Logic Guide

Texas Instruments

www.ti.com/logic

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Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
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Introduction

As the world leader in logic, Texas Instruments (TI) offers a full spectrum of logic functions and technologies ranging from the mature bipolar and bipolar complementary metal-oxide semiconductor (BiCMOS) families to the latest advanced CMOS families. TI offers process technologies with the logic performance and features needed in today's electronic markets while maintaining support for traditional logic products.

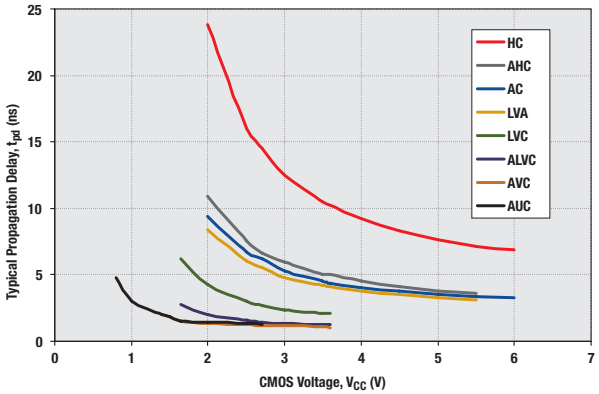
TI's product offerings include the following process technologies or device families:

- AC, ACT, AHC, AHCT, ALVC, AUC, AUP, AVC, FCT, HC, HCT, LV-A, LV-AT, LVC, TVC
- ABT, ABTE, ALB, ALVT, BCT, HSTL, LVT
- BTA, CB3Q, CB3T, CBT, CBT-C, CBTLV, FB, FIFOs, GTL, GTLP, JTAG, I_2C, VME
- ALS, AS, F, LS, S, TTL

Some logic families have been in the marketplace for years, the oldest well into its fourth decade. The "Logic Migration Overview" section gives logic users a visual guide to migration from the older to the newer technologies.

Today's applications are evolving with greater functionality and smaller size. TI's goal is to help designers easily find the ideal logic technology or function they need. By offering logic families at every price/performance node along with benchmark delivery, reliability and worldwide support, TI maintains a firm commitment to remain in the market with both leading-edge and mature logic lines. The "Product Index" section provides a snapshot of TI's extensive portfolio by function versus technology. The "Functional Cross-Reference" section shows the portfolio by device (type number) versus technology.

Figure 1. CMOS Voltage vs. Speed



Comparison of 16245 functions with 500-Ω/30-pF load.

Logic suppliers have historically focused on speed and low power as the priorities for product family improvement. As shown in Figure 1, fast performance is offered by many new TI product technologies such as AUC (1.8 V), ALVC (3.3 V) and LV-A (5 V), depending on operating voltage requirements. Other technologies such as AUP focus on delivering "best-in-class" low-power performance.

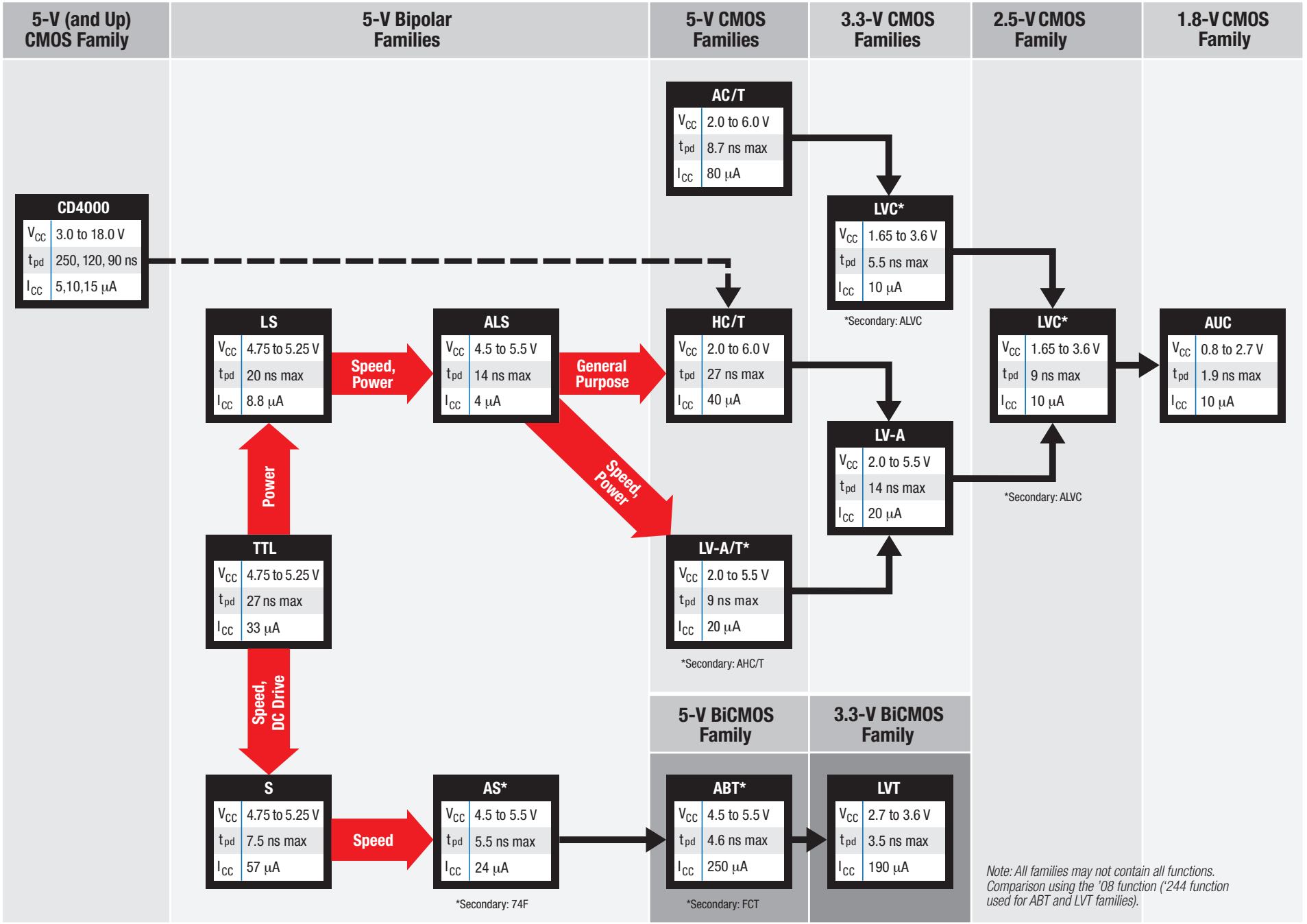
The "Packaging and Marking Information" section shows the wide variety of packaging options offered by TI. Included are advanced surface-mount packages like fine-pitch, small-outline ball-grid-array (BGA) packages, quad flat no-lead (QFN) packages for gates and octals, and WCSP (NanoFree™) packages for single-, dual- and triple-gate functions.

The "Resources" section provides additional information about TI logic families, including a list of technical literature and an overview of alternate sources for most logic families.

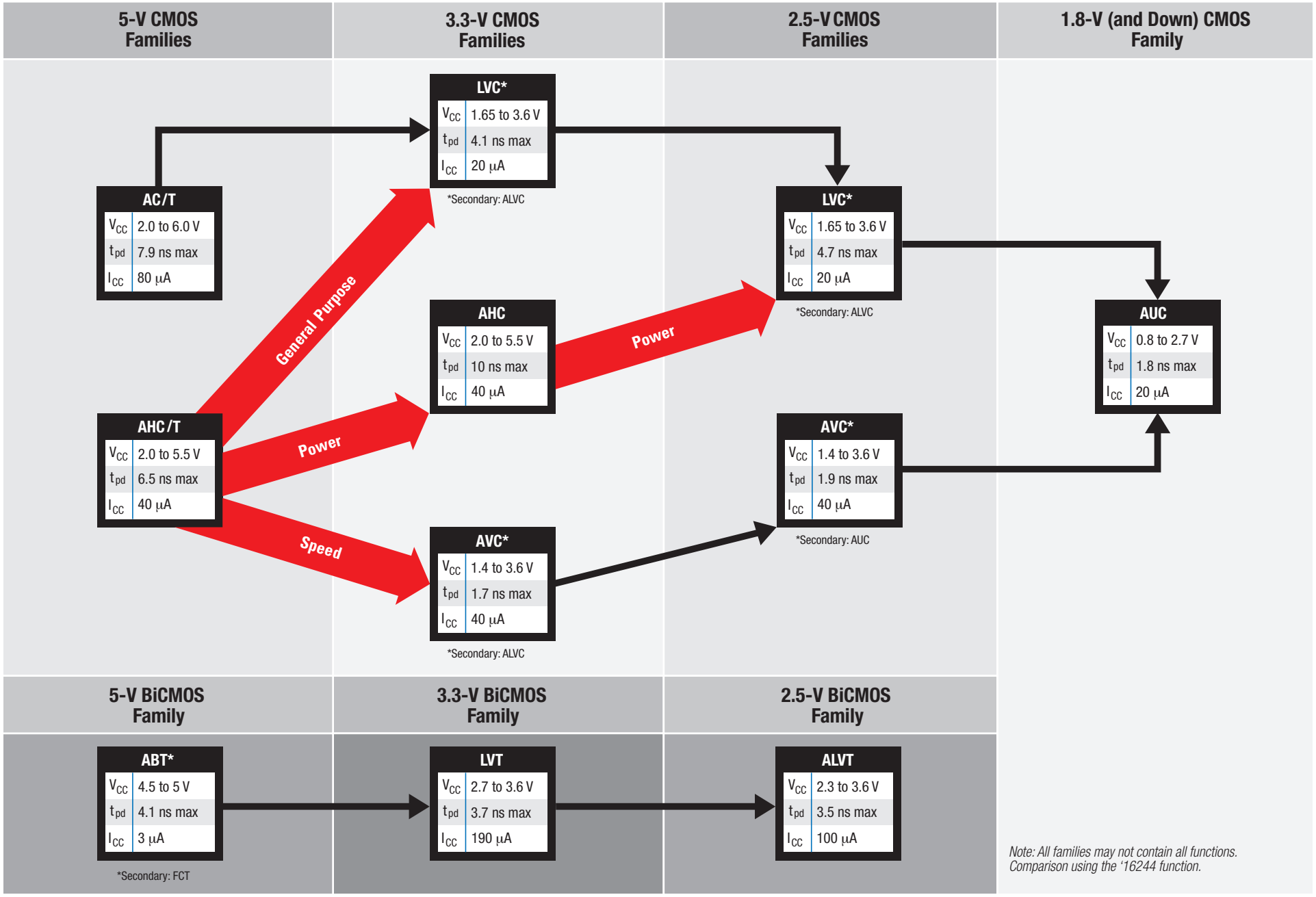
Data sheets can be downloaded from the TI Web site at **www.ti.com** or ordered through your local sales office or TI authorized distributor. (See back cover.)

Contents

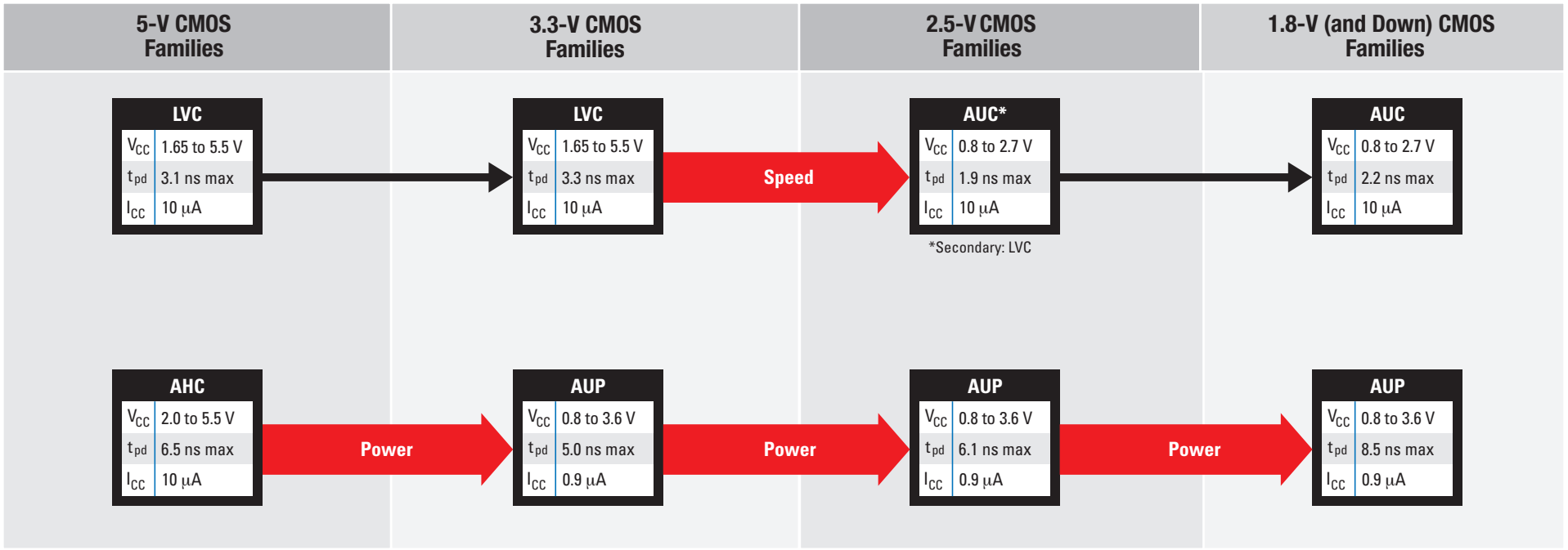
Gates and Octals



Widebus and Widebus+



Little Logic Family



Note: All families may not contain all functions. Comparison using the '1G04 function.

Welcome to the World of TI Logic

5+ V Logic
ABT, AC/ACT, AHC/AHCT, ALS, AS, BCT, CBT, F, LV, LV-A, LS, S, TTL, CD40001, FCT2
[1]HARRIS now TI. [2]Cypress now TI.

3.3- V Logic
AC, AHC, ALB, ALVC, ALVT, AUP, AVC, CBLTV, LV, LV-A, LVC, LVT

0.8- V Logic
AUC, AUP

Specialty
BTL, ETL, GTL, GTLP, HSTL, SSTL, SSTV, TVC, VME

2.5- V Logic
ALVC, ALVT, AUC, AUP, AVC, CBTLV, LV, LV-A, LVC

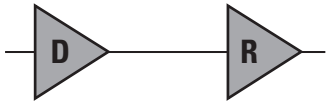
1.8- V Logic
ALVC, AUC, AUP, AVC, LVC

1.5- V Logic
AUC, AUP, AVC

1.2- V Logic
AUC, AUP, AVC

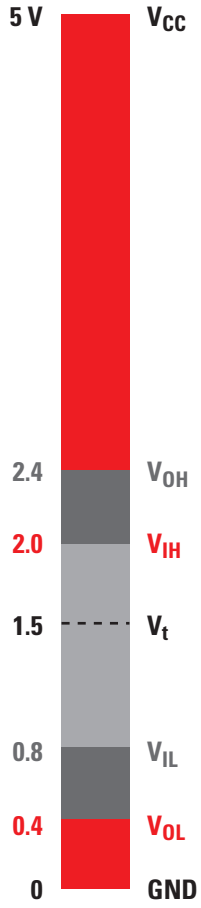
IC Basics: Comparison of Switching Standards

Is V_{OH} higher than V_{IH}?
Is V_{OL} less than V_{IL}?

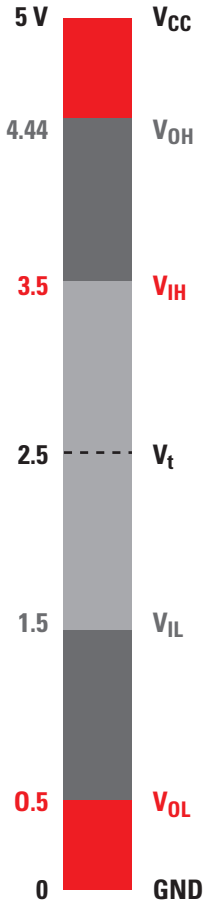


D \ R	5 TTL	5 CMOS	3 LVTTL	2.5 CMOS	1.8 CMOS
5 TTL	Yes	No	Yes*	Yes*	Yes*
5 CMOS	Yes	Yes	Yes*	Yes*	Yes*
3 LVTTL	Yes	No	Yes	Yes*	Yes*
2.5 CMOS	Yes	No	Yes	Yes	Yes*
1.8 CMOS	No	No	No	No	Yes*

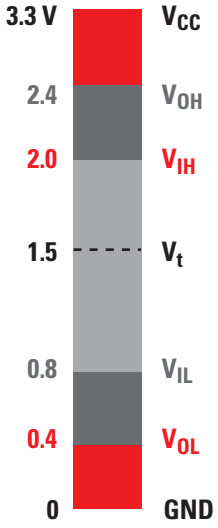
* Requires V_{IH} Tolerance



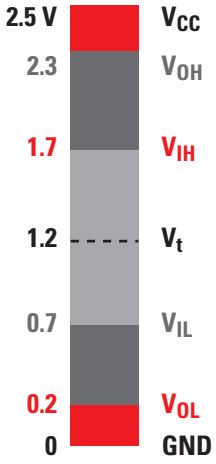
5-V TTL
Standard TTL: ABT,
AHCT, HCT, ACT, bipolar



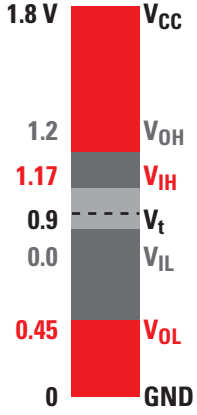
5-V CMOS
Rail-to-Rail 5 V
HC, AHC, AC, LV-A



3.3-V LVTTL
LVT, LVC, ALVC
AUP, LV-A, ALVT



2.5-V CMOS
AUC, AUP, AVC,
ALVC, LVC, ALVT

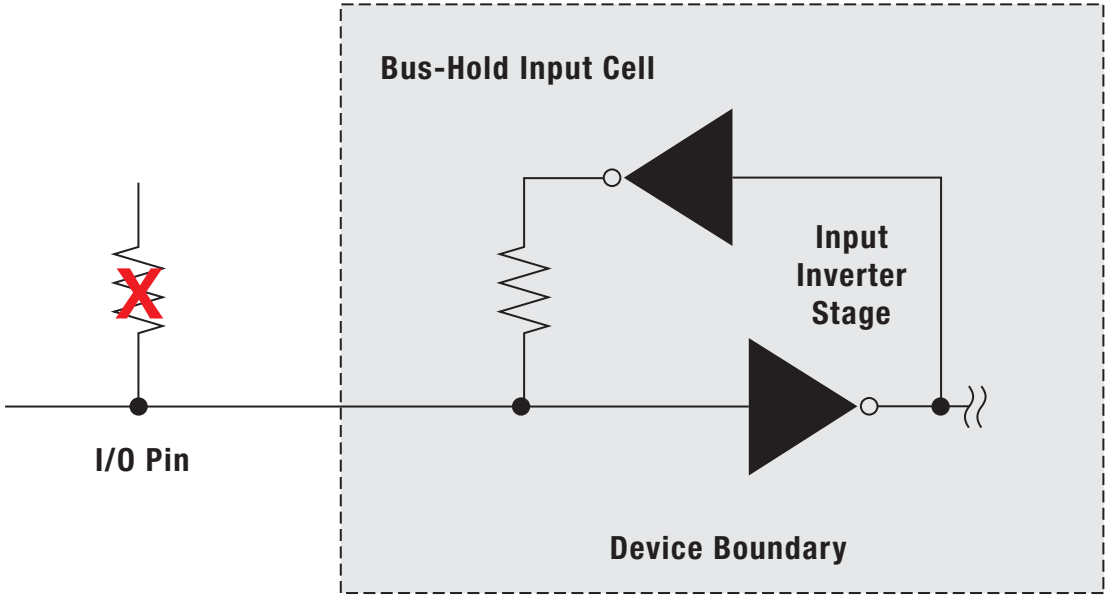


1.8-V CMOS
AUC, AUP, AVC,
ALVC, LVC

Bus-Hold Input

Key Features

- Holds the last known state of the input – avoids floating inputs
- $I_{i(HOLD)}$ or I_{BHL} and I_{BHH} specifies minimum holding current
- Bus-hold current does **not** load down the driving output significantly at valid logic levels
- Eliminates the need for external resistors on unused or floating input/output pins
- The “H” in the device name indicates bus hold
- Negligible increase in system power consumption
- Bus-hold input cell replaces pull-up resistor



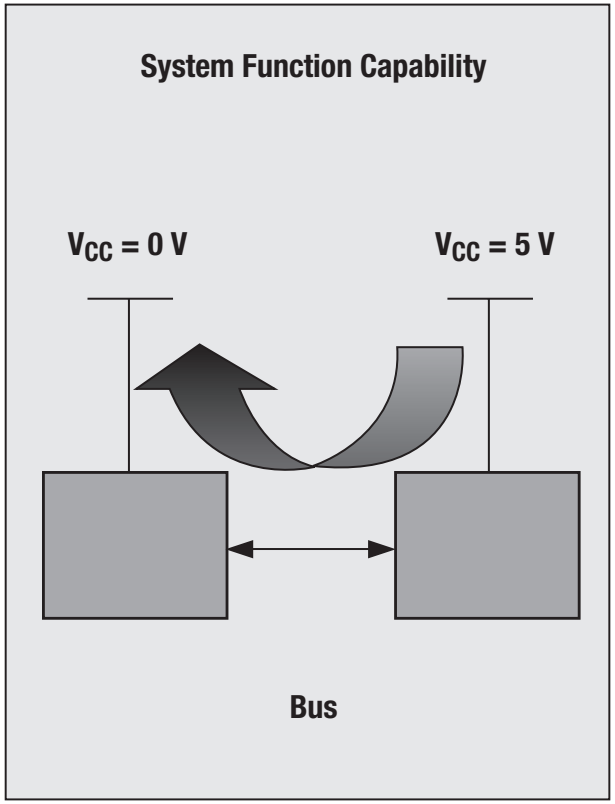
Families with Bus-Hold Options

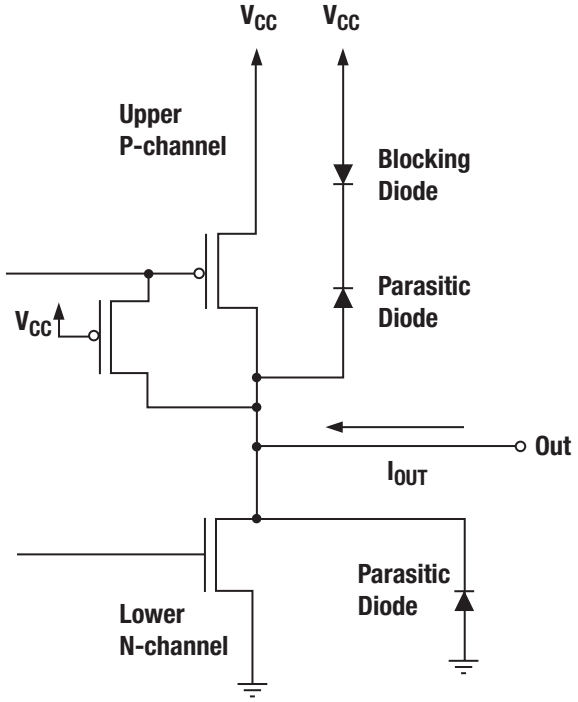
ABT, ALVC, ALVT, AVC, AUC, FCT, GTL, CTLP, LVC, LVT, VME

Partial Power Down Live Insertion, Level 1

Key Features

- Prevents unexpected device behavior during power up or power down
- Prevents signals from sourcing current through parasitic diodes
- Allows for power down of partial circuits within a system
- I_{off} spec is required for partial power-down operations





When $V_{CC} = 0$, $I_{OUT} = 0$ for $V_{OUT} > V_{CC}$

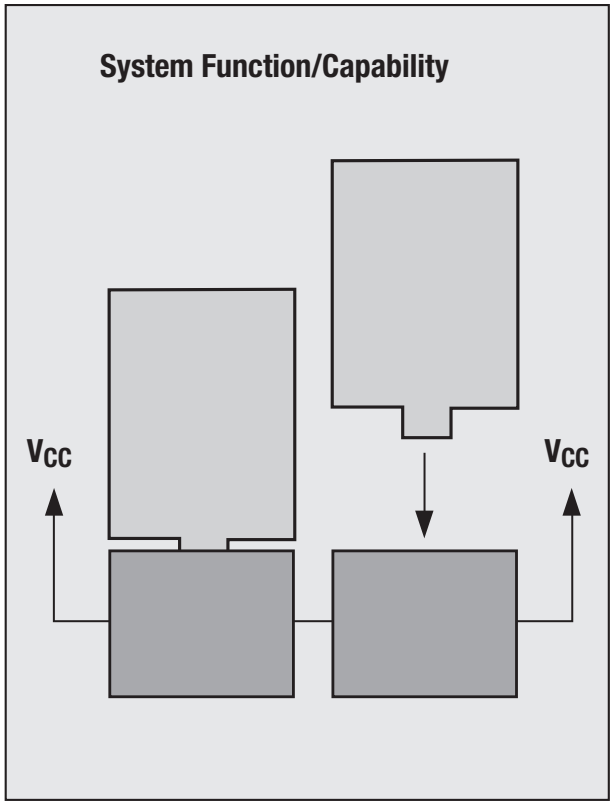
Families Supporting Partial Power Down (I_{off})

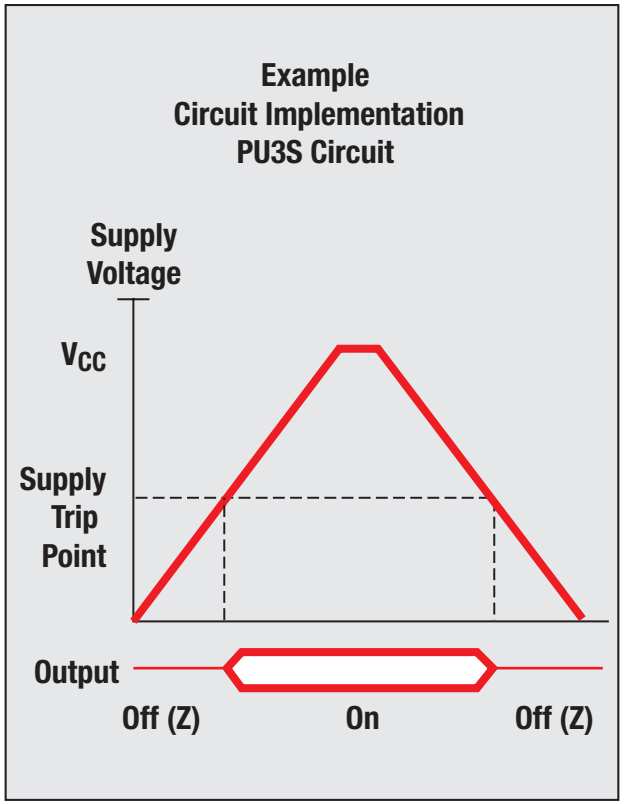
ABT, ALVT, AVC, AUC, AUP, CBTLV, CBT-C, GTL, GTLP, LV-A, LVC, LVT, VME

Hot Insertion, Live Insertion, Level 2

Key Features

- Prevents unwanted turn-on of output before V_{CC} trip point
- Prevents bus from loading down upon device power up
- Allows for hot insertion
- I_{off} and PU3S specs are required for hot insertion





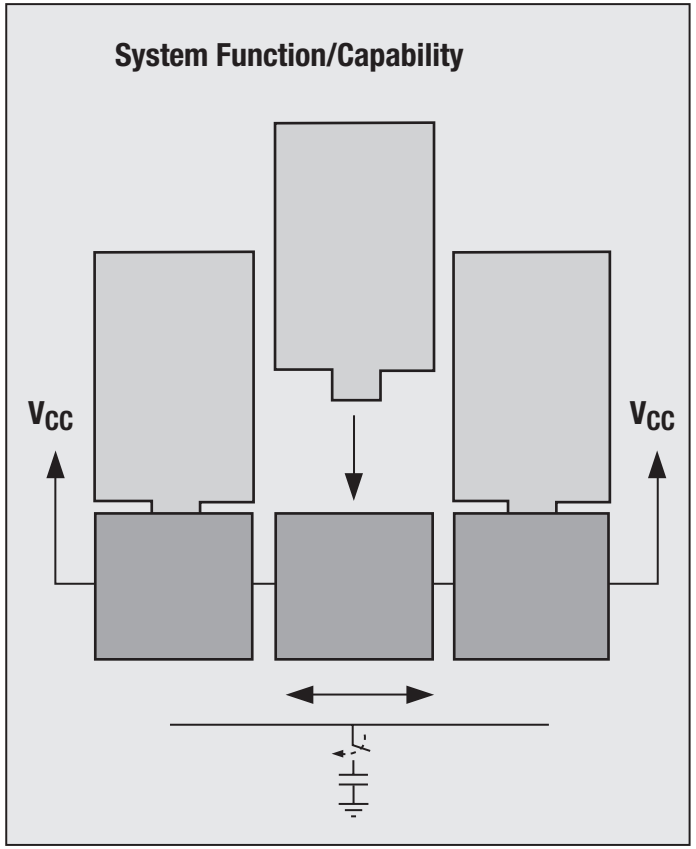
Families Supporting Hot Insertion (I_{off} and Power-up 3-state)

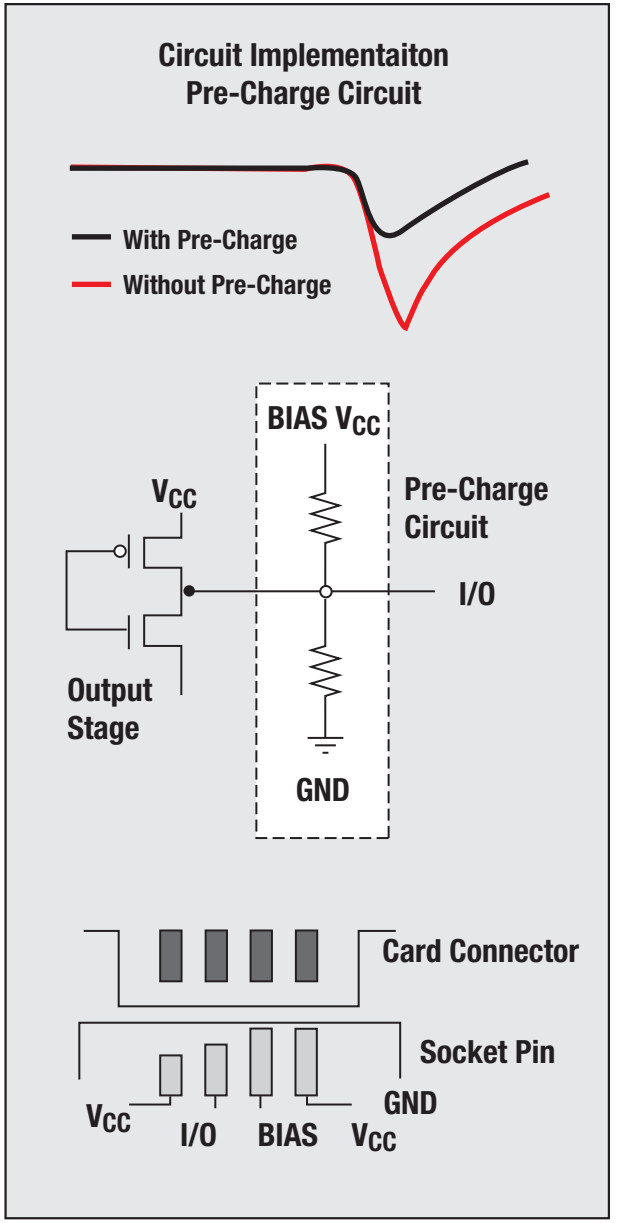
ABT, ALVT, GTLP, LVCZ, LVT, VME

Live Insertion, Level 3

Key Features

- Prevents unwanted glitches at the I/O
- Allows for live insertion
- I_{off}, PU3S and BIAS V_{CC} required for live Insertion
- Staggered pins required pre-charge functionality





Families Supporting Live Insertion (I_{off}, Power-Up 3-state and BIAS V_{CC})

GTLP, FB, CBT, CBTLV, VME

AUC, The World's First 1.8-V Logic

Key Features

- 1.8-V optimized performance
- V_{CC} specified at 2.5 V, 1.8 V and 1.2 V
- 0.8 V typical
- Balanced drive
- 3.6-V I/O tolerance
- Bus-hold option
- I_{off} spec for partial power down
- ESD protection
- Low noise
- Alternate source agreements

Advanced Packaging

- **NanoFree™ package** - YZP
- **SOT 23** - DBV (Microgate)
- **SC-70** - DCK (PicoGate)
- **TSSOP** - PW and DGG
- **TVSOP** - DGV
- **LFBGA** - GKE, GKF
- **VFBGA** - ZKE, ZKF
- **VFBGA** - GQL
- **VFBGA** - ZQL
- **QFN** - RGY

AUC 1.8-V Devices

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74AUC1G00	1.8	–8/8	2.5
SN74AUC16244	1.8	–8/8	2.0

AUP, The Lowest Power Logic

Key Features

- Very low power consumption, high battery life
- Ideal for portable applications
- Excellent signal integrity
- Input hysteresis (250 mV typ at 3.3 V) allows for slow input transition
- Operating V_{CC}: 0.8 V to 3.6 V (optimized at 3.3 V)
- Best in class for speed-power optimization
- Balanced drive
- 3.6-V I/O tolerant
- I_{off} spec for partial power down
- ESD protection

Advanced Packaging

- **NanoStar™ package** - YZP
- **SOT 23** - DBV (Microgate)
- **SC-70** - DCK (PicoGate)
- **SSOP** - DCT
- **VSSOP** - DCU
- **WCSP** - YFP

AUP Low-Power Logic

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74AUP1G08	3.3	–4.0/4.0 (static)	4.3
	1.8	–1.9/1.9 (static)	8.2
	1.2	–1.1/1.1 (static)	15.6

ALVC Family

Key Features

- V_{CC} specified at 3.3 V, 2.5 V, and 1.8 V
- Balanced drive
- Bus-hold option
- Drive capability – 12/12 mA at 2.5 V
- Low noise
- Damping resistor options
- ESD protection

Advanced Packaging

- **SOIC** - D and DW
- **SSOP** - DB and DL
- **TSSOP** - DB, DCT and DL
- **TVSOP** - DGV
- **LFBGA** - GKE, GKF
- **LFBGA** - ZKE, ZKF
- **VFBGA** - GQL
- **VFBGA** - ZQL
- **VSSOP** - DCU
- **UQFN** - DRY
- **SOT** - DRL
- **WCSP** - YZV

Literature

- ALVC Low-Voltage CMOS Logic Data Book
  Lit No. SCED006

Alternate Sources

- ALVC: NXP, Hitachi, IDT
- VCX: Fairchild, ON, Toshiba

ALVCH Bus-Hold Devices

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74ALVCH24	3.3	–24/24	2.8
SN74ALVCH1624	3.3	–24/24	3.0

AVC Family

Key Features

- V_{CC} specified at 3.3 V, 2.5 V and 1.8 V
- 3.3-V I/O tolerance
- Sub-2.0-ns max T_{pd} at 2.5 V
- Bus-hold option
- I_{off} for partial power down
- Dynamic output control (DOC™ circuit)

Advanced Packaging

- **SOIC** - DW
- **TSSOP** - PW, DGG
- **TVSOP** - DGV
- **LFBGA** - GKE, GKF
- **LFBGA** - ZKE, ZKF
- **VFBGA** - GQL
- **VFBGA** - ZQL

AVC 1.7-ns Devices

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74AVC16244	3.3	–12/12 (static)	1.7
	2.5	–8/8 (static)	1.9
	1.8	–4/4 (static)	3.2

LVC Family

Key Features
- V_{CC} specified at 3.3 V, 2.5 V and 1.8 V
- Balanced drive
- 5-V I/O tolerance
- Bus-hold option
- Series damping resistor option
- I_{off} spec for partial power down
- ESD protection
- LVCZ has power-up 3-state for hot insertion

LVC1G/2G/3G Family
- Vcc of 1.65 V-5.5 V
- Supports 5-V V_{CC} operation
- Inputs accept voltages to 5.5 V
- I_{off} supports partial-power-down mode operation

Advanced Packaging
- **NanoFree™ package** - YZP
- **SOT 23** - DBV (Microgate)
- **SC-70** - DCK (PicoGate)
- **SOIC** - D and DW
- **SSOP** - DB and DL
- **TSSOP** - PW and DGG
- **TVSOP** - DGV
- **LFBGA** - GKE, GKF
- **LFBGA** - ZKE, ZKF
- **VFBGA** - GQL
- **VFBGA** - ZQL
- **QFN** - RGY
- **SSOP** - DCT
- **VSSOP** - DCU
- **UQFN** - DRY
- **SOT** - DRL
- **WCSP** - YZV

Literature
- LVC Low-Voltage CMOS Logic Data Book Lit No. SCBD152
- LVC Designers Guide Application Report Lit No. SDZAE16

Alternate Sources
- LVC: NXP, Hitachi, IDT
- LCX: Fairchild, Motorola, Toshiba

LVCH Bus-Hold Devices

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74LVCH244	3.3	–24/24	5.9
SN74LVCH16244	3.3	–24/24	4.1

LV-A Family

Key Features
- V_{CC} specified at 5.0 V, 3.3 V, and 2.5 V
- Balanced drive
- 5-V I/O tolerance
- Bus-hold option
- I_{off} spec for partial power down
- ESD protection
- Low noise

Advanced Packaging
- **SOIC** - D, DW
- **SOP** - NS
- **SSOP** - DB
- **TSSOP** - PW, DGG
- **TVSOP** - DGV
- **QFN** - RGY, RGQ

Literature
- LV Low-Voltage CMOS Logic Data Book
  Lit No. SCBD152

Alternate Sources
- LV: Philips, Hitachi
- LVQ: Fairchild, ON, Toshiba
- LVX: Fairchild, ON

LV-A Family

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74LV244A	5.0	–16/16	6.5
	3.3	–8/8	10.0

LVT Family

Key Features

- V_{CC} specified at 3.3 V
- High-drive output: up to 64 mA
- 5-V I/O tolerance
- Bus-hold option
- Partial power down (I_{off})
- Power-up 3-state (I_{OZPU}, I_{OZPD})
- Hot insertion (I_{off} and PU3S)
- Low noise
- Damping resistor options

Advanced Packaging

- **SOIC** - DW
- **SSOP** - DB and DL
- **TSSOP** - PW and DGG
- **TVSOP** - DGV
- **LFBGA** - GKE and GKF
- **LFBGA** - ZKE and ZKF
- **VFBGA** - GQL
- **VFBGA** - ZQL

Literature

- LVT Low-Voltage Technology Data Book
  Lit No. SCBD154
- LVT-to-LVTH Conversion Application Report
  On the Internet

Alternate Sources

- LVT: Philips, Hitachi, Fairchild*, ON*

** Similar Device; No Second-Source Agreement*

LVTH Bus-Hold Devices

Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74LVTH244	3.3	–32/64	3.5
SN74LVTH16244	3.3	–32/64	3.2

ALVT Family

Key Features

- V_{CC} specified at 3.3 V and 2.5 V
- High-drive output: up to 64 mA
- 5-V I/O tolerance
- Power-up 3-state (I_{OZPU}, I_{OZPD})
- Partial power down (I_{off})
- Hot insertion (I_{off} and PU3S)
- Bus hold

Advanced Packaging

- **SSOP** - DL
- **TSSOP** - DGG
- **TVSOP** - DGV
- **LFBGA** - GKE and GKF
- **LFBGA** - GKE and GKF
- **VFBGA** - GQL
- **VFBGA** - ZQL

Literature

- ALVT Low-Voltage Technology Data Book
  Lit No. SCED003

Second Source

- ALVT: Philips

ALVTH Bus-Hold Device

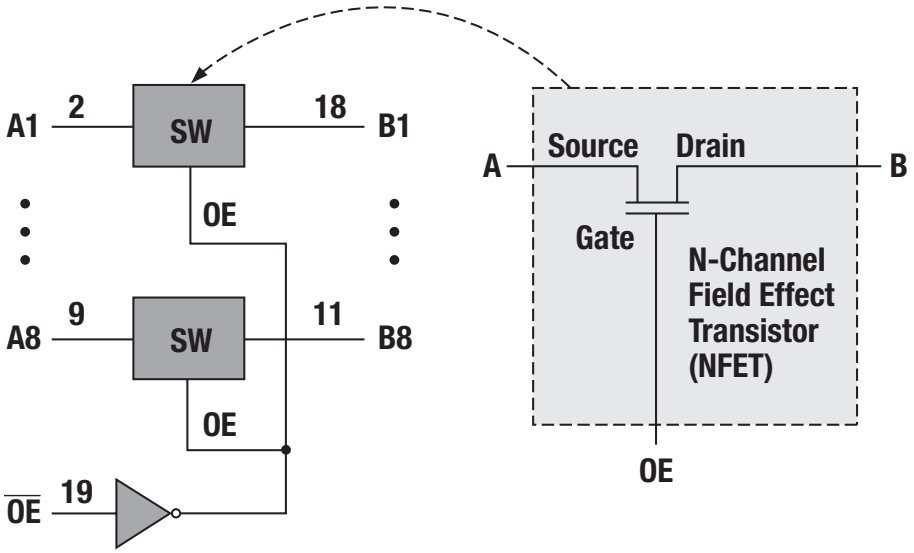
Device	V_{CC} (V)	Drive (mA)	$T_{PD(MAX)}$ (ns)
SN74ALVTH16244	3.3	–32/64	2.4
	2.5	–8/24	3.0

Digital Bus Switch: CBT

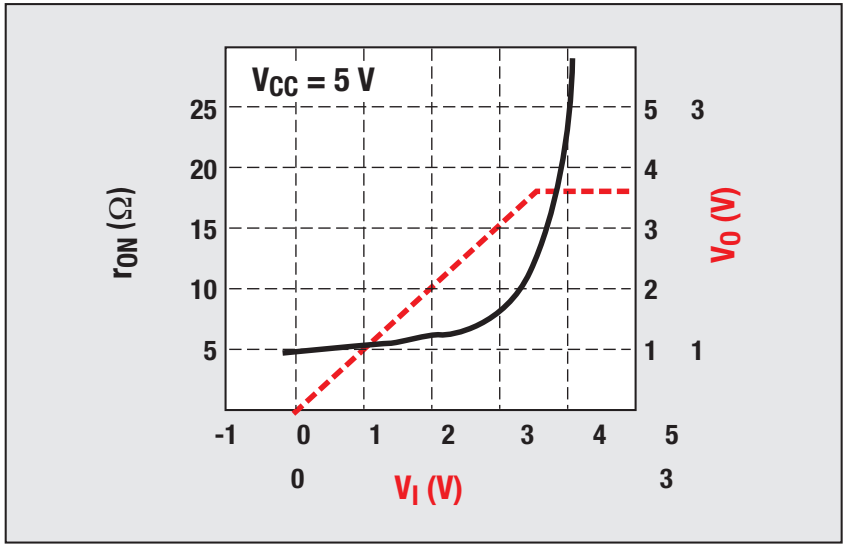
CBT: 5-V General-Purpose Bus Switch Family

- NMOS switch uses NFET
- Supports 5-V operation (V_{CC} = 4 V-5.5 V)
- Switch ON when positive signal applied at gate (/OE low)
- Switch OFF when low signal applied at gate (/OE high)
- Bi-directional operation (source and drain interchangeable)
- CBTD = NMOS switch configured as level shifter with level-shifting diode
- CBTR features series damping resistors for improved noise control

CBT3245 Logic Diagram



CBT V_{IN}/V_{OUT} Graph

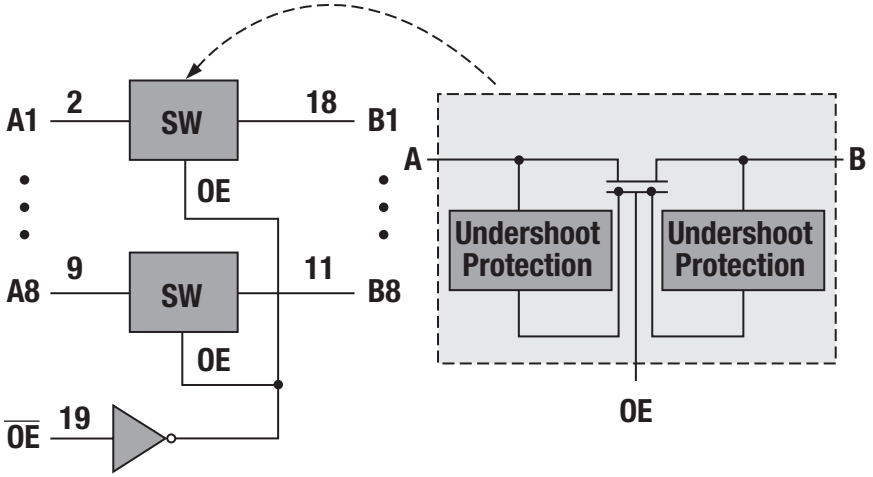


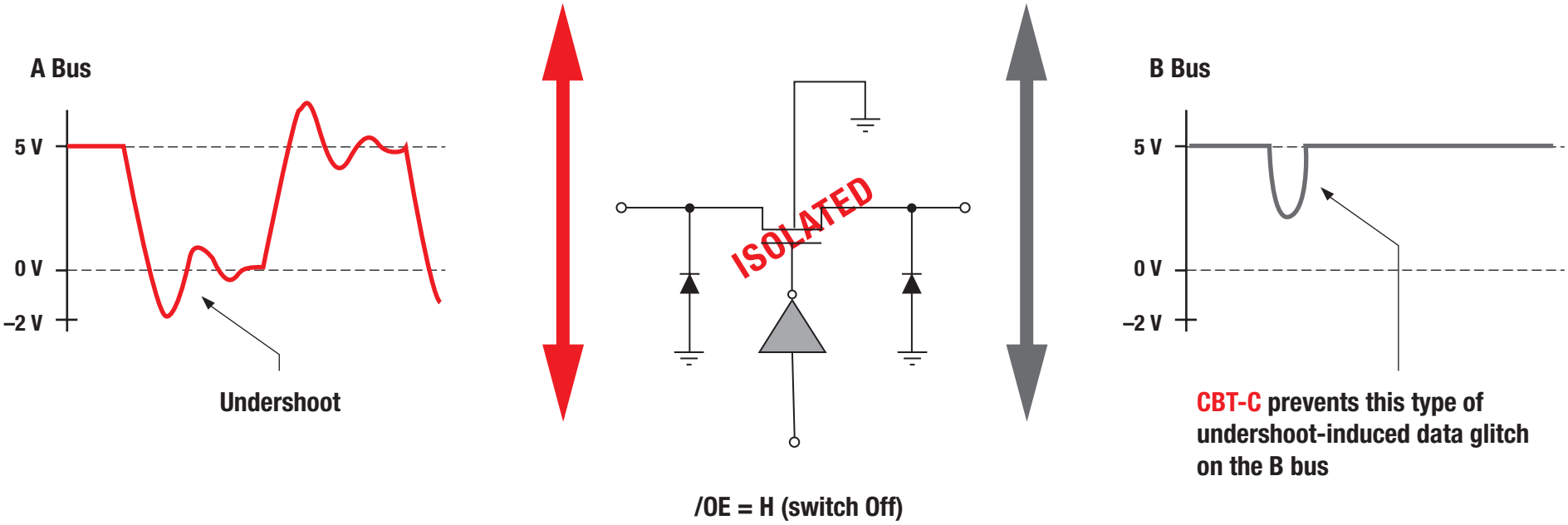
Digital Bus Switch: CBT-C

CBT-C: Improved 5-V General-Purpose Bus Switch Family

- Active undershoot protection circuitry provides protection down to –2 V
- I_{off} supports partial power-down mode operation
- Enhanced performance vs. CBT family (faster Ten/Tdis, lower r_{on})
- Improved ESD protection; 2-KV HBM, 1-KV CDM

CBT3245 Logic Diagram





/OE = H (switch Off)

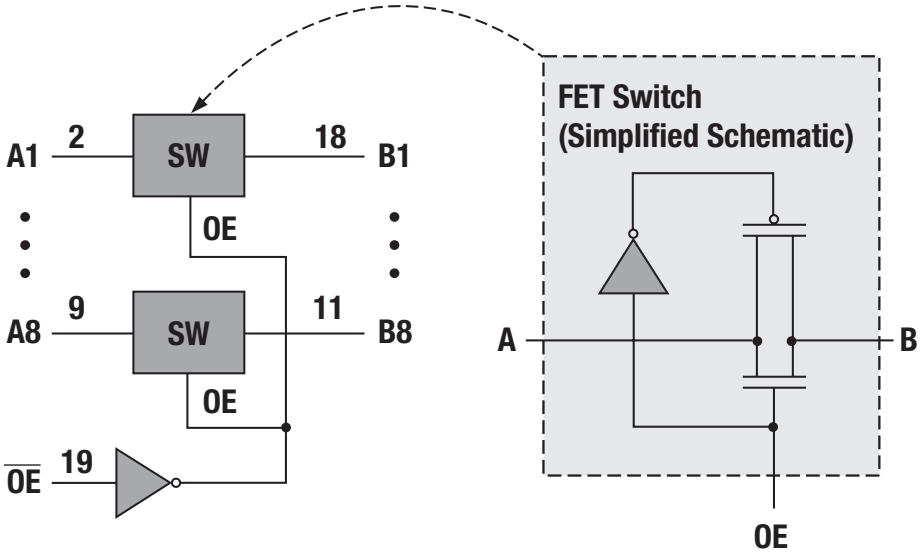
CBT-C prevents this type of undershoot-induced data glitch on the B bus

Digital Bus Switch: CBTLV

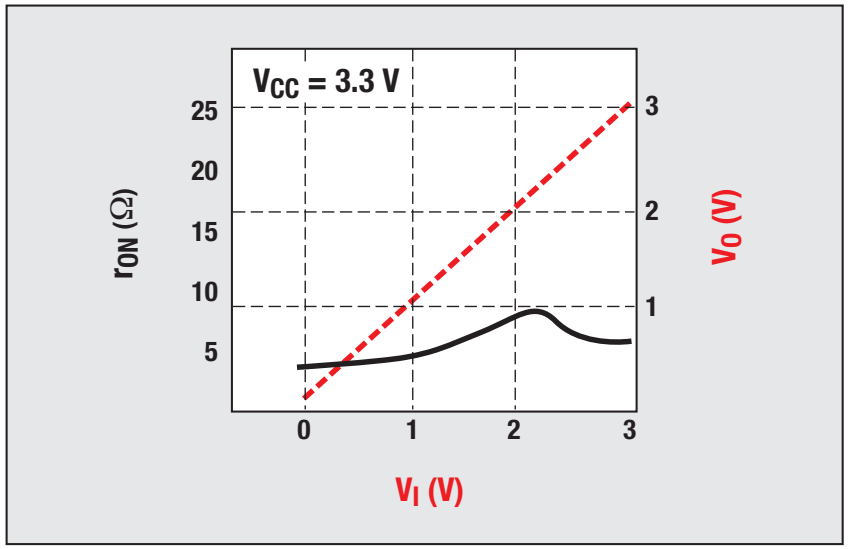
CBTLV: 3.3-V/2.5-V General-Purpose Bus Switch Family

- CMOS switch consisting of an NFET and PFET in parallel
- Supports 3.3-V/2.5-V operation (V_{CC} = 2.3-V to 3.6-V)
- Switch ON when positive signal applied at NFET gate and low signal applied at the PFET gate (/OE low)
- Switch OFF when low signal applied at NFET gate and positive signal applied at PFET gate (/OE high)
- Bidirectional operation (source and drain interchangeable)
- Offers rail-to-rail I/O (RRIO) signal transmission (no voltage clamping)

CBT3245 Logic Diagram



CBTLV V_{IN}/V_{OUT} Graph

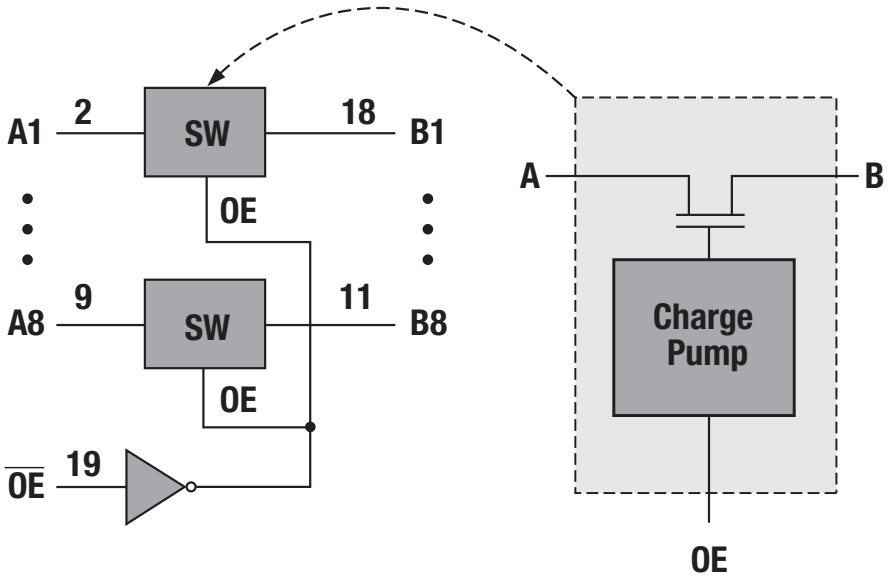


Digital Bus Switch: CB3Q

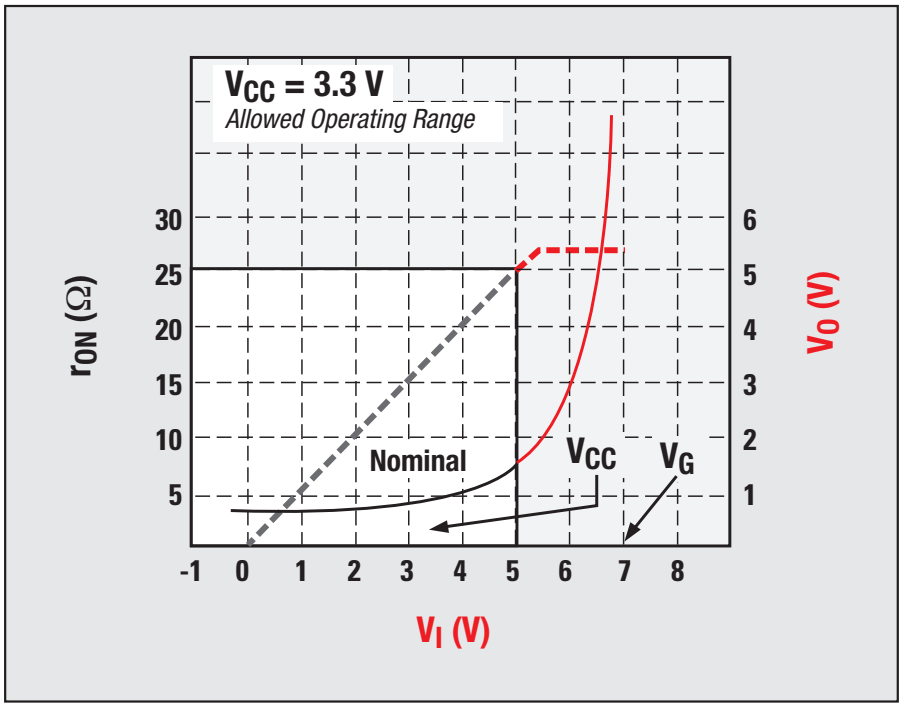
CB3Q: High-Bandwidth Bus Switch Family

- High-bandwidth data path (up to 500 MHz)
- Provides low and flat on-state resistance (r_{on}) characteristics
- Supports rail-to-rRail I/O (RRIO) switching from 0-V to 5-V
- V_{CC} operating range from 2.3-V to 3.6-V
- Ideal for broadband communications and networking systems
- Equivalent to IDTQS3VH HotSwitch line of IDT QuickSwitch products

CB3Q3245 Logic Diagram



CB3Q V_{IN}/V_{OUT} Graph

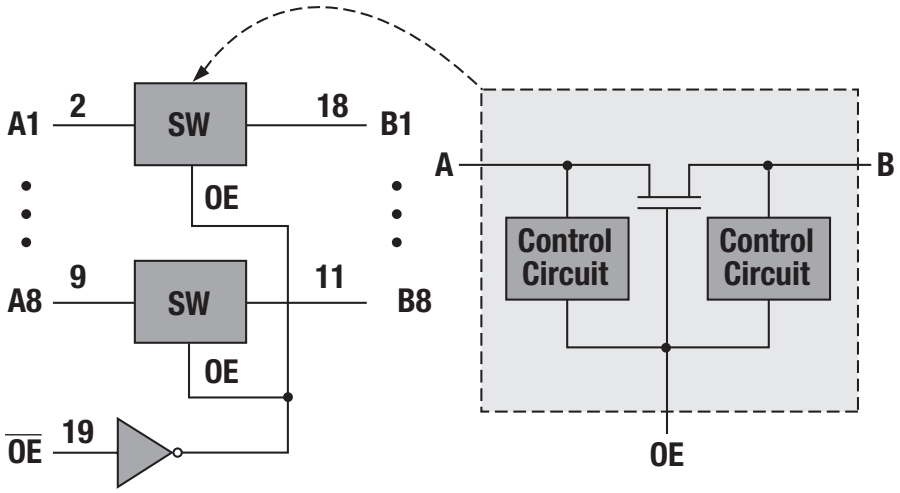


Digital Bus Switch: CB3T

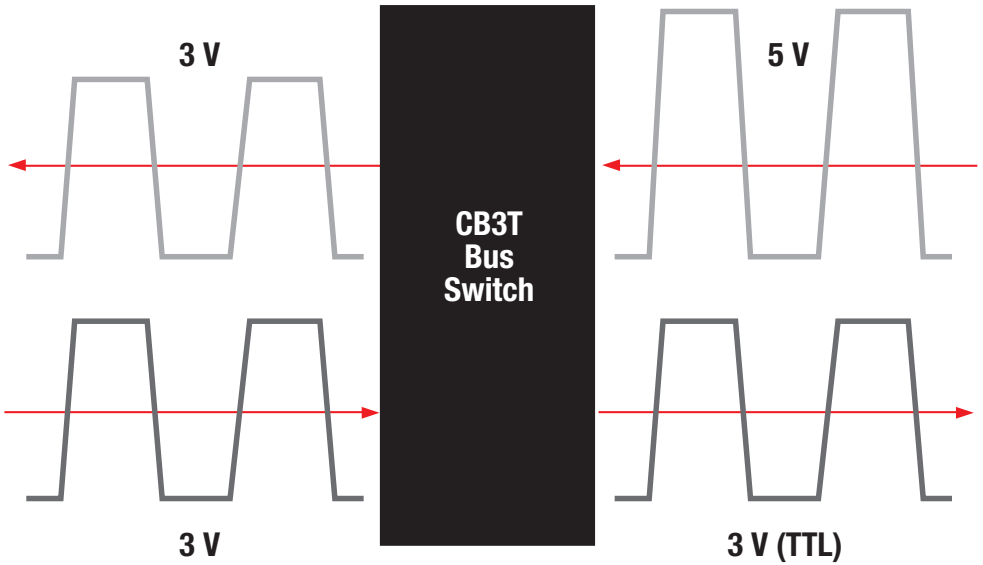
CB3T: Low-Voltage Translator Bus Switch Family

- Output voltage translation tracks V_{CC}
  - 5-V input to 3.3-V output level shift with V_{CC} = 3.3-V
  - 5-V/3.3 V input to 2.5-V output level shift with V_{CC} = 2.5-V
- Fully supports mixed-mode signal operation (2.5-V, 3.3-V and 5-V environments)
- V_{CC} operating range from 2.3-V to 3.6-V
- Low I_{CC} ideal for notebooks, PDAs, cell phones and digital cameras

CB3T3245 Logic Diagram

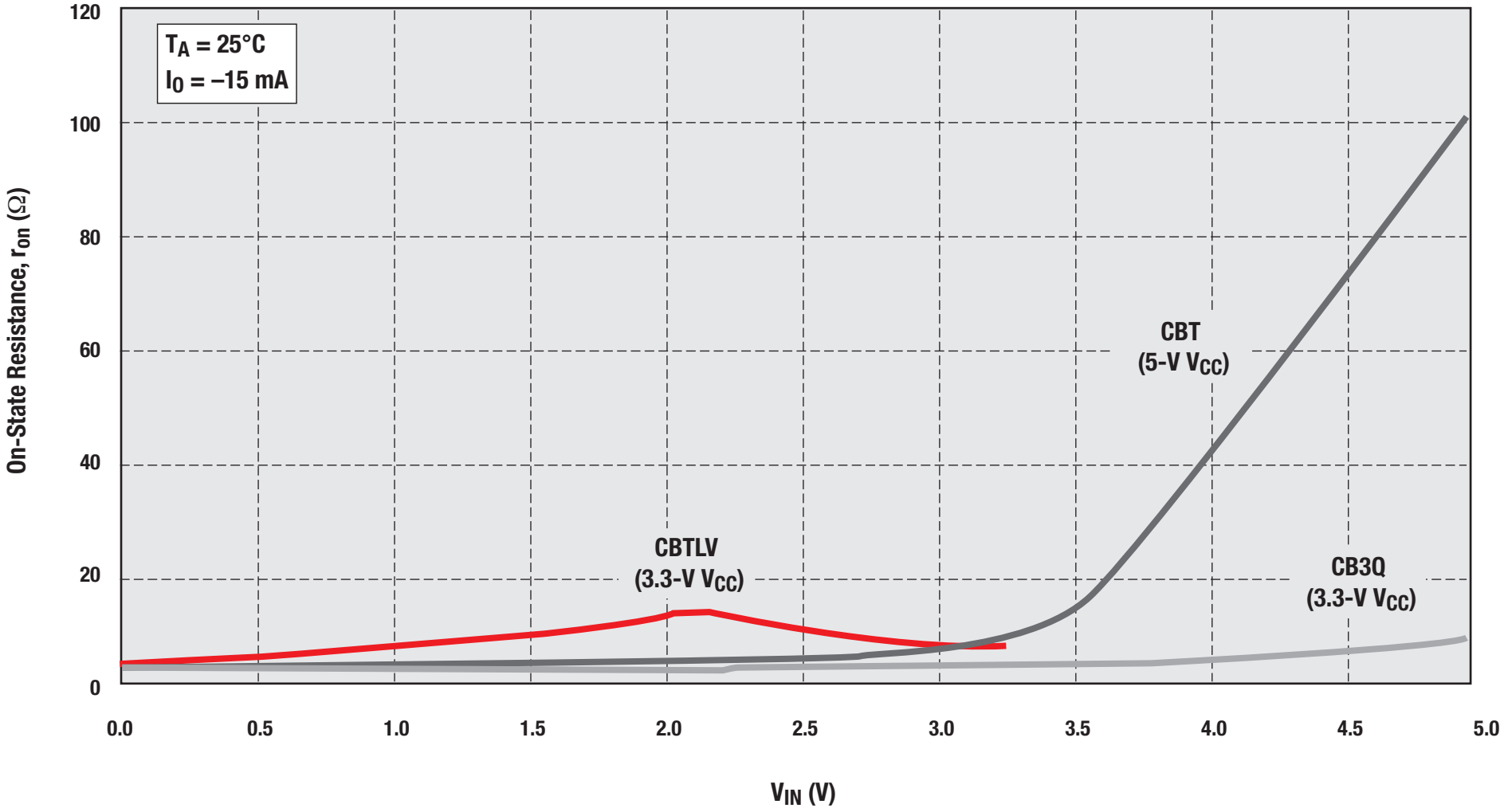


Mix-Mode Signal Operation



Digital Bus Switch: r_{on} Characteristics

Comparison of Typical r_{on} vs. V_{IN} for the CBT, CBTLV and CB3Q Bus Switch Families



Translation Voltage Clamp (TVC)

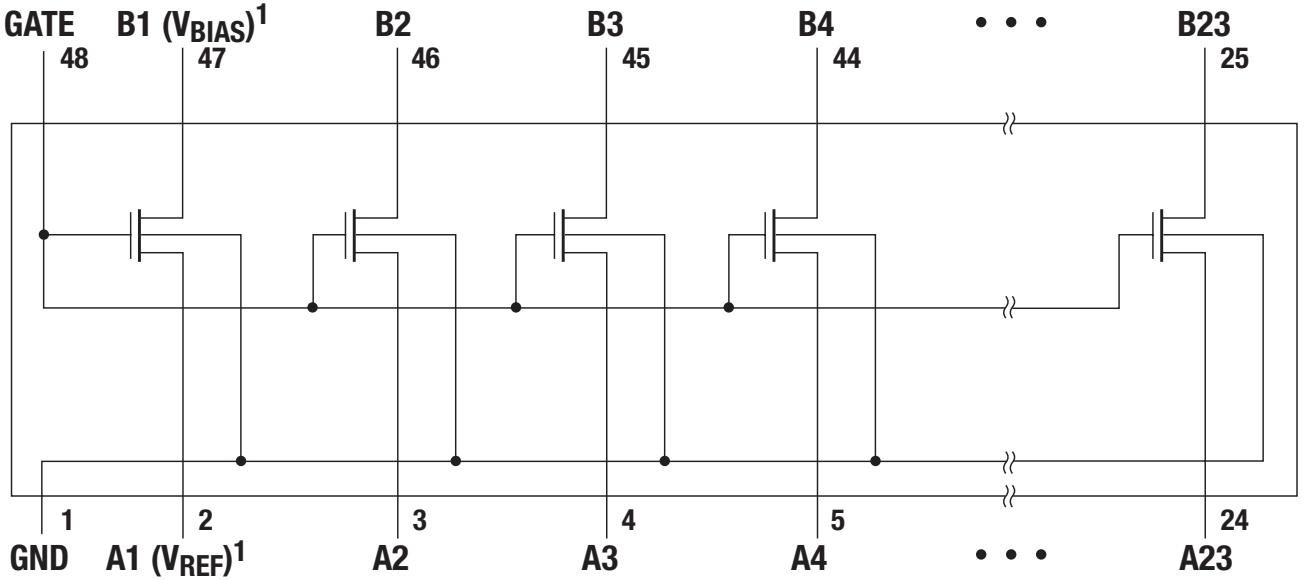
Key Features

- Overshoot protection
- Voltage translator or voltage clamp
- Abs 7-V to –0.5-V

TVC Devices

Device	Bit
TVC3306	2
TVC3010	10
TVC16222A	22

Logic Diagram (Positive Logic)



GLTP and VME

GTLP and VME are specifically designed for high-performance multi-slot parallel backplanes.

GTLP

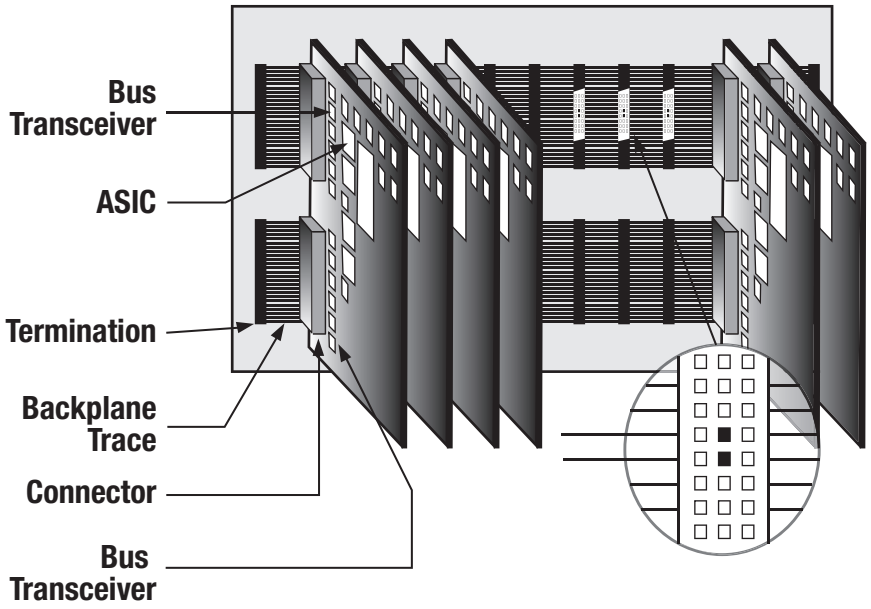
- Open-drain technology
- Allows high frequencies (up to 100-MHz clock)
- Standard pinouts allow ease of migration from standard logic
- Improved signal integrity over standard logic

VME

- Push-pull output structure
- Transmits data at 40 Mbps on legacy termination topologies
- Backward-compatible to existing VME backplane
- Reduced input threshold for greater noise immunity

Applications

- Mass storage
- ISDN remote access
- Internet routers
- ATM switches
- Wireless base stations
- Flight equipment
- Industrial controls
- Aerospace
- Transportation
- Medical
- Instrumentation systems



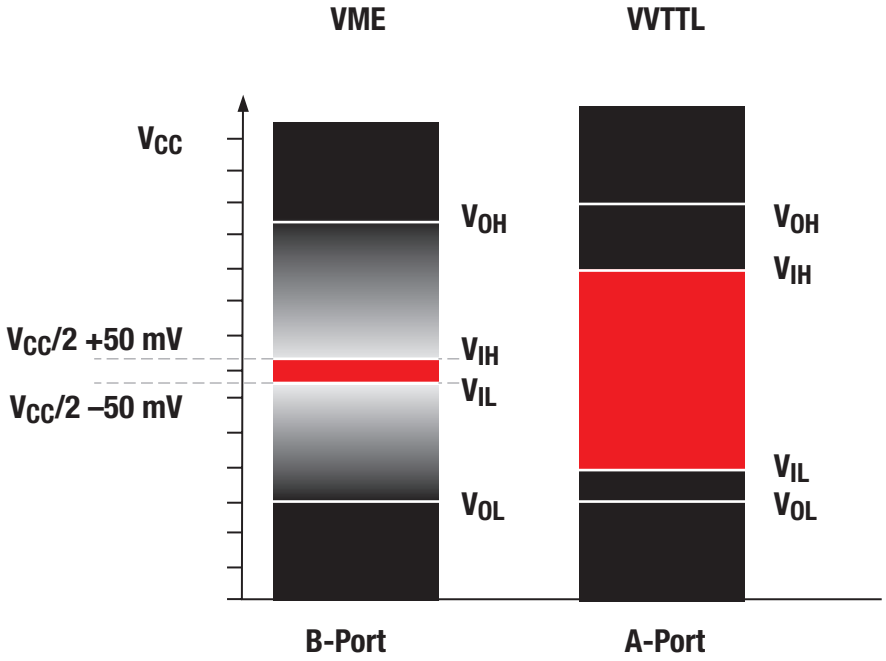
SN74VMEH22501/A UBT: The VME-Compatible Device for Low-Voltage Environments

Benefits

- Extends life of VME-characteristic bus
- Supports 2eVME and 2eSST protocols (VITA1.5)
- Increased noise immunity
- Supports transparent, latched or clocked mode
- 5-V tolerance at both ports
- Full live insertion capability with pre-charge
- Bus-hold and series resistors on A-port
- Up to 320 Mbps on standard VME backplane and up to 1 Gbps on VME320 (star topology)
- VMEH22501: 0 to 85°C
- VMEH22501A: –40 to 85°C

Characteristics

- Tighter input threshold (V_{CC}/2 ±50 mV)
- –48/64 mA drive capability
- Huge AC pull-up/down drive capability to drive backplanes (slow edge rates)
- BIAS-V_{CC} used to control pre-charge during live insertion



Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Inverting Buffers ans Drivers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																				
			ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AUP	BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LVC	LVT	S	TTL
Single Buffers/Drivers	OD	1G06										✔	✔									✔			
	3S	1G240										✔	✔									✔			
Single Inverters	PP	1G04				✔	✔					✔	✔									✔			
Single Schmitt-Trigger Inverters	PP	1G14				✔	✔					✔										✔			
Unbuffered Single Inverters	PP	1GU04				✔						✔										✔			
Dual Buffers/Drivers	3S	2G06										✔										✔			
		2G240										✔										✔			
Dual Inverters	PP	2G04										✔										✔			
		2GU04																				✔			
Dual Schmitt-Trigger Inverters	PP	2G14																				✔			
Triple Bufers/Drivers	OD	3G06																				✔			
Triple Inverters	PP	3G04																				✔			
Triple Schmitt-Trigger Inverters	PP	3G14																				✔			
Unbuffered Triple Inverters	PP	3GU04																				✔			
Hex Buffers/Drivers	OC	06																		✔					✔
	OD	06										✔									✔	✔			
	OC	16																							✔
	3S	366																✔							
		368																✔	✔	✔					
	OC	1005						✔																	
Hex Buffers/Converters	PP	4009													✔										
Hex Buffers/Converters	PP	4049													✔			✔							
Hex Drivers	PP	**1004**						✔			✔														

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Inverting Buffers and Drivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																					
			ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AUP	BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LVC	LVT	S	TTL
Hex Inverters	PP	04		✔	✔	✔	✔	✔	✔		✔	✔				✔		✔	✔	✔	✔	✔		✔	✔
	CP	11004		✔	✔																				
	OC	05						✔												✔				✔	✔
	OD	05		✔	✔	✔												✔			✔				
	OC	1005						✔																	
	PP	4069													✔										
Hex Schmitt-Trigger Buffers/Drivers	PP	40106													✔										
Hex Schmitt-Trigger Inverters	PP	14		✔	✔	✔	✔		✔			✔						✔	✔	✔	✔	✔			✔
		19																		✔					
Strobed Hex Inverters/Buffers	3S	4502													✔										
Unbuffered Hex Inverters	PP	U04				✔						✔						✔			✔	✔			
Octal Buffers/Drivers	3S	240	✔	✔	✔	✔	✔	✔			✔	✔		✔		✔		✔	✔	✔	✔	✔	✔	✔	
		11240		✔	✔																				
		540	✔	✔	✔	✔	✔	✔						✔			✔	✔	✔	✔	✔	✔	✔		
	OC	756									✔			✔											
Octal Buffers and Line/MOS Drivers with Series Damping Resistors	3S	2240	✔											✔		✔									
Oscillator Drivers for Crystal Oscillator or Ceramic Resonator	PP	1404																				✔			
10-Bit Buffers/Drivers	3S	828																				✔			
		29828						✔																	
11-Bit Line/Memory Drivers	3S	5401	✔																						
12-Bit Line/Memory Drivers	3S	5403	✔																						
16 Bit Buffers/Drivers	3S	16240	✔		✔	✔	✔		✔	✔		✔					✔					✔	✔		
		16540	✔			✔	✔															✔			
16-Bit Buffers/Drivers with Series Damping Resistors	3S	162240															✔						✔		
32-Bit	3S	32240																				✔	✔		

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Noninverting Buffers and Drivers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																									
			ABT	AC	ACT	AHC	AH CT	ALB	ALS	AL VC	AL VT	AS	AUC	AUP	AVC	BCT	64 BCT	CD 4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S	TTL
Single Buffers		1G34												✔												✔			
Single Bus Buffers	OD	1G07											✔	✔												✔			
	PP	1G17											✔	✔												✔			
	3S	1G125				✔	✔						✔	✔												✔			
		1G126				✔	✔						✔	✔												✔			
Dual	PP	2G07											✔	+												✔			
Dual Bus Buffers	OD	2G17												+												✔			
	PP	2G34											✔	+												✔			
	3S	2G125											✔	✔												✔			
		2G126											✔	✔												✔			
		2G241											✔	+												✔			
Triple Buffers/ Drivers	OD	3G07												+												✔			
Triple Schmitt-Trigger Buffers	PP	3G17												+												✔			
Triple Buffers Gates	PP	3G34												+												✔			
Quad True/ Complement Buffers	PP	4041																✔											
Quad Bus Buffers	3S	125	✔			✔	✔			✔			✔			✔	✔		✔		✔	✔	✔	✔	✔	✔	✔		
		126	✔			✔	✔			✔			✔			✔	✔		✔		✔	✔	✔	✔		✔	✔		
Hex Buffers	PP	34											✔																
	OC	1035							✔																				
	3S	4503																✔											
Hex Buffers/ Converters	PP	4010																✔											
		4550																✔			✔								

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
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Noninverting Buffers and Drivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	AC	ACT	AHC	AH CT	ALB	ALS	AL VC	AL VT	AS	AUC	AUP	AVC	BCT	64 BCT	CD 4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S	TTL
Hex Buffers/ OC 07 Line Drivers	3S	365																			✔	✔	✔						
		367				✔	✔														✔	✔	✔	✔					✔
	OC	07																					✔						✔
	OD	07											✔											✔		✔			
	OC	17																											✔
		35							✔																				
Hex Schmitt-Trigger Buffers	PP	17											✔																
Hex Drivers	PP	1034							✔			✔																	
Octal	3S	241	✔	✔	✔				✔			✔				✔			✔		✔	✔	✔				✔	✔	
		244	✔	✔	✔	✔	✔		✔	✔		✔	✔			✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	
		1244							✔																				
	CP/3S	11244		✔	✔																								
	3S	541	✔	✔	✔	✔	✔		✔							✔			✔	✔	✔	✔	✔	✔	✔	✔	✔		
	OC	757										✔				✔	✔												
		760							✔			✔				✔													
Octal with Series Damping Resistors	3S	2244	✔													✔				✔						✔			
		25244														✔	✔												
Octal Buffers	3S	465																					✔						
Octal Buffers and Line/MOS Drivers with Series Damping Resistors	3S	2241	✔													✔													
Octal Line Drivers/ MOS Drivers	3S	2541							✔											✔									
10-Bit	3S	827	✔																	✔						✔			
		29827							✔							✔													
10-Bit with Series Damping Resistors	3S	2827	✔													✔				✔									

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Noninverting Buffers and Drivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AUP	AVC	BCT	64BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S	TTL
10-Bit Universal Schmitt-Trigger Buffers	3S	8151																					✔					
11-Bit Line/ Memory Drivers	3S	5400	✔																									
12-Bit Line/ Memory Drivers	3S	5402	✔																									
16-Bit	3S	16241	✔																							✔		
		16244	✔	✔	✔	✔	✔	✔		✔	✔		✔		✔					✔						✔	✔		
		16541	✔		✔	✔	✔																			✔	✔		
16-Bit with Series Damping Resistors	3S	162241																									✔		
		162244								✔	✔									✔						✔	✔		
		162541																									✔		
18-Bit	3S	16825	✔		✔					✔																			
18-Bit with Series Damping Resistors	3S	162825	✔																										
20-Bit	3S	16827	✔		✔					✔	✔				✔					✔									
20-Bit with Series Damping Resistors	3S	162827	✔							✔	✔									✔									
1-Bit to 2-Bit Address Drivers	3S	162830								✔																			
1-Bit to 4-Bit Address Drivers	3S	16344								✔																			
		162344								✔																			
1-Bit to 4-Bit Address Registers/ Drivers	3S	162831								✔																			
		162832								✔																			
1-Bit to 4-Bit Address Registers/Drivers with Series Damping Resistors	3S	162832								✔																			
32-Bit	3S	32244								✔	✔		✔													✔	✔		

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
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Noninverting Buffers and Drivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																									
			ABT	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AUP	AVC	BCT	64 BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S	TTL
32-Bit with Series Resistors	3S	322244																									✔		
4-Segment Liquid Crystal Display Drivers	PP	4054																✔											

Parity Transceivers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY				
			ABT	ACT	ALS	BCT	F
Octal with Parity Generators/Checkers	3S	657	✔				✔
8-Bit to 9-Bit	PP	833	✔				
		853	✔				
		29854			✔	✔	
Dual 8-Bit to 9-Bit	PP	16833	✔				
		16853	✔				
16-Bit with Parity Generators/Checkers	3s	16657	✔	✔			

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Registered Transceivers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY													
			ABT	AC	ACT	ALS	ALVC	AS	AVC	BCT	F	FCT	HC	HCT	LS	LVC	LVT
Octal	3S	52										✔					
		543	✔							✔	✔	✔				✔	✔
		11543			✔												
		646	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	✔
		648				✔		✔							✔		
		651	✔		✔	✔											
		652	✔	✔	✔	✔		✔		✔		✔	✔	✔	✔	✔	✔
		11652			✔												
	OC/3S	653				✔											
		654				✔											
Octal with Series Damping Resistors	3S	2543										✔					
		2646										✔					
		2652										✔					
		2952	✔													✔	✔
16-Bit	3S	16470	✔														
		16543	✔		✔		✔					✔				✔	✔
		162543										✔					
		16646	✔		✔		✔		✔			✔				✔	✔
		162646										✔					
		16851			✔												
		16862	✔	✔	✔							✔				✔	✔
		162652										✔					
		16962	✔		✔		✔					✔				✔	✔
		162952										✔					

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Registered Transceivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY														
			ABT	AC	ACT	ALS	ALVC	AS	AVC	BCT	F	FCT	HC	HCT	LS	LVC	LVT
18-Bit	3S	16524					✔										
		16525					✔										
		162525					✔										
32-Bit	3S	32543	✔														
4-to-1 Multiplexed/Demultiplexed	3S	162460	✔														

Standard Transceivers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	ABTE	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	64BCT	F	FCT	GTL	GTLP	HC	HCT	LS	LV-A	LV-AT	LVC	LVT
Dual 1-Bit LVTTL to GTLP Adjustable Edge Rate with Split LVTTL Port, Feedback Path and Selectable Polarity	3S	1395																			✔							
2-Bit LVTTL to GTLP Adjustable Edge Rate with Selectable Parity	3S	1394																			✔							
Quad	3S	243								✔												✔	✔	✔				
Quad Tridirectional	3S	442																										
8-Bit Transceivers and Transparent D-Type Latches with Four Independent Buffers	pp	16973									✔																	
8-Bit LVTTL to GTLP	3S	306																			✔							

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Standard Transceivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	ABTE	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	64BCT	F	FCT	GTL	GTLP	HC	HCT	LS	LV-A	LV-AT	LVC	LVT
Octal	3S	245	✔		✔	✔	✔	✔		✔	✔		✔	✔		✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔
		1245								✔																		
		11245			✔	✔																						
		620	✔							✔																		
	OC	621								✔																		
	3S	623	✔		✔	✔				✔						✔			✔			✔	✔	✔				
		11623				✔																						
		638								✔			✔															
		639								✔																		
		640	✔							✔			✔			✔						✔	✔	✔				
	OC	641								✔			✔											✔				
		642								✔														✔				
	3S	645								✔			✔									✔	✔	✔				
		1645								✔																		
Octal with Series Damping Resistors	3S	2245	✔																								✔	✔
Octal Transceivers and Line/MOS Drivers with B-Port Series Damping Resistors	3S	2245	✔													✔			✔									
Octal with Adjustable Output Voltage	3S	3245																									✔	
Octal Dual Supply with Configurable Output Voltage	3S	4245																									✔	
Octal with 3.3-V to 5-V Shifters	3S	4245																									✔	

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Standard Transceivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	ABTE	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	64BCT	F	FCT	GTL	GTLP	HC	HCT	LS	LV-A	LV-AT	LVC	LVT
9-Bit	3S	863	✔																								✔	
		29863								✔						✔												
		29864														✔												
10-Bit	3S	861	✔																								✔	
11-Bit Incident Wave Switching	3S/OC	16246		✔																								
16-Bit	3S	16245	✔		✔	✔		✔	✔		✔	✔		✔	✔				✔								✔	✔
		16623	✔			✔																						
		16640	✔																									
16-Bit Bus Transceivers and Transparent D-Type Latches with Eight Independent Buffers	3S	32973									✔																	
16-Bit Incident Wave Switching	3S	16245		✔																								
16-Bit with Series Damping Resistors	3S	16245									✔	✔																
16-Bit with Series Damping Resistors	3S	162245	✔									✔							✔								✔	✔
16-Bit Level Shifting	3S	164245									✔				✔													
16-Bit LVTTL to GTLP Adjustable Edge Rate	3S	1645																			✔							

Buffers, Drivers and Transceivers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Standard Transceivers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																								
			ABT	ABTE	AC	ACT	AHC	AHCT	ALB	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	64BCT	F	FCT	GTL	GTLP	HC	HCT	LS	LV-A	LV-AT	LVC	LVT
16-Bit LVTTL to GTLP	3S	16945																			✔							
18-Bit Bus Interface	3S	16863	✔			✔					✔																	
18-Bit LVTTL to GTL/GTL+	pp	16622																		✔								
		16923																		✔								
18-Bit LVTTL to GTLP Source Synchronous Clock Outputs	3S	1627																			✔							
		16927																			✔							
20-Bit	3S	16861				✔																						
25 Octal	3S	25245	✔													✔	✔											
	OC	25642														✔												
32-Bit	3S	32245	✔								✔			✔													✔	✔
32-Bit LVTTL to GTLP	3S	32945																			✔							
32-Bit LVTTL to GTLP Adjustable Edge Rate	3S	3245																			✔							

Flip-Flops, Latches and Registers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

D-Type Flip-Flops (3-state)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																			
			ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	F	FCT	HC	HCT	LS	LV-A	LVC	LVT	S
Dual 4-Bit Edge-Triggered	3S	874						✔			✔												
		876						✔			✔												
Quad	3S	173															✔	✔	✔				
Octal Bus Interface	3S	825									✔					✔							
		29825												✔									
Octal Edge-Triggered	3S	374	✔	✔	✔	✔	✔	✔	✔		✔			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	3S/CP	11374			✔																		
	3S	574	✔	✔	✔	✔	✔	✔			✔			✔	✔	✔	✔	✔		✔	✔	✔	
		575						✔															
		576						✔			✔												
		577						✔															
Octal Edge-Triggered Dual Rank	3S	4374									✔												
Octal Edge-Triggered with Series Damping Resistors	3S	2374														✔							
		2574														✔							
Octal Inverting	3S	543	✔	✔	✔			✔									✔	✔					
		564		✔	✔			✔									✔	✔					
9-Bit Bus Interface	3S	823	✔								✔					✔					✔		
10-Bit Bus Interface	3S	821	✔								✔					✔					✔		
		29821						✔						✔									
10-Bit with Dual Outputs	3S	16820							✔														
		162820							✔														
16 Bit Edge-Triggered	3S	16374	✔	✔	✔	✔	✔		✔	✔		✔	✔			✔					✔	✔	
		162374							✔							✔						✔	
18-Bit	3S	16823	✔		✔				✔							✔							
		162823	✔													✔							

Flip-Flops, Latches and Registers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

D-Type Flip-Flops (3-state) (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																			
			ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	F	FCT	HC	HCT	LS	LV-A	LVC	LVT	S
20-Bit	3S	16721							✔														
		162721							✔														
		16722											✔										
		16821	✔						✔	✔													
32-Bit Edge-Triggered	3S	32374							✔	✔											✔	✔	
		322374																				✔	

D-Type Flip-Flops (non 3-state)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																			
			ABT	AC	ACT	AHC	AHCT	ALS	AS	AUC	AUP	CD4K	F	FCT	HC	HCT	LS	LV-A	LVC	LVT	S	
Single Edge-Triggered	PP	1G79								✔	✔								✔			
		1G80								✔	✔								✔			
Single Edge-Triggered with Preset and Clear	PP	1G74								✔	✔											
		2G74																	✔			
Dual	P	4013										✔										
		74		✔	✔	✔	✔	✔	✔	✔			✔		✔	✔	✔	✔	✔		✔	
	CP	11074		✔	✔																	
Dual Edge-Triggered	PP	2G79								✔									✔			
		2G80								✔									✔			
Quad	PP	175		✔	✔			✔	✔				✔		✔	✔	✔	✔			✔	
	CP	11175		✔																		
	PP	40175										✔										
Hex	PP	174		✔	✔	✔	✔	✔	✔				✔		✔	✔	✔	✔			✔	
		40174										✔										
Hex with Enable	PP	378															✔					
Octal	PP	273	✔	✔	✔	✔	✔	✔						✔	✔	✔	✔	✔		✔		
Octal with Enable	PP	377	✔										✔	✔	✔	✔	✔					

Flip-Flops, Latches and Registers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

J-K Flip-Flops

DESCRIPTION	TYPE	TECHNOLOGY											
		AC	ACT	ALS	AS	CD4K	F	HC	HCT	LS	LVC	S	TTL
Dual Edge-Triggered Master-Slave	4027					✔							
Dual Edge-Triggered with Reset	73							✔	✔	✔			
	107							✔	✔	✔			✔
Dual Edge-Triggered with Set and Reset	112	✔	✔	✔			✔	✔	✔	✔	✔	✔	
Dual Positive Edge-Triggered with Set and Reset	109	✔	✔	✔	✔		✔	✔	✔	✔			

D-Type Latches (3-state)

DESCRIPTION	TYPE	TECHNOLOGY																				
		ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S
Single	1G373																				✔		
1-Bit to 4-Bit Address Registers/ Drivers	162831							✔															
	162832							✔															
Dual 4-Bit	873						✔																
Octal Inverting Transparent	533	✔	✔	✔			✔			✔						✔	✔						
	563		✔	✔			✔									✔	✔						
Octal Transparent	373	✔	✔	✔	✔	✔	✔	✔		✔			✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
	11373			✔																			
	573	✔	✔	✔	✔	✔	✔			✔			✔	✔	✔	✔	✔		✔	✔	✔	✔	
	580						✔																
Octal Transparent Read Back	990						✔																
	666						✔																
	667						✔																
Octal Transparent with Series Damping Resistors	2372													✔	✔								
	2573														✔								
Octal Edge-Triggered Read Back	996						✔																
9-Bit Transparent	8744	✔					✔								✔								
	29843												✔										
9-Bit Transparent Read Back	992						✔																

Flip-Flops, Latches and Registers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

D-Type Latches (3-state) (continued)

DESCRIPTION	TYPE	TECHNOLOGY																			
		ABT	AC	ACT	AHC	AHCT	ALS	ALVC	ALVT	AS	AUC	AVC	BCT	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	LVT	S
10-Bit Transparent	841	✔					✔								✔						✔		
10-Bit Transparent Read Back	994							✔															
12-Bit to 24-Bit Multiplexed	16260	✔						✔															
12-Bit to 24-Bit Multiplexed with Series Damping Resistors	162260	✔						✔															
16-Bit Transparent	16373	✔	✔	✔	✔	✔		✔	✔		+	✔			✔						✔	✔	
	162373	✔						✔							✔							✔	
18-Bit Transparent	16843	✔																					
20-Bit Transparent	16841	✔		✔				✔							✔								
	162841	✔						✔							✔								
32-Bit Transparent	32373								✔												✔	✔	

Other Latches

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY				
			ALS	CD4K	HC	HCT	LS
Dual 2-Bit Bistable Transparent	PP	75			✔	✔	
Dual 4-Bit with Strobe 3S	3S	4508		✔			
4-Bit Bistable	PP	75					✔
		375					✔
Quad Clocked D	PP	4042		✔			
	3S	4076		✔			
Qua d NAND R-S	3S	4044		✔			
Quad NOR R-S	3S	4043		✔			
Quad S-R	PP	279					✔
8-Bit Addressable	PP	259	✔		✔	✔	✔
		4099		✔			
		4724		✔			
4-by-4 Register Files	3S	670			✔	✔	✔
Dual 16-by-4 Register Files	3S	870	✔				

Flip-Flops, Latches and Registers

Shift Registers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY													
			AC	ACT	AHC	AHCT	ALS	ALVC	AS	CD4K	F	FCT	HC	HCT	LS	LV-A
4-Bit Bidirectional Universal Shift	PP	194							✔				✔	✔	✔	
		195											✔			
		40194								✔						
4 Stage Parallel-In/Parallel-Out Shift	PP	4035								✔						
Dual 4 Stage Static Shift	PP	4015								✔			✔			
8-Bit Diagnostic Scan	3S	818										✔				
8-Bit Multilevel Pipeline	3S	520										✔				
8-Bit Serial In, Parallel Out Shift	PP	164	✔	✔			✔						✔	✔	✔	✔
8-Bit Parallel In, Serial Out Shift with Gated Clock	PP	165					✔						✔	✔	✔	✔
8-Bit Parallel In, Serial In, Serial Out Shift	PP	166					✔						✔	✔	✔	✔
8-Bit Shift with Output Registers	OC	594			✔	✔							✔		✔	✔
8-Bit Shift with 3-State Output Registers	3S	595			✔	✔							✔		✔	✔
8-Bit Shift with 3-State Output Latches	3S	596													✔	
8-Bit Shift with Input Latches	PP	597											✔	✔	✔	
8-Bit Shift with Input Latches and 3-State Input/Output Ports	3S	598													✔	
8-Bit Universal Shift/Storage	3S	299	✔	✔			✔				✔		✔	✔	✔	
		323	✔				✔									
8-Stage Static Shift	PP	4014								✔						
		4021								✔						
8-Stage Shift-and-Store Bus	3S	4094								✔			✔	✔		
8-Stage Static Bidirectional Parallel-/Serial- Input/Output Bus	PP	4034								✔						
16-Bit Serial In/Out with 16 Bit Parallel Out Storage	PP	673													✔	
		674													✔	
64-Stage Static Shift	PP	4031								✔						
Dual 64-Stage Static Shift	3S	4517								✔						
Serial-to-Parallel Interface	OC/PP	8153														✔

Gates

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

AND Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY															
			AC	ACT	AHC	AHCT	ALS	ALVC	AS	AUC	AUP	CD4K	F	HC	HCT	LS	LV	LVC	S
Single 2-Input	PP	1G08			✔	✔				✔	✔							✔	
Single 3-Input	PP	1G11									+							✔	
Single 3-Input AND-OR	PP	1G0832									+							✔	
Single 3-Input OR-AND	PP	1G3208									+							✔	
Dual 2-Input	PP	2G08								✔	+							✔	
Quad 2 Input	PP	08	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔
	CP	11008	✔	✔															
	OC	09					✔									✔			✔
	PP	4081										✔							
Quad 2-Input Buffers/Drivers	PP	1008							✔										
Quad 2-Input with Schmitt-Trigger Inputs	PP	7001												✔					
Dual 4-Input	PP	21					✔		✔				✔	✔	✔	✔	✔		
		4082										✔							
Triple 3-Input	PP	11	✔	✔			✔		✔		+		✔	✔	✔	✔	✔		
		4073										✔							
Hex 2-Input Drivers	PP	809							✔										

Configurable Gates

DESCRIPTION	TYPE	TECHNOLOGY		
		CD4K	LS	S
Dual 2-Wide 2-Input AND-OR Invert	51			✔
	4085	✔		
2-Wide 2-Input and 2-Wide 3-Input AND-OR- Invert	51		✔	
Expandable 4-Wide 2-Input	4086	✔		
Expandable 8-Input	4048	✔		
Quad AND-OR Select	4019	✔		

Gates

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Exclusive-OR Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY														
			AC	ACT	AHC	AHCT	ALS	AS	AUC	CD4K	F	HC	HCT	LS	LV-A	LVC	S
Single 2-Input	PP	1G86			✔	✔			✔							✔	
Single 3-Input	PP	1G386														✔	
Dual 2-Input	PP	2G86							✔							✔	
Quad 2 Input	PP	4030								✔						✔	
		4070								✔						✔	
		86	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔
	CP	11086	✔														
	OC	136												✔			

Exclusive-NOR Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			CD4K	HC	LS
Quad 2-Input	OC	266			✔
	OD	266		✔	
	pp	4077	✔		
		7266		✔	

NAND Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																
			AC	ACT	AHC	AHCT	ALS	ALVC	AS	AUC	AUP	CD4K	F	HC	HCT	LS	LV-A	LVC	S	TTL
Single 2-Input	PP	1G00			✔	✔				✔	✔							✔		
	OD	1G38									+							✔		
Single 3-Input Positive	PP	1G10									+							✔		
Dual 2-Input	PP	2G00								✔	+							✔		
	OD	2G38									+							✔		
Dual 2-Input with Schmitt-Trigger Input	PP	8003							✔											
		2G132									+							✔		
Dual 2-Input Buffers/Drivers	PP	40107										✔								

Gates

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

NAND Gates (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																	
			AC	ACT	AHC	AHCT	ALS	ALVC	AS	AUC	AUP	CD4K	F	HC	HCT	LS	LV-A	LVC	S	TTL
Quad 2-Input	PP	00	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔
	CP	11000	✔	✔																
	OC	03					✔									✔				
	OD	03												✔	✔					
	PP	4011										✔								
	3S	26														✔				
	PP	37					✔									✔			✔	
	OC	38					✔						✔			✔			✔	✔
Quad 2-Input Buffers/Drivers		1000							✔											
Quad 2-Input Unbuffered	PP	4011										✔								
Quad - Input with Schmitt-Trigger Inputs	PP	132			✔	✔								✔	✔	✔	✔		✔	
		4093										✔								
Hex 2-Input Drivers	PP	804					✔		✔											
Triple 3-Input	PP	10	✔	✔			✔	✔	✔				✔	✔	✔	✔	✔	✔	✔	✔
		4023										✔								
Dual 4-Input	PP	4012										✔								
		20	✔	✔			✔		✔				✔	✔	✔	✔	✔		✔	
Dual 4-Input Positive 50-Ω Line Drivers	PP	140																	✔	
8-Input	PP	30					✔		✔				✔	✔	✔	✔				
	CP	11030		✔																
8-Input AND/NAND	PP	4068										✔								
13-Input	PP	133					✔													

Gates

NOR Gates

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																
			AC	ACT	AHC	AHCT	ALS	AS	AUC	AUP	CD4K	F	HC	HCT	LS	LV-A	LVC	S	TTL
Single 2-Input	PP	1G02			✔	✔			✔	✔							✔		
Single 3-Input	PP	1G27								+							✔		
Dual 2-Input		2G02							✔	+							✔		
Quad 2-Input	PP	4001									✔								
		02	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔
	OC	33					✔								✔				
Quad 2-Input with Schmitt-Trigger Inputs	PP	7002											✔						
Quad 2-Input Unbuffered	PP	4001									✔								
Quad 2-Input 50- Line Drivers	PP	128																	✔
Hex 2-Input Drivers	PP	805					✔	✔											
Triple 3-Input	PP	4025									✔								
		27					✔	✔				✔	✔	✔	✔	✔			
Dual 4-Input	PP	4002									✔		✔						
Dual 4-Input with Strobe	PP	25																	✔
Dual 5-Input	PP	260										✔						✔	
8-Input NOR/OR	PP	4078									✔								

Gates

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

OR Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																
			AC	ACT	AHC	AHCT	ALS	ALVC	AS	AUC	AUP	CD4K	F	HC	HCT	LS	LV-A	LVC	S	TTL
Single 2-Input	PP	1G32			✔	✔				✔	✔							✔		
Single 3-Input	PP	1G332									+							✔		
Single 3-Input AND-OR	PP	1G0832									+							✔		
Single 3- Input OR-AND	PP	1G3208									+							✔		
Dual 2-Input	PP	2G32								✔	+							✔		
Quad 2-Input	PP	32	✔	✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔
	CP	11032	✔	✔																
	PP	4071										✔								
Quad 2-Input Buffers/Drivers	PP	1032							✔											
Quad 2-Input with Schmitt-Trigger Inputs	PP	7032												✔						
Hex 2-Input Drivers	PP	832					✔		✔											
Dual 4-Input	PP	4072										✔								
Dual 4-Input	PP	4075										✔		✔	✔					

I²C Logic

I²C Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY			
			P82	PCA	PCF	TCA
Buffers						
Bidirectional Unity Voltage Gain Buffers for I²C Bus and SMBus Extending		B715	✔			
Dual Bidirectional Bus Buffers		B96	✔			
Dual Bidirectional I²C Bus and SMBus Repeaters	OD	9515A		✔		
Dual Bidirectional I²C Bus and SMBus Voltage-Level Translators		9306		✔		
Expandable 5-Channel Bidirectional I²C Bus and SMBus Hub	OD	9518		✔		
Level-Translating I²C Bus Repeater	OD	9517		✔		
Hot Swappable 2-Wire Bus Buffers	OD	4311				✔
I/O Expanders						
Remote 4-Bit I²C and SMBus I/O Expanders with Configuration Registers	PP	9536		✔		
Remote 8-Bit I/O Expanders for I²C	PP	8574			✔	
	PP	8574A			✔	
Remote 8-Bit I²C and SMBus Low-Power I/O Expanders with Reset and Configuration Registers	OD/PP	9557		✔		
Remote 8-Bit I²C and SMBus Low-Power I/O Expanders with Interrupt Output, Reset and Configuration Registers	OD/PP	6107		✔		
Remote 8-Bit I²C and SMBus I/O Expanders with Interrupt and Configuration Registers	PP	9554		✔		
	PP	9554A		✔		
Remote 8-Bit I²C and SMBus I/O Expanders with Interrupt and Configuration Registers (Low-Power)	PP	9534		✔		
	PP	9534A		✔		
Remote 8-Bit I²C and SMBus I/O Expanders with Interrupt Output, Reset and Configuration Registers (Low-Power)	PP	9538		✔		
Remote 16-Bit I²C and SMBus I/O Expanders with Interrupt Output	PP	8575			✔	
	OD	8575C			✔	
Remote 16-Bit I²C and SMBus I/O Expanders with Interrupt Output and Configuration Registers	PP	9555		✔		
Remote 16-Bit I²C and SMBus Low-Power I/O Expanders with Interrupt Output and Configuration Registers	PP	9535		✔		
Remote 16-Bit I²C and SMBus Low-Power I/O Expanders with Interrupt Output, Reset and Configuration Registers	PP	9539		✔		
Switches and Multiplexers						
2-Channel I²C Bus Switch with Interrupt Logic and Reset	OD	9543A		✔		
4-Channel I²C and SMBus Multiplexers with Interrupt Logic	OD	9544A		✔		
4-Channel I²C and SMBus Multiplexers with Reset Functions	OD	9546A		✔		

I²C Logic (continued)

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY			
			P82	PCA	PCF	TCA
4-Channel I²C and SMBus Multiplexers with Interrupt Logic and Reset Functions	OD	9545A		✔		
8-Channel I²C Bus and SMBus Multiplexers with Reset	OD	9548A		✔		
I/O Expanders						
Low-Voltage 8-Bit I²C and SMBus I/O Expander with Interrupt Output, Reset and Configuration Registers	OD	6408				✔
Low-Voltage 16-Bit I²C and SMBus I/O Expander with Interrupt Output, Reset and Configuration Registers	OD	6416				✔
Low-Voltage 24-Bit I²C and SMBus I/O Expander with Interrupt Output, Reset and Configuration Registers	OD	6424				✔
LED Drivers						
Low-Voltage 7-Bit I²C and SMBus LED Driver with Intensity Control and Shutdown	OD	6507				✔

Single Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY							
			AHC	AHCT	AUC	AUP	CBT	CB3T	CBTLV	LVC
Configurable Multiple-Function	PP	1G57				✔				✔
		1G58				✔				✔
		1G97				✔				✔
		1G98				✔				✔
		1G99				✔				✔
Bilateral Bus Switches (Analog or Digital)	PP	1G66			✔					✔
Crystal Oscillator Drivers	PP	1GX04								✔
D-Type Flip-Flops	3S	1G374				+				✔
Edge-Triggered D-Type Flip-Flops	PP	1G79			✔	✔				✔
		1G80			✔	✔				✔
Edge-Triggered Flip-Flops with Preset and Clear	PP	1G74			✔	✔				
FET Bus Switches	PP	1G125					+		✔	
		1G384					✔			
FET Bus Switches with Level-Shifting	PP	1G125					+	✔		
		1G384					✔			
Buffer	PP	1G34				✔				✔
Inverters	PP	1GU04	✔		✔					✔
		1G04	✔	✔	✔	✔				✔

Little Logic

Single Gates (continued)

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY							
			AHC	AHCT	AUC	AUP	CBT	CB3T	CBTLV	LVC
Inverting Buffers/Drivers	OD	1G06			✔	✔				✔
	3S	1G240			✔	✔				✔
Latches	3S	1G373				✔				✔
NAND	PP	1G10				+				✔
		1G11				+				✔
		1G27				+				✔
		1G332				+				✔
		1G386				+				✔
Noninverting Buffers/Drivers	OD	1G07			✔	✔				✔
Noninverting Buffers	3S	1G125	✔	✔	✔	✔				✔
		1G126	✔	✔	✔	✔				✔
Noninverting Schmitt-Trigger Buffers/Drivers	PP	1G17			✔	✔				✔
Single-Pole Double-Throw Analog Switches	PP	1G3157								✔
Schmitt-Trigger Inverters	PP	1G14	✔	✔	✔	✔				✔
2-Input AND	PP	1G08	✔	✔	✔	✔				✔
2-Input Exclusive-OR	PP	1G86	✔	✔	✔					✔
2-Input NAND	PP	1G00	✔	✔	✔	✔				✔
	OD	1G38				+				✔
2-Input NOR	PP	1G02	✔	✔	✔	✔				✔
2-Input OR	PP	1G32	✔	✔	✔	✔				✔
3-Input AND-OR	PP	1G0832				+				✔
3-Input OR-AND	PP	1G3208				+				✔
1-of-2 Decoders/Demultiplexers	PP	1G19			✔	+				✔
1-of-2 Noninverting Demultiplexers	3S	1G18				+				✔
2-of-3 Decoders/Demultiplexers	PP	1G29				+				✔
2-to-4 Line Decoders	PP	1G139				+				✔
Retriggerable Monostable Mutlivibrators with Schmitt-Trigger inputs	PP	1G123								✔

Little Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Dual Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			AUC	LVC	AUP
Single 2-to-1 Line Data Selectors/Multiplexers	PP	2G157		✔	
Single Edge-Triggered D-Type Flip-Flops with Preset and Clear	PP	2G74		✔	
Analog Multiplexers/Demultiplexers	PP	2G53	✔	✔	
Bilateral Bus Switches (Analog or Digital)	PP	2G66	✔	✔	
Edge-Triggered D-Type Flip-Flops	PP	2G79	✔	✔	+
		2G80	✔	✔	+
Inverters	PP	2G04	✔	✔	+
		2GU04	✔	✔	
Inverting Buffers/Drivers	3S	2G06	✔	✔	+
		2G240	✔	✔	+
Noninverting Buffers/ Drivers	OD	2G07	✔	✔	+
	PP	2G34	✔	✔	+
Noninverting Bus Drivers	OD	2G17		✔	+
	3S	2G125	✔	✔	+
		2G126	✔	✔	+
		2G241	✔	✔	+
Schmitt-Trigger Inverters	PP	2G14		✔	+
2-Input AND	PP	2G08	✔	✔	+
2-Input Exclusive-OR	PP	2G86	✔	✔	+
2-Input NAND	PP	2G00	✔	✔	+
	OD	2G38		✔	+
2-Input NAND with Schmitt-Trigger inputs	PP	2G132		✔	+
2-Input NOR	PP	2G02	✔	✔	+
2-input OR	PP	2G32	✔	✔	+

Little Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Triple Gates

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY	
			LVC	AUP
Inverting Buffers/ Drivers	OD	3G06	✔	+
Noninverting Buffers/Drivers	OD	3G07	✔	+
	PP	3G17	✔	+
		3G34	✔	+
Schmitt-Trigger Inverters	PP	3G04	✔	+
		3G14	✔	+
Unbuffered Inverters	PP	3GU04	✔	

MSI FUNCTIONS

Adders

DESCRIPTION	TYPE	TECHNOLOGY						
		AC	ACT	F	HC	HCT	LS	S
9-Bit Binary Full with Fast Carry	283	✔	✔	✔	✔	✔	✔	✔

Arithmetic Logic Units

DESCRIPTION	TYPE	TECHNOLOGY	
		AS	LS
Arithmetic Logic Units/Function Generators	181	✔	✔

Parity Generators and Checkers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY									
			AC	ACT	ALS	AS	F	FCT	HC	HCT	LS	S
Dual 8-Bit Odd	PP	480						✔				
9-Bit Odd/Even	PP	280	✔	✔	✔	✔	✔		✔	✔	✔	✔
9-Bit Binary Full with Fast Carry	PP	286				✔						
	PP	11286		✔								

MSI Functions—Counters

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Binary Counters

DESCRIPTION	TYPE	TECHNOLOGY											
		AC	ACT	ALS	AS	CD4K	F	FCT	HC	HCT	LS	LV-A	S
4-Bit Ripple	93								✔	✔	✔		
	293										✔		
Dual 4-Bit	393								✔	✔	✔	✔	
Dual 4-Bit Up	4520					✔			✔	✔			
Presettable 4-Bit Up/Down	4516					✔							
Presettable 4-Bit BCD Up/Down with Dual Clock and Reset	40193					✔							
Presettable Synchronous 4-Bit Up/Down	191			✔				✔	✔	✔	✔		
	193			✔					✔	✔	✔		
Programmable 4-Bit with Asynchronous Clear	40161					✔							
Synchronous 4-Bit	569			✔									
Synchronous 4-Bit with 3-State Outputs and Carry Out	561			✔									
Synchronous 4-Bit Up/Down	169			✔	✔		✔				✔		
	669										✔		
	697										✔		
Synchronous 4-Bit with Preset and Asynchronous Clear	161	✔	✔	✔	✔		✔		✔	✔	✔	✔	
Synchronous 4-Bit with Preset and Synchronous Clear	163	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔
8-Bit Counters/Dividers with 1-of-8 Decoded Outputs	4022					✔							
8-Bit with 3-State Output Registers	590								✔		✔		
8-Bit with Input Registers	592										✔		
8-Bit with Input Registers and Parallel Counter Outputs	593										✔		
8-Bit Synchronous Up/Down	867			✔	✔								
	869			✔	✔								
8 Bit Presettable Synchronous Down	40103					✔			✔	✔			
7-Stage Ripple-Carry Counters/Dividers	4024					✔			✔	✔			
12-Stage Ripple-Carry Counters/Dividers	4040					✔			✔	✔		✔	

MSI Functions—Counters

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Binary Counters (continued)

DESCRIPTION	TYPE	TECHNOLOGY											
		AC	ACT	ALS	AS	CD4K	F	FCT	HC	HCT	LS	LV-A	S
14-Stage Ripple-Carry Counters/Dividers with Oscillators	4020					✔			✔	✔			
	4060					✔			✔	✔			
21-Stage	4045					✔							
Divide by 12	92										✔		
Divide by N	4018					✔							
Dual 16-Bit with Output Registers	8154											✔	
Programmable Divide by N	4059					✔			✔				
Presettable Up/Down or BCD Decade	4029					✔							

Decade Counters

DESCRIPTION	TYPE	TECHNOLOGY			
		CD4K	HC	HCT	LS
Divide by 2, Divide by 5	90				✔
Dual Divide by 2, Divide by 5	390		✔	✔	✔
Synchronous Presettable BCD Up/Down	190		✔		
	192		✔		
Counters/Dividers with 1-of-10 Decoded Outputs	4017	✔	✔		
Counters/Drivers with Decoded 7-Segment Display Outputs	4026	✔			
	4033	✔			
BCD-to-Decimal Decoders	4028	✔			
Presettable BCD Up/Down	4510	✔			
Dual BCD Up	4518	✔	✔		
Programmable BCD Divide by N 4522	4522	✔			
2-Decade Synchronous Presettable BCD Down 40102	40102	✔			
Up-Down Counters/Latches/7-Segment Display Drivers 40110	40110	✔			
Presettable BCD-Type Up/Down with Dual Clock and Reset 40192	40192	✔			

MSI Functions—Decoders, Encoders and Multiplexers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Data Selectors/Multiplexers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																	
			ABT	AC	ACT	AHC	AHCT	ALS	AS	AUC	CD4K	F	FCT	HC	HCT	LS	LV-A	LVC	PCA	S	TTL
Single 2-to-1 Line	PP	2G157																✔			
1-of-8 Analog Multiplexers/Demultiplexers	PP	4051												✔	✔		✔				
1-of-8 Analog Multiplexers/Demultiplexers with Logic Level Conversion	PP	4051									✔										
1-of-8 Analog Multiplexers/Demultiplexers with Latches	PP	4351												✔	✔						
1-of-8 Data Selectors	3S	4512									✔										
1-of-8	PP	151		✔	✔			✔	✔			✔		✔	✔	✔				✔	
	3S	251		✔				✔				✔		✔	✔	✔					
1-of-8 Data Selectors/Multiplexers/Registers	3S	354												✔	✔						
		356													✔						
1-of-8 Differential Analog Multiplexers/Demultiplexers	PP	4097									✔										
1-of-16 Analog Multiplexers/Demultiplexers	PP	4067									✔			✔	✔						
1-of-16	PP	150																			✔
1-of-16 Data Generators/Multiplexers	3S	250							✔												
Dual 1-of-4	PP	153		✔	✔			✔	✔			✔		✔	✔	✔					
	3S	253		✔	✔			✔	✔			✔		✔	✔	✔					
Dual Analog Multiplexers/Demultiplexers	PP	2G53								✔								✔			
Dual 1-of-4 Analog Multiplexers/Demultiplexers	PP	4052									✔										
Dual 1-of-4 Analog Multiplexers/Demultiplexers with Logic Level Conversion	PP	4052												✔	✔		✔				
Dual 1-of-4 Analog Multiplexers/Demultiplexers with Latches	PP	4352												✔							
Triple 1-of-2 Analog Multiplexers/Demultiplexers	PP	4053												✔	✔		✔				
Triple 1-of-2 Analog Multiplexers/Demultiplexers with Logic Level Conversion	PP	4053									✔										

MSI Functions—Decoders, Encoders and Multiplexers

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Data Selectors/Multiplexers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																	
			ABT	AC	ACT	AHC	AHCT	ALS	AS	AUC	CD4K	F	FCT	HC	HCT	LS	LV-A	LVC	PCA	S	TTL
Quad 1-of-2	3S	257		✔	✔			✔	✔			✔	✔	✔	✔	✔		✔		✔	
	PP	258			✔			✔	✔			✔		✔	✔	✔					
	CP/3S	11257		✔	✔																
Quad 1-of-2 with Series Damping Resistors	3S	2257											✔								
Quad 2-to-1	PP	157		✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔		✔	
	3S	40257									✔										
Quad 2-to-1 with Storage	PP	298							✔							✔					
		399											✔			✔					
Quad 2-to-4	PP	158		✔	✔	✔	✔	✔	✔					✔	✔	✔					
Hex 2-to-1 Universal Multiplexers	3S	857						✔													
4-to-1 Multiplexers/Demultiplexers	3S	16460	✔																		
Nonvolatile 5-Bit Registers with I^2C Interface	PP	8550																	✔		

MSI Functions—Decoders, Encoders and Multiplexers

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Decoders/Demultiplexers

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																	
			AC	ACT	AHC	AHCT	ALS	AS	AUC	BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	S	TTL
1-of-2	PP	1G19							✔										✔		
1-of-2 Noninverting Demultiplexers	3S	1G18																	✔		
2-of-3	PP	1G29																	✔		
2-to-4 Line Decoders	PP	1G139																	✔		
Dual 2-to-4 Line	PP	139	✔	✔	✔	✔	✔							✔	✔	✔	✔		✔	✔	
	CP	11139		✔																	
	PP	155														✔					
	OC	156					✔									✔					
Dual 2-Line to 4-Line Memory Decoders with On-Chip Supply-Voltage Monitors	PP	2414								✔											
Dual Binary 1-of-4	PP	4555									✔										
		4556									✔										
3-to-8 Line	PP	238	✔	✔										✔	✔						
3-to-8 Line Inverting	PP	138	✔	✔	✔	✔	✔	✔				✔	✔	✔	✔	✔	✔	✔	✔	✔	
	CP	11138	✔																		
3-to-8 Line with Address Latches	3S	137					✔							✔	✔						
		237												✔	✔						
4-Bit Latch/4 to 16 Line	PP	4514									✔			✔	✔						
		4515									✔			✔	✔						
4-to-16 Line	PP	154												✔	✔						✔
	OC	159																			✔
BCD-to-Decimal or Binary-to-Octal Decoders/Drivers	PP	4028									✔										
BCD to Decimal Decoders/Drivers	OC	45																			✔
		145														✔					✔

MSI Functions—Decoders, Encoders and Multiplexers

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Decoders/Demultiplexers (continued)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY																	
			AC	ACT	AHC	AHCT	ALS	AS	AUC	BCT	CD4K	F	FCT	HC	HCT	LS	LV-A	LV-AT	LVC	S	TTL
BCD to 7-Segment Decoders/Drivers	OC	47														✔					✔
		247														✔					
BCD to 7-Segment Latches/Decoders/Drivers	PP	4511									✔			✔	✔						
BCD to 7-Segment LCD Decoders/Drivers with Display-Frequency Outputs	PP	4055									✔										
BCD to 7-Segment LCD Decoders/Drivers with Strobed Latch Function	PP	4056									✔										
BCD to 7-Segment Latches/Decoders/Drivers for LCDs	PP	4543									✔			✔	✔						
BCD to 10-Line Decimal	PP	42												✔	✔	✔					

Priority Encoders

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY			
			CD4K	HC	HCT	LS
8-to-3 Line	PP	148		✔		✔
	3S	348				✔
	PP	4532	✔			
10-to-4 Line	PP	147		✔	✔	
10-to-4 Line BCD	PP	40147	✔			

MSI Functions—Digital Comparators

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Address, Identity, and Magnitude Comparators

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY							
			ALS	AS	CD4K	F	HC	HCT	LS	S
4-Bit Magnitude	PP	4063			✔					
		4585			✔					
		85					✔	✔	✔	✔
8-Bit Identity (P = Q) with Enable and 20 - Pullup Resistors on Q Inputs	OC	518	✔							
8-Bit Identity ($\overline{P = Q}$) with Enable and 20 - Pullup Resistors on Q Inputs	PP	520	✔							
8-Bit Identity ($\overline{P = Q}$) with Enable	PP	521	✔			✔				
	PP	688	✔							
8-Bit Magnitude (P > Q, P < Q) with Latched Inputs and Logical or Arithmetic Comparison	PP	885		✔						
8-Bit Magnitude ($\overline{P = Q}$, $\overline{P > Q}$) and 100K - Pullup Resistors on Q Inputs	PP	682					✔			
8-Bit Magnitude ($\overline{P = Q}$, $\overline{P > Q}$) and 20K - Pullup Resistors on Q Inputs	PP	682							✔	
8-Bit Magnitude ($\overline{P = Q}$, $\overline{P > Q}$)	PP	684					✔			
8-Bit Magnitude ($\overline{P = Q}$, $\overline{P > Q}$) with Enable	PP	684							✔	
8-Bit Magnitude (P = Q) with Enable	PP	688					✔	✔		
8-Bit Magnitude/Identity ($\overline{P = Q}$) with Enable	PP	688							✔	
12-Bit Address with Output Enable	PP	679	✔							

Signal Switches

Analog Switches and Multiplexers

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

DESCRIPTION	TYPE	TECHNOLOGY						
		AHC	AUC	CD4K	HC	HCT	LV-A	LVC
Single Switches	1G66		✔					✔
Dual Switches	2G66		✔					✔
Dual 4-Channel Multiplexers/Demultiplexers	4052				✔	✔	✔	
Dual 4-Channel Multiplexers/Demultiplexers with Injection-Current Effect Control	4852				✔			
Dual 4-Channel Multiplexers/Demultiplexers with Latches	4352				✔			
Dual 4-Channel Multiplexers/Demultiplexers with Logic-Level Conversion	4052			✔				
Triple 2-Channel Multiplexers/Demultiplexers	4053				✔	✔	✔	
Triple 2-Channel Multiplexers/Demultiplexers with Logic-Level Conversion	4053			✔				
Quadruple Switches	4066	✔		✔	✔		✔	
Quadruple Switches with Level Translation	4316				✔	✔		
8-Channel Multiplexers/Demultiplexers	4051				✔	✔	✔	
	4097			✔				
8-Channel Multiplexers/Demultiplexers with Injection-Current Effect Control	4851				✔			
8-Channel Multiplexers/Demultiplexers with Latches	4651				✔	✔		
8-Channel Analog Multiplexers/Demultiplexers with Latches	4351				✔	✔		
8-Channel Multiplexers/Demultiplexers with Logic-Level Conversion	4051			✔				
16-Channel Multiplexers/Demultiplexers	4067			✔	✔	✔		
SPDT Switches	1G3157							✔
SPDT Switches or 2:1 Multiplexers/Demultiplexers	2G53		✔					✔

Signal Switches

Digital Bus Exchange/Multiplexing Switches

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

DESCRIPTION	TYPE	TECHNOLOGY				
		CB3Q	CB3T	CBT	CBT-C	CBTLV
1-of-8 FET Multiplexers/Demultiplexers	3251	✔		✔		✔
Dual 1-of-4 FET Multiplexers/Demultiplexers	3253	✔	✔	✔	✔	✔
4-Bit 1-of-2 FET Multiplexers/Demultiplexers	3257	✔	✔	✔	✔	✔
10-Bit FET Bus-Exchange Switches	3383		✔	✔	✔	✔
12-Bit 1-of-2 FET Multiplexers/Demultiplexers with Internal Pulldown Resistors	16292			✔		✔
	162292			✔		
12-Bit 1-of-2 FET Multiplexers/Demultiplexers with Internal Pulldown Resistors and Series Damping Resistors	16292					✔
12-Bit 1-of-3 FET Multiplexers/Demultiplexers	16214			✔	✔	
Synchronous 16-Bit 1-of-2 FET Multiplexers/Demultiplexers	16232			✔		
16-Bit 1-of-2 FET Multiplexers/Demultiplexers	16233			✔		
16-Bit to 32-Bit FET Multiplexer/Demultiplexer Bus Switches	16390			✔		
18-Bit FET Bus-Exchange Switches	16209			✔		
24-Bit FET Bus-Exchange Switches	16212		✔	✔		✔
	16213			✔		
24-Bit FET Bus-Exchange Switches with Schottky Diode Clamping	16212			✔		

Signal Switches

Digital Bus Switches

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

DESCRIPTION	TYPE	TECHNOLOGY							
		CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	HC	HCT
Single FET	1G125			✔		✔			
	1G384			✔					
Single FET with Level Shifting	1G125		✔	✔					
	1G384			✔					
Dual FET	3305	✔			✔				
	3306	✔	✔	✔	✔				
Dual FET with Level Shifting	16211				✔				
	3306			✔	✔				
Dual FET with Schottky Diode Clamping	3306			✔					
Quad Bilateral	4016						✔	✔	
Quad FET	3125	✔	✔	✔	✔	✔			
	3126			✔		✔			
Octal FET	3244			✔	✔				
	3245	✔	✔	✔	✔	✔			
	3345			✔		✔			
Octal 5 V with Precharged Outputs and Undershoot Protection	6845					✔			
10-Bit FET	3384				✔				
	3861			✔					
10-Bit FET with Internal Pulldown Resistors	3857			✔					
10-Bit FET with Level Shifting	3384			✔					
	3861			✔					
10-Bit FET with Precharged Outputs and Diode Clamping	6800			✔					
10-Bit FET with Precharged Outputs and Active Clamp Undershoot Protection	6800	✔		✔	✔				
10-Bit FET with Precharged Outputs for Live Insertion	6800			✔					
10-Bit FET with Schottky Diode Clamping	3384	✔		✔					
16-Bit FET	16244	✔		✔	✔				
	16245	✔		✔	✔				
16-Bit FET with Active Clamp Undershoot Protection	16245			✔					

Signal Switches

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Digital Bus Switches (continued)

DESCRIPTION	TYPE	TECHNOLOGY							
		CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	HC	HCT
20-Bit FET	16210	✔	✔	✔	✔	✔			
	16861			✔					
20-Bit FET with Active Clamp Undershoot Protection	16861			✔					
20-Bit FET with Level Shifting	16210			✔					
20-Bit FET with Precharged Outputs	16800				✔	✔			
24-Bit FET	16211	✔	✔	✔	✔	✔			
24-Bit FET with Bus Hold	16211			✔					
24-Bit FET with Level Shifting	16211			✔					
24-Bit FET with Precharged Outputs	16811	✔			✔				
24-Bit FET with Schottky Diode Clamping	16211			✔					
32-Bit FET	34X245			✔					
	32245			✔					
32-Bit FET with Active Clamp Undershoot Protection	32245	✔		✔					

Backplane Logic

DESCRIPTION	TYPE	TECHNOLOGY				
		ABTE	FB	GTL	GTLP	VME
1:6/1:2 GTLP-to-LVTTL Fanout Drivers	817				✔	
Dual 1-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Bus Transceivers with Split LVTTL Port, Feedback Path, and Selectable Polarity	1395				✔	
	21395				✔	
2-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Bus Transceivers with Selectable Polarity	1394				✔	
7-Bit TTL/BTL Transceivers (IEEE Std 1194.1)	2041		✔			
8-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Registered Transceivers with Split LVTTL Port and Feedback Path	22033				✔	
	2034				✔	
	22034				✔	
8-Bit LVTTL-to-GTLP Bus Transceivers with Bus Hold	306				✔	
8-Bit TTL/BTL Registered Transceivers (IEEE Std 1194.1)	2033		✔		✔	
8-Bit TTL/BTL Transceivers (IEEE Std 1194.1)	2040		✔			

Specialty Logic

Bus-Termination Arrays and Networks

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

DESCRIPTION	TYPE	TECHNOLOGY				
		ABTE	FB	GTL	GTLP	VME
8-Bit Universal Bus Transceivers and Two 1-Bit Bus Transceivers with 3-State Outputs	22501					✔
9-Bit TTL/BTL Address/Data Transceivers (IEEE Std 1194.1)	2031		✔			
11-Bit Incident Wave Switching Bus Transceivers with 3-State and Open-Collector Outputs	16246	✔				
16-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Bus Transceivers with Bus Hold	1645				✔	
16-Bit LVTTL-to-GTL/GTL+ Universal Bus Transceivers with Live Insertion	1655			✔		
16-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Universal Bus Transceivers with Bus Hold	1655				✔	
16-Bit Incident Wave Switching Bus Transceivers with 3-State Outputs	16245	✔				
16-Bit LVTTL-to-GTLP Bus Transceivers with Bus Hold	16945				✔	
17-Bit LVTTL-to-GTL/GTL+ Universal Bus Transceivers with Buffered Clock Outputs	16616			✔		
17-Bit LVTTL-to-GTLP Universal Bus Transceivers with Buffered Clock and Bus Hold	16916				✔	
17-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Universal Bus Transceivers with Buffered Clock and Bus Hold	1616				✔	
17-Bit TTL/BTL Universal Storage Transceivers with Buffered Clock Lines (IEEE Std 1194.1)	1651		✔			
17-Bit LVTTL/BTL Universal Storage Transceivers with Buffered Clock Lines (IEEE Std 1194.1)	1653		✔			
18-Bit TTL/BTL Universal Storage Transceivers (IEEE Std 1194.1)	1650		✔			
18-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Universal Bus Transceivers with Bus Hold	1612				✔	
18-Bit LVTTL-to-GTL/GTL+ Universal Bus Transceivers	16612			✔		
18-Bit LVTTL-to-GTLP Universal Bus Transceivers with Bus Hold	16612				✔	
	16912				✔	
18-Bit LVTTL-to-GTL/GTL+ Bus Transceivers	16622			✔		
	16923			✔		
18-Bit LVTTL-to-GTLP Bus Transceivers with Source-Synchronous Clock Outputs and Bus Hold	1627				✔	
	16927				✔	
32-Bit LVTTL-to-GTLP Adjustable-Edge-Rate Bus Transceivers with Bus Hold	3245				✔	
32-Bit LVTTL-to-GTLP Bus Transceivers with Bus Hold	32945				✔	
34-Bit LVTTL-to-GTLP Universal Bus Transceivers with Bus Hold	32916				✔	
36-Bit LVTTL-to-GTLP Universal Bus Transceivers with Bus Hold	32912				✔	

Specialty Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Boundary Scan (JTAG) Bus Devices

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			ABT	BCT	LVT
Scan Test Devices with Octal Buffers	3S	8240		✔	
		8244		✔	
Scan Test Devices with Octal Bus Transceivers and Registers	3S	8646	✔		
		8652		✔	
Scan Test Devices with Octal D-Type Latches	3S	8373		✔	
Scan Test Devices with Octal D-Type Edge-Triggered Flip-Flops	3S	8374	✔		
Scan Test Devices with Octal Registered Bus Transceivers	PP	8543	✔		
		8952	✔		
Scan Test Devices with Octal Transceivers	3S	8245	✔	✔	
Scan Test Devices with 18-Bit Bus Transceivers	PP	18245	✔		
Scan Test Devices with 18-Bit Inverting Bus Transceivers	PP	18640	✔		
Scan Test Devices with 18-Bit Transceivers and Registers	3S	18646	✔		✔
		182646	✔		✔
		18652	✔		✔
		182652	✔		✔
Scan Test Devices with 18-Bit Universal Bus Transceivers	3S	18502	✔		✔
		182502	✔		✔
		18511			✔
		18512			✔
		182512			✔
Scan Test Devices with 20-Bit Universal Bus Transceivers	3S	18504	✔		✔
		182504	✔		✔
		18514			✔

Specialty Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Boundary Scan (JTAG) Support Devices

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			ACT	ACT	LVT
Embedded Test Bus Controllers with 8-Bit Generic Host Interfaces	3S	8980			✔
Test Bus Controllers IEEE Std 1149.1 (JTAG) TAP Masters with 16-Bit Generic Host Interfaces	3S	8990		✔	
10-Bit Addressable Scan Ports Multidrop-Addressable IEEE Std 1149.1 (JTAG) TAP Transceivers	PP	8996	✔		✔
10-Bit Linking Addressable IEEE Std 1149.1 (JTAG) TAP Transceivers	3S	8986			✔
Scan-Path Linkers with 4-Bit Identification Buses Scan-Controlled IEEE Std 1149.1 (JTAG) TAP Concatenators	3S	8997		✔	

Bus-Termination Arrays and Networks

DESCRIPTION	TYPE	TECHNOLOGY			
		ACT	CD4K	F	S
Dual 4-Bit Programmable Terminators	40117		✔		
8-Bit Schottky Barrier Diode Bus-Termination Arrays	1056			✔	
10-Bit Bus-Termination Networks with Bus Hold	1071	✔			
12-Bit Schottky Barrier Diode Bus-Termination Arrays	1050				✔
	1051				✔
16-Bit Bus-Termination Networks with Bus Hold	1073	✔			
16-Bit Schottky Barrier Diode Bus-Termination Arrays	1052				✔
	1053				✔
16-Bit Schottky Barrier Diode R-C Bus-Termination Arrays	1016			✔	

DIMM Memory Drivers and Transceivers

DESCRIPTION	TYPE	TECHNOLOGY
		HSTL
9-Bit to 18-Bit HSTL-to-LVTTL Memory Address Latches	16918	✔
9-Bit to 18-Bit HSTL-to-LVTTL Memory Address Latches with Input Pullup Resistors	16919	✔
14-Bit to 28-Bit HSTL-to-LVTTL Memory Address Latches	162822	✔

Specialty Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Synchronous FIFO Memories

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY							
			ABT	ACT	ALS	ALVC	CD4K	HC	HCT	S
16 4	3S	232			✔					
		40105					✔	✔	✔	
16 5	3S	225								✔
		229			✔					
64 4	3S	236			✔					
64 18	3S	7814		✔						
64 18 3.3-V	3S	7814				✔				
256 18	3S	7806		✔						
256 18 3.3-V	3S	7806				✔				
512 18	3S	7804		✔						
512 18 3.3-V	3S	7804				✔				
512 18 2 Bidirectional	3S	7820	✔							
1024 9 2 Bidirectional	3S	2235		✔						
1024 18	3S	7802		✔						
2048 9	3S	7808		✔						

Synchronous FIFO Memories

DESCRIPTION	OUTPUT	TYPE		TECHNOLOGY		
			ABT	ACT	ALVC	V
64 1 2 Independent	3S	2226		✔		
		2227		✔		
64 18	3S	7813		✔		
64 18 3.3-V	3S	7813			✔	
64 36 2 Bidirectional	3S	3612	✔			
		3614	✔			
256 1 2 Independent	3S	2228		✔		
		2229		✔		
256 18	3S	7805		✔		
256 18 3.3-V	3S	7805			✔	

Specialty Logic

Synchronous FIFO Memories (continued)

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY			
			ABT	ACT	ALVC	V
256 36 2 Bidirectional	3S	3622		✔		
512 18	3S	7803		✔		
512 18 3.0-V	3S	215				✔
		7803			✔	
512 18 2 Bidirectional	3S	7819	✔			
512 36	3S	3631		✔		
512 36 2 Bidirectional	3S	3632		✔		
1024 18	3S	7801		✔		
		7811		✔		
		7881		✔		
1024 18 3.3-V	3S	225				✔
1024 36	3S	3641		✔		
1024 36 3.3-V	3S	3640				✔
2048 9	3S	7807		✔		
2048 18	3S	7882		✔		
2048 18 3.3-V	3S	235				✔
2048 36	3S	3651		✔		
2048 36 3.3-V	3S	3650			✔	
		3651				✔
4096 18 3.3-V	3S	245				✔
4096 36 3.3-V	3S	3660				✔
8192 18 or 16384 9 3.3-V	3S	263				✔
8192 36 3.3-V	3S	3670				✔
16384 18 or 32768 9 3.3-V	3S	273				✔
16384 36 3.3-V	3S	3680				✔
32768 18 or 65536 9 3.3-V	3S	283				✔
32768 36 3.3-V	3S	3680				✔
65536 18 or 131072 9 3.3-V	3S	293				✔

Specialty Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

IEEE Std 1284 (Parallel Port Interface)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			ACT	LV	LVC
7-Bit Bus Interfaces	3S	1284	✔		
19-Bit Bus Interfaces	OD/PP	161284		✔	✔
19-Bit Translation Transceivers with Error-Free Power Up	OD/PP	E161284			✔
	OD/PP	Z161284			✔

Miscellaneous Gate and Delay Elements

DESCRIPTION	TYPE	TECHNOLOGY	
		CD4K	LS
Hex Delay Elements for Generating Delay Lines	31		✔
Dual Complementary Pairs Plus Inverters	4007	✔	
Hex Gates (Four Inverters, One 2-Input NOR, One 2-Input NAND)	4572	✔	

PLLs

DESCRIPTION	TYPE	TECHNOLOGY								
		AHC	AHCT	CD4K	HC	HCT	LS	LV-A	LVC	TTL
Lo w Power Monostable/Astable	4047			✔						
Monostable Multivibrators with Schmitt-Trigger Inputs	121									✔
Retriggerable	122						✔			
Single Retriggerable with Schmitt-Trigger Inputs	1G123								✔	
Dual	4098			✔						
Dual with Schmitt-Trigger Inputs	221				✔	✔	✔	✔		✔
Dual Precision	14538			✔						
Dual Retriggerable with Reset	123	✔	✔		✔	✔	✔	✔		✔
	423				✔	✔	✔			
Dual Retriggerable Precision	4538				✔	✔				

Specialty Logic

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

PLLs

DESCRIPTION	TYPE	TECHNOLOGY					
		ACT	CD4K	HC	HCT	LS	LV-A
Digital PLLs	297	✔		✔	✔	✔	
PLLs with VCO	4046		✔	✔	✔		✔
PLLs with VCO and Lock Detectors	7046			✔	✔		

Oscillators

DESCRIPTION	TYPE	TECHNOLOGY	
		LS	S
Single Voltage-Controlled	624	✔	
	628	✔	
Dual Voltage-Controlled	124		✔
	629	✔	

Rate Multipliers and Frequency Dividers/Timers

DESCRIPTION	TYPE	TECHNOLOGY		
		CD4K	LS	TTL
4-Bit Binary Rate Multipliers	4089	✔		
BCD Rate Multipliers	4527	✔		
Synchronous 6-Bit Binary Rate Multipliers	97			✔
24-Stage Frequency Dividers	4521	✔		
Programmable Frequency Dividers/Digital Timers	292		✔	
	294		✔	
Programmable Timers	4536	✔		
	4541	✔		

Universal Bus Functions

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Universal Bus Drivers (UBDs)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			ALVC	AVC	LVT
12-Bit with Parity Checker and Dual 3-State Outputs	3S	16903	✔		
16-Bit Quad 2 Input	3S	16334	✔	✔	
		162334	✔		
18-Bit	3S	16834	✔	✔	
		162834	✔		
		16835	✔	✔	✔
		162835	✔		
20-Bit	3S	162836	✔		

Universal Bus Exchangers (UBEs)

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY		
			ABT	ALVC	AVC
9-Bit 4-Port	3S	16409		✔	
		162409		✔	
12-Bit to 24-Bit Multiplexed	3S	16271		✔	
12-Bit to 24-Bit Registered	3S	16269		✔	✔
		16270		✔	
		162268		✔	
16-Bit to 32-Bit with Byte Masks	3S	162280		✔	
16-Bit Tri-Port	3S	32316	✔		
18-Bit to 36-Bit Registered	3S	16282		✔	
		162282		✔	
18-Bit Tri-Port	3S	32318	✔		

Universal Bus Functions

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Universal Bus Transceivers (UBTs)

DESCRIPTION	TYPE	TYPE	TECHNOLOGY								
			ABT	ALVC	ALVT	FCT	GTL	GTLP	LVC	LVT	VME
8-Bit and Two 1-Bit Split Outputs with Feedback Path	3S	22501									✔
16-Bit LVTTL-to-GTL/GTL+ with Live Insertion	3S	1655					✔				
16-Bit LVTTL-to-GTLP Adjustable-Edge-Rate	3S	1655						✔			
17-Bit LVTTL-to-GTLP Adjustable-Edge-Rate with Buffered Clock Outputs and Bus Hold	3S	1616						✔			
17-Bit LVTTL-to-GTL/GTL+	3S	16616					✔				
17-Bit LVTTL-to-GTLP with Buffered Clock	3S	16916						✔			
18-Bit	3S	16500	✔	✔		✔				✔	
		162500	✔			✔					
		16501	✔	✔		✔				✔	
		162501	✔			✔					
		16600	✔	✔							
		16601	✔	✔	✔						
		162601	✔	✔							
18-Bit with Boundary Scan	3S	18511								✔	
18-Bit with Parity Generators/Checkers	3S	16901		✔					✔		
18-Bit LVTTL-to-GTL/GTL+	3S	16612					✔				
18-BitLVTTL-to-GTLPwithBusHold	3S	16612						✔			
		16912						✔			
18-Bit LVTTL-to-GTLP Adjustable-Edge-Rate with Bus Hold	3S	1612						✔			
32-Bit	3S	32501	✔	✔							

Application Specific [CompactFlash™, SD Cards, Multimedia Cards (MMCs) I^2C]

DESCRIPTION	TYPE	TECHNOLOGY		
		AVC	LV-A	TXS
Voltage-Translation Transceivers for MMCs, SD Cards, Memory Stick-Compliant Products, SmartMedia Cards and xD-Picture Cards™	A406	✔		
Voltage-Translation Transceivers for MMCs, SD Cards and Memory Stick-Compliant Products	A406L	✔		
Low-Power, Dual-Supply, Level-Translating CompactFlash Interfaces with 16-Bit Data, 11-Bit Address	4320		✔	
Voltage-Translation Transceiver for MMC, SD Cards, and Memory Stick-Compliant Products with EMI Filter and IEC-Level ESD Protection	A406E	✔		
Comparator with Output Voltage-Level Translation	TXS03121			✔
Directionless Voltage-Translation Transceiver for MMC, SD Cards and Memory Stick-Compliant Products with EMI Filter and IEC-Level ESD Protection	TXS0206			✔
SDIO Port Expander with Voltage-Translation Transceiver	TXS02612			✔

Universal Bus Functions

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

Dual-Supply Translators

DESCRIPTION		TYPE	ALVC	AVC	CD4K	LVC
Single Bus Transceivers	Translate Between 1.2 V to 3.6 V	1T45		✔		
	Translate Between 1.65 V to 5.5 V	1T45				✔
Dual Bus Transceivers	Translate Between 1.2 V to 3.6 V	2T45		✔		
	Translate Between 1.65 V to 5.5 V	2T45		✔		✔
	Two DIR Pins to Translate Between 1.2 V to 3.6 V	2T245		✔		
Quad Bus Transceivers	Two DIR Pins to Translate Between 1.2 V to 3.6 V	4T245		✔		
	Four DIR Pins to Translate Between 1.2 V to 3.6 V	4T774		✔		
Six Channel Bus Transceivers	Translate Between 1.2 V to 3.6 V	6T245		✔		
Octal Bus Transceivers	Translate Between 1.4 V to 3.6 V	8T245				✔
	Translate Between 1.6 V to 5.5 V	8T245				✔
	Translate Between 2.3 V to 3.6 V and 3 V to 5.5 V	C3245				✔
	Translate Between 2.7 V to 3.6 V and 4.5 V to 5.5 V	4245				✔
	Translate Between 2.7 V to 5.5 V and 4.5 V to 5.5 V	C4245		✔		
16-Bit Bus Transceivers	Translate Between 1.4 V to 3.6 V	A164245		✔		
	Translate Between 1.4 V to 3.6 V and 1.2 V to 3.6 V	B164245		✔		
	Translate Between 1.65 V to 5.5 V	16T245				✔
	Translate Between 2.5 V to 3.3 V and 3.5 V to 5 V	164245	✔			
20-Bit Bus Transceivers	Translate Between 1.4 V to 3.6 V and 1.2 V to 3.6 V	20T245		✔		
24-Bit Bus Transceivers	Translate Between 1.4 V to 3.6 V and 1.2 V to 3.6 V	24T245		✔		
32-Bit Bus Transceivers	Translate Between 1.4 V to 3.6 V	B324245		✔		
	Translate Between 1.4 V to 3.6 V and 1.2 V to 3.6 V	32T245		✔		

Voltage-Level Translation

✔ *Product available in technology indicated* + *New product planned in technology indicated*
OC = open collector *CP = center pin* *OD = open drain* *PP = push-pull* *3S = 3-state*

ECL/TTL Translators

DESCRIPTION	OUTPUT	TYPE	TECHNOLOGY
			ECL
Octal	3S	10KHT5541	✔
Octal with Edge-Triggered D-Type Flip-Flops	3S	10KHT5574	✔
Octal TTL-to-ECL with Edge-Triggered D-Type Flip-Flops and Output Enable	PP	10KHT5578	✔
Octal TTL-to-ECL with Output	PP	10KHT5542	✔
		10KHT5543	✔

GTL/TTL Translators

DESCRIPTION	TYPE	TECHNOLOGY
		GTL
10-Bit Voltage Clamp	2010	✔
12-Bit GTL–/GTL/GTL+ to LVTTL	2007	✔
	2107	✔
13-Bit GTL–/GTL/GTL+ to LVTTL	2006	✔
Voltage Translators	1T57	✔
	1T58	✔
	1T97	✔
	1T98	✔

Dual-Supply Auto-Direction Sensing Translators

DESCRIPTION	TYPE		
		TXB	TXS
Single-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXB0101	✔	
Single-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXS0101		✔
Dual-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXB0102	✔	
Dual-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXS0102		✔
Quad-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXB0104	✔	
Quad-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXS0104E		✔
Six-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXB0106	✔	
Octal-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXB0108	✔	
Octal-Bit Bidirectional Translation Between 1.2 V to 3.6 V and 1.65 V to 5.5 V	TXS0108E		✔

Voltage-Level Translation

✔ Product available in technology indicated + New product planned in technology indicated
OC = open collector CP = center pin OD = open drain PP = push-pull 3S = 3-state

Translating Bus Switches

DESCRIPTION	TYPE	TECHNOLOGY			
		CB3T	CBT	CBTC	TVC
Single FET 2.5-V/3.3-V Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	1G125	✔			
Single FET Bus Switches with Level Shifting	D1G125		✔		
	D1G384		✔		
Dual FET Bus Switches with Level Shifting	D3306		✔		
Dual FET Bus Switches with Level Shifting and –2-V Undershoot Protection	D3305			✔	
	D3306			✔	
Dual Bus Switch Voltage Translators	3306	✔			
Dual 1-of-4 FET Multiplexers/Demultiplexers 2.5-V/3.3-V Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	3253	✔			
Dual Voltage Clamps	3306				✔
4-Bit 1-of-2 FET Multiplexing/Demultiplexing Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	3257	✔			
Quad FET Bus Switches with 5-V-Tolerant Level Shifters	3125	✔			
8-Bit FET Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	3245	✔			
10-Bit FET Bus Switches with Level Shifting	D3384		✔		
	D3861		✔		
10-Bit FET Bus Switches with Level Shifting and –2-V Undershoot Protection	D3384			✔	
10-Bit FET 2.5-V/3.3-V Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	3384	✔			
10-Bit Voltage Clamps	3010				✔
20-Bit FET Bus Switches with Level Shifting	D16210		✔		
20-Bit FET 2.5-V/3.3-V Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	16210	✔			
22-Bit Voltage Clamps	16222				✔
24-Bit FET Bus Switches with Level Shifting	D16211		✔		
24-Bit FET 2.5-V/3.3-V Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	16211	✔			
24-Bit FET Bus-Exchange Low-Voltage Bus Switches with 5-V-Tolerant Level Shifters	16212	✔			

1G00 — 1G97

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
1G00															✔	✔		✔	✔												✔												
1G02															✔	✔		✔	✔												✔												
1G04															✔	✔		✔	✔												✔												
1GU04															✔			✔	✔												✔												
1GX04																															✔												
1G06																		✔	✔												✔												
1G07																		✔	✔												✔												
1G08															✔	✔		✔	✔												✔												
1G0832																			+												✔												
1G10																			+												✔												
1G 11																			+												✔												
1G14															✔	✔		✔	✔												✔												
1G17																		✔	✔												✔												
1G18																			+												✔												
1G19																		✔	+												✔												
1G27																			+												✔												
1G29																			+												✔												
1G32															✔	✔		✔	✔												✔												
1G34																			✔												✔												
1G38																			+												✔												
1G57																			✔												✔												
1G58																			✔												✔												
1G66																		✔													✔												
1G74																		✔	✔																								
1G79																		✔	✔												✔												
1G80																		✔	✔												✔												
1G86																		✔	+												✔												
1G97															✔	✔		✔	✔												✔												

1G98 — 2G14

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																			OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
1G98																			✔												✔											
1G99																			✔												✔											
1G123																															✔											
1G125															✔	✔		✔	✔			✔	✔		✔						✔											
1G126															✔	✔		✔	✔												✔											
1G139																															✔											
1G240																		✔	+												✔											
1G244																		✔																									
1G245																		✔																									
1G332																			+												✔											
1G373																															✔											
1G374																															✔											
1G384																							✔																			
1G386																			+												✔											
1G3157																															✔											
1G3208																			+												✔											
1T45																				✔											✔											
1T57																			✔																							
1T58																			✔																							
1T97																			✔																							
1T98																			✔																							
2G00																		✔	+												✔											
2G02																		✔	+												✔											
2G04																		✔	+												✔											
2GU04																		✔													✔											
2G06																		✔	+												✔											
2G07																		✔	+												✔											
2G08																		✔	+												✔											
2G14																			+												✔											

2G17 — 32T245

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																			OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
2G17																			+												✔											
2G32																		✔	+												✔											
2G34																		✔	+												✔											
2G38																			+												✔											
2G53																		✔													✔											
2G66																		✔													✔											
2G74																															✔											
2G79																		✔	+												✔											
2G80																		✔	+												✔											
2G86																		✔	+												✔											
2G125																		✔	✔												✔											
2G126																		✔	✔												✔											
2G132																			+												✔											
2G157																			+												✔											
2G240																		✔	✔												✔											
2G241																		✔	+												✔											
2T45																				✔												✔											
3G04																			+												✔											
3GU04																															✔											
3G06																			+												✔											
3G07																			+												✔											
3G14																			+												✔											
3G17																			+												✔											
3G34																			+												✔											
8T245																				✔												✔											
16T245																				✔												✔											
20T245																				✔																							
24T245																				✔																							
32T245																				✔																							

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✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
00							✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔											✔	✔	✔	✔											
02							✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔											✔	✔	✔	✔											
03							✔			✔																			✔	✔													
04							✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔											✔	✔	✔	✔											
U04															✔			✔											✔		✔	✔											
05							✔			✔	✔		✔	✔	✔														✔		✔											
06										✔		✔						✔													✔	✔											
07										✔		✔						✔													✔	✔											
08							✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔											✔	✔	✔	✔											
09							✔			✔	✔																															
10							✔	✔	✔	✔	✔	✔	✔	✔		✔													✔	✔	✔	✔											
11							✔	✔	✔	✔			✔	✔															✔	✔	✔												
14										✔		✔	✔	✔	✔	✔	✔	✔											✔	✔	✔	✔											
16												✔																														
17												✔						✔																									
19										✔																																
20							✔	✔	✔	✔	✔		✔	✔															✔	✔	✔												
21							✔	✔	✔	✔																			✔	✔	✔												
25												✔																														
26										✔																																
27							✔	✔	✔	✔																			✔	✔	✔												
30							✔	✔	✔	✔																			✔	✔													
31										✔																																
32							✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔											✔	✔	✔	✔											
33							✔			✔																																
34																		✔																									
35							✔																																			
37							✔			✔	✔																																
38							✔		✔	✔	✔	✔																															

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✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
42										✔																		✔	✔														
45												✔																																
47										✔		✔																																
51										✔	✔																																
52																											✔																
73										✔																		✔	✔														
74							✔	✔	✔	✔	✔		✔	✔	✔	✔		✔											✔	✔	✔	✔												
75										✔																		✔	✔														
85										✔	✔																	✔	✔														
86							✔	✔	✔	✔	✔		✔	✔	✔	✔													✔	✔	✔	✔												
90										✔																																
92										✔																																
93										✔																		✔	✔														
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97												✔																														
107										✔		✔																✔	✔														
109							✔	✔	✔	✔			✔	✔														✔	✔														
112							✔		✔	✔	✔		✔	✔														✔	✔			✔											
121												✔																														
122										✔																																
123										✔		✔			✔	✔												✔	✔	✔													
124											✔																																
125	✔			✔	✔	✔			✔	✔					✔	✔	✔	✔										✔	✔	✔	✔												
126	✔			✔	✔	✔			✔	✔					✔	✔	✔	✔										✔	✔	✔	✔												
128												✔																														
132										✔	✔																	✔	✔	✔													
133							✔																																			
136										✔																																
137							✔																					✔	✔														

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✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																						OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
138							✔	✔	✔	✔	✔		✔	✔	✔	✔											✔	✔	✔	✔	✔												
139							✔			✔	✔		✔	✔	✔	✔												✔	✔	✔	✔												
140											✔																															
145										✔		✔																															
147																												✔	✔													
148																												✔														
150												✔																														
151							✔	✔	✔	✔	✔		✔	✔														✔	✔													
153							✔	✔	✔	✔			✔	✔														✔	✔													
154												✔																✔	✔													
155										✔																																
156							✔			✔																																
157							✔	✔	✔	✔	✔		✔	✔	✔	✔											✔	✔	✔	✔	✔												
158							✔	✔		✔			✔	✔	✔	✔												✔	✔													
159												✔																														
161							✔	✔	✔	✔			✔	✔														✔	✔	✔												
163							✔	✔	✔	✔	✔		✔	✔													✔	✔	✔	✔												
165							✔			✔			✔	✔														✔	✔	✔												
166							✔			✔																		✔	✔	✔												
169							✔			✔																		✔	✔	✔												
170							✔	✔	✔	✔																																
173										✔																																
174										✔																		✔	✔													
175							✔	✔	✔	✔	✔		✔	✔														✔	✔	✔												
175							✔	✔	✔	✔	✔	✔	✔	✔														✔	✔	✔												
181								✔		✔																																
190																												✔														
191							✔			✔																	✔	✔	✔													
192																												✔														

193 — 276

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
193							✔			✔																		✔	✔														
194								✔		✔																		✔	✔														
195																												✔															
215																																			✔								
221										✔		✔																✔	✔	✔													
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229																																			✔								
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235																																			✔								
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237																												✔	✔														
238													✔	✔														✔	✔														
240	✔			✔		✔	✔	✔	✔	✔	✔		✔	✔	✔	✔		✔										✔	✔	✔	✔												
241	✔			✔		✔	✔	✔	✔	✔	✔		✔	✔														✔	✔														
243							✔			✔																		✔	✔														
244	✔			✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔									✔	✔	✔	✔	✔											
245	✔			✔	✔	✔	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔		✔							✔	✔	✔	✔	✔				✔							
247										✔																																
250								✔																																		
251							✔		✔	✔			✔																✔	✔														
253							✔	✔	✔	✔			✔	✔															✔	✔														
257							✔	✔	✔	✔	✔		✔	✔														✔	✔	✔		✔											
258							✔	✔	✔	✔				✔															✔	✔														
259							✔			✔																			✔	✔														
260									✔		✔																																
263																																			✔								
266										✔																		✔														
273	✔					✔	✔			✔			✔	✔	✔	✔											✔	✔	✔	✔						✔							
276												✔																														

279 — 423

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																						OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
279										✔																																	
280							✔	✔	✔	✔	✔		✔	✔															✔	✔														
283									✔	✔	✔		✔	✔															✔	✔						✔							
286								✔																																			
292										✔																																	
293										✔																										✔							
294										✔																																	
297										✔				✔															✔	✔														
298								✔		✔																																		
299							✔		✔	✔			✔	✔															✔	✔														
306																																					✔							
323							✔						✔																															
348										✔																																	
354																													✔	✔														
356																														✔														
365										✔																			✔	✔														
366																													✔															
367										✔		✔			✔	✔													✔	✔	✔													
368										✔		✔																	✔	✔														
373	✔			✔		✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔												✔	✔	✔	✔											
374	✔			✔		✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔											✔	✔	✔	✔	✔											
375										✔																																	
377	✔								✔	✔																	✔	✔	✔														
378										✔																																	
390										✔																			✔	✔														
393										✔																			✔	✔	✔													
399										✔																	✔																
406																				✔																							
423										✔																			✔	✔														

Functional Cross-Reference

442 — 598

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																				OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
442										✔																																
465										✔																																
480																											✔															
518							✔																																			
520							✔																				✔															
521							✔		✔																																	
533	✔						✔		✔				✔	✔														✔	✔													
534	✔						✔						✔	✔														✔	✔													
540	✔			✔		✔	✔			✔			✔	✔	✔	✔											✔	✔	✔	✔	✔											
541	✔			✔		✔	✔		✔	✔			✔	✔	✔	✔											✔	✔	✔	✔	✔											
543	✔			✔		✔			✔																		✔				✔											
561							✔																																			
563							✔						✔	✔														✔	✔													
564							✔						✔	✔													✔	✔	✔													
569							✔																																			
573	✔			✔		✔	✔	✔	✔				✔	✔	✔	✔											✔	✔	✔	✔	✔											
574	✔			✔		✔	✔	✔	✔				✔	✔	✔	✔											✔	✔	✔	✔	✔											
575							✔	✔																																		
576							✔	✔																																		
577							✔																																			
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590										✔																		✔														
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595										✔				✔	✔																											
596										✔																		✔	✔													
597										✔																																
598										✔																																

599 — 684

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
599										✔																																	
620	✔						✔																																				
621							✔																																				
623	✔			✔			✔		✔	✔			✔	✔													✔	✔	✔															
624										✔																																	
628										✔																																	
629										✔																																	
638							✔	✔																																		
639							✔																																			
640	✔			✔			✔	✔		✔																		✔	✔														
641							✔	✔		✔																																	
642							✔			✔																																	
645							✔	✔		✔																			✔	✔														
646	✔					✔				✔			✔	✔													✔	✔	✔		✔												
648							✔	✔		✔																																	
651	✔																																										
652	✔					✔	✔			✔			✔	✔													✔	✔	✔		✔												
653							✔																																				
654							✔																																				
657	✔								✔																																		
666							✔																																				
667							✔																																				
669										✔																																		
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673										✔																																		
674										✔																																		
679							✔																																				
682										✔																			✔														
684										✔																			✔														

688 — 873

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
688							✔			✔																		✔	✔														
697										✔																																		
746							✔																																				
756				✔				✔																																			
757				✔	✔			✔																																			
760				✔			✔	✔																																			
804							✔	✔																																			
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808								✔																																			
817																																				✔							
818																											✔																
821	✔							✔																							✔											
823	✔							✔																			✔				✔											
825								✔																			✔															
827	✔																										✔				✔											
828																															✔											
832							✔	✔																																			
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841	✔						✔	✔																			✔				✔											
843	✔						✔																																			
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853	✔																																									
857							✔																																			
861	✔																														✔											
863	✔																														✔											
867							✔	✔																																			
869							✔	✔																																			
870							✔																																			
873							✔	✔																																			

874 — 1444

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																			OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
874							✔	✔																																	
876							✔	✔																																	
885								✔																																	
990							✔																																	
992							✔																																	
994							✔																																	
996							✔																																	
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1073														✔																													
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1394																																					✔					
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1612 — 2373

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																						OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
1612																																					✔						
1616																																					✔						
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2235																																			✔								
2240	✔			✔			✔																				✔															
2241	✔			✔																																							
2244	✔			✔					✔																		✔				✔												
2245	✔			✔		✔			✔																		✔				✔												
2257																											✔																
2373									✔																		✔																

2374 — 3640

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
2374																											✔																
2414				✔																																							
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2543																											✔																
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2646																											✔																
2652																											✔																
2827	✔			✔																							✔																
2952	✔					✔																					✔				✔												
3010																																✔											
3125																					✔	✔	✔	✔	✔																		
3126																							✔		✔																		
3244																					✔		✔	✔																			
3245																					✔	✔	✔	✔	✔						✔						✔						
3251																					✔		✔		✔																		
3253																					✔	✔	✔	✔	✔																		
3257																					✔	✔	✔	✔	✔																		
3305																					✔			✔																			
3306																					✔	✔	✔	✔								✔											
3345																					✔		✔	✔																			
3383																						✔	✔	✔	✔																		
3384																					✔	✔	✔	✔	✔																		
3612																																			✔								
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3631																																			✔								
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3640																																			✔								

3641 — 4025

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																								OTHER								
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
3641																																			✔								
3650																																			✔								
3651																																			✔								
3660																																			✔								
3670																																			✔								
3680																																			✔								
3690																																			✔								
3857																									✔																			
3861																								✔	✔																			
4001																										✔																			
4002																										✔		✔																	
4007																										✔																			
4009																										✔																			
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4024																										✔		✔	✔																
4025																										✔																			

4026 — 4063

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																			OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
4026																										✔																
4027																										✔																
4028																										✔																
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4040																										✔		✔	✔	✔												
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4050																										✔		✔														
4051																										✔		✔	✔	✔												
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4053																										✔		✔	✔	✔												
4054																										✔																
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4056																										✔																
4059																										✔		✔														
4060																										✔		✔	✔													
4063																										✔																

4066 — 4503

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																								OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
4066															✔											✔		✔	✔	✔													
4067																										✔		✔	✔														
4068																										✔																	
4069																										✔																	
4070																										✔																	
4071																										✔																	
4072																										✔																	
4073																										✔																	
4075																										✔		✔	✔														
4076																										✔																	
4077																										✔																	
4078																										✔																	
4081																										✔																	
4082																										✔																	
4085																										✔																	
4086																										✔																	
4089																										✔																	
4093																										✔																	
4094																										✔		✔	✔														
4097																										✔																	
4098																										✔																	
4099																										✔																	
4245																										✔																	
4316																															✔												
4351																												✔	✔														
4352																												✔	✔														
4374																												✔															
4502																										✔																	
4503																										✔																	

4504 — 5402

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
4504																										✔																	
4508																										✔																	
4510																										✔																	
4511																										✔		✔	✔														
4512																										✔																	
4514																										✔		✔	✔														
4515																										✔		✔	✔														
4516																										✔																	
4517																										✔																	
4518																										✔		✔															
4520																										✔		✔	✔														
4521																										✔																	
4522																										✔																	
4527																										✔																	
4532																										✔																	
4536																										✔																	
4538																												✔	✔														
4541																										✔																	
4543																										✔		✔	✔														
4555																										✔																	
4556																										✔																	
4572																										✔																	
4585																										✔																	
4724																										✔																	
4851																												✔														
4852																												✔														
5400	✔																																										
5401	✔																																										
5402	✔																																										

5403 — 8244

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
5403	✔																																										
6800																					✔		✔	✔																				
6845																								✔																				
7001																												✔															
7002																												✔															
7032																												✔															
7046																												✔	✔														
7266																												✔															
7802																																			✔								
7803																																			✔								
7804																																			✔								
7805																																			✔								
7806																																			✔								
7807																																			✔								
7808																																			✔								
7811																																			✔								
7813																																			✔								
7814																																			✔								
7819																																			✔								
7820																																			✔								
7881																																			✔								
7882																																			✔								
8003								✔																																			
8151																														✔													
8153																														✔													
8154																														✔													
8157																														✔													
8240																																								✔			
8244																																								✔			

8245 — 11245

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
8245																																							✔			
8373																																							✔			
8374																																							✔			
8543																																							✔			
8550																																								✔		
8574																																									✔	
8575																																									✔	
8646																																							✔			
8652																																							✔			
8952																																							✔			
8980																																							✔			
8986																																							✔			
8990																																							✔			
8996																																							✔			
8997																																							✔			
9306																																								✔		
11000													✔	✔																													
11004													✔	✔																													
11008													✔	✔																													
11030														✔																													
11032													✔	✔																													
11074													✔	✔																													
11086													✔																													
11138													✔																													
11139														✔																													
11175													✔																													
11240													✔	✔																													
11244													✔	✔																													
11245													✔	✔																													

11257 — 16344

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																			OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
11257													✔	✔																												
11286														✔																												
11373														✔																												
11374														✔																												
11543														✔																												
11652														✔																												
14538																										✔																
16209																							✔																			
16210																					✔	✔	✔	✔	✔																	
16211																					✔	✔	✔	✔	✔																	
16212																						✔	✔	✔	✔																	
16213																							✔																			
16214																							✔	✔																		
16222																																✔									
16232																							✔																			
16233																							✔																			
16240	✔		✔			✔								✔	✔	✔	✔	✔									✔				✔											
16241	✔					✔																																			
16244	✔	✔	✔			✔							✔	✔	✔	✔	✔	✔		✔	✔		✔	✔			✔				✔											
16245	✔	✔	✔			✔							✔	✔		✔	✔	✔		✔	✔		✔	✔			✔				✔		✔								
16246																																	✔								
16260	✔																✔																								
16269																	✔			✔																					
16270																	✔																								
16271																	✔																								
16282																	✔																								
16292																							✔		✔																
16334																	✔			✔																					
16344																	✔																								

16373 — 16820

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																								OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
16373	✔		✔			✔							✔	✔	✔	✔	✔	✔		✔							✔				✔													
16374	✔		✔			✔							✔	✔	✔	✔	✔	✔		✔							✔				✔													
16390																							✔																					
16409																	✔																											
16460	✔																																											
16470	✔																																											
16500	✔					✔											✔										✔																	
16501	✔					✔											✔										✔																	
16524																	✔																											
16525																	✔																											
16540	✔														✔	✔															✔													
16541	✔					✔								✔	✔	✔															✔													
16543	✔					✔								✔			✔										✔				✔													
16600	✔																✔																											
16601	✔		✔														✔																											
16612																																				✔	✔								
16616																																				✔									
16622	✔													✔																							✔									
16623	✔																																											
16640	✔					✔								✔			✔			✔							✔				✔													
16646														✔																														
16651														✔																														
16652	✔					✔							✔	✔													✔				✔													
16657	✔													✔																														
16721																	✔																											
16722																				✔																								
16800																								✔	✔																		
16811																					✔			✔																			
16820																				✔																								

16821 — 18502

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
16821	✔		✔														✔																											
16823	✔													✔			✔										✔																	
16825	✔													✔			✔																											
16827	✔		✔											✔			✔			✔							✔																	
16831																	✔																											
16832																	✔																											
16833	✔																																									
16834																	✔			✔																								
16835						✔											✔			✔																								
16841	✔													✔			✔										✔																	
16843	✔																																									
16853	✔																																									
16857																																										✔
16859																																										✔
16861														✔									✔																				
16863	✔													✔			✔																											
16901																	✔														✔												
16903																	✔																											
16912																																					✔						
16916																																					✔						
16918																																						✔					
16919																																						✔					
16923																																					✔						
16927																																					✔						
16945	✔					✔																															✔						
16952														✔			✔										✔				✔													
16973																	✔																											
18245																																								✔			
18502																																								✔			

18504 — 32318

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
18504																																							✔			
18511						✔																																				
18512																																							✔			
18514																																							✔			
18640																																							✔			
18646																																							✔			
18652																																							✔			
21395																																					✔					
22033																																					✔					
22034																																					✔					
22501																																										✔
25244				✔	✔																																				
25245	✔			✔	✔																																				
25642				✔																																					
29821				✔			✔																																		
29823							✔																																		
29825				✔																																					
29827				✔			✔																																		
29828							✔																																		
29833							✔																																		
29843				✔																																					
29854							✔																																		
29863				✔			✔																																		
29864				✔																																					
32240						✔																									✔										
32244			✔			✔											✔	✔													✔										
32245	✔					✔											✔	✔			✔		✔								✔										
32316	✔																																									
32318	✔																																									

32373 — 162240

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
32373			✔			✔																									✔											
32374			✔			✔											✔	✔													✔												
32501	✔																✔																										
32543	✔																																									
32852																																										✔
32867																																										✔
32877																																										✔
32912																																					✔					
32916																																					✔					
32945																																					✔					
32973																	✔																										
40102																										✔																
40103																										✔		✔	✔														
40105																																			✔								
40106																										✔																
40107																										✔																
40109																										✔																
40110																										✔																
40117																										✔																
40147																										✔																
40161																										✔																
40174																										✔																
40175																										✔																
40192																										✔																
40193																										✔																
40194																										✔																
40257																										✔																
161284																														✔	✔											
162240						✔																					✔																

162241 — 162831

✔ Product available in technology indicated + New product planned in technology indicated

DEVICE	BiCMOS						BIPOLAR						CMOS																					OTHER									
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	PCA	PCF	VME
162241						✔																																				
162244	✔		✔			✔											✔										✔				✔												
162245	✔		✔			✔											✔										✔				✔												
162260	✔																✔																										
162268																	✔																										
162280																	✔																										
162282																	✔																										
162334																	✔																										
162344																	✔																										
162373						✔											✔										✔																
162374						✔											✔										✔																
162409																	✔																										
162460	✔																																									
162500	✔																										✔																
162501	✔																										✔																
162525																	✔																										
162541						✔																																				
162543																											✔																
162601	✔																✔																										
162646																											✔																
162652																											✔																
162721																	✔																										
162820																	✔																										
162822																																						✔					
162823	✔																										✔																
162825	✔																																										
162827	✔		✔														✔										✔																
162830																	✔																										
162831																	✔																										

162832 — 34X245

✔ *Product available in technology indicated* + *New product planned in technology indicated*

DEVICE	BiCMOS						BIPOLAR						CMOS																							OTHER							
	ABT	ALB	ALVT	BCT	64BCT	LVT	ALS	AS	F	LS	S	TTL	AC	ACT	AHC	AHCT	ALVC	AUC	AUP	AVC	CB3Q	CB3T	CBT	CBT-C	CBTLV	CD4K	FCT	HC	HCT	LV/LV-A/LV-AT	LVC	TVC	ABTE	FB	FIFO	GTL	GTLP	HSTL	JTAG	VME
162832																	✔																									
162834																	✔																									
162835																	✔																									
162836																	✔																									
162841	✔																✔										✔														
162952																											✔													
164245																	✔			✔																					
182502																																								✔	
182504																																								✔	
182512																																								✔	
182646																																								✔	
182652																																								✔	
322374						✔																																		
324245																				✔																					
34X245																							✔																		

TI's Definition of Lead(Pb)-Free

Pb-free at TI means semiconductor products that are compatible with the current Restriction of Hazardous Substances (RoHS) requirements for all six substances, including the requirement that lead not exceed 0.1 percent by weight in homogeneous material. Where designed to be soldered at high temperatures, TI Pb-free products are suitable for use in specified lead-free processes.

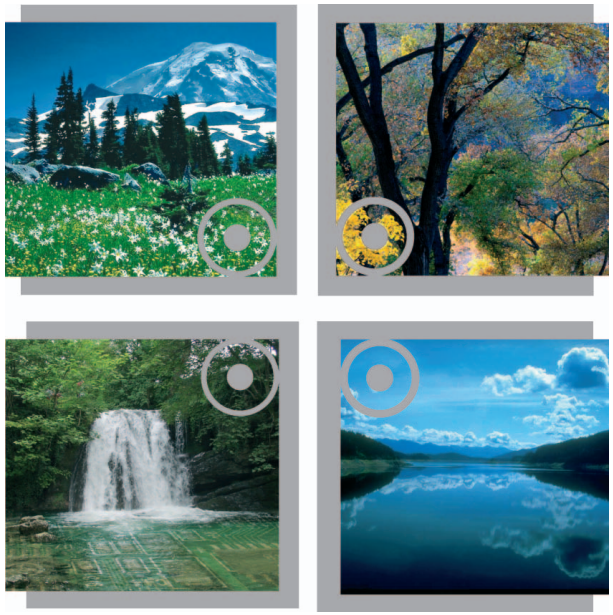
TI's Key Information Resources

General information: **www.ti.com/ecoinfo**

Substance and Pb-free schedule search tool: **www.ti.com/productcontent**

Frequently asked questions: **www.ti.com/leadfree**

Alternatively, you can contact your TI sales representative or an authorized TI distributor, or visit the worldwide Product Information Center: **support.ti.com**



TI's Pb-Free Initiative (RoHS Compatibility)

TI is committed to delivering Pb-free products that comply with RoHS.

We follow an aggressive migration roadmap and have already converted the majority of our semiconductor portfolio to Pb-free solutions.

TI's Proven Pb-Free Solutions

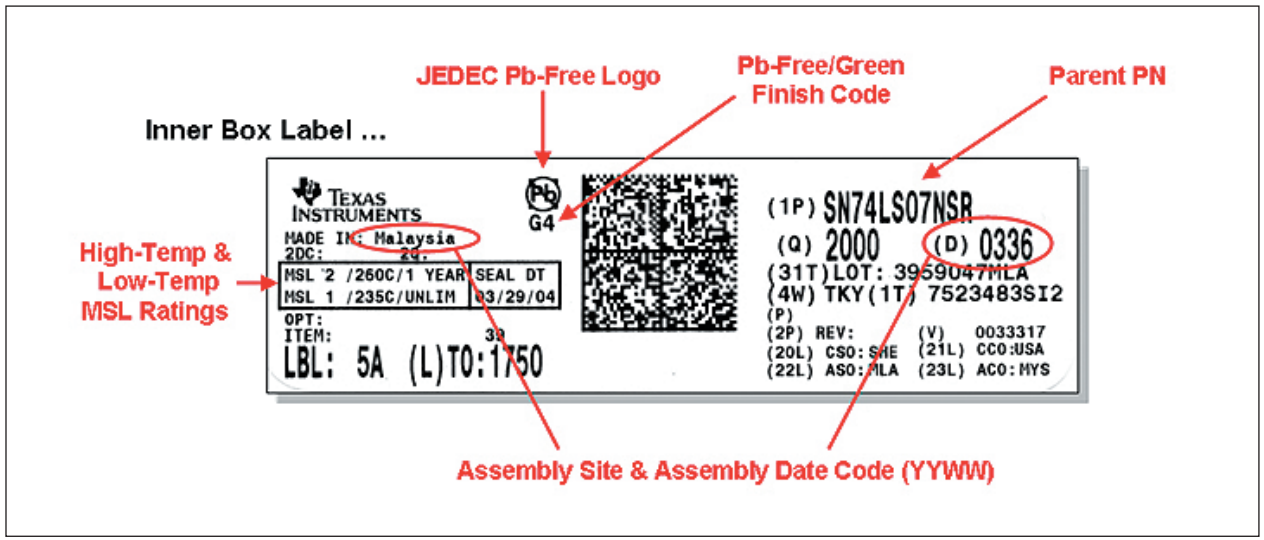
TI began removing lead (Pb) from semiconductor products more than a decade ago.

Nickel-palladium-gold (NiPdAu) is our primary Pb-free finish for leadframes.

The industry generally recognizes this finish as the proven, reliable (whisker-free) solution of choice.

We offer one of the most comprehensive selections of semiconductor products with NiPdAu finish.

The solder balls in our Pb-free array packages are based on the industry-standard tin-silver-copper (SnAgCu) process (lead solder-ball versions will continue to be available).



Package Options and Marking Information

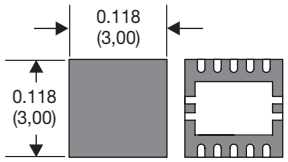
Pin	PDIP	SOIC	SOP	SSOP	QSOP	TSSOP
8	 P	 D	 PS	 DCT		 PW
14		 D	 NS	 DB		 PW
16	 N  NE	 D  DW	 NS	 DB	 DBQ	 PW
18	 N	 DW				
20	 N	 DW	 NS	 DB	 DBQ	 PW
24	 NT	 DW	 NS	 DB	 DBQ	 PW
28		 DW		 DB  DL		 PW
38						 DBT
48				 DL		 DGG
56				 DL		 DGG
64						 DGG

Package Options and Marking Information

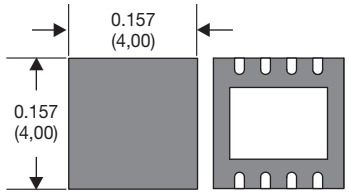
Pin	VSSOP	TVSOP	SOT	QFN	MIRCO QFN	WCSP	XLGA
3			DBZ PK				
4			DCY DZD	DRS		YFP YZV	YFM
5			DBV DCK DRL DRT			YZP YEA/YZA	
6			DCK DBV DRL DRT DCQ		DRY DSF	YZP YFP YEA/YZA YFC	
8	DGN DDU DGK DCU		DCN	DRG DRJ	DQE RSE	YFP YZP YEA/YZA	
9						YFP	
10	DGS			DRC	RSE	YZP	
12				RSF	RUE	YFC YZT	
14		DGV		RGY	RUC		
16		DGV		RGT RTE RGY	RSV	YFP	
20		DGV		RGW RGY		YFP	
24		DGV		RTW RGE RHL RGE			
25						YFP	
30						YFC	
32				RGJ RSM RHB			
36				RHH			
42				RVA			
48		DGV					
56		DGV		RHU RGQ			
80		DBB					

Pin	BGA
8	YFP
12	ZXU
20	ZXY VFBGA GQN/ZQN
24	ZQS VFBGA GQL/ZQL
48	ZAH ZQC
54	ZRD
56	VFBGA GQL/ZQL
83	ZRG
96	VFBGA GKE/ZKE ZRL
114	VFBGA GKF/ZKF

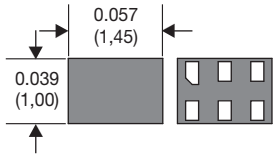
Typical Package Dimensions



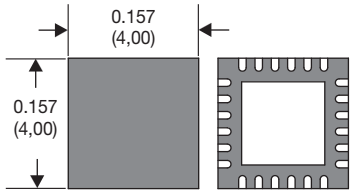
10-Pin
QFN (DRC)
Lead Pitch = 0.020 (0,50)
Height = 0.035 (0,90)
Area = 0.014 (9,03)



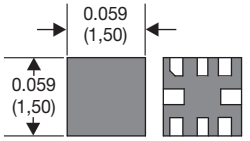
8-Pin
QFN (DRJ)
Lead Pitch = 0.031 (0,80)
Height = 0.029 (0,75)
Area = 0.025 (16,13)



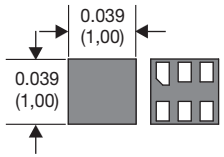
6-Pin
Micro QFN (DRY)
Lead Pitch = 0.020 (0,50)
Height = 0.022 (0,55)
Area = 0.002 (1,29)



24-Pin
QFN (RGE)
Lead Pitch = 0.020(0,50)
Height = 0.035 (0,90)
Area = 0.025 (16,13)



8-Pin
QFN (RSE)
Lead Pitch = 0.020 (0,50)
Height = 0.022 (0,55)
Area = 0.003 (1,94)

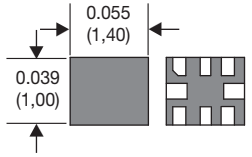


6-Pin Micro
QFN (DSF)
Lead Pitch = 0.014 (0,35)
Height = 0.014 (0,37)
Area = 0.001 (0,645)

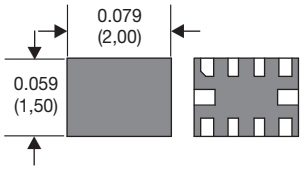
For more TI logic packaging offerings, visit:

logic.ti.com

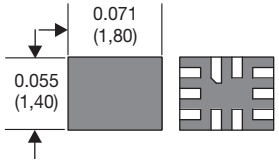
Dimensions are in inches (millimeters)



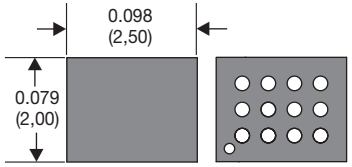
8-Pin Micro
QFN (DQE)
Lead Pitch = 0.014 (0,35)
Height = 0.014 (0,37)
Area = 0.002 (1,29)



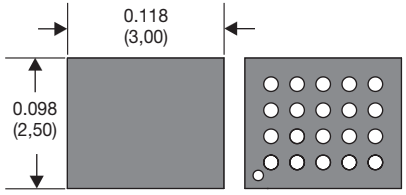
10-Pin
QFN (RSE)
Lead Pitch = 0.020 (0,50)
Height = 0.022 (0,55)
Area = 0.005 (3,23)



10-Pin
QFN (RSW)
Lead Pitch = 0.016 (0,40)
Height = 0.020 (0,50)
Area = 0.004 (2,58)

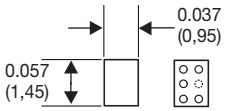


12-Ball
PBGA (ZXU)
Ball Pitch = 0.020 (0,50)
Height = 0.014 (0,363)
Area = 0.008 (5,16)

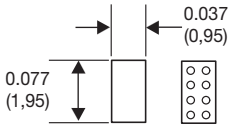


20-Ball
PBGA (ZXY)
Ball Pitch = 0.020 (0,50)
Height = 0.014 (0,363)
Area = 0.012 (7,74)

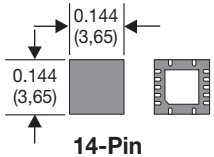
Typical Package Dimensions



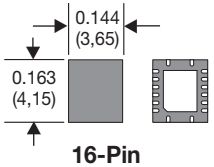
5-/6-Ball WCSP NanoFree™ Package (YZP)
Ball Pitch = 0.020 (0,50)
Height = 0.020 (0,50)
Area = 0.002 (1,26)



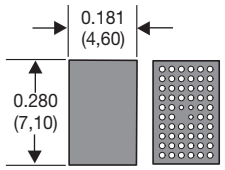
8-Ball WCSP NanoFree™ Package (YZP)
Ball Pitch = 0.020 (0,50)
Height = 0.020 (0,50)
Area = 0.003 (1,85)



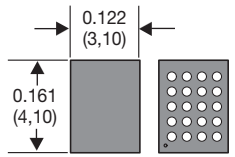
14-Pin QFN (RGY)
Lead Pitch = 0.020 (0,50)
Height = 0.039 (1,00)
Area = 0.021 (13,3)



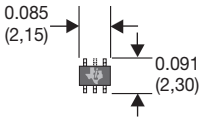
16-Pin QFN (RHL)
Lead Pitch = 0.020 (0,50)
Height = 0.039 (1,00)
Area = 0.023 (15,1)



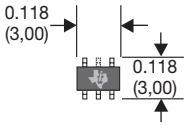
56-Ball VFBGA (GQL)
Ball Pitch = 0.026 (0,65)
Height = 0.039 (1,00)
Area = 0.051 (32,7)



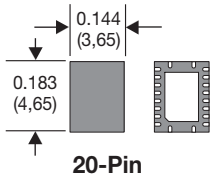
20-Ball PBGA (GQN)
Ball Pitch = 0.026 (0,65)
Height = 0.039 (1,00)
Area = 0.020 (12,7)



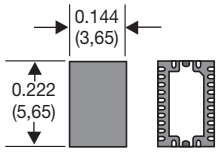
5-/6-Pin SC-70 (DCK)
Lead Pitch = 0.026 (0,65)
Height = 0.037 (0,95)
Area = 0.008 (4,95)



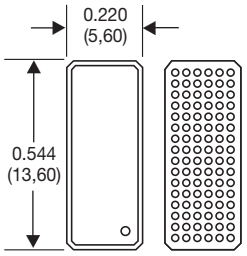
5-/6-Pin SOT-23 (DBV)
Lead Pitch = 0.037 (0,95)
Height = 0.047 (1,20)
Area = 0.014 (9)



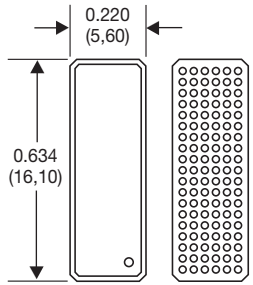
20-Pin QFN (RGY)
Lead Pitch = 0.020 (0,50)
Height = 0.039 (1,00)
Area = 0.026 (17,0)



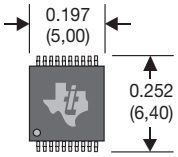
24-Pin QFN (RHL)
Lead Pitch = 0.020 (0,50)
Height = 0.039 (1,00)
Area = 0.032 (21,0)



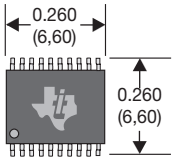
96-Ball LFBGA (GKE)
Ball Pitch = 0.031 (0,80)
Height = 0.055 (1,40)
Area = 0.139 (90,2)



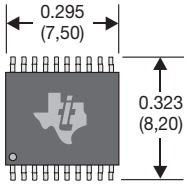
114-Ball LFBGA (GKF)
Ball Pitch = 0.031 (0,80)
Height = 0.055 (1,40)
Area = 0.139 (90,2)



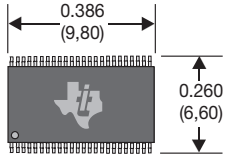
20-Pin TVSOP (DGV)
Lead Pitch = 0.016 (0,40)
Height = 0.047 (1,20)
Area = 0.050 (32)



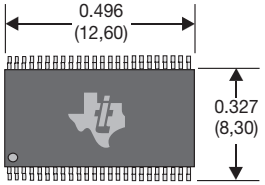
20-Pin TSSOP (PW)
Lead Pitch = 0.026 (0,65)
Height = 0.047 (1,20)
Area = 0.068 (44)



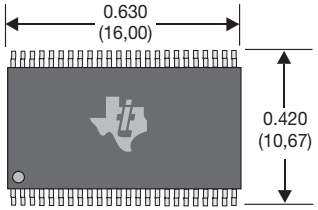
20-Pin SSOP (DB)
Lead Pitch = 0.026 (0,65)
Height = 0.079 (2,0)
Area = 0.095 (62)



48-Pin Widebus TVSOP (DGV)
Lead Pitch = 0.016 (0,40)
Height = 0.047 (1,20)
Area = 0.100 (63)



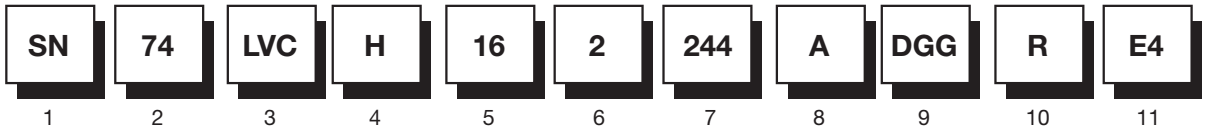
48-Pin Widebus TSSOP (DGG)
Ball Pitch = 0.026 (0,65)
Height = 0.039 (1,00)
Area = 0.051 (32,7)



48-Pin Widebus SSOP (DL)
Lead Pitch = 0.025 (0,635)
Height = 0.110 (2,79)
Area = 0.265 (171)

Device Names and Package Designators

Example:



1 Standard Prex

Examples: SN – Standard Prefix
SNJ – Conforms to MIL-PRF-38535 (QML)

2 Temperature Range

Examples: 54 – Military
74 – Commercial

3 Family

Examples: Blank – Transistor-Transistor Logic (TTL)
ABT – Advanced BiCMOS Technology
ABTE/ETL – Advanced BiCMOS Technology/ Enhanced Transceiver Logic
AC/ACT – Advanced CMOS Logic
AHC/AHCT – Advanced High-Speed CMOS Logic
ALB – Advanced Low-Voltage BiCMOS
ALS – Advanced Low-Power Schottky Logic
ALVC – Advanced Low-Voltage CMOS Technology
ALVT – Advanced Low-Voltage BiCMOS Technology
AS – Advanced Schottky Logic
AUC – Advanced Ultra-Low-Voltage CMOS Logic
AUP – Advanced Ultra-Low-Power CMOS Logic
AVC – Advanced Very Low-Voltage CMOS Logic
BCT – BiCMOS Bus-Interface Technology
CB3Q – 2.5-V/3.3-V Low-Voltage High-Bandwidth Bus-Switch Crossbar Technology Logic
CB3T – 2.5-V/3.3-V Low-Voltage Translator Bus-Switch Crossbar Technology Logic
CBT – Crossbar Technology
CBT-C – 5-V Bus-Switch Crossbar Technology Logic With –2-V Undershoot Protection
CBTLV – Low-Voltage Crossbar Technology Logic
F – F Logic
FB – Backplane Transceiver Logic/Futurebus+
GTL – Gunning Transceiver Logic
GTLP – Gunning Transceiver Logic Plus
HC/HCT – High-Speed CMOS Logic
HSTL – High-Speed Transceiver Logic
LS – Low-Power Schottky Logic
LV-A – Low-Voltage CMOS Technology
LV-AT – Low-Voltage CMOS Technology – TTL Compatible
LVC – Low-Voltage CMOS Technology
LVT – Low-Voltage BiCMOS Technology
PCA/PCF – I2C Inter-Integrated Circuit Applications
S – Schottky Logic
SSTL – Stub Series-Terminated Logic
SSTU – Stub Series-Terminated Ultra-Low-Voltage Logic
SSTV/SSTVF – Stub Series-Terminate Low-Voltage Logic
TVC – Translation Voltage Clamp Logic
VME – VERSAmodule Eurocard Bus Technology

4 Special Features

Examples: Blank = No Special Features
C – Configurable VCC (LVCC)
D – Level-Shifting Diode (CBTD)
H – Bus Hold (ALVCH) Circuitry (CBTK)
K – Undershoot-Protection Ports (LVCR)
R – Damping Resistor on Both Output
S – Schottky Clamping Diode (CBTS)
Z – Power-Up 3-State (LVCZ)

5 Bit Width

Examples: Blank = Gates, MSI, and Octals
1G – Single Gate
2G – Dual Gate
3G – Triple Gate
8 – Octal IEEE 1149.1 (JTAG)
16 – Widebus (16-, 18- and 20-bit)
18 – Widebus IEEE 1149.1 (JTAG)
32 – Widebus+ (32- and 36-bit)

6 Options

Examples: Blank = No Options Output Port
2 – Series Damping Resistor on One
4 – Level Shifter
25 – 25-Ω Line Driver

7 Function

Examples: 244 – Noninverting Buffer/Driver
374 – D-Type Flip-Flop
573 – D-Type Transparent Latch
640 – Inverting Transceiver

8 Device Revision

Examples: Blank = No Revision
Letter Designator A–Z

9 Packages

Commercial: D, DW – Small-Outline Integrated Circuit (SOIC)
DB, DBQ, DCT, DL – Shrink Small-Outline Package (SSOP)
DBB, DGV – Thin Very Small-Outline Package (TVSOP)
DBQ – Quarter-Size Small-Outline Package (QSOP)
DBV, DCK, DCY, PK – Small-Outline Transistor (SOT)
DCU – Very Thin Shrink Small-Outline Package (VSSOP)
DGG, PW – Thin Shrink Small-Outline Package (TSSOP)
FN – Plastic Leaded Chip Carrier (PLCC)
GGM, GKE, GKF, ZKE, ZKF – MicroStar BGA™ Low-Profile Fine-Pitch Ball Grid Array (LFBGA)
GQL, GQN, ZQL, ZQN, ZXU, ZXY – MicroStar Junio™ Very-Thin-Profile Fine-Pitch Ball Grid Array (VFBGA)
N, NT, P – Plastic Dual-In-Line Package (PDIP)
NS, PS – Small-Outline Package (SOP)
PAG, PAH, PCA, PCB, PM, PN, PZ – Thin Quad Flatpack (TQFP)
PH, PQ, RC – Quad Flatpack (QFP)
PZA – Low-Profile Quad Flatpack (LQFP)
RGQ, RGY, DRY, RSE, RSW, DRJ, DRC, RGE– Quad Flatpack No Lead (QFN)
YZP – NanoStar™ and NanoFree™ Die-Size Ball Grid Array (DSBGA†)

Military: FK – Leadless Ceramic Chip Carrier (LCCC)
GB – Ceramic Pin Grid Array (CPGA)
HFP, HS, HT, HV – Ceramic Quad Flatpack (CQFP)
J, JT – Ceramic Dual-In-Line Package (CDIP)
W, WA, WD – Ceramic Flatpack (CFP)

10 Tape and Reel

R – Tape and reel packing (standard reel quantities)
T – Tape and reel packing (short reel, 250 units)

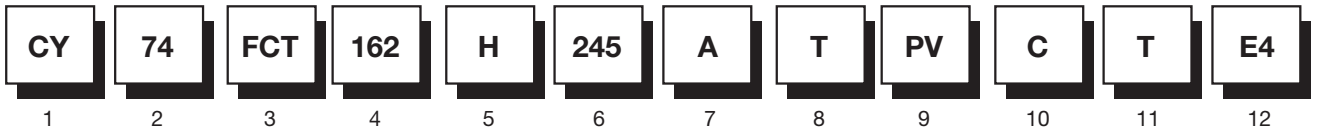
11 RoHS and Green Status

E_ – Conforms to JEDEC JESD97 E-Category specification for Pb-free and reduced environmentally unfriendly substances
G_ – Additional reductions in environmentally unfriendly substances (Sb and Br) in addition to E_ reductions

† DSBGA is the JEDEC reference for wafer chip scale package (WCSP).

Logic Products Formerly Offered by Cypress Semiconductor

Example:



1 Prex Designation for Acquired Cypress FCT Logic
May be blank to accommodate 18-character limitation

2 Temperature Range
Examples: 54 – Military (–55°C to 125°C)
74 – Commercial/Industrial (–40°C to 85°C)
29 – Commercial/Industrial or Military (see data sheet)

3 Family
Eample: FCT – FAST™ CMOS TTL Logic

4 16 or Greater Bit Width With Balanced Drive
Examples: Blank
16x – 16 or Greater Bit Width With Balanced Drive
162 – Balanced Drive (series output resistors)

5 Bus Hold
Examples: Blank = No Bus Hold
H – Bus Hold (present only when preceded by 16x – see item 4)

6 Type Designation
Up to Five Digits
Examples: 245
1652
16245

7 Speed Grade
Examples: Blank = Standard Speed Grade
A
B
C
D

8 TTL or CMOS Outputs
Examples: Blank = CMOS Outputs
T – TTL Outputs

9 Packages
Examples: P – Plastic Dual-In-Line Package (PDIP) (N)
PA – Thin Shrink Small-Outline Package (TSSOP) (DGG/G)
PV – Shrink Small-Outline Package (SSOP) (DL)
Q – Quarter-Size Outline Package (QSOP) (DBQ)
SO – Small-Outline Integrated Circuit (SOIC) (DL)

10 Processing
Example: C – Commercial Processing

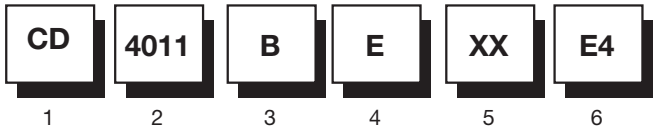
11 Tape and Reel
Example: T – Tape-and-Reel Packing

12 RoHS and Green Status
E_ – Conforms to JEDEC JESD97 E-Category specification for Pb-free and reduced environmentally unfriendly substances
G_ – Additional reductions in environmentally unfriendly substances (Sb and Br) in addition to E_ reductions

Logic Products Formerly Offered by Harris Semiconductor

CD4000 Nomenclature

Example:



1 Prex Designation for Acquired Harris Digital Logic

2 Type Designation
Up to Five Digits

3 Supply Voltage
Examples: A – 12 V Maximum
B – 18 V Maximum
UB – 18 V Maximum, Unbuffered

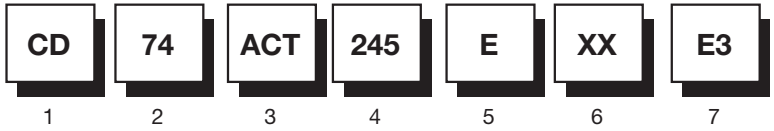
4 Packages
Examples: D – Ceramic Side-Brazed Dual-In-Line Package (DIP)
E – Plastic DIP
F – Ceramic DIP
K – Ceramic Flatpack
M – Plastic Surface-Mount Small-Outline Integrated Circuit (SOIC)
SM – Plastic Shrink SOIC (SSOP)
M96 – Reeled Plastic Surface-Mount SOIC
SM96 – Reeled Plastic Shrink SOIC (SSOP)

5 High–Reliability Screening
Military Products Only
Examples: 3 – Noncompliant With MIL-STD-883, Class B
3A – Fully Compliant With MIL-STD-883, Class B

6 RoHS and Green Status
E_ – Conforms to JEDEC JESD97 E-Category specification for Pb-free and reduced environmentally unfriendly substances
G_ – Additional reductions in environmentally unfriendly substances (Sb and Br) in addition to E_ reductions

CD-AC/CD-ACT Advanced CMOS and CD-HC/CD-HCT/CD-HCU High-Speed CMOS Nomenclature

Example:



1 Prex Designation for Acquired Harris Digital Logic

2 Temperature Range
Example: 54/74 – Military (–55°C to 125°C)

3 Family
Examples: AC – Advanced CMOS Logic, CMOS Input Levels
ACT – Advanced CMOS Logic, TTL Input Levels
HC – High-Speed CMOS Logic, CMOS Input Levels
HCT – High-Speed CMOS Logic, TTL Input Levels
HCU – High-Speed CMOS Logic, CMOS Input Levels, Unbuffered

4 Type Designation
Up to Five Digits

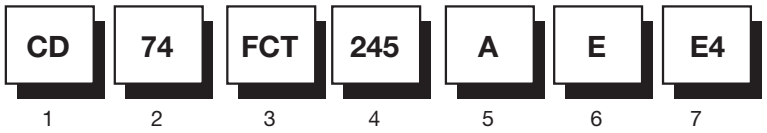
5 Packages
Examples: E – Plastic Dual-In-Line Package (DIP)
EN – Plastic Slim-Line 24-Lead DIP
F – Ceramic DIP
M – Plastic Surface-Mount Small-Outline Integrated Circuit (SOIC)
SM – Plastic Shrink SOIC (SSOP)
M96 – Reeled Plastic Surface-Mount SOIC
SM96 – Reeled Plastic Shrink SOIC (SSOP)

6 High–Reliability Screening
HiRel Products Only
Example: 3A – Fully Compliant With MIL-STD-883

6 RoHS and Green Status
E_ – Conforms to JEDEC JESD97 E-Category specification for Pb-free and reduced environmentally unfriendly substances
G_ – Additional reductions in environmentally unfriendly substances (Sb and Br) in addition to E_ reductions

Logic Products Formerly Offered by Harris Semiconductor

Example:



1 Prex Designation for Acquired Harris Digital Logic

2 Temperature Range
Example: 74 – Commercial (0°C to 70°C)

3 Family
Example: FCT – Bus Interface, TTL Input Levels

4 Type Designation
Up to Five Digits

5 Speed Grade
Example: Blank or A – Standard Equivalent to FAST™

6 Packages
Examples: E – Plastic Dual-In-Line Package (DIP)
EN – Plastic Slim-Line 24-Lead DIP
F – Ceramic DIP
M – Plastic Surface-Mount Small-Outline Integrated Circuit (SOIC)
SM – Plastic Shrink SOIC (SSOP)
M96 – Reeled Plastic Surface-Mount SOIC
SM96 – Reeled Plastic Shrink SOIC (SSOP)

7 RoHS and Green Status
E_ – Conforms to JEDEC JESD97 E-Category specification for Pb-free and reduced environmentally unfriendly substances
G_ – Additional reductions in environmentally unfriendly substances (Sb and Br) in addition to E_ reductions

Moisture Sensitivity by Package

Table A-1 lists the moisture sensitivity of TI packages by level. Some packages differ in level by pin count.

Table A-1. Logic Package Moisture Sensitivity by Levels

PACKAGE	LEVEL 1	LEVEL 2	LEVEL 2A	LEVEL 3	LEVEL 4
PLCC	FN (20/28)				
SOT	DBV (5) DCK (5)				
SOP		NS (14/16/20)† PS (8)†			
SOIC		D (8/14/16)† DW (16/20/24/28)†			
SSOP	DCT (8) DL (28/48/56)	DB (14/16/20/24/28/30/38)† DBQ (16/20/24)†			
QSOP		DBQ (16/20/24)†			
TSSOP	DGG (48/56/64)† PW (8/14/16/20/24)†				
TVSOP	DBB (80)† DGV (14/16/20/24/48/56)†				
VSSOP	DCU (8)				
QFN		RGY (14/16/20)†			
QFP		RC (52)			
TQFP		PAG (64) PCA (100) PN (80) PZ (100)			PM (64)
MicroStar BGA				GKE (96) GKF (114)	
MicroStar Junior BGA	YEA (5/8)		GQL (56)		

† Meets 250°C

NOTES: 1. No current device packages are moisture-sensitivity levels 5 or 6.
2. Some device types in these packages may have different moisture-sensitivity levels than shown.
3. All levels except level 1 are dry packed.

TI's through-hole packages (N, NT) have not been tested per the JESD22-A112A/JESD22-A113A standards. Due to the nature of the through-hole PCB soldering process, the component package is shielded from the solder wave by the PC board and is not subjected to the higher reflow temperatures experienced by surface-mount components.

TI's through-hole component packages are classified as not moisture-sensitive.

Moisture Sensitivity by Package

Table A-3 is a packaging cross-reference for TI and other semiconductor manufacturing companies.

Table A-3. Logic Packaging Competitive Cross-Reference

PACKAGE TYPE	NO. PINS	TI	TI-ACQUIRED HARRIS	TI-ACQUIRED CYPRESS	FAIRCHILD	IDT	IDT-ACQUIRED QUALITY	ON (formerly Motorola)	PERICOM	NXP	RENESAS	ST MICRO	TOSHIBA
DSBGA†	5	YZP‡	—	—	MicroPak™	—	—	—	—	—	—	—	—
	8	YZP‡	—	—	MicroPak™	—	—	—	—	—	—	—	—
LFBGA	96	GKF‡	—	—	G	BF	—	—	—	EC	—	—	—
	114	GKF‡	—	—	—	BF	—	—	NB	ED	—	—	—
PDIP	8	P	E	P	N, P, PC	P	P	P, N	P	N	—	EY	P
	14	N	E	P	N, P, PC	P	P	P, N	P	N	—	B, B1R, EY	P
	16	N	E	P	P, PC	P	—	P, N	P	N	—	B, B1R, EY	P
	20	N	E	P	P, PC	P	—	P, N	P	N	—	B, B1R, EY	P
	24	NT	EN	P	NT, SP	PT	—	N	P	N2	—	B, B1R, EY	P
	28	NT	—	P	—	PT	—	—	P	—	—	—	—
QSOP	16	DBQ	—	Q	—	Q	Q	—	—	—	—	—	—
	20	DBQ	—	Q	—	Q	Q	—	Q	—	—	—	—
	24	DBQ	—	Q	—	Q	Q	—	—	—	—	—	—
SOIC	14	D	M	SO	M, S, SC	DC	S1	D	W	D	RP	M/MTR, M1R/ RM13TR, M1/M013TR	FN
	16	D	D, M	SO	M, S, SC	DC	S1	D	W	D	RP	M/MTR, M1R/ RM13TR, M1/M013TR	FN
	16	DW	DW, M	SO	—	SO	S0	DW	S	—	—	M/MTR, M1R/ RM13TR, M1/M013TR	—
	20	DW	M	SO	WM, SC	SO	S0	DW	S	DW	RP	M/MTR, M1R/ RM13TR, M1/M013TR	FN
	24	DW	M	SO	WM, SC	SO	S0	DW	S	DW	RP	—	—
	28	DW	—	SO	—	SO	S0	—	S	DW	RP	—	—
SOP	14	NS	—	—	SJ	—	—	F, M(EL)	—	—	FP	—	—
	16	NS	—	—	SJ	—	—	F, M(EL)	—	—	FP	—	—
	20	NS	—	—	SJ	—	—	F, M(EL)	—	—	FP	—	—

Packaging Cross-Reference

Table A-3. Logic Packaging Competitive Cross-Reference (continued)

PACKAGE TYPE	NO. PINS	TI	TI-ACQUIRED HARRIS	TI-ACQUIRED CYPRESS	FAIRCHILD	IDT	IDT-ACQUIRED QUALITY	ON (formerly Motorola)	PERICOM	NXP	RENESAS	ST MICRO	TOSHIBA
SSOP	14	DB	—	—	—	—	—	SD	H	DB	—	—	—
	16	DB	SM	—	—	—	—	SD	H	DB	—	—	—
	16	DBQ	—	Q	—	Q	Q	—	Q	—	—	—	—
	20	DB	SM	—	MSA	PY	—	SD	H	DB	—	—	—
	20	DBQ	—	Q	QSC	Q	Q	—	Q	—	—	—	—
	24	DB	SM	—	MSA	PY	—	SD	H	DB	—	—	—
	24	DBQ	—	Q	—	Q	Q	—	Q	—	—	—	—
	28	DB	—	—	—	PY	—	—	H	DB	—	—	—
	30	DB	—	—	—	—	—	—	—	—	—	—	—
	38	DB	—	—	—	—	—	—	—	—	—	—	—
	28	DL	—	—	—	—	—	—	—	—	—	—	—
	48	DL	—	PV	MEA/SSC	PV	PV	—	V	DL	—	—	—
	56	DL	—	PV	MEA/SSC	PV	PV	—	V	DL	—	—	—
TSSOP	14	PW	—	—	MTC	—	—	DT	L	PW/DH	TTP	TTR	FS, FT
	16	PW	—	—	MTC	—	—	DT	L	PW/DH	TTP	TTR	FS, FT
	20	PW	—	—	MTC	PG	—	DT	L	PW/DH	TTP	TTR	FS, FT
	24	PW	—	—	MTC	PG	PA	DT	L	PW/DH	TTP	TTR	—
	28	PW	—	—	—	PG	—	—	L	—	TTP	TTR	—
	48	DGG	—	PA	MTC	PA	PA	DT	A	DGG	TTP	TTR	FT
	56	DGG	—	PA	MTC	PA	PA	DT	A	DGG	TTP	TTR	FT
	64	DGG	—	—	—	—	—	—	—	—	TTP	TTR	—
TVSOP	14	DGV	—	—	—	—	—	—	—	DGV	—	—	—
	16	DGV	—	—	—	—	—	—	—	—	—	—	—
	20	DGV	—	—	—	—	—	—	—	—	—	—	—
	24	DGV	—	—	—	—	—	—	—	—	—	—	—
	48	DGV	—	—	—	PF	Q1§	—	K¶	—	—	—	—
	16	DGV	—	—	—	PF	—	—	K6	—	—	—	—
	80	DBB	—	—	—	—	—	—	—	—	TTP	—	—

Table A-3. Logic Packaging Competitive Cross-Reference (continued)

PACKAGE TYPE	NO. PINS	TI	TI-ACQUIRED HARRIS	TI-ACQUIRED CYPRESS	FAIRCHILD	IDT	IDT-ACQUIRED QUALITY	ON (formerly Motorola)	PERICOM	NXP	RENESAS	ST MICRO	TOSHIBA
VFBGA	20	GQN‡	—	—	—	—	—	—	—	—	—	—	—
	56	GQL‡	—	—	—	—	—	—	—	—	—	—	—
Single Gate	5	DBV	—	—	P5	—	—	—	—	GV	—	STR	F
	5	DCK	—	—	M5	—	—	DF	—	GW	CM(E)	CTR	FU
Dual Gate	8	DCT	—	—	—	—	—	—	—	—	—	—	FU
	8	DCU	—	—	K8	—	—	—	—	—	US(E)	CTR	FK
Triple Gate	8	DCT	—	—	—	—	—	—	—	—	—	—	FU
	8	DCU	—	—	K8	—	—	—	—	—	US(E)	—	FK

† DSBGA is the JEDEC reference for wafer chip scale package (WCSP).
‡ Also available in lead-free (YZA).
§ Quality Semiconductor's QVSOP package has the same pitch but slightly different footprint than the TI TVSOP package.
¶ Pericom has a QVSOP with similar specifications and lead pitch to the TI TVSOP package.
# Tape-and-reel packaging is valid for surface-mount packages only. All orders must be for whole reels.
R = Standard tape and reel (required for DBB, DBV, and DGG; optional for D, DL, and DW packages).

Packaging Cross-Reference

Tables A-4 through A-7 list the standard pack quantities, by package type, for tubes, reels, boxes, and trays, respectively.

Table A-4. Tube Quantities

	PIN COUNT									
	8	**14**	**16**	**20**	**24**	**28**	**44**	**48**	**56**	**68**
DIP	50	25	25	20	15	13	N/A	N/A	N/A	N/A
PLCC	N/A	N/A	N/A	46	N/A	37	26	N/A	N/A	18
SOIC	75	50	40	25	25	20	N/A	N/A	N/A	N/A
SSOP	N/A	N/A	N/A	N/A	N/A	40	N/A	25	20	N/A

NOTE 1: QSOP (DBQ) and EIAJ devices (DB, NS, PS, and PW packages) are not available in tubes.

Table A-5. Reel Quantities

		PACKAGE DESIGNATOR	UNITS PER REEL
DSBGA†	5/8 pin	YZAR‡	3000
EIAJ surface mount		DBR/DBLE, NSR/NSLE, PWR/PWLE	2000
LFBGA	96/114 pin	GKE‡, GKF‡	1000
PLCC	20 pin	FNR	1000
	28 pin	FNR	750
	44 pin	FNR	500
QFN	14/16/20 pin	RGY	1000
	56 pin	RGQ	2000
QSOP	16/20/24 pin	DBQR	2500
SSOP	48/56 pin	DLR	1000
SOIC/SOP	14/16 pin	DR	2500
	Widebody 16 pin	DWR	2000
	20/24 pin	DWR	2000
	28 pin	DWR	1000
TQFP	64 pin	PMR	1000
TSSOP		DGGR	2000
VFBGA	20/56 pin	GQN‡, GQL‡	1000

† DSBGA is the JEDEC reference for wafer chip scale package (WCSP).
‡ Also available in lead-free.

Table A-6. Box Quantities

		PACKAGE DESIGNATOR	UNITS PER REEL
DIP		N	1000
		NT	750
		NP	700
SOIC		D, DW	1000
SSOP	48/56 pin	DL	1000

Table A-7. Tray Quantities

		PACKAGE DESIGNATOR	UNITS PER REEL
TQFP	64 pin	PM	160

Technical Literature

Listed below is the current collection of TI logic technical documentation. These documents can be ordered through a TI representative or authorized distributor by referencing the appropriate literature number.

Logic Data Books	Literature Number
ABT Logic Advanced BiCMOS Technology Data Book (1997)	SCBD002C
AC/ACT CMOS Logic Data Book (1997)	SCAD001D
AHC/AHCT Logic Advanced High-Speed CMOS Data Book (2000)	SCLD003B
ALS/AS Logic Data Book (1995)	SDAD001C
ALVC Advanced Low-Voltage CMOS Data Book	SCED006B*
AUC Advanced Ultra-Low-Voltage CMOS Data Book (2003)	SCED011A*
AVC Advanced Very-Low-Voltage CMOS Data Book (2000)	SCED008C*
HC/HCT Logic High-Speed CMOS Data Book (2003)	SCLD001E
74F Logic Data Book (1994)	SDFD001B
Digital Logic Pocket Data Book (2007)	SCYD013B*

Application Notes of Interest

Designing With Logic	SDYA009C*
Selecting the Right Level-Translation Solution	SCEA035A*
Understanding and Interpreting Standard-Logic Data Sheets	SZZA036B*

Other Useful Logic and Logic-Related Information

Standard Linear and Logic 5-Minute Guide	SLYB128A*
Design Considerations for Logic Products Application Book (1997)	SDYA002
Design Considerations for Logic Products Application Book, Volume 2 (1999)	SDYA018
Design Considerations for Logic Products Application Book, Volume 3 (2000)	SDYA019
Dual-Supply Level-Translation Product Clip	SCYB033A*

Other Useful Logic and Logic Related Information (Continued)	Literature Number
I²C Selection Guide	SSZC003A*
Little Logic Selection Guide	SCYT129B*
Logic Cross-Reference (2003)	SCYB017B*
Logic and Analog Packaging Migration Card	SSZB138
Configurable Multi-Function Little Logic Devices Product Clip	SCYB010*
Signal Switch Including Digital/Analog/Bilateral Switches and Voltage Clamps Data Book (2004)	SCDD003A*
Translation Selection Guide	SCYB018C

Other Information from Standard Linear and Logic

Data Transmission Circuits Data Book	SLLD001B
Analog Switch Selection Guide	SLYB125A*
AVCA (B) 164245 Translation Devices Application Clip	SCYB012*
LP2981/LP2985/LP2985LV Ultra-Low Dropout Regulator with Shutdown Product Clip	SCYB034*
PCF8574 and PCF8574A I/O Expanders Product Clip	SCYB031*
Precision Shunt Reference Solutions Product Clip	SLDB002*
System-Level ESD Protection Guide	SSZB130*
Available Literature and Support from Standard Linear and Logic (SLL) flier	SSZB132*
Industry Standard Operation Amplifiers flier	SLOB090*

* To download literature, substitute the listed literature number in the following URL. Do not include the asterisk or revision-letter suffix.
www-s.ti.com/sc/techlit/**literaturenumber**

Logic Purchasing Tool/Alternate Sources

Tables B-1 through B-6 list equivalent or similar product types for most logic families available in the industry, separated by voltage node and specialty logic. As the world leader in logic products, TI offers the broadest logic portfolio to meet your design needs.

Table B-1. 5-V Logic

TI	FAIRCHILD	IDT	ON	PERICOM	NXP	RENESAS	STMICRO	TOSHIBA
ABT	ABT				ABT			
AC	AC, ACQ		AC			AC	AC	AC
ACT	ACT, ACTQ		ACT			ACT	ACT	ACT
AHC	VHC		VHC		AHC		VHC	VHC
AHC1G	HS		VHC1G		AHC1G			TC7SH
AHCT	VHCT		VHCT		AHCT		VHCT	VHCT
AHCT1G	HST		VHC1GT		AHCT1G			TC7SET
ALS	ALS							
AS	AS							
BCT						BC		
CBT	FST	FST, QS	FST	PI5C				
CD4000	CD4000		MC14000		HEF4000		HCF4000	TC4000
F	FAST				FAST			
FCT		FCT		FCT				
HC	HC		HC		HC	HC	HC	HC
HCT	HCT		HCT		HCT	HCT	HCT	HCT
LS						LS		
LV-AT	VHCT							
S								
TTL								

Table B-2. 3.3-V Logic

TI	FAIRCHILD	IDT	ON	PERICOM	NXP	RENESAS	STMICRO	TOSHIBA
ALB								
ALVC	ALVC, VCX	ALVC	VCX		ALVC	ALVC	ALVC, VCX	VCX
AUP	ULP				AUP			
CBTLV/CB3Q		CBTLV, QS3VH		PI3B	CBTLV			
CB3T				PI3VT				
LV-A	LVX, VHC		LVX		LV	LV-A	LVX	LUX, VHC
LVC	LCX	LVC. FCT	LCX		LVC	LVC	LCX, LVC	LCX
LVT	LVT				LVT			

FAIRCHILD = Fairchild Semiconductor, IDT = Integrated Device Technology, ON = ON Semiconductor, PERICOM = Pericom Semiconductor, NXP = NXP Semiconductors, RENESAS = Renesas Technology, STMICRO = STMicroelectronics, TOSHIBA = Toshiba Semiconductor Company

Logic Purchasing Tool/Alternate Sources

Table B-3. 2.5-V Logic

TI	FAIRCHILD	NXP	PERICOM	STMICRO	TOSHIBA
ALVT		ALVT			
AVC	VCX	AVC		VCX	VCX
CB3Q			P13C		
CB3T			PI3VT		

Table B-4. 1.8-V Logic

TI	FAIRCHILD	NXP	TOSHIBA
AUC	VCX	AUC	VCX

Table B-5. Speciality Logic

TI	FAIRCHILD	NXP	PERICOM	RENESAS
GTL				
GTLP	GTLP	GTLP		
HSTL		HSTL	HSTL	
JTAG	SCAN			
TVC		GTL		
PCA, PCF		PCA, PCF		
SSTL		SSTL		
SSTU		SSTU	SSTU	
SSTV		SSTV	SSTV	SSTV

Table B-6. Little Logic

TI	FAIRCHILD	ON	NXP	PERICOM	RENESAS	STMICRO	TOSHIBA
SN74AHC1G	NC7S	MC74VHC1G	741HC1G		HD74LV1GA	74V1G	TC7SH
SN74AHCT1G	NC7ST	MC74VHC1GT	74AHCT1G		HD74LV1GT-A	74VIGT	TC7SET
SN74AUC1G	NC7SV	NL17SV					TC7SA/PA
SN74AHC2G	NC7WV						TC7PA
SN74AUP1G	NC7SP		74AUP1G				TC7SG
SN74AUP2G	NC7WP		74AUP2G				
SN74AUP3G	NC7NP		74AUP3G				
SN74AVC1T							
SN74AVC2T							
SN74CBT1G	NC7SZ				HD74CBT1G		TC7SB
SN74CBTD1G	NC7SZD						TC7SBD
SN74CBTLV1G							TC7SBL
SN74LVC1G	NC7SZ	NL17SZ	74LVC1G	PI74STX1G	HD74LVC1G	74LX1G	TC7SZ
SN74LVC1T							
SN74LVC2G	NC7WZ/WB	NL27WZ	74LVC2G	PI74STX2G	HD74LVC2G		TC7WZ
SN74LVC2T							
SN74LVC3G	NC7NZ	NL37WZ	74LVC3G		HD74LVC3G		TC7WZ

FAIRCHILD = Fairchild Semiconductor, IDT = Integrated Device Technology, ON = ON Semiconductor, PERICOM = Pericom Semiconductor, NXP = NXP Semiconductors, RENESAS = Renesas Technology, STMICRO = STMicroelectronics, TOSHIBA = Toshiba Semiconductor Company

TI Worldwide Technical Support

Internet

TI Semiconductor Product Information Center Home Page
support.ti.com

TI Semiconductor KnowledgeBase Home Page
support.ti.com/sc/knowledgebase

Product Information Centers

Americas	Phone	+1-972-644-5580
Brazil	Phone	0800-891-2616
Mexico	Phone	0800-670-7544
	Fax	+1-972-927-6377
	Internet	support.ti.com/sc/pic/americas.htm

Europe, Middle East, and Africa
Phone

European Free Call	00800-ASK-TEXAS (00800 275 83927)
International	+49 (0) 8161 80 2121
Russian Support	+7 (4) 95 98 10 701

Note: The European Free Call (Toll Free) number is not active in all countries. If you have technical difficulty calling the free call number, please use the international number above.

Fax	+49 (0) 8161 80 2045
Internet	support.ti.com/sc/pic/euro.htm

Japan
Fax

International	+81-3-3344-5317
Domestic	0120-81-0036

Internet

International	support.ti.com/sc/pic/japan.htm
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