Data sheet acquired from Cypress Semiconductor Corporation.
Data sheet modified to remove devices not offered.

CY74FCT16952T
CY74FCT162952T
CY74FCT162H952T

SCCS065C - August 1994 - Revised September 2001

16-Bit Registered Transceivers

Features

- **I_{off} supports partial-power-down mode operation**
- **Edge-rate control circuitry for significantly improved noise characteristics**
- **Typical output skew < 250 ps**
- **ESD > 2000V**
- **TSSOP (19.6-mil pitch) and SSOP (25-mil pitch) packages**
- **Industrial temperature range of –40˚C to +85˚C**
- **V_{CC} = 5V ± 10%**

CY74FCT16952T Features:

- **64 mA sink current, 32 mA source current**
- **Typical V_{OLP} (ground bounce) <1.0V at V_{CC} = 5V, T_A = 25˚C**

CY74FCT162952T Features:

- **Balanced 24 mA output drivers**
- **Reduced system switching noise**
- **Typical V_{OLP} (ground bounce) <0.6V at V_{CC} = 5V, T_A= 25˚C**

CY74FCT162H952T Features:

- **Bus hold retains last active state**
- **Eliminates the need for external pull-up or pull-down resistors**

Functional Description

These 16-bit registered transceivers are high-speed, low-power devices. 16-bit operation is achieved by connecting the control lines of the two 8-bit registered transceivers together. For data flow from bus A-to-B, $\overline{CEAB}$ must be LOW to allow data to be stored when CLKAB transitions from LOW-to-HIGH. The stored data will be present on the output when $\overline{OEAB}$ is LOW. Control of data from B-to-A is similar and is controlled by using the $\overline{CEBA}$, CLKBA, and $\overline{OEBA}$ inputs.

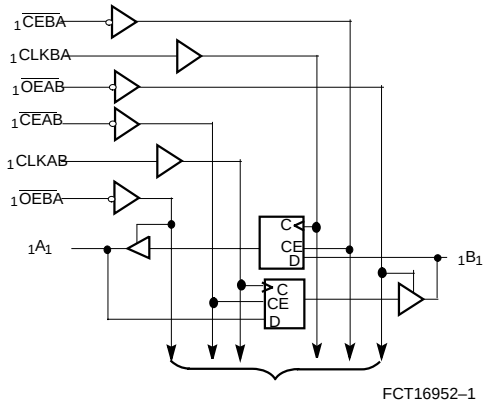
This device is fully specified for partial-power-down applications using I_{off}. The I_{off} circuitry disables the outputs, preventing damaging current backflow through the device when it is powered down.

The CY74FCT16952T is ideally suited for driving high-capacitance loads and low-impedance backplanes.

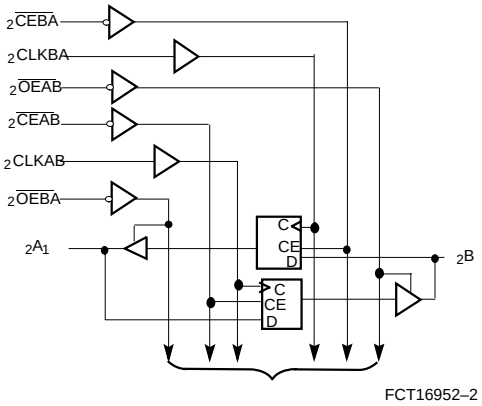
The CY74FCT162952T has 24-mA balanced output drivers with current-limiting resistors in the outputs. This reduces the need for external terminating resistors and provides for minimal undershoot and reduced ground bounce. The CY74FCT162952T is ideal for driving transmission lines.

The CY74FCT162H952T is a 24-mA balanced output part that has “bus hold” on the data inputs. The device retains the input’s last state whenever the input goes to high impedance. This eliminates the need for pull-up/down resistors and prevents floating inputs.

Logic Block Diagrams



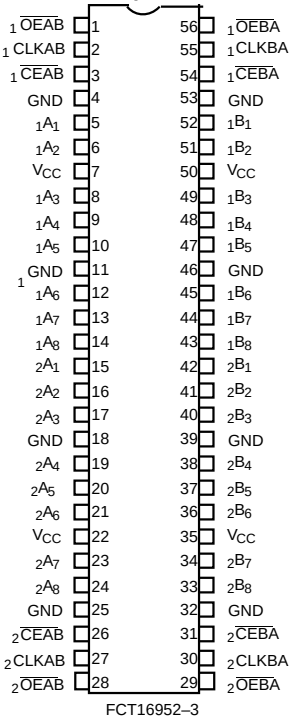
TO 7 OTHER CHANNELS



TO 7 OTHER CHANNELS

Pin Configuration

SSOP/TSSOP
Top View



Pin Description

Name	Description
$\overline{OEAB}$	A-to-B Output Enable Input (Active LOW)
$\overline{OEBA}$	B-to-A Output Enable Input (Active LOW)
$\overline{CEAB}$	A-to-B Clock Enable Input (Active LOW)
$\overline{CEBA}$	B-to-A Clock Enable Input (Active LOW)
CLKAB	A-to-B Clock Input
CLKBA	B-to-A Clock Input
A	A-to-B Data Inputs or B-to-A Three-State Outputs[1]
B	B-to-A Data Inputs or A-to-B Three-State Outputs[1]

Function Table[2, 3]

For A-to-B (Symmetric with B-to-A)

Inputs				Outputs
$\overline{CEAB}$	CLKAB	$\overline{OEAB}$	A	B
H	X	L	X	B[4]
X	L	L	X	B[4]
L	↑	L	L	L
L	↑	L	H	H
X	X	H	X	Z

Maximum Ratings[5, 6]

(Above which the useful life may be impaired. For user guidelines, not tested.)

Storage Temperature ..... –55°C to +125°C

Ambient Temperature with Power Applied..... –55°C to +125°C

DC Input Voltage ..... –0.5V to +7.0V

DC Output Voltage..... –0.5V to +7.0V

DC Output Current (Maximum Sink Current/Pin) .....–60 to +120 mA

Power Dissipation 1.0W

Static Discharge Voltage.....>2001V (per MIL-STD-883, Method 3015)

Operating Range

Range	Ambient Temperature	V_{CC}
Industrial	–40°C to +85°C	5V ± 10%

Notes:

1. On the CY74FCT162H952T these pins have bus hold.
2. A-to-B data flow is shown: B-to-A data flow is similar but uses, $\overline{CEBA}$, CLKBA, and $\overline{OEBA}$.
3. H = HIGH Voltage Level.
   L = LOW Voltage Level.
   X = Don't Care.
   ↑ = LOW-to-HIGH Transition.
   Z = HIGH Impedance.
4. Level of B before the indicated steady-state input conditions were established.
5. Operation beyond the limits set forth may impair the useful life of the device. Unless otherwise noted, these limits are over the operating free-air temperature range.
6. Unused inputs must always be connected to an appropriate logic voltage level, preferably either V_{CC} or ground.

Electrical Characteristics Over the Operating Range

Parameter	Description		Test Conditions		Min.	Typ.[7]	Max.	Unit
V_{IH}	Input HIGH Voltage				2.0			V
V_{IL}	Input LOW Voltage						0.8	V
V_H	Input Hysteresis[8]					100		mV
V_{IK}	Input Clamp Diode Voltage		V_{CC}=Min., I_{IN}= –18 mA			–0.7	–1.2	V
I_{IH}	Input HIGH Current	Standard	V_{CC}=Max., V_I=V_{CC}				±1	µA
		Bus Hold					±100	
I_{IL}	Input LOW Current	Standard	V_{CC}=Max., V_I=GND				±1	µA
		Bus Hold					±100	µA
I_{BBH} I_{BBL}	Bus Hold Sustain Current on Bus Hold Input[9]		V_{CC}=Min.	V_I=2.0V	–50			µA
				V_I=0.8V	+50			µA
I_{BHHO} I_{BHLO}	Bus Hold Overdrive Current on Bus Hold Input[9]		V_{CC}=Max., V_I=1.5V				TBD	mA
I_{OZH}	High Impedance Output Current (Three-State Output pins)		V_{CC}=Max., V_{OUT}=2.7V				±1	µA
I_{OZL}	High Impedance Output Current (Three-State Output pins)		V_{CC}=Max., V_{OUT}=0.5V				±1	µA
I_{OS}	Short Circuit Current[10]		V_{CC}=Max., V_{OUT}=GND		–80	–140	–200	mA
I_O	Output Drive Current[10]		V_{CC}=Max., V_{OUT}=2.5V		–50		–180	mA
I_{OFF}	Power-Off Disable		V_{CC}=0V, V_{OUT}≤4.5V[11]				±1	µA

Output Drive Characteristics for CY74FCT16952T

Parameter	Description	Test Conditions	Min.	Typ.[7]	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{CC}=Min., I_{OH}= –3 mA	2.5	3.5		V
		V_{CC}=Min., I_{OH}= –15 mA	2.4	3.5		V
		V_{CC}=Min., I_{OH}= –32 mA	2.0	3.0		V
V_{OL}	Output LOW Voltage	V_{CC}=Min., I_{OL}=64 mA		0.2	0.55	V

Output Drive Characteristics for CY74FCT162952T, CY74FCT162H952T

Parameter	Description	Test Conditions	Min.	Typ.[7]	Max.	Unit
I_{ODL}	Output LOW Current[10]	V_{CC}=5V, V_{IN}=V_{IH} or V_{IL}, V_{OUT}=1.5V	60	115	150	mA
I_{ODH}	Output HIGH Current[10]	V_{CC}=5V, V_{IN}=V_{IH} or V_{IL}, V_{OUT}=1.5V	–60	–115	–150	mA
V_{OH}	Output HIGH Voltage	V_{CC}=Min., I_{OH}= –24 mA	2.4	3.3		V
V_{OL}	Output LOW Voltage	V_{CC}=Min., I_{OL}=24 mA		0.3	0.55	V

Capacitance[8] (T_A = +25°C, f = 1.0 MHz)

Parameter	Description	Test Conditions	Typ.[7]	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	4.5	6.0	pF
C_{OUT}	Output Capacitance	V_{OUT} = 0V	5.5	8.0	pF

Note:

7. Typical values are at V_{CC}= 5.0V, T_A= +25°C ambient.
8. This parameter is specified but not tested.
9. Pins with bus hold are described in the Pin Description.
10. Not more than one output should be shorted at a time. Duration of short should not exceed one second. The use of high-speed test apparatus and/or sample and hold techniques are preferable in order to minimize internal chip heating and more accurately reflect operational values. Otherwise prolonged shorting of a high output may raise the chip temperature well above normal and thereby cause invalid readings in other parametric tests. In any sequence of parameter tests, I_{OS} tests should be performed last.
11. Tested at +25°C.

Power Supply Characteristics

Parameter	Description	Test Conditions[12]		Typ.[7]	Max.	Unit
I_{CC}	Quiescent Power Supply Current	V_{CC}=Max.	$V_{IN} \le 0.2V$ $V_{IN} \ge V_{CC}-0.2V$	5	500	μA
ΔI_{CC}	Quiescent Power Supply Current (TTL inputs HIGH)	V_{CC}=Max.	V_{IN}=3.4V[13]	0.5	1.5	mA
I_{CCD}	Dynamic Power Supply Current[14]	V_{CC}=Max., One Input Toggling, 50% Duty Cycle, Outputs Open, $\overline{OEAB}$ or $\overline{OEBA}$=GND	$V_{IN}=V_{CC}$ or V_{IN}=GND	75	120	μA/MHz
I_C	Total Power Supply Current[15]	V_{CC}=Max., F_1=5 MHz, F_0 = 10 MHz (CLKAB) $\overline{OEAB}$ = $\overline{CEAB}$ = GND $\overline{OEBA}$ = V_{CC} 50% Duty Cycle, Outputs Open, One Bit Toggling	$V_{IN}=V_{CC}$ or V_{IN}=GND	0.8	1.7	mA
			V_{IN}=3.4V or V_{IN}=GND	1.3	3.2	
		V_{CC}=Max., f_0=10 MHz (CLKAB) f_1=2.5 MHz, $\overline{OEAB}$ = $\overline{CEAB}$ = GND $\overline{OEBA}$ = V_{CC} 50% Duty Cycle, Outputs Open, Sixteen Bit Toggling	$V_{IN}=V_{CC}$ or V_{IN}=GND	3.8	6.5[16]	
			V_{IN}=3.4V or V_{IN}=GND	8.3	20.0[16]	

Notes:

12. For conditions shown as Max. or Min., use appropriate value specified under Electrical Characteristics for the applicable device type.
13. Per TTL driven input (V_{IN}=3.4V); all other inputs at V_{CC} or GND.
14. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
15. $I_C = I_{QUIESCENT} + I_{INPUTS} + I_{DYNAMIC}$
    $I_C = I_{CC}+\Delta I_{CC} D_H N_T + I_{CCD}(f_0/2 + f_1 N_1)$
    I_{CC} = Quiescent Current with CMOS input levels
    ΔI_{CC} = Power Supply Current for a TTL HIGH input (V_{IN}=3.4V)
    D_H = Duty Cycle for TTL inputs HIGH
    N_T = Number of TTL inputs at D_H
    I_{CCD} = Dynamic Current caused by an input transition pair (HLH or LHL)
    f_0 = Clock frequency for registered devices, otherwise zero
    f_1 = Input signal frequency
    N_1 = Number of inputs changing at f_1
    All currents are in milliamps and all frequencies are in megahertz.
16. Values for these conditions are examples of the I_{CC} formula. These limits are specified but not tested.

Switching Characteristics Over the Operating Range[17]

Parameter	Description	CY74FCT16952AT CY74FCT162952AT CY74FCT162H952AT		CY74FCT162952BT		Unit	Fig. No.[18]
		Min.	Max.	Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay CLKAB, CLKBA to B, A	2.0	10.0	2.0	7.5	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time $\overline{OEBA}$, $\overline{OEAB}$ to A, B	1.5	10.5	1.5	8.0	ns	1, 7, 8
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{OEBA}$, $\overline{OEAB}$ to A, B	1.5	10.0	1.5	7.5	ns	1, 7, 8
t_{SU}	Set-Up Time, HIGH or LOW A, B to CLKAB, CLKBA	2.5	—	2.5	—	ns	4
t_H	Hold Time, HIGH or LOW A, B to CLKAB, CLKBA	2.0	—	1.5	—	ns	4
t_{SU}	Set-Up Time, HIGH or LOW $\overline{CEAB}$, $\overline{CEBA}$ to CLKAB, CLKBA	3.0	—	3.0	—	ns	4
t_H	Hold Time, HIGH or LOW $\overline{CEAB}$, $\overline{CEBA}$ to CLKAB, CLKBA	2.0	—	2.0	—	ns	4
t_W	Pulse Width HIGH or LOW CLKAB or CLKBA[19]	3.0	—	3.0	—	ns	5
$t_{SK(O)}$	Output Skew[20]	—	0.5	—	0.5	ns	—

Parameter	Description	CY74FCT16952CT CY74FCT162H952CT		Unit	Fig. No.[18]
		Min.	Max.		
t_{PLH} t_{PHL}	Propagation Delay CLKAB, CLKBA to B, A	2.0	6.3	ns	1, 5
t_{PZH} t_{PZL}	Output Enable Time $\overline{OEBA}$, $\overline{OEAB}$ to A, B	1.5	7.0	ns	1, 7, 8
t_{PHZ} t_{PLZ}	Output Disable Time $\overline{OEBA}$, $\overline{OEAB}$ to A, B	1.5	6.5	ns	1, 7, 8
t_{SU}	Set-Up Time, HIGH or LOW A, B to CLKAB, CLKBA	2.5	—	ns	4
t_H	Hold Time, HIGH or LOW A, B to CLKAB, CLKBA	1.5	—	ns	4
t_{SU}	Set-Up Time, HIGH or LOW $\overline{CEAB}$, $\overline{CEBA}$ to CLKAB, CLKBA	3.0	—	ns	4
t_H	Hold Time, HIGH or LOW $\overline{CEAB}$, $\overline{CEBA}$ to CLKAB, CLKBA	2.0	—	ns	4
t_W	Pulse Width HIGH or LOW CLKAB or CLKBA[19]	3.0	—	ns	5
$t_{SK(O)}$	Output Skew[20]	—	0.5	ns	—

Notes:

17. Minimum limits are specified but not tested on Propagation Delays.
18. See “Parameter Measurement Information” in the General Information section.
19. This parameter is specified but not tested.
20. Skew between any two outputs of the same package switching in the same direction. This parameter is ensured by design.

Ordering Information CY74FCT16952

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
6.3	CY74FCT16952CTPACT	Z56	56-Lead (240-Mil) TSSOP	Industrial
10.0	CY74FCT16952ATPVC/PVCT	O56	56-Lead (300-Mil) SSOP	Industrial

Ordering Information CY74FCT162952

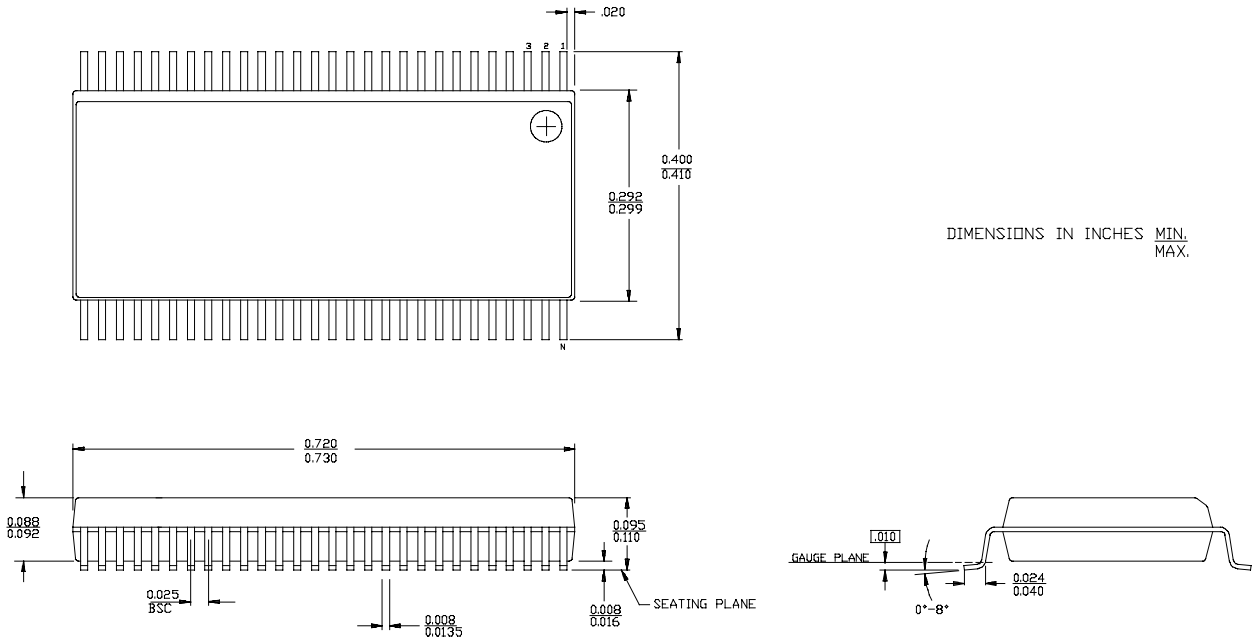
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
7.5	CY74FCT162952BTPVC	O56	56-Lead (300-Mil) SSOP	Industrial
	74FCT162952BTPVCT	O56	56-Lead (300-Mil) SSOP	
10.0	74FCT162952ATPACT	Z56	56-Lead (240-Mil) TSSOP	Industrial

Ordering Information CY74FCT162H952

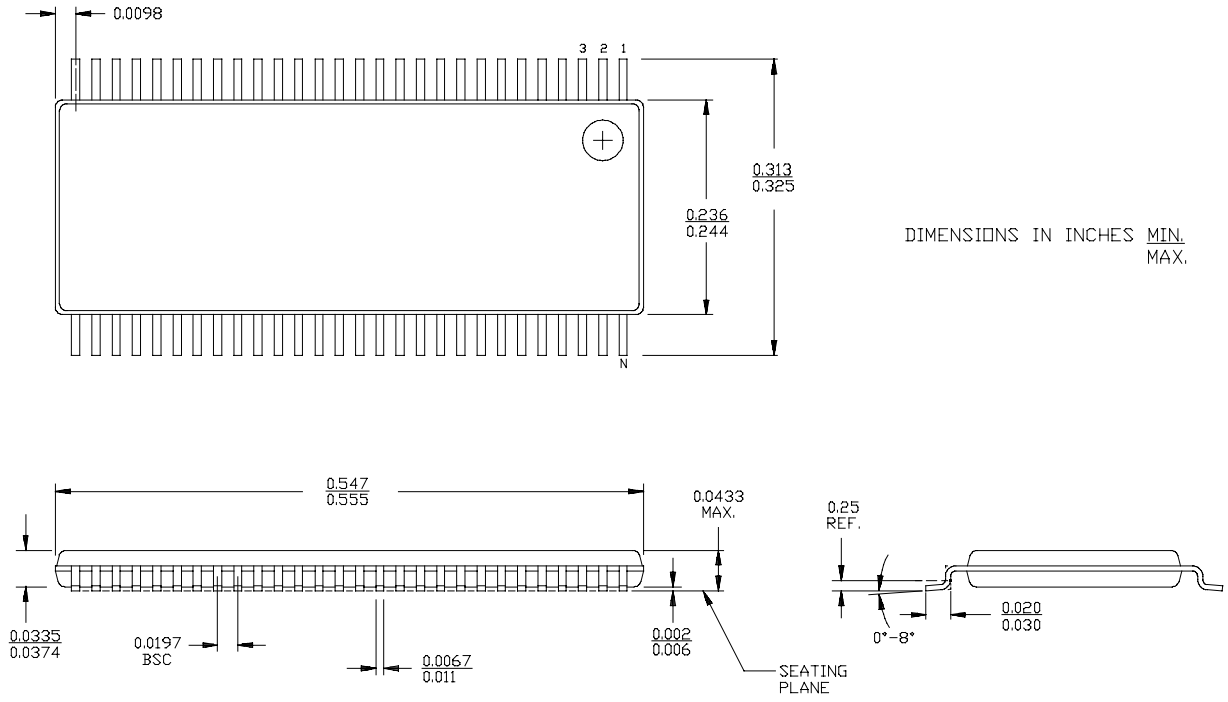
Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
6.3	74FCT162H952CTPVC/PVCT	O56	56-Lead (300-Mil) SSOP	Industrial
10.0	74FCT162H952ATPACT	Z56	56-Lead (240-Mil) TSSOP	Industrial

Package Diagrams

56-Lead Shrunk Small Outline Package O56



56-Lead Thin Shrunk Small Outline Package Z56



PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
74FCT162952ATPACT	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162952BTPVCG4	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162952BTPVCT	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162952ETPACT	OBSOLETE	TSSOP	DGG	56		TBD	Call TI	Call TI
74FCT162952ETPVCT	OBSOLETE	SSOP	DL	56		TBD	Call TI	Call TI
74FCT162H952ATPACT	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162H952CTPVC	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162H952CTPVCT	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT162H952ETPAC	OBSOLETE	TSSOP	DGG	56		TBD	Call TI	Call TI
74FCT162H952ETPACT	OBSOLETE	TSSOP	DGG	56		TBD	Call TI	Call TI
74FCT16952ATPVCG4	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT16952ATPVCTG4	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT16952CTPACTE4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74FCT16952CTPACTG4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CY74FCT162952BTPVC	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CY74FCT162952ETPAC	OBSOLETE	TSSOP	DGG	56		TBD	Call TI	Call TI
CY74FCT162952ETPVC	OBSOLETE	SSOP	DL	56		TBD	Call TI	Call TI
CY74FCT16952ATPVC	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CY74FCT16952ATPVCT	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CY74FCT16952CTPACT	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
CY74FCT16952ETPVC	OBSOLETE	SSOP	DL	56		TBD	Call TI	Call TI
CY74FCT16952ETPVCT	OBSOLETE	SSOP	DL	56		TBD	Call TI	Call TI
FCT162952ATPACTE4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
FCT162952ATPACTG4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
FCT162952BTPVCTG4	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
FCT162H952ATPACTE4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
FCT162H952ATPACTG4	ACTIVE	TSSOP	DGG	56	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
FCT162H952CTPVCG4	ACTIVE	SSOP	DL	56	20	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
FCT162H952CTPVCTG4	ACTIVE	SSOP	DL	56	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

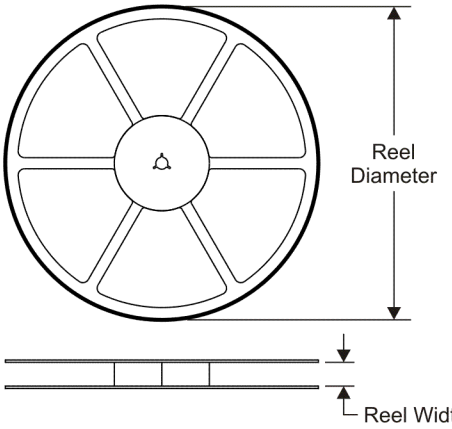
(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

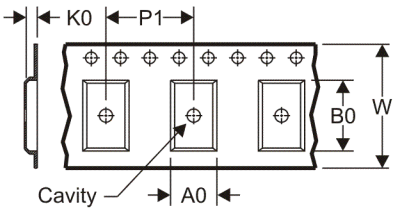
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

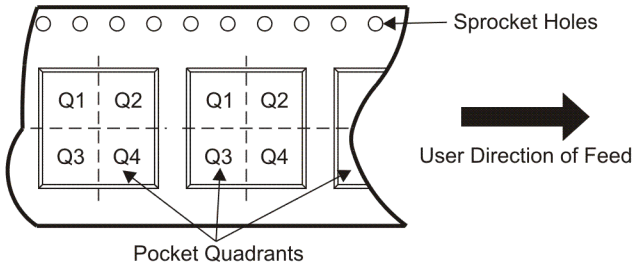


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

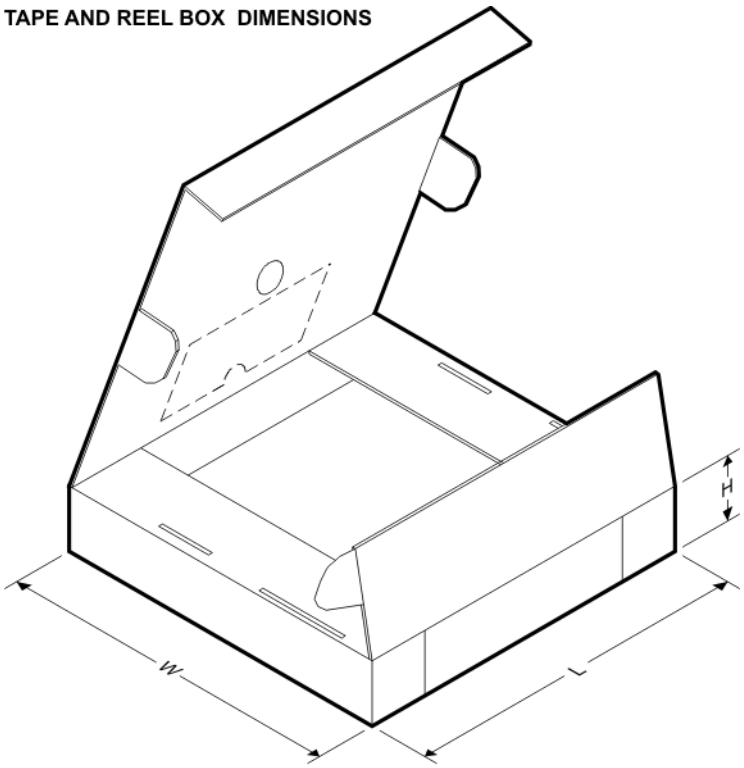
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74FCT162952ATPACT	TSSOP	DGG	56	2000	330.0	24.4	8.6	15.6	1.8	12.0	24.0	Q1
74FCT162952BTPVCT	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1
74FCT162H952ATPACT	TSSOP	DGG	56	2000	330.0	24.4	8.6	15.6	1.8	12.0	24.0	Q1
74FCT162H952CTPVCT	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1
CY74FCT16952ATPVCT	SSOP	DL	56	1000	330.0	32.4	11.35	18.67	3.1	16.0	32.0	Q1
CY74FCT16952CTPACT	TSSOP	DGG	56	2000	330.0	24.4	8.6	15.6	1.8	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS

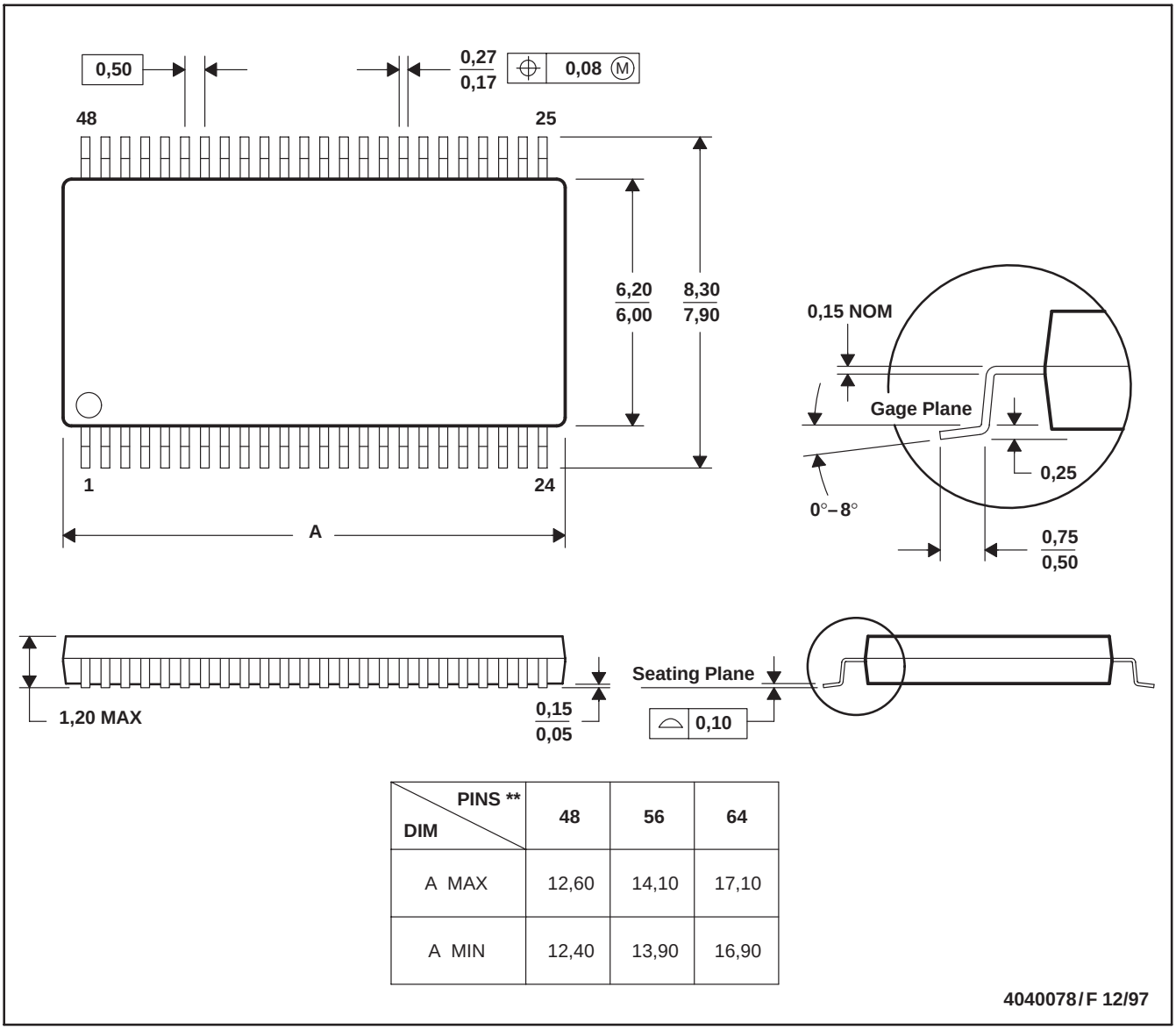


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74FCT162952ATPACT	TSSOP	DGG	56	2000	346.0	346.0	41.0
74FCT162952BTPVCT	SSOP	DL	56	1000	346.0	346.0	49.0
74FCT162H952ATPACT	TSSOP	DGG	56	2000	346.0	346.0	41.0
74FCT162H952CTPVCT	SSOP	DL	56	1000	346.0	346.0	49.0
CY74FCT16952ATPVCT	SSOP	DL	56	1000	346.0	346.0	49.0
CY74FCT16952CTPACT	TSSOP	DGG	56	2000	346.0	346.0	41.0

DGG (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

48 PINS SHOWN

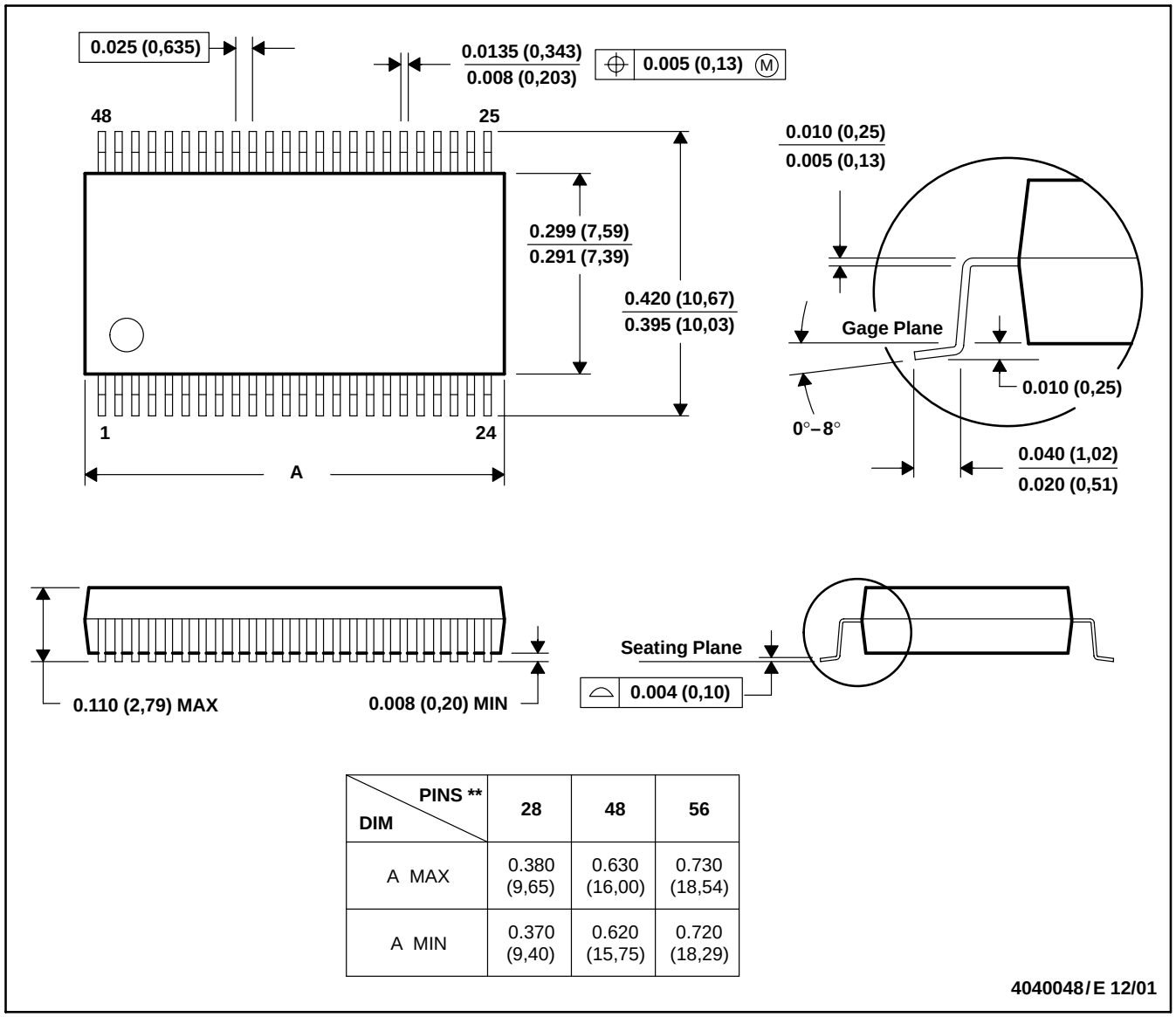


DIM \ PINS **	48	56	64
A MAX	12,60	14,10	17,10
A MIN	12,40	13,90	16,90

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold protrusion not to exceed 0,15.
D. Falls within JEDEC MO-153

DL (R-PDSO-G)** **PLASTIC SMALL-OUTLINE PACKAGE**

48 PINS SHOWN



DIM \ PINS **	28	48	56
A MAX	0.380 (9,65)	0.630 (16,00)	0.730 (18,54)
A MIN	0.370 (9,40)	0.620 (15,75)	0.720 (18,29)

4040048/E 12/01

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MO-118

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Clocks and Timers	www.ti.com/clocks	Digital Control	www.ti.com/digitalcontrol
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265