

# IRU1010-18 & (PbF)

## 1A LOW DROPOUT POSITIVE FIXED 1.8V REGULATOR

### FEATURES

- Guaranteed < 1.3V Dropout at Full Load Current
- Fast Transient Response
- 1% Voltage Reference Initial Accuracy
- Built-In Thermal Shutdown
- Available in SOT-223, D-Pak, Ultra Thin-Pak™ and 8-Pin SOIC Surface-Mount Packages

### APPLICATIONS

- Low Voltage IC Supply Applications
- DSP Core Voltage
- 8-Lead SOIC (IRU1010-18CS) is also available LEAD-FREE

### DESCRIPTION

The IRU1010-18 is a low dropout three-terminal fixed output regulator with minimum of 1A output current capability. This product is specifically designed to provide well regulated supply for low voltage IC applications as well as generating clock supply for PC applications. The IRU1010-18 is guaranteed to have <1.3V dropout at full load current making it ideal to provide well regulated with 3.8V input supply. The IRU1010-18 is specifically designed to be stable with low cost aluminum capacitors while maintaining stability with low ESR tantalum caps.

### TYPICAL APPLICATION

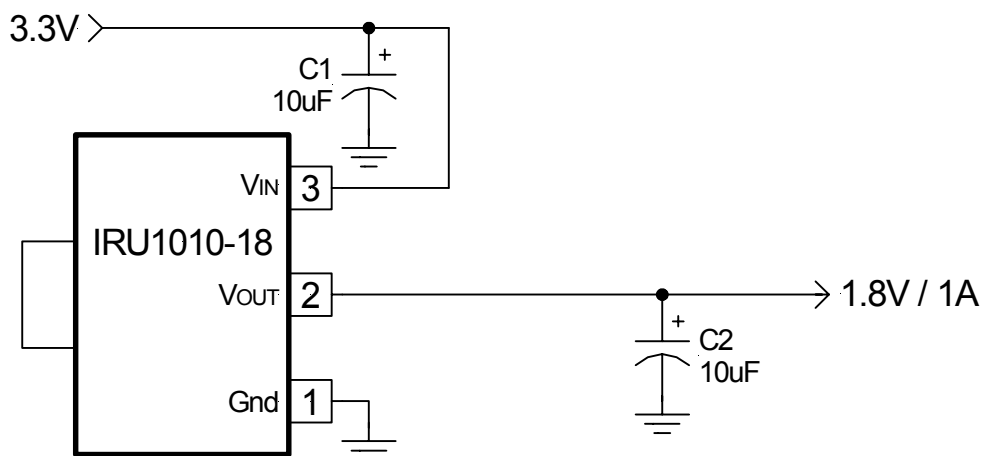


Figure 1 - Typical set-up of the IRU1010-18 in a 3.3V to 1.8V regulator application.

### PACKAGE ORDER INFORMATION

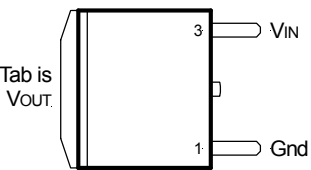
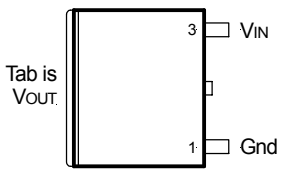
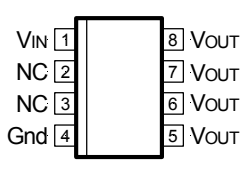
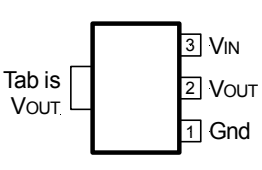
#### Basic Part (Non-Lead Free)

| T <sub>J</sub> (°C) | 2-PIN PLASTIC<br>TO-252 (D-Pak) | 2-PIN PLASTIC<br>Ultra Thin-Pak™ (P) | 8-PIN PLASTIC<br>SOIC (S) | 3-PIN PLASTIC<br>SOT-223 (Y) |
|---------------------|---------------------------------|--------------------------------------|---------------------------|------------------------------|
| 0 To 125            | IRU1010-18CD                    | IRU1010-18CP                         | IRU1010-18CS              | IRU1010-18CY                 |
| Leadfree Part       |                                 |                                      |                           |                              |
| T <sub>J</sub> (°C) | 2-PIN PLASTIC<br>TO-252 (D-Pak) | 2-PIN PLASTIC<br>Ultra Thin-Pak™ (P) | 8-PIN PLASTIC<br>SOIC (S) | 3-PIN PLASTIC<br>SOT-223 (Y) |
| 0 To 125            | Not available                   | Not available                        | IRU1010-18CSPbF           | Not available                |

## ABSOLUTE MAXIMUM RATINGS

|                                      |                    |
|--------------------------------------|--------------------|
| Input Voltage ( $V_{IN}$ )           | 7V                 |
| Power Dissipation                    | Internally Limited |
| Storage Temperature Range            | -65°C To 150°C     |
| Operating Junction Temperature Range | 0°C To 125°C       |

## PACKAGE INFORMATION

| 2-PIN PLASTIC TO-252 (D-Pak)                                                                                                                                               | 2-PIN ULTRA THIN-PAK™ (P)                                                                                                                                                  | 8-PIN PLASTIC SOIC (S)                                                                                                                                | 3-PIN PLASTIC SOT-223 (Y)                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Tab is VOUT.</p> <p><math>\theta_{JA}=70^{\circ}\text{C/W}</math> for 0.5" Sq pad</p> |  <p>Tab is VOUT.</p> <p><math>\theta_{JA}=70^{\circ}\text{C/W}</math> for 0.5" Sq pad</p> |  <p><math>\theta_{JA}=55^{\circ}\text{C/W}</math> for 1" Sq pad</p> |  <p>Tab is VOUT.</p> <p><math>\theta_{JA}=90^{\circ}\text{C/W}</math> for 0.4" Sq pad</p> |

## ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over  $C_{IN}=1\mu\text{F}$ ,  $V_{IN}=5\text{V}$ ,  $C_{OUT}=10\mu\text{F}$  and  $T_J=0$  to  $125^{\circ}\text{C}$ . Typical values refer to  $T_J=25^{\circ}\text{C}$ .

| PARAMETER                | SYM   | TEST CONDITION                                                        | MIN            | TYP            | MAX            | UNITS   |
|--------------------------|-------|-----------------------------------------------------------------------|----------------|----------------|----------------|---------|
| Output Voltage           | $V_o$ | $I_o=10\text{mA}$ , $T_J=25^{\circ}\text{C}$<br>$I_o=10\text{mA}$     | 1.782<br>1.764 | 1.800<br>1.800 | 1.818<br>1.836 | V       |
| Line Regulation          |       | $I_o=10\text{mA}$ , $4.75\text{V}<V_{IN}<7\text{V}$                   |                |                | 7              | mV      |
| Load Regulation (Note 1) |       | $10\text{mA}<I_o<1\text{A}$                                           |                |                | 17             | mV      |
| Dropout Voltage (Note 2) |       | $I_o=1\text{A}$                                                       |                |                | 1.3            | V       |
| Current Limit            |       | $\Delta V_o=100\text{mV}$                                             | 1.1            |                |                | A       |
| Thermal Regulation       |       | 30ms Pulse, $I_o=1\text{A}$                                           |                | 0.01           |                | %/W     |
| Ripple Rejection         |       | $f=120\text{Hz}$ , $C_o=25\mu\text{F}$ Tantalum,<br>$I_o=0.5\text{A}$ |                | 70             |                | dB      |
| Temperature Stability    |       | $I_o=10\text{mA}$                                                     |                | 0.5            |                | %       |
| Long Term Stability      |       | $T_J=125^{\circ}\text{C}$ , 1000Hrs                                   |                | 0.3            |                | %       |
| RMS Output Noise         |       | $T_J=25^{\circ}\text{C}$ , $10\text{Hz}<f<10\text{KHz}$               |                | 0.003          |                | % $V_o$ |

**Note 1:** Low duty cycle pulse testing with Kelvin connections is required in order to maintain accurate data.

**Note 2:** Dropout voltage is defined as the minimum differential voltage between  $V_{IN}$  and  $V_{OUT}$  required to maintain regulation at  $V_{OUT}$ . It is measured when the output voltage drops 1% below its nominal value.

## PIN DESCRIPTIONS

| PIN# | PIN SYMBOL       | PIN DESCRIPTION                                                                                                                                                                                                                                                                                                                  |
|------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Gnd              | Ground pin. This pin must be connected to ground plane using a low inductance short connection.                                                                                                                                                                                                                                  |
| 2    | V <sub>OUT</sub> | The output of the regulator. This pin is also connected to the tab of the package. An output capacitor must be connected to this pin to insure stability of the regulator.                                                                                                                                                       |
| 3    | V <sub>IN</sub>  | Input pin of the regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimum dropout voltage during the load transient response. This pin must always be 1.3V higher than V <sub>OUT</sub> in order for the device to regulate properly. |

## BLOCK DIAGRAM

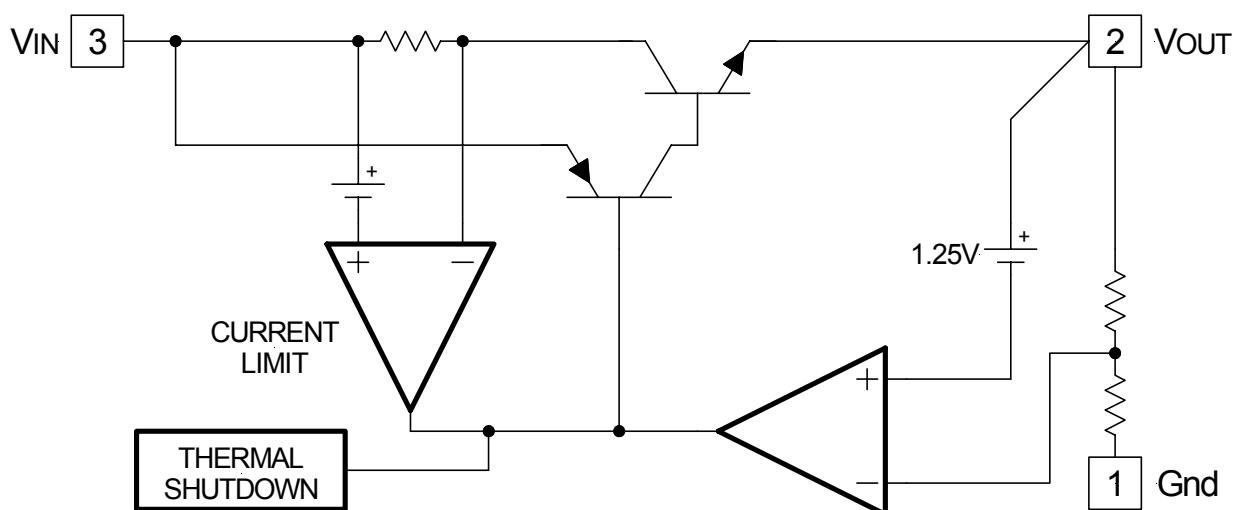
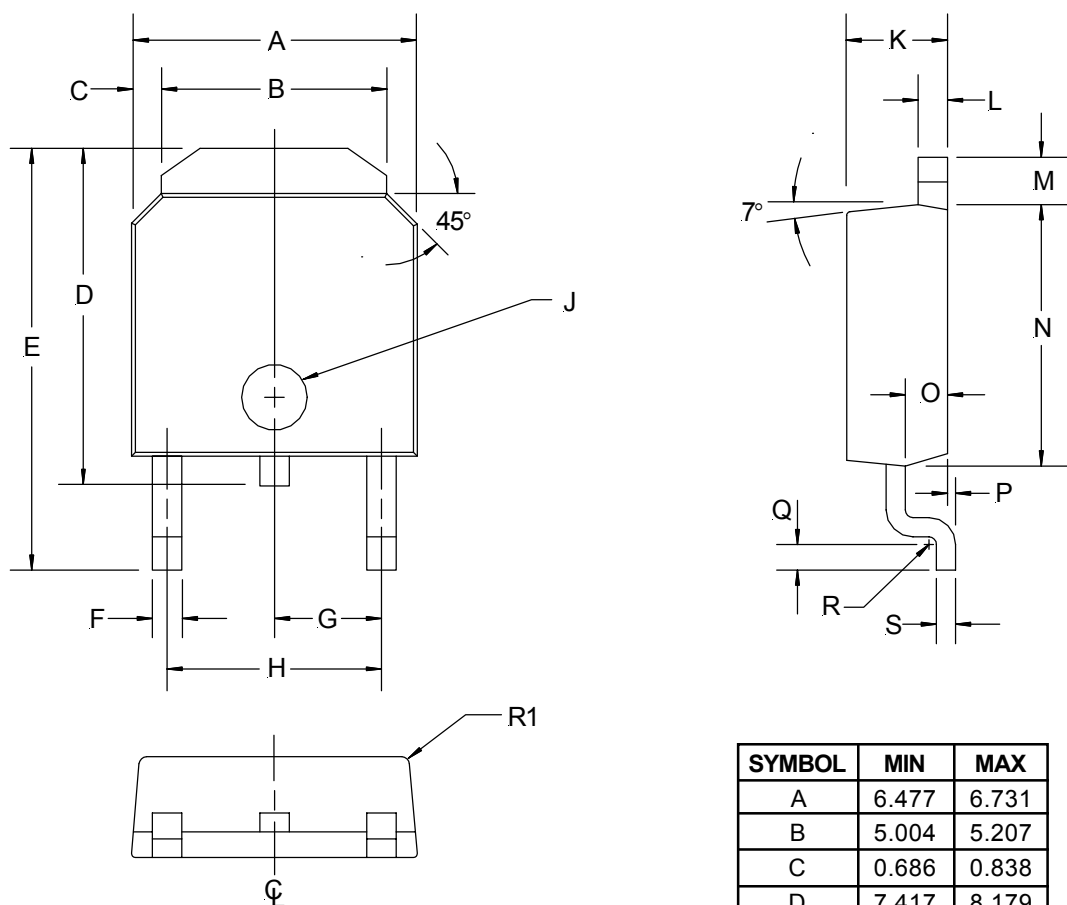


Figure 2 - Simplified block diagram of the IRU1010-18.

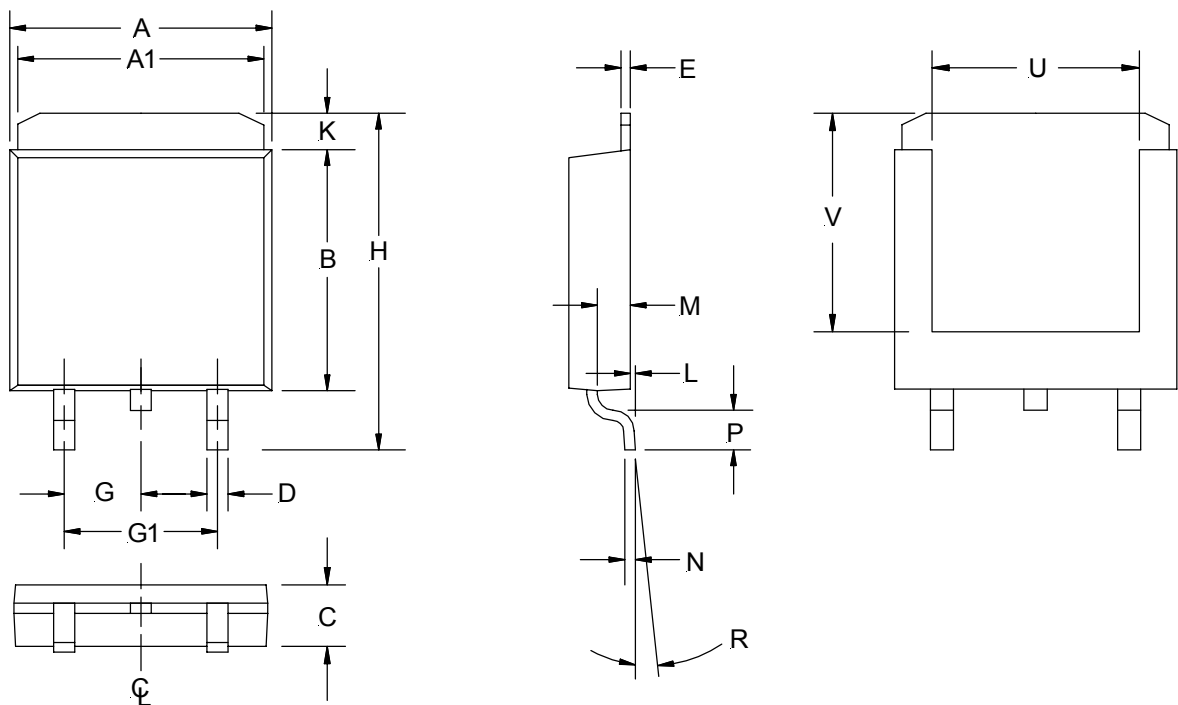
**(D) TO-252 Package  
2-Pin**



| SYMBOL | MIN       | MAX    |
|--------|-----------|--------|
| A      | 6.477     | 6.731  |
| B      | 5.004     | 5.207  |
| C      | 0.686     | 0.838  |
| D      | 7.417     | 8.179  |
| E      | 9.703     | 10.084 |
| F      | 0.635     | 0.889  |
| G      | 2.286 BSC |        |
| H      | 4.521     | 4.623  |
| J      | Ø1.52     | Ø1.62  |
| K      | 2.184     | 2.388  |
| L      | 0.762     | 0.864  |
| M      | 1.016     | 1.118  |
| N      | 5.969     | 6.223  |
| O      | 1.016     | 1.118  |
| P      | 0         | 0.102  |
| Q      | 0.534     | 0.686  |
| R      | R0.31 TYP |        |
| R1     | R0.51 TYP |        |
| S      | 0.428     | 0.588  |

NOTE: ALL MEASUREMENTS  
ARE IN MILLIMETERS.

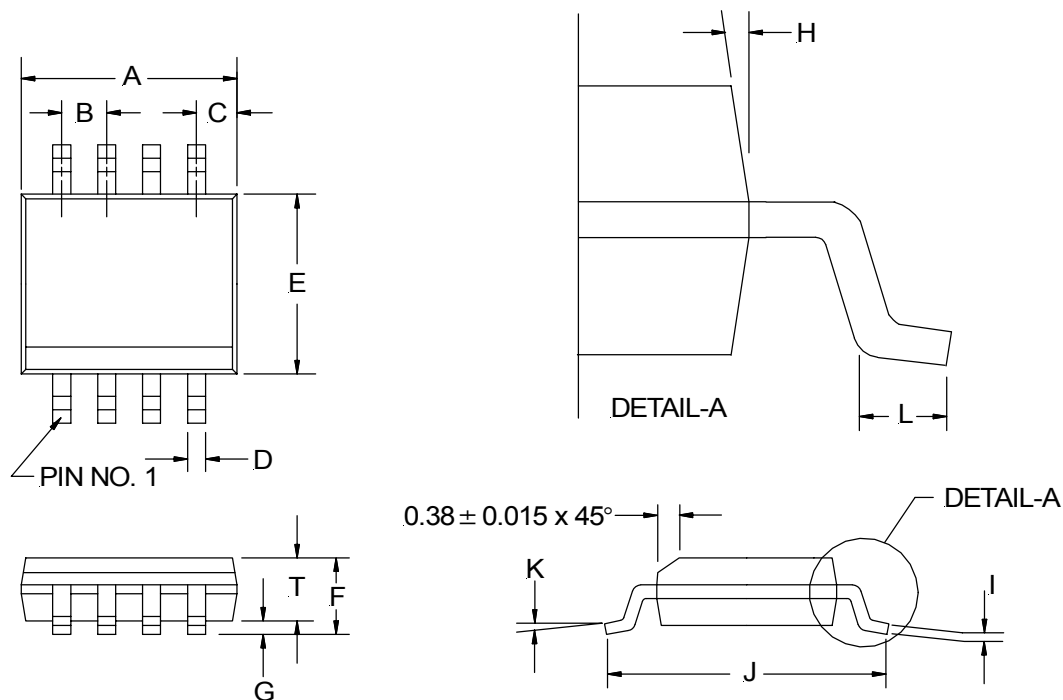
**(P) Ultra Thin-Pak™  
2-Pin**



| SYMBOL | MIN      | MAX  |
|--------|----------|------|
| A      | 5.91     | 6.17 |
| A1     | 5.54     | 5.79 |
| B      | 6.02     | 6.27 |
| C      | 1.70     | 2.03 |
| D      | 0.63     | 0.79 |
| E      | 0.17     | 0.33 |
| G      | 2.16     | 2.41 |
| G1     | 4.45     | 4.70 |
| H      | 9.42     | 9.68 |
| K      | 0.76     | 1.27 |
| L      | 0.02     | 0.13 |
| M      | 0.89     | 1.14 |
| N      | 0.25     | 0.25 |
| P      | 0.94     | 1.19 |
| R      | 2°       | 6°   |
| U      | 2.92     | 3.30 |
| V      | 5.08 NOM |      |

NOTE: ALL MEASUREMENTS  
ARE IN MILLIMETERS.

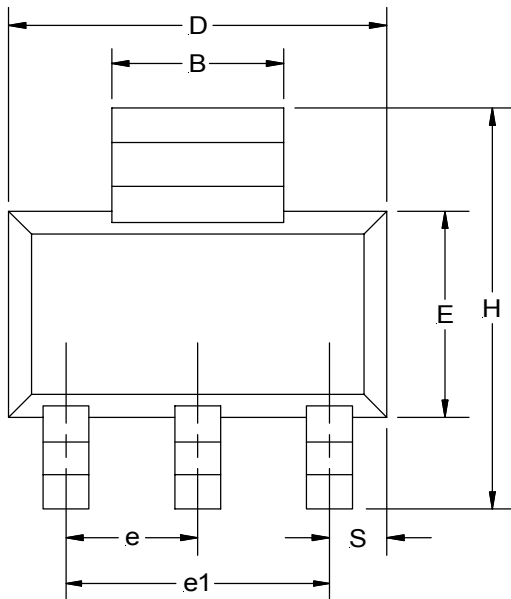
**(S) SOIC Package**  
**8-Pin Surface Mount, Narrow Body**



| 8-PIN  |          |      |
|--------|----------|------|
| SYMBOL | MIN      | MAX  |
| A      | 4.80     | 4.98 |
| B      | 1.27 BSC |      |
| C      | 0.53 REF |      |
| D      | 0.36     | 0.46 |
| E      | 3.81     | 3.99 |
| F      | 1.52     | 1.72 |
| G      | 0.10     | 0.25 |
| H      | 7° BSC   |      |
| I      | 0.19     | 0.25 |
| J      | 5.80     | 6.20 |
| K      | 0°       | 8°   |
| L      | 0.41     | 1.27 |
| T      | 1.37     | 1.57 |

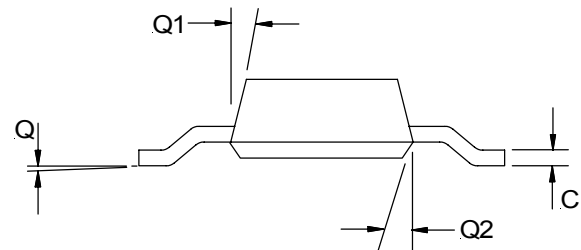
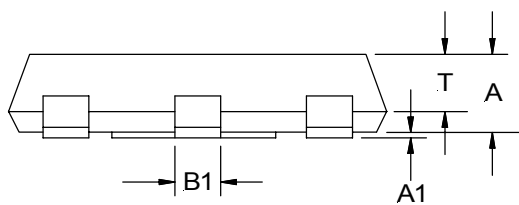
NOTE: ALL MEASUREMENTS  
ARE IN MILLIMETERS.

**(Y) SOT-223 Package  
3-Pin**



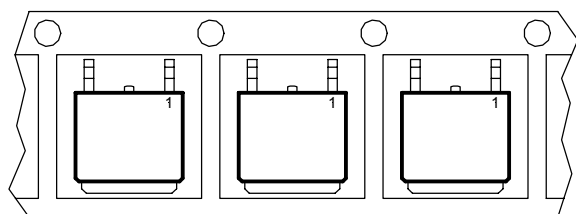
| SYMBOL | MIN   | MAX   |
|--------|-------|-------|
| A      | 1.498 | 1.702 |
| A1     | 0.02  | 0.11  |
| B      | 2.895 | 3.15  |
| B1     | 0.637 | 0.85  |
| C      | 0.239 | 0.381 |
| D      | 6.299 | 6.706 |
| E      | 3.30  | 3.708 |
| e      | 2.209 | 2.953 |
| e1     | 4.496 | 4.699 |
| H      | 6.70  | 7.30  |
| Q      | 0°    | 10°   |
| Q1     | 7°    | 16°   |
| Q2     | 7°    | 16°   |
| S      | 0.838 | 1.05  |
| T      | 1.092 | 1.30  |

NOTE: ALL MEASUREMENTS  
ARE IN MILLIMETERS.

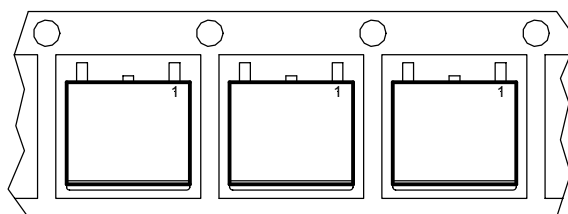


## PACKAGE SHIPMENT METHOD

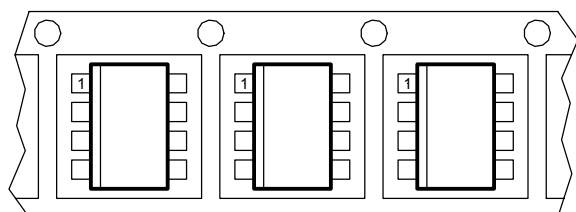
| PKG<br>DESIG | PACKAGE<br>DESCRIPTION | PIN<br>COUNT | PARTS<br>PER TUBE | PARTS<br>PER REEL | T & R<br>Orientation |
|--------------|------------------------|--------------|-------------------|-------------------|----------------------|
| D            | TO-252, (D-Pak)        | 2            | 75                | 2500              | Fig A                |
| P            | Ultra Thin-Pak™        | 2            | 75                | 2500              | Fig B                |
| S            | SOIC, Narrow Body      | 8            | 95                | 2500              | Fig C                |
| Y            | SOT-223                | 3            | 80                | 2500              | Fig D                |



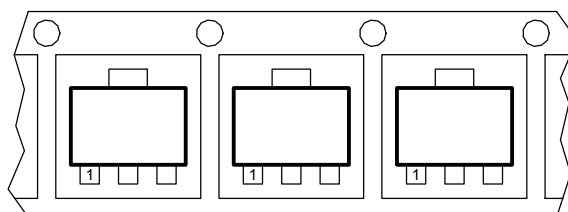
Feed Direction  
Figure A



Feed Direction  
Figure B



Feed Direction  
Figure C



Feed Direction  
Figure D