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

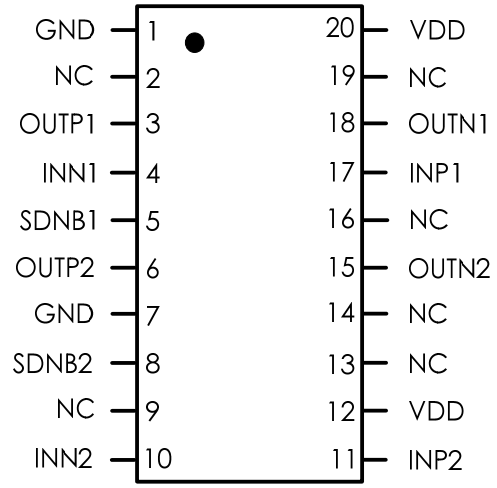
- 2.7 W/Ch Into 4Ω From a 5-V Supply at THD = 10% (Typ)
- Low Supply Current: 9mA (Typ) at 5 V
- Shutdown Current: 0.1 µA (Typ)
- Fast Startup With Minimal Pop
- Improved PSRR (-65 dB) and Wide Supply Voltage (2.2 V to 5.5 V) for Direct Battery Operation
- Fully Differential Design Reduces RF Rectification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

Applications

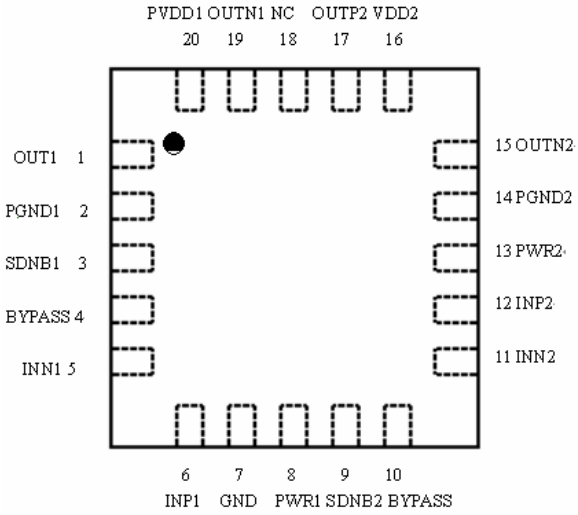
- PMPs
- Desktop
- Notebook

CONNECTION DIAGRAM

TSSOP-20FD



TQFN-20



ORDER INFORMATION

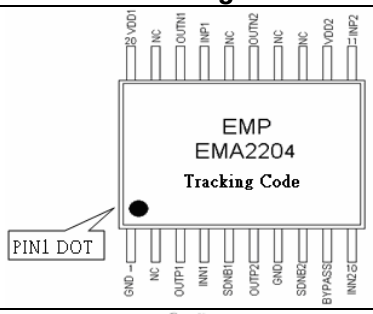
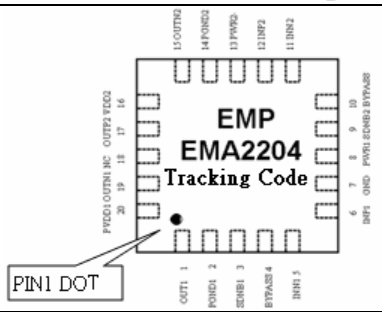
EMA2204-50QE20GRR/NRR

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

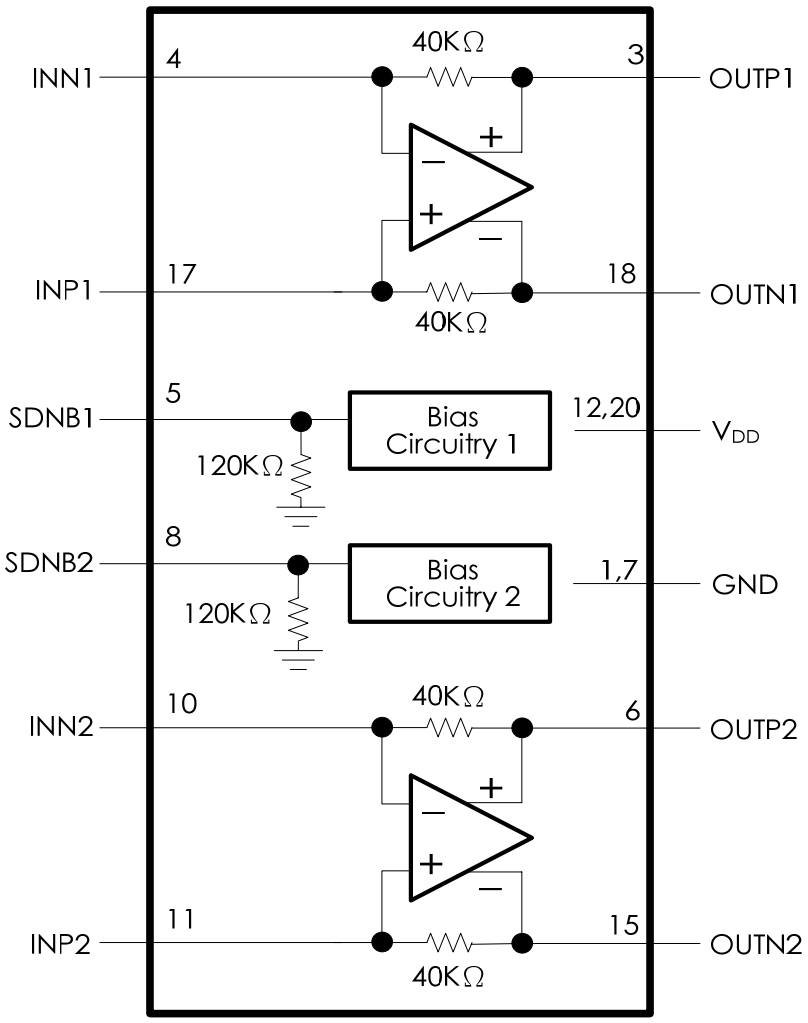
EMA2204-50HC20NRR

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		2.5K units Tape & Reel
TQFN-20	EMA2204-50HC20NRR		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	Supply Voltage	2.2V ≦ VDD ≦ 5.5V
	MM 200V		
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, Io = 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 =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, Io = 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 = 4Ω R_L = 8Ω	 0.62 0.4		W
		THD+N = 1%(max), f = 1kHz R_L = 4Ω R_L = 8Ω	 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

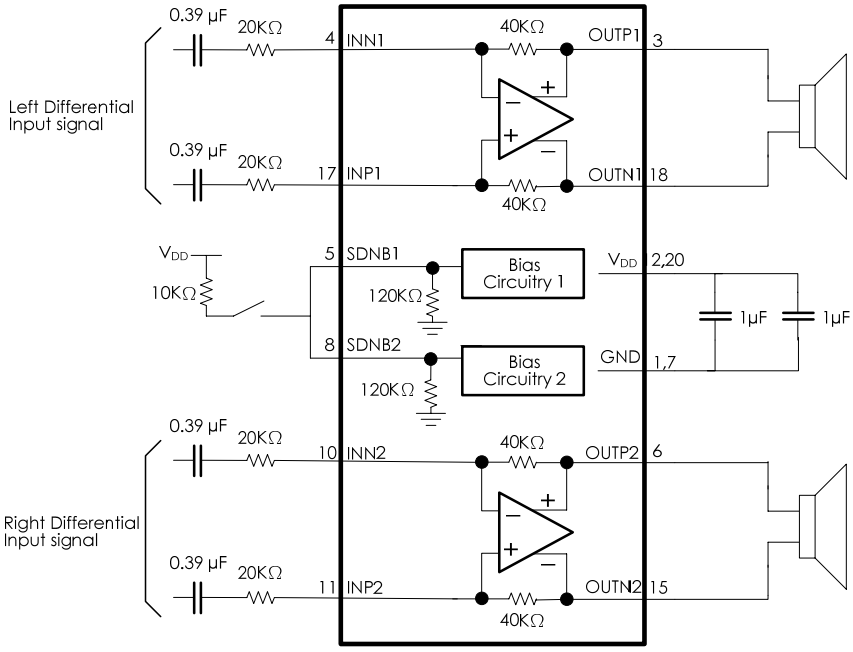


Fig1. Typical Differential Input Application with A_V=2

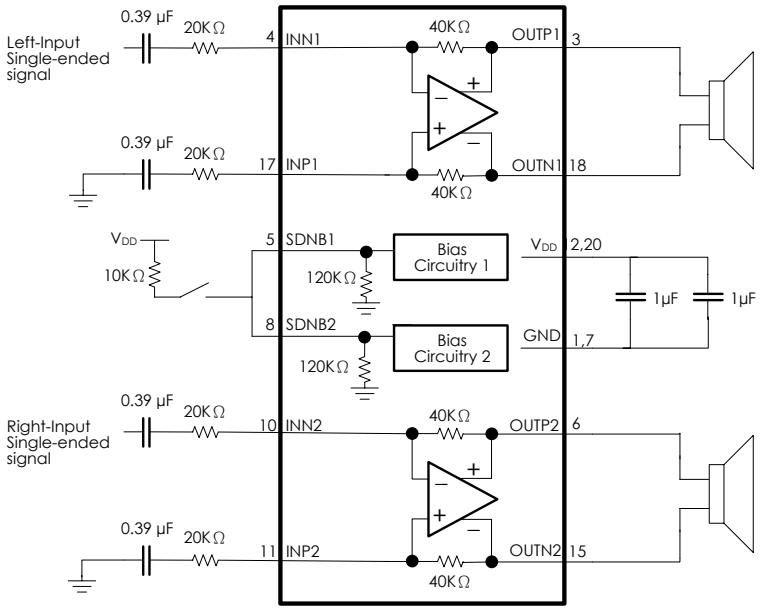
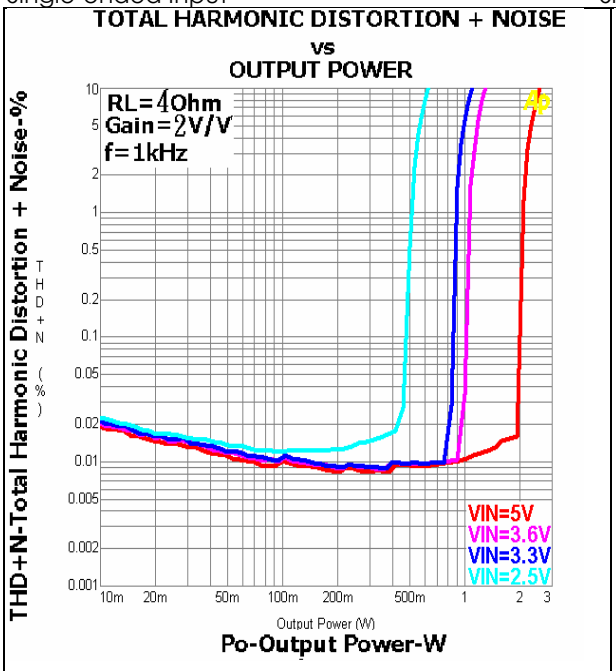


Fig2. Typical Single-ended Input Application with A_V=2

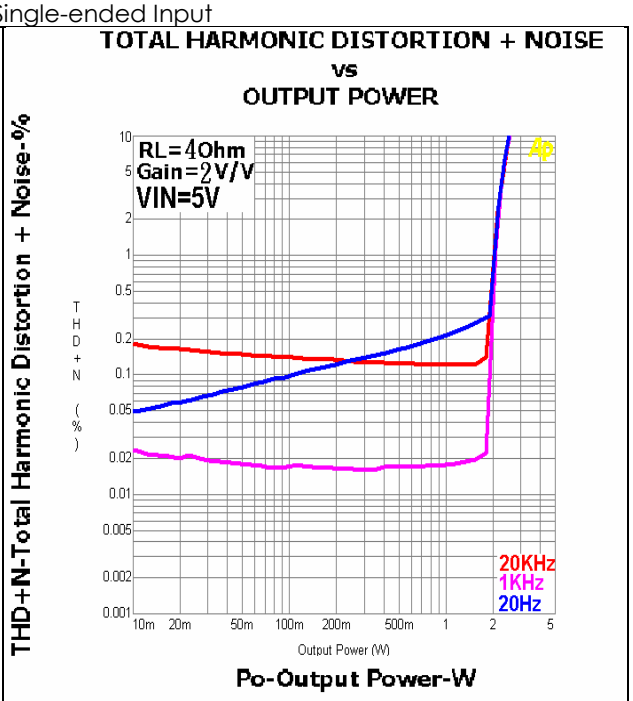
Typical Performance Characteristics

Single-ended Input



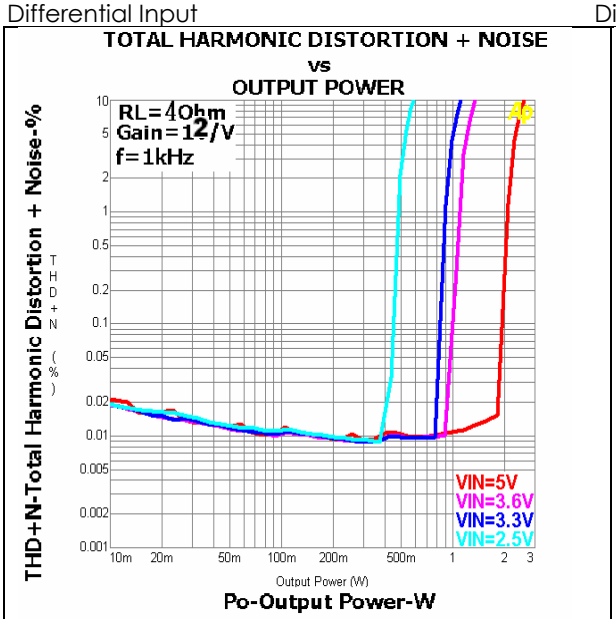
THD + Noise vs Output Power

Single-ended Input



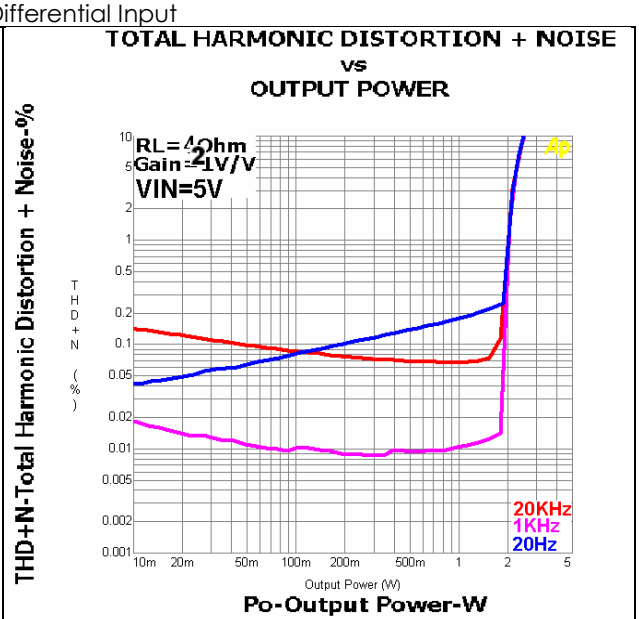
THD + Noise vs Output Power

Differential Input

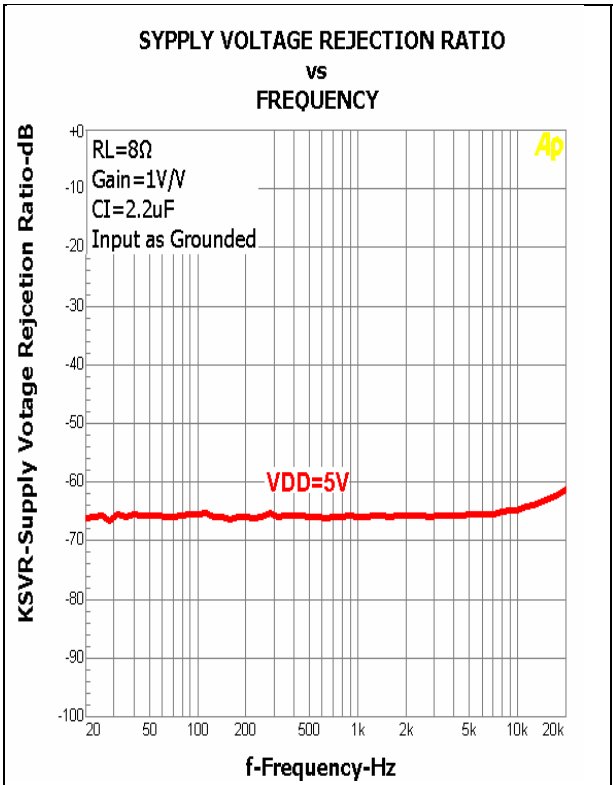


THD + Noise vs Output Power

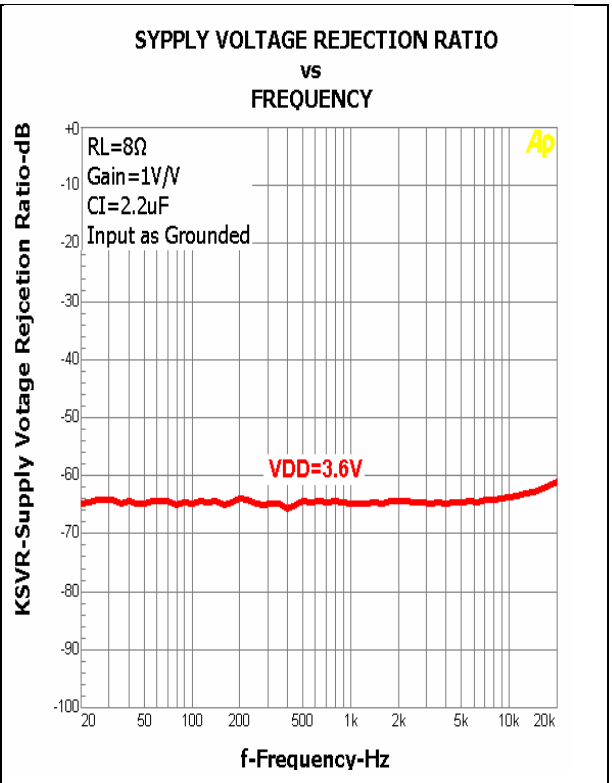
Differential Input



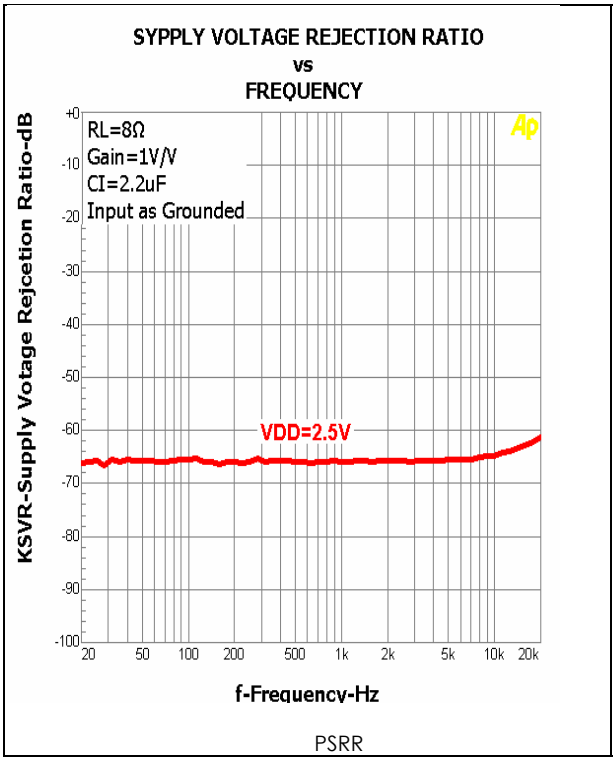
THD + Noise vs Output Power



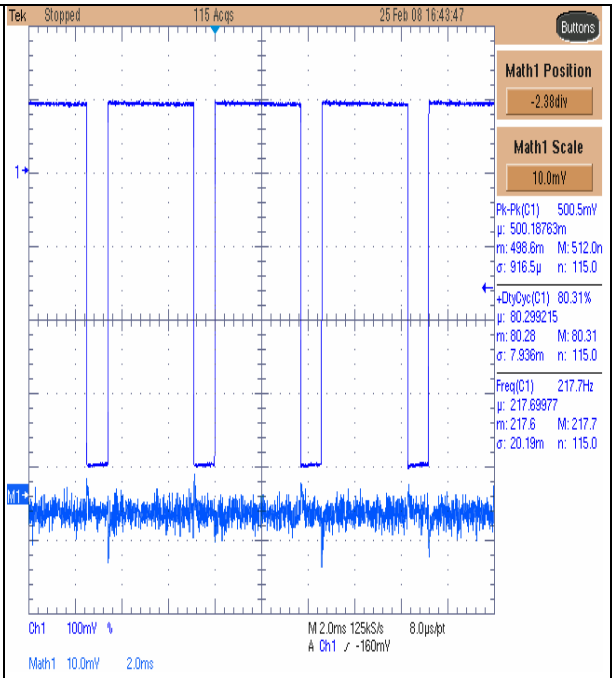
PSRR



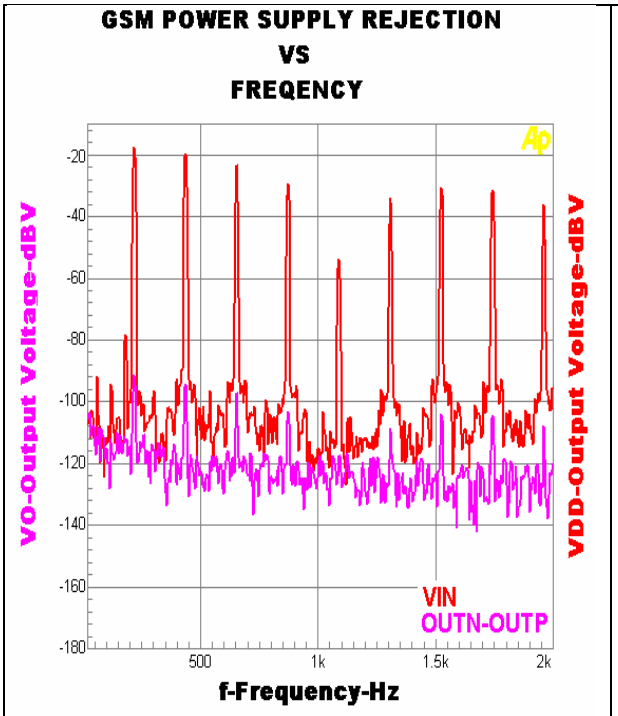
PSRR



PSRR

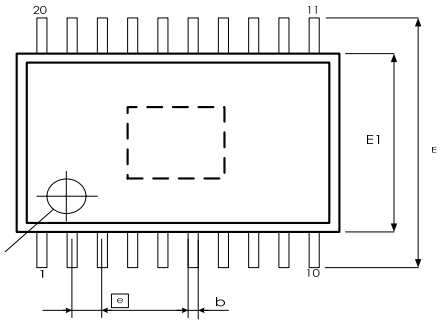


3.6V power supply with
square wave, 500mVp-p, f=217Hz, duty=20%

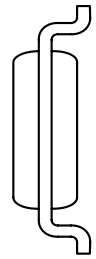


3.6V power supply with
square wave, 500mVp-p, f=217Hz, duty=20%

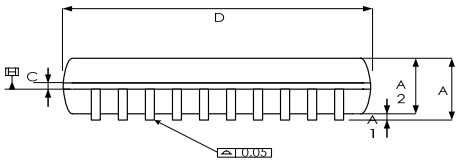
TSSOP-20FD OUTLINE DIMENSION



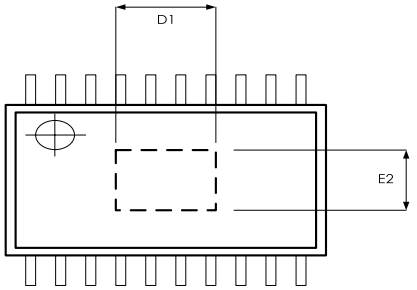
TOP VIEW

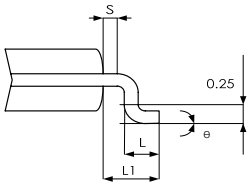


SIDE VIEW



BOTTOM VIEW

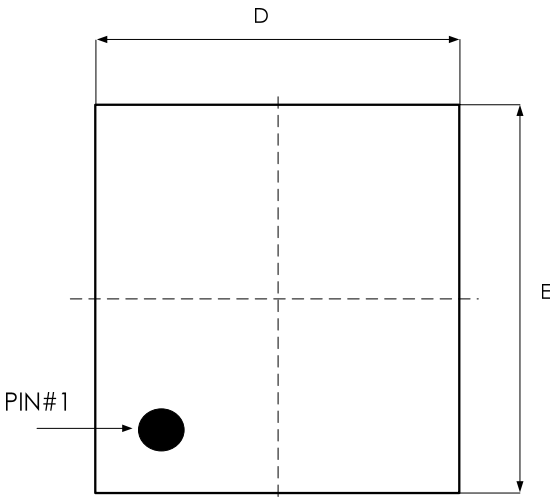




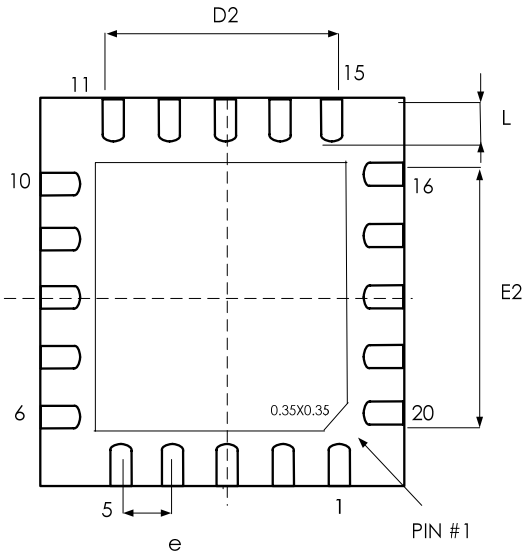
SYMBOLS	MIN	NOM	MAX
A	-	-	1.20
A1	0.05	-	0.15
a2	0.80	0.90	1.05
b	0.19	-	0.30
C	0.09	-	0.20
D	6.40	6.50	6.60
E1	4.30	4.40	4.50
E	6.40 BSC		
e	0.65 BSC		
L1	1.00 BSC		
L	0.50	0.60	0.75
S	0.20	-	-
θ	0°	-	8°

Unit : mm

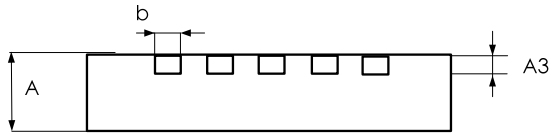
TQFN-20



TOP VIEW



BOTTOM VIEW



SIDE VIEW

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

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