

## 1.1 Watt Audio Power Amplifier

### Features

- Improved PSRR at 217 Hz & 1 KHz      60 dB
- Power output at 5.0V, 1% THD+N, 8Ω      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 8Ω 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.

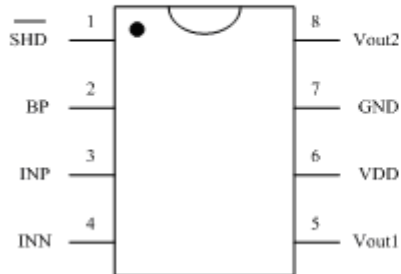
With special pop-click eliminating circuit, the BL6281 provides perfect pop-click characteristic during turn-on and turn-off transitions.

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

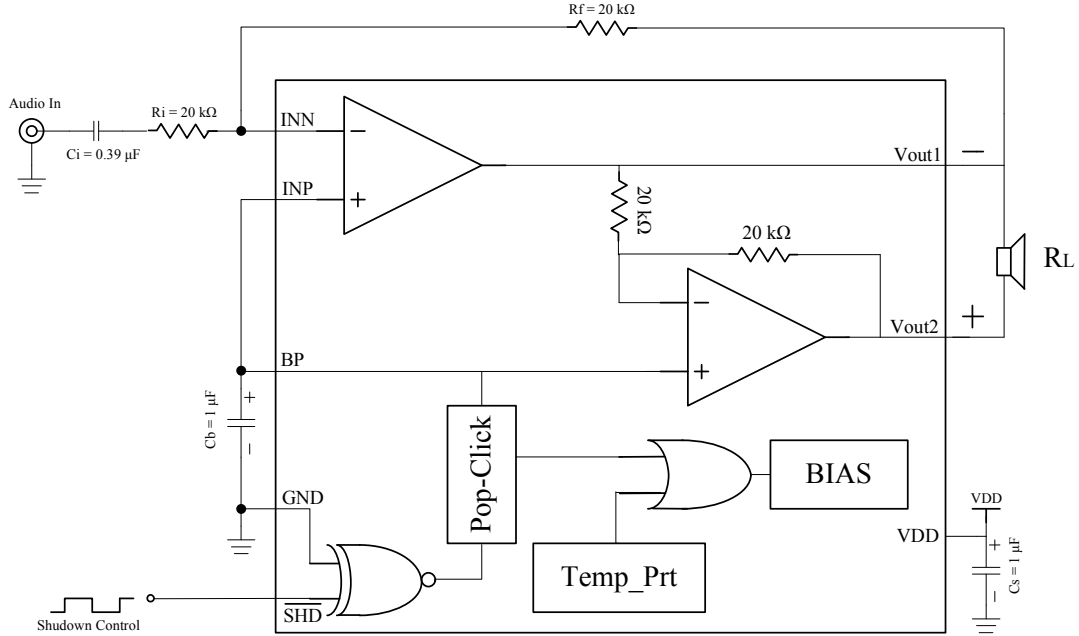
## Pin Diagrams

 Mini Small Outline Package (MSOP8/SOP8)  
 (Top View)

 MSOP8/SOP8 Marking  
 (Top View)

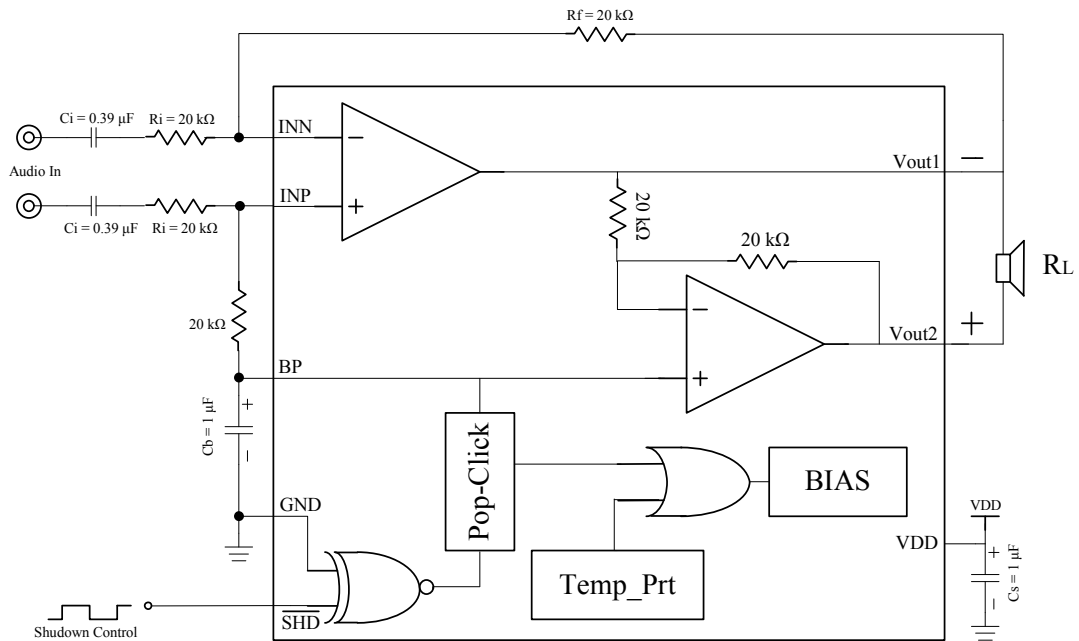

## Pin Description

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	
$\theta_{JC}$ (MSOP8)	56°C/W
$\theta_{JA}$ (MSOP8)	190°C/W
$\theta_{JA}$ (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 <sub>SDIL</sub>	Shutdown Voltage Input Low				0.9	V
V <sub>OS</sub>	Output Offset Voltage		-50	6	50	mV
THD+N	Total Harmonic Distortion+Noise	P <sub>o</sub> =0.5Wrms, f=1KHz,		0.07		%
P <sub>O</sub>	Output Power	THD+N<=1%, f=1KHz, 8Ω Load	0.9	1.1		W
PSRR	Power Supply Rejection Ratio	Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=217Hz		60		dB
		Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=1KHz		61		dB
T <sub>WU</sub>	Wake-up time			100		ms

**□ V<sub>DD</sub> = 3V**

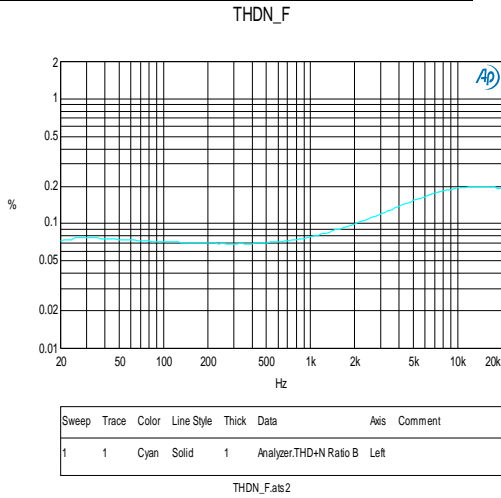
Symbol	Parameter	Conditions	Spec			Units
			Min.	Typ.	Max.	
I <sub>DD</sub>	Quiescent Power Supply Current	V <sub>IN</sub> = 0V, 8Ω Load		2	7	mA
		V <sub>IN</sub> = 0V, No Load		1.5	6	mA
I <sub>SD</sub>	Shutdown Current	V <sub>IN</sub> =0V, V <sub>SHD</sub> =GND, No Load		0.1	2	uA
V <sub>SDIH</sub>	Shutdown Voltage Input High		1.0			V
V <sub>SDIL</sub>	Shutdown Voltage Input Low				0.7	V
V <sub>OS</sub>	Output Offset Voltage		-50	6	50	mV
THD+N	Total Harmonic Distortion+Noise	P <sub>o</sub> =0.25Wrms, f=1KHz,		0.08		%
P <sub>O</sub>	Output Power	THD+N<=1%, f=1KHz, 8Ω Load		310		mW
PSRR	Power Supply Rejection Ratio	Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=217Hz		57		dB
		Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=1KHz		58		dB
T <sub>WU</sub>	Wake-up time			75		ms

**□ V<sub>DD</sub> = 2.6V**

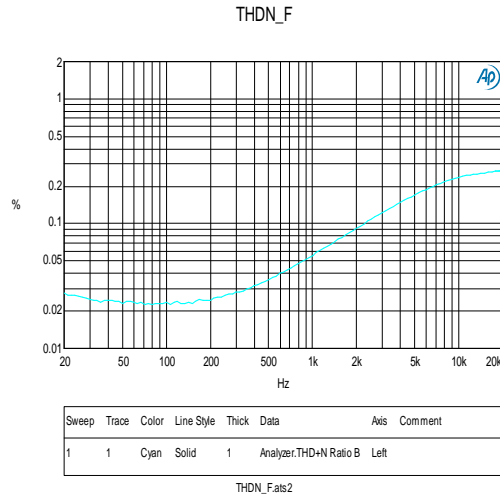
Symbol	Parameter	Conditions	Spec			Units
			Min.	Typ.	Max.	
I <sub>DD</sub>	Quiescent Power Supply Current	V <sub>IN</sub> = 0V, 8Ω Load		1.7		mA
		V <sub>IN</sub> = 0V, No Load		1.2		mA
I <sub>SD</sub>	Shutdown Current	V <sub>IN</sub> =0V, V <sub>SHD</sub> =GND, No Load		0.1		uA
V <sub>SDIH</sub>	Shutdown Voltage Input High		1.0			V
V <sub>SDIL</sub>	Shutdown Voltage Input Low				0.7	V
V <sub>OS</sub>	Output Offset Voltage		-50	4	50	mV
THD+N	Total Harmonic Distortion+Noise	P <sub>o</sub> =0.15Wrms, f=1KHz,		0.08		%
P <sub>O</sub>	Output Power	THD+N<=1%, f=1KHz, 8Ω Load		230		mW

PSRR	Power Supply Rejection Ratio	Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=217Hz	56		dB
		Input terminated with 10Ω, V <sub>DDRIPPLE</sub> =0.2V <sub>P-P</sub> , f=1KHz	57		dB
T <sub>WU</sub>	Wake-up time		70		ms

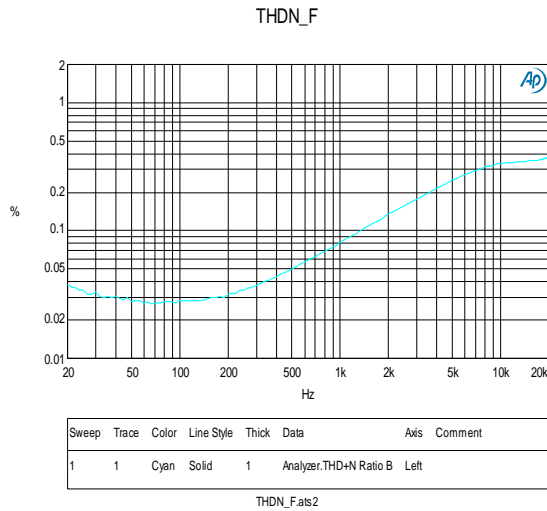
**Typical Performance Characteristics**



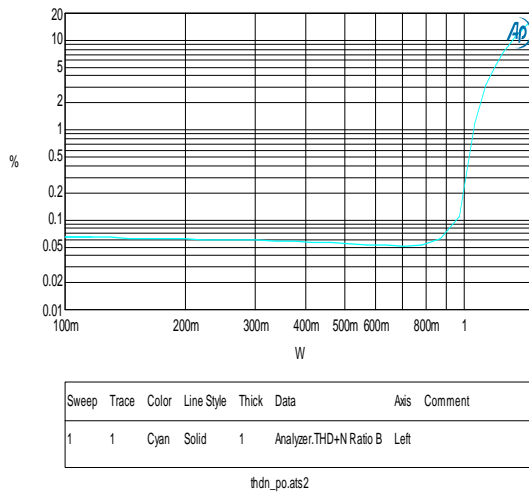
**THDN vs Frequency**  
VDD=5V RL=8Ω PO=500 mW



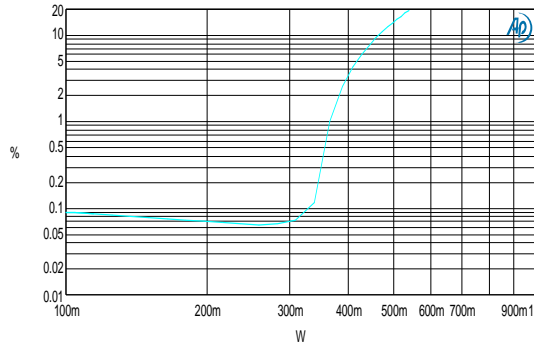
**THDN vs Frequency**  
VDD=3V RL=8Ω PO=250mW



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



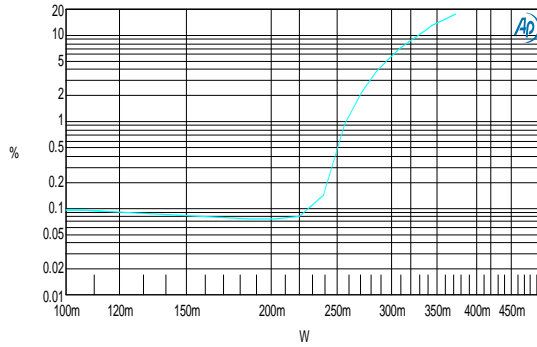
**THDN vs Output Power**  
VDD=5V RL=8Ω F=1KHz



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

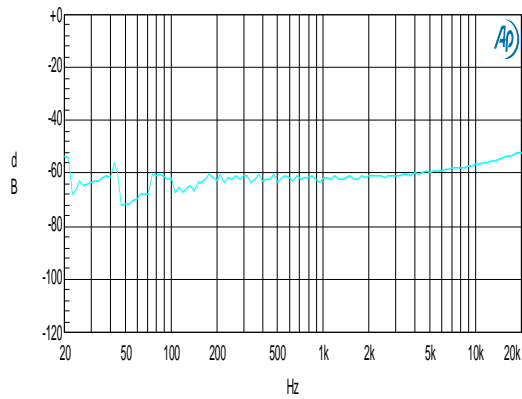


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:THD+N Ratio B	Left	

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

**PSRR\_F**

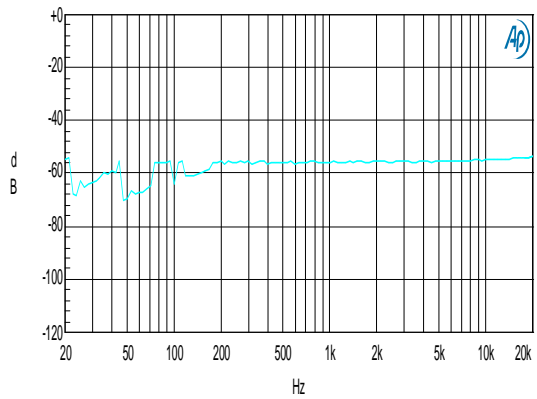


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:Crosstalk B	Left	

psrr\_f.ats2

**PSRR vs Frequency**  
VDD=5V RL=8Ω

**PSRR\_F**

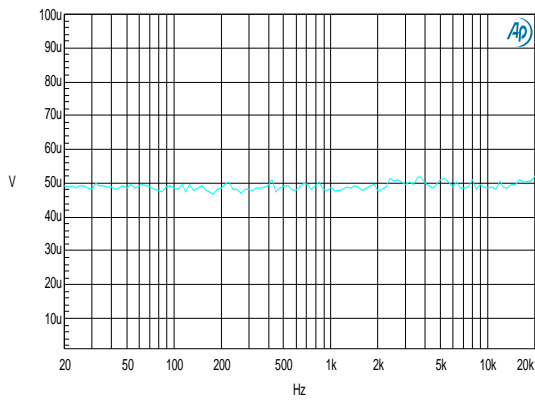


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Cyan	Solid	1	Analyzer:Crosstalk B	Left	

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	

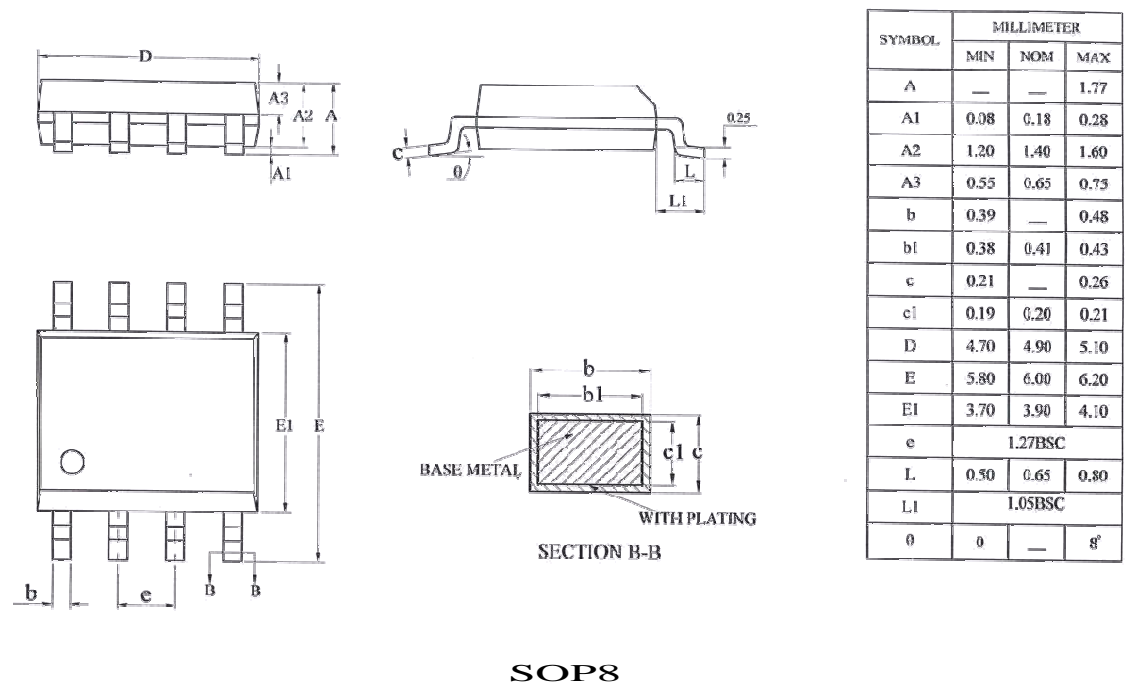
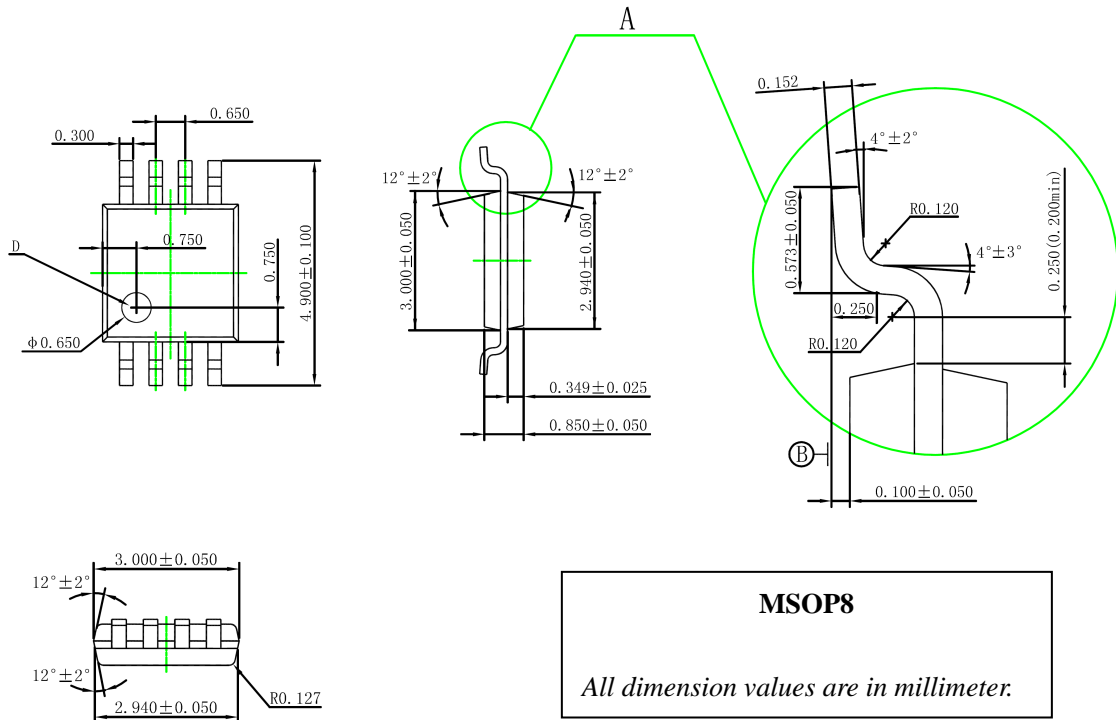
NOISE\_F:ats2

**Noise Floor 20KBW**

**VDD=5V RL=8Ω**



**Package Dimensions**



**SOP8**