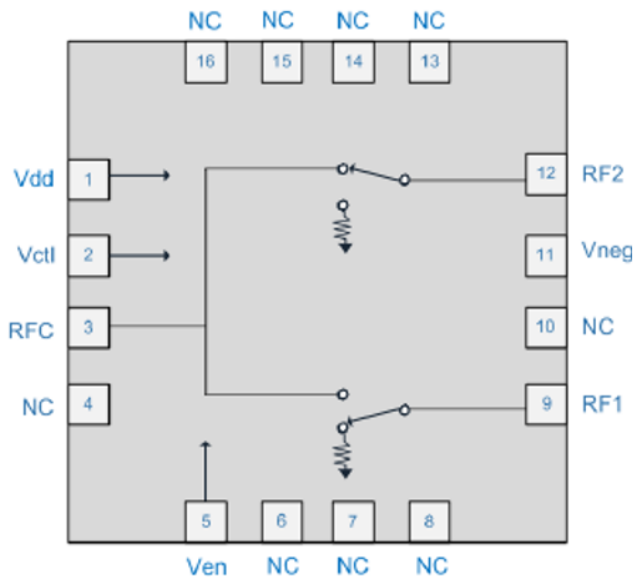


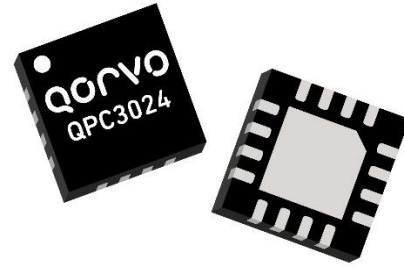
### Product Overview

The QPC3024 is a 75Ω Silicon on Insulator (SOI) single-pole, double throw (SPDT) switch designed for use in CATV, satellite set top, and other high performance communications systems. It offers a high isolation symmetric topology with excellent linearity and power handling capability. No blocking caps are necessary on the RF ports. The design is non-reflective such that RF ports 1 and 2 are terminated in in the off-state. The  $V_{EN}$  pin allows for a terminated "all-off state". Applying a negative voltage to the  $V_{NEG}$  pin will turn the negative voltage generator off and allow for external supply input.

### Functional Block Diagram



Top View



16 Pad 4 x 4 mm QFN Package

### Key Features

- 5 MHz to 3000 MHz Operation
- Symmetric SPDT
- Non-Reflective (RF1, RF2)
- Terminated All-Off State
- No Blocking Caps Required Unless Voltage on RF Line
- High Isolation: >65 dB at 1.2 GHz
- High Input IP3: >60 dBm
- Option to Turn Off Negative Voltage Generator and Supply  $V_{NEG}$  Externally
- 2 kV ESD
- +1.8 V Logic Compatible

### Applications

- MDU Amplifiers
- Point To Point
- Optical Nodes
- Set Top Box
- PCTV
- Multi-tuner DVR

### Ordering Information

Part No.	Description
QPC3024SQ	Sample bag with 25 pieces
QPC3024SR	7" Reel with 100 pieces
QPC3024TR13	13" Reel with 2500 pieces
QPC3024PCK	5 – 3000 MHz PCBA with 5 pc. sample bag

### Absolute Maximum Ratings

Parameter	Rating
Control Voltage ( $V_{CTL}$ , $V_{EN}$ )	+6.0 V
Supply Voltage ( $V_{DD}$ )	+6.0 V
External Negative Supply ( $V_{NEG}$ )	-6.0 V
Maximum CW Input Power at 25°C	+36 dBm
Maximum CW Input Power, Terminated Port	+28 dBm
Junction Temperature	+125°C
Storage Temperature Range	-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.

### Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
Supply Voltage, $V_{DD}$	+2.7	+3	+5.5	V
Supply Voltage, $V_{NEG}$	-5.5	-5	-3	V
Temperature Range	-40		+105	°C

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

### Electrical Specifications

Parameter	Conditions <sup>(1)</sup>	Min	Typ	Max	Units
Frequency Range		5		3000	MHz
Insertion Loss	5 MHz		0.38		dB
	50 MHz		0.42		
	1.2 GHz		0.82		
	2 GHz		0.83		
	3 GHz		1.4		
Isolation (RFC to RF1/RF2)	5 MHz		75		dB
	50 MHz		70		
	1.2 GHz		66		
	2 GHz		66		
	3 GHz		56		
Isolation (RF1 to RF2)	5 MHz		75		dB
	50 MHz		70		
	1.2 GHz		56		
	2 GHz		52		
	3 GHz		45		
Return Loss (RFC On-state)	5 MHz		33		dB
	50 MHz		32		
	1.2 GHz		15		
	2 GHz		17		
	3 GHz		13		
Return Loss (RF1/RF2 Off-state) Terminated Ports	5 MHz		40		dB
	50 MHz		39		
	1.2 GHz		19		
	2 GHz		18		
	3 GHz		25		

**Notes:**

1. Test Conditions Unless Otherwise Specified:  $T_A = +25^\circ\text{C}$ ,  $V_{CTL} = 0/+5\text{ V}$ ,  $V_{DD} = +5\text{ V}$ , 75 Ω system.

### Electrical Specifications (cont'd.)

Parameter	Conditions <sup>(1)</sup>	Min	Typ	Max	Units
Input IP3 <sup>(2)</sup>	1 GHz +12 dBm input power per tone, 1 MHz tone spacing		61		dBm
Input 1dB Compression Point <sup>(2)</sup>	1 GHz		36		
Input 0.1dB Compression Point <sup>(2)</sup>	1 GHz		36		
CSO	130 Channel, Flat Tilt, +42 dBmV/ch		>100		dBc
CTB	130 Channel, Flat Tilt, +42 dBmV/ch		>90		
Turn On Time	90% VDD to steady state harmonics		7.4		μs
Settling Time	50% control to steady state harmonics		3.8		
Switching Speed	50% control to 10/90% RF		1.5		
NVG Spurs	Internal NVG on (F<10MHz)		-113		dBm
Harmonics-2nd	5 MHz		-77		dBc
	17 MHz		-82		
	170 MHz		-95		
	800 MHz		-106		
Harmonics-3rd	5 MHz		-93		dBc
	17 MHz		-115		
	170 MHz		-119		
	800 MHz		-121		

Notes:

1. Test Conditions Unless Otherwise Specified: T<sub>A</sub> = +25 °C, V<sub>CTL</sub> = 0/+5 V, V<sub>DD</sub> = +5 V, V<sub>NEG</sub> = -5 V, 75 Ω system. Drive RFC, RFx output.
2. Tested at 50Ω.

### Electrical Specifications - Power Supply

Parameter	Conditions <sup>(1)</sup>	Min	Typ	Max	Units
Supply Current (I <sub>DD</sub> )	V <sub>DD</sub> = +5.0V		130	200	μA
Control Current (I <sub>CTL</sub> , I <sub>EN</sub> )	V <sub>CTL</sub> = +5.0V		0.5	5	μA
Low Control Voltage (V <sub>CTL</sub> , V <sub>EN</sub> )	+1.8V Logic compatible	0		0.63	V
High Control Voltage (V <sub>CTL</sub> , V <sub>EN</sub> )		1.1		VDD	V

### Maximum Operating Power

Input	State	VEN	Power at 85C (dBm)	Power at 105C (dBm)	Theta-J (°C/W)
RFC, RF1/2	On	Low	34 <sup>(1)</sup>	31 <sup>(1)</sup>	125
RFC	Both Off	High	30	27	N/A
RF1/2	Off	Low or High	27	24	77
RF1/2 (Simultaneous)	Both Off	High	29 <sup>(2)</sup>	26 <sup>(2)</sup>	50

Notes:

1. Assuming load VSWR <3:1, for high VSWR loads, this value reduces by 3dB.
2. Total power in both loads being driving simultaneously.

### Power Supply Sequencing Requirements

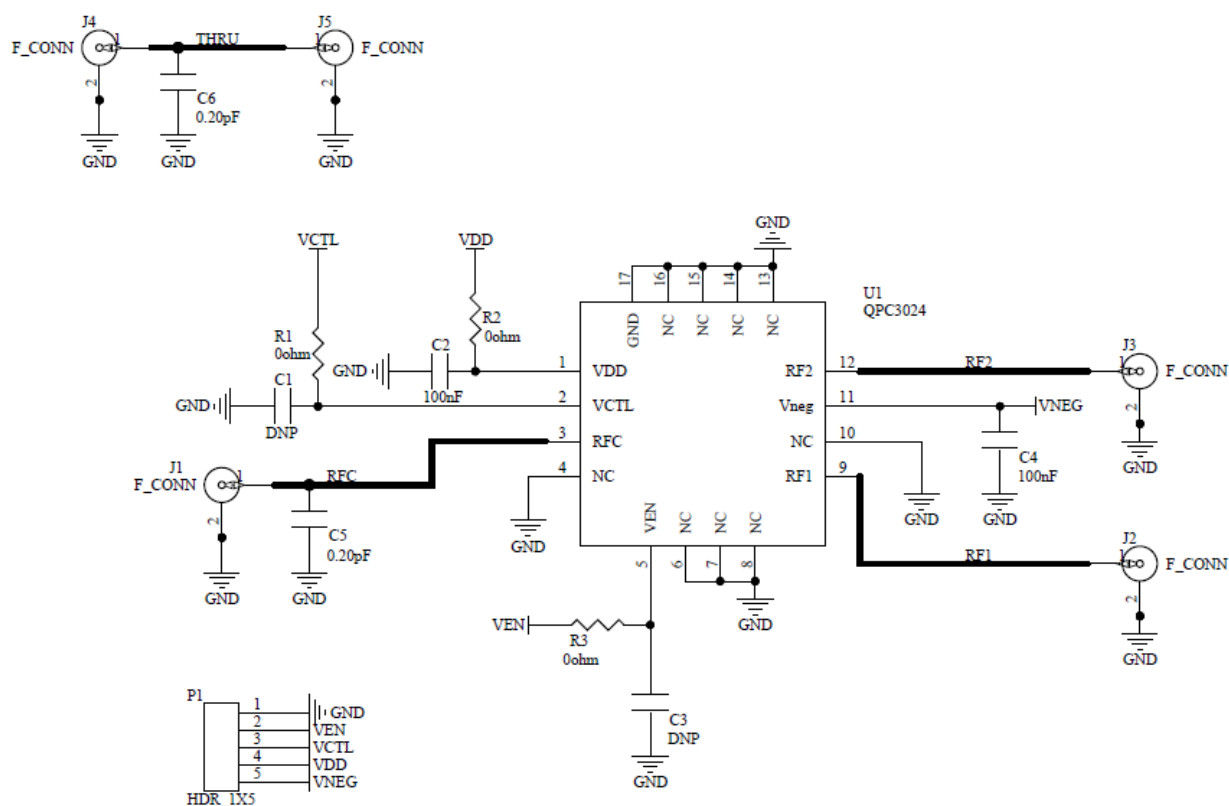
No power supply sequencing is required if VCTL or VEN are less than 4.1V. When VCTL and VEN are greater than 4.1V, for best reliability, apply V<sub>DD</sub> before the applying the control voltage.

If the internal Negative Voltage Generator (NVG) is disabled by applying a negative voltage on V<sub>NEG</sub>, V<sub>DD</sub> must be power cycled after changing V<sub>NEG</sub> to 0V to enable it again.

### Truth Table

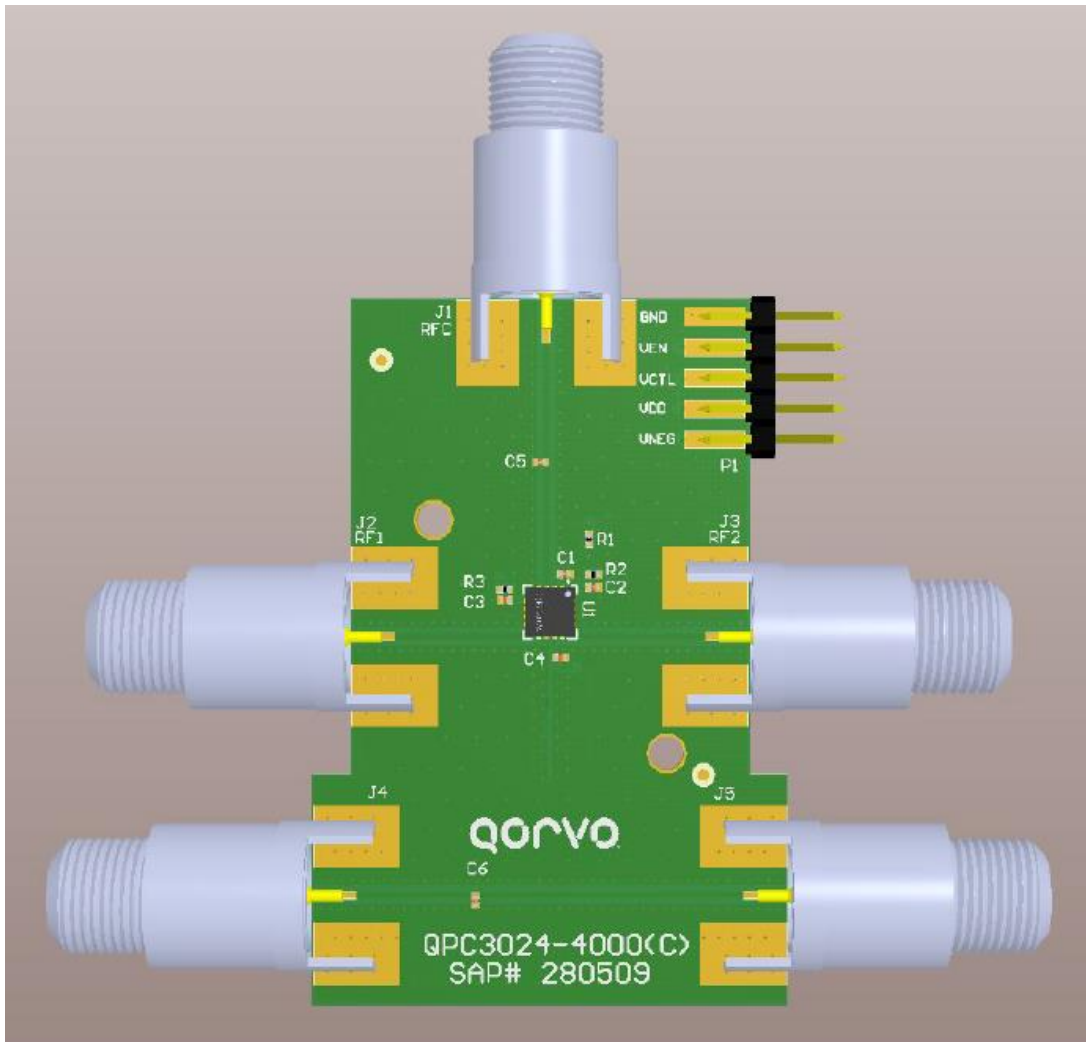
Control Input		Signal Path State	
V <sub>CTL</sub>	V <sub>EN</sub>	RFC-RF1	RFC-RF2
0	0	On	Off
1	0	Off	On
0	1	Off	Off
1	1	Off	Off

### 5-3000 MHz Evaluation Board Schematic (QPC3024PCK)



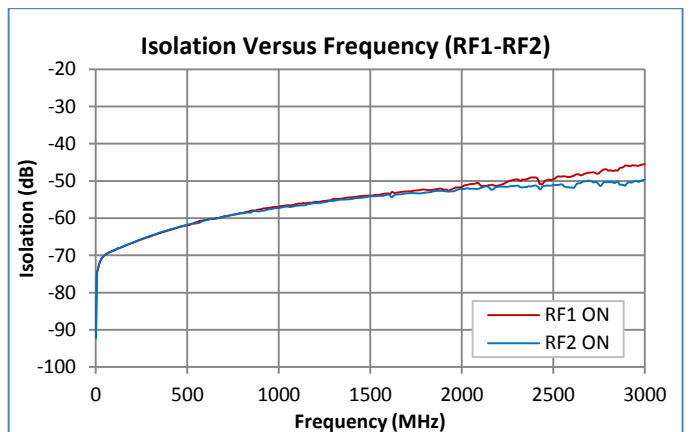
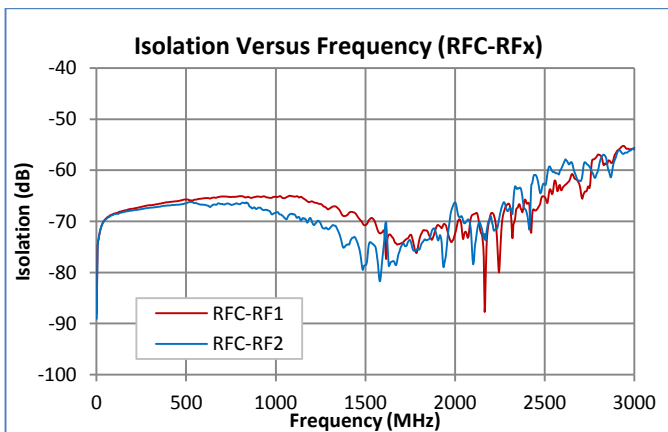
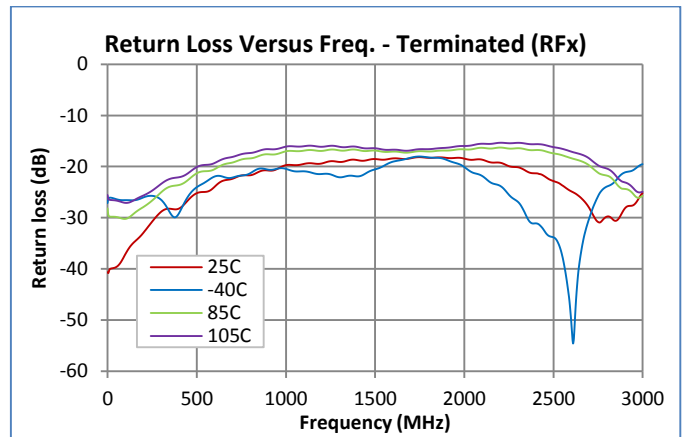
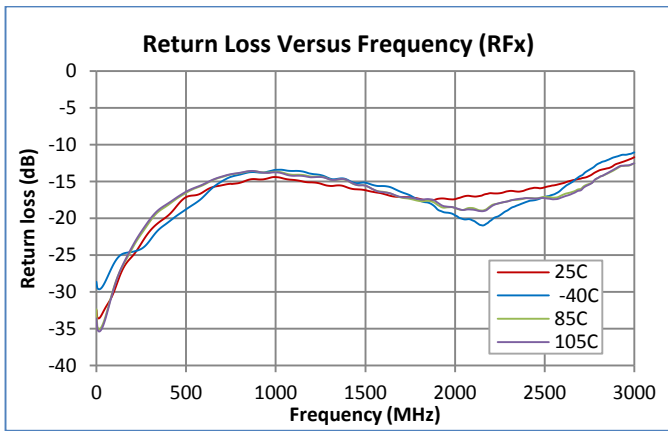
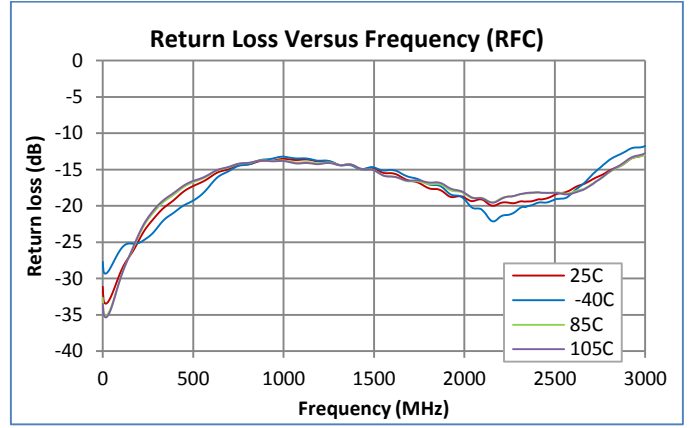
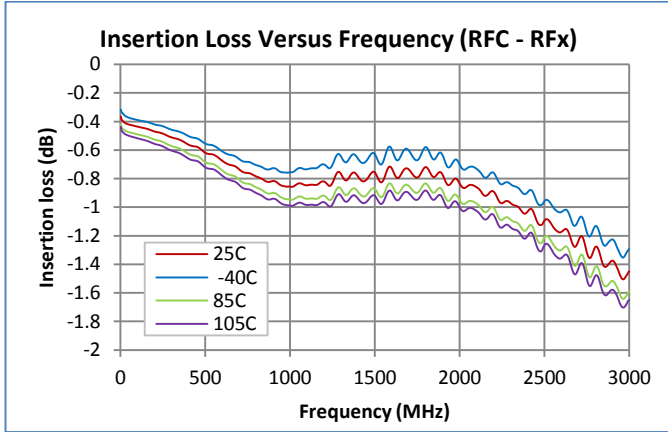
Ref. Designator	Description	Manufacturer	Part Number
PCB	Evaluation Board PCB	Viasystems	QPC3024-4000
U1	75ohm High Isolation Switch	Qorvo	QPC3024SB
J1, J2, J3, J4, J5	Conn, Type F, Edge Mount, 75 Ω, 0.065"	Genesis Technology	GT20-300204
R1, R2, R3	0 Ω RES, 0402	Panasonic	ERJ-2GE0R00X
P1	Conn, HDR, ST, 5-Pin, T/H	Molex	22-28-4053
C2, C4	100nF 10% X7R 16V CAP, 0402	Murata	GJM1555C1HR20RB12D
C5, C6	0.2pF +/- 0.03pF COG 50V CAP, 0402	Murata	GRM155R71C104KA88D
C1, C3	DNP	N/A	N/A

## Evaluation Board Assembly Drawing



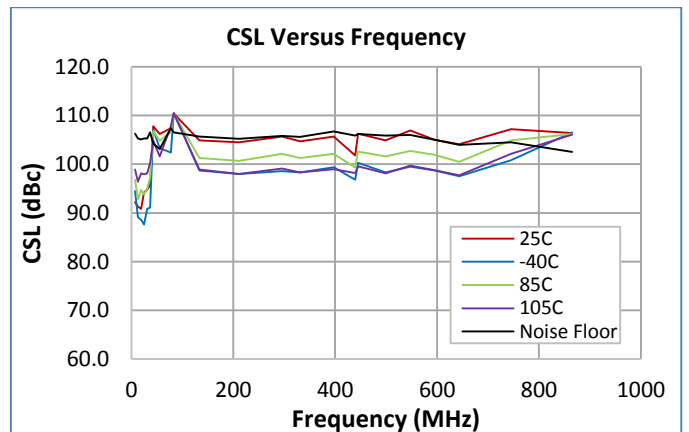
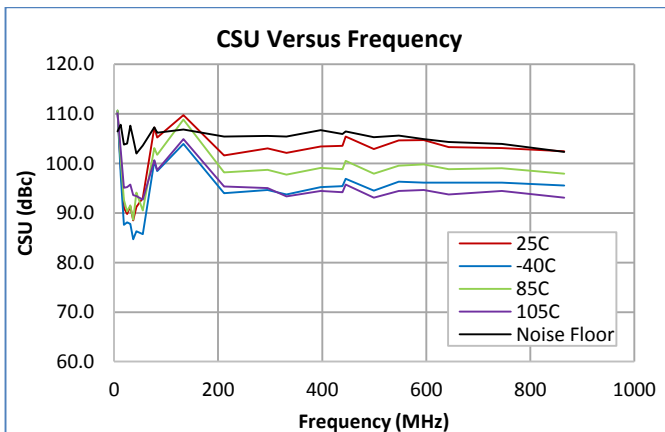
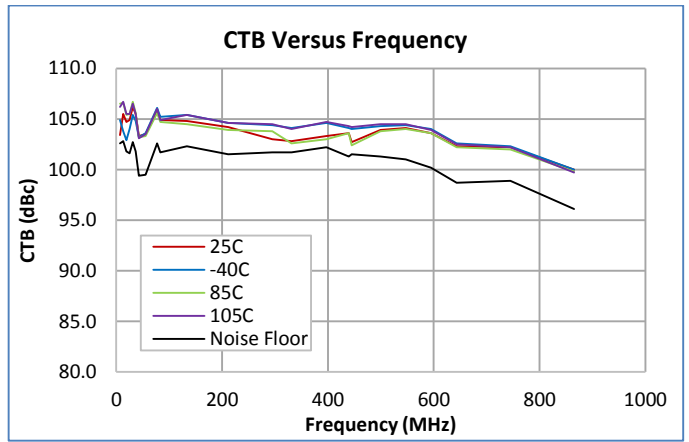
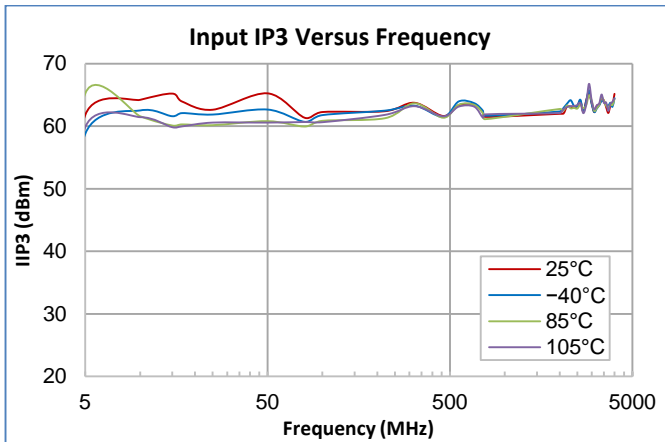
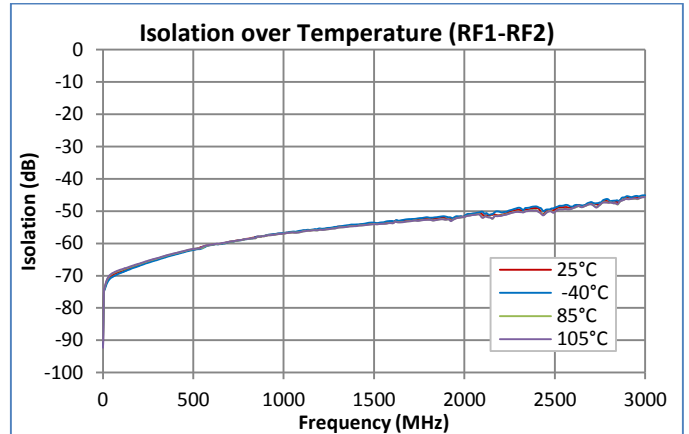
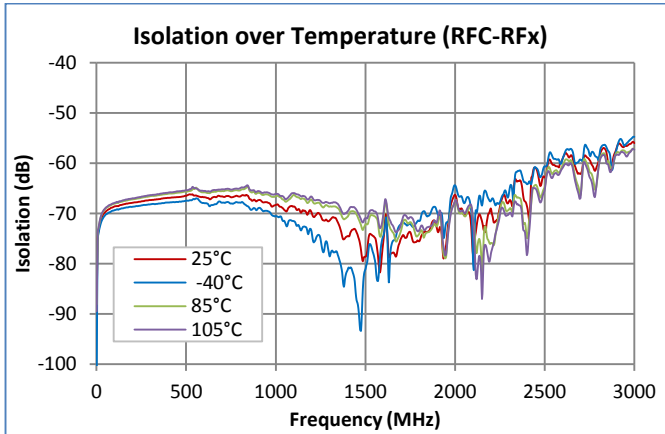
Performance Plots

Test conditions unless otherwise noted:  $V_{DD} = +5V$ ,  $V_{NEG} = -5V$ , Temp =  $+25^{\circ}C$ ,  $Z_o = 75\Omega$



Performance Plots (cont'd.)

Test conditions unless otherwise noted:  $V_{DD} = +5V$ ,  $V_{NEG} = -5V$  Temp =  $+25^\circ C$ ,  $Z_o = 75\Omega$



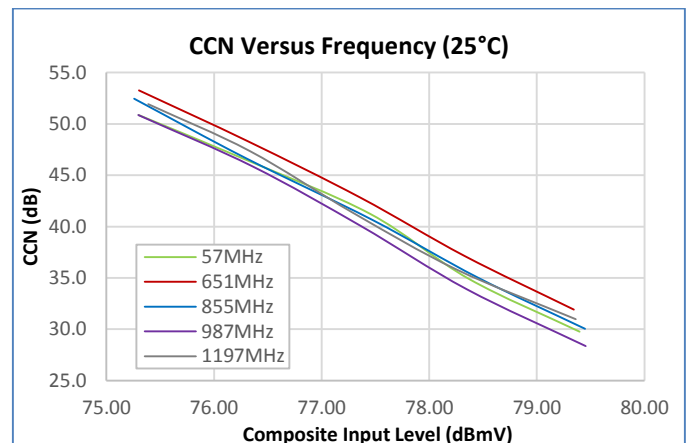
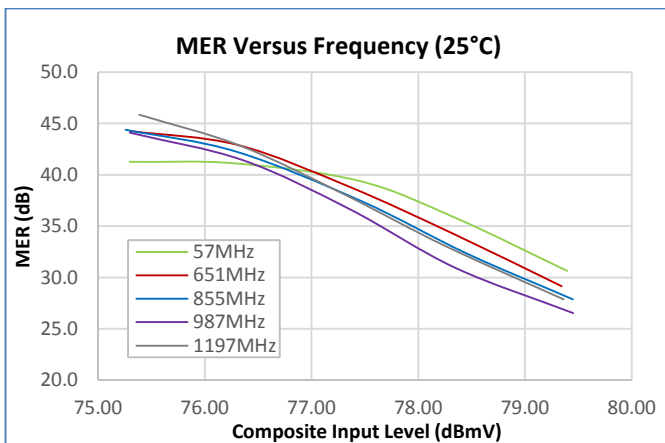
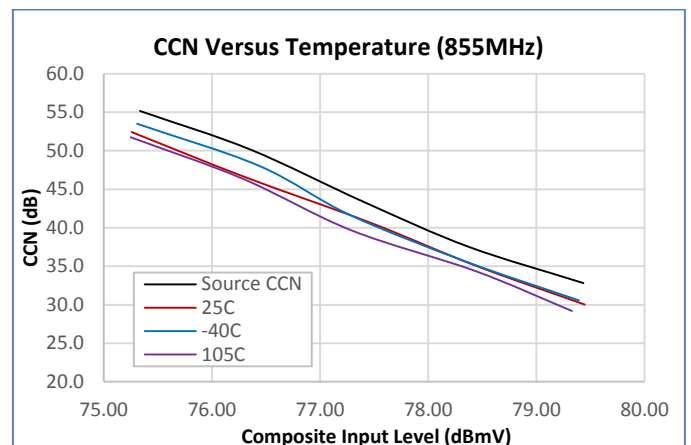
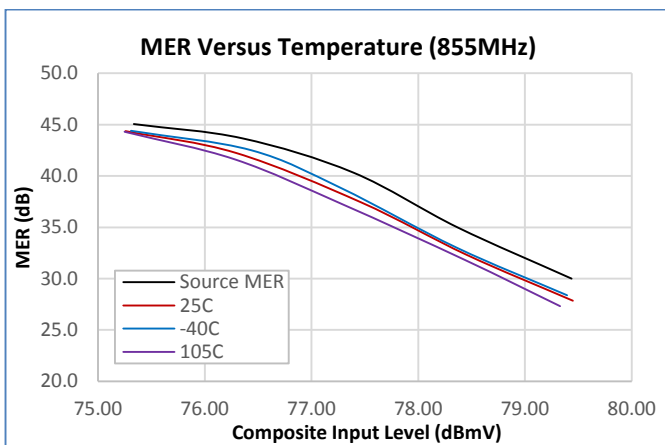
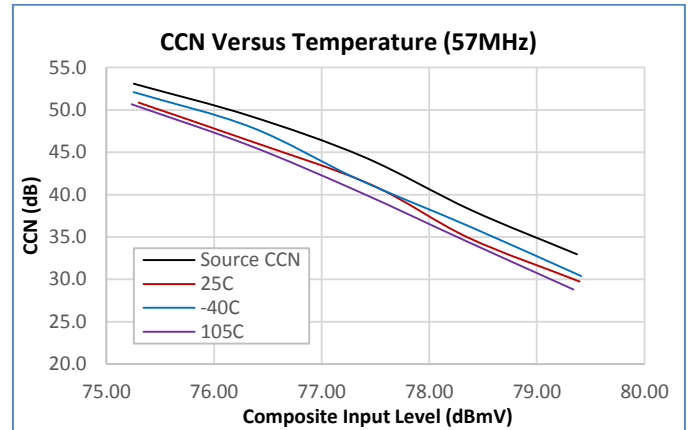
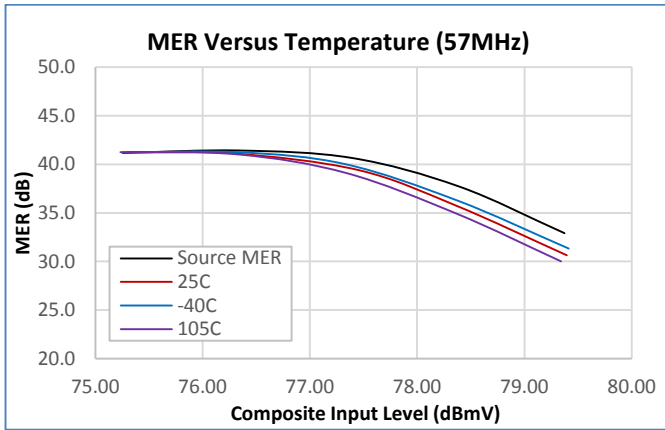
Test Conditions:

1. IIP3: Two tone, 50Ω, +12dBm per Tone.
2. CSO/CTB: 130 Channels, 42dBmV per Channel, Flat Tilt.



### Performance Plots (cont'd.)

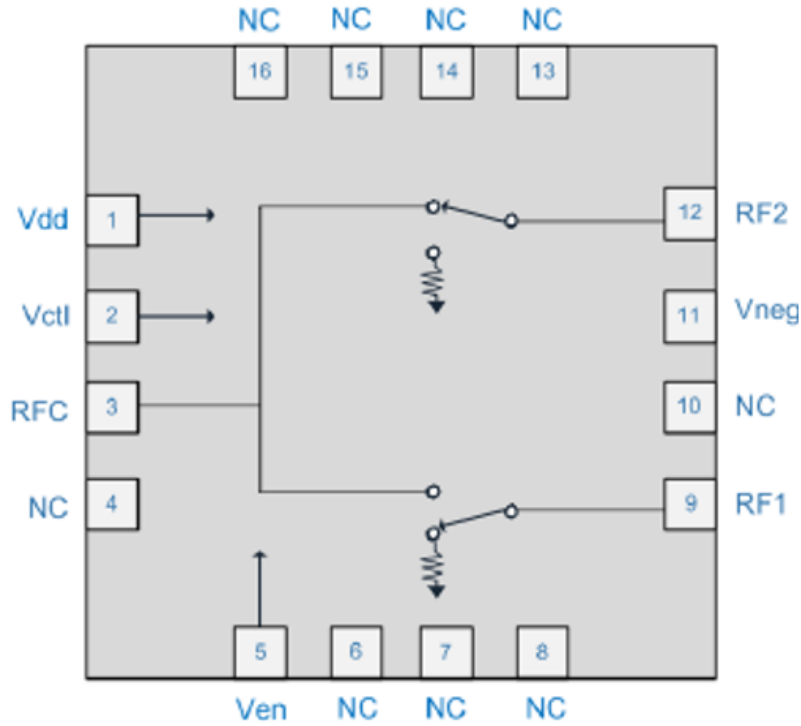
Test conditions unless otherwise noted:  $V_{DD} = +5V$ ,  $V_{NEG} = -5V$ , Temp =  $+25^{\circ}C$ ,  $Z_o = 75\Omega$



**MER/CCN Test Conditions:**

1. 190 QAM256 Channels, 57-1215MHz, ITU-T J.83, Annex B
2. CCN test procedure according to ANSI/SCTE 17. System BW 5.36MHz.

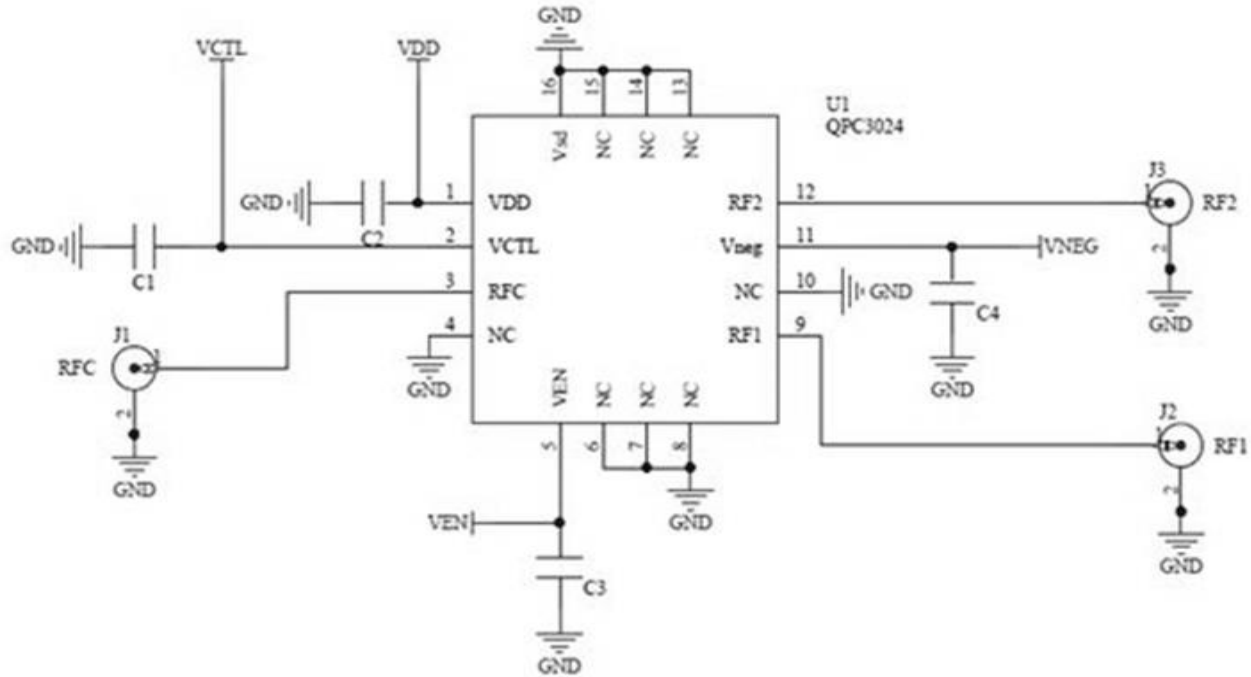
### Pad Configuration and Description



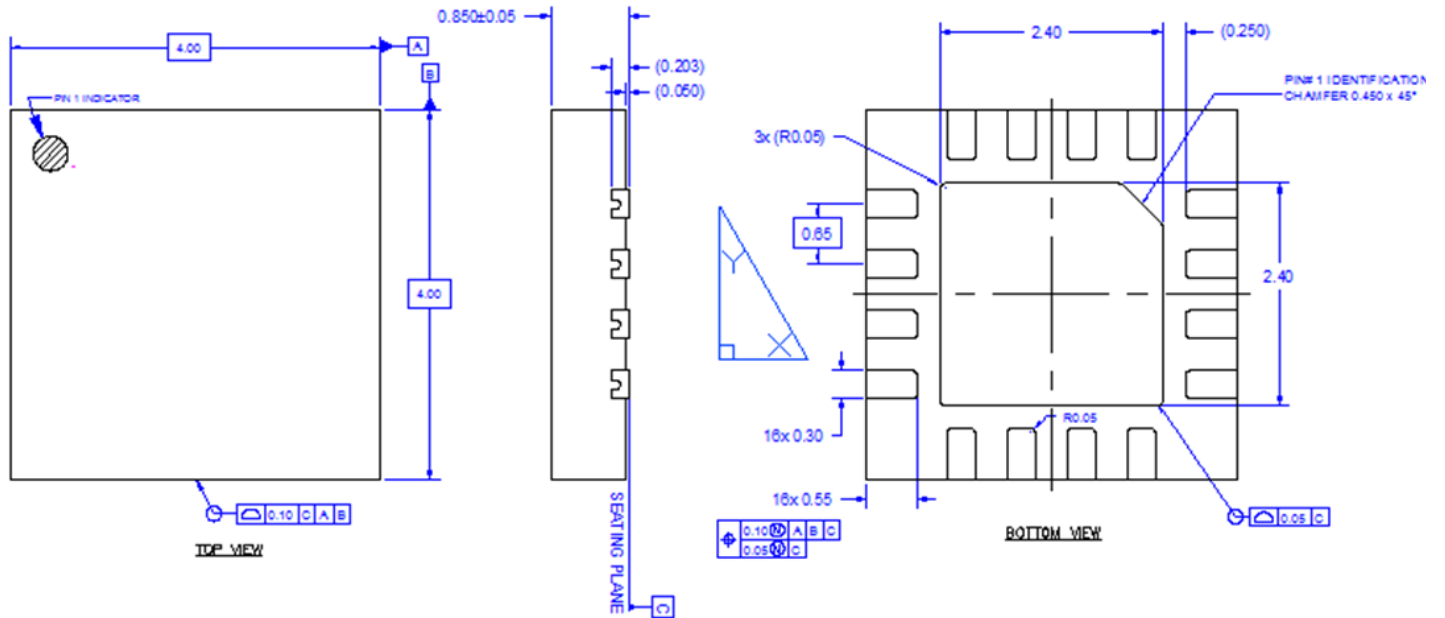
Top View

Pad No.	Label	Description
1	VDD	Supply Voltage
2	VCTL	Logic Control Input
3	RFC	RF Common Port
4	NC	Grounding this pin is recommended for performance
5	VEN	Logic input for putting switch in "all-off state". Logic high for "all-off state".
6, 7, 8, 13, 14, 15, 16	NC	Grounding this pin is recommended to maximize isolation
9	RF1	RF Port 1
10	NC	Grounding this pin is recommended for performance
11	VNEG	Negative Voltage Generator (NVG) control pin. Supply GND (Low inductive path to ground) to enable internal NVG or supply -2.7 V to -5 V to disable internal NVG. Once disabled, internal NVG cannot be enabled without cycling V <sub>DD</sub> .
12	RF2	RF Port 2
EPAD	GND	RF and DC Ground: Must be soldered to EVB ground plane.

Applications Schematic; 5-1200MHz



### Package Dimensions

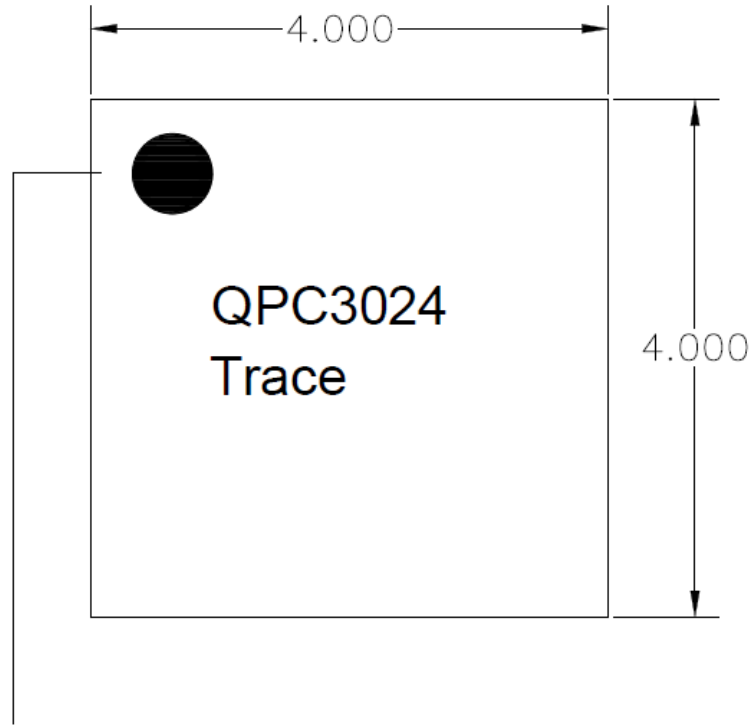


**Notes:**

1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Contact plating: NiPdAu

### Package Marking

---



Pin 1 Indicator

Trace Code to be assigned by SubCon

---

### Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	1000V, Class C3	ANSI/ESDA/JEDEC JS-002-2014
ESD – Charged Device Model (CDM)	2000V, Class 2	ANSI/ESDA/JEDEC JS-002-2014
MSL – Moisture Sensitivity Level	Level 2	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: 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 (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) 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](http://www.qorvo.com)

Email: [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

### Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

Copyright 2016 © Qorvo, Inc. | Qorvo is a registered trademark of Qorvo, Inc.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «**JONHON**», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «**FORSTAR**».



## JONHON

«**JONHON**» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«**FORSTAR**» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А