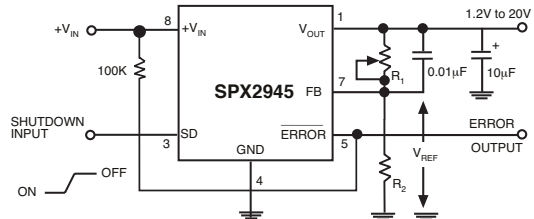


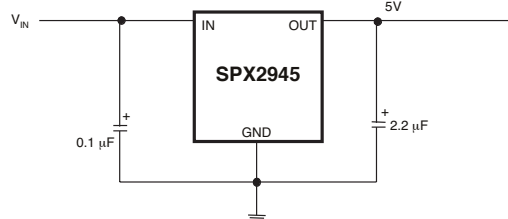
## 400mA Low Dropout Voltage Regulator with Shutdown

### FEATURES

- Output 3.3V, 5.0V at 400mA Output
- Very Low Quiescent Current, 100 $\mu$ A
- Low Dropout Voltage, 420mV at 400mA
- Extremely Tight Load and Line Regulation
- Very Low Temperature Coefficient
- Current & Thermal Limiting
- Error Flag Warns Of Output Dropout
- Logic-Controlled Electronic Shutdown
- Output Programmable From 1.24V to 20V (for SO-8)



*Adjustable Regulator*



*5V Regulator Circuit*

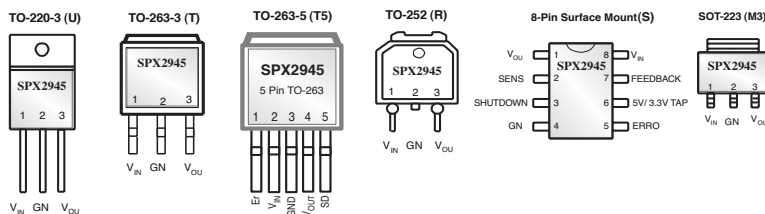
Now Available in Lead Free Packaging

### DESCRIPTION

The SPX2945 is a low power voltage regulator. This device is an excellent choice for use in battery-powered applications such as cordless telephones, radio control systems, and portable computers. The SPX2945 features very low quiescent current (100 $\mu$ A Typ.) and very low dropout voltage. This includes a tight initial tolerance of 1% max and very low output temperature coefficient, making the SPX2945 useful as a low-power voltage reference.

The error flag output feature is used as power-on reset for warning of a low output voltage, due to a falling voltage input of batteries. Another feature is the logic-compatible shutdown input which enables the regulator to be switched on and off. The SPX2945 is offered in 3-pin TO-220 package, SO-8 (same pin out as SPX2951), SOT-223, surface mount 3-Pin TO-252, 3-Pin TO-263 packages and 5-Pin TO-263.

The regulator output voltage (of the 8-pin SO-8) may be pin-strapped for a 3.3V and 5.0V or programmed from 1.24V to 20V with an external pair of resistors. Look for SPX2951 for 150mA and SPX2954 for 250mA applications.



*Note: Tab is Ground*

## ABSOLUTE MAXIMUM RATINGS

Power Dissipation ..... Internally Limited  
 Lead Temp. (Soldering, 5 Seconds) ..... 260°C  
 Storage Temperature Range ..... -65°C to +150°C  
 Operating Junction Temperature Range ..... -40°C to +125°C  
 Input Supply Voltage ..... -20V to +26V

Feedback Input Voltage ..... -1.5V to +26V  
 Shutdown Input Voltage ..... -0.3V to +26V  
 Error Comparator Output ..... -0.3V to +26V  
 ESD Rating ..... 2kV Min

## ELECTRICAL CHARACTERISTICS

Electrical characteristics at  $V_{IN} = V_O + 1V$ ,  $I_O = 1mA$ ,  $C_{OUT} = 2.2\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise specified. The ♦ denotes the specifications which apply over full operating temperature range -40°C to +85°C, unless noted.

| PARAMETER                                      | CONDITIONS<br>(Note 2)                                                     | MIN            | TYP                    | MAX                                         |                      | UNITS             |
|------------------------------------------------|----------------------------------------------------------------------------|----------------|------------------------|---------------------------------------------|----------------------|-------------------|
| <b>3.3V Version</b>                            |                                                                            |                |                        |                                             |                      |                   |
| Output Voltage                                 | $1mA \leq I_L \leq 400mA$                                                  | 3.267<br>3.217 | 3.3<br>3.3             | 3.333<br>3.382                              | ♦                    | V                 |
| <b>5.0V Version</b>                            |                                                                            |                |                        |                                             |                      |                   |
| Output Voltage                                 | $1mA \leq I_L \leq 400mA$                                                  | 4.950<br>4.880 | 5.0<br>5.0             | 5.050<br>5.120                              | ♦                    | V                 |
| <b>All Voltage Options</b>                     |                                                                            |                |                        |                                             |                      |                   |
| Output Voltage<br>Temperature Coefficient      | (Note1)                                                                    | 20             |                        | 100                                         | ♦                    | ppm/°C            |
| Line Regulation (Note 3)                       | $6V \leq V_{IN} \leq 20V$ (Note 4)                                         |                | 1.5                    | 20                                          | ♦                    | mV                |
| Load Regulation (Note 3)                       | $I_L = 1$ to 400mA                                                         |                | 6                      | 20<br>30                                    | ♦                    | mV                |
| Dropout Voltage (Note5)                        | $I_L = 1mA$<br><br>$I_L = 400mA$                                           |                | 60<br><br>360          | 100<br>150<br>450<br>700                    | ♦<br><br>♦           | mV                |
| Ground Current                                 | $I_L = 1mA$<br><br>$I_L = 150mA$<br><br>$I_L = 300mA$<br><br>$I_L = 400mA$ |                | 100<br><br>2<br>4<br>8 | 200<br>300<br>4<br>6<br>8<br>12<br>15<br>25 | ♦<br><br>♦<br>♦<br>♦ | μA<br><br>mA      |
| Current Limit                                  | $V_{OUT} = 0$                                                              |                | 330                    | 800                                         | ♦                    | mA                |
| Thermal Regulation                             |                                                                            |                | 0.05                   | 0.2                                         |                      | %/W               |
| Output Noise, 10Hz to 100kHz,<br>$I_L = 100mA$ | $C_L = 2.2\mu F$<br>$C_L = 33\mu F$                                        |                | 400<br>260             |                                             |                      | μV <sub>RMS</sub> |
| PSRR at 100KHz<br>$I_L = 100mA$                | $C_L = 10\mu F$                                                            |                | 31                     |                                             |                      | dB                |
| <b>Adjustable 8 Pin Version only</b>           |                                                                            |                |                        |                                             |                      |                   |
| Reference Voltage                              |                                                                            | 1.210          | 1.235                  | 1.260                                       |                      | V                 |
| Reference Voltage                              | Over Temperature                                                           | 1.185          |                        | 1.285                                       |                      | V                 |
| Feedback Pin Bias Current                      |                                                                            |                | 20                     | 40<br>60                                    | ♦                    | nA                |
| Reference Voltage Temp.<br>Coefficient         |                                                                            |                | 20                     |                                             |                      | ppm/°C            |

## ELECTRICAL CHARACTERISTICS: Continued

Electrical characteristics at  $V_{IN} = V_O + 1V$ ,  $I_O = 1mA$ ,  $C_{OUT} = 2.2\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise specified. ♦ applies over the full operating temperature range.

| PARAMETER                                                  | CONDITIONS<br>(Note 2)                                           | MIN      | TYP                                         | MAX                     | ♦                          | UNITS   |
|------------------------------------------------------------|------------------------------------------------------------------|----------|---------------------------------------------|-------------------------|----------------------------|---------|
| Feedback Pin Bias Current<br>Temperature Coefficient       |                                                                  |          | 0.1                                         |                         |                            | nA/°C   |
| Output Leakage Current                                     | $V_{OH}=20V$                                                     |          | 0.01                                        | 1<br>2                  | ♦                          | $\mu A$ |
| Output Low Voltage                                         | $V_{IN}=4.5V$<br>$I_{OL}=400\mu A$                               |          | 150                                         | 250<br>400              | ♦                          | mV      |
| Upper Threshold Voltage                                    | (Note 6)                                                         | 40<br>25 | 60                                          |                         |                            | mV      |
| Lower Threshold Voltage                                    | (Note 6)                                                         |          | 75                                          | 95<br>140               | ♦                          | mV      |
| Hysteresis                                                 | (Note 6)                                                         |          | 15                                          |                         |                            | mV      |
| Input Logic Voltage                                        | Low (Regulator ON)<br>High (Regulator OFF)                       |          | 1.3                                         | 0.7<br>2.0              | ♦<br>♦                     | V       |
| Shutdown Pin Input Current                                 | $V_S=2.4V$<br><br>$V_S=26V$                                      |          | 30<br><br>450                               | 50<br>100<br>600<br>750 | ♦<br><br>♦                 | $\mu A$ |
| Regulator Output Current<br>in Shutdown                    | (Note 7)                                                         | 10<br>20 | 3                                           |                         | ♦                          | $\mu A$ |
| Thermal Resistance<br>Theta Junction-Ambient $\theta_{JA}$ | TO-220-3<br>TO-263-3<br>TO-263-5<br>NSOIC-8<br>SOT-223<br>TO-252 |          | 29.4<br>31.4<br>31.2<br>128.4<br>62.3<br>50 |                         | ♦<br>♦<br>♦<br>♦<br>♦<br>♦ | °C/W    |

**Note 1:** Output or reference voltage temperature coefficients defined as the worst case voltage change divided by the total temperature range.

**Note 2:** Unless otherwise specified all limits are guaranteed for  $T_J = 25^\circ C$ ,  $V_{IN} = 6V$ ,  $I_L = 1mA$  and  $C_L = 2.2\mu F$ . Additional conditions for the 8-pin versions are feedback tied to 5V/3.3V tap and output tied to output sense ( $V_{OUT} = 5V$ ) and  $V_{SHUTDOWN} \leq 0.8V$ .

**Note 3:** Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

**Note 4:** Line regulation for the SPX2945 is tested at  $150^\circ C$  for  $I_L = 1mA$ . For  $T_J = 125^\circ C$ , line regulation is guaranteed by design.

**Note 5:** Dropout voltage is defined as the input to output differential at which the output voltage drops 100 mV below its nominal value measured at 1V differential at very low values of programmed output voltage, the minimum input supply voltage of 2V ( 2.3V over temperature) must be taken into account.

**Note 6:** Comparator thresholds are expressed in terms of a voltage differential at the feedback terminal below the nominal reference voltage measured at 6V input. To express these thresholds in terms of output voltage change, multiply by the error amplifier gain  $= V_{OUT}/V_{REF} = (R1 + R2)/R2$ . For example, at a programmed output voltage of 5V, the Error output is guaranteed to go low when the output drops by  $95mV \times 5V/1.235 = 384mV$ . Thresholds remain constant as a percent of  $V_{OUT}$  as  $V_{OUT}$  is varied, with the dropout warning occurring at typically 5% below nominal, 7.5% guaranteed.

**Note 7:**  $V_{SHUTDOWN} \geq 2V$ ,  $V_{IN} \leq 26V$ ,  $V_{OUT} = 0$ , Feedback pin tied to 5V/3.3V Tap.



This problem can be fixed by adding a 100pF capacitor between output and feedback and increasing the output capacitor to at least 3.3μF.

## Error Detection Comparator Output

The Comparator produces a logic low output whenever the SPX2945 output falls out of regulation by more than around 5%. This is around 60mV offset divided by the 1.235 reference voltage. This trip level remains 5% below normal regardless of the programmed output voltage of the regulator. Figure 1 shows the timing diagram depicting the ERROR signal and the regulator output voltage as the SPX2945 input is ramped up and down. The ERROR signal becomes low at around 1.3V input, and goes high around 5V input (input voltage at which  $V_{OUT} = 4.75$ ). Since the SPX2945's dropout voltage is load dependent, the input voltage trip point (around 5V) will vary with the load current. The output voltage trip point (approx. 4.75V) does not vary with load.

The error comparator has an open-collector output, which requires an external pull-up resistor. Depending on the system requirements the resistor may be returned to 5V output or other supply voltage. In determining the value of this resistor, note that the output is rated to sink 400 $\mu$ A; this value adds to battery drain in a low battery condition. Suggested values range from 100K to 1M $\Omega$ . If the output is unused this resistor is not required.

## Programming the Output Voltage of SPX2945

The SPX2945 may be pin-strapped for 5V or 3.3V using its internal voltage divider by tying Pin 1 (output) to Pin 2 (sense) and Pin 7 (feedback) to Pin 6 (5V/3.3V Tap).

Also, it may be programmed for any output voltage between its 1.235V reference and its 20V maximum rating. As seen in Figure 2, an external pair of resistors is required.

Refer to the below equation for the programming of the output voltage::

$$V_{OUT} = V_{REF} \times (1 + R_1 / R_2) + I_{FB} R_1$$

The  $V_{REF}$  is 1.235 and  $I_{FB}$  is the feedback bias current, nominally -20nA. The minimum recommended load current of 1  $\mu$ A forces an upper limit of 1.2 M $\Omega$  on value of  $R_2$ . If no load is presented the  $I_{FB}$  produces an error of typically

2% in  $V_{OUT}$ , which may be eliminated at room temperature by trimming  $R_1$ . To improve the accuracy choose the value of  $R_2 = 100k$ ; this reduces the error by 0.17% and increases the resistor program current by 12 $\mu$ A. Since the SPX2945 typically draws 60  $\mu$ A at no load with Pin 2 open-circuited this is a small price to pay.

## Reducing Output Noise

It may be an advantage to reduce the AC noise present at the output. One way is to reduce the regulator bandwidth by increasing the size of the output capacitor. This is the only way that noise can be reduced on the 3 lead SPX2945 but is relatively inefficient, as increasing the capacitor from 1 $\mu$ F to 220 $\mu$ F only decreases the noise from 430 $\mu$ V to 160 $\mu$ V Vrms for a 100kHz bandwidth at 5V output. Noise could also be reduced fourfold by a bypass capacitor across  $R_1$ , since it reduces the high frequency gain from 4 to unity. Pick

$$C_{BYPASS} \cong 1 / 2\pi R_1 \times 200 \text{ Hz}$$

or choose 0.01 $\mu$ F. When doing this, the output capacitor must be increased to 3.3 $\mu$ F to maintain stability. These changes reduce the output noise from 430 $\mu$ V to 100 $\mu$ V Vrms for a 100kHz bandwidth at 5V output. With the bypass capacitor added, noise no longer scales with output voltage so that improvements are more dramatic at higher output voltages.

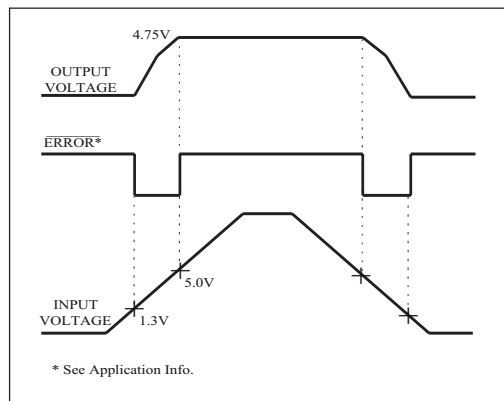
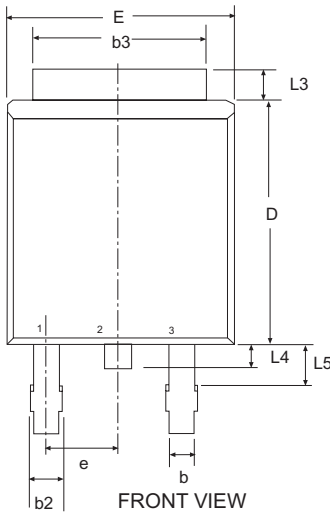
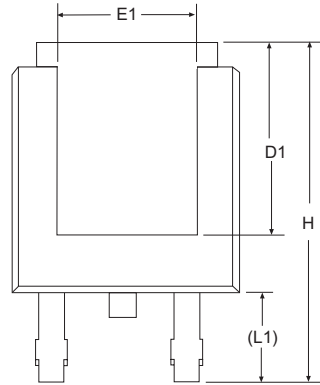
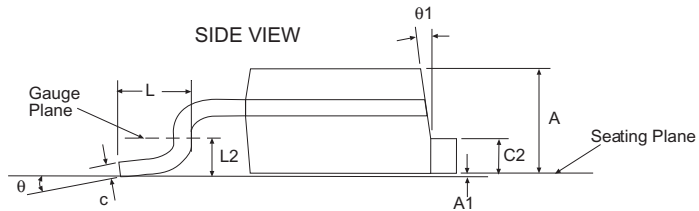
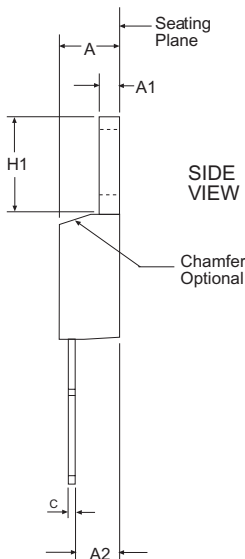
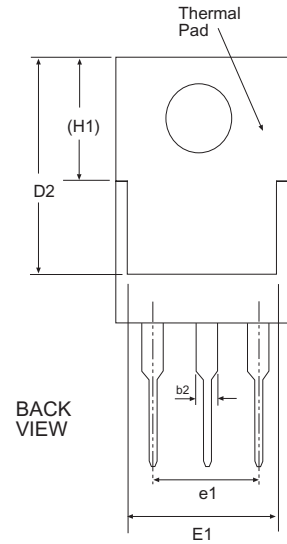
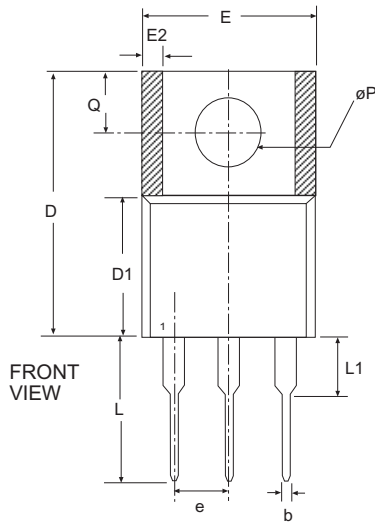


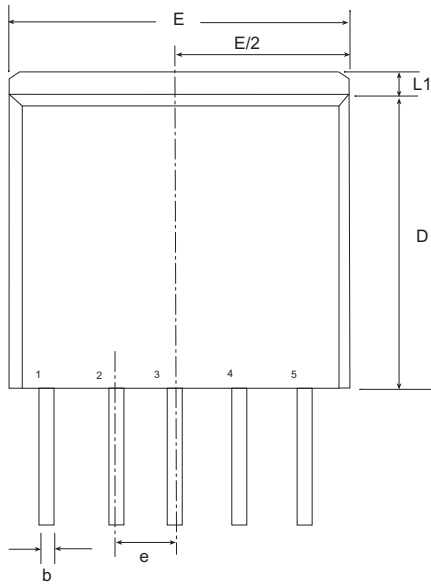
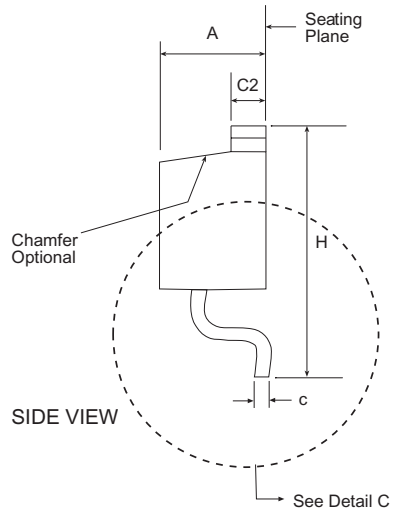
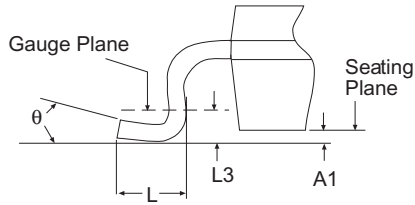
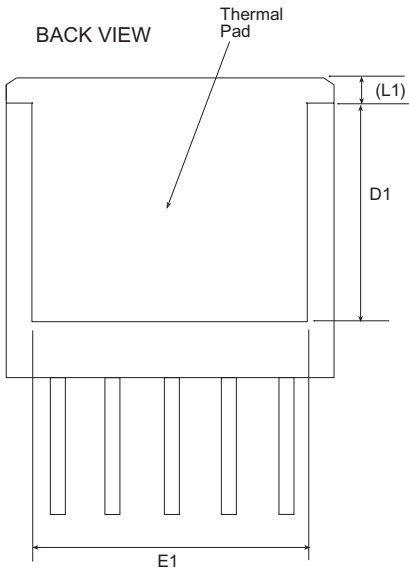
Figure 1. ERROR Output Timing


**FRONT VIEW**

**BACK VIEW**

**SIDE VIEW**

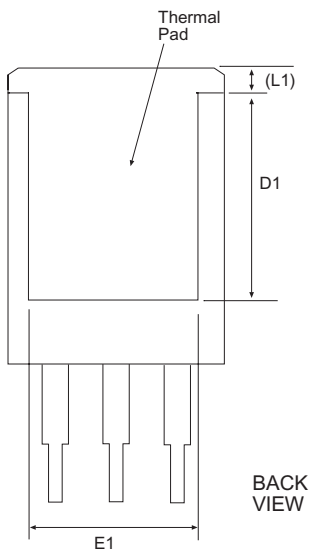
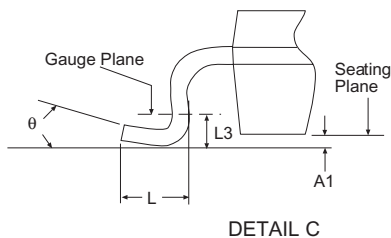
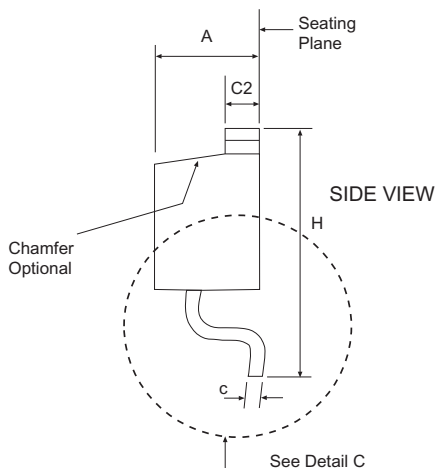
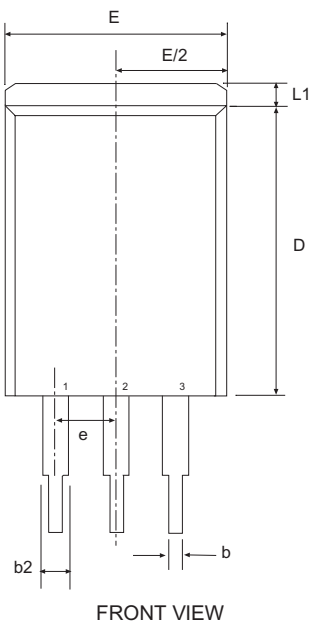
|                             | 3 Pin TO-252                                   |       |       | JEDEC TO-252                                                         |      |       | Variation AA |
|-----------------------------|------------------------------------------------|-------|-------|----------------------------------------------------------------------|------|-------|--------------|
| SYMBOL                      | Dimensions in Inches:<br>Controlling Dimension |       |       | Dimensions in Millimeters<br>Conversion Factor:<br>1 Inch = 25.40 mm |      |       |              |
|                             | MIN                                            | NOM   | MAX   | MIN                                                                  | NOM  | MAX   |              |
| A                           | 0.086                                          | -     | 0.094 | 2.18                                                                 | -    | 2.39  |              |
| A1                          | -                                              | -     | 0.005 | -                                                                    | -    | 0.13  |              |
| b                           | 0.025                                          | -     | 0.035 | 0.64                                                                 | -    | 0.89  |              |
| b2                          | 0.030                                          | -     | 0.045 | 0.76                                                                 | -    | 1.14  |              |
| b3                          | 0.195                                          | -     | 0.215 | 4.95                                                                 | -    | 5.46  |              |
| c                           | 0.018                                          | -     | 0.024 | 0.46                                                                 | -    | 0.61  |              |
| c2                          | 0.018                                          | -     | 0.035 | 0.46                                                                 | -    | 0.89  |              |
| D                           | 0.235                                          | 0.240 | 0.245 | 5.97                                                                 | 6.10 | 6.22  |              |
| D1                          | 0.205                                          | -     | -     | 5.21                                                                 | -    | -     |              |
| E                           | 0.250                                          | -     | 0.265 | 6.35                                                                 | -    | 6.73  |              |
| E1                          | 0.170                                          | -     | -     | 4.32                                                                 | -    | -     |              |
| e                           | .090 BSC                                       |       |       | 2.29 BSC                                                             |      |       |              |
| H                           | 0.370                                          | -     | 0.410 | 9.4                                                                  | -    | 10.41 |              |
| L                           | 0.055                                          | 0.060 | 0.070 | 1.4                                                                  | 1.52 | 1.78  |              |
| L1                          | .108 REF                                       |       |       | 2.74 REF                                                             |      |       |              |
| L2                          | .020 BSC                                       |       |       | 0.51 BSC                                                             |      |       |              |
| L3                          | 0.035                                          | -     | 0.050 | 0.89                                                                 | -    | 1.27  |              |
| L4                          | -                                              | -     | 0.040 | -                                                                    | -    | 1.02  |              |
| L5                          | 0.045                                          | -     | 0.060 | 1.14                                                                 | -    | 1.52  |              |
| ø                           | 0°                                             | -     | 10°   | 0°                                                                   | -    | 10°   |              |
| ø1                          | 0°                                             | -     | 15°   | 0°                                                                   | -    | 15°   |              |
| SIPEX Pkg Signoff Date/Rev: |                                                |       |       | JL Aug4-05/Rev A                                                     |      |       |              |



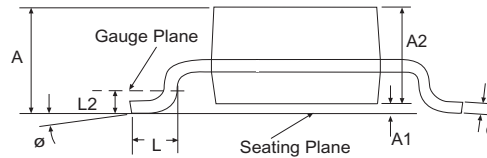
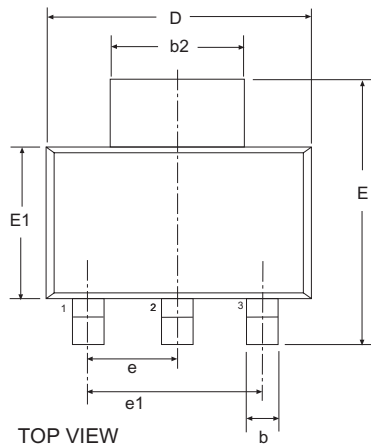
| 3 Pin TO-220                |                                                |       | JEDEC TO-220 |                                                                       | Variation AB |       |
|-----------------------------|------------------------------------------------|-------|--------------|-----------------------------------------------------------------------|--------------|-------|
| SYMBOL                      | Dimensions in Inches:<br>Controlling Dimension |       |              | Dimensions in Millimeters:<br>Conversion Factor:<br>1 Inch = 25.40 mm |              |       |
|                             | MIN                                            | NOM   | MAX          | MIN                                                                   | NOM          | MAX   |
| A                           | 0.140                                          | -     | 0.190        | 3.56                                                                  | -            | 4.83  |
| A1                          | 0.020                                          | -     | 0.055        | 0.51                                                                  | -            | 1.27  |
| A2                          | 0.080                                          | -     | 0.115        | 2.03                                                                  | -            | 2.79  |
| b                           | 0.015                                          | 0.027 | 0.040        | 0.25                                                                  | 0.51         | 1.02  |
| b2                          | 0.045                                          | 0.057 | 0.070        | 1.14                                                                  | 1.45         | 1.78  |
| c                           | 0.014                                          | -     | 0.024        | 0.25                                                                  | -            | 0.51  |
| D                           | 0.560                                          | -     | 0.650        | 14.22                                                                 | -            | 16.51 |
| D1                          | 0.330                                          | -     | 0.355        | 8.38                                                                  | -            | 8.89  |
| D2                          | 0.480                                          | -     | 0.507        | 12.19                                                                 | -            | 12.70 |
| E                           | 0.380                                          | -     | 0.420        | 9.65                                                                  | -            | 10.67 |
| E1                          | 0.270                                          | -     | 0.350        | 6.86                                                                  | -            | 8.89  |
| E2                          | -                                              | -     | 0.030        | -                                                                     | -            | 0.76  |
| e                           | .100 BSC                                       |       |              | 2.54 BSC                                                              |              |       |
| e1                          | .200 BSC                                       |       |              | 5.08 BSC                                                              |              |       |
| H1                          | 0.230                                          | -     | 0.270        | 5.84                                                                  | -            | 6.86  |
| L                           | 0.500                                          | -     | 0.580        | 12.70                                                                 | -            | 14.73 |
| L1                          | -                                              | -     | 0.250        | -                                                                     | -            | 6.35  |
| ΦP                          | 0.139                                          | -     | 0.161        | 3.30                                                                  | -            | 4.06  |
| Q                           | 0.100                                          | -     | 0.135        | 2.54                                                                  | -            | 3.30  |
| SIPEX Pkg Signoff Date/Rev: |                                                |       |              | JL Aug4-05 / Rev A                                                    |              |       |


**FRONT VIEW**

**SIDE VIEW**

**DETAIL C**

**BACK VIEW**

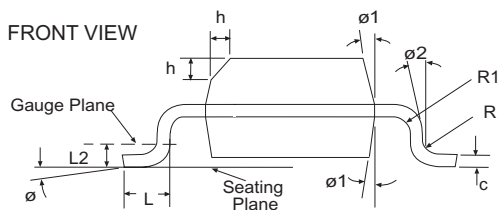
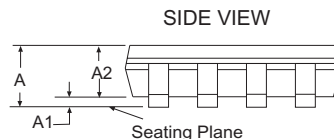
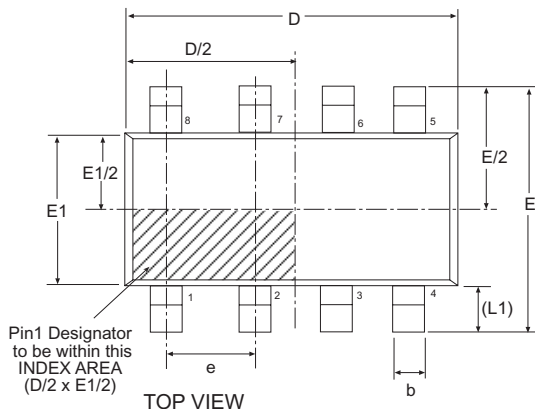
| 5 Pin TO-263 JEDEC TO-263   |                                 |     |       | Variation BA                                           |     |       |
|-----------------------------|---------------------------------|-----|-------|--------------------------------------------------------|-----|-------|
| SYMBOL                      | Inches<br>Controlling Dimension |     |       | Millimeters<br>Conversion Factor:<br>1 Inch = 25.40 mm |     |       |
|                             | MIN                             | NOM | MAX   | MIN                                                    | NOM | MAX   |
| A                           | 0.160                           | -   | 0.190 | 4.06                                                   | -   | 4.83  |
| A1                          | 0.000                           | -   | 0.010 | 0.00                                                   | -   | 0.25  |
| b                           | 0.020                           | -   | 0.039 | 0.51                                                   | -   | 0.99  |
| c                           | 0.015                           | -   | 0.029 | 0.38                                                   | -   | 0.74  |
| c2                          | 0.045                           | -   | 0.065 | 11.43                                                  | -   | 5.84  |
| D                           | 0.330                           | -   | 0.380 | 8.38                                                   | -   | 9.65  |
| D1                          | 0.270                           | -   | -     | 6.86                                                   | -   | -     |
| E                           | 0.380                           | -   | 0.420 | 9.65                                                   | -   | 10.67 |
| E1                          | 0.245                           | -   | -     | 6.22                                                   | -   | -     |
| e                           | .067 BSC                        |     |       | 17.02 BSC                                              |     |       |
| H                           | 0.575                           | -   | 0.625 | 14.61                                                  | -   | 15.88 |
| L                           | 0.070                           | -   | 0.110 | 1.78                                                   | -   | 2.79  |
| L1                          | -                               | -   | 0.066 | -                                                      | -   | 1.68  |
| L3                          | .010 BSC                        |     |       | 2.54 BSC                                               |     |       |
| Θ                           | 0°                              | -   | 8°    | 0°                                                     | -   | 8°    |
| SIPEX Pkg Signoff Date/Rev: |                                 |     |       | JL Jan18-06/Rev A                                      |     |       |



| 3 Pin TO-263 JEDEC TO-263   |                       |     |       | Variation AA                            |     |       |
|-----------------------------|-----------------------|-----|-------|-----------------------------------------|-----|-------|
| SYMBOL                      | Inches                |     |       | Millimeters                             |     |       |
|                             | Controlling Dimension |     |       | Conversion Factor:<br>1 Inch = 25.40 mm |     |       |
|                             | MIN                   | NOM | MAX   | MIN                                     | NOM | MAX   |
| A                           | 0.160                 | -   | 0.190 | 4.06                                    | -   | 4.83  |
| A1                          | 0.000                 | -   | 0.010 | 0.00                                    | -   | 0.25  |
| b                           | 0.020                 | -   | 0.039 | 0.51                                    | -   | 0.99  |
| b2                          | 0.045                 | -   | 0.070 | 1.14                                    | -   | 1.78  |
| c                           | 0.015                 | -   | 0.029 | 0.38                                    | -   | 0.74  |
| c2                          | 0.045                 | -   | 0.065 | 1.14                                    | -   | 1.65  |
| D                           | 0.330                 | -   | 0.380 | 8.38                                    | -   | 9.65  |
| D1                          | 0.270                 | -   | -     | 6.86                                    | -   | -     |
| E                           | 0.380                 | -   | 0.420 | 9.65                                    | -   | 10.67 |
| E1                          | 0.245                 | -   | -     | 6.22                                    | -   | -     |
| e                           | .100 BSC              |     |       | 2.54 BSC                                |     |       |
| H                           | 0.575                 | -   | 0.625 | 14.61                                   | -   | 15.88 |
| L                           | 0.070                 | -   | 0.110 | 1.78                                    | -   | 2.79  |
| L1                          | -                     | -   | 0.066 | -                                       | -   | 1.68  |
| L3                          | .010 BSC              |     |       | 0.25 BSC                                |     |       |
| Θ                           | 0°                    | -   | 8°    | 0°                                      | -   | 8°    |
| SIPEX Pkg Signoff Date/Rev: |                       |     |       | JL Aug5-05 / Rev A                      |     |       |



| 3 Pin SOT-223               |                                      |      | JEDEC TO-261 |                                                   | Variation AA |       |
|-----------------------------|--------------------------------------|------|--------------|---------------------------------------------------|--------------|-------|
|                             | Millimeters<br>Controlling Dimension |      |              | Inches<br>Conversion Factor:<br>1 Inch = 25.40 mm |              |       |
| SYMBOL                      | MIN                                  | NOM  | MAX          | MIN                                               | NOM          | MAX   |
| A                           | -                                    | -    | 1.80         | -                                                 | -            | 0.071 |
| A1                          | 0.02                                 | -    | 0.10         | 0.001                                             | -            | 0.004 |
| A2                          | 1.50                                 | 1.60 | 1.70         | 0.060                                             | 0.063        | 0.067 |
| b                           | 0.66                                 | 0.76 | 0.84         | 0.026                                             | 0.030        | 0.033 |
| b2                          | 2.90                                 | 3.00 | 3.10         | 0.114                                             | 0.118        | 0.122 |
| c                           | 0.23                                 | 0.30 | 0.35         | 0.010                                             | 0.012        | 0.014 |
| D                           | 6.30                                 | 6.50 | 6.70         | 0.248                                             | 0.256        | 0.264 |
| E                           | 6.70                                 | 7.00 | 7.30         | 0.264                                             | 0.276        | 0.287 |
| E1                          | 3.30                                 | 3.50 | 3.70         | 0.130                                             | 0.138        | 0.146 |
| e                           | 2.30 BASIC                           |      |              | 0.091 BASIC                                       |              |       |
| e1                          | 4.60 BASIC                           |      |              | 0.182 BASIC                                       |              |       |
| L                           | 0.75                                 | -    | -            | 0.030                                             | -            | -     |
| L2                          | 0.25 BASIC                           |      |              | 0.010 BASIC                                       |              |       |
| ø                           | 0°                                   | -    | 10°          | 0°                                                | -            | 10°   |
| SIPEX Pkg Signoff Date/Rev: |                                      |      |              | JL Aug8-05/Rev A                                  |              |       |



| 8 Pin NSOIC                 |                                                     |     |      | JEDEC MS-012                                                    |     | Variation AA |  |
|-----------------------------|-----------------------------------------------------|-----|------|-----------------------------------------------------------------|-----|--------------|--|
| SYMBOL                      | Dimensions in Millimeters:<br>Controlling Dimension |     |      | Dimensions in Inches<br>Conversion Factor:<br>1 Inch = 25.40 mm |     |              |  |
|                             | MIN                                                 | NOM | MAX  | MIN                                                             | NOM | MAX          |  |
| A                           | 1.35                                                | -   | 1.75 | 0.053                                                           | -   | 0.069        |  |
| A1                          | 0.10                                                | -   | 0.25 | 0.004                                                           | -   | 0.010        |  |
| A2                          | 1.25                                                | -   | 1.65 | 0.049                                                           | -   | 0.065        |  |
| b                           | 0.31                                                | -   | 0.51 | 0.012                                                           | -   | 0.020        |  |
| c                           | 0.17                                                | -   | 0.25 | 0.007                                                           | -   | 0.010        |  |
| E                           | 6.00 BSC                                            |     |      | 0.236 BSC                                                       |     |              |  |
| E1                          | 3.90 BSC                                            |     |      | 0.154 BSC                                                       |     |              |  |
| e                           | 1.27 BSC                                            |     |      | 0.050 BSC                                                       |     |              |  |
| h                           | 0.25                                                |     | 0.50 | 0.010                                                           | -   | 0.020        |  |
| L                           | 0.40                                                | -   | 1.27 | 0.016                                                           | -   | 0.050        |  |
| L1                          | 1.04 REF                                            |     |      | 0.041 REF                                                       |     |              |  |
| L2                          | 0.25 BSC                                            |     |      | 0.010 BSC                                                       |     |              |  |
| R                           | 0.07                                                | -   | -    | 0.003                                                           | -   | -            |  |
| R1                          | 0.07                                                | -   | -    | 0.003                                                           | -   | -            |  |
| ø                           | 0°                                                  | -   | 8°   | 0°                                                              | -   | 8°           |  |
| ø1                          | 5°                                                  | -   | 15°  | 5°                                                              | -   | 15°          |  |
| ø2                          | 0°                                                  | -   | -    | 0°                                                              | -   | -            |  |
| D                           | 4.90 BSC                                            |     |      | 0.193 BSC                                                       |     |              |  |
| SIPEX Pkg Signoff Date/Rev: |                                                     |     |      | JL Aug16-05 / Rev A                                             |     |              |  |

| Ordering No.     | Accuracy | Output Voltage | Packages      |
|------------------|----------|----------------|---------------|
| SPX2945M3-3-3    | 1%       | 3.3V           | 3-Pin SOT-223 |
| SPX2945M3-3-3/TR | 1%       | 3.3V           | 3-Pin SOT-223 |
| SPX2945M3-5-0    | 1%       | 5.0V           | 3-Pin SOT-223 |
| SPX2945M3-5-0/TR | 1%       | 5.0V           | 3-Pin SOT-223 |
| SPX2945S-3-3     | 1%       | 3.3V           | 8-Pin NSOIC   |
| SPX2945S-3-3/TR  | 1%       | 3.3V           | 8-Pin NSOIC   |
| SPX2945S-5-0     | 1%       | 5.0V           | 8-Pin NSOIC   |
| SPX2945S-5-0/TR  | 1%       | 5.0V           | 8-Pin NSOIC   |
| SPX2945R-3-3     | 1%       | 3.3V           | 3-Pin TO-252  |
| SPX2945R-3-3/TR  | 1%       | 3.3V           | 3-Pin TO-252  |
| SPX2945R-5-0     | 1%       | 5.0V           | 3-Pin TO-252  |
| SPX2945R-5-0/TR  | 1%       | 5.0V           | 3-Pin TO-252  |
| SPX2945T-3-3     | 1%       | 3.3V           | 3-Pin TO-263  |
| SPX2945T-3-3/TR  | 1%       | 3.3V           | 3-Pin TO-263  |
| SPX2945T-5-0     | 1%       | 5.0V           | 3-Pin TO-263  |
| SPX2945T-5-0/TR  | 1%       | 5.0V           | 3-Pin TO-263  |
| SPX2945T5-3-3    | 1%       | 3.3V           | 5-Pin TO-263  |
| SPX2945T5-3-3/TR | 1%       | 3.3V           | 5-Pin TO-263  |
| SPX2945T5-5-0    | 1%       | 5.0V           | 5-Pin TO-263  |
| SPX2945T5-5-0/TR | 1%       | 5.0V           | 5-Pin TO-263  |
| SPX2945U-3-3     | 1%       | 3.3V           | 3-Pin TO-220  |
| SPX2945U-5-0     | 1%       | 5.0V           | 3-Pin TO-220  |

Available in lead free packaging. To order add "-L" suffix to part number.

Example: SPX2954S-5-0/TR = standard; SPX2954S-L-5-0/TR = lead free

/TR = Tape and Reel

Pack quantity is 500 for TO-263, 2,000 for TO-252, and 2,500 for SOT223 or NSOIC.



Solved By Sipex™

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Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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