

## 1.7 Watt Audio Power Amplifier

### Features

- Improved PSRR at 217 Hz & 1 KHz 60 dB
- Power output at 5.0V, 10%THD+N, 4  $\Omega$  (SOP8 package) 1.7W(typ.)
- Power output at 5.0V, 1% THD+N, 8 $\Omega$  1.1 W (typ.)
- Ultra low shutdown current 0.1 uA (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
- Packages: MSOP8、SOP8

### General Description

The BL6281 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 8 $\Omega$  BTL load with less than 1% distortion (THD+N) from a 5V<sub>DC</sub> power supply.

The BL6281 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 BL6281 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 BL6281 provides perfect pop-click characteristic during turn-on and turn-off transitions.

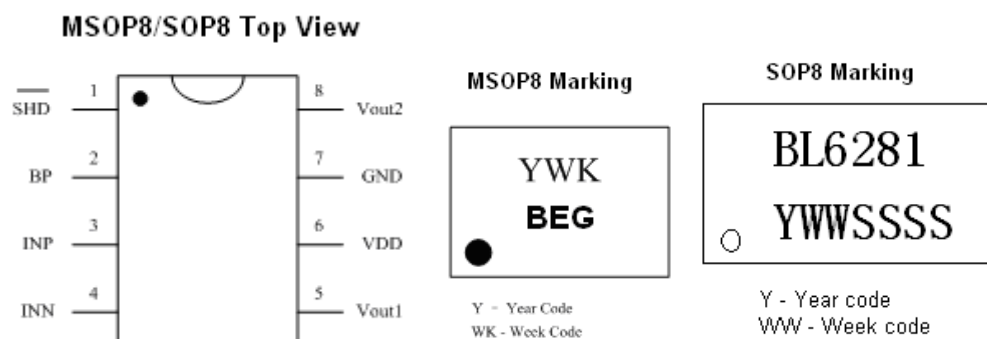
The BL6281 is unity-gain stable and can be configured by external gain-setting resistors.

### Applications

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

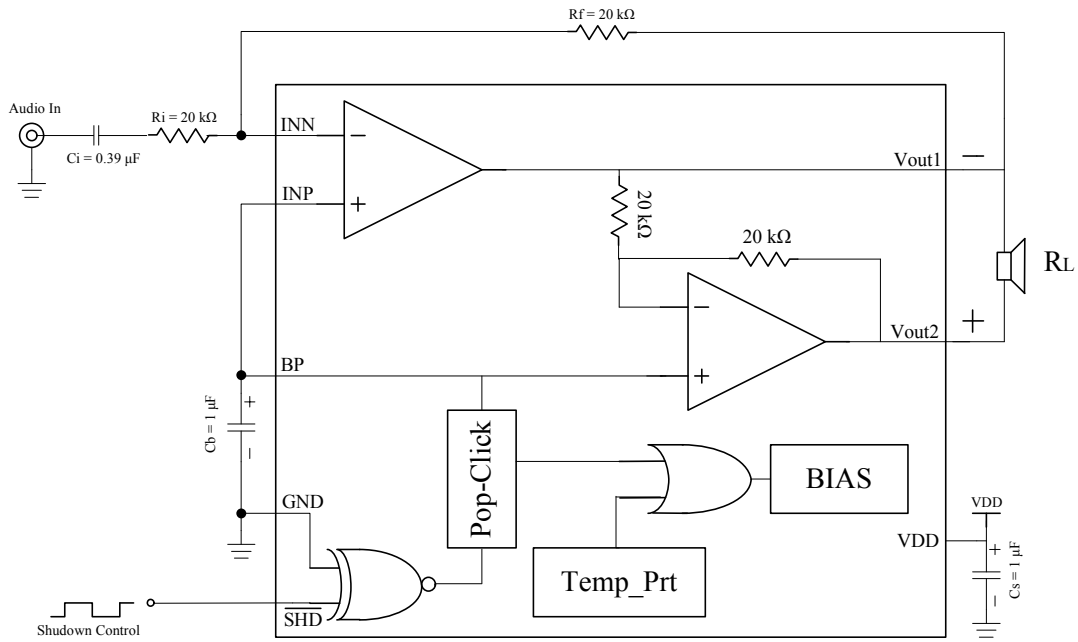
**Order Information**

Part Number	Package	MOQ
BL6281MM	MSOP8	3000 pcs / Tape & Reel
BL6281SO-R	SOP8	2500 pcs / Tape & Reel
BL6281SO-T	SOP8	20000pcs / Tube

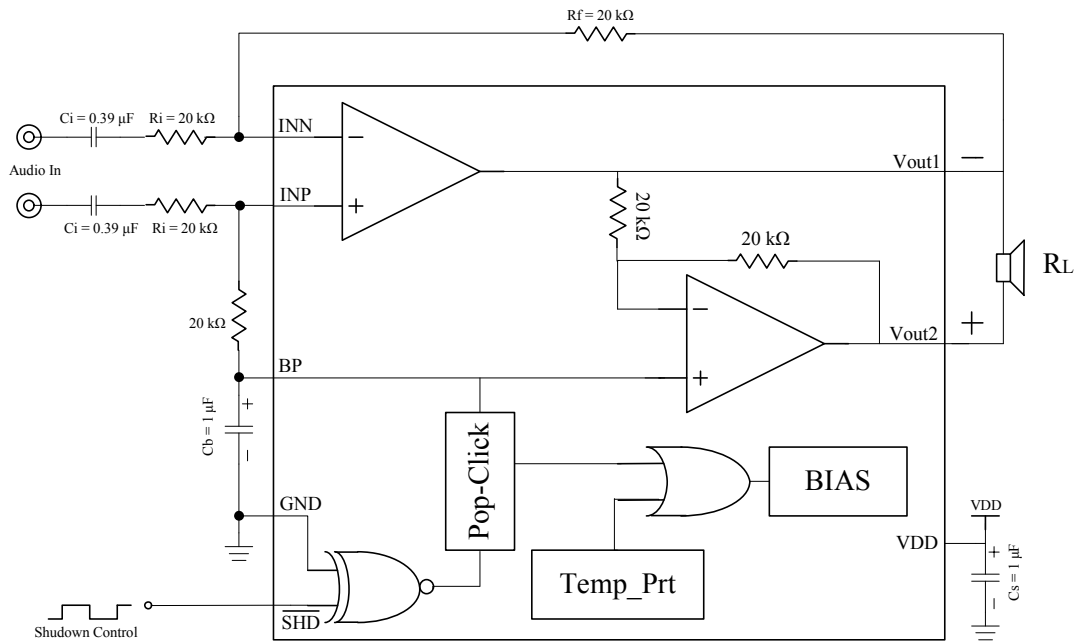
**Pin Diagrams**

**Pin Description**

No.	Pin Name	I/O	Description
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 VDD.
3	INP	I	Positive Input
4	INN	I	Negative Input
5	Vout1	O	Negative BTL Output
6	VDD	I/O	Power Supply (2.2 – 5.5 V)
7	GND	I/O	Ground
8	Vout2	O	Positive BTL Output

**Typical Application Circuit**



**FIGURE 1. BL6281 Typical Application Circuit**



**FIGURE 2. BL6281 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.

### Absolute Maximum Ratings

Supply Voltage                      -0.3V to 6V  
 Input Voltage                      -0.3V to VDD+0.3V  
 Power Dissipation

See Dissipation Rating Table

Junction Temperature           -40°C to +150°C

Storage Temperature           -65°C to +150°C

Thermal Resistance

$\theta_{JC}(\text{MSOP8})$	56°C/W
$\theta_{JA}(\text{MSOP8})$	190°C/W
$\theta_{JA}(\text{SOP8})$	184°C/W

### Operating Ratings

Temperature Range              -40°C  $\leq$  T<sub>A</sub>  $\leq$  85°C

Supply Voltage                    2.2V  $\leq$  V<sub>DD</sub>  $\leq$  5.5V

**NOTE:** Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.  
Operating Rating indicate conditions for which the device is functional, but do not guarantee specific performance limits.

### Electrical Characteristics

The following specifications apply for the circuit shown in Figure 1, unless otherwise specified. Limits apply for T<sub>A</sub> = 25°C.

□ V<sub>DD</sub> = 5V

Symbol	Parameter	Conditions	Spec			Units
			Min.	Typ.	Max.	
I <sub>DD</sub>	Quiescent Power Supply Current	V <sub>IN</sub> = 0V, 8Ω Load		3.0	8	mA
		V <sub>IN</sub> = 0V, No Load		2.5	7	mA
I <sub>SD</sub>	Shutdown Current	V <sub>IN</sub> =0V, V <sub>SHD</sub> =GND, No Load		0.1	2	uA
V <sub>SDIH</sub>	Shutdown Voltage Input High		1.2			V

$V_{SDIL}$	Shutdown Voltage Input Low				0.9	V
$V_{OS}$	Output Offset Voltage		-50	6	50	mV
THD+N	Total Harmonic Distortion+Noise	$P_o=0.5W_{rms}$ , $f=1KHz$ ,		0.07		%
$P_o$	Output Power	THD+N $\leq$ 1%, $f=1KHz$ , 8 $\Omega$ Load	0.9	1.1		W
PSRR	Power Supply Rejection Ratio	Input terminated with 10 $\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=217Hz$		60		dB
		Input terminated with 10 $\Omega$ , $V_{DDRIPPLE}=0.2V_{P-P}$ , $f=1KHz$		61		dB
$T_{WU}$	Wake-up time			100		ms

**□  $V_{DD} = 3V$** 

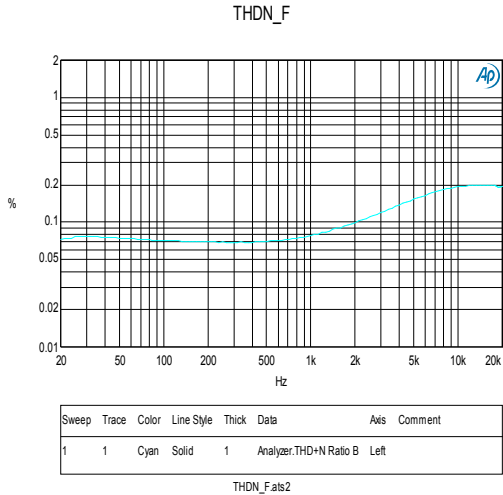
Symbol	Parameter	Conditions	Spec			Units
			Min.	Typ.	Max.	
$I_{DD}$	Quiescent Power Supply Current	$V_{IN} = 0V$ , 8 $\Omega$ Load		2	7	mA
		$V_{IN} = 0V$ , No Load		1.5	6	mA
$I_{SD}$	Shutdown Current	$V_{IN}=0V$ , $V_{SHD}=GND$ , No Load		0.1	2	$\mu A$
$V_{SDIH}$	Shutdown Voltage Input High		1.0		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

**□  $V_{DD} = 2.6V$** 

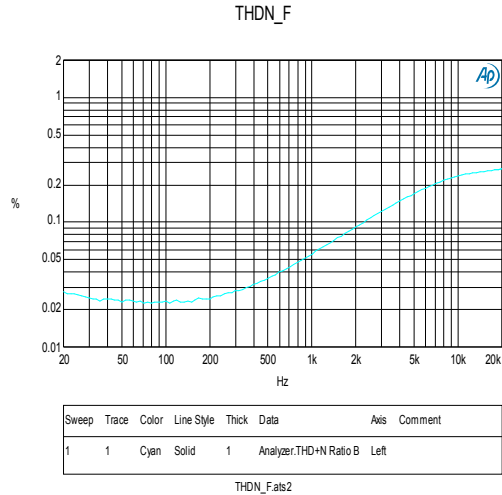
Symbol	Parameter	Conditions	Spec			Units
			Min.	Typ.	Max.	
$I_{DD}$	Quiescent Power Supply Current	$V_{IN} = 0V$ , 8 $\Omega$ Load		1.7		mA
		$V_{IN} = 0V$ , No Load		1.2		mA
$I_{SD}$	Shutdown Current	$V_{IN}=0V$ , $V_{SHD}=GND$ , No Load		0.1		$\mu A$
$V_{SDIH}$	Shutdown Voltage Input High		1.0			V
$V_{SDIL}$	Shutdown Voltage Input Low				0.7	V
$V_{OS}$	Output Offset Voltage		-50	4	50	mV
THD+N	Total Harmonic Distortion+Noise	$P_o=0.15W_{rms}$ , $f=1KHz$ ,		0.08		%
$P_o$	Output Power	THD+N $\leq$ 1%, $f=1KHz$ , 8 $\Omega$ Load		230		mW
PSRR	Power Supply Rejection Ratio	Input terminated with 10 $\Omega$ ,		56		dB

		$V_{DDRIPPLE}=0.2V_{P-P}$ , $f=217\text{Hz}$			
		Input terminated with $10\Omega$ ,		57	dB
		$V_{DDRIPPLE}=0.2V_{P-P}$ , $f=1\text{KHz}$			
$T_{WU}$	Wake-up time			70	ms

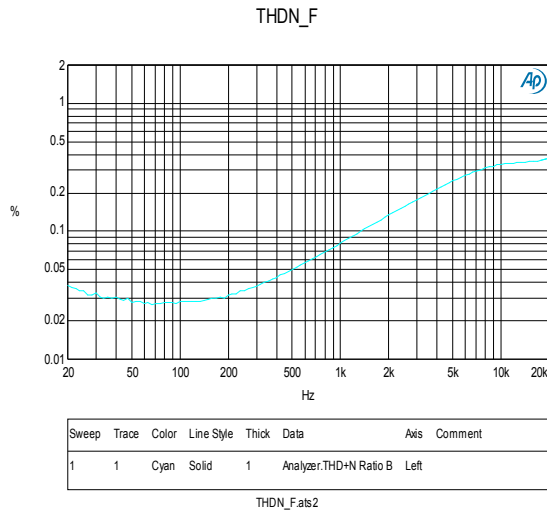
**Typical Performance Characteristics**



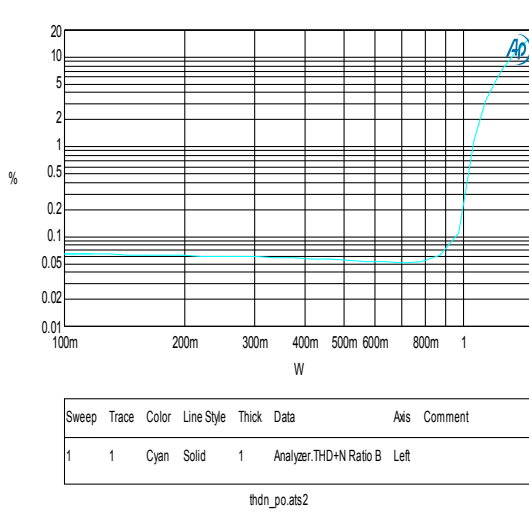
THDN vs Frequency  
VDD=5V RL=8Ω PO=500 mW



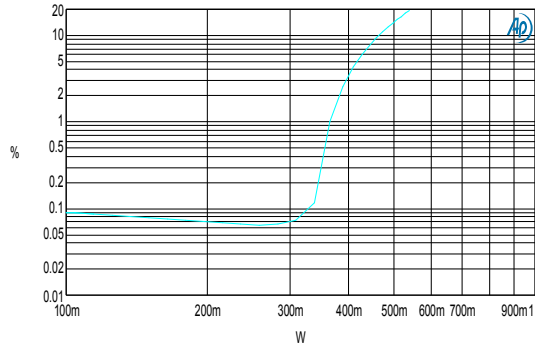
THDN vs Frequency  
VDD=3V RL=8Ω PO=250mW



THDN vs Frequency  
VDD=2.6V RL=8Ω PO=150 mW



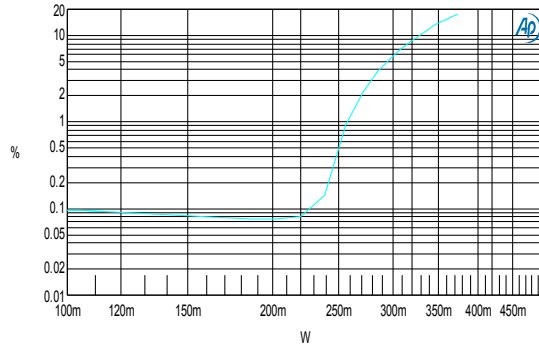
THDN vs Output Power  
VDD=5V RL=8Ω F=1KHz



Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:THD+N Ratio B	Left	

thdn\_po.ats2

THDN vs Output Power  
VDD=3V RL=8Ω F=1KHz

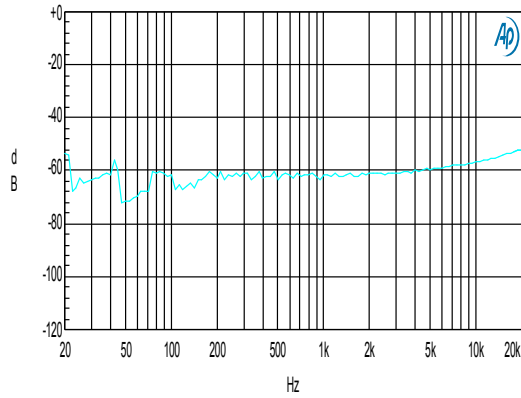


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:THD+N Ratio B	Left	

thdn\_po.ats2

THDN vs Output Power  
VDD=2.6V RL=8Ω F=1KHz

PSRR\_F

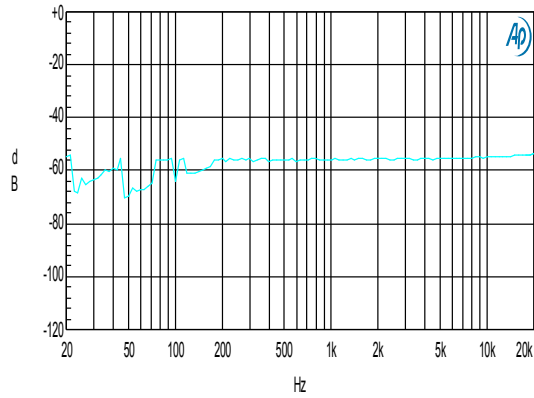


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:Crosstalk B	Left	

psrr\_f.ats2

PSRR vs Frequency  
VDD=5V RL=8Ω

PSRR\_F

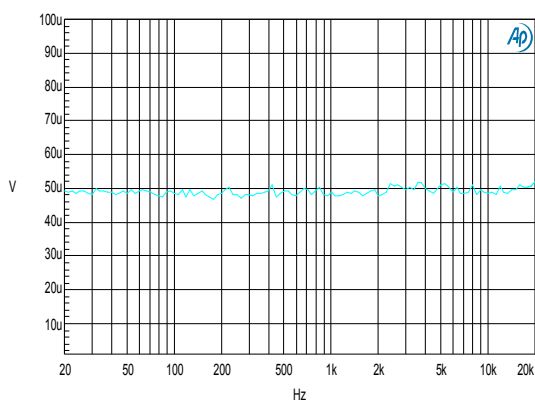


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:Crosstalk B	Left	

psrr\_f.ats2

PSRR vs Frequency  
VDD=3V RL=8Ω

NOISE\_F



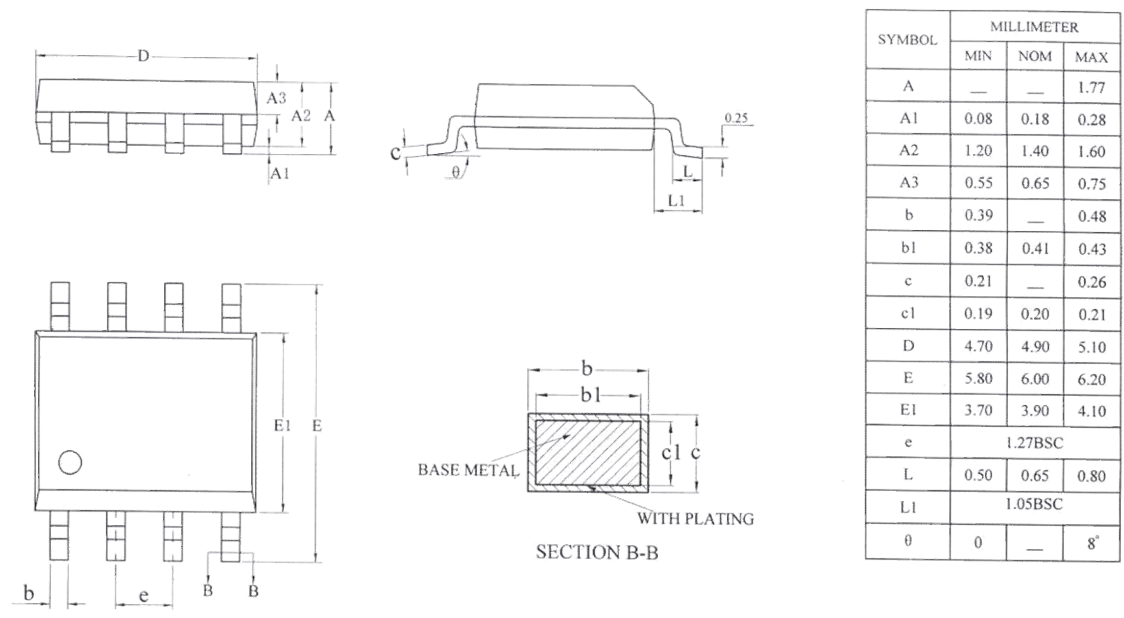
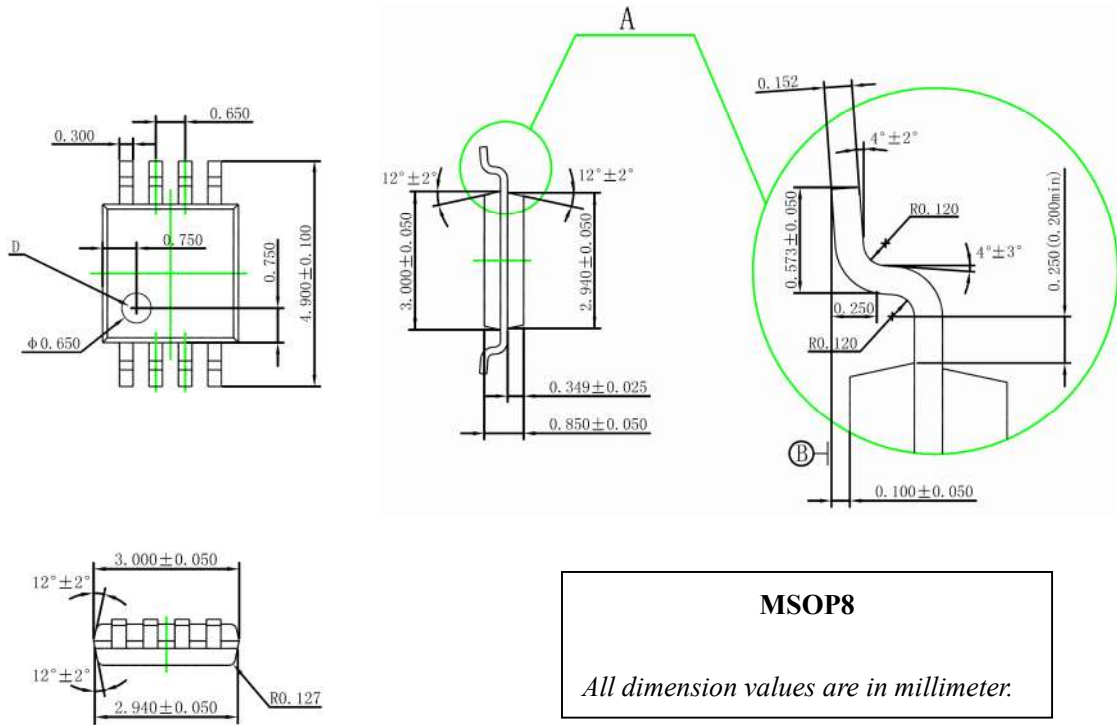
Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer,Amplitude B	Left	

NOISE\_F:ats2

**Noise Floor 20KBW**  
**VDD=5V RL=8Ω**



**Package Dimensions**



**SOP8**