



FCC RADIO TEST REPORT

FCC ID : DC9WSOPMW
Equipment : Microwave Module
Brand Name : OPTEX
Model Name : WS-OPMW-WL X5
Applicant : OPTEX CO., LTD.
5-8-12, Ogoto Otsu-Shi, Shiga-Ken, 520-0101 Japan
Manufacturer : OPTEX CO., LTD.
5-8-12, Ogoto Otsu-Shi, Shiga-Ken, 520-0101 Japan
Standard : 47 CFR FCC Part 15.245

The product was received on Aug. 14, 2019, and testing was started from Aug. 27, 2019 and completed on Aug. 30, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown 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: Sam Chen

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Appendix A. Test Photos

Photographs of EUT v01



History of this test report



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.207	AC Power Conducted Emissions	PASS	-
3.2	15.245(b)	Field Strength of Fundamental	PASS	-
3.3	15.245(b)	Transmitter Spurious Emissions	PASS	-
3.4	15.203	Antenna Requirements	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.

Reviewed by: Sam Chen

Report Producer: Cindy Peng



1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information	
Power Type	From host system
Frequency Range	10.5 – 10.55 GHz
Operation Frequency	10525 MHz
Channel Number	1
Modulation	CW
Antenna	Antenna Type: Printed Antenna (Without any antenna connector), Antenna Gain: 7.50 dBi

Note: The above information was declared by manufacturer.

1.1.2 Field Strength of Fundamental

Field Strength of Fundamental							
Applicable power levels:	<input type="checkbox"/> Conducted <input type="checkbox"/> EIRP <input checked="" type="checkbox"/> Field Strength at 3m						
Frequency	Highest setting (P_{high}): (dBuV/m)						
	Power Setting	Modulation	Data Rate (Mb/s)	Average Level	Peak Level	Average Level Limit	Peak Level Limit
10525 MHz	N/A	CW	N/A	108.27	108.95	128	148

1.1.3 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR611401

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Add eight host system model names as below: 1. VXS-DAM-X5 2. VXS-DAM-X5(W) 3. VXS-RDAM-X5 4. VXS-RDAM-X5(W) 5. WXS-DAM-X5 6. WXS-RDAM-X5 7. QXI-DT-X5 8. QXI-RDT-X5	<ul style="list-style-type: none">1. AC Power Conducted Emissions.2. Field Strength of Fundamental.3. Transmitter Spurious Emissions Below 1GHz.4. Transmitter Spurious Emissions 1GHz~40GHz.



1.2 Accessories

N/A

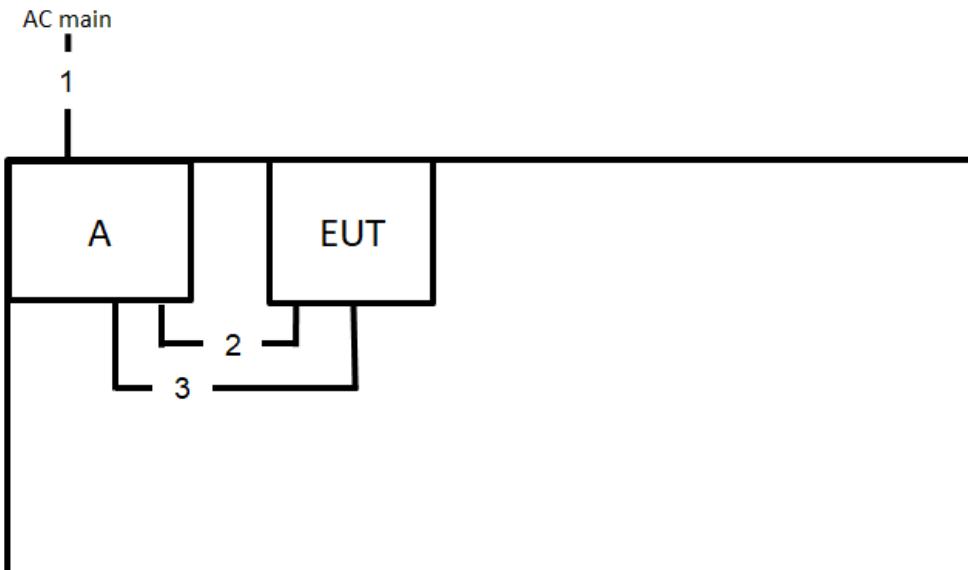
1.3 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Power Supply	Advanced	LPS-305	N/A



1.4 EUT Setups

AC Power Conducted Emissions

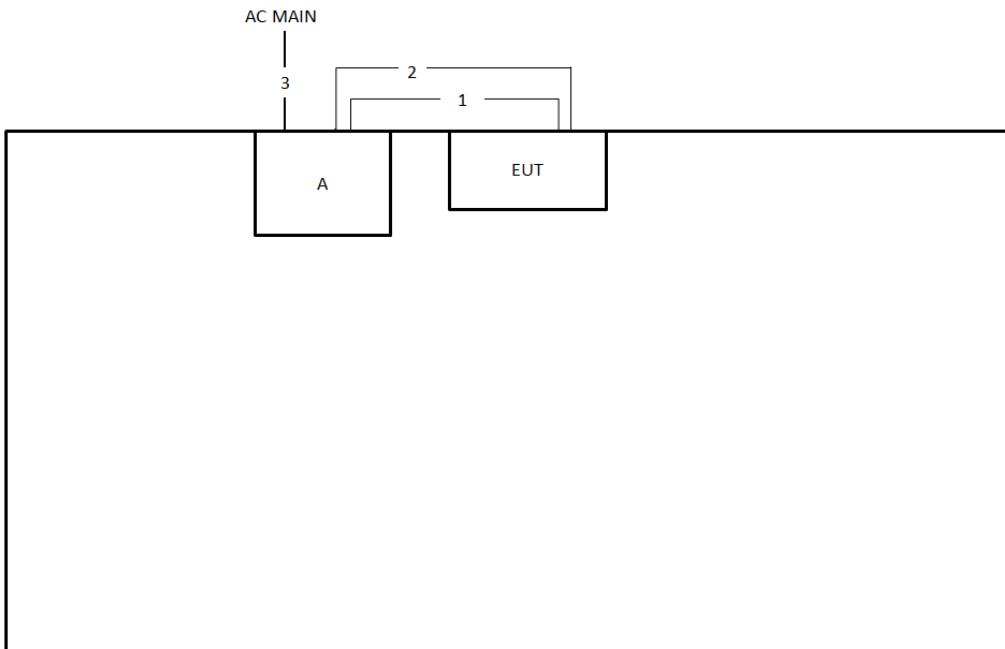


Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	Crocodile clip cable	No	1m
3	Crocodile clip cable	No	1m



Transmitter Spurious Emissions

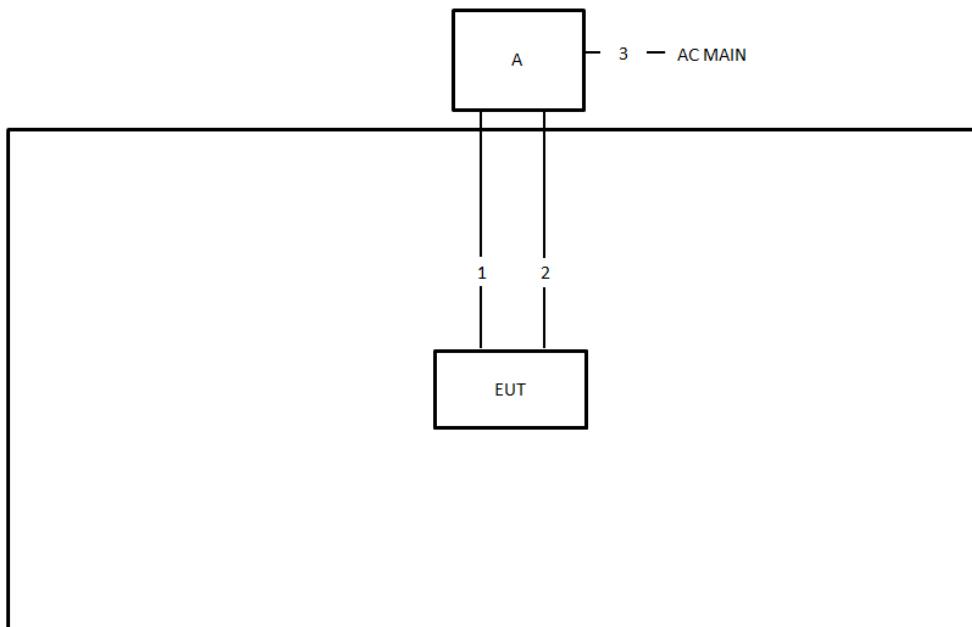
30MHz~1GHz



Item	Connection	Shielded	Length
1	Crocodile clip cable	No	0.8m
2	Crocodile clip cable	No	0.8m
3	Power cable	No	1.5m



Above 1GHz



Item	Connection	Shielded	Length
1	Crocodile clip cable	No	0.8m
2	Crocodile clip cable	No	0.8m
3	Power cable	No	1.5m



1.5 Applicable Standards

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

- ♦ ANSI C63.10-2013
- ♦ 47 CFR FCC Part 15.245
- ♦ FCC KDB 414788 D01 v01r01

1.6 Testing Location Information

Testing Location				
<input type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973		
<input checked="" type="checkbox"/>	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085		

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO02-CB	Peter Wu	24~25°C / 57~58%	Aug. 30, 2019
Radiated Below 1GHz	03CH06-CB	Eason Chen	24.2~25.5°C / 62~66%	Aug. 27, 2019~Aug. 29, 2019
Radiated Above 1GHz	03CH06-CB	KJ Chang	23.9~25.8°C / 62~65%	Aug. 27, 2019

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086B with Industry Canada.



2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Nominal Channel Bandwidth			
Frequency Band	Low Channel	Middle Channel	High Channel
10.5 – 10.55 GHz	N/A	10525 MHz	N/A

2.2 Conformance Tests and Related Test Frequencies

Test	Mode	Test Frequencies
AC Power Conducted Emissions	Normal Link	-
Field Strength of Fundamental	CTX	10525 MHz
Transmitter Spurious Emissions Below 1GHz	Normal Link	-
Transmitter Spurious Emissions 1GHz~40GHz	CTX	10525 MHz

The EUT is a limited module which only limited to the host (brand: OPTEX / model: VXS-DAM-X5, VXS-DAM-X5(W), VXS-RDAM-X5, VXS-RDAM-X5(W), WXS-DAM-X5, WXS-RDAM-X5, QXI-DT-X5, QXI-RDT-X5).

The EUT was installed to the host (brand: OPTEX / model: VXS-DAM-X5, VXS-RDAM-X5, WXS-DAM-X5, WXS-RDAM-X5, QXI-DT-X5, QXI-RDT-X5) to perform all the tests.

The following test modes were performed for all tests:

For AC Power Conducted Emissions test:

Mode 1. host model: VXS-DAM-X5 (powered by DC power)

Mode 2. host model: WXS-DAM-X5 (powered by DC power)

Mode 3. host model: QXI-DT-X5 (powered by DC power)

Mode 1 is the worst case, so it was selected to record in this test report.

For Field Strength of Fundamental test:

Mode 1. host model: VXS-DAM-X5

Mode 2. host model: WXS-DAM-X5

Mode 3. host model: QXI-DT-X5

Mode 1 is the worst case, so it was selected to record in this test report.

For Transmitter Spurious Emissions Below 1GHz test:

Mode 1. host model: VXS-DAM-X5 (powered by DC power)

Mode 2. host model: VXS-RDAM-X5 (powered by battery)

Mode 3. host model: WXS-DAM-X5 (powered by DC power)

Mode 4. host model: WXS-RDAM-X5 (powered by battery)

Mode 5. host model: QXI-DT-X5 (powered by DC power)

Mode 6. host model: QXI-RDT-X5 (powered by battery)

Mode 1 is the worst case, so it was selected to record in this test report.

For Transmitter Spurious Emissions 1GHz~40GHz test:

"host model: VXS-DAM-X5" generated the worst test result for Field Strength of Fundamental test, thus the measurement for Transmitter Spurious Emissions 1GHz~40GHz test will follow this same test configuration.

Mode 1. model: VXS-DAM-X5

Note: The EUT can only be used at Y axis position.



2.3 Duty Cycle

On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
0.032	1.004	3.19%	14.97	31.25



3 Transmitter Test Result

3.1 AC Power Conducted Emissions

3.1.1 Limit of AC Power Conducted Emissions

AC Power Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note: * Decreases with the logarithm of the frequency.

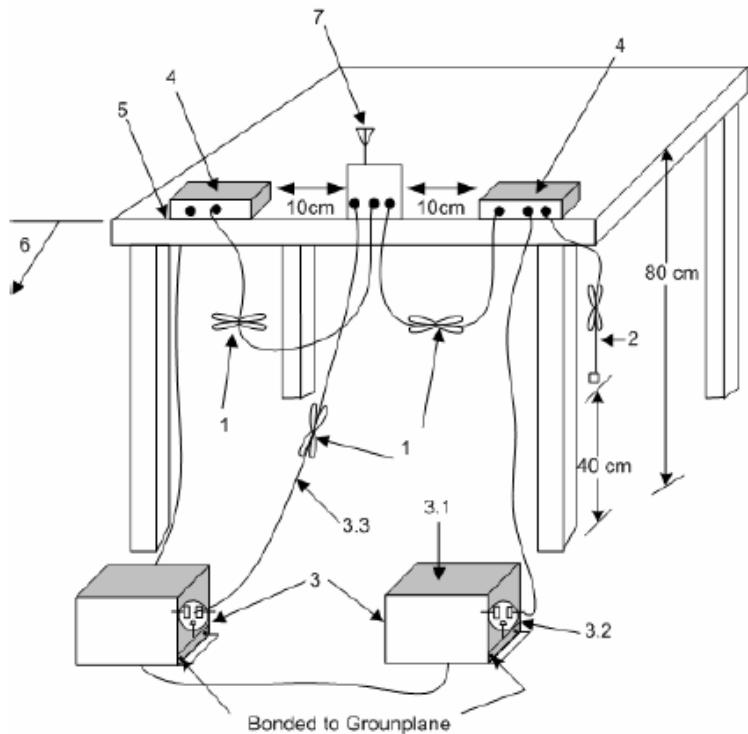
3.1.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.1.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 6.2.

3.1.4 Test Setup



- 1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
- 2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- 3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
 - 3.1—All other equipment powered from additional LISN(s).
 - 3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
 - 3.3—LISN at least 80 cm from nearest part of EUT chassis.
- 4—Non-EUT components of EUT system being tested.
- 5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
- 6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- 7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.



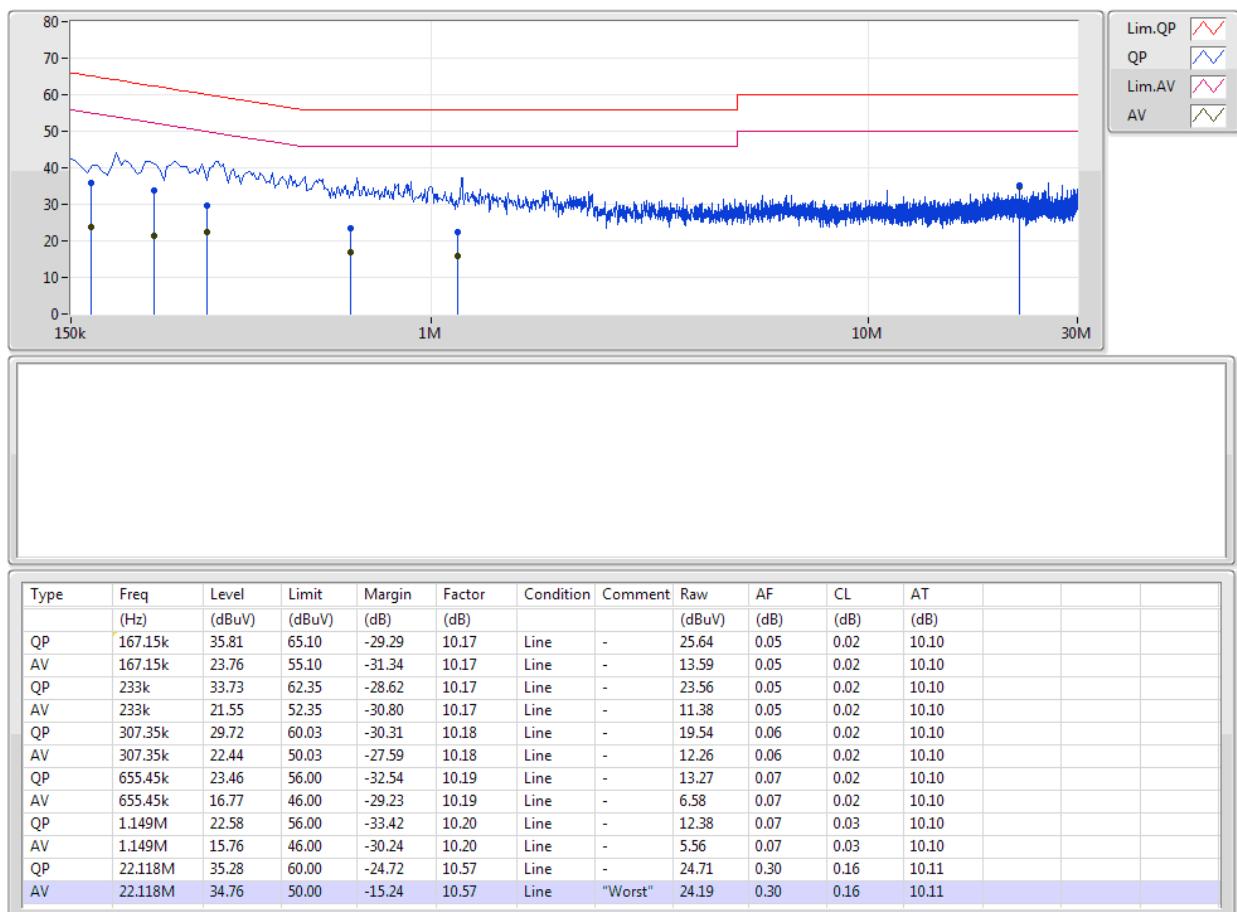
3.1.5 Test Result of AC Power Conducted Emissions

Test Conditions:	see ANSI C63.10, clause 5.11
Test Setup:	see ANSI C63.10, clause 6.2.3
Note 1: If equipment having different channel plan and nominal channel bandwidth modes, the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes. If equipment having different transmit operating modes, the measurements are uninfluenced by different transmit operating modes, may not need to be repeated for all the operating modes. Similar, if the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing.	
Note 2: ">20dB" means the tables in this clause should only list values of spurious emissions that exceed the level of 20 dB below the applicable limit, see ANSI C63.4, clause 10.1.8.1.	



Phase	Line	Configuration	Normal Link
Test Mode	Mode 1		

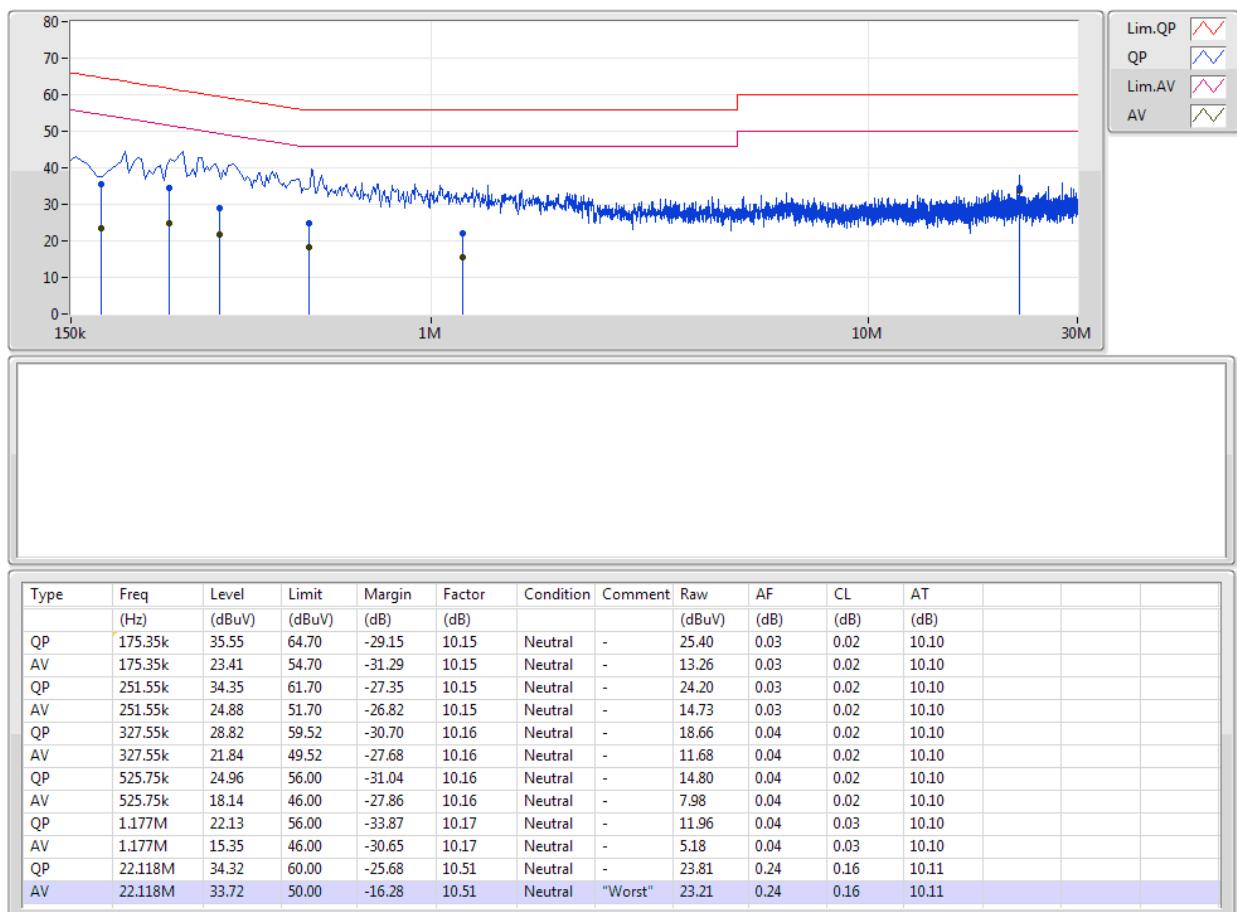
30/08/2019





Phase	Neutral	Configuration	Normal Link
Test Mode	Mode 1		

30/08/2019





3.2 Field Strength of Fundamental

3.2.1 Limit of Field Strength of Fundamental

Frequencies (MHz)	Field Strength (mV/meter)	Field Strength (dBuV/m) at 3m
902~928 MHz	500 at 3m	114 (Average)
902~928 MHz	5000 at 3m	134 (Peak)
2435~2465MHz	500 at 3m	114 (Average)
2435~2465MHz	5000 at 3m	134 (Peak)
5785~5815 MHz	500 at 3m	114 (Average)
5785~5815 MHz	5000 at 3m	134 (Peak)
10.5~10.55 GHz	2500 at 3m	128 (Average)
10.5~10.55 GHz	25000 at 3m	148 (Peak)
24.075~24.175 GHz	2500 at 3m	128 (Average)
24.075~24.175 GHz	25000 at 3m	148 (Peak)

Note1: For the applicable limit, see 15.245(b)

Note2: The limit shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [9.54 dB].

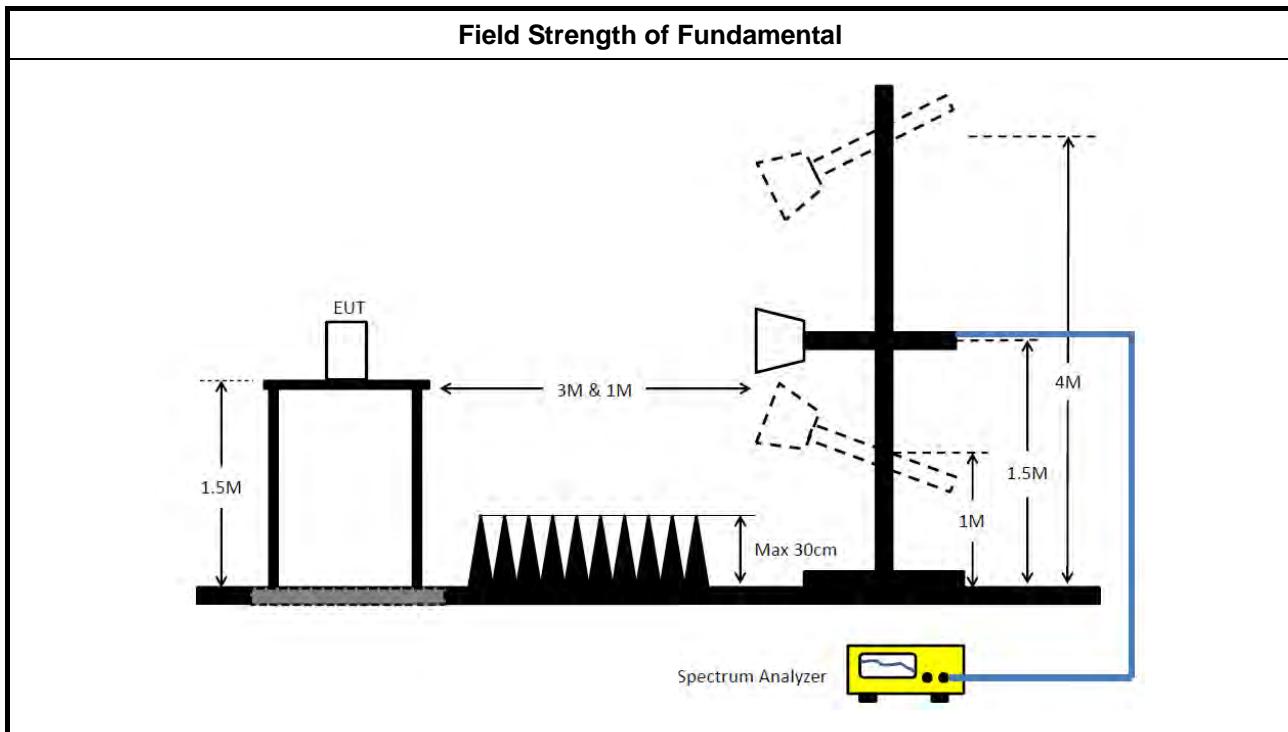
3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clause 6.6.

3.2.4 Test Setup



3.2.5 Test Result of Field Strength of Fundamental

Test Conditions: see ANSI C63.10, clause 5.11

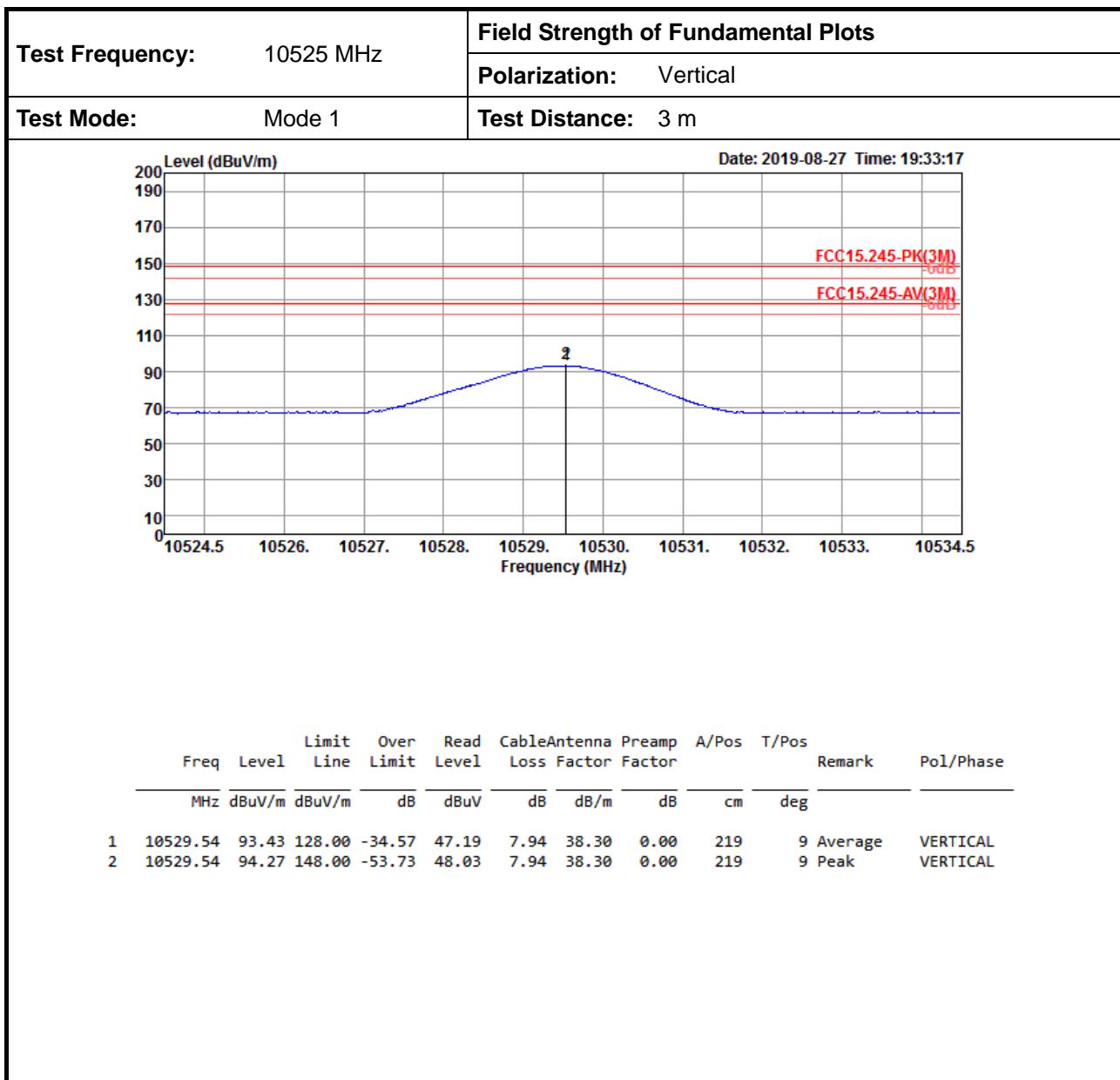
Test Setup: see ANSI C63.10, clause 6.6

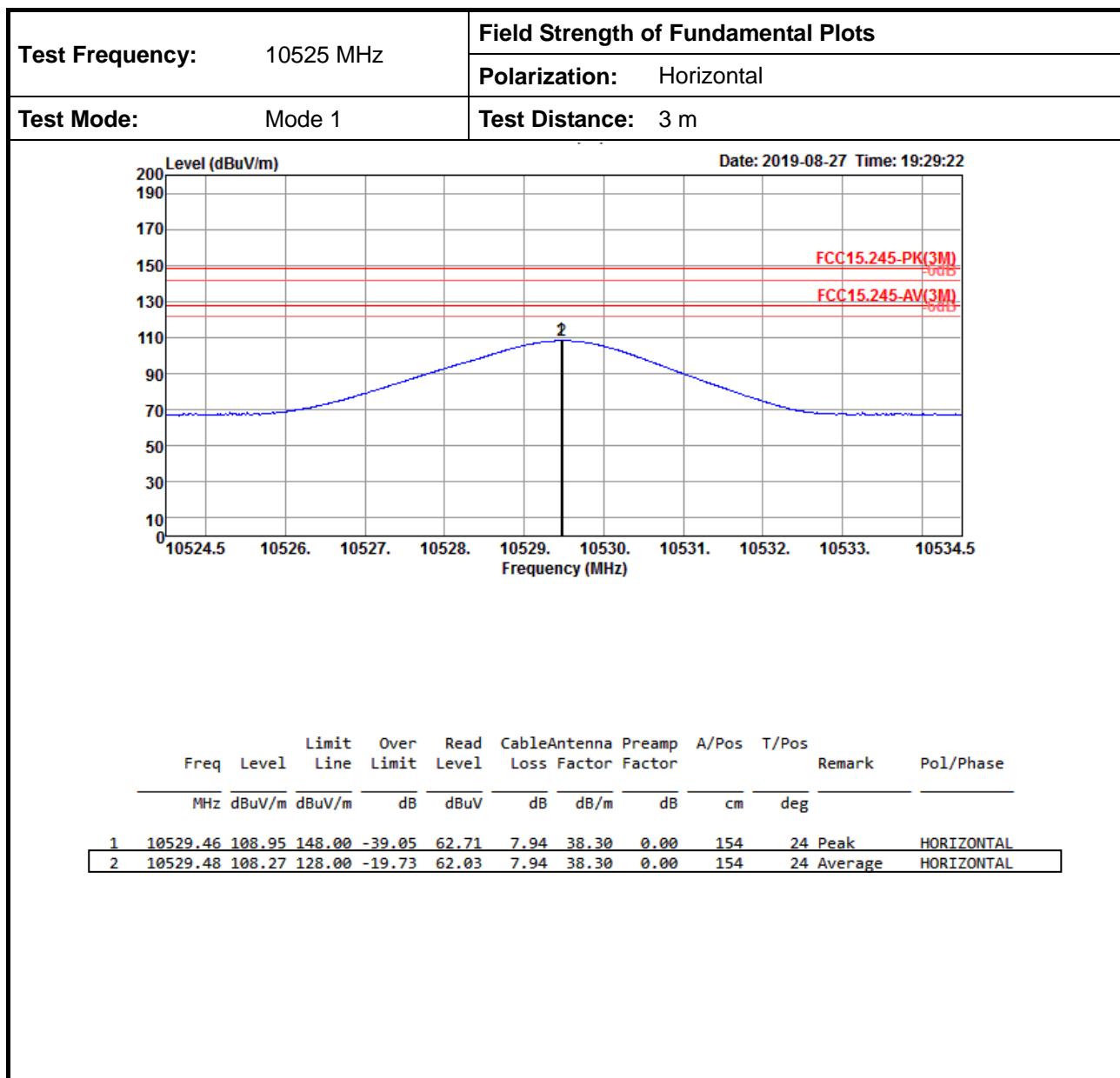
Note1: If the equipment supports different modulations and/or data rates, the measurements described in ANSI C63.10, clause 5.12 may not need to be repeated for all these modulations and data rates. Simple comparison of engineering test across all operating modes, modulations and data rates may need to be performed to define the worse case combination to be used for the conformance testing.

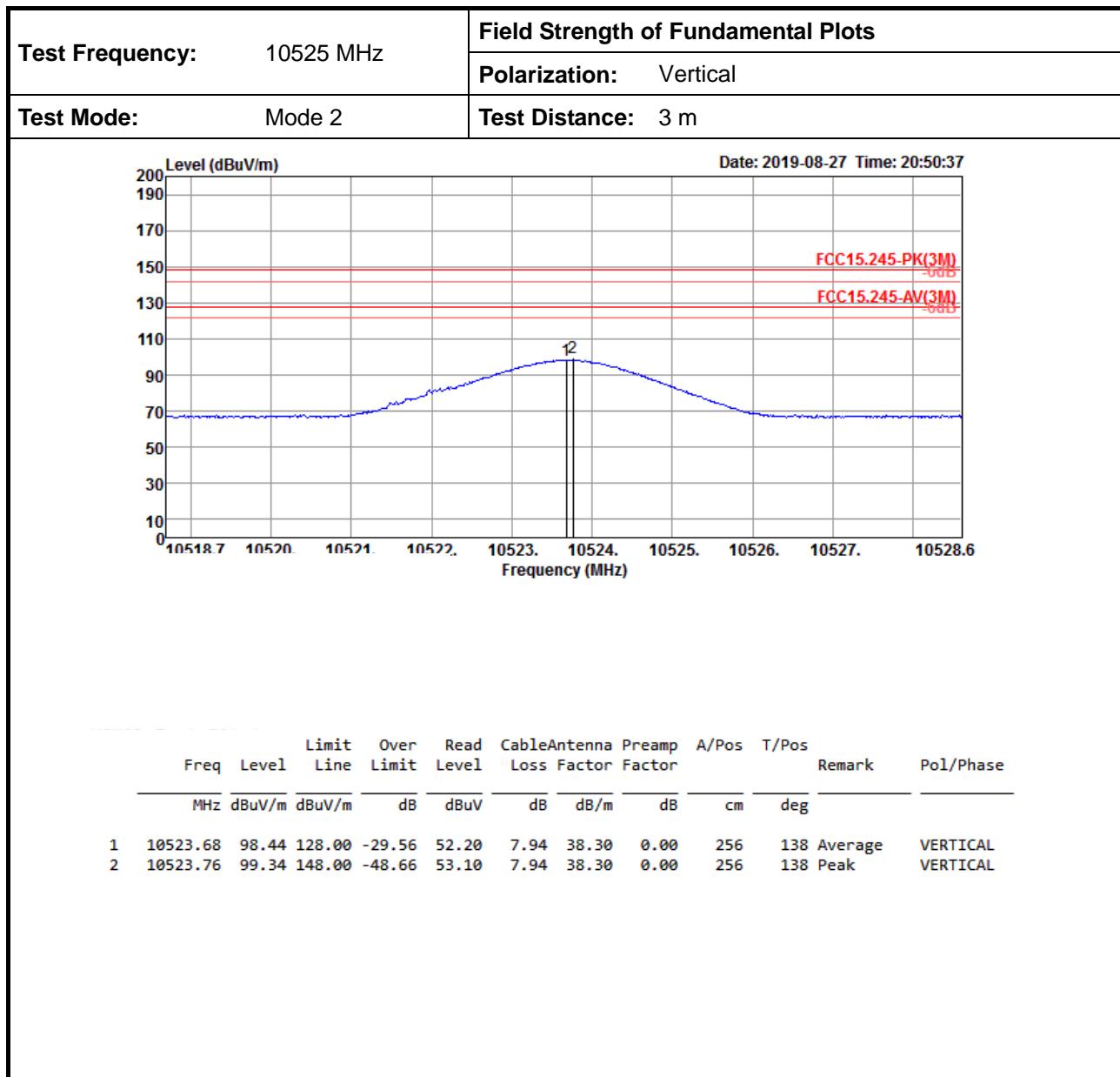
Note2: Conformance tests have to be performed over the frequency range(s) that has been declared with this Field Strength of Fundamental and using the antenna gain of the antenna with the highest gain among those that have been declared with this Field Strength of Fundamental. For smart antenna systems, the antenna beam forming gain may have to be taken into account as well.

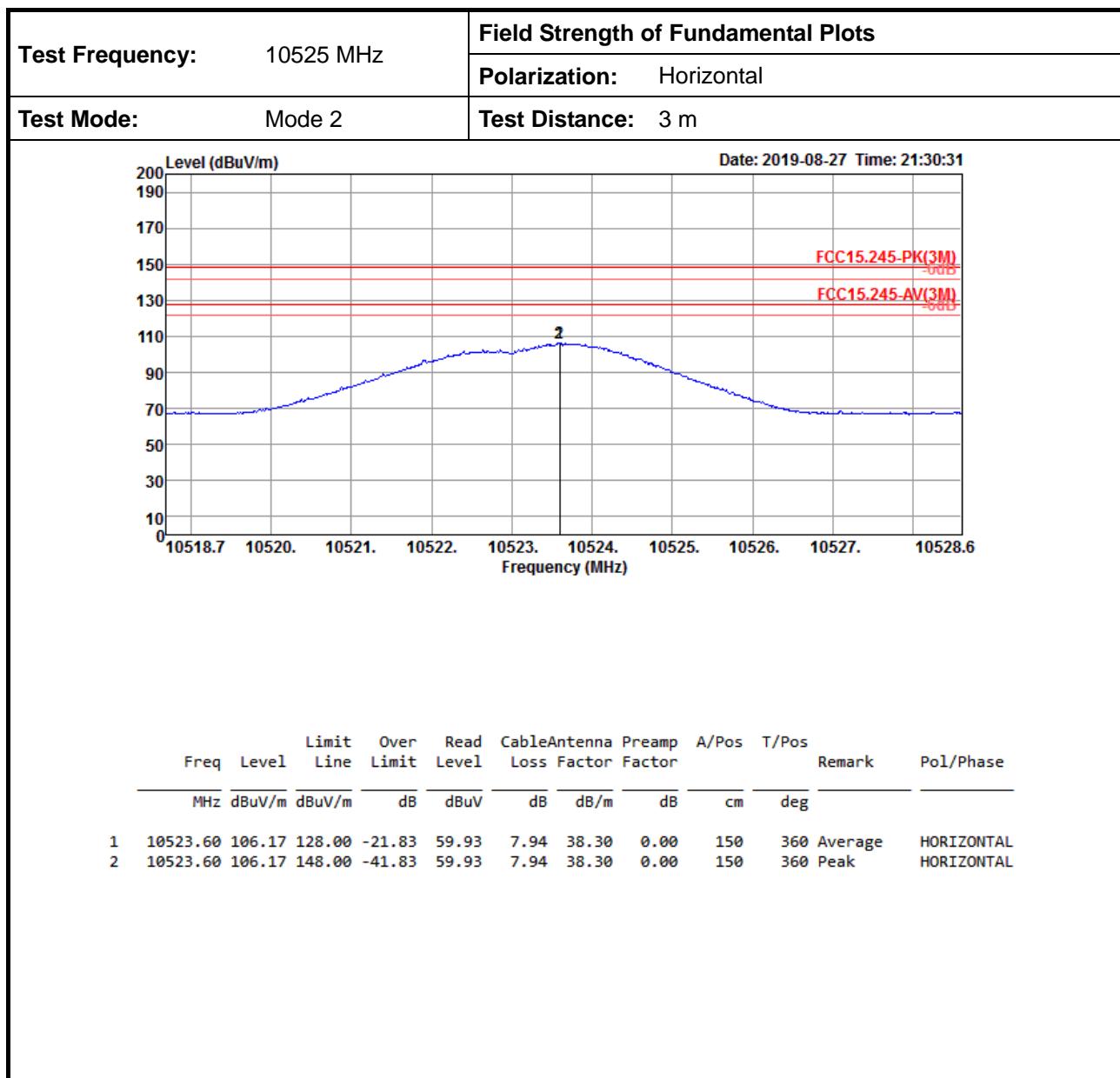


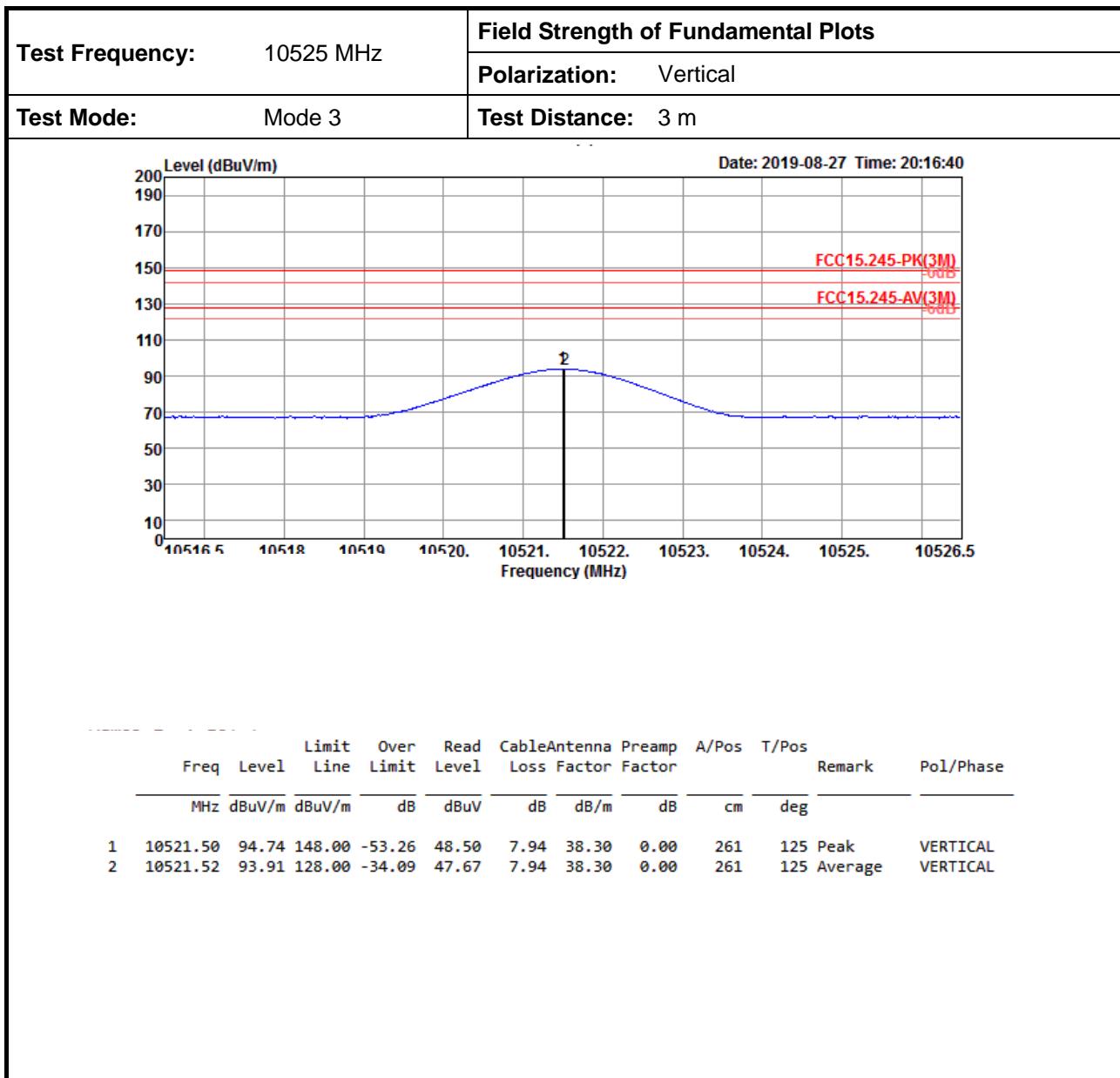
3.2.6 Test Result of Field Strength of Fundamental

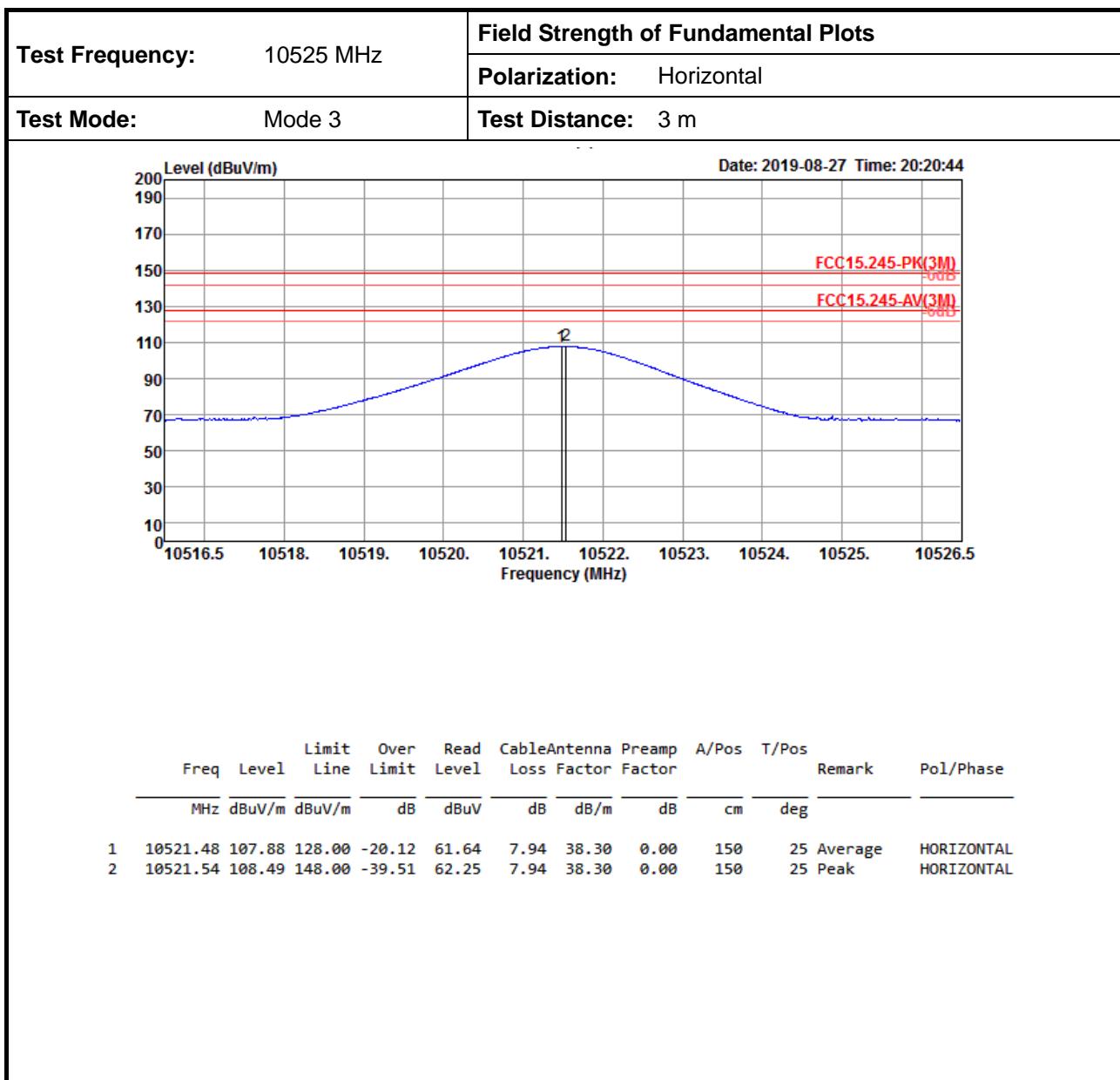














3.3 Transmitter Spurious Emissions

3.3.1 Limit of Transmitter Spurious Emissions

Transmitter Spurious Emissions	
1.	902 - 928MHz, Field disturbance sensors
	<ul style="list-style-type: none">Harmonic emissions in the restricted bands: 15.209 limitHarmonic emissions in the non-restricted bands: 1.6mV/mExcept harmonic emissions, spurious emissions: FCC 15.209 limit or 50 dB below the fundamental, whichever is the lesser attenuation.
2.	2435 - 2465MHz, 5785 - 5815MHz, Field disturbance sensors
	<ul style="list-style-type: none">Harmonic emissions in the restricted bands at and below 17.7 GHz: 15.209 limitHarmonic emissions in the restricted bands at and above 17.7 GHz: 7.5mV/mHarmonic emissions in the non-restricted bands: 1.6mV/mExcept harmonic emissions, spurious emissions: FCC 15.209 limit or 50 dB below the fundamental, whichever is the lesser attenuation.
3.	10500 – 10550MHz, Field disturbance sensors
	<ul style="list-style-type: none">Harmonic emissions in the restricted bands at and above 17.7 GHz: 7.5mV/mHarmonic emissions in the non-restricted bands: 25mV/mExcept harmonic emissions, spurious emissions: FCC 15.209 limit or 50 dB below the fundamental, whichever is the lesser attenuation.
4.	24075-24175 MHz, Field disturbance sensors
	<ul style="list-style-type: none">Second and third harmonics: 25 mV/mExcept harmonic emissions, spurious emissions: FCC 15.209 limit or 50 dB below the fundamental, whichever is the lesser attenuation.

3.3.2 Measuring Instruments

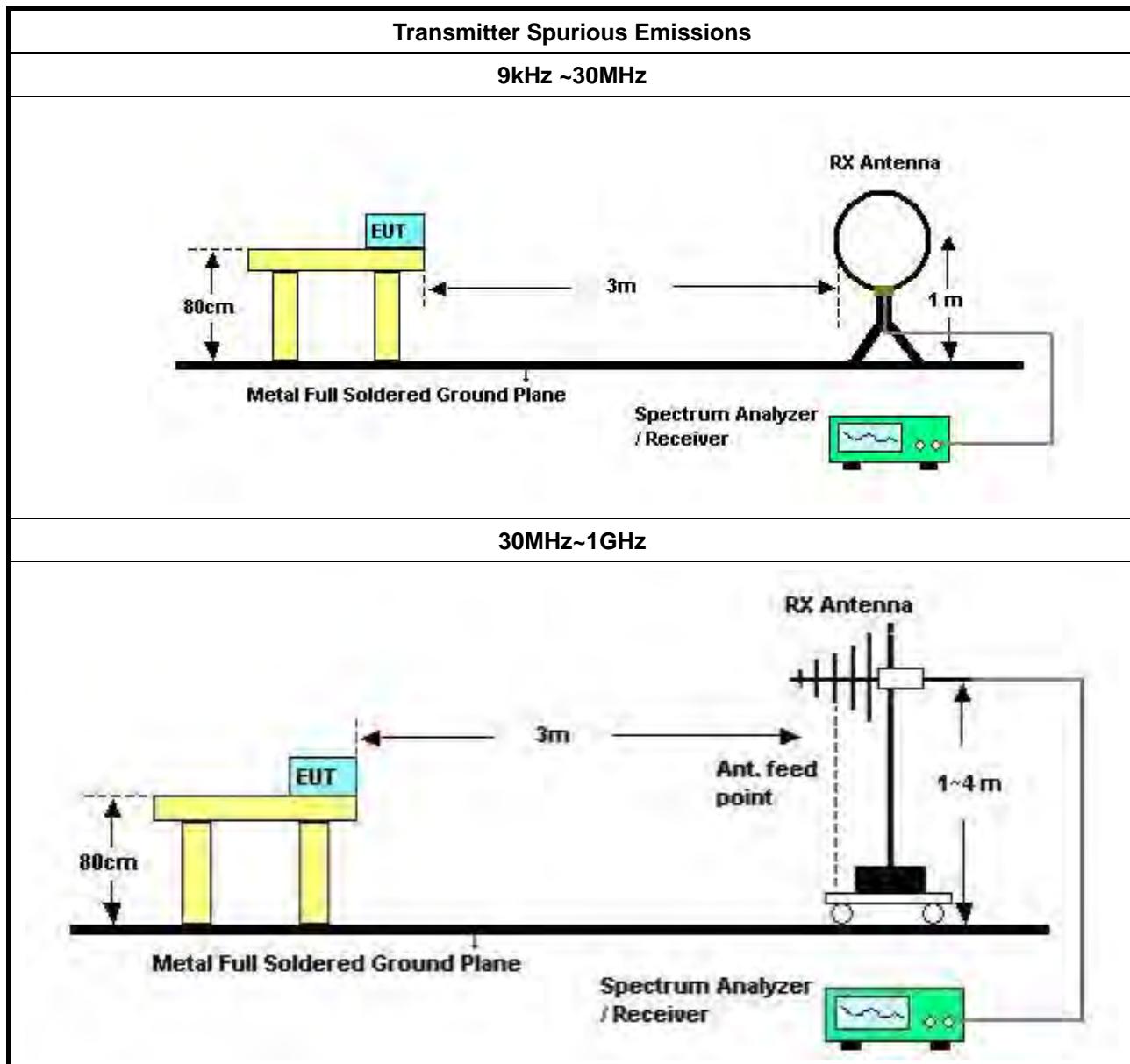
Refer a measuring instruments list in this test report.

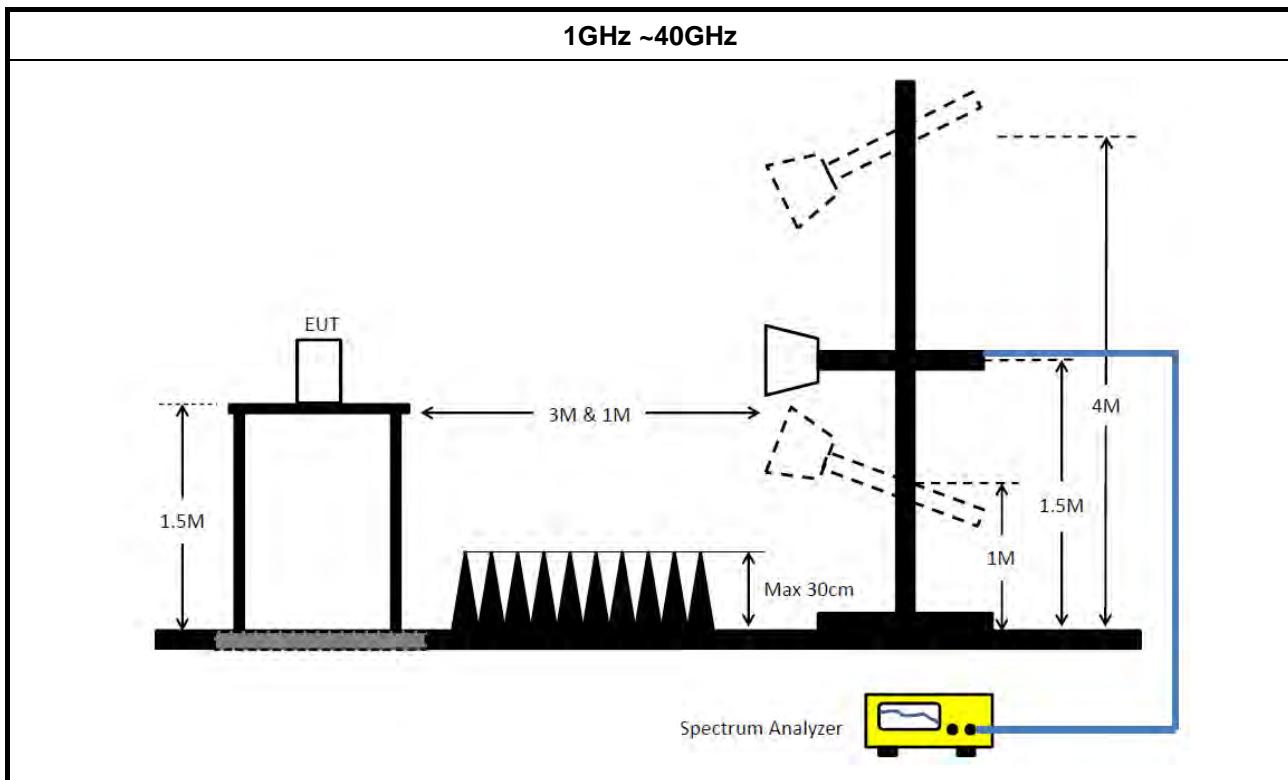
3.3.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 6.3, 6.4, 6.5, 6.6 and 9.12.



3.3.4 Test Setup





3.3.5 Test Result of Transmitter Spurious Emissions

Test Conditions:	see ANSI C63.10, clause 5.11
Test Setup:	see ANSI C63.10, clauses 6.3, 6.4, 6.5, 6.6 and 9.12
Note1: If equipment having different channel plan and nominal channel bandwidth modes, the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated for all modes.	
Note2: Note: Conformance tests have to be performed over the frequency range(s) that has been declared with this Field Strength of Fundamental and using the antenna gain of the antenna with the highest gain among those that have been declared with this Field Strength of Fundamental. For smart antenna systems, the antenna beam forming gain may have to be taken into account as well.	

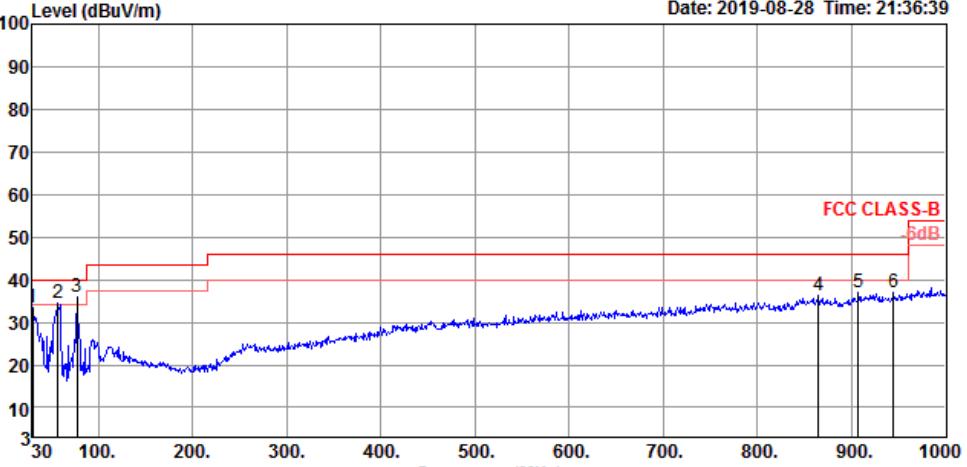


Configuration: Normal Link		Test Range: 9 kHz - 30 MHz			
		Test Results			
Test Mode: Mode 1					
Test Range	Emission Frequency (MHz)	Emission Observed (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
9 kHz - 30 MHz	N/F	N/F	-	-	Peak
NOTE: "N/F" means Nothing Found (No spurious emissions were detected.) There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.					

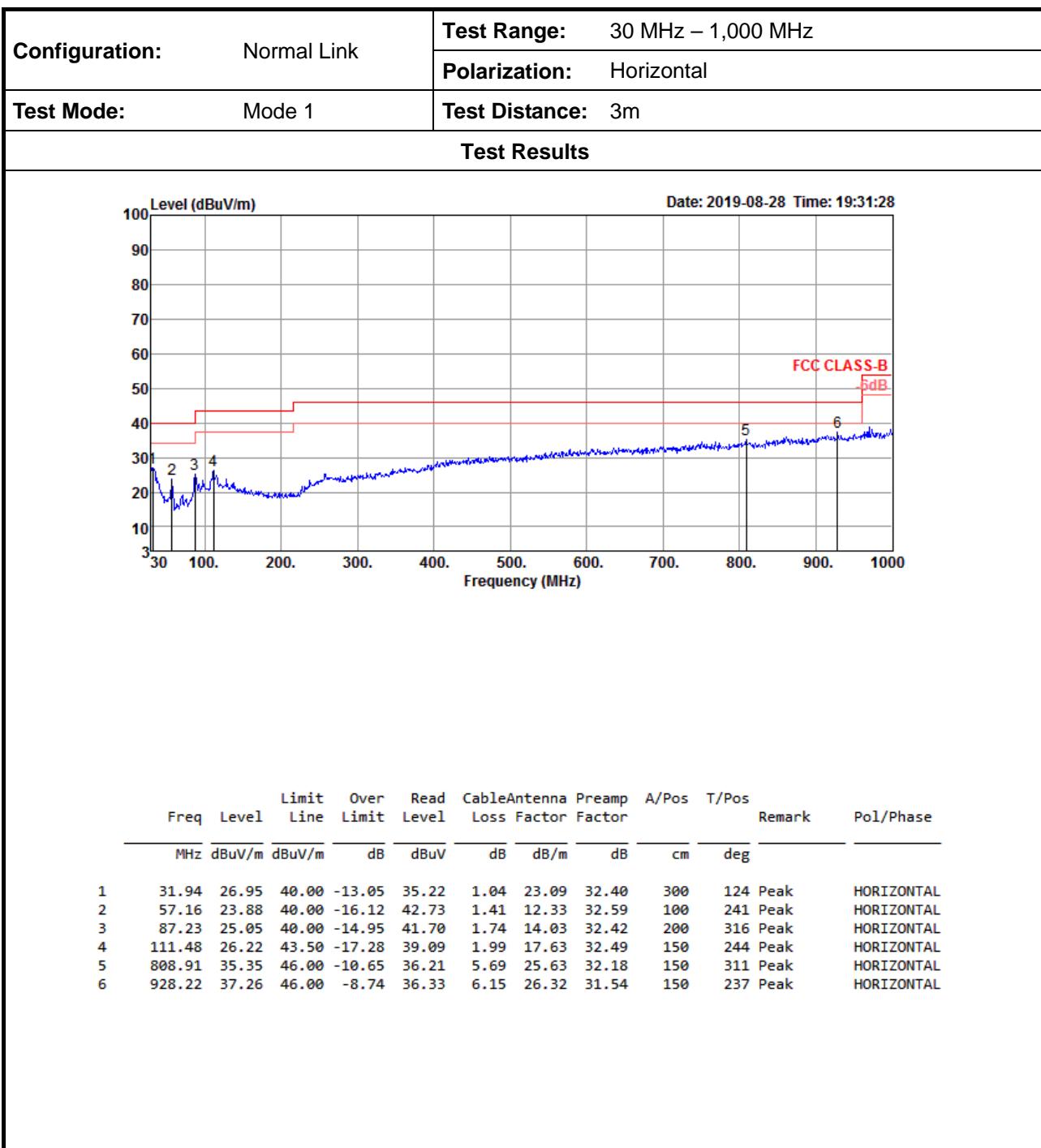


FCC RADIO TEST REPORT

Report No. : FR611401-04

Configuration:	Normal Link	Test Range:	30 MHz – 1,000 MHz																																																																																																														
		Polarization:	Vertical																																																																																																														
Test Mode:	Mode 1	Test Distance:	3m																																																																																																														
Test Results																																																																																																																	
		Date: 2019-08-28 Time: 21:36:39																																																																																																															
<table border="1"> <thead> <tr> <th rowspan="2">Freq</th> <th rowspan="2">Level</th> <th>Limit</th> <th>Over</th> <th>Read</th> <th>Cable</th> <th>Antenna</th> <th>Preamp</th> <th>A/Pos</th> <th>T/Pos</th> <th rowspan="2">Remark</th> <th rowspan="2">Pol/Phase</th> </tr> <tr> <th>Line</th> <th>Limit</th> <th>Level</th> <th>Loss</th> <th>Factor</th> <th>Factor</th> <th>cm</th> <th>deg</th> </tr> <tr> <th>MHz</th> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB</th> <th>dB/m</th> <th>dB</th> <th>cm</th> <th>deg</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>30.00</td> <td>33.58</td> <td>40.00</td> <td>-6.42</td> <td>40.69</td> <td>1.01</td> <td>24.23</td> <td>32.35</td> <td>300</td> <td>248</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>2</td> <td>57.16</td> <td>34.40</td> <td>40.00</td> <td>-5.60</td> <td>53.25</td> <td>1.41</td> <td>12.33</td> <td>32.59</td> <td>100</td> <td>224</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>3</td> <td>77.53</td> <td>35.84</td> <td>40.00</td> <td>-4.16</td> <td>54.32</td> <td>1.65</td> <td>12.36</td> <td>32.49</td> <td>150</td> <td>0</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>4</td> <td>865.17</td> <td>36.23</td> <td>46.00</td> <td>-9.77</td> <td>35.99</td> <td>5.89</td> <td>26.08</td> <td>31.73</td> <td>100</td> <td>246</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>5</td> <td>906.88</td> <td>36.89</td> <td>46.00</td> <td>-9.11</td> <td>36.27</td> <td>6.06</td> <td>26.26</td> <td>31.70</td> <td>300</td> <td>133</td> <td>Peak</td> <td>VERTICAL</td> </tr> <tr> <td>6</td> <td>944.71</td> <td>36.93</td> <td>46.00</td> <td>-9.07</td> <td>35.71</td> <td>6.24</td> <td>26.41</td> <td>31.43</td> <td>300</td> <td>312</td> <td>Peak</td> <td>VERTICAL</td> </tr> </tbody> </table>		Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase	Line	Limit	Level	Loss	Factor	Factor	cm	deg	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg			1	30.00	33.58	40.00	-6.42	40.69	1.01	24.23	32.35	300	248	Peak	VERTICAL	2	57.16	34.40	40.00	-5.60	53.25	1.41	12.33	32.59	100	224	Peak	VERTICAL	3	77.53	35.84	40.00	-4.16	54.32	1.65	12.36	32.49	150	0	Peak	VERTICAL	4	865.17	36.23	46.00	-9.77	35.99	5.89	26.08	31.73	100	246	Peak	VERTICAL	5	906.88	36.89	46.00	-9.11	36.27	6.06	26.26	31.70	300	133	Peak	VERTICAL	6	944.71	36.93	46.00	-9.07	35.71	6.24	26.41	31.43	300	312	Peak	VERTICAL		
Freq	Level			Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos			Remark	Pol/Phase																																																																																																		
		Line	Limit	Level	Loss	Factor	Factor	cm	deg																																																																																																								
MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg																																																																																																								
1	30.00	33.58	40.00	-6.42	40.69	1.01	24.23	32.35	300	248	Peak	VERTICAL																																																																																																					
2	57.16	34.40	40.00	-5.60	53.25	1.41	12.33	32.59	100	224	Peak	VERTICAL																																																																																																					
3	77.53	35.84	40.00	-4.16	54.32	1.65	12.36	32.49	150	0	Peak	VERTICAL																																																																																																					
4	865.17	36.23	46.00	-9.77	35.99	5.89	26.08	31.73	100	246	Peak	VERTICAL																																																																																																					
5	906.88	36.89	46.00	-9.11	36.27	6.06	26.26	31.70	300	133	Peak	VERTICAL																																																																																																					
6	944.71	36.93	46.00	-9.07	35.71	6.24	26.41	31.43	300	312	Peak	VERTICAL																																																																																																					

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



FCC RADIO TEST REPORT

Report No. : FR611401-04

Test Frequency: 10525 MHz	Test Range: 1 GHz – 18 GHz																																																							
	Polarization: Vertical																																																							
Test Mode: Mode 1	Test Distance: 3m																																																							
Test Results																																																								
<p>Level (dBuV/m)</p> <p>Date: 2019-08-27 Time: 22:26:34</p> <p>Frequency (MHz)</p> <p>FCC CLASS-B PK -80dB</p> <p>FCC CLASS-B AV -60dB</p>																																																								
<table><thead><tr><th rowspan="2">Freq MHz</th><th rowspan="2">Level dBuV/m</th><th rowspan="2">Limit Line dBuV/m</th><th rowspan="2">Over Limit dB</th><th rowspan="2">Read Level dBuV</th><th rowspan="2">Cable Loss dB</th><th rowspan="2">Antenna Factor dB/m</th><th rowspan="2">Preamp Factor dB</th><th rowspan="2">A/Pos cm</th><th rowspan="2">T/Pos deg</th><th rowspan="2">Remark</th><th rowspan="2">Pol/Phase</th></tr><tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr></thead><tbody><tr><td>1</td><td>1710.44</td><td>24.83</td><td>54.00</td><td>-29.17</td><td>29.91</td><td>3.08</td><td>26.44</td><td>34.60</td><td>189</td><td>269 Average</td><td>VERTICAL</td></tr><tr><td>2</td><td>1711.04</td><td>36.98</td><td>74.00</td><td>-37.02</td><td>42.06</td><td>3.08</td><td>26.44</td><td>34.60</td><td>189</td><td>269 Peak</td><td>VERTICAL</td></tr></tbody></table>											Freq MHz	Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Read Level dBuV	Cable Loss dB	Antenna Factor dB/m	Preamp Factor dB	A/Pos cm	T/Pos deg	Remark	Pol/Phase											1	1710.44	24.83	54.00	-29.17	29.91	3.08	26.44	34.60	189	269 Average	VERTICAL	2	1711.04	36.98	74.00	-37.02	42.06	3.08	26.44	34.60	189	269 Peak	VERTICAL
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Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



FCC RADIO TEST REPORT

Report No. : FR611401-04

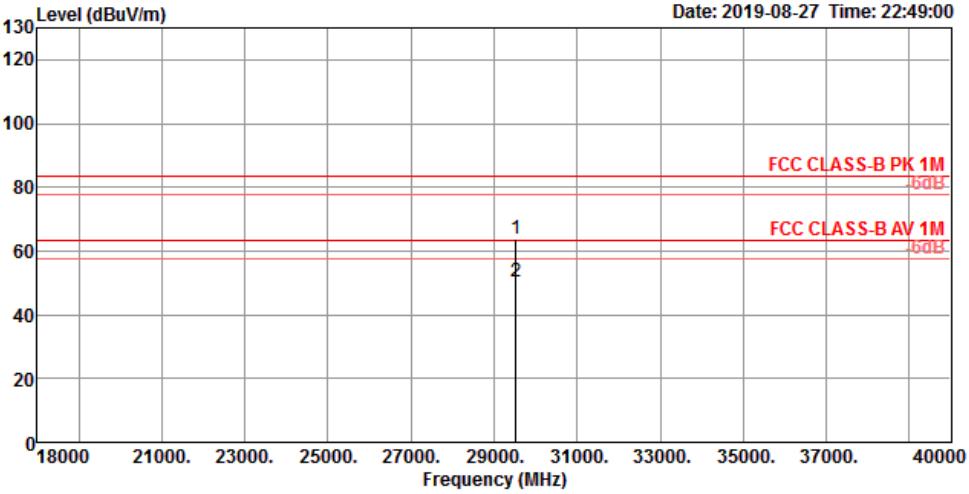
Test Frequency: 10525 MHz	Test Range: 1 GHz – 18 GHz																																																																						
	Polarization: Horizontal																																																																						
Test Mode: Mode 1	Test Distance: 3m																																																																						
Test Results																																																																							
<p>Level (dBuV/m)</p> <p>Date: 2019-08-27 Time: 22:29:31</p> <p>FCC CLASS-B PK</p> <p>FCC CLASS-B AV</p> <p>1000 4000. 6000. 8000. 10000. 12000. 14000. 16000. 18000</p> <p>Frequency (MHz)</p>																																																																							
<table><thead><tr><th rowspan="2">Freq</th><th rowspan="2">Level</th><th colspan="2">Limit</th><th rowspan="2">Over</th><th rowspan="2">Read</th><th rowspan="2">Cable</th><th rowspan="2">Antenna</th><th rowspan="2">Preamp</th><th rowspan="2">A/Pos</th><th rowspan="2">T/Pos</th><th rowspan="2">Remark</th><th rowspan="2">Pol/Phase</th></tr><tr><th>Line</th><th>Limit</th><th>dB</th><th>dBuV</th><th>Loss</th><th>Factor</th><th>Factor</th><th>cm</th><th>deg</th></tr><tr><th>MHz</th><th>dBuV/m</th><th>dBuV/m</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr></thead><tbody><tr><td>1</td><td>1710.68</td><td>37.51</td><td>74.00</td><td>-36.49</td><td>42.59</td><td>3.08</td><td>26.44</td><td>34.60</td><td>225</td><td>117</td><td>Peak</td><td>HORIZONTAL</td></tr><tr><td>2</td><td>1711.52</td><td>24.91</td><td>54.00</td><td>-29.09</td><td>29.99</td><td>3.08</td><td>26.44</td><td>34.60</td><td>225</td><td>117</td><td>Average</td><td>HORIZONTAL</td></tr></tbody></table>												Freq	Level	Limit		Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase	Line	Limit	dB	dBuV	Loss	Factor	Factor	cm	deg	MHz	dBuV/m	dBuV/m										1	1710.68	37.51	74.00	-36.49	42.59	3.08	26.44	34.60	225	117	Peak	HORIZONTAL	2	1711.52	24.91	54.00	-29.09	29.99	3.08	26.44	34.60	225	117	Average	HORIZONTAL
Freq	Level	Limit		Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark			Pol/Phase																																																									
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Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



FCC RADIO TEST REPORT

Report No. : FR611401-04

Test Frequency: 10525 MHz	Test Range: 18 GHz – 40 GHz																																																																
	Polarization: Vertical																																																																
Test Mode: Mode 1	Test Distance: 1m																																																																
Test Results																																																																	
 <p>Level (dBuV/m)</p> <p>Date: 2019-08-27 Time: 22:49:00</p> <p>FCC CLASS-B PK 1M 80 dBuV/m</p> <p>FCC CLASS-B AV 1M 60 dBuV/m</p> <p>Frequency (MHz)</p>																																																																	
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Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Remark			Pol/Phase																																																				
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Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



FCC RADIO TEST REPORT

Report No. : FR611401-04

Test Frequency: 10525 MHz	Test Range: 18 GHz – 40 GHz																																																											
	Polarization: Horizontal																																																											
Test Mode: Mode 1	Test Distance: 1m																																																											
Test Results																																																												
<p>Level (dBuV/m)</p> <p>Date: 2019-08-27 Time: 22:48:47</p> <p>Frequency (MHz)</p> <p>FCC CLASS-B PK 1M 60dB</p> <p>FCC CLASS-B AV 1M 63dB</p> <p>1 29518.08 50.25 63.54 -13.29 39.12 16.43 40.40 45.70 150 125 Average HORIZONTAL</p> <p>2 29523.64 63.18 83.54 -20.36 52.05 16.43 40.40 45.70 150 125 Peak HORIZONTAL</p>																																																												
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Freq	Level	Limit		Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark			Pol/Phase																																														
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Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.



3.4 Antenna Requirements

3.4.1 Limit of Antenna Requirements

Limits for Antenna Requirements

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

3.4.2 EUT Antenna

See test report clause 1.1.1, EUT antenna complied with antenna requirements.



4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
LISN	Schwarzbeck	NSLK 8127	8127650	9kHz ~ 30MHz	Nov. 21, 2018	Nov. 20, 2019	Conduction (CO02-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 05, 2018	Nov. 04, 2019	Conduction (CO02-CB)
EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8.4GHz	Jan. 16, 2019	Jan. 15, 2020	Conduction (CO02-CB)
COND Cable	Woken	Cable	2	0.15MHz ~ 30MHz	Nov. 06, 2018	Nov. 05, 2019	Conduction (CO02-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO02-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 29, 2019	Mar. 28, 2020	Radiation (03CH06-CB)
Bilog Antenna with 6dB Attenuator	Chase & EMCI	CBL6111A &N-6-06	1543 &AT-N0604	30MHz ~ 1GHz	Apr. 02, 2019	Apr. 01, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1292	1GHz~18GHz	Jul. 17, 2019	Jul. 16, 2020	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170507	15GHz ~ 40GHz	Jun. 12, 2019	Jun. 11, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	310N	187290	0.1MHz ~ 1GHz	May 07, 2019	May 06, 2020	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	May 08, 2019	May 07, 2020	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Jul. 03, 2019	Jul. 02, 2020	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Oct. 03, 2018	Oct. 02, 2019	Radiation (03CH06-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	May 15, 2019	May 14, 2020	Radiation (03CH06-CB)
RF Cable-low	HUBER+SUHNER	RG402	Low Cable-05+24	30MHz~1GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05	1GHz~18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH06-CB)
RF Cable-high	HUBER+SUHNER	RG402	High Cable-05+24	1GHz~18GHz	Oct. 08, 2018	Oct. 07, 2019	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#1	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-40G#2	18GHz ~ 40 GHz	Jul. 24, 2019	Jul. 23, 2020	Radiation (03CH06-CB)

Note: Calibration Interval of instruments listed above is one year.

N.C.R. means Non-Calibration required.



5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.0 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	5.1 dB	Confidence levels of 95%