

FCC PART 22H, PART 24E
MEASUREMENT AND TEST REPORT

For

Shanghai HowayGIS Co., Ltd

RM230, Fawkes Building, No.1985, Road Chunshen, Shanghai, China

FCC ID: 2AAZDT1XN2017

Report Type: Original Report	Product Type: Industrial Data Controller/Collector
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Report Number: RKS170119001-00M	
Report Date: 2017-03-01	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Manufacturer	Shanghai HowayGIS Co., Ltd
Tested Model	T17
Series Model	T17M, T17N, HC1
Product Type	Industrial Data Controller/Collector
Dimension	200 mm(L) × 96 mm(W) × 32 mm(H)
Power input	DC 3.7V from rechargeable battery or DC 5V supplied by adapter

Note: The difference between tested model and series model was explained in the declaration letter.

Adapter Information:

Model: PSAC10R-050

Input: AC 100-240V, 50/60 Hz, 0.3A, 23-32VA

Output: DC 5.0V, 2.0A

** All measurement and test data in this report was gathered from production sample serial number: 20161123001.
(Assigned by BACL, Kunshan). The EUT was received on 2016-11-23.*

Objective

This type approval report is prepared on behalf of Shanghai HowayGIS Co., Ltd in accordance with Part 2, Part 22-Subpart H, 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 15B JBP, Part 15.247 DTS and Part 15.247 DSS submissions with FCC ID: 2AAZDT1XN2017.

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		3.26 dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6 GHz ~18 GHz	4.92dB
	18 GHz~40 GHz	4.88dB
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.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communications Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 02, 2012. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

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.

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

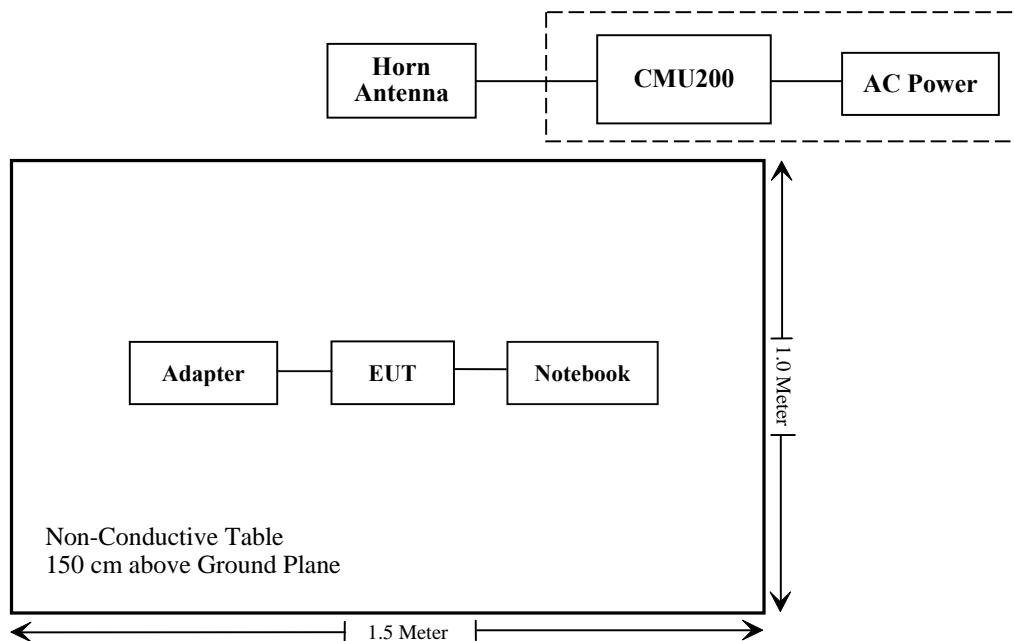
Manufacturer	Description	Model	Serial Number
DELL	Notebook	GX620	D65874152
Howay	Adapter	PSAC10R-050	N/A

External I/O Cable

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Un-shielding	0.8	EUT	Notebook

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz&Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §1.1310 & §2.1093	RF Exposure	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

Compliance*: Please refer to SAR report released by BACL, report number: RKS161122011-20A.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
HP	Signal Generator	8341B	DE23437	2016-08-29	2017-08-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
Sunol Sciences	Broadband Antenna	JB3	A040914-1	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
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
Sonoma Instrunent	Amplifier	330	171377	2016-12-12	2017-12-11
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-7	007	2016-12-12	2017-12-11
RF Conducted Test					
Rohde & Schwarz	OSP120 Base Unit	OSP120	101247	2016-07-04	2017-07-03
BACL	EMC32 Version	EMC32	09106	/	/
Rohde & Schwarz	SMBV100A Vector Signal Generator	SMBV100A	261558	2016-07-04	2017-07-03
Rohde & Schwarz	SMB 100A Signal Generator	SMB100A	110390	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-10-10	2017-10-09
Howay	RF Cable	N/A	N/A	2016-12-02	2017-12-01

* **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§15.247 (i), §1.1310& §2.1093 –RF EXPOSURE

Applicable Standard

According to§15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

Test Result

Compliance, please refer to the SAR report: RKS161122011-20A.

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.

§2.1046; § 22.913 (a);§ 24.232 (c) - RF OUTPUT POWER**Applicable Standards**

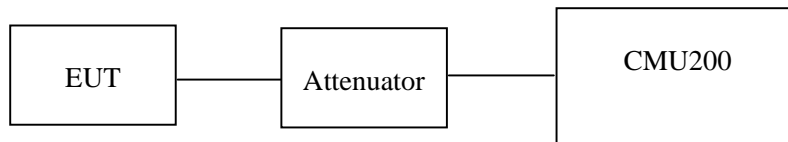
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §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..

Test Procedure

Conducted method:

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

**Test Data****Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2016-12-13.

Conducted Power**Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	31.83	29.12	27.77	26.75	38.45
	190	836.6	31.54	28.80	27.44	26.44	38.45
	251	848.8	31.83	29.09	27.72	26.68	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	26.23	23.72	22.43	22.46	38.45
	190	836.6	25.91	23.50	22.21	22.08	38.45
	251	848.8	26.20	23.48	22.41	22.36	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2k		21.56	21.39	21.28
		Rel 6 HSDPA	1	21.12	20.39	21.08
			2	20.99	20.68	20.19
			3	21.23	21.11	20.37
			4	20.67	20.38	19.67
		Rel 6 HSUPA	1	20.18	20.16	20.66
			2	19.87	19.97	20.79
			3	20.13	19.88	19.86
			4	20.24	20.67	20.13
			5	20.75	20.94	20.27

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.89	27.09	25.77	24.81	33
	661	1880.0	29.78	26.99	25.69	24.75	33
	810	1909.8	30.30	27.48	26.17	25.23	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	25.94	23.60	22.32	22.29	33
	661	1880.0	25.98	23.64	22.66	22.23	33
	810	1909.8	26.32	23.99	22.77	22.75	33

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	21.10	21.59	22.08
			1	20.97	20.13	21.03
		Rel 6 HSDPA	2	20.46	20.66	20.27
			3	20.13	20.19	20.36
			4	20.89	20.46	20.31
			4	20.89	20.46	20.31
		Rel 6 HSUPA	1	20.11	19.78	19.56
			2	19.23	20.37	19.88
			3	20.37	20.35	20.45
			4	19.98	19.28	19.57
			5	19.64	19.16	19.49
			5	19.64	19.16	19.49

Peak-to-average ratio (PAR)**Cellular Band**

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.21	13
	Middle	2.30	13
	High	2.19	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.33	13
	Middle	2.51	13
	High	2.42	13

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	2.68	13
	Middle	2.71	13
	High	2.72	13
HSDPA (16QAM)	Low	2.59	13
	Middle	2.37	13
	High	2.44	13
HSUPA (BPSK)	Low	2.42	13
	Middle	2.29	13
	High	2.56	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.21	13
	Middle	2.30	13
	High	2.19	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.33	13
	Middle	2.51	13
	High	2.42	13

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	2.68	13
	Middle	2.71	13
	High	2.72	13
HSDPA (16QAM)	Low	2.59	13
	Middle	2.37	13
	High	2.44	13
HSUPA (BPSK)	Low	2.42	13
	Middle	2.29	13
	High	2.56	13

Radiated Power**GPRS 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 (dB)			
Cellular Band (Part 22H), Middle Channel										
836.60	80.77	283	223	H	24.63	0.26	4.86	29.23	38.45	9.22
836.60	83.92	115	109	V	25.96	0.26	4.86	30.56	38.45	7.89
PCS Band (Part 24E), Middle Channel										
1880.00	87.44	112	176	H	18.99	0.44	8.81	27.36	33.00	5.64
1880.00	90.42	137	170	V	19.76	0.44	8.81	28.13	33.00	4.87

EGPRS 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 (dB)			
Cellular Band (Part 22H), Middle Channel										
836.6	74.21	57	142	H	18.07	0.26	4.86	22.67	38.45	15.78
836.6	77.35	245	151	V	19.39	0.26	4.86	23.99	38.45	14.46
PCS Band (Part 24E), Middle Channel										
1880.0	83.21	228	221	H	14.76	0.44	8.81	23.13	33.00	9.87
1880.0	87.16	134	162	V	16.50	0.44	8.81	24.87	33.00	8.13

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 (dB)			
WCDMA Band V (Part 22H), Middle Channel										
836.6	71.22	253	136	H	15.08	0.26	4.86	19.68	38.45	18.77
836.6	74.11	23	171	V	16.15	0.26	4.86	20.75	38.45	17.70
WCDMA Band II (Part 24E), Middle Channel										
1880.0	79.24	10	153	H	10.79	0.44	8.81	19.16	33.00	13.84
1880.0	82.80	170	176	V	12.14	0.44	8.81	20.51	33.00	12.49

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

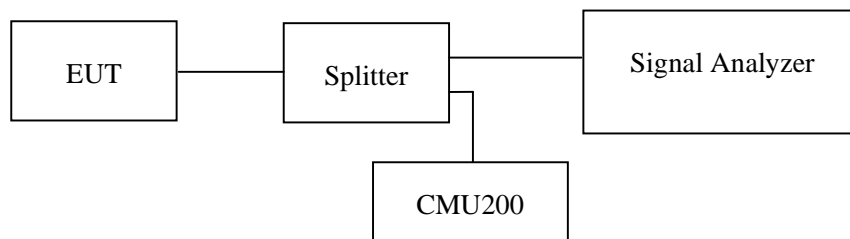
Applicable Standards

FCC 47 §2.1049, §22.917, §22.905 and §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 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2016-12-02.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables and plots.

Cellular Band (Part 22H)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS(GMSK)	836.6	242.48	320.64
EGPRS(8PSK)	836.6	252.51	320.64

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	836.6	4.07	4.67

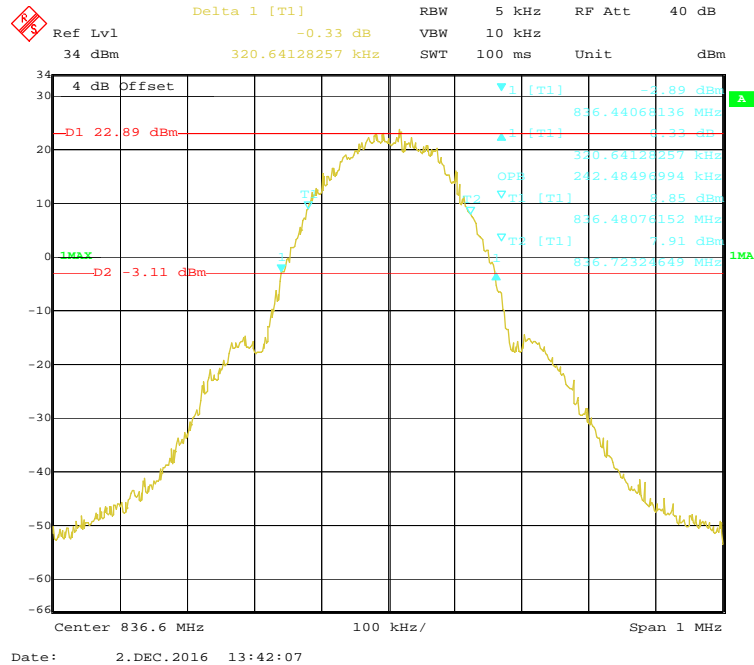
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GPRS(GMSK)	1880	248.50	316.63
EGPRS(8PSK)	1880	250.50	316.63

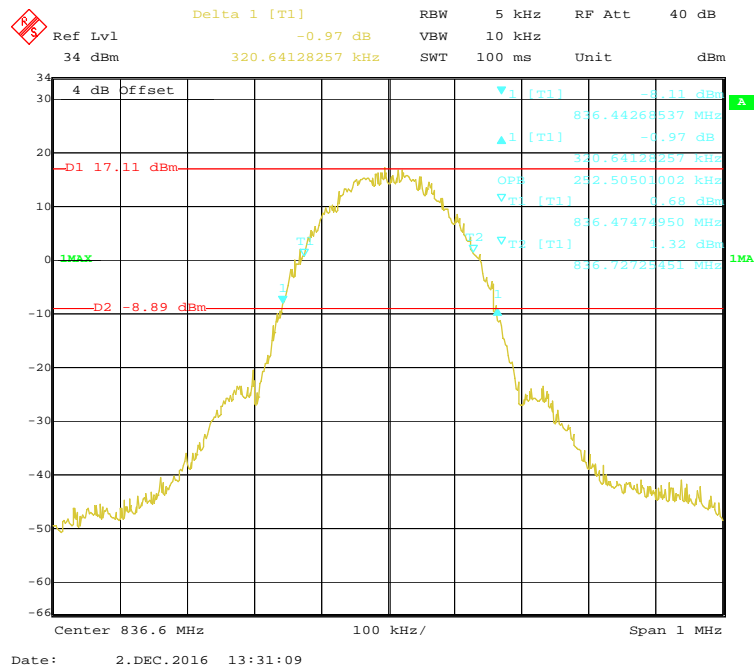
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	1880	4.09	4.69

Cellular Band (Part 22H)

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



99% Occupied & 26 dB Emissions Bandwidth for EGPRS (8PSK) Mode



Delta 1 [T1] -1.06 dB
 RBW 100 kHz RF Att 30 dB
 Ref Lvl 24 dBm
 VBW 300 kHz
 SWT 5 ms Unit dBm

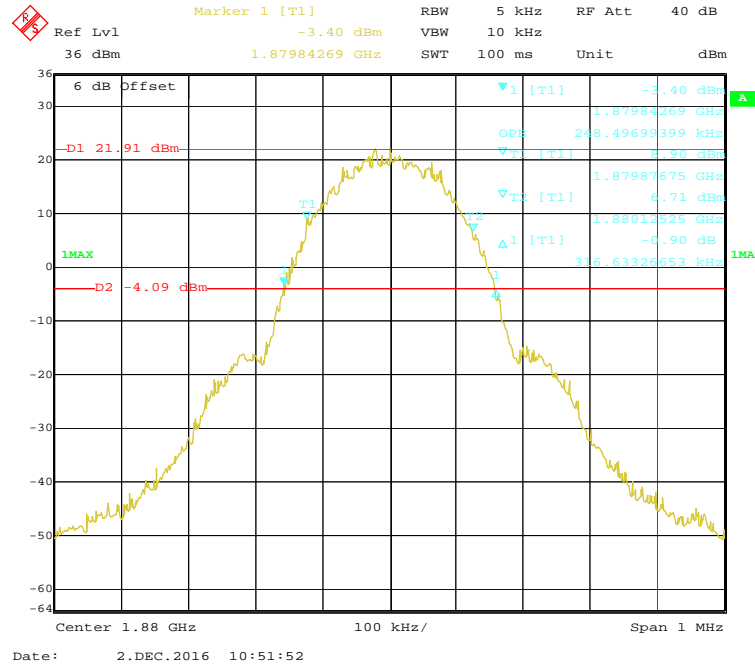
4 dB Offset
 -D1 14.38 dBm
 -D2 -11.62 dBm
 max
 min

Center 836.6 MHz 1 MHz/
 Span 10 MHz

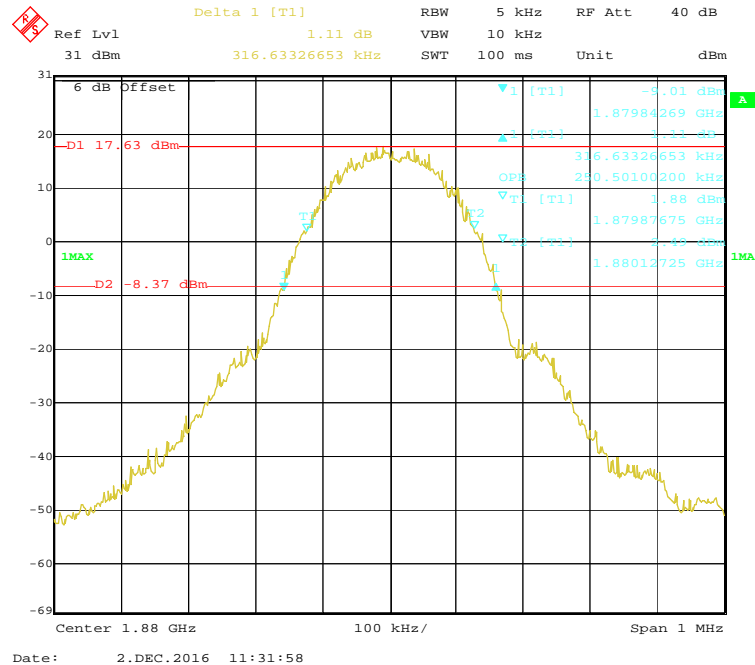
Date: 2.DEC.2016 13:19:09

PCS Band (Part 24E)

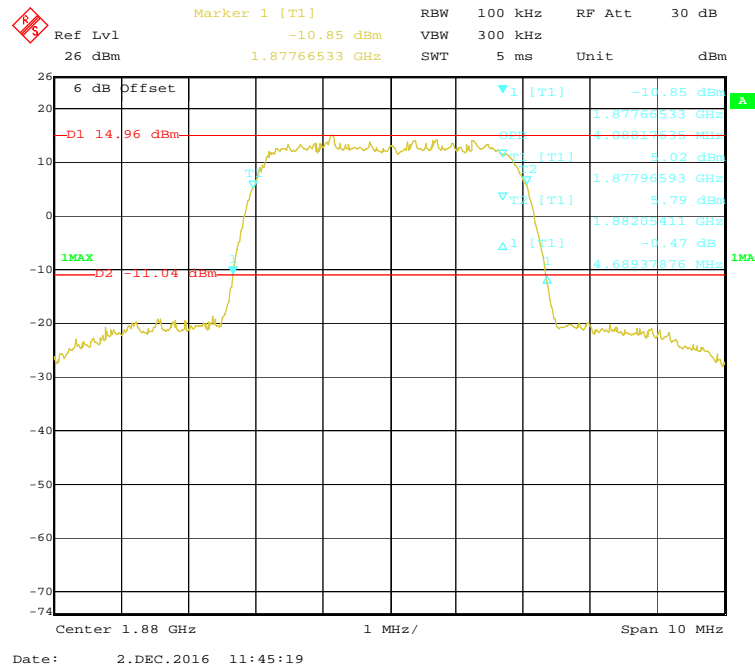
99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode



99% Occupied & 26 dB Emissions Bandwidth for EGPRS (8PSK) Mode



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



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

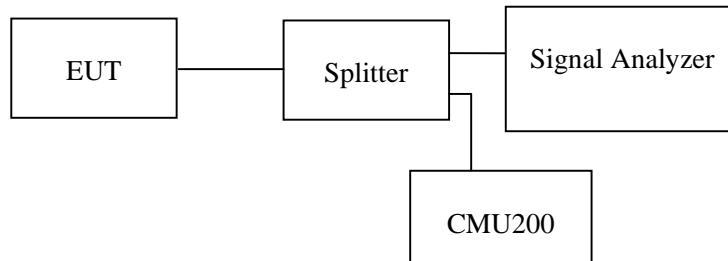
Applicable Standards

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 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

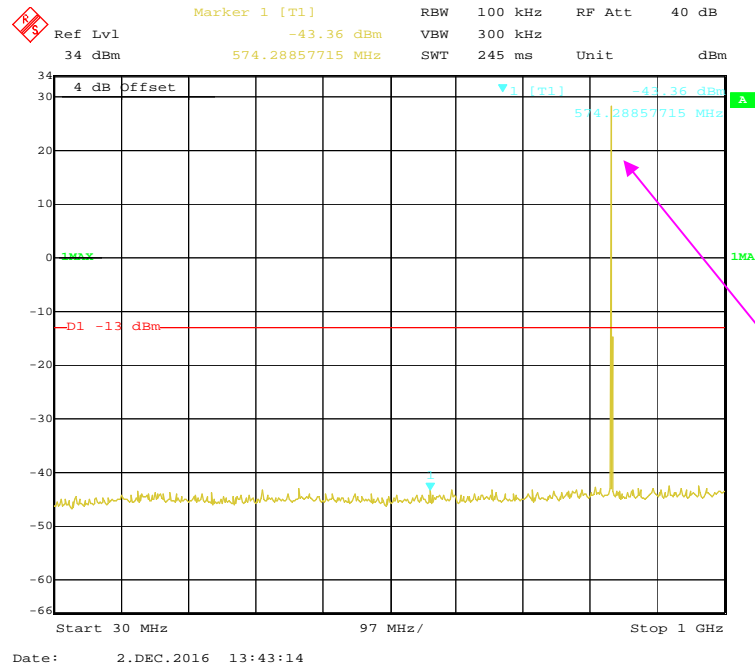
Temperature:	23 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2016-12-02.

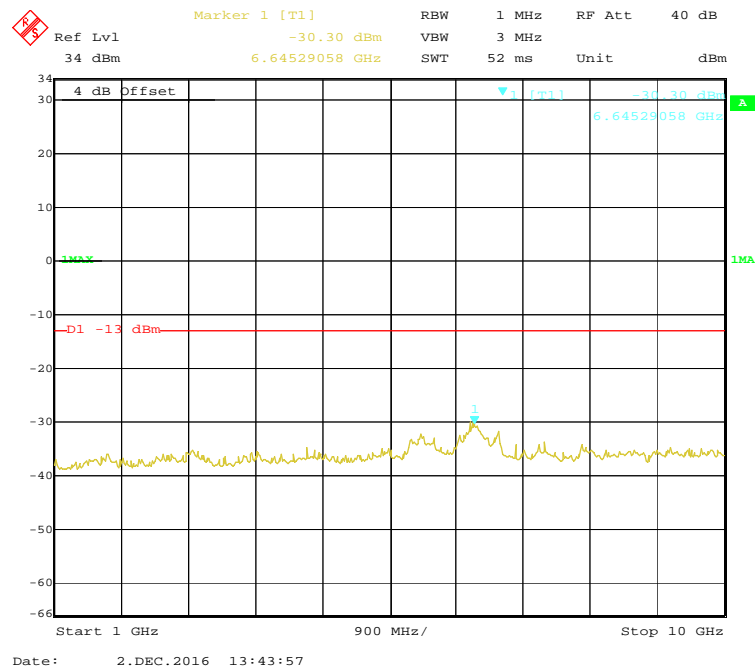
Please refer to the following plots.

Cellular Band (Part 22H)

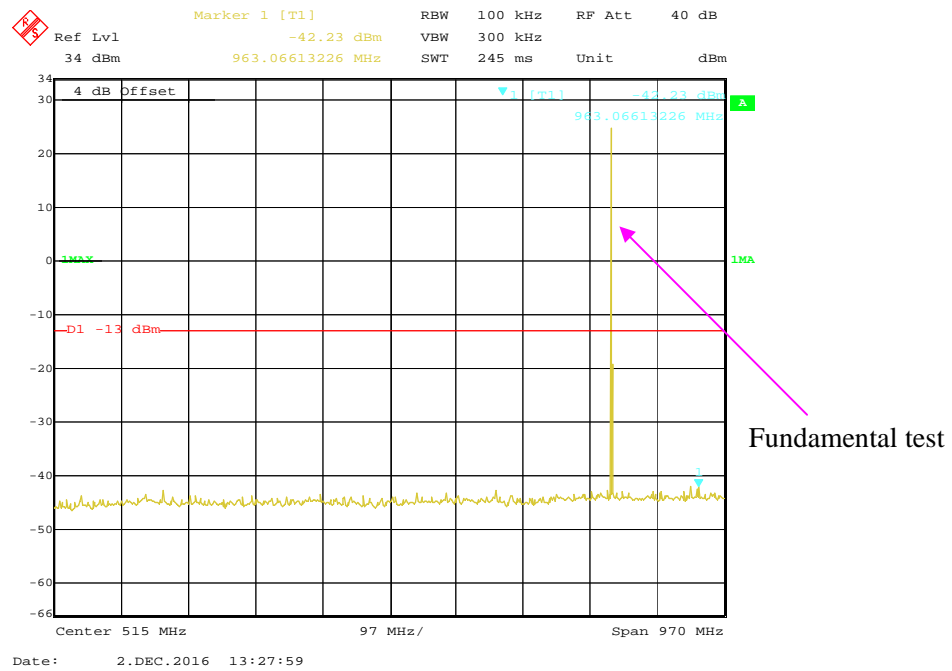
30 MHz – 1 GHz (GPRS Mode)



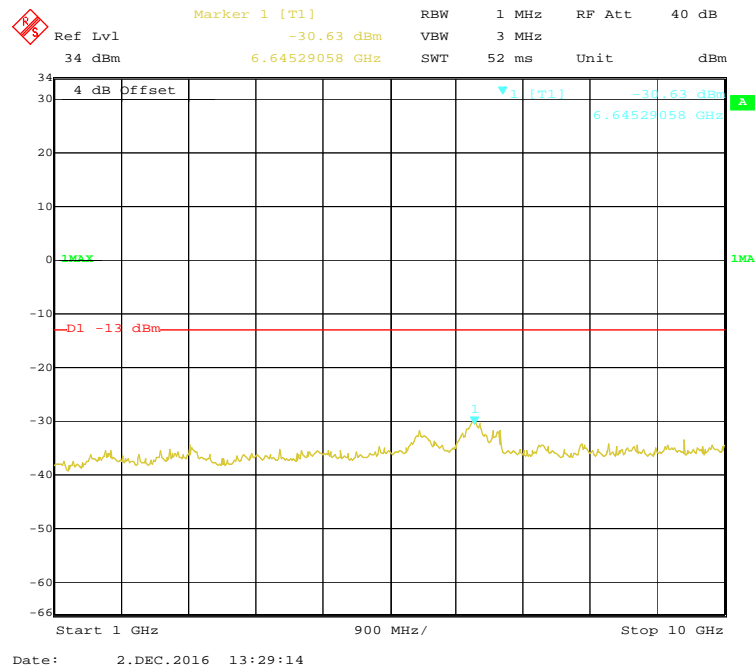
1 GHz – 10 GHz (GPRS Mode)

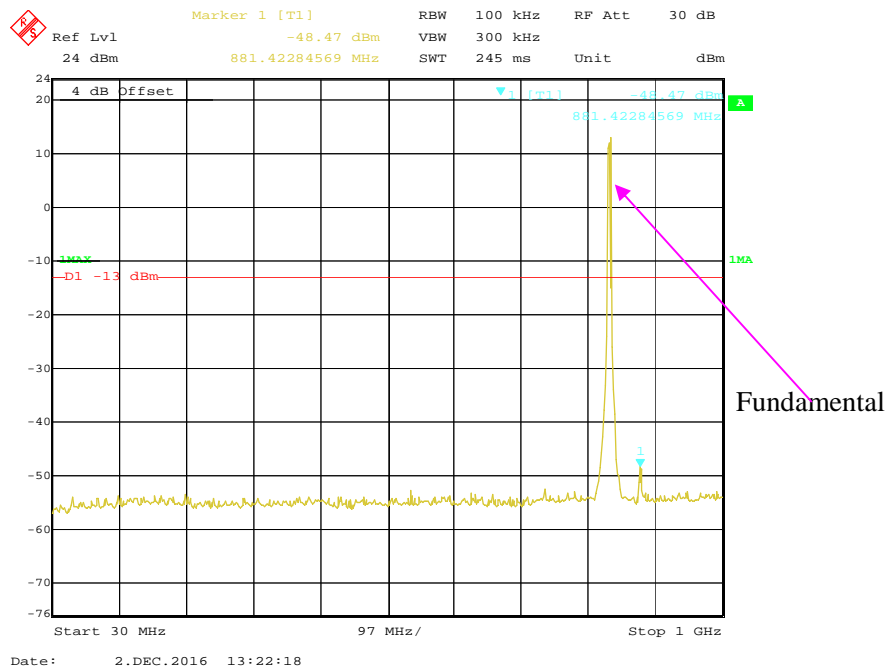
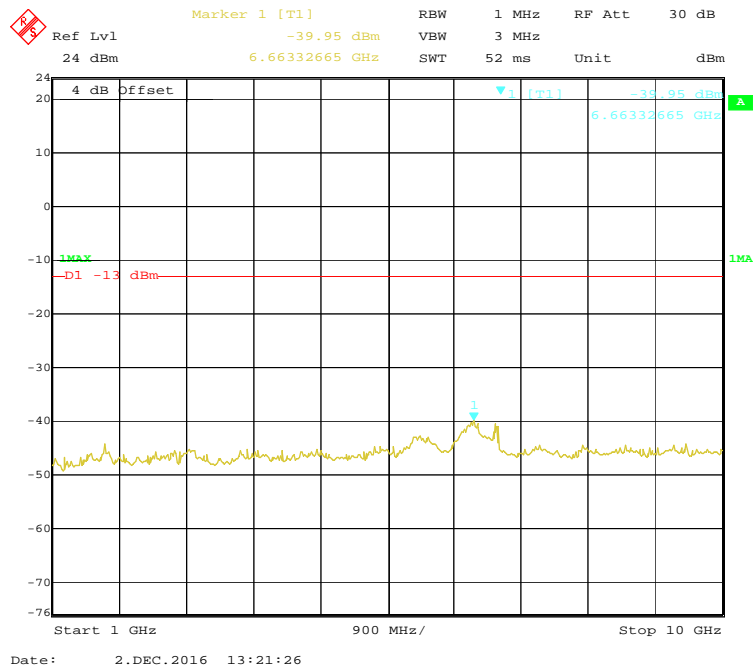


30 MHz – 1 GHz (EGPRS Mode)



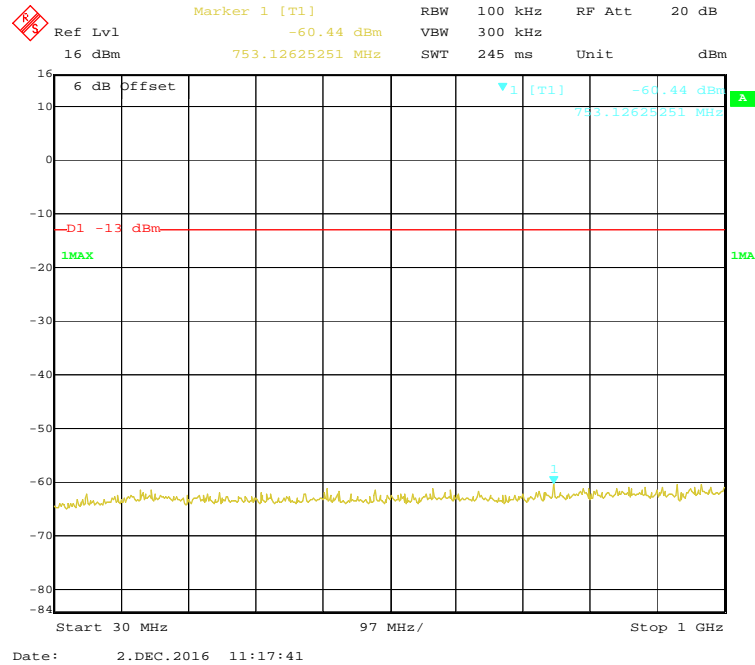
1 GHz – 10 GHz (EGPRS Mode)



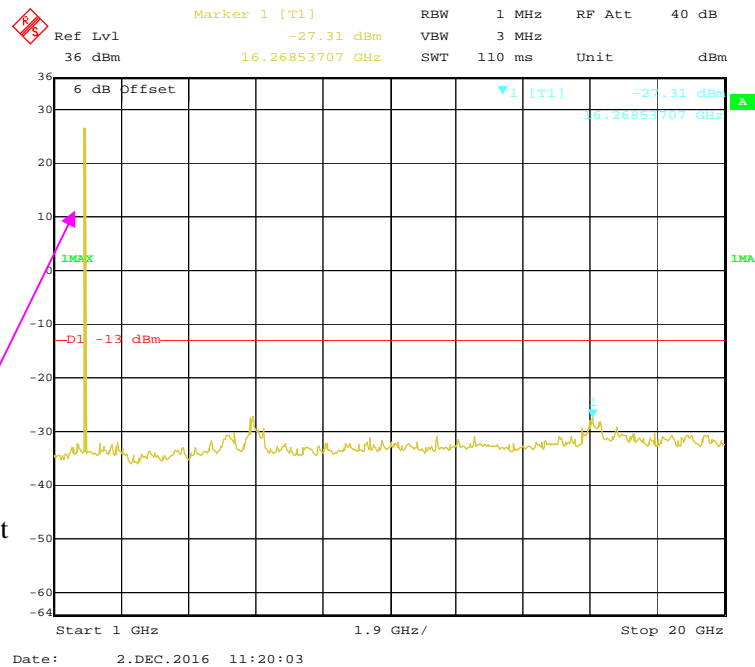
30 MHz – 1GHz(WCDMA Mode)**1 GHz – 10 GHz (WCDMA Mode)**

PCS Band (Part 24E)

30 MHz – 1 GHz (GPRS Mode)

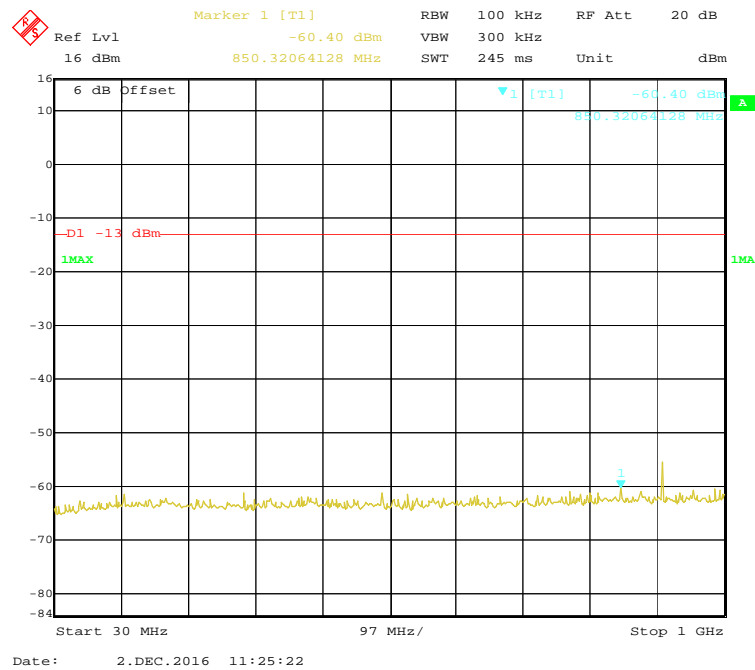


1 GHz – 20 GHz (GPRS Mode)

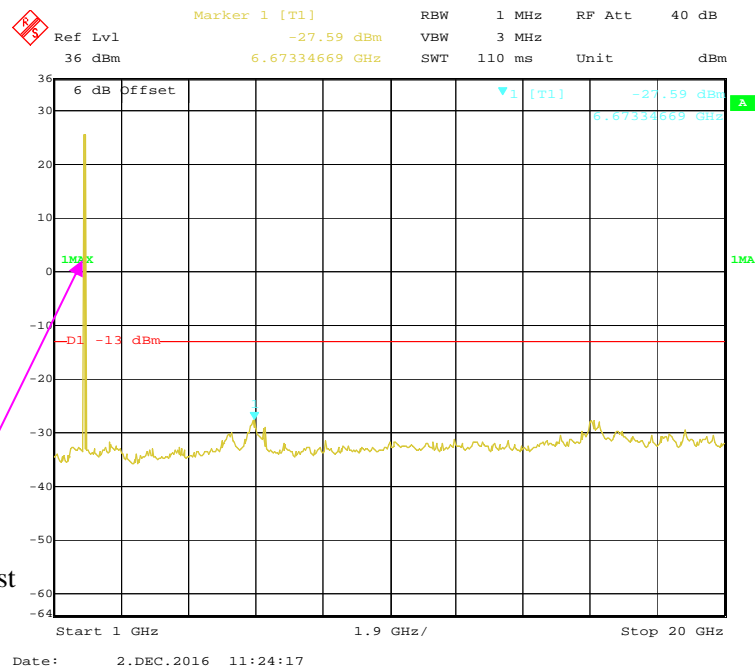


Fundamental test

30 MHz – 1 GHz (EGPRS Mode)

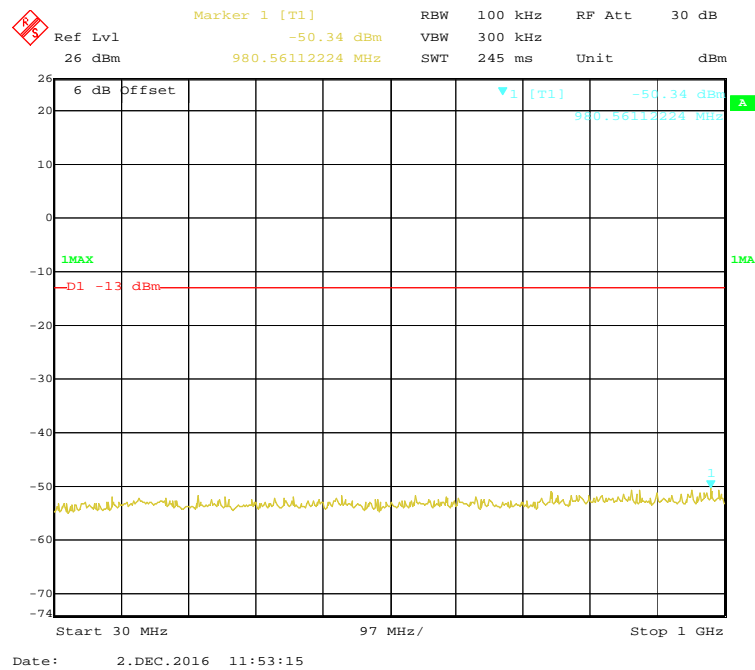


1 GHz – 20 GHz (EGPRS Mode)

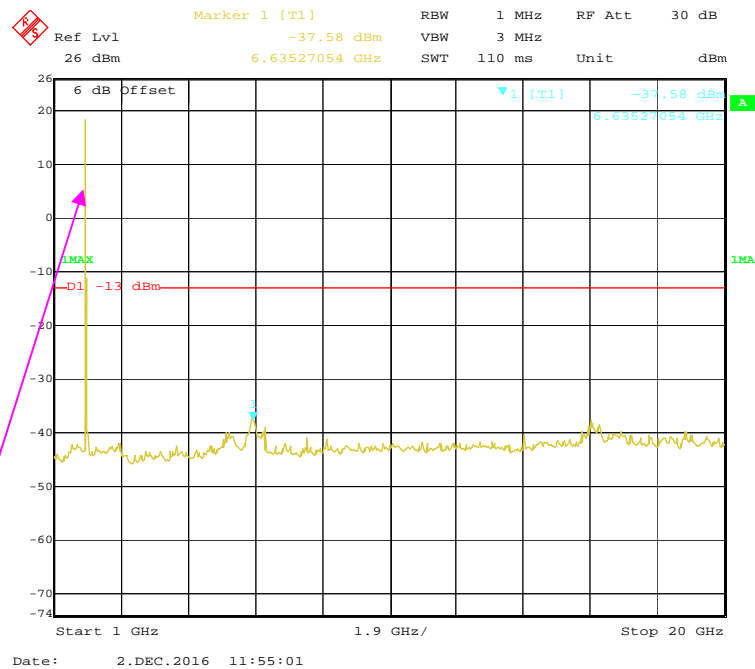


Fundamental test

30 MHz – 1 GHz (WCDMA Mode)



1 GHz – 20 GHz (WCDMA Mode)



Fundamental test

FCC § 2.1053; § 22.917 (a);§ 24.238 (a) SPURIOUS RADIATED EMISSIONS**Applicable Standards**

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

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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 = $10 \lg (\text{TX pwr in Watts}/0.001)$ – the absolute level

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

Test Data**Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2016-12-13.

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

30 MHz ~ 10 GHz:**Cellular Band (Part 22H)**

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 (dB)			
GPRS Mode, Middle channel										
570.16	35.47	10	129	H	-65.93	0.24	4.96	-61.21	-13.00	48.21
570.16	32.99	52	160	V	-68.71	0.24	4.96	-63.99	-13.00	50.99
1673.20	45.34	190	163	H	-64.82	0.39	8.48	-56.73	-13.00	43.73
1673.20	44.12	12	196	V	-67.98	0.39	8.48	-59.89	-13.00	46.89
2509.80	41.23	327	235	H	-69.68	0.49	10.09	-60.08	-13.00	47.08
2509.80	42.13	6	108	V	-69.49	0.49	10.09	-59.89	-13.00	46.89
WCDMA Mode, Middle channel										
570.16	34.23	280	242	H	-67.17	0.24	4.96	-62.45	-13.00	49.45
570.16	31.62	281	107	V	-70.08	0.24	4.96	-65.36	-13.00	52.36
1673.20	41.23	208	211	H	-68.93	0.39	8.48	-60.84	-13.00	47.84
1673.20	42.36	277	189	V	-69.74	0.39	8.48	-61.65	-13.00	48.65
2509.80	41.11	282	223	H	-69.80	0.49	10.09	-60.20	-13.00	47.20
2509.80	41.56	325	108	V	-70.06	0.49	10.09	-60.46	-13.00	47.46

30 MHz ~ 20 GHz:**PCS Band (Part 24E)**

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 (dB)			
GPRS Mode, Middle channel										
475.25	36.13	62	145	H	-66.35	0.23	4.20	-62.38	-13.00	49.38
475.25	37.37	177	123	V	-65.24	0.23	4.20	-61.27	-13.00	48.27
3760.00	46.29	212	101	H	-59.04	0.59	9.74	-49.89	-13.00	36.89
3760.00	49.65	77	153	V	-56.80	0.59	9.74	-47.65	-13.00	34.65
5640.00	45.13	194	187	H	-56.52	0.67	10.47	-46.72	-13.00	33.72
5640.00	43.21	204	110	V	-60.31	0.67	10.47	-50.51	-13.00	37.51
WCDMA Mode, Middle channel										
475.25	34.59	320	158	H	-67.89	0.23	4.20	-63.92	-13.00	50.92
475.25	35.97	42	173	V	-66.64	0.23	4.20	-62.67	-13.00	49.67
3760.00	43.67	345	185	H	-61.66	0.59	9.74	-52.51	-13.00	39.51
3760.00	45.26	153	128	V	-61.19	0.59	9.74	-52.04	-13.00	39.04
5640.00	42.11	126	176	H	-59.54	0.67	10.47	-49.74	-13.00	36.74
5640.00	41.34	265	150	V	-41.99	0.67	10.47	-32.19	-13.00	19.19

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.

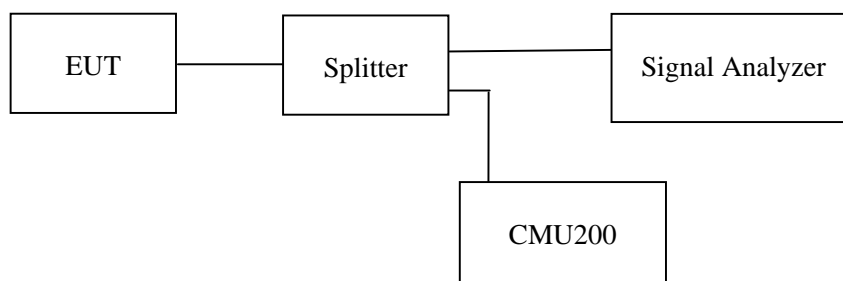
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

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

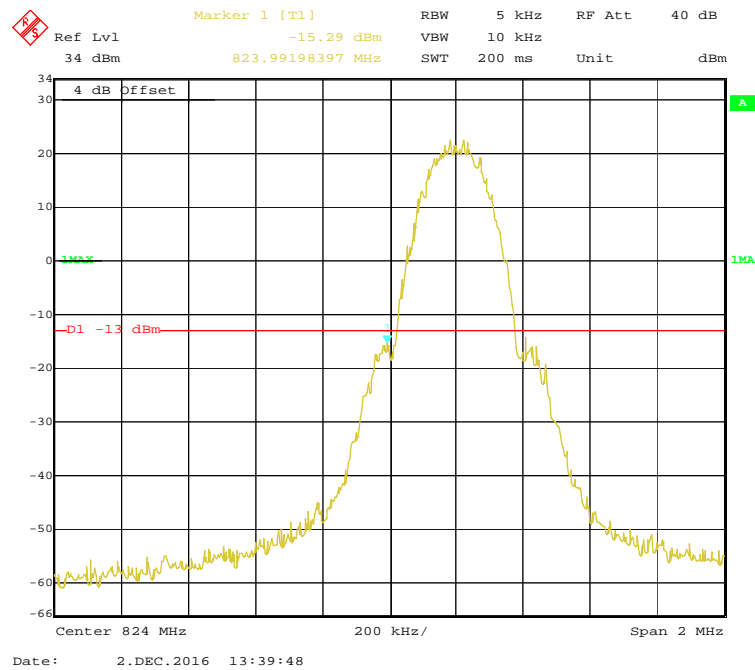
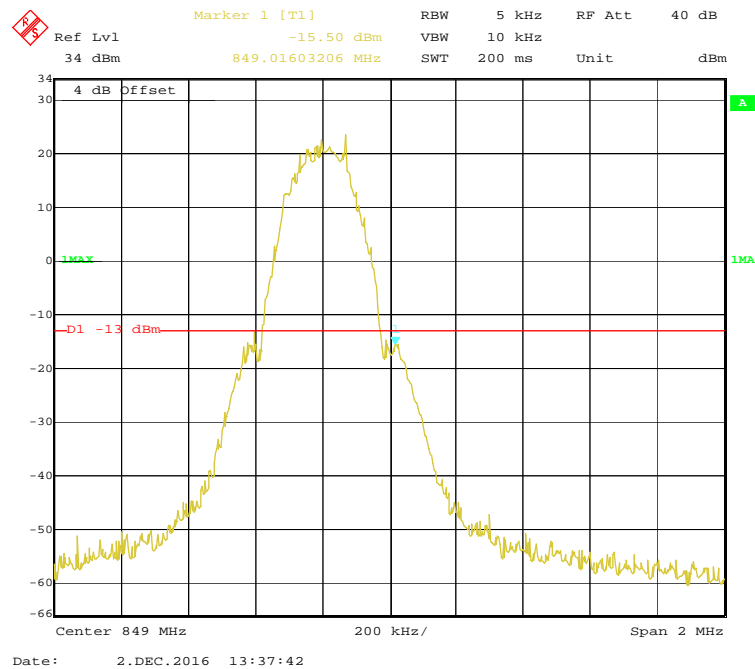
**Test Data****Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

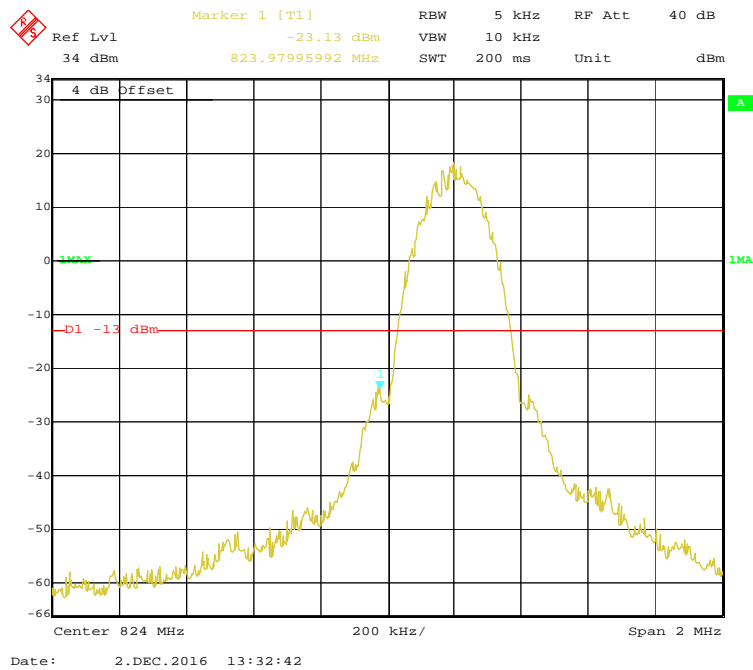
The testing was performed by Ada Yu on 2016-12-02.

EUT operation mode: Transmitting

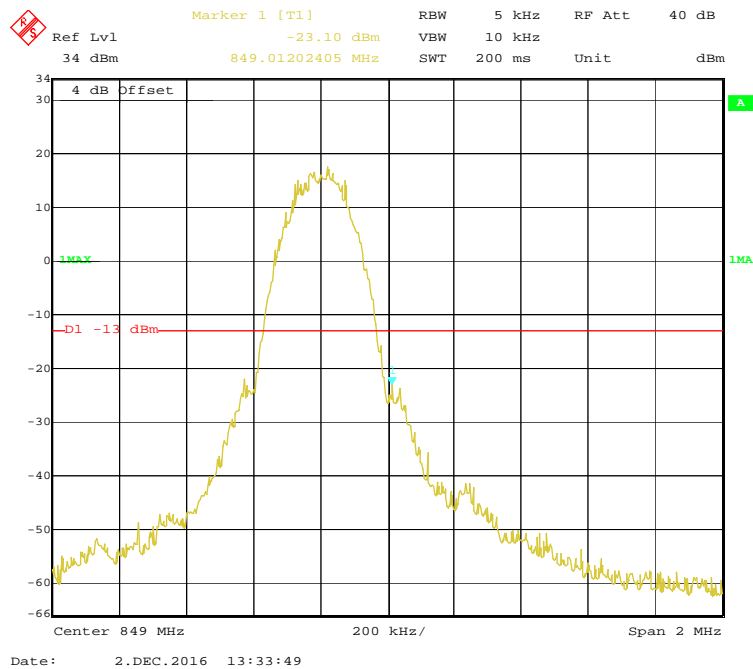
Test Result: Compliance. Please refer to the following plots.

Cellular Band, Left Band Edge for GPRS (GMSK) Mode**Cellular Band, Right Band Edge for GPRS (GMSK) Mode**

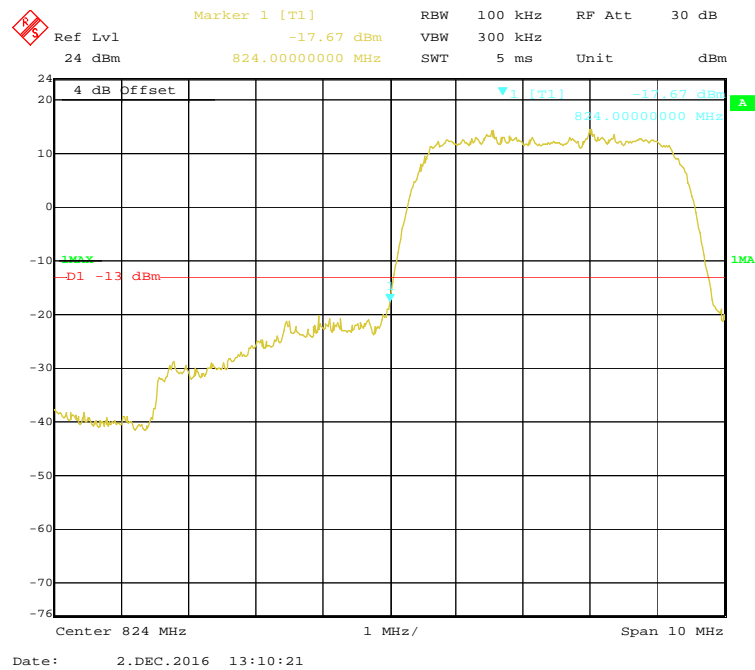
Cellular Band, Left Band Edge for EGPRS Mode



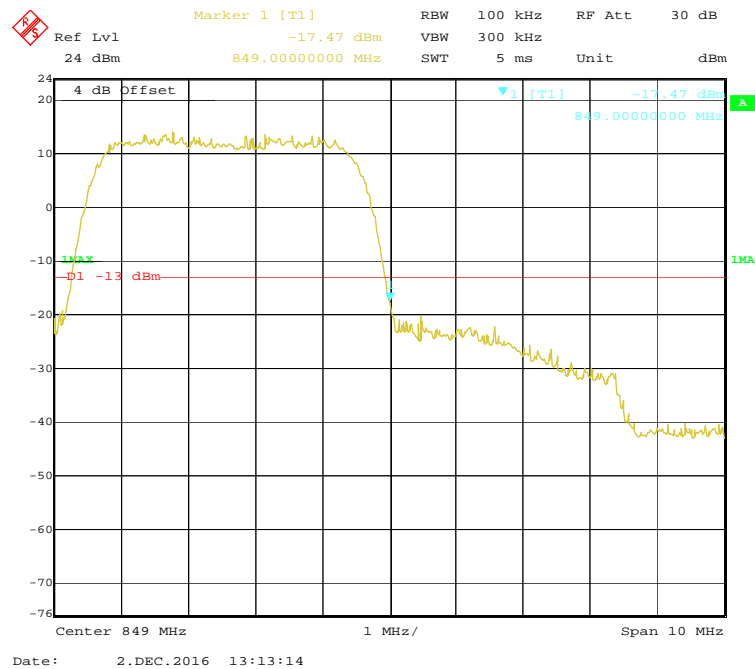
Cellular Band, Right Band Edge for EGPRS Mode

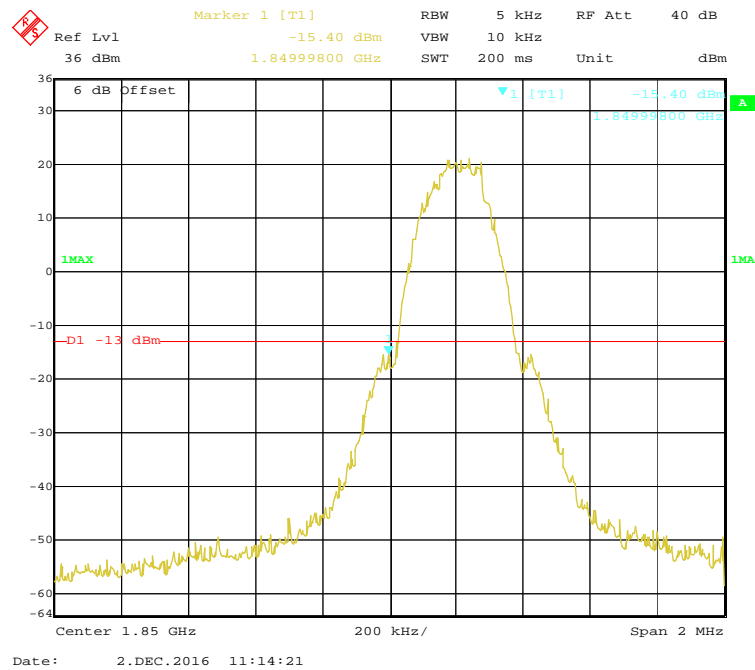
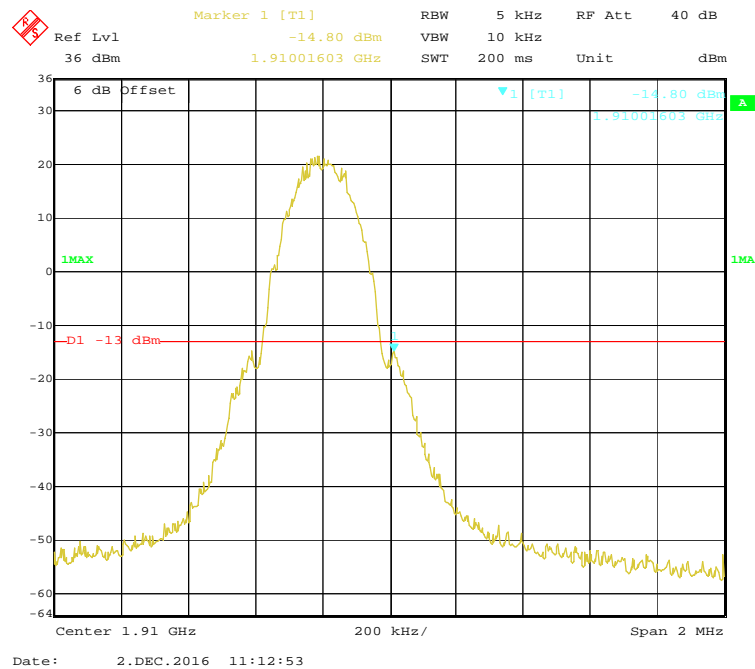


Cellular Band, Left Band Edge for WCDMA Mode

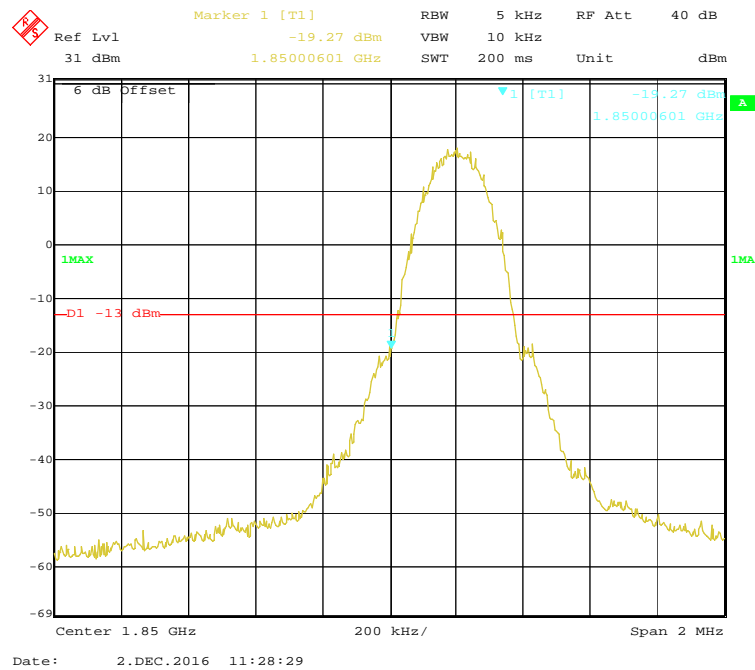


Cellular Band, Right Band Edge for WCDMA Mode

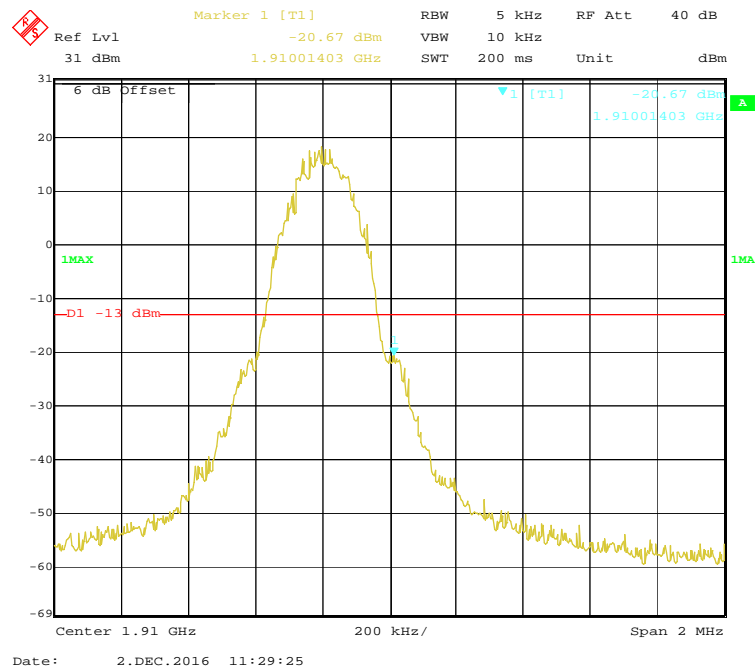


PCS Band, Left Band Edge for GPRS (GMSK) Mode**PCS Band, Right Band Edge for GPRS (GMSK) Mode**

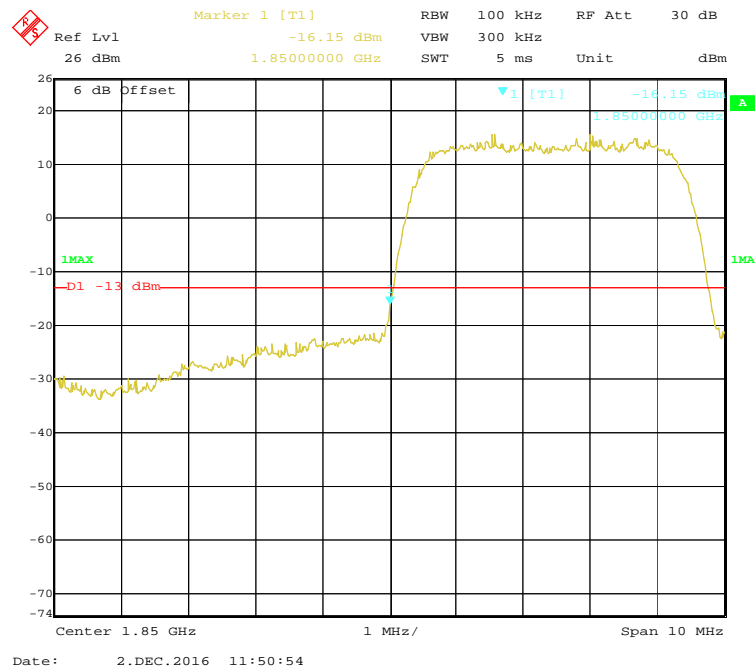
PCS Band, Left Band Edge for EGPRS Mode



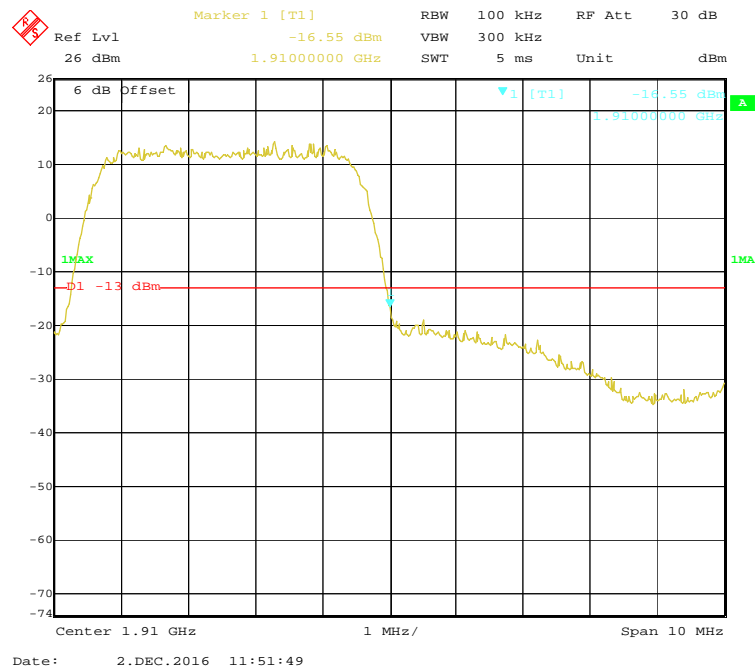
PCS Band, Right Band Edge for EGPRS Mode



PCS Band, Left Band Edge for WCDMA Mode



PCS Band, Right Band Edge for WCDMA Mode



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

Applicable Standards

FCC § 2.1055, §22.355 and §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

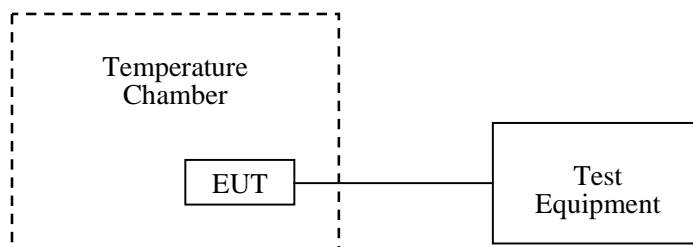
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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 °C
Relative Humidity:	50 %
ATM Pressure:	101.2 kPa

The testing was performed by Ada Yu on 2016-12-13.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

Cellular Band (Part 22H)**GPRS Mode**

Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	24	0.029	2.5
-20		17	0.020	2.5
-10		-4	-0.005	2.5
0		16	0.019	2.5
10		14	0.017	2.5
20		11	0.013	2.5
30		12	0.014	2.5
40		-6	-0.007	2.5
50		16	0.019	2.5
25	V min.= 3.6	15	0.018	2.5
25	V max.= 4.2	23	0.027	2.5

EGPRS Mode

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	56	0.067	2.5
-20		34	0.041	2.5
-10		31	0.037	2.5
0		27	0.032	2.5
10		13	0.016	2.5
20		-14	-0.017	2.5
30		-11	-0.013	2.5
40		1	0.001	2.5
50		14	0.017	2.5
25	V min.= 3.6	-2	-0.002	2.5
25	V max.= 4.2	3	0.004	2.5

WCDMA Mode

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	64	0.077	2.5
-20		55	0.066	2.5
-10		32	0.038	2.5
0		16	0.019	2.5
10		25	0.030	2.5
20		-3	-0.004	2.5
30		-9	-0.011	2.5
40		-11	-0.013	2.5
50		12	0.014	2.5
25	V min.= 3.6	-1	-0.001	2.5
25	V max.= 4.2	13	0.016	2.5

PCS Band (Part 24E)**GPRS Mode**

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	61	0.032	Pass
-20		53	0.028	Pass
-10		51	0.027	Pass
0		44	0.023	Pass
10		13	0.007	Pass
20		-11	-0.006	Pass
30		-6	-0.003	Pass
40		6	0.003	Pass
50		8	0.004	Pass
25	V min.= 3.6	16	0.009	Pass
25	V max.= 4.2	12	0.006	Pass

EGPRS Mode

Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	68	0.036	Pass
-20		42	0.022	Pass
-10		49	0.026	Pass
0		37	0.020	Pass
10		29	0.015	Pass
20		-13	-0.007	Pass
30		-11	-0.006	Pass
40		-1	-0.001	Pass
50		3	0.002	Pass
25	V min.= 3.6	4	0.002	Pass
25	V max.= 4.2	11	0.006	Pass

WCDMA Mode

Middle Channel, f_o =1880.0 MHz				
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	59	0.031	Pass
-20		47	0.025	Pass
-10		43	0.023	Pass
0		31	0.016	Pass
10		29	0.015	Pass
20		1	0.001	Pass
30		-6	-0.003	Pass
40		-11	-0.006	Pass
50		2	0.001	Pass
25	V min.= 3.6	-3	-0.002	Pass
25	V max.= 4.2	12	0.006	Pass

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