ON Semiconductor®

CAT885

Five-Channel Power Supply Supervisors

FEATURES

- **Five-channel supply voltage detection**
- **2 V_{DD} inputs allow monitoring of +5.0V, +3.3V, +3.0V, +2.5V or +1.8V supplies**
- **3 adjustable voltage inputs allow monitoring supplies > 0.6V**
- **70ms minimum reset delay**
- **Manual reset capability**
- **Reset signals valid down to V_{DD} = 1V**
- **Accurate ± < 2% voltage threshold**
- **Power-supply transients suppressed**
- **Low 2µA maximum supply current at 5V**
- **RoHS-compliant MSOP package**

APPLICATIONS

- **Telecom & datacom systems**
- **Routers & servers**
- **Data storage equipment**
- **Set-top boxes**
- **Multi-voltage systems**
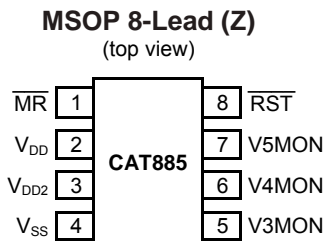
DESCRIPTION

The CAT885 is a five-channel power supply supervisory circuit with high reset thereshold accuracy and very low power consumption. The device features an open-drain output, active-low function with manual reset to perform basic system reset and monitoring functions for a wide range of electronic products. The CAT885 monitors five system voltages by maintaining a reset output active until all the power supply voltages exceed the specified trip values. The device then maintains the reset output in an active condition until the internal timer times out, which allows the system power supplies to stabilize.

Two of the five voltage detectors are factory set for standard supplies, while the threshold voltages of the third, fourth, and fifth voltage monitors can be adjusted for specific system design requirements using external resistors.

The CAT885 lowers system costs and saves board space by integrating five channels into a single, small MSOP 8-lead package.
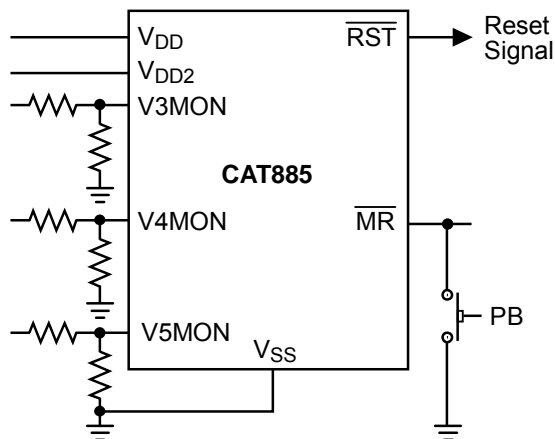
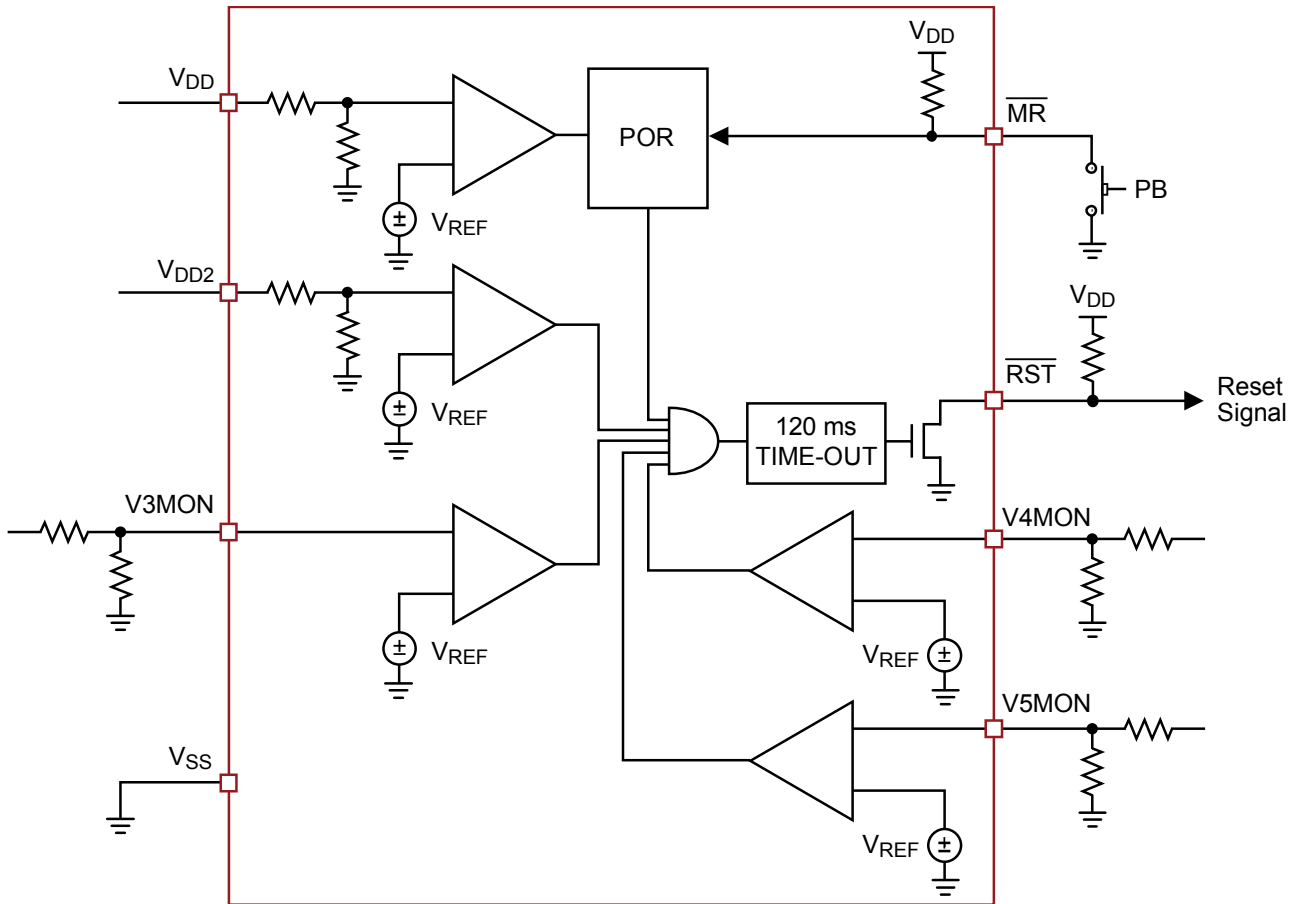**For Ordering Information details see page 7.**

PIN CONFIGURATION

MSOP 8-Lead (Z)
(top view)

$\overline{MR}$	1	8 $\overline{RST}$
V_{DD}	2	7 V5MON
V_{DD2}	3	6 V4MON
V_{SS}	4	5 V3MON

CAT885

See page 2 for pin functions

TYPICAL APPLICATION

FUNCTIONAL BLOCK DIAGRAM

PIN FUNCTIONS

Pin #	Pin	Function
1	$\overline{MR}$	Active-low manual reset Input with internal pull-up resistor
2	V_{DD}	Chip supply, first preset under-voltage detector input
3	V_{DD2}	Second preset under-voltage detector input
4	V_{SS}	Ground
5	V3MON	Adjustable third under-voltage detector input
6	V4MON	Adjustable fourth under-voltage detector input
7	V5MON	Adjustable fifth under-voltage detector input
8	$\overline{RST}$	Active-low open drain reset output, use external resistor

ABSOLUTE MAXIMUM RATINGS[1]

Parameters	Ratings	Units
Temperature under Bias	-40 to +125	ºC
Voltage on any Pin with Respect to V_{SS}	-1.0 to +7.0	V
DC Output Current	5	mA
Thermal Resistance Θ_{JA} for MSOP Package[2]	145	°C/W

RECOMMENDED OPERATING CONDITIONS

Parameters	Ratings	Units
Operating Temperature Range (Industrial)	-40 to +85	ºC
Storage Temperature	-65 to +150	ºC
Lead Soldering Temperature (10 seconds)	+300	ºC

ELECTRICAL CHARACTERISTICS

Over the recommended operating conditions unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ.	Max	Units
V_{DD}	Supply Voltage Range		1.5		5.5	V
I_{DD1}	V_{DD} Supply Current	V_{DD} = 5.0V		2	9	µA
I_{DD2}	V_{DD2} Input Current	V_{DD2} = 3.3V		0.5	3	µA
I_{DDX}	V3, V4, V5MON Input Current	V3, V4, V5MON = 1.0V		15	50	nA
Voltage Thresholds						
V_{TH1}	Fixed Voltage Trip Point for V_{DD}	CAT885Lx	4.55	4.63	4.72	V
		CAT885Sx	2.81	2.87	2.92	V
$V_{TH1HYST}$	Hysteresis of V_{TH1}	V_{TH1} = 4.63V		50		mV
		V_{TH1} = 2.87V		30		mV
V_{TH2}	Fixed Voltage Trip Point for V_{DD2}	CAT885xT	3.02	3.08	3.13	V
		CAT885xS	2.90	2.95	3.01	V
		CAT885xZ	2.29	2.33	2.37	V
		CAT885xA	1.65	1.68	1.71	V
$V_{TH2HYST}$	Hysteresis of V_{TH2}	V_{TH2} = 3.08V		40		mV
		V_{TH2} = 2.95V		30		mV
		V_{TH2} = 2.33V		25		mV
		V_{TH2} = 1.68V		20		mV
V_{REF}	V3MON, V4MON, V5MON Adj. Reset Threshold Voltage	V_{TH} for V3, V4, V5MON	0.585	0.598	0.611	V
$V_{REFHYST}$	Hysteresis Voltage			3		mV

Notes:

(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 devices 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.

(2) θ_{JA} is measured with the component mounted on a high effective thermal conductivity test board in free air.

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Conditions	Min	Typ.	Max	Units
Reset						
V_{OL}	Reset Output Voltage Low	$V_{DD} \geq 3.3V$, Sinking 2.5mA		0.05	0.40	V
		$V_{DD} < 3.3V$, Sinking 1.5mA		0.05	0.40	V
t_{RPD}	V_{TH} to Reset Asserted Delay		1	6		µs
t_{PD}	POR Timeout Delay		70	120	240	ms
C_{LOAD}	Load Capacitance on Reset Pin			5		pF
Manual Reset						
V_{THL}	$\overline{MR}$ Input Voltage Low				0.8	V
V_{THH}	$\overline{MR}$ Input Voltage High		V_{DD} - 0.6			V
T_{PW}	$\overline{MR}$ Minimum Pulse Width		1			µs
R_{IN}	Internal Pull-Up Resistor		8		16	kΩ

OPERATION

The CAT885 is designed to monitor critical supply voltages in line driven and battery powered microprocessor systems, providing Supply Voltage Supervision, Power On Reset control and Manual Reset Assertion. These features along with excellent threshold accuracy and low power consumption make the CAT885 device suitable for a wide variety of applications needing multi-voltage monitoring.

During normal operation, the CAT885 monitors the voltage levels of V_{DD}, V2MON, V3MON, V4MON, and V5MON. If the voltage on any of these five inputs falls below their respective voltage trip points, a reset is asserted ($\overline{RST}$ = low) to prevent the microprocessor from operating during a power failure or brownout condition. This reset signal remains low until the voltages exceeds the voltage threshold settings for the reset time delay period t_{PD}.

CAT885 allows users to adjust the minimum voltage sense level for three of the five monitored voltages. For example, the user can adjust the voltage input trip point for V_{3MON}, V_{4MON} and V_{5MON} inputs. This is done by connecting an external resistor divider network to the V_{xMON} pin in order to set the trip point to a voltage above 600mV. Resistors R_1 and R_2 in Figure 1 are selected by the formula: $V_{TRIP} = 0.6V \times (R_1 + R_2) / R_2$.
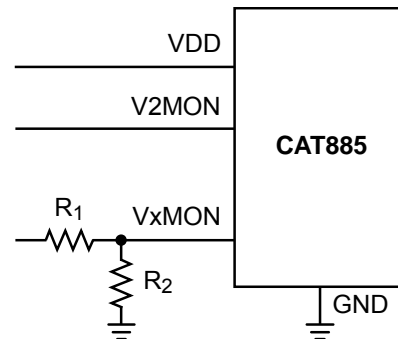

Figure 1. CAT885 Programming Trip Voltage

POWER ON RESET (POR)

Applying power to the CAT885 activates a POR circuit which activates the reset output (active LOW). At power-up POR prevents the system microprocessor from starting to operate with insufficient voltage and prior to stabilization of the clock oscillator. It ensures that operation is precluded until internal registers are properly loaded, FPGA's have downloaded their configuration data prior and all system power supplies are above minimum operating levels and stable. The reset signal remains active until V_{DD} rises above the minimum preset voltage level for time period t_{PD}.

MANUAL RESET

The manual-reset input ($\overline{MR}$) allows the user to trigger a reset by using a push-button switch or by electronically driving the input low. The $\overline{MR}$ input is an active LOW debounced input. Reset is asserted anytime the $\overline{MR}$ pin is pulled low to less than 100mV for the minimum $\overline{MR}$ pulse width or longer. The reset output remains asserted low for t_{PD}, typically 120ms and then is released. Figures 2 and 3 illustrate the CAT885's operation and $\overline{RST}$ output response times.
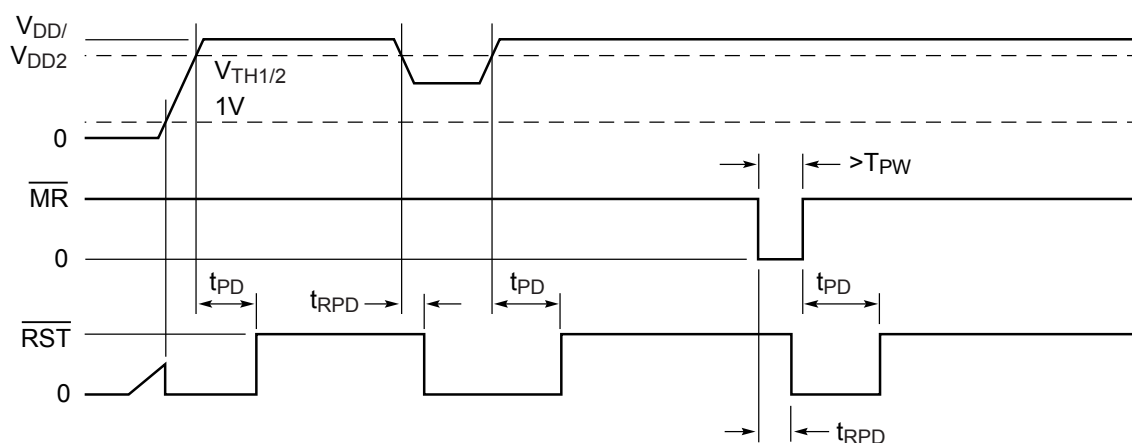
Figure 2. Power Supply Monitoring Diagram
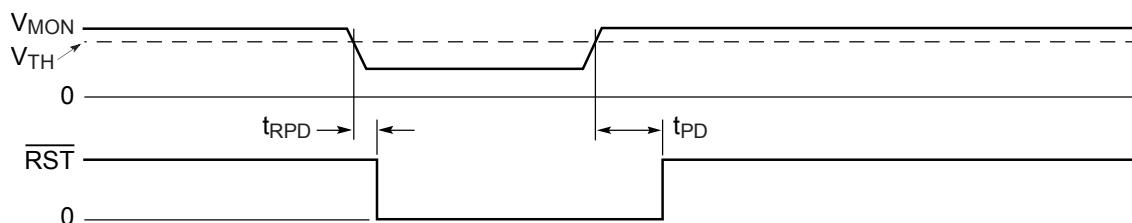
Figure 3. Auxillary Voltage Monitoring Diagram

PACKAGE OUTLINE DRAWING

MSOP 8-Lead 3 x 3mm (Z) [(1)(2)]
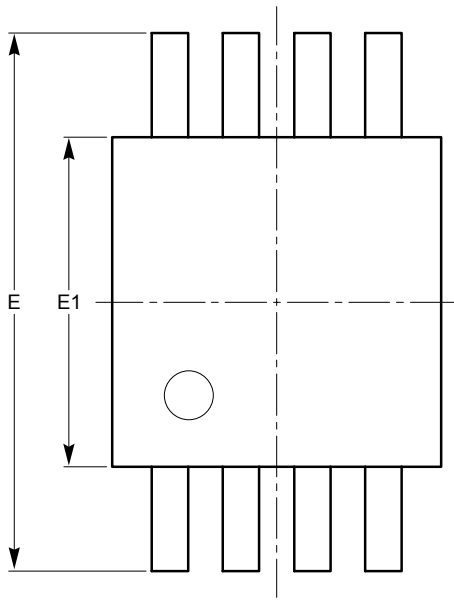
TOP VIEW

SYMBOL	MIN	NOM	MAX
A			1.10
A1	0.05	0.10	0.15
A2	0.75	0.85	0.95
b	0.22		0.38
c	0.13		0.23
D	2.90	3.00	3.10
E	4.80	4.90	5.00
E1	2.90	3.00	3.10
e		0.65 BSC	
L	0.40	0.60	0.80
L1		0.95 REF	
L2		0.25 BSC	
θ	0º		6º
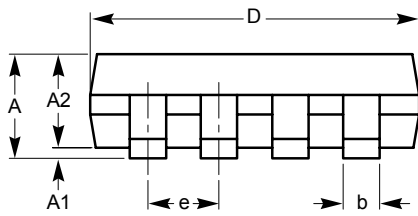
SIDE VIEW
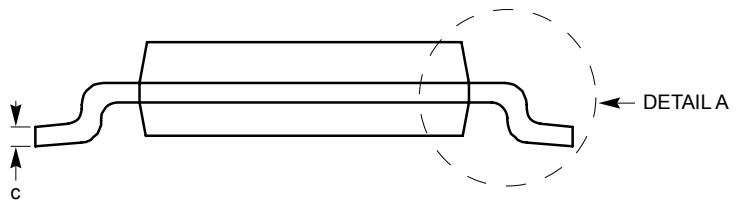
END VIEW
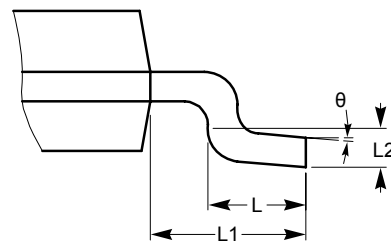
DETAIL A

Notes:

(1) All dimensions are in millimeters. Angles in degrees.

(2) Complies with JEDEC standard MO-187.

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EXAMPLE OF ORDERING INFORMATION

| Prefix | Device # | Suffix |

CAT 885 Z I -L S -G T3

Company ID

Product Number
885

Package
Z: MSOP

Temperature Range
I = Industrial (-40ºC to 85ºC)

Voltage Detection V_{DD} Level
S = 2.87V
L = 4.63V

Voltage Detection V_{DD2} Level
T = 3.08V
S = 2.95V
Z = 2.33V
A = 1.68V

Lead Finish
G:NiPdAu

Tape & Reel
T: Tape & Reel
3: 3,000/Reel
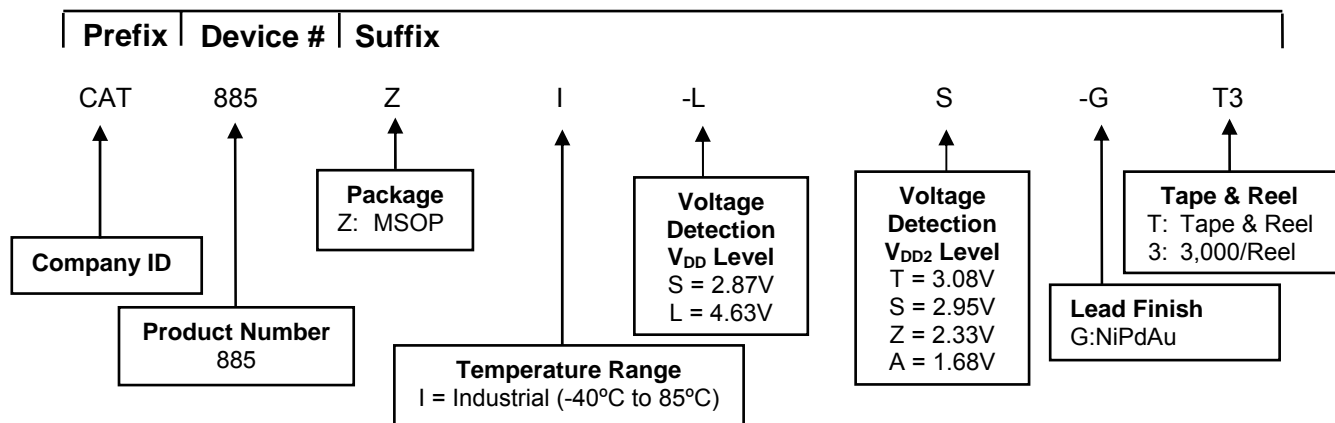
ORDERING INFORMATION

Part Number	V_{DD}	V_{DD2}	Package
CAT885ZI-ST-GT3	2.87V	3.08V	MSOP
CAT885ZI-SS-GT3	2.87V	2.95V	MSOP
CAT885ZI-SZ-GT3	2.87V	2.33V	MSOP
CAT885ZI-SA-GT3	2.87V	1.68V	MSOP
CAT885ZI-LT-GT3	4.63V	3.08V	MSOP
CAT885ZI-LS-GT3	4.63V	2.95V	MSOP
CAT885ZI-LZ-GT3	4.63V	2.33V	MSOP
CAT885ZI-LA-GT3	4.63V	1.68V	MSOP

Notes:
(1) All packages are RoHS-compliant (Lead-free, Halogen-free).
(2) The standard finish is NiPdAu.
(3) The device used in the above example is a CAT885ZI-LS-GT3 (MSOP, Industrial Temperature, 4.63V (V_{DD}) and 2.95V (V_{DD2}) Detection Levels, NiPdAu, Tape & Reel, 3,000/Reel).
(4) For additional detection voltage, package and temperature options, please contact your nearest ON Semiconductor Sales office.

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REVISION HISTORY

Date	Rev.	Description
05-May-08	A	Initial Release
06-Nov-08	B	Change logo and fine print to ON Semiconductor
03-Aug-09	C	Update Functional Block Diagram