

## Description

The AZ386 is a power amplifier designed for use in low voltage consumer applications. The gain is internally set to 20 to keep external part count low, but the addition of an external resistor and capacitor between pin 1 and pin 8 will increase the gain to any value from 20 to 200.

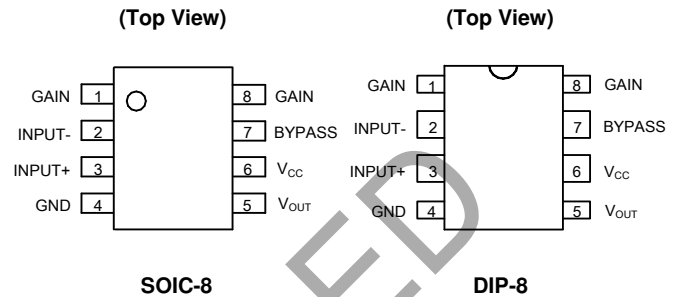
The inputs are ground referenced while the output automatically biases to one-half the supply voltage. The quiescent power drain is only 24mW when operating from a 5V supply, making the AZ386 ideal for battery operation.

This IC is available in SOIC-8 and DIP-8 packages.

## Features

- Wide Supply Voltage Range: 4V to 16V
- Low Quiescent Current Drain: 6mA
- Voltage Gains from 20 to 200
- Battery Operation
- Minimum External Parts
- Low Power Dissipation
- Low Distortion
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](#) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

## Pin Assignments

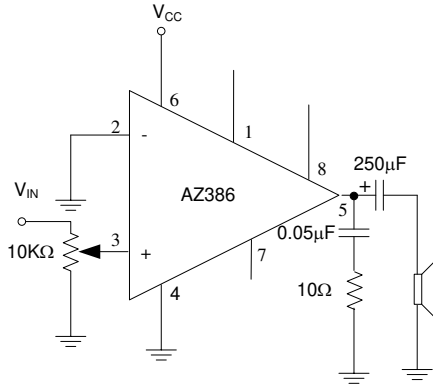


## Applications

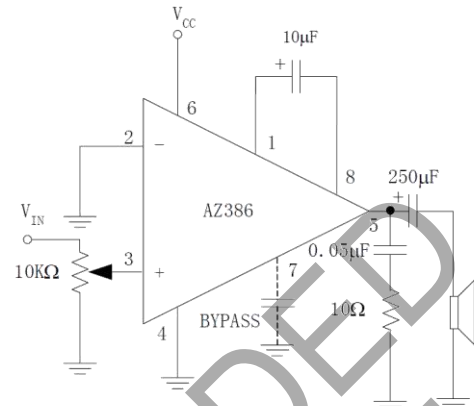
- AM-FM Radio Amplifier
- Cordless Phone
- TV Sound Systems
- Portable Tape Player Amplifier
- Intercoms
- Line Drivers
- Ultrasonic Drivers
- Small Servo Drivers
- Power Converters

NOT RECOMMENDED FOR NEW DESIGN

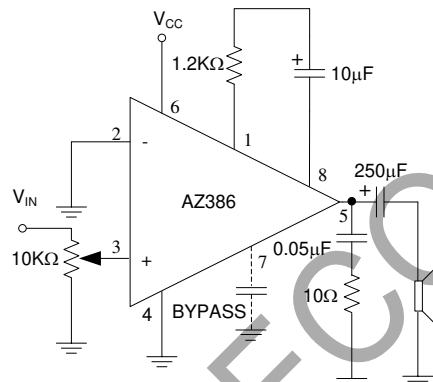
**Typical Applications Circuit** (Note 1)



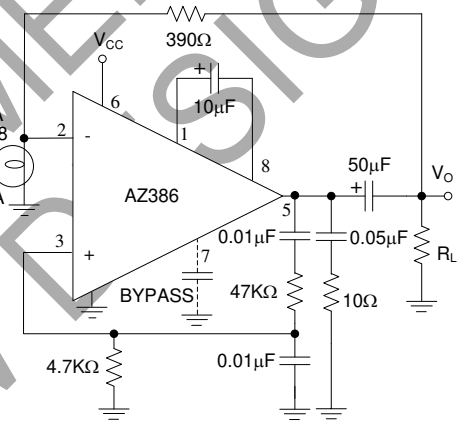
Amplifier With Gain=20



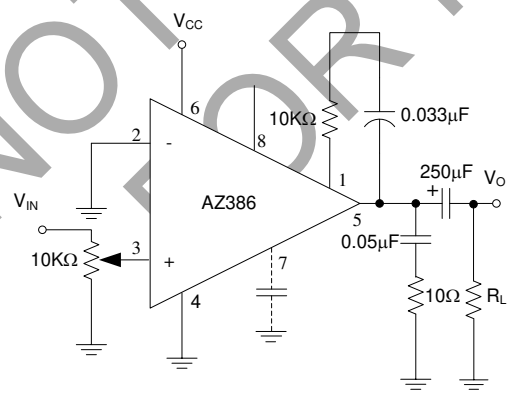
Amplifier With Gain=200



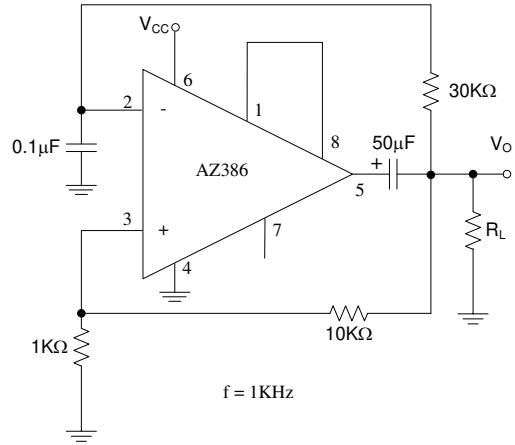
Amplifier With Gain=50



Low Distortion Power Wienbridge Oscillator



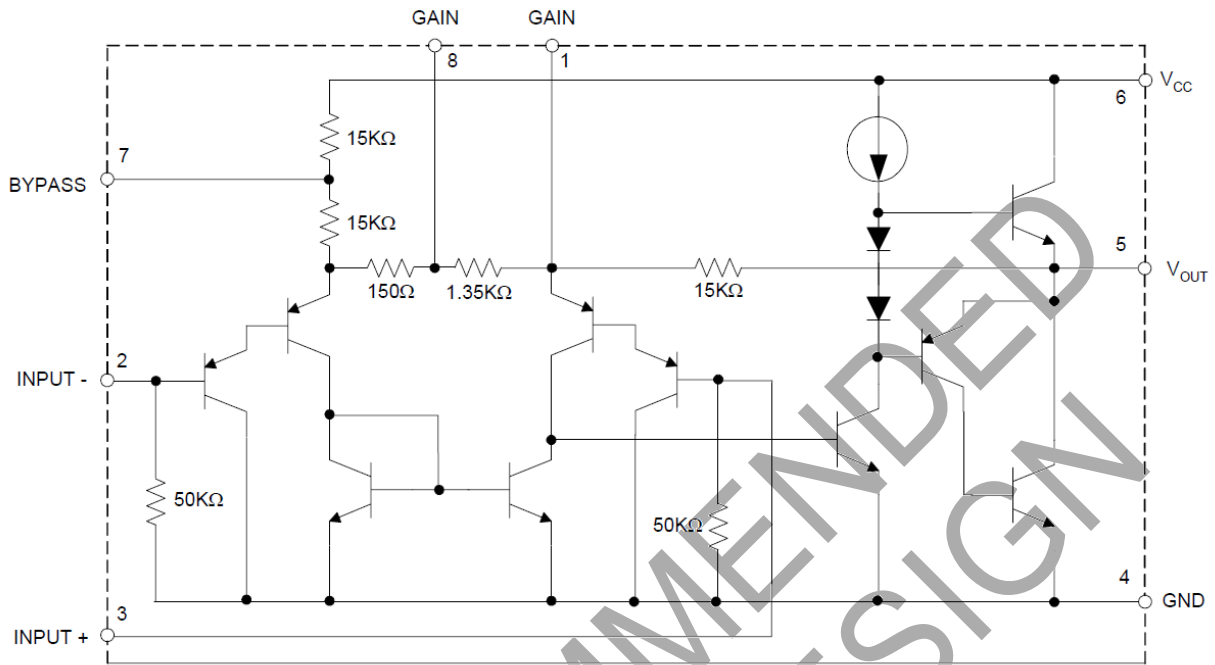
Amplifier With Bass Boost



Square Wave Oscillator

Note 1: The R-C series circuit from output to ground, which will make the output stable, is depended on the different capacitive load in the circuit, the correct values for the R and C can be determined through experimental methods.

**Functional Block Diagram**



**Absolute Maximum Ratings** (Note 2)

Symbol	Parameter	Rating		Unit
$V_{CC}$	Power Supply Voltage	18		V
$P_D$	Package Dissipation (Note 3)	AZ386P	1.25	W
		AZ386M	0.73	W
$V_{IN}$	Input Voltage	-0.4V to $V_{IN}+0.4V$		V
$T_J$	Junction Temperature	+150		°C
$T_{STG}$	Storage Temperature Range	-55 to +150		°C
-	Soldering Information	DIP-8 Soldering (10 sec.)	+260	°C
		SOIC-8 (15 sec.)	+215	
$\theta_{JA}$	Thermal Resistance	DIP-8	107	°C/W
		SOIC-8	172	

- Notes:
- Stresses greater than those listed under *Absolute Maximum Ratings* can 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 under *Recommended Operating Conditions* is not implied. Exposure to *Absolute Maximum Ratings* for extended periods can affect device reliability.
  - For operation in ambient temperatures ( $T_A$ ) above +25°C, the device must be derated based on a +150°C maximum junction temperature and 1) a thermal resistance of 107°C/W junction to ambient for the Dual-in-Line package and 2) a thermal resistance of 172°C/W for the small outline package.

## Recommended Operating Conditions

Parameter	Min	Max	Unit
Operating Temperature Range	0	+70	°C

## Electrical Characteristics (Note 4)

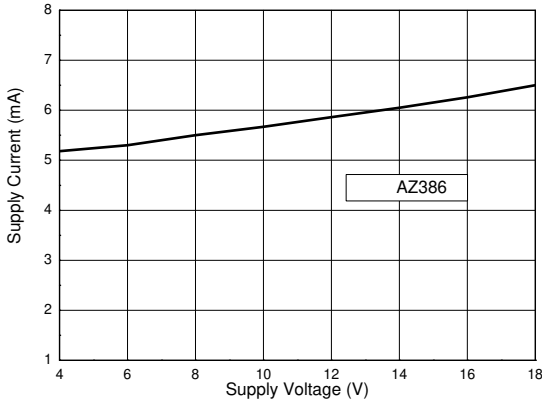
Operating Conditions:  $T_A=+25^{\circ}\text{C}$ , unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{CC}$	Supply Voltage	–	4	–	16	V
$I_Q$	Quiescent Current	$V_{CC}=6\text{V}$ , $V_{IN}=0$	–	6	8	mA
$P_{OUT}$	Output Power	$V_{CC}=6\text{V}$ , $R_L=8\Omega$ , THD=10%	250	300	–	mW
		$V_{CC}=9\text{V}$ , $R_L=8\Omega$ , THD=10%	500	800	–	mW
		$V_{CC}=16\text{V}$ , $R_L=32\Omega$ , THD=10%	700	1000	–	mW
$G_V$	Voltage Gain	$V_{CC}=6\text{V}$ , $f=1\text{KHz}$ $10\mu\text{F}$ from Pin 1 to 8	–	26	–	dB
			–	45	–	dB
BW	Bandwidth	$V_{CC}=6\text{V}$ , Pins 1 and 8 open	–	500	–	KHz
THD	Total Harmonic Distortion	$V_{CC}=6\text{V}$ , $R_L=8\Omega$ , $P_{OUT}=125\text{mW}$ $f=1\text{KHz}$ , Pins 1 and 8 open	–	0.27	–	%
PSRR	Power Supply Rejection Ratio	$V_{CC}=6\text{V}$ , $f=1\text{KHz}$ , $C_{BYPASS}=10\mu\text{F}$ , Pins 1 and 8 open, Referred to Output	–	45	–	dB
$R_{IN}$	Input Resistance	–	–	70	–	$\text{K}\Omega$
$I_{BIAS}$	Input Bias Current	$V_{CC}=6\text{V}$ , Pins 2 and 3 open	–	10	–	nA

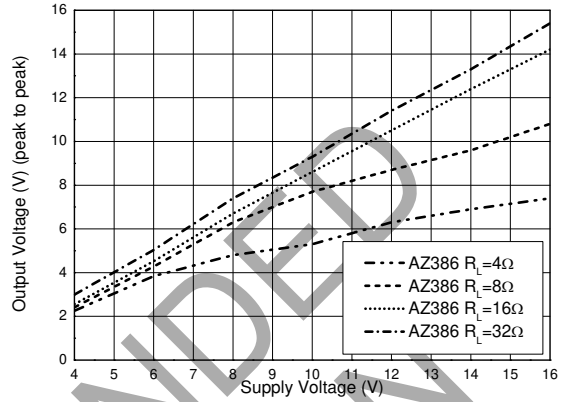
Note 4: All voltages are measured with respect to the ground pin, unless otherwise specified.

**Performance Characteristics**

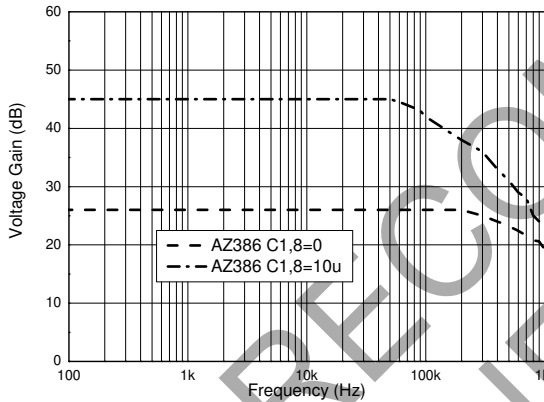
**Quiescent Supply Current vs. Supply Voltage**



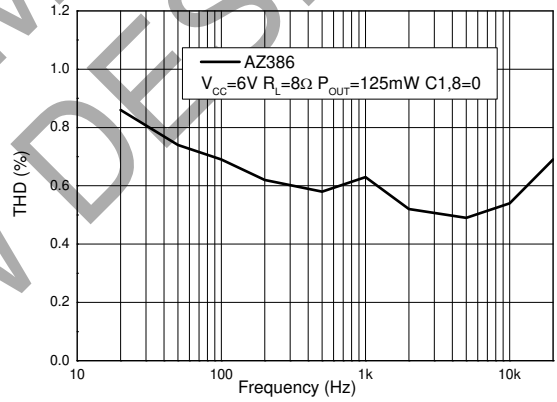
**Peak-to-Peak Output Voltage Swing vs. Supply Voltage**



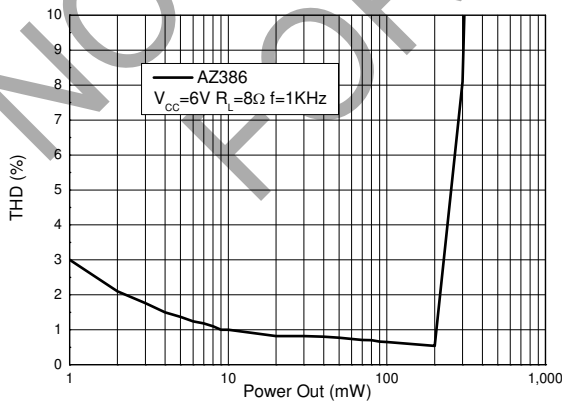
**Voltage Gain vs. Frequency**



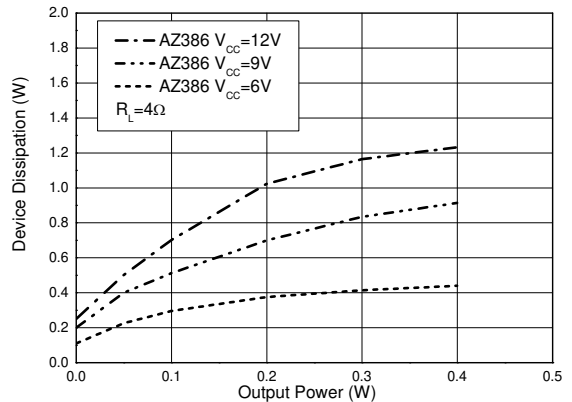
**Distortion vs. Frequency**



**Distortion vs. Output Power**

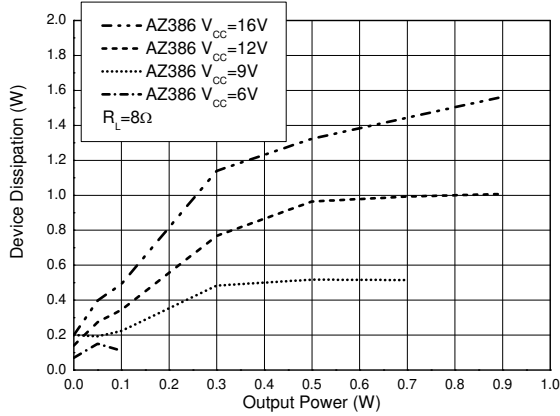


**Device Dissipation vs. Output Power (4Ω Load)**

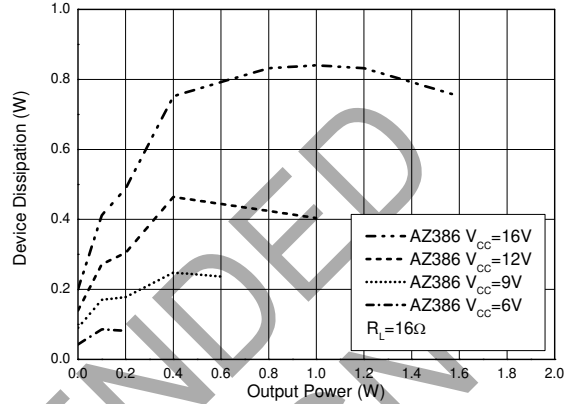


**Performance Characteristics** (continued)

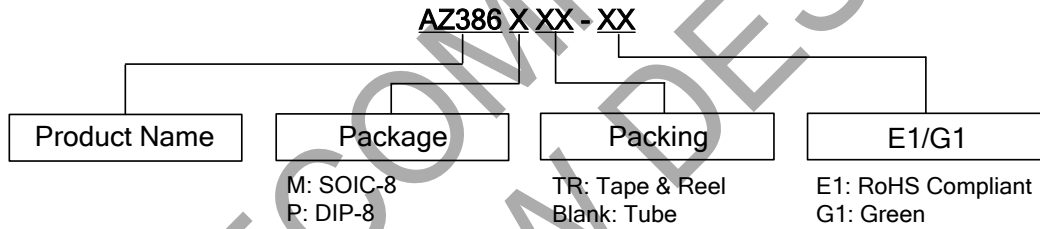
**Device Dissipation vs. Output Power (8Ω Load)**



**Device Dissipation vs. Output Power (16Ω Load)**



**Ordering Information**

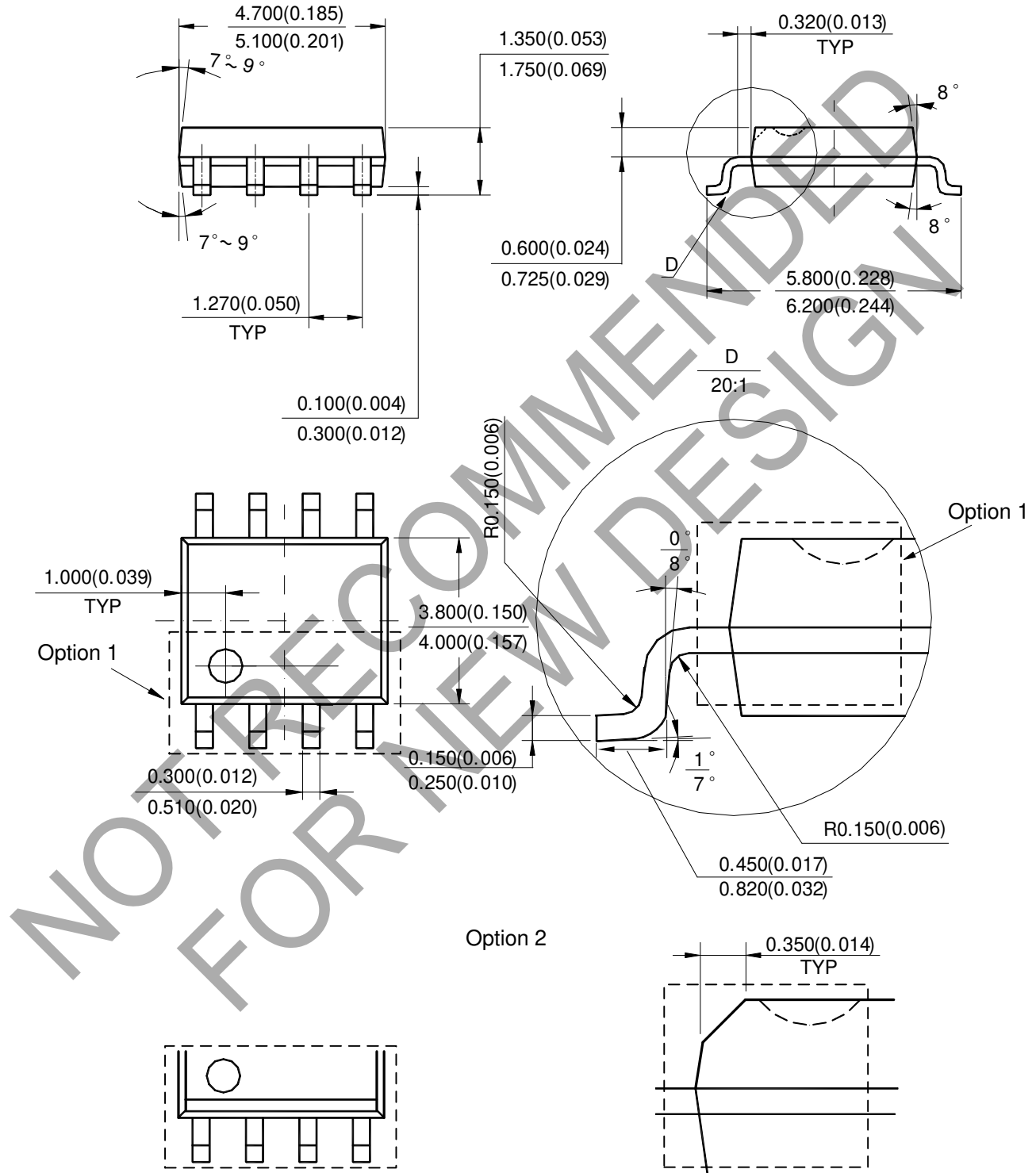


Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SOIC-8	0 to +70°C	AZ386M-E1	AZ386M-G1	386M-E1	386M-G1	Tube
		AZ386MTR-E1	AZ386MTR-G1	386M-E1	386M-G1	Tape & Reel
DIP-8	0 to +70°C	AZ386P-E1	AZ386P-G1	AZ386P-E1	AZ386P-G1	Tube

**Package Outline Dimensions** (All dimensions in mm(inch).)

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SOIC-8

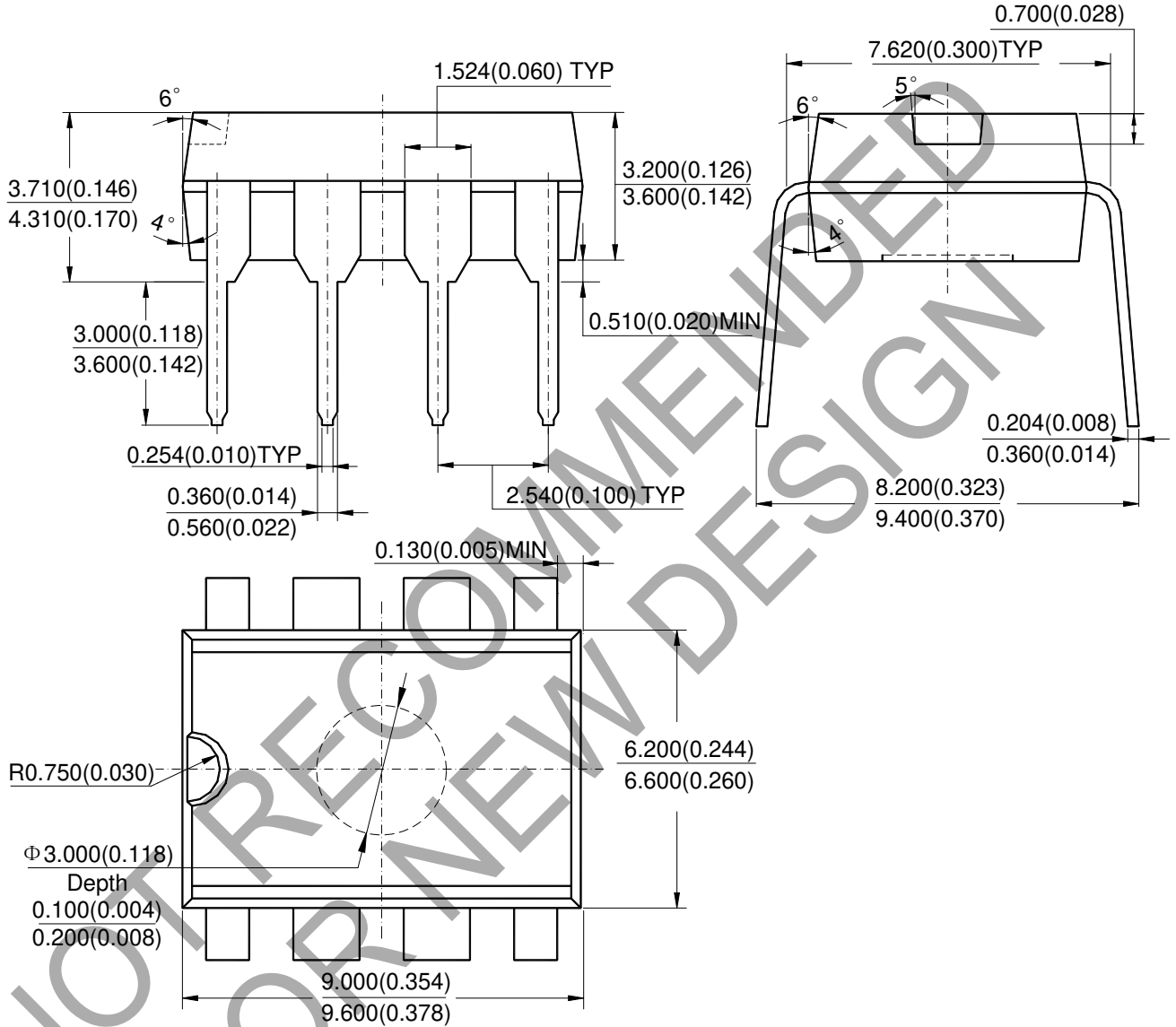


Note: Eject hole, oriented hole and mold mark is optional.

**Package Outline Dimensions** (All dimensions in mm(inch).) (continued)

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(2) **Package Type: DIP-8**



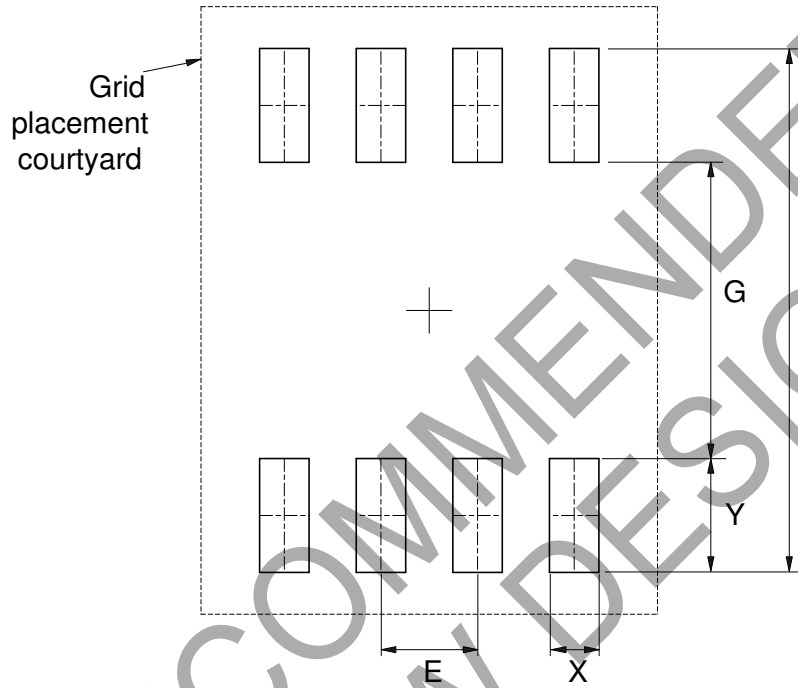
Note: Eject hole, oriented hole and mold mark is optional.



## Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

(1) Package Type: SOIC-8



Dimensions	Z (mm)/(inch)	G (mm)/(inch)	X (mm)/(inch)	Y (mm)/(inch)	E (mm)/(inch)
Value	6.900/0.272	3.900/0.154	0.650/0.026	1.500/0.059	1.270/0.050

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