MOTOROLA SOLUTIONS

CERTIFICATE 2518.08

MOTOROLA PENANG ADV. COMM. LABORATORY
Motorola Solutions Malaysia SDN BHD,
Plot 2A, Medan Bayan Lepas,
Mukim 12 S.W.D, 11900 Bayan Lepas,
Penang, Malaysia.

FCC / ISED TEST REPORT
Report Revision : Rev.C

Date/s Tested	:	14-January-2020 to 16-January-2020
Manufacturer	:	MOTOROLA SOLUTIONS MALAYSIA SDN BHD
Manufacturer Address	:	PLOT 2A, MEDAN BAYAN LEPAS MUKIM 12, S.W.D 11900 BAYAN LEPAS PENANG, MALAYSIA
Requestor	:	KHOO PHAIK HUN
Product Type	:	Portable
Model Number	:	T47X
Frequency Band	:	462-468MHZ
Firmware Version	:	V1.110
Max Output Power	:	0.5W ERP / 2W ERP
Applicant Name	:	Motorola Solutions Inc
ISED Registrations	:	MY0001
FCC Registrations	:	461337

The equipment was tested accordance to the requirement listed below:

FCC 47 CFR Part 15B / RSS-GEN / ICES-003	**PASS**

Prepared By:

Azil Ezzaddin Khalil
Technician

Approved By:

Leow Ting Jun
Responsible Engineer

Table of Contents

REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	**21-January-2020**	Azil Ezzaddin Khalil
Rev. B	Update Frequency Band	**27-February-2020**	Azil Ezzaddin Khalil
Rev. C	Update Frequency Band, Max Output Power & Applicant Name	**6-April-2020**	Azil Ezzaddin Khalil

1.0. General Information

EUT Description:

Technologies	T470 FRS CONSUMER RADIOS 462-467MHZ, 0.5W-2W
Modulation Type	Analog

The EUT contains following accessory devices and data cable:

Item	Brand	Model or P/N
1300MAH 3XAA NIMH RECHARGEABLE BATTERY PACK	MOTOROLA	1532
POWER SUPPLY ADAPTOR,SWITCH MODE, 3W, L6, 100 V - 240 V, MICRO USB, US/NOM/JP	MOTOROLA	PS000228A01
ACCESSORY KIT,TALKABOUT TWINPACK CHARGING TRAY WITH PSU NA. (This kit contains PMLN7679A - USB Charging Tray Single Slot)	MOTOROLA	PMLN7711AR

General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, the EUT is to comply with the requirements of the following standards:

ANSI C63.4.2014

2.0. Summary of Test Results

FCC General Rules Part (47CFR)	IC General Rules Part	Test Item	Result
15.111	RSS-Gen 7.4	Conducted Spurious Output Power	NA
15.109	RSS-Gen 7.3	Radiated Spurious Output Power	Pass
15.107	RSS-Gen 7.2	AC Power Conducted Spurious Emissions	Pass

NA → Not Applicable

3.0. Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.43
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	4.25
	200MHz ~ 1000MHz	4.25
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	4.94
	18GHz ~ 25GHz	4.94
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82

4.0. Equipment List

Conducted Spur Emission ATE # 1

NA

Radiated Emission Station

DESCRIPTION	MODEL	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
DRG HORN FREQ.	SAS-571	720	21-Mar-19	21-Mar-21
DRG HORN FREQ.	SAS-571	1143	14-Feb-19	14-Feb-21
POWER SUPPLY (0-60V / 0-50A, 1000W)	6032A	MY41001736	25-May-19	25-May-20
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101750	24-Jul-19	24-Jul-20
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Jul-20
5m Semi-anechoic Chamber	S800-HX	J2308	No Cal. Req'd	No Cal. Req'd
BILOG ANTENNA	CBL6112D	30991	5-Aug-19	5-Aug-20
BILOG ANTENNA	CBL6112B	2964	16-Feb-18	16-Feb-20
DATA LOGGER	SDL500	A.016800	19-Mar-19	18-Mar-20
SYSTEM CONTROLLER	SC104V	050806-1	No Cal. Req'd	No Cal. Req'd
TURNTABLE FLUSH MOUNT 2M	FM2011	NA	No Cal. Req'd	No Cal. Req'd
ANTENNA POSITIONING TOWER	TLT2	NA	No Cal. Req'd	No Cal. Req'd
BROAD-BAND HORN ANTENNA	BBHA9170	BBHA9170143	23-Jun-19	23-Jun-20
18 - 40GHz PREAMPLIFIER	Miteq Hi Gain Sucoflex	001	No Cal. Req'd	No Cal. Req'd
PREAMPLIFIER	PAM-0118	269	24-May-19	24-May-20
LOOP ANTENNA	6502	00208416	5-Sep-19	5-Sep-20
Test Software	EMC_FCC_IC_Bluetooth_RE_Test			
Version	EMC_FCC_RE_v1.6.1			

AC Power Line Conducted Spurious Emission

DESCRIPTION	MODEL	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
TEMPERATURE & HUMIDITY LOGGER	DSB	16344134	5-Apr-19	5-Apr-20
V-NETWORK 2-LINE	ENV216V	101039	20-Jul-19	20-Jul-20
EMI TEST RECEIVER	ESIB26	827769/009	25-Jul-19	25-Jul-20
PROGRAMMABLE AC SOURCE	61604	ABR000000926	1-Jul-19	1-Jul-20
Test Software	EMC32			
Version	Ver. 10.50.40			

4.1. Test Condition

4.1.1 Receiver Test Conditions

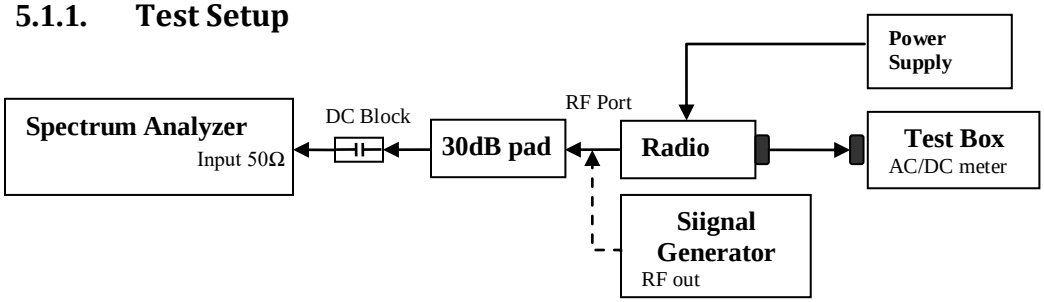
Test Item, (Channel Spacing)	Temperature (°C)	Voltage Supply (V)	Power (W)	Modulation	Test Frequency (MHz)
Conducted Spurious Output Power (12.5kHz / 25kHz)	25°C	NA	NA	NA	NA
Radiated Spurious Output Power (12.5kHz)	23.8°C	120	0.5 & 2	Analog	462.6375 & 467.6375 MHz
AC Power Line Conducted Spurious Emissions (12.5kHz)	21.1°C	120	2	Analog	462.6375 MHz

NA → Not Applicable

5.0. Receiver Test Parameters

5.1. Conducted Spurious Output Power

5.1.1. Test Setup



1) Identify the radio is high side (LO = Fc + IF) or low side injection (LO = Fc – IF).
2) To get the reference point, set sigen to 1st LO frequency with amplitude level 0dBm.
3) Set the LO frequency into PSA. Adjust the PSA RBW = 100 kHz and record the Reference level offset.
4) Replace the Sigen with the UUT.
5) At PSA, set the frequency step size to LO frequency to test from 2LO to 10LO.
6) Record or screen captures the data in dBm value.

5.1.2. Test Result

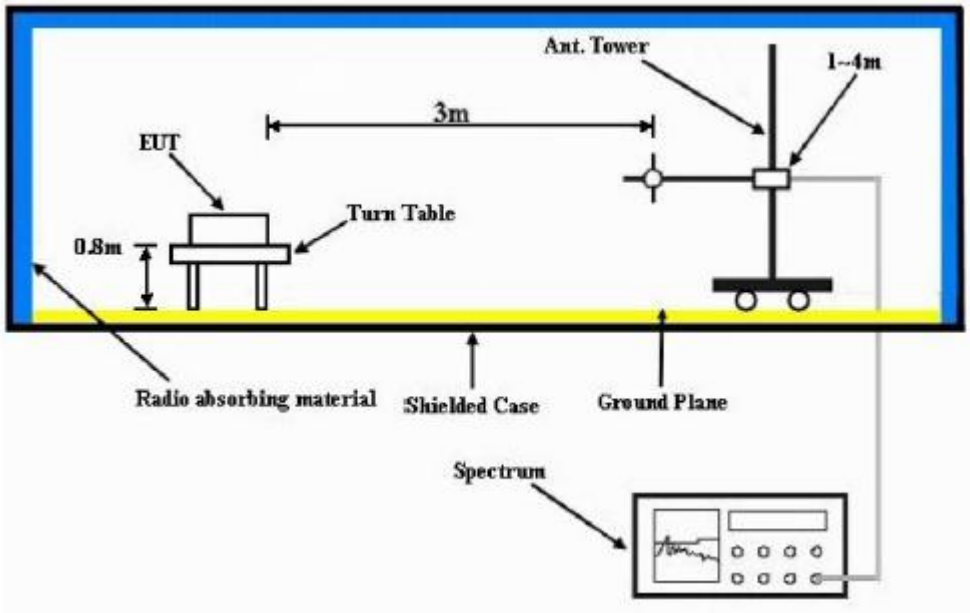
NA

5.1.3. Test Limit

NA

5.2. Radiated Spurious Output Power

5.2.1. Test Setup



a.The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1MHz, VBW = 3MHz. Detector mode is positive peak. For exploratory testing.

b. Final is done using QP Detector (<1Ghz) and Peak and Average Detector (>1Ghz).

c. In the semi-anechoic chamber, setup as illustrated above the EUT placed on the 0.8m height of Turn table. For each radiated spurious emissions component detected, rotate the turn table around 360 degrees to search the maximum radiated spurious emissions and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiated spurious emissions. The “Read Value” is the spectrum reading the maximum radiated spurious emissions.

d. Final Radiated Spurious Emission (dBuV/m) = “Read Value (dBuV)” + Cable Loss (dB) +Antenna Gain (dB/m)-Pre-amp Gain (dB)

5.2.2. Test Result

Motorola Solutions. **FCC ID: AZ489FT4959, IC ID: 109U-89FT4959**

Test: SAC Receiver Radiated Emission
Model#: T47X **S/N: 16514VY559** **EMC SR ID#: 20002-EMC-00009**
Battery: 1532 **Accessory: 8372-PS000228A01-1, PMLN7679A-C1**
Test Mode: RX Analog **Test Frequency: 462.6375 MHz 12.5 kHz 2.000 Watt(s) /Max Power**
Test Standard: ANSI C63.4-2014

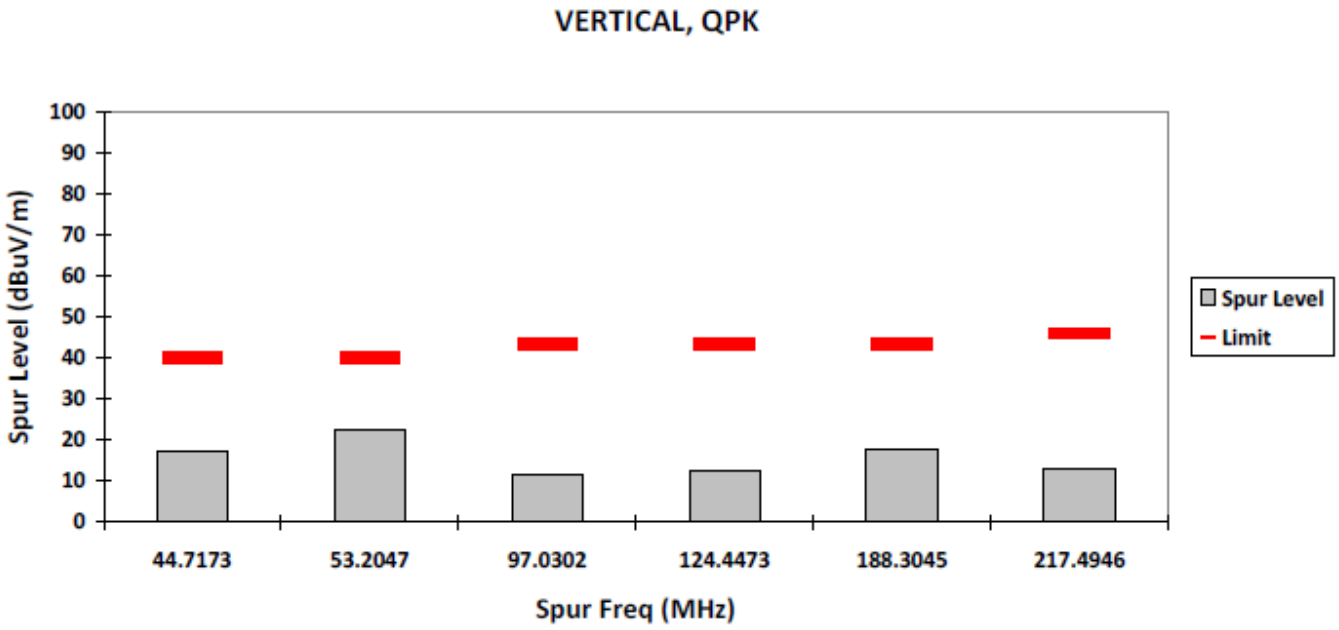
Radiated Emission tabular data

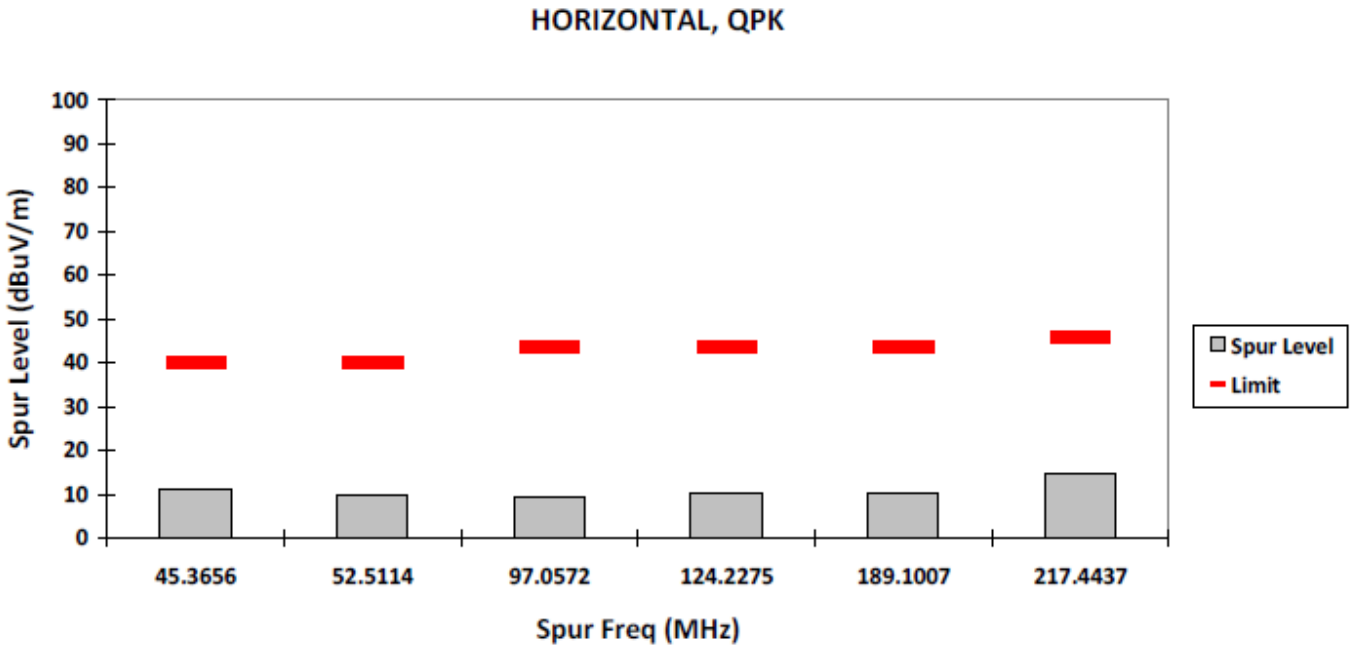
Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
44.7173	17.4573	-	-	40.0000	-	-	22.5427	-	-	-
53.2047	22.4386	-	-	40.0000	-	-	17.5614	-	-	-
97.0302	11.5131	-	-	43.5000	-	-	31.9869	-	-	-
124.4473	12.7428	-	-	43.5000	-	-	30.7572	-	-	-
188.3045	17.6447	-	-	43.5000	-	-	25.8553	-	-	-
217.4946	13.1102	-	-	46.0000	-	-	32.8898	-	-	-
3700.1160	-	54.9286	46.6154	-	74.0000	54.0000	-	19.0714	7.3846	-
Horizontal Radiated Emission Result										
45.3656	11.1353	-	-	40.0000	-	-	28.8647	-	-	-
52.5114	9.6983	-	-	40.0000	-	-	30.3017	-	-	-
97.0572	9.3277	-	-	43.5000	-	-	34.1723	-	-	-
124.2275	10.0609	-	-	43.5000	-	-	33.4391	-	-	-
189.1007	10.1702	-	-	43.5000	-	-	33.3298	-	-	-
217.4437	14.7754	-	-	46.0000	-	-	31.2246	-	-	-
3700.1550	-	50.9332	41.0631	-	74.0000	54.0000	-	23.0668	12.9369	-

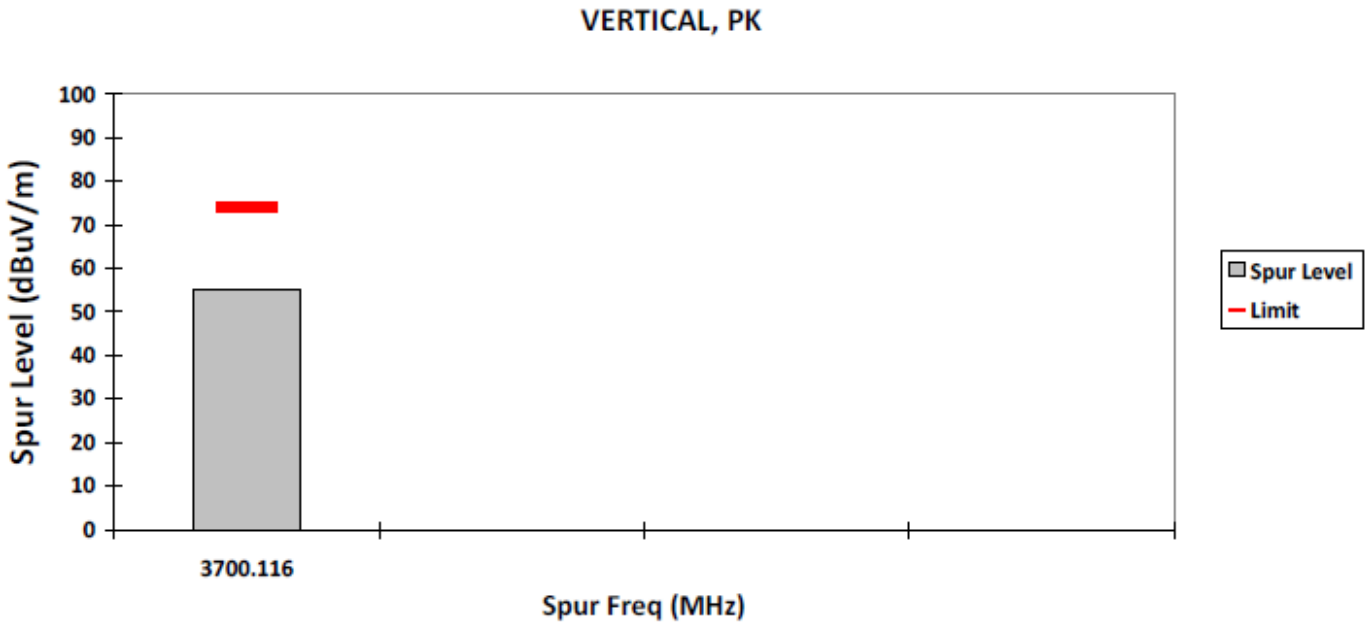
Remarks: Pass Result	Marginal Result	Fail Result

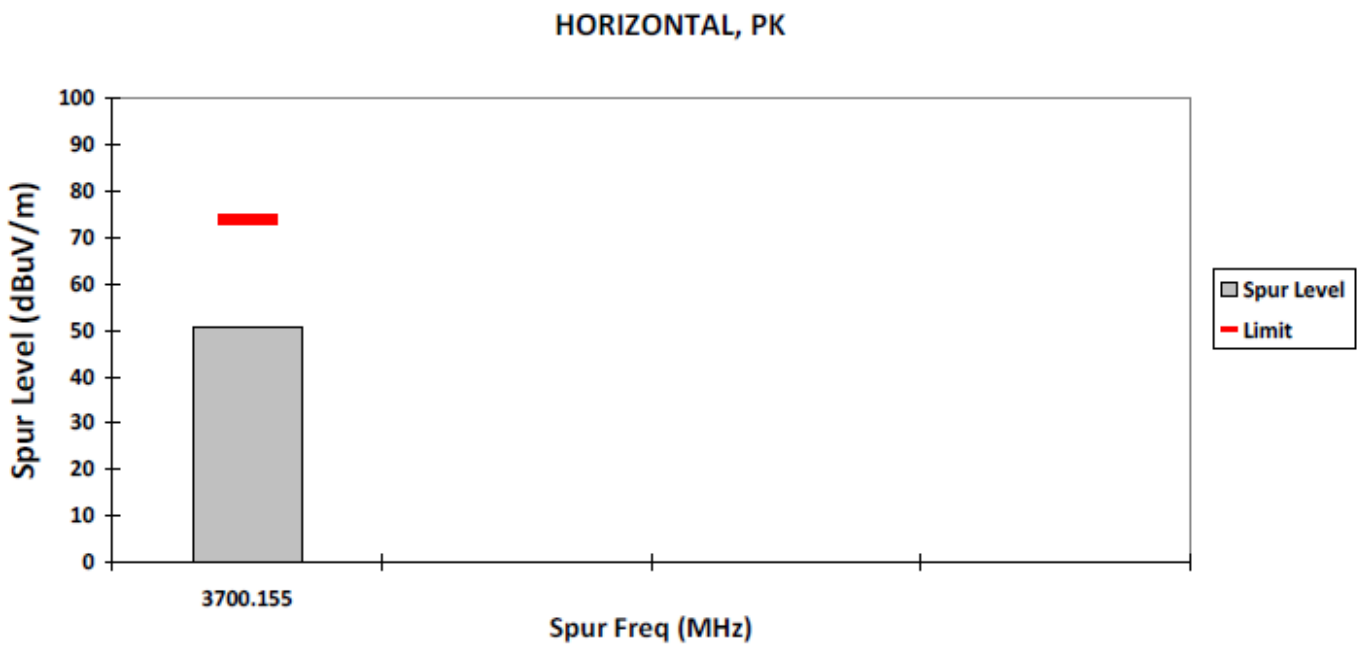
Temperature (degC): 23.8 **Humidity (%): 70.2**
Test Performed by: Nazrin&Qawiman **Test Date: Tue, Jan 14, 2020**
System MU: 4.25 dB (30-1000MHz), 4.94 dB (1000-18000MHz)

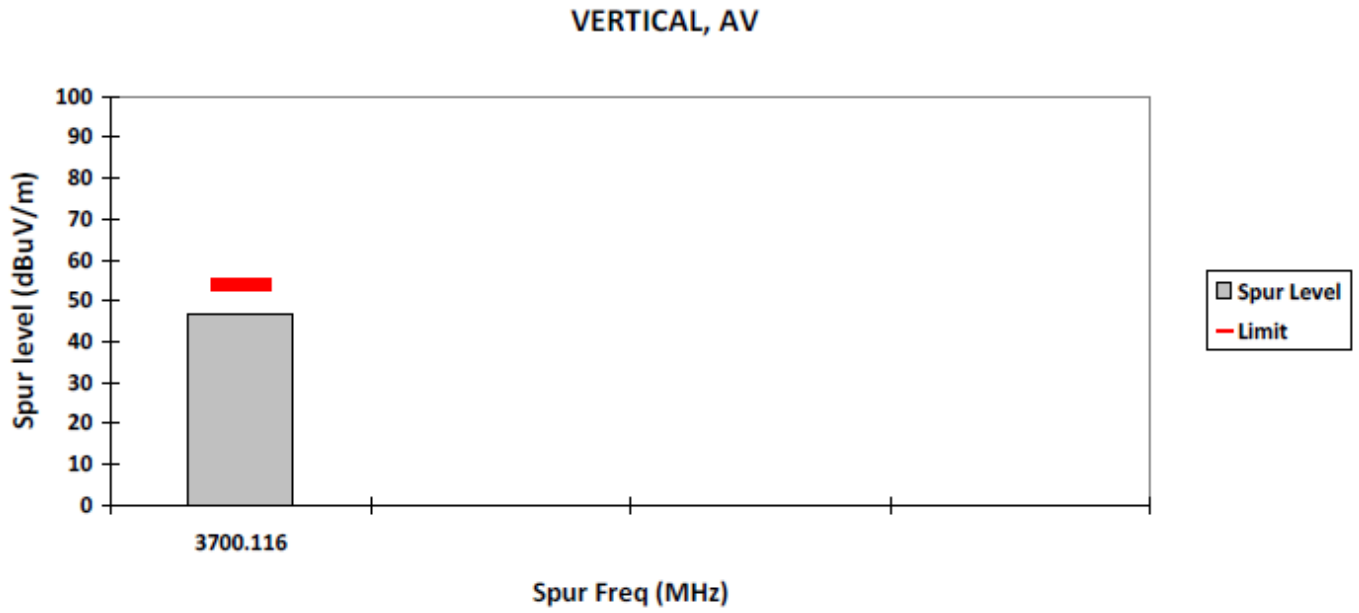
Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

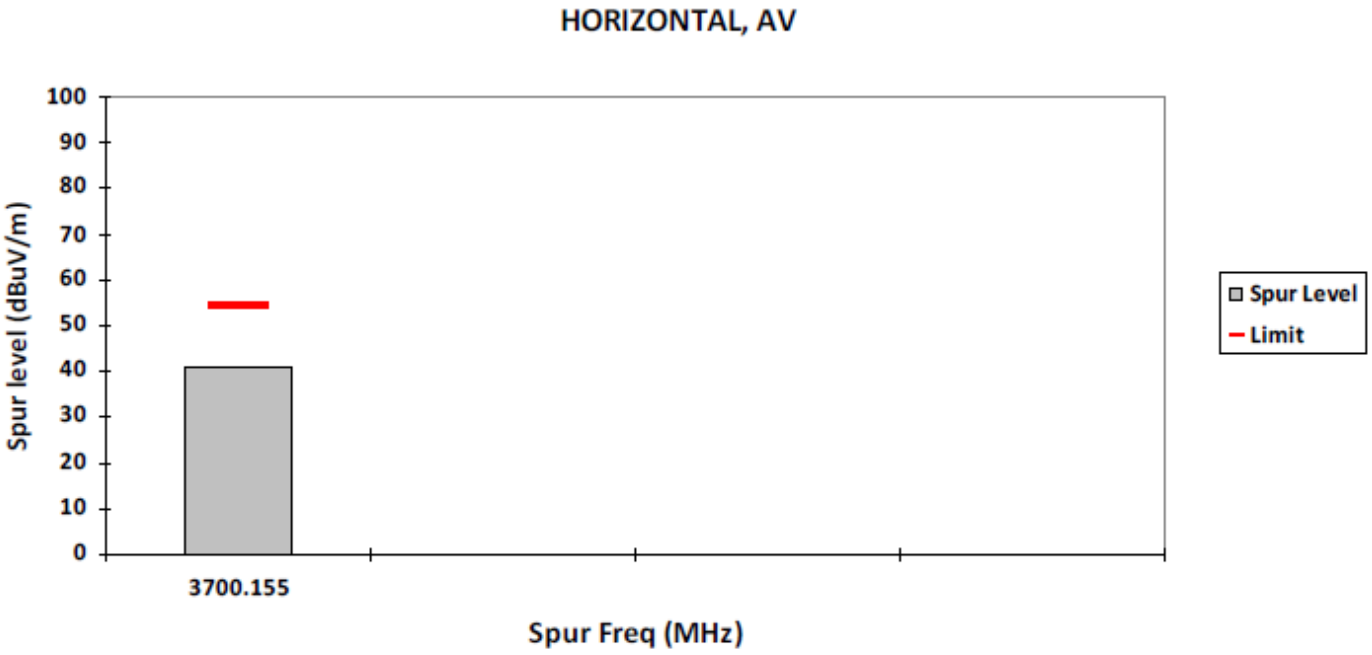

VERTICAL, QPK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
44.7173
53.2047
97.0302
124.4473
188.3045
217.4946
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, QPK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
45.3656
52.5114
97.0572
124.2275
189.1007
217.4437
Spur Freq (MHz)
Spur Level
Limit


VERTICAL, PK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3700.116
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, PK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3700.155
Spur Freq (MHz)
Spur Level
Limit


VERTICAL, AV
Spur level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3700.116
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, AV
Spur level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3700.155
Spur Freq (MHz)
Spur Level
Limit

Motorola Solutions. **FCC ID: AZ489FT4959, IC ID: 109U-89FT4959**

Test: SAC Receiver Radiated Emission

Model#: T47X **S/N: 16514VY559** **EMC SR ID#: 20002-EMC-00009**

Battery: 1532 **Accessory: 8372-PS000228A01-1, PMLN7679A-C1**

Test Mode: RX Analog **Test Frequency: 467.6375 MHz 12.5 kHz 0.500 Watt(s) /Max Power**

Test Standard: ANSI C63.4-2014

Radiated Emission tabular data

Vertical Radiated Emission Result										
Spur Freq (MHz)	Spur level QPK (dBµV/m)	Spur level PK (dBµV/m)	Spur level AV (dBµV/m)	Limit QPK (dBµV/m)	Limit PK (dBµV/m)	Limit AV (dBµV/m)	Margin QPK (dBµV/m)	Margin PK (dBµV/m)	Margin AV (dBµV/m)	Carrier PK Power (dBµV/m)
44.2791	17.2530 *	-	-	40.0000	-	-	22.7470	-	-	-
51.7335	21.0252	-	-	40.0000	-	-	18.9748	-	-	-
106.9479	16.5411 *	-	-	43.5000	-	-	26.9589	-	-	-
143.6479	9.3086 *	-	-	43.5000	-	-	34.1914	-	-	-
188.4507	15.9312 *	-	-	43.5000	-	-	27.5688	-	-	-
217.6975	13.7558 *	-	-	46.0000	-	-	32.2442	-	-	-
3536.3762	-	56.3285 *	32.6234 *	-	74.0000	54.0000	-	17.6715	21.3766	-
3739.8895	-	49.1532 *	38.7976	-	74.0000	54.0000	-	24.8468	15.2024	-
Horizontal Radiated Emission Result										
43.8805	11.8062 *	-	-	40.0000	-	-	28.1938	-	-	-
50.8264	9.9054 *	-	-	40.0000	-	-	30.0946	-	-	-
107.0758	10.1929 *	-	-	43.5000	-	-	33.3071	-	-	-
143.8297	13.7419 *	-	-	43.5000	-	-	29.7581	-	-	-
187.9462	9.9769 *	-	-	43.5000	-	-	33.5231	-	-	-
218.5756	15.1058 *	-	-	46.0000	-	-	30.8942	-	-	-
3536.3342	-	52.3463 *	32.5113 *	-	74.0000	54.0000	-	21.6537	21.4887	-
3740.0903	-	54.2200 *	45.7350	-	74.0000	54.0000	-	19.7800	8.2650	-

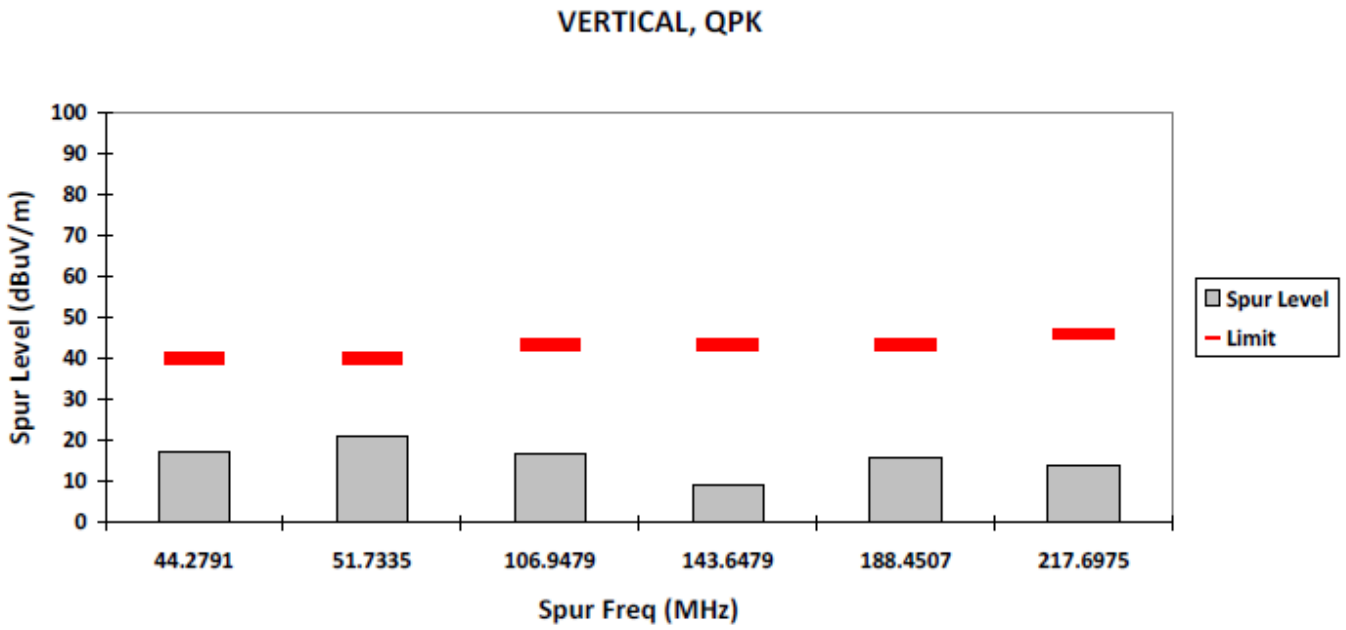
Remarks: Pass Result	Marginal Result	Fail Result

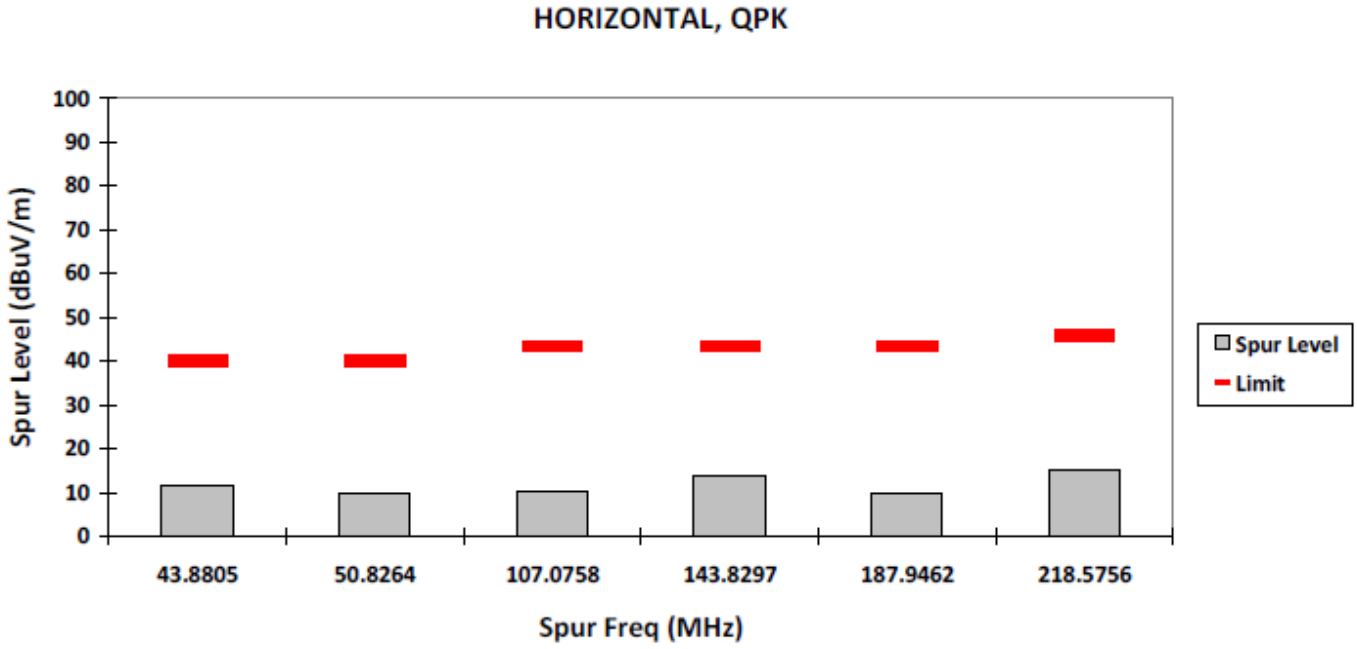
Temperature (degC): 23.8 **Humidity (%): 70.2**

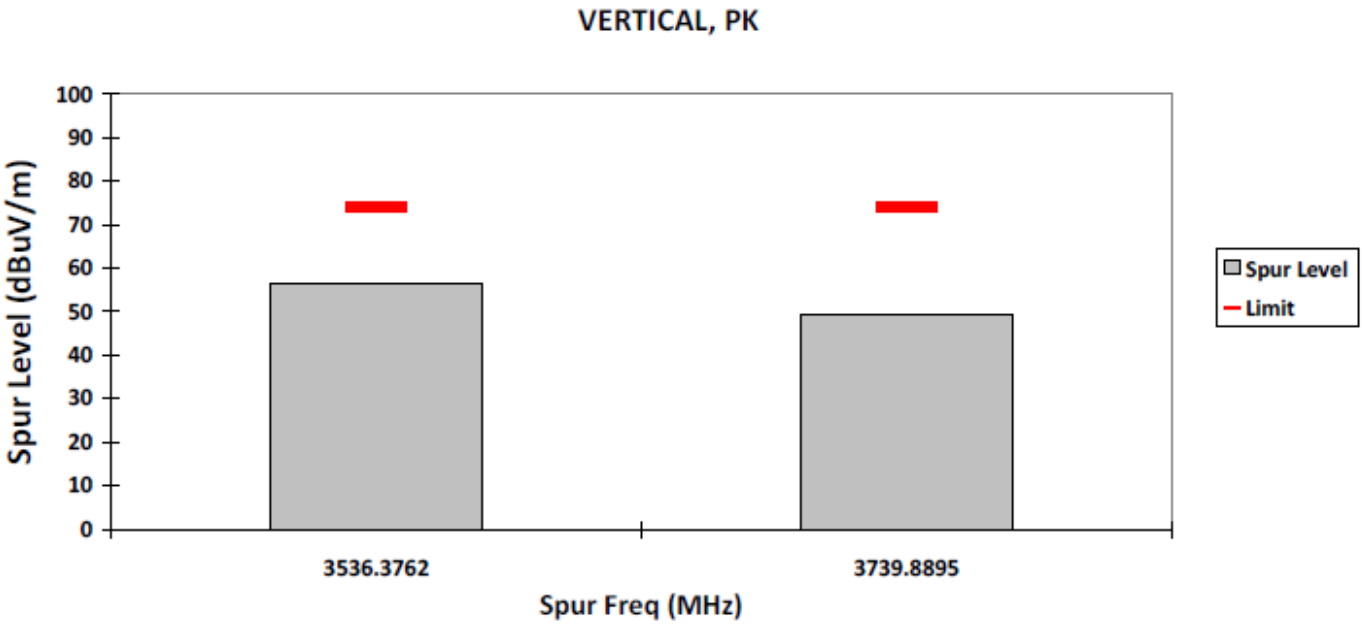
Test Performed by: Nazrin&Qawiman **Test Date: Tue, Jan 14, 2020**

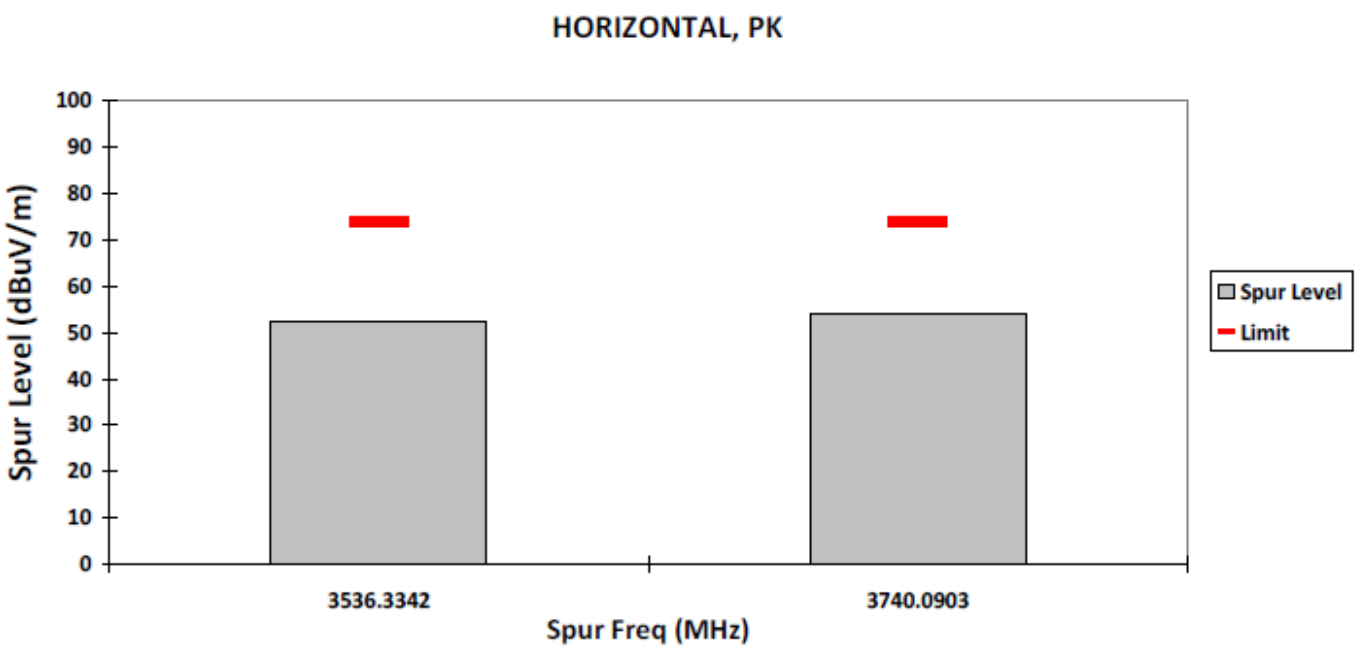
System MU: 4.25 dB (30-1000MHz), 4.94 dB (1000-18000MHz)

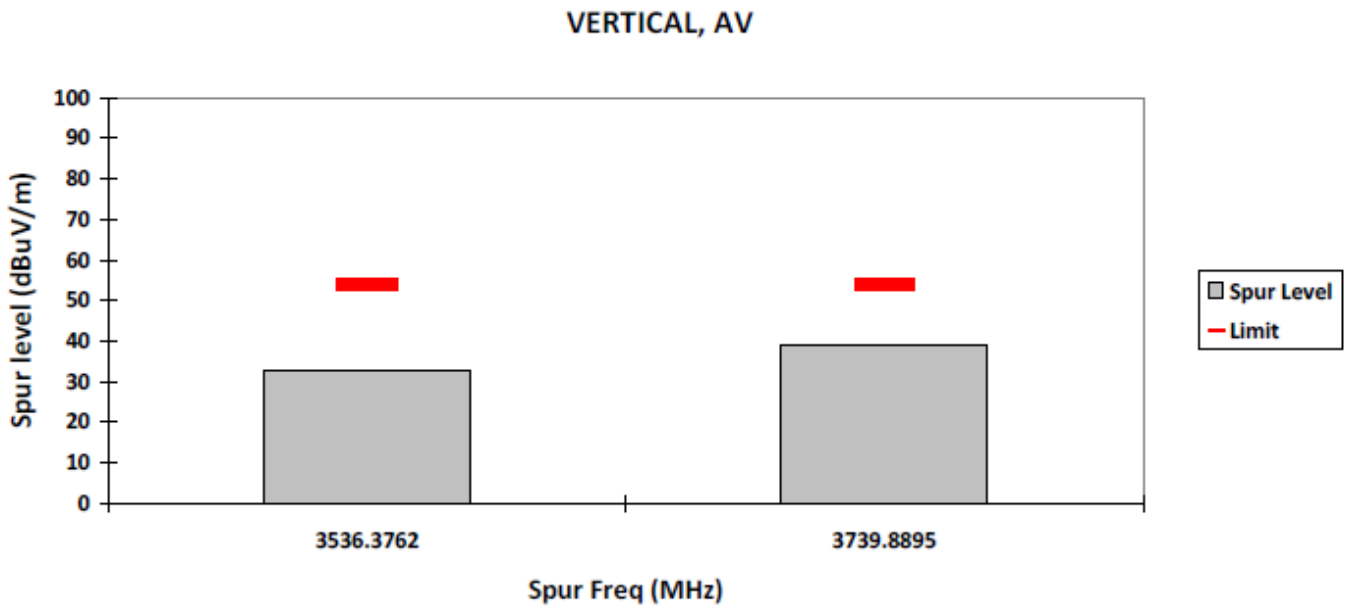
Remarks: ** Indicates the spurious emission could not be detected due to noise limitations or ambient.
***Pursuant to CFR 47 Part 2.1057 (c), emissions attenuated more than 20 dB below the permissible limit are not reported.**

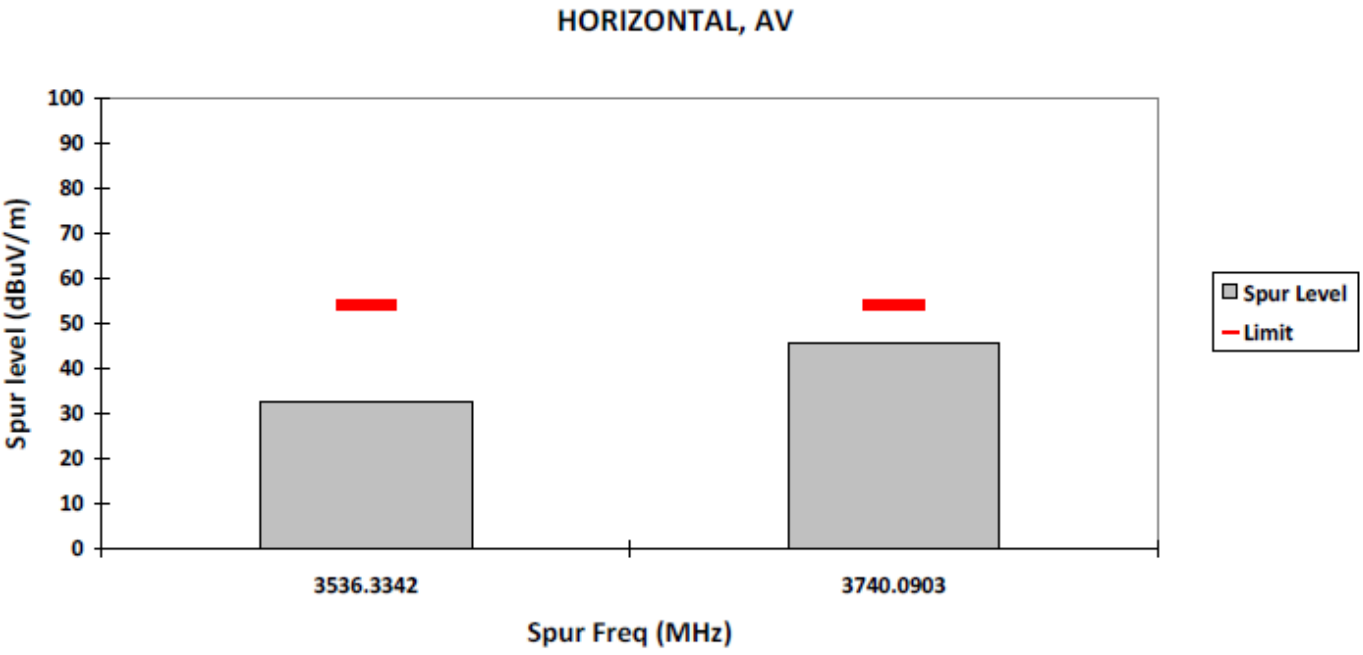

VERTICAL, QPK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
44.2791
51.7335
106.9479
143.6479
188.4507
217.6975
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, QPK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
43.8805
50.8264
107.0758
143.8297
187.9462
218.5756
Spur Freq (MHz)
Spur Level
Limit


VERTICAL, PK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3536.3762
3739.8895
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, PK
Spur Level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3536.3342
3740.0903
Spur Freq (MHz)
Spur Level
Limit


VERTICAL, AV
Spur level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3536.3762
3739.8895
Spur Freq (MHz)
Spur Level
Limit


HORIZONTAL, AV
Spur level (dBuV/m)
100
90
80
70
60
50
40
30
20
10
0
3536.3342
3740.0903
Spur Freq (MHz)
Spur Level
Limit

5.2.3. Test Limit

(a) Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

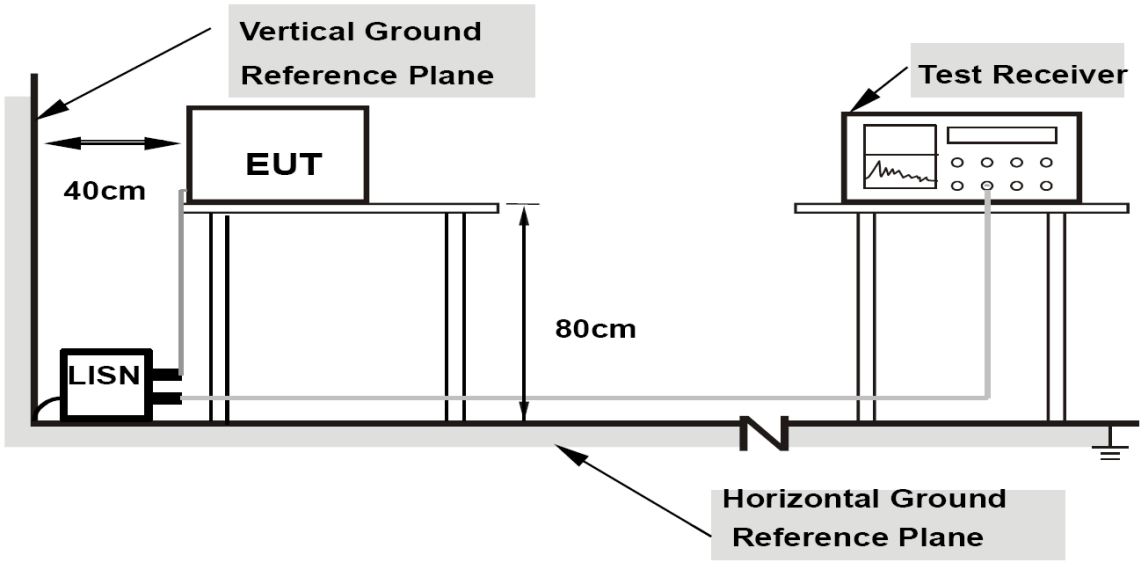
Frequency of emission (MHz)	Field strength (microvolts/meter)
30-88	100
88-216	150
216-960	200
Above 960	500

(b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength (microvolts/meter)
30-88	90
88-216	150
216-960	210
Above 960	300

5.3. AC Power Line Conducted Spur Emissions

5.3.1. Test Setup



1) Tests were conducted for both Receive and Transmit Mode of the EUT.
2) The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50uH of coupling impedance for the measuring instrument.
3) Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
4) The frequency range from 150 kHz to 30MHz was measured.

5.3.2. Test Result

Report ID.:	:	20002-EMC-00009
Ambient Temperature:	:	21.1 °C
Humidity:	:	69.9 %
Tester:	:	Iskandar/Dean
Date of test:	:	16 January 2020

EMI Auto Test Template: Voltage with 2-Line-LISN

Hardware Setup: Voltage with 2-Line-LISN
Measurement Type: 2 Line LISN
Frequency Range: 150 kHz - 30 MHz
Graphics Level Range: 0 dBµV - 90 dBµV

Preview Measurements:
Scan Test Template: Voltage with 2-Line-LISN pre

Data Reduction:
Limit Line #1: FCC Part 15 Class B Voltage on Mains QP
Limit Line #2: FCC Part 15 Class B Voltage on Mains AV
Peak Search: 6 dB , Maximum Results: 20
Subrange Maxima: 10 Subranges , Maxima per Subrange: 1
Acceptance Offset: -20 dB
Maximum Number of Results: 20

Maximization Measurements:
Template for Single Meas.: Voltage with 2-Line-LISN max

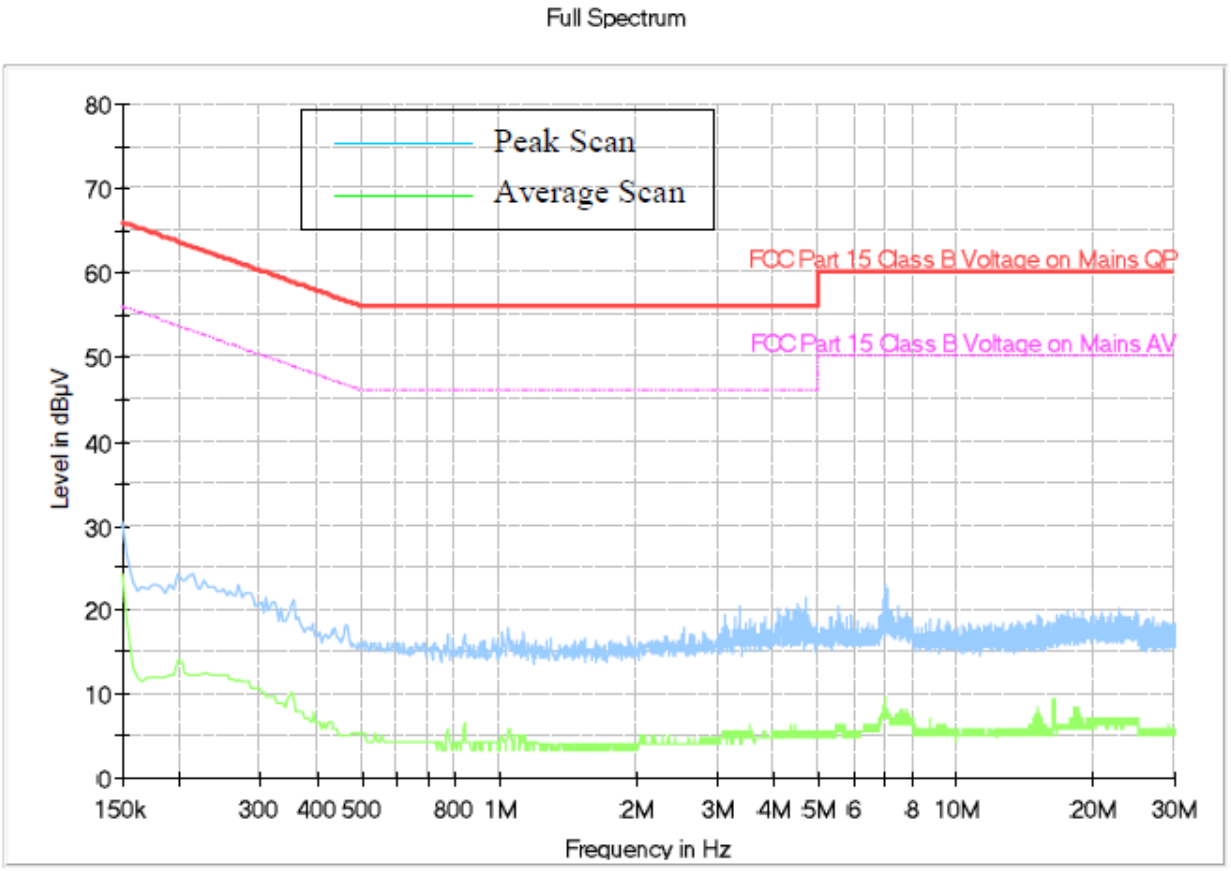
Final Measurements:
Template for Single Meas.: Voltage with 2-Line-LISN fin

Subrange	Step Size	Detectors	IF BW	Meas. Time	Preamp
150 kHz - 30 MHz	4.5 kHz	QPK; AVG	9 kHz	1 s	0 dB

Receiver: [ESIB 26]

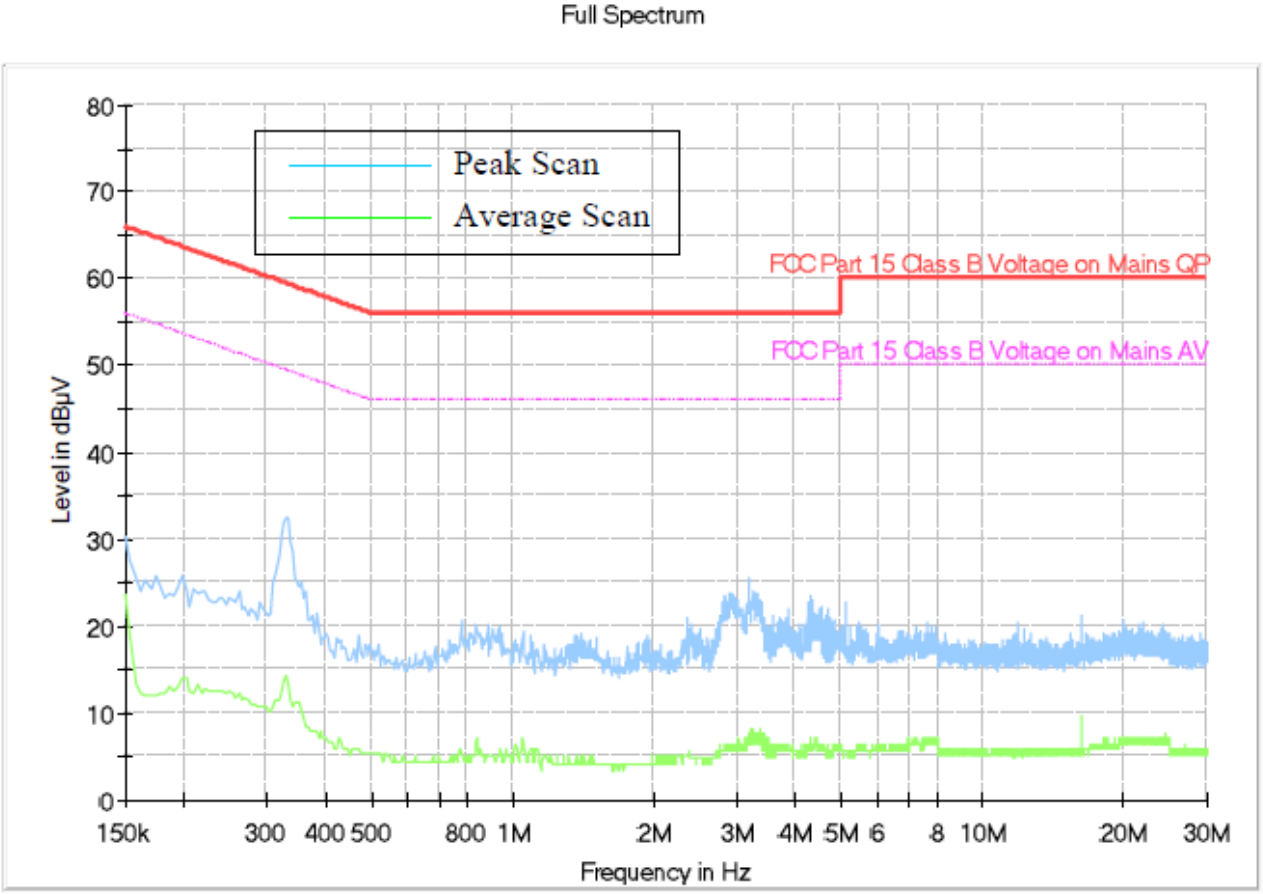
Test Data

1) Ambient Noise

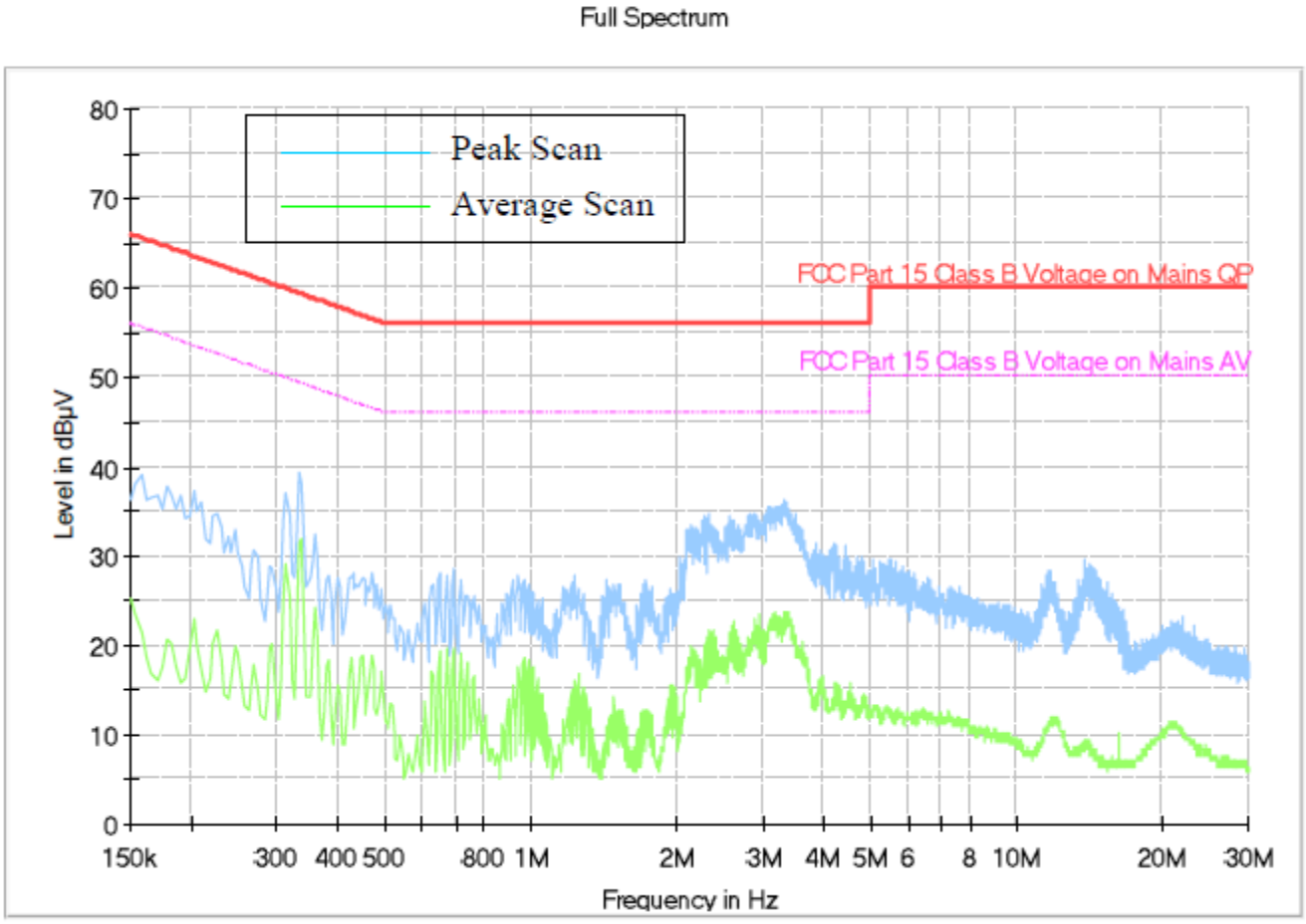


120 VAC/60 Hz

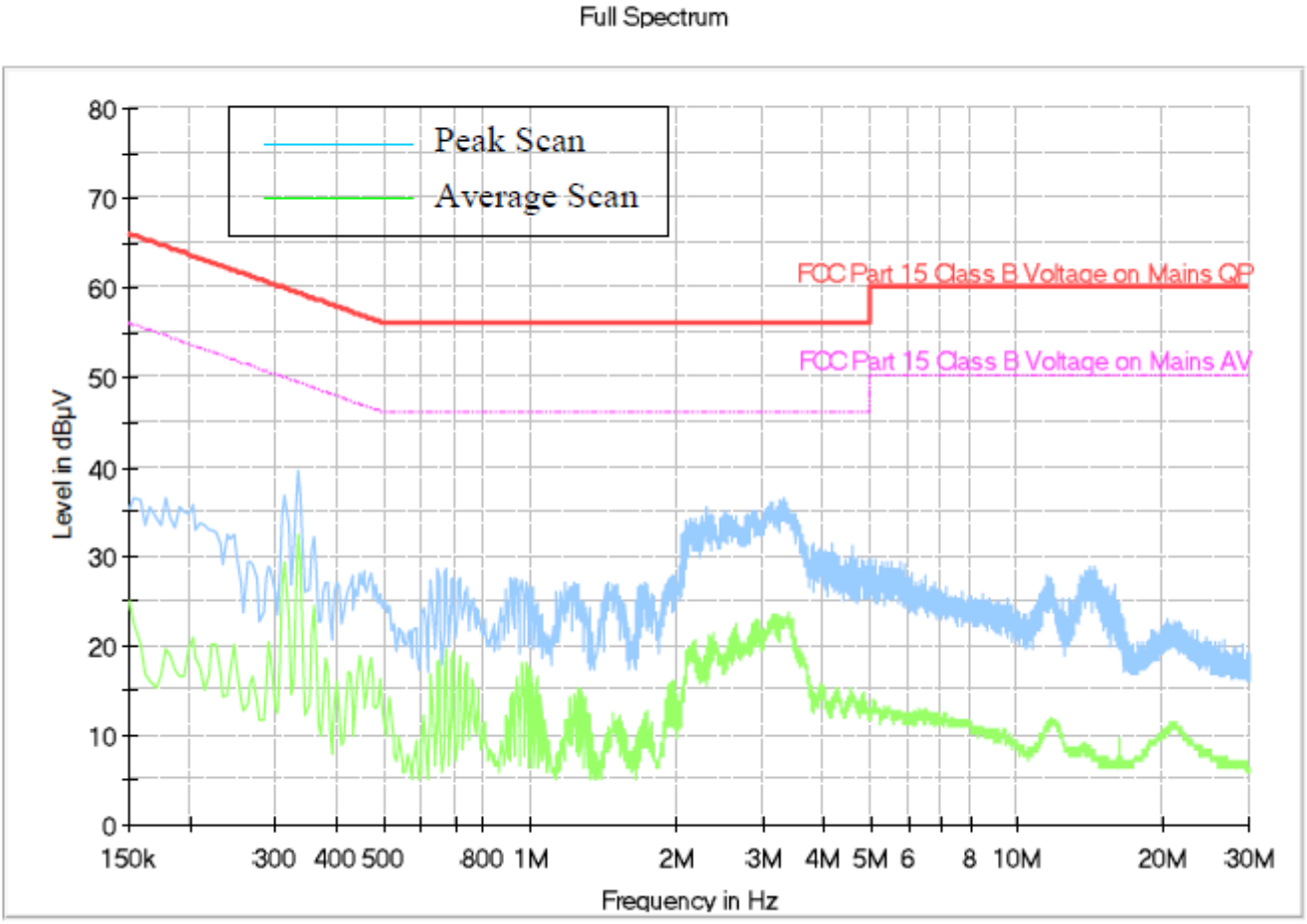
1) Charger Alone



2) Charger with Radio off



3) Charger with Radio Standby Mode



5.3.3. Test Limits

For AC Power Line Conducted Test Limit can be Class A or B depends on product classification.

Limits for conducted disturbance at the mains ports of class A ITE

Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	79	66
0,50 to 30	73	60
NOTE The lower limit shall apply at the transition frequency.		

Limits for conducted disturbance at the mains ports of class B ITE

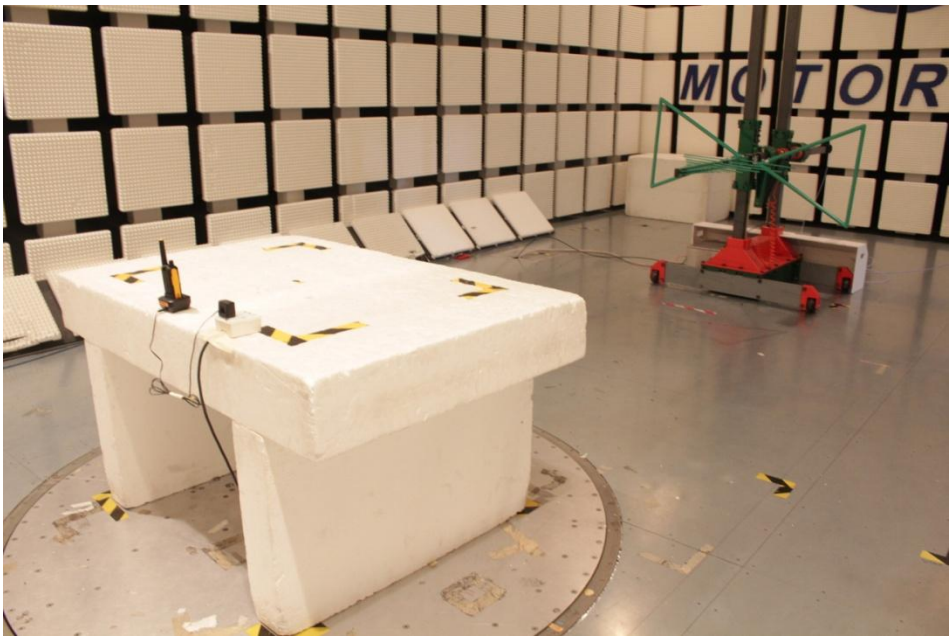
Frequency range MHz	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies. NOTE 2 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

6.0. Appendix: Test Setup Photo

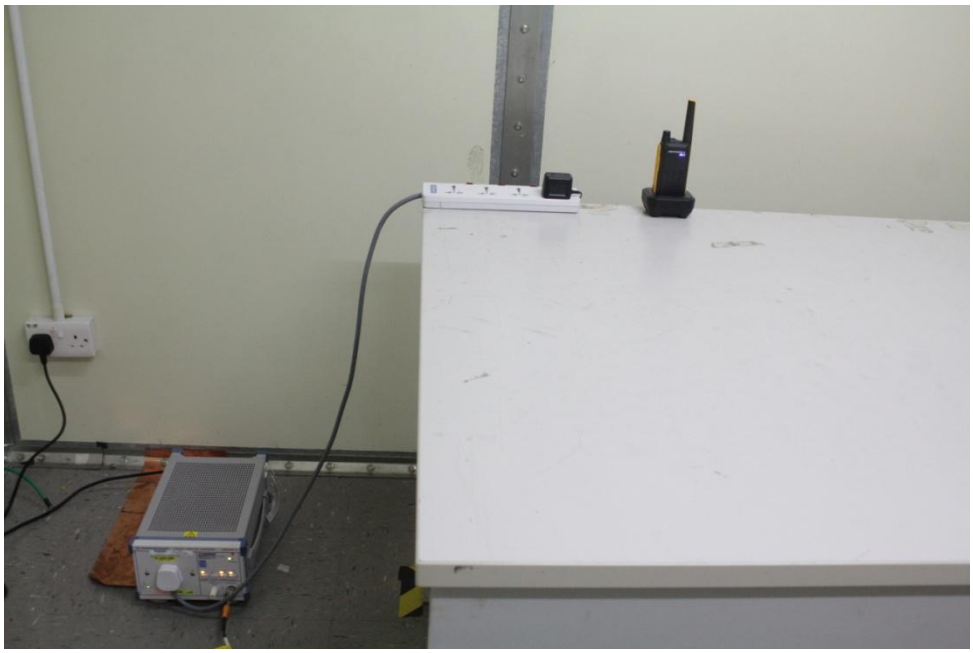
6.1. Conducted Spur Emission ATE Station Setup

NA

6.2. Radiated Spur Emission Station Setup



6.3. AC Power Line Conducted Emission Station Setup



6.4. Photographs – EUT

Radio + Battery + Charger + Power Supply

~ End of Test Report ~