



## DESCRIPTION

The A2203 is a Class-AB audio power amplifier designed for mobile phone, MID and other portable communication devices. It is capable of delivering 1.1 watts of continuous average power to an 8Ω BTL load with less than 1% distortion (THD+N) from a 5V<sub>DC</sub> power supply.

The A2203 was designed specifically to provide high quality output power with a minimal amount of external components. It does not require output coupling capacitors or bootstrap capacitors. And with ultra low shutdown current, the A2203 is ideally suited for mobile phone, MID and other low voltage applications where minimal power consumption is a primary requirement.

With special pop-click eliminating circuit, the A2203 provides perfect pop-click characteristic during turn-on and turn-off transitions.

The A2203 is unity-gain stable and can be configured by external gain-setting resistors.

The A2203 is available in MSOP8 and SOP8 packages

## ORDERING INFORMATION

Package Type	Part Number	
MSOP8 SPQ : 3,000pcs/Reel	MS8	A2203MS8R
		A2203MS8VR
SOP8 SPQ : 2,500pcs/Reel	M8	A2203M8R
		A2203M8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products		

## FEATURES

- Improved PSRR at 217 Hz & 1 kHz: 60dB
- Power output at 5.0V, 1% THD+N, 8Ω: 1.1W (typ.)
- Ultra low shutdown current: 0.1uA (typ.)
- 2.2V ~ 5.5V operation
- Improved circuitry eliminates pop-click noise during turn-on and turn-off transitions
- No output coupling capacitors, snubber networks or bootstrap capacitors required
- Unity-gain stable
- External gain configuration capability
- Available in MSOP8 and SOP8 Packages

## APPLICATION

- MID
- Wireless handsets
- Portable electronic devices
- PDAs, Handheld computers

## TYPICAL APPLICATION

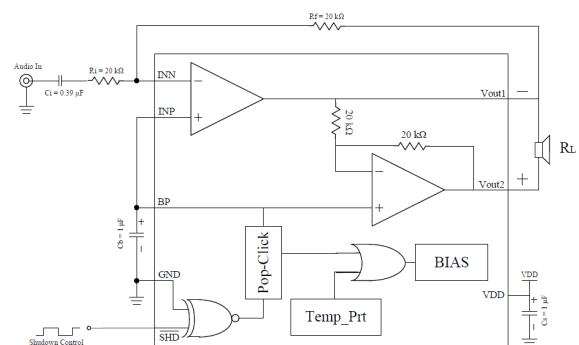
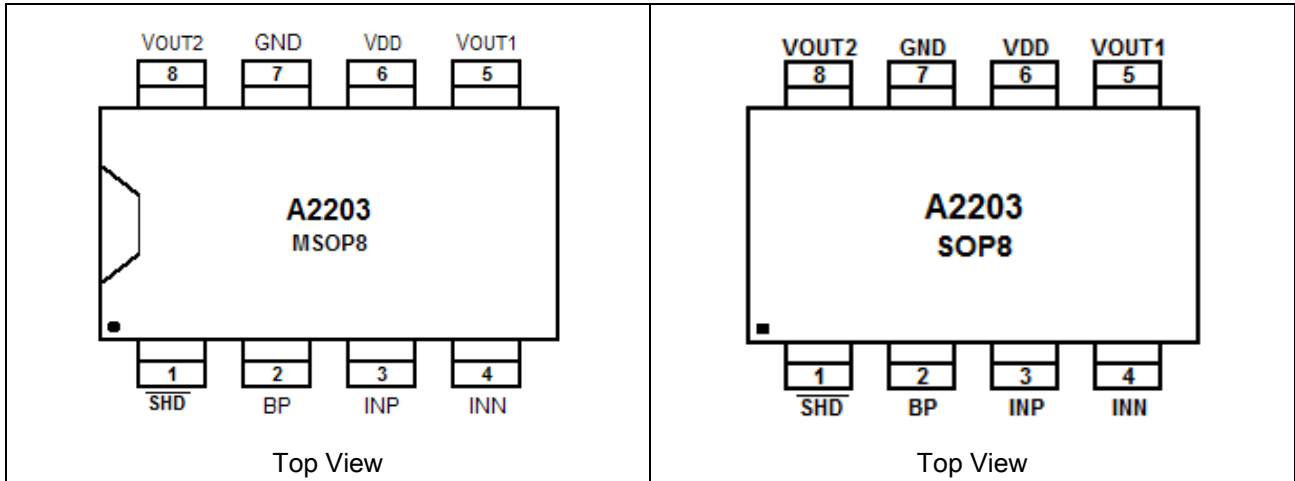


Fig1.



## PIN DESCRIPTION



Pin #	Symbol	I/O	Functions
1	$\overline{\text{SHD}}$	I	Shut-down Logical Control, '0' is active.
2	BP	I/O	Analog ground for inner OPAs. It's about a half of $V_{DD}$ .
3	INP	I	Positive Input
4	INN	I	Negative Input
5	$V_{OUT1}$	O	Negative BTL Output
6	$V_{DD}$	I/O	Power Supply (2.2 ~ 5.5 V)
7	GND	I/O	Ground
8	$V_{OUT2}$	O	Positive BTL Output



## ABSOLUTE MAXIMUM RATINGS

Supply Voltage	-0.3V~6V
Input Voltage	-0.3V~V <sub>DD</sub> +0.3V
Power Dissipation	See Dissipation Rating Table
Junction Temperature	-40°C~+150°C
Storage Temperature	-65°C~+150°C
Thermal Resistance	
$\theta_{JC}$ , MSOP8	56°C/W
$\theta_{JA}$ , MSOP8	190°C/W
$\theta_{JA}$ , SOP8	184°C/W
<b>Operating Ratings</b>	
Temperature Range	-40°C $\leq$ T <sub>A</sub> $\leq$ 85°C
Supply Voltage	2.2V $\leq$ V <sub>DD</sub> $\leq$ 5.5V

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



## ELECTRICAL CHARACTERISTICS

The following specifications apply for the circuit shown in Figure 1, unless otherwise specified.  
Limits apply for  $T_A = 25^\circ\text{C}$ .

$V_{DD} = 5V$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	$I_{DD}$	$V_{IN} = 0V, 8\Omega$ Load	-	3.0	8	mA
		$V_{IN} = 0V$ , No Load	-	2.5	7	mA
Shutdown Current	$I_{SD}$	$V_{IN}=0V, V_{SHD}=GND$ , No Load	-	0.1	2	$\mu\text{A}$
Shutdown Voltage Input High	$V_{SDIH}$		1.2	-	-	V
Shutdown Voltage Input Low	$V_{SDIL}$		-	-	0.9	V
Output Offset Voltage	$V_{OS}$		-50	6	50	mV
Total Harmonic Distortion+Noise	THD+N	$P_{OUT} = 0.5W_{rms}$ , $f=1\text{kHz}$ ,	-	0.07	-	%
Output Power	$P_O$	THD+N $\leq 1\%$ , $f=1\text{kHz}$ , $8\Omega$ Load	0.9	1.1	-	W
Power Supply Rejection Ratio	PSRR	Input terminated with $10\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=217\text{Hz}$	-	60	-	dB
		Input terminated with $10\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=1\text{kHz}$	-	61	-	dB
Wake-up time	$t_{WU}$		-	100	-	ms

$V_{DD} = 3V$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	$I_{DD}$	$V_{IN} = 0V, 8\Omega$ Load	-	2	7	mA
		$V_{IN} = 0V$ , No Load	-	1.5	6	mA
Shutdown Current	$I_{SD}$	$V_{IN}=0V, V_{SHD}=GND$ , No Load	-	0.1	2	$\mu\text{A}$
Shutdown Voltage Input High	$V_{SDIH}$		1.0	-	-	V
Shutdown Voltage Input Low	$V_{SDIL}$		-	-	0.7	V
Output Offset Voltage	$V_{OS}$		-50	6	50	mV
Total Harmonic Distortion+Noise	THD+N	$P_{OUT} = 0.25W_{rms}$ , $f=1\text{kHz}$ ,	-	0.08	-	%
Output Power	$P_O$	THD+N $\leq 1\%$ , $f=1\text{kHz}$ , $8\Omega$ Load	-	310	-	mW
Power Supply Rejection Ratio	PSRR	Input terminated with $10\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=217\text{Hz}$	-	57	-	dB
		Input terminated with $10\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=1\text{kHz}$	-	58	-	dB
Wake-up time	$t_{WU}$		-	75	-	ms



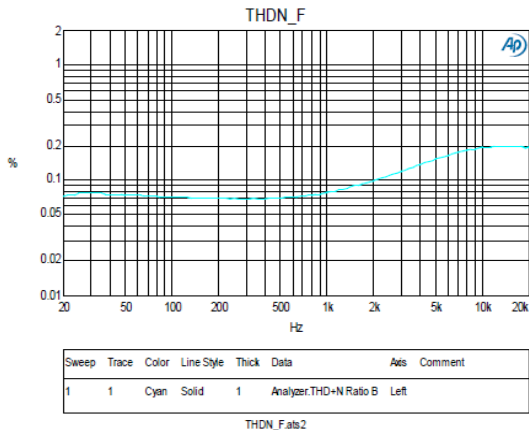
V<sub>DD</sub> = 2.6V

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Quiescent Power Supply Current	I <sub>DD</sub>	V <sub>IN</sub> = 0V, 8Ω Load	-	1.7	-	mA
		V <sub>IN</sub> = 0V, No Load	-	1.2	-	mA
Shutdown Current	I <sub>SD</sub>	V <sub>IN</sub> =0V, V <sub>SHD</sub> =GND, No Load	-	0.1	-	uA
Shutdown Voltage Input High	V <sub>SDIH</sub>		1.0	-	-	V
Shutdown Voltage Input Low	V <sub>SDIL</sub>		-	-	0.7	V
Output Offset Voltage	V <sub>OS</sub>		-50	4	50	mV
Total Harmonic Distortion+Noise	THD+N	P <sub>OUT</sub> =0.15Wrms, f=1kHz,	-	0.08	-	%
Output Power	P <sub>O</sub>	THD+N<=1%, f=1kHz, 8Ω Load	-	230	-	mW
Power Supply Rejection Ratio	PSRR	Input terminated with 10Ω, V <sub>DD</sub> RIPPLE=0.2V <sub>P-P</sub> , f=217Hz	-	56	-	dB
		Input terminated with 10Ω, V <sub>DD</sub> RIPPLE=0.2V <sub>P-P</sub> , f=1kHz	-	57	-	dB
Wake-up time	t <sub>WU</sub>		-	70	-	ms

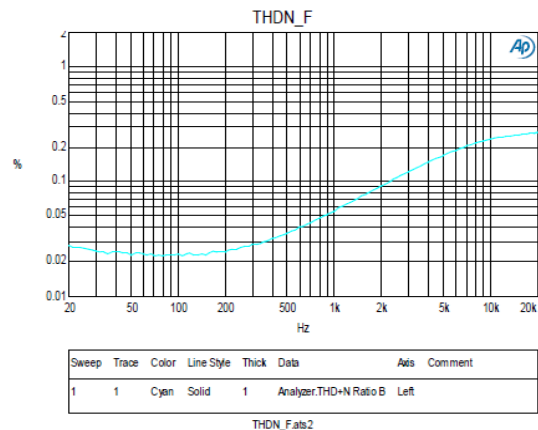


**TYPICAL PERFORMANCE CHARACTERISTICS**

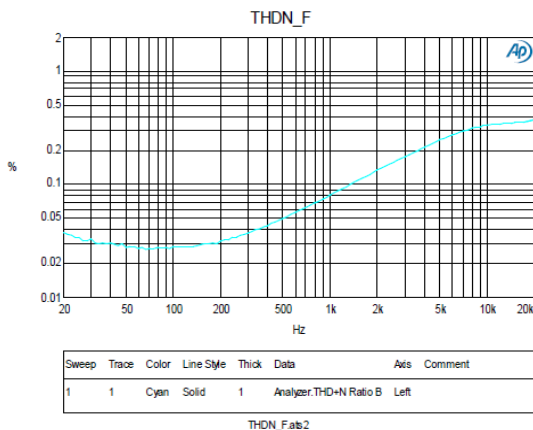
1. THDN vs. Frequency  
 $V_{DD}=5V$   $R_L=8\Omega$   $P_O=500mW$



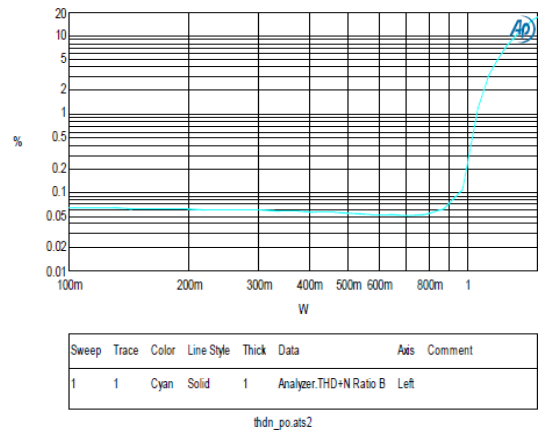
2. THDN vs. Frequency  
 $V_{DD}=3V$   $R_L=8\Omega$   $P_O=250mW$



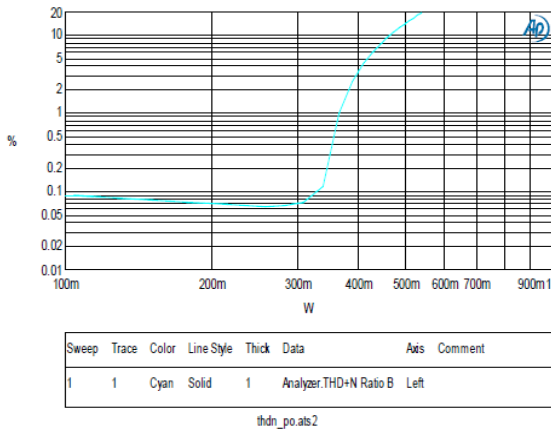
3. THDN vs. Frequency  
 $V_{DD}=2.6V$   $R_L=8\Omega$   $P_O=150mW$



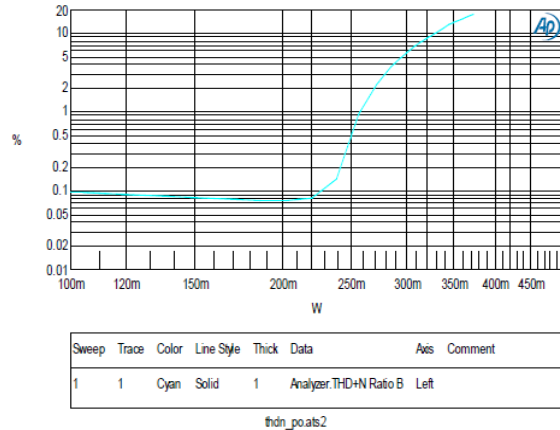
4. THDN vs. Frequency  
 $V_{DD}=5V$   $R_L=8\Omega$   $f=1kHz$



5. THDN vs. Output Power  
 $V_{DD}=3V$   $R_L=8\Omega$   $f=1kHz$

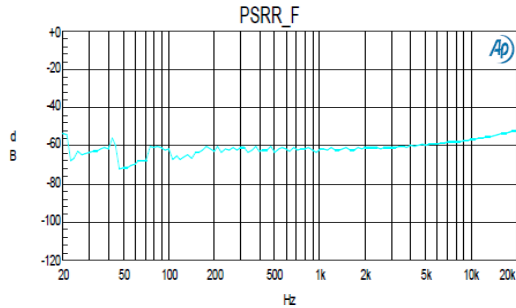


6. THDN vs. Output Power  
 $V_{DD}=2.6V$   $R_L=8\Omega$   $f=1kHz$





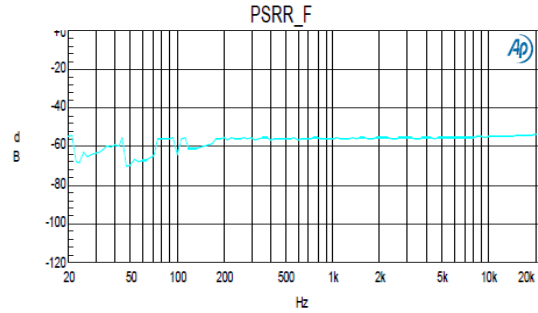
7. PSRR vs. Frequency  
 $V_{DD}=5V$   $R_L=8\Omega$



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer.Crosstalk B	Left	

psrr\_fats2

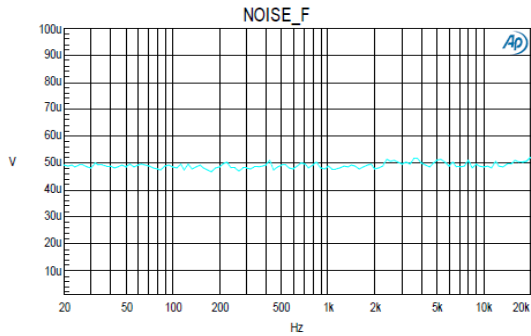
8. PSRR vs. Frequency  
 $V_{DD}=3V$   $R_L=8\Omega$



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer.Crosstalk B	Left	

psrr\_fats2

9. Noise Floor 20kBW  
 $V_{DD}=5V$   $R_L=8\Omega$



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer.Amplitude B	Left	

NOISE\_Fats2



**DETAILED INFORMATION**

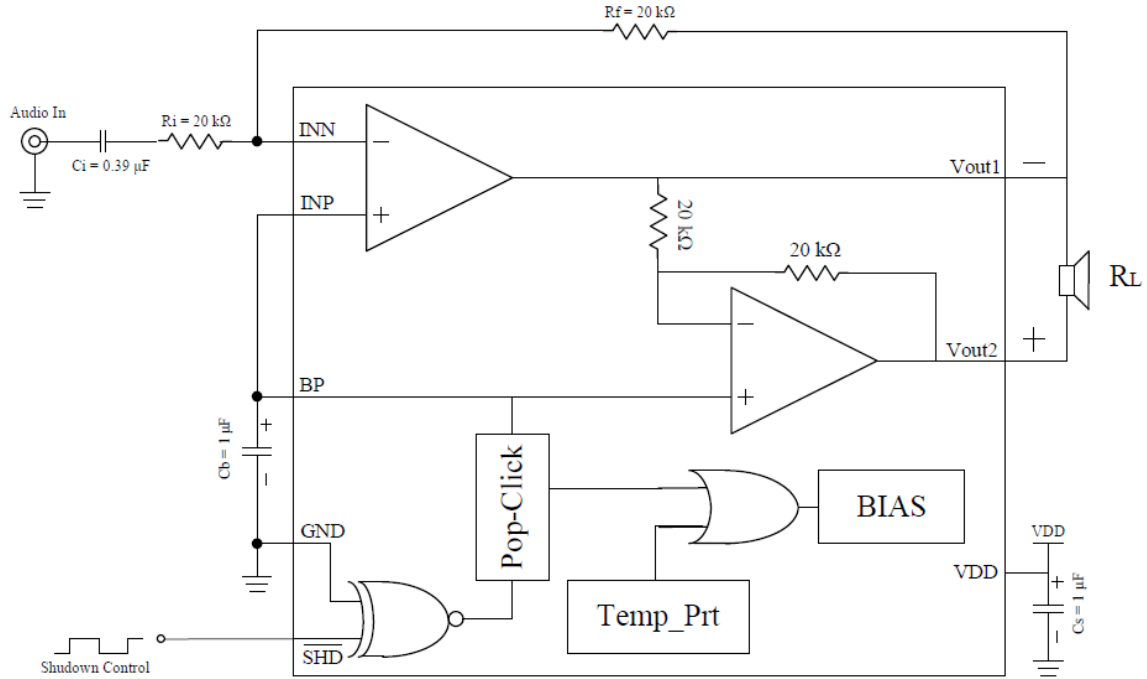


Figure. 1 A2203 Typical Application Circuit

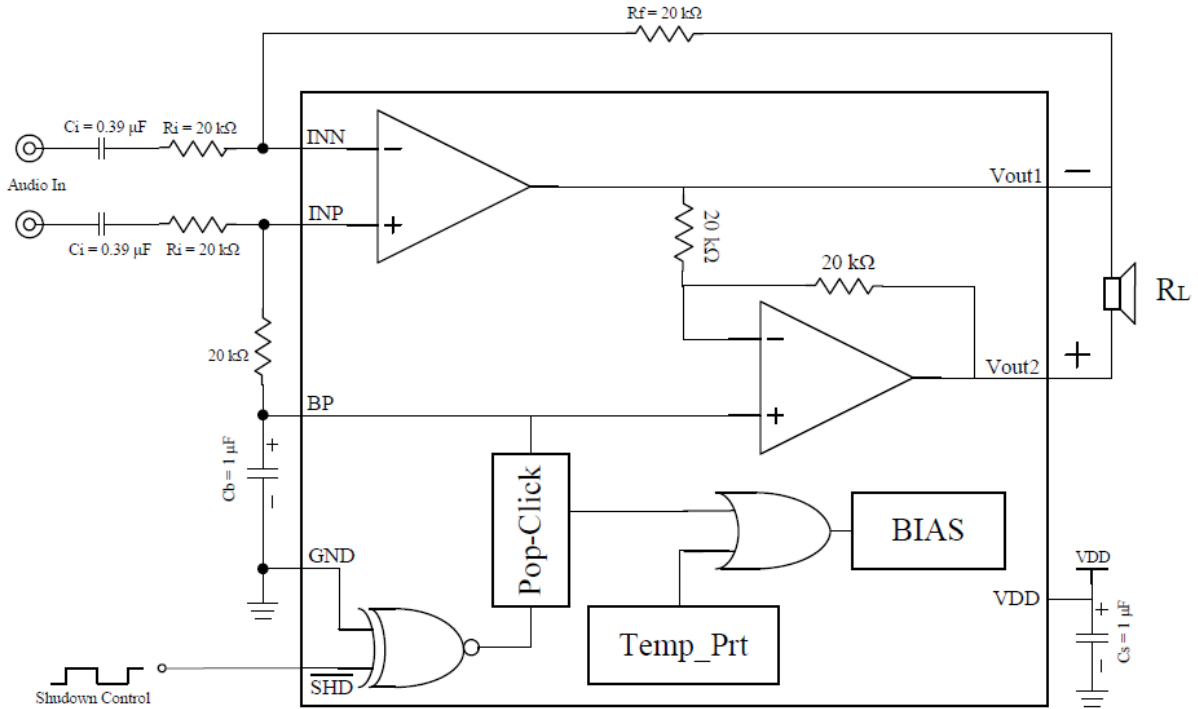


Figure. 2 A2203 Differential Amplifier Configuration





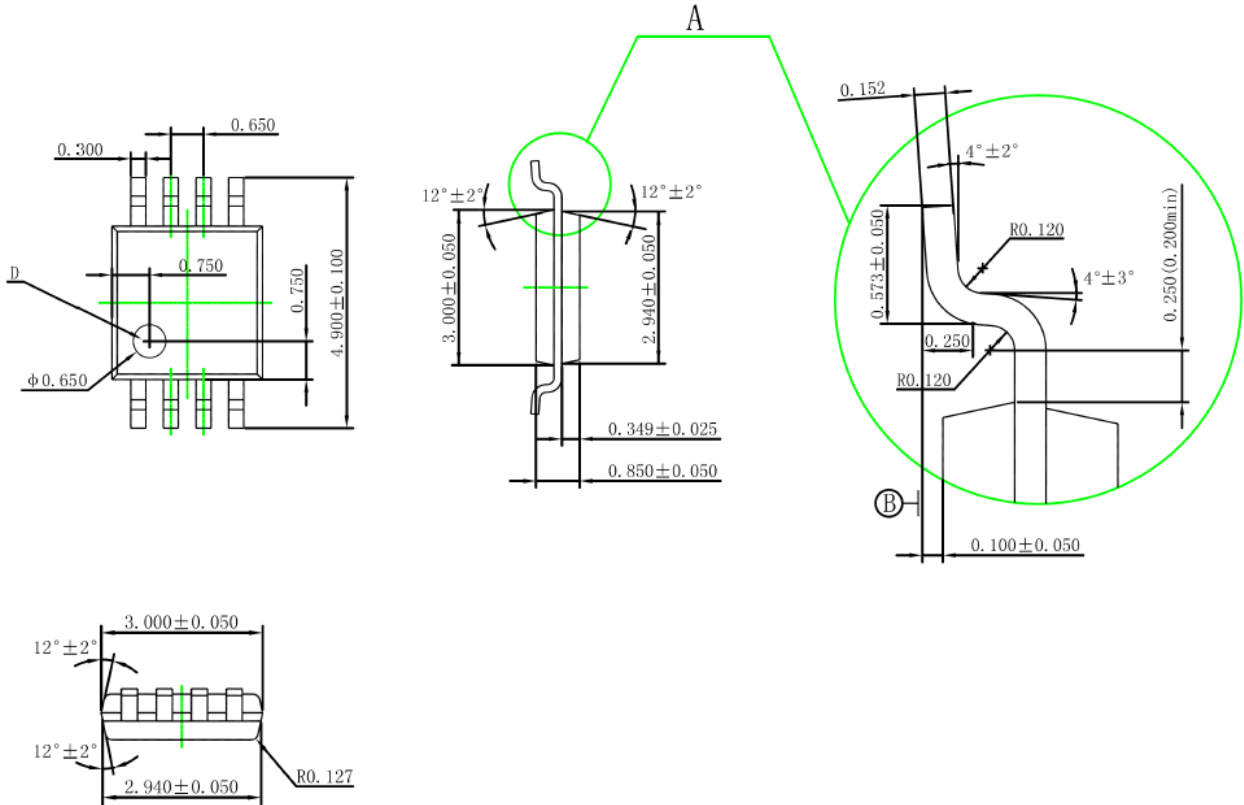
### External Components Description

Components	Functional Description
Ri	Inverting input resistance which sets the closed-loop gain in conjunction with Rf. This resistor also forms a high pass filter with Ci at $f_c = 1/(2\pi R_i C_i)$ .
Ci	Input coupling capacitor which blocks the DC voltage at the amplifiers input terminates. Also creates a high-pass filter with Ri at $f_c = 1/(2\pi R_i C_i)$ ..
Rf	Feedback resistance which sets the closed-loop gain in conjunction with Ri. The gain is $A_{VD} = 2 * (R_f / R_i)$ .
Cs	Supply bypass capacitor which provides power supply filtering.
Cb	Bypass pin capacitor which provides half-supply filtering. Refer to the section.



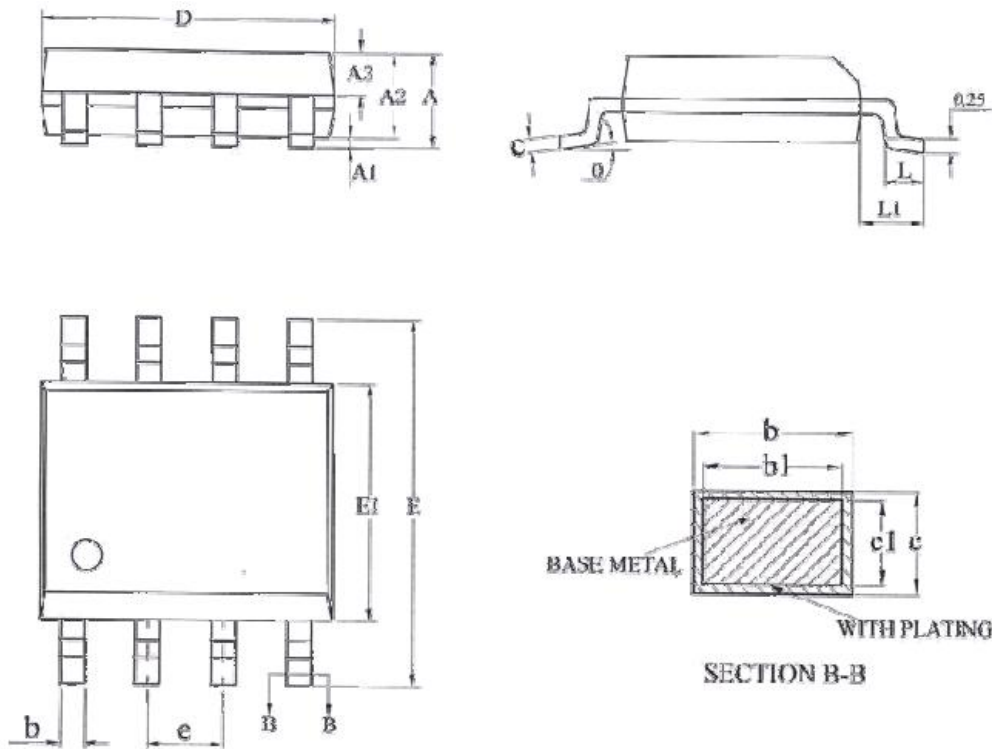
**PACKAGE INFORMATION**

Dimension in MSOP8 (Unit: mm)





Dimension in SOP8 (Unit: mm)



Symbol	Min	Max
A	-	1.770
A1	0.080	0.280
A2	1.200	1.600
A3	0.550	0.750
b	0.390	0.480
b1	0.380	0.430
c	0.210	0.260
c1	0.190	0.210
D	4.700	5.100
E	5.800	6.200
E1	3.700	4.100
e	1.270(BSC)	
L	0.500	0.800
L1	1.050(BSC)	
$\theta$	0°	8°



## IMPORTANT NOTICE

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