

F1102 – Extended Frequency Testing

- September 22, 2015
- AT0249

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Agenda

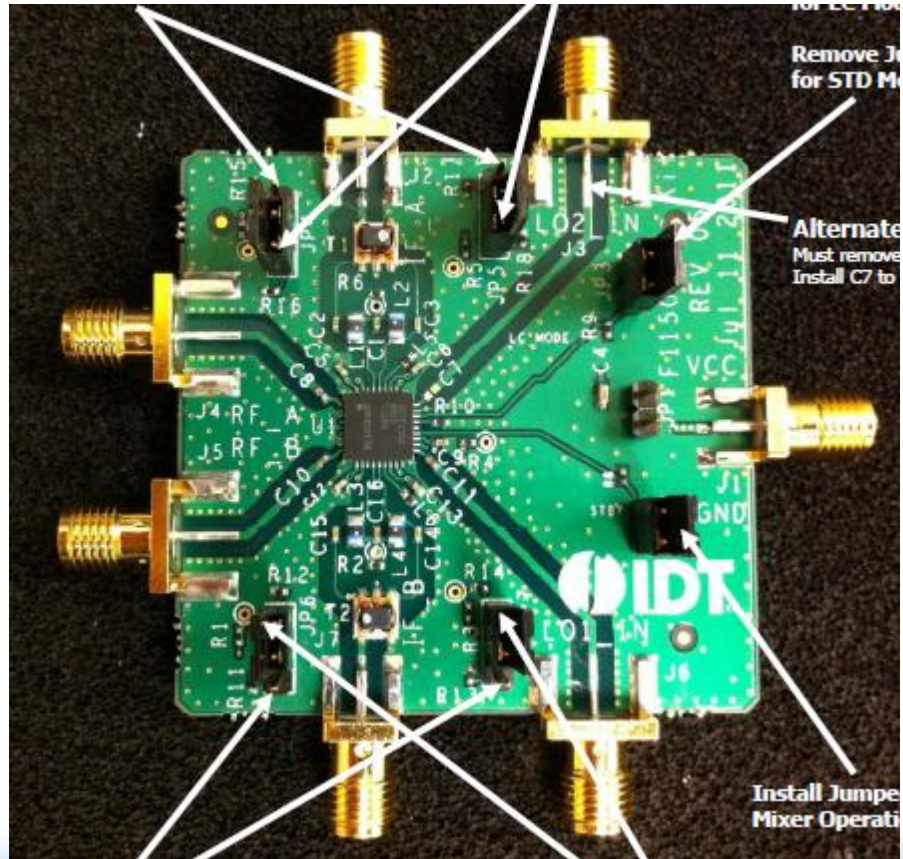
- Customer had seen a previous test results of the F1102 mixer in which the frequency range was extended.
- They would like to know if it would work in the following bands:

Band	Input [RF] (MHz)		LO (MHz)	Output [IF] (MHz)		
1	150	680	806	956	1486	$f_{IF} = f_{LO} + f_{RF}$
2	863	866	806	1669	1672	$f_{IF} = f_{LO} + f_{RF}$
3	276	282	806	530	524	$f_{IF} = f_{LO} - f_{RF}$
4	136	318	1105	969	787	$f_{IF} = f_{LO} - f_{RF}$
5	55	566	1105	1160	1671	$f_{IF} = f_{LO} + f_{RF}$
6	575	581	1105	530	524	$f_{IF} = f_{LO} - f_{RF}$



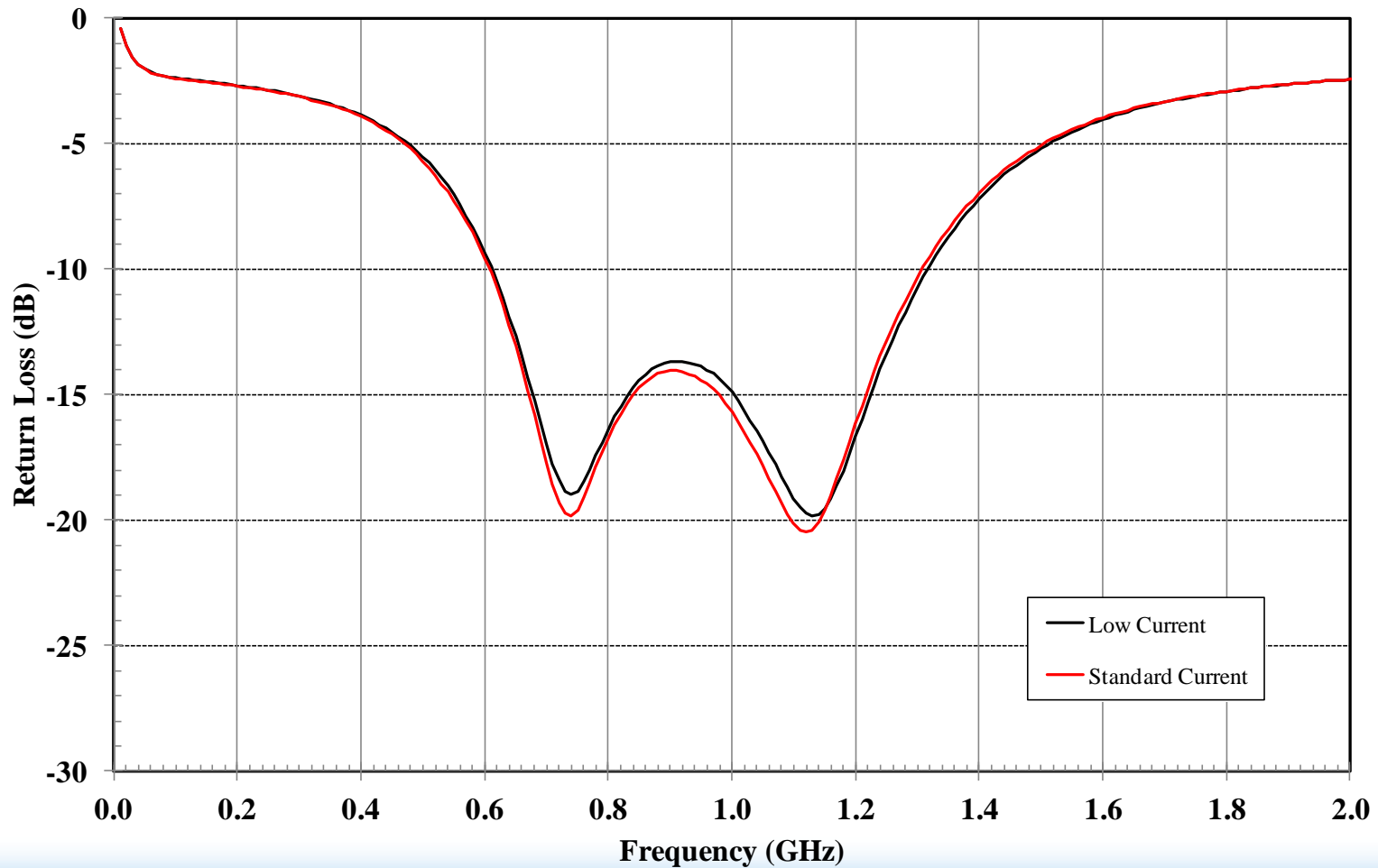
Circuit Modifications

- The previous report, [AT0225-F1102 Extended Frequency Range R01.pdf](#), modified the three ports for operation.
- Key Components
 - RF Path
 - ✓ $C8=C10 = 18 \text{ pF}$
 - ✓ Added Shunt 3.0 pF
 - ✓ Tuned for 400 MHz
 - LO Path
 - ✓ $C11 = 6.8 \text{ pF}$
 - IF Path
 - ✓ $T1=T2 = \text{TC4-6TG2+}$
($1.5\text{-}600 \text{ MHz}$)



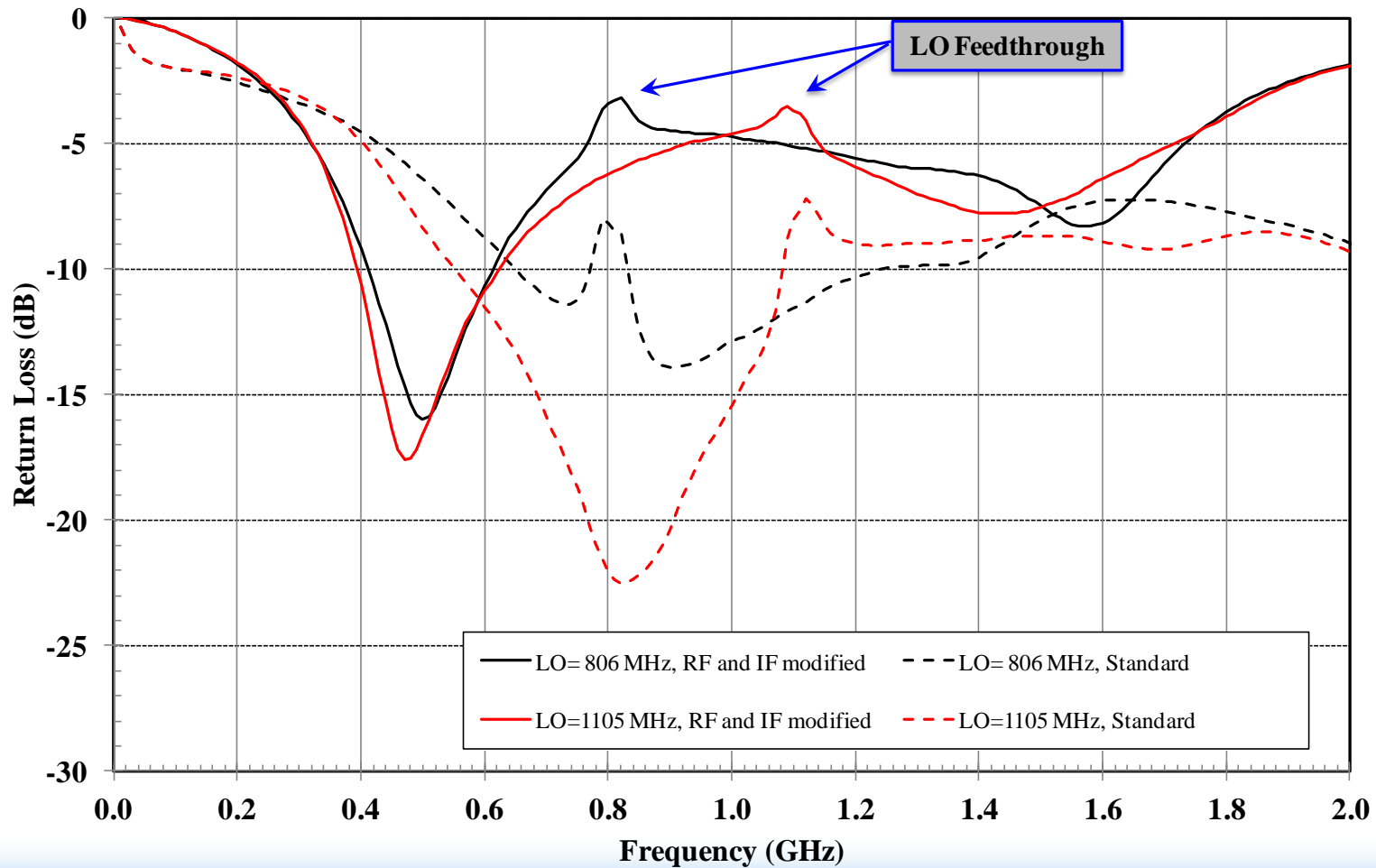
LO Return

F1102 - LO Port Return Loss
+5 V, + 25 C, LO Power = 0 dBm
Data is measured to the evaluation board connector



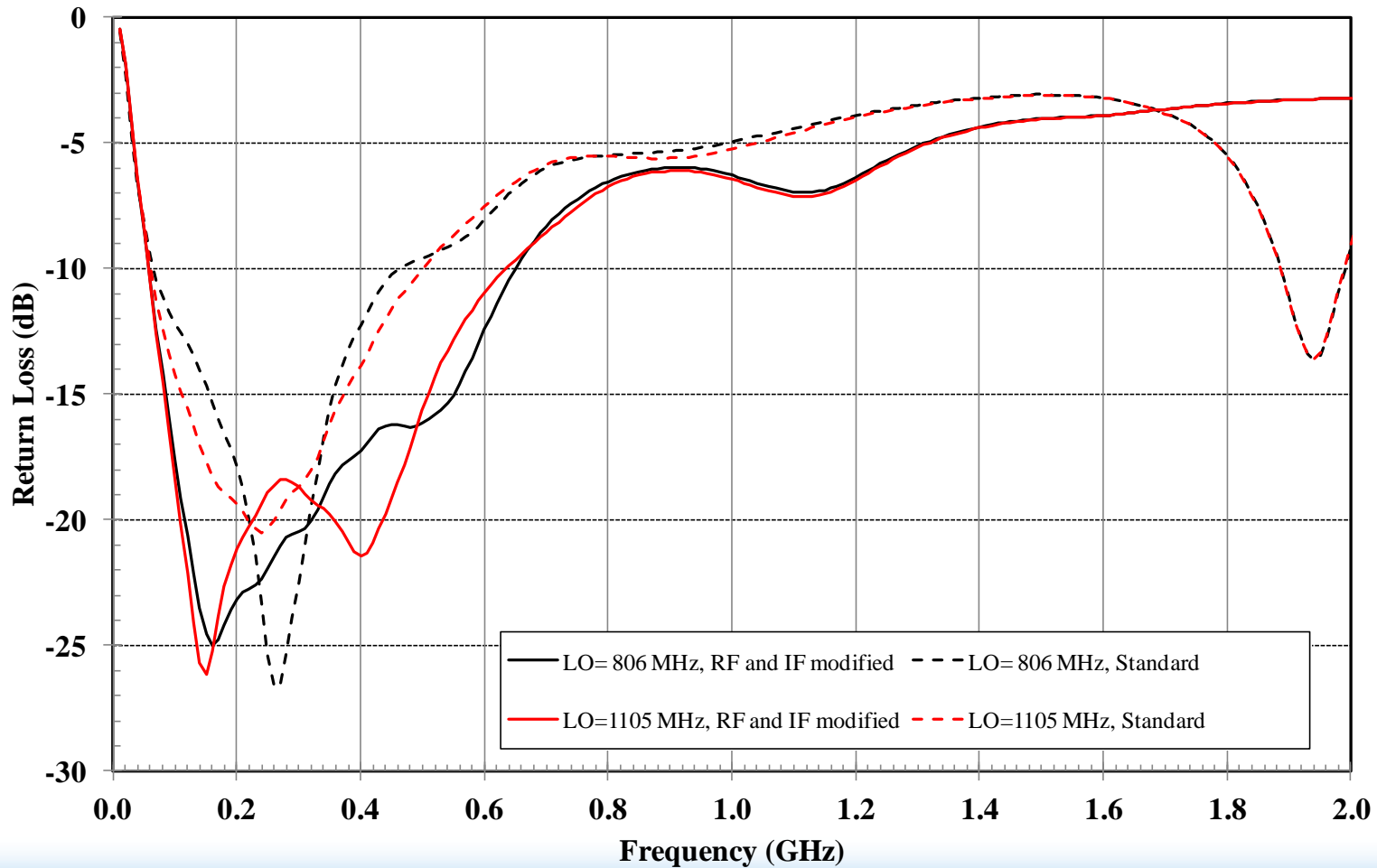
RF Port Return Loss Comparison

F1102 - RF Port Return Loss
Standard Current Mode, +5 V, +25 C, LO Power = 0 dBm
Data is measured to the evaluation board connector



IF Port Return Loss Comparison

F1102 - IF Port Return Loss
Standard Current Mode, +5 V, + 25 C, LO Power = 0 dBm
Data is measured to the evaluation board connector

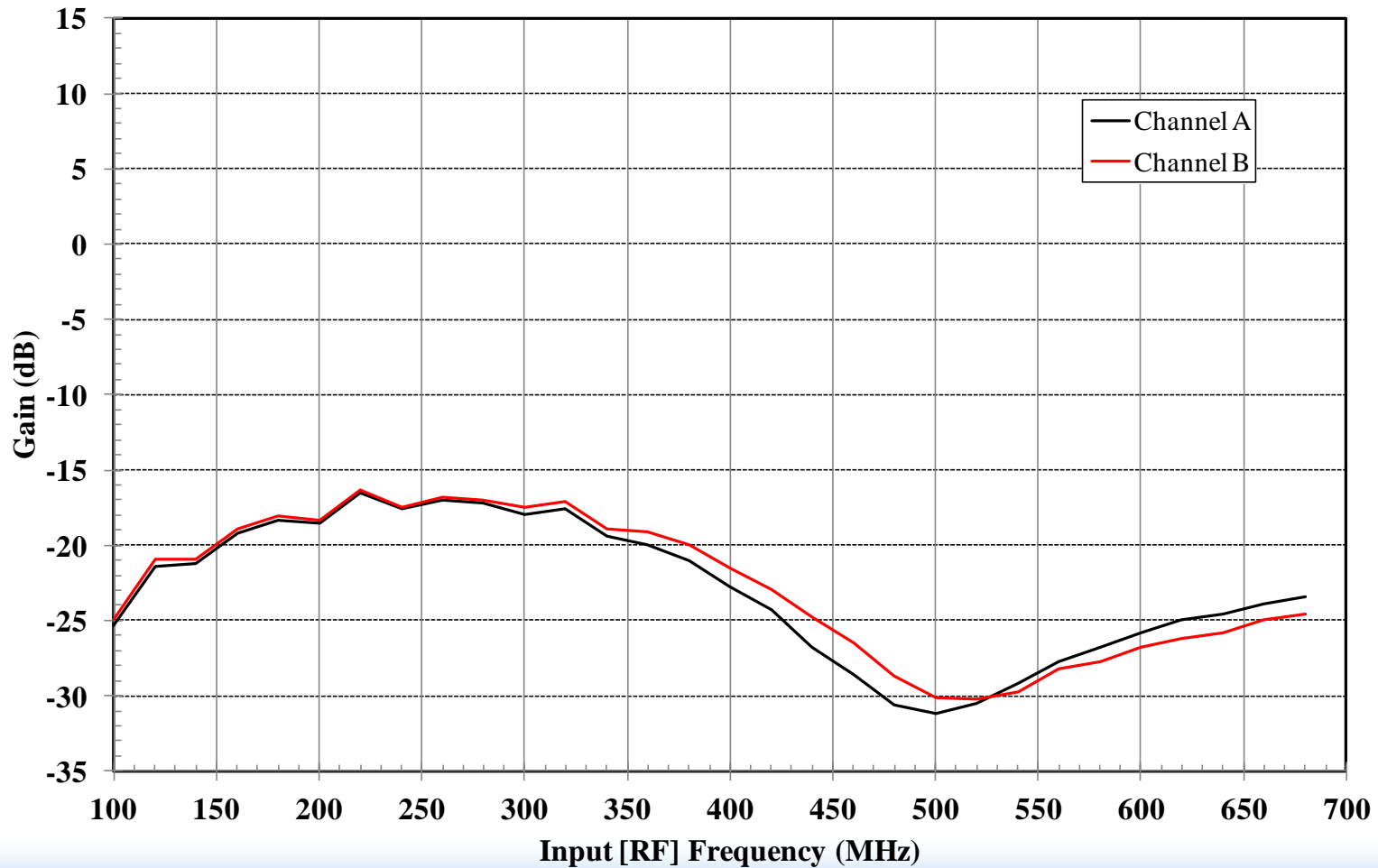


Comments

- The LO port modification was not added since the return loss using the standard 150 pF capacitor had a good return loss over the band of 600 to 1300 MHz.
- The modification for the RF Port shows a steep increase below 400 MHz. This may show poor performance for these frequencies.
- The addition of the high frequency IF transformer does add bandwidth but does show poor performance above 800 MHz.
- The original design of the F1102 has the
 - RF: 400 to 1000 MHz
 - IF: 50 to 300 MHz

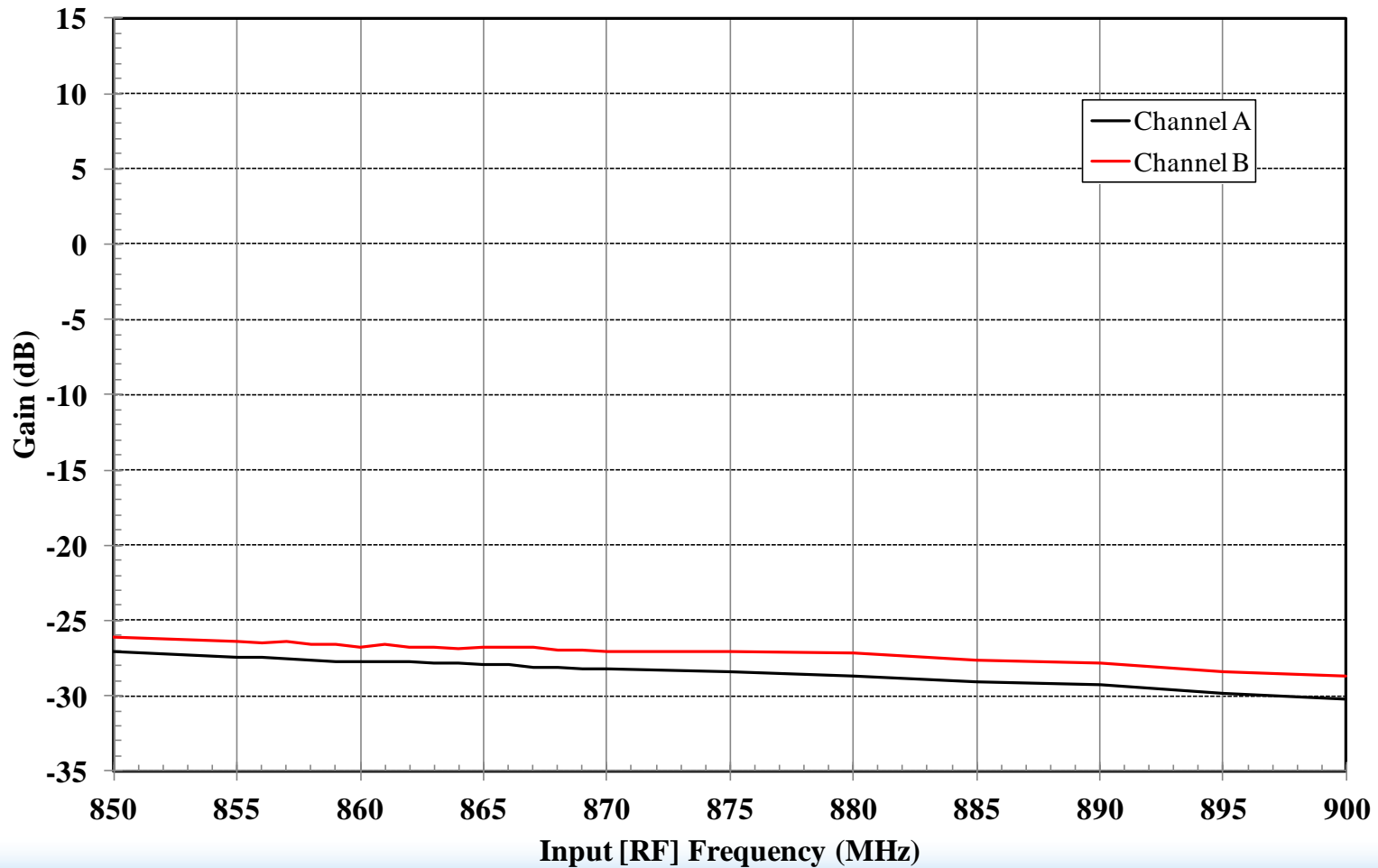
Gain – Band 1

F1102 - Gain
LO = 806 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



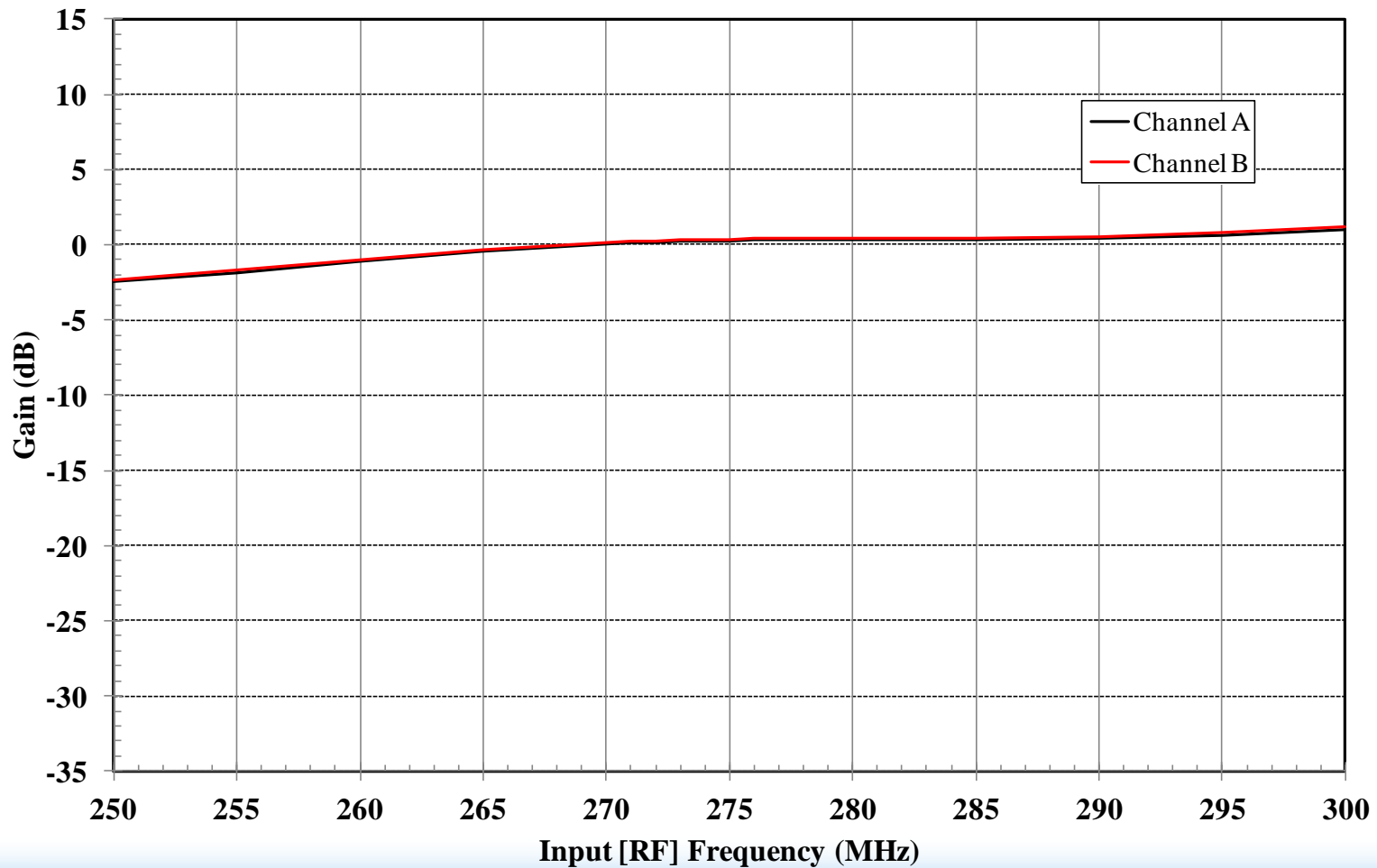
Gain – Band 2

F1102 - Gain
LO = 806 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



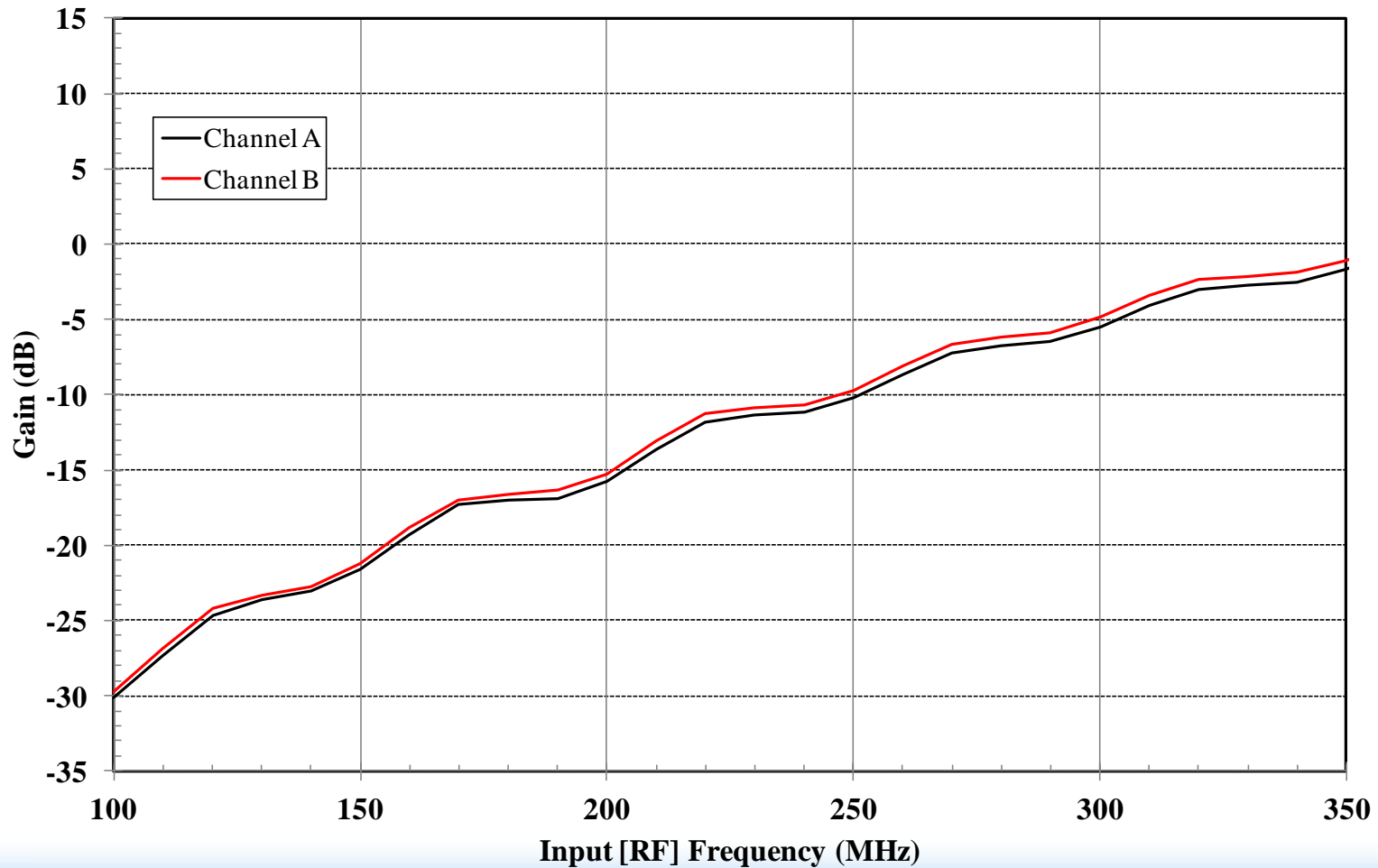
Gain – Band 3

F1102 - Gain
LO = 806 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



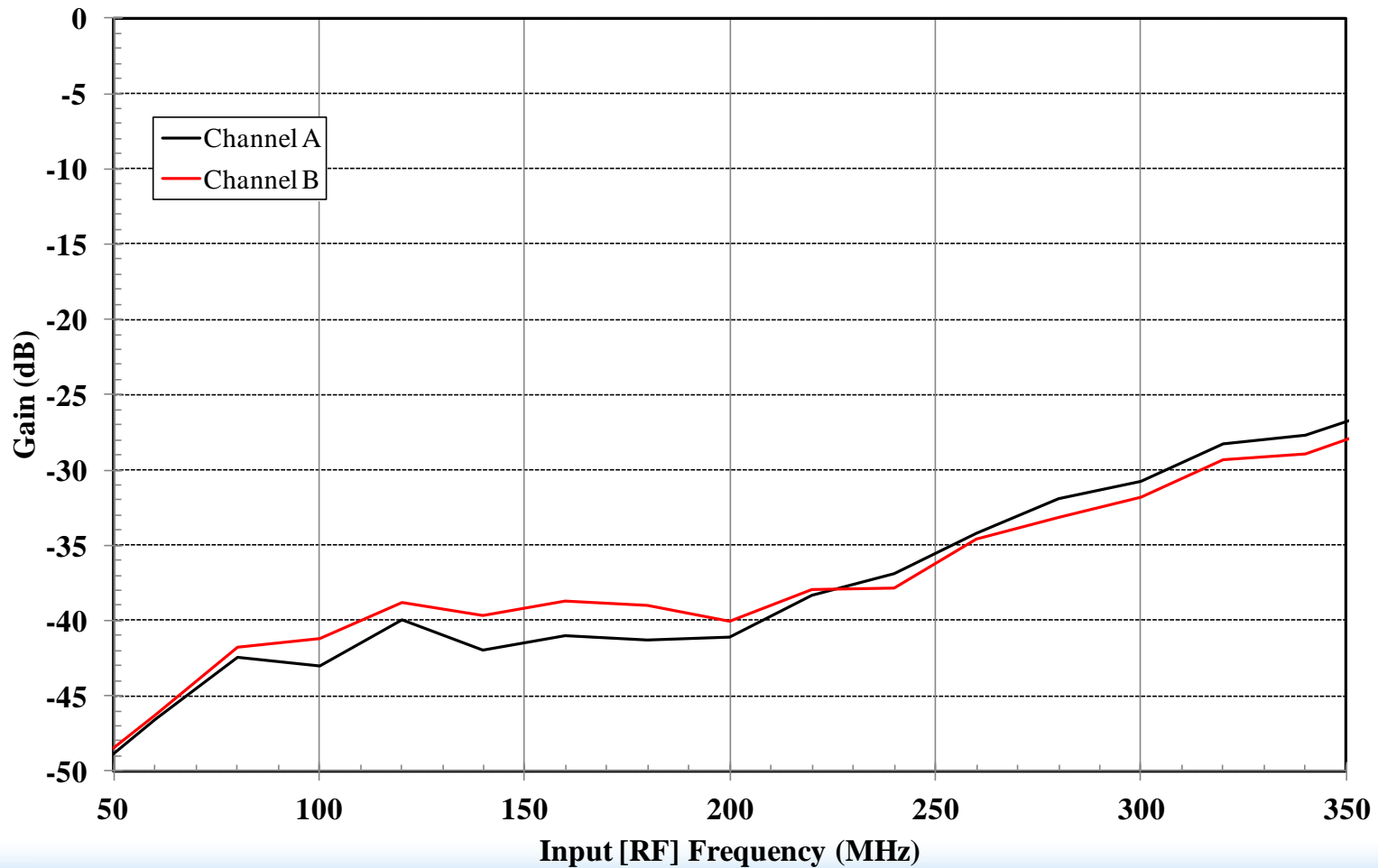
Gain – Band 4

F1102 - Gain
LO = 1105 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



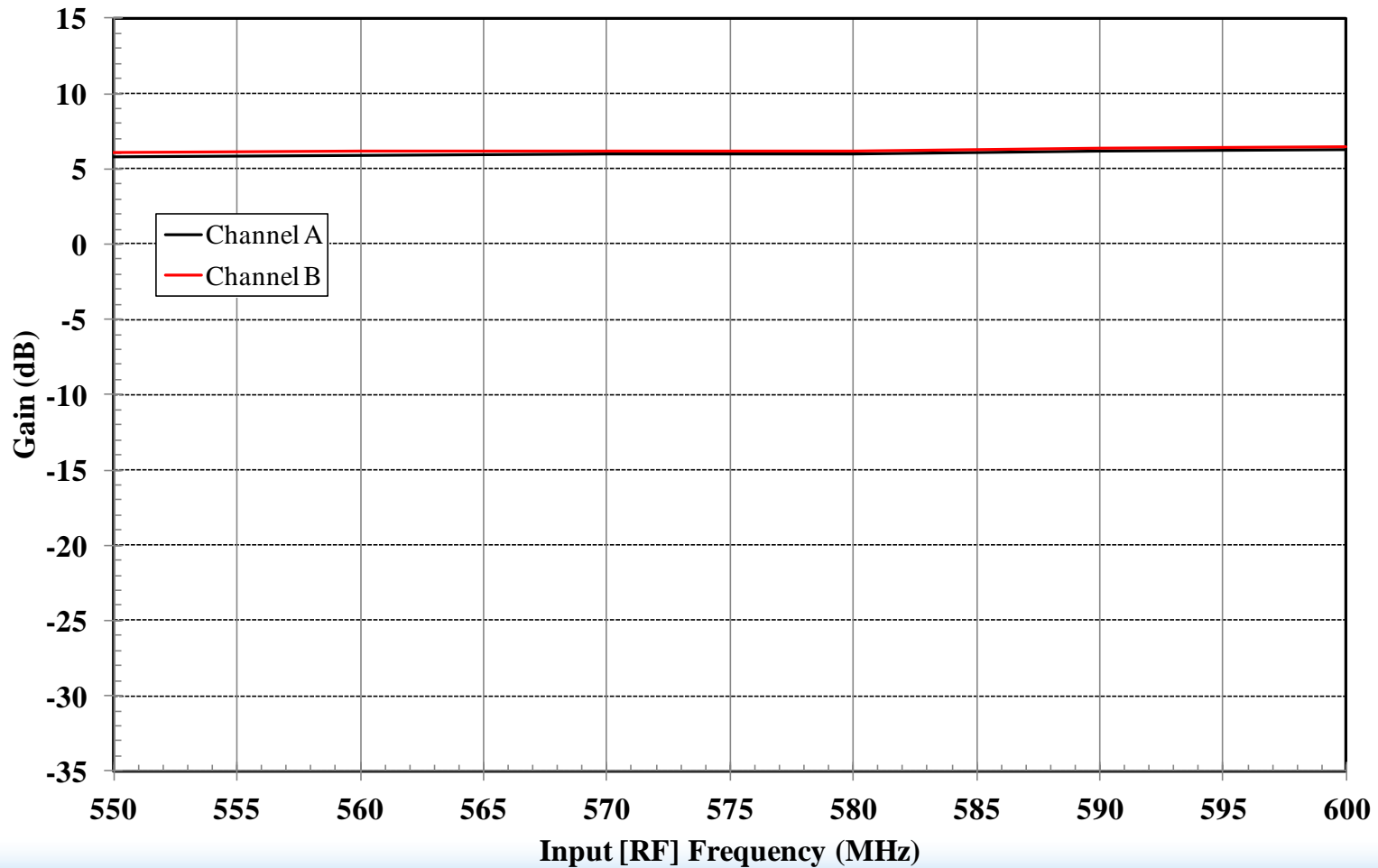
Gain – Band 5

F1102 - Gain
LO = 1105 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



Gain – Band 6

F1102 - Gain
LO = 1105 MHz, 0 dBm, +5 V, =25 C
Data Measured to connectors



Comments

- The F1102 mixer does not work properly for most of the bands.

Band	Input [RF] (MHz)		LO (MHz)	Output [IF] (MHz)		Comment
1	150	680	806	956	1486	RF is out band, IF is out of band. This is a upconverter application.
2	863	866	806	1669	1672	IF is out of band. This is a upconverter application.
3	276	282	806	530	524	RF is out band but shows promise since the gain is 0 dB. Further RF tuning might increase the gain.
4	136	318	1105	969	787	RF is out band, IF is out of band. This is a upconverter application.
5	55	566	1105	1160	1671	RF is out band, IF is out of band. This is a upconverter application.
6	575	581	1105	530	524	RF is out band but shows promise since the gain is 5 dB. Further RF tuning might increase the gain.



Comments

- For the upconverter applications our downconverters can not be expanded into these bands.
- IDT does building blocks for an upconverter and if you contact Sales we could investigate a design.

