



# 5-Pin, Multiple-Input, Programmable Reset ICs

MAX6305-MAX6313

## General Description

The MAX6305–MAX6313 CMOS microprocessor ( $\mu$ P) supervisory circuits are designed to monitor more than one power supply. Ideal for monitoring both 5V and 3.3V in personal computer systems, these devices assert a system reset if any of the monitored supplies falls outside the programmed threshold. Low supply current (15 $\mu$ A) and a small package suit them for portable applications. The MAX6305–MAX6313 are specifically designed to ignore fast transients on any monitored supply.

These devices are available in a SOT23-5 package, have factory-programmed reset thresholds from 2.5V to 5.0V (in 100mV increments), and feature four power-on reset timeout periods. Ten standard versions are available. Contact the factory for availability of non standard versions.

## Applications

Portable Computers  
Computers  
Controllers  
Intelligent Instruments  
Portable/Battery-Powered Equipment  
Multivoltage Systems: 3V/5V, 5V/12V, 5V/24V  
Embedded Control Systems

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

**Ordering Information continued at end of data sheet.**

**Standard Versions Table appears at end of data sheet.**

## Features

- ◆ Small 5-Pin SOT23 Package
- ◆ Precision Factory-Set  $V_{CC}$  Reset Thresholds; Available in 0.1V Increments from 2.5V to 5V
- ◆ Immune to Short  $V_{CC}$  Transients
- ◆ Guaranteed  $\overline{\text{RESET}}$  Valid to  $V_{CC} = 1V$
- ◆ Guaranteed Over Temperature
- ◆ 8 $\mu$ A Supply Current
- ◆ Factory-Set Reset Timeout Delay from 1ms (min) to 1120ms (min)
- ◆ No External Components
- ◆ Manual Reset Input
- ◆ Under/Overvoltage Supply Monitoring

## Ordering Information

PART <sup>†</sup>	TEMP RANGE	PIN-PACKAGE
MAX6305UK00D_-T	-0°C to +70°C	5 SOT23
MAX6305EUK00D_-T	-40°C to +85°C	5 SOT23

<sup>†</sup> The MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313 are available with factory-set  $V_{CC}$  reset thresholds from 2.5V to 5V, in 0.1V increments. Insert the desired nominal reset threshold (from Table 1) into the blanks following the letters UK. All parts also offer factory-programmed reset timeout periods. Insert the number corresponding to the desired nominal timeout period index following the "D" in the part number (D1 = 1ms min, D2 = 20ms min, D3 = 140ms min, and D4 = 1120ms min). There are 10 standard versions with a required order increment of 2,500 pieces. Sample stock is generally held on the standard versions only (see Standard Versions table). Required order increment is 10,000 pieces for non-standard versions. Contact factory for availability of non-standard versions. All devices available in tape-and-reel only.

Devices are available in both leaded and lead-free packaging. Specify lead-free by replacing "-T" with "+T" when ordering.

## Selector Table

PART	OPEN-DRAIN RESET OUTPUT	PUSH/PULL RESET OUTPUT	PUSH/PULL RESET OUTPUT	FACTORY-SET RESET THRESHOLD ON $V_{CC}$	ADDITIONAL UNDERVOLTAGE RESET INPUTS	NEGATIVE/OVERVOLTAGE RESET INPUT	MANUAL-RESET INPUT
MAX6305	✓	—	—	—	2	—	—
MAX6306	✓	—	—	✓	1	—	✓
MAX6307	✓	—	—	✓	1	✓	—
MAX6308	—	✓	—	—	2	—	—
MAX6309	—	✓	—	✓	1	—	✓
MAX6310	—	✓	—	✓	1	✓	—
MAX6311	—	—	✓	—	2	—	—
MAX6312	—	—	✓	✓	1	—	✓
MAX6313	—	—	✓	✓	1	✓	—



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## ABSOLUTE MAXIMUM RATINGS

V <sub>CC</sub> .....	-0.3V to +6V
All Other Pins.....	-0.3V to (V <sub>CC</sub> + 0.3V)
Input/Output Current, All Pins.....	20mA
Rate of Rise, V <sub>CC</sub> .....	100V/μs
Continuous Power Dissipation (T <sub>A</sub> = +70°C)	
SOT23-5 (derate 7.1mW/°C above +70°C).....	571mW

### Operating Temperature Range

MAX63_UK_D-T.....	0°C to +70°C
MAX63_EUK_D-T.....	-40°C to +85°C
Storage Temperature Range.....	-65°C to +160°C
Lead Temperature (soldering, 10sec).....	+300°C

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<sub>CC</sub> = +2.5V to +5.5V for the MAX6305/MAX6308/MAX6311, V<sub>CC</sub> = (V<sub>TH</sub> + 2.5%) to +5.5V for the MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313; T<sub>A</sub> = -40°C to +85°C; unless otherwise noted. Typical values are at T<sub>A</sub> = +25°C.) (Note 1)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
V <sub>CC</sub> Range		T <sub>A</sub> = -40°C to +85°C (Note 2)		1.0		5.5	
Supply Current	I <sub>CC</sub>	V <sub>CC</sub> = 5.5V			8	16	
Reset Threshold (Note 3)	V <sub>TH</sub>	MAX6306/MAX6307/ MAX6309/MAX6310/ MAX6312/MAX6313	T <sub>A</sub> = +25°C	V <sub>TH</sub> - 1.5%	V <sub>TH</sub>	V <sub>TH</sub> + 1.5%	V
			T <sub>A</sub> = 0°C to +70°C	V <sub>TH</sub> - 2.5%	V <sub>TH</sub>	V <sub>TH</sub> + 2.5%	
		MAX6306E/MAX6307/ MAX6309E/MAX6310E/ MAX6312E/MAX6313E	T <sub>A</sub> = -40°C to +85°C	V <sub>TH</sub> - 2.5%	V <sub>TH</sub>	V <sub>TH</sub> + 2.5%	
Reset Threshold	V <sub>TH</sub> /°C				40		ppm/°C
Reset Threshold	V <sub>TH</sub> HYST				2 x V <sub>TH</sub>		mV
Reset Timeout Period	t <sub>RP</sub>	D1		1.0	1.4	2.0	ms
		D2		20	28	40	
		D3		140	200	280	
		D4		1120	1570	2240	
RESET Output Voltage	V <sub>OL</sub>	MAX6305-MAX6310		V <sub>CC</sub> > 4.25V, I <sub>SINK</sub> = 3.2mA		0.4	V
				V <sub>CC</sub> > 2.5V, I <sub>SINK</sub> = 1.2mA		0.3	
				V <sub>CC</sub> > 1.2V, I <sub>SINK</sub> = 500μA		0.3	
				V <sub>CC</sub> > 1.0V, I <sub>SINK</sub> = 50μA		0.3	
RESET Output Voltage	V <sub>OH</sub>	MAX6308/MAX6309/ MAX6310		V <sub>CC</sub> > 4.25V, I <sub>SOURCE</sub> = 800μA		V <sub>CC</sub> - 1.5	V
				V <sub>CC</sub> > 2.5V, I <sub>SOURCE</sub> = 500μA		0.8 x V <sub>CC</sub>	
RESET Output Voltage	V <sub>OL</sub>	MAX6311/MAX6312/ MAX6313		V <sub>CC</sub> > 4.25V, I <sub>SINK</sub> = 3.2mA		0.4	V
				V <sub>CC</sub> > 2.5V, I <sub>SINK</sub> = 1.2mA		0.3	
	V <sub>OH</sub>			V <sub>CC</sub> > 1.8V, I <sub>SOURCE</sub> = 150μA		0.8 x V <sub>CC</sub>	
				V <sub>CC</sub> > 1.0V, I <sub>SOURCE</sub> = 10μA		0.8 x V <sub>CC</sub>	

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## ELECTRICAL CHARACTERISTICS (continued)

$V_{CC} = +2.5V$  to  $+5.5V$  for the MAX6305/MAX6308/MAX6311,  $V_{CC} = (V_{TH} + 2.5\%)$  to  $+5.5V$  for the MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313;  $T_A = -40^\circ C$  to  $+85^\circ C$ ; unless otherwise noted. Typical values are at  $T_A = +25^\circ C$ .) (Note 1)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
<b>MANUAL-RESET INPUT (MAX6306/MAX6309/MAX6312)</b>						
$\overline{MR}$ Input	$V_{IL}$	$V_{TH} > 4.0V$	0.8			V
	$V_{IH}$		2.4			
	$V_{IL}$	$V_{TH} < 4.0V$	$0.3 \times V_{CC}$			
	$V_{IH}$		$0.7 \times V_{CC}$			
$\overline{MR}$ Minimum Input Pulse Width		$T_A = 0^\circ C$ to $+70^\circ C$	1			$\mu s$
		$T_A = -40^\circ C$ to $+85^\circ C$	1.5			
$\overline{MR}$ Glitch Rejection			0.1			$\mu s$
$\overline{MR}$ to Reset Delay			500			nsV
$\overline{MR}$ Pullup Resistance			32	63.5	100	k $\Omega$
<b>ADJUSTABLE RESET COMPARATOR INPUTS</b>						
RST IN_/OVRST_IN Input Threshold	$V_{RSTH}$	$T_A = +25^\circ C$	1.21	1.23	1.25	V
		MAX6305-MAX6313, $T_A = 0^\circ C$ to $+70^\circ C$	1.20		1.26	
		MAX6305E-MAX6313E, $T_A = -40^\circ C$ to $+85^\circ C$	1.20		1.26	
RST IN_/OVRST_IN Input Current	$I_{RST IN\_}$	$0V < V_{RST IN\_} < V_{CC} - 0.3V$ (Note 4)	-25		+25	nA
RST IN_/OVRST_IN Hysteresis			2.5			mV

**Note 1:** Overtemperature limits are guaranteed by design, not production tested.

**Note 2:** The MAX6305/MAX6308/MAX6311 switch from undervoltage reset to normal operation between  $1.5V < V_{CC} < 2.5V$ .

**Note 3:** The MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313 monitor  $V_{CC}$  through an internal factory-trimmed voltage divider, which programs the nominal reset threshold. Factory-trimmed reset thresholds are available in approximately 100mV increments from 2.5V to 5V (Table 1).

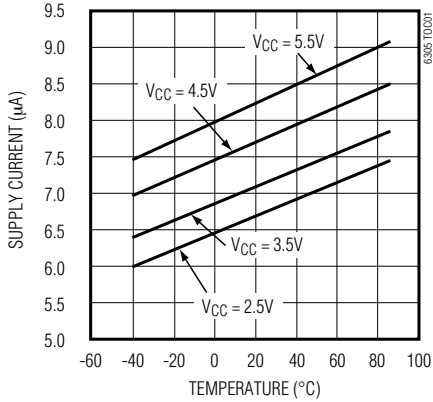
**Note 4:** Guaranteed by design.

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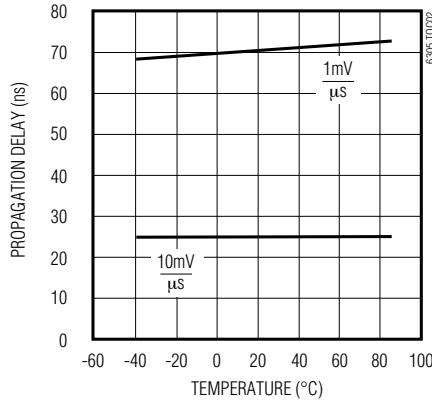
## Typical Operating Characteristics

( $V_{CC} = +5V$ ,  $T_A = +25^\circ C$ , unless otherwise noted.)

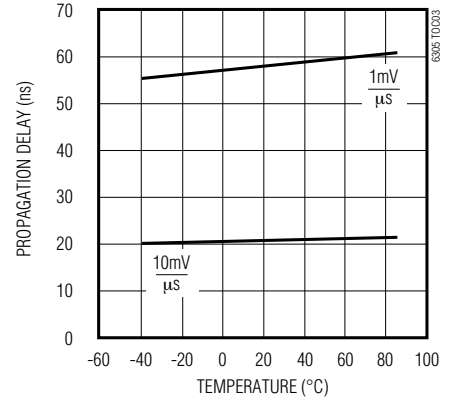
**SUPPLY CURRENT vs. TEMPERATURE**



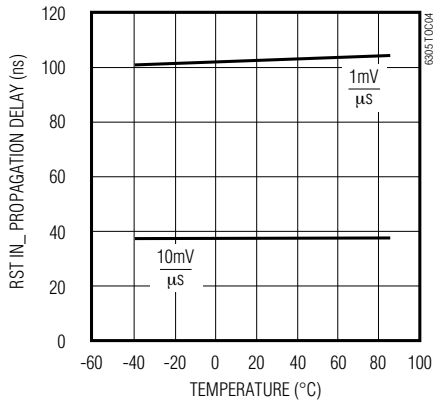
**$V_{CC}$  FALLING PROPAGATION DELAY vs. TEMPERATURE**



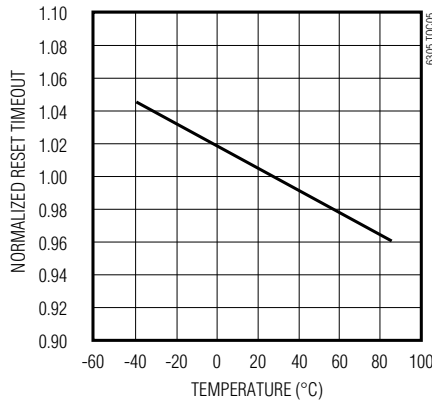
**OVRST IN RISING PROPAGATION DELAY vs. TEMPERATURE (OVERVOLTAGE RESET INPUT)**



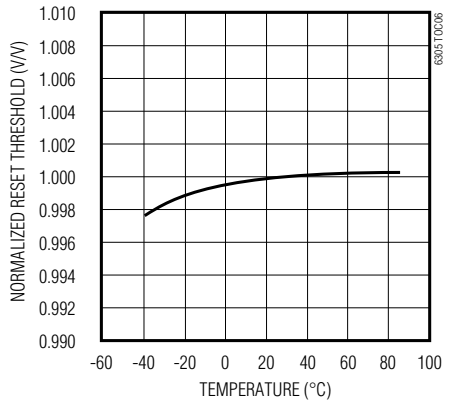
**RST IN FALLING PROPAGATION DELAY vs. TEMPERATURE**



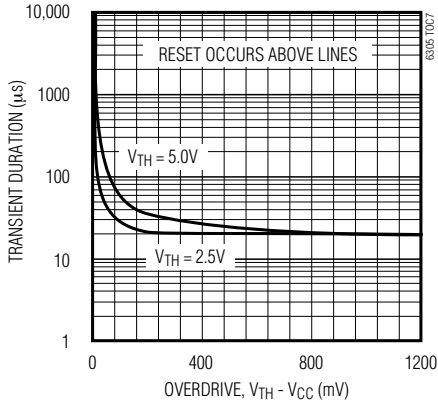
**RESET TIMEOUT vs. TEMPERATURE**



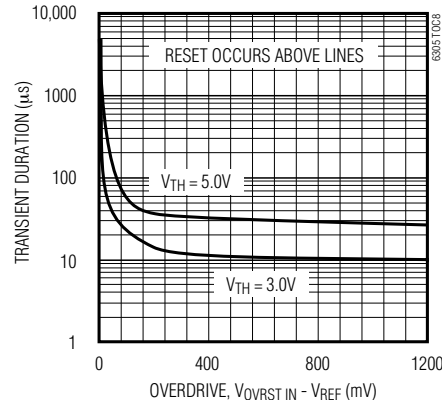
**RESET THRESHOLD vs. TEMPERATURE**



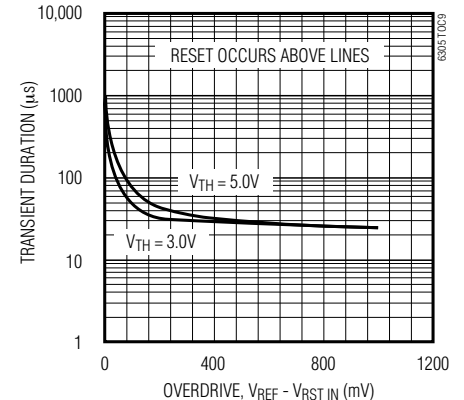
**MAXIMUM TRANSIENT DURATION vs.  $V_{CC}$  RESET THRESHOLD OVERDRIVE**



**MAXIMUM TRANSIENT DURATION vs. OVRST IN THRESHOLD OVERDRIVE**



**MAXIMUM TRANSIENT DURATION vs. RST IN THRESHOLD OVERDRIVE**



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## Pin Description

PIN			NAME	FUNCTION
MAX6305 MAX6308 MAX6311	MAX6306 MAX6309 MAX6312	MAX6307 MAX6310 MAX6313		
1	1	1	$\overline{\text{RESET}}$	Active-Low, Open-Drain Reset Output for the MAX6305/MAX6306/MAX6307. Active-Low, Push/Pull Reset Output (sources and sinks current) for the MAX6308/MAX6309/MAX6310.
			RESET	Active-High, Push/Pull Reset Output for the MAX6311/MAX6312/MAX6313
2	2	2	GND	System Ground
—	3	—	$\overline{\text{MR}}$	Manual-Reset Input. Pull low to force a reset. $\overline{\text{RESET}}$ /RESET remains active as long as $\overline{\text{MR}}$ is low and for the timeout period after MR goes high. Leave unconnected or connect to V <sub>CC</sub> if unused.
3, 4	—	—	RST IN1, RST IN2	Undervoltage Reset Comparator Input. Asserts reset when the monitored voltage falls below the programmed threshold. Set the reset threshold with an external resistor divider. Connect to V <sub>CC</sub> if unused.
—	4	3	RST IN	
—	—	4	OVRST IN	Overshoot Reset Comparator Input. Asserts reset when the monitored voltage exceeds the programmed threshold. Set the reset threshold with an external resistor divider. Connect to GND if unused.
5	5	5	V <sub>CC</sub>	System Supply. The MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313 also monitor V <sub>CC</sub> through an internal factory-trimmed resistor divider to the reset comparator.

MAX6305–MAX6313

## Detailed Description

The MAX6305–MAX6313 CMOS microprocessor ( $\mu\text{P}$ ) supervisory circuits are designed to monitor more than one power supply and issue a system reset when any monitored supply falls out of regulation. The MAX6305/MAX6308/MAX6311 have two adjustable undervoltage reset inputs (RST IN1 and RST IN2). The MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313 monitor V<sub>CC</sub> through an internal, factory-trimmed voltage divider. The MAX6306/MAX6309/MAX6312 have, in addition, an adjustable undervoltage reset input and a manual-reset input. The internal voltage divider sets the reset threshold as specified in the device part number (Table 1). The MAX6307/MAX6310/MAX6313 feature an adjustable undervoltage reset input (RST IN) and an adjustable overvoltage reset input (OVRST IN) in addition to the factory-trimmed reset threshold on the V<sub>CC</sub> monitor. Program the adjustable reset inputs with an external resistor divider (see *Adjustable Reset Inputs* section).

## Reset Outputs

A  $\mu\text{P}$ 's reset input starts the  $\mu\text{P}$  in a known state. These  $\mu\text{P}$  supervisory circuits assert reset to prevent code-execution errors during power-up, power-down, or brownout conditions.

$\overline{\text{RESET}}$  (MAX6305–MAX6310) and RESET (MAX6311/MAX6312/MAX6313) are guaranteed to be asserted at a valid logic level for V<sub>CC</sub> > 1V (see *Electrical Characteristics*). Once all monitored voltages exceed their programmed reset thresholds, an internal timer keeps reset asserted for the reset timeout period (TRP); after this interval, reset deasserts.

If a brownout condition occurs (any or all monitored voltages dip outside their programmed reset threshold), reset asserts (RESET goes high;  $\overline{\text{RESET}}$  goes low). Any time any of the monitored voltages dip below their reset threshold, the internal timer resets to zero and reset asserts. The internal timer starts when all of the monitored voltages return above their reset thresholds, and reset remains asserted for a reset timeout period. The MAX6305/MAX6306/MAX6307 feature an active-low,

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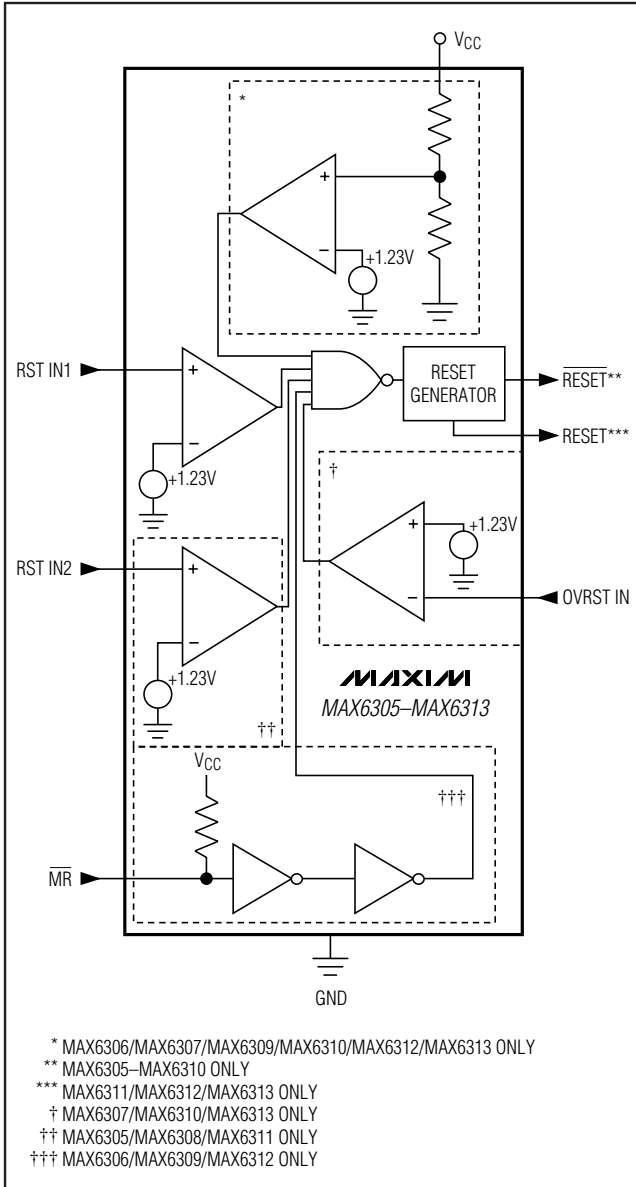


Figure 1. Functional Diagram

open-drain, N-channel output. The MAX6308/MAX6309/MAX6310 feature an active-low, complementary output structure that both sinks and sources current, and the MAX6311/MAX6312/MAX6313 have an active-high complementary reset output.

The MAX6305/MAX6308/MAX6311 switch from under-voltage lockout operation to normal operation between  $1.5V < V_{CC} < 2.5V$ . Below 1.5V,  $V_{CC}$  undervoltage-lockout mode asserts  $\overline{RESET}$ . Above 2.5V,  $V_{CC}$  normal-operation mode asserts reset if RST IN<sub>-</sub> falls below the RST IN<sub>-</sub> threshold.

### Manual-Reset Input (MAX6306/MAX6309/MAX6312)

Many  $\mu P$ -based products require manual-reset capability, allowing an operator or external logic circuitry to initiate a reset. A logic low on  $\overline{MR}$  asserts reset. Reset remains asserted while  $\overline{MR}$  is low, and for a reset active timeout period ( $t_{RP}$ ) after  $\overline{MR}$  returns high. This input has an internal 63.5k $\Omega$  pull-up resistor, so it can be left open if it is not used.  $\overline{MR}$  can be driven with TTL-logic levels in 5V systems, with CMOS-logic levels in 3V systems, or with open-drain/collector output devices. Connect a normally open momentary switch from  $\overline{MR}$  to GND to create a manual-reset function; external debounce circuitry is not required. If  $\overline{MR}$  is driven from long cables or if the device is used in a noisy environment, connecting a 0.1 $\mu F$  capacitor from  $\overline{MR}$  to ground provides additional noise immunity.

The  $\overline{MR}$  pin has internal ESD-protection circuitry that may be forward biased under certain conditions, drawing excessive current. For example, assume the circuitry driving  $\overline{MR}$  uses a +5V supply other than  $V_{CC}$ . If  $V_{CC}$  drops or browns out lower than +4.7V,  $\overline{MR}$ 's absolute maximum rating is violated (-0.3V to ( $V_{CC} + 0.3V$ )), and undesirable current flows through the ESD structure from  $\overline{MR}$  to  $V_{CC}$ . To avoid this, it is recommended that the supply for the  $\overline{MR}$  pin be the same as the supply monitored by  $V_{CC}$ . In this way, the voltage at  $\overline{MR}$  will not exceed  $V_{CC}$ .

### Adjustable Reset Inputs

The MAX6305-MAX6313 each have one or more reset inputs (RST IN<sub>-</sub> /OVRST IN). These inputs are compared to the internal reference voltage (Figure 1). Connect a resistor voltage divider to RST IN<sub>-</sub> such that  $V_{RST IN_-}$  falls below  $V_{RSTH}$  (1.23V) when the monitored voltage ( $V_{IN}$ ) falls below the desired reset threshold ( $V_{TH}$ ) (Figure 2). Calculate the desired reset voltage with the following formula:

$$V_{TH} = \frac{R1 + R2}{R2} \times V_{RSTH}$$

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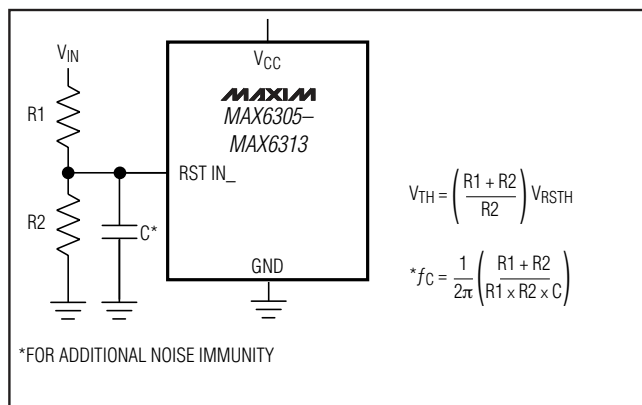


Figure 2. Increasing Noise Immunity

The  $\pm 25\text{nA}$  max input leakage current allows resistors on the order of megohms. Choose the pull-up resistor in the divider to minimize the error due to the input leakage current. The error term in the calculated threshold is simply:

$$\pm 25\text{nA} \times R1$$

If you choose R1 to be  $1\text{M}\Omega$ , the resulting error is  $\pm 25 \times 10^{-9} \times 1 \times 10^6 = \pm 25\text{mV}$ .

Like the  $V_{CC}$  voltage monitors on the MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313, the RST IN\_ inputs (when used with a voltage divider) are designed to ignore fast voltage transients. Increase the noise immunity by connecting a capacitor on the order of  $0.1\mu\text{F}$  between RST IN and GND (Figure 2). This creates a single-pole lowpass filter with a corner frequency given by:

$$f = (1/2\pi) / (R1 + R2)(R1 \times R2 \times C)$$

For example, if  $R1 = 1\text{M}\Omega$  and  $R2 = 1.6\text{M}\Omega$ , adding a  $0.1\mu\text{F}$  capacitor from RST IN\_ to ground results in a lowpass corner frequency of  $f = 2.59\text{Hz}$ . Note that adding capacitance to RST IN slows the circuit's overall response time.

## Applications Information

### Interfacing to $\mu\text{Ps}$ with Bidirectional Reset Pins

Since the  $\overline{\text{RESET}}$  output on the MAX6305/MAX6306/MAX6307 is open drain, these devices interface easily with  $\mu\text{Ps}$  that have bidirectional reset pins, such as the Motorola 68HC11. Connecting the  $\mu\text{P}$  supervisor's  $\overline{\text{RESET}}$  output directly to the microcontroller's  $\overline{\text{RESET}}$  pin with a single pull-up resistor allows either device to assert reset (Figure 3).

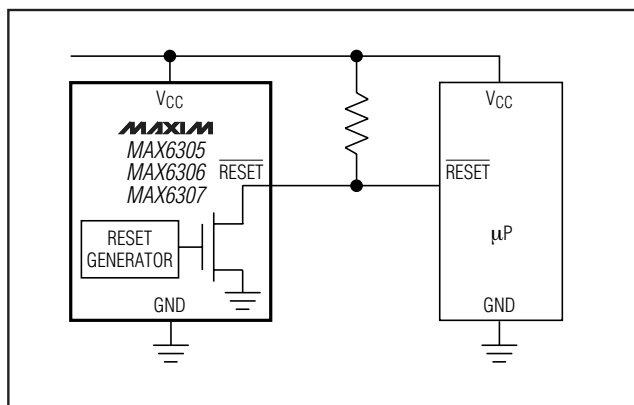


Figure 3. Interfacing to  $\mu\text{Ps}$  with Bidirectional Reset I/O

### Negative-Going $V_{CC}$ Transients

In addition to issuing a reset to the  $\mu\text{P}$  during power-up, power-down, and brownout conditions, these devices are relatively immune to short-duration, negative-going  $V_{CC}$  transients (glitches).

The *Typical Operating Characteristics* show the Maximum Transient Duration vs.  $V_{CC}$  Reset Threshold Overdrive, for which reset pulses are not generated. The graph was produced using negative-going pulses, starting at  $V_{TH}$  max, and ending below the programmed reset threshold by the magnitude indicated (reset threshold overdrive). The graph shows the maximum pulse width that a negative-going  $V_{CC}$  transient may typically have without causing a reset pulse to be issued. As the amplitude of the transient increases (i.e., goes farther below the reset threshold), the maximum allowable pulse width decreases.

RST IN\_/OVRST IN are also immune to negative/positive-going transients (see *Typical Operating Characteristics*). A  $0.1\mu\text{F}$  bypass capacitor mounted close to the RST IN\_, OVRST IN, and/or the  $V_{CC}$  pin provides additional transient immunity.

### Ensuring a Valid $\overline{\text{RESET}}$ /RESET Output Down to $V_{CC} = 0\text{V}$

When  $V_{CC}$  falls below  $1\text{V}$ , push/pull structured  $\overline{\text{RESET}}$ /RESET current sinking (or sourcing) capabilities decrease drastically. High-impedance CMOS logic inputs connected to  $\overline{\text{RESET}}$  can drift to undetermined voltages. This presents no problem in most applications, since most  $\mu\text{Ps}$  and other circuitry do not operate with  $V_{CC}$  below  $1\text{V}$ . In those applications where RESET must be valid down to  $0\text{V}$ , adding a pull-down resistor between  $\overline{\text{RESET}}$  and ground sinks any stray leakage

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currents, holding  $\overline{\text{RESET}}$  low (Figure 4). The pull-down resistor's value is not critical; 100k $\Omega$  is large enough not to load  $\overline{\text{RESET}}$  and small enough to pull  $\overline{\text{RESET}}$  to ground. For applications where  $\overline{\text{RESET}}$  must be valid to  $V_{CC}$ , a 100k $\Omega$  pull-up resistor between  $\overline{\text{RESET}}$  and  $V_{CC}$  will hold  $\overline{\text{RESET}}$  high when  $V_{CC}$  falls below 1V (Figure 5).

Since the MAX6305/MAX6306/MAX6307 have open-drain, active-low outputs, they typically use a pull-up resistor. With these devices and under these conditions ( $V_{CC} < 1V$ ),  $\overline{\text{RESET}}$  will most likely not maintain an active condition, but will drift toward a nonactive level due to the pull-up resistor and the  $\overline{\text{RESET}}$  output's reduction in sinking capability. These devices are not recommended for applications that require a valid  $\overline{\text{RESET}}$  output below 1V.

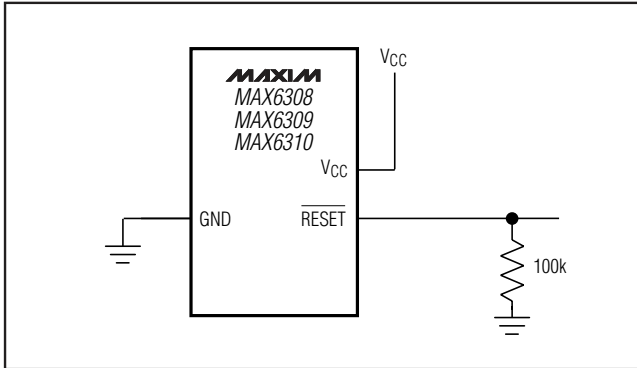


Figure 4. Ensuring  $\overline{\text{RESET}}$  Valid to  $V_{CC} = 0V$

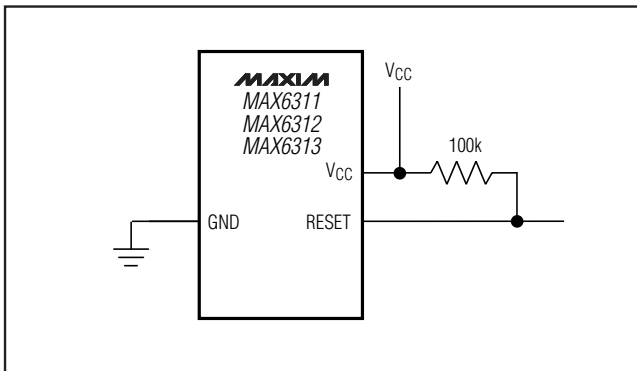


Figure 5. Ensuring  $\overline{\text{RESET}}$  Valid to  $V_{CC} = 0V$

Table 1. Factory-Trimmed Reset Thresholds\*

SUFFIX	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$	
	MIN	TYP	MAX	MIN	MAX
00	Preprogrammed Threshold Not Available			Preprogrammed Threshold Not Available	
50	4.925	5.000	5.075	4.875	5.125
49	4.827	4.900	4.974	4.778	5.023
48	4.728	4.800	4.872	4.680	4.920
47	4.630	4.700	4.771	4.583	4.818
46	4.561	4.630	4.699	4.514	4.746
45	4.433	4.500	4.568	4.388	4.613
44	4.314	4.380	4.446	4.270	4.490
43	4.236	4.300	4.365	4.193	4.408
42	4.137	4.200	4.263	4.095	4.305
41	4.039	4.100	4.162	3.998	4.203
40	3.940	4.000	4.060	3.900	4.100
39	3.842	3.900	3.959	3.803	3.998
38	3.743	3.800	3.857	3.705	3.895
37	3.645	3.700	3.756	3.608	3.793
36	3.546	3.600	3.654	3.510	3.690
35	3.448	3.500	3.553	3.413	3.588
34	3.349	3.400	3.451	3.315	3.485
33	3.251	3.300	3.350	3.218	3.383
32	3.152	3.200	3.248	3.120	3.280
31	3.034	3.080	3.126	3.003	3.157
30	2.955	3.000	3.045	2.925	3.075
29	2.886	2.930	2.974	2.857	3.000
28	2.758	2.800	2.842	2.730	2.870
27	2.660	2.700	2.741	2.633	2.768
26	2.591	2.630	2.669	2.564	2.696
25	2.463	2.500	2.538	2.438	2.563

\* Factory-trimmed reset thresholds are available in approximately 100mV increments with a  $\pm 1.5\%$  room-temperature variance.



# 5-Pin, Multiple-Input, Programmable Reset ICs

MAX6305-MAX6313

## Ordering Information (continued)

PART†	TEMP RANGE	PIN-PACKAGE
MAX6306UK__D_-T	-0°C to +70°C	5 SOT23
MAX6306EUK__D_-T	-40°C to +85°C	5 SOT23
MAX6307UK__D_-T	-0°C to +70°C	5 SOT23
MAX6307EUK__D_-T	-40°C to +85°C	5 SOT23
MAX6308UK00D_-T	-0°C to +70°C	5 SOT23
MAX6308EUK00D_-T	-40°C to +85°C	5 SOT23
MAX6309UK__D_-T	-0°C to +70°C	5 SOT23
MAX6309EUK__D_-T	-40°C to +85°C	5 SOT23
MAX6310UK__D_-T	-0°C to +70°C	5 SOT23
MAX6310EUK__D_-T	-40°C to +85°C	5 SOT23
MAX6311UK00D_-T	-0°C to +70°C	5 SOT23
MAX6311EUK00D_-T	-40°C to +85°C	5 SOT23
MAX6312UK__D_-T	-0°C to +70°C	5 SOT23
MAX6312EUK__D_-T	-40°C to +85°C	5 SOT23

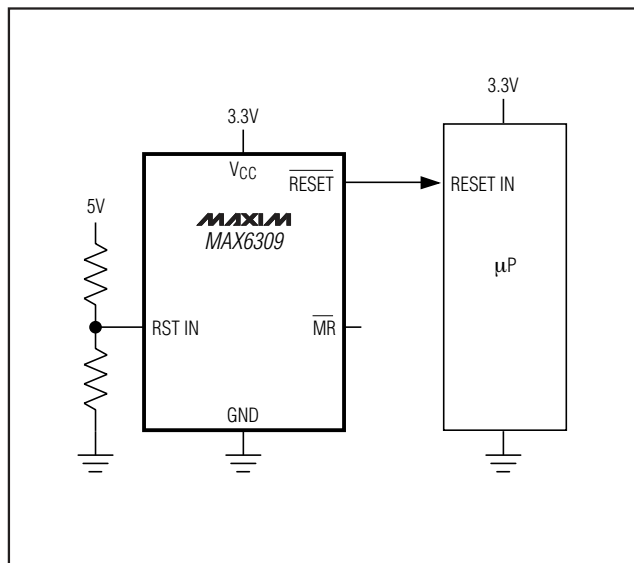
† The MAX6306/MAX6307/MAX6309/MAX6310/MAX6312/MAX6313 are available with factory-set  $V_{CC}$  reset thresholds from 2.5V to 5V, in 0.1V increments. Insert the desired nominal reset threshold (from Table 1) into the blanks following the letters UK. All parts also offer factory-programmed reset timeout periods. Insert the number corresponding to the desired nominal timeout period index following the “D” in the part number (D1 = 1ms min, D2 = 20ms min, D3 = 140ms min, and D4 = 1120ms min). There are 10 standard versions with a required order increment of 2,500 pieces. Sample stock is generally held on the standard versions only (see Standard Versions table). Required order increment is 10,000 pieces for non-standard versions. Contact factory for availability of non-standard versions. All devices available in tape-and-reel only.

Devices are available in both leaded and lead-free packaging. Specify lead-free by replacing “-T” with “+T” when ordering.

## Standard Versions Table

MAX6305UK00D3-T	MAX6309UK29D3-T
MAX6306UK29D3-T	MAX6309UK46D3-T
MAX6306UK46D3-T	MAX6311UK00D3-T
MAX6307UK46D3-T	MAX6312UK29D3-T
MAX6308UK00D3-T	MAX6312UK46D3-T

## Typical Operating Circuit

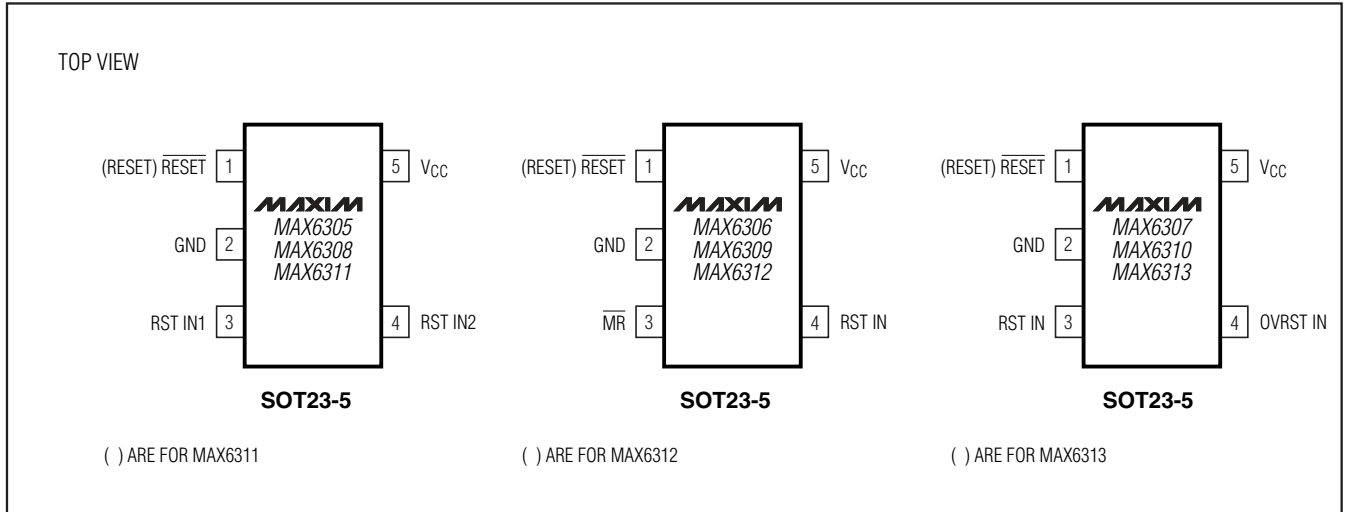


## Chip Information

TRANSISTOR COUNT: 800

# 5-Pin, Multiple-Input, Programmable Reset ICs

## Pin Configurations



## Package Information

For the latest package outline information, go to [www.maxim-ic.com/packages](http://www.maxim-ic.com/packages).

PACKAGE TYPE	PACKAGE CODE	DOCUMENT NO.
5 SOT23	U5-1	<a href="#">21-0057</a>

# 5-Pin, Multiple-Input, Programmable Reset ICs

## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	9/96	Initial release	—
1	8/98	Make corrections to EC table and Figures 1 and 8	3, 6, 8
2	4/99	Added Standard Versions Table and note to the Ordering Information table. Text added to the General Description	1, 13
3	11/05	Added lead-free option to the Ordering Information table.	1, 13
4	12/07	Updated Table 2 and Package Outline	9, 10, 14
5	4/08	Added MAX6305E–MAX6313E to <i>Ordering Information</i> table, updated <i>Electrical Characteristics</i> table and global conditions, updated Table 1, and removed Table 2.	1, 2, 3, 8–15

MAX6305–MAX6313

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.

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## MAX6305, MAX6306, MAX6307, MAX6308, MAX6309, MAX6310, MAX6311, MAX6312, MAX6313

5-Pin, Multiple-Input, Programmable Reset ICs

5-Pin, Multiple Voltage, Programmable Reset ICs in SOT package

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Technical Documents

Ordering Info

More Information

User Comments (0)

All

### Ordering Information

#### Notes:

- Other options and links for purchasing parts are listed at: <http://www.maxim-ic.com/sales>.
- Didn't Find What You Need?** Ask our applications engineers. Expert assistance in finding parts, usually within one business day.
- Part number suffixes: T or T&R = tape and reel; + = RoHS/lead-free; # = RoHS/lead-exempt. More: See [Full Data Sheet](#) or [Part Naming Conventions](#).
- \* Some packages have variations, listed on the drawing. "PkgCode/Variation" tells which variation the product uses. Note that "+", "#", "-" in the part number suffix describes RoHS status. Package drawings may show a different suffix character.

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MAX6305	Free Sample	Buy	Package: TYPE PINS FOOTPRINT DRAWING CODE/ VAR *	Temp	RoHS/Lead-Free? Materials Analysis
MAX6305EUK00D2-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D3-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D3+ T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D2+ T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D1-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D1+ T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305EUK00D4-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet

MAX6305UK00D4	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6305UK00D3	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D3+	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX6305UK00D2	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D2+	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX6305UK00D1+	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX6305UK00D1	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D3+ T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX6305UK00D2-T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D1-T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D3-T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">No Materials Analysis</a>
MAX6305UK00D4-T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5-1*	-40°C to +85°C	See data sheet <a href="#">Materials Analysis</a>
MAX6305UK00D1+ T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
MAX6305UK00D2+ T		<input type="button" value="Buy"/>	SOT-23;5 pin; Dwg: <a href="#">21-0057</a> (PDF) Use pkgcode/variation: U5+1*	-40°C to +85°C	RoHS/Lead-Free: <a href="#">Lead Free Materials Analysis</a>
<b>MAX6306</b>	<b>Free Sample</b>	<b>Buy</b>	<b>Package:</b> TYPE PINS FOOTPRINT DRAWING CODE/ VAR *	<b>Temp</b>	<b>RoHS/Lead-Free? Materials Analysis</b>
MAX6306EUK43D2-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK43D1-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK42D4-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK42D3-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK42D2-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet

MAX6306EUK43D3+ T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK43D3- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK43D4- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK44D1- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK44D2- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK44D3	<input type="button" value="Sample"/>	<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK44D3- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK44D4- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK42D1- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK41D4- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK38D4- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK39D1- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK39D2- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK39D3- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK39D4- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK40D1- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK40D2- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK40D3- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK41D1- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK41D2- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK38D3- T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet

MAX6306EUK45D1-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK48D2-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK50D3-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK45D4-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
MAX6306EUK46D1-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet
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MAX6306EUK46D4-T		<input type="button" value="Buy"/>		-40°C to +85°C	See data sheet

MAX6306EUK47D1-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK47D2+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
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MAX6306EUK25D2-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D1-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D2+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D2-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D3+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D3-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK29D4+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
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MAX6306EUK30D2+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK30D2-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK30D3+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK30D3-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK28D4-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK28D3-T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK28D3+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet
MAX6306EUK25D3+T	<input type="button" value="Buy"/>	-40°C to +85°C	See data sheet



MAX6306EUK25D3-T	<a href="#">Buy</a>	-40°C to +85°C	See data sheet
MAX6306EUK25D4-T	<a href="#">Buy</a>	-40°C to +85°C	See data sheet
MAX6306EUK26D1-T	<a href="#">Buy</a>	-40°C to +85°C	See data sheet
MAX6306EUK26D2-T	<a href="#">Buy</a>	-40°C to +85°C	See data sheet
MAX6306EUK26D3-T	<a href="#">Buy</a>	-40°C to +85°C	See data sheet

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