LOW VOLTAGE MICROPHONE AMPLIFIER for PORTABLE AUDIO

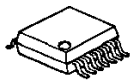
■ GENERAL DESCRIPTION

The **NJM2173** is a low voltage microphone amplifier designed for portable audio items.

It includes standby, two-type gain selector, and power ripple rejection adjustment circuit. It realizes very low turn-noise at standby mode.

It is suitable for portable Mini-Disc, portable Compact-Disc, and other microphone amplifier application.

■ PACKAGE OUTLINE



NJM2173AV

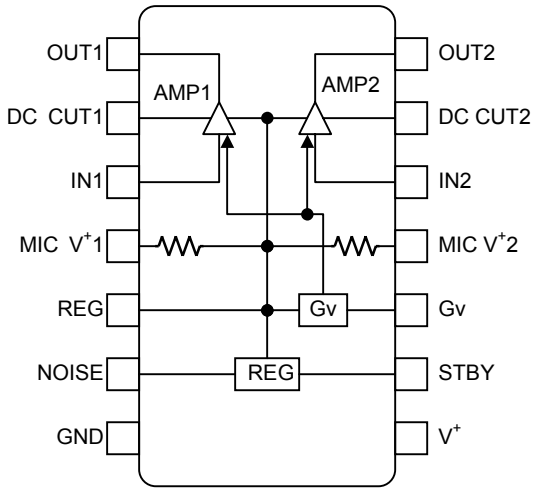
NJM2173AFPC1

NJM2173ASE4

■ FEATURES

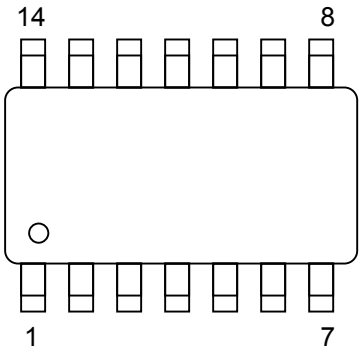
- Operating Voltage Range 2.7 to 4.5V
- Operating Current 2.2mA typ. at V^+=2.7V
- Supply Current in Standby Mode 1μA max.
- Maximum Output Voltage -1.5dBV typ. at THD=0.1%
- Internal Two-type Gain Select Function 13dB typ./ 29dB typ.
- Internal Standby Function
- Power Ripple Rejection Terminal 95dB typ. at Gv=13dB
- Bipolar Technology
- Package Outline SSOP14, FFP16, P-CSP16

■ BLOCK DIAGRAM



■ **PIN FUNCTION**

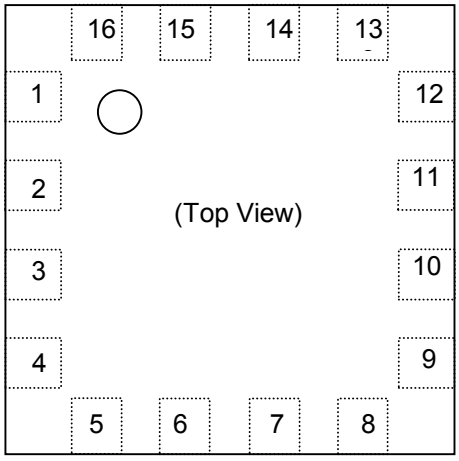
SSOP14



No.	SYMBOL	FUNCTION
1	OUT1	AMP1 Output
2	DC CUT1	DC Cut Capacitor 1
3	IN1	AMP1 Input
4	MIC V^+1	MIC1 Power Output
5	REG	Internal Regulator Output
6	NOISE	Internal Regulator Noise Rejection Capacitor
7	GND	Ground
8	V^+	Power Supply
9	STBY	Stand-By Control
10	Gv	Gain Select
11	MIC V^+2	MIC2 Power Output
12	IN2	AMP2 Input
13	DC CUT2	DC Cut Capacitor 2
14	OUT2	AMP2 Output

■ **PIN FUNCTION**

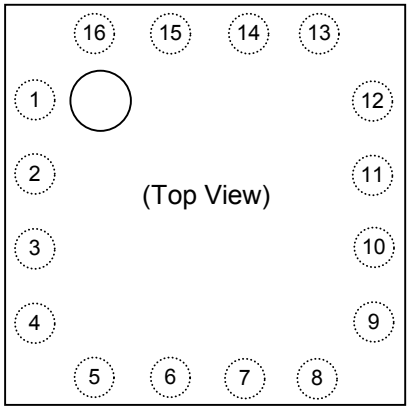
FFP16



No.	SYMBOL	FUNCTION
1	DC CUT2	DC Cut Capacitor 2
2	IN2	AMP2 Input
3	MIC V^+2	MIC2 Power Output
4	Gv	Gain Select
5	STBY	Stand-By Control
6	V^+	Power Supply
7	GND	Ground
8	NOISE	Internal Regulator Noise Rejection Capacitor
9	REG	Internal Regulator Output
10	MIC V^+1	MIC1 Power Output
11	IN1	AMP1 Input
12	DC CUT1	DC Cut Capacitor 1
13	OUT1	AMP1 Output
14	N.C.	No Connect
15	N.C.	No Connect
16	OUT2	AMP2 Output

■ **PIN FUNCTION**

P-CSP16



No.	SYMBOL	FUNCTION
1	DC CUT1	DC Cut Capacitor 1
2	IN1	AMP1 Input
3	MIC V^+1	MIC1 Power Output
4	REG	Internal Regulator Output
5	NOISE	Internal Regulator Noise Rejection Capacitor
6	GND	Ground
7	V^+	Power Supply
8	STBY	Stand-By Control
9	Gv	Gain Select
10	MIC V^+2	MIC2 Power Output
11	IN2	AMP2 Input
12	DC CUT2	DC Cut Capacitor 2
13	N.C.	No Connect
14	OUT2	AMP2 Output
15	OUT1	AMP1 Output
16	N.C.	No Connect

■ **ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	5	V
Maximum Input Voltage	V_{IN}	(IN1,IN2 pin) -0.3 to V_{REG}+0.3	V
Power Dissipation	P_D	SSOP14 ; 300 FFP16 ; 400 * P-CSP16 ; 690 *	mW
Operating Temperature Range	Topr	-20 to +75	°C
Storage Temperature Range	Tstg	-40 to +125	°C

*(Note) EIA/JEDEC STANDARD Test board (76.2 x 114.3 x 1.6mm, 4layers, FR4) mounting

■ **ELECRRICAL CHARACTERISTICS** (V^+=2.7V, Gv=13dB, V_{IN}=-40dBV, R_L=9kΩ, f=1kHz, Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage Range	V^+		2.7	-	4.5	V
Operating Current 1	$I_{CC}1$	Standby On:STBY= V^+	-	-	1.0	μA
Operating Current 2	$I_{CC}2$	G_V=29dB,No Signal,Standby Off :STBY=GND	-	2.2	2.8	mA
Output Voltage	V_O	No Signal	1.28	1.35	1.42	V
Voltage Gain 1	G_V1	10pin=L	12	13	14	dB
Voltage Gain 2	G_V2	10pin=H	28	29	30	dB
Maximum Output Voltage	V_{OM}	THD=0.1%	-2.7	-1.5	-	dBV
Total Harmonic Distortion	THD1	V_O=-28.2dBV	-	0.013	0.026	%
	THD2	G_V=29dB, V_O=-28.2dBV	-	0.05	0.1	%
Output Noise Voltage	$V_{NO}1$	Rg=600Ω, A-Weighted	-	-105 (5.63)	-100 (10)	dBV (μVrms)
	$V_{NO}2$	Rg=600Ω, A-Weighted, G_V=29dB	-	-95 (17.8)	-90 (32)	dBV (μVrms)
Channel Separation	CS1	Rg=600Ω, V_{IN}=-18dBV	-	105	-	dB
	CS2	Rg=600Ω, V_{IN}=-34dBV, Gv=29dB	80	90	-	dB
Supply Voltage Rejection Ratio	SVR1	V^+=3V, ΔV^+=-20dBV, Rg=600Ω	-	95	-	dB
	SVR2	V^+=3V, ΔV^+=-20dBV, Rg=600Ω G_V=29dB	70	80	-	dB
Microphone Regulator Output Voltage	V_{REG}	R_L=3.55kΩ	2.3	2.42	2.54	V
High Level Input Voltage G	V_{IHG}	Gv Termial	2.0	-	V^+	V
Low Level Input Voltage G	V_{ILG}	Gv Terminal	0	-	0.5	V
High Level Input Voltage S	V_{IHS}	STBY Terminal	V^+-0.5	-	V^+	V
Low Level Input Voltage S	V_{ILS}	STBYTerminal	0	-	V^+-2.0	V

■ **CONTROL TERMINAL EXPLANATION**

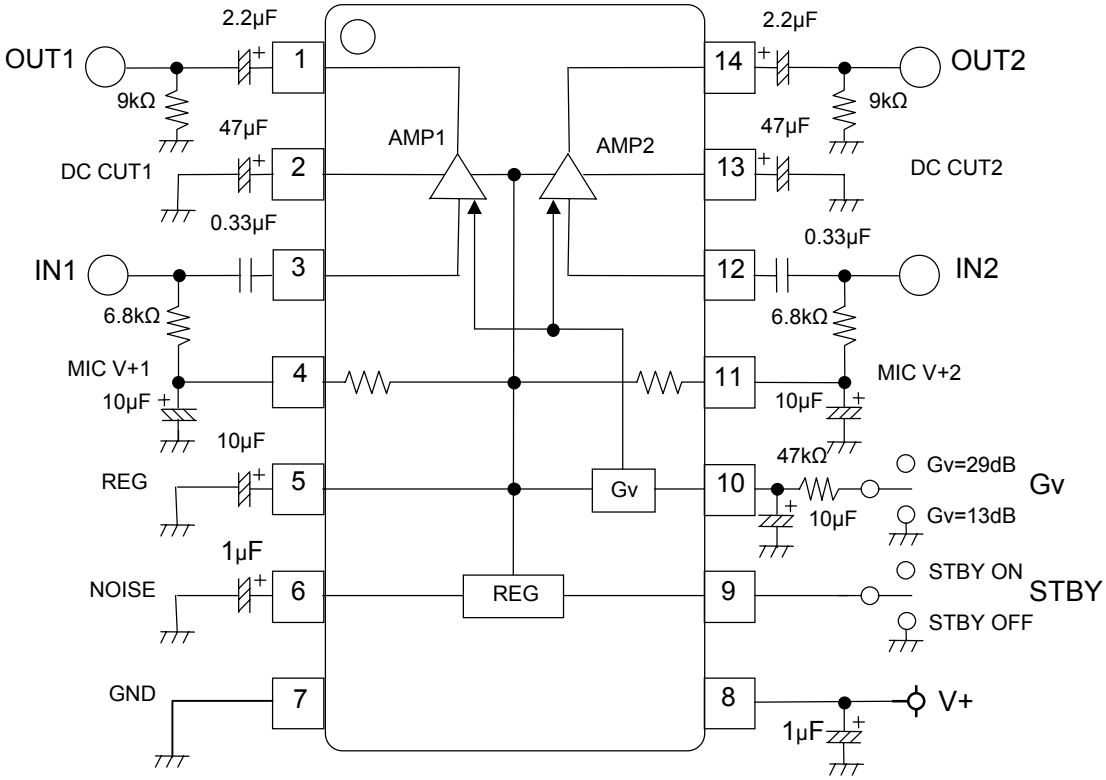
● **STBY (SSOP14;9Pin FFP16;5Pin ,P-CSP16;8Pin)**

PARAMETER	CONTROL SIGNAL	STATUS
STANDBY OFF	L	IC is active.
STANDBY ON	H	IC is non-active.

● **Gv (SSOP14;10Pin FFP16;4Pin ,P-CSP16;9Pin)**

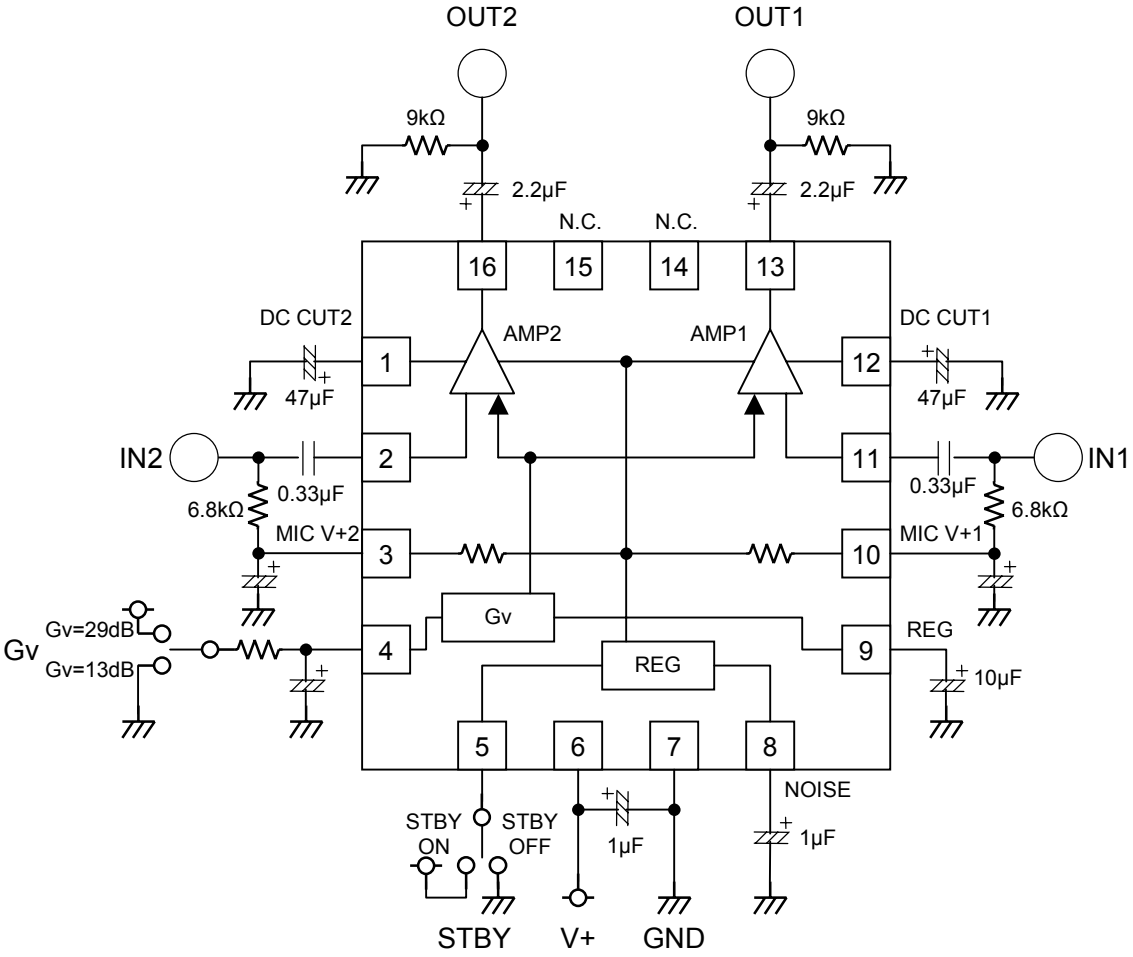
PARAMETER	CONTROL SIGNAL	STATUS
Gv1	L	IC set up 13dB typ. voltage gain.
Gv2	H	IC set up 29dB typ. voltage gain.

■ **APPLICATION CIRCUIT (SSOP14)**



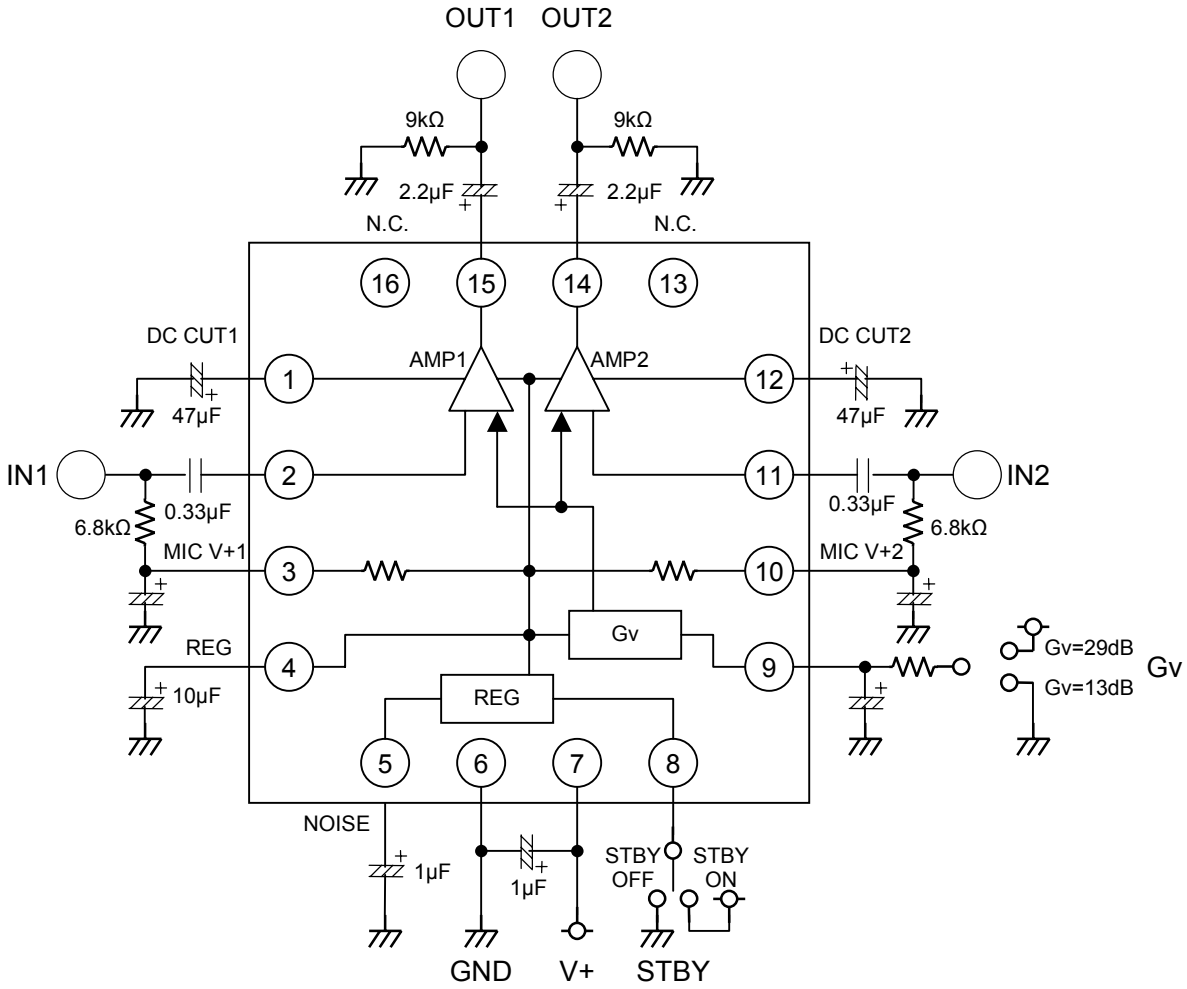
■ **APPLICATION CIRCUIT (FFP16)**

(Top View)

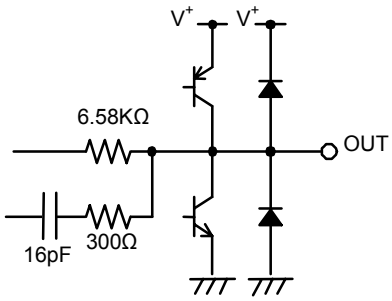
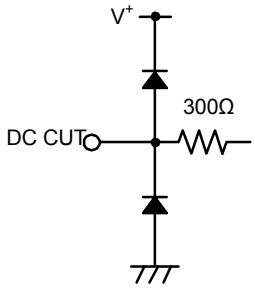
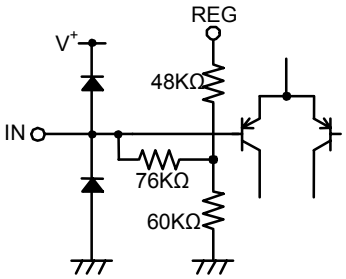
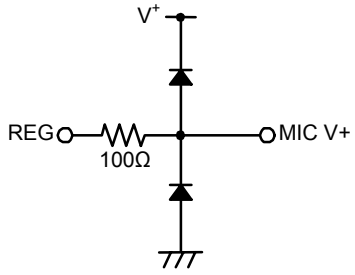
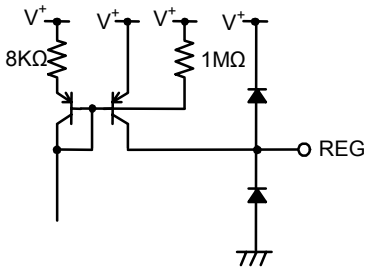


■ **APPLICATION CIRCUIT (P-CSP16)**

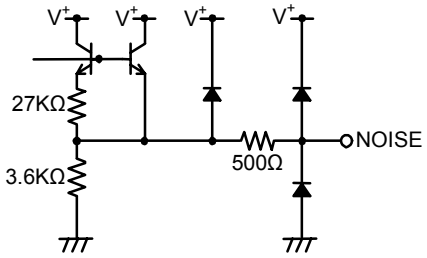
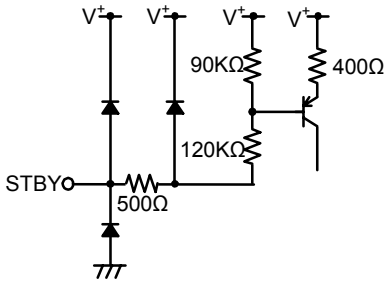
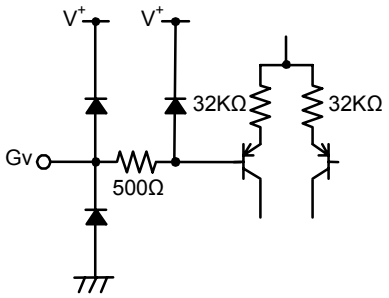
(Top View)



■TERMINAL DESCRIPTION

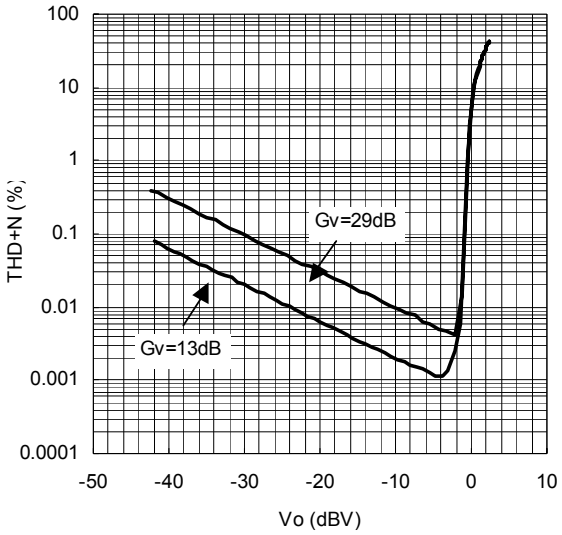
PIN No.			SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	TERMINAL VOLTAGE
SSOP	FFP	PCSP				
1 14	13 16	15 14	OUT1 OUT2	AMP1 Output AMP2 Output		1.35V
2 13	12 1	1 12	DC CUT1 DC CUT2	DC Cut Capacitor 1 DC Cut Capacitor 2		1.35V
3 12	11 2	2 11	IN1 IN2	AMP1 Input AMP2 Input		1.35V
4 11	10 3	3 10	MIC V+1 MIC V+2	MIC1 Power Output MIC2 Power Output		2.42V
5	9	4	REG	Internal Regulator Output		2.42V

■TERMINAL DESCRIPTION

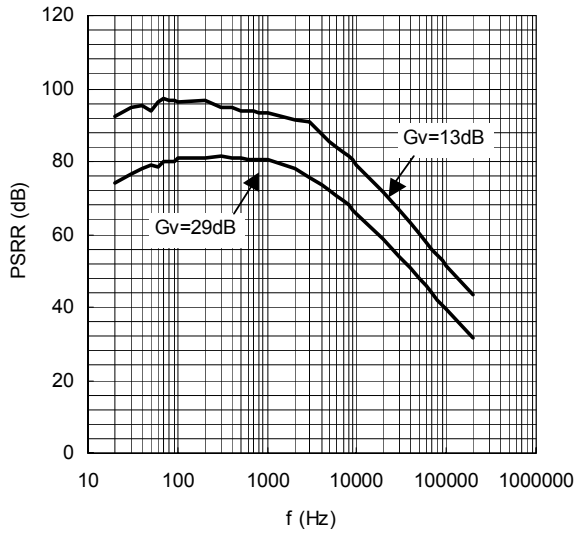
PIN No.			SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	TERMINAL VOLTAGE
SSOP	FFP	PCSP				
6	8	5	NOISE	Internal Regulator Noise Rejection Capacitor		0.54V
9	5	8	STBY	Stand-By Control		-
10	4	9	Gv	Gain Select		-

■ TYPICAL CHARACTERISTICS

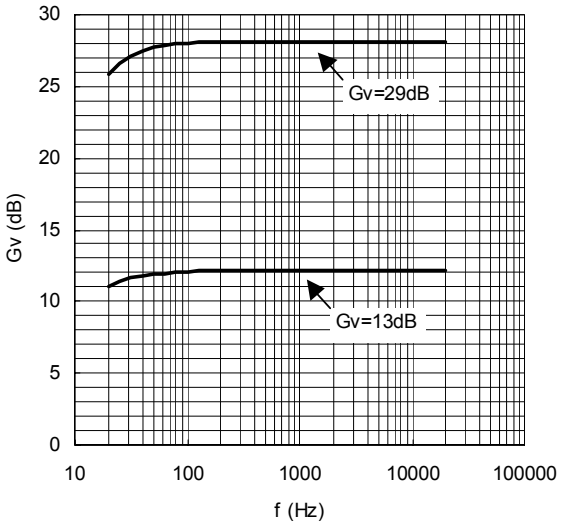
THD vs Vo



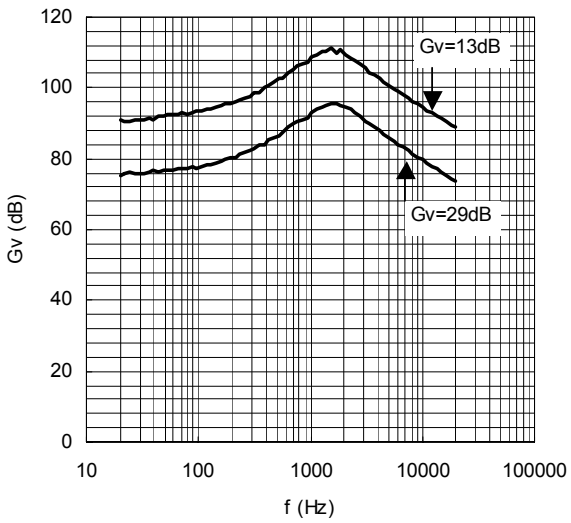
PSRR vs Frequency



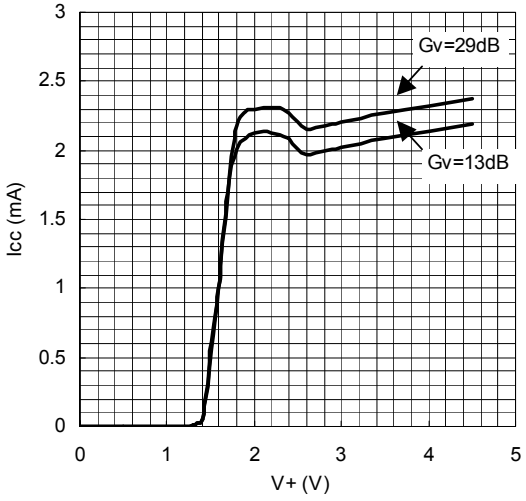
Gv vs Frequency



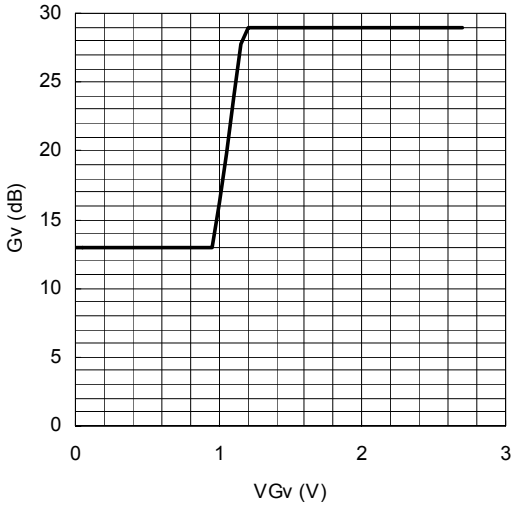
Channel Sepalation



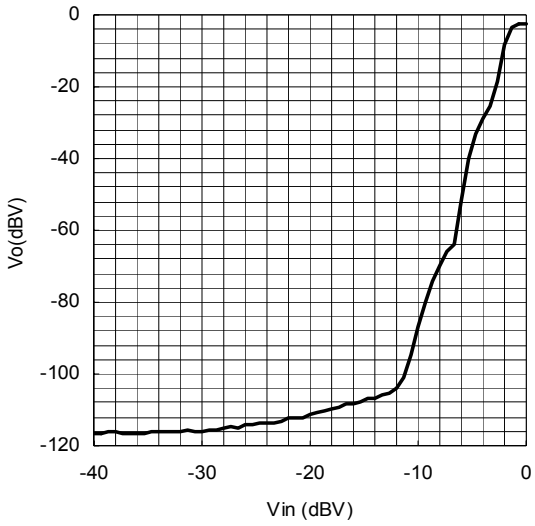
Icc vs V+



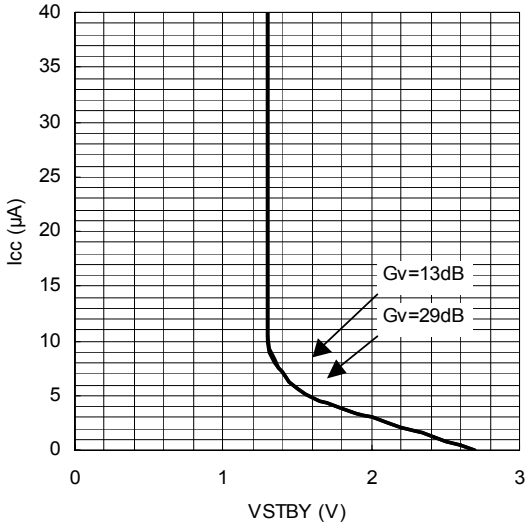
Gv vs VGv



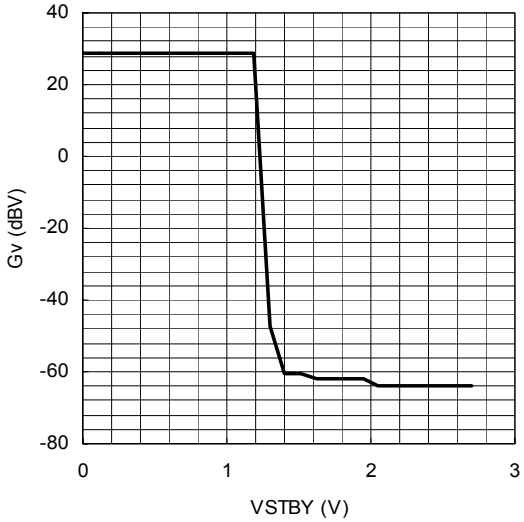
Vo vs Vin
(STBY)



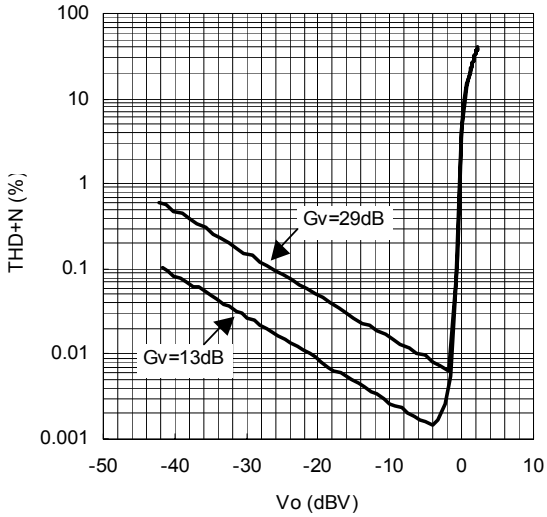
Icc vs VSTBY



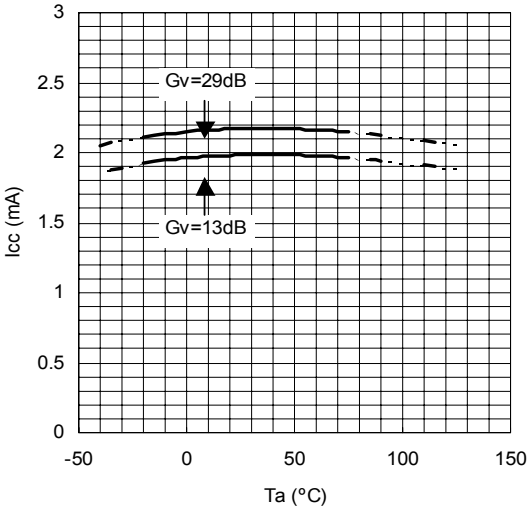
Gv vs VSTBY



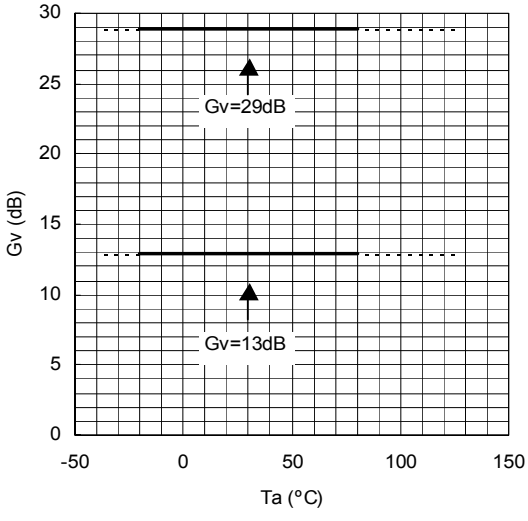
THD vs Vo



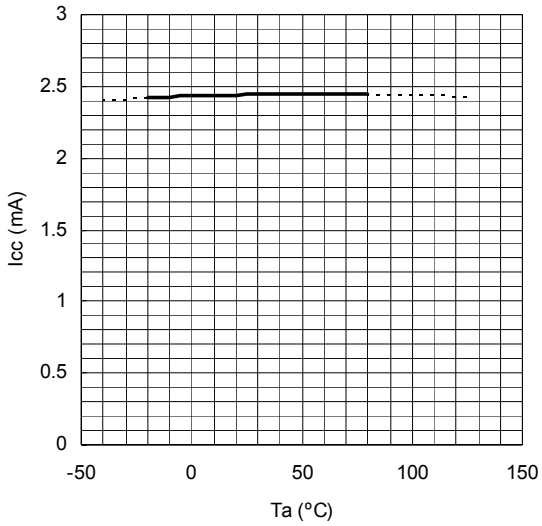
Icc2 vs Ta



Gv vs Ta



VREG vs Ta



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