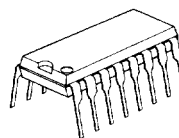


MULTI OUTPUT VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

NJM2351 is series regulator with positive output, negative output and positive five peices output, which can deliver up to 200mA output current with additional external transistors. System A in positive and negative output have ripple filter internally for audio system. System B positive output is applied for other system control.

■ PACKAGE OUTLINE



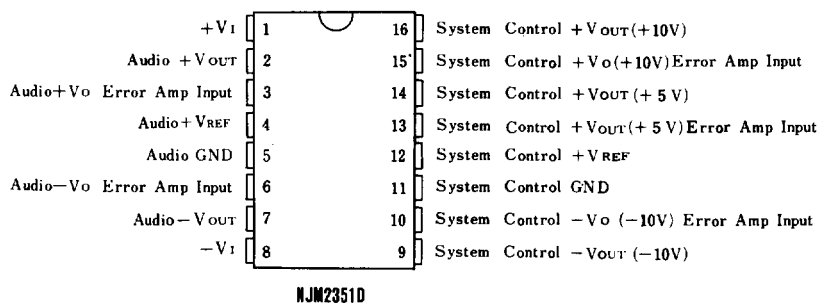
NJM2351D

■ FEATURES

- Operating Voltage ($\pm 13V \sim \pm 21V$)
- Dual Supply Operation
- Internal Ripple Filter Circuit
- Package Outline
- Bipolar Technology

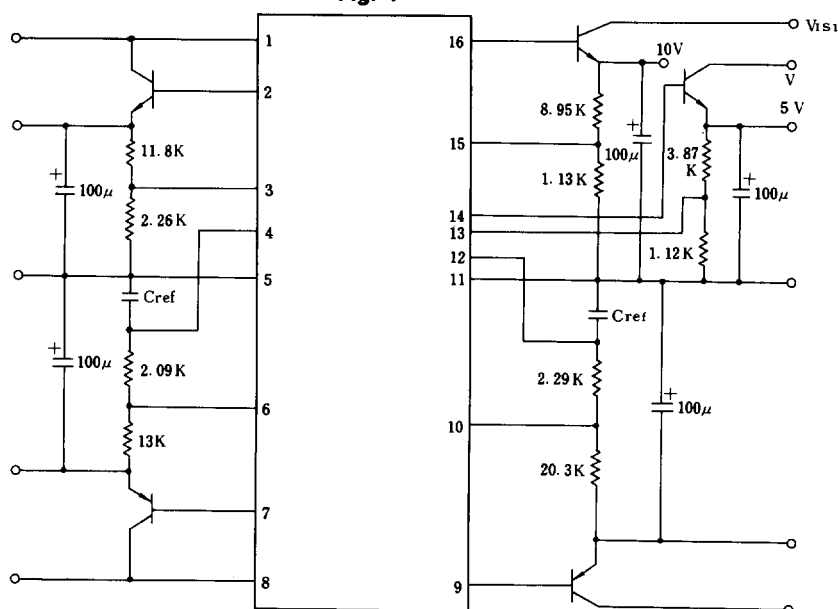
DIP16

■ PIN CONFIGURATION



■ TEST CIRCUIT

Fig. 1



- Note: 1. The accuracy of all resistors should be $\pm 1\%$.
 2. The h_{FE} value of all transistors is 80 ~ 100.



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$\pm V_I$	± 22	V
Output Current Pin 2	I_{O2}	+ 4	mA
Pin 7	I_{O7}	- 4	mA
Pin 14, 16	$I_{O14,16}$	+ 8	mA
Pin 9	I_{O9}	- 8	mA
Power Dissipation	P_D	700	mW
Operating Temperature Range	T_{opr}	- 10 ~ +75	°C
Storage Temperature Range	T_{stg}	- 40 ~ +125	°C

■ ELECTRICAL CHARACTERISTICS

[1] Audio System (Ta=25°C, $\pm V_I = \pm 16V$, $I_O = 100mA$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O		± 6.65	± 7.0	± 7.35	V
Line Regulation	$\Delta V_O - V_I$	$V_I = \pm 13 \sim \pm 21V$	—	7	100	mV
Load Regulation	$\Delta V_O - I_O$	$I_O = 1 \sim 200mA$	—	16	100	mV
Ripple Rejection	RR	$f = 120Hz$, $C_{REF} = 100\mu F$	67	77	—	dB
Output Noise Voltage	V_{NO}	JISA, $C_{REF} = 100\mu F$	—	14	—	μV
Positive Quiescent Current	$+I_O$	$V_I = +16V$	—	5.1	8	mA
Minimum Output Voltage	V_{OL}	$V_I = \pm 13V$, $I_O = 200mA$	± 6.5	—	—	V
Reference Voltage	V_{REF}		1.070	1.125	1.180	V
Temperature Coefficient of Reference Voltage	$\Delta V_{REF} / \Delta T$		—	0.1	—	mV/°C
Output Resistance	R_O	$f = 1kHz$	—	86	—	mΩ



ELECTRICAL CHARACTERISTICS

[II] System Control

(I) 10V Type ($T_a=25^\circ\text{C}$, $\pm V_{IS1}=\pm 15\text{V}$, $I_O=200\text{mA}$, $\pm V_1=16\text{V}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O		± 9.5	± 10	± 10.5	V
Line Regulation	ΔV_O-V_{I1}	$V_{IS1}=\pm 11.5 \sim \pm 20\text{V}$	—	3	40	mV
Line Regulation	ΔV_O-V_{I2}	$V_1=\pm 13 \sim \pm 21\text{V}$	—	21	200	mV
Load Regulation	ΔV_O-I_O	$I_O=1 \sim 400\text{mA}$	—	44	200	mV
Output Noise Voltage	V_{NO}	JISA, $C_{REF}=10\mu\text{F}$	—	18	—	μV
Minimum Output Voltage	V_{OL}	$V_{IS1}=11.5\text{V}$, $I_O=400\text{mA}$	± 9.2	—	—	V
Reference Voltage	V_{REF}		1.065	1.115	1.175	V
Temperature Coefficient of Reference Voltage	$\Delta V_{REF}/\Delta T$		—	0.2	—	mV/ $^\circ\text{C}$

(I) 5V Type ($T_a=25^\circ\text{C}$, $V_{IS2}=10\text{V}$, $I_O=200\text{mA}$, $\pm V_1=\pm 16\text{V}$)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O		4.7	5.0	5.3	V
Line Regulation	ΔV_O-V_{I1}	$V_{IS2}=6.5 \sim 15\text{V}$	—	2	20	mV
Line Regulation	ΔV_O-V_{I2}	$V_1=\pm 13 \sim \pm 21\text{V}$	—	9	100	mV
Load Regulation	ΔV_O-I_O	$I_O=1 \sim 400\text{mA}$	—	9	100	mV
Output Noise Voltage	V_{NO}	JISA, $C_{REF}=10\mu\text{F}$	—	9	—	μV
Minimum Output Voltage	V_{OL}	$V_{IS2}=6.5\text{V}$, $I_O=400\text{mA}$	4.4	—	—	V
Reference Voltage	V_{REF}		1.065	1.115	1.175	V
Temperature Coefficient of Reference Voltage	$\Delta V_{REF}/\Delta T$		—	0.2	—	mV/ $^\circ\text{C}$

(note 1) Test circuit: Fig. 1.

(note 2) Unless otherwise specified C_{REF} should be $100\mu\text{F}$.

(note 3) Use a transistor having a h_{FE} of 80 ~ 100 in Fig. 1.