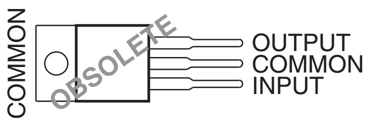
# POSITIVE-VOLTAGE REGULATORS

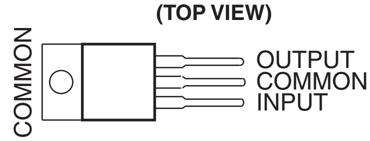
## FEATURES

- **3-Terminal Regulators**
- **Output Current up to 1.5 A**
- **Internal Thermal-Overload Protection**
- **High Power-Dissipation Capability**
- **Internal Short-Circuit Current Limiting**
- **Output Transistor Safe-Area Compensation**

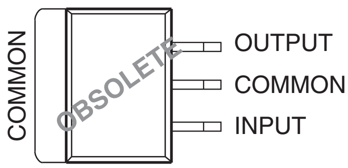
**KC (TO-220) PACKAGE (TOP VIEW)**



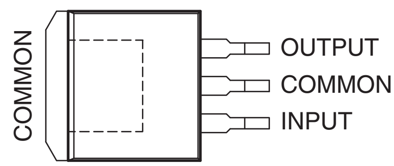

**KCS (TO-220) PACKAGE (TOP VIEW)**




**KTE (PowerFLEX™) PACKAGE (TOP VIEW)**




**KTT (TO-263) PACKAGE (TOP VIEW)**




## DESCRIPTION/ORDERING INFORMATION

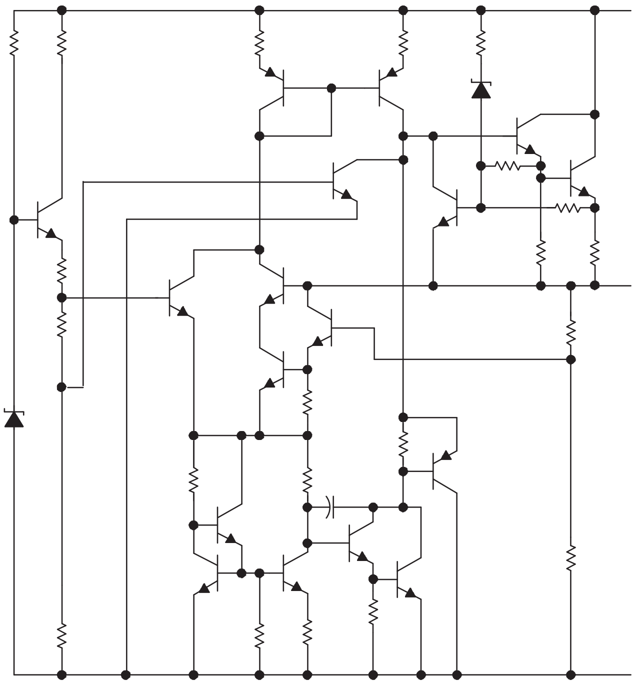
This series of fixed-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. Each of these regulators can deliver up to 1.5 A of output current. The internal current-limiting and thermal-shutdown features of these regulators essentially make them immune to overload. In addition to use as fixed-voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents, and also can be used as the power-pass element in precision regulators.

## ORDERING INFORMATION(1)

| $T_J$ | $V_{O(NOM)}$ | PACKAGE(2) | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---|---|---|---|---|---|
| 0°C to 125°C | 5 V | TO-220, short shoulder – KCS | Tube of 50 | UA7805CKCS | UA7805C |
| | | TO-263 – KTT | Reel of 500 | UA7805CKTTR | UA7805C |
| | | PowerFLEX™ – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |
| | 8 V | TO-220, short shoulder – KCS | Tube of 50 | UA7808CKCS | UA7808C |
| | | TO-263 – KTT | Reel of 500 | UA7808CKTTR | UA7808C |
| | | PowerFLEX – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |
| | 10 V | TO-220, short shoulder – KCS | Tube of 50 | UA7810CKCS | UA7810C |
| | | TO-263 – KTT | Reel of 500 | UA7810CKTTR | UA7810C |
| | | PowerFLEX – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |
| | 12 V | TO-220, short shoulder – KCS | Tube of 50 | UA7812CKCS | UA7812C |
| | | TO-263 – KTT | Reel of 500 | UA7812CKTTR | UA7812C |
| | | PowerFLEX – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |
| | 15 V | TO-220, short shoulder – KCS | Tube of 50 | UA7815CKCS | UA7815C |
| | | TO-263 – KTT | Reel of 500 | UA7815CKTTR | UA7815C |
| | | PowerFLEX – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |
| | 24 V | TO-220, short shoulder – KCS | Tube of 50 | UA7824CKCS | UA7824C |
| | | TO-263 – KTT | Reel of 500 | UA7824CKTTR | UA7824C |
| | | PowerFLEX – KTE | | OBSOLETE | OBSOLETE |
| | | TO-220 – KC | | OBSOLETE | OBSOLETE |

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
(2) Package drawings, thermal data, and symbolization are available at www.ti.com/packaging.

## SCHEMATIC




## Absolute Maximum Ratings[(1)]

over virtual junction temperature range (unless otherwise noted)

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_I$ | Input voltage | µA7824C | | 40 | V |
| | | All others | | 35 | |
| $T_J$ | Operating virtual junction temperature | | | 150 | °C |
| | Lead temperature | 1,6 mm (1/16 in) from case for 10 s | | 260 | °C |
| $T_{stg}$ | Storage temperature range | | –65 | 150 | °C |

(1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## Package Thermal Data[(1)]

| PACKAGE | BOARD | $\theta_{JA}$ | $\theta_{JC}$ | $\theta_{JP}$[(2)] |
|---|---|---|---|---|
| PowerFLEX (KTE) – OBSOLETE | High K, JESD 51-5 | 23°C/W | 3°C/W | 2.7°C/W |
| TO-220 (KCS)<br>(KC – OBSOLETE) | High K, JESD 51-5 | 19°C/W | 17°C/W | 3°C/W |
| TO-263 (KTT) | High K, JESD 51-5 | 25.3°C/W | 18°C/W | 1.94°C/W |

(1) Maximum power dissipation is a function of $T_{J(max)}$, $\theta_{JA}$, and $T_A$. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_{J(max)} – T_A)/\theta_{JA}$. Operating at the absolute maximum $T_J$ of 150°C can affect reliability.
(2) For packages with exposed thermal pads, such as QFN, PowerPAD™, or PowerFLEX, $\theta_{JP}$ is defined as the thermal resistance between the die junction and the bottom of the exposed pad.

## Recommended Operating Conditions

| | | | MIN | MAX | UNIT |
|---|---|---|---|---|---|
| $V_I$ | Input voltage | μA7805 | 7 | 25 | V |
| | | μA7808 | 10.5 | 25 | |
| | | μA7810 | 12.5 | 28 | |
| | | μA7812 | 14.5 | 30 | |
| | | μA7815 | 17.5 | 30 | |
| | | μA7824 | 27 | 38 | |
| $I_O$ | Output current | | | 1.5 | A |
| $T_J$ | Operating virtual junction temperature | | 0 | 125 | °C |

## uA7805 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 10 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$(1) | µA7805C MIN | µA7805C TYP | µA7805C MAX | UNIT |
|---|---|---|---|---|---|---|
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 7 V to 20 V, $P_D$ ≤ 15 W | 25°C | 4.8 | 5 | 5.2 | V |
| | | 0°C to 125°C | 4.75 | | 5.25 | |
| Input voltage regulation | $V_I$ = 7 V to 25 V | 25°C | | 3 | 100 | mV |
| | $V_I$ = 8 V to 12 V | | | 1 | 50 | |
| Ripple rejection | $V_I$ = 8 V to 12 V, f = 120 Hz | 0°C to 125°C | 62 | 78 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 15 | 100 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 5 | 50 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.017 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –1.1 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 40 | | µV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.2 | 8 | mA |
| Bias current change | $V_I$ = 7 V to 25 V | 0°C to 125°C | | | 1.3 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 750 | | mA |
| Peak output current | | 25°C | | 2.2 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## uA7808 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 14 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$(1) | µA7808C MIN | µA7808C TYP | µA7808C MAX | UNIT |
|---|---|---|---|---|---|---|
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 10.5 V to 23 V, $P_D$ ≤ 15 W | 25°C | 7.7 | 8 | 8.3 | V |
| | | 0°C to 125°C | 7.6 | | 8.4 | |
| Input voltage regulation | $V_I$ = 10.5 V to 25 V | 25°C | | 6 | 160 | mV |
| | $V_I$ = 11 V to 17 V | | | 2 | 80 | |
| Ripple rejection | $V_I$ = 11.5 V to 21.5 V, f = 120 Hz | 0°C to 125°C | 55 | 72 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 12 | 160 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 4 | 80 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.016 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –0.8 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 52 | | µV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.3 | 8 | mA |
| Bias current change | $V_I$ = 10.5 V to 25 V | 0°C to 125°C | | | 1 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 450 | | mA |
| Peak output current | | 25°C | | 2.2 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## uA7810 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 17 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$ (1) | µA7810C | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 12.5 V to 25 V, $P_D$ ≤ 15 W | 25°C | 9.6 | 10 | 10.4 | V |
| | | 0°C to 125°C | 9.5 | | 10.5 | |
| Input voltage regulation | $V_I$ = 12.5 V to 28 V | 25°C | | 7 | 200 | mV |
| | $V_I$ = 14 V to 20 V | | | 2 | 100 | |
| Ripple rejection | $V_I$ = 13 V to 23 V, f = 120 Hz | 0°C to 125°C | 55 | 71 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 12 | 200 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 4 | 100 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.018 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –1 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 70 | | µV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.3 | 8 | mA |
| Bias current change | $V_I$ = 12.5 V to 28 V | 0°C to 125°C | | | 1 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 400 | | mA |
| Peak output current | | 25°C | | 2.2 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## uA7812 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 19 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$ (1) | µA7812C | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 14.5 V to 27 V, $P_D$ ≤ 15 W | 25°C | 11.5 | 12 | 12.5 | V |
| | | 0°C to 125°C | 11.4 | | 12.6 | |
| Input voltage regulation | $V_I$ = 14.5 V to 30 V | 25°C | | 10 | 240 | mV |
| | $V_I$ = 16 V to 22 V | | | 3 | 120 | |
| Ripple rejection | $V_I$ = 15 V to 25 V, f = 120 Hz | 0°C to 125°C | 55 | 71 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 12 | 240 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 4 | 120 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.018 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –1 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 75 | | µV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.3 | 8 | mA |
| Bias current change | $V_I$ = 14.5 V to 30 V | 0°C to 125°C | | | 1 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 350 | | mA |
| Peak output current | | 25°C | | 2.2 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-µF capacitor across the input and a 0.1-µF capacitor across the output.

## uA7815 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 23 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$ (1) | μA7815C MIN | μA7815C TYP | μA7815C MAX | UNIT |
|---|---|---|---|---|---|---|
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 17.5 V to 30 V, $P_D$ ≤ 15 W | 25°C | 14.4 | 15 | 15.6 | V |
| | | 0°C to 125°C | 14.25 | | 15.75 | |
| Input voltage regulation | $V_I$ = 17.5 V to 30 V | 25°C | | 11 | 300 | mV |
| | $V_I$ = 20 V to 26 V | | | 3 | 150 | |
| Ripple rejection | $V_I$ = 18.5 V to 28.5 V, f = 120 Hz | 0°C to 125°C | 54 | 70 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 12 | 300 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 4 | 150 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.019 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –1 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 90 | | μV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.4 | 8 | mA |
| Bias current change | $V_I$ = 17.5 V to 30 V | 0°C to 125°C | | | 1 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 230 | | mA |
| Peak output current | | 25°C | | 2.1 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

## uA7824 Electrical Characteristics

at specified virtual junction temperature, $V_I$ = 33 V, $I_O$ = 500 mA (unless otherwise noted)

| PARAMETER | TEST CONDITIONS | $T_J$ (1) | μA7824C MIN | μA7824C TYP | μA7824C MAX | UNIT |
|---|---|---|---|---|---|---|
| Output voltage | $I_O$ = 5 mA to 1 A, $V_I$ = 27 V to 38 V, $P_D$ ≤ 15 W | 25°C | 23 | 24 | 25 | V |
| | | 0°C to 125°C | 22.8 | | 25.2 | |
| Input voltage regulation | $V_I$ = 27 V to 38 V | 25°C | | 18 | 480 | mV |
| | $V_I$ = 30 V to 36 V | | | 6 | 240 | |
| Ripple rejection | $V_I$ = 28 V to 38 V, f = 120 Hz | 0°C to 125°C | 50 | 66 | | dB |
| Output voltage regulation | $I_O$ = 5 mA to 1.5 A | 25°C | | 12 | 480 | mV |
| | $I_O$ = 250 mA to 750 mA | | | 4 | 240 | |
| Output resistance | f = 1 kHz | 0°C to 125°C | | 0.028 | | Ω |
| Temperature coefficient of output voltage | $I_O$ = 5 mA | 0°C to 125°C | | –1.5 | | mV/°C |
| Output noise voltage | f = 10 Hz to 100 kHz | 25°C | | 170 | | μV |
| Dropout voltage | $I_O$ = 1 A | 25°C | | 2 | | V |
| Bias current | | 25°C | | 4.6 | 8 | mA |
| Bias current change | $V_I$ = 27 V to 38 V | 0°C to 125°C | | | 1 | mA |
| | $I_O$ = 5 mA to 1 A | | | | 0.5 | |
| Short-circuit output current | | 25°C | | 150 | | mA |
| Peak output current | | 25°C | | 2.1 | | A |

(1) Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.33-μF capacitor across the input and a 0.1-μF capacitor across the output.

## APPLICATION INFORMATION

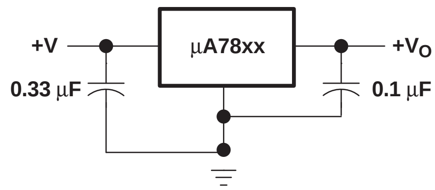



**Figure 1. Fixed-Output Regulator**

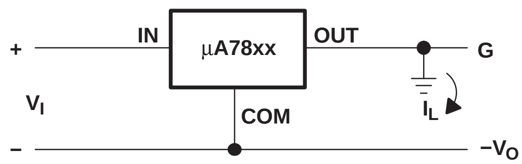
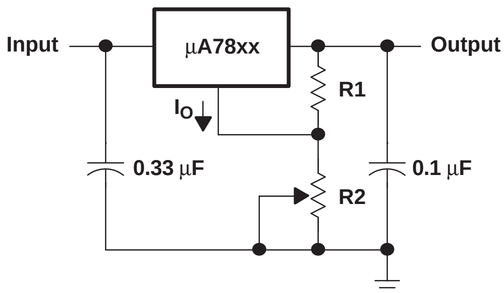


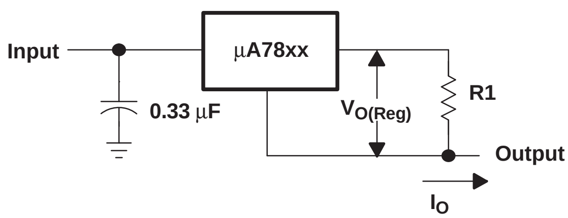

**Figure 2. Positive Regulator in Negative Configuration ($V_I$ Must Float)**




A: The following formula is used when $V_{xx}$ is the nominal output voltage (output to common) of the fixed regulator:

$$V_O = V_{xx} + \left(\frac{V_{xx}}{R1} + I_Q\right)R2$$

**Figure 3. Adjustable-Output Regulator**




$I_O = (V_O/R1) + I_O$ Bias Current

**Figure 4. Current Regulator**

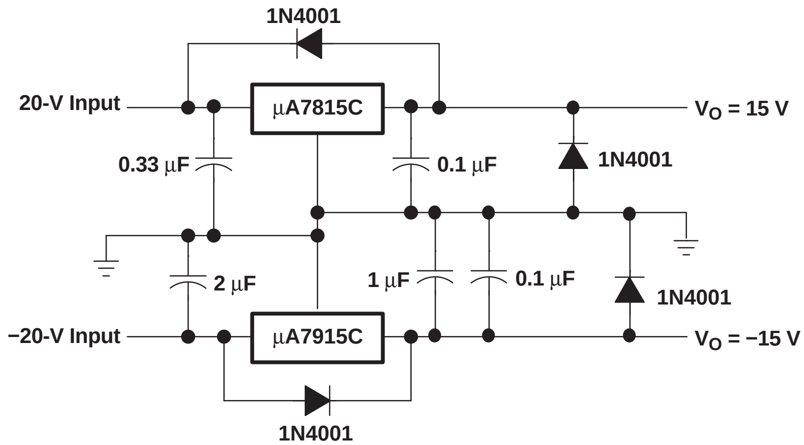



**Figure 5. Regulated Dual Supply**

## Operation With a Load Common to a Voltage of Opposite Polarity

In many cases, a regulator powers a load that is not connected to ground but, instead, is connected to a voltage source of opposite polarity (e.g., operational amplifiers, level-shifting circuits, etc.). In these cases, a clamp diode should be connected to the regulator output as shown in Figure 6. This protects the regulator from output polarity reversals during startup and short-circuit operation.

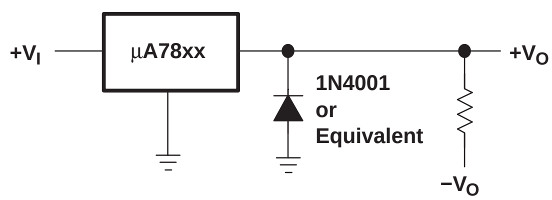



**Figure 6. Output Polarity-Reversal-Protection Circuit**

## Reverse-Bias Protection

Occasionally, the input voltage to the regulator can collapse faster than the output voltage. This can occur, for example, when the input supply is crowbarred during an output overvoltage condition. If the output voltage is greater than approximately 7 V, the emitter-base junction of the series-pass element (internal or external) could break down and be damaged. To prevent this, a diode shunt can be used as shown in Figure 7.

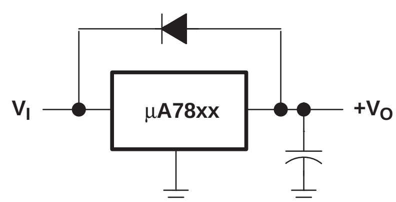



**Figure 7. Reverse-Bias-Protection Circuit**

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) |
|---|---|---|---|---|---|---|---|---|
| UA7805CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7805CKCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7805CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7805CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7805CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7805CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7805CKTTRG3 | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7805QKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7805QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7808CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7808CKCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7808CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7808CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7808CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7808CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7808CKTTRG3 | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7808QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7810CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7810CKCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7810CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7810CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7810CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7810CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7810CKTTRG3 | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7810QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7812CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7812CKCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7812CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7812CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7812CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7812CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7812CKTTRG3 | ACTIVE | DDPAK/ | KTT | 3 | 500 | Green (RoHS & | CU SN | Level-3-245C-168 HR |

| Orderable Device | Status [(1)] | Package Type | Package Drawing | Pins | Package Qty | Eco Plan [(2)] | Lead/Ball Finish | MSL Peak Temp [(3)] |
|---|---|---|---|---|---|---|---|---|
| | | TO-263 | | | | no Sb/Br) | | |
| UA7812QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7815CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7815CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7815CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7815CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7815CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7815CKTTRG3 | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7815QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7824CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7824CKCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7824CKCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7824CKCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| UA7824CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7824CKTTR | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7824CKTTRG3 | ACTIVE | DDPAK/ TO-263 | KTT | 3 | 500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-245C-168 HR |
| UA7885CKC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| UA7885CKTER | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |
| UA7885QKTE | OBSOLETE | PFM | KTE | 3 | | TBD | Call TI | Call TI |

(1) The marketing status values are defined as follows:
**ACTIVE:** Product device recommended for new designs.
**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.
**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
**TBD:** The Pb-Free/Green conversion plan has not been defined.
**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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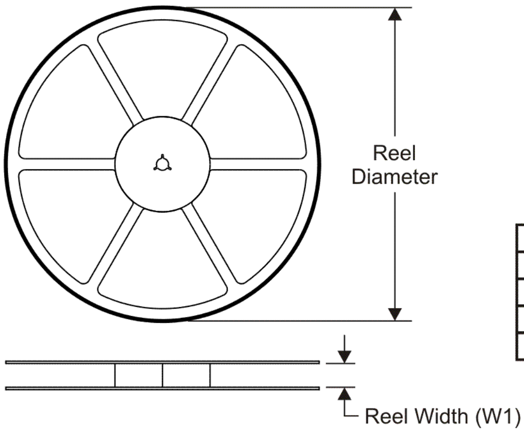
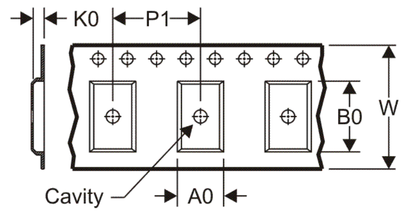
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

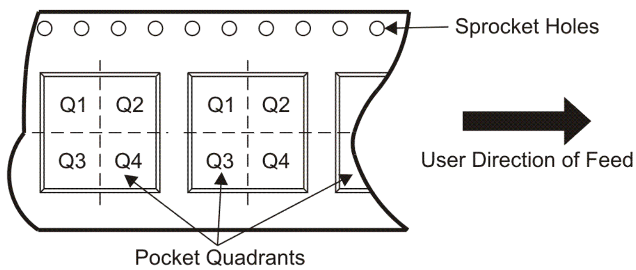



**TAPE DIMENSIONS**




| | |
|---|---|
| A0 | Dimension designed to accommodate the component width |
| B0 | Dimension designed to accommodate the component length |
| K0 | Dimension designed to accommodate the component thickness |
| W | Overall width of the carrier tape |
| P1 | Pitch between successive cavity centers |

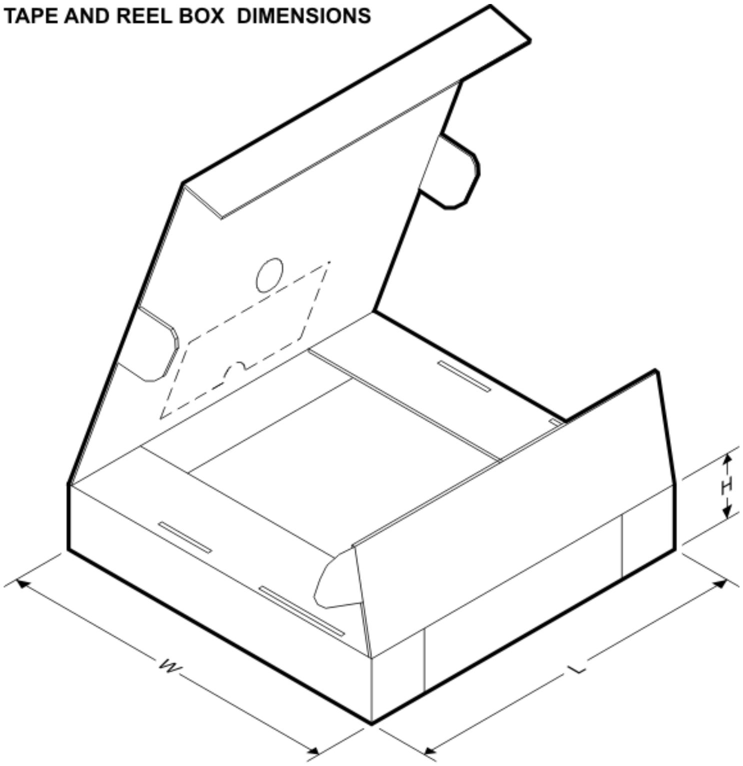
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UA7805CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |
| UA7808CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |
| UA7810CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |
| UA7812CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |
| UA7815CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |
| UA7824CKTTR | DDPAK/ TO-263 | KTT | 3 | 500 | 330.0 | 24.4 | 10.6 | 15.8 | 4.9 | 16.0 | 24.0 | Q2 |

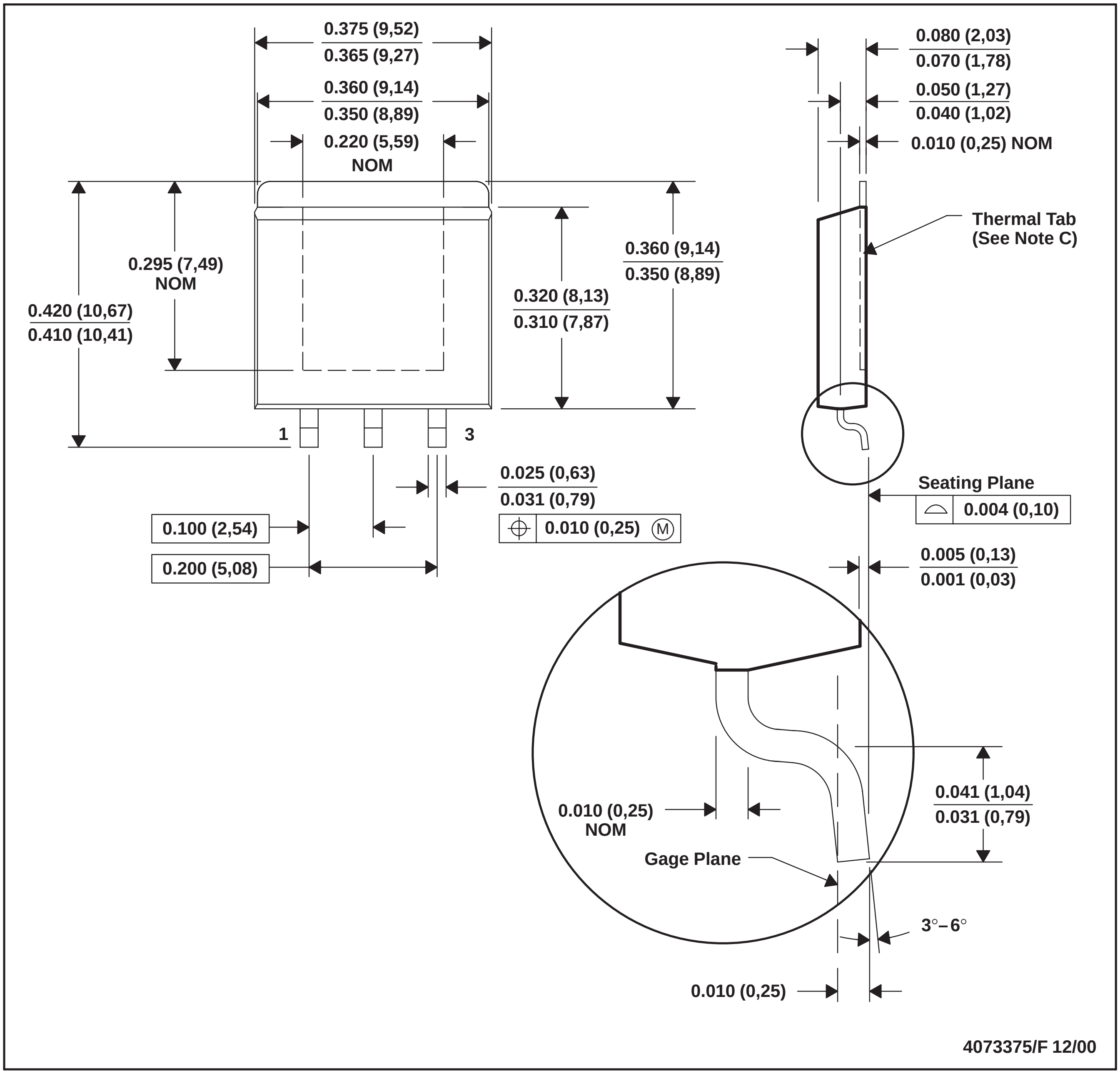
TAPE AND REEL BOX DIMENSIONS




*All dimensions are nominal

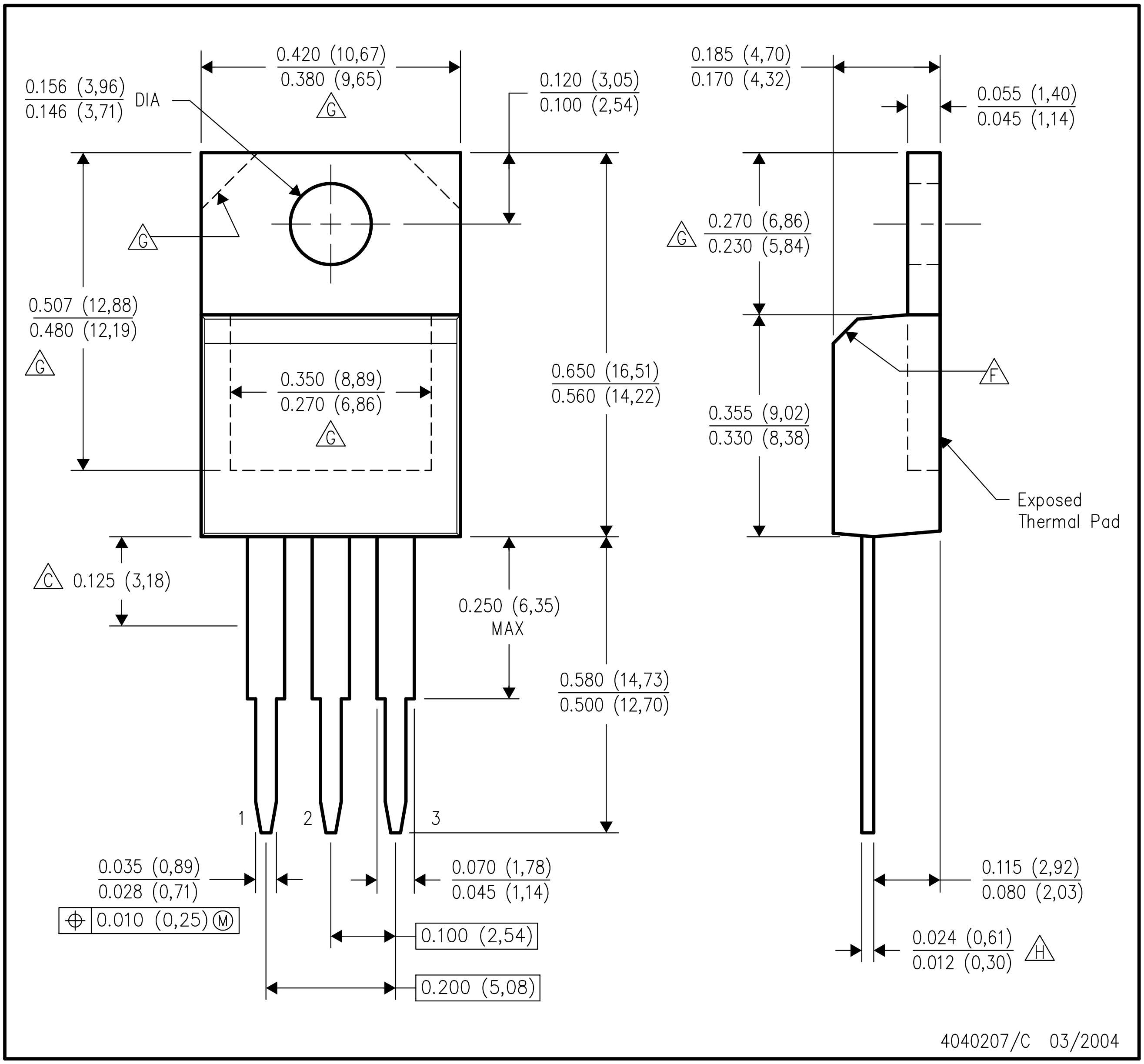
| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| UA7805CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |
| UA7808CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |
| UA7810CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |
| UA7812CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |
| UA7815CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |
| UA7824CKTTR | DDPAK/TO-263 | KTT | 3 | 500 | 340.0 | 340.0 | 38.0 |

**KTE (R-PSFM-G3)** **PowerFLEX™ PLASTIC FLANGE-MOUNT**



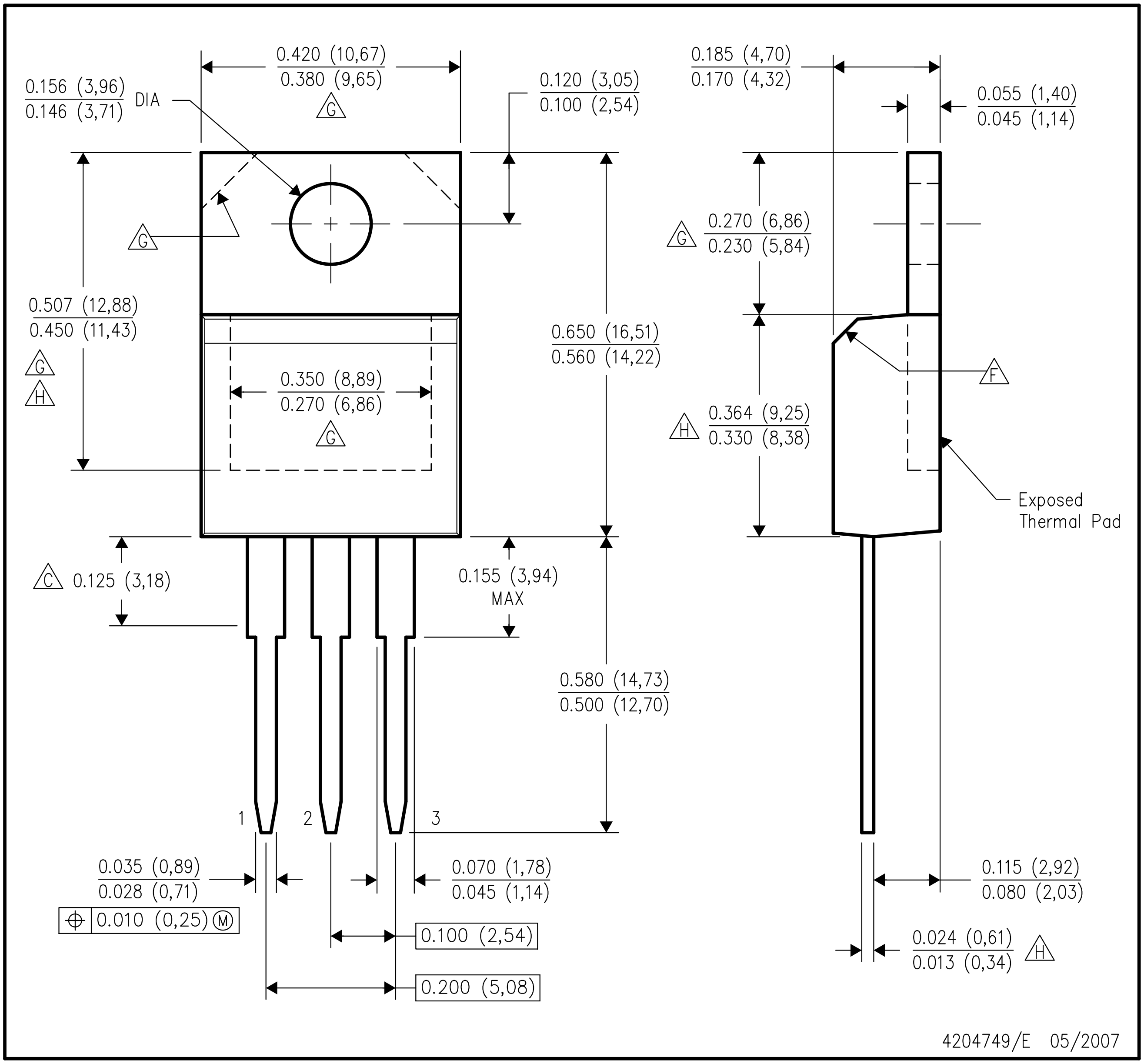

NOTES: A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. The center lead is in electrical contact with the thermal tab.
D. Dimensions do not include mold protrusions, not to exceed 0.006 (0,15).
E. Falls within JEDEC MO-169

## KC (R-PSFM-T3) PLASTIC FLANGE-MOUNT PACKAGE



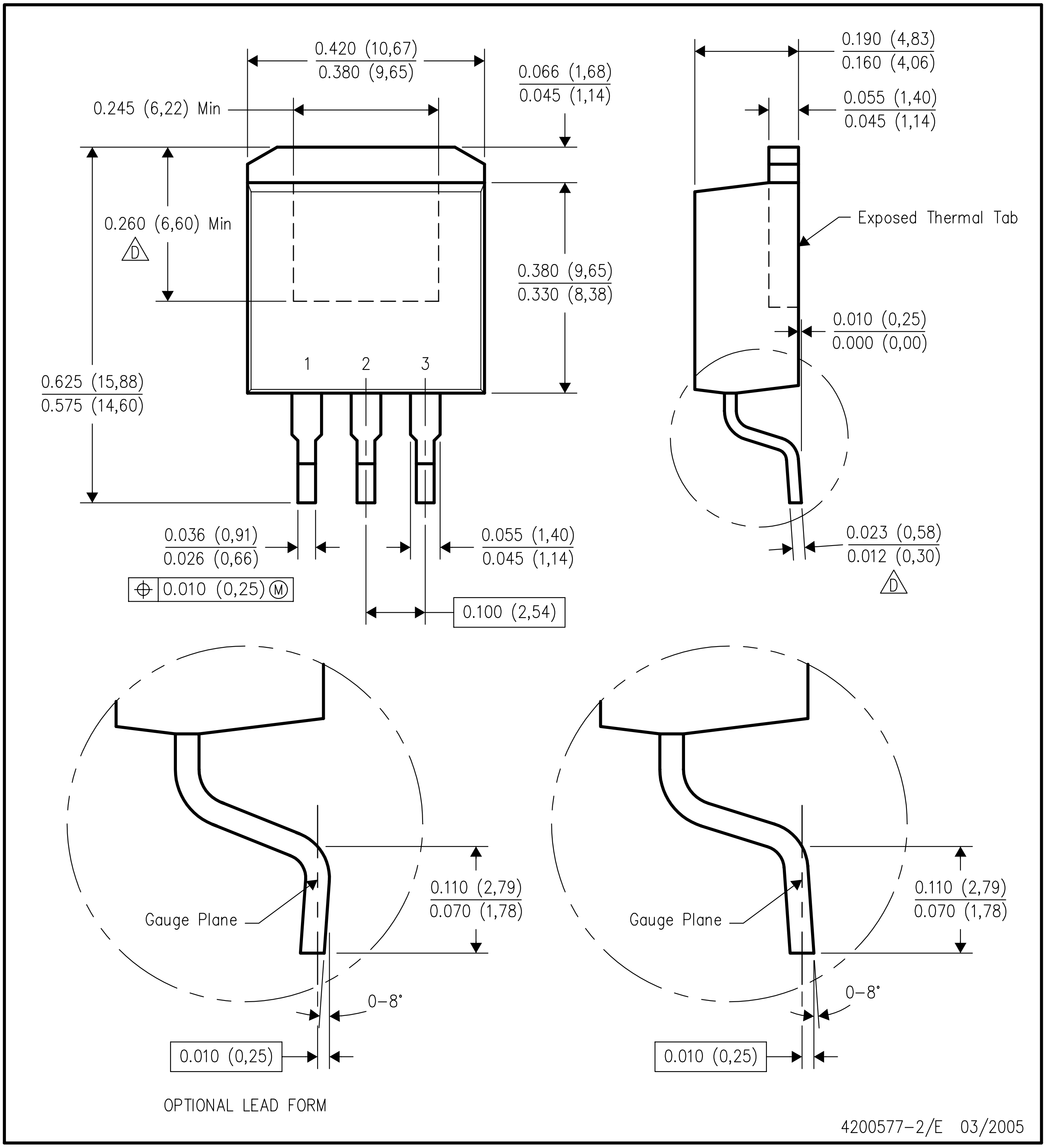

NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Lead dimensions are not controlled within this area.
D. All lead dimensions apply before solder dip.
E. The center lead is in electrical contact with the mounting tab.
F. The chamfer is optional.
G. Thermal pad contour optional within these dimensions.
H. Falls within JEDEC TO-220 variation AB, except minimum lead thickness.

KCS (R-PSFM-T3) PLASTIC FLANGE-MOUNT PACKAGE



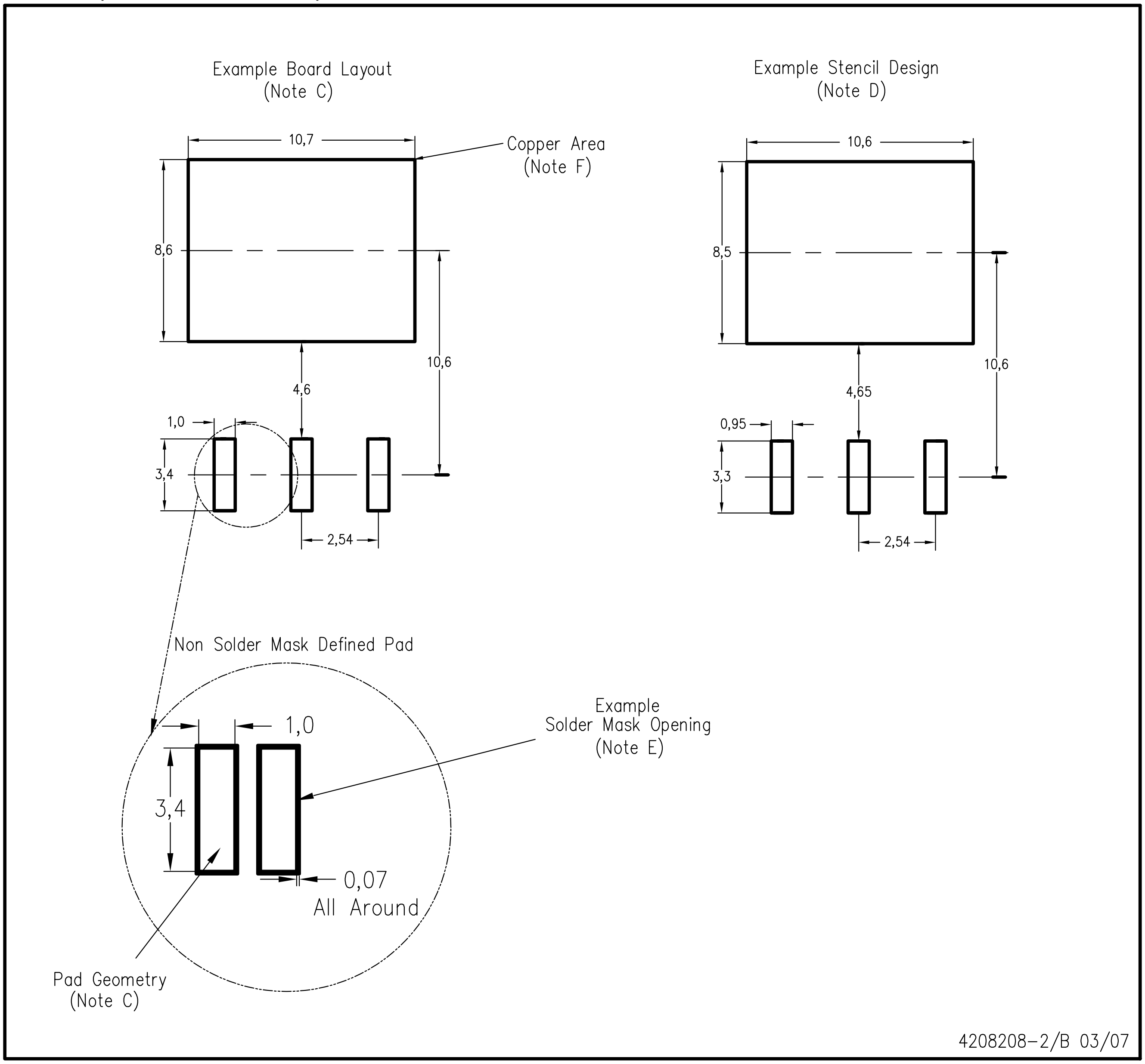

NOTES:
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Lead dimensions are not controlled within this area.
- D. All lead dimensions apply before solder dip.
- E. The center lead is in electrical contact with the mounting tab.
- F. The chamfer is optional.
- G. Thermal pad contour optional within these dimensions.
- H. Falls within JEDEC TO-220 variation AB, except minimum lead thickness, minimum exposed pad length, and maximum body length.

KTT (R–PSFM–G3) PLASTIC FLANGE–MOUNT PACKAGE




NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion. Mold flash or protrusion not to exceed 0.005 (0,13) per side.
D. Falls within JEDEC TO–263 variation AA, except minimum lead thickness and minimum exposed pad length.

# KTT (R–PSFM–G3)




NOTES:
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC–SM–782 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC–7525.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.
- F. This package is designed to be soldered to a thermal pad on the board. Refer to the Product Datasheet for specific thermal information, via requirements, and recommended thermal pad size. For thermal pad sizes larger than shown a solder mask defined pad is recommended in order to maintain the solderable pad geometry while increasing copper area.