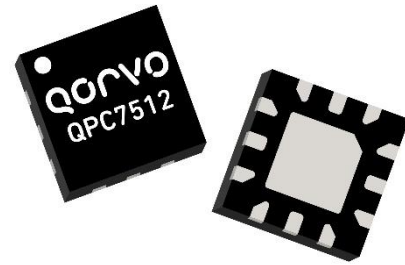
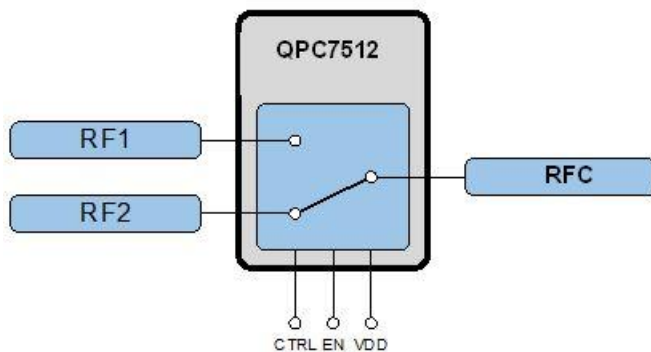


General Description

The QPC7512 is a high isolation Silicon on Insulator (SOI) single pole double throw (SPDT) reflective switch designed for use in CATV, satellite set top and other high-performance communications systems.

Featuring a single supply with a single CMOS/TTL compatible control line, QPC7512 features low insertion loss and high isolation throughout its bandwidth making it an optimal choice for operation from 5MHz to 3.3GHz. QPC7512 offers excellent linearity and power handling capability thanks to its SOI process and does not require blocking caps on the RF ports if DC is not present on the RF ports. QPC7512 is packaged in a space saving 2.0 x 2.0mm 12-lead QFN.

Functional Block Diagram



2.0 x 2.0mm 12-lead QFN

Product Features

- 5 MHz to 3300 MHz Operation
- Optimized for 75 Ω Applications (can be also be used in 50 Ω applications).
- Low Insertion Loss: 0.4 dB at 1 GHz
- High Isolation: 42 dB at 1 GHz
- High IP3: 75 dBm at 1GHz
- Compatible with Low Voltage Logic (V_{HIGH} Minimum = 1.3 V)
- No External DC Blocking Capacitors Required on RF Paths Unless DC is Applied Externally
- 2000 V HBM ESD Rating on All Ports

Applications

- Extended Spectrum DOCSIS
- CATV Amplifiers
- CATV Head End
- Fiber Deep Nodes
- Cable Set Top Box
- Satellite Set Top Box

Ordering Information

Part Number	Description
QPC7512SB	Sample Bag with 5 pieces
QPC7512SR	Sample Reel with 100 pieces
QPC7512TR7	Standard Reel with 2,500 pieces
QPC7512PCK-01	75 Ω PCBA with 5-piece sample bag

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-50 to +150 °C
Operating Temperature	-40 to +105 °C
Maximum V_{DD}	6.0 V
Maximum V_{EN} , V_{CTRL}	3.0 V
PIN Max (CW)	+30dBm(5-25MHz) +33dBm (25-500MHz) +36dBm (>500MHz)

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Device Voltage (V_{DD})	+2.7	+5.0	+5.5	V
Device Current, 5V (I_{DD})		91		μ A
Device Current, 3V (I_{DD})		85		
V_{EN} , V_{CTRL} High	1.3		2.7	V
V_{EN} , V_{CTRL} Low	0		0.45	V

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

Electrical Specifications

Parameter	Conditions ⁽¹⁾	Min	Typ	Max	Units
Operational Frequency Range ⁽¹⁾		5		3300	MHz
Insertion Loss	5 – 50 MHz		0.15		dB
	50-1000 MHz		0.22		dB
	1000-2000 MHz		0.43		dB
	2000-3000 MHz		0.52		dB
	3300 MHz		0.66		dB
Isolation, RFC - RFx	5 – 50 MHz		66		dB
	50-1000 MHz		42		dB
	1000-2000 MHz		35		dB
	2000-3000 MHz		29		dB
	3300 MHz		28		dB
Isolation, RF1 – RF2	5 – 50 MHz		66		dB
	50-1000 MHz		42		dB
	1000-2000 MHz		34		dB
	2000-3000 MHz		29		dB
	3300 MHz		28		dB
Input Return Loss; RFC	5 – 50 MHz		37		dB
	50-1000 MHz		19		dB
	1000-2000 MHz		18		dB
	2000-3000 MHz		22		dB
	3300 MHz		22		dB
Output Return Loss; RFx	5 – 50 MHz		36		dB
	50-1000 MHz		19		dB
	1000-2000 MHz		18		dB
	2000-3000 MHz		21		dB
	3300 MHz		21		dB

Notes:

1. Test conditions unless otherwise noted: V_{DD} = +5.0 V, Temp = +25 °C, 75 Ω test system.



QPC7512

CATV SPDT Reflective Switch (5 – 3300 MHz)

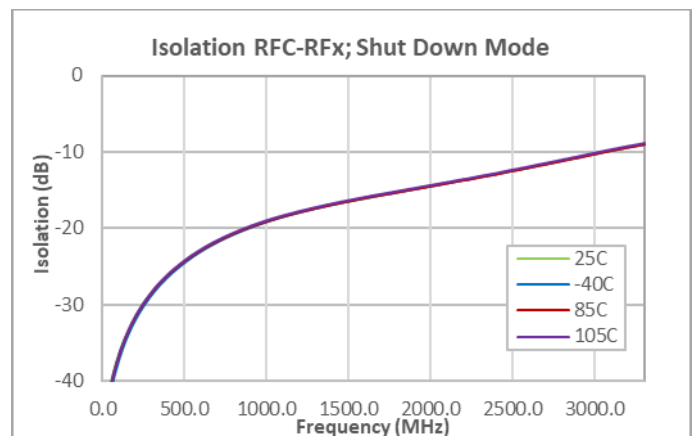
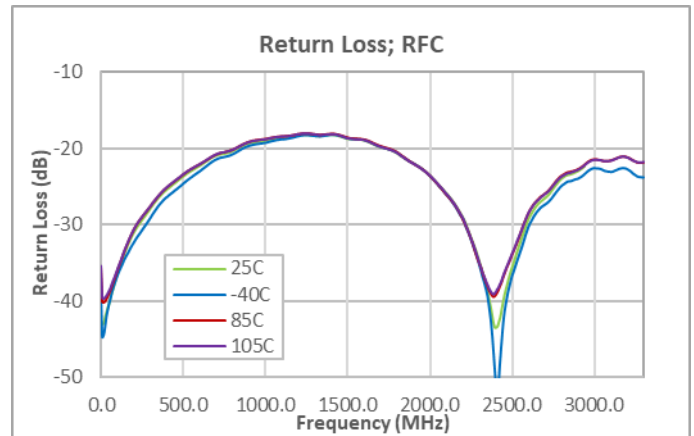
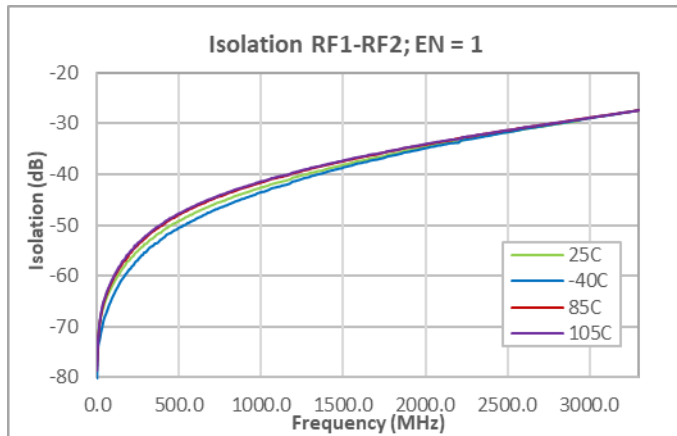
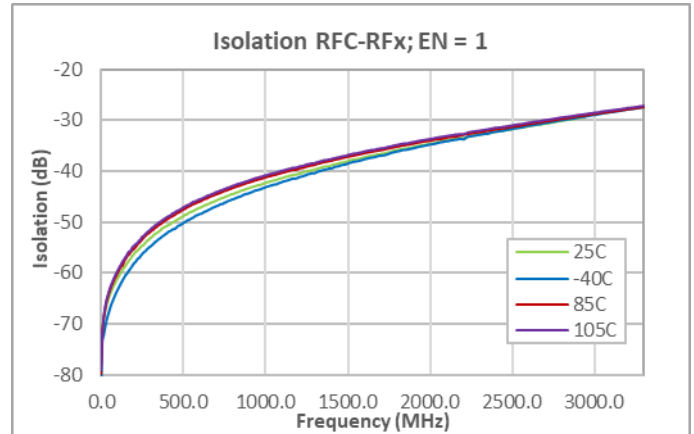
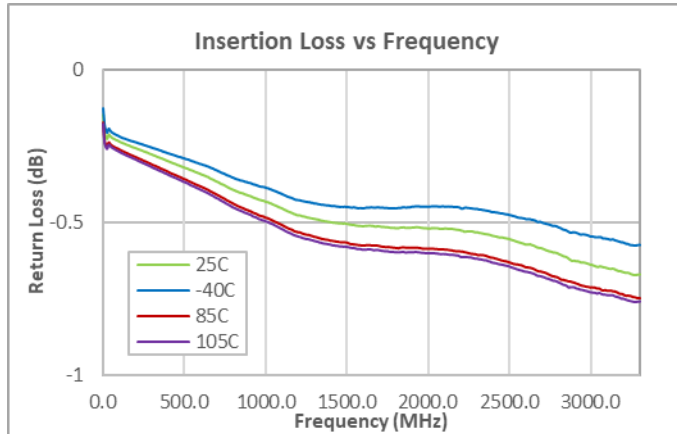
Electrical Specifications (cont'd.)

Parameter	Conditions ⁽¹⁾	Min	Typ	Max	Units
P0.1 dB Compression ^(2, 3)	Full Bandwidth		36		dBm
2 nd Harmonic	17MHz, 12Bm tone		-102.3		dBc
3 rd Harmonic	17MHz, 12dBm tone		-119.9		dBc
Output IP2	1000 MHz, 12dBm per tone		133.0		dBm
Output IP3	1000 MHz, 12dBm per tone		74.8		dBm
Switching Time	50% Control to 10%/90% RF		2	5	μS

Notes:

1. Test conditions unless otherwise noted: $V_{DD} = +5.0V$, Temp = +25 °C, 75Ω test system.
2. Measured in a 50 Ω system.
3. Limited by absolute maximum power handling.

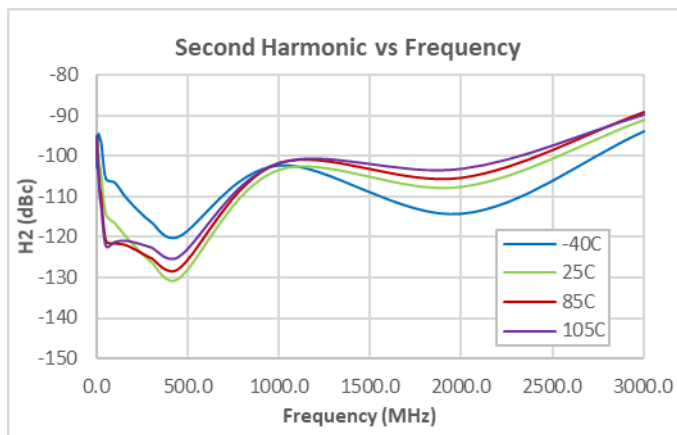
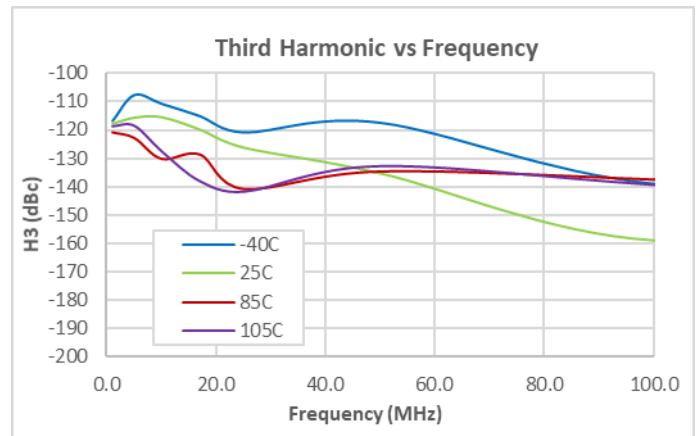
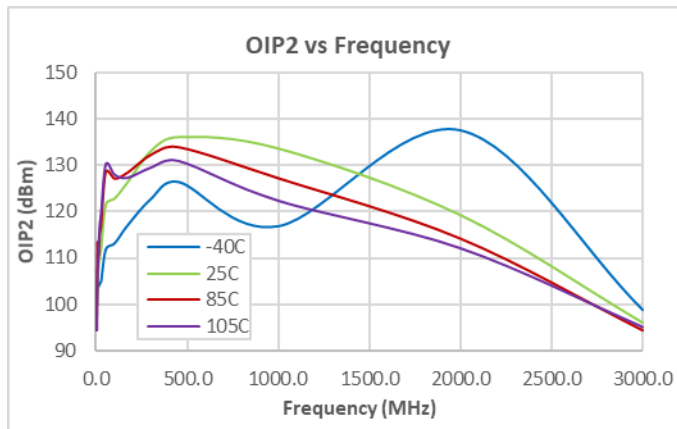
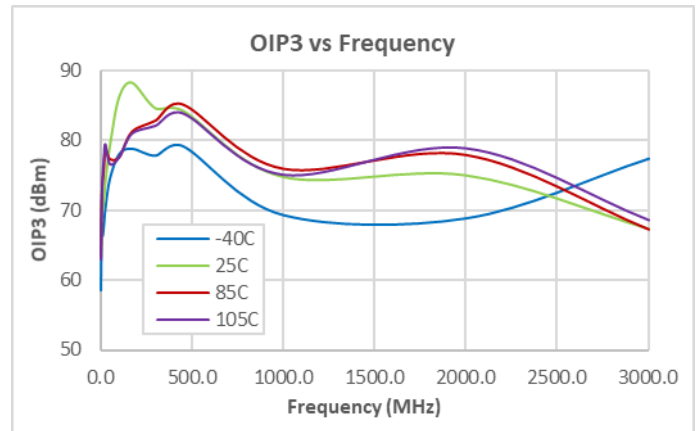
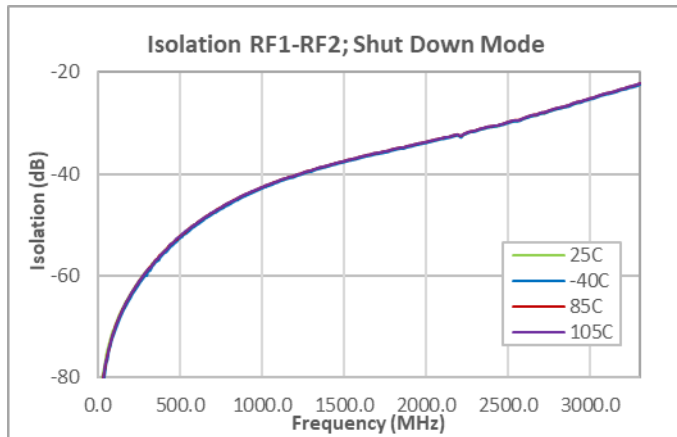
Performance Plots



Test Conditions:

1. Test conditions unless otherwise noted: $V_{DD} = +5V$, $Z_0 = 75\Omega$

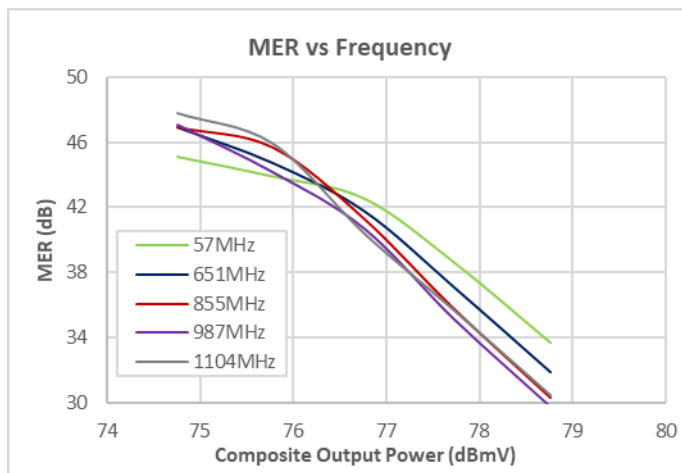
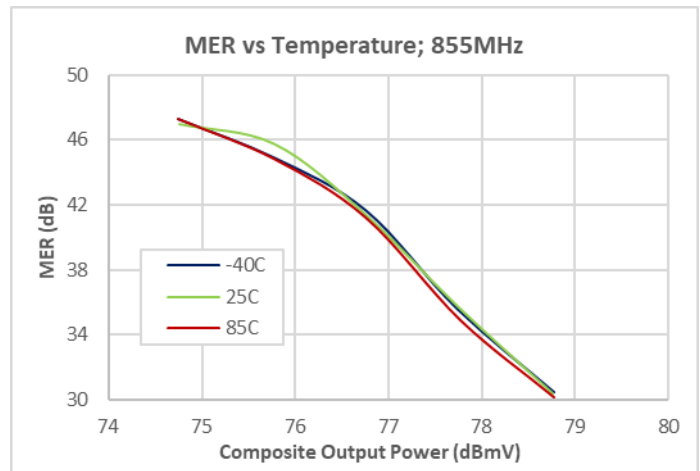
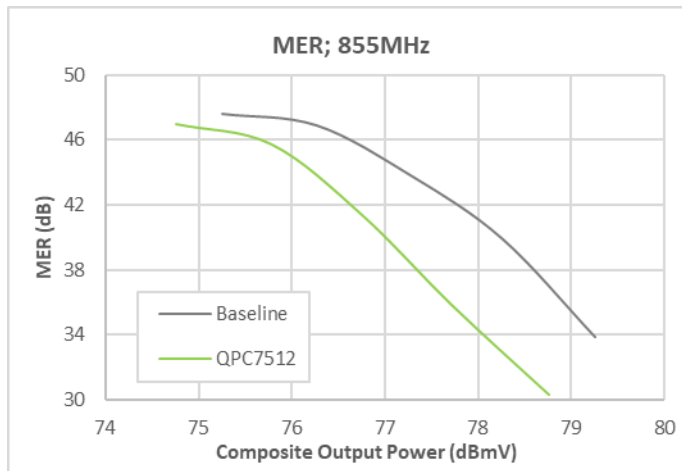
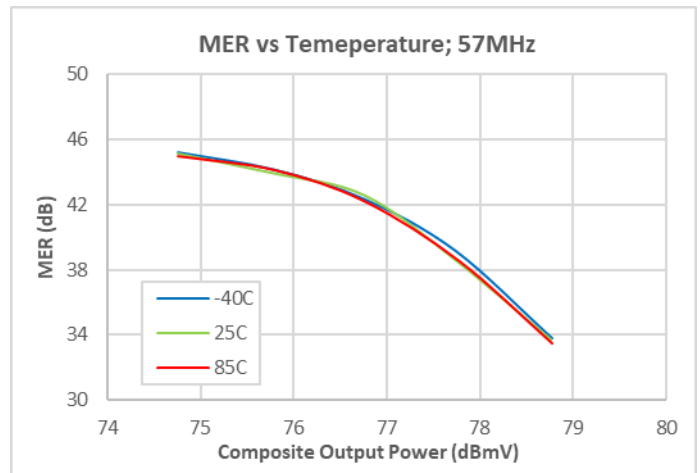
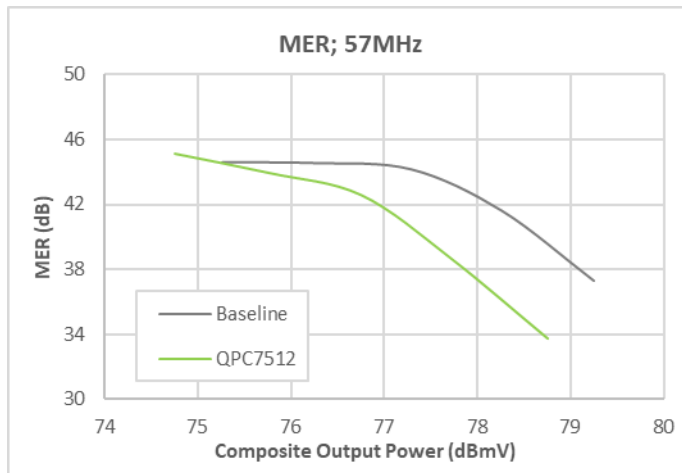
Performance Plots (cont'd.)



Test Conditions:

1. Test conditions unless otherwise noted: $V_{DD} = +5V$, $Z_0 = 75\Omega$
2. IIP3, IP2: 75 Ω , +12dBm per Tone.

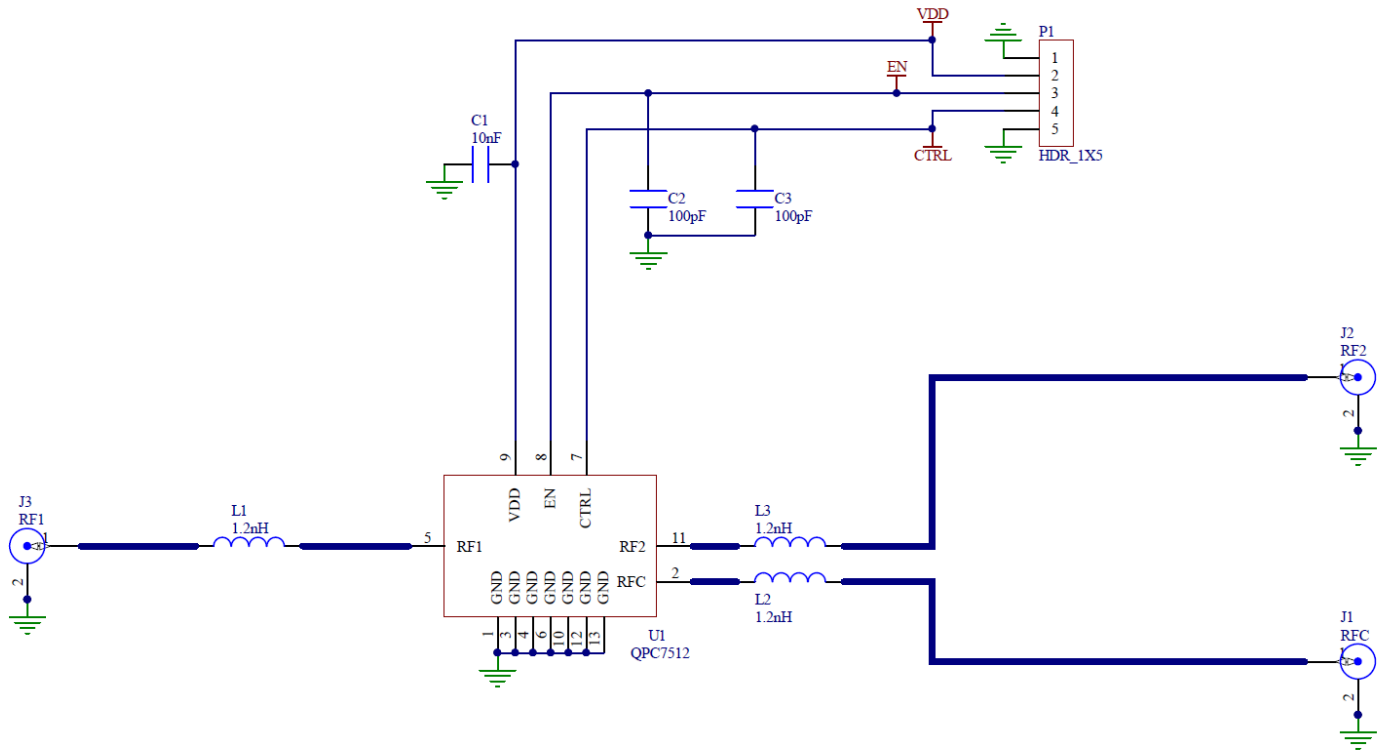
Performance Plots (cont'd.)



Test Conditions:

1. Test conditions unless otherwise noted: $V_{DD} = +5V$, $Z_0 = 75\Omega$
2. MER: 190 QAM Ch; 57-1215MHz; 10dB Tilt; ITU-T J.83, Annex B; Baseline represents RFPD3580 output.

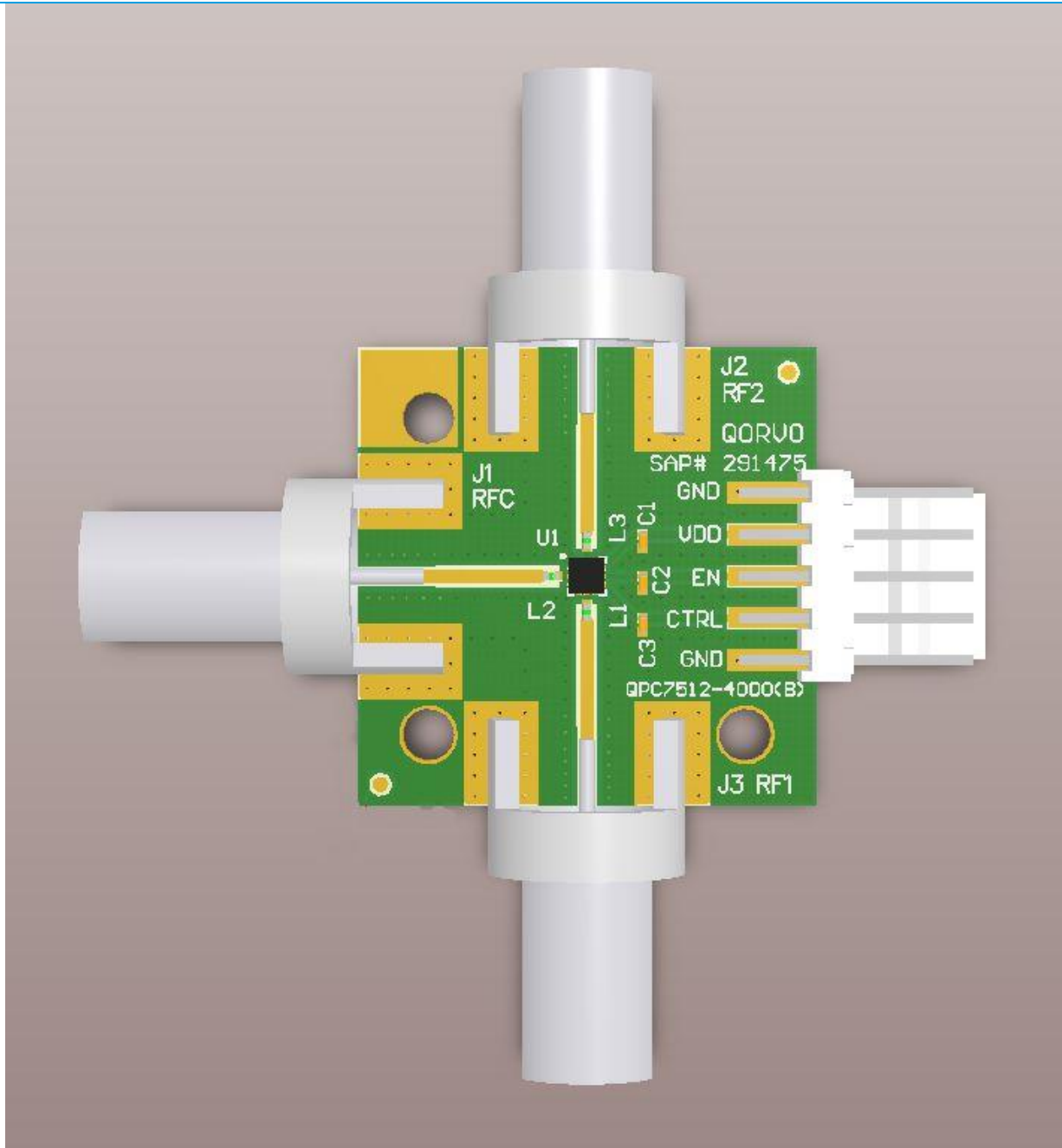
Evaluation Board Schematic



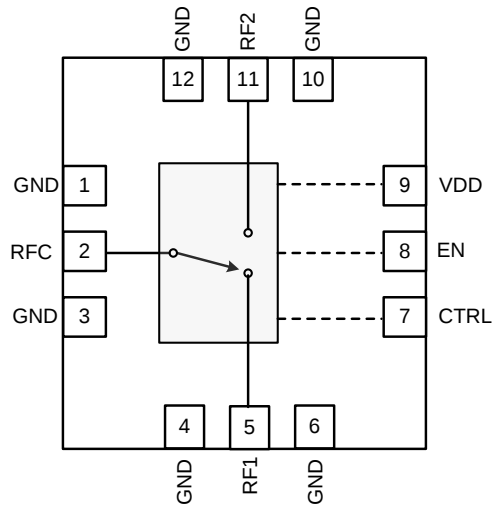
Evaluation Board Bill of Materials

Ref Designator	Description	Manufacturer	Part Number
PCB	PCB, QPC7512	Qorvo	QPC7512-4000(B)
U1	QPC7512 Switch	Qorvo	QPC4270SB
C1	CAP, 0.01uF, 10%, 25V, X8R, 0402	TDK SINGAPORE (PTE) LTD	C1005X8R1E103K
C2, C3	CAP, 100pF, 5%, 50V, C0G, 0402	TAIYO YUDEN (SINGAPORE) PTE LTD	RM UMK105 CG101JV-F
L1, L2, L3	IND, 1.2nH, +/-0.1nH, T/F, 0402	MURATA ELECTRONICS SINGAPORE PTE LT	LQP15MN1N2B02D
P1	CONN, HDR, ST, PLRZD, 5-PIN, 0.100"	ITW Pancon	MPSS100-5-C
J1, J2, J3	CONN, F FEM EDGE MOUNT, 75 OHMS, 0.065"	Genesis Technology USA	GT20-300204

Evaluation Board Layout



Pin Configuration and Description



Top View

Pin Number	Label	Description
1, 3	GND	No internal connection but recommend to ground on board for proper mounting integrity.
4, 6, 10, 12	GND	Internally connected and must be grounded on board.
2	RFC	Single ended Common Port
5	RF1	Single Ended RF port
7	CTRL	Switch logic control input
8	EN	Shutdown logic control input
9	VDD	Supply Voltage
11	RF2	Single ended RF port
Backside Pad	GND	Ground connection. The back side of the package should be soldered to the ground plane. PCB vias under the device are required.

Notes:

- Both RF pins must be held at $0V_{DC}$ or require external DC blocking capacitors.
- The ground paddle must be soldered to the ground plane for proper switch performance.



QPC7512

CATV SPDT Reflective Switch (5 – 3300 MHz)

Power Up / Down and Operational Controls

Scenario 1	Sequence for power up and power down from the supply that is connected to QPC7512 VDD Pin.
Power Up	Turn on VDD (supply), then EN, then CTRL. Then (20 mS or greater), apply RF signal
Power Down	Turn off RF signal, then CTRL, then EN, turn off VDD (supply)
Scenario 2	Sequence for going in and out of a shutdown mode, keeping VDD on, but disabling/enabling QPC7512 by the EN pin
Power Up	Turn on EN (enable), then CTRL, then (5 mS or greater), turn on RF Signal
Power Down	Turn off RF signal, then CTRL, then EN (disable)
Scenario 3	When changing switch positions between RF1 and RF2, no RF signal should be applied to any RF port while the CTRL is changing states
Switching Ports	Turn off RF signal, then change CTRL state, then wait (5 mS or greater), then turn on RF signal

Logic Table

V _{CTRL}	V _{EN}	RFC-RF1	RFC-RF2
1	1	OFF	ON
0	1	ON	OFF
X	0	OFF	OFF

VDD = 2.7 – 5.0 V

TOP VIEW

PIN 1 DOT BY MARKING

2.000±0.050

2.000±0.050

BOTTOM VIEW

PIN #1 IDENTIFICATION CHAMFER 0.200 X 45°

1.100±0.050 Exp. DAP

.500 Bsc

275±0.050

1.100±0.050 Exp. DAP

.200±0.050

.140

1.000 Ref.

.140

SIDE VIEW

0.550±0.050

0.000-.050

.152 Ref.

1. All dimensions are in millimeters. Angles are in degrees.

Pin 1 Indicator

Qorvo Logo - Use Q5D

Trace Code to be assigned by SubCon

Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1C (1000V)	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	C3 (1000V)	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	MSL1	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Solderability

Compatible with both lead-free (260°C max. reflow temp.) soldering process.

Solder profiles available upon request.

Contact plating: MatteSn

RoHS Compliance

This part is compliant with EU 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
- Qorvo Green



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

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