BURR - BROWN®



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 = 800mA
- INTERNAL CURRENT LIMIT
- THERMAL OVERLOAD PROTECTION
- SOT-223 SURFACE MOUNT PACKAGE

APPLICATIONS

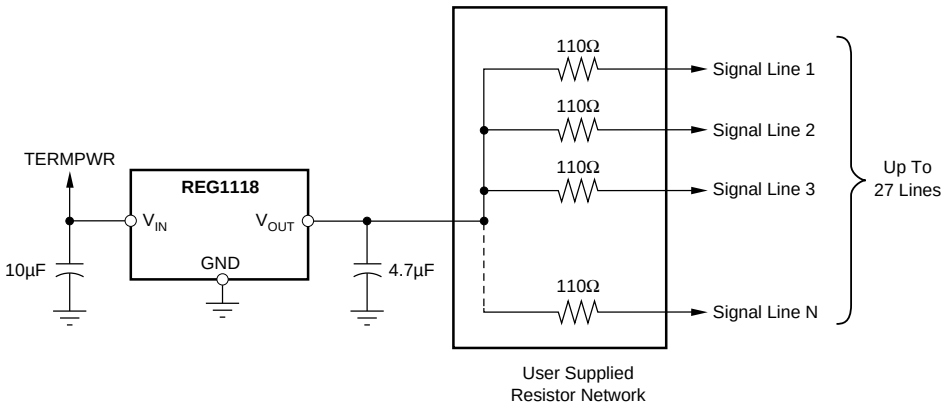
- SCSI-2 AND SCSI-3 DEVICES
- FAST-20 SCSI
- ACTIVE NEGATION SCSI TERMINATORS
- SUPPLY SPLITTER GROUND GENERATION

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

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SBVS005

SPECIFICATIONS

At T_A = 0°C to 70°C, TERMPWR = +5V, unless otherwise noted.

PARAMETER	CONDITIONS	REG1118-2.85 MIN	REG1118-2.85 TYP	REG1118-2.85 MAX	UNITS
OUTPUT VOLTAGE					
	No Load, T_A = 25°C	2.82	2.85	2.88	V
	All Operating Conditions(1)	2.79	2.85	2.91	V
LINE REGULATION(2)					
	I_O = 0, V_{IN} = 4.75V to 6V		0.3	4	mV
LOAD REGULATION(2)					
	I_O = 0 to 800mA		2	25	mV
	I_O = –400 to 0mA		25	60	mV
DROPOUT VOLTAGE(3)	T_A = 25°C				
	I_O = 100mA		0.8	1.1	V
	I_O = 800mA		1.1	1.3	V
CURRENT LIMIT	T_A = 25°C				
Positive (I_{SC}+)(4)		800	1450		mA
Negative (I_{SC}–)	V_{OUT} = 3.7V		–750	–400	mA
QUIESCENT CURRENT	I_O = 0		3	7	mA
RIPPLE REJECTION	T_A = 25°C				
	f = 120Hz, V_{IN} – V_{OUT} = 2V, V_{RIPPLE} = 0.5Vp-p		56		dB
LONG-TERM STABILITY					
	T_A = +125°C, 1000Hr		0.2		%
THERMAL SHUTDOWN					
Junction Temperature Shutdown			150		°C
Junction Temperature Reset			140		°C
THERMAL RESISTANCE					
Specified Junction Temperature Range		0		70	°C
Operating Junction Temperature Range		0		125	°C
Storage Range		–55		125	°C
Thermal Resistance					
θ_{JC}	(Junction-to-Case at Tab)		15		°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 1Ω.

ABSOLUTE MAXIMUM RATINGS

Input Voltage	7V
Output Voltage	–0.2V to (V+) +0.5V
Short-Circuit Duration	Indefinite
Operating Junction Temperature Range	0°C to +125°C
Storage Temperature Range	–55°C to +125°C
Lead Temperature (soldering, 10s)(1)	+300°C

NOTE: (1) See "Soldering Methods."

PACKAGE INFORMATION

PRODUCT	PACKAGE	PACKAGE DRAWING NUMBER(1)
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.

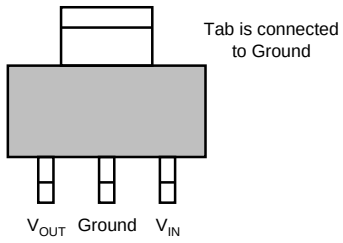
ORDERING INFORMATION

PRODUCT(1)	PART MARKING	PACKAGE
REG1118-2.85	BB11182	SOT-223

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

CONNECTION DIAGRAM

Front View **SOT-223**



Plastic SOT-223

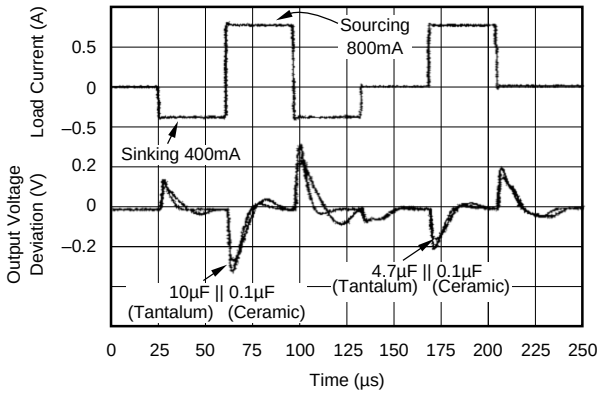
ELECTROSTATIC DISCHARGE SENSITIVITY

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.

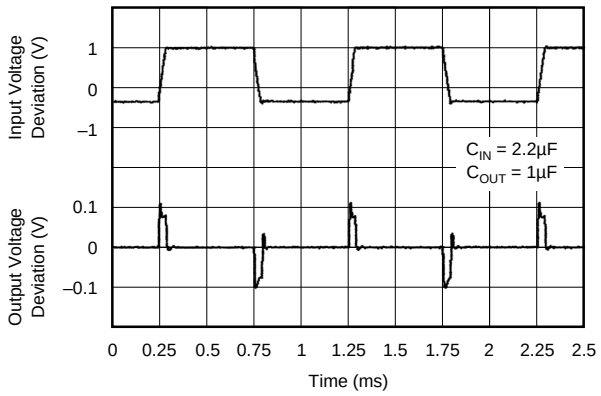
TYPICAL PERFORMANCE CURVE

At T_A = 25°C, TERMPWR = +5V, unless otherwise specified.

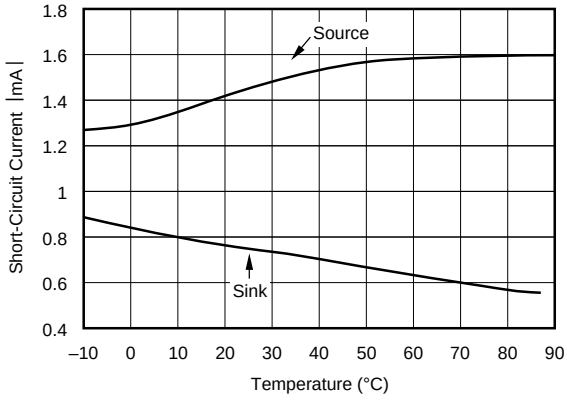
LOAD TRANSIENT RESPONSE



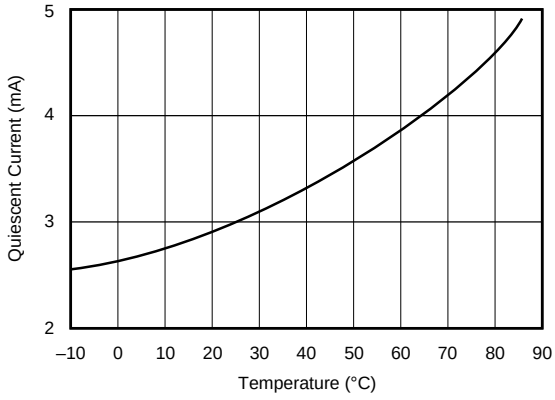
LINE TRANSIENT RESPONSE



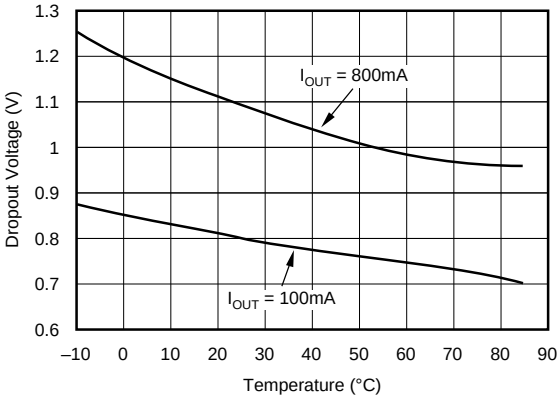
SHORT-CIRCUIT CURRENT vs TEMPERATURE



QUIESCENT CURRENT vs TEMPERATURE



DROPOUT VOLTAGE vs TEMPERATURE



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 0.5Ω. A capacitor of at least 1µF is recommended. Increasing C_{OUT} improves output voltage deviation, see the typical curve "Load Transient Response." It is suggested that the input be decoupled with 10µF low ESR capacitor.

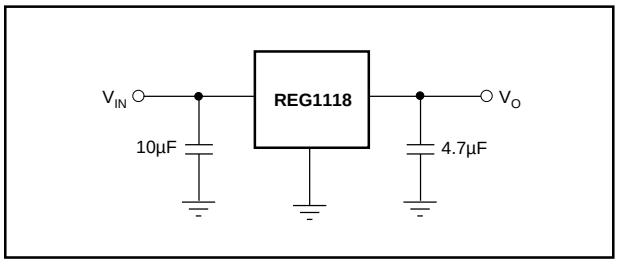


FIGURE 1. Basic Connections.

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°C. For continuous operation, however, the junction temperature should not be allowed to exceed 125°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:

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

The junction temperature can be calculated by:

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

where T_A is the ambient temperature, and
θ_{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 θ_{JA} for various circuit board and copper areas. Nearby heat dissipating components, circuit board mounting conditions and ventilation can dramatically affect the actual θ_{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°C above the maximum expected ambient temperature, then the T_J will be less than 125°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.

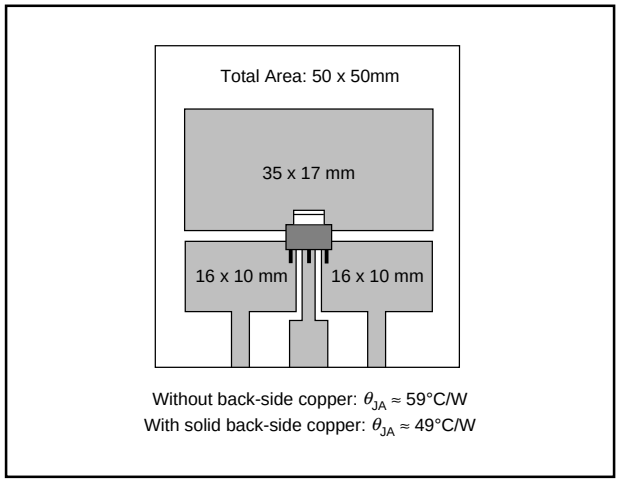


FIGURE 2. Circuit Board Layout Example.

TOTAL PC BOARD AREA	TOPSIDE[1] COPPER AREA	BACKSIDE COPPER AREA	THERMAL RESISTANCE JUNCTION-TO-AMBIENT
2500mm²	2500mm²	2500mm²	46°C/W
2500mm²	1250mm²	2500mm²	47°C/W
2500mm²	950mm²	2500mm²	49°C/W
2500mm²	2500mm²	0	51°C/W
2500mm²	1800mm²	0	53°C/W
1600mm²	600mm²	1600mm²	55°C/W
2500mm²	1250mm²	0	58°C/W
2500mm²	915mm²	0	59°C/W
1600mm²	600mm²	0	67°C/W
900mm²	340mm²	900mm²	72°C/W
900mm²	340mm²	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 5WK9Ω 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.

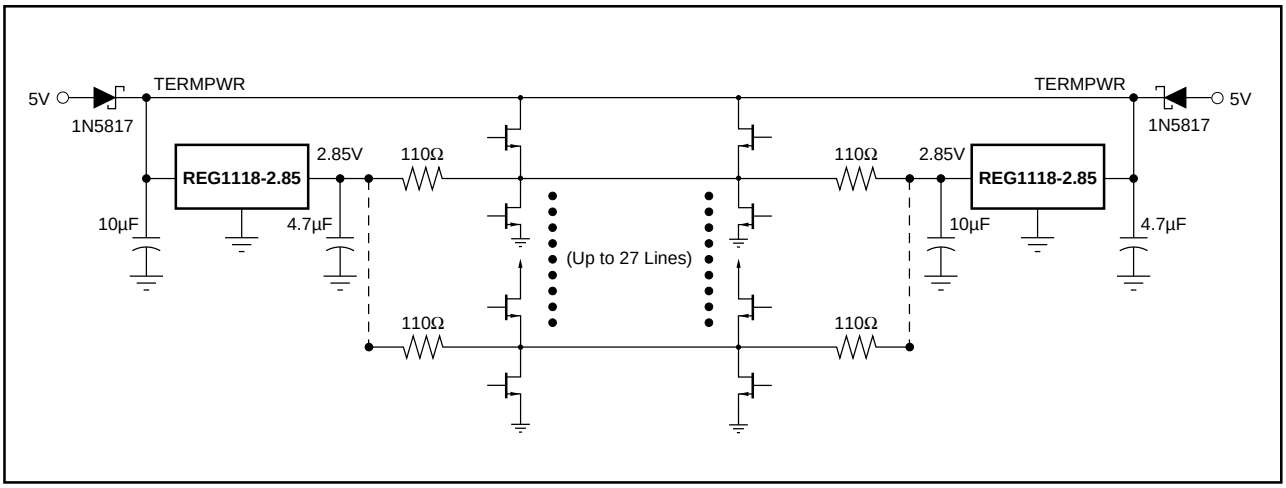


FIGURE 3. SCSI Active Termination Configuration.

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PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
REG1118-2.85	ACTIVE	SOT-223	DCY	4	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REG1118-2.85/2K5	ACTIVE	SOT-223	DCY	4	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REG1118-2.85/2K5G4	ACTIVE	SOT-223	DCY	4	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
REG1118-2.85G4	ACTIVE	SOT-223	DCY	4	80	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

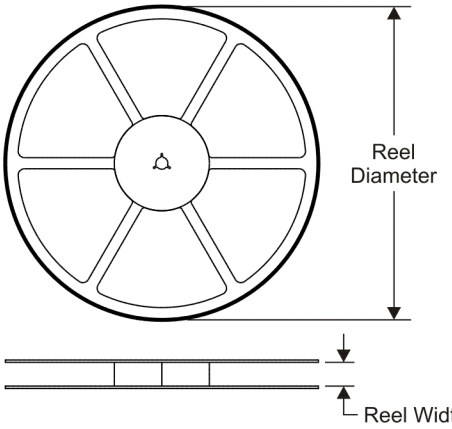
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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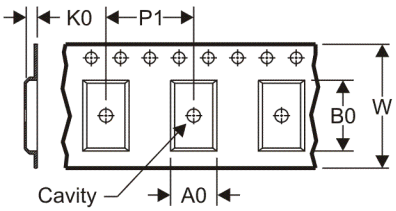
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

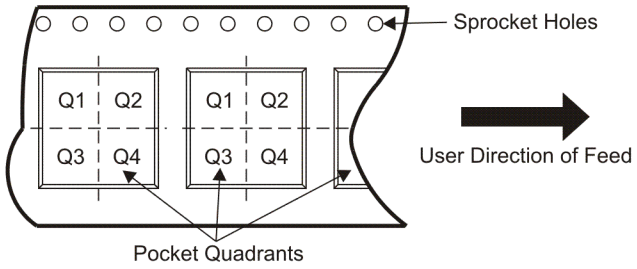


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

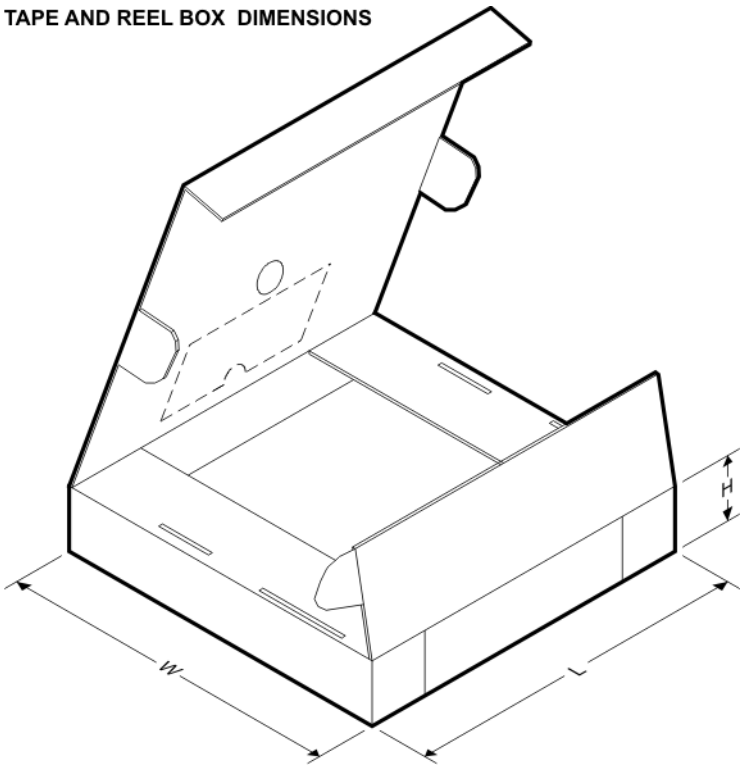
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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	6.8	7.3	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

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