

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

For

**Queclink Wireless Solutions Co.,Ltd**

Room 501, Building 9, No. 99, TianZhou Road, Shanghai, China

**FCC ID: YQD-GV75**

<b>Report Type:</b> Original Report	<b>Product Type:</b> GPS Tracker
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<b>Report Number:</b> RKS160810001-00B	
<b>Report Date:</b> 2016-08-15	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The Queclink Wireless Solutions Co.,Ltd's product, model number: GV75 (FCC ID: YQD-GV75) or the "EUT" in this report was a GPS Tracker , which was measured approximately 102 mm (L) ×46 mm (W) ×20.5 mm (H),rated with input voltage: 3.7V rechargeable Li-ion battery or DC 12.0V from adapter.

#### Adapter Information:

Model: RCL-121000UL

Input: AC 100-240V, 50/60Hz, 0.5A

Output: DC 12V, 1000mA

*\* All measurement and test data in this report was gathered from production sample serial number: 20160715007.*

*(Assigned by BACL, Kunshan).The EUT supplied by the applicant was received on 2016-07-15.*

### Objective

This type approval report is prepared on behalf of Queclink Wireless Solutions 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)

N/A

### 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, ANSI C63.4-2014.

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

Measurement uncertainty with radiated emission is 5.81 dB for 30MHz-1GHz.and 4.88 dB for above 1GHz, 1.95dB for conducted measurement.

## **Test Facility**

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

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication 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 November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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.

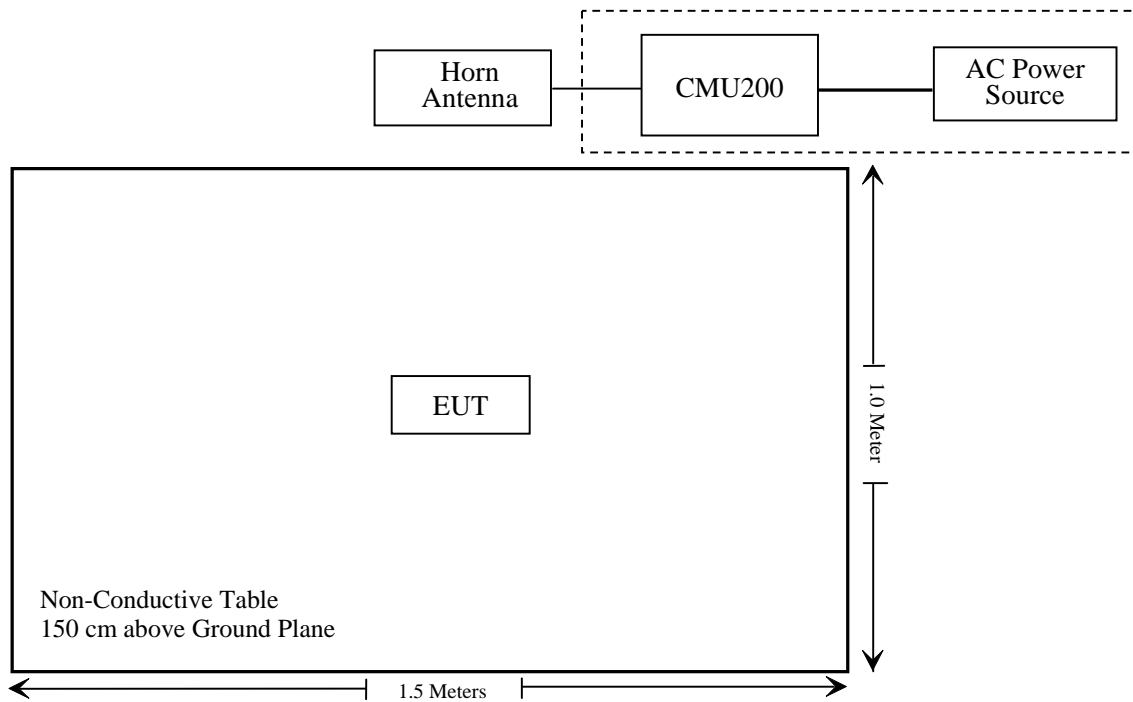
### Equipment Modifications

No modifications were made to the EUT.

### Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
§1.1307, §2.1091	MAXIMUM PERMISSIBLE EXPOSURE (MPE)	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

**FCC §1.1307& §2.1091 –MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

**Applicable Standard**

According to subpart § 2.1051and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
<b>Frequency Range (MHz)</b>	<b>Electric Field Strength (V/m)</b>	<b>Magnetic Field Strength (A/m)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>Averaging Time (minutes)</b>
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz; \* = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

**Calculated Formulary:**

Predication of MPE limit at a given distance

$S = PG/4 \pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

**Calculated Data:**

<b>Mode</b>	<b>Frequency</b>	<b>Antenna Gain</b>		<b>Target Power</b>		<b>Evaluation Distance (cm)</b>	<b>Power Density (mW/cm<sup>2</sup>)</b>	<b>MPE Limit (mW/cm<sup>2</sup>)</b>
		<b>(dBi)</b>	<b>(numeric)</b>	<b>(dBm)</b>	<b>(mW)</b>			
GSM850	824.2	0	1	33.50	2238.72	20	0.445	0.549
GSM1900	1850.2	1.96	1.570	30.50	1122.02	20	0.35	1.0
GPRS850	824.2	0	1	33.00	1995.26	20	0.397	0.549
GPRS1900	1850.2	1.96	1.570	30.00	1000.00	20	0.31	1.0

Note : Target Power =the max power from Tune-up Procedure

GSM850= 32.5 ± 1 dBm;GSM1900=29.5 ± 1 dBm

GPRS 850= 32 ± 1 dBm; GPRS1900=29 ± 1 dBm

Result: The device meet FCC MPE at 20 cm distance



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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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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**

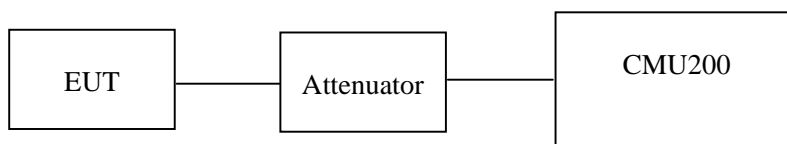
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

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.



*Radiated method:*

TIA603-D section 2.2.17

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Agilent	Signal Generator	8648C	3537A01810	2016-07-04	2017-07-03
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	6431	2015-11-07	2016-11-06
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
Sunol Sciences	Broadband Antenna	JB3	A090421-2	2015-11-07	2016-11-06
MCH	Regulated DC Power Supply	MCH-303D-II	14070562	2015-12-03	2016-12-03
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15

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

**Test Data**

**Environmental Conditions**

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0kPa

The testing was performed by Chris Wang on 2016-08-08.

**Conducted Power**

**Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	32.30	38.45
	190	836.6	32.36	38.45
	251	848.8	32.68	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.37	31.92	30.21	29.07	38.45
	190	836.6	32.38	31.93	30.14	29.19	38.45
	251	848.8	32.62	31.94	30.10	29.42	38.45

**PCS Band (Part 24E)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.81	33
	661	1880.0	28.80	33
	810	1909.8	29.16	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.77	28.55	27.65	26.73	33
	661	1880.0	28.71	28.59	27.80	26.56	33
	810	1909.8	28.79	28.57	27.68	26.66	33

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

**PCS Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.22	13
	Middle	0.37	13
	High	0.28	13

**Radiated Power**

**GSM Mode:**

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	S.G. Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
Cellular Band (Part 22H), Middle Channel										
836.6	109.28	112	1.5	H	30.1	0.3	0	29.80	38.45	8.65
836.6	108.88	75	1.5	V	27.7	0.3	0	27.40	38.45	11.05
PCS Band (Part 24E), Middle Channel										
1880.00	98.03	331	1.7	H	22.8	1.40	7.30	28.70	33	4.30
1880.00	98.63	274	1.9	V	15.8	1.40	7.30	21.70	33	11.30

**Note:**

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

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

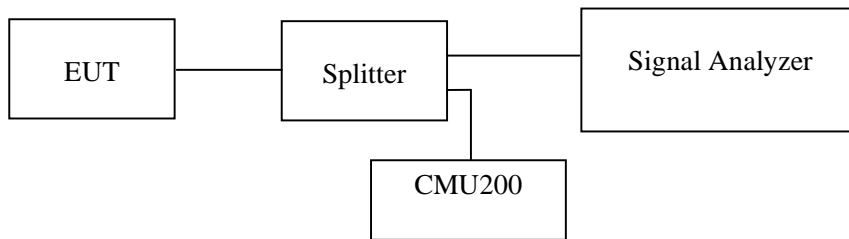
**Applicable Standards**

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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	SIGNAL ANALYZER	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Mini	Splitter	ZFRSC-14-S+	SF019411452	2016-07-04	2017-07-03
BACL	RF cable	KS-LAB-020	KS-LAB-020	2016-07-04	2017-07-03

\* **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).

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

<b>Temperature:</b>	21 °C
<b>Relative Humidity:</b>	49 %
<b>ATM Pressure:</b>	101.0kPa

*The testing was performed by Chris Wang on 2016-08-06&2016-08-09.*

*EUT operation mode: Transmitting*

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

**Cellular Band (Part 22H)**

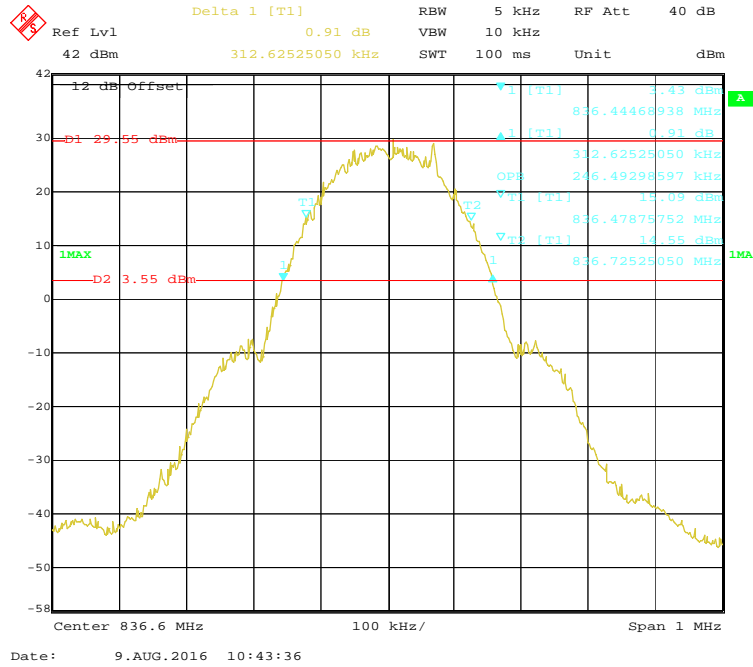
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>99% Occupied Bandwidth (kHz)</b>	<b>26 dB Emission Bandwidth (kHz)</b>
GSM(GMSK)	836.6	246.5	312.6
GPRS(GMSK)	836.6	244.5	315.6

**PCS Band (Part 24E)**

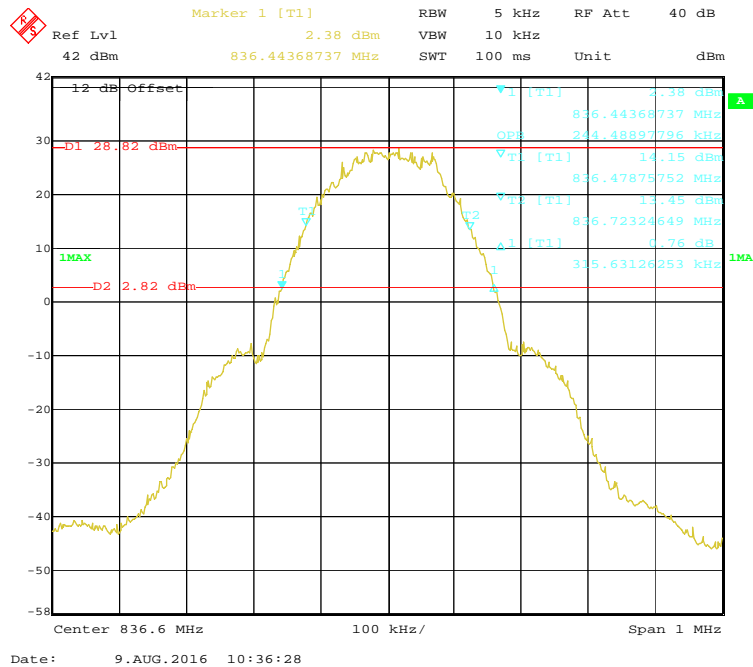
<b>Mode</b>	<b>Frequency (MHz)</b>	<b>99% Occupied Bandwidth (kHz)</b>	<b>26 dB Emission Bandwidth (kHz)</b>
GSM(GMSK)	1880.0	243.1	322.7
GPRS(GMSK)	1880.0	244.6	321.3

Cellular Band (Part 22H)

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



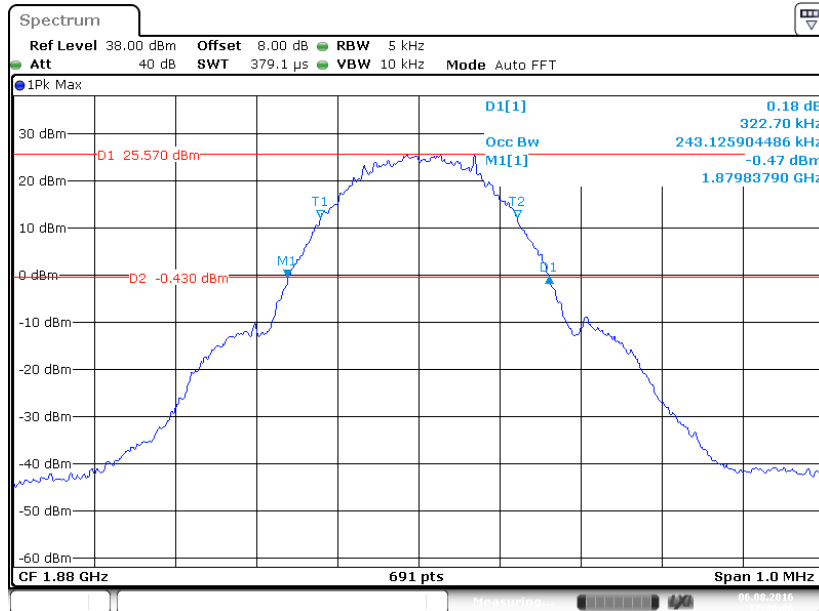
99% Occupied & 26 dB Emissions Bandwidth for GPRS (GMSK) Mode





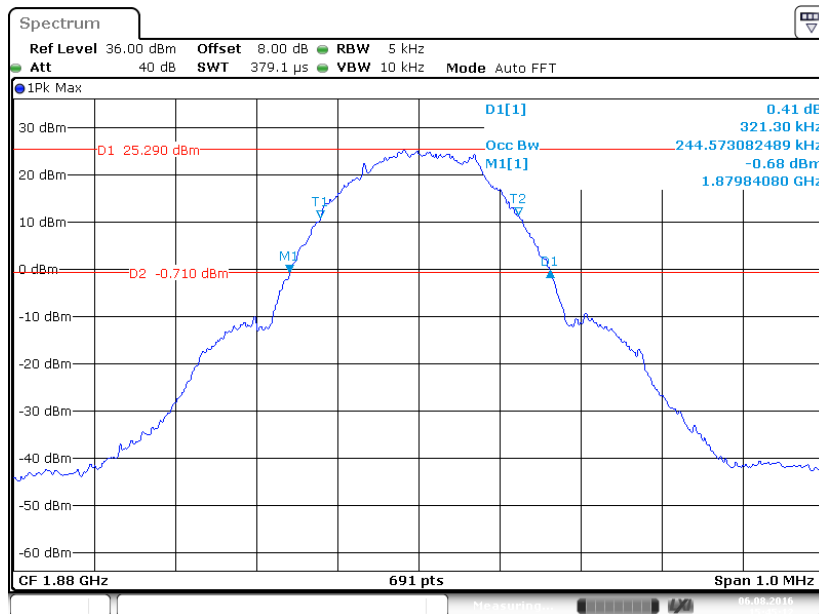
**PCS Band (Part 24E)**

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



Date: 6 AUG 2016 17:30:06

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



Date: 6 AUG 2016 15:45:13

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

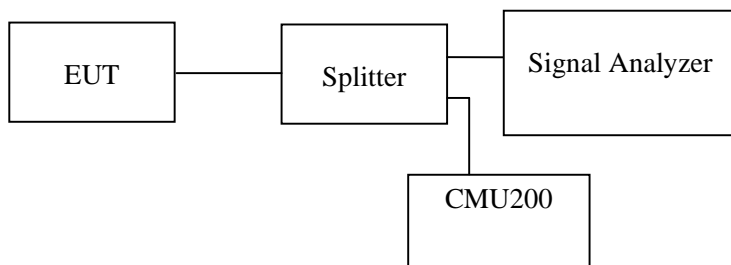
**Applicable Standards**

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 10<sup>th</sup> harmonic.



**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	SIGNAL ANALYZER	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Mini	Splitter	ZFRSC-14-S+	SF019411452	2016-07-04	2017-07-03
BACL	RF cable	KS-LAB-020	KS-LAB-020	2016-07-04	2017-07-03

\* **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).

**Test Data**

**Environmental Conditions**

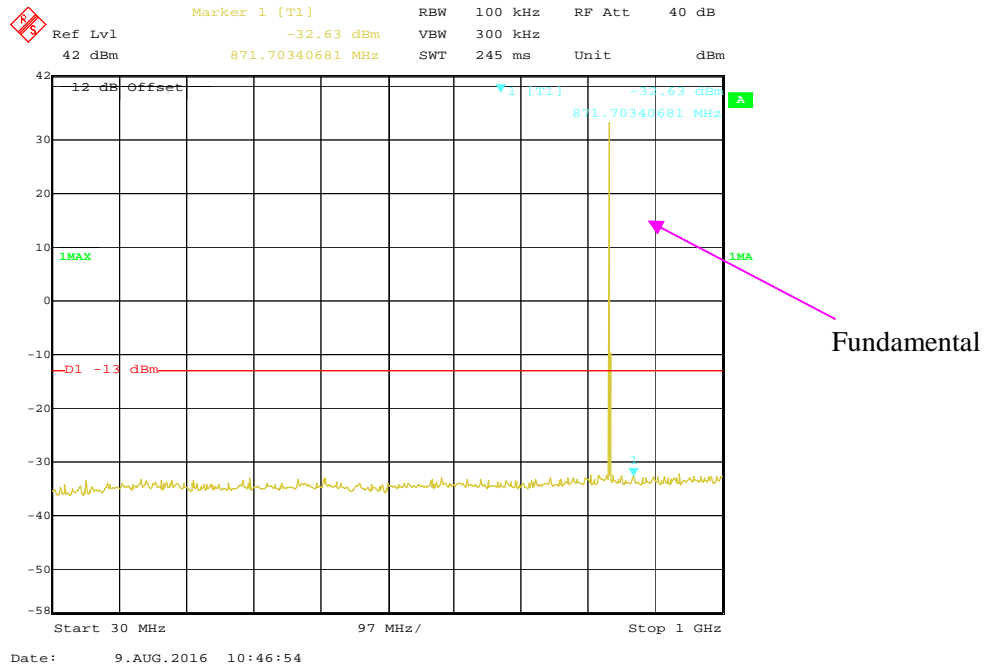
<b>Temperature:</b>	20~23 °C
<b>Relative Humidity:</b>	48~50 %
<b>ATM Pressure:</b>	100.5~101.0kPa

The testing was performed by Chris Wang on 2016-08-06 and 2016-08-09.

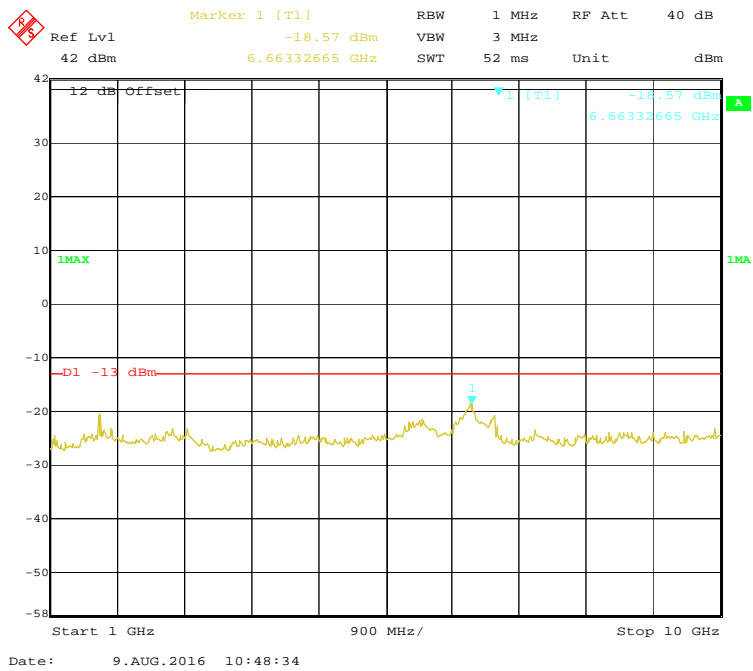
Please refer to the following plots.

**Cellular Band (Part 22H)**

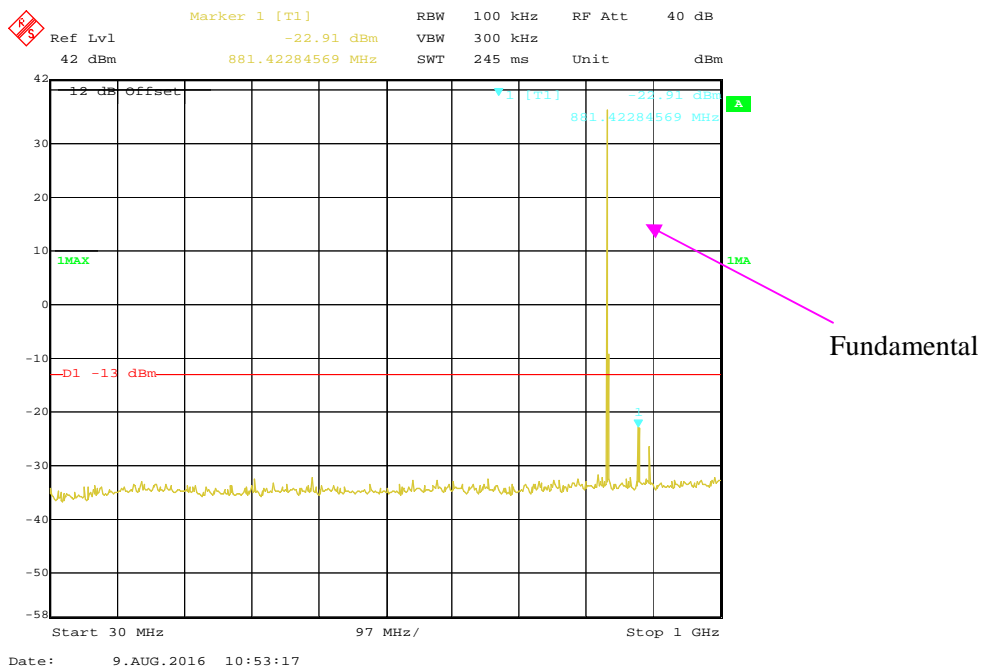
**30 MHz – 1 GHz (GSM Mode)**



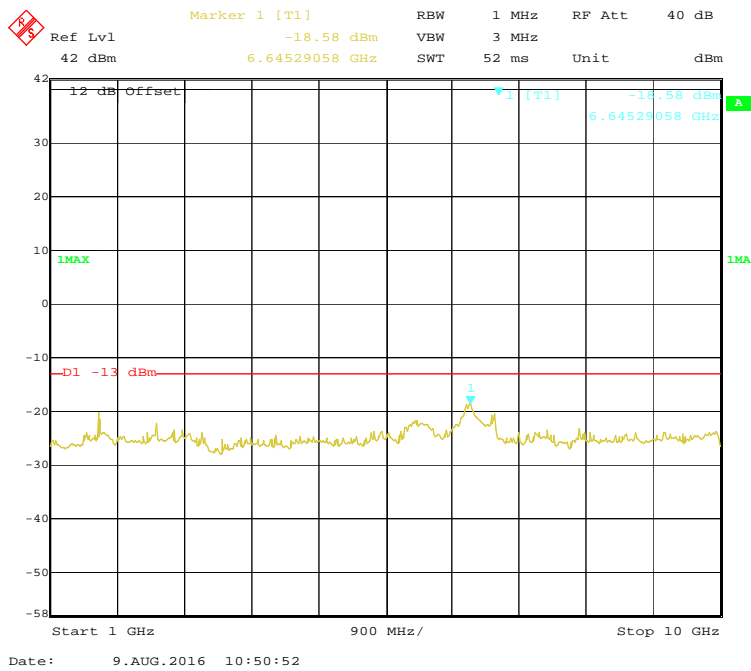
### 1 GHz – 10 GHz (GSM Mode)



### 30 MHz – 1 GHz (GPRS Mode)

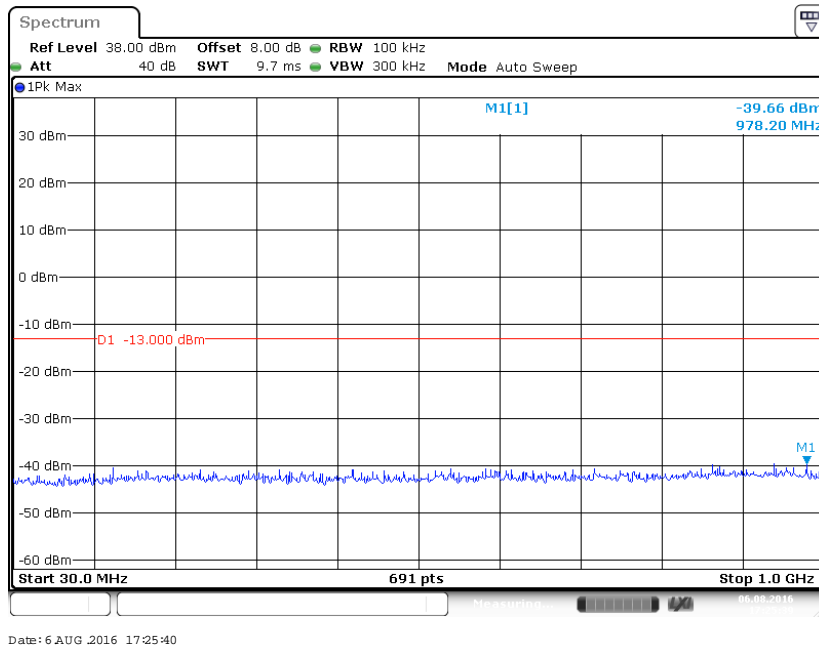


### 1 GHz – 10 GHz (GPRS Mode)

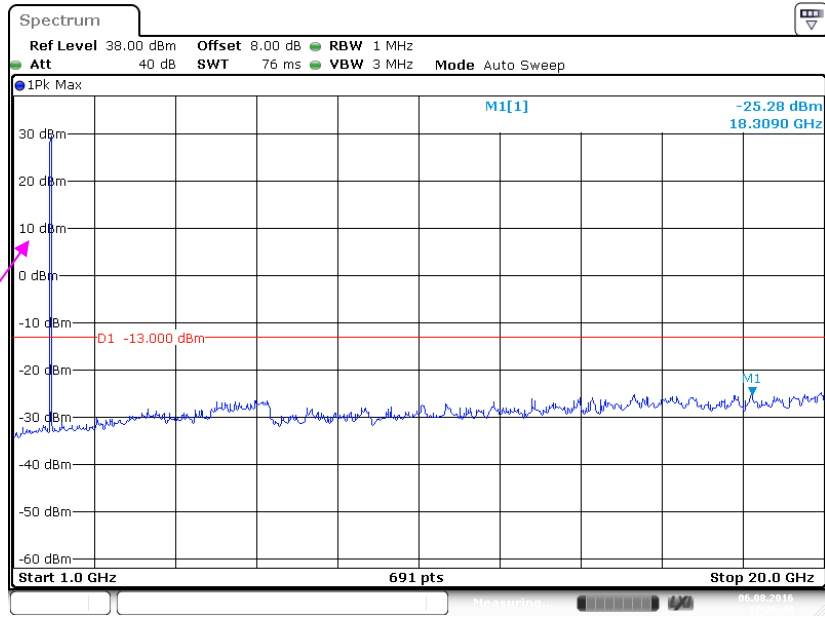


### PCS Band (Part 24E)

### 30 MHz – 1 GHz (GSM Mode)



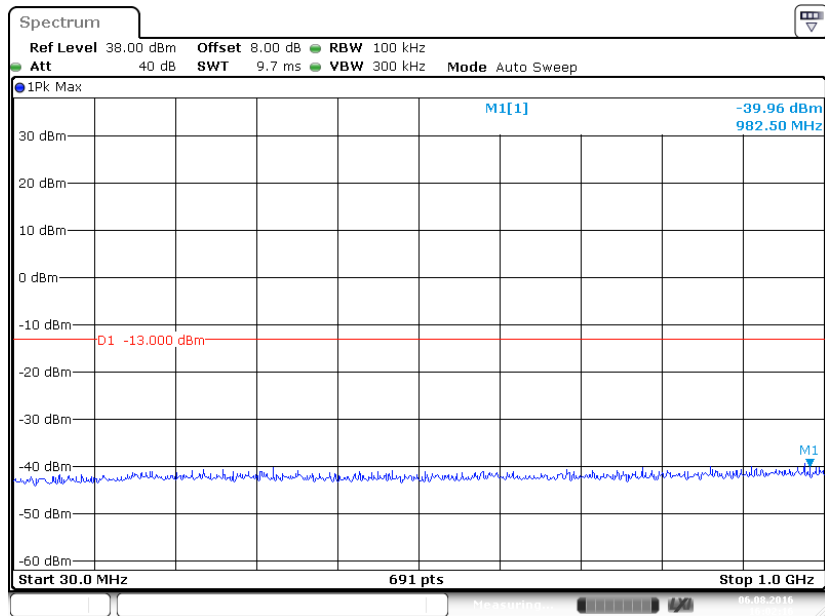
### 1 GHz – 20 GHz (GSM Mode)



Fundamental

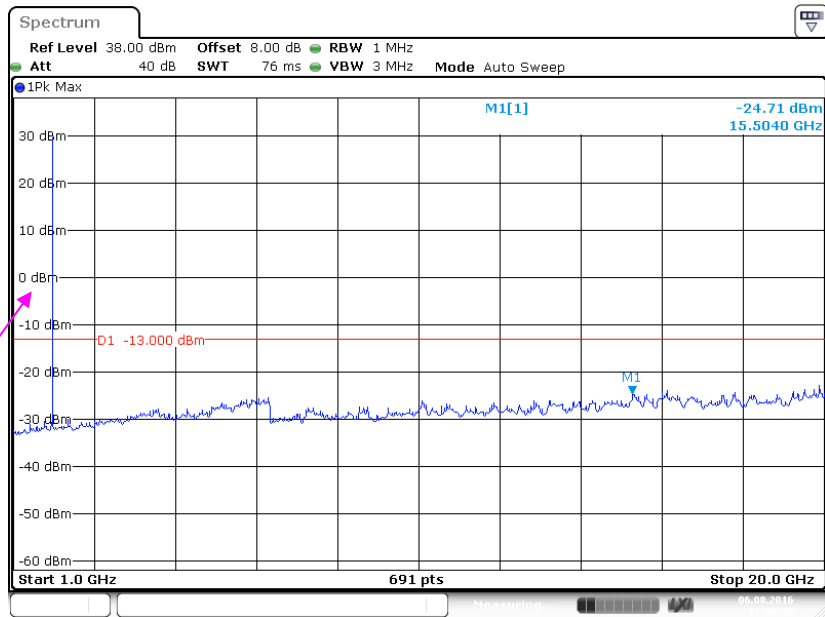
Date: 6 AUG. 2016 17:26:45

### 30 MHz – 1 GHz (GPRS Mode)



Date: 6 AUG. 2016 16:02:16

1 GHz – 20 GHz (GPRS Mode)



Fundamental

Date: 6 AUG 2016 16:00:58

## **FCC § 2.1053; § 22.917 (a);§ 24.238 (a)**

### **SPURIOUS RADIATED EMISSIONS**

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#### **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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Sonoma Instrument	Amplifier	330	171377	2015-09-16	2016-09-16
Agilent	Signal Generator	8648C	3537A01810	2016-07-04	2017-07-03
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	6431	2015-11-07	2016-11-06
Mini	Pre-amplifier	ZVA-183-S+	857001418	2015-11-12	2016-11-11
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
Sunol Sciences	Broadband Antenna	JB3	A090421-2	2015-11-07	2016-11-06
MCH	Regulated DC Power Supply	MCH-303D-II	14070562	2015-12-03	2016-12-03
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15

\* **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).

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

<b>Temperature:</b>	25 °C
<b>Relative Humidity:</b>	48 %
<b>ATM Pressure:</b>	101.0kPa

*The testing was performed by Chris Wang on 2016-08-09.*

*Test mode: Transmitting*

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 (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GSM Mode, Middle channel										
330.56	34.75	233	1.6	H	-64.92	1.20	3.49	-62.63	-13	49.63
330.56	32.51	275	2.3	V	-67.16	1.20	3.49	-64.87	-13	51.87
1673.20	39.81	34	2.0	H	-61.12	2.50	8.20	-55.42	-13	42.42
1673.20	38.50	356	1.5	V	-62.43	2.50	8.20	-56.73	-13	43.73
2509.80	41.00	292	1.3	H	-60.39	3.94	10.10	-54.23	-13	41.23
2509.80	39.72	273	1.6	V	-61.67	3.94	10.10	-55.51	-13	42.51

**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 (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM Mode, Middle channel										
330.56	37.76	221	1.8	H	-61.91	1.20	3.49	-59.62	-13	46.62
330.56	34.03	10	2.1	V	-65.64	1.20	3.49	-63.35	-13	50.35
3760.00	46.86	149	1.3	H	-52.37	5.60	9.60	-48.37	-13	35.37
3760.00	50.02	304	2.5	V	-49.21	5.60	9.60	-45.21	-13	32.21
5640.00	48.81	254	1.2	H	-50.30	6.42	10.30	-46.42	-13	33.42
5640.00	46.70	232	1.5	V	-52.41	6.42	10.30	-48.53	-13	35.53

**Note:**

- 1) Absolute Level = SG Level - Cable loss + Antenna Gain
- 2) Margin = Limit - Absolute Level

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

### **Applicable Standards**

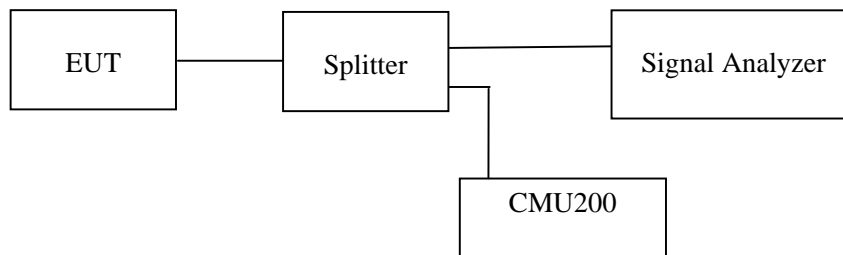
According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Mini	Splitter	ZFRSC-14-S+	SF019411452	2016-07-04	2017-07-03
BACL	RF cable	KS-LAB-020	KS-LAB-020	2016-07-04	2017-07-03

\* **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).

**Test Data**

**Environmental Conditions**

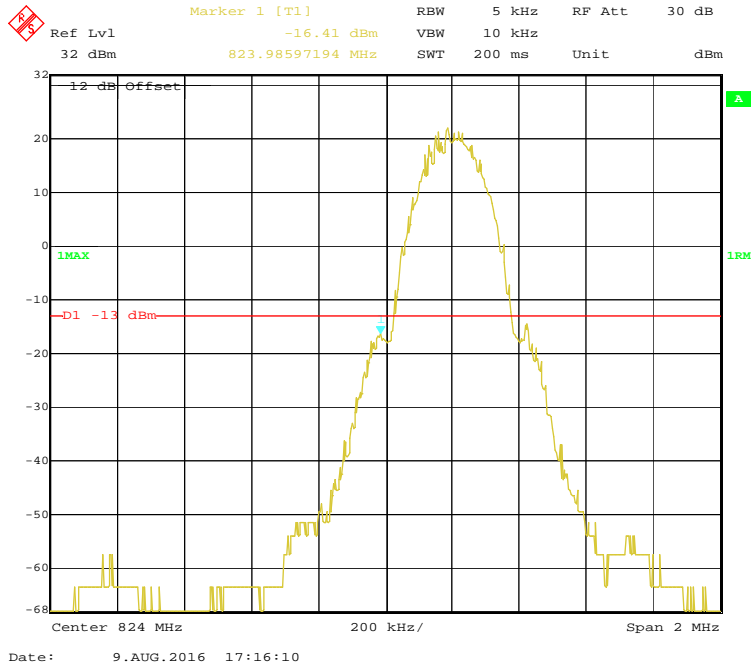
<b>Temperature:</b>	20~23 °C
<b>Relative Humidity:</b>	48~52 %
<b>ATM Pressure:</b>	100.5~101.0kPa

*The testing was performed by Chris Wang on 2016-08-09.*

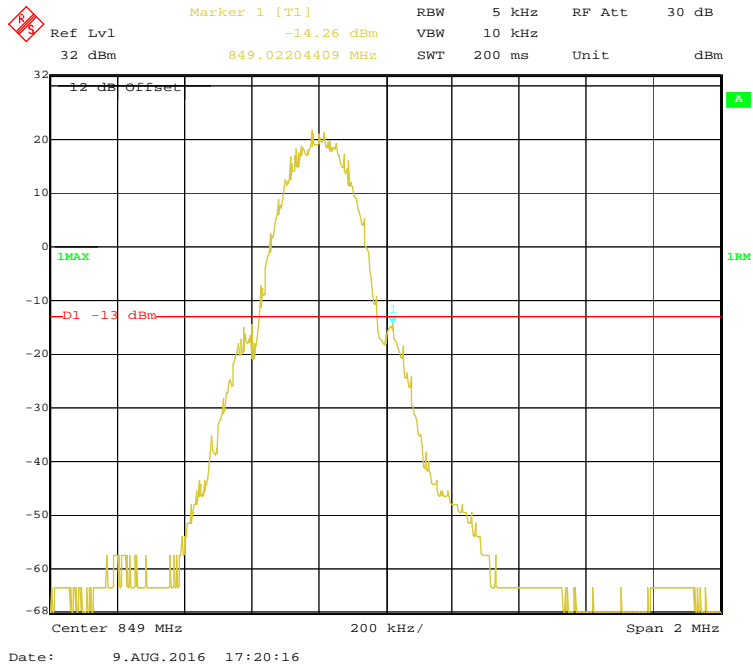
*EUT operation mode: Transmitting*

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

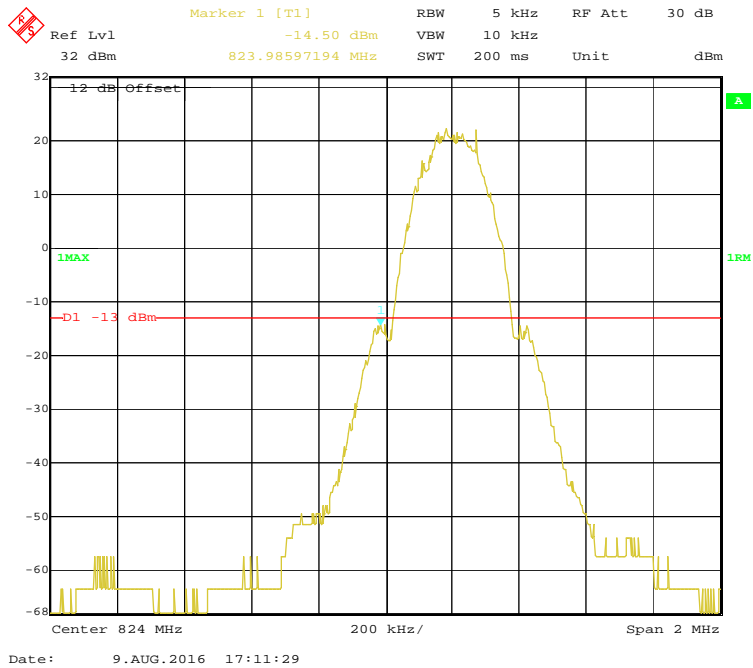
### Cellular Band, Left Band Edge for GSM (GMSK) Mode



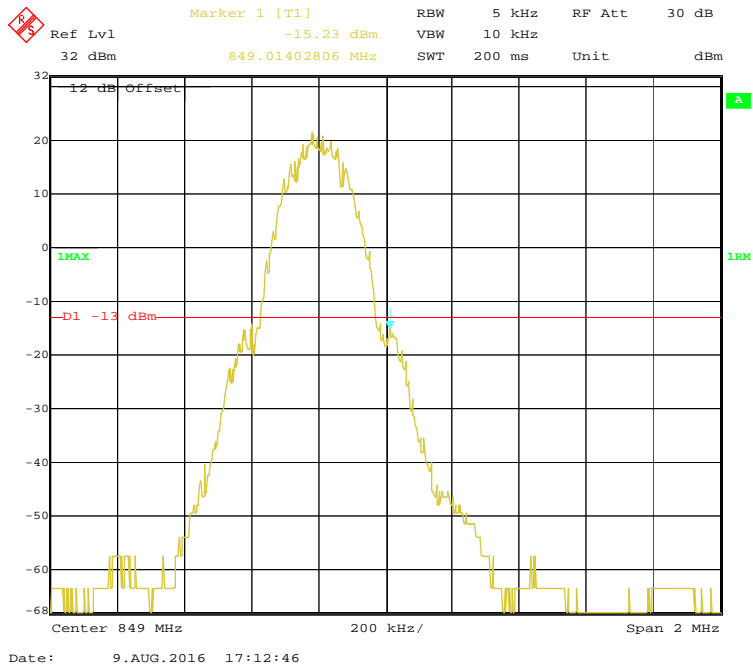
### Cellular Band, Right Band Edge for GSM (GMSK) Mode



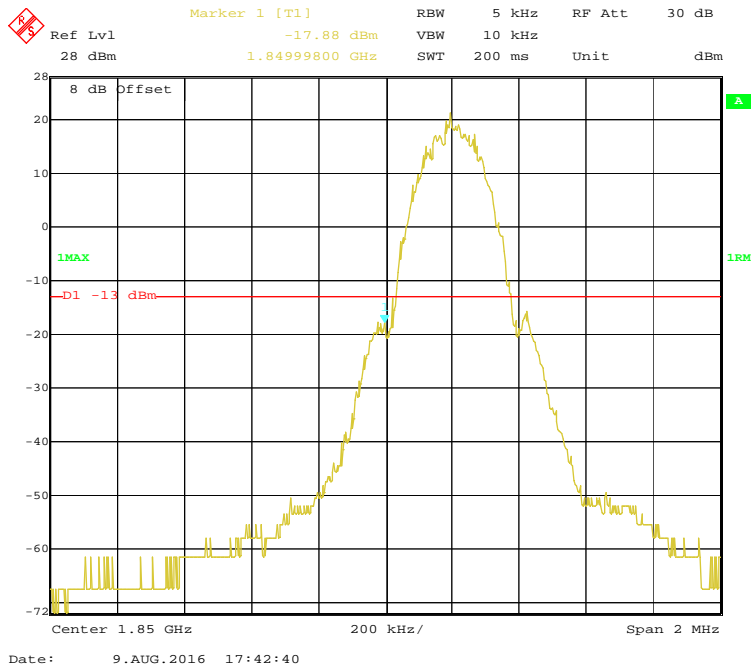
**Cellular Band, Left Band Edge for GPRS (GMSK) Mode**



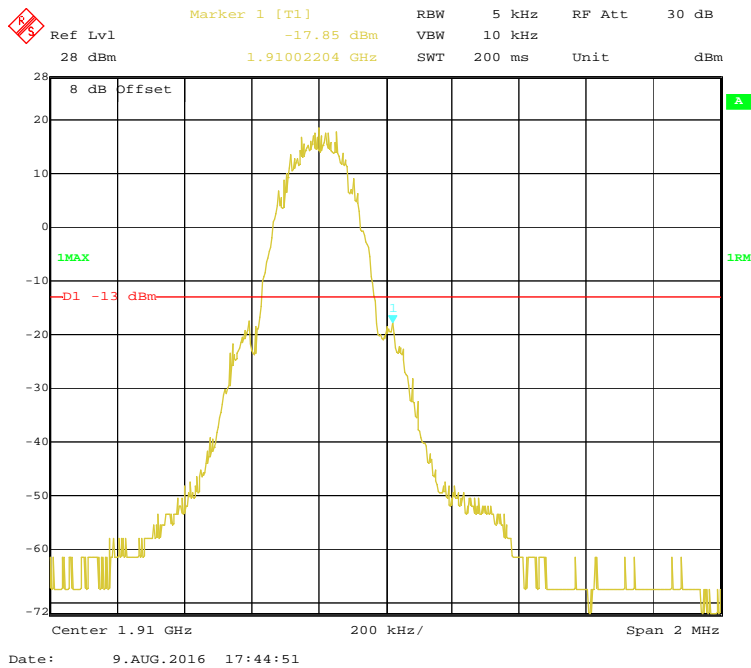
**Cellular Band, Right Band Edge for GPRS (GMSK) Mode**



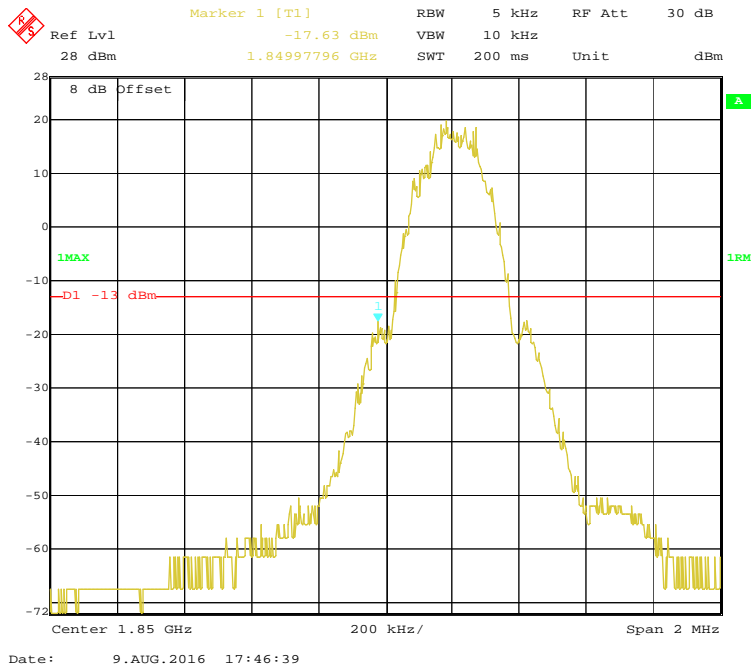
**PCS Band, Left Band Edge for GSM (GMSK) Mode**



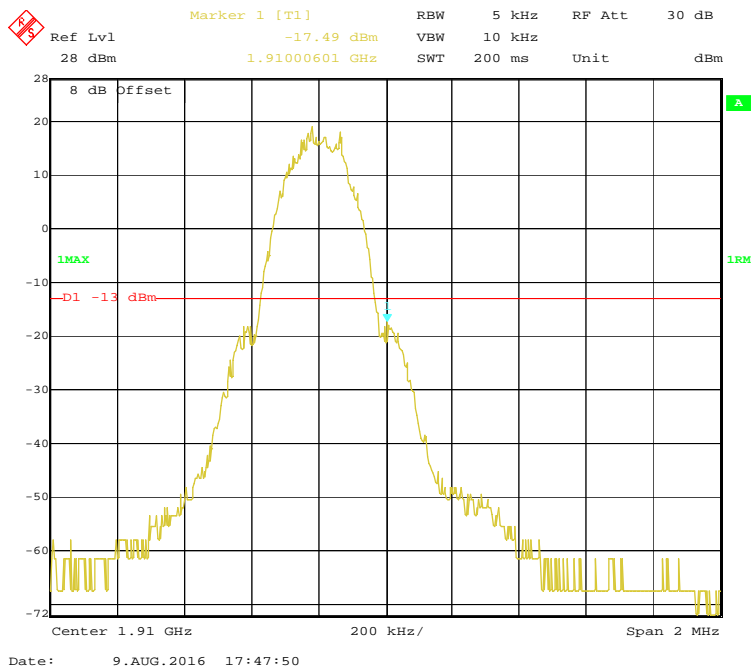
**PCS Band, Right Band Edge for GSM (GMSK) Mode**



### PCS Band, Left Band Edge for GPRS (GMSK) Mode



### PCS Band, Right Band Edge for GPRS (GMSK) Mode





**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

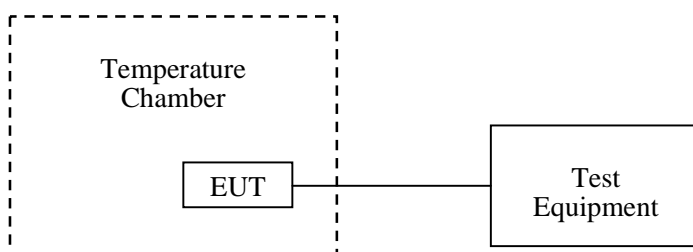
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

**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 Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
BACL	Temperature Chamber	BTH-150	30023	/	/
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	828590	2015-11-12	2016-11-11
Mini	Splitter	ZFRSC-14-S+	SF019411452	2016-07-04	2017-07-03
BACL	RF cable	KS-LAB-020	KS-LAB-020	2016-07-04	2017-07-03

\* **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).

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

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	50 %
<b>ATM Pressure:</b>	101.0kPa

*The testing was performed by Chris Wang on 2016-08-09.*

*EUT operation mode: Transmitting*

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

**Cellular Band (Part 22H)**

**GSM Mode**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	15	0.01793	2.5
-20		14	0.01673	2.5
-10		10	0.01195	2.5
0		12	0.01434	2.5
10		13	0.01554	2.5
20		13	0.01554	2.5
30		11	0.01315	2.5
40		13	0.01554	2.5
50		14	0.01673	2.5
25		V min.= 3.5	14	0.01673
25	V max.= 4.2	16	0.01913	2.5

**PCS Band (Part 24E)**

**GSM Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	31	0.01649	pass
-20		33	0.01755	pass
-10		30	0.01596	pass
0		32	0.01702	pass
10		21	0.01117	pass
20		21	0.01117	pass
30		23	0.01223	pass
40		23	0.01223	pass
50		23	0.01223	pass
25		V min.= 3.5	25	0.01330
25	V max.= 4.2	25	0.01330	pass

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