

# 32-tap Digital Potentiometer (POT)

## CAT5114

### Description

The CAT5114 is a single digital POT designed as an electronic replacement for mechanical potentiometers and trim pots. Ideal for automated adjustments on high volume production lines, they are also well suited for applications where equipment requiring periodic adjustment is either difficult to access or located in a hazardous or remote environment.

The CAT5114 contains a 32-tap series resistor array connected between two terminals  $R_H$  and  $R_L$ . An up/down counter and decoder that are controlled by three input pins, determines which tap is connected to the wiper,  $R_W$ . The wiper setting, stored in nonvolatile memory, is not lost when the device is powered down and is automatically reinstated when power is returned. The wiper can be adjusted to test new system values without affecting the stored setting. Wiper-control of the CAT5114 is accomplished with three input control pins,  $\overline{CS}$ ,  $U/\overline{D}$ , and  $\overline{INC}$ . The  $\overline{INC}$  input increments the wiper in the direction which is determined by the logic state of the  $U/\overline{D}$  input. The  $\overline{CS}$  input is used to select the device and also store the wiper position prior to power down.

The digital POT can be used as a three-terminal resistive divider or as a two-terminal variable resistor. Digital POTs bring variability and programmability to a wide variety of applications including control, parameter adjustments, and signal processing.

### Features

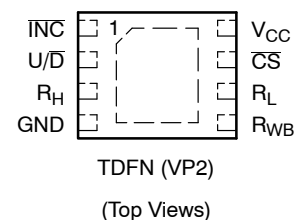
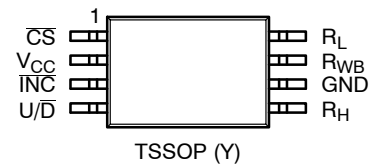
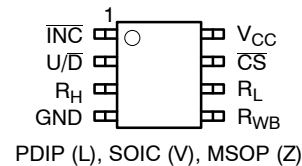
- 32-position Linear Taper Potentiometer
- Non-volatile EEPROM Wiper Storage
- Low Standby Current
- Single Supply Operation: 2.5 V – 6.0 V
- Increment Up/Down Serial Interface
- Resistance Values: 10 k $\Omega$ , 50 k $\Omega$  and 100 k $\Omega$
- Available in PDIP, SOIC, TSSOP, MSOP and Space Saving 2 × 3 mm TDFN Packages
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### Applications

- Automated Product Calibration
- Remote Control Adjustments
- Offset, Gain and Zero Control
- Tamper-proof Calibrations
- Contrast, Brightness and Volume Controls
- Motor Controls and Feedback Systems
- Programmable Analog Functions



### PIN CONFIGURATIONS

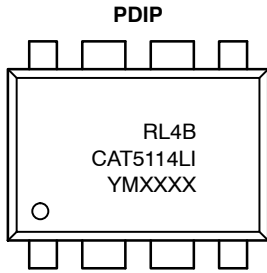


### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 9 of this data sheet.

# CAT5114

## DEVICE MARKING INFORMATION



R = Resistance:

2 = 10 kΩ

4 = 50 kΩ

5 = 100 kΩ

L = Assembly Location

4 = Lead Finish – NiPdAu

B = Product Revision (Fixed as "B")

CAT5114L = Device Code (PDIP)

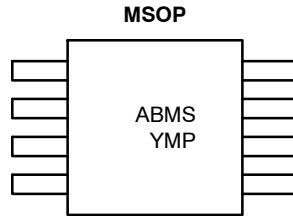
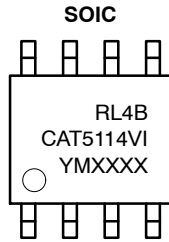
CAT5114V = Device Code (SOIC)

I = Temperature Range (Industrial)

Y = Production Year (Last Digit)

M = Production Month (1–9, O, N, D)

XXXX = Last Four Digits of Assembly Lot Number



ABMS = CAT5114ZI–10–GT3

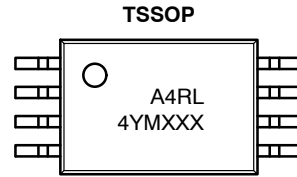
ABMT = CAT5114ZI–50–GT3

ABTH = CAT5114ZI–00–GT3

Y = Production Year (Last Digit)

M = Production Month (1–9, O, N, D)

P = Product Revision



A4 = Device Code

R = Resistance:

2 = 10 kΩ

4 = 50 kΩ

5 = 100 kΩ

L = Assembly Location

4 = Lead Finish – NiPdAu

Y = Production Year (last digit)

M = Production Month (1–9, O, N, D)

XXX = Last Three Digits of Assembly Lot Number

TDFN



EF = CAT5114VP2I10GT3

HF = CAT5114VP2I50GT3

GW = CAT5114VP2I00GT3

L = Assembly Location

XXX = Last Three Digits of Assembly Lot Number

Y = Production Year (Last Digit)

M = Production Month (1–9, O, N, D)

## Functional Diagram

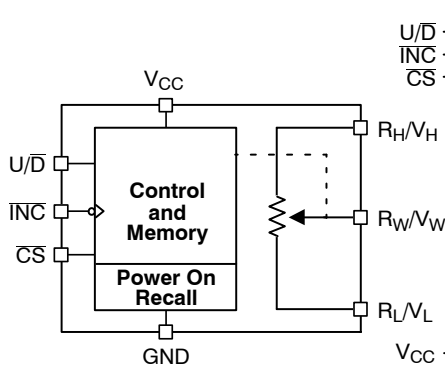


Figure 1. General

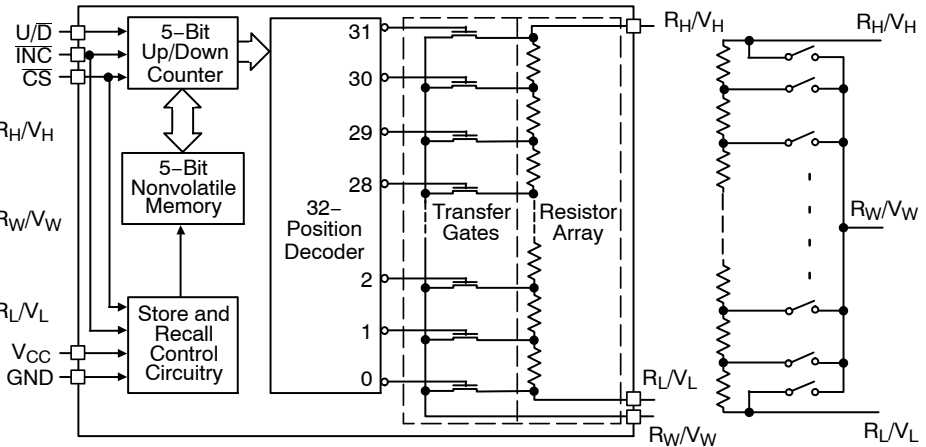


Figure 2. Detailed

Figure 3. Electronic Potentiometer Implementation

**Table 1. PIN DESCRIPTIONS**

| Name                           | Function                    |
|--------------------------------|-----------------------------|
| $\overline{\text{INC}}$        | Increment Control           |
| $\text{U}/\overline{\text{D}}$ | Up/Down Control             |
| $\text{R}_\text{H}$            | Potentiometer High Terminal |
| GND                            | Ground                      |
| $\text{R}_\text{W}$            | Wiper Terminal              |
| $\text{R}_\text{L}$            | Potentiometer Low Terminal  |
| $\overline{\text{CS}}$         | Chip Select                 |
| $\text{V}_{\text{CC}}$         | Supply Voltage              |

## Pin Function

### $\overline{\text{INC}}$ : Increment Control Input

The  $\overline{\text{INC}}$  input moves the wiper in the up or down direction determined by the condition of the  $\text{U}/\overline{\text{D}}$  input.

### $\text{U}/\overline{\text{D}}$ : Up/Down Control Input

The  $\text{U}/\overline{\text{D}}$  input controls the direction of the wiper movement. When in a high state and  $\overline{\text{CS}}$  is low, any high-to-low transition on  $\overline{\text{INC}}$  will cause the wiper to move one increment toward the  $\text{R}_\text{H}$  terminal. When in a low state and  $\overline{\text{CS}}$  is low, any high-to-low transition on  $\overline{\text{INC}}$  will cause the wiper to move one increment towards the  $\text{R}_\text{L}$  terminal.

### $\text{R}_\text{H}$ : High End Potentiometer Terminal

$\text{R}_\text{H}$  is the high end terminal of the potentiometer. It is not required that this terminal be connected to a potential greater than the  $\text{R}_\text{L}$  terminal. Voltage applied to the  $\text{R}_\text{H}$  terminal cannot exceed the supply voltage,  $\text{V}_{\text{CC}}$  or go below ground, GND.

### $\text{R}_\text{W}$ : Wiper Potentiometer Terminal

$\text{R}_\text{W}$  is the wiper terminal of the potentiometer. Its position on the resistor array is controlled by the control inputs,  $\overline{\text{INC}}$ ,  $\text{U}/\overline{\text{D}}$  and  $\overline{\text{CS}}$ . Voltage applied to the  $\text{R}_\text{W}$  terminal cannot exceed the supply voltage,  $\text{V}_{\text{CC}}$  or go below ground, GND.

### $\text{R}_\text{L}$ : Low End Potentiometer Terminal

$\text{R}_\text{L}$  is the low end terminal of the potentiometer. It is not required that this terminal be connected to a potential less

than the  $\text{R}_\text{H}$  terminal. Voltage applied to the  $\text{R}_\text{L}$  terminal cannot exceed the supply voltage,  $\text{V}_{\text{CC}}$  or go below ground, GND.  $\text{R}_\text{L}$  and  $\text{R}_\text{H}$  are electrically interchangeable.

### $\overline{\text{CS}}$ : Chip Select

The chip select input is used to activate the control input of the CAT5114 and is active low. When in a high state, activity on the  $\overline{\text{INC}}$  and  $\text{U}/\overline{\text{D}}$  inputs will not affect or change the position of the wiper.

## Device Operation

The CAT5114 operates like a digitally controlled potentiometer with  $\text{R}_\text{H}$  and  $\text{R}_\text{L}$  equivalent to the high and low terminals and  $\text{R}_\text{W}$  equivalent to the mechanical potentiometer's wiper. There are 32 available tap positions including the resistor end points,  $\text{R}_\text{H}$  and  $\text{R}_\text{L}$ . There are 31 resistor elements connected in series between the  $\text{R}_\text{H}$  and  $\text{R}_\text{L}$  terminals. The wiper terminal is connected to one of the 32 taps and controlled by three inputs,  $\overline{\text{INC}}$ ,  $\text{U}/\overline{\text{D}}$  and  $\overline{\text{CS}}$ . These inputs control a five-bit up/down counter whose output is decoded to select the wiper position. The selected wiper position can be stored in nonvolatile memory using the  $\overline{\text{INC}}$  and  $\overline{\text{CS}}$  inputs.

With  $\overline{\text{CS}}$  set LOW the CAT5114 is selected and will respond to the  $\text{U}/\overline{\text{D}}$  and  $\overline{\text{INC}}$  inputs. HIGH to LOW transitions on  $\overline{\text{INC}}$  will increment or decrement the wiper (depending on the state of the  $\text{U}/\overline{\text{D}}$  input and five-bit counter). The wiper, when at either fixed terminal, acts like its mechanical equivalent and does not move beyond the last position. The value of the counter is stored in nonvolatile memory whenever  $\overline{\text{CS}}$  transitions HIGH while the  $\overline{\text{INC}}$  input is also HIGH. When the CAT5114 is powered-down, the last stored wiper counter position is maintained in the nonvolatile memory. When power is restored, the contents of the memory are recalled and the counter is set to the value stored.

With  $\overline{\text{INC}}$  set low, the CAT5114 may be de-selected and powered down without storing the current wiper position in nonvolatile memory. This allows the system to always power up to a preset value stored in nonvolatile memory.

Table 2. OPERATION MODES

| INC         | CS          | U/D  | Operation                   |
|-------------|-------------|------|-----------------------------|
| High to Low | Low         | High | Wiper toward H              |
| High to Low | Low         | Low  | Wiper toward L              |
| High        | Low to High | X    | Store Wiper Position        |
| Low         | Low to High | X    | No Store, Return to Standby |
| X           | High        | X    | Standby                     |

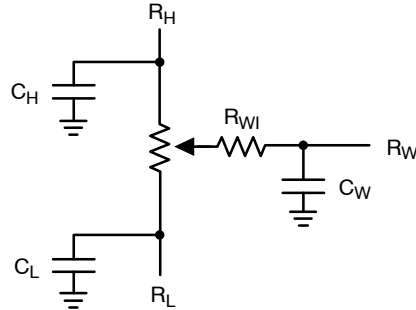


Figure 4. Potentiometer Equivalent Circuit

Table 3. ABSOLUTE MAXIMUM RATINGS

| Parameters                                               | Ratings                | Units |
|----------------------------------------------------------|------------------------|-------|
| Supply Voltage<br>$V_{CC}$ to GND                        | -0.5 to +7             | V     |
| Inputs<br>$\overline{CS}$ to GND                         | -0.5 to $V_{CC} + 0.5$ | V     |
| $\overline{INC}$ to GND                                  | -0.5 to $V_{CC} + 0.5$ | V     |
| $\overline{U/D}$ to GND                                  | -0.5 to $V_{CC} + 0.5$ | V     |
| H to GND                                                 | -0.5 to $V_{CC} + 0.5$ | V     |
| L to GND                                                 | -0.5 to $V_{CC} + 0.5$ | V     |
| W to GND                                                 | -0.5 to $V_{CC} + 0.5$ | V     |
| Operating Ambient Temperature<br>Industrial ('I' suffix) | -40 to +85             | °C    |
| Junction Temperature                                     | +150                   | °C    |
| Storage Temperature                                      | -65 to 150             | °C    |
| Lead Soldering (10 s max)                                | +300                   | °C    |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Table 4. RELIABILITY CHARACTERISTICS

| Symbol                 | Parameter          | Test Method                   | Min       | Typ | Max | Units  |
|------------------------|--------------------|-------------------------------|-----------|-----|-----|--------|
| $V_{ZAP}$ (Note 1)     | ESD Susceptibility | MIL-STD-883, Test Method 3015 | 2000      |     |     | V      |
| $I_{LTH}$ (Notes 1, 2) | Latch-up           | JEDEC Standard 17             | 100       |     |     | mA     |
| $T_{DR}$               | Data Retention     | MIL-STD-883, Test Method 1008 | 100       |     |     | Years  |
| $N_{END}$              | Endurance          | MIL-STD-883, Test Method 1003 | 1,000,000 |     |     | Stores |

1. This parameter is tested initially and after a design or process change that affects the parameter.

2. Latch-up protection is provided for stresses up to 100 mA on address and data pins from -1 V to  $V_{CC} + 1$  V.

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**Table 5. DC ELECTRICAL CHARACTERISTICS** ( $V_{CC} = +2.5 \text{ V}$  to  $+6 \text{ V}$  unless otherwise specified)

| Symbol                                         | Parameter                     | Conditions                                                                           | Min                   | Typ    | Max                   | Units  |
|------------------------------------------------|-------------------------------|--------------------------------------------------------------------------------------|-----------------------|--------|-----------------------|--------|
| POWER SUPPLY                                   |                               |                                                                                      |                       |        |                       |        |
| V <sub>CC</sub>                                | Operating Voltage Range       |                                                                                      | 2.5                   | —      | 6.0                   | V      |
| I <sub>CC1</sub>                               | Supply Current (Increment)    | V <sub>CC</sub> = 6 V, f = 1 MHz, I <sub>W</sub> = 0                                 | —                     | —      | 100                   | μA     |
|                                                |                               | V <sub>CC</sub> = 6 V, f = 250 kHz, I <sub>W</sub> = 0                               | —                     | —      | 50                    | μA     |
| I <sub>CC2</sub>                               | Supply Current (Write)        | Programming, V <sub>CC</sub> = 6 V                                                   | —                     | —      | 1000                  | μA     |
|                                                |                               | V <sub>CC</sub> = 3 V                                                                | —                     | —      | 500                   | μA     |
| I <sub>SB1</sub> (Note 4)                      | Supply Current (Standby)      | $\overline{CS} = V_{CC} - 0.3\text{ V}$<br>U/D, INC = V <sub>CC</sub> – 0.3 V or GND | —                     | —      | 1                     | μA     |
| LOGIC INPUTS                                   |                               |                                                                                      |                       |        |                       |        |
| I <sub>IH</sub>                                | Input Leakage Current         | V <sub>IN</sub> = V <sub>CC</sub>                                                    | —                     | —      | 10                    | μA     |
| I <sub>IL</sub>                                | Input Leakage Current         | V <sub>IN</sub> = 0 V                                                                | —                     | —      | –10                   | μA     |
| V <sub>IH2</sub>                               | CMOS High Level Input Voltage | 2.5 V ≤ V <sub>CC</sub> ≤ 6 V                                                        | V <sub>CC</sub> × 0.7 | —      | V <sub>CC</sub> + 0.3 | V      |
| V <sub>IL2</sub>                               | CMOS Low Level Input Voltage  |                                                                                      | –0.3                  | —      | V <sub>CC</sub> × 0.2 | V      |
| POTENTIOMETER CHARACTERISTICS                  |                               |                                                                                      |                       |        |                       |        |
| R <sub>POT</sub>                               | Potentiometer Resistance      | –10 Device                                                                           |                       | 10     |                       | kΩ     |
|                                                |                               | –50 Device                                                                           |                       | 50     |                       |        |
|                                                |                               | –00 Device                                                                           |                       | 100    |                       |        |
|                                                | Pot. Resistance Tolerance     |                                                                                      |                       |        | ±20                   | %      |
| V <sub>RH</sub>                                | Voltage on R <sub>H</sub> pin |                                                                                      | 0                     |        | V <sub>CC</sub>       | V      |
| V <sub>RL</sub>                                | Voltage on R <sub>L</sub> pin |                                                                                      | 0                     |        | V <sub>CC</sub>       | V      |
|                                                | Resolution                    |                                                                                      |                       | 3.2    |                       | %      |
| INL                                            | Integral Linearity Error      | I <sub>W</sub> ≤ 2 μA                                                                |                       | 0.5    | 1                     | LSB    |
| DNL                                            | Differential Linearity Error  | I <sub>W</sub> ≤ 2 μA                                                                |                       | 0.25   | 0.5                   | LSB    |
| R <sub>WI</sub>                                | Wiper Resistance              | V <sub>CC</sub> = 5 V, I <sub>W</sub> = 1 mA                                         |                       | 70     | 200                   | Ω      |
|                                                |                               | V <sub>CC</sub> = 2.5 V, I <sub>W</sub> = 1 mA                                       |                       | 150    | 400                   | Ω      |
| I <sub>W</sub>                                 | Wiper Current                 |                                                                                      | –4.4                  |        | 4.4                   | mA     |
| TC <sub>RPOT</sub>                             | TC of Pot Resistance          |                                                                                      |                       | 300    |                       | ppm/°C |
| TC <sub>RATIO</sub>                            | Ratiometric TC                |                                                                                      |                       |        | 20                    | ppm/°C |
| V <sub>N</sub>                                 | Noise                         | 100 kHz / 1 kHz                                                                      |                       | 8/24   |                       | nV/√Hz |
| C <sub>H</sub> /C <sub>L</sub> /C <sub>W</sub> | Potentiometer Capacitances    |                                                                                      |                       | 8/8/25 |                       | pF     |
| fc                                             | Frequency Response            | Passive Attenuator, 10 kΩ                                                            |                       | 1.7    |                       | MHz    |

3. This parameter is tested initially and after a design or process change that affects the parameter.

4. Latch-up protection is provided for stresses up to 100 mA on address and data pins from  $-1 \text{ V}$  to  $V_{CC} + 1 \text{ V}$ .

5.  $I_W$  = source or sink.

6. These parameters are periodically sampled and are not 100% tested.

**Table 6. AC TEST CONDITIONS**

|                           |                                                |
|---------------------------|------------------------------------------------|
| V <sub>CC</sub> Range     | 2.5 V ≤ V <sub>CC</sub> ≤ 6 V                  |
| Input Pulse Levels        | 0.2 x V <sub>CC</sub> to 0.7 x V <sub>CC</sub> |
| Input Rise and Fall Times | 10 ns                                          |
| Input Reference Levels    | 0.5 x V <sub>CC</sub>                          |

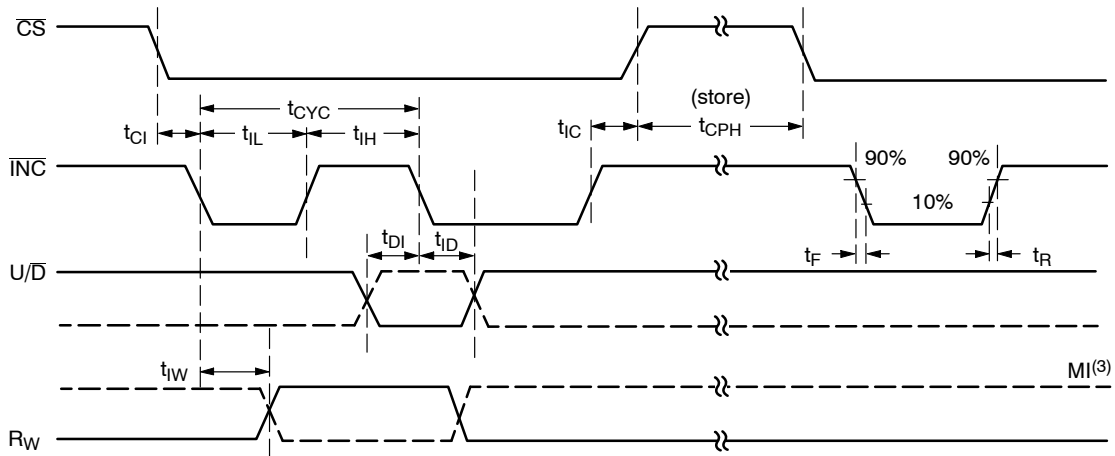
**Table 7. AC OPERATING CHARACTERISTICS** (V<sub>CC</sub> = +2.5 V to +6.0 V, V<sub>H</sub> = V<sub>CC</sub>, V<sub>L</sub> = 0 V, unless otherwise specified)

| Symbol                                   | Parameter                      | Min | Typ (Note 7) | Max | Units |
|------------------------------------------|--------------------------------|-----|--------------|-----|-------|
| t <sub>CI</sub>                          | CS to INC Setup                | 100 | –            | –   | ns    |
| t <sub>DI</sub>                          | U/D to INC Setup               | 50  | –            | –   | ns    |
| t <sub>ID</sub>                          | U/D to INC Hold                | 100 | –            | –   | ns    |
| t <sub>IL</sub>                          | INC LOW Period                 | 250 | –            | –   | ns    |
| t <sub>IH</sub>                          | INC HIGH Period                | 250 | –            | –   | ns    |
| t <sub>IC</sub>                          | INC Inactive to CS Inactive    | 1   | –            | –   | μs    |
| t <sub>CPH</sub>                         | CS Deselect Time (NO STORE)    | 100 | –            | –   | ns    |
| t <sub>CPH</sub>                         | CS Deselect Time (STORE)       | 10  | –            | –   | ms    |
| t <sub>IW</sub>                          | INC to V <sub>OUT</sub> Change | –   | 1            | 5   | μs    |
| t <sub>CYC</sub>                         | INC Cycle Time                 | 1   | –            | –   | μs    |
| t <sub>R</sub> , t <sub>F</sub> (Note 8) | INC Input Rise and Fall Time   | –   | –            | 500 | μs    |
| t <sub>PU</sub> (Note 8)                 | Power-up to Wiper Stable       | –   | –            | 1   | ms    |
| t <sub>WR</sub>                          | Store Cycle                    | –   | 5            | 10  | ms    |

7. Typical values are for T<sub>A</sub> = 25°C and nominal supply voltage.

8. This parameter is periodically sampled and not 100% tested.

9. MI in the A.C. Timing diagram refers to the minimum incremental change in the W output due to a change in the wiper position.

**Figure 5. A.C. Timing**

# CAT5114

## APPLICATIONS INFORMATION

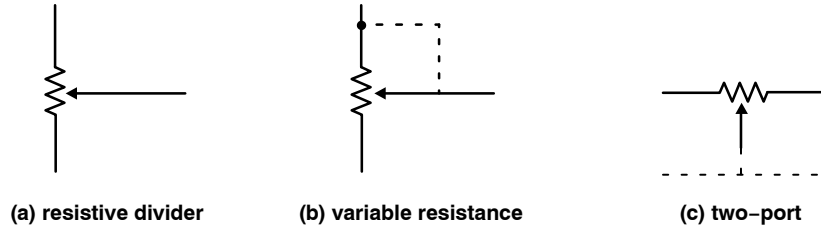


Figure 6. Potentiometer Configuration

### Applications

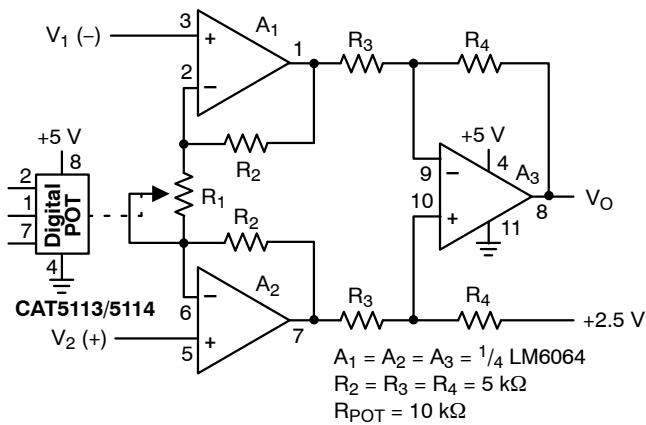


Figure 7. Programmable Instrumentation Amplifier

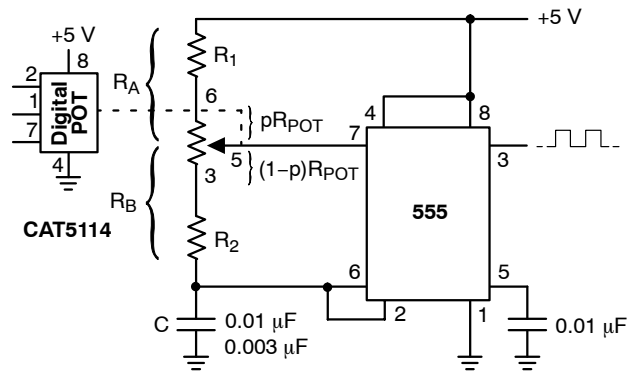


Figure 8. Programmable Sq. Wave Oscillator (555)

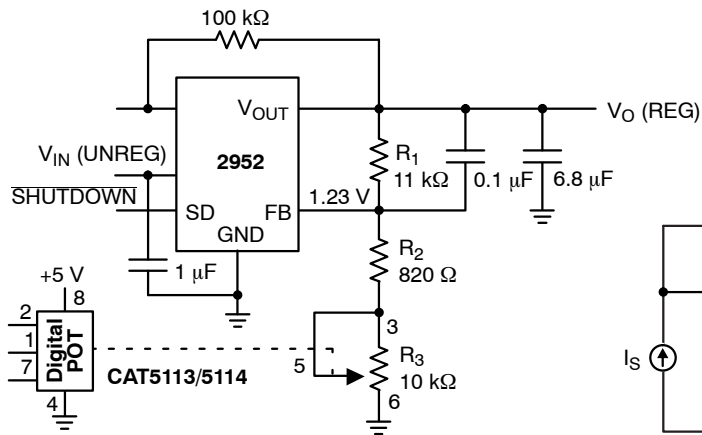


Figure 9. Programmable Voltage Regulator

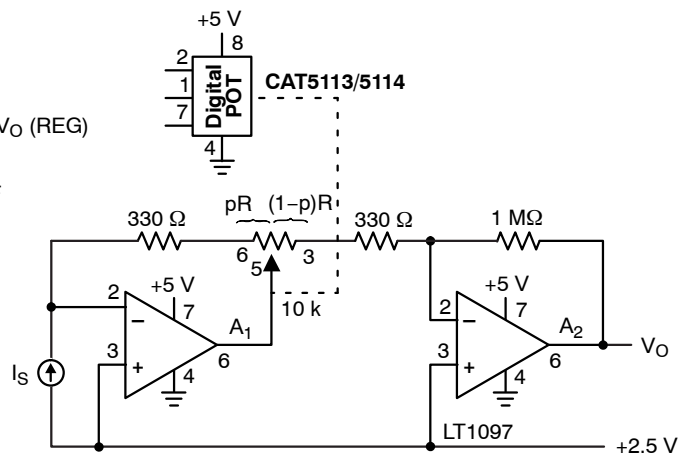


Figure 10. Programmable I to V Convertor

The circuit diagram shows a precision active low-pass filter. A digital potentiometer (CAT5113/5114) is configured with its wiper (pin 2) connected to the non-inverting input (pin 3) of an op-amp (A1). The op-amp's non-inverting input is also connected to a voltage divider consisting of a 10 kΩ resistor (R2) and a 100 kΩ resistor (R3). The wiper of the digital potentiometer is connected to the output (pin 6) of the op-amp. The op-amp's inverting input (pin 2) is connected to a feedback network consisting of a 100 kΩ resistor (R3) and a 0.001 μF capacitor (C2). The output (pin 6) is also connected to a 0.001 μF capacitor (C1) to ground. The op-amp is powered by a +5 V supply (pin 7) and a +2.5 V supply (pin 4). The input signal (V<sub>S</sub>) is applied to the non-inverting input (pin 3) through a 50 kΩ resistor (R1) and a 1 μF capacitor (C1). The output (V<sub>O</sub>) is taken from the op-amp's output (pin 6).

The circuit diagram illustrates a DAC implementation using three ICs:

- IC1 (74HC132):** A hex invert Schmitt trigger. Its input (pin 1) is connected to the output of IC2 (pin 6). Its output (pin 2) is connected to pin 3 of IC2.
- IC2 (74HC132):** Another hex invert Schmitt trigger. Its input (pin 1) is connected to the output of IC1 (pin 2). Its output (pin 2) is connected to pin 3 of IC1.
- IC3 (CAT5114):** A Digital POT. Its pins are connected as follows:
  - Pin 1: Ground
  - Pin 2: +5V
  - Pin 3: Output of IC1 (pin 2)
  - Pin 4: Ground
  - Pin 5: Output of IC2 (pin 2)
  - Pin 6: +5V
  - Pin 7: Ground
  - Pin 8: Output of IC3 (Digital POT)

The circuit also includes an oscillator section (OSC) consisting of a square wave generator (represented by a triangle symbol) connected to a 10 kΩ resistor and a 0.1 μF capacitor, which are connected to the inputs of IC1 and IC2. The output of the Digital POT (pin 8) is connected to a 10 kΩ resistor, which is in turn connected to the input of IC4 (AI).

**IC4 (AI):** An analog integrator or amplifier. Its non-inverting input (+) is connected to ground. Its inverting input (-) is connected to the output of IC3 (pin 8) through a 10 kΩ resistor. The output of IC4 is labeled  $V_O$ .

The circuit is powered by a +5V supply and a -2.5V supply ( $V_S$ ). The output voltage  $V_O$  is specified to range from 2.5V to 5V.

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# CAT5114

**Table 8. ORDERING INFORMATION**

| Orderable Part Numbers          | Resistance Values (kΩ) | Package–Pin        | Lead Finish | Shipping†          |
|---------------------------------|------------------------|--------------------|-------------|--------------------|
| CAT5114LI–10–G                  | 10                     | PDIP–8             | NiPdAu      | 50 Units / Rail    |
| CAT5114LI–50–G                  | 50                     |                    |             |                    |
| CAT5114LI–00–G                  | 100                    |                    |             |                    |
| CAT5114VI–10–GT3                | 10                     | SOIC–8             | NiPdAu      | 100 Units / Rail   |
| CAT5114VI–50–GT3                | 50                     |                    |             |                    |
| CAT5114VI–00–GT3                | 100                    |                    |             |                    |
| CAT5114VP2I10GT3 (Notes 10, 11) | 10                     | TDFN–8<br>2 x 3 mm | NiPdAu      | 3000 / Tape & Reel |
| CAT5114VP2I50GT3 (Notes 10, 11) | 50                     |                    |             |                    |
| CAT5114VP2I00GT3 (Notes 10, 11) | 100                    |                    |             |                    |
| CAT5114YI–10–GT3                | 10                     | TSSOP–8            | NiPdAu      | 3000 / Tape & Reel |
| CAT5114YI–50–GT3                | 50                     |                    |             |                    |
| CAT5114YI–00–GT3                | 100                    |                    |             |                    |
| CAT5114ZI–10–GT3                | 10                     | MSOP–8             | NiPdAu      | 96 Units / Rail    |
| CAT5114ZI–50–GT3                | 50                     |                    |             |                    |
| CAT5114ZI–00–GT3                | 100                    |                    |             |                    |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

10. Contact factory for package availability.

11. Part number is not exactly the same as the “Example of Ordering Information” shown above. For the indicated part numbers there are NO hyphens in the orderable part numbers.

12. All packages are RoHS-compliant (Pb-Free, Halogen-Free).

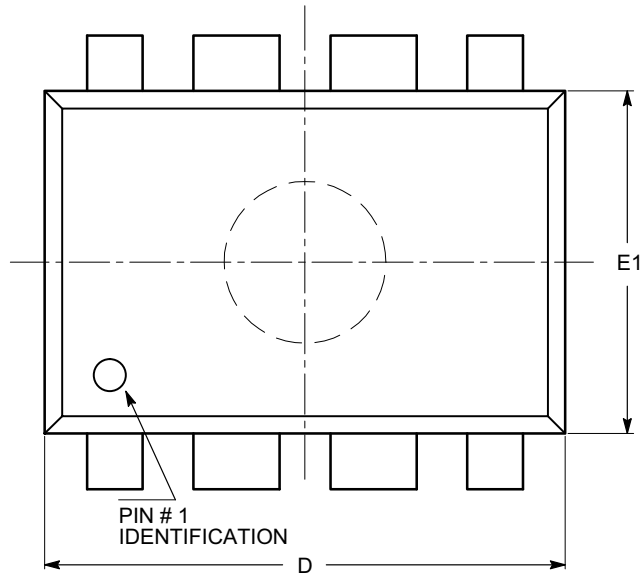
13. The standard lead finish is NiPdAu.

14. For additional package and temperature options, please contact your nearest ON Semiconductor Sales office.

# CAT5114

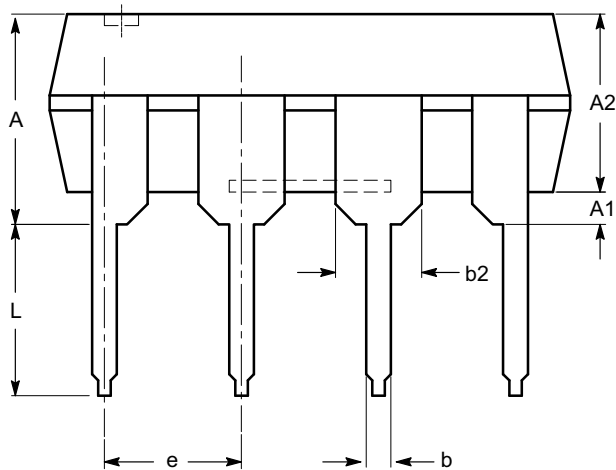
## PACKAGE DIMENSIONS

PDIP-8, 300 mils  
CASE 646AA  
ISSUE A

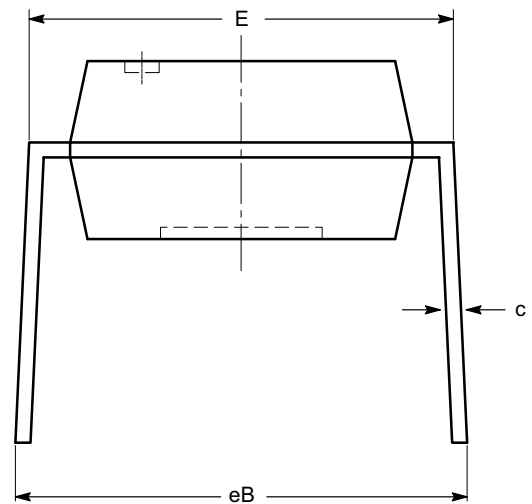


| SYMBOL | MIN      | NOM  | MAX   |
|--------|----------|------|-------|
| A      |          |      | 5.33  |
| A1     | 0.38     |      |       |
| A2     | 2.92     | 3.30 | 4.95  |
| b      | 0.36     | 0.46 | 0.56  |
| b2     | 1.14     | 1.52 | 1.78  |
| c      | 0.20     | 0.25 | 0.36  |
| D      | 9.02     | 9.27 | 10.16 |
| E      | 7.62     | 7.87 | 8.25  |
| E1     | 6.10     | 6.35 | 7.11  |
| e      | 2.54 BSC |      |       |
| eB     | 7.87     |      | 10.92 |
| L      | 2.92     | 3.30 | 3.80  |

TOP VIEW



SIDE VIEW



END VIEW

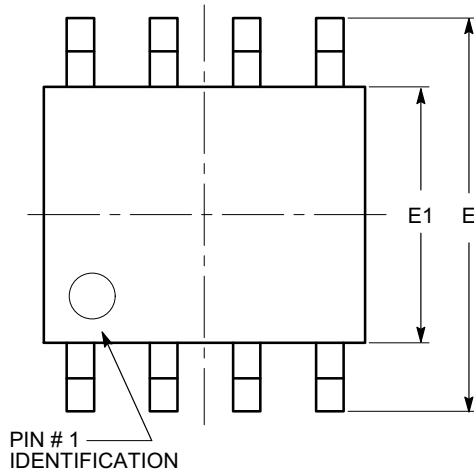
### Notes:

- (1) All dimensions are in millimeters.
- (2) Complies with JEDEC MS-001.

# CAT5114

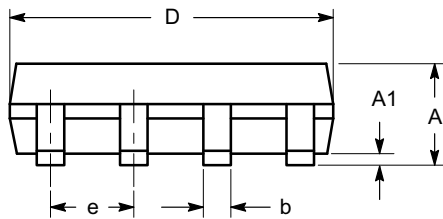
## PACKAGE DIMENSIONS

SOIC 8, 150 mils  
CASE 751BD  
ISSUE O

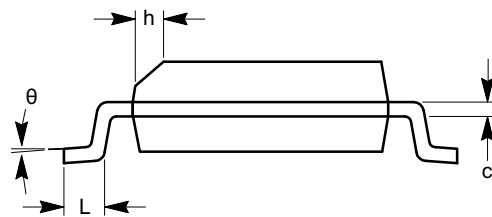


TOP VIEW

| SYMBOL   | MIN      | NOM | MAX  |
|----------|----------|-----|------|
| A        | 1.35     |     | 1.75 |
| A1       | 0.10     |     | 0.25 |
| b        | 0.33     |     | 0.51 |
| c        | 0.19     |     | 0.25 |
| D        | 4.80     |     | 5.00 |
| E        | 5.80     |     | 6.20 |
| E1       | 3.80     |     | 4.00 |
| e        | 1.27 BSC |     |      |
| h        | 0.25     |     | 0.50 |
| L        | 0.40     |     | 1.27 |
| $\theta$ | 0°       |     | 8°   |



SIDE VIEW



END VIEW

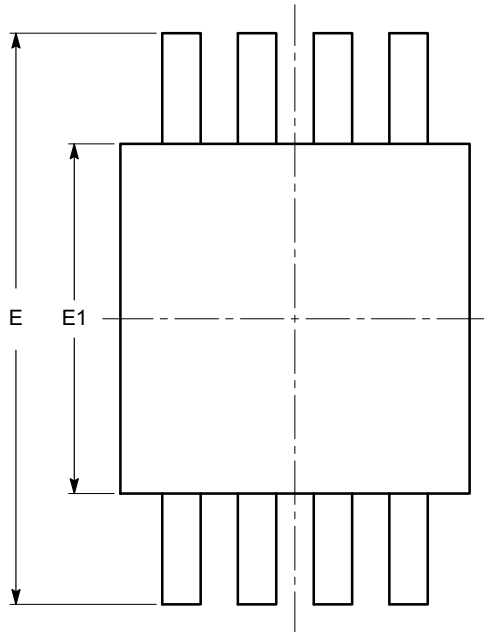
### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MS-012.

# CAT5114

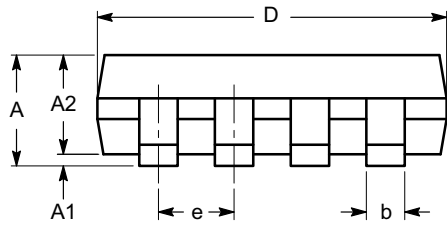
## PACKAGE DIMENSIONS

MSOP 8, 3x3  
CASE 846AD  
ISSUE O

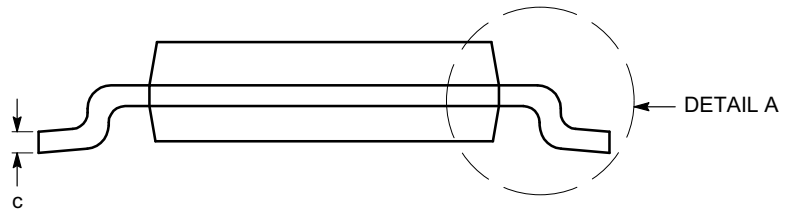


TOP VIEW

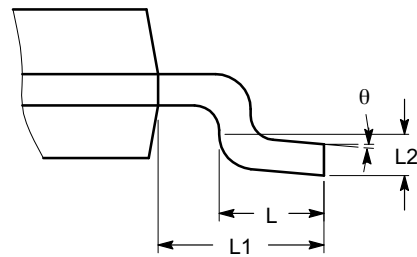
| SYMBOL   | MIN      | NOM  | MAX  |
|----------|----------|------|------|
| A        |          |      | 1.10 |
| A1       | 0.05     | 0.10 | 0.15 |
| A2       | 0.75     | 0.85 | 0.95 |
| b        | 0.22     |      | 0.38 |
| c        | 0.13     |      | 0.23 |
| D        | 2.90     | 3.00 | 3.10 |
| E        | 4.80     | 4.90 | 5.00 |
| E1       | 2.90     | 3.00 | 3.10 |
| e        | 0.65 BSC |      |      |
| L        | 0.40     | 0.60 | 0.80 |
| L1       | 0.95 REF |      |      |
| L2       | 0.25 BSC |      |      |
| $\theta$ | 0°       |      | 6°   |



SIDE VIEW



END VIEW



DETAIL A

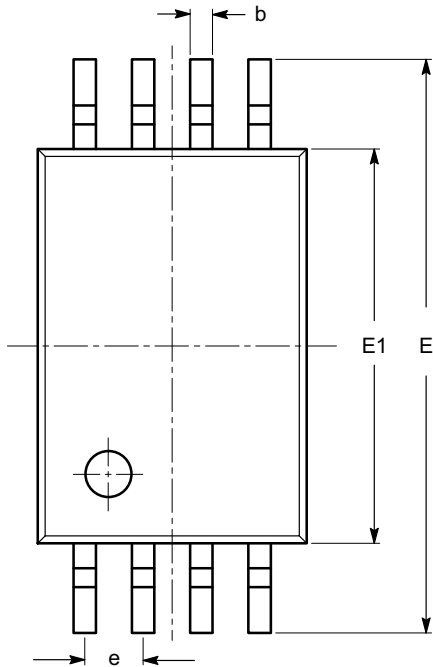
### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-187.

# CAT5114

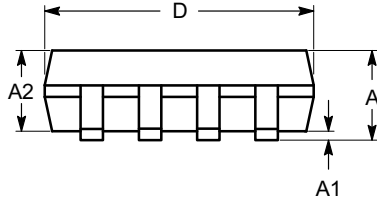
## PACKAGE DIMENSIONS

**TSSOP8, 4.4x3**  
CASE 948AL  
ISSUE O

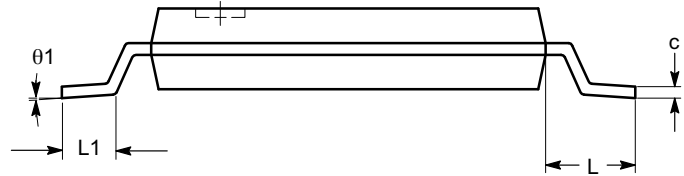


| SYMBOL | MIN      | NOM  | MAX  |
|--------|----------|------|------|
| A      |          |      | 1.20 |
| A1     | 0.05     |      | 0.15 |
| A2     | 0.80     | 0.90 | 1.05 |
| b      | 0.19     |      | 0.30 |
| c      | 0.09     |      | 0.20 |
| D      | 2.90     | 3.00 | 3.10 |
| E      | 6.30     | 6.40 | 6.50 |
| E1     | 4.30     | 4.40 | 4.50 |
| e      | 0.65 BSC |      |      |
| L      | 1.00 REF |      |      |
| L1     | 0.50     | 0.60 | 0.75 |
| θ      | 0°       |      | 8°   |

**TOP VIEW**



**SIDE VIEW**



**END VIEW**

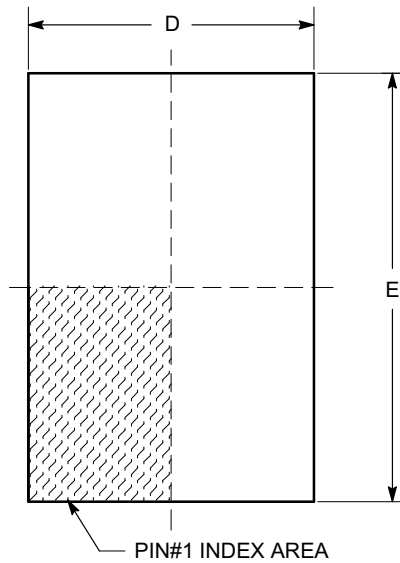
### Notes:

- (1) All dimensions are in millimeters. Angles in degrees.
- (2) Complies with JEDEC MO-153.

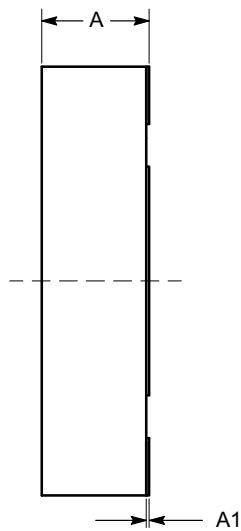
# CAT5114

## PACKAGE DIMENSIONS

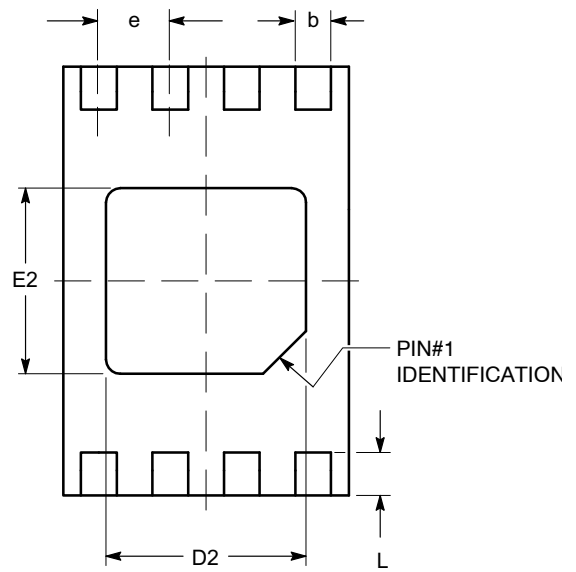
TDFN8, 2x3  
CASE 511AK  
ISSUE A



TOP VIEW

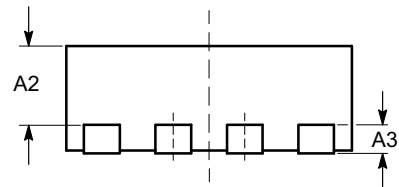


SIDE VIEW



BOTTOM VIEW

| SYMBOL | MIN      | NOM  | MAX  |
|--------|----------|------|------|
| A      | 0.70     | 0.75 | 0.80 |
| A1     | 0.00     | 0.02 | 0.05 |
| A2     | 0.45     | 0.55 | 0.65 |
| A3     | 0.20 REF |      |      |
| b      | 0.20     | 0.25 | 0.30 |
| D      | 1.90     | 2.00 | 2.10 |
| D2     | 1.30     | 1.40 | 1.50 |
| E      | 2.90     | 3.00 | 3.10 |
| E2     | 1.20     | 1.30 | 1.40 |
| e      | 0.50 TYP |      |      |
| L      | 0.20     | 0.30 | 0.40 |



FRONT VIEW

### Notes:

- (1) All dimensions are in millimeters.
- (2) Complies with JEDEC MO-229.

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