

OCCUPIED BANDWIDTH



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

- RBW is 1% - 5% of the occupied bandwidth
- VBW is $\geq 3x$ the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets. FCC 24.238(b) defines the 26dB emission bandwidth requirement.

RSS GEN Section 6.7 defines the 99% emission bandwidth requirement.

GSM/EDGE Emission Designators for the PCS Band (1930 MHz to 1990 MHz)				
Radio Channel	GSM -GMSK		EDGE -8PSK	
	FCC	ISED	FCC	ISED
Low	315KGXW	244KGXW	306KG7W	241KG7W
Mid	314KGXW	245KGXW	307KG7W	241KG7W
High	315KGXW	243KGXW	307KG7W	241KG7W

Note: FCC emission designators are based on 26dB emission bandwidth. ISED emission designators are based on 99% emission bandwidth.

Emission Designator Table

OCCUPIED BANDWIDTH



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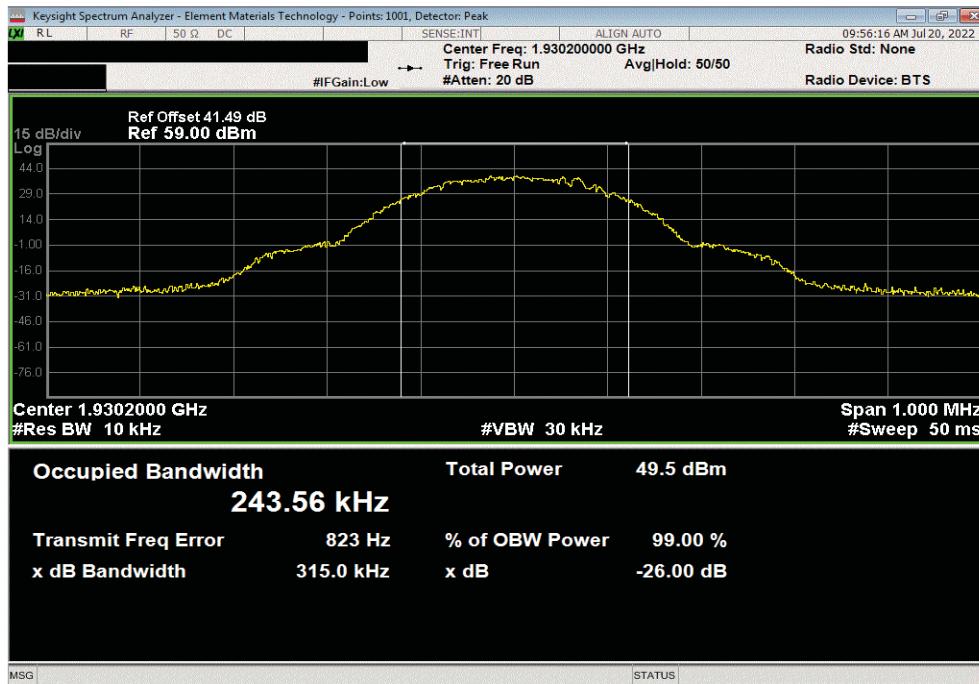
EUT:	AHFII (FCC/ISED C2PC)		Work Order:	NOKI0044					
Serial Number:	YK21400036		Date:	21-Jul-22					
Customer:	Nokia Solutions and Networks		Temperature:	19.8 °C					
Attendees:	David Le		Humidity:	59.6% RH					
Project:	None		Barometric Pres.:	1016 mbar					
Tested by:	Marty Martin	Power:	54 VDC	Job Site:	TX07				
TEST SPECIFICATIONS			Test Method						
FCC 24E:2022			ANSI C63.26:2015						
RSS-133 Issue 6:2013+A1:2018			ANSI C63.26:2015						
COMMENTS									
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. PCS band II GSM carriers are enabled at maximum power (20 watts/carrier).									
DEVIATIONS FROM TEST STANDARD									
None									
Configuration #	2	Signature	Marty Martin	Value 99 (%)	Value 26 dB (MHz)				
Port 1	Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz		Limit	Result					
GMSK Modulation									
Low Channel - 1930.2 MHz			243.562 kHz	314.961 kHz	N/A				
Mid Channel - 1960 MHz			244.549 kHz	314.208 kHz	N/A				
High Channel - 1989.8 MHz			243.483 kHz	314.843 kHz	N/A				
8PSK Modulation									
Low Channel - 1930.2 MHz			240.522 kHz	306.196 kHz	N/A				
Mid Channel - 1960 MHz			240.735 kHz	307.496 kHz	N/A				
High Channel - 1989.8 MHz			241.187 kHz	306.745 kHz	N/A				

OCCUPIED BANDWIDTH

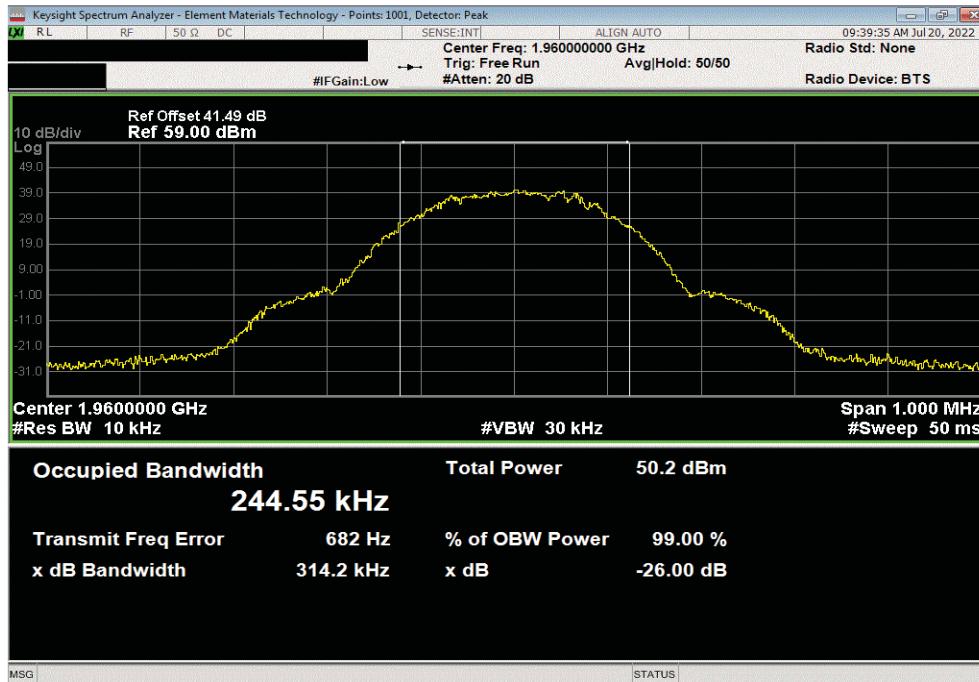


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz				
Value	Value	Limit	Result	
99 (%)	26 dB (MHz)			
243.562 kHz	314.961 kHz	N/A	N/A	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz				
Value	Value	Limit	Result	
99 (%)	26 dB (MHz)			
244.549 kHz	314.208 kHz	N/A	N/A	

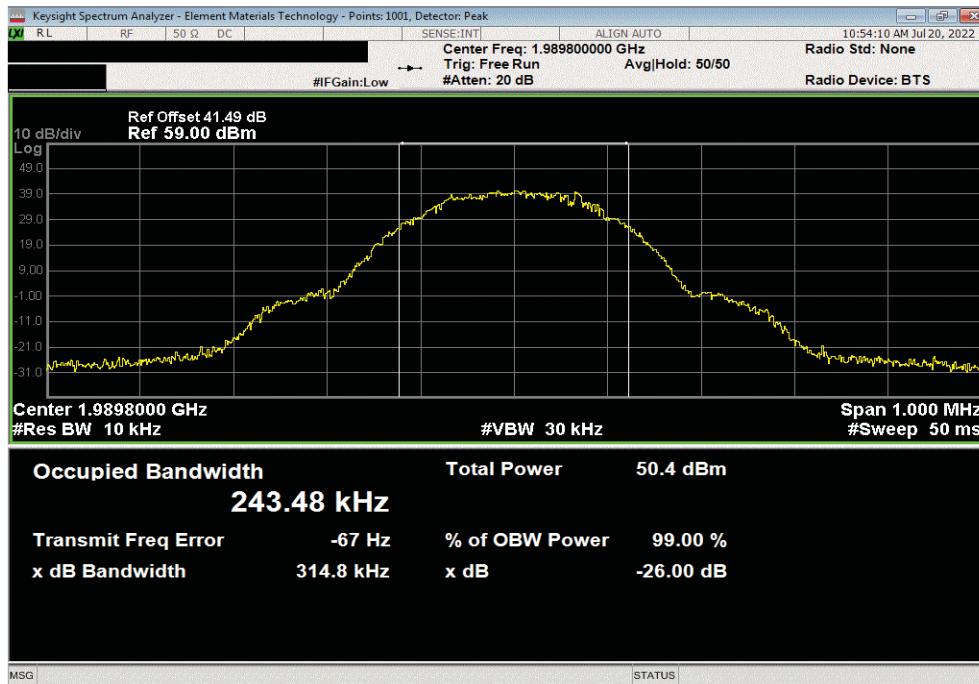


OCCUPIED BANDWIDTH

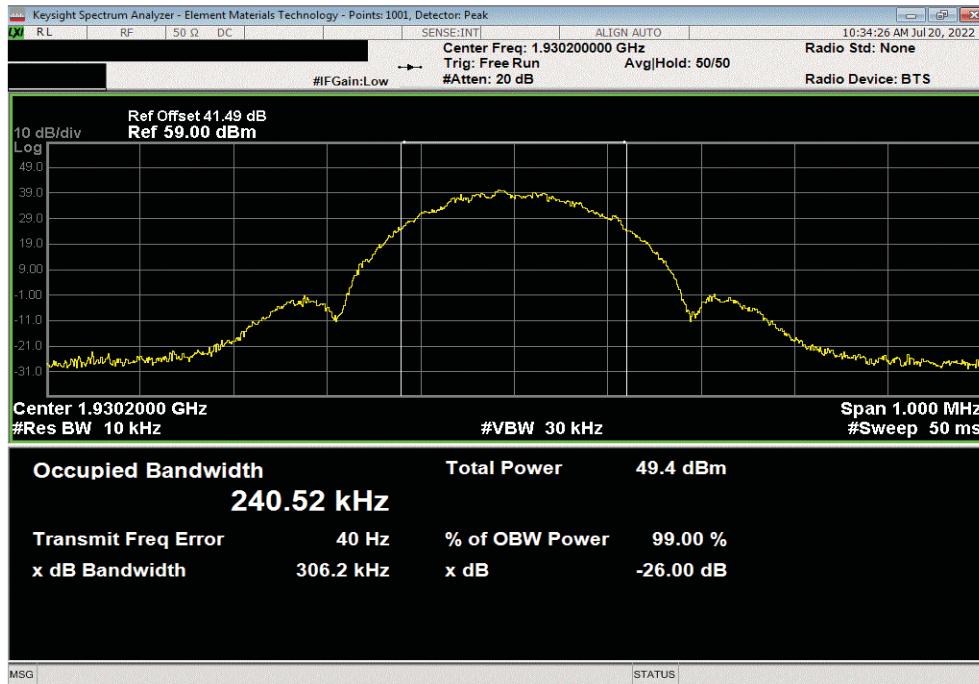


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz					
	Value 99 (%)	Value 26 dB (MHz)	Limit	Result	
	243.483 kHz	314.843 kHz	N/A	N/A	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz					
	Value 99 (%)	Value 26 dB (MHz)	Limit	Result	
	240.522 kHz	306.196 kHz	N/A	N/A	

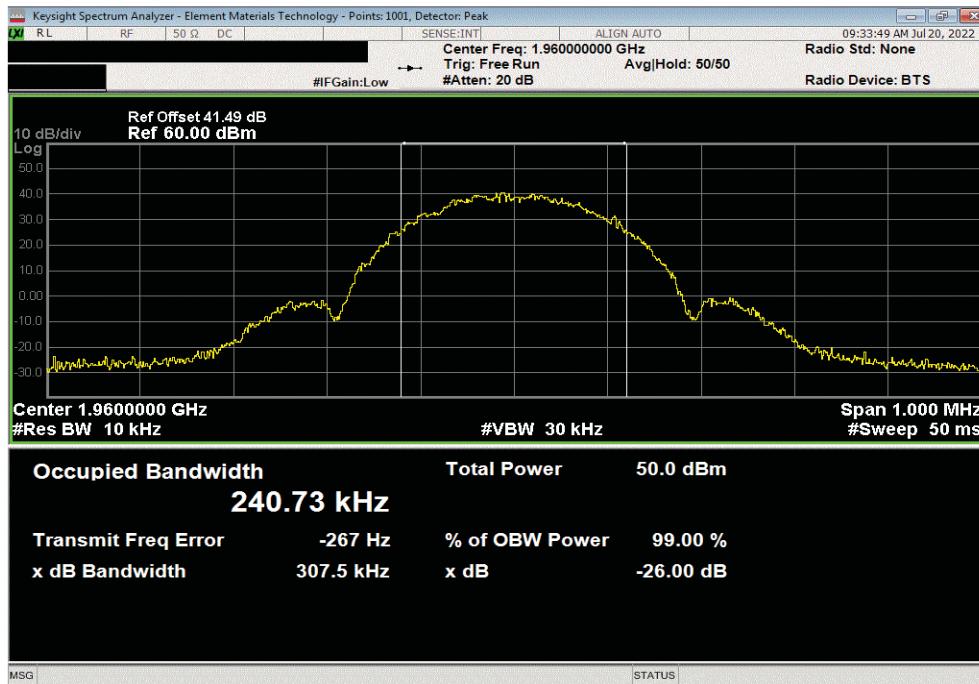


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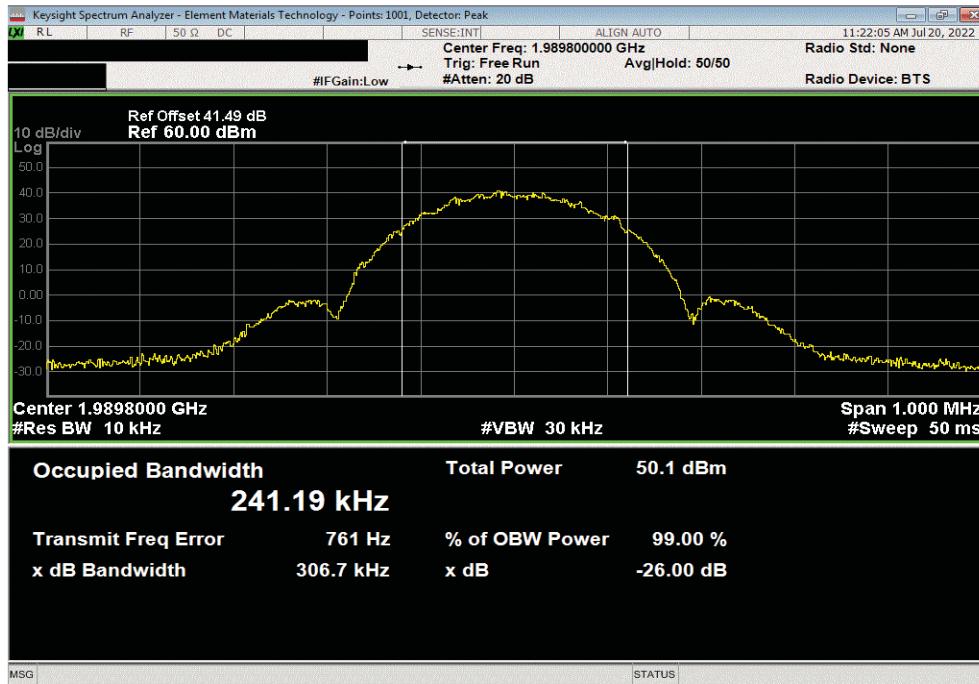


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz					
Value	Value	Limit	Result		
99 (%)	26 dB (MHz)				
	240.735 kHz	307.496 kHz	N/A	N/A	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel - 1989.8 MHz					
Value	Value	Limit	Result		
99 (%)	26 dB (MHz)				
	241.187 kHz	306.745 kHz	N/A	N/A	



PEAK TO AVERAGE POWER (PAPR)



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Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

Because the conducted Output Power was measured using a RMS Average detector, the Peak to Average Power Ratio (PAPR) was measured to show that the maximum peak-max-hold spectrum to the maximum of the average spectrum does not exceed the rule part defined limit.

Peak power was measured as described in ANSI C63.26-2015 section 5.2.3.3.

The peak to average power ratio (PAPR) has been calculated as described in ANSI C63.26-2015 section 5.2.6.

Per FCC part 24.232(d) and RSS-133 6.4, the PAPR limit shall not exceed 13 dB for more than the ANSI described 0.1% of the time.

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

PEAK TO AVERAGE POWER (PAPR)



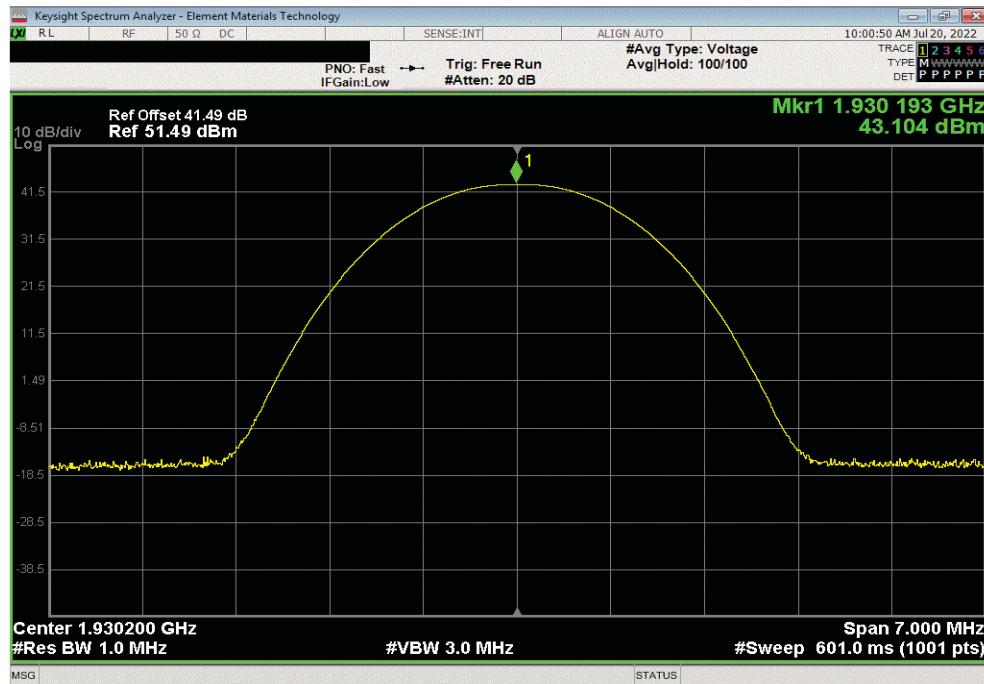
EUT: AHFIU (FCC/ISED C2PC)	Work Order:	NOKI0044																																																												
Serial Number: YK214000036	Date:	21-Jul-22																																																												
Customer: Nokia Solutions and Networks	Temperature:	20 °C																																																												
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COMMENTS																																																														
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. PCS Band II GSM carriers are enabled at maximum power (20 watts/carrier). The output power was measured for a single carrier over the carrier channel bandwidth on port 1. The average power measurements are from Conducted Output Power section (page 23).																																																														
DEVIATIONS FROM TEST STANDARD																																																														
None																																																														
Configuration #	2	Signature																																																												
Port 1																																																														
<table border="1"> <thead> <tr> <th></th> <th>Peak Det dBm/MHz</th> <th>Avg Det dBm/MHz</th> <th>PAPR (dB)</th> <th>PAPR Limit (dB)</th> <th>Results</th> </tr> </thead> <tbody> <tr> <td>Band 2 2G GSM EDGE 1930.0 - 1990.0 MHz</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="6">GMSK Modulation</td> </tr> <tr> <td>Low Channel - 1930.2 MHz</td> <td>43.104</td> <td>42.8</td> <td>0.3</td> <td>13</td> <td>Pass</td> </tr> <tr> <td>Mid Channel - 1960 MHz</td> <td>43.788</td> <td>43.4</td> <td>0.4</td> <td>13</td> <td>Pass</td> </tr> <tr> <td>High Channel - 1989.8 MHz</td> <td>43.953</td> <td>43.6</td> <td>0.4</td> <td>13</td> <td>Pass</td> </tr> <tr> <td colspan="6">8PSK Modulation</td> </tr> <tr> <td>Low Channel - 1930.2 MHz</td> <td>46.122</td> <td>42.7</td> <td>3.4</td> <td>13</td> <td>Pass</td> </tr> <tr> <td>Mid Channel - 1960 MHz</td> <td>46.787</td> <td>43.4</td> <td>3.4</td> <td>13</td> <td>Pass</td> </tr> <tr> <td>High Channel - 1989.8 MHz</td> <td>46.969</td> <td>43.6</td> <td>3.4</td> <td>13</td> <td>Pass</td> </tr> </tbody> </table>				Peak Det dBm/MHz	Avg Det dBm/MHz	PAPR (dB)	PAPR Limit (dB)	Results	Band 2 2G GSM EDGE 1930.0 - 1990.0 MHz						GMSK Modulation						Low Channel - 1930.2 MHz	43.104	42.8	0.3	13	Pass	Mid Channel - 1960 MHz	43.788	43.4	0.4	13	Pass	High Channel - 1989.8 MHz	43.953	43.6	0.4	13	Pass	8PSK Modulation						Low Channel - 1930.2 MHz	46.122	42.7	3.4	13	Pass	Mid Channel - 1960 MHz	46.787	43.4	3.4	13	Pass	High Channel - 1989.8 MHz	46.969	43.6	3.4	13	Pass
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PEAK TO AVERAGE POWER (PAPR)

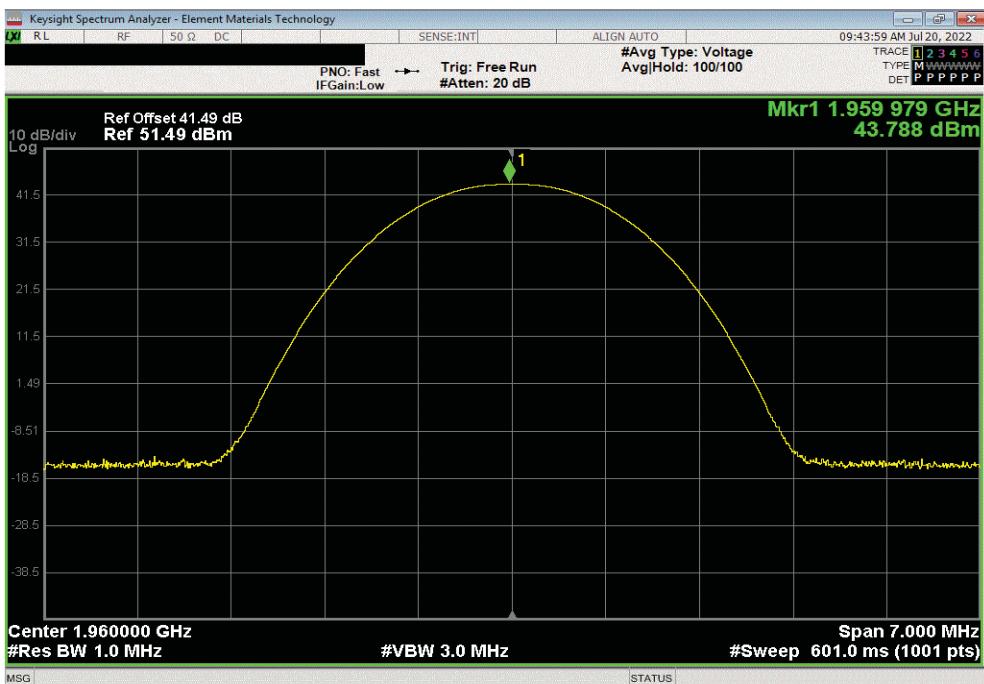


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz				
Peak Det	dBm/MHz	Results		
	43.104			N/A



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz				
Peak Det	dBm/MHz	Results		
	43.788			N/A

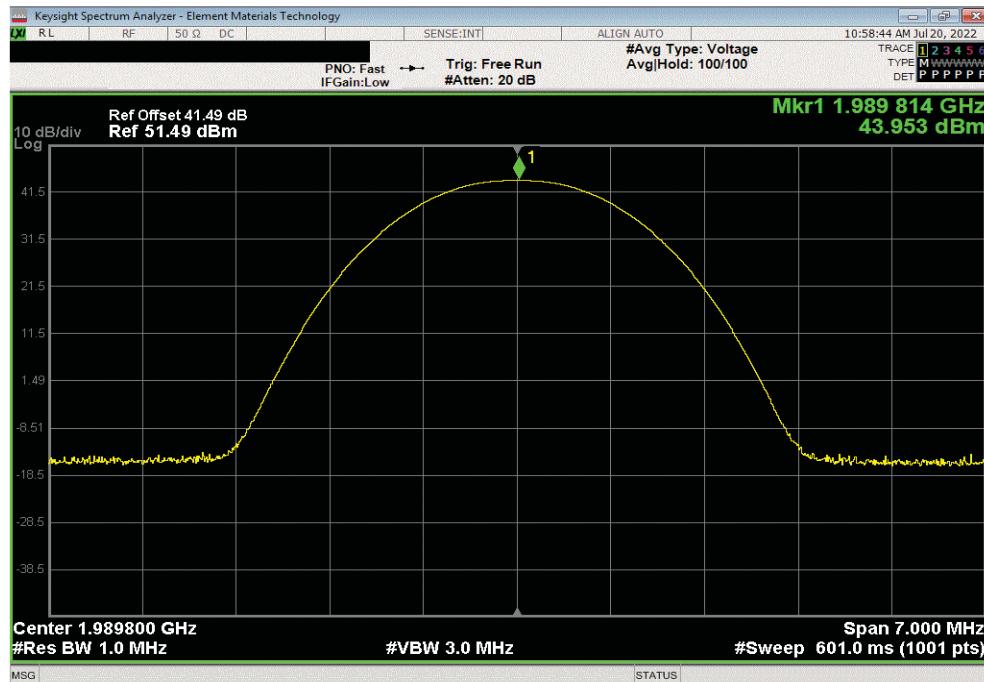


PEAK TO AVERAGE POWER (PAPR)

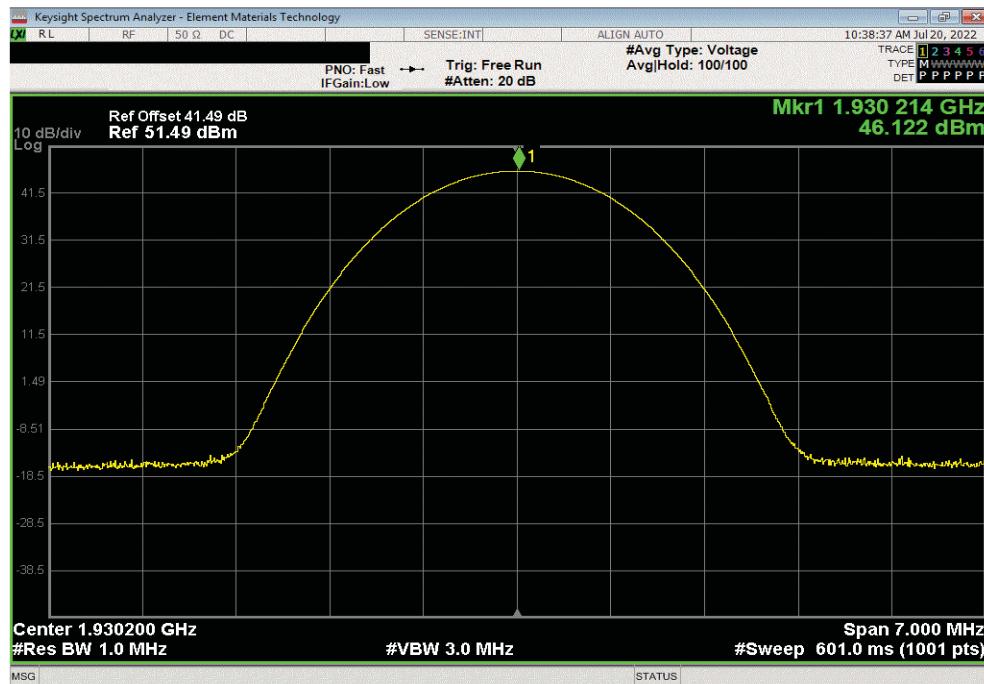


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz				Peak Det dBm/MHz	Results
				43.953	N/A



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz				Peak Det dBm/MHz	Results
				46.122	N/A

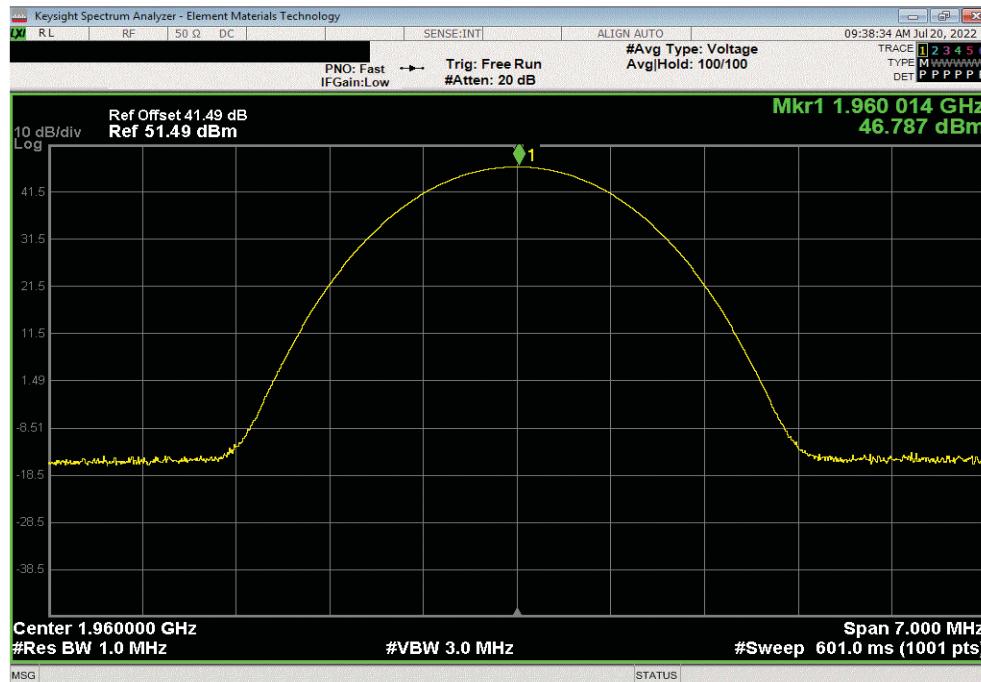


PEAK TO AVERAGE POWER (PAPR)

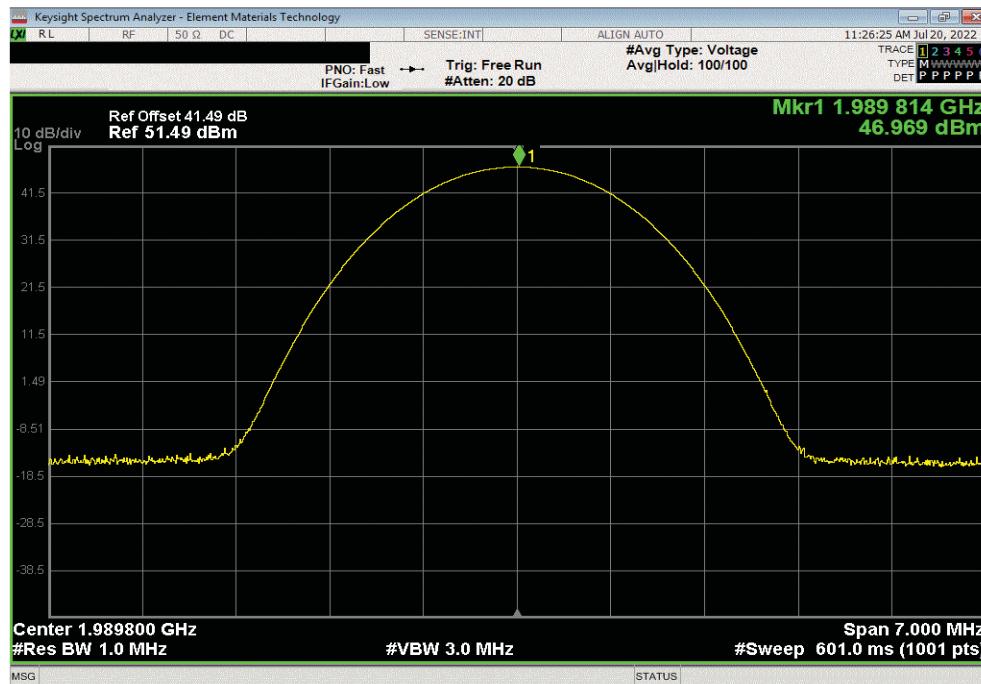


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz				
		Peak Det dBm/MHz	Results	
		46.787		N/A



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel - 1989.8 MHz				
		Peak Det dBm/MHz	Results	
		46.969		N/A



BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a) and RSS 133 6.5(i). The GSM/EDGE carriers are not MIMO.

The RBW to be used for these measurements are per FCC 24.238(b), and RSS-133 6.5. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

Multicarrier test cases have been developed as shown below.

Multicarrier Test Case 1: In the PCS band (Band 2) _Three GSM/EDGE carriers (operating at maximum power ~20W/carrier) using two carriers (with minimum spacing between carrier frequencies) at the lower band edge +1 (1930.4 & 1930.8MHz) and a third carrier with maximum spacing between the other two carrier frequencies at the upper band edge -1 (1989.6MHz). A single LTE1.4 carrier operating at maximum power (20W) at Band 2 middle channel (1960.0MHz). In the AWS band _ Single LTE10 carrier at 40W at the middle channel (2155.0MHz).

The carriers are operated at maximum power (~20W/PCS carrier and 40W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carrier).

Multicarrier Test Case 2: In the PCS band (Band 2) _Three GSM/EDGE carriers (operating at reduced power level) using two carriers (with minimum spacing between carrier frequencies) at the lower band edge (1930.2 & 1930.6MHz) and a third carrier with maximum spacing between the other two carrier frequencies at the upper band edge (1989.8MHz). A single LTE1.4 carrier operating at maximum power (20W) at Band 2 middle channel (1960.0MHz). In the AWS band _ Single LTE10 carrier at 40W at the middle channel (2155.0MHz). The GSM carriers are operated at reduced power level that will pass at upper and lower band edges.

BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



TxDx 2022.05.02.0 Xmit 2022.02.07.0

EUT: AHFII (FCC/ISED C2PC)	Work Order: NOKI0044			
Serial Number: YK214000036	Date: 21-Jul-22			
Customer: Nokia Solutions and Networks	Temperature: 20.7 °C			
Attendees: David Le	Humidity: 58.3% RH			
Project: None	Barometric Pres.: 1017 mbar			
Tested by: Marty Martin	Job Site: TX07			
TEST SPECIFICATIONS	Power: 54 VDC			
FCC 24E:2022	Test Method			
RSS-133 Issue 6:2013+A1:2018	ANSI C63.26:2015			
COMMENTS	ANSI C63.26:2015			
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. AHFII GSM carriers are required to be operated with a 3G, 4G or 5G RAT carrier in the PCS band. Carrier are enabled as described in test description. Test Case 1 GSM carriers were operated at maximum power (20W/carrier or 43.0 dBm/carrier), with maximum band and port power. Test Case 2 GSM carrier power level was reduced by 4.0 dB (39.0 dBm/carrier or 8.0W/carrier).				
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	2			
Signature				
Port 1	Frequency Range	Max Value (dBm)	Limit < (dBm)	Result
GMSK Modulation				
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	1	-30.22	-13	Pass
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	2	-22.91	-13	Pass
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	3	-25.33	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	1	-30.15	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	2	-19.92	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	3	-22.22	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	1	-15.59	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	2	-24.33	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	3	-26.36	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	1	-14.64	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	2	-24.06	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	3	-25.23	-13	Pass
8PSK Modulation				
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	1	-30.12	-13	Pass
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	2	-22.9	-13	Pass
Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz	3	-24.41	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	1	-29.51	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	2	-20.64	-13	Pass
Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	3	-22.55	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	1	-18.46	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	2	-24.39	-13	Pass
Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz	3	-26.23	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	1	-17.96	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	2	-24.02	-13	Pass
Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	3	-25.01	-13	Pass

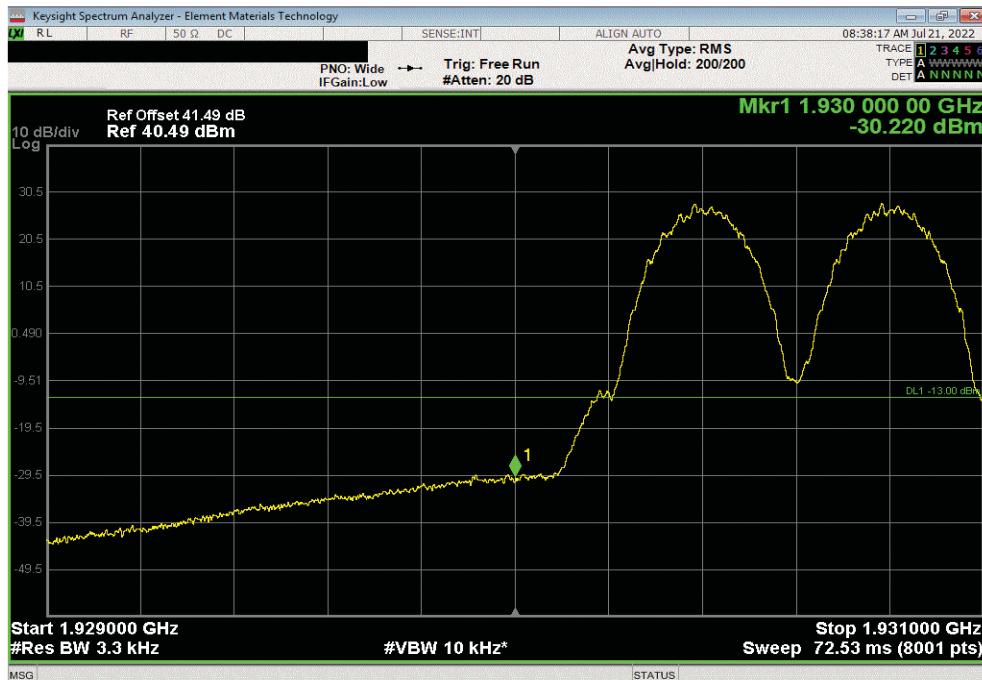
BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



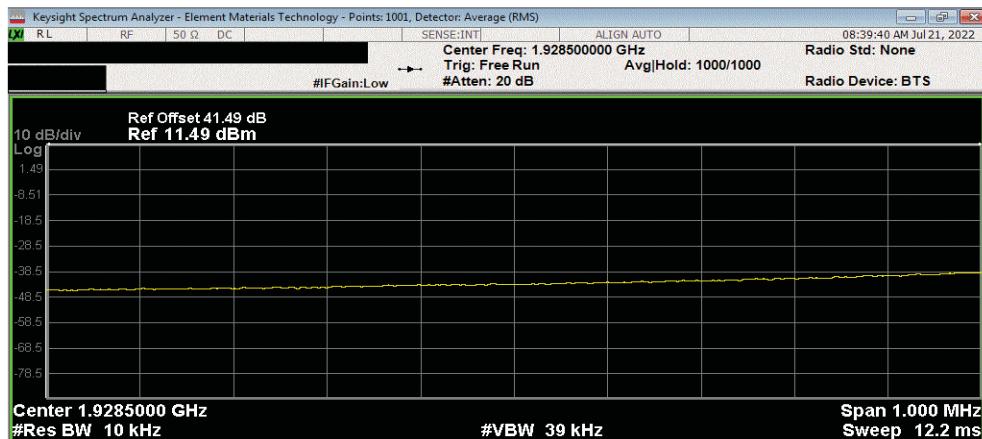
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Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz						
Frequency Range	Max Value (dBm)		Limit < (dBm)	Result		
1	-30.22	-13	Pass			



Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz						
Frequency Range	Max Value (dBm)			Limit < (dBm)	Result	
2	-22.91	-13	Pass			



Channel Power

Power Spectral Density

-22.91 dBm / 1 MHz

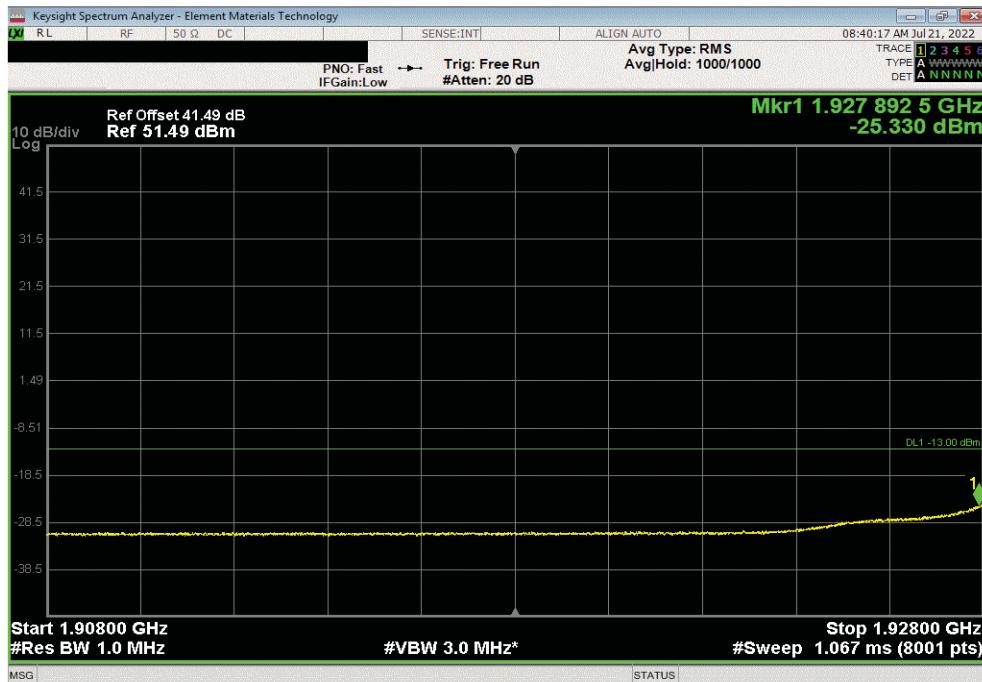
-82.91 dBm /Hz

BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

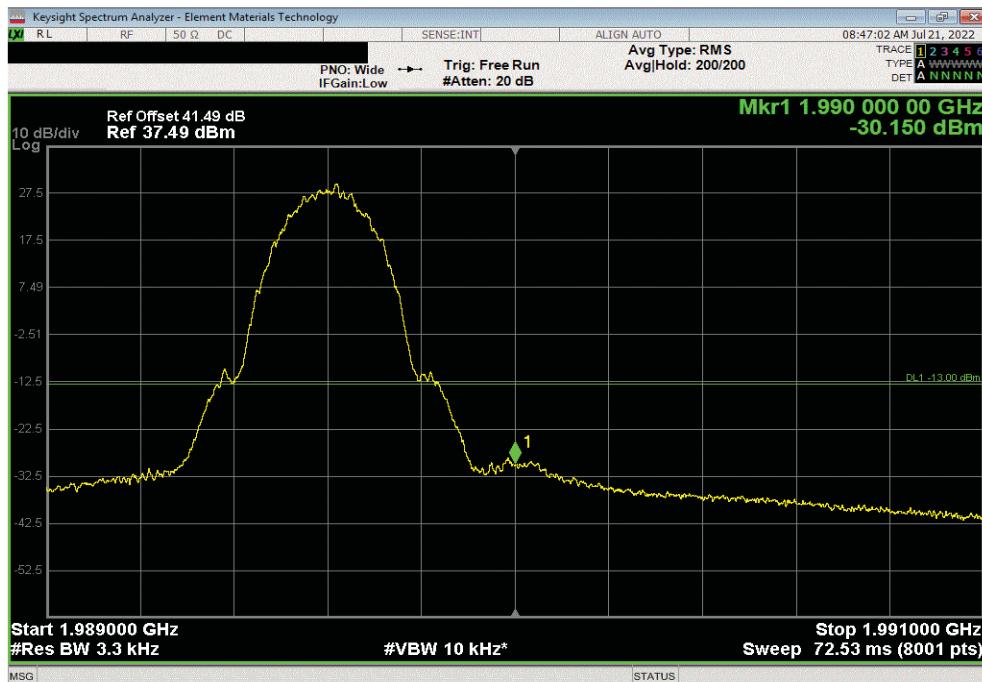


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Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-25.33	-13	Pass		



Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-30.15	-13	Pass		

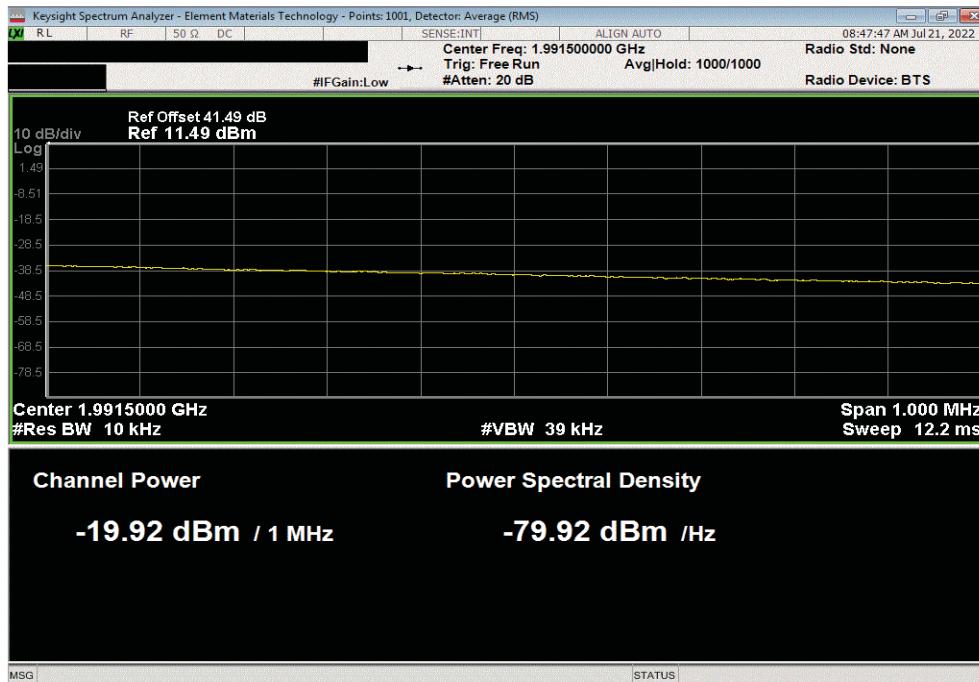


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

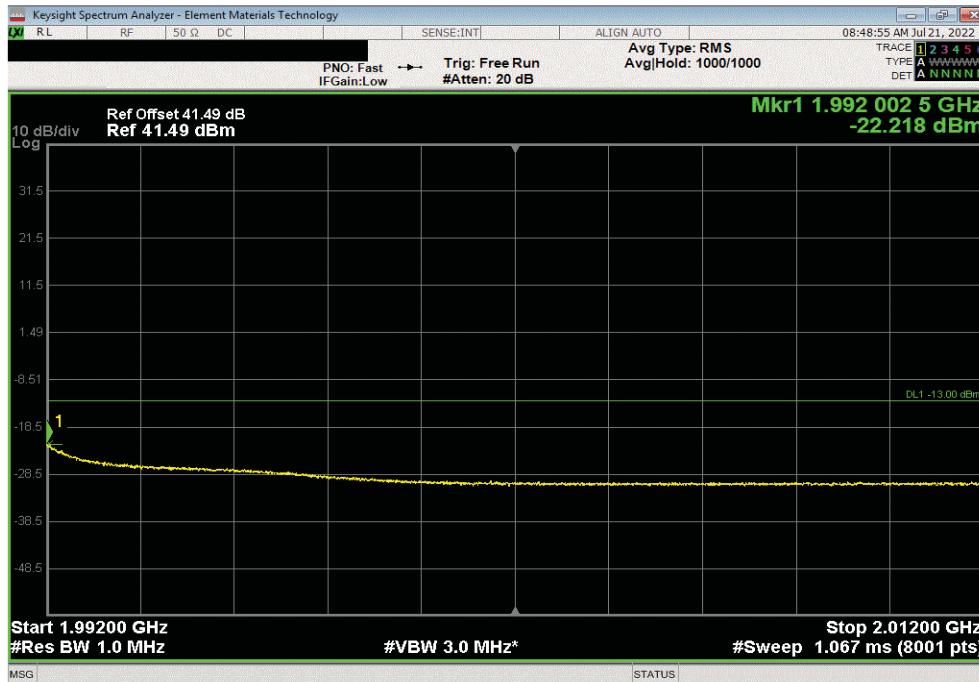


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	2	-19.92	-13	Pass	



Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-22.22	-13	Pass	

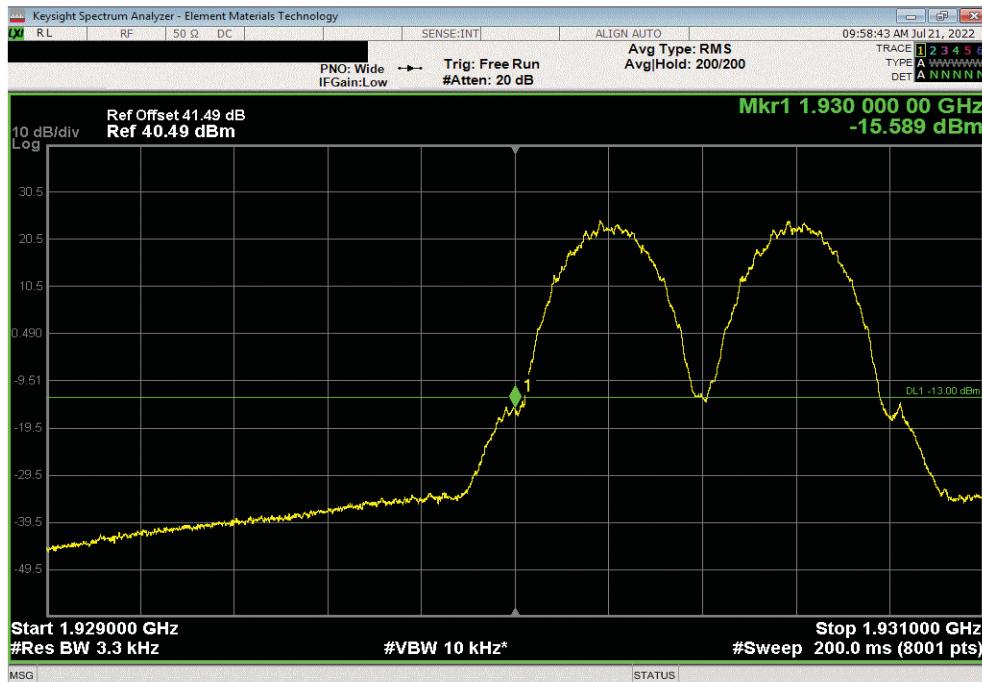


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

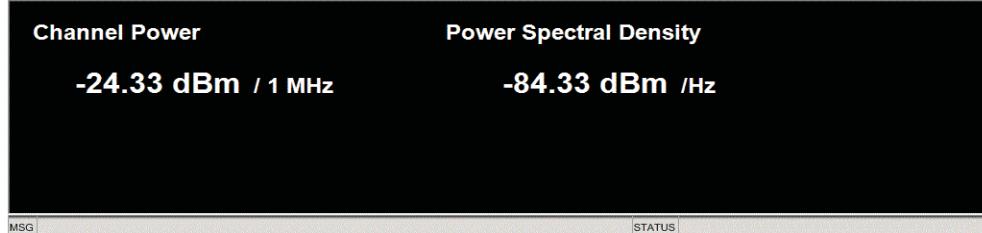
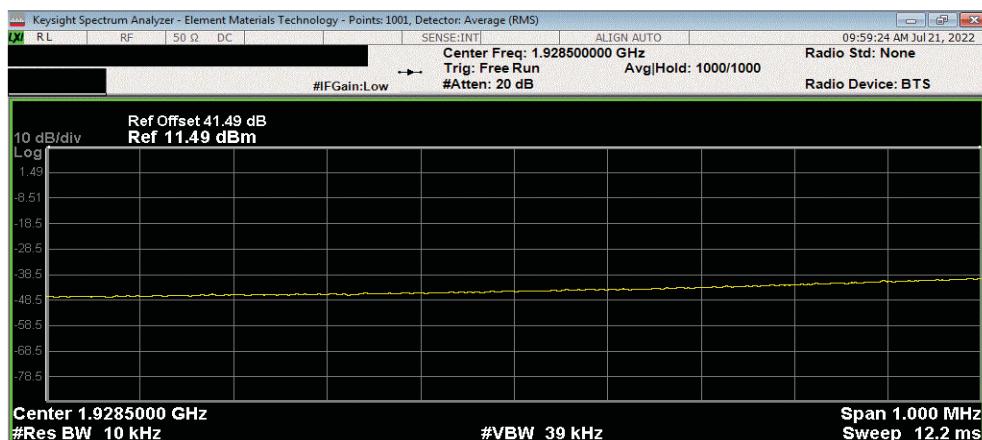


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-15.59	-13	Pass		



Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE Low Chanel 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-24.33	-13	Pass		

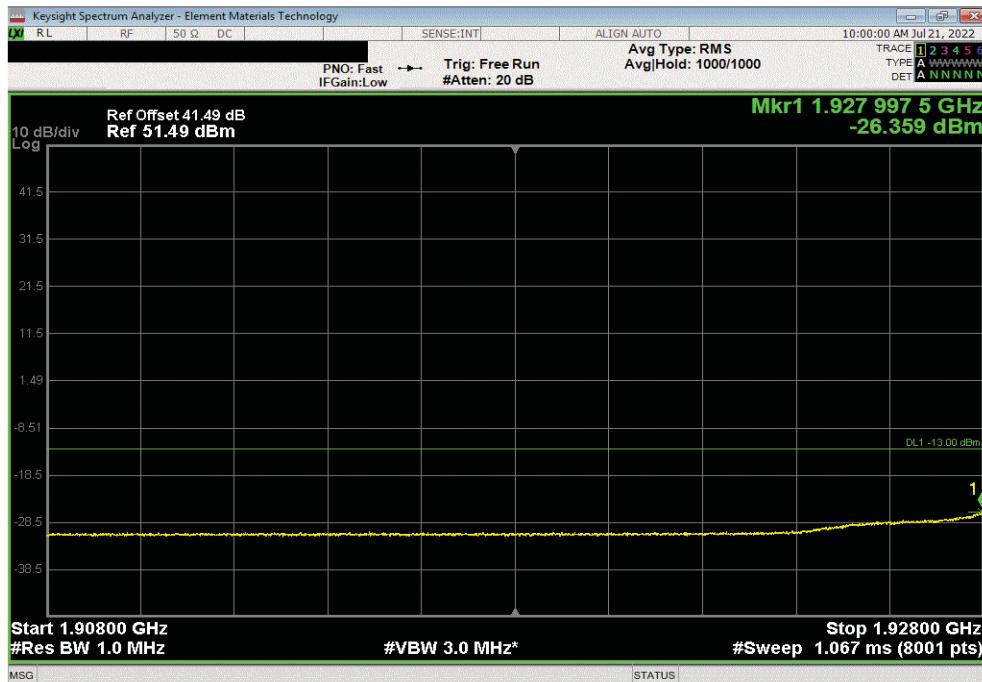


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-26.36	-13	Pass		



Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-14.64	-13	Pass		

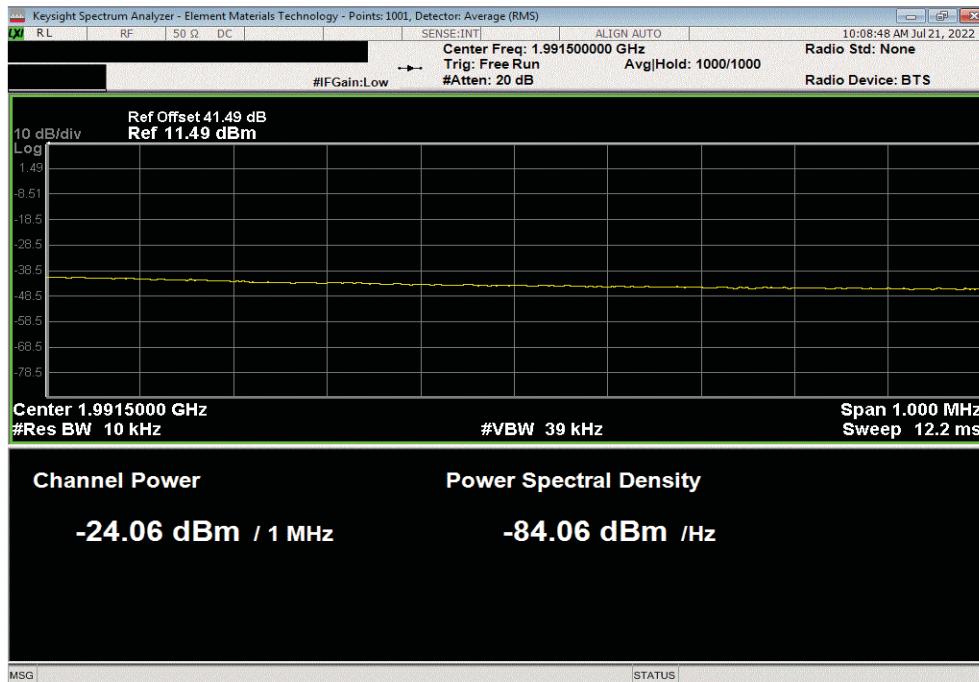


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-2.41E+01	-13	Pass		



Port 1, GMSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-25.23	-13	Pass		

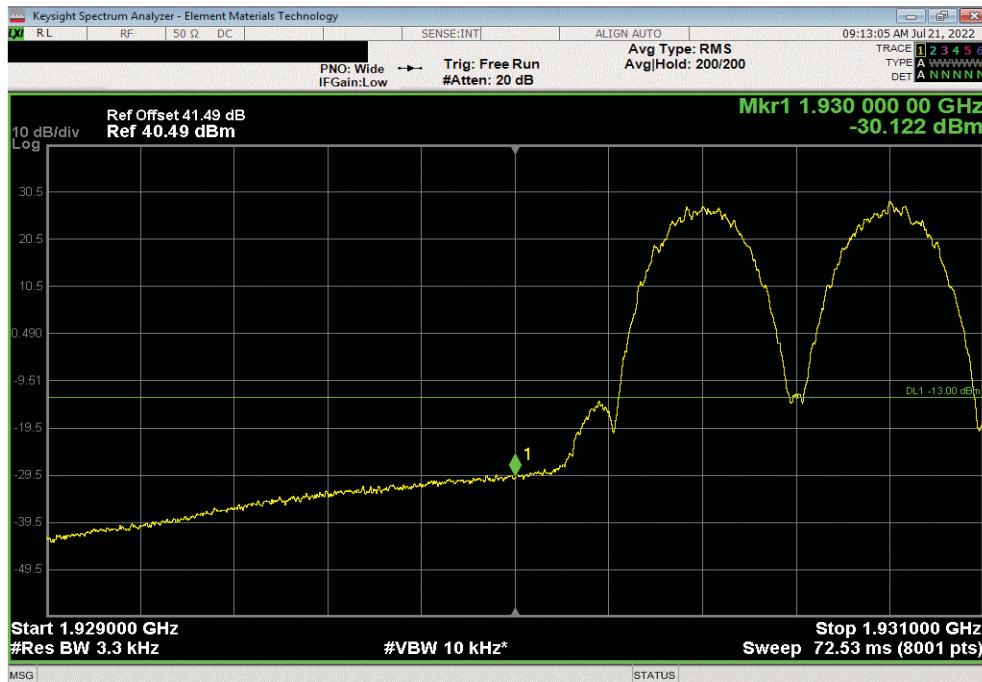


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

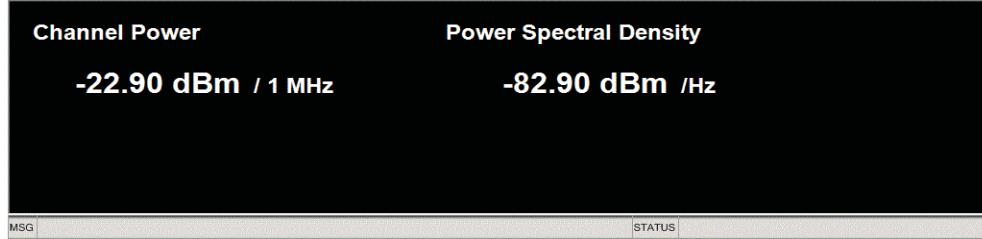


TbTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-30.12	-13	Pass		



Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-2.29E+01	-13	Pass		

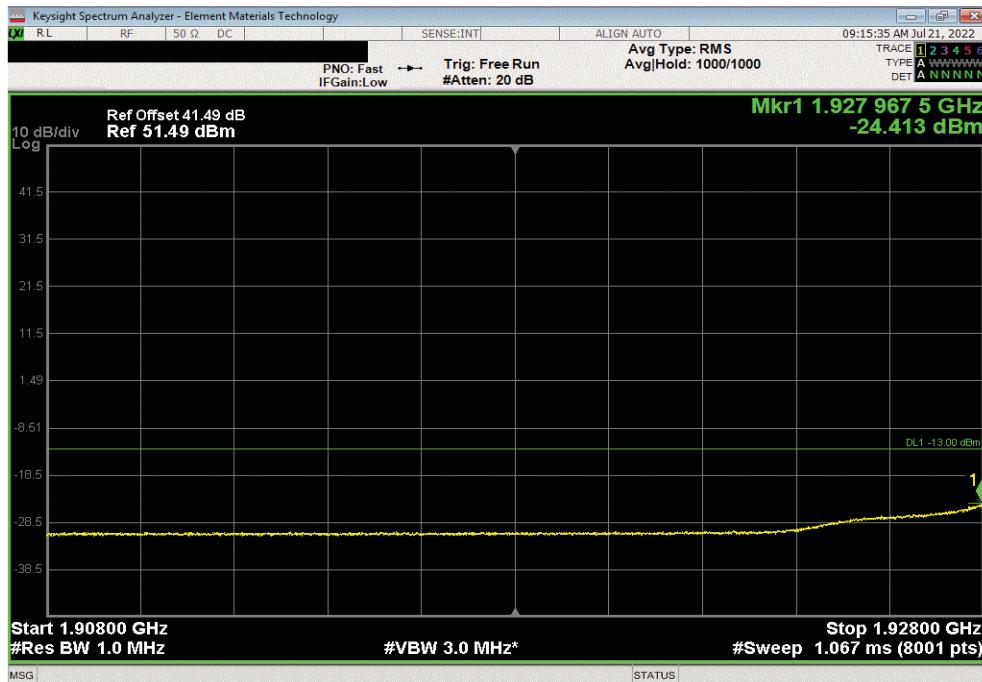


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

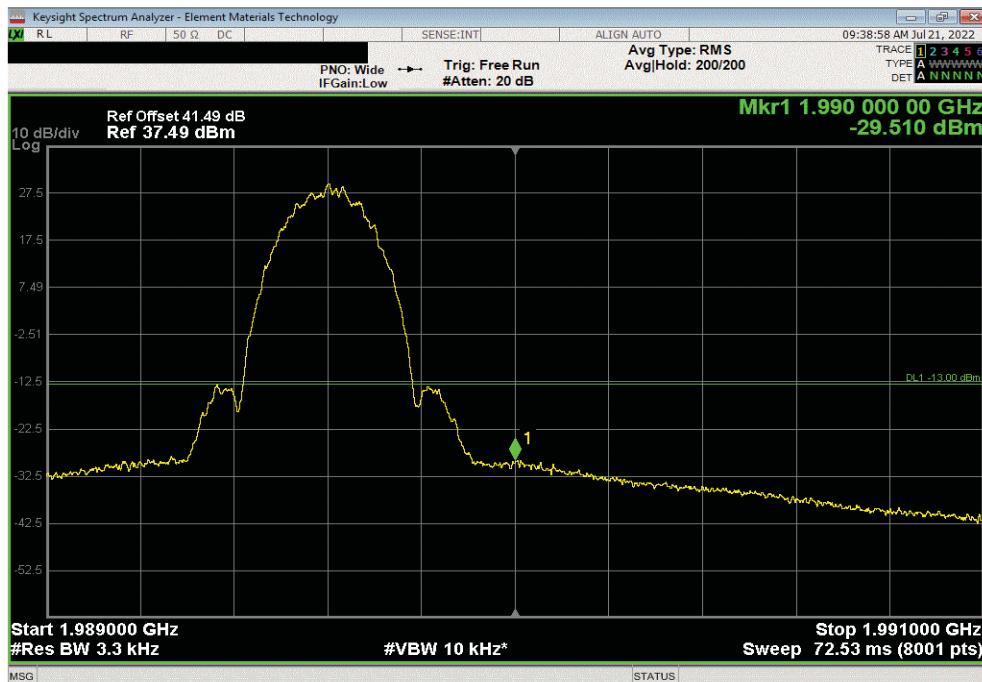


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-24.41	-13	Pass		



Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-29.51	-13	Pass		

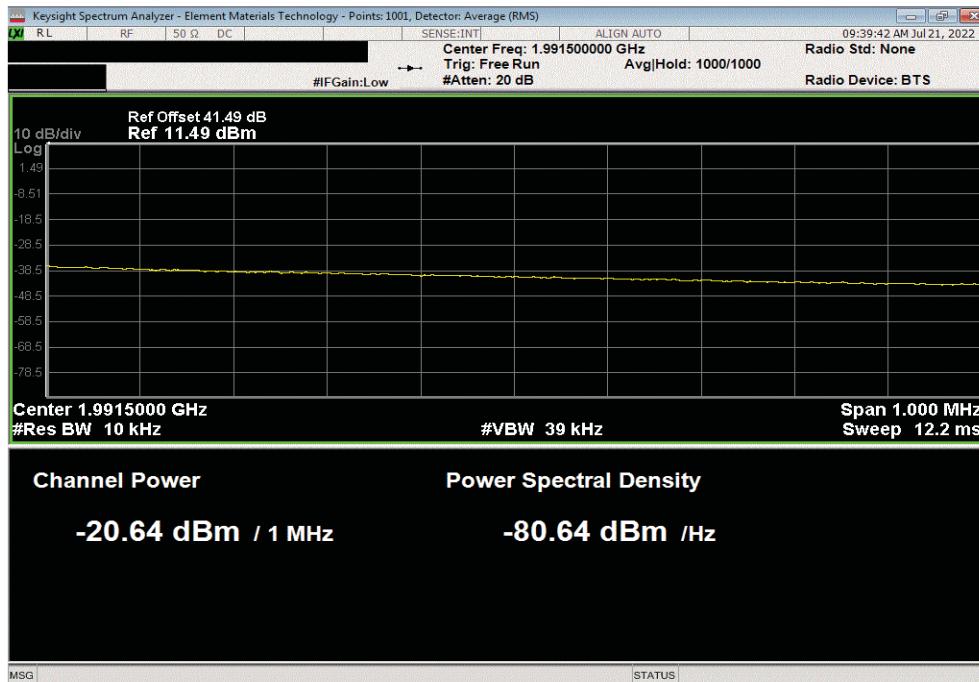


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

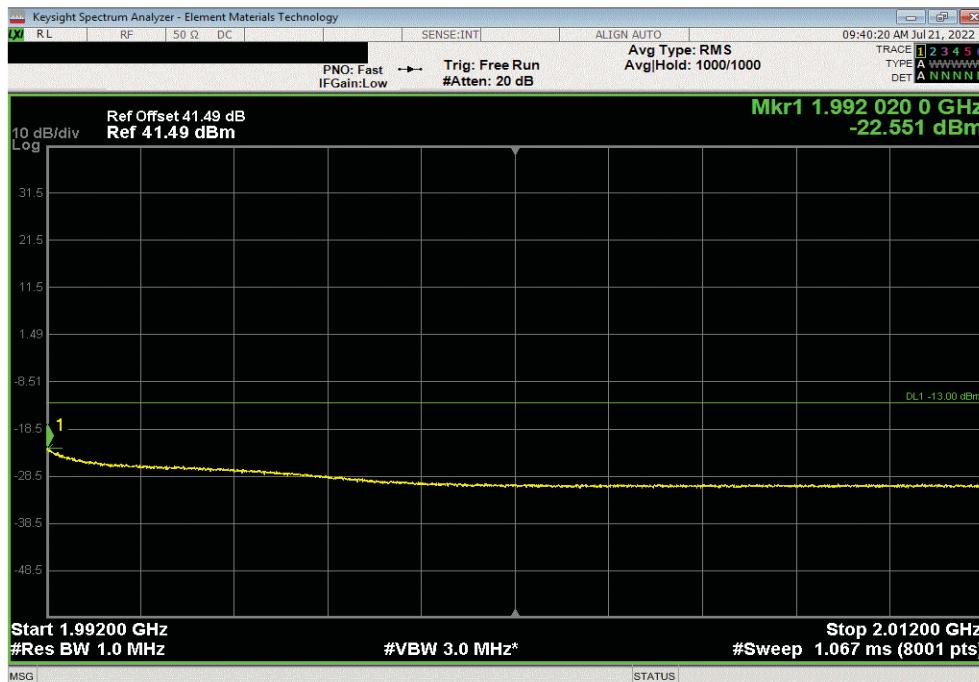


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	2	-20.64	-13	Pass	



Port 1, 8PSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-22.55	-13	Pass	



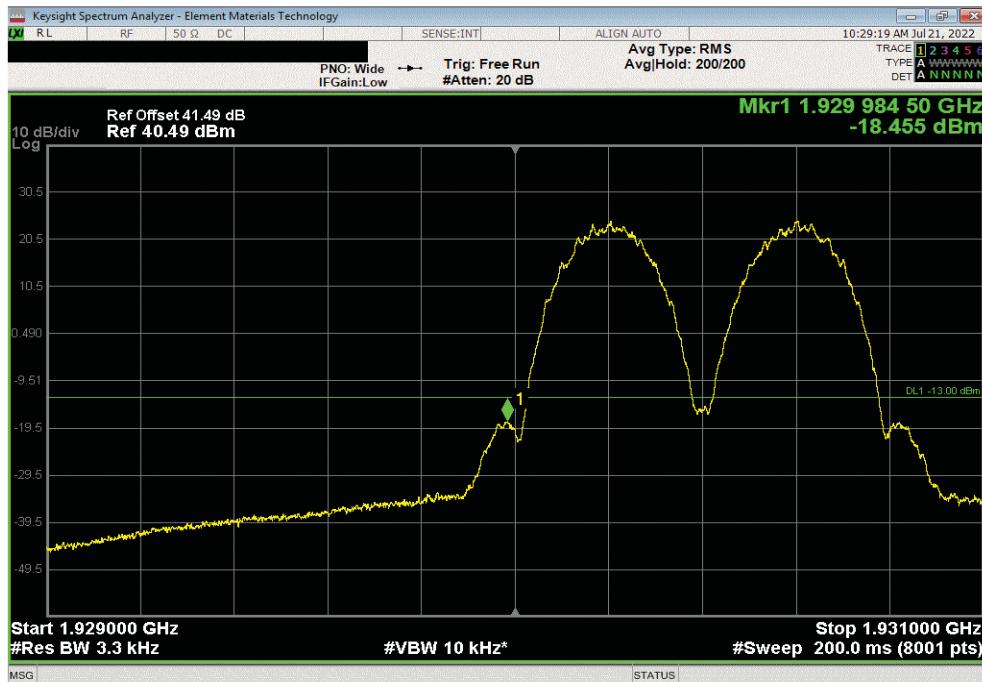
BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



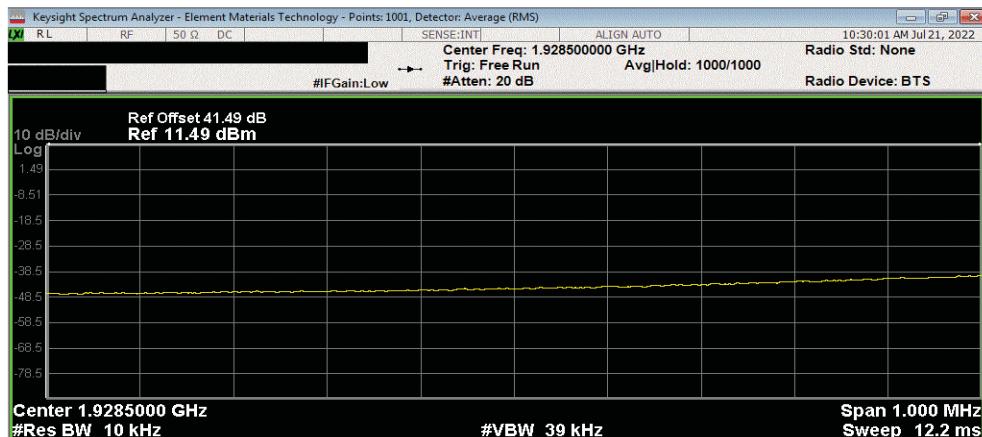
TbtTx 2022.05.02.0

XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM EDGE Low Chanel 1930.2 MHz						
Frequency Range	Max Value (dBm)		Limit < (dBm)	Result		
1	-18.46	-13	Pass			



Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM EDGE Low Chanel 1930.2 MHz						
Frequency Range	Max Value (dBm)			Limit < (dBm)		Result
2	-24.39			-13		Pass



Channel Power

Power Spectral Density

-24.39 dBm / 1 MHz

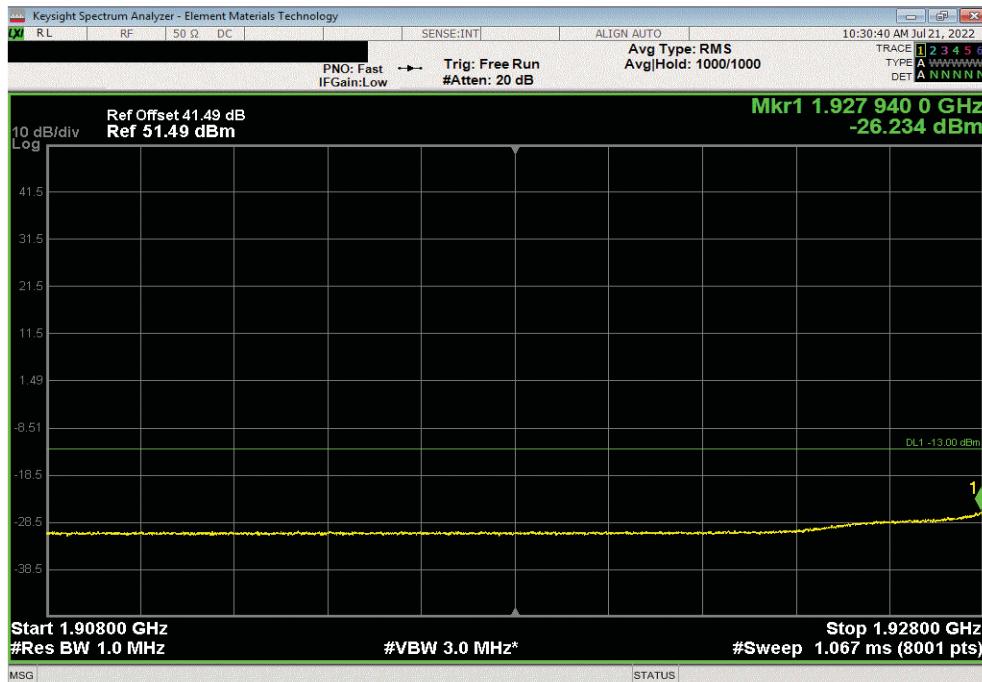
-84.39 dBm /Hz

BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-26.23	-13	Pass		



Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-17.96	-13	Pass		

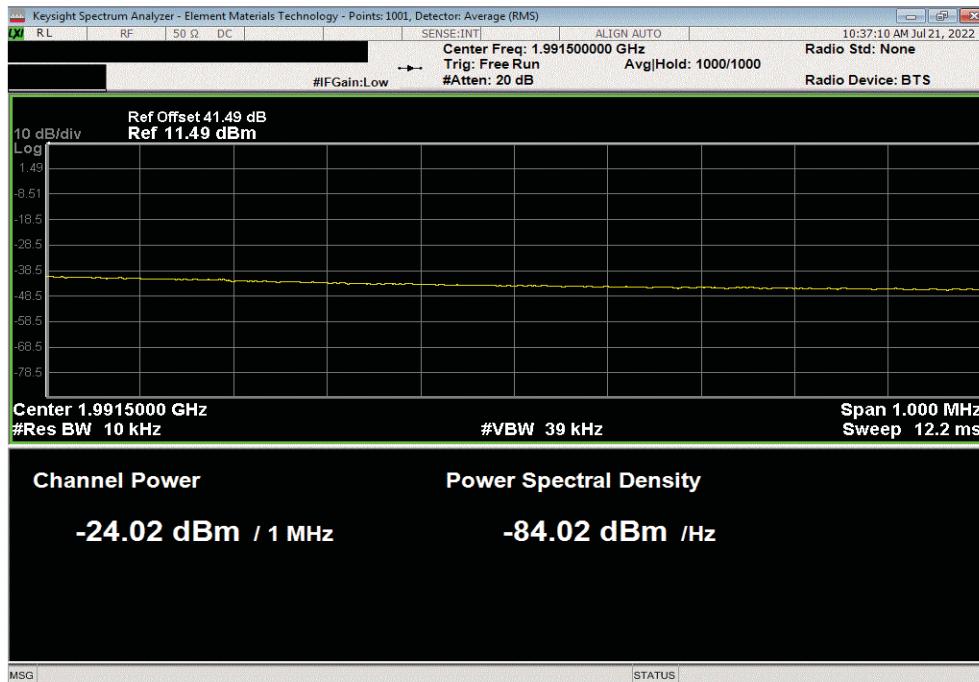


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

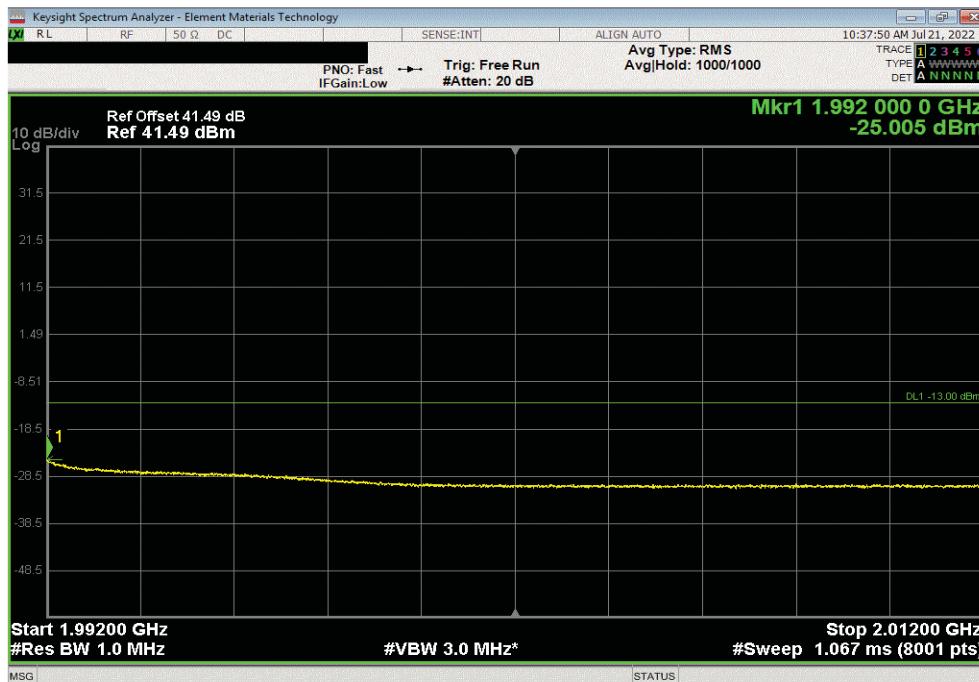


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	2	-24.02	-13	Pass	



Port 1, 8PSK Modulation, Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-25.01	-13	Pass	



BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a) and RSS 133 6.5(i). The GSM/EDGE carriers are not MIMO.

The RBW to be used for these measurements are per fcc 24.238(b) and RSS-133 6.5. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE



TbTx 2022.05.02.0 XMII 2022.02.07.0

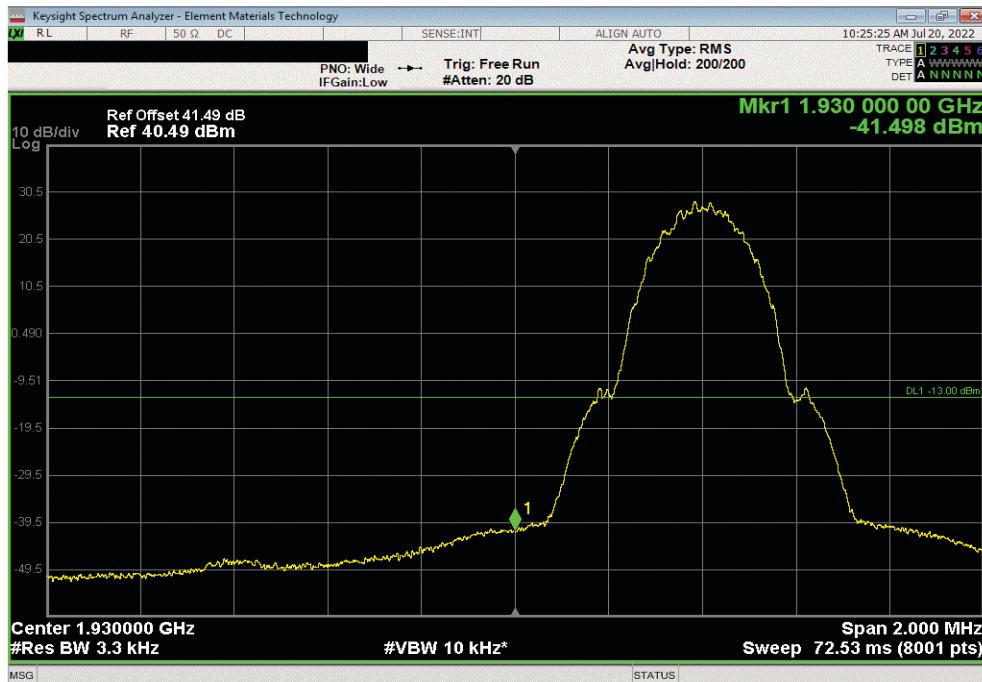
EUT:	AHFII (FCC/ISED C2PC)		Work Order:	NOKI0044					
Serial Number:	YK214000036		Date:	21-Jul-22					
Customer:	Nokia Solutions and Networks		Temperature:	20.9 °C					
Attendees:	David Le		Humidity:	57.1% RH					
Project:	None		Barometric Pres.:	1017 mbar					
Tested by:	Marty Martin	Power:	54 VDC	Job Site:	TX07				
TEST SPECIFICATIONS			Test Method						
FCC 24E:2022	ANSI C63.26:2015		RSS-133 Issue 6:2013+A1:2018	ANSI C63.26:2015					
COMMENTS									
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. PCS Band II GSM carriers enabled at maximum power (20 watts/carrier) passes band edge emissions requirements with the single carrier operating at one RF channel inside the bottom or top RF channels (Low Channel +1: 1930.4MHz and High Channel -1: 1989.6MHz).									
DEVIATIONS FROM TEST STANDARD									
None									
Configuration #	2	Signature	Frequency Range	Max Value (dBm)	Limit < (dBm)	Result			
Port 1									
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz									
GMSK Modulation									
Low Channel +1: 1930.4 MHz	1		-41.5	-13	Pass				
Low Channel +1: 1930.4 MHz	2		-27.14	-13	Pass				
Low Channel +1: 1930.4 MHz	3		-26.91	-13	Pass				
High Channel -1: 1989.6 MHz	1		-39.5	-13	Pass				
High Channel -1: 1989.6 MHz	2		-26.51	-13	Pass				
High Channel -1: 1989.6 MHz	3		-26.38	-13	Pass				
8PSK Modulation									
Low Channel +1: 1930.4 MHz	1		-39.76	-13	Pass				
Low Channel +1: 1930.4 MHz	2		-26.91	-13	Pass				
Low Channel +1: 1930.4 MHz	3		-26.81	-13	Pass				
High Channel -1: 1989.6 MHz	1		-39.07	-13	Pass				
High Channel -1: 1989.6 MHz	2		-26.4	-13	Pass				
High Channel -1: 1989.6 MHz	3		-26.23	-13	Pass				

BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

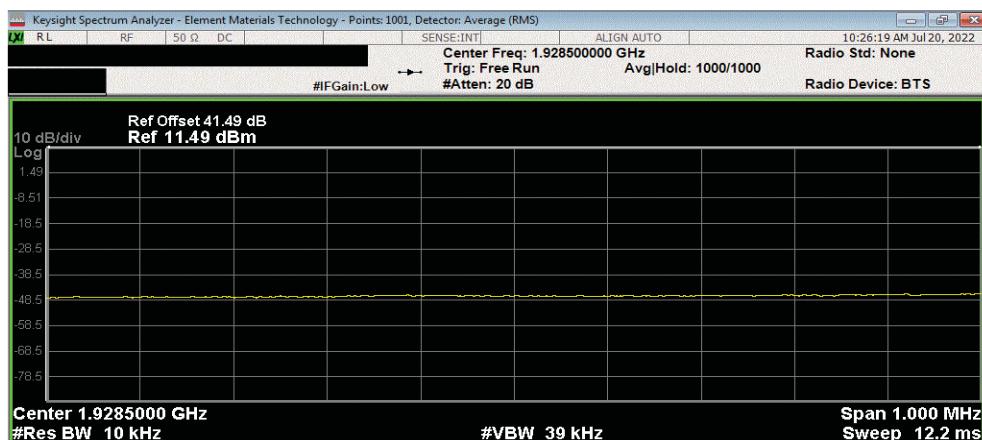


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel +1: 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-41.5	-13	Pass		



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel +1: 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-27.14	-13	Pass		

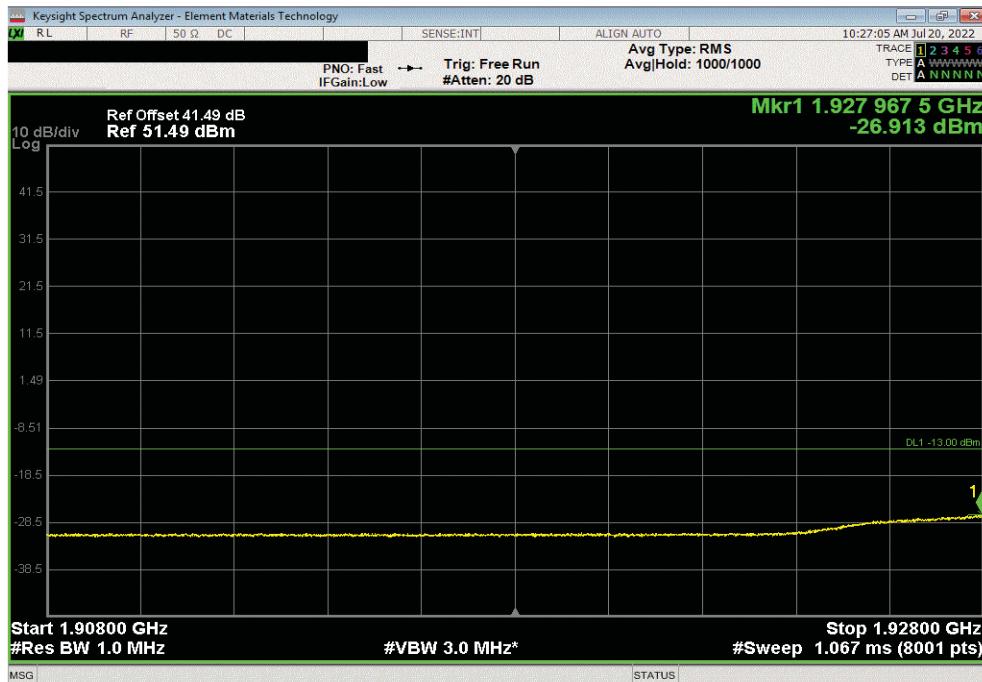


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

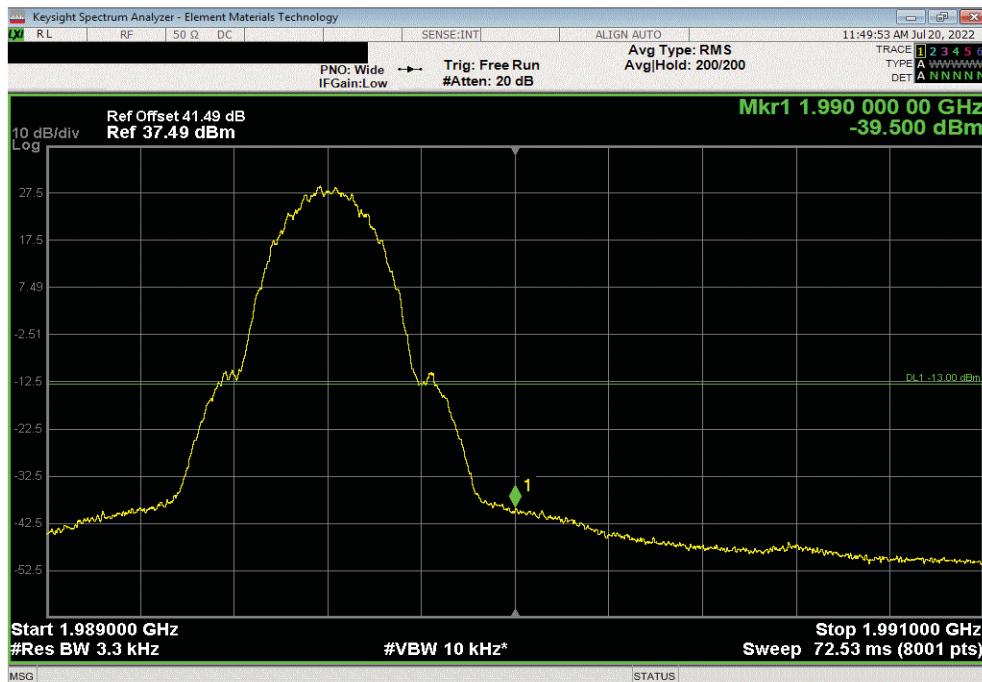


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel +1: 1930.4 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-26.91	-13	Pass		



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-39.5	-13	Pass		

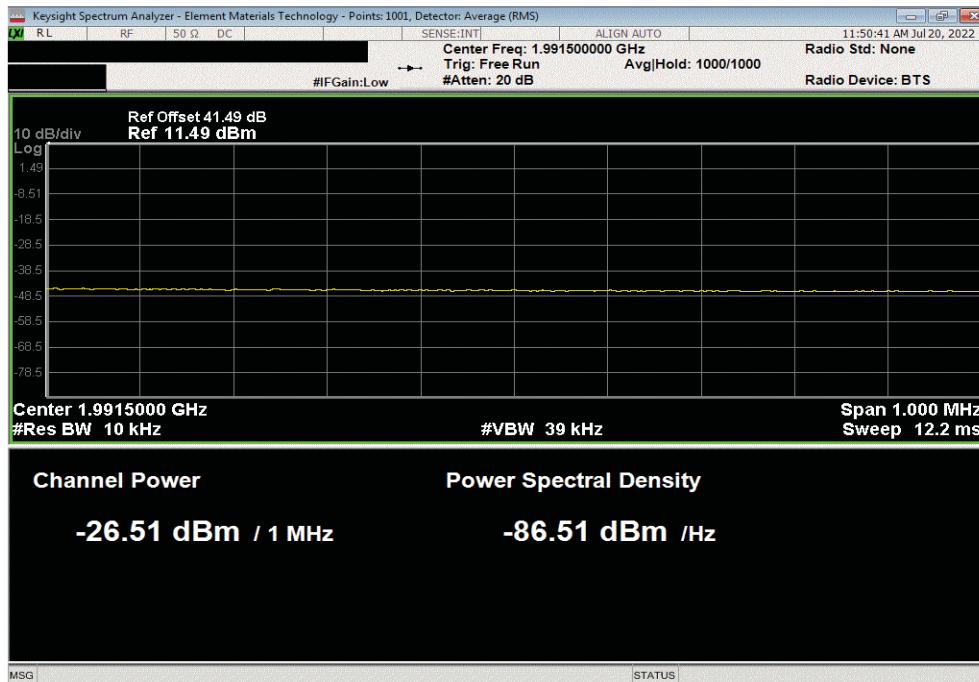


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

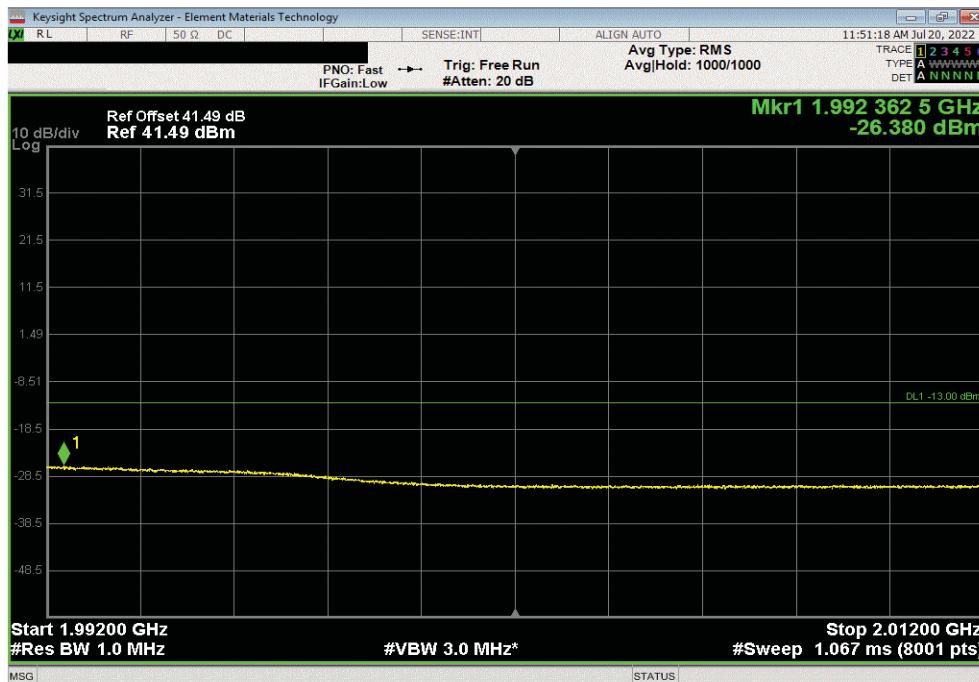


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
2		-26.51	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
3		-26.38	-13	Pass	



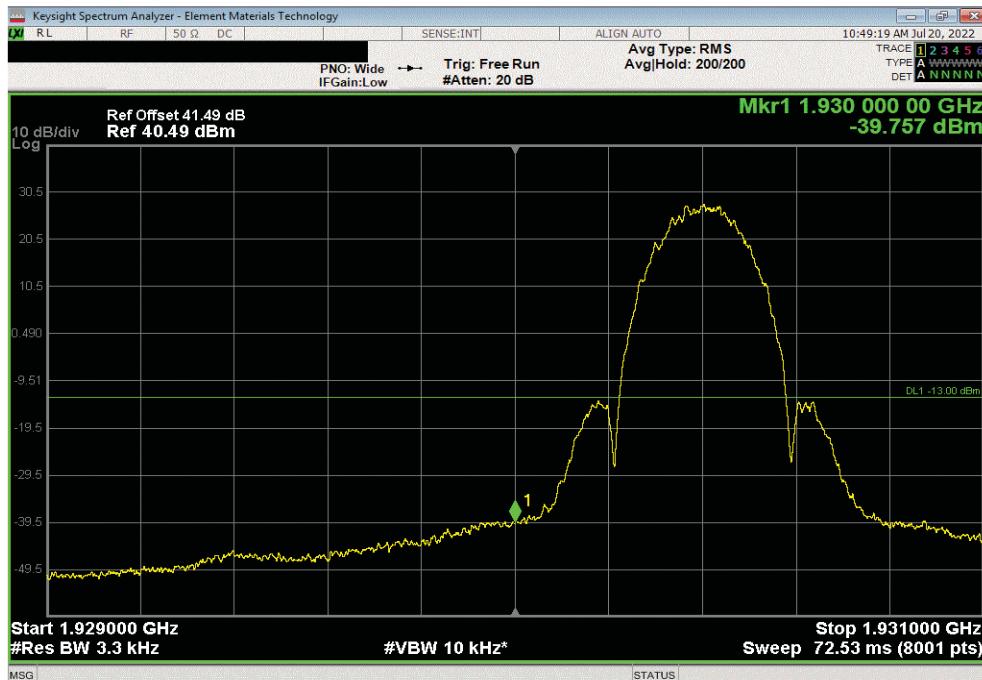
BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE



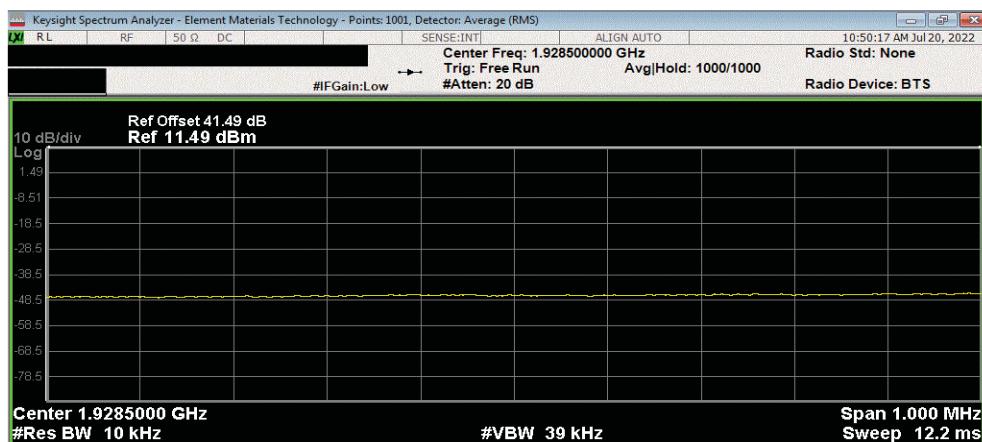
TbtTx 2022.05.02.0

XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel +1: 1930.4 MHz						
Frequency Range	Max Value (dBm)		Limit < (dBm)	Result		
1	-39.76	-13	Pass			



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel +1: 1930.4 MHz						
Frequency Range	Max Value (dBm)		Limit < (dBm)	Result		
2	-26.91	-13	Pass			



Channel Power

Power Spectral Density

-26.91 dBm / 1 MHz

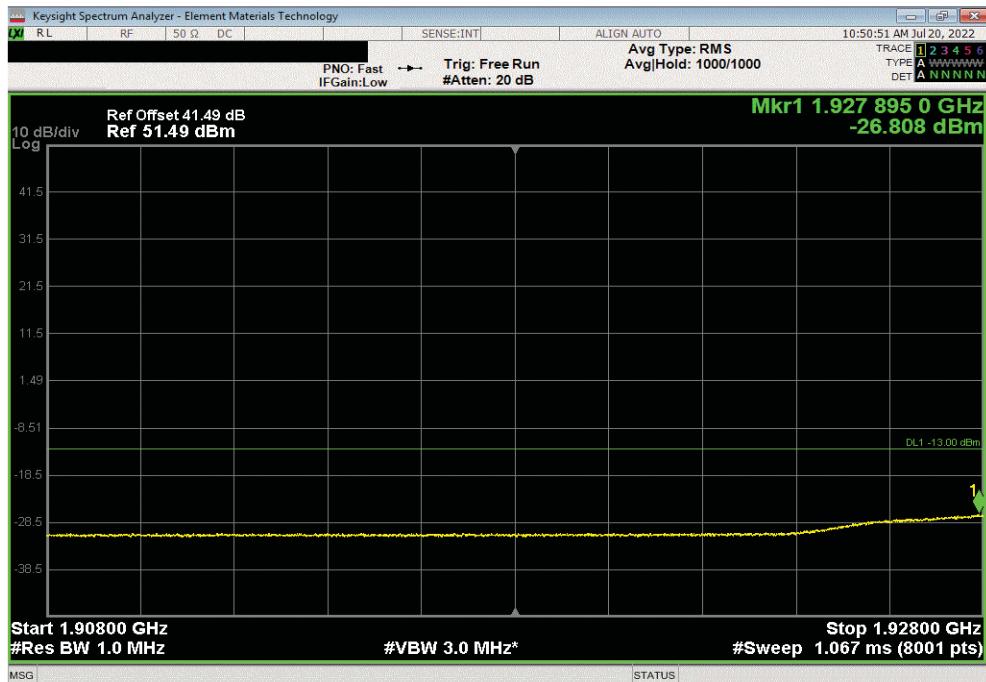
-86.91 dBm /Hz

BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE



TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel +1: 1930.4 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-26.81	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	1	-39.07	-13	Pass	

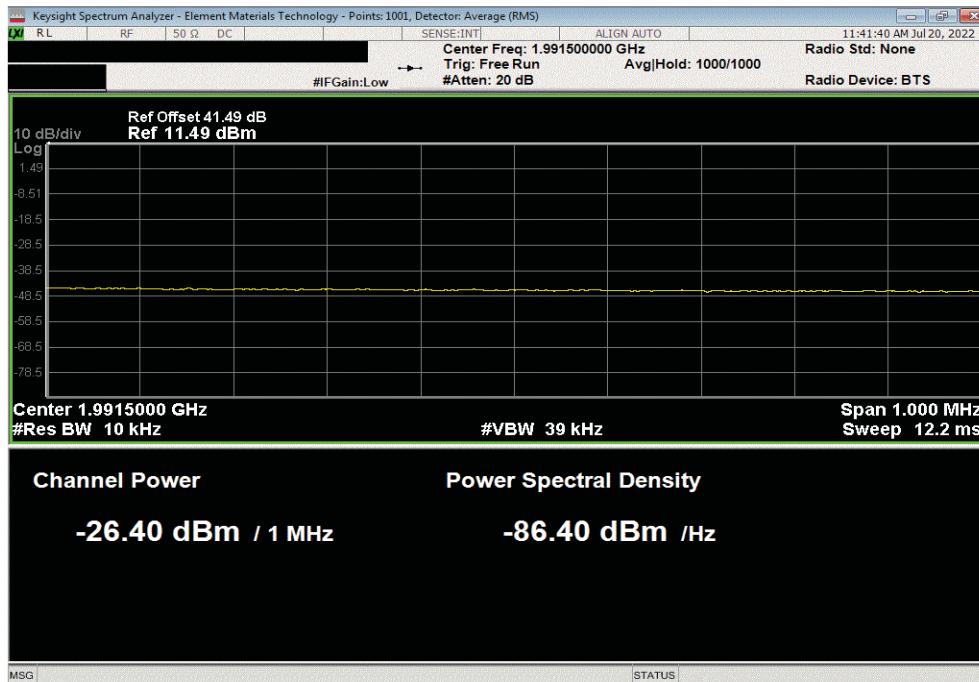


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

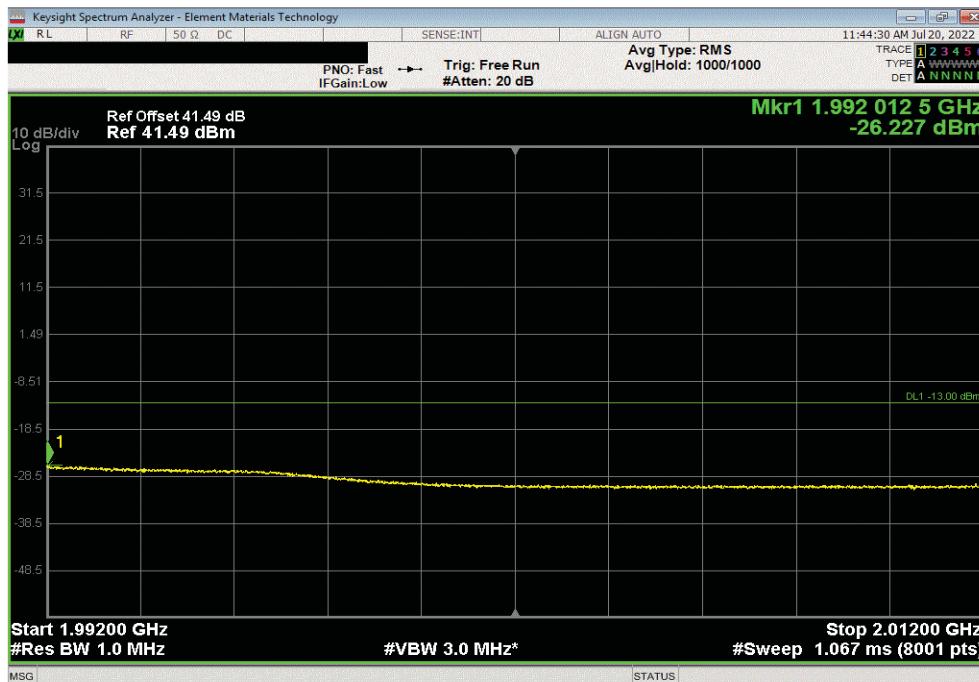


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_ 1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
2		-26.4	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_ 1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel -1: 1989.6 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
3		-26.23	-13	Pass	



BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

The power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm as specified in section 24.238(a) and RSS 133 6.5(i). The GSM/EDGE carriers are not MIMO.

The RBW to be used for these measurements are per FCC 24.238(b), and RSS-133 6.5. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (*i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

RF conducted emissions testing was performed only on one port. The testing was performed on the same version of hardware (AHFII) as the original certification test. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in this certification testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraph 5.7.2i.

BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER



TbTx 2022.05.02.0

XMI 2022.02.07.0

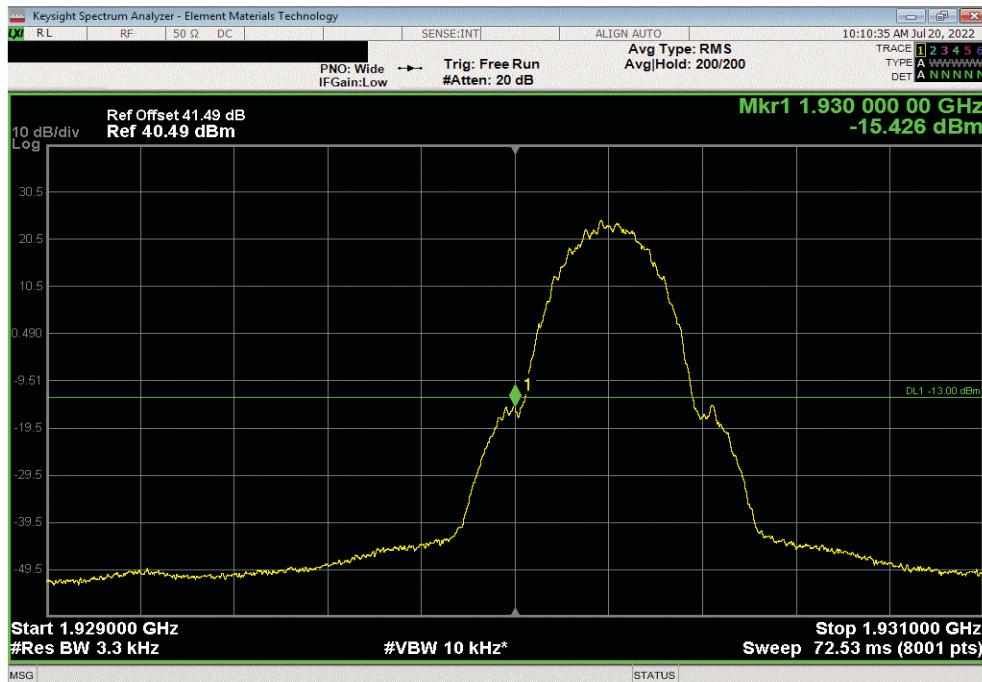
EUT:	AHFII (FCC/ISED C2PC)		Work Order:	NOKI0044	
Serial Number:	YK214000036		Date:	21-Jul-22	
Customer:	Nokia Solutions and Networks		Temperature:	20.2 °C	
Attendees:	David Le		Humidity:	58.9% RH	
Project:	None		Barometric Pres.:	1017 mbar	
Tested by:	Marty Martin	Power:	54 VDC	Job Site:	TX07
TEST SPECIFICATIONS	Test Method				
FCC 24E:2022	ANSI C63.26:2015				
RSS-133 Issue 6:2013+A1:2018	ANSI C63.26:2015				
COMMENTS	All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. PCS Band II GSM carrier power level was reduced by 4.0 dB (39.0 dBm/carrier or 8.0W/carrier) from maximum to pass band edge limits with the single carrier operating at the Low Channel: 1930.2MHz or High Channel: 1989.8MHz.				
DEVIATIONS FROM TEST STANDARD	None				
Configuration #	2	Signature	Marty	Marty	
Port 1	Frequency Range		Max Value (dBm)	Limit < (dBm)	Result
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz					
GMSK Modulation					
Low Channel - 1930.2 MHz	1		-15.43	-13	Pass
Low Channel - 1930.2 MHz	2		-27.8	-13	Pass
Low Channel - 1930.2 MHz	3		-27.426	-13	Pass
High Channel - 1989.8 MHz	1		-14.125	-13	Pass
High Channel - 1989.8 MHz	2		-27.12	-13	Pass
High Channel - 1989.8 MHz	3		-28.87	-13	Pass
8PSK Modulation					
Low Channel - 1930.2 MHz	1		-20.88	-13	Pass
Low Channel - 1930.2 MHz	2		-27.71	-13	Pass
Low Channel - 1930.2 MHz	3		-27.29	-13	Pass
High Channel - 1989.8 MHz	1		-20.28	-13	Pass
High Channel - 1989.8 MHz	2		-27.07	-13	Pass
High Channel - 1989.8 MHz	3		-28.92	-13	Pass

BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

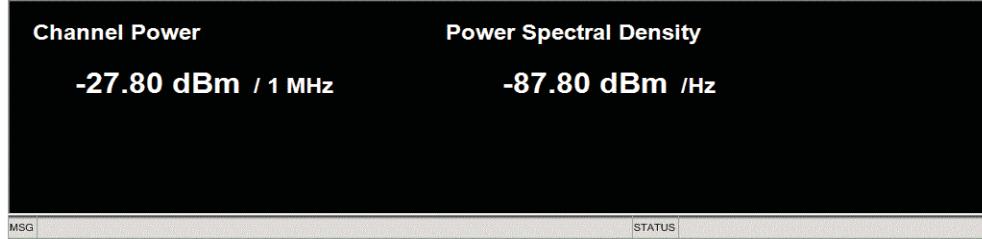
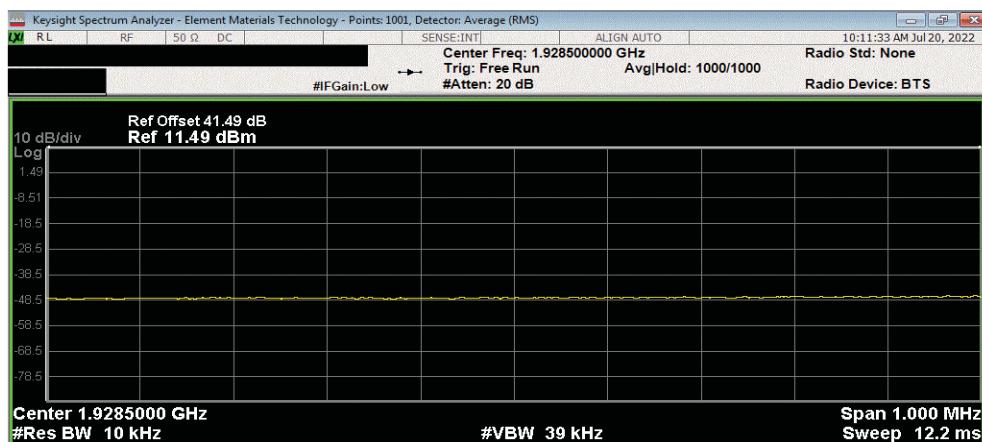


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
1	-15.43	-13	Pass		



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-27.8	-13	Pass		

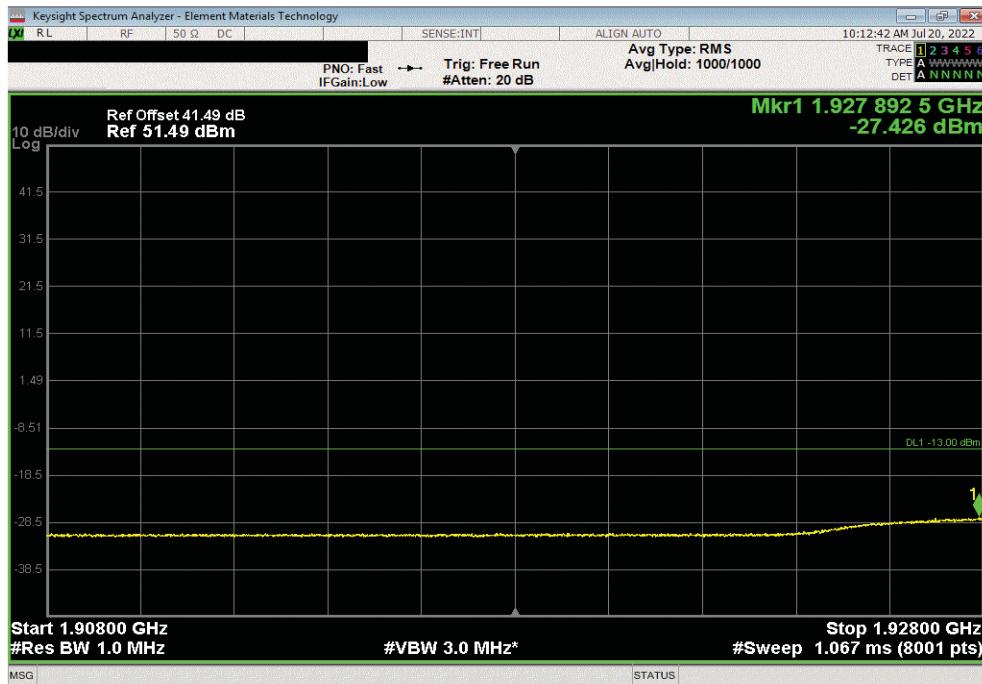


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

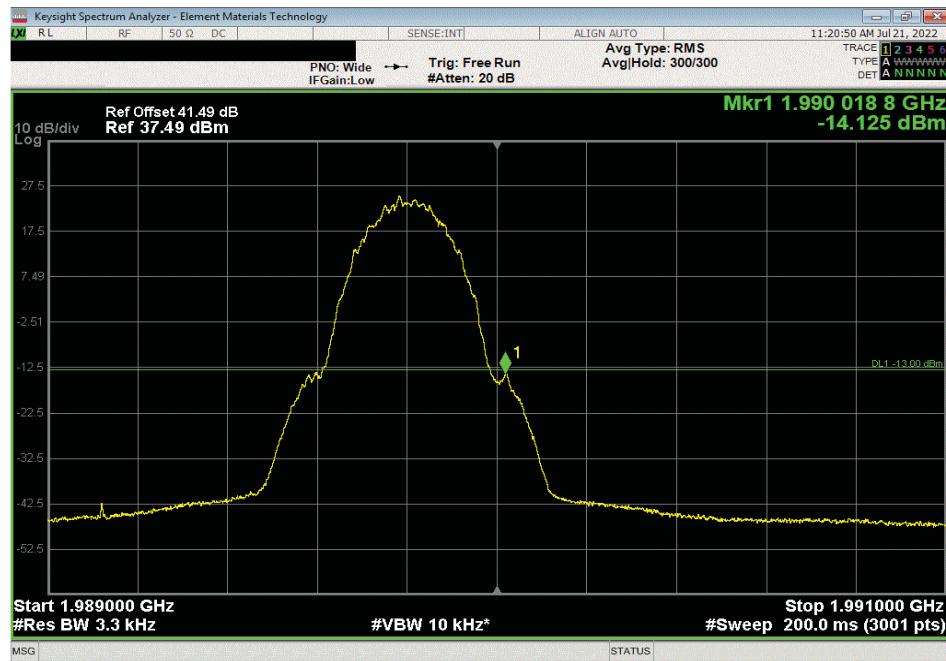


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-27.426	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	1	-14.125	-13	Pass	

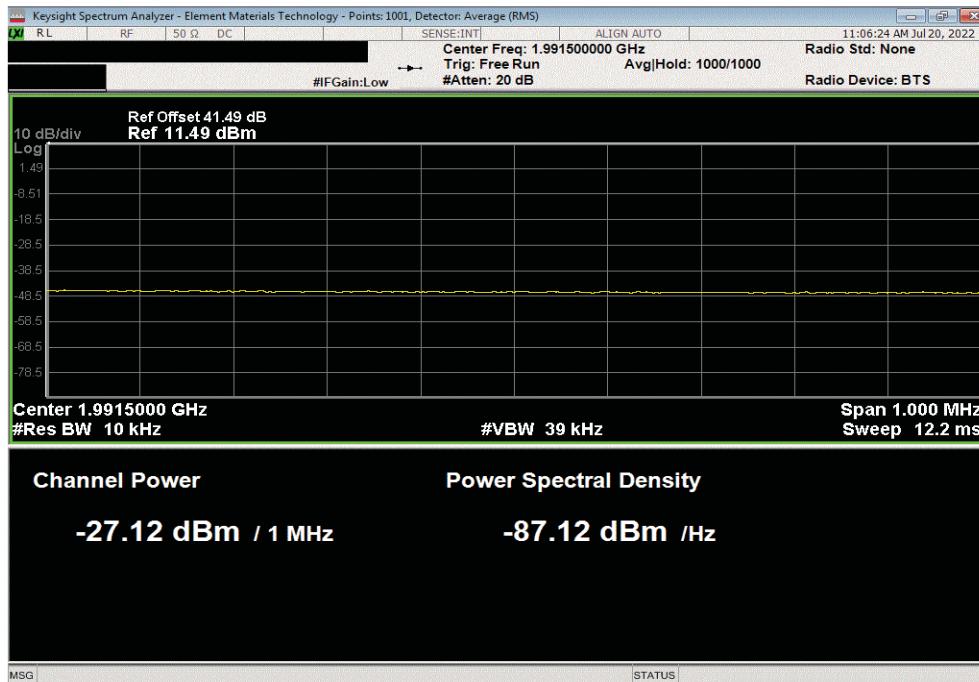


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

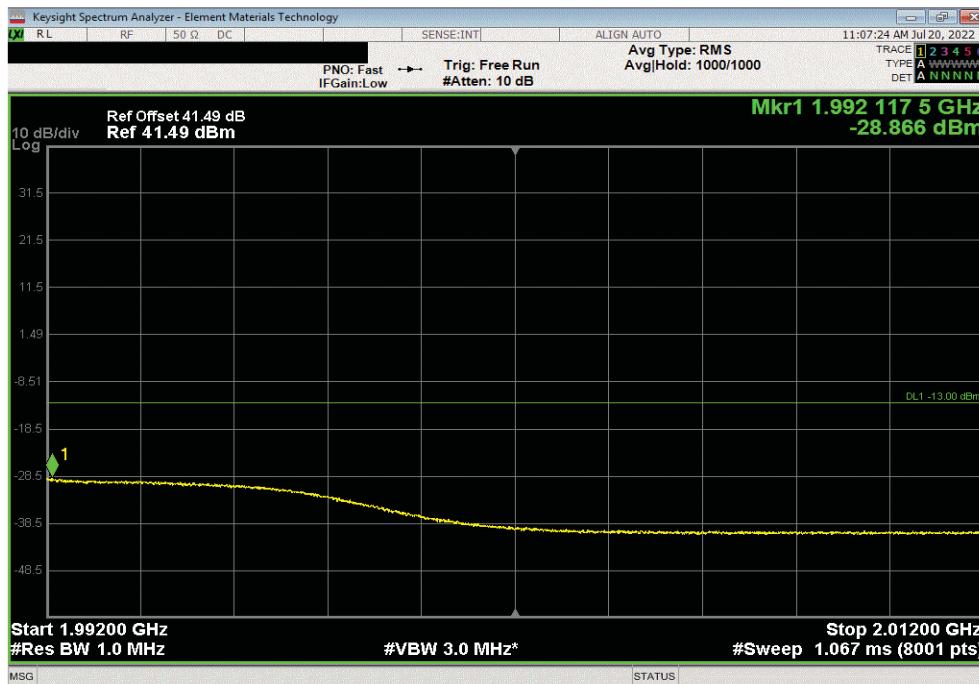


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
2	-27.12	-13	Pass		



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz					
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result		
3	-28.87	-13	Pass		

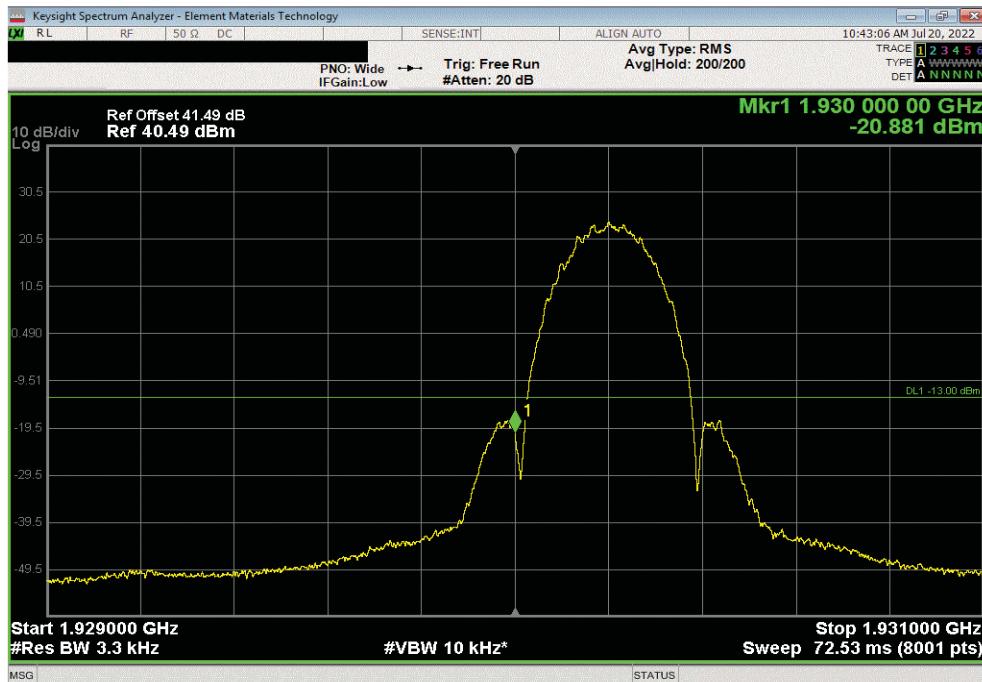


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

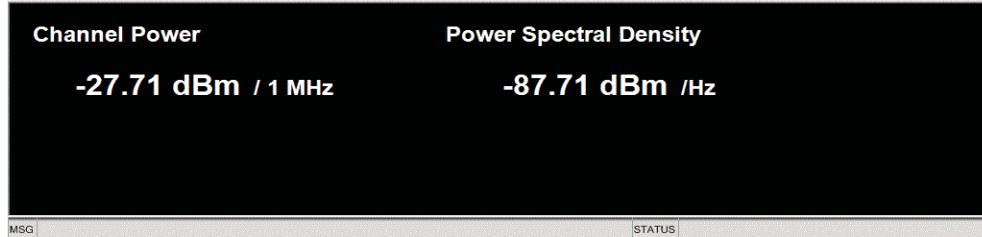
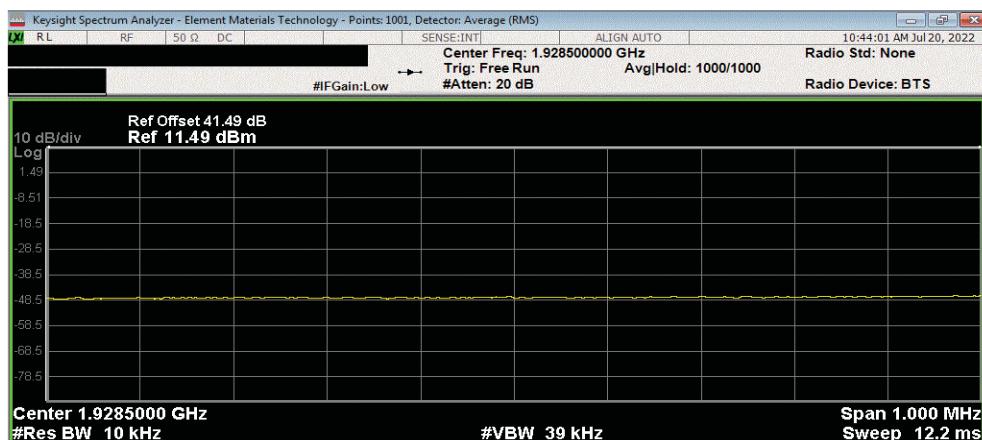


TbTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	1	-20.88	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	2	-27.71	-13	Pass	

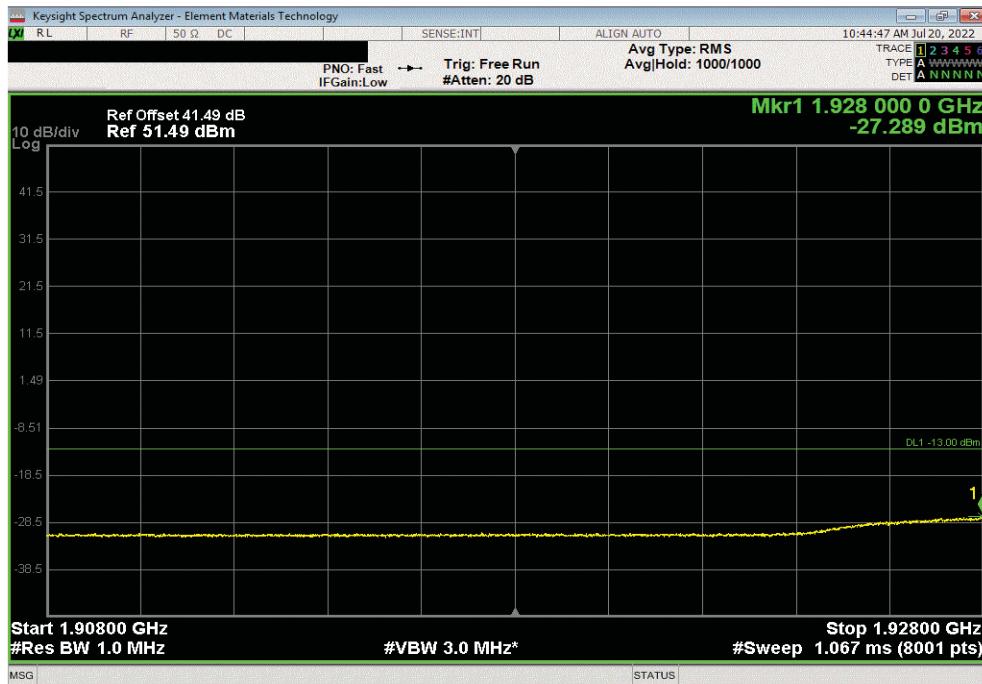


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

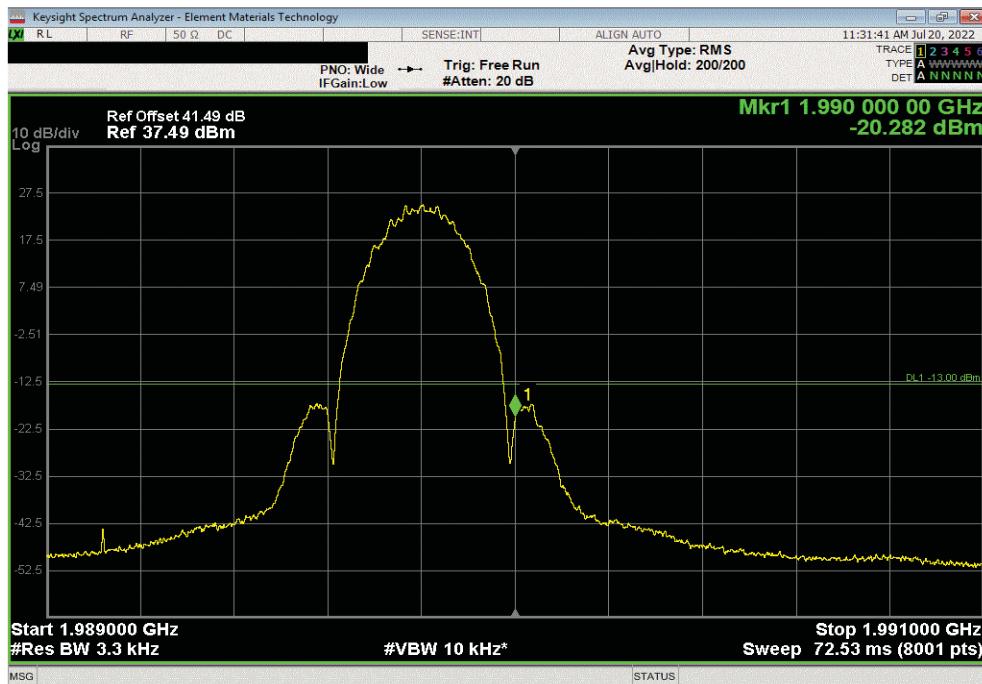


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	3	-27.29	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel - 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
	1	-20.28	-13	Pass	

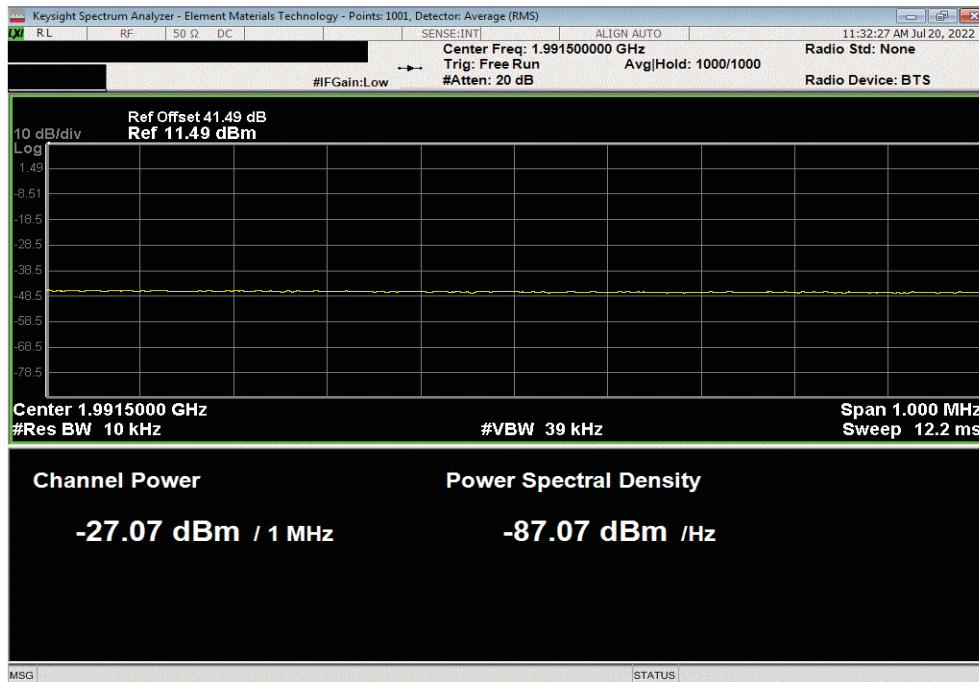


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

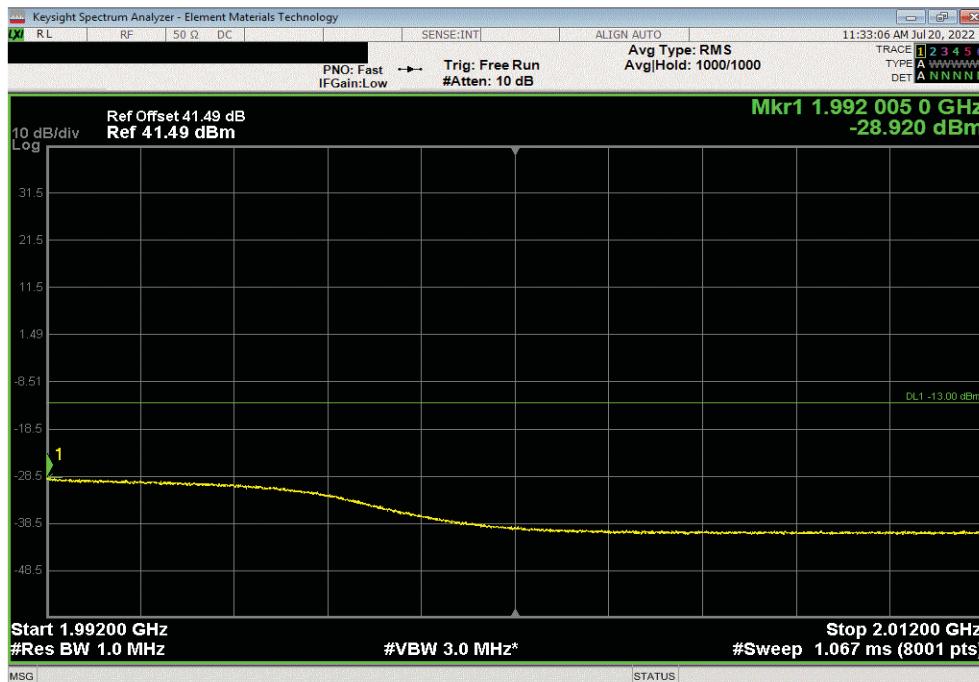


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel - 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
2		-27.07	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, High Channel - 1989.8 MHz					
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result	
3		-28.92	-13	Pass	



SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS



XMIT 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3379	AMT	2021-09-14	2022-09-14
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The antenna port spurious emissions were measured at the RF output terminal of the EUT through 4 different attenuation configurations which continues through to the RF input of the spectrum analyzer. Analyzer plots utilizing a resolution bandwidth called out by the client's test plan were made for each modulation type from 9 KHz to 22 GHz. The conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than the limits also called out by the client's test plan shown below.

The measurement methods are detailed in KDB 971168 D01v03 section 6 and ANSI C63.26-2015.

Per FCC 2.1057(a)(1) and RSS Gen 6.13, the upper level of measurement is the 10th harmonic of the highest fundamental frequency.

These measurements are for the frequency band after the first 1.0 MHz bands immediately outside and adjacent to the frequency block.

RF conducted emissions testing was performed only on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

Per section FCC 24.238(a), FCC 27.53(h)(1), RSS 133 6.5 (ii), and RSS-139 6.6 - the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The GSM/EDGE carriers are not MIMO

The limit for the 9kHz to 150kHz frequency range was adjusted to -43dBm to correct for a spectrum analyzer RBW of 1kHz versus the required RBW of 1MHz [i.e.: $-43\text{dBm} = -13\text{dBm} - 10\log(1\text{MHz}/1\text{kHz})$]. The limit for the 150kHz to 20MHz frequency range was adjusted to -33dBm to correct for a spectrum analyzer RBW of 10kHz versus the required RBW of 1MHz [i.e.: $-33\text{dBm} = -13\text{dBm} - 10\log(1\text{MHz}/10\text{kHz})$]. The required limit of -13dBm with a RBW of > 1MHz was used for all other frequency ranges. (See ANSI C63.26-2015 paragraph 5.7.2a for details on the Limit/RBW scaling method)

SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS



TbTx 2022.05.02.0 XMII 2022.02.07.0

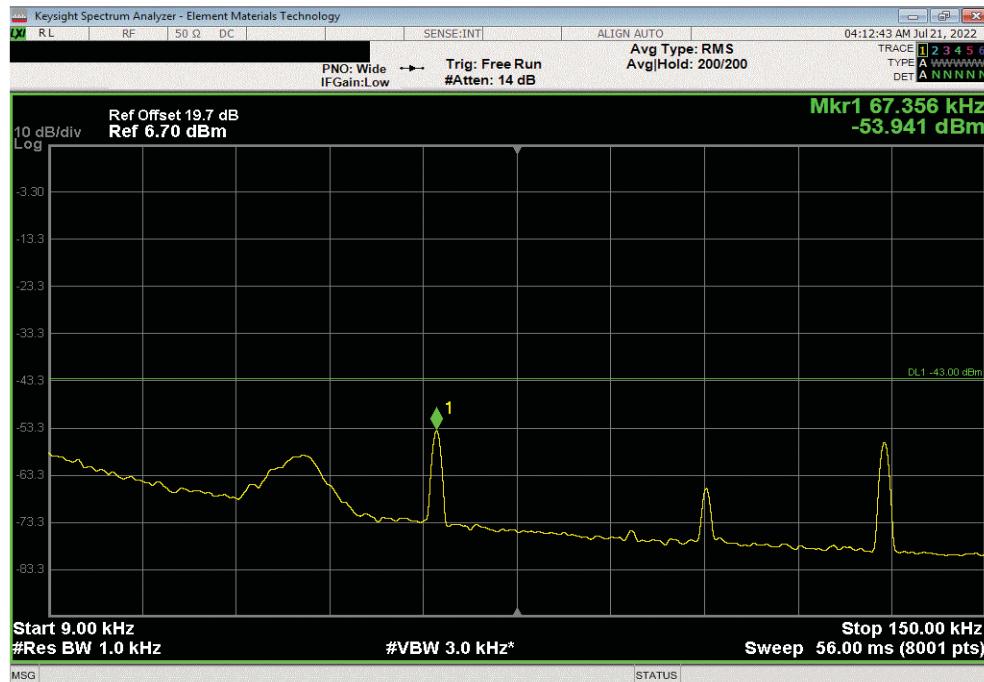
EUT:	AHFII (FCC/ISED C2PC)	Work Order:	NOKI0044		
Serial Number:	YK214000036	Date:	21-Jul-22		
Customer:	Nokia Solutions and Networks	Temperature:	20.4 °C		
Attendees:	David Le	Humidity:	59.7% RH		
Project:	None	Barometric Pres.:	1016 mbar		
Tested by:	Marty Martin	Power:	54 VDC		
TEST SPECIFICATIONS		Test Method	Job Site: TX07		
FCC 24E:2022		ANSI C63.26:2015			
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015			
COMMENTS	All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. AHFII GSM carriers are required to be operated with a 3G, 4G or 5G RAT carrier in the PCS band. PCS Band GSM carriers were enabled at maximum power (20 watts/carrier). A PCS Band LTE10 carrier was enabled at maximum power (60W) at 1970.0 MHz to allow operation of the GSM carrier. The AHFII PCS Band is set at maximum power (80W) for this testing.				
DEVIATIONS FROM TEST STANDARD	None				
Configuration #	1, 2, 3, 4	Signature			
Port 1	Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz					
GMSK Modulation					
Mid Channel - 1960 MHz	9 kHz - 150 kHz	0.07	-53.94	-43	Pass
Mid Channel - 1960 MHz	150 kHz - 20 MHz	0.15	-53.82	-33	Pass
Mid Channel - 1960 MHz	20 MHz - 3.5 GHz	3224.66	-24.17	-13	Pass
Mid Channel - 1960 MHz	1.9 GHz - 2.2 GHz	1990.38	-21.16	-13	Pass
Mid Channel - 1960 MHz	2.2 GHz - 13 GHz	4023.93	-36.74	-13	Pass
Mid Channel - 1960 MHz	13 GHz - 22 GHz	21968.95	-31.08	-13	Pass
8PSK Modulation					
Mid Channel - 1960 MHz	9 kHz - 150 kHz	0.07	-54.12	-43	Pass
Mid Channel - 1960 MHz	150 kHz - 20 MHz	0.15	-53.28	-33	Pass
Mid Channel - 1960 MHz	20 MHz - 3.5 GHz	3139.4	-24.13	-13	Pass
Mid Channel - 1960 MHz	1.9 GHz - 2.2 GHz	1991.05	-21.09	-13	Pass
Mid Channel - 1960 MHz	2.2 GHz - 13 GHz	4019.65	-36.87	-13	Pass
Mid Channel - 1960 MHz	13 GHz - 22 GHz	21564.4	-30.83	-13	Pass

SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

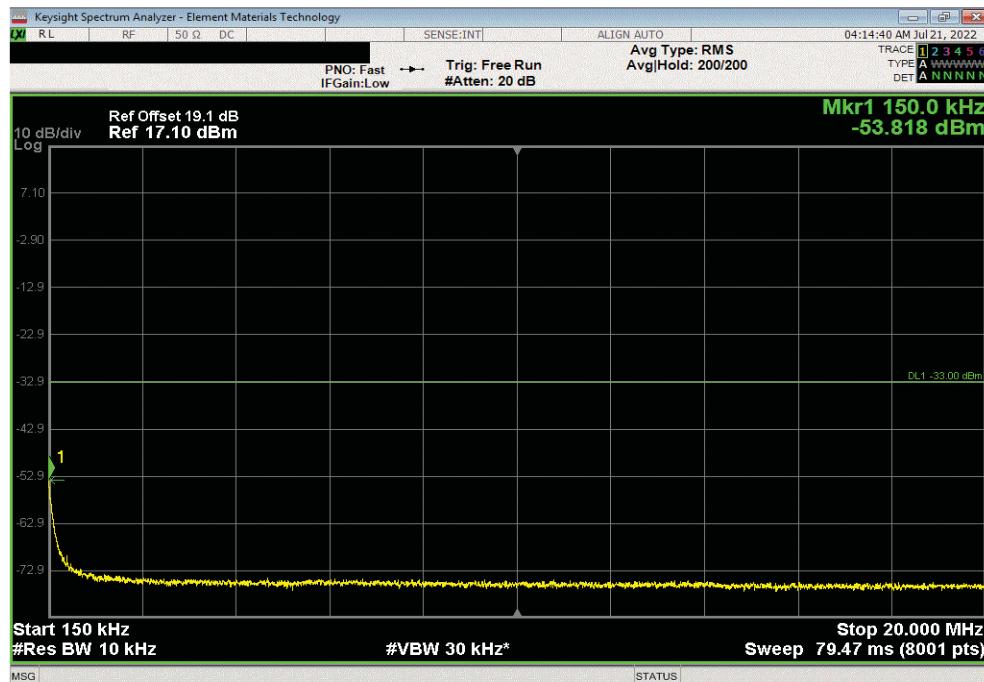


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
9 kHz - 150 kHz	0.07	-53.94	-43	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
150 kHz - 20 MHz	0.15	-53.82	-33	Pass	

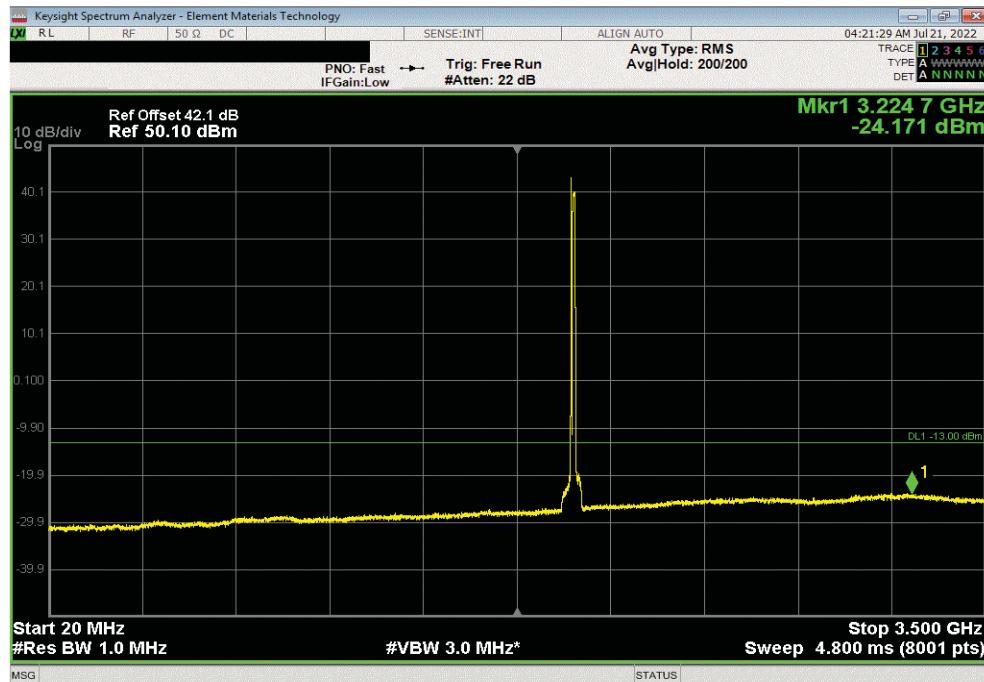


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

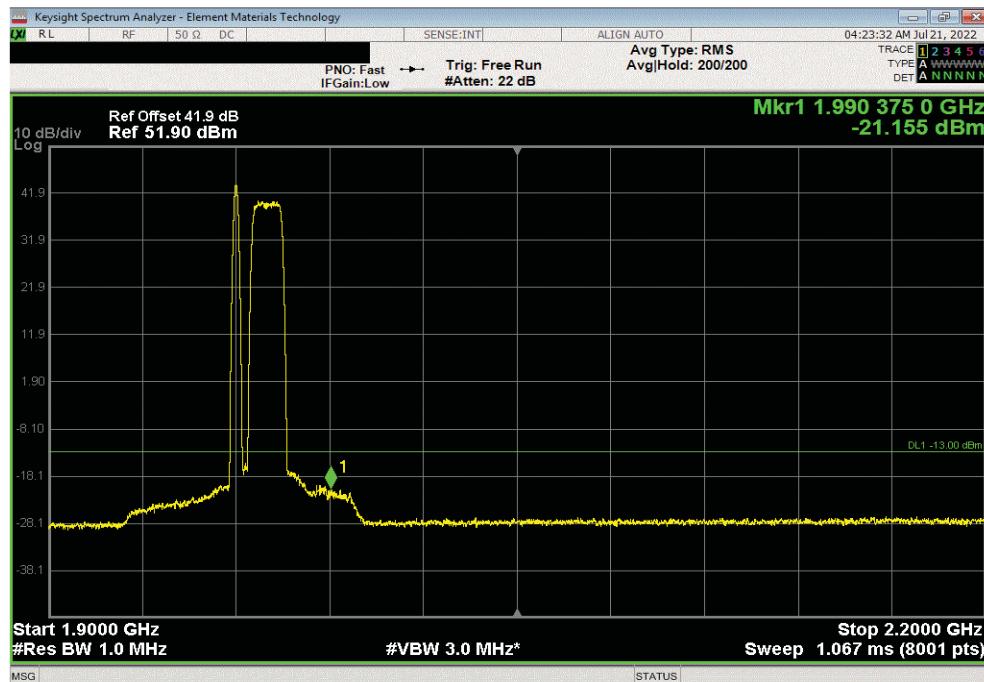


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
20 MHz - 3.5 GHz	3224.66	-24.17	-13	Fail



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
1.9 GHz - 2.2 GHz	1990.38	-21.16	-13	Pass

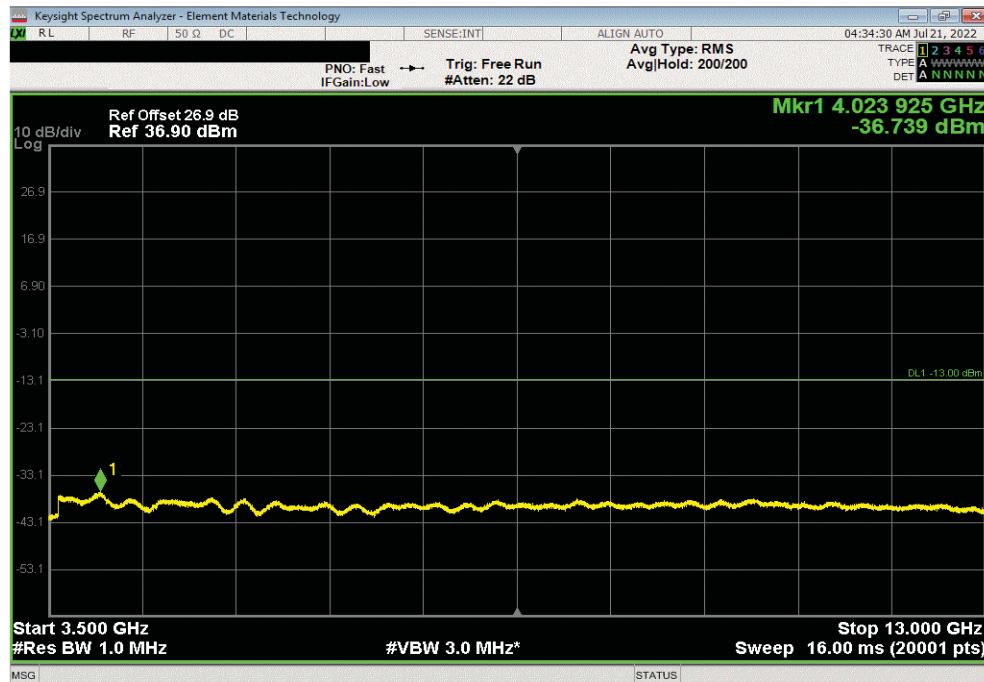


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

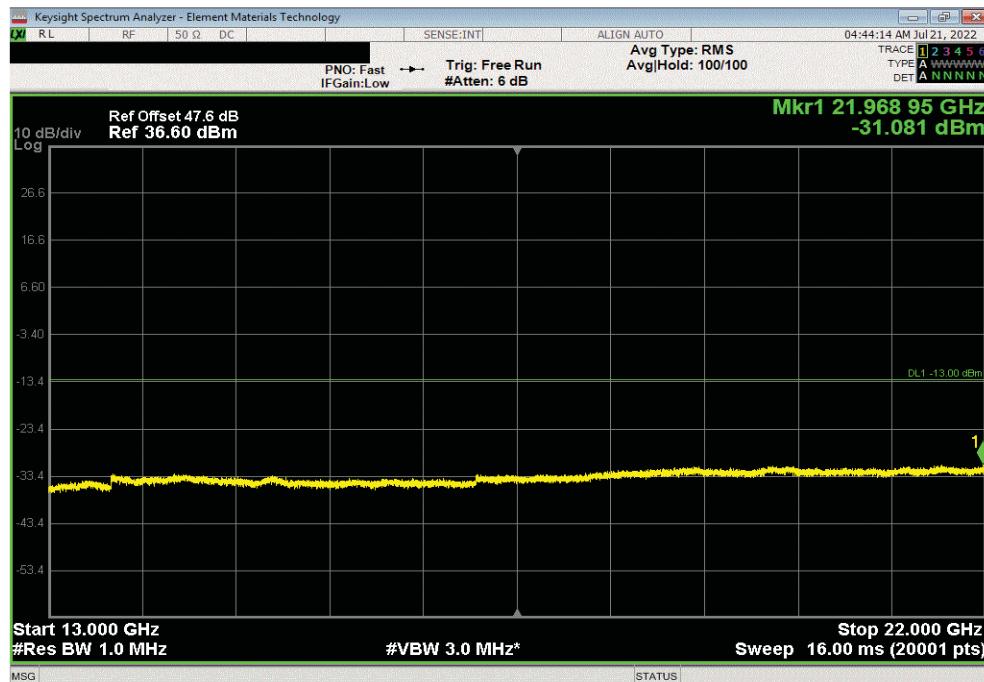


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
2.2 GHz - 13 GHz	4023.93	-36.74	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
13 GHz - 22 GHz	21968.95	-31.08	-13	Pass	

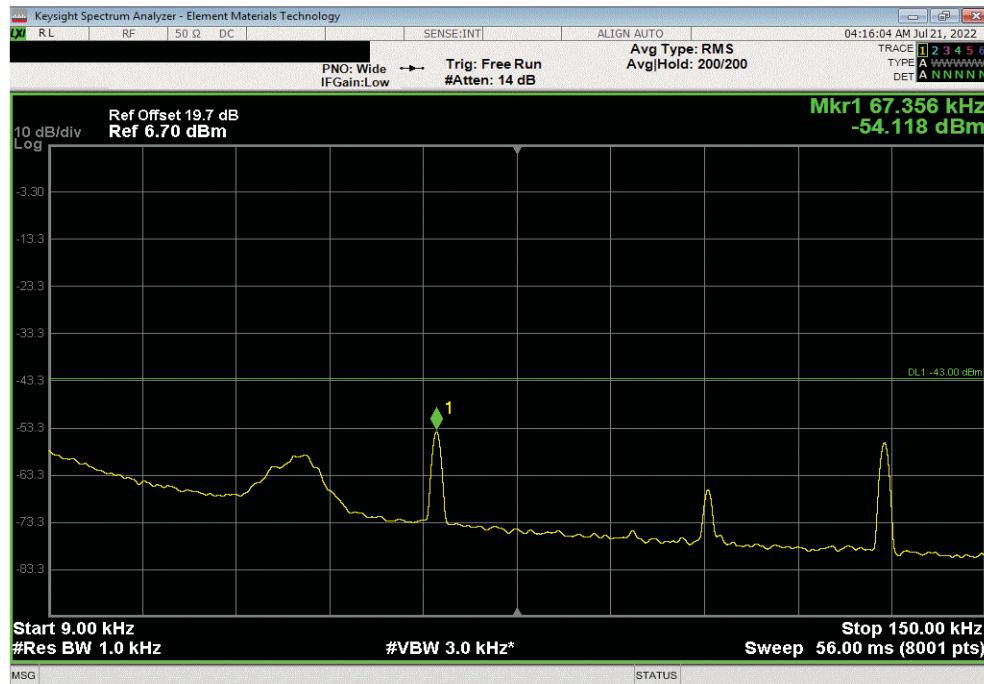


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

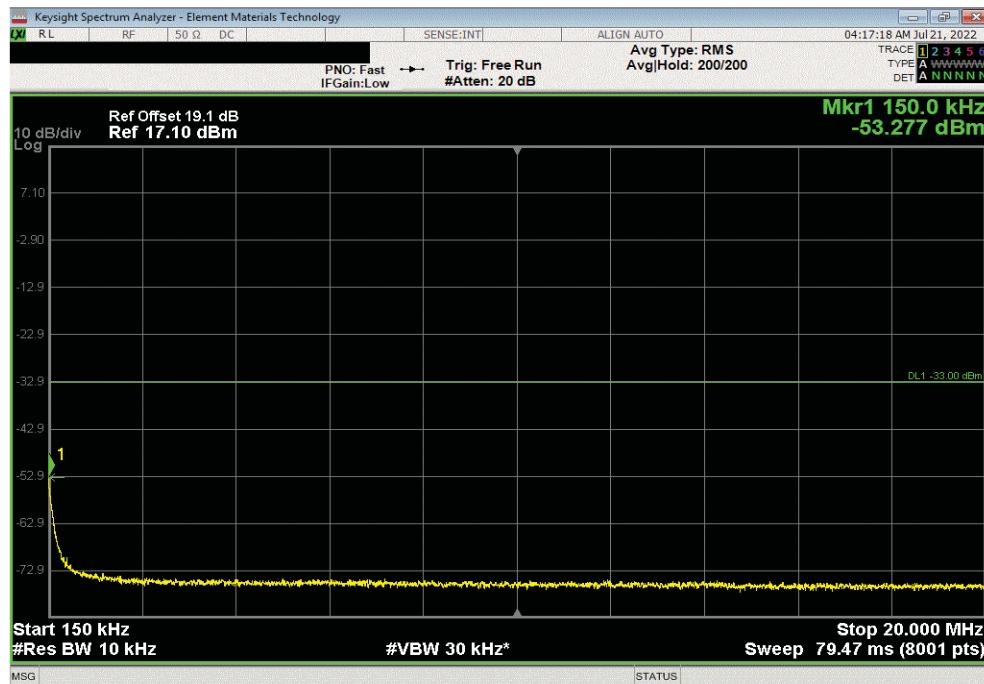


TbTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
9 kHz - 150 kHz	0.07	-54.12	-43	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
150 kHz - 20 MHz	0.15	-53.28	-33	Pass	

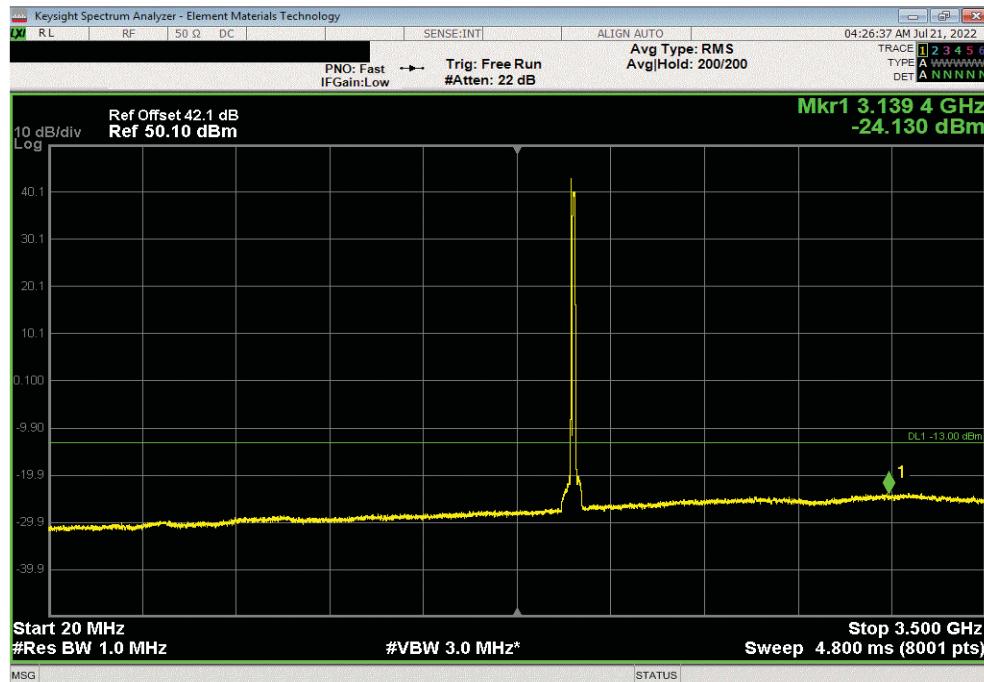


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

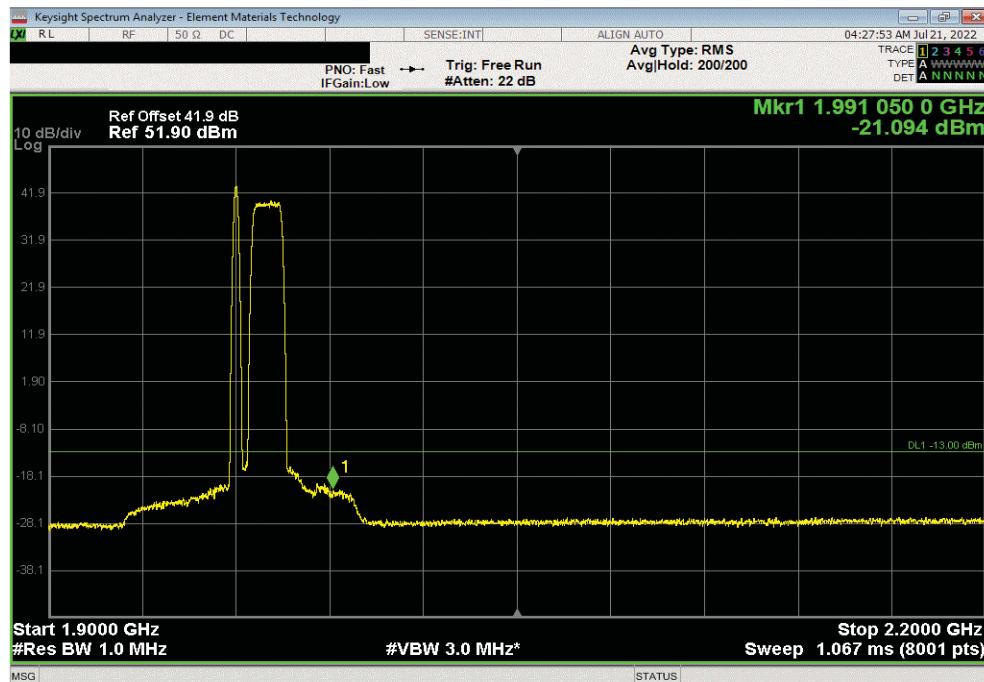


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
20 MHz - 3.5 GHz	3139.4	-24.13	-13	Pass



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz				
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
1.9 GHz - 2.2 GHz	1991.05	-21.09	-13	Pass

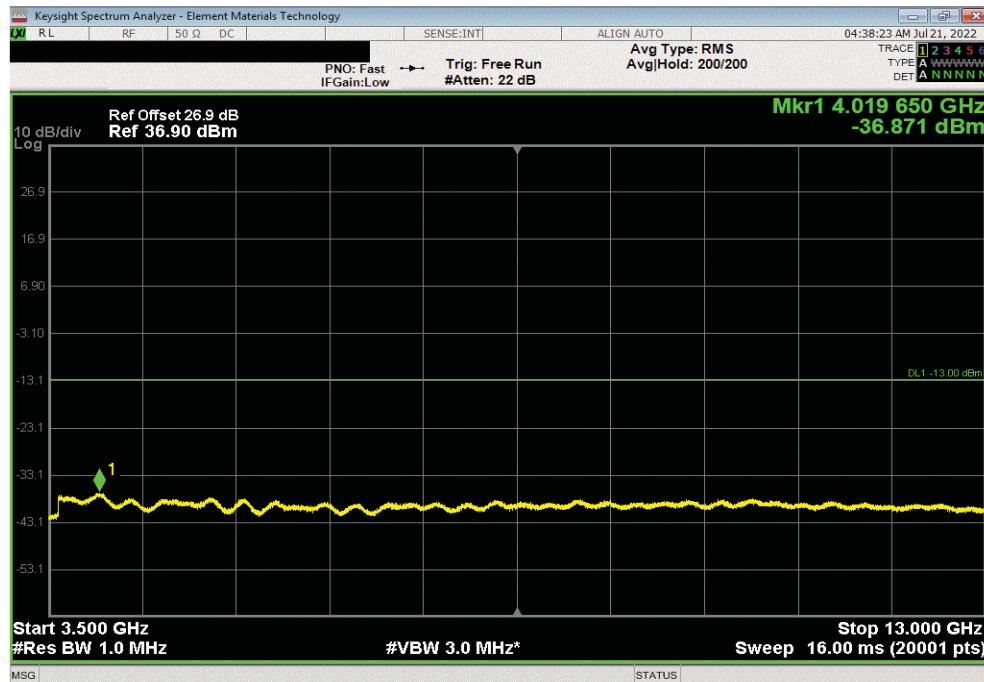


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

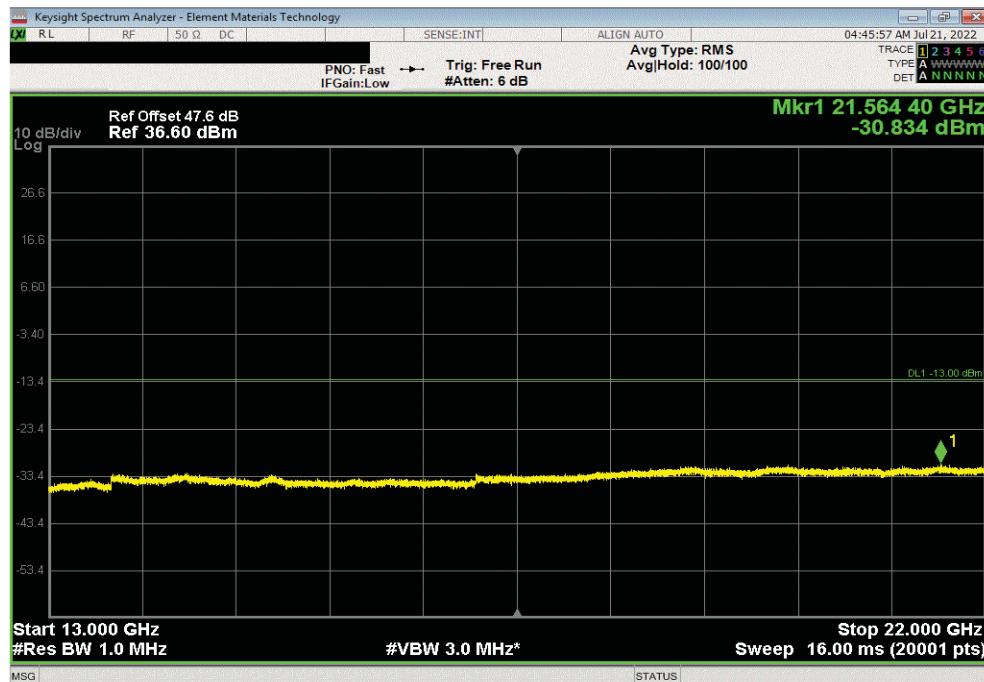


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
2.2 GHz - 13 GHz	4019.65	-36.87	-13	Pass	



Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
13 GHz - 22 GHz	21564.4	-30.83	-13	Pass	



SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



XMit 2022.02.07.0

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFQ	2022-01-17	2023-01-17

TEST DESCRIPTION

The antenna port spurious emissions were measured at the RF output terminal of the EUT through 4 different attenuation configurations which continues through to the RF input of the spectrum analyzer. Analyzer plots utilizing a resolution bandwidth called out by the client's test plan were made for each modulation type from 9 KHz to 22 GHz. The conducted power of spurious emissions, up to the 10th harmonic of the transmit frequency, were investigated to ensure they were less than the limits also called out by the client's test plan shown below.

The measurement methods are detailed in KDB 971168 D01v03 section 6 and ANSI C63.26-2015.

Per FCC 2.1057(a)(1) and RSS Gen 6.13, the upper level of measurement is the 10th harmonic of the highest fundamental frequency.

These measurements are for the frequency band after the first 1.0 MHz bands immediately outside and adjacent to the frequency block.

RF conducted emissions testing was performed only on one port. The AHFII antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown in output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

Per section FCC 24.238(a), FCC 27.53(h)(1), RSS 133 6.5 (ii), and RSS-139 6.6 - the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The GSM/EDGE carriers are not MIMO.

The limit for the 9kHz to 150kHz frequency range was adjusted to -43dBm to correct for a spectrum analyzer RBW of 1kHz versus the required RBW of 1MHz [i.e.: -43dBm = -13dBm -10log(1MHz/1kHz)]. The limit for the 150kHz to 20MHz frequency range was adjusted to -33dBm to correct for a spectrum analyzer RBW of 10kHz versus the required RBW of 1MHz [i.e.: -33dBm = -13dBm -10log(1MHz/10kHz)]. The required limit of -13dBm with a RBW of > 1MHz was used for all other frequency ranges. (See ANSI C63.26-2015 paragraph 5.7.2a for details on the Limit/RBW scaling method)

Multicarrier test cases have been developed as shown below.

Multicarrier Test Case 1: In the PCS band (Band 2) _Three GSM/EDGE carriers (operating at maximum power ~ 20W/carrier) using two carriers (with minimum spacing between carrier frequencies) at the lower band edge +1 (1930.4 & 1930.8MHz) and a third carrier with maximum spacing between the other two carrier frequencies at the upper band edge -1 (1989.6MHz). A single LTE1.4 carrier operating at maximum power (20W) at Band 2 middle channel (1960.0MHz). In the AWS band _ Single LTE10 carrier at 40W at the middle channel (2155.0MHz).

The carriers are operated at maximum power (~20W/PCS carrier and 40W/AWS carrier) with a total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carrier).

SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



TestRx 2022.05.02.0 XMRI 2022.02.07.0

EUT:	AHFII (FCC/ISED C2PC)	Work Order:	NOKI0044			
Serial Number:	YK21400036	Date:	21-Jul-22			
Customer:	Nokia Solutions and Networks	Temperature:	20.2 °C			
Attendee:	David Le	Humidity:	58.5% RH			
Project:	None	Barometric Pres.:	1017 mbar			
Tested by:	Marty Martin	Power:	54 VDC			
TEST SPECIFICATIONS		Test Method	TX07			
FCC 24E:2022		ANSI C63.26:2015				
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015				
COMMENTS						
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. AHFII GSM carriers are required to be operated with a 3G, 4G or 5G RAT carrier in the PCS band. Carrier are enabled as described in test description. Test Case 1 GSM carriers were operated at maximum power (20W/carrier or 43.0 dBm/carrier), with maximum band and port power. Test case 1 is worst case since all carriers are at maximum power - Test case 2 was not performed.						
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1, 2, 3, 4	Signature				
Multicarrier	Port 1	Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
GMSK Modulation						
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	9 kHz - 150 kHz	0.01	-58.32	-43	-43	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	150 kHz - 20 MHz	0.15	-53	-33	-33	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	20 MHz - 3.5 GHz	3155.93	-24.27	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	1.9 GHz - 2.2 GHz	2124.36	-24.88	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	2.2 GHz - 13 GHz	4011.1	-36.7	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	13 GHz - 22 GHz	21601.75	-31.02	-13	-13	Pass
8PSK Modulation						
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	9 kHz - 150 kHz	0.07	-57.4	-43	-43	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	150 kHz - 20 MHz	0.15	-53.55	-33	-33	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	20 MHz - 3.5 GHz	3133.75	-24.45	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	1.9 GHz - 2.2 GHz	2127.36	-24.94	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	2.2 GHz - 13 GHz	4023.45	-36.7	-13	-13	Pass
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers	13 GHz - 22 GHz	19966.45	-30.87	-13	-13	Pass

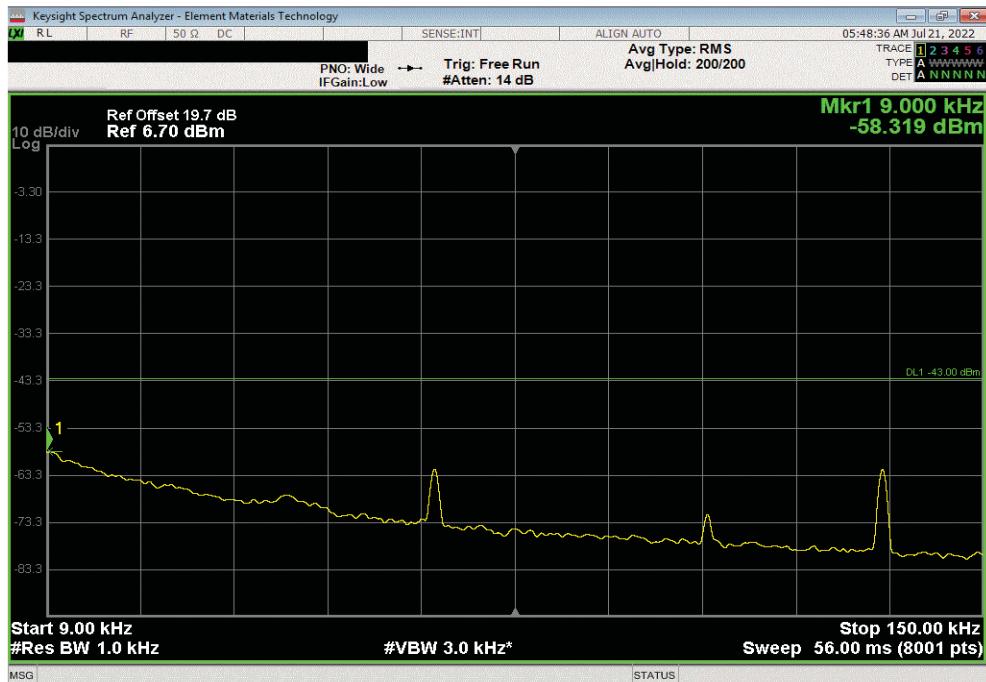
SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



TbtTx 2022.05.02.0 XMit 2022.02.07.0

Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
9 kHz - 150 kHz	0.01	-58.32	-43	Pass



Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
150 kHz - 20 MHz	0.15	-53	-33	Pass



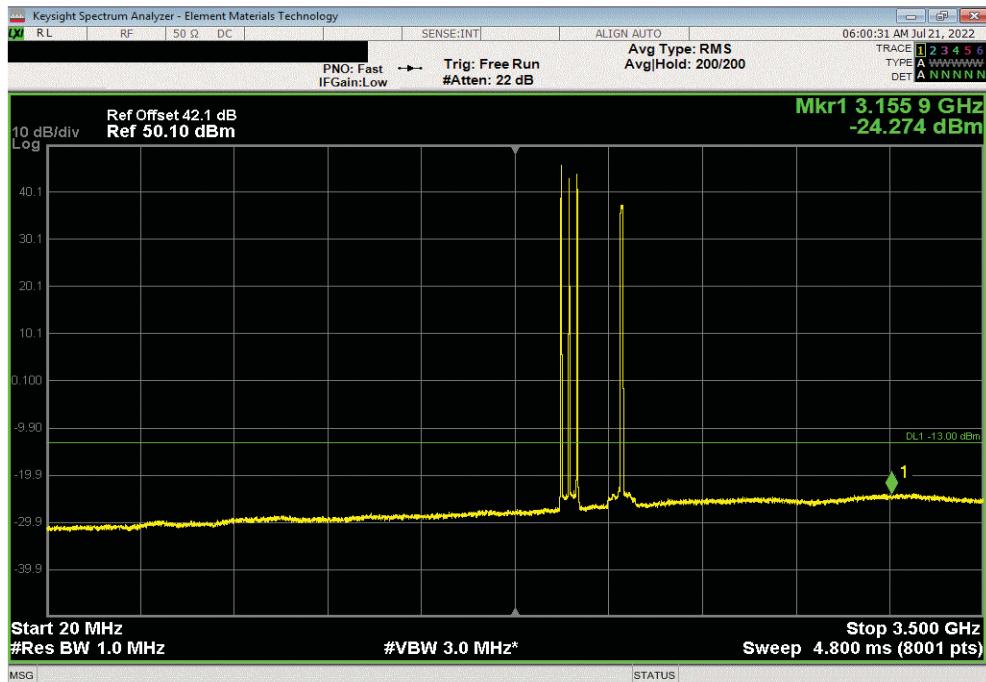
SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



TbtTx 2022.05.02.0 XMit 2022.02.07.0

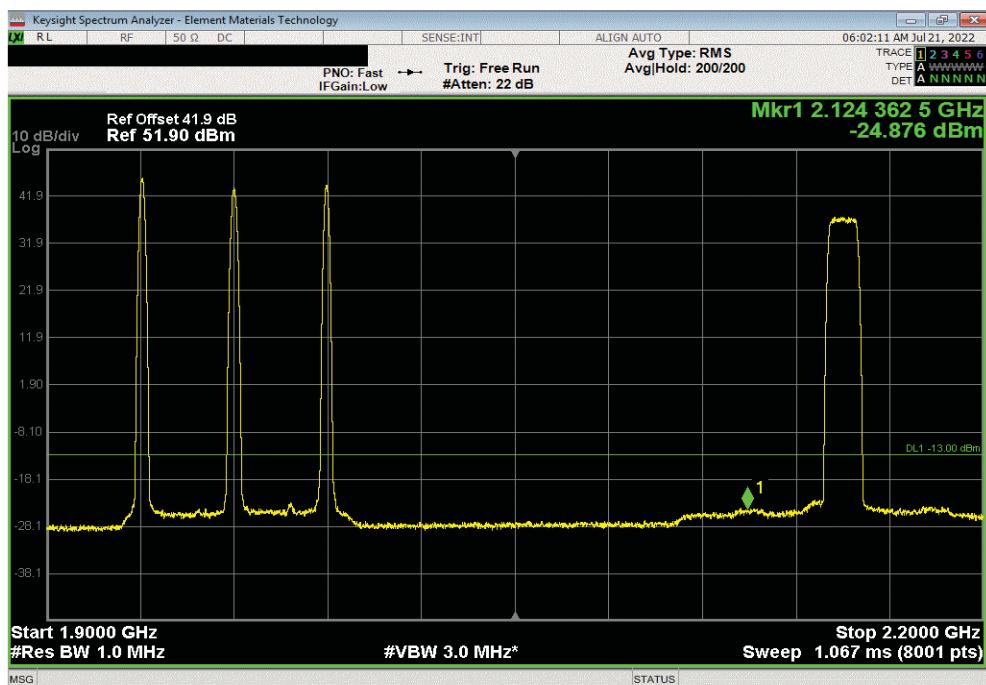
Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
20 MHz - 3.5 GHz	3155.93	-24.27	-13	Pass



Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
1.9 GHz - 2.2 GHz	2124.36	-24.88	-13	Pass



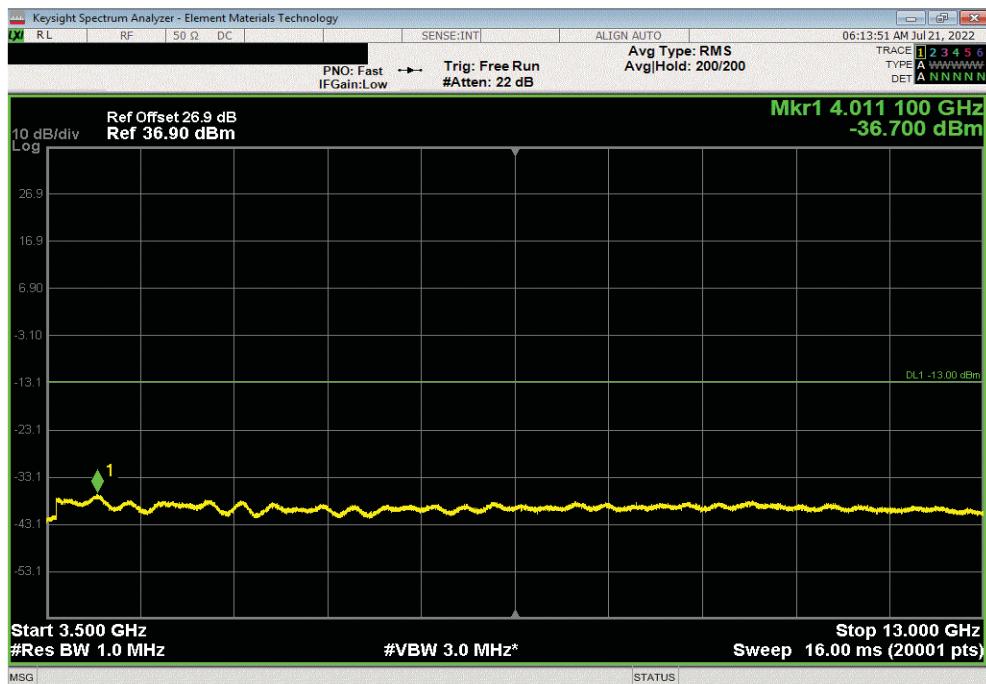
SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



TbtTx 2022.05.02.0 XMit 2022.02.07.0

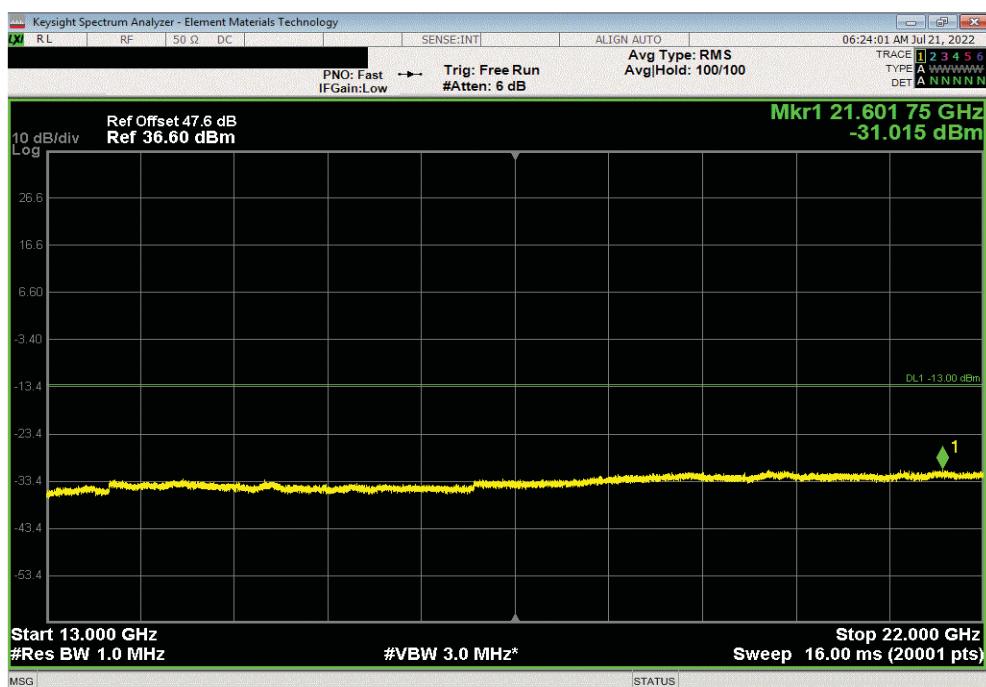
Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
2.2 GHz - 13 GHz	4011.1	-36.7	-13	Pass



Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
13 GHz - 22 GHz	21601.75	-31.02	-13	Pass

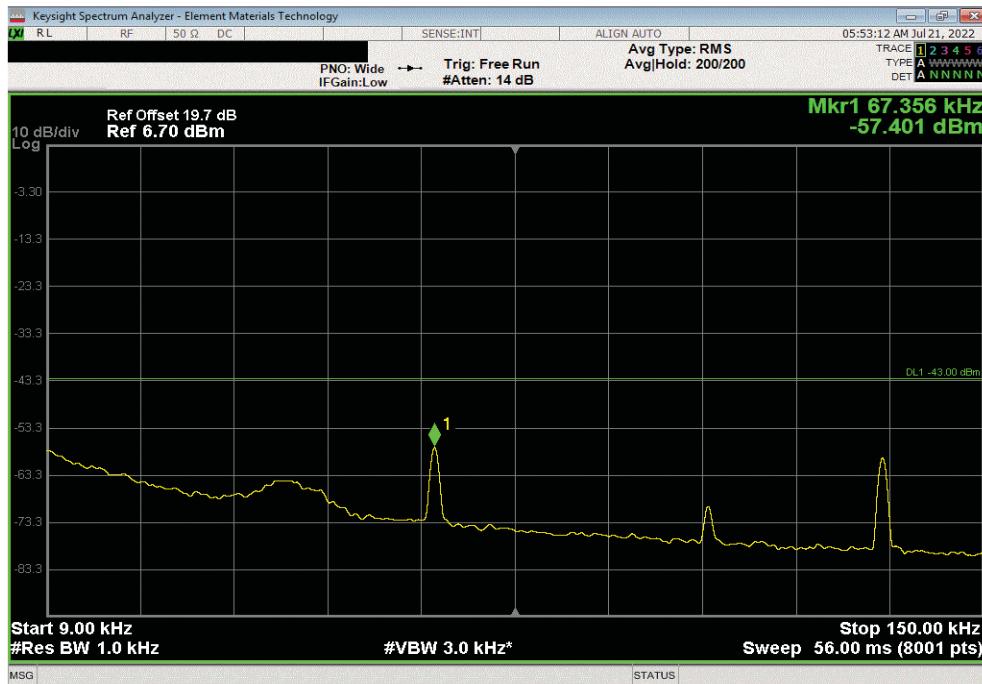


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

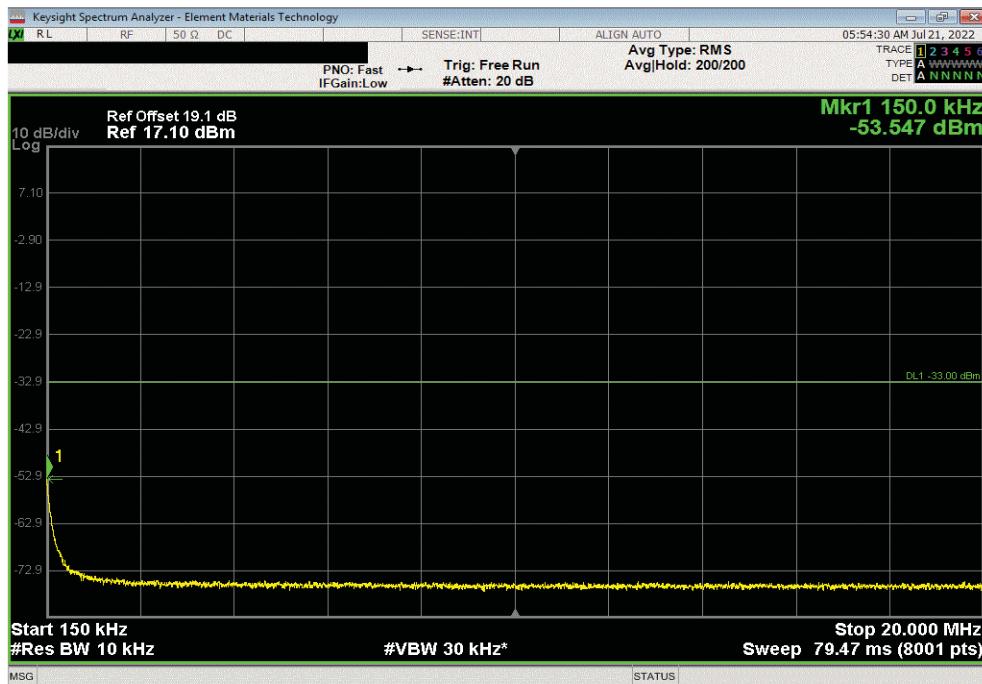


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Multicarrier, Port 1, GMSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
9 kHz - 150 kHz	0.07	-57.4	-43	Pass	



Multicarrier, Port 1, 8PSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
150 kHz - 20 MHz	0.15	-53.55	-33	Pass	

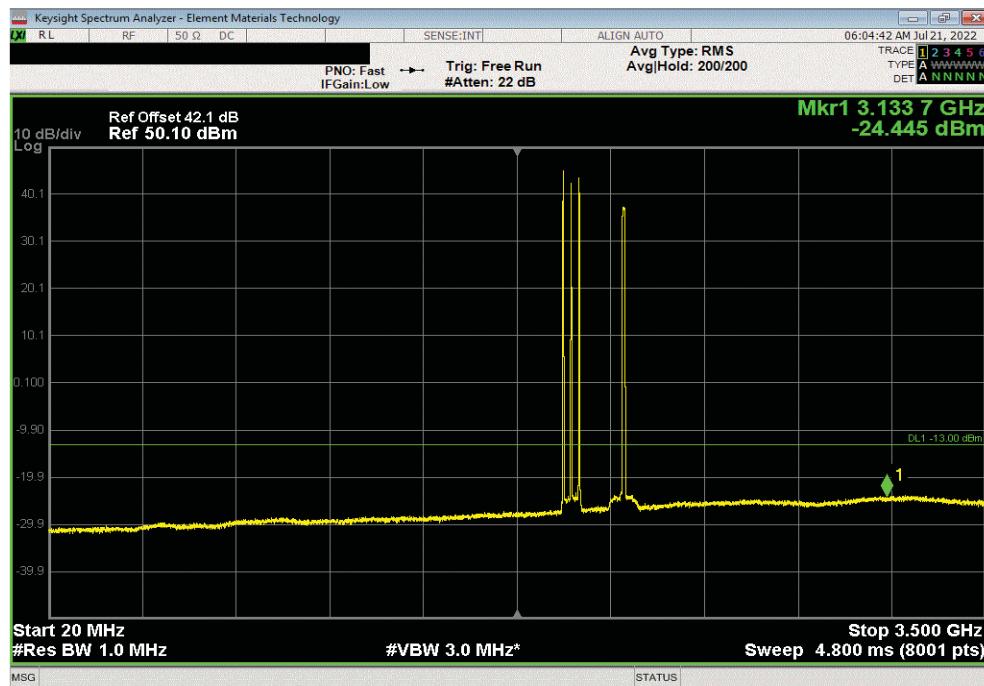


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

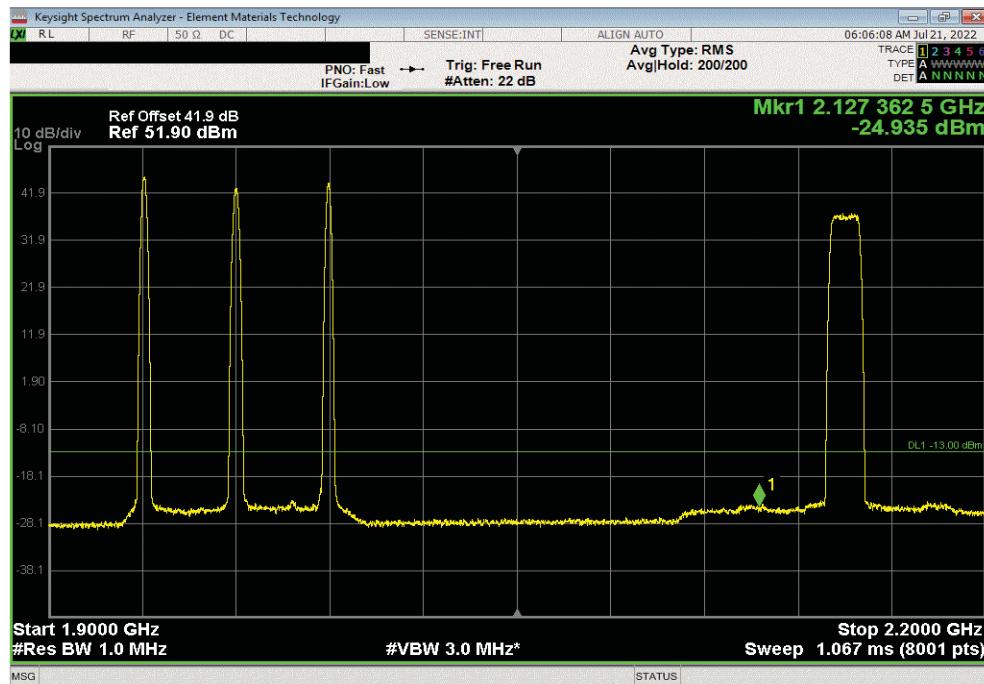


TbtTx 2022.05.02.0 XMit 2022.02.07.0

Multicarrier, Port 1, 8PSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
20 MHz - 3.5 GHz	3133.75	-24.45	-13	Pass	



Multicarrier, Port 1, 8PSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result	
1.9 GHz - 2.2 GHz	2127.36	-24.94	-13	Pass	



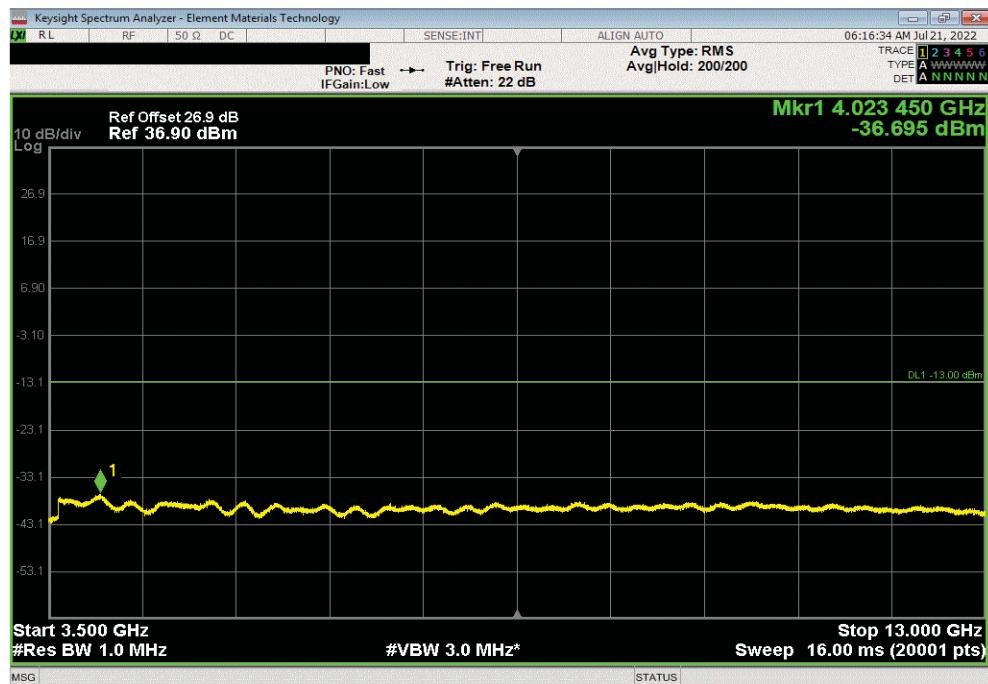
SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



TbtTx 2022.05.02.0 XMit 2022.02.07.0

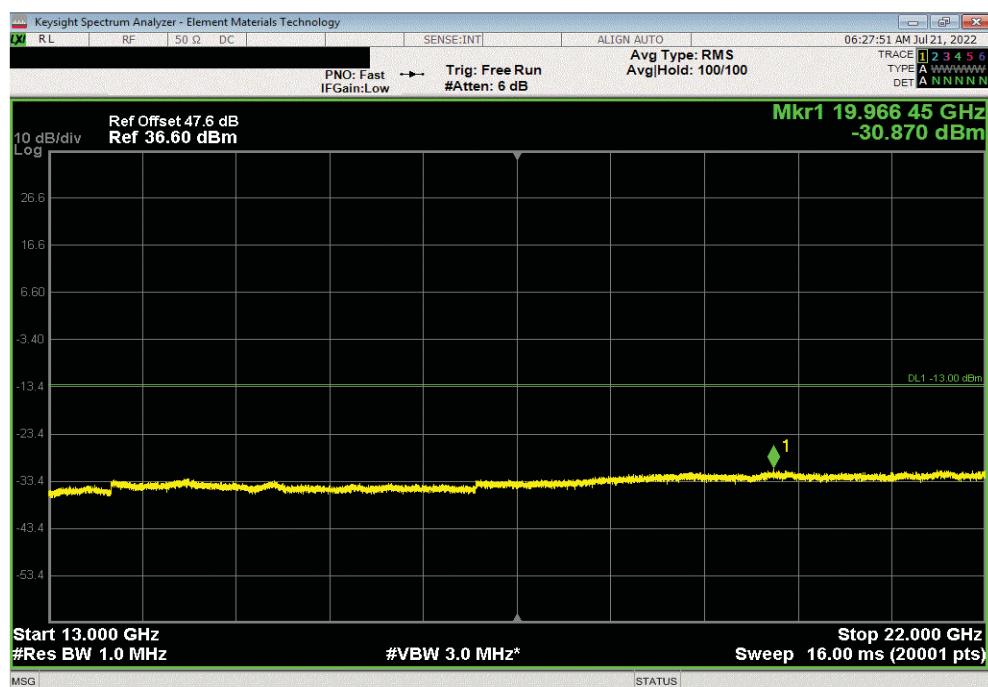
Multicarrier, Port 1, 8PSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
2.2 GHz - 13 GHz	4023.45	-36.7	-13	Pass



Multicarrier, Port 1, 8PSK Modulation, Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers

Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit < (dBm)	Result
13 GHz - 22 GHz	19966.45	-30.87	-13	Pass



End of Test Report