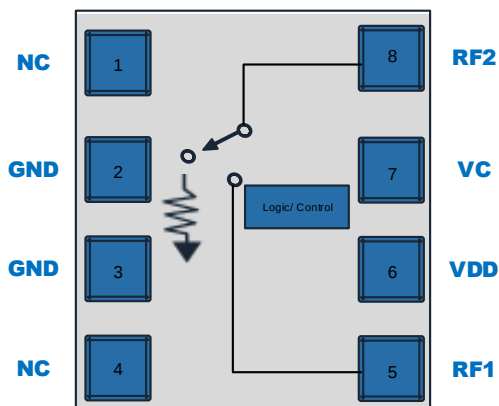


Product Description

The QPC6014 is a Silicon on Insulator (SOI) single-pole single-throw (SPST) absorptive switch designed for use in cellular, 3G, LTE 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 RF2 port is terminated into 50 Ohms in the off state. The QPC6014 is +1.8V positive logic compatible.

Functional Block Diagram



8-pin, 2.0 mm x 2.0 mm DFN Package

Product Features

- 5 MHz to 6000 MHz Operation
- Non-Reflective (RF2)
- No Blocking Capacitors Necessary Unless Voltage is on RF Line
- High Isolation: 53 dB at 2 GHz
- High Input IP3: +58 dBm
- 2 kV ESD
- +1.8 V Logic Compatible

Applications

- Cellular, 3G, LTE Infrastructure
- High Performance Communications Systems
- Test Equipment

Ordering Information

Part No.	Description
QPC6014SQ	Sample bag with 25 pcs
QPC6014SR	7" Reel with 100 pcs
QPC6014TR7	7" Reel with 2500 pcs
QPC6014PCK401	5 MHz to 6000 MHz PCBA with 5pcs sample bag

Absolute Maximum Ratings

Parameter	Range / Value	Units
Supply Voltage	+6	V
Control Voltage	+6	V
Max RF Input Power, Non-terminated	+37	dBm
Max RF Input Power, Terminated	+29	dBm
Storage Temperature	-40 to +150	°C

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. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Operation Temperature Range	-40		+105	°C
Operating Junction Temperature			+125	°C
Supply Voltage	+2.7	+3	+5.5	V
Max RF Input Power, Non-terminated +85°C (RF1-RF2) <500MHz			+30.5	dBm
Max RF Input Power, Non-terminated +85°C (RF1-RF2) >500MHz			+35	dBm
Max RF Input Power, Non-terminated +105°C (RF1-RF2) <500MHz			+27.5	dBm
Max RF Input Power, Non-terminated +105°C (RF1-RF2) > 500MHz			+32	dBm
Max RF Input Power, Terminated +85°C (RF2)			+28.5	dBm
Max RF Input Power, Terminated +105°C (RF2)			+25.5	dBm

Electrical specifications are measured under bias, signal and temperature conditions as specified. Specifications are not guaranteed over all recommended operating conditions.

Electrical Specifications

Parameter	Conditions ⁽¹⁾		Min	Typ	Max	Units
Operational Frequency Range			5		6000	MHz
Insertion Loss (RF1 to RF2)	$V_{CTRL}=+3.3\text{ V}$	450 MHz		0.63		dB
		900 MHz		0.68	0.83	
		2100 MHz		0.84		
		2600 MHz		0.89	0.98	
		4000 MHz		1.05		
Isolation Loss (RF1 to RF2)	$V_{CTRL}=0\text{ V}$	450 MHz		70		dB
		900 MHz	45	64		
		2100 MHz		53		
		2600 MHz	35	51		
		4000 MHz		43		
Return Loss (RFX On-state)	$V_{CTRL}=+3.3\text{ V}$	450 MHz		20		dB
		900 MHz		20		
		2100 MHz		20		
		2600 MHz		20		
		4000 MHz		20		
Return Loss (RFX Off-state)	$V_{CTRL}=0\text{ V}$	450 MHz		20		dB
		900 MHz		20		
		2100 MHz		20		
		2600 MHz		20		
		4000 MHz		20		

Notes:

1. Test conditions unless otherwise noted: $V_{DD}=+5\text{ V}$, Temp.=+25 °C, 50 Ω system

Electrical Specifications (continued)

Parameter	Conditions ⁽¹⁾	Min	Typ	Max	Units
Input IP2			110		dBm
Input IP3	$P_{IN}=+20$ dBm/tone, $\Delta f=1$ MHz, >15 MHz		58		dBm
	$P_{IN}=+15$ dBm/tone, $\Delta f=1$ MHz, 5 MHz to 15 MHz		50		
Input P1dB	10 MHz to 50 MHz		33		dBm
	>50 MHz		36		
Settling Time			1		μ s
Start-up Time	V_{DD} turn on to 90% RF		1.8	25	μ s
Switching Speed	50% Control to 10/90% RF		165	500	ns
Thermal Resistance (Rth)	Switch			70.3	$^{\circ}$ C/W
	Termination			53.2	

Notes:

1. Test conditions unless otherwise noted: $V_{DD}=+3.3$ V, Temp. $=+25$ $^{\circ}$ C, 50 Ω system

Electrical Specifications – Power Supply

Parameter	Conditions	Min	Typ	Max	Units
Supply Current (I_{DD})	$V_{DD}=+3.3$ V		75	150	μ A
Control Current (V_C)	$V_{CTRL} = +3.3$ V		0.1		μ A
Low Control Voltage (V_{CTRL})	+1.8 V Logic Compatible	0		+0.63	V
High Control Voltage (V_{CTRL})	+1.8 V Logic Compatible	+1.1		V_{DD}	V

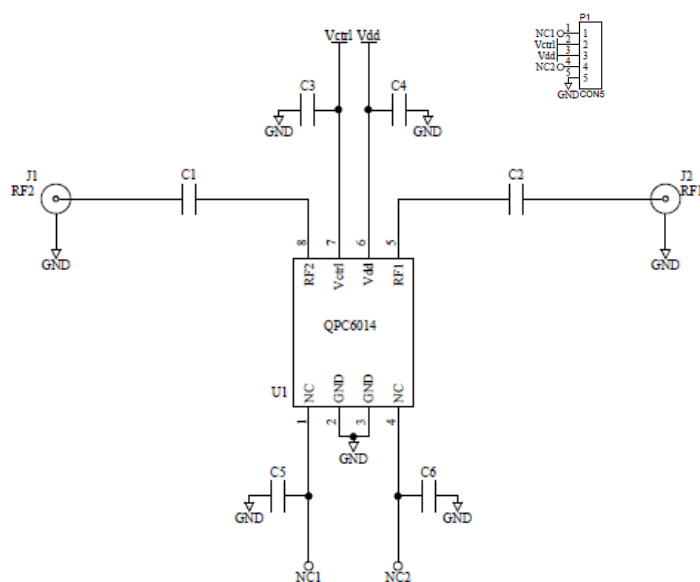
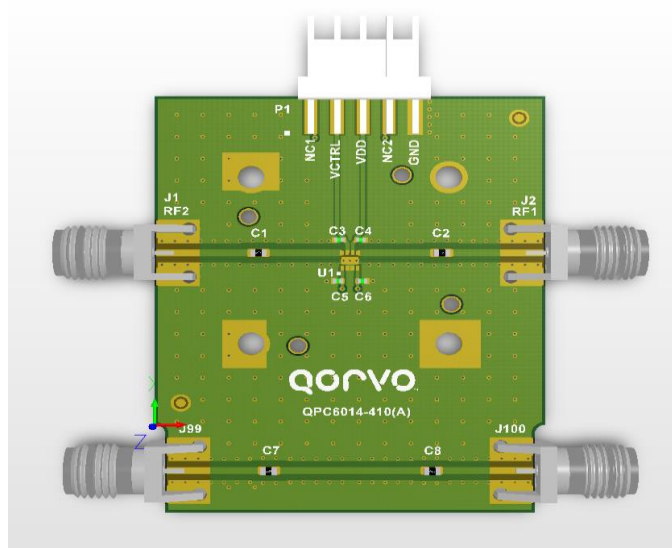
Notes:

1. Test conditions unless otherwise noted: $V_{DD}=+3.3$ V_{DC}, Temp. $=+25$ $^{\circ}$ C, 50 Ω system

Truth Table

V_{CTRL} STATE	Control Input Signal Path State
0	Isolation Mode
1	IL Mode

QPC6014 Evaluation Board

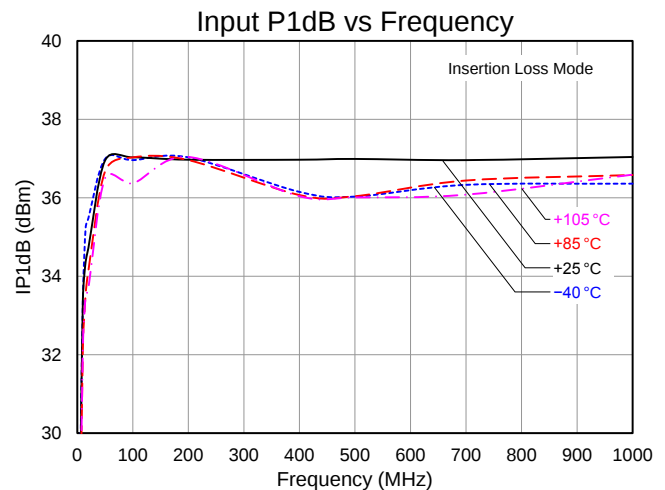
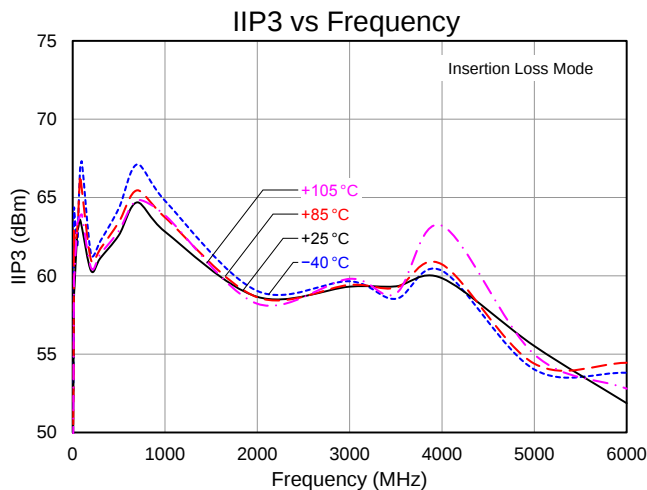
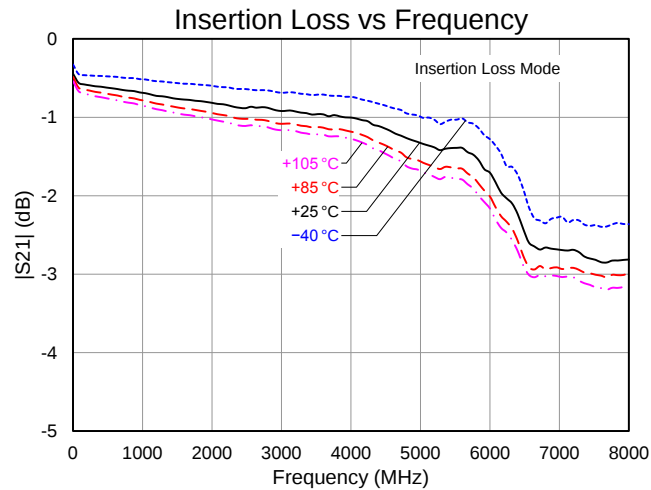
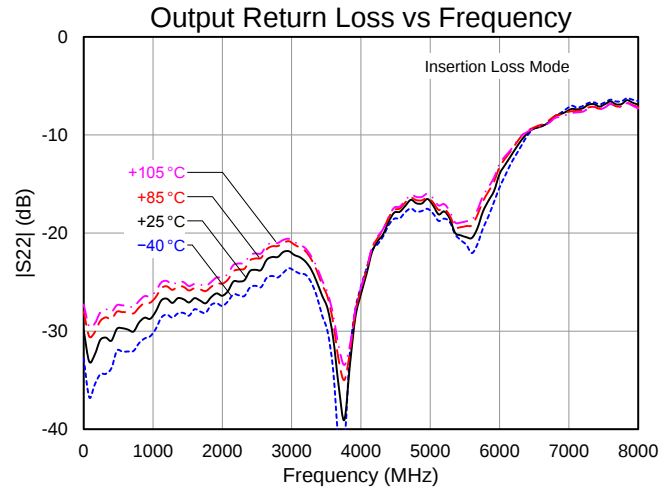
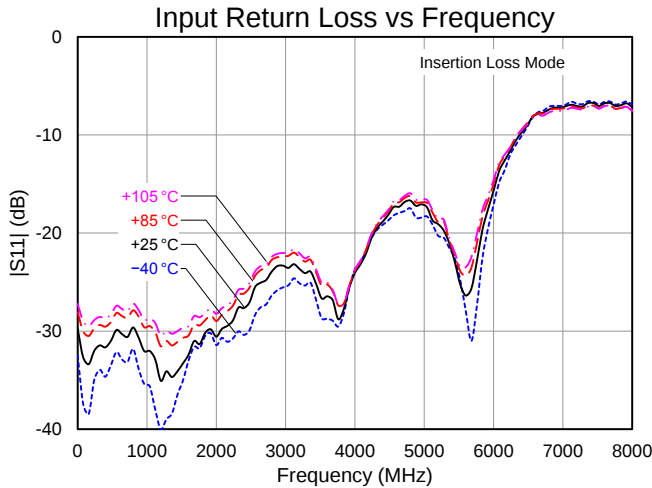


Bill of Material – QPC6014 Evaluation Board

Reference Designation	Description	Manufacturer	Manufacturer's PIN
N/A	Evaluation Board		QPC6014-410(A)
C3 – C4	CAP, 100pF, 5%, 50V, C0G, 0402	Murata Electronics	GRM1555C1H101JA01D
C1 – C2, C7 – C8	RES, 0 OHM, 0603	KOA Speer Electronic, Inc.	RK73Z1JTTD
J1 – J2, J99 – J100	CONN, SMA, EL, FLT VIPER, MAT-21-1038	Amphenol	901-10425
P1	CONN, HDR, ST, PLRZD, 5-PIN	ITW Pancon	MPSS100-5-C
U1	QPC6014	Qorvo, Inc.	QPC6014

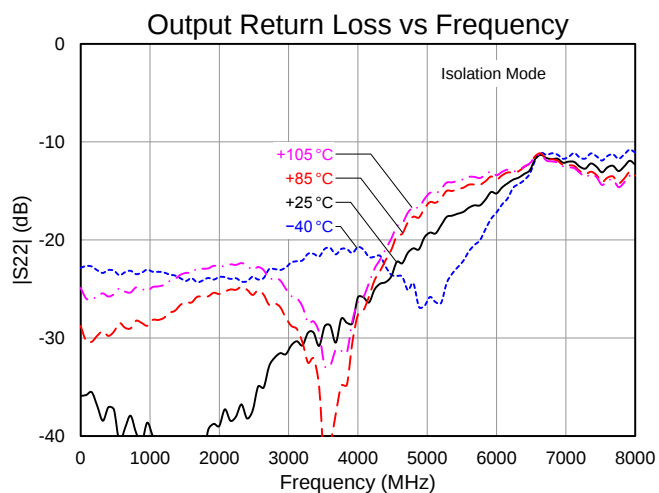
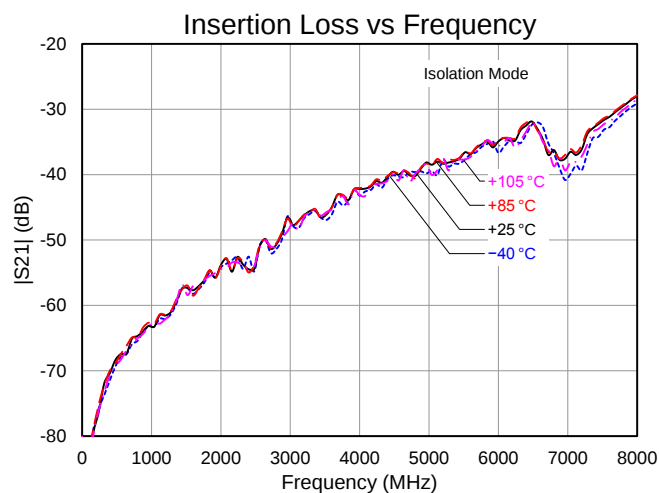
Performance Plots – Insertion Loss Mode

Test conditions unless otherwise noted: $V_{DD}=+3.3\text{ V}_{DC}$, V_{CTRL} : High, $50\ \Omega$ system

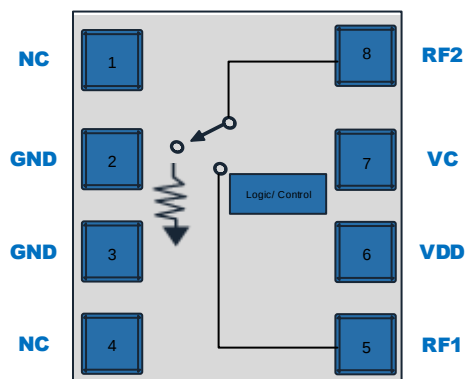


Performance Plots – Isolation Mode

Test conditions unless otherwise noted: $V_{DD}=+3.3\text{ V}_{DC}$, V_{CTRL} : Low, $50\ \Omega$ system

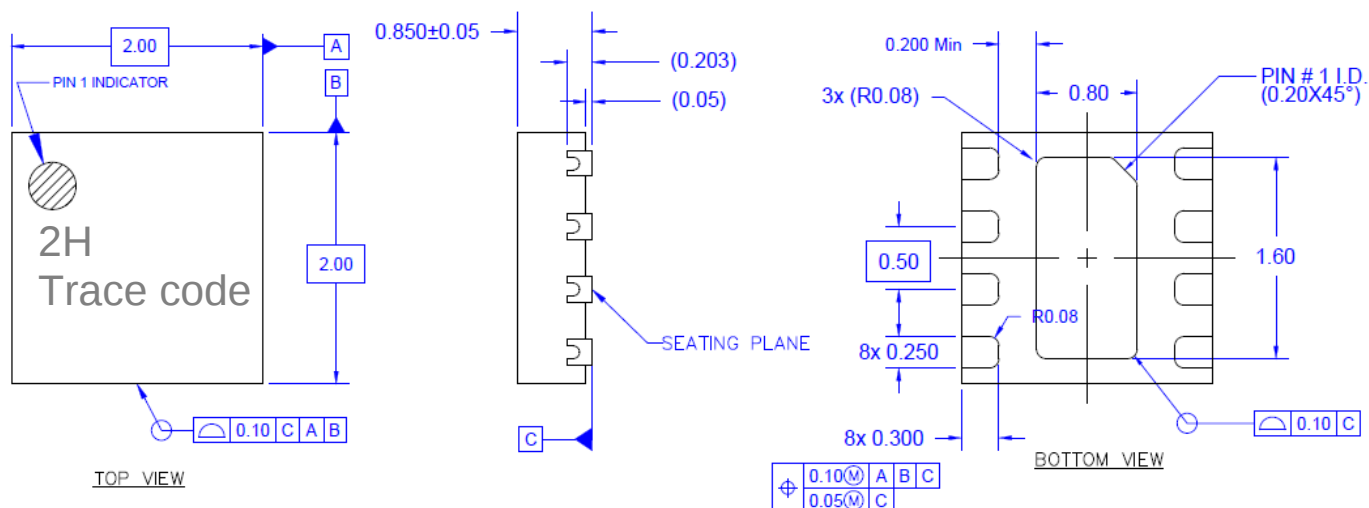


Pin Configuration and Description



Pin No.	Label	Description
1	NC	No Connection
2	GND	Low Inductance Path to Ground
3	GND	Low Inductance Path to Ground
4	NC	No Connection
5	RF1	RF Port; Non-terminating Side
6	VDD	Supply Voltage
7	VC	Control Voltage
8	RF2	RF Port; Termination Port

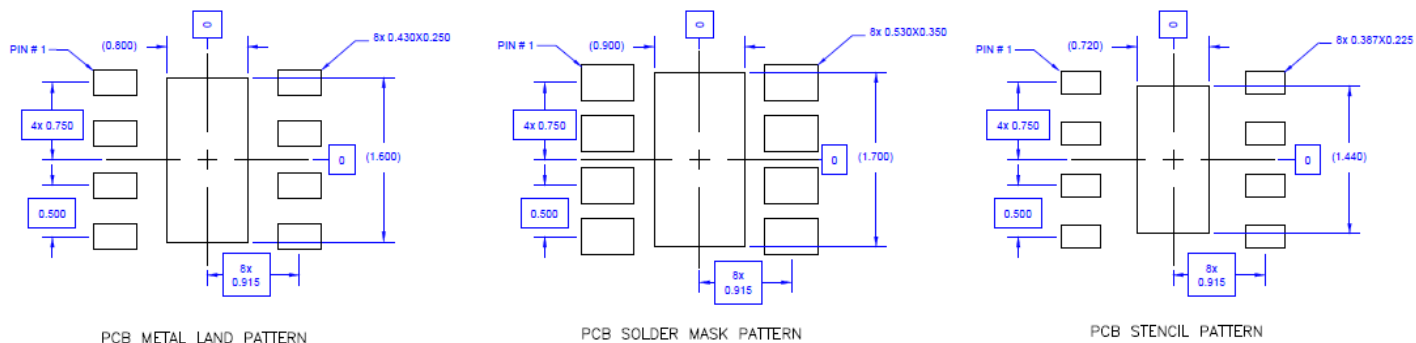
Package Marking and Dimensions



Notes:

1. All dimensions are in millimeters. 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 the structure of the vias 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 (0.10").
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 1A	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (HBM)	Class C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 2	JEDEC IPC/JEDEC J-STD-02020



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.
Plating: NiPdAu

RoHS Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment). 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

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