

OCCUPIED BANDWIDTH



XMH 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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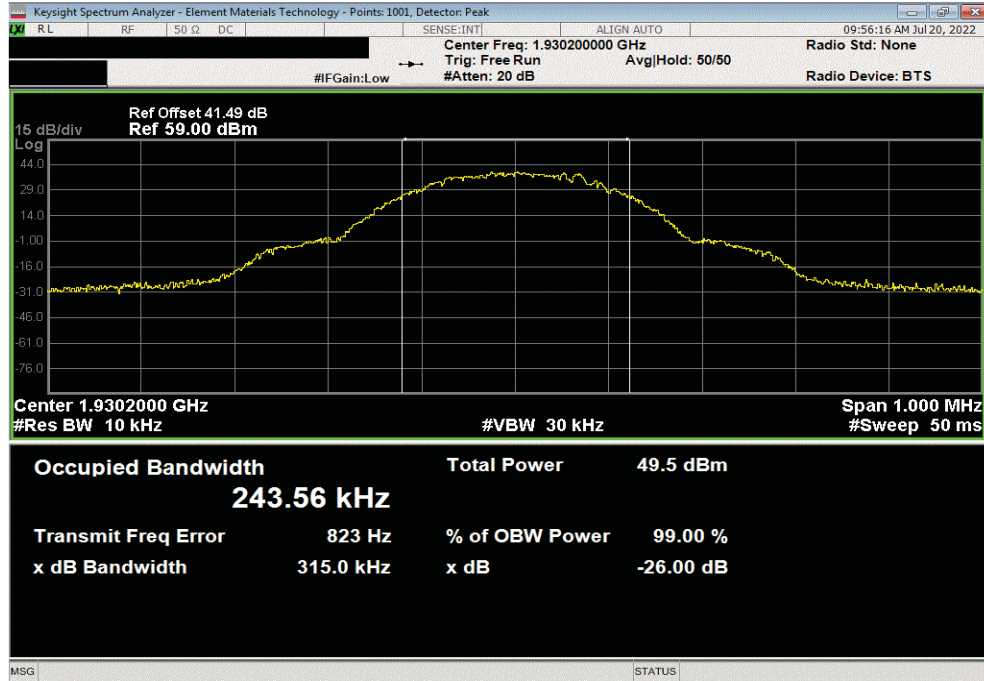
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 19.8 °C	
Attendees: David Le		Humidity: 59.6% RH	
Project: None		Barometric Pres.: 1016 mbar	
Tested by: Marty Martin	Power: 54 VDC	Job Site: TX07	
TEST SPECIFICATIONS			
FCC 24E:2022		Test Method	
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015	
		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 <i>Marty Martin</i>	
		Value 99 (%)	Value 26 dB (MHz)
		Limit	Result
Port 1			
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz			
GMSK Modulation			
	Low Channel - 1930.2 MHz	243.562 kHz	314.961 kHz
	Mid Channel - 1960 MHz	244.549 kHz	314.208 kHz
	High Channel - 1989.8 MHz	243.483 kHz	314.843 kHz
8PSK Modulation			
	Low Channel - 1930.2 MHz	240.522 kHz	306.196 kHz
	Mid Channel - 1960 MHz	240.735 kHz	307.496 kHz
	High Channel - 1989.8 MHz	241.187 kHz	306.745 kHz

OCCUPIED BANDWIDTH

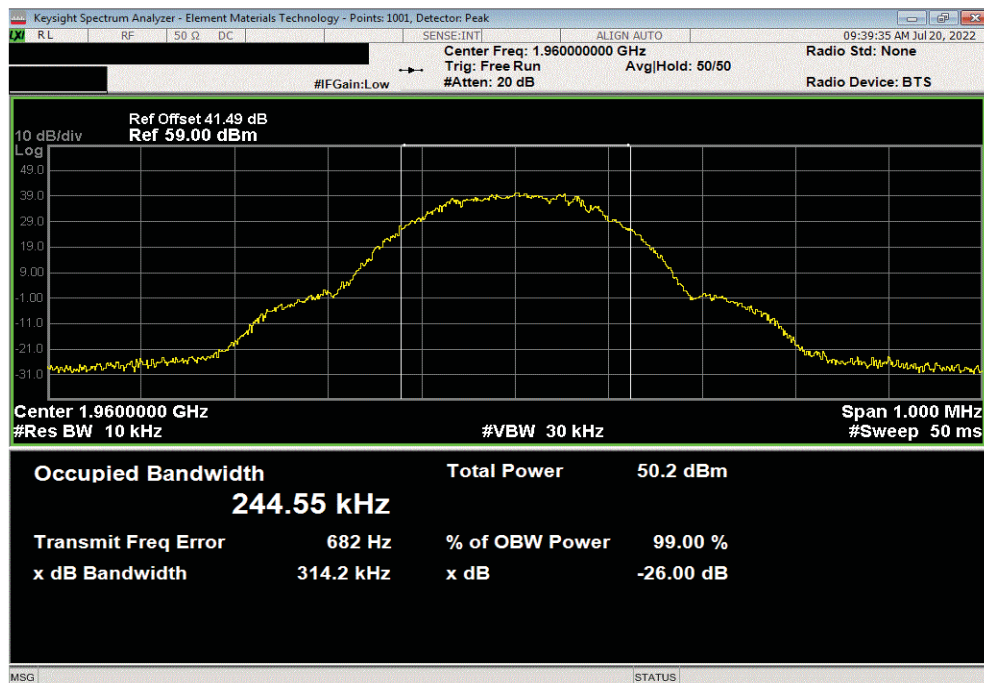


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz						
	Value	Value	Limit	Result		
	99 (%)	26 dB (MHz)				
	243.562 kHz	314.961 kHz	N/A	N/A		



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		

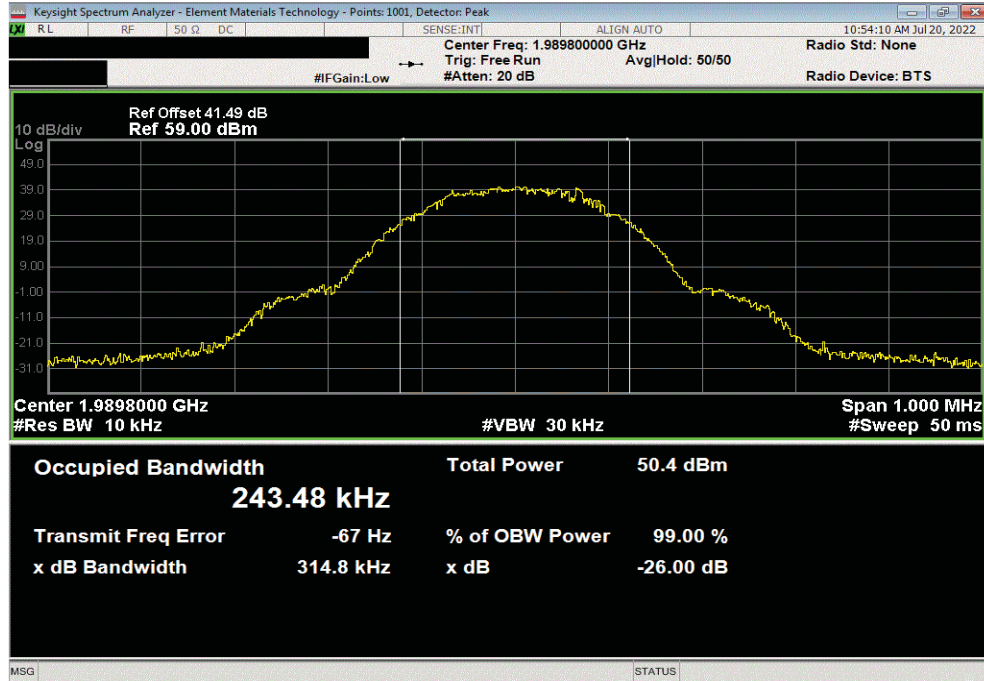


OCCUPIED BANDWIDTH

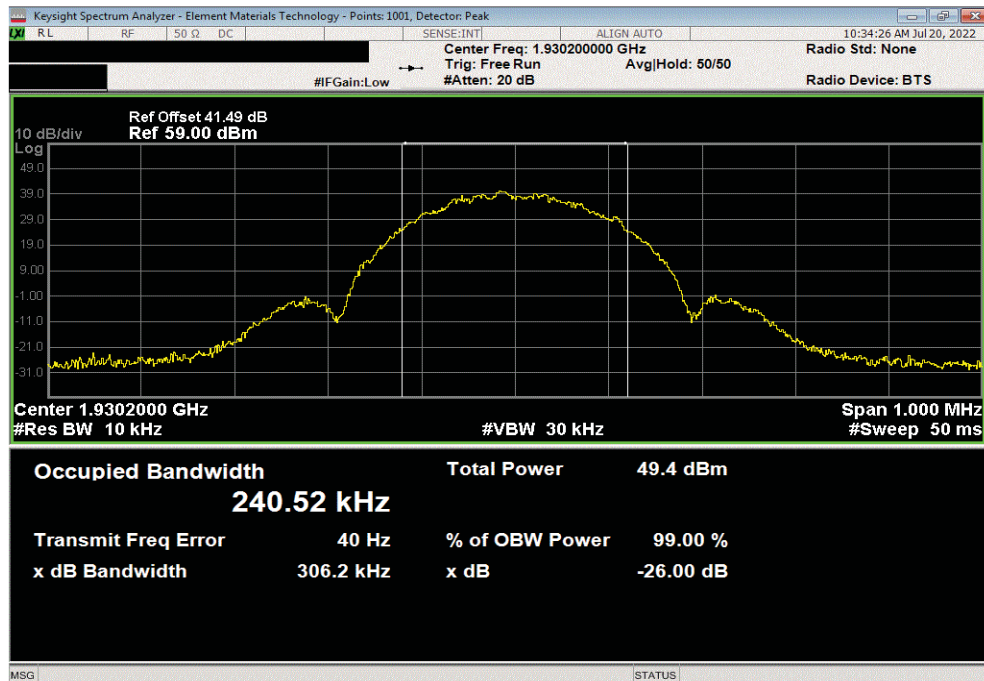


TbTx 2022.05.02.0 XbTx 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz						
	Value	Value	Limit	Result		
	99 (%)	26 dB (MHz)				
	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	Value	Limit	Result		
	99 (%)	26 dB (MHz)				
	240.522 kHz	306.196 kHz	N/A	N/A		

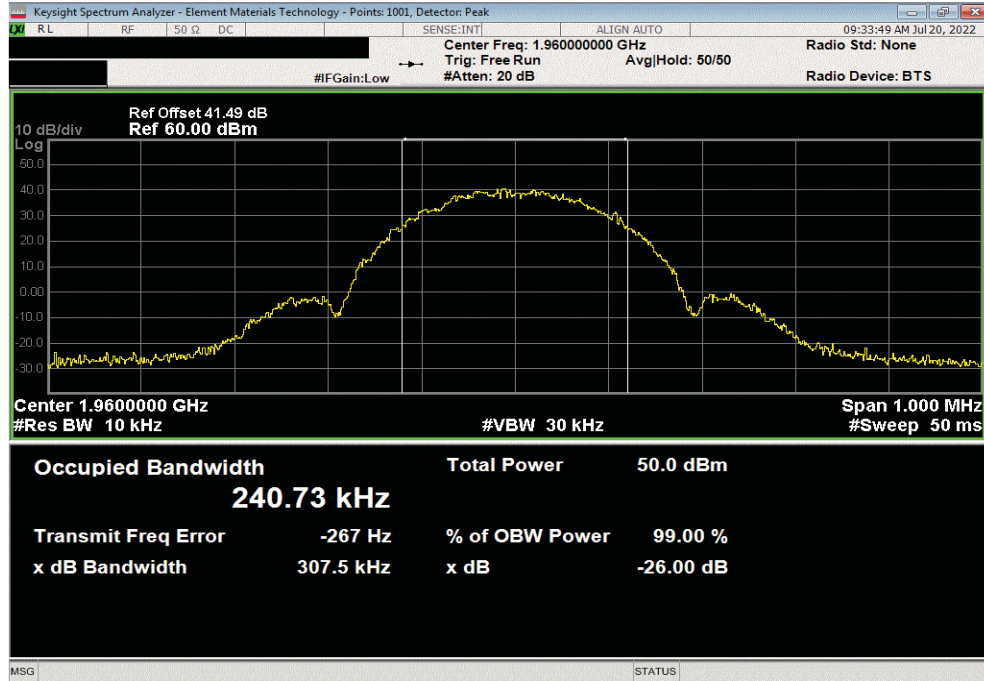


OCCUPIED BANDWIDTH

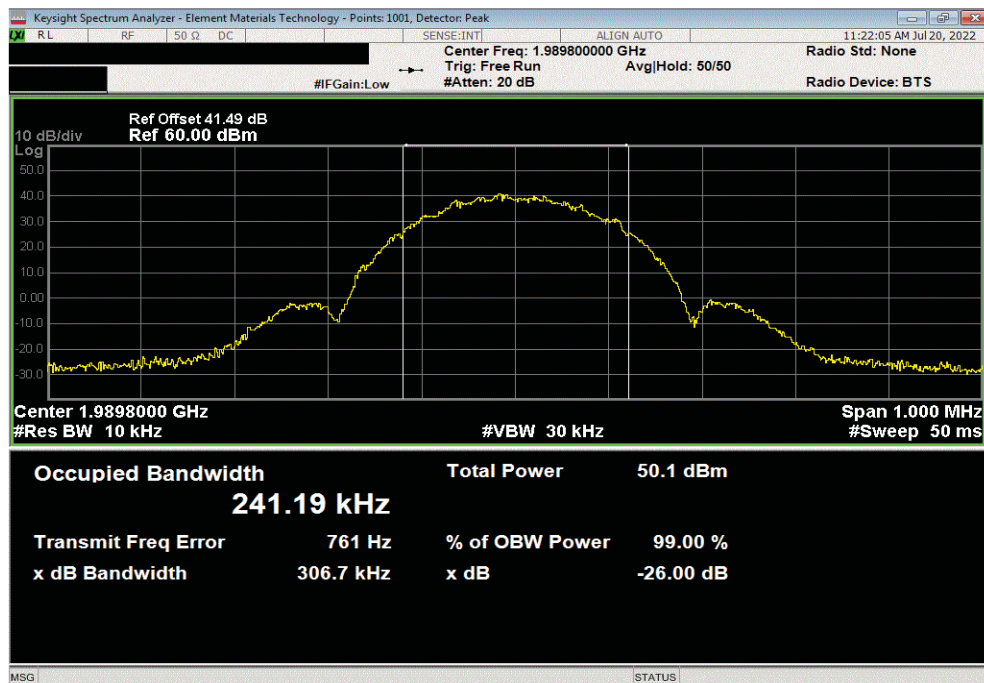


TbTx 2022.05.02.0 XbTx 2022.02.07.0

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)

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)



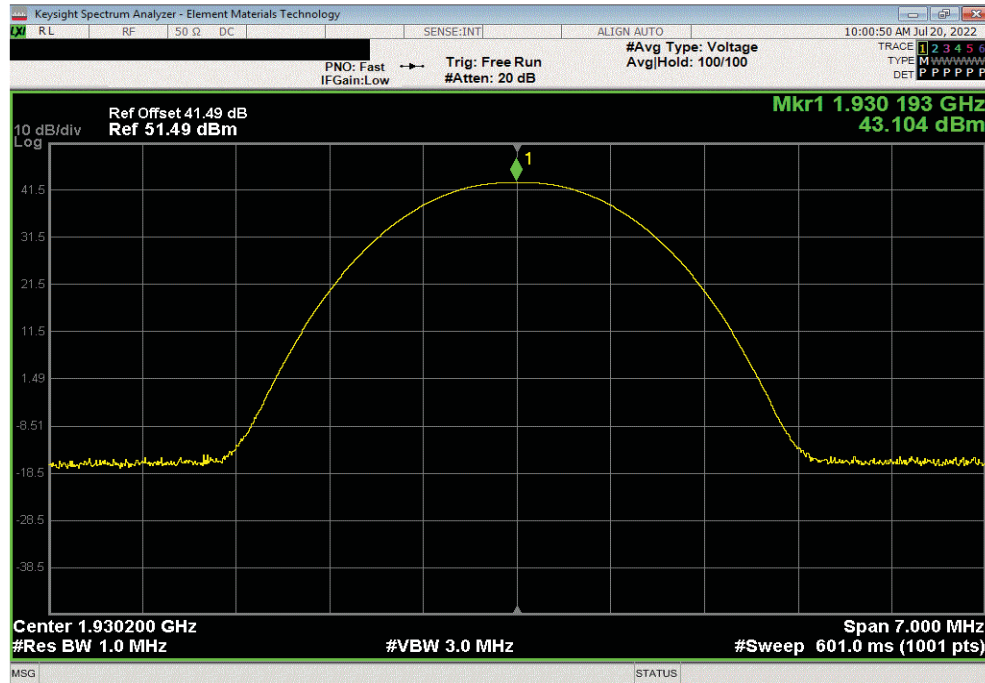
EUT: AHFII (FCC/ISED C2PC)		Work Order:		NOKI0044		
Serial Number: YK214000036		Date:		21-Jul-22		
Customer: Nokia Solutions and Networks		Temperature:		20 °C		
Attendees: David Le		Humidity:		59.2% RH		
Project: None		Barometric Pres.:		1016 mbar		
Tested by: Marty Martin		Power: 54 VDC		Job Site: TX07		
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). 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 <i>Marty Martin</i>				
		Peak Det	Avg Det	PAPR (dB)	PAPR Limit (dB)	Results
Port 1						
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

PEAK TO AVERAGE POWER (PAPR)

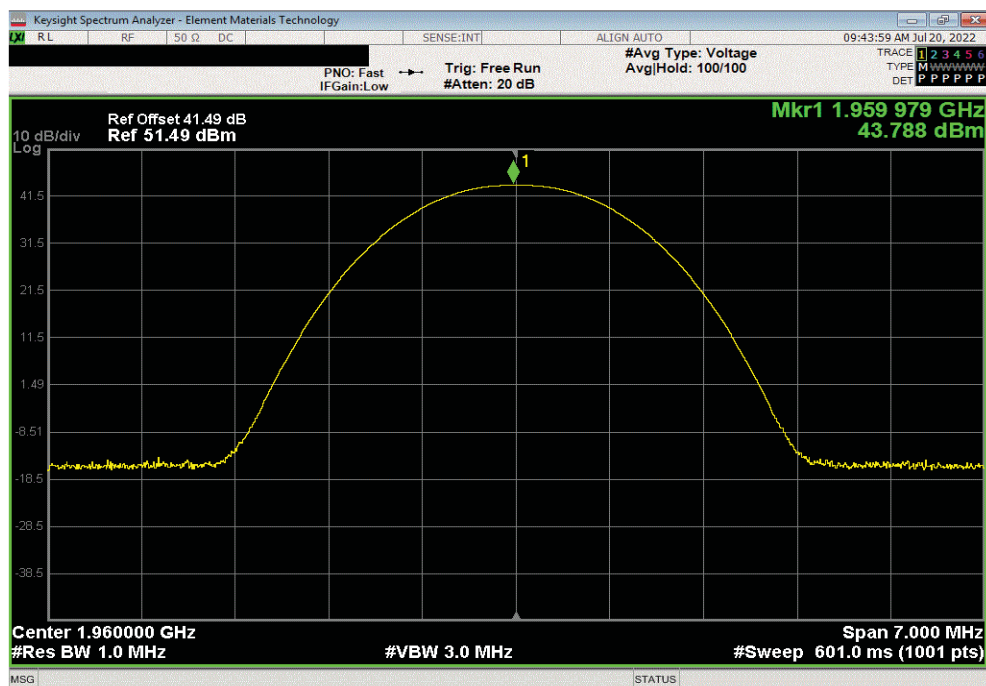


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, Low Channel - 1930.2 MHz						
				Peak Det dBm/MHz		Results
				43.104		N/A



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)



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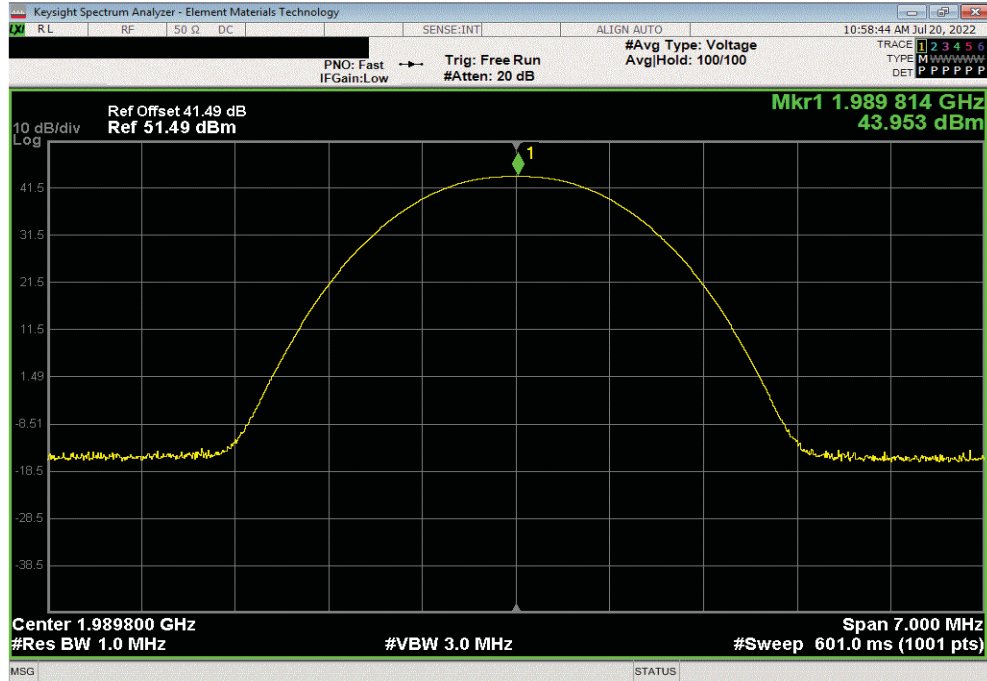
Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, GMSK Modulation, High Channel - 1989.8 MHz

Peak Det
dBm/MHz

Results

43.953

N/A



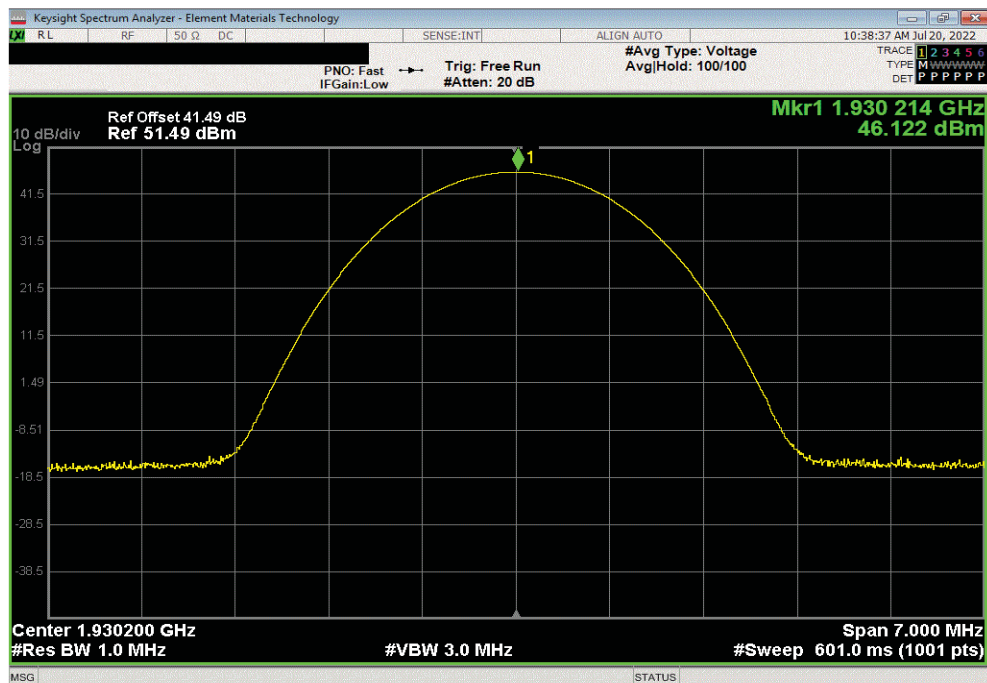
Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Low Channel - 1930.2 MHz

Peak Det
dBm/MHz

Results

46.122

N/A

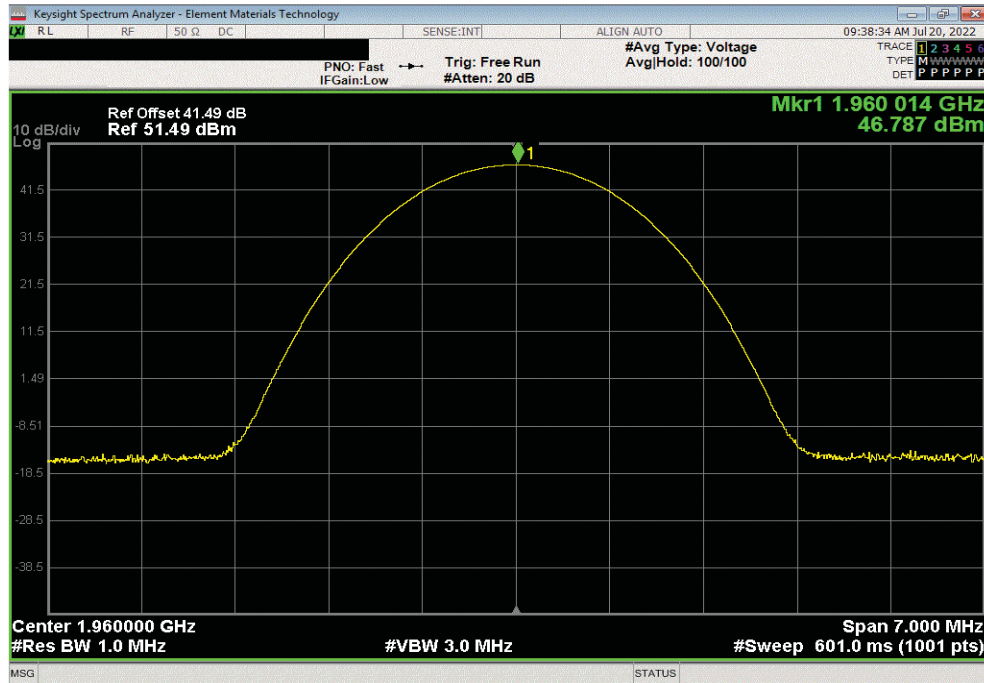


PEAK TO AVERAGE POWER (PAPR)

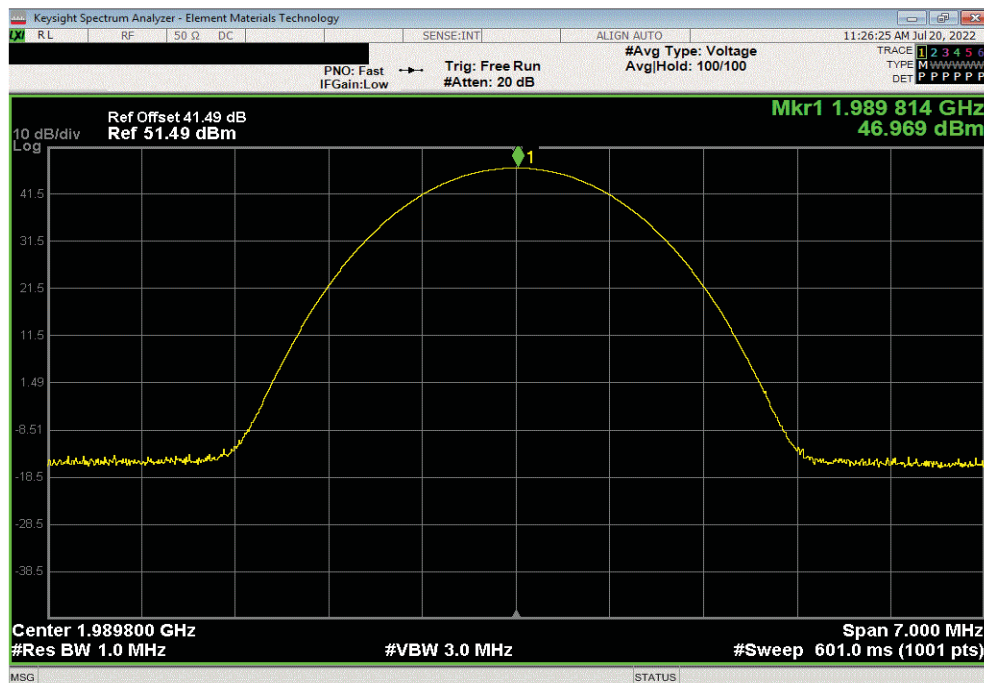


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Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 8PSK Modulation, Mid Channel - 1960 MHz						
				Peak Det dBm/MHz		Results
				46.787		N/A



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



XMH 2022.02.07.0

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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 at 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



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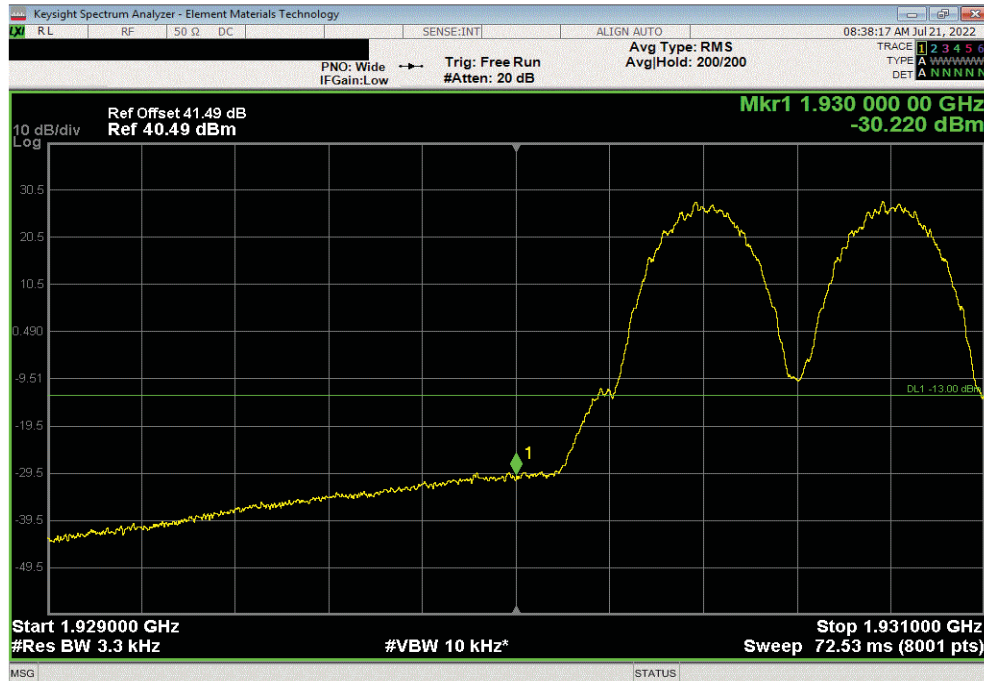
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 20.7 °C	
Attendees: David Le		Humidity: 58.3% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Marty Martin		Job Site: TX07	
Power: 54 VDC			
TEST 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. 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 <i>Marty Martin</i>	
		Frequency Range	Max Value (dBm)
			Limit < (dBm)
			Result
Port 1			
GMSK Modulation			
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	1	-30.22
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	2	-22.91
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	3	-25.33
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	1	-30.15
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	2	-19.92
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	3	-22.22
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	1	-15.59
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	2	-24.33
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	3	-26.36
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	1	-14.64
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	2	-24.06
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	3	-25.23
8PSK Modulation			
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	1	-30.12
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	2	-22.9
	Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz	3	-24.41
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	1	-29.51
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	2	-20.64
	Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz	3	-22.55
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	1	-18.46
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	2	-24.39
	Test Case 2: Band 2 GSM_EDGE Low Channel 1930.2 MHz	3	-26.23
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	1	-17.96
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	2	-24.02
	Test Case 2: Band 2 GSM_EDGE High Channel 1989.8 MHz	3	-25.01

BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

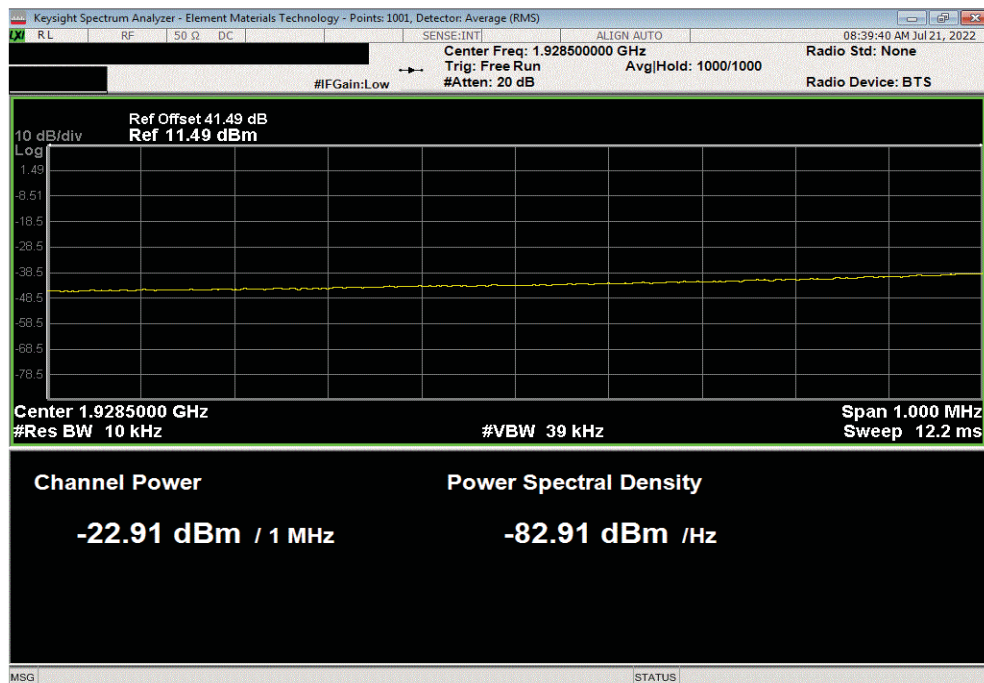


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Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Chanel 1930.4 MHz						
Frequency Range	Max Value (dBm)	Limit < (dBm)	Result			
1	-30.22	-13	Pass			



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			

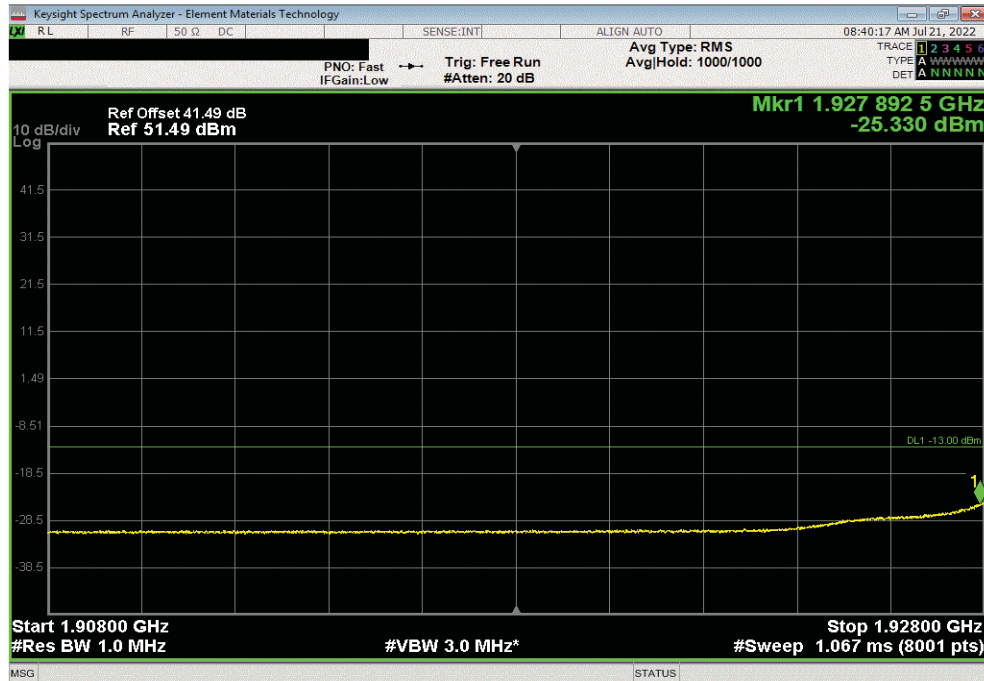


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

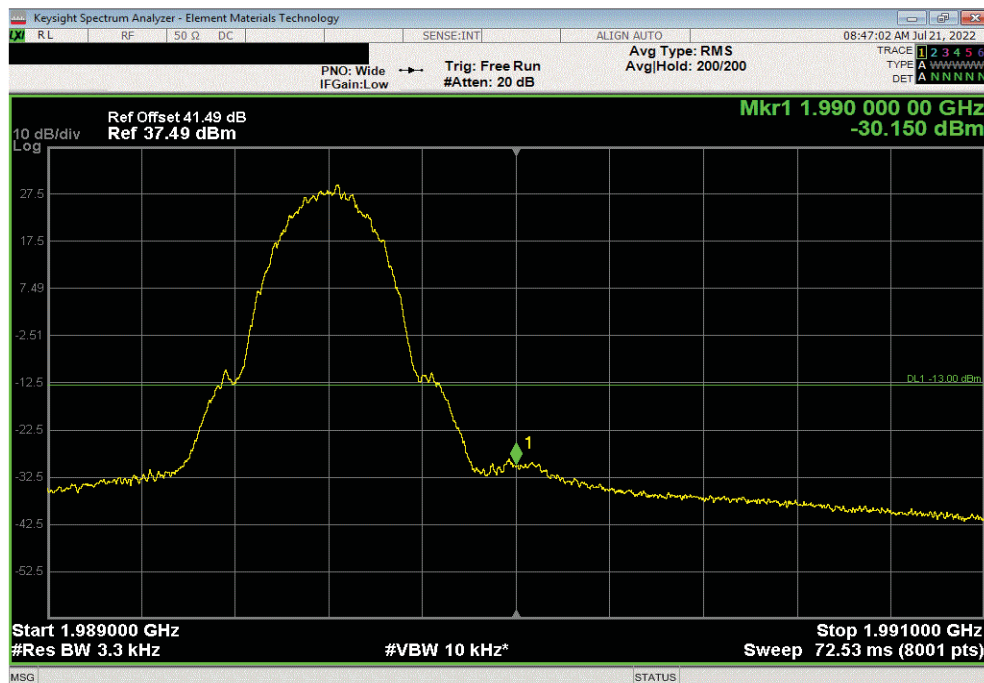


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Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE Low Channel 1930.4 MHz						
Frequency Range		Max Value (dBm)	Limit < (dBm)	Result		
3		-25.33	-13	Pass		



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		



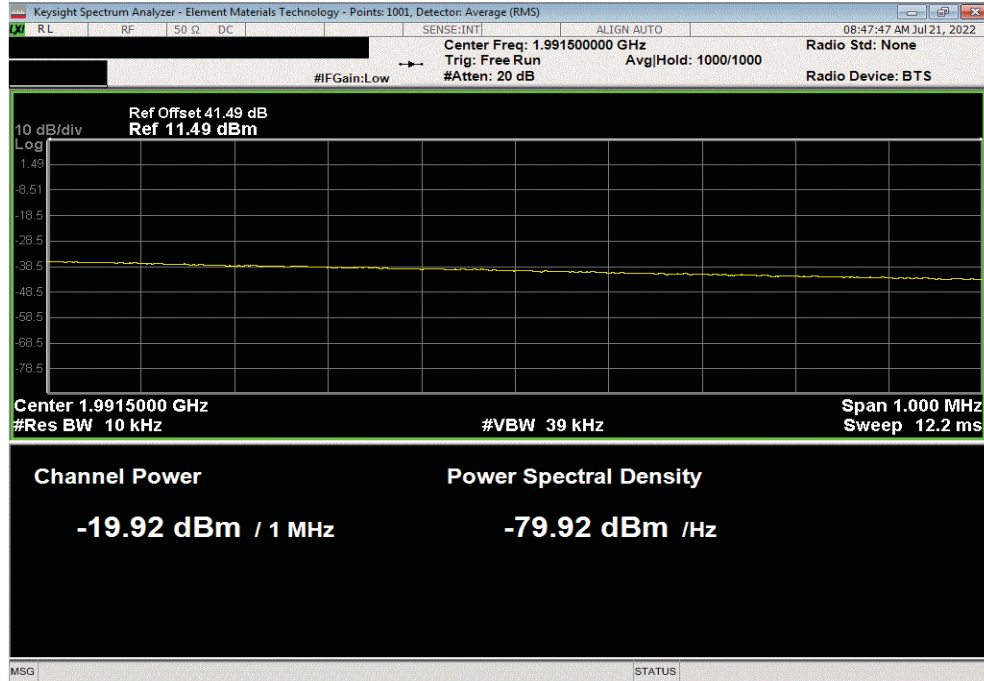
BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND



TbTx 2022.05.02.0 XMit 2022.02.07.0

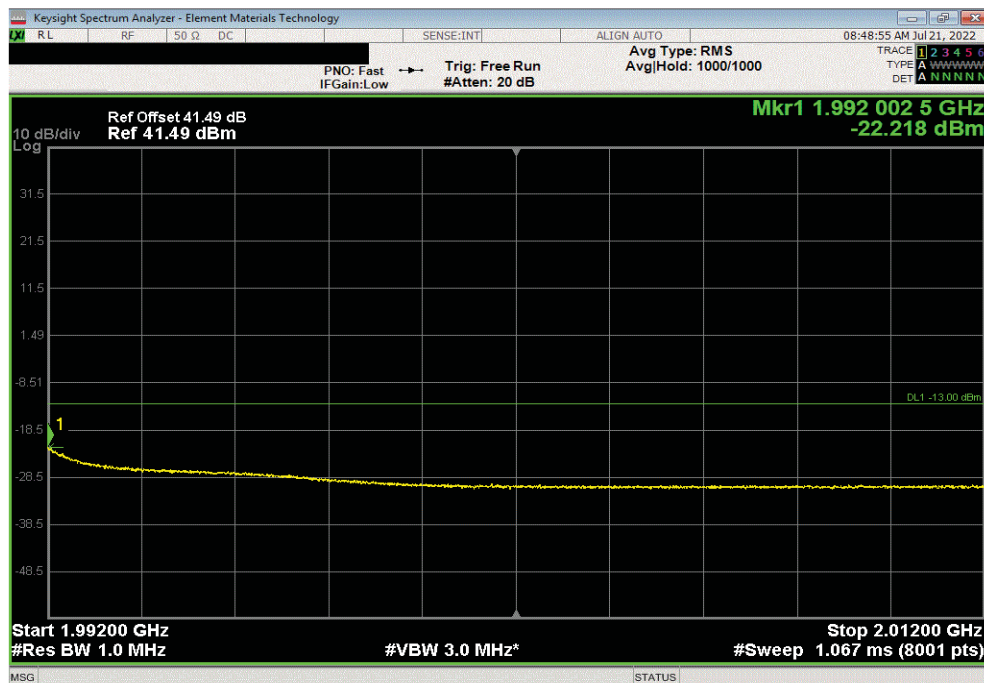
Port 1, GMSK Modulation, Test Case 1: Band 2 GSM_EDGE High Channel 1989.6 MHz

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

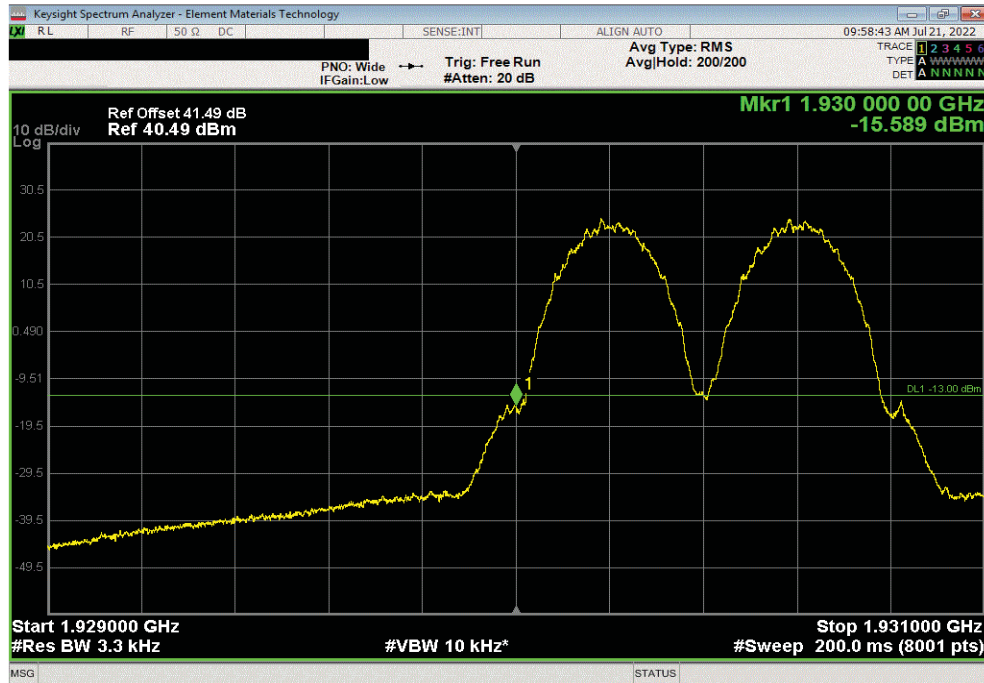


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

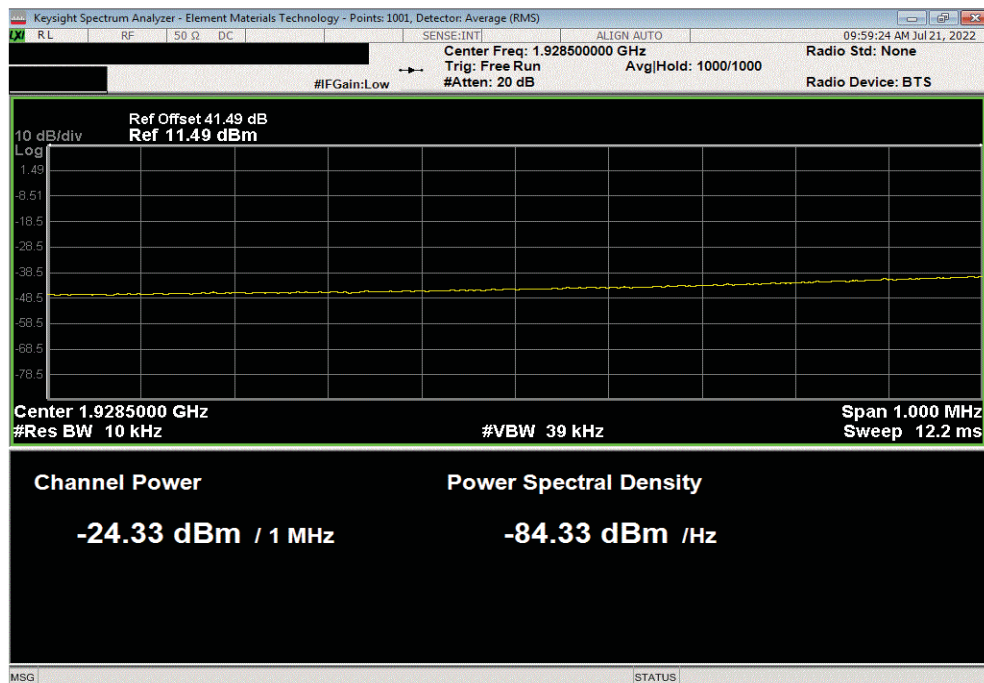


TbTx 2022.05.02.0 XbTx 2022.02.07.0

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	

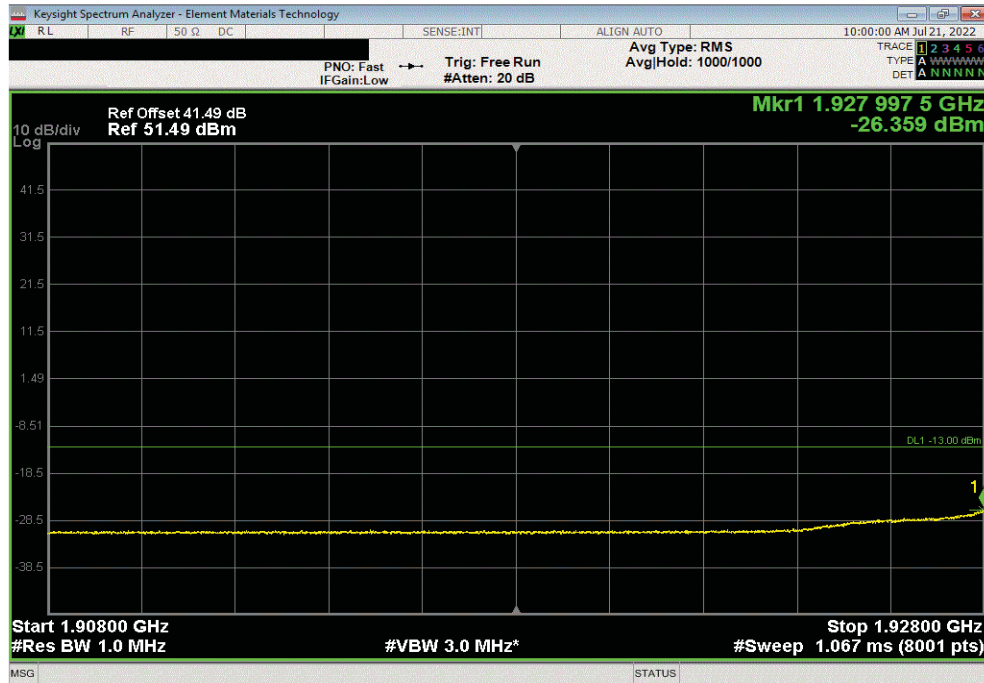


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

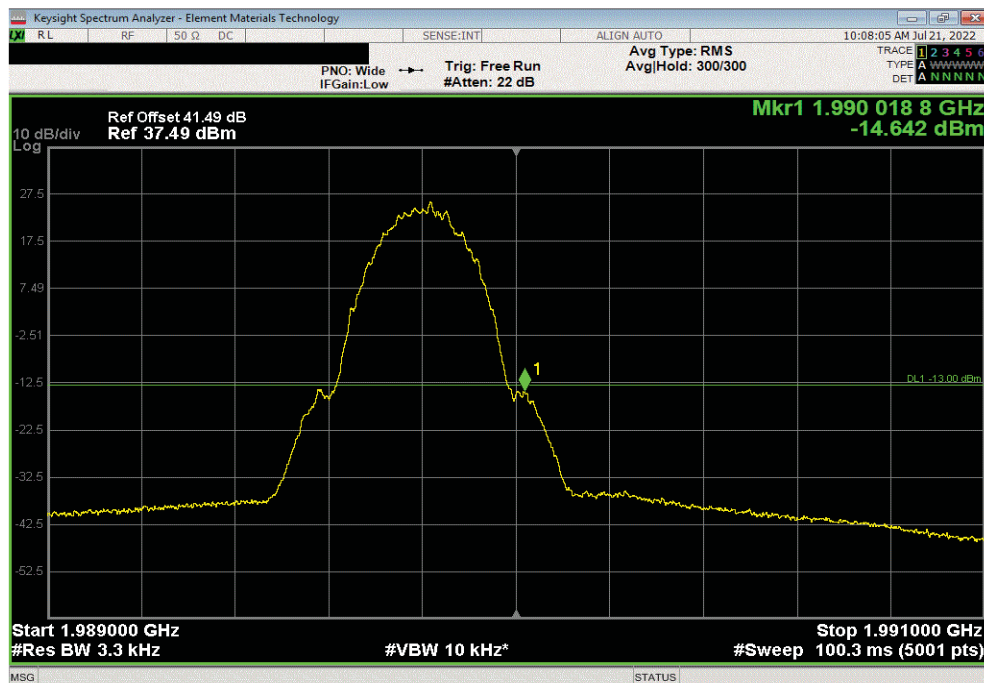


TbTx 2022.05.02.0 XbTx 2022.02.07.0

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		

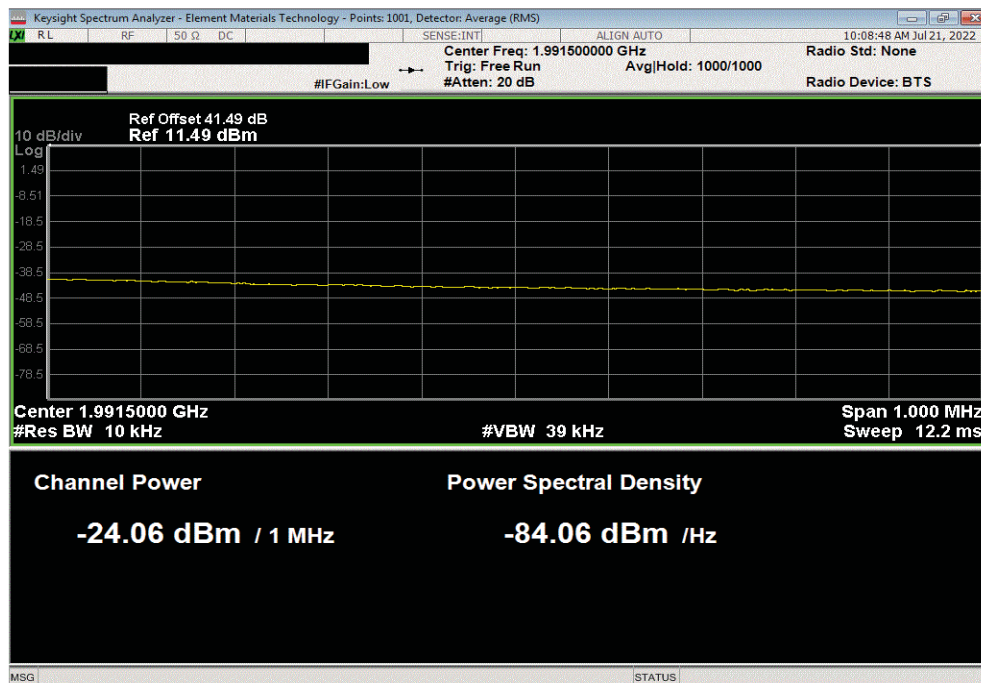


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

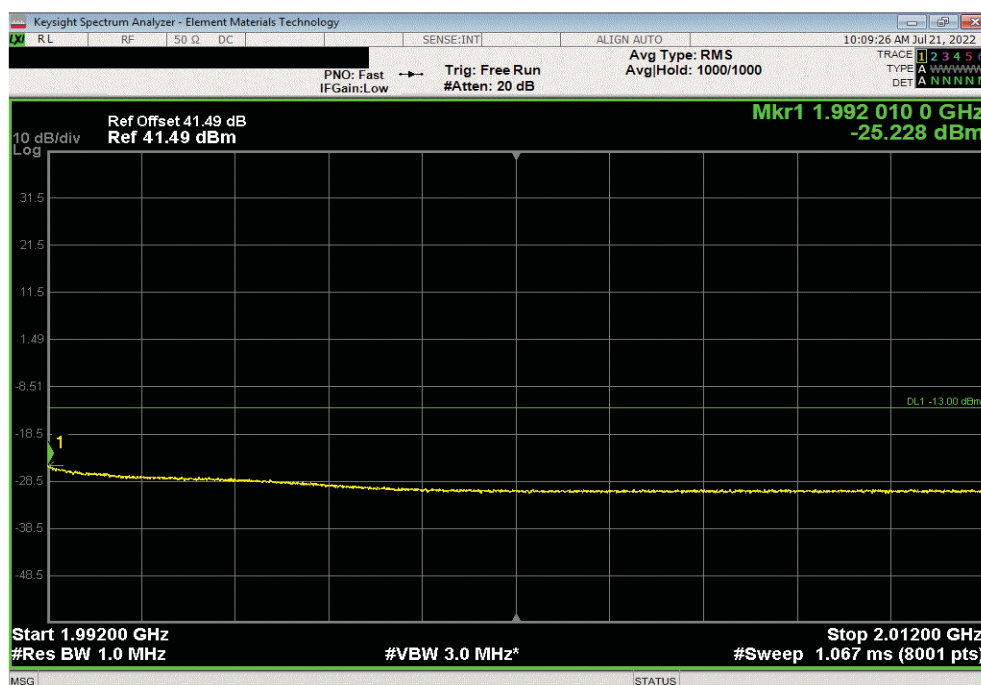


TbTx 2022.05.02.0 XMit 2022.02.07.0

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			

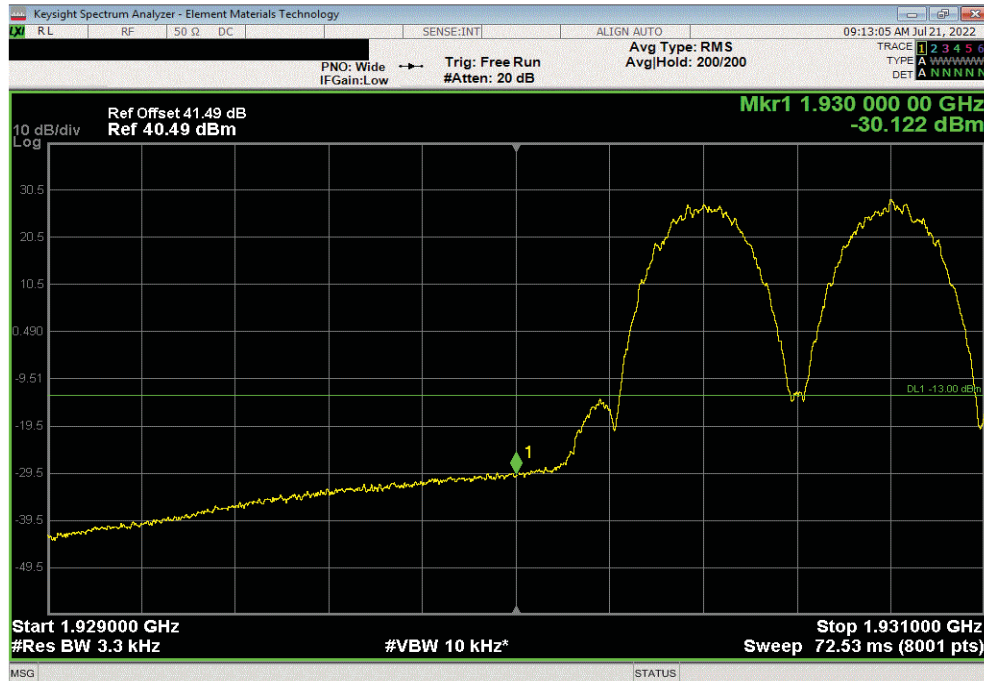


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

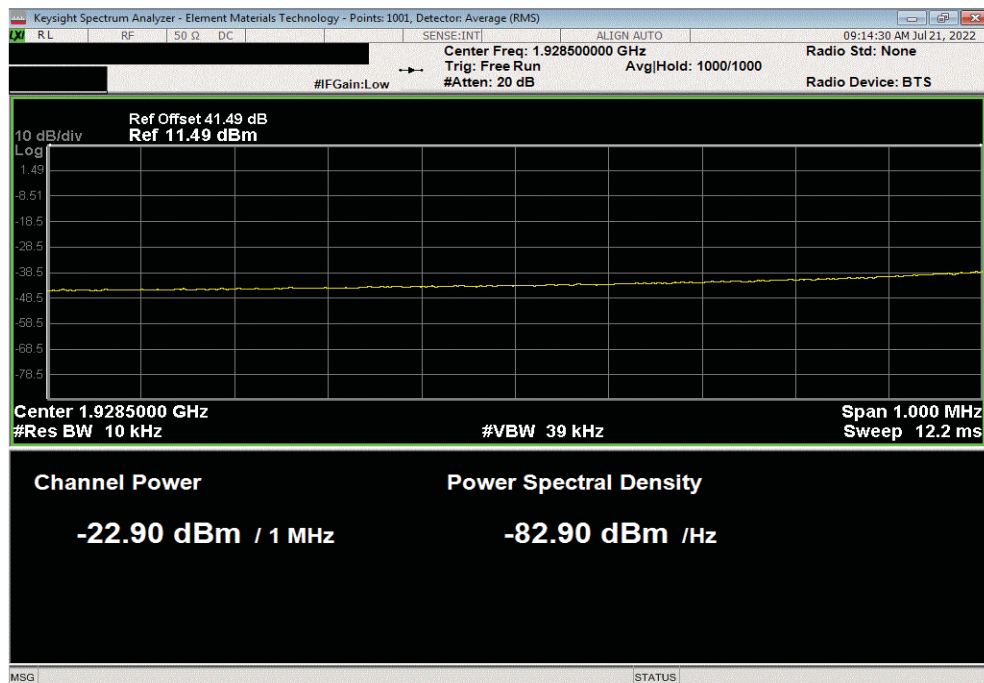


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

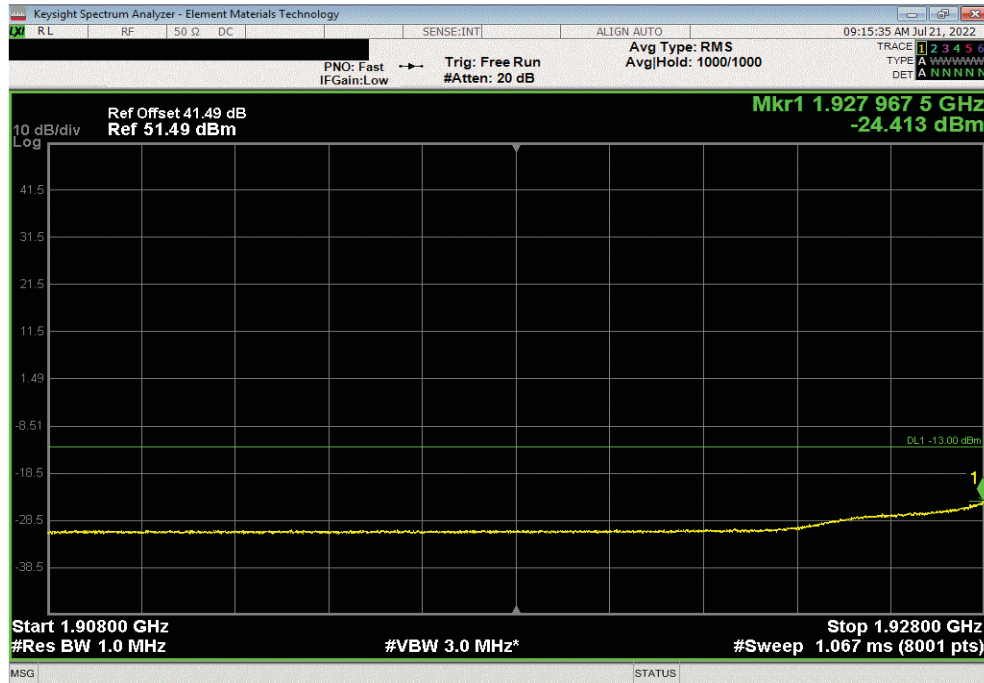


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

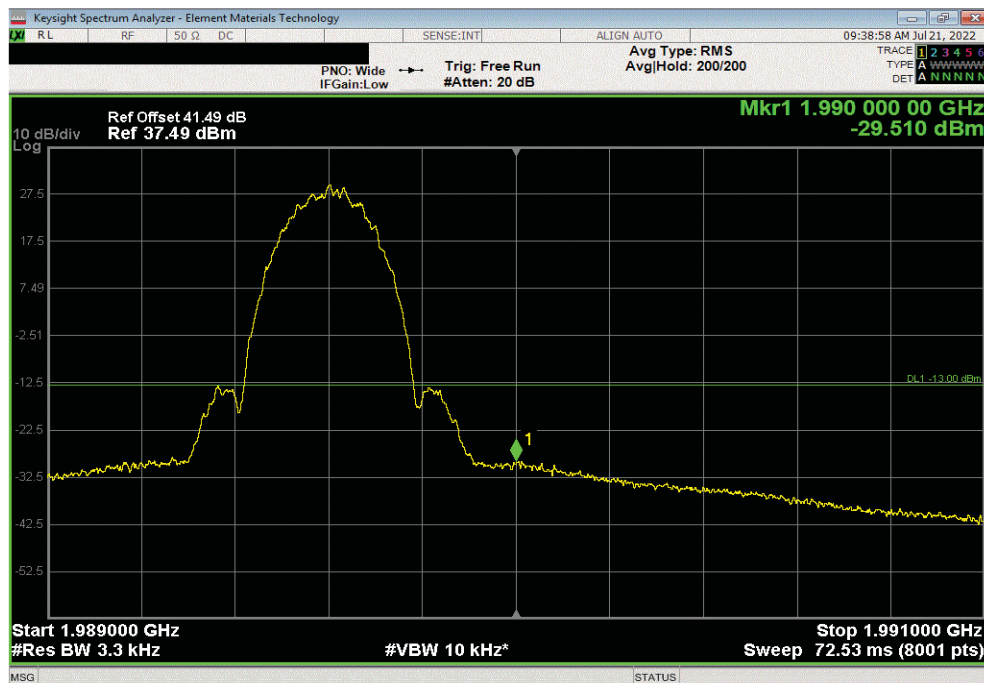


TbTtx 2022.05.02.0 XMIT 2022.02.07.0

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		

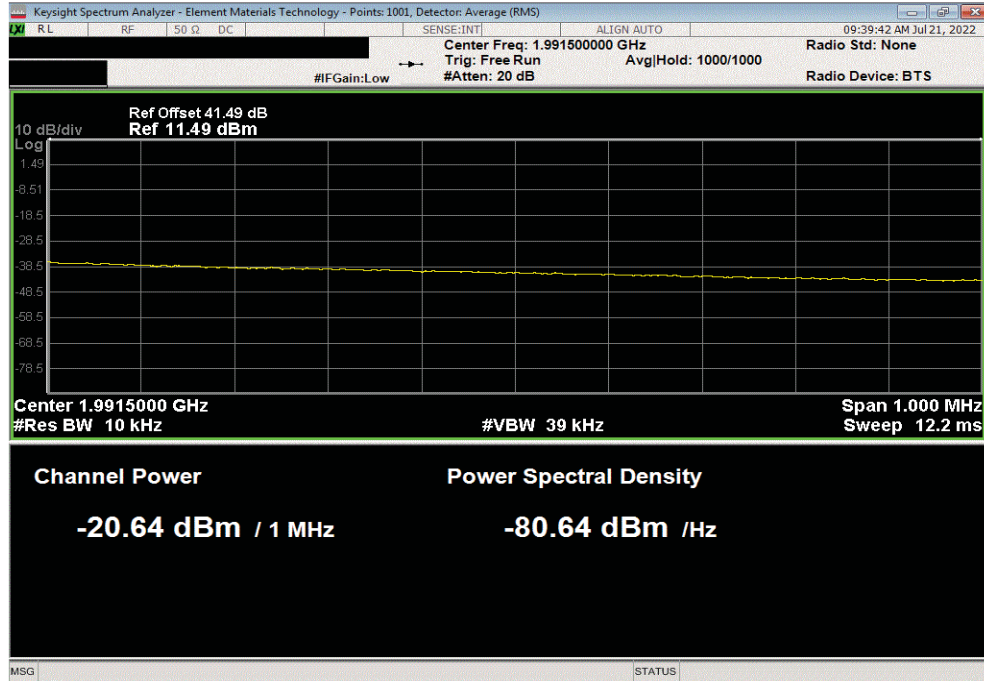


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

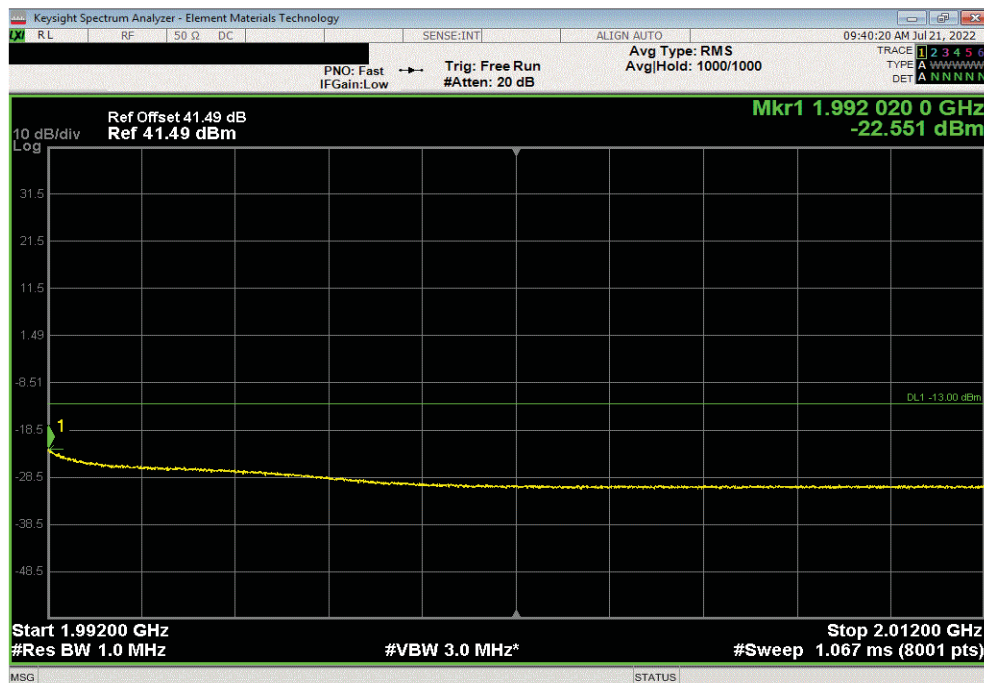


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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			

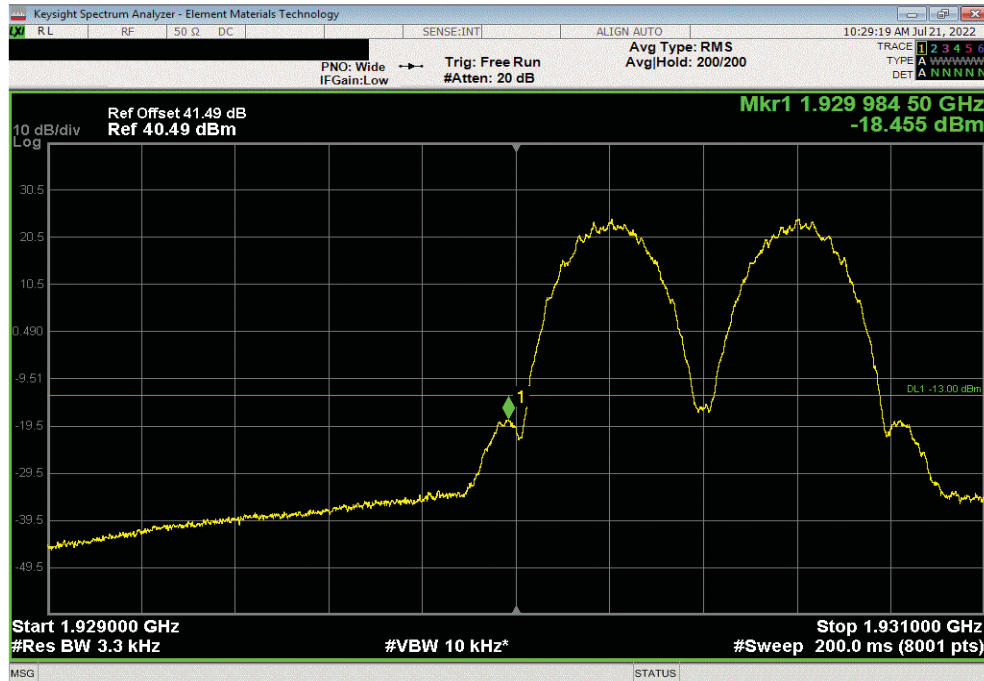


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

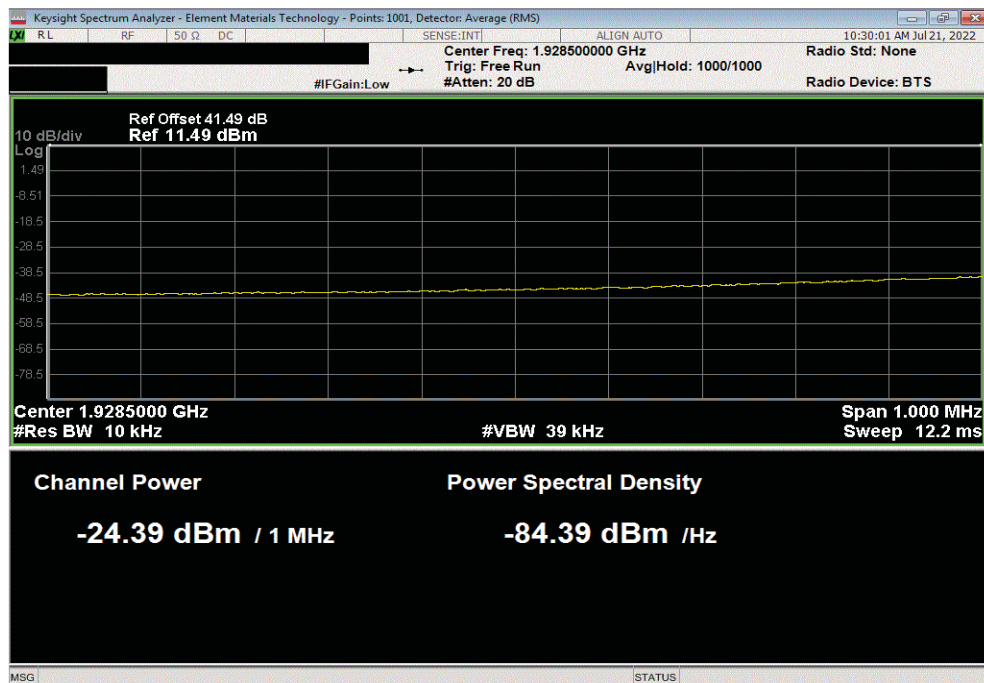


TbTtx 2022.05.02.0 XMIT 2022.02.07.0

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	

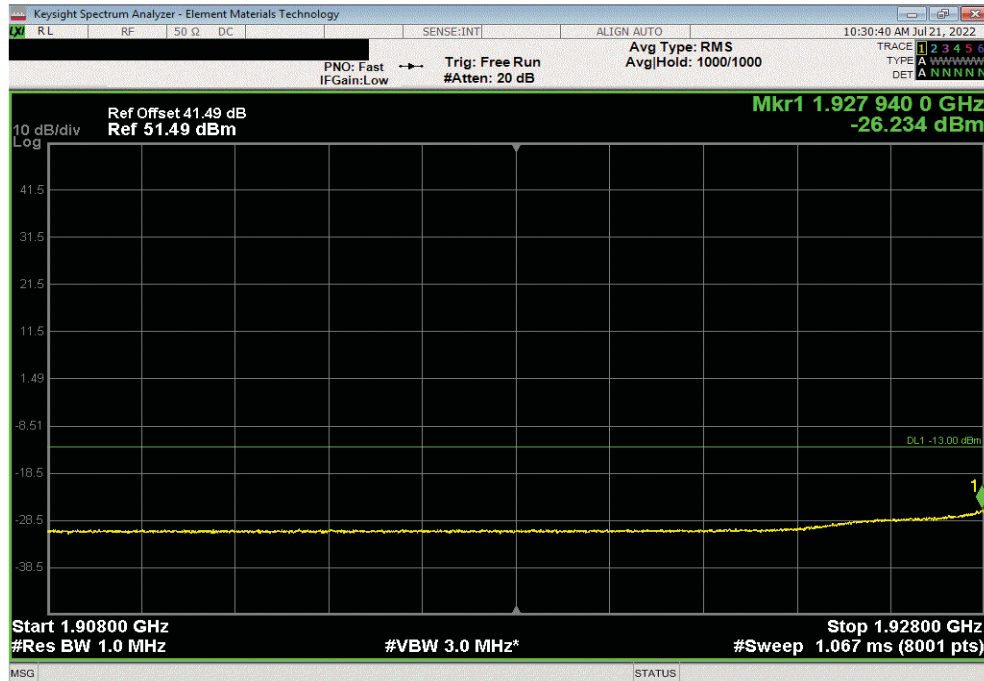


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

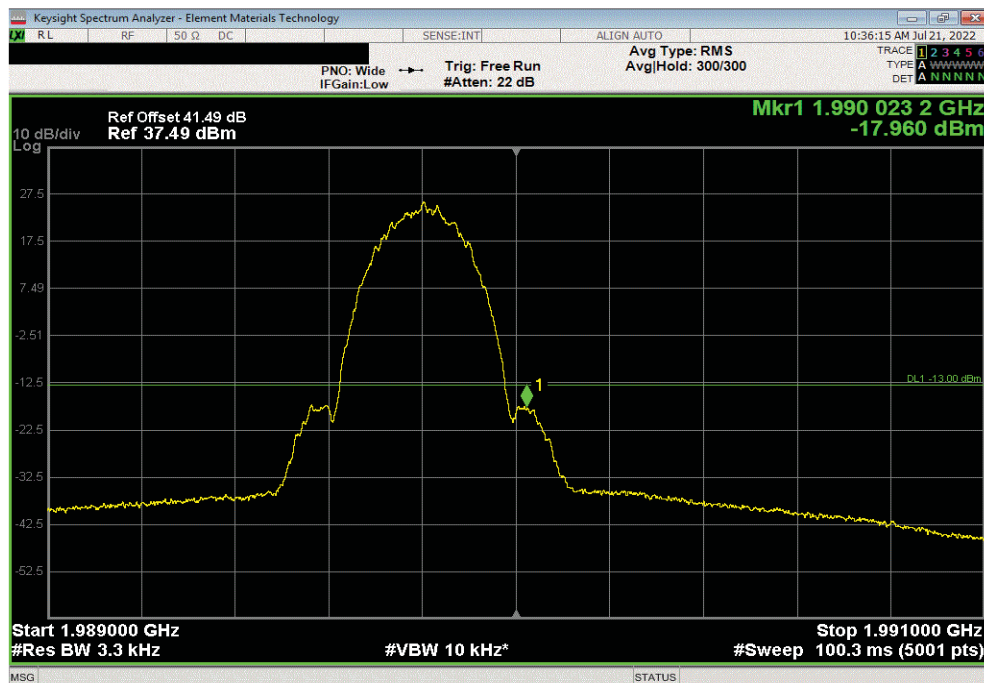


TbTx 2022.05.02.0 XMI 2022.02.07.0

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		

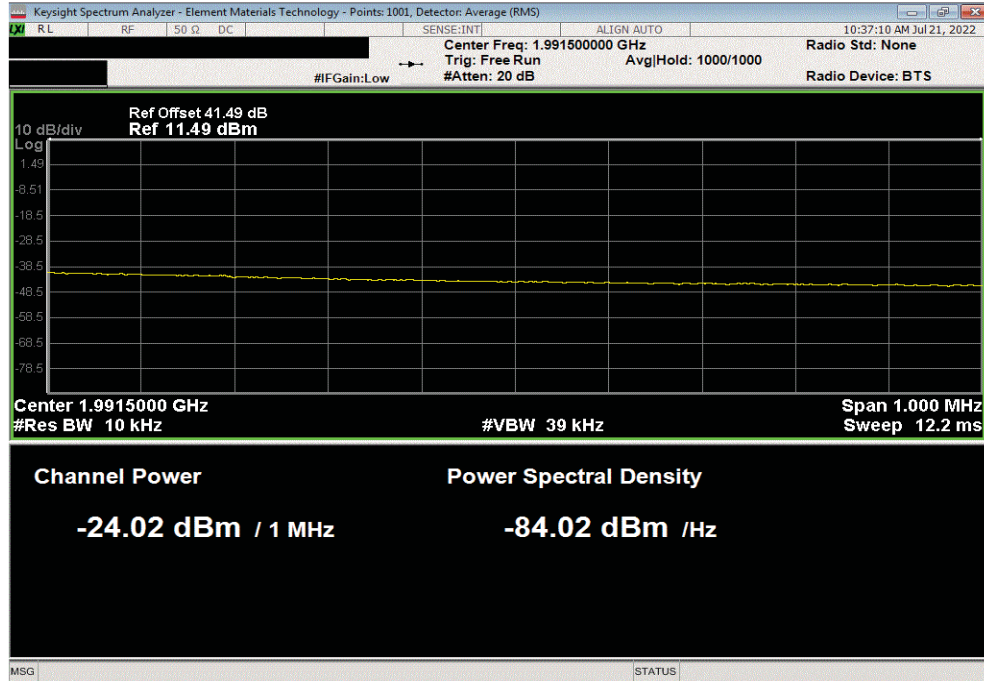


BAND EDGE COMPLIANCE - MULTICARRIER MULTIBAND

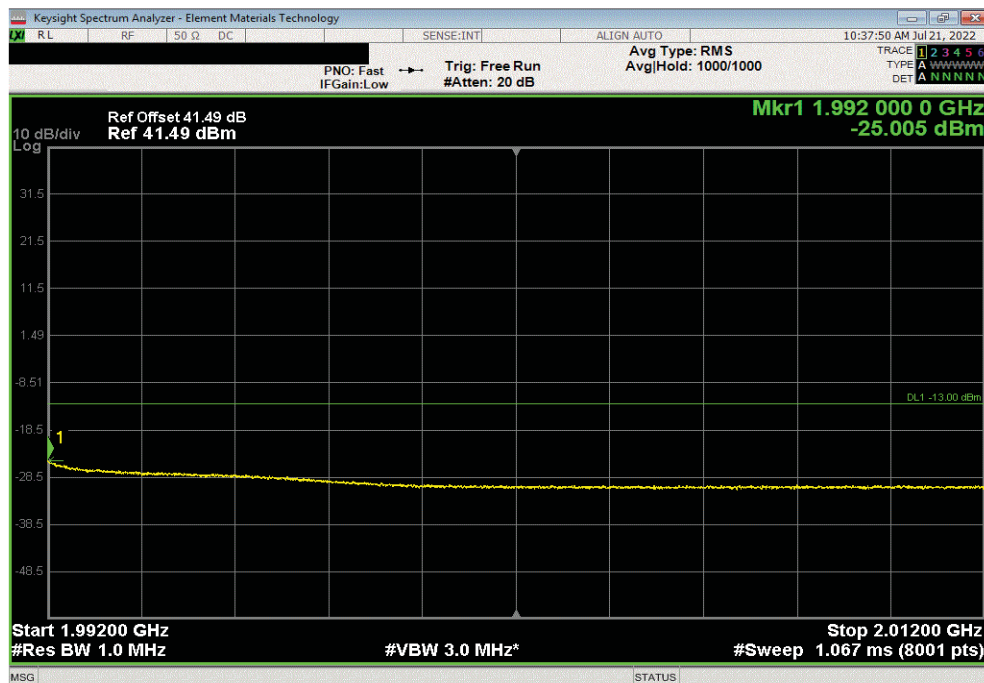


TbTx 2022.05.02.0 XMit 2022.02.07.0

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



XMH 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



TstTx 2022.05.02.0 XMit 2022.02.07.0

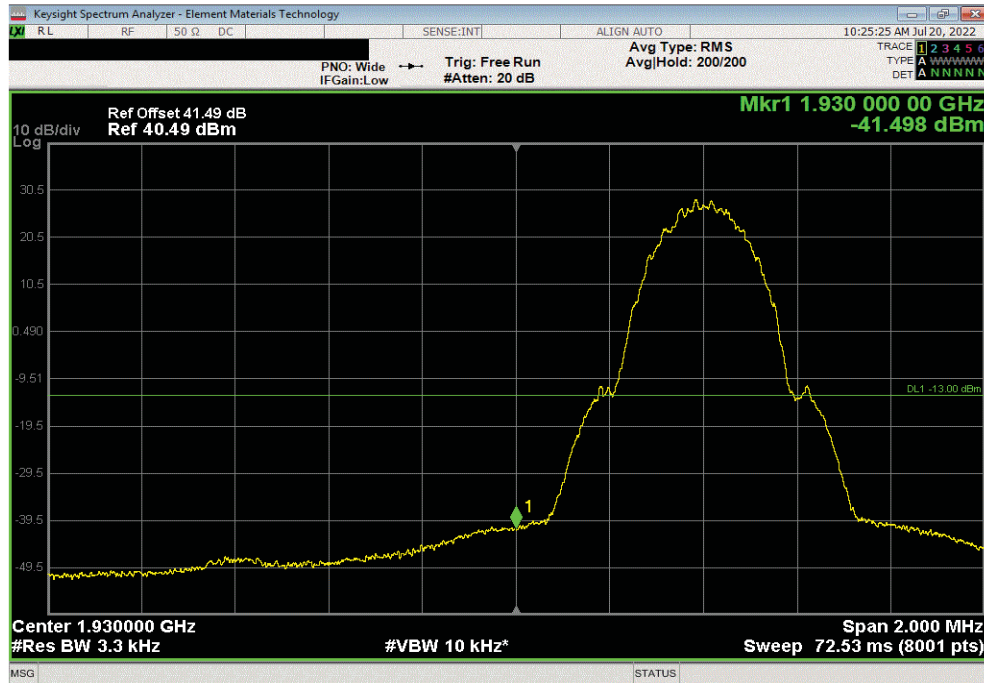
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 20.9 °C	
Attendees: David Le		Humidity: 57.1% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Marty Martin	Power: 54 VDC	Job Site: TX07	
TEST SPECIFICATIONS			
FCC 24E:2022		Test Method	
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 <i>Marty Martin</i>	
		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

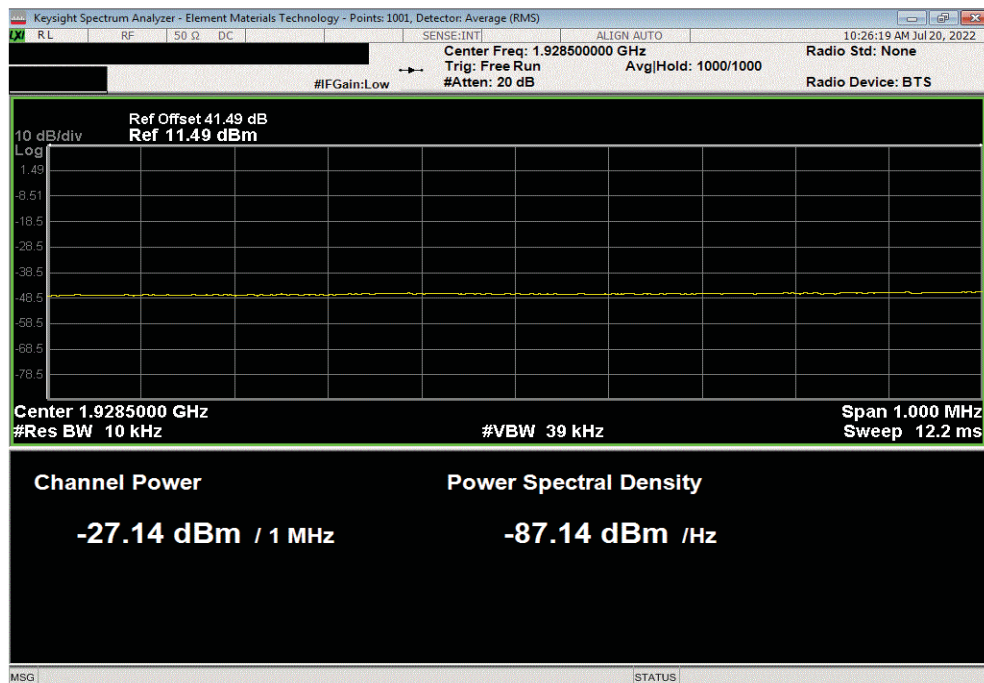


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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			

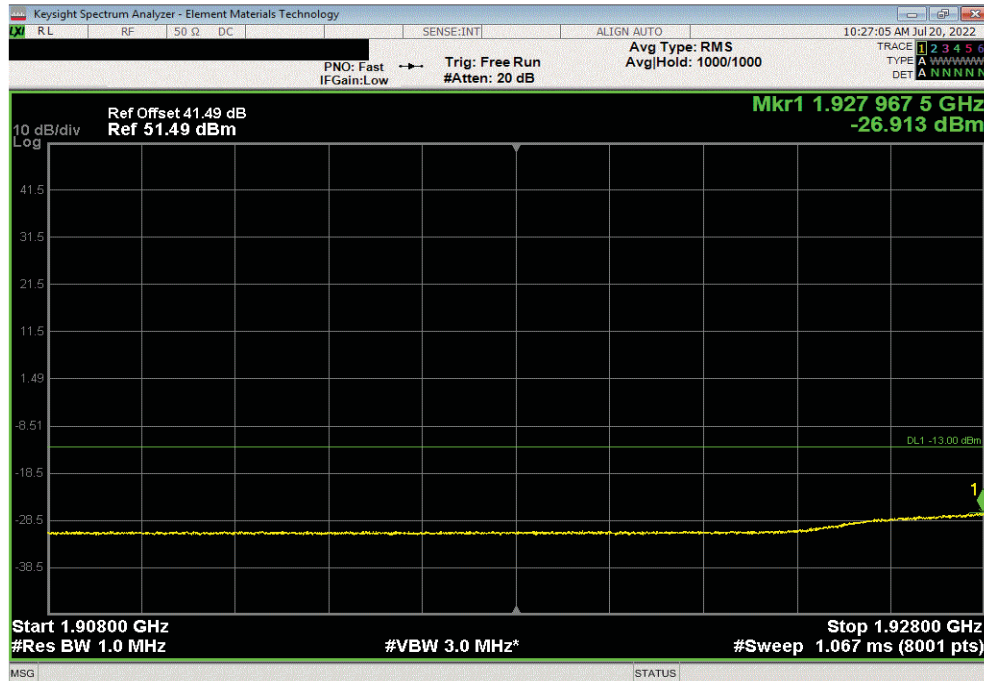


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

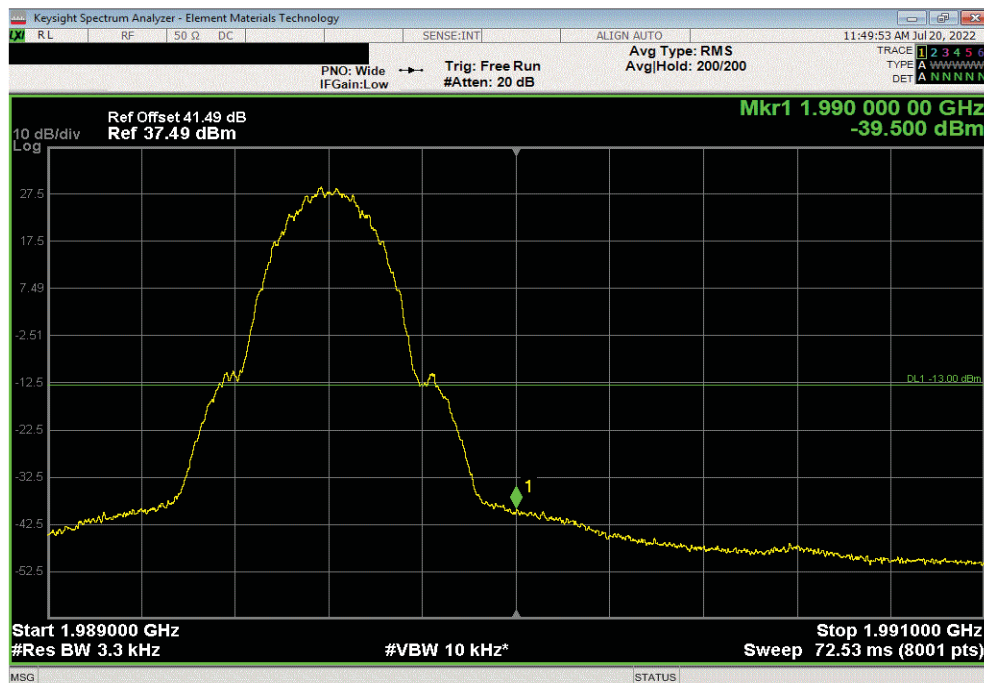


TbTtx 2022.05.02.0 XMIT 2022.02.07.0

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			

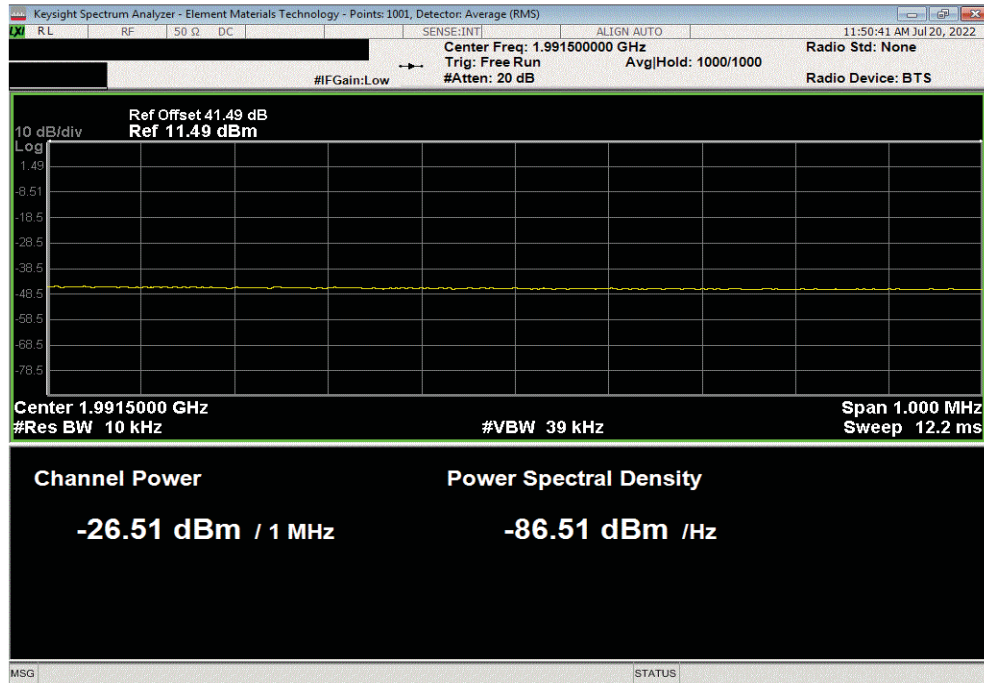


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

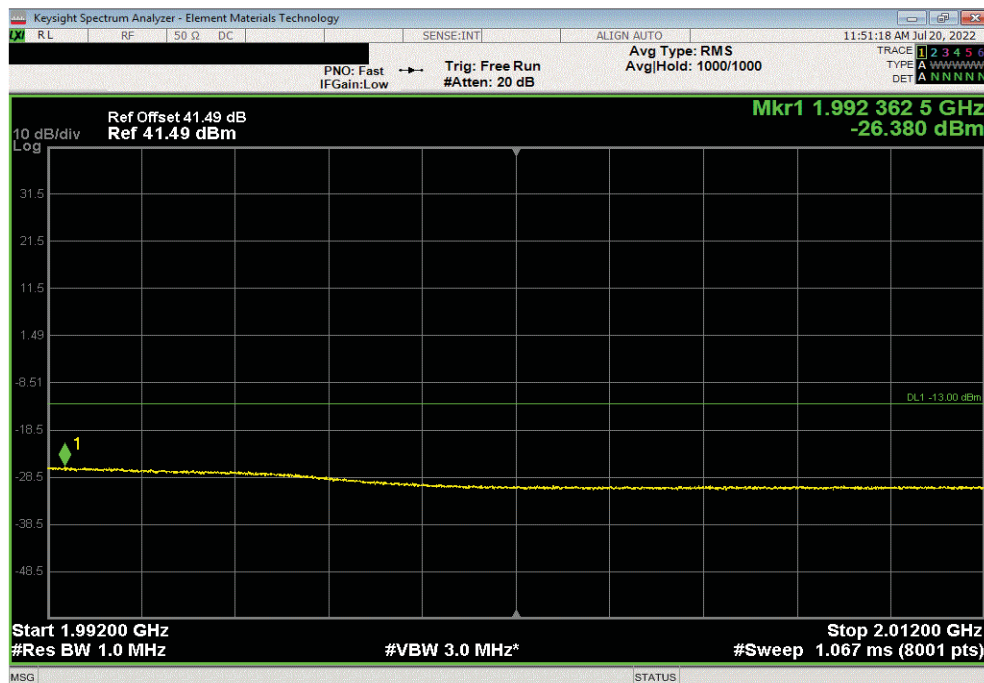


TbTx 2022.05.02.0 XMit 2022.02.07.0

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			

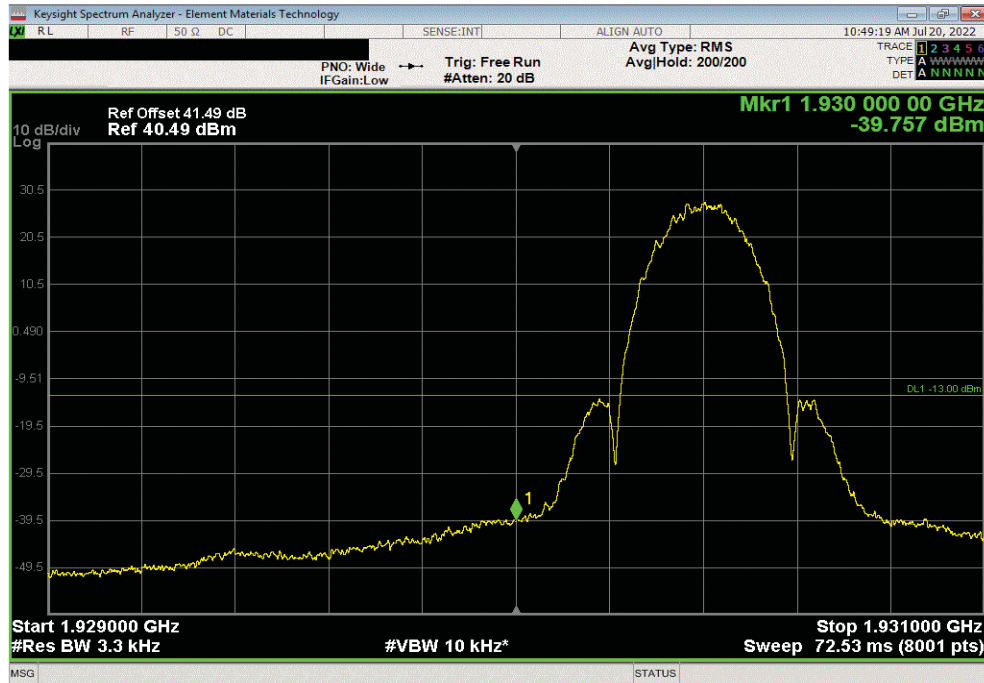


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

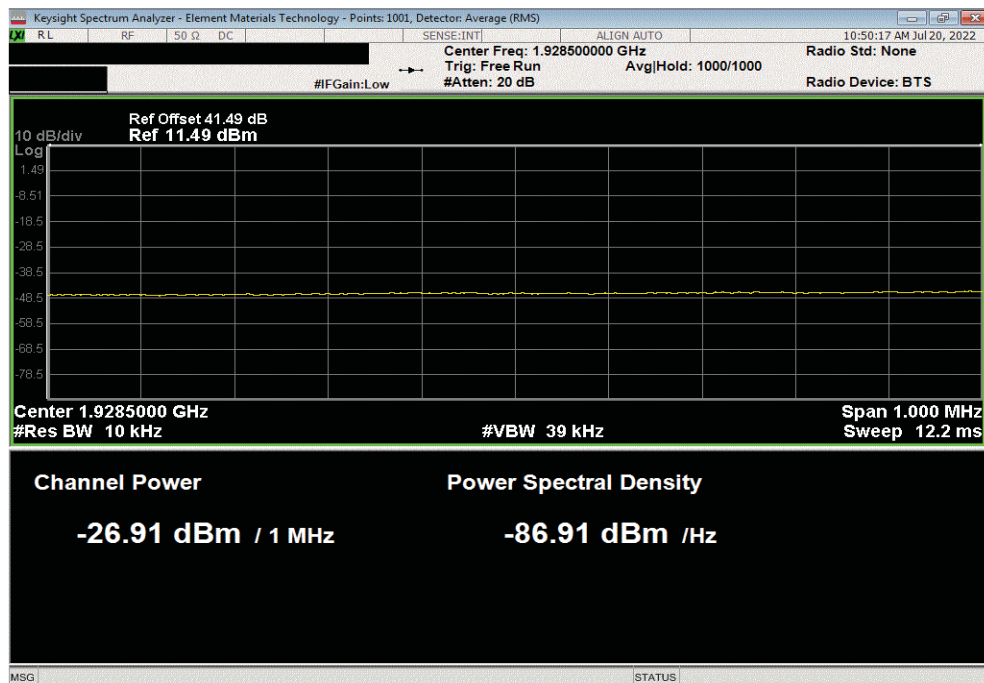


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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			

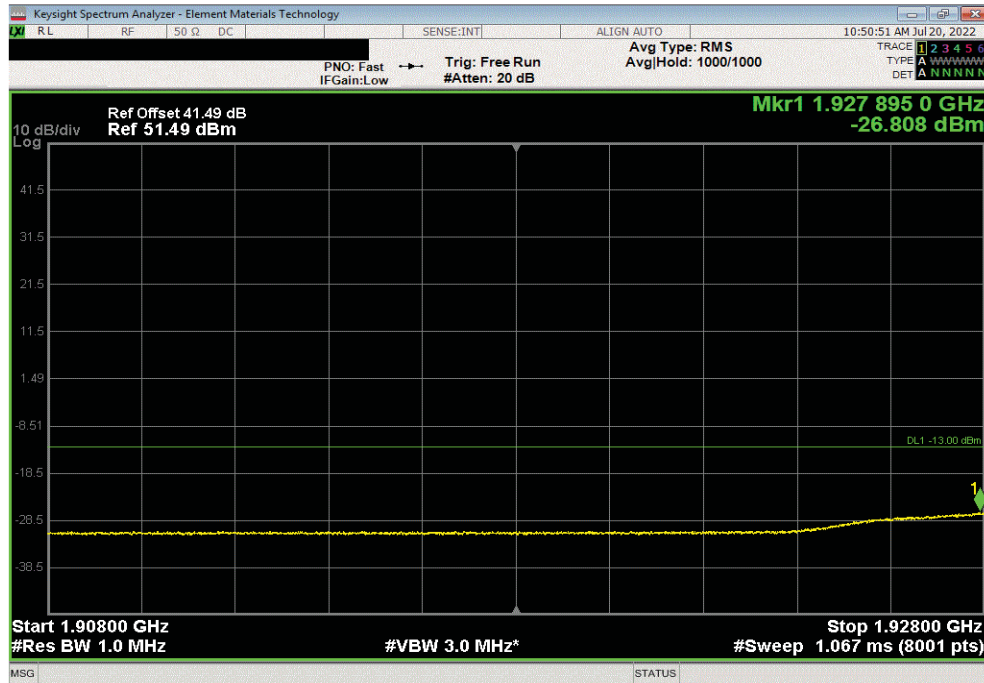


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

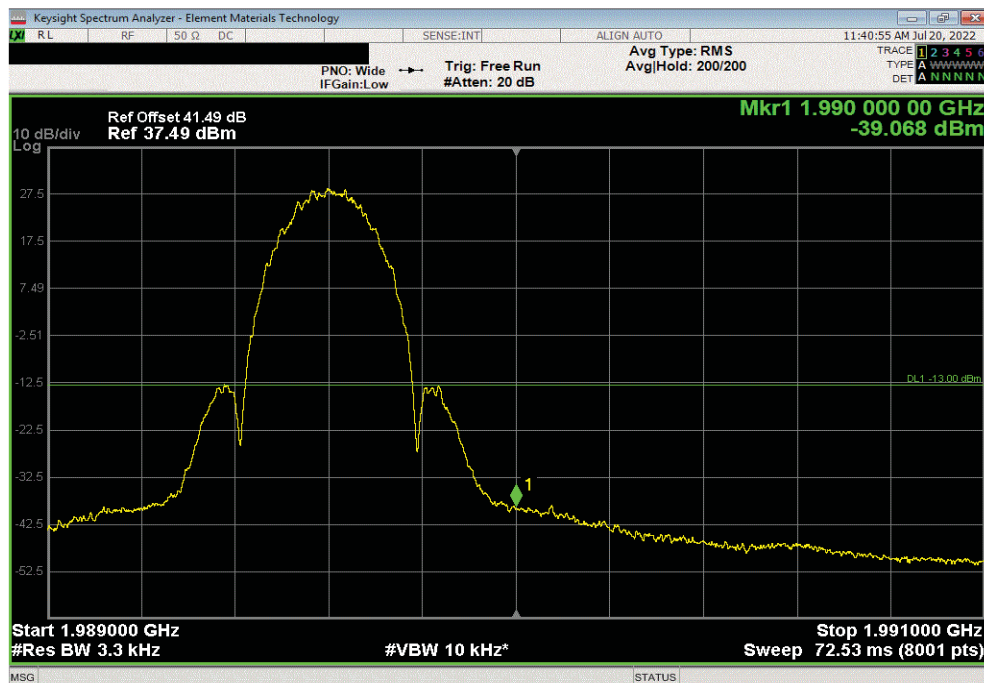


TbTtx 2022.05.02.0 XMIT 2022.02.07.0

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			

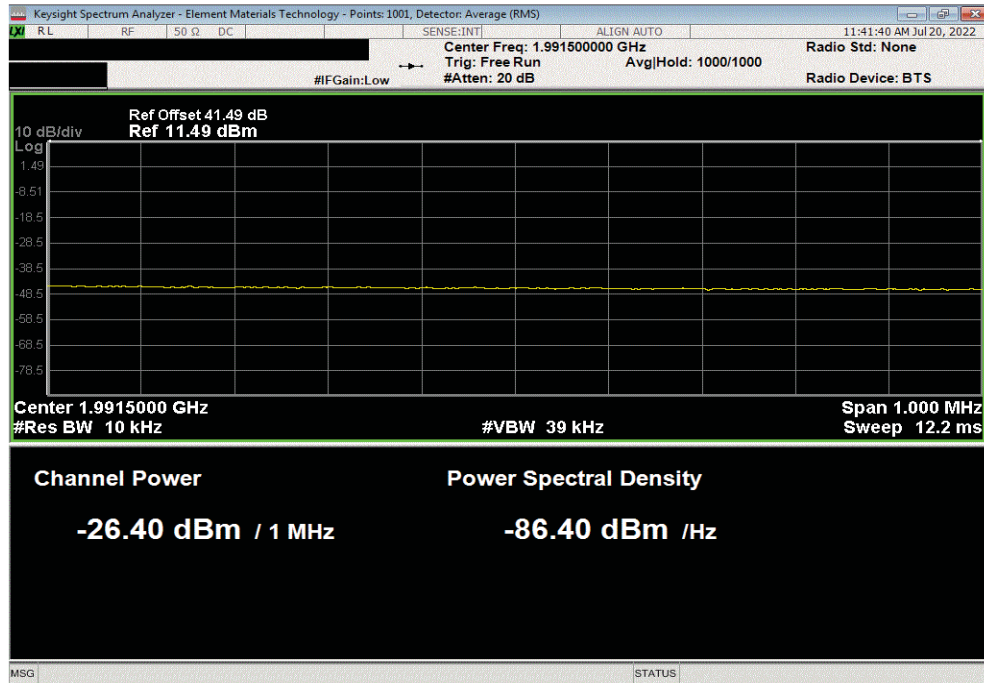


BAND EDGE COMPLIANCE FULL POWER SINGLE CARRIER - ONE CH INSIDE

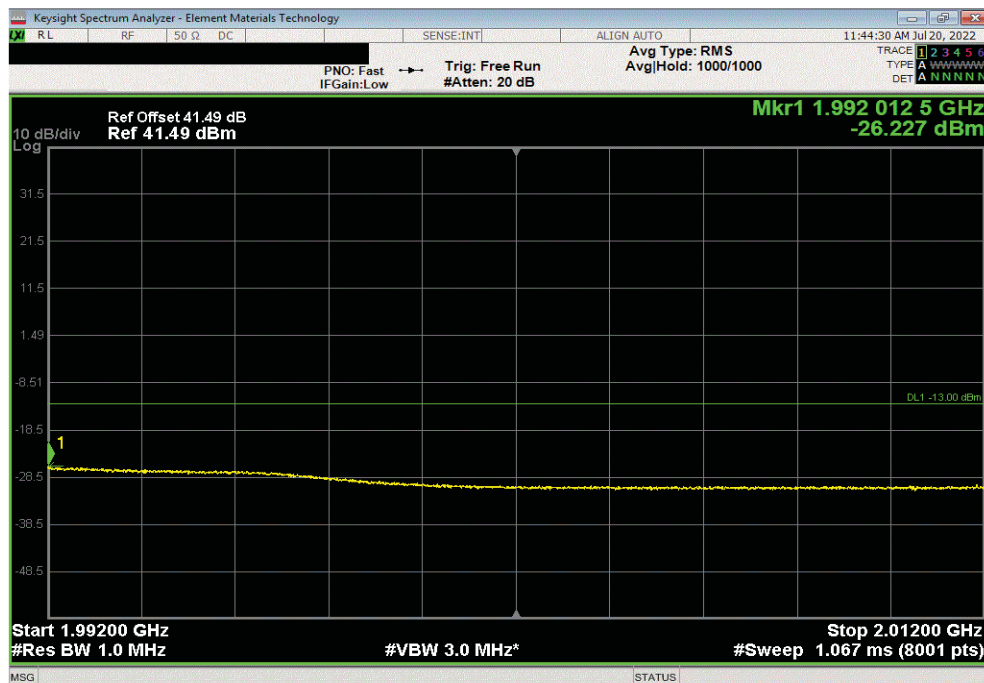


TbTx 2022.05.02.0 XMit 2022.02.07.0

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



XMH 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



TstTx 2022.05.02.0 XMI 2022.02.07.0

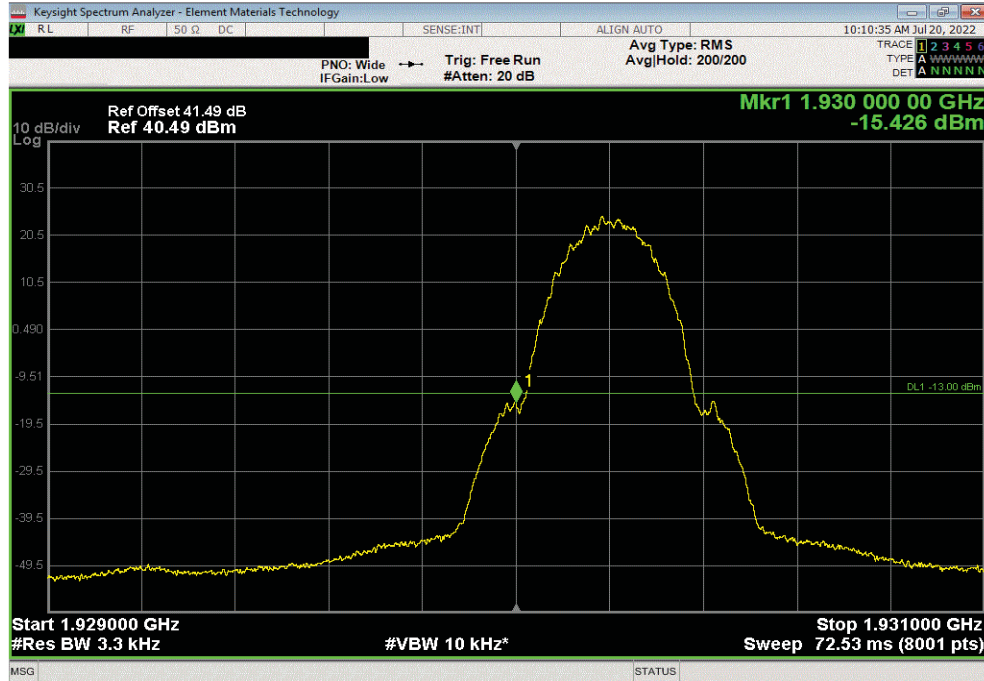
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 20.2 °C	
Attendees: David Le		Humidity: 58.9% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Marty Martin	Power: 54 VDC	Job Site: TX07	
TEST SPECIFICATIONS			
FCC 24E:2022		Test Method	
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015	
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 <i>Marty Martin</i>	
		Frequency Range	Max Value (dBm)
			Limit < (dBm)
			Result
Port 1			
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz			
GMSK Modulation			
	Low Channel - 1930.2 MHz	1	-15.43
	Low Channel - 1930.2 MHz	2	-27.8
	Low Channel - 1930.2 MHz	3	-27.426
	High Channel - 1989.8 MHz	1	-14.125
	High Channel - 1989.8 MHz	2	-27.12
	High Channel - 1989.8 MHz	3	-28.87
8PSK Modulation			
	Low Channel - 1930.2 MHz	1	-20.88
	Low Channel - 1930.2 MHz	2	-27.71
	Low Channel - 1930.2 MHz	3	-27.29
	High Channel - 1989.8 MHz	1	-20.28
	High Channel - 1989.8 MHz	2	-27.07
	High Channel - 1989.8 MHz	3	-28.92

BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

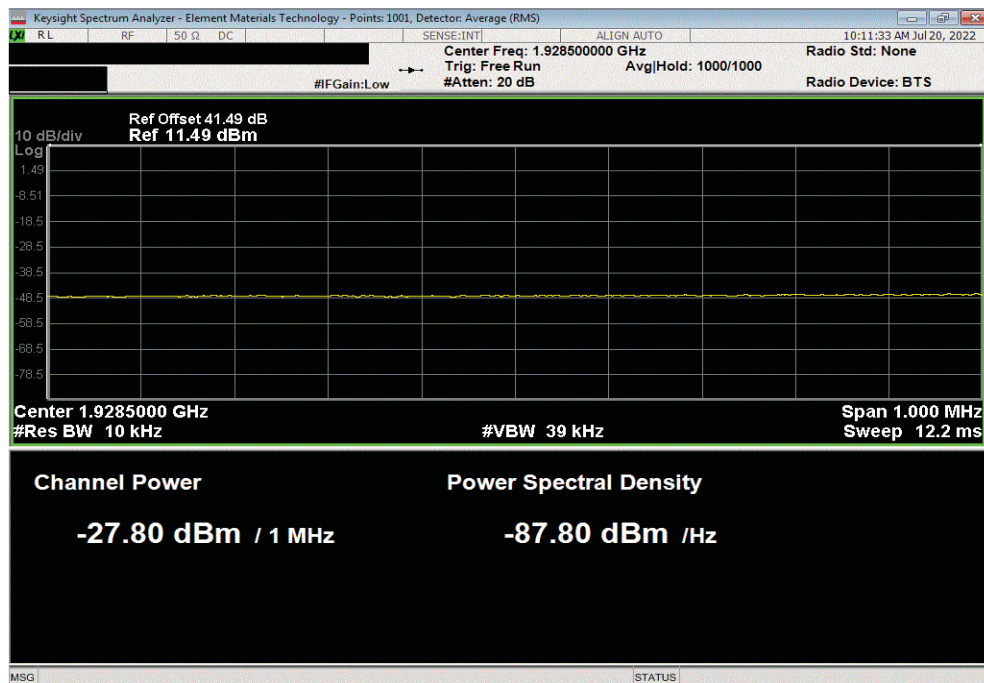


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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			

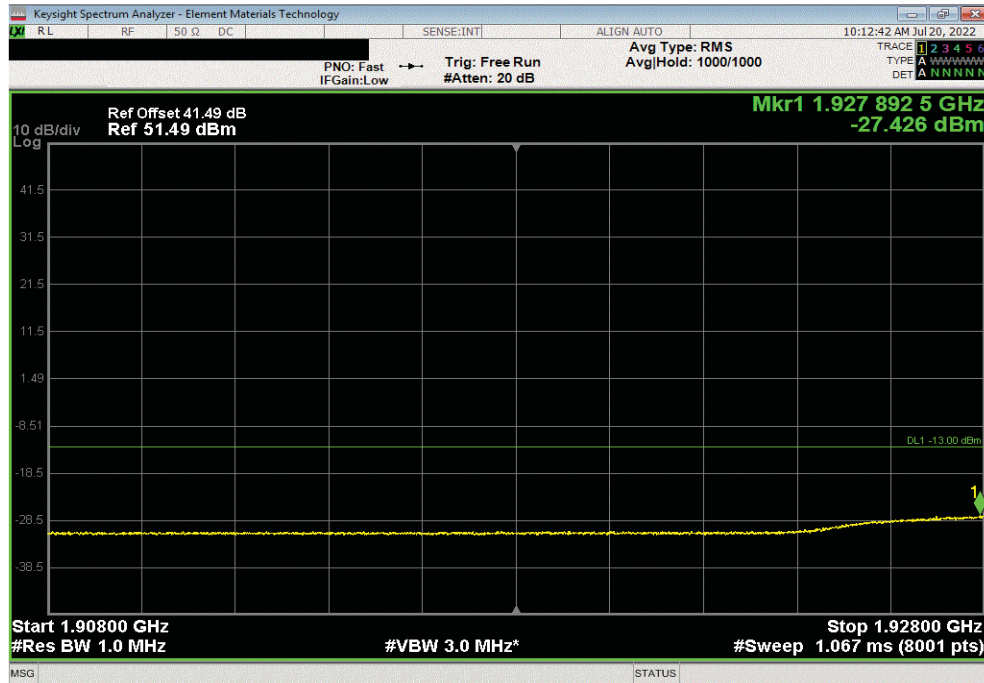


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

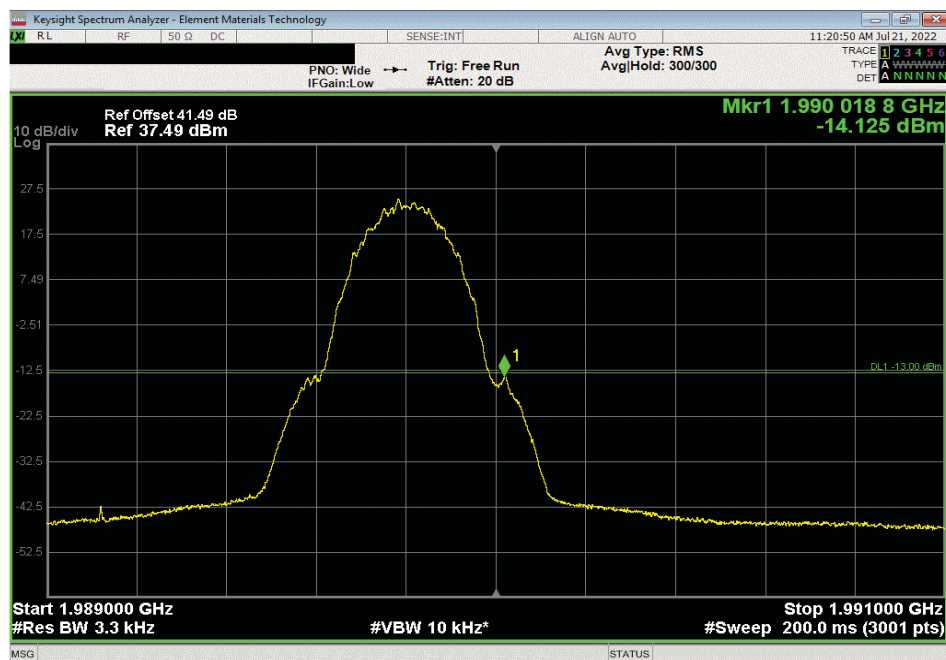


TbTtx 2022.05.02.0 XMt 2022.02.07.0

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			

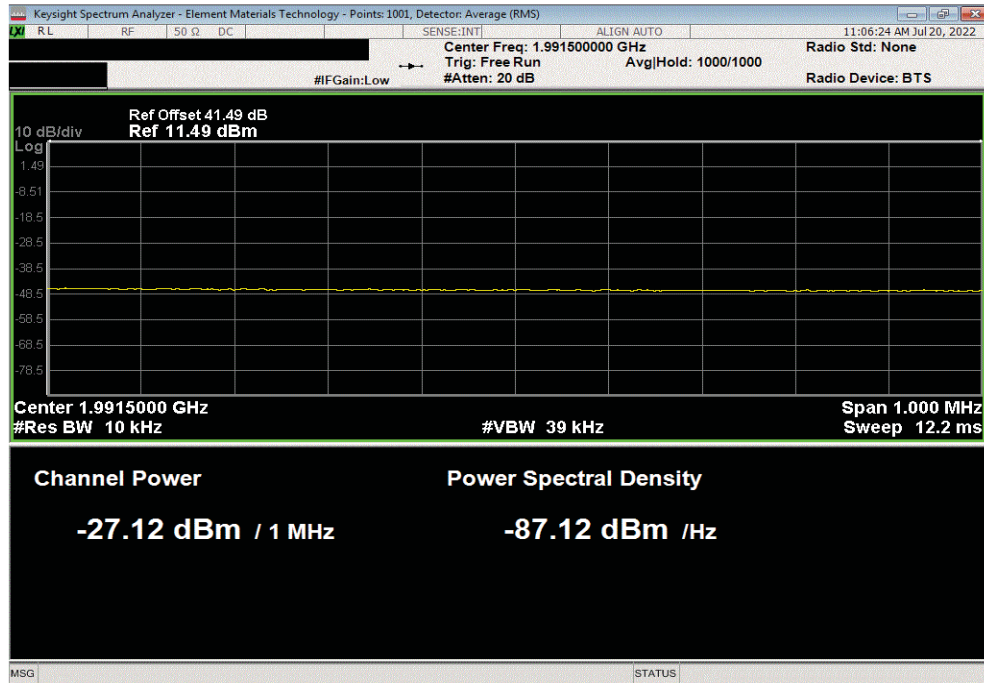


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

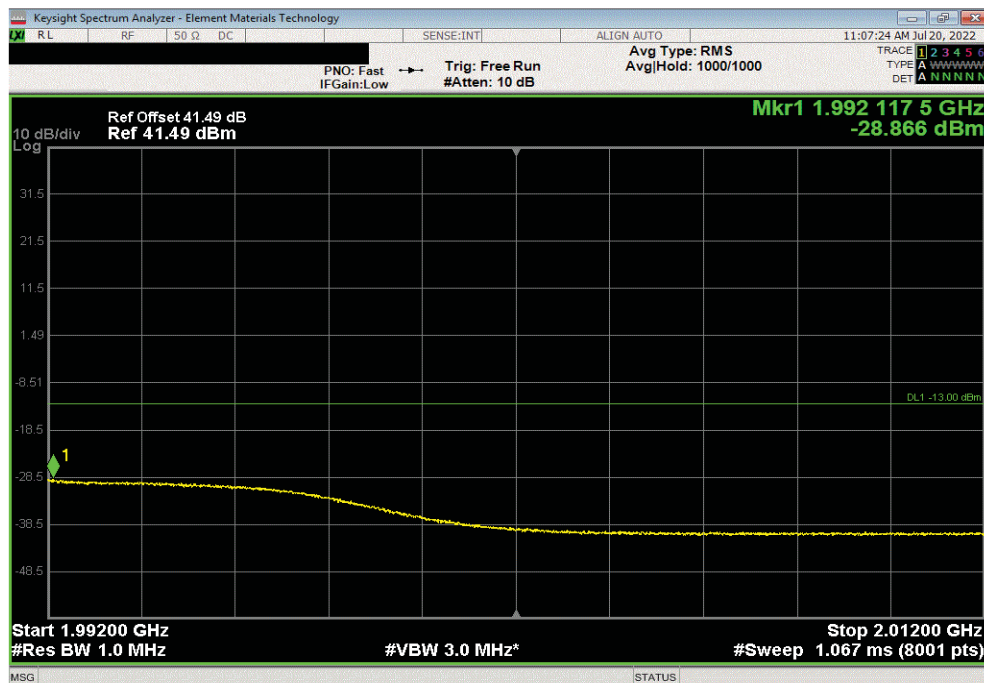


TbTx 2022.05.02.0 XMit 2022.02.07.0

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			

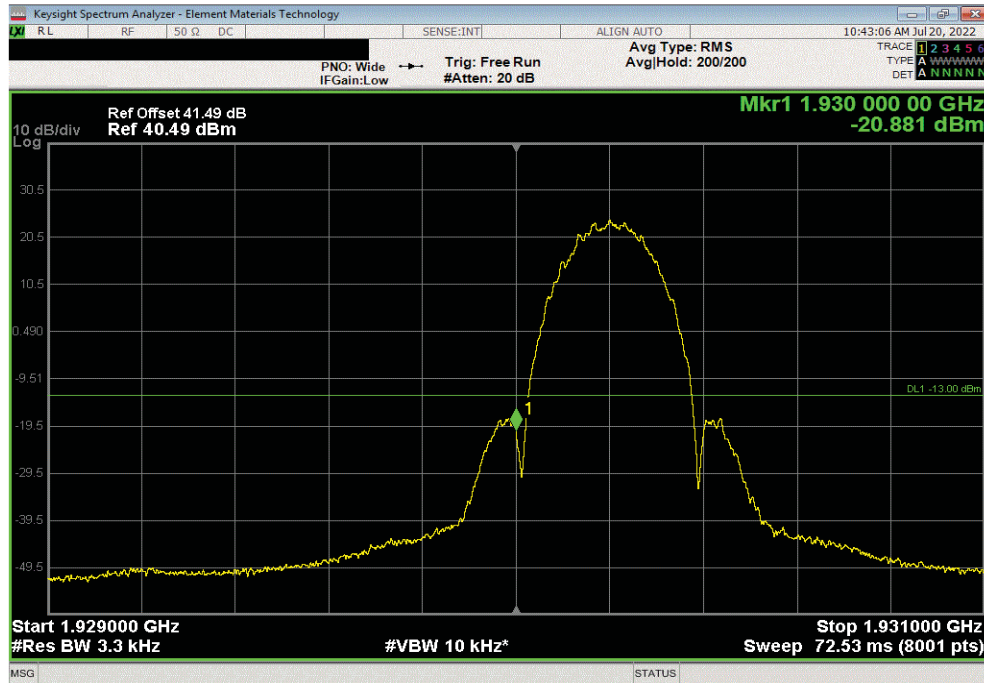


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

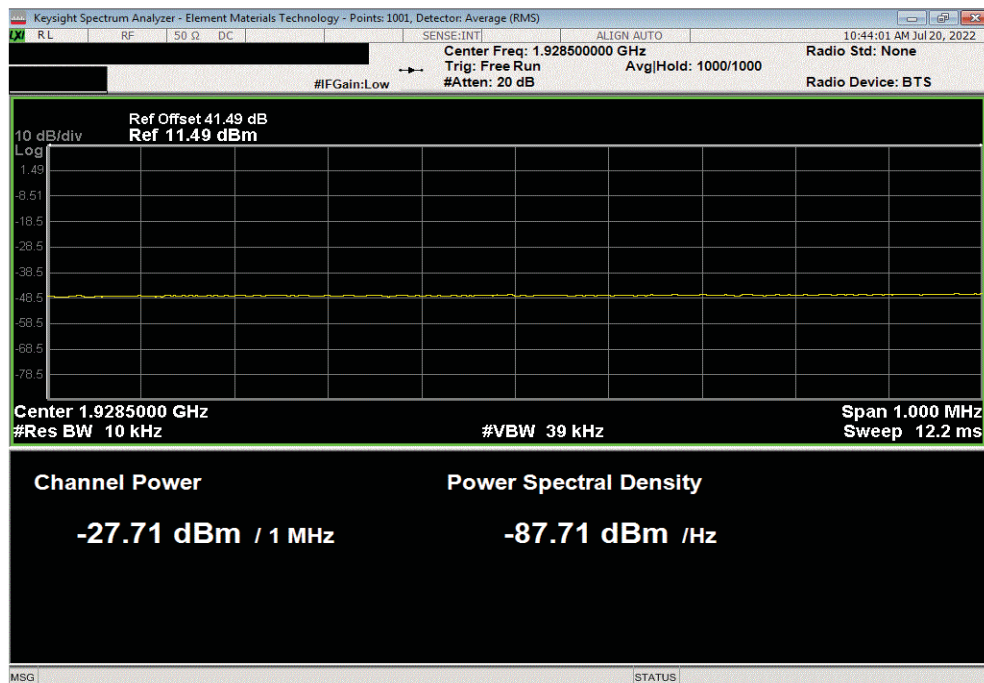


TbTtx 2022.05.02.0 XMt 2022.02.07.0

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	

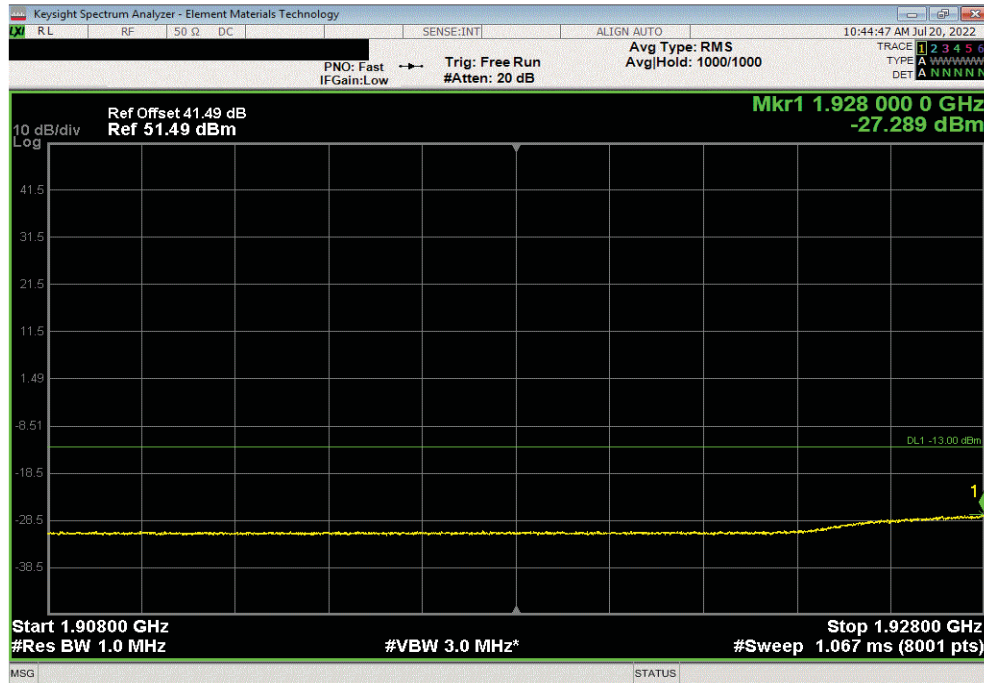


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

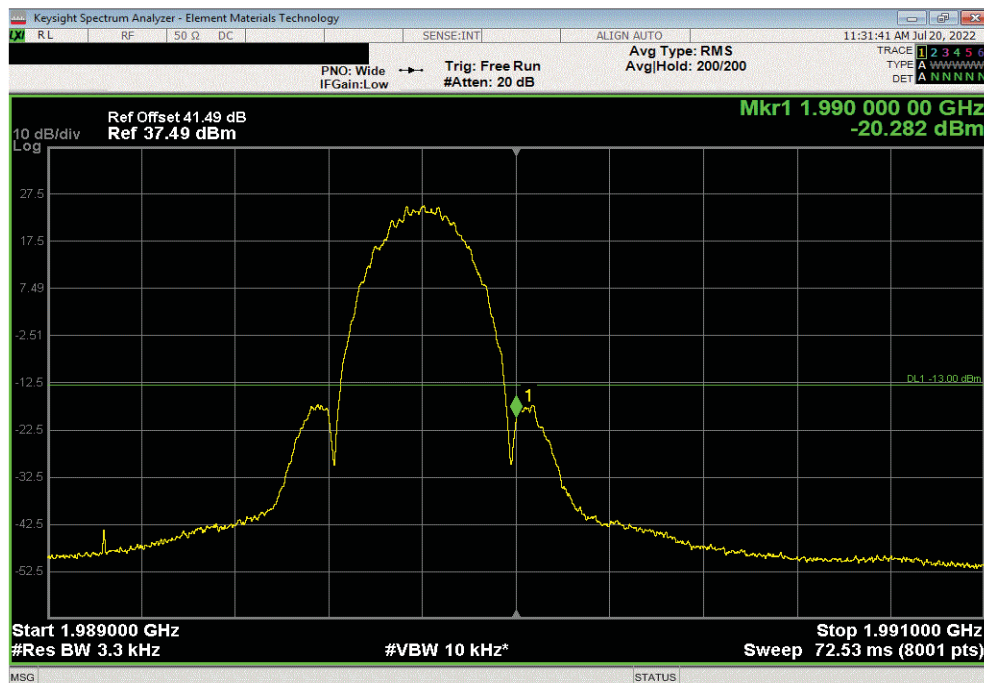


TbTtx 2022.05.02.0 XMIT 2022.02.07.0

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			

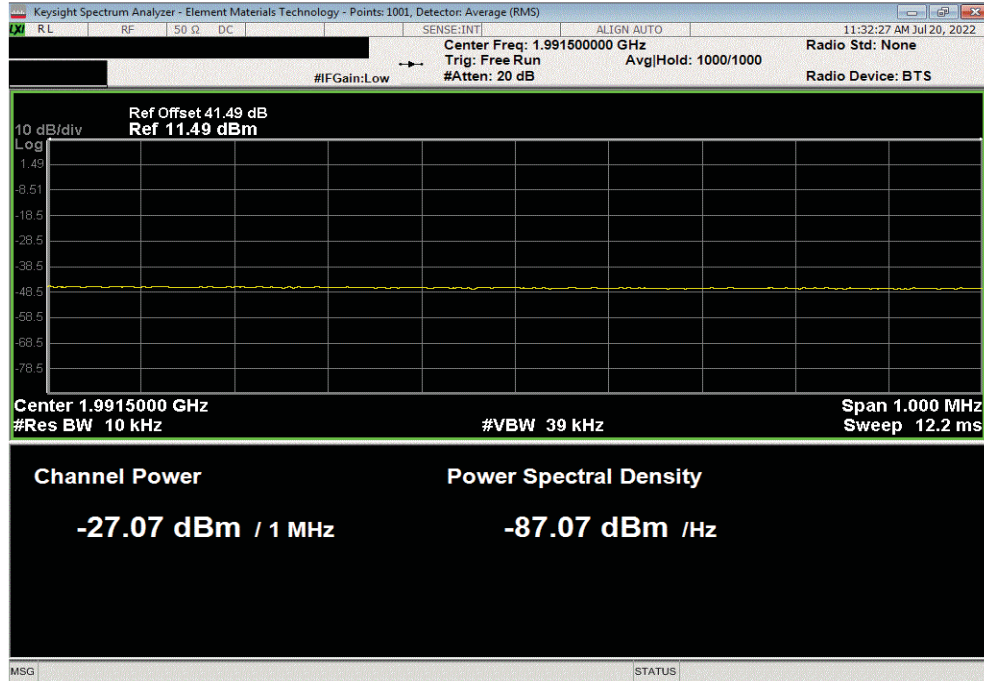


BAND EDGE COMPLIANCE REDUCED POWER SINGLE CARRIER

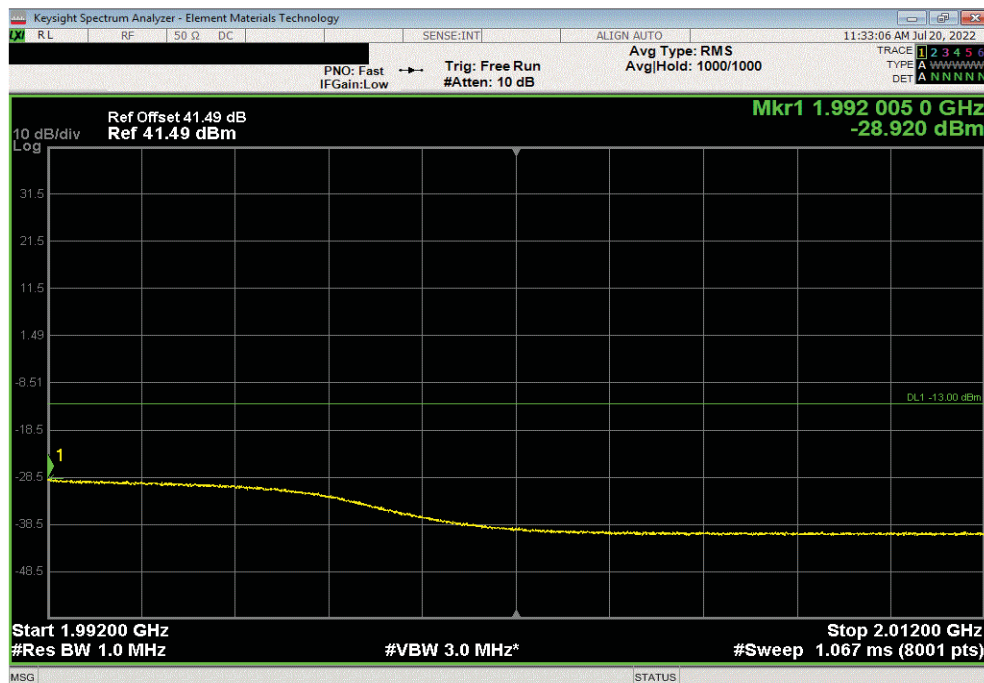


TbTx 2022.05.02.0 XMit 2022.02.07.0

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



XMH 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



TstTx 2022.05.02.0 XMit 2022.02.07.0

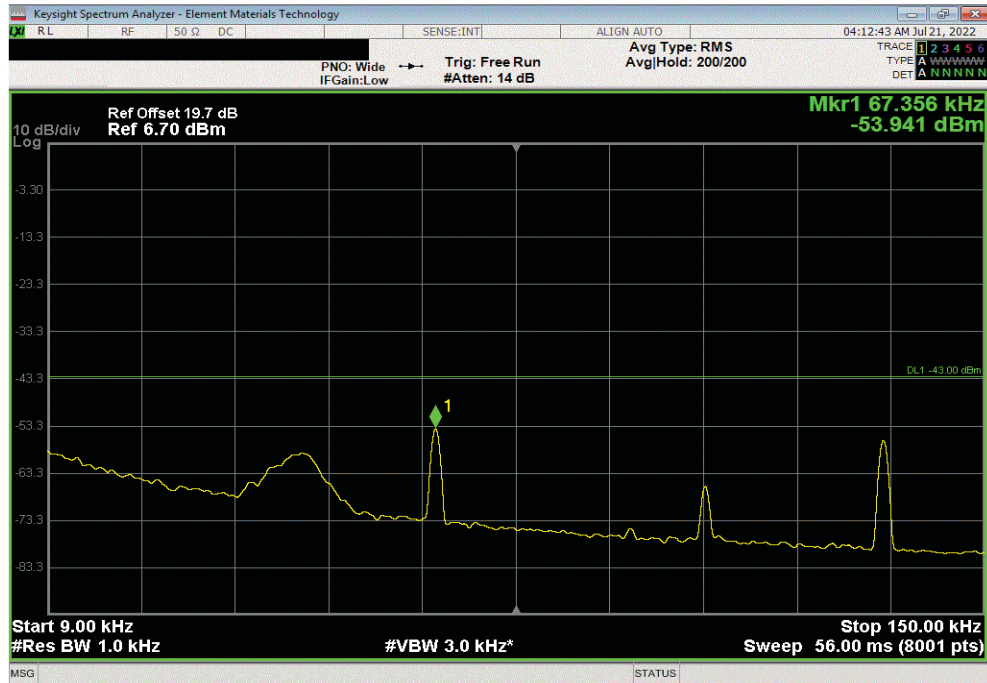
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 20.4 °C	
Attendees: David Le		Humidity: 59.7% RH	
Project: None		Barometric Pres.: 1016 mbar	
Tested by: Marty Martin	Power: 54 VDC	Job Site: TX07	
TEST SPECIFICATIONS			
FCC 24E:2022		Test Method	
RSS-133 Issue 6:2013+A1:2018		ANSI C63.26:2015	
		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 <i>Marty Martin</i>	
		Frequency Range	Measured Freq (MHz)
			Max Value (dBm)
			Limit < (dBm)
			Result
Port 1			
Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz			
GMSK Modulation			
	Mid Channel - 1960 MHz	9 kHz - 150 kHz	0.07
	Mid Channel - 1960 MHz	150 kHz - 20 MHz	0.15
	Mid Channel - 1960 MHz	20 MHz - 3.5 GHz	3224.66
	Mid Channel - 1960 MHz	1.9 GHz - 2.2 GHz	1990.38
	Mid Channel - 1960 MHz	2.2 GHz - 13 GHz	4023.93
	Mid Channel - 1960 MHz	13 GHz - 22 GHz	21968.95
8PSK Modulation			
	Mid Channel - 1960 MHz	9 kHz - 150 kHz	0.07
	Mid Channel - 1960 MHz	150 kHz - 20 MHz	0.15
	Mid Channel - 1960 MHz	20 MHz - 3.5 GHz	3139.4
	Mid Channel - 1960 MHz	1.9 GHz - 2.2 GHz	1991.05
	Mid Channel - 1960 MHz	2.2 GHz - 13 GHz	4019.65
	Mid Channel - 1960 MHz	13 GHz - 22 GHz	21564.4

SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

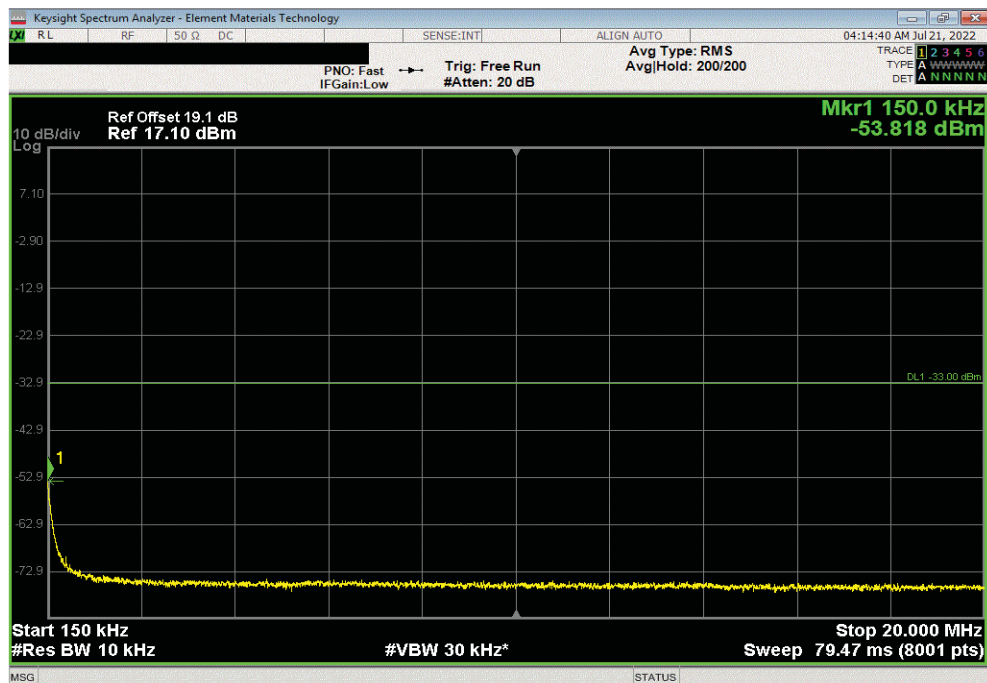


TbTx 2022.05.02.0 XMit 2022.02.07.0

Port 1, Band 2 2G_GSM EDGE_1930.0 - 1990.0 MHz, 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	

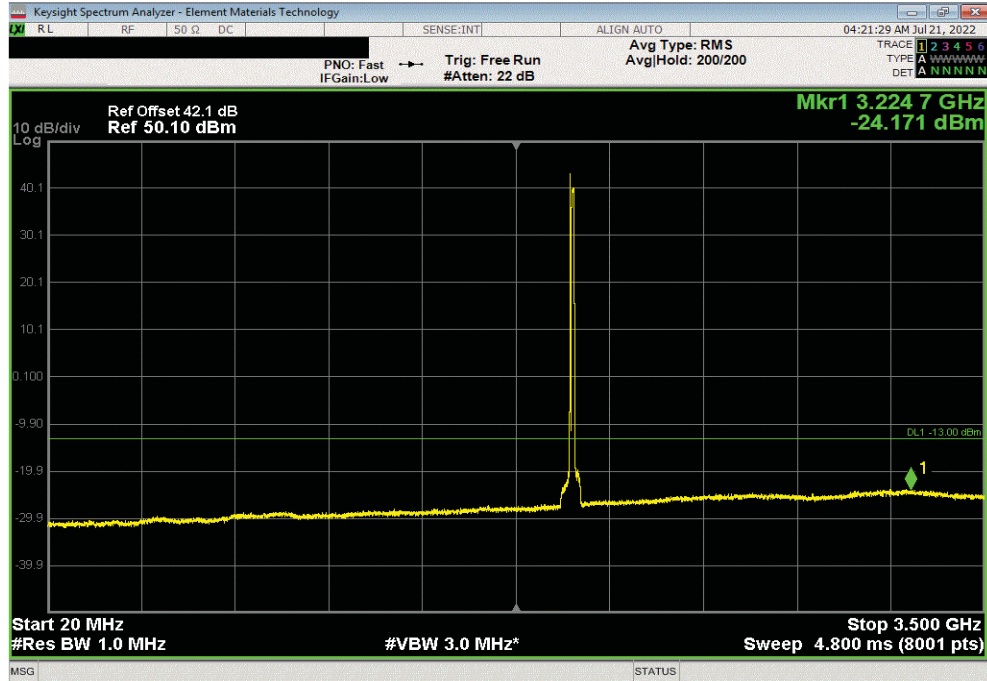


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

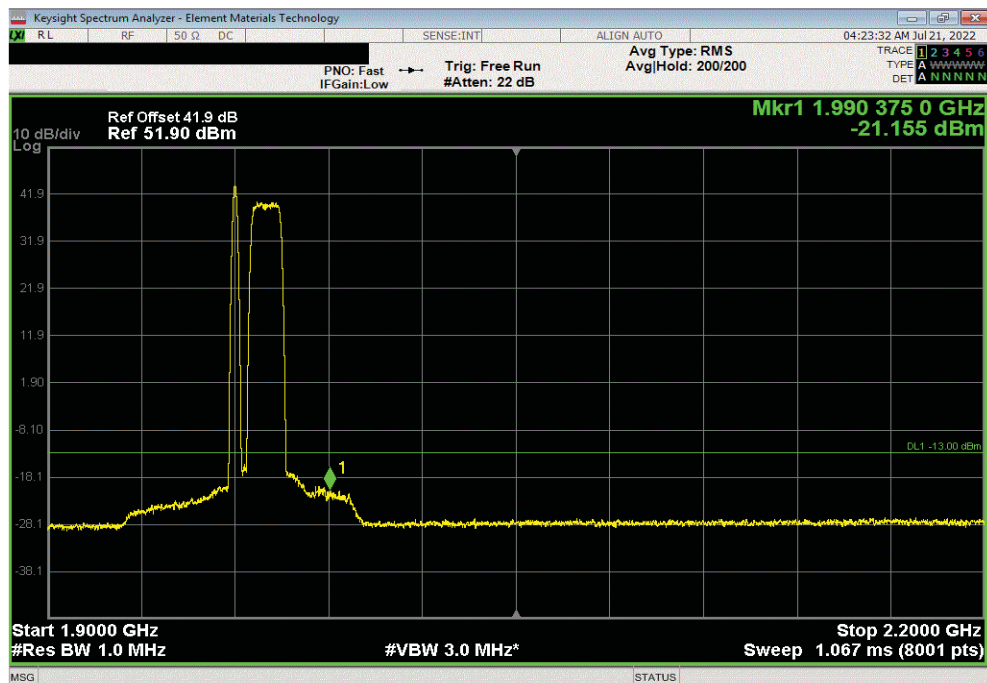


TbTx 2022.05.02.0 XMit 2022.02.07.0

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	

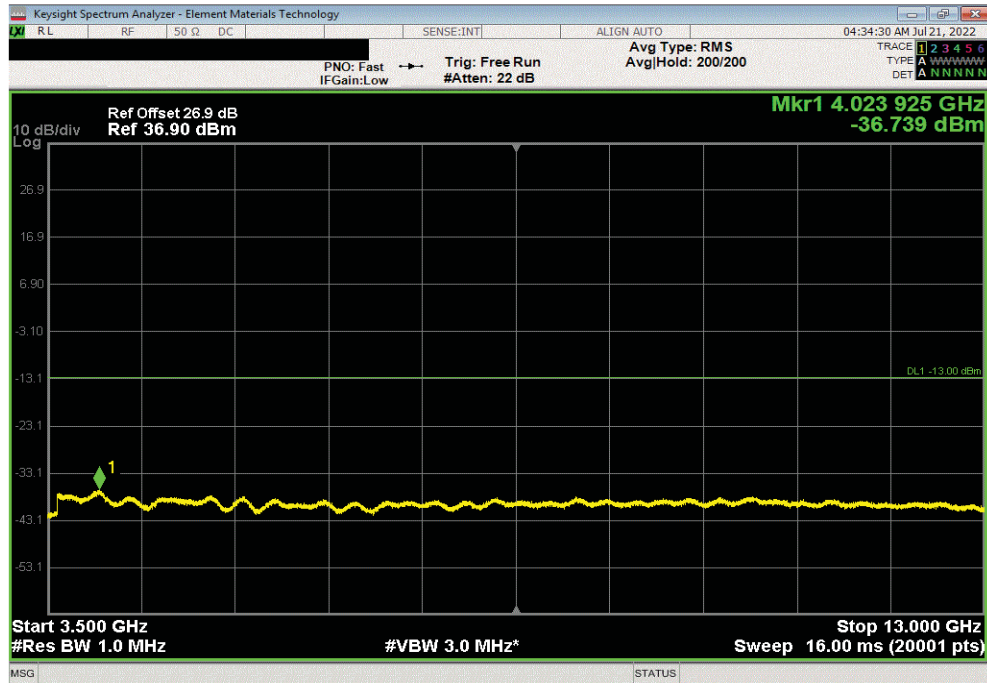


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

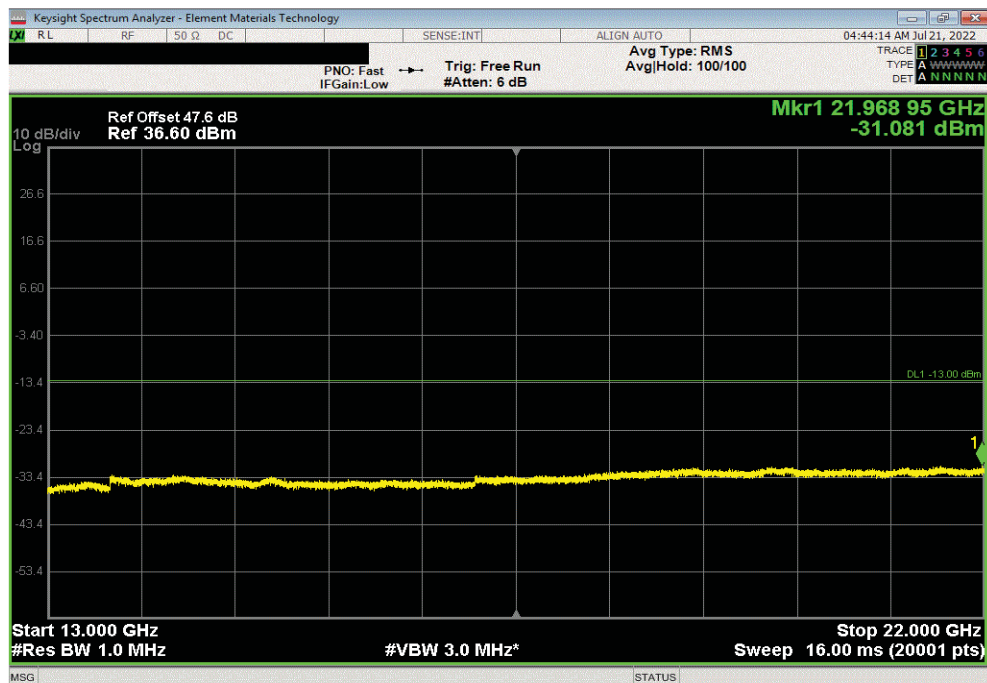


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

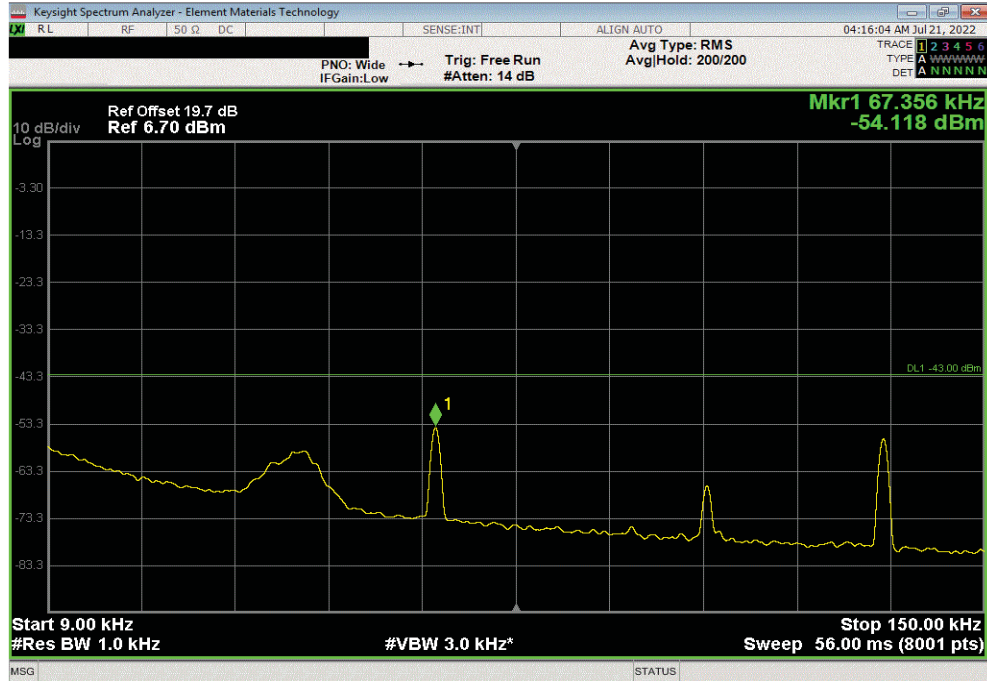


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

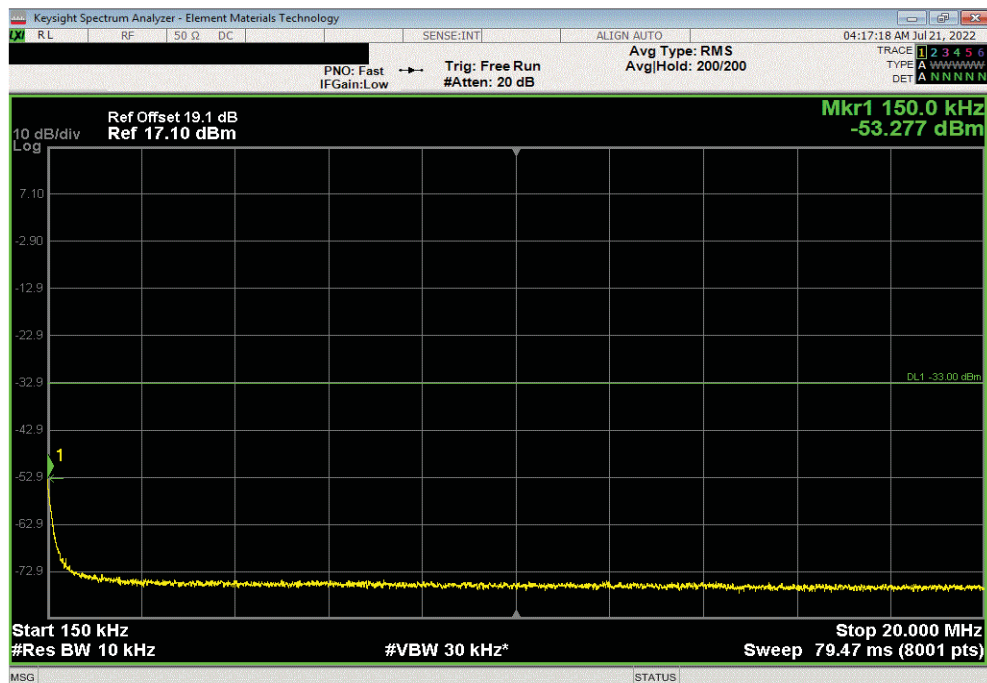


TbTx 2022.05.02.0 XMt 2022.02.07.0

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	

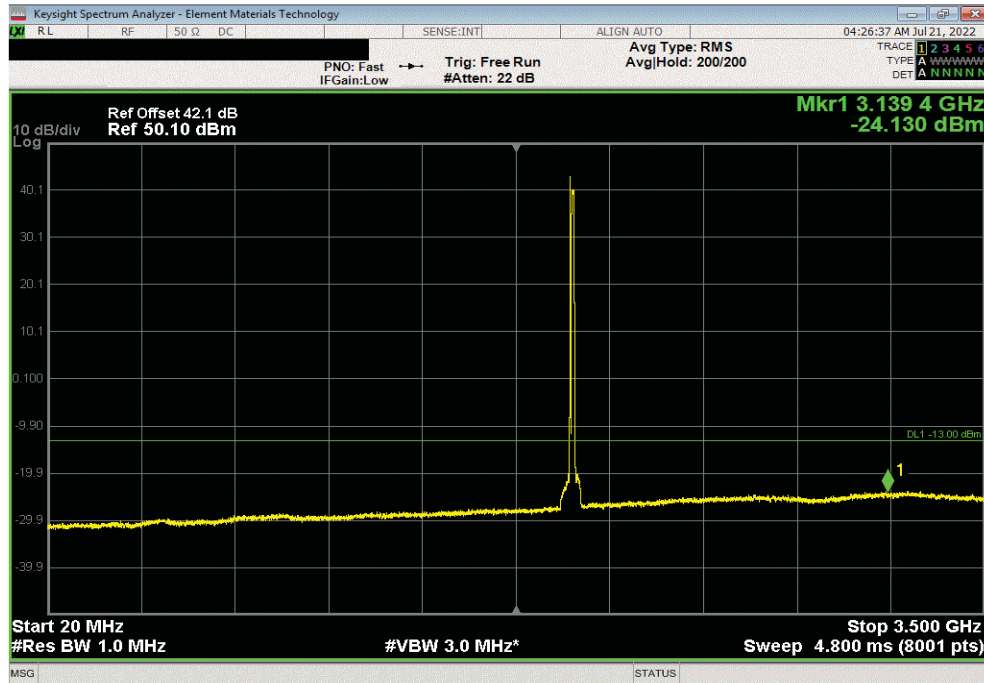


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

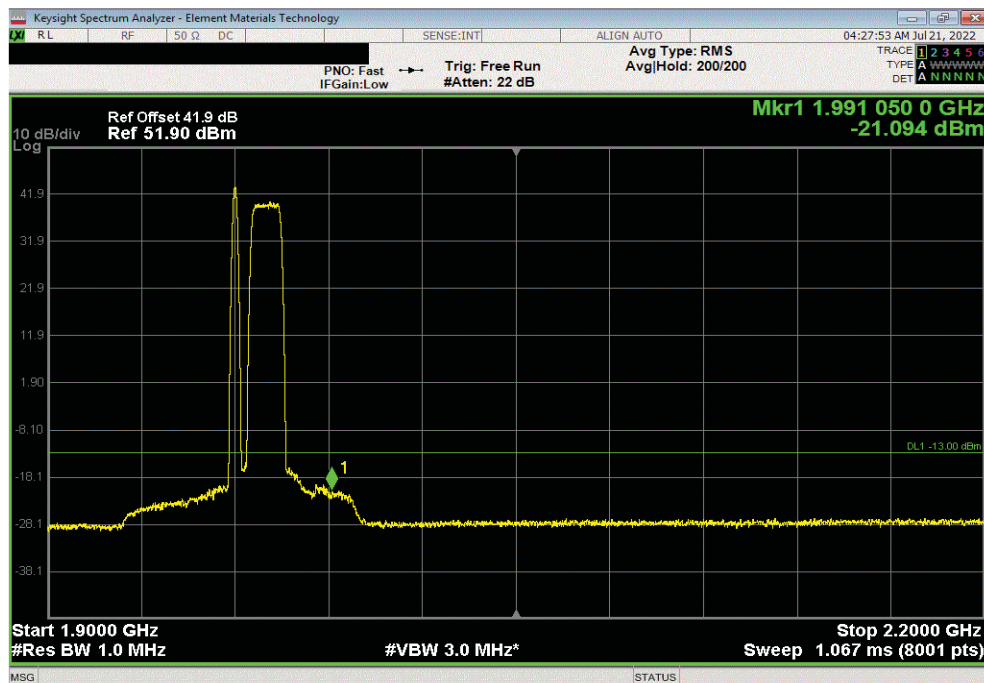


TbTx 2022.05.02.0 XMI 2022.02.07.0

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	

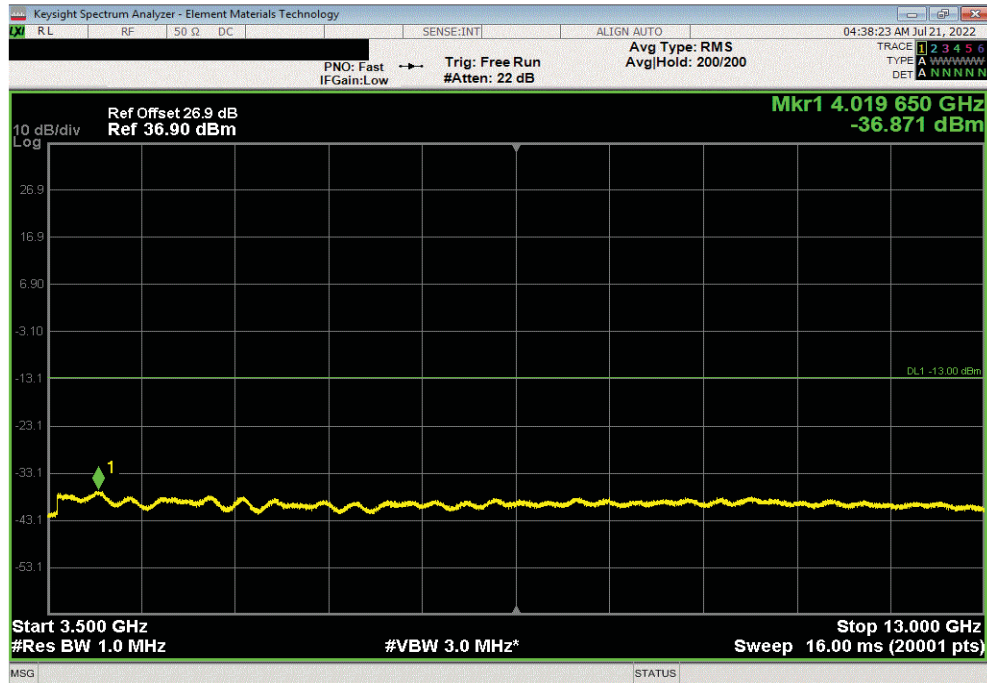


SPURIOUS EMISSIONS AT THE ANTENNA TERMINALS

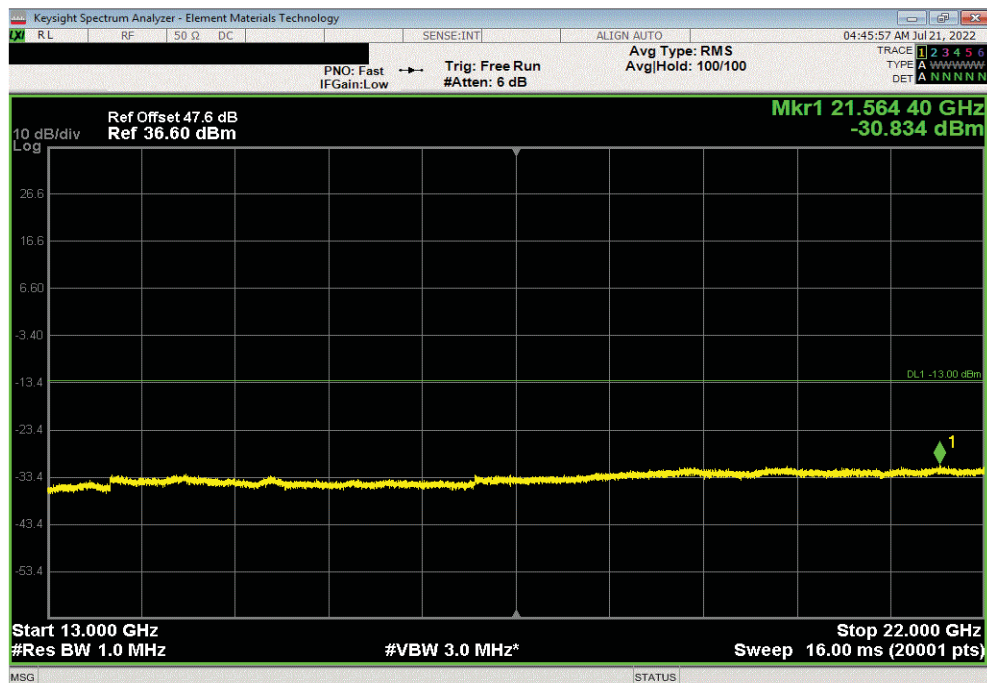


TbTx 2022.05.02.0 XMit 2022.02.07.0

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	
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 AHFI 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)

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 at total port power of 120 watts (80W for PCS band carriers + 40W for AWS band carrier).

SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER



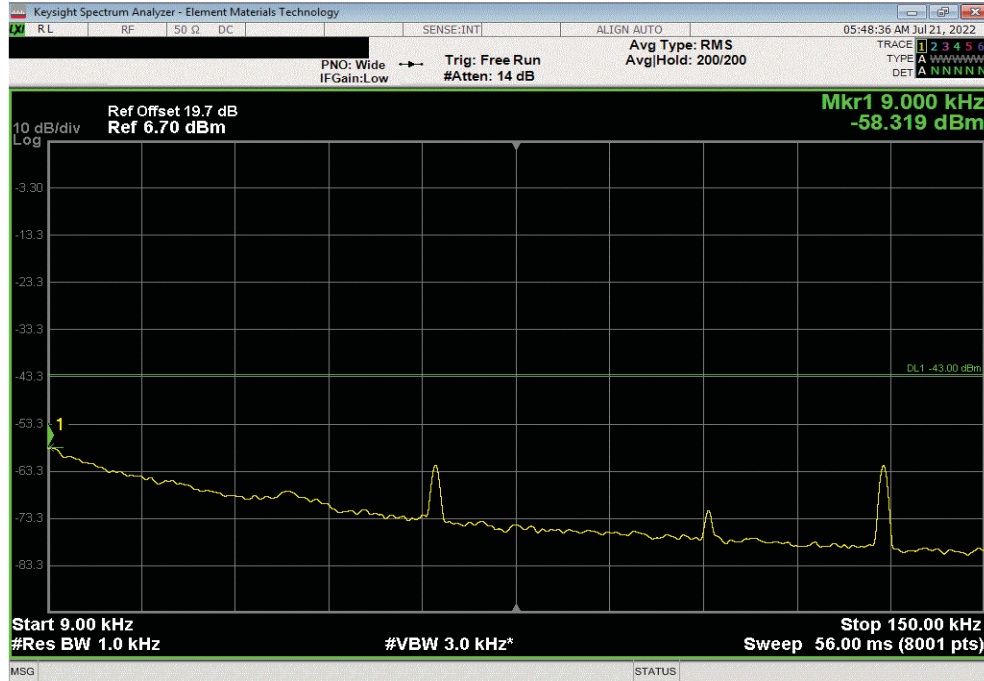
EUT: AHFII (FCC/ISED C2PC)		Work Order: NOKI0044	
Serial Number: YK214000036		Date: 21-Jul-22	
Customer: Nokia Solutions and Networks		Temperature: 20.2 °C	
Attendees: David Le		Humidity: 58.5% RH	
Project: None		Barometric Pres.: 1017 mbar	
Tested by: Marty Martin		Job Site: TX07	
Power: 54 VDC			
TEST 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. 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 <i>Marty Martin</i>	
		Frequency Range	Measured Freq (MHz)
		Max Value (dBm)	Limit < (dBm)
			Result
Multicarrier			
Port 1			
GMSK Modulation			
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		9 kHz - 150 kHz	0.01
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		150 kHz - 20 MHz	0.15
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		20 MHz - 3.5 GHz	3155.93
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		1.9 GHz - 2.2 GHz	2124.36
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		2.2 GHz - 13 GHz	4011.1
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		13 GHz - 22 GHz	21601.75
8PSK Modulation			
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		9 kHz - 150 kHz	0.07
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		150 kHz - 20 MHz	0.15
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		20 MHz - 3.5 GHz	3133.75
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		1.9 GHz - 2.2 GHz	2127.36
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		2.2 GHz - 13 GHz	4023.45
Test Case 1: PCS Band 2 GSM_EDGE and AWS Band LTE10 Carriers		13 GHz - 22 GHz	19966.45

SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

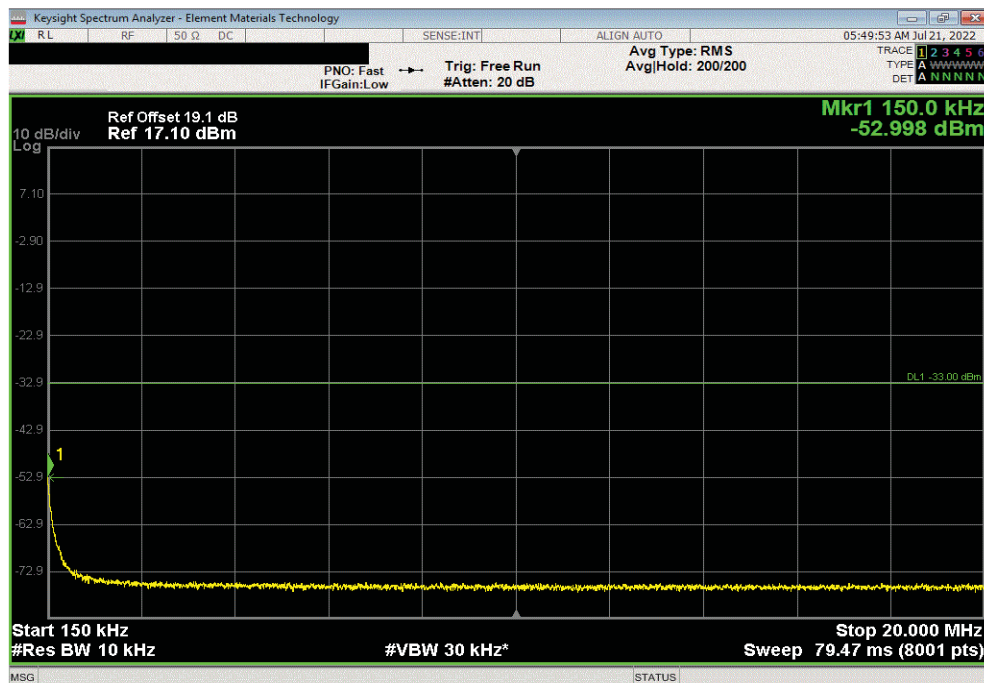


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

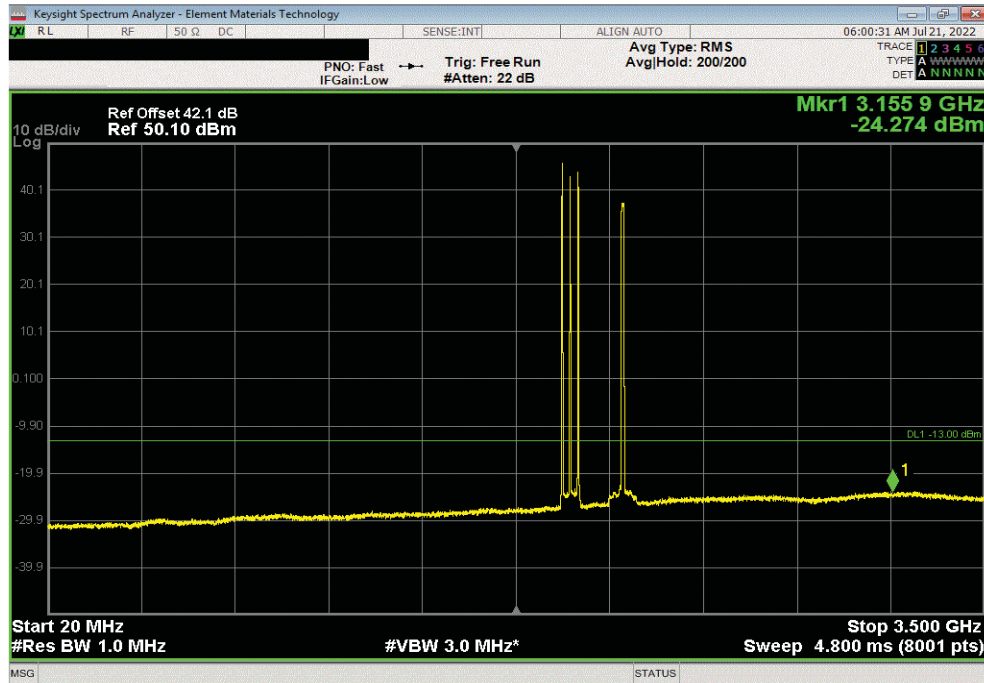


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

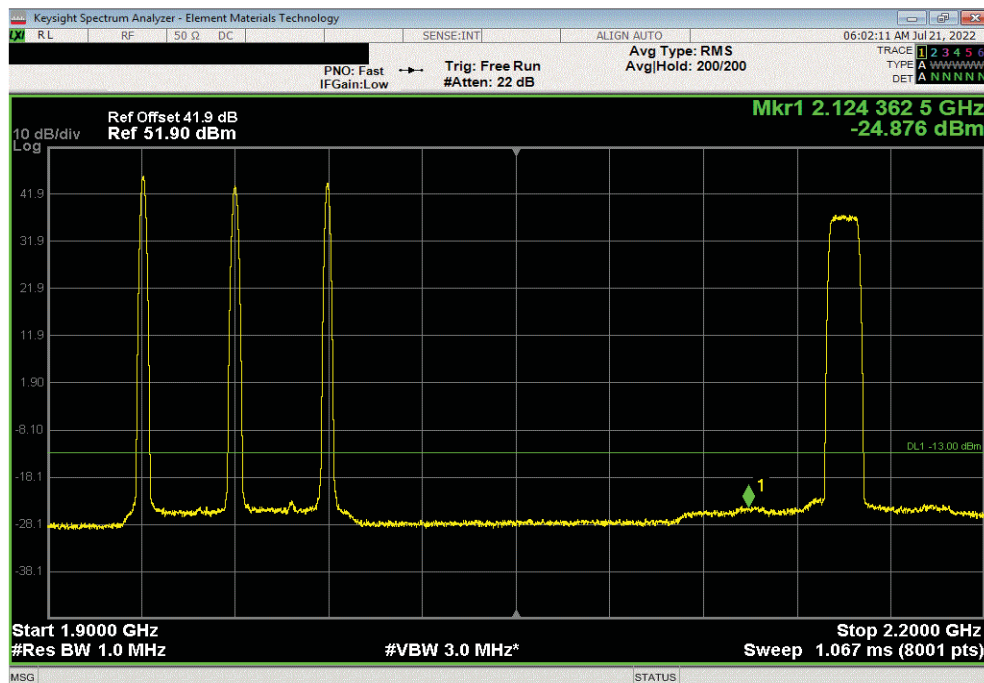


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

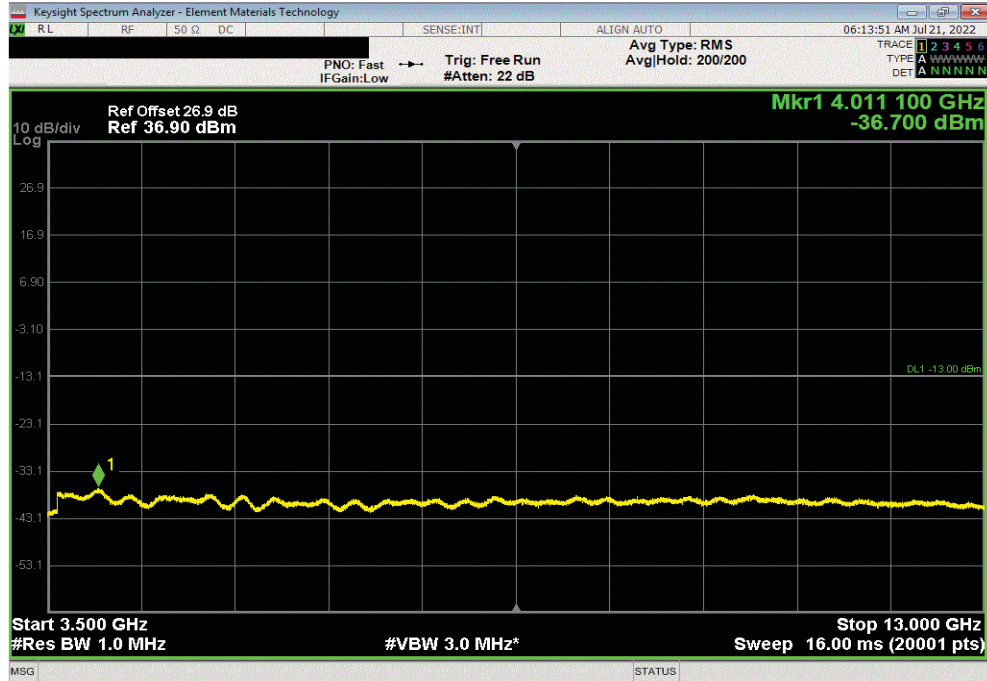


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

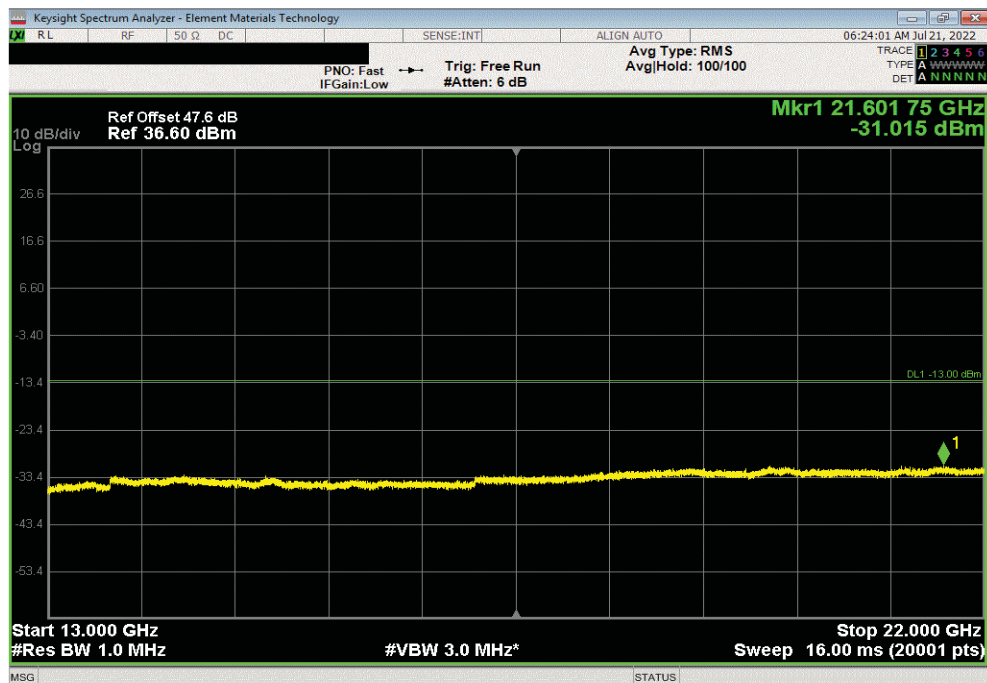


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

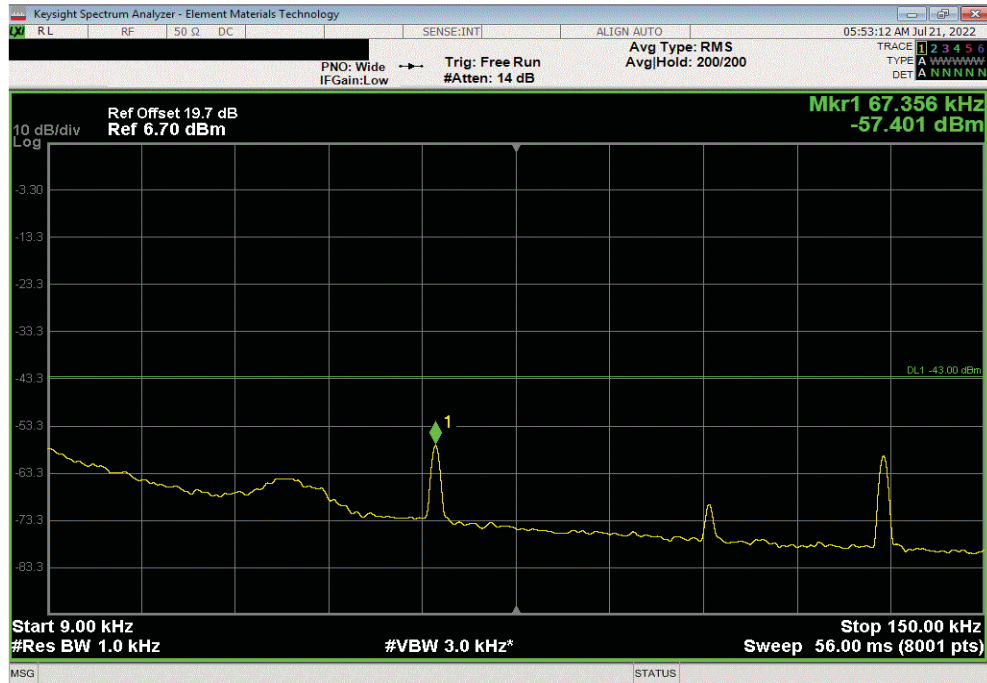


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

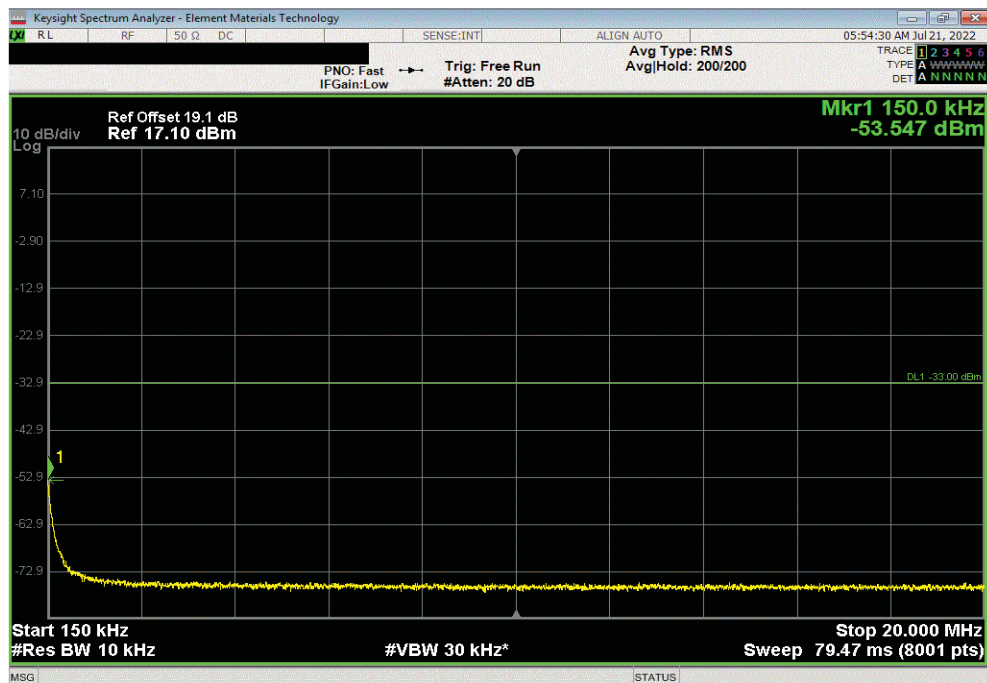


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

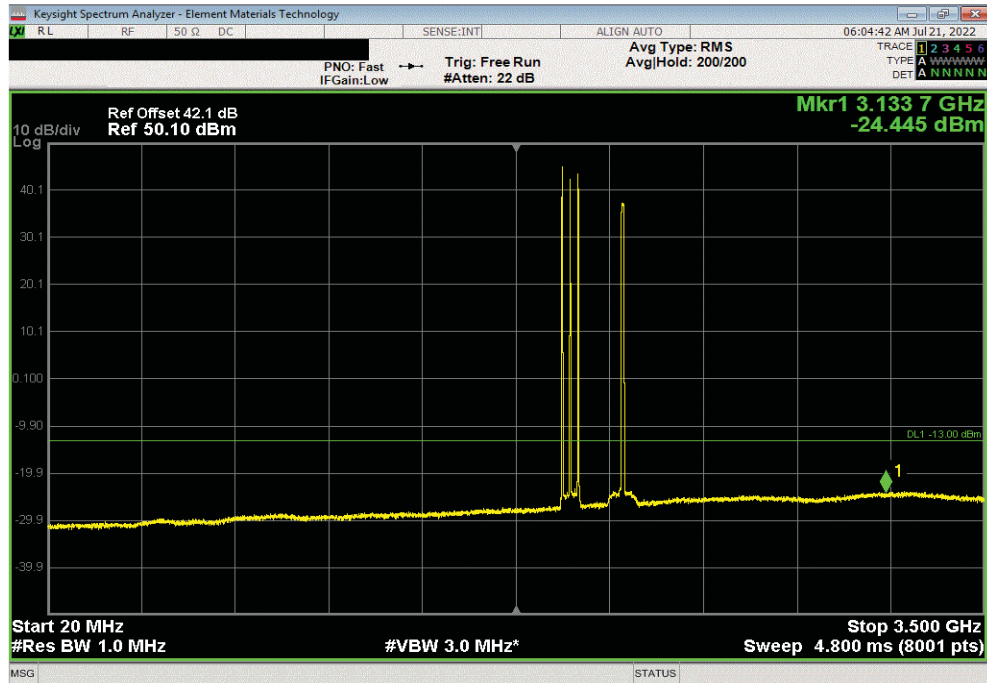


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

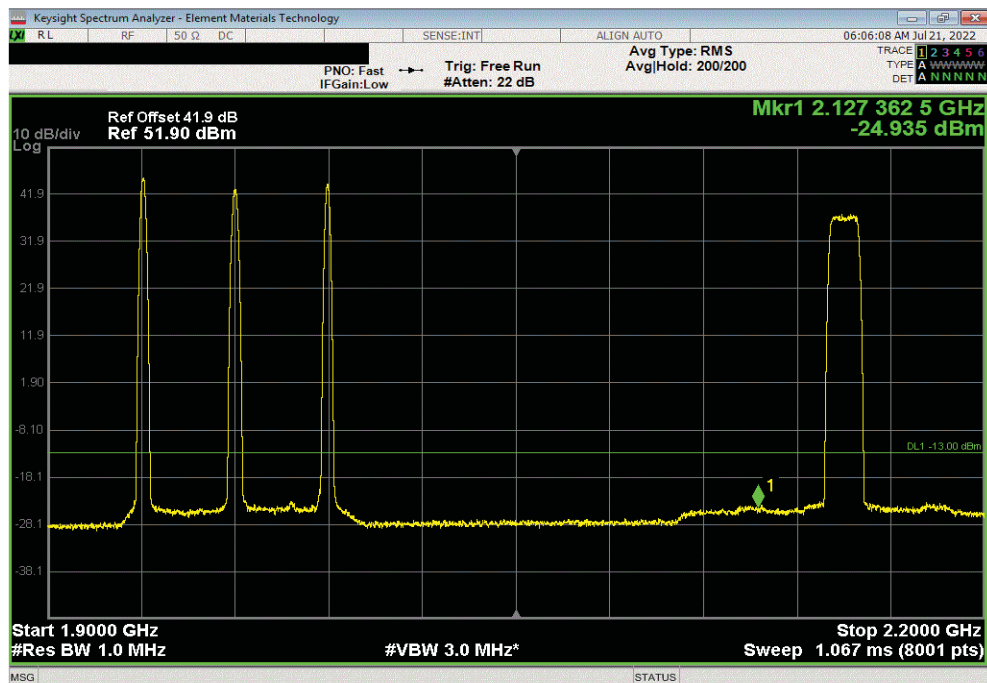


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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	

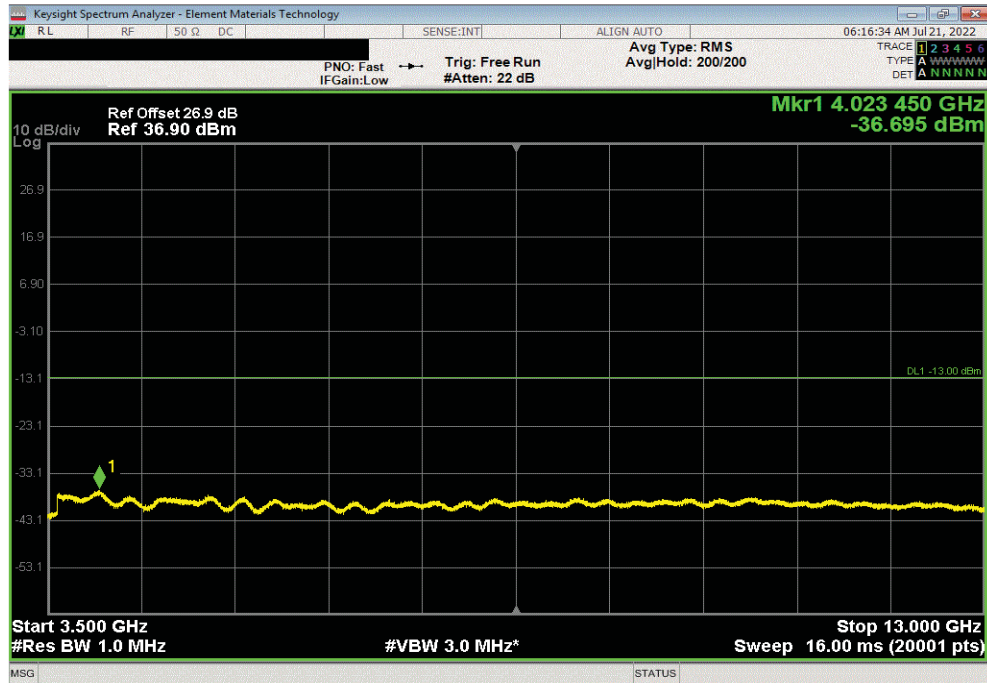


SPURIOUS CONDUCTED EMISSIONS - MULTIBAND MULTICARRIER

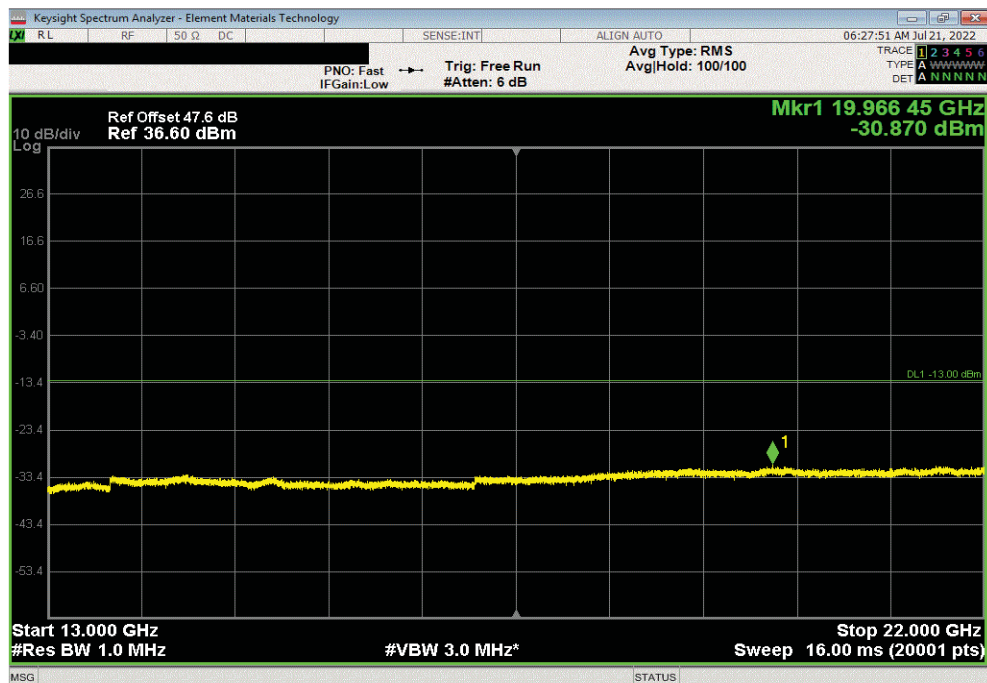


TbTtx 2022.05.02.0 XMit 2022.02.07.0

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