

## 3-TERMINAL NEGATIVE VOLTAGE REGULATOR

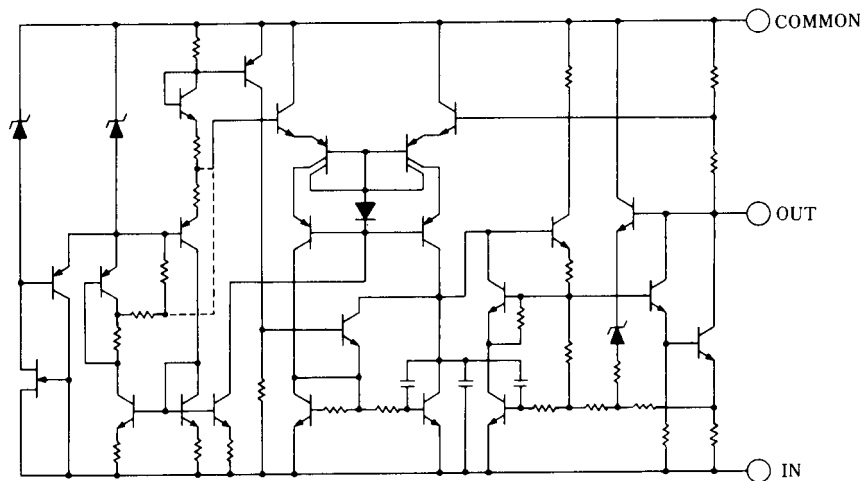
### ■ GENERAL DESCRIPTION

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 safearea 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

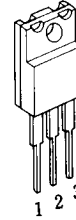
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 500mA Output Current
- Package Outline            TO-220F, TO-252
- Bipolar Technology

### ■ EQUIVALENT CIRCUIT

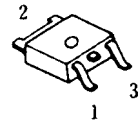


### ■ PACKAGE OUTLINE

(TO-220F)



(TO-252)



#### NJM79M00FA

1. COMMON
2. IN
3. OUT

#### NJM79M00DL1A

1. COMMON
2. IN
3. OUT

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

# NJM79M00

## ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MAXIMUM RATINGS		UNIT
Input Voltage	$V_{IN}$	79M05 to 79M09 79M12 to 79M15 79M18 to 79M24	-35 -35 -40	V
Storage Temperature Range	$T_{stg}$	TO-220F -40 to +150 TO-252 -40 to +150		°C
Operating Temperature Range		Operating Junction Temperature Operating Junction Temperature	$T_j$ $T_{opr}$ TO-220F -40 to +150 TO-252 -40 to +150 -40 to +85	°C
Power Dissipation	$P_D$	7.5( $T_C \leq 75^\circ\text{C}$ )		W

## ■ THERMAL CHARACTERISTICS

			TO-220F	TO-252		
Thermal Resistance	Junction-to-Ambient Temperature	$\theta_{ja}$	60	125	°C/W	
	Junction-to-Case	$\theta_{jc}$	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
<b>NJM79M05FA/DL1A</b>						
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	$\Delta V_O - I_O$	$V_{IN}=-10\text{V}$ , $I_O=0.005$ to $0.5\text{A}$	-	35	50	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-7$ to $-25\text{V}$ , $I_O=0.35\text{A}$	-	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	$V_{NO}$	$V_{IN}=-10\text{V}$ , $I_O=0.35\text{A}$ , $BW=10\text{Hz}$ to $100\text{kHz}$ ,	-	100	-	$\mu\text{V}$
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** ( $T_F=25^\circ\text{C}$ ,  $C_{IN}=2.2\mu\text{F}$ ,  $C_O=1.0\mu\text{F}$ )

Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>NJM79M06FA/DL1A</b>						
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	$\Delta V_O - I_O$	$V_{IN}=-11\text{V}$ , $I_O=0.005$ to $0.5\text{A}$	-	35	60	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-8$ to $-25\text{V}$ , $I_O=0.35\text{A}$	-	5	60	mV
Ripple Rejection	RR	$V_{IN}=-11\text{V}$ , $I_O=0.35\text{A}$ , $e_{in}=2V_{P-P}$ , $f=120\text{Hz}$	50	57	-	dB
Output Noise Voltage	$V_{NO}$	$V_{IN}=-11\text{V}$ , $I_O=0.35\text{A}$ , $BW=10\text{Hz}$ to $100\text{kHz}$ ,	-	110	-	$\mu\text{V}$
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-11\text{V}$ , $I_O=5\text{mA}$	-	-0.5	-	mV/ $^\circ\text{C}$
<b>NJM79M08FA/DL1A</b>						
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	$\Delta V_O - I_O$	$V_{IN}=-14\text{V}$ , $I_O=0.005$ to $0.5\text{A}$	-	40	80	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-10.5$ to $-25\text{V}$ , $I_O=0.35\text{A}$	-	8	80	mV
Ripple Rejection	RR	$V_{IN}=-14\text{V}$ , $I_O=0.35\text{A}$ , $e_{in}=2V_{P-P}$ , $f=120\text{Hz}$	50	55	-	dB
Output Noise Voltage	$V_{NO}$	$V_{IN}=-14\text{V}$ , $I_O=0.35\text{A}$ , $BW=10\text{Hz}$ to $100\text{kHz}$ ,	-	130	-	$\mu\text{V}$
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-14\text{V}$ , $I_O=5\text{mA}$	-	-0.7	-	mV/ $^\circ\text{C}$
<b>NJM79M09FA/DL1A</b>						
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	$\Delta V_O - I_O$	$V_{IN}=-15\text{V}$ , $I_O=0.005$ to $0.5\text{A}$	-	40	90	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-11.5$ to $-25\text{V}$ , $I_O=0.35\text{A}$	-	8	80	mV
Ripple Rejection	RR	$V_{IN}=-15\text{V}$ , $I_O=0.35\text{A}$ , $e_{in}=2V_{P-P}$ , $f=120\text{Hz}$	50	54	-	dB
Output Noise Voltage	$V_{NO}$	$V_{IN}=-15\text{V}$ , $I_O=0.35\text{A}$ , $BW=10\text{Hz}$ to $100\text{kHz}$ ,	-	150	-	$\mu\text{V}$
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-15\text{V}$ , $I_O=5\text{mA}$	-	-0.8	-	mV/ $^\circ\text{C}$
<b>NJM79M12FA/DL1A</b>						
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	$\Delta V_O - I_O$	$V_{IN}=-19\text{V}$ , $I_O=0.005$ to $0.5\text{A}$	-	30	120	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-14.5$ to $-30\text{V}$ , $I_O=0.35\text{A}$	-	3	80	mV
Ripple Rejection	RR	$V_{IN}=-19\text{V}$ , $I_O=0.35\text{A}$ , $e_{in}=2V_{P-P}$ , $f=120\text{Hz}$	54	71	-	dB
Output Noise Voltage	$V_{NO}$	$V_{IN}=-19\text{V}$ , $I_O=0.35\text{A}$ , $BW=10\text{Hz}$ to $100\text{kHz}$ ,	-	150	-	$\mu\text{V}$
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-19\text{V}$ , $I_O=5\text{mA}$	-	-0.4	-	mV/ $^\circ\text{C}$

# NJM79M00

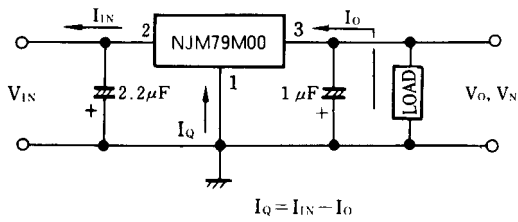
## ■ ELECTRICAL CHARACTERISTICS (T<sub>F</sub>=25°C, C<sub>IN</sub>=2.2μF, C<sub>O</sub>=1.0μF)

Measurement is to be conducted in pulse testing.

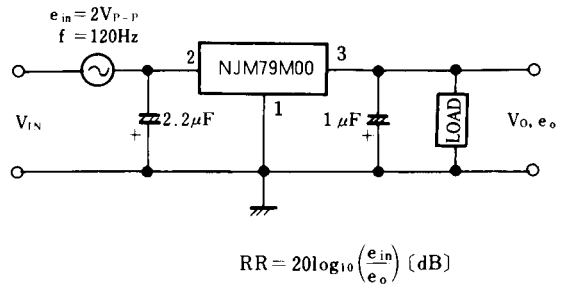
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
<b>NJM79M15FA/DL1A</b>						
Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =-23V, I <sub>O</sub> =0.35A	-14.4	-15.0	-15.6	V
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =-23V, I <sub>O</sub> =0mA	-	2.7	6.0	mA
Load Regulation	ΔV <sub>O</sub> - I <sub>O</sub>	V <sub>IN</sub> =-23V, I <sub>O</sub> =0.005 to 0.5A	-	30	150	mV
Line Regulation	ΔV <sub>O</sub> - V <sub>IN</sub>	V <sub>IN</sub> =-17.5 to -30V, I <sub>O</sub> =0.35A	-	3	80	mV
Ripple Rejection	RR	V <sub>IN</sub> =-23V, I <sub>O</sub> =0.35A, e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz	54	70	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =-23V, I <sub>O</sub> =0.35A, BW=10Hz to 100kHz	-	170	-	μV
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT	V <sub>IN</sub> =-23V, I <sub>O</sub> =5mA	-	-0.5	-	mV/°C
<b>NJM79M18FA/DL1A</b>						
Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =-27V, I <sub>O</sub> =0.35A	-17.3	-18.0	-18.7	V
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =-27V, I <sub>O</sub> =0mA	-	2.7	6.0	mA
Load Regulation	ΔV <sub>O</sub> - I <sub>O</sub>	V <sub>IN</sub> =-27V, I <sub>O</sub> =0.005 to 0.5A	-	35	180	mV
Line Regulation	ΔV <sub>O</sub> - V <sub>IN</sub>	V <sub>IN</sub> =-21 to -33V, I <sub>O</sub> =0.35A	-	4	80	mV
Ripple Rejection	RR	V <sub>IN</sub> =-27V, I <sub>O</sub> =0.35A, e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz	54	69	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =-27V, I <sub>O</sub> =0.35A, BW=10Hz to 100kHz	-	200	-	μV
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT	V <sub>IN</sub> =-27V, I <sub>O</sub> =5mA	-	-0.6	-	mV/°C
<b>NJM79M24FA/DL1A</b>						
Output Voltage	V <sub>O</sub>	V <sub>IN</sub> =-33V, I <sub>O</sub> =0.35A	-23.0	-24.0	-25.0	V
Quiescent Current	I <sub>Q</sub>	V <sub>IN</sub> =-33V, I <sub>O</sub> =0mA	-	2.7	6.0	mA
Load Regulation	ΔV <sub>O</sub> - I <sub>O</sub>	V <sub>IN</sub> =-33V, I <sub>O</sub> =0.005 to 0.5A	-	40	240	mV
Line Regulation	ΔV <sub>O</sub> - V <sub>IN</sub>	V <sub>IN</sub> =-27 to -38V, I <sub>O</sub> =0.35A	-	5	80	mV
Ripple Rejection	RR	V <sub>IN</sub> =-33V, I <sub>O</sub> =0.35A, e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz	54	66	-	dB
Output Noise Voltage	V <sub>NO</sub>	V <sub>IN</sub> =-33V, I <sub>O</sub> =0.35A, BW=10Hz to 100kHz	-	300	-	μV
Average Temperature Coefficient of Output Voltage	ΔV <sub>O</sub> /ΔT	V <sub>IN</sub> =-33V, I <sub>O</sub> =5mA	-	-0.8	-	mV/°C

## ■ TEST CIRCUIT

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



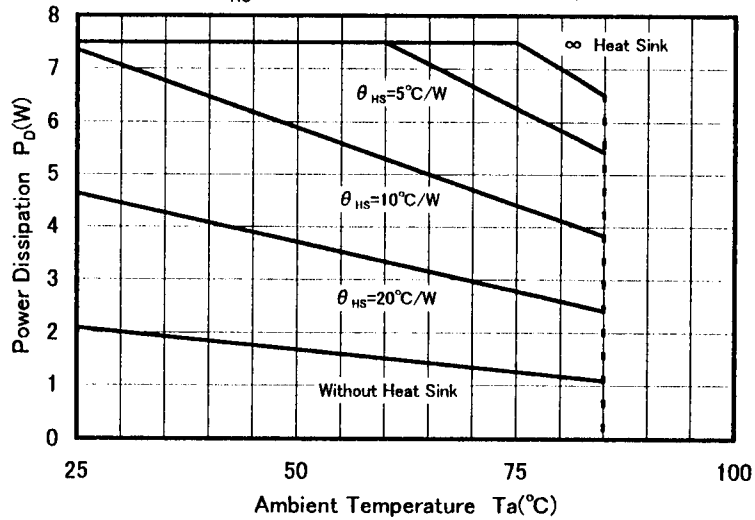
2. Ripple Rejection



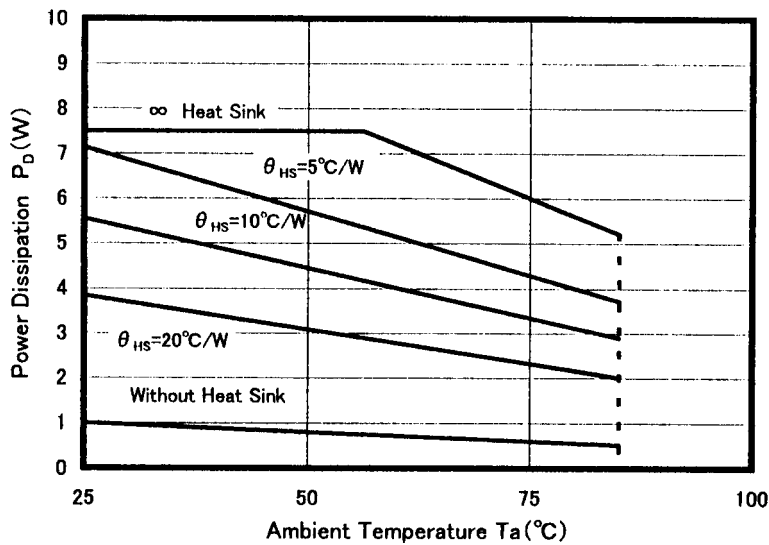
## ■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

### NJM79M00FA

( $\theta_{HS}$  = Heat Sink Thermal Resistance)



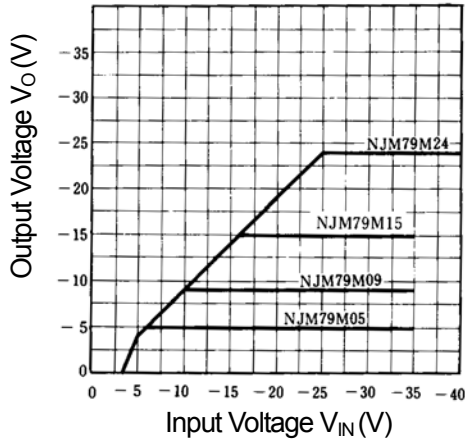
### NJM79M00DL1A



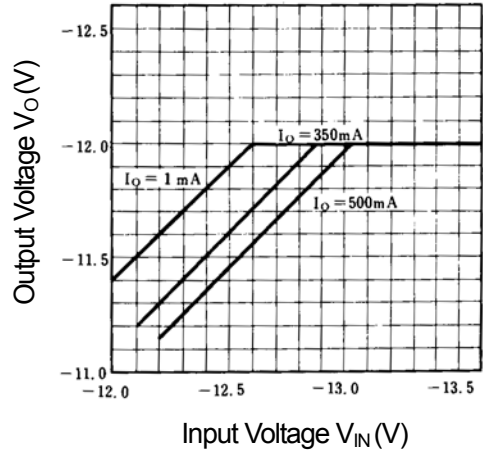
# NJM79M00

## ■ TYPICAL CHARACTERISTICS

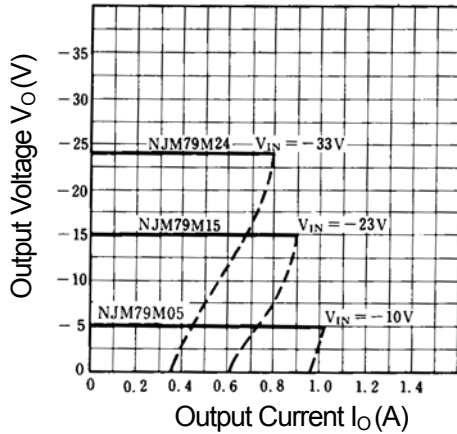
**NJM79M00 Output Characteristics**  
( $I_o=0.35A$ ,  $T_j=25^\circ C$ )



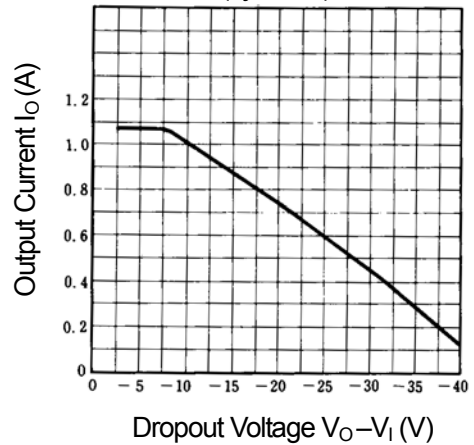
**NJM79M12 Output Voltage vs. Low Input Voltage**  
( $I_o=0.35A$ ,  $T_j=25^\circ C$ )



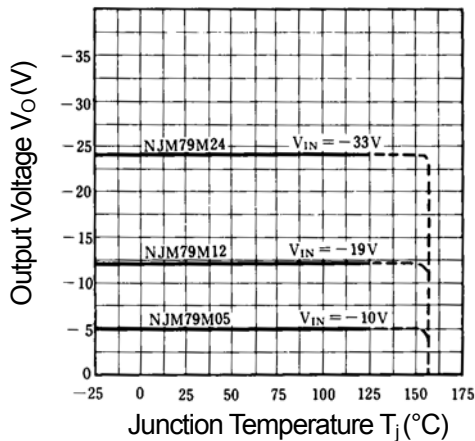
**NJM79M05/15/24 Load Characteristics**  
( $T_j=25^\circ C$ )



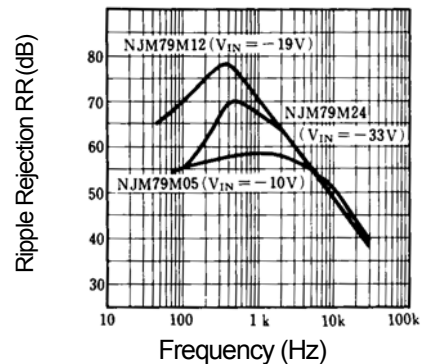
**NJM79M00 Series Short Circuit Output Current**  
( $T_j=25^\circ C$ )



**NJM7805/15/24 Output Voltage vs. Junction Temperature**

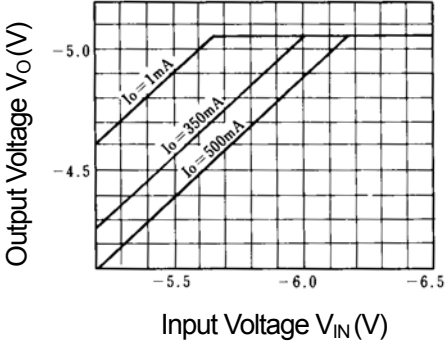


**NJM79M05/15/24 Ripple Rejection vs. Frequency**  
( $T_j=25^\circ C$ ,  $I_o=0.35A$ ,  $e_{in}=2V_{P-P}$ )

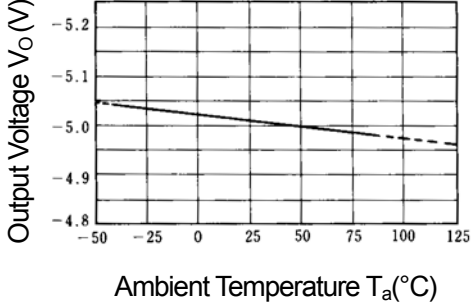


## ■ TYPICAL CHARACTERISTICS

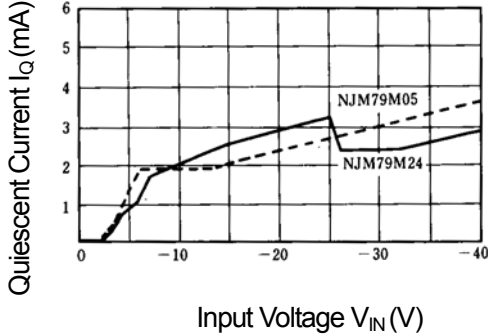
### NJM79M05 Dropout Characteristics ( $T_j=25^\circ\text{C}$ )



### NJM79M05 Output Voltage vs. Temperature



### Quiescent Current vs. Input Voltage ( $T_j=25^\circ\text{C}$ , $I_O=0\text{mA}$ )



**[CAUTION]**

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