TESTING LABORATORY
CERTIFICATE#4323.01

FCC PART 22H, PART 24E

TEST REPORT

For

Shanghai Sunmi Technology Co.,Ltd.

Room 605, Block 7, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai 200433 China

FCC ID: 2AH25NT211

Report Type:	**Product Type:**
Original Report	Thermal POS Printer

Test Engineer:	Sam Ye
Report Number:	RKSA200109001-00D
Report Date:	2020-03-03
Reviewed By:	Oscar Ye EMC Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Sunmi Technology Co.,Ltd.
Tested Model	NT211
Product Type	Thermal POS Printer
Power Supply	AC 100-240V
RF Function	GPRS
Operating Band/Frequency	GPRS 850, GPRS 1900
Modulation Type	GMSK
Antenna Type	FPC Antenna
Antenna Gain	1.82dBi

**All measurement and test data in this report was gathered from production sample serial number: 20200109001. (Assigned by the BACL. The EUT supplied by the applicant was received on 2020-01-09)*

Objective

This type approval report is prepared on behalf of *Shanghai Sunmi Technology Co.,Ltd.* in accordance with Part 2, Part 22-Subpart H and Part 24-Subpart E of the Federal Communication Commission's rules.

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

Related Submittal(s)/Grant(s)

FCC Part 15.247 DSS Submittal with FCC ID: 2AH25NT211
FCC Part 15.247 DTS Submittal with FCC ID: 2AH25NT211

Test Methodology

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

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

Applicable Standards: TIA/EIA 603-D.

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

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		3.19dB
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	5.91dB
	1GHz~6GHz	4.68dB
	6GHz~18GHz	4.92dB
	18GHz~40GHz	5.21dB
Occupied Bandwidth		0.5kHz
Temperature		1.0℃
Humidity		6%

Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

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

Bay Area Compliance Laboratories Corp. (Kunshan) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01 and CAB identifier CN0004 under the ISED requirement. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

SYSTEM TEST CONFIGURATION

Justification

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

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

Channel List

Mode	Channel		Frequency (MHz)
GPRS 850	Low	128	824.2
	Middle	190	836.6
	High	251	848.8
GPRS 1900	Low	512	1850.2
	Middle	661	1880.0
	High	810	1909.8

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

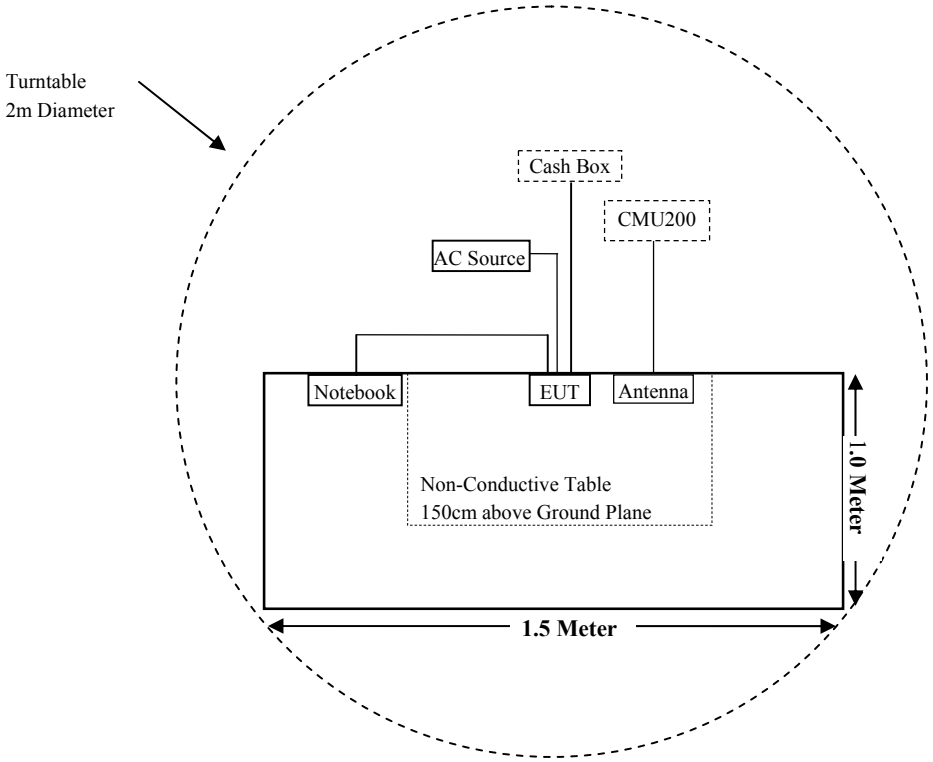
Manufacturer	Description	Model	Serial Number
Aihuaixin technology	Antenna	/	/
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605
/	Cash Box	/	/
DELL	Notebook	GX620	D65874152

External I/O Cable

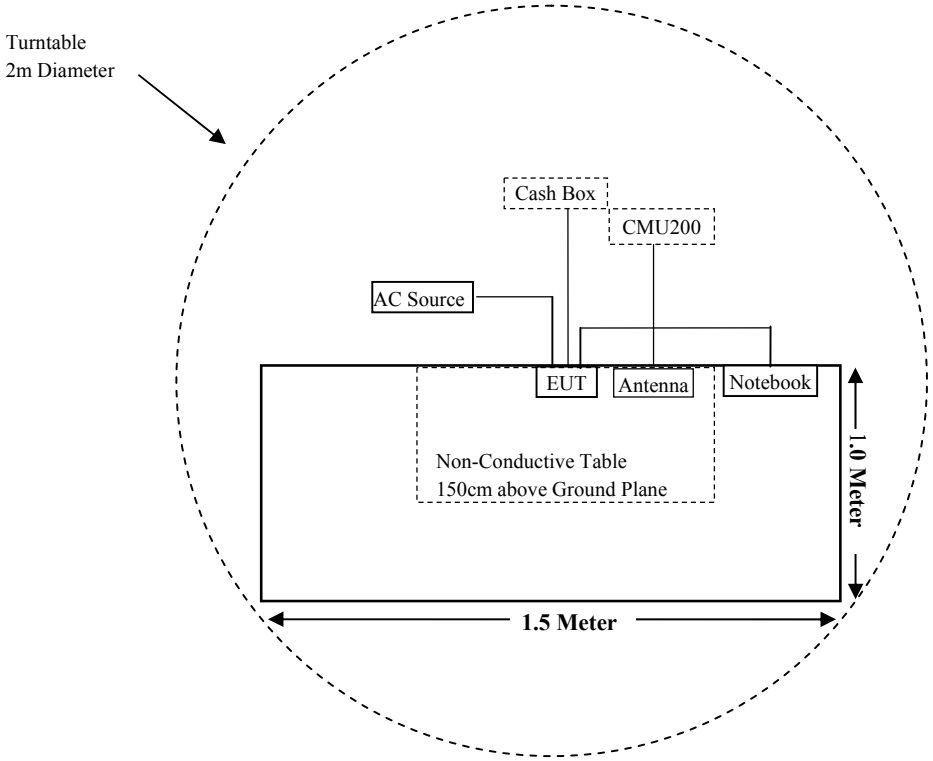
Cable Description	Length (m)	From Port	To
Power Cable	1.0	EUT	LISN/AC source
RJ12 Cable	3.0	EUT	Cash Box
Type-C Cable	1.0	EUT	Notebook

Block Diagram of Test Setup

For Radiated Emissions (Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310 & §2.1091	Maximum Permissible Exposure(MPE)	Compliant
§2.1046; § 22.913 (a);§ 24.232 (c);	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238;	Occupied Bandwidth	Compliant
§ 2.1051; § 22.917 (a); § 24.238 (a);	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a);	Spurious Radiated Emissions	Compliant
§ 22.917 (a); § 24.238 (a);	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235;	Frequency Stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test（Chamber 1#）					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2019-11-30	2020-11-29
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Sunol Sciences	Broadband Antenna	JB3	A090413-1	2019-12-26	2022-12-25
Sunol Sciences	Bilog antenna	JB3	A060217	2017-08-04	2020-08-03
Sonoma Instrunent	Pre-amplifier	310N	171205	2019-08-14	2020-08-13
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-8	008	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2019-08-15	2020-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2019-11-12	2020-11-11
Radiated Emission Test（Chamber 2#）					
HP	Signal Generator	HP 8341B	2624A00116	2019-11-30	2020-11-29
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2019-08-27	2020-08-26
ETS-LINDGREN	Horn Antenna	3115	9207-3900	2017-07-15	2020-07-14
ETS-LINDGREN	Horn Antenna	3115	6229	2019-12-12	2022-12-11
ETS-LINDGREN	Horn Antenna	3116	00084159	2019-12-12	2022-12-11
ETS-LINDGREN	Horn Antenna	3116	2516	2019-12-12	2022-12-11
A.H.Systems, inc	Amplifier	2641-1	491	2020-02-20	2021-02-19
EM Electronics Corporation	Amplifier	EM18G40G	060726	2019-03-22	2020-03-21
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2019-08-15	2020-08-14
MICRO-COAX	Coaxial Cable	Cable-16	016	2019-08-15	2020-08-14
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2019-11-12	2020-11-11

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	EMI Test Receiver	ESIB26	100146	2019-11-30	2020-11-29
Narda	Attenuator	6dB	006	2020-01-10	2021-01-09
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2019-11-12	2020-11-11
Mini-Ciruits	Power splitter	ZFRSC-14-S+	SF019411452	2019-11-10	2020-11-09
BACL	Temperature & Humidity Chamber	BTH-150	30023	2019-10-10	2020-10-09
FLUKE	Digital MULTIMETER	15B+	28821029WS	2019-08-15	2020-08-14
ALCAN	High voltage regulator	Y16HM	3135	2019-08-15	2020-08-14
Sunmi	RF Cable	Sunmi 01	C01	Each Time	/

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

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

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**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

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^2);
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);

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data (worst case):

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
Wi-Fi	2412-2462	2.42	1.75	23.50	223.87	20	**0.0779**	1.00
BLE	2402-2480	2.42	1.75	8.50	7.08	20	0.0025	1.00
Bluetooth	2402-2480	2.42	1.75	10.00	10.00	20	0.0035	1.00

Mode	Frequency Range (MHz)	Maximum Antenna Gain		Tune-up Conducted Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
GPRS 850	824.2-848.8	1.82	1.52	26.00	398.11	20	**0.1204**	**0.55**
GPRS 1900	1850.2-1909.8	1.82	1.52	22.24	167.49	20	0.0507	1.00

Note 1:
GPRS 850: Tune-up maximum output power with 4 slots is 29.00 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 26.00dBm.
GPRS 1900: Tune-up maximum output power with 3 slots is 26.50 dBm, so the tune-up time based Ave. power compared to sloted Ave. power is 22.24 dBm.

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Time based Ave. power compared to slotted Ave. power	-9 dB	-6 dB	-4.26 dB	-3 dB

Note 2:
Wi-Fi and BT/BLE cannot transmit simultaneously.
Wi-Fi & GPRS or BT/BLE & GPRS can transmit simultaneously; the worst condition is Wi-Fi & GPRS 850 as below:

$$\sum_i \frac{S_i}{S_{Limit,i}} = 0.0779/1.00+0.1204/0.55=0.2968< 1.0$$

Conclusion: The device meets MPE at distance 20cm.

FCC §2.1047 - MODULATION CHARACTERISTIC

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

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

Applicable Standards

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

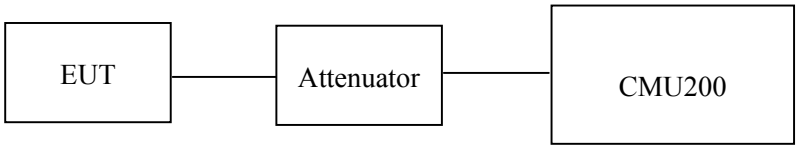
According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts (33dBm) EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

Test Procedure

Conducted method:

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



Radiated Output Power:

The measurements procedures specified in ANSI/TIA-603-D were applied.

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360o azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used,raise and lower the test antenna to obtain a maximum reading.
LOSS = Generator Output Power (dBm) – Analyzer reading (dBm)

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:
ERP (dBm) = LVL (dBm) + LOSS (dB)

f) The maximum ERP is the maximum value determined in the preceding step.
(Note: Effective Isotropic Radiated Power (EIRP) can be computed using the following:
EIRP (dBm) = ERP (dBm) + 2.15 (dB)

Test Data

Environmental Conditions

Temperature:	20.9 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3 kPa

The testing was performed by Sam Ye on 2020-02-27.

Conducted Power:

GPRS 850

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.05	31.28	29.97	28.59	38.45
	190	836.6	32.09	31.13	29.94	28.53	38.45
	251	848.8	32.05	31.08	29.92	28.71	38.45

GPRS 1900

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.76	26.84	26.31	23.88	33.00
	661	1880.0	29.49	27.39	25.91	24.28	33.00
	810	1909.8	28.99	27.36	25.97	23.95	33.00

Peak-to-average ratio (PAR):

GPRS 850

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.86	13.00
	Middle	3.40	13.00
	High	3.31	13.00

GPRS 1900

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	3.22	13.00
	Middle	2.89	13.00
	High	3.13	13.00

ERP:

GPRS 850

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
Cellular Band (Part 22H), Middle Channel										
836.6	96.21	198	200	H	32.52	0.63	-1.14	30.75	38.45	7.70
836.6	93.74	237	200	V	26.59	0.63	-1.14	24.82	38.45	13.63

EIRP:

GPRS 1900

Frequency (MHz)	Receiver Reading (dBµV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
PCS Band (Part 24E), Middle Channel										
1880.0	82.06	25	100	H	18.63	0.85	8.81	26.59	33	6.41
1880.0	78.45	254	100	V	14.59	0.85	8.81	22.55	33	10.45

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

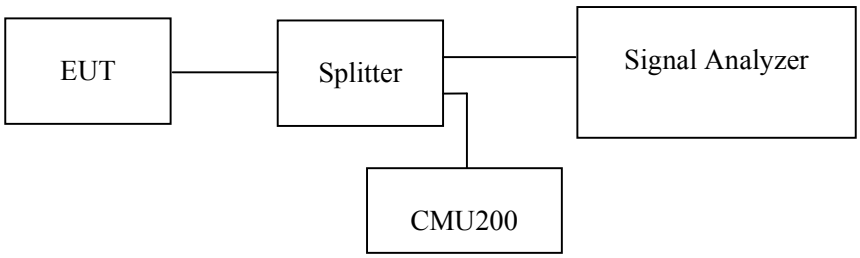
Applicable Standards

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 3 kHz (Cellular /PCS) and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	51 %
ATM Pressure:	103.3 kPa

The testing was performed by Sam Ye on 2020-02-27

EUT operation mode: Transmitting

Test Result: Compliant.

GPRS 850

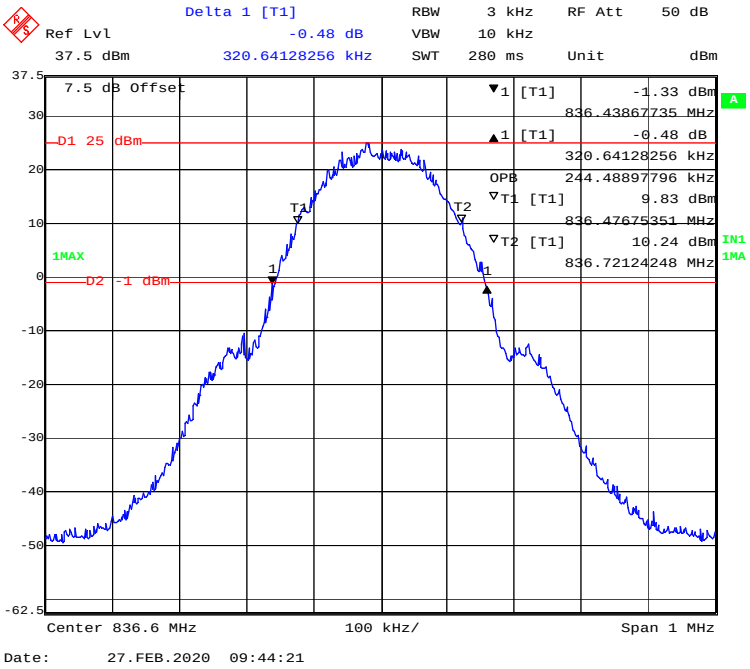
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GPRS	836.6	0.321	0.244

GPRS 1900

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
GPRS	1880.0	0.319	0.244

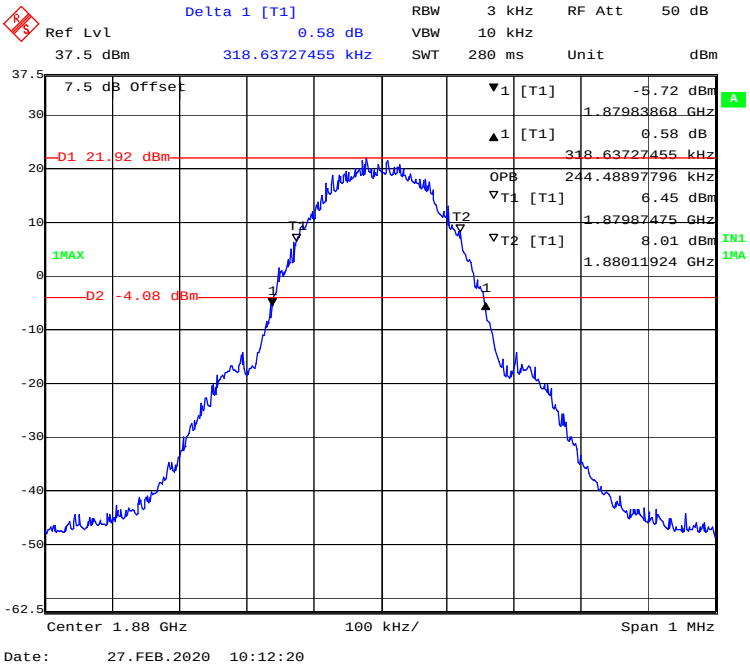
GPRS 850

99% Occupied &26 dB Emissions Bandwidth



GPRS 1900

99% Occupied &26 dB Emissions Bandwidth



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

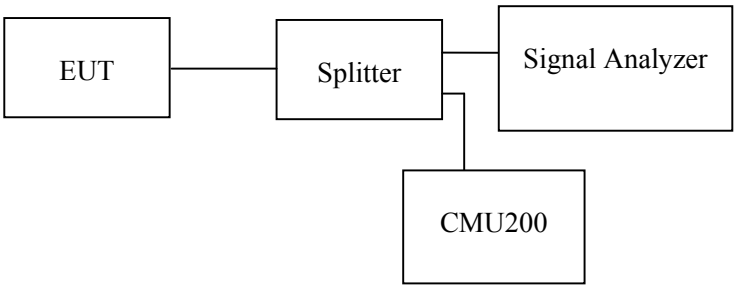
Applicable Standards

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

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

Test Procedure

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



Test Data

Environmental Conditions

Temperature:	23.5 ℃
Relative Humidity:	51 %
ATM Pressure:	103.3kPa

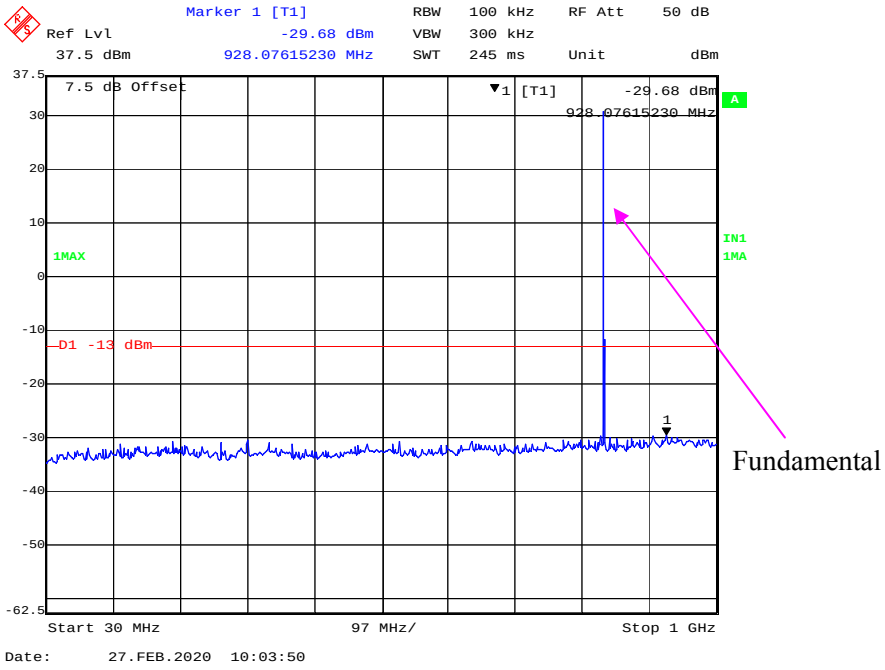
The testing was performed by Sam Ye on 2020-02-27.

EUT operation mode: Transmitting

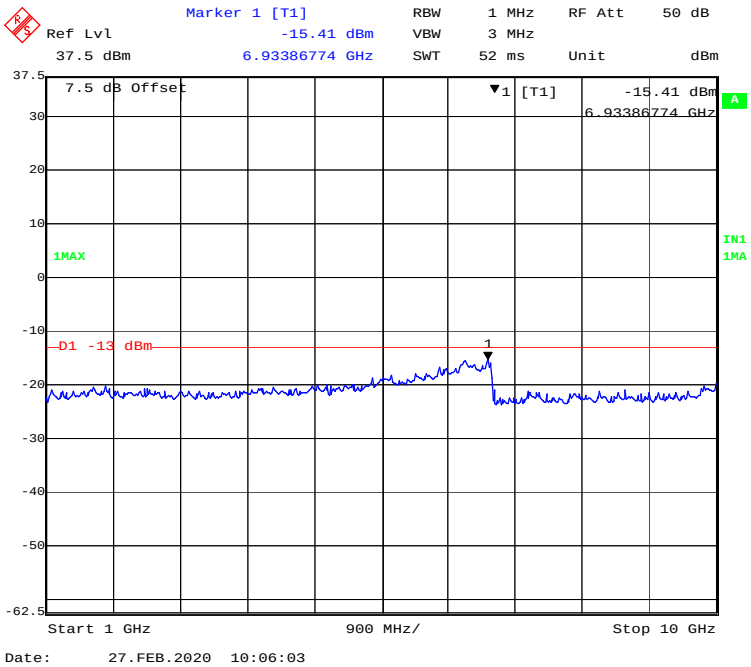
Test Result: Compliant.

GPRS 850:

30 MHz – 1GHz (GPRS Mode)

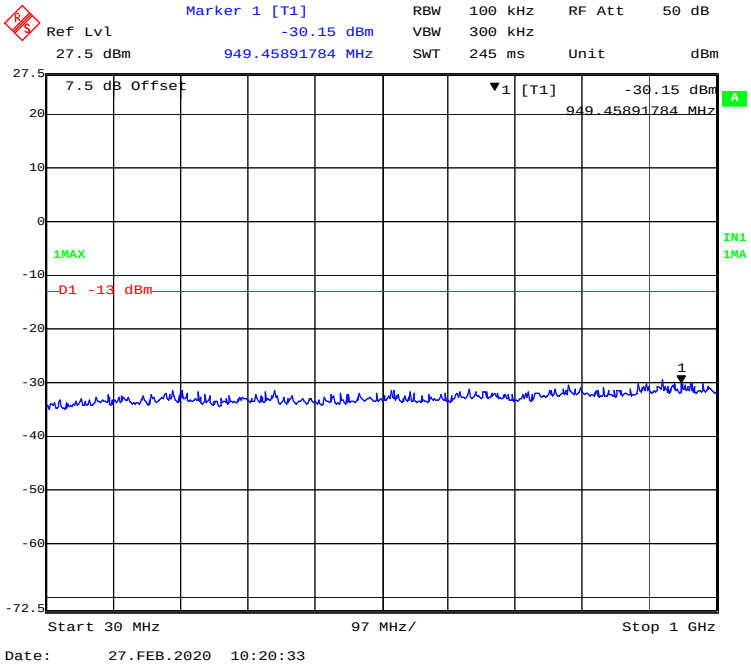


1 GHz – 10 GHz (GPRS Mode)

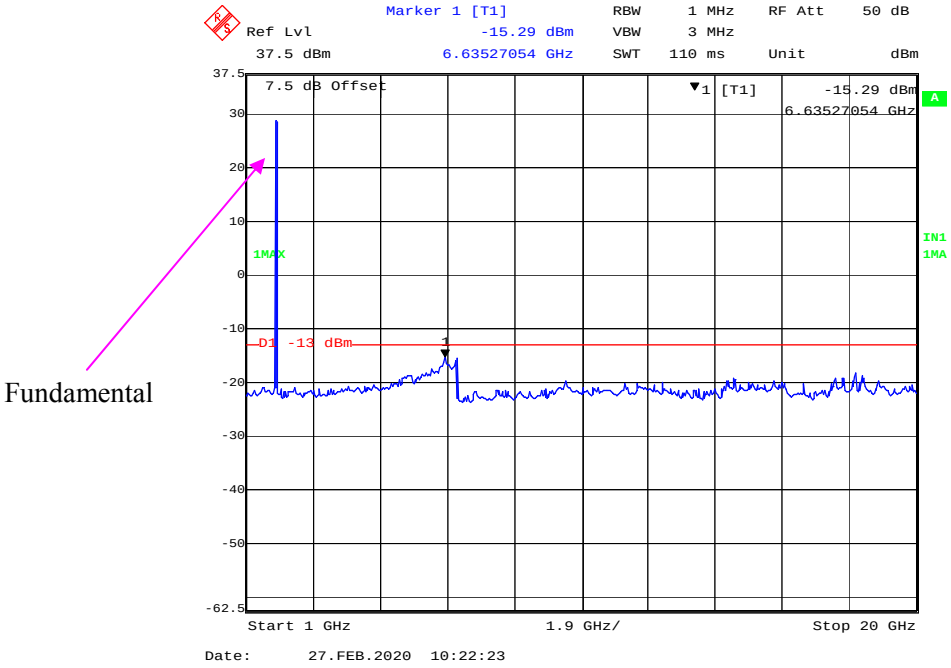


GPRS 1900:

30 MHz – 1GHz (GPRS Mode)



1 GHz – 20 GHz (GPRS Mode)



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

Applicable Standards

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

22.917 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

24.238 (a) Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

Test Procedure

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

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

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

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

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

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

Test Data

Environmental Conditions

Temperature:	23.2 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3kPa

The testing was performed by Sam Ye on 2020-03-02.

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

30 MHz ~ 10 GHz:

GPRS 850

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GPRS Mode, Middle channel										
125.36	66.97	310	200	H	-39.18	0.35	-6.10	-45.63	-13.00	32.63
125.36	63.65	126	200	V	-42.50	0.35	-6.10	-48.95	-13.00	35.95
1673.20	55.39	270	100	H	-48.00	0.84	8.48	-40.36	-13.00	27.36
1673.20	54.91	80	100	V	-48.98	0.84	8.48	-41.34	-13.00	28.34
2509.80	47.11	151	200	H	-53.83	0.89	10.09	-44.63	-13.00	31.63
2509.80	46.04	160	200	V	-54.91	0.89	10.09	-45.71	-13.00	32.71

30 MHz ~ 20 GHz:

GPRS 1900

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GPRS Mode, Middle channel										
221.63	57.92	327	100	H	-45.89	0.43	-3.21	-49.53	-13.00	36.53
221.63	57.09	307	100	V	-46.72	0.43	-3.21	-50.36	-13.00	37.36
3760.00	44.59	89	200	H	-52.12	0.95	9.74	-43.33	-13.00	30.33
3760.00	42.84	120	200	V	-54.04	0.95	9.74	-45.25	-13.00	32.25
5640.00	42.14	84	100	H	-51.79	1.15	10.47	-42.47	-13.00	29.47
5640.00	40.52	91	100	V	-53.44	1.15	10.47	-44.12	-13.00	31.12

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

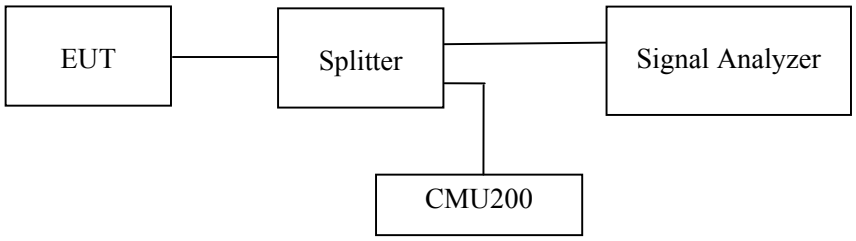
Applicable Standards

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

Test Procedure

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

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



Test Data

Environmental Conditions

Temperature:	23.5 ℃
Relative Humidity:	51 %
ATM Pressure:	103.3 kPa

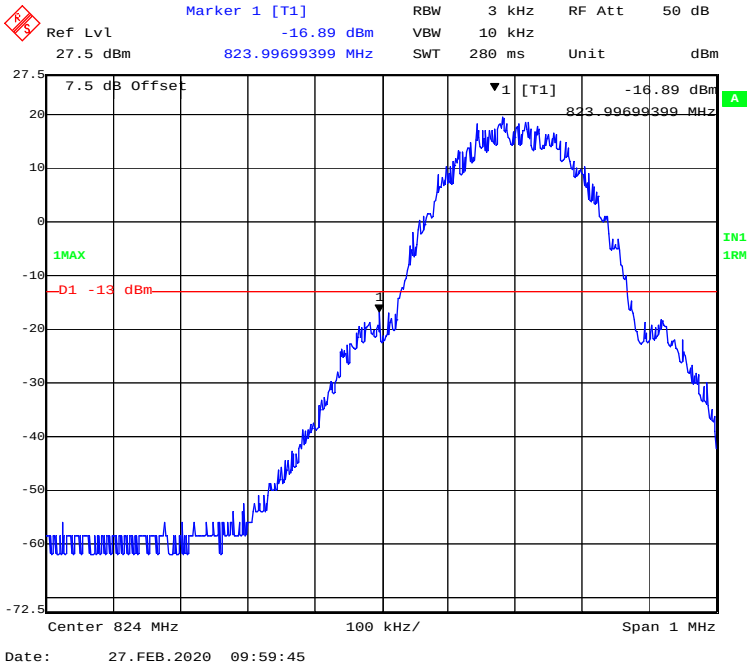
The testing was performed by Sam Ye on 2020-02-27.

EUT operation mode: Transmitting

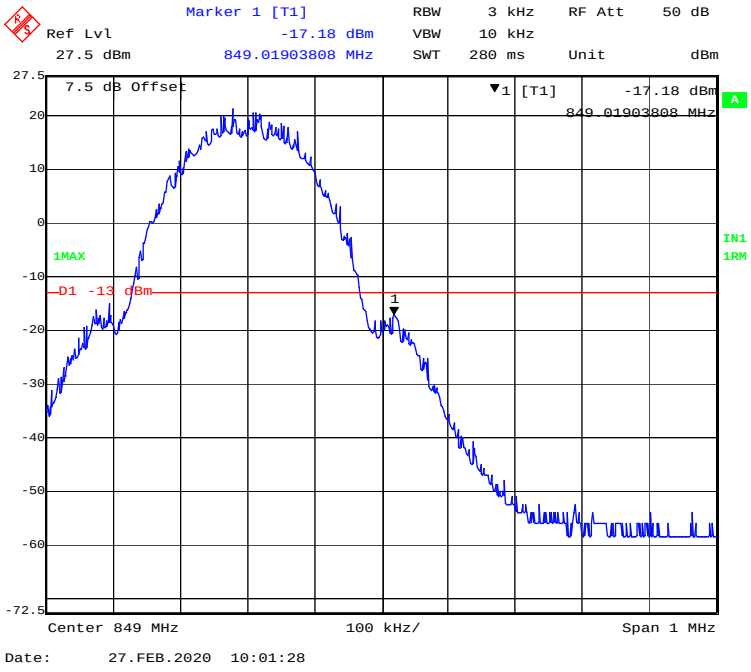
Test Result: Compliant.

GPRS 850:

Left Band Edge

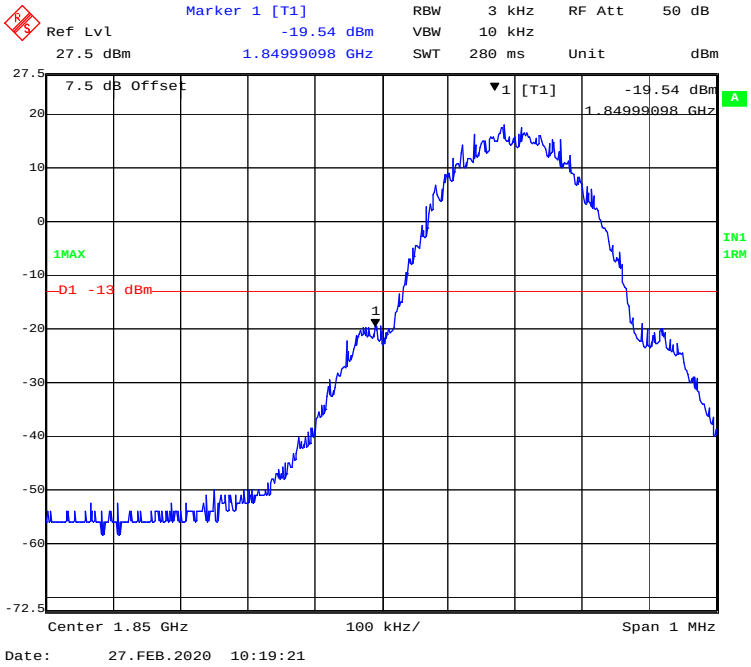


Right Band Edge

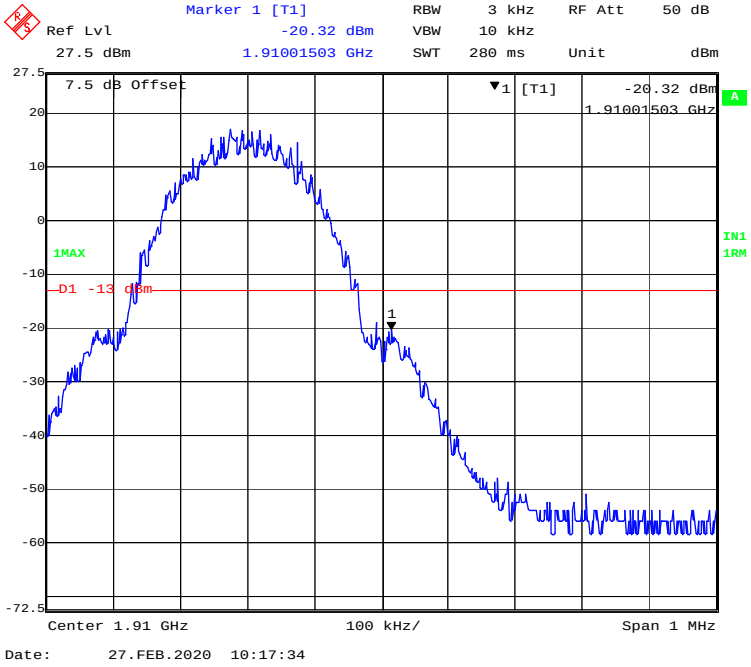


GPRS 1900:

Left Band Edge



Right Band Edge



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

Applicable Standards

FCC § 2.1055, §22.355, §24.235.

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

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

Frequency Tolerance for Transmitters in the Public Mobile Services

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

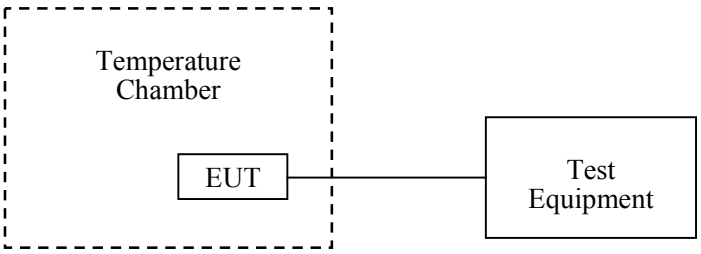
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to AC Source and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber.

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

Frequency Stability vs. Voltage: Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.



Test Data

Environmental Conditions

Temperature:	23.7 ℃
Relative Humidity:	51 %
ATM Pressure:	101.3kPa

The testing was performed by Sam Ye on 2020-03-02.

EUT operation mode: Transmitting

Test Result: Compliant.

GPRS 850

GPRS Mode, Middle Channel, f_o=836.6 MHz				
Temperature (℃)	**Power Supplied (V_{AC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Limit (ppm)**
-30	120	9	0.0108	2.5
-20		8	0.0096	2.5
-10		6	0.0072	2.5
0		1	0.0012	2.5
10		9	0.0108	2.5
20		6	0.0072	2.5
30		4	0.0048	2.5
40		8	0.0096	2.5
50		5	0.0060	2.5
25	V min.= 102	10	0.0120	2.5
25	V max.= 138	9	0.0108	2.5

GPRS 1900

GPRS Mode, Middle Channel, f_o=1880.0 MHz				
Temperature (℃)	**Power Supplied (V_{AC})**	**Frequency Error (Hz)**	**Frequency Error (ppm)**	**Result**
-30	120	5	0.0027	pass
-20		3	0.0016	pass
-10		7	0.0037	pass
0		10	0.0053	pass
10		2	0.0011	pass
20		10	0.0053	pass
30		2	0.0011	pass
40		6	0.0032	pass
50		5	0.0027	pass
25	V min.= 102	10	0.0053	pass
25	V max.= 138	8	0.0043	pass

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