

General Description

The MAX6314 low-power CMOS microprocessor (µP) supervisory circuit is designed to monitor power supplies in µP and digital systems. The MAX6314's RESET output is bidirectional, allowing it to be directly connected to µPs with bidirectional reset inputs, such as the 68HC11. It provides excellent circuit reliability and low cost by eliminating external components and adjustments. The MAX6314 also provides a debounced manual reset input.

This device performs a single function: it asserts a reset signal whenever the VCC supply voltage falls below a preset threshold or whenever manual reset is asserted. Reset remains asserted for an internally programmed interval (reset timeout period) after VCC has risen above the reset threshold or manual reset is deasserted.

The MAX6314 comes with factory-trimmed reset threshold voltages in 100mV increments from 2.5V to 5V. Preset timeout periods of 1ms, 20ms, 140ms, and 1120ms (minimum) are also available. The device comes in a SOT143 package.

For a µP supervisor with an open-drain reset pin, see the MAX6315 data sheet.

Applications

Computers

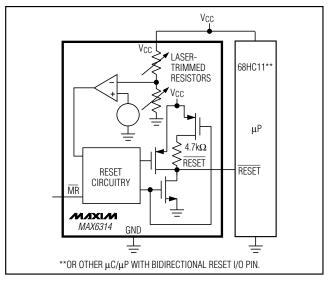
Controllers

Intelligent Instruments

Critical µP and µC Power Monitoring

Portable/Battery-Powered Equipment

Typical Operating Circuit



Features

- ♦ Small SOT143 Package
- **♦ RESET Output Simplifies Interface to** Bidirectional Reset I/Os
- ♦ Precision Factory-Set V_{CC} Reset Thresholds: 100mV Increments from 2.5V to 5V
- ♦ ±1.8% Reset Threshold Accuracy at T_A = +25°C
- **♦** ±2.5% Reset Threshold Accuracy Over Temp.
- **♦** Four Reset Timeout Periods Available: 1ms, 20ms, 140ms, or 1120ms (minimum)
- **♦ Immune to Short Vcc Transients**
- ♦ 5µA Supply Current
- ♦ Pin-Compatible with MAX811

Ordering Information

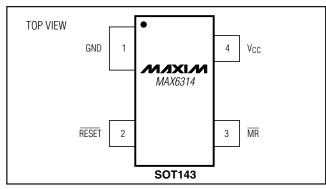
PART [†]	NOMINAL V _{TH} (V)	MIN t _{RP} (ms)	TOP MARK ^{††}
MAX6314US50D1-T	5.00	1	AA
MAX6314US49D1-T	4.90	1	AB
MAX6314US48D1-T	4.80	1	AC
MAX6314US47D1-T	4.70	1	AD
MAX6314US46D1-T	4.63	1	AE
MAX6314US45D1-T	4.50	1	AF

- †The MAX6314 is available in a SOT143 package, -40°C to +85°C temperature range.
- ††The first two letters in the package top mark identify the part, while the remaining two letters are the lot tracking code.

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

Ordering Information continued at end of data sheet.

Pin Configuration



NIXIN

Maxim Integrated Products 1

ABSOLUTE MAXIMUM RATINGS

Vcc	0.3V to +6.0V	Continuous Power Dissipation ($T_A = +70$ °C)	
All Other Pins	0.3V to (V _{CC} + 0.3V)	SOT143 (derate 4mW/°C above +70°C)	320mW
Input Current (VCC)	20mA	Operating Temperature Range	40°C to +85°C
Output Current (RESET)	20mA	Storage Temperature Range	65°C to +160°C
Rate of Rise (VCC)	100V/µs	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

 $(V_{CC} = +2.5V \text{ to } +5.5V, T_A = -40^{\circ}C \text{ to } +85^{\circ}C, \text{ unless otherwise noted. Typical values are at } T_A = +25^{\circ}C.)$

PARAMETER	SYMBOL	CC	ONDITIONS	MIN	TYP	MAX	UNITS	
Operating Voltage Range	Vcc	$T_A = 0^{\circ}C$ to	+70°C	1.0		5.5	V	
V Cupply Current	1	$V_{CC} = 5.5$	/, no load		5	12	μА	
V _{CC} Supply Current	ICC	V _C C = 3.6\	/, no load		4	10		
Doost Throshold (Note 1)	\/	T _A = +25°0	C	V _{TH} - 1.8%	VTH	V _{TH} + 1.8%	V	
Reset Threshold (Note 1)	VTH	T _A = -40°C	to +85°C	V _{TH} - 2.5%		V _{TH} + 2.5%		
Reset Threshold Tempco	ΔV _{TH} /°C				60		ppm/°C	
V _{CC} to Reset Delay			ng at 1mV/µs		35		μs	
		MAX6314L		1	1.4	2		
Reset Timeout Period	t _{RP}	MAX6314L		20	28	40	ms	
Tieset Timeout Feriou	'AP	MAX6314L		140	200	280	1110	
		MAX6314L	JSD4-T	1120	1570	2240		
MANUAL RESET INPUT								
	V_{IL}	V _{TH} > 4.0V		0.8]	
MR Input Threshold	V _{IH}	. 1111				2.4	1 v	
	V _{IL}	V _{TH} < 4.0V		0.3 x V _{CC}		0.7. \	_	
	VIH					0.7 x V _{CC}		
MR Minimum Input Pulse				1			μs	
MR Glitch Rejection					100		ns	
MR to Reset Delay					500		ns	
MR Pullup Resistance				32	63	100	kΩ	
		V _{CC} > 4.25	5V, I _{SINK} = 3.2mA			0.4		
DECET O 1 11/1		V _{CC} > 2.5\	/, I _{SINK} = 1.2mA			0.3		
RESET Output Voltage	V _{OL}	V _{CC} > 1.2\	/, I _{SINK} = 0.5mA			0.3	1 V	
		V _{CC} > 1.0\	/, I _{SINK} = 80µA			0.3	1	
RESET INTERNAL PULLUP	<u> </u>							
Transition Flip-Flop Setup Time (Note 2	2) t _S				400		ns	
Active Pullup Enable Threshold		$V_{CC} = 5V$		0.4		0.9	V	
RESET Active Pullup Current		V _{CC} = 5V			20		mA	
RESET Pullup Resistance				4.2	4.7	5.2	kΩ	
			C _{LOAD} = 120pF			333		
RESET Output Rise Time			$C_{LOAD} = 250pF$			666		
(Note 3)	t _R	\/ F\/	C _{LOAD} = 200pF			333	ns	
		$V_{CC} = 5V$	C _{LOAD} = 400pF			666		

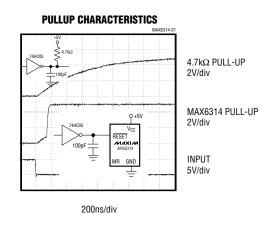
Note 1: The MAX6314 monitors V_{CC} through an internal, factory-trimmed voltage divider that programs the nominal reset threshold. Factory-trimmed reset thresholds are available in 100mV increments from 2.5V to 5V (see *Ordering and Marking Information*).

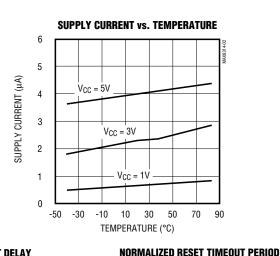
Note 3: Measured from \overline{RESET} Vol. to (0.8 x Vcc), RLOAD = ∞ .

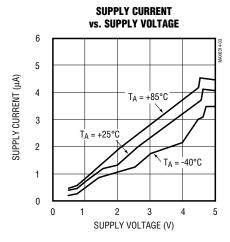
Note 2: This is the minimum time RESET must be held low by an external pull-down source to set the active pull-up flip-flop.

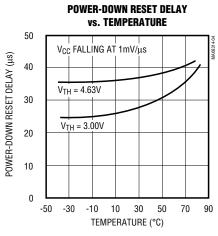
Typical Operating Characteristics

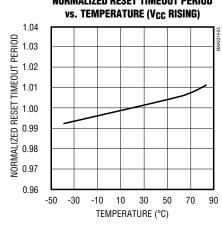
 $(T_A = +25^{\circ}C, \text{ unless otherwise noted.})$

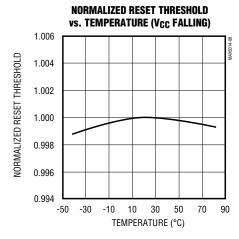


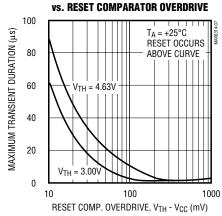




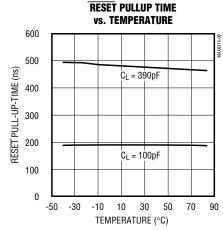








MAXIMUM TRANSIENT DURATION



Pin Description

PIN	NAME	FUNCTION
1	GND	Ground
2	RESET	Active-Low Complementary Output. In addition to the normal n-channel pulldown, $\overline{\text{RESET}}$ has a p-channel pullup transistor in parallel with a $4.7\text{k}\Omega$ resistor to facilitate connection to μPs with bidirectional resets. See the <i>Reset Output</i> section.
3	MR	Manual Reset Input. A logic low on $\overline{\text{MR}}$ asserts reset. Reset remains asserted as long as $\overline{\text{MR}}$ is low, and for the reset timeout period (t _{RP}) after the reset conditions are terminated. Connect to V _{CC} if not used.
4	V _{CC}	Supply Voltage and Reset Threshold Monitor Input

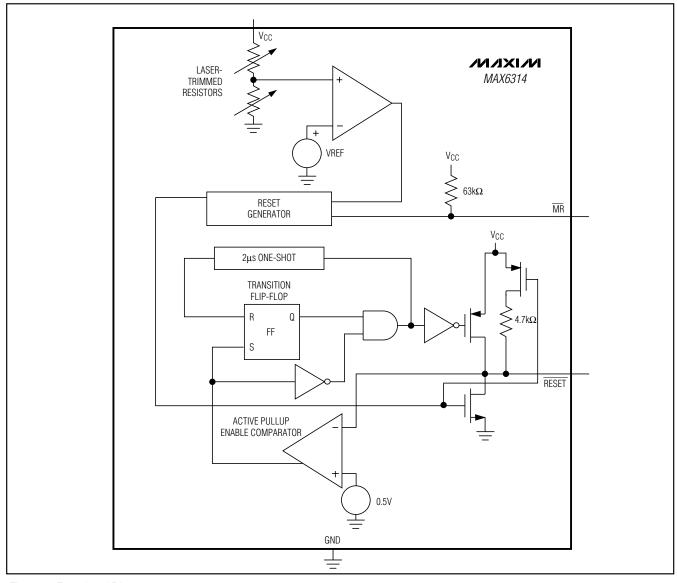


Figure 1. Functional Diagram

Detailed Description

The MAX6314 has a reset output consisting of a $4.7 k\Omega$ pull-up resistor in parallel with a P-channel transistor and an N-channel pull down (Figure 1), allowing this IC to directly interface with microprocessors (µPs) that have bidirectional reset pins (see the *Reset Output* section).

Reset Output

A µP's reset input starts the µP in a known state. The MAX6314 asserts reset to prevent code-execution errors during power-up, power-down, or brownout conditions. $\overline{\text{RESET}}$ is guaranteed to be a logic low for VCC > 1V (see the *Electrical Characteristics* table). Once VCC exceeds the reset threshold, the internal timer keeps reset asserted for the reset timeout period (tRP); after this interval $\overline{\text{RESET}}$ goes high. If a brownout condition occurs (monitored voltage dips below its programmed reset threshold), $\overline{\text{RESET}}$ goes low. Any time VCC dips below the reset threshold, the internal timer resets to zero and $\overline{\text{RESET}}$ goes low. The internal timer starts when VCC returns above the reset threshold, and $\overline{\text{RESET}}$ remains low for the reset timeout period.

The MAX6314's $\overline{\text{RESET}}$ output is designed to interface with µPs that have bidirectional reset pins, such as the Motorola 68HC11. Like an open-drain output, the MAX6314 allows the µP or other devices to pull $\overline{\text{RESET}}$ low and assert a reset condition. However, unlike a standard open-drain output, it includes the commonly specified 4.7k Ω pullup resistor with a P-channel active pullup in parallel.

This configuration allows the MAX6314 to solve a problem associated with μPs that have bidirectional reset pins in systems where several devices connect to RESET. These μPs can often determine if a reset was asserted by an external device (i.e., the supervisor IC) or by the μP itself (due to a watchdog fault, clock error, or other source), and then jump to a vector appropriate for the source of the reset. However, if the μP does assert reset, it does not retain the information, but must determine the cause after the reset has occurred.

The following procedure describes how this is done with the Motorola 68HC11. In all cases of reset, the μP pulls \overline{RESET} low for about four E-clock cycles. It then releases \overline{RESET} , waits for two E-clock cycles, then checks \overline{RESET} 's state. If \overline{RESET} is still low, the μP concludes that the source of the reset was external and, when \overline{RESET} eventually reaches the high state, jumps to the normal reset vector. In this case, stored state information is erased and processing begins from

scratch. If, on the other hand, RESET is high after the two E-clock cycle delay, the processor knows that it caused the reset itself and can jump to a different vector and use stored state information to determine what caused the reset.

The problem occurs with faster $\mu Ps;$ two E-clock cycles is only 500ns at 4MHz. When there are several devices on the reset line, the input capacitance and stray capacitance can prevent RESET from reaching the logic-high state (0.8 x Vcc) in the allowed time if only a passive pullup resistor is used. In this case, all resets will be interpreted as external. The μP is guaranteed to sink only 1.6mA, so the rise time cannot be much reduced by decreasing the recommended 4.7k Ω pullup resistance.

The MAX6314 solves this problem by including a pullup transistor in parallel with the recommended $4.7k\Omega$ resistor (Figure 1). The pullup resistor holds the output high until RESET is forced low by the µP reset I/O, or by the MAX6314 itself. Once RESET goes below 0.5V, a comparator sets the transition edge flip-flop, indicating that the next transition for RESET will be low to high. As soon as $\overline{\text{RESET}}$ is released, the 4.7k Ω resistor pulls RESET up toward V_{CC}. When RESET rises above 0.5V, the active p-channel pullup turns on for the 2µs duration of the one-shot. The parallel combination of the $4.7k\Omega$ pullup and the p-channel transistor onresistance quickly charges stray capacitance on the reset line, allowing RESET to transition low to high within the required two E-clock period, even with several devices on the reset line (Figure 2). Once the one-shot times out, the p-channel transistor turns off. This process occurs regardless of whether the reset was caused by V_{CC} dipping below the reset threshold, MR being asserted, or the µP or other device asserting RESET. Because the MAX6314 includes the standard $4.7k\Omega$ pullup resistor, no external pullup resistor is required. To minimize current consumption, the internal pullup resistor is disconnected whenever the MAX6314 asserts RESET.

Manual Reset Input

Many $\mu\text{P-based}$ products require manual reset capability, allowing the operator, a test technician, or external logic circuitry to initiate a reset. A logic low on $\overline{\text{MR}}$ asserts reset. Reset remains asserted while $\overline{\text{MR}}$ is low, and for the reset active timeout period after $\overline{\text{MR}}$ returns high. To minimize current consumption, the internal 4.7k Ω pullup resistor on $\overline{\text{RESET}}$ is disconnected whenever $\overline{\text{RESET}}$ is asserted.

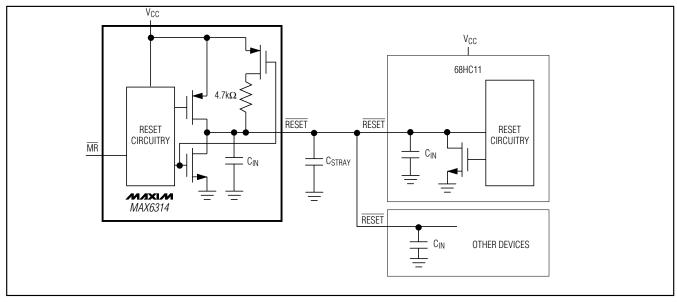


Figure 2. MAX6314 Supports Additional Devices on the Reset Bus

 $\overline{\text{MR}}$ has an internal $63\text{k}\Omega$ pullup resistor, so it can be left open if not used. Connect a normally open momentary switch from $\overline{\text{MR}}$ to GND to create a manual reset function; external debounce circuitry is not required. If $\overline{\text{MR}}$ is driven from long cables or if the device is used in a noisy environment, connecting a $0.1\mu\text{F}$ capacitor from $\overline{\text{MR}}$ to ground provides additional noise immunity.

_Applications Information

Negative-Going Vcc Transients

In addition to issuing a reset to the µP during power-up, power-down, and brownout conditions, these devices are relatively immune to short-duration negative-going transients (glitches). The Typical Operating Characteristics show the Maximum Transient Duration vs. Reset Threshold Overdrive, for which reset pulses are not generated. The graph was produced using negativegoing pulses, starting at V_{RST} 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. A 0.1µF bypass capacitor mounted close to V_{CC} provides additional transient immunity.

Ensuring a Valid RESET Output Down to VCC = 0V

When V_{CC} falls below 1V, RESET no longer sinks current—it becomes an open circuit. Therefore, high-impedance CMOS-logic inputs connected to RESET can drift to undetermined voltages. This presents no problem in most applications, since most μP and other circuitry is inoperative with V_{CC} below 1V. However, in applications where RESET must be valid down to V_{CC} = 0V, adding a pull-down resistor to RESET will cause any stray leakage currents to flow to ground, holding RESET low (Figure 3). R1's value is not critical; 100k Ω is large enough not to load RESET and small enough to pull RESET to ground.

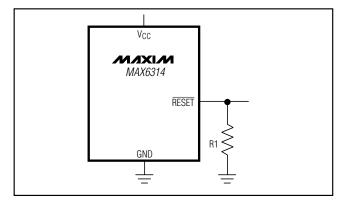


Figure 3. RESET Valid to V_{CC} = Ground Circuit

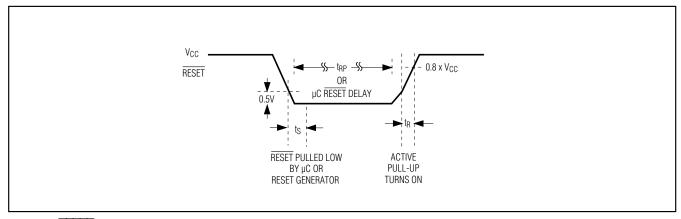


Figure 4. RESET Timing Diagram

Ordering Information (continued)

PART [†]	NOMINAL V _{TH} (V)	MIN t _{RP} (ms)	TOP MARK ^{††}
MAX6314US44D1-T†††	4.39	1	AG
MAX6314US43D1-T	4.30	1	AH
MAX6314US42D1-T	4.20	1	AI
MAX6314US41D1-T	4.10	1	AJ
MAX6314US40D1-T	4.00	1	AK
MAX6314US39D1-T	3.90	1	AL
MAX6314US38D1-T	3.80	1	CA
MAX6314US37D1-T	3.70	1	CB
MAX6314US36D1-T	3.60	1	CC
MAX6314US35D1-T	3.50	1	CD
MAX6314US34D1-T	3.40	1	CE
MAX6314US33D1-T	3.30	1	CF
MAX6314US32D1-T	3.20	1	CG
MAX6314US31D1-T	3.08	1	CH
MAX6314US30D1-T	3.00	1	CI
MAX6314US29D1-T	2.93	1	CJ
MAX6314US28D1-T	2.80	1	CK
MAX6314US27D1-T	2.70	1	CL
MAX6314US26D1-T†††	2.63	1	CM

PART [†]	NOMINAL V _{TH} (V)	MIN t _{RP} (ms)	TOP MARK ^{††}
MAX6314US25D1-T	2.50	1	CN
MAX6314US50D2-T	5.00	20	CO
MAX6314US49D2-T	4.90	20	CP
MAX6314US48D2-T	4.80	20	CQ
MAX6314US47D2-T	4.70	20	CR
MAX6314US46D2-T	4.63	20	CS
MAX6314US45D2-T	4.50	20	CT
MAX6314US44D2-T†††	4.39	20	CU
MAX6314US43D2-T	4.30	20	CV
MAX6314US42D2-T	4.20	20	CW
MAX6314US41D2-T	4.10	20	CX
MAX6314US40D2-T	4.00	20	CY
MAX6314US39D2-T	3.90	20	CZ
MAX6314US38D2-T	3.80	20	DA
MAX6314US37D2-T	3.70	20	DB
MAX6314US36D2-T	3.60	20	DC
MAX6314US35D2-T	3.50	20	DD
MAX6314US34D2-T	3.40	20	DE
MAX6314US33D2-T	3.30	20	DJ

[†]The MAX6314 is available in a SOT143 package, -40°C to +85°C temperature range.

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

Note: All devices available in tape-and-reel only. Contact factory for availability.

^{††}The first two letters in the package top mark identify the part, while the remaining two letters are the lot tracking code.

^{†††}Sample stocks generally held on the bolded products; also, the bolded products have 2,500 piece minimum-order quantities. Non-bolded products have 10,000 piece minimum-order quantities. Contact factory for details.

Ordering and Marking Information (continued)

PART [†]	NOMINAL V _{TH} (V)	MIN t _{RP} (ms)	TOP MARK††
MAX6314US32D2-T	3.20	20	DK
MAX6314US31D2-T	3.08	20	DL
MAX6314US30D2-T	3.00	20	DM
MAX6314US29D2-T	2.93	20	DN
MAX6314US28D2-T	2.80	20	DO
MAX6314US27D2-T	2.70	20	DP
MAX6314US26D2-T†††	2.63	20	DQ
MAX6314US25D2-T	2.50	20	DR
MAX6314US50D3-T	5.00	140	DS
MAX6314US49D3-T	4.90	140	DT
MAX6314US48D3-T	4.80	140	DU
MAX6314US47D3-T	4.70	140	DV
MAX6314US46D3-T†††	4.63	140	DW
MAX6314US45D3-T	4.50	140	DX
MAX6314US44D3-T†††	4.39	140	DY
MAX6314US43D3-T	4.30	140	DZ
MAX6314US42D3-T	4.20	140	EA
MAX6314US41D3-T	4.10	140	EB
MAX6314US40D3-T	4.00	140	EC
MAX6314US39D3-T	3.90	140	EG
MAX6314US38D3-T	3.80	140	EH
MAX6314US37D3-T	3.70	140	El
MAX6314US36D3-T	3.60	140	EJ
MAX6314US35D3-T	3.50	140	EK
MAX6314US34D3-T	3.40	140	EL
MAX6314US33D3-T	3.30	140	EM
MAX6314US32D3-T	3.20	140	EN
MAX6314US31D3-T†††	3.08	140	EO
MAX6314US30D3-T	3.00	140	EP
MAX6314US29D3-T†††	2.93	140	ES

PART†	NOMINAL V _{TH} (V)	MIN t _{RP}	TOP MARK ^{††}
MAX6314US28D3-T	2.80	140	ET
MAX6314US27D3-T	2.70	140	EU
MAX6314US26D3-T†††	2.63	140	EV
MAX6314US25D3-T	2.50	140	EW
MAX6314US50D4-T	5.00	1120	EX
MAX6314US49D4-T	4.90	1120	EY
MAX6314US48D4-T	4.80	1120	EZ
MAX6314US47D4-T	4.70	1120	FA
MAX6314US46D4-T	4.63	1120	FB
MAX6314US45D4-T	4.50	1120	FC
MAX6314US44D4-T†††	4.39	1120	FD
MAX6314US43D4-T	4.30	1120	FE
MAX6314US42D4-T	4.20	1120	FF
MAX6314US41D4-T	4.10	1120	FG
MAX6314US40D4-T	4.00	1120	FH
MAX6314US39D4-T	3.90	1120	Fl
MAX6314US38D4-T	3.80	1120	FJ
MAX6314US37D4-T	3.70	1120	FK
MAX6314US36D4-T	3.60	1120	FL
MAX6314US35D4-T	3.50	1120	FM
MAX6314US34D4-T	3.40	1120	FN
MAX6314US33D4-T	3.30	1120	FO
MAX6314US32D4-T	3.20	1120	FP
MAX6314US31D4-T	3.08	1120	FQ
MAX6314US30D4-T	3.00	1120	FR
MAX6314US29D4-T	2.93	1120	FS
MAX6314US28D4-T	2.80	1120	FT
MAX6314US27D4-T	2.70	1120	FU
MAX6314US26D4-T†††	2.63	1120	FV
MAX6314US25D4-T	2.50	1120	FW

[†]The MAX6314 is available in a SOT143 package, -40°C to +85°C temperature range.

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

Note: All devices available in tape-and-reel only. Contact factory for availability.

_Chip Information

_Package Information

For the latest package outline information, go to www.maxim-ic.com/packages.

TRANSISTOR COUNT: 519

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.

8 ______Maxim Integrated Products, 120 San Gabriel Drive, Sunnyvale, CA 94086 408-737-7600

^{††}The first two letters in the package top mark identify the part, while the remaining two letters are the lot tracking code.

^{†††}Sample stocks generally held on the bolded products; also, the bolded products have 2,500 piece minimum-order quantities. Non-bolded products have 10,000 piece minimum-order quantities. Contact factory for details.



OOO «ЛайфЭлектроникс" "LifeElectronics" LLC

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 3010181090000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



Тел: +7 (812) 336 43 04 (многоканальный) Email: org@lifeelectronics.ru