



# REG1118

## 800mA Low Dropout Positive Regulator with Current Source and Sink Capability

### FEATURES

- SOURCES 800mA, SINKS 400mA
- 2.85V OUTPUT FOR SCSI ACTIVE NEGATION TERMINATION
- 1.3V max DROPOUT VOLTAGE AT  $I_o = 800\text{mA}$
- INTERNAL CURRENT LIMIT
- THERMAL OVERLOAD PROTECTION
- SOT-223 SURFACE MOUNT PACKAGE

### APPLICATIONS

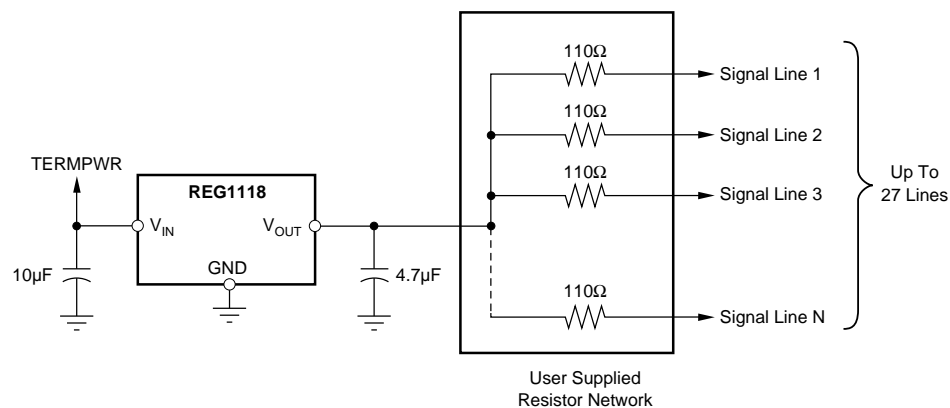
- SCSI-2 AND SCSI-3 DEVICES
- FAST-20 SCSI
- ACTIVE NEGATION SCSI TERMINATORS
- SUPPLY SPLITTER GROUND GENERATION

### DESCRIPTION

The REG1118-2.85 is a three-terminal voltage regulators capable of sourcing up to 800mA and sinking up to 400mA. The sinking capability is important in SCSI applications where active negation line drivers are used. The REG1118-2.85 is useful for making a 27-line Boulay terminator capable of interfacing with active negation drivers required in FAST-20 SCSI applications. The regulator has active current limits for both sink and source currents as well as internal thermal limiting.

Laser trimming assures excellent output voltage accuracy. An NPN output stage allows output stage drive current to contribute to the source load current for maximum efficiency.

REG1118 is packaged in a SOT-223 surface-mount package, suitable for reflow soldering techniques.



REG1118-2.85 Used to Make Active Negation SCSI Terminator

# SPECIFICATIONS

At  $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$ ,  $\text{TERMPWR} = +5\text{V}$ , unless otherwise noted.

| PARAMETER  | CONDITIONS  | REG1118-2.85  |              |                  | UNITS  |
|--|---|---------------|--------------|------------------|--|
|  |   | MIN           | TYP          | MAX              |  |
| OUTPUT VOLTAGE   | No Load, $T_A = 25^\circ\text{C}$<br>All Operating Conditions <sup>(1)</sup>                                    | 2.82<br>2.79  | 2.85<br>2.85 | 2.88<br>2.91     | V<br>V   |
| LINE REGULATION <sup>(2)</sup>   | $I_O = 0$ , $V_{IN} = 4.75\text{V}$ to $6\text{V}$  |               | 0.3          | 4                | mV   |
| LOAD REGULATION <sup>(2)</sup>   | $I_O = 0$ to $800\text{mA}$<br>$I_O = -400$ to $0\text{mA}$   |               | 2<br>25      | 25<br>60         | mV<br>mV   |
| DROPOUT VOLTAGE <sup>(3)</sup>   | $T_A = 25^\circ\text{C}$<br>$I_O = 100\text{mA}$<br>$I_O = 800\text{mA}$  |               | 0.8<br>1.1   | 1.1<br>1.3       | V<br>V   |
| CURRENT LIMIT<br>Positive ( $I_{SC+}$ ) <sup>(4)</sup><br>Negative ( $I_{SC-}$ )   | $T_A = 25^\circ\text{C}$<br>$V_{OUT} = 3.7\text{V}$   | 800           | 1450<br>-750 | -400             | mA<br>mA   |
| QUIESCENT CURRENT  | $I_O = 0$   |               | 3            | 7                | mA   |
| RIPPLE REJECTION   | $T_A = 25^\circ\text{C}$<br>$f = 120\text{Hz}$ , $V_{IN} - V_{OUT} = 2\text{V}$ , $V_{RIPPLE} = 0.5\text{Vp-p}$ |               | 56           |                  | dB   |
| LONG-TERM STABILITY  | $T_A = +125^\circ\text{C}$ , 1000Hr   |               | 0.2          |                  | %  |
| THERMAL SHUTDOWN<br>Junction Temperature Shutdown<br>Junction Temperature Reset  |   |               | 150<br>140   |                  | $^\circ\text{C}$<br>$^\circ\text{C}$   |
| THERMAL RESISTANCE<br>Specified Junction Temperature Range<br>Operating Junction Temperature Range<br>Storage Range<br>Thermal Resistance<br>$\theta_{JC}$ | (Junction-to-Case at Tab)   | 0<br>0<br>-55 |              | 70<br>125<br>125 | $^\circ\text{C}$<br>$^\circ\text{C}$<br>$^\circ\text{C}$<br>$^\circ\text{C/W}$ |

NOTES: (1) All operating conditions include the combined effects of load current, input voltage, and temperature over each parameter's full specified range. (2) Load and line regulation are tested at a constant junction temperature by low duty cycle testing. (3) Dropout voltage is defined as the minimum input-to-output voltage that produces a 1% decrease in output voltage. (4)  $V_{OUT}$  to ground through  $1\Omega$ .

## ABSOLUTE MAXIMUM RATINGS

|  |   |
|--|---|
| Input Voltage .....                                    | 7V  |
| Output Voltage .....                                   | -0.2V to (V+) +0.5V                         |
| Short-Circuit Duration .....                           | Indefinite                                  |
| Operating Junction Temperature Range .....             | $0^\circ\text{C}$ to $+125^\circ\text{C}$   |
| Storage Temperature Range .....                        | $-55^\circ\text{C}$ to $+125^\circ\text{C}$ |
| Lead Temperature (soldering, 10s) <sup>(1)</sup> ..... | $+300^\circ\text{C}$                        |

NOTE: (1) See "Soldering Methods."

## PACKAGE INFORMATION

| PRODUCT      | PACKAGE | PACKAGE DRAWING NUMBER <sup>(1)</sup> |
|--------------|---------|---------------------------------------|
| REG1118-2.85 | SOT-223 | 311                                   |

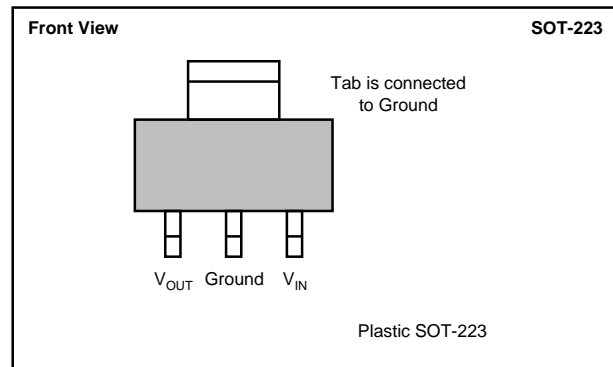
NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.

## ORDERING INFORMATION

| PRODUCT <sup>(1)</sup> | PART MARKING | PACKAGE |
|------------------------|--------------|---------|
| REG1118-2.85           | BB11182      | SOT-223 |

NOTE: (1) Available in Tape and Reel, add -TR to Model Number.

## CONNECTION DIAGRAM

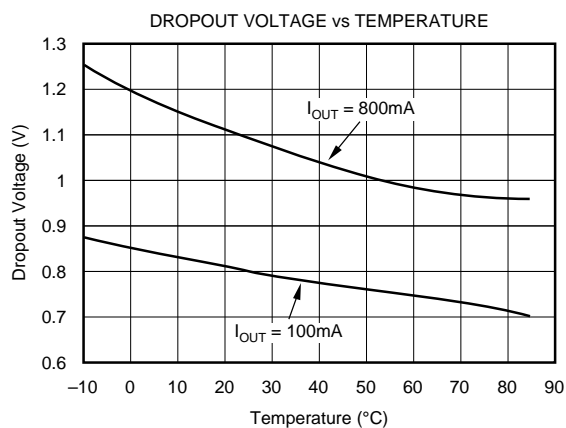
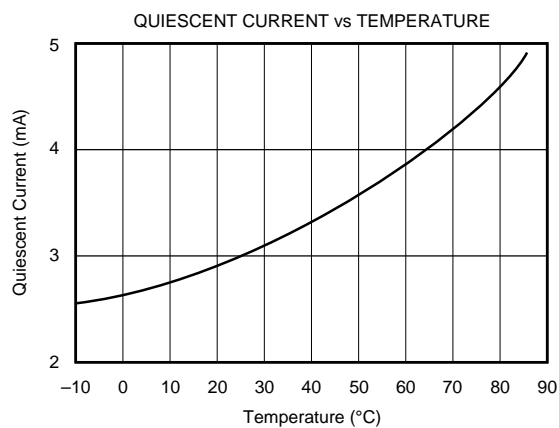
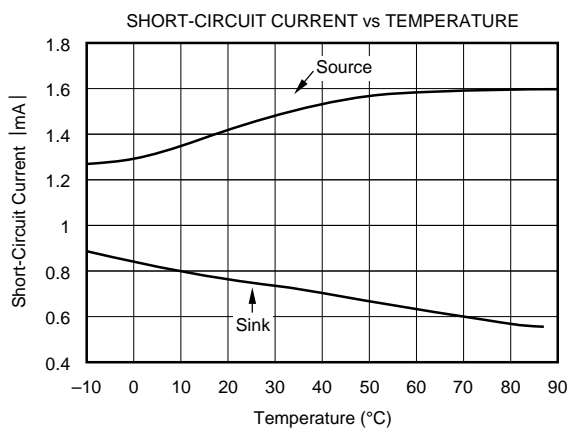
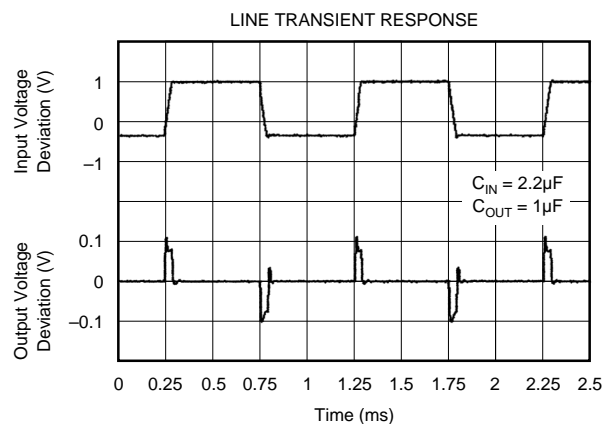
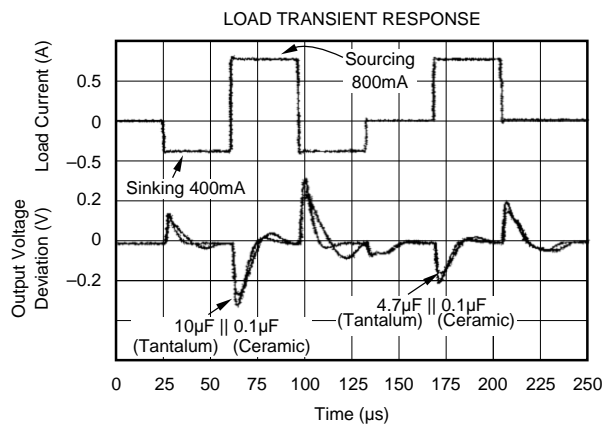


## ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

# TYPICAL PERFORMANCE CURVE

At  $T_A = 25^\circ\text{C}$ ,  $\text{TERMPWR} = +5\text{V}$ , unless otherwise specified.



## APPLICATIONS INFORMATION

Figure 1 shows the basic hookup diagram for the REG1118. An output capacitor is required for proper operation and to improve high frequency load regulation. A high quality capacitor should be used to assure that the ESR (effective series resistance) is less than  $0.5\Omega$ . A capacitor of at least  $1\mu\text{F}$  is recommended. Increasing  $C_{\text{OUT}}$  improves output voltage deviation, see the typical curve "Load Transient Response." It is suggested that the input be decoupled with  $10\mu\text{F}$  low ESR capacitor.

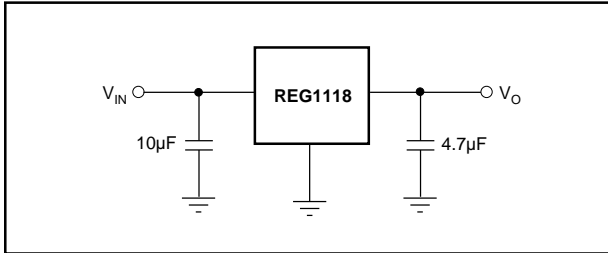


FIGURE 1. Basic Connections.

## THERMAL CONSIDERATIONS

The REG1118 has current limit and thermal shutdown circuits that protect it from overload. The thermal shutdown activates at approximately  $T_J = 150^\circ\text{C}$ . For continuous operation, however, the junction temperature should not be allowed to exceed  $125^\circ\text{C}$ . Any tendency to activate the thermal shutdown in normal use is an indication of an inadequate heat sink or excessive power dissipation. The power dissipation is equal to:

$$P_D = (V_{\text{IN}} - V_{\text{OUT}}) I_{\text{OUT}}$$

The junction temperature can be calculated by:

$$T_J = T_A + P_D (\theta_{JA})$$

where  $T_A$  is the ambient temperature, and

$\theta_{JA}$  is the junction-to-ambient thermal resistance

The REG1118 derives heat sinking from conduction through its copper leads, especially the large mounting tab. These must be soldered to a circuit board with a substantial amount of copper remaining (see Figure 2). Circuit board traces connecting to the tab and the leads should be made as large as practical. Other nearby circuit traces, including those on the back side of the circuit board, help conduct heat away from the device, even though they are not electrically connected. Make all nearby copper traces as wide as possible and leave only narrow gaps between traces. In addition, multiple contacts to internal power and ground planes increase heat sinking with minimal increase in circuit board area.

Table I shows approximate values of  $\theta_{JA}$  for various circuit board and copper areas. Nearby heat dissipating components, circuit board mounting conditions and ventilation can dramatically affect the actual  $\theta_{JA}$ .

A simple experiment will determine whether the maximum recommended junction temperature is exceeded in an actual circuit board and mounting configuration: Increase the

ambient temperature above that expected in normal operation until the device's thermal shutdown is activated. If this occurs at more than  $40^\circ\text{C}$  above the maximum expected ambient temperature, then the  $T_J$  will be less than  $125^\circ\text{C}$  during normal operation.

## SOLDERING METHODS

The REG1118 package is suitable for infrared reflow and vapor-phase reflow soldering techniques. The high rate of temperature change that occurs with wave soldering, or hand soldering can damage the REG1118.

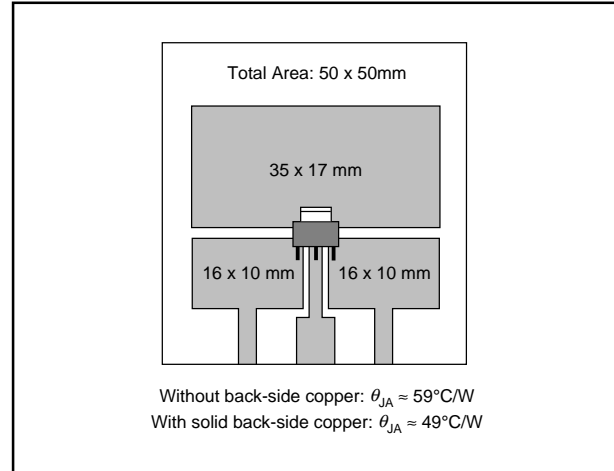


FIGURE 2. Circuit Board Layout Example.

| TOTAL PC BOARD AREA | TOPSIDE <sup>(1)</sup> COPPER AREA | BACKSIDE COPPER AREA | THERMAL RESISTANCE JUNCTION-TO-AMBIENT |
|---------------------|------------------------------------|----------------------|--|
| 2500mm <sup>2</sup> | 2500mm <sup>2</sup>                | 2500mm <sup>2</sup>  | 46°C/W                                 |
| 2500mm <sup>2</sup> | 1250mm <sup>2</sup>                | 2500mm <sup>2</sup>  | 47°C/W                                 |
| 2500mm <sup>2</sup> | 950mm <sup>2</sup>                 | 2500mm <sup>2</sup>  | 49°C/W                                 |
| 2500mm <sup>2</sup> | 2500mm <sup>2</sup>                | 0                    | 51°C/W                                 |
| 2500mm <sup>2</sup> | 1800mm <sup>2</sup>                | 0                    | 53°C/W                                 |
| 1600mm <sup>2</sup> | 600mm <sup>2</sup>                 | 1600mm <sup>2</sup>  | 55°C/W                                 |
| 2500mm <sup>2</sup> | 1250mm <sup>2</sup>                | 0                    | 58°C/W                                 |
| 2500mm <sup>2</sup> | 915mm <sup>2</sup>                 | 0                    | 59°C/W                                 |
| 1600mm <sup>2</sup> | 600mm <sup>2</sup>                 | 0                    | 67°C/W                                 |
| 900mm <sup>2</sup>  | 340mm <sup>2</sup>                 | 900mm <sup>2</sup>   | 72°C/W                                 |
| 900mm <sup>2</sup>  | 340mm <sup>2</sup>                 | 0                    | 85°C/W                                 |

NOTE: (1) Tab is attached to the topside copper.

TABLE I.

INSPEC Abstract Number: B91007604, C91012627  
 Kelly, E.G. "Thermal Characteristics of Surface 5WK9Q Packages." The Proceedings of SMTCON. Surface Mount Technology Conference and Exposition: *Competitive Surface Mount Technology*, April 3-6, 1990, Atlantic City, NJ, USA.  
 Abstract Publisher: IC Manage, 1990, Chicago, IL, USA.

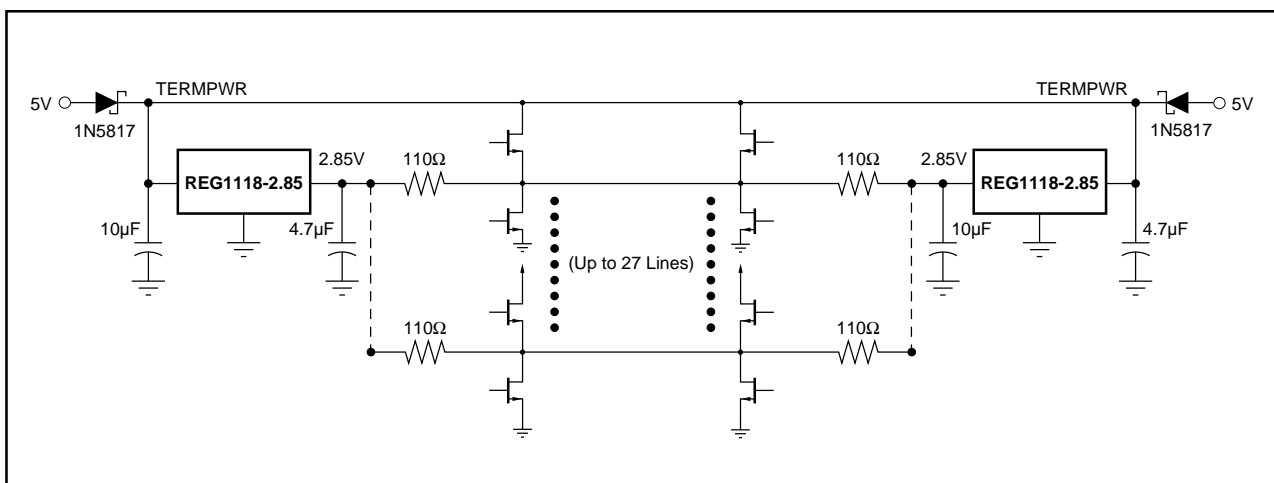


FIGURE 3. SCSI Active Termination Configuration.

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## PACKAGING INFORMATION

| Orderable part number            | Status<br>(1) | Material type<br>(2) | Package   Pins    | Package qty   Carrier | RoHS<br>(3) | Lead finish/<br>Ball material<br>(4) | MSL rating/<br>Peak reflow<br>(5) | Op temp (°C) | Part marking<br>(6) |
|----------------------------------|---------------|----------------------|-------------------|-----------------------|-------------|--------------------------------------|-----------------------------------|--------------|---------------------|
| <a href="#">REG1118-2.85</a>     | Active        | Production           | SOT-223 (DCY)   4 | 80   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 125     | BB11182             |
| REG1118-2.85.A                   | Active        | Production           | SOT-223 (DCY)   4 | 80   TUBE             | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 125     | BB11182             |
| <a href="#">REG1118-2.85/2K5</a> | Active        | Production           | SOT-223 (DCY)   4 | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 125     | BB11182             |
| REG1118-2.85/2K5.A               | Active        | Production           | SOT-223 (DCY)   4 | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 125     | BB11182             |
| REG1118-2.85/2K5G4               | Active        | Production           | SOT-223 (DCY)   4 | 2500   LARGE T&R      | Yes         | NIPDAU                               | Level-1-260C-UNLIM                | 0 to 125     | BB11182             |

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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## TAPE AND REEL INFORMATION



\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|------------------|--------------|-----------------|------|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| REG1118-2.85/2K5 | SOT-223      | DCY             | 4    | 2500 | 330.0              | 12.4               | 7.1     | 7.45    | 1.88    | 8.0     | 12.0   | Q3            |

## TAPE AND REEL BOX DIMENSIONS



\*All dimensions are nominal

| Device           | Package Type | Package Drawing | Pins | SPQ  | Length (mm) | Width (mm) | Height (mm) |
|------------------|--------------|-----------------|------|------|-------------|------------|-------------|
| REG1118-2.85/2K5 | SOT-223      | DCY             | 4    | 2500 | 358.0       | 335.0      | 35.0        |



## TUBE



\*All dimensions are nominal

| Device         | Package Name | Package Type | Pins | SPQ | L (mm) | W (mm) | T (μm) | B (mm) |
|----------------|--------------|--------------|------|-----|--------|--------|--------|--------|
| REG1118-2.85   | DCY          | SOT-223      | 4    | 80  | 542.9  | 8.6    | 3606   | 2.67   |
| REG1118-2.85.A | DCY          | SOT-223      | 4    | 80  | 542.9  | 8.6    | 3606   | 2.67   |

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