TEST REPORT

Report No.:	BCTC2109705800-2E
Applicant:	SZ PGST Co., Ltd.
Product Name:	GSM&WIFI Network Alarm Syetem
Model/Type reference:	PG-107
Tested Date:	2021-09-08 to 2021-09-10
Issued Date:	2021-09-30

Shenzhen BCTC Testing Co., Ltd.

FCC ID:2AIT9-PG-107

Product Name:	GSM&WIFI Network Alarm Syetem
Trademark:	N/A
Model/Type reference:	PG-107
Prepared For:	SZ PGST Co., Ltd.
Address:	No.9 Building, Huafu Industrial Park, Huachang Road, Longhua District, Shenzhen, Guangdong, China
Manufacturer:	SZ PGST Co., Ltd.
Address:	No.9 Building, Huafu Industrial Park, Huachang Road, Longhua District, Shenzhen, Guangdong, China
Prepared By:	Shenzhen BCTC Testing Co., Ltd.
Address:	1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date:	2021-09-08
Sample tested Date:	2021-09-08 to 2021-09-10
Issue Date:	2021-09-30
Report No.:	BCTC2109705800-2E
Test Standards:	FCC CFR Title 47 Part 2: 2016 FCC CFR Title 47 Part22 Subpart H: 2016 FCC CFR Title 47 Part24 Subpart E: 2016 ANSI/ TIA/ EIA-603-D-2010 FCC KDB 971168 D01 Power Meas. License Digital Systems v02v02
Test Results:	PASS

Tested by:

Kelsey Tan/ Project Handler

Approved by:

Zero Zhou/Reviewer

The test report is effective only with both signature and specialized stamp.This result(s) shown in this report refer only to the sample(s) tested.Without written approval of Shenzhen BCTC Testing Co., Ltd, this report can't be reproduced except in full.The tested sample(s) and the sample information are provided by the client.

Table Of Content

(Note: N/A Means Not Applicable)

1. Version

Report No.	Issue Date	Description	Approved
BCTC2109705800-2E	2021-09-30	Original	Valid

2. Test Summary

The Product has been tested according to the following specifications:

No.	Test Parameter	Clause No	Results
1	RF Exposure	§1.1307,§2.1093	PASS
2	RF Output Power	§22.913 (a), §24.232 (c),	PASS
3	Peak-to-average Ratio(PAR) of Transmitter	§24.51,	PASS
4	Emission Bandwidth	§22.917 (b), §24.238 (b),	PASS
5	Spurious Emissions at Antenna Terminal	§22.917 (a), §24.238 (a)	PASS
6	Spurious Radiation Emissions	§22.917 (a), §24.238 (a)	PASS
7	Out of Band Emissions	§22.917 (a), §24.238 (a),	PASS
8	Frequency Stability	§22.355, §24.235	PASS

3. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Uncertainty
1	3m chamber Radiated spurious emission(30MHz-1GHz)	U=4.3dB
2	3m chamber Radiated spurious emission(9KHz-30MHz)	U=3.7dB
3	3m chamber Radiated spurious emission(1GHz-18GHz)	U=4.5dB
4	3m chamber Radiated spurious emission(18GHz-40GHz)	U=3.34dB
5	Conducted Emission (150kHz-30MHz)	U=3.20dB
6	Conducted Adjacent channel power	U=1.38dB
7	Conducted output power uncertainty Above 1G	U=1.576dB
8	Conducted output power uncertainty below 1G	U=1.28dB
9	humidity uncertainty	U=5.3%
10	Temperature uncertainty	U=0.59℃

4. Product Information And Test Setup

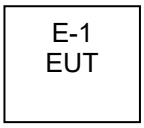
4.1 Product Information

Model/Type reference:	PG-107
Model differences:	N/A
Operation Frequency:	GSM/GPRS 850:TX: 824~849MHz; RX: 869~894MHz; GSM/GPRS 1900: TX:1850~1910MHz; RX:1930~1990MHz;
GPRS Class:	Class 12
MaxRF Output Power:	GSM850: 33.88dBm, GSM1900: 28.86dBm
Type of Modulation:	GSM/GPRS with GMSK Modulation
Type of Emission:	GSM850: 250KGXW GSM1900: 247KGXW
Antenna installation:	PCB antenna
Antenna Gain:	GSM850: 0 dBi GSM1900: 0dBi
Connecting I/O Port(s)	Please refer to the User's Manual
Ratings:	USB:DC 5V Battery:DC 3.7V

4.2 Test Setup Configuration

See test photographs attached in *EUT TEST SETUP PHOTOGRAPHS* for the actual connections between Product and support equipment.

Radiated Spurious Emission



4.3 Support Equipment

	Device Type	Brand	Model	Series No.	Note
E-1	GSM&WIFI Network Alarm Syetem	N/A	PG-107	N/A	EUT
E-2	Adapter	UGREEN	CD122	N/A	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	0.3M	USB cable unshielded

Notes:
1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Test Mode

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM/GPRS	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS	1850.2 MHz	512
		1880.0 MHz	661
		1909.8 MHz	810
Note: the transmitter has been tested on the communications mode of GSM, GPRS compliance test and record the worst case.			

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/
/	/	/	/

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

5. Test Facility And Test Instrument Used

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address:1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, FuhaiSubdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850

IC Registered No.: 23583

5.2 Test Instrument Used

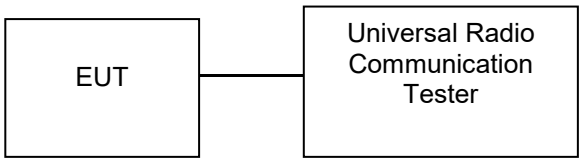
RF conducted test					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
Power Metter	Keysight	E4419B	\	May 28, 2021	May 27, 2022
Power Sensor (AV)	Keysight	E9 300A	\	May 28, 2021	May 27, 2022
Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	May 28, 2021	May 27, 2022
Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	100363	May 28, 2021	May 27, 2022
Communication test set	R&S	CMU200	119435	May 28, 2021	May 27, 2022

Radiated emissions Test (966 chamber)					
Equipment	**Manufacturer**	**Model#**	**Serial#**	**Last Cal.**	**Next Cal.**
966 chamber	ChengYu	966 Room	966	Jun. 06. 2020	Jun. 05, 2023
Receiver	R&S	ESR3	102075	May 28, 2021	May 27, 2022
Receiver	R&S	ESRP	101154	May 28, 2021	May 27, 2022
Amplifier	SKET	LAPA_01G18G-45dB	\	May 28, 2021	May 27, 2022
Amplifier	Schwarzbeck	BBV9744	9744-0037	May 28, 2021	May 27, 2022
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Jun. 01, 2021	May 31, 2022
Horn Antenna	SCHWARZBECK	BBHA9120D	1541	Jun. 02, 2021	Jun. 01, 2022
Horn Antenna (18GHz-40GHz)	SCHWARZBECK	BBHA9170	822	Jun. 15, 2021	Jun. 14, 2022
Amplifier (18GHz-40GHz)	MITEQ	TTA1840-35-HG	2034381	May 28, 2021	May 27, 2022
Loop Antenna (9KHz-30MHz)	SCHWARZBECK	FMZB1519B	014	Jun. 02, 2021	Jun.01, 2022
RF cables1 (9kHz-30MHz)	Huber+Suhnar	9kHz-30MHz	B1702988-0008	May 28, 2021	May 27, 2022
RF cables2 (30MHz-1GHz)	Huber+Suhnar	30MHz-1GHz	1486150	May 28, 2021	May 27, 2022
RF cables3 (1GHz-40GHz)	Huber+Suhnar	1GHz-40GHz	1607106	May 28, 2021	May 27, 2022
Power Metter	Keysight	E4419B	\	May 28, 2021	May 27, 2022
Power Sensor (AV)	Keysight	E9 300A	\	May 28, 2021	May 27, 2022
Signal Analyzer 20kHz-26.5GHz	KEYSIGHT	N9020A	MY49100060	May 28, 2021	May 27, 2022
Spectrum Analyzer 9kHz-40GHz	R&S	FSP40	100363	May 28, 2021	May 27, 2022
Communication test set	R&S	CMU200	119435	May 28, 2021	May 27, 2022
Software	Frad	EZ-EMC	FA-03A2 RE	\	\

6. RF Output Power

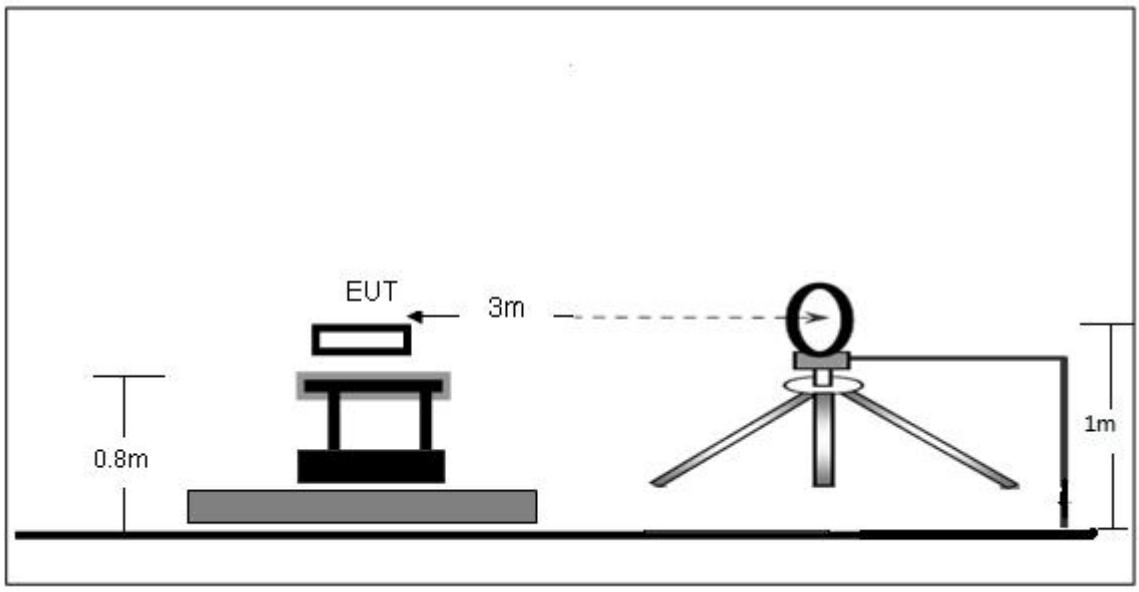
6.1 Block Diagram Of Test Setup

Conducted output power test method:

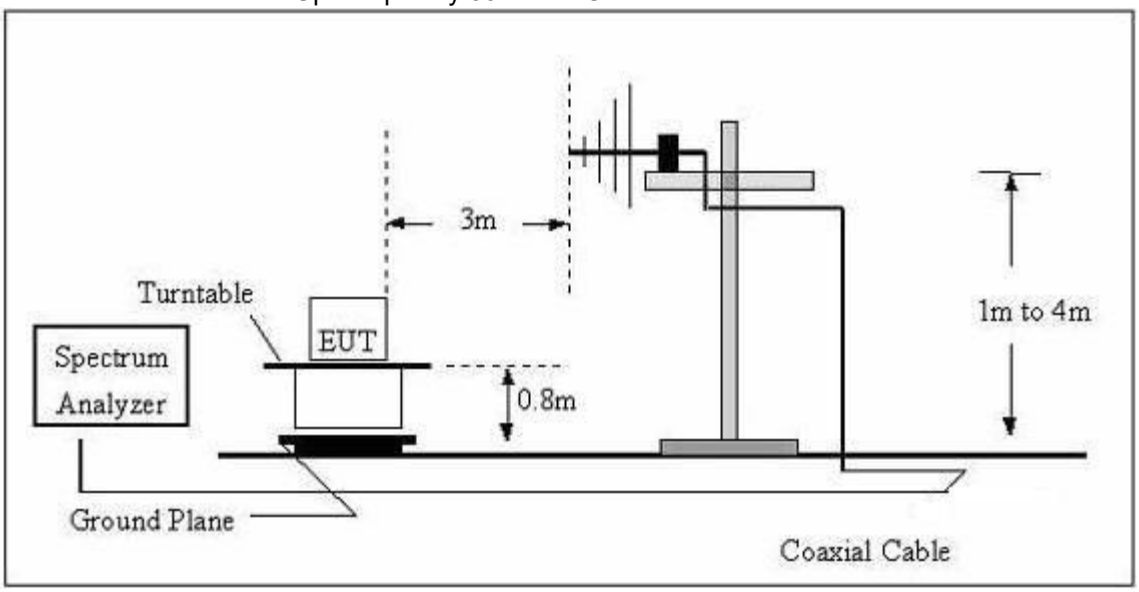


Radiated power test method:

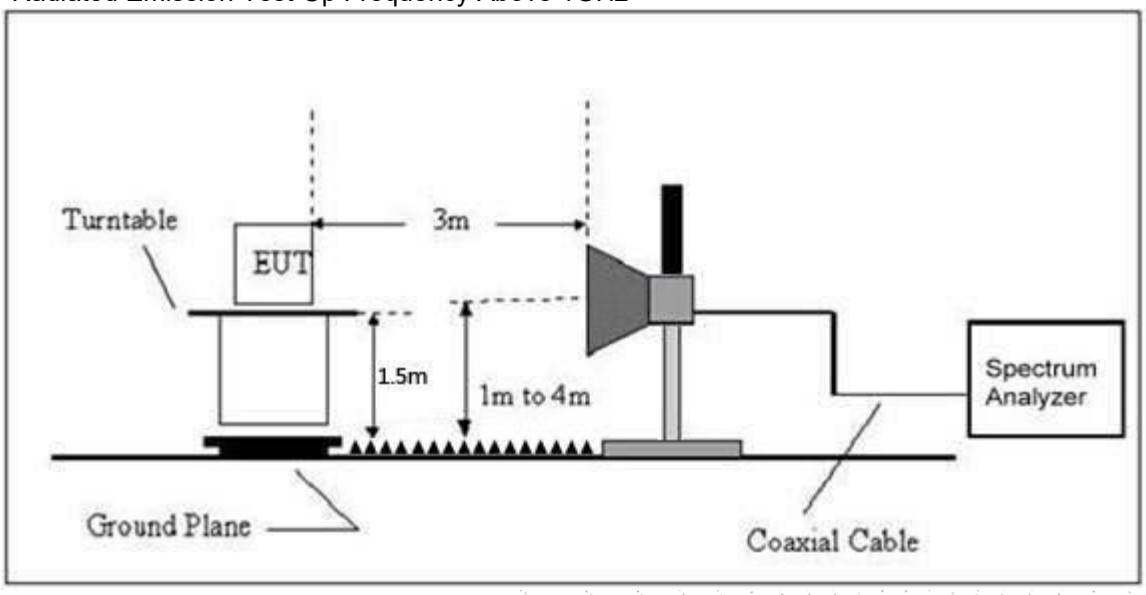
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



6.2 Limit

According to §22.913(a)(2),The ERP of mobileand portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

6.3 Test procedure

Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA Standard 603D and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

6.4 Test Result

ERP For GSM Mode GSM850

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	EPR (dBm)	FCC Part 22H Limits (dBm)	Result
Low Channel								
824.2	H	1.5	0	32.88	-1.38	31.50	38.45	PASS
824.2	V	1.5	0	31.40	-1.38	30.02	38.45	PASS
Middle Channel								
836.6	H	1.5	0	32.04	-1.10	30.94	38.45	PASS
836.6	V	1.5	0	31.74	-1.10	30.64	38.45	PASS
High Channel								
848.8	H	1.5	0	32.35	-0.82	31.53	38.45	PASS
848.8	V	1.5	0	31.27	-0.82	30.45	38.45	PASS

EIRP For GSM Mode PCS1900

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	EIRP (dBm)	FCC Part 24E Limit Limits (dBm)	Result
Low Channel								
1850.2	H	1.5	0	50.53	-22.26	28.27	33.00	PASS
1850.2	V	1.5	0	50.19	-22.26	27.93	33.00	PASS
Middle Channel								
1880	H	1.5	0	51.67	-22.16	29.51	33.00	PASS
1880	V	1.5	0	50.52	-22.16	28.36	33.00	PASS
High Channel								
1909.8	H	1.5	0	51.52	-22.05	29.47	33.00	PASS
1909.8	V	1.5	0	50.38	-22.05	28.33	33.00	PASS

ERP For GPRS Mode GSM850

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	ERP (dBm)	FCC Part 22H Limits (dBm)	Result
Low Channel								
824.2	H	1.5	0	31.28	-1.38	29.90	38.45	PASS
824.2	V	1.5	0	32.09	-1.38	30.71	38.45	PASS
Middle Channel								
836.6	H	1.5	0	32.98	-1.10	31.88	38.45	PASS
836.6	V	1.5	0	31.35	1.10	32.45	38.45	PASS
High Channel								
848.8	H	1.5	0	32.26	-0.82	31.44	38.45	PASS
848.8	V	1.5	0	31.82	-0.82	31.00	38.45	PASS

EIRP For GPRS Mode PCS1900

Frequency (MHz)	Polar (H/V)	Height (Meter)	Table (Degree)	Reading Level (dBm)	Correct Factor (dB)	EIRP (dBm)	FCC Part 24E Limit Limits (dBm)	Result
Low Channel								
1850.2	H	1.5	0	51.69	-22.26	29.43	33.00	PASS
1850.2	V	1.5	0	50.74	-22.26	28.48	33.00	PASS
Middle Channel								
1880.0	H	1.5	0	51.02	-22.16	28.86	33.00	PASS
1880.0	V	1.5	0	50.30	-22.16	28.14	33.00	PASS
High Channel								
1909.8	H	1.5	0	51.01	-22.05	28.96	33.00	PASS
1909.8	V	1.5	0	50.77	-22.05	28.72	33.00	PASS

Max. Conducted Output Power

For Cellular Band (GSM850)

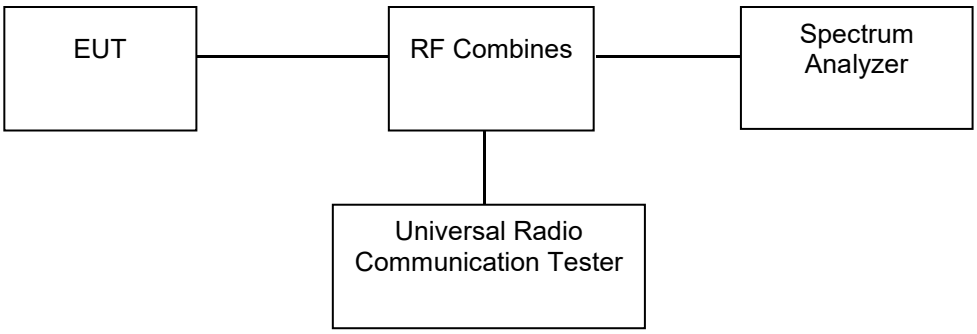
Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 22.913 Limit (dBm)
GSM	Low Channel	824.2	33.61	38.45
	Middle Channel	836.6	33.79	38.45
	High Channel	848.8	33.55	38.45
GPRS(1 Slot)	Low Channel	824.2	33.72	38.45
	Middle Channel	836.6	33.88	38.45
	High Channel	848.8	33.64	38.45

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	Average Power (dBm)	FCC Part 24.232 Limit (dBm)
GSM	Low Channel	1850.2	28.86	33.0
	Middle Channel	1880.0	28.45	33.0
	High Channel	1909.8	28.40	33.0
GPRS(1 Slot)	Low Channel	1850.2	28.83	33.0
	Middle Channel	1880.0	28.49	33.0
	High Channel	1909.8	28.41	33.0

7. Peak-To-Average Ratio(PAR) Of Transmitter

7.1 Block Diagram Of Test Setup



7.2 Limit

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

7.3 Test procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the peak-to-average ratio (PAR) of the transmission was recorded.Record the maximum PAPR level associated with a probability of 0.1%.

7.4 Test Result

For Cellular Band (GSM850)

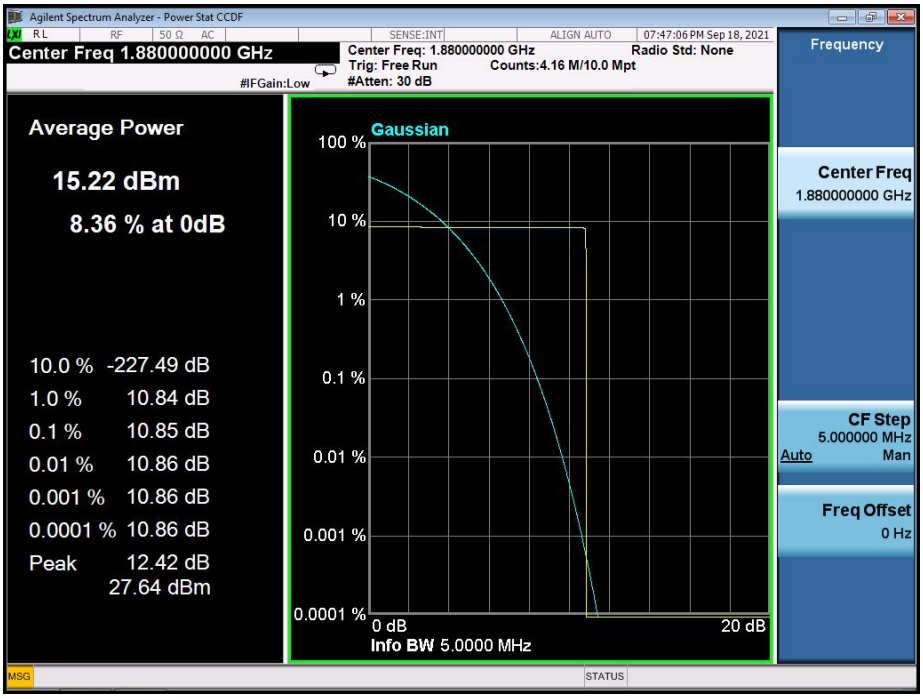
Test Mode	Channel	Frequency (MHz)	PAR(dB)	Limited (dB)
GSM	Low Channel	824.2	9.32	13
	Middle Channel	836.6	9.37	13
	High Channel	848.8	9.38	13
GPRS(1 Slot)	Low Channel	824.2	9.44	13
	Middle Channel	836.6	9.61	13
	High Channel	848.8	8.77	13

For PCS Band (GSM1900)

Test Mode	Channel	Frequency (MHz)	PAR(dB)	Limited (dB)
GSM	Low Channel	1850.2	9.38	13
	Middle Channel	1880.0	10.85	13
	High Channel	1909.8	9.15	13
GPRS(1 Slot)	Low Channel	1850.2	10.02	13
	Middle Channel	1880.0	10.45	13
	High Channel	1909.8	9.79	13

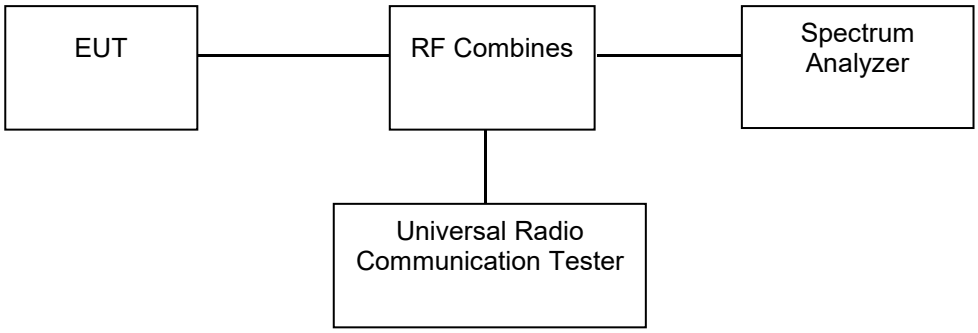
All modulations of EUT have been tested, but only show the test data of the worst case in this report.

GSM 1900 Middle Channel:



8. Emission Bandwidth

8.1 Block Diagram Of Test Setup



8.2 Limit

According to §22.917(b),The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

8.3 Test procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 10kHz for GSM mode and 100kHz for WCDMA mode, VBW shall be at least 3 times the RBW, and the 26dB bandwidth was recorded.

8.4 Test Result

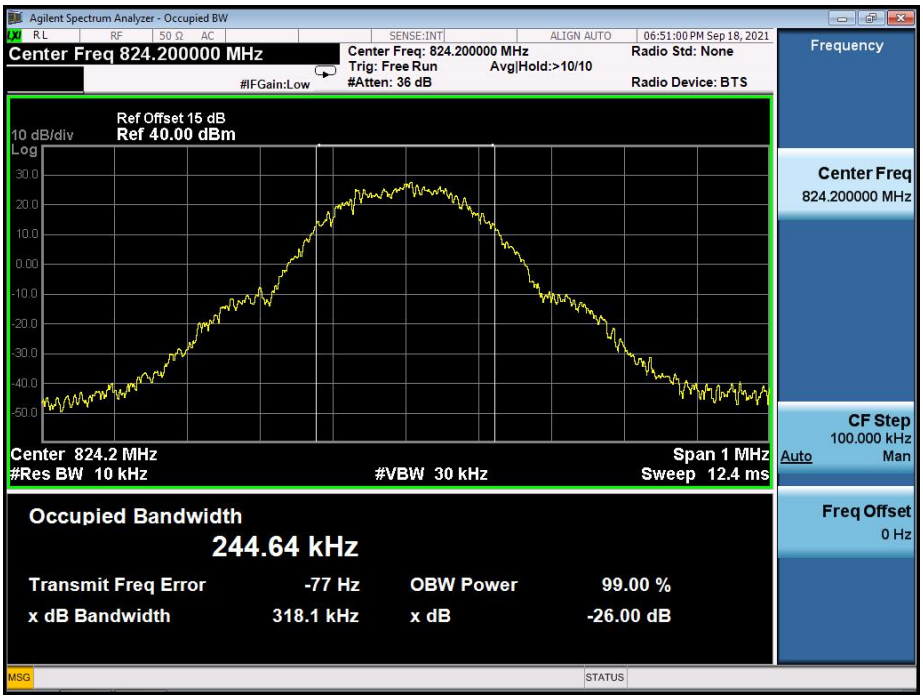
For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	Low Channel	824.2	244.64	318.1
	Middle Channel	836.6	249.92	305.0
	High Channel	848.8	246.97	321.5
GPRS	Low Channel	824.2	247.81	316.1
	Middle Channel	836.6	238.51	301.5
	High Channel	848.8	244.09	317.2

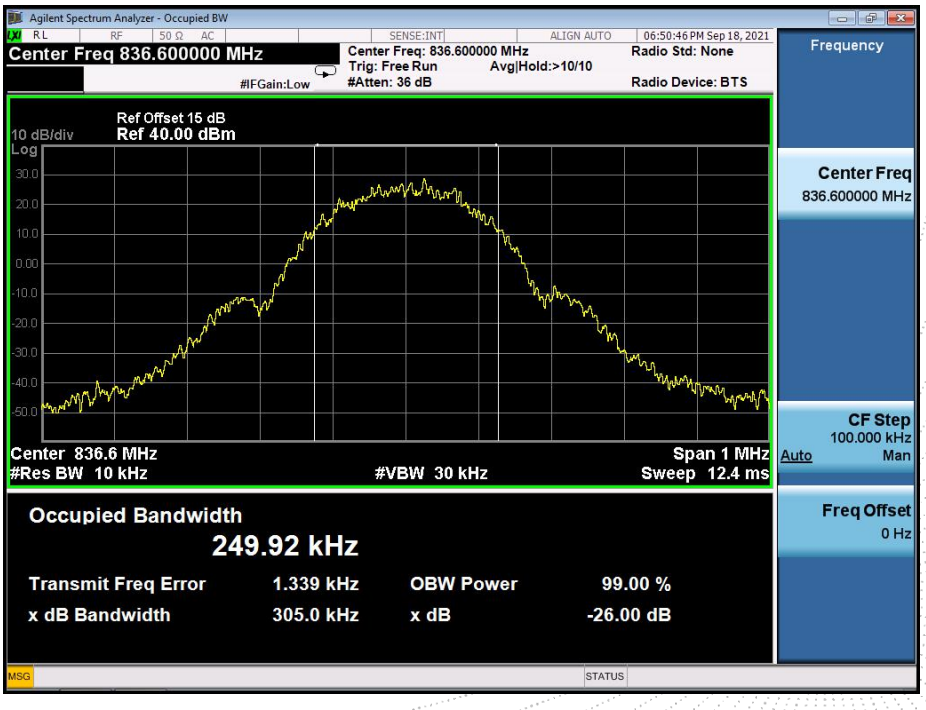
For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	Low Channel	1850.2	247.06	318.1
	Middle Channel	1880.0	241.76	314.6
	High Channel	1909.8	243.22	314.6
GPRS	Low Channel	1850.2	244.88	314.9
	Middle Channel	1880.0	238.75	305.3
	High Channel	1909.8	246.31	320.7

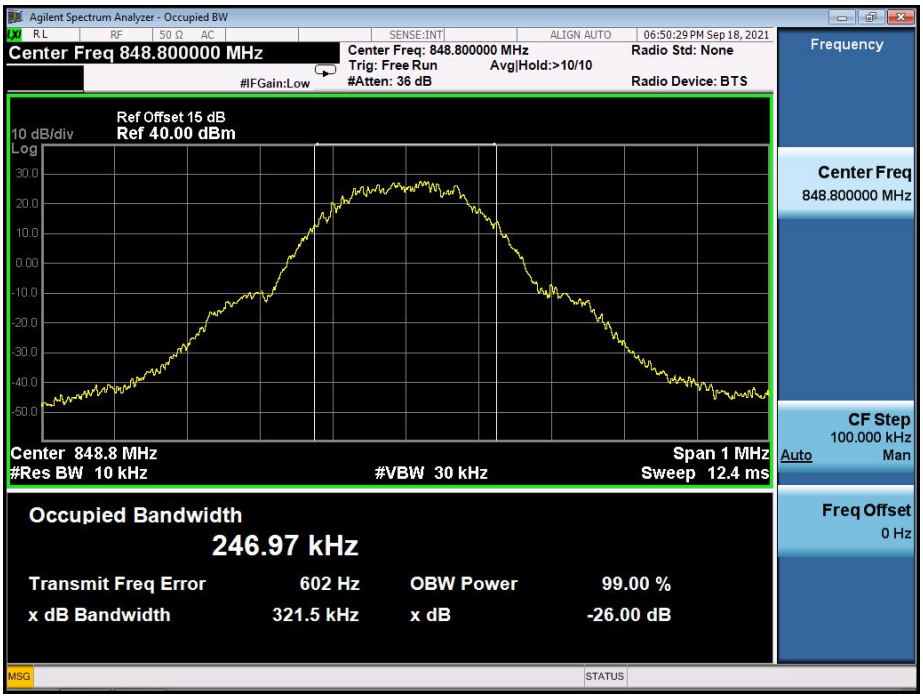
For Cellular Band
GSM Low Channel



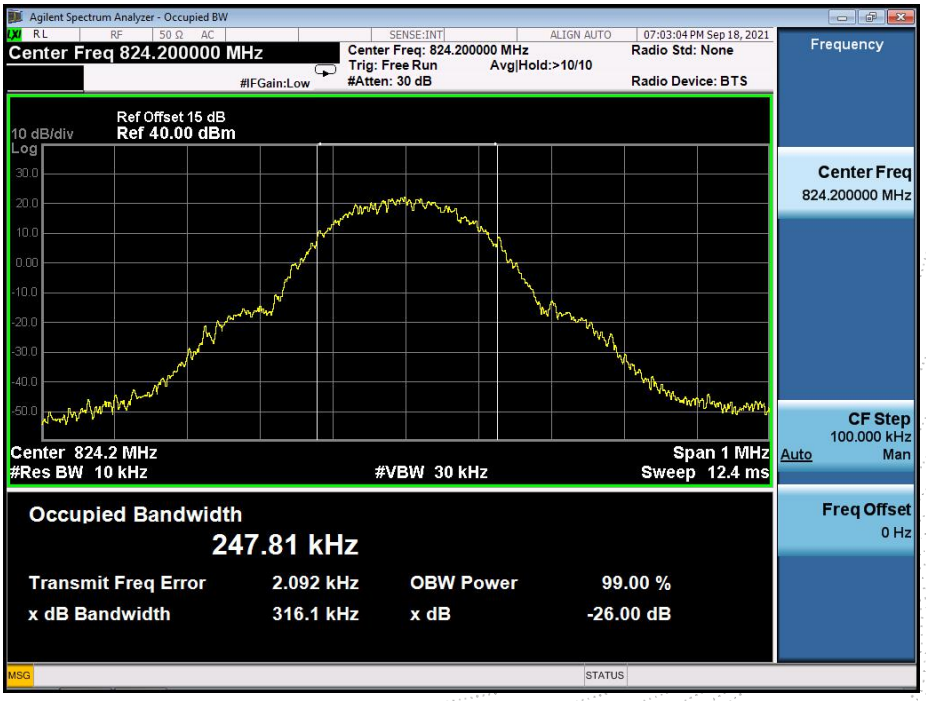
GSM Middle Channel



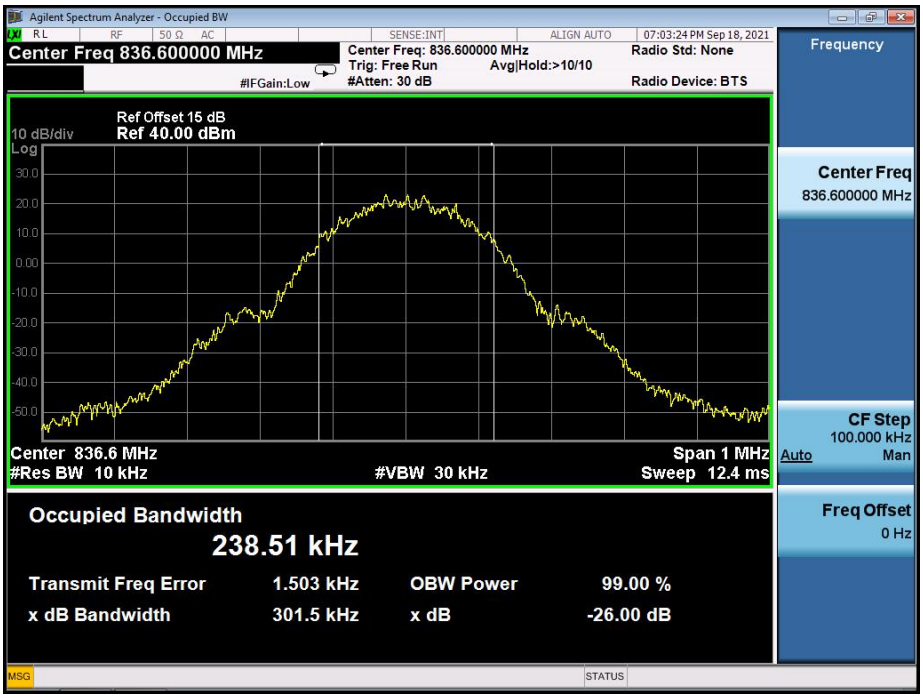
GSM High channel



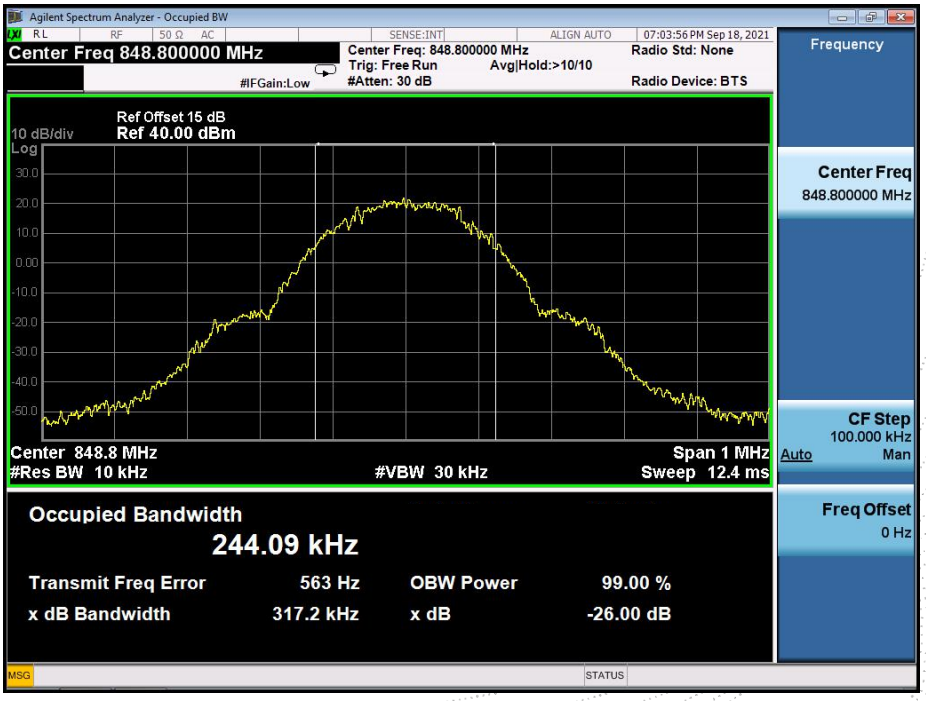
GPRS Low Channel



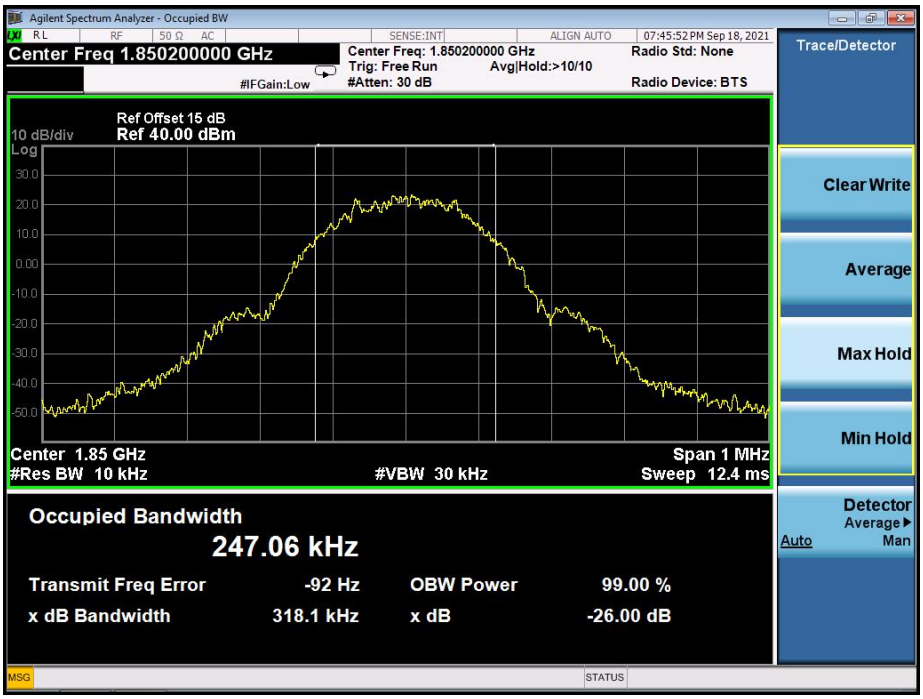
GPRS Middle Channel



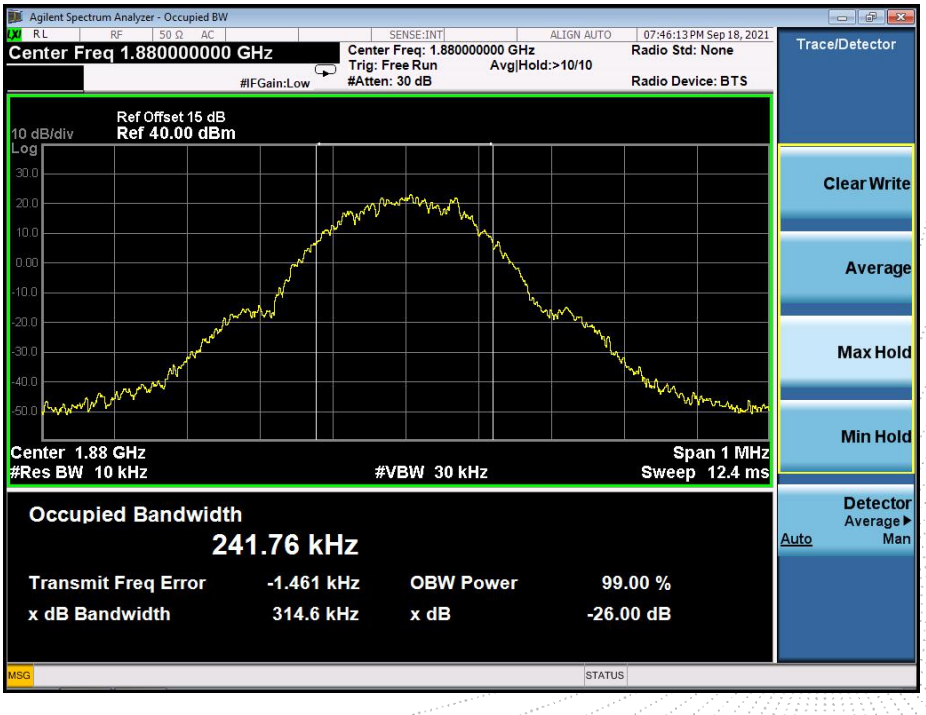
GPRS High Channel



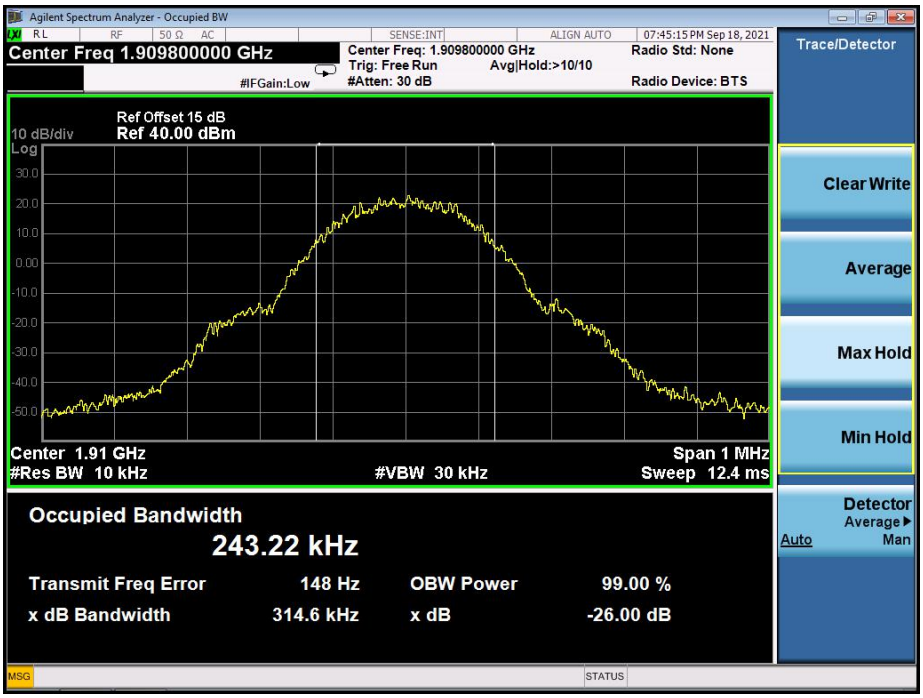
For PCS Band
GSM Low Channel



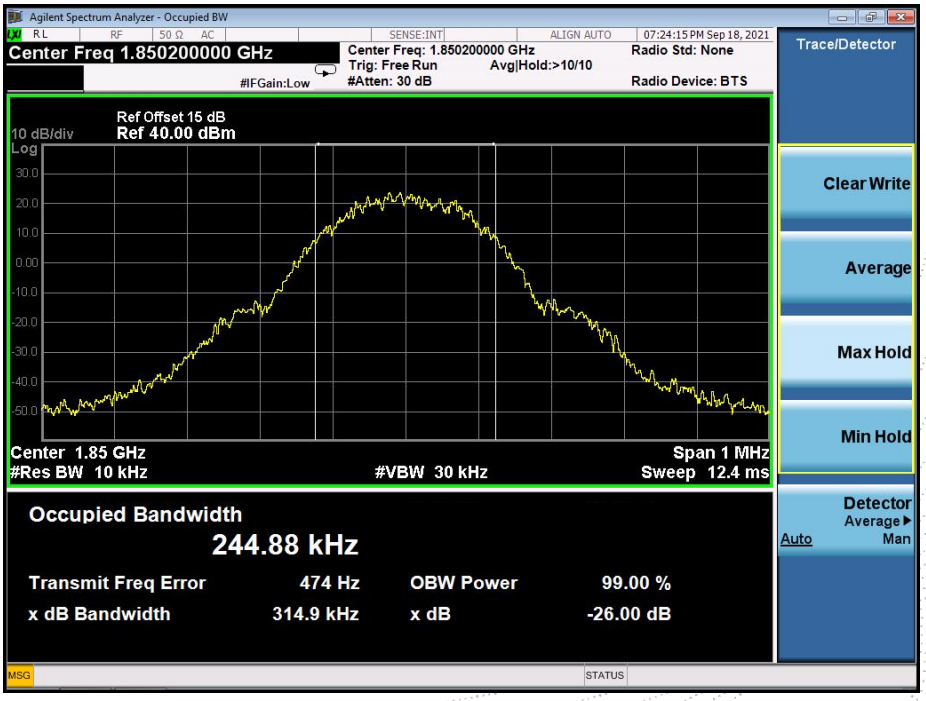
GSM Middle Channel



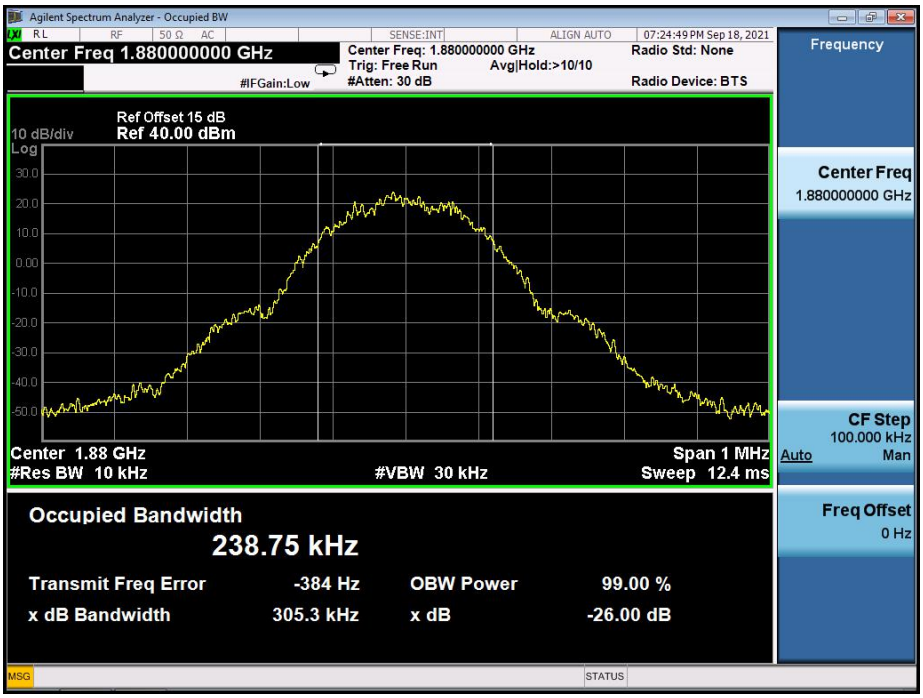
GSM High channel



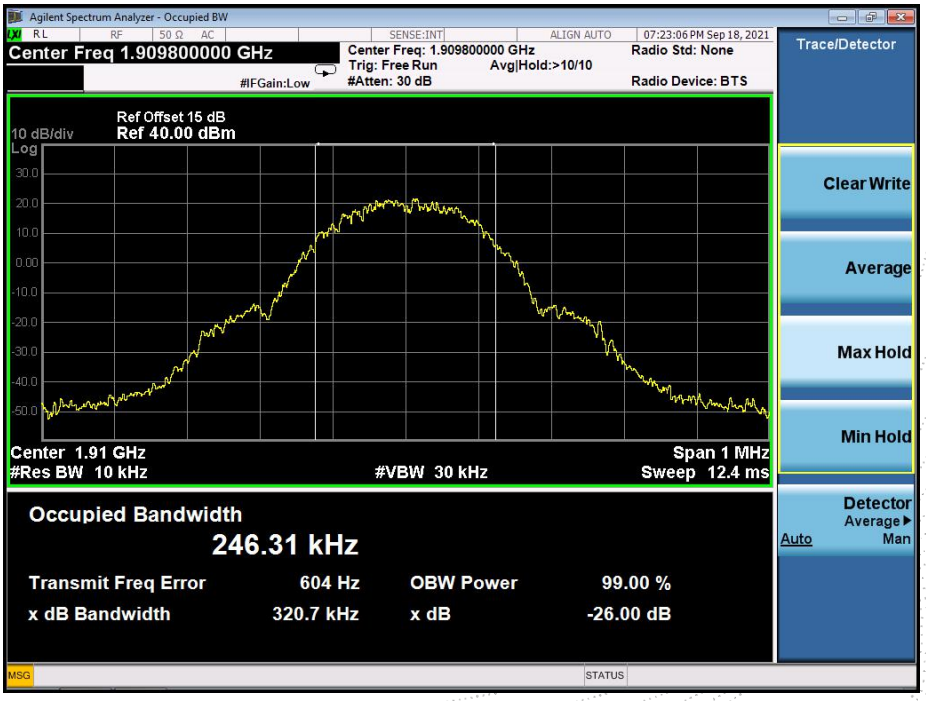
GPRS Low Channel



GPRS Middle Channel

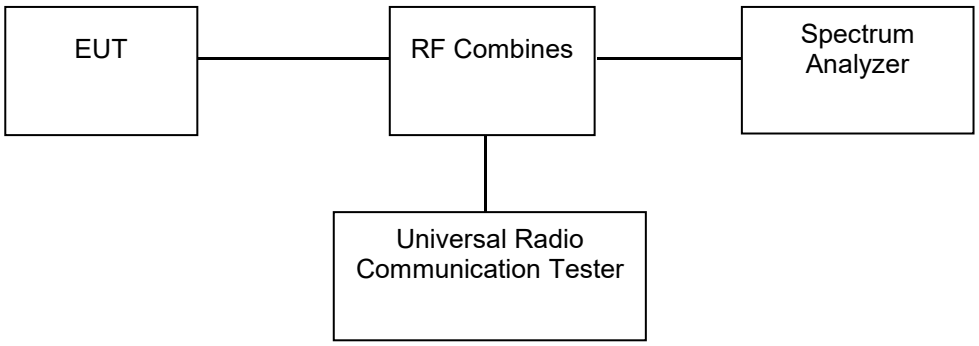


GPRS High Channel



9. Out Of Band Emissions At Antenna Terminal

9.1 Block Diagram Of Test Setup



9.2 Limit

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

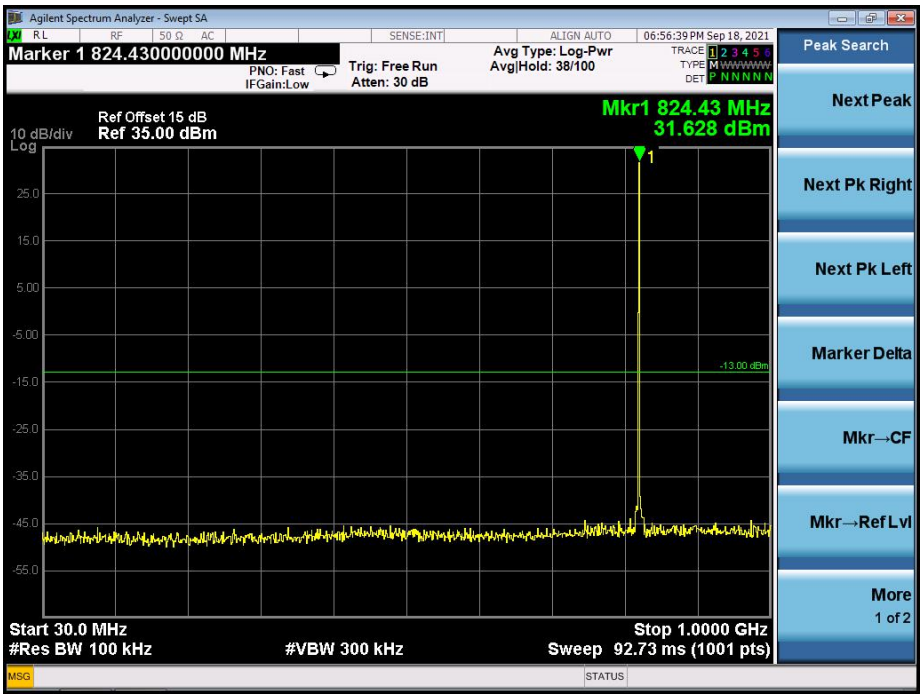
According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

9.3 Test procedure

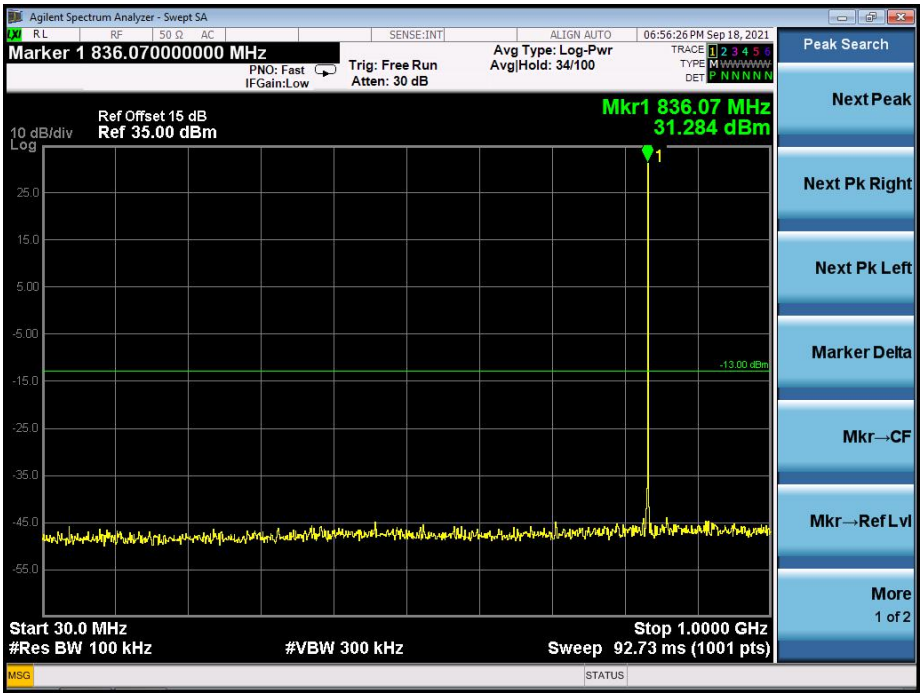
The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

9.4 Test Result

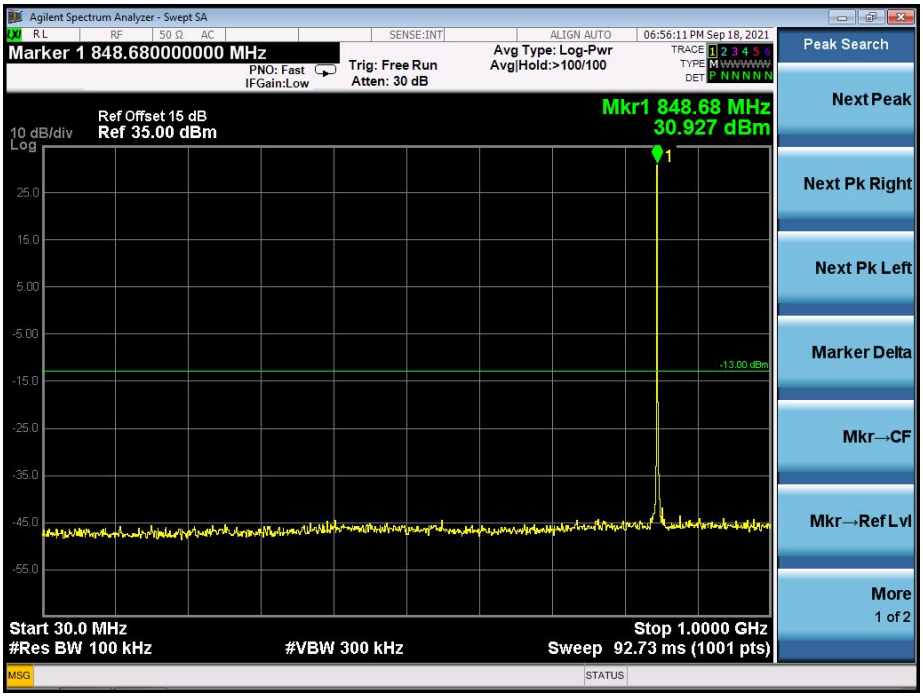
For Cellular Band
GSM Low Channel



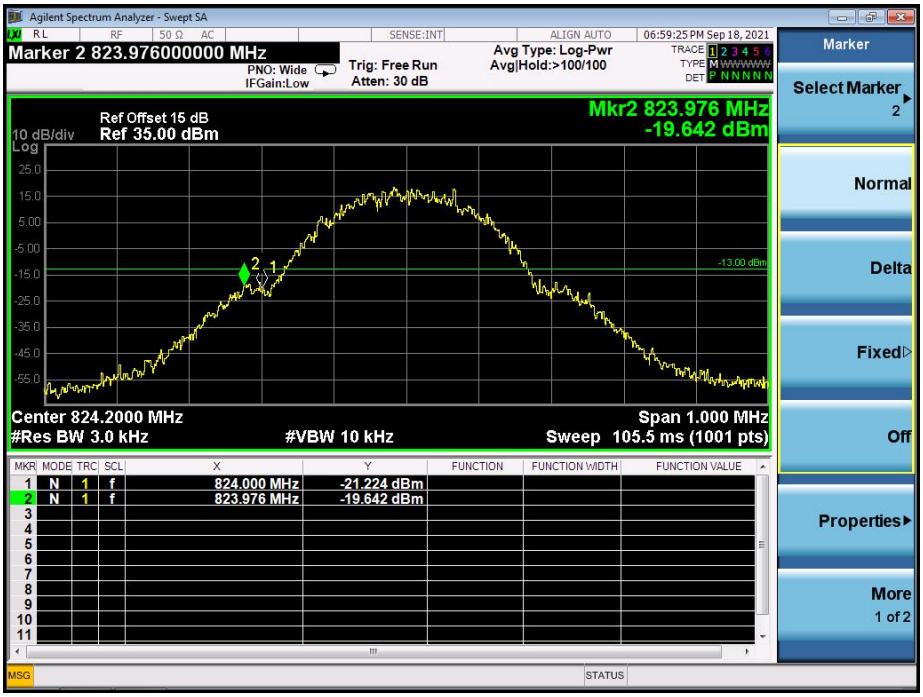
GSM Middle Channel



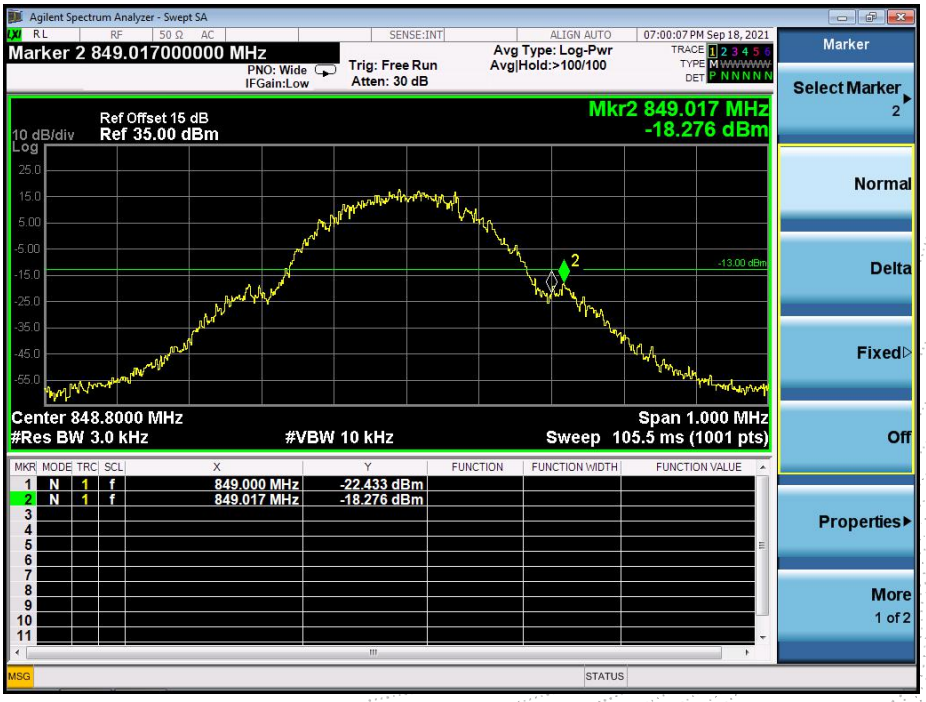
GSM High Channel



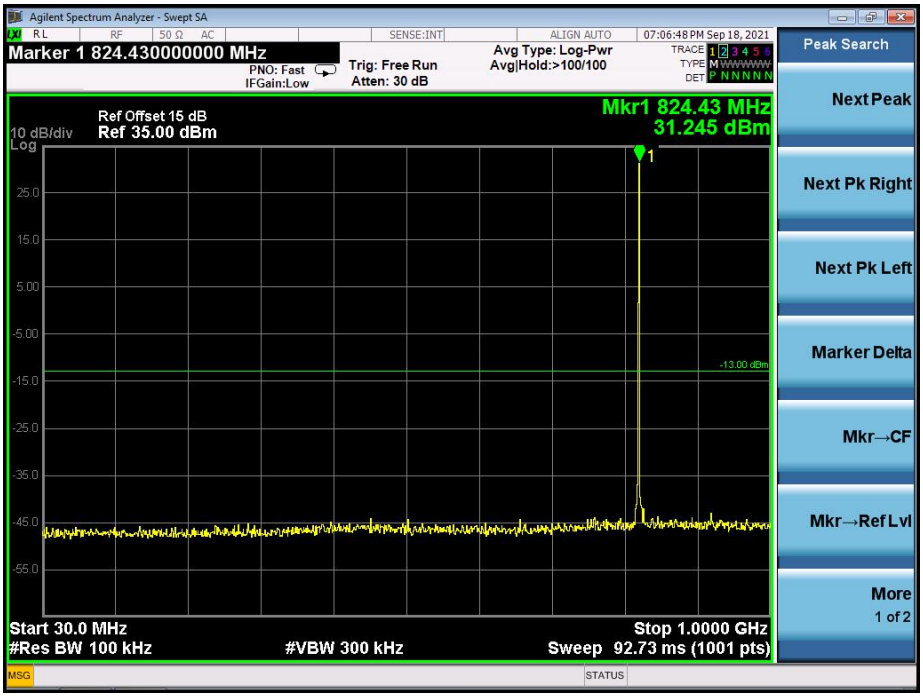
GSM Low Band Emission



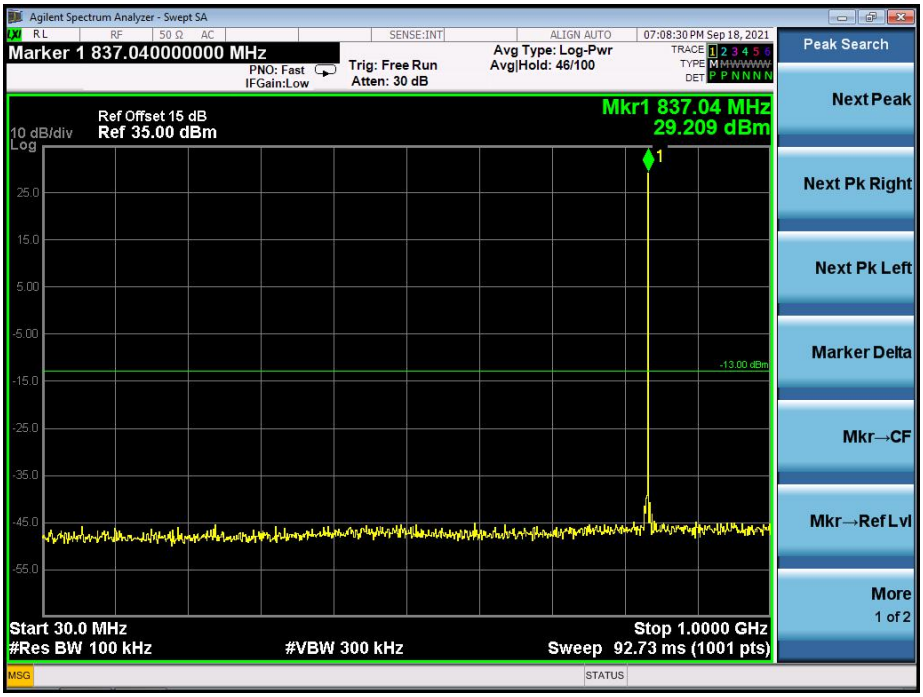
GSM High Band Emission



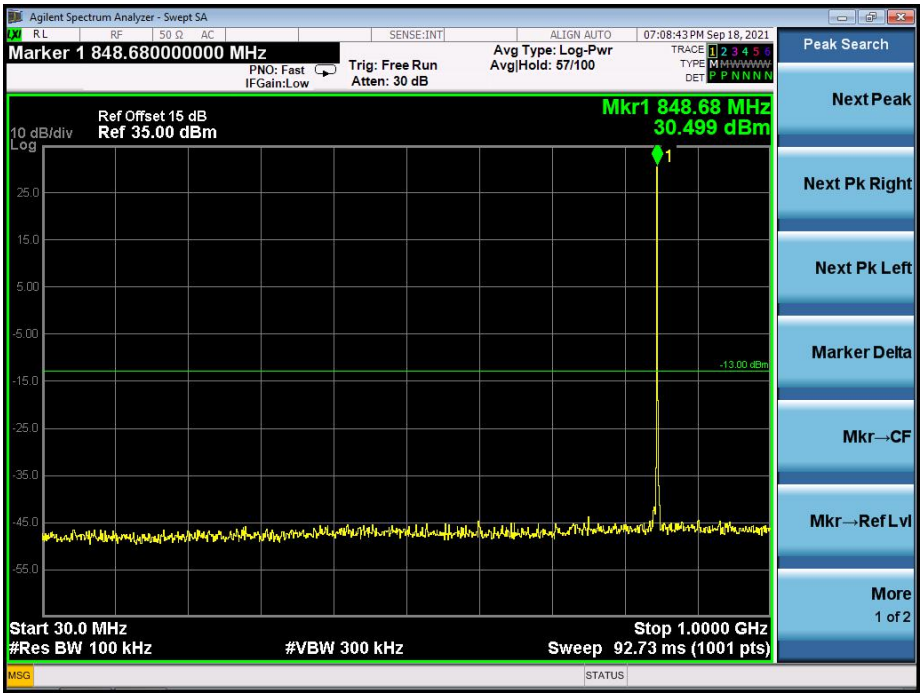
GPRS Low Channel



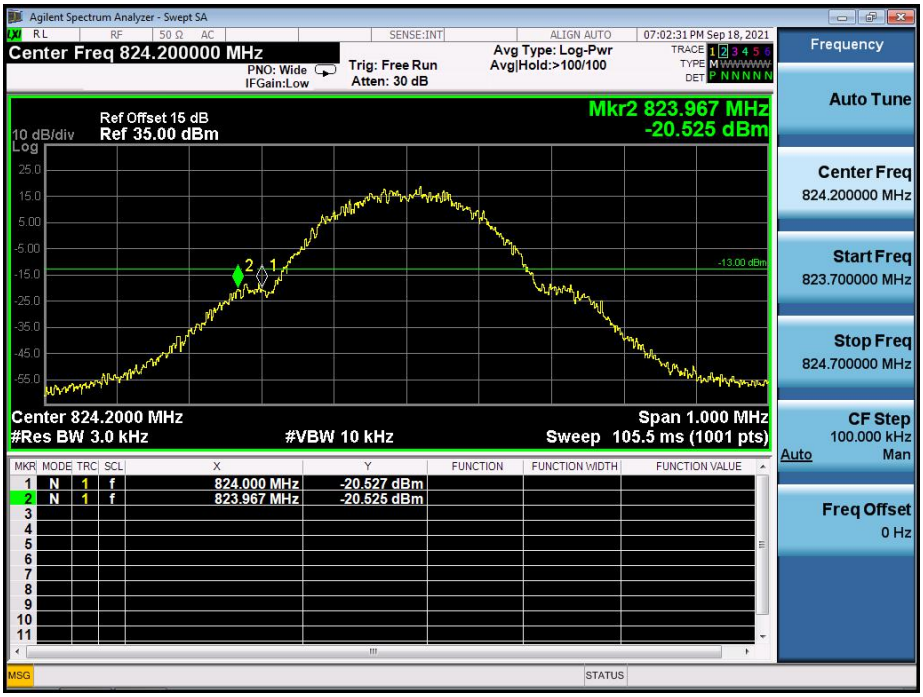
GPRS Middle Channel



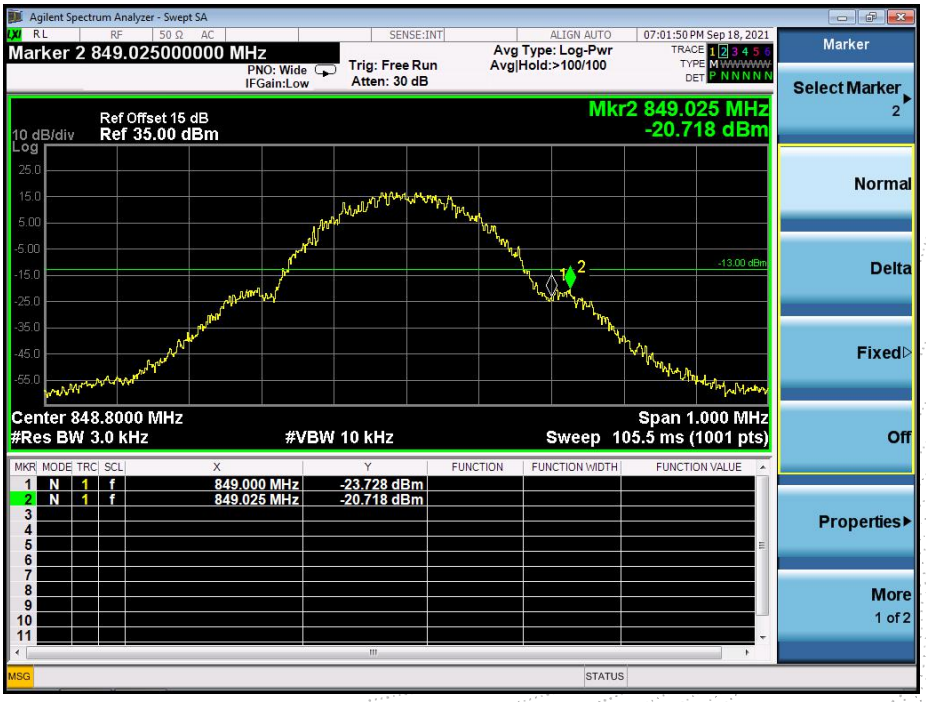
GPRS High Channel



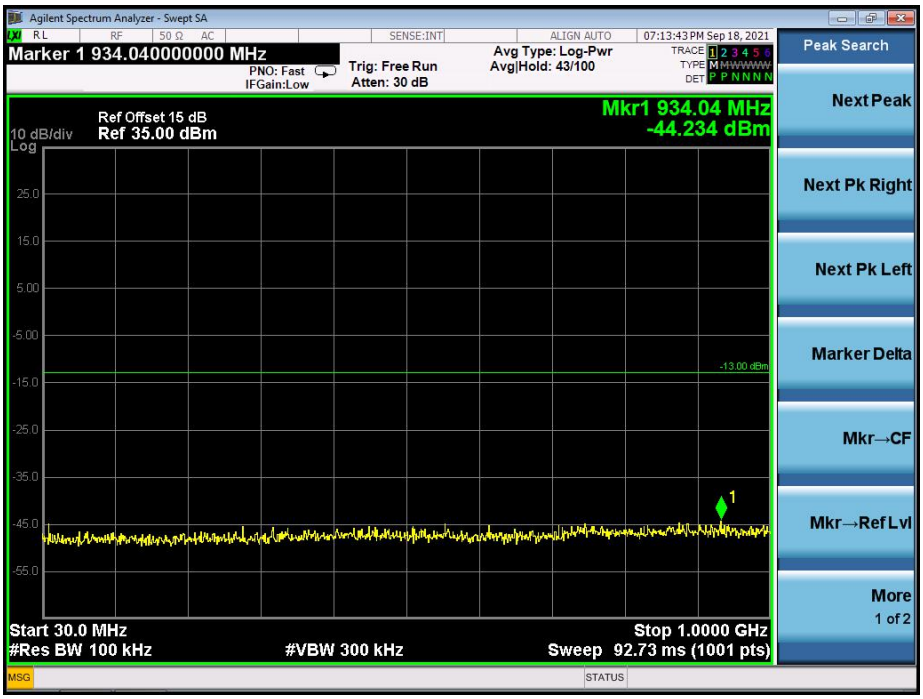
GPRS Low Band Emission



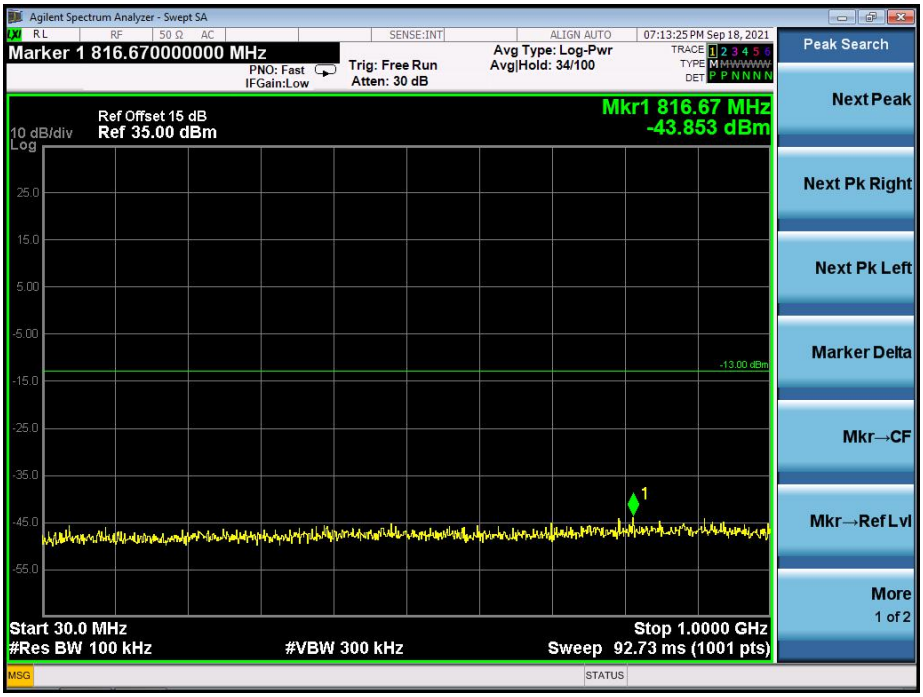
GPRS High Band Emission



For PCS Band
GSM Low Channel



GSM Middle Channel



GSM High Channel