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New Japan Radio Co.,Ltd.

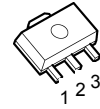
[www.njr.com](http://www.njr.com)

## 3-TERMINAL NEGATIVE VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

The NJM79L00 series of 3-Terminal Negative Voltage Regulators is constructed using the New JRC Planar epitaxial process. These regulators employ internal current-limiting, and thermal-shutdown, making them essentially indestructible. If adequate heat sinking is provided, they can deliver up to 100mA output current. They are intended as fixed voltage regulators in a wide range of applications including local or on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power pass elements to make high-current voltage regulators. The NJM79L00 used as a Zener diode/resistor combination replacement, offers an effective output impedance improvement of typically two orders of magnitude, along with lower quiescent current and lower noise.

### ■ PACKAGE OUTLINE



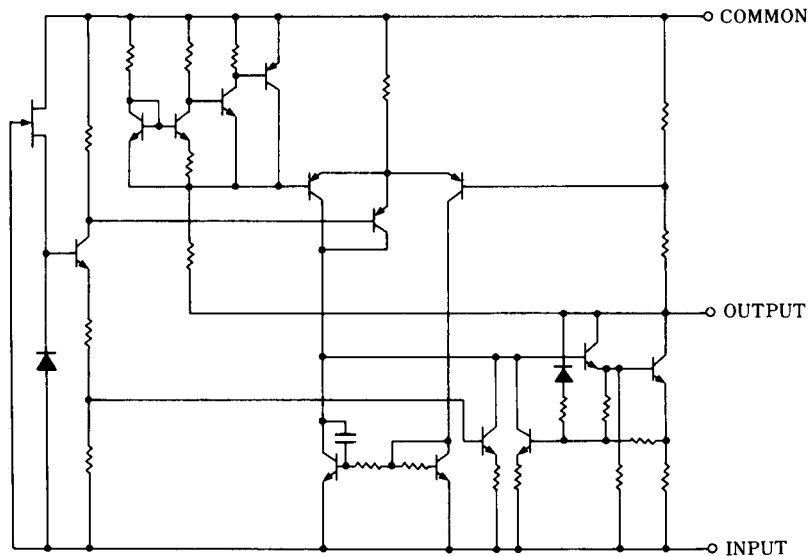
- 1. COMMON
- 2. IN
- 3. OUT

**NJM79L00UA** (SOT-89)

### ■ FEATURES

- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 100mA Output Current
- Output Capacitor recommended electrolytic capacitor
- Bipolar Technology
- Package Outline SOT-89

### ■ EQUIVALENT CIRCUIT



# NJM79L00

## ■ ABSOLUTE MAXIMUM RATINGS

(T<sub>a</sub>=25 °C)

| PARAMETER                   | SYMBOL           | RATINGS   | UNIT |
|-----------------------------|------------------|---|------|
| Input Voltage               | V <sub>IN</sub>  | (79L03A to 79L09A) - 30<br>(79L12A to 79L15A) - 35<br>(79L18A to 79L24A) - 40 | V    |
| Operating Temperature Range | T <sub>opr</sub> | -40 to +85  | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -40 to +125   | °C   |
| Power Dissipation           | P <sub>D</sub>   | (SOT89) 350   | mW   |

## ■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=0.33μF, C<sub>O</sub>=1.0μF, T<sub>J</sub>=25 °C)

Measurement is to be conducted in pulse testing.

| PARAMETER            | SYMBOL                            | TEST CONDITION  | MIN.  | TYP. | MAX.  | UNIT |
|----------------------|-----------------------------------|---|-------|------|-------|------|
| <b>NJM79L03UA</b>    |                                   |   |       |      |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-10V, I <sub>O</sub> =40mA   | -2.88 | -3.0 | -3.12 | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-7 to -20V, I <sub>O</sub> =40mA   | -     | 10   | 60    | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-10V, I <sub>O</sub> =1 to 100mA   | -     | 4    | 72    | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-10V, I <sub>O</sub> =0mA  | -     | 3.5  | 6.0   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-8 to -18V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz | 45    | 72   | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-10V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                  | -     | 70   | -     | μV   |
| <b>NJM79L05UA</b>    |                                   |   |       |      |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-10V, I <sub>O</sub> =40mA   | -4.8  | -5.0 | -5.2  | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-7 to -20V, I <sub>O</sub> =40mA   | -     | 15   | 150   | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-10V, I <sub>O</sub> =1 to 100mA   | -     | 7    | 60    | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-10V, I <sub>O</sub> =0mA  | -     | 3.5  | 6.0   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-8 to -18V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz | 41    | 71   | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-10V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                  | -     | 120  | -     | μV   |
| <b>NJM79L06UA</b>    |                                   |   |       |      |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-12V, I <sub>O</sub> =40mA   | -5.76 | -6.0 | -6.24 | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-8.5 to -20V, I <sub>O</sub> =40mA   | -     | 18   | 150   | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-12V, I <sub>O</sub> =1 to 100mA   | -     | 8    | 70    | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-12V, I <sub>O</sub> =0mA  | -     | 3.5  | 6.0   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-9 to -19V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz | 40    | 68   | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-12V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                  | -     | 140  | -     | μV   |

■ **ELECTRICAL CHARACTERISTICS** ( $C_{IN}=0.33\mu F$ ,  $C_O=1.0\mu F$ ,  $T_J=25\text{ }^\circ\text{C}$ )

Measurement is to be conducted in pulse testing.

| PARAMETER            | SYMBOL                | TEST CONDITION  | MIN.  | TYP.  | MAX.  | UNIT    |
|----------------------|-----------------------|---|-------|-------|-------|---------|
| <b>NJM79L07UA</b>    |                       |   |       |       |       |         |
| Output Voltage       | $V_O$                 | $V_{IN}=-13V$ , $I_O=40mA$  | -6.72 | -7.0  | -7.28 | V       |
| Line Regulation      | $\Delta V_O - V_{IN}$ | $V_{IN}=-9.5\sim-22V$ , $I_O=40mA$                                  | -     | 21    | 160   | mV      |
| Load Regulation      | $\Delta V_O - I_O$    | $V_{IN}=-13V$ , $I_O=1\sim 100mA$                                   | -     | 9     | 75    | mV      |
| Quiescent Current    | $I_Q$                 | $V_{IN}=-13V$ , $I_O=0mA$   | -     | 3.5   | 6.0   | mA      |
| Ripple Rejection     | RR                    | $V_{IN}=-10\sim-20V$ , $I_O=40mA$ , $e_{in}=1V_{P-P}$ , $f=120Hz$   | 40    | 68    | -     | dB      |
| Output Noise Voltage | $V_{NO}$              | $V_{IN}=-13V$ , $BW=10Hz\sim 100kHz$ , $I_O=40mA$                   | -     | 170   | -     | $\mu V$ |
| <b>NJM79L08UA</b>    |                       |   |       |       |       |         |
| Output Voltage       | $V_O$                 | $V_{IN}=-14V$ , $I_O=40mA$  | -7.68 | -8.0  | -8.32 | V       |
| Line Regulation      | $\Delta V_O - V_{IN}$ | $V_{IN}=-10.5$ to $-23V$ , $I_O=40mA$                               | -     | 24    | 175   | mV      |
| Load Regulation      | $\Delta V_O - I_O$    | $V_{IN}=-14V$ , $I_O=1$ to $100mA$                                  | -     | 10    | 80    | mV      |
| Quiescent Current    | $I_Q$                 | $V_{IN}=-14V$ , $I_O=0mA$   | -     | 3.5   | 6.0   | mA      |
| Ripple Rejection     | RR                    | $V_{IN}=-11$ to $-21V$ , $I_O=40mA$ , $e_{in}=1V_{P-P}$ , $f=120Hz$ | 39    | 68    | -     | dB      |
| Output Noise Voltage | $V_{NO}$              | $V_{IN}=-14V$ , $BW=10Hz$ to $100kHz$ , $I_O=40mA$                  | -     | 190   | -     | $\mu V$ |
| <b>NJM79L09UA</b>    |                       |   |       |       |       |         |
| Output Voltage       | $V_O$                 | $V_{IN}=-15V$ , $I_O=40mA$  | -8.64 | -9.0  | -9.36 | V       |
| Line Regulation      | $\Delta V_O - V_{IN}$ | $V_{IN}=-11.5$ to $-24V$ , $I_O=40mA$                               | -     | 27    | 200   | mV      |
| Load Regulation      | $\Delta V_O - I_O$    | $V_{IN}=-15V$ , $I_O=1$ to $100mA$                                  | -     | 12    | 90    | mV      |
| Quiescent Current    | $I_Q$                 | $V_{IN}=-15V$ , $I_O=0mA$   | -     | 3.5   | 6.0   | mA      |
| Ripple Rejection     | RR                    | $V_{IN}=-12$ to $-22V$ , $I_O=40mA$ , $e_{in}=1V_{P-P}$ , $f=120Hz$ | 38    | 67    | -     | dB      |
| Output Noise Voltage | $V_{NO}$              | $V_{IN}=-15V$ , $BW=10Hz$ to $100kHz$ , $I_O=40mA$                  | -     | 210   | -     | $\mu V$ |
| <b>NJM79L12UA</b>    |                       |   |       |       |       |         |
| Output Voltage       | $V_O$                 | $V_{IN}=-19V$ , $I_O=40mA$  | -11.5 | -12.0 | -12.5 | V       |
| Line Regulation      | $\Delta V_O - V_{IN}$ | $V_{IN}=-14.5$ to $-27V$ , $I_O=40mA$                               | -     | 36    | 250   | mV      |
| Load Regulation      | $\Delta V_O - I_O$    | $V_{IN}=-19V$ , $I_O=1$ to $100mA$                                  | -     | 16    | 100   | mV      |
| Quiescent Current    | $I_Q$                 | $V_{IN}=-19V$ , $I_O=0mA$   | -     | 3.5   | 6.5   | mA      |
| Ripple Rejection     | RR                    | $V_{IN}=-15$ to $-25V$ , $I_O=40mA$ , $e_{in}=1V_{P-P}$ , $f=120Hz$ | 37    | 64    | -     | dB      |
| Output Noise Voltage | $V_{NO}$              | $V_{IN}=-19V$ , $BW=10Hz$ to $100kHz$ , $I_O=40mA$                  | -     | 210   | -     | $\mu V$ |

# NJM79L00

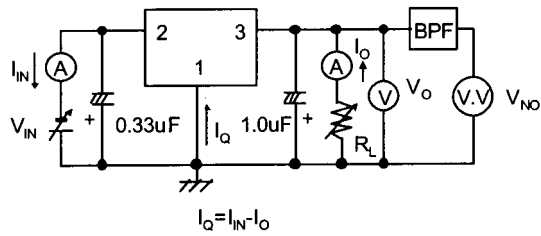
## ■ ELECTRICAL CHARACTERISTICS (C<sub>IN</sub>=0.33μF, C<sub>O</sub>=1.0μF, T<sub>J</sub>=25°C)

Measurement is to be conducted in pulse testing.

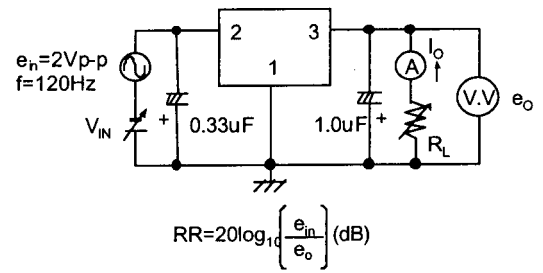
| PARAMETER            | SYMBOL                            | TEST CONDITION   | MIN.  | TYP.  | MAX.  | UNIT |
|----------------------|-----------------------------------|--|-------|-------|-------|------|
| <b>NJM79L15UA</b>    |                                   |  |       |       |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-23V, I <sub>O</sub> =40mA  | -14.4 | -15.0 | -15.6 | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-17.5 to -30V, I <sub>O</sub> =40mA   | -     | 45    | 300   | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-23V, I <sub>O</sub> =1 to 100mA  | -     | 20    | 150   | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-23V, I <sub>O</sub> =0mA   | -     | 3.5   | 6.5   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-18.5 to -28.5V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz | 34    | 63    | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-23V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                       | -     | 340   | -     | μV   |
| <b>NJM79L18UA</b>    |                                   |  |       |       |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-27V, I <sub>O</sub> =40mA  | -17.3 | -18.0 | -18.7 | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-20.7 to -33V, I <sub>O</sub> =40mA   | -     | 54    | 325   | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-27V, I <sub>O</sub> =1 to 100mA  | -     | 23    | 170   | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-27V, I <sub>O</sub> =0mA   | -     | 3.5   | 6.5   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-23 to -33V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz     | 33    | 60    | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-27V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                       | -     | 410   | -     | μV   |
| <b>NJM79L24UA</b>    |                                   |  |       |       |       |      |
| Output Voltage       | V <sub>O</sub>                    | V <sub>IN</sub> =-33V, I <sub>O</sub> =40mA  | -23.0 | -24.0 | -25.0 | V    |
| Line Regulation      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =-27 to -38V, I <sub>O</sub> =40mA   | -     | 72    | 350   | mV   |
| Load Regulation      | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =-33V, I <sub>O</sub> =1 to 100mA  | -     | 30    | 200   | mV   |
| Quiescent Current    | I <sub>Q</sub>                    | V <sub>IN</sub> =-33V, I <sub>O</sub> =0mA   | -     | 3.5   | 6.5   | mA   |
| Ripple Rejection     | RR                                | V <sub>IN</sub> =-29 to -35V, I <sub>O</sub> =40mA, e <sub>in</sub> =1V <sub>P-P</sub> , f=120Hz     | 31    | 55    | -     | dB   |
| Output Noise Voltage | V <sub>NO</sub>                   | V <sub>IN</sub> =-33V, BW=10Hz to 100kHz, I <sub>O</sub> =40mA                                       | -     | 550   | -     | μV   |

## ■ TEST CIRCUIT

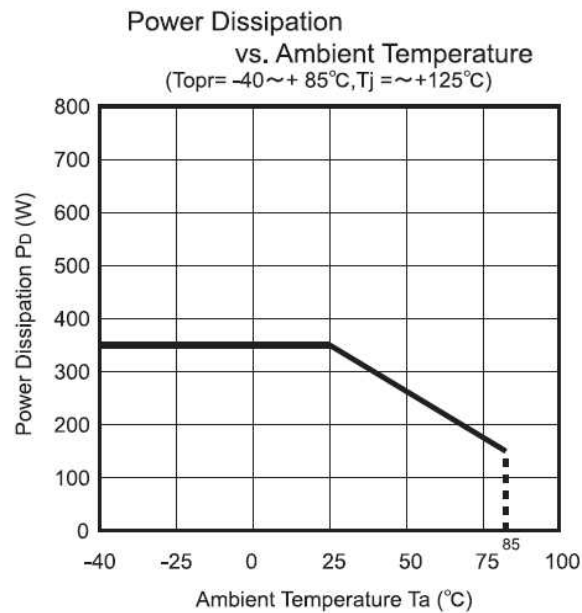
1. Output Voltage, Output Current, Line Regulation, Load Regulation, Quiescent Current, Output Noise Voltage



2. Ripple Rejection



## ■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

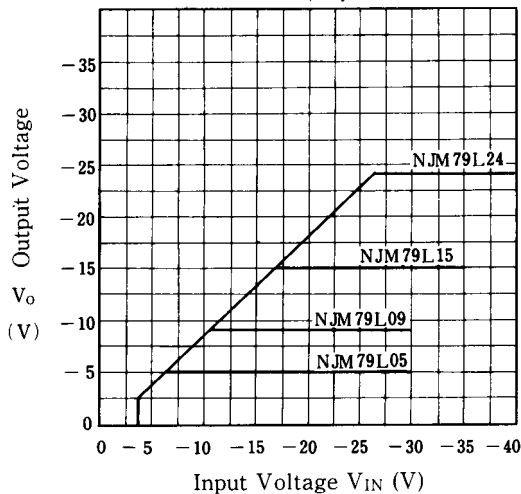


# NJM79L00

## ■ TYPICAL CHARACTERISTICS

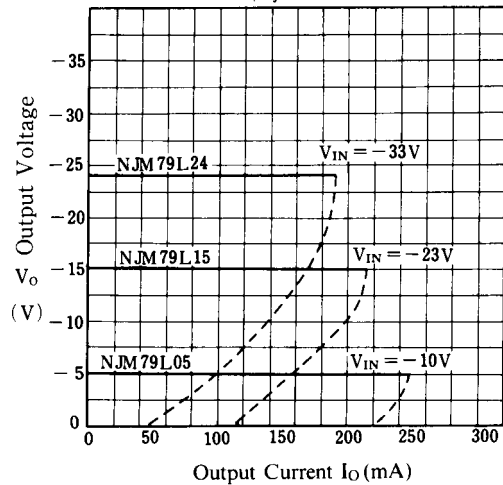
**NJM79L00 Input Voltage vs. Output Voltage**

( $I_o = 40\text{mA}$ ,  $T_j = 25^\circ\text{C}$ )



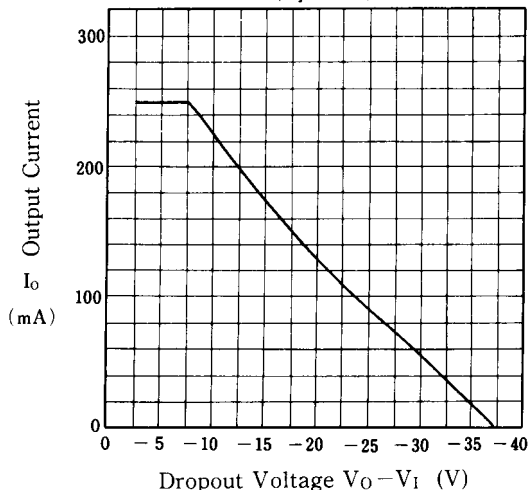
**NJM79L05/15/24 Load Characteristics**

( $T_j = 25^\circ\text{C}$ )

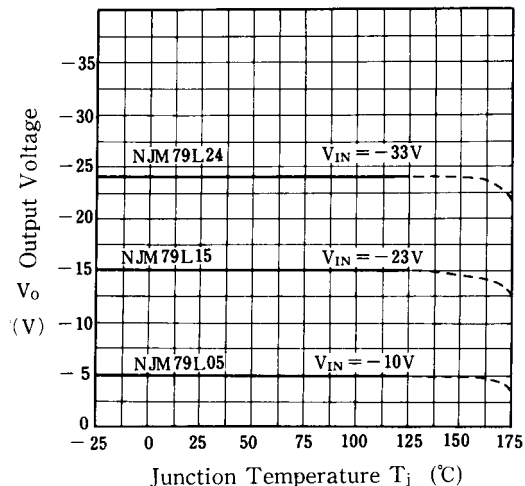


**NJM79L00 Series Short Circuit Current**

( $T_j = 25^\circ\text{C}$ )

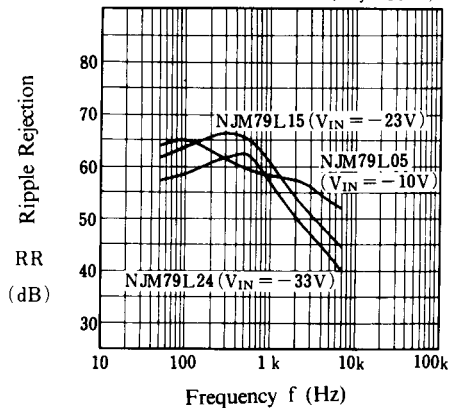


**NJM79L05/12/24 Output Voltage vs. Junction Temperature**



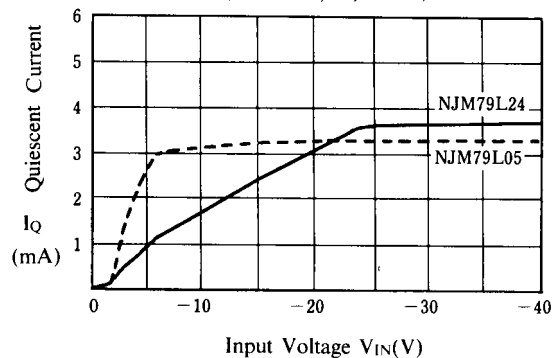
**NJM79L05/15/24 Ripple Rejection vs. Frequency**

( $I_o = 40\text{mA}$ ,  $e_{in} = 2\text{V}_{p-p}$ ,  $T_j = 25^\circ\text{C}$ )



**Quiescent Current vs. Input Voltage**

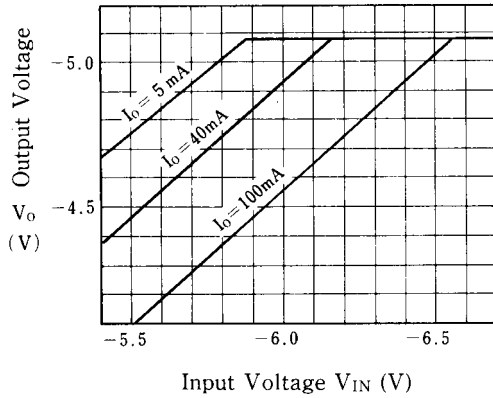
( $I_o = 0\text{mA}$ ,  $T_j = 25^\circ\text{C}$ )



## ■ TYPICAL CHARACTERISTICS

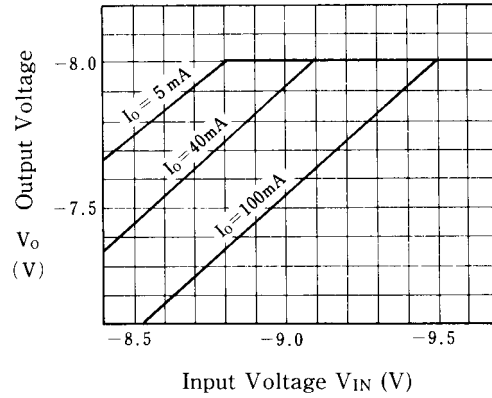
### NJM79L05 Dropout Characteristics

( $T_j = 25^\circ\text{C}$ )

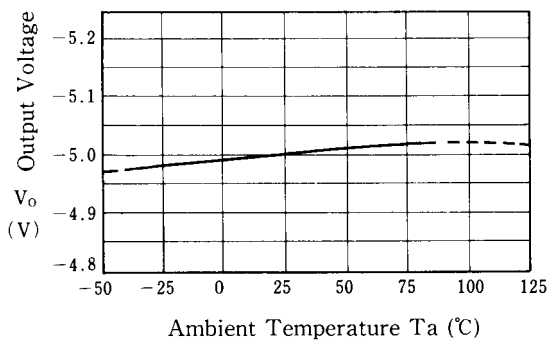


### NJM79L08 Dropout Characteristics

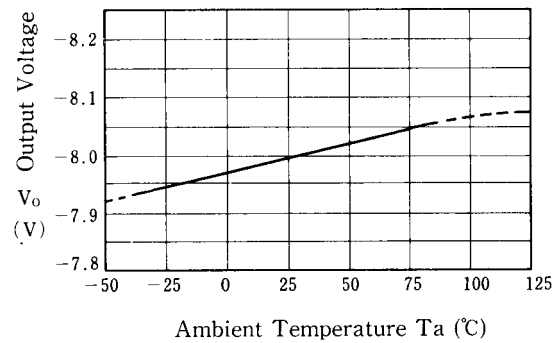
( $T_j = 25^\circ\text{C}$ )



### NJM79L05 Output Voltage vs. Temperature

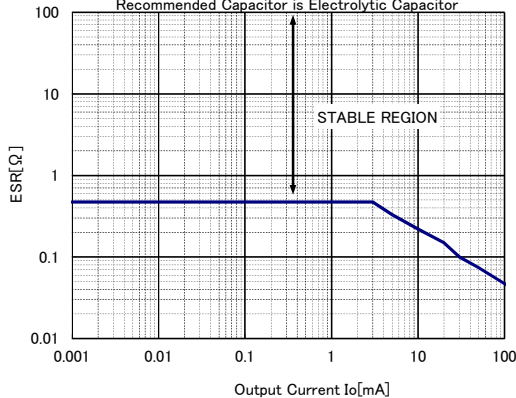


### NJM79L08 Output Voltage vs. Temperature



## NJM79L00 Equivalent Series Resistance vs. Output Current

$V_{in}$  = Output voltage of the conditions described in the ELECTRICAL CHARACTERISTICS  
 $T_a = 25^\circ\text{C}$ ,  $C_{in} = 0.33\mu\text{F}$ ,  $C_o = 1.0\mu\text{F}$  (Ceramic capacitor)  
 Recommended Capacitor is Electrolytic Capacitor



### [CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.