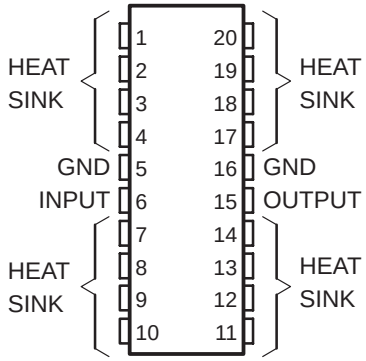
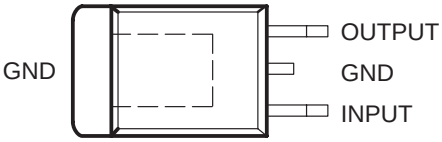
- **Fixed 1.8-V, 2.5-V, and 3.3-V Outputs**
- **±1% Maximum Output Voltage Tolerance at $T_J$ = 25°C**
- **500-mV Maximum Dropout Voltage at 500 mA (3.3-V Option)**
- **±2% Output Voltage Variation Across Load and Temperature**
- **Internal Overcurrent Limiting**
- **Internal Thermal-Overload Protection**
- **Internal Overvoltage Protection**

**PW (TSSOP) PACKAGE**
**(TOP VIEW)**



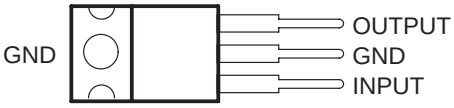

HEAT SINK − These terminals have an internal resistive connection to ground and should be grounded or electrically isolated.

**KTP (PowerFLEX™/TO-252*) PACKAGE**
**(TOP VIEW)**

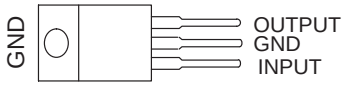



*Complies with JEDEC TO-252, variation AC

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




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




## description/ordering information

**ORDERING INFORMATION**

| $T_J$ | $V_O$ (NOM) | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|---|---|---|---|---|---|
| 0°C to 125°C | 1.8 V | PowerFLEX™/TO-252* (KTP) | Reel of 3000 | TLV2217-18KTPR | 2217−18 |
| | | TO-220 (KCS) | Tube of 50 | TLV2217-18KCS | TLV2217−18 |
| | 2.5 V | TO-220 (KC) | Tube of 50 | TLV2217-25KC | TLV2217−25 |
| | | PowerFLEX™/TO-252* (KTP) | Reel of 3000 | TLV2217-25KTPR | 2217−25 |
| | | TSSOP (PW) | Tube of 70 | TLV2217-25PW | 2217−25 |
| | | | Reel of 2000 | TLV2217-25PWR | |
| | 3.3 V | PowerFLEX™/TO-252* (KTP) | Reel of 3000 | TLV2217-33KTPR | 2217−33 |
| | | TO-220 (KC) | Tube of 50 | TLV2217-33KC | TLV2217−33 |
| | | TSSOP (PW) | Reel of 2000 | TLV2217-33PWR | 2217−33 |

*Complies to TO-252, variation AC.
† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

## description/ordering information (continued)

The TLV2217 family of low-dropout regulators offers a variety of fixed-voltage options that offer a maximum continuous input voltage of 16 V, making them more versatile than CMOS regulators. Utilizing a pnp pass element, these regulators are capable of sourcing 500 mA of current, with a specified maximum dropout of 500 mV (3.3-V and 2.5-V options), making these regulators ideal for low-voltage applications. Additionally, the TLV2217 regulators offer very tight output accuracy of ±2% across operating load and temperature ranges. Other convenient features the regulators provide are internal overcurrent limiting, thermal-overload protection, and overvoltage protection. The TLV2217 family of regulators is available in fixed voltages of 1.8 V, 2.5 V, and 3.3 V.

## absolute maximum ratings over operating virtual junction temperature range (unless otherwise noted)†

Continuous input voltage, $V_I$ . . . . . 16 V
Operating virtual junction temperature, $T_J$ . . . . . 150°C
Storage temperature range, $T_{stg}$ . . . . . −65°C to 150°C

† 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 (see Note 1)

| PACKAGE | BOARD | $\theta_{JP}$‡ | $\theta_{JC}$ | $\theta_{JA}$ |
|---|---|---|---|---|
| PowerFLEX™/TO-252 (KTP) | High K, JESD 51-5 | 1.4°C/W | 19°C/W | 28°C/W |
| TO-220 (KC/KCS) | High K, JESD 51-5 | 3°C/W | 17°C/W | 19°C/W |
| TSSOP (PW) | High K, JESD 51-7 | | 32°C/W | 83°C/W |

‡ For packages with exposed thermal pads, such as QFN, PowerPAD, and PowerFLEX, $\theta_{JP}$ is defined as the thermal resistance between the die junction and the bottom of the exposed pad.

NOTE 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.

## recommended operating conditions

| | | MIN | MAX | UNIT |
|---|---|---|---|---|
| $V_I$ | Input voltage | 3.0 | 12 | V |
| $I_O$ | Output current | 0 | 500 | mA |
| $T_J$ | Operating virtual junction temperature range | 0 | 125 | °C |

§ Minimum $V_I$ is equal to 3.0 V or $V_O(max)$ + 0.6 V, whichever is greater.

## electrical characteristics at $V_I$ = 4.5 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)

| PARAMETER | TEST CONDITIONS† | | TLV2217-33 | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Output voltage | $I_O$ = 20 mA to 500 mA, $V_I$ = 3.8 V to 5.5 V | $T_J$ = 25°C | 3.267 | 3.30 | 3.333 | V |
| | | $T_J$ = 0°C to 125°C | 3.234 | | 3.366 | |
| Input voltage regulation | $V_I$ = 3.8 V to 5.5 V | | | 5 | 15 | mV |
| Ripple rejection | f = 120 Hz, $V_{ripple}$ = 1 $V_{PP}$ | $V_I$ = 4.5 V | | −62 | | dB |
| Output voltage regulation | $I_O$ = 20 mA to 500 mA | | | 5 | 30 | mV |
| Output noise voltage | f = 10 Hz to 100 kHz | | | 500 | | μV |
| Dropout voltage | $I_O$ = 250 mA | | | | 400 | mV |
| | $I_O$ = 500 mA | | | | 500 | |
| Bias current | $I_O$ = 0 | | | 2 | 5 | mA |
| | $I_O$ = 500 mA | | | 19 | 49 | |

† Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 22-μF tantalum capacitor, with equivalent series resistance of 1.5 Ω, on the output.

## electrical characteristics at $V_I$ = 3.3 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)

| PARAMETER | TEST CONDITIONS† | | TLV2217-25 | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Output voltage | $I_O$ = 20 mA to 500 mA, $V_I$ = 3.0 V to 5.5 V | $T_J$ = 25°C | 2.475 | 2.5 | 2.525 | V |
| | | $T_J$ = 0°C to 125°C | 2.45 | | 2.55 | |
| Input voltage regulation | $V_I$ = 3.0 V to 5.5 V | | | 4 | 12 | mV |
| Ripple rejection | f = 120 Hz, $V_{ripple}$ = 1 $V_{PP}$, | $V_I$ = 4.5 V | | −62 | | dB |
| Output voltage regulation | $I_O$ = 20 mA to 500 mA | | | 4 | 23 | mV |
| Output noise voltage | f = 10 Hz to 100 kHz | | | 500 | | μV |
| Dropout voltage | $I_O$ = 250 mA | | | | 400 | mV |
| | $I_O$ = 500 mA | | | | 500 | |
| Bias current | $I_O$ = 0 | | | 2 | 5 | mA |
| | $I_O$ = 500 mA | | | 19 | 49 | |

† Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 22-μF tantalum capacitor, with equivalent series resistance of 1.5 Ω, on the output.

## electrical characteristics at $V_I$ = 3.3 V, $I_O$ = 500 mA, $T_J$ = 25°C (unless otherwise noted)

| PARAMETER | TEST CONDITIONS† | | TLV2217-18 | | | UNIT |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| Output voltage | $I_O$ = 20 mA to 500 mA, $V_I$ = 3.0 V to 5.5 V | $T_J$ = 25°C | 1.782 | 1.8 | 1.818 | V |
| | | $T_J$ = 0°C to 125°C | 1.764 | | 1.836 | |
| Input voltage regulation | $V_I$ = 3.0 V to 5.5 V | | | 3 | 9 | mV |
| Ripple rejection | f = 120 Hz, $V_{ripple}$ = 1 $V_{PP}$, $V_I$ = 4.5 V | | | −62 | | dB |
| Output voltage regulation | $I_O$ = 20 mA to 500 mA | | | 3 | 17 | mV |
| Output noise voltage | f = 10 Hz to 100 kHz | | | 500 | | μV |
| Dropout voltage | $I_O$ = 250 mA | | | ‡ | | mV |
| | $I_O$ = 500 mA | | | ‡ | | |
| Bias current | $I_O$ = 0 | | | 2 | 5 | mA |
| | $I_O$ = 500 mA | | | 19 | 49 | |

† Pulse-testing techniques are used to maintain the virtual junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 22-μF tantalum capacitor, with equivalent series resistance of 1.5 Ω, on the output.

‡ Dropout voltage is limited by the input voltage range, with minimum $V_I$ = 3.0 V.

## COMPENSATION-CAPACITOR SELECTION INFORMATION

The TLV2217 is a low-dropout regulator. This means that the capacitance loading is important to the performance of the regulator because it is a vital part of the control loop. The capacitor value and the equivalent series resistance (ESR) both affect the control loop and must be defined for the load range and the temperature range. Figures 1 and 2 can be used to establish the capacitance value and ESR range for the best regulator performance.

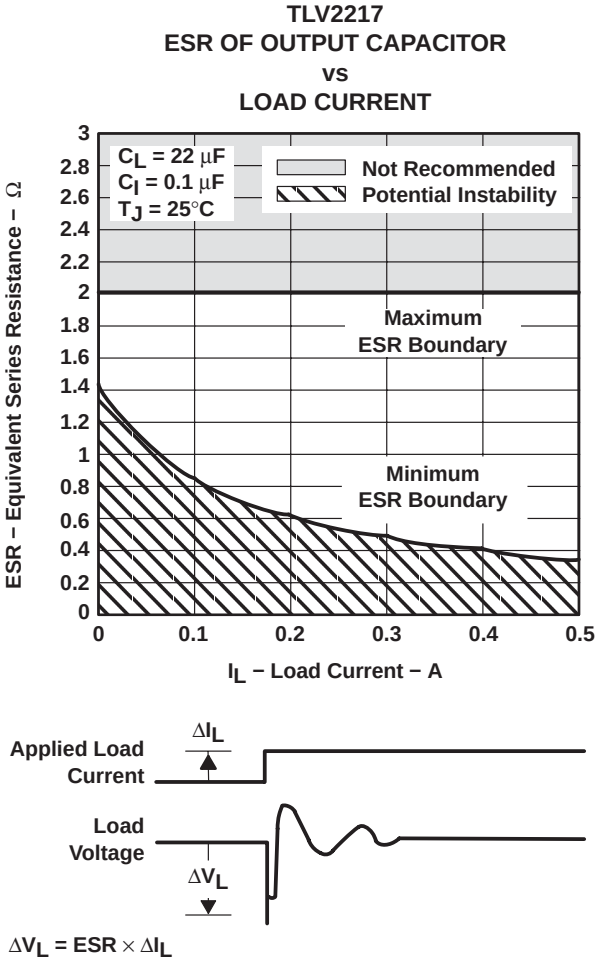



Figure 1

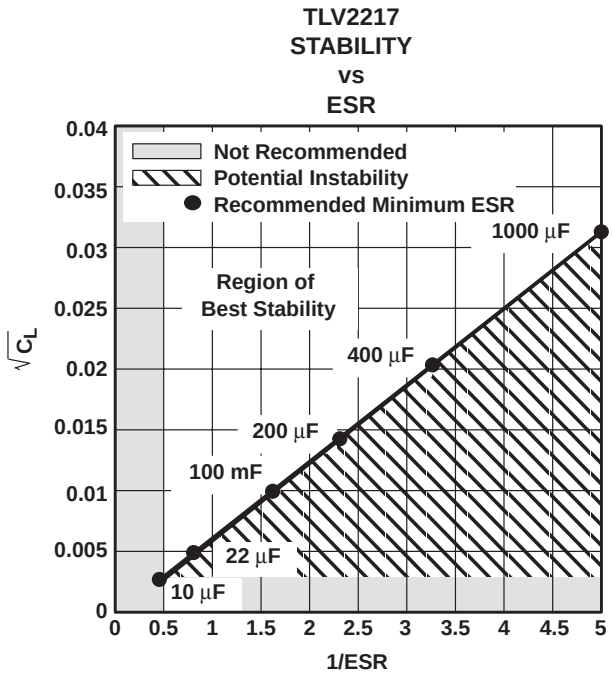



Figure 2

### typical application schematic

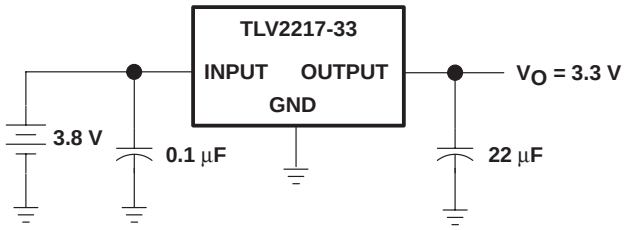



Figure 3

## PACKAGING INFORMATION

| Orderable Device | Status (1) | Package Type | Package Drawing | Pins | Package Qty | Eco Plan (2) | Lead/Ball Finish | MSL Peak Temp (3) |
|---|---|---|---|---|---|---|---|---|
| TLV2217-18KCS | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| TLV2217-18KCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| TLV2217-18KTPR | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-18KTPRG3 | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-18KVURG3 | ACTIVE | PFM | KVU | 3 | 2500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-260C-168 HR |
| TLV2217-25KC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| TLV2217-25KCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| TLV2217-25KCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| TLV2217-25KTPR | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-25KTPRG3 | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-25KVURG3 | ACTIVE | PFM | KVU | 3 | 2500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-260C-168 HR |
| TLV2217-25PW | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-25PWE4 | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-25PWG4 | ACTIVE | TSSOP | PW | 20 | 70 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-25PWR | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-25PWRE4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-25PWRG4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-33KC | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| TLV2217-33KCE3 | OBSOLETE | TO-220 | KC | 3 | | TBD | Call TI | Call TI |
| TLV2217-33KCSE3 | ACTIVE | TO-220 | KCS | 3 | 50 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| TLV2217-33KTPR | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-33KTPRG3 | OBSOLETE | PFM | KTP | 2 | | TBD | Call TI | Call TI |
| TLV2217-33KVURG3 | ACTIVE | PFM | KVU | 3 | 2500 | Green (RoHS & no Sb/Br) | CU SN | Level-3-260C-168 HR |
| TLV2217-33PWR | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-33PWRE4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |
| TLV2217-33PWRG4 | ACTIVE | TSSOP | PW | 20 | 2000 | Green (RoHS & no Sb/Br) | CU NIPD | Level-1-260C-UNLIM |

(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.

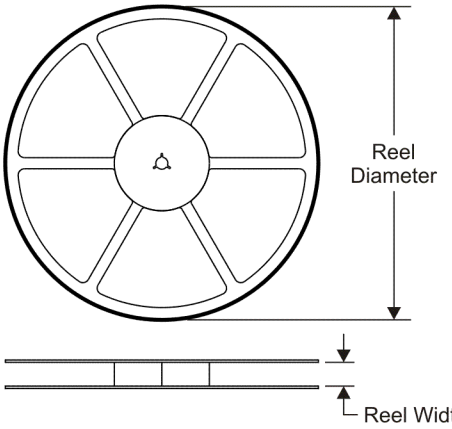
**OBSOLETE:** TI has discontinued the production of the device.

**(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)

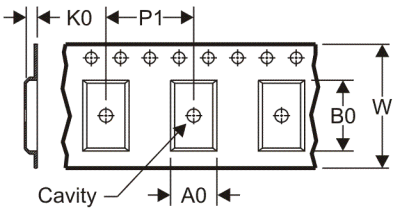
**(3)** MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

## TAPE AND REEL INFORMATION

**REEL DIMENSIONS**

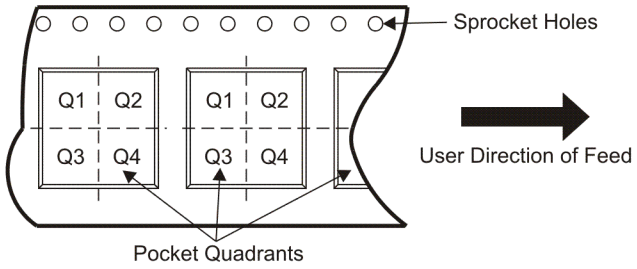



**TAPE DIMENSIONS**




| | |
|---|---|
| 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 |

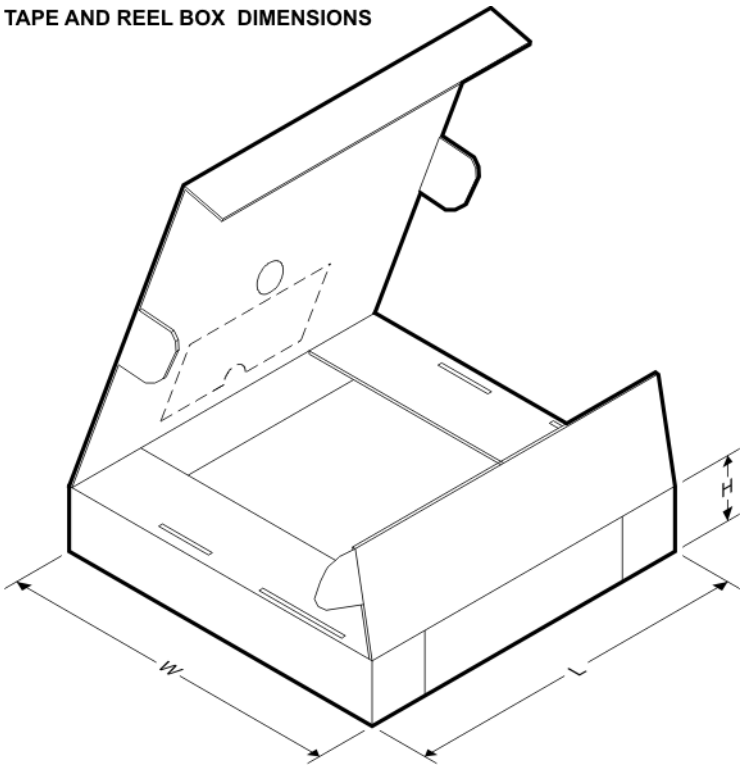
**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**




*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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TLV2217-18KVURG3 | PFM | KVU | 3 | 2500 | 330.0 | 16.4 | 6.9 | 10.5 | 2.7 | 8.0 | 16.0 | Q2 |
| TLV2217-25KVURG3 | PFM | KVU | 3 | 2500 | 330.0 | 16.4 | 6.9 | 10.5 | 2.7 | 8.0 | 16.0 | Q2 |
| TLV2217-25PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |
| TLV2217-33KVURG3 | PFM | KVU | 3 | 2500 | 330.0 | 16.4 | 6.9 | 10.5 | 2.7 | 8.0 | 16.0 | Q2 |
| TLV2217-33PWR | TSSOP | PW | 20 | 2000 | 330.0 | 16.4 | 6.95 | 7.1 | 1.6 | 8.0 | 16.0 | Q1 |

**TAPE AND REEL BOX DIMENSIONS**

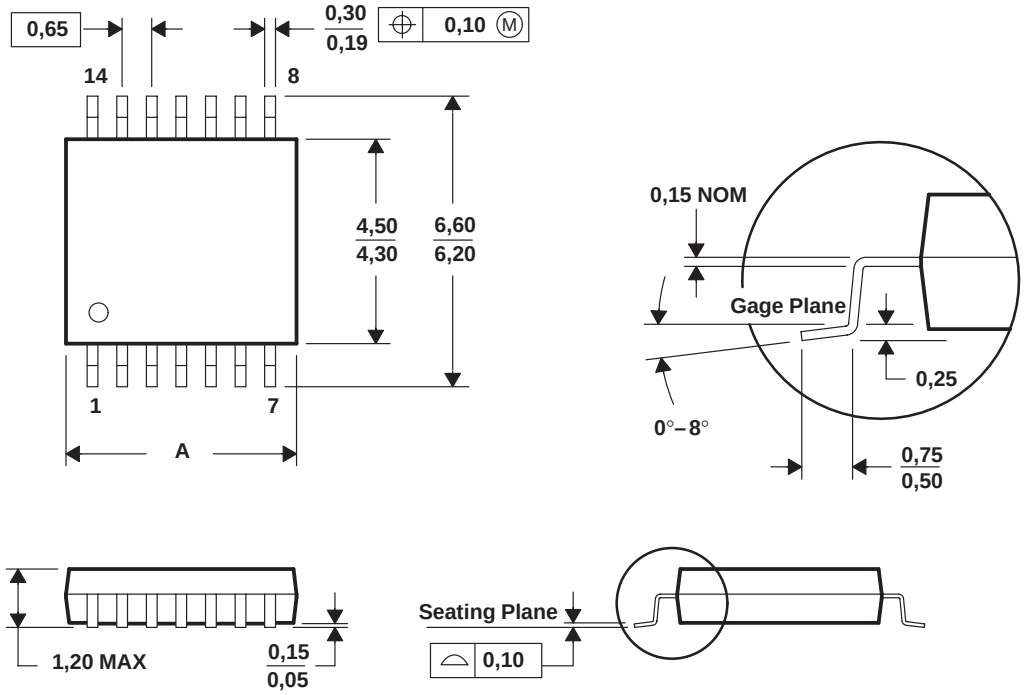



*All dimensions are nominal

| Device | Package Type | Package Drawing | Pins | SPQ | Length (mm) | Width (mm) | Height (mm) |
|---|---|---|---|---|---|---|---|
| TLV2217-18KVURG3 | PFM | KVU | 3 | 2500 | 340.0 | 340.0 | 38.0 |
| TLV2217-25KVURG3 | PFM | KVU | 3 | 2500 | 340.0 | 340.0 | 38.0 |
| TLV2217-25PWR | TSSOP | PW | 20 | 2000 | 346.0 | 346.0 | 33.0 |
| TLV2217-33KVURG3 | PFM | KVU | 3 | 2500 | 340.0 | 340.0 | 38.0 |
| TLV2217-33PWR | TSSOP | PW | 20 | 2000 | 346.0 | 346.0 | 33.0 |

**PW (R-PDSO-G**)** **PLASTIC SMALL-OUTLINE PACKAGE**

**14 PINS SHOWN**



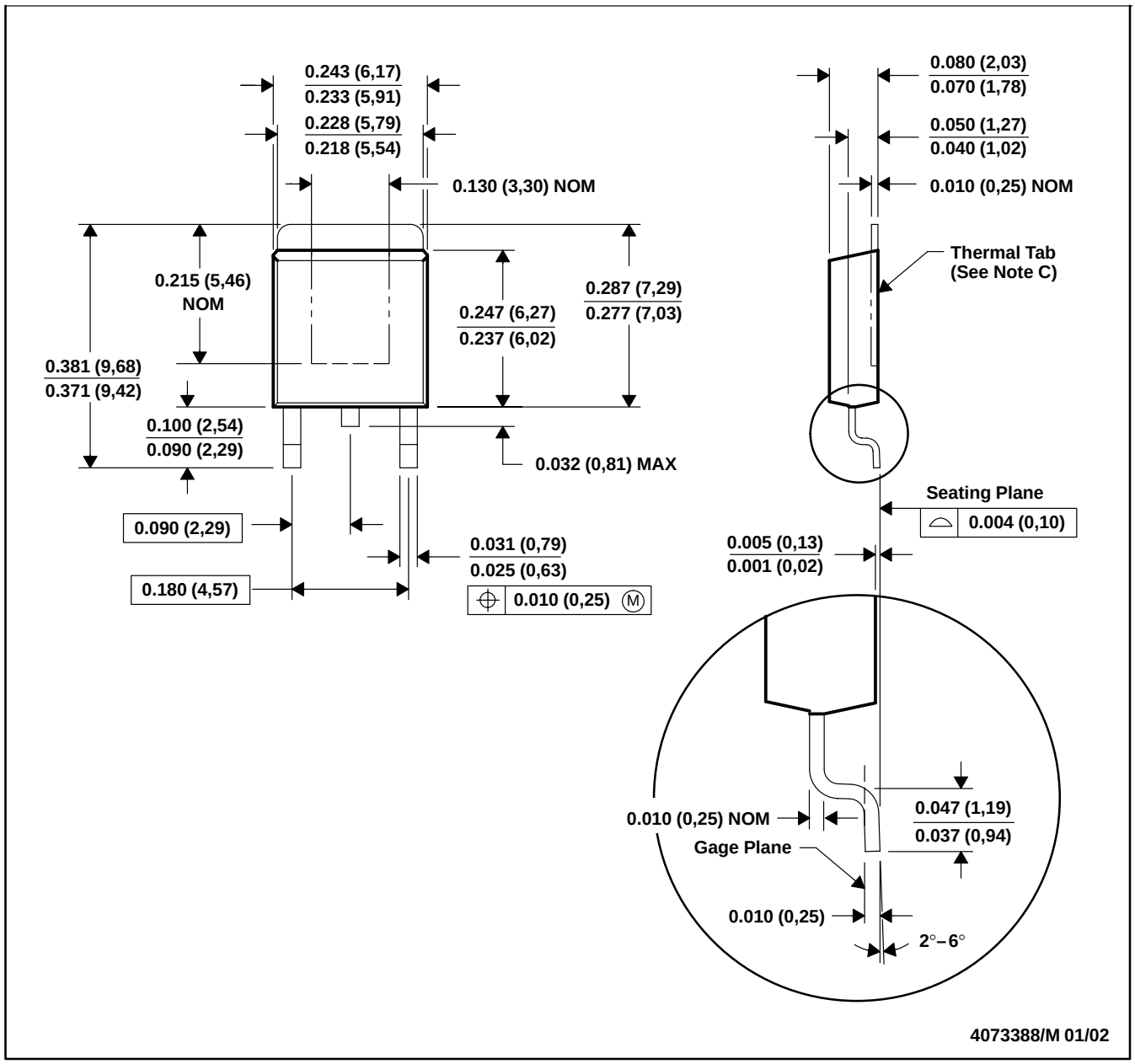

| DIM \ PINS ** | 8 | 14 | 16 | 20 | 24 | 28 |
|---|---|---|---|---|---|---|
| A MAX | 3,10 | 5,10 | 5,10 | 6,60 | 7,90 | 9,80 |
| A MIN | 2,90 | 4,90 | 4,90 | 6,40 | 7,70 | 9,60 |

**4040064/F 01/97**

NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0,15.
D. Falls within JEDEC MO-153

MPSF001F – JANUARY 1996 – REVISED JANUARY 2002

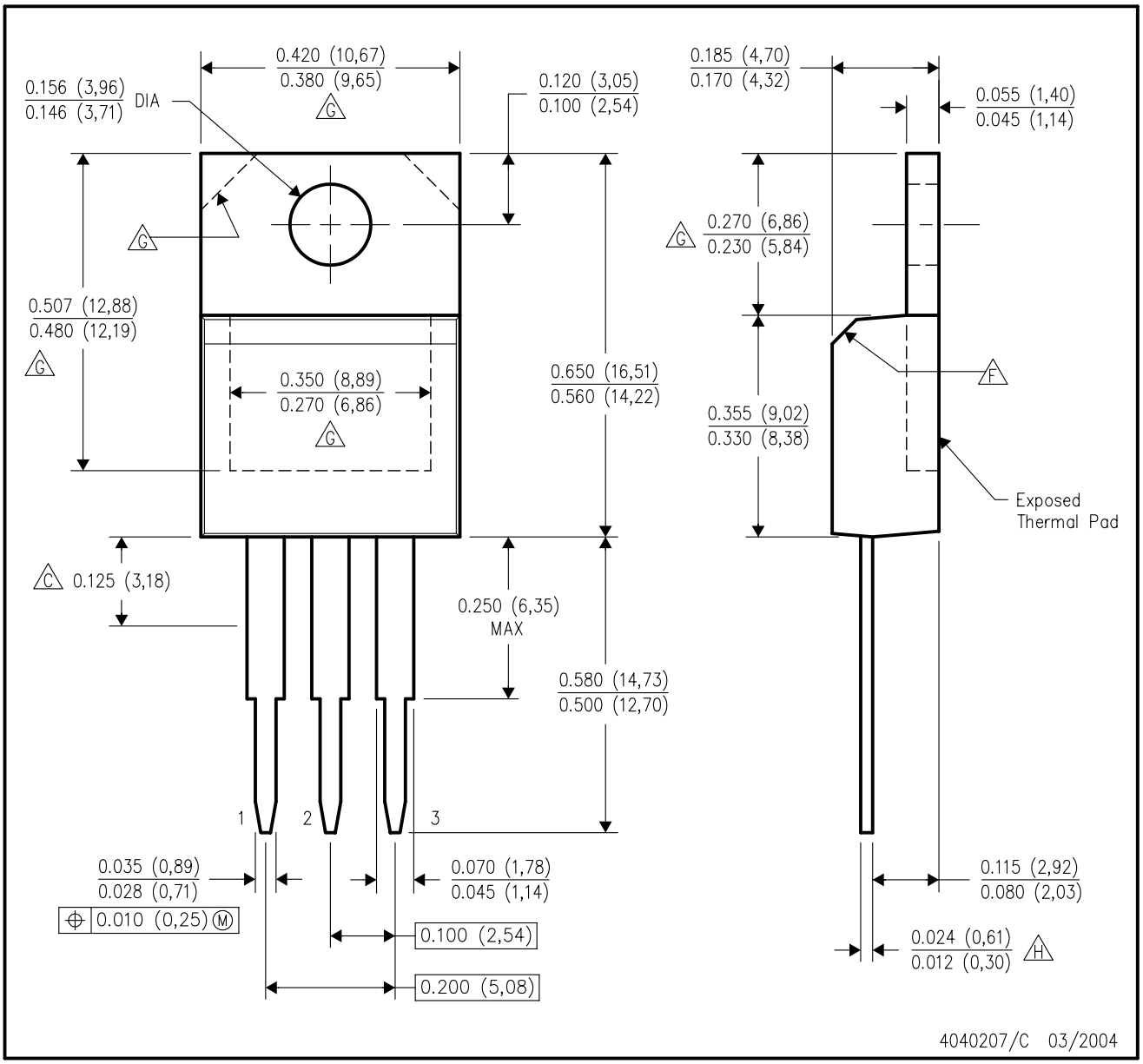
**KTP (R-PSFM-G2)** **PowerFLEX™ PLASTIC FLANGE-MOUNT PACKAGE**




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 TO-252 variation AC.

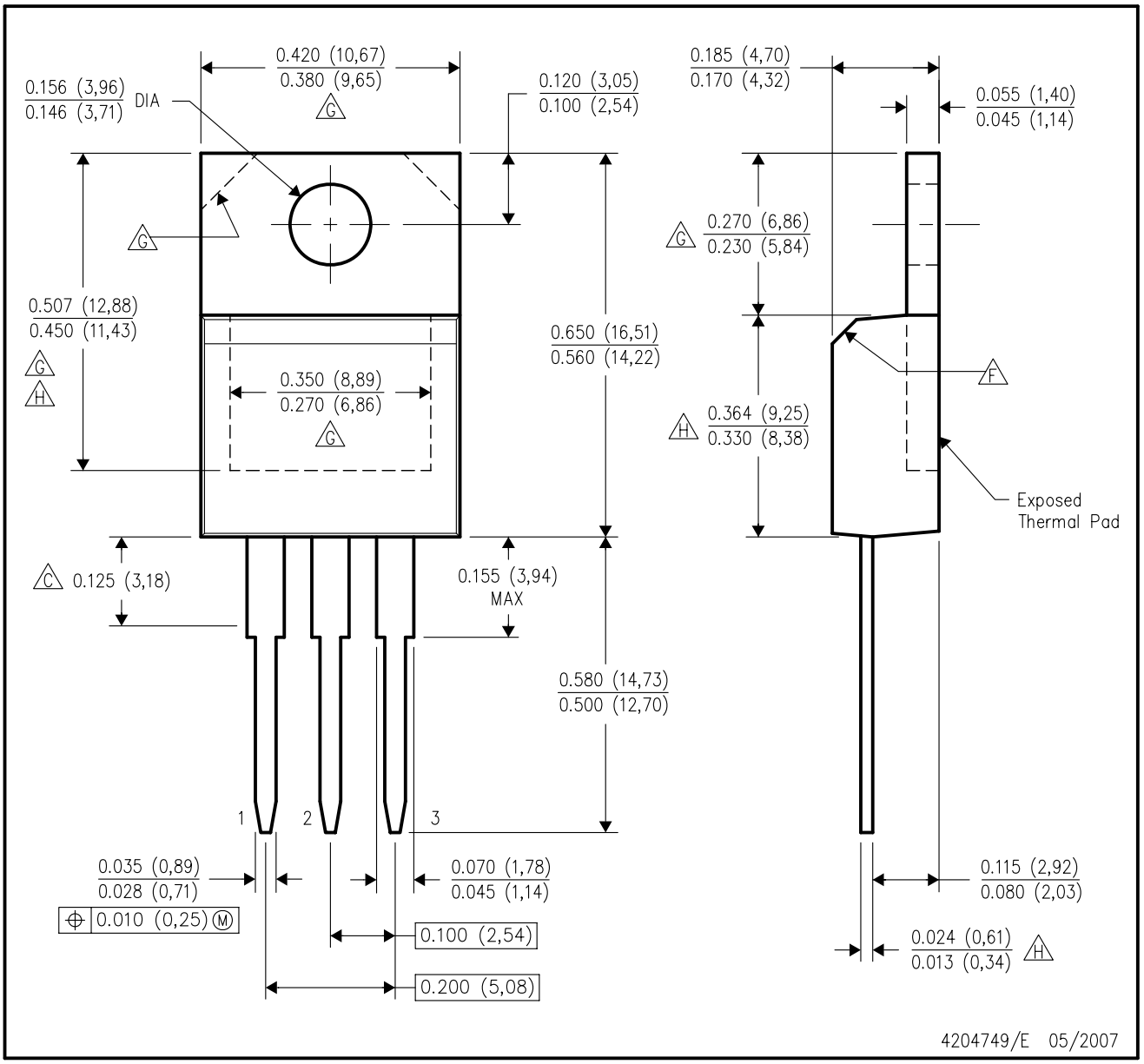
PowerFLEX is a trademark of Texas Instruments.

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



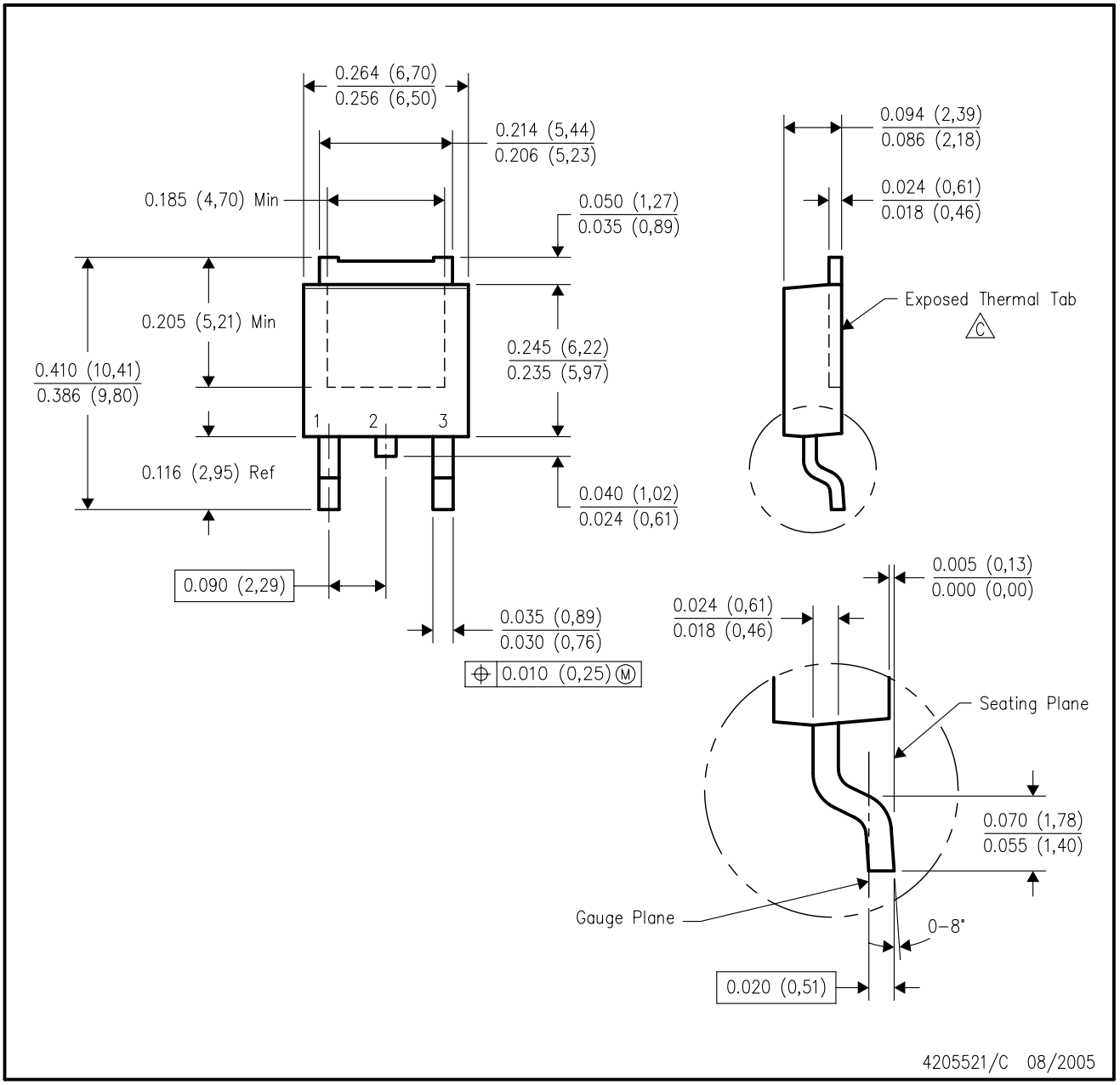

NOTES:
- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Lead dimensions are not controlled within this area.
- D. All lead dimensions apply before solder dip.
- E. The center lead is in electrical contact with the mounting tab.
- F. The 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.

## KVU (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. The center lead is in electrical contact with the exposed thermal tab.
D. Body Dimensions do not include mold flash or protrusions. Mold flash and protrusion shall not exceed 0.006 (0,15) per side.
E. Falls within JEDEC TO–252 variation AA.

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