

FCC Part 22H & 24E Measurement and Test Report

For

SHENZHEN PEOPLE STRONG HIGH-TECH Co. Ltd.

FCC ID: 2APAF-YH02

FCC Rules:	<u>FCC Part 22H, FCC Part 24E</u>
Product Description:	<u>HEJIAJIANKANG-Smart Pillbox</u>
Tested Model:	<u>YH02</u>
Report No.:	<u>BSL18011040740005Y-ER-4</u>
Tested Date:	<u>Mar. 23~28, 2018</u>
Issued Date:	<u>Mar. 28,2018</u>
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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: SHENZHEN PEOPLE STRONG HIGH-TECH Co. Ltd.
 Address of applicant: Room 1205, Building A, Overseas Students Venture Building, NO. 29 High-Tech South Ring Road , Nanshan District, Shenzhen, Guangdong, China

Manufacturer: G-TECH OPTOELECTRONICS (SHENZHEN) CO., LTD.
 Address of manufacturer: Zoom C, 1-3F, H5 Factory & Zoom B, 1F, H3 Factory, K2 District, Shen Hyper Optoelectronic Science Park, North of Ming-Qing Road, Longhua Sub-district Office , Longhua District, Shenzhen, Guangdong, P.R.C

General Description of EUT:	
Product Name:	HEJIAJIANKANG-Smart Pillbox
Brand Name:	HEJIAJIANKANG
Model No.:	YH02
Rated Voltage:	DC 5V from adapter
Adapter information:	Model: BX-0501000 INPUT: AC 100~240V, 50/60Hz, 0.4A OUTPUT: DC 5.0V, 1A
Battery:	DC 3.8V, 800mAh
Device Category:	Portable Device
<i>Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model YH02, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT:	
2G	
Support Networks:	GSM, GPRS, EDGE
Support Band:	GSM850/PCS1900
Uplink Frequency:	GSM/GPRS/EDGE 850: 824~849MHz GSM/GPRS/EDGE 1900: 1850~1910MHz
Downlink Frequency:	GSM/GPRS/EDGE 850: 869~894MHz GSM/GPRS/EDGE 1900: 1930~1990MHz
Max RF Output Power:	GSM850: 32.01dBm, GSM1900: 28.68dBm EDGE850: 25.88dBm, EDGE1900: 24.86dBm
Type of Emission:	GSM850: 250KGXW, GSM1900: 248KGXW EDGE850: 252KG7W, EDGE1900: 252KG7W
Type of Modulation:	GMSK, 8PSK
Type of Antenna:	Internal Antenna
Antenna Gain:	GSM850: 0dBi; GSM1900: 0dBi
GPRS/EDGE Class:	Class 12

1.2 Test Standards

The following report is prepared on behalf of the SHENZHEN PEOPLE STRONG HIGH-TECH Co. Ltd. in accordance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 22 subpart H and FCC Part 24 subpart E of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI/TIA-603-D: 2010 and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v02r02 shall be performed also.

1.4 Test Facility

BSL Testing Co.,LTD.

NO. 24, ZH Park, Nantou, Shenzhen, 518000 China

Designation Number : CN1217

Test Firm Registration Number: 866035

Tel: 86- 755-26508703

Fax: 86- 755-26508703

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	GSM 850	Low, Middle, High Channels
TM2	GPRS 850	Low, Middle, High Channels
TM3	EDGE 850	Low, Middle, High Channels
TM4	GSM 1900	Low, Middle, High Channels
TM5	GPRS 1900	Low, Middle, High Channels
TM6	EDGE 1900	Low, Middle, High Channels

Testing Configure			
Support Band	Support Standard	Channel Frequency	Channel Number
GSM 850	GSM/GPRS/EDGE	824.2 MHz	128
		836.6 MHz	190
		848.8 MHz	251
PCS 1900	GSM/GPRS/EDGE	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, EDGE, compliance test and record the worst case.

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.0	Unshielded	Without Ferrite

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
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$
Transmitter Spurious Emissions	Conducted	$\pm 0.42\text{dB}$

1.7 Test Equipment List and Details

Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
Communication Tester	Rohde & Schwarz	CMW500	100358	2017-10-21	2018-10-20
Spectrum Analyzer	R&S	FSP40	100550	2017-10-21	2018-10-20
Test Receiver	R&S	ESCI7	US47140102	2017-10-21	2018-10-20
Signal Generator	HP	83630B	3844A01028	2017-10-22	2018-10-21
Test Receiver	R&S	ESPI-3	100180	2017-10-21	2018-10-20
Amplifier	Agilent	8449B	4035A00116	2017-10-22	2018-10-21
Amplifier	HP	8447E	2945A02770	2017-10-22	2018-10-21
Signal Generator	IFR	2023A	202307/242	2017-10-22	2018-10-21
Broadband Antenna	SCHAFFNER	2774	2774	2017-10-17	2018-10-16
Biconical and log periodic antennas	ELECTRO-METRIC	EM-6917B-1	171	2017-10-17	2018-10-16
Horn Antenna	R&S	HF906	100253	2017-10-17	2018-10-16
Horn Antenna	EM	EM-6961	6462	2017-10-17	2018-10-16
LISN	R&S	ESH3-Z5	100196	2017-10-17	2018-10-16
LISN	COM-POWER	LI-115	02027	2017-10-17	2018-10-16
3m Semi-Anechoic Chamber	Chengyu Electron	9 (L)*6 (W)* 6 (H)	BSL086	2017-10-21	2018-10-20
Horn Antenna	A-INFOMW	LB-180400KF	BSL088	2017-10-21	2018-10-20

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	PASS
§ 22.913 (a), § 24.232 (c)	RF Output Power	PASS
§ 24.51	Peak-to-average Ratio (PAR) of Transmitter	PASS
§ 22.917 (b), § 24.238 (b)	Emission Bandwidth	PASS
§ 22.917 (a), § 24.238 (a)	Spurious Emissions at Antenna Terminal	PASS
§ 22.917 (a), § 24.238 (a)	Spurious Radiation Emissions	PASS
§ 22.917 (a), § 24.238 (a)	Out of Band Emissions	PASS
§ 22.355, § 24.235	Frequency Stability	PASS

Note: PASS: applicable, N/A: not applicable.

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.

4. RF Output Power

4.1 Standard Applicable

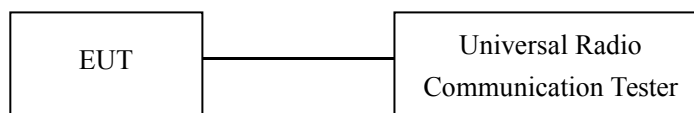
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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.

4.2 Test Procedure

Conducted output power test method:



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.

4.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.4 Summary of Test Results/Plots

Max. Radiated Power

ERP For GSM Mode GSM850

Frequency	Polar	Result	FCC Part 22H Limit
MHz	H / V	dBm	dBm
Low channel			
824.2	H	31.54	38.45
824.2	V	29.88	38.45
Middle channel			
836.4	H	31.02	38.45
836.4	V	31.25	38.45
High channel			
848.8	H	29.86	38.45
848.8	V	30.98	38.45

EIRP For GSM Mode PCS1900

Frequency	Polar	Result	FCC Part 24E Limit
MHz	H / V	dBm	dBm
Low channel			
1850.2	H	27.56	33.00
1850.2	V	28.24	33.00
Middle channel			
1880.0	H	26.03	33.00
1880.0	V	28.56	33.00
High channel			
1909.8	H	26.25	33.00
1909.8	V	26.98	33.00

ERP For GPRS Mode GSM850

Frequency	Polar	Result	FCC Part 22H Limit
MHz	H / V	dBm	dBm
Low channel			
824.2	H	30.51	38.45
824.2	V	30.96	38.45
Middle channel			
836.6	H	29.52	38.45
836.6	V	30.56	38.45
High channel			
848.8	H	30.95	38.45
848.8	V	30.88	38.45

EIRP For GPRS Mode PCS1900

Frequency	Polar	Result	FCC Part 24E Limit
MHz	H / V	dBm	dBm
Low channel			
1850.2	H	25.89	33.00
1850.2	V	27.05	33.00
Middle channel			
1880.0	H	26.02	33.00
1880.0	V	27.89	33.00
High channel			
1909.8	H	25.02	33.00
1909.8	V	27.26	33.00

ERP For EDGE Mode GSM850

Frequency	Polar	Result	FCC Part 22H Limit
MHz	H / V	dBm	dBm
824.2	H	23.04	38.45
824.2	V	25.25	38.45
836.6	H	23.95	38.45
836.6	V	25.84	38.45
848.8	H	23.68	38.45
848.8	V	25.54	38.45

EIRP For EDGE Mode PCS1900

Frequency	Polar	Result	FCC Part 24E Limit
MHz	H / V	dBm	dBm
1850.2	H	21.02	33.00
1850.2	V	23.45	33.00
1880.0	H	21.68	33.00
1880.0	V	23.51	33.00
1909.8	H	21.28	33.00
1909.8	V	23.68	33.00

Note: Result = Substitute - Cable loss + Antenna Gain

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	31.87	38.45
	Middle Channel	836.6	31.98	38.45
	High Channel	848.8	32.01	38.45
GPRS(1 Slot)	Low Channel	824.2	32.02	38.45
	Middle Channel	836.6	32.01	38.45
	High Channel	848.8	32.04	38.45
EDGE(1 Slot)	Low Channel	824.2	25.68	38.45
	Middle Channel	836.6	25.27	38.45
	High Channel	848.8	25.88	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	28.68	33.0
	Middle Channel	1880.0	28.38	33.0
	High Channel	1909.8	28.57	33.0
GPRS(1 Slot)	Low Channel	1850.2	28.56	33.0
	Middle Channel	1880.0	28.84	33.0
	High Channel	1909.8	28.65	33.0
EDGE(1 Slot)	Low Channel	1850.2	24.86	33.0
	Middle Channel	1880.0	24.51	33.0
	High Channel	1909.8	24.68	33.0

5. Peak-to-average Ratio (PAR) of Transmitter

5.1 Standard Applicable

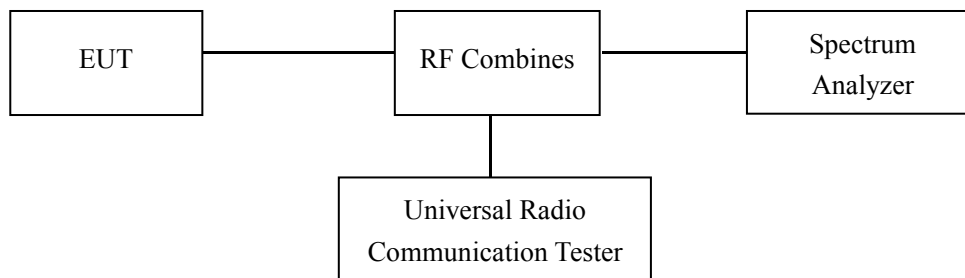
According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in 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.

5.2 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%.

Test Configuration for the emission bandwidth testing:



5.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

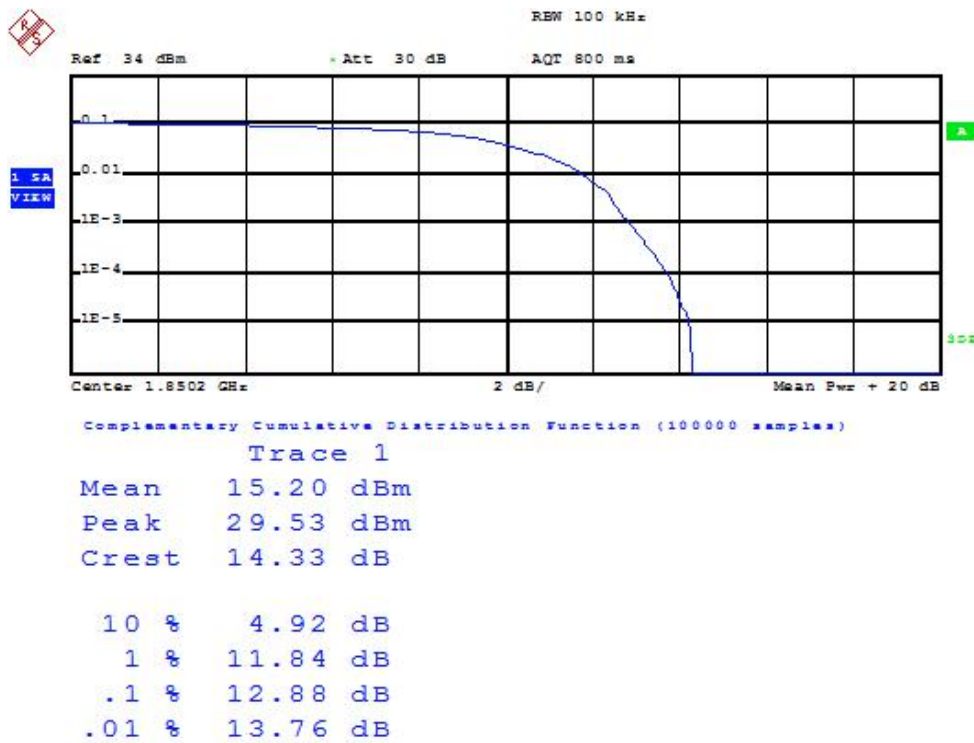
5.4 Summary of Test Results

Only the worst case was selected to record

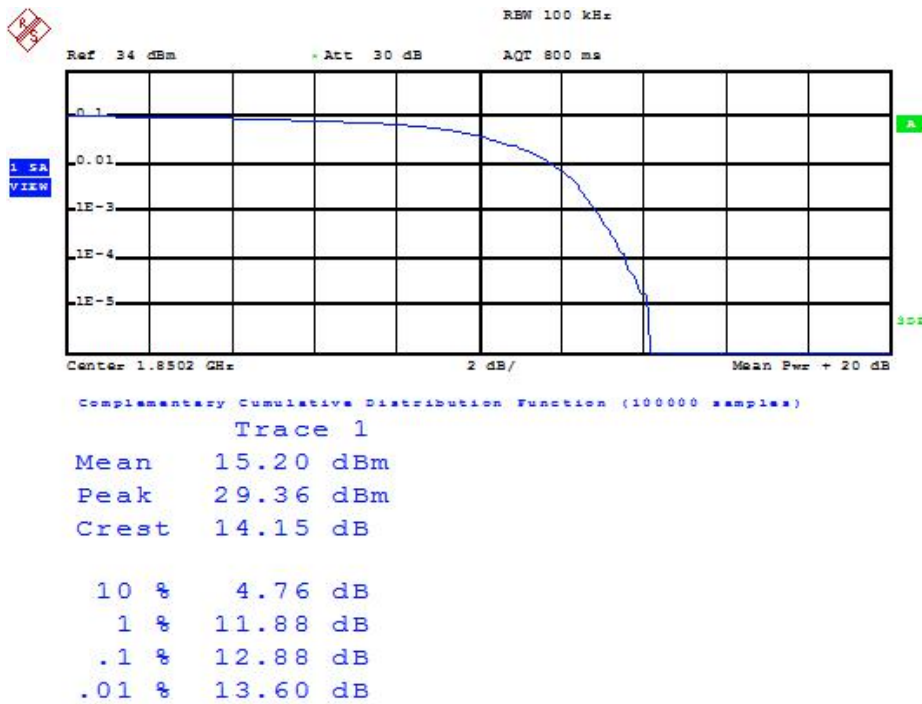
For PCS Band

Test Mode	Channel	Frequency (MHz)	PAR (dB)	Limit (dB)
GSM	512	1850.2	12.88	13
GPRS(1 Slot)	512	1850.2	12.88	13
EDGE(1 Slot)	512	1850.2	12.92	13

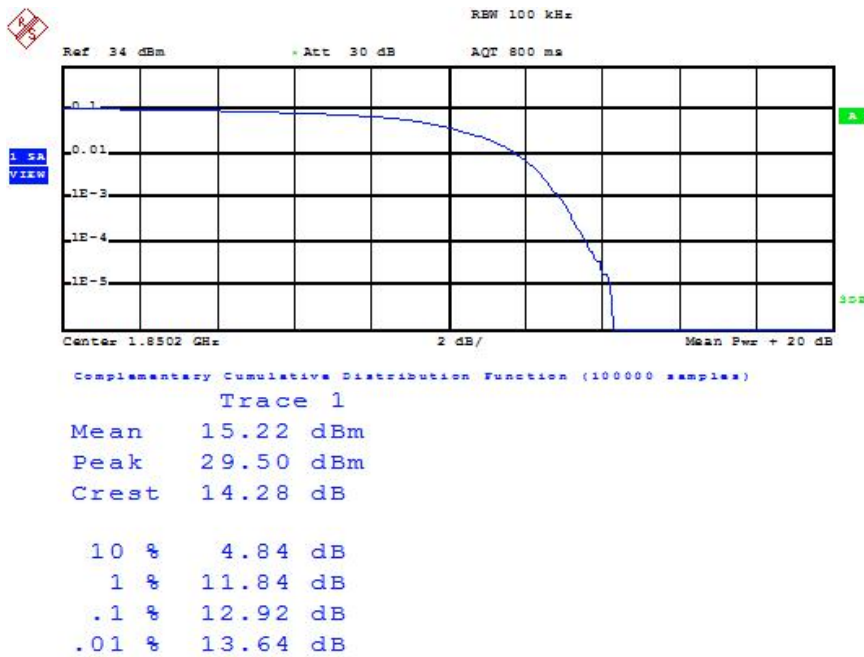
GSM Low Channel:



GPRS Low Channel:



EDGE Low Channel:



6. Emission Bandwidth

6.1 Standard Applicable

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.

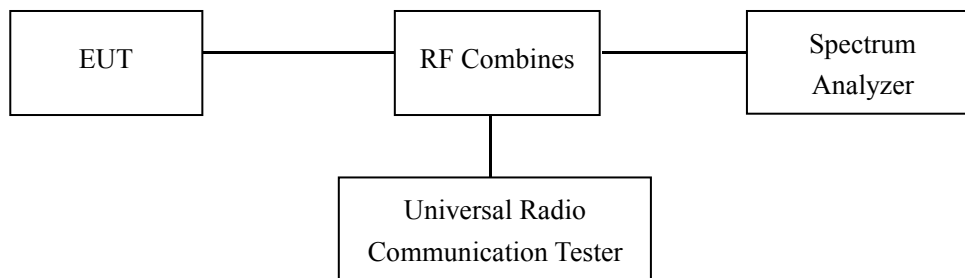
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

6.2 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.

Test Configuration for the emission bandwidth testing:



6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

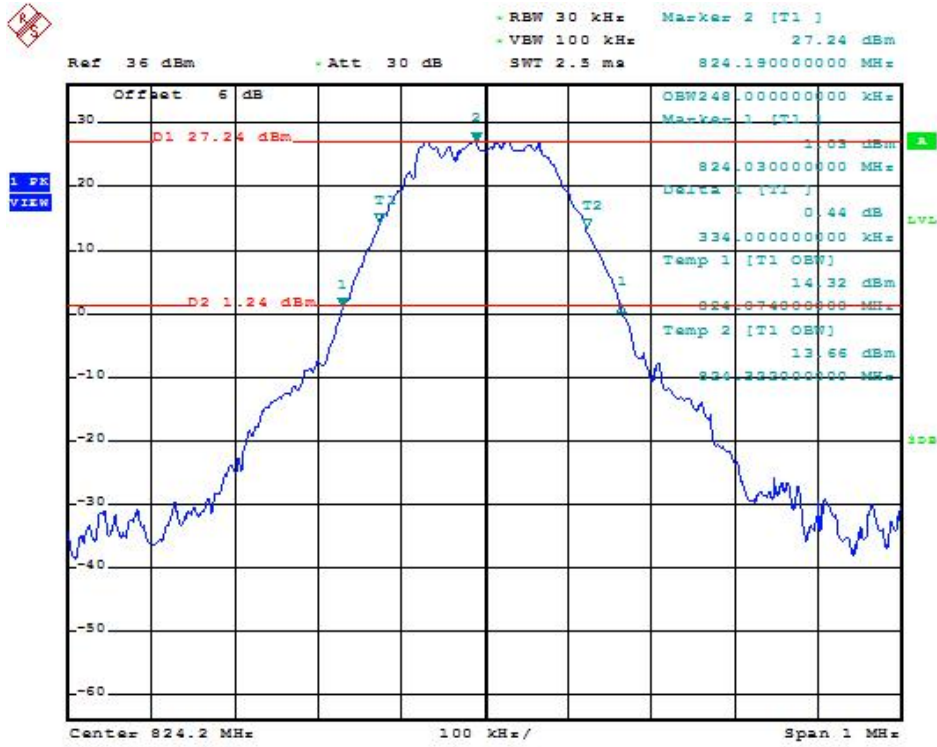
For Cellular Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	128	824.2	248	334
	190	836.6	250	336
	251	848.8	250	330
GPRS	128	824.2	248	334
	190	836.6	252	332
	251	848.8	250	334
EDGE	128	824.2	250	334
	190	836.6	248	336
	251	848.8	250	334

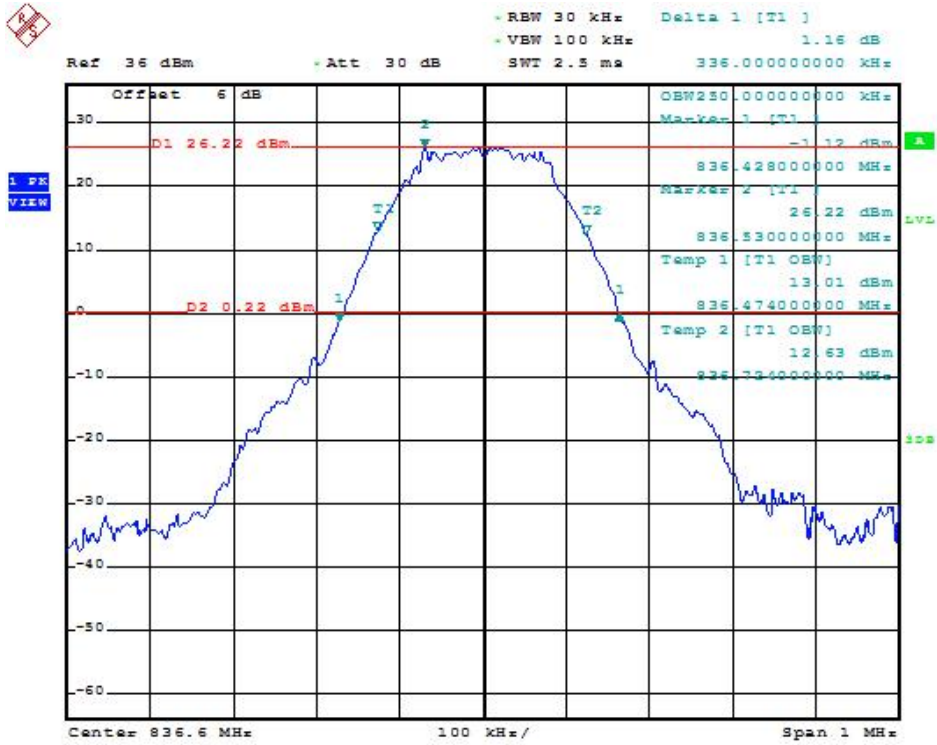
For PCS Band

Test Mode	Channel	Frequency (MHz)	99% Emission Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM	512	1850.2	250	332
	661	1880.0	248	334
	810	1909.8	248	334
GPRS	512	1850.2	252	332
	661	1880.0	250	334
	810	1909.8	250	334
EDGE	512	1850.2	252	332
	661	1880.0	252	334
	810	1909.8	250	332

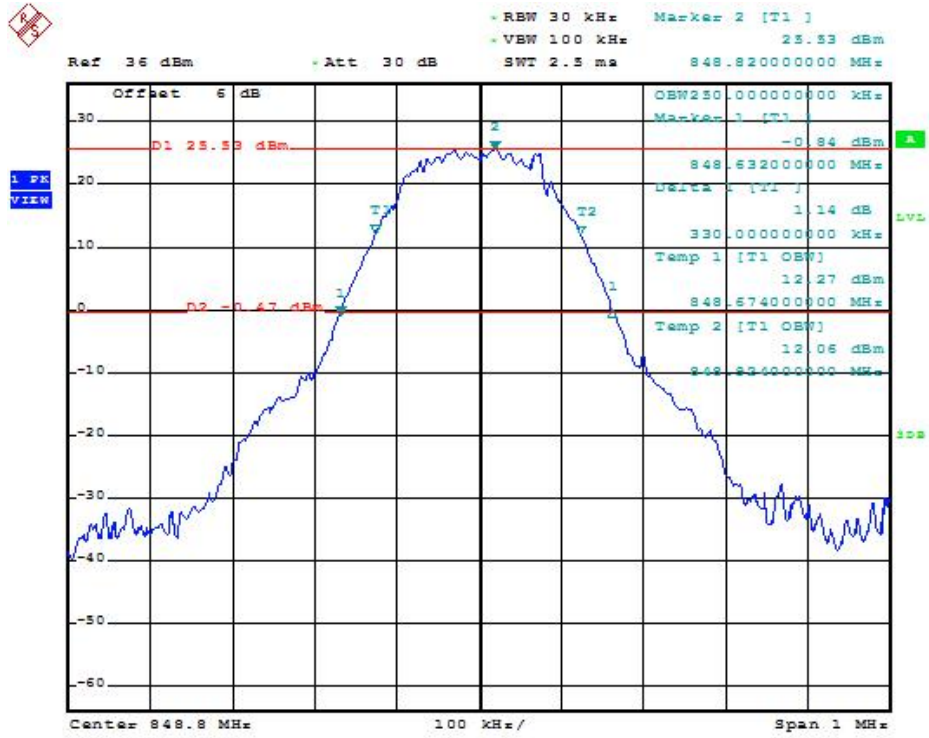
For Cellular Band
GSM Low Channel



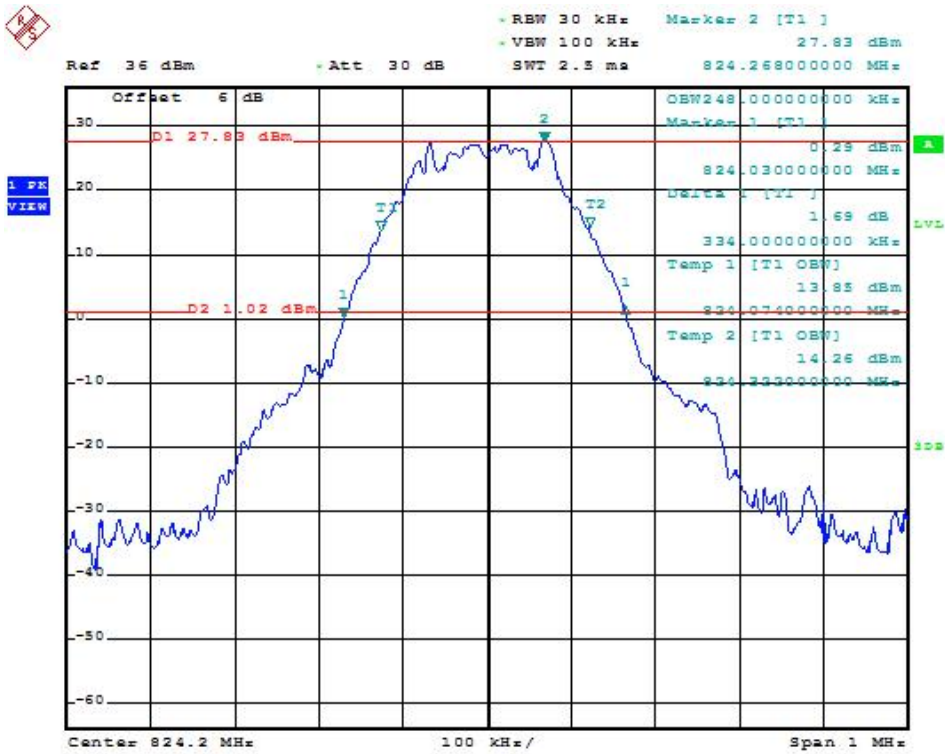
GSM Middle Channel



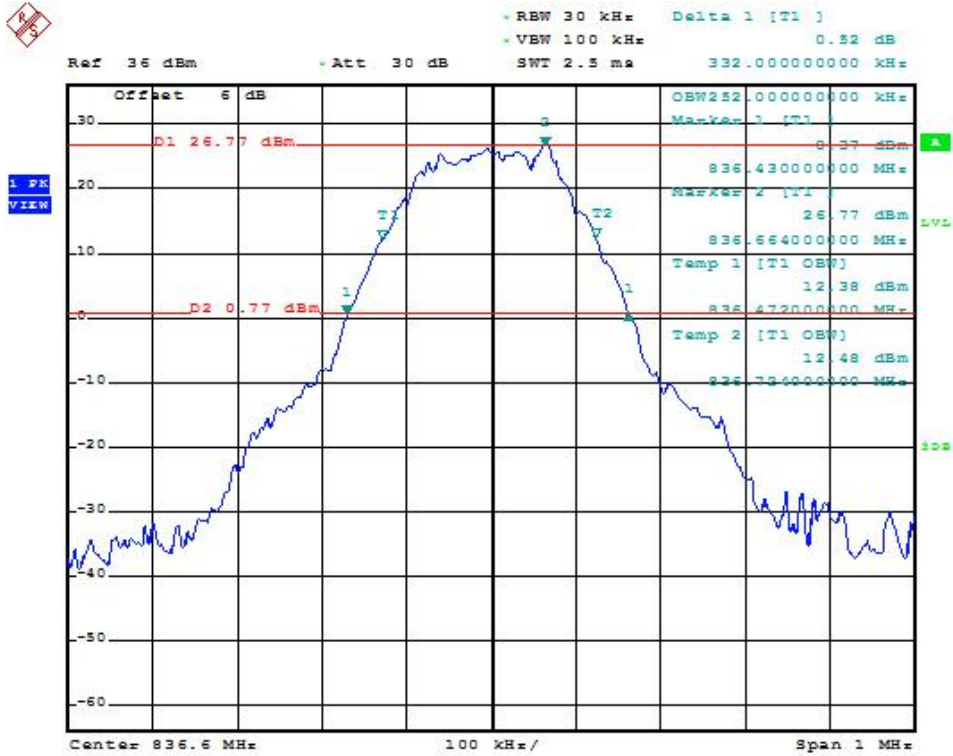
GSM High channel



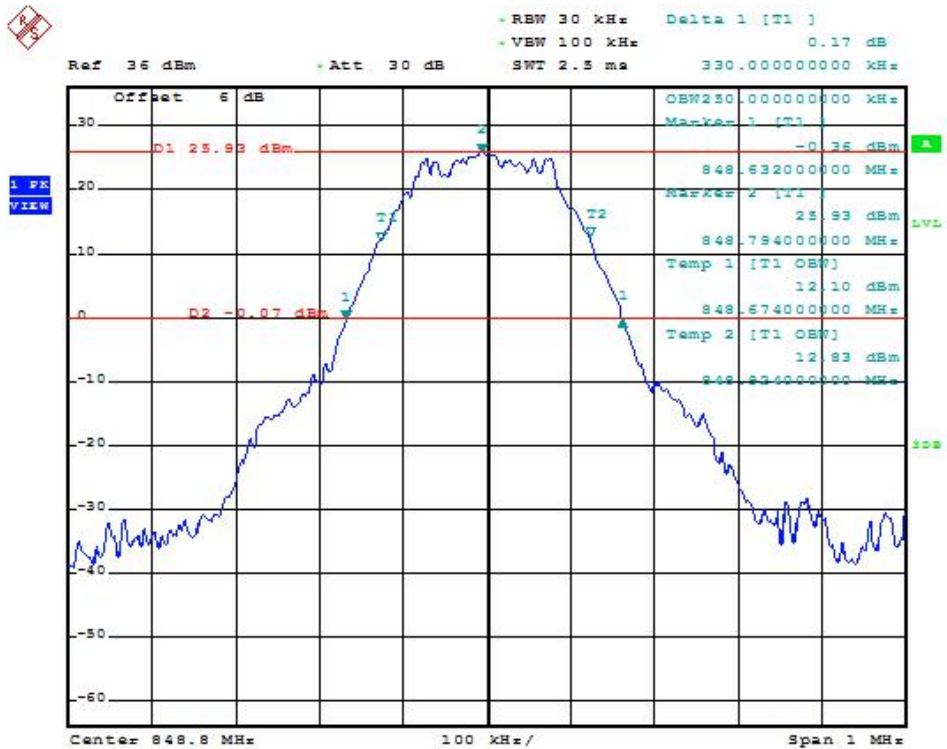
GPRS Low Channel



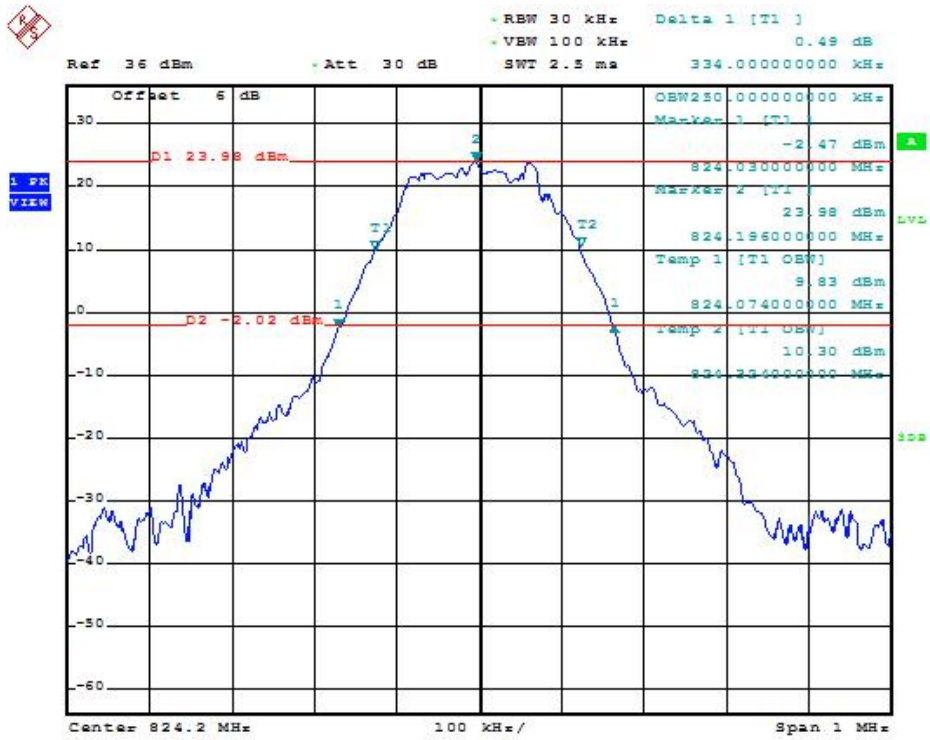
GPRS Middle Channel



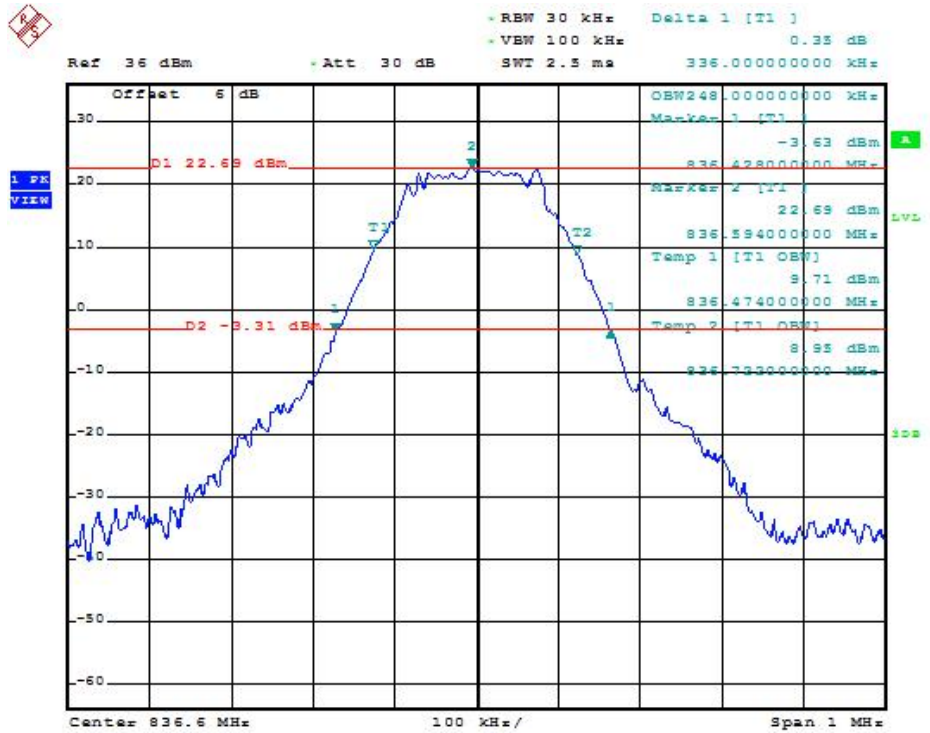
GPRS High Channel



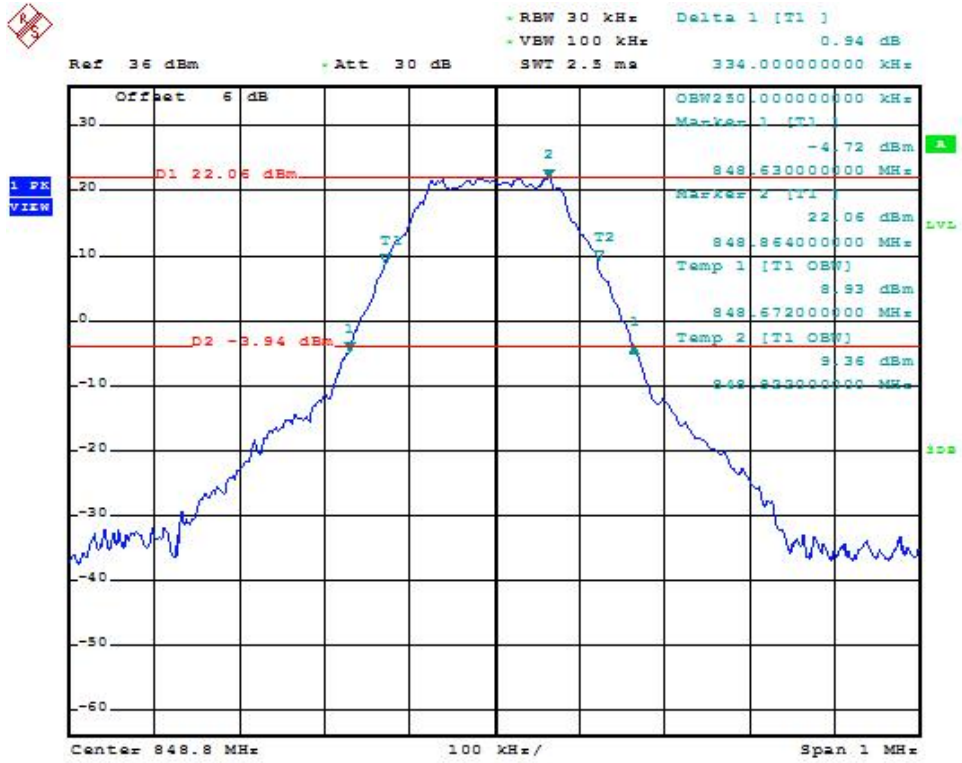
EDGE Low Channel



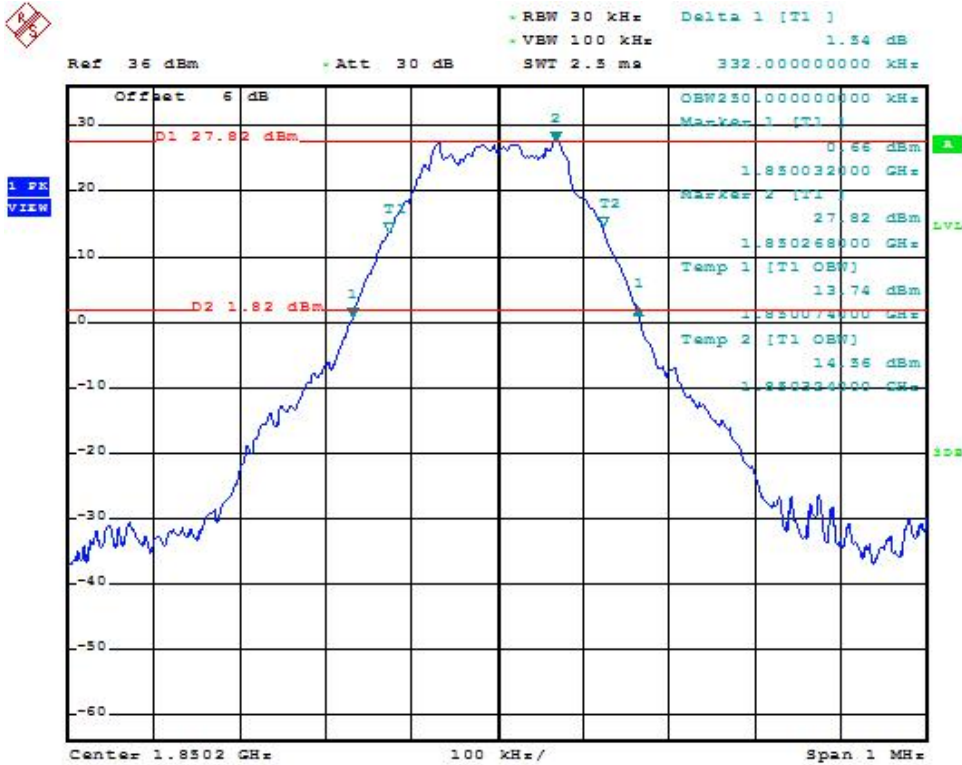
EDGE Middle Channel



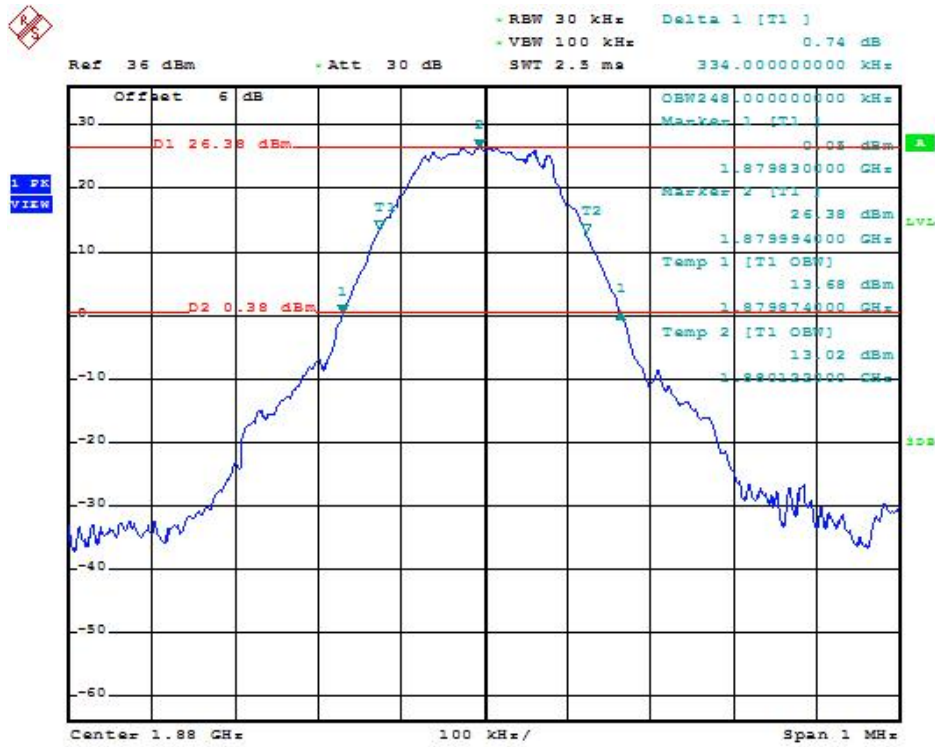
EDGE High Channel



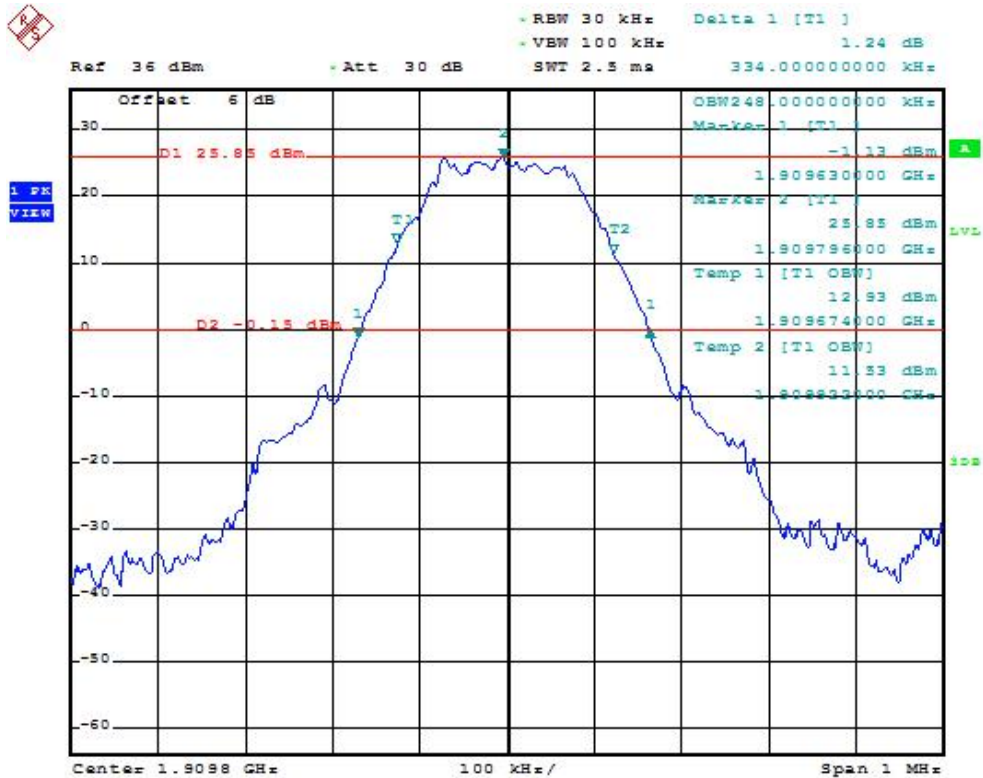
For PCS Band
 GSM Low Channel



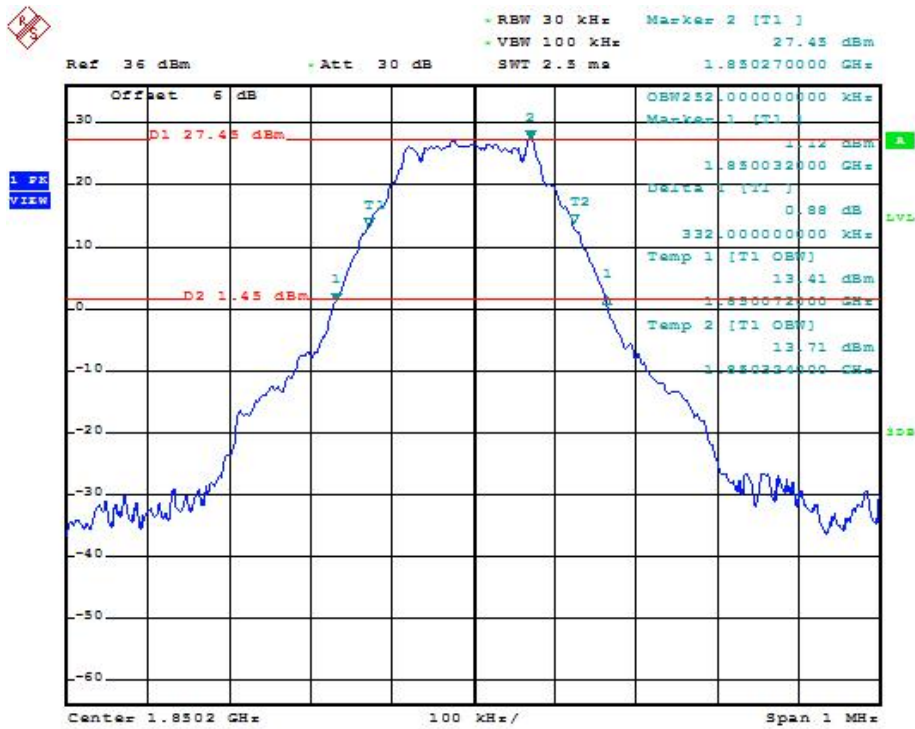
GSM Middle Channel



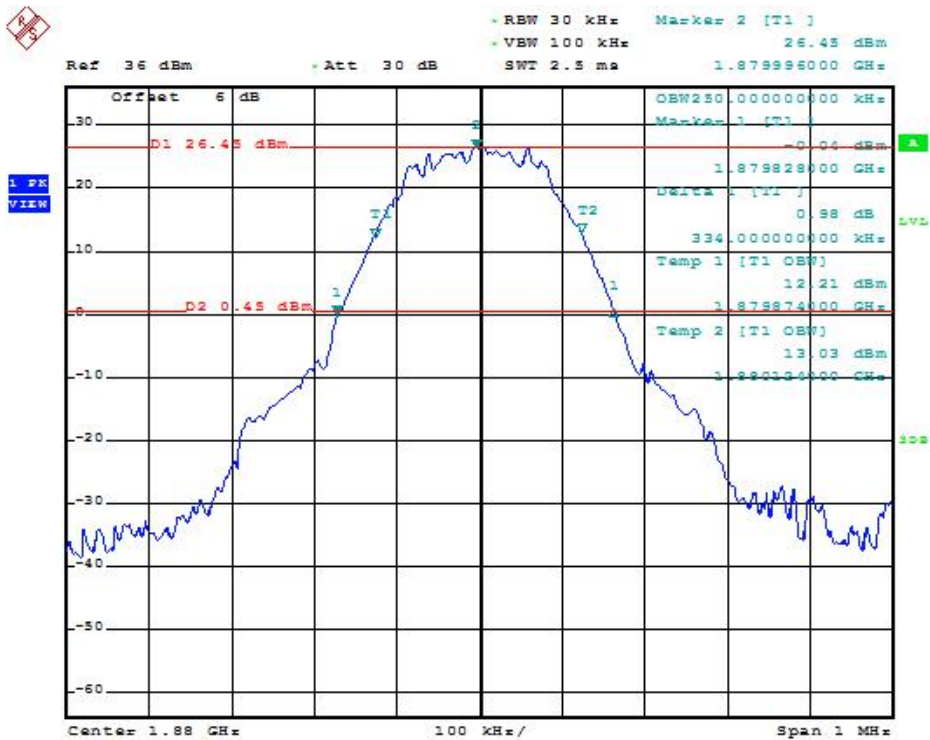
GSM High channel



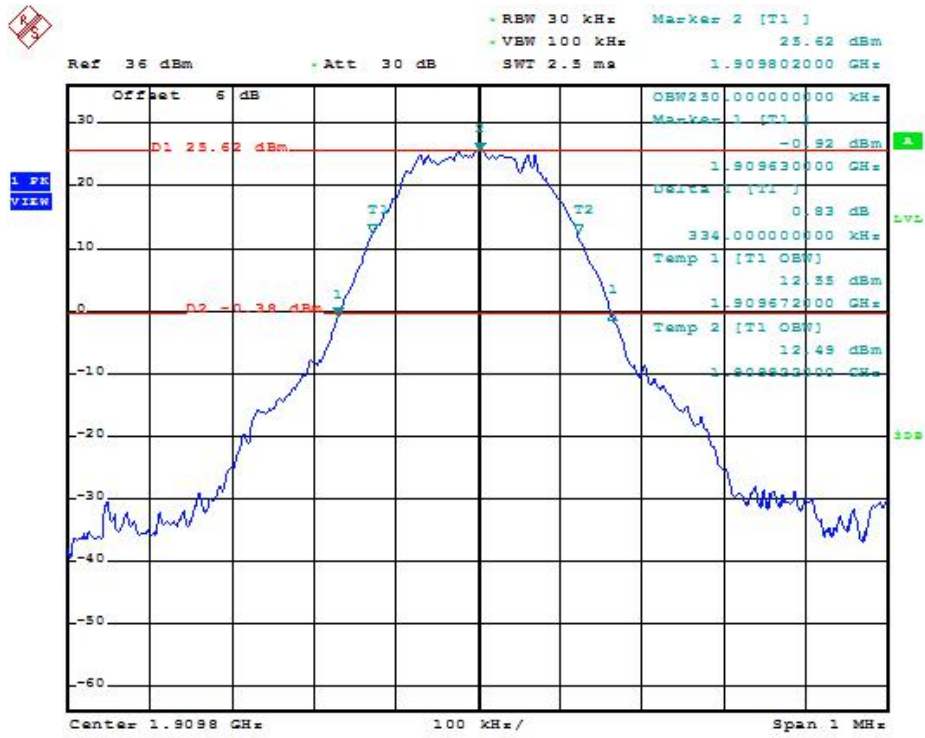
GPRS Low Channel



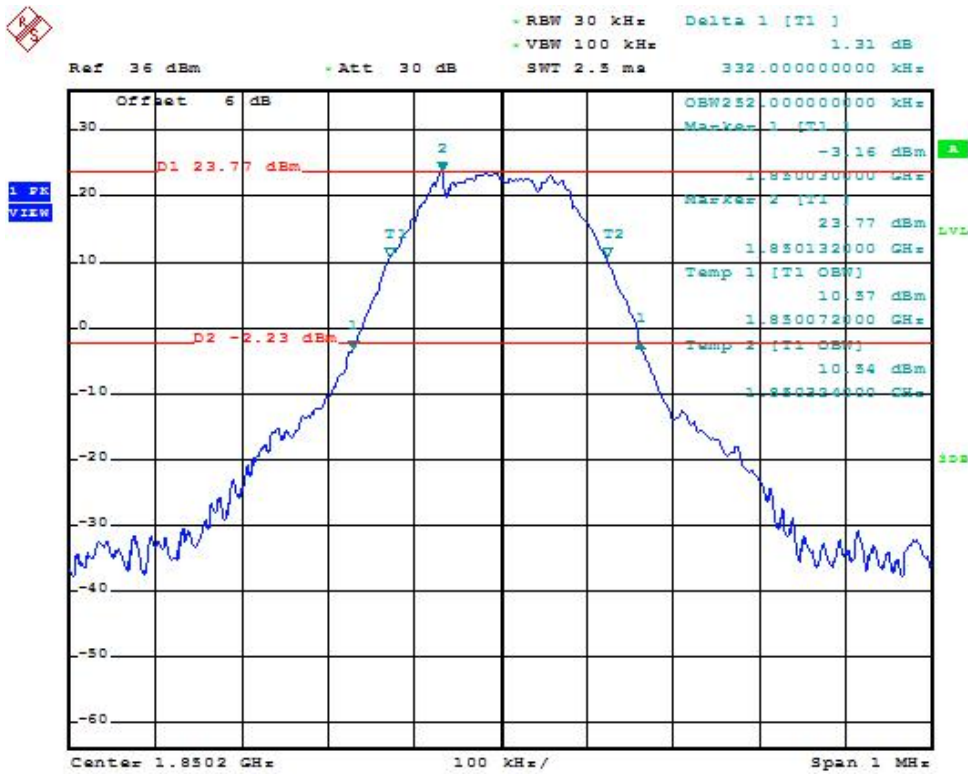
GPRS Middle Channel



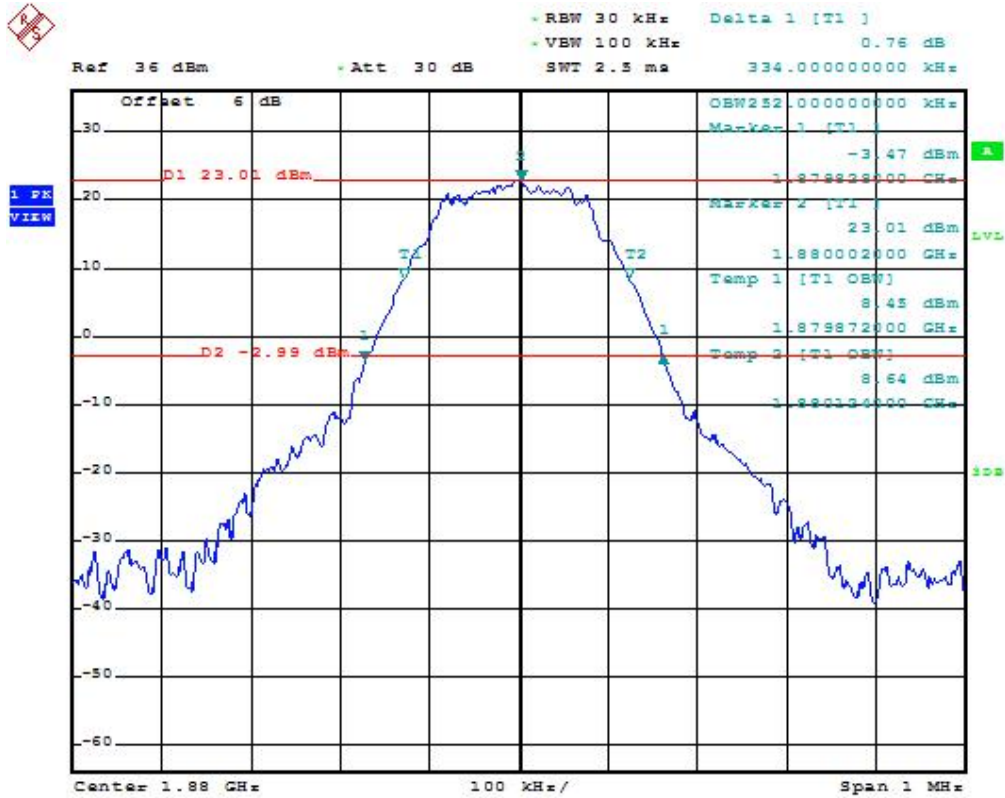
GPRS High Channel



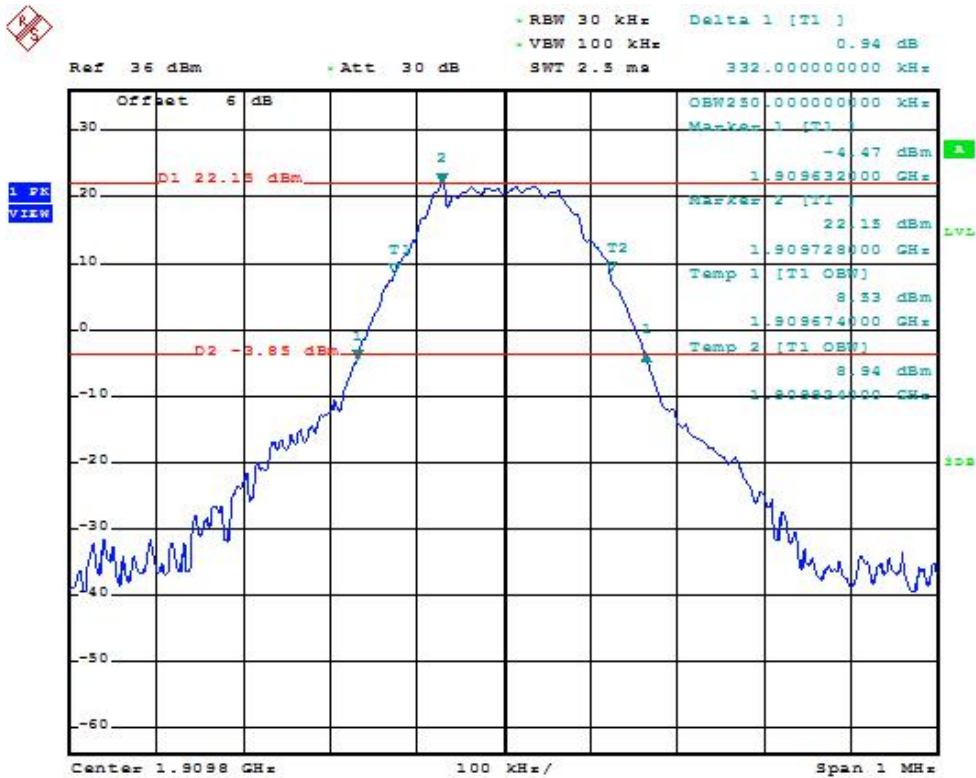
EDGE Low Channel



EDGE Middle Channel



EDGE High Channel



7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

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.

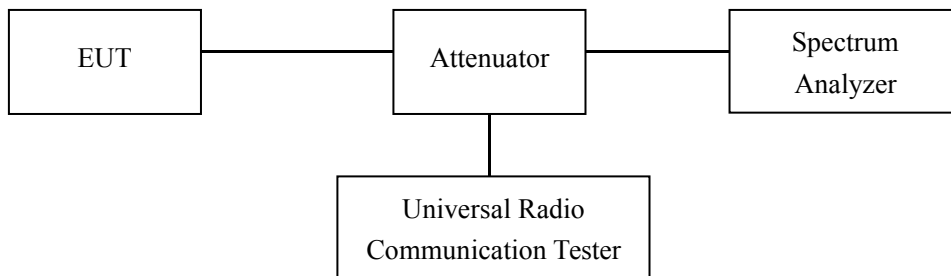
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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 $43 + 10 \log_{10}(P)$ dB.

7.2 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.

Test Configuration for the out of band emissions testing:



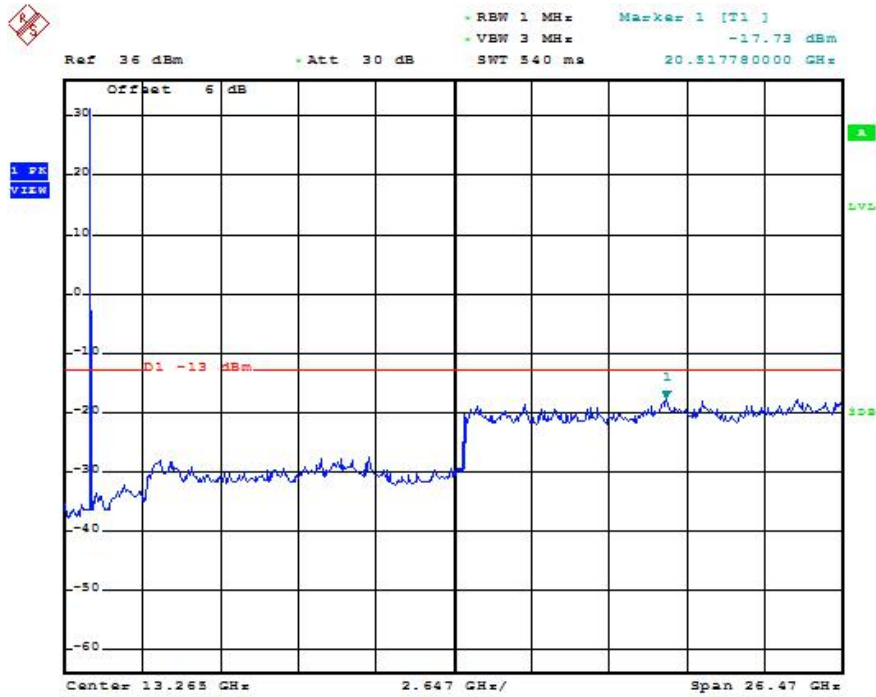
7.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

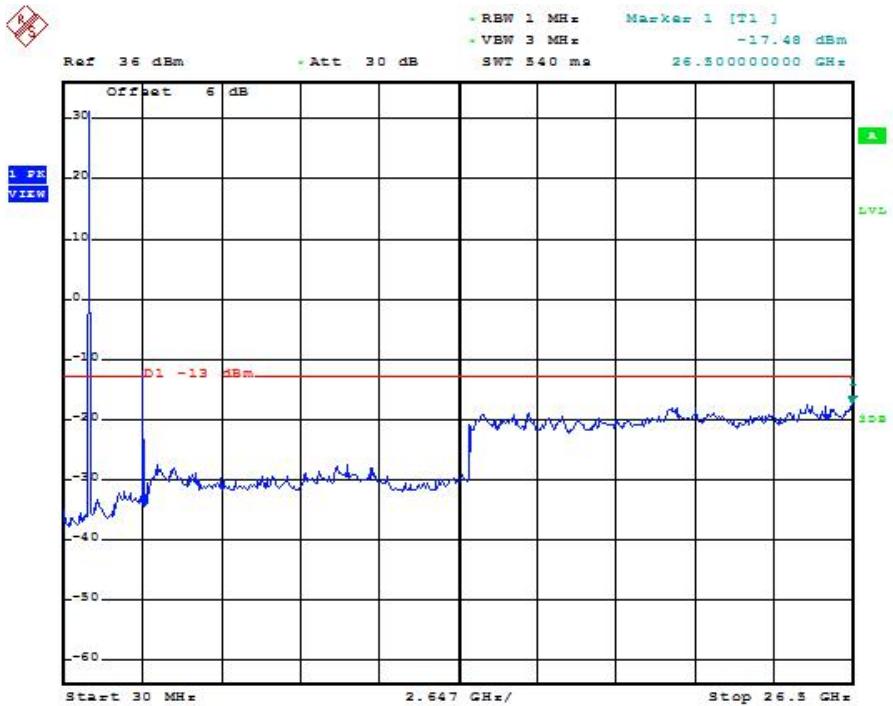
7.4 Summary of Test Results/Plots

Please refer to the following test plots For Cellular Band

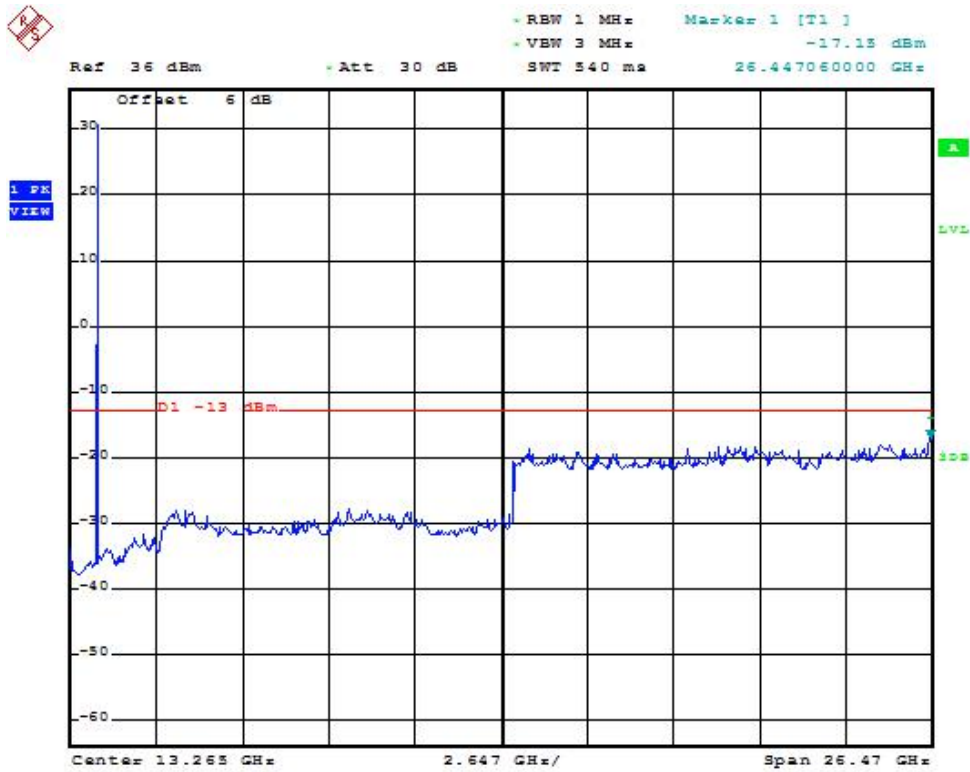
GSM Low Channel



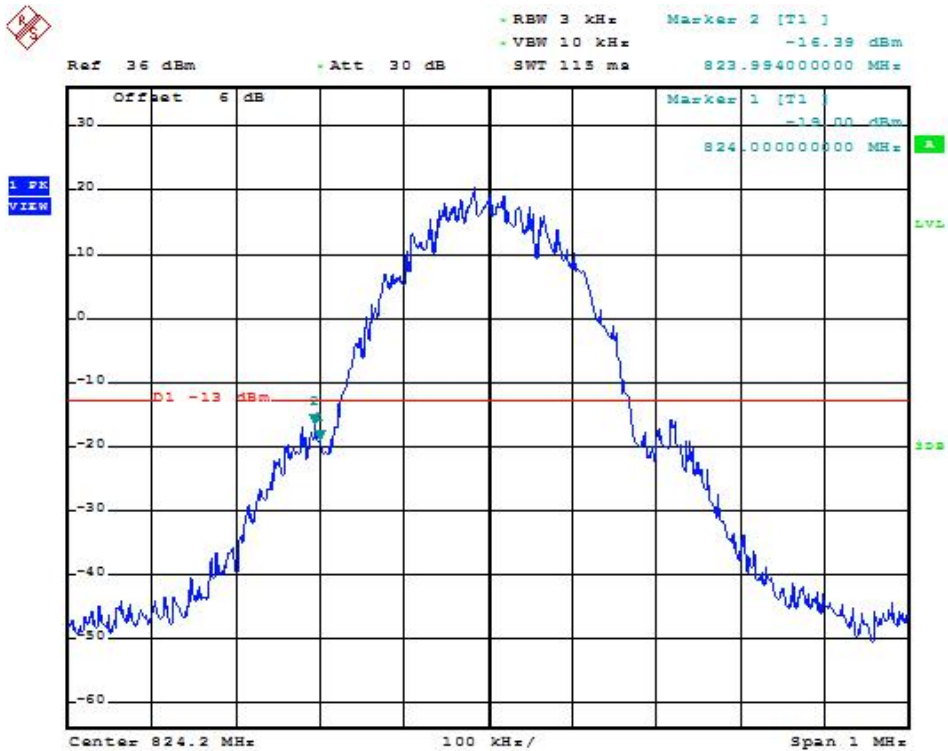
GSM Middle Channel



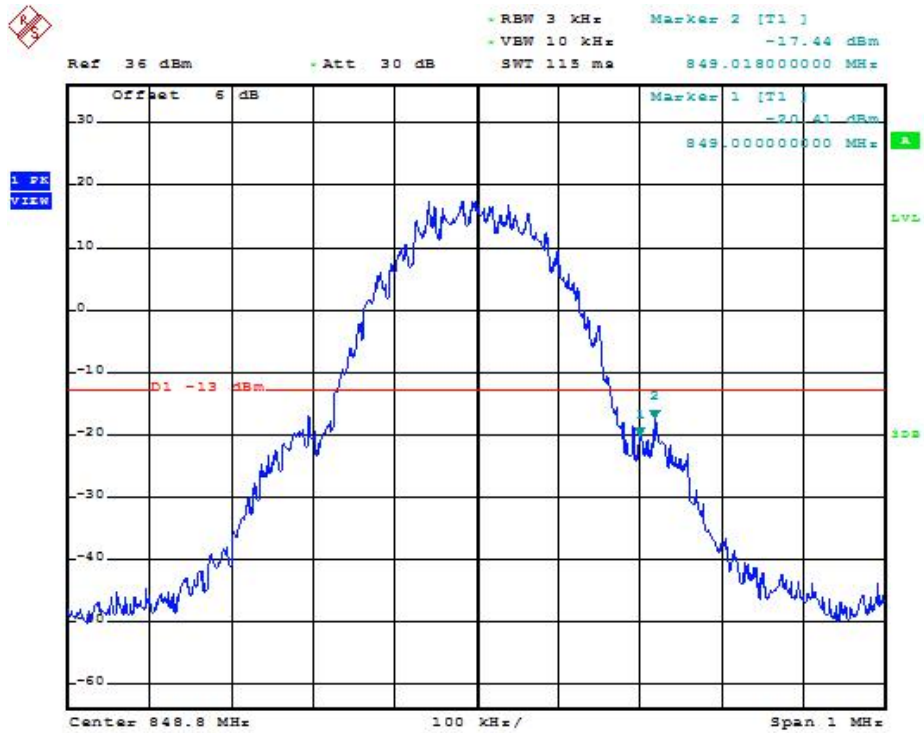
GSM High Channel



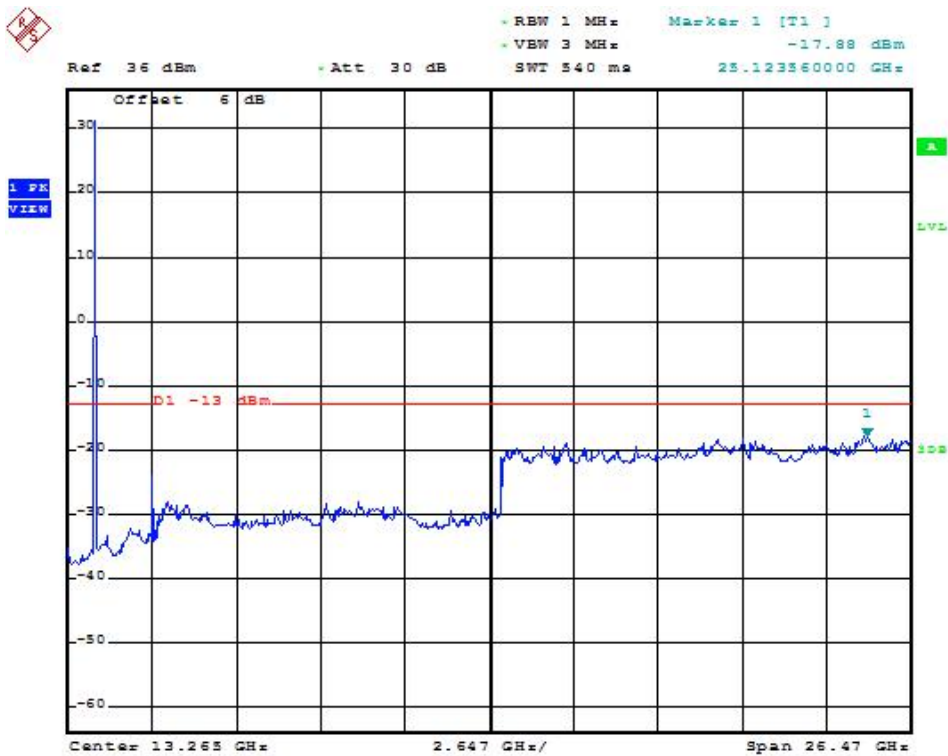
GSM Low Band Emission



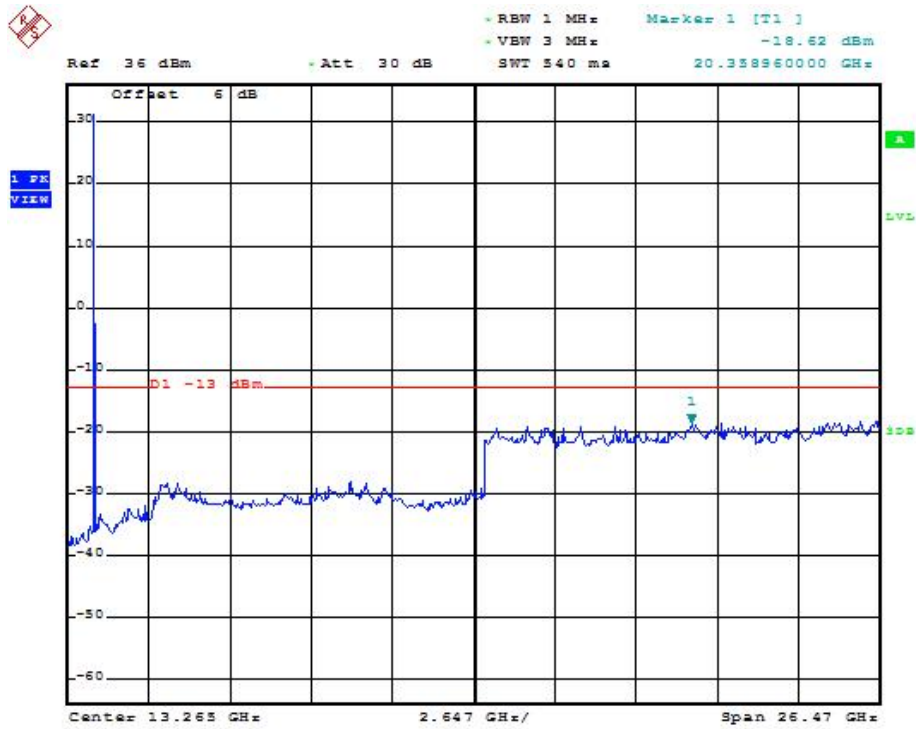
GSM High Band Emission



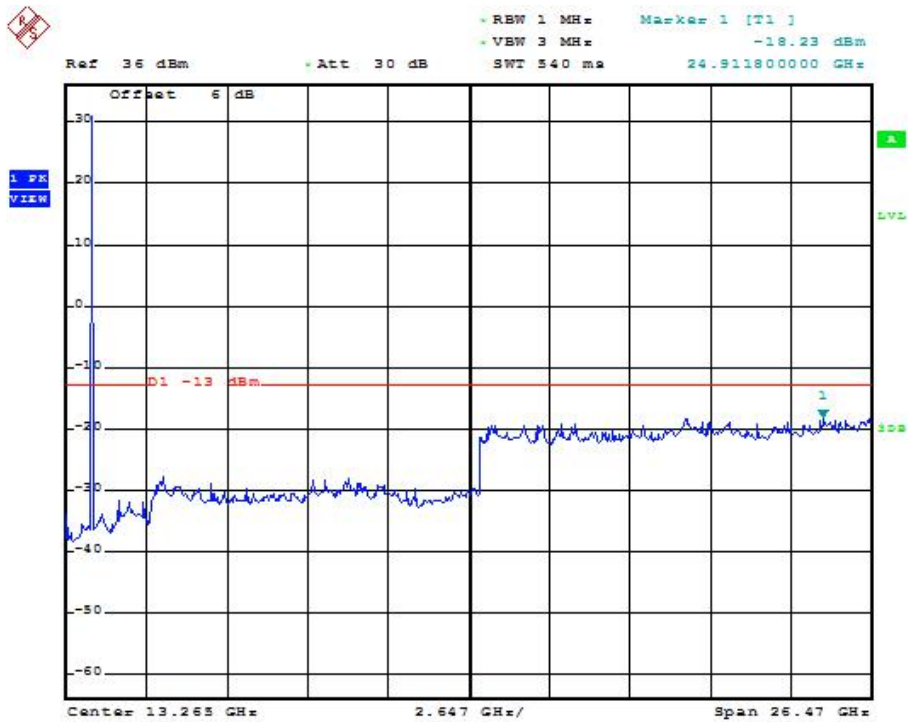
GPRS Low Channel



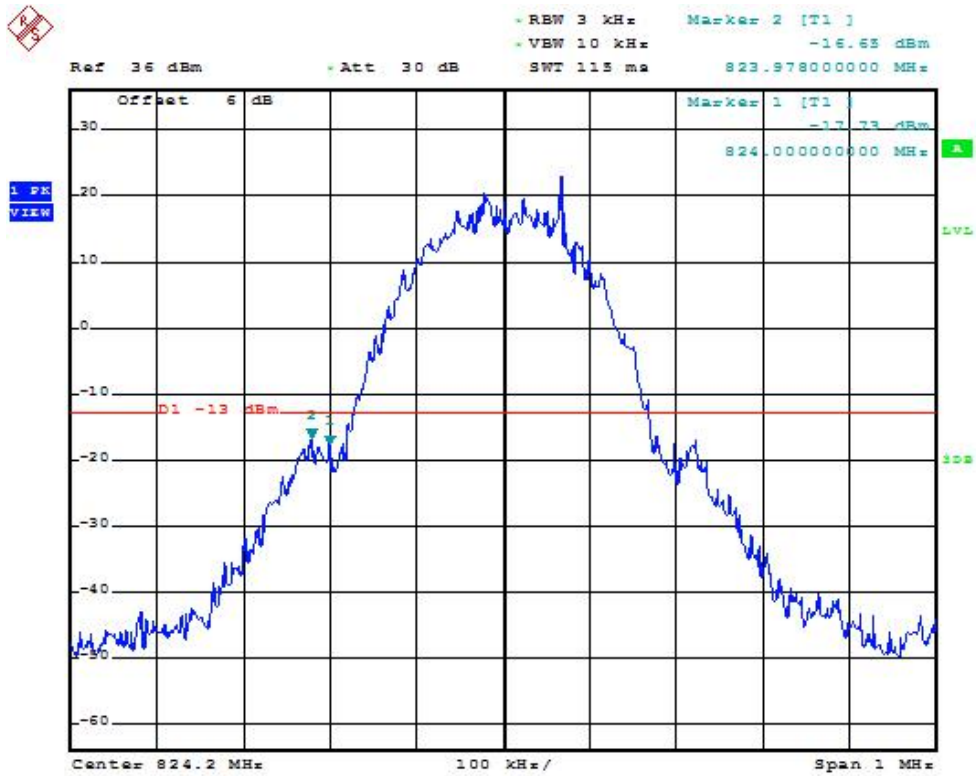
GPRS Middle Channel



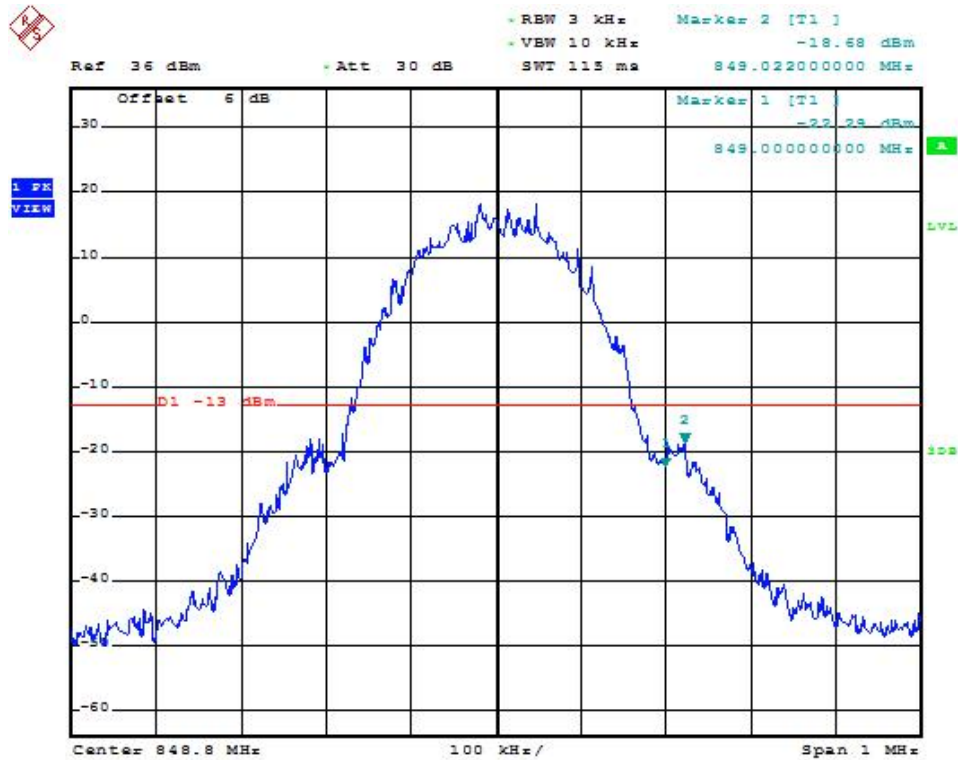
GPRS High Channel



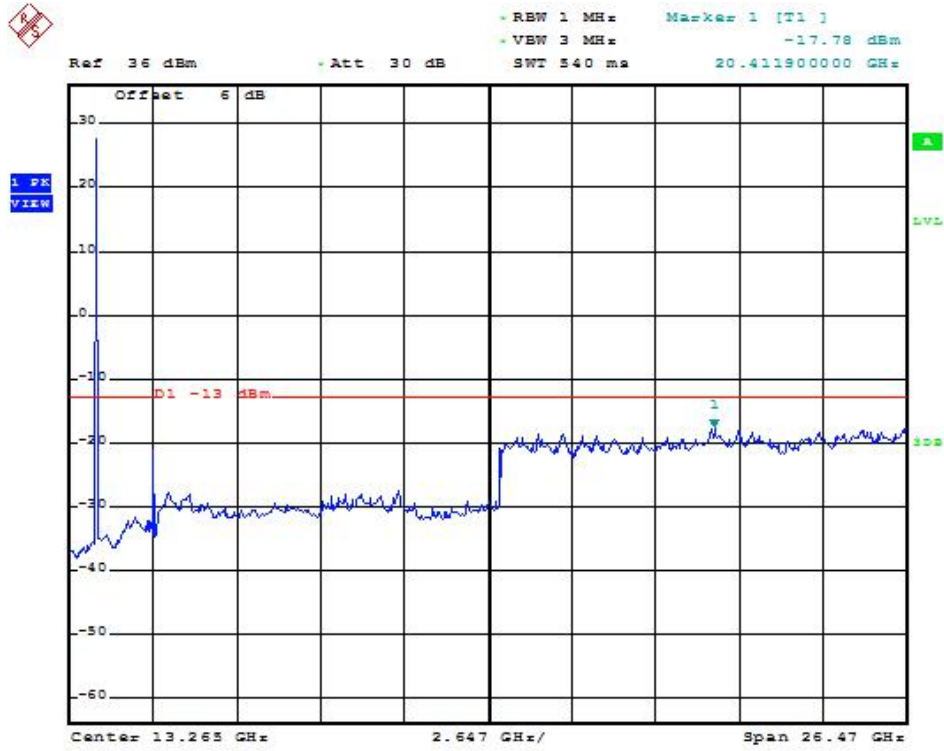
GPRS Low Band Emission



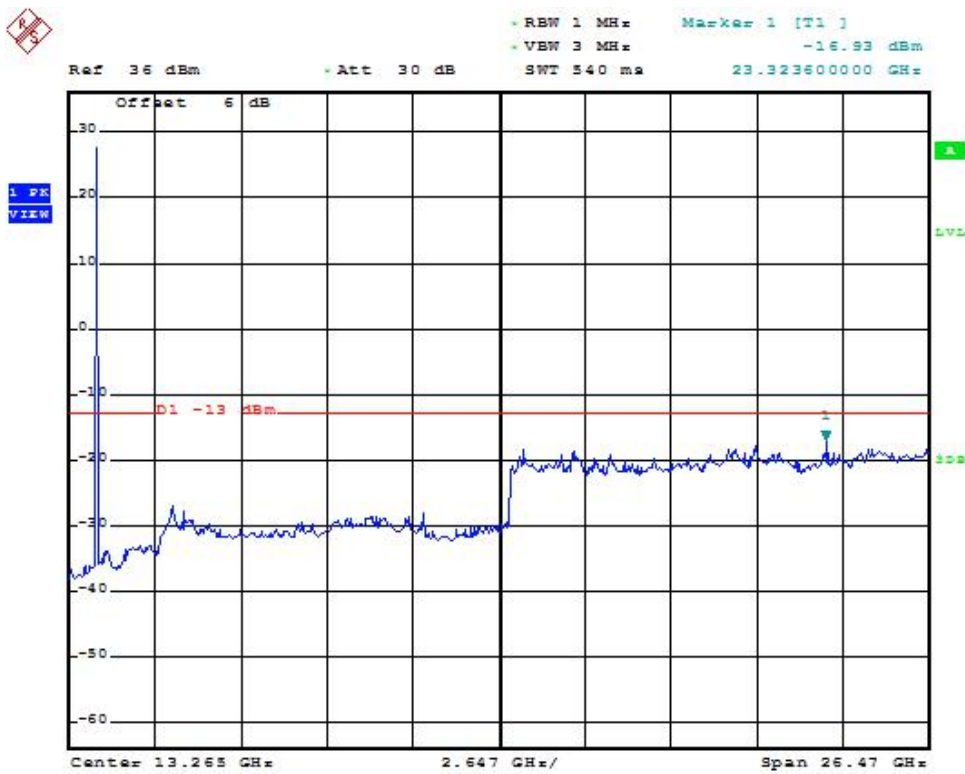
GPRS High Band Emission



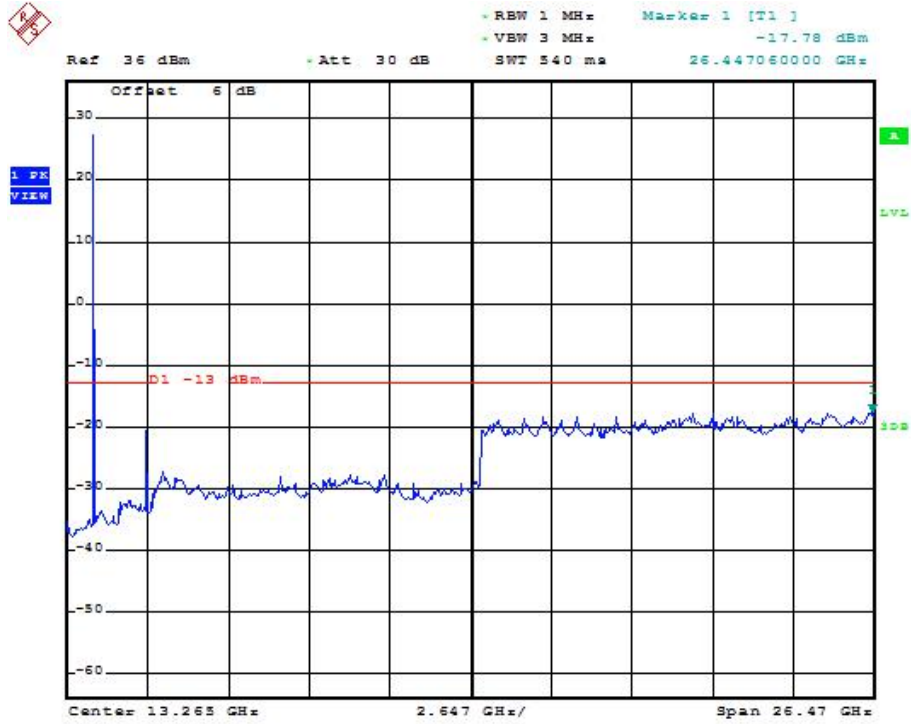
EDGE Low Channel



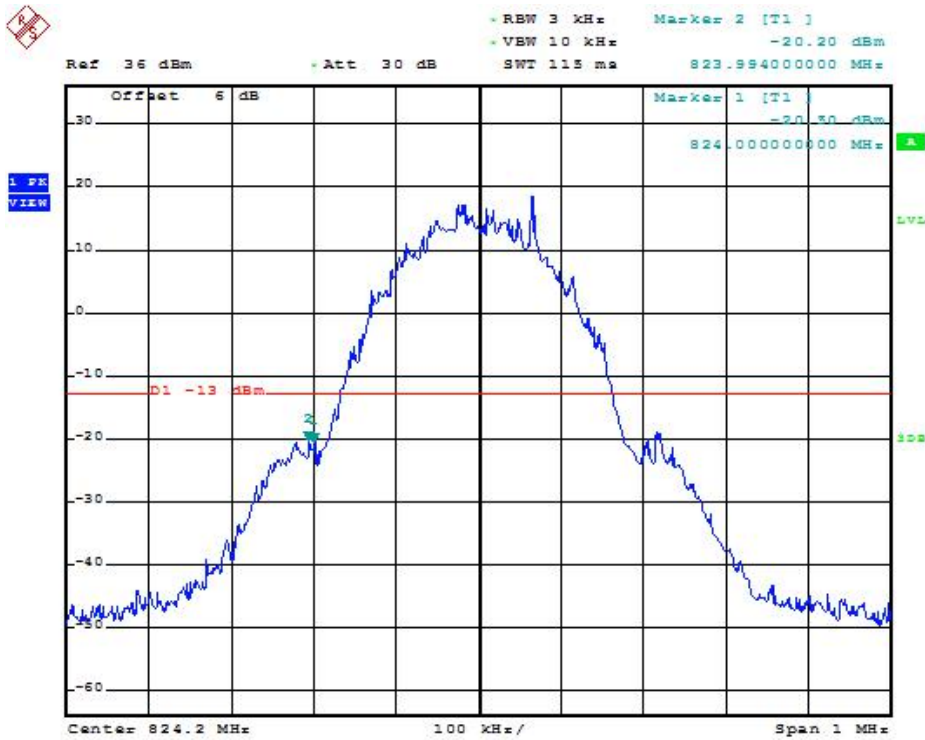
EDGE Middle Channel



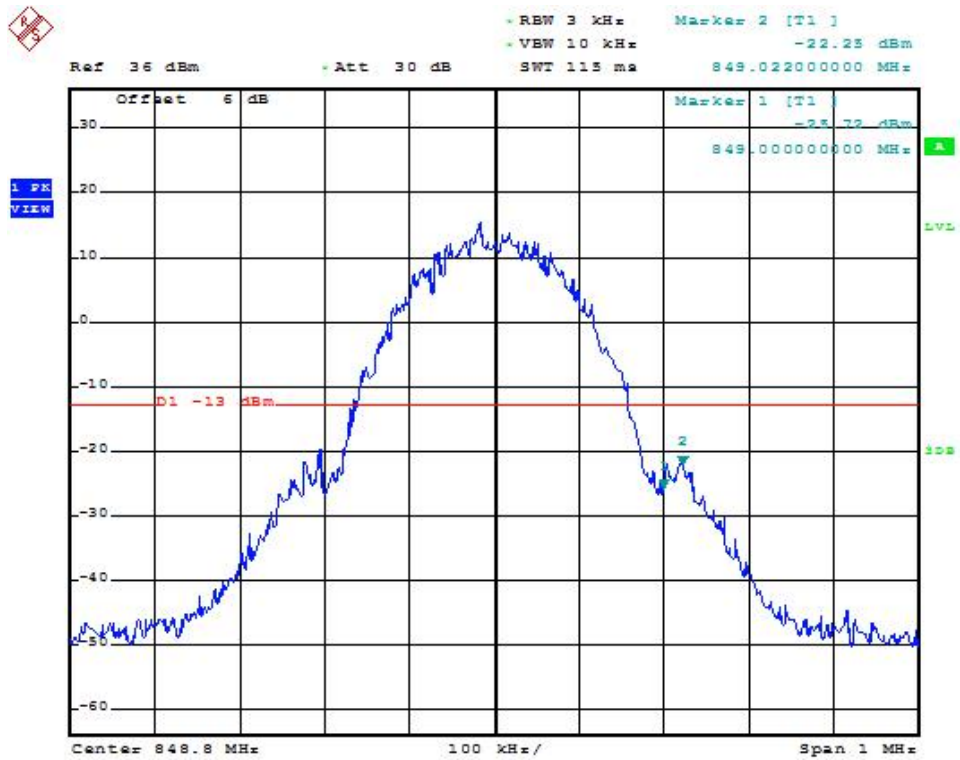
EDGE High Channel



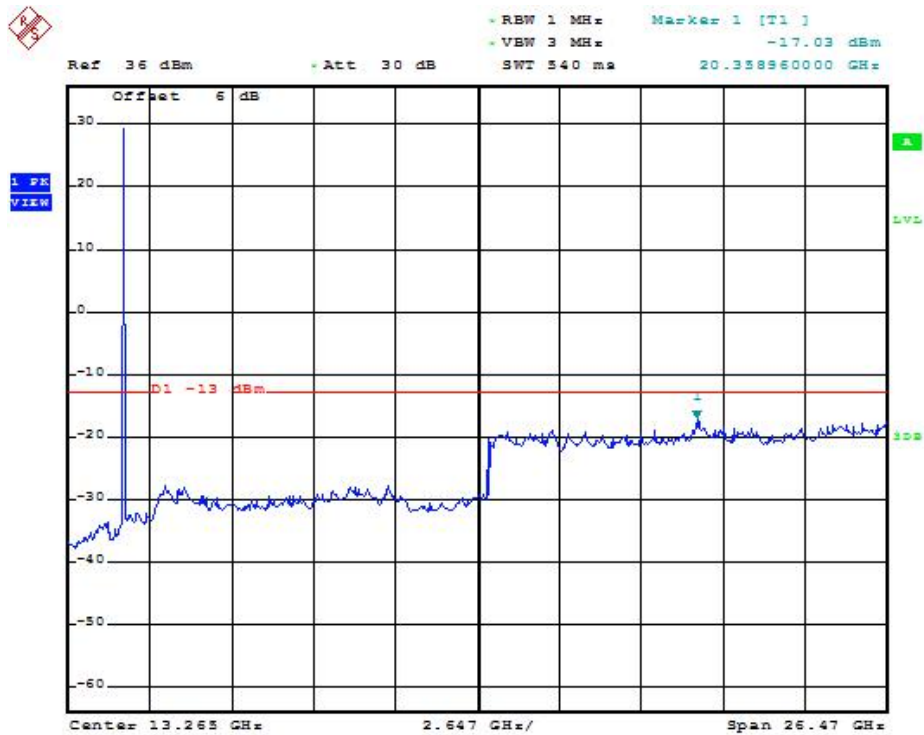
EDGE Low Band Emission



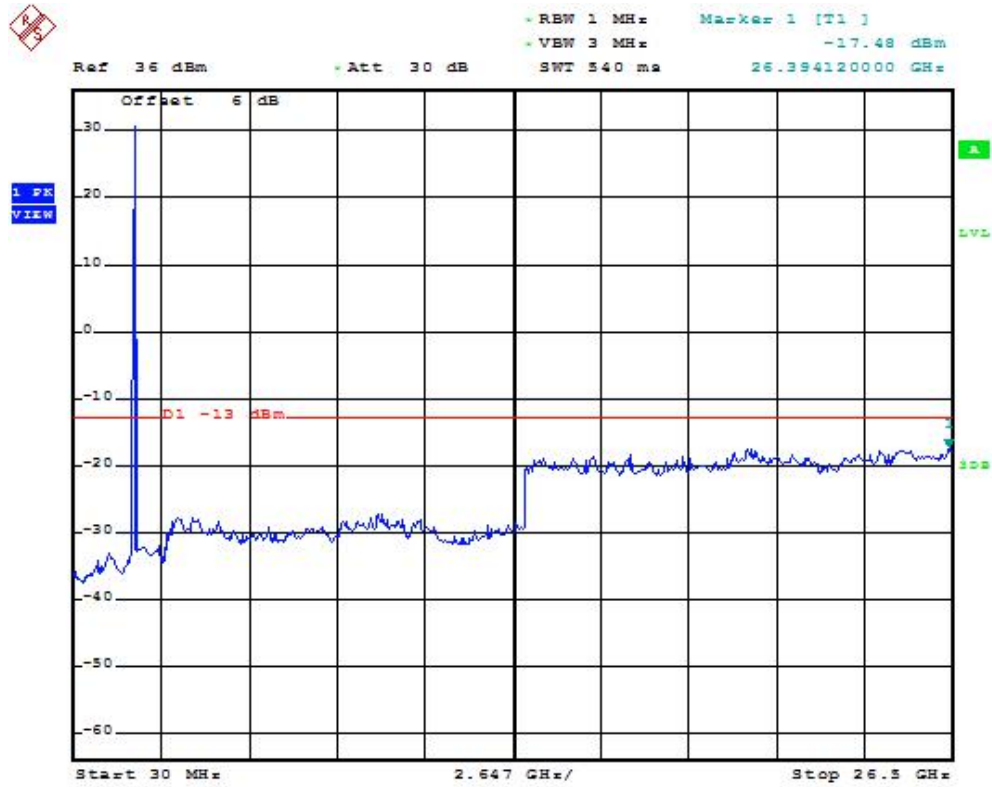
EDGE High Band Emission



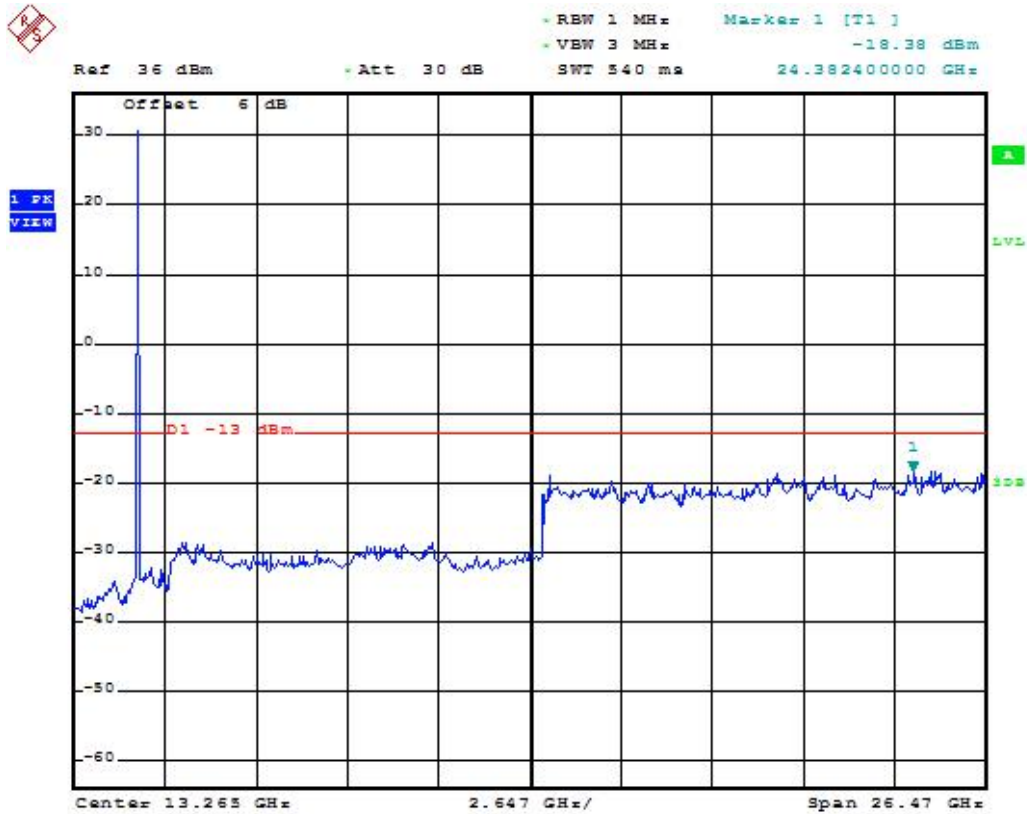
For PCS Band
GSM Low Channel



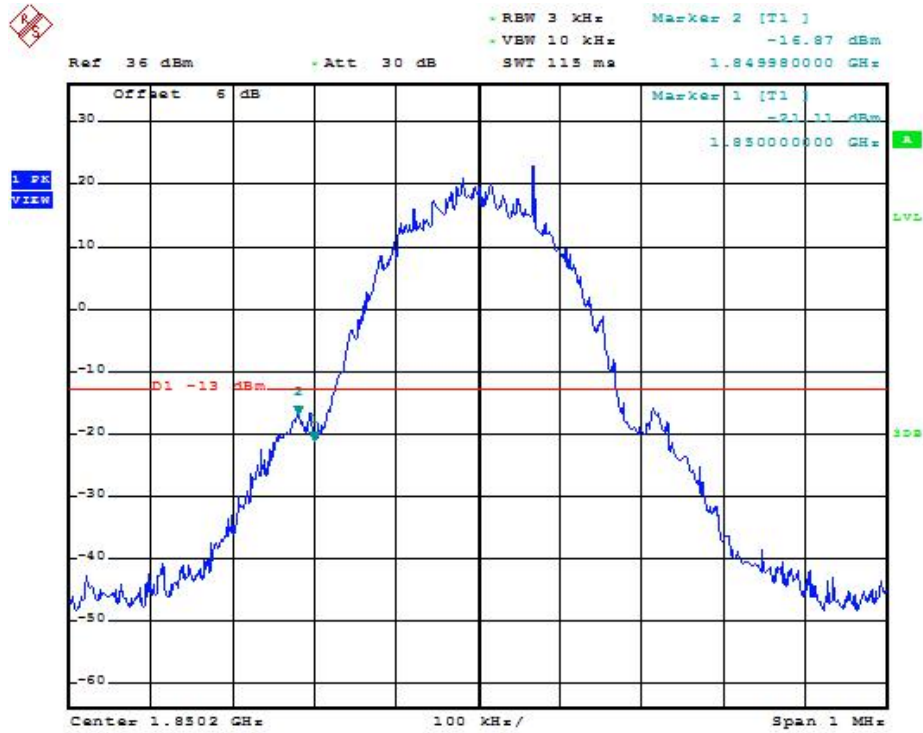
GSM Middle Channel



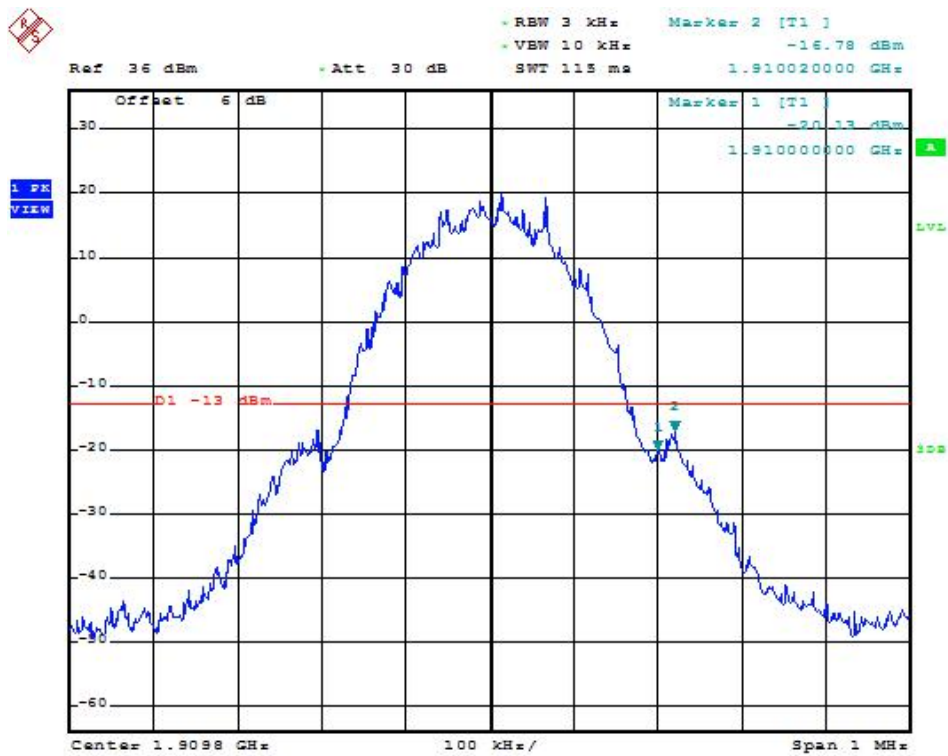
GSM High Channel



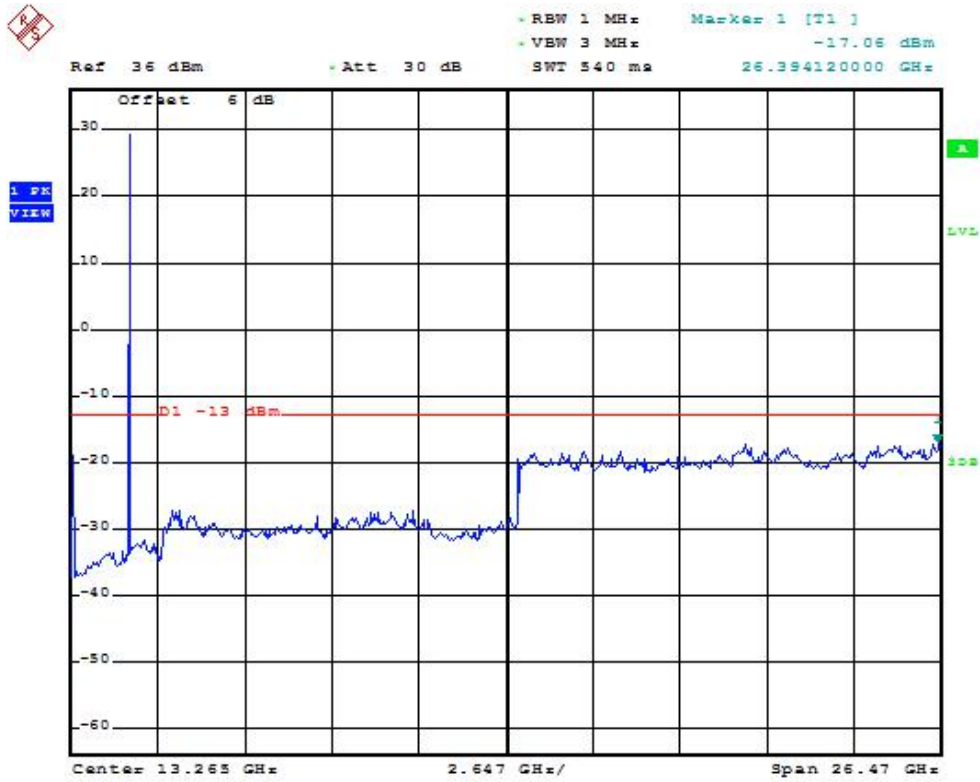
GSM Low Band Emission



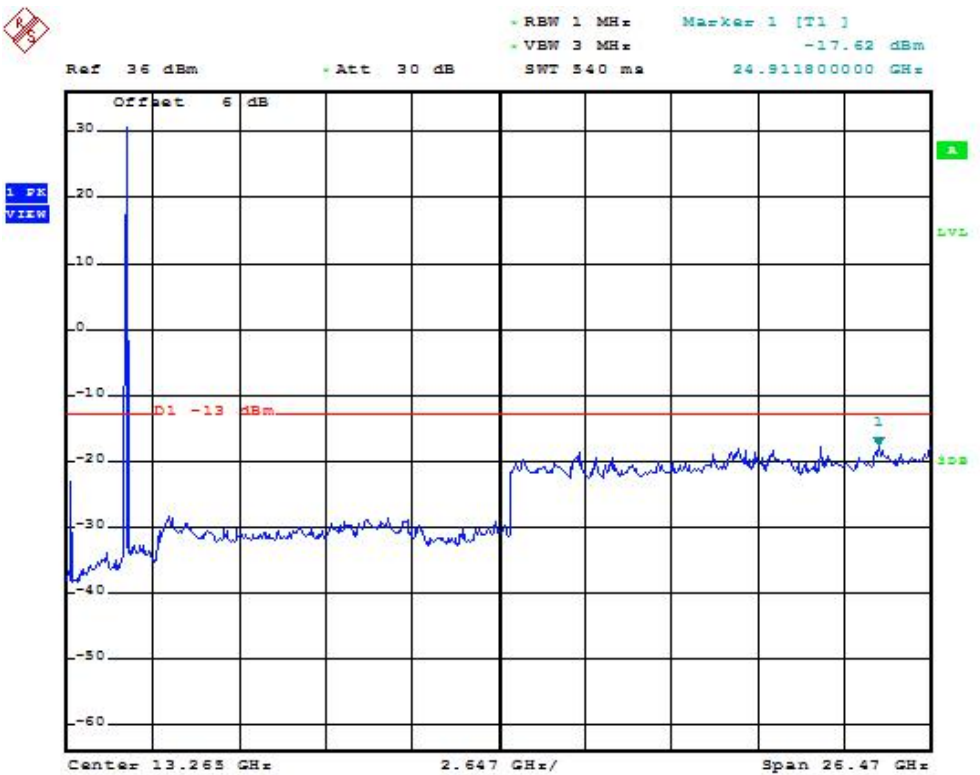
GSM High Band Emission



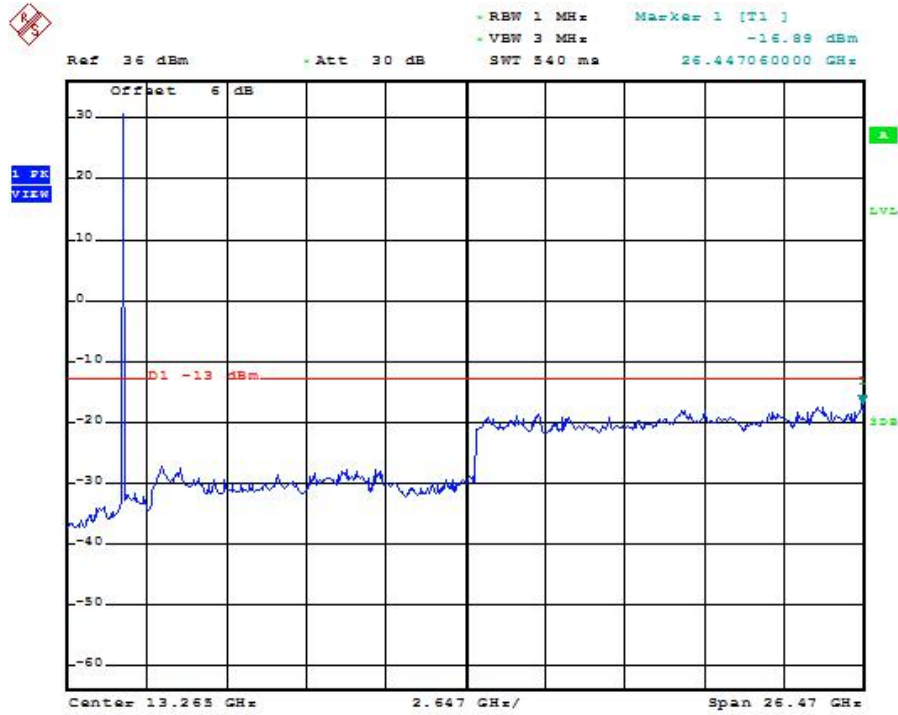
GPRS Low Channel



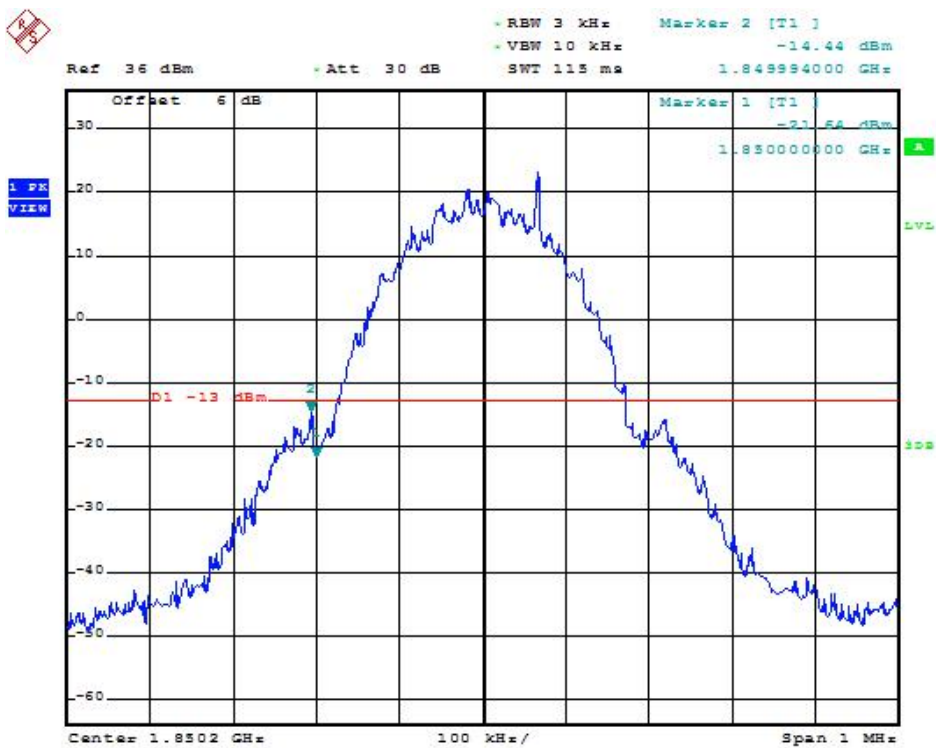
GPRS Middle Channel



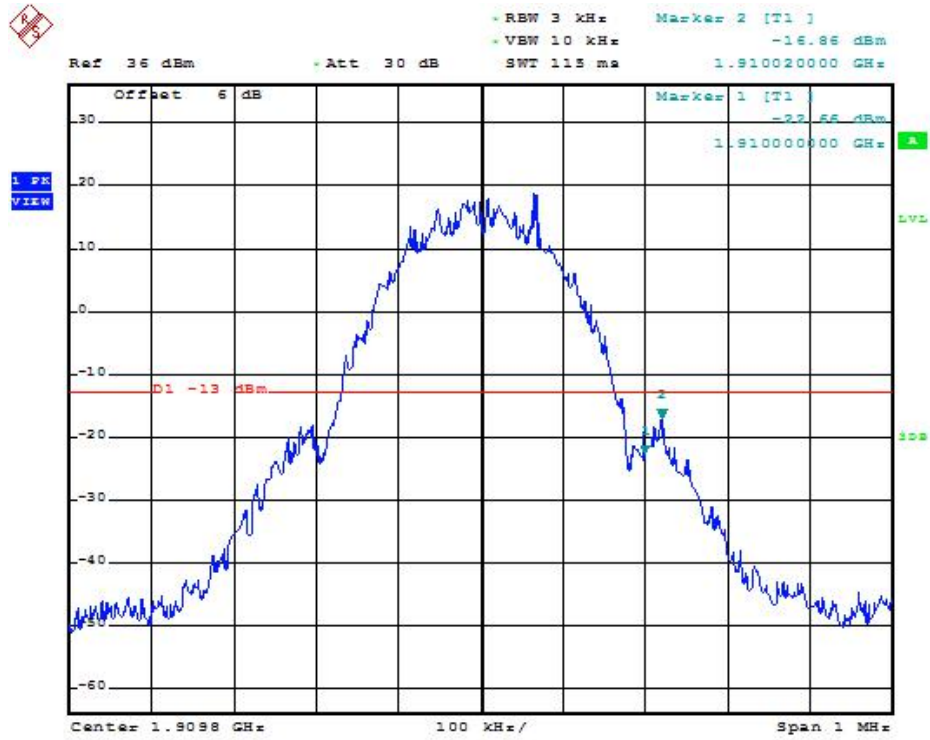
GPRS High Channel



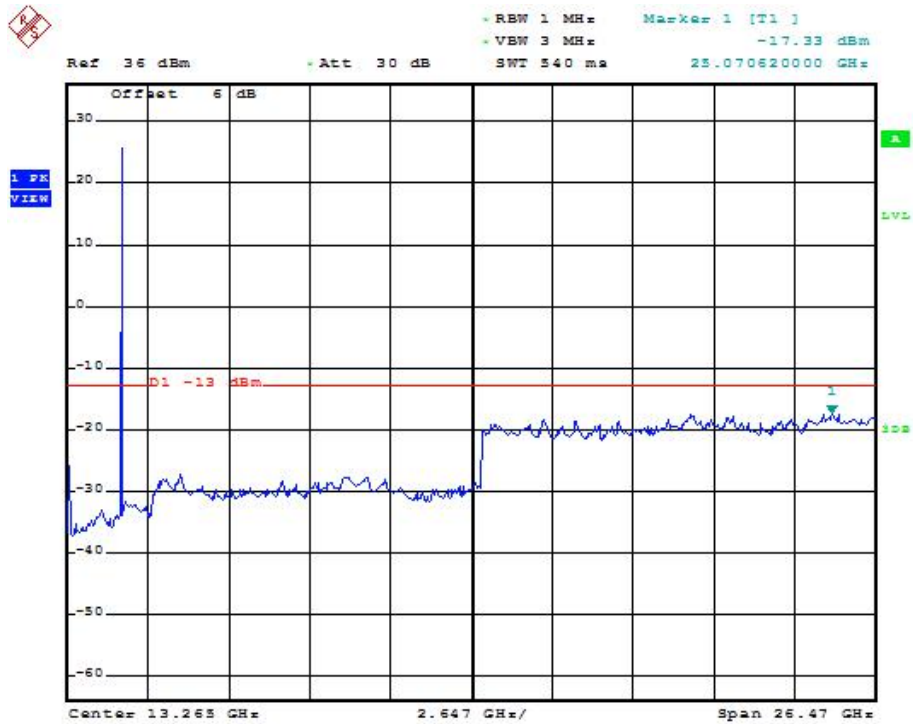
GPRS Low Band Emission



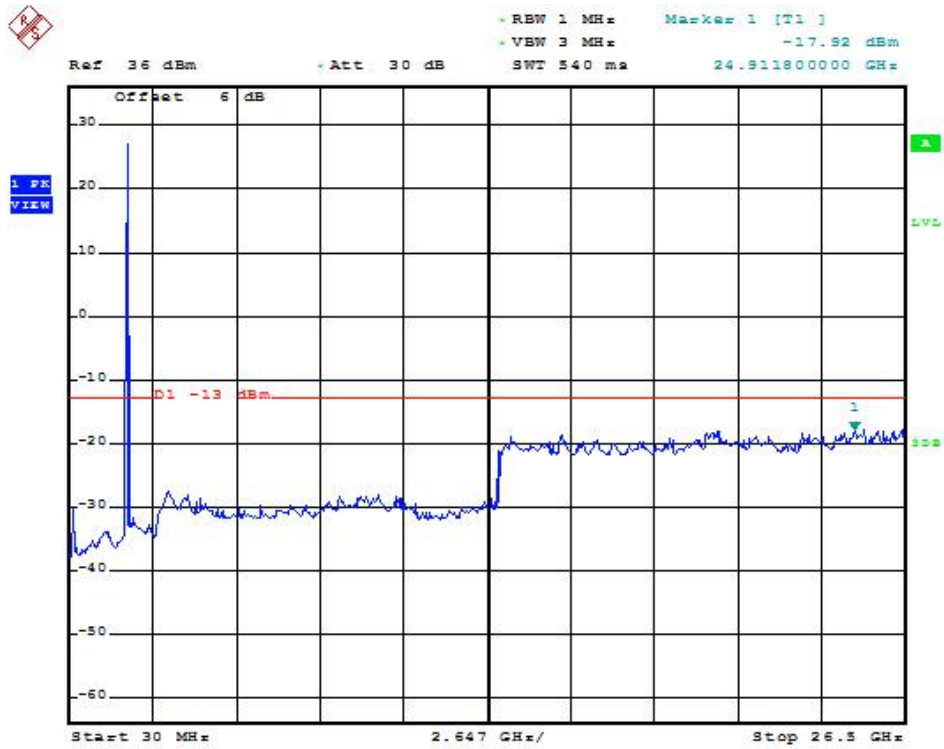
GPRS High Band Emission



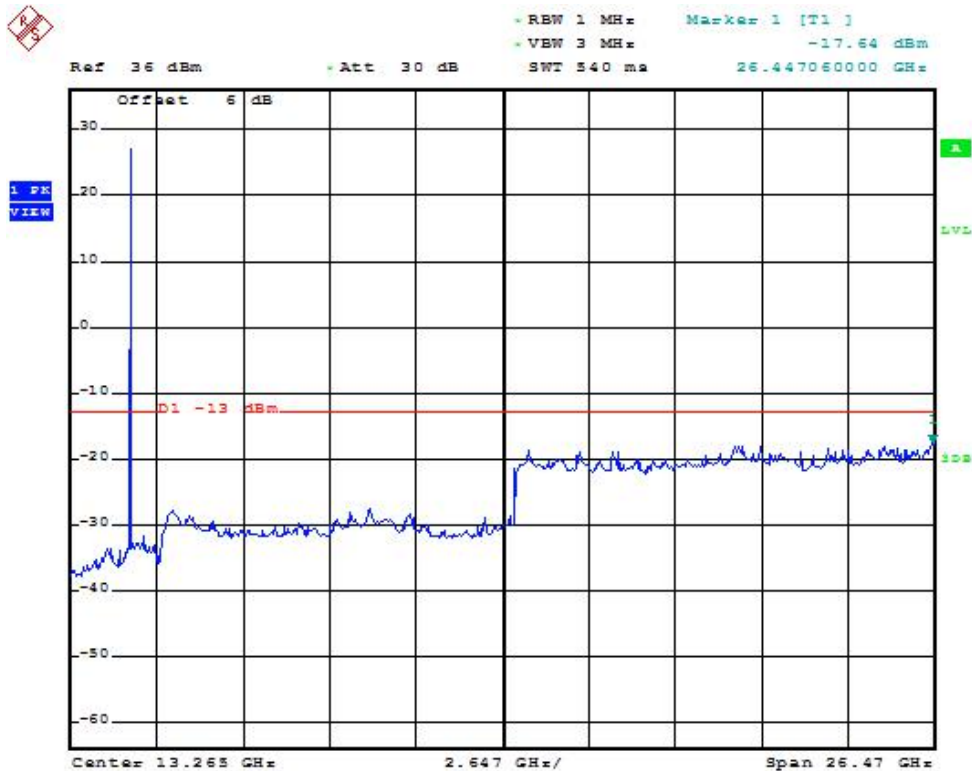
EDGE Low Channel



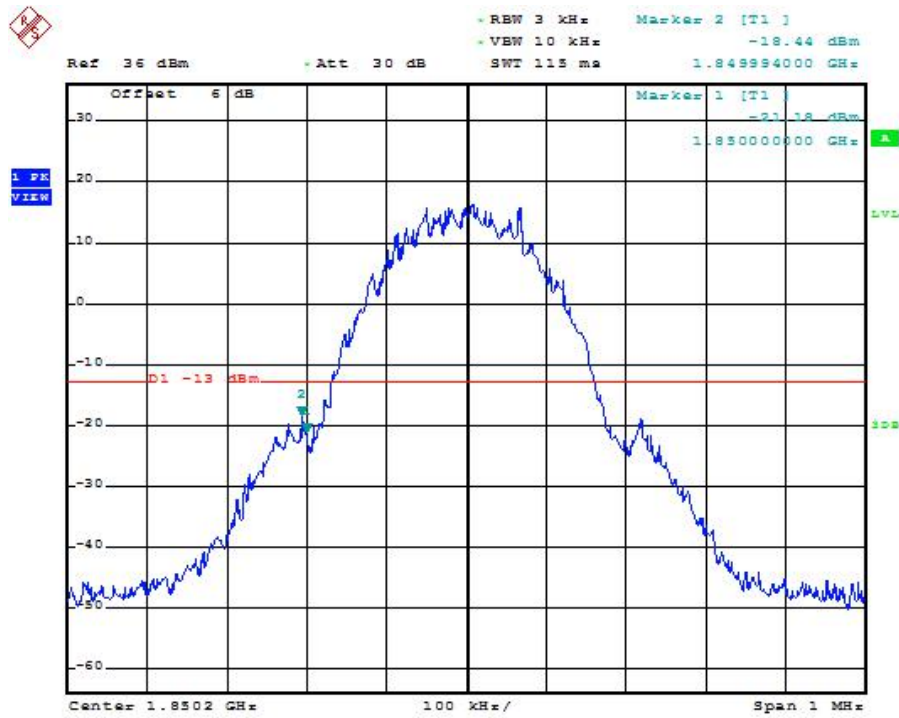
EDGE Middle Channel



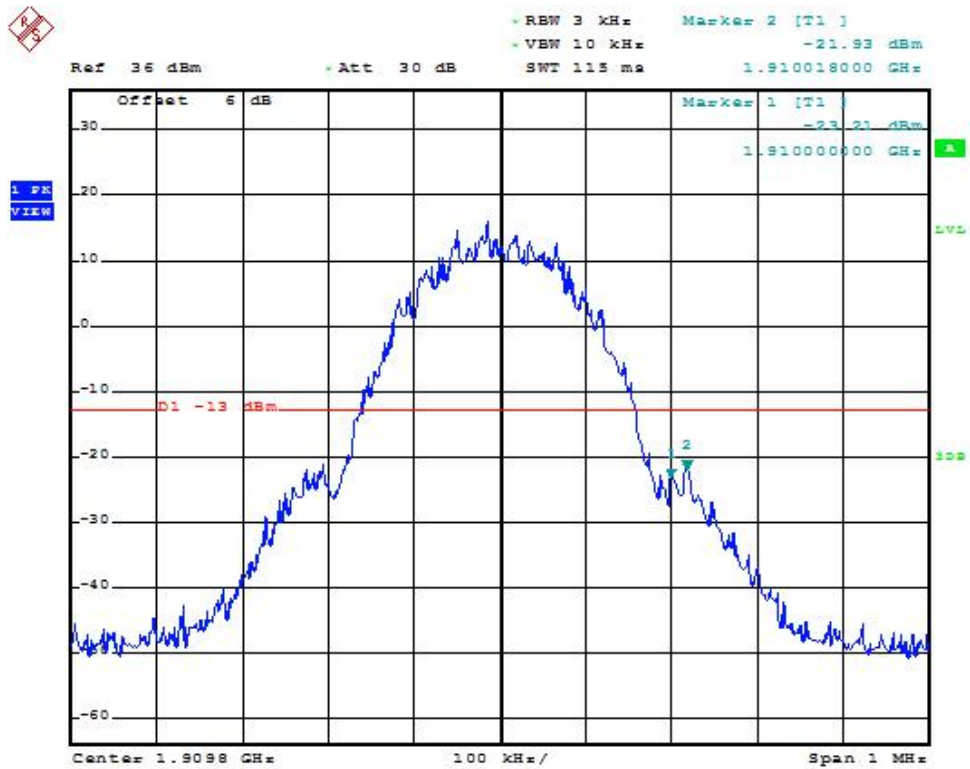
EDGE High Channel



EDGE Low Band Emission



EDGE High Band Emission



8. Spurious Radiated Emissions

8.1 Standard Applicable

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 $43 + 10 \log_{10}(P)$ dB.

8.2 Test Procedure

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.

Spurious attenuation limit in dB = $43 + 10 \log_{10}(\text{power out in Watts})$

8.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

8.4 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

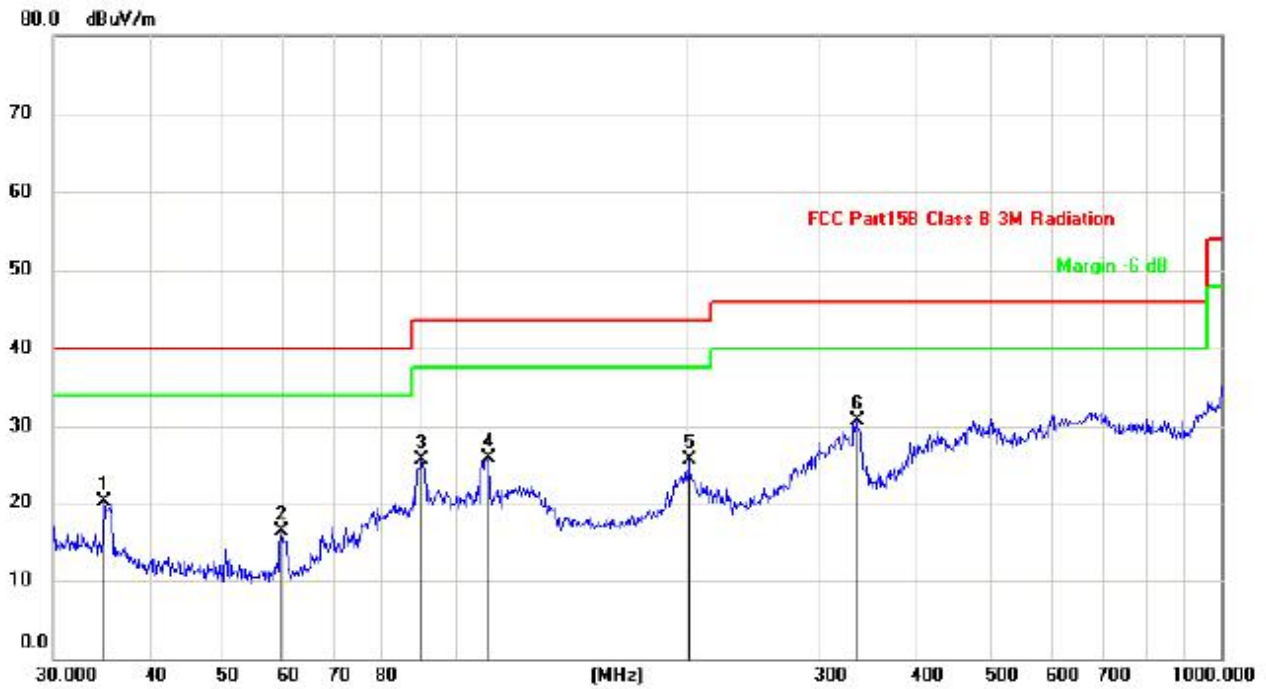
Note:

1. *Worst-case radiated emission below 1GHz is GSM850 mode.*
2. *Worst-case radiated emission above 1GHz is GSM850/GSM1900/ WCDMA BAND 2 mode.*

Spurious Emission From 30MHz to 1GHz

For Cellular Band_ GSM850 Mode

Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		34.8823	18.10	1.96	20.06	40.00	-19.94	QP		
2		59.4405	17.91	-1.54	16.37	40.00	-23.63	QP		
3		90.5374	26.19	-0.55	25.64	43.50	-17.86	QP		
4		110.9570	21.48	4.45	25.93	43.50	-17.57	QP		
5		202.1005	19.27	6.36	25.63	43.50	-17.87	QP		
6	*	334.8589	19.15	11.63	30.78	46.00	-15.22	QP		

Vertical:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dBuV/m	dBuV/m	dBuV/m	dB	cm	degree	Comment
1	*	33.6802	24.57	2.07	26.64	40.00	-13.36	QP		
2		139.8508	17.92	2.25	20.17	43.50	-23.33	QP		
3		202.1005	15.77	6.36	22.13	43.50	-21.37	QP		
4		280.0237	16.81	9.78	26.59	46.00	-19.41	QP		
5		334.8589	14.65	11.63	26.28	46.00	-19.72	QP		
6		492.4685	14.64	14.24	28.88	46.00	-17.12	QP		

*Spurious Emissions Above 1GHz
For Cellular Band_GSM850 Mode*

Frequency	Result	Limit	Margin	Polar
(MHz)	(dBm)	(dBm)	(dB)	H/V
Low channel(824.2MHz)				
1648.4	-46.84	-13	-32.34	H
2472.6	-42.17	-13	-28.87	H
1648.4	-43.06	-13	-29.96	V
2472.6	-40.1	-13	-33.1	V
Middle channel(836.6MHz)				
1673.2	-46.67	-13	-31.52	H
2509.8	-42.09	-13	-33.38	H
1673.2	-42.89	-13	-30.72	V
2509.8	-40.02	-13	-28.05	V
High channel(848.8MHz)				
1697.6	-41.51	-13	-27.51	H
2546.4	-40.58	-13	-28.28	H
1697.6	-41.38	-13	-27.24	V
2546.4	-40.51	-13	-27.31	V

For PCS Band_GSM1900 Mode

Frequency	Result	Limit	Margin	Polar
(MHz)	(dBm)	(dBm)	(dB)	H/V
Low channel(1850.2MHz)				
3700.4	-40.76	-13	-27.62	H
5550.6	-40.65	-13	-27.81	H
3700.4	-39.76	-13	-25.95	V
5550.6	-40.65	-13	-27.02	V
Middle channel(1880MHz)				
3760.0	-38.76	-13	-25.85	H
5640.0	-40.65	-13	-27.83	H
3760.0	-38.76	-13	-25.26	V
5640.0	-40.65	-13	-27.84	V
High channel(1909.8MHz)				
3819.6	-40.06	-13	-27.26	H
5729.4	-40.62	-13	-27.05	H
3819.6	-40.76	-13	-27.62	V
5729.4	-40.12	-13	-27.84	V

Note:

1. Calculation of result is: $\text{Result (dBm)} = \text{Reading (dBm)} + \text{Correction Factor (dB)}$.
2. $\text{Correction Factor (dB)} = \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$.
3. Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

9. Frequency Stability

9.1 Standard Applicable

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile >3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

9.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	DC 3.3-4.2V declared by manufacturer
-30°C to +50°C	Normal

9.3 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

For Cellular Band GSM Mode

Reference Frequency(Middle Channel): 836.6 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	70	0.0837
40	3.8	72	0.0861
30	3.8	71	0.0849
20	3.8	64	0.0765
10	3.8	76	0.0908
0	3.8	68	0.0813
-10	3.8	53	0.0634
-20	3.8	65	0.0777
-30	3.8	64	0.0765

For PCS Band GSM Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.8	48	0.0255
40	3.8	49	0.0261
30	3.8	45	0.0239
20	3.8	51	0.0271
10	3.8	49	0.0261
0	3.8	50	0.0266
-10	3.8	61	0.0324
-20	3.8	56	0.0298
-30	3.8	65	0.0335

For Cellular Band GPRS Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	62	0.0741
40	3.7	64	0.0765
30	3.7	58	0.0693
20	3.7	52	0.0622
10	3.7	60	0.0717
0	3.7	55	0.0657
-10	3.7	40	0.0478
-20	3.7	45	0.0538
-30	3.7	41	0.0490

For PCS Band GPRS Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	71	0.0378
40	3.7	75	0.0399
30	3.7	66	0.0351
20	3.7	73	0.0388
10	3.7	70	0.0372
0	3.7	72	0.0383
-10	3.7	75	0.0399
-20	3.7	60	0.0319
-30	3.7	63	0.0335

For Cellular Band EDGE Mode

Reference Frequency(Middle Channel): 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	61	0.0729
40	3.7	60	0.0717
30	3.7	55	0.0657
20	3.7	59	0.0705
10	3.7	64	0.0765
0	3.7	53	0.0634
-10	3.7	47	0.0562
-20	3.7	56	0.0669
-30	3.7	44	0.0526

For PCS Band EDGE Mode

Reference Frequency(Middle Channel): 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		MCF (Hz)	Error (ppm)
50	3.7	64	0.0340
40	3.7	65	0.0346
30	3.7	60	0.0319
20	3.7	70	0.0372
10	3.7	65	0.0346
0	3.7	74	0.0394
-10	3.7	78	0.0415
-20	3.7	51	0.0271
-30	3.7	56	0.0298

So, Frequency Stability Versus Input Voltage is:

Reference Frequency(Middle Channel): GSM 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	61	0.0729
	3.7	60	0.0717
	4.3	65	0.0777
Reference Frequency(Middle Channel): GSM 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	46	0.0245
	3.7	49	0.0261
	4.3	57	0.0303
Reference Frequency(Middle Channel): GPRS 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	48	0.0574
	3.7	50	0.0598
	4.3	53	0.0634
Reference Frequency(Middle Channel): GPRS 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	70	0.0372
	3.7	73	0.0388
	4.3	71	0.0378

Reference Frequency(Middle Channel): EDGE 836.6MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	48	0.0574
	3.7	51	0.0610
	4.2	54	0.0645
Reference Frequency(Middle Channel): EDGE 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Frequency (Hz)	Error (ppm)
20	3.3	60	0.0319
	3.7	65	0.0346
	4.3	63	0.0335

***** END OF REPORT *****