FCC RF Test Report

APPLICANT	:	Telrad Networks Ltd
EQUIPMENT	:	CPE-12300SG-PRO-1D-3.x
BRAND NAME	:	Telrad
MODEL NAME	:	735400
FCC ID	:	ARA-CPE12300SG
STANDARD	:	47 CFR Part 2, 96
CLASSIFICATION	:	Citizens Band Category A and B Devices (CBD)
EQUIPMENT TYPE	:	CBSD (Category B)

The product was received on Jul. 23, 2020 and completely tested on Sep. 07, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26 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 (Kunshan) Inc., the test report shall not be reproduced except in full.

Jason Jia

Reviewed by: Jason Jia / Supervisor

James Huang

Approved by: James Huang / Manager

ACCREDITED Cert #5145.02

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

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FG072303-01	01	Initial issue of report	Dec. 08, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	§96.41	Maximum E.I.R.P	Pass	-
4.4	§2.1051 §96.41	Radiated Spurious Emission	Pass	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Applicant

Telrad Networks Ltd
Industrial Center PO Box 6118 Lod, 711600 Israel

1.2 Manufacturer

Asiatelco
No.68 Huatuo Road,Building-8,Zhangjiang Hi-Tech Park,Pudong,Shanghai,PRC

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	CPE-12300SG-PRO-1D-3.x
Brand Name	Telrad
Model Name	735400
FCC ID	ARA-CPE12300SG
Tx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz LTE Band 42 : 3552.5 MHz ~ 3597.5 MHz LTE Band 43 : 3602.5 MHz ~ 3697.5 MHz
Rx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz LTE Band 42 : 3552.5 MHz ~ 3597.5 MHz LTE Band 43 : 3602.5 MHz ~ 3697.5 MHz
Bandwidth	5MHz / 10MHz / 15MHz / 20MHz
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM (Downlink Only)
Antenna Type / Gain	Fixed Internal Antenna with gain 13.0dBi
IMEI Code	Conducted: N/A Radiation: 353139110020384
HW Version	P3
SW Version	KT2A_OJ71_TRD_1.0.0.1
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Re-use of Measured Data

1.4.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: 735400, FCC ID: ARA-CPE12300SG) is electrically identical to the reference device (Model: 735350, FCC ID: ARA-CPE12300HG) for the portions of the circuitry corresponding to the data being re-used, as treated by KDB Publication 484596 D01.

1.4.2 Difference Section

For details concerning the similarity with respect to component placement, mechanical/electrical design etc., please refer to the Product Equality Declaration.

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. FG072303 for the reference device Model: 735350, FCC ID: ARA-CPE12300HG).

1.4.3 Reference detail Section:

Equipment Class	Reference FCC ID	Folder Test	Report Title/Section
CBD	ARA-CPE12300HG	Part 96 (FG072303)	All conducted sections applicable except for EIRP & RSE

1.4.4 Spot Check Verification Data Section

In order to confirm hardware similarity of the subject device with the reference device, spot check measurements were performed on the subject device for the following test items, the test result were consistent with FCC ID: ARA-CPE12300HG and the EIRP & RSE to re-test.

Assertions concerning the similarity of these devices are based on representations by the applicant. The applicant accepts full responsibility for the validity of the similarity claim, and for the determination that verification test data are sufficient to support it.

Test Item	Mode	ARA-CPE12300HG Worst Result	ARA-CPE12300SG Worst Result	Difference (dB)
Average Conducted Power (dBm)	Part 96 B48	22.11	21.65	0.46

1.5 Maximum EIRP Power

LTE Band 48		QPSK	16QAM
BW (MHz)	Frequency Range (MHz)	Maximum EIRP (W)	Maximum EIRP (W)
5	3552.5~3697.5	2.6424	2.5823
10	3555~3695	2.6792	2.7416
15	3557.5~3692.5	3.2434	2.7040
20	3560~3690	2.9174	2.7606

LTE Band 48		64QAM
BW (MHz)	Frequency Range (MHz)	Maximum EIRP (W)
5	3552.5~3697.5	2.0091
10	3555~3695	2.0324
15	3557.5~3692.5	2.6424
20	3560~3690	2.6062

1.6 Testing Site

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

Test Firm	Sporton International (Kunshan) Inc.		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958		
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	6.2009-8-24a

1.8 Applied Standards

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

- ANSI C63.26-2015
- ANSI / TIA-603-E
- 47 CFR Part 2, 96
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 940660 D01 Part 96 CBRS v02
- 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

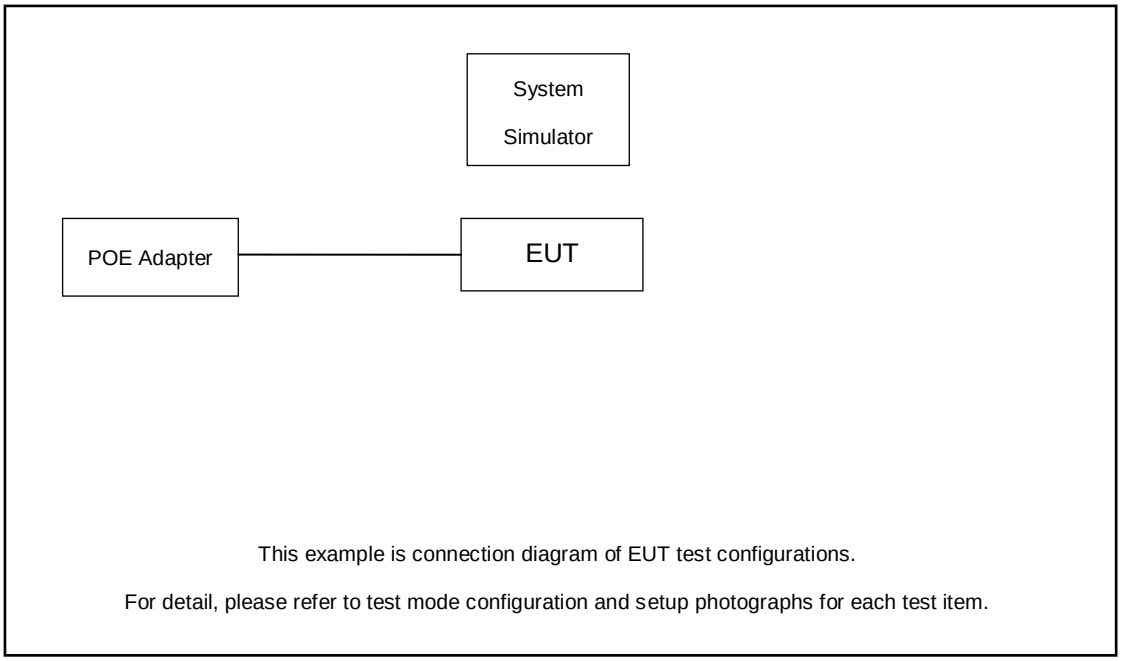
2.1 Test Mode

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.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Test Items	Band	Bandwidth (MHz)						Modulation			RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full	L	M	H
E.R.P / E.I.R.P	48	-	-	v	v	v	v	v	v	v			v	v	v	v
Radiated Spurious Emission	48	Worst Case													v	
Remark	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. 4. All the radiated test cases were performed with Adapter. 5. Only full RB is support by manufacturer declared. 6. LTE Band 48 overlaps the entire frequency range of LTE Band 42/43. Therefore, the test results provided in this report covers Band 48 as well as Band 42/43.															

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

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	Power Supply	GWINSTEK	PSS-2002	N/A	N/A	Unshielded, 1.8 m
2.	LTE Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 48 Channel and Frequency List				
BW [MHz]	**Channel/Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
20	Channel	55340	55990	56640
	Frequency	3560.0	3625.0	3690.0
15	Channel	55315	55990	56665
	Frequency	3557.5	3625.0	3692.5
10	Channel	55290	55990	56690
	Frequency	3555.0	3625.0	3695.0
5	Channel	55265	55990	56715
	Frequency	3552.5	3625.0	3697.5

3 Conducted Test Items

3.1 EIRP

3.1.1 Description of the EIRP Measurement

EIRP limits for CBRS equipment as below table:

Device		Maximum EIRP (dBm/10 MHz)
	End User Device	23
	Category A CBSD	30
V	**Category B CBSD**	47

Remark: This device is Category B CBSD.

3.1.2 Test Procedures for EIRP

The testing follows ANSI C63.26-2015 Section 5.2.5.5

According to KDB 412172 D01 Power Approach,

EIRP = $P_T + G_T – L_C$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

3.1.3 Test Result of EIRP Test

Please refer to Appendix A.

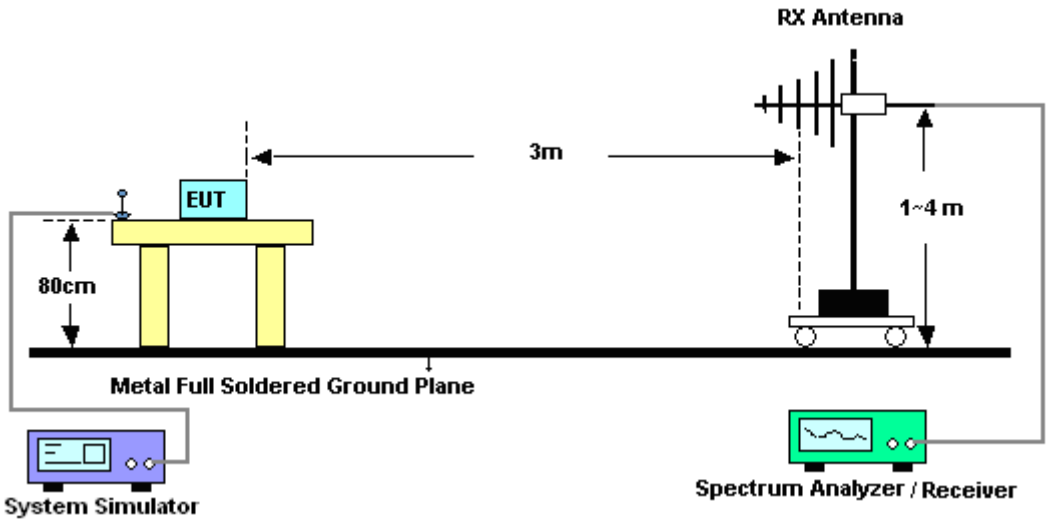
4 Radiated Test Items

4.1 Measuring Instruments

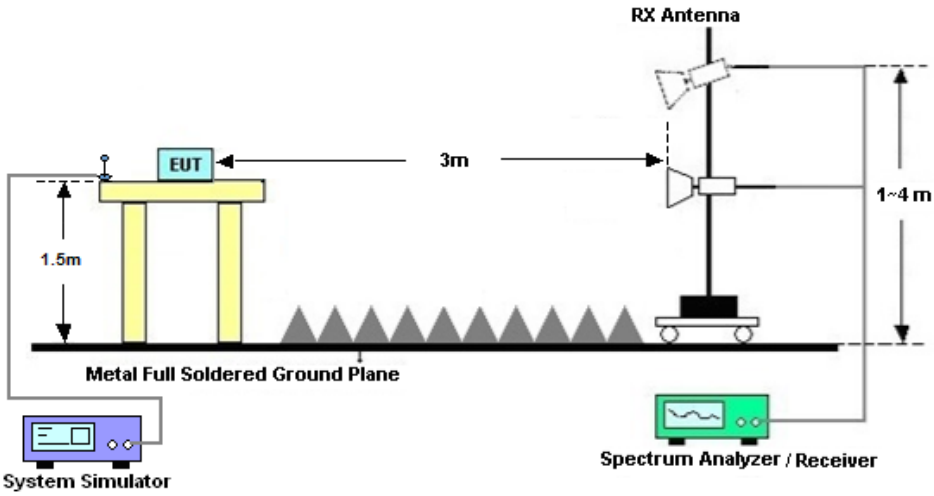
See list of measuring instruments of this test report.

4.2 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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.

4.4.2 Test Procedures

1. 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.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
   Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
   EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
   ERP (dBm) = EIRP - 2.15
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
   The limit line is −40dBm/MHz

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Nov. 02, 2019	Sep. 07, 2020	Nov. 01, 2020	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	-40~+150°C	Oct. 28, 2019	Sep. 07, 2020	Oct. 27, 2020	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz-44G,MAX 30dB	Apr. 15, 2020	Sep. 07, 2020	Apr. 14, 2021	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	Jan. 03, 2020	Sep. 07, 2020	Jan. 02, 2021	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1356	1GHz~18GHz	Apr. 20, 2020	Sep. 07, 2020	Apr. 19, 2021	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2019	Sep. 07, 2020	Nov. 09, 2020	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Jan. 03, 2020	Sep. 07, 2020	Jan. 02, 2021	Radiation (03CH04-KS)
Amplifier	MITEQ	EM18G40GGA	060728	18~40GHz	Jan. 08, 2020	Sep. 07, 2020	Jan. 07, 2021	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Jan. 03, 2020	Sep. 07, 2020	Jan. 02, 2021	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Oct. 14, 2019	Sep. 07, 2020	Oct. 13, 2020	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Sep. 07, 2020	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 07, 2020	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 07, 2020	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

6 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.3dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.8dB**

Appendix A. Test Results of EIRP Test

EIRP

LTE Band 48 (GT - LC = 13.0 dB) QPSK			
Bandwidth	5M		
Channel	55265	55990	56715
	(Low)	(Mid)	(High)
Frequency (MHz)	3552.5	3625	3697.5
Conducted Power (dBm)	20.77	21.22	20.83
Conducted Power (Watts)	0.1194	0.1324	0.1211
EIRP(dBm)	33.77	34.22	33.83
EIRP(Watts)	2.3823	2.6424	2.4155

LTE Band 48 (GT - LC = 13.0 dB) QPSK									
Bandwidth	10M			15M			20M		
Channel	55290	55990	56690	55315	55990	56665	55340	55990	56640
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	3555	3625	3695	3557.5	3625	3692.5	3560	3625	3690
Conducted Power (dBm)	20.85	21.06	21.28	21.44	22.11	21.22	21.65	21.25	21.44
Conducted Power (Watts)	0.1216	0.1276	0.1343	0.1393	0.1626	0.1324	0.1462	0.1334	0.1393
EIRP(dBm)	33.85	34.06	34.28	34.44	35.11	34.22	34.65	34.25	34.44
EIRP(Watts)	2.4266	2.5468	2.6792	2.7797	3.2434	2.6424	2.9174	2.6607	2.7797

LTE Band 48 (GT - LC = 13.0 dB) 16QAM			
Bandwidth	5M		
Channel	55265	55990	56715
	(Low)	(Mid)	(High)
Frequency (MHz)	3552.5	3625	3697.5
Conducted Power (dBm)	20.65	21.12	20.91
Conducted Power (Watts)	0.1161	0.1294	0.1233
EIRP(dBm)	33.65	34.12	33.91
EIRP(Watts)	2.3174	2.5823	2.4604

LTE Band 48 (GT - LC = 13.0 dB) 16QAM									
Bandwidth	10M			15M			20M		
Channel	55290	55990	56690	55315	55990	56665	55340	55990	56640
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	3555	3625	3695	3557.5	3625	3692.5	3560	3625	3690
Conducted Power (dBm)	20.91	20.95	21.38	20.84	21.32	20.05	21.25	21.24	21.41
Conducted Power (Watts)	0.1233	0.1245	0.1374	0.1213	0.1355	0.1012	0.1334	0.1330	0.1384
EIRP(dBm)	33.91	33.95	34.38	33.84	34.32	33.05	34.25	34.24	34.41
EIRP(Watts)	2.4604	2.4831	2.7416	2.4210	2.7040	2.0184	2.6607	2.6546	2.7606

LTE Band 48 (GT - LC = 13.0 dB) 64QAM			
Bandwidth	5M		
Channel	55265	55990	56715
	(Low)	(Mid)	(High)
Frequency (MHz)	3552.5	3625	3697.5
Conducted Power (dBm)	19.67	20.03	19.79
Conducted Power (Watts)	0.0927	0.1007	0.0953
EIRP(dBm)	32.67	33.03	32.79
EIRP(Watts)	1.8493	2.0091	1.9011

LTE Band 48 (GT - LC = 13.0 dB) 64QAM									
Bandwidth	10M			15M			20M		
Channel	55290	55990	56690	55315	55990	56665	55340	55990	56640
	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)	(Low)	(Mid)	(High)
Frequency (MHz)	3555	3625	3695	3557.5	3625	3692.5	3560	3625	3690
Conducted Power (dBm)	19.85	20.06	20.08	19.69	20.11	21.22	20.01	21.16	20.16
Conducted Power (Watts)	0.0966	0.1014	0.1019	0.0931	0.1026	0.1324	0.1002	0.1306	0.1038
EIRP(dBm)	32.85	33.06	33.08	32.69	33.11	34.22	33.01	34.16	33.16
EIRP(Watts)	1.9275	2.0230	2.0324	1.8578	2.0464	2.6424	1.9999	2.6062	2.0701

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

LTE Band 48 / 20MHz / QPSK								
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)
Middle	7230	-55.19	-40	-15.19	-66.65	2.84	14.30	H
	10848	-57.07	-40	-17.07	-67.01	3.49	13.43	H
	14466	-55.70	-40	-15.70	-65.94	3.85	14.09	H
	7230	-51.64	-40	-11.64	-63.10	2.84	14.30	V
	10848	-58.29	-40	-18.29	-68.23	3.49	13.43	V
	14466	-52.83	-40	-12.83	-63.07	3.85	14.09	V

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

Appendix D. Reference Report

Please refer to Sporton report number FG072303 which is issued separately.