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Global Mixed-mode Technology

Dual Remote Resistor-Programmable Temperature Switches

Features

- **Duel Remote Temperature Switches Set by Thermistor and External Resistors**
- **Open-Drain Active Low Output Stage**
- **Guaranteed Output Signal Valid to V_{CC} = 0.8V**
- **SOT-23-8 , AQFN1.5X1.5-8 and TDFN2X2-8 Packages.**

Applications

- **µP Temperature Monitoring in High-Speed Computers**
- **Temperature Control**
- **Temperature Alarms**
- **Fan Control**
- **Automotive**

General Description

The G718 are fully integrated, resistor programmable dual remote temperature switches. The thresholds are set by external resistors and negative temperature coefficient thermistors. The G718 provides open-drain, active low over-temperature outputs for both sensors. These switches operate with a +2.7V to +5.5V single supply.

The G718 are available in 8-pin SOT-23, AQFN1.5X1.5 and TDFN2X2 packages.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G718TM1U	718xx	-40°C to 125°C	SOT-23-8
G718A71U	78 xx	-40°C to 125°C	AQFN1.5X1.5-8
G718RC1U	718	-40°C to 125°C	TDFN2X2-8

Note: TM: SOT-23-8   A7: AQFN1.5X1.5-8   RC:TDFN2X2-8
1: Bonding Code
U: Tape & Reel
Green : Lead Free / Halogen Free.

Pin Configuration
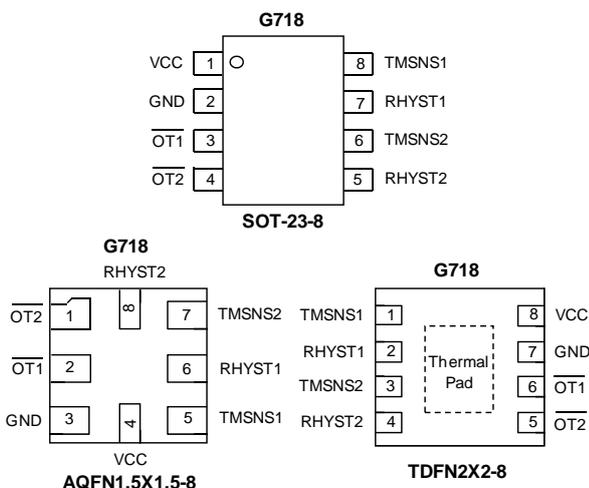
Typical Application Circuit
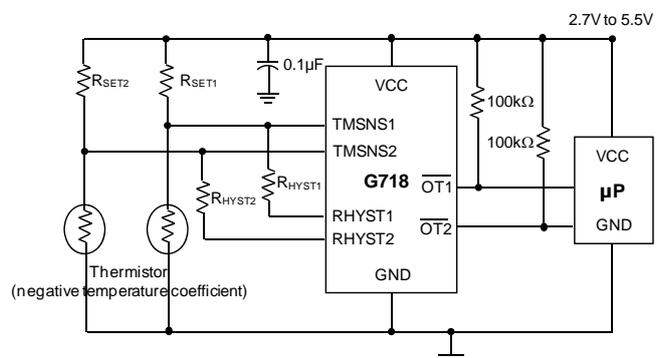
Absolute Maximum Ratings

Reference to GND Supply Voltage (VCC)..-0.3V to +6V
$\overline{OT1}$, $\overline{OT2}$, RHYST1, RHYST2 . . . . -0.3V to +6V
TMSNS1, TMSNS2 . . . . -0.3V to (VCC + 0.3V)
Output Current (all pins) 20mA
Input Current (all pins) 20mA
Thermal Resistance Junction to Ambient, (θJA)*
SOT-23-8 . . . . .250°C/W
AQFN1.5X1.5-8. . . . . 310°C/W
TDFN2X2-8. . . . . TBD°C/W
Continuous Power Dissipation (TA=25°C)*
SOT-23-8 . . . . .0.5W
AQFN1.5X1.5-8. . . . . 0.4W
TDFN2X2-8. . . . . .TBDW

Thermal Resistance Junction to Case, (θJC)
SOT-23-8 . . . . 60°C/W
AQFN1.5X1.5-8. . . . . 100°C/W
TDFN2X2-8. . . . . TBD°C/W
Operating Temperature Range . . . . . -40°C to +125°C
Junction Temperature . . . .+150°C
Storage Temperature Range. . . . . . . -65°C to +150°C
Reflow Temperature (soldering, 10s) . . . . 260°C
ESD(HBM)(Note 1) 2kV

* Please refer to Minimum Footprint PCB Layout Section.
Note 1：Human body model is a 100pF capacitor discharged through a 1.5kΩ resistor into each pin.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

(V$_{CC}$ = +2.7V to +5.5V, T$_A$ = T$_{MIN}$ to T$_{MAX}$, unless otherwise noted. Typical values are at T$_A$ = +25°C.)

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Supply Voltage Range	VCC		2.7	---	5.5	V
Supply Current	ICC	VCC=5.5V	---	42	70	µA
TMSNS Input Threshold	VTH	VCC=5V, VTH/VCC	0.246	0.25	0.254	V/V
		VCC=3V, VTH/VCC	0.24	0.25	0.26	V/V
TMSNS Input Leakage	I$_{TMSNS}$	V$_{TMSNS}$=5.5V	---	---	0.1	µA
Open-Drain RHYST Output Sink Current	I$_{RHYST}$	V$_{RHYST}$ =0.1V, V$_{TMSNS}$=0V	0.5	1.25	---	mA
Open-Drain RHYST Output Leakage Current	I$_{LEAKR}$	V$_{RHYST}$ =VCC, V$_{TMSNS}$=5V	---	---	0.1	µA
Open-Drain $\overline{OT}$ Output Sink Current	I$_{\overline{OT}}$	V$_{\overline{OT}}$ =0.3V, V$_{TMSNS}$=0V	4	7.5	---	mA
Open-Drain $\overline{OT}$ Output Leakage Current	I$_{LEAK\_\overline{OT}}$	V$_{\overline{OT}}$ =VCC, V$_{TMSNS}$=5V	---	---	1	µA
Deglitch time to OT	T$_{OT}$	Deglitch time to $\overline{OT}$ =Low, VCC=3.3V	70	100	250	µs
Deglitch time to dOT*	T$_{dOT}$	Deglitchtime to $\overline{OT}$ =High, VCC=3.3V	8	16	30	µs

* Guaranteed by design

Minimum Footprint PCB Layout Section

SOT-23-8 **AQFN1.5X1.5-8** **TDFN2X2-8**
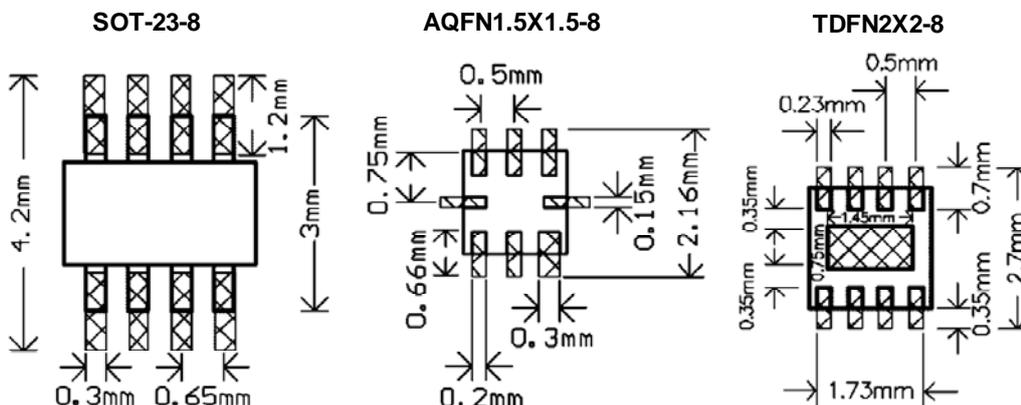
Pin Description

PIN			NAME	FUNCTION
SOT-23-8	AQFN1.5X1.5-8	TDFN2X2-8		
1	4	8	VCC	Power-Supply Input.
2	3	7	GND	Ground
3	2	6	$\overline{OT1}$	Open-Drain Active Low over-temperature output for sensor 1.
4	1	5	$\overline{OT2}$	Open-Drain Active Low over-temperature output for sensor 2.
5	8	4	RHYST2	Connect an external resistor from RHYST1 to TMSNS1 to set hysteresis of second remote temperature sensing.
6	7	3	TMSNS2	Connect an external 1% resistor from TMSNS2 to GND to set trigger point of second remote temperature sensing.
7	6	2	RHYST1	Connect an external resistor from RHYST1 to TMSNS1 to set hysteresis of first remote temperature sensing.
8	5	1	TMSNS1	Connect an external 1% resistor from TMSNS1 to GND to set trigger point of first remote temperature sensing.

Block Diagram
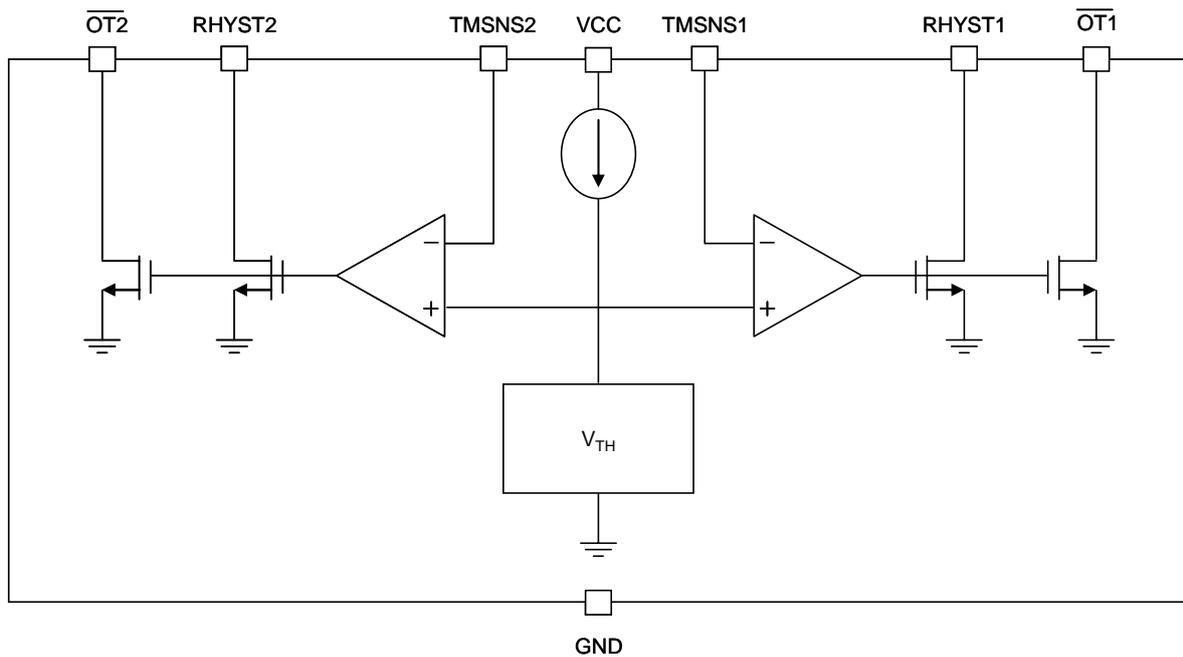
Detailed Description

The G718 fully integrated temperature switches incorporate two remote temperature sensors. The open-drain $\overline{OT1(2)}$ outputs low if sensor 1(2) detects over temperature events.

It's easily interfaces with a microprocessor (μP) reset input.

The temperature threshold is set by external resistor and a thermistor connected to TMSNS and in series from VCC to GND. Another resistor from TMSNS to RHYST set the hysteresis of the sensor.

Applications Information

Remote Temperature Threshold Setting
Refer to Typical Application Circuit. Remote over temperature threshold is set by R_{SET}, and the value is determined by the equations below.

$$R_{SET} = 3* R_{TMH}$$

Where R_{TMH} is the resistance of thermistor at over temperature threshold. The hysteresis temperature (Temperature that release OT) is set by R_{HYST}, and the value is determined by the equations below.

$$R_{HYST} = (R_{SET}* R_{TML}) / (3*R_{TML} - R_{SET})$$

Where R_{TML} is the resistance of thermistor at the hysteresis temperature. Both R_{TMH} and R_{TML} can be found

on datasheet of thermistor. Use high accuracy resistor as R_{SET} and R_{HYST} to achieve more accurate trigger point. Don't connect capacitors to TMSNS or RHYST pin. There is built-in deglitch circuit for over-temperature detection.

To prevent temperature offset due to power or GND differences, put R_{SET} close to G718 and connect power lines to R_{SET} and VCC pin of G718 closely. If the thermistors are far away from G718, users should layout another GND line directly connected to GND pin of G718. (Figure 1)

Thermal Considerations of Remote Temperature Sensor
To monitor accurate remote temperature, put thermistor underneath a socketed μP, allowing the device to monitor the μP's temperature directly.

To minimize trigger point offset come from the temperature coefficient of R_{SET}. Put R_{SET} to the position in relative stable temperature. Another way to reduce the effect is to put R_{SET} close to thermistor and take into account the temperature coefficient when calculate R_{SET}.

Self-heating of thermistor may cause trigger point offset if too large power generated in themistor. Select thermistor with sufficient resistance to reduce power.
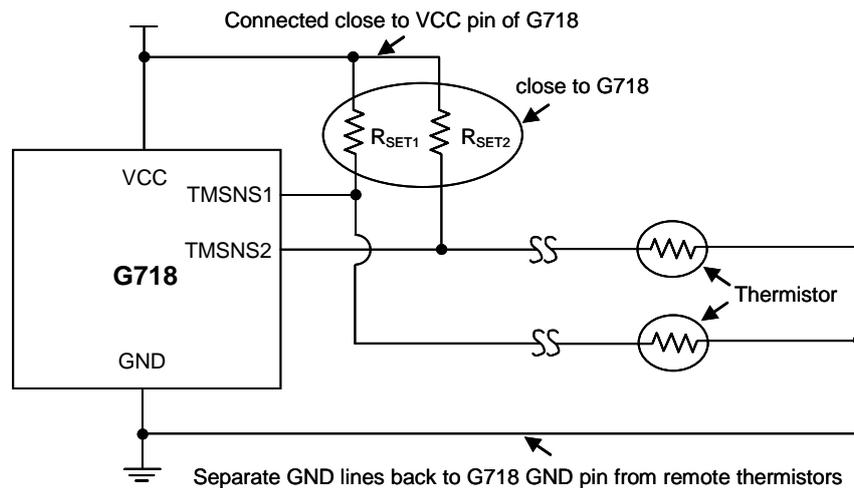

Figure 1

Package Information
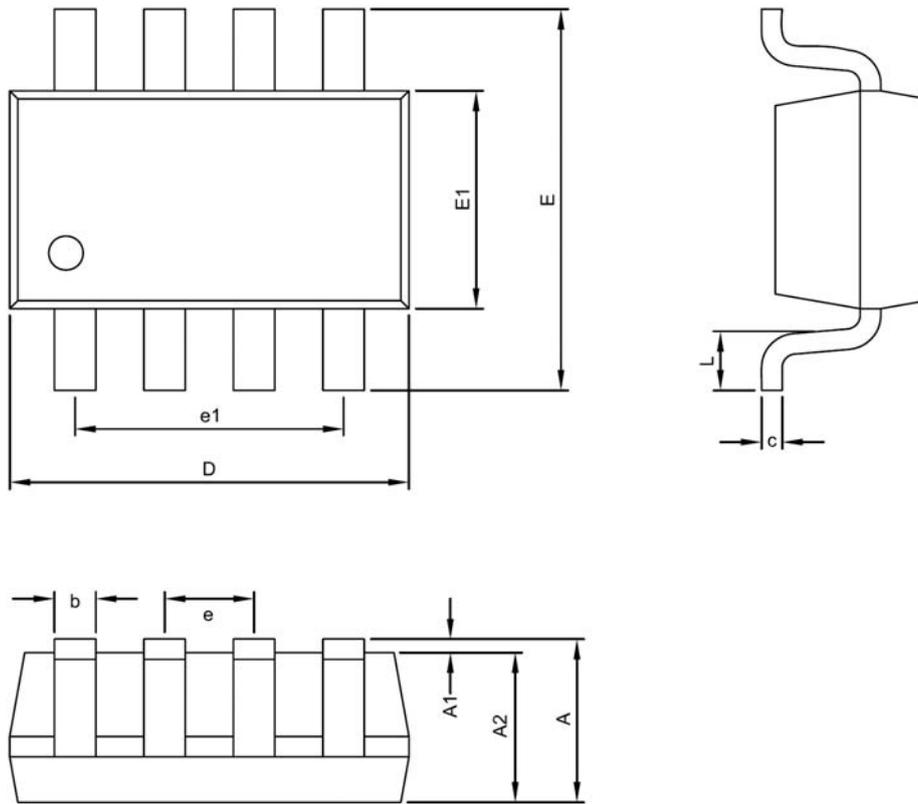
SOT-23-8 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.95	1.10	1.45	0.037	0.043	0.057
A1	0.00	- - -	0.15	0.000	- - -	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
D	2.80	2.90	3.00	0.110	0.114	0.118
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.22	0.30	0.40	0.008	0.012	0.016
e	0.65 BSC			0.026 BSC		
e1	1.95 BSC			0.077 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification

Feed Direction
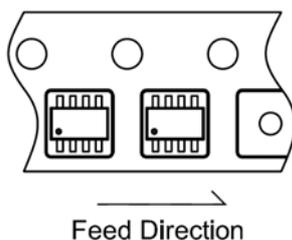
PACKAGE	Q'TY/REEL
SOT-23-8	3,000 ea
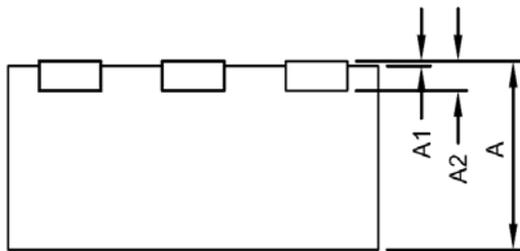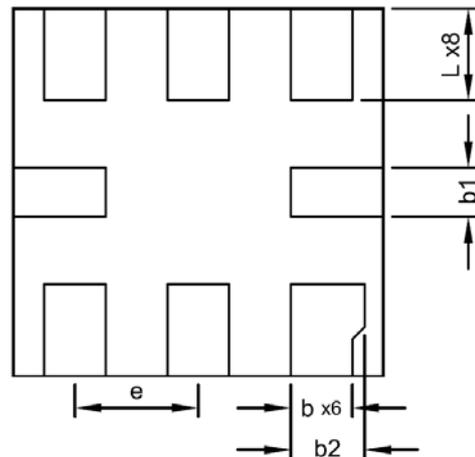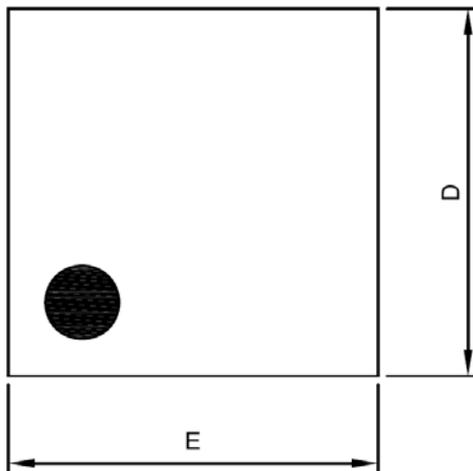
AQFN1.5X1.5-8 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	- - -	0.05	0.0000	- - -	0.0020
A2	0.11 REF			0.0043 REF		
D	1.45	1.50	1.55	0.0570	0.0590	0.0610
E	1.45	1.50	1.55	0.0570	0.0590	0.0610
b	0.20	0.25	0.30	0.0079	0.0098	0.0118
b1	0.15	0.20	0.25	0.0059	0.0079	0.0098
b2	0.30 REF			0.0118 REF		
e	0.50 BSC			0.0197 BSC		
L	0.33	0.38	0.43	0.0130	0.0150	0.0169

Taping Specification
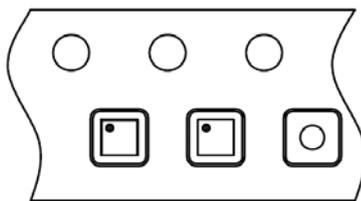
Feed Direction

PACKAGE	Q'TY/REEL
AQFN1.5X1.5-8	3,000 ea
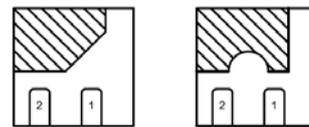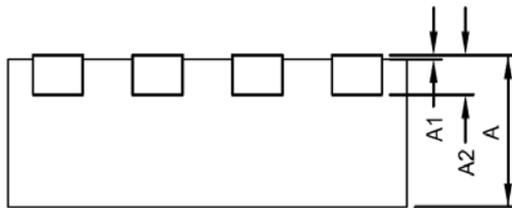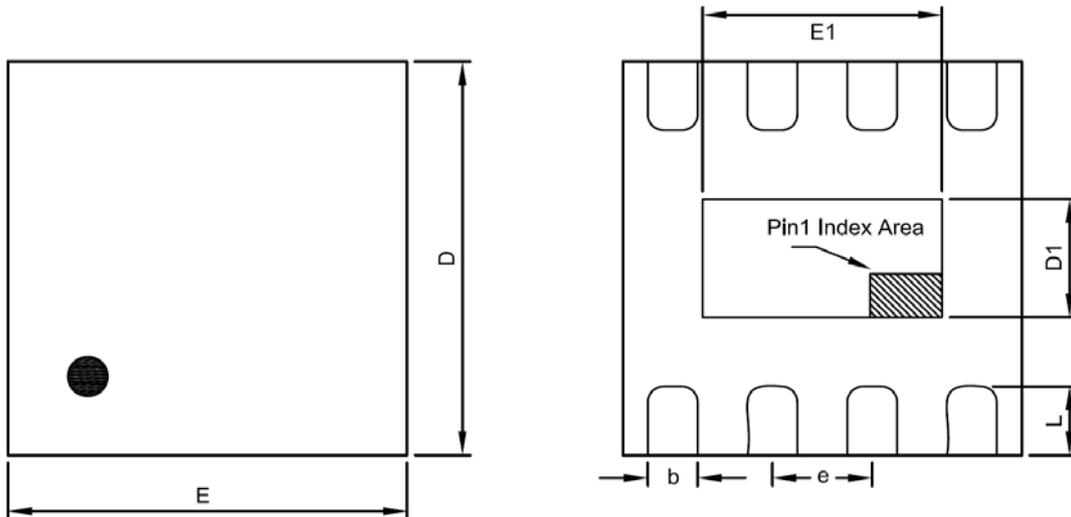
TDFN2X2-8 Package

Symbol	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	- - -	0.05	0.0000	- - -	0.0020
A2	0.20 REF			0.0079 REF		
D	1.95	2.00	2.05	0.0768	0.0787	0.0807
E	1.95	2.00	2.05	0.0768	0.0787	0.0807
D1	0.55	0.65	0.75	0.0217	0.0256	0.0295
E1	1.15	1.25	1.35	0.0453	0.0492	0.0531
b	0.18	0.25	0.30	0.0071	0.0098	0.0118
e	0.50 BSC			0.0197 BSC		
L	0.30	0.35	0.40	0.0118	0.0138	0.0157

Taping Specification

Feed Direction
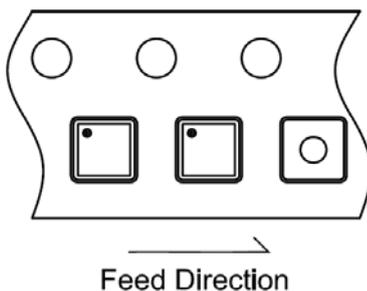
PACKAGE	Q'TY/REEL
TDFN2X2-8	3,000 ea

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