FCC PART 22H, PART 24E

MEASUREMENT AND TEST REPORT

For

MOBIWIRE MOBILES (NINGBO) CO., LTD

No.999, Dacheng East Road, Fenghua, Zhejiang, China

FCC ID: 2ADA4P281

Report Type:	**Product Type:**
Original Report	3G Smart Feature Phone

Test Engineer:	Aaron Wang
Report Number:	RSHA180105001-00D
Report Date:	2018-02-23
Reviewed By:	Oscar Ye RF Leader
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road,Kunshan,Jiangsu province,China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	MOBIWIRE MOBILES (NINGBO) CO., LTD
Tested Model	P281
Product Type	3G Smart Feature Phone
Dimension	128.3 mm (L)* 58 mm (W)*10.75 mm(H)
Power Supply	DC 3.7V by battery

**All measurement and test data in this report was gathered from production sample serial number: 20180105001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2018-01-05)*

Objective

This type approval report is prepared on behalf of MOBIWIRE MOBILES (NINGBO) CO., LTD in accordance with Part 2, Part 22-Subpart H and Part 24-Subpart E of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS and Part 15.247 DSS submissions with FCC ID: 2ADA4P281.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-Part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services

Applicable Standards: TIA/EIA 603-D.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.11dB
	1GHz~6GHz	4.45dB
	6GHz~18GHz	5.23dB
	18GHz~40GHz	5.65dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road,Kunshan,Jiangsu province,China.

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

Channel List

Mode	Channel		Frequency(MHz)
GSM/GPRS/EGPRS 850	Low	128	824.2
	Middle	190	836.6
	High	251	848.8
PCS/GPRS/EGPRS 1900	Low	512	1850.2
	Middle	661	1880.0
	High	810	1909.8
WCDMA Band II	Low	9262	1852.4
	Middle	9400	1880.0
	High	9538	1907.6
WCDMA Band V	Low	4132	826.4
	Middle	4183	836.6
	High	4233	846.6

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

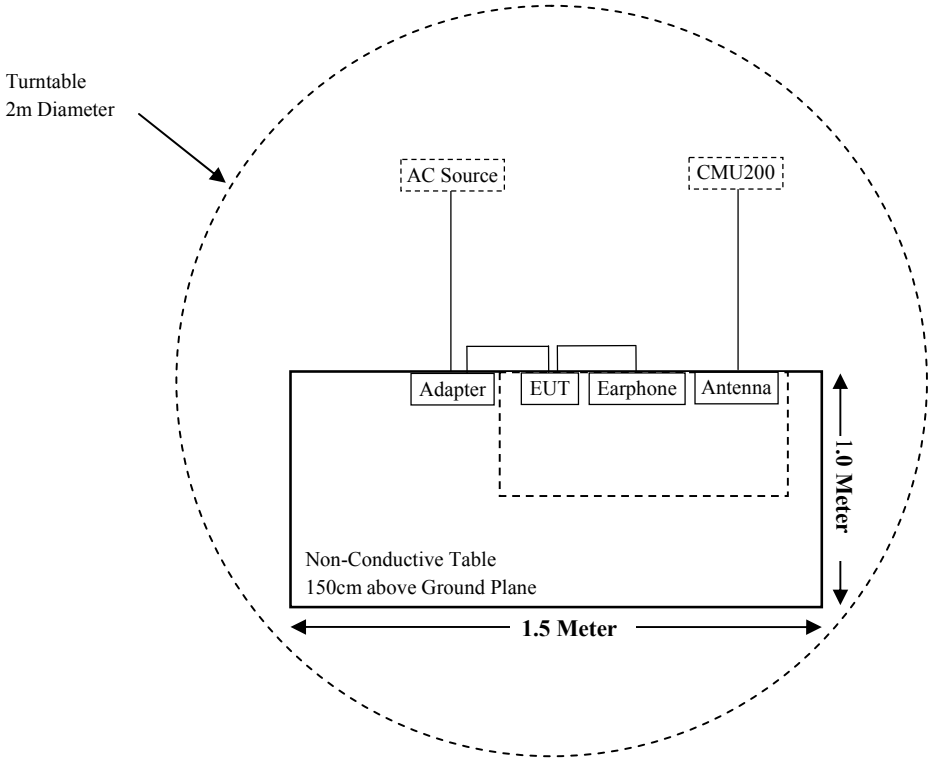
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
MOBIWIRE	Earphone	/	/
TE CONNECTIVITY	Antenna	/	/
TENPAO	Adapter Input: AC100-240V,50/60Hz,150Ma Output: DC5V, 1000mA	S005UA0500100	178111868

External Cable List and Details

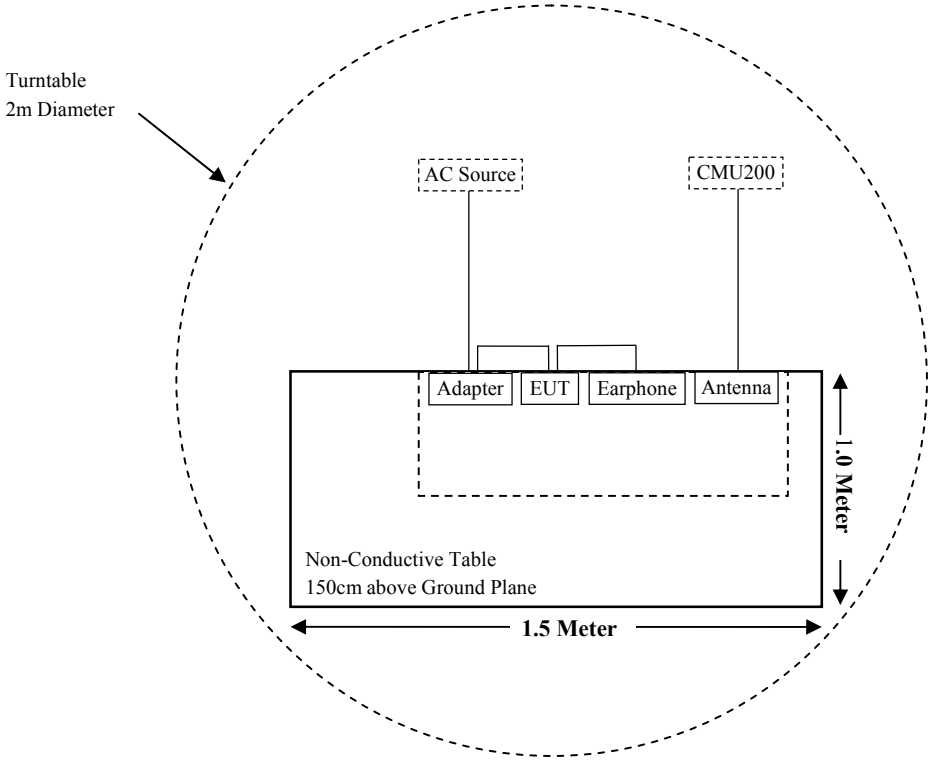
Cable Description	Shielding Type	Length (m)	From Port	To
/	/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz)



For Radiated Emissions(Above 1GHz)



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307(b)(1)& §2.1093	RF Exposure Information	Compliance
§2.1046; § 22.913 (a);§ 24.232 (c)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238	Occupied Bandwidth	Compliance
§ 2.1051; § 22.917 (a); § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a)	Spurious Radiated Emissions	Compliance
§ 22.917 (a); § 24.238 (a)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235	Frequency stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2017-11-12	2018-11-11
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2016-12-26	2019-12-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Sonoma Instrunent	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2017-11-12	2018-11-11
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-12
Narda	Pre-amplifier	AFS42-00101800	2001270	2017-12-12	2018-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2017-12-12	2018-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2017-11-12	2018-11-11

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2017-11-12	2018-11-11
BACL	Temperature & Humidity Chamber	BTH-150	30023	2017-10-10	2018-10-09
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	2017-10-10	2018-10-09
MOBIWIRE	RF Cable	/	/	/	/

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1307,§2.1093.

Test Result

Compliance, please refer to the SAR report: RSH180105051-20M1.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d) , Part 22H & 24E, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC §2.1046; § 22.913 (a);§ 24.232 (c) - RF OUTPUT POWER

Applicable Standards

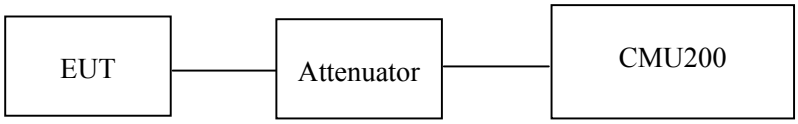
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts(38.45dBm).

According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts(33dBm) EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMU200 through sufficient attenuation.



Test Data

Environmental Conditions

Temperature:	23.4℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Aaron Wang on 2018-01-23.

Conducted Power:

GSM 850 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.50	38.45
	190	836.6	32.70	38.45
	251	848.8	32.70	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.47	31.55	29.87	29.13	38.45
	190	836.6	32.55	31.61	29.91	29.19	38.45
	251	848.8	32.67	31.74	29.99	29.27	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	27.13	26.99	26.80	26.64	38.45
	190	836.6	27.17	27.01	26.91	26.71	38.45
	251	848.8	27.33	27.17	27.01	26.86	38.45

WCDMA Band V

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	Rel 99	1	21.00	21.51	21.02
		HSDPA	1	20.92	21.21	20.76
			2	20.95	21.39	21.00
			3	20.76	21.16	20.88
			4	20.65	21.36	20.77
		HSUPA	1	20.90	21.11	20.97
			2	20.90	21.31	20.77
			3	20.64	21.34	20.74
			4	20.75	21.42	21.00
			5	21.00	21.42	20.72
		HSPA+	1	20.80	21.11	20.83

PCS 1900 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	30.10	33
	661	1880.0	29.80	33
	810	1909.8	29.80	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.87	29.12	27.67	26.51	33
	661	1880.0	29.74	28.89	27.42	26.31	33
	810	1909.8	29.68	28.76	27.16	26.21	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	26.15	26.03	25.86	25.68	33
	661	1880.0	26.34	26.21	26.05	25.84	33
	810	1909.8	26.45	26.30	26.18	26.06	33

WCDMA Band II

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	Rel 99	1	21.54	22.45	21.56
		HSDPA	1	21.16	22.09	21.43
			2	21.19	22.06	21.28
			3	21.51	22.09	21.38
			4	21.44	22.39	21.51
		HSUPA	1	21.38	22.14	21.19
			2	21.17	22.29	21.42
			3	21.54	22.18	21.16
			4	21.28	22.38	21.55
			5	21.17	22.27	21.43
		HSPA+	1	21.19	22.26	21.34

Peak-to-average ratio (PAR):

PCS 1900 Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	2.11	13
	Middle	2.12	13
	High	2.10	13

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.13	13
	Middle	2.11	13
	High	2.12	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.10	13
	Middle	2.09	13
	High	2.13	13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA	Low	2.68	13
	Middle	2.66	13
	High	2.67	13
HSDPA	Low	2.27	13
	Middle	2.29	13
	High	2.30	13
HSUPA	Low	2.37	13
	Middle	2.41	13
	High	2.42	13
HSPA+	Low	2.24	13
	Middle	2.21	13
	High	2.24	13

Radiated Power:

GSM Mode

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
GSM850, Middle Channel (ERP)										
836.6	94.87	213	117	H	31.18	0.63	-1.14	29.41	38.45	9.04
836.6	99.16	323	247	V	32.01	0.63	-1.14	30.24	38.45	8.21
EGPRS 850, Middle Channel (ERP)										
836.6	89.46	45	137	H	25.77	0.63	-1.14	24.00	38.45	14.45
836.6	94.03	12	175	V	26.88	0.63	-1.14	25.11	38.45	13.34
PCS 1900, Middle Channel (EIRP)										
1880.0	90.14	298	207	H	19.10	0.85	8.81	27.06	33	5.94
1880.0	92.26	178	142	V	20.91	0.85	8.81	28.87	33	4.13
EGPRS 1900, Middle Channel (EIRP)										
1880.0	86.13	25	123	H	15.09	0.85	8.81	23.05	33	9.95
1880.0	87.54	64	241	V	16.19	0.85	8.81	24.15	33	8.85

WCDMA Mode

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Band V, Middle Channel(ERP)										
836.6	85.56	315	155	H	21.87	0.63	-1.14	20.10	38.45	18.35
836.6	90.78	313	213	V	23.63	0.63	-1.14	21.86	38.45	16.59
WCDMA Band II, Middle Channel(EIRP)										
1880.0	82.12	135	227	H	11.08	0.85	8.81	19.04	33	13.96
1880.0	84.31	318	128	V	12.96	0.85	8.81	20.92	33	12.08

Note:
All above data were tested with no amplifier.
Absolute Level = Submitted Level - Cable loss + Antenna Gain
Margin = Limit- Absolute Level

FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH

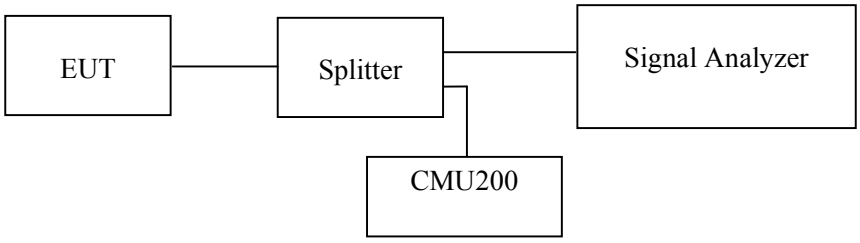
Applicable Standards

FCC 47 §2.1049, §22.917, §22.905 & §24.238.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 5 kHz (Cellular /PCS) & 100 kHz (WCDMA) and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	23 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Aaron Wang from 2018-01-22 to 2018-02-23

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GSM (GMSK)	836.6	0.319	0.244
GPRS (GMSK)	836.6	0.323	0.244
EGPRS (GMSK)	836.6	0.321	0.244

WCDMA Band V

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	836.6	4.729	4.168
WCDMA (HSDPA)	836.6	4.669	4.168
WCDMA (HSUPA)	836.6	4.689	4.168

PCS 1900 Band

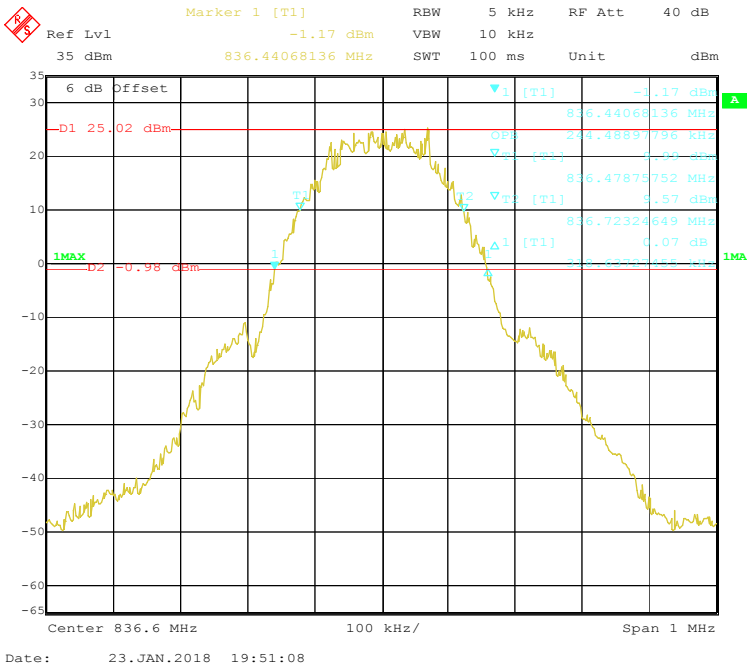
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GSM (GMSK)	1880.0	0.315	0.244
GPRS (GMSK)	1880.0	0.319	0.244
EGPRS (GMSK)	1880.0	0.321	0.244

WCDMA Band II

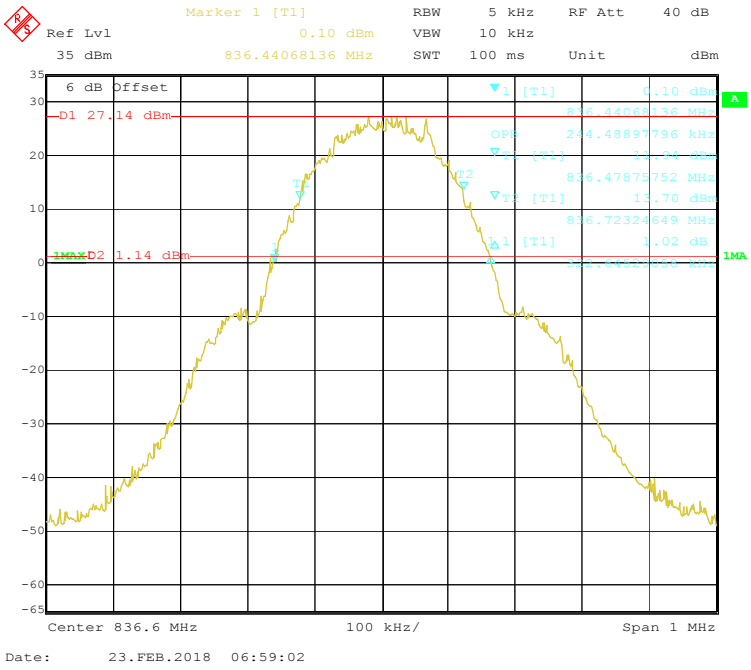
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	1880.0	4.709	4.168
WCDMA (HSDPA)	1880.0	4.729	4.168
WCDMA (HSUPA)	1880.0	4.709	4.168

GSM 850 Band

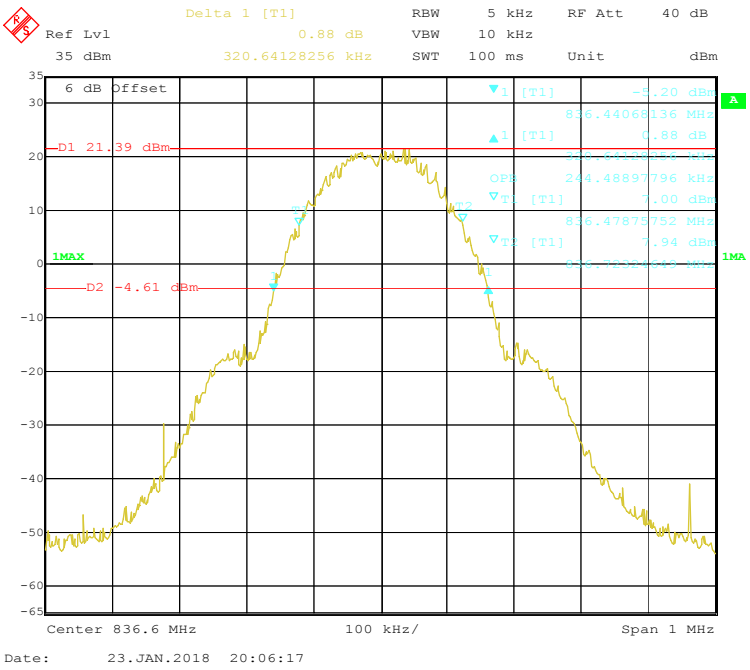
99% Occupied & 26 dB Emissions Bandwidth for GSM (GMSK) Mode



99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode

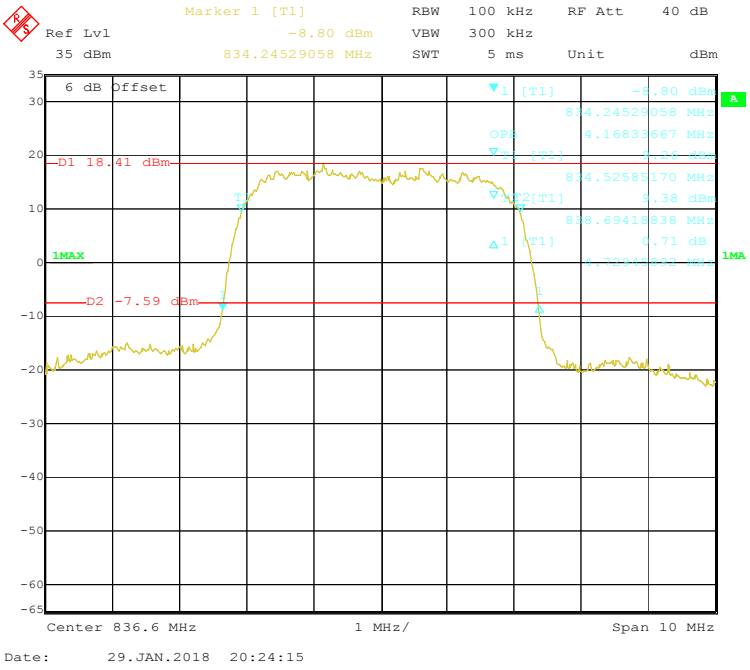


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (GMSK) Mode

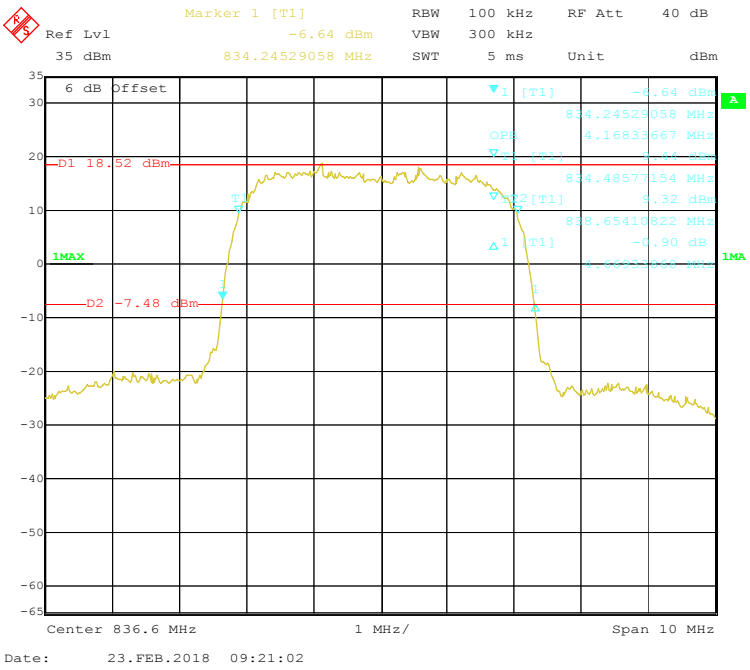


WCDMA Band V

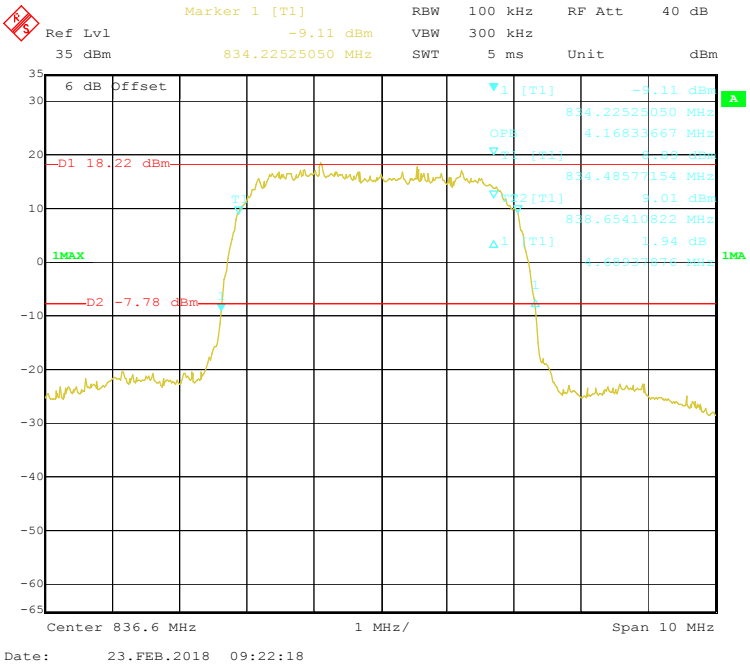
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode



99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode

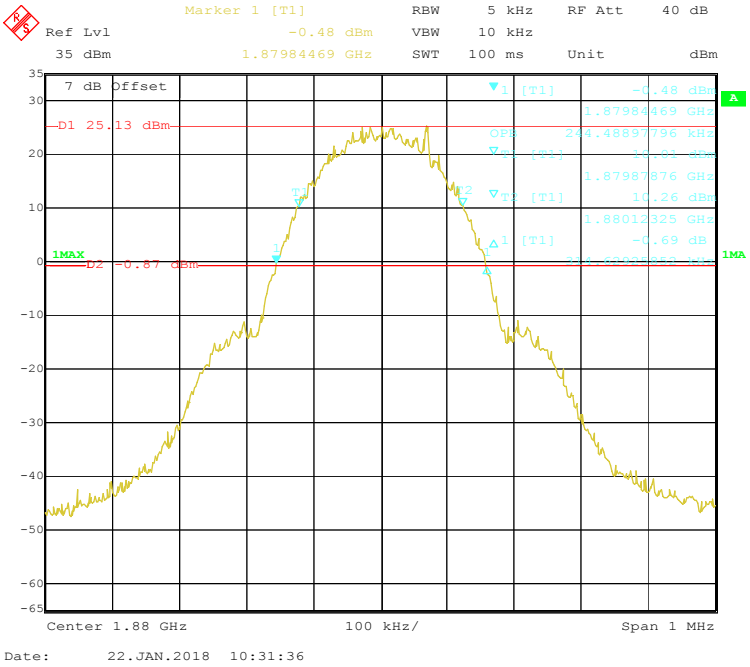


99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode

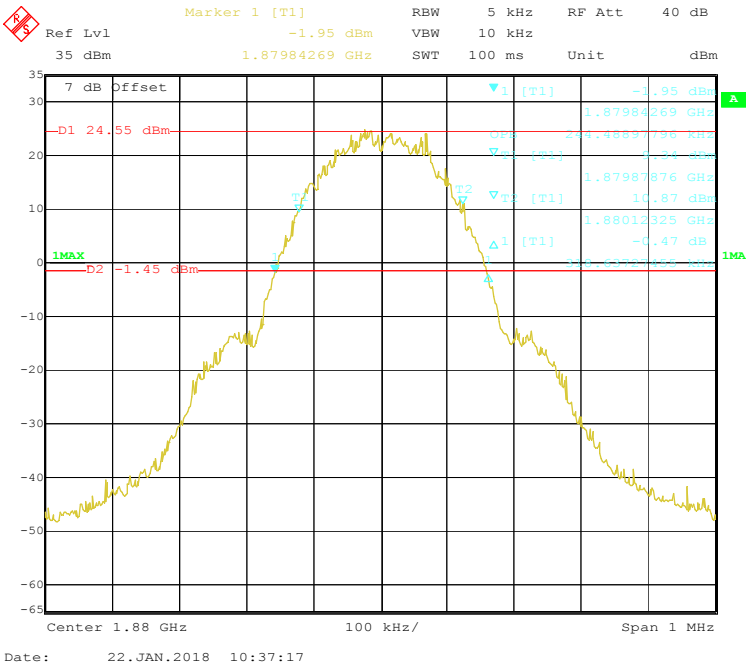


PCS 1900Band

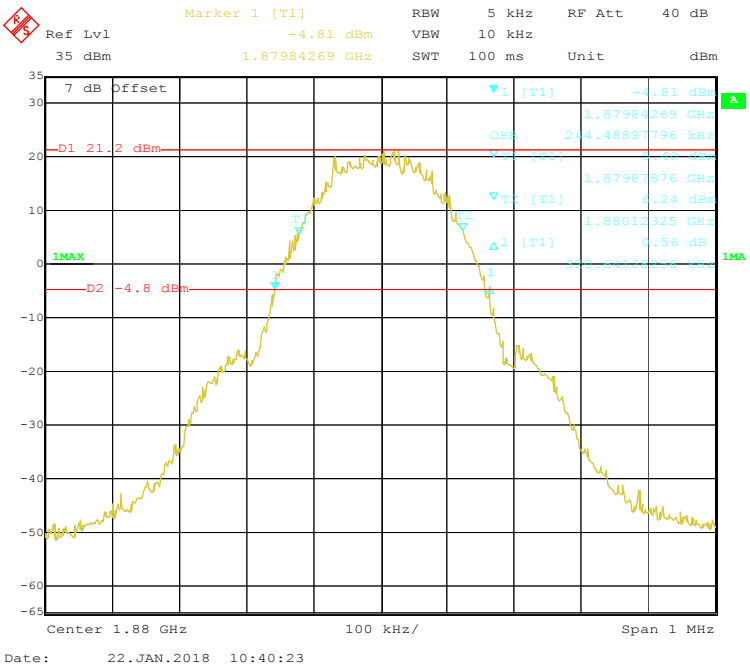
99% Occupied & 26 dB Emissions Bandwidth for GSM (GMSK) Mode



99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode

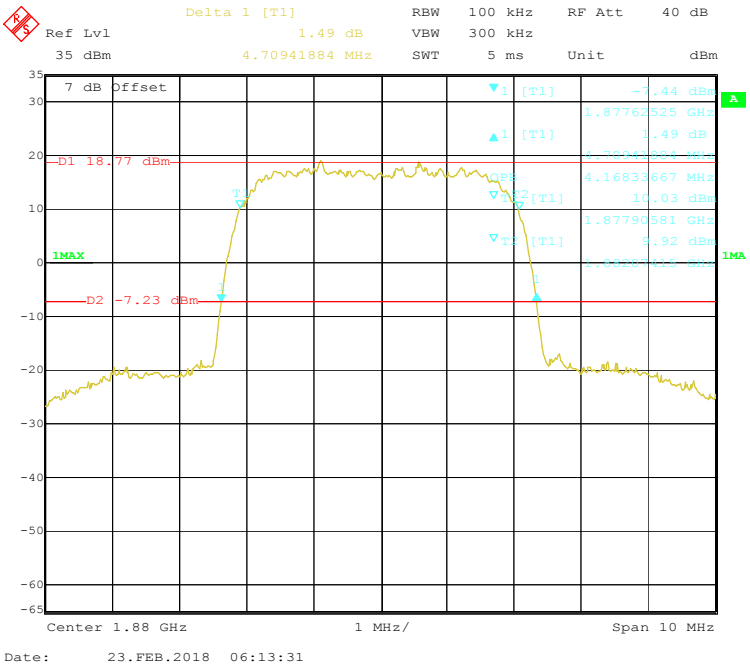


99% Occupied & 26 dB Emissions Bandwidth for EGPRS (GMSK) Mode

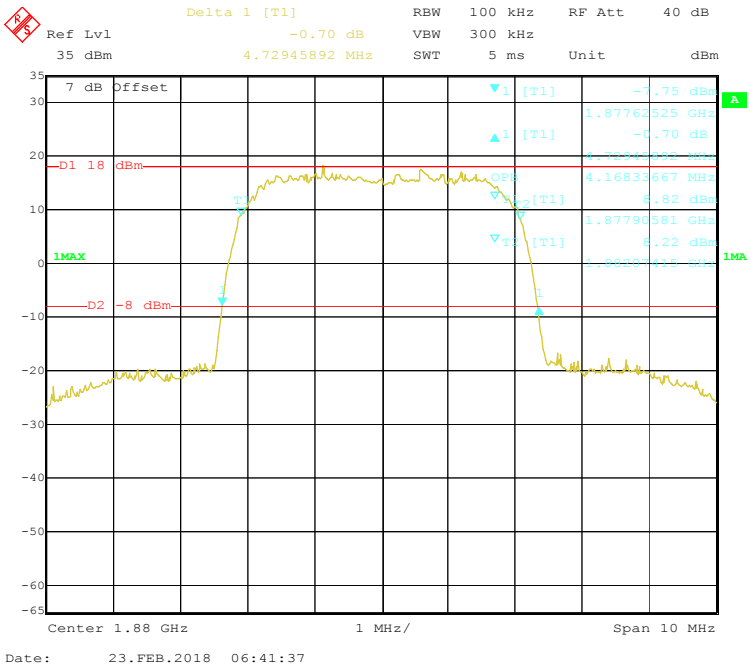


WCDMA Band II

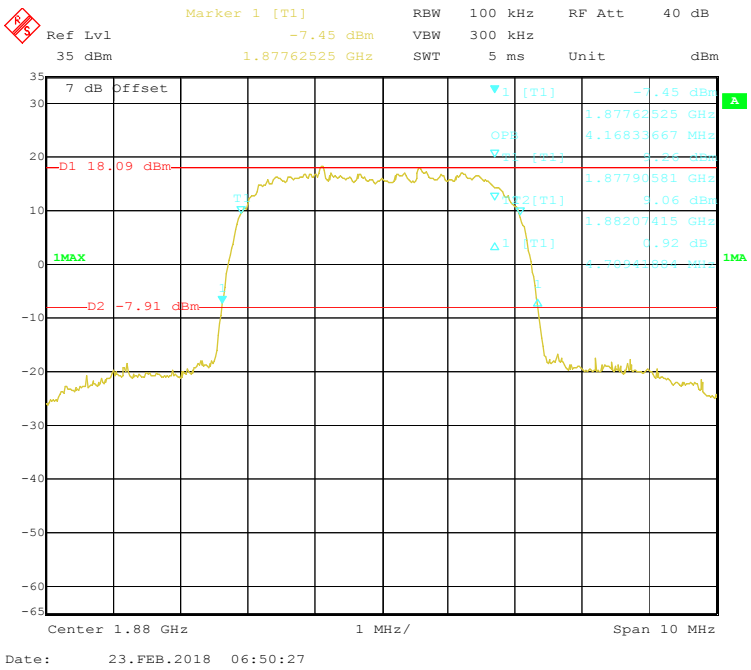
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode



99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSDPA) Mode



99% Occupied & 26 dB Emissions Bandwidth for WCDMA (HSUPA) Mode



FCC § 2.1051; § 22.917 (a);§ 24.238 (a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

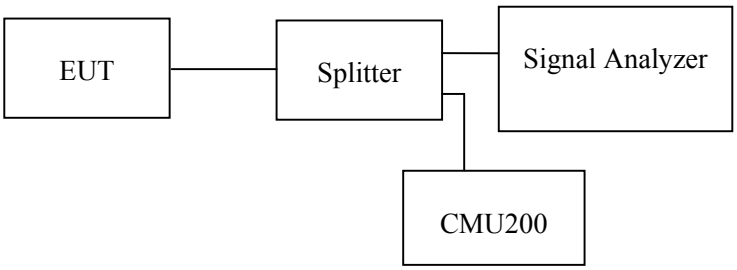
Applicable Standards

FCC §2.1051, §22.917(a) and §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz & 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

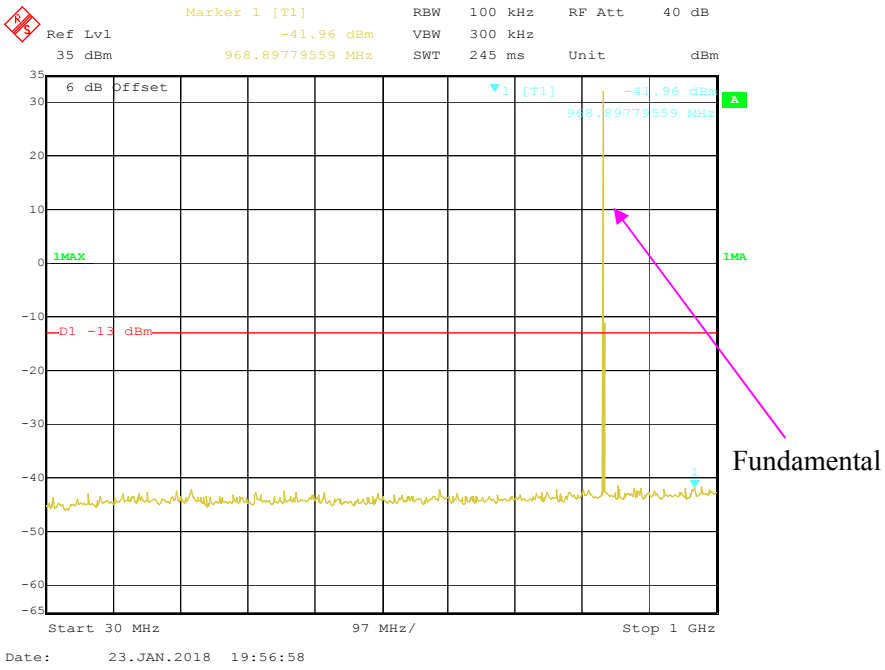
The testing was performed by Aaron Wang on 2018-01-22 & 2018-01-23.

EUT operation mode: Transmitting

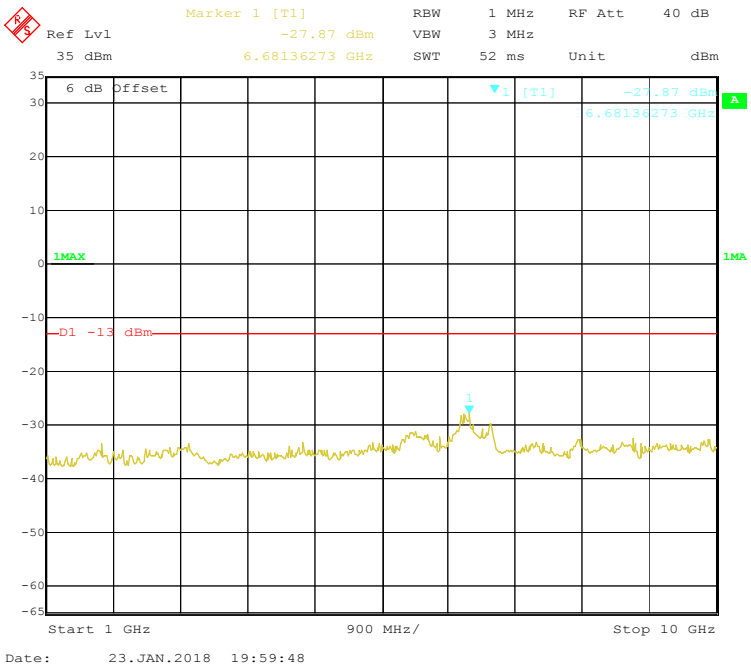
Test Result: Compliance.

GSM 850 Band:

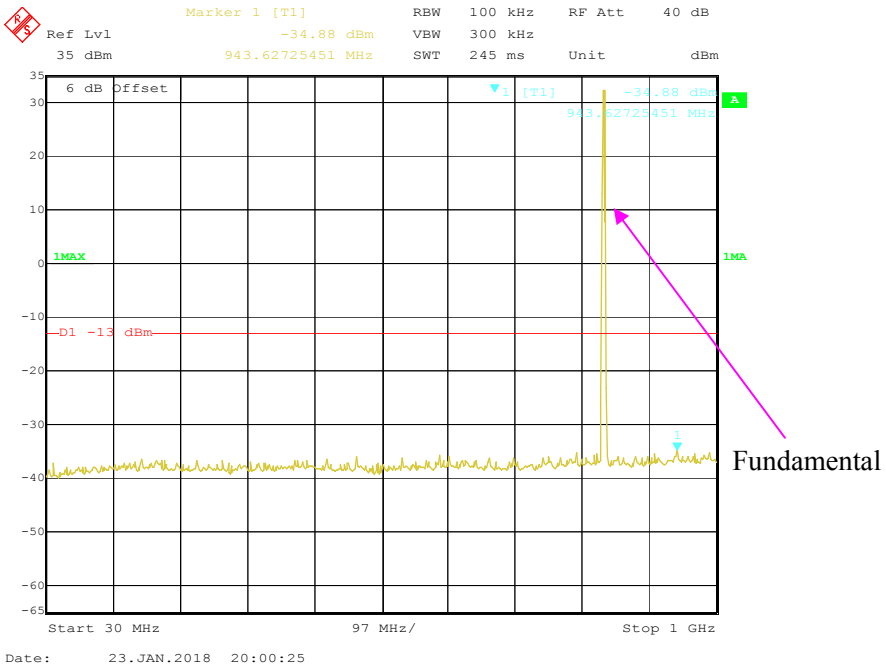
30 MHz – 1GHz(GSM Mode)



1 GHz – 10 GHz (GSM Mode)

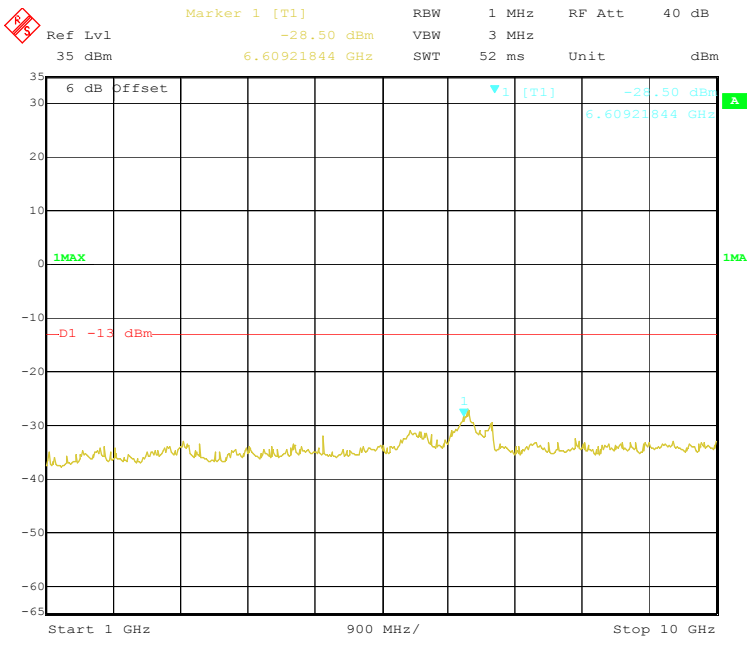


30 MHz – 1GHz(GPRS Mode)



Date: 23.JAN.2018 20:00:25

1 GHz – 10 GHz (GPRS Mode)



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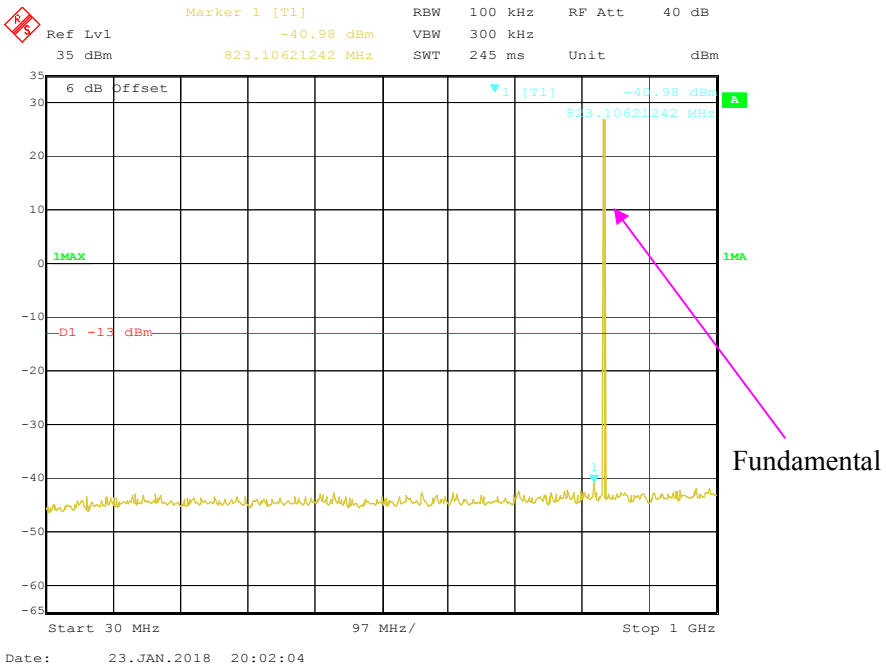
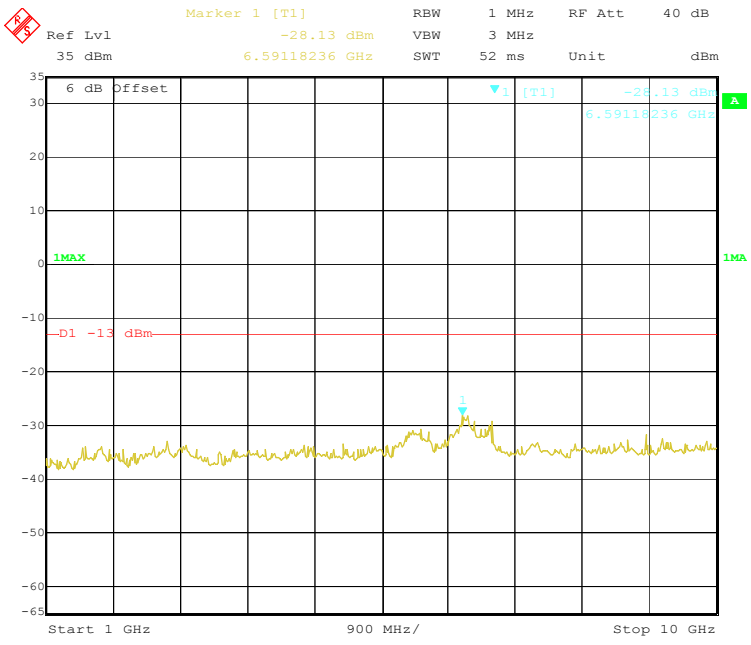
30 MHz – 1GHz(EGPRS Mode)



Date: 23.JAN.2018 20:02:04

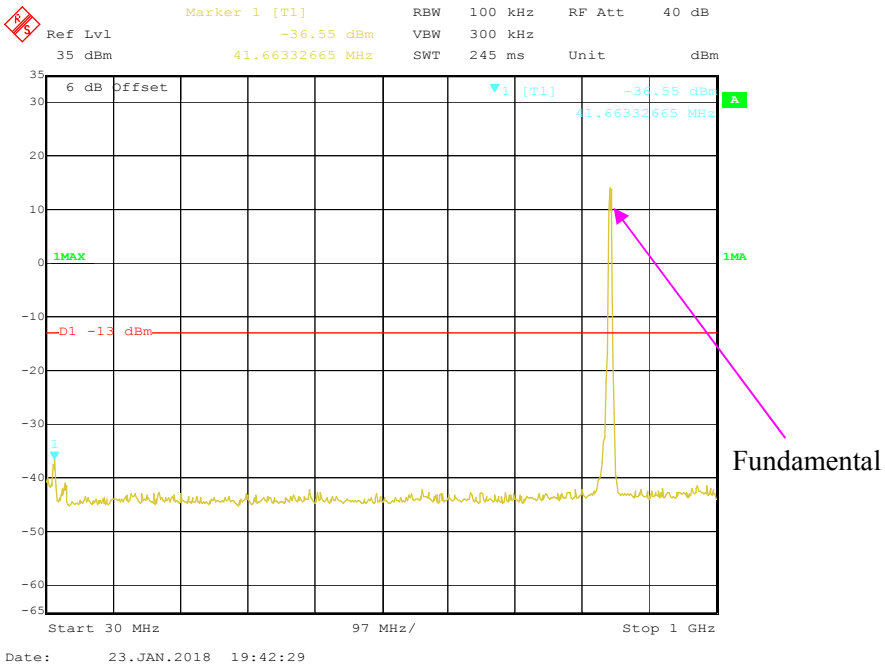
1 GHz – 10 GHz (EGPRS Mode)



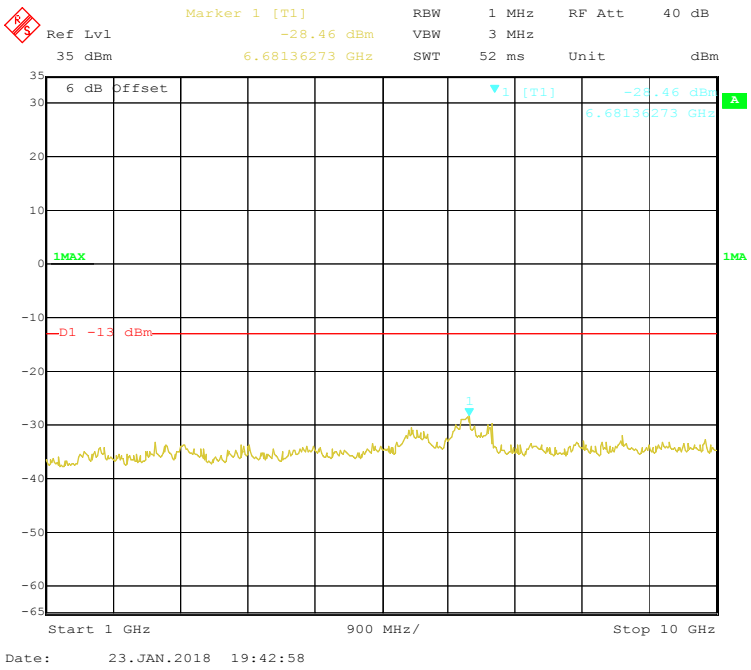
Date: 23.JAN.2018 19:58:57

WCDMA Band V:

30 MHz – 1GHz(WCDMA Mode)

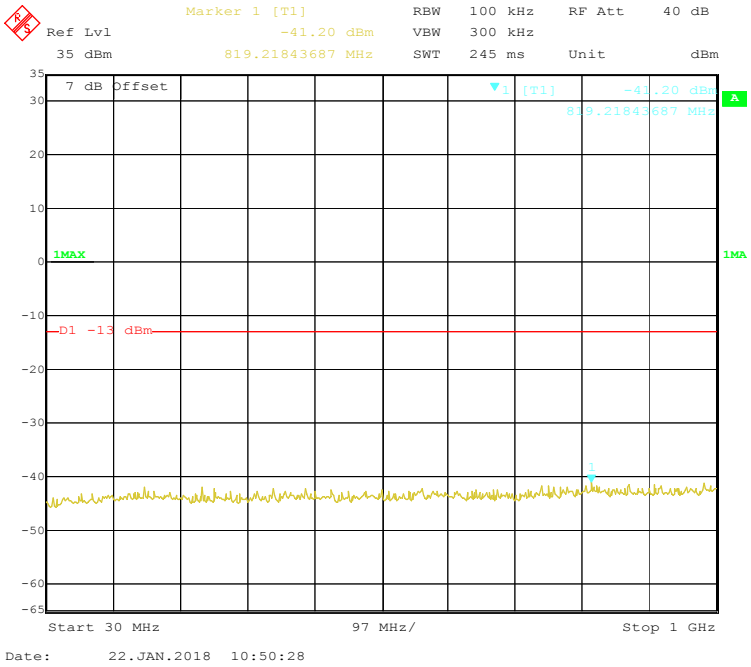


1 GHz – 10 GHz (WCDMA Mode)

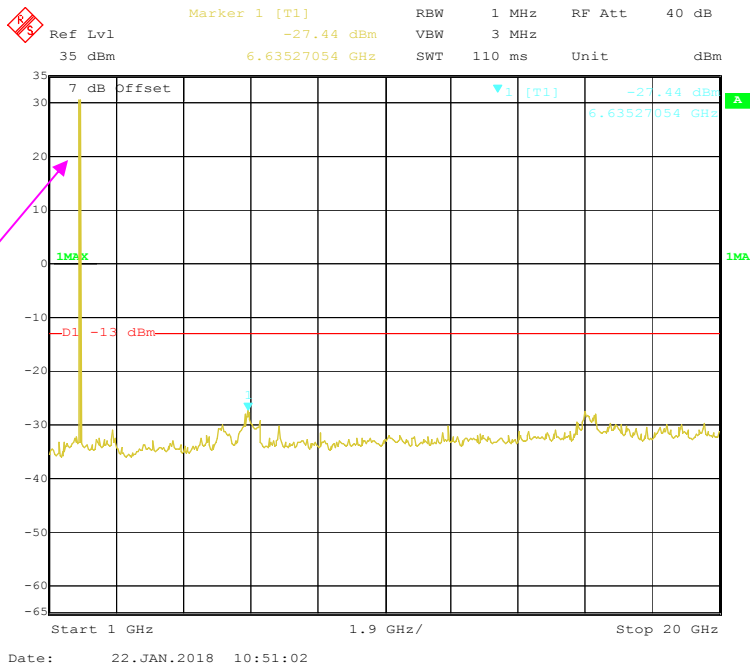


PCS 1900 Band:

30 MHz – 1GHz(GSM Mode)

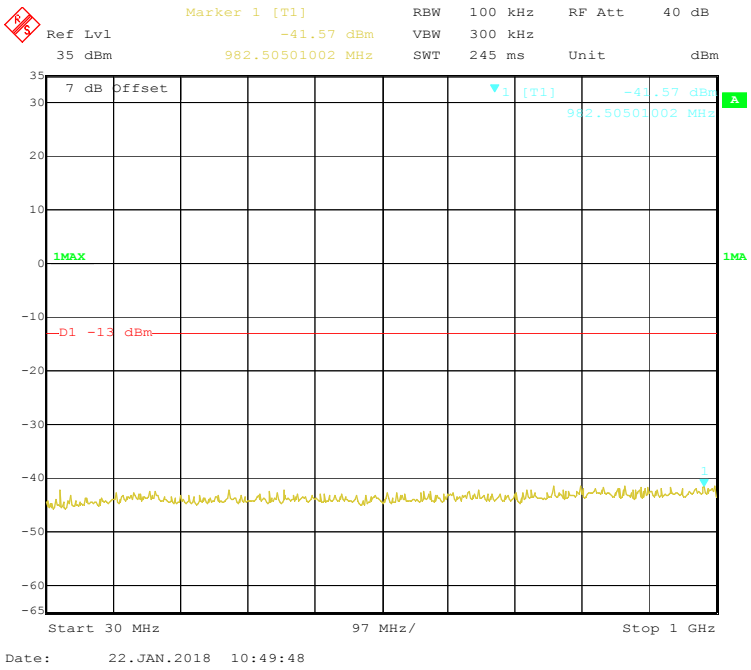


1 GHz – 20 GHz (GSM Mode)

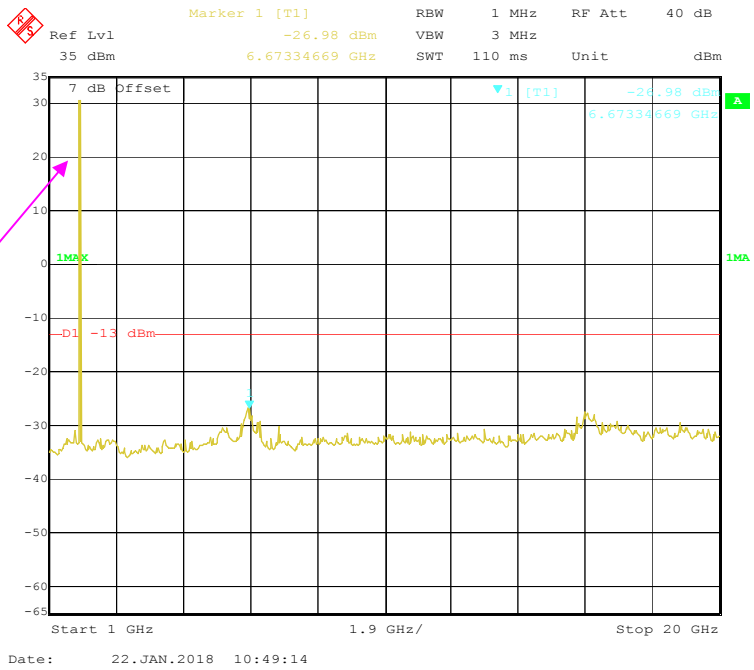


Fundamental

30 MHz – 1GHz(GPRS Mode)

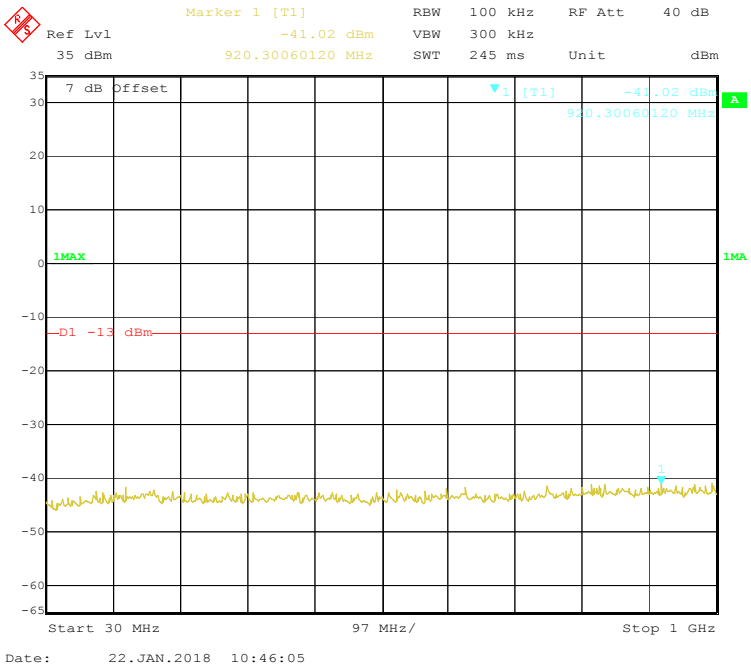


1 GHz – 20 GHz (GPRS Mode)

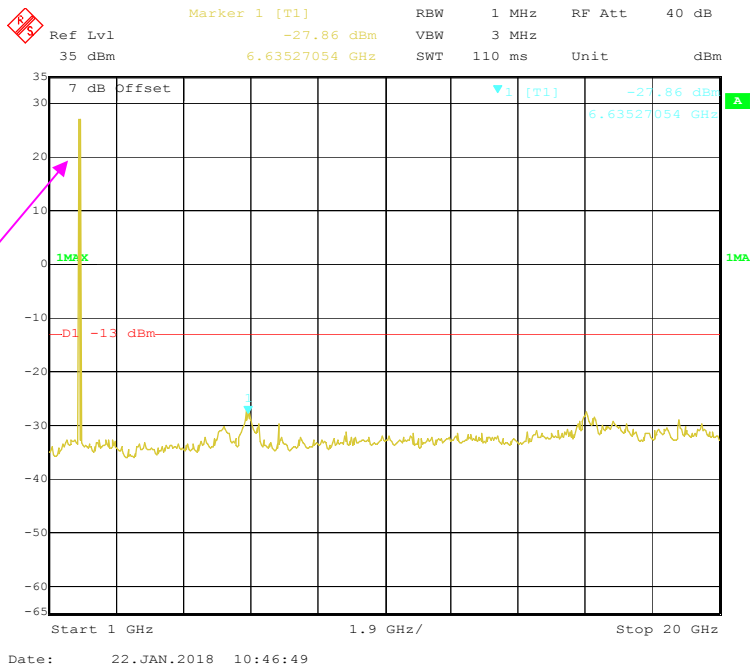


Fundamental

30 MHz – 1GHz(EGPRS Mode)



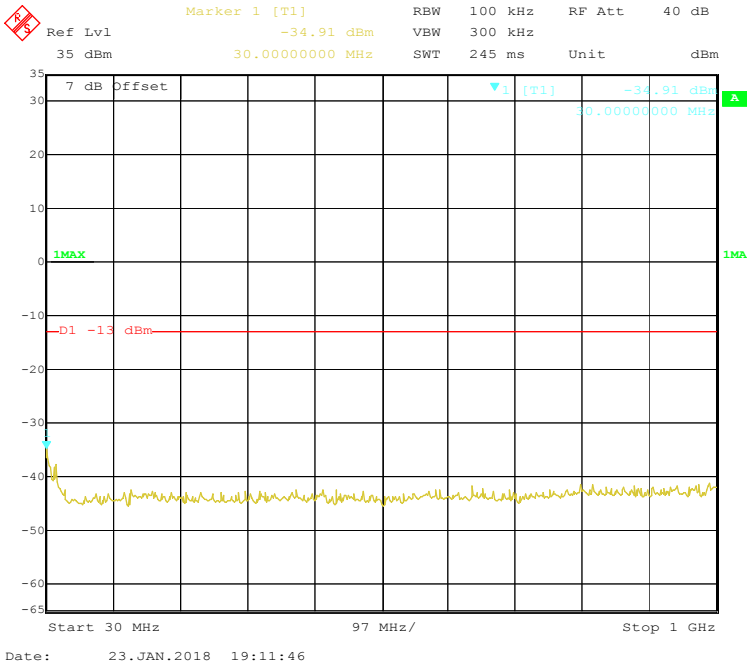
1 GHz – 20 GHz (EGPRS Mode)



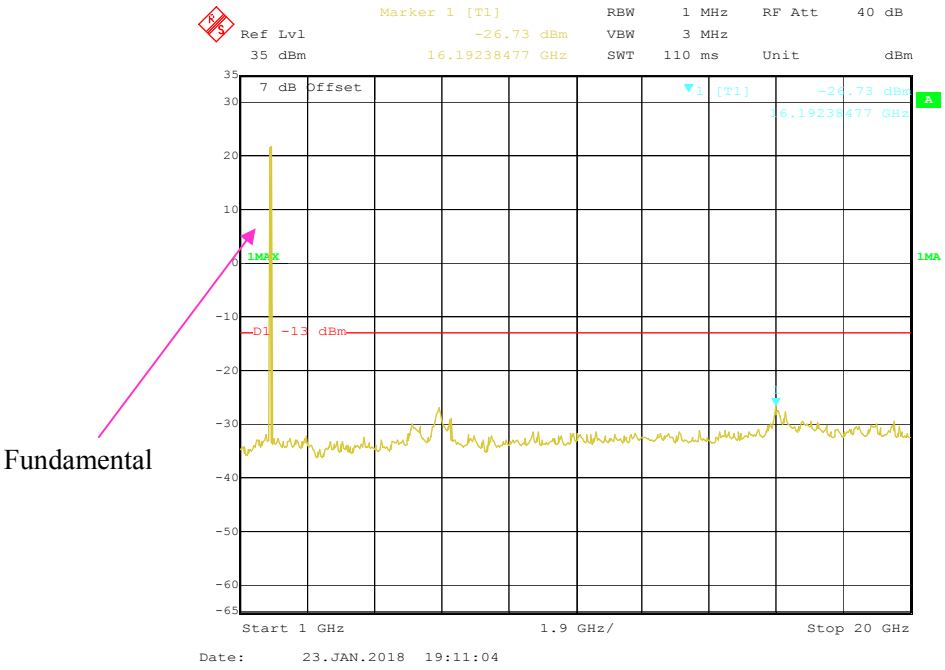
Fundamental

WCDMA Band II:

30 MHz – 1 GHz (WCDMA Mode)



1 GHz – 20 GHz (WCDMA Mode)



FCC § 2.1053; § 22.917 (a);§ 24.238 (a) - SPURIOUS RADIATED EMISSIONS

Applicable Standards

FCC § 2.1053, §22.917(a) and § 24.238(a)

22.917 (a) Out of band emissions. The power of any emission 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.

24.238 (a) Out of band emissions. The power of any emission 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.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

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.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

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 emissions in dB = 10 lg (TX pwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Aaron Wang on 2018-01-28.

Test mode: Transmitting (Pre-scan with low, middle and high channels, and the worse case data as below)

30 MHz ~ 10 GHz:

GSM 850 Band

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GSM Mode, Middle channel										
122.37	55.12	117	185	H	-51.20	0.35	-6.09	-57.64	-13	44.64
122.37	56.99	312	153	V	-42.40	0.35	-6.09	-48.84	-13	35.84
1673.20	59.37	122	164	H	-51.58	0.84	8.48	-43.94	-13	30.94
1673.20	60.12	339	219	V	-51.08	0.84	8.48	-43.44	-13	30.44
2509.80	59.73	20	172	H	-48.89	0.89	10.09	-39.69	-13	26.69
2509.80	59.37	246	121	V	-49.32	0.89	10.09	-40.12	-13	27.12

WCDMA Band V

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
122.37	54.78	101	143	H	-51.54	0.35	-6.09	-57.98	-13	44.98
122.37	56.23	340	146	V	-43.16	0.35	-6.09	-49.60	-13	36.60
1673.20	58.69	323	141	H	-52.26	0.84	8.48	-44.62	-13	31.62
1673.20	62.37	146	174	V	-48.83	0.84	8.48	-41.19	-13	28.19
2509.80	54.66	158	200	H	-53.96	0.89	10.09	-44.76	-13	31.76
2509.80	55.37	2	218	V	-53.32	0.89	10.09	-44.12	-13	31.12

30 MHz ~ 20 GHz:

PCS 1900 Band

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GSM Mode, Middle channel										
122.37	54.67	73	101	H	-51.65	0.35	-6.09	-58.09	-13	45.09
122.37	56.31	266	207	V	-43.08	0.35	-6.09	-49.52	-13	36.52
3760.00	50.37	213	117	H	-53.32	0.95	9.74	-44.53	-13	31.53
3760.00	51.99	338	105	V	-52.02	0.95	9.74	-43.23	-13	30.23
5640.00	48.12	321	191	H	-52.39	1.15	10.47	-43.07	-13	30.07
5640.00	46.55	321	178	V	-54.26	1.15	10.47	-44.94	-13	31.94

WCDMA Band II

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
122.37	54.31	252	169	H	-52.01	0.35	-6.09	-58.45	-13	45.45
122.37	55.12	137	154	V	-44.27	0.35	-6.09	-50.71	-13	37.71
3760.00	59.31	328	166	H	-44.38	0.95	9.74	-35.59	-13	22.59
3760.00	55.19	118	201	V	-48.82	0.95	9.74	-40.03	-13	27.03
5640.00	58.37	173	155	H	-42.14	1.15	10.47	-32.82	-13	19.82
5640.00	57.66	280	216	V	-43.15	1.15	10.47	-33.83	-13	20.83

FCC § 22.917 (a);§ 24.238 (a) - BAND EDGES

Applicable Standards

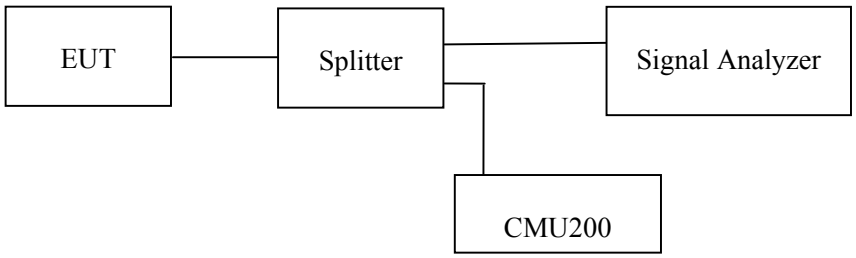
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency



Test Data

Environmental Conditions

Temperature:	23.3 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

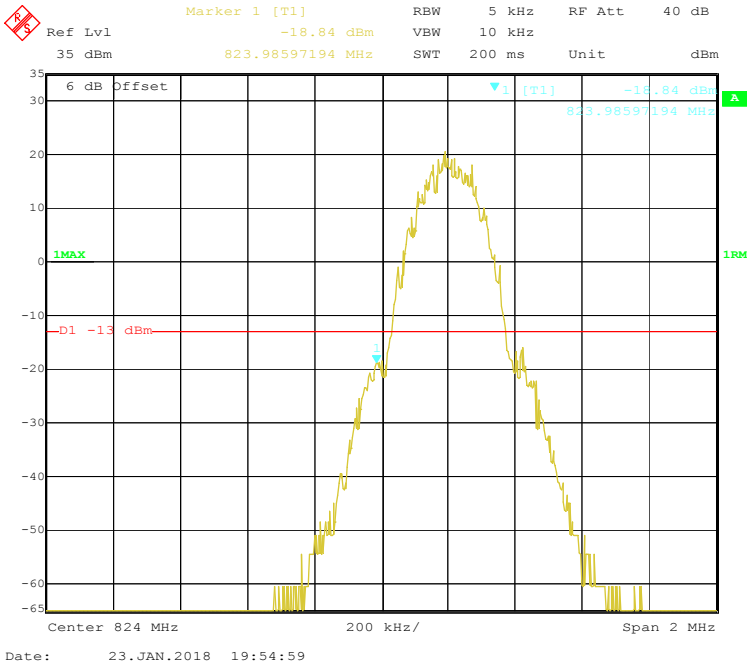
The testing was performed by Aaron Wang on 2018-01-23&2018-02-23.

EUT operation mode: Transmitting

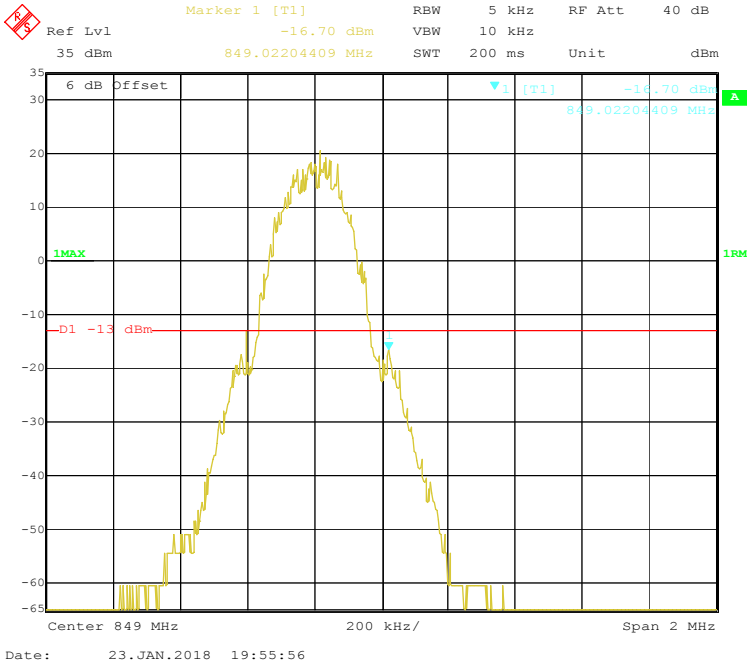
Test Result: Compliance.

GSM 850 Band:

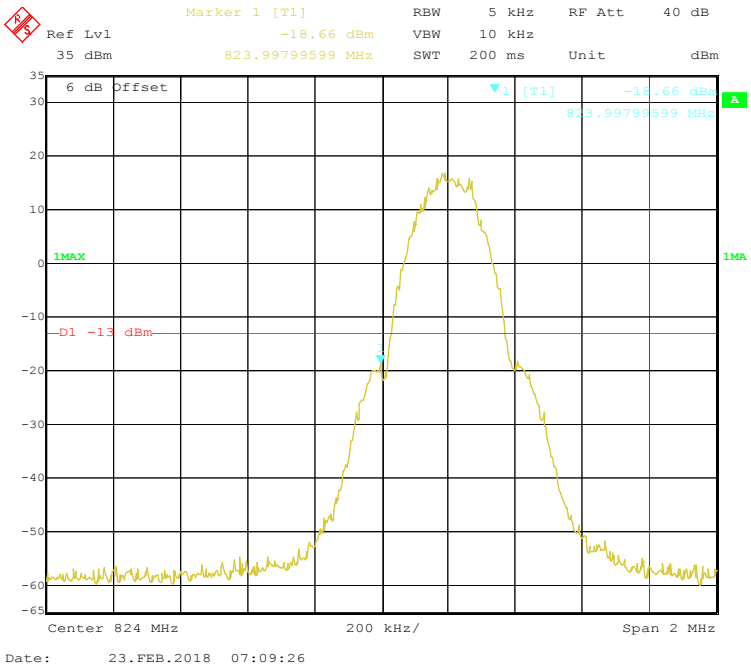
GSM Mode, Left Band Edge



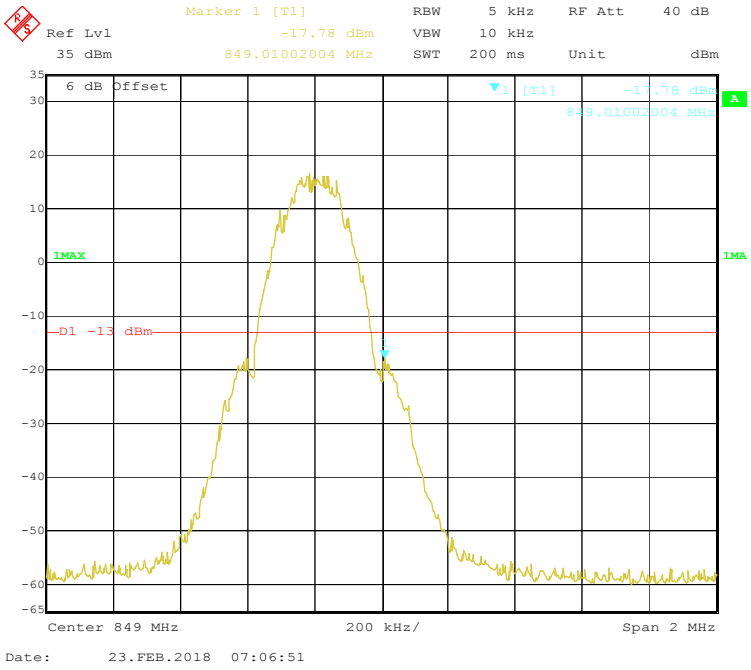
GSM Mode, Right Band Edge



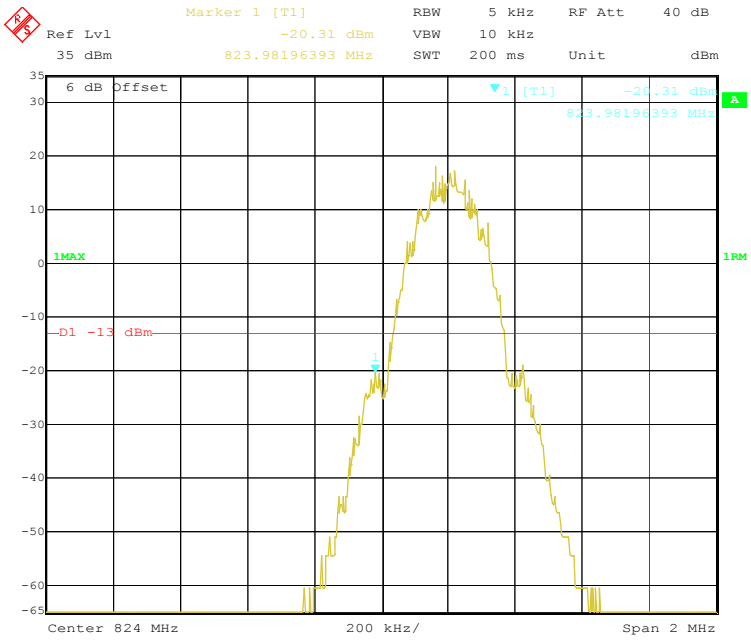
GPRS Mode, Left Band Edge



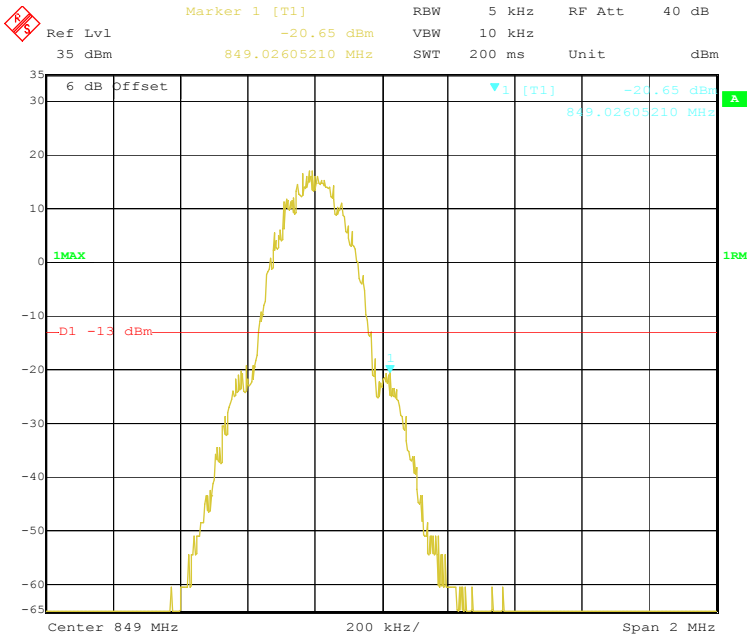
GPRS Mode, Right Band Edge



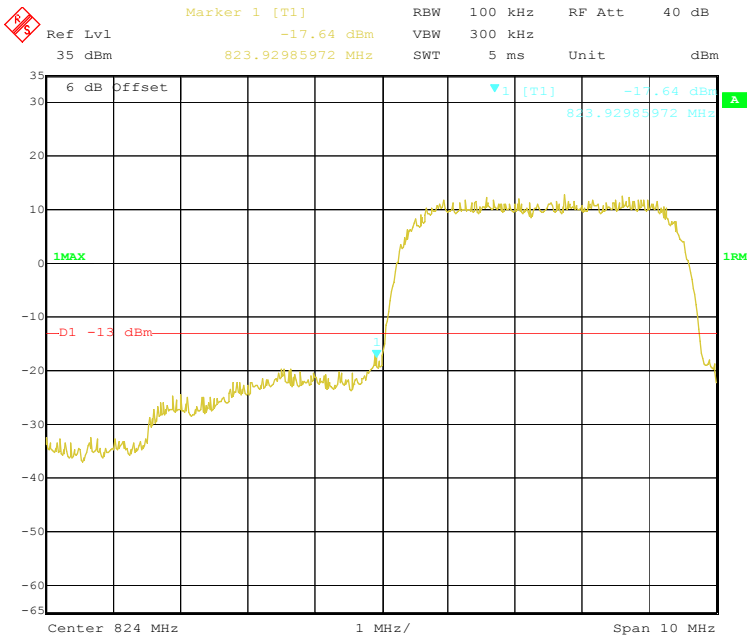
EGPRS Mode, Left Band Edge



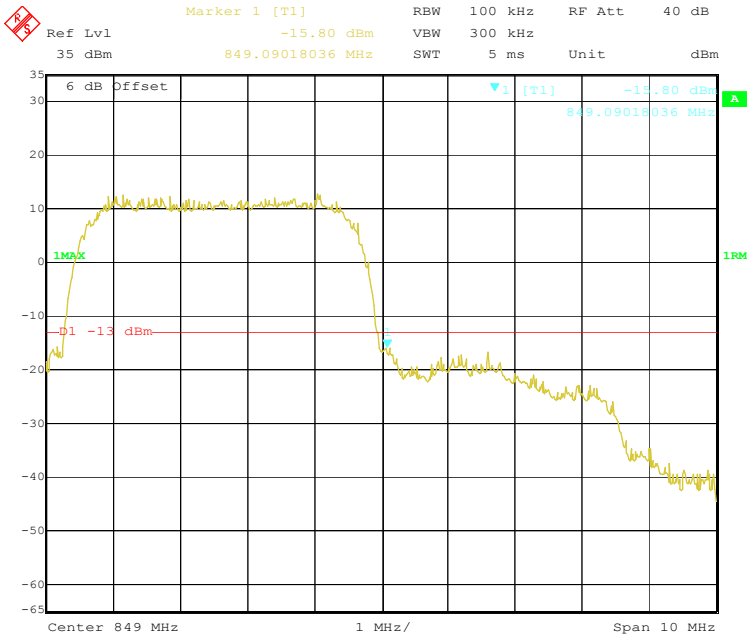
EGPRS Mode, Right Band Edge



WCDMA Mode Band V, Left Band Edge

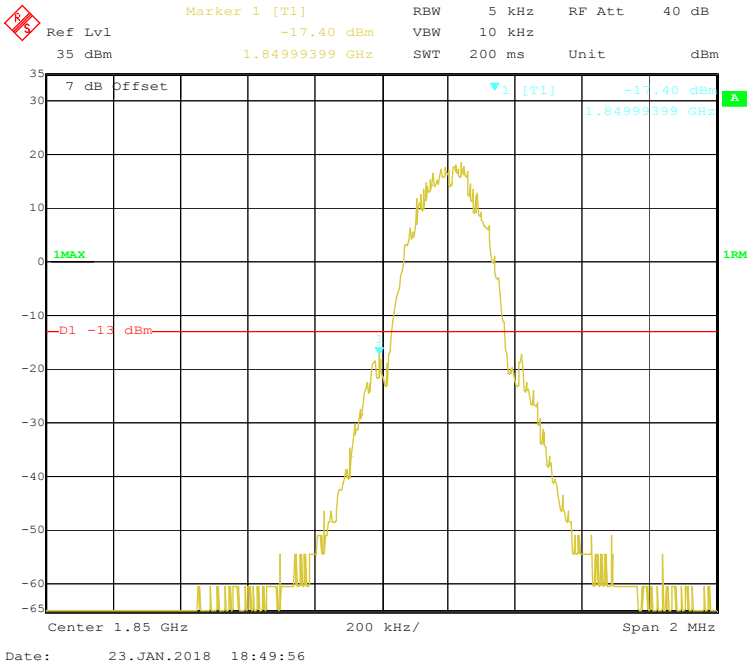


WCDMA Mode Band V, Right Band Edge

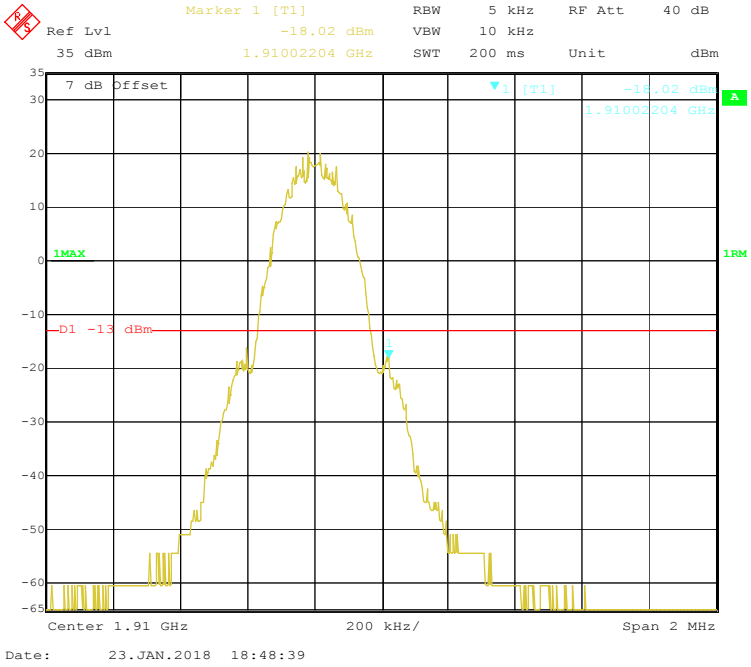


PCS 1900 Band:

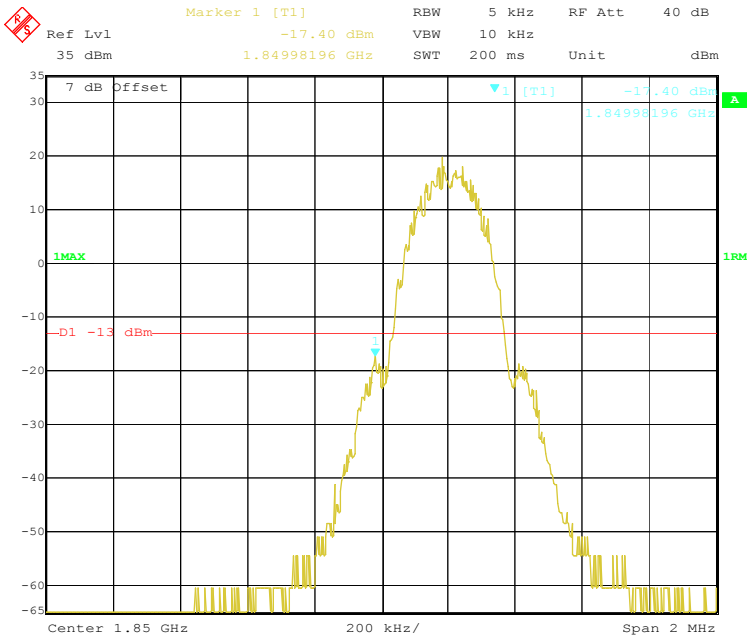
GSM Mode, Left Band Edge



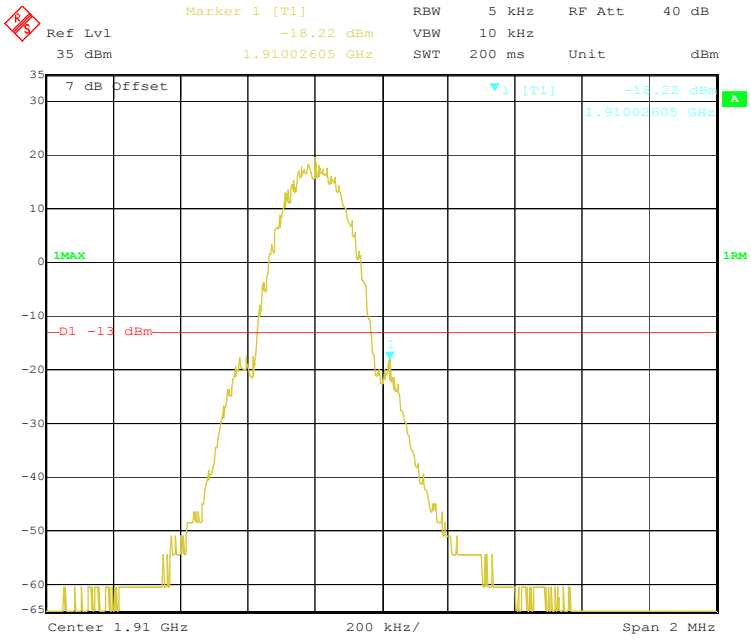
GSM Mode, Right Band Edge



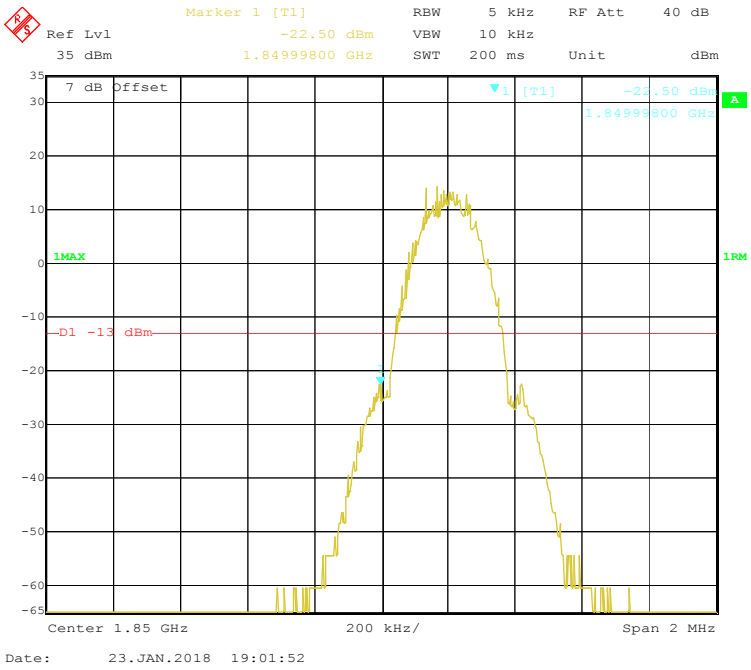
GPRS Mode, Left Band Edge



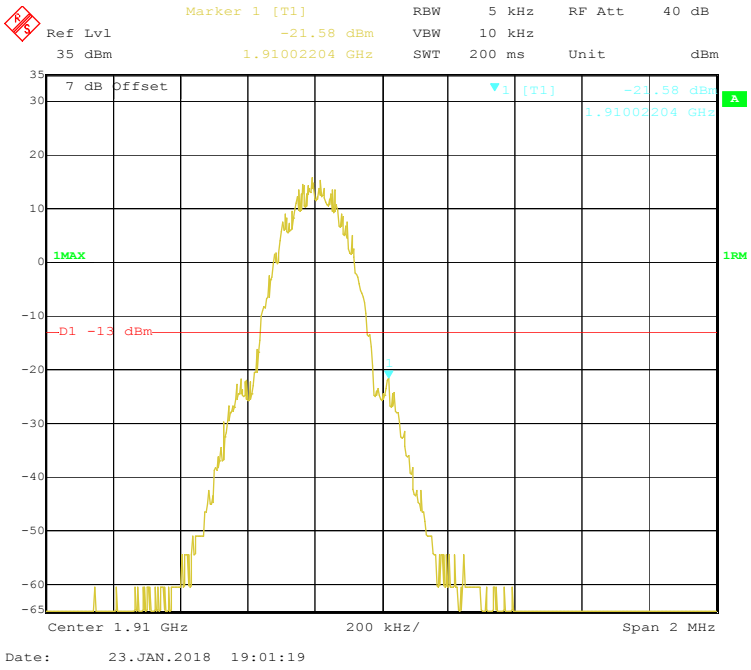
GPRS Mode, Right Band Edge



EGPRS Mode, Left Band Edge

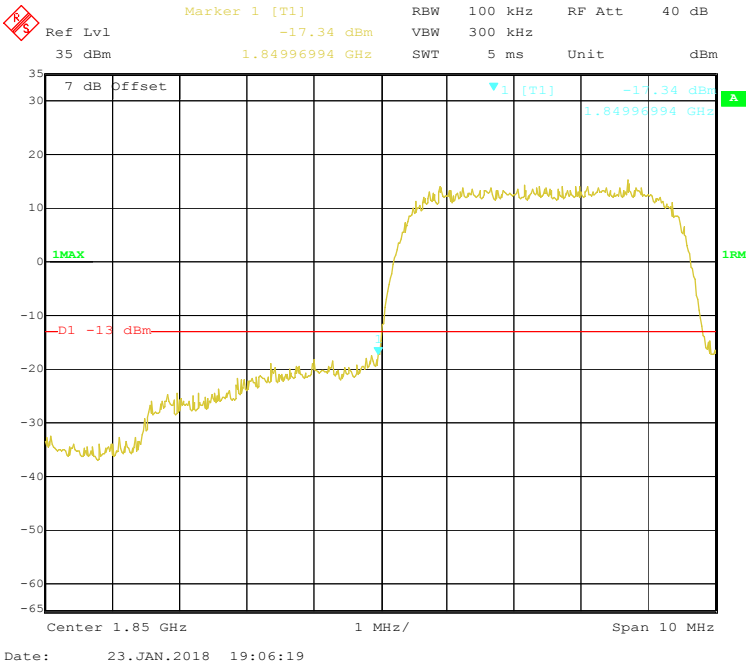


EGPRS Mode, Right Band Edge

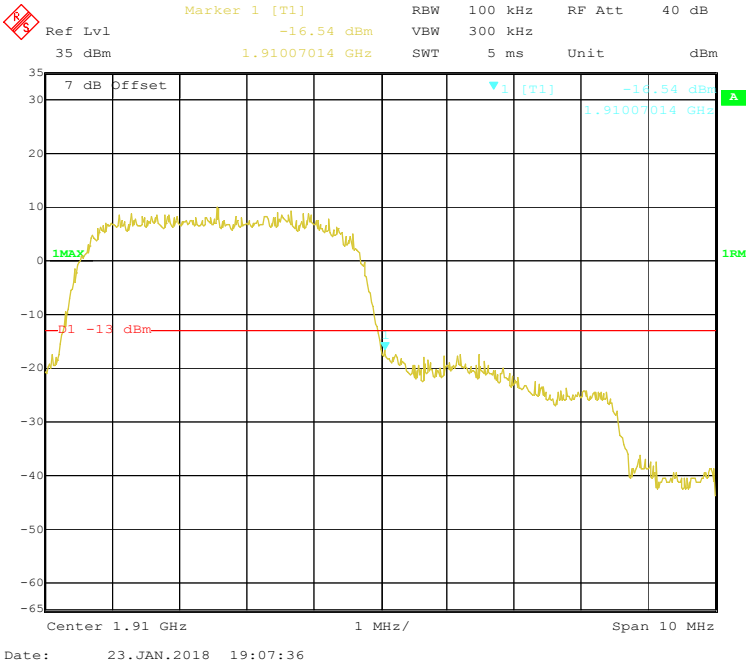


WCDMA Band II

WCDMA Mode, Left Band Edge



WCDMA Mode, Right Band Edge



FCC § 2.1055; § 22.355;§ 24.235 - FREQUENCY STABILITY

Applicable Standards

FCC § 2.1055, §22.355, §24.235.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 Transmitters in the Public Mobile Services

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

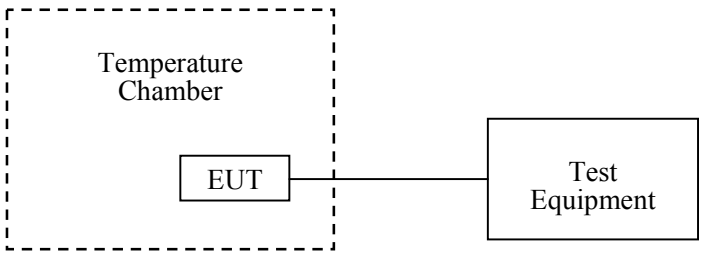
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Aaron Wang on 2018-01-23.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band:

GSM Mode, Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	12	0.01434	2.5
-20		10	0.01195	2.5
-10		11	0.01315	2.5
0		9	0.01076	2.5
10		7	0.00837	2.5
20		9	0.01076	2.5
30		12	0.01434	2.5
40		11	0.01315	2.5
50		10	0.01195	2.5
25	V min.= 3.6	11	0.01315	2.5
25	V max.= 4.2	13	0.01554	2.5

GPRS Mode, Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	13	0.01554	2.5
-20		12	0.01434	2.5
-10		10	0.01195	2.5
0		8	0.00956	2.5
10		6	0.00717	2.5
20		12	0.01434	2.5
30		13	0.01554	2.5
40		14	0.01673	2.5
50		11	0.01315	2.5
25	V min.= 3.6	10	0.01195	2.5
25	V max.= 4.2	11	0.01315	2.5

EGPRS Mode, Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	14	0.01673	2.5
-20		13	0.01554	2.5
-10		11	0.01315	2.5
0		9	0.01076	2.5
10		8	0.00956	2.5
20		10	0.01195	2.5
30		9	0.01076	2.5
40		12	0.01434	2.5
50		13	0.01554	2.5
25	V min.= 3.6	11	0.01315	2.5
25	V max.= 4.2	12	0.01434	2.5

WCDMA Band V:

WCDMA Mode(BPSK), Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	-8	-0.00956	2.5
-20		-7	-0.00837	2.5
-10		-5	-0.00598	2.5
0		-2	-0.00239	2.5
10		-1	-0.00120	2.5
20		-3	-0.00359	2.5
30		-5	-0.00598	2.5
40		-7	-0.00837	2.5
50		-8	-0.00956	2.5
25	V min.= 3.6	-6	-0.00717	2.5
25	V max.= 4.2	-9	-0.01076	2.5

WCDMA Mode(HSDPA), Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	-9	-0.01076	2.5
-20		-6	-0.00717	2.5
-10		-4	-0.00478	2.5
0		0	0.00000	2.5
10		-2	-0.00239	2.5
20		-3	-0.00359	2.5
30		-4	-0.00478	2.5
40		-8	-0.00956	2.5
50		-9	-0.01076	2.5
25	V min.= 3.6	-10	-0.01195	2.5
25	V max.= 4.2	-7	-0.00837	2.5

WCDMA Mode(HSUPA), Middle Channel, f_o =836.6 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	3.7	-7	-0.00837	2.5
-20		-6	-0.00717	2.5
-10		-4	-0.00478	2.5
0		-1	-0.00120	2.5
10		0	0.00000	2.5
20		-4	-0.00478	2.5
30		-7	-0.00837	2.5
40		-6	-0.00717	2.5
50		-9	-0.01076	2.5
25	V min.= 3.6	-8	-0.00956	2.5
25	V max.= 4.2	-9	-0.01076	2.5

PCS 1900 Band:

GSM Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-9	-0.00479	pass
-20		-8	-0.00426	pass
-10		-6	-0.00319	pass
0		-4	-0.00213	pass
10		-3	-0.00160	pass
20		-2	-0.00106	pass
30		-4	-0.00213	pass
40		-6	-0.00319	pass
50		-8	-0.00426	pass
25	V min.= 3.6	-10	-0.00532	pass
25	V max.= 4.2	-9	-0.00479	pass

GPRS Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-7	-0.00372	pass
-20		-7	-0.00372	pass
-10		-6	-0.00319	pass
0		-2	-0.00106	pass
10		-1	-0.00053	pass
20		-4	-0.00213	pass
30		-6	-0.00319	pass
40		-10	-0.00532	pass
50		-8	-0.00426	pass
25	V min.= 3.6	-9	-0.00479	pass
25	V max.= 4.2	-11	-0.00585	pass

EGPRS Mode, Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-11	-0.00585	pass
-20		-10	-0.00532	pass
-10		-9	-0.00479	pass
0		-4	-0.00213	pass
10		-6	-0.00319	pass
20		-3	-0.00160	pass
30		-2	-0.00106	pass
40		-7	-0.00372	pass
50		-8	-0.00426	pass
25	V min.= 3.6	-11	-0.00585	pass
25	V max.= 4.2	-12	-0.00638	pass

WCDMA Band II:

WCDMA Mode(BPSK), Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-12	-0.00638	pass
-20		-11	-0.00585	pass
-10		-9	-0.00479	pass
0		-6	-0.00319	pass
10		-2	-0.00106	pass
20		-3	-0.00160	pass
30		-5	-0.00266	pass
40		-9	-0.00479	pass
50		-10	-0.00532	pass
25	V min.= 3.6	-12	-0.00638	pass
25	V max.= 4.2	-10	-0.00532	pass

WCDMA Mode(HSDPA), Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-11	-0.00585	pass
-20		-10	-0.00532	pass
-10		-8	-0.00426	pass
0		-6	-0.00319	pass
10		-3	-0.00160	pass
20		-2	-0.00106	pass
30		-7	-0.00372	pass
40		-8	-0.00426	pass
50		-12	-0.00638	pass
25	V min.= 3.6	-10	-0.00532	pass
25	V max.= 4.2	-9	-0.00479	pass

WCDMA Mode(HSUPA), Middle Channel, f_o =1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{DC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	3.7	-11	-0.00585	pass
-20		-9	-0.00479	pass
-10		-5	-0.00266	pass
0		-4	-0.00213	pass
10		-3	-0.00160	pass
20		-4	-0.00213	pass
30		-8	-0.00426	pass
40		-6	-0.00319	pass
50		-11	-0.00585	pass
25	V min.= 3.6	-10	-0.00532	pass
25	V max.= 4.2	-12	-0.00638	pass

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