



FCC Radio Test Report

EQUIPMENT : Microwave Module
BRAND NAME : OPTEX
MODEL NO. : WS-OPMW-WL X5
FCC ID : DC9WSOPMW
STANDARD : 47 CFR FCC Part 15.245

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

The product sample received on Jan. 13, 2016 and completely tested on Jan. 27, 2016. We, SPORTON, 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 test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.


Sam Chen
SPORTON INTERNATIONAL INC.





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SUMMARY OF TEST RESULT

FCC Standard Requirements and Conformance Test Specifications				
Report Clause	Ref. Std. Clause	Description	Result	Remark
3.1	15.207	AC Power Conducted Emissions	Complied	-
3.2	15.215(c)	Occupied Bandwidth	Complied	-
3.3	15.245(b)	Field Strength of Fundamental	Complied	-
3.4	15.245(b)	Transmitter Spurious Emissions	Complied	-
3.5	15.203	Antenna Requirements	Complied	-

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



SPORTON INTERNATIONAL INC.
TEL : 886-3-327-3456
FAX : 886-3-327-0973
FCC ID: DC9WSOPMW

1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information	
Power Type	From DC 2.2V
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

1.1.2 Field Strength of Fundamental

Field Strength of Fundamental							
Applicable power levels:	☐ Conducted ☐ EIRP ☒ 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	117.21	117.60	128	148



1.2 Accessories

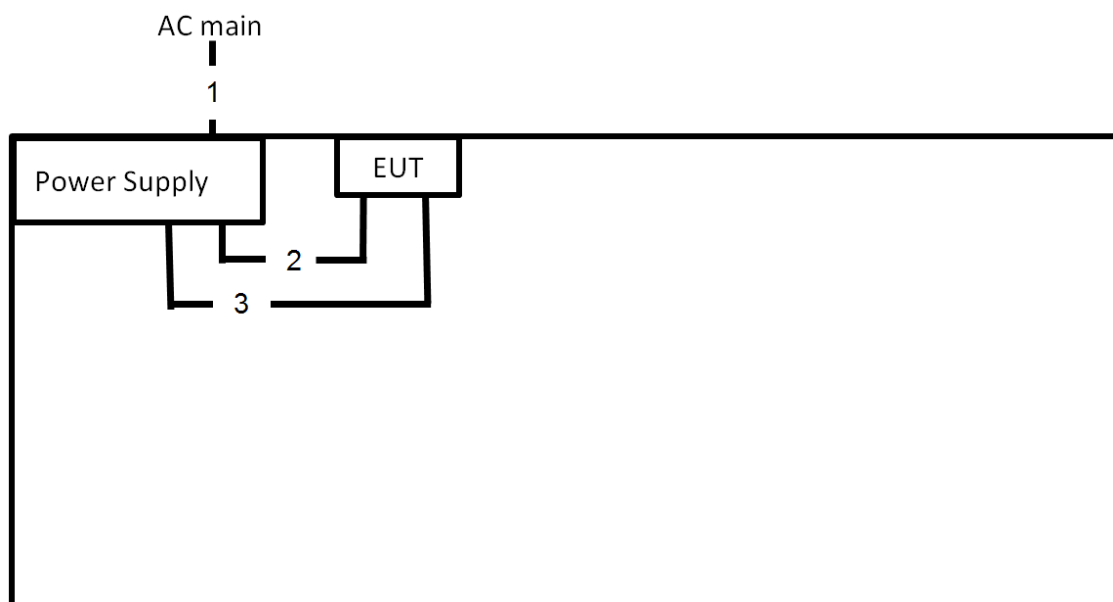
N/A

1.3 Support Equipment

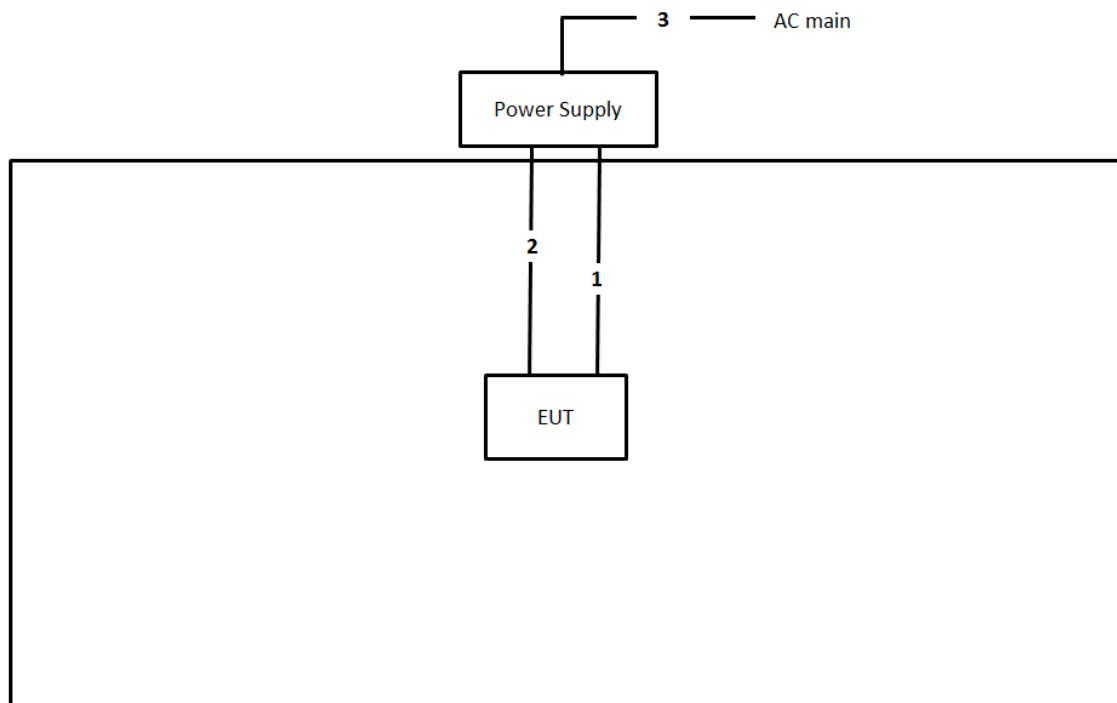
Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Power Supply	Advanced	LPS-305	N/A

1.4 EUT Setups

AC Power Conducted Emissions



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	DC power cable	No	0.8m
3	DC power cable	No	0.5m

Transmitter Spurious Emissions


Item	Connection	Shielded	Length
1	DC power cable	No	0.8m
2	DC power cable	No	0.5m
3	Power cable	No	1.5m

1.5 Testing Applied 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

1.6 Testing Location Information

Testing Location		
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	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.
AC Conduction		CO01-CB
Radiated Emission		03CH01-CB

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	Test Frequencies
AC Power Conducted Emissions	10525 MHz
Emission Bandwidth	10525 MHz
Field Strength of Fundamental	10525 MHz
Transmitter Spurious Emissions	10525 MHz

2.3 Duty Cycle

On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
1.000	1.000	100.00	0.00	0.01

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.

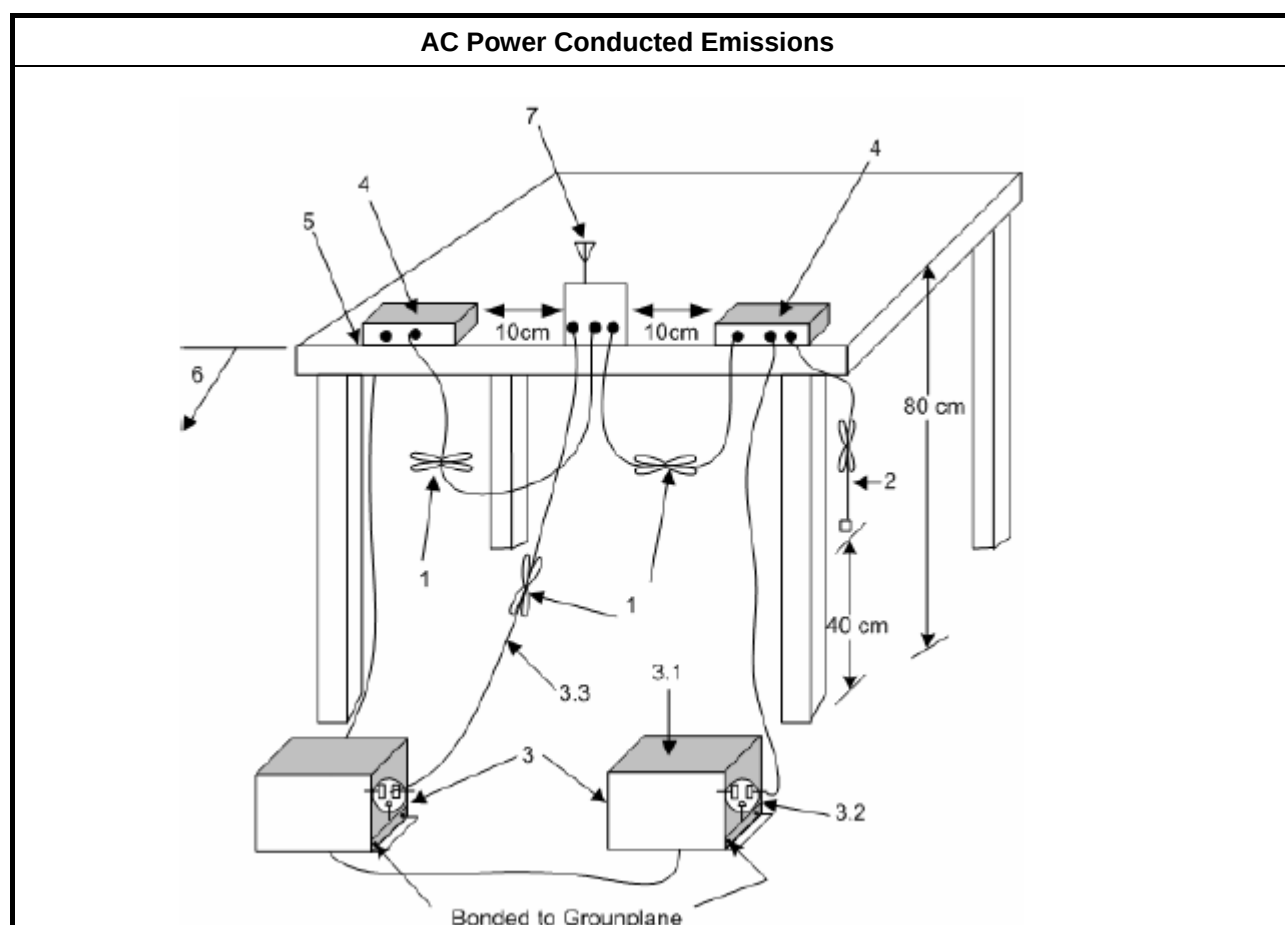
3.1.2 Measuring Instruments

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



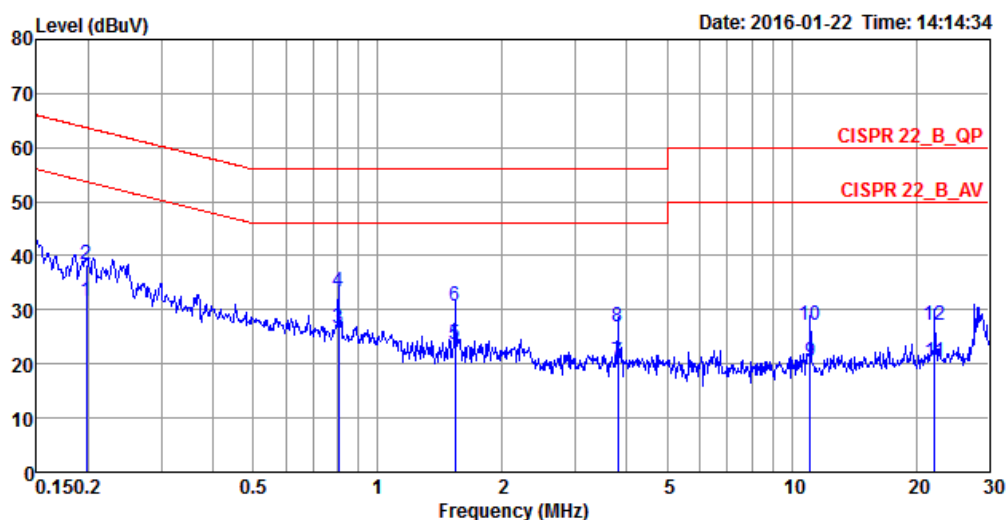
AC Power Conducted Emissions

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 (see ANSI C63.10, clause 6.2.3.2).
2. 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 (see ANSI C63.10, clause 6.2.2).
3. EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 ohm loads. LISN can be placed on top of, or immediately beneath, reference ground plane (see ANSI C63.10, clauses 6.2.2 and 6.2.3).
 - 3.1. All other equipment powered from additional LISN(s).
 - 3.2. A multiple-outlet strip can 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 (see ANSI C63.10, clause 6.2.3.2).
6. Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane (see ANSI C63.10, clause 6.2.2 for options).
7. Antenna may be integral or detachable. If detachable, the antenna shall be attached for this test.

3.1.5 Test Result of AC Power Conducted Emissions

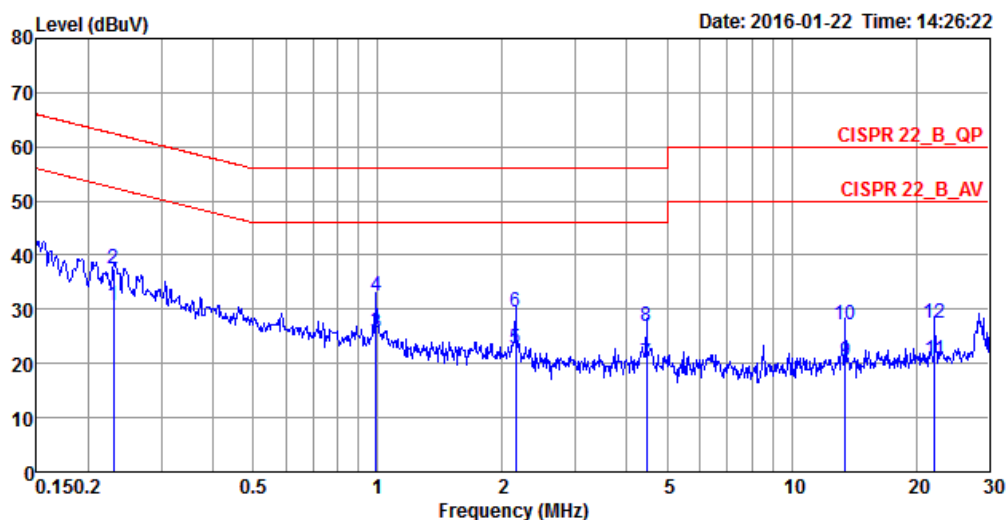
Test Conditions:	see ANSI C63.10, clause 5.11
Test Setup:	see ANSI C63.10, clause 6.2.3
Note 1: If equipment having different channel plan and nominal channel bandwidth modes, the measurements are uninfluenced by different channel plan and nominal channel bandwidth modes, may not need to be repeated 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.	

Temp	24°C	Humidity	55%
Test Engineer	Da Deng	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1976	31.50	-22.21	53.71	21.37	9.95	0.18	Average	LINE
2	0.1976	38.51	-25.20	63.71	28.38	9.95	0.18	QP	LINE
3	0.8045	26.51	-19.49	46.00	16.28	10.04	0.19	Average	LINE
4	0.8045	33.22	-22.78	56.00	22.99	10.04	0.19	QP	LINE
5	1.5369	23.70	-22.30	46.00	13.40	10.07	0.23	Average	LINE
6	1.5369	30.63	-25.37	56.00	20.33	10.07	0.23	QP	LINE
7	3.7994	20.30	-25.70	46.00	9.87	10.11	0.32	Average	LINE
8	3.7994	27.01	-28.99	56.00	16.58	10.11	0.32	QP	LINE
9	11.0797	20.44	-29.56	50.00	9.88	10.17	0.39	Average	LINE
10	11.0797	27.28	-32.72	60.00	16.72	10.17	0.39	QP	LINE
11	22.1801	20.49	-29.51	50.00	9.70	10.30	0.49	Average	LINE
12	22.1801	27.29	-32.71	60.00	16.50	10.30	0.49	QP	LINE

Temp	24°C	Humidity	55%
Test Engineer	Da Deng	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.2304	30.63	-21.81	52.44	20.49	9.96	0.18	Average	NEUTRAL
2	0.2304	37.47	-24.97	62.44	27.33	9.96	0.18	QP	NEUTRAL
3	0.9891	25.54	-20.46	46.00	15.38	9.97	0.19	Average	NEUTRAL
4	0.9891	32.44	-23.56	56.00	22.28	9.97	0.19	QP	NEUTRAL
5	2.1553	22.74	-23.26	46.00	12.48	9.99	0.27	Average	NEUTRAL
6	2.1553	29.59	-26.41	56.00	19.33	9.99	0.27	QP	NEUTRAL
7	4.4540	20.21	-25.79	46.00	9.84	10.04	0.33	Average	NEUTRAL
8	4.4540	26.96	-29.04	56.00	16.59	10.04	0.33	QP	NEUTRAL
9	13.4793	20.46	-29.54	50.00	9.83	10.21	0.42	Average	NEUTRAL
10	13.4793	27.11	-32.89	60.00	16.48	10.21	0.42	QP	NEUTRAL
11	22.1801	20.57	-29.43	50.00	9.78	10.30	0.49	Average	NEUTRAL
12	22.1801	27.57	-32.43	60.00	16.78	10.30	0.49	QP	NEUTRAL

3.2 Occupied Bandwidth

3.2.1 Limit of Occupied Bandwidth

20dB Bandwidth (see Note 1)	None
99% Occupied Bandwidth (see Note 2)	None
Note 1: Refer as 15.215(c). Ensure that the 20 dB occupied bandwidth shall be fall in the specified operating frequency range. Note 2: The 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth when resolution bandwidth should be approximately 1 % to 5 % of the occupied bandwidth (OBW). These measurements shall also be performed at normal test conditions.	

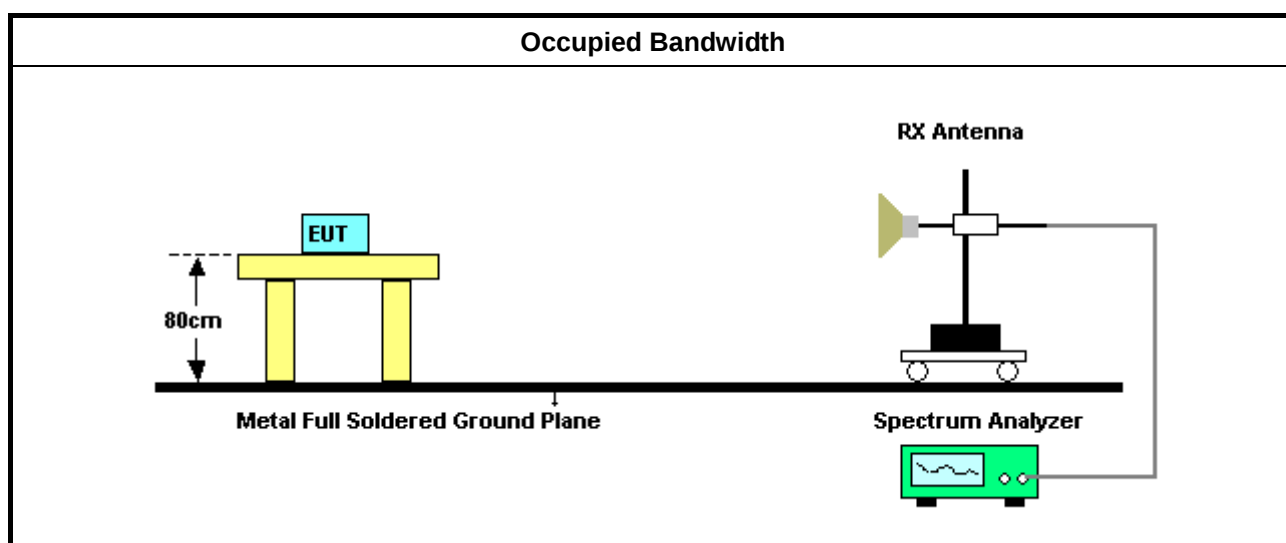
3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 6.6 and 6.9.1.

3.2.4 Test Setup



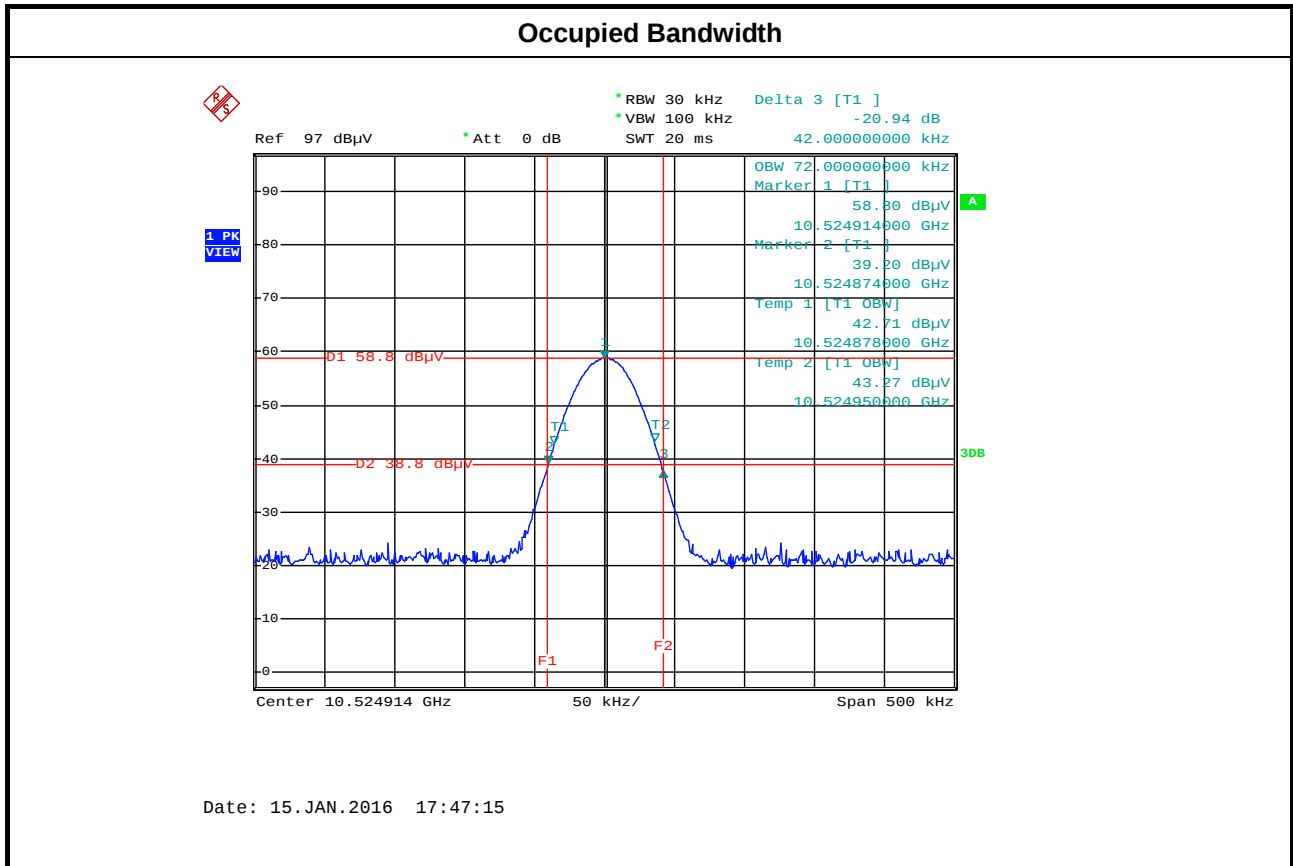
3.2.5 Test Result of Occupied Bandwidth

Test Conditions:	see ANSI C63.10, clause 5.11
Test Setup:	see ANSI C63.10, clause 6.6
Note: 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. Refer as ANSI C63.10, clause 6.9.1, observe and record with plotted graphs or photographs the worst-case (i.e., widest) occupied bandwidth produced by these different modulation sources.	

Test Conditions:	see ANSI C63.10, clause 5.12			
Test Engineer:	Akina Chiu			
Humidity:	50 %	Test Results		
Temperature:	21.1 °C	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Frequency range (GHz) $f_L > 10.5 \text{ GHz}$
Test Frequency				Frequency range (GHz) $f_H < 10.55 \text{ GHz}$
10525 MHz		42	72	10.524878
				10.524950



3.2.6 Occupied Bandwidth Plots



3.3 Field Strength of Fundamental

3.3.1 Limit of Field Strength of Fundamental

Frequencies (MHz)	Field Strength (mV/meter)	Field Strength (dBµV/m) at 3m
10.5~10.55 GHz	2500 at 3m	128 (Average)
10.5~10.55 GHz	25000 at 3m	148 (Peak)
Note: For the applicable limit, see 15.245(b)		

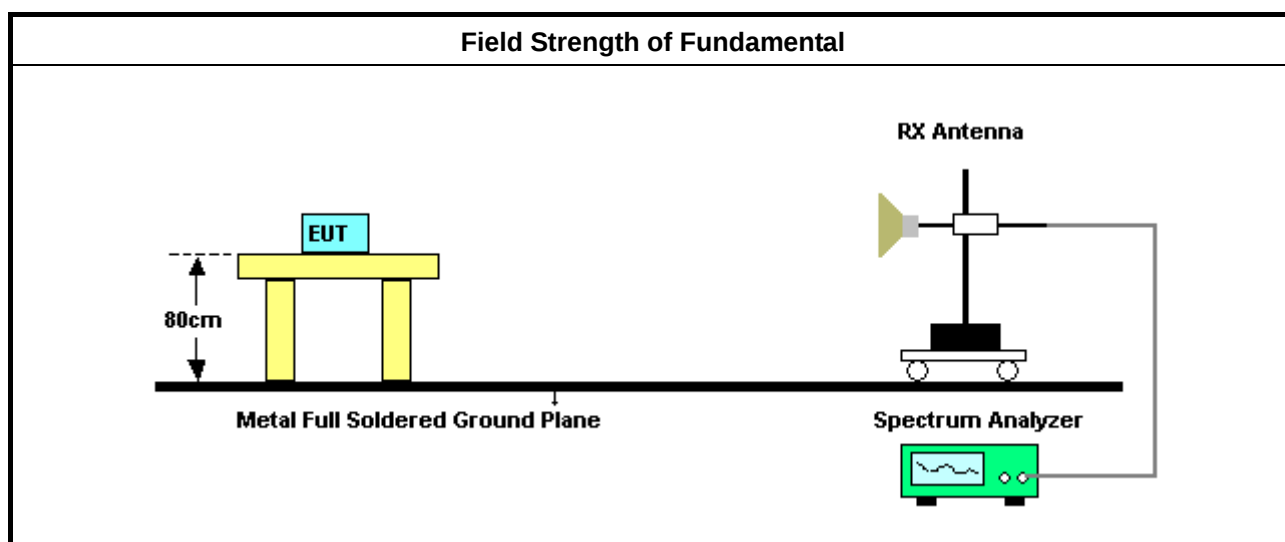
3.3.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

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

3.3.4 Test Setup



3.3.5 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.	

3.3.6 Test Result of Field Strength of Fundamental

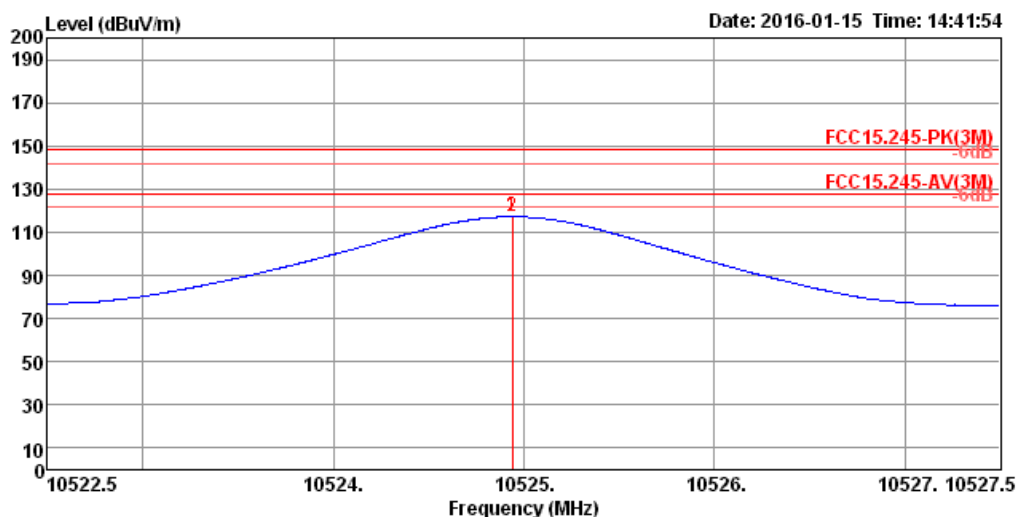
Test Engineer: Akina Chiu								
Humidity: 50 %			Test Results					
Temperature: 21.1 °C			Field Strength (dBuV/m) (note 1)		Field Strength Limit (dBm)		Margin (dB)	
Test Distance: 3 m								
Test Frequency			AV	Peak	AV	Peak	AV	Peak
10525 MHz			117.21	117.60	128	148	-10.79	-30.40
Note 1: If EUT is the pulsed transmitters, the average value shall be considered the peak value plus the duty cycle factor using as following as equation: Average = Peak + 20 log (Duty Cycle).								
Note 2: For the applicable limit, see 15.245(b)								
Note 3: AV is average EIRP power.								



FCC Radio Test Report

Report No. : FR611401

Test Engineer:	Akina Chiu		
Humidity:	50	%	Field Strength of Fundamental Plots
Temperature:	21.1	°C	Polarization: Vertical
Test Frequency:	10525 MHz		Test Distance: 3 m



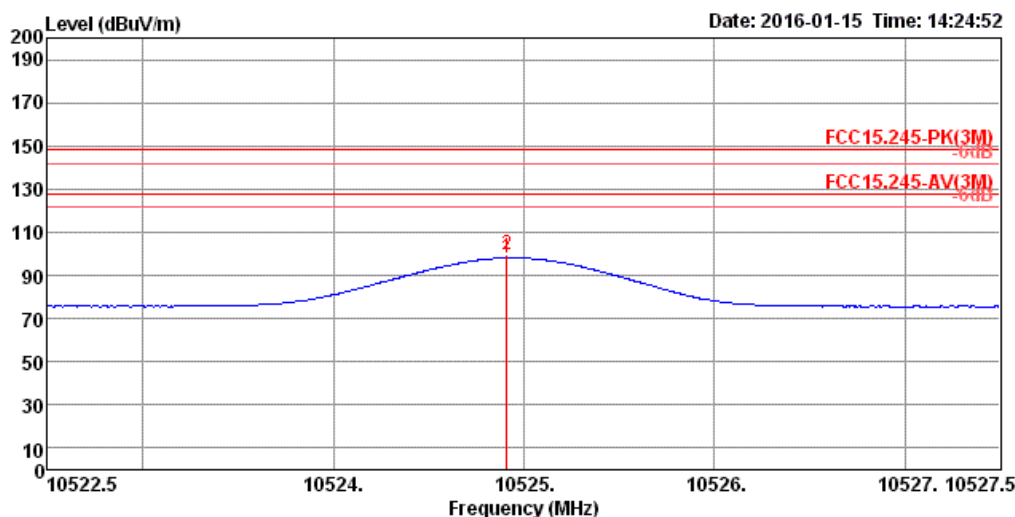
	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	10524.94	117.21	128.00	-10.79	68.90	9.41	38.90	0.00	177	6	VERTICAL	Average
2	10524.94	117.60	148.00	-30.40	69.29	9.41	38.90	0.00	177	6	VERTICAL	Peak



FCC Radio Test Report

Report No. : FR611401

Test Engineer:	Akina Chiu		
Humidity:	50	%	Field Strength of Fundamental Plots
Temperature:	21.1	°C	Polarization: Horizontal
Test Frequency:	10525 MHz		Test Distance: 3 m



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	10524.91	98.11	128.00	-29.89	49.80	9.41	38.90	0.00	193	226	HORIZONTAL	Average
2	10524.91	99.31	148.00	-48.69	51.00	9.41	38.90	0.00	193	226	HORIZONTAL	Peak

3.4 Transmitter Spurious Emissions

3.4.1 Limit of Transmitter Spurious Emissions

Transmitter Spurious Emissions
10500 – 10550MHz, Field disturbance sensors
♦ Harmonic emissions in the restricted bands at and above 17.7 GHz: 7.5mV/m ♦ Harmonic emissions in the non-restricted bands: 25mV/m ♦ Except harmonic emissions, spurious emissions: FCC 15.209 limit or 50 dB below the fundamental, whichever is the lesser attenuation.

3.4.2 Measuring Instruments

Refer a measuring instruments list in this test report.

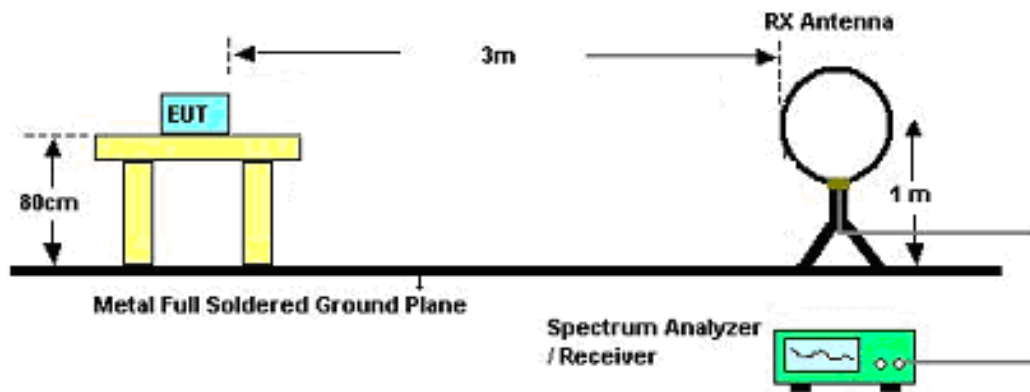
3.4.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2013, clauses 6.3, 6.4, 6.5, 6.6 and 7.8.6.

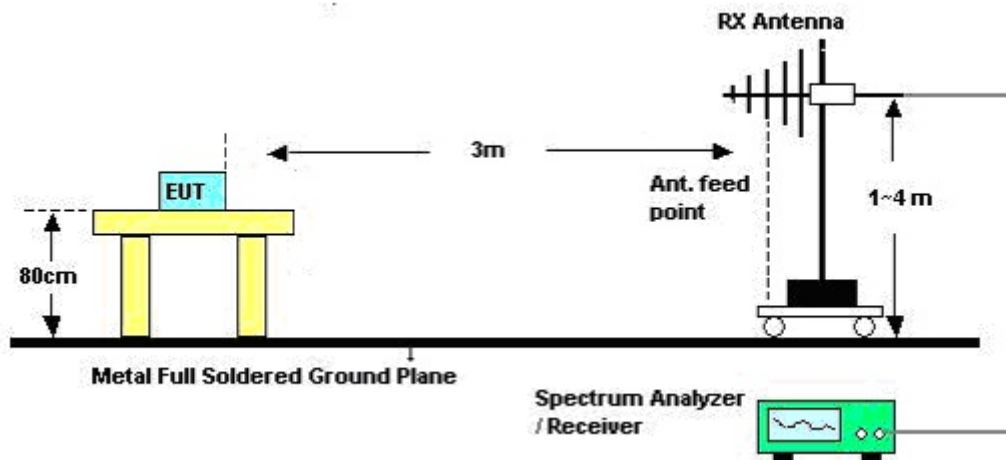
3.4.4 Test Setup

Transmitter Spurious Emissions

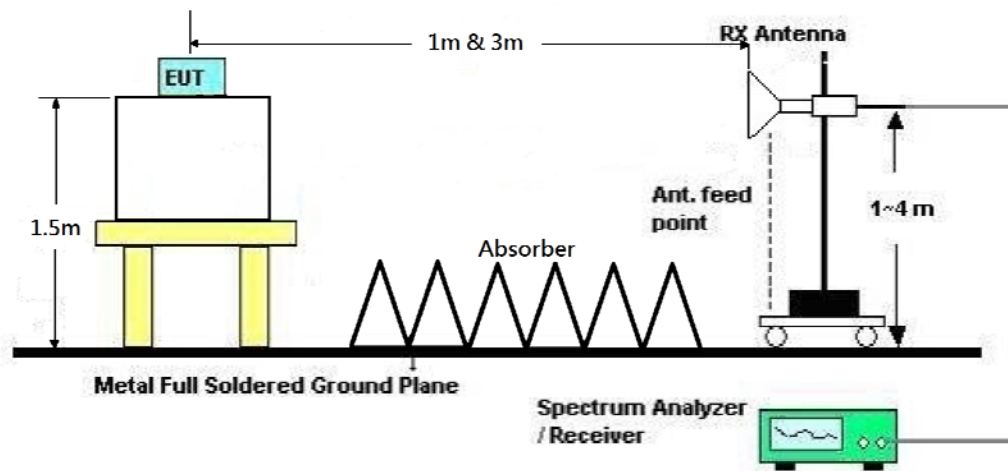
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For radiated emissions: 1GHz~40GHz



3.4.5 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.	

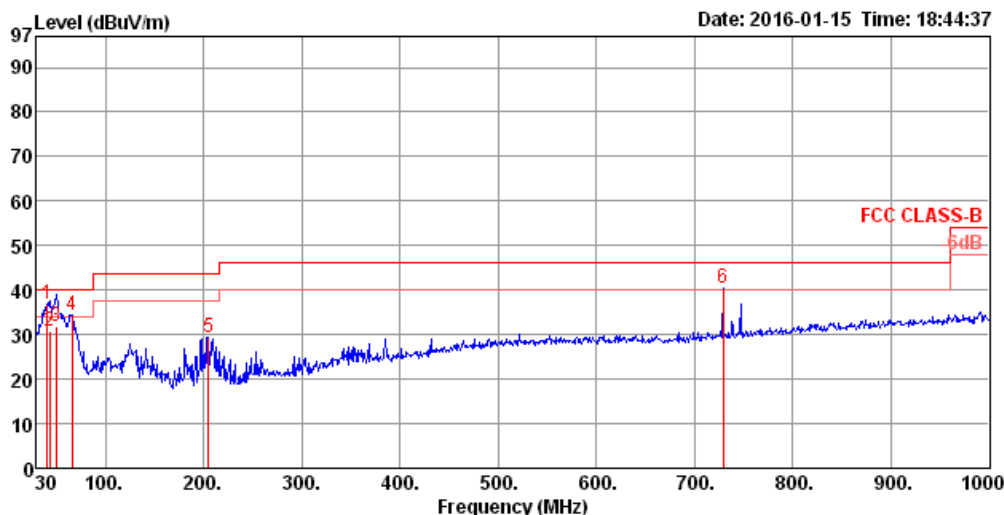
**3.4.6 Test Frequency FX, Radiated Testing**

Test Engineer:		Akina Chiu									
Test Date:		Jan. 15, 2016									
Humidity:		50	%	Test Range:		9 kHz - 30 MHz					
Temperature:		21.1	°C	Test Results							
Test Frequency:		10525 MHz									
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.)											



Test Engineer:	Akina Chiu		
Humidity:	50	%	Test Range: 30 MHz – 1000 MHz
Temperature:	21.1	°C	Polarization: Vertical
Test Frequency:	10525 MHz		Test Distance: 3m

Test Results

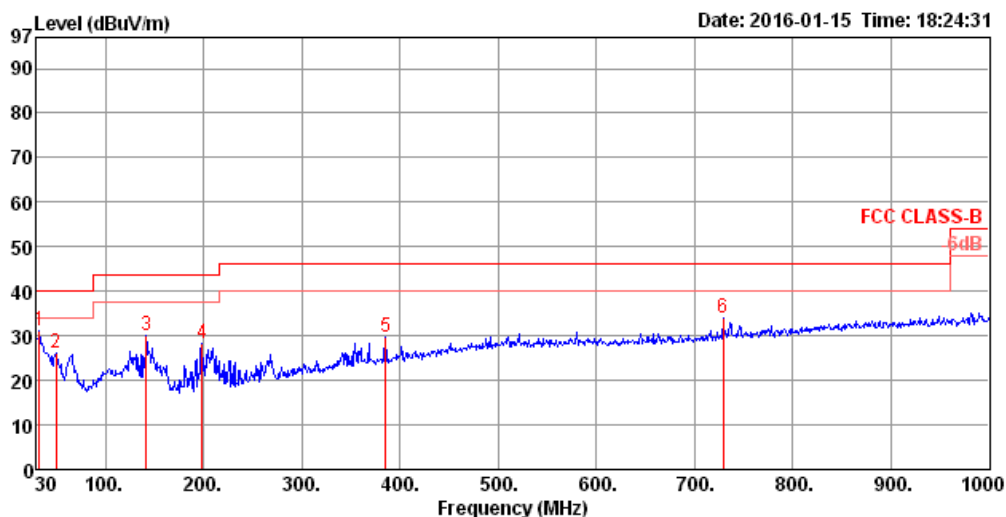


	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	40.67	36.98	40.00	-3.02	42.16	0.54	18.89	24.61	300	360	VERTICAL	Peak
2	43.58	30.88	40.00	-9.12	37.52	0.59	17.32	24.55	100	266	VERTICAL	QP
3	49.40	31.99	40.00	-8.01	41.23	0.61	14.59	24.44	100	289	VERTICAL	QP
4	65.89	34.31	40.00	-5.69	46.51	0.64	12.24	25.08	300	360	VERTICAL	Peak
5	204.60	29.33	43.50	-14.17	42.53	1.14	16.10	30.44	300	360	VERTICAL	Peak
6	729.37	40.56	46.00	-5.44	40.34	2.15	25.82	27.75	300	360	VERTICAL	Peak



Test Engineer:	Akina Chiu		
Humidity:	50	%	Test Range: 30 MHz – 1000 MHz
Temperature:	21.1	°C	Polarization: Horizontal
Test Frequency:	10525 MHz		Test Distance: 3m

Test Results



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	32.91	31.05	40.00	-8.95	31.78	0.53	23.53	24.79	100	360	HORIZONTAL	Peak
2	49.40	25.97	40.00	-14.03	35.21	0.61	14.59	24.44	100	360	HORIZONTAL	Peak
3	141.55	29.99	43.50	-13.51	39.97	0.94	17.36	28.28	100	360	HORIZONTAL	Peak
4	198.78	28.29	43.50	-15.21	41.64	1.13	15.99	30.47	100	360	HORIZONTAL	Peak
5	385.02	29.84	46.00	-16.16	34.99	1.52	21.82	28.49	100	360	HORIZONTAL	Peak
6	729.37	34.06	46.00	-11.94	33.84	2.15	25.82	27.75	100	360	HORIZONTAL	Peak



Test Engineer:		Akina Chiu				
Test Date:		Jan. 15, 2016				
Humidity:		50 %	Test Range: 1 GHz – 40GHz			
Temperature:		21.1 °C	Test Distance: 1 GHz – 18GHz: 3m / 18 GHz – 40GHz: 1m			
Test Frequency:		10525 MHz				
Test Results						
Test Range		Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
1 GHz – 40 GHz		4548	43.59	74	-30.41	Peak
		Frequency (MHz)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Remark
		4548	39.21	54	-14.79	Average
		Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
		21049.88	57.06	117.49	-60.43	Peak
		Frequency (MHz)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Remark
		21049.88	52.33	97.49	-45.16	Average
		Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
		31563	46.84	117.49	-70.65	Peak
		Frequency (MHz)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Remark
		31563	35.67	97.49	-61.82	Average
		Note: “N/F” means Nothing Found (No spurious emissions were detected.)				

Test Distance : 1m ; Limit = 25mV +Distance factor 20log(3/1)

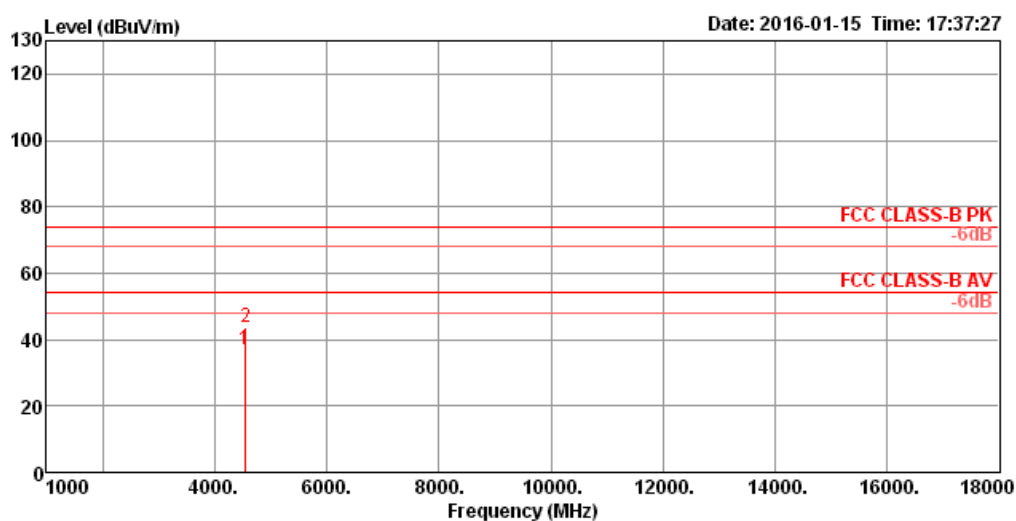
AV Limit=87.95dBuV/m + 9.54dB =97.49dBuV/m

PK Limit=97.49dBuV/m + 20dB = 117.49dBuV/m



Test Engineer:	Akina Chiu		
Humidity:	50	%	Test Range: 1 GHz – 18 GHz
Temperature:	21.1	°C	Polarization: Vertical
Test Frequency:	10525 MHz		Test Distance: 3m

Test Results

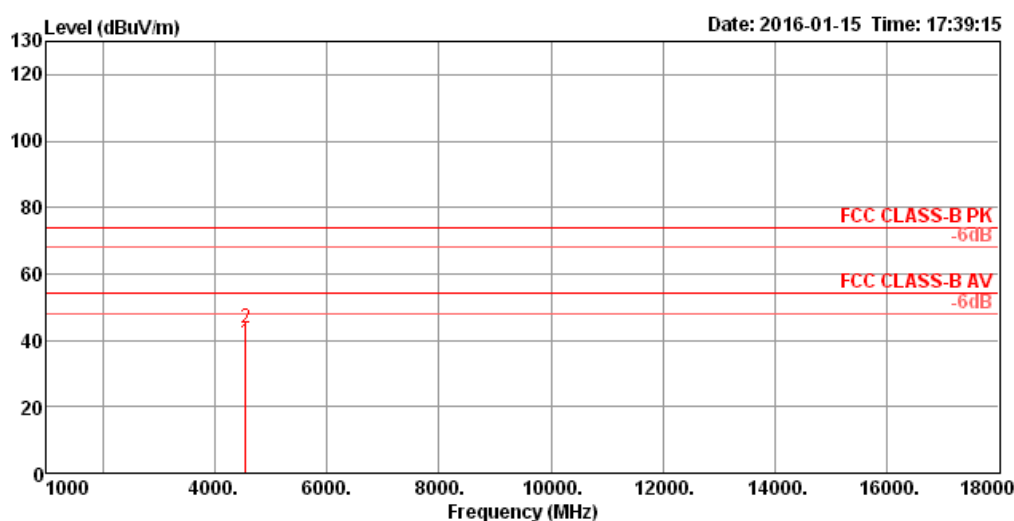


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	cm	deg	
1	4542.00	37.17	54.00	-16.83	34.73	6.91	32.10	36.57	150	92 VERTICAL	Average
2	4548.00	43.67	74.00	-30.33	41.23	6.91	32.10	36.57	150	92 VERTICAL	Peak

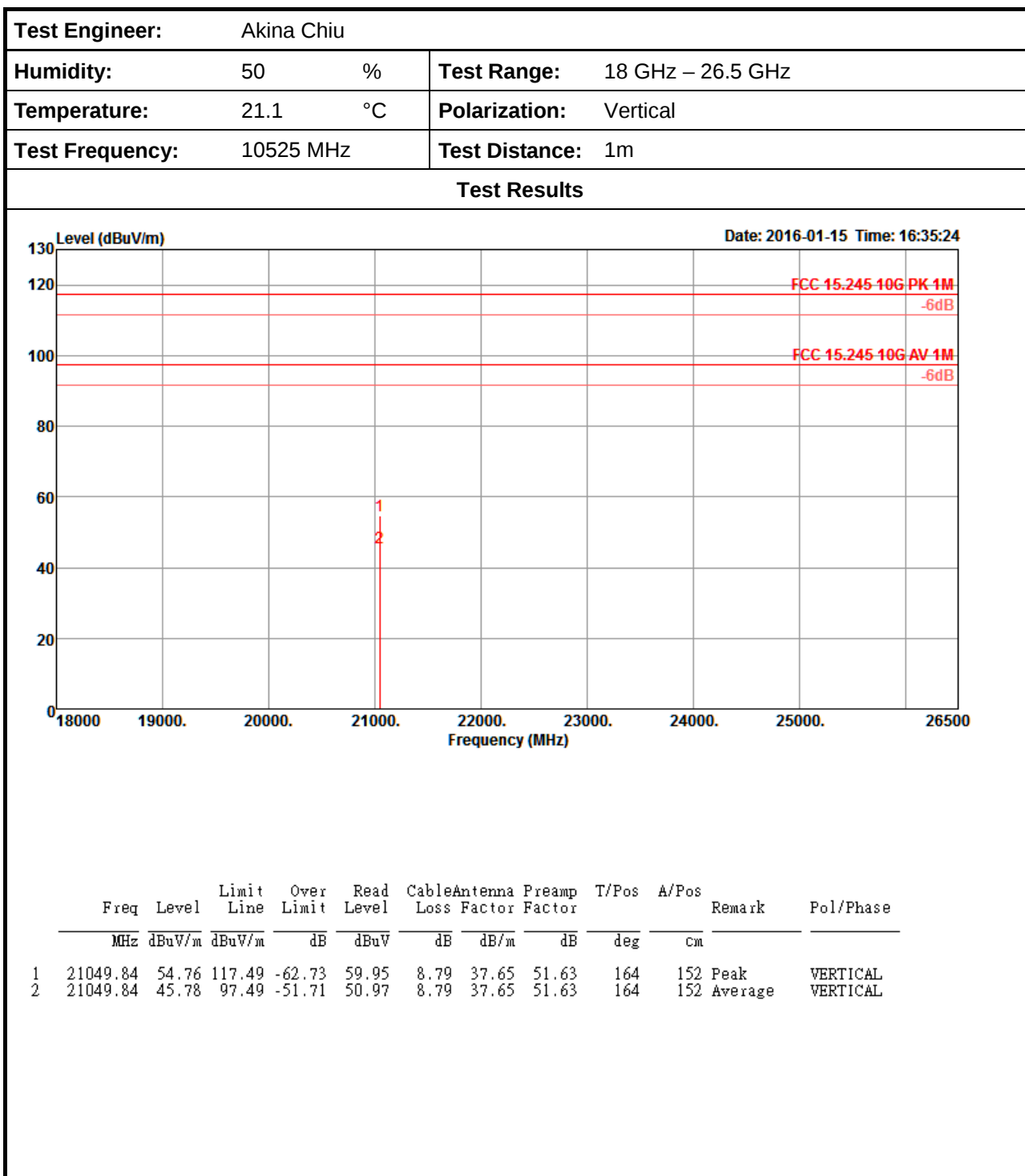


Test Engineer:	Akina Chiu		
Humidity:	50	%	Test Range: 1 GHz – 18 GHz
Temperature:	21.1	°C	Polarization: Horizontal
Test Frequency:	10525 MHz		Test Distance: 3m

Test Results



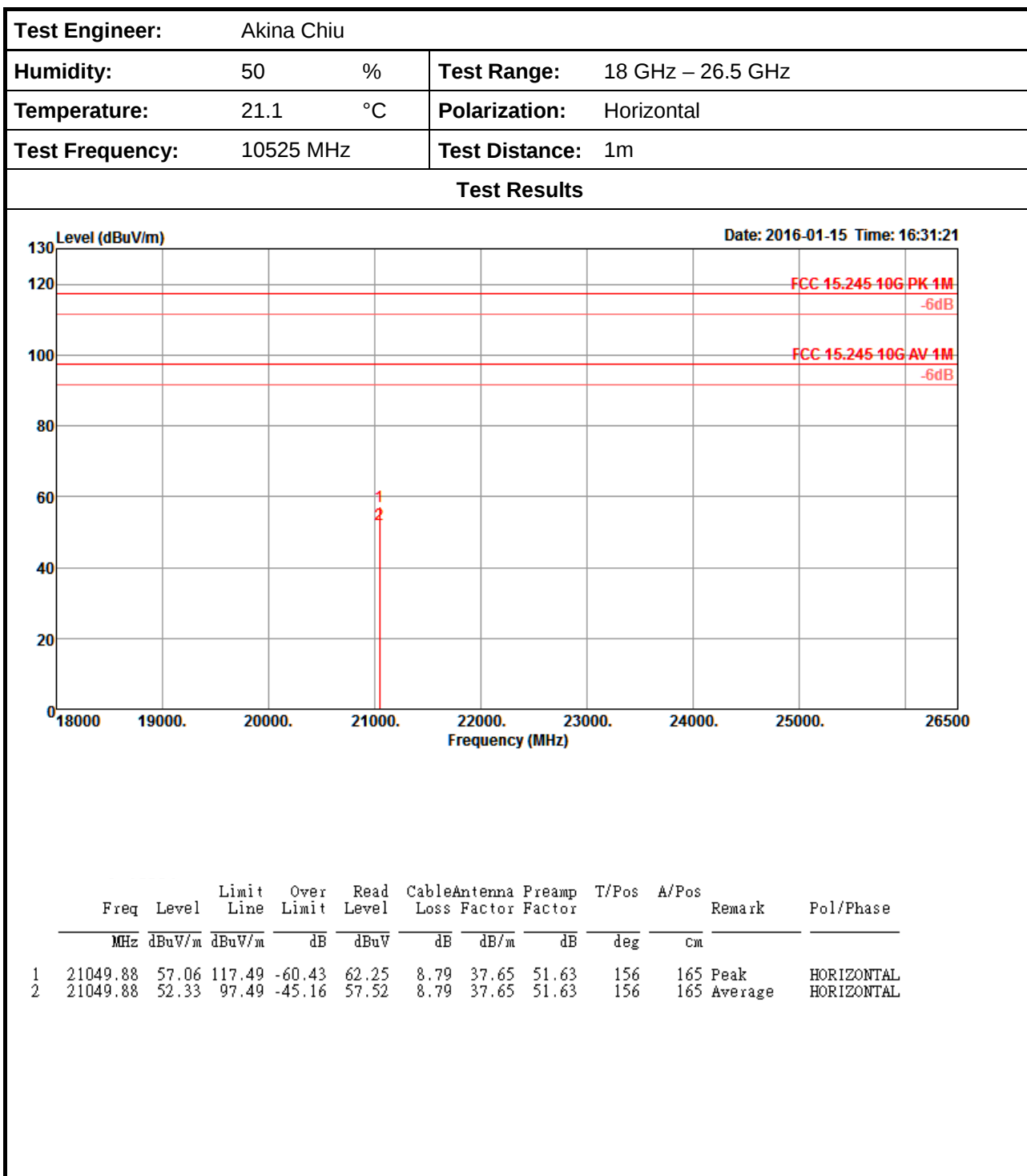
	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4548.00	39.21	54.00	-14.79	36.77	6.91	32.10	36.57	150	198	HORIZONTAL	Average
2	4548.00	43.59	74.00	-30.41	41.15	6.91	32.10	36.57	150	198	HORIZONTAL	Peak



Test Distance : 1m ; Limit = 25mV +Distance factor 20log(3/1)

AV Limit=87.95dBuV/m + 9.54dB =97.49dBuV/m

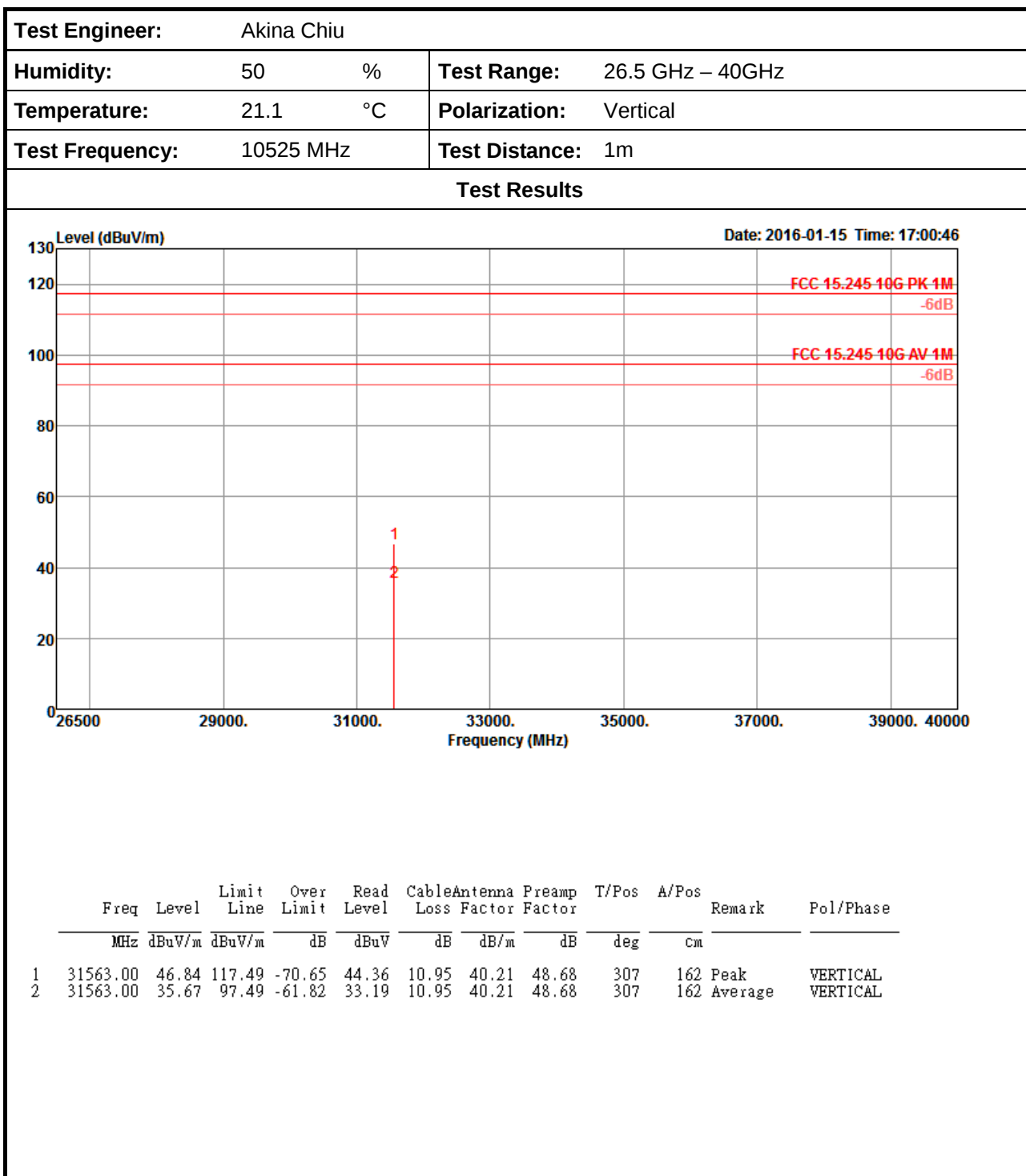
PK Limit=97.49dBuV/m + 20dB = 117.49dBuV/m



Test Distance : 1m ; Limit = 25mV +Distance factor 20log(3/1)

AV Limit=87.95dBuV/m + 9.54dB =97.49dBuV/m

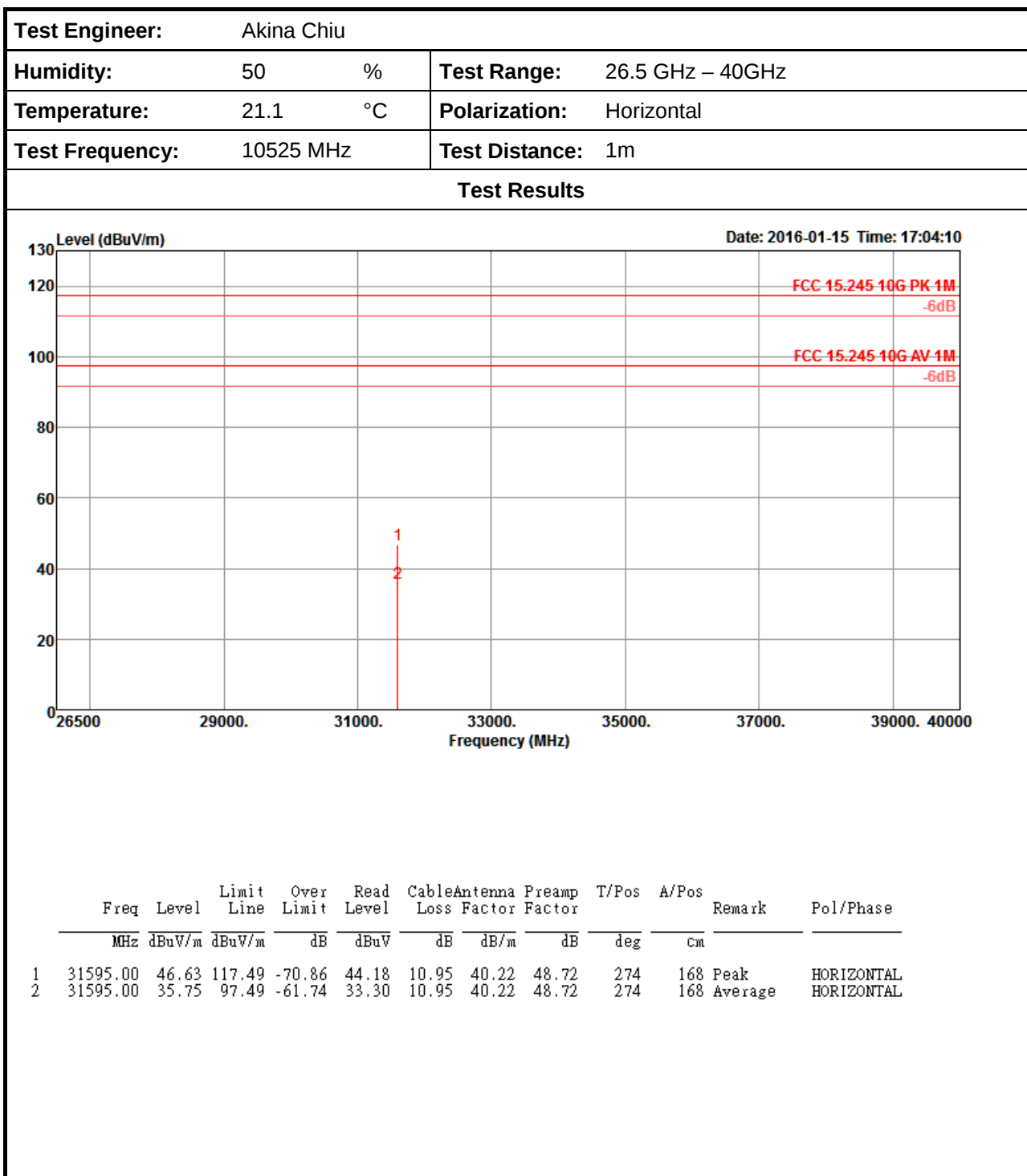
PK Limit=97.49dBuV/m + 20dB = 117.49dBuV/m



Test Distance : 1m ; Limit = 25mV +Distance factor 20log(3/1)

AV Limit=87.95dBuV/m + 9.54dB =97.49dBuV/m

PK Limit=97.49dBuV/m + 20dB = 117.49dBuV/m



Test Distance : 1m ; Limit = 25mV +Distance factor 20log(3/1)

AV Limit=87.95dBUV/m + 9.54dB =97.49dBUV/m

PK Limit=97.49dBUV/m + 20dB = 117.49dBUV/m



Test Engineer: Akina Chiu					
Test Date: Jan. 26, 2016					
Humidity: 50 %		Test Range: 40 GHz – 60 GHz			
Temperature: 21.1 °C		Test Distance: 1m			
Test Frequency: 10525 MHz		Test Results			
Test Range	Frequency (MHz)	Peak Level (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Remark
40 GHz – 60 GHz	41.61	82.88	117.49	-34.61	Peak
	Frequency (MHz)	Average Level (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Remark
	41.61	74.52	97.49	-22.97	Average
Note: "N/F" means Nothing Found (No spurious emissions were detected.)					

Test Distance: 1m ; Limit = 25mV + Distance factor $20\log(3/1)$

AV Limit= 88dBuV/m + 9.54dB = 97.54dBuV/m

PK Limit= 97.54dBuV/m + 20dB = 117.54dBuV/m

3.5 Antenna Requirements

3.5.1 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

3.5.2 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	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 08, 2015	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 23, 2015	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 25, 2015	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep. 03, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02099	1GHz ~ 26.5GHz	Dec. 07, 2015	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Feb.10, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESR26	101289	9kHz ~ 26GHz	Oct. 14, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Mixer	OML	M19HW/A	U91113-1	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Mixer	OML	M12HW/A	E91113-1	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)
Mixer	OML	M08HW/A	F91113-1	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO19R	U91113-A	40 ~ 60 GHz	Sep. 09, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO12R	E91113-A	60 ~ 90 GHz	Sep. 17, 2015*	Radiation (03CH01-CB)
Standard Horn Antenna	Custom Microwave	HO08R	F91113-A	90 ~ 140 GHz	Sep. 21, 2015*	Radiation (03CH01-CB)

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

“*” Calibration Interval of instruments listed above is two years.

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

5 Measurement Uncertainty

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Radiated Emission (40GHz ~ 220GHz)	4.7 dB	Confidence levels of 95%