# QONO

# QM11024

# **BROADBAND HIGH LINEARITY DP4T ROUTING SWITCH**

#### **Product Overview**

The QM11024 is a low loss, high linearity dual-pole four-throw addressable switch with performance optimized for transfer routing applications. The QM11024 integrates a serial control system compatible with the RFFE standard. The select lines (SID) provide USID addressability and up to two placements of the QM11024 on the same RFFE Bus. The QM11024 runs off a single VIO voltage supply and is packaged in a 16 pin compact 2.0mm x 2.0mm x 0.5mm size device. This offers mobile handset designers a compact, easy-to-use, switch component for quick integration into multimode, multi-band systems.

# **Functional Block Diagram**





16 Pin 2.0 x 2.0 X 0.5 mm<sup>3</sup> Module

# **Key Features**

- Excellent Insertion Loss and Isolation performance
- High Linearity
  - RFFE 2.1 Control Interface
    - UDR Mask write capable (R/WM)
- Broadband Performance Suitable for Multiple Air Interfaces including 5G applications.
- Slave ID for Multiple Placements on the Same Board
- Very Low Current Consumption
- DC blocking capacitors are not required in typical applications
- Single VIO supply

# **Applications**

- Cellular Handset Applications
- Cellular Modems and USB Devices
- Multi-Mode GSM, CDMA, WCDMA,LTE and NR including n77, n79 frequency bands.

# **Ordering Information**

Part Number	Description
QM11024DK	Design Kit
QM11024SB	Sample Bag with 5 pcs
QM11024SR	Sample Reel with 100 pcs
QM11024TR13	Standard 13" Reel with 10,000 pcs

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# QM11024 BROADBAND HIGH LINEARITY DP4T ROUTING SWITCH

# **Absolute Maximum Ratings**

Parameter	Conditions	Rating	
Storage Temperature		-40 to +125 °C	
Operating Temperature		-30 to +90°C	
VIO, SDATA, SCLK, & SID		2.15 V	
Absolute Max Power	All ports 10:1 VSWR, +25°C	38dBm	

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

# **Recommended Operating Conditions**

Parameter	Min.	Тур.	Max.	Units
V <sub>IO</sub> Interface Supply Voltage High	1.65	1.8	1.95	V
V <sub>IO</sub> Interface Supply Voltage Low	0	0	0.45	V
SDATA, SCLK – Voltage High	0.8 x V <sub>IO</sub>	1.8	V <sub>IO</sub>	V
SDATA, SCLK – Voltage Low	0.00	0.00	0.2 x V <sub>IO</sub>	V
Switching Time Switch RF path from 10% to 90% (see Figure.2/3)		3	4	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 50 $\Omega$ , Input and Output = 50 $\Omega$ , T = 25°C,

VIO/SDATA/SCLK/SID = 1.8 V / 0 V

CONDITIONS	MIN.	TYP.	MAX.	UNITS
617 MHz to 960 MHz		0.4		dB
1425 MHz to 2200 MHz		0.5		dB
2300 MHz to 2690 MHz		0.65		dB
3300 MHz to 3800 MHz		0.8		dB
3800 MHz to 5000 MHz*		0.9		dB
	617 MHz to 960 MHz 1425 MHz to 2200 MHz 2300 MHz to 2690 MHz 3300 MHz to 3800 MHz	617 MHz to 960 MHz           1425 MHz to 2200 MHz           2300 MHz to 2690 MHz           3300 MHz to 3800 MHz	617 MHz to 960 MHz         0.4           1425 MHz to 2200 MHz         0.5           2300 MHz to 2690 MHz         0.65           3300 MHz to 3800 MHz         0.8	617 MHz to 960 MHz         0.4           1425 MHz to 2200 MHz         0.5           2300 MHz to 2690 MHz         0.65           3300 MHz to 3800 MHz         0.8

Isolation**			
Active RFIN1/2/3/4 to RFOUT1,	617 MHz to 960 MHz	40	dB
measure RFIN1/2/3/4 to RFOUT2	1427 MHz to 2200 MHz	35	dB
	2300 MHz to 2690 MHz	35	dB
Active RFIN1/2/3/4 to RFOUT2,	3300 MHz to 3800 MHz	30	dB
measure RFIN1/2/3/4 to RFOUT1	3800 MHz to 5000 MHz	30	dB

Harmonics			
2 <sup>nd</sup> Harmonic		-50	dBm
3 <sup>rd</sup> Harmonic	Freq = 824 MHz to 915 MHz ; P <sub>IN</sub> = 36dBm	-50	dBm
2nd Harmonic		-58	dBm
3 <sup>rd</sup> Harmonic	Freq = 1710 MHz to 1785 MHz ; P <sub>IN</sub> = 33dBm	-55	dBm
2nd Harmonic		-58	dBm
3 <sup>rd</sup> Harmonic	Freq = 1850 MHz to 1910 MHz ; P <sub>IN</sub> = 33dBm	-55	dBm
2 <sup>nd</sup> Harmonic		-78	dBm
3 <sup>rd</sup> Harmonic	Freq = 617 MHz to 960 MHz ; P <sub>IN</sub> = 26dBm	-80	dBm
2 <sup>nd</sup> Harmonic		-72	dBm
3 <sup>rd</sup> Harmonic	Freq = 1427 MHz to 2200 MHz ; P <sub>IN</sub> = 26dBm	-79	dBm
2 <sup>nd</sup> Harmonic		-70	dBm
3 <sup>rd</sup> Harmonic	Freq = 2300-2690MHz; P <sub>IN</sub> = 26dBm	-80	dBm
2 <sup>nd</sup> Harmonic		-65	dBm
3 <sup>rd</sup> Harmonic	Freq = 3300 MHz to 3800 MHz ; P <sub>IN</sub> = 26dBm	-80	dBm
2 <sup>nd</sup> Harmonic	Freg = 3800 MHz to 5000 MHz ; P <sub>IN</sub> =	-55	dBm
3 <sup>rd</sup> Harmonic	26dBm***	-75	dBm

Linearity				
IIP2	f1=20dBm f2=-15dBm: f1=1950MHz f2=4090MHz	118	120	dBm
IIP3	f1=20dBm f2=-15dBm: f1=1950MHz f2=1760MHz	76	78	dBm
VSWR				
Input/Output VSWR	699 MHz to 960 MHz	1.2		:1

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# QM11024 BROADBAND HIGH LINEARITY DP4T ROUTING SWITCH

PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS
	1427 MHz to 2200 MHz		1.2		:1
	2300 MHz to 2690 MHz		1.4		:1
	3300 MHz to 3800 MHz		1.5		:1
	3800 MHz to 5000 MHz		2.0		:1



PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNITS

#### <u>Notes</u>

- \* Insertion loss averaged over band. See separate application note for improvement of matching at 5GHz/6GHz and recommended ports.
- \*\* See Table 1

\*\*\* The performance between 3300MHz to 5000MHz is based on the use of RFOUT2 for optimum harmonic performance.

# QM11024 BROADBAND HIGH LINEARITY DP4T ROUTING SWITCH

	to 960MHz				Devi			1				Dert	_	1
Active Path	-		Me	asured	Port	DE	Active Path			Me	asured	Port	DE	
Active Fatt	Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	RF OUT2	Active Faul	Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	RF OUT1	unit
	RFIN1	х	40	62	61	44		RFIN1	х	40	38	45	45	
RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1	х	40	63	61	43	RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2	х	40	37	45	45	
	RFIN2	39	х	47	62	38		RFIN2	53	х	38	37	47	
RFIN2 to RFOUT1 (RFOUT2 isolation)	RFOUT1	40	х	48	62	38	RFIN2 to RFOUT2 (RFOUT1 isolation)	RFOUT2	53	х	38	37	46	
	RFIN3	51	46	х	40	36		RFIN3	53	41	х	34	47	dB
RFIN3 to RFOUT1 (RFOUT2 isolation)	RFOUT1	50	46	х	41	37	RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2	52	41	х	34	46	
	RFIN4	51	57	40	x	38		RFIN4	35	41	45	x	43	
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1	50	56	41	x	39	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2	35	39	45	x	43	
Isolation Frequency Range: 1425MH	z to 2200M⊦	lz												
			Me	asured	Port					Me	asured	Port		T
Active Path				1	1	RF	Active Path			1	1	1	RF	
	Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	OUT2		Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	OUT1	unit
	RFIN1	х	34	54	55	37		RFIN1	х	33	32	40	39	
RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1	х	33	57	55	37	RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2	х	33	31	39	38	
	RFIN2	34	x	41	54	31		RFIN2	47	x	32	31	40	1
RFIN2 to RFOUT1 (RFOUT2 isolation)	RFOUT1	34	x	41	56	31	RFIN2 to RFOUT2 (RFOUT1 isolation)	RFOUT2	46	x	31	31	39	1
		-				30								dB
RFIN3 to RFOUT1 (RFOUT2 isolation)	RFIN3	45	41	х	34		RFIN3 to RFOUT2 (RFOUT1 isolation)	RFIN3	46	35	x	28	40	4
,	RFOUT1	45	41	х	34	30	,	RFOUT2	46	34	х	28	39	4
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFIN4	44	53	34	х	32	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFIN4	28	34	39	х	36	
	RFOUT1	44	50	34	х	32		RFOUT2	28	33	39	x	35	
Isolation Frequency Range: 2300MH	z to 2700M⊦	łz												
			Me	asured	Port					Me	asured	Port		
Active Path	Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	RF OUT2	Active Path	Input Ports	RFIN1	RFIN2	RFIN3	RFIN4	RF OUT1	unit
	RFIN1	x	31	50	53	35		RFIN1	x	31	30	38	36	
RFIN1 to RFOUT1 (RFOUT2 isolation)	-						RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2						-
	RFOUT1	х	31	57	54	34			x	31	29	38	35	-
RFIN2 to RFOUT1 (RFOUT2 isolation)	RFIN2	33	х	39	51	29	RFIN2 to RFOUT2 (RFOUT1 isolation)	RFIN2	45	х	30	30	38	_
	RFOUT1	33	х	39	54	29		RFOUT2	44	х	29	30	37	dB
														aD
	RFIN3	44	39	х	31	28		RFIN3	44	32	х	26	37	
RFIN3 to RFOUT1 (RFOUT2 isolation)	RFIN3 RFOUT1	44 42	39 40	x x	31 31	28 27	RFIN3 to RFOUT2 (RFOUT1 isolation)	RFIN3 RFOUT2	44 43	32 32	x x	26 26	37 37	
	-		40		31	27	. ,			-		26		_
RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4	42	40 56	x 31	31 x	27 29	RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4	43 26	32	x 37	26 x	37 33	-
	RFOUT1	42 42	40	х	31	27	. ,	RFOUT2	43	32 32	x	26	37	-
	RFOUT1 RFIN4 RFOUT1	42 42 41	40 56	x 31	31 x	27 29	. ,	RFOUT2 RFIN4	43 26	32 32	x 37	26 x	37 33	
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1	42 42 41	40 56 49	x 31 31	31 x x	27 29	. ,	RFOUT2 RFIN4	43 26	32 32 32	x 37 37	26 x x	37 33	
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 z to 3800M	42 42 41 Hz	40 56 49 Mea	x 31 31 asured	31 x x Port	27 29 29	. ,	RFOUT2 RFIN4 RFOUT2	43 26 26	32 32 32 32 Mea	x 37 37 asured	26 x x Port	37 33 32	
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1	42 42 41	40 56 49	x 31 31 asured	31 x x Port	27 29	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4	43 26 26	32 32 32	x 37 37 asured	26 x x Port	37 33	unit
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path	RFOUT1 RFIN4 RFOUT1 z to 3800M	42 42 41 Hz	40 56 49 Mea	x 31 31 asured	31 x x Port	27 29 29 RF	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2	43 26 26	32 32 32 32 Mea	x 37 37 asured	26 x x Port	37 33 32 RF	unit
RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 z to 3800Mi	42 42 41 Hz RFIN1	40 56 49 Mea RFIN2	x 31 31 asured RFIN3	31 x x Port RFIN4	27 29 29 RF OUT2	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports	43 26 26 RFIN1	32 32 32 Mea	x 37 37 asured l RFIN3	26 x x Port RFIN4	37 33 32 RF OUT1	unit
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 z to 3800MI Input Ports RFIN1 RFOUT1	42 42 41 Hz RFIN1 x x	40 56 49 Mea RFIN2 29 29	x 31 31 asured RFIN3 44 53	31 x x Port RFIN4 48 54	27 29 29 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2	43 26 26 RFIN1 x x	32 32 32 32 Mea RFIN2 29 28	x 37 37 asured I RFIN3 29 28	26 x x Port RFIN4 37 36	37 33 32 32 RF OUT1 32 31	unit
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path	RFOUT1 RFIN4 RFOUT1 z to 3800MI Input Ports RFIN1 RFOUT1 RFIN2	42 42 41 Hz RFIN1 x x 33	40 56 49 Me: RFIN2 29 29 29 x	x 31 31 asured RFIN3 44 53 35	31 x x Port RFIN4 48 54 45	27 29 29 RF OUT2 32 31 26	RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2	43 26 26 RFIN1 x x 43	32 32 32 32 Mea RFIN2 29 28 x	x 37 37 asured RFIN3 29 28 29	26 x x Port RFIN4 37 36 29	37 33 32 RF OUT1 32 31 35	unit
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1	42 42 41 Hz RFIN1 X x 33 35	40 56 49 Me RFIN2 29 29 29 x x x	x 31 31 asured RFIN3 44 53 35 38	31 x x Port RFIN4 48 54 45 52	27 29 29 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFOUT2	43 26 26 RFIN1 x x 43 43	32 32 32 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	x 37 37 asured I RFIN3 29 28 29 28	26 x x Port RFIN4 37 36 29 29	37 33 32 32 RF OUT1 32 31 35 34	unit
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3	42 42 41 <b>Hz</b> RFIN1 x x 33 35 41	40 56 49 Me: RFIN2 29 29 29 x x x 37	x 31 31 asured RFIN3 44 53 35 38 x	31 x x Port RFIN4 48 54 45 52 28	27 29 29 8 8 7 8 7 8 7 9 7 9 7 9 7 9 7 9 7 9 7	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN2 RFOUT2 RFIN3	43 26 26 RFIN1 x 43 43 43 42	32 32 32 32 RFIN2 29 28 X x x 30	x 37 37 8 8 8 8 7 8 7 8 29 28 29 28 29 28 x	26 x x Port RFIN4 37 36 29 29 29 25	37 33 32 8 RF OUT1 32 31 35 34 34	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1	42 42 41 <b>Hz</b> RFIN1 x x 33 35 41 37	40 56 49 Mea RFIN2 29 29 29 x x x 37 41	x 31 31 31 RFIN3 44 53 35 38 x x x	31 x x Port RFIN4 48 54 45 52	27 29 29 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN2 RFIN3 RFOUT2	43 26 26 RFIN1 X 43 43 43 42 42	32 32 32 32 RFIN2 29 28 x x 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x	26 x x Port RFIN4 37 36 29 29 25 24	37 33 32 RF OUT1 32 31 35 34 34 34 34	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4	42 41 Hz RFIN1 x x 33 35 41 37 39	40 56 49 Mea RFIN2 29 29 29 x x x 37 41 54	x 31 31 31 RFIN3 44 53 35 38 x x x 28	31 x x Port RFIN4 48 54 45 52 28	27 29 29 29 8 8 7 8 7 20 26 26 25 25 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4	43 26 26 RFIN1 x x 43 43 42 42 42 24	32 32 32 32 RFIN2 29 28 x x 30 30 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x 36	26 x x Port RFIN4 37 36 29 29 29 25	37 33 32 8 7 8 7 8 7 32 31 35 34 34 34 34 29	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1	42 42 41 <b>Hz</b> RFIN1 x x 33 35 41 37	40 56 49 Mea RFIN2 29 29 29 x x x 37 41	x 31 31 31 RFIN3 44 53 35 38 x x x	31 x x Port RFIN4 48 54 45 52 28 28 28	27 29 29 8 8 7 8 7 8 7 9 7 20 26 26 25 25 25	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN2 RFIN3 RFOUT2	43 26 26 RFIN1 X 43 43 43 42 42	32 32 32 32 RFIN2 29 28 x x 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x	26 x x Port RFIN4 37 36 29 29 25 24	37 33 32 RF OUT1 32 31 35 34 34 34 34	units dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4	42 41 Hz RFIN1 x x 33 35 41 37 39	40 56 49 Mea RFIN2 29 29 29 x x x 37 41 54	x 31 31 31 RFIN3 44 53 35 38 x x x 28	31 x x Port RFIN4 48 54 45 52 28 28 28 x	27 29 29 29 8 8 7 8 7 20 26 26 25 25 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4	43 26 26 RFIN1 x x 43 43 42 42 42 24	32 32 32 32 RFIN2 29 28 x x 30 30 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x 36	26 x x Port RFIN4 37 36 29 29 29 25 24 x	37 33 32 8 7 8 7 8 7 32 31 35 34 34 34 34 29	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 z to 3800MI Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1	42 41 41 <b>Hz</b> RFIN1 x x 33 35 41 37 39 37	40 56 49 Mea RFIN2 29 29 29 x x x 37 41 54	x 31 31 31 RFIN3 44 53 35 38 x x x 28	31 x x Port RFIN4 48 54 45 52 28 28 28 x	27 29 29 29 8 8 7 8 7 20 26 26 25 25 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4	43 26 26 RFIN1 x x 43 43 42 42 42 24	32 32 32 32 RFIN2 29 28 x x 30 30 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x 36	26 x x Port RFIN4 37 36 29 29 29 25 24 x	37 33 32 8 7 8 7 8 7 32 31 35 34 34 34 34 29	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 z to 3800MI Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1	42 41 41 <b>Hz</b> RFIN1 x x 33 35 41 37 39 37	40 56 49 RFIN2 29 29 29 x x 37 41 54 47	x 31 31 31 RFIN3 44 53 35 38 x x x 28	31 x x Port RFIN4 48 54 45 52 28 28 28 x x x	27 29 29 29 8 8 7 8 7 20 26 26 25 25 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4	43 26 26 RFIN1 x x 43 43 42 42 42 24	32 32 32 32 RFIN2 29 28 x x 30 30 30 30	x 37 37 8 8 8 8 29 28 29 28 29 28 x x x x 36	26 x x Port RFIN4 37 36 29 29 25 24 x x x	37 33 32 8 7 8 7 8 7 32 31 35 34 34 34 34 29	-
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 2 to 500MH2	42 41 Hz RFIN1 x x 33 35 41 37 39 37	40 56 49 Meine 29 29 x x x 37 41 54 47 Meine	x 31 31 31 RFIN3 44 53 35 38 x x 28 29	31 x x RFIN4 48 54 45 52 28 28 28 x x x Port	27 29 29 29 32 31 26 25 25 26 26 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4 RFOUT2	43 26 26 RFIN1 x 43 43 42 42 24 24	32 32 32 RFIN2 29 28 x x 30 30 30 30 30	x 37 37 RFIN3 29 28 29 28 x x x 36 35	26 x x Port RFIN4 37 36 29 29 25 24 x x x Port	37 33 32 32 8 7 9 31 35 34 34 34 29 29 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 Z to 500MH2 Input Ports	42 41 Hz RFIN1 x x 33 35 41 37 39 37	40 56 49 Me RFIN2 29 29 x x 37 41 54 47 41 54 8 RFIN2	x 31 31 31 RFIN3 44 53 35 38 x x x 28 29 asured RFIN3	31 x x Port 48 54 45 52 28 28 x x x x RFIN4	27 29 29 29 32 31 26 26 25 25 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2	43 26 26 RFIN1 x 43 43 42 42 24 24	32 32 32 RFIN2 29 28 x x 30 30 30 30 8 RFIN2	x 37 37 37 RFIN3 29 28 29 28 29 28 x x x 36 35 RFIN3	26 x x Port 37 36 29 29 25 24 x x x RFIN4	37 33 32 32 8 0UT1 32 31 35 34 34 34 34 29 29	dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH Active Path	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 2 to 500MH2	42 41 Hz RFIN1 x x 33 35 41 37 39 37	40 56 49 Meine 29 29 x x x 37 41 54 47 Meine	x 31 31 31 RFIN3 44 53 35 38 x x 28 29	31 x x RFIN4 48 54 45 52 28 28 28 x x x Port	27 29 29 29 32 31 26 25 25 26 26 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN3 RFOUT2 RFIN4 RFOUT2	43 26 26 RFIN1 x 43 43 42 42 24 24	32 32 32 RFIN2 29 28 x x 30 30 30 30 30	x 37 37 RFIN3 29 28 29 28 x x x 36 35	26 x x RFIN4 37 36 29 29 25 24 x x x Port	37 33 32 32 8 7 9 31 35 34 34 34 29 29 8 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7	dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 Z to 500MH2 Input Ports	42 42 41 <b>Hz</b> RFIN1 x x x 33 35 41 37 39 37 2 RFIN1	40 56 49 Me RFIN2 29 29 x x 37 41 54 47 41 54 8 RFIN2	x 31 31 31 RFIN3 44 53 35 38 x x x 28 29 asured RFIN3	31 x x Port 48 54 45 52 28 28 x x x x RFIN4	27 29 29 29 32 31 26 25 25 25 26 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2	43 26 26 RFIN1 x x 43 43 42 42 24 24 24 24	32 32 32 RFIN2 29 28 x x 30 30 30 30 8 RFIN2	x 37 37 37 RFIN3 29 28 29 28 29 28 x x x 36 35 RFIN3	26 x x Port 37 36 29 29 25 24 x x x RFIN4	37 33 32 32 31 35 34 34 34 29 29 29 RF OUT1	dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 z to 500MH2 Input Ports RFIN1 RFOUT1	42 42 41 <b>Hz</b> RFIN1 x x x 33 35 41 37 39 37 37 <b>RFIN1</b> x x	40 56 49 Me RFIN2 29 29 x x x 37 41 54 47 41 54 47 KFIN2 26 27	x 31 31 31 RFIN3 44 53 35 38 x x 28 29 esured RFIN3 38 45	31 x x Port RFIN4 48 54 45 52 28 28 28 x x x Port RFIN4 43 51	27 29 29 29 32 31 26 26 26 25 26 26 26 26 26 26 26 26 26 26 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN3 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2	43 26 26 RFIN1 x x 43 43 43 42 42 24 24 24 24 24 24 x x	32 32 32 RFIN2 29 28 x x x 30 30 30 30 30 30 8 FIN2 27 27	x 37 37 37 RFIN3 29 28 29 28 x x 36 35 35 RFIN3 29 28	26 x x Port RFIN4 37 36 29 29 25 24 x x x RFIN4 38 34	37 33 32 32 31 32 31 35 34 34 34 34 29 29 29 RF 0UT1 30 29	dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH Active Path	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 RFIN4 RFOUT1 RFIN1 RFOUT1 RFIN1 RFOUT1 RFIN2	42 42 41 <b>Hz</b> RFIN1 x x x 33 35 41 37 39 37 2 <b>R</b> FIN1 x x x 31	40 56 49 Me RFIN2 29 29 x x x 37 41 54 47 41 54 47 KFIN2 26 27 x	x 31 31 31 RFIN3 44 53 35 38 x x 28 29 x 29 x 29 x 29 x 29 x 29 x 2	31 x x RFIN4 48 54 45 52 28 28 28 x x x RFIN4 43 51 41	27 29 29 32 31 26 25 25 26 26 26 26 26 26 26 26 26 26 225 26 26 225 26 26 225 26 26 26 26 26 26 26 26 26 26 27 30 30 30 30 30 30 30 30 30 30 30 30 30	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN2 RFIN3 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2 RFIN1 RFOUT2 RFIN1 RFOUT2 RFIN2	43 26 26 RFIN1 x x 43 43 42 42 24 24 24 24 24 24 24 24 24 3	32 32 32 RFIN2 29 28 x x x 30 30 30 30 30 30 27 27 27 x	x 37 37 37 29 28 29 28 29 28 x x 36 35 35 x 29 28 x 29 28 x 29 28 28 29 28 28 29 28 28 29 28 28 29 28 29 28 29 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 29 28 28 28 28 29 28 28 29 28 28 28 29 28 28 28 29 28 28 28 28 28 28 28 28 28 28 28 28 28	26 x x Port RFIN4 37 36 29 29 25 24 x x x Port RFIN4 37 36 29 29 25 24 x x 36 37 36 29 29 25 24 37 36 37 36 36 37 37 36 37 37 36 37 37 36 37 37 36 37 37 36 37 37 37 37 37 37 37 37 37 37	37 33 32 32 8 RF 0UT1 32 31 35 34 34 34 34 29 29 29 8 RF 0UT1 30 29 33	dB dB
RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3300MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation) RFIN2 to RFOUT1 (RFOUT2 isolation) RFIN3 to RFOUT1 (RFOUT2 isolation) RFIN4 to RFOUT1 (RFOUT2 isolation) Isolation Frequency Range: 3800MH Active Path RFIN1 to RFOUT1 (RFOUT2 isolation)	RFOUT1 RFIN4 RFOUT1 Input Ports RFIN1 RFOUT1 RFIN2 RFOUT1 RFIN3 RFOUT1 RFIN4 RFOUT1 RFIN4 RFOUT1 RFIN1 RFOUT1 RFIN1 RFOUT1 RFIN2 RFOUT1	42 42 41 <b>Hz</b> RFIN1 x x 33 35 41 37 39 39 37 2 <b>x</b> x x x 31 35	40 56 49 RFIN2 29 29 x x 37 41 54 47 8FIN2 26 27 x x x	x 31 31 31 8 8 8 44 53 35 38 x x 29 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	31 x x Port RFIN4 48 54 45 52 28 28 28 x x x Port RFIN4 43 51 41 48	27 29 29 32 31 26 25 25 26 26 26 26 26 26 26 26 26 26 26 26 26	RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation) RFIN2 to RFOUT2 (RFOUT1 isolation) RFIN3 to RFOUT2 (RFOUT1 isolation) RFIN4 to RFOUT2 (RFOUT1 isolation) Active Path RFIN1 to RFOUT2 (RFOUT1 isolation)	RFOUT2 RFIN4 RFOUT2 Input Ports RFIN1 RFOUT2 RFIN2 RFIN2 RFIN3 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2 RFIN4 RFOUT2 RFIN1 RFOUT2 RFIN2 RFIN2 RFIN2 RFIN2 RFIN2	43 26 26 RFIN1 X 43 43 42 42 24 24 24 24 24 24 24 24 24 24 3 3 43	32 32 32 RFIN2 29 28 x x 30 30 30 30 30 30 30 30 27 27 27 27 x x	x 37 37 37 29 28 29 28 29 28 x x 36 35 x x 36 35 x 29 28 x z 28 22 28 22 22 28 22 22 28 22 22 22 22	26 x x Port RFIN4 37 36 29 29 25 24 x x x Port RFIN4 37 36 29 29 25 24 x x 36 31 36 31 31 32 32 32 32 32 32 32 32 32 32	37 33 32 RF 0UT1 32 31 35 34 34 34 29 29 29 29 29 29 29 29 29 29 29 29 29	dB
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#### Table 1. Port to port typical Isolation



# QM11024 BROADBAND HIGH LINEARITY DP4T ROUTING SWITCH



# **Pin Description**

PIN	LABEL	DESCRIPTION
1	RFIN1	RF I/O
2	GND	Ground
3	RFOUT1	RF I/O
4	GND	Ground
5	USID	USID configurable Address input
6	VIO	RFFE Power Supply
7	SCLK	RFFE Clock Signal
8	SDATA	RFFE Data Signal
9	N/C	N/C. (Can be grounded.)
10	GND	Ground
11	RFOUT2	RF I/O
12	GND	Ground
13	RFIN4	RF I/O
14	RFIN3	RF I/O
15	GND	Ground
16	RFIN2	RF I/O
GND PAD	GND PAD	Ground

# **Register Configuration**

#### Register 0x0000 - Output\_Cross\_CTRL

Field Name	Description	Reset	B/G	Trig	R/WM
SPARE	Reserved for future use	0x00	No	0	R/WM
	Enable DPDT output Switch to cross mode,				
Output_Cross	0x0: DPDT Direct operating mode	0x0	No	0	R/WM
	0x1: DPDT output cross operating mode				
	Note: See Truth Table for example of operation				
	SPARE	SPARE       Reserved for future use         Enable DPDT output Switch to cross mode,         Output_Cross       0x0: DPDT Direct operating mode         0x1: DPDT output cross operating mode	SPARE     Reserved for future use     0x00       Enable DPDT output Switch to cross mode,     0x0: DPDT Direct operating mode     0x0       Output_Cross     0x0: DPDT Direct operating mode     0x0       0x1: DPDT output cross operating mode     0x0	SPARE       Reserved for future use       0x00       No         Enable DPDT output Switch to cross mode,       0x0: DPDT Direct operating mode       0x0       No         Output_Cross       0x0: DPDT Direct operating mode       0x0       No         0x1: DPDT output cross operating mode       0x0       No	SPARE       Reserved for future use       0x00       No       0         Enable DPDT output Switch to cross mode,       0x00       No       0         Output_Cross       0x0: DPDT Direct operating mode       0x0       No       0         0x1: DPDT output cross operating mode       0x0       No       0

#### **Register 0x0001 – SW\_CTRL**

Bit(s)	Field Name	Description		Reset	B/G	Trig	R/WM
7:6	SPARE	Reserved for future use		0x0	No	0	R/WM
	SW_Connect_Ind[1:0]	Indicate switch connect seque	ence from bit0 to bit 3				
		00: one port connect to output1,o	uput2 isolation				
5:4		01: Lower bit in bit0 to bit3 conne	ect to output1	0x0	No	0	R/WM
		10: Higher bit in bit0 to bit3 conn	ect to output1				
		11: one port connect to output2,	ouput1 isolation				
		Input Ports S	elect	_			
		Enables DP4T input Port. Each bit is a dedicated input port.	0000: Isolation				
0.0		Bit0 <->input1	0001: Input 1 Select	0.40	Nia	0	
3:0	Input_Sel[3:0]	Bit1 <->input2	0010: Input 2 Select	0x0	No	0	R/WM
		Bit2 <->input3	0100: Input 3 Select				
		Bit3 <->input4	1000: Input 4 Select				
			etc				
		Note: See Truth Table for examp	le of operation				

#### **Register 0x001A - RFFE\_STATUS**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Setting this bit initiates a software reset				
7	UDR_RST	Note: On software reset, this register and all User Defined registers (UDRs) are reset. This bit will always read as 0.	0	No	No	W
6	CMD_FR_P_ERR	Command Frame received with a parity error	0	No	No	R/W
5	CMD_LEN_ERR	Command Sequence received with an incorrect length	0	No	No	R/W
4	ADDR_FR_P_ERR	Address Frame received with a parity error	0	No	No	R/W
3	DATA_FR_P_ERR	Data Frame received with a parity error	0	No	No	R/W
2	RD_INVLD_ADDR	Read Command Sequence received with an invalid address	0	No	No	R/W
1	WR_INVLD_ADDR	Write Command Sequence received with an invalid address	0	No	No	R/W
0	BID_GID_ERR	Read Command Sequence received with a BSID or GSID	0	No	No	R/W
		Note: Reading this register resets this register.				

#### Register 0x001B - GSID

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
7:4	GSID0[3:0]	Group Slave ID0	0x0	No	No	R/W
3:0	GSID1[3:0]	Group Slave ID1	0x0	No	No	R/W

#### **Register 0x001C - PM\_TRIG**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		0: Normal Operation				
7	PWR_MODE[1]	1: Low Power - Antenna in isolation	1	B/G	No	R/W
		0: ACTIVE				
		1: STARTUP - Reset all registers to default settings		5/0		5 444
6	PWR_MODE[0]	Note: Setting PWR_MODE to STARTUP is identical to a hardware reset initiated by the VIO signal.	0	B/G	No	R/W
		Setting bit TriggerMask[N] disables Trigger[N]				
		TriggerMask[N] updates before Trigger[N] is processed				
5:3	TriggerMask[2:0]	Note: When Trigger[N] is disabled, writing to a register associated with Trigger[N] sends data directly to that register. If a register is associated with multiple triggers, then <u>all associated triggers</u> must be disabled to allow direct writes to the associated register.	0b000	No	No	R/W
		Setting bit Trigger[N] loads Trigger[N]'s associated registers				
2:0	Trigger[2:0]	Note: When Trigger[N] is enabled, writing to a register associated with Trigger[N] sends data to that register's shadow. Setting the Trigger[N] bit loads data from shadow. <u>All triggers</u> are processed immediately and simultaneously and then cleared. Trigger[0], [1], and [2] will always read as 0.	06000	B/G	No	W

### Register 0x001D - PRODUCT\_ID

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Lower eight bits of Product Number				
7:0	PROD_ID[7:0]	Note: These are read-only registers. However, as part of the special programming sequence for writing USID, a write command sequence is performed on one or both registers, but does not update them. See MIPI 6.6.2 for details.	0x1E	No	No	R

#### **Register 0x001E – MANUFACTURER\_ID**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Lower eight bits of MIPI Manufacturer ID				
7:0	MFG_ID[7:0]	Note: These are read-only registers. However, as part of the special programming sequence for writing USID, a write command sequence is performed on one or both registers, but does not update them. See MIPI 6.6.2 for details.	0xC6	No	No	R

#### **Register 0x001F - MAN\_USID**

Bit(s)	Field Name	Description		Reset	B/G	Trig	R/W		
		Upper four bits of MIPI Manu	ufacturer ID						
7:4	MFG_ID[11:8]	Note: This is a read-only reg special programming sequer command sequence is perfo does not update it. See MIPI	rmed on this register, but	0x3	No	No	R		
		Programmable Unique Slave	e ID						
		The default value at reset is	selected via pin SID0.						
0.0		SID0 US	SID	00	NI-	NI-			
3:0	3:0 USID[3:0]	0 0>	x6	0x6	No	No	R/W		
		1 0>	x7						

Note: USID is only writeable using a special programming sequence. See MIPI 6.6.2 for details.

#### **Register 0x0020 – EXT\_PRODUCT\_ID**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Upper eight bits of Product Number				
7:0	PROD_ID[15:8]	Note: These are read-only registers. However, as part of the special programming sequence for writing USID, a write command sequence is performed on one or both registers, but does not update them. See MIPI 6.6.2 for details.	0x00	No	No	R

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
7:6	MAJOR_REV[1:0]	Major Revisions - all layer	0b00	No	No	R
5:4	MINOR_REV[1:0]	Minor Revisions - metal only	0b00	No	No	R
3:0	MISC_REV[3:0]	Misc Revisions - mask variants	0b0001	No	No	R
		Note: The REVISION_ID register contains this product's revision number which is set by Qorvo according to manufacture date. The value may change throughout the product life cycle.				

#### Register 0x0022 - GSID0-1

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
7:4	GSID0[3:0]	Group Slave ID0	0x0	No	No	R/W
3:0	GSID1[3:0]	Group Slave ID1	0x0	No	No	R/W

#### Register 0x0023 - UDR\_RST

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Setting this bit initiates a software reset				
7	UDR_RST	Note: On software reset, this register and all User Defined registers (UDRs) are reset. This bit will always read as 0.	0	B/G	No	W
6:0	RESERVED		0x00	No	No	R

#### Register 0x0024 - ERR\_SUM

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
7	SPARE	Reserved for future use	0	No	No	R/W
6	CMD_FR_P_ERR	Command Frame received with a parity error	0	No	No	R/W
5	CMD_LEN_ERR	Command Sequence received with an incorrect length	0	No	No	R/W
4	ADDR_FR_P_ERR	Address Frame received with a parity error	0	No	No	R/W
3	DATA_FR_P_ERR	Data Frame received with a parity error	0	No	No	R/W
2	RD_INVLD_ADDR	Read Command Sequence received with an invalid address	0	No	No	R/W
1	WR_INVLD_ADDR	Write Command Sequence received with an invalid address	0	No	No	R/W
0	BID_GID_ERR	Read Command Sequence received with a BSID or GSID	0	No	No	R/W
		Note: Reading this register resets this register.				

#### **Register 0x002C – TEST\_PATT**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
7:0	TEST_PATT[7:0]	Test Pattern	0xD2	No	No	R

#### **Register 0x002D – EXT\_TRIG\_MASK**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Setting bit TriggerMask[N] disables Trigger[N]				
		If using an Extended Write to update both TriggerMask and Trigger, than TriggerMask[N] updates <u>before</u> Trigger[N] is processed				
7:0	TriggerMask[10:3]	Note: When Trigger[N] is disabled, writing to a register associated with Trigger[N] sends data directly to that register. If a register is associated with multiple triggers, then <u>all associated triggers</u> must be disabled to allow direct writes to the associated register.	0x00	No	No	R/W

#### **Register 0x002E - EXT\_TRIG**

Bit(s)	Field Name	Description	Reset	B/G	Trig	R/W
		Setting bit Trigger[N] loads Trigger[N]'s associated registers				
7:0	Trigger[10:3]	Note: When Trigger[N] is enabled, writing to a register associated with Trigger[N] sends data to that register's shadow. Setting the Trigger[N] bit loads data from shadow. <u>All triggers</u> are processed immediately and simultaneously and then cleared. Trigger[10 - 3] will always read as 0.	0x00	B/G	No	W

# **Truth Table**

Reg_00		Reg_01						<b>RFOUT2</b>
0	5	4	3	2	1	0	RFOUT1	RF0012
0	0	0	0	0	0	0	Isolation	Isolation
0	0	0	0	0	0	1	RFIN1	Isolation
0	0	0	0	0	1	0	RFIN2	Isolation
0	0	0	0	1	0	0	RFIN3	Isolation
0	0	0	1	0	0	0	RFIN4	Isolation
0	0	1	0	0	1	1	RFIN1	RFIN2
0	0	1	0	1	0	1	RFIN1	RFIN3
0	0	1	0	1	1	0	RFIN2	RFIN3
0	0	1	1	0	0	1	RFIN1	RFIN4
0	0	1	1	0	1	0	RFIN2	RFIN4
0	0	1	1	1	0	0	RFIN3	RFIN4
0	1	0	0	0	1	1	RFIN2	RFIN1
0	1	0	0	1	0	1	RFIN3	RFIN1
0	1	0	0	1	1	0	RFIN3	RFIN2
0	1	0	1	0	0	1	RFIN4	RFIN1
0	1	0	1	0	1	0	RFIN4	RFIN2
0	1	0	1	1	0	0	RFIN4	RFIN3
0	1	1	0	0	0	1	Isolation	RFIN1
0	1	1	0	0	1	0	Isolation	RFIN2
0	1	1	0	1	0	0	Isolation	RFIN3
0	1	1	1	0	0	0	Isolation	RFIN4

Reg_00	Reg_01					RFOUT1	<b>RFOUT2</b>	
0	5	4	3	2	1	0	RFOUTI	RF0012
1	0	0	0	0	0	0	Isolation	Isolation
1	0	0	0	0	0	1	Isolation	RFIN1
1	0	0	0	0	1	0	Isolation	RFIN2
1	0	0	0	1	0	0	Isolation	RFIN3
1	0	0	1	0	0	0	Isolation	RFIN4
1	0	1	0	0	1	1	RFIN2	RFIN1
1	0	1	0	1	0	1	RFIN3	RFIN1
1	0	1	0	1	1	0	RFIN3	RFIN2
1	0	1	1	0	0	1	RFIN4	RFIN1
1	0	1	1	0	1	0	RFIN4	RFIN2
1	0	1	1	1	0	0	RFIN4	RFIN3
1	1	0	0	0	1	1	RFIN1	RFIN2
1	1	0	0	1	0	1	RFIN1	RFIN3
1	1	0	0	1	1	0	RFIN2	RFIN3
1	1	0	1	0	0	1	RFIN1	RFIN4
1	1	0	1	0	1	0	RFIN2	RFIN4
1	1	0	1	1	0	0	RFIN3	RFIN4
1	1	1	0	0	0	1	RFIN1	Isolation
1	1	1	0	0	1	0	RFIN2	Isolation
1	1	1	0	1	0	0	RFIN3	Isolation
1	1	1	1	0	0	0	RFIN4	Isolation



### **Power On and Off Sequence**

It is very important that the user adheres to the correct timing sequences in order to avoid damaging the device. Figures are NOT drawn to scale.

 Once VIO is powered down to 0V, wait a minimum of 10 µs to reapply power to VIO. (see Figure: Digital Supply Detail)





- 2. VIO must be applied for a minimum of 120 ns before sending SDATA/SCLK to ensure correct data transmission.
- 3. VIO must be applied for a minimum of 15 μs before applying RF power.
- Wait a minimum of typically 3 µs after RFFE bus is idle to apply an RF signal. (see Figure: Digital Signal / RF Power-On Detail)



Figure.2: Digital Signal / RF Power-On Detail

 RF power must not be applied during switching events. To ensure this, remove RF power before completing a register write that will change the switch mode. (see Figure: Switch Event Timing)



Figure.3: Switch Event Timing

 If "Low Power Mode" is utilized, there must be a delay of 10 µs before exiting "Low Power Mode". (see Figure: Low-Power Mode Exit Timimg)



Figure.4: Low-Power Mode Exit Timing



# **Mechanical Drawing**



#### RECOMMENDED LAND PATTERN

#### RECOMMENDED LAND PATTERN MASK

# **Tape and Reel Info**



# **Marking Diagram**





# **Handling Precautions**

Parameter	Rating	Standard	•	
ESD – Human Body Model (HBM)	Class 2	ANSI/ESD/JEDEC JS-001		Caution!
ESD – Charged Device Model (CDM)	Class C3	ANSI/ESD/JEDEC JS-002		ESD sensitive device
MSL – Moisture Sensitivity Level	3	IPC/JEDEC J-STD-020		

# **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 (C15H12Br402) Free
- SVHC Free



### **Revision History**

Revision	Description
Rev. G	Production Release Version
Rev.H	Isolation Table, Absolute Max Power simplified, Absolute Max voltage set to 2.15V, Harmonics to 5GHz, Minor editing to Figure 2/3.
Rev.I	Update to Absolute Max table at 25deg C

# **Contact Information**

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

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