



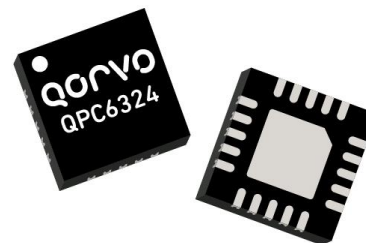
QPC6324

Absorptive, High Isolation SPDT Switch

Product Overview

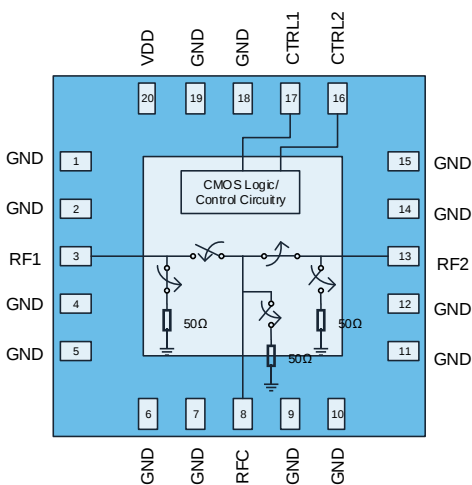
The QPC6324 is a Silicon on Insulator (SOI) single-pole, double-throw (SPDT) switch, designed for use in 4G/5G wireless infrastructure applications and other high performance communications systems. It offers high isolation with excellent linearity and power handling capability. No blocking capacitors are necessary on the RF ports. The design is non-reflective such that the RFX ports are terminated into 50 Ω in the off state. The QPC6324 is +1.8V logic compatible.

The QPC6324 is packaged in a RoHS-compliant, compact 4x4 mm surface-mount leadless package.



20 Pin 4 mm x 4 mm leadless SMT Package

Functional Block Diagram



Top View

Key Features

- 5 MHz to 6000 MHz Operation
- Non-Reflective (RFX ports)
- Terminated All-Off State mode
- No Blocking Caps needed unless voltage is on RF Line
- High Isolation: RFC-RFX: 63 dB at 2 GHz
RFX-RFX: 63 dB at 2 GHz
- +1.8 V Logic Compatible
- HBM ESD rating: Class 2 (2000V to <4000V)

Applications

- Wireless Infrastructure
- Macro or picocell base stations
- TDD-based architectures

Ordering Information

Part No.	Description
QPC6324TR13	2500 pcs on a 13" reel
QPC6324SR	100 pcs on a 7" reel
QPC6324EVB-01	Evaluation board

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-50 to 150 °C
V _{DD}	+6 V
V _{ctrl}	V _{DD} -0.2V
Pin max (RFC-RFX), CW, 50 Ω	37 dBm
Pin max (RFX-TERM), CW, 50 Ω	31 dBm

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V _{DD}	+2.7	+5	+5.5	V
T _{CASE}	-40		+110	°C
T _j at MTTF>10 ⁶ hrs			125	°C

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Test conditions, unless otherwise noted: Temp = 25°C, V_{DD} = +5V.

Parameter	Conditions	Min	Typ	Max	Units
Operational Frequency Range		5		6000	MHz
Insertion Loss ⁽¹⁾	100 – 2000 MHz		0.9	1.15	
	2000 – 4000 MHz		1.0	1.25	
	4000 – 5000 MHz		1.05	1.3	dB
	5000 - 6000 MHz		1.1	1.35	dB
Insertion Loss Ripple	In any 400 MHz band		0.03		dB
Isolation, RFC-RFX ⁽¹⁾	100 - 2000 MHz	55	61.5		dB
	2000 – 4000 MHz	50	57		dB
	4000 – 5000 MHz	48	54		dB
	5000 - 6000 MHz	44	50		dB
Isolation, RFX-RFX ⁽¹⁾	100 - 2000 MHz	57	63		dB
	2000 – 4000 MHz	50	57		dB
	4000 – 5000 MHz	48	54		dB
	5000 - 6000 MHz	44	50		dB
Return Loss, RFC ⁽²⁾	100 - 4000 MHz	14	17		dB
	4000 – 5000 MHz	13	16		dB
	5000 - 6000 MHz	14	17		dB
Return Loss, RFX ⁽²⁾	100 - 4000 MHz	13	16		dB
	4000 – 5000 MHz	12	15		dB
	5000 - 6000 MHz	15	18		dB
Return Loss	RFC Terminated, 2000 MHz		22		dB
	RFC Terminated, 6000 MHz		15		dB
Return Loss	RFX Terminated, 2000 MHz		20		dB
	RFX Terminated, 6000 MHz		13		dB

Note:

1. Production screen of product is done only at 2GHz and 6GHz.
2. Guaranteed by design only. Not tested in production.

Electrical Specifications Contd.

Test conditions, unless otherwise noted: Temp = 25°C, VDD = +5V.

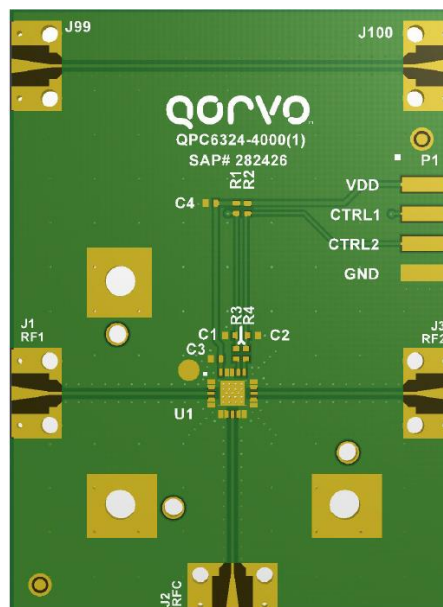
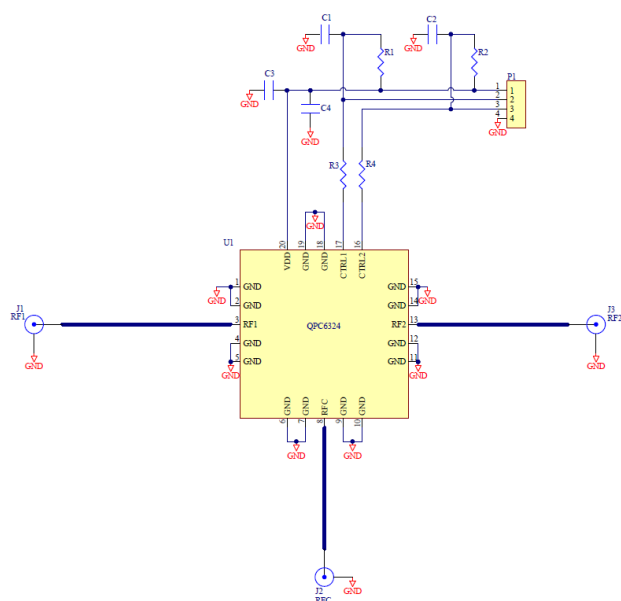
Parameter	Conditions	Min	Typ	Max	Units
Input P1dB	RFC-RFX, 2600 MHz	34	37		dBm
Input IP3	RFC-RFX, 2600 MHz, 13dBm/tone, 1MHz Δf	55	60		dBm
Switching Speed	Turn-on, (50% Ctrl to 90% RF)		180		ns
	Turn-off, (50% Ctrl to 10% RF)		150		ns
	Turn-on, (50% Ctrl to 99% RF)		417		ns
	Turn-off, (50% Ctrl to 1% RF)		210		ns
Supply Current, IDD	VDD = +5V		90	200	uA
Control Voltage	VIH	1.2		VDD	V
	VIL	0		0.63	V
Control Current, Ictrl1, Ictrl2			1		uA
Spur Level	Any RF ports, >100MHz			-125	dBm
Thermal Resistance			60		°C/W

Power Handling Specification (MTTF≥10⁶ hrs)

Input Port	Port State	Power(dBm)	Tamb	theta-j (C/W)
RFC, RF1, RF2 ^{1,4}	On	34.2	85C	60
RFC, RF1, RF2 ^{1,4}	On	31.6	105C	60
RFC, RF1, RF2 ^{1,4}	On	30.5	110C	60
RFC, RF1, RF2 ²	Off	28.4	85C	60
RFC, RF1, RF2 ²	Off	25	105C	60
RFC, RF1, RF2 ²	Off	23.8	110C	60
RFC/RF1/RF2 simultaneous ³	all off	27.6	85C	
RFC/RF1/RF2 simultaneous ³	all off	24.2	105C	
RFC/RF1/RF2 simultaneous ³	all off	23	110C	

1. For high VSWR loads, this power reduces by 4dB
2. RFC is only off during all off mode
3. Power shown is for each input, not total
4. For <20MHz, max power reduces to 28dBm

Application Circuit Schematic and Layout



Bill of Material

Ref Des	Value	Description	Manuf.	Part Number
n/a	n/a	Printed Circuit Board	Qorvo	
U1	n/a	High Isolation SPDT Switch	Qorvo	QPC6324
C1, C2	200 pF	CAP, 0402, 50V, 5%, C0G	Various	
C4	0.1 uF	CAP, 0402, 50V, 10%, X7R	Various	
R3, R4	0 Ω	RES, 0402	Various	
R1, R2, C3	DNP			

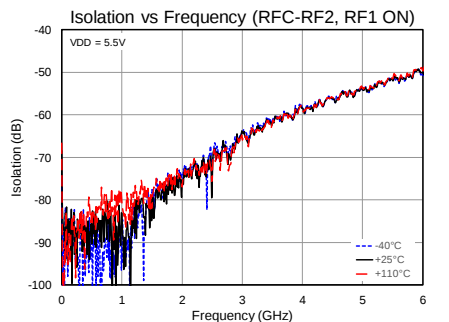
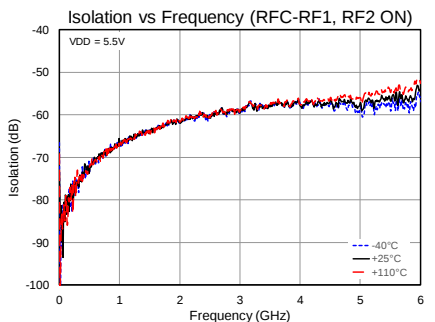
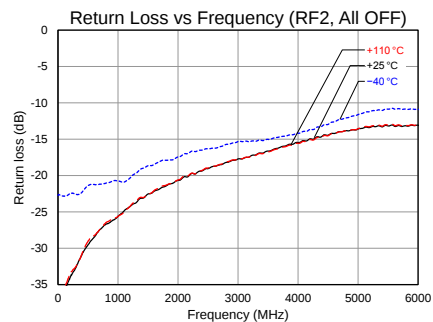
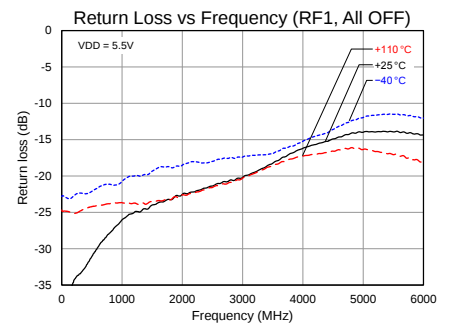
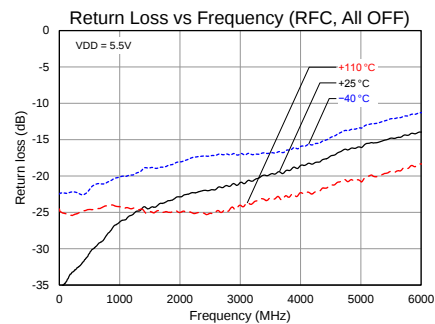
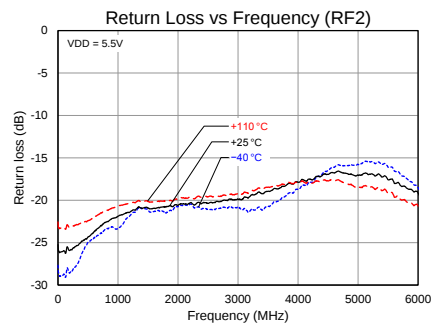
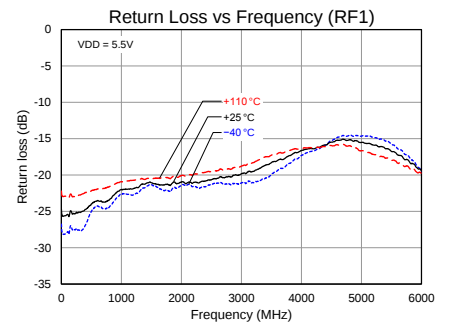
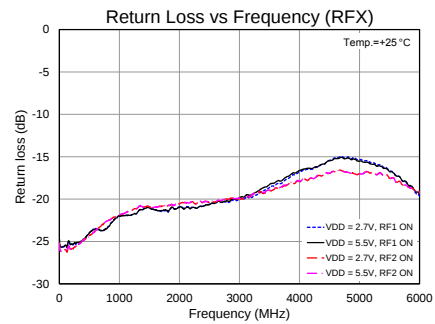
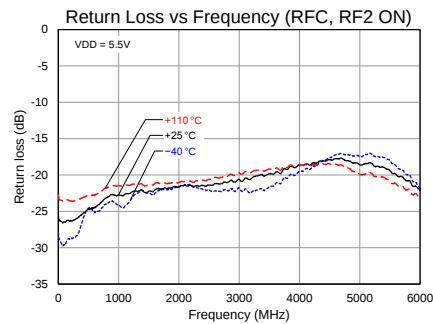
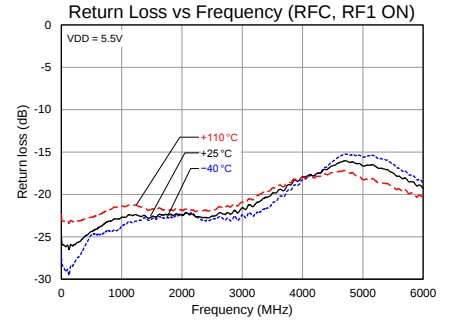
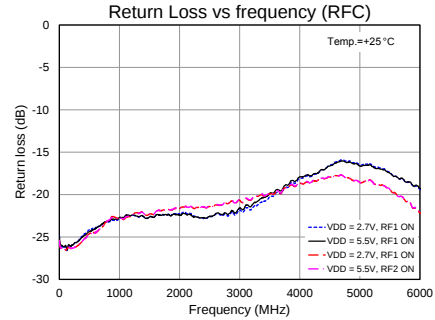
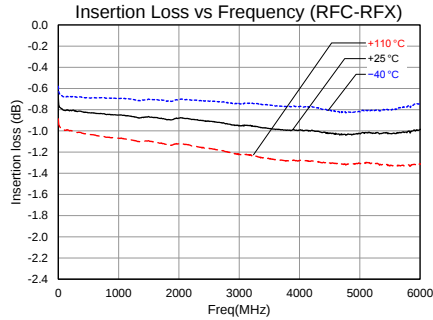
Logic Table

Vctrl1	Vctrl2	RFC-RF1	RFC-RF2
0	0	OFF	OFF
0	1	OFF	ON
1	0	ON	OFF
1	1	OFF ⁽¹⁾	OFF ⁽¹⁾

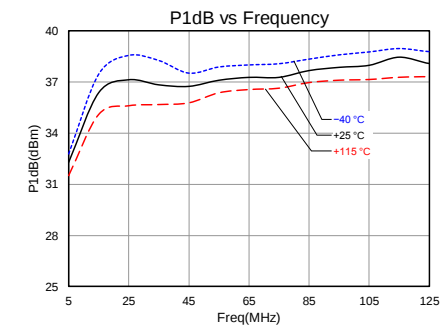
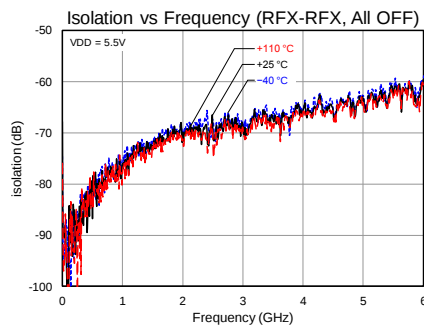
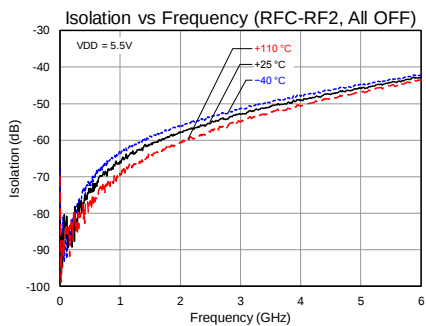
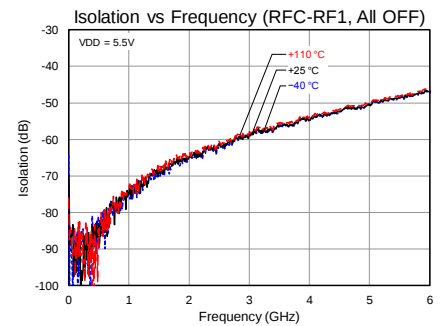
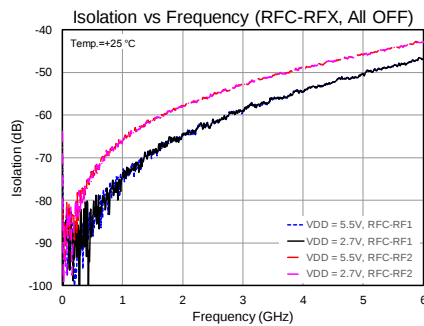
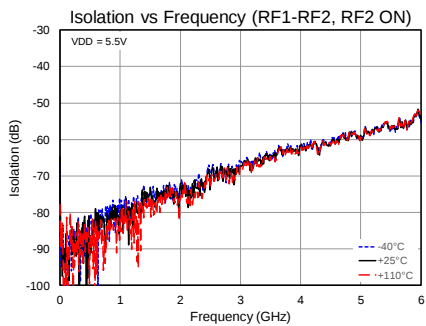
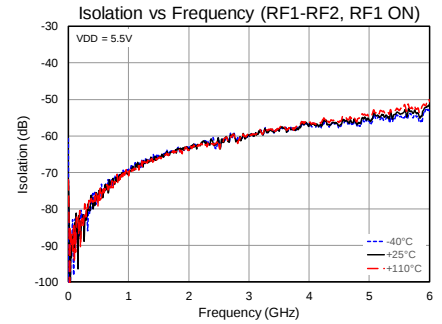
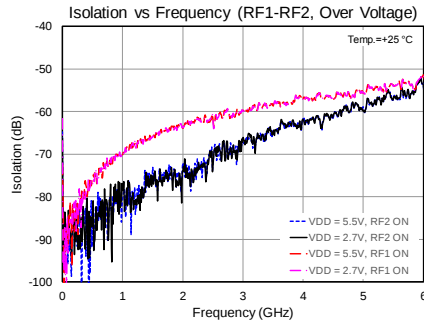
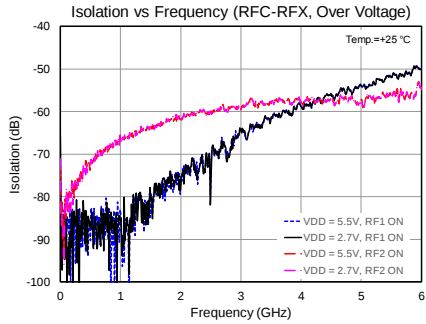
Notes:

1. This is not a supported 'switch' mode. RFC is not terminated.

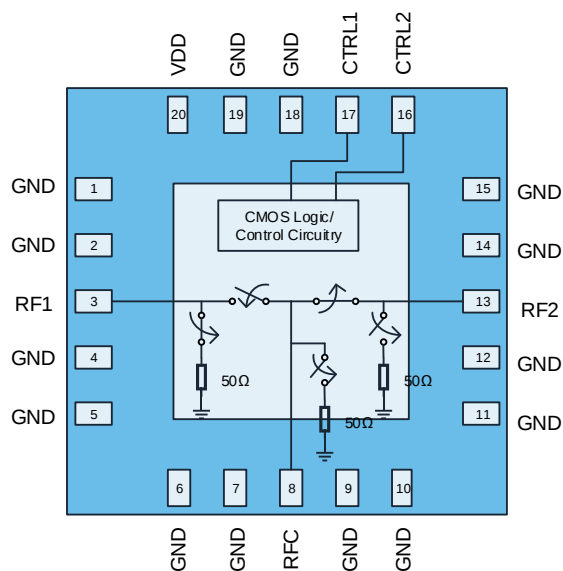
Performance Plots



Performance Plots Contd.



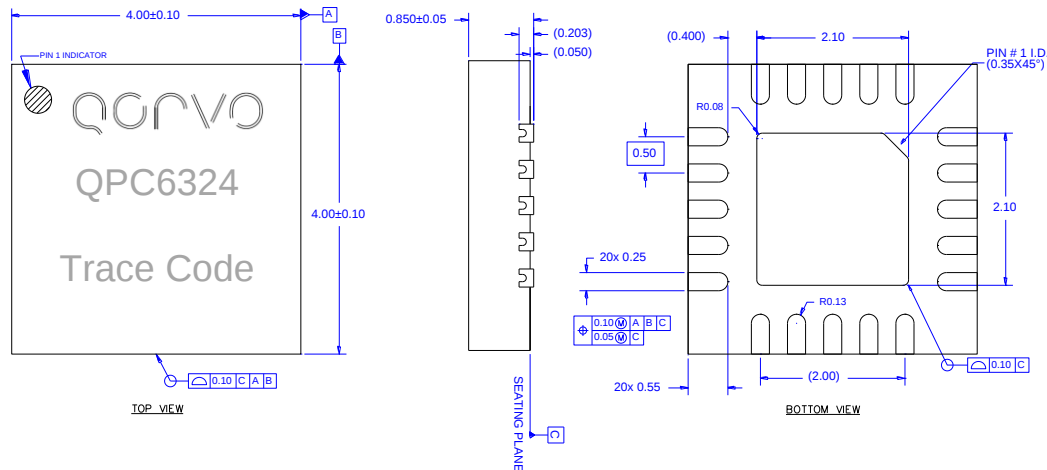
Pin Configuration and Description



Top View

Pin No.	Label	Description
1,2,5,6,9,10,11,12,14,15	GND	No internal connection but recommend to ground on board for proper mounting integrity.
4, 7, 18, 19	GND	Internally connected and must be grounded on board.
3	RF1	Switch output port 1. Internally pulled to 0V (GND).
8	RFC	Switch common port. Internally pulled to 0V (GND).
13	RF2	Switch output port 2. Internally pulled to 0V (GND).
16	CTRL2	Switch control voltage 2
17	CTRL1	Switch control voltage 1
20	VDD	Supply voltage. Bypassing recommended.
Backside Pad	GND	Ground connection. The back side of the package should be connected to the ground plan though as short of a connection as possible. PCB vias under the device are required.

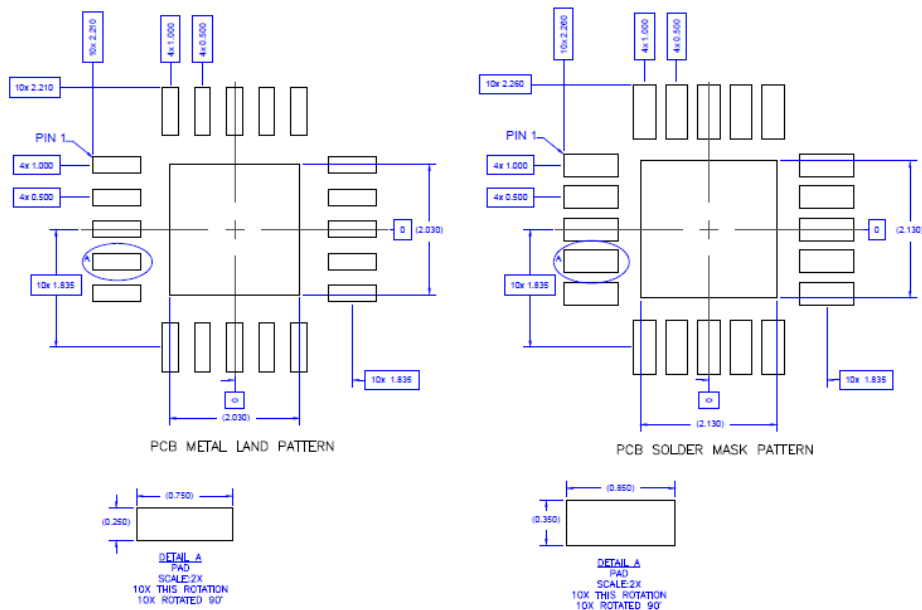
Package Marking and Dimensions



Notes:

1. All dimensions are in microns. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.

PCB Mounting Pattern



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. Vias are required under the backside paddle of this device for proper RF/DC grounding and thermal dissipation.
4. Do not remove or minimize via hole structure in the PCB. Thermal and RF grounding is critical.
5. We recommend a 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.010").
6. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 2	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 1	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes. Solder profiles available upon request.

Contact plating: Electrolytic plated Au over Ni

RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- PFOS Free
- SVHC Free



Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Tel: 1-844-890-8163

Web: www.qorvo.com

Email: customer.support@qorvo.com

For technical questions and application information: **Email:** appsupport@qorvo.com

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