

## 3-TERMINAL POSITIVE VOLTAGE REGULATOR

### ■ GENERAL DESCRIPTION

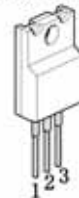
The NJM7800 series of monolithic 3-Terminal Positive Voltage Regulators is constructed using the New JRC Planar epitaxial process. These regulators employ internal current-limiting, thermal-shutdown and safe-area compensation making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on card) regulation for elimination of distribution problems associated with single point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

### ■ FEATURES

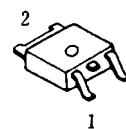
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 1.5A Output Current
- Package Outline TO-220F, TO-252
- Bipolar Technology

### ■ PACKAGE OUTLINE

( TO-220F )



( TO-252 )



#### NJM7800FA

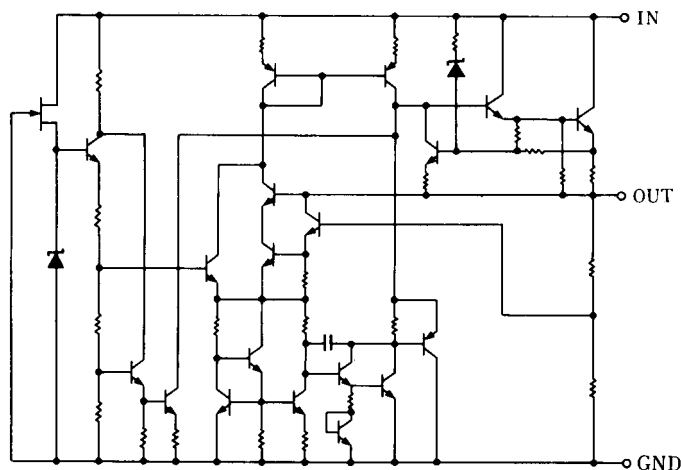
1. IN
2. GND
3. OUT

#### NJM7800DL1A

1. IN
2. GND
3. OUT

(note) The radiation fin is connected pin2.

### ■ EQUIVALENT CIRCUIT



# NJM7800

## ■ ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

| PARAMETER                   | SYMBOL                         | MAXIMUM RATINGS                              |                                                                    | UNIT |
|-----------------------------|--------------------------------|----------------------------------------------|--------------------------------------------------------------------|------|
| Input Voltage               | V <sub>IN</sub>                | 7805 to 7810<br>7812 to 7815<br>7818 to 7824 | 35<br>35<br>40                                                     | V    |
| Storage Temperature Range   | T <sub>stg</sub>               | -40 to +150                                  |                                                                    | °C   |
| Operating Temperature Range | Operating Junction Temperature | T <sub>j</sub>                               | -40 to +150                                                        | °C   |
|                             | Operating Junction Temperature | T <sub>opr</sub>                             | -40 to +85                                                         |      |
| Power Dissipation           | P <sub>D</sub>                 | TO-220F<br>TO-252                            | 16(T <sub>C</sub> ≤70°C)<br>10(T <sub>C</sub> =25°C)<br>1(Ta≤25°C) | W    |

## ■ THERMAL CHARACTERISTICS

|                    |                                 |                 | TO-220F | TO-252 | °C/W |
|--------------------|---------------------------------|-----------------|---------|--------|------|
| Thermal Resistance | Junction-to-Ambient Temperature | θ <sub>ja</sub> | 60      | 125    |      |
|                    | Junction-to-Case                | θ <sub>jc</sub> | 5       | 12.5   |      |

## ■ ELECTRICAL CHARACTERISTICS (C<sub>1</sub>=0.33μF, C<sub>O</sub>=0.1μF, T<sub>J</sub>=25°C)

Measurement is to be conducted in pulse testing.

| PARAMETER                                         | SYMBOL                            | TEST CONDITIONS                                                                          | TO-220F |      |      | TO-252 |      |      | UNIT  |
|---------------------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------|---------|------|------|--------|------|------|-------|
|                                                   |                                   |                                                                                          | MIN.    | TYP. | MAX. | MIN.   | TYP. | MAX. |       |
| NJM7805FA/DL1A                                    |                                   |                                                                                          |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =10V, I <sub>O</sub> =0.5A                                               | 4.8     | 5.0  | 5.2  | 4.8    | 5.0  | 5.2  | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =10V, I <sub>O</sub> =0mA                                                | -       | 4.2  | 6.0  | -      | 4.2  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =10V, I <sub>O</sub> =0.005 to 1.5A                                      | -       | 15   | 50   | -      | 15   | 100  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =7 to 25V, I <sub>O</sub> =0.5A                                          | -       | 3    | 50   | -      | 3    | 100  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =10V, I <sub>O</sub> =0.5A, e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 68      | 78   | -    | 68     | 78   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =10V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                            | -       | 45   | -    | -      | 45   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =10V, I <sub>O</sub> =5mA                                                | -       | -0.5 | -    | -      | -0.5 | -    | mV/°C |

## ■ ELECTRICAL CHARACTERISTICS (C<sub>1</sub>=0.33μF, C<sub>O</sub>=0.1μF, T<sub>J</sub>=25°C)

Measurement is to be conducted in pulse testing.

| PARAMETER                                         | SYMBOL                            | TEST CONDITIONS                                                                           | TO-220F |      |      | TO-252 |      |      | UNIT  |
|---------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------|---------|------|------|--------|------|------|-------|
|                                                   |                                   |                                                                                           | MIN.    | TYP. | MAX. | MIN.   | TYP. | MAX. |       |
| NJM7806FA/DL1A                                    |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =11V, I <sub>O</sub> =0.5A                                                | 5.75    | 6.0  | 6.25 | 5.75   | 6.0  | 6.25 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =11V, I <sub>O</sub> =0mA                                                 | -       | 4.3  | 6.0  | -      | 4.3  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =11V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 15   | 60   | -      | 15   | 120  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =8 to 25V, I <sub>O</sub> =0.5A                                           | -       | 5    | 60   | -      | 5    | 120  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =11V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 65      | 75   | -    | 65     | 75   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =11V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 45   | -    | -      | 45   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =11V, I <sub>O</sub> =5mA                                                 | -       | -0.6 | -    | -      | -0.6 | -    | mV/°C |
| NJM7808FA/DL1A                                    |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =14V, I <sub>O</sub> =0.5A                                                | 7.7     | 8.0  | 8.3  | 7.7    | 8.0  | 8.3  | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =14V, I <sub>O</sub> =0mA                                                 | -       | 4.3  | 6.0  | -      | 4.3  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =14V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 15   | 80   | -      | 15   | 160  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =10.5 to 25V, I <sub>O</sub> =0.5A                                        | -       | 6    | 80   | -      | 6    | 160  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =14V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 62      | 72   | -    | 62     | 72   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =14V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 55   | -    | -      | 55   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =14V, I <sub>O</sub> =5mA                                                 | -       | -0.8 | -    | -      | -0.8 | -    | mV/°C |
| NJM7809FA/DL1A                                    |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =15V, I <sub>O</sub> =0.5A                                                | 8.65    | 9.0  | 9.35 | 8.65   | 9.0  | 9.35 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =15V, I <sub>O</sub> =0mA                                                 | -       | 4.3  | 6.0  | -      | 4.3  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =15V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 15   | 90   | -      | 15   | 180  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =11.5 to 25V, I <sub>O</sub> =0.5A                                        | -       | 7    | 90   | -      | 7    | 180  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =15V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 62      | 72   | -    | 62     | 72   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =15V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 60   | -    | -      | 60   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =15V, I <sub>O</sub> =5mA                                                 | -       | -0.9 | -    | -      | -0.9 | -    | mV/°C |
| NJM7810FA/DL1A                                    |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =17V, I <sub>O</sub> =0.5A                                                | 9.60    | 10.0 | 10.4 | 9.6    | 10.0 | 10.4 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =17V, I <sub>O</sub> =0mA                                                 | -       | 4.3  | 6.0  | -      | 4.3  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =17V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 15   | 130  | -      | 15   | 200  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =12.5 to 25V, I <sub>O</sub> =0.5A                                        | -       | 7    | 100  | -      | 7    | 200  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =17V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 62      | 72   | -    | 62     | 72   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =17V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 60   | -    | -      | 65   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =17V, I <sub>O</sub> =5mA                                                 | -       | -0.9 | -    | -      | -1.0 | -    | mV/°C |

# NJM7800

## ■ ELECTRICAL CHARACTERISTICS ( $C_1=0.33\mu\text{F}$ , $C_O=0.1\mu\text{F}$ , $T_J=25^\circ\text{C}$ )

Measurement is to be conducted in pulse testing.

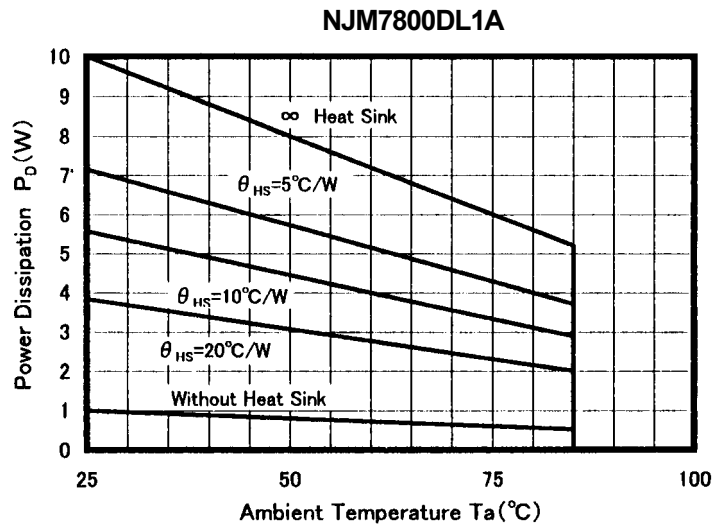
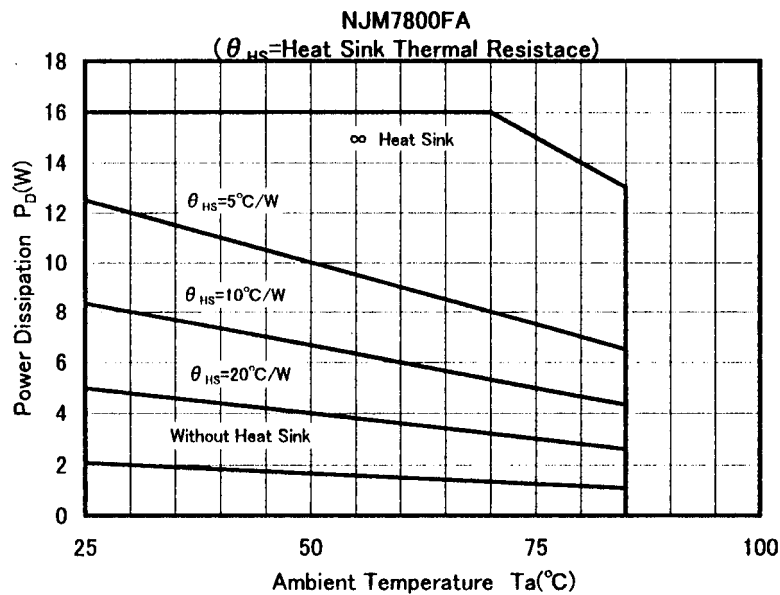
| PARAMETER                                         | SYMBOL                            | TEST CONDITIONS                                                                           | TO-220F |      |      | TO-252 |      |      | UNIT  |
|---------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------|---------|------|------|--------|------|------|-------|
|                                                   |                                   |                                                                                           | MIN.    | TYP. | MAX. | MIN.   | TYP. | MAX. |       |
| <b>NJM7812FA/DL1A</b>                             |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =19V, I <sub>O</sub> =0.5A                                                | 11.5    | 12.0 | 12.5 | 11.5   | 12.0 | 12.5 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =19V, I <sub>O</sub> =0mA                                                 | -       | 4.3  | 6.0  | -      | 4.3  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =19V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 25   | 120  | -      | 25   | 240  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =14.5 to 30V, I <sub>O</sub> =0.5A                                        | -       | 10   | 120  | -      | 10   | 240  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =19V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 61      | 71   | -    | 61     | 71   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =19V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 75   | -    | -      | 75   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =19V, I <sub>O</sub> =5mA                                                 | -       | -1.2 | -    | -      | -1.2 | -    | mV/°C |
| <b>NJM7815FA/DL1A</b>                             |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =23V, I <sub>O</sub> =0.5A                                                | 14.4    | 15.0 | 15.6 | 14.4   | 15.0 | 15.6 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =23V, I <sub>O</sub> =0mA                                                 | -       | 4.4  | 6.0  | -      | 4.4  | 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 1.5A                                       | -       | 35   | 150  | -      | 35   | 300  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =17.5 to 30V, I <sub>O</sub> =0.5A                                        | -       | 11   | 150  | -      | 11   | 300  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =23V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 60      | 70   | -    | 60     | 70   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =23V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 90   | -    | -      | 90   | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =23V, I <sub>O</sub> =5mA                                                 | -       | -1.5 | -    | -      | -1.5 | -    | mV/°C |
| <b>NJM7818FA/DL1A</b>                             |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =27V, I <sub>O</sub> =0.5A                                                | 17.3    | 18.0 | 18.7 | 17.3   | 18.0 | 18.7 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =27V, I <sub>O</sub> =0mA                                                 | -       | 4.5  | 6.0  | -      | 4.5  | 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 1.5A                                       | -       | 55   | 180  | -      | 55   | 360  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =21 to 33V, I <sub>O</sub> =0.5A                                          | -       | 15   | 180  | -      | 15   | 360  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =27V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 59      | 69   | -    | 59     | 69   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =27V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 100  | -    | -      | 100  | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =27V, I <sub>O</sub> =5mA                                                 | -       | -1.8 | -    | -      | -1.8 | -    | mV/°C |
| <b>NJM7820FA/DL1A</b>                             |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                    | V <sub>O</sub>                    | V <sub>IN</sub> =29V, I <sub>O</sub> =0.5A                                                | 19.2    | 20.0 | 20.8 | 19.2   | 20.0 | 20.8 | V     |
| Quiescent Current                                 | I <sub>Q</sub>                    | V <sub>IN</sub> =29V, I <sub>O</sub> =0mA                                                 | -       | 4.5  | 6.0  | -      | 4.5  | 6.0  | mA    |
| Load Regulation                                   | ΔV <sub>O</sub> - I <sub>O</sub>  | V <sub>IN</sub> =29V, I <sub>O</sub> =0.005 to 1.5A                                       | -       | 61   | 200  | -      | 61   | 400  | mV    |
| Line Regulation                                   | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =23 to 35V, I <sub>O</sub> =0.5A                                          | -       | 16   | 200  | -      | 16   | 400  | mV    |
| Ripple Rejection                                  | RR                                | V <sub>IN</sub> =29V, I <sub>O</sub> =0.5A , e <sub>in</sub> =2V <sub>P-P</sub> , f=120Hz | 58      | 68   | -    | 58     | 68   | -    | dB    |
| Output Noise Voltage                              | V <sub>NO</sub>                   | V <sub>IN</sub> =29V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 120  | -    | -      | 120  | -    | μV    |
| Average Temperature Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =29V, I <sub>O</sub> =5mA                                                 | -       | -2.0 | -    | -      | -2.0 | -    | mV/°C |

## ■ ELECTRICAL CHARACTERISTICS (C<sub>1</sub>=0.33μF, C<sub>O</sub>=0.1μF, T<sub>J</sub>=25°C)

Measurement is to be conducted in pulse testing.

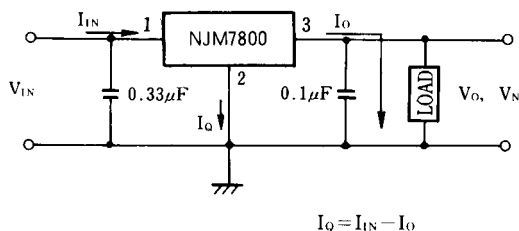
| PARAMETER                                            | SYMBOL                            | TEST CONDITIONS                                                                           | TO-220F |      |      | TO-252 |      |      | UNIT  |
|------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------------|---------|------|------|--------|------|------|-------|
|                                                      |                                   |                                                                                           | MIN.    | TYP. | MAX. | MIN.   | TYP. | MAX. |       |
| NJM7824FA/DL1A                                       |                                   |                                                                                           |         |      |      |        |      |      |       |
| Output Voltage                                       | V <sub>O</sub>                    | V <sub>IN</sub> =33V, I <sub>O</sub> =0.5A                                                | 23.0    | 24.0 | 25.0 | 23.0   | 24.0 | 25.0 | V     |
| Quiescent Current                                    | I <sub>Q</sub>                    | V <sub>IN</sub> =33V, I <sub>O</sub> =0mA                                                 | -       | 4.6  | 6.0  | -      | 4.6  | 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 1.5A                                       | -       | 65   | 240  | -      | 65   | 480  | mV    |
| Line Regulation                                      | ΔV <sub>O</sub> - V <sub>IN</sub> | V <sub>IN</sub> =27 to 38V, I <sub>O</sub> =0.5A                                          | -       | 18   | 240  | -      | 18   | 480  | mV    |
| Ripple Rejection                                     | RR                                | V <sub>IN</sub> =33V, I <sub>O</sub> =0.5A , e <sub>IN</sub> =2V <sub>P-P</sub> , f=120Hz | 56      | 66   | -    | 56     | 66   | -    | dB    |
| Output Noise Voltage                                 | V <sub>NO</sub>                   | V <sub>IN</sub> =33V, BW=10Hz to 100kHz, I <sub>O</sub> =0.5A                             | -       | 120  | -    | -      | 120  | -    | μV    |
| Average Temperature<br>Coefficient of Output Voltage | ΔV <sub>O</sub> /ΔT               | V <sub>IN</sub> =33V, I <sub>O</sub> =5mA                                                 | -       | -2.4 | -    | -      | -2.4 | -    | mV/°C |

## ■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

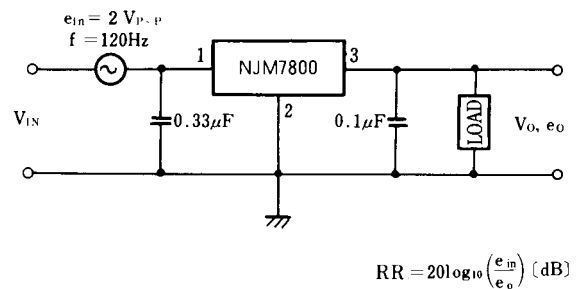


## ■ TEST CIRCUIT

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



2. Ripple Rejection



## ■ Input Capacitor $C_{IN}$

Input Capacitor  $C_{IN}$  is required to prevent oscillation and reduce power supply ripple for applications when high power supply impedance or a long power supply line.

Therefore, use the recommended  $C_{IN}$  value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and  $V_{IN}$  as shortest path as possible to avoid the problem.

## ■ Output Capacitor $C_O$

Output capacitor ( $C_O$ ) will be required for a phase compensation of the internal error amplifier.

The capacitance and the equivalent series resistance (ESR) influence to stable operation of the regulator.

Use of a smaller  $C_O$  may cause excess output noise or oscillation of the regulator due to lack of the phase compensation.

On the other hand, Use of a larger  $C_O$  reduces output noise and ripple output, and also improves output transient response when rapid load change.

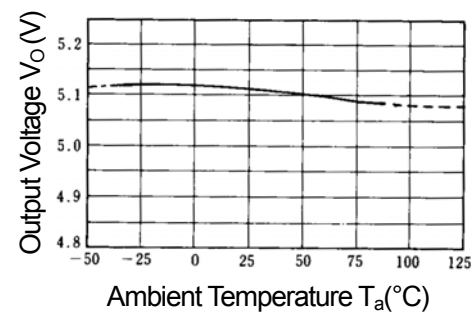
Therefore, use the recommended  $C_O$  value (refer to conditions of ELECTRIC CHARACTERISTIC) or larger and should connect between GND and  $V_{OUT}$  as shortest path as possible for stable operation

In addition, you should consider varied characteristics of capacitor (a frequency characteristic, a temperature characteristic, a DC bias characteristic and so on) and unevenness peculiar to a capacitor supplier enough.

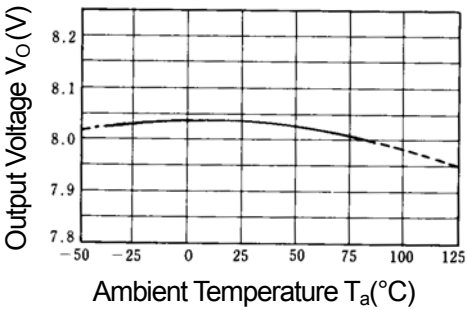
When selecting  $C_O$ , recommend that have withstand voltage margin against output voltage and superior temperature characteristic though

■ TYPICAL CHARACTERISTICS

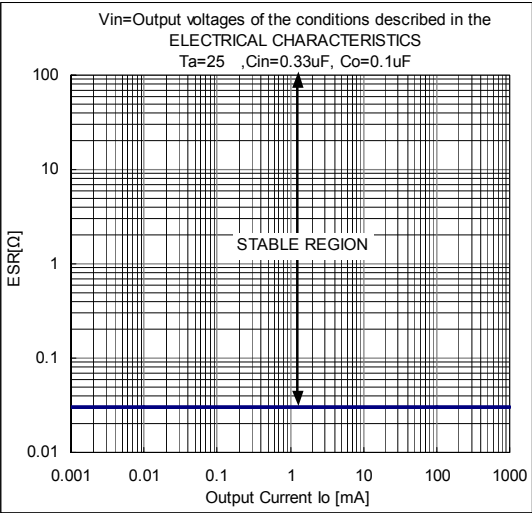
NJM7805 Output Voltage vs. Temperature



NJM7808 Output Voltage vs. Temperature

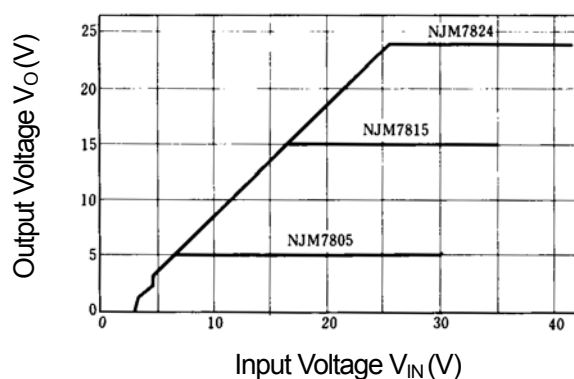


NJM78M00 Series Equivalent Series Resistance vs. Output Current

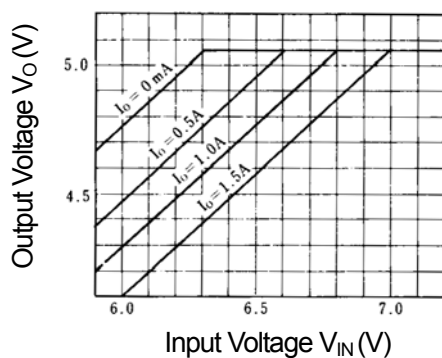


## ■ TYPICAL CHARACTERISTICS

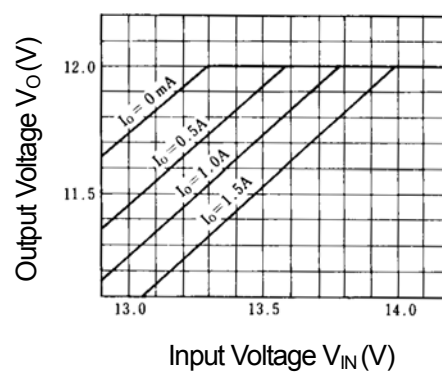
**NJM7805/15/24 Output Characteristics**  
( $I_o=0.5A$ ,  $T_j=25^\circ C$ )



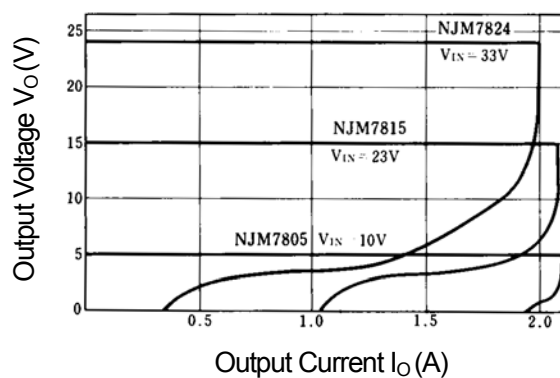
**NJM7805 Dropout Characteristics**  
( $T_j=25^\circ C$ )



**NJM7812 Dropout Characteristics**  
( $T_j=25^\circ C$ )



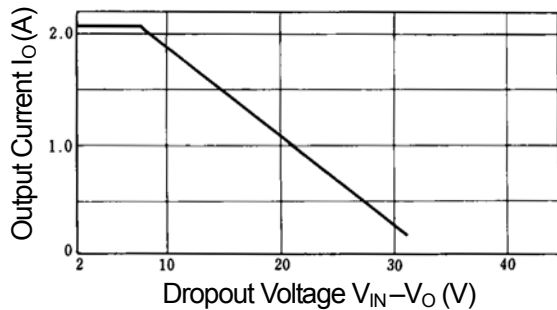
**NJM7805/15/24 Load Characteristics**  
( $T_j=25^\circ C$ )



## ■ TYPICAL CHARACTERISTICS

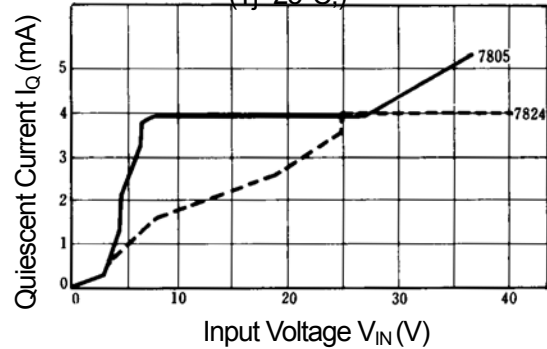
**NJM7800 Series Short Circuit Output Current**

( $T_j = 25^\circ\text{C}$ ,  $\infty$  Heat Sink)

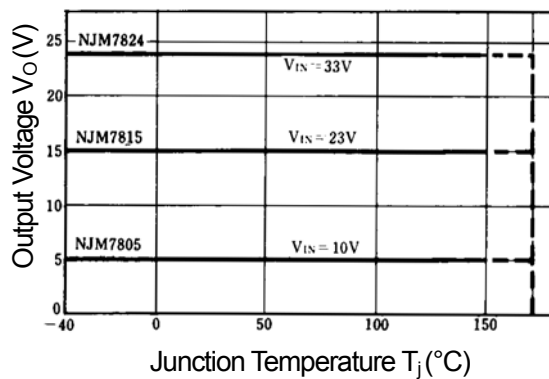


**NJM7805/24 Quiescent Current vs. Input Voltage**

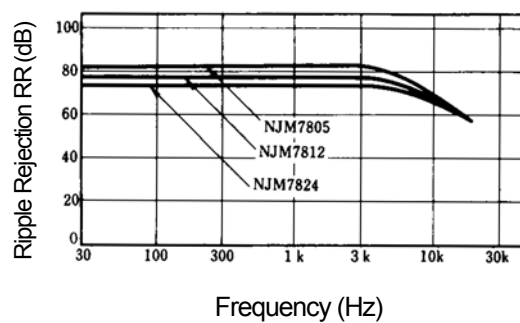
( $T_j = 25^\circ\text{C}$ .)



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



**NJM7805/15/24 Ripple Rejection vs. Frequency**



$V_{IN} = 10\text{V (05)}$     $e_{in} = 2V_{P-P}$   
 $19\text{V (12)}$   
 $33\text{V (24)}$   
 $T_j = 25^\circ\text{C}$

**[CAUTION]**

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