



DESCRIPTION

The A2327 is a 2.6W high efficiency filter-free class-D audio power amplifier that requires only three external components.

Features like 88% efficiency, -75dB PSRR, and improved RF-rectification immunity make the A2327 ideal for cellular handsets. In cellular handsets, the earpiece, speaker phone, and melody ringer can each be driven by the A2327.

The A2327 is available in MSOP8, SOP8 and DFN8 packages.

ORDERING INFORMATION

Package Type	Part Number	
MSOP8	MS8	A2327MS8R
		A2327MS8VR
SOP8	M8	A2327M8R
		A2327M8VR
DFN8	J8	A2327J8R
		A2327J8VR
Note	V: Halogen free Package R: Tape & Reel	
AiT provides all RoHS products Suffix " V " means Halogen free Package		

FEATURES

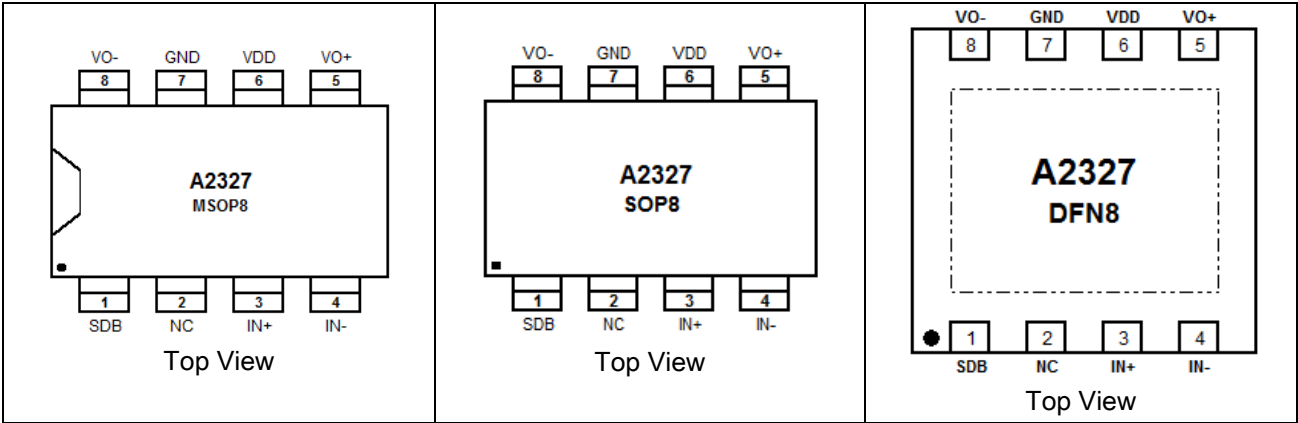
- Efficiency With an 8Ω Speaker:
 - 88% @ 400mW
 - 80% @ 100mW
- 3.8mA Quiescent Current
- 0.4μA Shutdown Current
- Optimized PWM Output Stage Eliminates LC Output Filter
- Internally Generated 250kHz Switching Frequency Eliminates Capacitor and Resistor
- Improved PSRR (-75dB) and Wide Supply Voltage (2.5V to 5.5V) Eliminates Need for a Voltage Regulator
- Fully Differential Design Reduces RF Rectification and Eliminates Bypass Capacitor
- Improved CMRR Eliminates Two Input Coupling Capacitors
- Available in MSOP8, SOP8 and DFN8 Packages

APPLICATION

- Mobile phone, PDA, MID
- MP3/4, PMP
- Portable electronic devices



PIN DESCRIPTION



Pin #	Symbol	Function
1	SDB	Shutdown terminal (low active)
2	NC	NC (No internal connection)
3	IN+	Positive differential input
4	IN-	Negative differential input
5	VO+	Positive BTL output
6	V _{DD}	Power Supply
7	GND	Power Ground
8	VO-	Negative BTL output



ELECTRICAL CHARACTERISTICS

The following specifications apply for the circuit shown in Figure 1.

T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Shutdown Current	I _{SD}	V _{IN} =0V, V _{SDB} =0V, No Load		0.4	2	uA
Quiescent Current	I _Q	V _{DD} =2.5V, V _{IN} =0V, No Load		2.2	3.2	mA
		V _{DD} =3.6V, V _{IN} =0V, No Load		2.6		
		V _{DD} =5.5V, V _{IN} =0V, No Load		3.8	8	
Output Offset Voltage	V _{OS}	V _{IN} =0V, A _V =2V/V, V _{DD} =2.5V to 5.5V		2	25	mV
Power Supply Rejection Ratio	PSRR	V _{DD} =2.5V to 5.5V		-75		dB
Common Mode Rejection Ratio	CMRR	V _{DD} =2.5V to 5.5V, V _{IC} =V _{DD} /2 to 0.5V, V _{IC} =V _{DD} /2 to V _{DD} -0.8V		-68		dB
Modulation Frequency	F _{SW}	V _{DD} =2.5V to 5.5V	200	250	300	kHz
Voltage Gain	A _V	V _{DD} =2.5V to 5.5V	270k	300k	330k	V V
			R _I	R _I	R _I	
Resistance from SDB to GND	R _{SDB}			300		kΩ
Input Impedance	Z _I		135	150	165	kΩ
Wake-up Time from Shutdown	T _{WU}	V _{DD} =3.6V		32		ms
Drain-Source Resistance on-state)	R _{DS(on)}	V _{DD} =2.5V		700		mΩ
		V _{DD} =3.6V		500		
		V _{DD} =5.5V		400		
Shutdown Voltage Input High	V _{SDIH}		1.3			V
Shutdown Voltage Input Low	V _{SDIL}				0.4	V



OPERATING CHARACTERISTICS

$V_{DD}=5V$, $R_I=150k\Omega$, $T_A=25^\circ C$, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Power	P_o	THD+N=10%, f=1kHz, $R_L=4\Omega$		2.60		W
		THD+N=1%, f=1kHz, $R_L=4\Omega$		2.10		
		THD+N=10%, f=1kHz, $R_L=8\Omega$		1.60		
		THD+N=1%, f=1kHz, $R_L=8\Omega$		1.30		
Total Harmonic Distortion + Noise	THD+N	$P_o=1.0W_{rms}$, f=1kHz, $R_L=8\Omega$		0.21		%
Signal-to-Noise Ratio	SNR	$V_{DD}=5V$, $P_o=1.0W_{rms}$, $R_L=8\Omega$		91		dB

$V_{DD}=3.6V$, $R_I=150k\Omega$, $T_A=25^\circ C$, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Power	P_o	THD+N=10%, f=1kHz, $R_L=4\Omega$		1.35		W
		THD+N=1%, f=1kHz, $R_L=4\Omega$		1.08		
		THD+N=10%, f=1kHz, $R_L=8\Omega$		0.85		
		THD+N=1%, f=1kHz, $R_L=8\Omega$		0.69		
Total Harmonic Distortion + Noise	THD+N	$P_o=0.5W_{rms}$, f=1kHz, $R_L=8\Omega$		0.21		%
Supply Ripple Rejection Ratio	K_{SVR}	$V_{DD}=3.6V$, input ac-grounded with $C_I=2\mu F$, f=217Hz, $V(\text{Ripple})=200mV_{PP}$		-65		dB
Output Voltage Noise	V_n	$V_{DD} = 3.6V$, input ac-grounded with $C_I=2\mu F$, f=20~20kHz	No weighting	100		μV_{RMS}
			A weighting	75		
Common Mode Rejection Ratio	CMRR	$V_{DD}=3.6V$, $V_{IC}=1V_{PP}$, f=217Hz		-70		dB

$V_{DD}=2.5V$, $R_I=150k\Omega$, $T_A=25^\circ C$, unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Power	P_o	THD+N=10%, f=1kHz, $R_L=4\Omega$		0.60		W
		THD+N=1%, f=1kHz, $R_L=4\Omega$		0.51		
		THD+N=10%, f=1kHz, $R_L=8\Omega$		0.40		
		THD+N=1%, f=1kHz, $R_L=8\Omega$		0.33		
Total Harmonic Distortion + Noise	THD+N	$P_o=0.2W_{rms}$, f=1kHz, $R_L=8\Omega$		0.21		%



TEST CIRCUIT

Figure1. A2327 test set up circuit

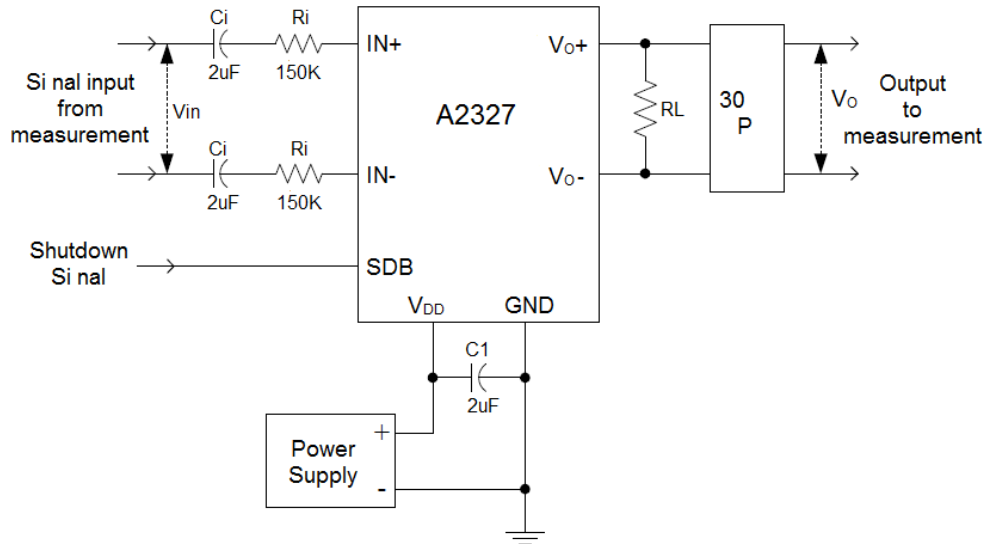
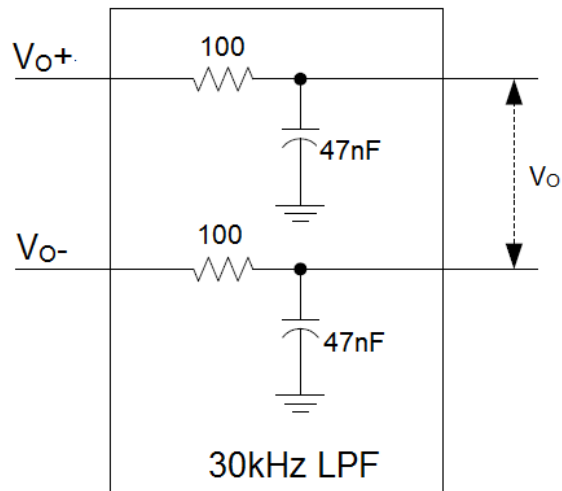


Figure2. 30 kHz LPF for A2327 test



NOTE1: C_S should be placed as close as possible to V_{DD}/GND pad of the device

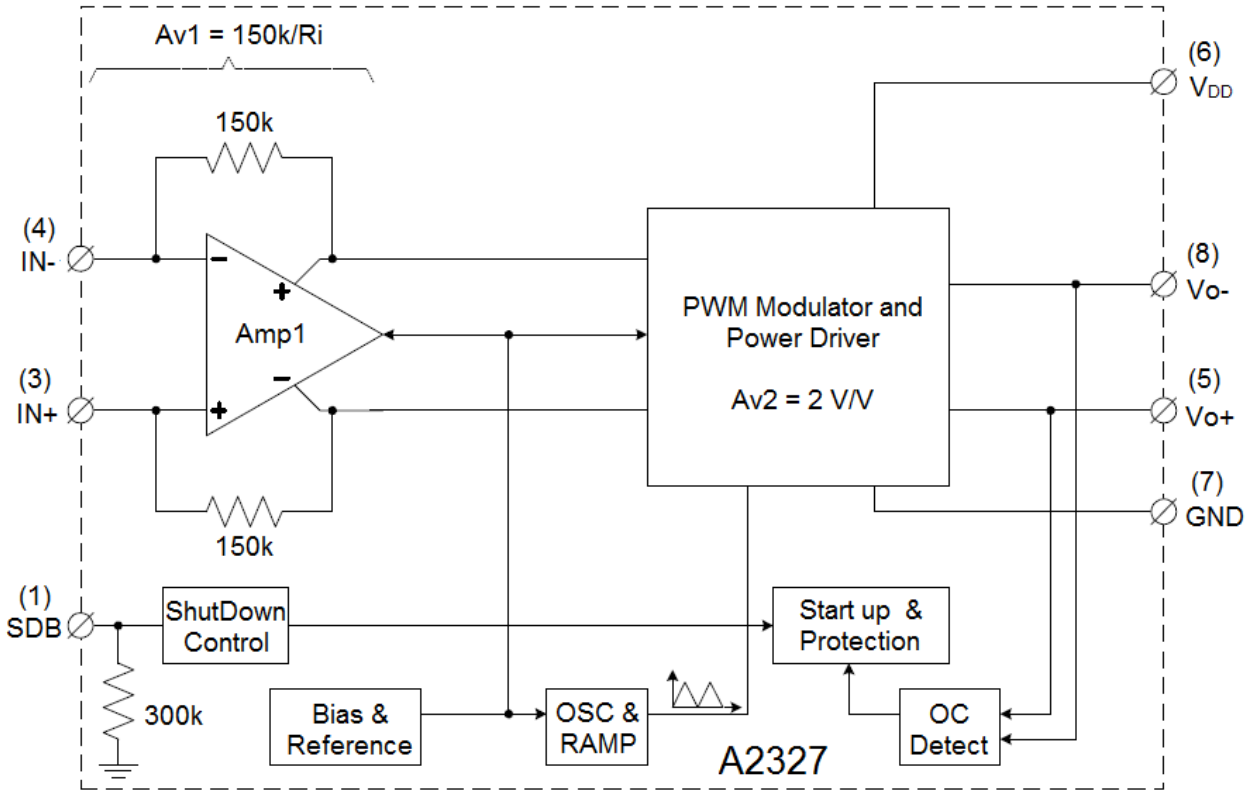
NOTE2: C_I should be shorted for any Common-Mode input voltage measurement

NOTE3: A 33uH inductor should be used in series with R_L for efficiency measurement

NOTE4: The 30kHz LPF (shown in figure 1) is required even if the analyzer has an internal LPF



BLOCK DIAGRAM



NOTE: Total Voltage Gain = $Av1 \times Av2 = 2 \times \frac{150k}{Ri}$



DETAILED INFORMATION

Application Circuit

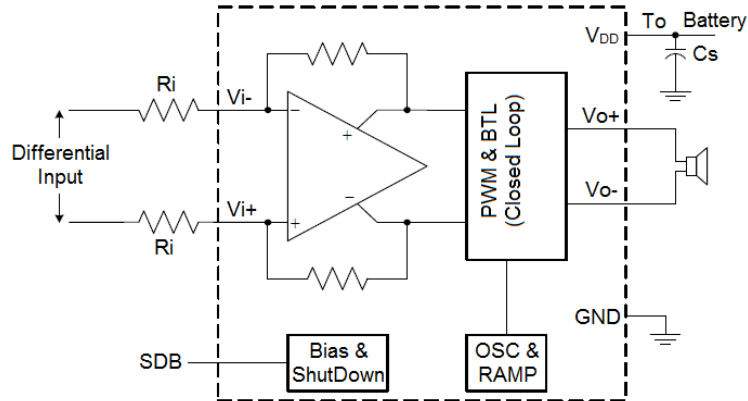


Figure 3. A2327 Application Schematic With Differential Input

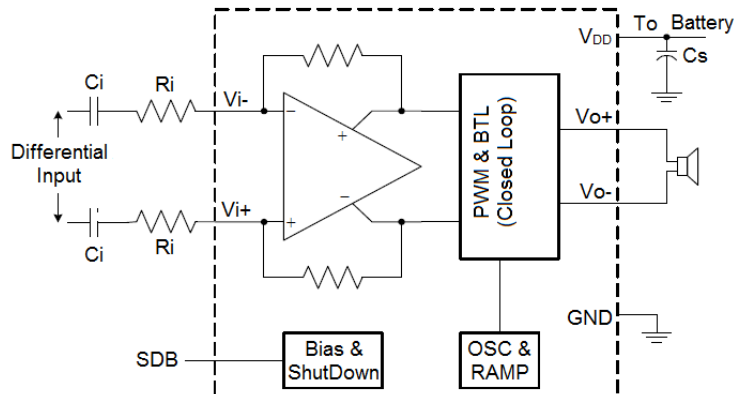


Figure 4. A2327 Application Schematic With Differential Input and Input Capacitors

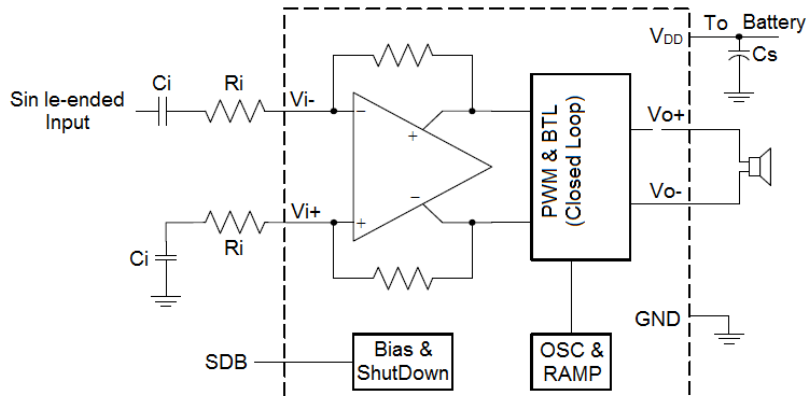


Figure 5. A2327 Application Schematic With Single-Ended Input



Component Recommended

Due to the weak noise immunity of the single-ended input application, the differential input application should be used whenever possible. The typical component values are listed in the table:

R _i	C _i	C _s
150k	3.3nF	2uF

- (1) C_i should have a tolerance of ±10% or better to reduce impedance mismatch.
- (2) Use 1% tolerance resistors or better to keep the performance optimized, and place the R_i close to the device to limit noise injection on the high-impedance nodes.

Input Resistors (R_i) & Capacitors (C_i)

The input resistors (R_i) set the total voltage gain of the amplifier according to Eq1

$$\text{Gain} = \frac{2 \times 150\text{k}\Omega}{R_i} \left(\frac{V}{V} \right) \quad \text{Eq1}$$

The input resistor matching directly affects the CMRR, PSRR, and the second harmonic distortion cancellation.

If a differential signal source is used, and the signal is biased from 0.5V ~ V_{DD}-0.8V (shown in Figure3), the input capacitor (C_i) is not required.

If the input signal is not biased within the recommended common-mode input range in differential input application (shown in Figure4), or in a single-ended input application (shown in Figure5), the input coupling capacitors are required.

If the input coupling capacitors are used, the R_i and C_i form a high-pass filter (HPF). The corner frequency (f_c) of the HPF can be calculated by Eq2

$$f_c = \frac{1}{2\pi \times R_i \times C_i} \text{(Hz)} \quad \text{Eq2}$$

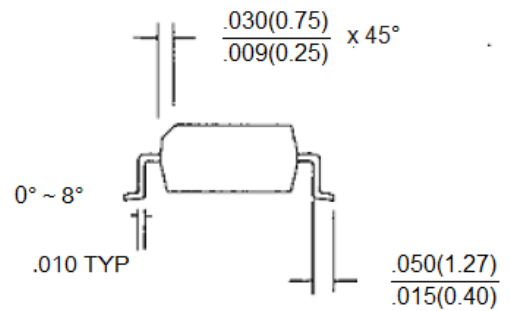
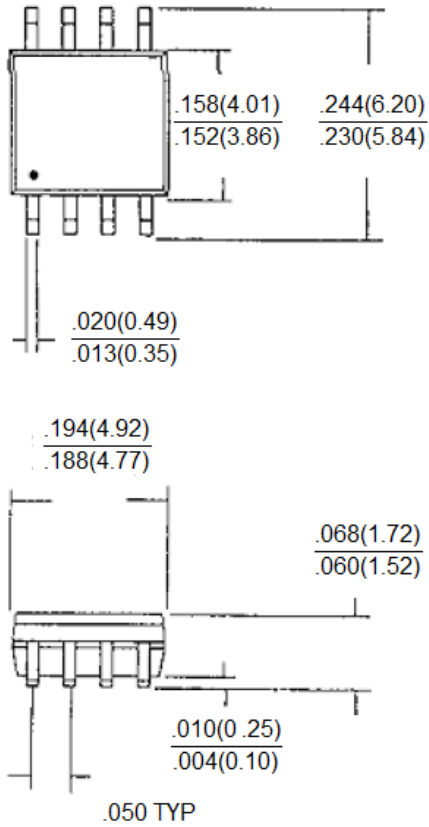
Decoupling Capacitor (C_s)

A good low equivalent-series-resistance (ESR) ceramic capacitor (C_s), used as power supply decoupling capacitor (C_s), is required for high power supply rejection (PSRR), high efficiency and low total harmonic distortion (THD). C_s is 2μF, placed as close as possible to the device V_{DD} pin.



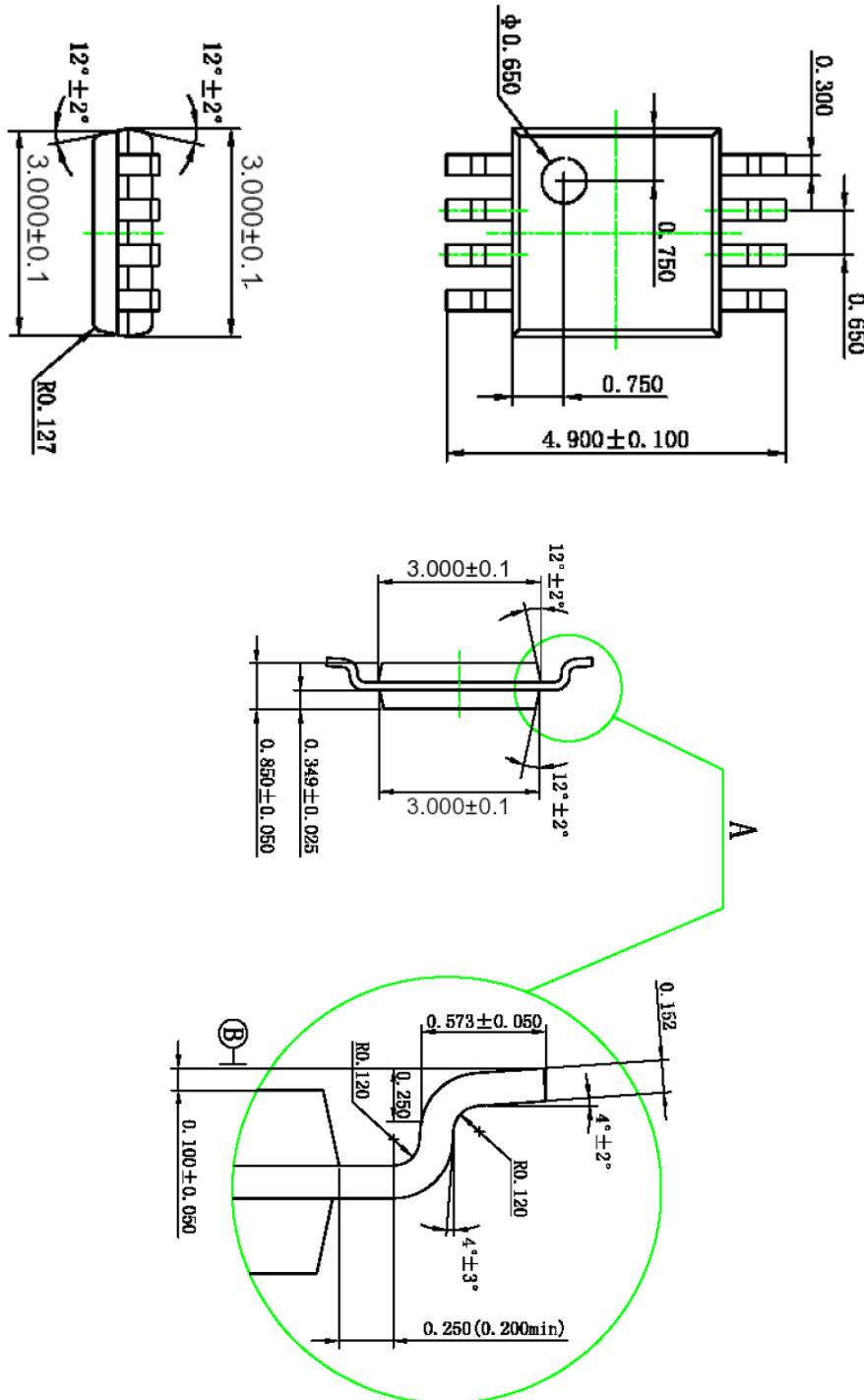
PACKAGE INFORMATION

Dimension in SOP8 (Unit: mm)



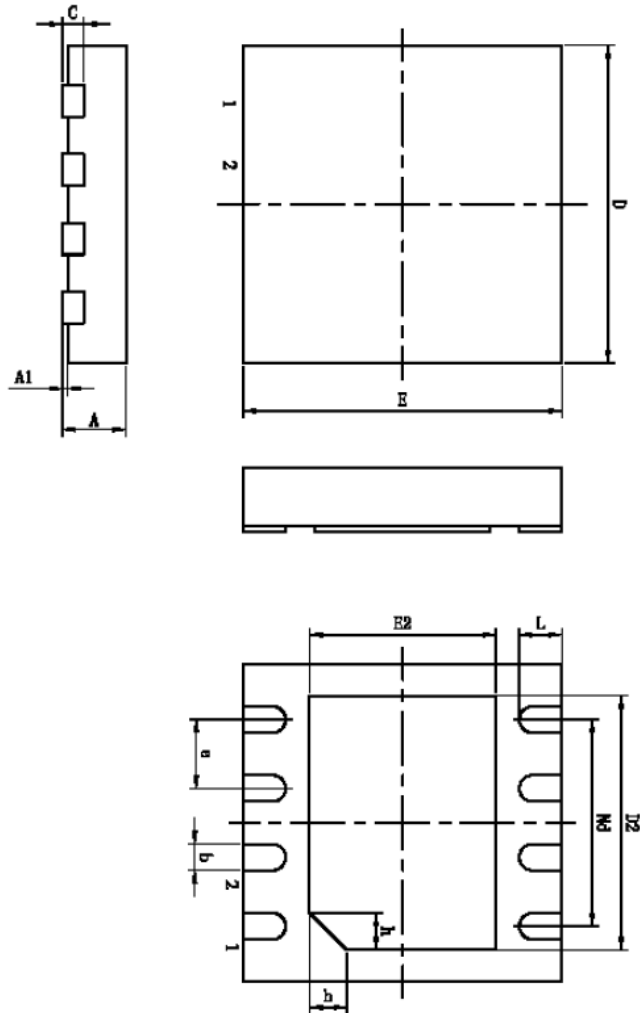


Dimension in MSOP8 (Unit: mm)





Dimension in DFN8 (Unit: mm)



Symbol	Min	Max
A	0.70	0.80
A1	-	0.05
b	0.25	0.35
c	0.18	0.25
D	2.90	3.10
D2	2.50REF	
e	0.65BSC	
Nd	1.95BSC	
E	2.90	3.10
E2	1.55REF	
L	0.30	0.50
h	0.20	0.30



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