



# FCC RF Test Report

APPLICANT : Motorola Mobility LLC  
EQUIPMENT : Mobile Cellular Phone  
BRAND NAME : Motorola  
MODEL NAME : XT2333-3  
FCC ID : IHDT56AH8  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : (DSS) Spread Spectrum Transmitter  
TEST DATE(S) : Nov. 01, 2022 ~ Nov. 02, 2022

We, Sporton International Inc. (Kunshan), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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



**Sporton International Inc. (Kunshan)**

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People's Republic of China



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### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
4.1	15.247(b)(1)	Peak Output Power	≤ 125 mW	Pass	-
4.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.44 dB at 30.970 MHz
4.3	15.203 & 15.247(b)	Antenna Requirement	15.203 & 15.247(b)	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

Motorola Mobility LLC  
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.2 Manufacturer

Motorola Mobility LLC  
222 W,Merchandise Mart Plaza, Chicago IL 60654 USA

## 1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2333-3
FCC ID	IHDT56AH8
IMEI Code	Radiation: 357758180024350/357758180024368 357758180029813/357758180029821
HW Version	DVT2
SW Version	THA33.23
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 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Antenna Type / Gain	IFA Antenna type with gain -1.8 dBi
Type of Modulation	Bluetooth BR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK



### 1.5 Modification of EUT

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

### 1.6 Specification of Accessory

Accessories Information				
AC Adapter 1(US)	Brand Name	Motorola(Salcomp)	Model Name	MC-331
AC Adapter 1(EU)	Brand Name	Motorola(Salcomp)	Model Name	MC-332
AC Adapter 1(UK)	Brand Name	Motorola(Salcomp)	Model Name	MC-333
AC Adapter 1(IN)	Brand Name	Motorola(Salcomp)	Model Name	MC-334
AC Adapter 1(AU)	Brand Name	Motorola(Salcomp)	Model Name	MC-335
AC Adapter 1(BR)	Brand Name	Motorola(Salcomp)	Model Name	MC-337
AC Adapter 1(CHILE)	Brand Name	Motorola(Salcomp)	Model Name	MC-339
AC Adapter 2(US)	Brand Name	Motorola(Chenyang)	Model Name	MC-331
AC Adapter 2(EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-332
AC Adapter 2(AU)	Brand Name	Motorola(Chenyang)	Model Name	MC-335
AC Adapter 2(AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-336
AC Adapter 2(BR)	Brand Name	Motorola(Chenyang)	Model Name	MC-337
AC Adapter 2(PRC)	Brand Name	Motorola(Chenyang)	Model Name	MC-338
AC Adapter 3(US)	Brand Name	Motorola(Acbel)	Model Name	MC-331
AC Adapter 3(EU)	Brand Name	Motorola(Acbel)	Model Name	MC-332
AC Adapter 3(UK)	Brand Name	Motorola(Acbel)	Model Name	MC-333
Battery 1	Brand Name	Motorola(ATL)	Model Name	PH50
Battery 2	Brand Name	Motorola(SUNWODA)	Model Name	PH50
Earphone 1	Brand Name	Motorola(Xinlide)	Model Name	MH202
Earphone 2	Brand Name	Motorola(Lianyun)	Model Name	MH202
USB Cable 1	Brand Name	Motorola(KingPower)	Model Name	K235-08074-H0
USB Cable 2	Brand Name	Motorola(Broad)	Model Name	HO0003
USB Cable 3	Brand Name	Motorola(KINGHOME)	Model Name	5G data cable



### 1.7 Testing Location

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

<b>Test Firm</b>	Sporton International Inc. (Kunshan)		
<b>Test Site Location</b>	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		
<b>Test Site No.</b>	<b>Sporton Site No.</b>	<b>FCC Designation No.</b>	<b>FCC Test Firm Registration No.</b>
	03CH08-KS TH01-KS	CN1257	314309

### 1.8 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH08-KS	AUDIX	E3	6.2009-8-24al

### 1.9 Applicable Standards

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

- ♦ 47 CFR Part 15 Subpart C §15.247
- ♦ FCC KDB 558074 D01 15.247 Meas Guidance v05r02
- ♦ ANSI C63.10-2013

**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 Re-use of Measured Data

### 2.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: XT2333-3, FCC ID: IHDT56AH8) is electrically identical to the reference device (Model: XT2331-1, XT2333-1, FCC ID: IHDT56AH6) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 15C (equipment class: DSS) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: IHDT56AH8 .

### 2.2 Model Difference Information

The main difference between FCC ID: IHDT56AH6 and FCC ID: IHDT56AH8 is as below:

- Remove WCDMA Band IV and LTE Band 4/13/26/66.
- Add NFC function and LTE Band 20/41.

Other differences and all the details of similarity and difference can be found in the confidential documents (XT2333-3\_Operational Description of Product Equality Declaration).

### 2.3 Reference detail Section:

Rule Part	Equipment Class	Frequency Band (MHz)	Reference FCC ID(Parent)	Type Grant/ Permissive Change	Reference Title	FCC ID Filling (Variant)	Report Title/Section
15C	DSS (BR/EDR)	2400~2483.5	IHDT56AH6	Original Grant	FR282501A	IHDT56AH8	All sections applicable except for RSE





## 2.4 Spot Check Verification Data Section

Conducted power test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model

Summary for power spot check for each rule entry and technology is listed as below:

Test Item	Mode	IHDT56AH6 Parent Worst Result	IHDT56AE8 Variant Check Result	Difference (dB)
Conducted Power (dBm)	BT BR/EDR	10.06	10.02	0.04

Conclusion:

Conducted Power test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result, the test data from the original model is representative for the variant model. The power level spot check are shown within expected level compliant to limit line.

We confirm that the test data reuse policy of FCC KDB 484596 D01 Referencing Test Data v01 has been followed and the test data as referenced from the parent model report represents compliance with new FCC ID.



### 3 Test Configuration of Equipment Under Test

#### 3.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	27	2429	54	2456
	1	2403	28	2430	55	2457
	2	2404	29	2431	56	2458
	3	2405	30	2432	57	2459
	4	2406	31	2433	58	2460
	5	2407	32	2434	59	2461
	6	2408	33	2435	60	2462
	7	2409	34	2436	61	2463
	8	2410	35	2437	62	2464
	9	2411	36	2438	63	2465
	10	2412	37	2439	64	2466
	11	2413	38	2440	65	2467
	12	2414	39	2441	66	2468
	13	2415	40	2442	67	2469
	14	2416	41	2443	68	2470
	15	2417	42	2444	69	2471
	16	2418	43	2445	70	2472
	17	2419	44	2446	71	2473
	18	2420	45	2447	72	2474
	19	2421	46	2448	73	2475
	20	2422	47	2449	74	2476
	21	2423	48	2450	75	2477
	22	2424	49	2451	76	2478
	23	2425	50	2452	77	2479
	24	2426	51	2453	78	2480
	25	2427	52	2454	-	-
	26	2428	53	2455	-	-



### 3.2 Test Mode

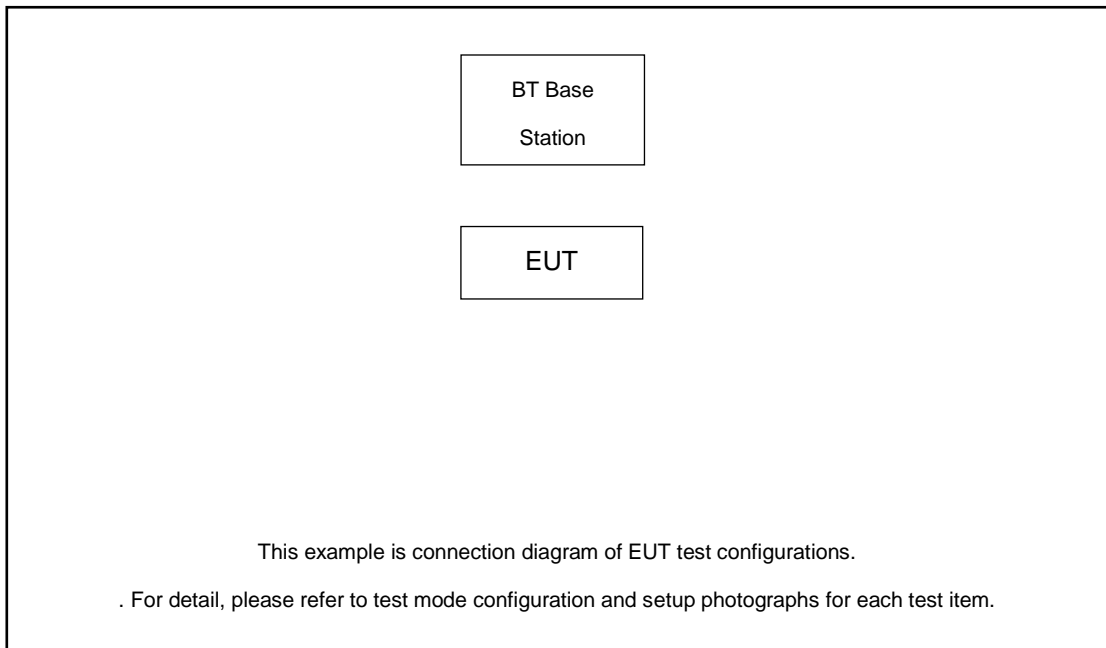
- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (X plane) were recorded in this report, and the worst mode of radiated spurious emissions is Bluetooth 1Mbps mode, and recorded in this report.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Radiated Test Cases	Bluetooth BR 1Mbps GFSK		
	As Appendix A.		
<b>Remark:</b>			
For radiated test cases, the worst mode data rate 1Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and no other significantly frequencies found in conducted spurious emission.			

### 3.3 Connection Diagram of Test System

Radiated Emission:



### 3.4 EUT Operation Test Setup

For Bluetooth function, the engineering test program was provided and enabled to make EUT connect with Bluetooth base station to continuous transmit.

## 4 Test Result

### 4.1 Output Power Measurement

#### 4.1.1 Limit of Output Power

The maximum peak conducted output power of the intentional radiator shall not exceed the following:

- (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts.

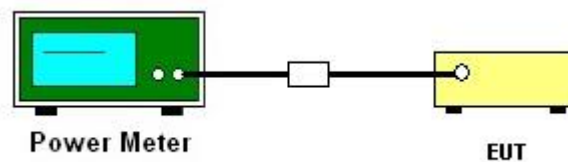
#### 4.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

#### 4.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
1. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power with cable loss and record the results in the test report.
4. Measure and record the results in the test report.

#### 4.1.4 Test Setup



#### 4.1.5 Test Result of Peak Output Power

Please refer to Spot Check Verification Data Section.



## 4.2 Radiated Band Edges and Spurious Emission Measurement

### 4.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

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

### 4.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.



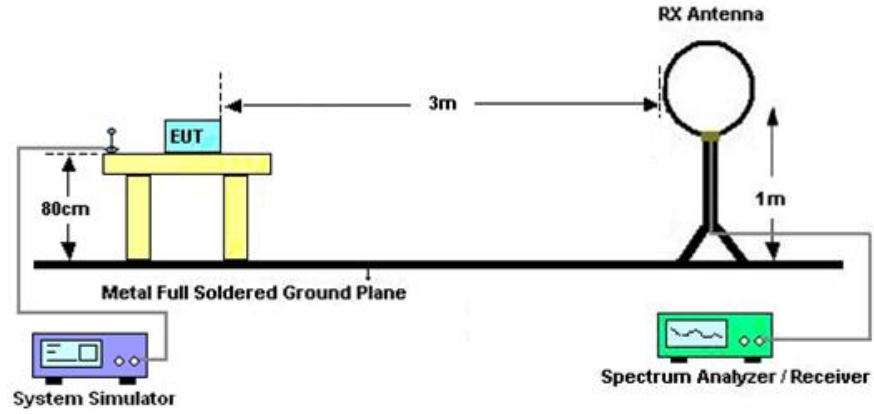
### 4.2.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 kHz for  $f < 1 \text{ GHz}$ , RBW=1MHz for  $f > 1\text{GHz}$  ; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
  - (3) For average measurement: use duty cycle correction factor method per 15.35(c).  
Duty cycle = On time/100 milliseconds  
On time =  $N_1 * L_1 + N_2 * L_2 + \dots + N_{n-1} * L_{n-1} + N_n * L_n$   
Where  $N_1$  is number of type 1 pulses,  $L_1$  is length of type 1 pulses, etc.  
Average Emission Level = Peak Emission Level +  $20 * \log(\text{Duty cycle})$
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

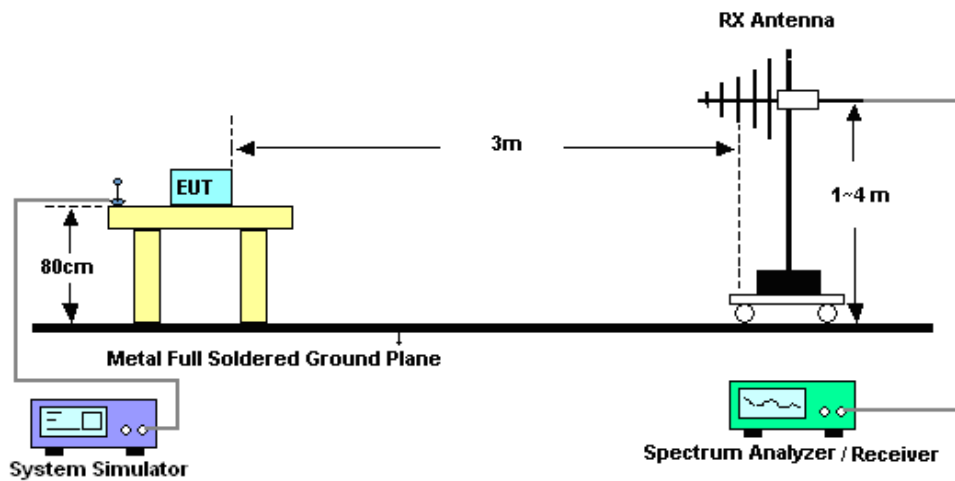
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.82dB) derived from  $20 \log(\text{dwell time}/100\text{ms})$ . This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

### 4.2.4 Test Setup

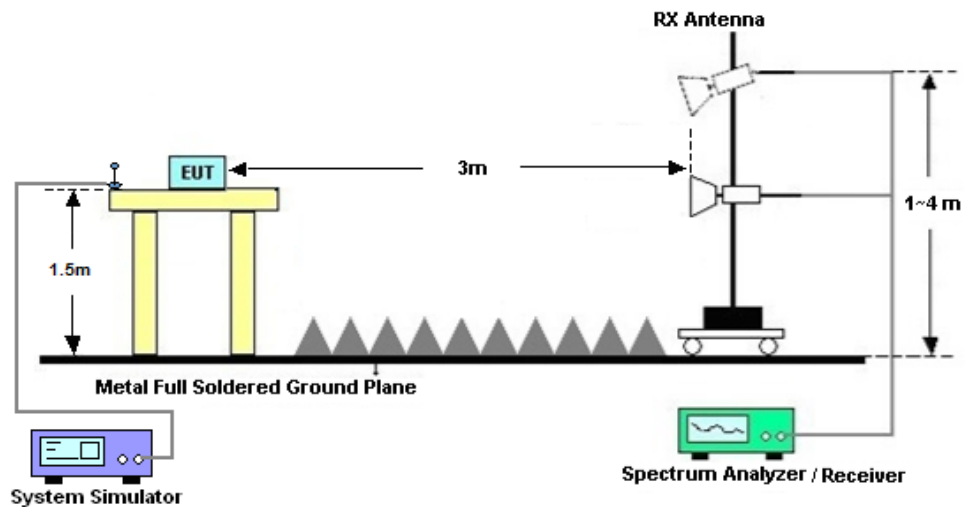
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz







#### **4.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)**

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.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

#### **4.2.6 Test Result of Radiated Spurious at Band Edges**

Please refer to Appendix A.

#### **4.2.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)**

Please refer to Appendix A.

#### **4.2.8 Duty cycle correction factor for average measurement**

Please refer to Appendix B.



## **4.3 Antenna Requirements**

### **4.3.1 Standard Applicable**

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

### **4.3.2 Antenna Anti-Replacement Construction**

An embedded-in antenna design is used.

### **4.3.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 05, 2022	Nov. 02, 2022	Jan. 04, 2023	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 05, 2022	Nov. 02, 2022	Jan. 04, 2023	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jul. 11, 2022	Nov. 01, 2022	Jul. 10, 2023	Radiation (03CH08-KS)
Spectrum Analyzer	R&S	FSV40	101932	10kHz~40GHz;Max 30dBm	Oct. 12, 2022	Nov. 01, 2022	Oct. 11, 2023	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 16, 2022	Nov. 01, 2022	Oct. 15, 2023	Radiation (03CH08-KS)
Bilog Antenna	TESEQ& VGT	CBL 61110	59915	30MHz-1GHz	Aug. 26, 2022	Nov. 01, 2022	Aug. 25, 2023	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 08, 2022	Nov. 01, 2022	Jul. 07, 2023	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060845	1Ghz-18Ghz	Jan. 05, 2022	Nov. 01, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2022	Nov. 01, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	413741	9KHz-1GHz	Jan. 05, 2022	Nov. 01, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	EM	EM01G18GA	060834	1Ghz-18Ghz	Jan. 05, 2022	Nov. 01, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 05, 2022	Nov. 01, 2022	Jan. 04, 2023	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Nov. 01, 2022	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Nov. 01, 2022	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Nov. 01, 2022	NCR	Radiation (03CH08-KS)

NCR: No Calibration Required



## 6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. 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 Conducted Measurement

Test Item	Uncertainty
Conducted Power	±0.46 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB
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### Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB
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### Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0 dB
---	--------

----- THE END -----



## Appendix A. Radiated Spurious Emission

### Radiated Spurious Emission Test Modes

Mode	Band (MHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	SISO	Bluetooth BR_GFSK	00	2402	1Mbps	-	-
Mode 2	2400-2483.5	SISO	Bluetooth BR_GFSK	39	2441	1Mbps	-	-
Mode 3	2400-2483.5	SISO	Bluetooth BR_GFSK	78	2480	1Mbps	-	-

### Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth BR_GFSK	00	2342.29	56.48	74.00	-17.52	V	PEAK	Pass	Band Edge
2	Bluetooth BR_GFSK	39	4882.00	42.68	74.00	-31.32	H	PEAK	Pass	Harmonic
3	Bluetooth BR_GFSK	78	2492.68	56.97	74.00	-17.03	H	PEAK	Pass	Band Edge



Mode	1																																																																																																					
	Band Edge																																																																																																					
	2400-2483.5_Bluetooth BR_GFSK_CH00_2402MHz																																																																																																					
ANT	SISO																																																																																																					
Pol.	Horizontal	Fundamental																																																																																																				
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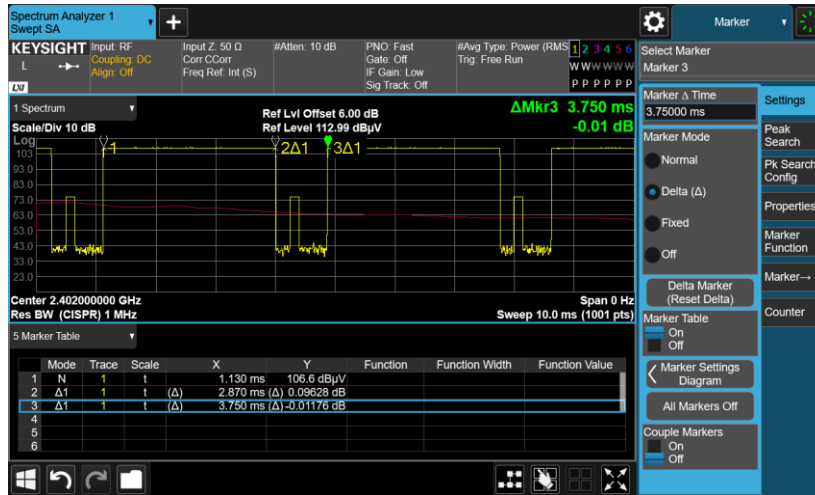
Note: For 18GHz to 25GHz, only worst case is verified in this report.



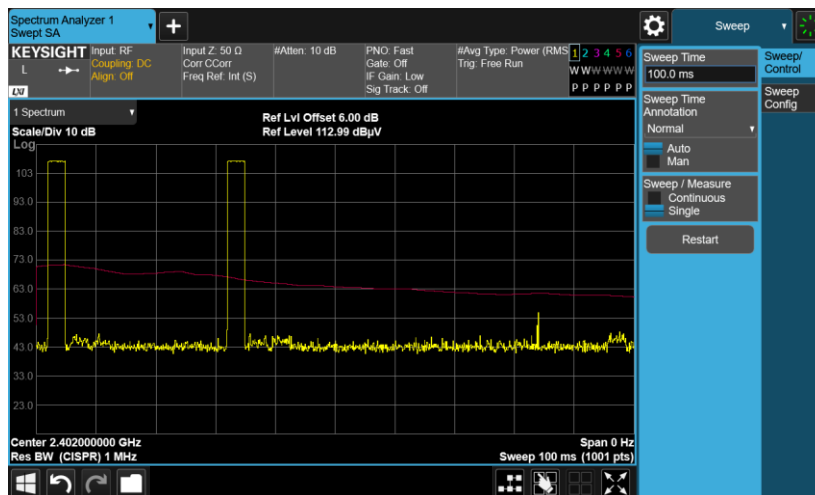
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## Appendix B. Duty Cycle Plots

### DH5 on time (One Pulse) Plot on Channel 00



### DH5 on time (Count Pulses) Plot on Channel 00



**Note:**

1. Worst case Duty cycle = on time/100 milliseconds =  $2 * 2.87 / 100 = 5.74 \%$
2. Worst case Duty cycle correction factor =  $20 * \log(\text{Duty cycle}) = -24.82 \text{ dB}$
3. DH5 has the highest duty cycle worst case and is reported.



## **Appendix D. Reference Report**

Please refer to Sporton report number FR282501A which is issued separately.