FCC RF Test Report

APPLICANT	:	Motorola Mobility LLC
EQUIPMENT	:	Mobile Cellular Phone
BRAND NAME	:	Motorola
MODEL NAME	:	XT2229-2
FCC ID	:	IHDT56AC6
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter
TEST DATE(S)	:	Feb. 26, 2022 ~ Mar. 02, 2022

We, Sporton International Inc. (Shenzhen), 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. (Shenzhen), the test report shall not be reproduced except in full.

Reviewed by: Derreck Chen / Supervisor

Approved by: Eric Shih / Manager

ACCREDITED Cert #5145.01

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055

People's Republic of China

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR1N1011-03A	Rev. 01	Initial issue of report	Mar. 15, 2022

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 9.29 dB at 43.580 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,IL60654 USA

1.2 Manufacturer

Motorola Mobility LLC
222 W,Merchandise Mart Plaza,Chicago,IL60654 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Cellular Phone
Brand Name	Motorola
Model Name	XT2229-2
FCC ID	IHDT56AC6
IMEI Code	Conducted : N/A Radiation: 352303500031051/352303500032208 for sample 1 352303500035193/352303500037645 for sample 2
HW Version	DVT2
SW Version	STA32.48
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. There are two types of EUT, the difference could be referred to the XT2229-2_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, we evaluate the sample 1 to perform full test and the sample 2 verified worse cases for RSE testing.

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
Maximum Output Power to Antenna	Bluetooth BR(1Mbps) : 10.40 dBm (0.0110 W) Bluetooth EDR (2Mbps) : 9.70 dBm (0.0093 W) Bluetooth EDR (3Mbps) : 9.70 dBm (0.0093 W)
Antenna Type / Gain	PIFA Antenna type with gain -4.8 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 Testing Location

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH01-SZ	CN1256	421272

1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH01-SZ	AUDIX	E3	6.2009-8-24

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 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.

1.9 Specification of Accessory

Specification of Accessory				
AC Adapter 1(US)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-201
AC Adapter 1(EU)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-202
AC Adapter 1(AR)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-206
AC Adapter 2(US)	**Brand Name**	Motorola (Acbel)	**Model Name**	MC-201
AC Adapter 2(EU)	**Brand Name**	Motorola (Acbel)	**Model Name**	MC-202
AC Adapter 2(AR)	**Brand Name**	Motorola (Acbel)	**Model Name**	MC-206
AC Adapter 2(CHILE)	**Brand Name**	Motorola (Acbel)	**Model Name**	MC-209
AC Adapter 3(IN)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-204
AC Adapter 4(IN)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-204
AC Adapter 5(BR)	**Brand Name**	Motorola (Flex)	**Model Name**	MC-207
AC Adapter 6(BR)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-207
AC Adapter 7(US)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-101
AC Adapter 7(EU)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-102
AC Adapter 7(UK)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-103
AC Adapter 7(AU)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-105
AC Adapter 8(US)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-101
AC Adapter 8(EU)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-102
AC Adapter 8(UK)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-103
AC Adapter 8(AU)	**Brand Name**	Motorola (Salcomp)	**Model Name**	MC-105
AC Adapter 9(US)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-101
AC Adapter 9(EU)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-102
AC Adapter 9(UK)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-103
AC Adapter 10(IN)	**Brand Name**	Motorola (Chenyang)	**Model Name**	MC-104
AC Adapter 11(IN)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-104
AC Adapter 12(AU)	**Brand Name**	Motorola (Aohai)	**Model Name**	MC-105
AC Adapter 13(EU)	**Brand Name**	Motorola (Salom)	**Model Name**	SC-42
AC Adapter 14(UK)	**Brand Name**	Motorola (Chenyang)	**Model Name**	SC-43
Earphone 1	**Brand Name**	Motorola (lyand)	**Model Name**	LYM239-76C-003
Earphone 2	**Brand Name**	Motorola (LCHSE)	**Model Name**	MEND1432B875000
Earphone 3	**Brand Name**	Motorola (New Leader)	**Model Name**	MH202
USB Cable 1	**Brand Name**	Motorola(Yihuaxing)	**Model Name**	T365-011B
USB Cable 2	**Brand Name**	Motorola(SUNTOPS)	**Model Name**	336258
USB Cable 3	**Brand Name**	Motorola(SUNTOPS)	**Model Name**	336281
USB Cable 4	**Brand Name**	Motorola(I SHENG)	**Model Name**	SC18D33506
USB Cable 5	**Brand Name**	Motorola(Yihuaxing)	**Model Name**	T365-012B
Battery 1	**Brand Name**	Motorola(Sunwoda)	**Model Name**	NH50
Battery 2	**Brand Name**	Motorola(SCUD)	**Model Name**	NH50

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: XT2229-2, FCC ID: IHDT56AC6) is electrically identical to the reference device (Model: XT2231-2, FCC ID: IHDT56AC3) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 15C DSS(BR/EDR) 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: IHDT56AC6.

2.2 Model Difference Information

The **main** difference between FCC ID: IHDT56AC3 and FCC ID: IHDT56AC6 is as below:

- Remove NFC.

Other differences and all the details of similarity and difference can be found in the confidential documents (XT2229-2_Operational Description of Product Equality Declaration).

The re-used RF data includes the following bands provided in Appendix D (Sporton RF Report No. 1N1011-01 for the reference device Model: XT2231-2, FCC ID: IHDT56AC3).

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	IHDT56AC2	Original Grant	1N1011-01	IHDT56AC6	All sections applicable except for RSE and Conducted Power
			IHDT56AC3	Data reuse			

2.4 Spot Check Verification Data Section

Conducted power test and radiated spurious emission for re-testing against the variant model based on the original model was performed in this filing.

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

Test Item	Mode	IHDT56AC3 Parent Worst Result	IHDT56AC6 Variant Check Result	Difference (dB)
Conducted Power (dBm)	BT BR/EDR DH5 CH78	11.2	10.4	0.8

Conclusion:

We confirm that the test data reuse policy of FCC KDB 484596 D01 Referencing Test Data v01 has been followed and the test data for AC Conduction and Conducted test items except Conducted Power 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 (Y 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.

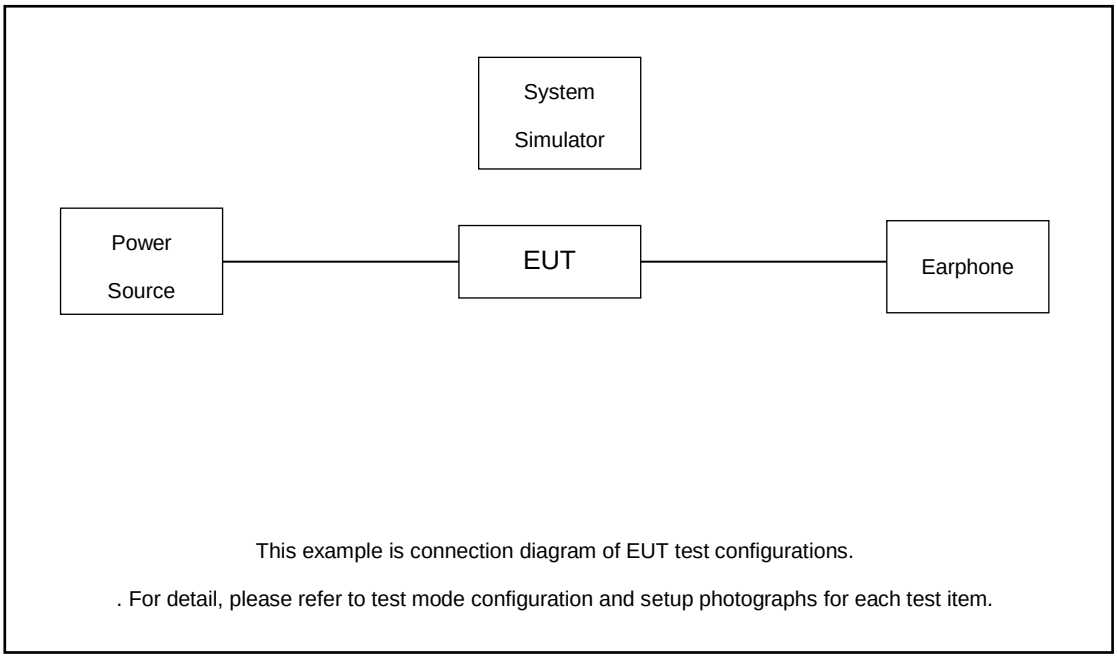
Summary table of Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth BR 1Mbps GFSK	**Bluetooth EDR 2Mbps π/4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Radiated Test Cases	**Bluetooth BR 1Mbps GFSK**		
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz		

Remark:

1. 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.
2. For Radiated Test Cases, The tests were performed with Adapter 1, Earphone 1 and USB Cable 1.

3.3 Connection Diagram of Test System

< Radiated Emission >



3.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	R&S	CBT32	N/A	N/A	Unshielded,1.8m

3.5 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.

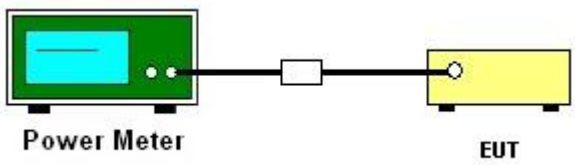
4.1.2 Measuring Instruments

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.
2. 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.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

4.1.4 Test Setup



4.1.5 Test Result of Peak Output Power

DH	CH.	NTX	Peak Power (dBm)	Power Limit (dBm)	Test Result
DH5	0	1	9.90	20.97	Pass
	39	1	9.60	20.97	Pass
	78	1	10.40	20.97	Pass
2DH5	0	1	9.40	20.97	Pass
	39	1	9.30	20.97	Pass
	78	1	9.70	20.97	Pass
3DH5	0	1	9.50	20.97	Pass
	39	1	9.40	20.97	Pass
	78	1	9.70	20.97	Pass

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.

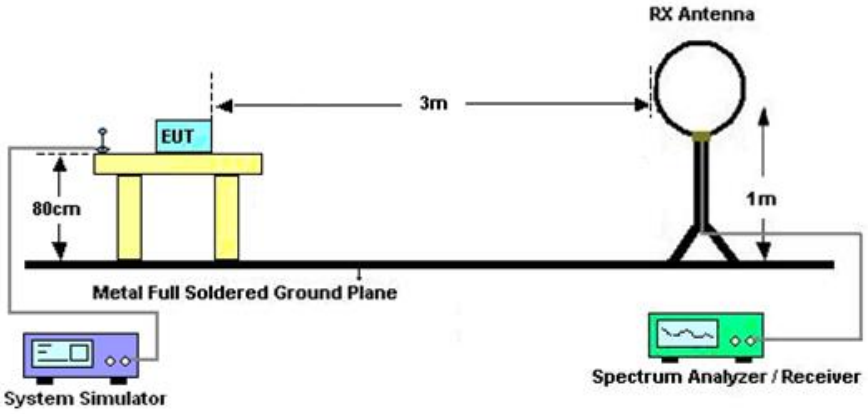
4.2.3 Test Procedures

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 GHz, RBW=1MHz for f>1GHz ; VBW ≥ 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 = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   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(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.

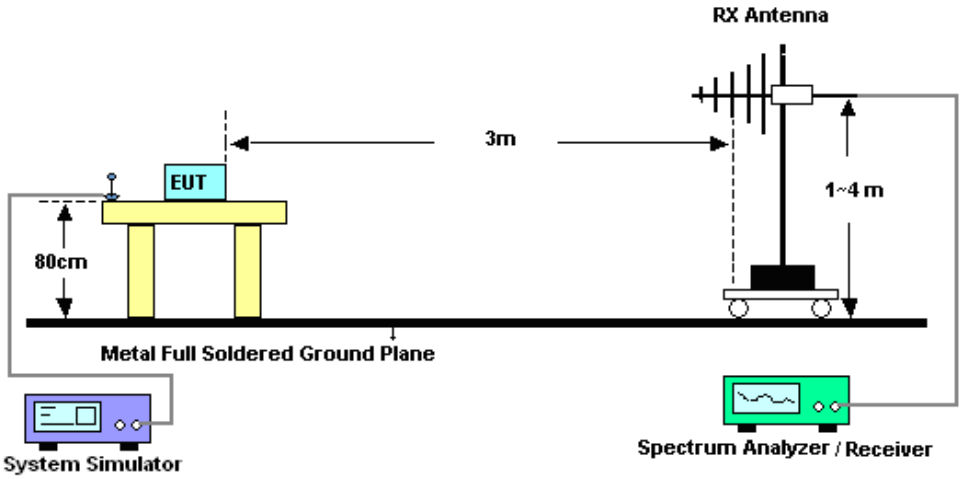
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.79dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

4.2.4 Test Setup

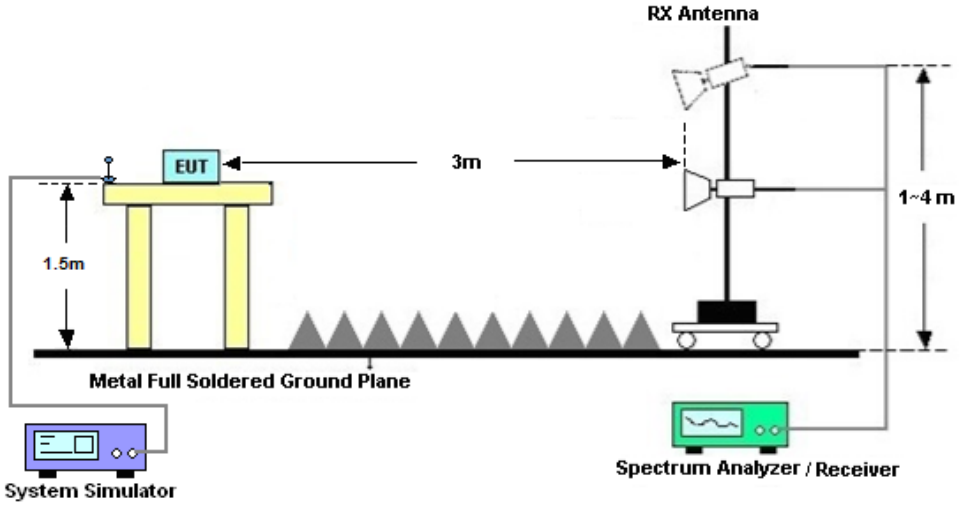
For radiated emissions below 30MHz



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
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 08, 2021	Mar. 02, 2022	Apr. 07, 2022	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 28, 2021	Mar. 02, 2022	Dec. 27, 2022	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 28, 2021	Mar. 02, 2022	Dec. 27, 2022	Conducted (TH01-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010A	MY55150213	10Hz~44GHz	Jul. 21, 2021	Feb. 26, 2022	Jul. 20, 2022	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 22, 2021	Feb. 26, 2022	Jun. 21, 2022	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz-2GHz	Jul. 15, 2021	Feb. 26, 2022	Jul. 14, 2022	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 25, 2021	Feb. 26, 2022	Jul. 24, 2022	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 11, 2021	Feb. 26, 2022	Apr. 10, 2022	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 07, 2021	Feb. 26, 2022	Apr. 06, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 16, 2021	Feb. 26, 2022	Oct. 15, 2022	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY53270105	0.5GHz~26.5Ghz	Oct. 16, 2021	Feb. 26, 2022	Oct. 15, 2022	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 21, 2021	Feb. 26, 2022	Jul. 20, 2022	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	NCR	Feb. 26, 2022	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Feb. 26, 2022	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Feb. 26, 2022	NCR	Radiation (03CH01-SZ)

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 Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.48dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.53dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.02dB**

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

Appendix A. Radiated Spurious Emission

Sample 1

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2363.025	48.47	-25.53	74	39.49	32.07	9.61	32.7	159	31	P	H
		2363.025	23.68	-30.32	54	-	-	-	-	-	-	A	H
	*	2402	102.91	-	-	93.96	32	9.65	32.7	159	31	P	H
	*	2402	78.12	-	-	-	-	-	-	-	-	A	H
		2359.665	48.48	-25.52	74	39.51	32.07	9.6	32.7	212	215	P	V
		2359.665	23.69	-30.31	54	-	-	-	-			A	V
	*	2402	101.64	-	-	92.69	32	9.65	32.7	212	215	P	V
	*	2402	76.85	-	-	-	-	-	-	-	-	A	V
BT CH 39 2441MHz		2353.26	48.03	-25.97	74	39.07	32.07	9.59	32.7	135	38	P	H
		2353.26	23.24	-30.76	54	-	-	-	-	-	-	A	H
	*	2441	103.57	-	-	94.27	32.3	9.7	32.7	135	38	P	H
	*	2441	78.78	-	-	-	-	-	-	-	-	A	H
		2485.72	48.89	-25.11	74	39.67	32.17	9.75	32.7	135	38	P	H
		2485.72	24.1	-29.9	54	-	-	-	-	-	-	A	H
		2316.16	48.8	-25.2	74	40.05	31.9	9.55	32.7	213	209	P	V
		2316.16	24.01	-29.99	54	-	-	-	-	-	-	A	V
	*	2441	101.7	-	-	92.4	32.3	9.7	32.7	213	209	P	V
	*	2441	76.91	-	-	-	-	-	-	-	-	A	V
		2494.61	48.07	-25.93	74	38.91	32.1	9.76	32.7	213	209	P	V
		2494.61	23.28	-30.72	54	-	-	-	-	-	-	A	V

BT CH 78 2480MHz	*	2480	103.78	-	-	94.56	32.17	9.75	32.7	148	41	P	H
	*	2480	78.99	-	-	-	-	-	-	-	-	A	H
		2489.48	48.46	-25.54	74	39.3	32.1	9.76	32.7	148	41	P	H
		2489.48	23.67	-30.33	54	-	-	-	-	-	-	A	H
	*	2480	101.87	-	-	92.65	32.17	9.75	32.7	204	211	P	V
	*	2480	77.08	-	-	-	-	-	-	-	-	A	V
		2488.68	48.93	-25.07	74	39.77	32.1	9.76	32.7	204	211	P	V
		2488.68	24.14	-29.86	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	45.37	-28.63	74	51.62	33.9	12	52.15	-	-	P	H
		4804	20.58	-33.42	54	-	-	-	-	-	-	A	H
		4804	44.71	-29.29	74	50.96	33.9	12	52.15	-	-	P	V
		4804	19.92	-34.08	54	-	-	-	-	-	-	A	V
BT CH 39 2441MHz		4882	44.21	-29.79	74	50.53	33.73	12.05	52.1	-	-	P	H
		4882	19.42	-34.58	54	-	-	-	-	-	-	A	H
		7323	47.25	-26.75	74	49.08	35.77	14.17	51.77	-	-	P	H
		7323	22.46	-31.54	54	-	-	-	-	-	-	A	H
		4882	45.01	-28.99	74	51.33	33.73	12.05	52.1	-	-	P	V
		4882	20.22	-33.78	54	-	-	-	-	-	-	A	V
		7323	47.85	-26.15	74	49.68	35.77	14.17	51.77	-	-	P	V
		7323	23.06	-30.94	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	45.36	-28.64	74	51.57	33.73	12.09	52.03	-	-	P	H
		4960	20.57	-33.43	54	-	-	-	-	-	-	A	H
		7440	47.21	-26.79	74	48.83	35.79	14.24	51.65	-	-	P	H
		7440	22.42	-31.58	54	-	-	-	-	-	-	A	H
		4960	44.38	-29.62	74	50.59	33.73	12.09	52.03	-	-	P	V
		4960	19.59	-34.41	54	-	-	-	-	-	-	A	V
		7440	47.85	-26.15	74	49.47	35.79	14.24	51.65	-	-	P	V
		7440	23.06	-30.94	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		46.49	19.89	-20.11	40	32.54	20.26	2.15	35.06	-	-	P	H
		101.78	20.15	-23.35	43.5	37.8	15.09	2.46	35.2	-	-	P	H
		205.57	22.83	-20.67	43.5	38.65	16.51	2.76	35.09	-	-	P	H
		318.09	21.53	-24.47	46	33.05	20.18	3.2	34.9	-	-	P	H
		402.48	22.58	-23.42	46	31.94	22.13	3.31	34.8	-	-	P	H
		588.72	24.86	-21.14	46	29.96	25.58	3.84	34.52	-	-	P	H
		43.58	30.71	-9.29	40	43.58	20.1	2.07	35.04	-	-	P	V
		101.78	21.82	-21.68	43.5	39.47	15.09	2.46	35.2	-	-	P	V
		180.35	21.57	-21.93	43.5	36.06	17.94	2.67	35.1	-	-	P	V
		206.54	21.21	-22.29	43.5	37	16.54	2.76	35.09	-	-	P	V
		290.93	20.72	-25.28	46	32.94	19.57	3.13	34.92	-	-	P	V
		506.27	23.88	-22.12	46	31.11	23.97	3.49	34.69	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Sample 2

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz		2480	102.77	28.77	74	93.55	32.17	9.75	32.7	146	42	P	H
		2480	77.98	23.98	54	-	-	-	-	-	-	A	H
	*	2498.96	48.54	-	-	39.37	32.1	9.77	32.7	146	42	P	H
	*	2498.96	23.75	-	-	-	-	-	-	-	-	A	H
		2480	101.11	27.11	74	91.89	32.17	9.75	32.7	212	105	P	V
		2480	76.32	22.32	54	-	-	-	-	-	-	A	V
	*	2483.72	50.89	-	-	41.67	32.17	9.75	32.7	212	105	P	V
	*	2483.72	26.1	-	-	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH 78 2480MHz		4960	45.35	-28.65	74	51.56	33.73	12.09	52.03			P	H
		4960	20.56	-33.44	54							A	H
		7440	47.8	-26.2	74	49.42	35.79	14.24	51.65			P	H
		7440	23.01	-30.99	54							A	H
		4960	44.68	-29.32	74	50.89	33.73	12.09	52.03			P	V
		4960	19.89	-34.11	54							A	V
		7440	47.03	-26.97	74	48.65	35.79	14.24	51.65			P	V
		7440	22.24	-31.76	54							A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

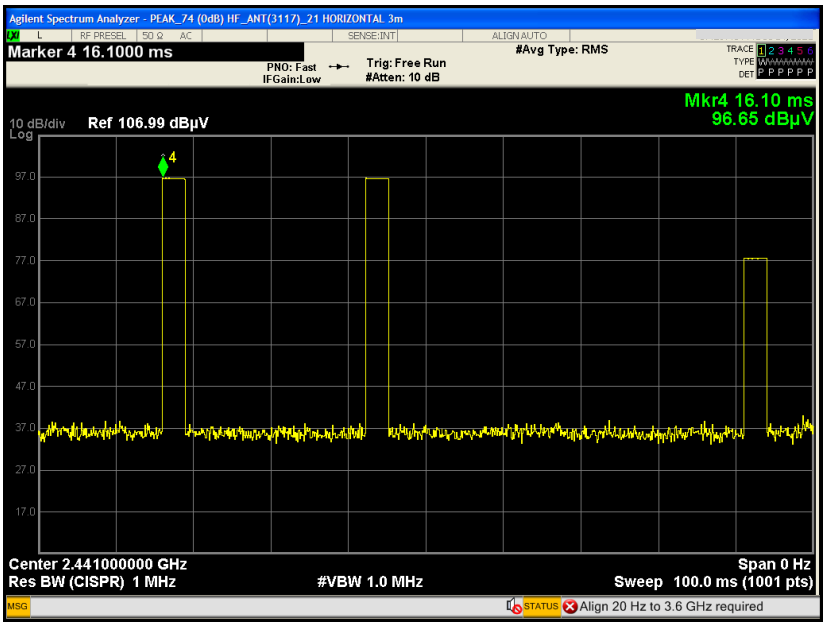
= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

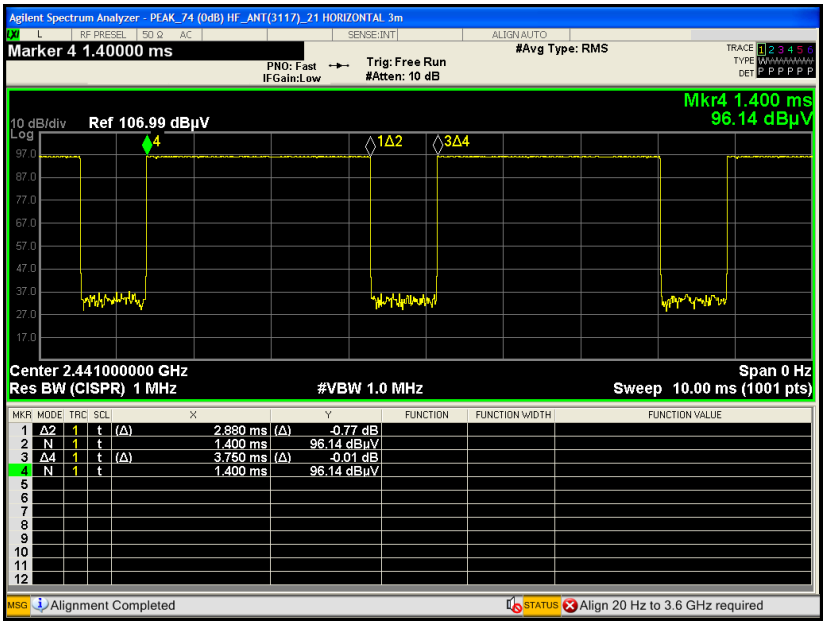
Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix B. Duty Cycle Plots

DH5 on time (One Pulse) Plot on Channel 39



DH5 on time (Count Pulses) Plot on Channel 39



Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. DH5 has the highest duty cycle worst case and is reported.

Appendix D. Reference Report

Please refer to Sporton report number 1N1011-01 which is issued separately.