

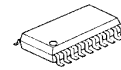
## 3-Channels Differential Output Line Amplifier

### ■ GENERAL DESCRIPTION

The **NJW1241** is a differential output 3-channel audio line amplifier for High Voltage Pre-out of Car AV system. It can swing 5Vrms(14.1V peak-to peak) signal at 8V operating voltage /single-end output because of including the charge pump circuit.

Ground-referenced outputs eliminate output coupling capacitor. The pop noise suppression circuit reduces a pop noise at the power-on and power-off.

### □ PACKAGE OUTLINE

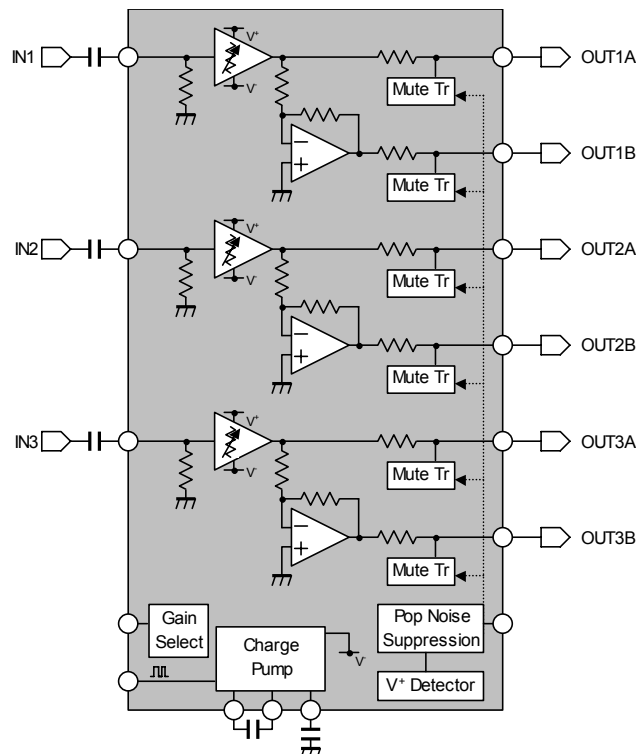


NJW1241V

### ■ FEATURES

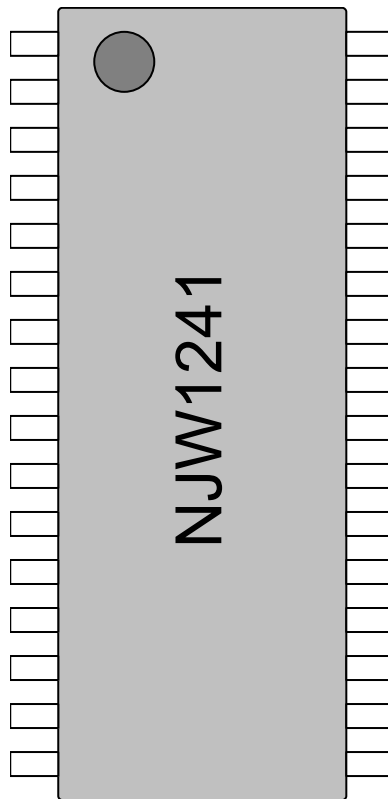
- ℓ Operating Voltage 6.0V to +10V
- ℓ Operating Current  $I_{DD}=12\text{mA typ.}$   
at  $V^+=8\text{V}$ ,  $R_L=47\text{k}\Omega$ , No Signal
- ℓ Maximum Output Voltage 5.0Vrms min. @single-end output
- ℓ Low Distortion 0.004% typ
- ℓ Output Coupling Capacitor-less
- ℓ External Synchronizing Divide-by-2
- ℓ Pop Noise Suppression Circuit
- ℓ External Mute
- ℓ Gain Select +6dB/+8dB
- ℓ RF Immunity OpAmp tolerant to FR noise. (ex. mobile phone)
- ℓ Bi-CMOS Technology
- ℓ Package Outline SSOP32

### ■ BLOCK DIAGRAM



# NJW1241

## ■ PIN CONFIGURATION



No.	Symbol	Function	No.	Symbol	Function
1	IN1	Input 1	17	NC	No Connect
2	REF1	Reference 1	18	FB	V- Power Supply External Setting
3	IN2	Input 2	19	CP	Flying Capacitor Positive Terminal
4	REF2	Reference 2	20	NC	No Connect
5	IN3	Input 3	21	NC	No Connect
6	REF3	Reference 3	22	GND	Ground
7	MUTE	MUTE / Pop Noise Suppression	23	CN	Flying Capacitor Negative Terminal
8	GAIN	Gain Select	24	MUTE_TC	Pop Noise Suppression Capacitor
9	V <sup>-</sup> IN	V- Power Input	25	V <sup>+</sup> A	V+ Power Supply for Analog
10	V <sup>-</sup> OUT	V- Power Output	26	GND	Ground
11	RegCNT	V- Power Control	27	OUT3B	Output 3B
12	NC	No Connect	28	OUT3A	Output 3A
13	NC	No Connect	29	OUT2B	Output 2B
14	CLK	External Clock Input	30	OUT2A	Output 2A
15	V <sup>+</sup> Reg	V+ Power Supply for Regulator	31	OUT1B	Output 1B
16	NC	No Connect	32	OUT1A	Output 1A

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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sup>+</sup>	10.5	V
CLK Terminal Voltage	V <sub>CLK</sub>	-0.3 ~ +6	V
V <sup>-</sup> Power Supply Control Voltage	V <sub>RegCNT</sub>	-0.3 ~ +6	V
FB Terminal Voltage	V <sub>FB</sub>	(V <sub>OUT</sub> )+6	V
Maximum Input Voltage	V <sub>IN</sub>	V <sup>+</sup> +0.3	V
Power Dissipation	P <sub>D</sub>	905 <sup>(Note1)</sup>	mW
Operating Temperature Range	Topr	-40 ~ +85	°C
Storage Temperature Range	Tstg	-40 ~ +125	°C

(Note1) EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting

**□ RECOMMENDED OPERATING CONDITIONS**

(Ta=25°C unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sup>+</sup>		6	8	10	V
External Clock Input Range <sup>(Note2)</sup>	f <sub>CLK</sub>		150	-	1250	kHz
External Clock Duty Input Range	DUTY		45	-	80	%

(Note2) The regulator for V<sup>-</sup> power supply operates by the half of f<sub>CLK</sub>.

**■ ELECTRICAL CHARACTERISTICS**

(Ta=25°C, V<sup>+</sup>=8V, f=1kHz, V<sub>in</sub>=0dBV, R<sub>L</sub>=47kΩ, GAIN=Low, MUTE=High, RegCNT=High unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I <sub>DD</sub>	No signal	-	12	20	mA
Voltage Gain1	G <sub>V1</sub>		5.5	6	6.5	dB
Voltage Gain2	G <sub>V2</sub>	GAIN=High	7.5	8	8.5	dB
Maximum Output Voltage	V <sub>OMAX</sub>	THD=1%,	5	-	-	V <sub>rms</sub>
Mute Level	V <sub>MUTE</sub>	MUTE=Low	-	-100	-80	dB
S/N Ratio	V <sub>NO1</sub>	V <sub>in</sub> =500mV <sub>rms</sub> , A=Weighted Differential Output	-	100	-	dB
Total Harmonic Distortion	THD	BW:400Hz-22kHz, Differential Output	-	0.004	-	%
Channel Separation	CS	R <sub>g</sub> =600Ω	80	-	-	dB
Internal Oscillating Frequency	f <sub>OSC</sub>	f <sub>CLK</sub> =No signal	-	300	-	kHz

**■ CONTROL CHARACTERISTICS**

(Ta=25°C, V<sup>+</sup>=8V, f=1kHz, V<sub>in</sub>=0dBV, R<sub>L</sub>=47kΩ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Mute Terminal High	Mute <sub>H</sub>	MUTE OFF	2.3	-	V <sup>+</sup>	V
Mute Terminal Low	Mute <sub>L</sub>	MUTE ON	0	-	0.7	V
Gain Terminal High	Gain <sub>H</sub>	G <sub>v</sub> =8dB	2.3	-	V <sup>+</sup>	V
Gain Terminal Low	Gain <sub>L</sub>	G <sub>v</sub> =6dB	0	-	0.7	V
CLK Terminal High	CLK <sub>H</sub>		2.3	-	5.5	V
CLK Terminal Low	CLK <sub>L</sub>		0	-	0.7	V

## ■ TERMINAL DESCRIPTION

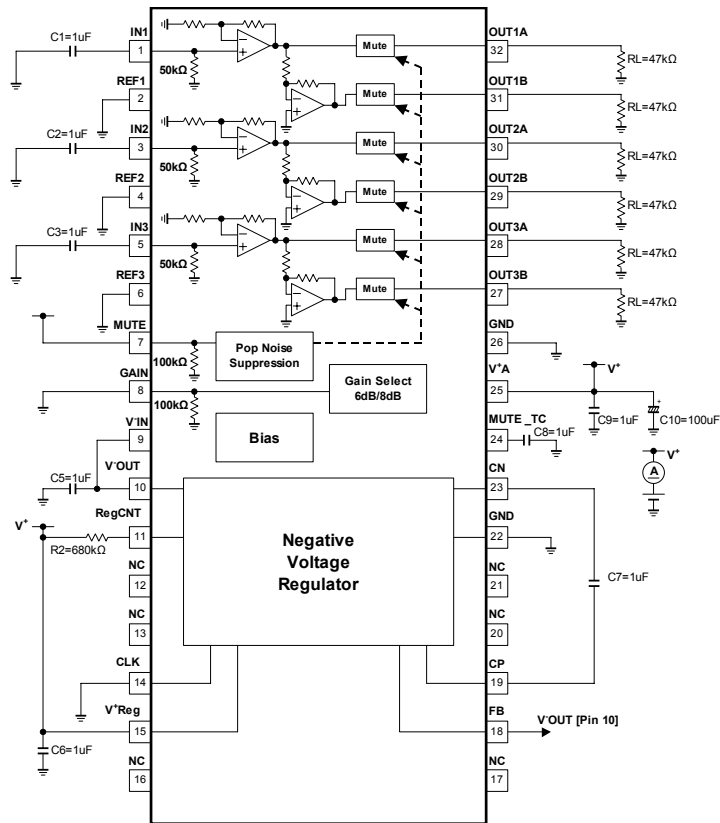
Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
1 3 5	IN1 IN2 IN3	INPUT1 INPUT2 INPUT3		0V
2 4 6	REF1 REF2 REF3	Reference1 Reference2 Reference3		0V
7 8	MUTE GAIN	MUTE/Pop Noise Suppression Gain Select		0V
11	RegCNT	V- Power Control		0V
14	CLK	External Clock Input		0V

## ■ TERMINAL DESCRIPTION

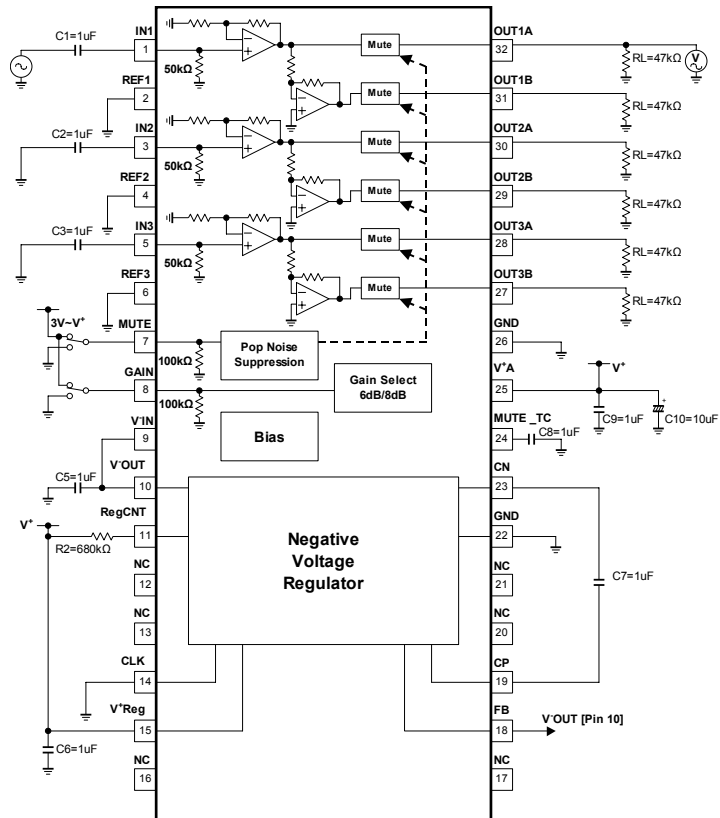
Terminal	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
18	FB	V- Power Supply External Setting		-
19	CP	Flying Capacitor Positive Terminal		-
23	CN	Flying Capacitor Negative Terminal		-
24	MUTE_TC	Pop Noise Suppression Capacitor		0V
27 28 29 30 31 32	OUT6 OUT5 OUT4 OUT3 OUT2 OUT1	Output6 Output5 Output4 Output3 Output2 Output1		0V

# NJW1241

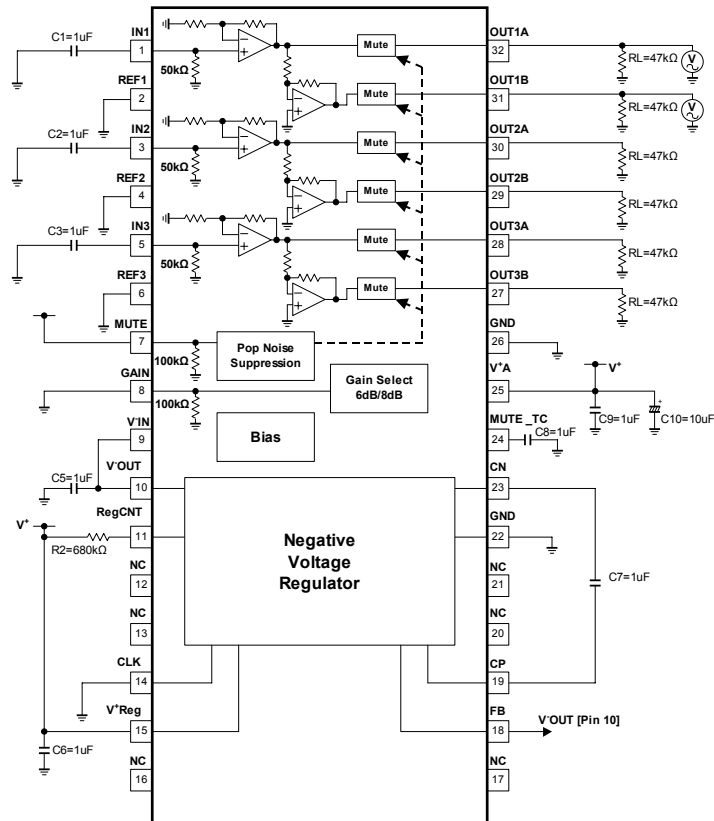
## TEST CIRCUIT ( $I_{DD}$ )



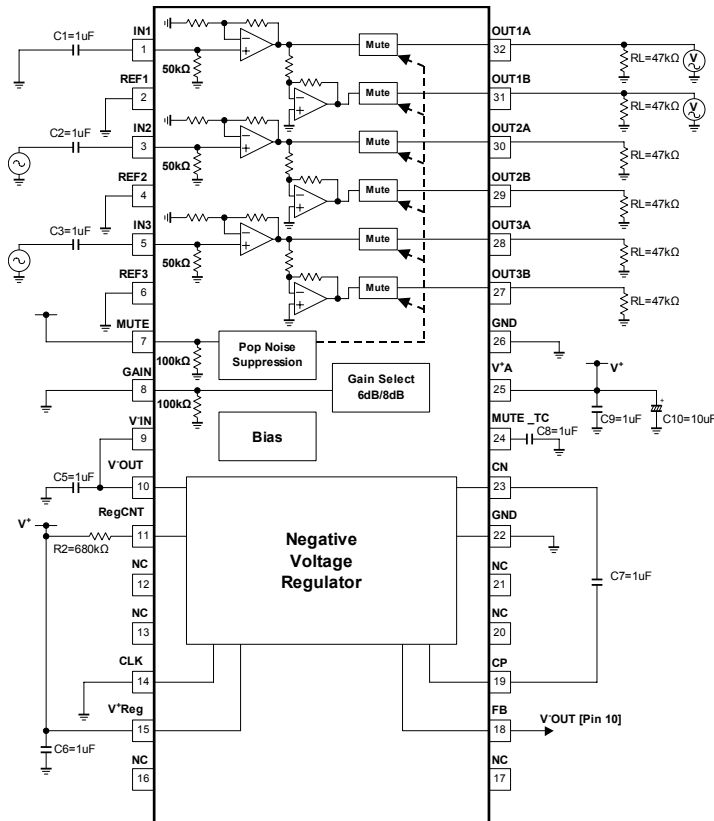
## TEST CIRCUIT ( $G_v$ , $V_{OMAX}$ , THD, $V_{MUTE}$ )



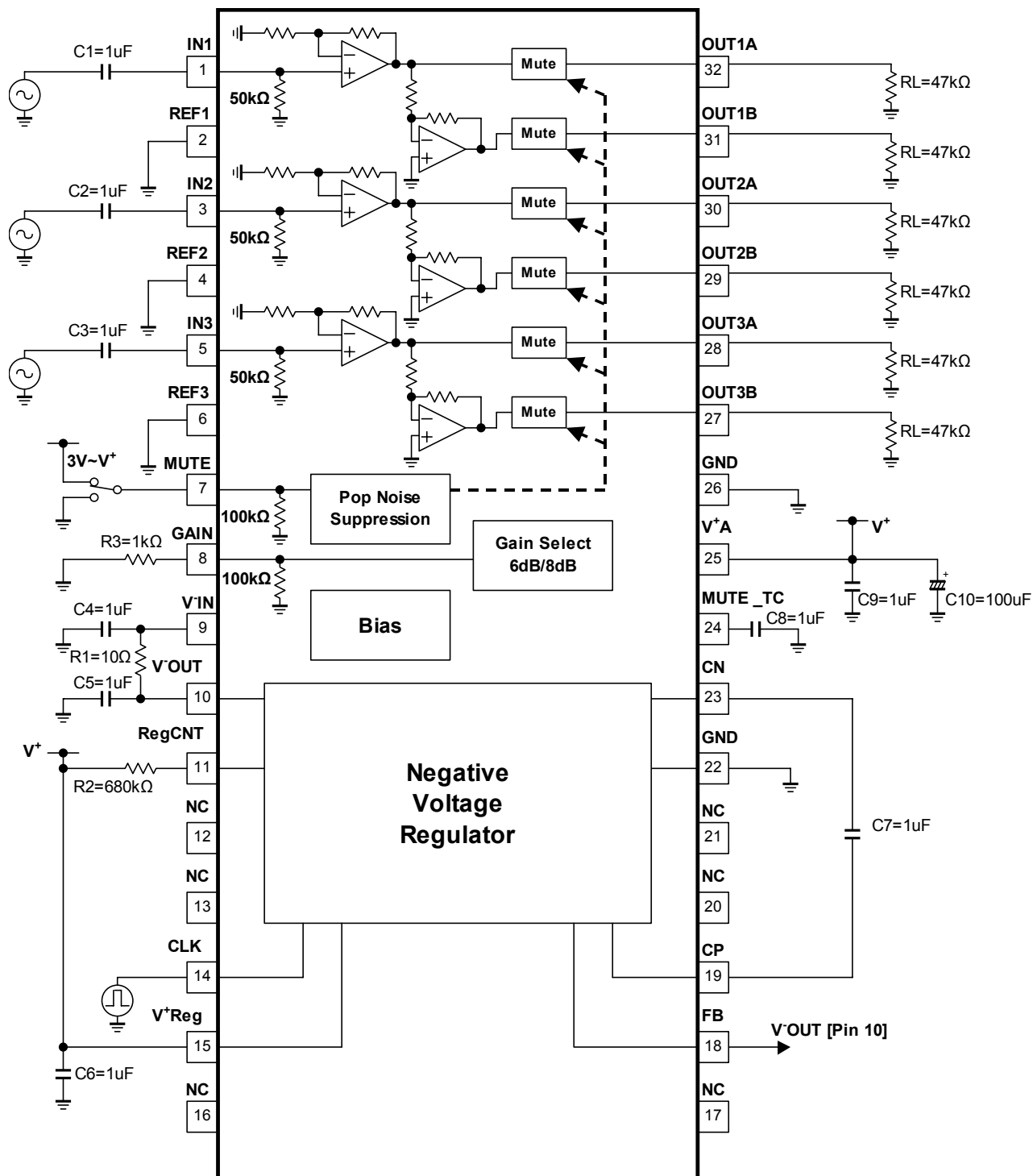
## TEST CIRCUIT (V<sub>NO</sub>)



## TEST CIRCUIT (CS)



## APPLICATION CIRCUIT



**[CAUTION]**  
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