FCC RF Test Report

APPLICANT	:	Smawave Technology Co. ,Ltd
EQUIPMENT	:	CAT12 outdoor CPE
BRAND NAME	:	smawave
MODEL NAME	:	SRE410
FCC ID	:	2AU8HSRE410-EUD
STANDARD	:	47 CFR Part 2, 27(Q), 96
CLASSIFICATION	:	Licensed Non-Broadcast Station Transmitter (TNB) Citizens Band End User Devices (CBE)
TEST DATE(S)	:	Nov. 02, 2023

We, Sporton International Inc. (KunShan), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (KunShan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG3O1704D	Rev. 01	Initial issue of report	Dec. 04, 2023

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
-	§2.1046	Conducted Output Power	-	Report Only	1
	§27.50 (k)(2)	Equivalent Isotropic Radiated Power (Band 42)	EIRP < 1640Watt	PASS	1
	§96.41	Maximum E.I.R.P (Band 42/43)	EIRP < 23 dBm/10MHz		1
-	§27.50 (k)(4)	Peak-to-Average Ratio	<13 dB	PASS	1
-	§2.1049	Occupied Bandwidth	-	Report Only	1
-	§2.1051 §27.53 (n)(2)	Conducted Band Edge Measurement (Band 42)	-13dBm/MHz	PASS	1
	§2.1051 §96.41	Conducted Band Edge Measurement Adjacent Channel Leakage Ratio (Band 42/43)	§96.41		
-	§2.1051 §27.53 (n)(2)	Conducted Spurious Emission (Band 42)	-13dBm/MHz	PASS	1
	§2.1051 §96.41	Conducted Spurious Emission (Band 42/43)	−40dBm/MHz		
-	§2.1055 §27.54	Frequency Stability Temperature & Voltage	Within Authorized Band	PASS	1
3.4	§2.1053 §27.53 (n)(2)	Radiated Spurious Emission (Band 42)	-13dBm/MHz	PASS	Under limit 7.35 dB at 7128.00 MHz
	§2.1051 §96.41	Radiated Spurious Emission (Band 42/43)	−40dBm/MHz		

Remark 1 : The test items of inter band CA were cover by LTE single carrier due to the CA power is reduced according to 3GPP MPR.

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Smawave Technology Co. ,Ltd
3/F, Building 8, 1001 North Qinzhou Road，Xuhui District, Shanghai, China

1.2 Manufacturer

Smawave Technology Co. ,Ltd
3/F, Building 8, 1001 North Qinzhou Road，Xuhui District, Shanghai, China

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	CAT12 outdoor CPE
Brand Name	smawave
Model Name	SRE410
FCC ID	2AU8HSRE410-EUD
IMEI Code	Radiation: 862165041897446
HW Version	V1.0
SW Version	OCB12FW_Codium_CBSD_V10.20

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 42: 3450 MHz ~ 3550 MHz (Part27Q) LTE Band 42 : 3550 MHz ~ 3600 MHz (Part 96) LTE Band 43 : 3600 MHz ~ 3700 MHz (Part 96)
Rx Frequency	LTE Band 42: 3450 MHz ~ 3550 MHz (Part27Q) LTE Band 42 : 3550 MHz ~ 3600 MHz (Part 96) LTE Band 43 : 3600 MHz ~ 3700 MHz (Part 96)
Uplink CA Bands	Part27Q+Part 96: 42A-43A, 43A-42A Part 96: 42A-43A, 43A-42A
Type of Modulation	QPSK / 16QAM / 64QAM

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-KS	CN1257	314309

1.7 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH04-KS	AUDIX	E3	210616

1.8 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 2, 27(Q), 96
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas License Digital Systems v03r01
- FCC KDB 940660 D01 Part 96 CBRS v03
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

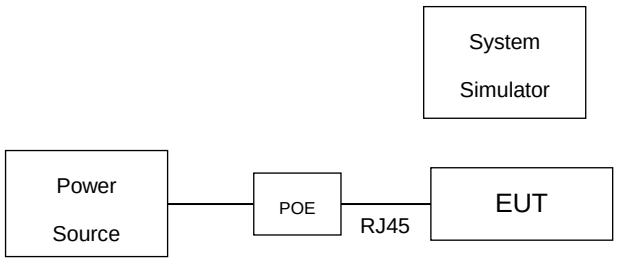
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas License Digital Systems v03r01 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (Y-Plane)

Test Items	Band	Bandwidth (MHz)				Modulation			RB #			Test Channel		
		5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
Radiated Spurious Emission	42A-43A (Part27Q+Part 96)	Worst Case											v	
	43A-42A (Part27Q+Part 96)	Worst Case											v	
	42A-43A (Part 96)	Worst Case											v	
	43A-42A (Part 96)	Worst Case											v	
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.													

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

. For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 42 Channel and Frequency List for Part27Q				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	42190	42590	42990
	Frequency	3460	3500	3540
15	Channel	42165	42590	43015
	Frequency	3457.5	3500	3542.5
10	Channel	42140	42590	43040
	Frequency	3455	3500	3545
5	Channel	42115	42590	43065
	Frequency	3452.5	3500	3547.5

LTE Band 42 Channel and Frequency List for Part 96				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	43190	43340	43490
	Frequency	3560	3575	3590
15	Channel	43165	43340	43515
	Frequency	3557.5	3575	3592.5
10	Channel	43140	43340	43540
	Frequency	3555	3575	3595
5	Channel	43115	43340	43565
	Frequency	3552.5	3575	3597.5

LTE Band 43 Channel and Frequency List for Part 96				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	43690	44090	44490
	Frequency	3610	3650	3690
15	Channel	43665	44090	44515
	Frequency	3607.5	3650	3692.5
10	Channel	43640	44090	44540
	Frequency	3605	3650	3695
5	Channel	43615	44090	44565
	Frequency	3602.5	3650	3697.5

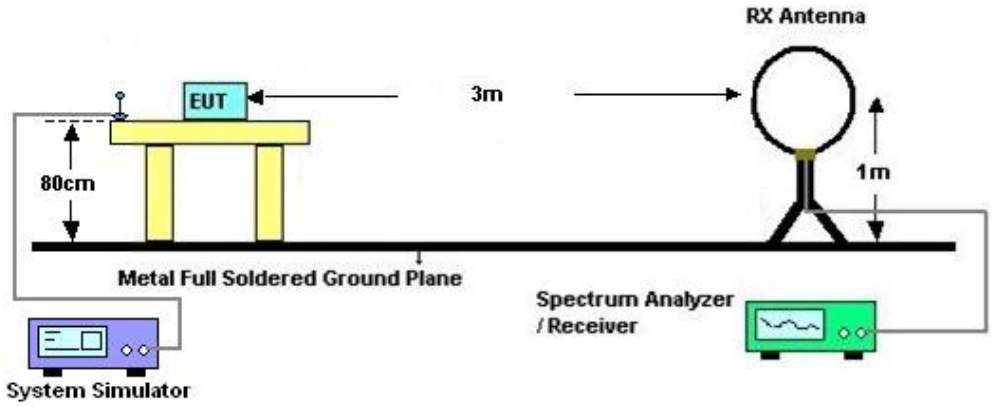
3 Radiated Test Items

3.1 Measuring Instruments

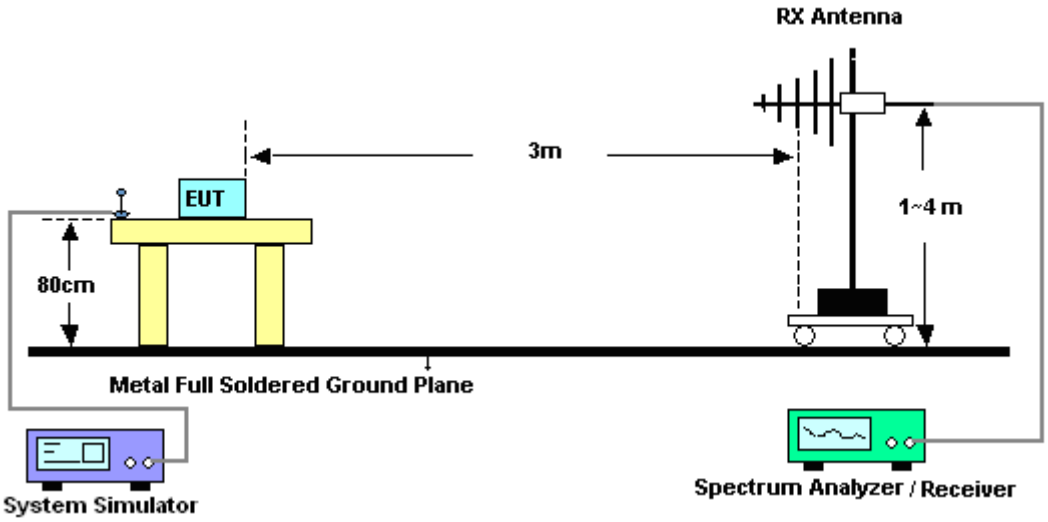
See list of measuring instruments of this test report.

3.2 Test Setup

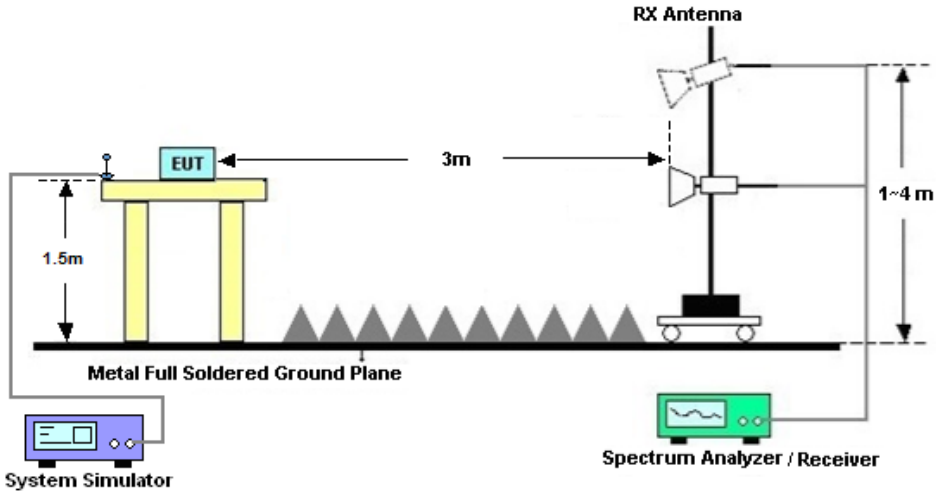
For radiated test below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.3 Test Result of Radiated Test

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

Please refer to Appendix A.

3.4 Radiated Spurious Emission

Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26.

For Band 42 Part27Q:

The power of any emission outside of the authorized operating frequency ranges shall not exceed −13 dBm/MHz.

For LTE Band 42/43 Part96:

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
2. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
6. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
7. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
8. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
9. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
10. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    For Band 42 Part27Q:
    The limit line is −13dBm/MHz
    For LTE Band 42/43 Part96:
    The limit line is −40dBm/MHz

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 10, 2023	Nov. 02, 2023	Oct. 09, 2024	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 15, 2023	Nov. 02, 2023	Oct. 14, 2024	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Apr. 09, 2023	Nov. 02, 2023	Apr. 08, 2024	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1284	1GHz~18GHz	Oct. 10, 2023	Nov. 02, 2023	Oct. 09, 2024	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2023	Nov. 02, 2023	Jan. 07, 2024	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	380827	9KHz-1GHz	Jul. 06, 2023	Nov. 02, 2023	Jul. 05, 2024	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 05, 2023	Nov. 02, 2023	Jan. 04, 2024	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18GA	060840	1Ghz-18Ghz	Oct. 10, 2023	Nov. 02, 2023	Oct. 09, 2024	Radiation (03CH04-KS)
Amplifier	Agilent	8449B	3008A02370	1Ghz-18Ghz	Oct. 10, 2023	Nov. 02, 2023	Oct. 09, 2024	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Nov. 02, 2023	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Nov. 02, 2023	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Nov. 02, 2023	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.82dB**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.56dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.54dB**

Appendix A. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Carl Ni	Temperature :	23~25℃
		Relative Humidity :	41~42%

Pre-scanned harmonic for the different antenna combinations, we choose the worst antenna mode to perform final test and record in the report.

ULCA_42A-43A (ANT0+2) for Part27Q+Part96								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B42 BW 20MHz Middle 1RB0,QPSK	6984	-54.09	-13	-41.09	-64.30	3.03	13.24	H
	10476	-58.61	-13	-45.61	-68.06	3.56	13.01	H
	13964	-59.67	-13	-46.67	-69.19	3.92	13.44	H
	6984	-56.18	-13	-43.18	-66.39	3.03	13.24	V
	10476	-59.43	-13	-46.43	-68.88	3.56	13.01	V
	13968	-59.69	-13	-46.69	-69.21	3.92	13.44	V
LTE B43 BW 20MHz Middle 1RB0,QPSK	7284	-64.02	-40	-24.02	-75.48	2.84	14.30	H
	10920	-59.95	-40	-19.95	-69.89	3.49	13.43	H
	14568	-60.16	-40	-20.16	-70.40	3.85	14.09	H
	7284	-64.49	-40	-24.49	-75.95	2.84	14.30	V
	10920	-59.53	-40	-19.53	-69.47	3.49	13.43	V
	14568	-60.12	-40	-20.12	-70.36	3.85	14.09	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

ULCA_43A-42A (ANT0+2) for Part27Q+Part96								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B43 BW 20MHz Middle 1RB0,QPSK	7284	-64.11	-40	-24.11	-74.32	3.03	13.24	H
	10920	-59.79	-40	-19.79	-69.24	3.56	13.01	H
	14568	-60.28	-40	-20.28	-69.80	3.92	13.44	H
	7284	-64.53	-40	-24.53	-74.74	3.03	13.24	V
	10920	-59.80	-40	-19.80	-69.25	3.56	13.01	V
	14568	-59.98	-40	-19.98	-69.50	3.92	13.44	V
LTE B42 BW 20MHz Middle 1RB0,QPSK	6984	-64.68	-13	-51.68	-76.14	2.84	14.30	H
	10476	-61.14	-13	-48.14	-71.08	3.49	13.43	H
	13968	-59.62	-13	-46.62	-69.86	3.85	14.09	H
	6984	-65.06	-13	-52.06	-76.52	2.84	14.30	V
	10476	-61.52	-13	-48.52	-71.46	3.49	13.43	V
	13968	-59.43	-13	-46.43	-69.67	3.85	14.09	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

ULCA_42A-43A (ANT0+2) for Part 96								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B42 BW 20MHz Middle 1RB0,QPSK	7128	-64.07	-40	-24.07	-75.53	2.84	14.30	H
	10704	-62.33	-40	-22.33	-72.27	3.49	13.43	H
	14268	-59.26	-40	-19.26	-69.50	3.85	14.09	H
	7128	-47.35	-40	-7.35	-58.81	2.84	14.30	V
	10704	-62.79	-40	-22.79	-72.73	3.49	13.43	V
	14268	-59.30	-40	-19.30	-69.54	3.85	14.09	V
LTE B43 BW 20MHz Middle 1RB0,QPSK	7284	-64.28	-40	-24.28	-75.74	2.84	14.30	H
	10920	-59.76	-40	-19.76	-69.70	3.49	13.43	H
	14568	-60.20	-40	-20.20	-70.44	3.85	14.09	H
	7284	-64.40	-40	-24.40	-75.86	2.84	14.30	V
	10920	-60.01	-40	-20.01	-69.95	3.49	13.43	V
	14568	-59.95	-40	-19.95	-70.19	3.85	14.09	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

ULCA_43A-42A (ANT0+2) for Part 96								
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
LTE B43 BW 20MHz Middle 1RB0,QPSK	7284	-63.96	-40	-23.96	-75.42	2.84	14.30	H
	10920	-59.75	-40	-19.75	-69.69	3.49	13.43	H
	14568	-60.24	-40	-20.24	-70.48	3.85	14.09	H
	7284	-64.12	-40	-24.12	-75.58	2.84	14.30	V
	10920	-59.88	-40	-19.88	-69.82	3.49	13.43	V
	14568	-59.90	-40	-19.90	-70.14	3.85	14.09	V
LTE B42 BW 20MHz Middle 1RB0,QPSK	7128	-64.00	-40	-24.00	-75.46	2.84	14.30	H
	10704	-62.83	-40	-22.83	-72.77	3.49	13.43	H
	14268	-59.34	-40	-19.34	-69.58	3.85	14.09	H
	7128	-64.35	-40	-24.35	-75.81	2.84	14.30	V
	10704	-62.81	-40	-22.81	-72.75	3.49	13.43	V
	14268	-59.40	-40	-19.40	-69.64	3.85	14.09	V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.