

GM79LXX NEGATIVE VOLTAGE REGULATOR

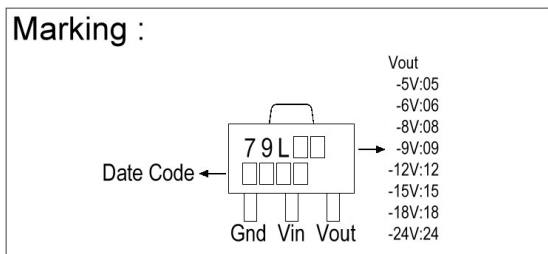
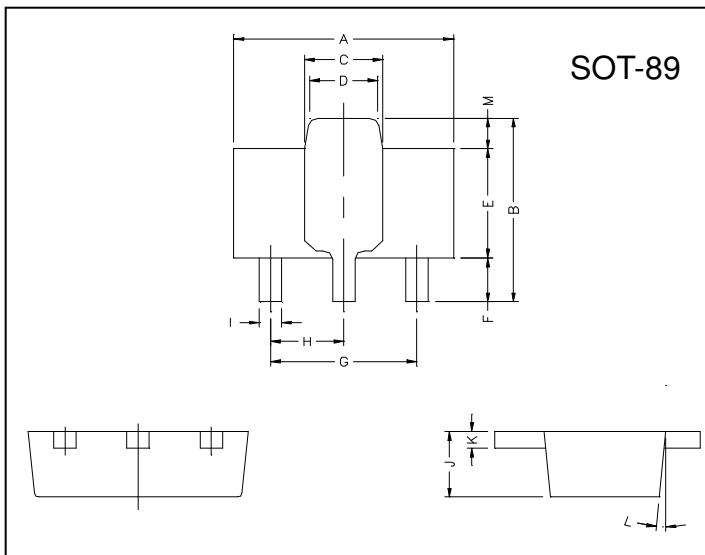
Description

The GM79LXX series of fixed-voltage monolithic integrated circuit voltage regulators are designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high current voltage regulators. Each of these regulators can deliver up to 100mA of output current. The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload. When used as a replacement for a Zener diode-resistor combination, an effective improvement in output impedance can be obtained together with lower-bias current.

Features

- Fixed output voltage of -5V, -6V, -8V, -9V, -12V, -15V, -18V, -24V
- Internal Short-Circuit Current Limiting
- Internal Thermal Overload Protection
- No External Components Required

Package Dimensions



| REF. | Millimeter | | REF. | Millimeter | |
|------|------------|------|------|------------|------|
| | Min. | Max. | | Min. | Max. |
| A | 4.40 | 4.60 | G | 3.00 | REF. |
| B | 4.05 | 4.25 | H | 1.50 | REF. |
| C | 1.50 | 1.70 | I | 0.40 | 0.52 |
| D | 1.30 | 1.50 | J | 1.40 | 1.60 |
| E | 2.40 | 2.60 | K | 0.35 | 0.41 |
| F | 0.89 | 1.20 | L | 5° TYP. | |
| | | | M | 0.70 REF. | |

Absolute Maximum Ratings

| Parameter | | Ratings | Unit |
|--------------------------------------|--------------|-----------|------|
| Input voltage | GM79L05 ~ 09 | -30 | V |
| | GM79L12 ~ 18 | -35 | V |
| | GM79L24 | -40 | V |
| Output current | | 100 | mA |
| Operating junction temperature range | | 0 ~ 125 | °C |
| Storage temperature range | | -65 ~ 150 | °C |
| Power Dissipation | | 350* | mW |

*When tested in free air condition, without heat sinking.

Electrical Characteristics

GM79L05 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-10\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|--|-------------|-------|------|-------|---------------|--|
| VO | A-Rank (3%) | -4.85 | -5.0 | -5.15 | V | $V_{in}=-10\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-7\text{V} \leq V_{in} \leq -20\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-10\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -4.75 | - | -5.25 | | |
| ΔVO (Line Regulation) | | - | 15 | 150 | mV | $-7\text{V} \leq V_{in} \leq -20\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔVO (Load Regulation) | | - | 20 | 60 | mV | $V_{in}=-10\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.0 | mA | $V_{in}=-10\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-10\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-8\text{V} \leq V_{in} \leq -20\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 40 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 41 | 49 | - | dB | $-8\text{V} \leq V_{in} \leq -18\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L06 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-11\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|--|-------------|-------|------|-------|---------------|--|
| VO | A-Rank (3%) | -5.82 | -6.0 | -6.18 | V | $V_{in}=-11\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-8\text{V} \leq V_{in} \leq -20\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-11\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -5.70 | - | -6.30 | | |
| ΔVO (Line Regulation) | | - | 20 | 150 | mV | $-8\text{V} \leq V_{in} \leq -20\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔVO (Load Regulation) | | - | 21 | 60 | mV | $V_{in}=-11\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.0 | mA | $V_{in}=-11\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-11\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-9\text{V} \leq V_{in} \leq -20\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 44 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 40 | 48 | - | dB | $-9\text{V} \leq V_{in} \leq 19\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L08 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-14\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|--|-------------|-------|------|-------|---------------|---|
| VO | A-Rank (3%) | -7.76 | -8.0 | -8.24 | V | $V_{in}=-14\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-10.5\text{V} \leq V_{in} \leq -23\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-14\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -7.60 | - | -8.40 | | |
| ΔVO (Line Regulation) | | - | 42 | 175 | mV | $-10.5\text{V} \leq V_{in} \leq -23\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔVO (Load Regulation) | | - | 30 | 80 | mV | $V_{in}=-14\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.0 | mA | $V_{in}=-14\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-14\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-11\text{V} \leq V_{in} \leq -23\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 54 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 37 | 46 | - | dB | $-11\text{V} \leq V_{in} \leq -21\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L09 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-15\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------------------------------|-------------|-------|------|-------|---------------|---|
| VO | A-Rank (3%) | -8.73 | -9.0 | -9.27 | V | $V_{in}=-15\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-11.5\text{V} \leq V_{in} \leq -24\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-15\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -8.55 | - | -9.45 | | |
| ΔV_O (Line Regulation) | | - | 42 | 200 | mV | $-11.5\text{V} \leq V_{in} \leq -24\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔV_O (Load Regulation) | | - | 30 | 90 | mV | $V_{in}=-15\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.0 | mA | $V_{in}=-15\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-15\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-12\text{V} \leq V_{in} \leq -24\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 54 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 37 | 46 | - | dB | $-12\text{V} \leq V_{in} \leq -22\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L12 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-19\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------------------------------|-------------|--------|-------|--------|---------------|---|
| VO | A-Rank (3%) | -11.64 | -12.0 | -12.36 | V | $V_{in}=-19\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-14.5\text{V} \leq V_{in} \leq -27\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-19\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -11.40 | - | -12.60 | | |
| ΔV_O (Line Regulation) | | - | 50 | 250 | mV | $-14.5\text{V} \leq V_{in} \leq -27\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔV_O (Load Regulation) | | - | 24 | 100 | mV | $V_{in}=-19\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.5 | mA | $V_{in}=-19\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-19\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-16\text{V} \leq V_{in} \leq -27\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 80 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 37 | 42 | - | dB | $-15\text{V} \leq V_{in} \leq -25\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L15 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-23\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|-----------------------------------|-------------|--------|-------|--------|---------------|---|
| VO | A-Rank (3%) | -14.55 | -15.0 | -15.45 | V | $V_{in}=-23\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-17.5\text{V} \leq V_{in} \leq -30\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-23\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -14.25 | - | -15.75 | | |
| ΔV_O (Line Regulation) | | - | 65 | 300 | mV | $-17.5\text{V} \leq V_{in} \leq -30\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔV_O (Load Regulation) | | - | 25 | 150 | mV | $V_{in}=-23\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.5 | mA | $V_{in}=-23\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-23\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-20\text{V} \leq V_{in} \leq -30\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 90 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 34 | 39 | - | dB | $-18.5\text{V} \leq V_{in} \leq -28.5\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

GM79L18 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-27\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|----------------------------------|-------------|--------|-------|--------|---------------|---|
| VO | A-Rank (3%) | -17.46 | -18.0 | -18.54 | V | $V_{in}=-27\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-20.5\text{V} \leq V_{in} \leq -33\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-27\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -17.10 | - | -18.9 | | |
| ΔVO (Line Regulation) | | - | 70 | 300 | mV | $-20.5\text{V} \leq V_{in} \leq -33\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔVO (Load Regulation) | | - | 27 | 170 | mV | $V_{in}=-27\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.5 | mA | $V_{in}=-27\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-27\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-21\text{V} \leq V_{in} \leq -33\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 150 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 33 | 48 | - | dB | $-23\text{V} \leq V_{in} \leq -33\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

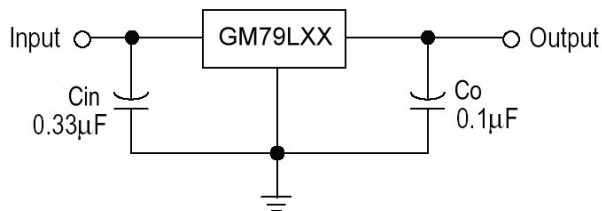
GM79L24 (Refer to the test circuits, $T_j=0\sim 125^\circ\text{C}$, $I_o=40\text{mA}$, $V_{in}=-33\text{V}$, $C_{in}=0.33\mu\text{F}$, $C_o=0.1\mu\text{F}$ unless otherwise specified) (Note1)

| Symbol | | Min. | Typ. | Max. | Unit | Test Conditions |
|----------------------------------|-------------|--------|-------|--------|---------------|---|
| VO | A-Rank (3%) | -23.28 | -24.0 | -24.72 | V | $V_{in}=-33\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ $-27\text{V} \leq V_{in} \leq -38\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ $V_{in}=-33\text{V}$, $1\text{mA} \leq I_o \leq 70\text{mA}$ (Note2) |
| | B-Rank (5%) | -22.80 | - | -25.20 | | |
| ΔVO (Line Regulation) | | - | 90 | 350 | mV | $-27\text{V} \leq V_{in} \leq -38\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔVO (Load Regulation) | | - | 40 | 200 | mV | $V_{in}=-33\text{V}$, $1\text{mA} \leq I_o \leq 100\text{mA}$, $T_j=25^\circ\text{C}$ |
| IQ | | - | - | 6.5 | mA | $V_{in}=-33\text{V}$, $I_o=40\text{mA}$, $T_j=25^\circ\text{C}$ |
| ΔIQ | | - | - | 0.1 | mA | $V_{in}=-33\text{V}$, $1\text{mA} \leq I_o \leq 40\text{mA}$ |
| | | - | - | 1.5 | | $-28\text{V} \leq V_{in} \leq -38\text{V}$, $I_o=40\text{mA}$ |
| Vn | | - | 200 | - | μV | $10\text{Hz} \leq f \leq 100\text{KHz}$ |
| RR | | 31 | 47 | - | dB | $-29\text{V} \leq V_{in} \leq -35\text{V}$, $I_o=40\text{mA}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ |
| VD | | - | 1.7 | - | V | $I_o=100\text{mA}$, $T_j=25^\circ\text{C}$ |

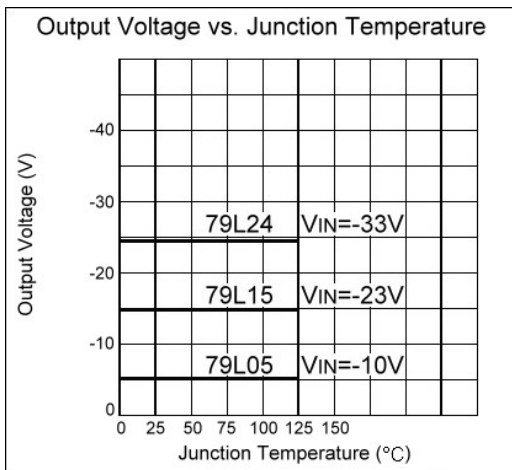
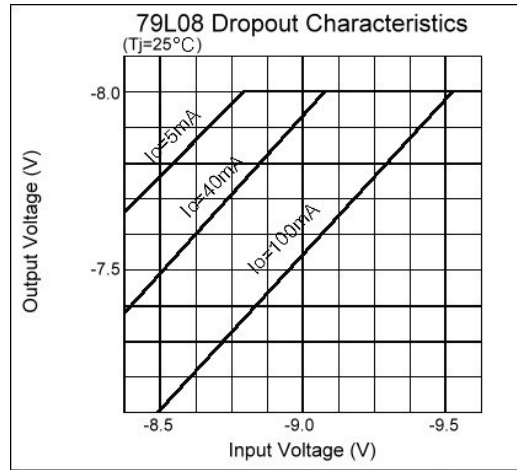
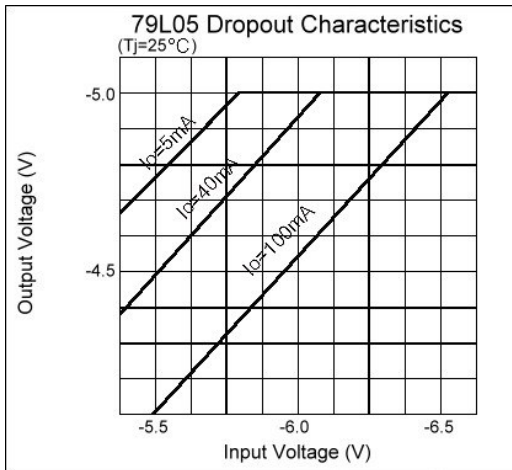
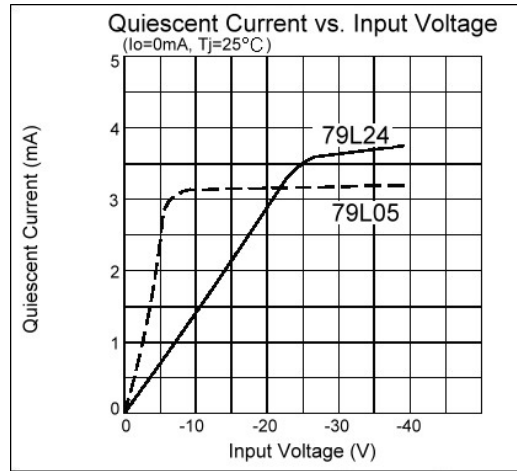
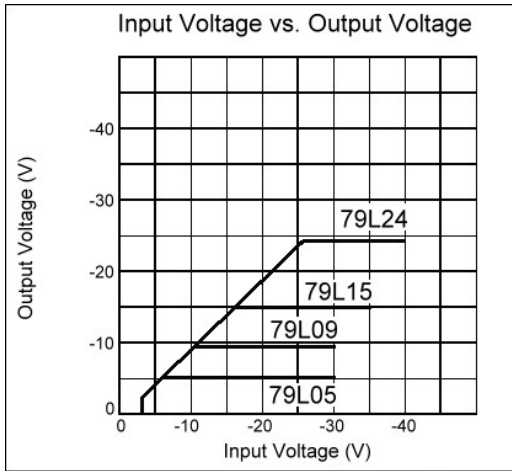
Note1: The Maximum steady state usable output current is dependent on input voltage, heat sinking, lead length of the package and copper of PCB. The data above represent pulse test conditions with junction temperatures specified at the initiation of test.

Note2: Power dissipation < 0.5W

Typical Application



Characteristics Curve



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