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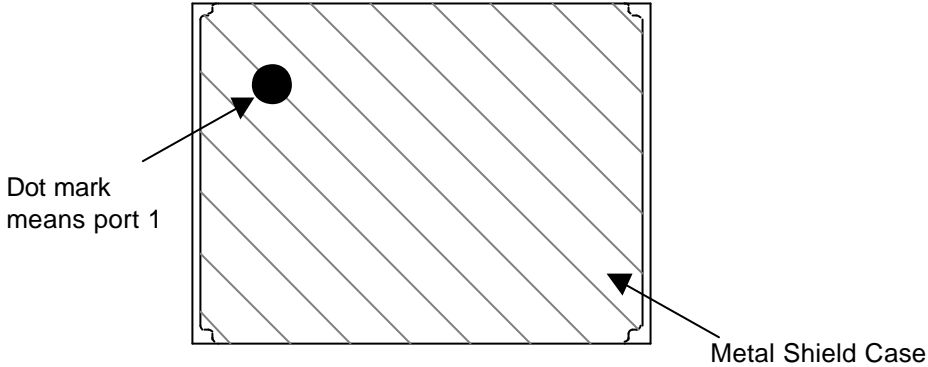
P/N	ESHS-M085TQ	DATE	26-Nov-2004
DWN.	Shinichirou Takeuchi	DATA-No.	2MT43556

# GSM850 / GSM900 / DCS / PCS Quad Band Antenna Switch Module

## Sample plot data with network analyzer

### - Model No : ESHS-M085TQ (version I)

- Measurement Equipment : Network Analyzer
  - 8753E upto 6GHz
  - 8720ES upto 13GHz
- Input power : +10dBm
- Unused ports are loaded with 50 ohm terminator
- ESD protection circuit is placed at Rx1 port.



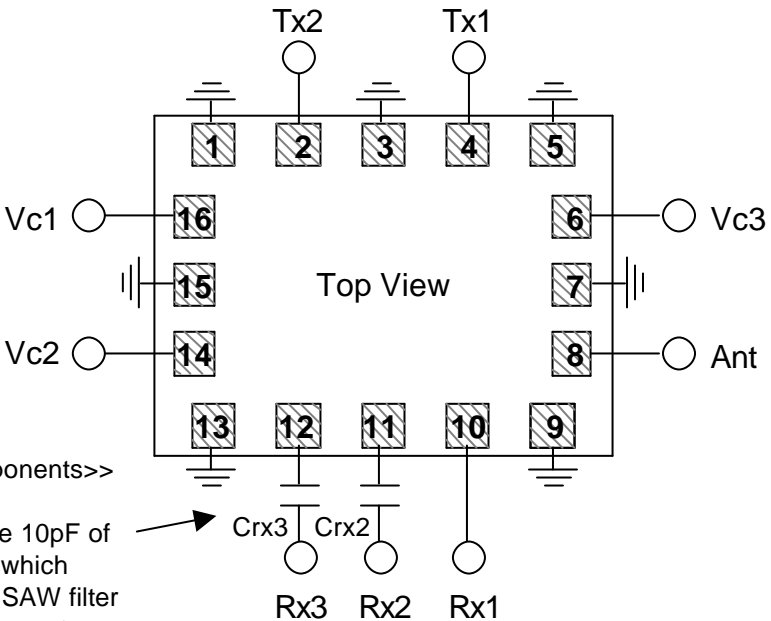
## Logic & Current

	VC1	VC2	VC3	Current
TX1 mode	0V	0V	2.6V	8.0mA
TX2 mode [Type1]	2.6V	2.6V	0V	8.8mA
[Type2]	2.6V	0V	0V	8.0mA
RX1mode	0V	0V	0V	<0.1mA
RX2mode	0V	0V	0V	<0.1mA
RX3mode	0V	2.6V	0V	0.8mA

Type1 or Type2 Logic is available at TX2 mode

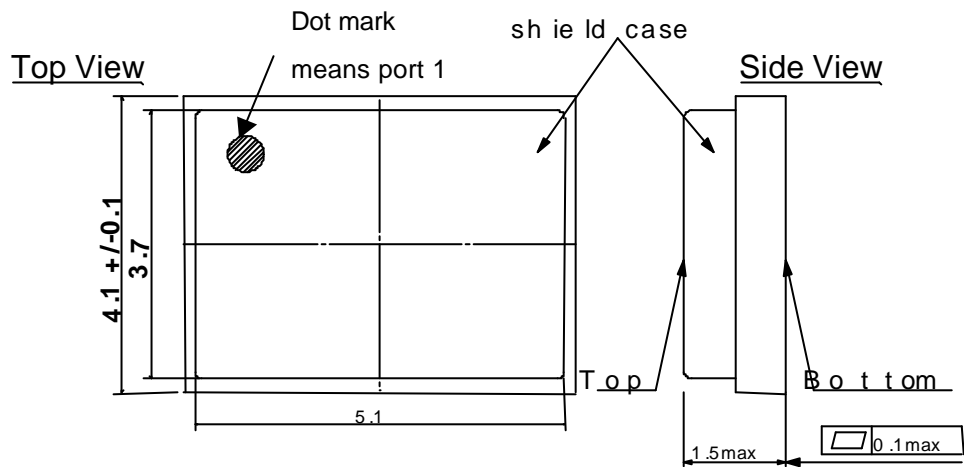
- TX1 : GSM850 / GSM900\_TX
- TX2 : DCS / PCS\_TX
- RX1 : GSM850 / GSM900\_RX
- RX2 : DCS\_RX
- RX3 : PCS\_RX

<<External Components>>  
 Nothing.  
 Crx2 and Crx3 are 10pF of DC cut capacitor which are not needed if SAW filter is connected to Rx port.

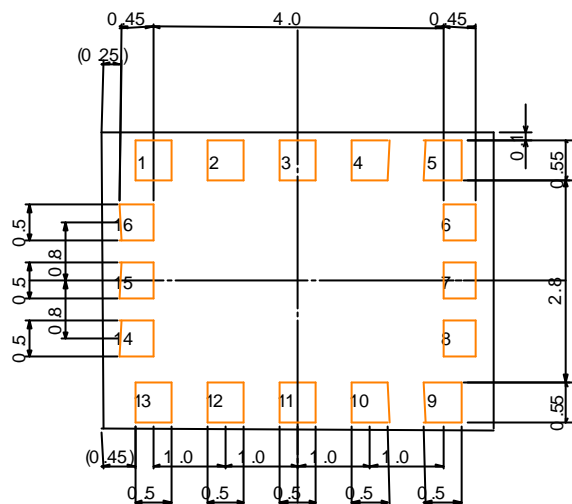
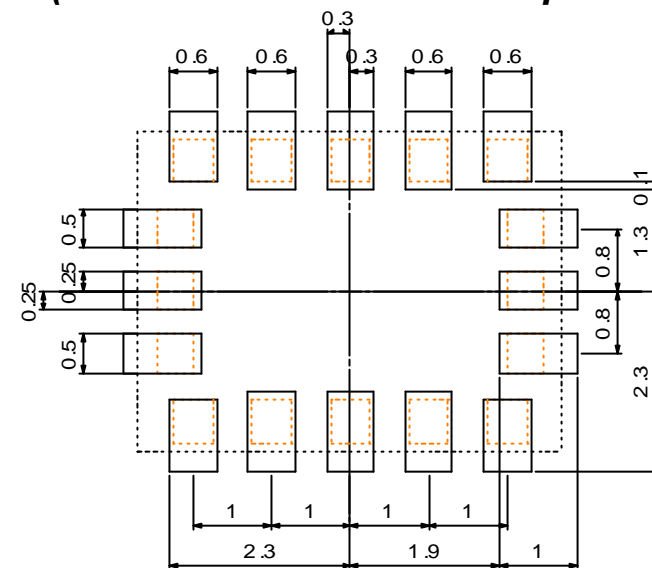


All the technical data and information contained herein are subject to change without notice.

### Shape & Size



### Foot Pattern on PCB (Same as conventional foot pattern)



### Pin Layout

Port1	GND	Port9	GND
Port2	TX2 [DCS/PCS TX]	Port10	RX1 [GSM850/900 RX]
Port3	GND	Port11	RX2 [DCS RX]
Port4	TX1 [GSM850/900 TX]	Port12	RX3 [PCS RX]
Port5	GND	Port13	GND
Port6	VC3	Port14	VC2
Port7	GND	Port15	GND
Port8	ANT	Port16	VC1

## Specification in TX-side

TX MODE	Parameter	Freq.(MHz)		unit	Temporary Specification based on Version I		Test Condition
		min	max		min	max	
GSM850/900_TX (TX1 mode)	Insertion Loss @+25 deg.C.	824	915	dB		1.4	Measured with network analyzer at +10 dBm level, measurement port and other ports should be terminated 50 ohm.
	-20 to +75 deg.C.	824	915	dB		1.6	
	Attenuation	1648	1830	dB	30		
		2472	2745	dB	25		
		3296	3660	dB	25		
	VSWR @EGSM TX port	824	915			1.50	
	@ANT port	824	915			1.50	
	Isolation TX1 -> RX1	824	915	dB	20		
	TX1 -> RX2	824	915	dB	25		
	TX1 -> RX3	824	915	dB	30		
	Harmonics Generation	1648	1830	dBc		-70	
		2472	2745	dBc		-70	
Permissible input power	-	-	dBm		35	Peak	
Current consumption	-	-	mA		10	-	
DCS/PCS_TX (TX2 mode) Type1	Insertion Loss @+25 deg.C.	1710	1910	dB		1.7	Measured with network analyzer at +10 dBm level, measurement port and other ports should be terminated 50 ohm.
	-20 to +75 deg.C.	1710	1910	dB		1.9	
	Attenuation	3420	3820	dB	25		
		5130	5730	dB	30		
	VSWR @DCS/PCS TX port	1710	1910			1.80	
	@ANT port	1710	1910			1.80	
	Isolation TX2 -> RX1	1710	1910	dB	15		
	TX2 -> RX2	1710	1910	dB	25		
	TX2 -> RX3	1710	1910	dB	15		
	Harmonics Generation	3420	3820	dBc		-67	
		5130	5730	dBc		-67	
	Permissible input power	-	-	dBm		32	Peak
Current consumption	-	-	mA		11		

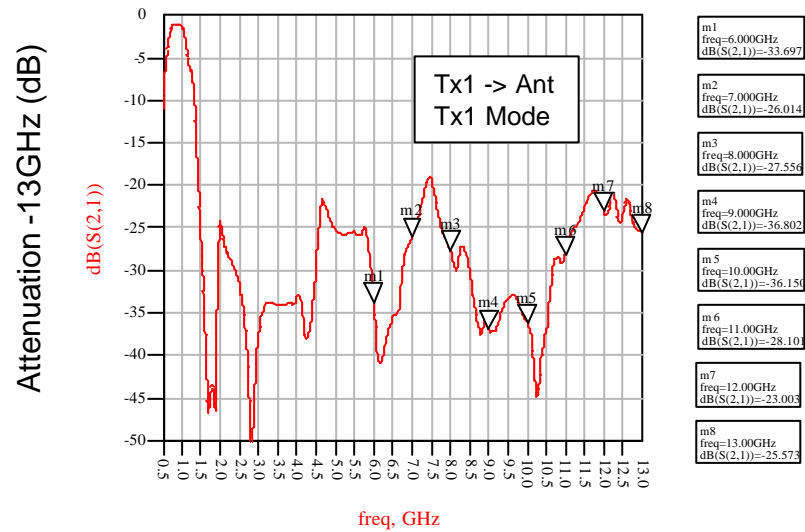
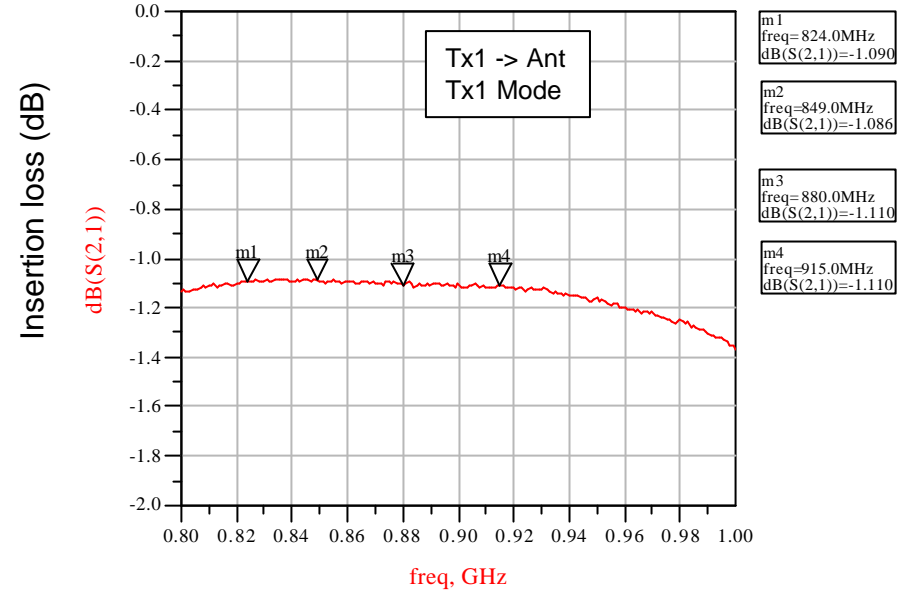
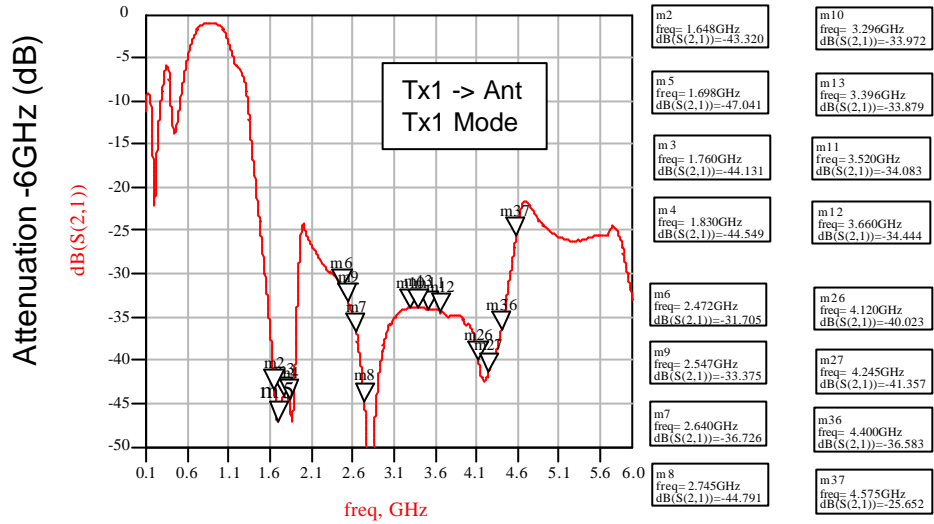
**Specification in RX-side**

RX MODE	Parameter	Freq.(MHz)		unit	Temporary Specification based on Version I		Test Condition
		min	max		min	max	
GSM850/900_RX (RX1 mode)	Insertion Loss @+25 deg.C.	869	960	dB		1.6	Measured with network analyzer at +10 dBm level, measurement port and other ports should be terminated 50 ohm.
	-20 to +75 deg.C.	869	960	dB		1.8	
	VSWR @ANT port	869	960			2.0	
	@GSM850/EGSM RX port	869	960			2.0	
	Current consumption	-	-	uA		10	
Permissible input power	-	-	dBm		+10	-	
DCS_RX (RX2 mode)	Insertion Loss @+25 deg.C.	1805	1880	dB		1.5	Measured with network analyzer at +10 dBm level, measurement port and other ports should be terminated 50 ohm.
	-20 to +75 deg.C.	1805	1880	dB		1.7	
	VSWR @ANT port	1805	1880			1.8	
	@DCS_RX port	1805	1880			1.8	
	Current consumption	-	-	uA		10	
Permissible input power	-	-	dBm		+10	-	
PCS_RX (RX3 mode)	Insertion Loss @+25 deg.C.	1930	1990	dB		1.6	Measured with network analyzer at +10 dBm level, measurement port and other ports should be terminated 50 ohm.
	-20 to +75 deg.C.	1930	1990	dB		1.8	
	VSWR @ANT port	1930	1990			1.8	
	@PCS_RX port	1930	1990			1.8	
	Current consumption	-	-	mA		1.0	
Permissible input power	-	-	dBm		+10	-	

# Tx1 Attenuation , Insertion Loss

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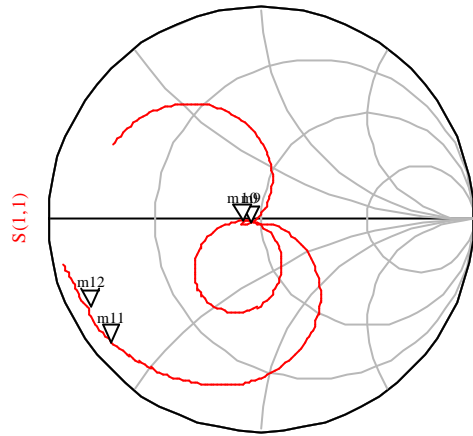
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# Tx1 VSWR

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Impedance @ Tx1 port



freq (500.0MHz to 2.500GHz)

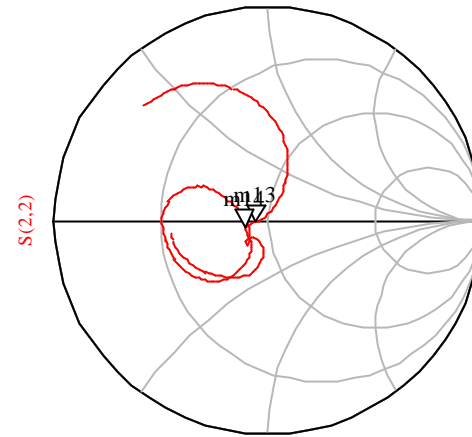
m9  
freq= 824.0MHz  
S(1,1)=0.052 / -161.008  
impedance = Z0 \* (0.905 - j0.031)

m10  
freq= 915.0MHz  
S(1,1)=0.088 / -172.975  
impedance = Z0 \* (0.838 - j0.018)

m11  
freq= 1.710GHz  
S(1,1)=0.910 / -140.743  
impedance = Z0 \* (0.053 - j0.356)

m12  
freq= 1.990GHz  
S(1,1)=0.898 / -152.867  
impedance = Z0 \* (0.057 - j0.241)

Impedance @ Ant port



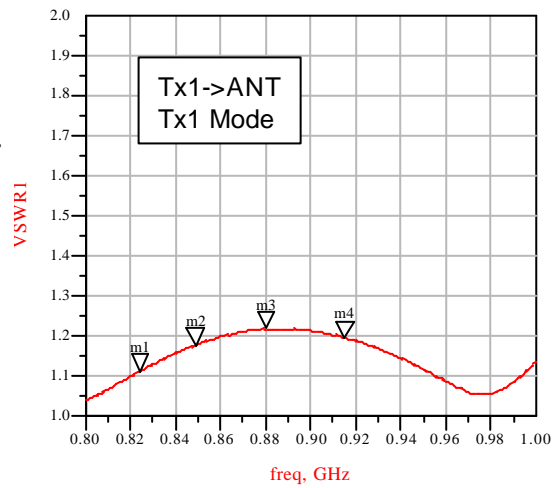
freq (500.0MHz to 2.500GHz)

m13  
freq= 824.0MHz  
S(2,2)=0.060 / -169.857  
impedance = Z0 \* (0.889 - j0.019)

m14  
freq=915.0MHz  
S(2,2)=0.114 / -163.228  
impedance = Z0 \* (0.801 - j0.054)

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VSWR @ Tx1 port



freq, GHz

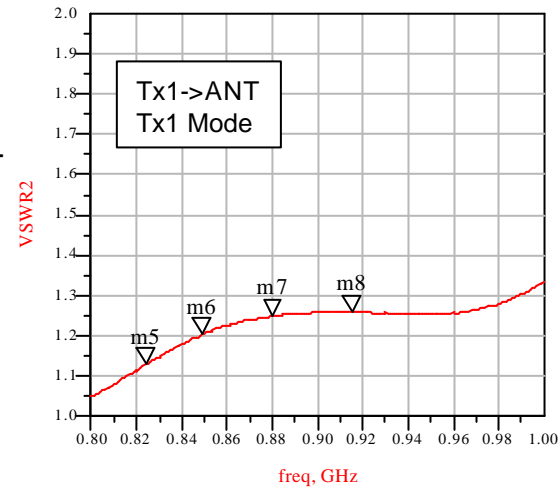
m1  
freq= 824.0MHz  
VSWR1=1.111

m2  
freq= 849.0MHz  
VSWR1=1.177

m3  
freq= 880.0MHz  
VSWR1=1.217

m4  
freq=915.0MHz  
VSWR1=1.194

VSWR @ Ant port



freq, GHz

m5  
freq=824.0MHz  
VSWR2=1.127

m6  
freq=849.0MHz  
VSWR2=1.203

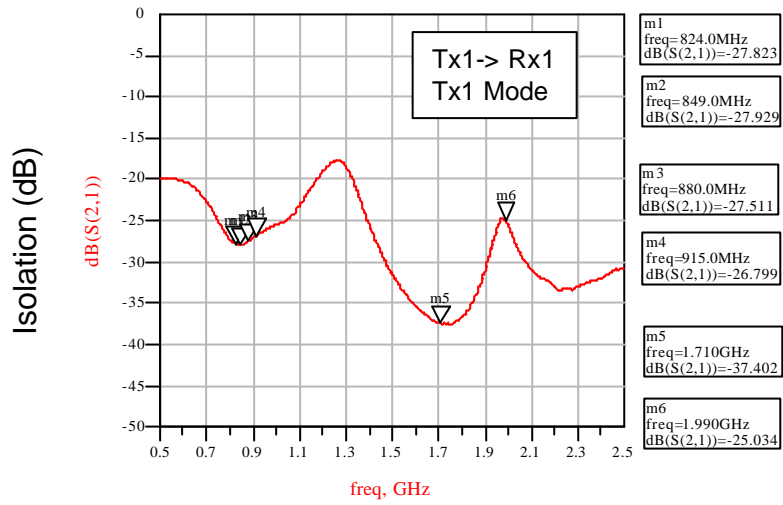
m7  
freq= 880.0MHz  
VSWR2=1.249

m8  
freq=915.0MHz  
VSWR2=1.259

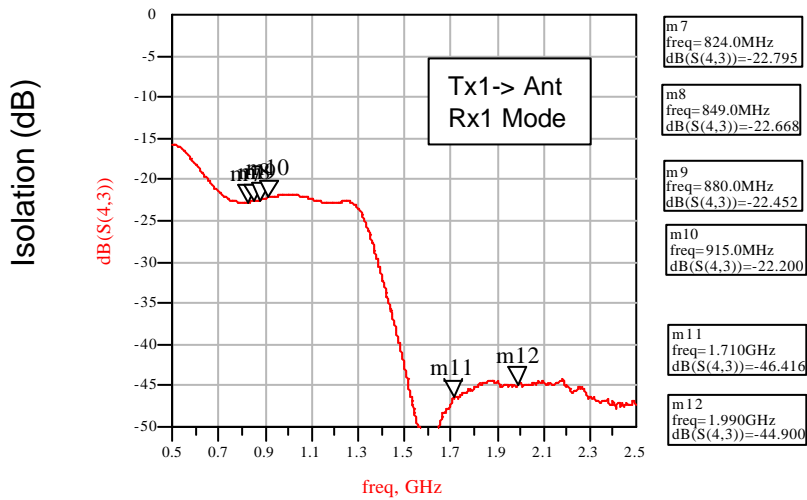
# Tx1 in-band isolation

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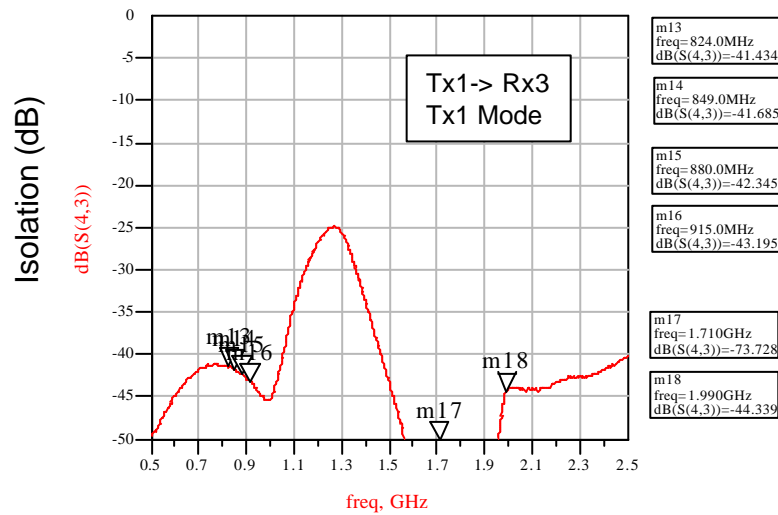
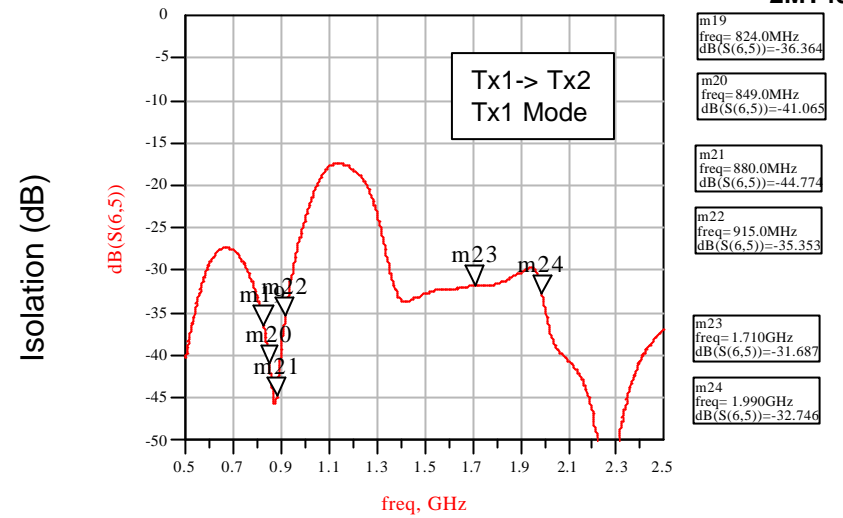
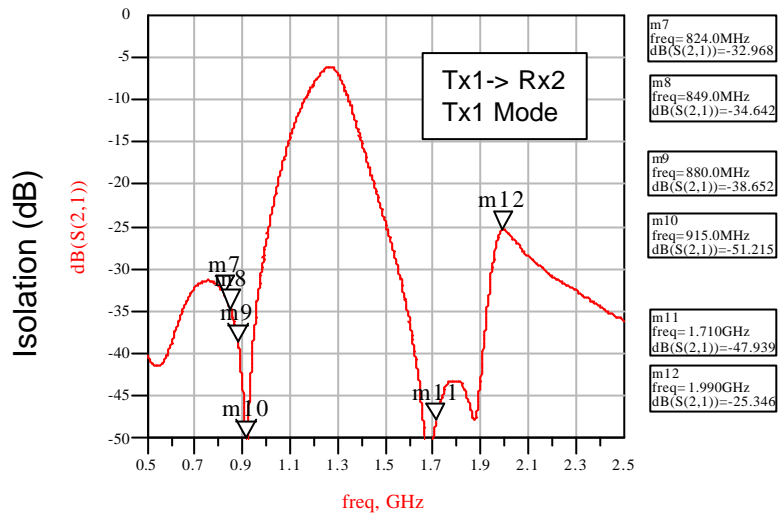
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# Tx1 x-band isolation

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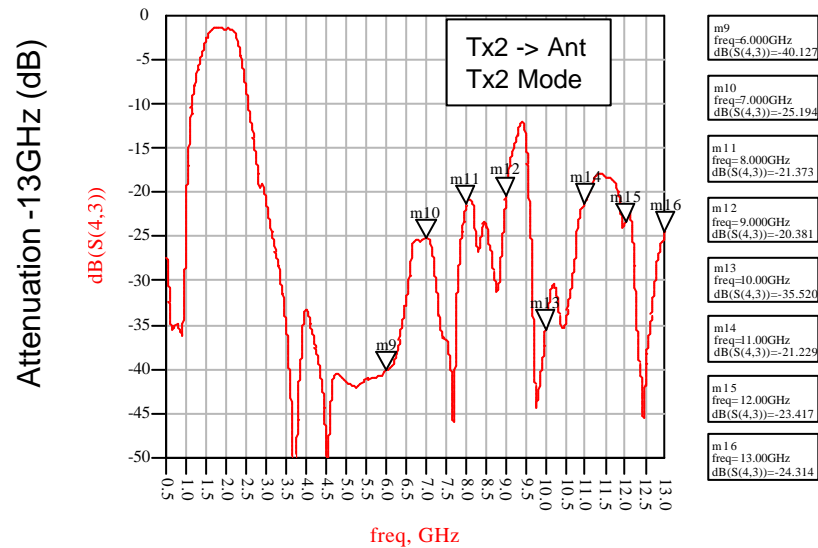
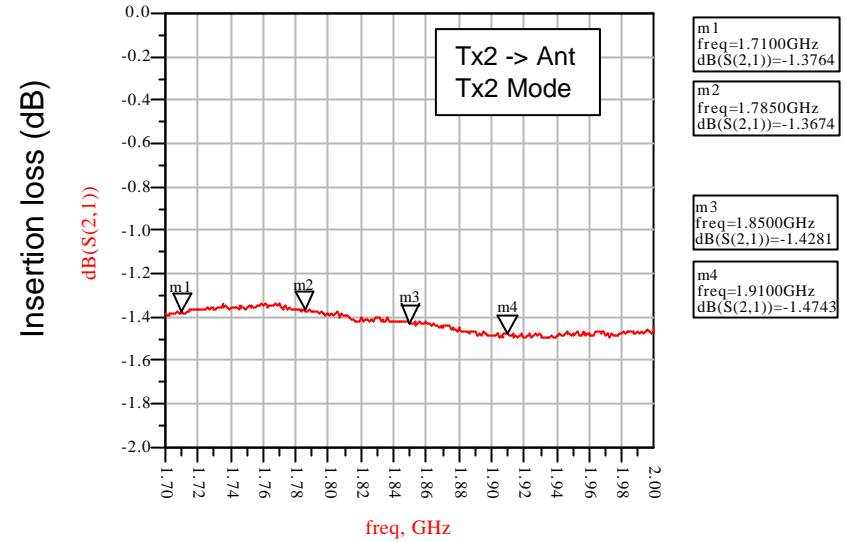
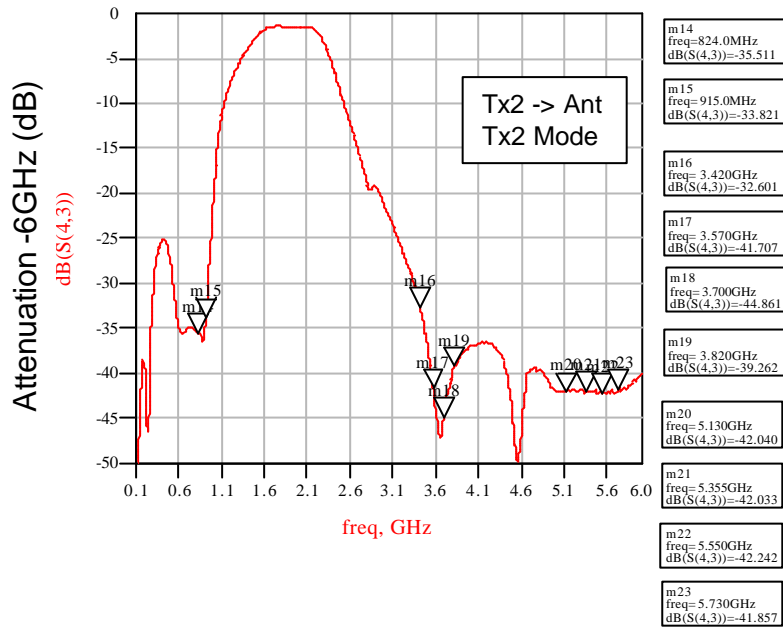
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# Tx2 Attenuation , Insertion Loss

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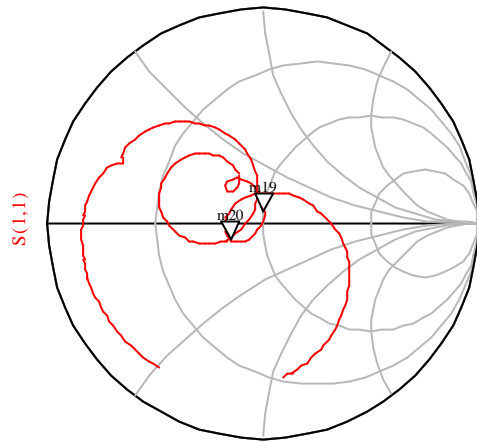
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# Tx2 VSWR

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Impedance @ Tx2 port

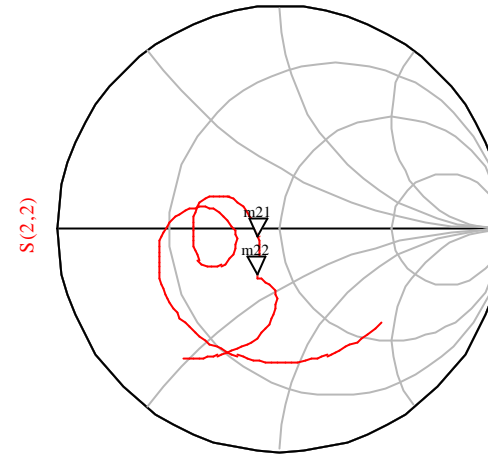


m19  
freq= 1.710GHz  
S(1,1)=0.057 / 85.292  
impedance = Z0 \* (1.003 + j0.114)

m20  
freq= 1.910GHz  
S(1,1)=0.171 / -152.869  
impedance = Z0 \* (0.727 - j0.117)

freq (500.0MHz to 2.500GHz)

Impedance @ Ant port



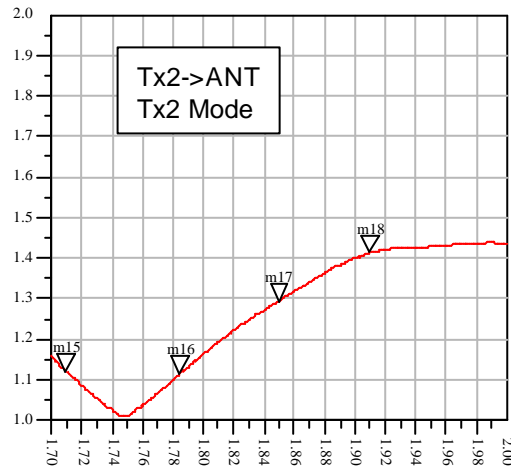
m21  
freq= 1.725GHz  
S(2,2)=-0.104 / -161.254  
impedance = Z0 \* (0.818 - j0.056)

m22  
freq= 1.910GHz  
S(2,2)=0.235 / -117.433  
impedance = Z0 \* (0.743 - j0.328)

freq (500.0MHz to 2.500GHz)

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VSWR @ Tx2 port  
V<sub>SWR1</sub>



m15  
freq= 1.710GHz  
VSWR1=1.120

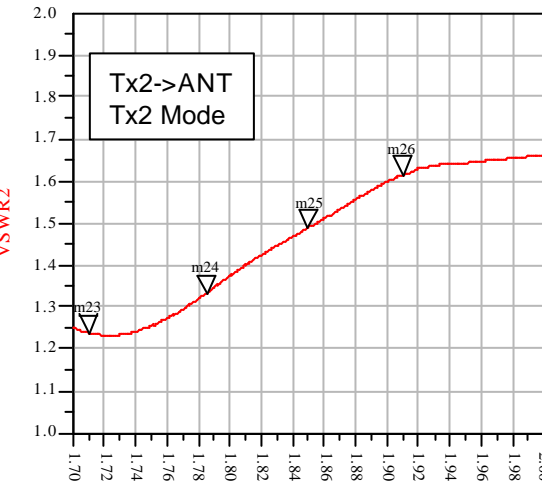
m16  
freq= 1.785GHz  
VSWR1=1.114

m17  
freq= 1.850GHz  
VSWR1=1.294

m18  
freq= 1.910GHz  
VSWR1=1.414

freq, GHz

VSWR @ Ant port  
V<sub>SWR2</sub>



m23  
freq= 1.710GHz  
VSWR2=1.239

m24  
freq= 1.785GHz  
VSWR2=1.333

m25  
freq= 1.850GHz  
VSWR2=1.489

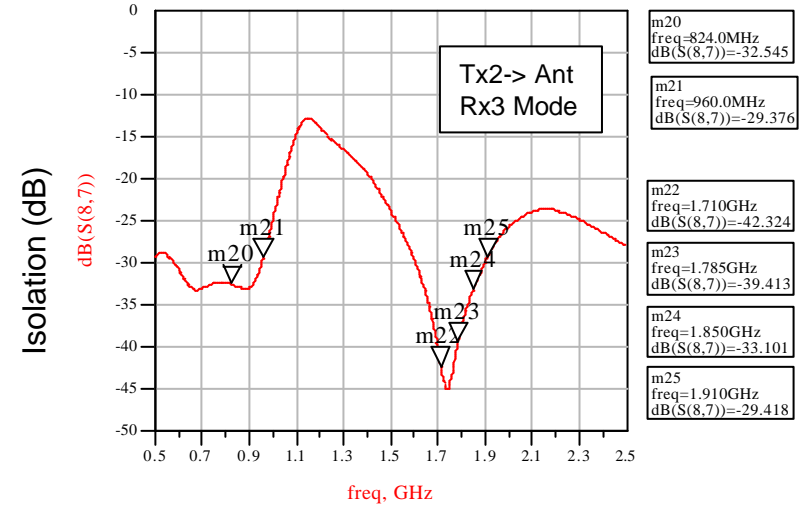
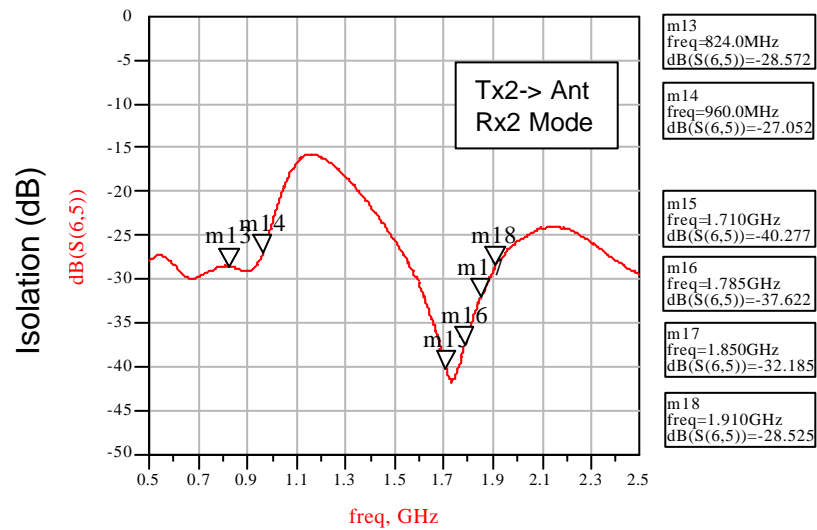
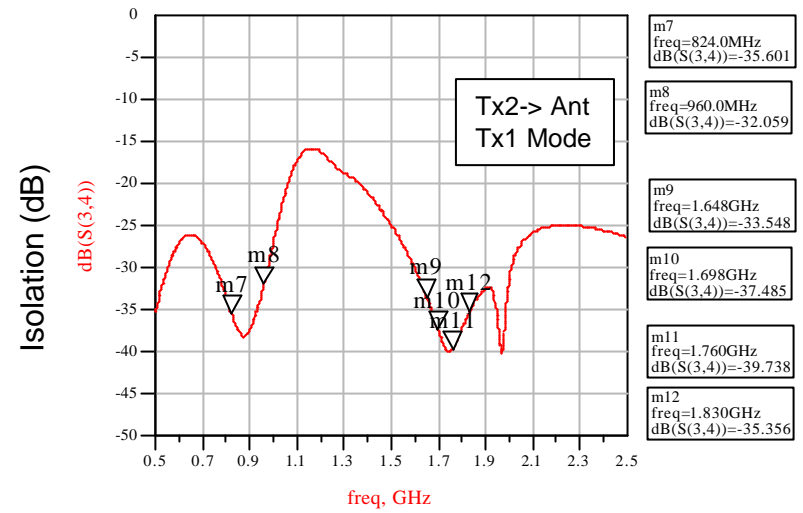
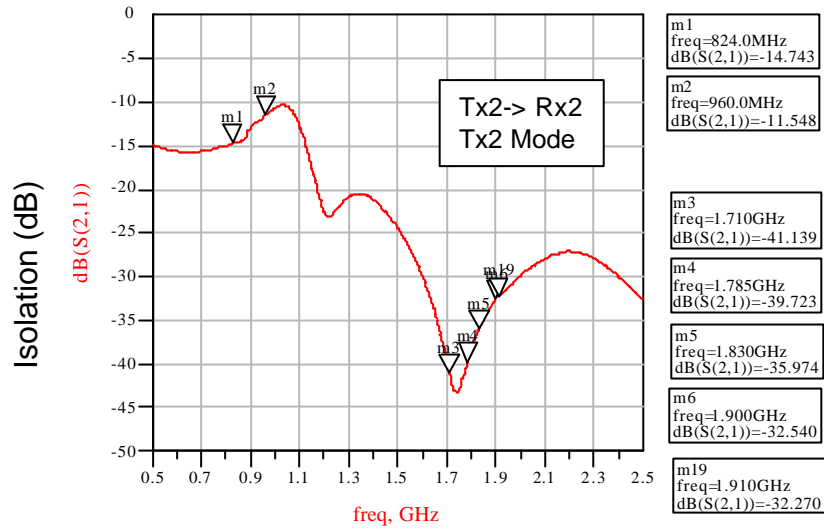
m26  
freq= 1.910GHz  
VSWR2=1.615

freq, GHz

# Tx2 in-band isolation

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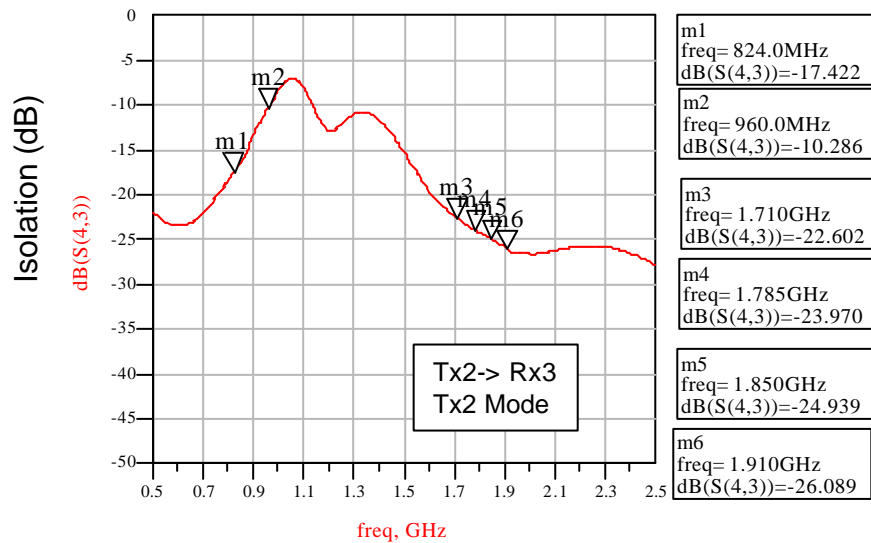
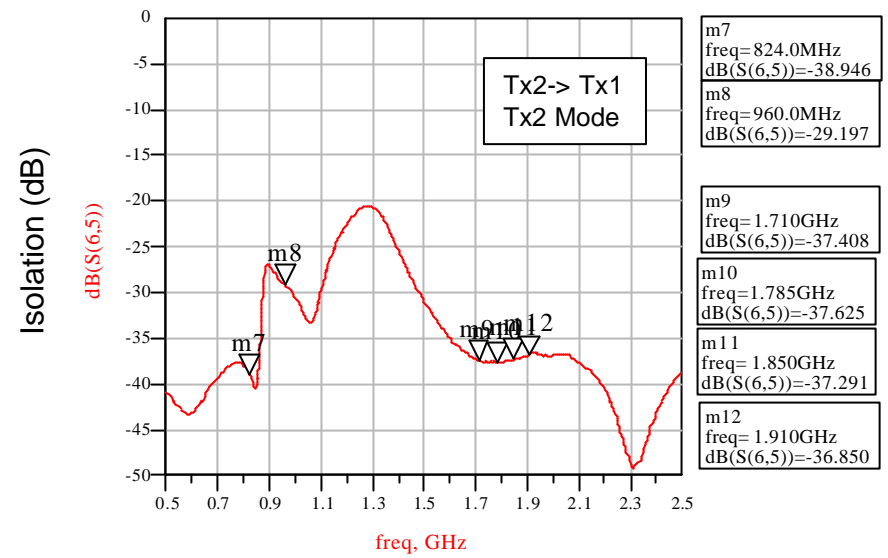
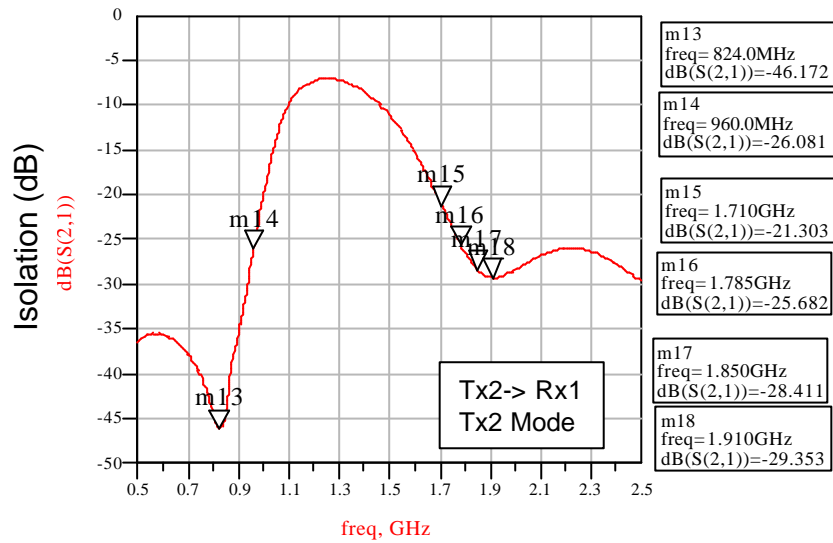


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# Tx2 x-band isolation

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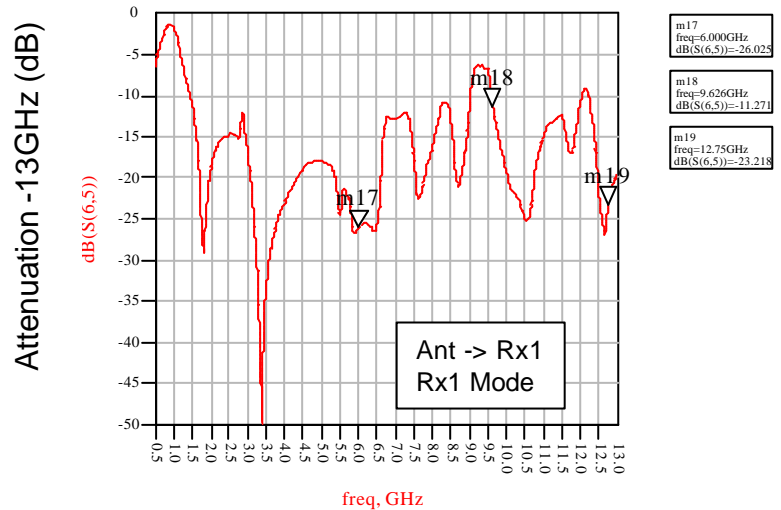
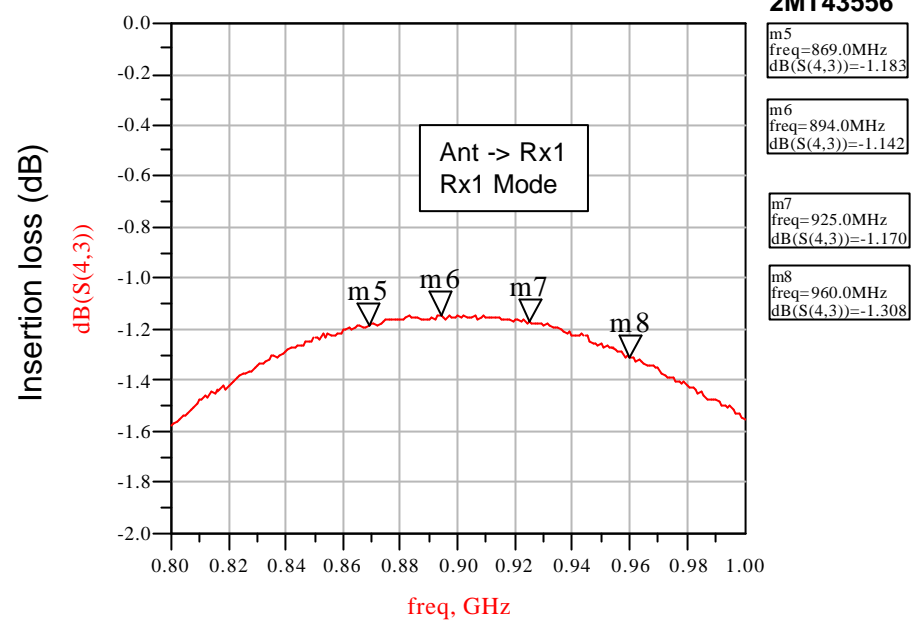
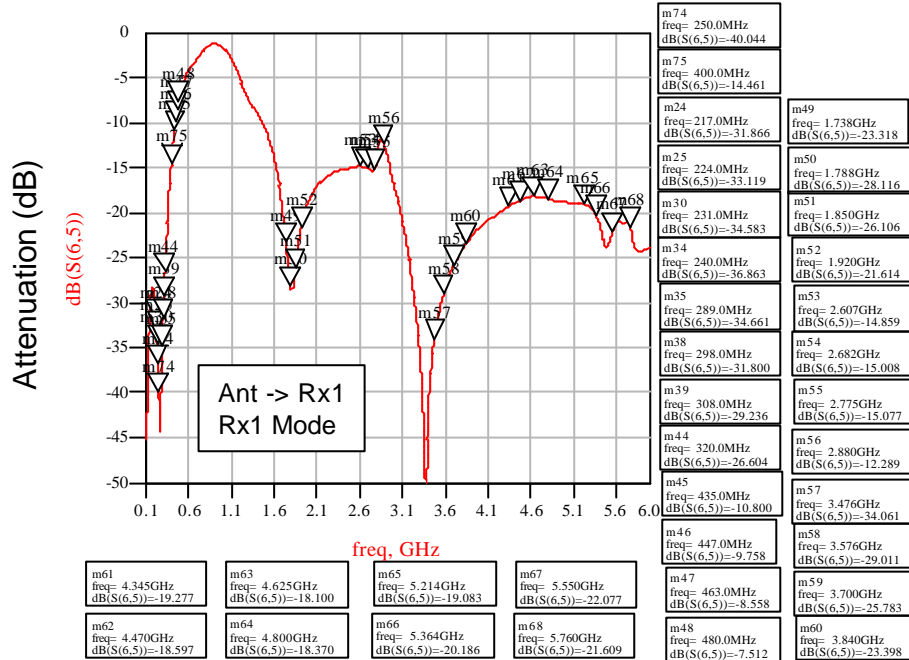
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# Rx1 Attenuation , Insertion Loss

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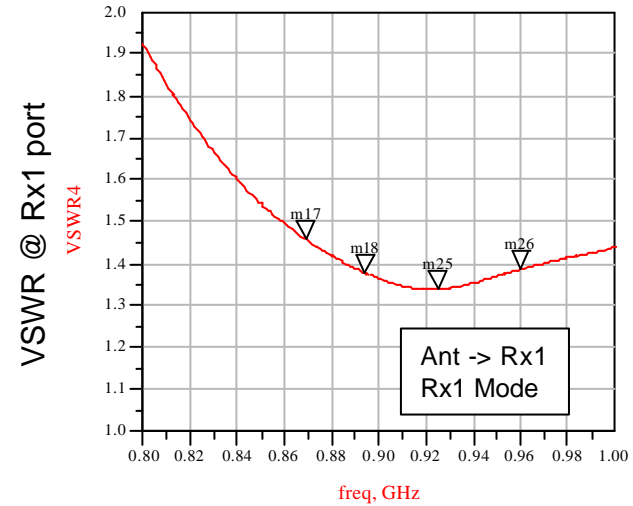
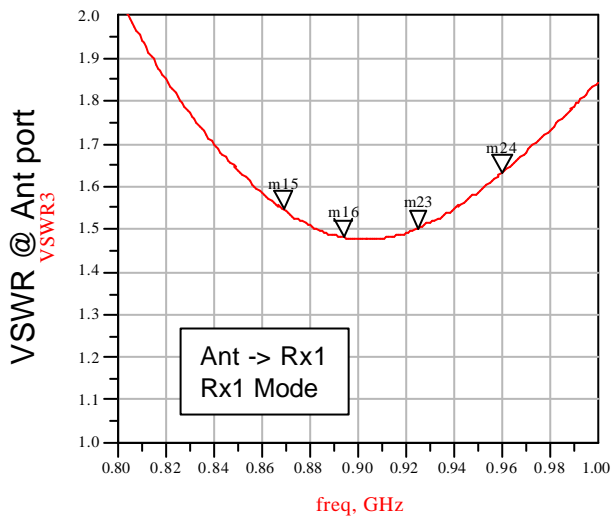
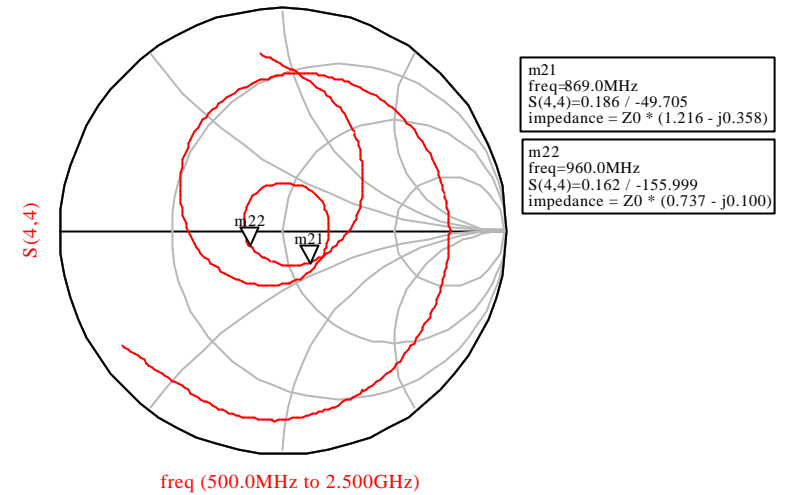
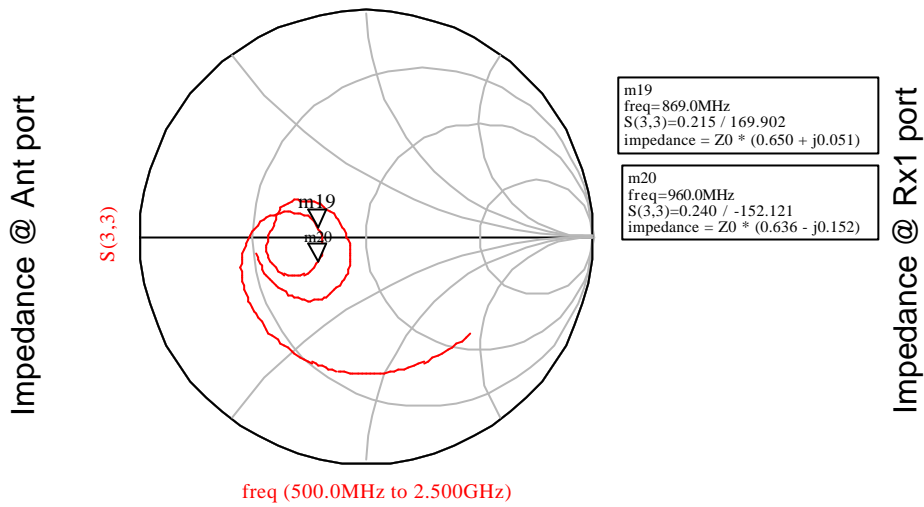


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# Rx1 VSWR

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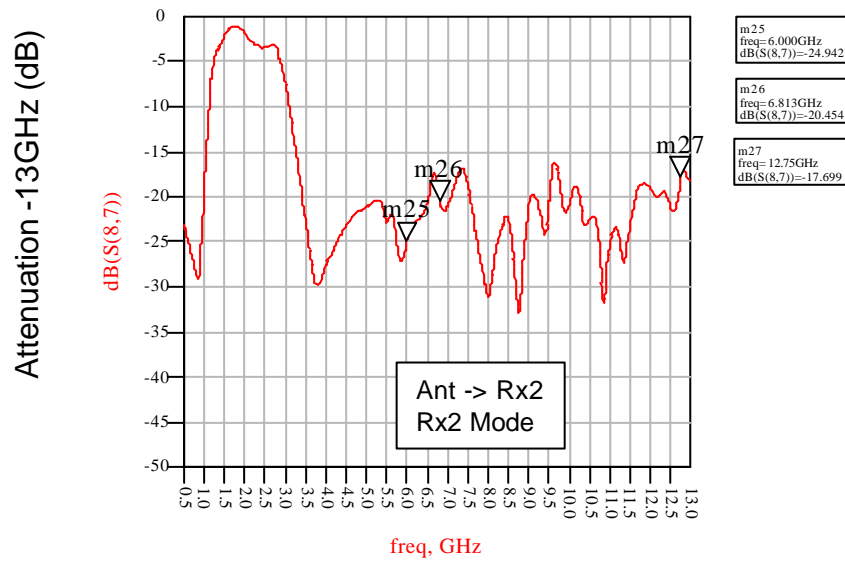
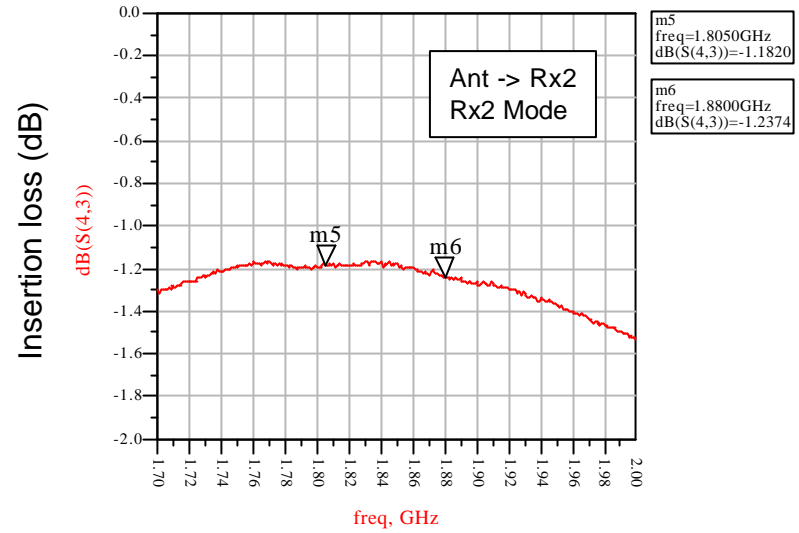
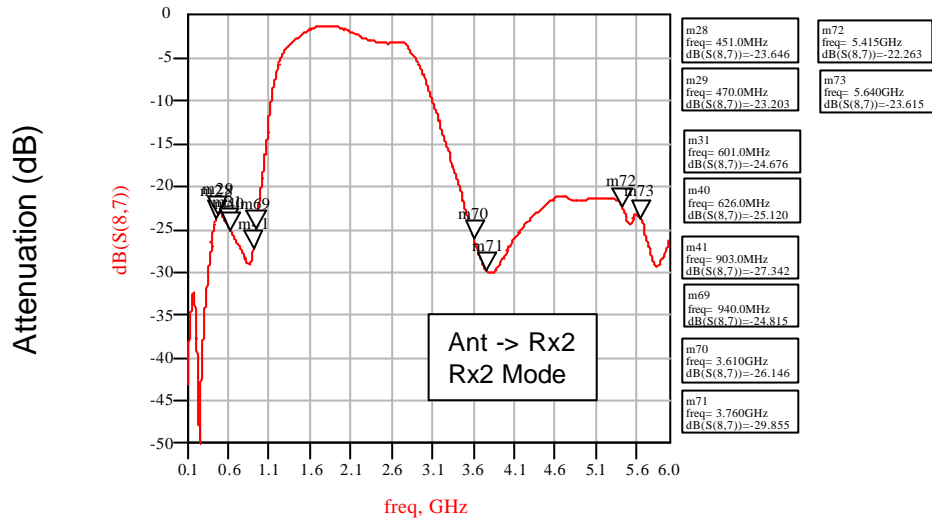
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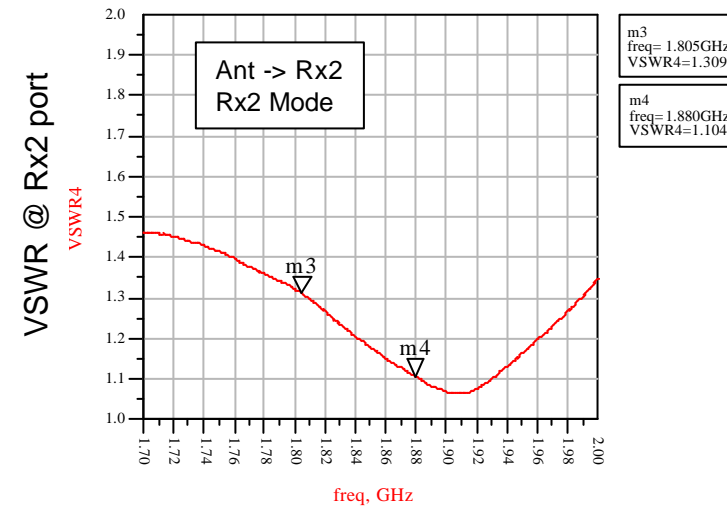
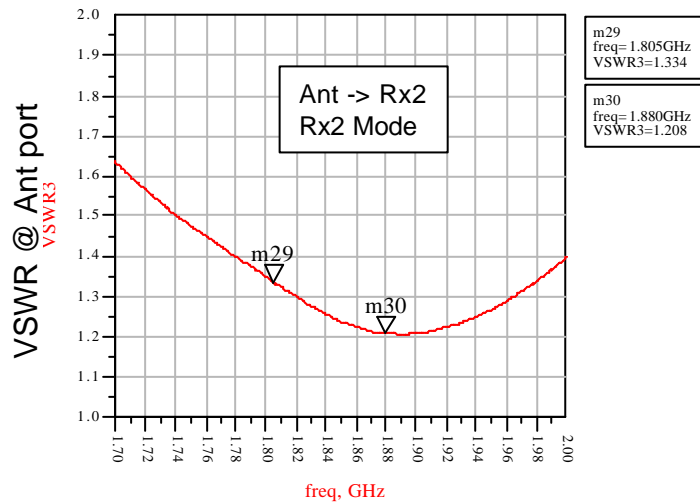
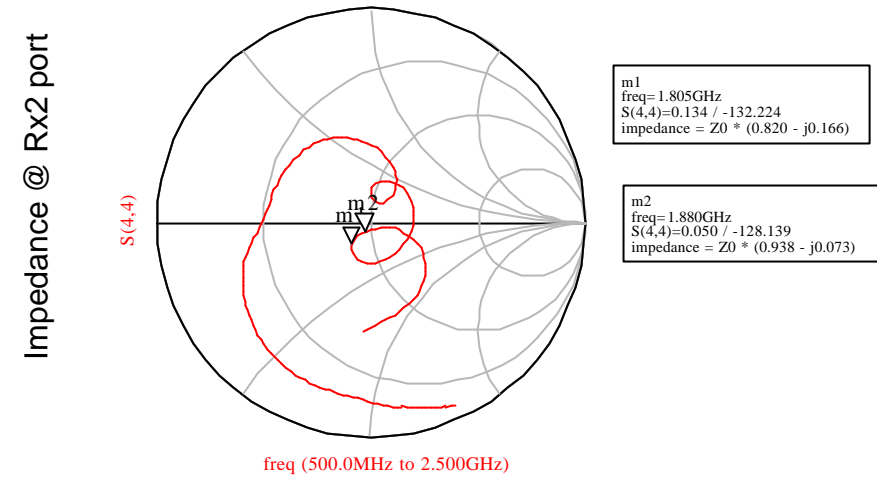
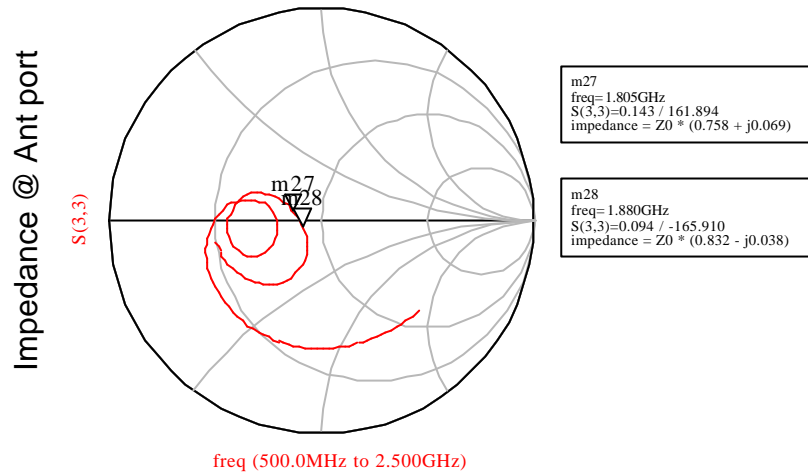
# Rx2 Attenuation , Insertion Loss

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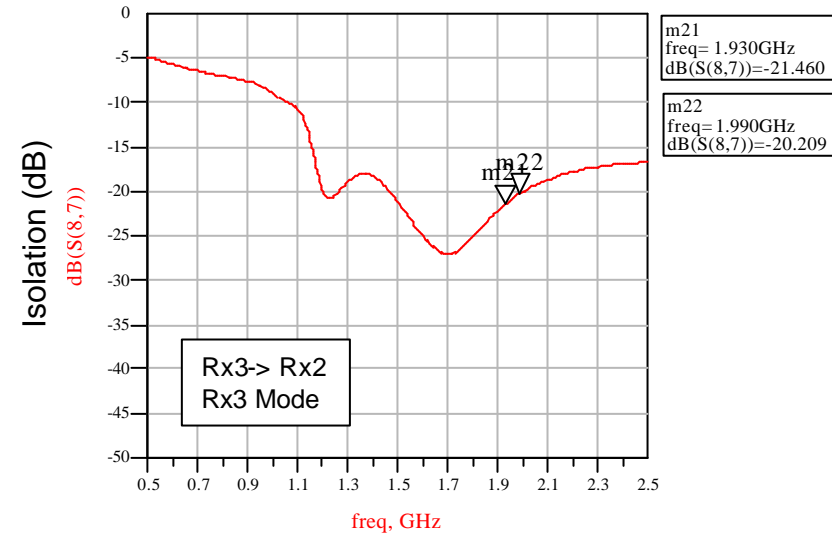
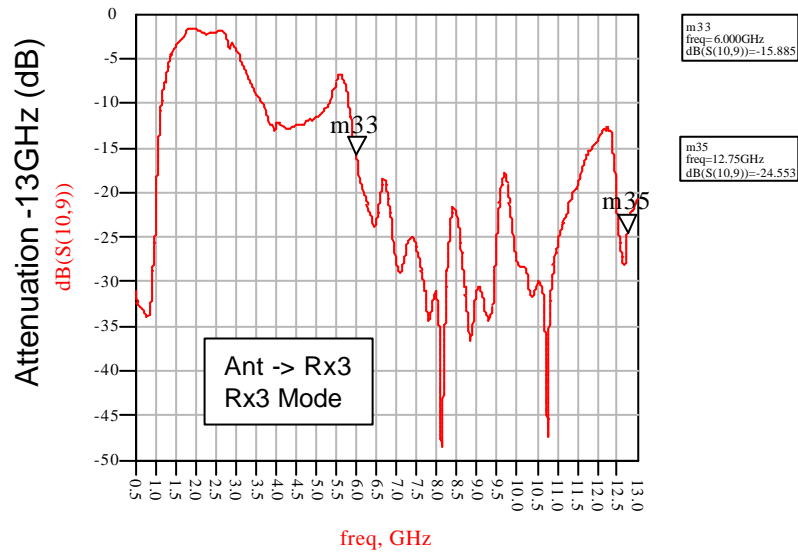
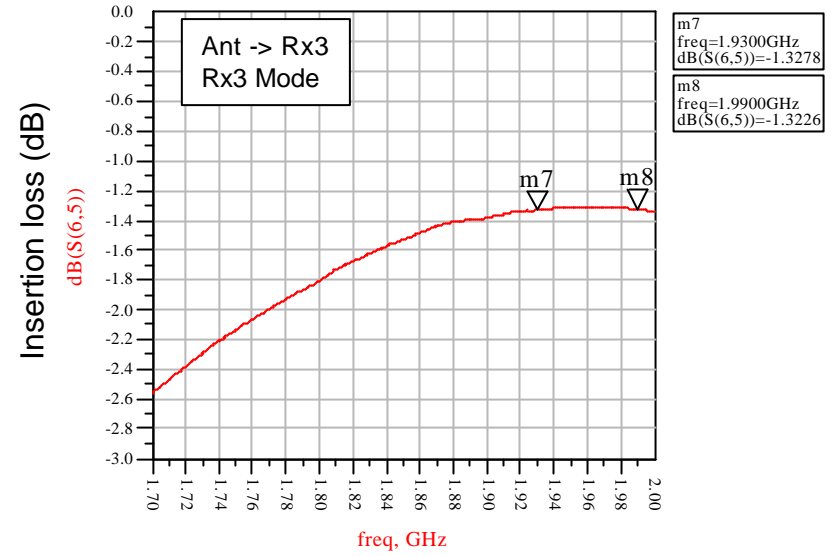
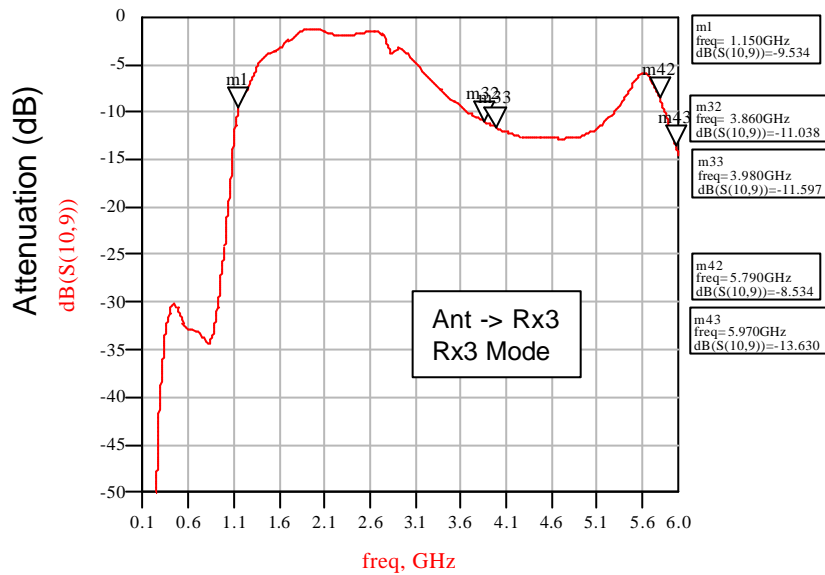




# Rx3 Attenuation , Insertion Loss , isolation

26-Nov-2004

2MT43556

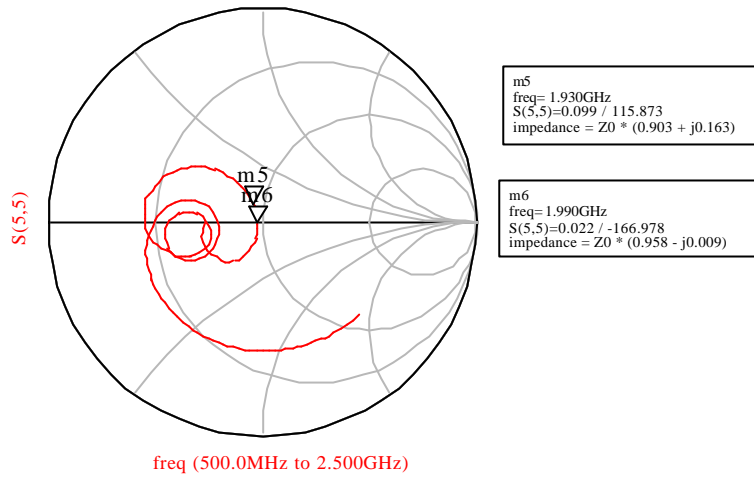


# Rx3 VSWR

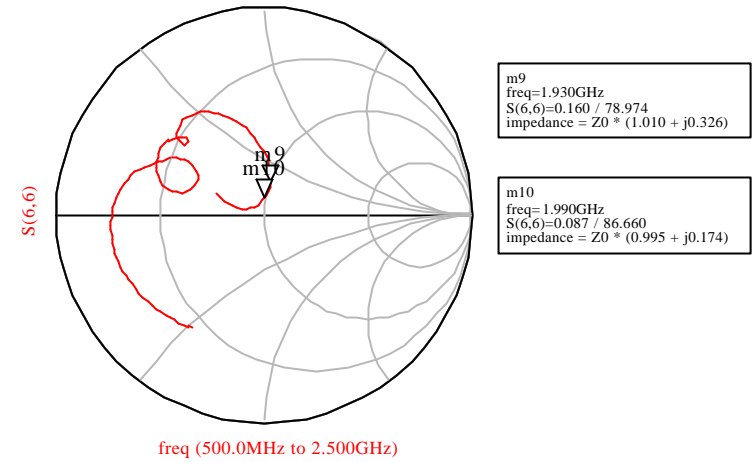
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Impedance @ Ant port

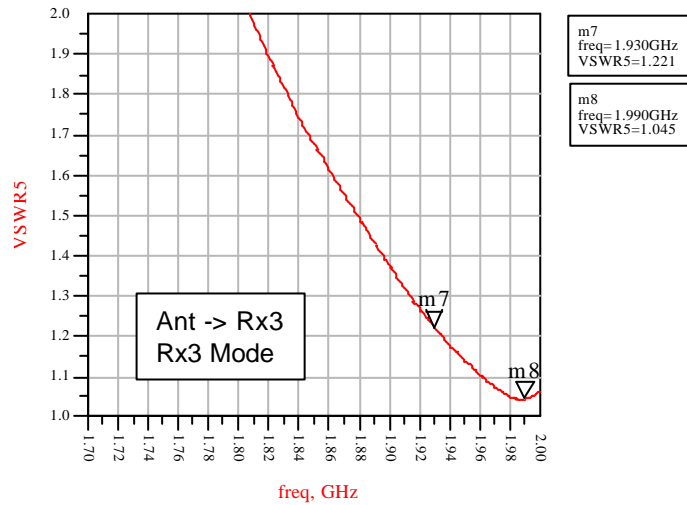


Impedance @ Rx3 port

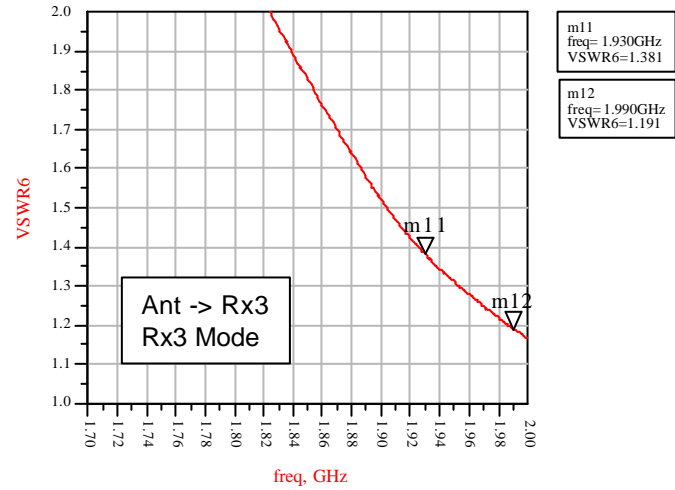


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VSWR @ Ant port



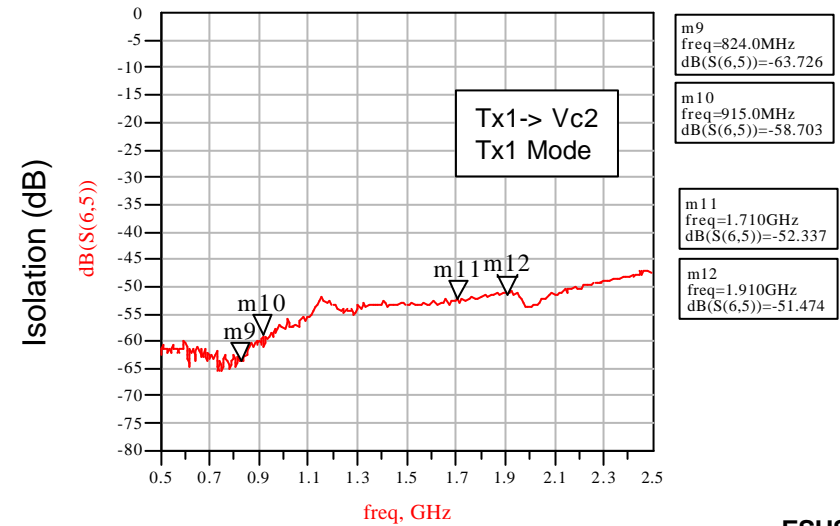
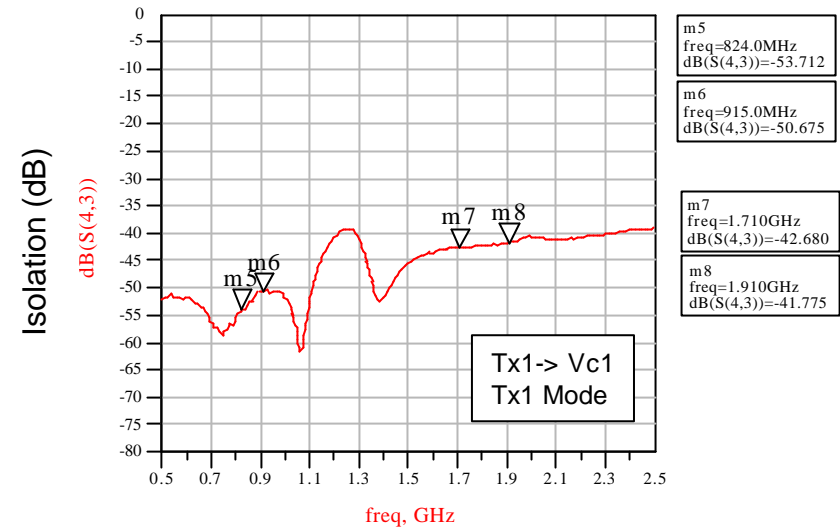
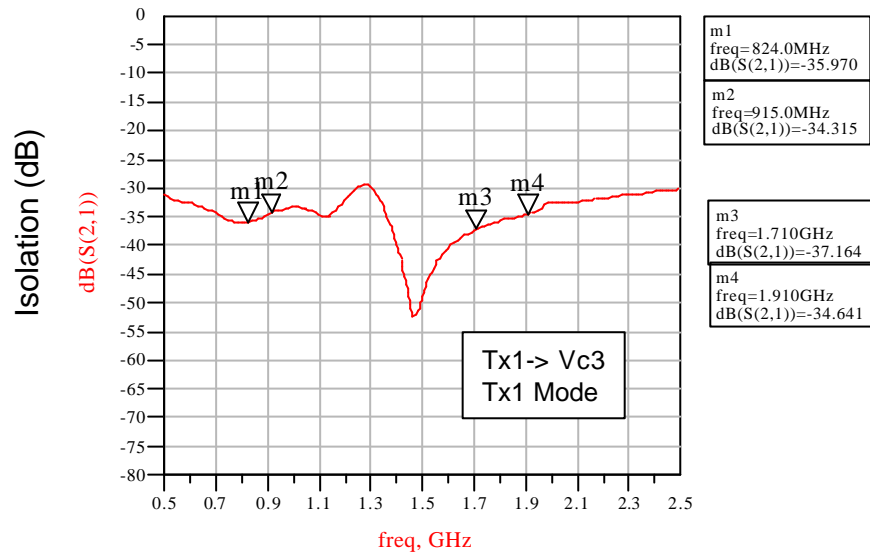
VSWR @ Rx3 port



# Isolation from Tx port to Vc port(Tx1 mode)

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# Isolation from Tx port to Vc port(Tx2 mode)

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