RF TEST REPORT

SIEMIC
A Bureau Veritas Group Company

Report No.: FCC_RF_SL18081801-FWV-001-850M REV 2.0
Supersede Report No.: FCC_RF_SL18081801-FWV-001-850M REV 1.0

Applicant	:	Fairwaves, Inc.
Product Name	:	GSM Base Station
Model No.	:	UMSITE-TM5-E900
Test Standard	:	47 CFR Part 22H
Test Method	:	ANSI C63.4:2014
FCC ID	:	2ASMN-US-G05
Dates of test	:	09/03/2018 – 09/07/2018
Issue Date	:	08/08/2019
Test Result	:	☒ Pass ☐ Fail
Equipment complied with the specification [X] Equipment did not comply with the specification [ ]		

This Test Report is Issued Under the Authority of:	
Cipher	**Chen Ge**
Test Engineer	Engineer Reviewer

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

ilac-MRA
ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC, RF/Wireless, Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless, Telecom
Taiwan	BSMI, NCC, NIST	EMC, RF, Telecom, Safety
Hong Kong	OFTA, NIST	RF/Wireless, Telecom
Australia	NATA, NIST	EMC, RF, Telecom, Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF, Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC, RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom, Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC, RF, Telecom
Canada	IC FCB, NIST	EMC, RF, Telecom
Singapore	iDA, NIST	EMC, RF, Telecom
EU	NB	EMC & Radio Equipment Directive (RED)
Japan	MIC (RCB 208)	RF, Telecom
Hong Kong	OFTA (US002)	RF, Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL18081801-FWV-001-850M	None	Original	09/18/2018
FCC_RF_SL18081801-FWV-001-850M REV 1.0	1.0	Added FCC ID, Antenna gain, and ERP	04/22/2019
FCC_RF_SL18081801-FWV-001-850M REV 2.0	2.0	Add Peak-Avg ratio	08/08/2019

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: Fairwaves Inc.
Product: GSM Base Station
Model No.: UMSITE-TM5-E900

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	Fairwaves, Inc.
Applicant Address	444 Somerville Ave, Somerville, MA 02143, USA
Manufacturer Name	Fairwaves, Inc.
Manufacturer Address	Klavu 15-1, Jurmala LV2015, Latvia

4 Test site information

Lab performing tests	SIEMIC Inc
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	540430
IC Test Site No.	4842D
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name:	GSM Base Station
Trade Name:	Fairwaves, Inc.
Model No:	UmSITE-TM5-E900
Serial No.:	08.18.019
Input Power:	30 VDC
Date of EUT received:	08/29/2018
Equipment Class/ Category	TNB
Port/Connectors:	N (x2), RJ45 Ethernet, and Coaxial
Remark:	N/A
AC Power Cord Type:	N/A
DC Power Cable Type:	Standard 2 Wire DC Cabling

6.2 Radio Description

Item	GSM
Operating Band /Radio Type	GSM 850MHz Band
Bandwidth	500 KHz
Modulation	GMSK
Antenna Type	External antenna
Antenna Gain	See below *Note
Frequency (MHz)	TX: 869.2 MHz to 893.8 MHz RX: 824.2 MHz to 848.8 MHz

***Note:**
The antenna gain **must not exceed 20 dBi**

Exception: for those systems operating in areas more than 72 km (45 miles) from international borders that: (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or, (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in Title 47, CFR §22.949 (Code of Federal Regulations), the antenna gain **must not exceed 23 dBi**

Cellular Radiotelephone Service (subpart H of part 22)	Non-building-mounted antennas: height above ground level to lowest point of antenna <10 m and total power of all channels >1000 W ERP (1640 W EIRP).
	Building-mounted antennas: total power of all channels >1000 W ERP (1640 W EIRP).

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	Laptop	Satellite C55-A5322	3E198990U	Toshiba	Part # PSCF6U-06306D

7.2 Test Software Description

Test Item	Software	Description
RF testing	Command Prompt	Control the testing mode for channel change to B,M,T.

7.3 Ports and Cabling

Connection Start		Connection Stop		Length / shielding Info	
From	I/O Port	To	I/O Port	Length (m)	Shielding
EUT	N Coaxial 1	Unterminated	Coaxial Cable Only	3m	Yes
EUT	N Coaxial 2	Unterminated	Coaxial Cable Only	10m	Yes
EUT	RJ-45 Ethernet	Laptop	RJ-45 Ethernet	4m	No
EUT	Coaxial	Unterminated	No Cable	N/A	N/A

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
RF Output Power	FCC	2.1046 22. 913(a)	FCC	TIA-603-E:2016	☒ Pass ☐ N/A
Frequency Stability	FCC	2.1055 22.355	FCC	TIA-603-E:2016	☒ Pass ☐ N/A
Occupied Bandwidth	FCC	2.1049 22.917	FCC	TIA-603-E:2016	☒ Pass ☐ N/A
Spurious and Harmonic Emissions at Antenna Terminals	FCC	2.1051 22.917	FCC	TIA-603-E:2016	☒ Pass ☐ N/A
Field Strength of Spurious and Harmonic Radiation	FCC	2.1053	FCC	TIA-603-E:2016	☒ Pass ☐ N/A
Remark	1. All measurement uncertainties do not take into consideration for all presented test results. 2. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.				

9 Measurement Uncertainty

9.1 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
LISN Insertion Loss	0.40	Normal	2	1	0.20
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					**3.856266**

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					**6.0118262**

The total derived measurement uncertainty is +/- 6.00 dB.

9.3 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:
- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					**8.4726**

The total derived measurement uncertainty is +/- 8.47 dB.

9.4 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					**0.952174**

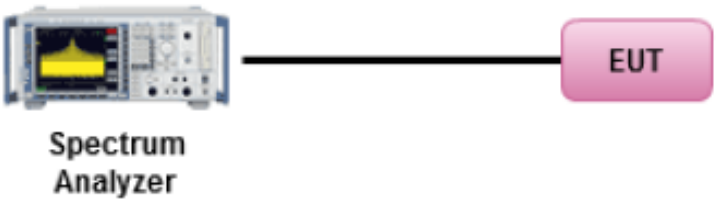
The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 Effective Radiated Power

Requirement(s):

Spec	Requirement	Applicable
2.1046 22.913	(1) Except as described in paragraphs (a)(2), (3), and (4) of this section, the ERP of base stations and repeaters must not exceed - (i) 500 watts per emission; or (ii) 400 watts/MHz (PSD) per sector. (2) Except as described in paragraphs (a)(3) and (4) of this section, for systems operating in areas more than 72 kilometers (45 miles) from international borders that: (i) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or (ii) Extend coverage into Unserved Area on a secondary basis (see§ 22.949), the ERP of base transmitters and repeaters must not exceed - (A) 1000 watts per emission; or (B) 800 watts/MHz (PSD) per sector.	☒

Test Setup				
Procedure	Same set up was used for Conducted Power and Frequency measurement. Testing use GSM/EDGE Power function.			
Test Date	09/03/2018 – 09/07/2018	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23ºC 44% 1021mbar
Remark	The antenna gain is 20dBi for high population area and 23dBi for low population area. 1000Watt = 60dBm, 500W = 57dBm.			
Result	☒ Pass ☐ Fail			

Test Data ☒ Yes (See below) ☐ N/A
Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Cipher Chu at RF test site.

Conducted Power measurement result

Power (dBm)	Ch 128	Ch 189	Ch 251
	GMSK	GMSK	GMSK
TX 1, Ave	35.22	35.17	35.27
TX 1, Peak	35.34	35.32	35.42
TX 2, Ave	35.11	35.13	35.13
TX 2, Peak	35.24	35.26	35.26

Type	Channel	Measured PW (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)	E.R.P (dBm)	Limit (dBm)
TX 1, Ave.	Low	35.22	20	55.22	53.07	57
	Mid	35.17	20	55.17	53.02	57
	High	35.27	20	55.27	53.12	57
TX 1, Peak	Low	35.34	20	55.34	53.19	57
	Mid	35.32	20	55.32	53.17	57
	High	35.42	20	55.42	53.27	57
TX 2, Ave.	Low	35.11	20	55.11	52.96	57
	Mid	35.13	20	55.13	52.98	57
	High	35.13	20	55.13	52.98	57
TX 2, Peak	Low	35.24	20	55.24	53.09	57
	Mid	35.26	20	55.26	53.11	57
	High	35.26	20	55.26	53.11	57

Note: Ch 128 = Low Channel, 869.2 MHz, Ch189 = Mid Channel, 881.4 MHz, Ch 251 = High Channel, 893.8 MHz.

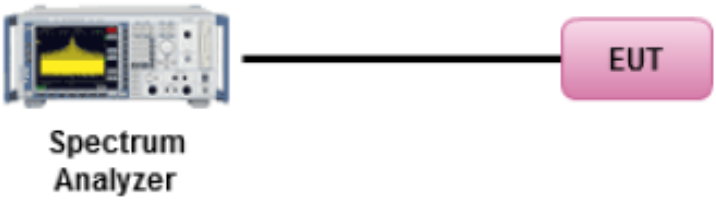
Exception: for those systems operating in areas more than 72 km (45 miles) from international borders that: (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or, (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in Title 47, CFR §22.949 (Code of Federal Regulations), the antenna gain **must not exceed 23 dBi.**

Type	Channel	Measured PW (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)	E.R.P (dBm)	Limit (dBm)
TX 1, Ave.	Low	35.22	23	58.22	56.07	60
	Mid	35.17	23	58.17	56.02	60
	High	35.27	23	58.27	56.12	60
TX 1, Peak	Low	35.34	23	58.34	56.19	60
	Mid	35.32	23	58.32	56.17	60
	High	35.42	23	58.42	56.27	60
TX 2, Ave.	Low	35.11	23	58.11	55.96	60
	Mid	35.13	23	58.13	55.98	60
	High	35.13	23	58.13	55.98	60
TX 2, Peak	Low	35.24	23	58.24	56.09	60
	Mid	35.26	23	58.26	56.11	60
	High	35.26	23	58.26	56.11	60

Note: Ch 128 = Low Channel, 869.2 MHz, Ch189 = Mid Channel, 881.4 MHz, Ch 251 = High Channel, 893.8 MHz.

10.2 Frequency Stability

Requirement(s):

Spec	Requirement	Applicable
2.1055 22.355	The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.	☒
Test Setup		
Procedure	Frequency offset in hertz from the nominal frequency was measured. a) At 10 °C intervals of temperatures between -30 °C and +50 °C at the manufacturer's rated supply voltage; b) At +20 °C temperatures and ±15% supply voltage variations. If a product is specified to operate over a range of input voltage then the -15% variation is applied to the lowermost voltage and the +15% is applied to the uppermost voltage.	

Test Date	09/03/2018 – 09/07/2018	Environmental condition	Temperature 23ºC Relative Humidity 44% Atmospheric Pressure 1021mbar
Remark	N/A		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes (See below) ☐ N/A
Test Plot ☐ Yes (See below) ☒ N/A

Test was done by Cipher at RF test site.

Temperature Variation

Temperature(°C)	TX1			TX2		
	Ch 128	Ch 189	Ch 251	Ch 128	Ch 189	Ch 251
-30	-9	-6	-6	-9	-6	-6
-20	-4	-5	-5	-4	-5	-5
-10	1	1	1	1	1	1
0	1	2	3	1	2	3
+10	3	3	3	3	3	3
+20	-1	-2	-2	-1	-2	-2
+30	1	1	1	1	1	1
+40	1	1	1	1	1	1
+50	2	1	1	2	1	1

Max deviation = 9 Hz.

Voltage Variation

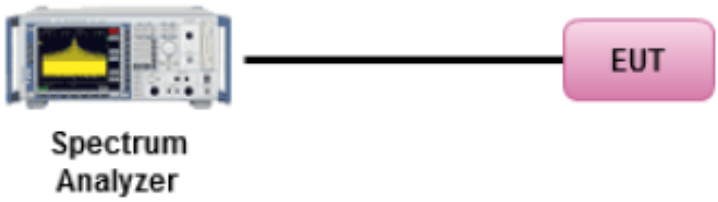
Voltage(VDC)	TX1			TX2		
	Ch 128	Ch 189	Ch 251	Ch 128	Ch 189	Ch 251
21.6	-2	-2	-2	-2	-2	-2
30	-1	-2	-2	-1	-2	-2
33	-2	-2	-2	-2	-2	-2

Max deviation = 2 Hz.

All frequency variation is within the authorized band.

10.3 Occupied Bandwidth

Requirement(s):

Spec	Requirement			Applicable
2.1049 22.917	N/A			☒
Test Setup				
Procedure	Frequency offset in hertz from the nominal frequency was measured. a) Occupied Bandwidth was measured -26 dBc occupied bandwidth using a spectrum analyzer display line and delta marker functions.			
Test Date	09/03/2018 – 09/07/2018	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23ºC 44% 1021mbar
Remark	N/A			
Result	☒ Pass ☐ Fail			

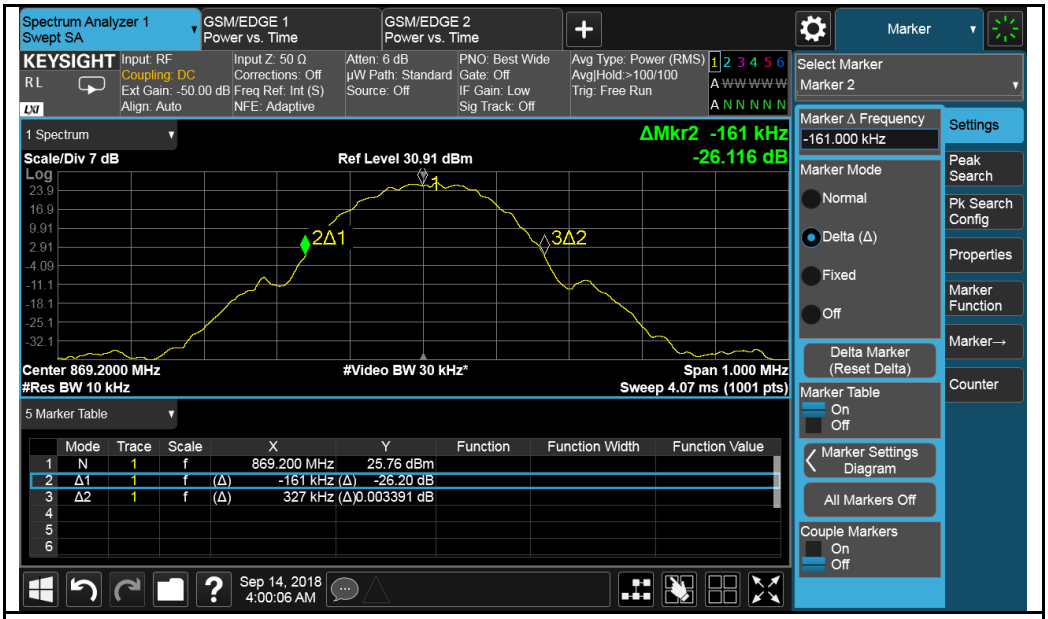
Test Data ☒ Yes (See below) ☐ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher Chu at RF test site.

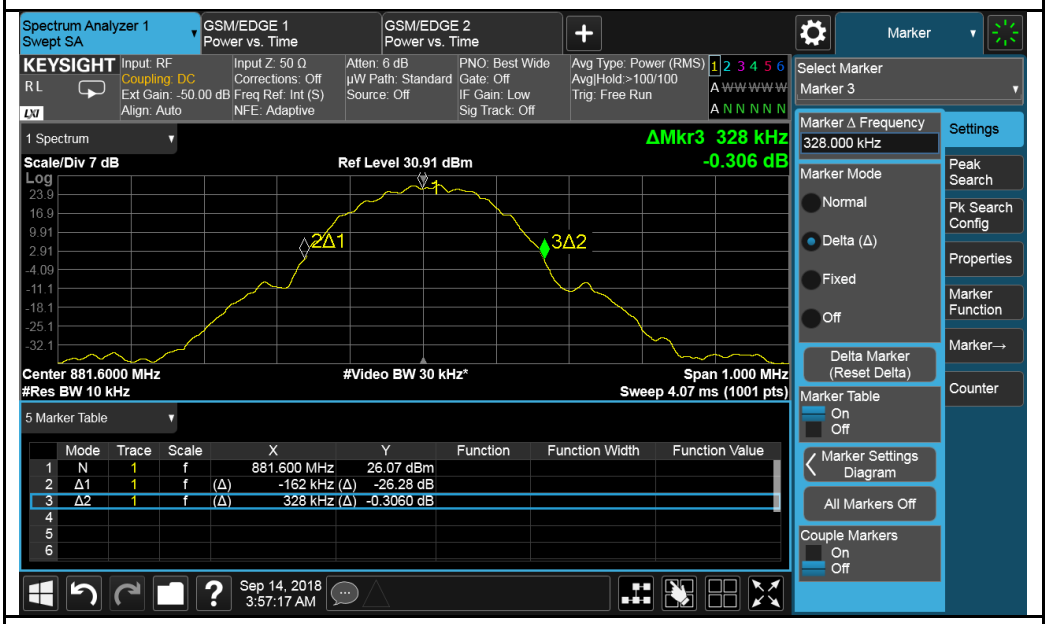
26dB measurement result

Power (dBm)	Ch 128	Ch 189	Ch 251
	GMSK	GMSK	GMSK
TX 1	327 KHz	328 KHz	329 KHz
TX 2	327 KHz	328 KHz	329 KHz

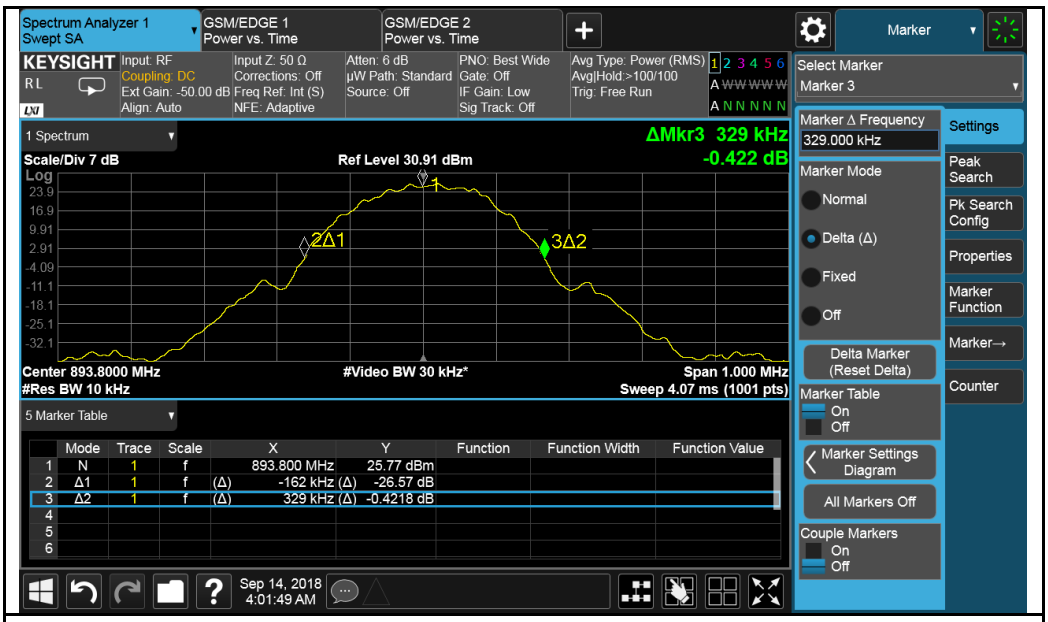
Test Plots



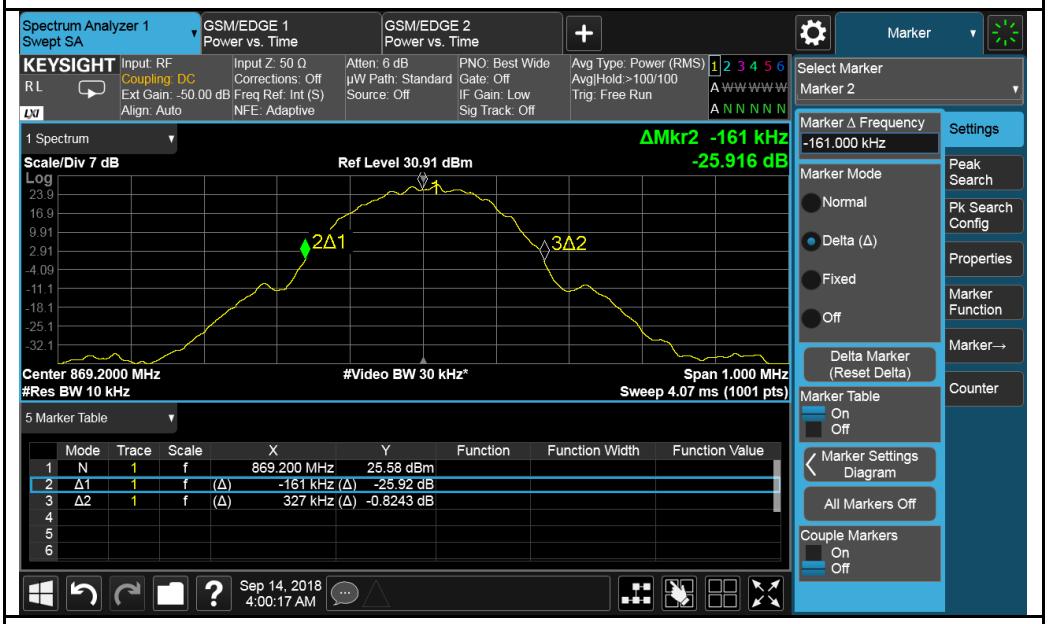
Chain 1 GMSK – Channel 128



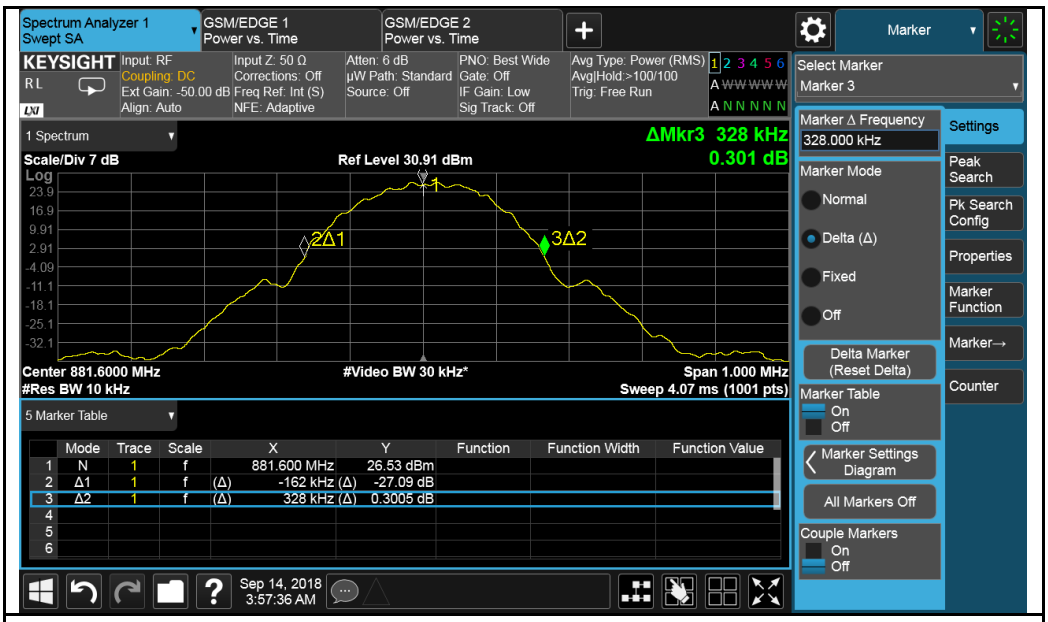
Chain 1 GMSK – Channel 189



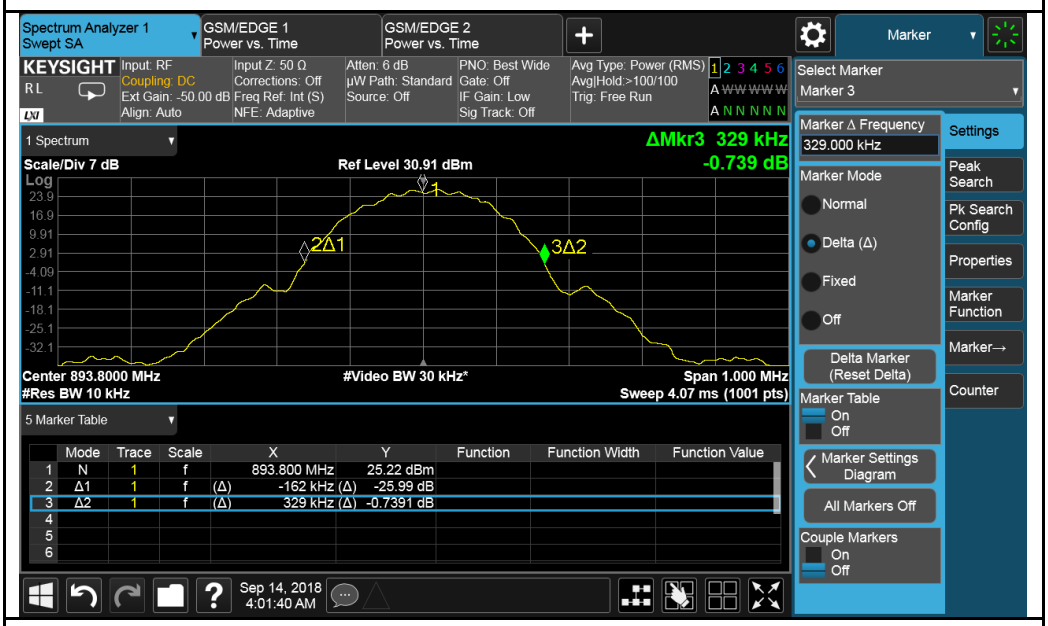
Chain 1 GMSK – Channel 251



Chain 2 GMSK – Channel 128



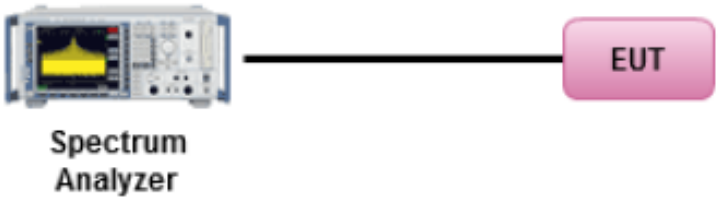
Chain 2 GMSK – Channel 189



Chain 2 GMSK – Channel 251

10.4 Peak-Average Ratio

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR22.913	(d)	ower measurement. Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.	☒
Test Setup			
Test Procedure	- EUT was set for low, mid, high channel with modulated mode and highest RF output power. - The spectrum analyzer was connected to the antenna terminal.		
Test Date	09/03/2018 – 09/07/2018	Environmental condition	Temperature 23°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

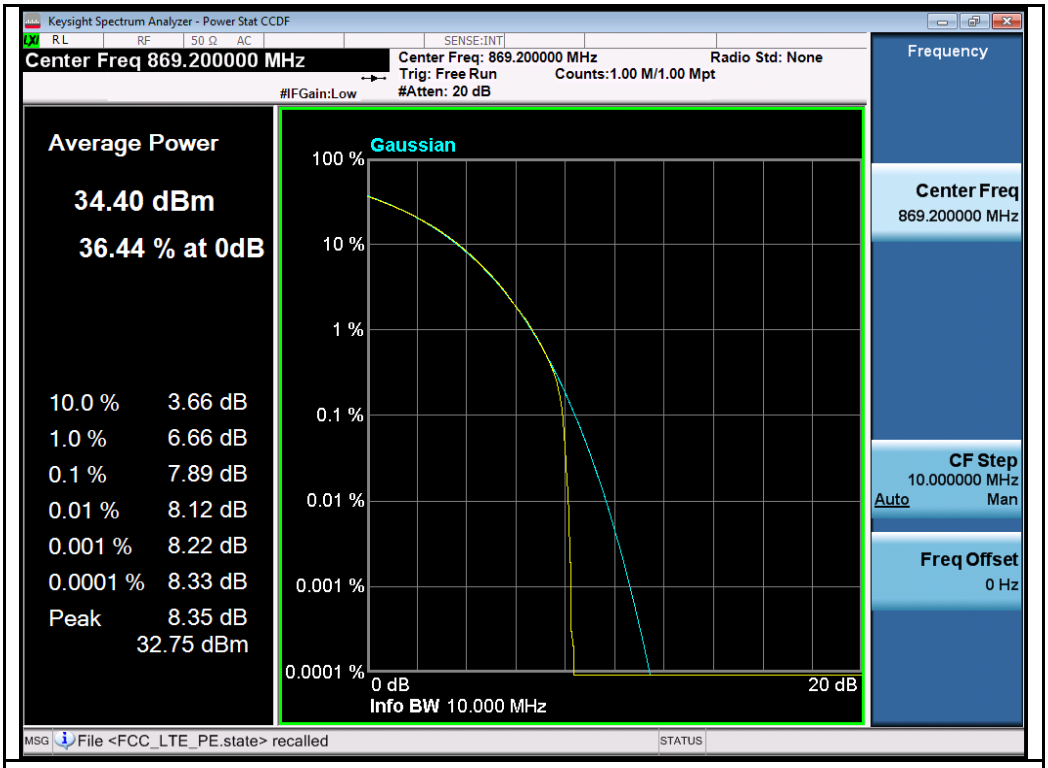
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher Chu at RF Test Site.

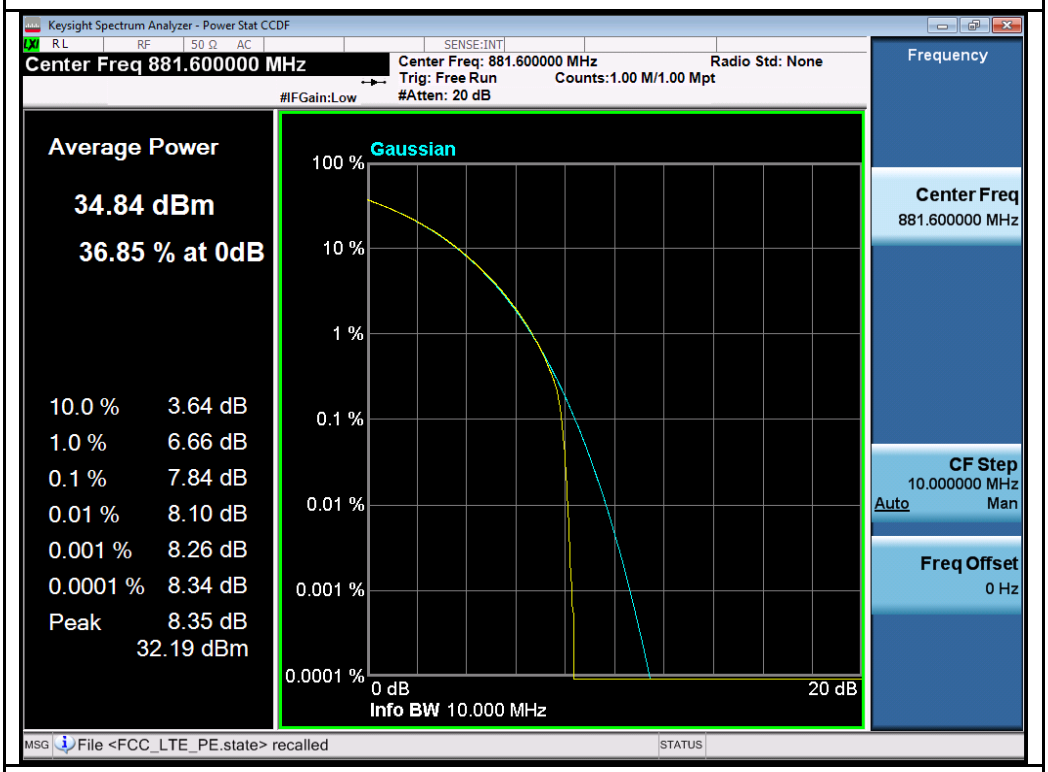
Peak-Avg Ratio measurement result

Type	Channel	Frequency (MHz)	Peak-Average Ratio (dB)	Limit (dB)
GMSK	Low	869.2	8.22	13
	Mid	881.6	8.26	13
	High	893.8	8.32	13

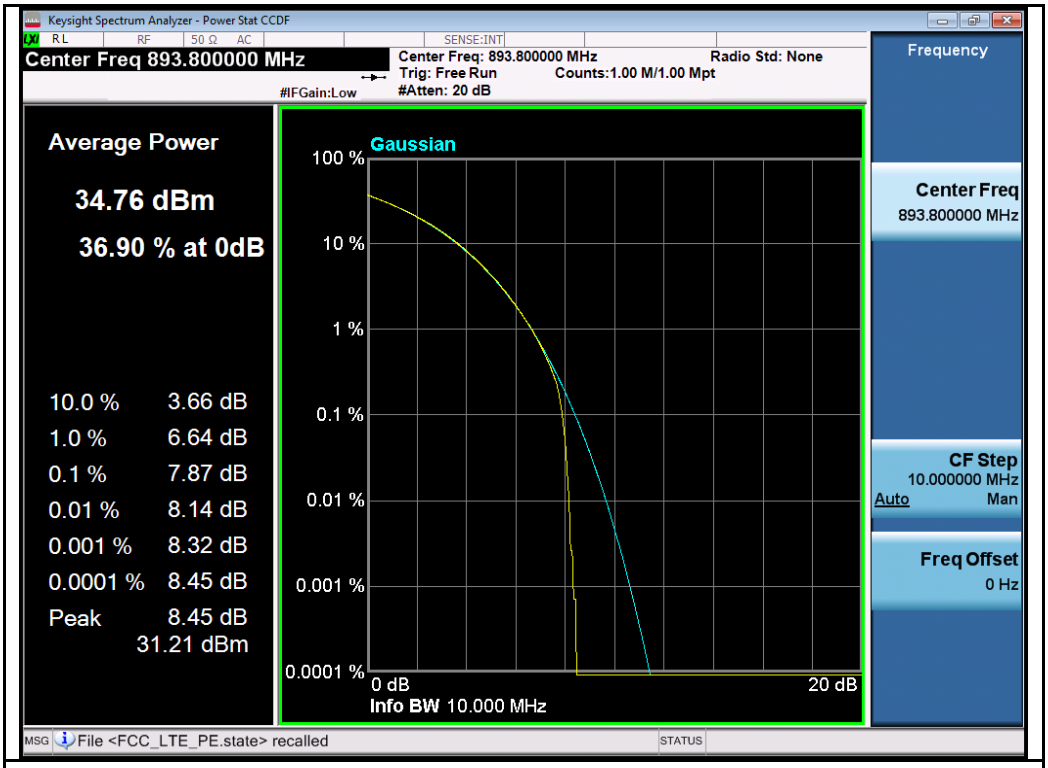
Test Plots



GMSK – Channel 128



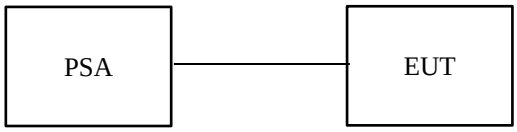
GMSK – Channel 189



GMSK – Channel 251

10.5 Spurious and Harmonic Emissions at Antenna Terminals

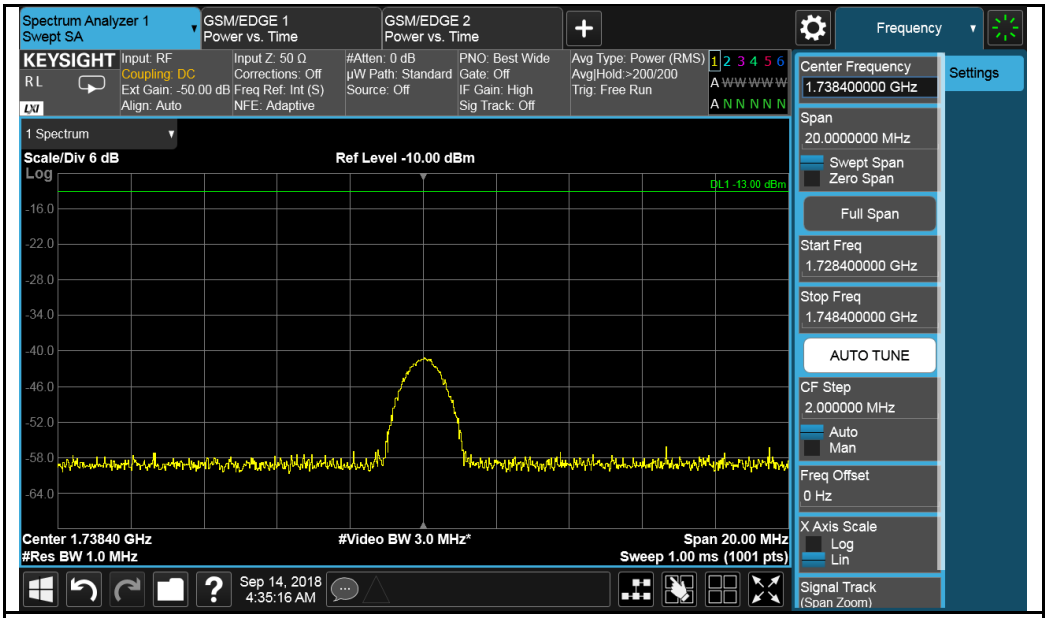
Requirement(s):

Spec	Requirement			Applicable
2.1051 22.917	Attenuate by 43 + 10logP dB = -13 dBm			☒
Test Setup				
Procedure	Spurious Type: a) Second Harmonic; b) Band edge Spectrum; c) Out of Band Spurious;			
Test Date	09/03/2018 – 09/07/2018	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	23ºC 44% 1021mbar
Remark	N/A			
Result	☒ Pass ☐ Fail			

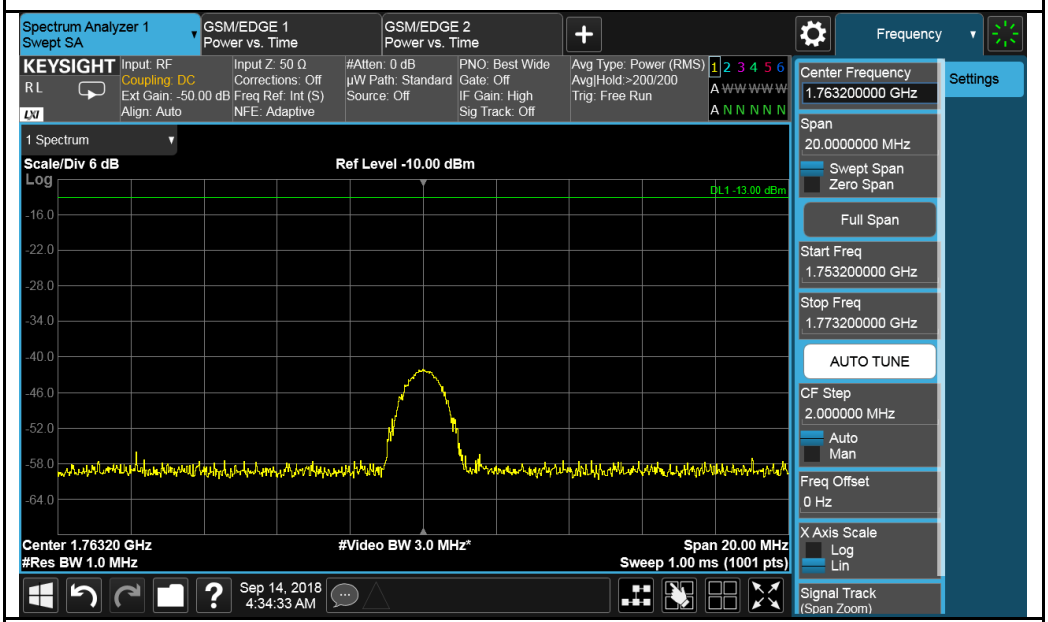
Test Data ☐ Yes (See below) ☒ N/A
Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher Chu at RF test site.

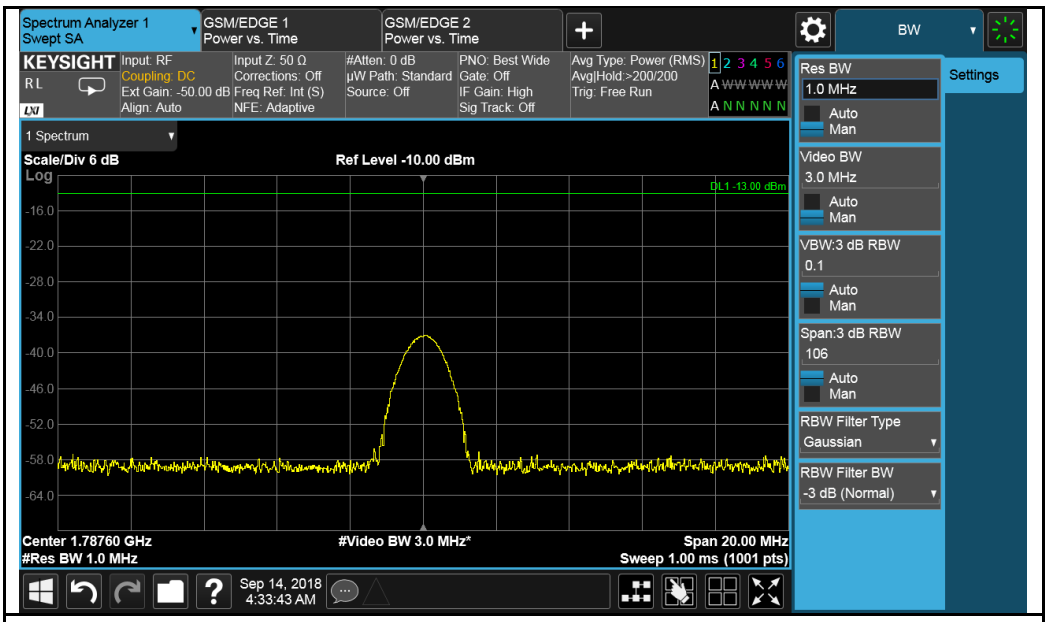
Test Plots
Second Harmonic



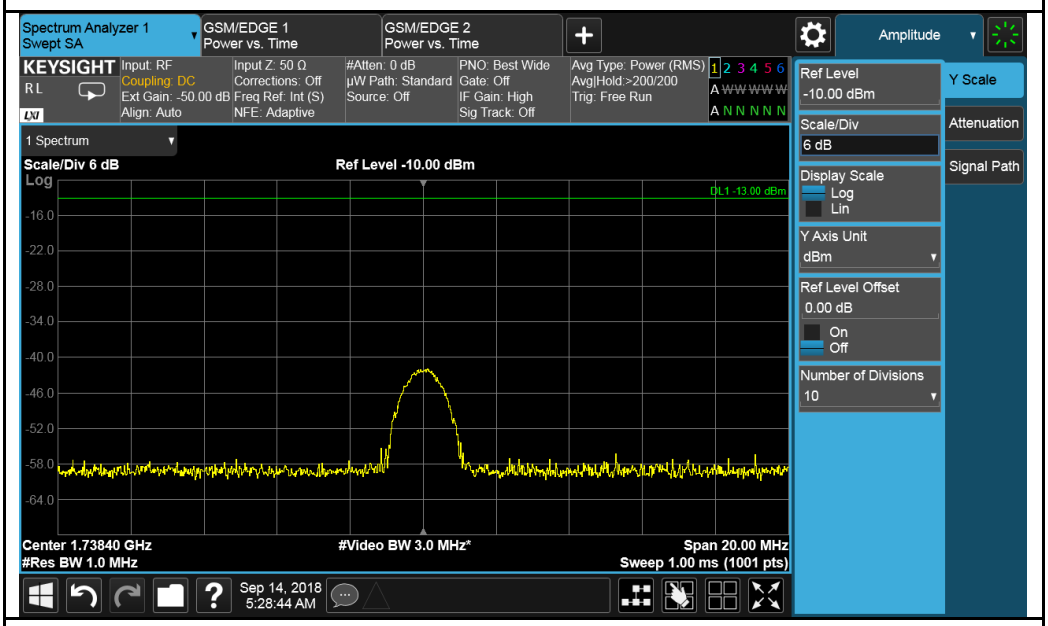
Chain 1 GMSK – Channel 128



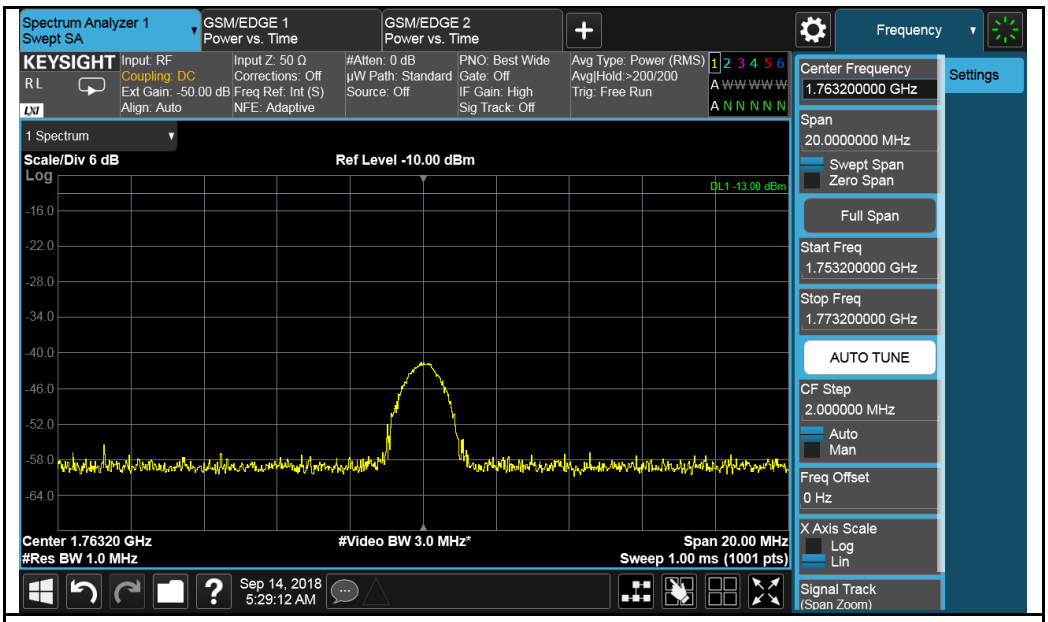
Chain 1 GMSK – Channel 189



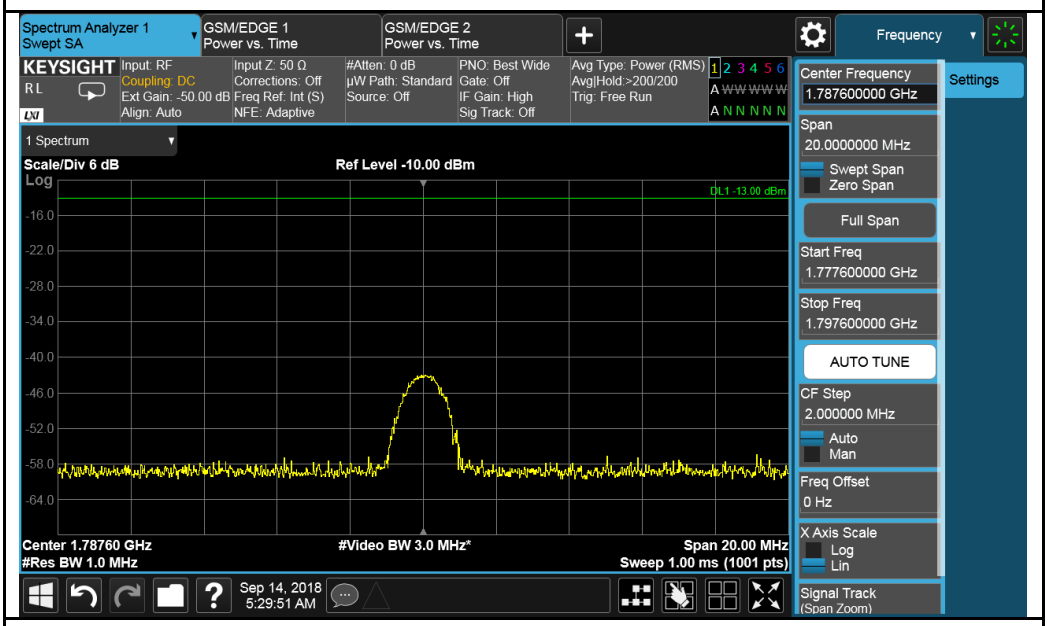
Chain 1 GMSK – Channel 251



Chain 2 GMSK – Channel 128

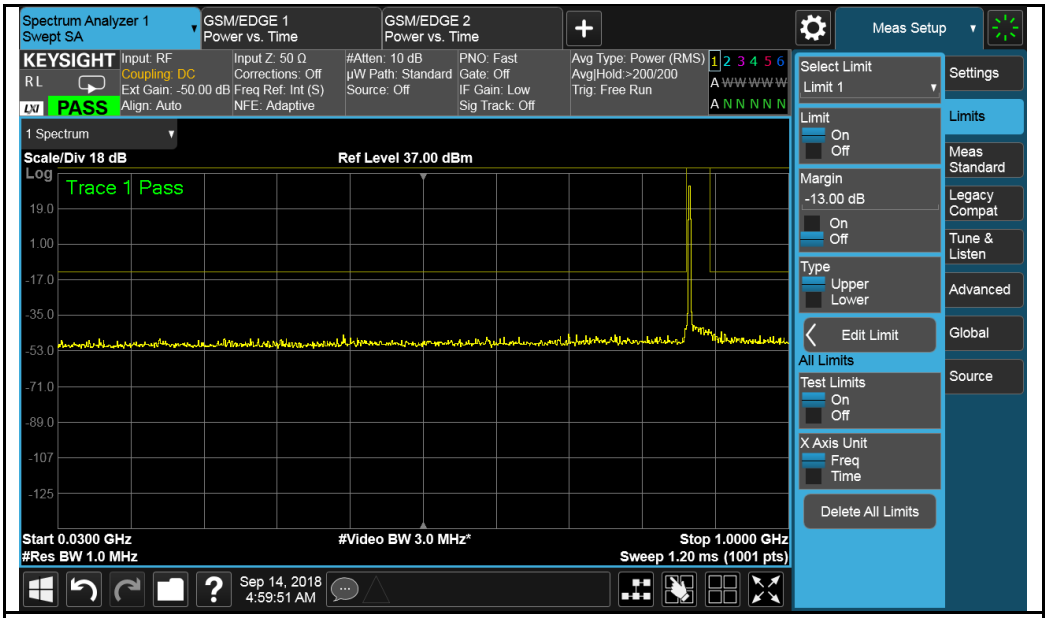


Chain 2 GMSK – Channel 189

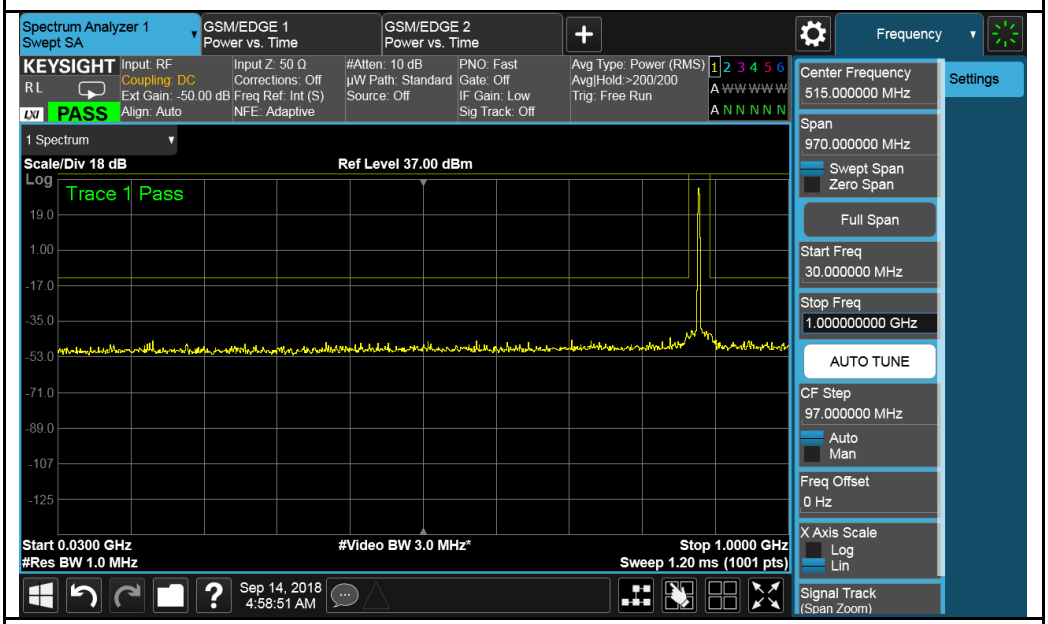


Chain 2 GMSK – Channel 251

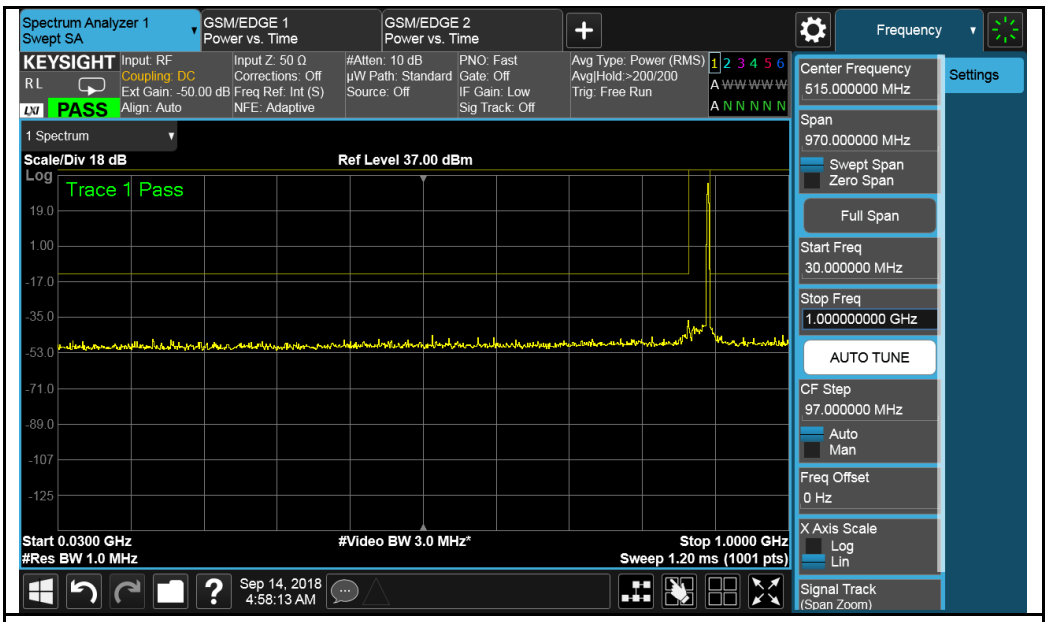
Out of Band Spurious
30 MHz – 1 GHz



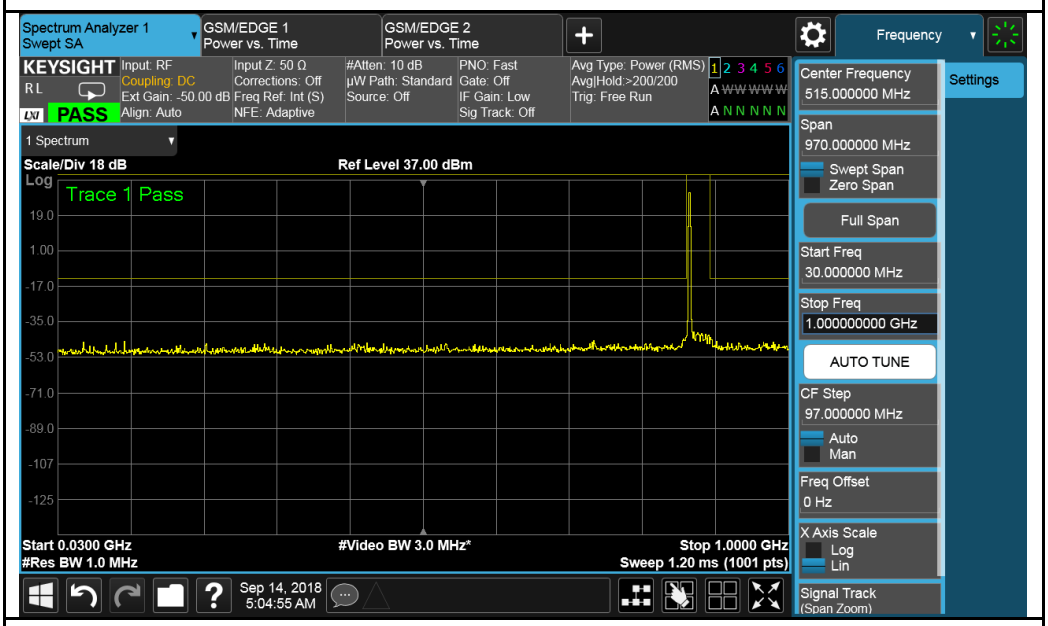
Chain 1 GMSK – Channel 128



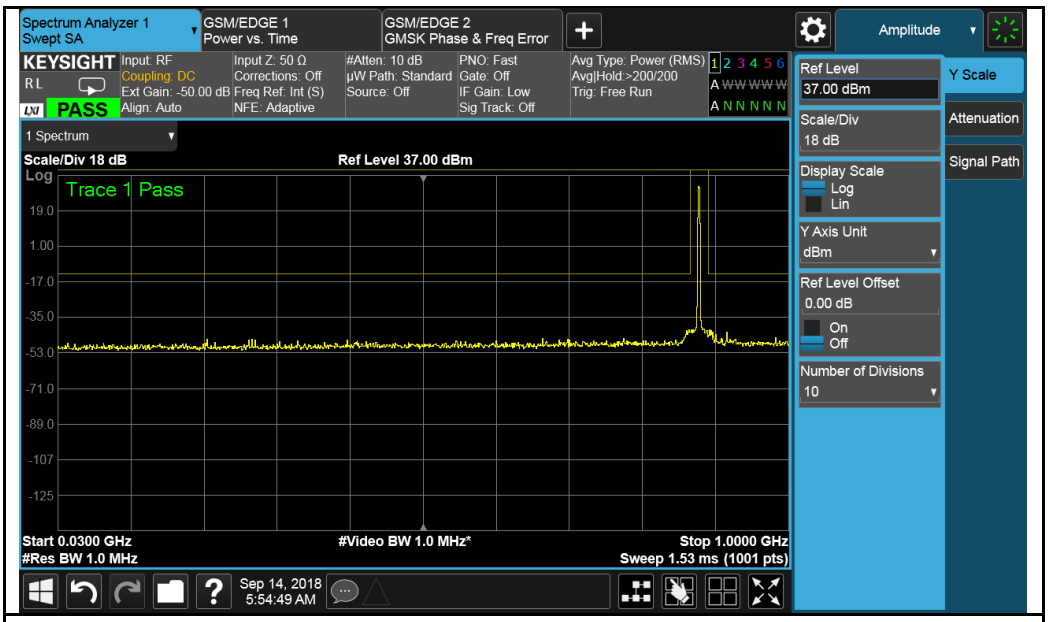
Chain 1 GMSK – Channel 189



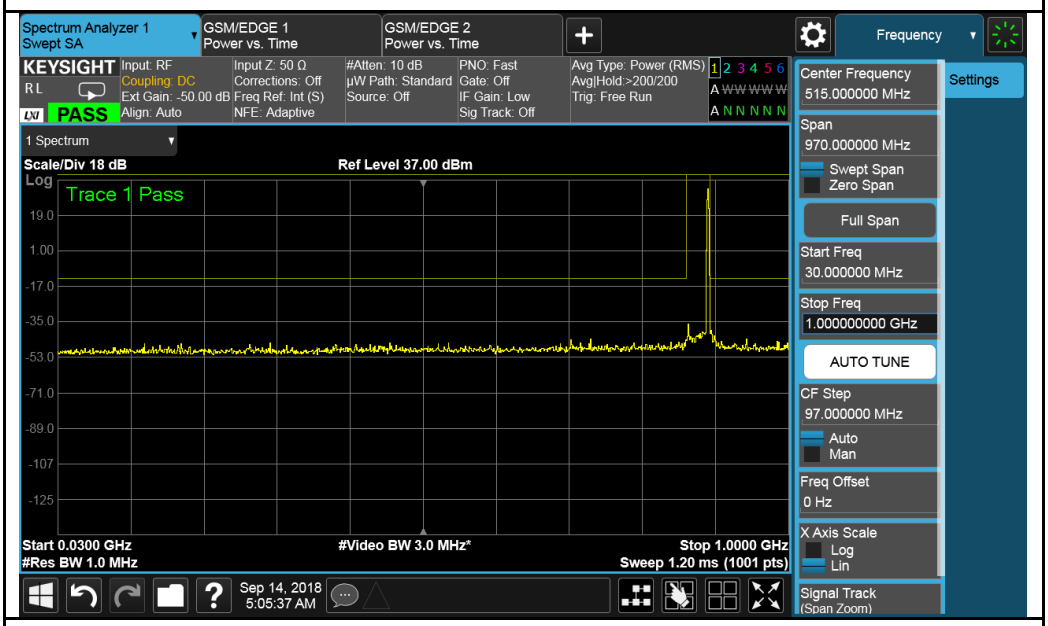
Chain 1 GMSK – Channel 251



Chain 2 GMSK – Channel 128

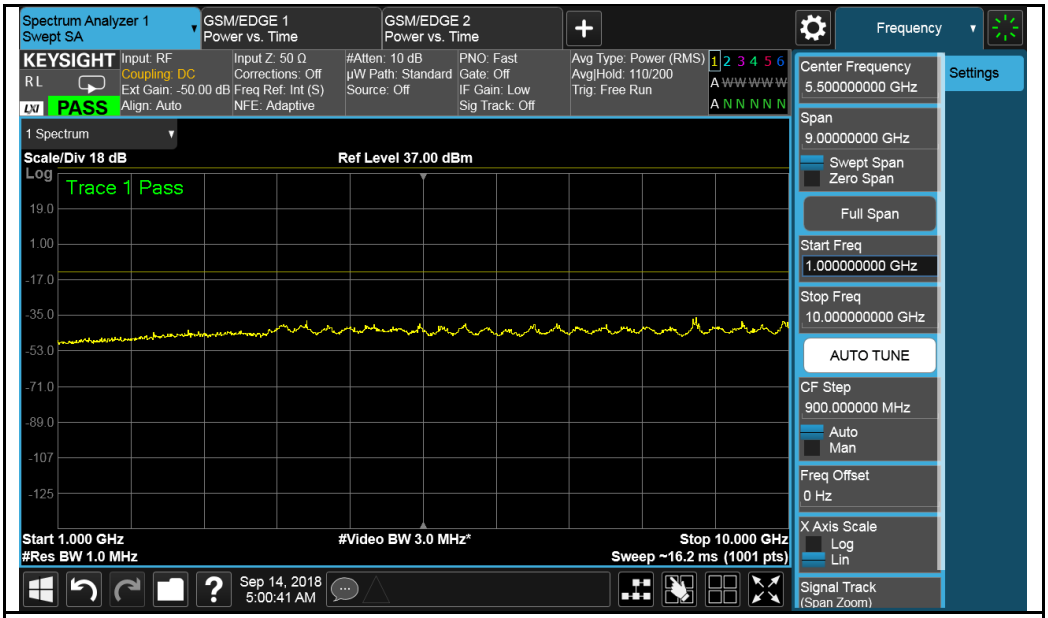


Chain 2 GMSK – Channel 189

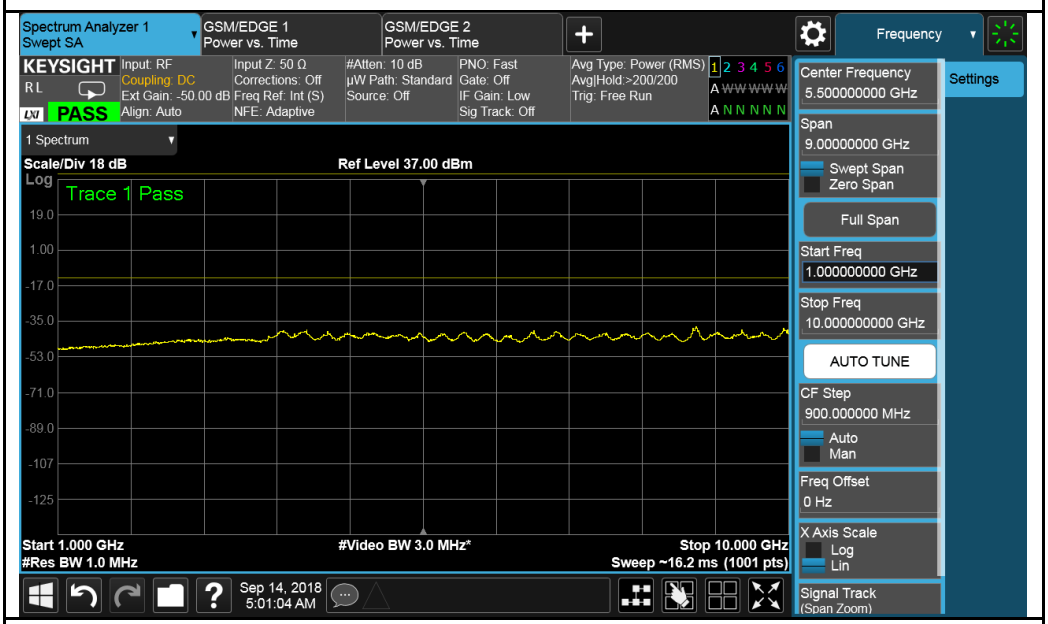


Chain 2 GMSK – Channel 251

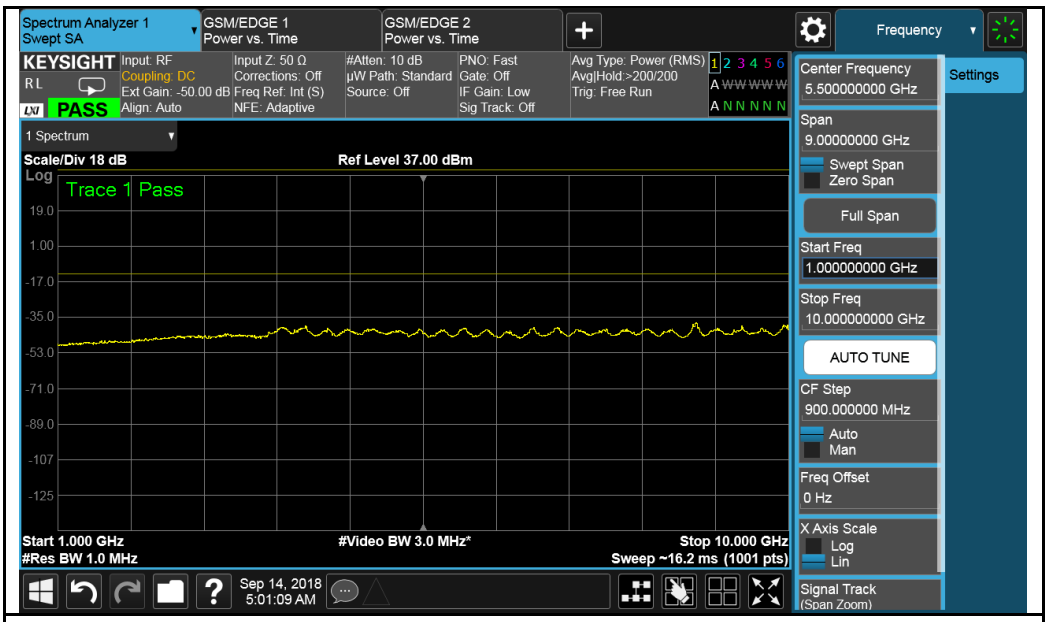
Out of Band Spurious
1 GHz – 10 GHz



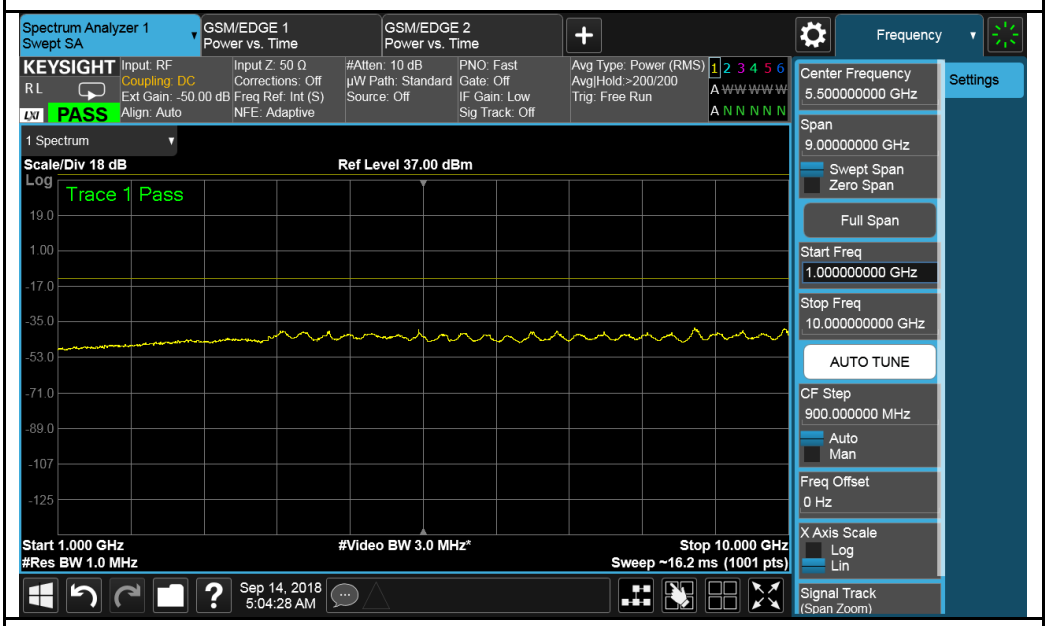
Chain 1 GMSK – Channel 128



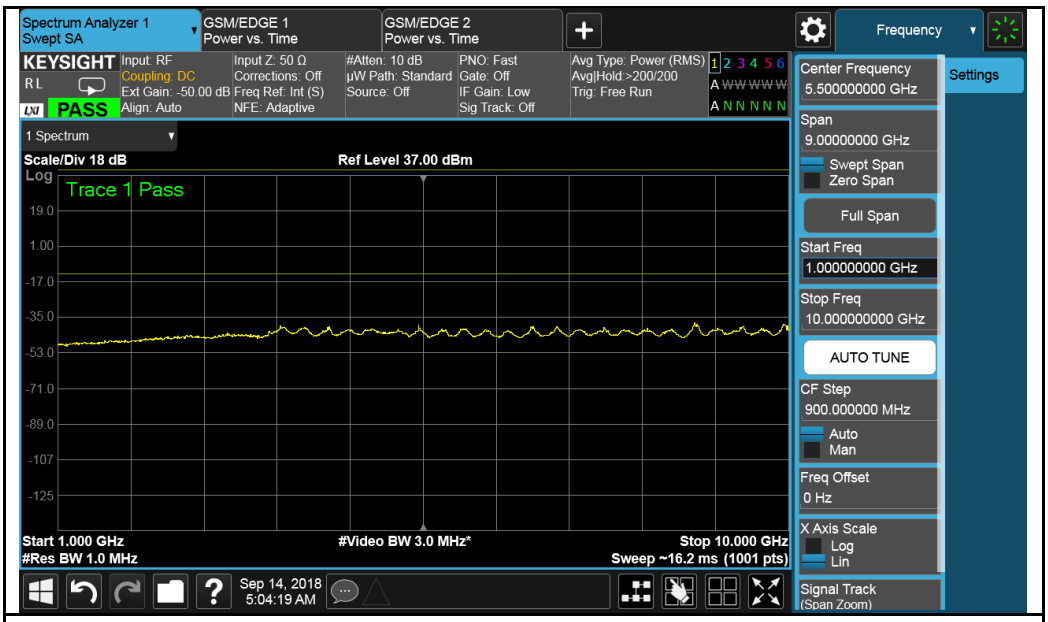
Chain 1 GMSK – Channel 189



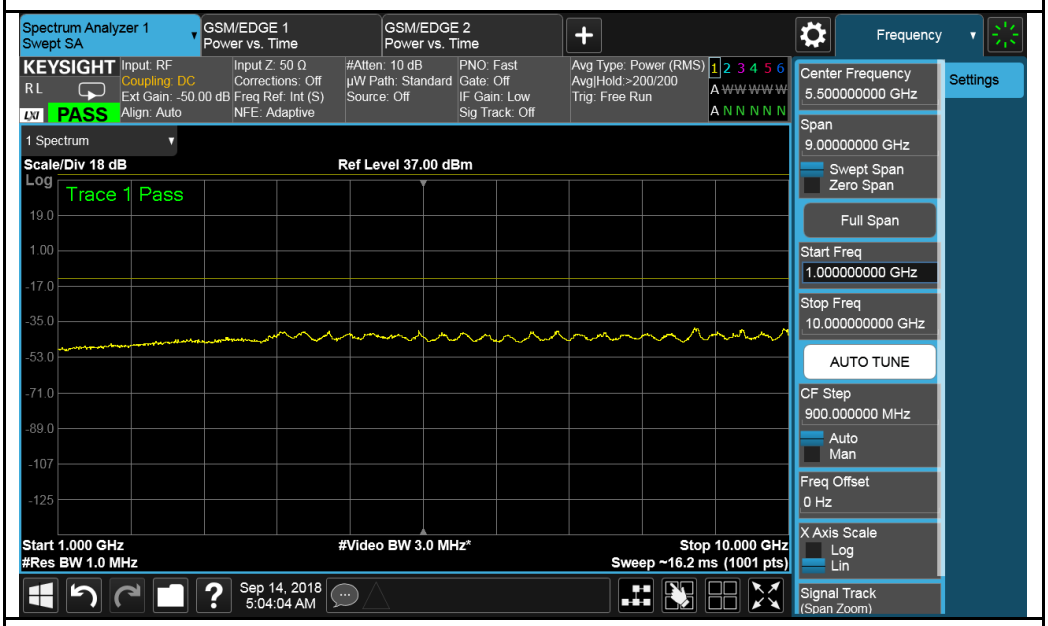
Chain 1 GMSK – Channel 251



Chain 2 GMSK – Channel 128

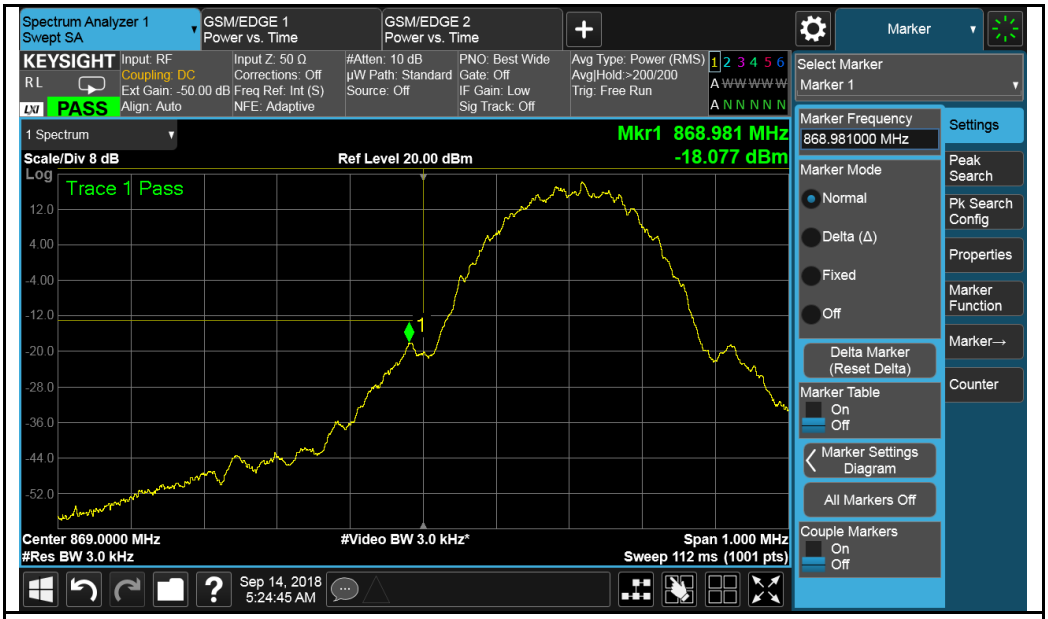


Chain 2 GMSK – Channel 189

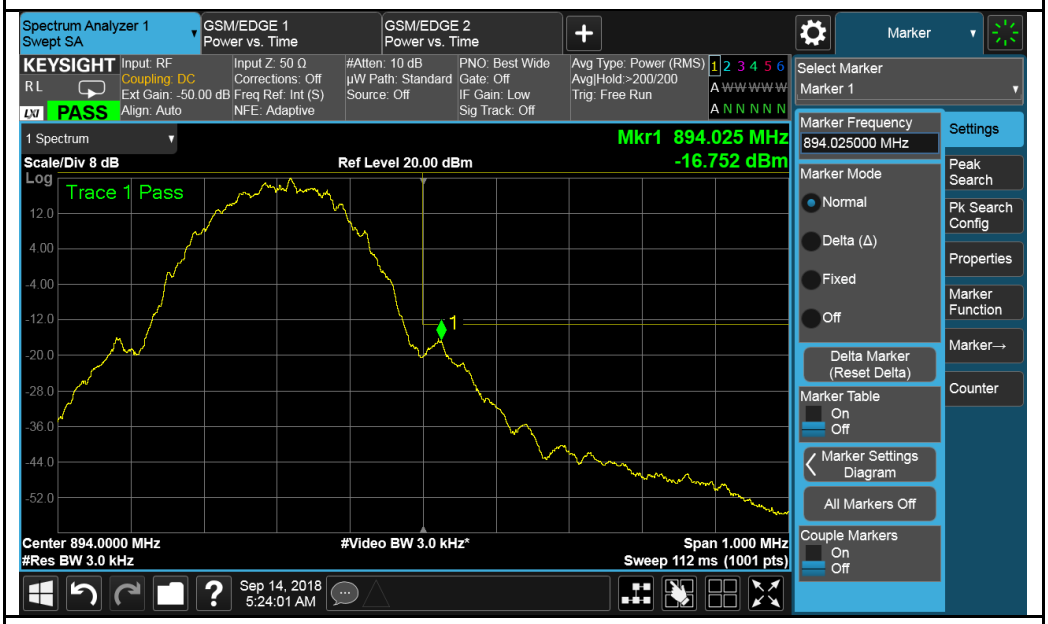


Chain 2 GMSK – Channel 251

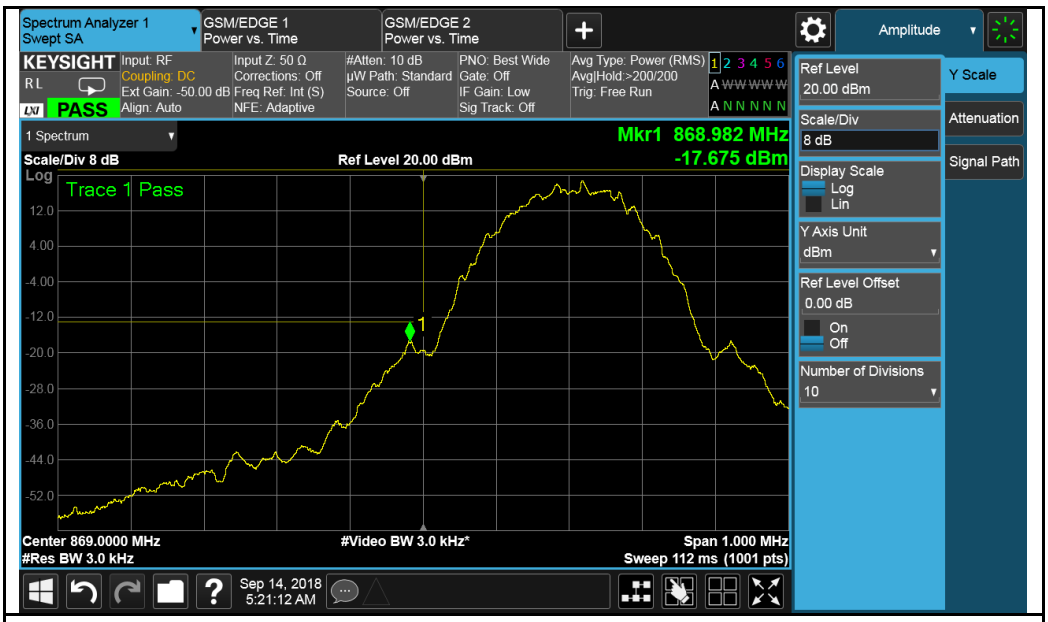
Band edge Spectrum



Chain 1 GMSK – Channel 128



Chain 1 GMSK – Channel 251

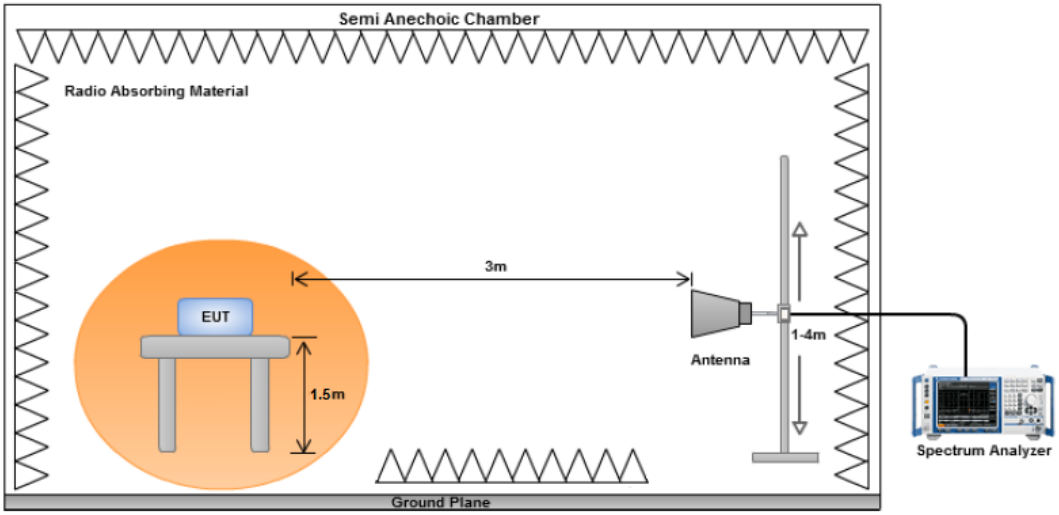


Chain 2 GMSK – Channel 128

Chain 2 GMSK – Channel 251

10.6 Field Strength of Spurious and Harmonic Radiation

Requirement(s):

Spec	Requirement	Applicable
2.1053	Requirement Limit: attenuate by 43+10logPwatts = -13 dBm	☒
Test Setup		
Procedure	The antenna output port of the EUT was terminated with a 50-ohm load. With the transmitter operating at full power, the EUT was rotated 360° and the search antenna was raised and lowered in both polarities, all in an attempt to maximize the levels of the received emission for each harmonic and spurious emission up to 10 fo. The EUT was removed and was replaced by a substitution antenna connected via coax to a signal generator. The generator output was set to each emission frequency detected, the search antenna was raised and lowered, the turntable was rotated, and until the maximum emission level was obtained. The signal generator output level was adjusted to match the radiated emission level from the EUT. After correcting for substitution antenna factor and generator cable loss, output power level is compared to the limit.	
Remark	The EUT was scanned up to 18GHz. Both horizontal and vertical polarities were investigated. The results show only the worst case.	
Result	☒ Pass ☐ Fail	

Test Data ☒ Yes (See below) ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Cipher Chu at 10m chamber.

GMSK – Channel 128

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBuV)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2604.15	61.74	36	161	V	2604.15	-46.28	0	1	-47.28	-13	-34.28
2604.15	59.72	185	155	H	2604.15	-49.45	0	1	-50.45	-13	-37.45

GMSK – Channel 189

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBuV)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2606.34	59.06	33	162	V	2604.15	-48.96	0	1	-49.96	-13	-36.96
2606.34	57.52	174	157	H	2604.15	-52.13	0	1	-53.13	-13	-40.13

GMSK – Channel 251

Indicated			Test Antenna		Substituted						
Frequency (MHz)	Raw (dBuV)	Degree	Height (cm)	Polarity	Frequency (MHz)	Level (dBm)	Ant Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
2606.81	60.75	29	161	V	2604.15	-47.27	0	1	-48.27	-13	-35.27
2606.81	59.1	182	157	H	2604.15	-50.07	0	1	-51.07	-13	-38.07

Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Cycle	Cal Due	In use
R & S Receiver	ESIB 40	1018	08/07/2018	1 Year	08/07/2019	☑
Spectrum Analyzer	N9010A	10SL0219	08/20/2018	1 Year	08/20/2019	☑
Bi-Log antenna (30MHz~2GHz)	JB1	A030702	03/09/2018	2 Year	03/09/2020	☑
Horn Antenna (1GHz~26GHz)	3115	100059	11/09/2017	1 Year	11/09/2018	☑
Preamplifier (100KHz-7GHz)	LPA-6-30	11170602	05/09/2018	1 Year	05/09/2019	☑
Pre-Amplifier (1-26.5GHz)	8449B	3008A00715	08/16/2018	1 Year	08/16/2019	☑

Annex B. SIEMIC Accreditation

Accreditations	Document	Scope / Remark
ISO 17025 (A2LA)		Please see the documents for the detailed scope
ISO Guide 65 (A2LA)		Please see the documents for the detailed scope
TCB Designation		A1, A2, A3, A4, B1, B2, B3, B4, C
FCC DoC Accreditation		FCC Declaration of Conformity Accreditation
FCC Site Registration		3 meter site
FCC Site Registration		10 meter site
IC Site Registration		3 meter site
IC Site Registration		10 meter site
EU NB		**Radio & Telecommunications Terminal Equipment:** EN45001 – EN ISO/IEC 17025
		Electromagnetic Compatibility: EN45001 – EN ISO/IEC 17025
Singapore iDA CB(Certification Body)		Phase I, Phase II
Vietnam MIC CAB Accreditation		Please see the document for the detailed scope
Hong Kong OFCA		**(Phase II)** OFCA Foreign Certification Body for Radio and Telecom
		(Phase I) Conformity Assessment Body for Radio and Telecom
Industry Canada CAB		**Radio:** Scope A – All Radio Standard Specification in Category I
		Telecom: CS-03 Part I, II, V, VI, VII, VIII

Japan Recognized Certification Body Designation		**Radio**: A1. Terminal equipment for purpose of calling **Telecom**: B1. Specified radio equipment specified in Article 38-2, Paragraph 1, Item 1 of the Radio Law
Korea CAB Accreditation		**EMI:** KCC Notice 2008-39, RRL Notice 2008-3: CA Procedures for EMI KN22: Test Method for EMI **EMS:** KCC Notice 2008-38, RRL Notice 2008-4: CA Procedures for EMS KN24, KN61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8, -4-11: Test Method for EMS
		Radio: RRL Notice 2008-26, RRL Notice 2008-2, RRL Notice 2008-10, RRL Notice 2007-49, RRL Notice 2007-20, RRL Notice 2007-21, RRL Notice 2007-80, RRL Notice 2004-68
		Telecom: President Notice 20664, RRL Notice 2007-30, RRL Notice 2008-7 with attachments 1, 3, 5, 6; President Notice 20664, RRL Notice 2008-7 with attachment 4
Taiwan NCC CAB Recognition		LP0002, PSTN01, ADSL01, ID0002, IS6100, CNS14336, PLMN07, PLMN01, PLMN08
Taiwan BSMI CAB Recognition		CNS 13438
Japan VCCI		R-3083: Radiation 3 meter site C-3421: Main Ports Conducted Interference Measurement T-1597: Telecommunication Ports Conducted Interference Measurement
Australia CAB Recognition		**EMC:** AS/NZS CISPR 11, AS/NZS CISPR 14.1, AS/NZS CISPR22, AS/NZS 61000.6.3, AS/NZS 61000.6.4
		Radio communications: AS/NZS 4281, AS/NZS 4268, AS/NZS 4280.1, AS/NZS 4280.2, AS/NZS 4295, AS/NZS 4582, AS/NZS 4583, AS/NZS 4769.1, AS/NZS 4769.2, AS/NZS 4770, AS/NZS 4771
		Telecommunications: AS/ACIF S002:05, AS/ACIF S003:06, AS/ACIF S004:06 AS/ACIF S006:01, AS/ACIF S016:01, AS/ACIF S031:01, AS/ACIF S038:01, AS/ACIF S040:01, AS/ACIF S041:05, AS/ACIF S043.2:06, AS/ACIF S60950.1
Australia NATA Recognition		AS/ACIF S002, AS/ACIF S003, AS/ACIF S004, AS/ACIF S006, AS/ACIF S016,AS/ACIF S031, AS/ACIF S038, AS/ACIF S040, AS/ACIF S041, AS/ACIF S043.2