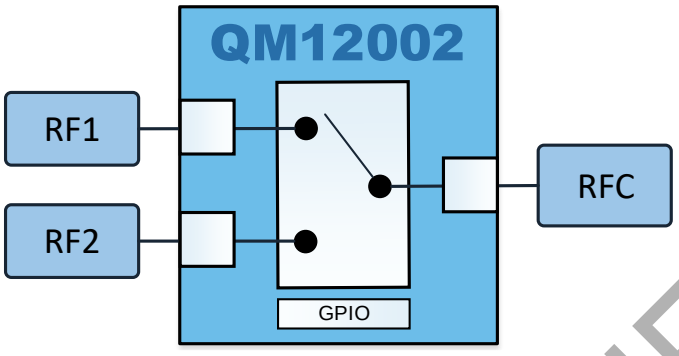
QM12002

SPDT SWITCH FOR RECEIVE APPLICATIONS

Product Overview

The QM12002 is a low insertion loss, high isolation single-pole dual-throw (SPDT) switch with performance optimized for low power routing and diversity applications. The QM12002 is controlled by 1 bit GPIO with a compact 0.7mm x 1.1mm x 0.59mm size, which allows for a small solution size with no need for external DC blocking capacitors.

Functional Block Diagram



Top View

6 Pin 1.1 x 0.7 X 0.59 mm³ Module

Key Features

- Low Insertion Loss
- High Isolation
- One Bit Controller Only
- Broadband Performance Suitable for All Cellular Modulation Schemes up to 3.8GHz
- Compact Size
- HBM Rating > 2kV on All Ports
- No DC Blocking Capacitors Required in Typical Applications

Applications

- Cellular Handset Applications
- Multi-Mode GSM, EDGE, WCDMA, and LTE Received Applications

Ordering Information

PART NUMBER	DESCRIPTION
QM12002PCB4B01	Fully Assembled EVB
QM12002SB	Sample Bag with 5 pcs
QM12002SR	Sample Reel with 100 pcs
QM12002TR13-10K	Standard 13” Reel with 10,000 pcs

Absolute Maximum Ratings

PARAMETER	CONDITIONS	RATING
Storage Temperature		-40 to +125 °C
Operating Temperature		-30 to +85°C
V_{DD}		6.0 V
CTRL Voltage		3.0 V
Maximum Input Power	1:1 VSWR, Continunous Wave +25°C	26 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} Supply Voltage	2.4	2.85	5.5	V
V_{DD} Supply Current (Active Mode)		42		µA
CTRL Logic Voltage High	1.3	1.8	2.7	V
CTRL Logic Voltage Low	0.00	0.00	0.45	V
CTRL Logic Current High		70		nA
Switching Time - ON Switching speed 10% to 90% port to port		2		µs

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

Electrical Specifications

Test conditions unless otherwise stated: all unused RF ports terminated in 50Ω, Input and Output = 50Ω, T = 25°C,

V_{DD} = 2.85V, CTRL = 1.8V

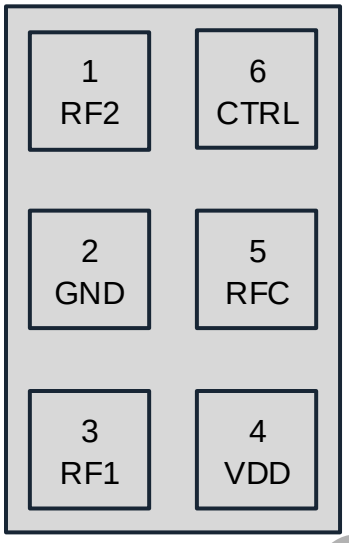
PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Frequency Range		698		3800	MHz
Insertion Loss					
RFx - RFC	698MHz to 803MHz		0.24		dB
RFx - RFC	824MHz to 960MHz		0.24		dB
RFx - RFC	1427MHz to 2170MHz		0.3		dB
RFx - RFC	2300MHz to 2690MHz		0.4		dB
RFx - RFC	3400MHz to 3800MHz		0.5		dB

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Isolation					
Active TRx the other ports to RFC	698MHz to 803MHz		41		dB
	824MHz to 960MHz		40		dB
	1427MHz to 2170MHz		32		dB
	2300MHz to 2690MHz		29		dB
	3400MHz to 3800MHz		23		dB

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Harmonics					
2nd Harmonic	Freq = 698-787, 824-915MHz; 1710-1980MHz; 2300-2690MHz; P_{IN} = 15dBm		-90		dBm
3rd Harmonic			-90		dBm
4th Harmonic to 12.75GHz			-110		dBm

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
VSWR					
Input/Output VSWR	698MHz to 803MHz		1.1		: 1
Input/Output VSWR	824MHz to 960MHz		1.1		: 1
Input/Output VSWR	1427MHz to 2170MHz		1.1		: 1
Input/Output VSWR	2300MHz to 2690MHz		1.2		: 1
Input/Output VSWR	3400MHz to 3800MHz		1.5		: 1

Pin Configuration and Description



Top View

Pin-out Description

PIN	NAME	DESCRIPTION
1	RF2	RF Port
2	GND	Ground
3	RF1	RF Port
4	VDD	Supply Voltage
5	RFC	RF Common Port
6	CTRL	Control

Control Logic

MODE	CTRL	DESCRIPTION
RFC – RF1	Low	Active path is RFC-RF1, RF2 is low impedance/reflective
RFC – RF2	High	Active path is RFC-RF2. RF1 is low impedance/reflective

Power On and Off Sequence

It is very important that the user adheres to the correct power-on/off sequence in order to avoid damaging the device. The control signals CTRL should be set to 0V unless V_{DD} is set in the operating voltage range.

Power Up Sequence:

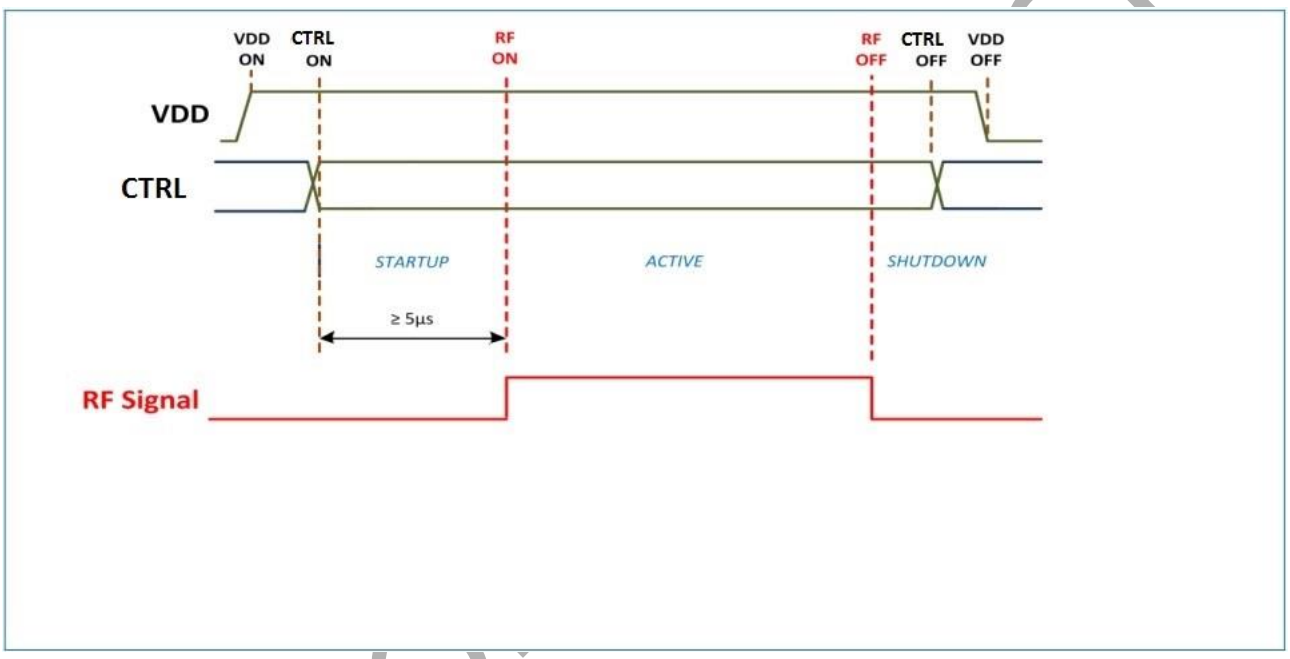
1) Apply V_{DD}

2) Apply CTRL

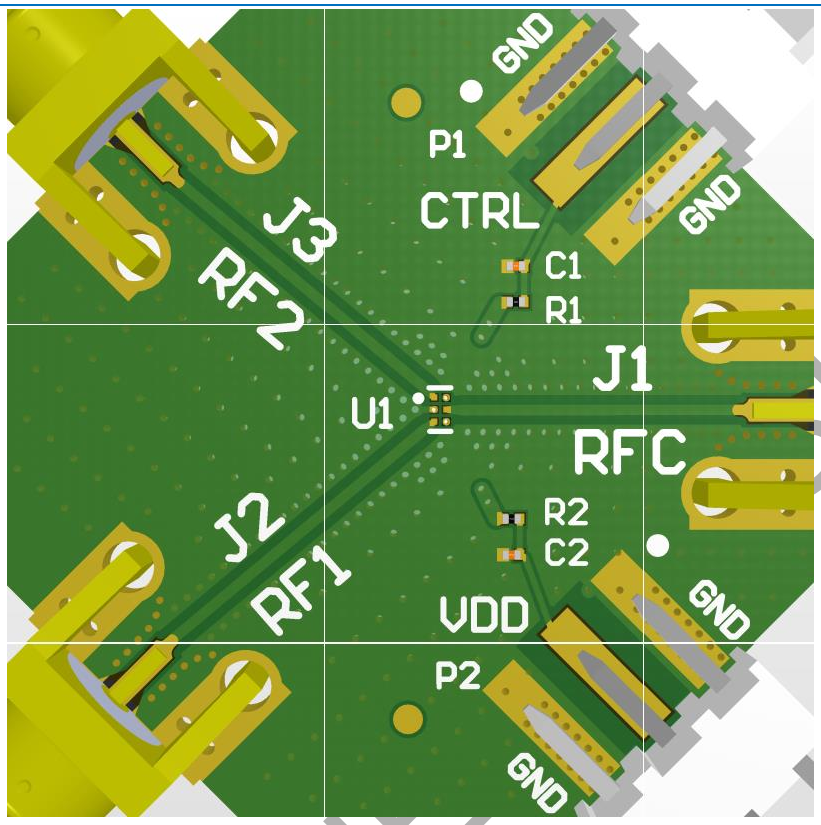
3) Apply RF

Power Down Sequence: Reverse order of the power up sequence.

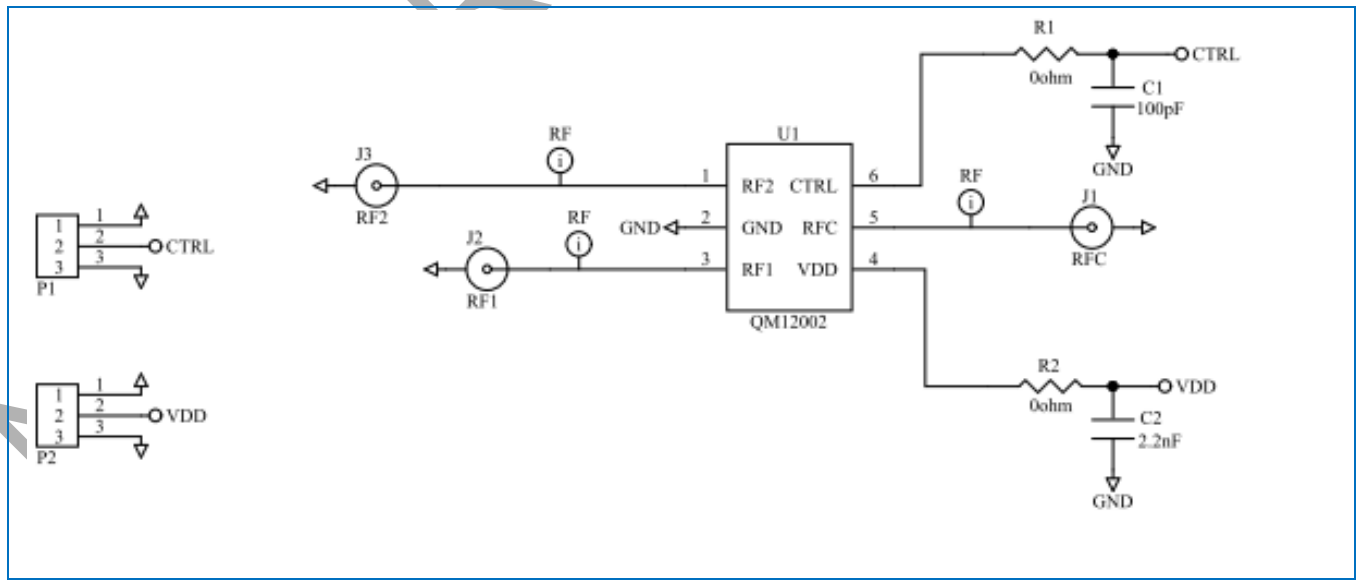
Not following the power up/down sequence may damage the device and affect long-term reliability.



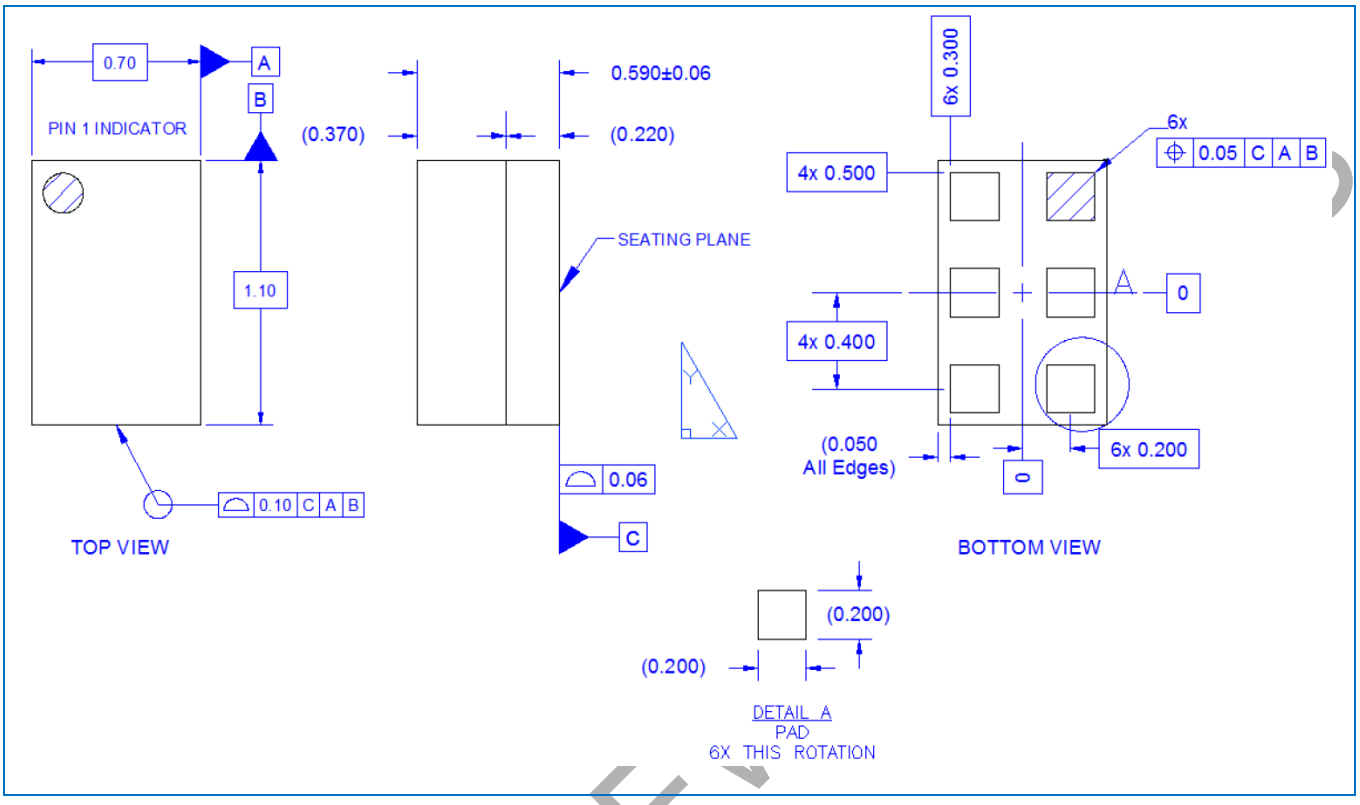
Evaluation Board Layout



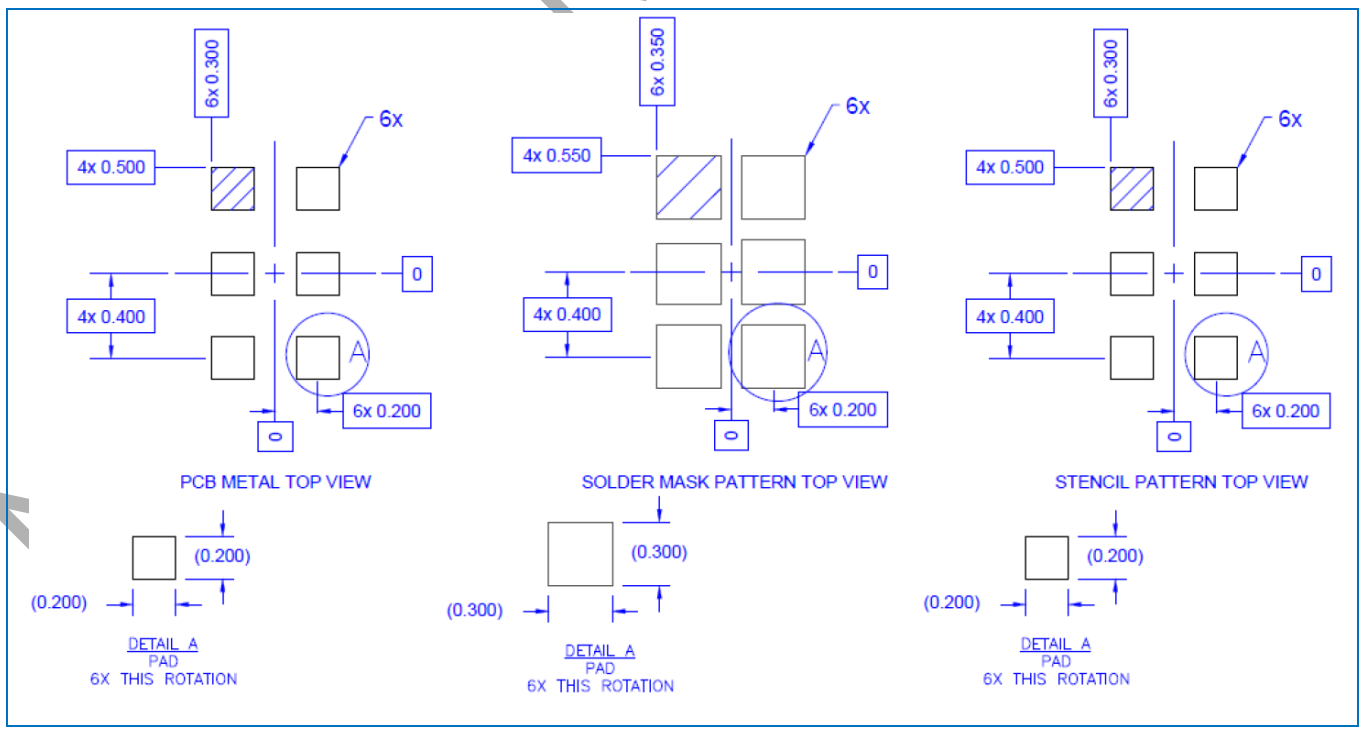
Evaluation Board Schematic



Package Drawing



PCB Pattern



Handling Precautions

PARAMETER	RATING	STANDARD
ESD – Human Body Model (HBM)	Class 1C	ANSI/ESD/JEDEC JS-001
ESD – Charged Device Model (CDM)	N/A	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020

ESD CDM - Data was not taken, part physically too small.

Caution!

ESD sensitive device

Solderability

Compatible with both lead-free (260 °C max. reflow temperature) and tin/lead (245 °C max. reflow temperature) soldering processes.

Package lead plating: Electrolytic plated Au over Ni

RoHS Compliance

This part is compliant with the 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 ($C_{15}H_{12}Br_4O_2$) Free
- SVHC Free

Revision History

Revision	Description
DS20160425	Production Release
DS20160803	Update to Qorvo Datasheet
DS20250131	Added NRND Watermarks to the Document

Contact Information

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

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

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