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.

■ FEATURES

- Operating Voltage (±13V∼±21V)
- Dual Supply Operation
- Internal Ripple Filter Circuit
- Package Outline

DIP16

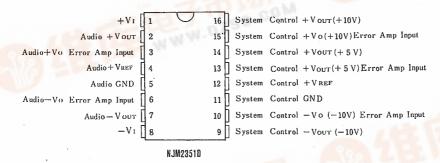
Bipolar Technology

■ PACKAGE OUTLINE



NJM2351D

PIN CONFIGURATION



■ TEST CIRCUIT

Fig. 1 O VISI 16 10V 8. 95 K 5 V 15 3. 87 ≶ 11.8K 100μ 1. 13 K § 100μ 100μ 2. 26 K 13 1. 12 K 12 11 Cref - Cref 100μ **≨** 2. 09 K 2. 29 K ≥ <u></u>
100μ 10 13K .20.3 K ≷

Note: 1. The accuracy of all resistors should be $\pm 1\%$.

2. The $h_{\rm FE}$ value of all transistors is $80 \sim 100$.



■ ABSOLUTE MAXIMUM RATINGS

(Ta=25℃)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|---------|----------|------|
| Input Voltage | ±Vι | ±22 | V |
| Output Current Pin 2 | I02 | +4 | mA |
| Pin 7 | I07 | -4 | mA |
| Pin 14, 16 | I014,16 | + 8 | mA |
| Pin 9 | I09 | -8 | mA |
| Power Dissipation | Po | 700 | mW |
| Operating Temperature Range | Topr | -10~+75 | |
| Storage Temperature Range | Tstg | -40~+125 | °C |

■ ELECTRICAL CHARACTERISTICS

[1] Audio System (Ta=25°C, ±V₁=±16V, I₀=100mA)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------|---------------------------------|---------------------------------|----------|-------|-------|---------|
| Output Voltage | V _O | | ±6.65 | ±7.0 | ±7.35 | V |
| Line Regulation | Δ٧0-٧1 | $V_1 = \pm 13 \sim \pm 21 V$ | | 7 | 100 | mV |
| Load Regulation | ΔV _O -I _O | $I_{O} = 1 \sim 200 \text{mA}$ | ľ — | 16 | 100 | mV. |
| Ripple Rejection | RR | $f=120$ Hz, $C_{REF}=100\mu$ F | 67 | 77 | | dB |
| Output Noise Voltage | V _{NO} | JISA, $C_{REF} = 100 \mu F$ | | 14 | | μV |
| Positive Quiescent Current | +I _Q | $V_1 = +16V$ | | 5.1 | 8 | mA |
| Minimum Output Voltage | V _{OL} | $V_1 = \pm 13V$, $I_O = 200mA$ | ±6.5 | _ | | v |
| Reference Voltage | VREF | | 1.070 | 1.125 | 1.180 | v |
| Temperature Coefficient of | , | | | | | |
| Reference Voltage | $\Delta V_{REF}/\Delta T$ | | - | 0.1 | _ | mV/°C |
| Output Resistance | Ro | f=1kl·lz | _ | 86 | _ | mΩ |

■ ELECTRICAL CHARACTERISTICS

[II] System Control

(1) 10V Type (Ta=25°C, $\pm V_{1S1} = \pm 15V$, $I_0 = 200 \text{mA}$, $\pm V_1 = 16V$)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------|----------------------------------|--|-------|-------|-------|------|
| Output Voltage | V _o | | ±9.5 | ± 10 | ±10.5 | v |
| Line Regulation | ΔV _O -V _{II} | $V_{ISI} = \pm 11.5 \sim \pm 20V$ | - | 3 | 40 | mV |
| Line Regulation | ΔV _O -V ₁₂ | $V_1 = \pm 13 \sim \pm 21V$ | l — | 21 | 200 | mV |
| Load Regulation | ΔV _O -l _O | $I_0 = 1 \sim 400 \text{mA}$ | | 44 | - 200 | mV |
| Output Noise Voltage | V _{NO} | JISA, $C_{REF}=10\mu F$ | | 18 | - | μV |
| Minimum Output Voltage | Vol | $V_{ISI} = 11.5V, I_O = 400 \text{mA}$ | ±9.2 | | l — | v |
| Reference Voltage. | V _{REF} | | 1.065 | 1.115 | 1.175 | v |
| Temperature Coefficient of | | | |] | | |
| Reference Voltage | ΔV _{REF} /ΔT | | | 0.2 | _ | mV/° |

(1) 5V Type (Ta=25°C, $V_{IS2}=10V$, $I_O=200mA$, $\pm V_1=\pm 16V$)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP, | MAX. | UNIT |
|----------------------------|----------------------------------|------------------------------|-------------|-------|-------|------|
| Output Voltage | Vo | | 4.7 | 5.0 | 5.3 | v |
| Line Regulation | ΔV0-V11 | V _{IS2} =6.5~15V | | 2 | 20 | mV |
| Line Regulation | ΔV ₀ -V ₁₂ | $V_1 = \pm 13 \sim \pm 21V$ | l — | 9 | 100 | mV |
| Load Regulation | ΔV _O -I _O | $I_0 = 1 \sim 400 \text{mA}$ | | 9 | 100 | mV |
| Output Noise Voltage | V _{NO} | JISA, $C_{REF} = 10 \mu F$ | | 9 | _ | μV |
| Minimum Output Voltage | Vol | $V_{1S2}=6.5V$, $I_0=400mA$ | 4.4 | l — | _ | v |
| Reference Voltage | V _{REF} | | 1.065 | 1.115 | 1.175 | v |
| Temperature Coefficient of | Ì | | | ĺ | 1 | 1 |
| Reference Voltage | $\Delta V_{REF}/\Delta T$ | | | 0.2 | — | mV/℃ |

⁽note 1) Test circuit: Fig. 1.

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

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

NJM2351

MEMO

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