

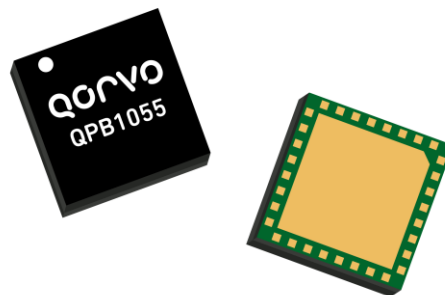


QPB1055

C-Band Switched filter Bank Module

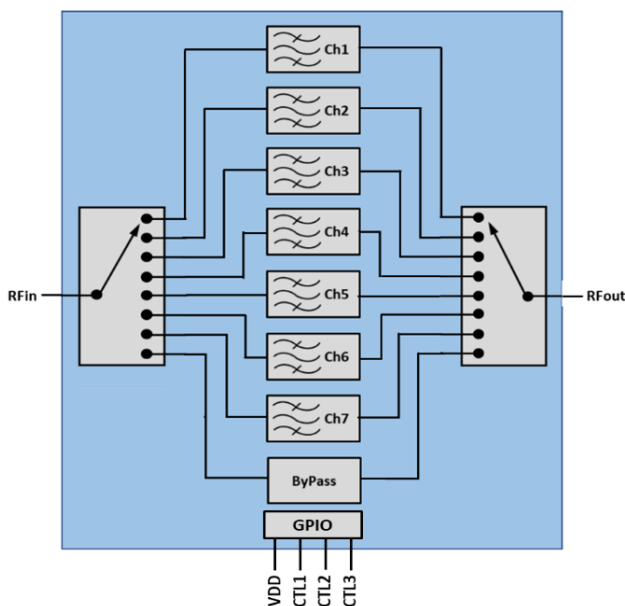
Product Overview

The QPB1055 is a C-Band switched filter bank module. The device integrates two switches on both sides of 7 filters and a bypass. Using Qorvo's BAW filter technology, the device provides excellent band filtering capability. This filter is housed in a compact 6.0 x 6.0 mm package for C-Band Radar applications.



32 Pin, 6 x 6 x 0.793 mm leadless OVM Package

Functional Block Diagram



Key Features

- Frequency Range: 5200 – 5900 MHz
- 7 Channels + Bypass
- Insertion Loss: 7 dB Max
- Out of Band Rejection: 40 dBc Min
- Switch Control: GPIO
- Switching Speed: 480 ns typical
- Package Size: 6.0 x 6.0 x 0.793 mm

Performance is typical across frequency. Please reference the electrical specification table and data plots for more details.

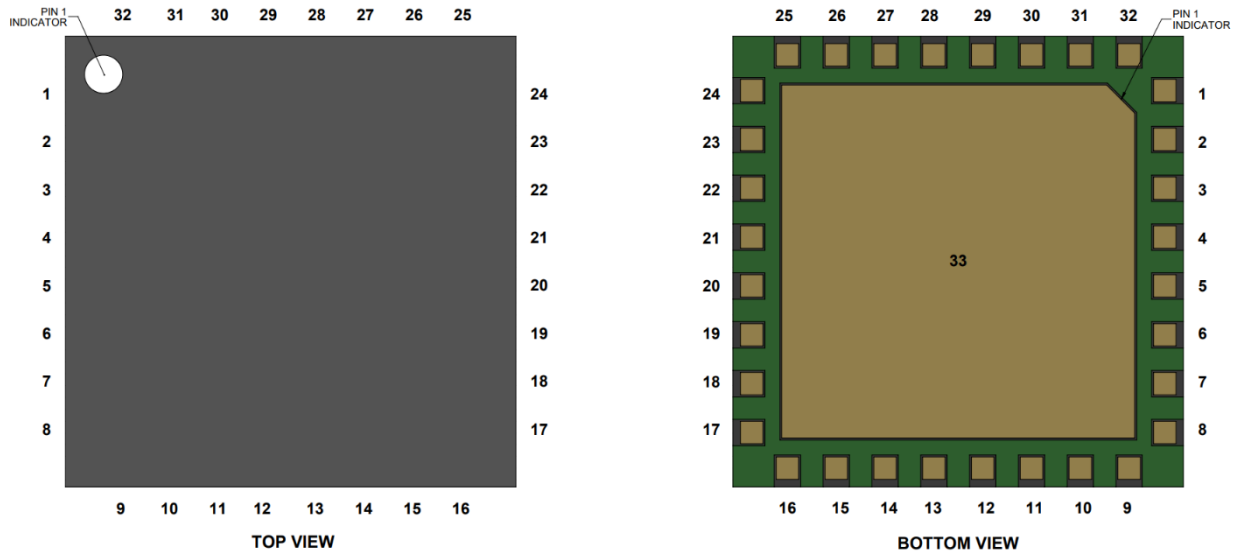
Applications

- Radar Applications

Ordering Information

Part No.	Description
QPB1055TR7	C-Band Switched Filter Module 1000 Piece 7" Reel
QPB1055EVB	Evaluation Board

Pin Configuration



Pin Description

Pin No.	Label	Description
1-3, 5-10, 12, 16-19, 21-32	GND	Ground. Connected to GND paddle (pin 33); should be grounded on PCB to improve isolation
4	RF IN	RF Input. Matched to 50 ohms, DC shorted. External DC blocking capacitor required.
11	VDD	Power Supply
13	CLT1	Switch Control 1
14	CLT2	Switch Control 2
15	CLT3	Switch Control 3
20	RF OUT	RF Output. Matched to 50 ohms, DC shorted. External DC blocking capacitor required.
33	GND	Backside Paddle. Multiple vias should be employed to minimize inductance and thermal resistance.



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C-Band Switched Filter Bank Module

Absolute Maximum Ratings ⁽¹⁾

Parameter	Rating
RF Input Power to Module; CW @ 25°C ⁽²⁾	38 dBm
RF Input Power to Module during Switching (Hot Switching); CW @ 85°C	29 dBm
Switch Supply Voltage (V _{DD})	6 V
Control Voltage (CTL1 – CTL3)	-0.3 to 6 V
Operating Temperature ⁽³⁾	-40 to +85 °C
Storage Temperature	-65 to +125 °C

Notes:

1. 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.
2. Power was applied at the center of each channel with a pulse width of 200ms and 50% of duty cycle.
3. In production, devices will be tested at room temperature to a guard-banded specification to ensure compliance over temperature.

Minimum Lifetime Ratings

Conditions	Rating
RF Input Power ⁽¹⁾ , Pin 4	>200K hours

⁽¹⁾ Input Power: CW, 29 dBm, @ +85 °C

Recommended Operating Conditions

Parameter ¹	Min	Typ.	Max	Units
Device Voltage (V _{DD})	+3.3	+5.0	+5.5	V
Supply Current (I _{DD})		100		μA
Start-up Time (90% of V _{DD} to harmonic steady state)		<1140		ns
Switching Time (50% of V _{CTL1-CTL3} to 10/90% of RF Output)		480		ns
Control Current (Each CTL)		2.1		μA
Low Control Voltage (1.8 V logic compatible) ²	-0.3		0.63	V
High Control Voltage (1.8 V logic compatible) ²	1.17		V _{DD}	V

¹ Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

² This product is designed for 1.8V control logic, with a logic low voltage of 0.63 V max. Otherwise an external voltage divider or logic converter must be used.

Switch Control Logic Truth Table

Channel	CTL1	CTL2	CTL3
1	0	0	0
2	0	0	1
3	0	1	0
4	0	1	1
5	1	0	0
6	1	0	1
7	1	1	0
Bypass	1	1	1

Note: Logic 0 = Low Control Voltage, Logic 1 = High Control Voltage



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C-Band Switched Filter Bank Module

Electrical Specifications

Test conditions unless otherwise noted: with Qorvo evaluation circuit on page 22, Temp = -40°C to +85°C, 50 Ω system

Parameter	Conditions ^{(1) (2)}	Min	Typ. ⁽³⁾	Max	Unit
Frequency Range		5200	-	5900	MHz
Maximum Insertion Loss	Ch1: 5200 - 5300 MHz, Fc = 5250 MHz	-	5.1	7	dB
	Ch2: 5300 - 5400 MHz, Fc = 5350 MHz	-	5.1	7	
	Ch3: 5400 - 5500 MHz, Fc = 5450 MHz	-	5.0	7	
	Ch4: 5500 - 5600 MHz, Fc = 5550 MHz	-	5.8	7	
	Ch5: 5600 - 5700 MHz, Fc = 5650 MHz	-	6.5	7	
	Ch6: 5700 - 5800 MHz, Fc = 5750 MHz	-	6.6	7	
	Ch7: 5800 - 5900 MHz, Fc = 5850 MHz	-	5.7	7	
	Bypass: 5200 – 5900 MHz	-	2.3	4	
CH1: Attenuation (Relative to 0 dB @ Fc = 5250 MHz)	4600 – 5127 MHz	40	56.9	-	dBc
	5373 – 5900 MHz	40	53.5	-	
CH2: Attenuation (Relative to 0 dB @ Fc = 5350 MHz)	4700 – 5227 MHz	40	49.7	-	
	5473 – 6000 MHz	40	57.0	-	
CH3: Attenuation (Relative to 0 dB @ Fc = 5450 MHz)	4800 – 5327 MHz	40	53.9	-	
	5573 – 6100 MHz	40	55.6	-	
CH4: Attenuation (Relative to 0 dB @ Fc = 5550 MHz)	4900 – 5427 MHz	40	53.4	-	
	5673 – 6200 MHz	40	57.8	-	
CH5: Attenuation (Relative to 0 dB @ Fc = 5650 MHz)	5000 – 5527 MHz	40	59.0	-	
	5773 – 6300 MHz	40	58.3	-	
CH6: Attenuation (Relative to 0 dB @ Fc = 5750 MHz)	5100 – 5627 MHz	40	49.5	-	
	5873 – 6400 MHz	40	60.0	-	
CH7: Attenuation (Relative to 0 dB @ Fc = 5850 MHz)	5200 – 5727 MHz	40	51.9	-	
	5973 – 6500 MHz	40	56.8	-	

Notes:

1. In production, devices will be tested at room temperature to a guard banded specification to ensure compliance over temperature.
2. Electrical margin has been built into the design to account for variations due to temperature drift and manufacturing tolerances.
3. Typical values are based on average measurements at room temperature.



QPB1055

C-Band Switched Filter Bank Module

Electrical Specifications – Cont.

Test conditions unless otherwise noted: with Qorvo evaluation circuit on page 22, Temp = -40°C to +85°C, 50 Ω system

Parameter	Conditions ^{(1) (2)}	Min	Typ. ⁽³⁾	Max	Unit
Frequency Range		5200	-	5900	MHz
Input Return Loss	5200 – 5300 MHz	9.0	12.6	-	dB
	5300 – 5400 MHz	8.5	13.8	-	
	5400 – 5500 MHz	7.5	13.5	-	
	5500 – 5600 MHz	7.5	12.4	-	
	5600 – 5700 MHz	9.0	10.8	-	
	5700 – 5800 MHz	8.5	10.5	-	
	5800 – 5900 MHz	7.5	12.0	-	
	Bypass: 5200 – 5900 MHz	13.0	24.3	-	
Output Return Loss	5200 – 5300 MHz	9.6	11.8	-	dB
	5300 – 5400 MHz	9.6	13.1	-	
	5400 – 5500 MHz	8.0	12.7	-	
	5500 – 5600 MHz	7.0	14.1	-	
	5600 – 5700 MHz	9.0	10.1	-	
	5700 – 5800 MHz	9.0	10.5	-	
	5800 – 5900 MHz	8.0	11.8	-	
	Bypass: 5200 – 5900 MHz	13.0	20.9	-	

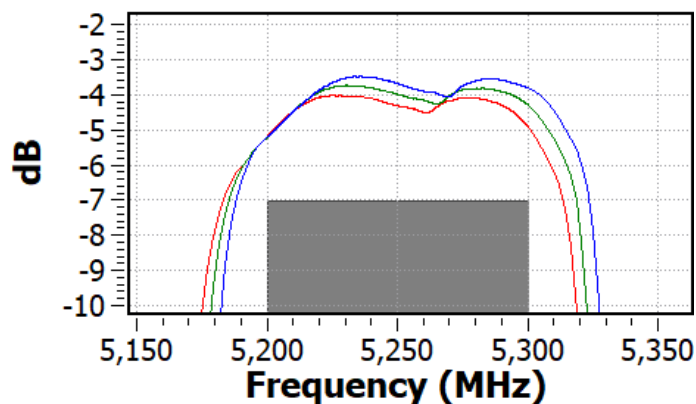
Notes:

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2. Electrical margin has been built into the design to account for variations due to temperature drift and manufacturing tolerances.
3. Typical values are based on average measurements at room temperature.

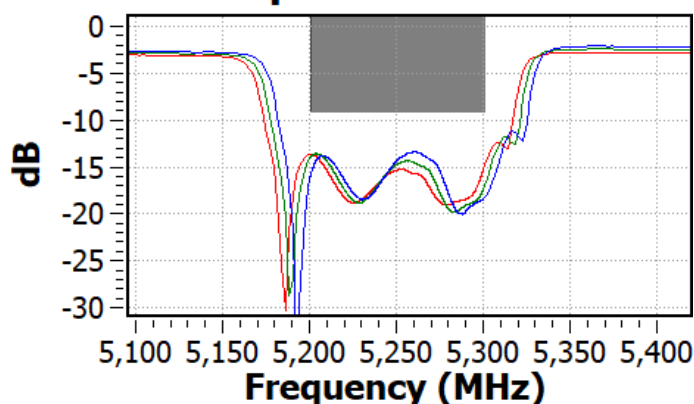
Performance Plots – Small Signal: Channel 1

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

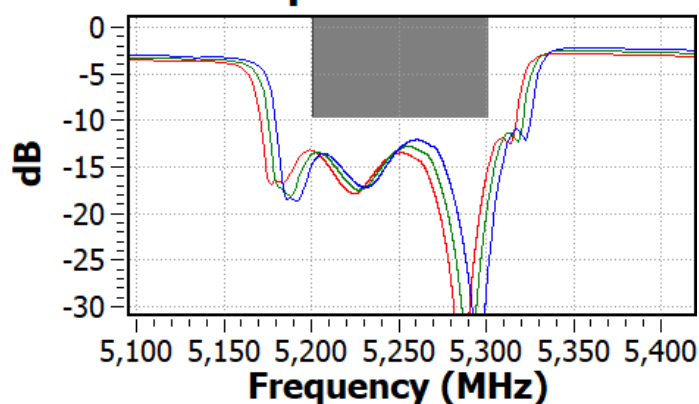
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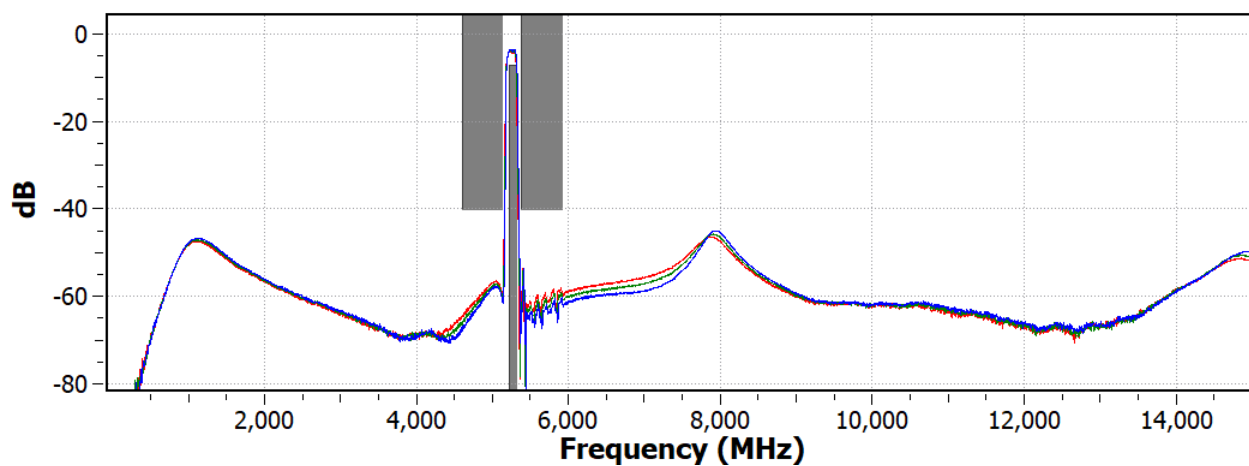
Input Return Loss



Output Return Loss



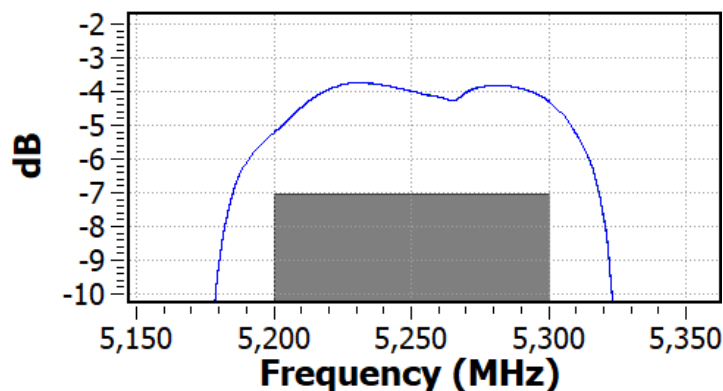
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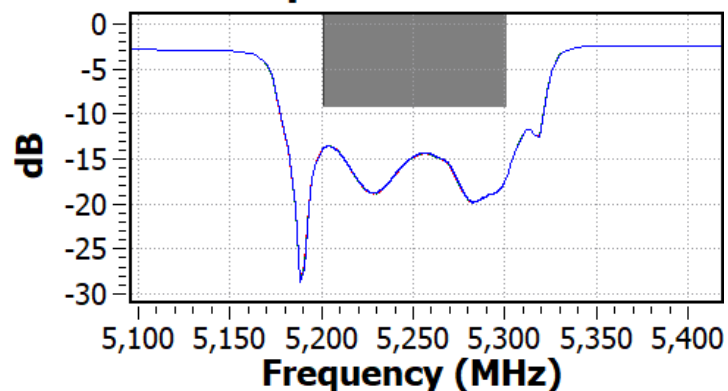
Performance Plots – Small Signal: Channel 1

Test conditions unless otherwise noted: V_{DD} : Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

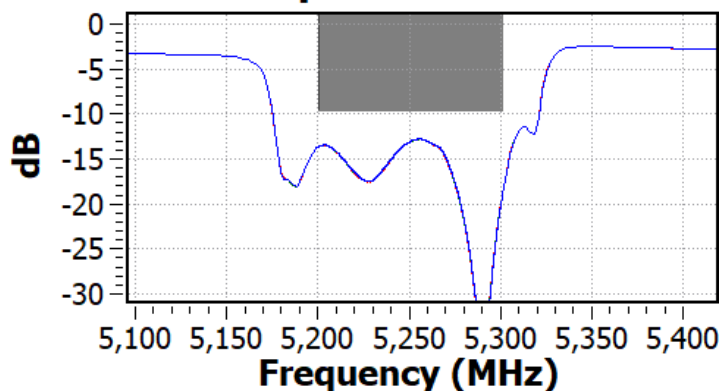
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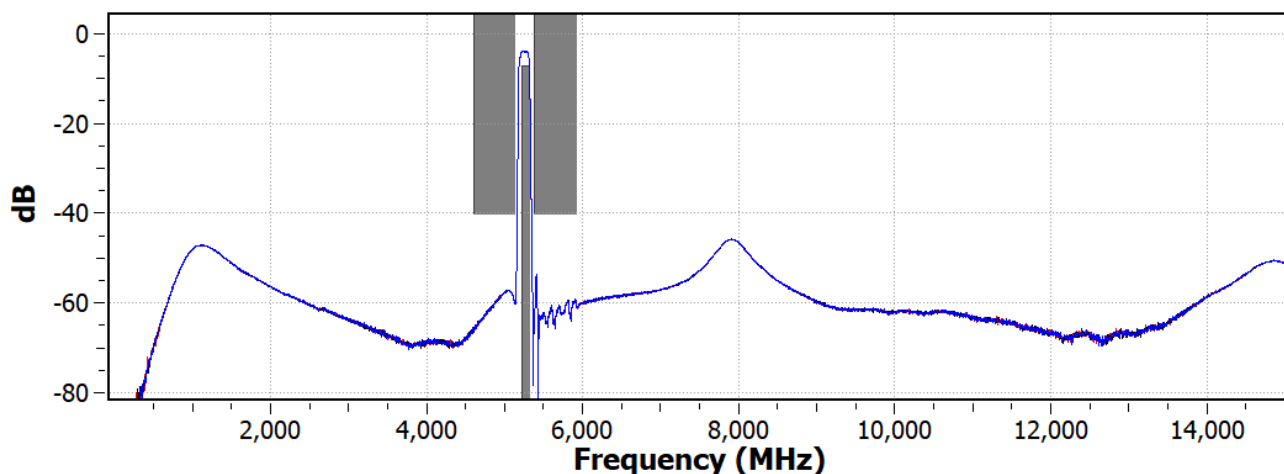
Input Return Loss



Output Return Loss



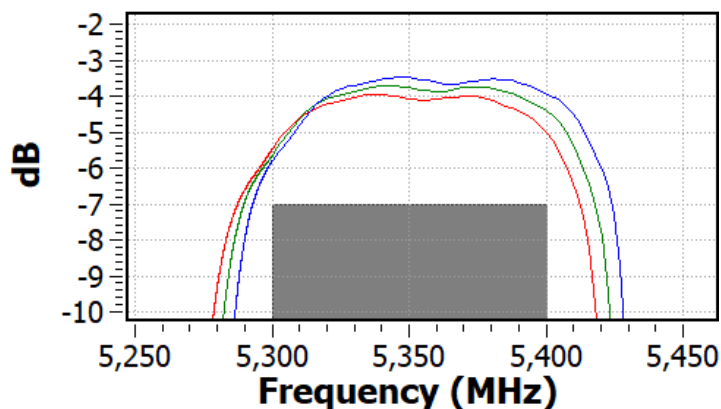
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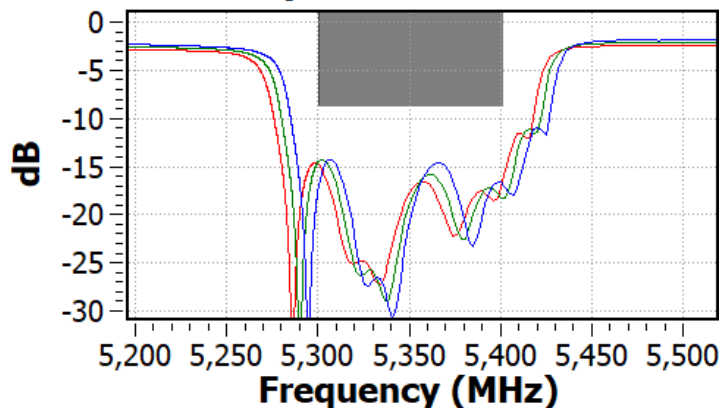
Performance Plots – Small Signal: Channel 2

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

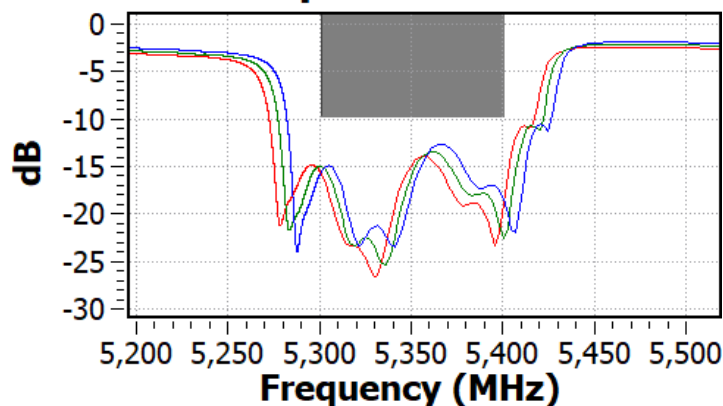
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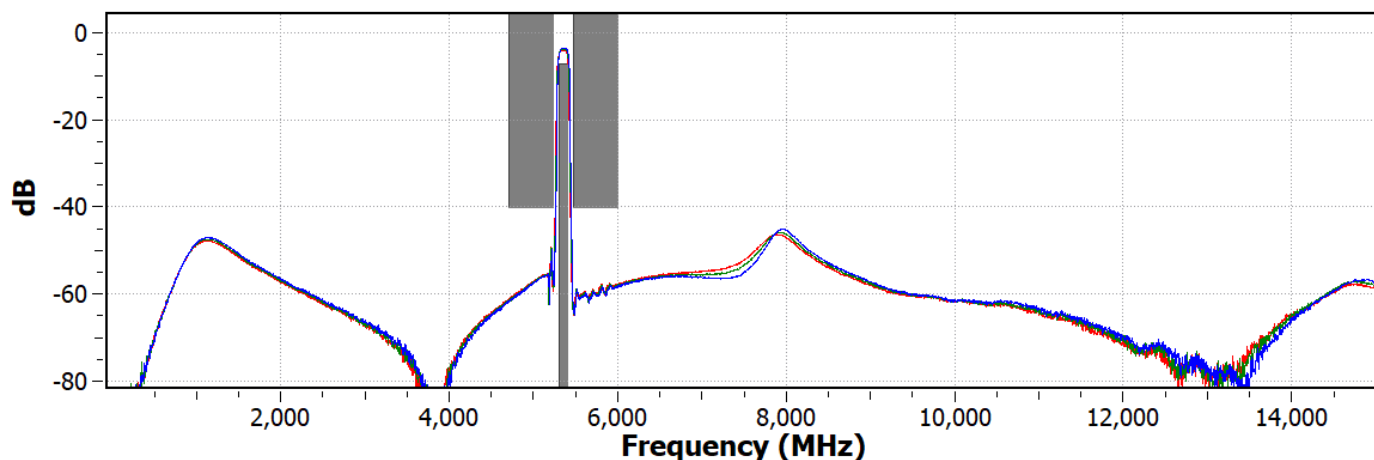
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Output Return Loss



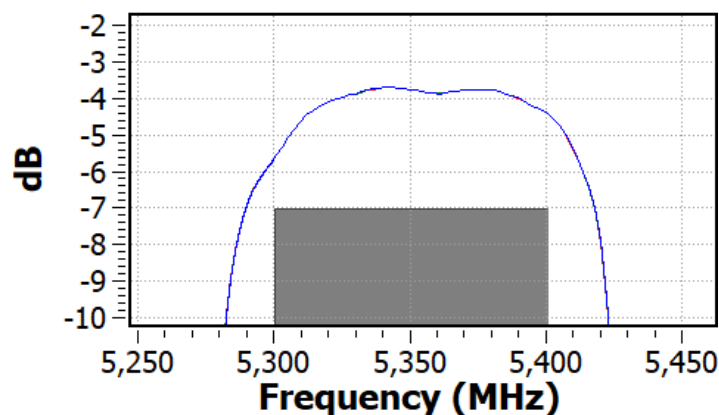
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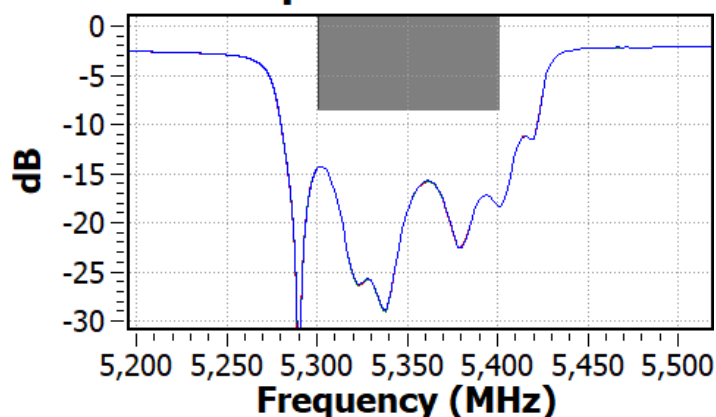
Performance Plots – Small Signal: Channel 2

Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

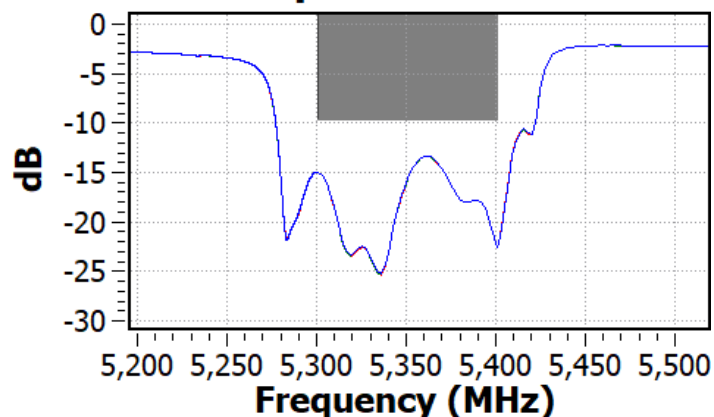
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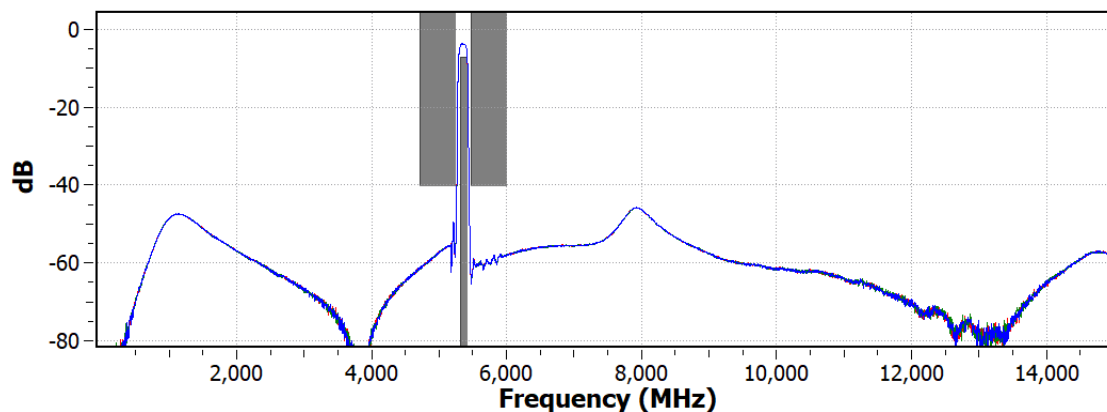
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Output Return Loss



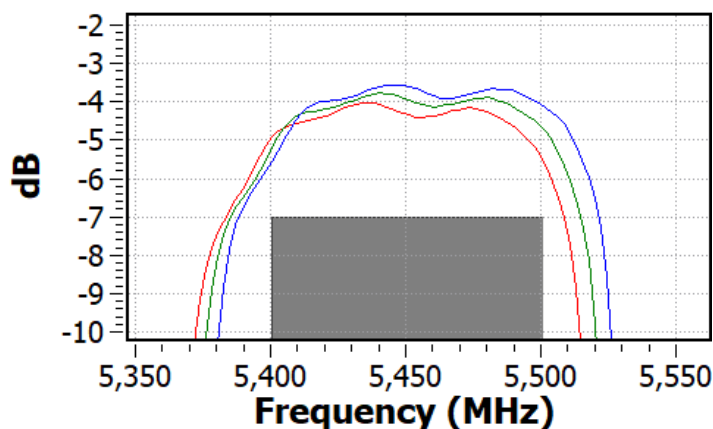
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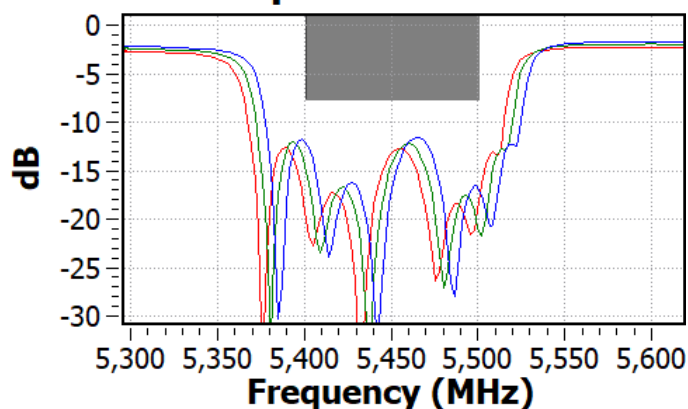
Performance Plots – Small Signal: Channel 3

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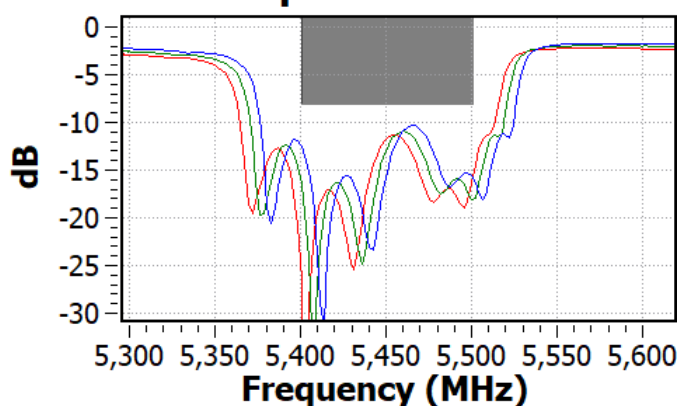
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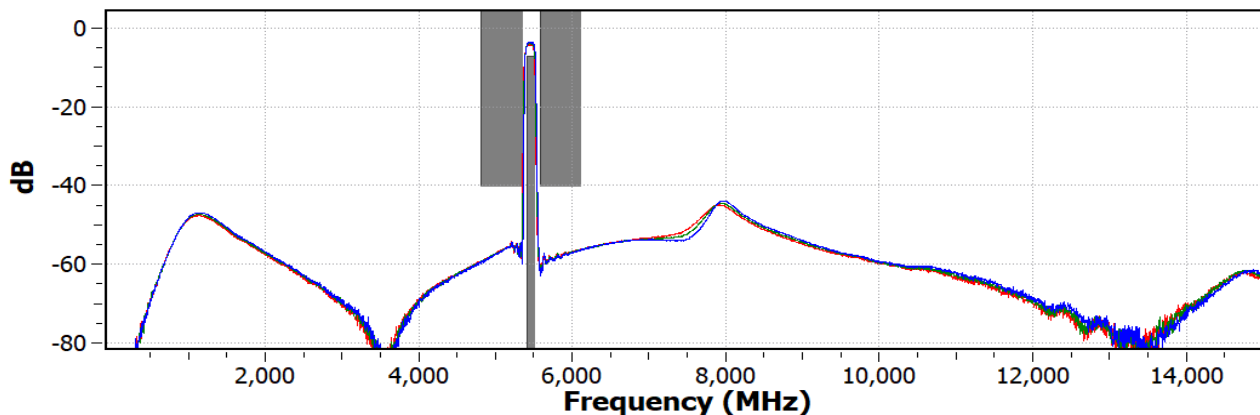
Input Return Loss



Output Return Loss



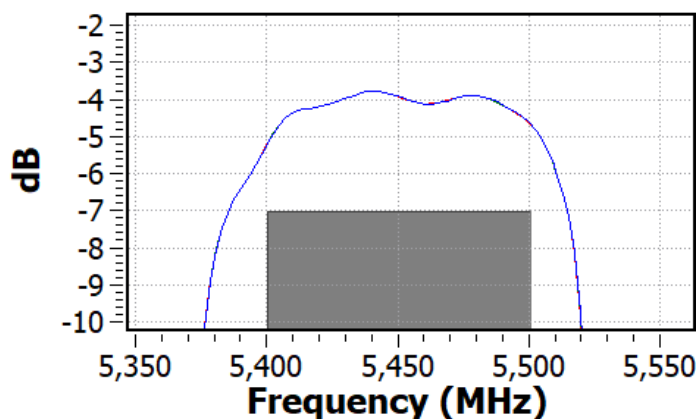
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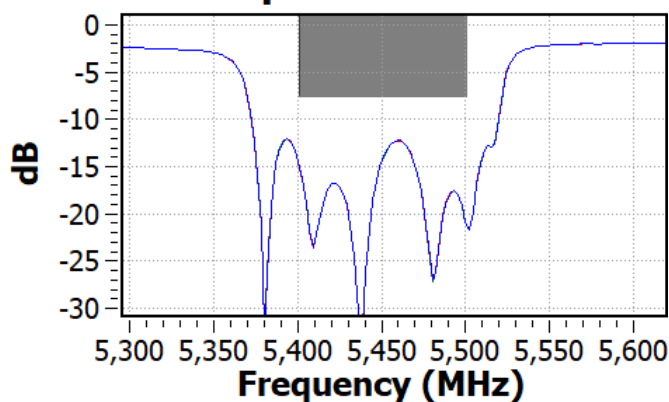
Performance Plots – Small Signal: Channel 3

Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

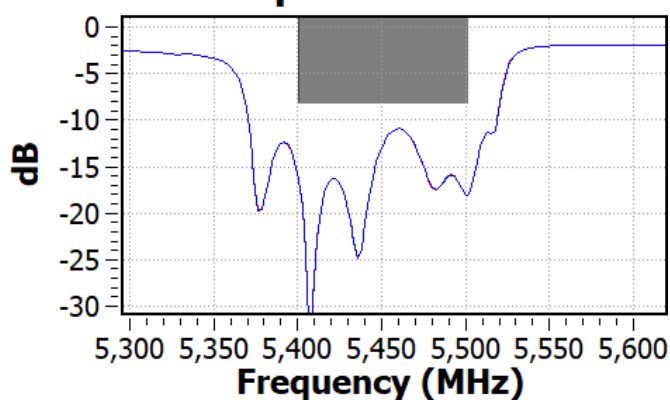
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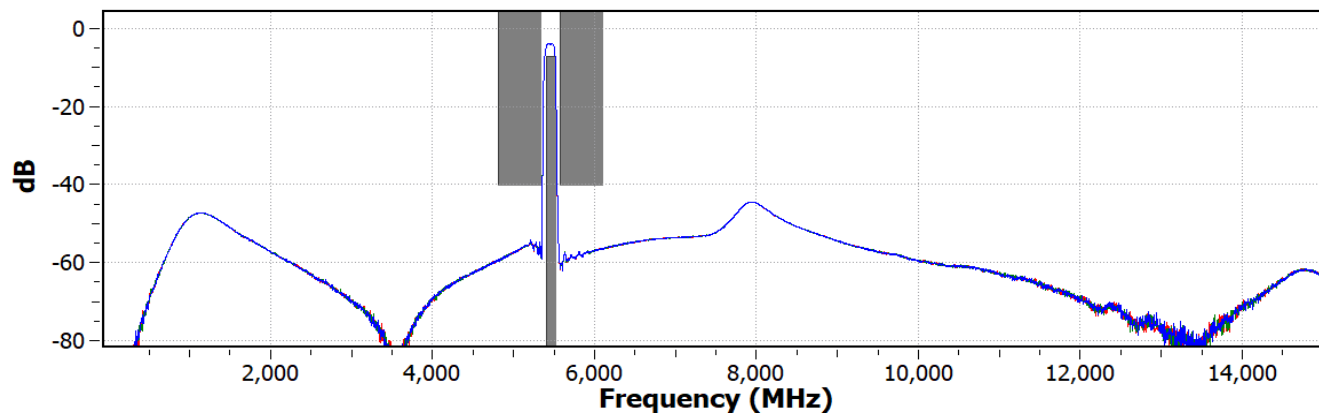
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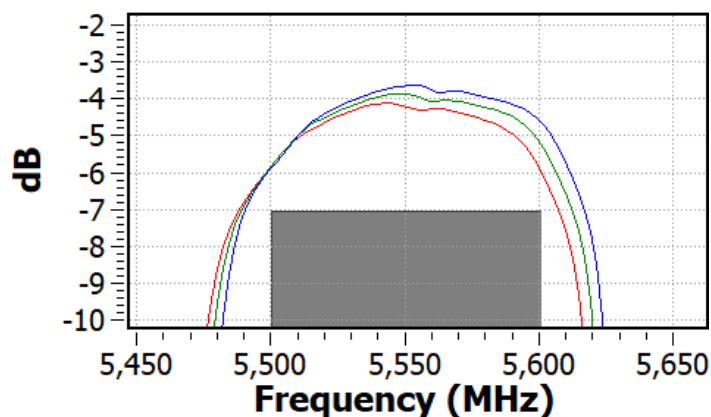
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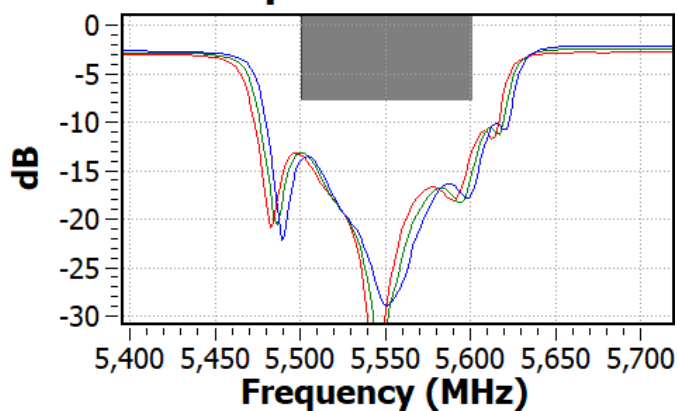
Performance Plots – Small Signal: Channel 4

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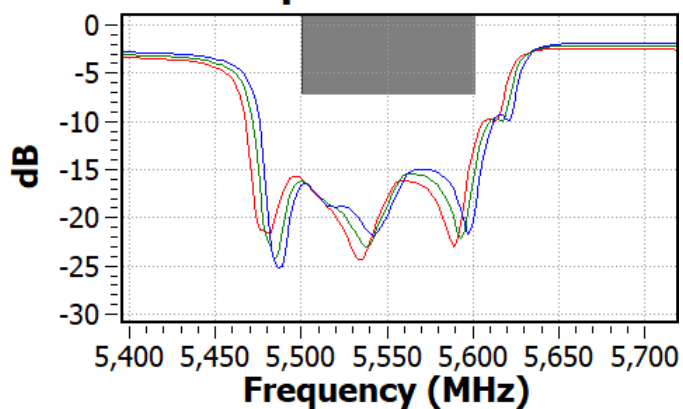
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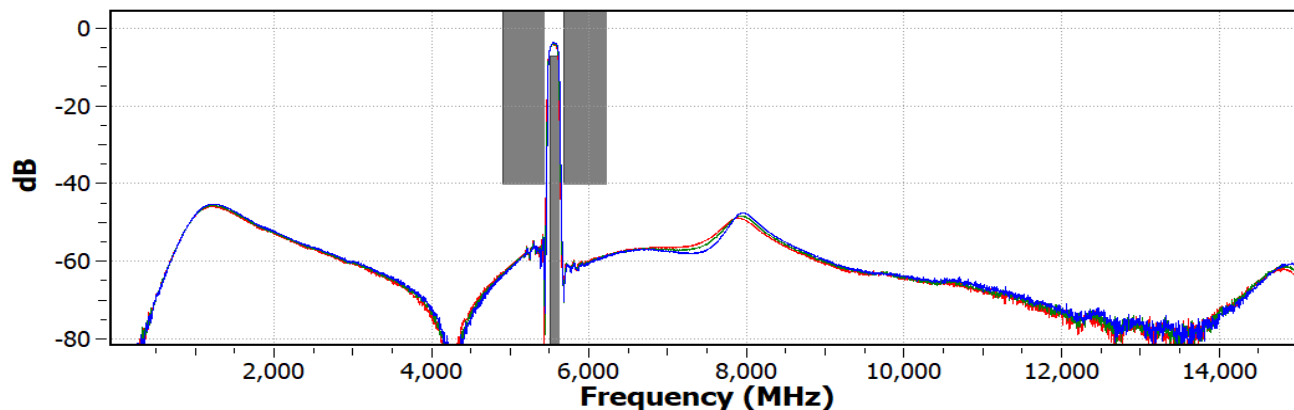
Input Return Loss



Output Return Loss



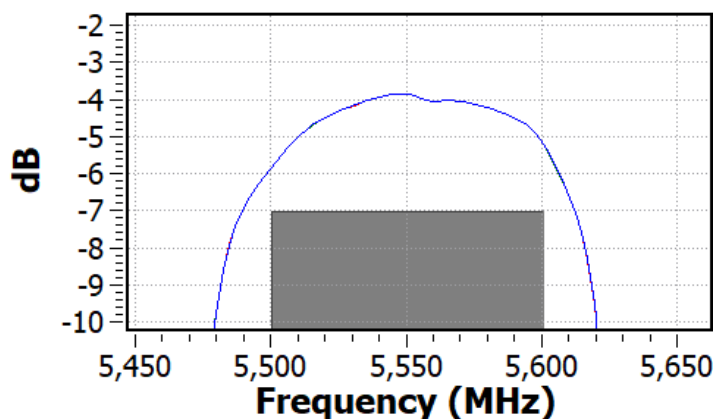
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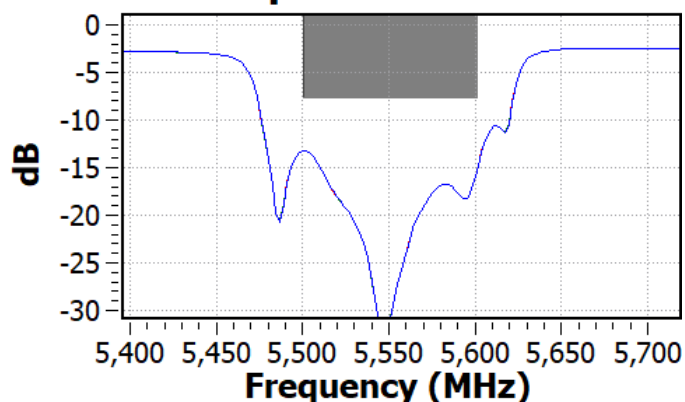
Performance Plots – Small Signal: Channel 4

Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

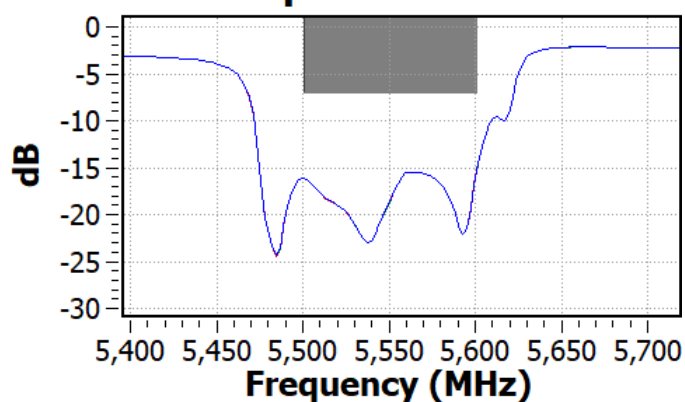
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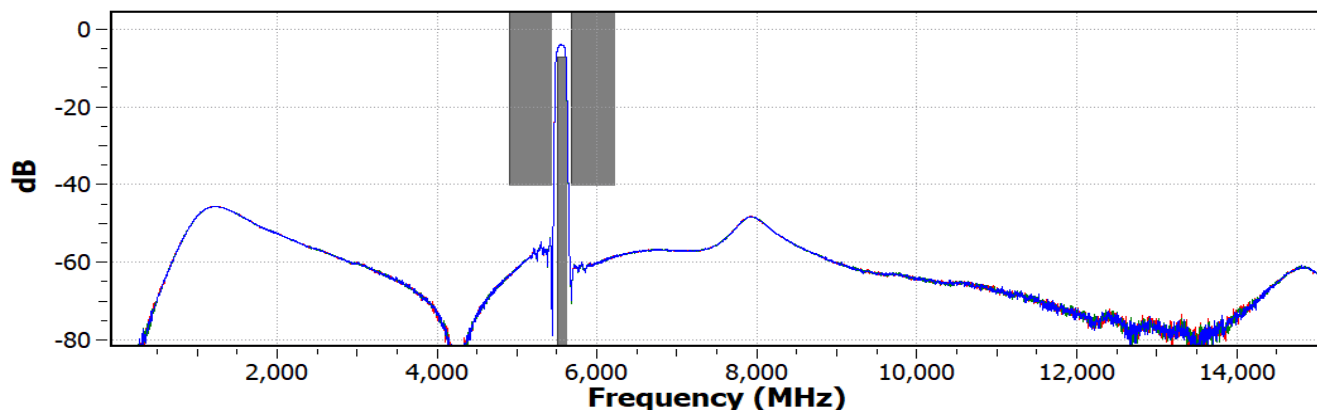
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Output Return Loss



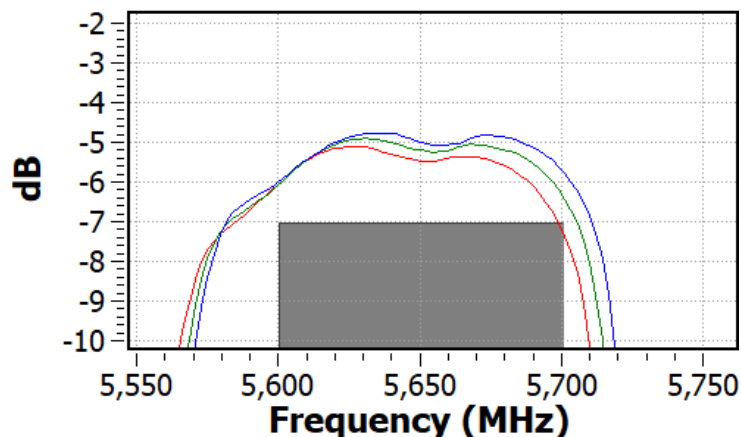
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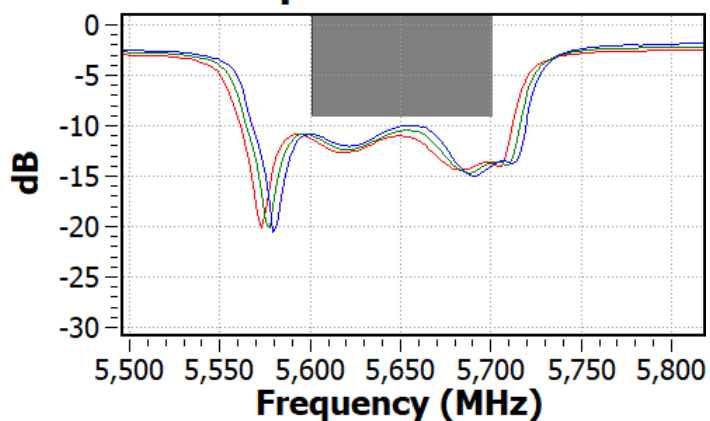
Performance Plots – Small Signal: Channel 5

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

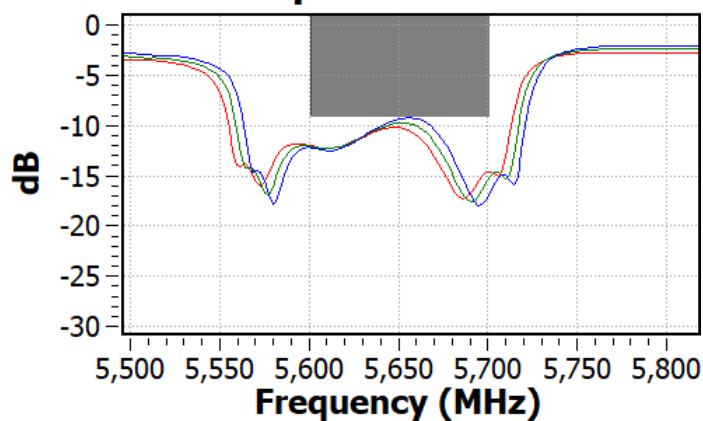
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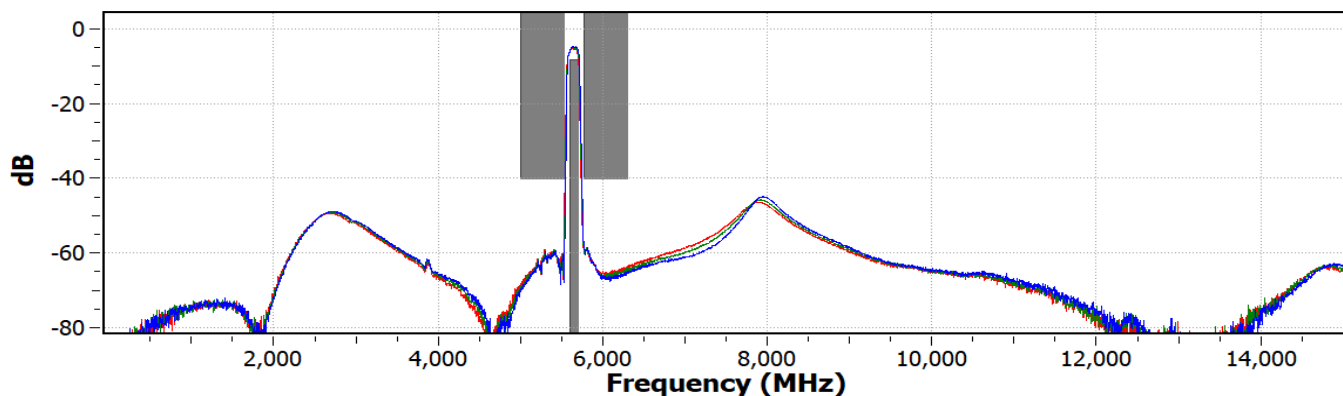
Input Return Loss



Output Return Loss



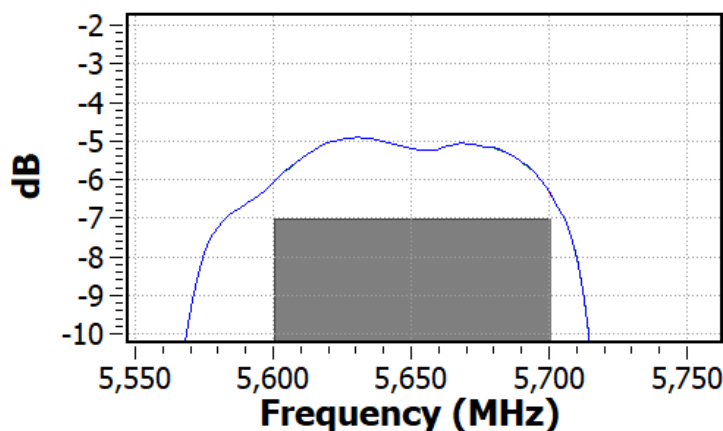
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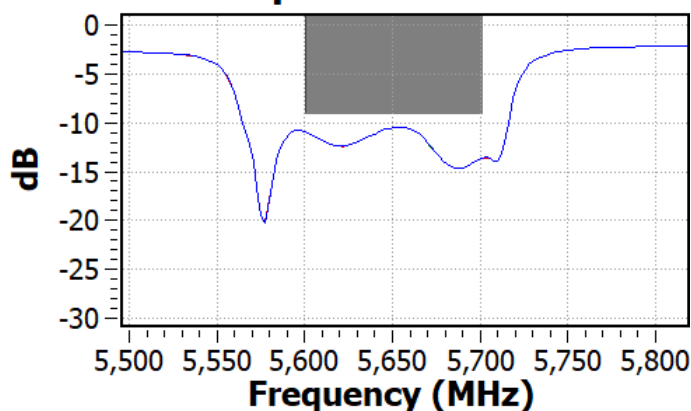
Performance Plots – Small Signal: Channel 5

Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

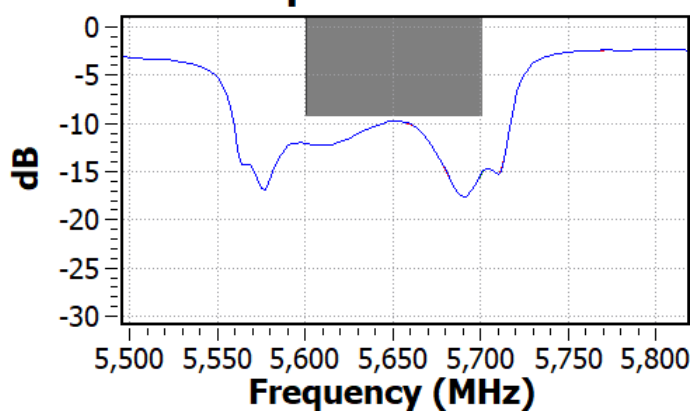
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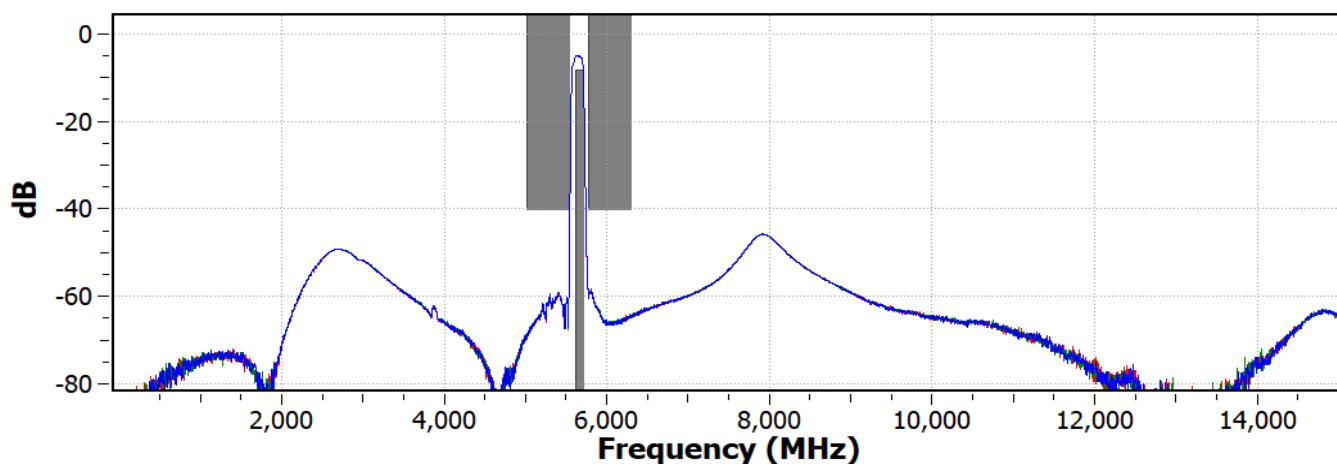
Input Return Loss



Output Return Loss



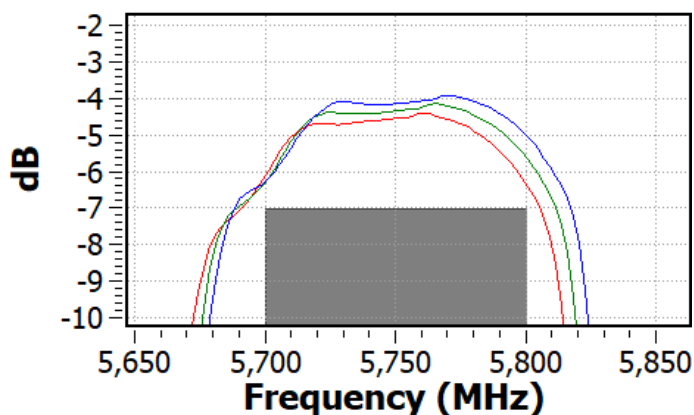
Wide Band



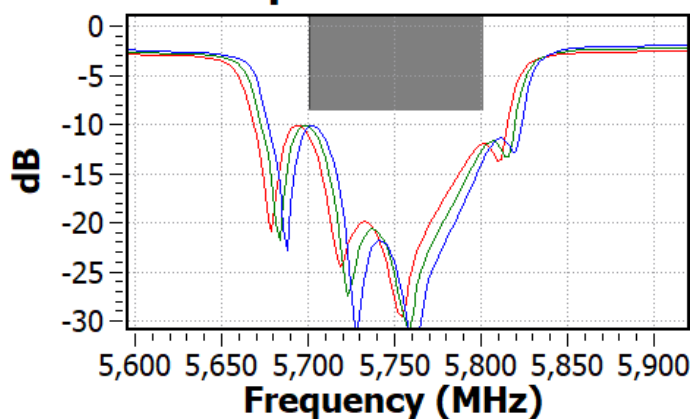
Performance Plots – Small Signal: Channel 6

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

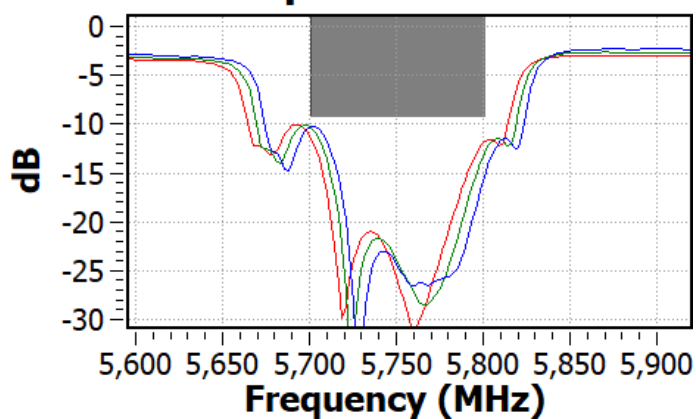
Passband



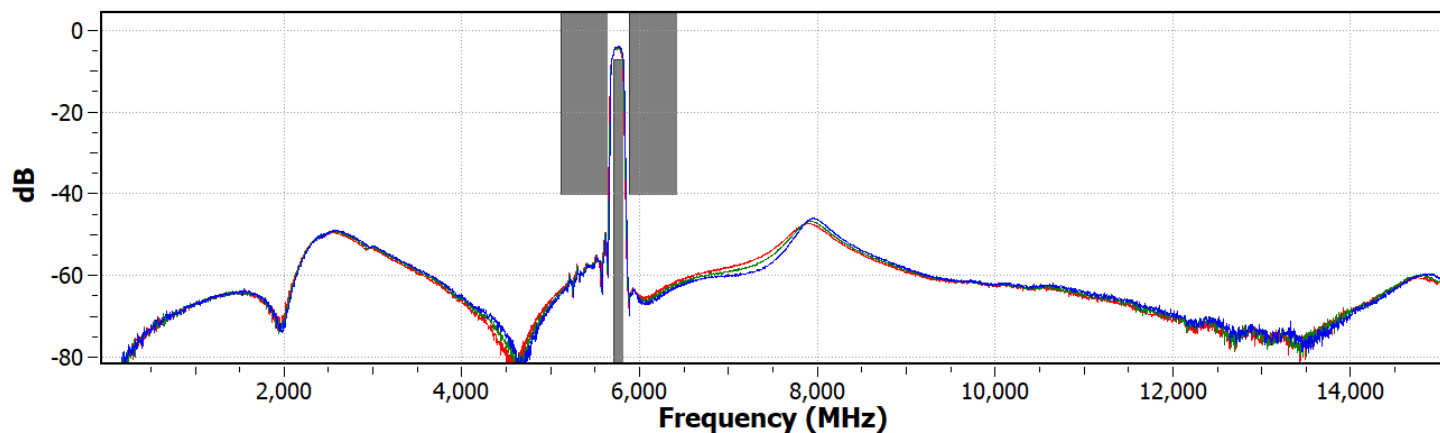
Input Return Loss



Output Return Loss

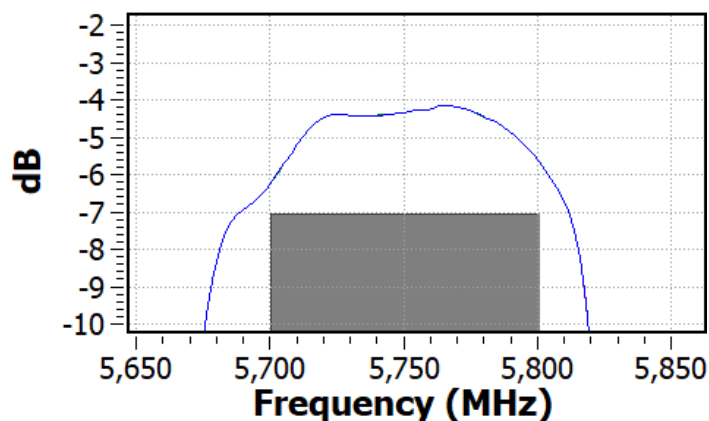
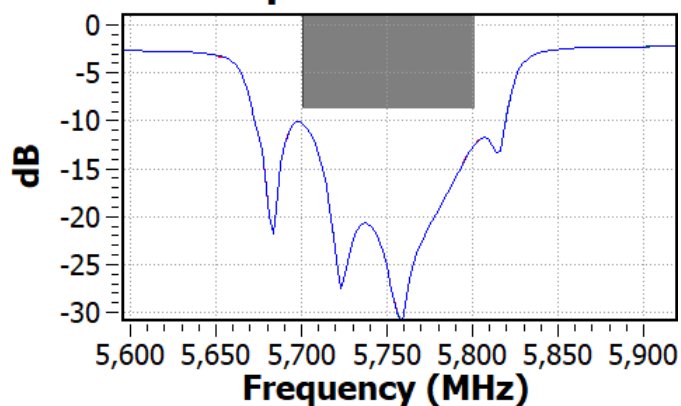
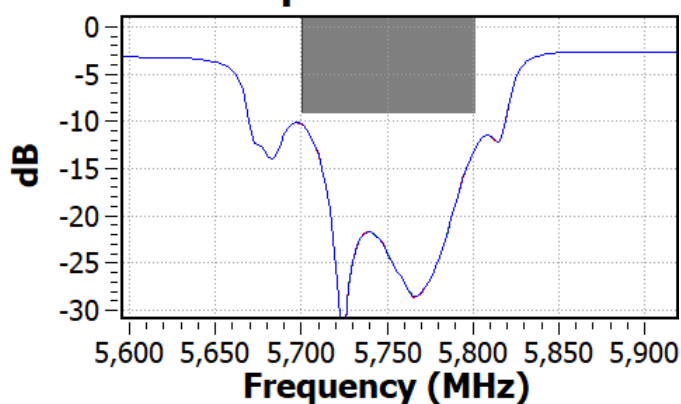
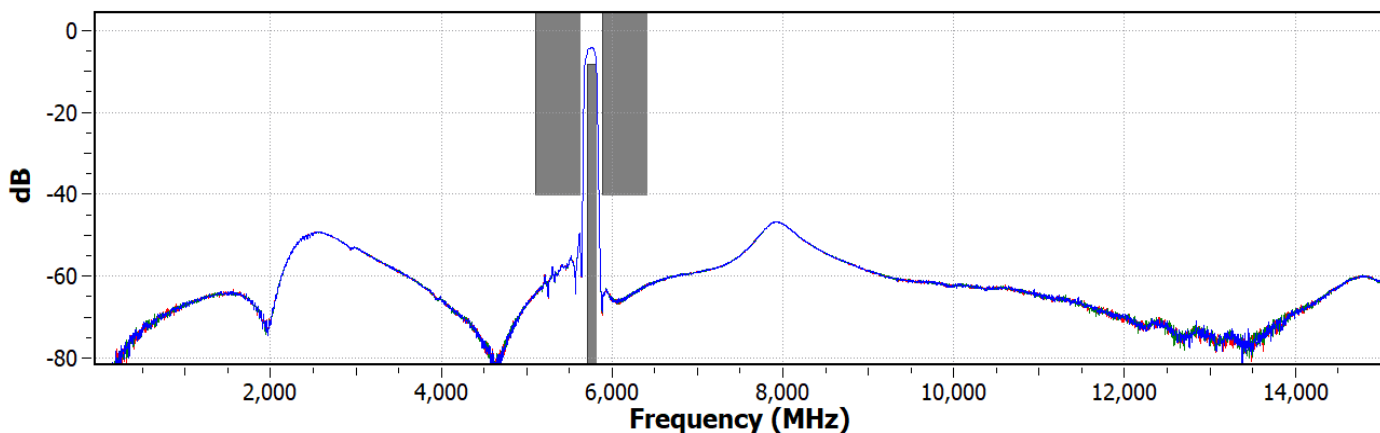


Wide Band



Performance Plots – Small Signal: Channel 6

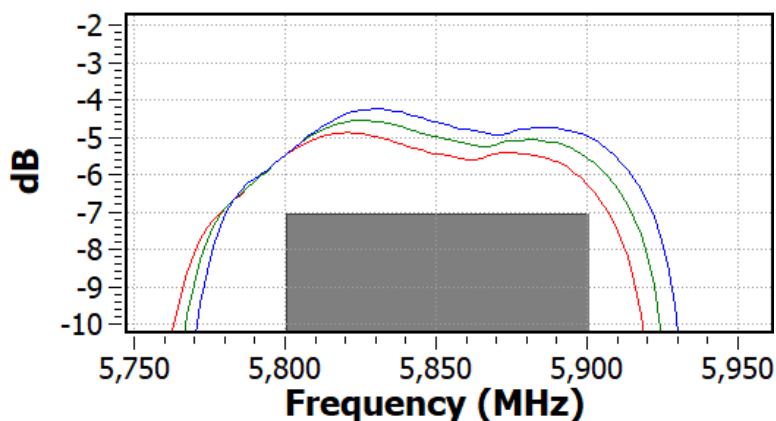
Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

Passband

Input Return Loss

Output Return Loss

Wide Band


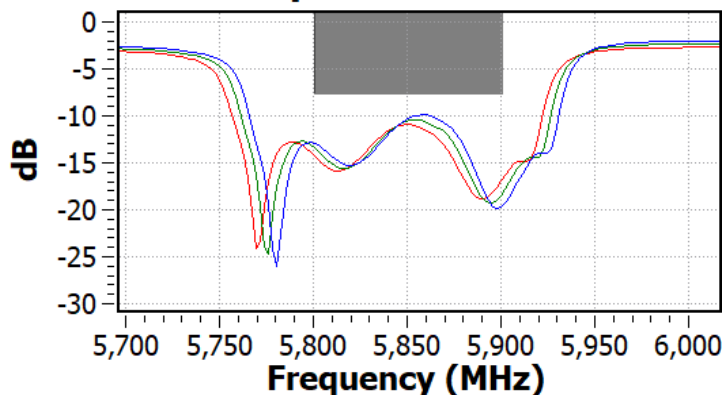
Performance Plots – Small Signal: Channel 7

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

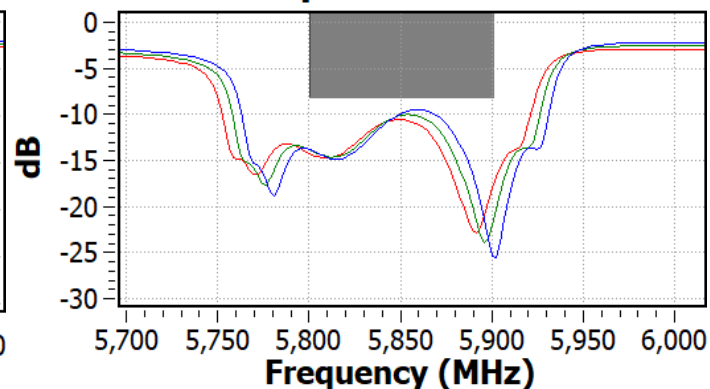
Passband



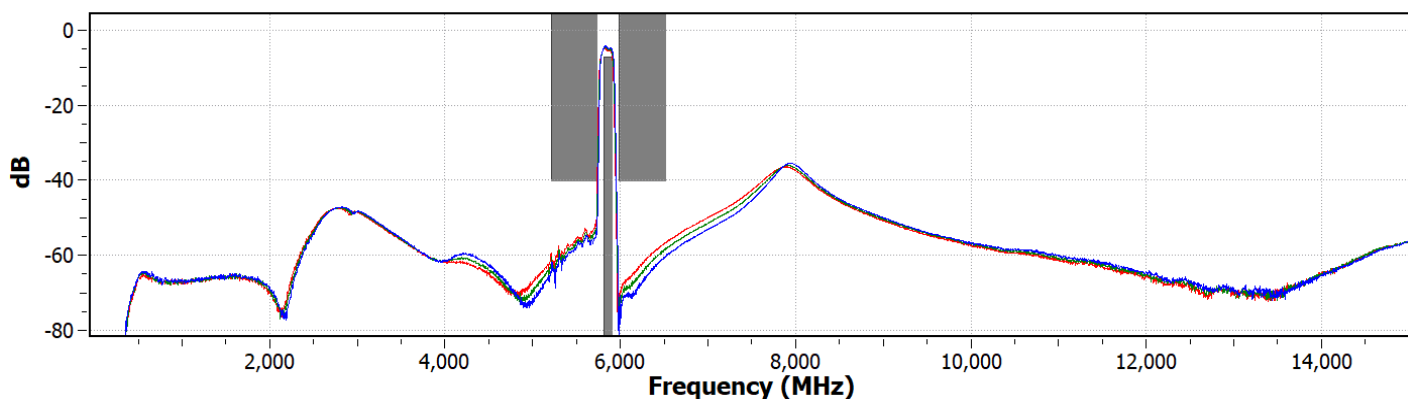
Input Return Loss



Output Return Loss

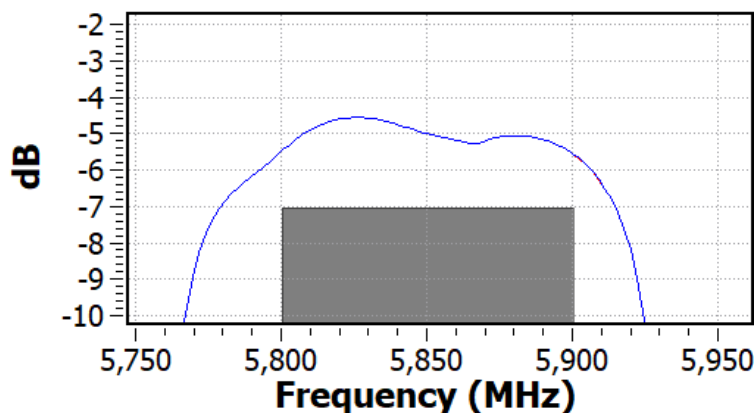
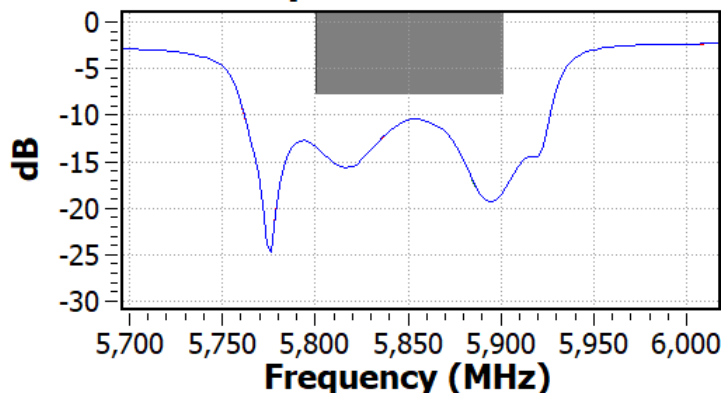
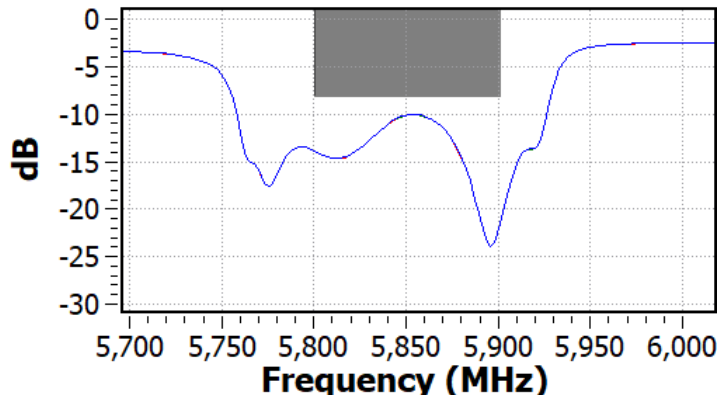
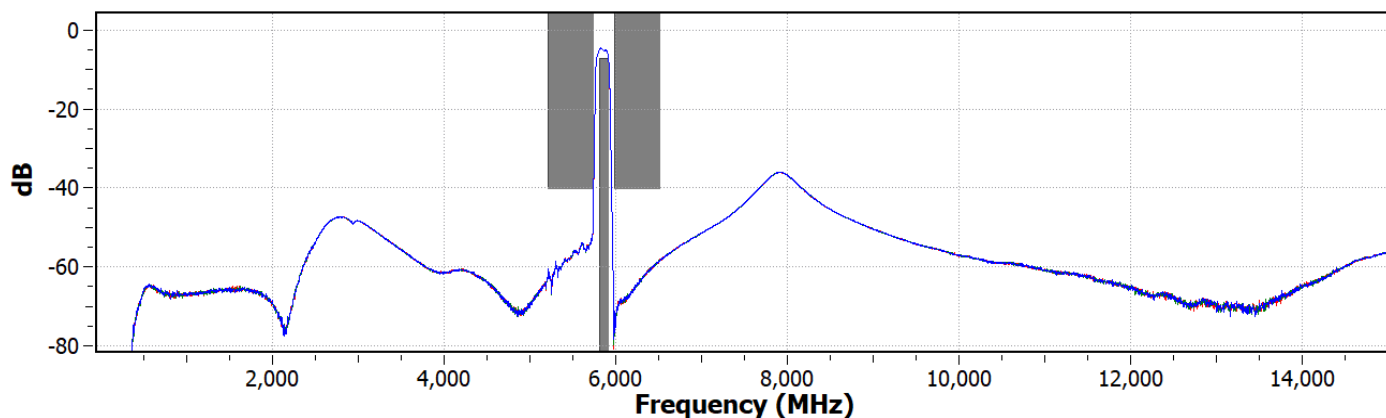


Wide Band



Performance Plots – Small Signal: Channel 7

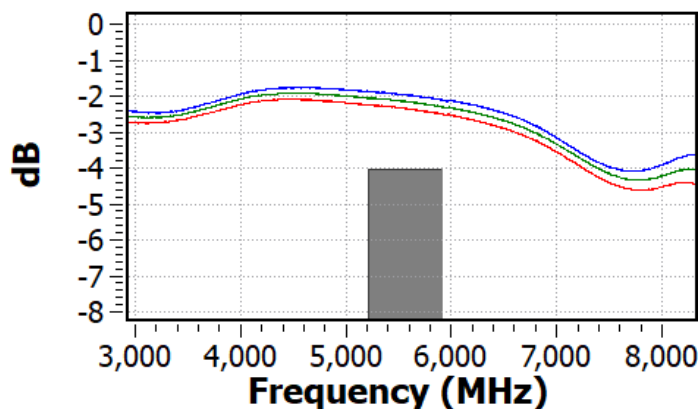
Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

Passband

Input Return Loss

Output Return Loss

Wide Band


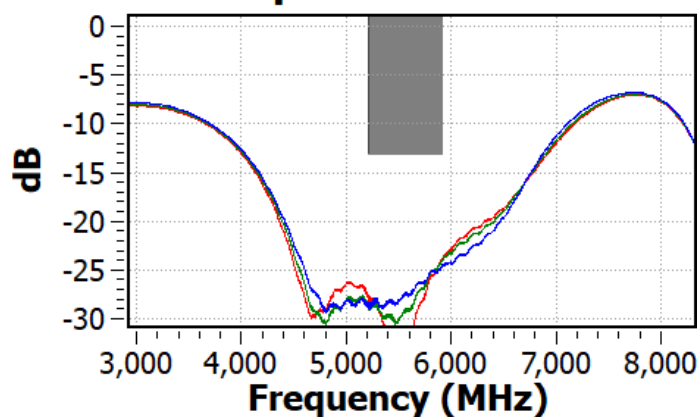
Performance Plots – Small Signal: Bandpass

Test conditions unless otherwise noted: $V_{DD} = 5V$; Blue = $-40^{\circ}C$; Green = $+25^{\circ}C$; Red = $+85^{\circ}C$ (Temperature Performance)

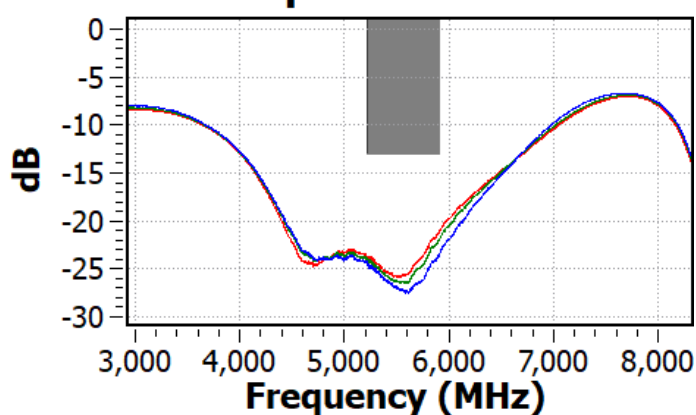
Passband



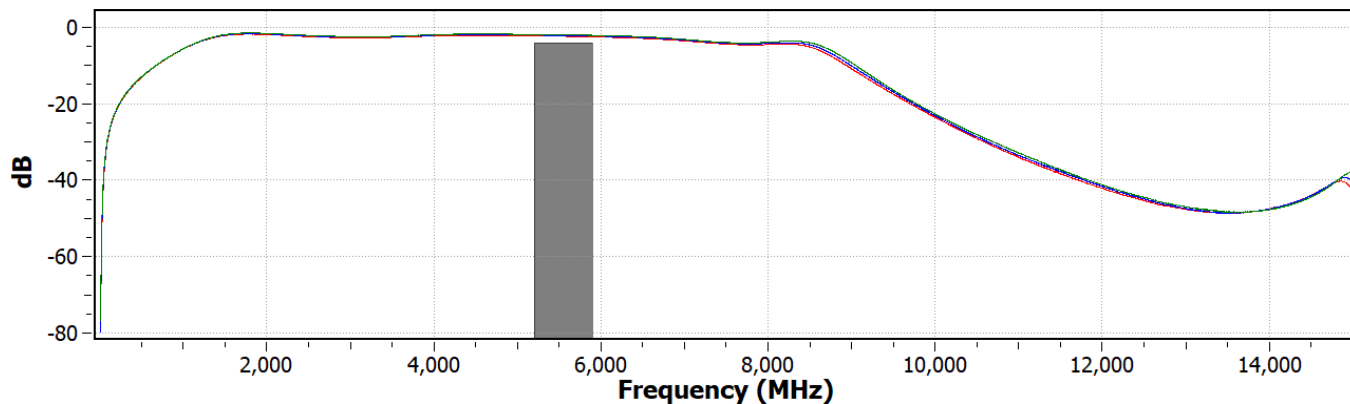
Input Return Loss



Output Return Loss

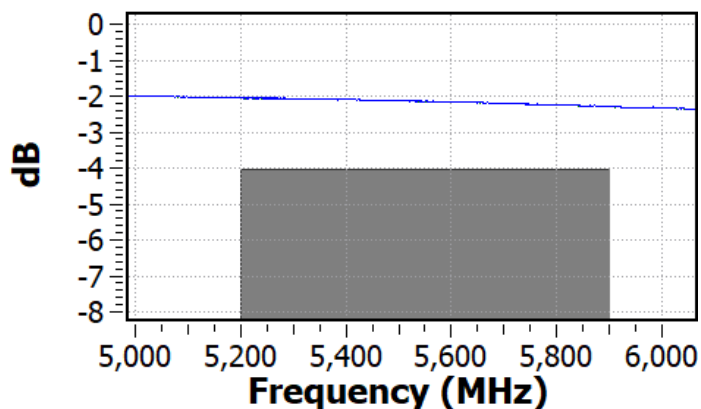
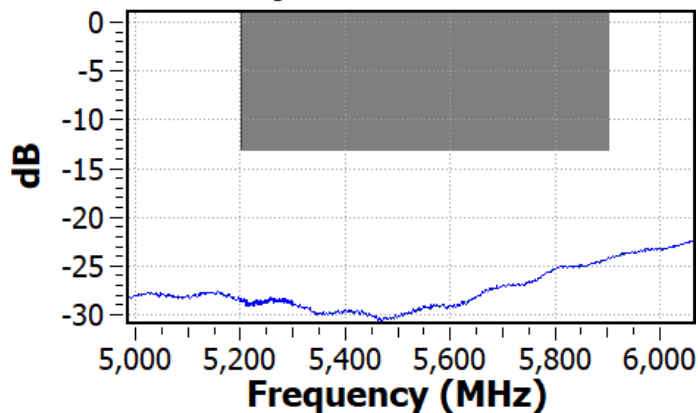
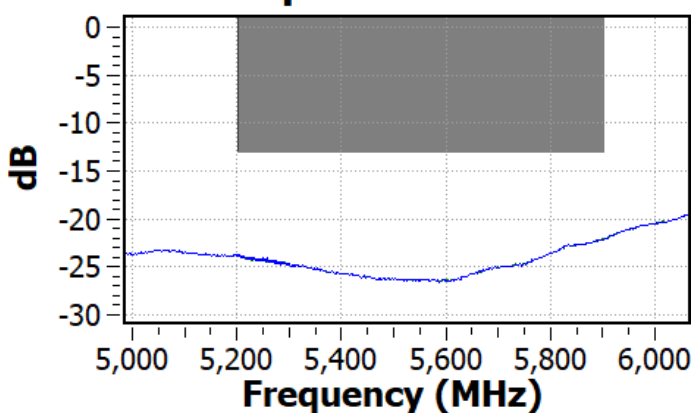
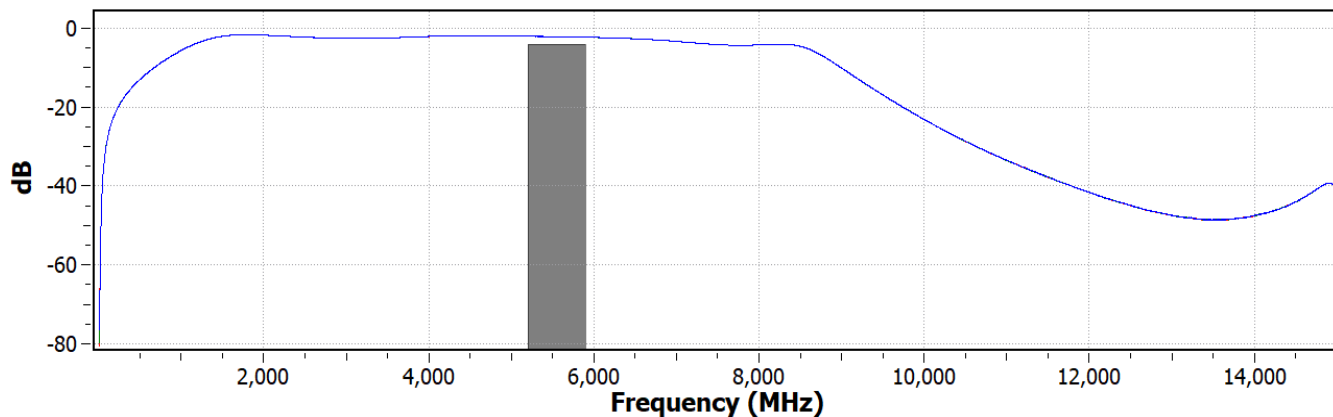


Wide Band

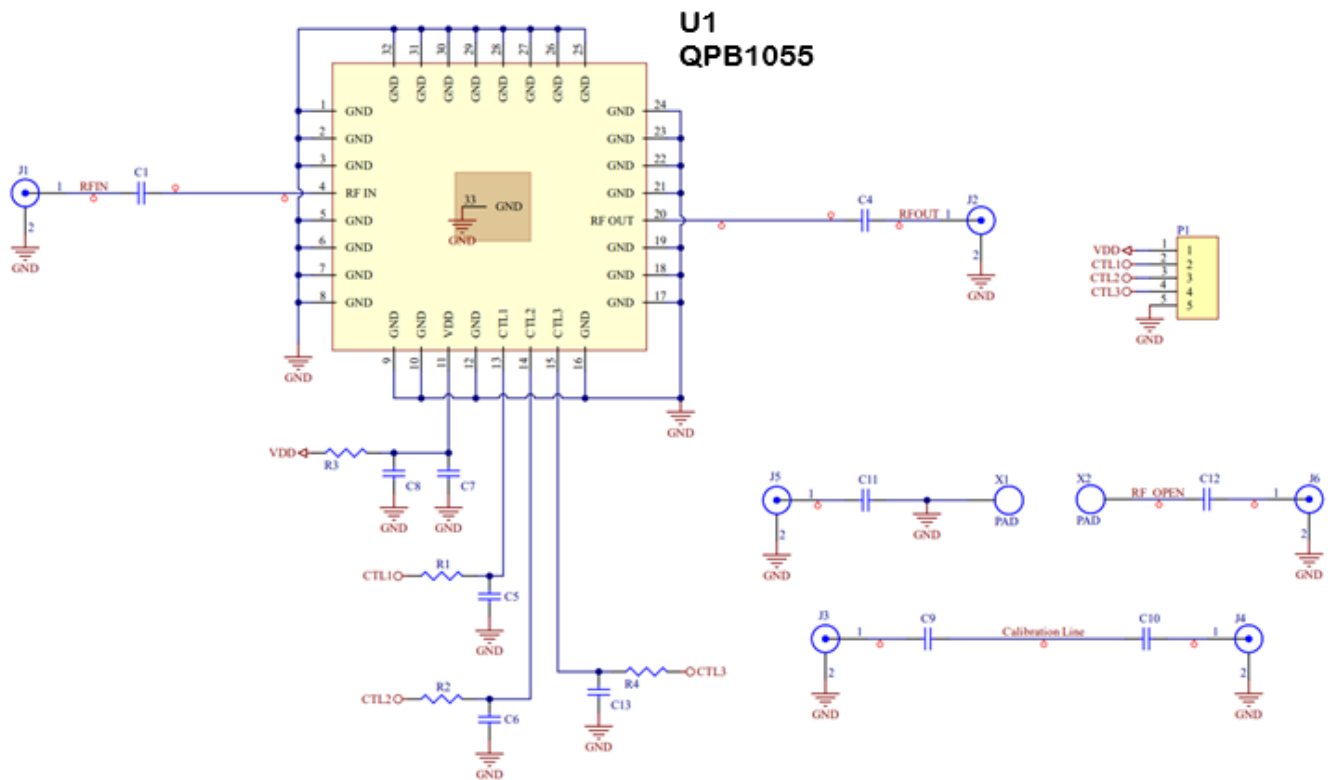


Performance Plots – Small Signal: Bandpass

Test conditions unless otherwise noted: V_{DD} = Blue = 3.3V; Green = 5V; Red = 5.25V (Voltage Performances)

Passband

Input Return Loss

Output Return Loss

Wide Band


Application Circuit



Notes:

- Blocking capacitors are required on any RF ports where a DC voltage may be present.

Bill of Materials

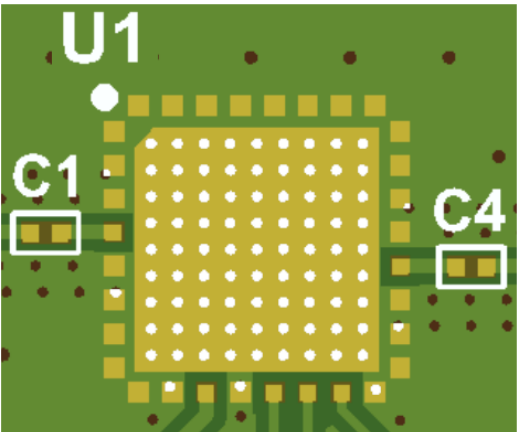
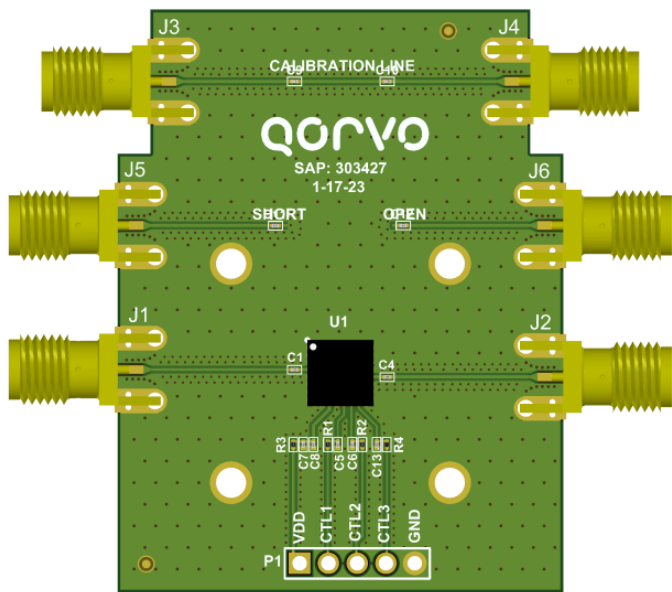
Reference Des.	Value	Description	Manuf.	Part Number
U1	-	QPB1055	Qorvo	
C1, C4-C7, C19-C13	100 pF	CAP, 5%, 25V, COG, 0201	Various	
C8	10000 pF	CAP, 10%, 25V, X5R, 0201	Various	
R1, R2, R3, R4	0 Ω	RES, Jumper, 5%, 1/20W, 0201	Various	
J1, J2 J3, J4, J5, J6	-	Connector, SMA EL FLT Viper MAT-21-1038	-	
P1	-	Connector, Header, ST, 4-PIN, 0.100"	Various	



QPB1055

C-Band Switched Filter Bank Module

Evaluation Board (EVB) Layout Assembly



Mounting Detail

Evaluation Board (EVB) PCB Information

LAYER STACK LEGEND

Material	Layer	Thickness	Dielectric Material	Type	Comment
Surface Material	Top Overlay			Legend	HIGH TEMPERATURE, NON-CONDUCTIVE, WHITE EPOXY BASED INK.
Top Solder	Top Solder	0.0008in	Solder Resist	Solder Mask	LPI (LIQUID PHOTO-IMAGEABLE) OR LDI (LASER DIRECT IMAGEABLE), GREEN.
Copper	Top Layer	0.0007in		Signal	FINISH THICKNESS=0.25oz COPPER CLADDING + SURFACE PLATING/VIA PLATING/FINISH
Prepreg		0.0066in	Rogers R4350B	Dielectric	
Copper	Layer 2	0.0007in		Signal	
Core		0.0450in	FR4	Dielectric	
Copper	Layer 3	0.0007in		Signal	
Prepreg		0.0066in	Rogers R4350B	Dielectric	
Copper	Bottom Layer	0.0007in		Signal	FINISH THICKNESS=0.25oz COPPER CLADDING + SURFACE PLATING/VIA PLATING/FINISH
Bottom Solder	Bottom Solder	0.0008in	Solder Resist	Solder Mask	LPI (LIQUID PHOTO-IMAGEABLE) OR LDI (LASER DIRECT IMAGEABLE), GREEN.
Bottom Overlay	Bottom Overlay			Legend	HIGH TEMPERATURE, NON-CONDUCTIVE, WHITE EPOXY BASED INK.

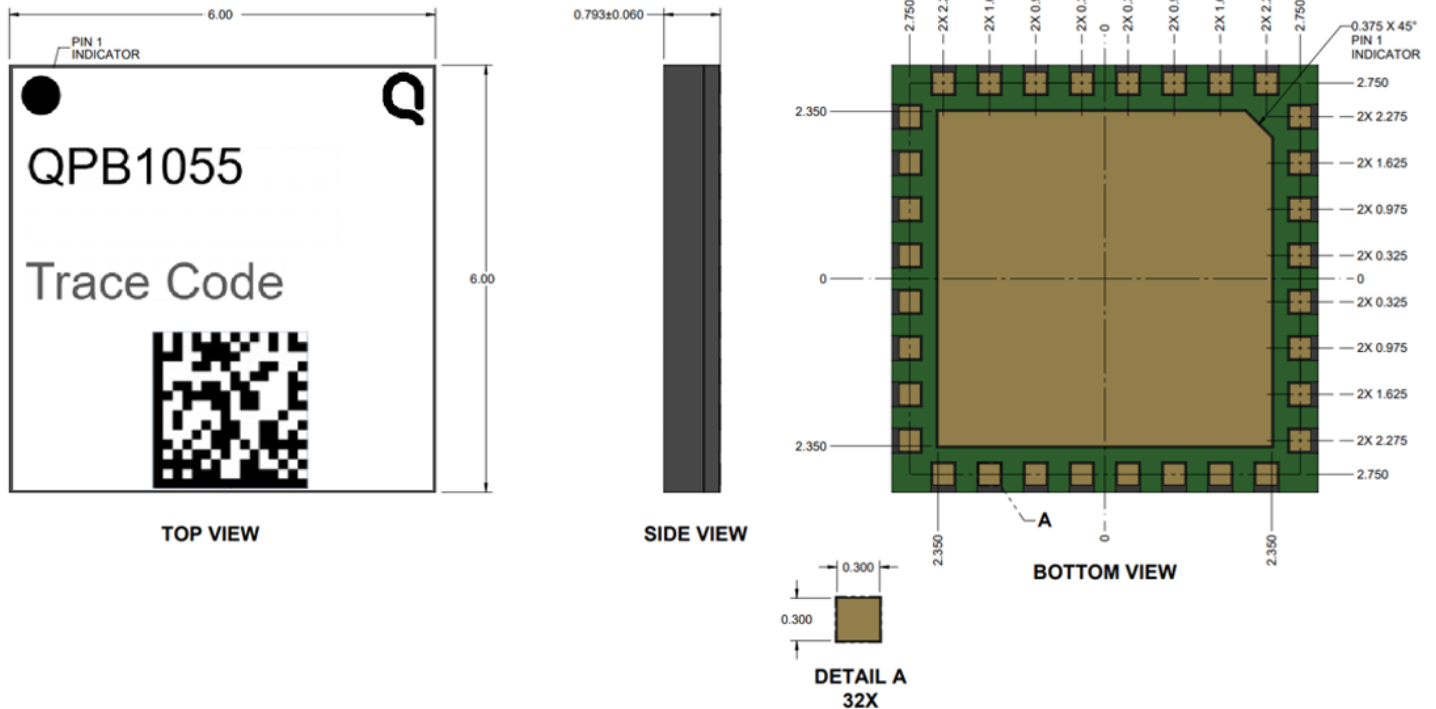
Finished board thickness: 0.0626in



QPB1055

C-Band Switched Filter Bank Module

Package Marking and Dimensions



Units: millimeters

Tolerances: unless specified

x.xx = ± 0.10; x.xxx = ± 0.050; Angles = 0.5°

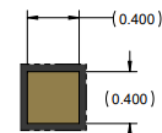
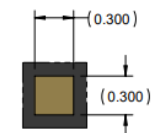
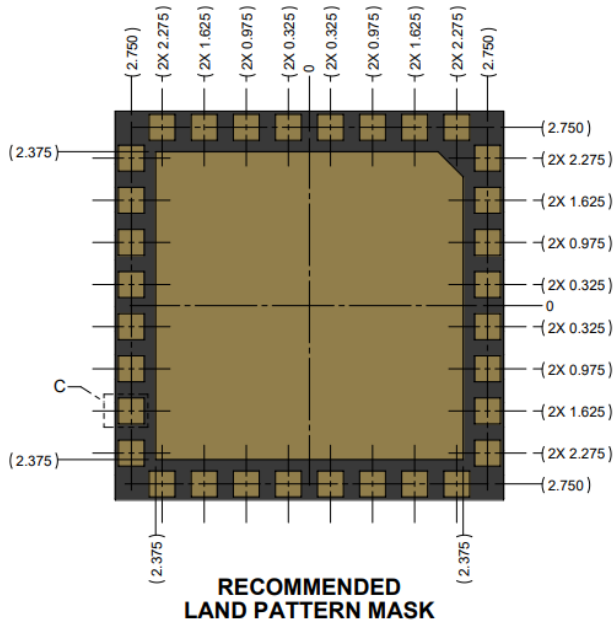
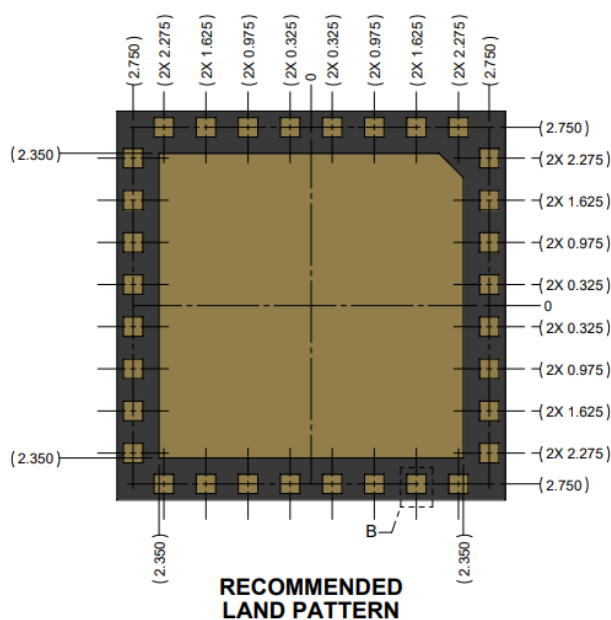
Materials:

PACKAGE EXPOSED METALLIZATION IS GOLD PLATED.
PART IS MOLD ENCAPSULATED.

Marking:

- PIN 1 INDICATOR
- QORVO LOGO – USE Q5D
- PART #: QPB1055
- TRACE CODE TO BE ASSIGNED BY SUBCON

Recommended PCB Mounting Land Pattern and Mask



Notes:

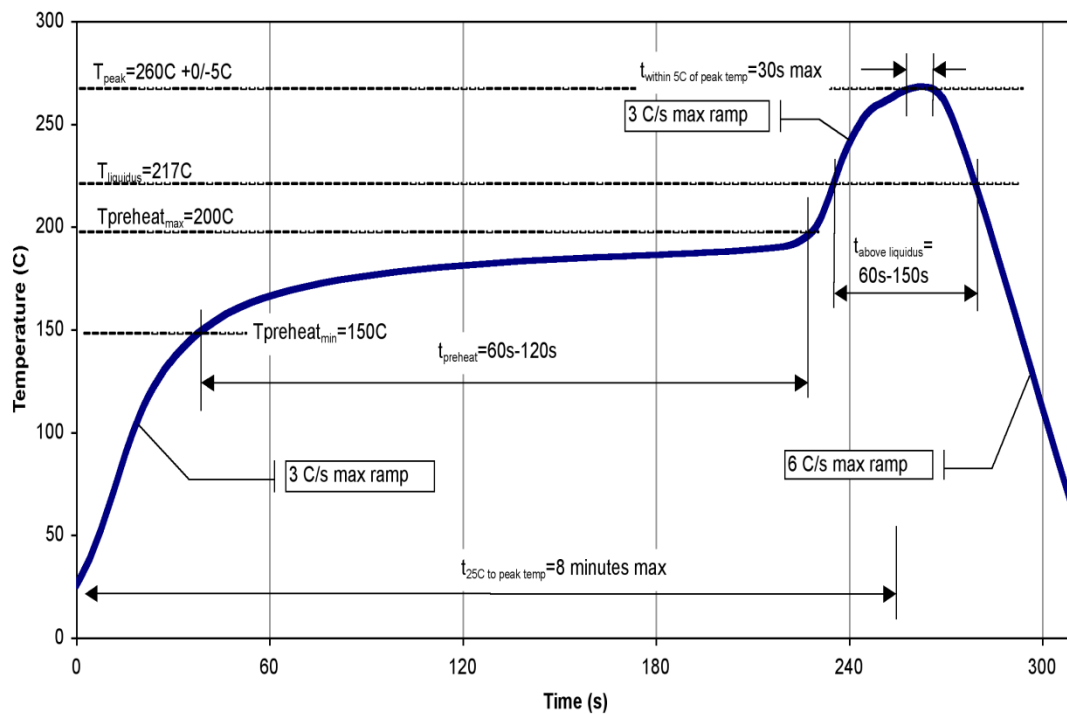
1. All dimensions are in millimeters. Angels are in degrees.
2. This drawing specifies the mounting pattern used on the Qorvo evaluation board for this product. Some modification may be necessary to suit end user assembly materials and processes.

Solderability

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

Contact plating: Thin NiENEPIG.

Recommended Soldering Profile



Handling Precautions

Parameter	Rating	Standard
ESD – Human Body Model (HBM)	Class 2	ESDA / JEDEC JS-001-2012
ESD – Charged Device Model (CDM)	Class C3	ESDA / JEDEC JS-002-2014
MSL – Convection Reflow 260 °C	Level 3	JEDEC standard IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive Device

Environmental 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



QPB1055

C-Band Switched Filter Bank Module

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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