

RF MMIC Innovator

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[CLASSIFICATION] APPLICATION NOTE

[DATE] 2017.06

[REVISION No.] REV.A

[MEASURING INSTRUMENTS]

- NA_AGILENT E5071B

- SA_AGILENT E4440A

- SG_AGILENT 4438C

- SG_AGILENT IFR3416

High Power Amp BMT352

Application Note



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1. BMT352_3400MHz Application Note

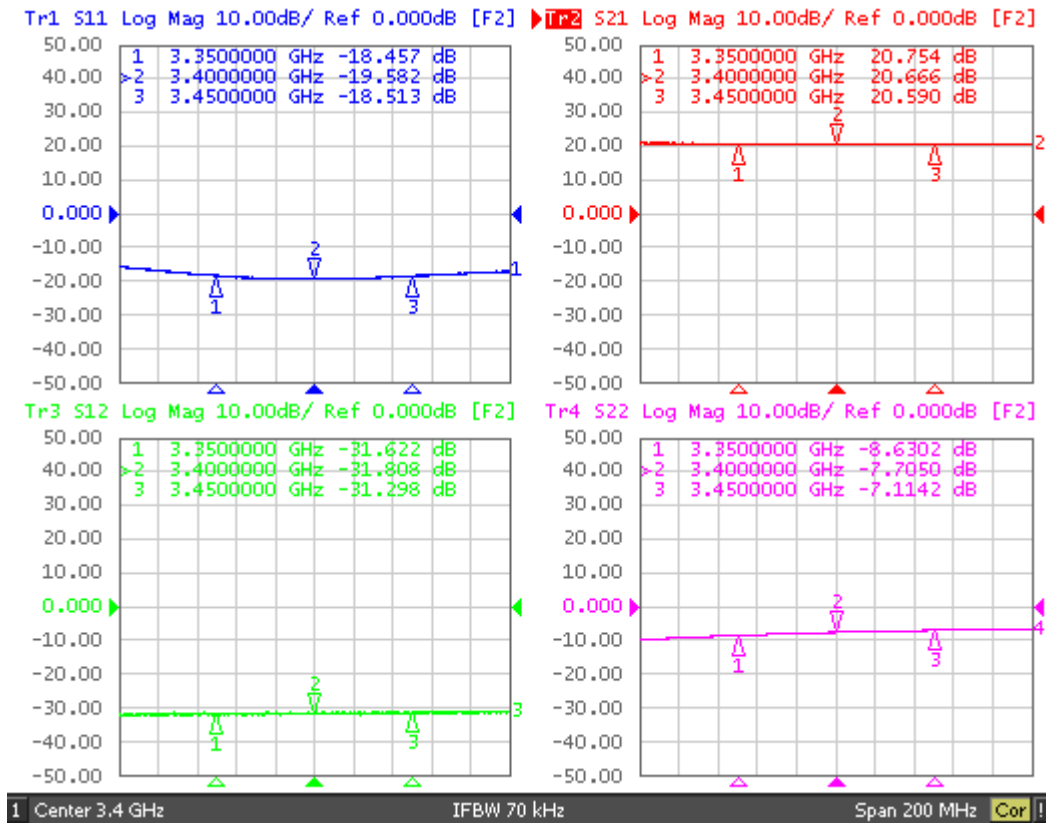
Schematic Diagram	BOM	Marks		
	C1	0603	1uF	
	C2	0603	1uF	
	C3	0603	20pF	
	C4	0603	20pF	
	C5	0603	N/A	
	C6	0603	N/A	
	C7	0603	20pF	
	C8	0603	20pF	
	C9	0603	N/A	
	C10	0603	N/A	
	C11	0603	N/A	
	C12	0603	N/A	
	C13	0603	2pF	
	C14	0603	1uF	
	C15	0603	20pF	
	C16	0603	1.2pF	
	C17	0603	0.75pF	
	C18	0603	1.2pF	
L1	0603	18nH		
L2	0805	22nH	Coil	
R1	0603	330 Ω	±5%	
R2	0603	470 Ω	±5%	
R3	0603	20 Ω	±5%	

PCB Diagram	Notice		
	Below information is subject to change as conditions of the substrate		
	Reference	Object	Distance
	Input pin	C17	8.5mm
	Input pin	C16	1.0mm
	Output pin	C18	1.4mm

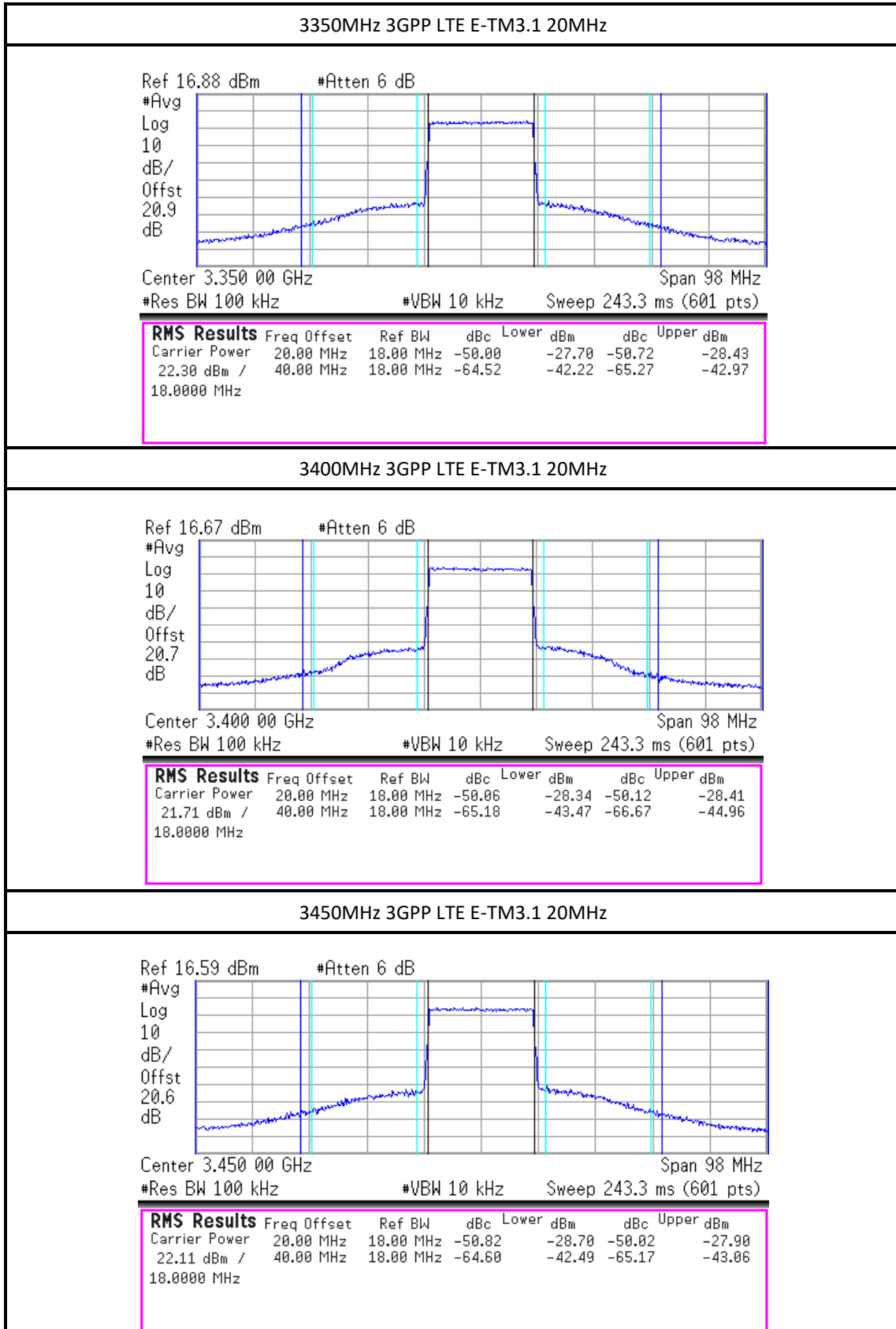
1.1 BMT352 _ 3400MHz Test Result

Freq [MHz]	Vcc [V]	Iref [mA]	Icq [mA]	Gain [dB]	OIP3 [dBm] ⁽¹⁾	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]
3350	5	24	342	20.7	45.3	31.5	-18.4	-8.6	-
3400	5	24	342	20.6	45.0	31.9	-19.5	-7.7	-
3450	5	24	342	20.4	44.4	31.7	-18.5	-7.1	-

(1) OIP3 was tested @Pout=17dBm/tone (CW) 1MHz offset



1.2 BMT352_3400MHz LTE20MHz ACLR Test Result



2. BMT352_3500MHz Application Note

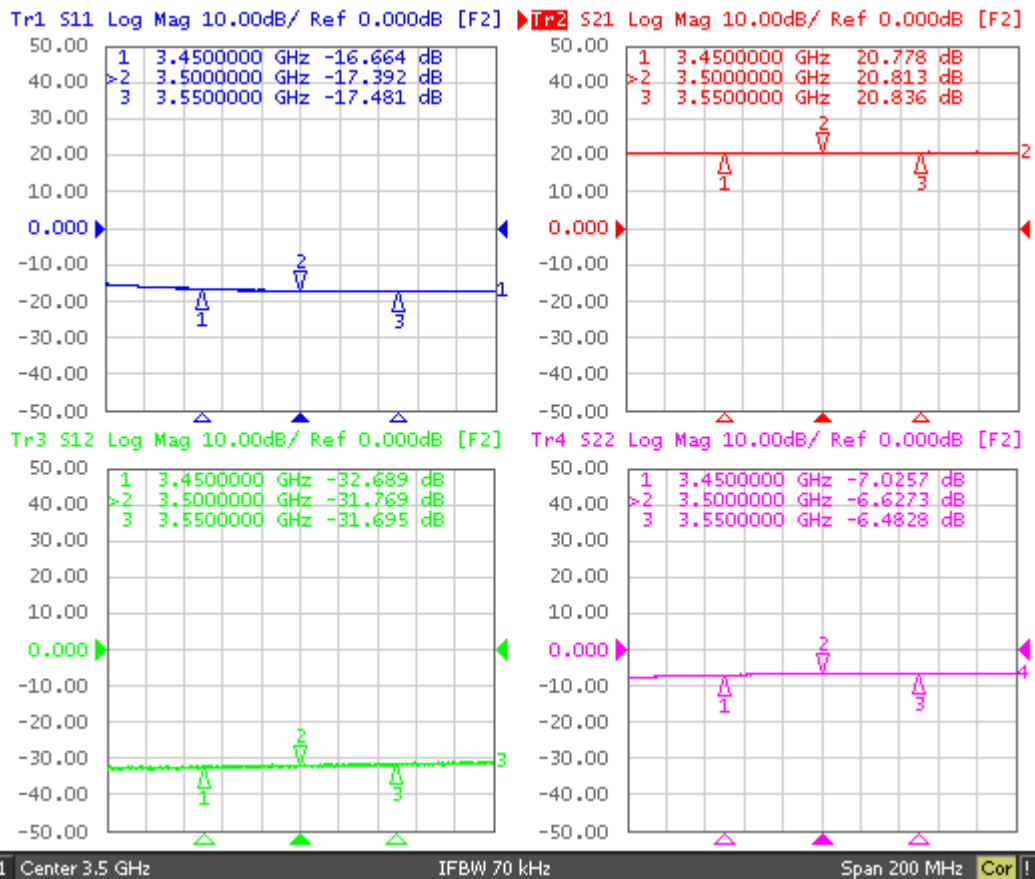
Schematic Diagram		BOM		Marks
	C1	0603	1uF	
	C2	0603	1uF	
	C3	0603	20pF	
	C4	0603	20pF	
	C5	0603	N/A	
	C6	0603	N/A	
	C7	0603	20pF	
	C8	0603	20pF	
	C9	0603	N/A	
	C10	0603	N/A	
	C11	0603	N/A	
	C12	0603	N/A	
	C13	0603	2pF	
	C14	0603	1uF	
	C15	0603	20pF	
	C16	0603	1.2pF	
	C17	0603	0.75pF	
	C18	0603	1.2pF	
L1	0603	18nH		
L2	0805	22nH	Coil	
R1	0603	330 Ω	±5%	
R2	0603	470 Ω	±5%	
R3	0603	20 Ω	±5%	

PCB Diagram		Notice		
		Below information is subject to change as conditions of the substrate		
		Reference	Object	Distance
		Input pin	C17	8.7mm
		Input pin	C16	1.5mm
Output pin	C18	1.5mm		
<p>3.5GHz_BMT352 Application Circuit QFN3x3_12L PKG Type 1.5W 2Stage_0.4T Ver4.1 PCB=FR-4, Oz=1.0 Er=4.6, RFwidth=0.64mm, Clearance=0.4mm, HEIGHT=0.4T BEREX_161220</p>				

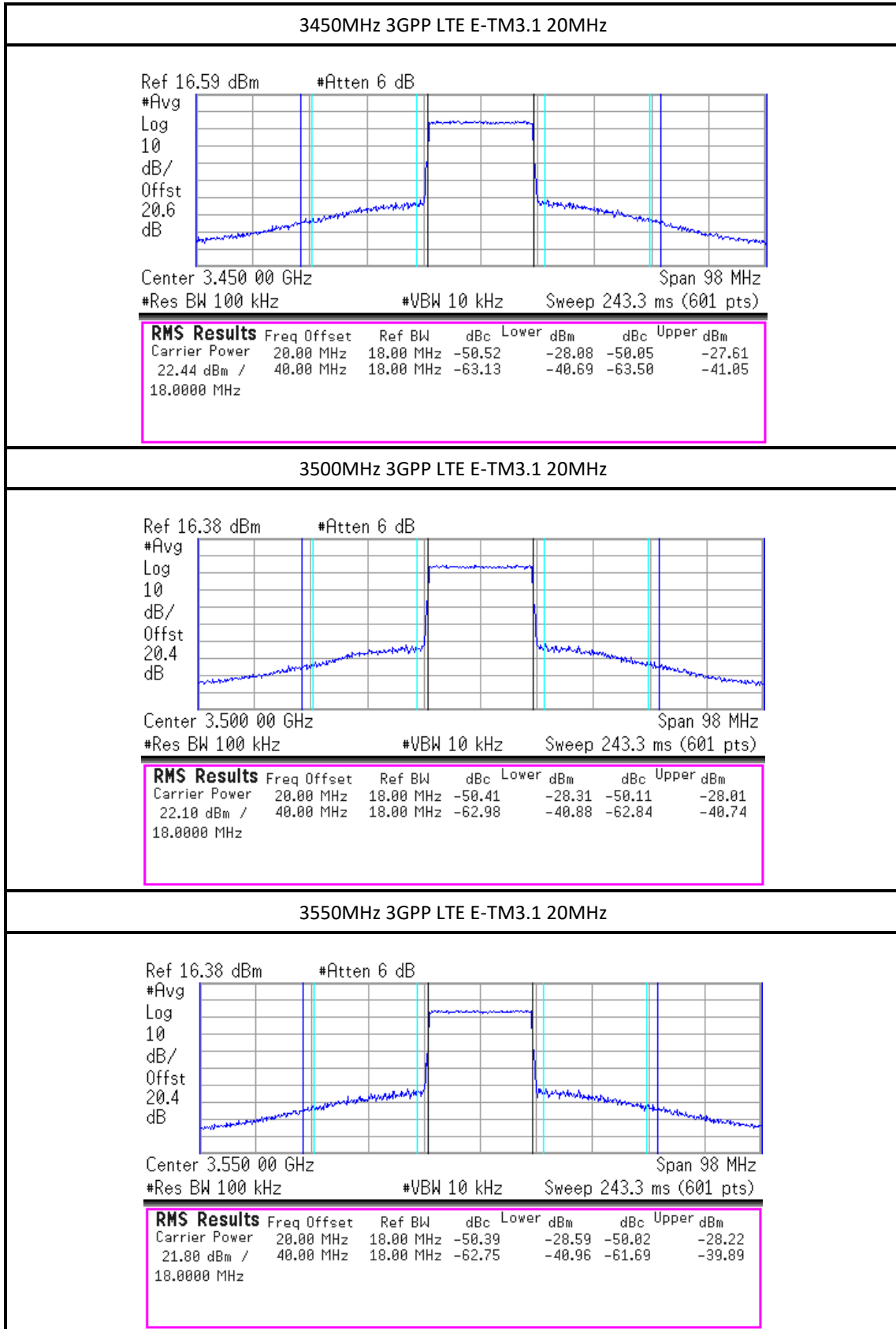
2.1 BMT352 _ 3500MHz Test Result

Freq [MHz]	Vcc [V]	Iref [mA]	Icq [mA]	Gain [dB]	OIP3 [dBm] ⁽¹⁾	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]
3450	5	24	319	20.7	46.8	31.5	-16.6	-7.0	-
3500	5	24	319	20.8	49.0	31.8	-17.3	-6.6	-
3550	5	24	319	20.8	44.8	31.4	-17.4	-6.4	-

(1) OIP3 was tested @Pout=17dBm/tone (CW) 1MHz offset



2.2 BMT352_3500MHz LTE20MHz ACLR Test Result



3. BMT352 _ 3600MHz Application Note

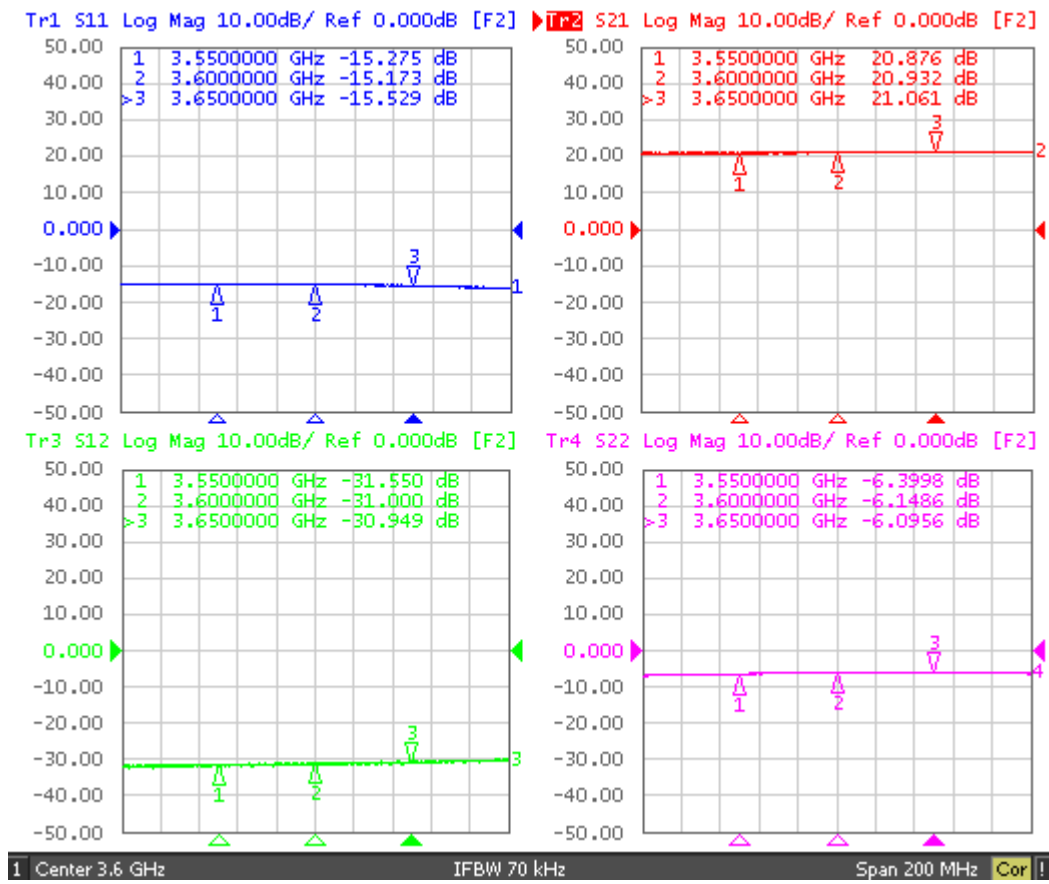
Schematic Diagram		BOM		Marks
	C1	0603	1uF	
	C2	0603	1uF	
	C3	0603	20pF	
	C4	0603	20pF	
	C5	0603	N/A	
	C6	0603	N/A	
	C7	0603	20pF	
	C8	0603	20pF	
	C9	0603	N/A	
	C10	0603	N/A	
	C11	0603	N/A	
	C12	0603	N/A	
	C13	0603	2pF	
	C14	0603	1uF	
	C15	0603	20pF	
	C16	0603	1.2pF	
	C17	0603	0.75pF	
	C18	0603	1.2pF	
L1	0603	18nH		
L2	0805	22nH	Coil	
R1	0603	330 Ω	±5%	
R2	0603	470 Ω	±5%	
R3	0603	20 Ω	±5%	

PCB Diagram		Notice	
	Below information is subject to change as conditions of the substrate.		
	Reference	Object	Distance
	Input pin	C17	8.0mm
	Input pin	C16	1.5mm
Output pin	C18	1.3mm	
<p>3.6GHz_BMT352 Application Circuit QFN3x3_12L PKG Type 1.5W 2Stage_0.4T Ver4.2 PCB=FR-4, Oz=1.0 Er=4.6, RF width=0.64mm, Clearance=0.4mm, HEIGHT=0.4T BEREX_161220</p>			

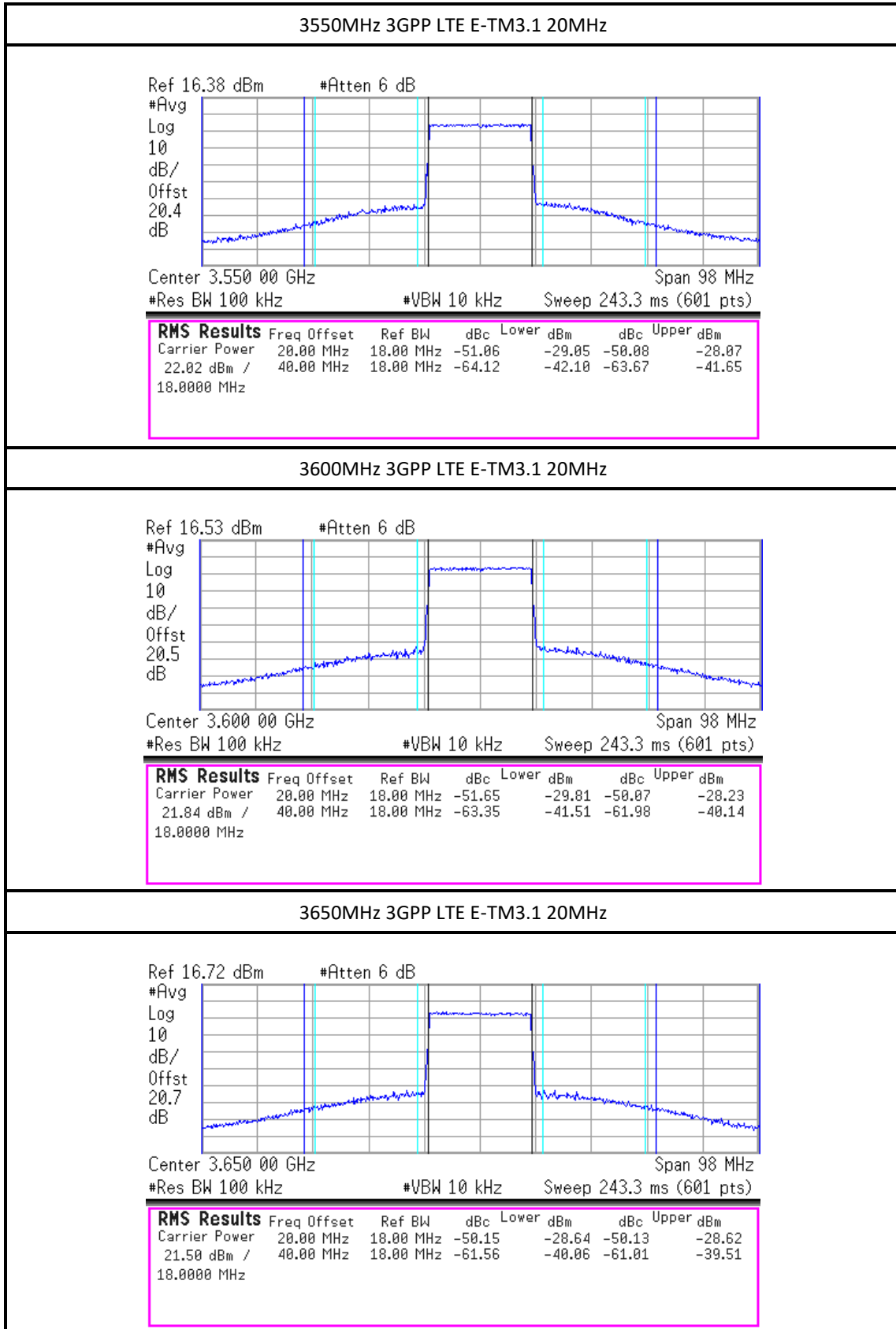
3.1 BMT352 _ 3600MHz Test Result

Freq [MHz]	Vcc [V]	Iref [mA]	Icq [mA]	Gain [dB]	OIP3 [dBm] ⁽¹⁾	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]
3550	5	24	336	20.8	46.0	31.9	-15.2	-6.3	-
3600	5	24	336	20.9	43.3	31.5	-15.1	-6.1	-
3650	5	24	336	21.0	42.0	31.3	-15.5	-6.0	-

(1) OIP3 was tested @Pout=17dBm/tone (CW) 1MHz offset



3.2 BMT352_3600MHz LTE20MHz ACLR Test Result



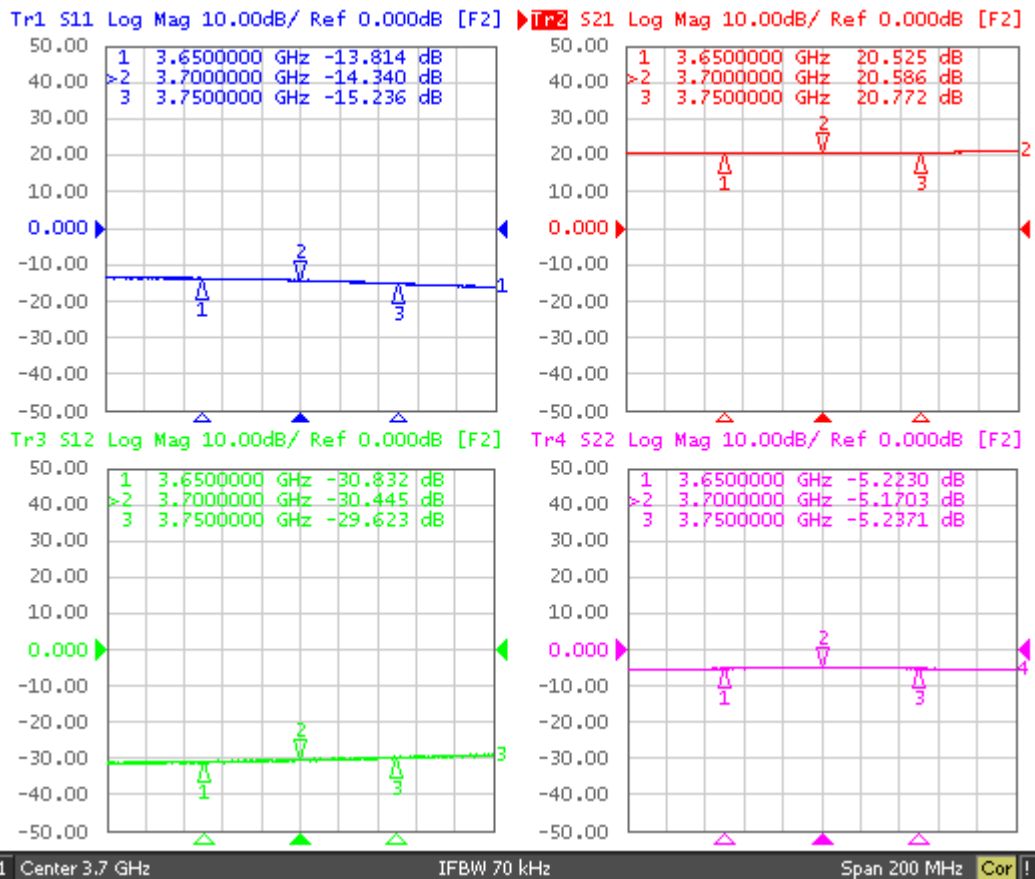
4. BMT352 _ 3700MHz Application Note

Schematic Diagram	BOM	Marks																																																																																												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>C1</td><td>0603</td><td>1uF</td><td></td></tr> <tr><td>C2</td><td>0603</td><td>1uF</td><td></td></tr> <tr><td>C3</td><td>0603</td><td>20pF</td><td></td></tr> <tr><td>C4</td><td>0603</td><td>20pF</td><td></td></tr> <tr><td>C5</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C6</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C7</td><td>0603</td><td>20pF</td><td></td></tr> <tr><td>C8</td><td>0603</td><td>20pF</td><td></td></tr> <tr><td>C9</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C10</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C11</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C12</td><td>0603</td><td>N/A</td><td></td></tr> <tr><td>C13</td><td>0603</td><td>2pF</td><td></td></tr> <tr><td>C14</td><td>0603</td><td>1uF</td><td></td></tr> <tr><td>C15</td><td>0603</td><td>20pF</td><td></td></tr> <tr><td>C16</td><td>0603</td><td>1.2pF</td><td></td></tr> <tr><td>C17</td><td>0603</td><td>0.75pF</td><td></td></tr> <tr><td>C18</td><td>0603</td><td>1.2pF</td><td></td></tr> <tr><td>L1</td><td>0603</td><td>18nH</td><td></td></tr> <tr><td>L2</td><td>0805</td><td>22nH</td><td>Coil</td></tr> <tr><td>R1</td><td>0603</td><td>330 Ω</td><td>±5%</td></tr> <tr><td>R2</td><td>0603</td><td>470 Ω</td><td>±5%</td></tr> <tr><td>R3</td><td>0603</td><td>20 Ω</td><td>±5%</td></tr> </table>	C1	0603	1uF		C2	0603	1uF		C3	0603	20pF		C4	0603	20pF		C5	0603	N/A		C6	0603	N/A		C7	0603	20pF		C8	0603	20pF		C9	0603	N/A		C10	0603	N/A		C11	0603	N/A		C12	0603	N/A		C13	0603	2pF		C14	0603	1uF		C15	0603	20pF		C16	0603	1.2pF		C17	0603	0.75pF		C18	0603	1.2pF		L1	0603	18nH		L2	0805	22nH	Coil	R1	0603	330 Ω	±5%	R2	0603	470 Ω	±5%	R3	0603	20 Ω	±5%	
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<p>3.7GHz_BMT352 Application Circuit QFN3x3_12L PKG Type 1.5W 2Stage_0.4T Ver4.2 PCB=FR-4, Oz=1.0 Er=4.6, RFwidth=0.64mm, Clearance=0.4mm, HEIGHT=0.4T BEREX_161220</p>																																																																																														

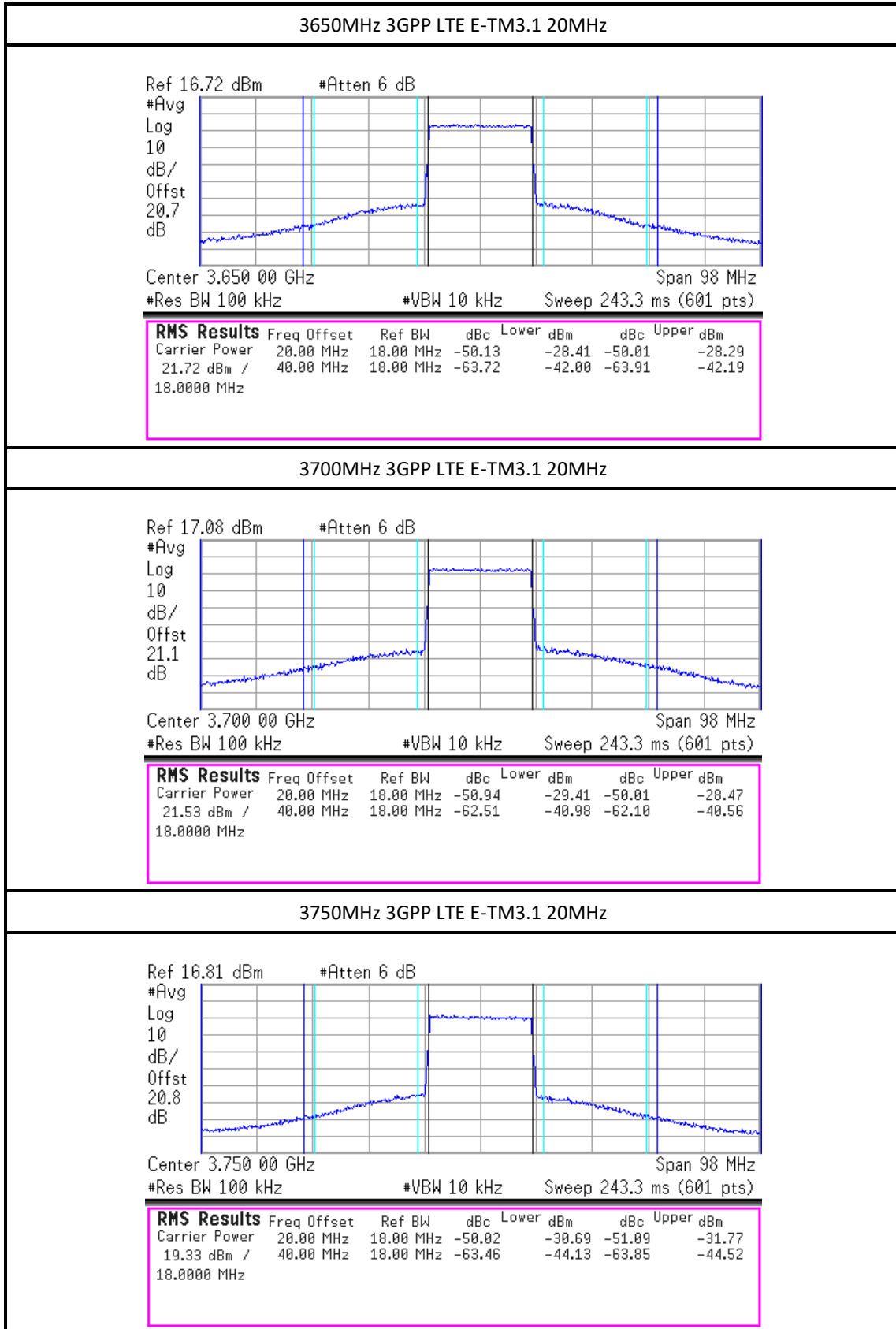
4.1 BMT352 _ 3700MHz Test Result

Freq [MHz]	Vcc [V]	Iref [mA]	Icq [mA]	Gain [dB]	OIP3 [dBm] ⁽¹⁾	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]
3650	5	23	309	20.5	46.4	32.3	-13.8	-5.2	-
3700	5	23	309	20.5	42.9	31.7	-14.3	-5.1	-
3750	5	263	309	20.7	43.6	31.8	-15.2	-5.2	-

(1) OIP3 was tested @Pout=17dBm/tone (CW) 1MHz offset



4.2 BMT352_3700MHz LTE20MHz ACLR Test Result



5. BMT352_3800MHz Application Note

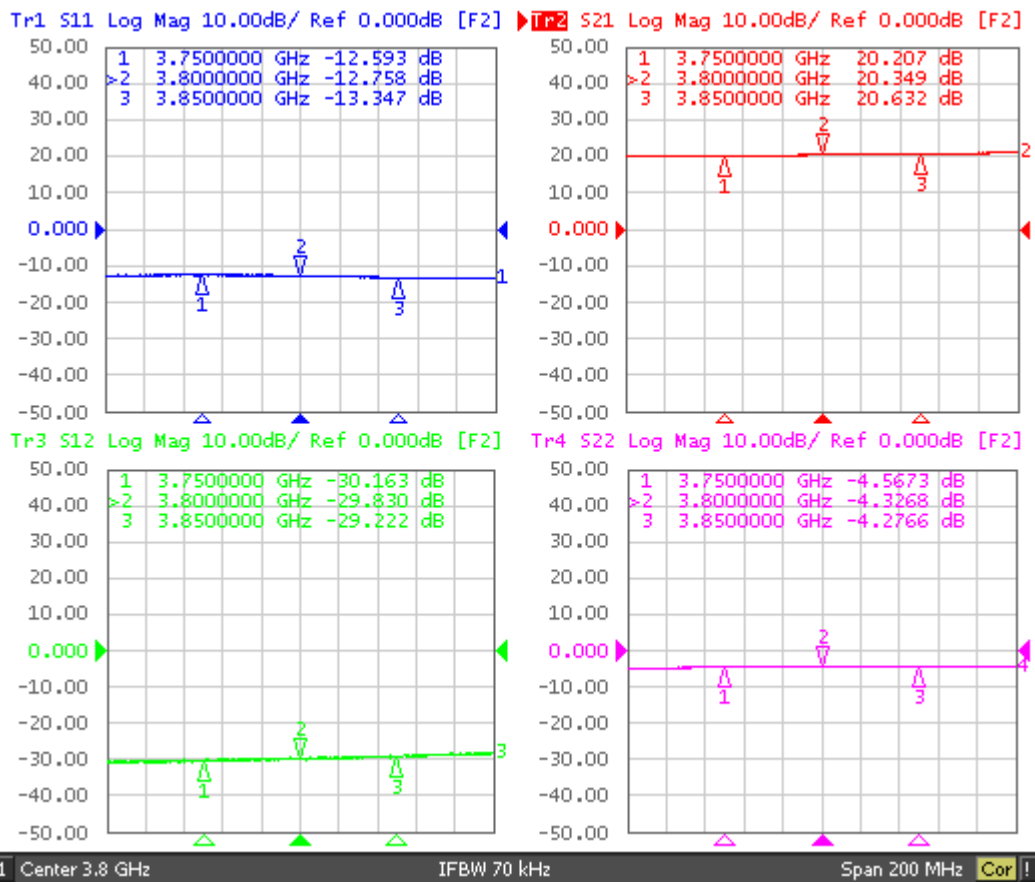
Schematic Diagram	BOM	Marks		
	C1	0603	1uF	
	C2	0603	1uF	
	C3	0603	20pF	
	C4	0603	20pF	
	C5	0603	N/A	
	C6	0603	N/A	
	C7	0603	20pF	
	C8	0603	20pF	
	C9	0603	N/A	
	C10	0603	N/A	
	C11	0603	N/A	
	C12	0603	N/A	
	C13	0603	2pF	
	C14	0603	1uF	
	C15	0603	20pF	
	C16	0603	1.2pF	
	C17	0603	0.75pF	
	C18	0603	1.2pF	
L1	0603	18nH		
L2	0805	22nH	Coil	
R1	0603	330 Ω	±5%	
R2	0603	470 Ω	±5%	
R3	0603	20 Ω	±5%	

PCB Diagram	Notice												
	Below information is subject to change as conditions of the substrate.												
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Reference</th> <th>Object</th> <th>Distance</th> </tr> </thead> <tbody> <tr> <td>Input pin</td> <td>C17</td> <td>7.6mm</td> </tr> <tr> <td>Input pin</td> <td>C16</td> <td>1.0mm</td> </tr> <tr> <td>Output pin</td> <td>C18</td> <td>0.8mm</td> </tr> </tbody> </table>	Reference	Object	Distance	Input pin	C17	7.6mm	Input pin	C16	1.0mm	Output pin	C18	0.8mm
	Reference	Object	Distance										
	Input pin	C17	7.6mm										
Input pin	C16	1.0mm											
Output pin	C18	0.8mm											
<p>3.8GHz_BMT352 Application Circuit QFN3x3_12L PKG Type 1.5W 2Stage_0.4T Ver4.2 PCB=FR-4, Oz=1.0 Er=4.5, RFwidth=0.64mm, Clearance=0.4mm, HEIGHT=0.4T BEREX_161220</p>													

5.1 BMT352 _ 3800MHz Test Result

Freq [MHz]	Vcc [V]	Iref [mA]	Icq [mA]	Gain [dB]	OIP3 [dBm] ⁽¹⁾	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]
3750	5	24	324	20.2	49.2	32.0	-12.5	-4.5	-
3800	5	24	324	20.3	42.7	31.8	-12.7	-4.3	-
3850	5	24	324	20.6	41.7	31.9	-13.3	-4.2	-

(1) OIP3 was tested @Pout=17dBm/tone (CW) 1MHz offset



5.2 BMT352_3800MHz LTE20MHz ACLR Test Result

