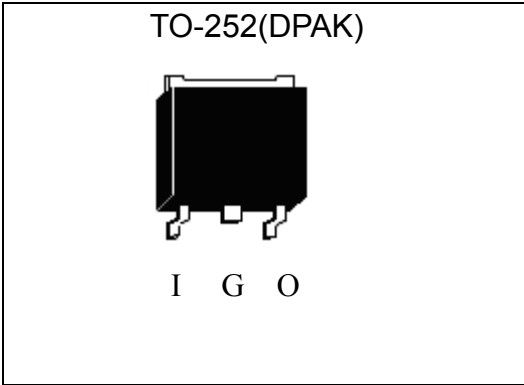


Three Terminal Positive Voltage Regulators

LM78XXJ3



Description

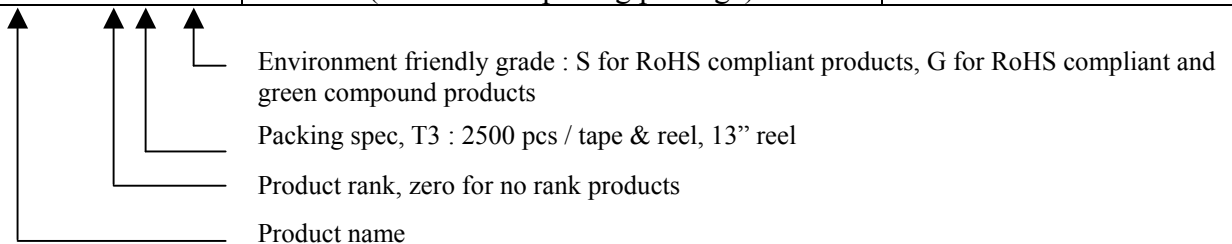
The LM78XXJ3 series of fixed voltage monolithic integrated circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single point regulation. Each of these regulators can deliver up to 1A of output current. The internal current limiting and thermal shutdown features of these regulators make them essentially immune to overload.

Features:

- 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 24V output voltage available
- Internal Short-Circuit Current Limiting
- High Power Dissipation Capability
- Internal Thermal Overload Protection
- No External Components Required
- Output Transistor Safe Area Compensation
- Pb-free lead plating package

Ordering Information

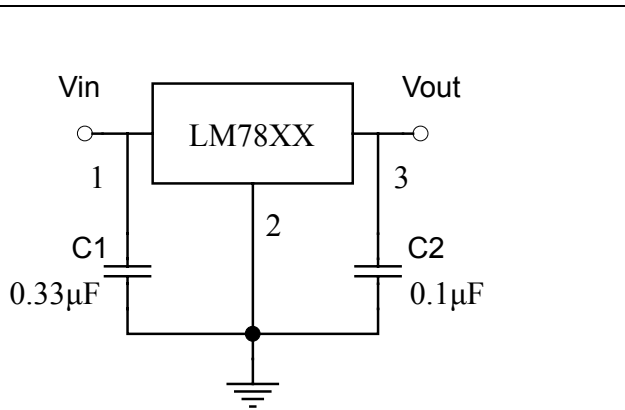
| Device | Package | Shipping |
|-----------------|--|------------------------|
| LM78XXJ3-X-T3-X | TO-252 (Pb-free lead plating package) | 2500 pcs / Tape & Reel |



Absolute Maximum Ratings (Ta=25°C)

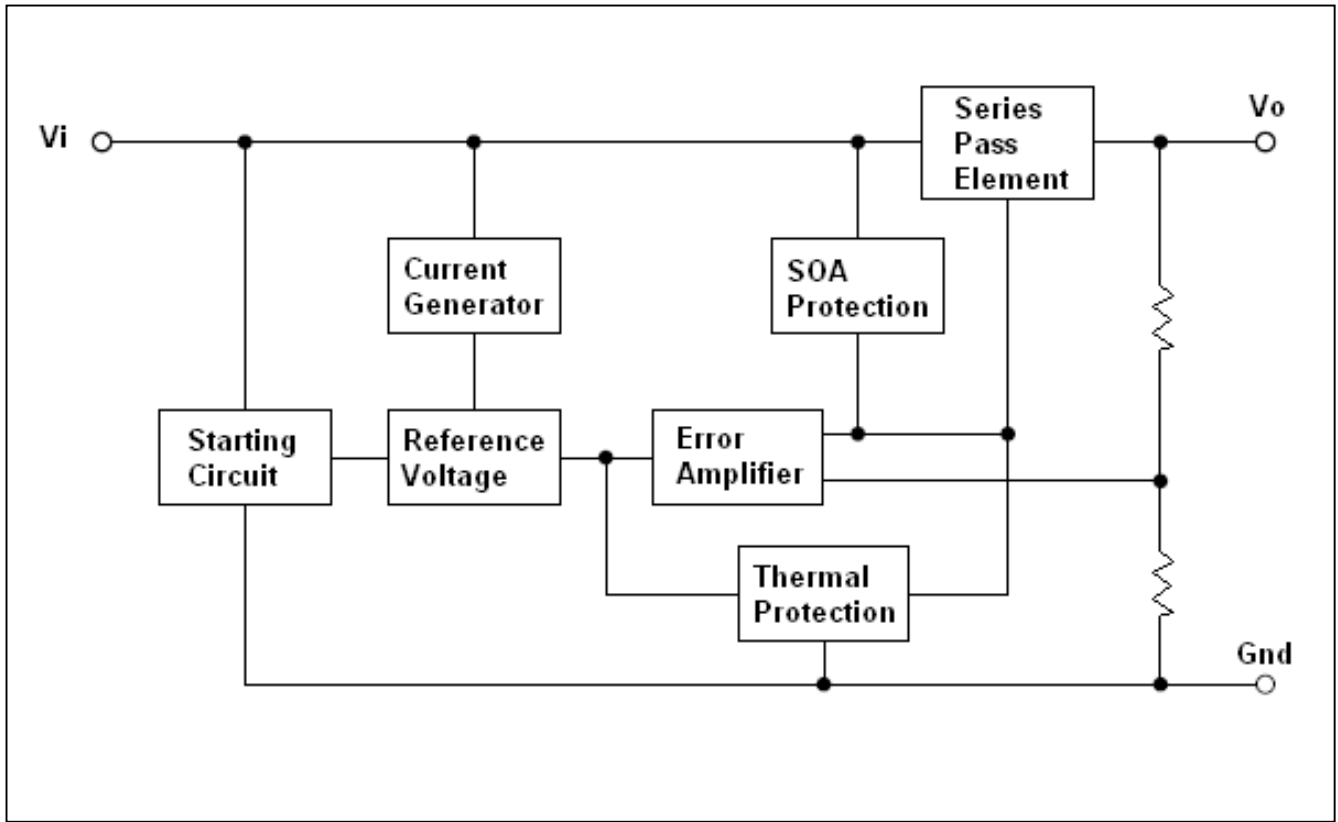
| Parameter | | Ratings | Unit |
|--|---------------|------------|------|
| Input Voltage | LM7805~LM7818 | 35 | V |
| | LM7824 | 40 | |
| Output Current | | 1 | A |
| Operating Junction Temperature Range | | -40 ~ +125 | °C |
| Storage Temperature Range | | -55 ~ +125 | °C |
| Thermal Resistance, Junction to Ambient (RθJA) | | 125 | °C/W |
| Thermal Resistance, Junction to Case (RθJC) | | 12.5 | °C/W |

Typical Application Circuit



Note:
 C1 and C2 are required if regulator is located far from power supply filter and load, or oscillation may induced on the loop.

Block Diagram



Electrical Characteristics

LM7805 ($T_j=0\sim 125^\circ\text{C}$, $V_{in}=10\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units |
|-------------------------|------------------------------|------|------|------|---|----------------------------|
| V_o | Output Voltage | 4.85 | 5.0 | 5.15 | $V_{in}=10\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ $7.5\text{V}\leq V_{in}\leq 20\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $P_D\leq 15\text{W}$ | V |
| | | 4.75 | - | 5.25 | | |
| ΔV_o | Line Regulation | - | 3 | 50 | $7\text{V}\leq V_{in}\leq 25\text{V}$, $T_j=25^\circ\text{C}$ | mV |
| | | - | 1 | 25 | $8\text{V}\leq V_{in}\leq 12\text{V}$, $T_j=25^\circ\text{C}$ | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^\circ\text{C}$ | mV |
| | | - | - | 50 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^\circ\text{C}$ | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=10\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ | mA |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA |
| | | - | - | 1.3 | $7\text{V}\leq V_{in}\leq 25\text{V}$ | |
| V_n | Output Noise Voltage | - | 40 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^\circ\text{C}$ | μV |
| RR | Ripple Rejection | - | 80 | - | $8\text{V}\leq V_{in}\leq 18\text{V}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ | dB |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^\circ\text{C}$ | V |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^\circ\text{C}$ | mA |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^\circ\text{C}$ | A |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -0.6 | - | $I_o=5\text{mA}$, $0^\circ\text{C}\leq T_j\leq 125^\circ\text{C}$ | $\text{mV}/^\circ\text{C}$ |



LM7806 ($T_j=0\sim 125^{\circ}\text{C}$, $V_{in}=11\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|------|-----|---|--|---|
| V_o | A-rank(3%) | Output Voltage | 5.82 | 6.0 | 6.18 | $V_{in}=11\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ $8\text{V}\leq V_{in}\leq 21\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 5.70 | - | 6.30 | | |
| ΔV_o | Line Regulation | - | 3 | 60 | $8\text{V}\leq V_{in}\leq 25\text{V}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | 1 | 25 | $9\text{V}\leq V_{in}\leq 13\text{V}$, $T_j=25^{\circ}\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | - | 50 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^{\circ}\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=11\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.3 | $8\text{V}\leq V_{in}\leq 25\text{V}$ | | |
| V_n | Output Noise Voltage | - | 45 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^{\circ}\text{C}$ | μV | |
| RR | Ripple Rejection | - | 75 | - | $9\text{V}\leq V_{in}\leq 19\text{V}$, $f=120\text{Hz}$, $T_j=25^{\circ}\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^{\circ}\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^{\circ}\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^{\circ}\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -0.7 | - | $I_o=5\text{mA}$, $0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}$ | $\text{mV}/^{\circ}\text{C}$ | |

LM7808 ($T_j=0\sim 125^{\circ}\text{C}$, $V_{in}=14\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|------|-----|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 7.76 | 8.0 | 8.24 | $V_{in}=14\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ $10.5\text{V}\leq V_{in}\leq 23\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 7.60 | - | 8.40 | | |
| ΔV_o | Line Regulation | - | 3 | 80 | $10.5\text{V}\leq V_{in}\leq 25\text{V}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | 1 | 40 | $11\text{V}\leq V_{in}\leq 17\text{V}$, $T_j=25^{\circ}\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | - | 50 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^{\circ}\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=14\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.3 | $10.5\text{V}\leq V_{in}\leq 25\text{V}$ | | |
| V_n | Output Noise Voltage | - | 58 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^{\circ}\text{C}$ | μV | |
| RR | Ripple Rejection | - | 72 | - | $11.5\text{V}\leq V_{in}\leq 21.5\text{V}$, $f=120\text{Hz}$, $T_j=25^{\circ}\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^{\circ}\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^{\circ}\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^{\circ}\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -0.9 | - | $I_o=5\text{mA}$, $0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}$ | $\text{mV}/^{\circ}\text{C}$ | |



LM7809 ($T_j=0\sim 125^{\circ}\text{C}$, $V_{in}=15\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|------|-----|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 8.73 | 9.0 | 9.27 | $V_{in}=15\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ $11.5\text{V}\leq V_{in}\leq 24\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 8.55 | - | 9.45 | | |
| ΔV_o | Line Regulation | - | 5 | 90 | $11.5\text{V}\leq V_{in}\leq 25\text{V}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | 3 | 45 | $13\text{V}\leq V_{in}\leq 19\text{V}$, $T_j=25^{\circ}\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | - | 50 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^{\circ}\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=15\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.3 | $11.5\text{V}\leq V_{in}\leq 26\text{V}$ | | |
| V_n | Output Noise Voltage | - | 58 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^{\circ}\text{C}$ | μV | |
| RR | Ripple Rejection | - | 72 | - | $12.5\text{V}\leq V_{in}\leq 22.5\text{V}$, $f=120\text{Hz}$, $T_j=25^{\circ}\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^{\circ}\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^{\circ}\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^{\circ}\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -1.1 | - | $I_o=5\text{mA}$, $0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}$ | $\text{mV}/^{\circ}\text{C}$ | |

LM7810 ($T_j=0\sim 125^{\circ}\text{C}$, $V_{in}=16\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|------|------|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 9.70 | 10.0 | 10.30 | $V_{in}=16\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ $12.5\text{V}\leq V_{in}\leq 25\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 9.50 | - | 10.50 | | |
| ΔV_o | Line Regulation | - | - | 100 | $13\text{V}\leq V_{in}\leq 25\text{V}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | - | 50 | $14\text{V}\leq V_{in}\leq 20\text{V}$, $T_j=25^{\circ}\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^{\circ}\text{C}$ | mV | |
| | | - | - | 50 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^{\circ}\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=16\text{V}$, $I_o=500\text{mA}$, $T_j=25^{\circ}\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.0 | $12.5\text{V}\leq V_{in}\leq 25\text{V}$ | | |
| V_n | Output Noise Voltage | - | 58 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^{\circ}\text{C}$ | μV | |
| RR | Ripple Rejection | - | 72 | - | $13\text{V}\leq V_{in}\leq 23\text{V}$, $f=120\text{Hz}$, $T_j=25^{\circ}\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^{\circ}\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^{\circ}\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^{\circ}\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -1.1 | - | $I_o=5\text{mA}$, $0^{\circ}\text{C}\leq T_j\leq 125^{\circ}\text{C}$ | $\text{mV}/^{\circ}\text{C}$ | |



LM7812 ($T_j=0\sim 125^\circ\text{C}$, $V_{in}=19\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|-------|------|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 11.64 | 12.0 | 12.36 | $V_{in}=19\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ $14.5\text{V}\leq V_{in}\leq 27\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 11.40 | - | 12.60 | | |
| ΔV_o | Line Regulation | - | 10 | 120 | $14.5\text{V}\leq V_{in}\leq 30\text{V}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | 3 | 60 | $16\text{V}\leq V_{in}\leq 22\text{V}$, $T_j=25^\circ\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 100 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 60 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^\circ\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=19\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.3 | $14.5\text{V}\leq V_{in}\leq 30\text{V}$ | | |
| V_n | Output Noise Voltage | - | 75 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^\circ\text{C}$ | μV | |
| RR | Ripple Rejection | - | 72 | - | $15\text{V}\leq V_{in}\leq 25\text{V}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^\circ\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^\circ\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^\circ\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -1.5 | - | $I_o=5\text{mA}$, $0^\circ\text{C}\leq T_j\leq 125^\circ\text{C}$ | $\text{mV}/^\circ\text{C}$ | |

LM7815 ($T_j=0\sim 125^\circ\text{C}$, $V_{in}=23\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|-------|------|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 14.55 | 15.0 | 15.45 | $V_{in}=23\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ $17.5\text{V}\leq V_{in}\leq 30\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 14.25 | - | 15.75 | | |
| ΔV_o | Line Regulation | - | - | 150 | $17.5\text{V}\leq V_{in}\leq 30\text{V}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 75 | $18.5\text{V}\leq V_{in}\leq 30\text{V}$, $T_j=25^\circ\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 150 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 75 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^\circ\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=23\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.3 | $17.5\text{V}\leq V_{in}\leq 30\text{V}$ | | |
| V_n | Output Noise Voltage | - | 90 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^\circ\text{C}$ | μV | |
| RR | Ripple Rejection | - | 70 | - | $18.5\text{V}\leq V_{in}\leq 28.5\text{V}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^\circ\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^\circ\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^\circ\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -1.8 | - | $I_o=5\text{mA}$, $0^\circ\text{C}\leq T_j\leq 125^\circ\text{C}$ | $\text{mV}/^\circ\text{C}$ | |



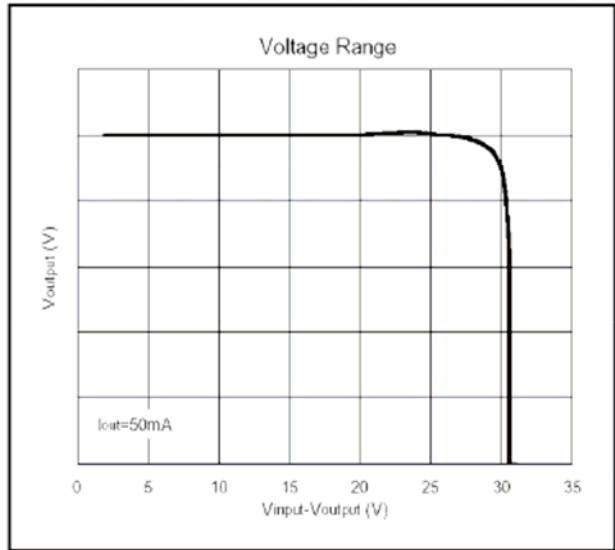
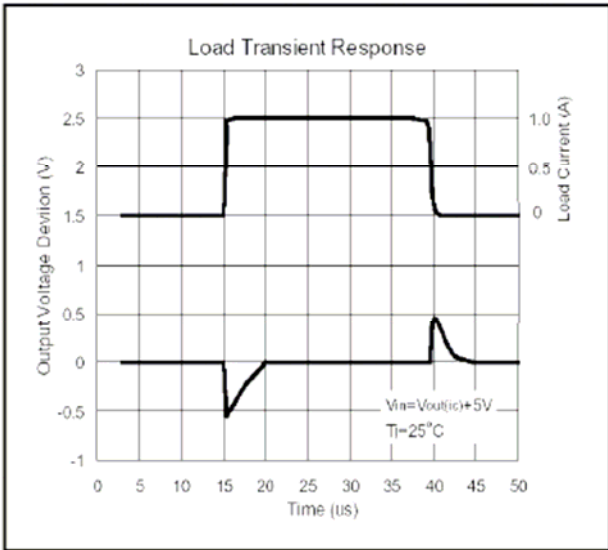
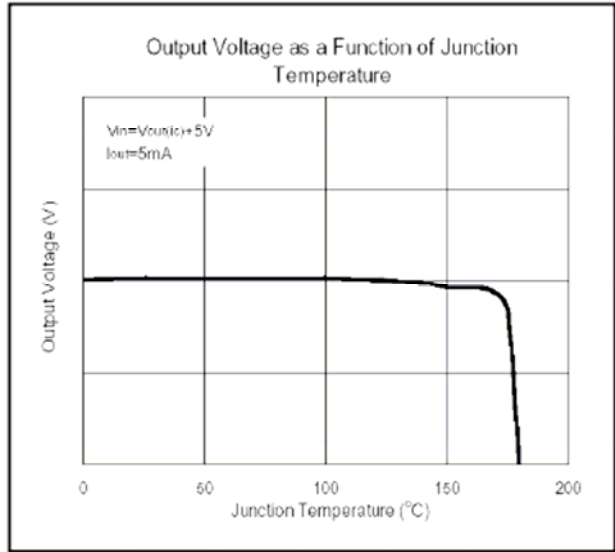
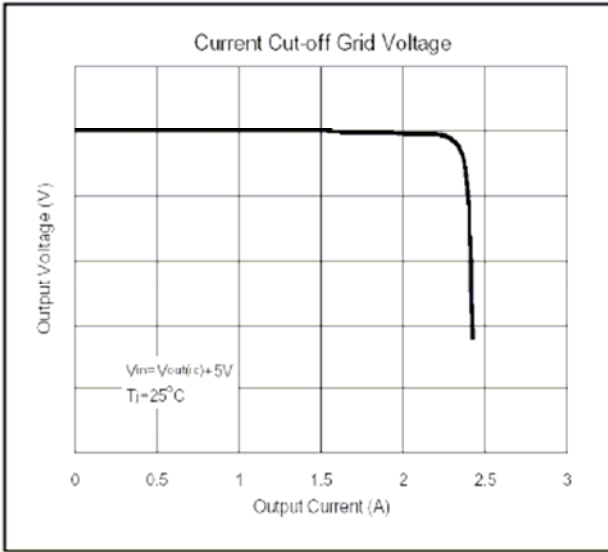
LM7818 ($T_j=0\sim 125^\circ\text{C}$, $V_{in}=27\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|-------|------|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 17.46 | 18.0 | 18.54 | $V_{in}=27\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ $21\text{V}\leq V_{in}\leq 33\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 17.10 | - | 18.90 | | |
| ΔV_o | Line Regulation | - | - | 180 | $21\text{V}\leq V_{in}\leq 33\text{V}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 90 | $24\text{V}\leq V_{in}\leq 30\text{V}$, $T_j=25^\circ\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 180 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 90 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^\circ\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=27\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.0 | $21\text{V}\leq V_{in}\leq 33\text{V}$ | | |
| V_n | Output Noise Voltage | - | 110 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^\circ\text{C}$ | μV | |
| RR | Ripple Rejection | - | 69 | - | $22\text{V}\leq V_{in}\leq 32\text{V}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^\circ\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^\circ\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^\circ\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -2.2 | - | $I_o=5\text{mA}$, $0^\circ\text{C}\leq T_j\leq 125^\circ\text{C}$ | $\text{mV}/^\circ\text{C}$ | |

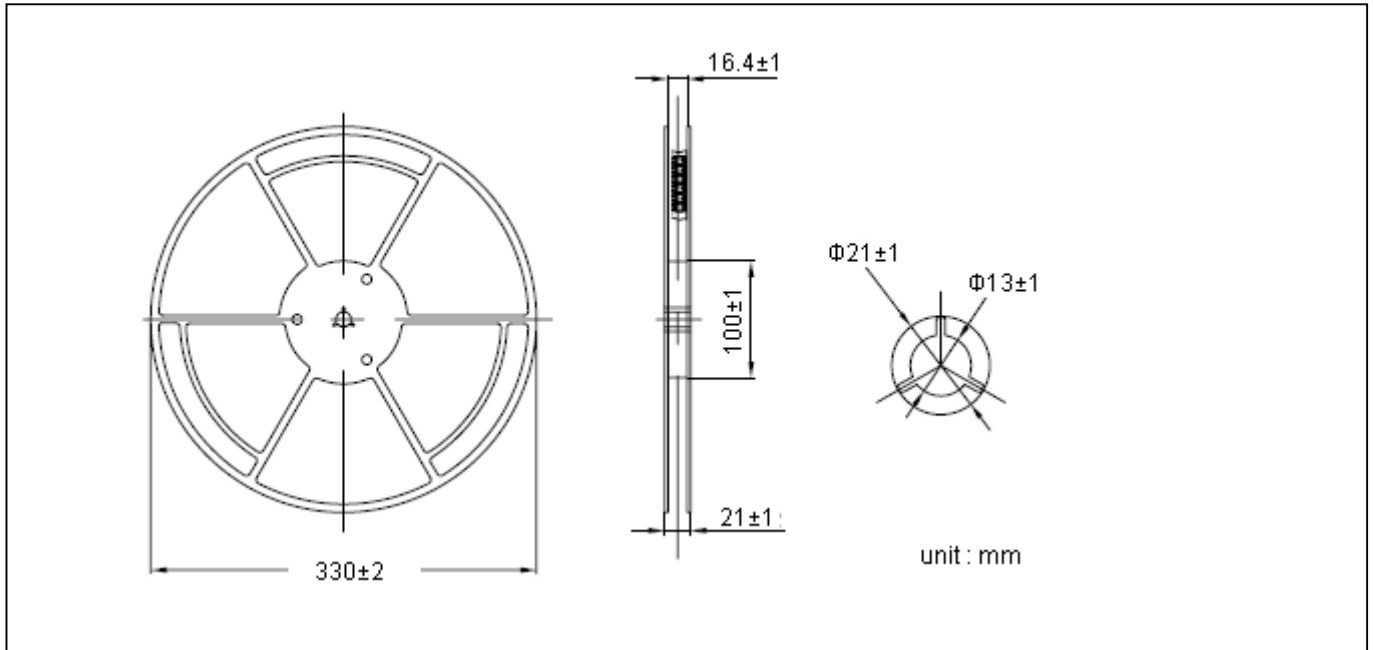
LM7824 ($T_j=0\sim 125^\circ\text{C}$, $V_{in}=33\text{V}$, $I_o=500\text{mA}$, $C_{in}=0.33\mu\text{F}$, $C_{out}=0.1\mu\text{F}$, unless otherwise noted)

| Symbol | Parameter | Min | Typ | Max | Conditions | Units | |
|-------------------------|------------------------------|----------------|-------|------|--|---|---|
| V_o | A-rank(3%) | Output Voltage | 23.28 | 24.0 | 24.72 | $V_{in}=33\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ $27\text{V}\leq V_{in}\leq 38\text{V}$, $5\text{mA}\leq I_o\leq 1\text{A}$, $PD\leq 15\text{W}$ | V |
| | B-rank(5%) | | 22.80 | - | 25.20 | | |
| ΔV_o | Line Regulation | - | - | 240 | $27\text{V}\leq V_{in}\leq 38\text{V}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 120 | $30\text{V}\leq V_{in}\leq 36\text{V}$, $T_j=25^\circ\text{C}$ | | |
| ΔV_o | Load Regulation | - | - | 240 | $5\text{mA}\leq I_o\leq 1\text{A}$, $T_j=25^\circ\text{C}$ | mV | |
| | | - | - | 120 | $250\text{mA}\leq I_o\leq 750\text{mA}$, $T_j=25^\circ\text{C}$ | | |
| I_Q | Quiescent Current | - | - | 8 | $V_{in}=33\text{V}$, $I_o=500\text{mA}$, $T_j=25^\circ\text{C}$ | mA | |
| ΔI_Q | Quiescent Current Change | - | - | 0.5 | $5\text{mA}\leq I_o\leq 1\text{A}$ | mA | |
| | | - | - | 1.0 | $28\text{V}\leq V_{in}\leq 38\text{V}$ | | |
| V_n | Output Noise Voltage | - | 170 | - | $10\text{Hz}\leq f\leq 100\text{KHz}$, $T_j=25^\circ\text{C}$ | μV | |
| RR | Ripple Rejection | - | 66 | - | $28\text{V}\leq V_{in}\leq 38\text{V}$, $f=120\text{Hz}$, $T_j=25^\circ\text{C}$ | dB | |
| VD | Dropout Voltage | - | 2 | - | $I_o=1\text{A}$, $T_j=25^\circ\text{C}$ | V | |
| ISC | Output Short Circuit Current | - | 250 | - | $V_{in}=35\text{V}$, $T_j=25^\circ\text{C}$ | mA | |
| IPK | Peak Output Current | - | 1.8 | - | $T_j=25^\circ\text{C}$ | A | |
| $\Delta V_o/\Delta T_j$ | Temperature Stability | - | -2.8 | - | $I_o=5\text{mA}$, $0^\circ\text{C}\leq T_j\leq 125^\circ\text{C}$ | $\text{mV}/^\circ\text{C}$ | |

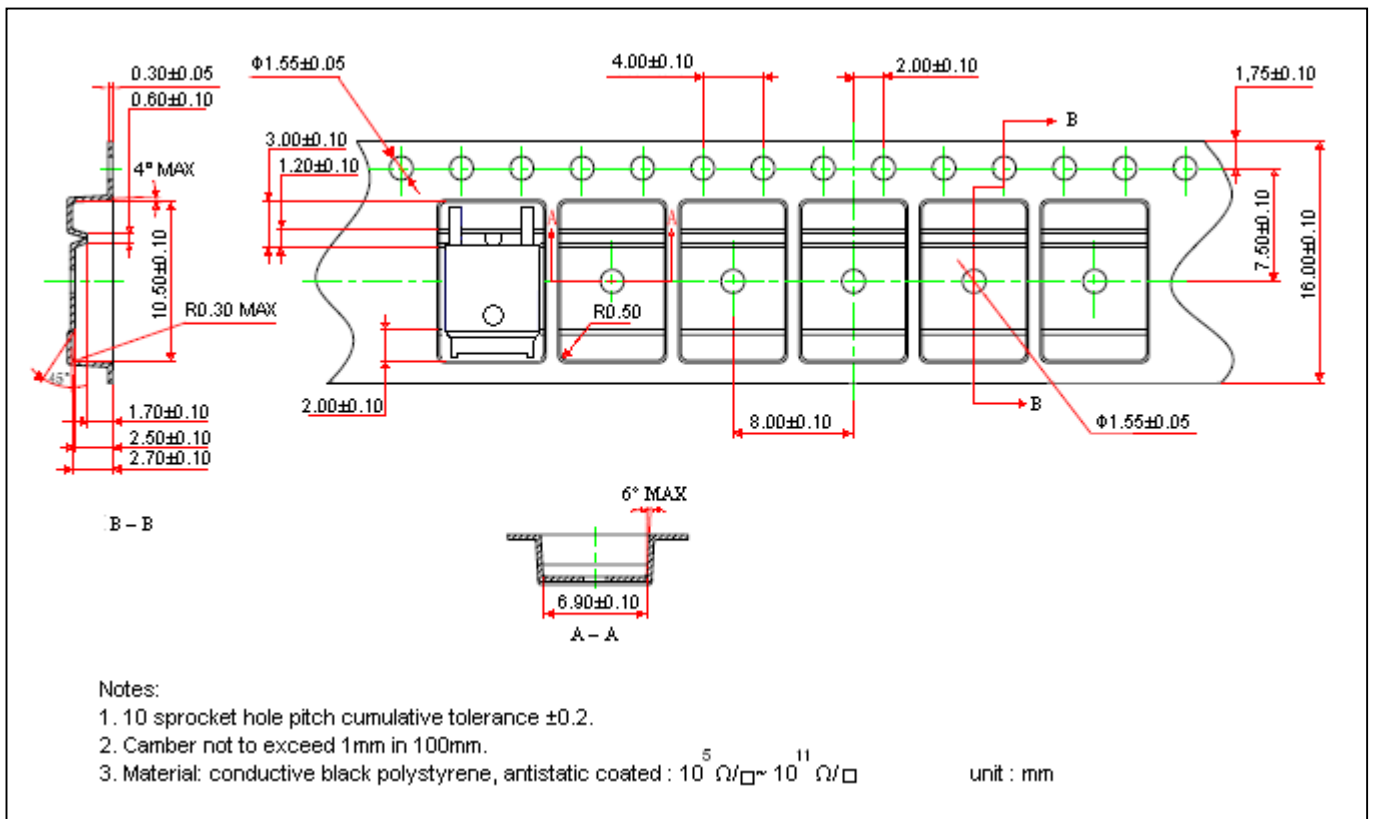
Characteristic Curves



Reel Dimension



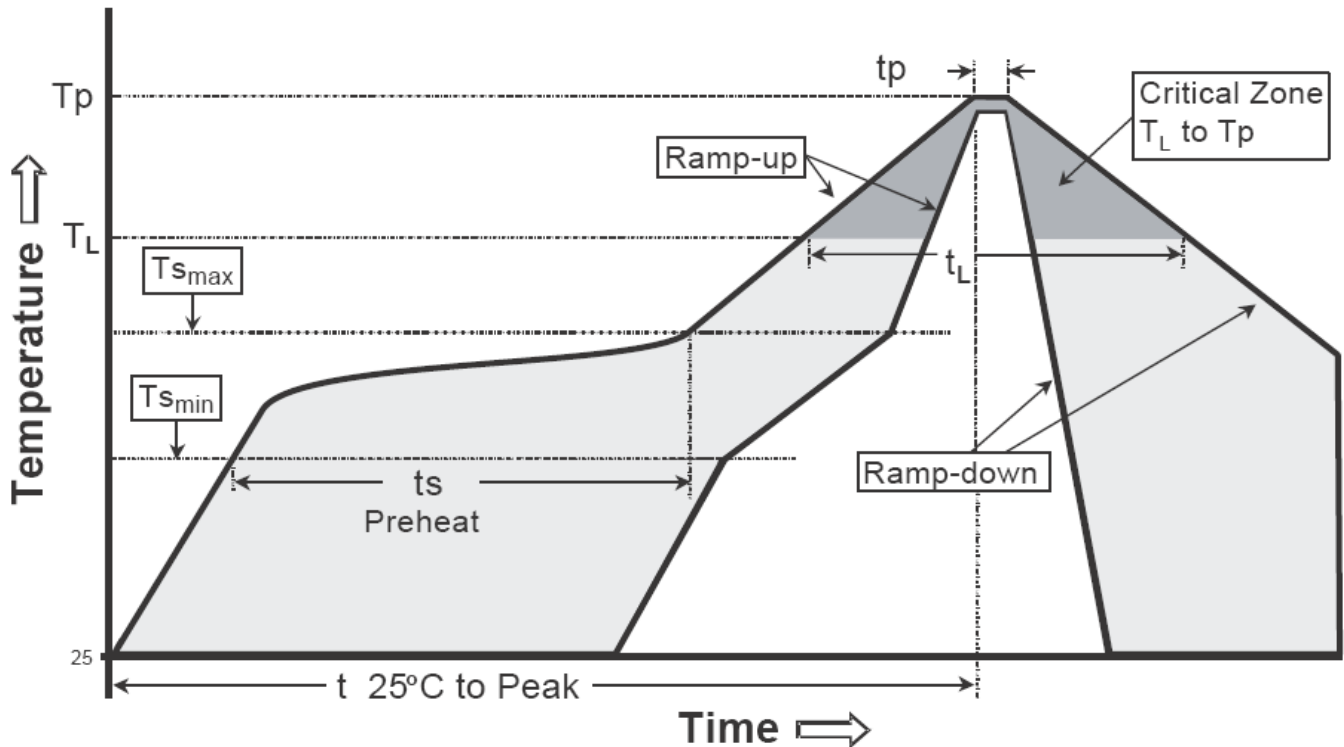
Carrier Tape Dimension



Recommended wave soldering condition

| | | |
|-----------------|------------------|-----------------|
| Product | Peak Temperature | Soldering Time |
| Pb-free devices | 260 +0/-5 °C | 5 +1/-1 seconds |

Recommended temperature profile for IR reflow



| Profile feature | Sn-Pb eutectic Assembly | Pb-free Assembly |
|---|-------------------------|------------------|
| Average ramp-up rate (T _{smax} to T _p) | 3°C/second max. | 3°C/second max. |
| Preheat | | |
| -Temperature Min(T _{s min}) | 100°C | 150°C |
| -Temperature Max(T _{s max}) | 150°C | 200°C |
| -Time(t _{s min} to t _{s max}) | 60-120 seconds | 60-180 seconds |
| Time maintained above: | | |
| -Temperature (T _L) | 183°C | 217°C |
| - Time (t _L) | 60-150 seconds | 60-150 seconds |
| Peak Temperature(T _P) | 240 +0/-5 °C | 260 +0/-5 °C |
| Time within 5°C of actual peak temperature(tp) | 10-30 seconds | 20-40 seconds |
| Ramp down rate | 6°C/second max. | 6°C/second max. |
| Time 25 °C to peak temperature | 6 minutes max. | 8 minutes max. |

Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-252(DPAK) Dimension

The diagram shows three views of the TO-252(DPAK) package: a top view with dimensions D, D1, B, E, L, b1, L3, e, e1, b; a side view with dimensions C1, A, A1, L2, C; and a front view with dimensions H, P, V, K, L1. A marking diagram shows a 4-pin package with pins 1, 2, 3, and 4. Pin 1 is labeled 'Device Name' with a '78' followed by two empty boxes. Pin 2 is labeled 'Date Code' with three empty boxes. Pin 3 is labeled 'Vout' with a list of voltage options: 5V: 05, 6V: 06, 8V: 08, 9V: 09, 10V: 10, 12V: 12, 15V: 15, 18V: 18, 24V: 24. Pin 4 is labeled 'Ground'.

Style: Pin 1.Vin 2.Ground 3.Vout 4.Ground

Date Code :
 1st code : year code, 1→ 2011, 2→2012, ...,etc
 2nd code : month code, referring to the following table
 3rd and 4th codes : production lot serial number : 01, 02, 03, ...,etc.

3-Lead TO-252AA Plastic Surface Mount Package
 CYStek Package Code: J3

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code | A | B | C | D | E | F | G | H | J | K | L | M |

| DIM | Inches | | Millimeters | | DIM | Inches | | Millimeters | |
|-----|--------|-------|-------------|-------|-----|--------|-------|-------------|--------|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 0.087 | 0.094 | 2.200 | 2.400 | e | 0.086 | 0.094 | 2.186 | 2.386 |
| A1 | 0.000 | 0.005 | 0.000 | 0.127 | e1 | 0.172 | 0.188 | 4.372 | 4.772 |
| B | 0.039 | 0.048 | 0.990 | 1.210 | H | 0.163 | REF | 4.140 | REF |
| b | 0.026 | 0.034 | 0.660 | 0.860 | K | 0.190 | REF | 4.830 | REF |
| b1 | 0.026 | 0.034 | 0.660 | 0.860 | L | 0.386 | 0.409 | 9.800 | 10.400 |
| C | 0.018 | 0.023 | 0.460 | 0.580 | L1 | 0.114 | REF | 2.900 | REF |
| C1 | 0.018 | 0.023 | 0.460 | 0.580 | L2 | 0.055 | 0.067 | 1.400 | 1.700 |
| D | 0.256 | 0.264 | 6.500 | 6.700 | L3 | 0.024 | 0.039 | 0.600 | 1.000 |
| D1 | 0.201 | 0.215 | 5.100 | 5.460 | P | 0.026 | REF | 0.650 | REF |
| E | 0.236 | 0.244 | 6.000 | 6.200 | V | 0.211 | REF | 5.350 | REF |

Notes: 1.Controlling dimension: millimeters.
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead : Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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