Features



Hex/Quad, Power-Supply Supervisory Circuits

General Description

The MAX6887/MAX6888 multivoltage supply supervisors provide several voltage-detector inputs, one watchdog input, and three outputs. Each voltage-detector input offers a factory-set undervoltage and overvoltage threshold. Manual reset and margin disable inputs offer additional flexibility.

The MAX6887 offers six voltage-detector inputs, while the MAX6888 offers four inputs. Output RESET asserts when any input voltage drops below its respective undervoltage threshold or manual reset MR is asserted. Output OV asserts when any input voltage exceeds its respective overvoltage threshold. Monitor standard supply voltages listed in the Selector Guide.

The MAX6887/MAX6888 offer a watchdog timer with an initial and normal timeout periods of 102.4s and 1.6s, respectively. Watchdog output WDO asserts when the watchdog timer expires. Connect WDO to manual reset input MR to generate resets when the watchdog timer expires. RESET, OV, and WDO are active-low, opendrain outputs.

The MAX6887/MAX6888 are available in a 5mm x 5mm x 0.8mm, 16-pin thin QFN package and operate over the extended -40°C to +85°C temperature range.

Applications

Multivoltage Systems

Telecom

Networking

Servers/Workstations/Storage Systems

♦ Hex/Quad Voltage Detectors

- ♦ Undervoltage and Overvoltage Thresholds
- **♦ 1% Threshold Accuracy**
- ♦ Margining Disable and Manual Reset Input
- ♦ Watchdog Timer
- ♦ Open-Drain RESET, OV, and WDO Outputs
- ◆ 180ms (min) Reset Timeout Period
- **♦ Few External Components**
- ♦ Small 5mm x 5mm, 16-Pin Thin QFN Packages

Ordering Information

PART	TEMP RANGE	PIN-PACKAGE
MAX6887_ETE+	-40°C to +85°C	16 Thin QFN-EP*
MAX6888_ETE+	-40°C to +85°C	16 Thin QFN-EP*

Note: Insert the desired letter from the Selector Guide into the blank to complete the part number.

Pin Configurations and Typical Operating Circuit appear at end of data sheet.

Selector Guide

PART	NO	NOMINAL INPUT VOLTAGE (V)*							
FARI	IN1	IN2	IN3	IN4	IN5	IN6	(%)		
MAX6887AETE	5.0	3.3	2.5	1.8	Adj	Adj	5		
MAX6887BETE	5.0	3.3	2.5	Adj	Adj	Adj	5		
MAX6887CETE	5.0	3.3	1.8	Adj	Adj	Adj	5		
MAX6887DETE	3.3	2.5	1.8	1.5	Adj	Adj	5		
MAX6887EETE	3.3	2.5	1.8	Adj	Adj	Adj	5		
MAX6887FETE	3.3	2.5	1.5	Adj	Adj	Adj	5		
MAX6887GETE	3.3	2.5	Adj	Adj	Adj	Adj	5		
MAX6887HETE	3.3	1.8	Adj	Adj	Adj	Adj	5		
MAX6887QETE	Adj	Adj	Adj	Adj	Adj	Adj	5		

PART	NOMINAL INPUT VOLTAGE (V)*								
PANI	IN1	IN2	IN3	IN4	IN5	IN6	(%)		
MAX6887IETE	5.0	3.3	2.5	1.8	Adj	Adj	10		
MAX6887JETE	5.0	3.3	2.5	Adj	Adj	Adj	10		
MAX6887KETE	5.0	3.3	1.8	Adj	Adj	Adj	10		
MAX6887LETE	3.3	2.5	1.8	1.5	Adj	Adj	10		
MAX6887METE	3.3	2.5	1.8	Adj	Adj	Adj	10		
MAX6887NETE	3.3	2.5	1.5	Adj	Adj	Adj	10		
MAX6887OETE	3.3	2.5	Adj	Adj	Adj	Adj	10		
MAX6887PETE	3.3	1.8	Adj	Adj	Adj	Adj	10		
MAX6887RETE	Adj	Adj	Adj	Adj	Adj	Adj	10		

^{*}See thresholds options tables (Tables 1 and 2) for actual undervoltage and overvoltage thresholds.

Selector Guides continued at end of data sheet.

Maxim Integrated Products 1

⁺Denotes a lead(Pb)-free/RoHS-compliant package.

^{*}EP = Exposed pad.

ABSOLUTE MAXIMUM RATINGS

(All voltages referenced to GND.) IN1–IN6, VCC, RESET, OV, WDO0.3V to +6V WDI, MR, MARGIN0.3V to +6V	Maximum Junction Temperature+150°C Operating Temperature Range40°C to +85°C Storage Temperature Range65°C to +150°C
BP0.3V to +3V	Lead Temperature (soldering, 10s)+300°C
Input/Output Current (all pins)±20mA	
Continuous Power Dissipation (T _A = +70°C)	
16-Pin 5mm x 5mm Thin QFN	
(derate 20.8mW/°C above +70°C)1667mW	

Stresses beyond 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 beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

 $(V_{IN1}-V_{IN4} \text{ or } V_{CC}=2.7V \text{ to } 5.8V, \text{WDI}=\text{GND}, \overline{\text{MARGIN}}=\overline{\text{MR}}=\text{BP}, T_{A}=-40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}, \text{ unless otherwise noted.}$ Typical values are at $T_{A}=+25^{\circ}\text{C}$.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Voltage Range (Note 3)		Voltage on either one of IN1–IN4 or V _{CC} to guarantee the part is fully operational	2.7		5.8	V
Supply Current	Icc	$V_{IN1} = 5.8V$, $IN2-IN6 = GND$, no load		0.9	1.2	mA
Threshold Accuracy	\/	IN1-IN6, IN_ falling, $T_A = +25$ °C to $+85$ °C	-1		+1	9/ \/
(See the Selector Guide)	V _{TH}	IN1-IN6, IN_ falling, $T_A = -40^{\circ}C$ to $+85^{\circ}C$	-1.5		+1.5	% V _{TH}
Threshold Hysteresis	V _{TH-H} yst			0.3		% V _{TH}
Threshold Tempco	ΔV _{TH} /°C			10		ppm/°C
IN_ Input Impedance	R _{IN}	For $V_{IN_}$ < highest $V_{IN1-IN4}$ and $V_{IN_}$ < V_{CC} (not ADJ), thresholds are not set as adjustable	130	200	300	kΩ
INI la sant la salas sas Occidentat		IN5, IN6 (MAX6887 only)	150		. 150	A
IN_ Input Leakage Current	IIN	IN1-IN4 set as adjustable thresholds	-150		+150	nA
Power-Up Delay	t _{D-PO}	V _{CC} ≥ 2.5V			2.5	ms
IN_ to RESET or OV Delay	t _{D-R}	IN_ falling/rising, 100mV overdrive		20		μs
RESET Timeout Period	t _{RP}		180	200	220	ms
OV Timeout Period	top			25		μs
RESET, OV, and WDO Output Low	V _{OL}	I _{SINK} = 4mA, output asserted			0.4	V
RESET, OV, and WDO Output Open-Drain Leakage Current	llkg	Output high impedance	-1		+1	μΑ

ELECTRICAL CHARACTERISTICS (continued)

 $(V_{IN1}-V_{IN4} \text{ or } V_{CC}=2.7V \text{ to } 5.8V, \text{ WDI}=\text{GND}, \overline{\text{MARGIN}}=\overline{\text{MR}}=\text{BP}, T_{A}=-40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}, \text{ unless otherwise noted.}$ Typical values are at $T_{A}=+25^{\circ}\text{C}$.) (Notes 1, 2)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
MR, MARGIN, WDI Input Voltage	VIL				0.6	V
Min, MANGIN, WDI Input Voltage	VIH		1.4			V
MR Input Pulse Width	tMR		1			μs
MR Glitch Rejection				100		ns
MR to RESET or OV Delay	t _{D-MR}			200		ns
MR to Internal BP Pullup Current	IMR	V _{MR} = 1.4V	5	10	15	μΑ
MARGIN to Internal BP Pullup Current	IMARGIN	V _{MARGIN} = 1.4V	5	10	15	μΑ
WDI Pulldown Current	IWDI	V _{WDI} = 0.6V	5	10	15	μΑ
WDI Input Pulse Width			50			ns
Watah dan Timaay t David	twDI	Initial	92.16	102.4	112.64	
Watchdog Timeout Period	twD	Normal	1.44	1.6	1.76	S

Note 1: 100% production tested at $T_A = +25^{\circ}C$ and $T_A = +85^{\circ}C$. Specifications at $T_A = -40^{\circ}C$ are guaranteed by design.

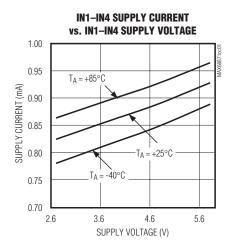
Note 2: Device may be supplied from any one of IN1-IN4 or V_{CC}.

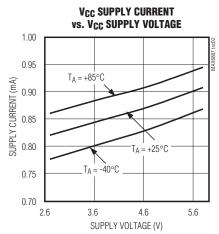
Note 3: The internal supply voltage, measured at V_{CC}, equals the maximum of IN1–IN4.

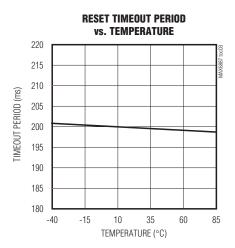
Note 4: Versions Q and R require that power be applied through VCC.

Typical Operating Characteristics

 $(V_{IN1}-V_{IN4} \text{ or } V_{CC} = 5V, \text{ WDI} = \text{GND}, \overline{\text{MARGIN}} = \overline{\text{MR}} = \text{BP}, T_A = +25^{\circ}\text{C}, \text{ unless otherwise noted.})$

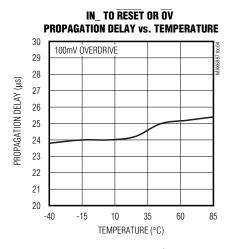


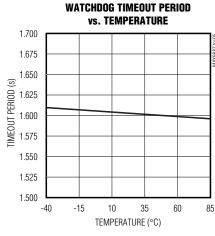


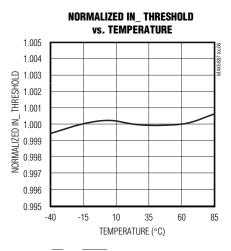


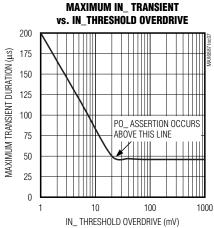
_Typical Operating Characteristics (continued)

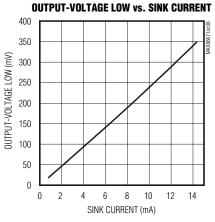
 $(V_{IN1}-V_{IN4} \text{ or } V_{CC} = 5V, \text{WDI} = \text{GND}, \overline{\text{MARGIN}} = \overline{\text{MR}} = \text{BP}, T_A = +25^{\circ}\text{C}, \text{ unless otherwise noted.})$

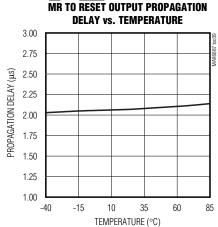












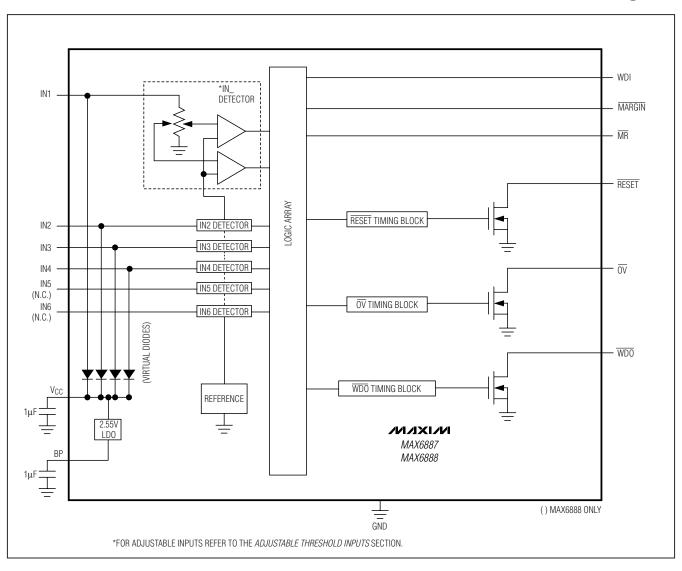
Pin Description

P	IN	NAME	FUNCTION
MAX6887	MAX6888	NAIVIE	FUNCTION
1	1	RESET	Open-Drain, Active-Low Reset Output. RESET asserts when any input voltage falls below its undervoltage threshold or when MR is pulled low. RESET remains low for 200ms after all assertion-causing conditions are cleared. An external pullup resister is required.
2	2	WDO	Open-Drain, Active-Low Watchdog Timer Output. Logic output for the watchdog timer function. WDO goes low when WDI is not strobed high-to-low or low-to-high within the watchdog timeout period.
3	3	ŌV	Open-Drain Active-Low Overvoltage Output. \overline{OV} asserts when any input voltage exceeds its overvoltage threshold. \overline{OV} remains low for 25µs after all overvoltage conditions are cleared. An external pullup resistor is required.
4	4	GND	Ground

Pin Description (continued)

	IN	NAME	FUNCTION				
MAX6887	MAX6888		Manual Reset Input. Pull MR low to assert RESET. Connect MR to WDO to generate resets				
5	5	MR	when the watchdog timer expires. Leave $\overline{\text{MR}}$ unconnected or connect to DBP if unused. $\overline{\text{MR}}$ is internally pulled up to BP through a 10 μ A current source.				
6	6	MARGIN	Margin Input. When MARGIN is pulled low, RESET is held in its existing state independent of subsequent changes in monitored input voltages or the watchdog timer expiration. MARGIN is internally pulled up to BP through a 10µA current source. Leave MARGIN unconnected or connect to BP if unused. MARGIN overrides MR if both are asserted at the same time.				
7	7	WDI	Watchdog Timer Input. Logic input for the watchdog timer function. If WDI is not strobed with a valid low-to-high or high-to-low transition within the selected watchdog timeout period, WDO asserts. WDI is internally pulled down to GND through a 10µA current sink.				
8	8	I.C.	Internal Connection. Leave unconnected.				
9	9	Vcc	Internal Power-Supply Voltage. Bypass V_{CC} to GND with a 1 μ F ceramic capacitor as close to the device as possible. V_{CC} supplies power to the internal circuitry. V_{CC} is internally powered from the highest of the monitored IN1–IN4 voltages. Do not use V_{CC} to supply power to external circuitry. To externally supply V_{CC} , see the <i>Powering the MAX6887/MAX6888</i> section.				
10	10	BP	Bypass Voltage. The internally generated voltage at BP supplies power to internal logic and output RESET. Connect a 1µF capacitor from BP to GND as close to the device as possible. Do not use BP to supply power to external circuitry.				
11	_	IN6	Input Voltage Detector 6. IN6 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. IN6 cannot power the device. For improved noise immunity, bypass IN6 to GND with a 0.1µF capacitor installed as close to the device as possible.				
12	1	IN5	Input Voltage Detector 5. IN5 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. IN5 cannot power the device. For improved noise immunity, bypass IN5 to GND with a 0.1µF capacitor installed as close to the device as possible.				
13	13	IN4	Input Voltage Detector 4. IN4 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. Power the device through IN1–IN4 or V _{CC} (see the <i>Powering the MAX6887/MAX6888</i> section). For improved noise immunity, bypass IN4 to GND with a 0.1µF capacitor installed as close to the device as possible.				
14	14	IN3	Input Voltage Detector 3. IN3 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. Power the device through IN1–IN4 or V _{CC} (see the <i>Powering the MAX6887/MAX6888</i> section). For improved noise immunity, bypass IN3 to GND with a 0.1µF capacitor installed as close to the device as possible.				
15	15	IN2	Input Voltage Detector 2. IN2 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. Power the device through IN1–IN4 or V _{CC} (see the <i>Powering the MAX6887/MAX6888</i> section). For improved noise immunity, bypass IN2 to GND with a 0.1µF capacitor installed as close to the device as possible.				
16	16	IN1	Input Voltage Detector 1. IN1 monitors both undervoltage and overvoltage conditions. See the thresholds options (Tables 1 and 2) for available thresholds. Power the device through IN1–IN4 or $V_{\rm CC}$ (see the <i>Powering the MAX6887/MAX6888</i> section). For improved noise immunity, bypass IN1 to GND with a 0.1 μ F capacitor installed as close to the device as possible.				
_	11, 12	N.C.	No Connection. Not internally connected.				
_	_	EP	Exposed Paddle. Internally connected to GND. Connect EP to GND or leave unconnected.				

_Functional Diagram



Detailed Description

The MAX6887/MAX6888 provide several supply-detector inputs, one watchdog input, and three outputs for power-supply monitoring applications. The MAX6887 offers six voltage-detector inputs, while the MAX6888 offers four. Each voltage-detector input offers both an undervoltage and overvoltage threshold.

The undervoltage and overvoltage thresholds are factory-set for monitoring standard supply voltages (see the *Selector Guide*). Inputs in the *Selector Guide* that contain "Adj" allow an external voltage-divider to be connected to set a user-defined threshold.

RESET goes low when any input voltage drops below its undervoltage threshold or when \overline{MR} is brought low. RESET stays low for 200ms after all assertion-causing conditions have been cleared. \overline{OV} goes low when an input voltage rises above its overvoltage threshold. \overline{OV} typically stays low for 25µs (typ) after all inputs fall back under their overvoltage thresholds.

The MAX6887/MAX6888 offer a watchdog timer with initial and normal timeout periods of 102.4s and 1.6s, respectively. WDO goes low when the watchdog timer expires and deasserts when WDI transitions from low-to-high or high-to-low.

Powering the MAX6887/MAX6888

The MAX6887/MAX6888 derive power from the voltage-detector inputs IN1–IN4 or through an externally supplied V_{CC}. A virtual diode-ORing scheme selects the positive input that supplies power to the device (see the *Functional Diagram*). The highest input voltage on IN1–IN4 supplies power to the device. One of IN1–IN4 must be at least 2.7V to ensure proper operation.

Internal hysteresis ensures that the supply input that initially powered the device continues to power the device when multiple input voltages are within 50mV of each other.

VCC powers the analog circuitry and is the bypass connection for the MAX6887/MAX6888 internal supply. Bypass VCC to GND with a 1µF ceramic capacitor installed as close to the device as possible. The internal supply voltage, measured at VCC, equals the maximum of IN1-IN4. If VCC is externally supplied, VCC must be at least 200mV higher than any voltage applied to IN1-IN4 and VCC must be brought up first. VCC always powers the device when all IN_ are factory set as "Adj." Do not use the internally generated VCC to provide power to external circuitry.

The MAX6887/MAX6888 generate a supply voltage at BP for the internal logic circuitry. Bypass BP to GND with a 1μ F ceramic capacitor installed as close to the device as possible. The nominal BP output voltage is +2.55V. Do not use BP to provide power to external circuitry.

Inputs

The MAX6887 offers six voltage-detector inputs, while the MAX6888 offers four voltage-detector inputs. Each voltage-detector input offers an undervoltage and overvoltage threshold set at the factory to monitor standard supply voltages (see the *Selector Guide*). The 5% and 10% tolerances are based on maximum and minimum threshold values. Actual thresholds for the MAX6887/MAX6888 are shown in Tables 1 and 2. Inputs in the *Selector Guide* listing "Adj" allow an external voltage-divider to be connected to set a user-defined threshold.

Adjustable Threshold Inputs

Inputs listed in the *Selector Guide* containing "Adj" for inputs allow external resistor voltage-dividers to be connected at the voltage-detector inputs. These inputs monitor any voltage supply higher than 0.6V (see Figure 1). Use the following equation to set a voltage-

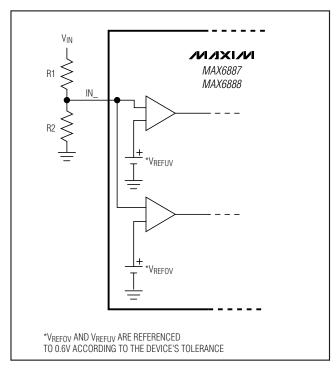


Figure 1. Adjusting the Monitored Threshold

detector input (IN1–IN6) to monitor a user-defined supply voltage:

$$0.6V = V_{MON} \times \left(\frac{R2}{R1 + R2}\right)$$

where V_{MON} is the desired voltage to be monitored. Use the following procedure to design the proper voltage-divider and calculate thresholds:

- Pick a value for R2. Use the equation above with the desired supply voltage to be monitored and solve for R1. Use high-value resistors R1 and R2 to minimize current consumption due to low leakage currents.
- To find the actual undervoltage and overvoltage thresholds, use the following equations:

$$V_{ACTUALUV} = V_{MON} \times \left(\frac{V_{REFUV}}{0.6V}\right)$$
$$V_{ACTUALOV} = V_{MON} \times \left(\frac{V_{REFOV}}{0.6V}\right)$$

VREFUV and VREFOV are the undervoltage and overvoltage thresholds listed in Tables 1 and 2 that allow adjustable thresholds. Their values are based on tolerances of $\pm 7.5\%$ and $\pm 12.5\%$ from a 0.6V reference. See the *Selector Guide* to find which thresholds in Tables 1 and 2 are adjustable.

Manual Reset (MR)

Many μP -based products require manual reset capability to allow an operator or external logic circuitry to initiate a reset. The manual reset input (MR) can be connected directly to a switch without an external pullup resistor or debouncing network. \overline{MR} is internally pulled up to BP. Leave unconnected if not used. \overline{MR} is internally pulled up to BP through a 10 μ A current source. \overline{MR} is designed to reject fast, falling transients (typically 100ns pulses) and \overline{MR} must be held low for a minimum of 1 μ s to assert RESET. Connect a 0.1 μ F capacitor from \overline{MR} to ground to provide additional noise immunity. After \overline{MR} transitions from low to high, \overline{RESET} remains asserted for the duration of its time delay.

Margin Output Disable (MARGIN)

MARGIN allows system-level testing while power supplies exceed the normal operating ranges. Drive MARGIN low to hold RESET, OV, and WDO in their

Table 1. MAX6887 Threshold Options

DART		UV THRESHOLDS (V)							V THRES	HOLDS (V)	
PART	IN1	IN2	IN3	IN4	IN5	IN6	IN1	IN2	IN3	IN4	IN5	IN6
MAX6887AETE	4.620	3.060	2.310	1.670	0.557	0.557	5.360	3.540	2.680	1.930	0.643	0.643
MAX6887BETE	4.620	3.060	2.310	0.557	0.557	0.557	5.360	3.540	2.680	0.643	0.643	0.643
MAX6887CETE	4.620	3.060	1.670	0.557	0.557	0.557	5.360	3.540	1.930	0.643	0.643	0.643
MAX6887DETE	3.060	2.310	1.670	1.390	0.557	0.557	3.540	2.680	1.930	1.610	0.643	0.643
MAX6887EETE	3.060	2.310	1.670	0.557	0.557	0.557	3.540	2.680	1.930	0.643	0.643	0.643
MAX6887FETE	3.060	2.310	1.390	0.557	0.557	0.557	3.540	2.680	1.610	0.643	0.643	0.643
MAX6887GETE	3.060	2.310	0.557	0.557	0.557	0.557	3.540	2.680	0.643	0.643	0.643	0.643
MAX6887HETE	3.060	1.670	0.557	0.557	0.557	0.557	3.540	1.930	0.643	0.643	0.643	0.643
MAX6887QETE	0.557	0.557	0.557	0.557	0.557	0.557	0.643	0.643	0.643	0.643	0.643	0.643
MAX6887IETE	4.380	2.880	2.190	1.580	0.527	0.527	5.620	3.700	2.810	2.020	0.673	0.673
MAX6887JETE	4.380	2.880	2.190	0.527	0.557	0.557	5.620	3.700	2.810	0.673	0.673	0.673
MAX6887KETE	4.380	2.880	1.580	0.527	0.557	0.557	5.620	3.700	2.020	0.673	0.673	0.673
MAX6887LETE	2.880	2.190	1.580	1.310	0.557	0.557	3.700	2.810	2.020	1.680	0.673	0.673
MAX6887METE	2.880	2.190	1.580	0.527	0.557	0.557	3.700	2.810	2.020	0.673	0.673	0.673
MAX6887NETE	2.880	2.190	1.310	0.527	0.557	0.557	3.700	2.810	1.680	0.673	0.673	0.673
MAX6887OETE	2.880	2.190	0.527	0.527	0.557	0.557	3.700	2.810	0.673	0.673	0.673	0.673
MAX6887PETE	2.880	1.580	0.527	0.527	0.557	0.557	3.700	2.020	0.673	0.673	0.673	0.673
MAX6887RETE	0.527	0.527	0.527	0.527	0.527	0.527	0.673	0.673	0.673	0.673	0.673	0.673

Table 2. MAX6888 Threshold Options

DADT		UV THRES	HOLDS (V)			OV THRES	HOLDS (V)	
PART	IN1	IN2	IN3	IN4	IN1	IN2	IN3	IN4
MAX6888AETE	4.620	3.060	2.310	1.670	5.360	3.540	2.680	1.930
MAX6888BETE	4.620	3.060	2.310	0.557	5.360	3.540	2.680	0.643
MAX6888CETE	4.620	3.060	1.670	0.557	5.360	3.540	1.930	0.643
MAX6888DETE	3.060	2.310	1.670	1.390	3.540	2.680	1.930	1.610
MAX6888EETE	3.060	2.310	1.670	0.557	3.540	2.680	1.930	0.643
MAX6888FETE	3.060	2.310	1.390	0.557	3.540	2.680	1.610	0.643
MAX6888GETE	3.060	2.310	0.557	0.557	3.540	2.680	0.643	0.643
MAX6888HETE	3.060	1.670	0.557	0.557	3.540	1.930	0.643	0.643
MAX6888QETE	0.557	0.557	0.557	0.557	0.643	0.643	0.643	0.643
MAX6888IETE	4.380	2.880	2.190	1.580	5.620	3.700	2.810	2.020
MAX6888JETE	4.380	2.880	2.190	0.527	5.620	3.700	2.810	0.673
MAX6888KETE	4.380	2.880	1.580	0.527	5.620	3.700	2.020	0.673
MAX6888LETE	2.880	2.190	1.580	1.310	3.700	2.810	2.020	1.680
MAX6888METE	2.880	2.190	1.580	0.527	3.700	2.810	2.020	0.673
MAX6888NETE	2.880	2.190	1.310	0.527	3.700	2.810	1.680	0.673
MAX6888OETE	2.880	2.190	0.527	0.527	3.700	2.810	0.673	0.673
MAX6888PETE	2.880	1.580	0.527	0.527	3.700	2.020	0.673	0.673
MAX6888RETE	0.527	0.527	0.527	0.527	0.673	0.673	0.673	0.673

existing state while system-level testing occurs. Leave MARGIN unconnected or connect to BP if unused. An internal 10µA current source pulls MARGIN to BP. MARGIN overrides $\overline{\text{MR}}$ if both are asserted at the same time. The state of $\overline{\text{RESET}}$, $\overline{\text{OV}}$, and $\overline{\text{WDO}}$ does not change while $\overline{\text{MARGIN}}$ = GND.

\overline{RESET} , \overline{OV} , and \overline{WDO} Outputs

The MAX6887/MAX6888 feature three active-low opendrain outputs: RESET, OV, and WDO. After power-up or overvoltage/undervoltage conditions, RESET and OV remain in their active states until their timeout periods expire and no undervoltage/overvoltage conditions are present (see Figure 2).

OV asserts when any monitored input is above its overvoltage threshold and remains asserted until all inputs are below their thresholds and its respective 25µs timeout period expires. Connect OV to MR to bring RESET low during an overvoltage condition. OV requires a pullup resistor (unless connected to MR).

RESET asserts when any monitored input is below its undervoltage threshold or \overline{MR} is asserted. \overline{RESET} remains asserted for 200ms after all assertion-causing conditions have been cleared. Configure \overline{RESET} to assert when the watchdog timer expires by connecting \overline{WDO} to \overline{MR} . \overline{RESET} requires a pullup resistor.

WDO asserts when the watchdog timer expires. See the *Configuring the Watchdog Timer* section for a complete description. WDO requires a pullup resistor.

Configuring the Watchdog Timer

A watchdog timer monitors microprocessor (µP) software execution for a stalled condition and resets the µP if it stalls. Connect the watchdog timer output \overline{WDO} to the reset input or a nonmaskable interrupt of the µP. The watchdog timer features independent initial and normal watchdog timeout periods of 102.4s and 1.6s, respectively.

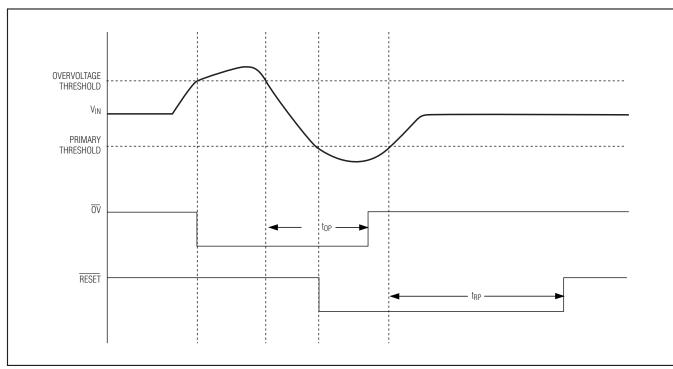


Figure 2. Output Timing Diagram

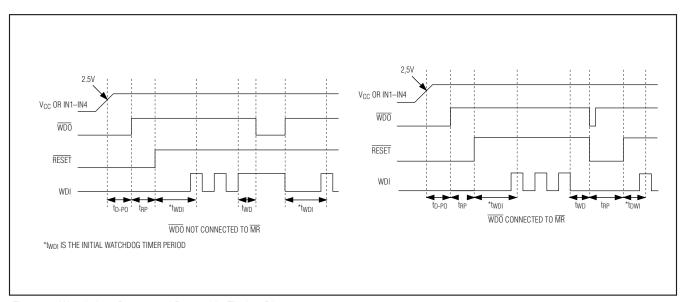


Figure 3. Watchdog, Reset, and Power-Up Timing Diagram

10 ______ **/\!/X!/\!**

At power-up, \overline{WDO} goes high after t_{D-PO} (see Figure 3). The initial watchdog timeout period (twDI) applies immediately after \overline{WDO} is high. The initial watchdog timeout period allows the μP to perform its initialization process. A normal watchdog timeout period (twD) applies whenever WDI transitions from high to low after the initial watchdog timeout period occurs. WDI monitors the toggling output of the μP , indicating normal processor behavior. If WDI does not toggle during the normal watchdog timeout period (twD), indicating that the processor has stopped operating or is stuck in an infinite execution loop, \overline{WDO} goes low. \overline{WDO} stays low until the next transition on WDI. An initial watchdog timeout period (twDI) starts when \overline{WDO} goes high.

If $\overline{\text{WDO}}$ is connected to $\overline{\text{MR}}$, the $\overline{\text{WDO}}$ will assert for a short duration (~5µs), long enough to assert the $\overline{\text{RESET}}$ output. Asserting $\overline{\text{RESET}}$ clears the watchdog timer and $\overline{\text{WDO}}$ goes high. The reset output will remain asserted for its timeout period after a watchdog fault. The watchdog timer stays cleared as long as $\overline{\text{RESET}}$ is low.

_Applications Information

Layout and Bypassing

For better noise immunity, bypass each of the voltage-detector inputs to GND with $0.1\mu F$ capacitors installed as close to the device as possible. Bypass V_{CC} and BP to GND with $1\mu F$ capacitors installed as close to the device as possible. V_{CC} (when not externally supplied) and BP are internally generated voltages and should not be used to supply power to external circuitry.

Chip Information

PROCESS: BICMOS

Selector Guide (continued)

PART	NOMINAL INPUT VOLTAGE (V)*					
	IN1	IN2	IN3	IN4	(%)	
MAX6888AETE	5.0	3.3	2.5	1.8	5	
MAX6888BETE	5.0	3.3	2.5	Adj	5	
MAX6888CETE	5.0	3.3	1.8	Adj	5	
MAX6888DETE	3.3	2.5	1.8	1.5	5	
MAX6888EETE	3.3	2.5	1.8	Adj	5	
MAX6888FETE	3.3	2.5	1.5	Adj	5	
MAX6888GETE	3.3	2.5	Adj	Adj	5	
MAX6888HETE	3.3	1.8	Adj	Adj	5	
MAX6888QETE	Adj	Adj	Adj	Adj	5	
MAX6888IETE	5.0	3.3	2.5	1.8	10	
MAX6888JETE	5.0	3.3	2.5	Adj	10	
MAX6888KETE	5.0	3.3	1.8	Adj	10	
MAX6888LETE	3.3	2.5	1.8	1.5	10	
MAX6888METE	3.3	2.5	1.8	Adj	10	
MAX6888NETE	3.3	2.5	1.5	Adj	10	
MAX6888OETE	3.3	2.5	Adj	Adj	10	
MAX6888PETE	3.3	1.8	Adj	Adj	10	
MAX6888RETE	Adj	Adj	Adj	Adj	10	

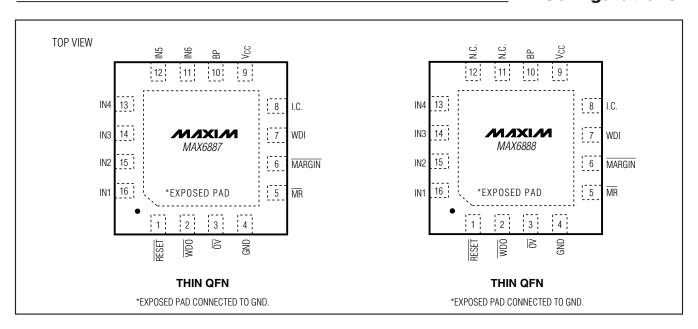
^{*}See thresholds options tables (Tables 1 and 2) for actual undervoltage and overvoltage thresholds.

Package Information

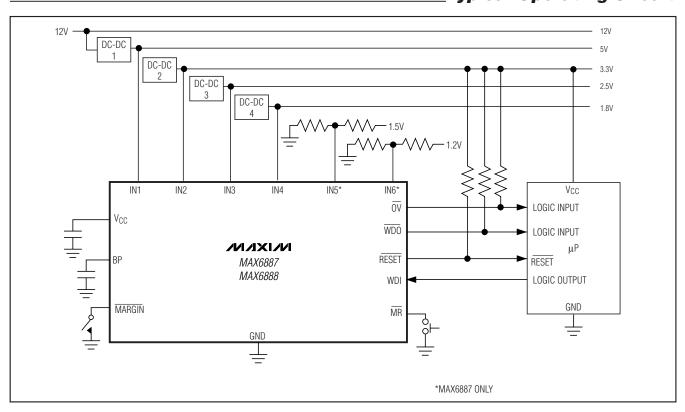
For the latest package outline information and land patterns, go to www.maxim-ic.com/packages. Note that a "+", "#", or "-" in the package code indicates RoHS status only. Package drawings may show a different suffix character, but the drawing pertains to the package regardless of RoHS status.

PACKAGE TYPE	PACKAGE CODE	DOCUMENT NO.
16-TQFN-EP	T1655+2	<u>21-0140</u>

Pin Configurations



Typical Operating Circuit



__ /VI/IXI/VI

Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	5/05	Initial release	_
1	3/07	Revised Pin Description.	1, 5, 14
2	1/10	Revised Ordering Information to add lead-free information and revised Table 2.	1, 9

Maxim cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a Maxim product. No circuit patent licenses are implied. Maxim reserves the right to change the circuitry and specifications without notice at any time.

ПОСТАВКА ЭЛЕКТРОННЫХ КОМПОНЕНТОВ

многоканальный

Общество с ограниченной ответственностью «МосЧип» ИНН 7719860671 / КПП 771901001 Адрес: 105318, г.Москва, ул.Щербаковская д.3, офис 1107

Данный компонент на территории Российской Федерации Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

http://moschip.ru/get-element

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

Офис по работе с юридическими лицами:

105318, г. Москва, ул. Щербаковская д. 3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: info@moschip.ru

Skype отдела продаж:

moschip.ru moschip.ru_6 moschip.ru_4 moschip.ru_9