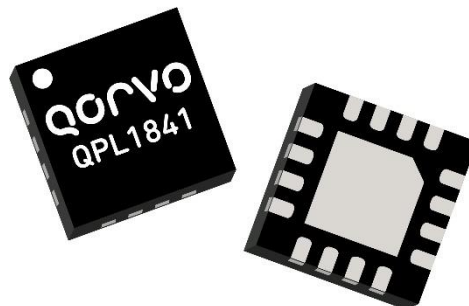


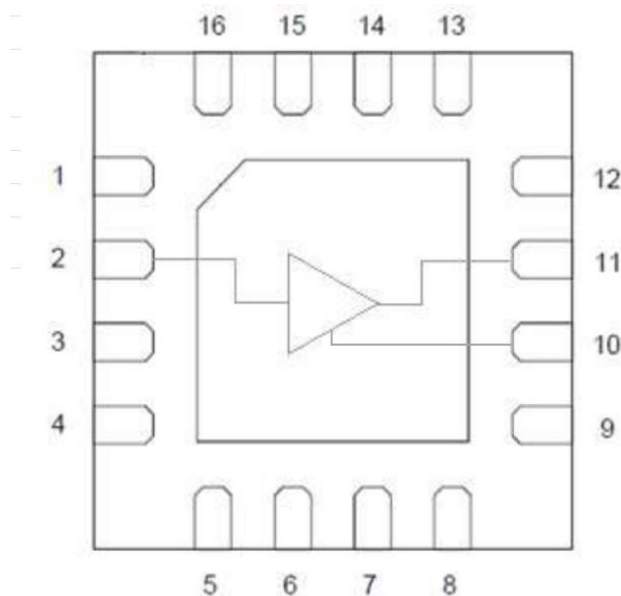
Product Overview

The QPL1841 is a GaAs pHEMT single ended MMIC RF amplifier IC featuring 12.5dB of gain and low noise from 5MHz to 850MHz. This high linearity IC is designed to support Broadband CATV DOCSIS 4.0 applications, such as Nodes, Amplifiers, and Remote PHY Devices, as well as Fiber to The Home (FTTH), Home Gateways, and Cable Modems. The combination of low noise, excellent distortion, and low gain make this suitable for drop amps and other distribution amps. The device is powered by a single supply that can operate from 5V to 8V with current set at 115 mA. At 5V the QPL1841 provides an output of 54dBmV TCP with a CCN of 51dB. The QPL1841 is packaged in a 3 x 3 16-pin QFN.



3 x 3 16-pin QFN

Functional Block Diagram



3 x 3 16-pin QFN Package

Key Features

- 5 MHz to 850 MHz Operation
- 5V & 8V Operation
- Gain: 12.5dB Typical
- TCP: 54dBmV @ 5V
- Noise Figure: 2.6dB @ 850MHz
- Adjustable Bias Using External Resistors
- RoHS Compliant

Applications

- DOCSIS 4.0 Amplifiers
- DOCSIS 4.0 Optical Nodes
- DOCSIS 4.0 Remote PHY Devices
- FTTH GPON and GEPON
- DOCSIS 4.0 Cable Modem and Home Gateways

Ordering Information

Part Number	Description	Part Number	Description
QPL1841EVB-02	5V Upstream Evaluation Board	QPL1841SB	Sample bag with 5 pieces
QPL1841EVB-04	8V Upstream Evaluation Board	QPL1841SR	7" Reel with 100 pieces
		QPL1841TR7	7" Reel with 2500 pieces



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Absolute Maximum Ratings

Parameter	Rating
Supply Voltage (V_{DD})	+10 V
Supply Current (I_{DD})	160 mA
Maximum Input Level	+65 dBmV
Operating Temperature Range (Operating Device Heat Slug Temperature)	-40 to +100 °C
Storage Temperature Range	-65 to +150 °C
Maximum Junction Temperature	+150 °C

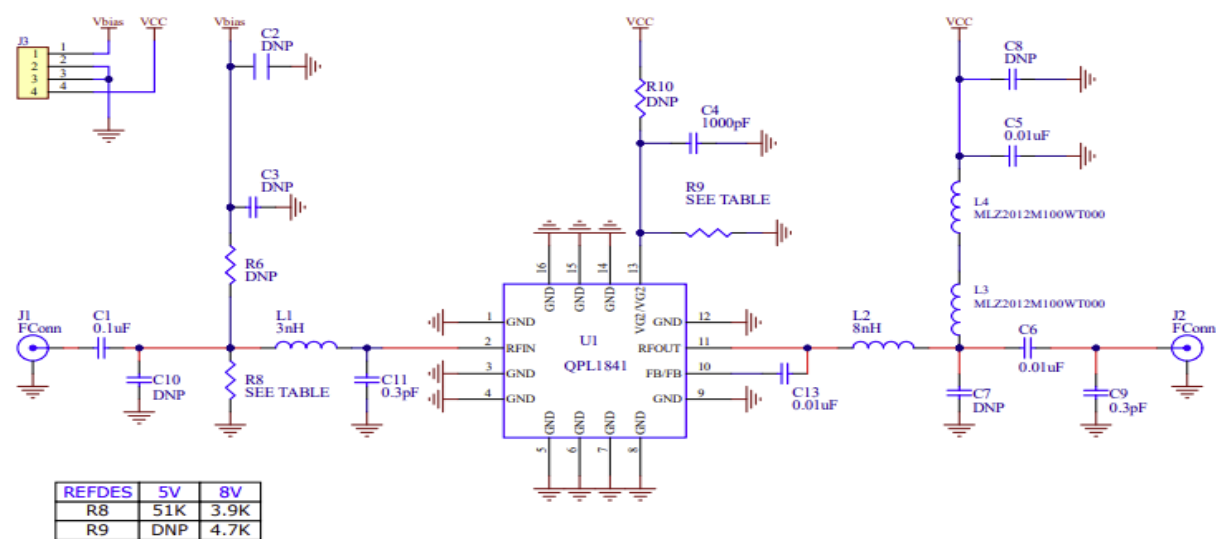
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Electrical Specifications

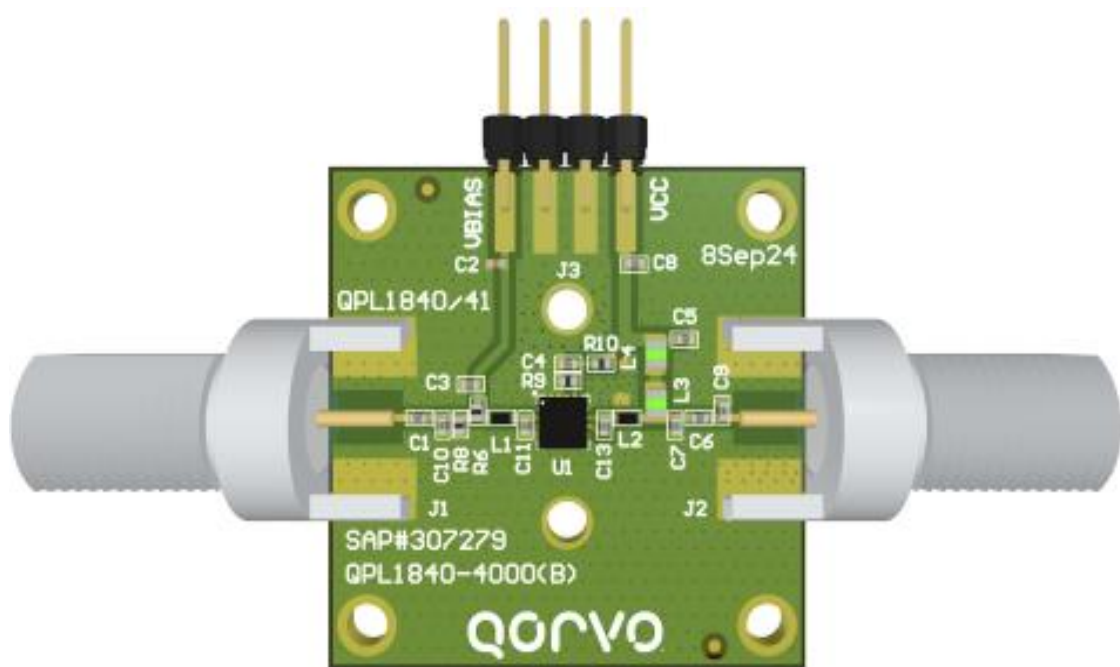
Parameter	Test Condition	Min	Typ	Max	Unit
Supply Voltage (V_{DD})			5/8		V
Supply Current (I_{DD})			115/115		mA
Frequency Range		5		850	MHz
Gain			12.5		dB
Reverse Isolation			17		dB
Input Return Loss	5 – 850MHz		-20		dB
Output Return Loss	5 – 850MHz		-20		dB
Noise Figure	5 – 40MHz		2.9		dB
Noise Figure	40 - 850MHz		2.6		dB
MER	At +53dBmV @ 5V and +55dBmV @ 8V Total Composite Output power. 5MHz to 850MHz, 113 Ch, SC-QAM, 0dB tilt, 0dB Offset (Source corrected)		51		dB
OIP2L	+5 dBm / tone output, $\Delta f=6$ MHz, Full Band		64/62		dBm
OIP2U	+5 dBm / tone output, $\Delta f=6$ MHz, Full Band		51/52		dBm
OIP3	+5 dBm / tone output, $\Delta f=6$ MHz, Full Band		38/37		dBm
OP1dB	5-850MHz		19.5/21.5		dBm
Thermal Resistance	Θ_{JC} (Junction to Device Heat Slug)		42		°C/W

Note: Typical performance at these conditions: Temp = +25 °C, V_{DD} = +5 V, 75 Ω system, Full band unless otherwise noted

Evaluation Board Schematic 5 MHz – 850 MHz



Evaluation Board Assembly Drawing



Layer Stack Legend					
	Material	Layer	Thickness	Dielectric Material	Type
		Top Overlay			Legend
	Surface Material	Top Solder	0.0010in	SM-001	Solder Mask
	Metal	Top Layer	0.0014in	10z	Signal
	Core		0.0580in	FR408HR	Dielectric
	Metal	Bottom Layer	0.0014in	10z	Signal
			Total thickness: 0.0618		

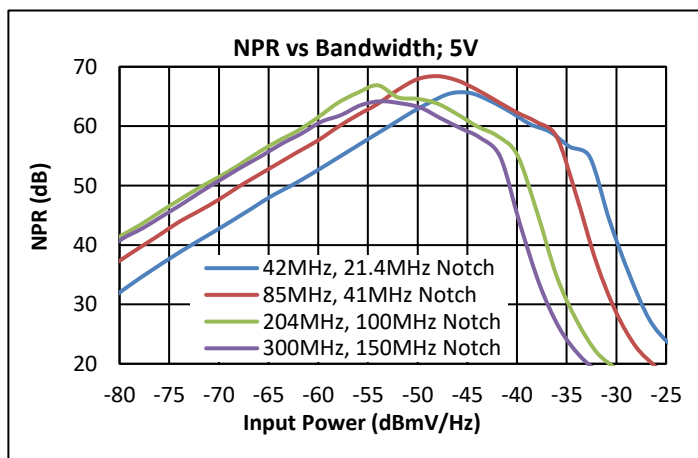
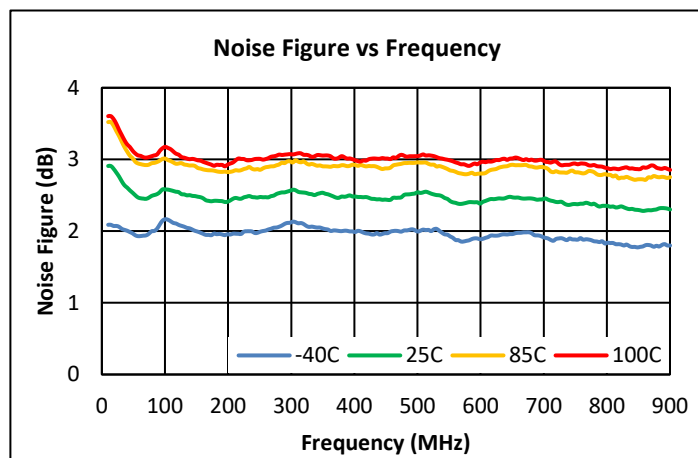
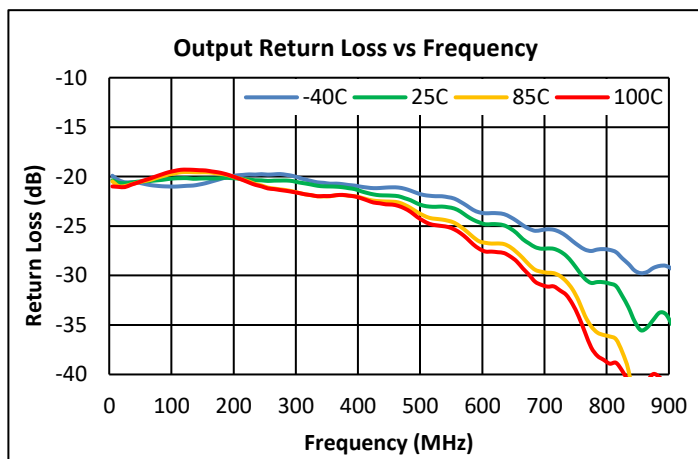
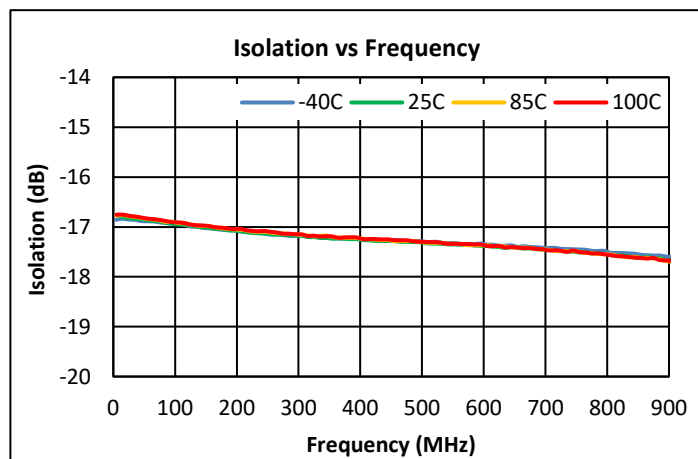
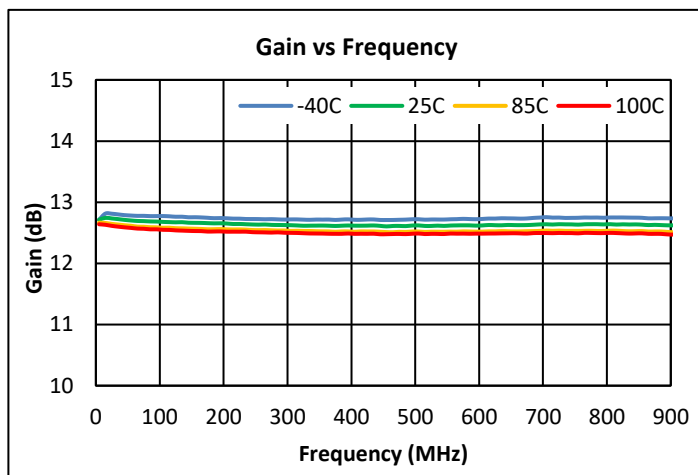
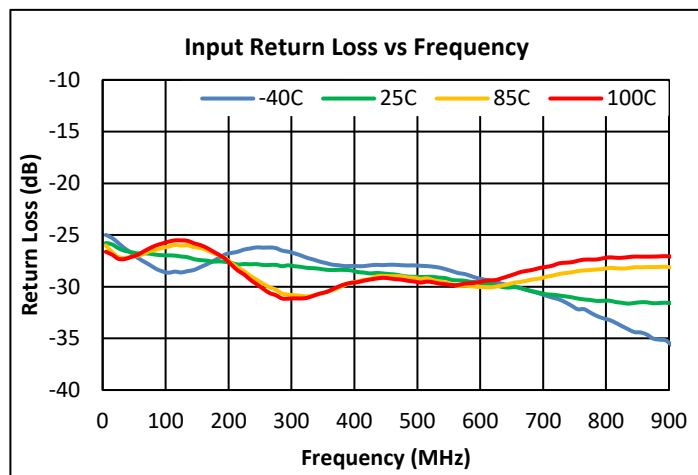
**Evaluation Board Bill of Materials for 5V**

PCB	PCB, QPL1841	Qorvo	QPL1840-4000(B)
U1	900MHz 5V, 12dB gain	Qorvo	QPL1841
C1	CAP, 0.1uF, 10%, 50V, X5R, 0402	MURATA	04025D104KAT2A
C4	CAP, 1000pF, 10%, 50V, X7R, AEC200 0402	TDK	CGA2B2X7R1H102K050BA
C5,C6,C13	CAP, 0.01uF, 10%, 50V, X7R, 0402	MURATA	GCM155R71H103KA55D
C9, C11	CAP, 0.30pF, +/-0.03pF, 50V, HI-Q, 0402	MURATA	GJM1555C1HR30RB12D
R8	RES, 51K OHM, 5%, 1/10W, 0402	Panasonic	ERJ-2GEJ513X
L1	IND, 3nH, \pm 0.1nH, W/W, HI-Q, 0402	MURATA	LQW15AN3N0B00D
L2	IND, 8nH, 2%, W/W, HI-Q, 1700mA, 0402	MURATA	LQW15AN8N0G80D
L3,L4	IND, 10uH, 20%, 350mA, M/L, 0805	TDK	MLZ2012M100WT000
J1,J2	CONN, F FEM EDGE MOUNT, 75R, 0.068"	Millimeter Wave	MW-846-C-DD-75
J3	CONN, HDR, ST, 4-PIN, 0.100"	SAMTEC INC.	TSW-104-08-S-S
C2,C3,C7,C8,C10, R6,R9,R10	NOT POPULATED ITEM		DUMMY PART

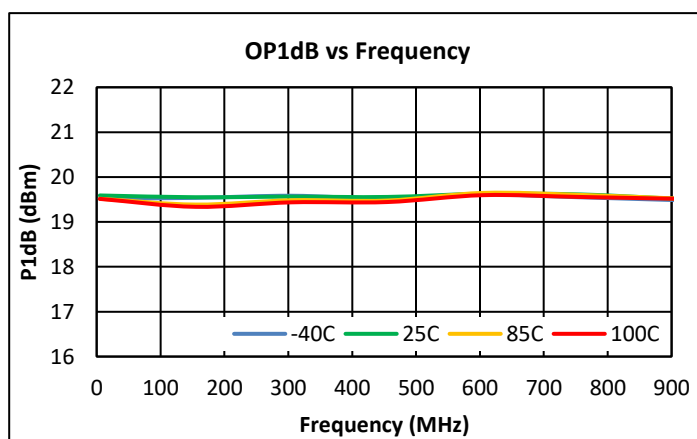
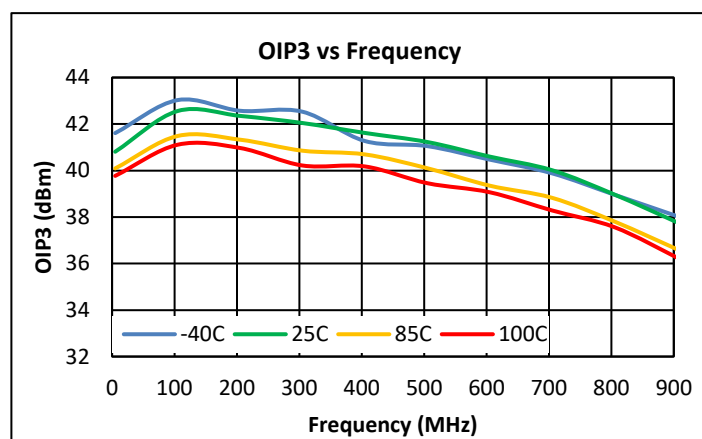
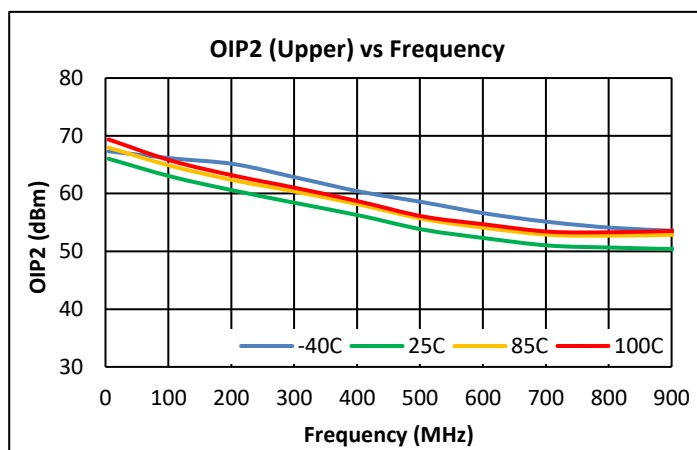
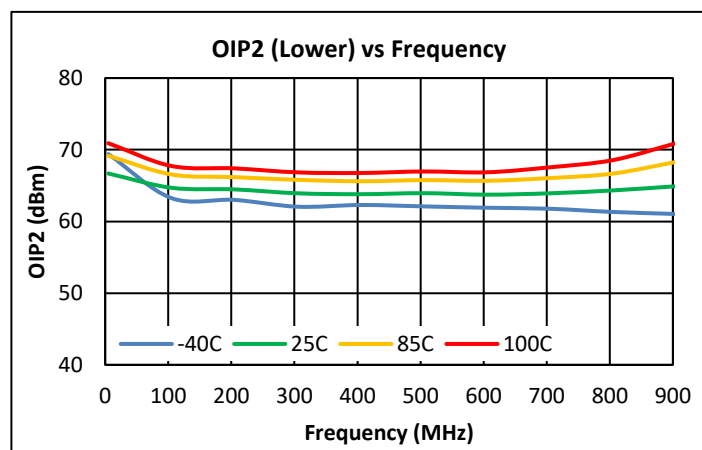
BOM Changes for 8V Operation

R8	RES, 3.9K OHM, 5%, 1/10W, 0402	Kamaya, Inc	RMC1/16S-392JTH
R9	RES, 4.7K OHM, 5%, 1/10W, 0402	Kamaya, Inc	RMC1/16S-472JTH

Performance Data, 5V



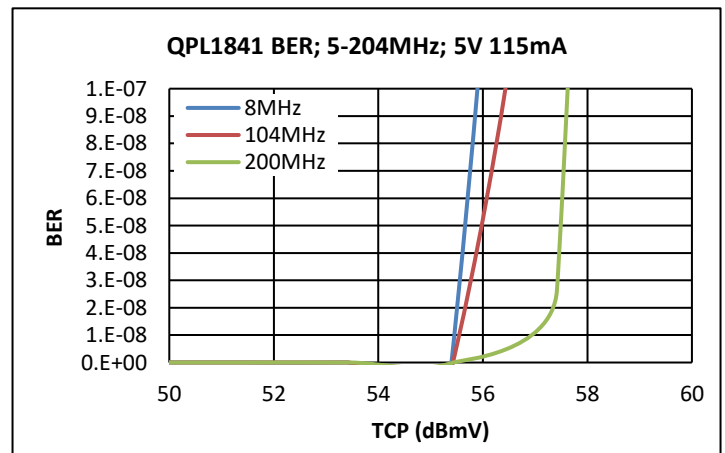
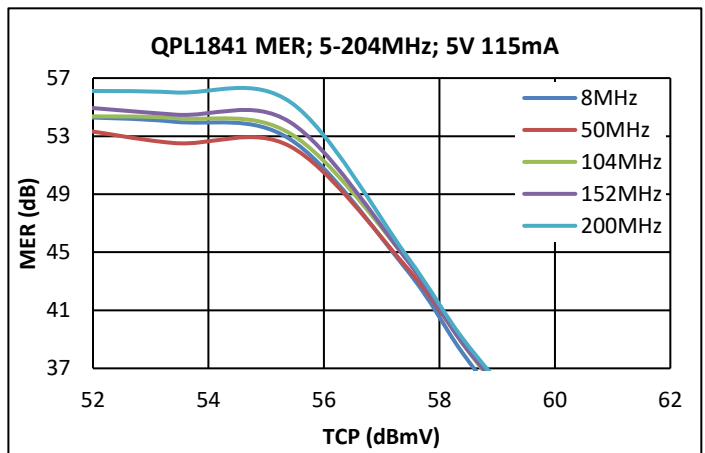
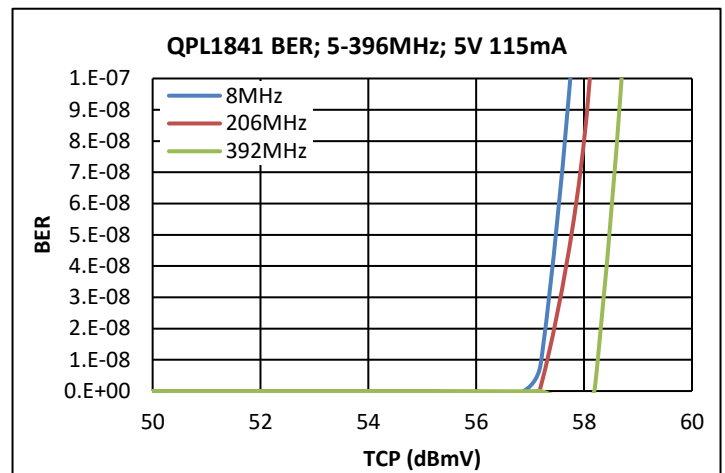
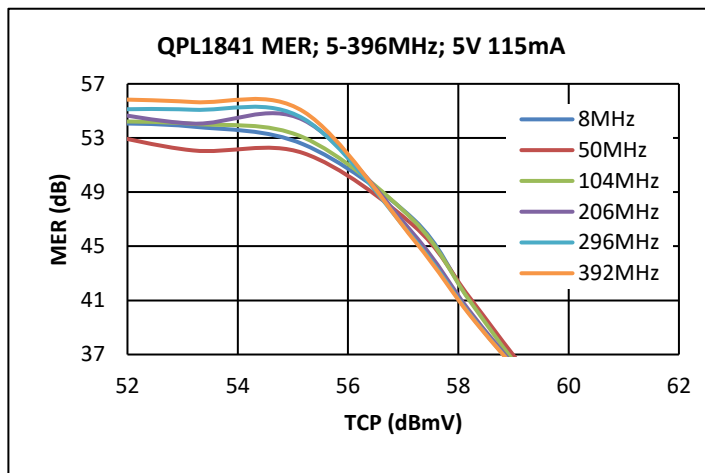
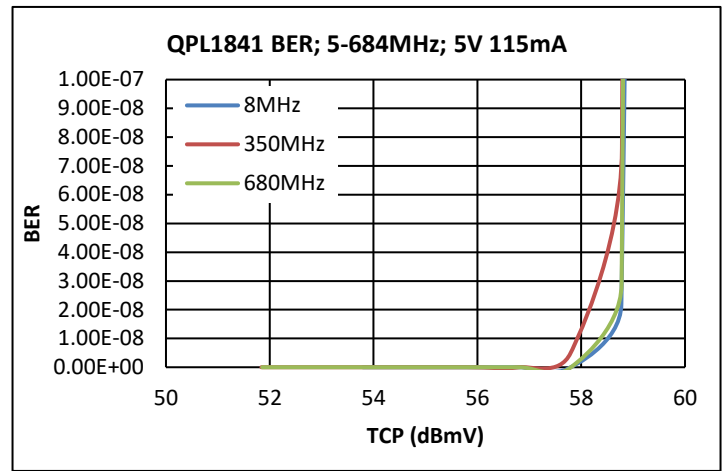
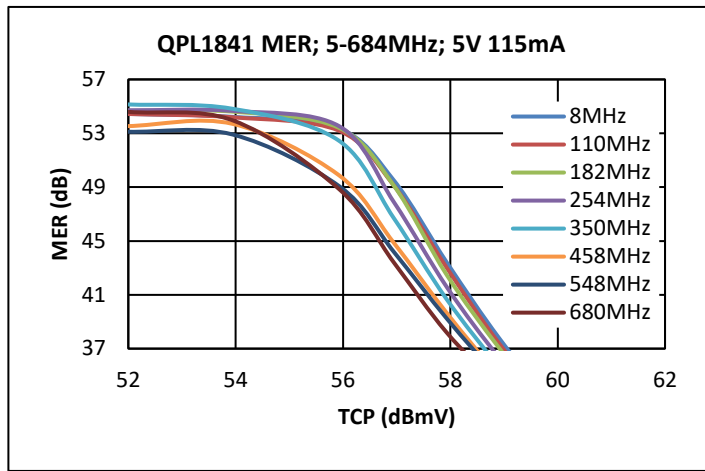
Performance Data, 5V (Cont'd)



Notes:

- (1) 5V OIP2: +5dBm/ tone output @ $\Delta f = 6\text{MHz}$
- (2) 5V OIP3: +5dBm/ tone output @ $\Delta f = 6\text{MHz}$

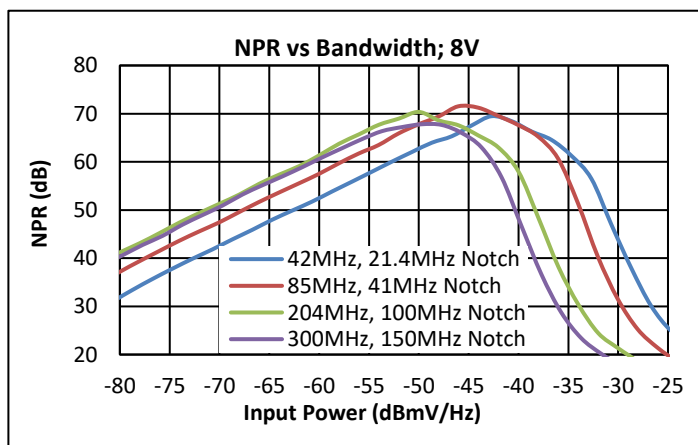
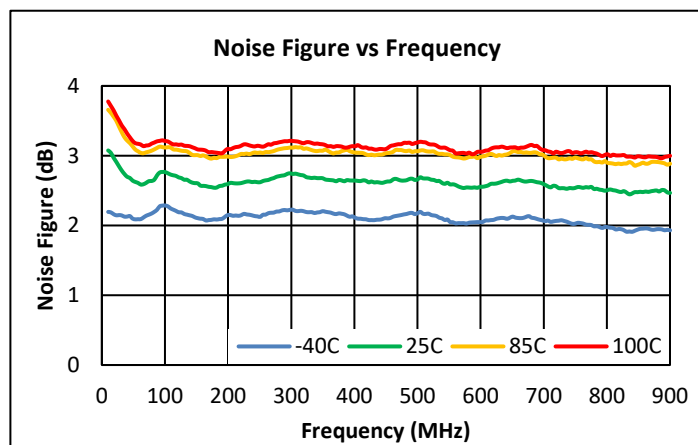
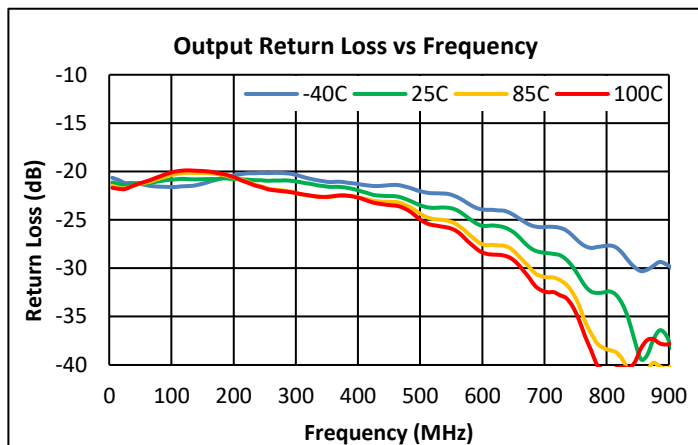
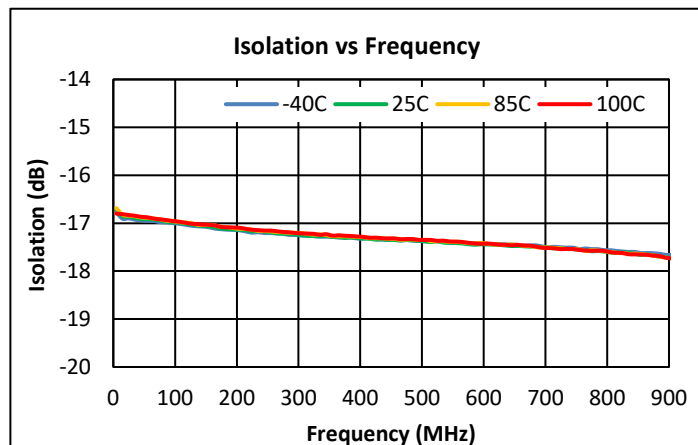
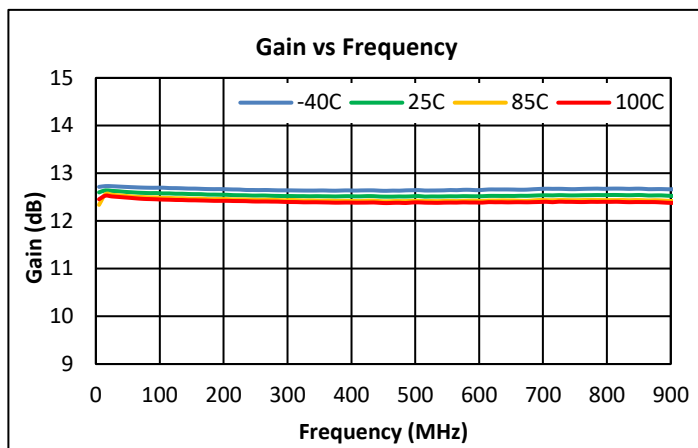
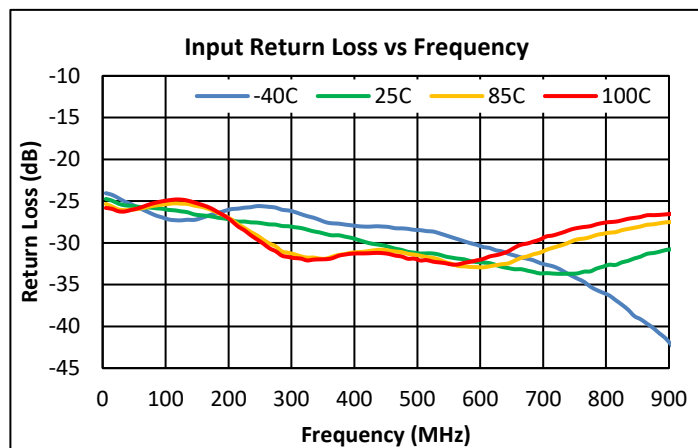
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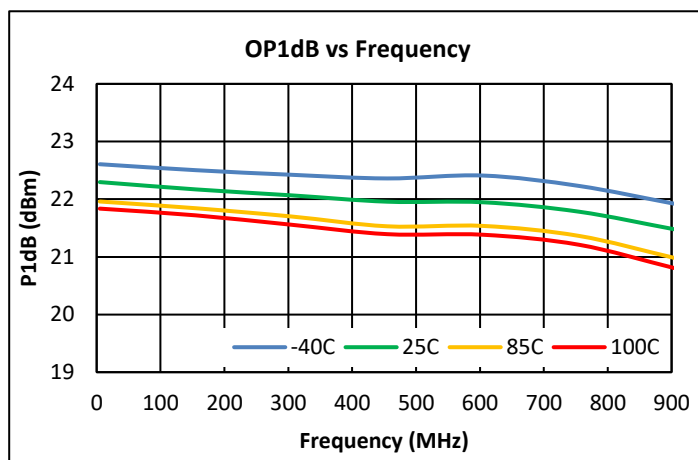
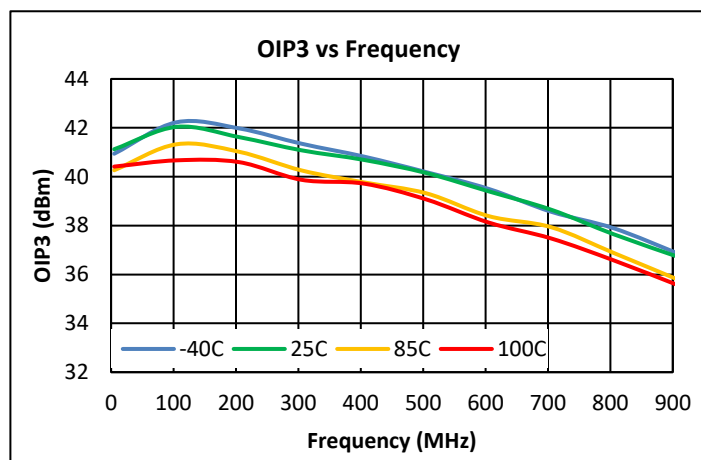
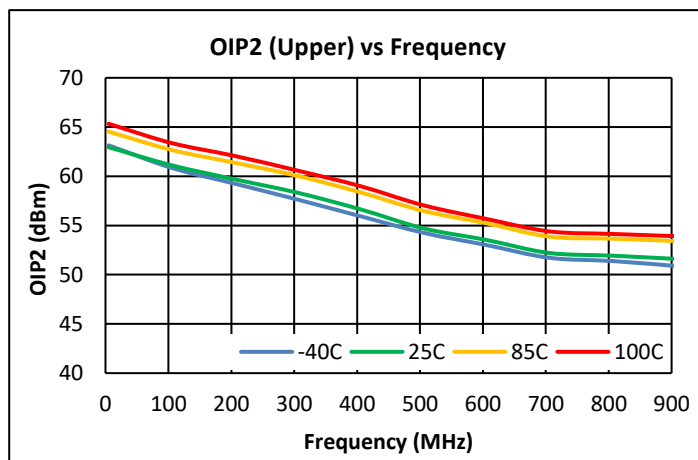
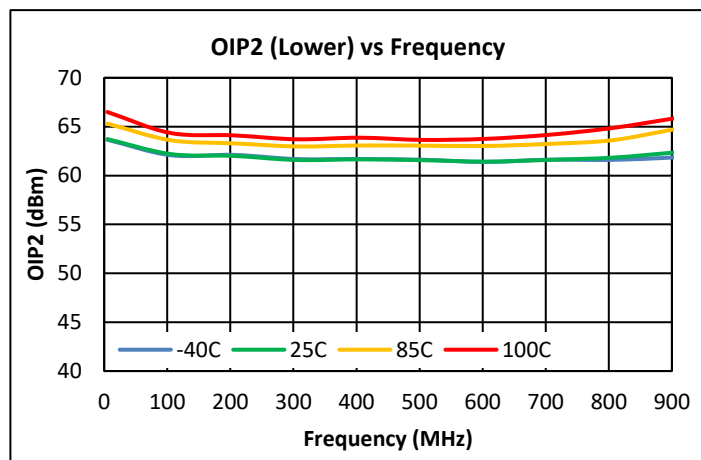
Notes:

- (1.) BER & MER Test Conditions: 5-684MHz, 113 Ch SC-QAM, 0dB Tilt
- (2.) BER & MER Test Conditions: 5-396MHz, 65 Ch SC-QAM, 0dB Tilt
- (3.) BER & MER Test Conditions: 5-204MHz, 33 Ch SC-QAM, 0dB Tilt
- (4.) Source corrected

Performance Data, 8V

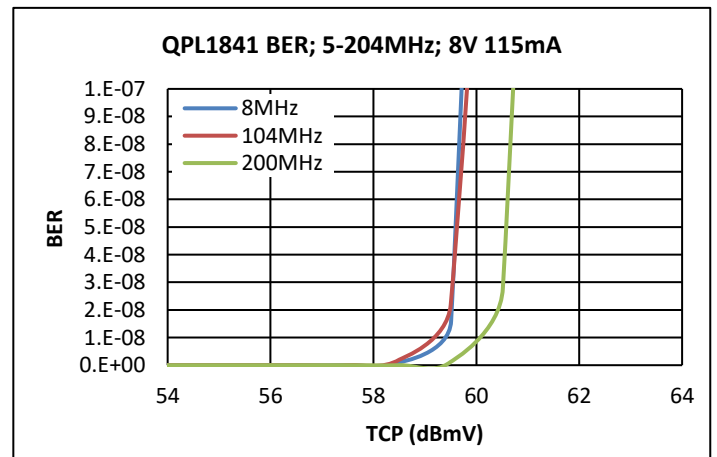
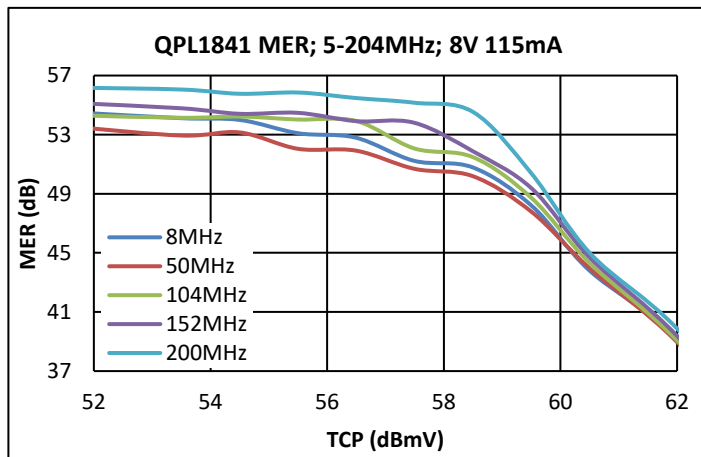
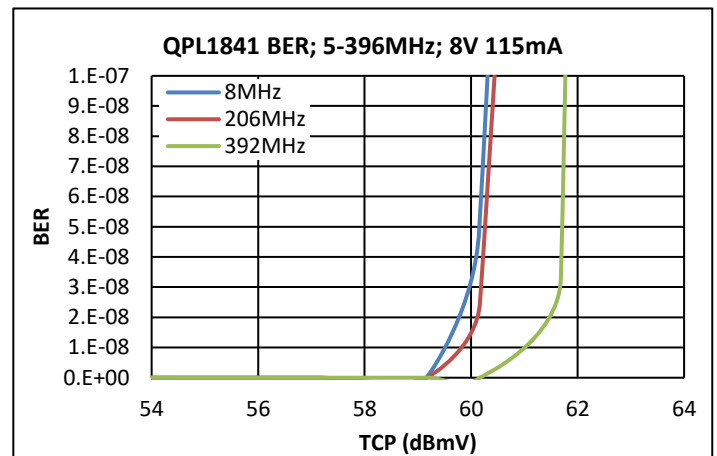
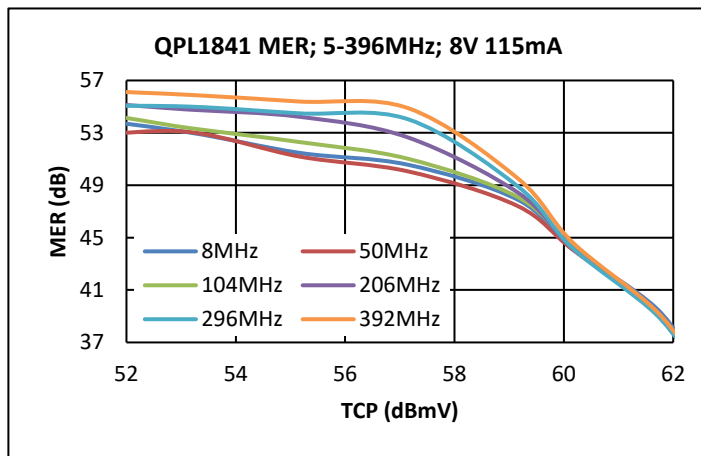
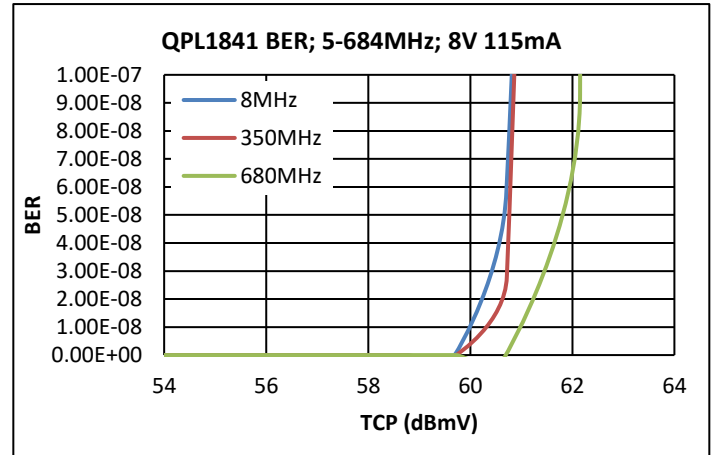
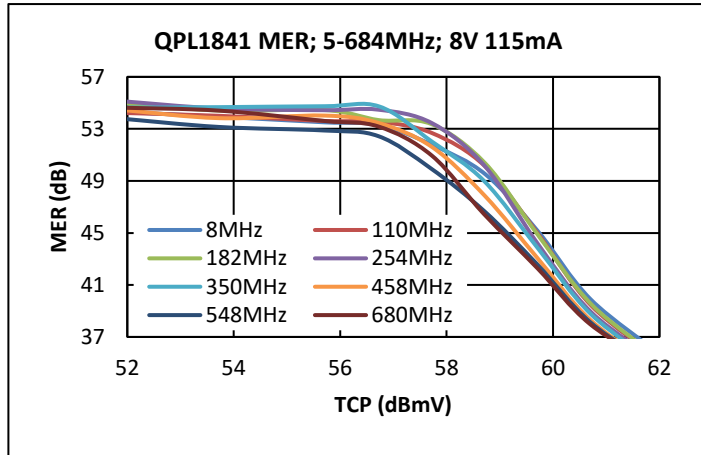


Performance Data, 8V (Cont'd)


Notes:

- (1) 8V OIP2: +5dBm/tone output @ $\Delta f = 6\text{MHz}$
- (2) 8V OIP3: +5dBm/tone output @ $\Delta f = 6\text{MHz}$

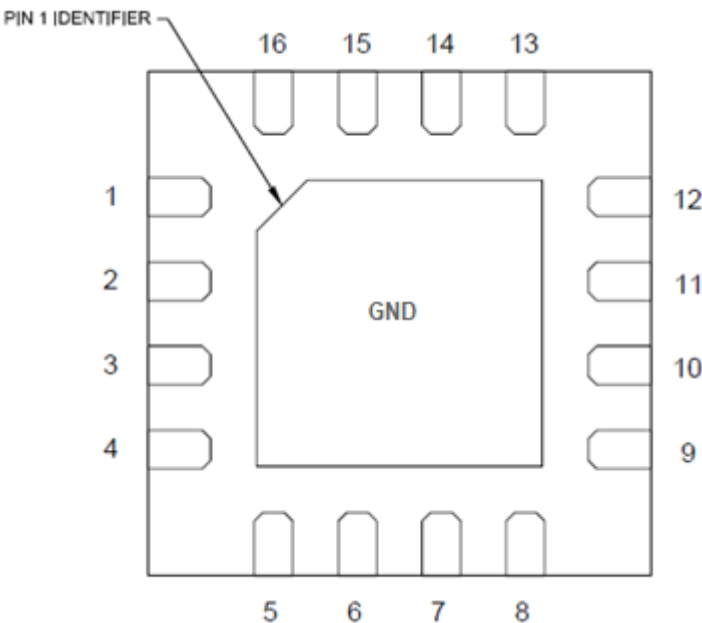
Performance Data, 8V (Cont'd)



Notes:

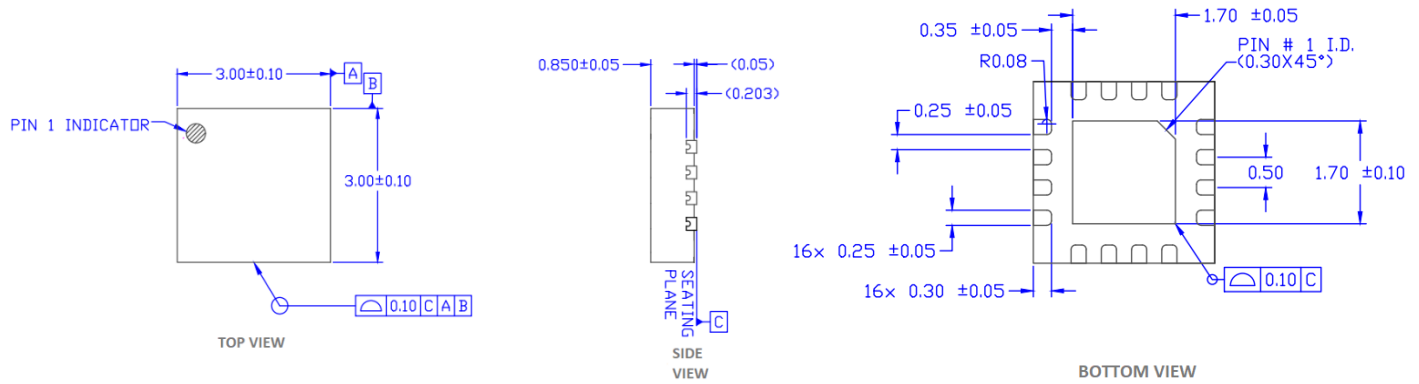
- (1.) BER & MER Test Conditions: 5-684MHz, 113 Ch SC-QAM, 0dB Tilt
- (2.) BER & MER Test Conditions: 5-396MHz, 65 Ch SC-QAM, 0dB Tilt
- (3.) BER & MER Test Conditions: 5-204MHz, 33 Ch SC-QAM, 0dB Tilt
- (4.) Source corrected

Pin Configuration and Description

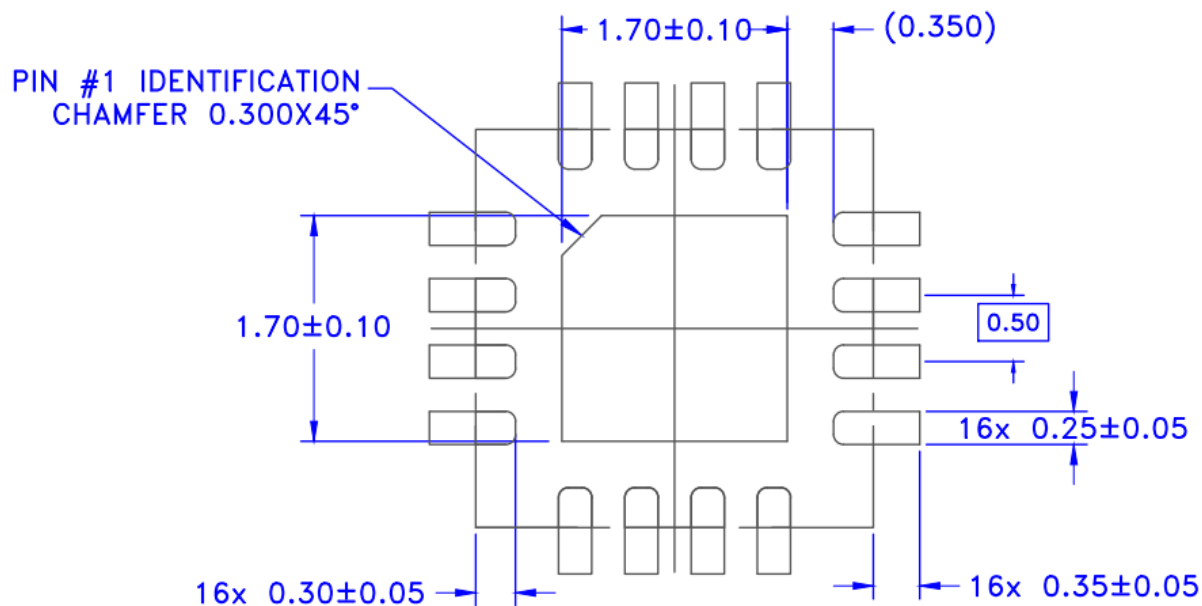


Pin Number	Label	Description
1,3,4,5,6,7,8,9,12,14,15,16	NC	Not connected internally. It may be left floating or connected to ground (preferred).
2	RFin	RF input. External DC blocking capacitor required.
10	CFB	Feedback capacitor
11	RFout/VDD	RF output. External bias choke to VDD required. External DC blocking capacitor required.
13	VG2	VG2 bias adjust. Set by resistor (R9) to ground.
Paddle	GND	DC/RF/Thermal/GND. (Maximize vias in this area)

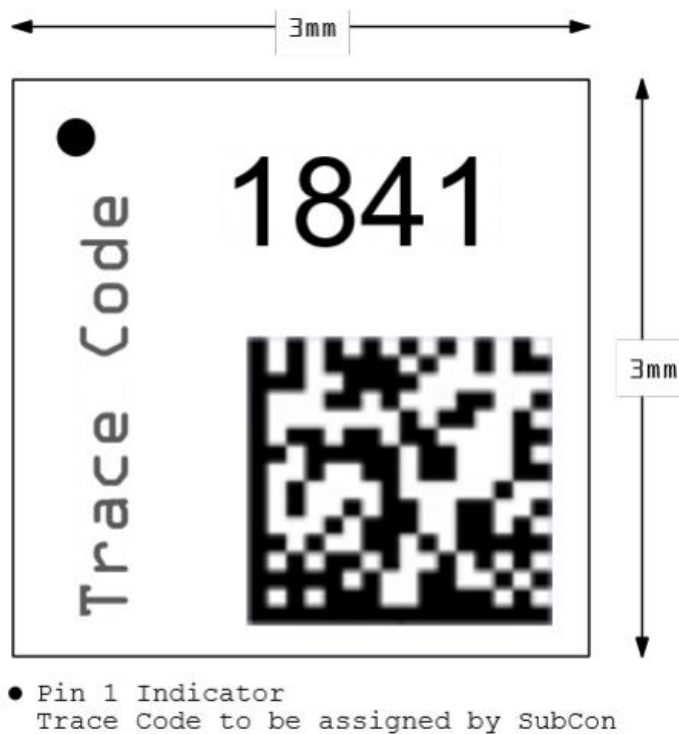
Package Outline



Recommended PCB Land Pattern

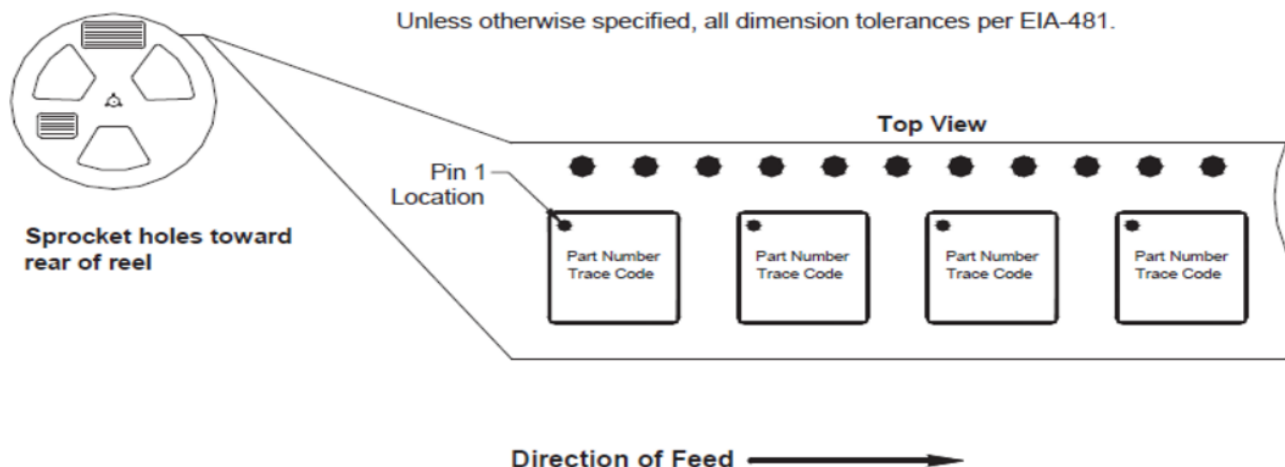


Package Marking




Tape and Reel

Qorvo Part Number	Reel Diameter Inch (mm)	Hub Diameter Inch (mm)	Width (mm)	Pocket Pitch (mm)	Feed	Units Per Reel
QPL184118TR7	7 (178)	2.4 (61)	12	4	Single	2500



Handling Precautions

Parameter	Rating	Standard	 Caution! ESD Sensitive Device
ESD – Human Body Model (HBM)	Class 1B (500V to <1000V)	ANSI / ESDA / JEDEC JS-001	
ESD – Charged Device Model (CDM)	Class C3 (\geq 1000V)	ANSI / ESDA / JEDEC JS-002	
MSL – Moisture Sensitivity Level	MSL2	IPC / JEDEC J-STD-020	

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:

- PFOS Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C₁₅H₁₂Br₄O₂) Free
- SVHC Free

Contact Information

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

Tel: 1-844-890-8163

Web: www.qorvo.com

Email: customer.support@qorvo.com



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