

Features

- Fixed Output Voltage:
 - 1.25 V, 2.048 V, 2.5 V, 3 V, 3.3 V, 4.096 V
- High Initial Accuracy
 - 0.15% Maximum
- Low Temperature Coefficient
 - 10 ppm/°C Typically
 - 30 ppm/°C Maximum
- Operation Temperature Range: -40°C to 125°C
- Output Noise: 50 μ Vpp of 2.5-V Output
- Quiescent current: 180 μ A
- Stable with 0.1 to 10 μ F Capacitive Loads
- Package Options:
 - SOT23G-3
 - QFN1.5X1.5-8
 - WLCSP-4

Applications

- Power
- Instrumentation
- Industry

Description

The TPR34xx-S product is a voltage reference with guaranteed temperature stability over the entire operating temperature range. The temperature range is extended from -40 °C to +125 °C.

Typical Application Circuit

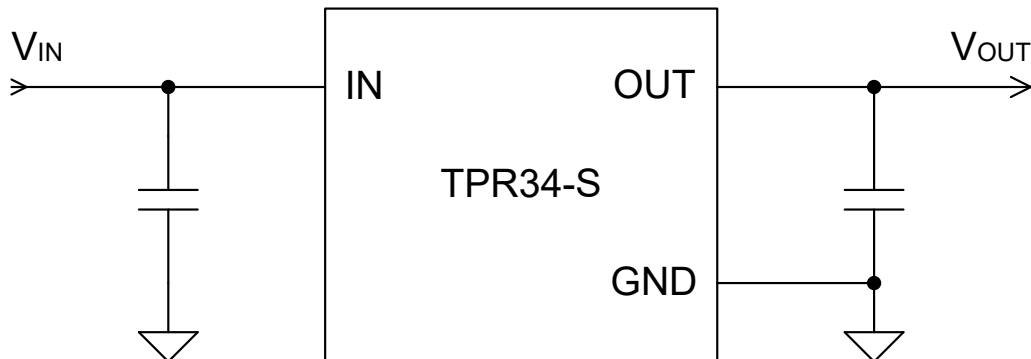


Table of Contents

Features.....	1
Applications.....	1
Description.....	1
Typical Application Circuit.....	1
Product Family Table.....	3
Revision History.....	3
Pin Configuration and Functions.....	4
Specifications.....	5
Absolute Maximum Ratings ⁽¹⁾	5
ESD, Electrostatic Discharge Protection.....	5
Recommended Operating Conditions.....	5
Thermal Information.....	5
Electrical Characteristics.....	6
Typical Performance Characteristics.....	8
Tape and Reel Information.....	10
Package Outline Dimensions.....	11
SOT23G-3.....	11
QFN1.5X1.5-8.....	12
WLCSP.....	13
Order Information.....	14
IMPORTANT NOTICE AND DISCLAIMER.....	15

Product Family Table

Order Number	Output Voltage (V)	Package
TPR3412-3STR-S ⁽¹⁾	1.25	SOT23G-3
TPR3420-3STR-S ⁽¹⁾	2.048	SOT23G-3
TPR3425-3STR-S ⁽¹⁾	2.5	SOT23G-3
TPR3430-3STR-S ⁽¹⁾	3	SOT23G-3
TPR3433-3STR-S ⁽¹⁾	3.3	SOT23G-3
TPR3440-3STR-S ⁽¹⁾	4.096	SOT23G-3
TPR3412-QFRR-S ⁽¹⁾	1.25	QFN1.5X1.5-8
TPR3420-QFRR-S ⁽¹⁾	2.048	QFN1.5X1.5-8
TPR3425-QFRR-S ⁽¹⁾	2.5	QFN1.5X1.5-8
TPR3430-QFRR-S ⁽¹⁾	3	QFN1.5X1.5-8
TPR3433-QFRR-S ⁽¹⁾	3.3	QFN1.5X1.5-8
TPR3440-QFRR-S ⁽¹⁾	4.096	QFN1.5X1.5-8
TPR3412-WLPR-S ⁽¹⁾	1.25	WLCSP-4
TPR3420-WLPR-S ⁽¹⁾	2.048	WLCSP-4
TPR3425-WLPR-S	2.5	WLCSP-4
TPR3430-WLPR-S ⁽¹⁾	3	WLCSP-4
TPR3433-WLPR-S ⁽¹⁾	3.3	WLCSP-4
TPR3440-WLPR-S ⁽¹⁾	4.096	WLCSP-4

(1) Preview.

Revision History

Date	Revision	Notes
2024-07-15	Rev.Pre.0	Pre-Released.
2025-03-15	Rev.Pre.1	1. Updated Package Outline Dimensions of the WLCSP package, added 5 μ m to the dimension D. 2. Updated to MSL1.
2025-06-19	Rev.A.0	Initial release.

Pin Configuration and Functions

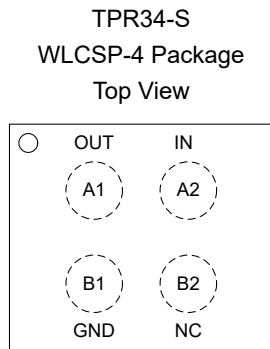
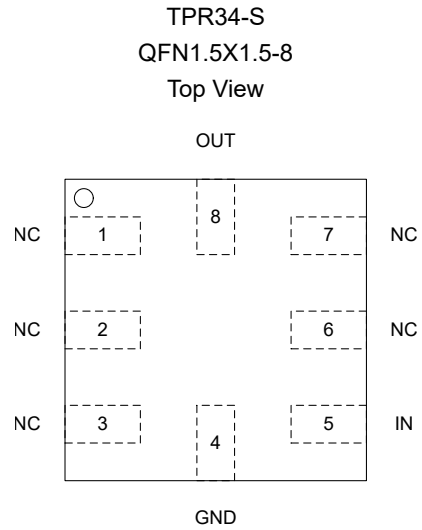
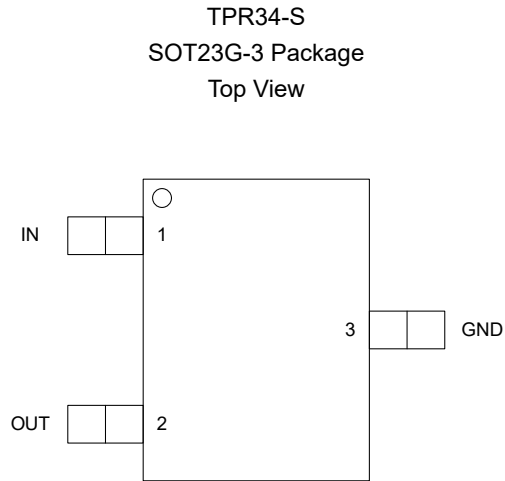


Table 1. Pin Functions: TPR34xx-S

Pin No.			Name	I/O	Description
SOT23G-3	QFN1.5X1.5-8	WLCSP-4			
3	4	B1	GND	-	Ground.
1	5	A2	IN	I	Supply voltage input pin.
-	1, 2, 3, 6, 7	B2	NC	-	No internal connection. Can pull up to IN.
2	8	A1	OUT	O	Reference voltage output pin.

Specifications

Absolute Maximum Ratings ⁽¹⁾

Parameter		Min	Max	Unit
V _{IN}		−0.3	7	V
T _J	Junction Temperature Range	−40	150	°C
T _A	Operating Temperature Range	−40	125	°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.

ESD, Electrostatic Discharge Protection

Symbol	Parameter	Condition	Minimum Level	Unit
HBM	Human Body Model ESD	ANSI/ESDA/JEDEC JS-001 ⁽¹⁾	±4	kV
CDM	Charged Device Model ESD	ANSI/ESDA/JEDEC JS-002 ⁽²⁾	±1.5	kV

(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	Max	Unit
V _{IN}	Supply Voltage	2.1	5.5	V
I _{OUT}	Output Current	−20	20	mA
T _J	Junction Temperature Range	−40	125	°C

Thermal Information

Package Type	θ _{JA}	θ _{Jc}	Unit
WLCSP-4	164	102	°C/W

Electrical Characteristics

All test conditions: $V_{IN} = 5\text{ V}$, $T_A = +25^\circ\text{C}$, unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
TPR3412						
V_{OUT}	Output Voltage			1.25		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		12		μVpp
TPR3420						
V_{OUT}	Output Voltage			2.048		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		20		μVpp
TPR3425						
V_{OUT}	Output Voltage			2.5		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		25		μVpp
TPR3430						
V_{OUT}	Output Voltage			3.0		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		30		μVpp
TPR3433						
V_{OUT}	Output Voltage			3.3		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		33		μVpp
TPR3440						
V_{OUT}	Output Voltage			4.096		V
	Initial Accuracy		-0.15		0.15	%
	Output Voltage Noise	$f = 0.1\text{ Hz to }10\text{ Hz}$		41		μVpp
Power Supply						
V_{IN}	Supply Voltage	1.25-V Output	2.1		5.5	V
		All parts except 1.25-V Output, $I_{LOAD} = \pm 1\text{ mA}$	$V_{OUT} + 0.05$		5.5	V
I_Q	Quiescent Current				180	μA
		$T_A = -40\text{ to }125^\circ\text{C}$			215	μA
V_{DP}	Minimum Dropout Voltage	$I_{LOAD} = \pm 1\text{ mA}$, all parts except 1.25-V Output	$T_A = 25^\circ\text{C}$	25	50	mV
			$T_A = 0^\circ\text{C to }70^\circ\text{C}$		50	mV
			$T_A = -40^\circ\text{C to }125^\circ\text{C}$		100	mV

Precision Voltage Reference

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		I _{LOAD} = ±5 mA, all parts except 1.25-V Output	T _A = 25°C			200	mV
			T _A = -40°C to 125°C			250	mV
Reference Output							
TC	Output Voltage Temperature Drift	T _A = -40°C to 85°C			10		ppm/°C
		T _A = -40°C to 125°C			15		ppm/°C
ΔV _{OUT}	Line Regulation, 1.25-V Output	V _{IN} = 2.1 to 5.5 V ⁽¹⁾		-65		65	ppm/V
		V _{IN} = 2.1 to 5.5 V ⁽¹⁾ , T _A = -40°C to 125°C		-85		85	ppm/V
	Line Regulation, All Parts except 1.25-V Output	V _{IN} = V _{OUT} + 300 mV to 5.5 V		-50		50	ppm/V
			T _A = -40°C to 125°C	-70		70	ppm/V
	Load Regulation	V _{IN} = V _{OUT} + 300 mV, I _{LOAD} = -5 to 5 mA ⁽¹⁾		-20		20	ppm/mA
			T _A = -40°C to 125°C	-30		30	ppm/mA
LTD	Long Term Stability	0 to 1000 hours, T _A = 25°C			40		ppm
T _{HYS}	Thermal Hysteresis				20		ppm
I _{SC}	Short-circuit Current	Sourcing and sinking			50		mA
C _{LOAD}	Capacitive Load			0.1		10	μF
t _{ON}	Turn-on Settling Time	To 0.1% with C _L = 1 μF			500		μs

(1) The minimum supply voltage for the 1.25-V Output is 2.1 V.

Typical Performance Characteristics

All test conditions: $T_A = +25^\circ\text{C}$, unless otherwise noted.

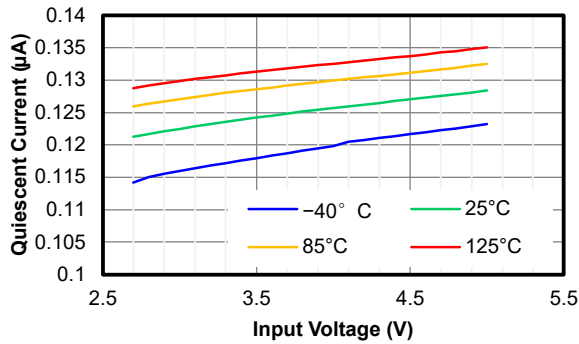


Figure 1. I_q

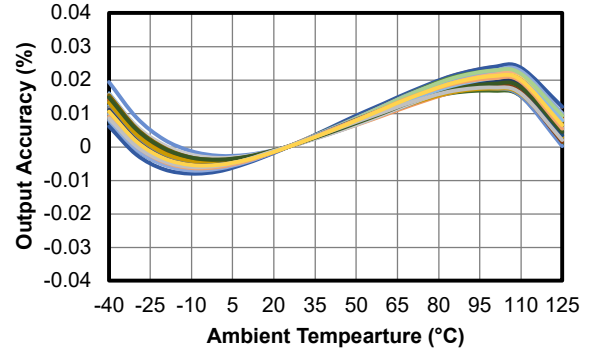


Figure 2. Temperature Coefficient

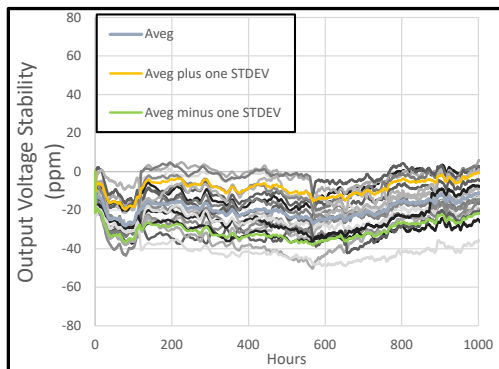


Figure 3. Long Time Stability

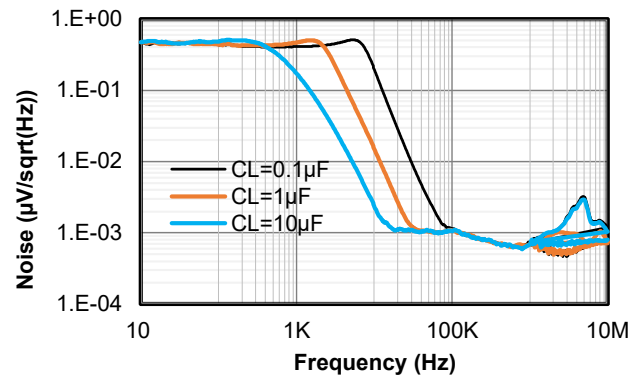


Figure 4. Noise

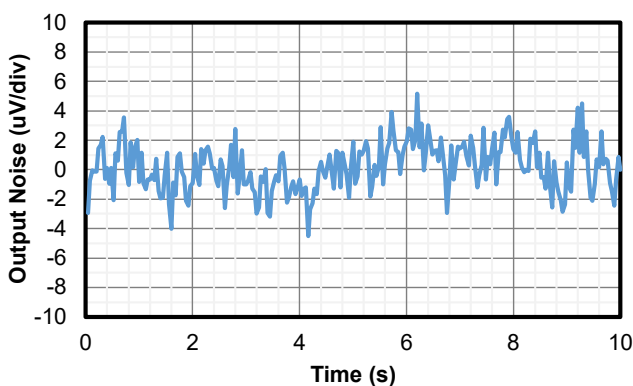
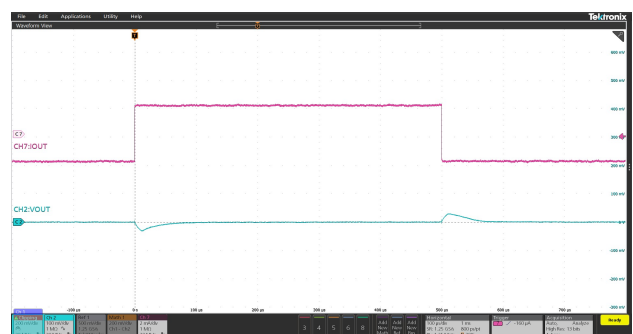
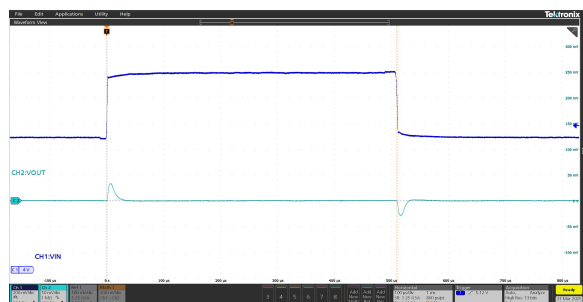


Figure 5. 0.1-Hz to 1-Hz Noise

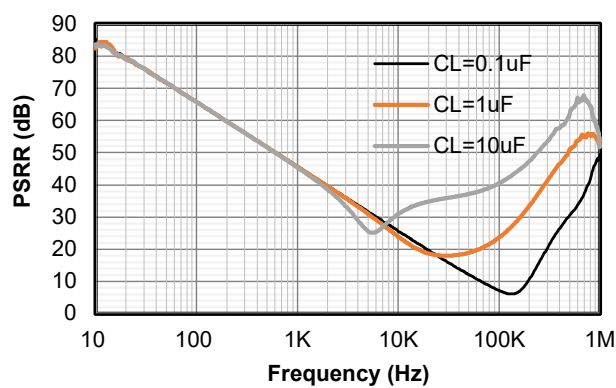


$V_{IN} = 5\text{ V}$, $T_R = T_F = 1\text{ }\mu\text{S}$, LOAD: $-5\text{ - }5\text{ mA}$, $C_{IN} = 1\text{ }\mu\text{F}$, $C_O = 1\text{ }\mu\text{F}$

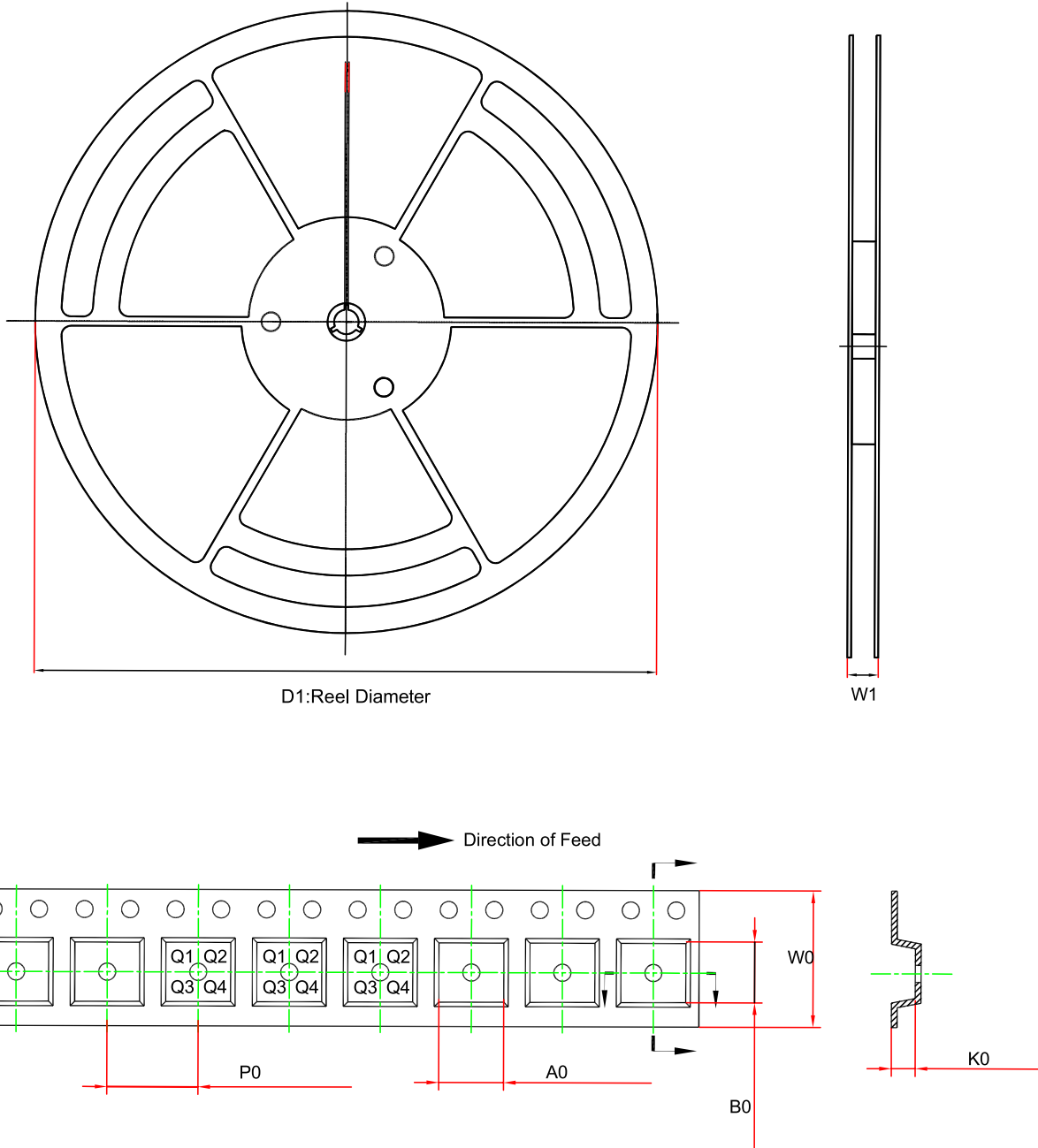
Figure 6. Load Transient



$V_{IN} = 5 - 5.5 \text{ V}$, $T_R = T_F = 1\mu\text{S}$, $C_{IN} = 1\mu\text{F}$, $C_O = 1\mu\text{F}$, $I_{OUT} = 0 \text{ mA}$

Figure 7. Line Transient

Figure 8. PSRR

Tape and Reel Information



Order Number	Package	D1 (mm)	W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	W0 (mm)	Pin1 Quadrant
TPR34xx-3STR-S	SOT23G-3	178	12.1	3.15	2.77	1.22	4.0	8.0	Q3
TPR34xx-QFFR-S	QFN1.5X1.5-8	180	12.3	1.7	1.7	0.8	4.0	8.0	Q2
TPR34xx- WLPR-S	WLCSP-4	178	12.5	0.97	0.93	0.55	2.0	8.0	Q2

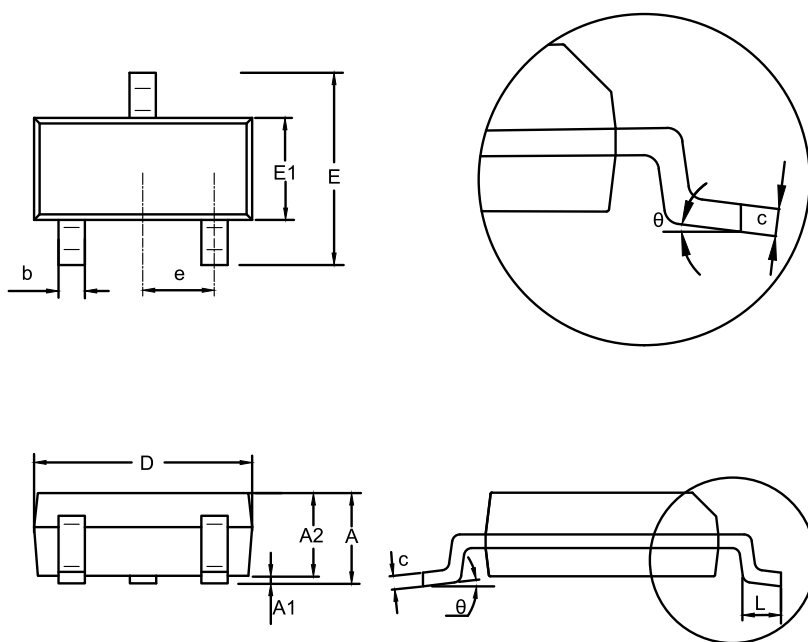
(1) Output voltage, xx = 12 to 40.

Package Outline Dimensions

SOT23G-3

Package Outline Dimensions

3ST(SOT23G-3-A)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.890	1.120	0.035	0.044
A1	0.000	0.100	0.000	0.004
A2	0.890	1.100	0.035	0.043
b	0.280	0.500	0.011	0.020
c	0.132	0.230	0.005	0.009
D	2.800	3.000	0.110	0.118
E	2.250	2.640	0.089	0.104
E1	1.200	1.400	0.047	0.055
e	0.950 BSC		0.037 BSC	
L	0.300	0.600	0.012	0.024
θ	0	8°	0	8°

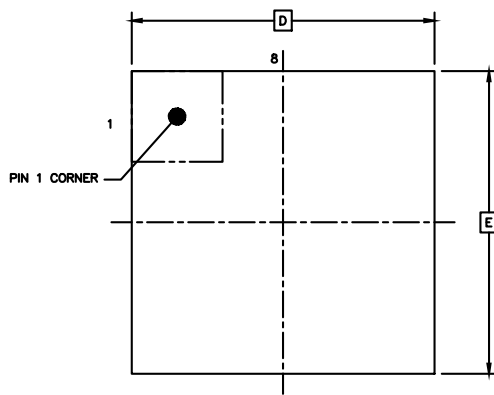
NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

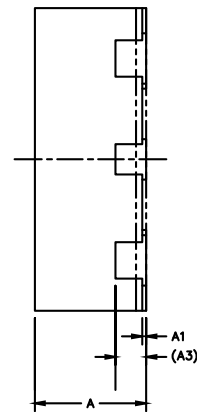
QFN1.5X1.5-8

Package Outline Dimensions

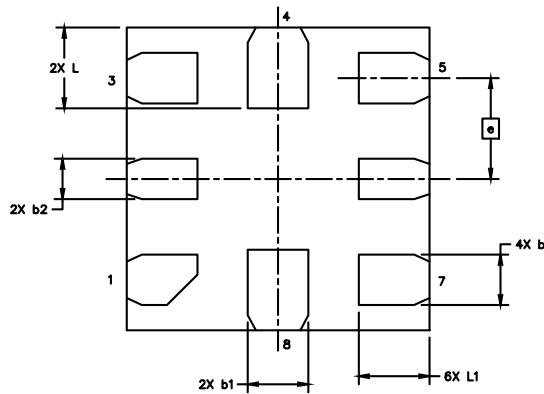
QFR(QFN1.5X1.5-8-A)



TOP VIEW



SIDE VIEW



BOTTOM VIEW

NOTES

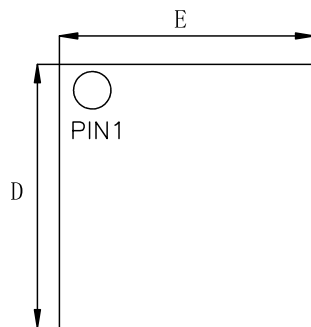
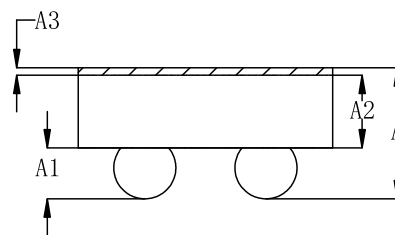
1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.500	0.600	0.020	0.024
A1	0.000	0.050	0.000	0.002
b	0.200	0.300	0.008	0.012
b1	0.250	0.350	0.010	0.014
b2	0.150	0.250	0.006	0.010
A3	0.152 REF		0.006 REF	
D	1.500 BSC		0.059 REF	
E	1.500 BSC		0.059 REF	
e	0.500 BSC		0.020 BSC	
L	0.350	0.450	0.014	0.018
L1	0.300	0.400	0.012	0.016

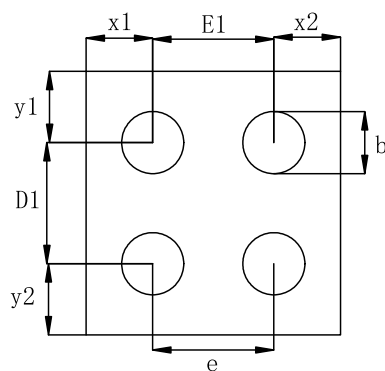
WLCSP

Package Outline Dimensions

WLP(WLCSP-A)


TOP VIEW
(MARK SIDE)


SIDE VIEW


BOTTOM VIEW
(BALL SIDE)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.388	0.478	0.015	0.019
A1	0.148	0.188	0.006	0.007
A2	0.215	0.265	0.008	0.010
A3	0.025		0.001	
b	0.185	0.225	0.007	0.009
D	0.845	0.905	0.033	0.036
D1	0.400 BSC		0.016 BSC	
E	0.810	0.870	0.032	0.034
E1	0.400 BSC		0.016 BSC	
e	0.400 BSC		0.016 BSC	
x1	0.220 REF		0.009 REF	
x2	0.220 REF		0.009 REF	
y1	0.2375 REF		0.009 REF	
y2	0.2375 REF		0.009 REF	

NOTES

1. Do not include mold flash or protrusion.
2. This drawing is subject to change without notice.
3. The many types of E-pad Pin1 signs may appear in the product.

Order Information

Order Number	Operating Temperature Range	Package	Marking Information	MSL	Transport Media, Quantity	Eco Plan
TPR3412-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4A	MSL3	3,000	Green
TPR3420-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4B	MSL3	3,000	Green
TPR3425-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4C	MSL3	3,000	Green
TPR3430-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4D	MSL3	3,000	Green
TPR3433-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4E	MSL3	3,000	Green
TPR3440-3STR-S ⁽¹⁾	-40 to 125°C	SOT23G-3	R4F	MSL3	3,000	Green
TPR3412-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4A	MSL3	3,000	Green
TPR3420-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4B	MSL3	3,000	Green
TPR3425-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4C	MSL3	3,000	Green
TPR3430-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4D	MSL3	3,000	Green
TPR3433-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4E	MSL3	3,000	Green
TPR3440-QFRR-S ⁽¹⁾	-40 to 125°C	QFN1.5X1.5-8	4F	MSL3	3,000	Green
TPR3412-WLPR-S ⁽¹⁾	-40 to 125°C	WLCSP-4	A	MSL1	12,000	Green
TPR3420-WLPR-S ⁽¹⁾	-40 to 125°C	WLCSP-4	B	MSL1	12,000	Green
TPR3425-WLPR-S	-40 to 125°C	WLCSP-4	C	MSL1	12,000	Green
TPR3430-WLPR-S ⁽¹⁾	-40 to 125°C	WLCSP-4	D	MSL1	12,000	Green
TPR3433-WLPR-S ⁽¹⁾	-40 to 125°C	WLCSP-4	E	MSL1	12,000	Green
TPR3440-WLPR-S ⁽¹⁾	-40 to 125°C	WLCSP-4	F	MSL1	12,000	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.

IMPORTANT NOTICE AND DISCLAIMER

Copyright© 3PEAK 2012-2025. All rights reserved.

Trademarks. Any of the 思瑞浦 or 3PEAK trade names, trademarks, graphic marks, and domain names contained in this document /material are the property of 3PEAK. You may NOT reproduce, modify, publish, transmit or distribute any Trademark without the prior written consent of 3PEAK.

Performance Information. Performance tests or performance range contained in this document/material are either results of design simulation or actual tests conducted under designated testing environment. Any variation in testing environment or simulation environment, including but not limited to testing method, testing process or testing temperature, may affect actual performance of the product.

Disclaimer. 3PEAK provides technical and reliability data (including data sheets), design resources (including reference designs), application or other design recommendations, networking tools, security information and other resources "As Is". 3PEAK makes no warranty as to the absence of defects, and makes no warranties of any kind, express or implied, including without limitation, implied warranties as to merchantability, fitness for a particular purpose or non-infringement of any third-party's intellectual property rights. Unless otherwise specified in writing, products supplied by 3PEAK are not designed to be used in any life-threatening scenarios, including critical medical applications, automotive safety-critical systems, aviation, aerospace, or any situations where failure could result in bodily harm, loss of life, or significant property damage. 3PEAK disclaims all liability for any such unauthorized use.

This page intentionally left blank