

Low Voltage High Performance Comparator

General Description

The ET8202 is a low power comparator. Guaranteed to operate at a low voltage of 1.5V and fully operational up to 5.5V, it is convenient for use battery powered systems.

The ET8202 has a complementary push-pull P and N channel output stage capable of driving a rail-to-rail output swing with a load ranging up to 5.0mA.

The device is available in an ultra small DFN6 package. And is suitable for space-limited portable device applications.

Features

- Low Supply Current is 10 μ A Typical
- Single Power Supply Operation
- Wide Input Voltage Range from 1.5V to 5.5V
- Wide Common-Mode Input Voltage Range from Rail-to-Rail
- Push-Pull Output Circuit
- Low Input Bias Current
- Internal Hysteresis
- Package information:

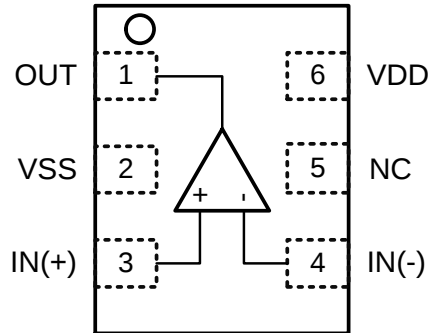
Part No.	Package	MSL
ET8202	DFN6 (1.5mm $\times$ 1.0mm)	Level 1

Application

- Mobile Phones
- Alarm and Security Systems
- Personal Digital Assistant

ET8202

Pin Configuration



TOP VIEW

Figure 1

Pin Function

Pin NO.	Pin Name	Description
1	OUT	Comparator Output
2	VSS	Negative Supply Voltage
3	IN(+)	Non-Inverting Input of Comparator
4	IN(-)	Inverting Input of Comparator
5	NC	No Connect
6	VDD	Positive Supply Voltage

Block Diagram

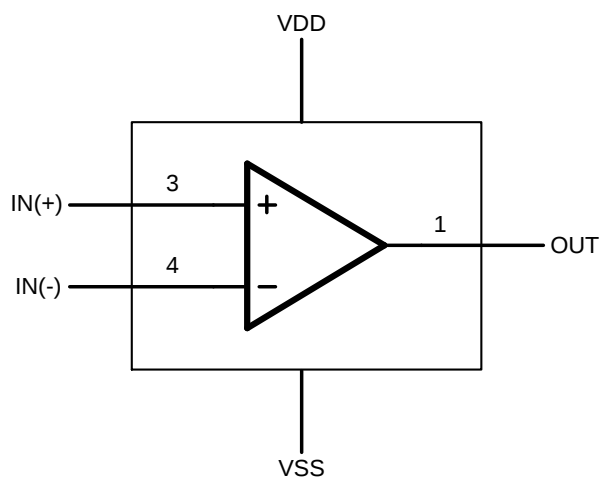
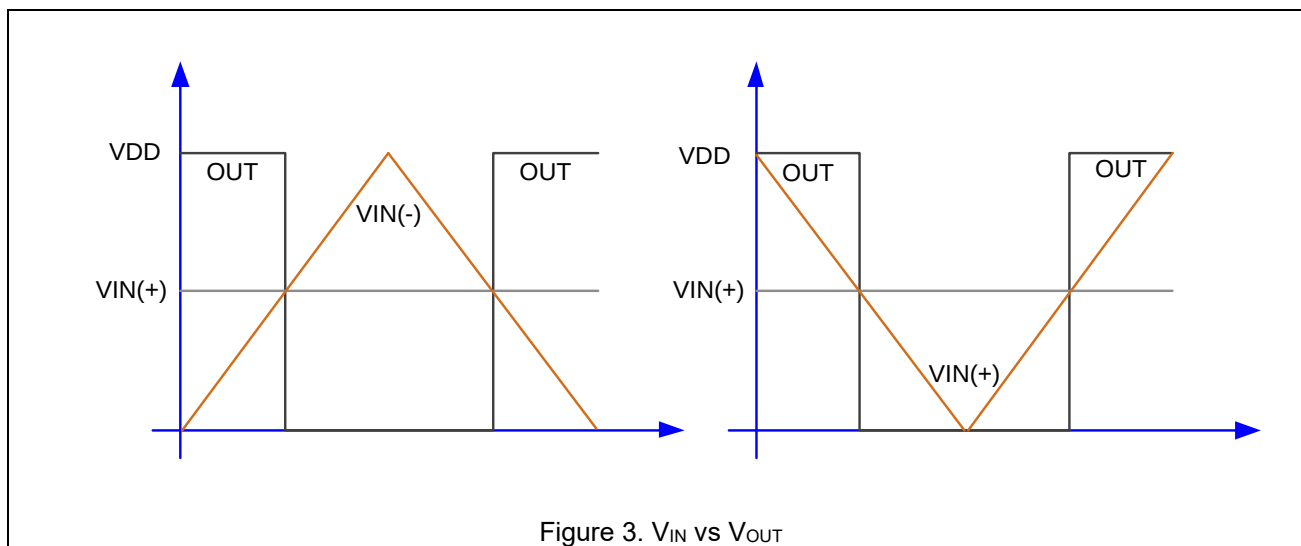


Figure 2

ET8202

Functional Description

Inputs	Outputs
$IN(-) > IN(+)$	Output LOW
$IN(+)> IN(-)$	Output HIGH



Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min	Max	Unit
V_{DD} to V_{SS}	Supply Voltage		7.0	V
DV_{IN}	Differential Input Voltage		± 7.0	V
V_{IN}	Input Voltage	-0.5	$V_{DD} + 0.5$	V
T_J	Max Junction Temperature	-40	+150	$^{\circ}\text{C}$
T_{STG}	Storage Temperature Range	-65	+150	$^{\circ}\text{C}$
$P_D^{(1)}$	Power Dissipation		220	mW
ESD	Human Body Model, All Pins (JESD22-A114)		± 4	kV
	Charged Device Mode, JESD22-C101		± 1.5	

Note1: The maximum total power dissipation must not be exceeded.

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Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. It is not recommended exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Condition	Min.	Typ	Max.	Unit
V_{DD} to V_{SS}	Power Supply				5.5	V
V_{DD}	Power Supply	$V_{SS}=0V$	1.5		5.5	V
V_{IN}	Input Voltage		V_{SS}		V_{DD}	V
I_{OH}/I_{OL}	Output Sink/Source Current	$V_{DD}=3.0V$			15	mA
		$V_{DD}=1.8V$			5	
		$V_{DD}=1.5V$			2	
T_A	Operating Temperature, Free Air		-40		+85	°C

Electrical Characteristics

$V_{DD}=3.0V, V_{SS}=GND, T_A=+25^{\circ}C$

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{HYS}	Input Hysteresis	$V_{CM}=0.5V_{DD}$		4		mV
V_{IO}	Input Offset Voltage ⁽²⁾	$V_{CM}=0.5V_{DD}$	-6	± 1	+6	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio ⁽³⁾	$V_{CM}=V_{DD}$		68		dB
I_{DD}	Supply Current			10	17	μA
PSRR	Power Supply Rejection Ratio ⁽³⁾	$\Delta V_{DD}=0.5V$	45	80		dB
V_{OL}	Low-Level Output Voltage	$I_{SINK}=5.0mA$		0.15	0.4	V
V_{OH}	High-Level Output Voltage	$I_{SOURCE}=5.0mA$	2.6	2.85		V
t_{PLH}	Propagation Delay (Turn-On) ⁽³⁾	Overdrive=20mV, $C_L=15pF$		0.60		μs
t_{PHL}	Propagation Delay (Turn-Off) ⁽³⁾			1		μs
t_{TLH}	Response Time, Output Rise/Fall ⁽³⁾⁽⁴⁾	$C_L=50pF$		30		ns
t_{THL}				24		

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Electrical Characteristics (Continued)

$V_{DD}=1.8V, V_{SS}=GND, T_A=+25^{\circ}C$

Symbol	Parameter	Condition	Min	Typ.	Max	Unit
V_{HYS}	Input Hysteresis	$V_{CM}=0.5V_{DD}$		4		mV
V_{IO}	Input Offset Voltage ⁽²⁾	$V_{CM}=0.5V_{DD}$	-6	± 1	+6	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio ⁽³⁾	$V_{CM}=V_{DD}$		60		dB
I_{DD}	Supply Current			9	15	μA
PSRR	Power Supply Rejection Ratio ⁽³⁾	$\Delta V_{DD}=0.5V$	45	70		dB
V_{OL}	Low-Level Output Voltage	$I_{SINK}=3.0mA$		0.15	0.4	V
V_{OH}	High-Level Output Voltage	$I_{SOURCE}=3.0mA$	1.4	1.65		V
t_{PLH}	Propagation Delay (Turn-On) ⁽³⁾	Overdrive=20mV, $C_L=15pF$		0.59		μs
t_{PHL}	Propagation Delay (Turn-Off) ⁽³⁾			1		μs
t_{TLH}	Response Time, Output Rise/Fall ⁽³⁾⁽⁴⁾	$C_L=50pF$		26		ns
t_{THL}				33		

$V_{DD}=1.5V, V_{SS}=GND, T_A=+25^{\circ}C$

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{HYS}	Input Hysteresis	$V_{CM}=0.5V_{DD}$		3.5		mV
V_{IO}	Input Offset Voltage ⁽²⁾	$V_{CM}=0.5V_{DD}$	-6	± 1	+6	mV
I_{IO}	Input Offset Current			10		pA
I_I	Input Bias Current			10		pA
V_{CM}	Common Mode Input Voltage		V_{SS}		V_{DD}	V
CMRR	Common Mode Rejection Ratio ⁽³⁾	$V_{CM}=V_{DD}$		56		dB
I_{DD}	Supply Current			8	13	μA
PSRR	Power Supply Rejection Ratio ⁽³⁾	$\Delta V_{DD}=0.5V$	45	70		dB
V_{OL}	Low-Level Output Voltage	$I_{SINK}=1.5mA$		0.15	0.4	V
V_{OH}	High-Level Output Voltage	$I_{SOURCE}=1.5mA$	1.1	1.35		V
t_{PLH}	Propagation Delay (Turn-On) ⁽³⁾	Overdrive=20mV, $C_L=15pF$		0.6		μs
t_{PHL}	Propagation Delay (Turn-Off) ⁽³⁾			1		μs
t_{TLH}	Response Time, Output Rise/Fall ⁽³⁾⁽⁴⁾	$C_L=50pF$		30		ns
t_{THL}				42		

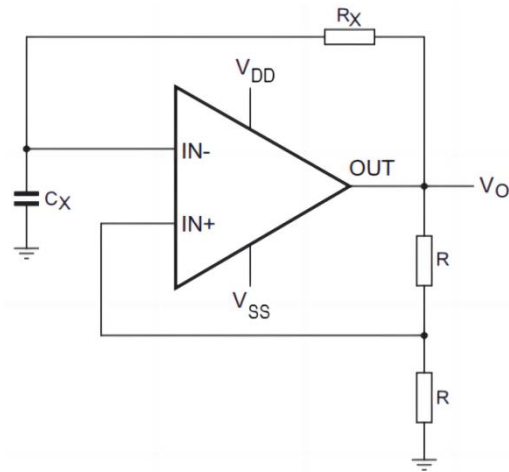
Note2. Differential input switching level is guaranteed at the minimum or maximum offset voltage, minus or plus half the maximum hysteresis voltage.

Note3. Guaranteed by design and characterization data.

Note4. Input signal: 1kHz, square-wave signal with 10ns edge rate.

Typical Application

Figure 4 shows the ET8202 configured as a Schmitt trigger oscillator



The oscillation frequency can be calculated as follows:

$$f = \frac{1}{T} = \frac{1}{2.2 \cdot R_X \cdot C_X}$$

Figure 4. Schmitt trigger oscillator

Figure 5 shows the ET8202 configured as a zero-crossing detector.

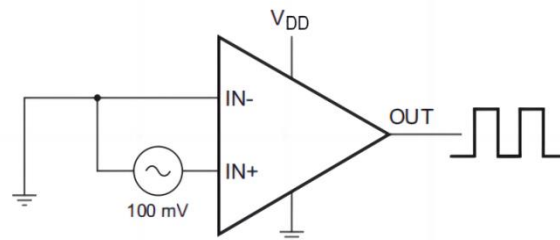
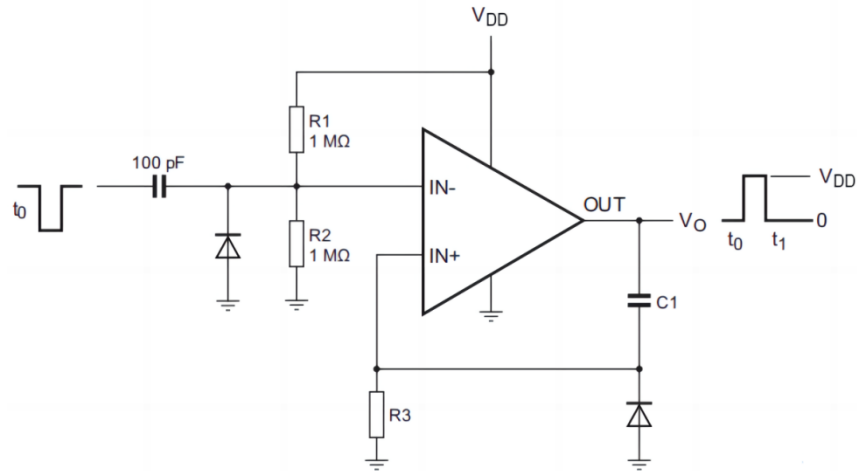


Figure 5. Zero-crossing detector

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Typical Application(Continued)

Figure 6 shows the ET8202 configured as a one-shot multivibrator.

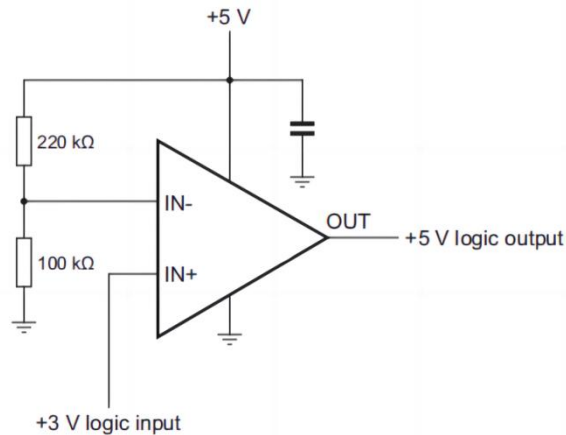


The resistor divider R1 and R2 can be used to set the magnitude of the input pulse.

The pulse width is set by adjusting C1 and R3.

Figure 6. one-shot multivibrator

Figure 7 shows the ET8202 configured as a logic level translator.



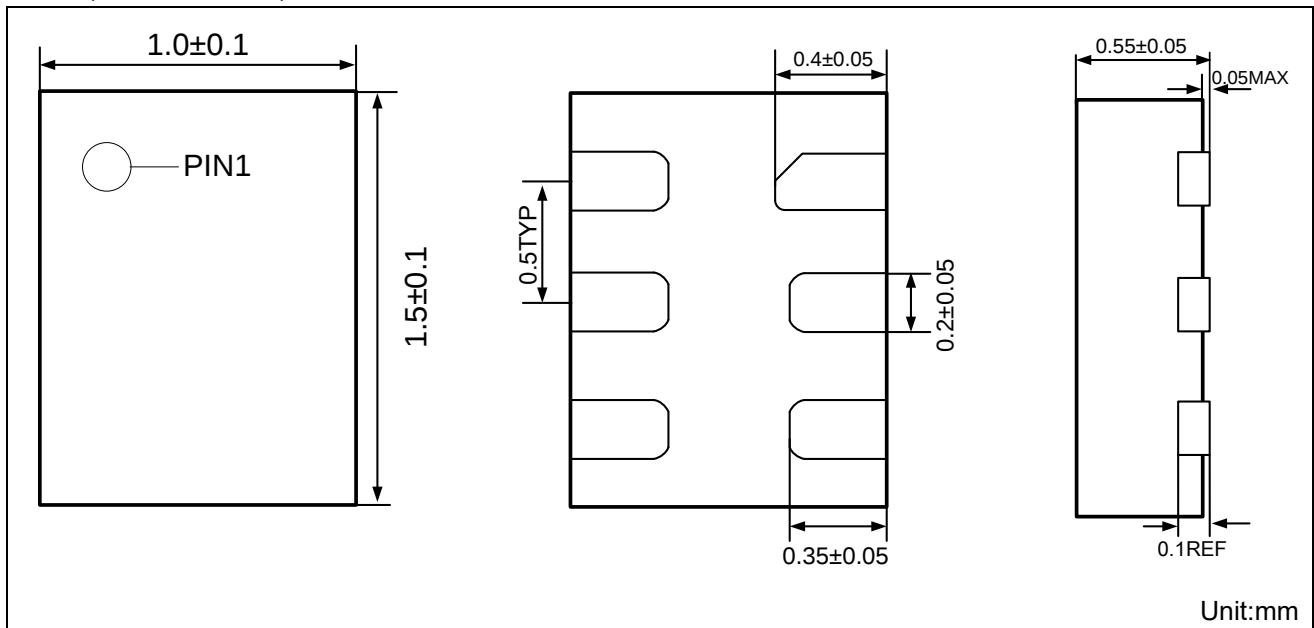
This circuit converts 3 V logic to 5 V logic.

Figure 7. logic level translator

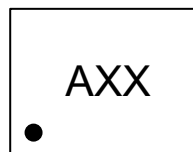
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Package Dimension

DFN6(1.5mm x1.0mm)



Marking Information



A - Part Number

XX - Tracking Number

Note: XX (Tracking Number) is variable, according to the wafer lot number.

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Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.1	2016-04-20	1.VDD: Change from 1.5~4.6V to 1.5~5.5V 2. Supply Voltage: Change from 6V to 8V	Huang Xingxing	Zhu Jun Li	Zhu Jun Li
1.2	2020-03-16	Documents check and formalize	Shib	Liujiy	Liujiy
1.3	2021-01-20	Update Package Size	Shib	Liujiy	Liujiy
1.4	2022-10-19	Update Typeset	Huyt	Liujiy	Liujiy
1.5	2024-01-11	Update AMR	Huyt	Liujiy	Liujiy
1.6	2024-02-07	Update Typical Application	Huyt	Liujiy	Liujiy
1.7	2024-03-01	Add Marking Information	Yin Peng	Liujiy	Liujiy