3-Pin Microprocessor Power Supply Supervisors

HALOGEN FREE LEAD FREE™ RoHS Compliance

FEATURES

- **Precision monitoring of +3.3V (-5%, -10%), 5V (-10% Power Supplies)**
- **Active low reset output**
- **Reset valid down to V_{CC} = 1.0V**
- **6µA power supply current**
- **Power supply transient immunity**
- **Industrial temperature range: -40ºC to +85ºC**
- **RoHS-compliant SOT-23 package**

APPLICATIONS

- **Computers**
- **Servers**
- **Laptops**
- **Cable modems**
- **Wireless communications**
- **Embedded control systems**
- **White goods**
- **Power meters**
- **Intelligent instruments**
- **PDAs and handheld equipment**

DESCRIPTION

The CAT853, CAT863, CAT859, and CAT869 are supervisory circuits that monitor power supplies in digital systems.

These devices generate a reset signal, which is asserted while the power supply voltage is below a preset threshold level and for at least 140 ms after the power supply level has risen above that level. Industry standard threshold levels are offered to support +3.3V or 5.0V systems.

The CAT859 and CAT869 feature a $\overline{\text{RESET}}$ push-pull output (active low) for the two pinout options.

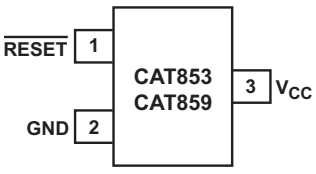
The CAT853 and CAT863 feature an open drain $\overline{\text{RESET}}$ output (active low). Both require a pull-up resistor on the RESET output.

Fast transients on the power supply are ignored and the output is guaranteed to be in the correct state at V_{cc} levels as low as 1.0V.

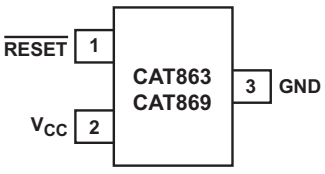
For Ordering Information details, see page 8.

PIN CONFIGURATION

3-Lead SOT23



3-Lead SOT23



THRESHOLD SUFFIX SELECTOR

Nominal Threshold Voltage	Threshold Suffix Designation
3.08V	T
2.93V	S
4.38V	M

PIN DESCRIPTIONS

Name	Description
$\overline{\text{RESET}}$	Active low reset. $\overline{\text{RESET}}$ is asserted if V_{CC} falls below the reset threshold and remains low for at least 140ms after V_{CC} rises above the reset threshold.
GND	Ground
V_{CC}	Power supply voltage that is monitored.

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

ABSOLUTE MAXIMUM RATINGS[1]

Any pin with respect to ground	-0.3V to +6.0V
Input Current, V_{CC}	20mA
Output Current, $\overline{RESET}$	20mA
Rate of Rise, V_{CC}	100V/µs
Continuous Power Dissipation Derate 4mW/ºC above 70ºC (SOT23)	 320 mW
Operating Temperature Range	-40ºC to +85ºC
Storage Temperature Range	-65ºC to +105ºC
Lead Soldering Temperature (10 sec)	300ºC

Note:

(1) Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions outside of those listed in the operational sections of this specification is not implied. Exposure to any absolute maximum rating for extended periods may affect device performance and reliability.

ELECTRICAL CHARACTERISTICS

V_{CC} = Full range, T_A = -40ºC to +85ºC unless otherwise noted. Typical values at T_A = +25ºC and V_{CC} = 3.3V for the T/S versions, V_{CC} = 5V for the M version.

Parameter	Symbol	Conditions		Min	Typ[1]	Max	Units
V_{CC} Range		T_A = 0ºC to +70ºC		1.0		5.5	V
		T_A = -40ºC to +85ºC		1.2		5.5	
Supply Current	I_{CC}	T_A = -40ºC to +85ºC	V_{CC} < 3.6V, S/T		6	15	µA
Reset Threshold Voltage	V_{TH}	T Threshold	T_A = +25ºC	3.04	3.08	3.11	V
			T_A = -40ºC to +85ºC	3.00		3.15	
		S Threshold	T_A = +25ºC	2.89	2.93	2.96	
			T_A = -40ºC to +85ºC	2.85		3.00	
		M Threshold	T_A = +25ºC	4.31	4.38	4.45	
			T_A = -40ºC to +85ºC	4.25		4.50	
Reset Threshold Tempco					30		ppm/ºC
V_{CC} to Reset Delay		V_{CC} = V_{TH} to (V_{TH} - 100 mV)			20		µs
Reset Active Timeout Period		T_A = -40ºC to +85ºC		140	240	460	ms
$\overline{RESET}$ Output Voltage Low	V_{OL}	V_{CC} = V_{TH} min, I_{SINK} = 1.2mA				0.4	V
		V_{CC} > 1.0V, I_{SINK} = 50µA				0.3	
$\overline{RESET}$ Output Voltage High	V_{OH}	V_{CC} = V_{TH} max, I_{SOURCE} = -500µA (for CAT859/869 only)		0.8 V_{CC}			V

Note:

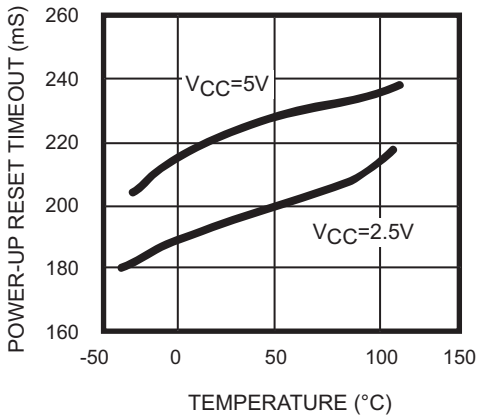
(1) Production testing done at T_A = +25ºC; limits over temperature guaranteed by design only.

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

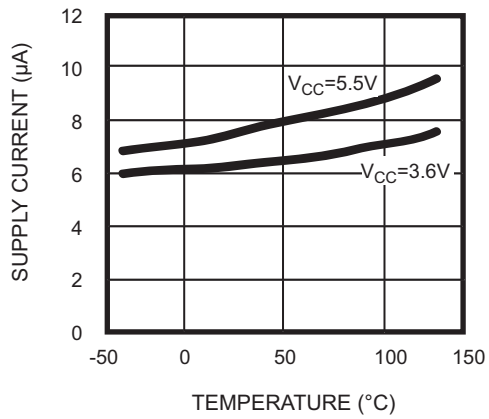
TYPICAL OPERATING CHARACTERISTICS

V_{CC} = Full range, T_A = -40ºC to +85ºC unless otherwise noted. Typical values at T_A = +25ºC, V_{CC}=3.3V for T/S versions, and V_{CC} = 5V for the M version.

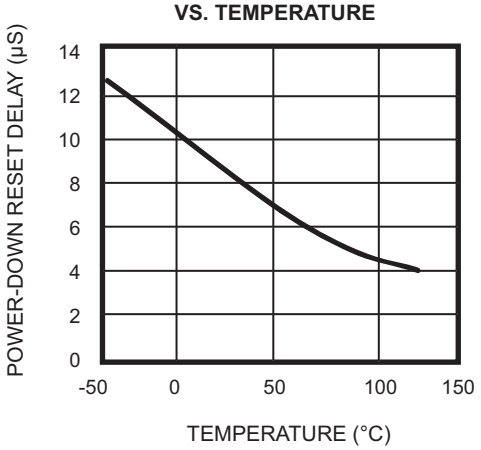
POWER-UP RESET TIMEOUT VS. TEMPERATURE



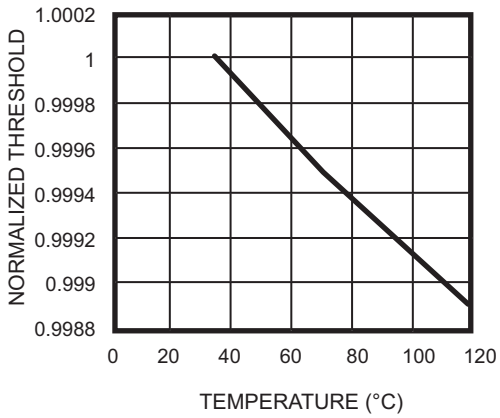
SUPPLY CURRENT VS. TEMPERATURE (NO LOAD)



POWER-DOWN RESET DELAY VS. TEMPERATURE



NORMALIZED RESET THRESHOLD VS. TEMPERATURE



© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

DETAILED DESCRIPTIONS

RESET TIMING

The reset signal is asserted low for the CAT853, CAT863, CAT859, and CAT869 when the power supply voltage falls below the threshold trip voltage and remains asserted for at least 140ms after the power supply voltage has risen above the threshold.

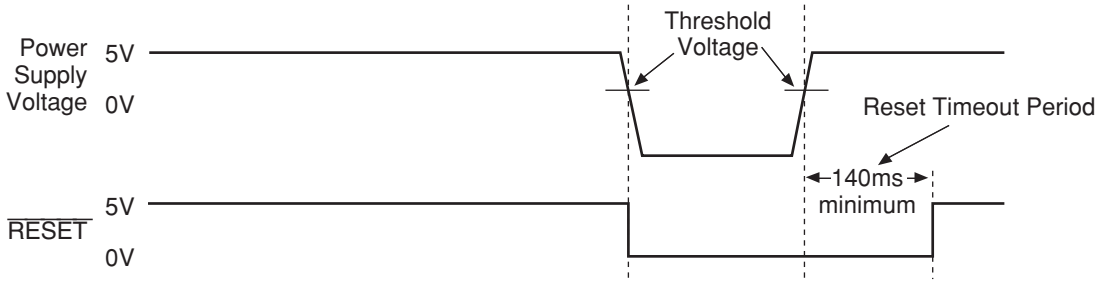


Figure 1. Reset Timing Diagram

V_{CC} TRANSIENT RESPONSE

The CAT853, CAT863, CAT859, and CAT869 protect µPs against brownout failure. Short duration transients of 4µsec or less and 100mV amplitude typically do not cause a false RESET.

Figure 2 shows the maximum pulse duration of negative-going V_{CC} transients that do not cause a reset condition.

As the amplitude of the transient goes further below the threshold (increasing V_{TH} - V_{CC}), the maximum pulse duration decreases. In this test, the V_{CC} starts from an initial voltage of 0.5V above the threshold and drops below it by the amplitude of the overdrive voltage (V_{TH} - V_{CC}).

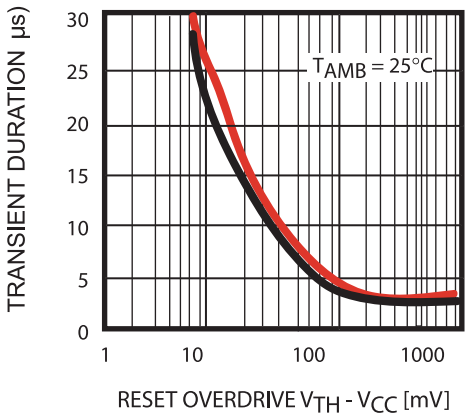


Figure 2. Maximum Transient Duration Without Causing a Reset Pulse vs. Reset Comparator Overdrive

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

VALID RESET WITH V_{CC} UNDER 1.0V

To ensure that the CAT859 and CAT869 $\overline{\text{RESET}}$ pin is in a known state when V_{CC} is under 1.0V, a >10kΩ pull-down resistor between $\overline{\text{RESET}}$ pin and GND is recommended.

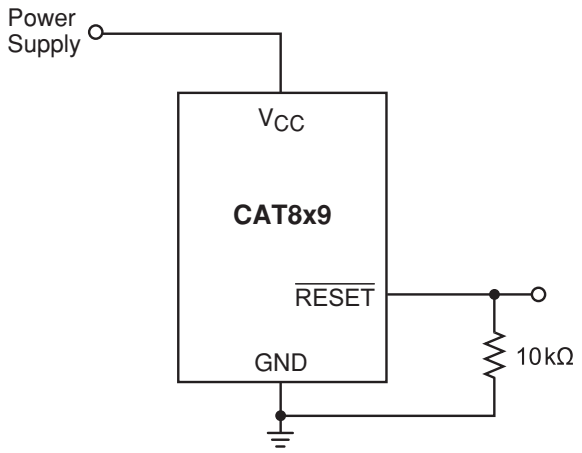


Figure 3. $\overline{\text{RESET}}$ Valid with V_{CC} Under 1.0V

BI-DIRECTIONAL RESET PIN INTERFACING

The CAT859 and CAT869 can interface with µP/µC bi-directional reset pins by connecting a 4.7kΩ resistor in series with the CAT859 and CAT869 reset output and the µP/µC bi-directional reset pin.

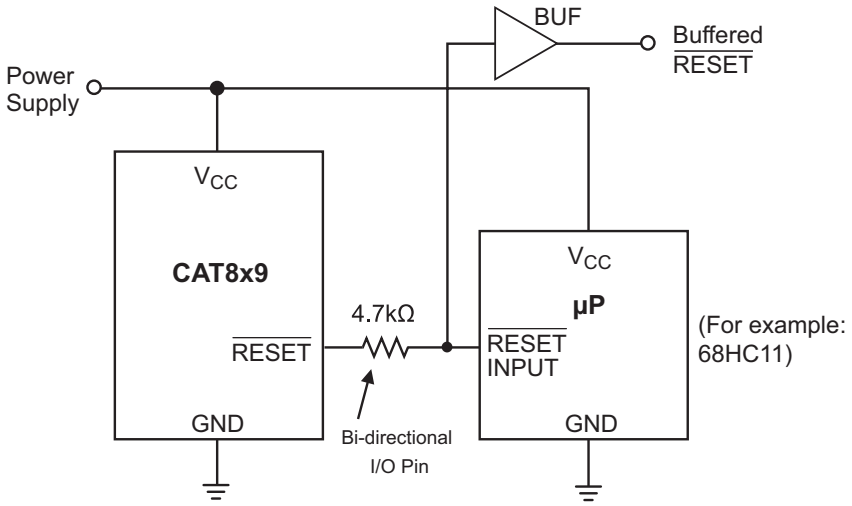


Figure 4. Bi-directional Reset Pin Interfacing

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

CAT853 AND CAT863 OPEN-DRAIN $\overline{\text{RESET}}$ APPLICATION

The CAT853 and CAT863 features an open-drain RESET output and therefore need a pull-up resistor on the output for proper operation, as shown on Figure 5. An advantage of the open-drain output includes the ability to “wire AND” several outputs together to form an inexpensive logic circuit. It is also possible to have the pull-up resistor connected to a different supply which can be higher than the CAT8x3 V_{CC} pin. The value of the pull-up resistor is not critical in most applications, typical values being between 5kΩ and 10kΩ.

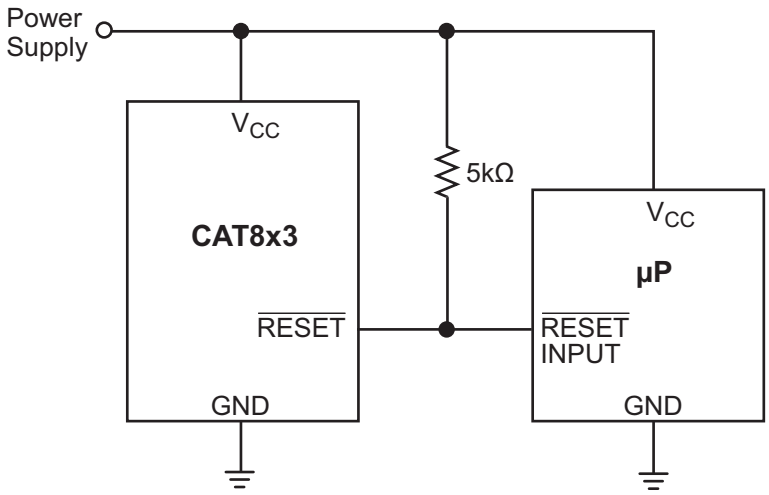
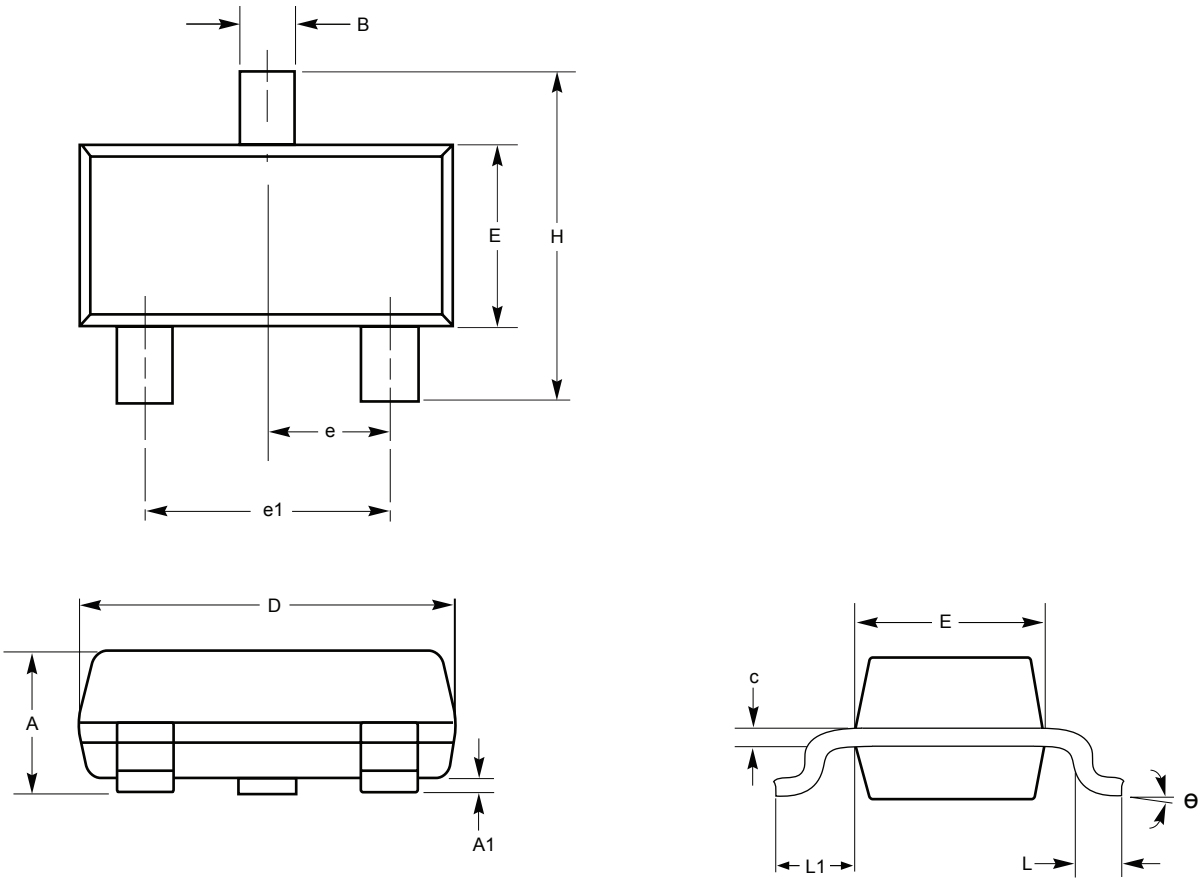


Figure 5. Typical CAT8x3 Open-Drain Circuit Configuration

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

PACKAGE INFORMATION

Plastic SOT-23 (3-Pin)



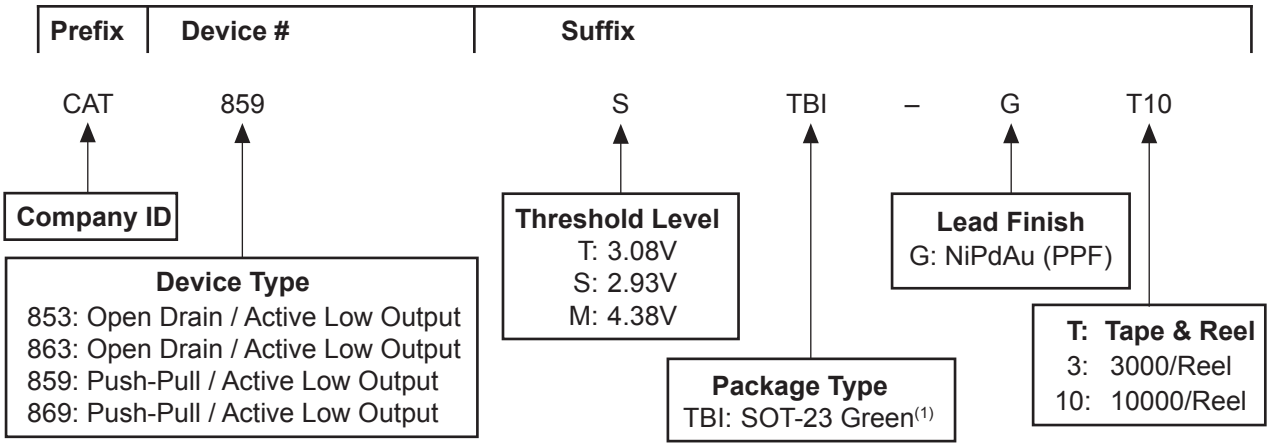
	Inches		Millimeters	
	Min	Max	Min	Max
Plastic SOT-23 (3-Pin)				
A	0.0350	0.0441	0.89	1.12
A1	0.0005	0.0039	0.013	0.10
B	0.0146	0.0197	0.37	0.50
c	0.0033	0.0071	0.085	0.18
D	0.1102	0.1197	2.80	3.04
E	0.0472	0.0551	1.20	1.40
e	0.0350	0.0406	0.89	1.03
e1	0.0701	0.0807	1.78	2.05
H	0.0827	0.1039	2.10	2.64
θ	0°	8°	0°	8°
L	0.0083	0.0161	0.275	0.41
L1	0.0160	0.0270	0.275	0.685

For current Tape and Reel information, download the PDF file from:
www.catsemi.com/documents/tapeandreel.pdf

Notes:
(1) This part is compliant with JEDEC specification TO-236
(2) Die is face up for mold and trim/form
(3) Dimensions are exclusive of mold flash and metal burr

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

EXAMPLE OF ORDERING INFORMATION (1) (2) (3)



TOP MARKING

Part and Threshold	SOT-23 RoHS NiPdAu Finish(4) (5)	Part and Threshold	SOT-23 RoHS NiPdAu Finish(4) (5)
CAT859T	RSYM	CAT853T	RUYM
CAT859S		CAT853S	
CAT859M		CAT853M	
CAT869T	RTYM	CAT863T	RVYM
CAT869S		CAT863S	
CAT869M		CAT863M	

ORDERING PART NUMBER

CAT859TTBI-G
CAT859STBI-G
CAT859MTBI-G(6)
CAT869TTBI-G
CAT869STBI-G
CAT869MTBI-G(6)
CAT853TTBI-G
CAT853STBI-G(6)
CAT853MTBI-G
CAT863TTBI-G
CAT863STBI-G(6)
CAT863MTBI-G

Notes:

(1) All packages are RoHS-compliant (Lead-free, Halogen-free).

(2) The device used in the example above is a CAT859STBI-GT10 (Push-Pull / Active Low Output, trip level of 2.85V to 3.00V NiPdAu, Tape and Reel).

(3) For additional package and temperature options, please contact your nearest Catalyst Semiconductor Sales office.

(4) The “YM” in the SOT-23 package marking indicates the Year and Month of production.

(5) All NiPdAu devices will be marked to indicate product type. Threshold and full part numbers will be provided on box and reel labels as well as all Shipping documents.

(6) For special threshold and package categories, contact factory.

© 2007 by Catalyst Semiconductor, Inc.
Characteristics subject to change without notice

REVISION HISTORY

Date	Rev.	**Reason**
10/11/2006	A	Initial Issue CAT859, CAT869
05/04/2007	B	Added CAT853, CAT863 Update Example of Ordering Information Update Top Marking Update Ordering Part Number

Copyrights, Trademarks and Patents
Trademarks and registered trademarks of Catalyst Semiconductor include each of the following:

Beyond Memory™, DPP ™, EZDim™, LDD™, MiniPot™ and Quad Mode™

Catalyst Semiconductor has been issued U.S. and foreign patents and has patent applications pending that protect its products.

CATALYST SEMICONDUCTOR MAKES NO WARRANTY, REPRESENTATION OR GUARANTEE, EXPRESS OR IMPLIED, REGARDING THE SUITABILITY OF ITS PRODUCTS FOR ANY PARTICULAR PURPOSE, NOR THAT THE USE OF ITS PRODUCTS WILL NOT INFRINGE ITS INTELLECTUAL PROPERTY RIGHTS OR THE RIGHTS OF THIRD PARTIES WITH RESPECT TO ANY PARTICULAR USE OR APPLICATION AND SPECIFICALLY DISCLAIMS ANY AND ALL LIABILITY ARISING OUT OF ANY SUCH USE OR APPLICATION, INCLUDING BUT NOT LIMITED TO, CONSEQUENTIAL OR INCIDENTAL DAMAGES.

Catalyst Semiconductor products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Catalyst Semiconductor product could create a situation where personal injury or death may occur.

Catalyst Semiconductor reserves the right to make changes to or discontinue any product or service described herein without notice. Products with data sheets labeled “Advance Information” or “Preliminary” and other products described herein may not be in production or offered for sale.

Catalyst Semiconductor advises customers to obtain the current version of the relevant product information before placing orders. Circuit diagrams illustrate typical semiconductor applications and may not be complete.



Catalyst Semiconductor, Inc.
Corporate Headquarters
2975 Stender Way
Santa Clara, CA 95054
Phone: 408.542.1000
Fax: 408.542.1200
www.catsemi.com

Document No: 3026
Revision: B
Issue date: 05/04/07