High-Voltage Sense and Low-IQ Supervisory Circuits with Programmable Reset Delay

Features

- Qualified for Automotive Applications
  - AEC-Q100 Grade 1: T_A = −40°C to 125°C
- Wide Supply Voltage Range: 2.4 V to 36 V (VDD Pin Version)
- Very Low Quiescent Current: 2 µA Typical
- Fixed Threshold Voltage from 3.0 V to 12.0 V with 100-mV Step
- High Threshold Accuracy ±1.5% Typical
- Open-Drain Active Low $\overline{\text{RESET}}$ Output
- Green Product, SOT23-6 Package

Applications

- Automotive ECU
- T-box
- EV Inverter
- Battery Charger Unit

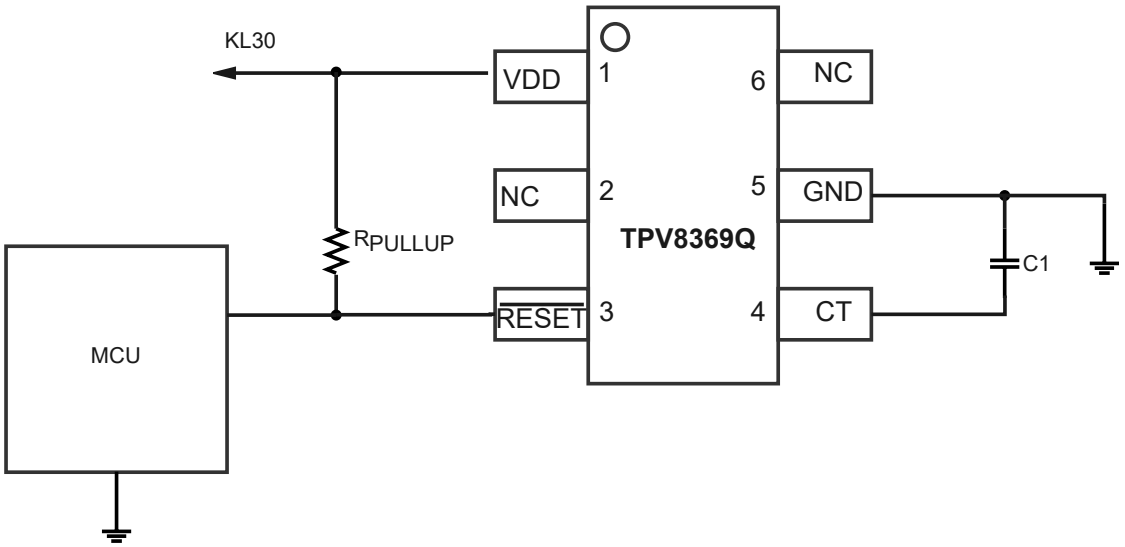
Description

The TPV8369Q is a family of supervisory circuits to monitor a voltage rail from 3.0 V to 12.0 V, asserting an active low open-drain $\overline{\text{RESET}}$ output when the VDD voltage drops below a fixed threshold. The $\overline{\text{RESET}}$ output remains low for the user-adjusted delay time by the external capacitor after the monitored voltage returns above the threshold with hysteresis.

The threshold voltage of the TPV8369Q device can achieve ±1.5% accuracy. The TPV8369Q has a very low typical quiescent current of 2 µA.

The TPV8369Q is available in the SOT23-6 package. Its operating temperature range is from −40°C to +125°C.

Typical Application Circuit



High-Voltage Sense and Low-IQ Supervisory Circuits with Programmable Reset Delay

Table of Contents

Product Family Table

Device	Threshold Voltage (V_{IT})	Sense Pin	Marking	Package
TPV8369VNQ-S6TR-S (1)	3.00	VDD	VNQ	SOT23-6
TPV8369VXQ-S6TR-S (1)	4.00	VDD	VXQ	SOT23-6
TPV8369WCQ-S6TR-S (1)	4.50	VDD	WCQ	SOT23-6
TPV8369WHQ-S6TR-S	5.0	VDD	WHQ	SOT23-6
TPV8369WMQ-S6TR-S (1)	5.50	VDD	WMQ	SOT23-6
TPV8369WOQ-S6TR-S (1)	5.70	VDD	WOQ	SOT23-6
TPV8369XLQ-S6TR-S (1)	8.00	VDD	XLQ	SOT23-6
TPV8369YFQ-S6TR-S (1)	10.00	VDD	YFQ	SOT23-6
TPV8369YZQ-S6TR-S (1)	12.00	VDD	YZQ	SOT23-6

(1) For new threshold voltage configurations, please contact the 3PEAK.

Revision History

Date	Revision	Notes
2026-02-27	Rev.A.0	Initial version

Pin Configuration and Functions

SOT23-6 Package
Top View

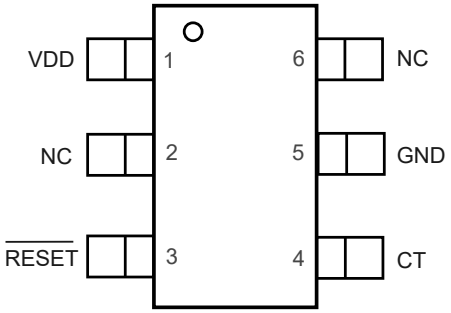


Table 1. Pin Functions: TPV8369Q

Pin	Name	I/O	Description
1	VDD	P	Supply Voltage. A 0.1-μF ceramic capacitor is placed as close as to the V_{DD} pin.
2, 6	NC	-	Not connected.
3	$\overline{\text{RESET}}$	O	$\overline{\text{RESET}}$ Output. This pin is an active low open-drain output. It is driven to a low impedance state when $\overline{\text{RESET}}$ is asserted by the voltage of the VDD voltage lower than the threshold. $\overline{\text{RESET}}$ is low for the reset delay time programmed by the CT pin after the monitored voltage is above V_{IT}. A pulled-up resistor from 10 kΩ to 1 MΩ should be connected to VDD if it is open-drain output.
4	CT	I/O	Reset Delay Time Programming Pin. Connecting this pin to ground referenced capacitor (≥ 100 pF) gives a user-programmable reset delay time.
5	GND	G	Ground. This pin should be connected to ground reference.

Specifications

Absolute Maximum Ratings

Parameter		Min	Max	Unit
	VDD to GND	−0.3	45	V
	Voltage of CT Pin	−0.3	6.5	V
	Output Voltage of $\overline{\text{RESET}}$ Pin	−0.3	6.5	V
	Current of $\overline{\text{RESET}}$ Pin		20	mA
T_J	Maximum Junction Temperature	−40	150	°C
T_A	Operating Temperature Range	−40	150	°C
T_{STG}	Storage Temperature Range	−65	150	°C
T_L	Lead Temperature (Soldering 10 sec)		260	°C

(1) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. Exposure to any Absolute Maximum Rating condition for extended periods may affect device reliability and lifetime.
(2) This data was taken with the JEDEC low effective thermal conductivity test board.
(3) This data was taken with the JEDEC standard multilayer test boards.

ESD, Electrostatic Discharge Protection

Parameter		Condition	Minimum Level	Unit
HBM	Human Body Model ESD	ANSI/ESDA/JEDEC JS-001 (1)	±2000	V
CDM	Charged Device Model ESD	ANSI/ESDA/JEDEC JS-002 (2)	±1000	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions

Parameter		Min	Typ	Max	Unit
V_{DD}	VDD Pin Detection	2.4		36	V
T_A	Operation Temperature	−40		125	℃
T_J	Junction Temperature	−40		125	℃

Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOT23-6	143.9	67.4	°C/W

Electrical Characteristics

All test conditions: V_{DD} = 2.4 V to 36 V (VDD Pin Detection), T_a = −40°C to 125°C, R_{PULLUP} = 10 kΩ to V_{DD}, C_{CT} = 1000 pF, typical values are at T_a = +25°C, unless otherwise noted.

Parameter			Conditions	Min	Typ	Max	Unit
DC Specifications							
V_{DD}	Supply Voltage Range (VDD Pin Detection)		−40°C < T_a < 125°C	2.4		36.0	V
I_{DD}	Quiescent Current (I_Q)		V_{DD} = V_{IT} − 0.1 V		2.0	7.0	μA
			V_{DD} = V_{IT} + 1.0 V		2.0	7.5	μA
I_{OL}	Output Current of the $\overline{\text{RESET}}$ pin		V_{DD} = 4.5 V, V_{DS} = 0.05 V			2	mA
$V_{IT, ERR}$	Negative-going Input Threshold Accuracy		T_a = 25°C	−1.5		1.5	%
			−40°C < T_a < 125°C	−3.0	±1.5	3.0	%
V_{HYS}	Hysteresis on V_{IT}		VDD pin detection		5	5.5	%
			VDD pin without hysteresis	0		10	mV
R_{CTDIS}	CT Pin Discharge NMOS on Resistance		V_{DD} = 13.0 V. V_{CD} = 0.5 V	0.5		3.4	kΩ
Switching Electrical Specifications							
t_D	Reset Delay Time	C_T = 1000 pF	Guaranteed by design and characterization		10		ms
		C_T = 10 nF			100		ms
t_{PHL}	Propagation Delay		V_{IH} = 1.05 V_{DD}, V_{IL} = 0.95 V_{DD}		20		μs

Typical Performance Characteristics

All test conditions: V_{DD} = 5 V, V_A = +25°C, unless otherwise noted.

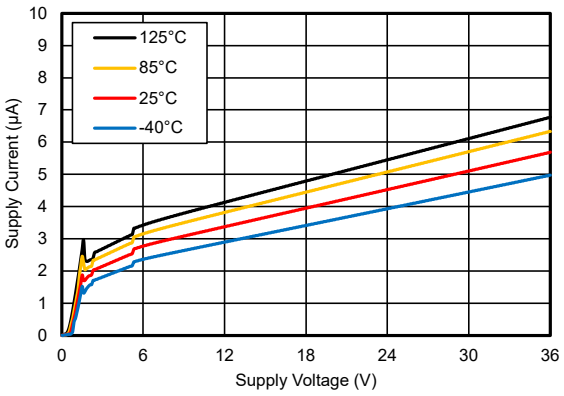


Figure 1. Supply Current vs. Supply Voltage

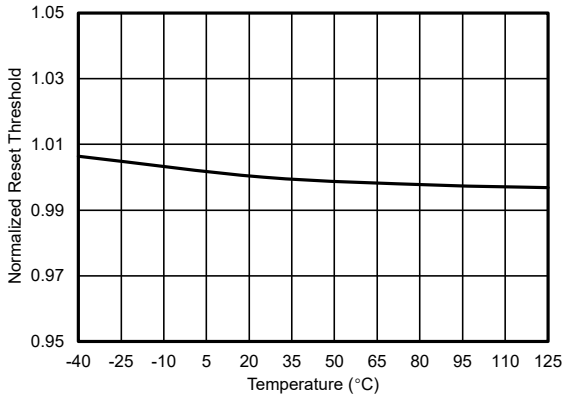


Figure 2. Normalized Reset Threshold vs. Temperature

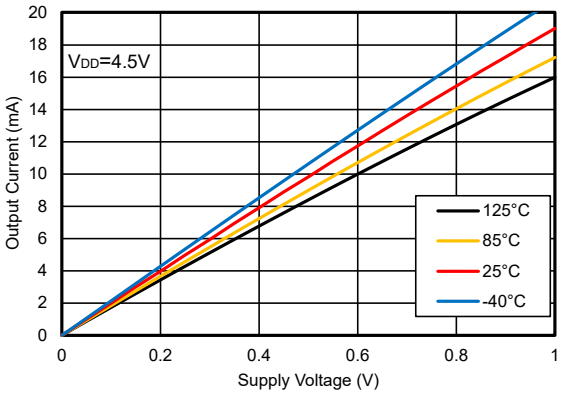


Figure 3. Output Current vs. V_{DS}

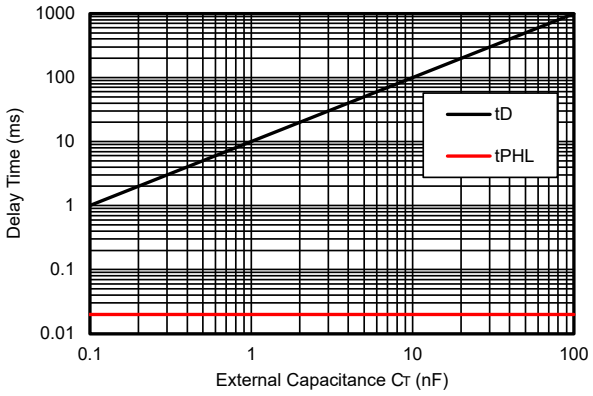


Figure 4. Delay Time vs. External Capacitor for CT Pin

Detailed Description

Overview

The TPV8369Q is a family of supervisory circuits to monitor a voltage rail from 3.0 V to 12.0 V, asserting an active low open-drain $\overline{\text{RESET}}$ output when the VDD voltage drops below a fixed threshold. The $\overline{\text{RESET}}$ output remains low for the user-adjusted delay time by the external capacitor or fixed delay time after the monitored voltage returns above the fixed threshold with hysteresis.

Functional Block Diagram

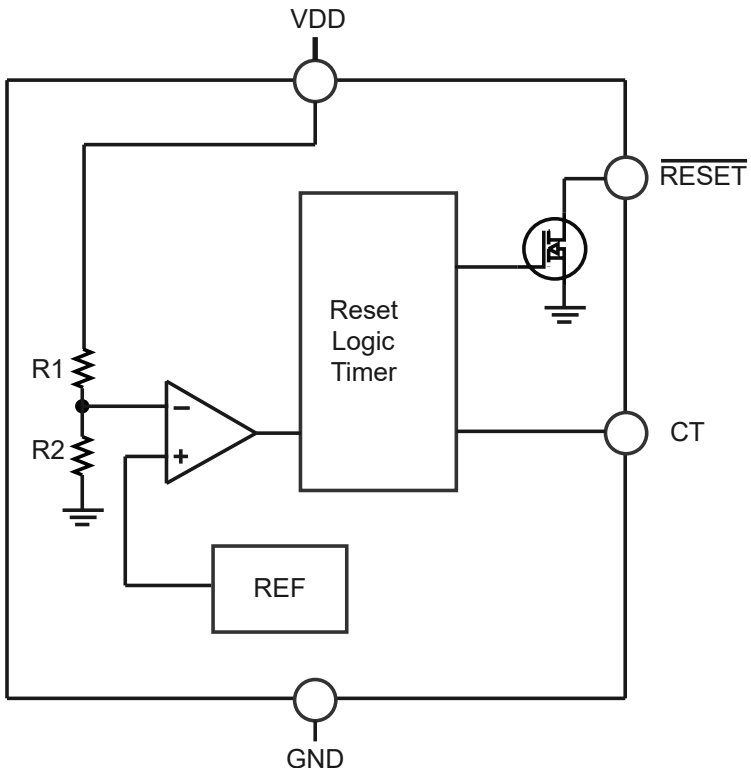


Figure 5. Functional Block Diagram

Feature Description

RESET Output

TPV8369Q features an active-low output, the reset signal is low when the VDD pin voltage (VDD pin version) drops below V_{IT}. The reset remains asserted for the duration of the reset delay time (t_D) after the monitored voltage rises above the reset threshold. The two figures below show the reset outputs.

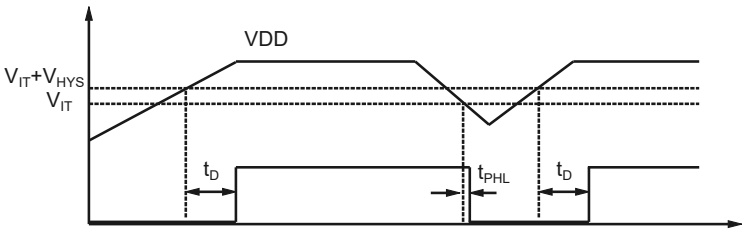


Figure 6. VDD Pin Version Reset Timing

RESET Delay Time

The TPV8369Q provides programmable reset delay time (t_D), which is realized by selecting a capacitor between CT and GND. The reset delay time (t_D) under the given capacitor value is calculated using Equation 1.

$$t_D\,(ms) = 10 \times C_{CT}\,(nF) \quad (1)$$

Application and Implementation

Note

Information in the following application sections is not part of the 3PEAK's component specification and 3PEAK does not warrant its accuracy or completeness. 3PEAK's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

Application Information

The TPV8369Q is a family of supervisory circuits to monitor a wide voltage rail from 3.0 V to 12.0 V, and assert an active low open drain output when the reset threshold is triggered. The reset delay time can be programmed by an external capacitor.

Typical Application

The following figures show the typical application schematic.

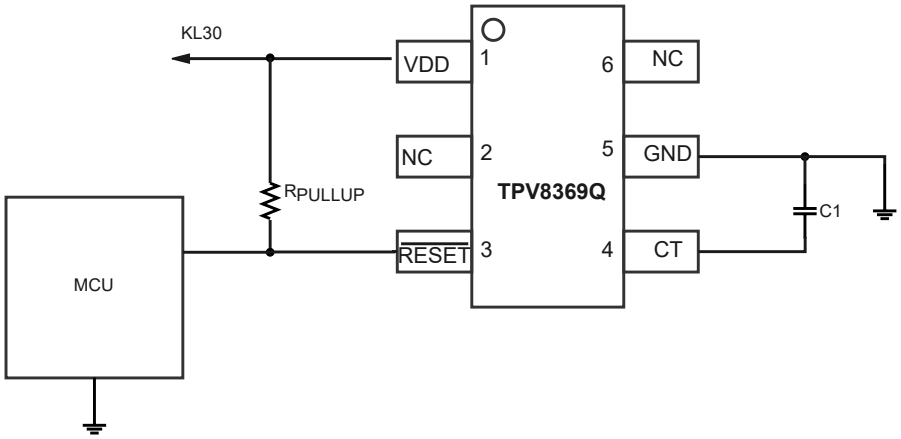
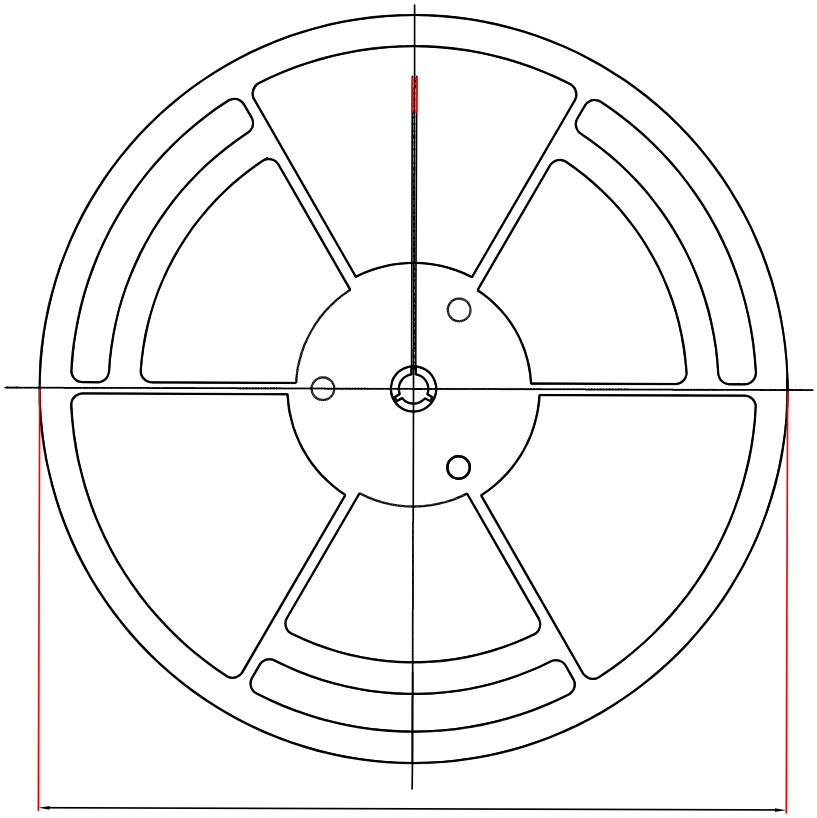
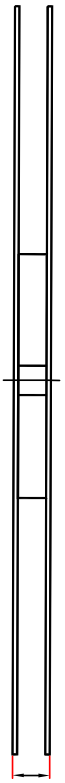
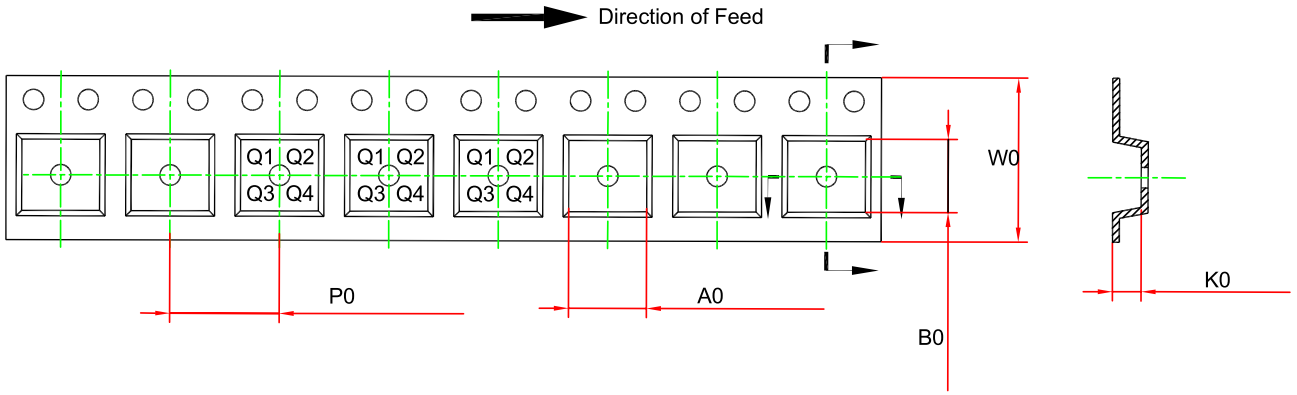


Figure 7. Typical Application Circuit

Tape and Reel Information





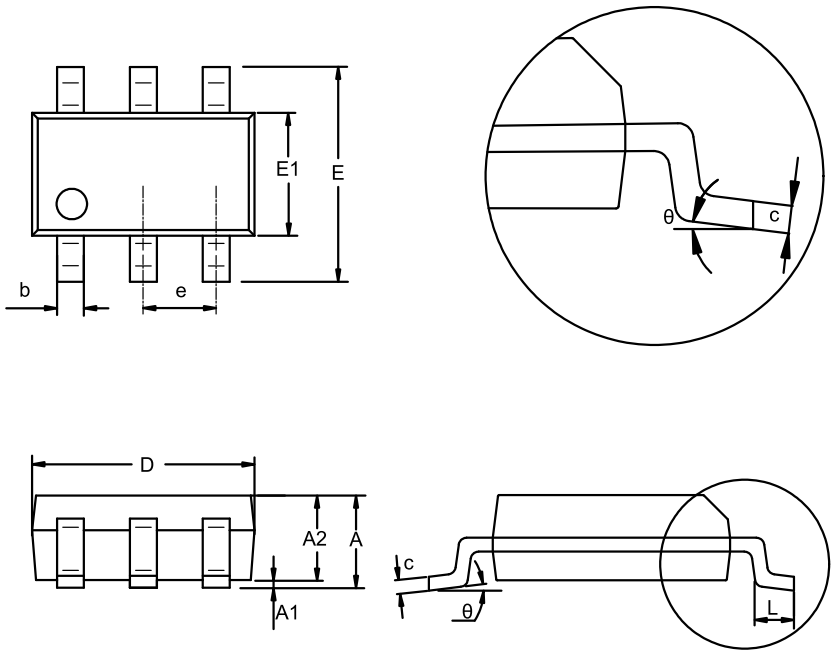


Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPV8369XXX-S6TR-S	SOT23-6	180.0	12	3.3	3.2	1.4	4.0	8.0	Q3

Package Outline Dimensions

SOT23-6

Package Outline Dimensions S6T(SOT23-6-A)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.150	0.000	0.006
A2	1.000	1.200	0.039	0.047
b	0.280	0.500	0.011	0.020
c	0.100	0.230	0.004	0.009
D	2.820	3.020	0.111	0.119
E	2.600	3.000	0.102	0.118
E1	1.500	1.720	0.059	0.068
e	0.950 BSC		0.037 BSC	
L	0.300	0.600	0.012	0.024
θ	0	8°	0	8°

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-178.

Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
TPV8369VNQ-S6TR-S (1)	−40 to 125°C	SOT23-6	VNQ	3	Tape and Reel, 3000	Green
TPV8369VXQ-S6TR-S (1)	−40 to 125°C	SOT23-6	VXQ	3	Tape and Reel, 3000	Green
TPV8369WCQ-S6TR-S (1)	−40 to 125°C	SOT23-6	WCQ	3	Tape and Reel, 3000	Green
TPV8369WHQ-S6TR-S	−40 to 125°C	SOT23-6	WHQ	3	Tape and Reel, 3000	Green
TPV8369WMQ-S6TR-S (1)	−40 to 125°C	SOT23-6	WMQ	3	Tape and Reel, 3000	Green
TPV8369WOQ-S6TR-S (1)	−40 to 125°C	SOT23-6	WOQ	3	Tape and Reel, 3000	Green
TPV8369XLQ-S6TR-S (1)	−40 to 125°C	SOT23-6	XLQ	3	Tape and Reel, 3000	Green
TPV8369YFQ-S6TR-S (1)	−40 to 125°C	SOT23-6	YFQ	3	Tape and Reel, 3000	Green
TPV8369YZQ-S6TR-S (1)	−40 to 125°C	SOT23-6	YZQ	3	Tape and Reel, 3000	Green

(1) For future products, contact the 3PEAK factory for more information and samples.

Green: 3PEAK defines "Green" to mean RoHS compatible and free of halogen substances.

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