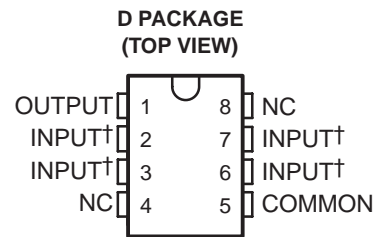


MC79L00 SERIES NEGATIVE-VOLTAGE REGULATORS

SLVS011D – OCTOBER 1982 – REVISED AUGUST 2003

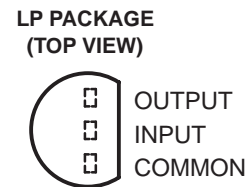
- 3-Terminal Regulators
- Output Current Up To 100 mA
- No External Components Required
- Internal Thermal-Overload Protection
- Internal Short-Circuit Current Limiting
- Direct Replacement for Industry-Standard MC79L00 Series
- Available in 5% or 10% Selections



† Internally connected
NC – No internal connection

description/ordering information

This series of fixed negative-voltage integrated-circuit voltage regulators is designed for a wide range of applications. These include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used to control series pass elements to make high-current voltage-regulator circuits. One of these regulators can deliver up to 100 mA of output current. The internal current-limiting and thermal-shutdown features essentially make the regulators immune to overload. When used as a replacement for a Zener-diode and resistor combination, these devices can provide an effective improvement in output impedance of two orders of magnitude, with lower bias current.



ORDERING INFORMATION

| T _J | OUTPUT VOLTAGE TOLERANCE | NOMINAL OUTPUT VOLTAGE (V) | PACKAGE† | | ORDERABLE PART NUMBER | TOP-SIDE MARKING |
|----------------|--------------------------|----------------------------|---------------------|--------------|-----------------------|------------------|
| 0°C to 125°C | 5% | -5 | SOIC (D) | Tube of 75 | MC79L05ACD | 79L05A |
| | | | | Reel of 2500 | MC79L05ACDR | |
| | | TO-226 / TO-92 (LP) | Bulk of 1000 | MC79L05ACL | 79L05AC | |
| | | | Reel of 2000 | MC79L05ACLPR | | |
| | | -12 | SOIC (D) | Tube of 75 | MC79L12ACD | 79L12A |
| | | | | Reel of 2500 | MC79L12ACDR | |
| | TO-226 / TO-92 (LP) | Bulk of 1000 | MC79L12ACL | 79L12AC | | |
| | | Reel of 2000 | MC79L12ACLPR | | | |
| | -15 | TO-226 / TO-92 (LP) | Bulk of 1000 | MC79L15ACL | 79L15AC | |
| | | | Ammo of 2000 | MC79L15ACLPM | | |
| | | | Reel of 2000 | MC79L15ACLPR | | |
| | 10% | -12 | TO-226 / TO-92 (LP) | Bulk of 1000 | MC79L12CLP | 79L12C |
| -15 | | SOIC (D) | Tube of 75 | MC79L15CD | 79L15C | |

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

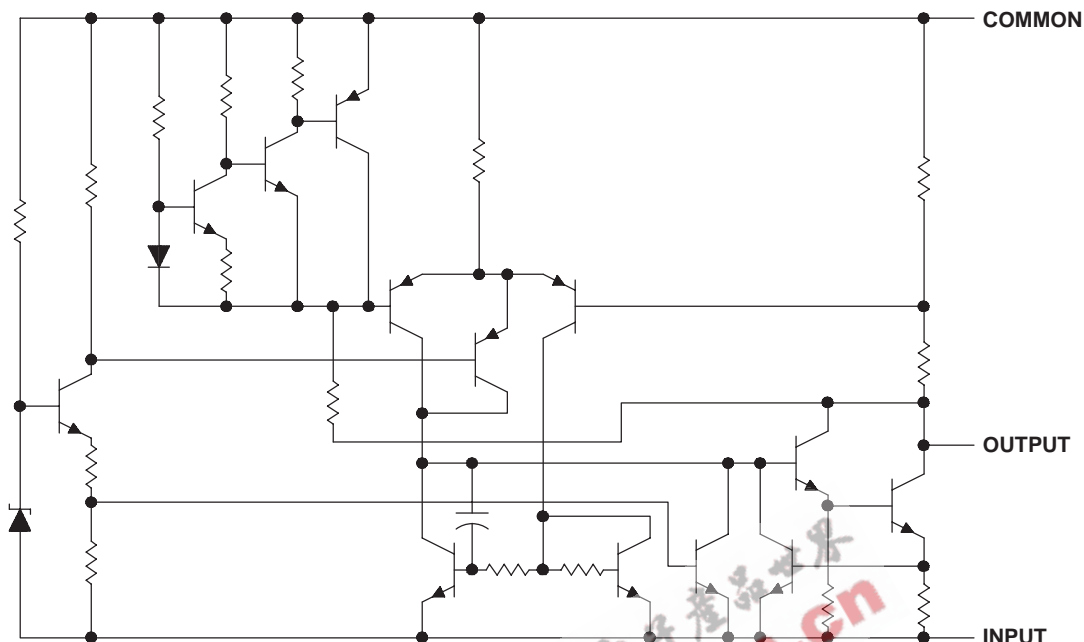
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MC79L00 SERIES NEGATIVE-VOLTAGE REGULATORS

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equivalent schematic



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†

| | |
|---|----------------|
| Input voltage: MC79L05 | -30 V |
| MC79L12, MC79L15 | -35 V |
| Package thermal impedance, θ_{JA} (see Notes 1 and 2): D package | 97°C/W |
| LP package | 140°C/W |
| Operating free-air, case, or virtual junction temperature | 150°C |
| Lead temperature 1.6 mm (1/16 inch) from case for 10 seconds | 260°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.

NOTES: 1. Maximum power dissipation is a function of $T_J(\text{max})$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\text{max}) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.
2. The package thermal impedance is calculated in accordance with JESD 51-7.

recommended operating conditions

| | | MIN | MAX | UNIT | |
|-------|--|---------|-------|------|---|
| V_I | Input voltage | MC79L05 | -7 | -20 | V |
| | | MC79L12 | -14.5 | -27 | |
| | | MC79L15 | -17.5 | -30 | |
| I_O | Output current | | 100 | mA | |
| T_J | Operating virtual junction temperature | 0 | 125 | °C | |

MC79L00 SERIES NEGATIVE-VOLTAGE REGULATORS

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electrical characteristics at specified virtual junction temperature, $V_I = -10\text{ V}$, $I_O = 40\text{ mA}$ (unless otherwise noted)

| PARAMETER | TEST CONDITION† | T_J | MC79L05C | | | MC79L05AC | | | UNIT |
|----------------------|--|--------------|----------|-----|------|-----------|-----|-------|---------------|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Output voltage‡ | | 25°C | -4.6 | -5 | -5.4 | -4.8 | -5 | -5.2 | V |
| | $V_I = -7\text{ V to }-20\text{ V}$, $I_O = 1\text{ mA to }40\text{ mA}$ | 0°C to 125°C | -4.5 | | -5.5 | -4.75 | | -5.25 | |
| | $V_I = -10\text{ V}$, $I_O = 1\text{ mA to }70\text{ mA}$ | 0°C to 125°C | -4.5 | | -5.5 | -4.75 | | -5.25 | |
| Input regulation | $V_I = -7\text{ V to }-20\text{ V}$ | 25°C | | | | 200 | | | mV |
| | $V_I = -8\text{ V to }-20\text{ V}$ | | | | | 150 | | | |
| Ripple rejection | $V_I = -8\text{ V to }-18\text{ V}$, $f = 120\text{ Hz}$ | 25°C | 40 | 49 | | 41 | 49 | | dB |
| Output regulation | $I_O = 1\text{ mA to }100\text{ mA}$ | 25°C | | | | 60 | | | mV |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | | | | 30 | | | |
| Output noise voltage | $f = 10\text{ Hz to }100\text{ kHz}$ | 25°C | 40 | | | 40 | | | μV |
| Dropout voltage | $I_O = 40\text{ mA}$ | 25°C | 1.7 | | | 1.7 | | | V |
| Bias current | | 25°C | | | | 6 | | | mA |
| | | 125°C | | | | 5.5 | | | |
| Bias current change | $V_I = -8\text{ V to }-20\text{ V}$ | 0°C to 125°C | | | | 1.5 | | | mA |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | | | | 0.1 | | | |

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

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

electrical characteristics at specified virtual junction temperature, $V_I = -19\text{ V}$, $I_O = 40\text{ mA}$ (unless otherwise noted)

| PARAMETER | TEST CONDITION† | T_J | MC79L12C | | | MC79L12AC | | | UNIT |
|----------------------|---|--------------|----------|-----|-------|-----------|-----|-------|---------------|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Output voltage‡ | | 25°C | -11.1 | -12 | -12.9 | -11.5 | -12 | -12.5 | V |
| | $V_I = -14.5\text{ V to }-27\text{ V}$, $I_O = 1\text{ mA to }40\text{ mA}$ | 0°C to 125°C | -10.8 | | -13.2 | -11.4 | | -12.6 | |
| | $V_I = -19\text{ V}$, $I_O = 1\text{ mA to }70\text{ mA}$ | 0°C to 125°C | -10.8 | | -13.2 | -11.4 | | -12.6 | |
| Input regulation | $V_I = -14.5\text{ V to }-27\text{ V}$ | 25°C | | | | 250 | | | mV |
| | $V_I = -16\text{ V to }-27\text{ V}$ | | | | | 200 | | | |
| Ripple rejection | $V_I = -15\text{ V to }-25\text{ V}$, $f = 120\text{ Hz}$ | 25°C | 36 | 42 | | 37 | 42 | | dB |
| Output regulation | $I_O = 1\text{ mA to }100\text{ mA}$ | 25°C | | | | 100 | | | mV |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | | | | 50 | | | |
| Output noise voltage | $f = 10\text{ Hz to }100\text{ kHz}$ | 25°C | 80 | | | 80 | | | μV |
| Dropout voltage | $I_O = 40\text{ mA}$ | 25°C | 1.7 | | | 1.7 | | | V |
| Bias current | | 25°C | | | | 6.5 | | | mA |
| | | 125°C | | | | 6 | | | |
| Bias current change | $V_I = -16\text{ V to }-27\text{ V}$ | 0°C to 125°C | | | | 1.5 | | | mA |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | | | | 0.1 | | | |

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

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.

MC79L00 SERIES NEGATIVE-VOLTAGE REGULATORS

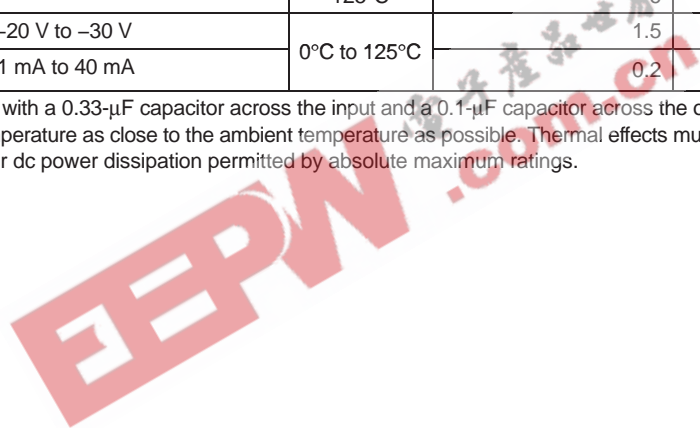
SLVS011D – OCTOBER 1982 – REVISED AUGUST 2003

electrical characteristics at specified virtual junction temperature, $V_I = -23\text{ V}$, $I_O = 40\text{ mA}$ (unless otherwise noted)

| PARAMETER | TEST CONDITION† | T _J | MC79L15C | | | MC79L15AC | | | UNIT |
|----------------------|---|----------------|----------|-----|-------|-----------|-----|--------|------|
| | | | MIN | TYP | MAX | MIN | TYP | MAX | |
| Output voltage‡ | | 25°C | -13.8 | -15 | -16.2 | -14.4 | -15 | -15.6 | V |
| | $V_I = -17.5\text{ V to }-30\text{ V}$, $I_O = 1\text{ mA to }40\text{ mA}$ | 0°C to 125°C | -13.5 | | -16.5 | -14.25 | | -15.75 | |
| | $V_I = -23\text{ V}$, $I_O = 1\text{ mA to }70\text{ mA}$ | 0°C to 125°C | -13.5 | | -16.5 | -14.25 | | -15.75 | |
| Input regulation | $V_I = -17.5\text{ V to }-30\text{ V}$ | 25°C | 300 | | | 300 | | | mV |
| | $V_I = -17.5\text{ V to }-30\text{ V}$ | | 250 | | | 250 | | | |
| Ripple rejection | $V_I = -18.5\text{ V to }-28.5\text{ V}$, $f = 120\text{ Hz}$ | 25°C | 33 | 39 | | 34 | 39 | | dB |
| Output regulation | $I_O = 1\text{ mA to }100\text{ mA}$ | 25°C | 150 | | | 150 | | | mV |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | 75 | | | 75 | | | |
| Output noise voltage | $f = 10\text{ Hz to }100\text{ kHz}$ | 25°C | 90 | | | 90 | | | μV |
| Dropout voltage | $I_O = 40\text{ mA}$ | 25°C | 1.7 | | | 1.7 | | | V |
| Bias current | | 25°C | 6.5 | | | 6.5 | | | mA |
| | | 125°C | 6 | | | 6 | | | |
| Bias current change | $V_I = -20\text{ V to }-30\text{ V}$ | 0°C to 125°C | 1.5 | | | 1.5 | | | mA |
| | $I_O = 1\text{ mA to }40\text{ mA}$ | | 0.2 | | | 0.1 | | | |

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

‡ This specification applies only for dc power dissipation permitted by absolute maximum ratings.



PACKAGING INFORMATION

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| MC79L05ACD | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACDE4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACDG4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACDR | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACDRE4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACDRG4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L05ACLP | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05ACLPE3 | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05ACLPM | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05ACL PME3 | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05ACLPR | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05ACLPRE3 | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L05AILP | OBSOLETE | TO-92 | LP | 3 | | TBD | Call TI | Call TI |
| MC79L05CD | OBSOLETE | SOIC | D | 8 | | TBD | Call TI | Call TI |
| MC79L05CDR | OBSOLETE | SOIC | D | 8 | | TBD | Call TI | Call TI |
| MC79L05CLP | OBSOLETE | TO-92 | LP | 3 | | TBD | Call TI | Call TI |
| MC79L12ACD | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACDE4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACDG4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACDR | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACDRE4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACDRG4 | ACTIVE | SOIC | D | 8 | 2500 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L12ACLP | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L12ACLPE3 | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L12ACLPR | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L12ACLPRE3 | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L12CD | OBSOLETE | SOIC | D | 8 | | TBD | Call TI | Call TI |

| Orderable Device | Status ⁽¹⁾ | Package Type | Package Drawing | Pins | Package Qty | Eco Plan ⁽²⁾ | Lead/Ball Finish | MSL Peak Temp ⁽³⁾ |
|------------------|-----------------------|--------------|-----------------|------|-------------|-------------------------|------------------|------------------------------|
| MC79L12CLP | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L12CLPE3 | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACD | OBSOLETE | SOIC | D | 8 | | TBD | Call TI | Call TI |
| MC79L15ACLP | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACLPE3 | ACTIVE | TO-92 | LP | 3 | 1000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACLPM | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACL PME3 | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACLPR | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15ACLPRE3 | ACTIVE | TO-92 | LP | 3 | 2000 | Pb-Free (RoHS) | CU SN | N / A for Pkg Type |
| MC79L15CD | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L15CDE4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L15CDG4 | ACTIVE | SOIC | D | 8 | 75 | Green (RoHS & no Sb/Br) | CU NIPDAU | Level-1-260C-UNLIM |
| MC79L15CLP | OBSOLETE | TO-92 | LP | 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)

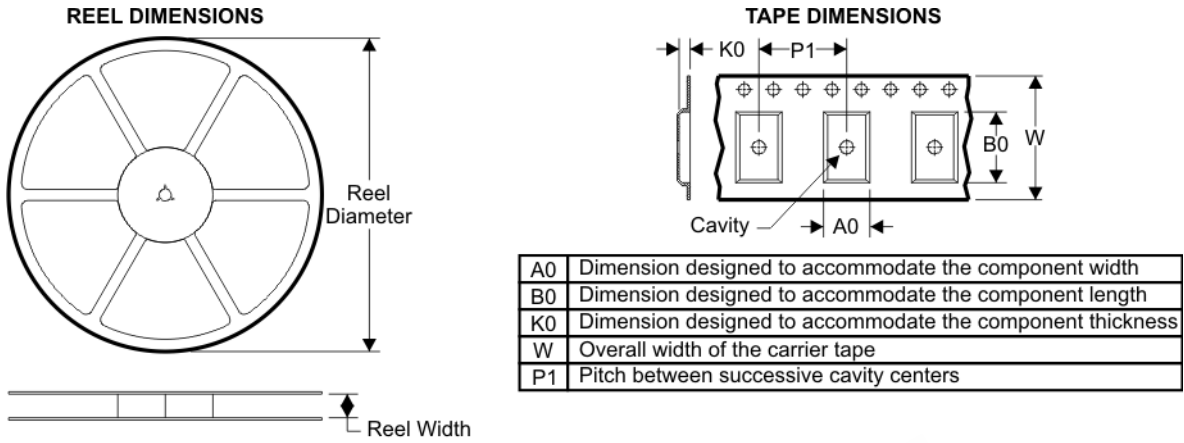
⁽³⁾ MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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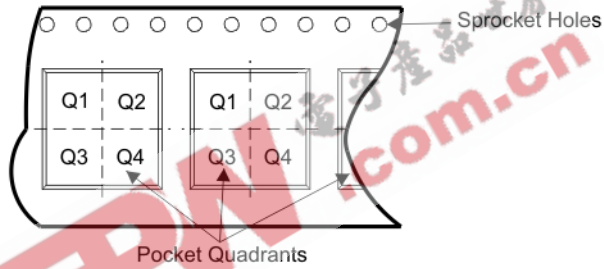
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TAPE AND REEL BOX INFORMATION

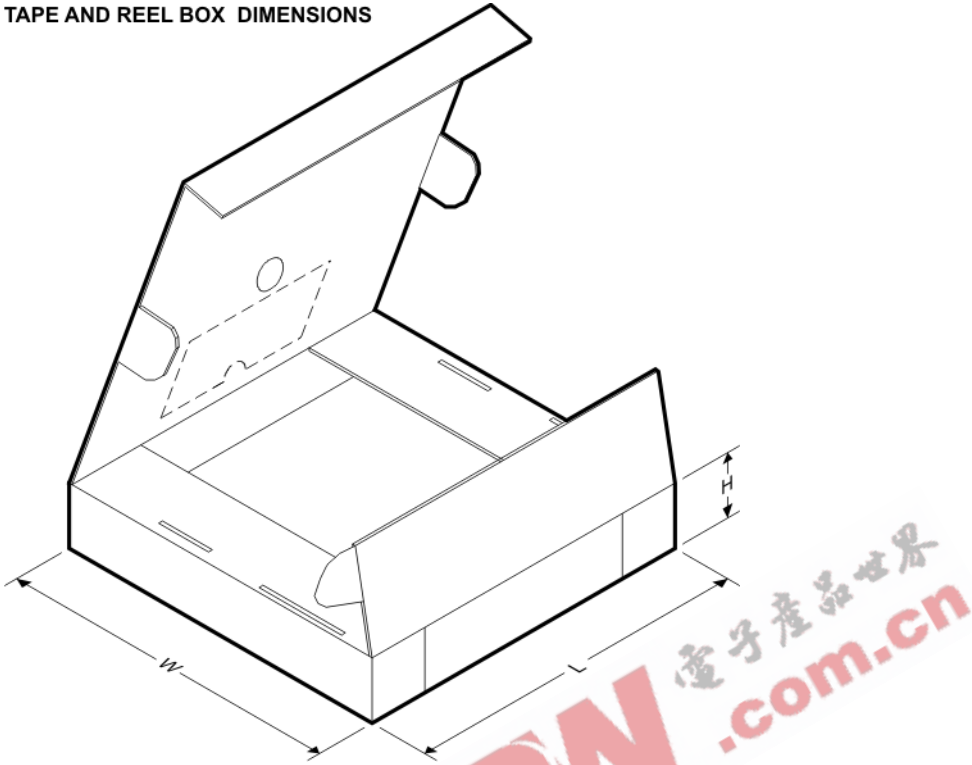


QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



| Device | Package | Pins | Site | Reel Diameter (mm) | Reel Width (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|-------------|---------|------|---------|--------------------|-----------------|---------|---------|---------|---------|--------|---------------|
| MC79L05ACDR | D | 8 | SITE 27 | 330 | 12 | 6.4 | 5.2 | 2.1 | 8 | 12 | Q1 |
| MC79L12ACDR | D | 8 | SITE 27 | 330 | 12 | 6.4 | 5.2 | 2.1 | 8 | 12 | Q1 |

TAPE AND REEL BOX DIMENSIONS

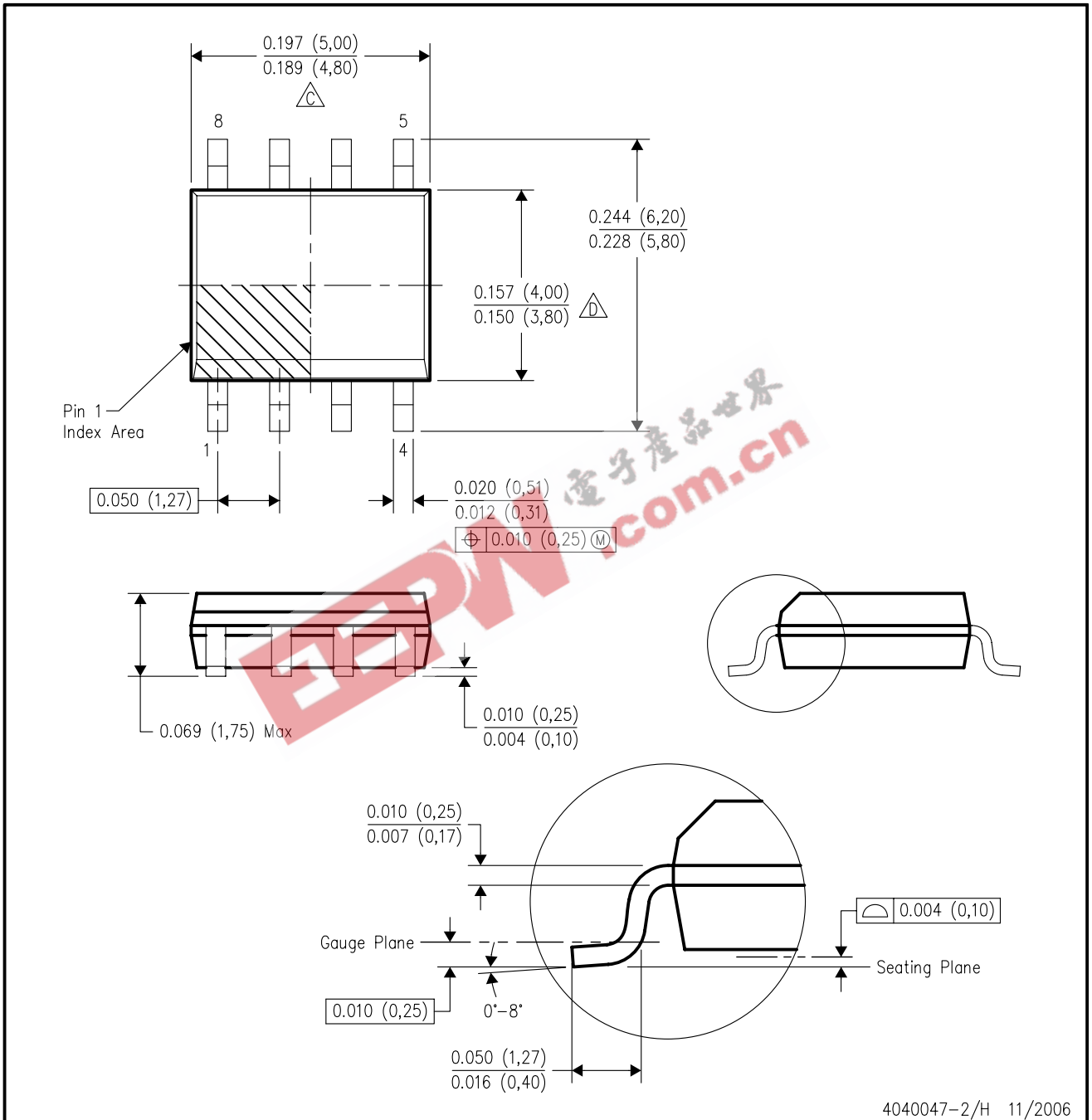


| Device | Package | Pins | Site | Length (mm) | Width (mm) | Height (mm) |
|-------------|---------|------|---------|-------------|------------|-------------|
| MC79L05ACDR | D | 8 | SITE 27 | 342.9 | 338.1 | 20.64 |
| MC79L12ACDR | D | 8 | SITE 27 | 342.9 | 338.1 | 20.64 |

MECHANICAL DATA

D (R-PDSO-G8)

PLASTIC SMALL-OUTLINE PACKAGE

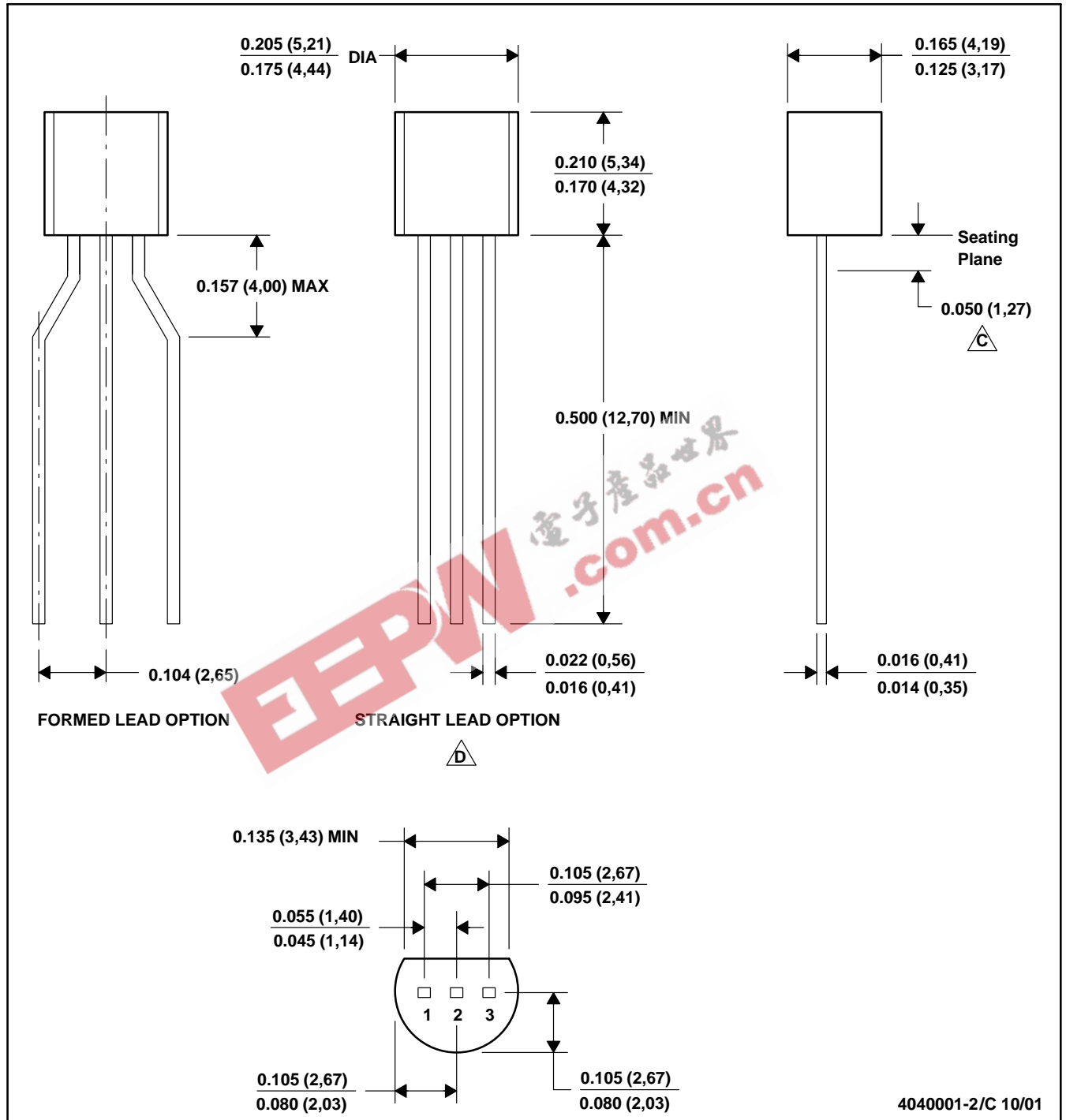


MECHANICAL DATA

MSOT002A – OCTOBER 1994 – REVISED NOVEMBER 2001

LP (O-PBCY-W3)

PLASTIC CYLINDRICAL PACKAGE



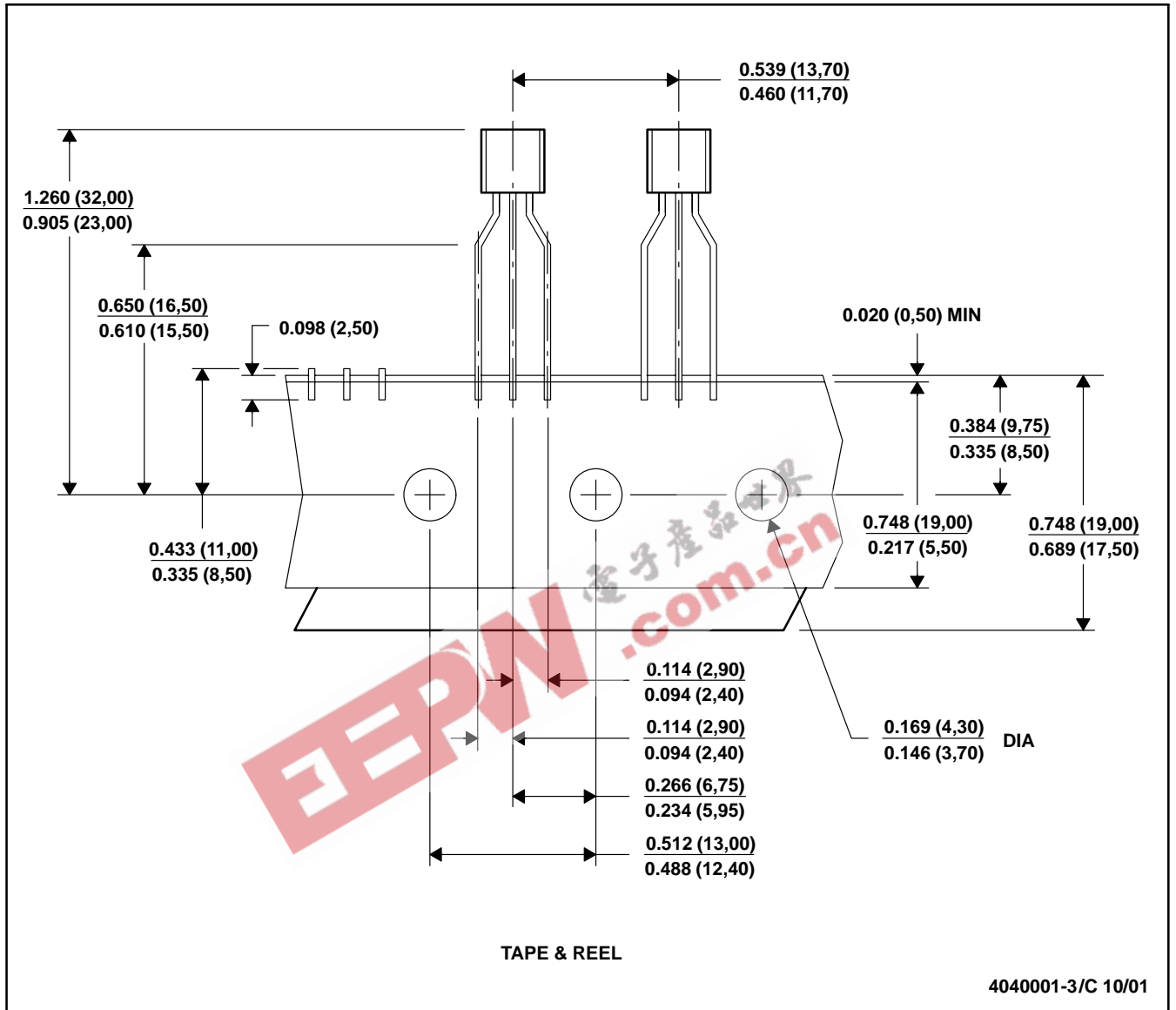
- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - $\triangle C$ Lead dimensions are not controlled within this area
 - $\triangle D$ Falls within JEDEC TO -226 Variation AA (TO-226 replaces TO-92)
 - $\triangle E$ Shipping Method:
 - Straight lead option available in bulk pack only.
 - Formed lead option available in tape & reel or ammo pack.

MECHANICAL DATA

MSOT002A – OCTOBER 1994 – REVISED NOVEMBER 2001

LP (O-PBCY-W3)

PLASTIC CYLINDRICAL PACKAGE



- NOTES:
- All linear dimensions are in inches (millimeters).
 - This drawing is subject to change without notice.
 - Tape and Reel information for the Format Lead Option package.

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