
 <p>CERTIFICATE 2518.08</p> <p>MS ISO/IEC 17025 TESTING SAMM NO. 0825</p>																																		
<p><b>MOTOROLA PENANG ADV. COMM. LABORATORY</b> Motorola Solutions Malaysia Sdn. Bhd. Plot 2A Medan Bayan Lepas, Mukim 12, S.W.D. 11900 Bayan Lepas, Penang, Malaysia.</p>	<p><b>FCC / ISED TEST REPORT</b> <b>Report Revision : Rev.A</b></p>																																		
<table><tr><td><b>Date/s Tested</b></td><td>: 12-November-2020 to 13-November-2020</td></tr><tr><td><b>Report Issue Date</b></td><td>: 24-November-2020</td></tr><tr><td><b>Manufacturer/Location</b></td><td>: Motorola Solution Malaysia Sdn Bhd</td></tr><tr><td><b>Requestor</b></td><td>: SIEW KHENG TAN</td></tr><tr><td><b>Product Type (PMN)</b></td><td>: Portable</td></tr><tr><td><b>Model Number (HVIN)</b></td><td>: AAH90ZDU9RH1AN (PMUE5674A)</td></tr><tr><td><b>Frequency Band</b></td><td>: 2.412 - 2.462 GHz</td></tr><tr><td><b>Rated / Max RF Output Power</b></td><td>: 802.11b - 35.48 mWatts 802.11g - 35.48 mWatts 802.11n_20MHz BW - 35.48 mWatts 802.11n_40MHz BW - 35.48 mWatts</td></tr><tr><td><b>Applicant Name</b></td><td>: Motorola Solutions Inc</td></tr><tr><td><b>Applicant Address</b></td><td>: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322.</td></tr><tr><td><b>FCC Registrations</b></td><td>: 461337</td></tr><tr><td><b>IC Registrations</b></td><td>: MY0001</td></tr><tr><td><b>Firmware Version (FVIN)</b></td><td>: D02.20.03.0081 (BP), D00.60.44 (AP)</td></tr></table> <p><b>The equipment was tested accordance to the requirement listed below:</b></p> <table><tr><td>(2.4GHz Wifi)</td><td><b>PASS</b></td></tr><tr><td>47CFR Part 15C</td><td></td></tr><tr><td>ISED RSS 247 Issue 2</td><td></td></tr><tr><td>February 2017</td><td></td></tr></table>		<b>Date/s Tested</b>	: 12-November-2020 to 13-November-2020	<b>Report Issue Date</b>	: 24-November-2020	<b>Manufacturer/Location</b>	: Motorola Solution Malaysia Sdn Bhd	<b>Requestor</b>	: SIEW KHENG TAN	<b>Product Type (PMN)</b>	: Portable	<b>Model Number (HVIN)</b>	: AAH90ZDU9RH1AN (PMUE5674A)	<b>Frequency Band</b>	: 2.412 - 2.462 GHz	<b>Rated / Max RF Output Power</b>	: 802.11b - 35.48 mWatts 802.11g - 35.48 mWatts 802.11n_20MHz BW - 35.48 mWatts 802.11n_40MHz BW - 35.48 mWatts	<b>Applicant Name</b>	: Motorola Solutions Inc	<b>Applicant Address</b>	: 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322.	<b>FCC Registrations</b>	: 461337	<b>IC Registrations</b>	: MY0001	<b>Firmware Version (FVIN)</b>	: D02.20.03.0081 (BP), D00.60.44 (AP)	(2.4GHz Wifi)	<b>PASS</b>	47CFR Part 15C		ISED RSS 247 Issue 2		February 2017	
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<p>Prepared By:</p>  <hr/> <p><b>Azil Ezzaddin Khalil</b> Test Personnel</p>	<p>Approved Signatory:</p> <hr/> <p><b>Ho Sze Khian</b> Responsible Engineer</p>																																		

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### REVISION HISTORY

Revision History	Description	Date	Originator
Rev. A	Initial Report	24-Nov-2020	Azil Ezzaddin Khalil

## 1.0. General Information

### EUT Description:

<b>Technologies</b>	2.4GHz WIFI
<b>TX Frequency range</b>	2412MHz – 2462MHz
<b>Modulation Type</b>	DSSS, OFDM
<b>Input/Output</b>	RF port
<b>Connector type</b>	PROGRAMMING, TEST & ALIGNMENT CABLE
<b>Antenna type</b>	INTERNAL BT/WLAN ANTENNA (RADIO ONLY)

The EUT contains following accessory devices and data cable:

<b>Item</b>	<b>Brand</b>	<b>Model or P/N</b>
BATTERY PACK,BATTERY PACK,IMPRES GEN2, LIION,IP68, 2900T, TIA4950	MOTOROLA	PMNN4804A
UHF SLIM WHIP ANTENNA (400-527MHZ) 400 - 527MHZ	MOTOROLA	PMAE4079A

Channel number and frequency information:

There are two bandwidth systems.

For 20MHz Bandwidth systems (802.11b, 802.11g, 802.11n), use channel 1 ~ channel 11

For 40MHz Bandwidth systems (802.11n), use channel 3 ~ channel 9

Channel	Frequency	Channel	Frequency
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

### 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:

FCC 47 CFR Part 15 Subpart C  
KDB 558074 D01 15.247 Meas Guidance v05  
ANSI C63.10-2013

### Deviation from standard

Not applicable as no deviation from standard test method

### Modifications to EUT

For RF conducted measurements a pigtail was soldered out of the board while for radiated measurements there were no modifications to the device

## 2.0. Summary of Test Results

FCC Clause	ISED Clause	Test Item	Result	Remark	Serial number tested	Tested by
15.205, 15.209, 15.247 (d)	RSS-247 5.5	Radiated Emission within Restricted Bands	Pass	Test on channel with lowest margin from limit (device alone - SR18058-EMC-00039)	734TWV0114	Nazrin & Fendi
15.207	RSS-Gen 8.8	AC Powerline Conducted Emission	NA	Testing is not required, radio shall turn off during charging mode	Not Applicable	Not Applicable
15.203	-	Antenna Requirement	NA	Internal antenna is not accessible to the end-user	Not Applicable	Not Applicable

NA → Not Available

## 3.0. Measurement Uncertainty

Measurement	Frequency	Expended Uncertainty (k=1.96) (±dB)
AC Power Line Conducted Spurious Emission	150KHz ~ 30MHz	3.43
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	5.01
	200MHz ~ 1000MHz	5.01
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.01
	18GHz ~ 25GHz	5.01
Conducted Spurious Emissions	9kHz ~ 12.75GHz	2.82

#### 4.0. Equipment List

##### Radiated Emission Station (SW Version: EMC FCC RE v1.6.0)

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	2615A01178	21-May-20	21-May-21
SIGNAL GENERATOR	SMB 100A	181117	8-Nov-18	8-Nov-21
EMI TEST RECEIVER	ESW44	101731	3-Dec-19	3-Dec-20
EMI TEST RECEIVER	ESIB26	100017	19-Jul-19	19-Nov-20
5m SEMI-ANECHOIC CHAMBER	S800-HX	J2308	No Cal. Req'd	No Cal. Req'd
BILOG ANTENNA	CBL6112B	2964	23-Apr-19	23-Apr-21
BILOG ANTENNA	CBL6112B	2950	8-Jul-19	8-Jul-21
DATA LOGGER	SDL500	A.016776	4-Jun-20	4-Jun-21
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	BBHA9170255	27-Jan-20	27-Jan-21
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-22
LOOP ANTENNA	6502	00203479	21-Jan-20	21-Jan-21
Test Software	EMC_FCC_IC_BLUETOOTH_RE_TEST			
Version	EMC_FCC_RE_v1.6.2			

## 5.0. Test Mode Applicability and Test Channel Detail

The device employs MIMO technology. Below are the possible configurations.

WLAN Configurations		Mode					
		SISO		Spatial Diversity Multiplexing (MIMO)		Cyclic Delay Diversity (MIMO)	
	Antenna	Primary	Secondary	Primary	Secondary	Primary	Secondary
2.4GHz	802.11b	√	x	x	x	x	x
	802.11g	√	x	x	x	x	x
	802.11n (HT20)	√	x	x	x	x	x
	802.11n (HT40)	√	x	x	x	x	x

√ = **Support;**  
 x = **NOT Support**

**Note:** This Device supports simultaneous transmission operation, which allows for two SISO or two MIMO channels to operate independent of one another in the 2.4GHz band on each antenna. 802.11n mode is capable of transmitting simultaneously on two antennas using Cyclic Delay Diversity and Spatial Diversity Multiplexing (2x2 MIMO).

The following tables show the worst case configurations determined during testing. The data for these configurations is contained in this test report.

**Radiated Emission Test (Above 1GHz)**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Date Rate (Mbps)	Mode	Environmental Conditions
Test Mode	802.11n (HT40)	3 to 9	9	OFDM	BPSK	13.5	SISO CDD (MIMO)	23.9°C, 69.8%RH

**Radiated Emission Test (Below 1GHz)**

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Modulation	Available Channel	Tested Channel	Modulation Technology	Data Modulation Type	Date Rate (Mbps)	Mode	Environmental Conditions
Test Mode	802.11n (HT40)	3 to 9	9	OFDM	BPSK	13.5	SISO CDD (MIMO)	23.9°C, 69.8%RH

### **Power Line Conducted Emission Test**

☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☐ Following channel(s) was (were) selected for the final test as listed below.

<b>EUT Configure Mode</b>	<b>Modulation</b>	<b>Available Channel</b>	<b>Tested Channel</b>	<b>Modulation Technology</b>	<b>Data Modulation Type</b>	<b>Date Rate (Mbps)</b>	<b>Environmental Conditions</b>
<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

### **Antenna Port Conducted Measurement:**

☐ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☐ Following channel(s) was (were) selected for the final test as listed below.

<b>EUT Configure Mode</b>	<b>Modulation</b>	<b>Available Channel</b>	<b>Tested Channel</b>	<b>Modulation Technology</b>	<b>Data Modulation Type</b>	<b>Date Rate (Mbps)</b>	<b>Environmental Conditions</b>
<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

### **Duty Cycle of Test Signal**

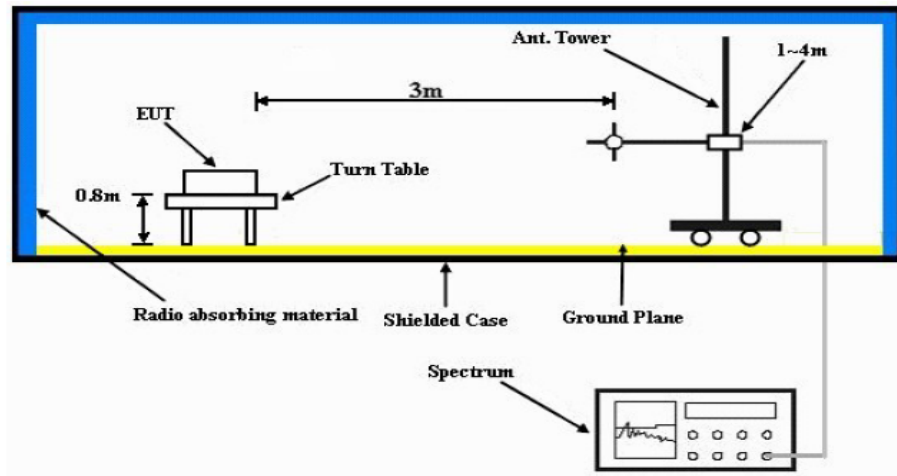
**802.11b, 802.11g and 802.11n : Duty cycle of test signal is  $\geq 98\%$ . (Refer to Clause 6.3 for duty cycle test signal)**



## 6.0. Transmitter Test Parameters

### 6.1. Radiated Emission within restricted Bands

#### 6.1.1. Test Setup



- The EUT is placed on the top of a rotating table 0.8m above the ground at a 3m semi-anechoic chamber. The table is rotated 360 degrees to determine the position of the highest radiation.
- The EUT is set 3m away from the interference-receiving antenna, which is mounted on the top of a variable-height antenna tower.
- The antenna is Bilog/Horn antenna depend on which frequency range uses, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT is arranged to its worst case and then the antenna is tuned to heights from 1m to 4m and the rotatable table is turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system is set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode is fall within the range of 10dB from the limit specified, the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. Otherwise, the testing could be stopped and the peak values of the EUT would be reported.

#### NOTE:

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1 GHz.
- All modes of operation were investigated and the worst-case emissions are reported.

### 6.1.2. Test Limits:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**NOTE:**

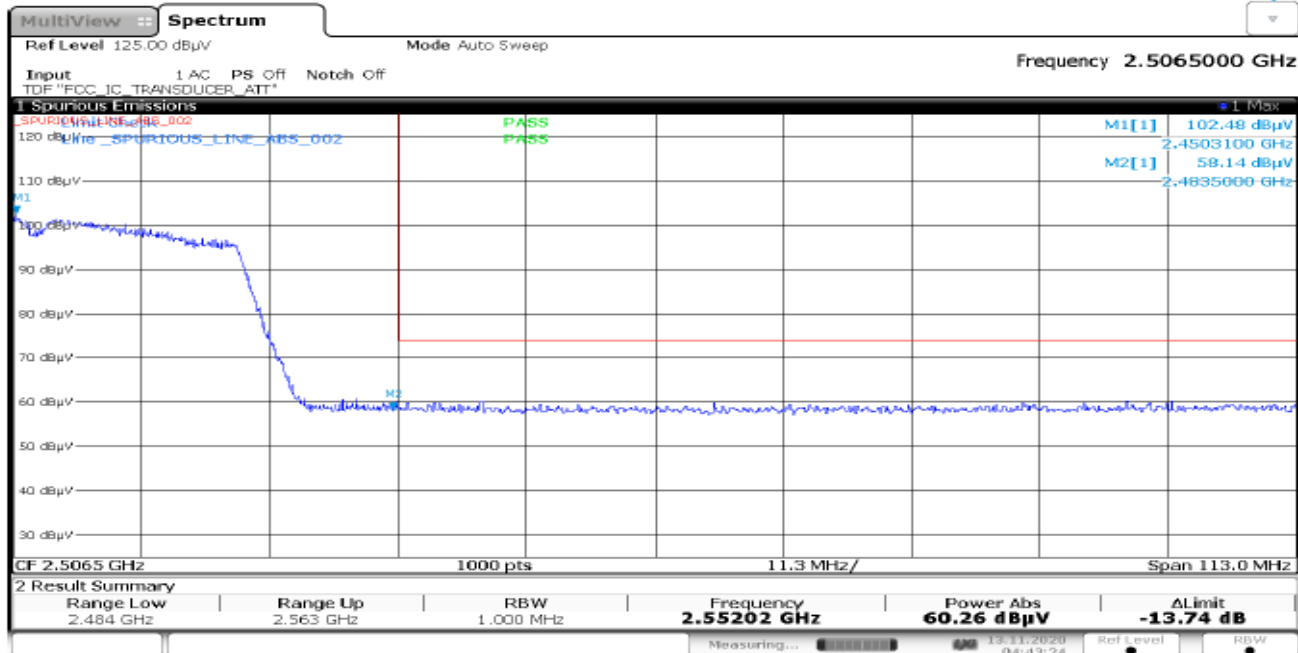
- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



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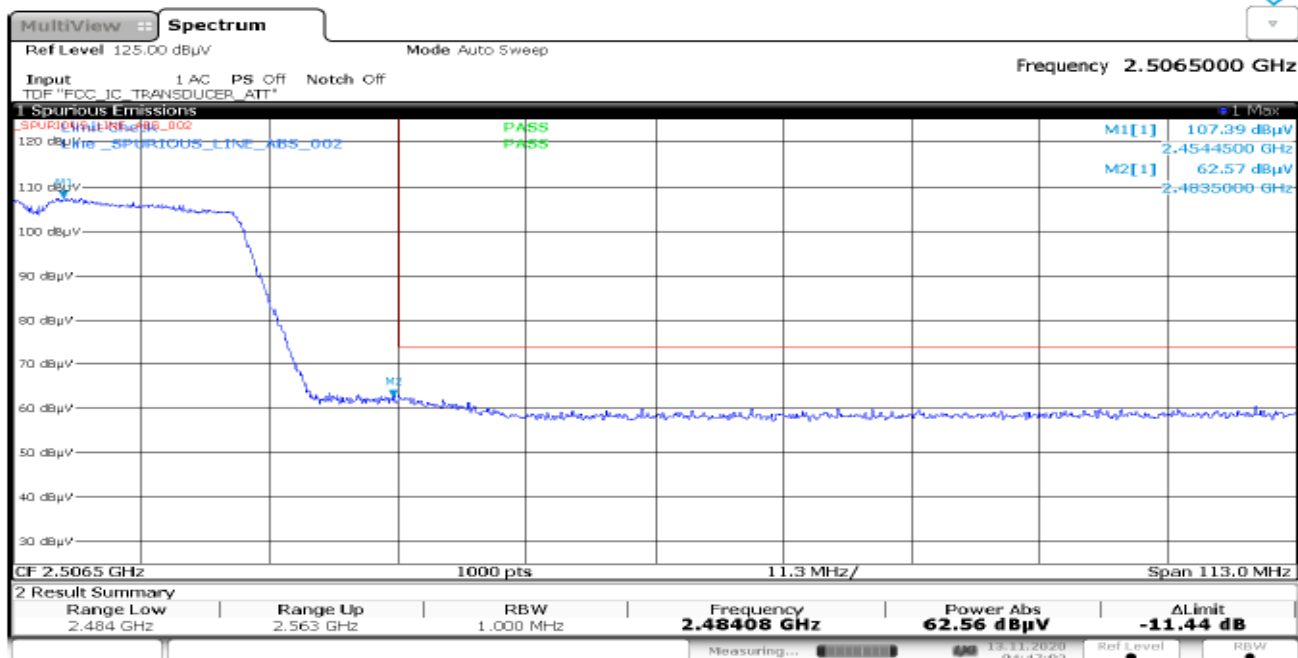
FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

### Restricted Band Edge (High Channel, Vertical, Peak) graphical screen shot



04:43:24 13.11.2020

### Restricted Band Edge (High Channel, Horizontal, Peak) graphical screen shot

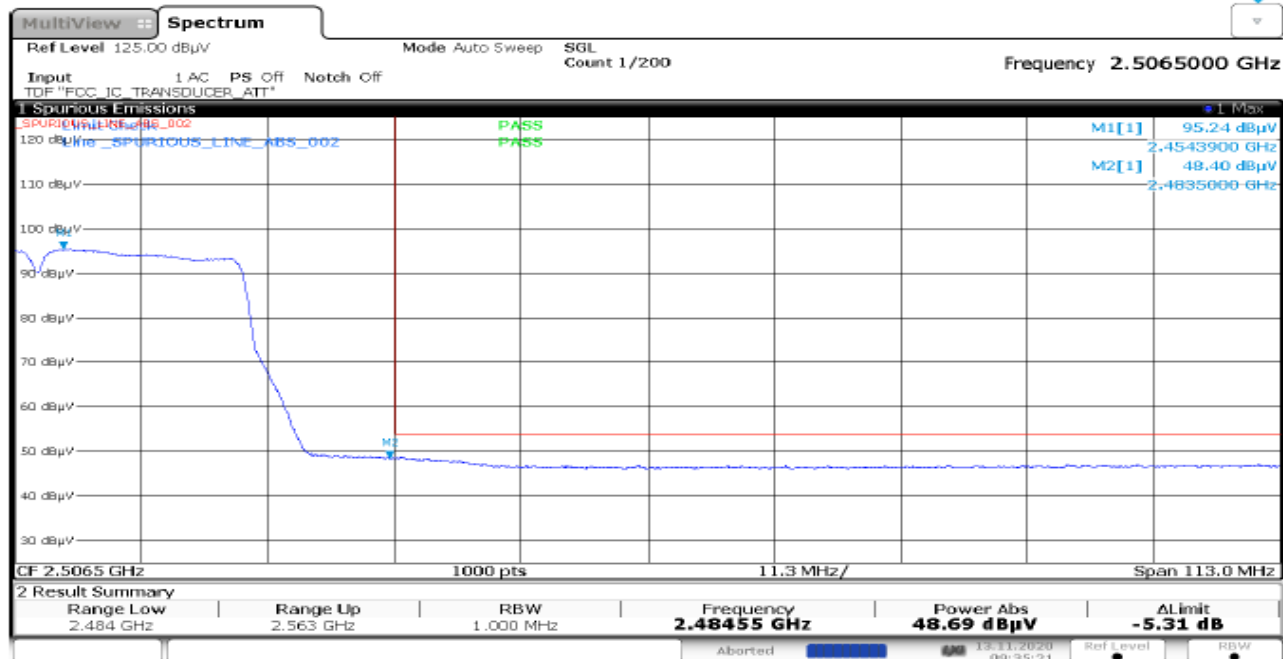


04:47:02 13.11.2020

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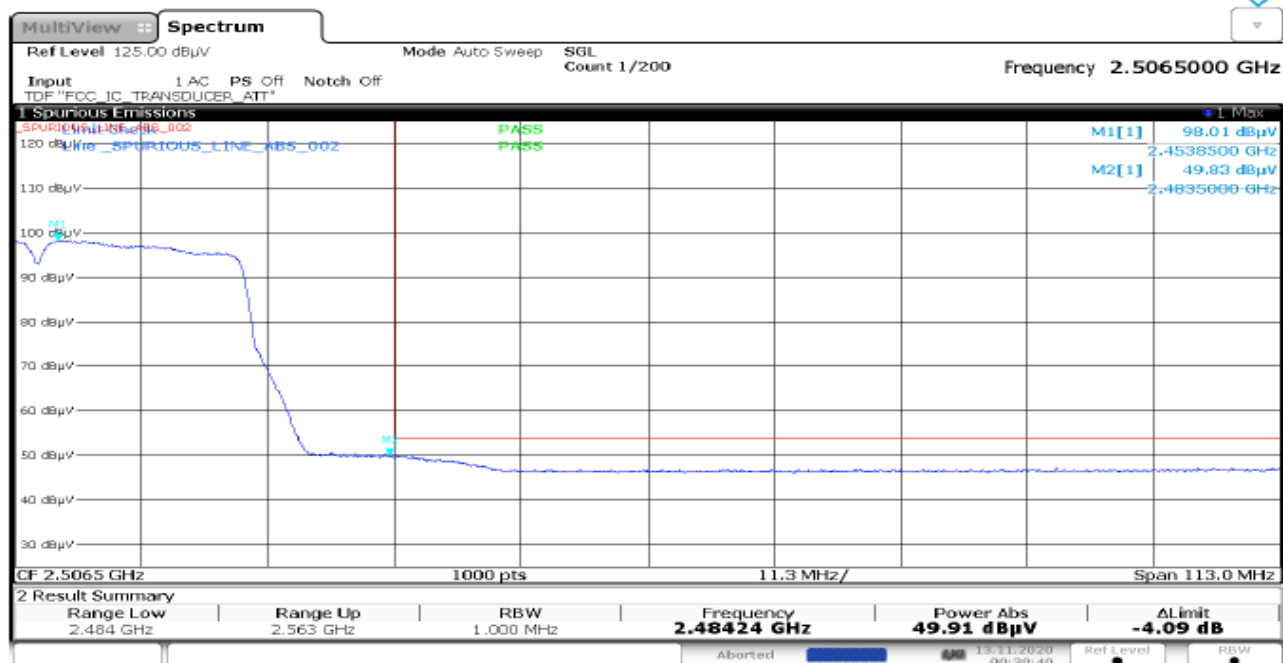
FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

### Restricted Band Edge (High Channel, Vertical, Average) graphical screen shot



09:35:22 13.11.2020

### Restricted Band Edge (High Channel, Horizontal, Average) graphical screen shot



09:39:49 13.11.2020

FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

Model#: AAH90ZDU9RH1AN S/N: 734TWV0114 EMC SR ID#: 18058-EMC-00097  
Battery: PMNN4804A Accessory: PMAE4079A  
Test Channel: High Test Frequency: 2452.0000 MHz Test Standard: ANSI C63.10-2013  
Worst Case Plane: Z-Plane (802.11n 40MHz)

[illegible]

Remarks: Pass Result	Marginal Result	Fail Result
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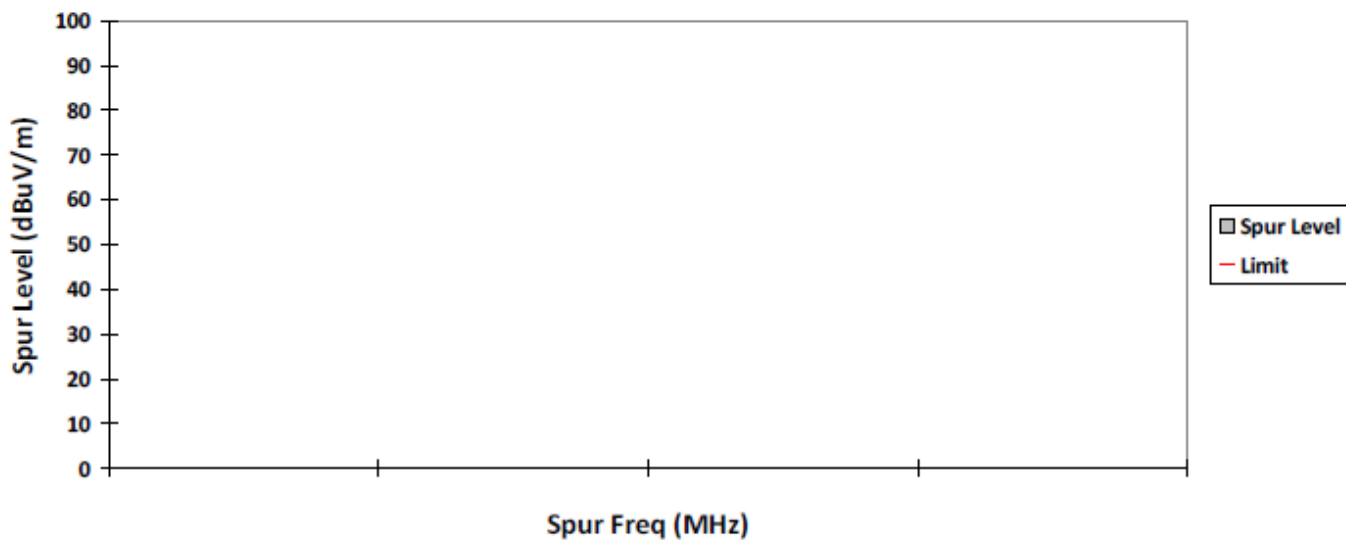
Humidity (%): 69.8  
Test Date: Thu, 12 Nov, 2020

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.

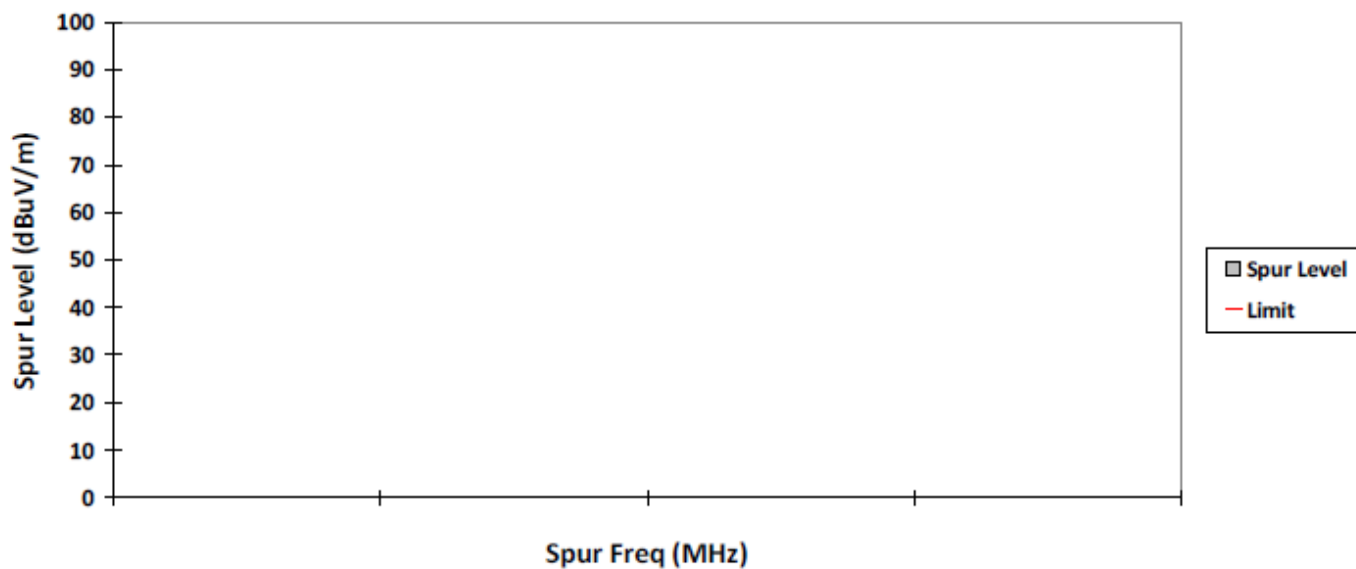
Motorola Solutions.

FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

### VERTICAL, QPK



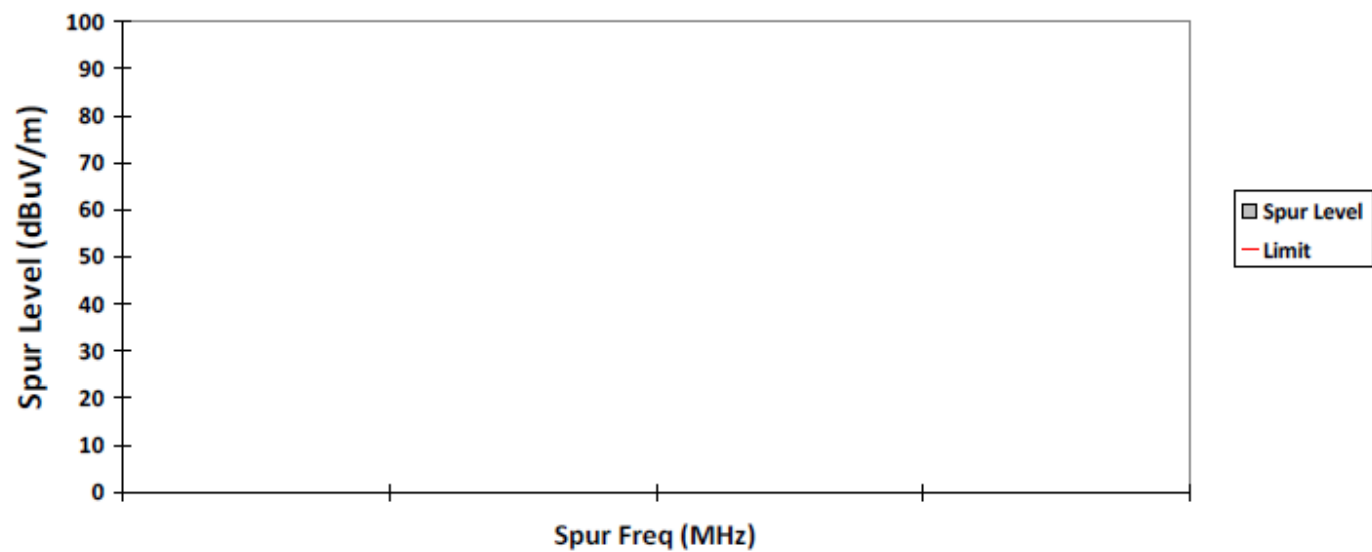
### HORIZONTAL, QPK



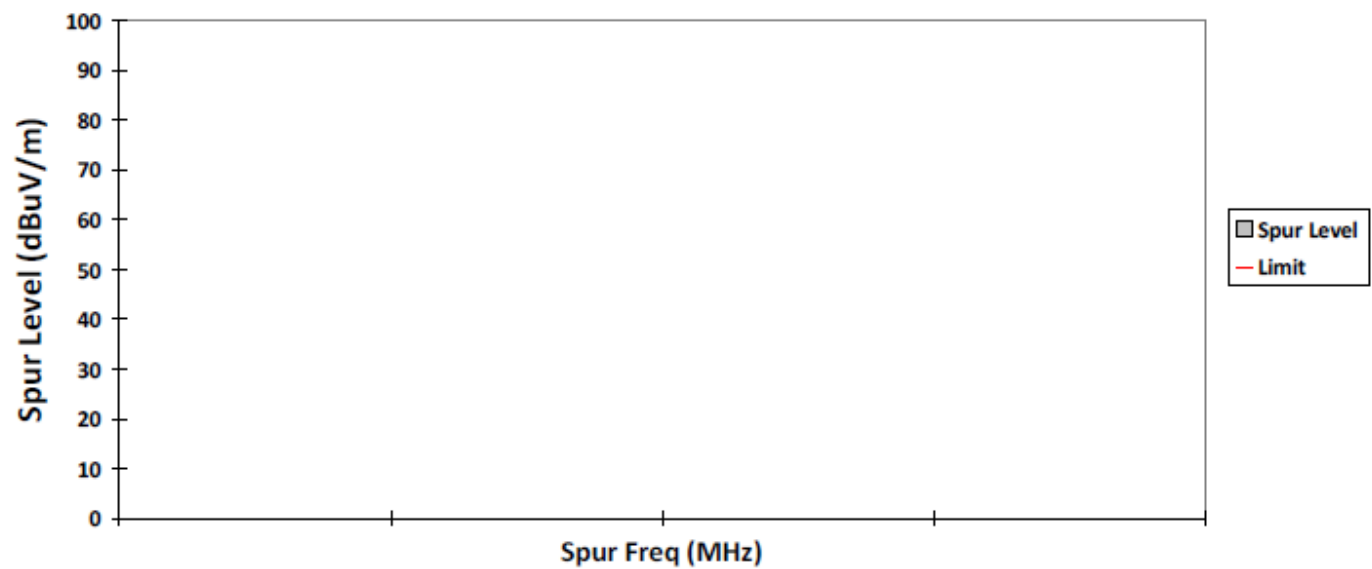
Motorola Solutions.

FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

VERTICAL, PK



HORIZONTAL, PK

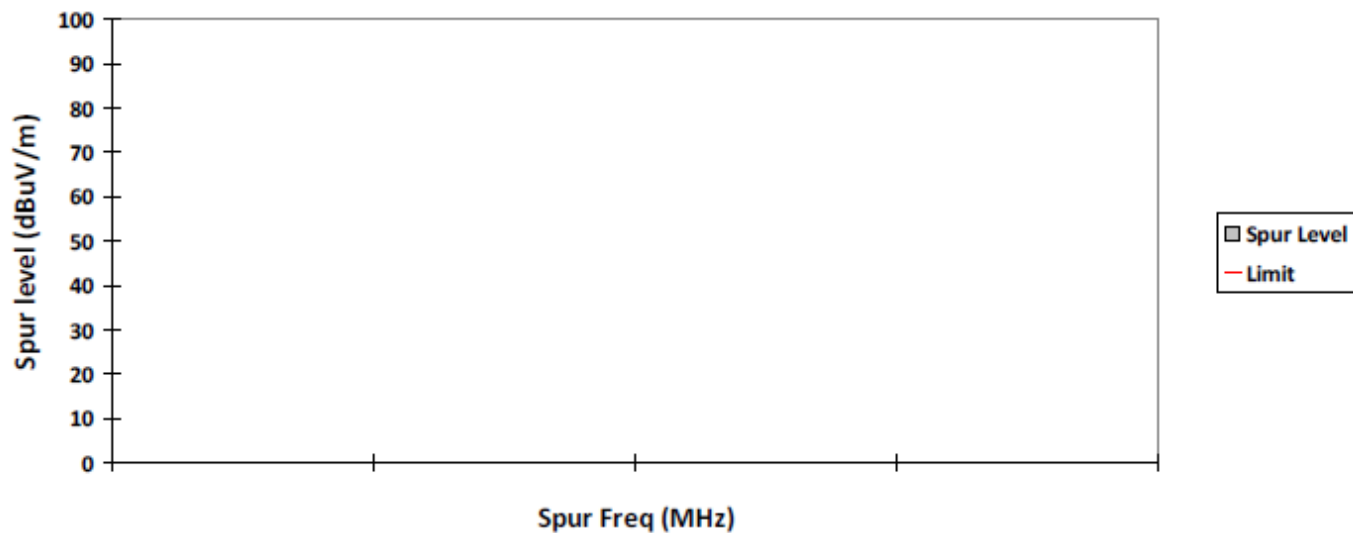




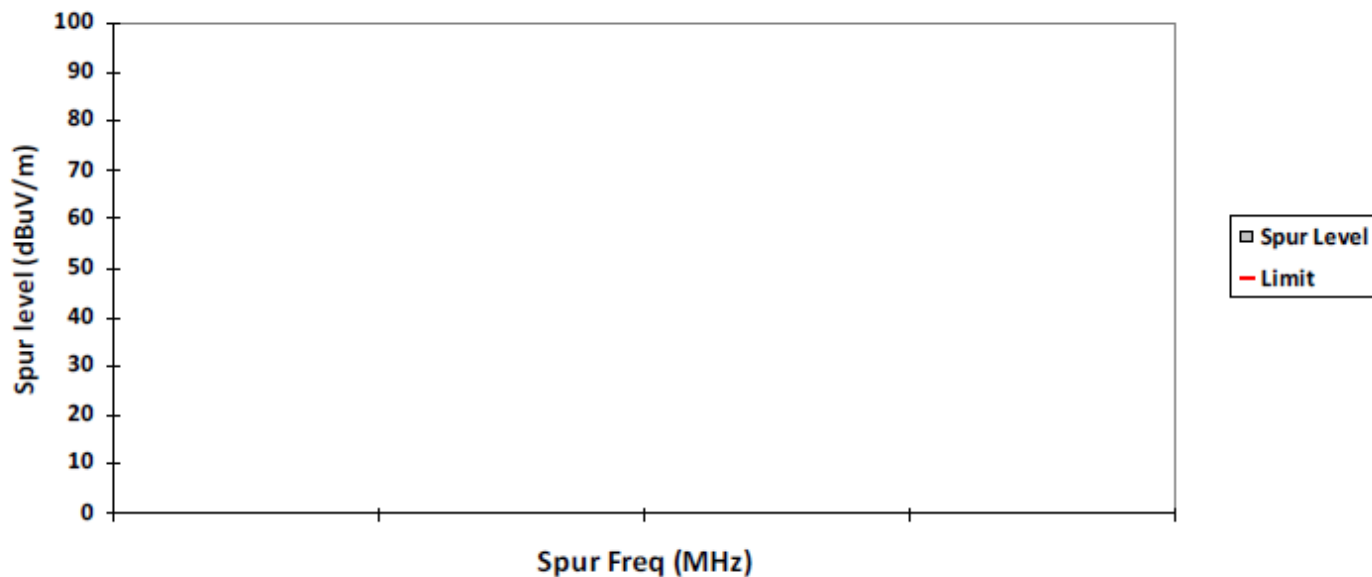
Motorola Solutions.

FCC ID: AZ489FT7133, IC ID: 109U-89FT7133

### VERTICAL, AV

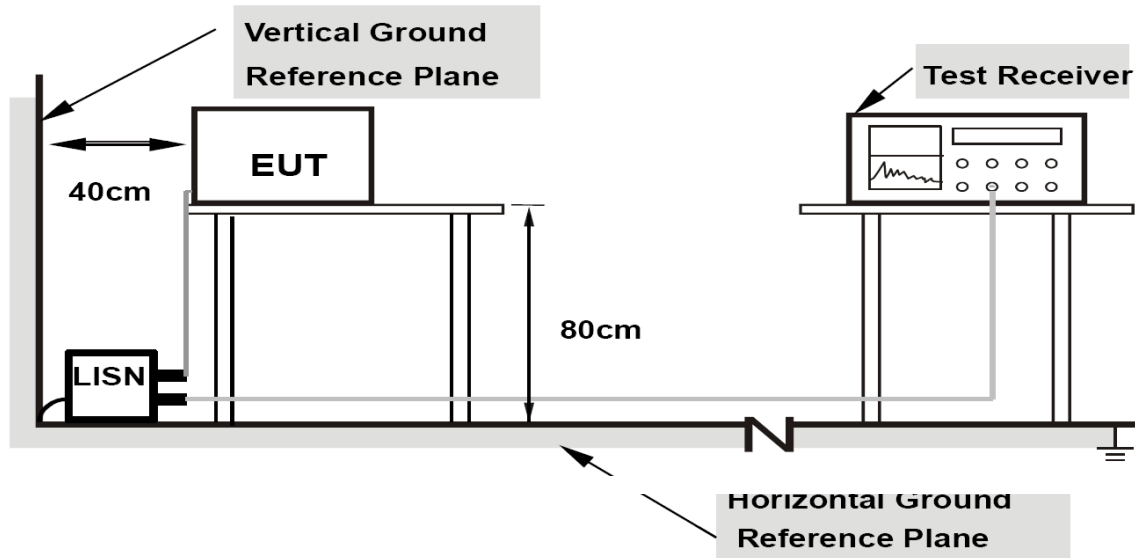


### HORIZONTAL, AV



## AC Powerline Conducted Emission

### 6.1.4. 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.

### 6.1.5. 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( $\mu$ V)	
	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.		

**Table 1: Limits for Conducted Disturbance at the Mains Ports of Class A ITE.**

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

Frequency range MHz	Limits dB( $\mu$ V)	
	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.		

**Table 2: Limits for Conducted Disturbance at the Mains Ports of Class B ITE**

### 6.1.6. Test Result

Not Applicable. Testing is not required, radio shall turn off during charging mode

**END OF TEST REPORT**