

2.7W/Ch Stereo Fully Differential Audio Power Amplifier with Bypass Capacitor Free

General Description

The EMA2204 is a 2.7W/Ch Stereo fully differential amplifier designed to drive a speaker with at least 4Ω impedance. The device operates from 2.2 V to 5.5 V, drawing 9mA(Typ.) of quiescent supply current. The EMA2204 performs superior THD+N and PSRR with no bypass capacitor required.

With no bypass capacitor, the EMA2204 is ideal for PMPs applications due to features such as -65dB supply voltage rejection from 20 Hz to 10kHz, improved RF rectification immunity and a fast startup with minimal pop.

Features

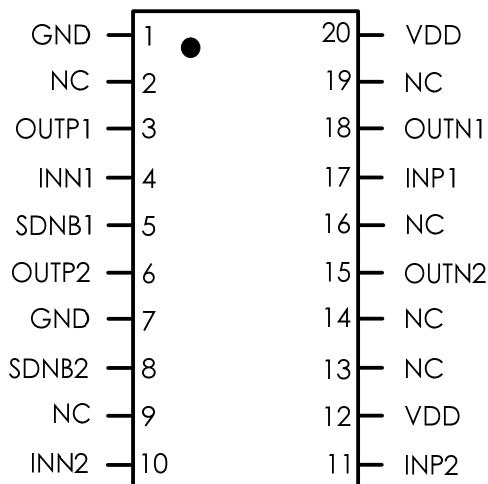
- 2.7 W/Ch Into 4Ω From a 5-V Supply at THD = 10% (Typ)
- Low Supply Current: 9mA (Typ) at 5 V
- Shutdown Current: 0.1 μA (Typ)
- Fast Startup With Minimal Pop
- Improved PSRR (-65 dB) and Wide Supply Voltage (2.2 V to 5.5 V) for Direct Battery Operation
- Fully Differential Design Reduces RF Rectification
- -63 dB CMRR Eliminates Two Input Coupling Capacitors
- Available in 3 mm X 3 mm TDFN Package

Applications

- PMPs
- Desktop
- Notebook

CONNECTION DIAGRAM

TSSOP-20FD

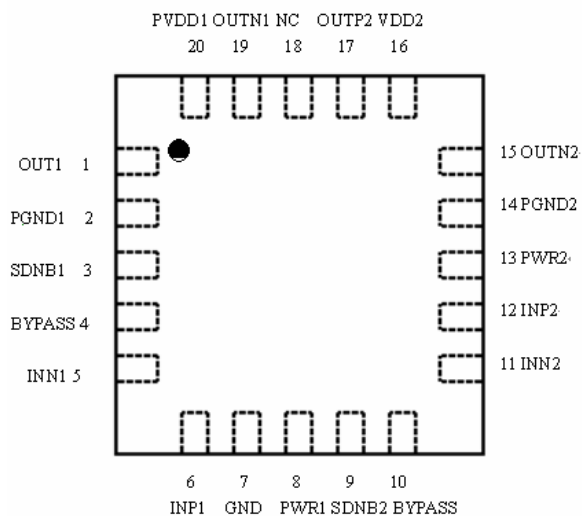


ORDER INFORMATION

EMA2204-50QE20GRR/NRR

50	5.0V Operation
QE20	TSSOP-20FD Package
GRR	RoHS (Pb Free) Rating: -40 to 85°C Package in Tape & Reel
NRR	RoHS & Halogen free (By Request) Rating: -40 to 85°C Package in Tape & Reel

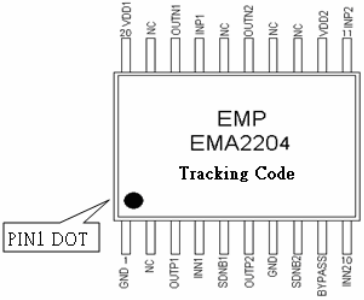
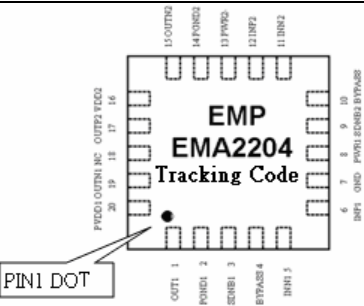
TQFN-20



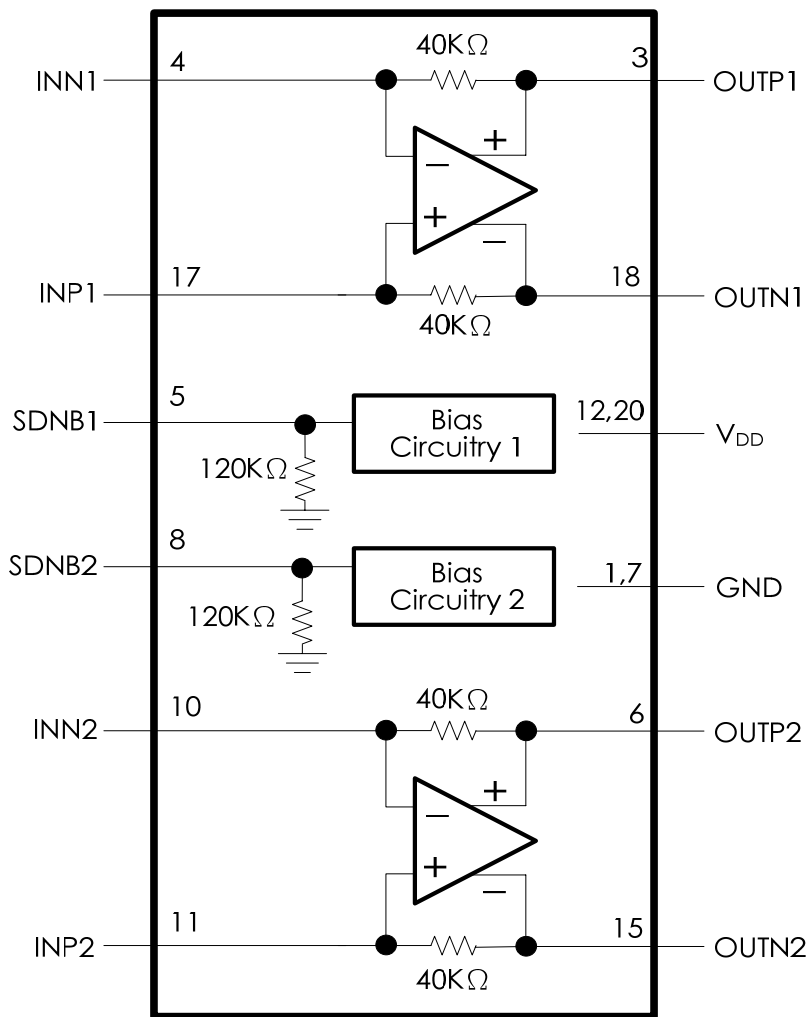
EMA2204-50HC20NRR

50	5.0V Operation
HC20	TQFN-20 Package
NRR	RoHS and Halogen free Rating: -40 to 85°C Package in Tape & Reel

Order, Mark & Packing Information

Package	Product ID	Marking	Packing
TSSOP-20FD	EMA2204-50QE20GRR	 <p>The diagram shows a TSSOP-20FD package with 20 pins. The top row of pins is labeled: 15 VDD1, 14 NC, 13 OUTN, 12 INP1, 11 NC, 10 OUTN2, 9 GND, 8 NC, 7 NC, 6 VDD2, 5 INP2. The bottom row of pins is labeled: 4 GND, 3 NC, 2 BYPASS, 1 INZ, 0 INZ. The package is marked with "EMP", "EMA2204", and "Tracking Code". A black dot on pin 1 is labeled "PIN1 DOT".</p>	2.5K units Tape & Reel
TQFN-20	EMA2204-50HC20NRR	 <p>The diagram shows a TQFN-20 package with 20 pins. The top row of pins is labeled: 11 OUTN2, 10 PWRN2, 9 PWRN2, 8 INP2, 7 INP2, 6 INZ, 5 INZ. The bottom row of pins is labeled: 4 INZ, 3 PWRN2, 2 PWRN2, 1 BYPASS, 0 BYPASS. The package is marked with "EMP", "EMA2204", and "Tracking Code". A black dot on pin 1 is labeled "PIN1 DOT".</p>	3K units Tape & Reel

Function Block Diagram



Absolute Maximum Ratings

Supply Voltage	6.0V	Thermal Resistance	
Storage Temperature	-65°C to +150°C	θ_{JA}	55°C/W
Input Voltage	-0.3V to VDD +0.3V	Operating Ratings	
Power Dissipation	Internally Limited	Temperature Range	-40°C ≤ TA ≤ 85°C
ESD Susceptibility	HBM 1.5KV MM 200V	Supply Voltage	2.2V ≤ VDD ≤ 5.5V
Junction Temperature	150°C		

Electrical Characteristics V_{DD} = 5V

The following specifications apply for V_{DD} = 5V, A_V = 2 and R_L = 8Ω unless otherwise specified. Limits apply for T_A = 25°C.

Symbol	Parameter	Conditions	Conditions		Units
			Typical	Limit	
I _{DD}	Quiescent Power Supply Current	V _{IN} = 0V, I _o = 0A	9	16	mA
I _{SD}	Shutdown Current	V _{SDNB} = GND	0.1	1	μA
V _{OS}	Output offset voltage	V _I = 0V differential, A _V = 1 V/V, V _{DD} = 5.5 V	1	10	mV
P _O	Output Power	THD+N = 10 % (max), f = 1kHz R _L = 4Ω R _L = 8Ω	2.7 1.7		W
		THD+N = 1% (max), f = 1kHz R _L = 4Ω R _L = 8Ω	2.1 1.4		
THD+N	Total Harmonic Distortion + Noise	V _{DD} = 3.6V, R _L = 8Ω, f = 1kHz P _O = 0.6 Wrms P _O = 0.25 Wrms P _O = 0.1 Wrms	0.007 0.01 0.017		%
PSRR	Power Supply Rejection Ratio	V _{ripple} = 200mV sine p-p, input ac-grounded			dB
		f = 217Hz	-65		
		f = 20 to 20kHz	-60		
CMRR	Common Mode Rejection Ratio	V _{DD} = 3.6V, V _{IC} = 1V _{PP} , f = 217Hz	63		dB

Electrical Characteristics $V_{DD} = 2.5V$

The following specifications apply for $V_{DD}=2.5V, A_v=2$ and $R_L=8\Omega$ unless otherwise specified. Limits apply for $T_A = 25^\circ C$.

Symbol	Parameter	Conditions	Conditions		Units
			Typical	Limit	
I_{DD}	Quiescent Power Supply Current	$V_{IN} = 0V, I_o = 0A$	8	16	mA
I_{SD}	Shutdown Current	$V_{SDNB}=GND$	0.1	1	μA
P_o	Output Power	THD+N = 10 %(max), f = 1kHz $R_L = 4\Omega$ $R_L = 8\Omega$	0.62 0.4		W
		THD+N = 1%(max), f = 1kHz $R_L = 4\Omega$ $R_L = 8\Omega$	0.5 0.3		
PSRR	Power Supply Rejection Ratio	$V_{ripple}=200mV$ sine p-p, input ac-grounded			dB
		f=217Hz	-65		
		f=20 to 20kHz	-60		

Application Information

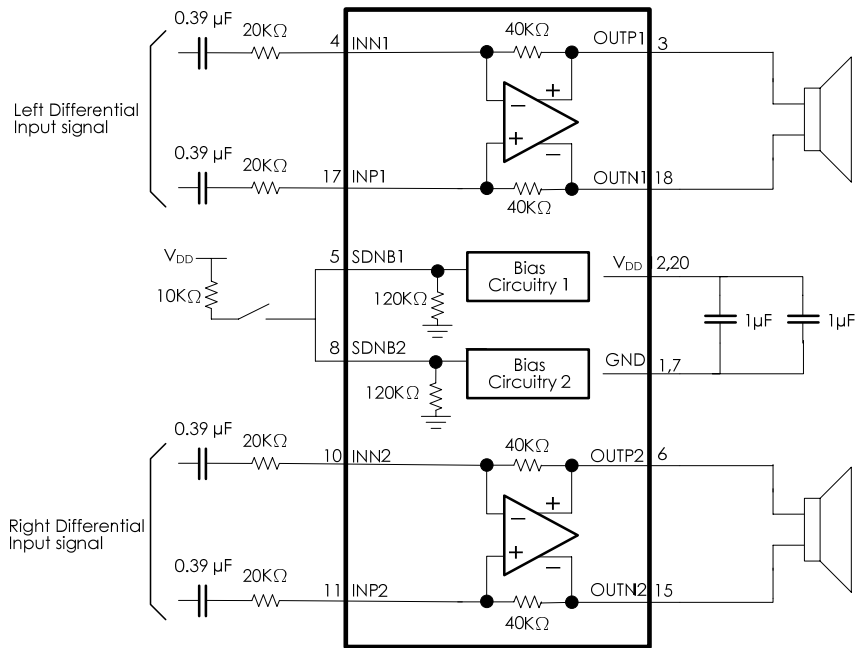


Fig1. Typical Differential Input Application with $A_v=2$

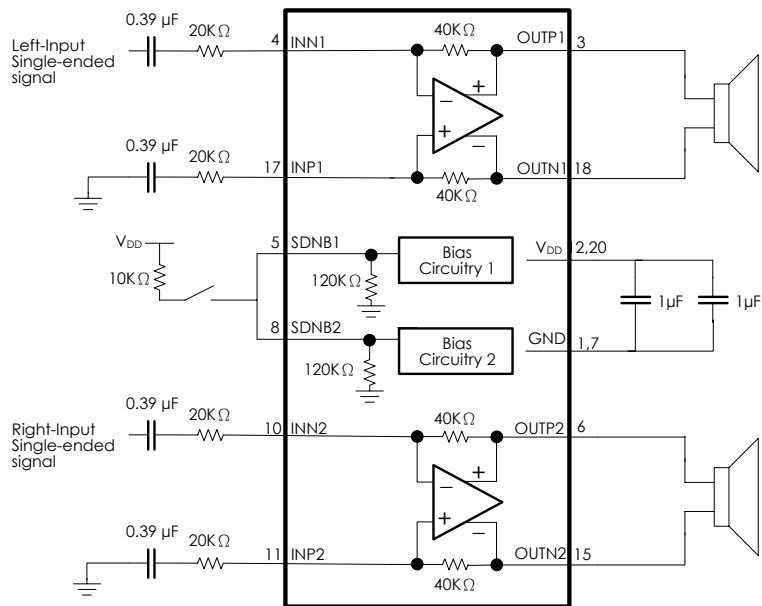
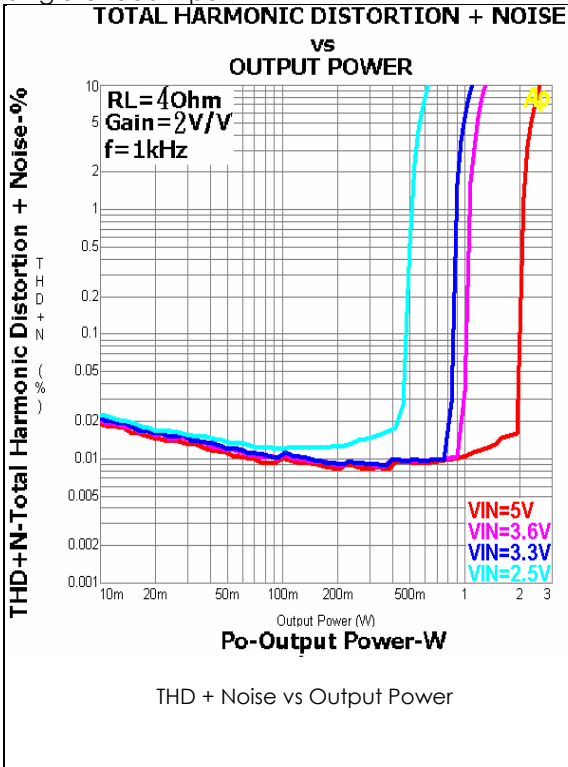


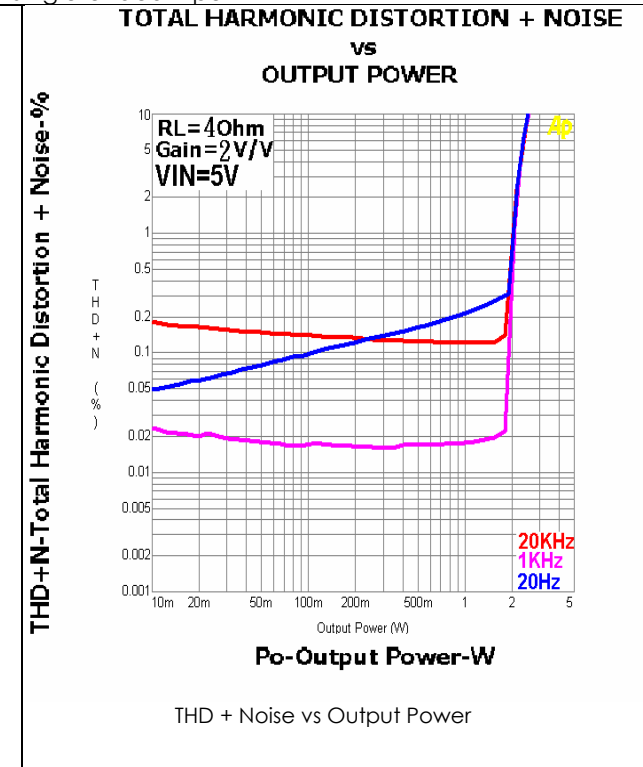
Fig2. Typical Single-ended Input Application with $A_v=2$

Typical Performance Characteristics

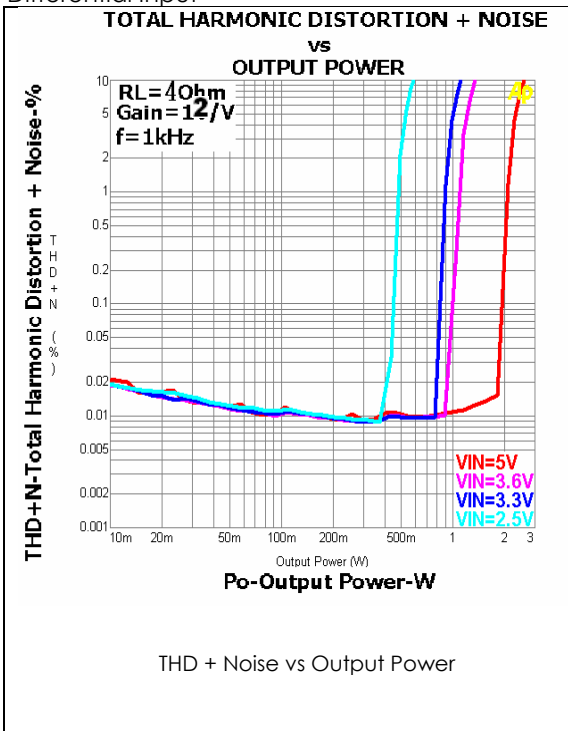
Single-ended Input



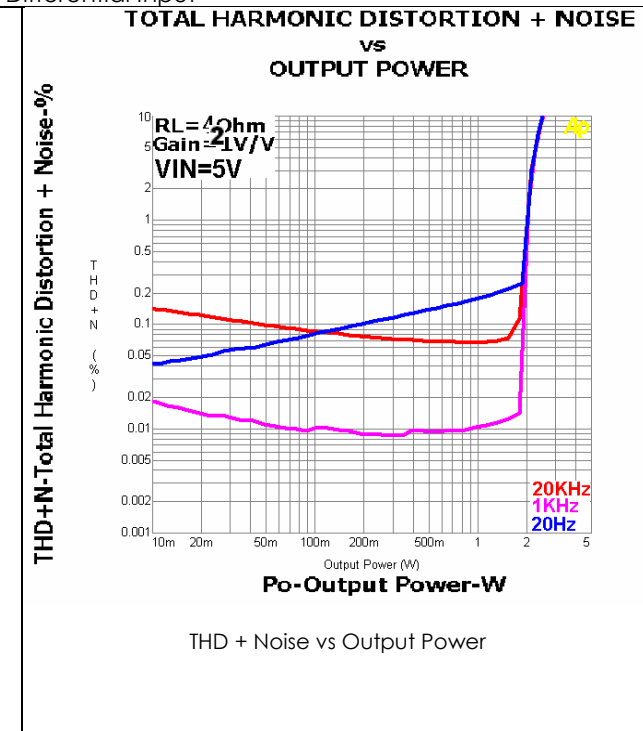
Single-ended Input

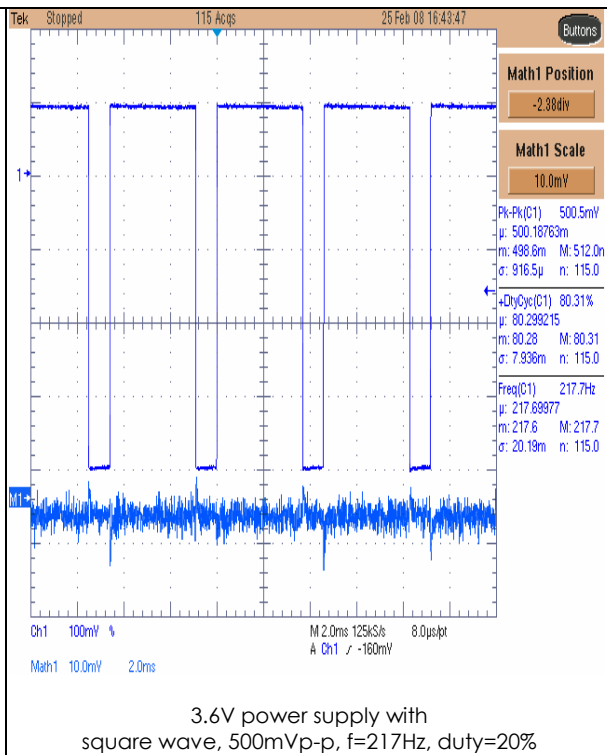
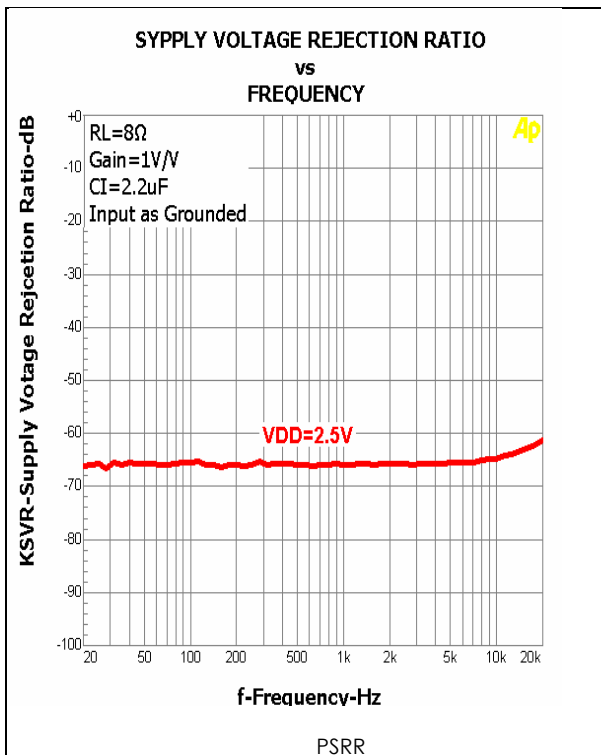
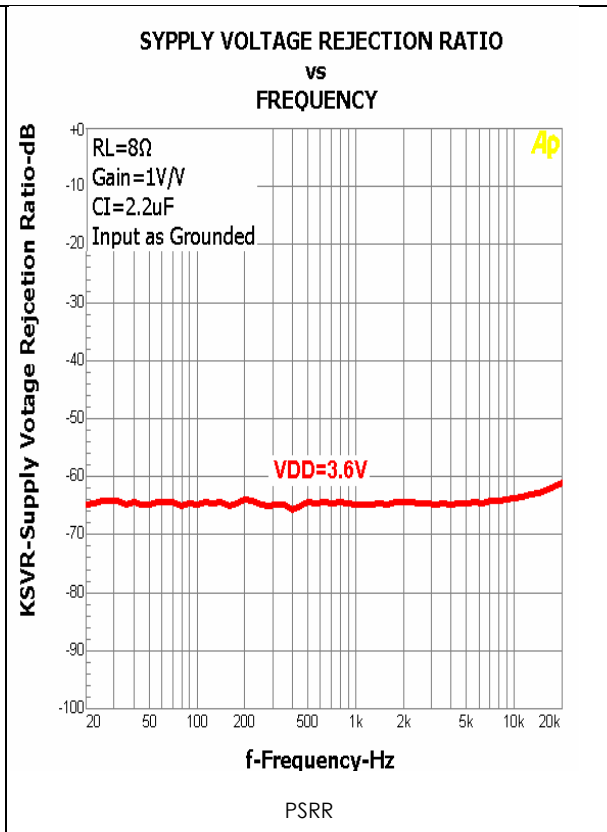
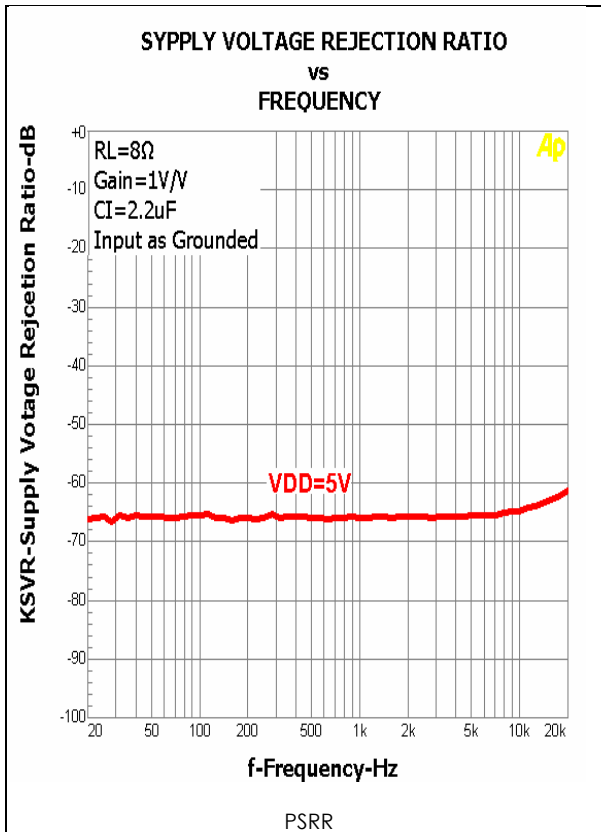


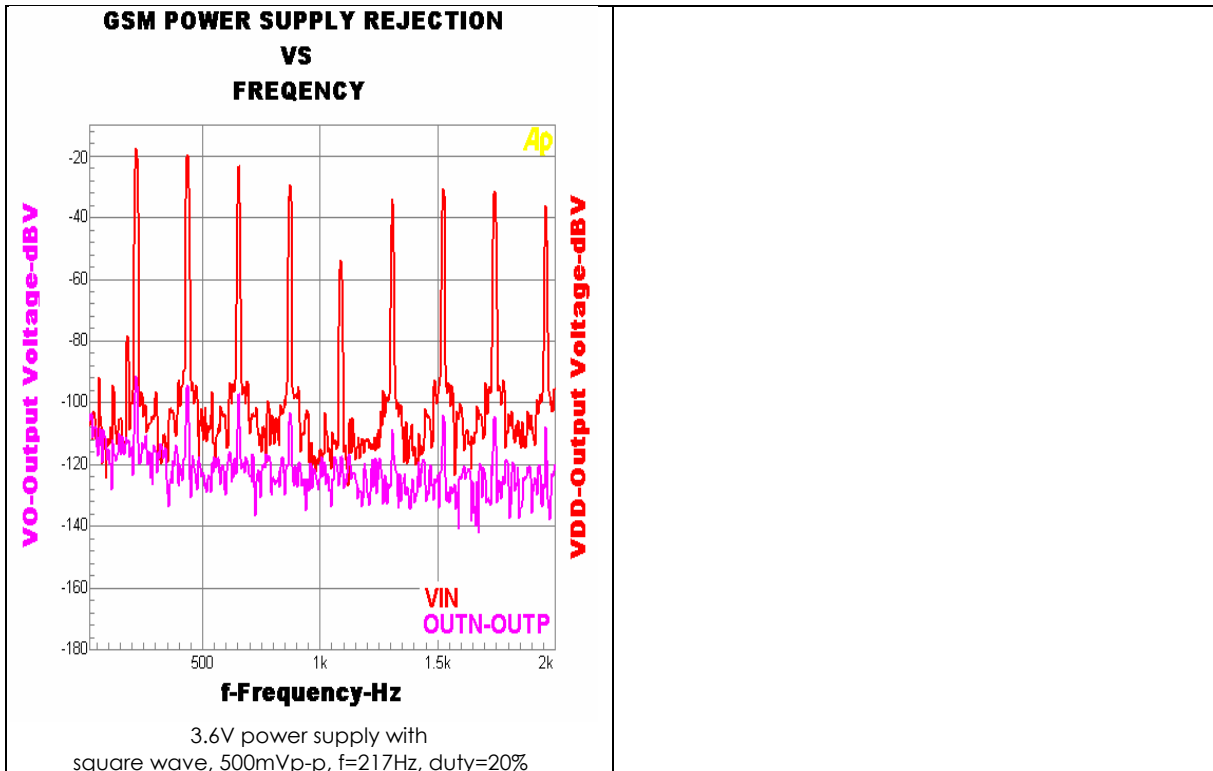
Differential Input



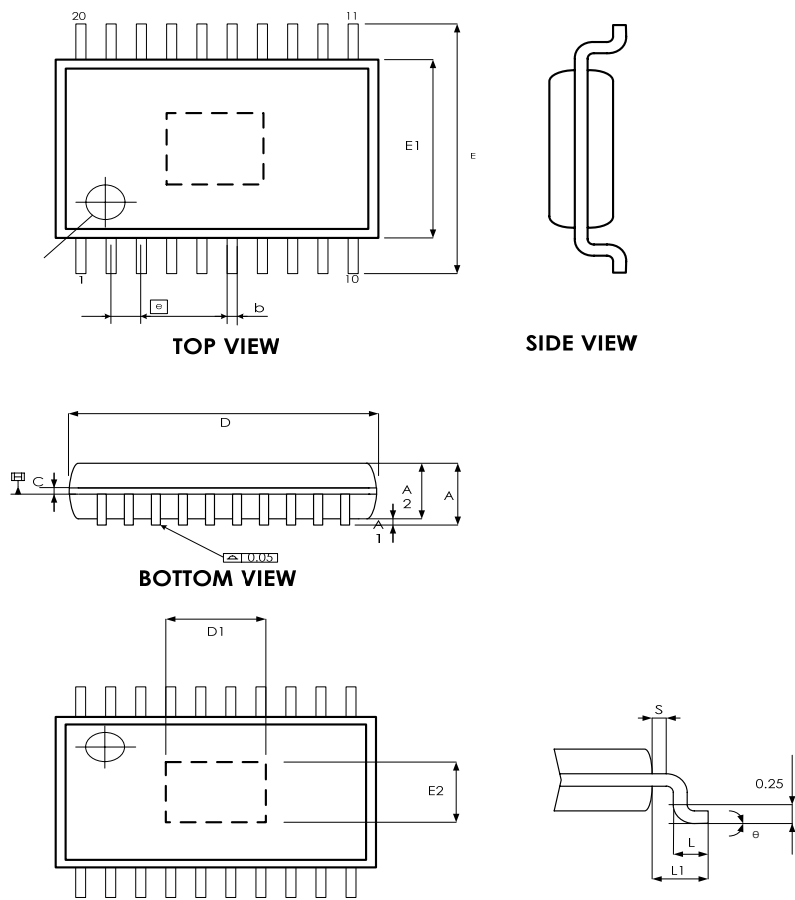
Differential Input







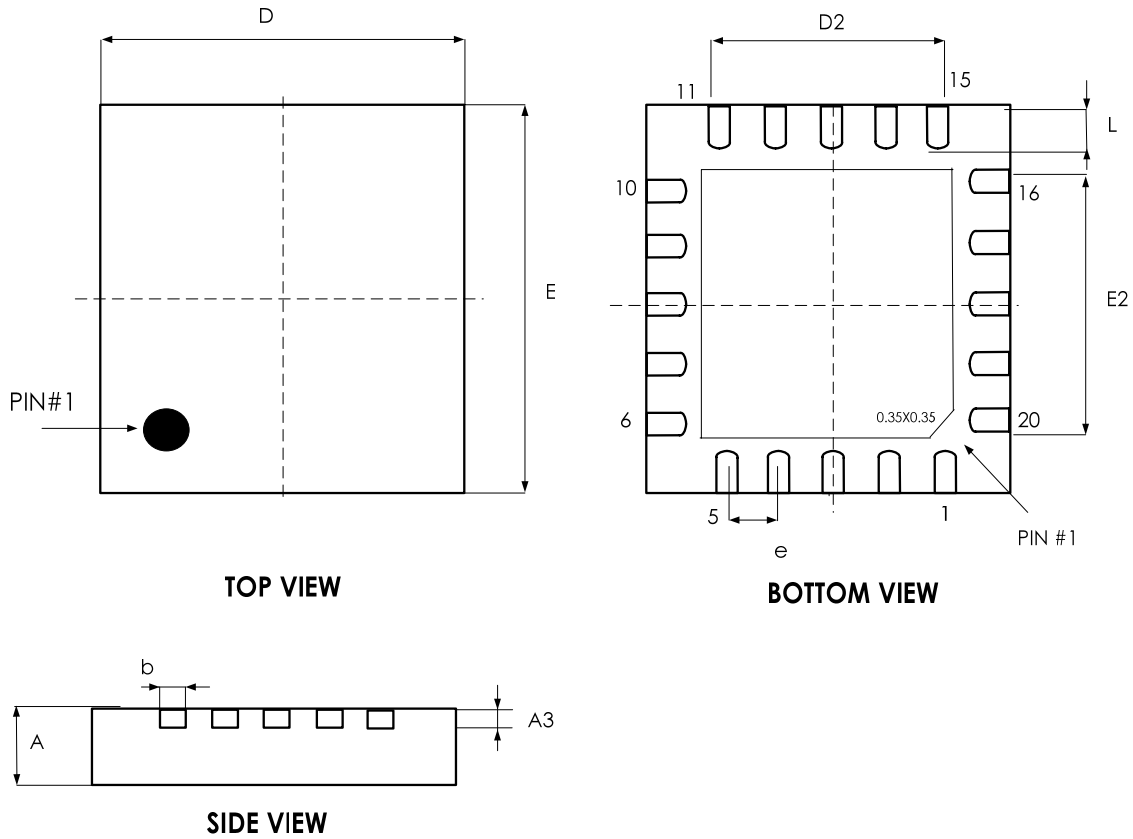
TSSOP-20FD OUTLINE DIMENSION



SYMBOLS	MIN	NOM	MAX
A	-	-	1.20
A1	0.05	-	0.15
a2	0.80	0.90	1.05
b	0.19	-	0.30
C	0.09	-	0.20
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.40 BSC		
e	0.65 BSC		
L1	1.00 BSC		
L	0.50	0.60	0.75
S	0.20	-	-
θ	0°	-	8°

Unit : mm

TQFN-20



SYMBOL	COMMON					
	DIMENSIONS MILLIMETER			DIMENSIONS INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.027	0.029	0.031
A3	0.203 REF			0.008 REF		
b	0.20	0.25	0.30	0.007	0.009	0.011
D	3.95	4.00	4.10	0.113	0.156	0.159
E	3.95	4.00	4.10	0.113	0.156	0.159
e	0.50 BSC			0.021 BSC		
L	0.50	0.55	0.60	0.019	0.021	0.023
D2	2.15	2.25	2.35	0.083	0.087	0.091
E2	2.15	2.25	2.35	0.083	0.087	0.091

Revision History

Revision	Date	Description
2.0	2009.06.05	EMP transferred from version 1.1

Important Notice

All rights reserved.

No part of this document may be reproduced or duplicated in any form or by any means without the prior permission of ESMT.

The contents contained in this document are believed to be accurate at the time of publication. ESMT assumes no responsibility for any error in this document, and reserves the right to change the products or specification in this document without notice.

The information contained herein is presented only as a guide or examples for the application of our products. No responsibility is assumed by ESMT for any infringement of patents, copyrights, or other intellectual property rights of third parties which may result from its use. No license, either express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of ESMT or others.

Any semiconductor devices may have inherently a certain rate of failure. To minimize risks associated with customer's application, adequate design and operating safeguards against injury, damage, or loss from such failure, should be provided by the customer when making application designs.

ESMT's products are not authorized for use in critical applications such as, but not limited to, life support devices or system, where failure or abnormal operation may directly affect human lives or cause physical injury or property damage. If products described here are to be used for such kinds of application, purchaser must do its own quality assurance testing appropriate to such applications.