

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-40 to +150 °C
RF Input Power, CW, 50Ω, T=25 °C	+5 dBm
Case Temperature Survival	-40 to +100 °C

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

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V _{DD1} , V _{DD2} , V _{DD3}	+3.15	+5.0	+5.25	V
T _{AMB}	-30	25	+85	°C
T _j (for > 10 ⁶ hours MTTF)			170	°C

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

Electrical Specifications – Overall Module

Parameter	Conditions ⁽¹⁾	Min	Typ	Max	Units
Quiescent Current	P _{out} = -10 dBm, 11ac, MCS9, HT80		180		mA
Operating Current	P _{out} = +20.5 dBm, 11ac, MCS9, HT80		300		mA
PA Enable Control Voltage, V _{IH}	Input Voltage for High State	+1.8	+3.0	V _{DD1}	V
PA Enable Control Voltage, V _{IL}	Input Voltage for Low State		0	+0.45	V
Control Current, I _{IH}				100	μA
TX Shutdown Current			8		μA
TX Turn on/off time	10 – 90%		<0.4		μs
TX Rise/Fall time	10 – 90%		<0.4		μs
Thermal Resistance, θ _{jc}	Junction to backside paddle		27		°C/W

Notes:

1. Test conditions unless otherwise noted: V_{DD1}, V_{DD2}, V_{DD3} = +5.0 V, Temp = +25°C.

Logic Truth Table

5 GHz FEM	PA_EN	LNA_EN	CRX
Shutdown	0	0	0
Rx - Bypass Mode	0	0	1
RX- Normal Mode	0	1	1
TX Mode	1	0	0

Electrical Specifications – Transmit (Tx)

Parameter	Conditions	Min	Typ	Max	Units
Operational Freq. Range		4900		5925	MHz
TX Gain	Small Signal		31		dB
	Pout = +21dBm		31		dB
Small Signal TX Gain Out of Band	1600 – 1960 MHz		-35		dB
	3200 – 3900 MHz		2		
	7000 MHz		20		
PA Noise Figure	Noise Figure		4		dB
TX Harmonics (2fo)	Pout = +25 dBm, 11a, 6 Mbps, 20 MHz		-33		dBm/MHz
TX Harmonics (3fo)	Pout = +25 dBm, 11a, 6 Mbps, 20 MHz		-37		dBm/MHz
ANT-RX Isolation	When TX is ON		45		dB
Spectral Emission Mask Margin Relative to 11ac standard 11ac, MCS0, HT20	Pout = +25 dBm		3.6		dB
DEVM (11n/MCS7/HT40)	Pout = +23 dBm, 5150 – 5850 MHz		-30		dB
DEVM (11ac/MCS9/VHT80)	Pout = +16 dBm, 5150 – 5850 MHz		-37		dB
DEVM (11ac/MCS9/VHT80)	Pout = +20.5 dBm, 5150 – 5850 MHz		-36		dB
Quiescent Current	No RF		180		mA
Operating Current	Pout = +20.5 dBm, 11ac, MCS9, VHT80		300		mA
Detector Voltage	No RF		0.35		V
	Pout = +25 dBm		1.0		

Notes:

- Test conditions unless otherwise noted: $V_{DD1}, V_{DD2}, V_{DD3} = +5.0\text{ V}$, Temp. = +25 °C, -45 dB EVM source, TQF7059-PCB

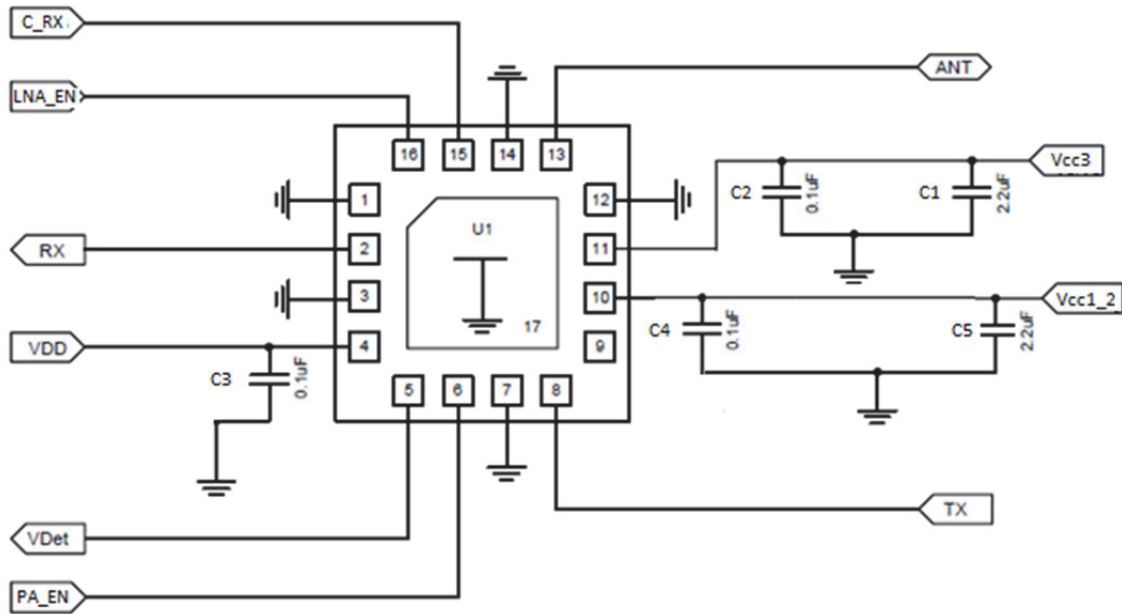
Electrical Specifications – Receive (Rx)

Parameter	Conditions	Min	Typ	Max	Units
Operating Frequency		4900		5925	MHz
RX Gain – Normal Mode	ANT to RX out		13		dB
RX Gain – Bypass Mode	ANT to RX out		-7		dB
RX Flatness	Over entire, ANT to RX out	-1		1	
RX Noise Figure	Normal mode, ANT to RX out		2.1		dB
LNA Current			9		mA
IIP3 – Normal Mode	At ANT port through LNA		+4.0		dBm
IIP3 – Bypass Mode	At ANT port through LNA		+23		dBm
RX Output Return Loss	RX output in RX mode		10		dB
RX ANT Port Return Loss	ANT port in RX mode		7		dB
RX Output Return Loss	RX output in Bypass mode		12		dB
RX ANT Port Return Loss	ANT port in Bypass mode		7		dB

Notes:

- Test conditions unless otherwise noted: $V_{DD1}, V_{DD2}, V_{DD3} = +5.0\text{ V}$, Temp. = +25 °C, TQF7059-PCB

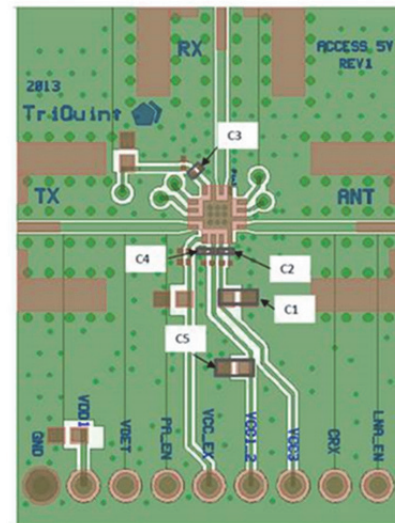
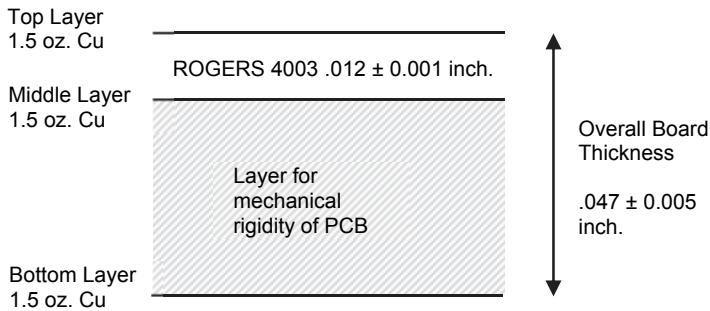
Application Circuit - TQF7059-PCB



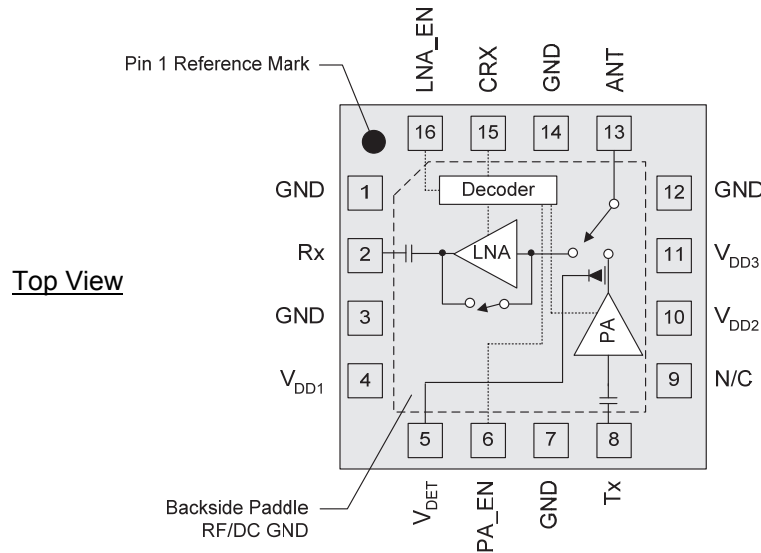
Bill of Material - TQF7059-PCB

Ref Des	Value	Description	Manuf.	Part Number
n/a	n/a	Printed Circuit Board		
U1	n/a	High Power WLAN 5GHz FEM	Qorvo	TQF7059
C1, C5	2.2 uF	Capacitor, Chip, 0402, 5%	various	
C2, C3, C4	0.1 uF	Capacitor, Chip, 0201, 5%	various	

Evaluation Board PCB Information



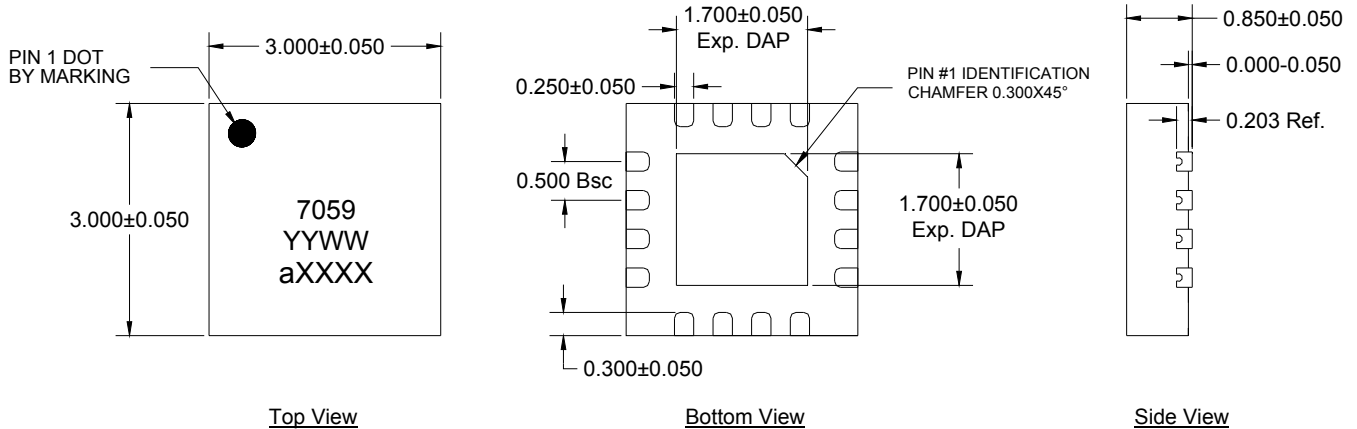
Pin Configuration and Description



Pad No.	Label	Description
1	GND	Ground
2	Rx	Rx output, DC blocked RF I/O
3	GND	No internal connection. Recommended grounding this pin.
4	V _{DD1}	Supply pin for LNA, Logic & Bias circuits.
5	V _{DET}	Detector output voltage for 5 GHz PA
6	PA_EN	PA Enable
7	GND	No internal connection. Recommended grounding this pin.
8	Tx	5 GHz Tx PA input, DC blocked RF I/O
9	NC	No internal connection. Recommended grounding this pin.
10	V _{DD2}	Supply pin for PA 1 st and 2 nd stage.
11	V _{DD3}	Supply pin for PA final stage.
12	GND	No internal connection. Recommended grounding this pin.
13	ANT	Antenna pin, DC blocked RF I/O
14	GND	No internal connection. Recommended grounding this pin.
15	CRX	Control pin. Refer to logic truth table on pg. 2
16	LNA_EN	LNA Enable
Backside Pad	RF/DC GND	RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern for suggested footprint.

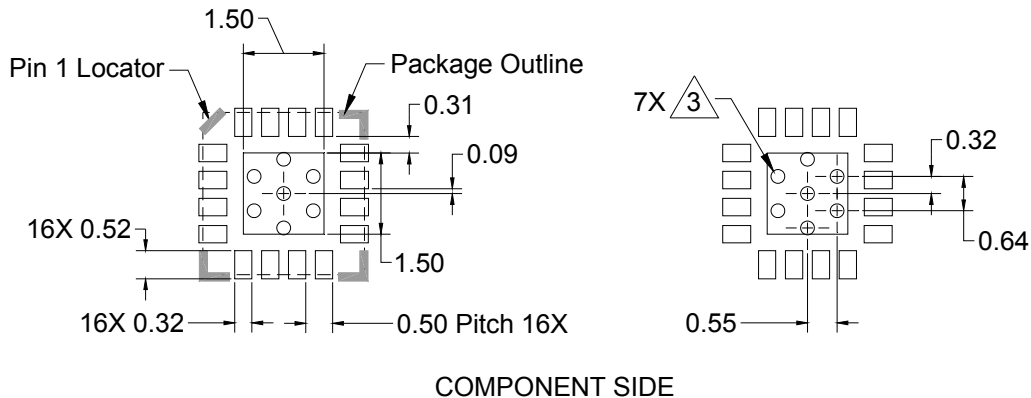
Package Marking and Dimensions

Marking: Product Identifier – “7059”
Date Code – YYWW
Lot Code – aXXXX



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

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. 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").
4. 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 1B	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	JEDEC JESD22-C101F
MSL – Moisture Sensitivity Level	Level 1	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 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



Contact Information

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

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