

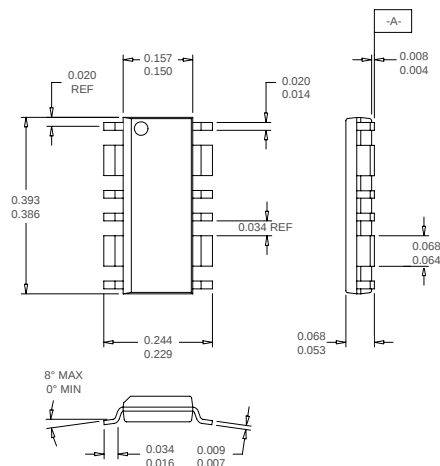
RoHS Compliant & Pb-Free Product

Typical Applications

- CATV Distribution Amplifiers
- Cable Modems
- Broadband Gain Blocks
- Laser Diode Driver
- Return Channel Amplifier
- Base Stations

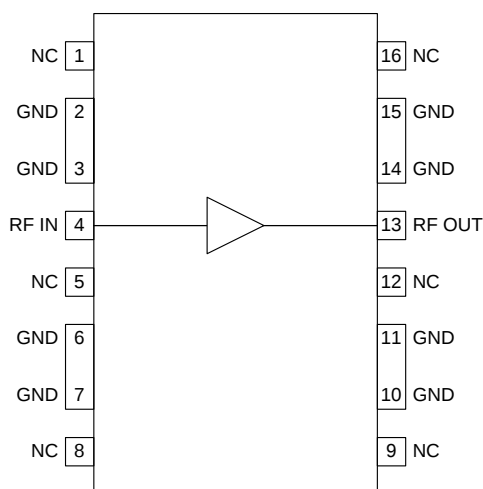
Product Description

The RF2317 is a general purpose, low-cost high-linearity RF amplifier IC. The device is manufactured on an advanced Gallium Arsenide Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as an easily cascaded 75Ω gain block. The gain flatness of better than $\pm 0.5\text{dB}$ from 50MHz to 1000MHz, and the high linearity, make this part ideal for cable TV applications. Other applications include IF and RF amplification in wireless voice and data communication products operating in frequency bands up to 3GHz. The device is self-contained with 75Ω input and output impedances and requires only two external DC biasing elements to operate as specified.



Optimum Technology Matching® Applied

- | | | |
|-------------------------------------|--|---------------------------------------|
| ☐ Si BJT | ☒ GaAs HBT | ☐ GaAs MESFET |
| ☐ Si Bi-CMOS | ☐ SiGe HBT | ☐ Si CMOS |
| ☐ InGaP/HBT | ☐ GaN HEMT | ☐ SiGe Bi-CMOS |



Functional Block Diagram

Package Style: CJ2BAT0

Features

- DC to 3.0GHz Operation
- Internally Matched Input and Output
- 15dB Small Signal Gain
- 4.9dB Noise Figure
- +47dBm Output IP_3
- Single 9V to 12V Power Supply

Ordering Information

- | | |
|-------------|--|
| RF2317 | Linear CATV Amplifier |
| RF2317 PCBA | Fully Assembled Evaluation Board - 50Ω |
| RF2317 PCBA | Fully Assembled Evaluation Board - 75Ω |

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<http://www.rfmd.com>

RF2317

Absolute Maximum Ratings

Parameter	Rating	Unit
Device Current	250	mA
Input RF Power	+18	dBm
Output Load VSWR	20:1	
Ambient Operating Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



Caution! ESD sensitive device.

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (50Ω)					T=+25°C, I _{CC} =180mA, R _C =10.2Ω, 50Ω System
Frequency Range	DC		3000	MHz	3dB Bandwidth
Gain	13.5	14.3	15.0	dB	
Noise Figure		4.9		dB	From 100MHz to 1000MHz
Input VSWR		1.7:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output VSWR		2.3:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output IP ₃		+47		dBm	At 100MHz
	+37	+42		dBm	At 500MHz
		+37		dBm	At 900MHz
Output IP ₂		+55		dBm	F ₁ =400MHz, F ₂ =500MHz, F _{OUT} =100MHz
Output P _{1dB}		+25.5		dBm	At 100MHz
		+24		dBm	At 500MHz
		+22		dBm	At 900MHz
Reverse Isolation		19.5		dB	
Thermal					
Theta _{JC}		55		°C/W	I _{CC} =150mA, P _{DISS} =1.2W, T _{AMB} =85°C
Maximum Junction Temperature		150		°C	
Mean Time To Failures		3100		years	T _{AMB} =+85°C
Theta _{JC}		58		°C/W	I _{CC} =180mA, P _{DISS} =1.5W, T _{AMB} =85°C
Maximum Junction Temperature		175		°C	
Mean Time To Failures		380		years	T _{AMB} =+85°C
Power Supply (50Ω)					
Device Voltage		8.5		V	On pin 13, I _{CC} =150mA
		9.3		V	On pin 13, I _{CC} =180mA
Operating Current Range	100	180	200	mA	Actual current determined by V _{CC} and R _C

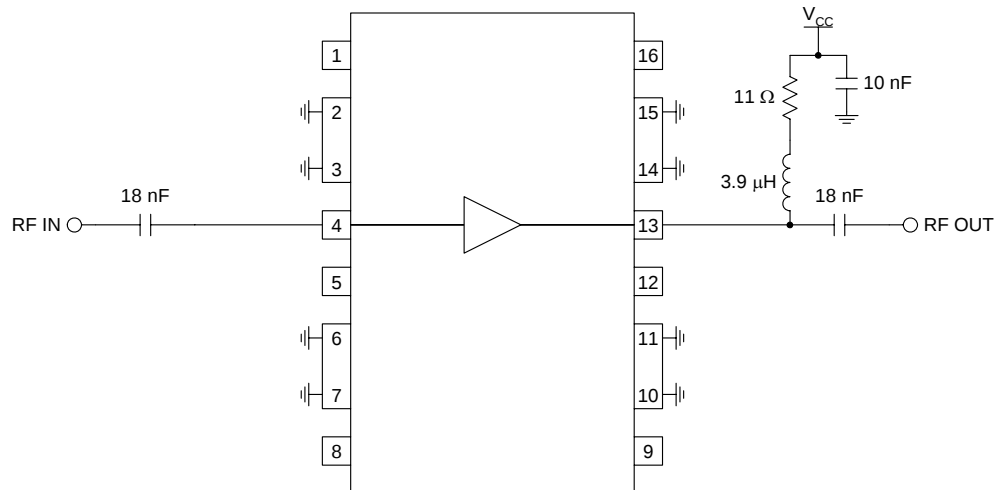
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Overall (75Ω)					T=25°C, I _{CC} =180mA, R _C =14.3Ω, 75Ω System
Frequency Range	DC		3000	MHz	3dB Bandwidth
Gain		15.0		dB	
Noise Figure		4.8		dB	From 100MHz to 1000MHz
Input VSWR		1.3:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output VSWR		1.8:1			Appropriate values for the DC blocking capacitors and bias inductor are required to maintain this VSWR at the intended operating frequency range.
Output IP ₃	+37	+49		dBm	At 100MHz
		+43		dBm	At 500MHz
		+38		dBm	At 900MHz
Output IP ₂		+58		dBm	F ₁ =400MHz, F ₂ =500MHz, F _{OUT} =100MHz
Output P _{1dB}		+22		dBm	At 100MHz
		+22		dBm	At 500MHz
		+21		dBm	At 900MHz
Reverse Isolation		19		dB	
133 Channels					10dBmV per channel, flat, at the input of the amplifier; I _{CC} =150mA, V _{CC} =10.4V
XMOD		<-75		dBc	At 55.25MHz
		<-75		dBc	At 331.25MHz
		<-75		dBc	At 547.25MHz
		<-75		dBc	At 853.25MHz
CTB		-85		dBc	At 55.25MHz
		-85		dBc	At 331.25MHz
		-84		dBc	At 547.25MHz
		-83		dBc	At 853.25MHz
CSO+1.25MHz		-90		dBc	At 55.25MHz
		-72		dBc	At 331.25MHz
		-69		dBc	At 853.25MHz
		-64		dBc	At 547.25MHz
CSO-1.25MHz		-63		dBc	At 55.25MHz
		-65		dBc	At 331.25MHz
		-70		dBc	At 547.25MHz
		-90		dBc	At 853.25MHz

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Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
133 Channels					10 dBmV per channel, flat, at the input of the amplifier; $I_{CC}=180\text{mA}$, $V_{CC}=11.4\text{V}$
XMOD		<-75		dBc	At 55.25MHz
		<-75		dBc	At 331.25MHz
		<-75		dBc	At 547.25MHz
		<-75		dBc	At 853.25MHz
CTB		-89		dBc	At 55.25MHz
		-86		dBc	At 331.25MHz
		-86		dBc	At 547.25MHz
		-84		dBc	At 853.25MHz
CSO+1.25MHz		-89		dBc	At 55.25MHz
		-74		dBc	At 331.25MHz
		-69		dBc	At 853.25MHz
		-62		dBc	At 547.25MHz
CSO-1.25MHz		-63		dBc	At 55.25MHz
		-65		dBc	At 331.25MHz
		-71		dBc	At 547.25MHz
		-91		dBc	At 853.25MHz
Power Supply (75Ω)					
Device Voltage		8.3		V	On pin 13, $I_{CC}=150\text{mA}$
		8.9		V	On pin 13, $I_{CC}=180\text{mA}$
Operating Current Range	100	180	200	mA	Actual current determined by V_{CC} and R_C

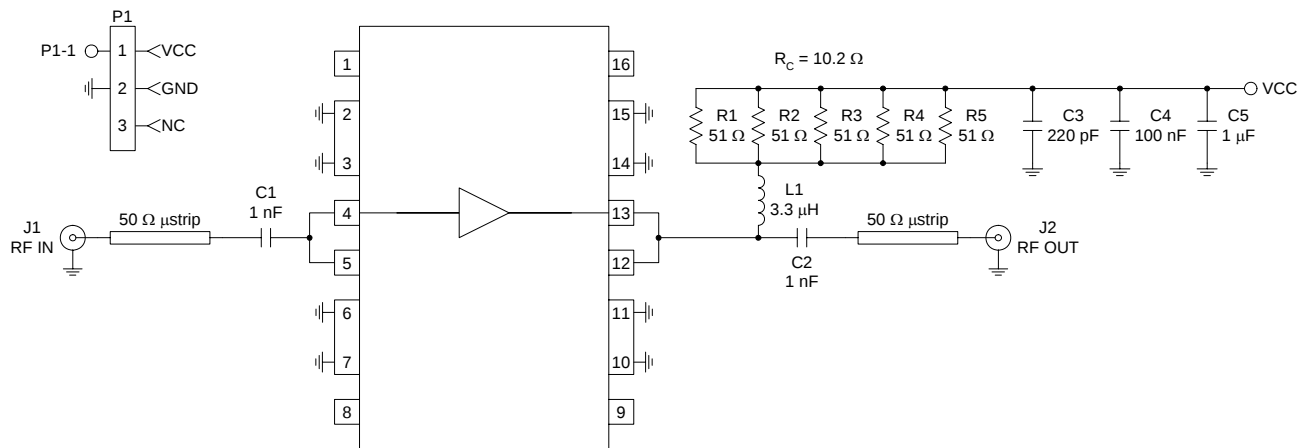
Pin	Function	Description	Interface Schematic
1	NC	This pin is internally not connected.	
2	GND	Ground connection. Keep traces physically short and connect immediately to ground plane for best performance. Each ground pin should have a via to the ground plane.	
3	GND	Same as pin 2.	
4	RF IN	RF input pin. This pin is NOT internally DC blocked. A DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. DC coupling of the input is not allowed, because this will override the internal feedback loop and cause temperature instability.	
5	NC	This pin is internally not connected.	
6	GND	Same as pin 2.	
7	GND	Same as pin 2.	
8	NC	This pin is internally not connected.	
9	NC	This pin is internally not connected.	
10	GND	Same as pin 2.	
11	GND	Same as pin 2.	
12	NC	This pin is internally not connected.	
13	RF OUT	RF output and bias pin. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. For biasing, an RF choke in series with a resistor is needed. The DC voltage on this pin is typically 8.3V with a current of 150mA (for 75 Ω board). See device voltage versus device current plot. In lower power applications the value of R_C can be increased to lower the current and V_D on this pin.	
14	GND	Same as pin 2.	
15	GND	Same as pin 2.	
16	NC	This pin is internally not connected.	

Application Schematic 5 MHz to 50 MHz Reverse Path



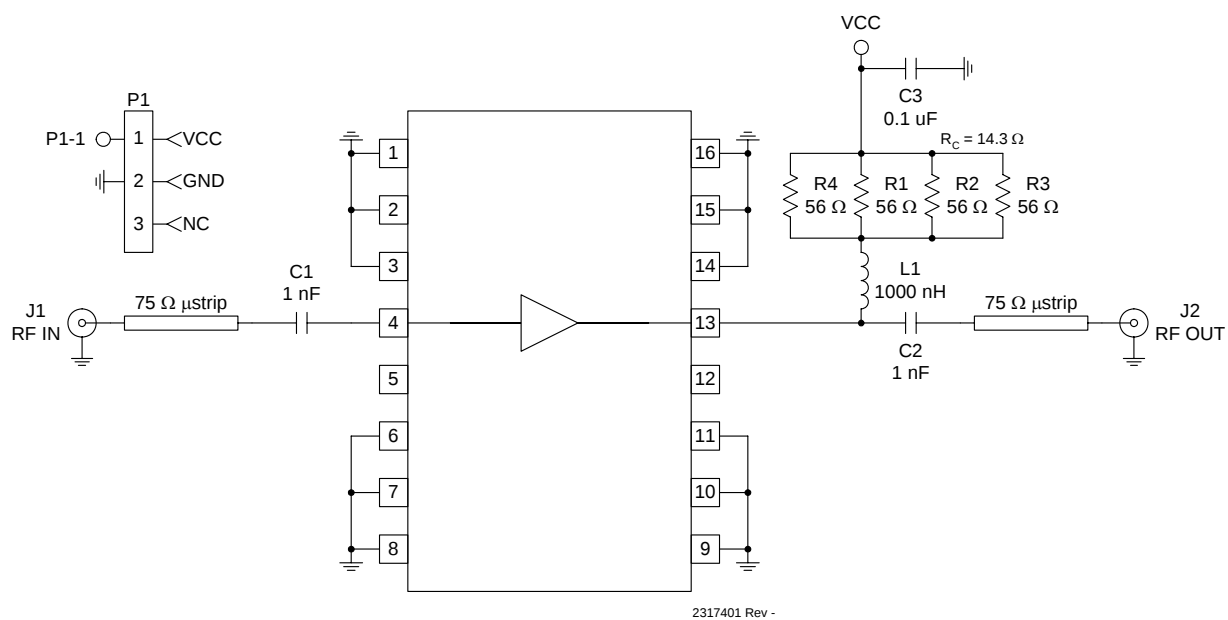
NOTES:
Gain Flatness <0.5 dB
Input and Output Return Loss >20 dB in 75 Ω system

Evaluation Board Schematic - 50Ω (Download [Bill of Materials](http://www.rfmd.com) from www.rfmd.com.)



2317400 Rev -

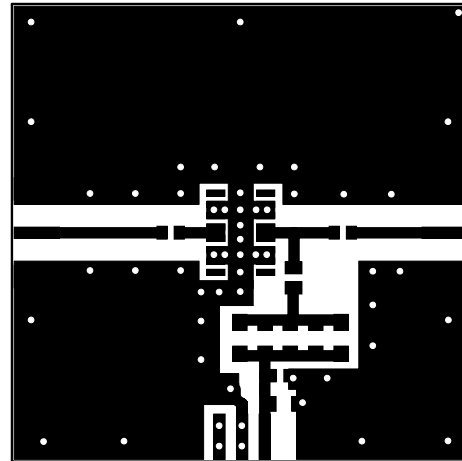
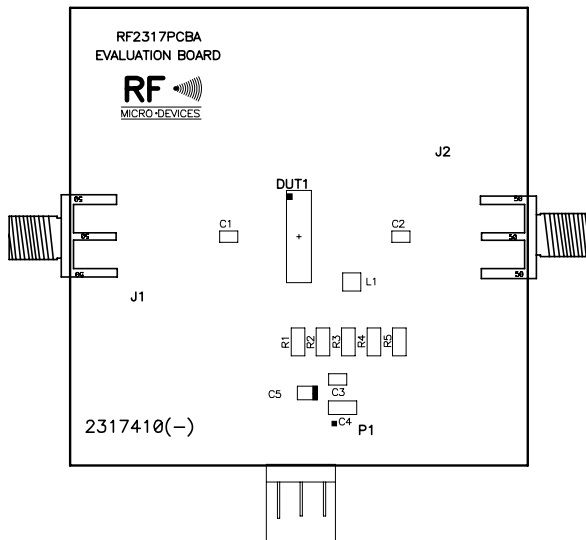
Evaluation Board Schematic - 75Ω



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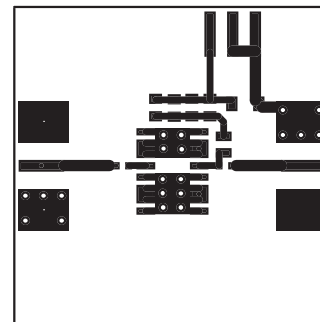
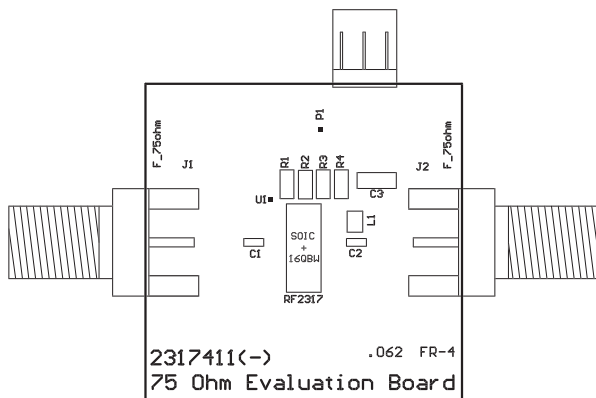
Evaluation Board Layout - 50Ω 2.0" x 2.0"

Board Thickness 0.031", Board Material FR-4

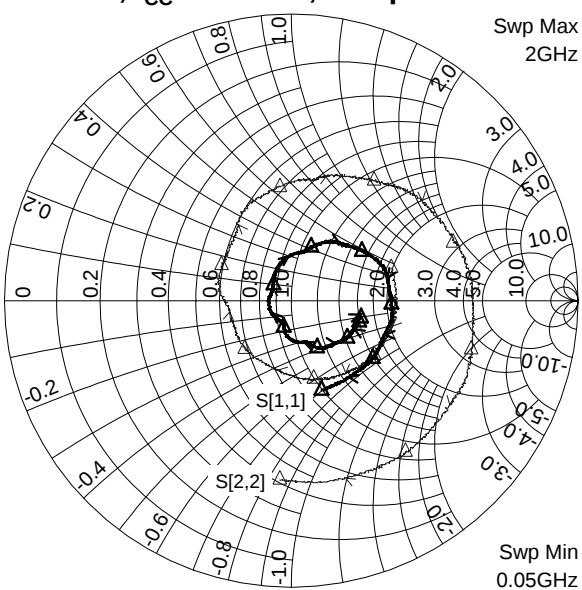


Evaluation Board Layout - 75Ω 1.40" x 1.40"

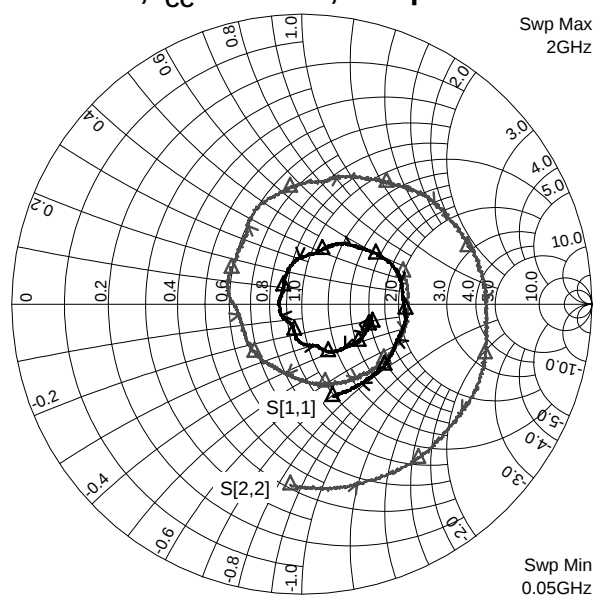
Board Thickness 0.062", Board Material FR-4



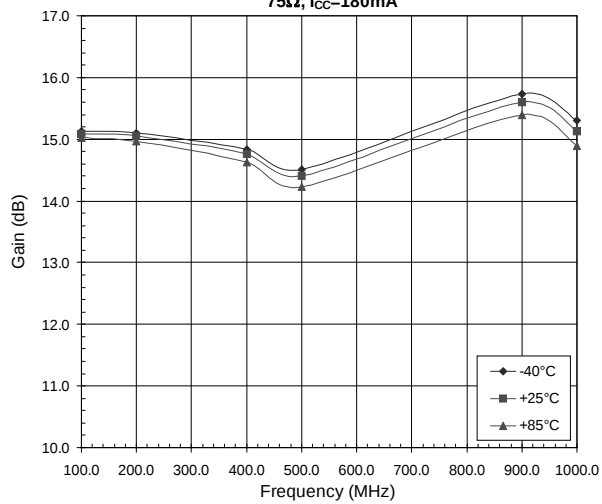
75Ω, $I_{CC} = 150\text{mA}$, Temp = +25°C



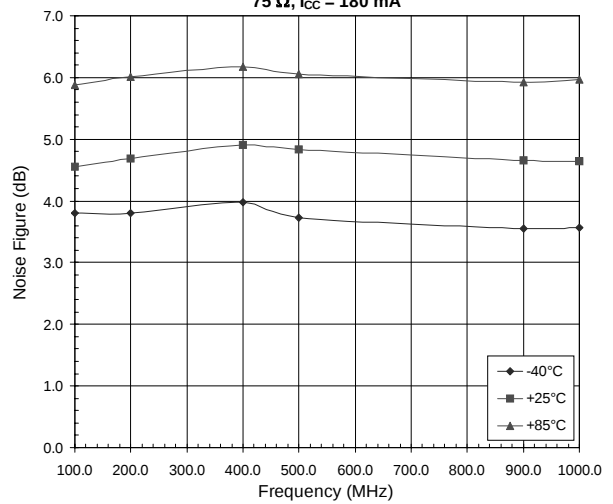
75Ω, $I_{CC} = 180\text{mA}$, Temp = +25°C



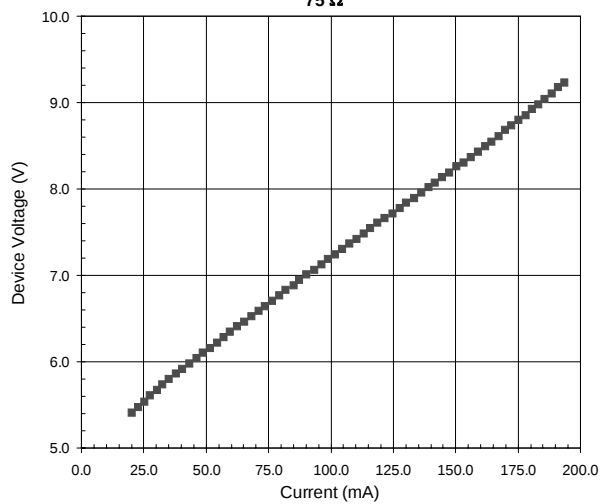
Gain versus Frequency
75 Ω , $I_{CC}=180\text{mA}$



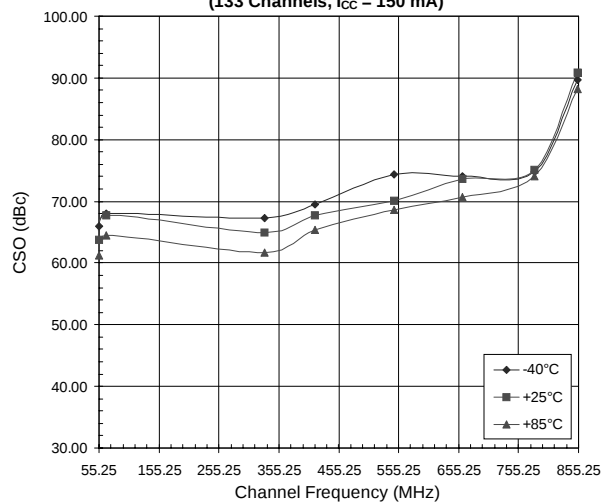
Noise Figure versus Frequency Over Temperature
75 Ω , $I_{CC} = 180\text{ mA}$



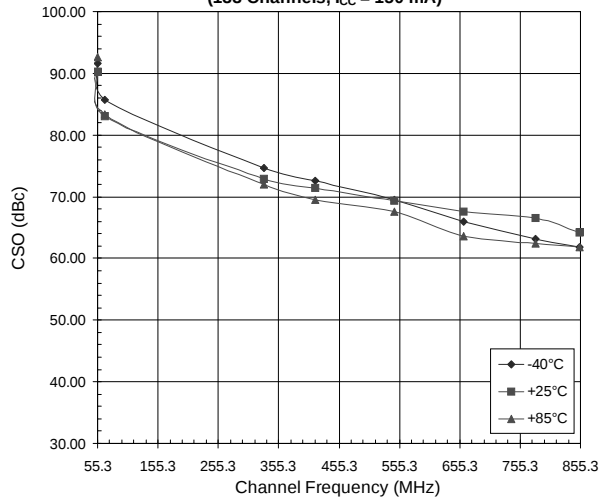
Device Voltage versus Current
75 Ω



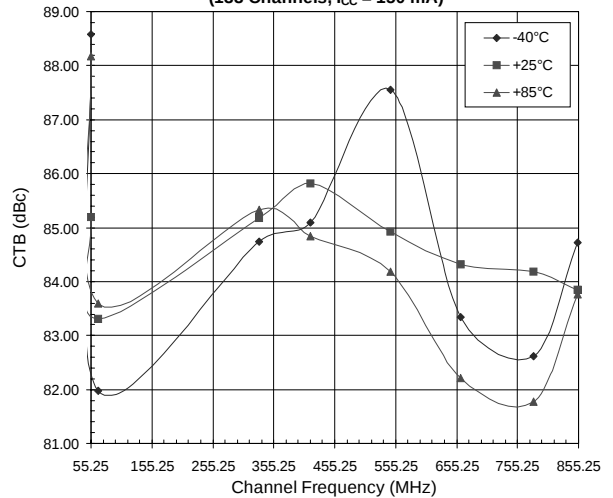
CSO (L) versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 150\text{ mA}$)



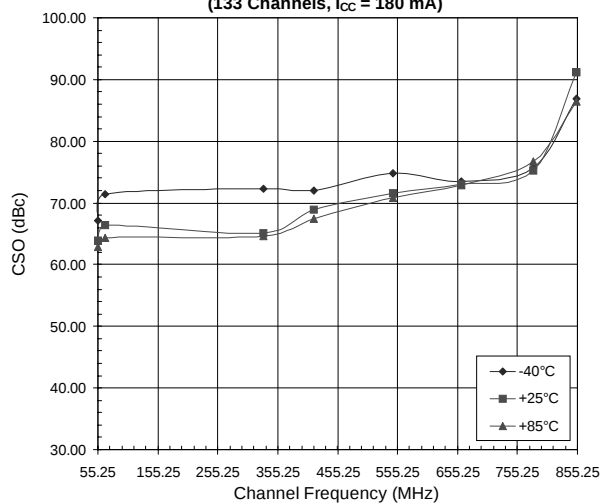
CSO (U) versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 150\text{ mA}$)



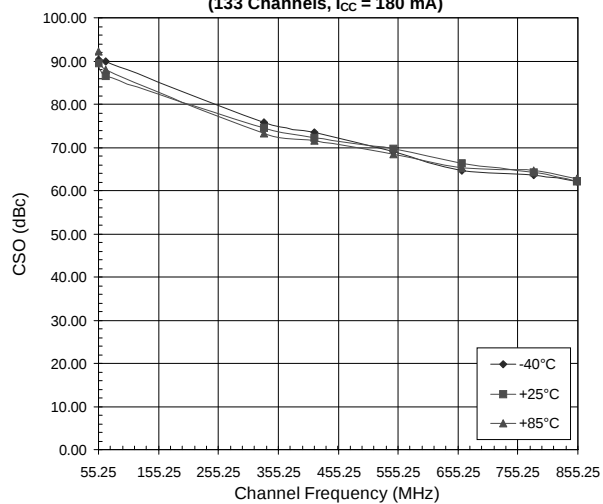
CTB versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 150\text{ mA}$)



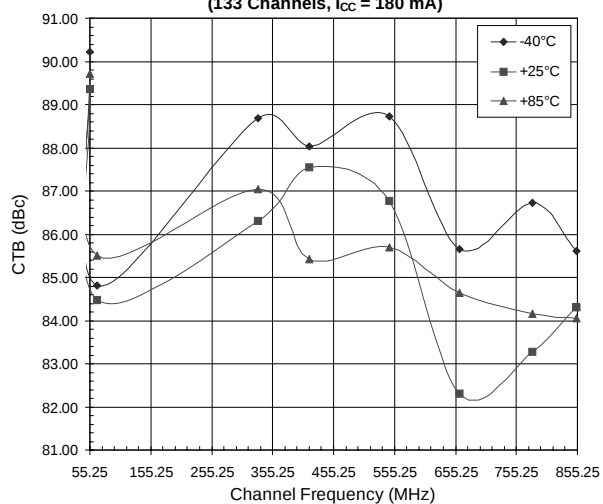
CSO (L) versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 180$ mA)



CSO (U) versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 180$ mA)



CTB versus Channel Frequency Across Temperature
(133 Channels, $I_{CC} = 180$ mA)



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