

CAT874

Smart Phone Battery Switch Controller

Description

CAT874 is a switch controller designed to start/shut-off smart phones with the push button input or by phone microcontroller unit.

CAT874 monitors two inputs and outputs an active high output after PWR_ON input has been active (logic low) for a factory preset minimum time. Releasing input from its active state before the minimum timeout period resets the internal timer and must return to being active before the timer will restart with a fresh count down. The output remains high until the next PWR_ON high-to-low or V_{CHG} low-to-high transition.

CAT874's push pull output is capable of sinking up to 3 mA of current.

Features

- Operate on 1.8 V to 5.5 V Power Supplies
- Ultra Low Quiescent Current: 100 nA (typical)
- Schmitt Trigger Inputs
- Small μ LLGA-6 Package: 1.45 x 1.0 x 0.4 mm
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Mobile Phones
- PDAs
- MP3 Players
- Personal Navigation Devices

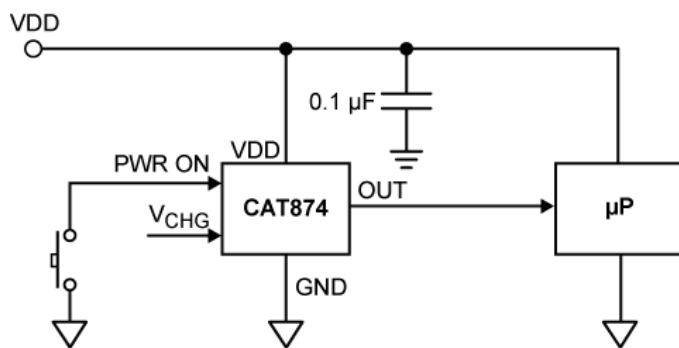
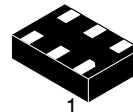


Figure 1. Application Schematic



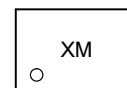
ON Semiconductor®

<http://onsemi.com>



ULLGA-6
UL SUFFIX
CASE 613AF

MARKING DIAGRAM

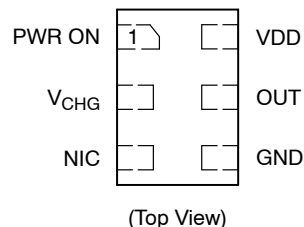


X = Specific Device Code
(d = CAT874)

M = Date Code

"P" written at 180° clockwise rotation

PIN CONNECTIONS



ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

CAT874

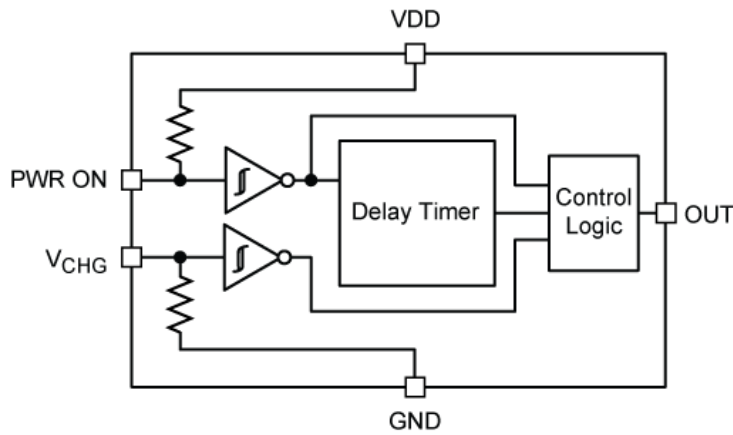


Figure 2. Functional Block Diagram

Table 1. PIN FUNCTION DESCRIPTION

Pin No.	Pin Name	Description
1	PWR_ON	Power ON, CMOS input.
2	V_CHG	Charger IN, CMOS input.
3	NIC	No Internal Connection. A voltage or signal applied to this pin will have no effect on device operation.
4	GND	System Ground.
5	OUT	Drive Output. Active-high push-pull output.
6	VDD	Positive Power Supply.

Table 2. ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Input Voltage Range	V_{DD}	-0.3 to 6	V
Output Voltage Range	V_{OUT}	-0.3 to 6 or ($V_{DD} + 0.3$), whichever is lower	V
Input Voltage; PWR_ON, V_CHG	V_{IN}	-0.3 to 6 or ($V_{DD} + 0.3$), whichever is lower	V
Maximum Junction Temperature	$T_{J(max)}$	150	°C
Output Current; OUT	I_{OUT}	10	mA
Storage Temperature Range	T_{STG}	-65 to 150	°C
ESD Capability, Human Body Model (Note 1)	ESD _{HBM}	2	kV
ESD Capability, Machine Model (Note 2)	ESD _{MM}	150	V
Lead Temperature Soldering Reflow (SMD Styles Only), Pb-Free Versions (Note 2)	T_{SLD}	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- This device series incorporates ESD protection and is tested by the following methods:
ESD Human Body Model tested per AEC-Q100-002 (EIA/JESD22-A114)
ESD Machine Model tested per AEC-Q100-003 (EIA/JESD22-A115)
Latch-up Current Maximum Rating: ≤150 mA per JEDEC standard: JESD78
- For information, please refer to our Soldering and Mounting Techniques Reference Manual, SOLDERRM/D

Table 3. RECOMMENDED OPERATING CONDITIONS

Rating	Symbol	Min	Max	Unit
Input Voltage; VDD	V_{DD}	1.8	5.5	V
Input Voltage; PWR_ON, V_CHG	V_{IN}	0	V_{DD}	V
Output Current; OUT	I_{OUT}	0	3	mA
Ambient Temperature	T_A	-40	85	°C

CAT874

Table 4. ELECTRICAL OPERATING CHARACTERISTICS

(V_{DD} = 1.8 V to 5.5 V. For typical values T_A = 25°C, for min/max values T_A = -40°C to +85°C unless otherwise noted.)

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
-----------	-----------------	--------	-----	-----	-----	------

POWER

V _{DD} Supply Voltage		V _{DD}	1.8		5.5	V
Quiescent Supply Current	PWR_ON = V _{DD} , V _{CHG} = 0 V	I _{DD}		100	1000	nA
Operating Supply Current	PWR_ON = 0 V, V _{CHG} = 0 V Measured during setup period. Measurement includes current through internal 200 kΩ pull-up resistor on PWR_ON				50	μA

LOGIC INPUTS AND OUTPUTS

Input Voltage; HIGH	PWR_ON, V _{CHG}	V _{IH}	0.7 x V _{DD}			V
Input Voltage; LOW	PWR_ON, V _{CHG}	V _{IL}			0.25 x V _{DD}	V
Hysteresis		V _{HYS}		250		mV
Input Current V _{CHG}	V _{CHG} = 0 V; V _{DD} = 5 V (internal pull-down)	I _{IL1}		50	300	nA
Input Current V _{CHG}	V _{CHG} = 5 V; V _{DD} = 5 V (internal pull-down)	I _{IH1}		25		μA
Input Current PWR_ON	PWR_ON = 0 V; V _{DD} = 5 V (internal 200 kΩ pull-up resistor)	I _{IL2}		25		μA
Input Current PWR_ON	PWR_ON = 5 V; V _{DD} = 5 V (internal 200 kΩ pull-up resistor)	I _{IH2}		50	300	nA
Output Voltage; HIGH	I _{SOURCE} = -0.1 mA, V _{DD} = 1.8 V	V _{OH}	V _{DD} - 0.2			V
Output Voltage; LOW	I _{SINK} = 3 mA, V _{DD} = 1.8 V	V _{OL}		0.1	0.4	V

TIMING

Input Delay PWR_ON	T _A = 25°C	t _{low_delay}	6.56	8.00	9.44	s
	T _A = -40°C to +85°C		6.00		10.00	

TEST MODE (V_{DD} = 5 V, T_A = 25°C) (Note 3)

Start TEST Window		t _{ST}			35	μs
Test Mode Delay	PWR_ON = 0 V, V _{CHG} → 7 cycles, delay measured after 8th rising edge of V _{CHG} clock pulse	t _D		250		μs
Test Mode Clock Frequency	Clock applied to V _{CHG}	f _{tm}		1		MHz
PWR_ON Test Mode Clock Setup Time	Measured from PWR_ON falling edge to first falling edge of V _{CHG}	t _p	1			μs
V _{CHG} Input Voltage; LOW	V _{CHG} , Test Mode Operation	V _{IL_TM}			0.2 x V _{DD}	V
V _{CHG} Pulse Width		t _{pw}		500		ns

3. "Test Mode" parameters are not tested in production.

TIMING WAVEFORMS

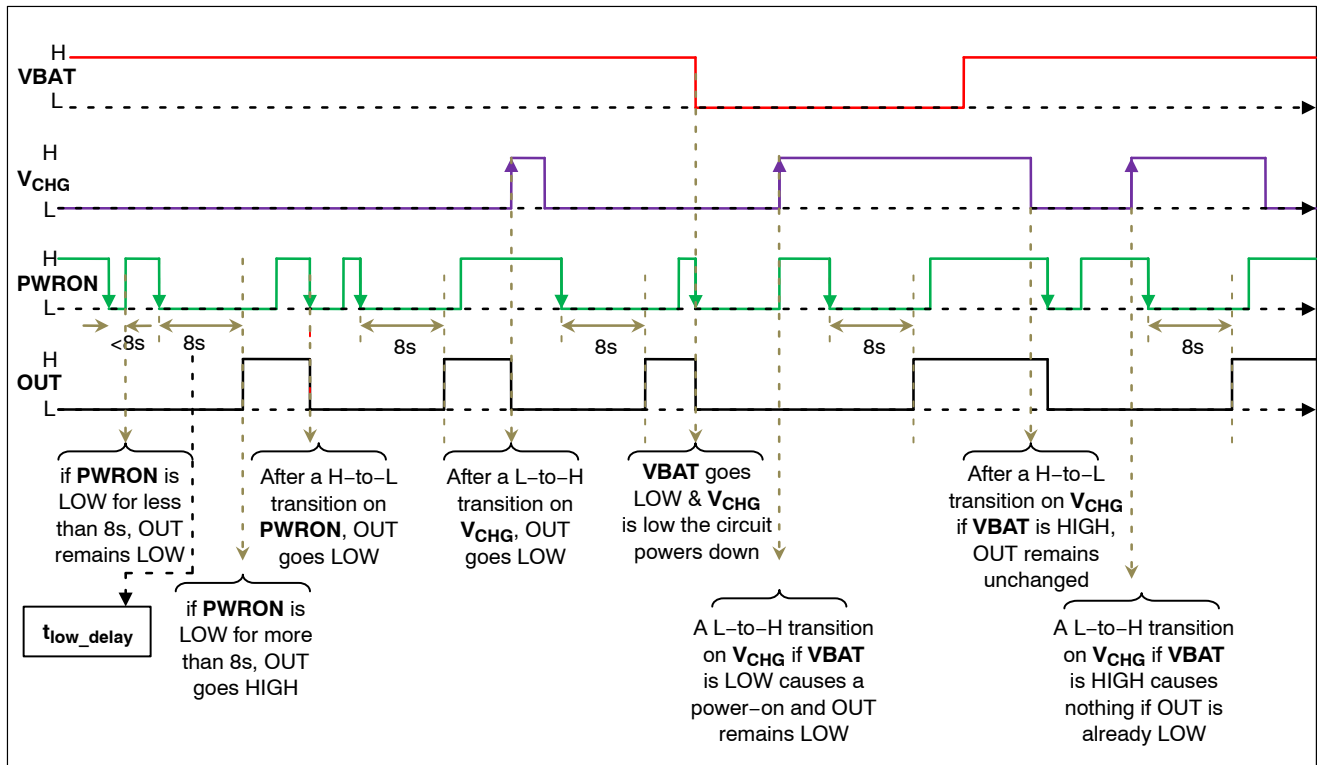


Figure 3. Timing Waveforms

SYSTEM DESCRIPTION AND APPLICATIONS INFORMATION

General

CAT874 is designed for the manual switching of microprocessors and microcontrollers. To prevent accidental resets, CAT874 requires PWR_ON input be held low for a prescribed period before an Active high output is issued to the system processor.

PWR_ON and V_{CHG} Inputs

PWR_ON and V_{CHG} are Schmitt trigger CMOS inputs. PWR_ON must go low and stay low for a predetermined period ($t_{\text{LOW_DELAY}}$) to generate an Active high on the output.

V_{CHG} is a standard CMOS input with internal pull down resistor 200 k Ω to keep the input low when charger is not plugged in and PWR_ON is also a CMOS input with an internal 200 k Ω pull-up resistor, thus PWR_ON can be left floating.

When PWR_ON goes low, an internal timing cycle is initiated. If it goes high before the countdown timer has concluded its cycle, the timer will reset and will restart from the beginning when PWR_ON returns to being low.

Output (OUT)

CAT874 provides an active-high push pull output. This output will sink up to 3 mA.

Delay Timer Testing:

A user test mode is provided to reduce the system test time after the CAT874 is mounted on the board. Instead of waiting $t_{\text{LOW_DELAY}}$ for the output to go active.

The user brings PWR_ON low, and sends seven positive edges on the V_{CHG} pin in a window of time t_{ST} . After a delay t_{D} , the device output will change state from low to high, and will return to the low state only when there is a high-to-low transition on PWR_ON.

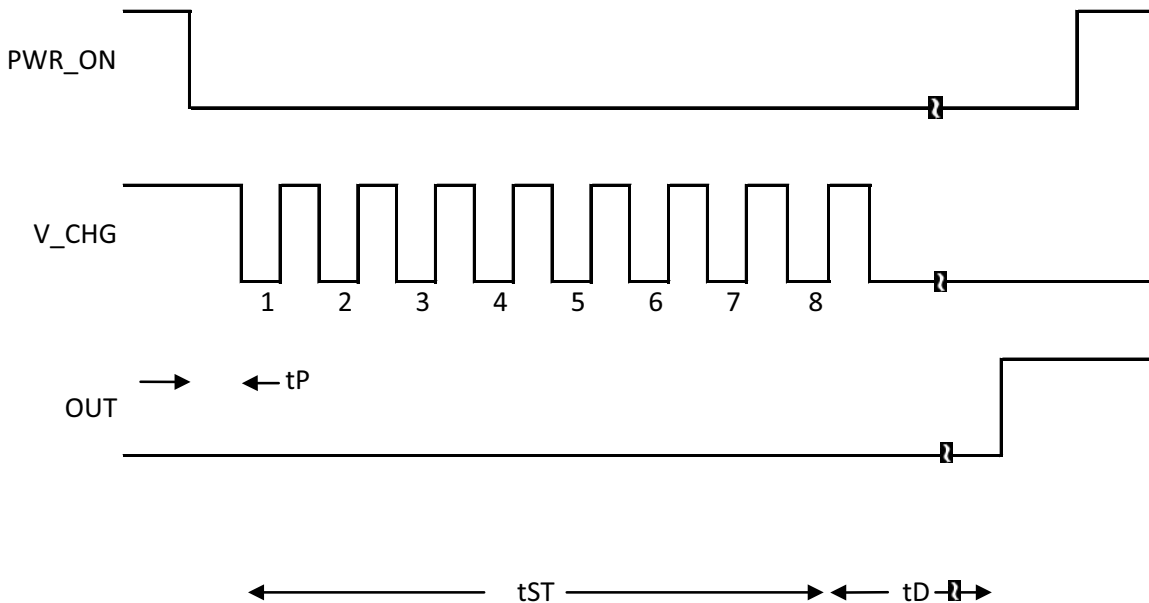


Figure 4. TOC Mode

APPLICATION INFORMATION

Output Operation

System with Two Different Power Supply Voltages

When both V_{CHG} and V_{BAT} are present, the following application can be adapted. Schottky diodes D1 and D2 can be used to isolate the two sources. The higher source will supply the VDD power.

If V_{CHG} is not present then drop across D2 should be low enough to turn off Q1. If both V_{CHG} and V_{BAT} are present, the timing waveforms should be used as shown in Figure 4.

An external resistor 1M should be used OUT, to discharge the output when both sources turn off.

Operation with Low VDD Voltage and Brownout Condition

The CAT874 requires a minimum supply voltage VDD of 1.8 V to guarantee the normal operation within the specification. To prevent small VDD supply glitch, a small ceramic capacitor can be added between the VDD pin and GND.

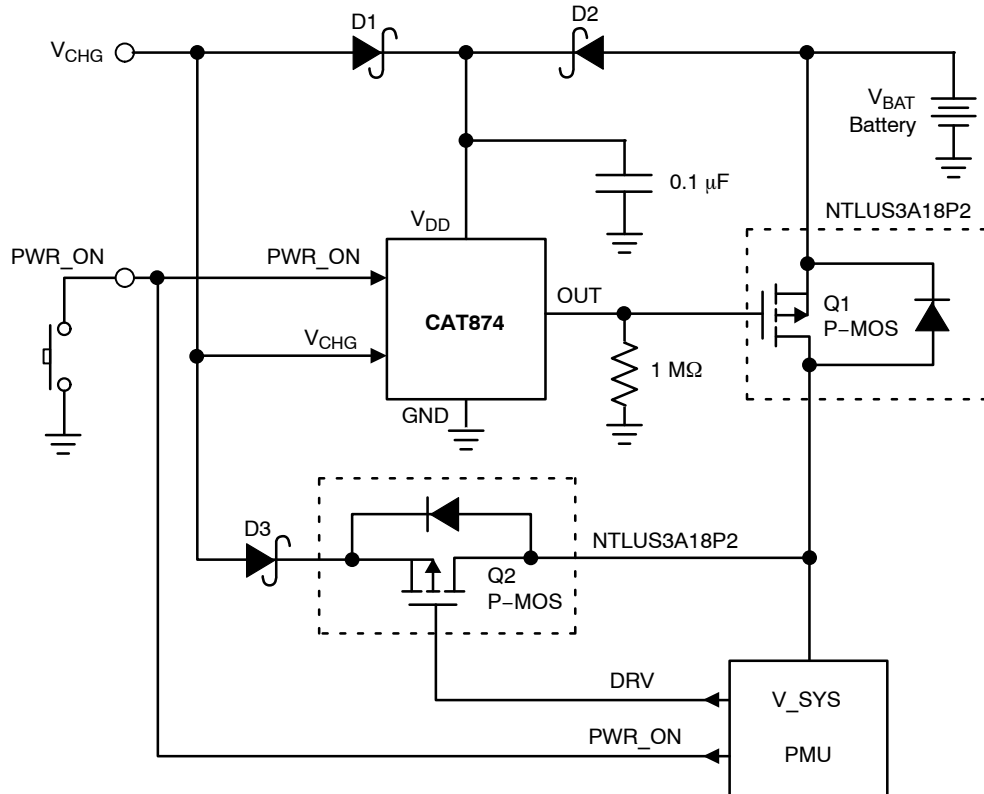


Figure 5. Application Schematic in Dual Supply System

MECHANICAL CASE OUTLINE

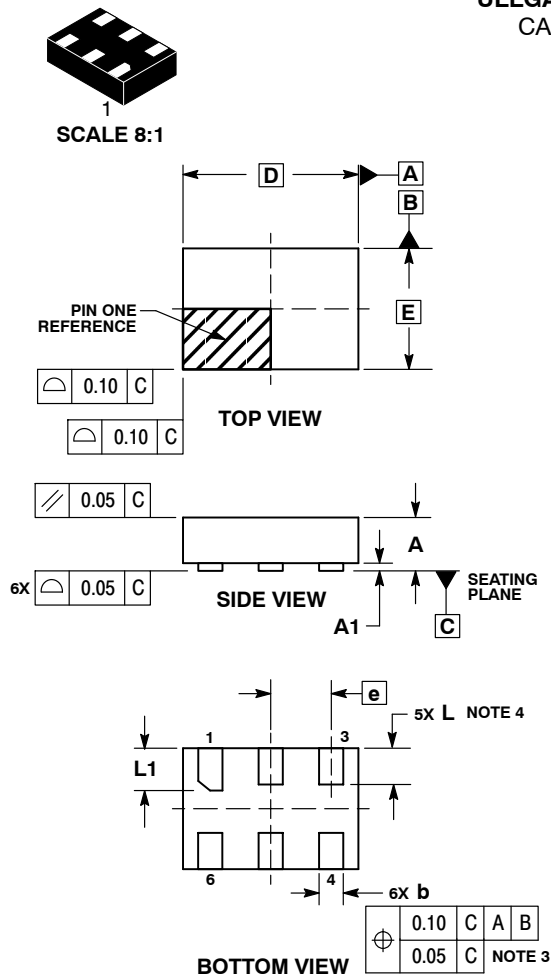
PACKAGE DIMENSIONS

ON Semiconductor®



ULLGA6, 1.45x1.0, 0.5P
CASE 613AF-01
ISSUE A

DATE 06 FEB 2008

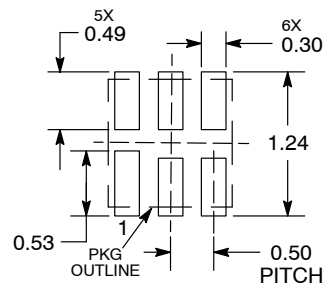


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.
4. A MAXIMUM OF 0.05 PULL BACK OF THE PLATED TERMINAL FROM THE EDGE OF THE PACKAGE IS ALLOWED.

MILLIMETERS		
DIM	MIN	MAX
A		0.40
A1	0.00	0.05
b	0.15	0.25
D	1.45 BSC	
E	1.00 BSC	
e	0.50 BSC	
L	0.25	0.35
L1	0.30	0.40

MOUNTING FOOTPRINT SOLDERMASK DEFINED*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

DOCUMENT NUMBER:	98AON24011D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	ULLGA6, 1.45X1.0, 0.5P	PAGE 1 OF 1

ON Semiconductor and are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. ON Semiconductor does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales