



Spot Check Evaluation

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2503-4, XT2505-1
FCC ID : IHDT56AU8
STANDARD : 47 CFR Part 2, 22, 24, 27, 90S
47 CFR Part 15 Subpart C §15.225
47 CFR Part 15 Subpart C §15.247
47 CFR Part 15 Subpart E §15.407
TEST DATE(S) : Jan. 03, 2025 ~ Jan. 23, 2025

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.

This report contains data that were produced under subcontract by Sporton International Inc. (KunShan)

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.

Jason Jia

Approved by: Jason Jia



Sporton International Inc. (ShenZhen)

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

People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1311-01D	Rev. 01	Initial issue of report	Feb. 10, 2025

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



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	XT2503-4, XT2505-1
FCC ID	IHDT56AU8
IMEI Code	Conducted/DFS: 357706750005150/357706750005168 Radiation: 357706750006133/357706750006141 Conduction: 357706750006158/357706750006166
HW Version	DVT2
SW Version	V2VC35.13
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 Modification of EUT

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

1.5 Testing Site

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 DFS01-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 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	03CH01-SZ	CN1256	421272

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

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CO01-KS 03CH02-KS 03CH08-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacturer	Name	Version
1.	CO01-KS	AUDIX	E3	6.2009-8-24
2.	03CH02-KS	AUDIX	E3	6.2009-8-24a1
3.	03CH08-KS	AUDIX	E3	210616
4.	03CH01-SZ	AUDIX	E3	6.2009-8-24
5.	DFS01-SZ	Sporton	Test Tools	1.0

1.7 Applicable Standards

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

- FCC KDB 484596 D01 Referencing Test Data v02r03
- 47 CFR Part 2, 22, 24, 27, 90S
- 47 CFR Part 15 Subpart C §15.225
- 47 CFR Part 15 Subpart C §15.247
- 47 CFR Part 15 Subpart E §15.407
- ANSI C63.10-2013
- ANSI C63.26-2015

1.8 Specification of Accessory

Accessories Information				
AC Adapter 1(US)	Brand Name	Motorola(Chenyang)	Model Name	MC-681N
AC Adapter 1(EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-682N
AC Adapter 1(UK)	Brand Name	Motorola(Chenyang)	Model Name	MC-683N
AC Adapter 1(AU)	Brand Name	Motorola(Chenyang)	Model Name	MC-685N
AC Adapter 1(AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-686N
AC Adapter 1(BR)	Brand Name	Motorola(Chenyang)	Model Name	MC-687N
AC Adapter 1(CHILE)	Brand Name	Motorola(Chenyang)	Model Name	MC-689N
AC Adapter 2(US)	Brand Name	Motorola(Acbel)	Model Name	MC-681N
AC Adapter 2(EU)	Brand Name	Motorola(Acbel)	Model Name	MC-682N
AC Adapter 2(UK)	Brand Name	Motorola(Acbel)	Model Name	MC-683N
AC Adapter 2(AU)	Brand Name	Motorola(Acbel)	Model Name	MC-685N
AC Adapter 2(AR)	Brand Name	Motorola(Acbel)	Model Name	MC-686N
AC Adapter 2(BR)	Brand Name	Motorola(Acbel)	Model Name	MC-687N
AC Adapter 2(CHILE)	Brand Name	Motorola(Acbel)	Model Name	MC-689N
Battery 1	Brand Name	Motorola(ATL)	Model Name	RM52
Battery 2	Brand Name	Motorola(Cosmx)	Model Name	RM52
Earphone	Brand Name	Motorola(Lyand)	Model Name	MI181C
USB Cable 1	Brand Name	Motorola(saibao)	Model Name	SC18D71644
USB Cable 2	Brand Name	Motorola(Luxshare)	Model Name	SC18E08104
USB Cable 3	Brand Name	Motorola(saibao)	Model Name	SC18D86731
USB Cable 4	Brand Name	Motorola(Luxshare)	Model Name	SC18E08103



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: XT2503-4, XT2505-1, FCC ID: IHDT56AU8) is electrically identical to the reference device (Model: XT2503-1, XT2505-3, FCC ID: IHDT56AU7) for the portions of the circuitry corresponding to the data being re-used, following the FCC KDB 484596 D01 Referencing Test Data v02r03.

ECR Data Referencing Inquiry has been approved by FCC, and the data referencing and spot check test plan includes RF/EMC, the details are presented in section 2.3 of this report, and for SAR Reference detail, please refer to FCC SAR report FA4D1311-01.

The criteria set in section 3 of KDB 484596 D01 v02r03 is followed to determine whether the data referencing is justified. For SAR, the higher between the referenced value and the spot check value is used to determine compliance in both standalone and simultaneous transmission conditions

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: IHDT56AU8 .

2.2 Model Difference Information

The **main** difference between FCC ID: IHDT56AU7 and FCC ID: IHDT56AU8 is as below:

- Remove WCDMA B4, LTE B4/12/13/17/66 and 5G NR n2/n66.
- Add LTE B18/19/20/32/43/71, 5G NR n20/n71/n75.
- Add n5 NSA mode and n41 SA mode.
- LTE B41, 5G NR n77/N78 upgraded to PC2 via software.

Other differences and all the details of similarity and difference can be found in the confidential documents (IHDT56AU8 Operational Description of Product Equality Declaration).



2.3 Reference detail Section:

Rule Part	Equipment Class	Frequency Band (MHz)	Reference FCC ID (Parent)	Reference on test	Reference Title	FCC ID Filling (Variant)	Test on the variant	Data Referencing (Y/N)
15C	DSS (BR/EDR)	2400~2483.5	IHDT56AU7	Full test	FR4D1311A	IHDT56AU8	Spot check	Y, All test items
	DTS (BLE)	2400~2483.5	IHDT56AU7	Full test	FR4D1311B	IHDT56AU8	Spot check	Y, All test items
	DTS (WLAN)	2400~2483.5	IHDT56AU7	Full test	FR4D1311C	IHDT56AU8	Spot check	Y, All test items
	DXX (NFC)	13.56	IHDT56AU7	Full test	FR4D1311D	IHDT56AU8	Spot check	Y, All test items
15E	U-NII	5180~5240	IHDT56AU7	Full test	FR4D1311E	IHDT56AU8	Spot check	Y, All test items
		5260~5320	IHDT56AU7	Full test	FR4D1311E	IHDT56AU8	Spot check	Y, All test items
		5500~5720	IHDT56AU7	Full test	FR4D1311E	IHDT56AU8	Spot check	Y, All test items
		5745~5825	IHDT56AU7	Full test	FR4D1311E	IHDT56AU8	Spot check	Y, All test items
		5260~5320 5500~5720	IHDT56AU7	Full test	FZ4D1311	IHDT56AU8	Spot check	Y, All test items
22, 24, 27, 90,	PCE (GSM)	GSM 850/1900	IHDT56AU7	Full test	FG4D1311A	IHDT56AU8	Spot check	Y, All test items
	PCE (WCDMA)	Band II, V	IHDT56AU7	Full test	FG4D1311A	IHDT56AU8	Spot check	Y, All test items
	PCE (LTE)	B2/5/7/26/38/42/ 7C/38C/42C	IHDT56AU7	Full test	FG4D1311B FG4D1311C FG4D1311E FG4D1311F	IHDT56AU8	Spot check	Y, All test items
	PCE (LTE)	B26 (90S)	IHDT56AU7	Full test	FG4D1311D	IHDT56AU8	Spot check	Y, All test items
	PCE (NR)	n5/n7/n26/n38/n41	IHDT56AU7	Full test	FG4D1311G FG4D1311H	IHDT56AU8	Spot check	Y, All test items except for n5 NSA RSE, n41 RSE
	PCE (NR)	n26 (90S)	IHDT56AU7	Full test	FG4D1311I	IHDT56AU8	Spot check	Y, All test items

Y: Pointer to spot-check exhibit; N: Pointer to full test exhibit

2.4 Spot Check Verification Data Section

All test items 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.

All test procedures follow the related section of parent report.

Spot-check measurements, while being always compliant with the applicable rule part(s) for the test under consideration, show a deviation d_{dB} from the reference data no larger than 3 dB:

$$d_{dB} = |V_{dB} - R_{dB}| \leq 3 \text{ dB} \quad (1)$$

V_{dB} , the variant spot-check level

R_{dB} , the corresponding measurement level for the reference model

An alternative to the limit of eq. (1) is available, and is based on considering how far the reference data R_{dB} is from the compliance threshold C_{dB} (also expressed in dB), for the particular test under consideration. In this case, if $M_{dB} = |C_{dB} - R_{dB}|$ is the margin in dB from the compliance limit, a spot check may be considered acceptable when the deviation d_{dB} from the reference data satisfies the following condition:

$$d_{dB} = |V_{dB} - R_{dB}| \leq (3 + M_{dB} / 20) \text{ dB} , \text{ for } 0 \leq M_{dB} \leq 60 \text{ dB} \quad (2)$$

$$d_{dB} = |V_{dB} - R_{dB}| = 6 \text{ dB} , \text{ for } M_{dB} > 60 \text{ dB}$$

where “| |” is the absolute value of the measured quantity.

When using the option in eq. (2), d_{dB} increases linearly from 3 dB to 6 dB.



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

Mode	Test Item	IHDT56AU7 Parent Worst mode Test Result	IHDT56AU8 Variant Check Test Result	Deviation	Deviation Limit
BT 1Mbps (CH39)	Number of Channels	79	79	0	3
	Hopping Channel Separation	1	1.003	0.003 MHz	3
	Dwell Time of Each Channel	0.306	0.307	0.001 s	3
	20dB Bandwidth	0.87	0.865	0.005 MHz	3
	99% Bandwidth	0.758	0.757	0.01 MHz	3
	Conducted Band Edges	-43.67	-45.85	2.18 dBm	3
	Conducted Spurious Emission	-36.12	-38.30	2.18 dBm	3
BT 1Mbps (CH78)	Radiated Band Edges and Radiated Spurious Emission	-18.78	-18	0.78 dB	3
BT	AC Conducted Emission	-13.67	-11.94	1.73 dB	3
BLE 2Mbps (CH01)	6dB Bandwidth	1.16	1.17	0.01 MHz	3
	99% Bandwidth	2.056	2.050	0.006 MHz	3
	Power Spectral Density	-4.23	-4.94	0.71 dBm/3kHz	3
	Conducted Band Edges	-52.99	-53.56	0.57 dBm/100kHz	3
	Conducted Spurious Emission	-35.36	-37.17	1.81 dBm/100kHz	3
BLE 1Mbps (CH19)	Radiated Band Edges and Spurious Emission	-3.41	-3.13	0.28 dB	3
BLE	AC Conducted Emission	-13.67	-11.94	1.73 dB	3
WIFI 2.4G (802.11ax HE20 CH06)	6dB Bandwidth	18.48	18.70	0.22 MHz	3
	99% Bandwidth	19.874	20.280	0.406 MHz	3
	Power Spectral Density	-6.15	-7.19	1.04 dBm/3kHz	3
	Conducted Band Edges	-14.78	-15.00	0.22 dBm/100kHz	3
	Conducted Spurious Emission	-35.5	-38.06	-2.56 dBm/100kHz	3
WIFI 2.4G (802.11ax HE40 CH06)	Radiated Band Edges and Spurious Emission	-3.11	-3.38	0.27 dB	3
WIFI 2.4G	AC Conducted Emission	-13.67	-11.94	1.73 dB	3
WIFI 5G (802.11ax HE40 CH142)	26dB & 99% Bandwidth	75.60	75.24	0.36 MHz	3
	Power Spectral Density	3.62	3.14	0.48 dBm/MHz	3
WIFI 5G (802.11ax HE80 CH58)	DFS	0.951632	0.88803	0.63602 s	3
WIFI 5G (802.11ax HE20 CH36)	Radiated Band Edges and Spurious Emission	-3.07	-3.23	0.16 dB	3
WIFI 5G	AC Conducted Emission	-17.62	-15.89	1.73 dB	3
NFC	20dB Spectrum Bandwidth	2.58	2.57	0.01 kHz	3
	99% Occupied Bandwidth	2.19	2.19	0 kHz	3
	Field Strength of Fundamental Emissions@3m	52.46	52.54	0.08 dBuV/m	3
	Radiated Spurious Emissions	47.17	49.99	0.82 dBuV/m	3
	AC Power Line Conducted Emissions	-14.93	-13.10	1.83 dB	3
Part 22H (GSM 850)	Peak-to-Average Ratio	0.17	0.14	0.03 dB	3
	Occupied Bandwidth	0.242	0.243	0.001 MHz	3
	Conducted Band Edge	-14.83	-14.60	0.23 dBm	3
	Conducted Spurious Emission	-31.6	-30.52	1.08 dBm	3
	Frequency Stability	0.0023	0.0024	0.0001 ppm	3
Part 27M (LTE Band 7)	26dB Bandwidth	0.32	0.31	0.01 MHz	3
	Radiated Spurious Emission	-49.04	-51.39	2.35 dB	3



Test Item	Mode	IHDT56AU7 Parent Worst mode Test Result	IHDT56AU8 Variant Check Test Result	Deviation (dB)	Deviation Limit (dB)
Conducted Power (dBm)	BT BR/EDR	17.40	17.30	0.10	3
	BLE 1Mbps/2Mbps	12.66	11.40	1.26	3
	11b, 2.4GHz	21.28	20.82	0.46	3
	11g, 2.4GHz	23.72	23.55	0.17	3
	11n HT20, 2.4GHz	23.68	23.53	0.15	3
	11n HT40, 2.4GHz	22.95	22.48	0.47	3
	11ax HE20, 2.4GHz	23.77	23.49	0.28	3
	11ax HE40, 2.4GHz	23.03	22.5	0.53	3
	11a, 5GHz	18.78	18.67	0.11	3
	11n HT20, 5GHz	18.69	18.67	0.02	3
	11n HT40, 5GHz	18.79	18.70	0.09	3
	11ac VHT20, 5GHz	18.75	18.74	0.01	3
	11ac VHT40, 5GHz	18.83	18.70	0.13	3
	11ac VHT80, 5GHz	17.98	17.95	0.03	3
	11ax HE20, 5GHz	18.83	18.78	0.05	3
	11ax HE40, 5GHz	18.95	18.82	0.13	3
	11ax HE80, 5GHz	18.07	18.06	0.01	3
	GSM 850	31.75	31.34	0.41	3
	GSM 1900	28.86	26.57	2.29	3
	WCDMA II	22.68	20.42	2.26	3
	WCDMA V	22.81	22.39	0.42	3
	LTE B2	22.51	22.27	0.24	3
	LTE B5	22.49	22.39	0.10	3
	LTE B7	23.67	22.36	1.31	3
	LTE B7C	22.52	22.39	0.13	3
	LTE B26L	22.47	22.13	0.34	3
	LTE B26H	22.52	22.28	0.24	3
	LTE B38	23.58	23.28	0.30	3
	LTE B38C	22.39	22.53	0.14	3
	LTE B42	22.49	22.23	0.26	3
	LTE B42C	22.38	22.18	0.20	3
	5GNR n5	23.17	22.95	0.22	3
	5GNR n7	23.57	22.84	0.73	3
	5GNR n38	23.10	23.01	0.29	3
	5GNR n41	23.62	23.26	0.36	3
	5GNR n26L	23.66	22.87	0.79	3
	5GNR n26H	23.45	23.19	0.26	3

**Conclusion:**

All test items 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. All spot check test data are shown within expected level compliant to limit line.

We are using power and ERP/EIRP measurements from the original parent model reports to list on the grant.

The same detection mechanism/software/antenna gain is used in the variant of DFS. Hence, all test cases refer to parent report.

We confirm that the test data referencing policy of FCC KDB 484596 D01 Referencing Test Data v02r03 has been followed and the test data as referenced from the parent model report represents compliance with new FCC ID.



3 List of Measuring Equipment

For BT/WIFI:

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Jan. 22, 2025	Apr. 08, 2025	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 25, 2024	Jan. 22, 2025	Dec. 24, 2025	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Oct.14, 2024	Jan. 22, 2025	Oct. 13, 2025	Conducted (TH01-SZ)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz;Max 30dBm	Jul. 04, 2024	Jan. 20, 2025	Jul. 03, 2025	Radiation (03CH08-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57441079	10Hz~44GHz	Oct. 09, 2024	Jan. 20, 2025	Oct. 08, 2025	Radiation (03CH08-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Jan. 20, 2025	Sep. 07, 2025	Radiation (03CH08-KS)
Bilog Antenna	TESEQ	CBL 6111D	59915	30MHz~1GHz	Aug. 18, 2024	Jan. 20, 2025	Aug.17, 2025	Radiation (03CH08-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00240138	1GHz~18GHz	Jul. 06, 2024	Jan. 20, 2025	Jul. 05, 2025	Radiation (03CH08-KS)
high gain Amplifier	EM	EM01G18GA	060890	1Ghz~18Ghz	Jul. 23, 2024	Jan. 20, 2025	Jul. 22, 2025	Radiation (03CH08-KS)
SHF-EHF Horn	Com-power	AH-840	101116	18GHz~40GHz	Oct. 22, 2024	Jan. 20, 2025	Oct. 21, 2025	Radiation (03CH08-KS)
Amplifier	SONOMA	310N	380826	9KHz~1GHz	Jul. 03, 2024	Jan. 20, 2025	Jul. 02, 2025	Radiation (03CH08-KS)
Amplifier	Keysight	83017A	MY53270417	500MHz~26.5GHz	Oct. 09, 2024	Jan. 20, 2025	Oct. 08, 2025	Radiation (03CH08-KS)
Amplifier	EM	EM18G40GGA	060737	18~40GHz	Jan. 03, 2025	Jan. 20, 2025	Jan. 02, 2026	Radiation (03CH08-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jan. 20, 2025	NCR	Radiation (03CH08-KS)
Turn Table	EM	EM 1000-T	N/A	0~360 degree	NCR	Jan. 20, 2025	NCR	Radiation (03CH08-KS)
Antenna Mast	EM	EM 1000-A	N/A	1 m~4 m	NCR	Jan. 20, 2025	NCR	Radiation (03CH08-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Jan. 20, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	Jan. 20, 2025	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Jan. 20, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	Jan. 20, 2025	Oct. 08, 2025	Conduction (CO01-KS)
Signal Analyzer	R&S	FSV7	101473	10Hz~7GHz	Dec. 25, 2024	Jan. 08, 2025	Dec. 24, 2025	DFS (DFS01-SZ)
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200424	9kHz~6GHz	Apr. 09, 2024	Jan. 08, 2025	Apr. 08, 2025	DFS (DFS01-SZ)
Combiner	TOJOIN	PS-2AM-0460	SZE14011007	0.4~6GHz	Sep. 05, 2024	Jan. 08, 2025	Sep. 04, 2025	DFS (DFS01-SZ)

NCR: No Calibration Required.



For NFC:

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Jan. 23, 2025	Apr. 08, 2025	Conducted (TH01-SZ)
Temperature & humidity chamber	Hongzhan	LP-150U	H2014011440	-40~+150°C 20%~95%RH	Jul. 04, 2024	Jan. 23, 2025	Jul. 03, 2025	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Max 30dBm	Oct. 11, 2024	Jan. 03, 2025	Oct. 10, 2025	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Jan. 03, 2025	Sep. 07, 2025	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	59915	30MHz~1GHz	Aug. 18, 2024	Jan. 03, 2025	Aug. 17, 2025	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002473	N/A	NCR	Jan. 03, 2025	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jan. 03, 2025	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jan. 03, 2025	NCR	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	413740	9KHz~1GHz	Jan. 02, 2025	Jan. 03, 2025	Jan. 01, 2026	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Jan. 20, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	Jan. 20, 2025	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Jan. 20, 2025	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	Jan. 20, 2025	Oct. 08, 2025	Conduction (CO01-KS)

For WWAN Bands:

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Jan. 08, 2025	Apr. 08, 2025	Conducted (TH01-SZ)
DC Power Supply	TTI	PL330P	290070	Max 32V , 3A	Oct.14, 2024	Jan. 08, 2025	Oct. 13, 2025	Conducted (TH01-SZ)
Power Divider	Titan	P02N005180	923402	0.4GHz~26.5GHz	Nov. 08, 2024	Jan. 08, 2025	Nov. 07, 2025	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 03, 2024	Jan. 08, 2025	Jul. 02, 2025	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY52260185	20Hz~26.5GHz	Dec. 25, 2024	Jan. 18, 2025	Dec. 24, 2025	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2E	101141	9kHz~30MHz	Dec. 28, 2024	Jan. 18, 2025	Dec. 27, 2025	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Oct. 24, 2023	Jan. 18, 2025	Oct. 23, 2025	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00119436	1GHz~18GHz	Jul. 04, 2024	Jan. 18, 2025	Jul. 03, 2025	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Apr. 09, 2024	Jan. 18, 2025	Apr. 08, 2025	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 09, 2024	Jan. 18, 2025	Apr. 08, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 14, 2024	Jan. 18, 2025	Oct. 13, 2025	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 03, 2024	Jan. 18, 2025	Jul. 02, 2025	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001985	N/A	Oct. 14, 2024	Jan. 18, 2025	Oct. 13, 2025	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jan. 18, 2025	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jan. 18, 2025	NCR	Radiation (03CH01-SZ)

NCR: No Calibration Required.

4 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. 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 (BT/WIFI2.4G/5G)

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	± 1.34 dB
Occupied Channel Bandwidth	± 0.012 MHz
Conducted Power	± 1.34 dB
Conducted Power Spectral Density	± 1.32 dB
Frequency	± 1.3 Hz

Uncertainty of Conducted Measurement (NFC)

Test Item	Uncertainty
Occupied Channel Bandwidth	± 0.012 MHz
Frequency	± 1.3 Hz

Uncertainty of Conducted Measurement (DFS)

Test Item	Uncertainty
Conducted Generated signal Levels	± 1.23 dB
Conducted Time	0.38%

Uncertainty of Conducted Measurement (WWAN)

Test Item	Uncertainty
Conducted Spurious Emission & Bandedge	± 1.34 dB
Occupied Channel Bandwidth	± 0.012 MHz
Conducted Power	± 1.34 dB
Peak to Average Ratio	± 1.34 dB
Frequency Stability	± 1.3 Hz

**Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)**

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.84 dB
---	---------

03CH08-KS(BT/WIF):**Uncertainty of Radiated Emission Measurement (9 KHz ~ 30 MHz)**

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.30 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.04 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.26 dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.40 dB
---	---------

03CH02-KS(NFC):**Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)**

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.30 dB
---	---------

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	6.04 dB
---	---------

**03CH01-SZ(WWAN):****Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)**

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.48 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

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

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

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

-THE END-



Appendix A. Radiated Spurious Emission

For Simultaneous transmission:

Test Engineer :	Zhaohui Liang	Relative Humidity :	50%
		Temperature :	20-22℃

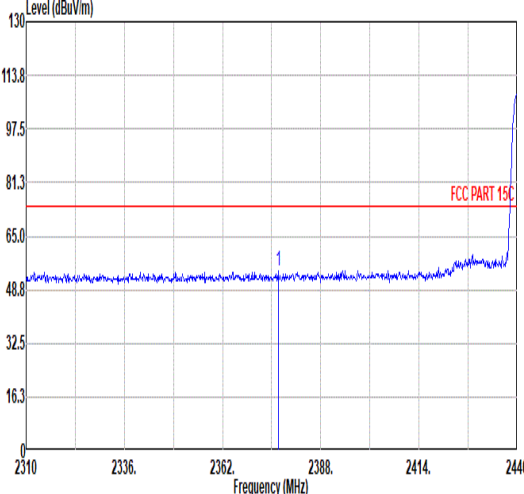
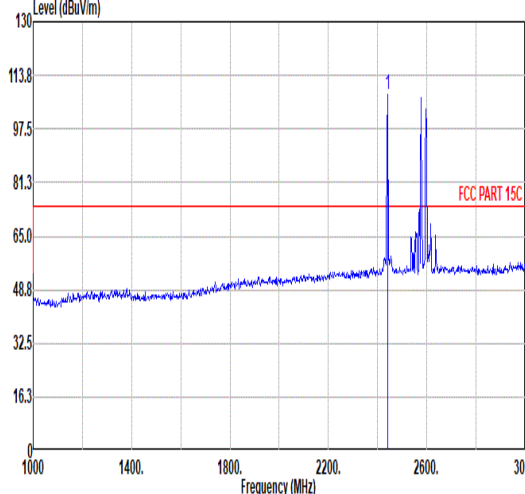
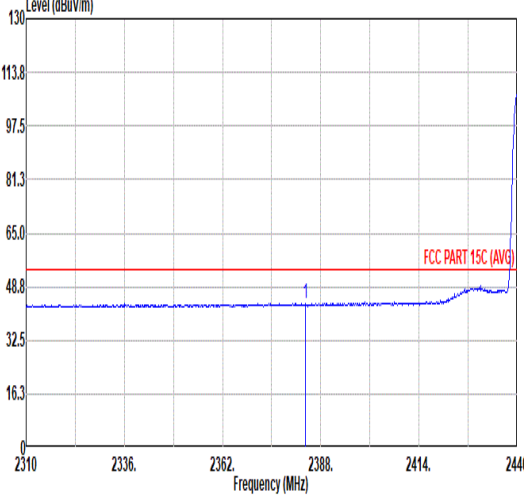
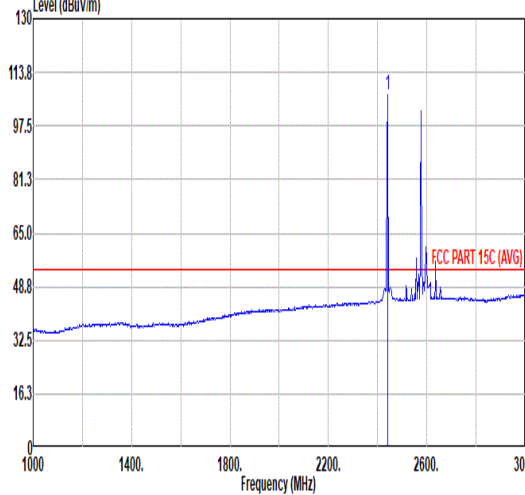
Radiated Spurious Emission Test Modes

Mode	Band	Band (GHz)	Antenna	Modulation	Channel	Frequency	Data Rate	RU	Remark
Mode 1	2400-2483.5	2400-2483.5	3	Bluetooth-LE_GSFK	19	2440	1Mbps	-	-
	U-NII-1	5.15-5.25	4	802.11ax HE20	36	5180	MCS0	Full RU	-
	LTE Band 41C								

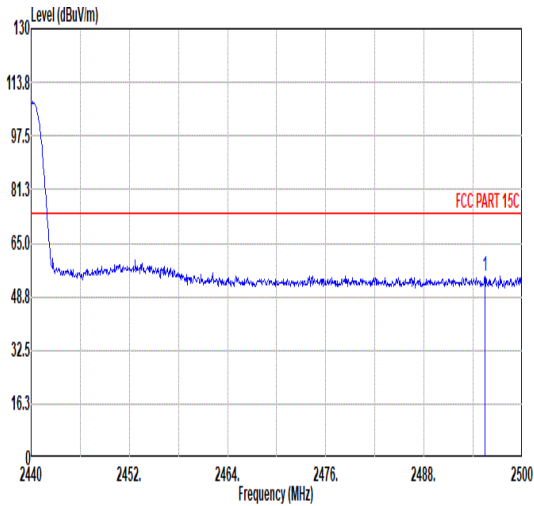
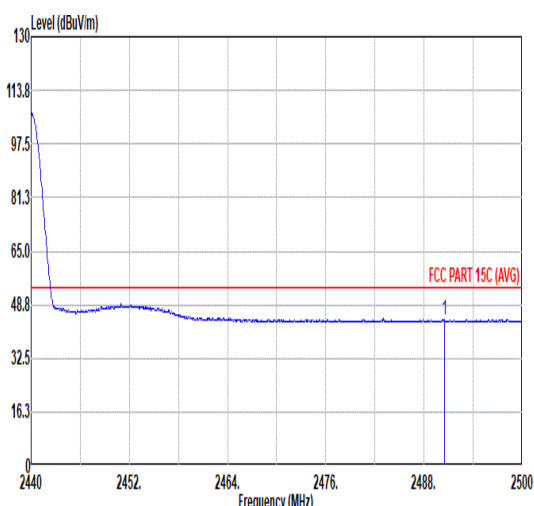
Summary of each worse mode

Mode	Modulation	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	Bluetooth-LE_GSFK	19	2490.46	44.29	54.00	-9.71	H	AVERAGE	Pass	Band Edge
	Bluetooth-LE_GSFK	19	4880.00	50.74	54.00	-3.26	H	AVERAGE	Pass	Harmonic
1	802.11ax HE20	36	5149.65	50.39	54.00	-3.61	H	AVERAGE	Pass	Band Edge
	802.11ax HE20	36	10360.00	44.85	68.20	-23.35	H	PEAK	Pass	Harmonic

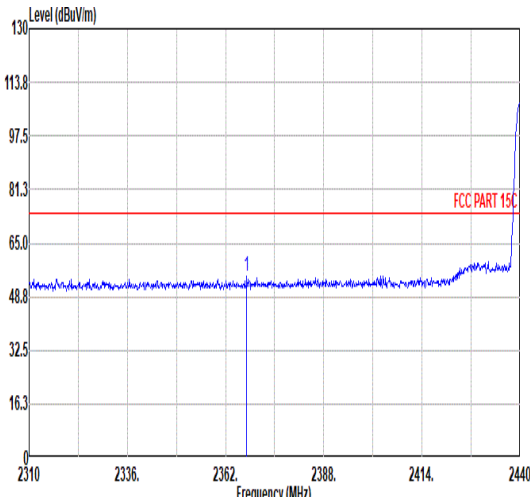
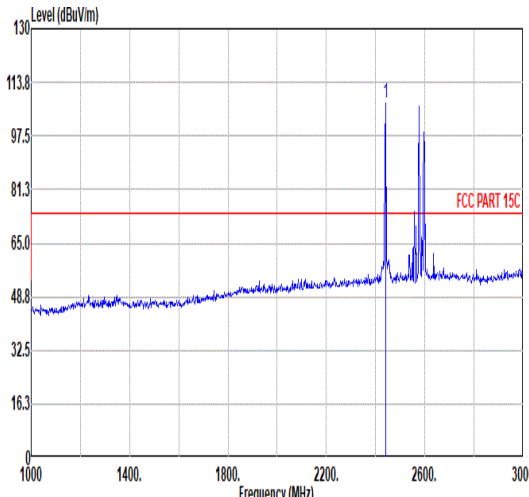
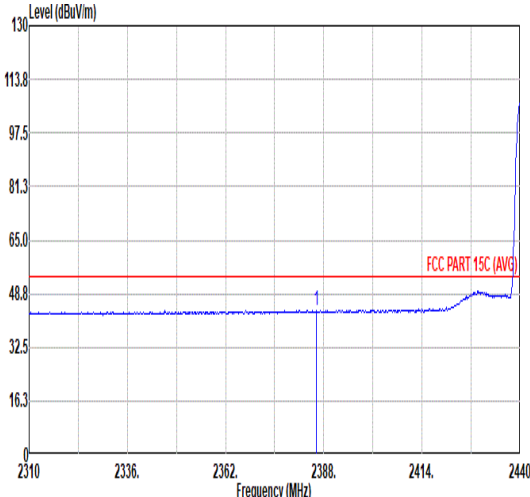
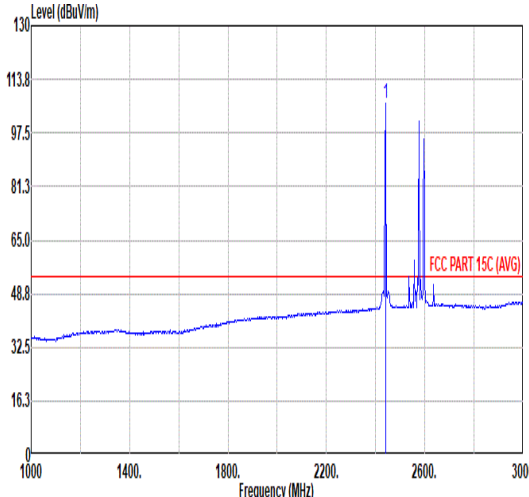


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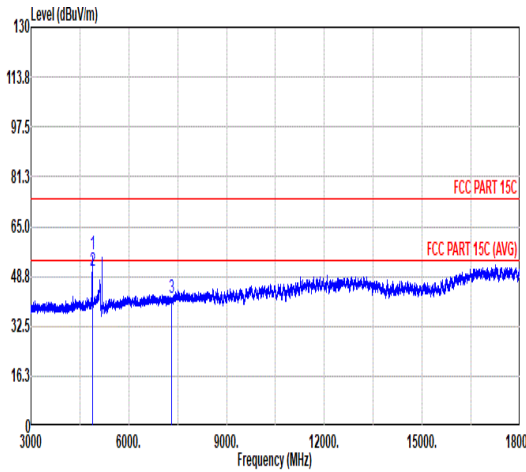
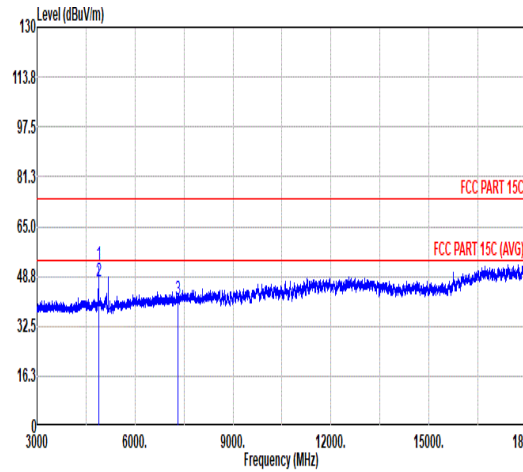


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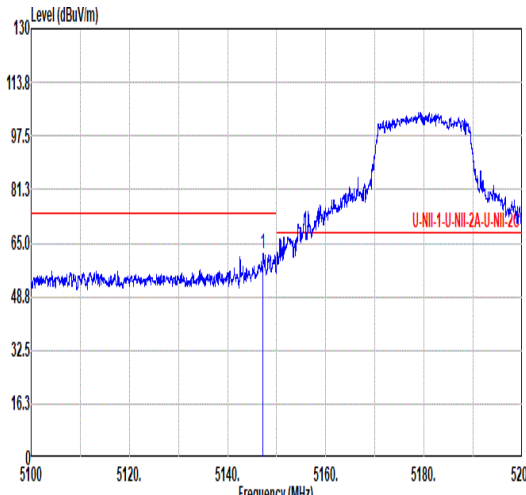
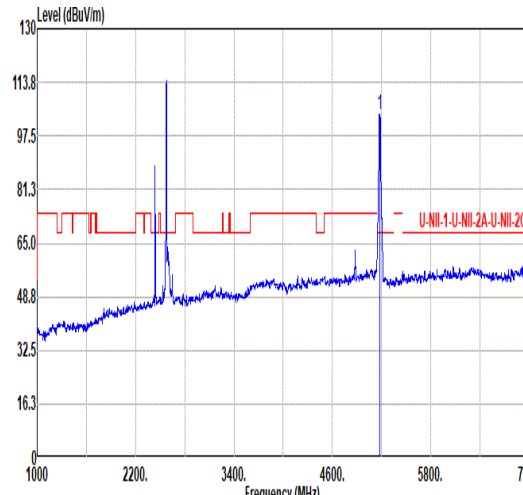
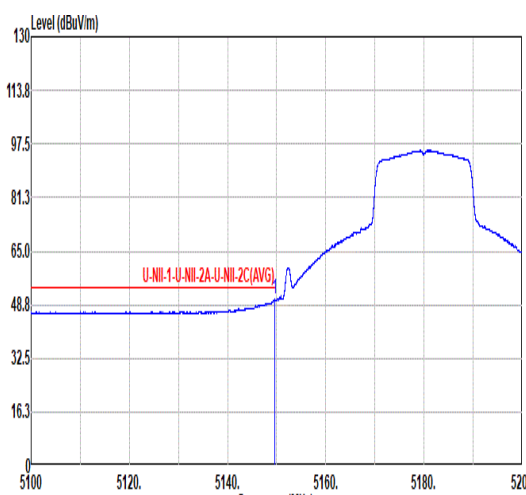
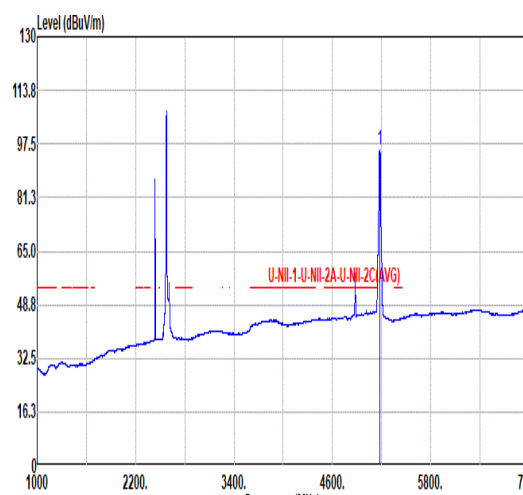


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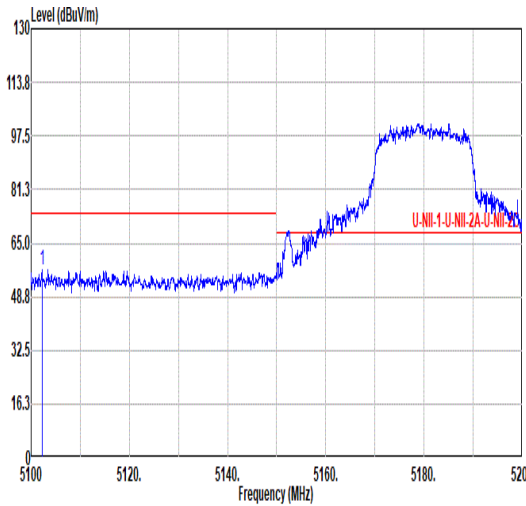
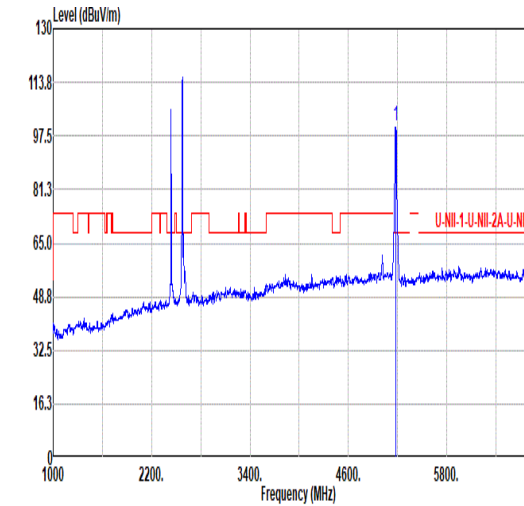
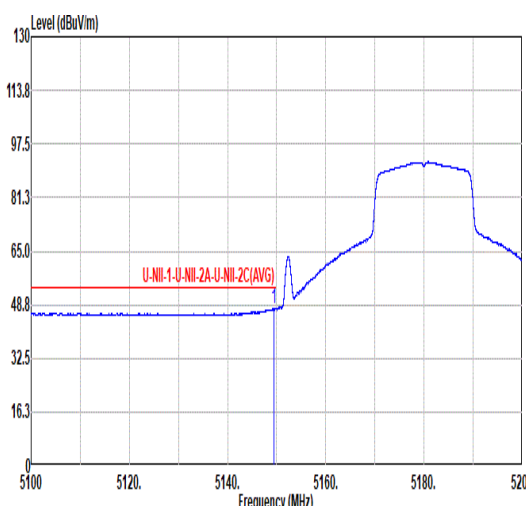
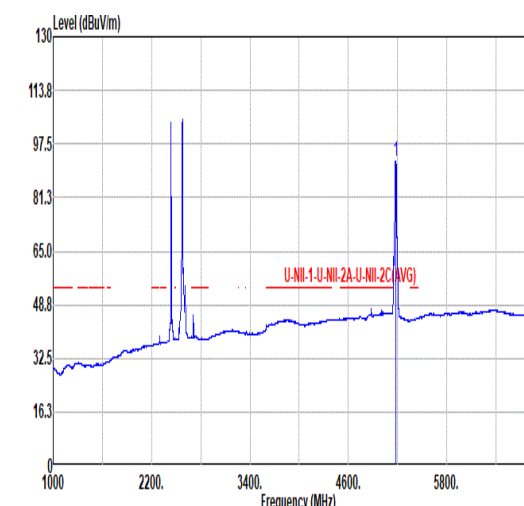


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	Band Edge																																																						
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1	10360.00	44.55	68.20	-23.65	56.08	37.47	17.54	66.54	0.00	--	PEAK																																											

Note: For all plots above, the over limit line signals are Fundamental signal which can be ignored

**For 5G NR n5 NSA:**

Test Engineer :	HuaCong Liang	Relative Humidity :	48~52%
		Temperature :	22-25℃

EN-DC_7A_n5A / LTE 10MHz + NR 20MHz / QPSK (ANT2+0)									
Channel	Frequency (MHz)	ERP/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)
NR n5 Middle	1654.5	-65.70	-13	-52.70	-77.23	-68.95	4.00	9.40	H
	2481.75	-59.92	-13	-46.92	-78.65	-63.49	4.88	10.60	H
	3309	-59.16	-13	-46.16	-79.95	-64.09	5.52	12.60	H
	1654.5	-64.93	-13	-51.93	-77.10	-68.18	4.00	9.40	V
	2481.75	-59.78	-13	-46.78	-78.83	-63.35	4.88	10.60	V
	3309	-58.45	-13	-45.45	-79.94	-63.38	5.52	12.60	V
LTE Band7 Middle	5061.18	-58.04	-25	-33.04	-81.16	-63.60	7.14	12.70	H
	7591.77	-55.00	-25	-30.00	-81.25	-58.30	8.30	11.60	H
	10122.36	-52.53	-25	-27.53	-82.91	-54.05	10.48	12.00	H
	5061.18	-57.38	-25	-32.38	-81.71	-62.94	7.14	12.70	V
	7591.77	-55.73	-25	-30.73	-81.98	-59.03	8.30	11.60	V
	10122.36	-51.58	-25	-26.58	-83.01	-53.10	10.48	12.00	V

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



Appendix C. Reference Report



FCC RF Test Report

APPLICANT : Motorola Mobility LLC
EQUIPMENT : Mobile Cellular Phone
BRAND NAME : Motorola
MODEL NAME : XT2503-1, XT2505-3
FCC ID : IHDT56AU7
STANDARD : FCC Part 15 Subpart C §15.225
CLASSIFICATION : (DXX) Low Power Communication Device Transmitter
TEST DATE(S) : Dec. 20, 2024 ~ Jan. 05, 2025

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.

This report contains data that were produced under subcontract by Sporton International Inc. (Shenzhen)

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)

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR4D1311D	Rev. 01	Initial issue of report	Jan. 24, 2025

SUMMARY OF THE TEST RESULT

Report Section	FCC Rule	Description of Test	Result	Remark
3.1	15.207	AC Power Line Conducted Emissions	Complies	Under limit 14.93 dB at 0.751MHz
3.2	15.215(c)	20dB Spectrum Bandwidth	Complies	-
	-	99% OBW Spectrum Bandwidth	Complies	-
3.3	15.225(e)	Frequency Stability	Complies	-
3.4	15.225(a)(b)(c)	Field Strength of Fundamental Emissions	Complies	Max level 12.46 dBμV/m at 13.56 MHz @30m
3.5	15.225(d) & 15.209	Radiated Spurious Emissions	Complies	Under limit 5.22 dB at 74.62MHz
3.6	15.203	Antenna Requirements	Complies	-

Conformity Assessment Condition:

1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacture who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty"

Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



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	XT2503-1, XT2505-3
FCC ID	IHDT56AU7
IMEI Code	Conducted: 354424860020035/354424860020043 Conduction: 354424860020134/354424860020142 Radiation: 354424860020159
HW Version	DVT2
SW Version	V2VC35.13
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, model name: XT2503-1 is sample 1 and model name: XT2505-3 is sample 2, the differences could be referred to the XT2503-1, XT2505-3_Operational Description of Product Equality Declaration which is exhibit separately. According to the difference, for RF report, we choose sample 1 to full test

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Frequency Range	13.553 ~ 13.567MHz
Channel Number	1
20dBW	2.577 KHz
99%OBW	2.188 KHz
Antenna Type	Loop Antenna
Type of Modulation	ASK

1.5 Modification of EUT

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

1.6 Testing Location

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

Test Firm	Sporton International Inc. (Kunshan)			
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158			
Test Site No.	Sporton Site No.		FCC Designation No.	FCC Test Firm Registration No.
	03CH02-KS	CO01-KS	CN1257	314309
Test Engineer	Moon	Amos		
Temperature	21~22℃	25.3~26.2℃		
Relative Humidity	45~46%	38~40%		



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 Engineer	ZhiQiangChen		
Temperature	24~26℃		
Relative Humidity	50~53%		

Test data subcontracted: conducted test case in section 3.2~3.3 of this report.



1.7 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH02-KS	AUDIX	E3	6.2009-8-24al
2.	CO01-KS	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 §15.225
- ♦ ANSI C63.10-2013

1.9 Specification of Accessory

Accessories Information				
AC Adapter 1(US)	Brand Name	Motorola(Chenyang)	Model Name	MC-681N
AC Adapter 1(EU)	Brand Name	Motorola(Chenyang)	Model Name	MC-682N
AC Adapter 1(UK)	Brand Name	Motorola(Chenyang)	Model Name	MC-683N
AC Adapter 1(AU)	Brand Name	Motorola(Chenyang)	Model Name	MC-685N
AC Adapter 1(AR)	Brand Name	Motorola(Chenyang)	Model Name	MC-686N
AC Adapter 1(BR)	Brand Name	Motorola(Chenyang)	Model Name	MC-687N
AC Adapter 1(CHILE)	Brand Name	Motorola(Chenyang)	Model Name	MC-689N
AC Adapter 2(US)	Brand Name	Motorola(Acbel)	Model Name	MC-681N
AC Adapter 2(EU)	Brand Name	Motorola(Acbel)	Model Name	MC-682N
AC Adapter 2(UK)	Brand Name	Motorola(Acbel)	Model Name	MC-683N
AC Adapter 2(AU)	Brand Name	Motorola(Acbel)	Model Name	MC-685N
AC Adapter 2(AR)	Brand Name	Motorola(Acbel)	Model Name	MC-686N
AC Adapter 2(BR)	Brand Name	Motorola(Acbel)	Model Name	MC-687N
AC Adapter 2(CHILE)	Brand Name	Motorola(Acbel)	Model Name	MC-689N
Battery 1	Brand Name	Motorola(ATL)	Model Name	RM52
Battery 2	Brand Name	Motorola(Cosmx)	Model Name	RM52
USB Cable 1	Brand Name	Motorola(saibao)	Model Name	SC18D71644
USB Cable 2	Brand Name	Motorola(Luxshare)	Model Name	SC18E08104
USB Cable 3	Brand Name	Motorola(saibao)	Model Name	SC18D86731
USB Cable 4	Brand Name	Motorola(Luxshare)	Model Name	SC18E08103
Wireless Earphones	Brand Name	Motorola	Model Name	XT2443-1

2. Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Investigation has been done on all the possible configurations.

The following table is a list of the test modes shown in this test report.

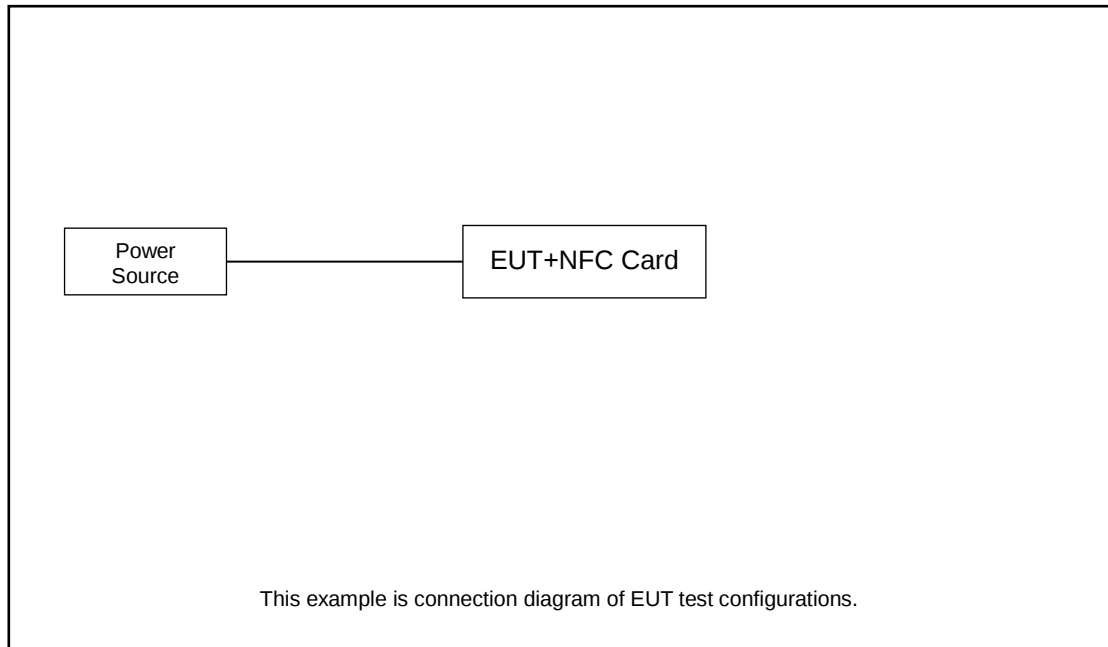
Test Items	
AC Power Line Conducted Emissions	Field Strength of Fundamental Emissions
20dB Spectrum Bandwidth	Frequency Stability
Radiated Emissions 9kHz~30MHz	Radiated Emissions 30MHz~1GHz

Pre-scanned tests, X, Y, Z in three orthogonal panels for Adapter mode and Earphone mode to determine the final configuration (Y plane as worst plane) from all possible combinations.

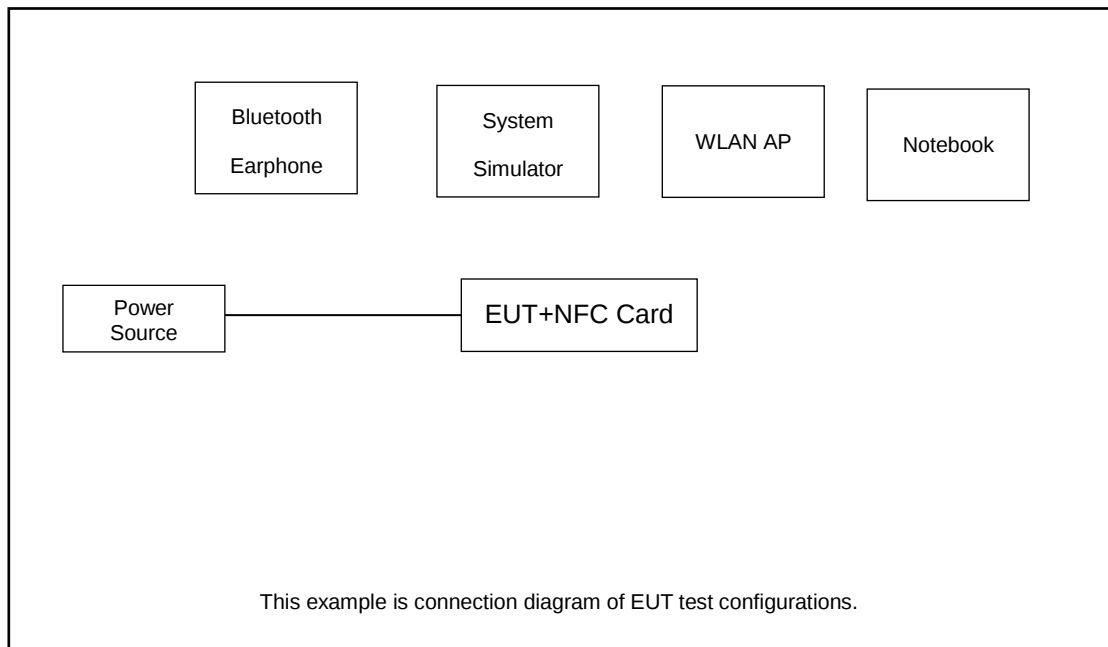
Test Cases	
AC Conducted Emission	Mode 1: GSM 850 Idle + BT Link + WLAN Link(2.4G) + NFC Tx + USB Cable 4 (Charging From Adaptor 1)
Remark: For Radiated Test Cases, the tests were performed with Adapter 1 and USB Cable 1.	

2.2 Connection Diagram of Test System

<Radiated Emission >



< AC Conducted Emission >



2.3 Table for Supporting Units

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
2.	Notebook	Lenovo	G480	QDS-BRCM1050I	N/A	shielded cable DC O/P 1.8m , Unshielded AC I/P cable 1.8m
3.	WLAN AP	D-link	DIR-655	KA21R655B1	N/A	Unshielded,1.8m
4.	SD Card	Kingston	8GB	N/A	N/A	N/A
5.	NFC Card	N/A	N/A	N/A	N/A	N/A

2.4 EUT Operation Test Setup

The EUT was programmed to be in continuously transmitting mode.

The ancillary equipment, NFC card, is used to make the EUT (NFC) continuously transmit at 13.56MHz and is placed around 0 cm gap to the EUT.

3. Test Results

3.1 AC Power Line Conducted Emissions Measurement

3.1.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

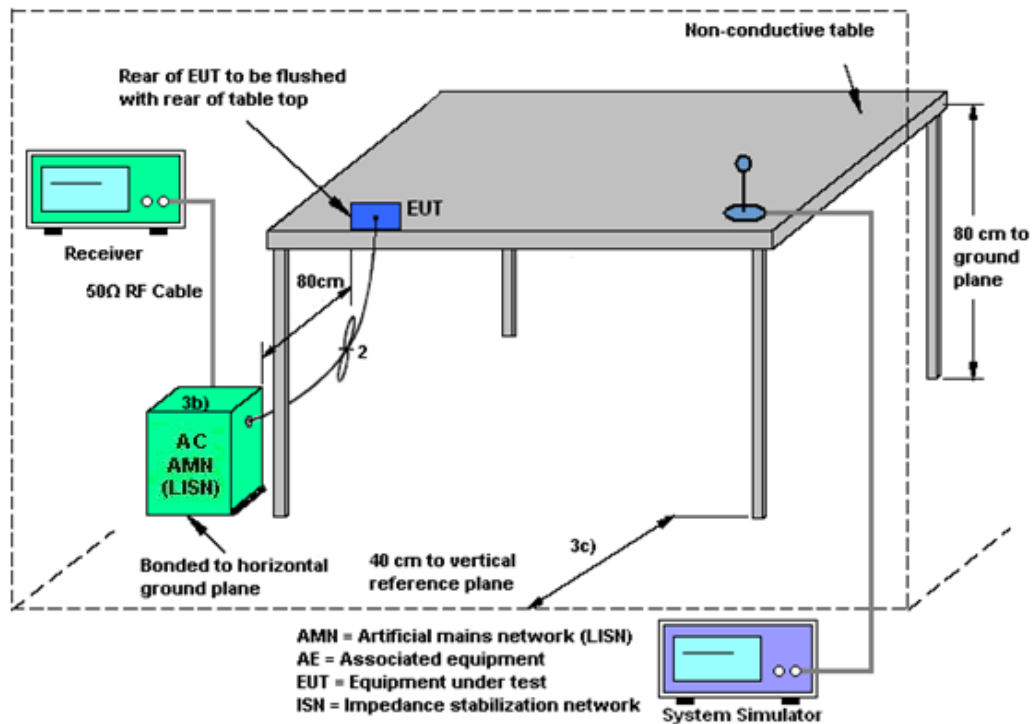
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.1.4 Test setup



3.1.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2 20dB and 99% OBW Spectrum Bandwidth Measurement

3.2.1 Limit

Intentional radiators must be designed to ensure that the 20dB and 99% emission bandwidth in the specific band 13.553~13.567MHz.

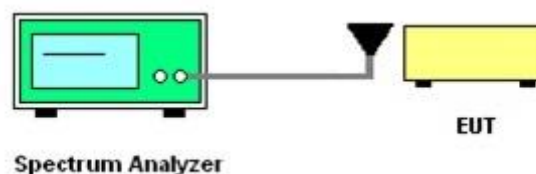
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT in peak Max hold mode.
2. The resolution bandwidth of 1 kHz and the video bandwidth of 3 kHz were used.
3. Measured the spectrum width with power higher than 20dB below carrier.
4. Measured the 99% OBW.

3.2.4 Test Setup



3.2.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.3 Frequency Stability Measurement

3.3.1 Limit

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% (100ppm) of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

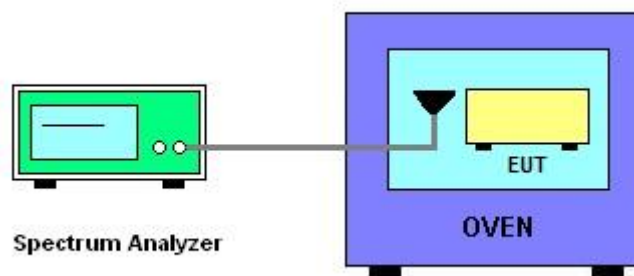
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The spectrum analyzer connected via a receive antenna placed near the EUT.
2. EUT have transmitted signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire emissions bandwidth.
4. Set RBW = 1 kHz, VBW = 3 kHz with peak detector and maxhold settings.
5. The f_c is declaring of channel frequency. Then the frequency error formula is $(f_c - f)/f_c \times 10^6$ ppm and the limit is less than ± 100 ppm.
6. Extreme temperature rule is -20°C~50°C.

3.3.4 Test Setup



3.3.5 Test Result of Conducted Test Items

Please refer to Appendix B.

3.4 Field Strength of Fundamental Emissions and Mask Measurement

3.4.1 Limit

Rules and specifications	FCC CFR 47 Part 15 section 15.225	
Description	Compliance with the spectrum mask is tested with RBW set to 9kHz.	
Freq. of Emission (MHz)	Field Strength ($\mu\text{V}/\text{m}$) at 30m	Field Strength ($\text{dB}\mu\text{V}/\text{m}$) at 30m
1.705~13.110	30	29.5
13.110~13.410	106	40.5
13.410~13.553	334	50.5
13.553~13.567	15848	84.0
13.567~13.710	334	50.5
13.710~14.010	106	40.5
14.010~30.000	30	29.5

3.4.2 Measuring Instruments

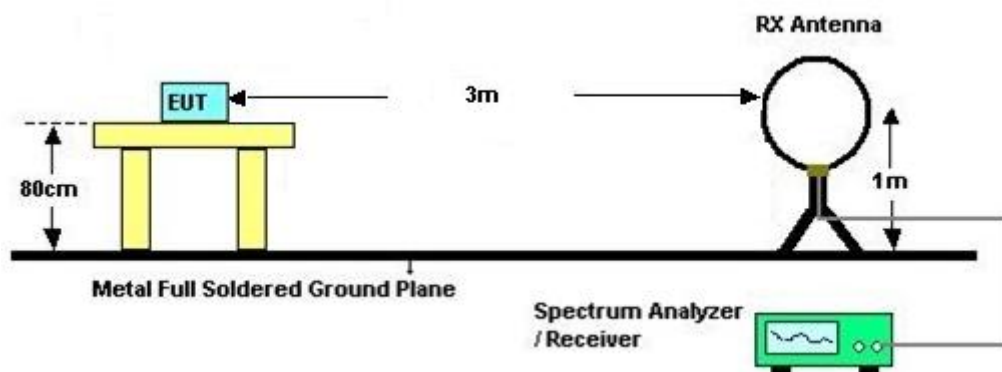
See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the loop receiving antenna mounted antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the receiving antenna was fixed at one meter above ground to find the maximum emissions field strength.
4. For Fundamental emissions, use the receiver to measure QP reading.
5. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
6. Compliance with the spectrum mask is tested with RBW set to 9kHz.
Note: Emission level (dBμV/m) = 20 log Emission level (μV/m).
7. The field strength is tested at 3m distance then convert to 30m by adding distance factor $40 \cdot \log(d1/d2)$.

3.4.4 Test Setup

For radiated emissions below 30MHz



3.4.5 Test Result of Field Strength of Fundamental Emissions and Mask

Please refer to Appendix C.

3.5 Radiated Emissions Measurement

3.5.1 Limit

The field strength of any emissions which appear outside of 13.110 ~14.010MHz band shall not exceed the general radiated emissions limits.

<FCC Limit>

Frequencies (MHz)	Field Strength (μ V/m)	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

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Measuring Instrument Setting

The following table is the setting of receiver.

Receiver Parameter	Setting
Attenuation	Auto
Frequency Range: 9kHz~150kHz	RBW 200Hz for QP
Frequency Range: 150kHz~30MHz	RBW 9kHz for QP
Frequency Range: 30MHz~1000MHz	RBW 120kHz for Peak

Note: The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

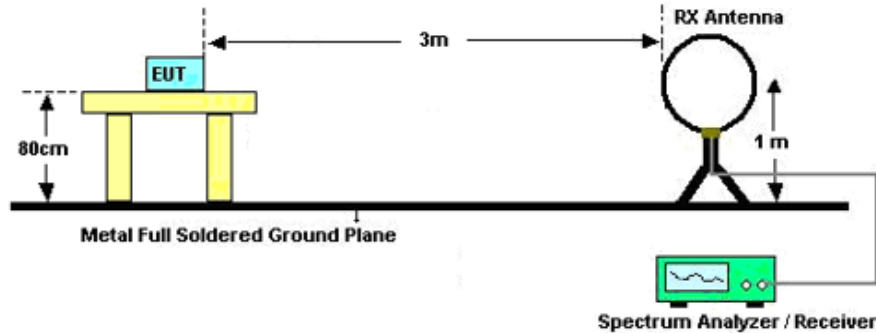


3.5.4 Test Procedures

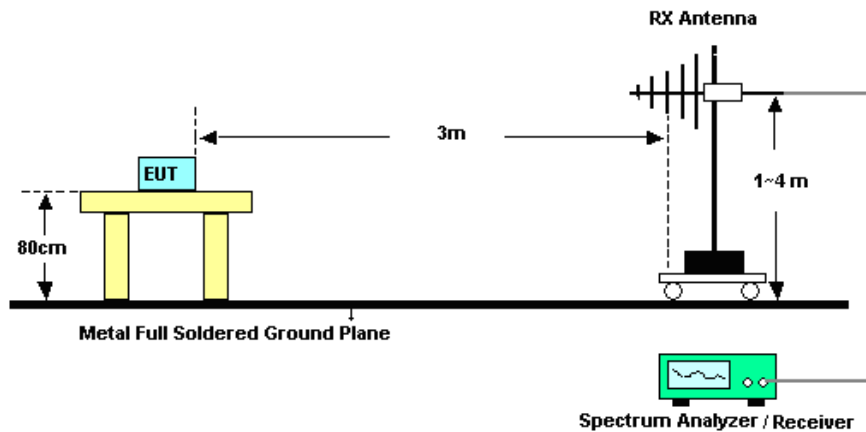
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
7. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. Antenna Requirements

3.5.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



3.5.6 Test Result of Radiated Emissions Measurement

Please refer to Appendix C.

Note:

1. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.
2. Tested for radiated below 30 MHz using a loop antenna in accordance with C63.10, the antenna was positioned in three antenna orientations: parallel, perpendicular, and ground-parallel. Pre-scanned the three antenna orientations, the worst case is parallel & perpendicular polarization, and test data of two mode was reported. (Parallel: The loop antenna is placed vertical axis and aligned along the site axis; Perpendicular: The loop antenna is placed vertical axis and orthogonal to the axis; ground-parallel: The loop antenna is placed horizontal axis and parallel with the ground).



3.6 Antenna Requirements

3.6.1 Standard Applicable

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited.

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.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.



4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Test Receiver	R&S	ESR7	101403	9kHz~7GHz;Ma x 30dBm	Oct. 11, 2024	Jan. 05, 2025	Oct. 10, 2025	Radiation (03CH02-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 08, 2024	Jan. 05, 2025	Sep. 07, 2025	Radiation (03CH02-KS)
Bilog Antenna	TeseQ	CBL6111D	59915	30MHz-1GHz	Aug. 18, 2024	Jan. 05, 2025	Aug. 17, 2025	Radiation (03CH02-KS)
AC Power Source	Chroma	61601	616010002 473	N/A	NCR	Jan. 05, 2025	NCR	Radiation (03CH02-KS)
Turn Table	MF	MF7802	N/A	0~360 degree	NCR	Jan. 05, 2025	NCR	Radiation (03CH02-KS)
Antenna Mast	MF	MF7802	N/A	1 m~4 m	NCR	Jan. 05, 2025	NCR	Radiation (03CH02-KS)
Amplifier	SONOMA	310N	413740	9KHz-1GHz	Jan. 02, 2025	Jan. 05, 2025	Jan. 01, 2026	Radiation (03CH02-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 18, 2024	Dec. 20, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Aug. 20, 2024	Dec. 20, 2024	Aug. 19, 2025	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Apr. 18, 2024	Dec. 20, 2024	Apr. 17, 2025	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 09, 2024	Dec. 20, 2024	Oct. 08, 2025	Conduction (CO01-KS)
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Jan. 02, 2025	Apr. 08, 2025	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangrou p	LP-150U	H2014081 803	-40~+150°C	Jul. 03, 2024	Jan. 02, 2025	Jul. 02, 2025	Conducted (TH01-SZ)

NCR: No Calibration Required

5. 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
Occupied Channel Bandwidth	± 0.012 MHz
Frequency	± 1.3 Hz

Uncertainty of AC Conducted Emission Measurement (0.15 MHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.84 dB
--	---------

Uncertainty of Radiated Emission Measurement (9 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	3.30 dB
--	---------

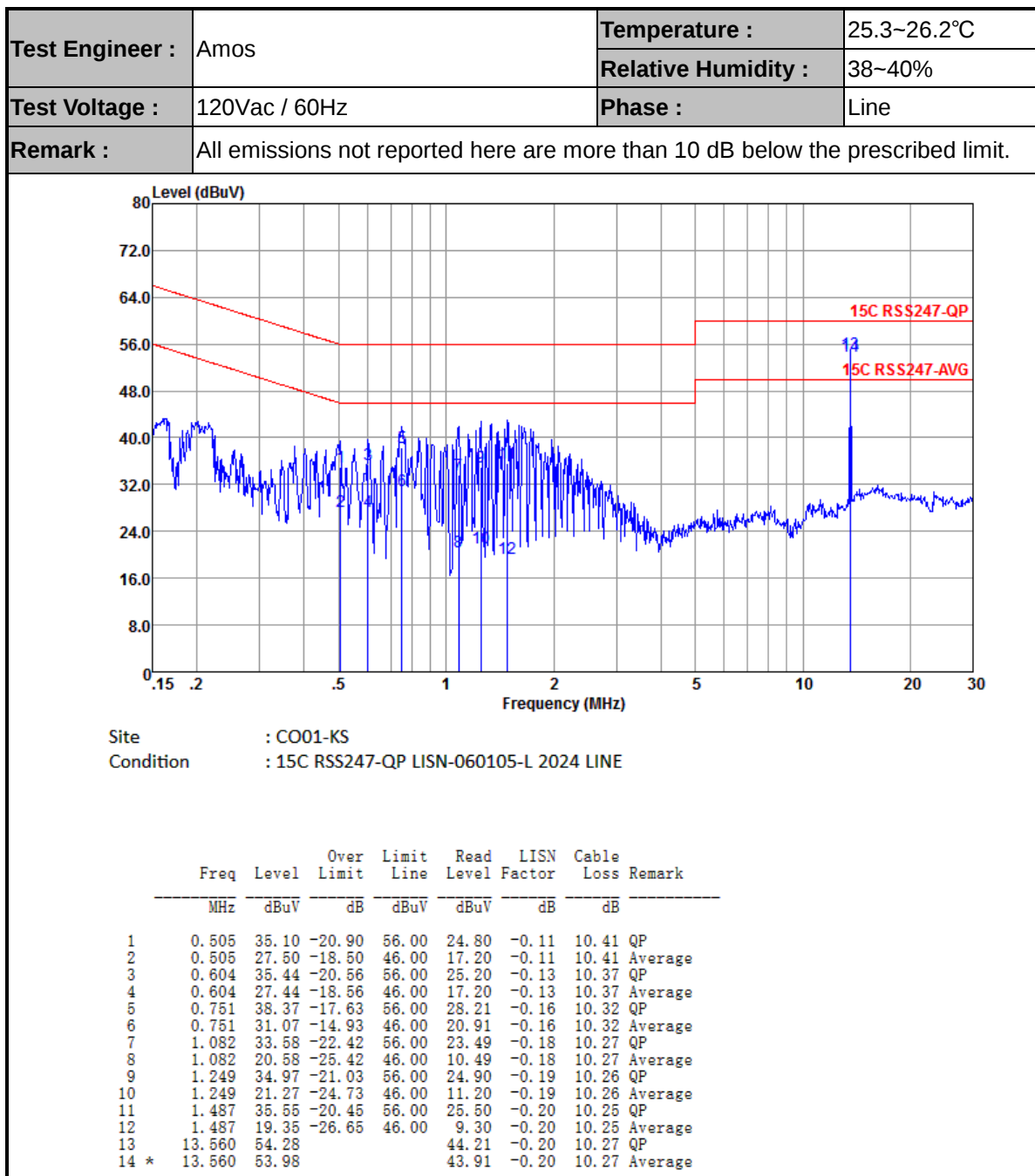
Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	6.04 dB
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----- THE END -----



Appendix A. Test Results of Conducted Emission Test

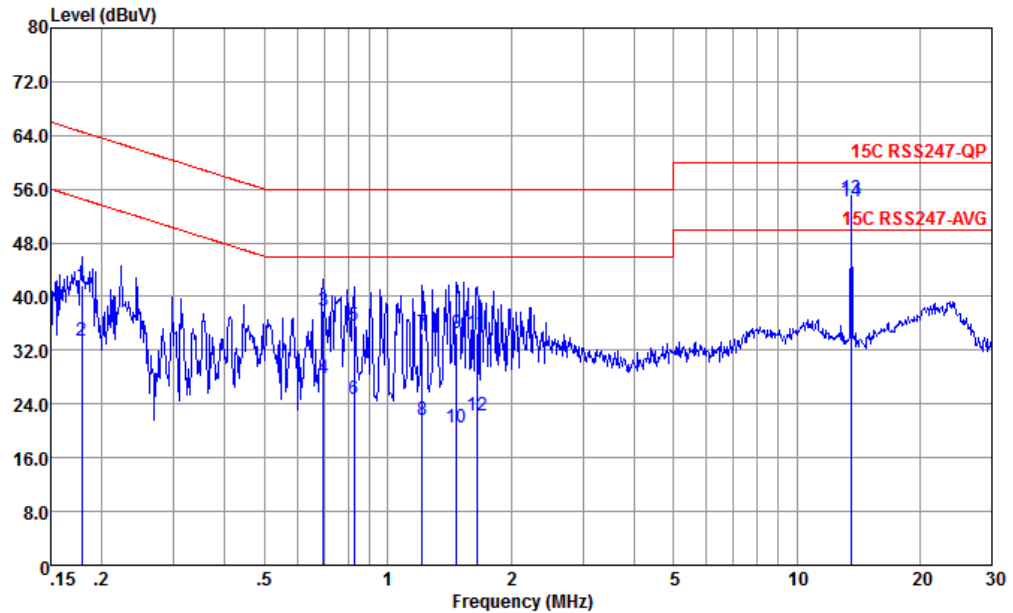


(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.



Test Engineer :	Amos	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-N 2024 NEUTRAL

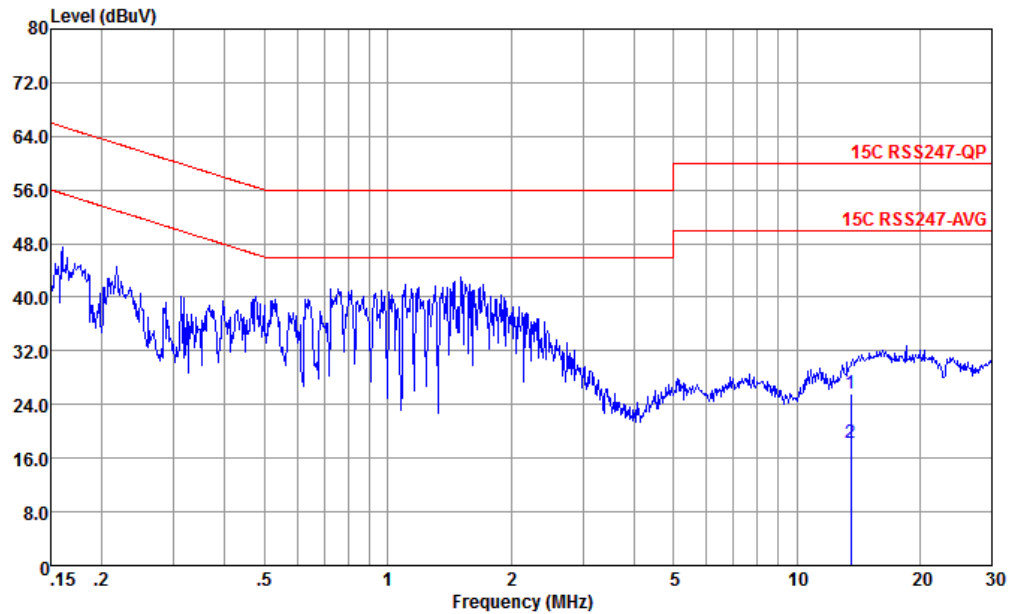
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.179	41.78	-22.77	64.55	31.19	0.13	10.46	QP
2	0.179	33.48	-21.07	54.55	22.89	0.13	10.46	Average
3	0.697	37.97	-18.03	56.00	27.79	-0.16	10.34	QP
4	0.697	27.77	-18.23	46.00	17.59	-0.16	10.34	Average
5	0.826	35.63	-20.37	56.00	25.50	-0.17	10.30	QP
6	0.826	24.63	-21.37	46.00	14.50	-0.17	10.30	Average
7	1.216	34.58	-21.42	56.00	24.50	-0.18	10.26	QP
8	1.216	21.68	-24.32	46.00	11.60	-0.18	10.26	Average
9	1.472	34.57	-21.43	56.00	24.51	-0.19	10.25	QP
10	1.472	20.57	-25.43	46.00	10.51	-0.19	10.25	Average
11	1.654	34.56	-21.44	56.00	24.50	-0.19	10.25	QP
12	1.654	22.26	-23.74	46.00	12.20	-0.19	10.25	Average
13	13.560	54.56			44.50	-0.21	10.27	QP
14 *	13.560	54.16			44.10	-0.21	10.27	Average

(1) with antenna

Remark: 13.560MHz is the NFC RF fundamental signal.



Test Engineer :	Amos	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



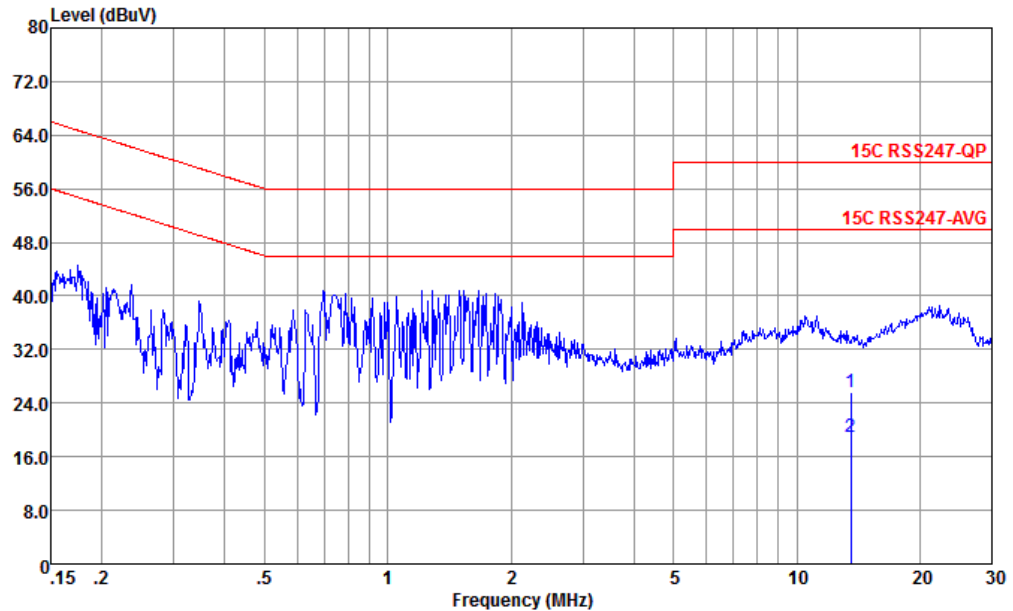
Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-L 2024 LINE

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	13.560	25.58	-34.42	60.00	15.51	-0.20	10.27	QP
2 *	13.560	18.38	-31.62	50.00	8.31	-0.20	10.27	Average

(2) With dummy load

Remark: Only the fundamental NFC signal needs to be retested per KDB 174176.

Test Engineer :	Amos	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-N 2024 NEUTRAL

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	13.560	25.56	-34.44	60.00	15.50	-0.21	10.27	QP
2 *	13.560	18.86	-31.14	50.00	8.80	-0.21	10.27	Average

(2) With dummy load

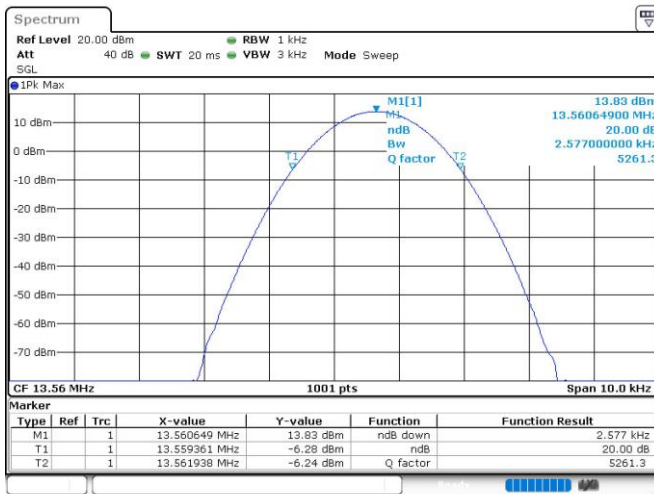
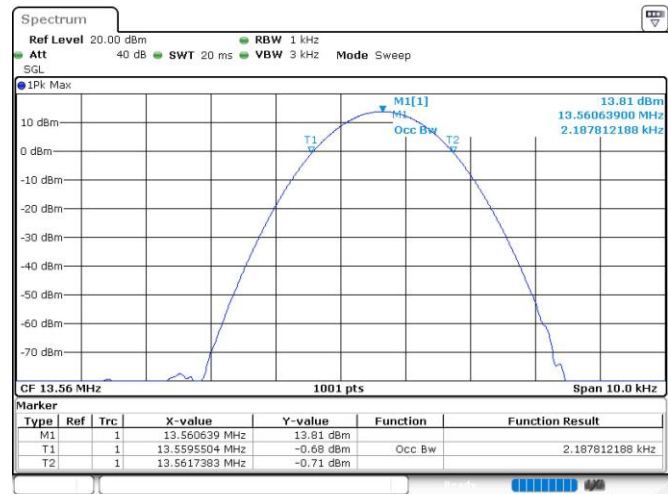
Remark: Only the fundamental NFC signal needs to be retested per KDB 174176.

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

Appendix B. Test Results of Conducted Test Items

B1. Test Result of 20dB Spectrum Bandwidth

Test mode		NFC Tx	
			
20dB Bandwidth (kHz)		99% Occupied BW(kHz)	
Frequency range (MHz)		Test Result	
$f_L > 13.553$		13.559361	
$f_H < 13.567$		13.561938	
		Complies	

Remark: Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.



B2. Test Result of Frequency Stability

Startup:

Voltage vs. Frequency Stability		Temperature vs. Frequency Stability		
Voltage (Vdc)	Measurement Frequency (MHz)	Temperature (°C)	Time	Measurement Frequency (MHz)
3.60	13.560645	-20	0	13.560645
3.91	13.560650		2	13.560615
4.50	13.560645		5	13.560610
			10	13.560610
		-10	0	13.560645
			2	13.560610
			5	13.560610
			10	13.560610
		0	0	13.560645
			2	13.560605
			5	13.560610
			10	13.560610
		10	0	13.560645
			2	13.560610
			5	13.560610
			10	13.560610
		20	0	13.560645
			2	13.560615
			5	13.560610
			10	13.560610
		30	0	13.560645
			2	13.560610
			5	13.560610
			10	13.560610
		40	0	13.560640
			2	13.560605
			5	13.560610
			10	13.560610
		50	0	13.560640
			2	13.560610
			5	13.560610
			10	13.560605
Max.Deviation (MHz)	0.000649	Max.Deviation (MHz)	0.000644	
Max.Deviation (ppm)	47.8982	Max.Deviation (ppm)	47.5295	
Limit	FS < ±100 ppm	Limit	FS < ±100 ppm	
Test Result	PASS	Test Result	PASS	

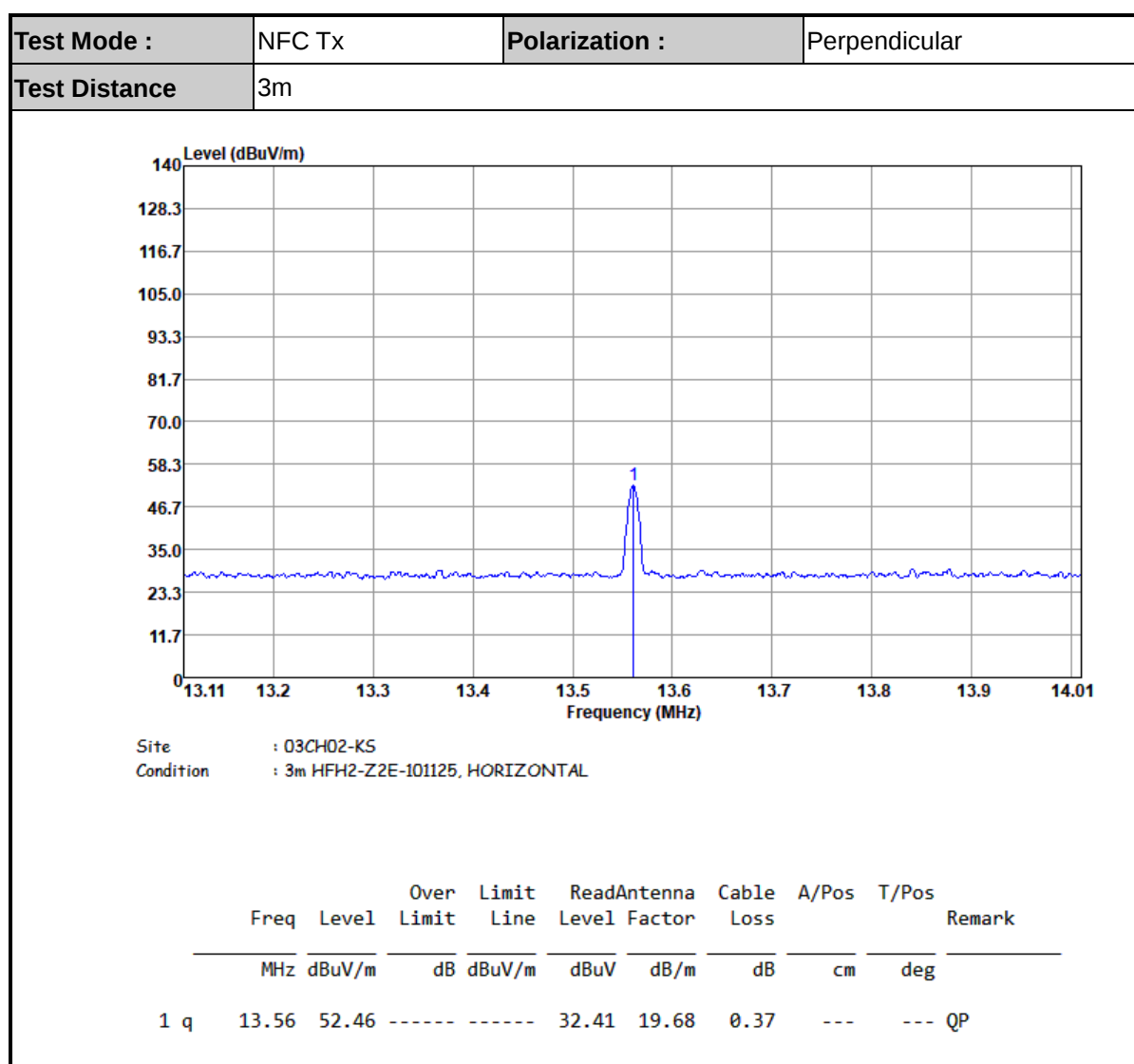


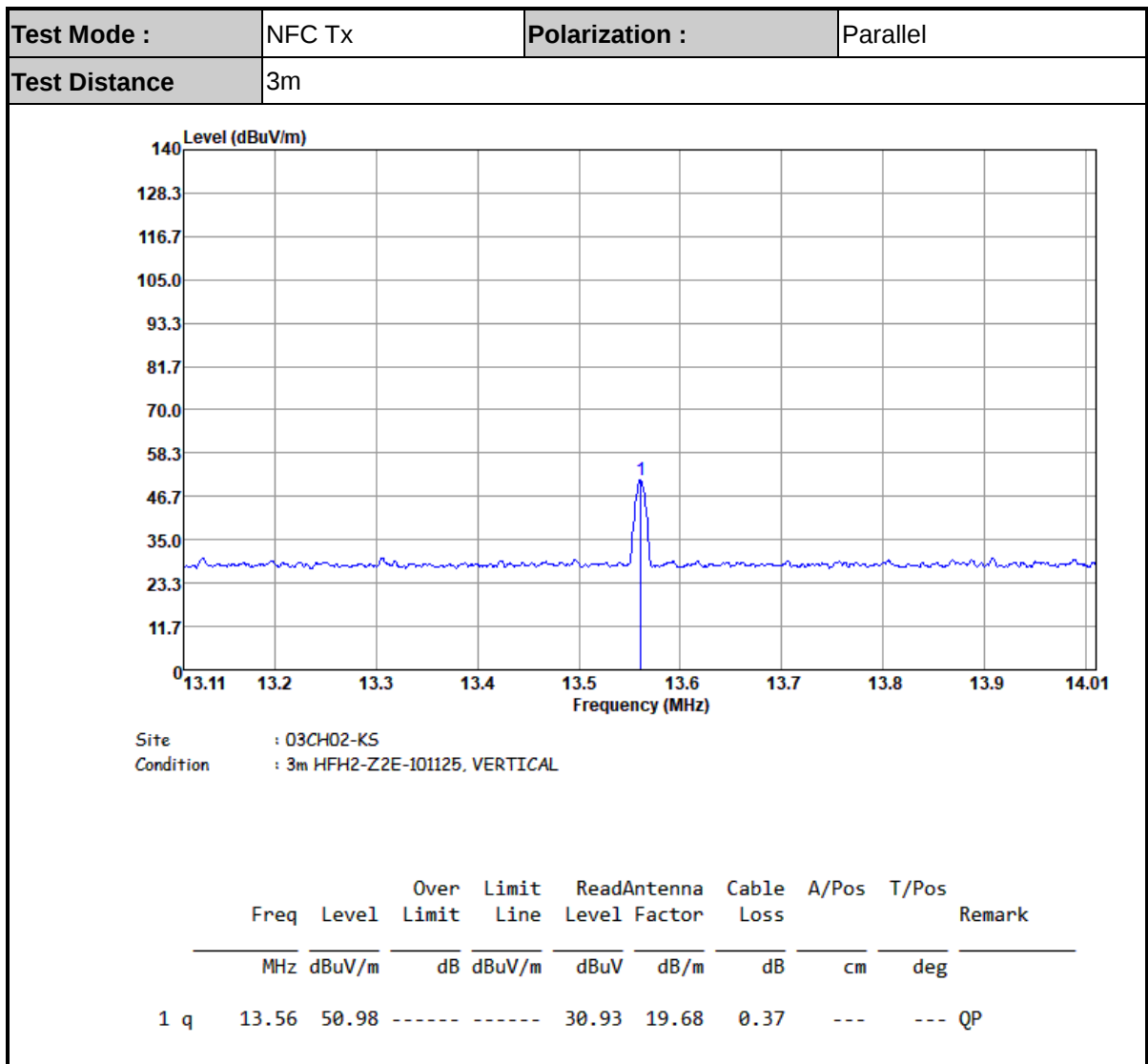
Appendix C. Test Results of Radiated Test Items

C.1 Test Result of Field Strength of Fundamental Emissions

Frequency (MHz)	Level @3m (dBuV/m)	Distance Factor (dB)	Corrected Level @30m (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Remark	Pol/Phase
13.56	52.46	40	12.46	83.9	-71.44	32.41	19.68	0.37	QP	Perpendicular
13.56	50.98	40	10.98	83.9	-72.92	30.93	19.68	0.37	QP	Parallel

Note: The field strength is tested at 3m distance then convert to 30m by adding distance factor $40 \cdot \log(d1/d2)$.





Note:

1. $\text{Level(dB}\mu\text{V/m)} = \text{Read Level(dB}\mu\text{V)} + \text{Antenna Factor(dB/m)} + \text{Cable Loss(dB)}$
2. $\text{Over Limit(dB)} = \text{Level(dB}\mu\text{V/m)} - \text{Limit Line(dB}\mu\text{V/m)}$
3. Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);
4. Corrected Level = Level @3m (dB μ V/m) - distance extrapolation factor.

C2.Results of Radiated Spurious Emissions (9 kHz~30MHz)

Test Mode :		NFC Tx				Polarization :		Perpendicular			
Frequency (MHz)	Level @3m (dBμV/m)	Distance Factor (dB)	Corrected Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.05	49.01	80	-30.99	-64.43	33.44	29.19	19.8	0.02	-	-	Average
0.07	49.17	80	-30.83	-61.24	30.41	29.45	19.7	0.02	-	-	Average
0.59	36.88	80	-43.12	-75.35	32.23	17.35	19.5	0.03	-	-	QP
5.61	29.56	40	-10.44	-39.94	29.5	10.07	19.32	0.17	-	-	QP
21.91	31.52	40	-8.48	-37.98	29.5	10.96	19.99	0.57	-	-	QP
28.82	31.19	40	-8.81	-38.31	29.5	10.18	20.28	0.73	-	-	QP

Test Mode :		NFC Tx				Polarization :		Parallel			
Frequency (MHz)	Level @3m (dBμV/m)	Distance Factor (dB)	Corrected Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
0.05	44.31	80	-35.69	-69.72	34.03	24.49	19.8	0.02	-	-	Average
0.07	42.57	80	-37.43	-68.44	31.01	22.85	19.7	0.02	-	-	Average
0.76	33.57	80	-46.43	-76.43	30	14.03	19.5	0.04	-	-	QP
7.96	29.29	40	-10.71	-40.21	29.5	9.56	19.5	0.23	-	-	QP
19.19	30.85	40	-9.15	-38.65	29.5	10.58	19.76	0.51	-	-	QP
28.24	31.21	40	-8.79	-38.29	29.5	10.27	20.22	0.72	-	-	QP

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = 40 log (specific distance / test distance) (dB);
3. Corrected Level = Level @3m (dBμV/m) - distance extrapolation factor.

C3.Results of Radiated Spurious Emissions (30MHz~1GHz)

Test Mode :		NFC Tx				Polarization :		Horizontal		
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
41.64	31.87	-8.13	40	45.31	18.79	0.6	32.83	-	-	Peak
74.62	34.78	-5.22	40	53.76	12.94	0.8	32.72	100	195	Peak
176.47	30.31	-13.19	43.5	46.5	15.17	1.38	32.74	-	-	Peak
321	24.7	-21.3	46	36.05	19.6	1.89	32.84	-	-	Peak
807.94	27.24	-18.76	46	28.79	28.41	2.98	32.94	-	-	Peak
956.35	30	-16	46	27.76	30.63	3.21	31.6	-	-	Peak

Test Mode :		NFC Tx				Polarization :		Vertical		
Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
72.68	30.91	-9.09	40	50.1	12.73	0.8	32.72	-	-	Peak
172.59	32.26	-11.24	43.5	48.1	15.51	1.38	32.73	-	-	Peak
321	26.3	-19.7	46	37.65	19.6	1.89	32.84	-	-	Peak
566.41	24.78	-21.22	46	29.1	26.42	2.51	33.25	-	-	Peak
794.36	27.13	-18.87	46	28.81	28.4	2.95	33.03	-	-	Peak
962.17	30.22	-23.78	54	27.91	30.58	3.26	31.53	-	-	Peak

Note:

1. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Emission level (dB μ V/m) = 20 log Emission level (μ V/m).
3. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor= Level.