



FCC RADIO TEST REPORT

FCC ID : IHDT56XL1
Equipment : Mobile 5G MOD
Brand Name : Motorola
Model Name : MD1005G
Applicant : Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA
Manufacturer : Motorola Mobility LLC
222 W, Merchandise Mart Plaza, Chicago IL 60654 USA
Standard : 47 CFR Part 2, 96

The product was received on Mar. 05, 2019 and testing was started from Apr. 06, 2019 and completed on Apr. 18, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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History of this test report

Report No.	Version	Description	Issued Date
FG930415-07C	01	Initial issue of report	Apr. 23, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	§2.1046	Conducted Output Power and Effective Isotropic Radiated Power	Not Required	-
-	§96.41	Peak-to-Average Ratio	Not Required	
-	§96.41	EIRP Power Density	Not Required	-
-	§2.1049 §96.41	Occupied Bandwidth	Not Required	-
-	§2.1051 §96.41	Conducted Band Edge Measurement	Not Required	-
-	§2.1051 §96.41	Conducted Spurious Emission	Not Required	
-	§2.1055	Frequency Stability for Temperature & Voltage	Not Required	-
3.4	§2.1053 §96.41	Radiated Spurious Emission	PASS	Under limit 6.50 dB at 25767.000 MHz

Remark: This is a variant report by changing mobile phone. All the test cases were performed on original report which can be referred to Sporton Report Number FG890514B. Based on the original report, only Radiated Spurious Emission tests were verified.

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.

Reviewed by: Wii Chang

Report Producer: Maggie Chiang

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile 5G MOD
Brand Name	Motorola
Model Name	MD1005G
FCC ID	IHDT56XL1
IMEI Code	352157100008509
EUT supports Radios application	LTE/5G NR
HW Version	PVT
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories	
USB Cable 1	Brand Name : Motorola
	Model Name : SC18C46623

Supported Unit Used in Test Configuration and System	
AC Adapter 1	Brand Name : Motorola
	Model Name : SC-22
	Manufacturer : Chenyang
AC Adapter 2	Brand Name : Motorola
	Model Name : SC-51
	Manufacturer : Salom
Mobile Phone	Brand Name : Motorola
	FCC ID : IHDT56XS1

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz
Rx Frequency	LTE Band 48: 3552.5 MHz ~ 3697.5 MHz
Bandwidth	LTE Band 48: 5MHz / 10MHz / 15MHz / 20MHz
Antenna Type	Fixed Internal Antenna
Antenna Gain	LTE Band 48: 0 dBi
Type of Modulation	QPSK / 16QAM / 64QAM

1.3 Modification of EUT

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



1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No.
	03CH12-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW0007

1.5 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 Eqpt v01

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

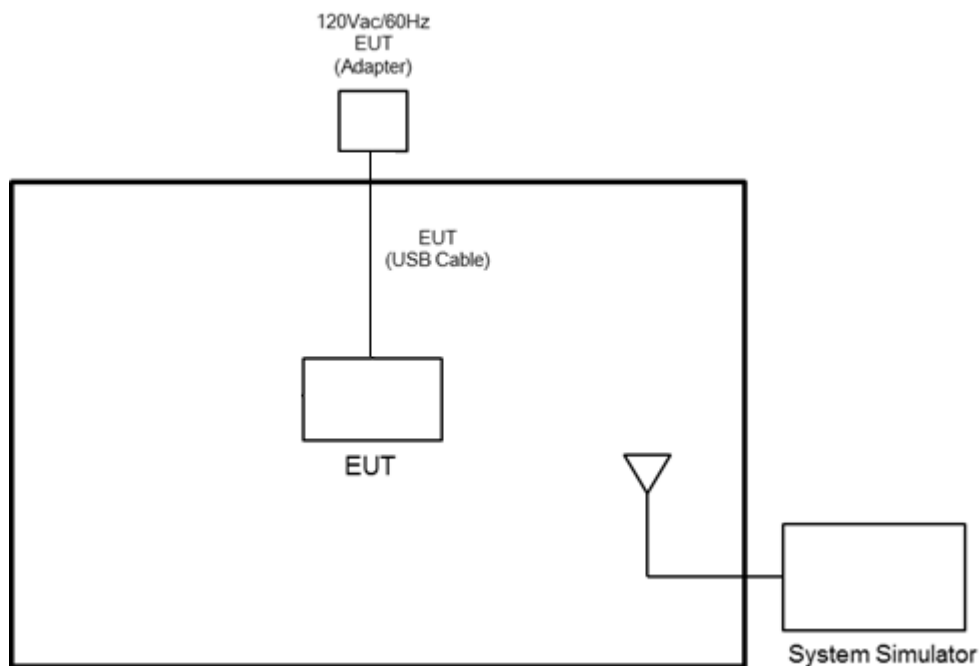
2.1 Test Mode

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 (X 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
	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.															

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8m



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

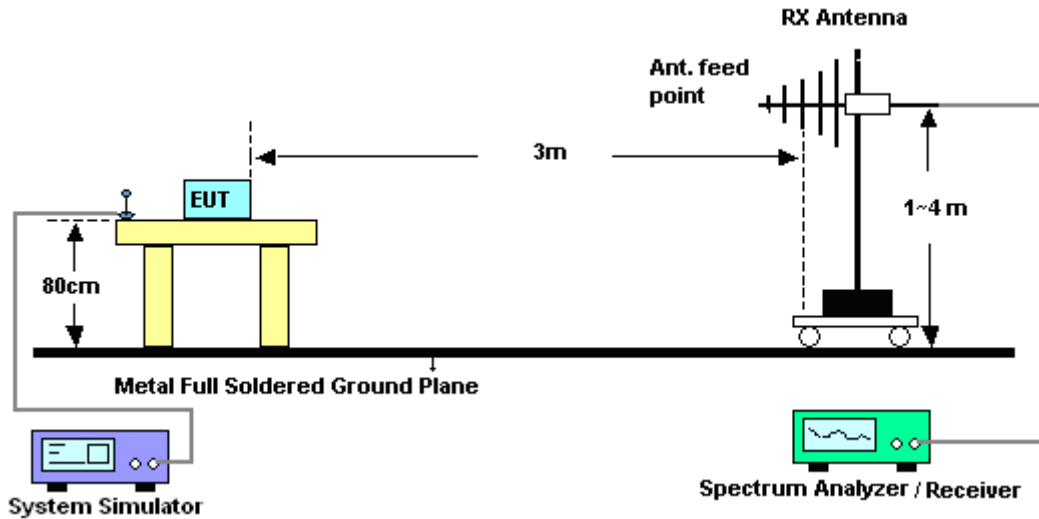
3 Radiated Test Items

3.1 Measuring Instruments

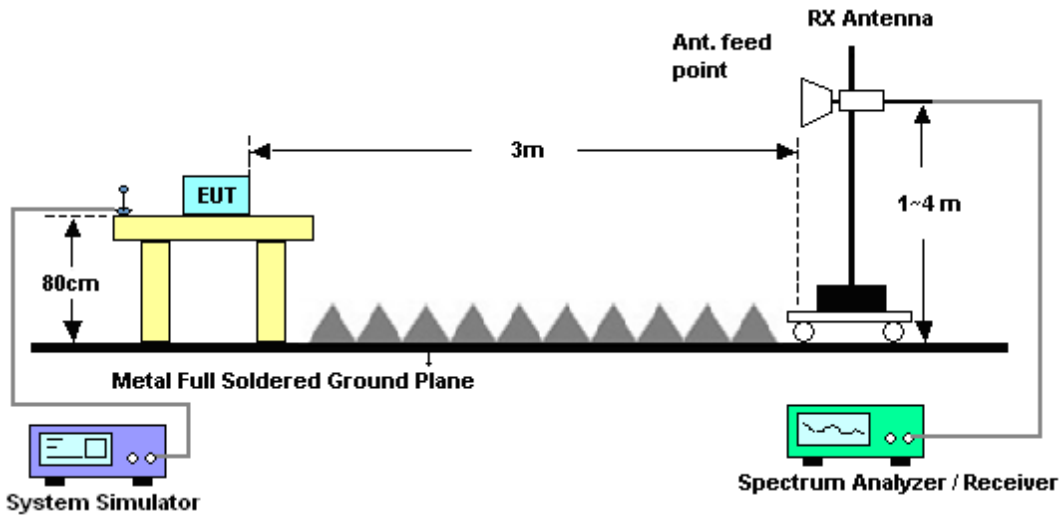
See list of measuring instruments of this test report.

3.2 Test Setup

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.3 Test Result of Radiated Test

Please refer to Appendix A.



3.4 Radiated Spurious Emission

3.4.1 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.

3.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI / TIA-603-E Section 2.2.12.

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.
$$\text{EIRP (dBm)} = \text{S.G. Power} - \text{Tx Cable Loss} + \text{Tx Antenna Gain}$$
$$\text{ERP (dBm)} = \text{EIRP} - 2.15$$
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is -40dBm/MHz



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	Mar. 28, 2019	Apr. 06, 2019~ Apr. 18, 2019	Mar. 27, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N1 D01N-06	37059&01	30MHz~1GHz	Oct. 13, 2018	Apr. 06, 2019~ Apr. 18, 2019	Oct. 12, 2019	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120D	9120D-1328	1GHz ~ 18GHz	Oct. 19, 2018	Apr. 06, 2019~ Apr. 18, 2019	Oct. 18, 2019	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	May 08, 2018	Apr. 06, 2019~ Apr. 18, 2019	May 07, 2019	Radiation (03CH12-HY)
Preamplifier	SONOMA	310N	187312	10MHz~1GHz	Dec. 04, 2018	Apr. 06, 2019~ Apr. 18, 2019	Dec. 03, 2019	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303	171000180005 4001	1GHz~18GHz	Apr. 15, 2018	Apr. 06, 2019~ Apr. 15, 2019	Apr. 16, 2019	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-303	171000180005 4001	1GHz~18GHz	Apr. 16, 2019	Apr. 16, 2019~ Apr. 18, 2019	Apr. 15, 2020	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Apr. 06, 2019~ Apr. 18, 2019	Dec. 05, 2019	Radiation (03CH12-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 26, 2018	Apr. 06, 2019~ Apr. 18, 2019	Dec. 25, 2019	Radiation (03CH12-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	May 21, 2018	Apr. 06, 2019~ Apr. 18, 2019	May 20, 2019	Radiation (03CH12-HY)
Filter	Wainwright	WLJ4-1000-1530 -6000-40ST	SN3	1.53 GHz Lowpass	Mar. 21, 2019	Apr. 06, 2019~ Apr. 18, 2019	Mar. 20, 2020	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-1080-1 200-1500-60SS	SN2	1.2G High Pass	Sep. 16, 2018	Apr. 06, 2019~ Apr. 18, 2019	Sep. 15, 2019	Radiation (03CH12-HY)
Filter	Wainwright	WHKX12-2700-3 000-18000-60ST	SN2	3GHz High Pass	Mar. 21, 2019	Apr. 06, 2019~ Apr. 18, 2019	Mar. 20, 2020	Radiation (03CH12-HY)
Filter	Woken	WHKX8-5272.5-6 750-18000-40ST	SN2	6.75G Highpass	Mar. 21, 2019	Apr. 06, 2019~ Apr. 18, 2019	Mar. 20, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30M-18G	Mar. 13, 2019	Apr. 06, 2019~ Apr. 18, 2019	Mar. 12, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Oct. 16, 2018	Apr. 06, 2019~ Apr. 18, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30M~40GHz	Oct. 16, 2018	Apr. 06, 2019~ Apr. 18, 2019	Oct. 15, 2019	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Apr. 06, 2019~ Apr. 18, 2019	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Apr. 06, 2019~ Apr. 18, 2019	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Apr. 06, 2019~ Apr. 18, 2019	N/A	Radiation (03CH12-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.36
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.70
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.98
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Appendix A. Test Results of Radiated Test

LTE Band 48

LTE Band 48 / 20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Highest	7360	-57.09	-40	-17.09	-62.22	-66.50	1.91	11.32	H
	11045	-61.81	-40	-21.81	-65.18	-70.13	2.63	10.95	H
	14724	-56.83	-40	-16.83	-68.14	-65.63	2.91	11.72	H
	18399	-52.36	-40	-12.36	-72.14	-68.41	1.87	17.92	H
	22086	-50.70	-40	-10.70	-75.07	-67.49	2.08	18.87	H
	25767	-46.50	-40	-6.50	-75.23	-63.52	2.03	19.05	H
									H
	7360	-58.96	-40	-18.96	-60.91	-68.37	1.91	11.32	V
	11045	-62.42	-40	-22.42	-65.62	-70.74	2.63	10.95	V
	14724	-58.93	-40	-18.93	-68.6	-67.73	2.91	11.72	V
	18399	-59.57	-40	-19.57	-71.99	-75.62	1.87	17.92	V
	22086	-56.63	-40	-16.63	-74.74	-73.42	2.08	18.87	V
	25767	-48.10	-40	-8.10	-73.23	-65.12	2.03	19.05	V
									V

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

————THE END————