

## Key Features

- 2.5W Output at 10% THD with a 4Ω Load and 5V Power Supply
- Filterless, Low Quiescent Current and Low EMI
- High Efficiency up to 88%
- Superior Low Noise
- Short Circuit Protection
- Thermal Shutdown
- Few External Components to Save Space and Cost
- MSOP-8, SOP-8 and DFN3x3 Packages Available
- Pb-Free Package

## Applications

- PMP/MP4
- GPS
- Portable Speakers
- Walkie Talkie
- Handsfree phones/Speaker Phones
- Cellular Phones

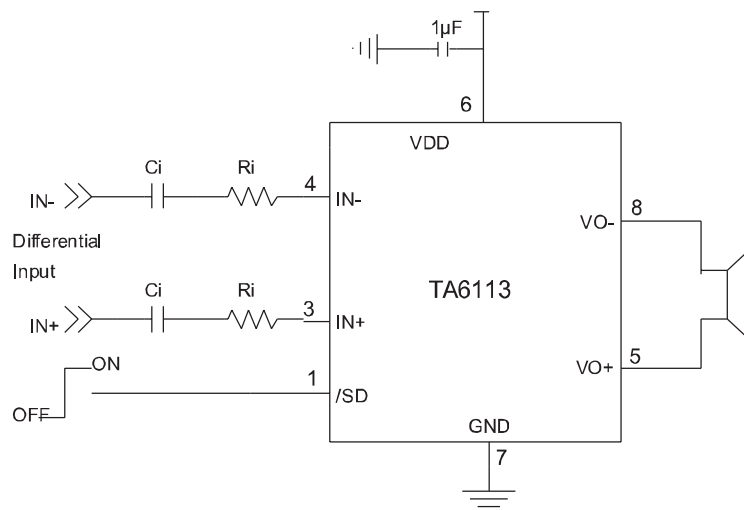
## General Description

The TA6113 is a 2.5W class-D mono audio amplifier. Its low THD+N feature offers high-quality sound reproduction. The new filterless architecture allows the device to drive speaker directly instead of using low-pass output filters, therefore save system cost and PCB area.

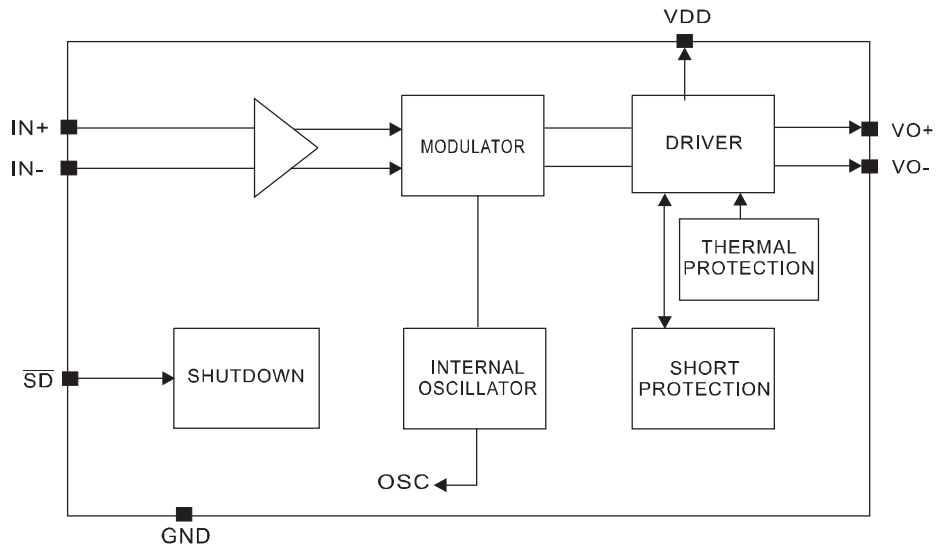
With the same number of external components, the efficiency of the TA6113 is much better than that of class-AB cousins. It can optimize battery life thus is ideal for portable applications.

The TA6113 is available in MSOP-8, SOP-8 and DFN3x3 packages.

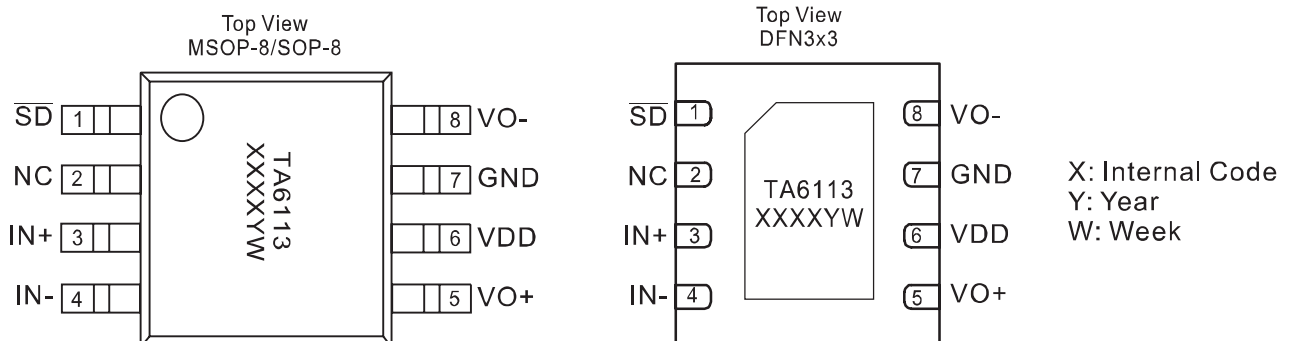
## Typical Application



## Block Diagram



## Pin Configuration & Marking Information



Pin Number	Pin name	Description
1	$\overline{SD}$	Shutdown terminal ,active low
2	NC	No connection
3	IN+	Positive differential input
4	IN-	Negative differential input
5	VO+	Positive BTL output
6	VDD	Analog power supply
7	GND	Ground
8	VO-	Negative BTL output

## Absolute Maximum Ratings

These are stress ratings only and functional operation is not implied. Exposure to absolute maximum ratings for prolonged time periods may affect device reliability. All voltages are with respect to ground.

Supply Voltage at no Input Signal.....	6.6V	Maximum Junction Temperature.....	150°C
Input Voltage.....	-0.3V to $V_{DD}+0.3V$	Storage Temperature.....	-65°C to 150°C
		Soldering Temperature.....	300°C,5sec

## Recommended Operating Conditions

Supply voltage Range.....	2.5V to 5.5V	Ambient Operation Temperature	
Max. Supply Voltage (for Max. duration of		Range.....	-40°C to 85°C
30 minutes).....	6.0V	Junction Temperature Range.....	-40°C to 125°C

## Thermal Information

Parameter	Symbol	Package	Maximum	Unit
Thermal Resistance (Junction to ambient)	$\theta_{JA}$	SOP-8	115	°C/W
		MSOP-8	180	°C/W
		DFN 3x3-8	47.9	°C/W

**Electrical Characteristic**

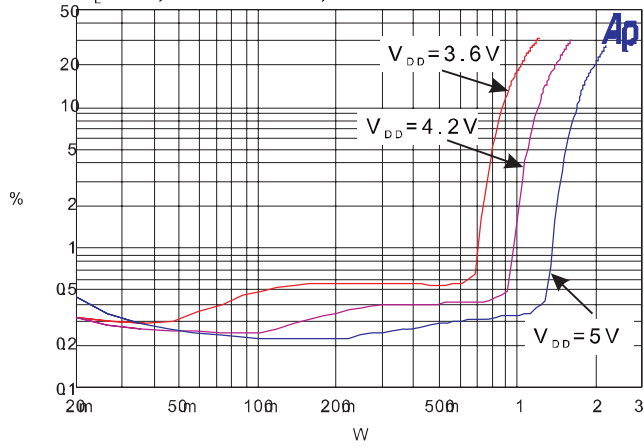
$V_{DD}=5V$ , Gain = 24dB,  $R_L=4\Omega$ ,  $T_A=25^\circ C$ , unless otherwise noted.

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS	
Supply Voltage Range	$V_{DD}$			2.5		5.5	V	
Quiescent Current	$I_Q$	No Load			4	8	mA	
Shutdown Current	$I_{SHDN}$	$V_{SHDN}=0V$				1	$\mu A$	
Output Power	$P_O$	f=1kHz, $R_L=4\Omega$ THD+N=10%	$V_{DD}=5V$		2.50		W	
			$V_{DD}=3.6V$		1.25			
		f=1kHz, $R_L=4\Omega$ THD+N=1%	$V_{DD}=5V$		2.00			
			$V_{DD}=3.6V$		0.95			
		f=1kHz, $R_L=8\Omega$ THD+N=10%	$V_{DD}=5V$		1.50			
			$V_{DD}=3.6V$		0.80			
		F=1kHz, $R_L=8\Omega$ THD+N=1%	$V_{DD}=5V$		1.30			
			$V_{DD}=3.6V$		0.65			
Peak Efficiency	$\eta$	f=1kHz			85	88	%	
Total Harmonic Distortion Plus Noise	THD+N	$R_L = 8\Omega$ , $P_O=0.1W$ , f=1kHz			0.30		%	
		$R_L = 8\Omega$ , $P_O=0.5W$ , f=1kHz			0.45			
		$R_L = 4\Omega$ , $P_O=0.1W$ , f=1kHz			0.35			
		$R_L = 4\Omega$ , $P_O=0.5W$ , f=1kHz			0.40			
Gain	$G_v$				24		dB	
Power Supply Ripple Rejection	PSRR	No input, f=1kHz, $V_{pp}=200mV$		45	50		dB	
Dynamic Range	Dyn	f=20 to 20kHz			90		dB	
Signal to Noise Ratio	SNR	f =20 to 20kHz			80		dB	
Noise	$V_n$	No A-weighting			180		$\mu V$	
		A-weighting			120			
Oscillator Frequency	$f_{OSC}$			200	250	300	kHz	
Drain-Source On-State Resistance	$R_{DS(ON)}$	$I_{DS}=100mA$	P MOSFET		0.45		$\Omega$	
			N MOSFET		0.20			
SHDN Input High	$V_{SH}$			1.2			V	
SHDN Input Low	$V_{SL}$					0.4	V	
Over Temperature Protection	OTP				135		$^\circ C$	
Over Temperature Hysteresis	OTH				30		$^\circ C$	

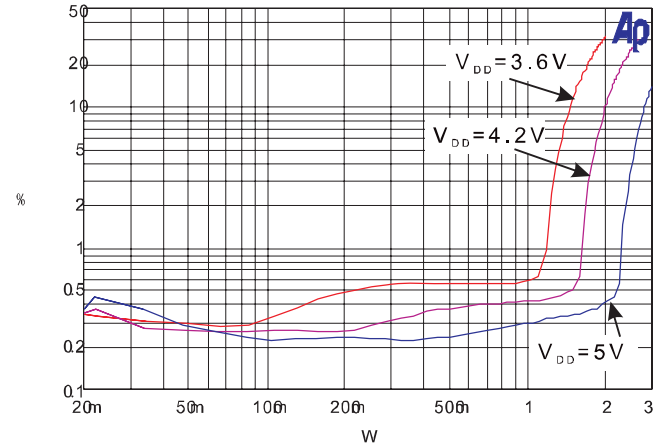
## Typical Performance Characteristics

$T_A=25^\circ\text{C}$ , unless otherwise noted.

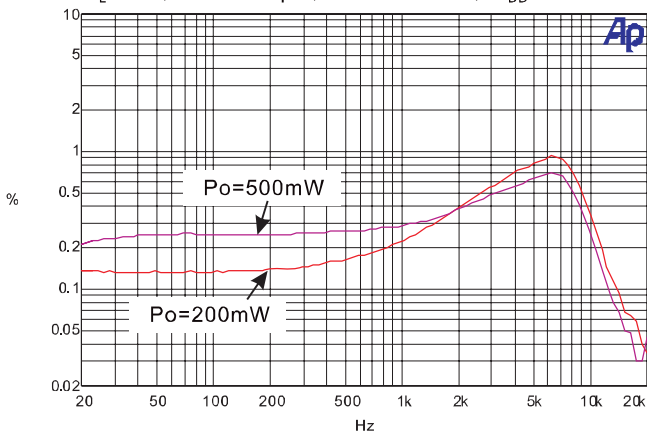
THD+N VS Output Power  
 $R_L=8\Omega$ , Gain=23dB,  $f=1\text{kHz}$



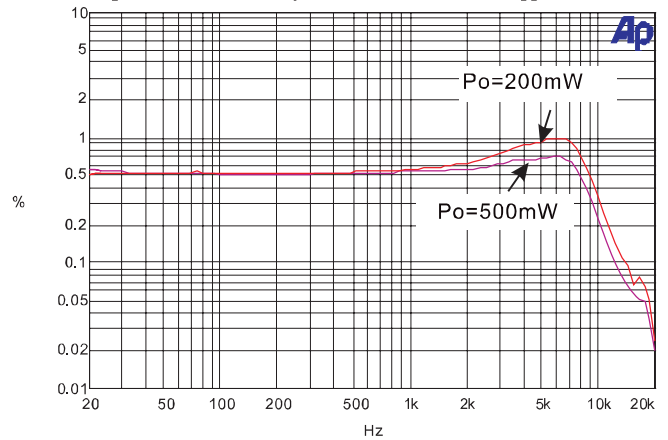
THD+N VS Output Power  
 $R_L=4\Omega$ , Gain=23dB,  $f=1\text{kHz}$



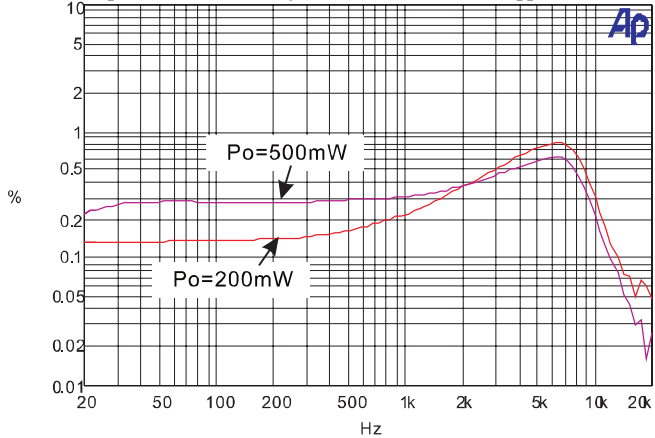
THD+N VS Frequency  
 $R_L=8\Omega$ ,  $C_{in}=0.1\mu\text{F}$ , Gain=23dB,  $V_{DD}=5\text{V}$



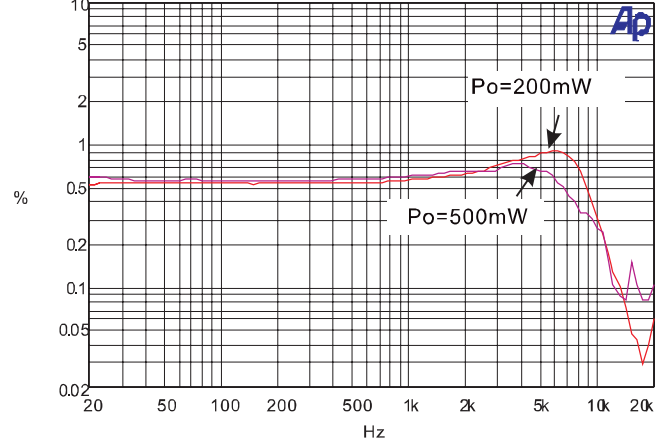
THD+N VS Frequency  
 $R_L=8\Omega$ ,  $C_{in}=0.1\mu\text{F}$ , Gain=23dB,  $V_{DD}=3.6\text{V}$



THD+N VS Frequency  
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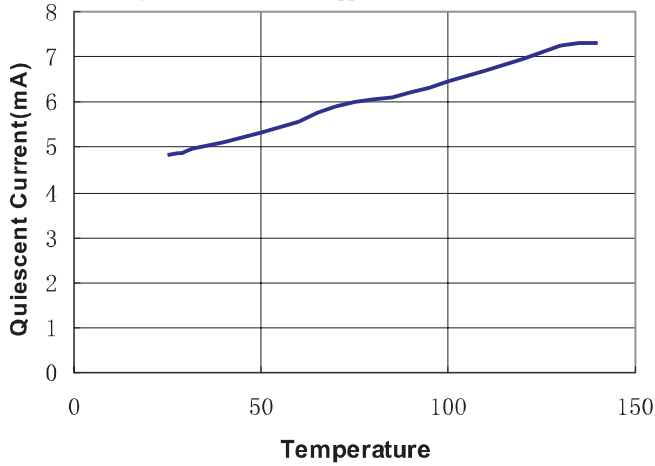
THD+N VS Frequency  
 $R_L=4\Omega$ ,  $C_{in}=0.1\mu\text{F}$ , Gain=23dB,  $V_{DD}=3.6\text{V}$



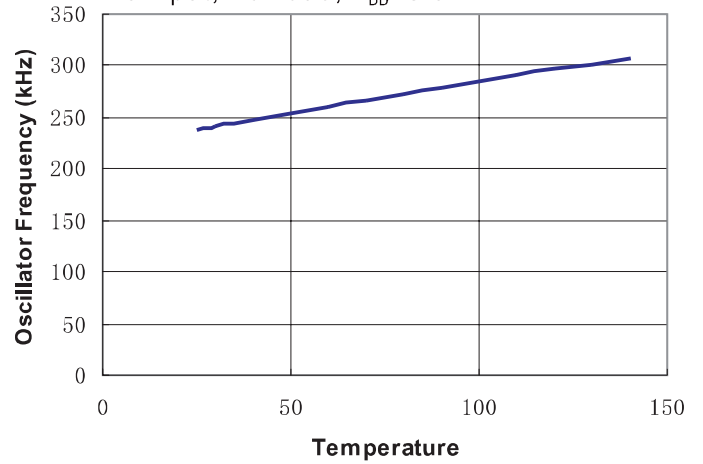
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$T_A=25^{\circ}\text{C}$ , unless otherwise noted.

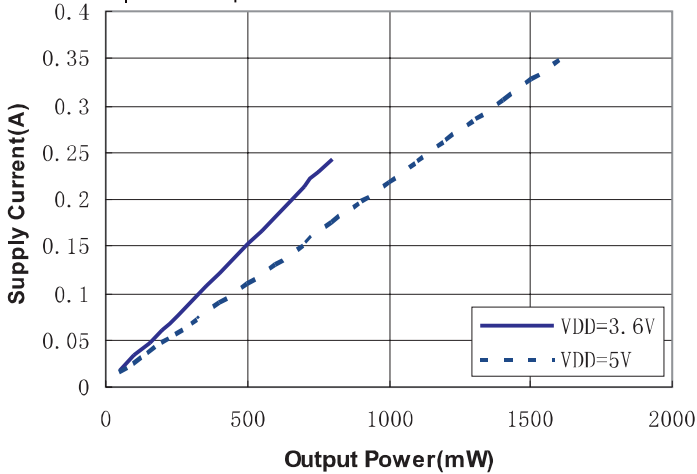
Quiescent Current VS Temperature  
No input, No Load,  $V_{DD}=5.0\text{V}$



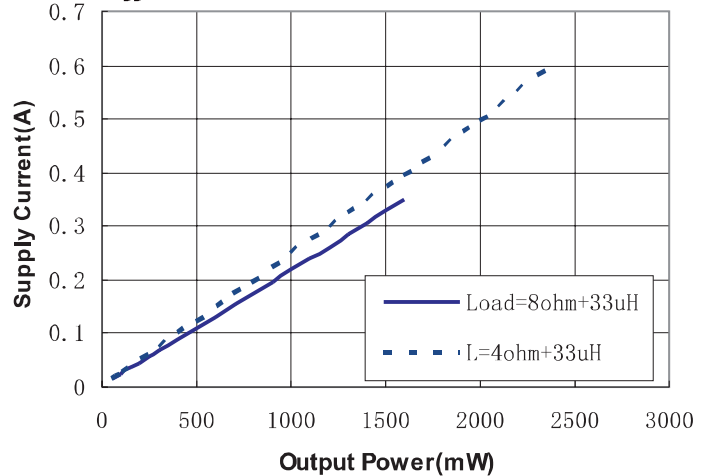
Frequency VS Temperature  
No input, No Load,  $V_{DD}=5.0\text{V}$



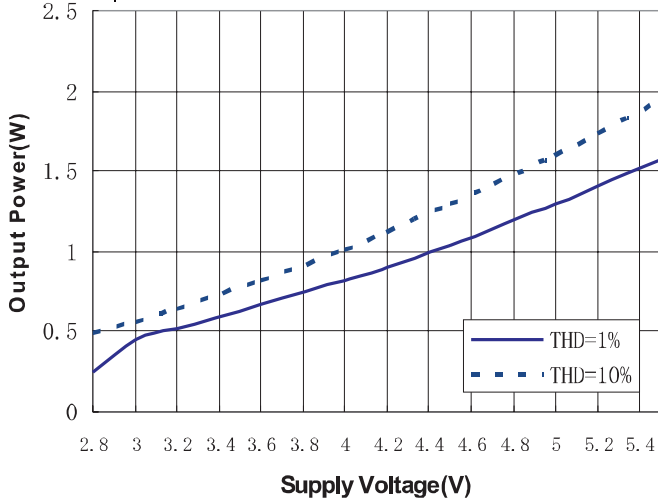
Supply Current VS Output Power  
 $R_L=8\Omega+33\mu\text{H}$



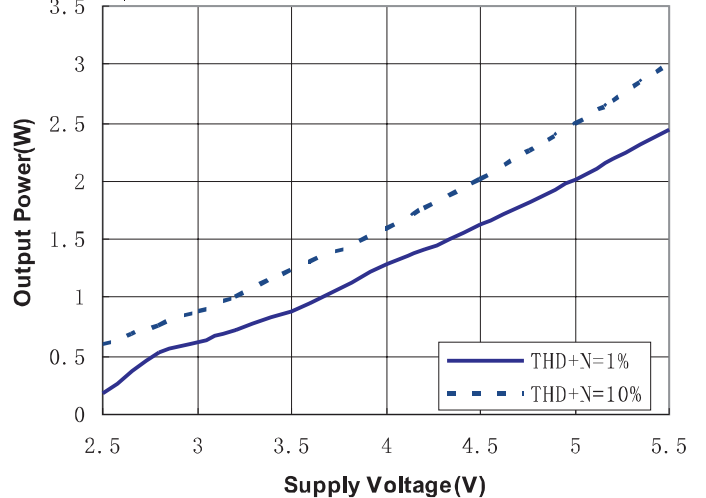
Supply Current VS Output Power  
 $V_{DD}=5.0\text{V}$



Output Power VS. Supply Voltage  
 $R_L=8\Omega$

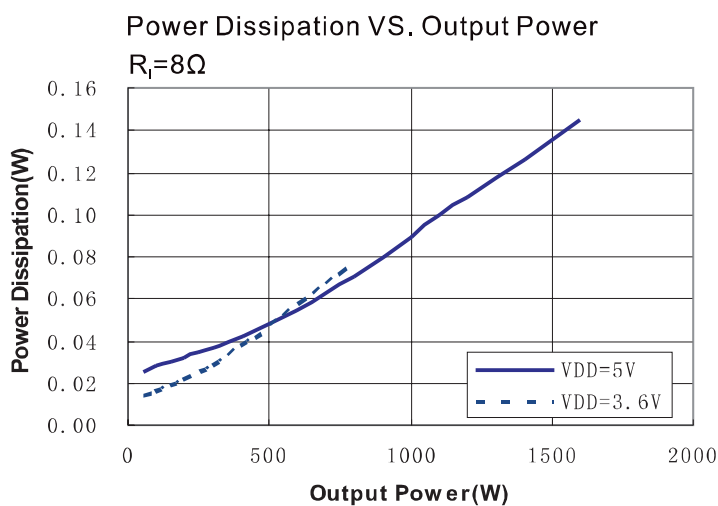
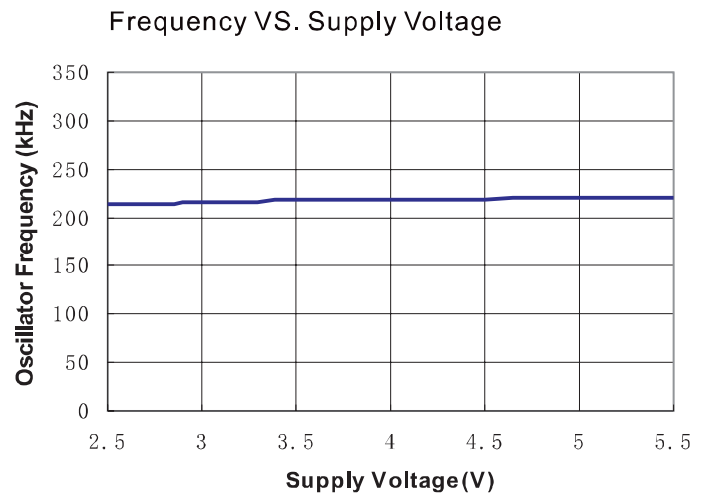
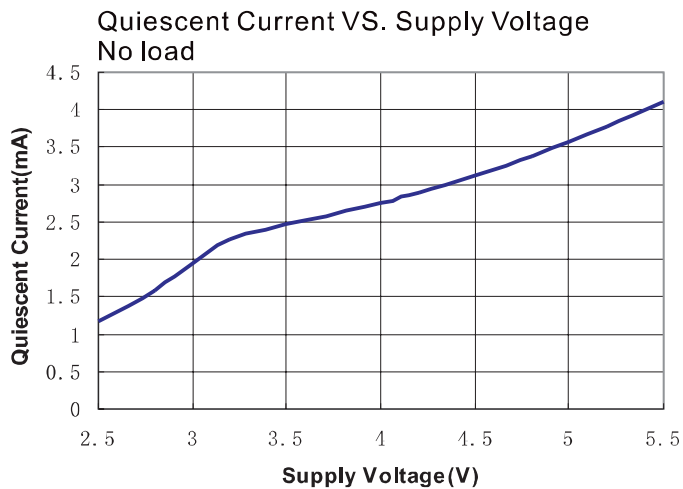
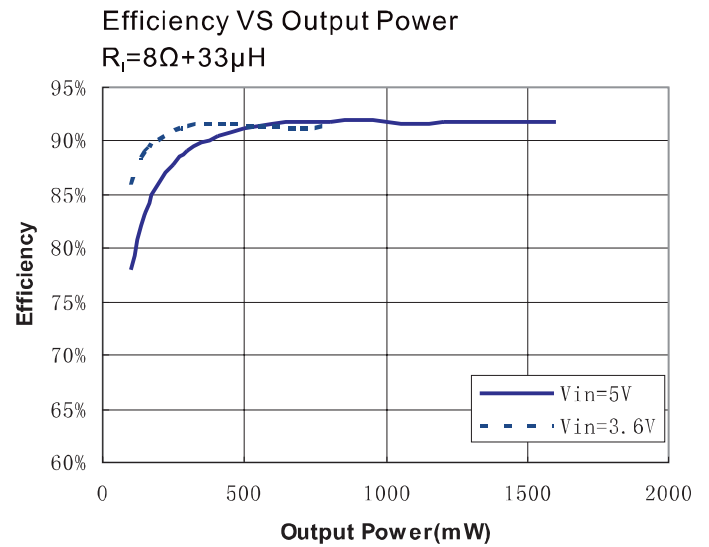
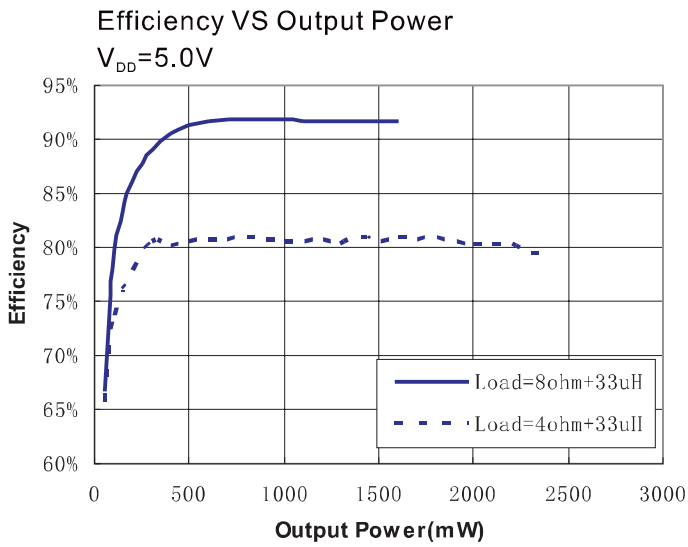


Output Power VS. Supply Voltage  
 $R_L=4\Omega$



## Typical Performance Characteristics

$T_A=25^{\circ}\text{C}$ , unless otherwise noted.



### How to Reduce EMI (Electro Magnetic Interference)

A simple solution is to put an additional capacitor  $1000\mu\text{F}$  at power supply terminal for power line coupling if the traces from amplifier to speakers are short ( $<20\text{CM}$ ).

Most applications require a ferrite bead filter as shown at Figure 1. The ferrite filter depresses EMI of around  $1\text{MHz}$  and higher. When selecting a ferrite bead, choose one with high impedance at high frequencies and low impedance at low frequencies.

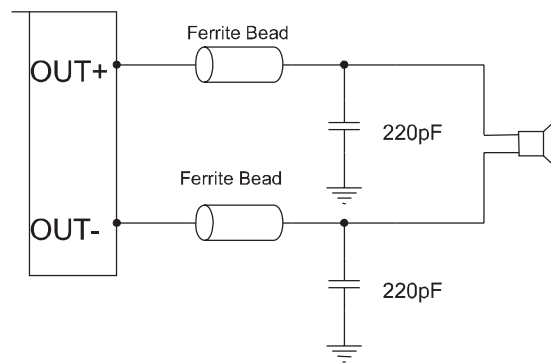
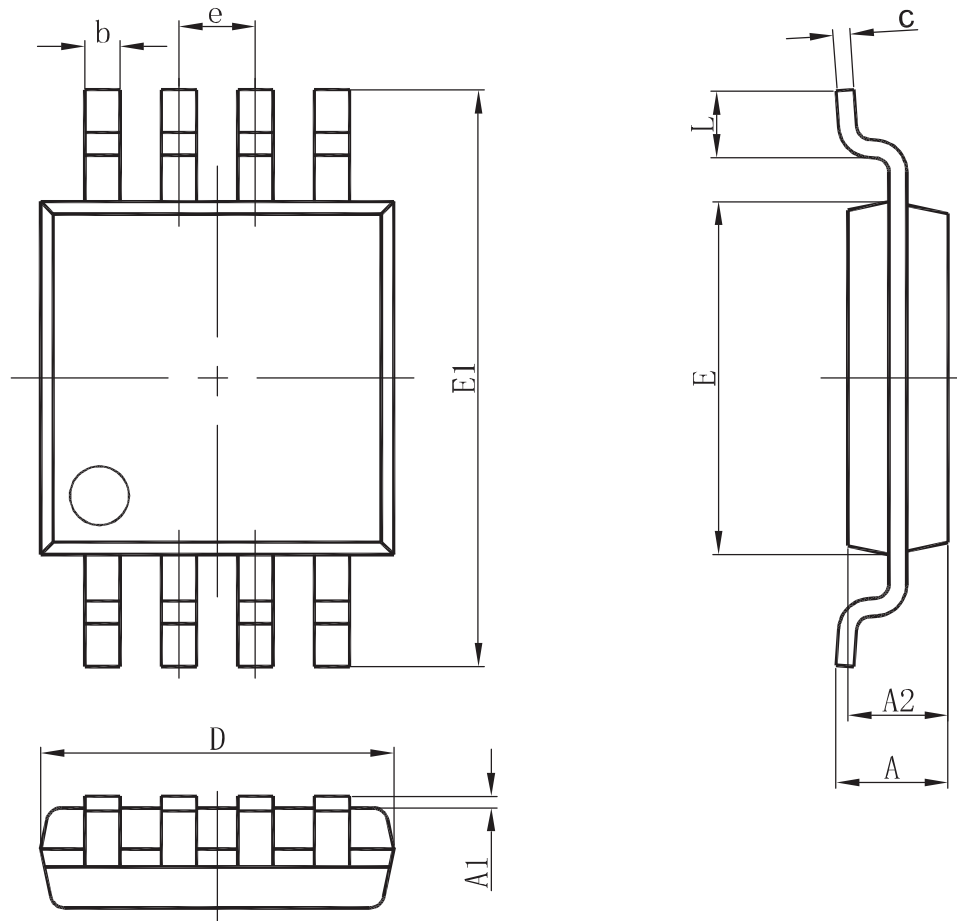


Figure 1: Ferrite Bead Filter to reduce EMI



## Outline Dimensions

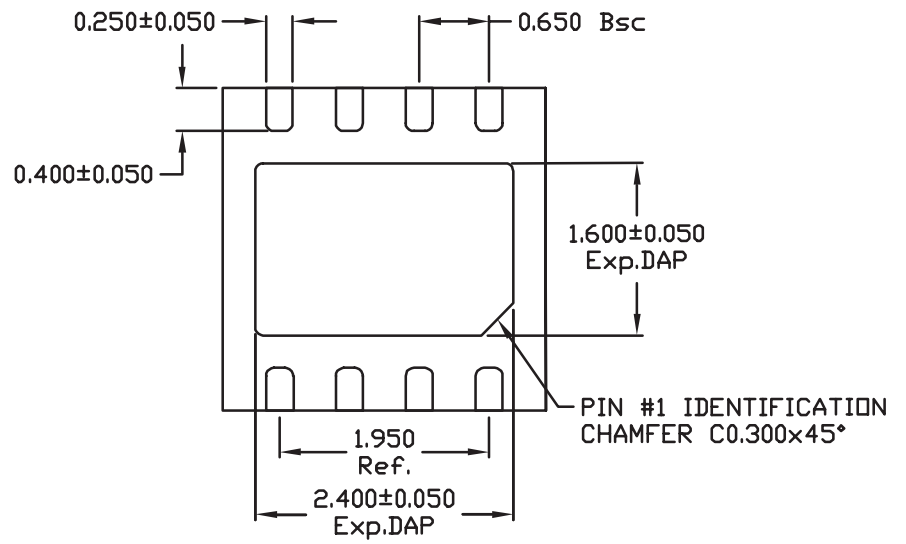
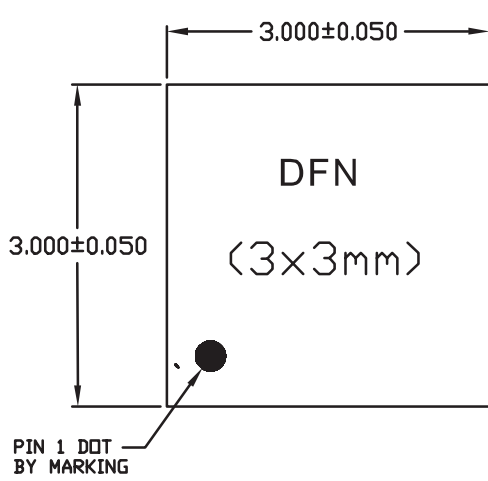
### MSOP-8



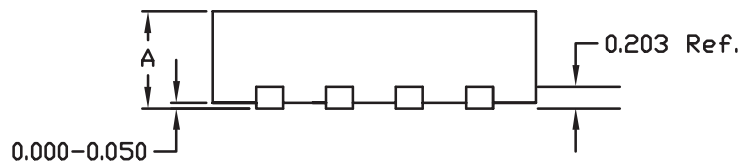
REF	Millimeter	
	Min	Max
A	--	1.10
A1	0.05	0.15
A2	0.78	0.94
b	0.22	0.38
c	0.08	0.23
D	2.90	3.10
E	2.90	3.10
E1	4.75	5.05
e	0.65BSC	
L	0.40	0.70

Outline Dimensions

DFN 3x3



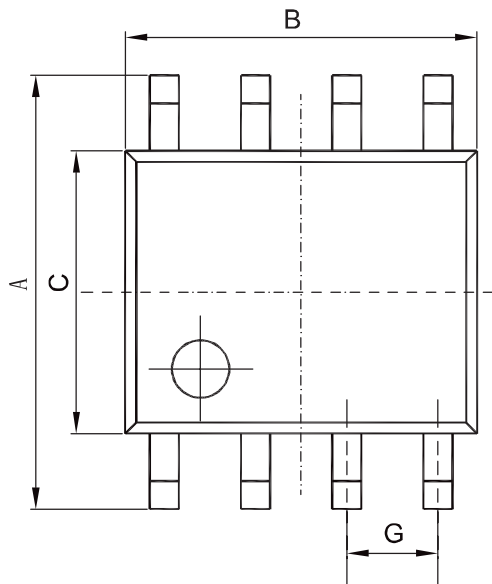
A	MAX.	0.800
	NOM.	0.750
	MIN.	0.700



Note: All dimensions are in Millimeters.

Outline Dimensions

SOP-8



REF	DIMENSIONS	
	Millimeters	
	Min	Max
A	5.80	6.20
B	4.80	5.00
C	3.80	4.00
D	0°	8°
E	0.40	0.90
F	0.19	0.25
M	0.10	0.25
H	0.35	0.49
L	1.35	1.75
J	0.375 REF	
K	45°	
G	1.27 TYP	

