

TEST REPORT

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 Report Number : SZXX1220301-06532E-RF
 FCC ID: 2ATUKBN-403

Test Standard (s)

FCC PART 27; FCC PART 22H; FCC PART 24E

Sample Description

Product: GPS TRACKER
 Model No.: 403,403ABCD,GPS-403,GPS-403ABCD,GPS-403A,
 GPS-403B,GPS-403C,GPS-403D,BN-403,
 BN-403ABCD, BN-403A, BN-403B, BN-403C, BN-403D
 BAANOOL, DI QIU TU XING

Trademark:



Date Received: 2022-03-01
 Date of Test: 2022-03-20 to 2022-04-21
 Report Date: 2022-04-21

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Approved By:

Black Ding

Candy Li

Black Ding
EMC Engineer

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	GPS TRACKER
Trademark	BAANOOL, DI QIU TU XING 
Tested Model	403
Multiple Model	403ABCD, GPS-403, GPS-403ABCD, GPS-403A, GPS-403B, GPS-403C, GPS-403D, BN-403, BN-403ABCD, BN-403A, BN-403B, BN-403C, BN-403D
Model difference	Please refer to DOS
Frequency Range	GSM 850: 824-849MHz(TX); 869-894MHz(RX) PCS 1900: 1850-1910MHz(TX); 1930-1990MHz(RX) LTE Band 2: 1850-1910MHz(TX); 1930-1990MHz(RX) LTE Band 4: 1710-1755MHz(TX); 2110-2155MHz(RX) LTE Band 5: 824-849MHz(TX); 869-894MHz(RX) LTE Band 7: 2500-2570MHz(TX); 2620-2690MHz(RX)
Maximum Output Power (Conducted power)	GSM 850: 32.77dBm PCS 1900: 29.45dBm LTE Band 2: 22.66dBm; LTE Band 4: 22.28dBm; LTE Band 5: 22.62dBm; LTE Band 7: 22.63dBm;
Modulation Technique	GSM: GMSK LTE: QPSK, 16QAM
Antenna Specification*	Internal FPC Antenna: 0 dBi (provided by the applicant):
Voltage Range	DC12V-24V or DC3.7V backup by battery. Typical testing voltage: Normal Voltage 12V DC; Low Voltage 10.8 V DC; High Voltage 13.2V DC
Sample serial number	SZXX1220301-06532E-RF-S1 (Assigned by ATC)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 22-Subpart H, Part 24-Subpart E, and Subpart 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of the 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.

Test Methodology

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

Part 22 Subpart H - Public Mobile Services
 Part 24 Subpart E - Personal Communication Services
 Part 27 - Miscellaneous Wireless Communications Services

ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
RF Frequency		0.082×10^{-7}
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
Temperature		1°C
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. 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 Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. 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.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISED), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

The test items were performed with the EUT operating at testing mode. Test was performed with channels as below table:

Band	Channel Bandwidth	Frequency
GSM 850	0.3 MHz	824.2MHz, 836.6MHz, 848.8MHz
PCS 1900	0.3 MHz	1850.2MHz, 1880.0MHz, 1909.8MHz;
LTE Band 2	1.4 MHz	1850.7MHz, 1880.0 MHz, 1909.3 MHz;
	3.0 MHz	1851.5MHz, 1880.0 MHz, 1908.5 MHz;
	5.0 MHz	1852.5MHz, 1880.0 MHz, 1907.5 MHz;
	10.0 MHz	1855MHz, 1880.0 MHz, 1905 MHz;
	15.0 MHz	1857.5MHz, 1880.0 MHz, 1902.5 MHz;
	20.0 MHz	1860MHz, 1880.0 MHz, 1900MHz;
LTE Band 4	1.4 MHz	1710.7MHz, 1732.5MHz, 1754.3MHz;
	3.0 MHz	1711.5MHz, 1732.5MHz, 1753.5MHz
	5.0 MHz	1712.5MHz, 1732.5MHz, 1752.5MHz
	10.0 MHz	1715MHz, 1732.5MHz, 1750MHz
	15.0 MHz	1717.5MHz, 1732.5MHz, 1747.5MHz
	20.0 MHz	1720MHz, 1732.5MHz, 1745MHz
LTE Band 5	1.4 MHz	824.7MHz, 836.5MHz, 848.3MHz
	3.0 MHz	825.5MHz, 836.5MHz, 847.5MHz
	5.0 MHz	826.5MHz, 836.5MHz, 846.5MHz
	10.0 MHz	829MHz, 836.5MHz, 844MHz
LTE Band 7	5.0 MHz	2502.5MHz, 2535.0MHz, 2567.5MHz
	10.0 MHz	2505MHz, 2535.0MHz, 2565MHz
	15.0 MHz	2507.5MHz, 2535.0MHz, 2562.5MHz
	20.0 MHz	2510MHz, 2535.0MHz, 2560MHz

Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

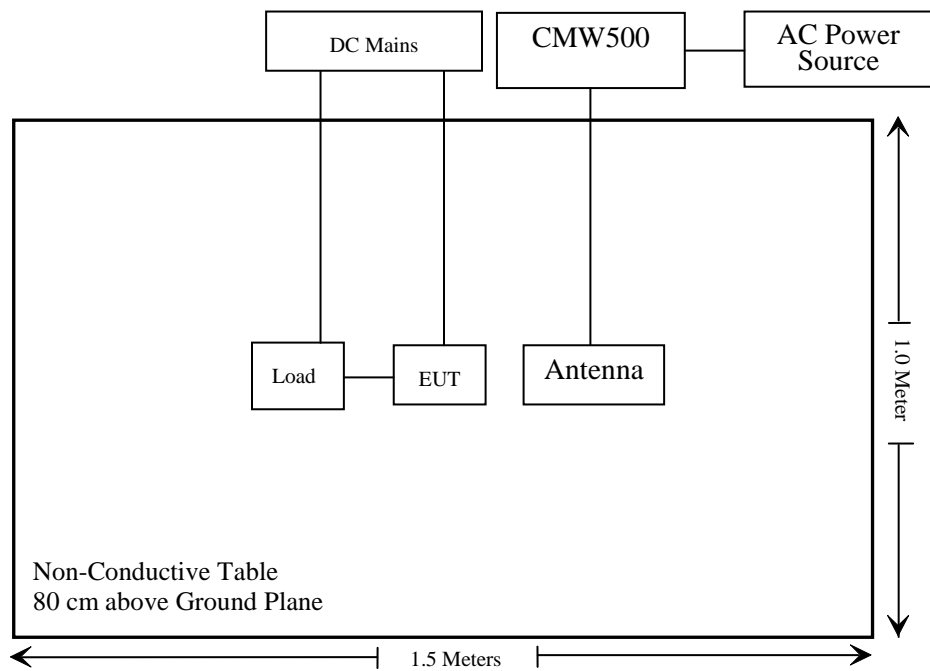
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606
Unknown	Battery	Unknown	Unknown
Shenzhen Coban Electronics Co.,Ltd	Load	Unknown	Unknown

Support Cable Description

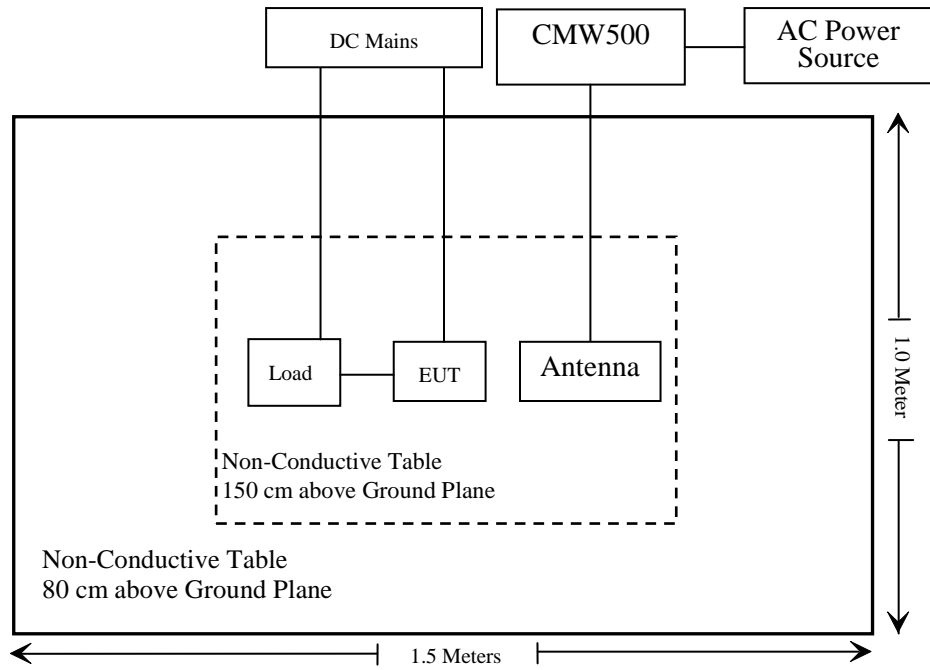
Cable Description	Length (m)	From / Port	To
Unshielded Un-detachable AC cable	1.2	AC Power	CMW500
Unshielded Detachable DC cable	2.0	Battery	EUT
Unshielded Detachable DC cable	2.0	Battery	Load
Unshielded Detachable Data cable	0.3	Load	EUT

Block Diagram of Test Setup

For Radiated emission for Below 1GHz:



For Radiated emission for Above 1GHz:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307 (b)	RF Exposure	Compliant
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (a) (b) (c) (d) (h);	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliant
§ 2.1051; § 22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliant
§ 22.917 (a); § 24.238 (a); §27.53 (c) (h) (m)	Band Edge	Compliant
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101949	2021/12/13	2022/12/12
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-024-1)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-025-1)	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b(V9)					

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Unknown	Band Reject Filter	MSF1850-191 OMS-1148	ATCE-142	2021/12/14	2022/12/13
Unknown	Band Reject Filter	MSF1710-178 5MS-1150	ATCE-144	2021/12/14	2022/12/13
Unknown	Band Reject Filter	MSF824-862 MS-1147	ATCE-141	2021/12/14	2022/12/13
Unknown	Band Reject Filter	MSF2495-257 OMS-1152	ATCE-146	2021/12/14	2022/12/13
Unknown	High Pass Filter	HPM-1.2/18G -60	110	2021/12/14	2022/12/13
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Rohde & Schwarz	Test Receiver	ESR	101817	2021/12/13	2022/12/12
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	154606	2021/12/13	2022/12/12
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/13	2022/12/12
UNI-T	DC Power Supply	UTP8305B	10584	NCR	NCR
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.32	RF-02	Each time	
Unknown	RF Coaxial Cable	No.33	RF-03	Each time	
Unknown	RF Coaxial Cable	No.34	RF-04	Each time	
Fluke	Desktop Multi Meter	45	7664009	2021/12/14	2022/12/13
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13

* Statement of Traceability: Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC § 1.1307(b) – RF EXPOSURE

Applicable Standard

According to §1.1307(b), 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.

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.3.1-SAR-Based Exemption:

A more comprehensive exemption, considering a variable power threshold that depends on both the separation distance and power, is provided in § 1.1307(b)(3)(i)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with test separation distances between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

Accordingly, a RF source is considered an RF exempt device if its available maximum time-averaged (matched conducted) power or its effective radiated power (ERP), whichever is greater, are below a specified threshold. This exemption threshold was derived based on general population 1-g SAR requirements and is detailed in Appendix C.

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases}$$

Where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

d = the separation distance (cm);

Result

For worst case:

Mode	Frequency	Maximum Time based Average Power (dBm)	Antenna Gain		ERP (dBm)	ERP _{20cm} (mW)	Distance (mm)	SAR-Based Exclusion Threshold		SAR-Based Exclusion
	(MHz)		(dBi)	(dBd)				(mW)	(dBm)	
GSM850	824-849	26	0	-2.15	23.85	2040f	200	1680	32.25	Yes
PCS1900	1850-1910	23	0	-2.15	20.85	3060	200	3060	34.85	Yes
LTE B2	1850-1910	23	0	-2.15	20.85	3060	200	3060	34.85	Yes
LTE B4	1710-1755	23	0	-2.15	20.85	3060	200	3060	34.85	Yes
LTE B5	824-849	23	0	-2.15	20.85	2040f	200	1680	32.25	Yes
LTE B7	2500-2570	23	0	-2.15	20.85	3060	200	3060	34.85	Yes

Note 1: 0dBd=2.15dBi.

Note 2: f = frequency in GHz.

Note 3: The tune-up power was declared by the applicant.

Mode	Tune-up Conducted Power (dBm)	Time based Average Power (dBm)
GSM 850	33	24
PCS 1900	30	21

Mode	Tune-up Conducted Power (dBm)				Time based Average Power (dBm)			
	1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots
GPRS 850	33	32	30	29	24	26	25.75	26
GPRS 1900	30	29	27	26	21	23	22.75	23

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E & 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

**FCC § 2.1046, § 22.913 (a) & § 24.232 (c); §27.50(a) (b) (c) (d) (h) - 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.

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

According to §27.50(a), (3) Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-2315 MHz band. Power averaging shall not include intervals in which the transmitter is off.

According to §27.50(b), Control stations and mobile stations transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands and fixed stations transmitting in the 787-788 MHz and 805-806 MHz bands are limited to 30 watts ERP.

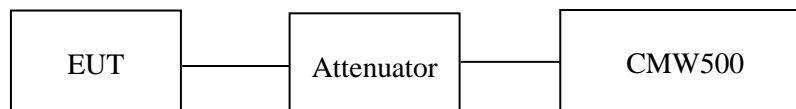
According to §27.50(c), Control and mobile stations in the 698-746 MHz band are limited to 30 watts ERP. And Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

According to §27.50(d), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

Test Procedure*Conducted method:*

The RF output of the transmitter was connected to the CMW500 through sufficient attenuation.

*Radiated method:*

ANSI C63.26-2015 Section 5.5.

Test Data**Environmental Conditions**

Temperature:	22~24 °C
Relative Humidity:	49~53 %
ATM Pressure:	101.0~101.1 kPa

The testing was performed by Key Pei from 2022-04-01 to 2022-04-21.

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

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	ERP(dBm)	Limit (dBm)
GSM	128	824.2	32.59	30.44	38.45
	190	836.6	32.46	30.31	38.45
	251	848.8	32.45	30.30	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				ERP(dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.77	31.59	29.63	28.41	30.62	29.44	27.48	26.26	38.45
	190	836.6	32.68	31.47	29.47	28.45	30.53	29.32	27.32	26.30	38.45
	251	848.8	32.63	31.42	29.39	28.36	30.48	29.27	27.27	26.21	38.45

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)

For GSM850: Antenna Gain = 0dBi = -2.15dBd (0dBd=2.15dBi)*

Limit: ERP ≤ 38.45dBm

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	EIRP(dBm)	Limit (dBm)
GSM	512	1850.2	29.24	29.24	33
	661	1880.0	29.17	29.17	33
	810	1909.8	29.35	29.35	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				EIRP(dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.32	28.24	26.27	25.13	29.32	28.24	26.27	25.13	33
	661	1880.0	29.27	28.19	26.21	25.09	29.27	28.19	26.21	25.09	33
	810	1909.8	29.45	28.37	26.42	25.31	29.45	28.37	26.42	25.31	33

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)

For PCS1900: Antenna Gain = 0dBi*

Limit: EIRP ≤ 33dBm

LTE Band 2

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	21.96	22.36	22.39	21.96	22.36	22.39
		RB1#2	22.11	22.47	22.44	22.11	22.47	22.44
		RB1#5	21.99	22.15	22.50	21.99	22.15	22.50
		RB3#0	22.14	22.18	22.39	22.14	22.18	22.39
		RB3#1	22.33	22.51	22.27	22.33	22.51	22.27
		RB3#2	21.23	21.28	21.34	21.23	21.28	21.34
		RB6#0	20.57	20.87	20.65	20.57	20.87	20.65
	16QAM	RB1#0	21.34	21.24	21.43	21.34	21.24	21.43
		RB1#2	21.69	21.67	21.54	21.69	21.67	21.54
		RB1#5	21.54	21.45	21.40	21.54	21.45	21.40
		RB3#0	21.30	21.70	21.49	21.30	21.70	21.49
		RB3#1	21.16	21.41	21.45	21.16	21.41	21.45
		RB3#2	20.27	20.90	20.57	20.27	20.90	20.57
3.0	QPSK	RB1#0	22.11	22.61	22.57	22.11	22.61	22.57
		RB1#7	22.09	22.52	22.52	22.09	22.52	22.52
		RB1#14	22.26	22.41	22.57	22.26	22.41	22.57
		RB8#0	21.14	21.34	21.45	21.14	21.34	21.45
		RB8#4	21.24	21.33	21.38	21.24	21.33	21.38
		RB8#7	21.18	21.42	21.43	21.18	21.42	21.43
		RB15#0	20.51	20.48	20.68	20.51	20.48	20.68
	16QAM	RB1#0	21.37	21.93	21.67	21.37	21.93	21.67
		RB1#7	21.27	21.71	21.45	21.27	21.71	21.45
		RB1#14	21.40	21.75	21.49	21.40	21.75	21.49
		RB8#0	20.10	20.75	20.62	20.10	20.75	20.62
		RB8#4	20.21	20.74	20.59	20.21	20.74	20.59
		RB8#7	20.35	20.65	20.61	20.35	20.65	20.61
		RB15#0	20.54	20.24	20.48	20.54	20.24	20.48

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	22.15	22.22	22.57	22.15	22.22	22.57
		RB1#12	22.17	22.39	22.64	22.17	22.39	22.64
		RB1#24	22.19	22.36	22.46	22.19	22.36	22.46
		RB12#0	21.22	21.49	21.59	21.22	21.49	21.59
		RB12#6	21.20	21.37	21.52	21.20	21.37	21.52
		RB12#11	21.15	21.52	21.66	21.15	21.52	21.66
		RB25#0	20.68	20.84	20.69	20.68	20.84	20.69
	16QAM	RB1#0	20.84	21.77	21.35	20.84	21.77	21.35
		RB1#12	20.88	21.80	21.13	20.88	21.80	21.13
		RB1#24	20.60	21.75	21.14	20.60	21.75	21.14
		RB12#0	20.17	20.49	20.68	20.17	20.49	20.68
		RB12#6	20.33	20.35	20.52	20.33	20.35	20.52
		RB12#11	20.42	20.62	20.66	20.42	20.62	20.66
		RB25#0	20.25	20.54	20.43	20.25	20.54	20.43
10.0	QPSK	RB1#0	22.32	22.43	22.27	22.32	22.43	22.27
		RB1#24	22.43	22.54	22.66	22.43	22.54	22.66
		RB1#49	22.51	22.35	22.12	22.51	22.35	22.12
		RB25#0	21.20	21.51	21.40	21.20	21.51	21.40
		RB25#12	21.38	21.42	21.32	21.38	21.42	21.32
		RB25#24	21.23	21.07	21.30	21.23	21.07	21.30
		RB50#0	20.84	20.68	20.79	20.84	20.68	20.79
	16QAM	RB1#0	21.73	21.64	21.28	21.73	21.64	21.28
		RB1#24	22.25	21.79	21.80	22.25	21.79	21.80
		RB1#49	22.32	21.64	21.29	22.32	21.64	21.29
		RB25#0	20.40	20.51	20.49	20.40	20.51	20.49
		RB25#12	20.52	20.28	20.61	20.52	20.28	20.61
		RB25#24	20.39	20.35	20.35	20.39	20.35	20.35
		RB50#0	20.19	20.26	20.24	20.19	20.26	20.24

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
15.0	QPSK	RB1#0	21.63	21.92	21.76	21.63	21.92	21.76
		RB1#37	21.67	21.70	21.98	21.67	21.70	21.98
		RB1#74	21.61	21.84	21.82	21.61	21.84	21.82
		RB36#0	20.42	20.92	20.99	20.42	20.92	20.99
		RB36#18	20.62	20.66	21.14	20.62	20.66	21.14
		RB36#37	20.50	20.91	20.99	20.50	20.91	20.99
		RB75#0	20.26	20.68	20.74	20.26	20.68	20.74
	16QAM	RB1#0	21.02	21.31	21.00	21.02	21.31	21.00
		RB1#37	20.88	21.29	21.20	20.88	21.29	21.20
		RB1#74	20.81	21.32	20.88	20.81	21.32	20.88
		RB36#0	19.54	19.89	20.10	19.54	19.89	20.10
		RB36#18	19.59	19.82	20.10	19.59	19.82	20.10
		RB36#37	19.66	19.96	20.20	19.66	19.96	20.20
		RB75#0	19.36	19.48	19.89	19.36	19.48	19.89
20.0	QPSK	RB1#0	21.67	22.20	22.06	21.67	22.20	22.06
		RB1#49	22.16	22.15	22.04	22.16	22.15	22.04
		RB1#99	22.00	22.08	21.86	22.00	22.08	21.86
		RB50#0	20.73	21.07	21.04	20.73	21.07	21.04
		RB50#24	20.90	20.89	21.16	20.90	20.89	21.16
		RB50#49	20.77	21.01	21.02	20.77	21.01	21.02
		RB100#0	20.48	20.69	20.87	20.48	20.69	20.87
	16QAM	RB1#0	21.21	21.03	21.79	21.21	21.03	21.79
		RB1#49	21.75	21.02	22.13	21.75	21.02	22.13
		RB1#99	21.52	20.48	21.73	21.52	20.48	21.73
		RB50#0	19.81	20.16	20.05	19.81	20.16	20.05
		RB50#24	20.00	19.95	20.33	20.00	19.95	20.33
		RB50#49	19.91	20.04	20.18	19.91	20.04	20.18
		RB100#0	19.74	19.86	19.98	19.74	19.86	19.98

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)

For Band2: Antenna Gain = 0dBi*

Limit: EIRP ≤ 33dBm

LTE Band 4

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	21.71	21.79	21.55	21.71	21.79	21.55
		RB1#2	21.70	21.90	21.72	21.70	21.90	21.72
		RB1#5	21.73	21.81	21.64	21.73	21.81	21.64
		RB3#0	21.72	21.82	21.68	21.72	21.82	21.68
		RB3#1	21.47	21.88	21.76	21.47	21.88	21.76
		RB3#2	20.53	20.74	20.73	20.53	20.74	20.73
		RB6#0	20.42	20.56	20.48	20.42	20.56	20.48
	16QAM	RB1#0	20.62	20.98	20.66	20.62	20.98	20.66
		RB1#2	20.68	21.46	20.57	20.68	21.46	20.57
		RB1#5	20.29	21.01	20.45	20.29	21.01	20.45
		RB3#0	20.55	20.62	20.72	20.55	20.62	20.72
		RB3#1	20.65	20.69	20.82	20.65	20.69	20.82
		RB3#2	19.71	19.69	19.89	19.71	19.69	19.89
3.0	QPSK	RB1#0	21.66	21.89	21.57	21.66	21.89	21.57
		RB1#7	21.45	22.11	21.56	21.45	22.11	21.56
		RB1#14	21.48	22.28	21.69	21.48	22.28	21.69
		RB8#0	20.59	20.71	20.68	20.59	20.71	20.68
		RB8#4	20.61	20.91	20.77	20.61	20.91	20.77
		RB8#7	20.71	20.75	20.77	20.71	20.75	20.77
		RB15#0	20.34	20.52	20.46	20.34	20.52	20.46
	16QAM	RB1#0	20.85	21.50	20.33	20.85	21.50	20.33
		RB1#7	20.82	21.44	19.31	20.82	21.44	19.31
		RB1#14	20.86	21.58	19.59	20.86	21.58	19.59
		RB8#0	19.78	19.82	18.87	19.78	19.82	18.87
		RB8#4	19.61	20.15	18.83	19.61	20.15	18.83
		RB8#7	19.79	19.99	19.05	19.79	19.99	19.05
		RB15#0	19.53	19.68	19.12	19.53	19.68	19.12

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	20.88	21.15	21.16	20.88	21.15	21.16
		RB1#12	20.70	21.30	21.22	20.70	21.30	21.22
		RB1#24	20.70	21.20	21.50	20.70	21.20	21.50
		RB12#0	19.94	20.19	20.29	19.94	20.19	20.29
		RB12#6	19.49	20.34	20.25	19.49	20.34	20.25
		RB12#11	19.86	20.30	20.25	19.86	20.30	20.25
		RB25#0	19.42	19.53	19.27	19.42	19.53	19.27
	16QAM	RB1#0	20.02	20.43	20.00	20.02	20.43	20.00
		RB1#12	19.41	20.53	20.08	19.41	20.53	20.08
		RB1#24	19.24	20.56	19.84	19.24	20.56	19.84
		RB12#0	19.00	19.03	19.27	19.00	19.03	19.27
		RB12#6	18.87	19.55	19.46	18.87	19.55	19.46
		RB12#11	19.19	19.43	19.53	19.19	19.43	19.53
		RB25#0	19.24	19.37	19.26	19.24	19.37	19.26
10.0	QPSK	RB1#0	21.07	21.34	21.71	21.07	21.34	21.71
		RB1#24	21.15	21.60	21.36	21.15	21.60	21.36
		RB1#49	21.32	21.34	21.48	21.32	21.34	21.48
		RB25#0	20.23	20.30	20.48	20.23	20.30	20.48
		RB25#12	20.27	20.49	20.29	20.27	20.49	20.29
		RB25#24	20.27	20.42	20.36	20.27	20.42	20.36
		RB50#0	20.16	20.18	20.22	20.16	20.18	20.22
	16QAM	RB1#0	21.01	20.74	20.66	21.01	20.74	20.66
		RB1#24	20.29	20.94	20.24	20.29	20.94	20.24
		RB1#49	20.09	20.86	20.29	20.09	20.86	20.29
		RB25#0	19.49	19.38	19.54	19.49	19.38	19.54
		RB25#12	19.30	19.82	19.59	19.30	19.82	19.59
		RB25#24	19.49	19.46	19.51	19.49	19.46	19.51
		RB50#0	19.39	19.42	19.35	19.39	19.42	19.35

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			EIRP(dBm)		
			Low	Mid	High	Low	Mid	High
15.0	QPSK	RB1#0	21.28	21.30	21.41	21.28	21.30	21.41
		RB1#37	21.28	21.59	21.43	21.28	21.59	21.43
		RB1#74	21.55	21.40	21.47	21.55	21.40	21.47
		RB36#0	20.32	20.43	20.54	20.32	20.43	20.54
		RB36#18	20.42	20.54	20.48	20.42	20.54	20.48
		RB36#37	20.42	20.45	20.56	20.42	20.45	20.56
		RB75#0	20.28	20.31	20.42	20.28	20.31	20.42
	16QAM	RB1#0	20.67	20.80	20.59	20.67	20.80	20.59
		RB1#37	20.43	21.60	20.37	20.43	21.60	20.37
		RB1#74	20.84	21.58	19.78	20.84	21.58	19.78
		RB36#0	19.27	19.56	19.57	19.27	19.56	19.57
		RB36#18	19.52	19.59	19.62	19.52	19.59	19.62
		RB36#37	19.53	19.73	19.72	19.53	19.73	19.72
		RB75#0	19.35	19.63	19.32	19.35	19.63	19.32
20.0	QPSK	RB1#0	21.39	21.54	22.06	21.39	21.54	22.06
		RB1#49	21.40	21.93	21.50	21.40	21.93	21.50
		RB1#99	21.74	21.92	21.60	21.74	21.92	21.60
		RB50#0	20.48	20.61	20.69	20.48	20.61	20.69
		RB50#24	20.58	20.72	20.59	20.58	20.72	20.59
		RB50#49	20.53	20.58	20.66	20.53	20.58	20.66
		RB100#0	20.23	20.33	20.42	20.23	20.33	20.42
	16QAM	RB1#0	20.90	20.59	21.40	20.90	20.59	21.40
		RB1#49	21.11	20.75	21.43	21.11	20.75	21.43
		RB1#99	20.99	20.49	21.38	20.99	20.49	21.38
		RB50#0	19.55	19.71	19.79	19.55	19.71	19.79
		RB50#24	19.75	19.87	19.46	19.75	19.87	19.46
		RB50#49	19.64	19.80	19.79	19.64	19.80	19.79
		RB100#0	19.44	19.71	19.68	19.44	19.71	19.68

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBi)

For Band4: Antenna Gain = 0dBi*

Limit: EIRP ≤ 30dBm

LTE Band 5

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
1.4	QPSK	RB1#0	22.24	22.42	22.45	20.09	20.27	20.3
		RB1#2	22.62	22.26	22.39	20.47	20.11	20.24
		RB1#5	22.40	22.12	22.14	20.25	19.97	19.99
		RB3#0	21.86	21.92	21.89	19.71	19.77	19.74
		RB3#1	21.80	21.83	21.91	19.65	19.68	19.76
		RB3#2	21.80	21.80	21.73	19.65	19.65	19.58
		RB6#0	21.65	21.59	20.74	19.5	19.44	18.59
	16QAM	RB1#0	21.79	21.47	22.25	19.64	19.32	20.1
		RB1#2	22.33	22.24	22.28	20.18	20.09	20.13
		RB1#5	22.23	22.24	22.14	20.08	20.09	19.99
		RB3#0	22.05	22.23	21.86	19.9	20.08	19.71
		RB3#1	21.04	21.02	21.05	18.89	18.87	18.9
		RB3#2	20.99	20.95	20.96	18.84	18.8	18.81
		RB6#0	20.67	20.55	20.58	18.52	18.4	18.43
3.0	QPSK	RB1#0	22.19	22.43	22.41	20.04	20.28	20.26
		RB1#7	22.61	22.25	22.33	20.46	20.1	20.18
		RB1#14	22.42	22.12	22.17	20.27	19.97	20.02
		RB8#0	21.85	21.90	21.91	19.7	19.75	19.76
		RB8#4	21.78	21.86	21.91	19.63	19.71	19.76
		RB8#7	21.78	21.76	21.76	19.63	19.61	19.61
		RB15#0	21.36	21.52	21.37	19.21	19.37	19.22
	16QAM	RB1#0	21.80	21.50	22.26	19.65	19.35	20.11
		RB1#7	22.32	22.20	22.30	20.17	20.05	20.15
		RB1#14	22.19	22.25	22.10	20.04	20.1	19.95
		RB8#0	22.05	22.22	21.86	19.9	20.07	19.71
		RB8#4	21.04	21.02	21.05	18.89	18.87	18.9
		RB8#7	20.99	20.94	20.94	18.84	18.79	18.79
		RB15#0	20.66	20.57	20.68	18.51	18.42	18.53

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
5.0	QPSK	RB1#0	21.83	22.38	22.46	19.68	20.23	20.31
		RB1#12	22.58	22.30	22.38	20.43	20.15	20.23
		RB1#24	22.39	22.12	22.17	20.24	19.97	20.02
		RB12#0	21.84	21.92	21.95	19.69	19.77	19.8
		RB12#6	21.82	21.86	21.92	19.67	19.71	19.77
		RB12#11	21.75	21.78	21.76	19.6	19.63	19.61
		RB25#0	20.58	20.43	20.68	18.43	18.28	18.53
	16QAM	RB1#0	21.78	21.50	22.31	19.63	19.35	20.16
		RB1#12	22.34	22.20	22.26	20.19	20.05	20.11
		RB1#24	22.23	22.24	22.11	20.08	20.09	19.96
		RB12#0	22.03	22.24	21.88	19.88	20.09	19.73
		RB12#6	21.09	21.01	21.05	18.94	18.86	18.9
		RB12#11	20.99	20.94	20.95	18.84	18.79	18.8
		RB25#0	20.59	20.51	20.36	18.44	18.36	18.21
10.0	QPSK	RB1#0	21.57	22.44	22.41	19.42	20.29	20.26
		RB1#24	22.62	22.32	22.36	20.47	20.17	20.21
		RB1#49	22.39	22.14	22.16	20.24	19.99	20.01
		RB25#0	21.83	21.89	21.91	19.68	19.74	19.76
		RB25#12	21.81	21.86	21.91	19.66	19.71	19.76
		RB25#24	21.82	21.78	21.74	19.67	19.63	19.59
		RB50#0	20.94	20.75	20.68	18.79	18.6	18.53
	16QAM	RB1#0	21.78	21.51	22.33	19.63	19.36	20.18
		RB1#24	22.31	22.22	22.28	20.16	20.07	20.13
		RB1#49	22.24	22.24	22.12	20.09	20.09	19.97
		RB25#0	22.04	22.23	21.87	19.89	20.08	19.72
		RB25#12	21.04	21.16	21.06	18.89	19.01	18.91
		RB25#24	20.99	20.98	20.98	18.84	18.83	18.83
		RB50#0	20.61	20.46	20.42	18.46	18.31	18.27

Note: ERP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)
For Band5: Antenna Gain = 0dBi = -2.15dBd (0dBd=2.15dBi)*
Limit: ERP ≤ 38.45dBm

LTE Band 7

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
5	QPSK	RB1#0	21.75	21.78	21.76	21.75	21.78	21.76
		RB1#13	20.58	20.43	20.68	20.58	20.43	20.68
		RB1#24	21.78	21.50	22.31	21.78	21.50	22.31
		RB15#0	22.34	22.20	22.26	22.34	22.20	22.26
		RB15#10	22.23	22.24	22.11	22.23	22.24	22.11
		RB25#0	22.03	22.24	21.88	22.03	22.24	21.88
	16QAM	RB1#0	20.99	20.94	20.95	20.99	20.94	20.95
		RB1#13	20.59	20.51	20.36	20.59	20.51	20.36
		RB1#24	21.57	22.44	22.41	21.57	22.44	22.41
		RB15#0	22.62	22.32	22.36	22.62	22.32	22.36
		RB15#10	22.39	22.14	22.16	22.39	22.14	22.16
		RB25#0	21.83	21.89	21.91	21.83	21.89	21.91
10	QPSK	RB1#0	22.06	22.43	22.42	22.06	22.43	22.42
		RB1#25	22.58	22.29	22.35	22.58	22.29	22.35
		RB1#49	22.40	22.11	22.14	22.40	22.11	22.14
		RB25#0	21.86	21.89	21.94	21.86	21.89	21.94
		RB25#25	21.80	21.86	21.88	21.80	21.86	21.88
		RB50#0	21.52	22.34	22.41	21.52	22.34	22.41
	16QAM	RB1#0	22.39	22.14	22.16	22.39	22.14	22.16
		RB1#25	21.83	21.89	21.91	21.83	21.89	21.91
		RB1#49	21.75	21.78	21.76	21.75	21.78	21.76
		RB25#0	22.06	22.37	22.41	22.06	22.37	22.41
		RB25#25	22.18	22.33	22.35	22.18	22.33	22.35
		RB50#0	22.21	22.11	22.03	22.21	22.11	22.03

Bandwidth (MHz)	Modulation	RB size/ RB Offset	Conducted Average Output Power (dBm)			ERP(dBm)		
			Low	Mid	High	Low	Mid	High
15	QPSK	RB1#0	21.19	21.03	21.24	21.19	21.03	21.24
		RB1#38	21.27	21.18	21.19	21.27	21.18	21.19
		RB1#74	20.43	20.56	20.72	20.43	20.56	20.72
		RB36#0	21.71	22.42	22.35	21.71	22.42	22.35
		RB36#39	22.63	22.29	22.37	22.63	22.29	22.37
		RB75#0	22.42	22.16	22.17	22.42	22.16	22.17
	16QAM	RB1#0	20.88	20.91	20.79	20.88	20.91	20.79
		RB1#38	20.35	20.41	20.67	20.35	20.41	20.67
		RB1#74	22.23	22.16	22.31	22.23	22.16	22.31
		RB36#0	22.16	22.33	21.96	22.16	22.33	21.96
		RB36#39	21.09	21.03	21.01	21.09	21.03	21.01
		RB75#0	20.97	20.98	20.99	20.97	20.98	20.99
20	QPSK	RB1#0	21.71	22.41	22.45	21.71	22.41	22.45
		RB1#50	22.43	22.59	22.27	22.43	22.59	22.27
		RB1#99	22.44	22.15	22.13	22.44	22.15	22.13
		RB50#0	21.71	22.42	22.45	21.71	22.42	22.45
		RB50#50	22.43	22.19	22.27	22.43	22.19	22.27
		RB100#0	22.31	22.16	22.16	22.31	22.16	22.16
	16QAM	RB1#0	21.82	21.84	21.88	21.82	21.84	21.88
		RB1#50	21.85	21.75	21.72	21.85	21.75	21.72
		RB1#99	21.42	20.23	20.27	21.42	20.23	20.27
		RB50#0	21.71	22.42	22.45	21.71	22.42	22.45
		RB50#50	21.09	21.03	21.04	21.09	21.03	21.04
		RB100#0	20.97	20.99	20.94	20.97	20.99	20.94

Note: EIRP(dBm) = Conducted Power(dBm) + Antenna Gain(dBd)

For Band 7: Antenna Gain = 0dBi*

Limit: EIRP ≤ 33dBm

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

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	3.68	13
	Middle	3.39	13
	High	3.27	13

PCS Band (Part 24E)

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	3.45	13
	Middle	3.62	13
	High	3.31	13

LTE Band 2 20MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.67	4.49	4.61	13	Pass
QPSK (100RB Size)	5.16	4.81	4.72	13	Pass
16QAM (1RB Size)	5.59	5.45	5.68	13	Pass
16QAM (100RB Size)	6.14	5.91	5.77	13	Pass

LTE Band 4 20MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.64	4.41	4.72	13	Pass
QPSK (100RB Size)	5.07	5.01	4.90	13	Pass
16QAM (1RB Size)	5.83	5.10	5.65	13	Pass
16QAM (100RB Size)	6.03	6.06	6.03	13	Pass

LTE Band 5 10MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.67	4.67	4.67	13	Pass
QPSK (50RB Size)	4.96	4.90	4.96	13	Pass
16QAM (1RB Size)	5.68	5.77	5.74	13	Pass
16QAM (50RB Size)	6.12	5.91	5.91	13	Pass

LTE Band 7 20MHz Bandwidth

Modulation	Low channel (dB)	Middle channel (dB)	High channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.75	4.84	4.12	13	Pass
QPSK (100RB Size)	5.07	5.33	5.04	13	Pass
16QAM (1RB Size)	5.88	5.83	5.42	13	Pass
16QAM (100RB Size)	6.20	6.41	6.20	13	Pass

FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53 - OCCUPIED BANDWIDTH

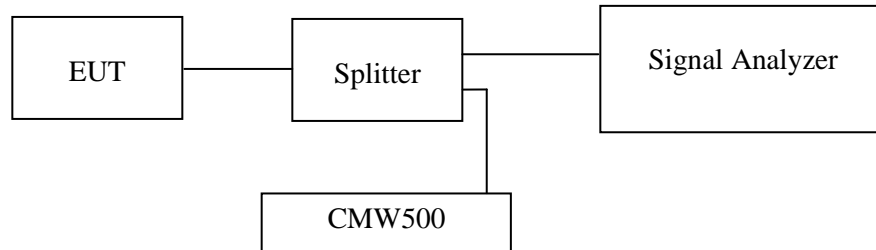
Applicable Standard

FCC 47 §2.1049, §22.917, §22.905, §24.238, and §27.53.

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 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	22~24 °C
Relative Humidity:	49~53 %
ATM Pressure:	101.0~101.1 kPa

The testing was performed by Key Pei from 2022-04-01 to 2022-04-21.

EUT operation mode: Transmitting

Test Result: Pass

Test plots refer to the Appendix A.

FCC §2.1051, §22.917(a) & §24.238(a) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

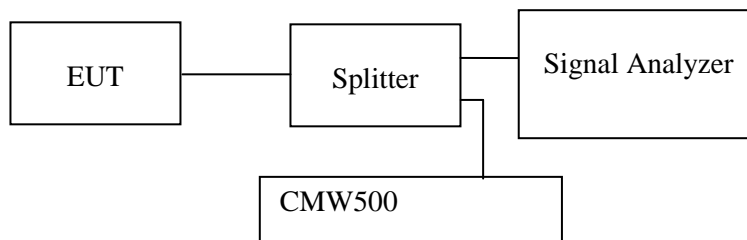
Applicable Standard

FCC §2.1051, §22.917(a) & §24.238(a) & §27.53.

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:	22~24 °C
Relative Humidity:	49~53 %
ATM Pressure:	101.0~101.1 kPa

The testing was performed by Key Pei from 2022-04-01 to 2022-04-21.

EUT operation mode: Transmitting

Test result: Pass

Test plots refer to the Appendix B.

FCC § 2.1053; § 22.917 (a); § 24.238 (a); § 27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, § 22.917(a) & § 24.238(a) & § 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 receiving 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.

Test Data**Environmental Conditions**

Temperature:	19-22 °C
Relative Humidity:	43-56 %
ATM Pressure:	101.0 kPa

The testing was performed by Chao Mo from 2022-03-20 to 2022-04-01.

EUT operation mode: Transmitting (Worst case record in the reports)

The worst case is as below:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Substituted Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/AV		Height (m)	Polar (H/V)				
GSM850, Low Channel									
201.74	-61.96	PK	237	1.4	H	-1.25	-63.21	-13	-50.21
414.904	-68.88	PK	271	1.8	V	3.51	-65.37	-13	-52.37
1648.4	-43.64	PK	237	1.4	H	3.52	-40.12	-13	-27.12
1648.4	-46.53	PK	271	1.8	V	3.1	-43.43	-13	-30.43
GSM850, Middle Channel									
201.74	-63.05	PK	104	2.1	H	-1.25	-64.30	-13	-51.30
414.904	-68.62	PK	334	1.3	V	3.51	-65.11	-13	-52.11
1673.2	-45.08	PK	104	2.1	H	3.78	-41.30	-13	-28.30
1673.2	-45.94	PK	334	1.3	V	3.1	-42.84	-13	-29.84
GSM850, High Channel									
201.74	-62.49	PK	225	1.4	H	-1.25	-63.74	-13	-50.74
414.904	-68.18	PK	167	1.4	V	3.51	-64.67	-13	-51.67
1697.6	-45.81	PK	152	1.7	H	4.07	-41.74	-13	-28.74
1697.6	-46.32	PK	199	1.3	V	3.1	-43.22	-13	-30.22
PCS1900, Low Channel									
201.74	-63.03	PK	43	1.7	H	-1.25	-64.28	-13	-51.28
414.904	-68.41	PK	95	2.1	V	3.51	-64.90	-13	-51.90
3700.4	-54.66	PK	78	1.6	H	4.72	-49.94	-13	-36.94
3700.4	-54.82	PK	149	1.0	V	4.61	-50.21	-13	-37.21
PCS1900, Middle Channel									
201.74	-62.44	PK	149	1.0	H	-1.25	-63.69	-13	-50.69
414.904	-68.18	PK	15	1.7	V	3.51	-64.67	-13	-51.67
3760	-54.79	PK	157	2.0	H	4.94	-49.85	-13	-36.85
3760	-55.26	PK	151	1.3	V	4.85	-50.41	-13	-37.41
PCS1900, High Channel									
201.74	-63.21	PK	151	1.3	H	-1.25	-64.46	-13	-51.46
414.904	-67.95	PK	254	2.1	V	3.51	-64.44	-13	-51.44
3819.6	-55.09	PK	96	1.2	H	5.25	-49.84	-13	-36.84
3819.6	-55.57	PK	268	2.2	V	5.08	-50.49	-13	-37.49
4G BAND2, Low Channel									
201.74	-62.44	PK	268	2.2	H	-1.25	-63.69	-13	-50.69
414.904	-69.25	PK	32	2.1	V	3.51	-65.74	-13	-52.74
3701.4	-36.67	PK	178	1.7	H	4.72	-31.95	-13	-18.95
3701.4	-37.35	PK	307	1.3	V	4.61	-32.74	-13	-19.74
4G BAND2, Middle Channel									
201.74	-63.03	PK	345	1.2	H	-1.25	-64.28	-13	-51.28
414.904	-68.80	PK	206	2.0	V	3.51	-65.29	-13	-52.29
3760	-38.61	PK	217	1.7	H	4.94	-33.67	-13	-20.67
3760	-41.00	PK	249	1.1	V	4.85	-36.15	-13	-23.15

4G BAND2, High Channel									
201.74	-62.51	PK	232	1.7	H	-1.25	-63.76	-13	-50.76
414.904	-68.62	PK	290	1.9	V	3.51	-65.11	-13	-52.11
3818.6	-39.20	PK	272	1.1	H	5.25	-33.95	-13	-20.95
3818.6	-41.16	PK	37	1.6	V	5.08	-36.08	-13	-23.08
4G BAND4, Low Channel									
201.74	-61.77	PK	260	2.2	H	-1.25	-63.02	-13	-50.02
414.904	-68.99	PK	311	1.4	V	3.51	-65.48	-13	-52.48
3421.4	-45.87	PK	97	1.5	H	2.72	-43.15	-13	-30.15
3421.4	-47.16	PK	279	1.4	V	2.59	-44.57	-13	-31.57
4G BAND4, Middle Channel									
201.74	-63.57	PK	58	1.4	H	-1.25	-64.82	-13	-51.82
414.904	-69.59	PK	340	1.4	V	3.51	-66.08	-13	-53.08
3465	-46.52	PK	277	1.3	H	3.09	-43.43	-13	-30.43
3465	-48.16	PK	40	2.1	V	2.97	-45.19	-13	-32.19
4G BAND4, High Channel									
201.74	-62.24	PK	42	1.3	H	-1.25	-63.49	-13	-50.49
414.904	-69.25	PK	203	1.8	V	3.51	-65.74	-13	-52.74
3508.6	-47.49	PK	138	1.9	H	3.44	-44.05	-13	-31.05
3508.6	-48.72	PK	40	1.7	V	3.31	-45.41	-13	-32.41
4G BAND5, Low Channel									
201.74	-62.39	PK	299	1.8	H	-1.25	-63.64	-13	-50.64
414.904	-68.80	PK	285	2.2	V	3.51	-65.29	-13	-52.29
1649.4	-35.88	PK	131	1.4	H	-2.79	-38.67	-13	-25.67
1649.4	-35.74	PK	110	1.4	V	-2.73	-38.47	-13	-25.47
4G BAND5, Middle Channel									
201.74	-62.24	PK	307	1.3	H	-1.25	-63.49	-13	-50.49
414.904	-68.18	PK	4	1.7	V	3.51	-64.67	-13	-51.67
1673	-36.57	PK	310	1.9	H	-2.74	-39.31	-13	-26.31
1673	-37.05	PK	228	1.7	V	-2.69	-39.74	-13	-26.74
4G BAND5, High Channel									
201.74	-62.41	PK	249	1.1	H	-1.25	-63.66	-13	-50.66
414.904	-68.29	PK	239	2.1	V	3.51	-64.78	-13	-51.78
1696.6	-36.71	PK	193	1.6	H	-2.7	-39.41	-13	-26.41
1696.6	-37.30	PK	236	1.3	V	-2.65	-39.95	-13	-26.95
4G BAND7, Low Channel									
201.74	-62.37	PK	37	1.6	H	-1.25	-63.62	-25	-38.62
414.904	-69.49	PK	124	2.1	V	3.51	-65.98	-25	-40.98
5005	-60.94	PK	189	1.3	H	8.82	-52.12	-25	-27.12
5005	-64.12	PK	191	1.7	V	8.53	-55.59	-25	-30.59
4G BAND7, Middle Channel									
201.74	-63.53	PK	279	1.4	H	-1.25	-64.78	-25	-39.78
414.904	-69.73	PK	244	1.9	V	3.51	-66.22	-25	-41.22
5070	-62.13	PK	74	1.7	H	9.18	-52.95	-25	-27.95
5070	-64.22	PK	72	2.2	V	8.56	-55.66	-25	-30.66

4G BAND7, High Channel									
201.74	-62.67	PK	40	2.1	H	-1.25	-63.92	-25	-38.92
414.904	-69.38	PK	330	1.5	V	3.51	-65.87	-25	-40.87
5135	-62.94	PK	252	1.2	H	9.47	-53.47	-25	-28.47
5135	-64.13	PK	273	2.0	V	8.65	-55.48	-25	-30.48

Note:

Absolute Level = Reading Level + Substituted Factor

Substituted Factor contains: SG Level - Cable loss+ Antenna Gain

Margin = Absolute Level – Limit

FCC § 22.917 (a); § 24.238 (a); § 27.53 (c)(h)(m) - BAND EDGES

Applicable Standard

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.

According to FCC § 27.53 (c), For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

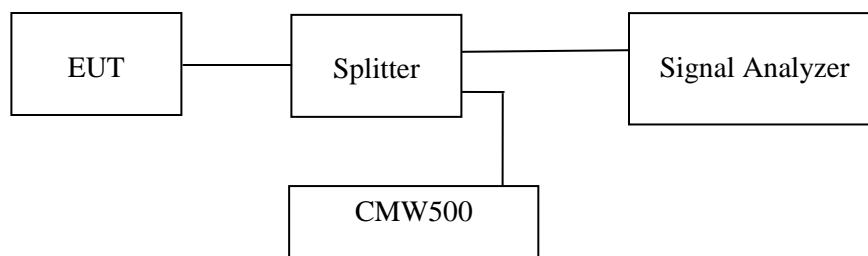
- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;

According to FCC § 27.53 (h)(m), 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 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:	22~24 °C
Relative Humidity:	49~53 %
ATM Pressure:	101.0~101.1 kPa

The testing was performed by Key Pei from 2022-04-01 to 2022-04-21.

EUT operation mode: Transmitting (Worst case)

Test Result: Pass

Test plots refer to the Appendix C.

FCC § 2.1055; § 22.355; § 24.235; §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055, §22.355, §24.235 & §27.54.

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

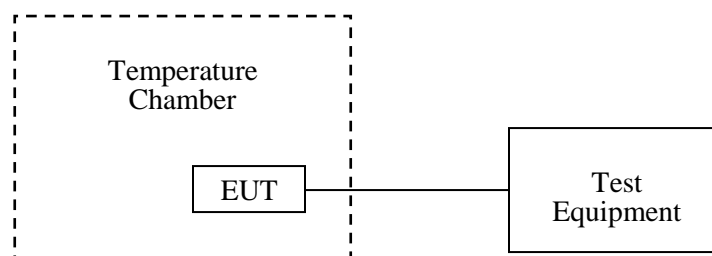
According to §24.235 & §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC 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 AC 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:	22~24 °C
Relative Humidity:	49~53 %
ATM Pressure:	101.0~101.1 kPa

The testing was performed by Key Pei from 2022-04-01 to 2022-04-21.

EUT operation mode: Transmitting

Test Result: Pass

Please refer to the following tables.

Note: The worst case was DC 12V was recorded.

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

Middle Channel, $f_0 = 836.6\text{MHz}$				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	N.V.	3	0.0036	2.5
-20		2	0.0024	2.5
-10		0	0.0000	2.5
0		2	0.0024	2.5
10		3	0.0036	2.5
20		5	0.0060	2.5
30		6	0.0072	2.5
40		7	0.0084	2.5
50		3	0.0036	2.5
20		L.V.	2	0.0024
	H.V.	2	0.0024	2.5

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

Middle Channel, $f_o = 1880.0$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	-3	-0.0016	pass
-20		4	0.0021	pass
-10		3	0.0016	pass
0		2	0.0011	pass
10		-1	-0.0005	pass
20		-4	-0.0021	pass
30		-3	-0.0016	pass
40		-6	-0.0032	pass
50		-4	-0.0021	pass
20		L.V.	-3	-0.0016
	H.V.	-2	-0.0011	pass

LTE:QPSK:**Band 2:**

10.0 MHz Middle Channel, $f_o = 1880$ MHz				
Temperature (°C)	Voltage Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	-2	-0.0011	pass
-20		-9	-0.0048	pass
-10		-6	-0.0032	pass
0		6	0.0032	pass
10		7	0.0037	pass
20		6	0.0032	pass
30		-5	-0.0027	pass
40		7	0.0037	pass
50		6	-0.0032	pass
20		L.V.	-8	-0.0043
	H.V.	-7	-0.0037	pass

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	1710.1169	1754.8715	1710	1755
-20		1710.1163	1754.8712	1710	1755
-10		1710.1119	1754.8762	1710	1755
0		1710.1119	1754.8754	1710	1755
10		1710.1126	1754.8742	1710	1755
20		1710.1173	1754.8737	1710	1755
30		1710.1108	1754.8733	1710	1755
40		1710.1141	1754.8767	1710	1755
50		1710.1176	1754.8751	1710	1755
20		L.V.	1710.1114	1754.8778	1710
	H.V.	1710.1094	1754.8736	1710	1755

Band 5:

10.0 MHz Middle Channel, f ₀ = 836.5MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	N.V.	-1	-0.0012	2.5
-20		-6	-0.0072	2.5
-10		-5	-0.0060	2.5
0		5	0.0060	2.5
10		9	0.0108	2.5
20		5	0.0060	2.5
30		-6	-0.0073	2.5
40		-8	-0.0096	2.5
50		-7	-0.0084	2.5
20		L.V.	8	0.0096
	H.V.	-7	-0.0084	2.5

Band 7:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	2500.0386	2569.9695	2500	2570
-20		2500.0456	2569.9621	2500	2570
-10		2500.0503	2569.9679	2500	2570
0		2500.0512	2569.9672	2500	2570
10		2500.0359	2569.9654	2500	2570
20		2500.0404	2569.9635	2500	2570
30		2500.0354	2569.9625	2500	2570
40		2500.0341	2569.9643	2500	2570
50		2500.0336	2569.9632	2500	2570
20	L.V.	2500.0366	2569.9684	2500	2570
	H.V.	2500.0407	2569.9671	2500	2570

16QAM:**Band 2:**

10.0 MHz Middle Channel, f ₀ =1880MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	N.V.	-9	-0.0048	pass
-20		-7	-0.0037	pass
-10		10	0.0053	pass
0		-8	-0.0043	pass
10		-10	-0.0053	pass
20		-10	-0.0053	pass
30		-7	-0.0037	pass
40		-9	-0.0048	pass
50		6	0.0032	pass
20	L.V.	6	0.0032	pass
	H.V.	8	0.0043	pass

Band 4:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	1710.2694	1754.7557	1710	1755
-20		1710.2703	1754.7632	1710	1755
-10		1710.2679	1754.7598	1710	1755
0		1710.2653	1754.7569	1710	1755
10		1710.2657	1754.7584	1710	1755
20		1710.2638	1754.7629	1710	1755
30		1710.2650	1754.7606	1710	1755
40		1710.2670	1754.7597	1710	1755
50		1710.2678	1754.7613	1710	1755
20	L.V.	1710.2657	1754.7573	1710	1755
	H.V.	1710.2702	1754.7579	1710	1755

Band 5:

10.0 MHz Middle Channel, f ₀ =836.5MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	N.V.	-8	-0.0096	2.5
-20		8	0.0096	2.5
-10		-9	-0.0108	2.5
0		9	0.0108	2.5
10		-7	-0.0084	2.5
20		8	0.0096	2.5
30		6	0.0072	2.5
40		-6	-0.0072	2.5
50		-6	-0.0072	2.5
20	L.V.	6	0.0072	2.5
	H.V.	-7	-0.0084	2.5

Band 7:

10 MHz Bandwidth					
Temperature (°C)	Power Supplied (V _{DC})	F _L (MHz)	F _H (MHz)	F _L Limit (MHz)	F _H Limit (MHz)
-30	N.V.	2500.0327	2569.9696	2500	2570
-20		2500.0356	2569.9621	2500	2570
-10		2500.0331	2569.9676	2500	2570
0		2500.0347	2569.9672	2500	2570
10		2500.0343	2569.9650	2500	2570
20		2500.0406	2569.9636	2500	2570
30		2500.0354	2569.9625	2500	2570
40		2500.0341	2569.9643	2500	2570
50		2500.0316	2569.9632	2500	2570
20		L.V.	2500.0366	2569.9664	2500
	H.V.	2500.0352	2569.9671	2500	2570

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