General Description

The AZV358 is dual low voltage (2.7-5.5V) operational amplifiers which have rail-to-rail output swing capability. The input common-mode voltage range includes ground. The chip exhibits excellent speed-power ratio, achieving 1MHz of bandwidth and 1V/μs of slew rate with low supply current.

The AZV358 is built with BiCMOS process. It has bipolar input and output stages for improved noise performance, low input offset voltage and higher output current drive.

AZV358 is available in the package of TSSOP-8 and MSOP-8. The small packages save space on pc boards, and enable the design of small portable electronic devices. It also allows the designer to place the device closer to the signal source to reduce noise pickup and increase signal integrity.

AZV358 is also available in standard SOIC-8 package.

Features

(For V_{CC}=5V and V_{EE}=0V, typical unless otherwise noted)

- Guaranteed 2.7V to 5.5V Performance
- No Crossover Distortion
- Gain-Bandwidth Product 1MHz
- Industrial Temperature Range: -40°C to +85°C
- Low Supply Current: 210μA
- Rail-to-Rail Output Swing under 10kΩ Load:
  V_{OH} up to V_{CC} -10mV
  V_{OL} near to V_{EE} +65mV
- V_{CM}: -0.1V to V_{CC}-0.8V

Applications

- Active Filters
- Low Power, Low Voltage Applications
- General Purpose Portable Devices
- Cellular Phone, Cordless Phone
- Battery-Powered Systems

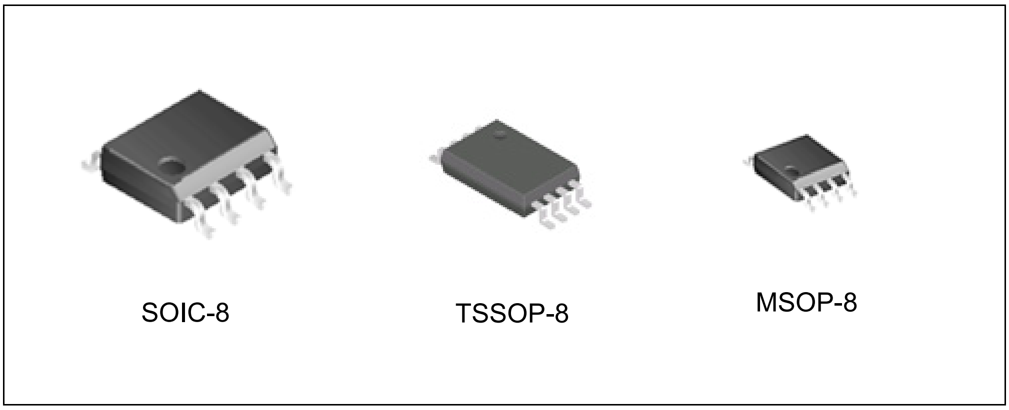


Figure 1. Package Types of AZV358

Pin Configuration

M/G/MM Package
(SOIC-8/TSSOP-8/MSOP-8)

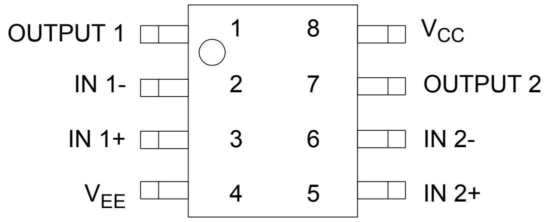


Figure 2. Pin Configuration of AZV358 (Top View)

Functional Block Diagram

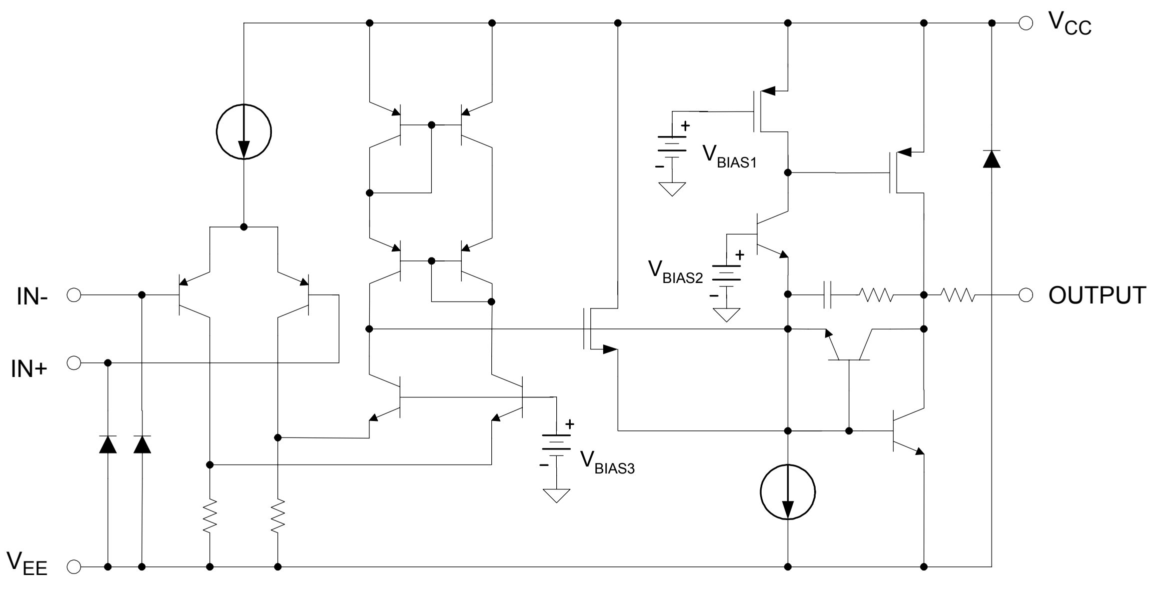
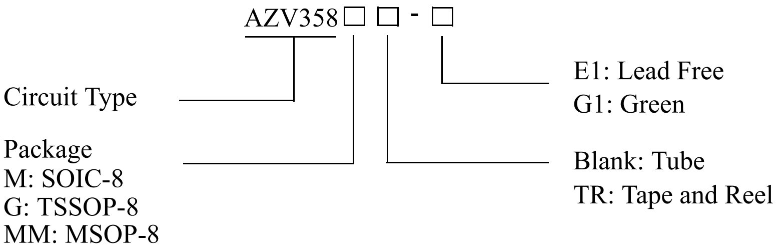


Figure 3. Functional Block Diagram of AZV358 (Each Block)

Ordering Information



Package	Temperature Range	Part Number		Marking ID		Packing Type
		Lead Free	Green	Lead Free	Green	
SOIC-8	-40 to 85°C	AZV358M-E1	AZV358M-G1	AZV358M-E1	AZV358M-G1	Tube
		AZV358MTR-E1	AZV358MTR-G1	AZV358M-E1	AZV358M-G1	Tape & Reel
TSSOP-8	-40 to 85°C	AZV358G-E1	AZV358G-G1	EG3E	GG3E	Tube
		AZV358GTR-E1	AZV358GTR-G1	EG3E	GG3E	Tape & Reel
MSOP-8	-40 to 85°C	AZV358MM-E1	AZV358MM-G1	AZV358MM-E1	AZV358MM-G1	Tube
		AZV358MMTR-E1	AZV358MMTR-G1	AZV358MM-E1	AZV358MM-G1	Tape & Reel

BCD Semiconductor's Pb-free products, as designated with "E1" suffix in the part number, are RoHS compliant. Products with "G1" suffix are available in green packages.

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	6	V
Operation Junction Temperature	T_J	150	°C
Storage Temperature Range	T_{STG}	-65 to 150	°C
Lead Temperature (Soldering, 10 Seconds)	T_{LEAD}	260	°C
ESD (Machine Model)		200	V
ESD (Human Body Model)		2000	V

Note 1: Stresses greater than 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 under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_{CC}	2.7	5.5	V
Ambient Operating Temperature Range	T_A	-40	85	°C

2.7V Electrical Characteristics

Limits in standard typeface are for T_A=25°C, **bold** typeface applies over T_A=-40°C to 85°C, V_{CC}=2.7V, V_{EE}=0V, V_{CM}=1.0V, V_O=V_{CC}/2 and R_L>1MΩ, unless otherwise specified. (Note 2)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}			1.7	7	mV
					9	
Input Bias Current	I_B			11	250	nA
					500	
Input Offset Current	I_{IO}			5	50	nA
					150	
Input Common Mode Voltage Range	V_{CM}	for CMRR≥50dB	-0.1		1.9	V
Supply Current	I_{CC}	V_O=V_{CC}/2, A_{VCL}=1, No load		140	340	μA
					420	
Common Mode Rejection Ratio	CMRR	0≤V_{CM}≤1.7V	50	63		dB
Power Supply Rejection Ratio	PSRR	2.7V≤V_{CC}≤5V V_O=1V,	50	60		dB
Output Short Circuit Current	I_{SOURCE}	V_O=0V	5	20		mA
	I_{SINK}	V_O=2.7V	10	30		mA
Output Voltage Swing	V_{OH}	R_L=10kΩ to 1.35V	2.60	2.69		V
	V_{OL}			60	180	mV
Gain Bandwidth Product	GBWP	C_L=200pF		1		MHz
Phase Margin	ϕ_M			60		deg
Gain Margin	G_M			10		dB

Note 2: Limits over the full temperature are guaranteed by design, but not tested in production.

5V Electrical Characteristics

Limits in standard typeface are for T_A=25°C, **bold** typeface applies over T_A=-40°C to 85°C, V_{CC}=5V, V_{EE}=0V, V_{CM}=2.0V, V_O=V_{CC}/2 and R_L>1MΩ, unless otherwise specified. (Note 2)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Offset Voltage	V_{IO}			1.7	7	mV
					9	
Input Bias Current	I_B			15	250	nA
					500	
Input Offset Current	I_{IO}			5	50	nA
					150	
Input Common Mode Voltage Range	V_{CM}	for CMRR≥50dB	-0.1		4.2	V
Supply Current	I_{CC}	V_O=V_{CC}/2, A_{VCL}=1, No load		210	440	µA
					615	
Large Signal Voltage Gain	G_V	R_L=2kΩ	84	100		dB
			80			
Common Mode Rejection Ratio	CMRR	0≤V_{CM}≤4V	50	63		dB
Power Supply Rejection Ratio	PSRR	2.7V≤V_{CC}≤5V V_O=1V, V_{CM}=1V	50	60		dB
Output Short Circuit Current	I_{SOURCE}	V_O=0V	5	60		mA
	I_{SINK}	V_O=5V	10	160		mA
Output Voltage Swing	V_{OH}	R_L=2kΩ to 2.5V	4.7	4.96		V
			4.6			
		R_L=10kΩ to 2.5V	4.9	4.99		
			4.8			
	V_{OL}	R_L=2kΩ to 2.5V		120	300	mV
					400	
		R_L=10kΩ to 2.5V		65	180	
					280	
Slew Rate	SR			1		V/µs
Gain Bandwidth Product	GBWP	C_L=200pF		1		MHz
Phase Margin	ϕ_M			60		deg
Gain Margin	G_M			10		dB

Note 2: Limits over the full temperature are guaranteed by design, but not tested in production.

Typical Performance Characteristics

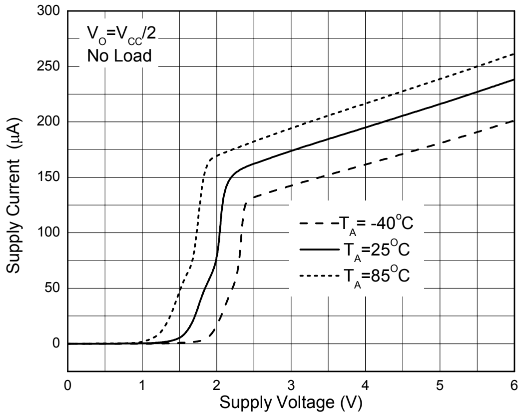


Figure 4. Supply Current vs. Supply Voltage

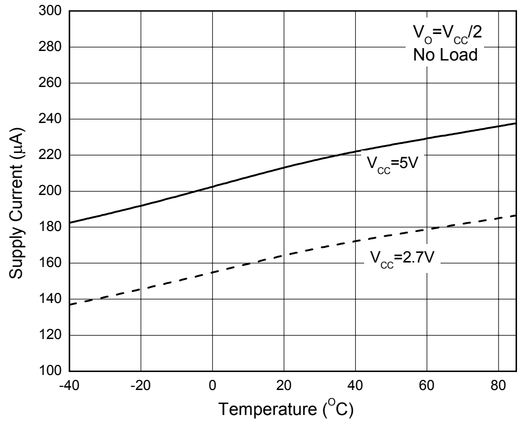


Figure 5. Supply Current vs. Temperature

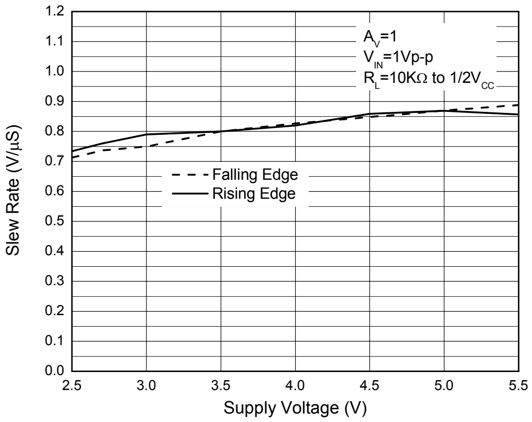


Figure 6. Slew Rate vs. Supply Voltage

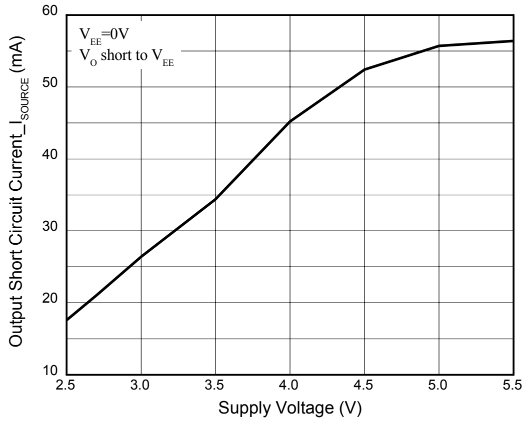


Figure 7. Output Short Circuit Current vs. Supply Voltage

Typical Performance Characteristics (Continued)

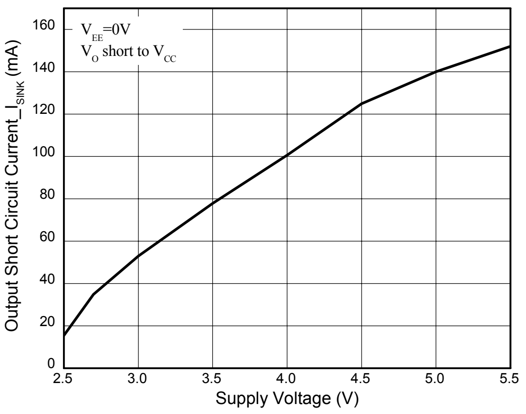


Figure 8. Output Short Circuit Current vs. Supply Voltage

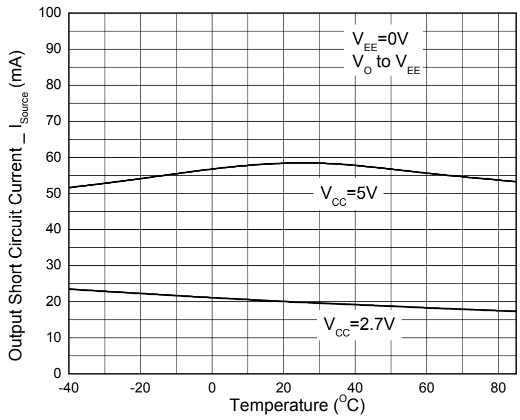


Figure 9. Output Short Circuit Current vs.Temperature

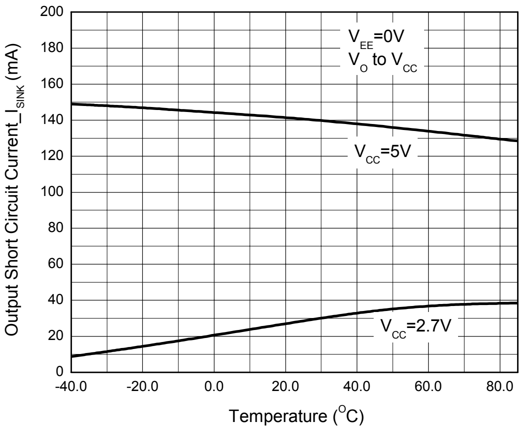


Figure 10. Output Short Circuit Current vs.Temperature

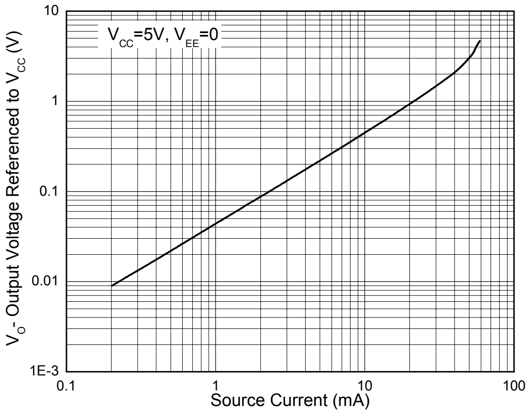


Figure 11. Output Voltage vs.Output Source Current

Typical Performance Characteristics (Continued)

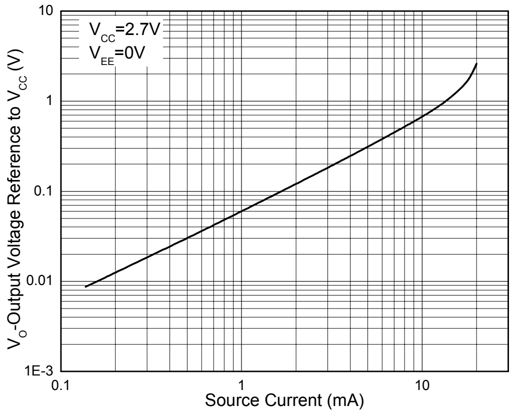


Figure 12. Output Voltage vs.Output Source Current

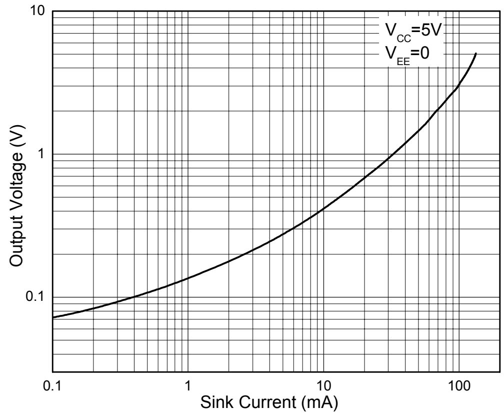


Figure 13. Output Voltage vs.Output Sink Current

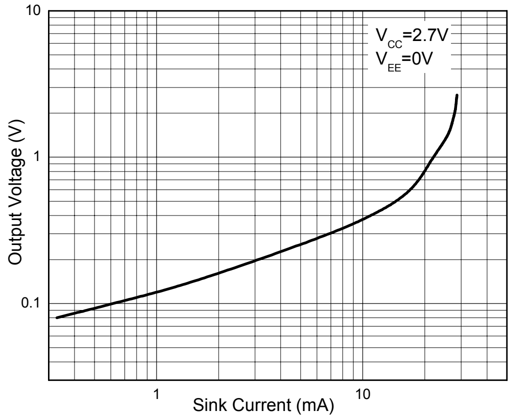


Figure 14. Output Voltage vs.Output Sink Current

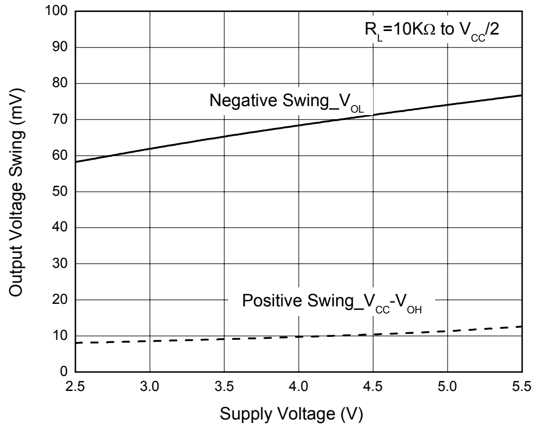


Figure 15. Output Voltage Swing vs. Supply Voltage

Typical Performance Characteristics (Continued)

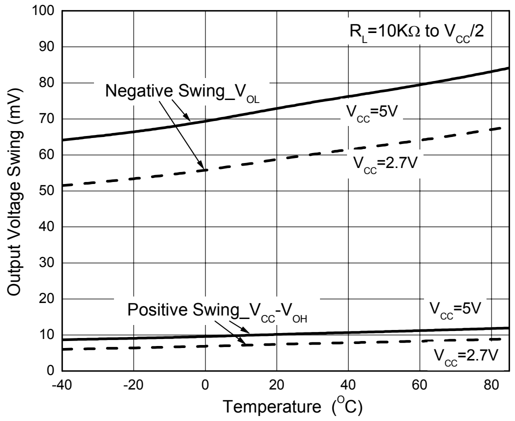


Figure 16. Output Voltage Swing vs.Temperature

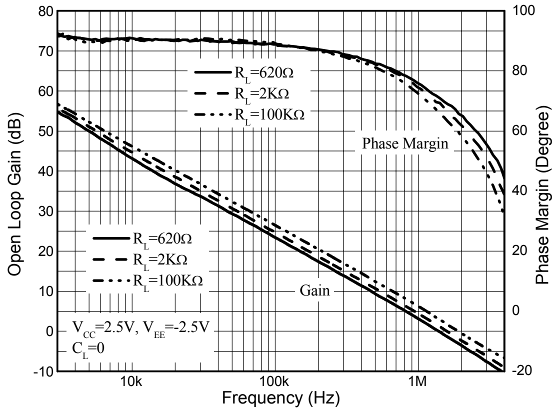


Figure 17. Gain and Phase vs. Frequency and Resistive Load

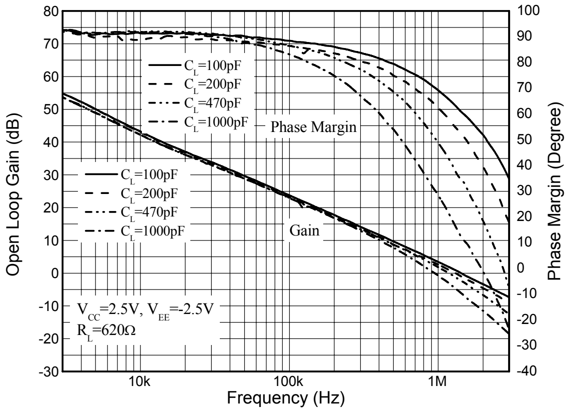


Figure 18. Gain and Phase vs. Frequency and Capacitive Load

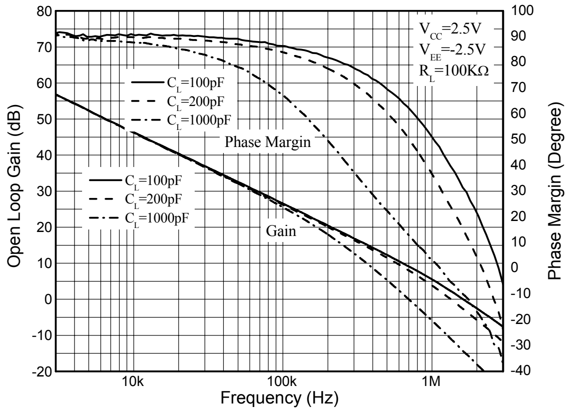


Figure 19. Gain and Phase vs. Frequency and Capacitive Load

Typical Performance Characteristics (Continued)

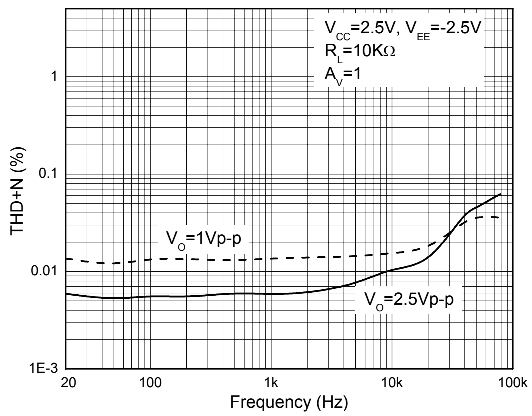


Figure 20. THD+N vs. Frequency

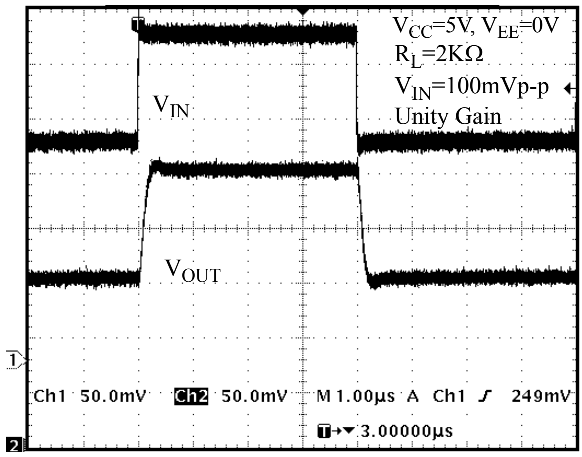


Figure 21. Non-Inverting Input Small Signal Pulse Response

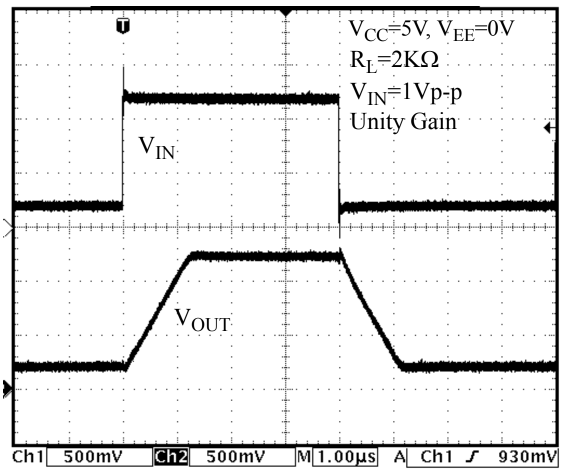


Figure 22. Non-Inverting Input Large Signal Pulse Response

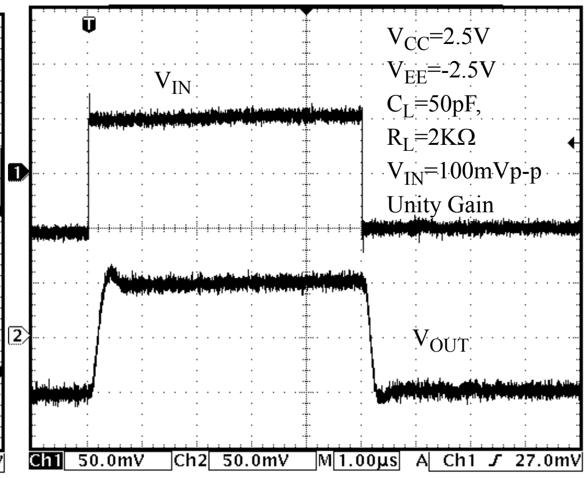


Figure 23. Non-Inverting Input Small Signal Response

Typical Performance Characteristics (Continued)

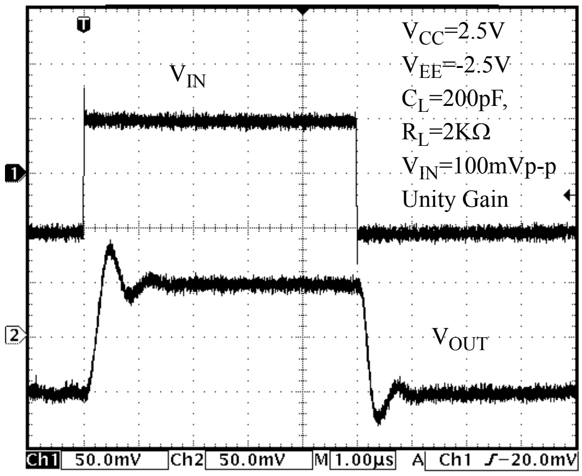
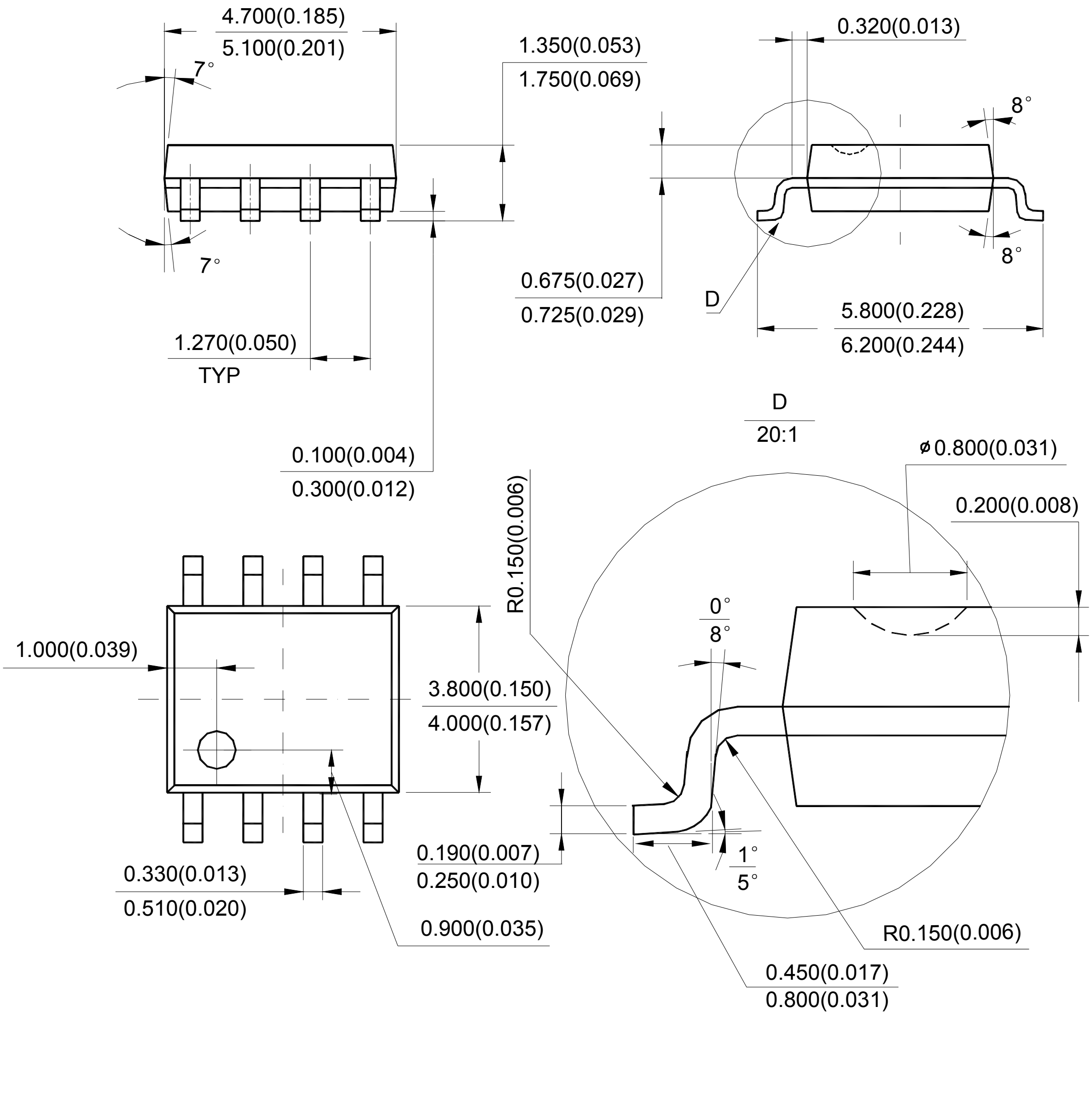


Figure 24. Non-Inverting Input Small Signal Response

Mechanical Dimensions

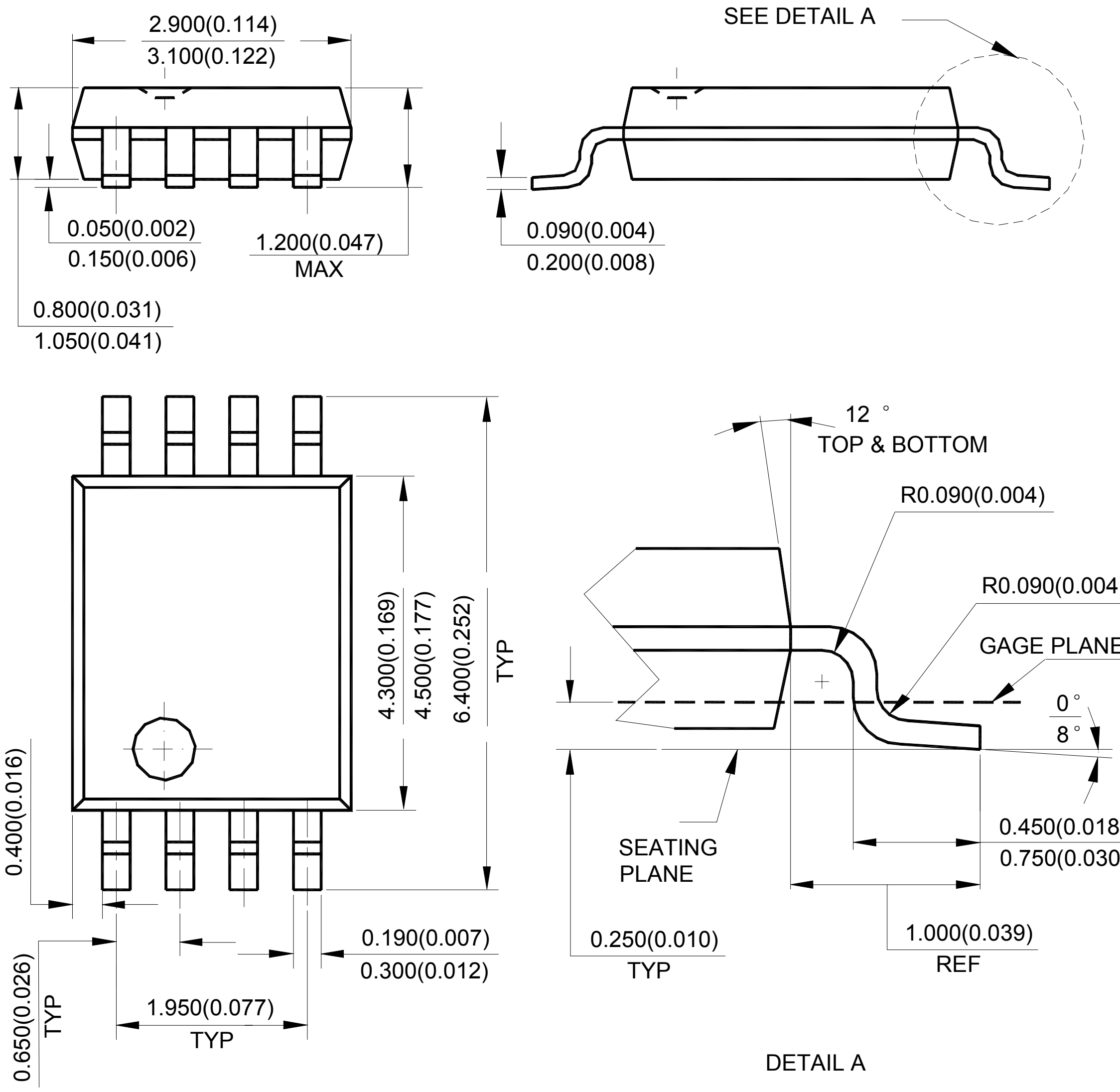
SOIC-8 **Unit: mm(inch)**



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

Mechanical Dimensions (Continued)

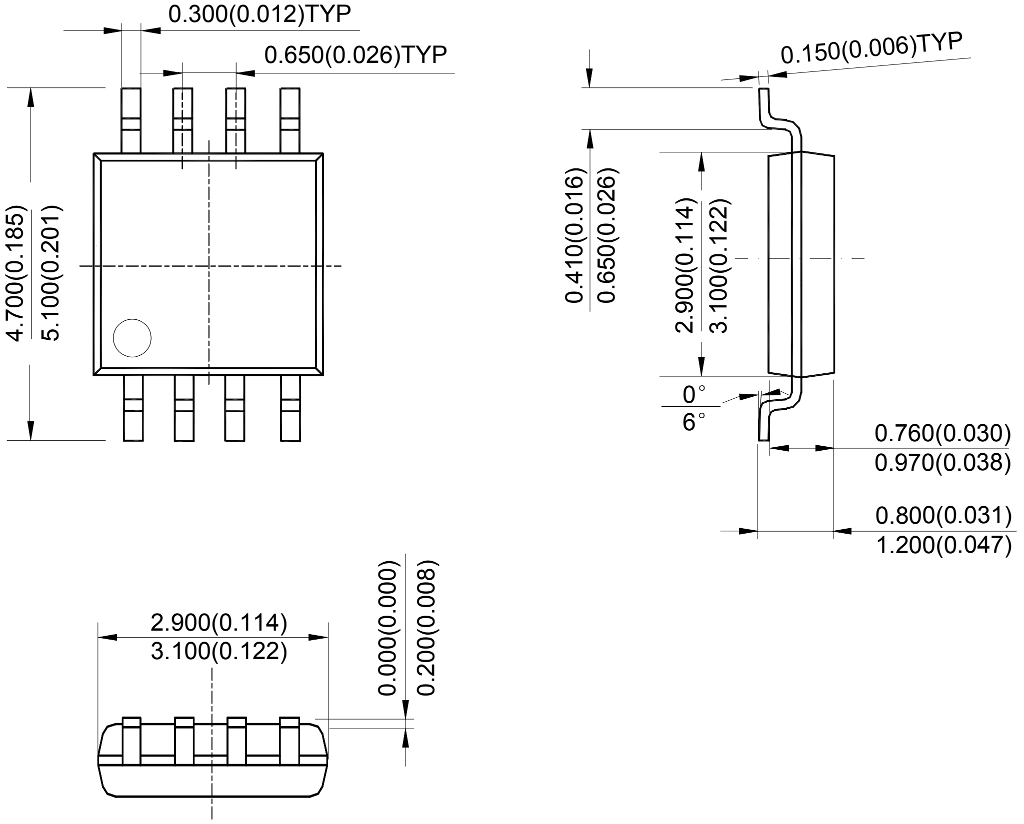
TSSOP-8 **Unit: mm(inch)**



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

Mechanical Dimensions (Continued)

MSOP-8 **Unit: mm(inch)**



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

BCD Semiconductor Manufacturing Limited

http://www.bcdsemi.com

IMPORTANT NOTICE

MAIN SITE

- Headquarters
BCD Semiconductor Manufacturing Limited
No. 1600, Zi Xing Road, Shanghai ZiZhu Science-based Industrial Park, 200241, China
Tel: +86-21-24162266, Fax: +86-21-24162277

- Wafer Fab
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd.
800 Yi Shan Road, Shanghai 200233, China
Tel: +86-21-6485 1491, Fax: +86-21-5450 0008

REGIONAL SALES OFFICE

Shenzhen Office
Shanghai SIM-BCD Semiconductor Manufacturing Co., Ltd., Shenzhen Office
Unit A Room 1203, Skyworth Bldg., Gaoxin Ave.1.S., Nanshan District, Shenzhen, China
Tel: +86-755-8826 7951
Fax: +86-755-8826 7865

Taiwan Office
BCD Semiconductor (Taiwan) Company Limited
4F, 298-1, Rui Guang Road, Nei-Hu District, Taipei, Taiwan
Tel: +886-2-2656 2808
Fax: +886-2-2656 2806

USA Office
BCD Semiconductor Corp.
30920 Huntwood Ave. Hayward, CA 94544, USA
Tel : +1-510-324-2988
Fax: +1-510-324-2788

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

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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_4
moschip.ru_6
moschip.ru_9