



TESTING LABORATORY
CERTIFICATE #4820.01



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

For

Insights Value Technology Co.Ltd

Room 1202,North Ring Center,Xicheng District,Beijing,P.R China

FCC ID: 2APVQ-YARDAQ07

Report Type: Original Report	Product Type: Micro Environment Quality Monitoring Station
Report Number: RBJ180507051-00A	
Report Date: 2018-08-14	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Micro Environment Quality Monitoring Station
EUT Model:		YSRDAQ07
Multiple Model:		YSRDPM25, YSRDPM25P5, YSRDAQ07P5, YSRDDF08
FCC ID:		2APVQ-YARDAQ07
Rated Input Voltage:		DC48V from adapter
Adapter Information	Model:	GRT150-480250
	Input:	AC100-240V, 2.5A 50/60Hz
	Output:	DC48V , 2.5A
External Dimension:		Length (240 mm)*Width (300 mm)*High (100 mm)
Serial Number:		180507051
EUT Received Date:		2018.05.08

Note: The series product, model YSRDAQ07, YSRDPM25, YSRDPM25P5, YSRDAQ07P5, YSRDDF08 are electrically identical, we selected YSRDAQ07 for fully testing, the differences details was explained in the declaration letter.

Objective

This report is prepared on behalf of *Insights Value Technology Co.Ltd* in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.

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

Related Submittal(s)/Grant(s)

No related submittal(s)/grant(s).

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-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz: 5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode.

Equipment Modifications

No modification was made to the EUT.

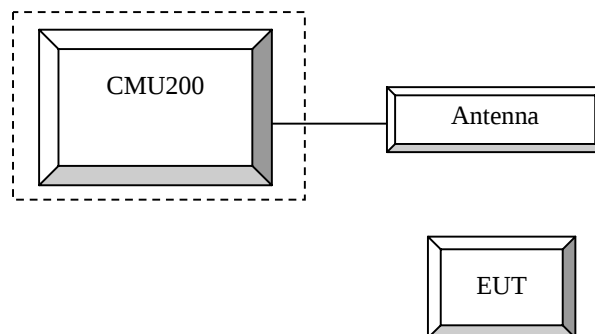
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universal Radio Communication Tester	CMU200	106 891
N/A	ANTENNA	N/A	N/A

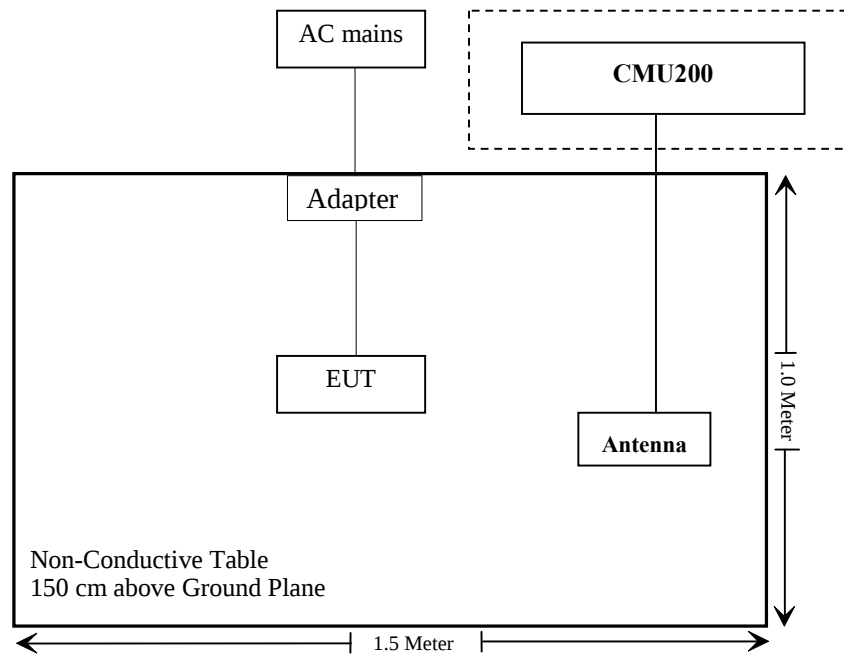
Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
Adapter Cable	No	No	0.8	Adapter	EUT

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §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 Radiation Emissions	Compliance
§ 22.917 (a); § 24.238 (a)	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to 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) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	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.

Calculation formula:

Prediction of power density at the distance of the applicable MPE limit

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);

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:

Band	Channel No.	Tune up RF Output Power (dBm)			
		GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
Cellular	128	33.0	33.0	31.0	31.0
	190	33.0	33.0	31.0	31.0
	251	33.0	33.0	31.0	31.0
PCS	512	30.0	30.0	28.0	28.0
	661	30.0	30.0	28.0	28.0
	810	30.0	30.0	28.0	28.0

The time based average power is relevant, the difference in between depends on the duty of the TDMA signal

Number of Time slot	1	2	3	4
Duty cycle	1:8	1:4	1:2.66	1:2
Time based average power compared to slotted average power	-9 dB	-6 dB	-4.25 dB	-3 dB

Band	Channel No.	Tune up time based average power (dBm)			
		GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
Cellular	128	24.0	27.0	26.8	28.0
	190	24.0	27.0	26.8	28.0
	251	24.0	27.0	26.8	28.0
PCS	512	21.0	24.0	23.8	25.0
	661	21.0	24.0	23.8	25.0
	810	21.0	24.0	23.8	25.0

Frequency (MHz)	Tune up time based average power		Antenna Gain (dBi)	Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
	(dBm)	(mW)				
824-849	28.0	630.96	2.5	20.00	0.22	0.55
1850-1910	25.0	316.23	2.5	20.00	0.11	1.00

Result: The device meet FCC MPE at 20 cm distance.

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 Standard

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.

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

Test Procedure

GSM/GPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900

Press Connection control to choose the different menus

Press RESET > choose all the reset all settings

Connection Press Signal Off to turn off the signal and change settings

Network Support > GSM + GPRS or GSM + EGSM

Main Service > Packet Data

Service selection > Test Mode A – Auto Slot Config. off

MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting

> Slot configuration > Uplink/Gamma

> 33 dBm for GPRS 850

> 30 dBm for GPRS 1900

> 27 dBm for EGPRS 850

> 26 dBm for EGPRS 1900

BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel

Frequency Offset > + 0 Hz

Mode > BCCH and TCH

BCCH Level > -85 dBm (May need to adjust if link is not stable)

BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off

P0 > 4 dB

Slot Config > Unchanged (if already set under MS signal)

TCH > choose desired test channel

Hopping > Off

Main Timeslot > 3

Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream

AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input

Connection Press Signal on to turn on the signal and change settings

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
Agilent	Spectrum Analyzer	E4440A	SG43360054	2017-12-08	2018-12-08
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
narda	Attenuator	6dB	04270	2017-09-05	2018-09-05
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14

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

Test Data**Environmental Conditions**

Temperature:	27.2~27.6°C
Relative Humidity:	35~40 %
ATM Pressure:	99.9~101.2 kPa

* The testing was performed by Vito Chen, Steven Zuo, Andy Huang from 2018-05-19 to 2018-07-20.

Conducted Output Power**Cellular Band & PCS Band**

Band	Channel No.	Conducted Peak Output Power (dBm)			
		GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot
Cellular	128	32.53	32.45	30.95	30.04
	190	32.37	32.26	30.76	29.83
	251	32.12	32.03	30.58	29.64
PCS	512	28.12	28.06	27.96	27.91
	661	28.13	28.09	27.99	27.94
	810	27.91	27.88	27.85	27.82

Radiated Power**Part 22H**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
ERP,GSM 850_Middle Channel								
836.600	H	95.02	27.1	0.0	0.5	26.6	38.45	11.9
836.600	V	96.44	31.5	0.0	0.5	31.0	38.45	7.5

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
EIRP,PCS 1900_Middle Channel								
1880.000	H	85.13	12.5	11.7	2.7	21.5	33.00	11.5
1880.000	V	94.69	22.2	11.7	2.7	31.2	33.00	1.8

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

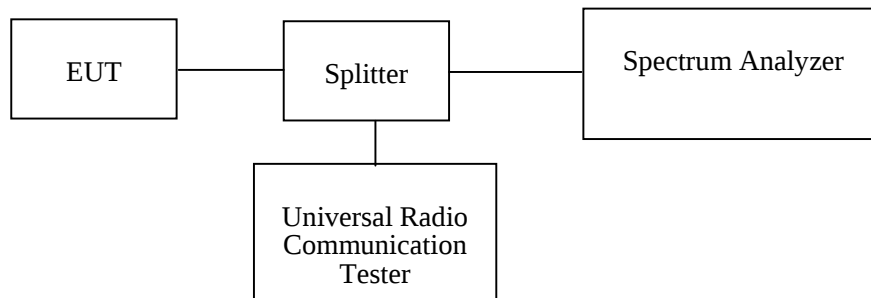
FCC §2.1049, §22.917, §22.905 & §24.238 - OCCUPIED BANDWIDTH**Applicable Standard**

FCC §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 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	831929/005	2017-08-31	2018-08-31
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14
narda	Attenuator	6dB	04270	2017-09-05	2018-09-05
Unknown	Attenuator	UNAT-3+	15529	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	N/A

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

Test Data**Environmental Conditions**

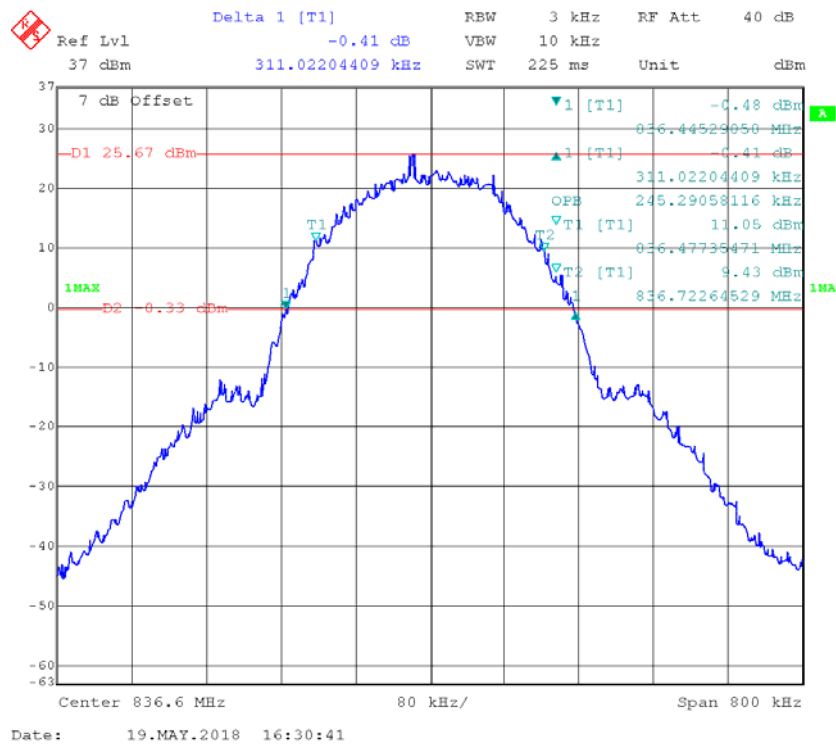
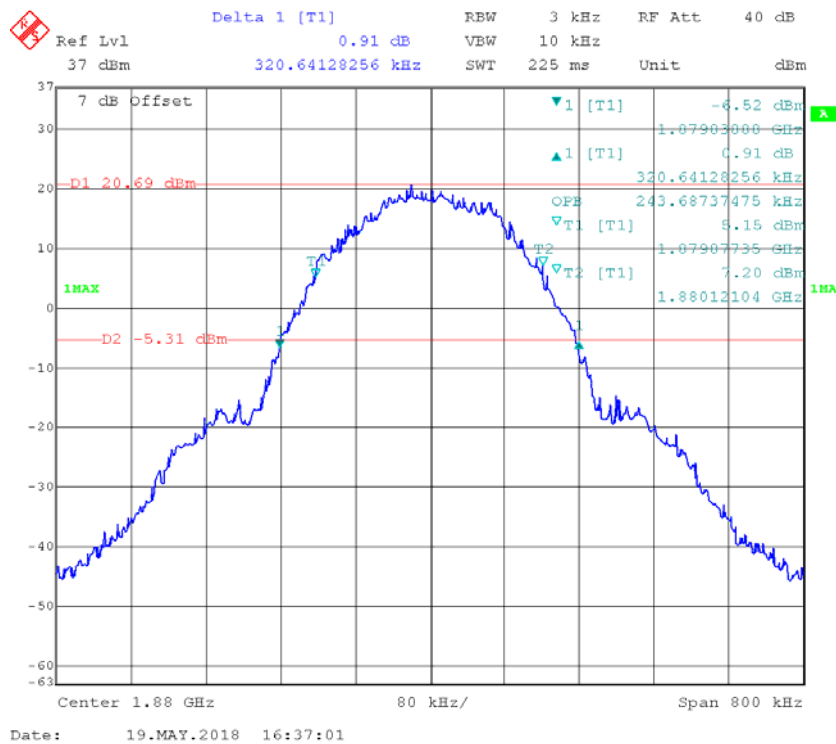
Temperature:	28.1 °C
Relative Humidity:	57 %
ATM Pressure:	101.1 kPa

* The testing was performed by Andy Huang on 2018-05-19.

Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GPRS	0.245	0.311
PCS		GPRS	0.244	0.321

GPRS 850 Cellular Band**GPRS PCS1900 Cellular Band**

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

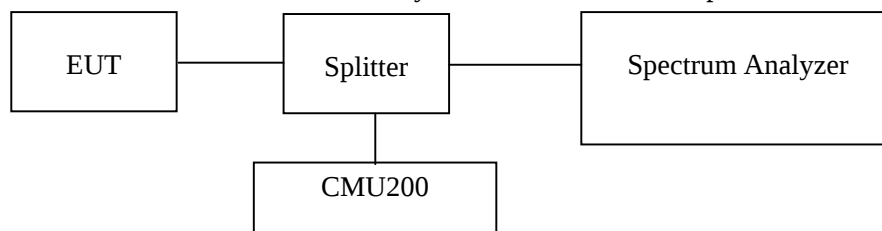
Applicable Standard

FCC §2.1051, §22.917(a) , §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. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2017-08-31	2018-08-31
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14
narda	Attenuator	6dB	04270	2017-09-05	2018-09-05
Unknown	Attenuator	UNAT-3+	15529	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	N/A

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

Test Data

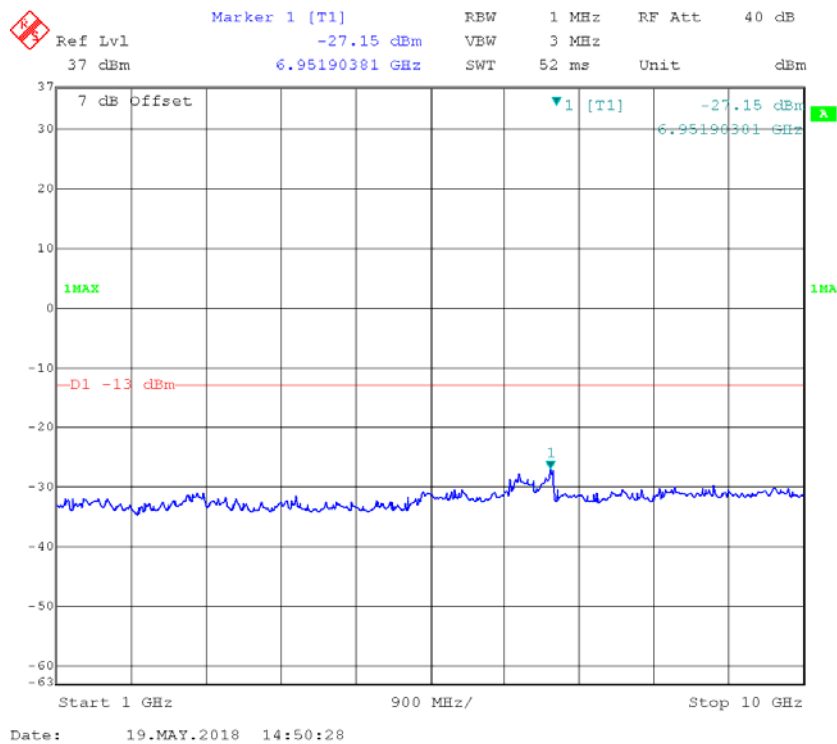
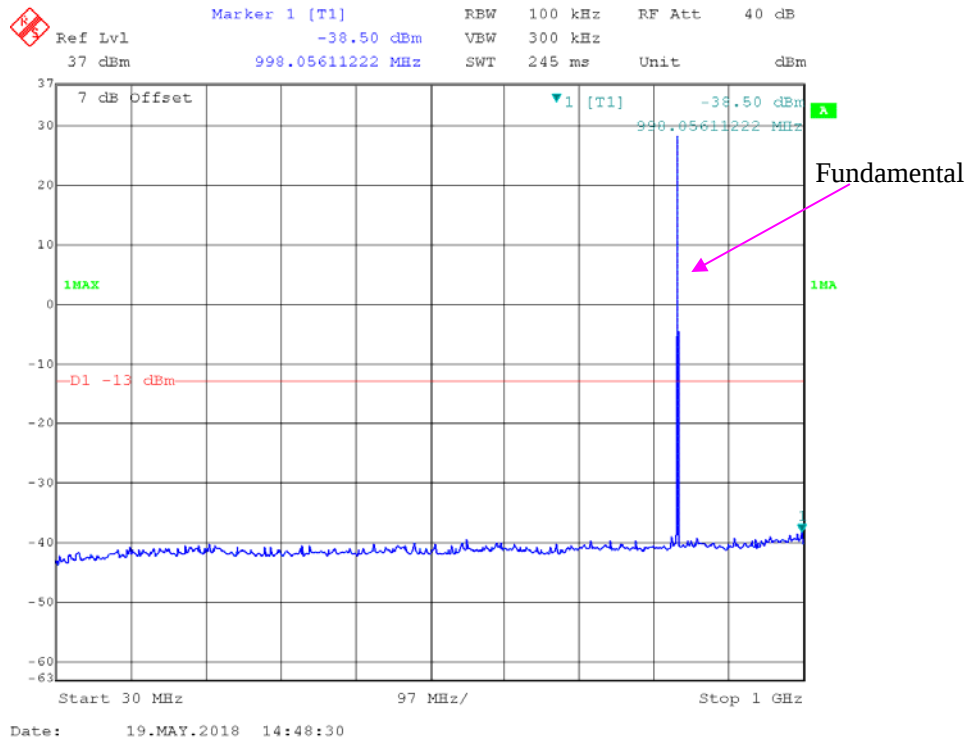
Environmental Conditions

Temperature:	26.4~28.1 °C
Relative Humidity:	52~57 %
ATM Pressure:	101.1~102.1 kPa

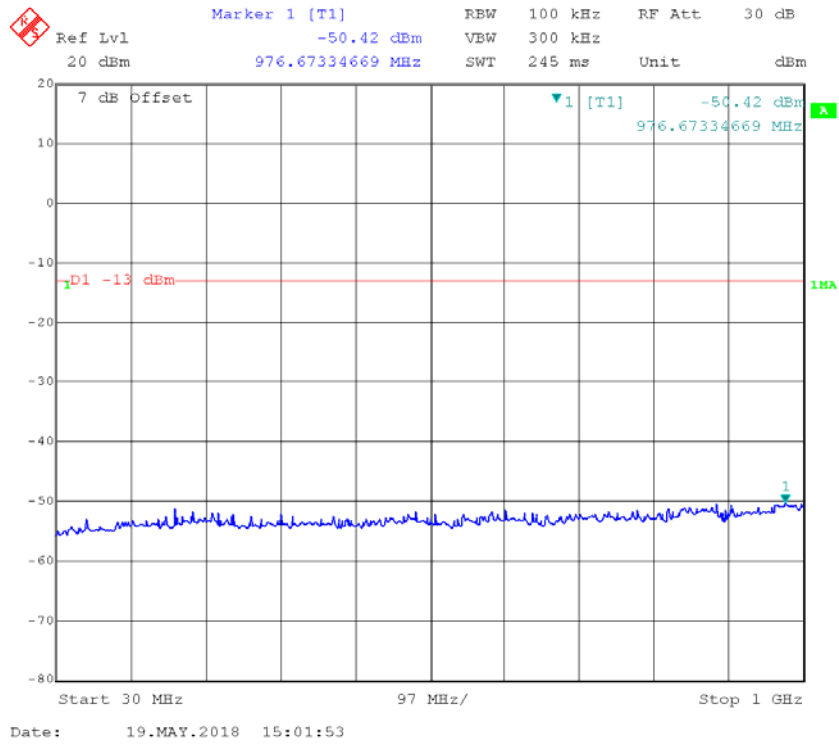
* The testing was performed by Andy Huang on 2018-05-19, 2018-05-25.

Please refer to the following plots.

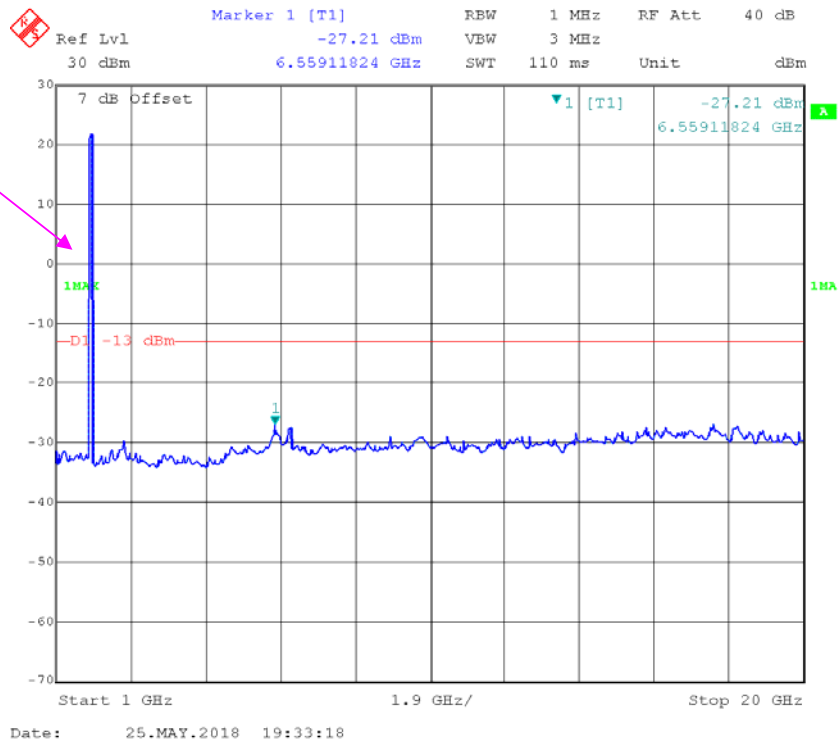
GPRS850_Middle Channel



GPRS PCS 1900_ Middle Channel



Fundamental



FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ – 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
R&S	EMI Test Receiver	ESCI	100035	2017-08-04	2018-08-04
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
HP	Amplifier	8447F	2443A01912	2017-09-05	2018-09-05
Agilent	Signal Generator	E8247C	MY43321350	2017-12-11	2018-12-11
Agilent	Spectrum Analyzer	E4440A	SG43360054	2018-01-04	2019-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
MITEQ	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-02 1304	2016-11-18	2019-11-18
Quinstar	Amplifier	QLW-18405536-JO	15964001001	2017-06-27	2018-06-27
Unknown	Coaxial Cable	C-NJNJ-50	C-0200-02	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-02	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-02	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-2200-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-2.4J2.4J-50	C-0700-02	2017-06-27	2018-06-27
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A

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

Test Data**Environmental Conditions**

Temperature:	27.6 °C
Relative Humidity:	35 %
ATM Pressure:	101.1 kPa

* The testing was performed by Vern Shen, Steven Zuo on 2018-05-19.

*EUT Operation Mode: Transmitting***Cellular Band (PART 22H)****30 MHz-10 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS850, Frequency:836.600 MHz								
1673.200	H	88.29	-25.9	10.6	0.7	-16.0	-13.0	3.0
1673.200	V	81.16	-33.7	10.6	0.7	-23.8	-13.0	10.8
2509.800	H	84.39	-28.6	13.1	1.2	-16.7	-13.0	3.7
2509.800	V	73.25	-39.8	13.1	1.2	-27.9	-13.0	14.9
3346.400	H	70.42	-40.2	13.8	1.6	-28.0	-13.0	15.0
3346.400	V	69.68	-41	13.8	1.6	-28.8	-13.0	15.8
285.100	H	31.39	-77.4	0.0	0.5	-77.9	-13.0	64.9
316.300	V	30.15	-79.5	0.0	0.5	-80.0	-13.0	67.0

PCS Band (PART 24E)**30 MHz-20 GHz:**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GPRS1900, Frequency:1880.000 MHz								
3760.000	H	59.74	-49.1	13.8	1.6	-36.9	-13.0	23.9
3760.000	V	59.26	-49.4	13.8	1.6	-37.2	-13.0	24.2
5640.000	H	67.13	-38.9	14.0	1.3	-26.2	-13.0	13.2
5640.000	V	59.98	-45.9	14.0	1.3	-33.2	-13.0	20.2
131.960	H	32.17	-72.7	0.0	0.3	-73.0	-13.0	60.0
225.370	V	30.66	-80.9	0.0	0.5	-81.4	-13.0	68.4

Note:

- 1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
- 2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
- 3) Margin = Limit-Absolute Level

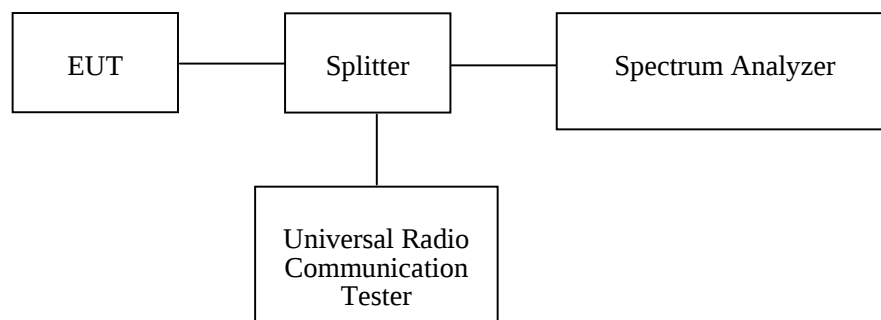
FCC §22.917(a) & §24.238(a)- BAND EDGES**Applicable Standard**

FCC § 2.1053, §22.917, § 24.238.

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	831929/005	2017-08-31	2018-08-31
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14
narda	Attenuator	6dB	04270	2017-09-05	2018-09-05
Unknown	Attenuator	UNAT-3+	15529	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each time	N/A
E-Microwave	Two-way Splitter	ODP-1-6-2S	OE0120142	Each Time	N/A

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

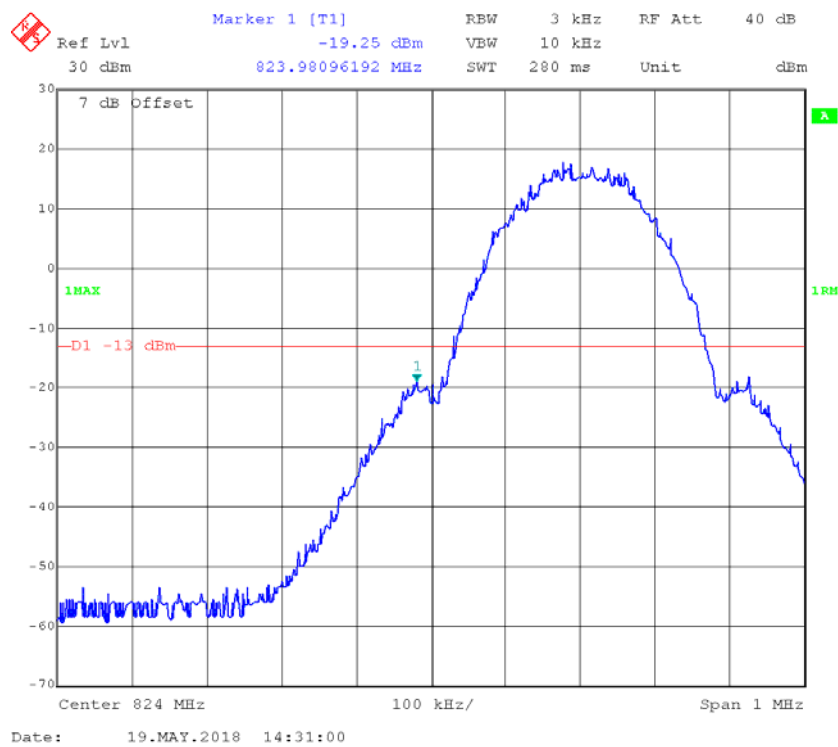
Test Data**Environmental Conditions**

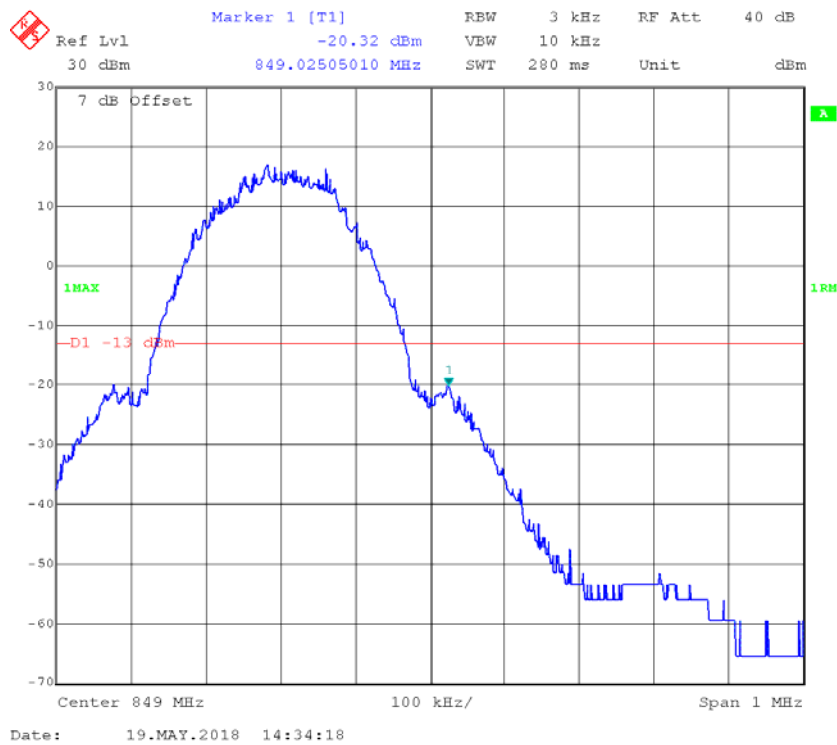
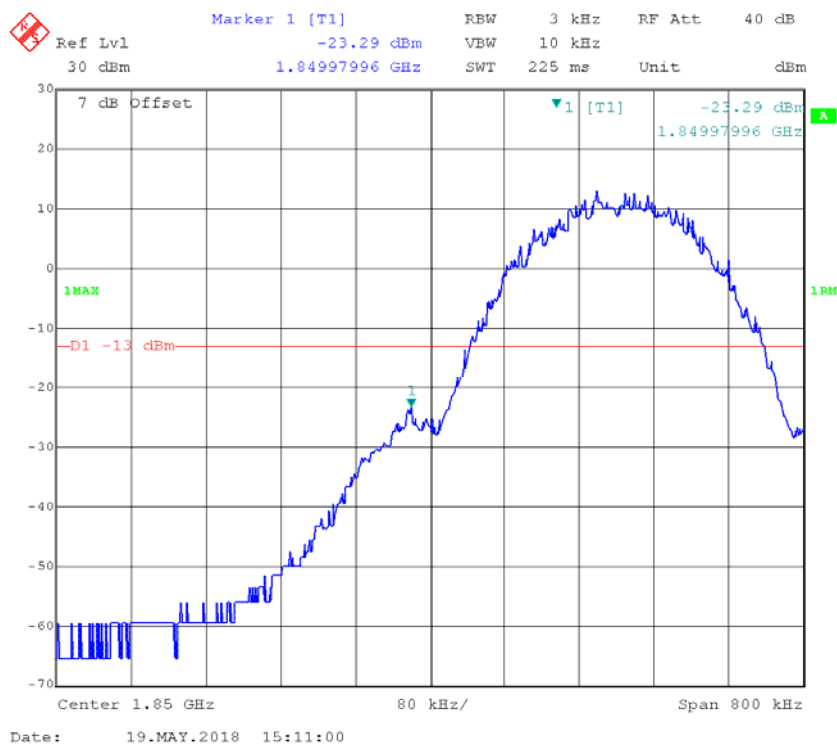
Temperature:	28.1 °C
Relative Humidity:	57 %
ATM Pressure:	101.2 kPa

* The testing was performed by Andy Huang on 2018-05-19.

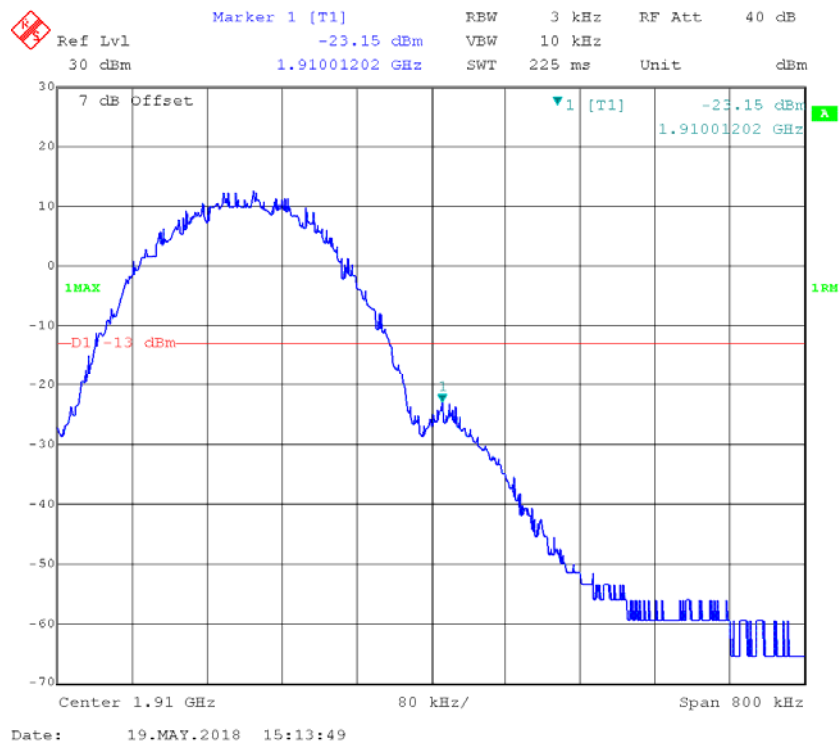
Test Mode: Transmitting

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

GPRS 850, Left Band Edge

GPRS 850, Right Band Edge**GPRS 1900, Left Band Edge**

GPRS 1900, Right Band Edge



FCC §2.1055, §22.355 & §24.235 - FREQUENCY STABILITY**Applicable Standard**

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235

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

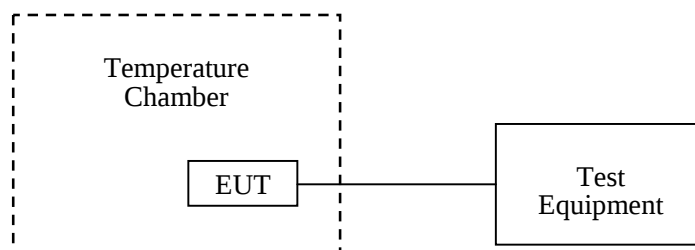
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-08-28	2018-08-28
R&S	Universal Radio Communication Tester	CMU200	106 891	2017-12-14	2018-12-14
UNI-T	Multimeter	UT39A	M130199938	2018-05-09	2019-05-09
narda	Attenuator	6dB	6dB-1	Each time	N/A
Unknown	Coaxial Cable	0.1m	C-1	Each Time	/
Pro instrument	DC Power Supply	pps3300	3300012	N/A	N/A

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

Test Data**Environmental Conditions**

Temperature:	28.1 °C
Relative Humidity:	57 %
ATM Pressure:	101.2 kPa

* The testing was performed by Andy Huang on 2018-05-19.

Cellular Band (Part 22H)

GMSK, Middle Channel, $f_c = 836.6$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
	V _{DC}	Hz	ppm	ppm
-30	48	-16	-0.019	1.5
-20		-15	-0.018	
-10		-19	-0.023	
0		-10	-0.012	
10		-16	-0.019	
20		-16	-0.019	
30		-10	-0.012	
40		-21	-0.025	
50		-20	-0.024	
25	18	-15	-0.018	1.5
25	72	-13	-0.016	

PCS Band (Part 24E)

GMSK, Middle Channel, $f_c = 1880.0$ MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Results
	V_{DC}	Hz	ppm	
-30	48	-1	-0.001	Pass
-20		2	0.001	
-10		4	0.002	
0		6	0.003	
10		1	0.001	
20		-3	-0.002	
30		-5	-0.003	
40		4	0.002	
50		6	0.003	
25	18	10	0.005	
25	72	-3	-0.002	

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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