

3-TERMINAL NEGATIVE VOLTAGE REGULATOR

■ GENERAL DESCRIPTION

The NJM79M00 series of 3-Terminal Negative Voltage Regulators are constructed using the New JRC Planar epitaxial process. These regulators employ internal current limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver up to 500mA output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single point regulation. In addition to use a fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

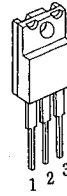
■ FEATURES

- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 500mA Output Current
- Package Outline
- Bipolar Technology

TO-220F, TO-252

■ PACKAGE OUTLINE

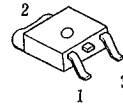
(TO-220F)



NJM79M00FA

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

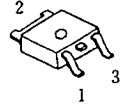
(TO-252)



NJM79M00DLA

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

(TO-252)

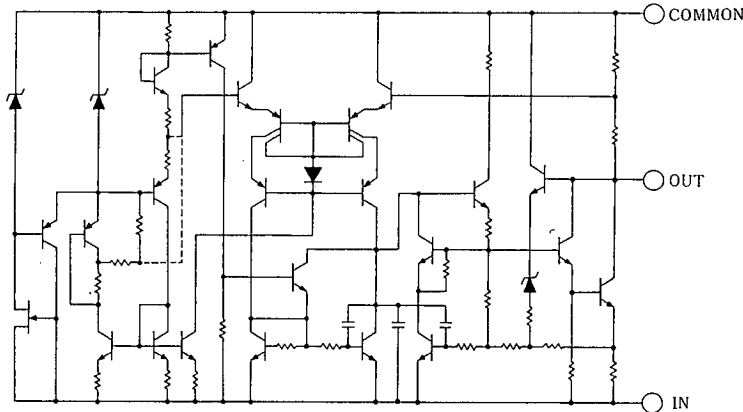


NJM79M00DL1A

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

(note) The radiation fin is connected to Pin 2.

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | MAXIMUM RATINGS | | UNIT |
|-----------------------------|--------------------------------|------------------------------------|------------------|------|
| Input Voltage | V_{IN} | 79M05~79M09 | -35 | V |
| | | 79M12~79M15 | -35 | |
| | | 79M18~79M24 | -40 | |
| Storage Temperature Range | T_{stg} | TO-220F | -40~+150 | °C |
| | | TO-252 | -40~+150 | |
| Operating Temperature Range | Operating Junction Temperature | T_j | TO-220F -30~+150 | °C |
| | | T_{opr} | TO-252 -30~+150 | |
| Power Dissipation | P_D | 7.5($T_c \leq 75^\circ\text{C}$) | | W |

■ THERMAL CHARACTERISTICS

| Thermal Resistance | | | TO220F | TO252 | °C/W |
|--------------------|---------------------------------|---------------|--------|-------|------|
| | Junction-to-Ambient Temperature | θ_{ja} | 60 | 125 | |
| | Junction-to-Case | θ_{jc} | 7 | 12.5 | |

■ ELECTRICAL CHARACTERISTICS ($T_j=25^\circ\text{C}$, $C_{IN}=2.2\ \mu\text{F}$, $C_o=1.0\ \mu\text{F}$)

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|---|------|------|------|---------------|
| NJM79M05A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$ | -4.8 | -5.0 | -5.2 | V |
| Quiescent Current | I_Q | $V_{IN}=-10\text{V}$, $I_O=0\text{mA}$ | — | 2.2 | 5.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-10\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 35 | 50 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-7\sim -25\text{V}$, $I_O=0.35\text{A}$ | — | 5 | 50 | mV |
| Ripple Rejection | RR | $V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 50 | 58 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-10\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 100 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-10\text{V}$, $I_O=5\text{mA}$ | — | -0.4 | — | mV/°C |

■ **ELECTRICAL CHARACTERISTICS** ($T_j=25^\circ\text{C}$, $C_{IN}=2.2\ \mu\text{F}$, $C_o=1.0\ \mu\text{F}$) Measurement is to be conducted in pulse testing.

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|---|-------|-------|-------|----------------------|
| NJM79M06A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$ | -5.75 | -6.0 | -6.25 | V |
| Quiescent Current | I_Q | $V_{IN}=-11\text{V}$, $I_O=0\text{mA}$ | — | 2.2 | 5.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-11\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 35 | 60 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-8\sim -25\text{V}$, $I_O=0.35\text{A}$ | — | 5 | 60 | mV |
| Ripple Rejection | RR | $V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 50 | 57 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 110 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-11\text{V}$, $I_O=5\text{mA}$ | — | -0.5 | — | mV/ $^\circ\text{C}$ |
| NJM79M08A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$ | -7.7 | -8.0 | -8.3 | V |
| Quiescent Current | I_Q | $V_{IN}=-14\text{V}$, $I_O=0\text{mA}$ | — | 2.2 | 5.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-14\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 40 | 80 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-10.5\sim -25\text{V}$, $I_O=0.35\text{A}$ | — | 8 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 50 | 55 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 130 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-14\text{V}$, $I_O=5\text{mA}$ | — | -0.7 | — | mV/ $^\circ\text{C}$ |
| NJM79M09A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$ | -8.65 | -9.0 | -9.35 | V |
| Quiescent Current | I_Q | $V_{IN}=-15\text{V}$, $I_O=0\text{mA}$ | — | 2.2 | 5.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-15\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 40 | 90 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-11.5\sim -25\text{V}$, $I_O=0.35\text{A}$ | — | 8 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 50 | 54 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 150 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-15\text{V}$, $I_O=5\text{mA}$ | — | -0.8 | — | mV/ $^\circ\text{C}$ |
| NJM79M12A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$ | -11.5 | -12.0 | -12.5 | V |
| Quiescent Current | I_Q | $V_{IN}=-19\text{V}$, $I_O=0\text{mA}$ | — | 2.7 | 6.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-19\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 30 | 120 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-14.5\sim -30\text{V}$, $I_O=0.35\text{A}$ | — | 3 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 54 | 71 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 150 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-19\text{V}$, $I_O=5\text{mA}$ | — | -0.4 | — | mV/ $^\circ\text{C}$ |

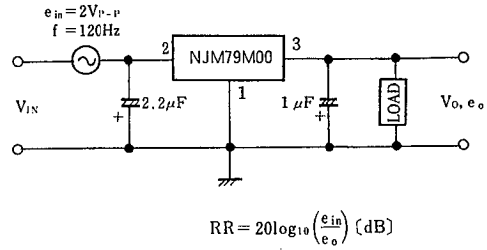
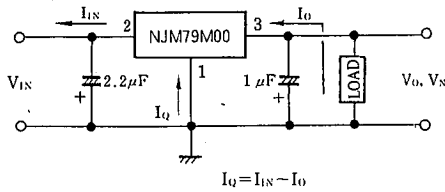
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■ **ELECTRICAL CHARACTERISTICS** ($T_j=25^\circ\text{C}$, $C_{IN}=2.2\ \mu\text{F}$, $C_o=1.0\ \mu\text{F}$) Measurement is to be conducted in pulse testing.

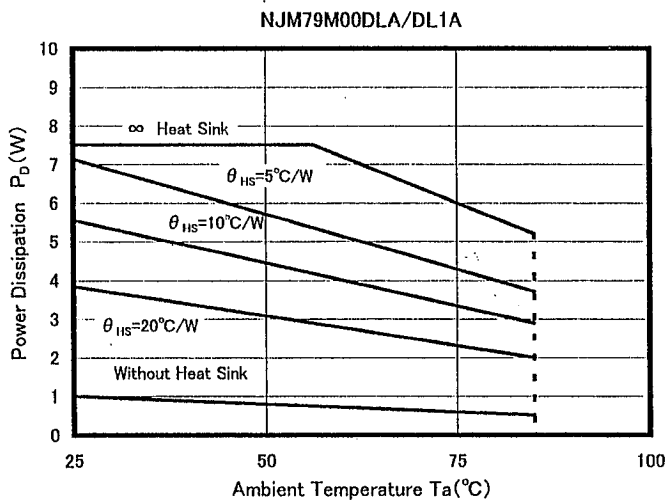
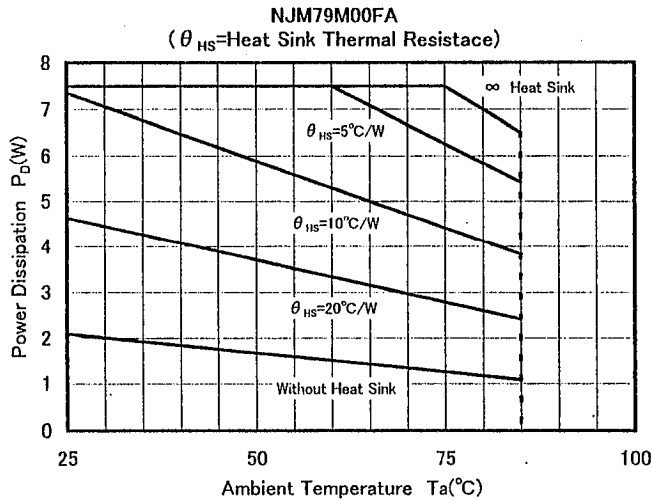
| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|---|-------|-------|-------|----------------------|
| NJM79M15A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$ | -14.4 | -15.0 | -15.6 | V |
| Quiescent Current | I_Q | $V_{IN}=-23\text{V}$, $I_O=0\text{mA}$ | — | 2.7 | 6.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-23\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 30 | 150 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-17.5\sim -30\text{V}$, $I_O=0.35\text{A}$ | — | 3 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 54 | 70 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-23\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 170 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-23\text{V}$, $I_O=5\text{mA}$ | — | -0.5 | — | mV/ $^\circ\text{C}$ |
| NJM79M18A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$ | -17.3 | -18.0 | -18.7 | V |
| Quiescent Current | I_Q | $V_{IN}=-27\text{V}$, $I_O=0\text{mA}$ | — | 2.7 | 6.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-27\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 35 | 180 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-21\sim -33\text{V}$, $I_O=0.35\text{A}$ | — | 4 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 54 | 69 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-27\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 200 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-27\text{V}$, $I_O=5\text{mA}$ | — | -0.6 | — | mV/ $^\circ\text{C}$ |
| NJM79M24A | | | | | | |
| Output Voltage | V_O | $V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$ | -23.0 | -24.0 | -25.0 | V |
| Quiescent Current | I_Q | $V_{IN}=-33\text{V}$, $I_O=0\text{mA}$ | — | 2.7 | 6.0 | mA |
| Load Regulation | ΔV_O-I_O | $V_{IN}=-33\text{V}$, $I_O=0.005\sim 0.5\text{A}$ | — | 40 | 240 | mV |
| Line Regulation | ΔV_O-V_{IN} | $V_{IN}=-27\sim -38\text{V}$, $I_O=0.35\text{A}$ | — | 5 | 80 | mV |
| Ripple Rejection | RR | $V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2\text{V}_{p-p}$, $f=120\text{Hz}$ | 54 | 66 | — | dB |
| Output Noise Voltage | V_{NO} | $V_{IN}=-33\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}\sim 100\text{kHz}$ | — | 300 | — | μV |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O/\Delta T$ | $V_{IN}=-33\text{V}$, $I_O=5\text{mA}$ | — | -0.8 | — | mV/ $^\circ\text{C}$ |

■ TEST CIRCUIT

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage
2. Ripple Rejection



■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

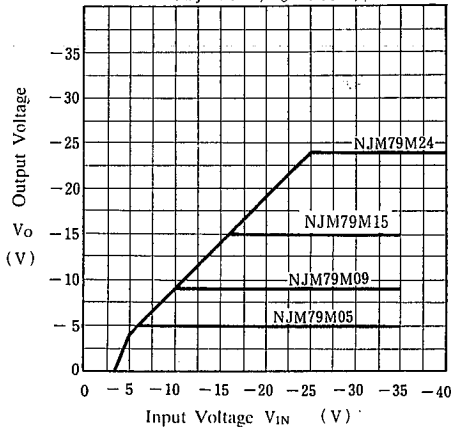


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TYPICAL CHARACTERISTICS

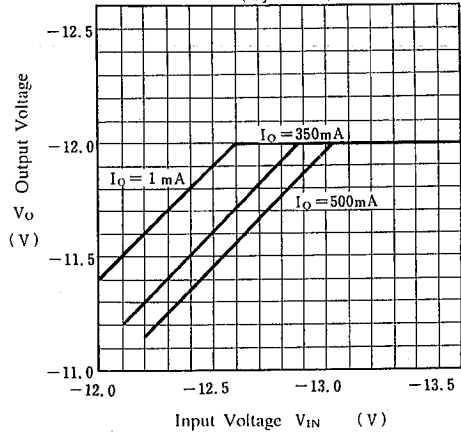
NJM79M00 Output Characteristics

($T_j = 25^\circ\text{C}$, $I_o = 0.35\text{A}$)



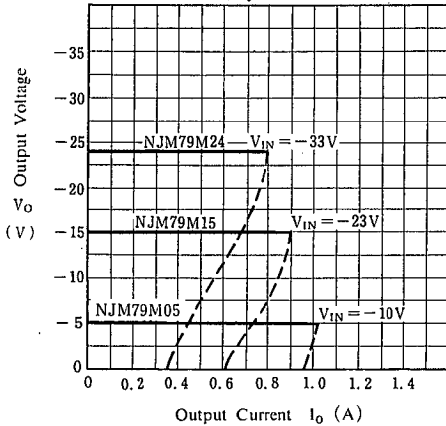
NJM79M12 Output Voltage vs. Low Input Voltage

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



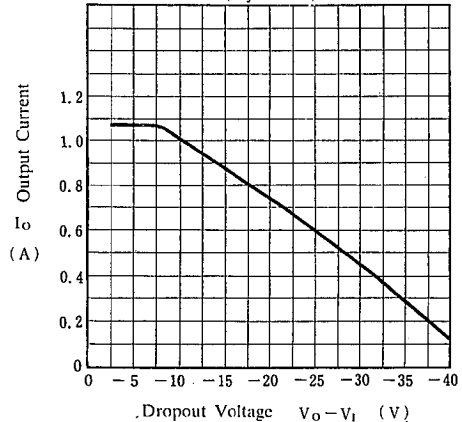
NJM79M05/15/24 Load Characteristics

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

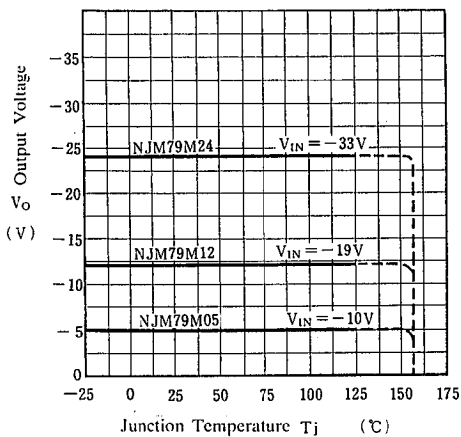


NJM79M00 Series Short Circuit Output Current

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

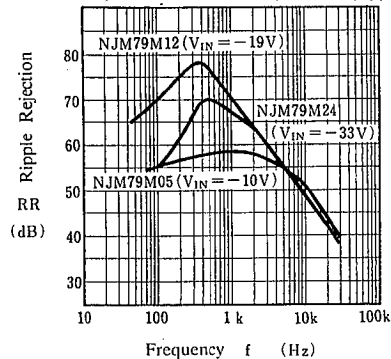


NJM79M05/12/24 Output Voltage vs. Junction Temperature

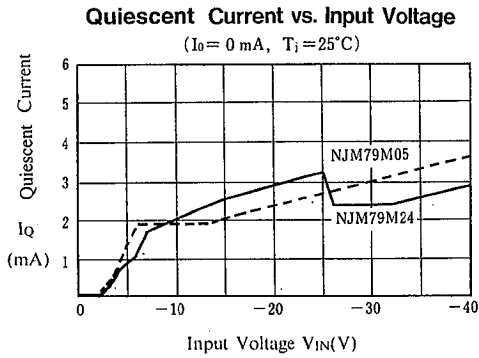
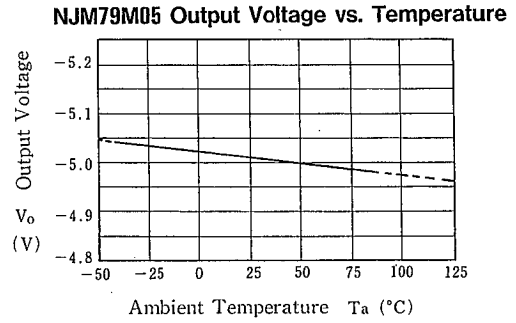
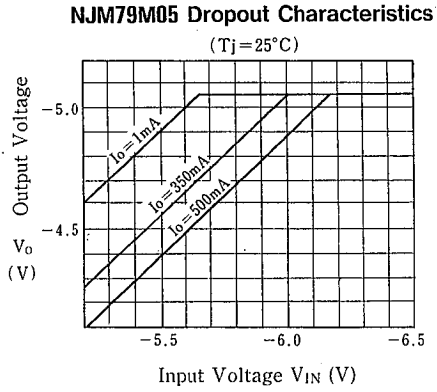


NJM79M05/15/24 Ripple Rejection vs. Frequency

($T_j = 25^\circ\text{C}$, $I_o = 350\text{mA}$, $e_{in} = 2V_{p-p}$)



■ TYPICAL CHARACTERISTICS



MEMO

[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.