

THREE TERMINAL POSITIVE VOLTAGE REGULATOR

DESCRIPTION

μ PC78N00 series are monolithic three terminal positive regulators which employ internally current limiting, thermal shut down, output transistor safe operating area protection make them essentially indestructible.

They are intended as fixed voltage regulators in a wide range of application including local on card regulation for elimination of distribution problems associated wide single point regulation.

FEATURES

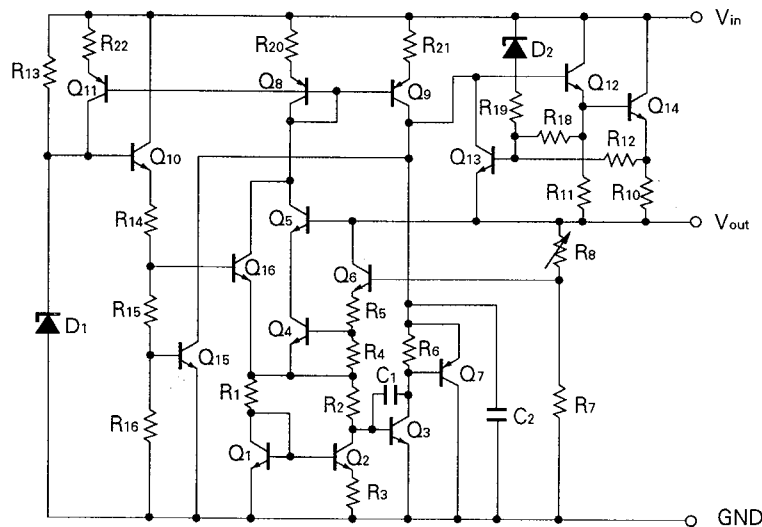
- Output current in excess of 300 mA.
- Built-in some protection circuits.
(over current protection, SOA protection and thermal shut down)
- Small package, TO-126

ORDER INFORMATION

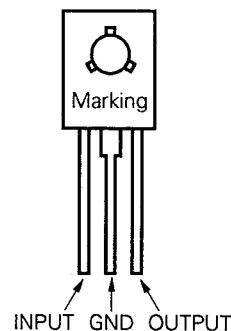
| Type Number | Output Voltage | Package | Quality Grade |
|----------------|----------------|---------|---------------|
| μ PC78N05H | 5 V | TO-126 | Standard |
| μ PC78N08H | 8 V | | |
| μ PC78N10H | 10 V | | |
| μ PC78N12H | 12 V | | |
| μ PC78N15H | 15 V | | |
| μ PC78N18H | 18 V | | |
| μ PC78N24H | 24 V | | |

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM



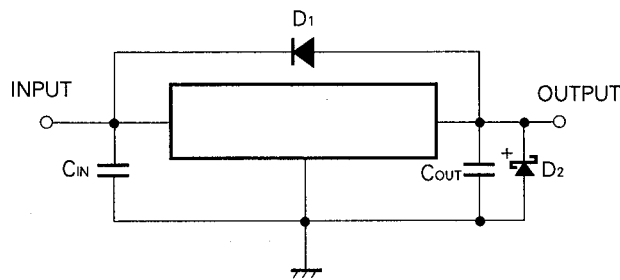
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|--|-----------------------|---------------|------|
| Input Voltage | V _{IN} | 35/40 (Note1) | V |
| Internal Power Dissipation | P _T | 12.5 (Note2) | W |
| Operating Ambient Temperature Range | T _{opt} | -20 to +85 | °C |
| Operating Junction Temperature Range | T _{opt (j)} | -20 to +150 | °C |
| Storage Temperature Range | T _{stg} | -55 to +150 | °C |
| Thermal Resistance (junction to case) | R _{th (j-c)} | 10 | °C/W |
| Thermal Resistance (junction to ambient) | R _{th (j-a)} | 110 | °C/W |

(Note 1) μ PC78N05, 08, 10, 12, 15, 18 : 35 V, μ PC78N24 : 40 V

(Note 2) Internally limited

TYPICAL CONNECTION



C1: Required if regulator is located an appreciable distance from power supply filter

C2: More than 0.1 μ F

D1: Needed for V_{IN} < V_o

D2: Needed for V_o < GND

RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC | SYMBOL | TYPE NUMBER | MIN. | TYP. | MAX. | UNIT |
|--------------------------------------|----------------------|----------------|------|------|------|------|
| Input Voltage | V _{IN} | μ PC78N05H | 7 | 10 | 25 | V |
| | | μ PC78N08H | 10.5 | 14 | 25 | |
| | | μ PC78N10H | 12.5 | 17 | 30 | |
| | | μ PC78N12H | 14.5 | 19 | 30 | |
| | | μ PC78N15H | 17.5 | 23 | 30 | |
| | | μ PC78N18H | 21 | 27 | 33 | |
| | | μ PC78N24H | 27 | 33 | 38 | |
| Output Current | I _o | All | 0 | | 300 | mA |
| Operating Temperature Range | T _{opt} | All | -20 | | +85 | °C |
| Operating Junction Temperature Range | T _{opt (j)} | All | -20 | | +125 | °C |

ELECTRICAL CHARACTERISTICS μPC78N05

($V_{IN} = 10\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ °C} \leq T_j \leq +125\text{ °C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-------------------------|--|------|------|------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ °C}$ | 4.8 | 5.0 | 5.2 | V |
| | | $7\text{ V} \leq V_{IN} \leq 20\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 4.75 | | 5.25 | |
| Line Regulation | REG_{IN} | $T_j = 25\text{ °C}$, $7\text{ V} \leq V_{IN} \leq 25\text{ V}$ | | 15 | 50 | mV |
| | | $T_j = 25\text{ °C}$, $8\text{ V} \leq V_{IN} \leq 20\text{ V}$ | | 10 | 25 | |
| Load Regulation | REG_L | $T_j = 25\text{ °C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 6 | 100 | mV |
| | | $T_j = 25\text{ °C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 4 | 50 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ °C}$ | | 3.5 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $7\text{ V} \leq V_{IN} \leq 25\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ °C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 50 | 120 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | $R \cdot R$ | $T_j = 25\text{ °C}$, $f = 120\text{ Hz}$, $8\text{ V} \leq V_{IN} \leq 18\text{ V}$ | 62 | 70 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ °C}$ | | 1.7 | | V |
| Short Circuit Current | I_{oshort} | $T_j = 25\text{ °C}$, $V_{IN} = 25\text{ V}$ | | 170 | | mA |
| Peak Output Current | I_{opeak} | $T_j = 25\text{ °C}$ | 360 | 500 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o / \Delta T$ | $I_o = 5\text{ mA}$ | | 0.1 | | mV/°C |

ELECTRICAL CHARACTERISTICS μPC78N08

($V_{IN} = 14\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ °C} \leq T_j \leq +125\text{ °C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-------------------------|--|------|------|------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ °C}$ | 7.7 | 8.0 | 8.3 | V |
| | | $10.5\text{ V} \leq V_{IN} \leq 23\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 7.6 | | 8.4 | |
| Line Regulation | REG_{IN} | $T_j = 25\text{ °C}$, $10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ | | 18 | 80 | mV |
| | | $T_j = 25\text{ °C}$, $12\text{ V} \leq V_{IN} \leq 23\text{ V}$ | | 13 | 40 | |
| Load Regulation | REG_L | $T_j = 25\text{ °C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 8 | 160 | mV |
| | | $T_j = 25\text{ °C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 6 | 80 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ °C}$ | | 3.5 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ °C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 65 | 190 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | $R \cdot R$ | $T_j = 25\text{ °C}$, $f = 120\text{ Hz}$, $11\text{ V} \leq V_{IN} \leq 21\text{ V}$ | 56 | 68 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ °C}$ | | 1.7 | | V |
| Short Circuit Current | I_{oshort} | $T_j = 25\text{ °C}$, $V_{IN} = 25\text{ V}$ | | 170 | | mA |
| Peak Output Current | I_{opeak} | $T_j = 25\text{ °C}$ | 360 | 490 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o / \Delta T$ | $I_o = 5\text{ mA}$ | | 0.2 | | mV/°C |

ELECTRICAL CHARACTERISTICS μ PC78N10

($V_{IN} = 17\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ }^\circ\text{C} \leq T_j \leq +125\text{ }^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|---|------|------|------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ }^\circ\text{C}$ | 9.6 | 10 | 10.4 | V |
| | | $12.5\text{ V} \leq V_{IN} \leq 25\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 9.5 | | 10.5 | |
| Line Regulation | REG_{IN} | $T_j = 25\text{ }^\circ\text{C}$, $12.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | 25 | 100 | mV |
| | | $T_j = 25\text{ }^\circ\text{C}$, $13\text{ V} \leq V_{IN} \leq 25\text{ V}$ | | 17 | 50 | |
| Load Regulation | REG_L | $T_j = 25\text{ }^\circ\text{C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 12 | 200 | mV |
| | | $T_j = 25\text{ }^\circ\text{C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 8 | 100 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ }^\circ\text{C}$ | | 3.6 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $13\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ }^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 80 | 230 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | $R \cdot R$ | $T_j = 25\text{ }^\circ\text{C}$, $f = 120\text{ Hz}$, $13\text{ V} \leq V_{IN} \leq 23\text{ V}$ | 56 | 66 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ }^\circ\text{C}$ | | 1.7 | | V |
| Short Circuit Current | I_{short} | $T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 30\text{ V}$ | | 100 | | mA |
| Peak Output Current | I_{peak} | $T_j = 25\text{ }^\circ\text{C}$ | 360 | 480 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o/\Delta T$ | $I_o = 5\text{ mA}$ | | 0.2 | | mV/ $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS μ PC78N12

($V_{IN} = 19\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ }^\circ\text{C} \leq T_j \leq +125\text{ }^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-----------------------|---|------|------|------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ }^\circ\text{C}$ | 11.5 | 12 | 12.5 | V |
| | | $14.5\text{ V} \leq V_{IN} \leq 27\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 11.4 | | 12.6 | |
| Line Regulation | REG_{IN} | $T_j = 25\text{ }^\circ\text{C}$, $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | 30 | 100 | mV |
| | | $T_j = 25\text{ }^\circ\text{C}$, $16\text{ V} \leq V_{IN} \leq 27\text{ V}$ | | 20 | 50 | |
| Load Regulation | REG_L | $T_j = 25\text{ }^\circ\text{C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 18 | 240 | mV |
| | | $T_j = 25\text{ }^\circ\text{C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 12 | 120 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ }^\circ\text{C}$ | | 3.6 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ }^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 90 | 280 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | $R \cdot R$ | $T_j = 25\text{ }^\circ\text{C}$, $f = 120\text{ Hz}$, $15\text{ V} \leq V_{IN} \leq 25\text{ V}$ | 55 | 64 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ }^\circ\text{C}$ | | 1.7 | | V |
| Short Circuit Current | I_{short} | $T_j = 25\text{ }^\circ\text{C}$, $V_{IN} = 30\text{ V}$ | | 100 | | mA |
| Peak Output Current | I_{peak} | $T_j = 25\text{ }^\circ\text{C}$ | 360 | 480 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o/\Delta T$ | $I_o = 5\text{ mA}$ | | 0.3 | | mV/ $^\circ\text{C}$ |

ELECTRICAL CHARACTERISTICS μPC78N15

($V_{IN} = 23\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ °C} \leq T_j \leq +125\text{ °C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-------------------------|---|-------|------|-------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ °C}$ | 14.4 | 15 | 15.6 | V |
| | | $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 14.25 | | 15.75 | |
| Line Regulation | REG _{IN} | $T_j = 25\text{ °C}$, $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | 32 | 100 | mV |
| | | $T_j = 25\text{ °C}$, $20\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | 25 | 50 | |
| Load Regulation | REG _L | $T_j = 25\text{ °C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 25 | 300 | mV |
| | | $T_j = 25\text{ °C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 16 | 150 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ °C}$ | | 3.7 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $17.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ °C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 100 | 350 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | R · R | $T_j = 25\text{ °C}$, $f = 120\text{ Hz}$, $18.5\text{ V} \leq V_{IN} \leq 28.5\text{ V}$ | 54 | 62 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ °C}$ | | 1.7 | | V |
| Short Circuit Current | I_{Oshort} | $T_j = 25\text{ °C}$, $V_{IN} = 30\text{ V}$ | | 100 | | mA |
| Peak Output Current | I_{Opeak} | $T_j = 25\text{ °C}$ | 360 | 470 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o / \Delta T$ | $I_o = 5\text{ mA}$ | | 0.5 | | mV/°C |

ELECTRICAL CHARACTERISTICS μPC78N18

($V_{IN} = 27\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ °C} \leq T_j \leq +125\text{ °C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

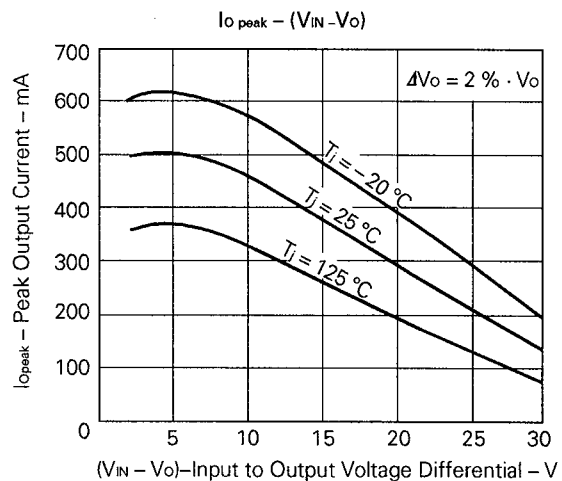
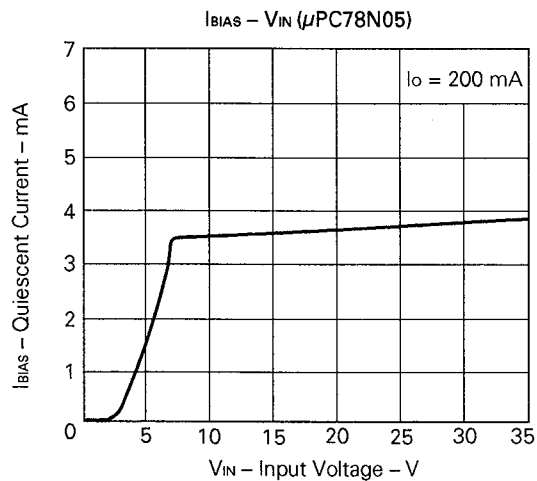
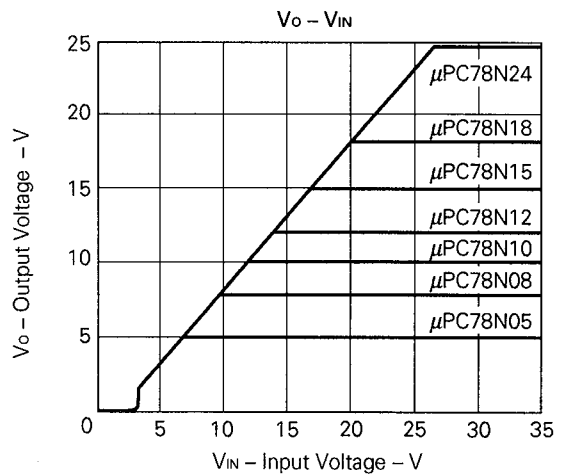
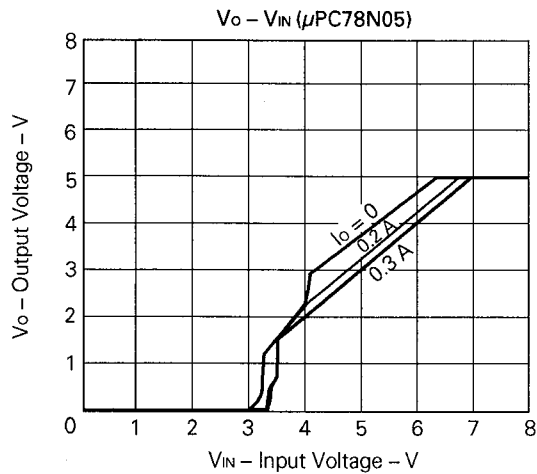
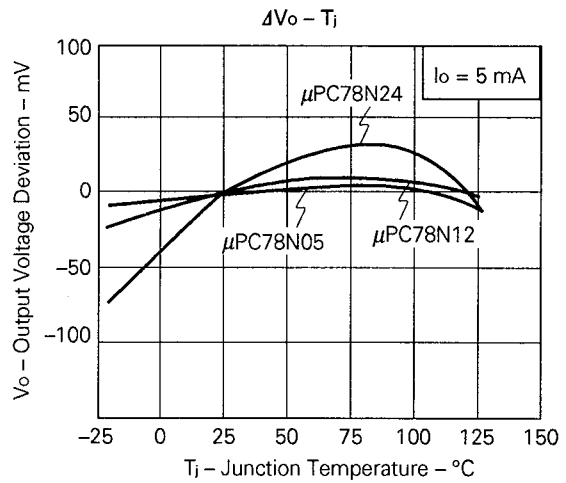
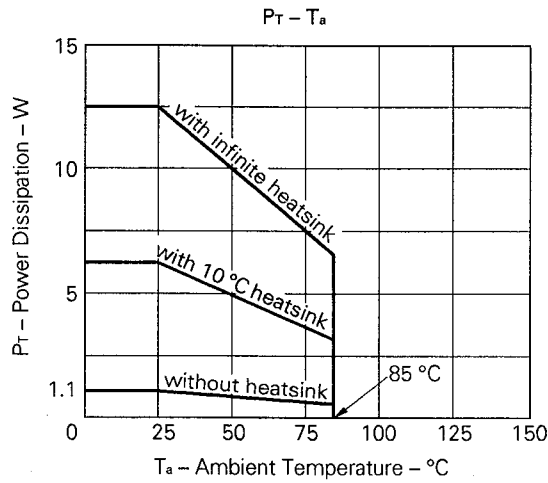
| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-------------------------|---|------|------|------|------------------------|
| Output Voltage | V_o | $T_j = 25\text{ °C}$ | 17.3 | 18 | 18.7 | V |
| | | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 17.1 | | 18.9 | |
| Line Regulation | REG _{IN} | $T_j = 25\text{ °C}$, $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ | | 32 | 100 | mV |
| | | $T_j = 25\text{ °C}$, $22\text{ V} \leq V_{IN} \leq 33\text{ V}$ | | 25 | 50 | |
| Load Regulation | REG _L | $T_j = 25\text{ °C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 30 | 360 | mV |
| | | $T_j = 25\text{ °C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 20 | 180 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ °C}$ | | 3.7 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ °C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 115 | 420 | $\mu\text{V}_{r.m.s.}$ |
| Ripple Rejection | R · R | $T_j = 25\text{ °C}$, $f = 120\text{ Hz}$, $22\text{ V} \leq V_{IN} \leq 32\text{ V}$ | 53 | 60 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ °C}$ | | 1.7 | | V |
| Short Circuit Current | I_{Oshort} | $T_j = 25\text{ °C}$, $V_{IN} = 33\text{ V}$ | | 60 | | mA |
| Peak Output Current | I_{Opeak} | $T_j = 25\text{ °C}$ | 360 | 460 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o / \Delta T$ | $I_o = 5\text{ mA}$ | | 0.5 | | mV/°C |

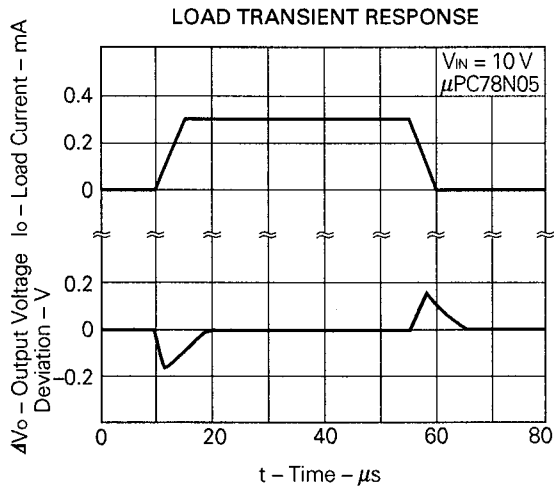
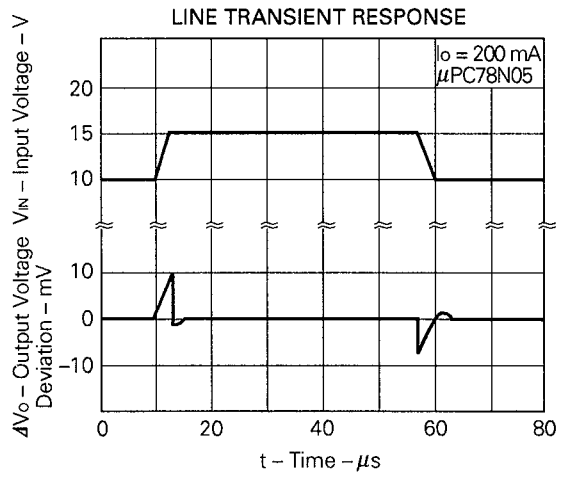
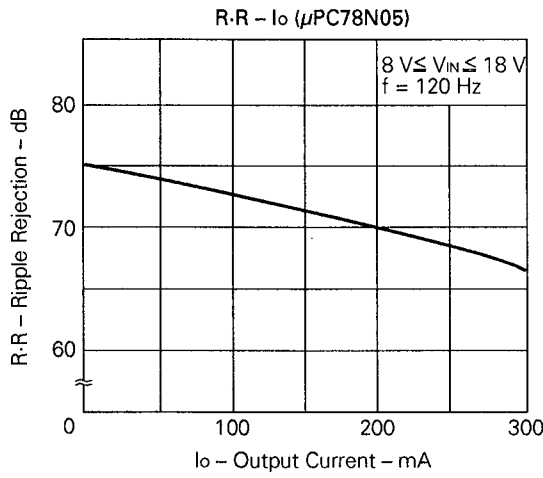
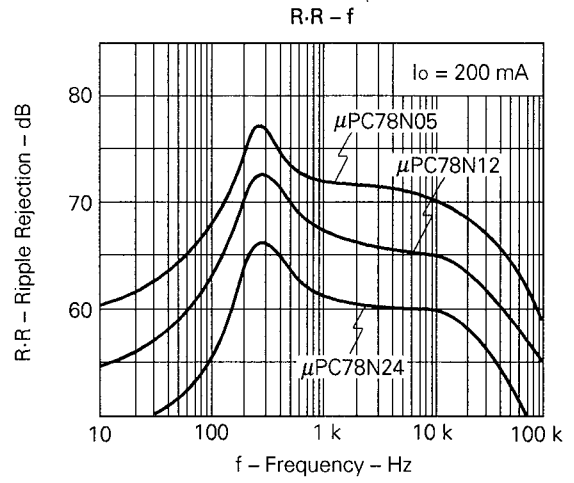
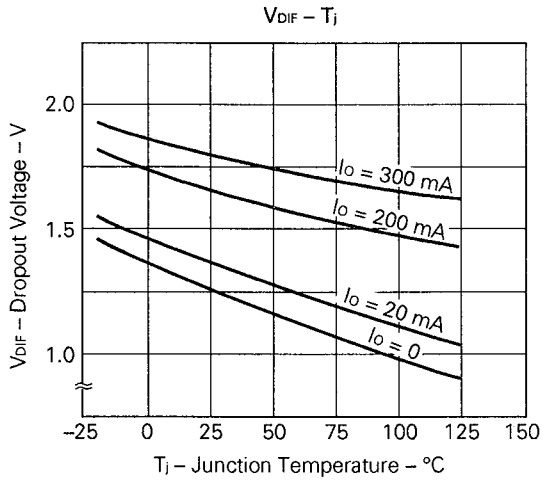
ELECTRICAL CHARACTERISTICS μPC78N24

($V_{IN} = 33\text{ V}$, $I_o = 200\text{ mA}$, $0\text{ °C} \leq T_j \leq +125\text{ °C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|-------------------------|---|------|------|------|----------------------|
| Output Voltage | V_o | $T_j = 25\text{ °C}$ | 23 | 24 | 25 | V |
| | | $27\text{ V} \leq V_{IN} \leq 38\text{ V}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | 22.8 | | 25.2 | |
| Line Regulation | REG _{IN} | $T_j = 25\text{ °C}$, $27\text{ V} \leq V_{IN} \leq 38\text{ V}$ | | 40 | 100 | mV |
| | | $T_j = 25\text{ °C}$, $28\text{ V} \leq V_{IN} \leq 38\text{ V}$ | | 30 | 50 | |
| Load Regulation | REG _L | $T_j = 25\text{ °C}$, $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | 35 | 480 | mV |
| | | $T_j = 25\text{ °C}$, $5\text{ mA} \leq I_o \leq 200\text{ mA}$ | | 23 | 240 | |
| Quiescent Current | I_{BIAS} | $T_j = 25\text{ °C}$ | | 3.7 | 5.0 | mA |
| Quiescent Current Change | ΔI_{BIAS} | $27\text{ V} \leq V_{IN} \leq 38\text{ V}$ | | | 0.8 | mA |
| | | $1\text{ mA} \leq I_o \leq 300\text{ mA}$ | | | 0.5 | |
| Output Noise Voltage | V_n | $T_j = 25\text{ °C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ | | 135 | 560 | μV _{r.m.s.} |
| Ripple Rejection | R · R | $T_j = 25\text{ °C}$, $f = 120\text{ Hz}$, $28\text{ V} \leq V_{IN} \leq 38\text{ V}$ | 50 | 57 | | dB |
| Dropout Voltage | V_{DIF} | $T_j = 25\text{ °C}$ | | 1.7 | | V |
| Short Circuit Current | I_{Oshort} | $T_j = 25\text{ °C}$, $V_{IN} = 38\text{ V}$ | | 5 | | mA |
| Peak Output Current | I_{Opeak} | $T_j = 25\text{ °C}$ | 360 | 460 | 640 | mA |
| Temperature coefficient of Output Voltage | $\Delta V_o / \Delta T$ | $I_o = 5\text{ mA}$ | | 0.7 | | mV/°C |

TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

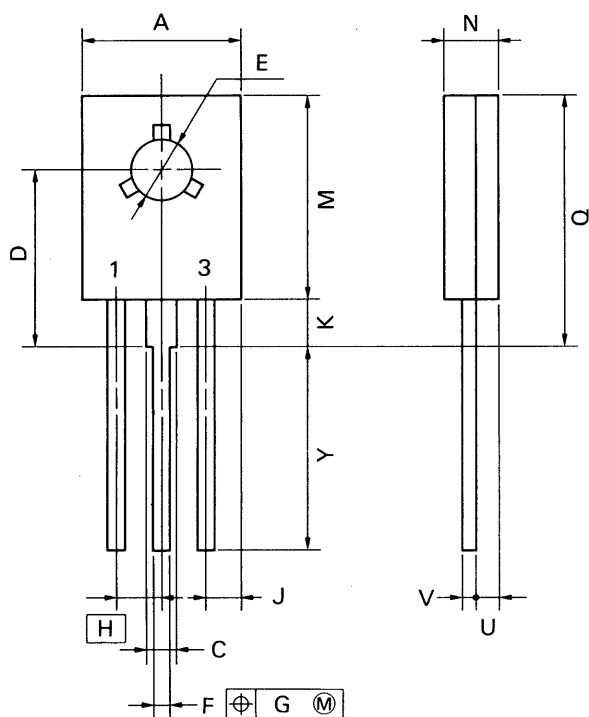




PACKAGE DIMENSIONS (Unit: mm)

μPC78N00H Series

3 PIN PLASTIC SIP (TO-126)



P3HP-230B

NOTE

Each lead centerline is located within 0.23 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

| ITEM | MILLIMETERS | INCHES |
|------|----------------------|--------------------------|
| A | 8.5 MAX. | 0.335 MAX. |
| C | 1.1 MIN. | 0.043 MIN. |
| D | 9.7 ^{±0.3} | 0.382 ^{±0.012} |
| E | φ3.2 ^{±0.1} | φ0.126 ^{±0.004} |
| F | 0.80 ^{±0.1} | 0.031 ^{±0.005} |
| G | 0.23 | 0.009 |
| H | 2.3 | 0.091 |
| J | 1.95 MAX. | 0.077 MAX. |
| K | 2.3 MIN. | 0.09 MIN. |
| M | 11.5 MAX. | 0.453 MAX. |
| N | 2.7 ^{±0.2} | 0.106 ^{±0.008} |
| Q | 14.5 MAX. | 0.571 MAX. |
| U | 1.7 MAX. | 0.067 MAX. |
| V | 0.55 ^{±0.1} | 0.022 ^{±0.005} |
| Y | 13.5 ^{±0.7} | 0.531 ^{±0.028} |

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.

Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

<TYPES OF THROUGH HOLE MOUNT DEVICE>

[μPC78N00H Series]

| Soldering process | Soldering condition | Symbol |
|-------------------|--|--------|
| Wave soldering | Solder temperature: 260 °C or below, Flow time: 10 seconds or below | |

Reference

| Application note name | No. |
|---|----------|
| Quality control of NEC semiconductor devices | TEI-1202 |
| Quality control guide of semiconductors devices | MEI-1202 |
| Assembly manual of semiconductors devices | IEI-1207 |
| NEC semiconductor device reliability/quality control system | IEI-1212 |

[MEMO]

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.