

SCCS054C - August 1994 - Revised October 2003

# 16-Bit Latches

#### **Features**

- Ioff 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
- $V_{CC} = 5V \pm 10\%$

#### CY74FCT16373T Features:

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

#### CY74FCT162373T 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

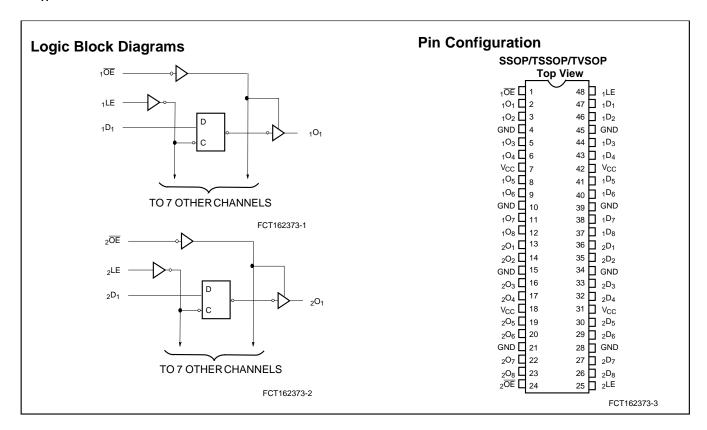
### **Functional Description**

CY74FCT16373T and CY74FCT162373T are 16-bit D-type latches designed for use in bus applications requiring high speed and low power. These devices can be used as two independent 8-bit latches or as a single 16-bit latch by connecting the Output Enable ( $\overline{OE}$ ) and Latch (LE) inputs. Flow-through pinout and small shrink packaging aid in simplifying board layout.

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

The CY74FCT16373T is ideally suited for driving high-capacitance loads and low-impedance backplanes.

The CY74FCT162373T 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 CY74FCT162373T is ideal for driving transmission lines.





#### **Pin Description**

Name	Description
D	Data Inputs
LE	Latch Enable Inputs (Active HIGH)
ŌĒ	Output Enable Inputs (Active LOW)
0	Three-State Outputs

#### Function Table<sup>[1]</sup>

	Inputs			
D	LE	ŌĒ	0	
Н	Н	L	Н	
L	Н	L	L	
Х	L	L	$Q_0$	
Х	Х	Н	Z	

## Maximum Ratings<sup>[2, 3]</sup>

(Above which the useful life may be impaired. For user guidelines, not tested.)
Storage Temperature Com'I $-55^{\circ}\text{C}$ to +125°C
Ambient Temperature with Power Applied
DC Input Voltage0.5V to +7.0V
DC Output Voltage0.5V to +7.0V
DC Output Current (Maximum Sink Current/Pin)60 to +120 mA
Power Dissipation
Static Discharge Voltage>2001V (per MIL-STD-883, Method 3015)

#### **Operating Range**

Range	Ambient Temperature	V <sub>CC</sub>
Industrial	–40°C to +85°C	5V ± 10%

### **Electrical Characteristics** Over the Operating Range

Parameter	Description	Test Conditions	Min.	Typ. <sup>[4]</sup>	Max.	Unit
V <sub>IH</sub>	Input HIGH Voltage		2.0			V
V <sub>IL</sub>	Input LOW Voltage				0.8	V
V <sub>H</sub>	Input Hysteresis <sup>[5]</sup>			100		mV
V <sub>IK</sub>	Input Clamp Diode Voltage	V <sub>CC</sub> =Min., I <sub>IN</sub> =-18 mA		-0.7	-1.2	V
I <sub>IH</sub>	Input HIGH Current	V <sub>CC</sub> =Max., V <sub>I</sub> =V <sub>CC</sub>			±1	μΑ
I <sub>IL</sub>	Input LOW Current	V <sub>CC</sub> =Max., V <sub>I</sub> =GND			±1	μΑ
l <sub>OZH</sub>	High Impedance Output Current (Three-State Output pins)	V <sub>CC</sub> =Max., V <sub>OUT</sub> =2.7V			±1	μΑ
l <sub>OZL</sub>	High Impedance Output Current (Three-State Output pins)	V <sub>CC</sub> =Max., V <sub>OUT</sub> =0.5V			±1	μΑ
I <sub>OS</sub>	Short Circuit Current <sup>[6]</sup>	V <sub>CC</sub> =Max., V <sub>OUT</sub> =GND	-80	-140	-200	mA
Io	Output Drive Current <sup>[6]</sup>	V <sub>CC</sub> =Max., V <sub>OUT</sub> =2.5V	-50		-180	mA
I <sub>OFF</sub>	Power-Off Disable	V <sub>CC</sub> =0V, V <sub>OUT</sub> ≤4.5V <sup>[7]</sup>			±1	μΑ

### **Output Drive Characteristics for CY74FCT16373T**

Parameter	Description	Test Conditions	Min.	Typ. <sup>[4]</sup>	Max.	Unit
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> =Min., I <sub>OH</sub> =-3 mA	2.5	3.5		V
		V <sub>CC</sub> =Min., I <sub>OH</sub> =-15 mA	2.4	3.5		V
		V <sub>CC</sub> =Min., I <sub>OH</sub> =-32 mA	2.0	3.0		V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> =Min., I <sub>OL</sub> =64 mA		0.2	0.55	V

- H = HIGH Voltage Level. L = LOW Voltage Level. X = Don't Care. Z = High Impedance. Q<sub>0</sub>=Previous state of flip-flop.

  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. Unused inputs must always be connected to an appropriate logic voltage level, preferably either  $V_{CC}$  or ground.

- Typical values are at V<sub>CC</sub>=5.0V, T<sub>A</sub>= +25°C ambient.

  This parameter is specified but not tested.

  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 Not filled that one output should be shorted at a time. Dutation 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<sub>OS</sub> tests should be performed last.
   Tested at +25°C.



## **Output Drive Characteristics for CY74FCT162373T**

Parameter	Description	Test Conditions	Min.	Typ. <sup>[4]</sup>	Max.	Unit
I <sub>ODL</sub>	Output LOW Current <sup>[6]</sup>	V <sub>CC</sub> =5V, V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub> , V <sub>OUT</sub> =1.5V	60	115	150	mA
I <sub>ODH</sub>	Output HIGH Current <sup>[6]</sup>	$V_{CC}$ =5V, $V_{IN}$ = $V_{IH}$ or $V_{IL}$ , $V_{OUT}$ =1.5V	-60	-115	-150	mA
V <sub>OH</sub>	Output HIGH Voltage	V <sub>CC</sub> =Min., I <sub>OH</sub> =-24 mA	2.4	3.3		V
V <sub>OL</sub>	Output LOW Voltage	V <sub>CC</sub> =Min., I <sub>OL</sub> =24 mA		0.3	0.55	V

# **Capacitance**<sup>[5]</sup> ( $T_A = +25^{\circ}C$ , f = 1.0 MHz)

Parameter	Description	Test Conditions	Typ. <sup>[4]</sup>	Max.	Unit
C <sub>IN</sub>	Input Capacitance	$V_{IN} = 0V$	4.5	6.0	pF
C <sub>OUT</sub>	Output Capacitance	V <sub>OUT</sub> = 0V	5.5	8.0	pF

## **Power Supply Characteristics**

Parameter	Description	Test Condition	ons	Typ. <sup>[4]</sup>	Max.	Unit
I <sub>CC</sub>	Quiescent Power Supply Current	V <sub>CC</sub> =Max.	V <sub>IN</sub> ≤0.2V, V <sub>IN</sub> ≥V <sub>CC</sub> −0.2V	5	500	μΑ
Δl <sub>CC</sub>	Quiescent Power Supply Current (TTL inputs HIGH)	V <sub>CC</sub> =Max.	V <sub>IN</sub> =3.4V <sup>[8]</sup>	0.5	1.5	mA
I <sub>CCD</sub>	Dynamic Power Supply Current <sup>[9]</sup>	V <sub>CC</sub> =Max., One Input Toggling, 50% Duty Cycle, Outputs Open, OE=GND	V <sub>IN</sub> =V <sub>CC</sub> or V <sub>IN</sub> =GND	60	100	μA/MHz
I <sub>C</sub>	Total Power Supply Current <sup>[10]</sup>	V <sub>CC</sub> =Max., f <sub>1</sub> =10 MHz, 50% Duty Cycle, Outputs	V <sub>IN</sub> =V <sub>CC</sub> or V <sub>IN</sub> =GND	0.6	1.5	mA
		Open, One Bit Toggling, OE=GND, LE=V <sub>CC</sub>	V <sub>IN</sub> =3.4V or V <sub>IN</sub> =GND	0.9	2.3	mA
		V <sub>CC</sub> =Max., f <sub>1</sub> =2.5 MHz, 50% Duty Cycle, Outputs	V <sub>IN</sub> =V <sub>CC</sub> or V <sub>IN</sub> =GND	2.4	4.5 <sup>[11]</sup>	mA
		Open, Sixteen Bits Toggling, OE=GND, LE=V <sub>CC</sub>	V <sub>IN</sub> =3.4V or V <sub>IN</sub> =GND	6.4	16.5 <sup>[11]</sup>	mA

Notes:
8. Per TTL driven input (V<sub>IN</sub>=3.4V); all other inputs at V<sub>CC</sub> or GND.
9. This parameter is not directly testable, but is derived for use in Total Power Supply calculations.
10. I<sub>C</sub> = I<sub>QUIESCENT</sub> + I<sub>INPUTS</sub> + I<sub>DYNAMIC</sub>
I<sub>C</sub> = Quiescent Current with CMOS input levels
ΔI<sub>CC</sub> = Power Supply Current for a TTL HIGH input(V<sub>IN</sub>=3.4V)
D<sub>H</sub> = Duty Cycle for TTL inputs HIGH
N<sub>T</sub> = Number of TTL inputs at D<sub>H</sub>
I<sub>CCD</sub> = Dynamic Current caused by an input transition pair (HLH or LHL)
f<sub>0</sub> = Clock frequency for registered devices, otherwise zero
f<sub>1</sub> = Input signal frequency
N<sub>1</sub> = Number of inputs changing at f<sub>1</sub>
All currents are in milliamps and all frequencies are in megahertz.
11. Values for these conditions are examples of the I<sub>CC</sub> formula. These limits are specified but not tested.



# Switching Characteristics Over the Operating Range<sup>[12]</sup>

		CY74FCT16373AT CY74FCT162373AT			
Parameter	Description	Min.	Max.	Unit	Fig. No. <sup>[13]</sup>
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay D to O	1.5	5.2	ns	1, 3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay LE to O	2.0	6.7	ns	1, 5
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time	1.5	6.1	ns	1, 7, 8
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time	1.5	5.5	ns	1, 7, 8
t <sub>SU</sub>	Set-Up Time HIGH or LOW, D to LE	2.0		ns	9
t <sub>H</sub>	Hold Time HIGH or LOW, D to LE	1.5		ns	9
t <sub>W</sub>	LE Pulse Width HIGH	3.3		ns	5
t <sub>SK(O)</sub>	Output Skew <sup>[14]</sup>		0.5	ns	_

		CY74FCT16373CT CY74FCT162373CT			
Parameter	Description	Min.	Max.	Unit	Fig. No. <sup>[13]</sup>
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay D to O	1.5	4.2	ns	1, 3
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation Delay LE to O	2.0	5.5	ns	1, 5
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable Time	1.5	5.5	ns	1, 7, 8
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable Time	1.5	5.0	ns	1, 7, 8
t <sub>SU</sub>	Set-Up Time HIGH or LOW, D to LE	2.0		ns	9
t <sub>H</sub>	Hold Time HIGH or LOW, D to LE	1.5		ns	9
t <sub>W</sub>	LE Pulse Width HIGH	3.3		ns	5
t <sub>SK(O)</sub>	Output Skew <sup>[14]</sup>		0.5	ns	_

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



# **Ordering Information CY74FCT16373**

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.2	CY74FCT16373CTPACT	Z48	48-Lead (240-Mil) TSSOP	Industrial
	CY74FCT16373CTPVC/PVCT	O48	48-Lead (300-Mil) SSOP	
	CY74FCT16373CTVR	-	48-Lead (173-Mil) TVSOP	
5.2	CY74FCT16373ATPACT	Z48	48-Lead (240-Mil) TSSOP	Industrial
	CY74FCT16373ATPVC/PVCT	O48	48-Lead (300-Mil) SSOP	
	CY74FCT16373ATVR	-	48-Lead (173-Mil) TVSOP	

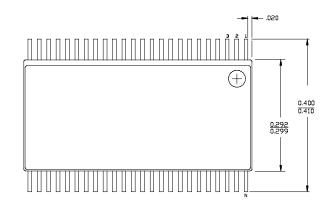
# **Ordering Information CY74FCT162373**

Speed (ns)	Ordering Code	Package Name	Package Type	Operating Range
4.2	74FCT162373CTPACT	Z48	48-Lead (240-Mil) TSSOP	Industrial
	CY74FCT162373CTPVC	O48	48-Lead (300-Mil) SSOP	
	74FCT162373CTPVCT	O48	48-Lead (300-Mil) SSOP	
5.2	74FCT162373ATPACT	Z48	48-Lead (240-Mil) TSSOP	Industrial
	CY74FCT162373ATPVC	O48	48-Lead (300-Mil) SSOP	
	74FCT162373ATPVCT	O48	48-Lead (300-Mil) SSOP	

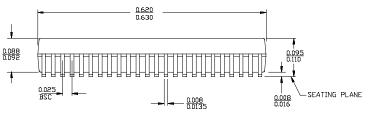


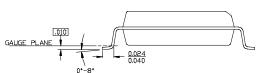
## **Package Diagrams**

### 48-Lead Shrunk Small Outline Package O48

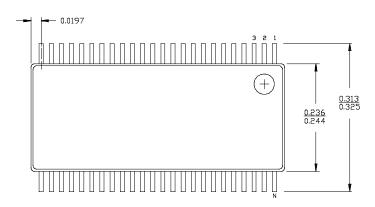


DIMENSIONS IN INCHES MIN. MAX.

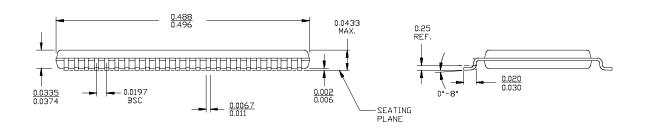




### 48-Lead Thin Shrunk Small Outline Package Z48



DIMENSIONS IN INCHES MIN. MAX.







9-Aug-2013

### **PACKAGING INFORMATION**

Orderable Device	Status	Package Type	_	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)		(3)		(4/5)	
74FCT162373ATPACT	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
74FCT162373ATPVCG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
74FCT162373ATPVCT	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
74FCT162373CTPACT	ACTIVE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85	FCT162373C	Samples
74FCT162373CTPVCG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373C	Samples
74FCT162373ETPACT	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
74FCT162373ETPVCT	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
74FCT16373ATPACTE4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
74FCT16373ATPACTG4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
74FCT16373ATPVCG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
74FCT16373ATPVCTG4	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
74FCT16373CTPACTE4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373C	Samples
74FCT16373CTPACTG4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373C	Samples
74FCT16373CTPVCG4	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373C	Samples
CY74FCT162373ATPVC	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
CY74FCT162373CTPVC	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373C	Samples
CY74FCT162373ETPAC	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
CY74FCT162373ETPVC	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
CY74FCT16373ATPACT	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples





9-Aug-2013

Orderable Device	Status	Package Type	Package	Pins	Package	Eco Plan	Lead/Ball Finish	MSL Peak Temp	Op Temp (°C)	Device Marking	Samples
	(1)		Drawing		Qty	(2)		(3)		(4/5)	
CY74FCT16373ATPVC	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
CY74FCT16373ATPVCT	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373A	Samples
CY74FCT16373CTPACT	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373C	Samples
CY74FCT16373CTPVC	ACTIVE	SSOP	DL	48	25	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT16373C	Samples
CY74FCT16373CTVR	ACTIVE	TVSOP	DGV	48		TBD	Call TI	Call TI	-40 to 85	FD373C	Samples
CY74FCT16373CTVRE4	ACTIVE	TVSOP	DGV	48		TBD	Call TI	Call TI	-40 to 85	FD373C	Samples
CY74FCT16373CTVRG4	ACTIVE	TVSOP	DGV	48		TBD	Call TI	Call TI	-40 to 85	FD373C	Samples
CY74FCT16373ETPAC	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
CY74FCT16373ETPACT	OBSOLETE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85		
CY74FCT16373ETPVC	OBSOLETE	SSOP	DL	48		TBD	Call TI	Call TI	-40 to 85		
CY74FCT16373ETPVCT	OBSOLETE	SSOP	DL	48		TBD	Call TI	Call TI	-40 to 85		
FCT162373ATPACTE4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
FCT162373ATPACTG4	ACTIVE	TSSOP	DGG	48	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
FCT162373ATPVCTG4	ACTIVE	SSOP	DL	48	1000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	FCT162373A	Samples
FCT162373CTPACTE4	ACTIVE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85	FCT162373C	Samples
FCT162373CTPACTG4	ACTIVE	TSSOP	DGG	48		TBD	Call TI	Call TI	-40 to 85	FCT162373C	Samples

(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.

<sup>(2)</sup> 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.



## PACKAGE OPTION ADDENDUM

9-Aug-2013

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.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

**Important Information and Disclaimer:** The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## PACKAGE MATERIALS INFORMATION

www.ti.com 12-Aug-2013

## TAPE AND REEL INFORMATION





	Dimension designed to accommodate the component width
	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

All dimensions are nominal												
Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74FCT162373ATPACT	TSSOP	DGG	48	2000	330.0	24.4	8.6	15.8	1.8	12.0	24.0	Q1
74FCT162373ATPVCT	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1
CY74FCT16373ATPACT	TSSOP	DGG	48	2000	330.0	24.4	8.6	15.8	1.8	12.0	24.0	Q1
CY74FCT16373ATPVCT	SSOP	DL	48	1000	330.0	32.4	11.35	16.2	3.1	16.0	32.0	Q1
CY74FCT16373CTPACT	TSSOP	DGG	48	2000	330.0	24.4	8.6	15.8	1.8	12.0	24.0	Q1

**PACKAGE MATERIALS INFORMATION** 

www.ti.com 12-Aug-2013



\*All dimensions are nominal

7 til diffictiolofio die floriffiai							
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74FCT162373ATPACT	TSSOP	DGG	48	2000	367.0	367.0	45.0
74FCT162373ATPVCT	SSOP	DL	48	1000	367.0	367.0	55.0
CY74FCT16373ATPACT	TSSOP	DGG	48	2000	367.0	367.0	45.0
CY74FCT16373ATPVCT	SSOP	DL	48	1000	367.0	367.0	55.0
CY74FCT16373CTPACT	TSSOP	DGG	48	2000	367.0	367.0	45.0

## DGV (R-PDSO-G\*\*)

#### **24 PINS SHOWN**

#### **PLASTIC SMALL-OUTLINE**



NOTES: A. All linear dimensions are in millimeters.

B. This drawing is subject to change without notice.

C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15 per side.

D. Falls within JEDEC: 24/48 Pins – MO-153 14/16/20/56 Pins – MO-194

# DL (R-PDSO-G48)

# PLASTIC SMALL-OUTLINE PACKAGE



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

PowerPAD is a trademark of Texas Instruments.



## DGG (R-PDSO-G\*\*)

## PLASTIC SMALL-OUTLINE PACKAGE

#### **48 PINS SHOWN**



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

#### IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license 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 significant portions 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. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have *not* been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

#### Products Applications

Audio www.ti.com/audio Automotive and Transportation www.ti.com/automotive Communications and Telecom **Amplifiers** amplifier.ti.com www.ti.com/communications **Data Converters** dataconverter.ti.com Computers and Peripherals www.ti.com/computers **DLP® Products** www.dlp.com Consumer Electronics www.ti.com/consumer-apps

DSP **Energy and Lighting** dsp.ti.com www.ti.com/energy Clocks and Timers www.ti.com/clocks Industrial www.ti.com/industrial Interface interface.ti.com Medical www.ti.com/medical logic.ti.com Logic Security www.ti.com/security

Power Mgmt power.ti.com Space, Avionics and Defense www.ti.com/space-avionics-defense

Microcontrollers microcontroller.ti.com Video and Imaging www.ti.com/video

RFID www.ti-rfid.com

OMAP Applications Processors <a href="www.ti.com/omap">www.ti.com/omap</a> TI E2E Community <a href="e2e.ti.com">e2e.ti.com</a>

Wireless Connectivity <u>www.ti.com/wirelessconnectivity</u>