

## 3-TERMINAL POSITIVE VOLTAGE REGULATOR

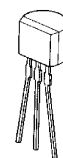
### ■ GENERAL DESCRIPTION

NJM78L00 is 3-terminal positive voltage regulator.

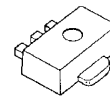
NJM78L00 series is mounted in EMP8 package of the surface mount package.

The EMP8 package possible flow soldering.

### ■ PACKAGE OUTLINE



NJM78L00A



NJM78L00UA

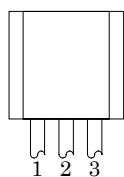


NJM78L00EA  
(5V,9V,12V)

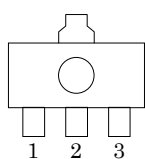
### ■ FEATURES

- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guaranteed 100mA Output Current
- Bipolar Technology
- Package Outline      T0-92,SOT-89,EMP8

### ■ PIN CONFIGURATION



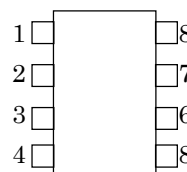
NJM78L00A



NJM78L00UA

#### PIN FUNCTION

- 1.OUT
- 2.GND
- 3.IN

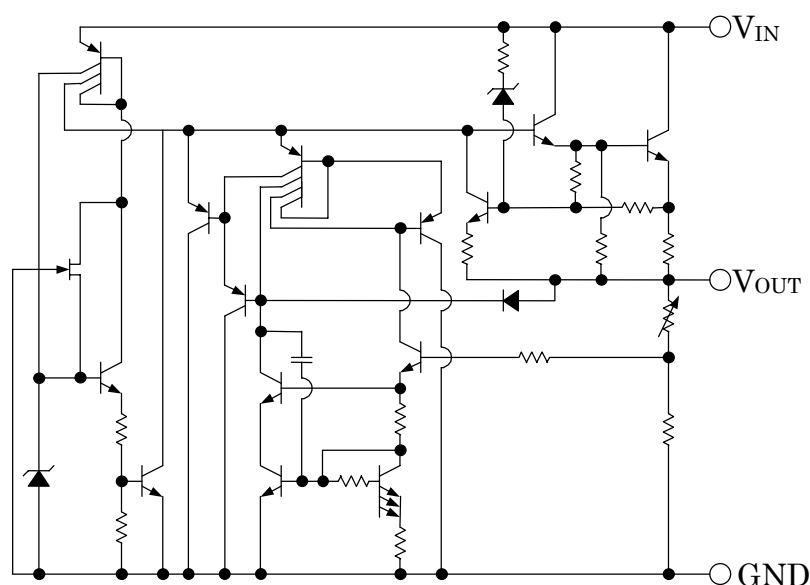


NJM78L00EA  
(5V,9V,12V)

#### PIN FUNCTION

- 1.OUT
- 2.GND
- 3.GND
- 4.NC
- 5.NC
- 6.GND
- 7.GND
- 8.IN

### ■ EQUIVALENT CIRCUIT



## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL    | MAXIMUM RATINGS                                                      | UNIT |
|-----------------------------|-----------|----------------------------------------------------------------------|------|
| Input Voltage               | $V_{IN}$  | (78L02A ~ 78L09A) 30<br>(78L12A ~ 78L15A) 35<br>(78L18A ~ 78L24A) 40 | V    |
| Power Dissipation           | $P_D$     | (TO-92) 500<br>(EMP8) 350<br>(SOT-89) 300                            | mW   |
| Operating Temperature Range | $T_{opr}$ | -40 ~ +85                                                            | °C   |
| Storage Temperature Range   | $T_{stg}$ | -40 ~ +150                                                           | °C   |

## ■ ELECTRICAL CHARACTERISTICS( $C_{IN}=0.33\mu F$ , $C_O=0.1\mu F$ , $T_j=25^\circ C$ )

Measurement is to be conducted is pulse testing.

| PARAMETER                                         | SYMBOL                  | TEST CONDITION                                                    | MIN. | TYP. | MAX. | UNIT    |
|---------------------------------------------------|-------------------------|-------------------------------------------------------------------|------|------|------|---------|
| <b>NJM78L02A</b>                                  |                         |                                                                   |      |      |      |         |
| Output Voltage                                    | $V_O$                   | $V_{IN}=9V$ , $I_O=40mA$                                          | 2.47 | 2.6  | 2.73 | V       |
| Line Regulation1                                  | $\Delta V_O - V_{IN1}$  | $V_{IN}=4.75V \sim 20V$ , $I_O=40mA$                              | —    | —    | 125  | mV      |
| Line Regulation2                                  | $\Delta V_O - V_{IN2}$  | $V_{IN}=5V \sim 20V$ , $I_O=40mA$                                 | —    | —    | 100  | mV      |
| Load Regulation1                                  | $\Delta V_O - I_{O1}$   | $V_{IN}=9V$ , $I_O=1 \sim 40mA$                                   | —    | —    | 25   | mV      |
| Load Regulation2                                  | $\Delta V_O - I_{O2}$   | $V_{IN}=9V$ , $I_O=1 \sim 100mA$                                  | —    | —    | 50   | mV      |
| Quiescent Current                                 | $I_Q$                   | $V_{IN}=9V$ , $I_O=0mA$                                           | —    | 2.0  | 6    | mA      |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O / \Delta T$ | $V_{IN}=9V$ , $I_O=1mA$                                           | —    | 0.2  | —    | mV/°C   |
| Ripple Rejection                                  | RR                      | $6V < V_{IN} < 16V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 43   | 73   | —    | dB      |
| Output Noise Voltage                              | $V_{NO}$                | $V_{IN}=9V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                 | —    | 35   | —    | $\mu V$ |
| <b>NJM78L03A(*1)</b>                              |                         |                                                                   |      |      |      |         |
| Output Voltage                                    | $V_O$                   | $V_{IN}=9V$ , $I_O=40mA$                                          | 2.85 | 3.0  | 3.15 | V       |
| Line Regulation1                                  | $\Delta V_O - V_{IN1}$  | $V_{IN}=5V \sim 20V$ , $I_O=40mA$                                 | —    | —    | 125  | mV      |
| Line Regulation2                                  | $\Delta V_O - V_{IN2}$  | $V_{IN}=6V \sim 20V$ , $I_O=40mA$                                 | —    | —    | 100  | mV      |
| Load Regulation1                                  | $\Delta V_O - I_{O1}$   | $V_{IN}=9V$ , $I_O=1 \sim 40mA$                                   | —    | —    | 25   | mV      |
| Load Regulation2                                  | $\Delta V_O - I_{O2}$   | $V_{IN}=9V$ , $I_O=1 \sim 100mA$                                  | —    | —    | 50   | mV      |
| Quiescent Current                                 | $I_Q$                   | $V_{IN}=9V$ , $I_O=0mA$                                           | —    | 2.0  | 6    | mA      |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O / \Delta T$ | $V_{IN}=9V$ , $I_O=1mA$                                           | —    | 0.2  | —    | mV/°C   |
| Ripple Rejection                                  | RR                      | $6V < V_{IN} < 16V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 43   | 72   | —    | dB      |
| Output Noise Voltage                              | $V_{NO}$                | $V_{IN}=9V$ , $BW=10Hz \sim 100kHz$ ,<br>$I_O=40mA$               | —    | 40   | —    | $\mu V$ |
| <b>NJM78L05A(*3)</b>                              |                         |                                                                   |      |      |      |         |
| Output Voltage                                    | $V_O$                   | $V_{IN}=10V$ , $I_O=40mA$                                         | 4.75 | 5.0  | 5.25 | V       |
| Line Regulation1                                  | $\Delta V_O - V_{IN1}$  | $V_{IN}=7V \sim 20V$ , $I_O=40mA$                                 | —    | —    | 200  | mV      |
| Line Regulation2                                  | $\Delta V_O - V_{IN2}$  | $V_{IN}=8V \sim 20V$ , $I_O=40mA$                                 | —    | —    | 150  | mV      |
| Load Regulation1                                  | $\Delta V_O - I_{O1}$   | $V_{IN}=10V$ , $I_O=1 \sim 40mA$                                  | —    | —    | 30   | mV      |
| Load Regulation2                                  | $\Delta V_O - I_{O2}$   | $V_{IN}=10V$ , $I_O=1 \sim 100mA$                                 | —    | —    | 60   | mV      |
| Quiescent Current                                 | $I_Q$                   | $V_{IN}=10V$ , $I_O=0mA$                                          | —    | 2.0  | 6    | mA      |
| Average Temperature Coefficient of Output Voltage | $\Delta V_O / \Delta T$ | $V_{IN}=10V$ , $I_O=1mA$                                          | —    | 0.4  | —    | mV/°C   |
| Ripple Rejection                                  | RR                      | $8V < V_{IN} < 18V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 40   | 69   | —    | dB      |
| Output Noise Voltage                              | $V_{NO}$                | $V_{IN}=10V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                | —    | 70   | —    | $\mu V$ |

(\*1):SOT-89 package only.

(\*2):TO-92 package only.

(\*3):SOT-89,TO-92, EMP8

**■ ELECTRICAL CHARACTERISTICS**( $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ ,  $T_J=25^\circ C$ )

Measurement is to be conducted is pulse testing.

| PARAMETER                     | SYMBOL                  | TEST CONDITION                                                        | MIN. | TYP. | MAX. | UNIT           |
|-------------------------------|-------------------------|-----------------------------------------------------------------------|------|------|------|----------------|
| <b>NJM78L06A</b>              |                         |                                                                       |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=12V$ , $I_O=40mA$                                             | 5.7  | 6.0  | 6.3  | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=8.5V \sim 20V$ , $I_O=40mA$                                   | —    | —    | 200  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=9V \sim 20V$ , $I_O=40mA$                                     | —    | —    | 150  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=12V$ , $I_O=1 \sim 40mA$                                      | —    | —    | 40   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=12V$ , $I_O=1 \sim 100mA$                                     | —    | —    | 80   | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=12V$ , $I_O=0mA$                                              | —    | 2.0  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=12V$ , $I_O=1mA$                                              | —    | 0.5  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                       |      |      |      |                |
| Ripple Rejection              | RR                      | $9V < V_{IN} < 20V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 40   | 67   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=12V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                    | —    | 80   | —    | $\mu V$        |
| <b>NJM78L62A(*2)</b>          |                         |                                                                       |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=12.2V$ , $I_O=40mA$                                           | 5.89 | 6.2  | 6.51 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=8.7V \sim 20.2V$ , $I_O=40mA$                                 | —    | —    | 200  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=9.2V \sim 20.2V$ , $I_O=40mA$                                 | —    | —    | 150  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=12.2V$ , $I_O=1 \sim 40mA$                                    | —    | —    | 40   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=12.2V$ , $I_O=1 \sim 100mA$                                   | —    | —    | 85   | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=12.2V$ , $I_O=0mA$                                            | —    | 2.0  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=12.2V$ , $I_O=1mA$                                            | —    | 0.5  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                       |      |      |      |                |
| Ripple Rejection              | RR                      | $9.2V < V_{IN} < 20.2V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 40   | 67   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=12.2V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                  | —    | 85   | —    | $\mu V$        |
| <b>NJM78L07A</b>              |                         |                                                                       |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=13V$ , $I_O=40mA$                                             | 6.65 | 7.0  | 7.35 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=9.5V \sim 22V$ , $I_O=40mA$                                   | —    | —    | 210  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=10V \sim 22V$ , $I_O=40mA$                                    | —    | —    | 160  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=13V$ , $I_O=1 \sim 40mA$                                      | —    | —    | 45   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=13V$ , $I_O=1 \sim 100mA$                                     | —    | —    | 90   | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=13V$ , $I_O=0mA$                                              | —    | 2.1  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=13V$ , $I_O=1mA$                                              | —    | 0.55 | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                       |      |      |      |                |
| Ripple Rejection              | RR                      | $10V < V_{IN} < 20V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$    | 39   | 66   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=13V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                    | —    | 100  | —    | $\mu V$        |
| <b>NJM78L08A</b>              |                         |                                                                       |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=14V$ , $I_O=40mA$                                             | 7.6  | 8.0  | 8.4  | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=10.5V \sim 23V$ , $I_O=40mA$                                  | —    | —    | 225  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=11V \sim 23V$ , $I_O=40mA$                                    | —    | —    | 175  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=14V$ , $I_O=1 \sim 40mA$                                      | —    | —    | 50   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=14V$ , $I_O=1 \sim 100mA$                                     | —    | —    | 100  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=14V$ , $I_O=0mA$                                              | —    | 2.1  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=14V$ , $I_O=1mA$                                              | —    | 0.6  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                       |      |      |      |                |
| Ripple Rejection              | RR                      | $11V < V_{IN} < 20V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$    | 39   | 66   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=14V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                    | —    | 115  | —    | $\mu V$        |

(\*1):SOT-89 package only.

(\*2):TO-92 package only.

(\*3):SOT-89,TO-92, EMP8

**■ ELECTRICAL CHARACTERISTICS**( $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ ,  $T_J=25^\circ C$ )

Measurement is to be conducted is pulse testing.

| PARAMETER                     | SYMBOL                  | TEST CONDITION                                                         | MIN. | TYP. | MAX. | UNIT           |
|-------------------------------|-------------------------|------------------------------------------------------------------------|------|------|------|----------------|
| <b>NJM78L09A(*3)</b>          |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=15V$ , $I_O=40mA$                                              | 8.55 | 9.0  | 9.45 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=11.5V \sim 23V$ , $I_O=40mA$                                   | —    | —    | 250  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=12V \sim 23V$ , $I_O=40mA$                                     | —    | —    | 200  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=15V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 50   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=15V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 100  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=15V$ , $I_O=0mA$                                               | —    | 2.1  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=15V$ , $I_O=1mA$                                               | —    | 0.65 | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $12V < V_{IN} < 21V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 38   | 65   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=15V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 125  | —    | $\mu V$        |
| <b>NJM78L10A</b>              |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=16V$ , $I_O=40mA$                                              | 9.5  | 10.0 | 10.5 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=13V \sim 25V$ , $I_O=40mA$                                     | —    | —    | 250  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=14V \sim 25V$ , $I_O=40mA$                                     | —    | —    | 200  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=16V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 50   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=16V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 100  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=16V$ , $I_O=0mA$                                               | —    | 2.1  | 6    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=16V$ , $I_O=1mA$                                               | —    | 0.7  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $13V < V_{IN} < 22V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 37   | 64   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=16V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 135  | —    | $\mu V$        |
| <b>NJM78L12A(*3)</b>          |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=19V$ , $I_O=40mA$                                              | 11.4 | 12.0 | 12.6 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=14.5V \sim 27V$ , $I_O=40mA$                                   | —    | —    | 250  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=16V \sim 27V$ , $I_O=40mA$                                     | —    | —    | 200  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=19V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 50   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=19V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 100  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=19V$ , $I_O=0mA$                                               | —    | 2.1  | 6.5  | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=19V$ , $I_O=1mA$                                               | —    | 0.9  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $15V < V_{IN} < 25V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 37   | 62   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=19V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 160  | —    | $\mu V$        |
| <b>NJM78L15A</b>              |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=23V$ , $I_O=40mA$                                              | 14.3 | 15.0 | 15.7 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=17.5V \sim 30V$ , $I_O=40mA$                                   | —    | —    | 300  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=20V \sim 30V$ , $I_O=40mA$                                     | —    | —    | 250  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=23V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 75   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=23V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 150  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=23V$ , $I_O=0mA$                                               | —    | 2.2  | 6.5  | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=23V$ , $I_O=1mA$                                               | —    | 1.0  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $18.5V < V_{IN} < 28.5V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 34   | 60   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=23V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 190  | —    | $\mu V$        |

(\*1):SOT-89 package only.

(\*2):TO-92 package only.

(\*3):SOT-89,TO-92, EMP8

**■ ELECTRICAL CHARACTERISTICS**( $C_{IN}=0.33\mu F$ ,  $C_O=0.1\mu F$ ,  $T_j=25^\circ C$ )

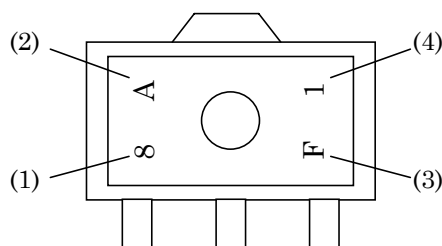
Measurement is to be conducted is pulse testing.

| PARAMETER                     | SYMBOL                  | TEST CONDITION                                                         | MIN. | TYP. | MAX. | UNIT           |
|-------------------------------|-------------------------|------------------------------------------------------------------------|------|------|------|----------------|
| <b>NJM78L18A</b>              |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=27V$ , $I_O=40mA$                                              | 17.1 | 18.0 | 18.9 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=22V \sim 33V$ , $I_O=40mA$                                     | —    | —    | 320  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=23V \sim 33V$ , $I_O=40mA$                                     | —    | —    | 270  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=27V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 80   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=27V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 160  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=27V$ , $I_O=0mA$                                               | —    | 2.2  | 6.5  | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=27V$ , $I_O=1mA$                                               | —    | 1.1  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $23V < V_{IN} < 33V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 33   | 59   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=27V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 230  | —    | $\mu V$        |
| <b>NJM78L20A</b>              |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=29V$ , $I_O=40mA$                                              | 19.0 | 20.0 | 21.0 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=23V \sim 34V$ , $I_O=40mA$                                     | —    | —    | 330  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=24V \sim 34V$ , $I_O=40mA$                                     | —    | —    | 280  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=29V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 90   | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=29V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 180  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=29V$ , $I_O=0mA$                                               | —    | 2.3  | 7    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=29V$ , $I_O=1mA$                                               | —    | 1.2  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $24V < V_{IN} < 34V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$     | 32   | 58   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=29V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 250  | —    | $\mu V$        |
| <b>NJM78L24A</b>              |                         |                                                                        |      |      |      |                |
| Output Voltage                | $V_O$                   | $V_{IN}=33V$ , $I_O=40mA$                                              | 22.8 | 24   | 25.2 | V              |
| Line Regulation1              | $\Delta V_O - V_{IN1}$  | $V_{IN}=27V \sim 38V$ , $I_O=40mA$                                     | —    | —    | 350  | mV             |
| Line Regulation2              | $\Delta V_O - V_{IN2}$  | $V_{IN}=28V \sim 38V$ , $I_O=40mA$                                     | —    | —    | 300  | mV             |
| Load Regulation1              | $\Delta V_O - I_{O1}$   | $V_{IN}=33V$ , $I_O=1 \sim 40mA$                                       | —    | —    | 100  | mV             |
| Load Regulation2              | $\Delta V_O - I_{O2}$   | $V_{IN}=33V$ , $I_O=1 \sim 100mA$                                      | —    | —    | 200  | mV             |
| Quiescent Current             | $I_Q$                   | $V_{IN}=33V$ , $I_O=0mA$                                               | —    | 2.3  | 7    | mA             |
| Average Temperature           | $\Delta V_O / \Delta T$ | $V_{IN}=33V$ , $I_O=1mA$                                               | —    | 1.4  | —    | mV/ $^\circ C$ |
| Coefficient of Output Voltage |                         |                                                                        |      |      |      |                |
| Ripple Rejection              | RR                      | $27.5V < V_{IN} < 37.5V$ , $I_O=40mA$<br>$e_{in}=1V_{p-p}$ , $f=120Hz$ | 32   | 57   | —    | dB             |
| Output Noise Voltage          | $V_{NO}$                | $V_{IN}=33V$ , $BW=10Hz \sim 100kHz$<br>$I_O=40mA$                     | —    | 280  | —    | $\mu V$        |

(\*1):SOT-89 package only.

(\*2):TO-92 package only.

(\*3):SOT-89,TO-92, EMP8

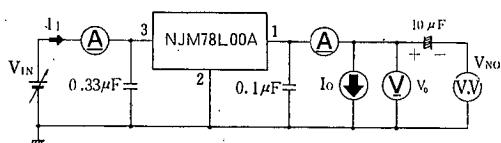
**■ SOT-89 MARK**


- (1) 8 : Positive Output  
 (2) Vo Rank  
 (3) The end of A.D.  
 (4) Production Mouth  
     Oct. ... X  
     Nov. ... Y  
     Dec. ... Z

|           |   |   |
|-----------|---|---|
| NJM78L02A | 8 | A |
| NJM78L03A | 8 | B |
| NJM78L05A | 8 | C |
| NJM78L06A | 8 | E |
| NJM78L62A | 8 | Z |
| NJM78L07A | 8 | F |
| NJM78L08A | 8 | G |
| NJM78L09A | 8 | H |
| NJM78L10A | 8 | J |
| NJM78L12A | 8 | K |
| NJM78L15A | 8 | L |
| NJM78L18A | 8 | M |
| NJM78L20A | 8 | N |
| NJM78L24A | 8 | P |

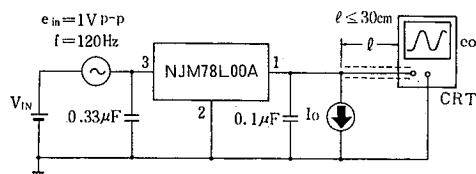
## ■ TEST CIRCUIT

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage, Peak Output/Short-Circuit Current
2. Ripple Rejection



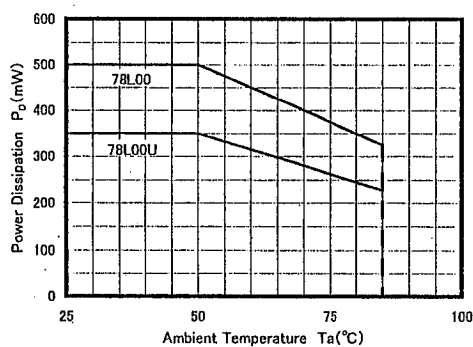
○ Measurement is to be conducted in pulse testing.

○  $I_Q = I_1 - I_O$



$$RR = 20 \log_{10} \left( \frac{e_{in}}{e_o} \right) \text{ (dB)}$$

## ■ AMBIENT TEMPERATURE VS. POWER DISSIPATION

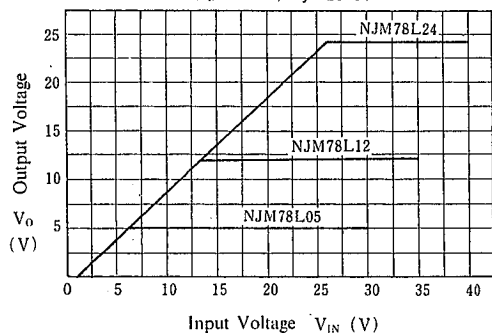


## ■ TYPICAL CHARACTERISTICS

### NJM78L05/L12/L24

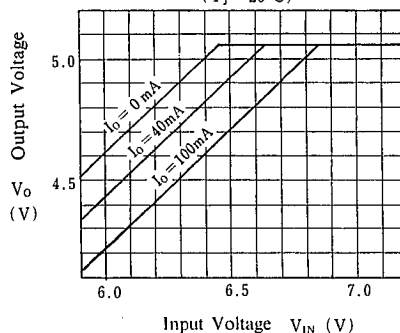
#### Output Characteristics

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



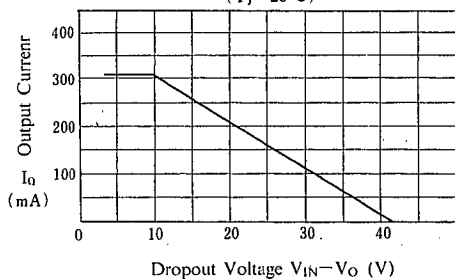
### NJM78L05 Dropout Characteristics

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



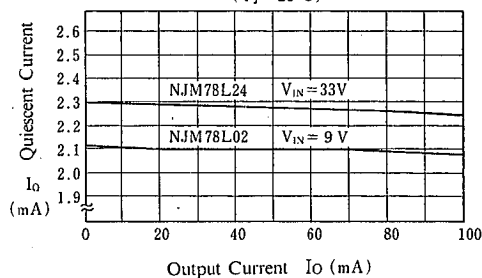
### NJM78L00 Series Short Circuit Output Current

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



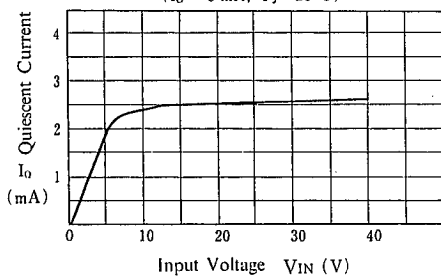
### NJM78L02/L24 Quiescent Current vs. Output Current

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

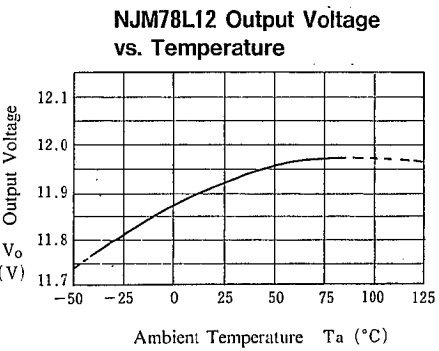
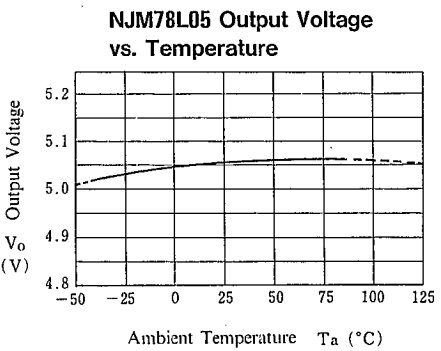
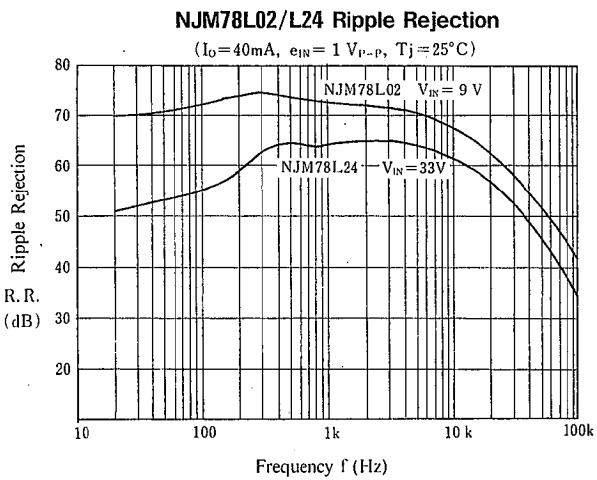
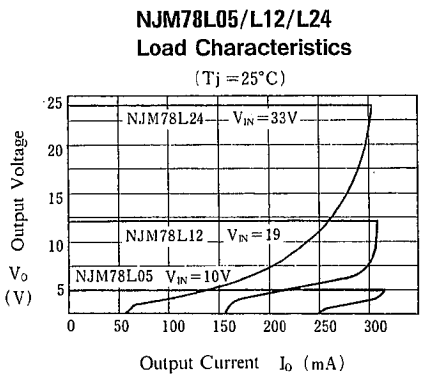
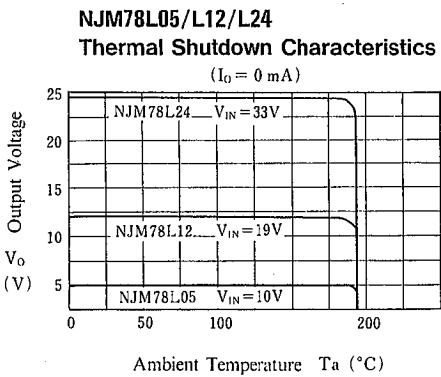


### NJM78L05 Quiescent Current vs. Input Voltage

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



■ TYPICAL CHARACTERISTICS



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# 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.