


FCC Test Report

EQUIPMENT : Out Door Unit(ODU)

BRAND NAME :  wavelab

MODEL NO. : G3 SP+ Series 06G

FCC ID : ZXJ-G3-SPP-06

STANDARD : 47 CFR FCC Part 101

APPLICANT : Wavelab Telecom Equipment (GZ) Ltd.
Guangzhou Economic and Technological Development
District, 6 Jinbi Road, 510730 Guangzhou, China

MANUFACTURER : Wavelab Telecom Equipment (GZ) Ltd.
Guangzhou Economic and Technological Development
District, 6 Jinbi Road, 510730 Guangzhou, China

The product sample received on Aug. 03, 2011 and completely tested on Sep. 02, 2011. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 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.

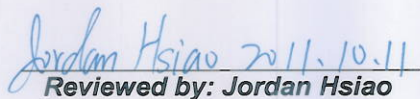

Reviewed by: Jordan Hsiao



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SUMMARY OF TEST RESULT

FCC Standard Requirements and Conformance Test Specifications				
Report Clause	Ref. FCC Std. Clause	Description	Result	Remark
-	15.107	AC Power Conducted Emissions	-	Note
3.1	2.1049/101.109	Occupied Bandwidth	Complied	-
3.2	101.113	Transmitter Power	Complied	-
3.3	101.111	Radiated Out-of-band Emissions	Complied	-
3.4	2.1051/101.111	Conducted Out-of-band Emissions	Complied	-
3.5	101.111	Spectrum Mask Emissions	Complied	-
3.6	101.107	Frequency Tolerance	Complied	-
4.1	2.1091	Maximum Permissible Exposure	Complied	-

Note: The power supply of this EUT is DC voltage.

Conducted Powerline test is not applicable for this EUT.



REVISION HISTORY

[illegible]

1 General Description

1.1 Information

1.1.1 Operating Frequency Range(s)

Operating Frequency Range(s)	
Model	Transmitter Frequency
G3 SP+ Series 06G	5925 ~ 6875MHz

1.1.2 The Channel Plan(s)

The Channel Plan(s)	
Channel Plan	6GHz Band
Authorized Bandwidth	10/20/30 MHz
TX/RX Space	252.04 / 300 / 160 / 170 / 340 / 350 MHz
NOTE: EUT complied with FCC 101.101	

1.1.3 Transmit Operating Modes

The Different Transmit Operating Modes	
<input checked="" type="checkbox"/>	Operating mode 1: Single Antenna Equipment
<input type="checkbox"/>	Operating mode 2: Smart Antenna Systems - without beam forming
<input type="checkbox"/>	Operating mode 3: Smart Antenna Systems - with beam forming

1.1.4 Smart Antenna Systems

In Case of Smart Antenna Systems		
<input checked="" type="checkbox"/>	No, EUT is without smart antenna feature.	
<input type="checkbox"/>	Yes, specify smart antenna feature:	
The number of Receive chains:	N/A	
The number of Transmit chains:	N/A	
Equal power distribution among the transmit chains:	<input type="checkbox"/> Yes ; <input type="checkbox"/> No	
<input type="checkbox"/>	In case of beam forming, the maximum beam forming gain:	dB

1.1.5 Antenna Information

Antenna Information	
Frequency Range: 5925 ~ 6425MHz / 6525 ~ 6875MHz	
Minimum Antenna Gain:	38 dBi, (Category A)
<input checked="" type="checkbox"/> Equipment placed on the market without antennas	
<input type="checkbox"/> Integral antenna (antenna permanently attached)	
Integral antenna gain:	N/A dBi
	<input type="checkbox"/> Temporary RF connector provided
	<input checked="" type="checkbox"/> No temporary RF connector provided
<input type="checkbox"/> External antenna (dedicated antennas)	
	<input type="checkbox"/> Single power level with corresponding antenna(s)
	<input type="checkbox"/> Multiple power settings and corresponding antenna(s)
	<input type="checkbox"/> Professional Install
	<input type="checkbox"/> Unique antenna connector
	<input type="checkbox"/> BIOS lock.
NOTE: EUT antenna complied with FCC 101.115, antenna requirements.	

Antenna Information	
Frequency Range: 6425 ~ 6525MHz	
Maximum antenna Gain:	36.21 dBi
<input checked="" type="checkbox"/> Equipment placed on the market without antennas	
<input type="checkbox"/> Integral antenna (antenna permanently attached)	
Integral antenna gain:	N/A dBi
	<input type="checkbox"/> Temporary RF connector provided
	<input checked="" type="checkbox"/> No temporary RF connector provided
<input type="checkbox"/> External antenna (dedicated antennas)	
	<input type="checkbox"/> Single power level with corresponding antenna(s)
	<input type="checkbox"/> Multiple power settings and corresponding antenna(s)
	<input type="checkbox"/> Professional Install
	<input type="checkbox"/> Unique antenna connector
	<input type="checkbox"/> BIOS lock.

1.1.6 Type of Equipment

Type of Equipment	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined Equipment (The radio part is fully integrated within another type of equipment)
<input type="checkbox"/>	Plug-in radio device (Equipment intended for a variety of host systems)
<input type="checkbox"/>	Other:

1.1.7 Transmit Power Control (TPC) Range

(a) Highest Power Levels for TPC 1 Range (without antenna)				
Applicable power levels		<input checked="" type="checkbox"/> Conducted; <input type="checkbox"/> EIRP		
Test Bandwidth		30 MHz (Only the widest bandwidth was tested and recorded in the report.)		
Operating Mode & Frequency (MHz)	Highest setting (P_{high}): (dBm)			
	Power Setting	Modulation	Power	EIRP Power Limit
5940	30	QPSK	28.65	85
6580	30	QPSK	28.79	65
6855	30	QPSK	28.57	85

1.1.8 Extreme Operating

The Extreme Operating Temperature Range that Apply to the Equipment			
<input checked="" type="checkbox"/> -33 °C to + 55 °C			
<input type="checkbox"/> 0 °C to +35 °C			
<input type="checkbox"/> Other:			
The nominal voltages of the stand-alone radio equipment or the nominal voltages of the combined (host) equipment or test jig in case of plug-in devices.			
Details provided are for the:	<input checked="" type="checkbox"/> stand-alone equipment		
	<input type="checkbox"/> combined (or host) equipment		
	<input type="checkbox"/> test jig		
Supply Voltage	<input type="checkbox"/> AC mains	State AC voltage	V
Supply Voltage	<input checked="" type="checkbox"/> DC	State DC voltage	48 V
		State DC current	1500 mA
In case of DC, indicate the type of power source:			
<input type="checkbox"/> Internal Power Supply			
<input checked="" type="checkbox"/> External Power Supply from IDU			
<input type="checkbox"/> Battery	<input type="checkbox"/> Nickel Cadmium		
	<input type="checkbox"/> Alkaline		
	<input type="checkbox"/> Nickel-Metal Hydride		
	<input type="checkbox"/> Lithium-Ion		
	<input type="checkbox"/> Lead acid (Vehicle regulated)		
	<input type="checkbox"/> Other:		
Operating Voltage	<input checked="" type="checkbox"/> Vnom (-48 VDC)		
Operating Climatic	<input checked="" type="checkbox"/> Tnom (20°C)	<input checked="" type="checkbox"/> Tmin (-33°C)	<input checked="" type="checkbox"/> Tmax (55°C)

1.2 Additional Information Provided by the Submitter

1.2.1 Modulation

Modulation	
ITU Class of emission	D1D(QPSK,16QAM,32QA,64QAM,128QAM, 256QAM)-OFDM
Can the transmitter operate un-modulated:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

1.2.2 Duty Cycle

Duty Cycle	
The transmitter is intended for:	<input checked="" type="checkbox"/> Continuous Duty: 100 %
	<input type="checkbox"/> Intermittent Duty: ... %
	<input type="checkbox"/> Continuous operation possible for testing purposes

1.2.3 About the EUT

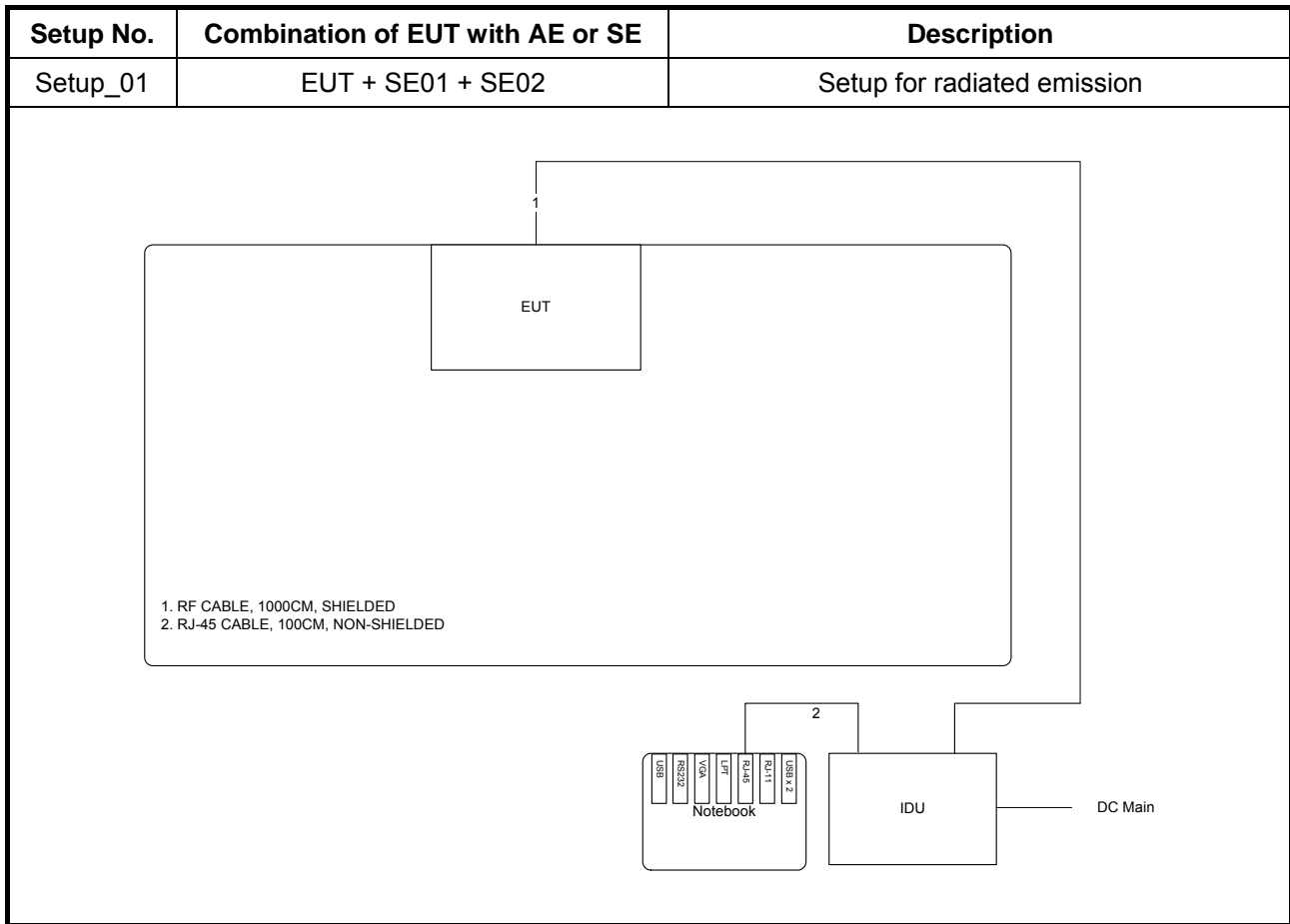
About the EUT	
<input checked="" type="checkbox"/>	The equipment submitted are representative production models.
<input type="checkbox"/>	If not, the equipment submitted are pre-production models
<input type="checkbox"/>	If pre-production equipment is submitted, the final production equipment will be identical in all respects with the equipment tested.
<input type="checkbox"/>	If not, supply full details:

1.3 Ancillary and/or Support Equipment

Support Equipment (SE)				
Item	Equipment	Brand Name	Model Name	Serial No.
SE01	Notebook	DELL	1200	E2K4965AGNM
SE02	IDU	HUAWEI	RTN950	-

1.4 EUT Setups

For the purposes of this test report, EUT's ancillary equipment (AE) or testing support equipment (SE) is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless EUT's ancillary equipment (AE) or testing support equipment (SE) could possible influence the test results. EUT setups describe the combination of EUT's and EUT's ancillary equipment (AE) or testing support equipment (SE) used for testing.



1.5 Testing Applied Standards

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

- 47 CFR FCC Part 101
- ANSI C63.10-2009

1.6 Testing Location

Testing Location		
<input type="checkbox"/>	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 : 886-3-318-0055
<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
Testing Site No.		
03CH01-CB		TH01-CB

1.7 Abbreviations Used for the Test Report

- Test Channel: B (Bottom Channel), M (Middle Channel), and T (Top Channel).
- EUT: Equipment under Test.
- AE: EUT's Ancillary Equipment
- SE: Testing Support Equipment
- TPC: Transmit Power Control
- OFS: Private Operational Fixed Point-to-Point Microwave Service

2 Test Configuration of Equipment under Test

2.1 Test Channel Frequencies

Authorized Bandwidth (30 MHz)				
Frequency Band	Channel Plan	B (Bottom Channel)	M (Middle Channel)	T (Top Channel)
5925 ~ 6875MHz	-	5940 MHz (F1)	6580 MHz (F2)	6855 MHz (F3)

2.2 Conformance Tests and Related Test Frequencies

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test	Test Frequencies (MHz)	Test Operating Mode	Test Channel Bandwidth
Occupied Bandwidth	F1, F2, F3	QPSK	30MHz
Transmitter Power	F1, F2, F3	QPSK	30MHz
Radiated Out-of-band Emissions	F1, F2, F3	QPSK	30MHz
Conducted Out-of-band Emissions	F1, F2, F3	QPSK	30MHz
Frequency Tolerance	F2	QPSK	30MHz
F1: The centre frequency of the lowest declared channel for every declared authorized bandwidth. F2: The centre frequency of the middle declared channel for every declared authorized bandwidth. F3: The centre frequency of the highest declared channel for every declared authorized bandwidth. Transmit operating modes (see test report clause 1.1.3), Operating Mode 1: Single Antenna Equipment. Test Channel Bandwidth (see test report clause 1.1.2), Channel Bandwidth: 30 MHz.			

3 Transmitter Test Result

3.1 Occupied Bandwidth

3.1.1 Limit of Occupied Bandwidth

99% Occupied Bandwidth (see Note 1)	None
NOTE 1: 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.	

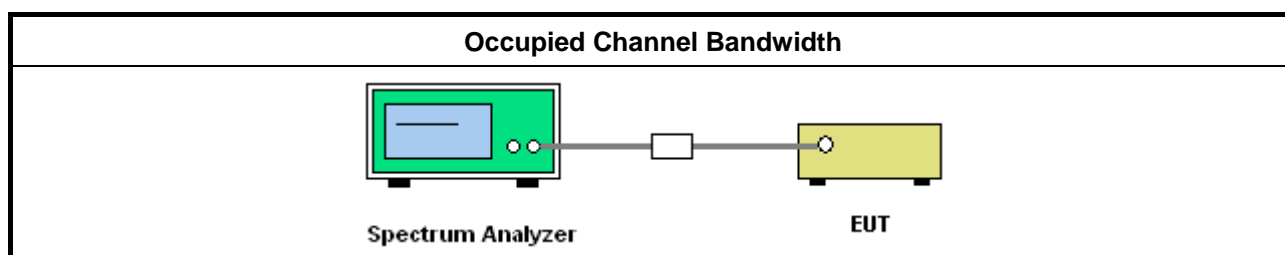
3.1.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.1.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.9.1.

3.1.4 Test Setup



3.1.5 Test Information

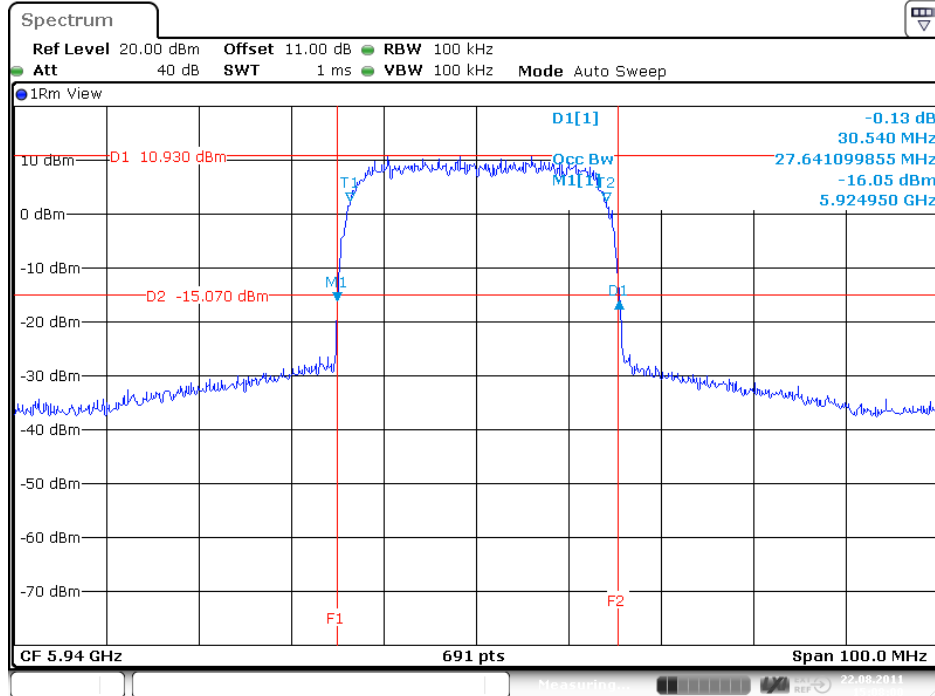
Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/22 ~ 2011/08/25	TH01-CB
Measurement Uncertainty		$\pm 8.5 \times 10^{-8}$ Hz	-

3.1.6 Test Result of Occupied Bandwidth

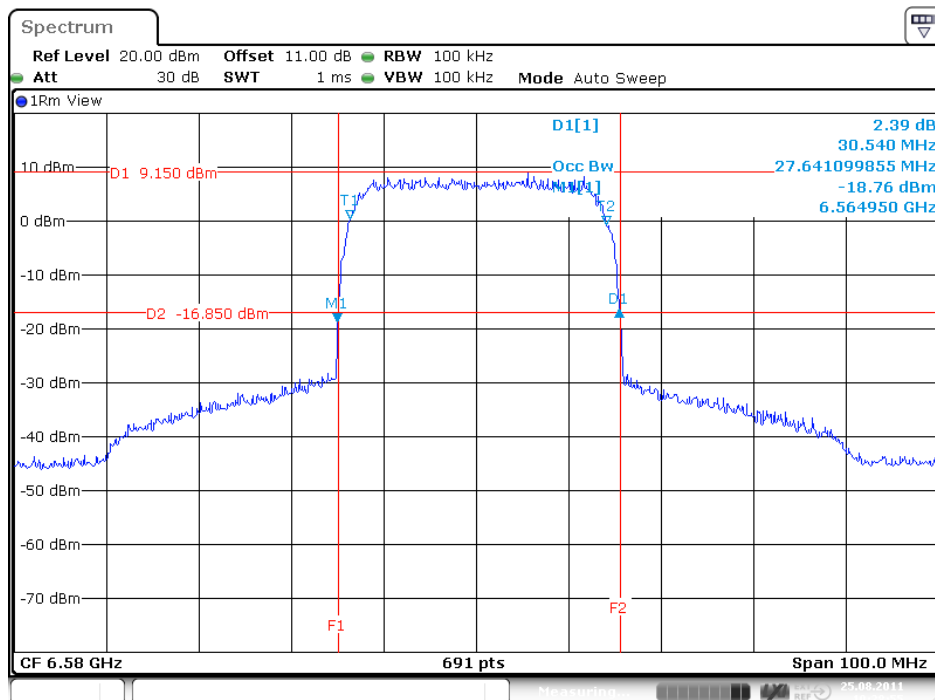
Transmitter Bandwidth			
30 MHz-QPSK	F1 (5940MHz)	F2 (6580MHz)	F3 (6855MHz)
TxPwr	30.00	30.00	30.00
99% Bandwidth	27.64	27.64	27.79
26dB Bandwidth	30.54	30.54	30.39
Limit	N/A		
Complied Limit	Complied		

3.1.6.1 Bandwidth Plots

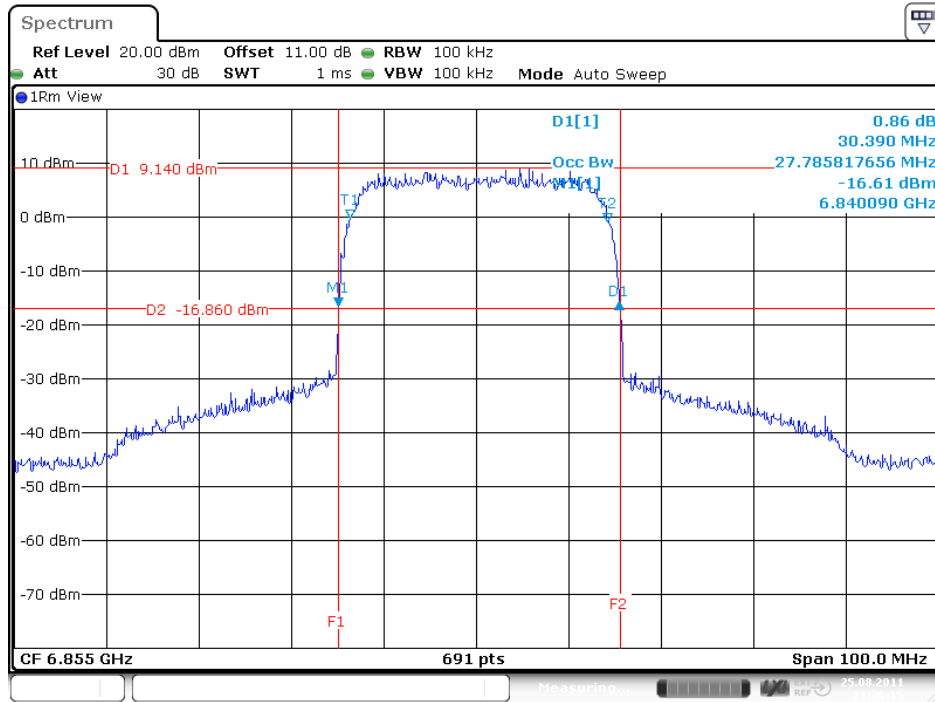
Occupied Bandwidth (F1) 30 MHz-QPSK / 5940MHz



Occupied Bandwidth (F2) 30 MHz-QPSK / 6580MHz



Occupied Bandwidth (F3) 30 MHz-QPSK / 6855MHz



3.2 Transmitter Power

3.2.1 Limit of Transmitter Power

Frequency Band	Transmitter Power (EIRP)
5925 ~ 6425MHz / 6525 ~ 6875MHz	55 dBW (85 dBm)
6425 ~ 6525MHz	35 dBW (65 dBm)
NOTE: For the applicable limit, see FCC 101.113	

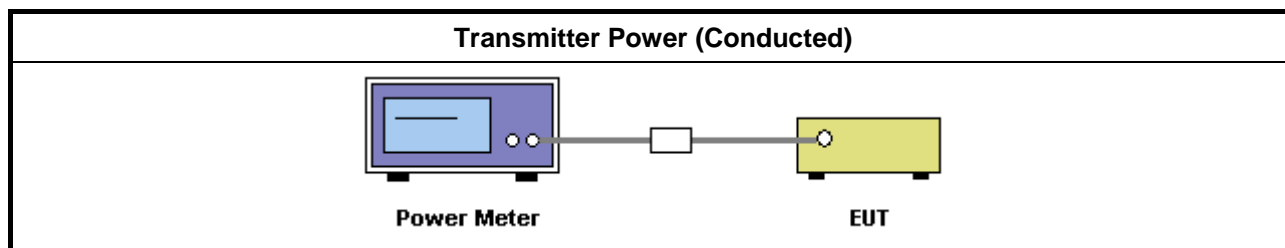
3.2.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.2.3 Test Procedures

Method of measurement:
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.10.2.1 for power meter measurement.
<input type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.10.2.2 for spectrum analyzer measurement.

3.2.4 Test Setup



3.2.5 Test Information

Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/22 ~ 2011/08/25	TH01-CB
Measurement Uncertainty		±0.5 dB	-

3.2.6 Test Result of Transmitter Power

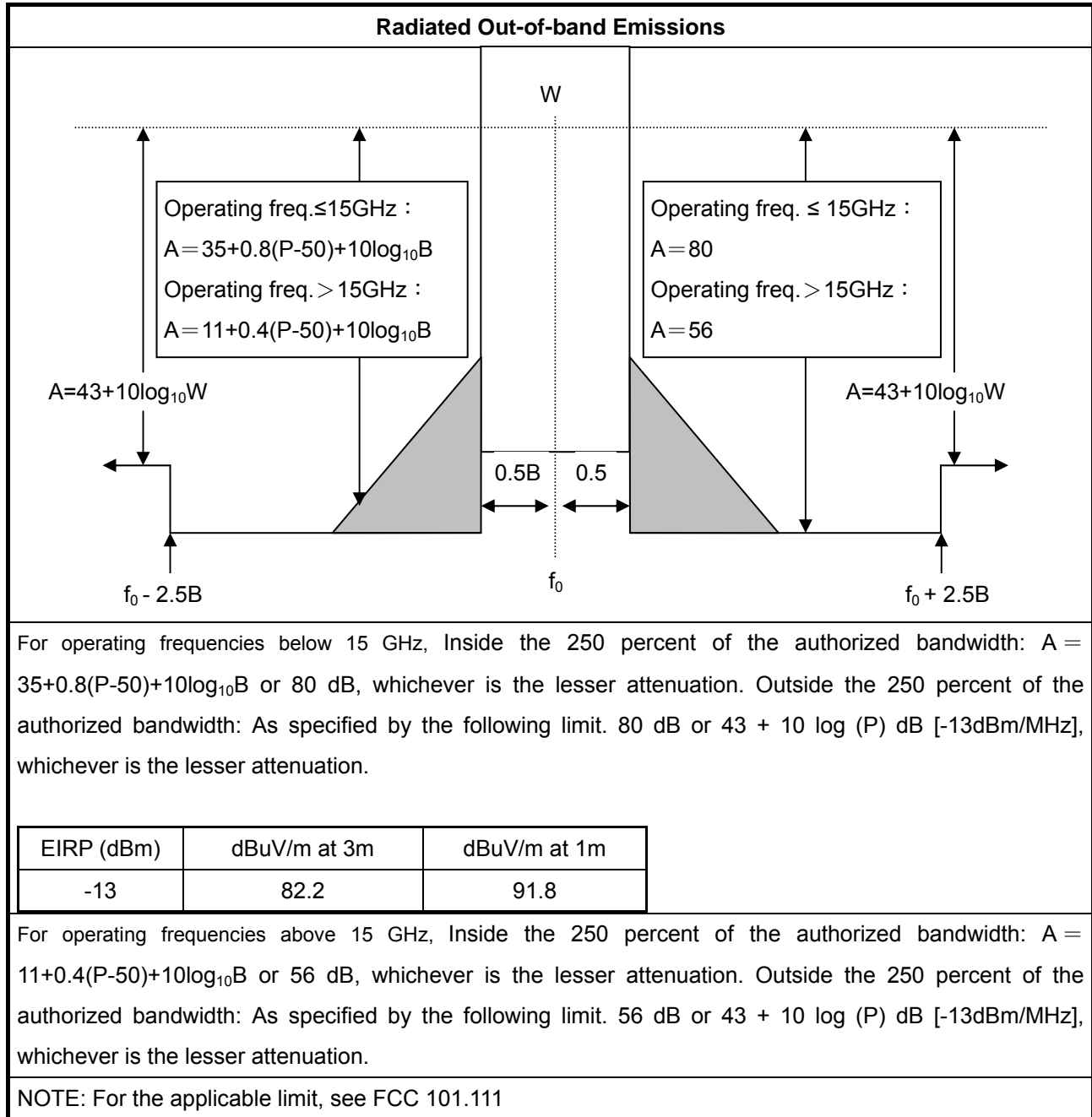
Transmitter Power (5925 ~ 6425MHz Band)	
Minimum Antenna Gain (dBi)	38
30 MHz-QPSK	F1 (5940MHz)
TxPwr	30.00
Conducted Power (dBm)	28.65
EIRP Power (dBm)	66.65
Maximum EIRP Power (dBm)	66.65
EIRP Power Limit (dBm)	85.00
Complied Limit	Complied

Transmitter Power (6525 ~ 6875MHz Band)	
Minimum Antenna Gain (dBi)	38
30 MHz-QPSK	F3 (6855MHz)
TxPwr	30.00
Conducted Power (dBm)	28.57
EIRP Power (dBm)	66.57
Maximum EIRP Power (dBm)	66.57
EIRP Power Limit (dBm)	85.00
Complied Limit	Complied

Transmitter Power (6425 ~ 6525MHz)	
Maximum antenna gain (dBi)	36.21
30 MHz-QPSK	F2 (6580MHz)
TxPwr	30.00
Conducted Power (dBm)	28.79
Maximum EIRP Power (dBm)	65.00
EIRP Power Limit (dBm)	65.00
Complied Limit	Complied

3.3 Radiated Out-of-band Emissions

3.3.1 Limit of Radiated Out-of-band Emissions



3.3.2 Measuring Instruments

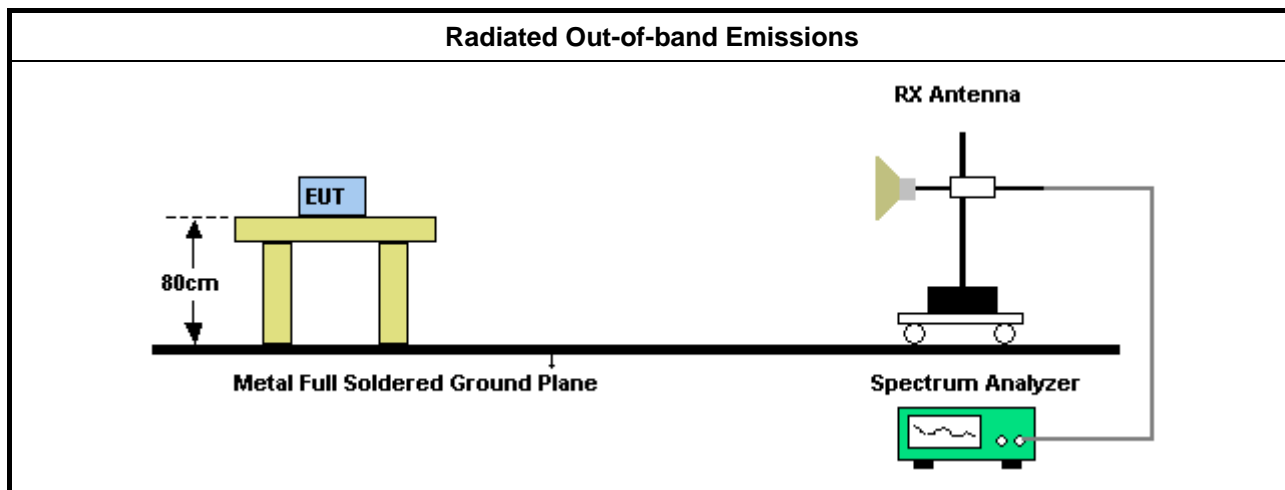
Refer a measuring instruments list in this test report.

3.3.3 Test Procedures

Method of measurement:

- ☒ Refer as ANSI C63.10-2009, clause 6.5 for radiated measurement for 30 – 1000 MHz emissions.
- ☒ Refer as ANSI C63.10-2009, clause 6.6 for radiated measurement for above 1000 MHz emissions.

3.3.4 Test Setup

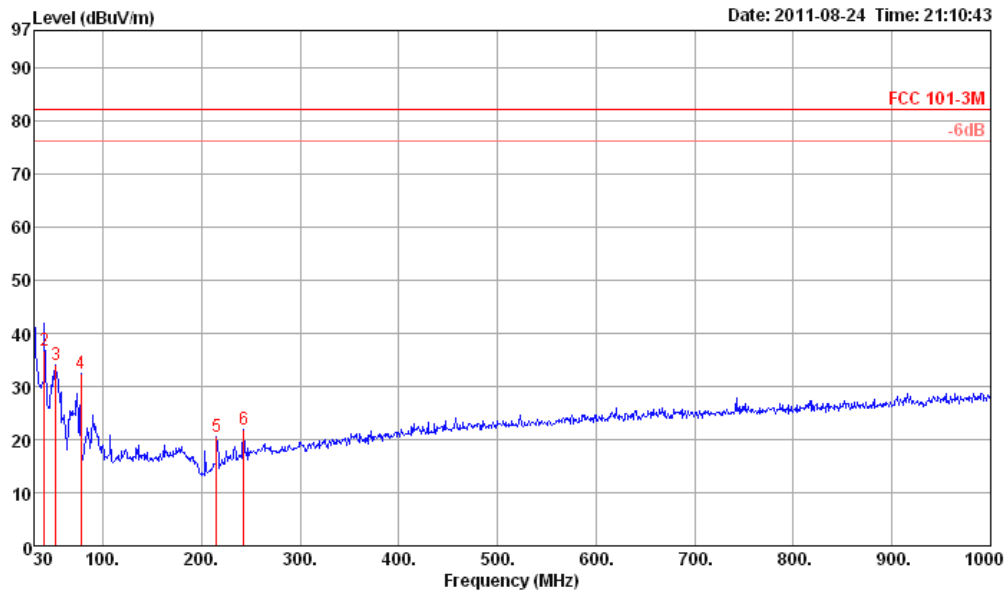


3.3.5 Test Information

Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/24	03CH01-CB
Measurement Uncertainty		30 – 1000 MHz	±2.28 dB
		1 – 18 GHz	±2.59 dB
		18 – 40 GHz	±2.37 dB
		40 – 200 GHz	±4.43 dB

3.3.6 Test Result of Radiated Out-of-band Emissions

Frequency Band:	5925 ~ 6875MHz Band	Power Setting:	30
Modulation:	QPSK	Operating Mode:	QPSK
Test Range:	30 MHz – 1000 MHz	Polarization:	Vertical

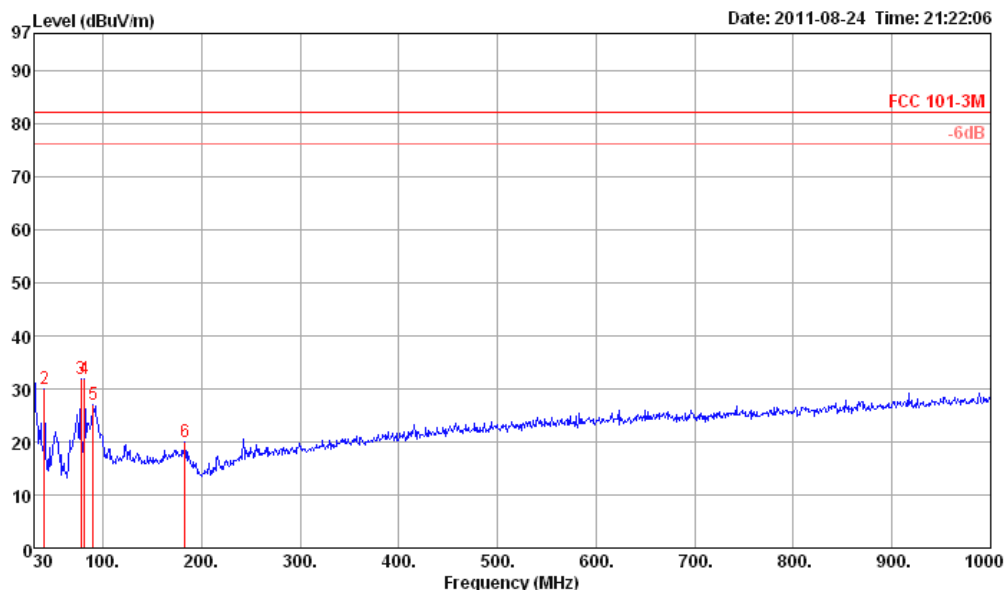


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	30.00	36.67	82.20	-45.53	45.21	0.50	18.76	27.80	QP
2	40.67	36.75	82.20	-45.45	51.30	0.70	12.55	27.80	QP
3	52.31	34.13	82.20	-48.07	53.00	0.74	8.18	27.79	Peak
4	77.53	32.31	82.20	-49.89	51.97	1.00	7.03	27.69	Peak
5	215.27	20.54	82.20	-61.66	35.66	1.76	10.19	27.07	Peak
6	242.43	21.89	82.20	-60.31	34.83	1.87	12.20	27.01	Peak

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Power Setting:	30
Modulation:	QPSK	Operating Mode:	QPSK
Test Frequency:	30 MHz – 1000 MHz	Polarization:	Horizontal

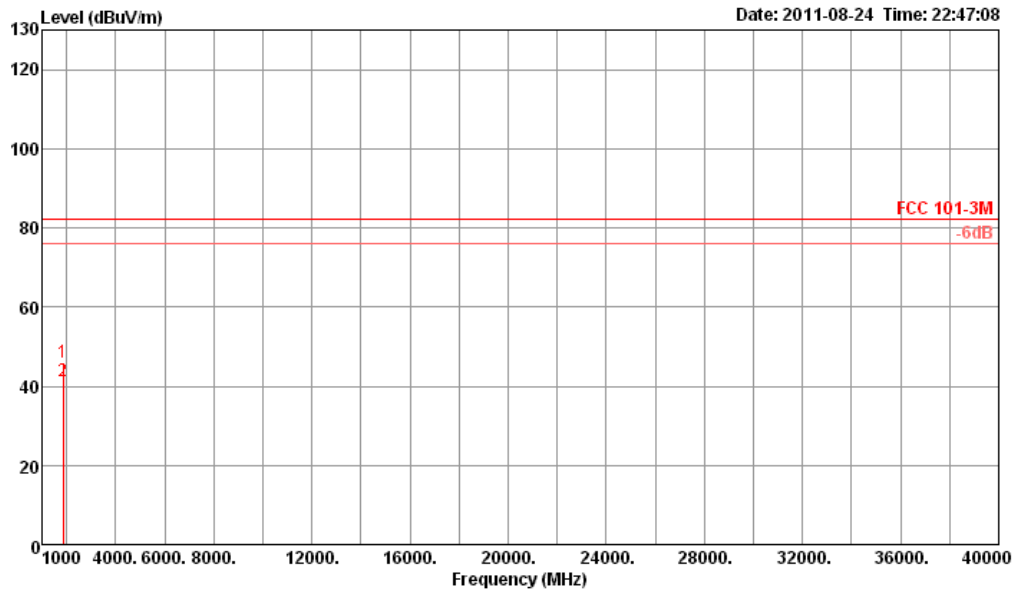


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	30.00	33.58	82.20	-48.62	42.12	0.50	18.76	27.80	Peak
2	40.67	30.07	82.20	-52.13	44.62	0.70	12.55	27.80	Peak
3	77.53	31.97	82.20	-50.23	51.63	1.00	7.03	27.69	Peak
4	81.41	31.97	82.20	-50.23	51.20	1.10	7.35	27.68	Peak
5	90.14	27.05	82.20	-55.15	44.61	1.10	8.98	27.64	Peak
6	183.26	19.95	82.20	-62.25	32.98	1.62	12.53	27.18	Peak

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected).

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	5940MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Vertical

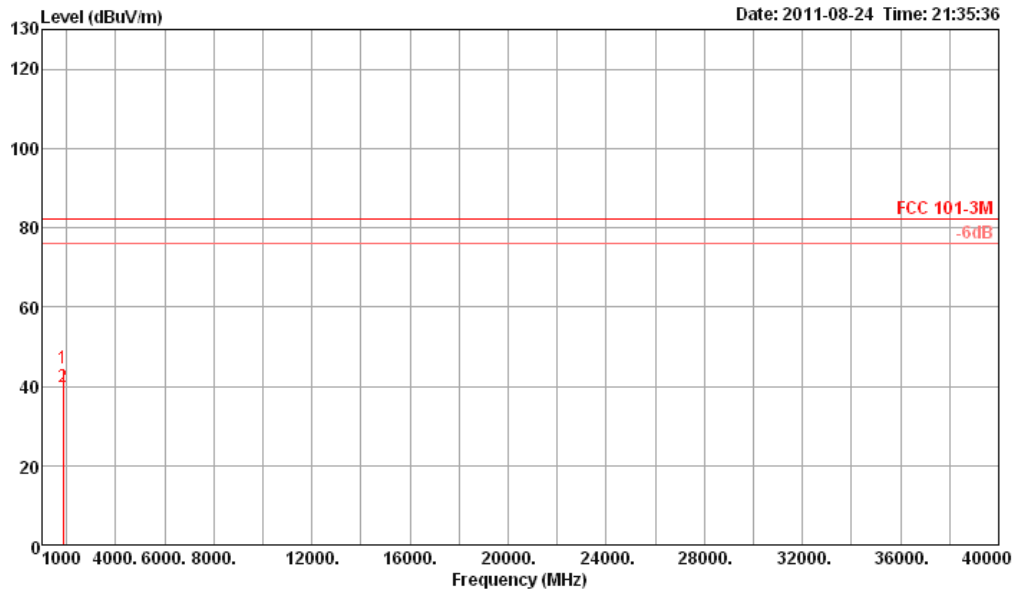


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	1863.29	46.02	82.20	-36.18	51.74	2.49	26.69	34.90	Peak
2	1863.33	41.21	82.20	-40.99	46.93	2.49	26.69	34.90	Average

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	5940MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Horizontal

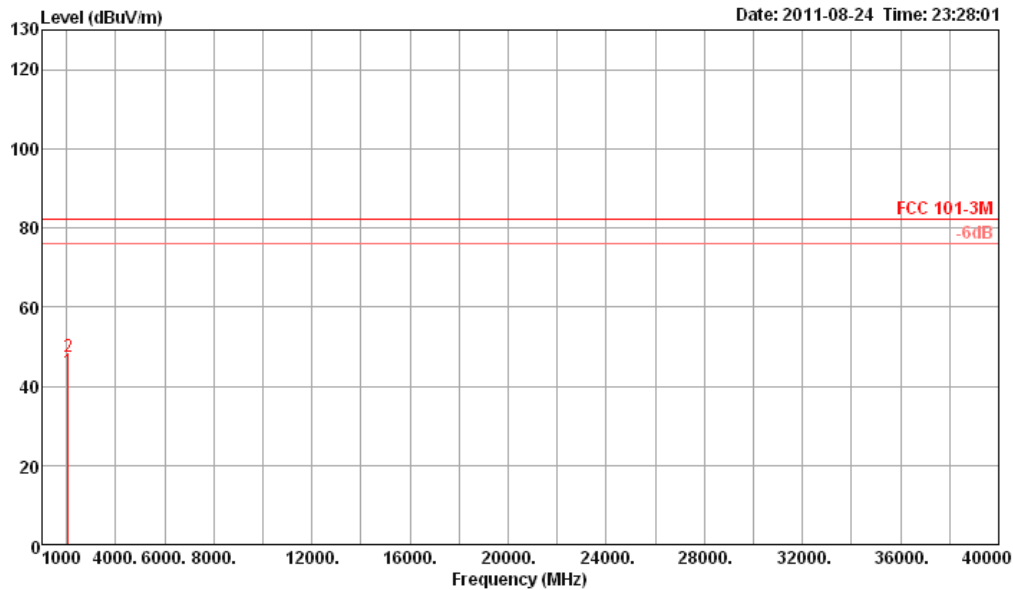


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark
						dB	dB/m	dB	
1	1863.31	44.50	82.20	-37.70	50.22	2.49	26.69	34.90	Average
2	1863.33	39.77	82.20	-42.43	45.49	2.49	26.69	34.90	Peak

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	6580MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Vertical

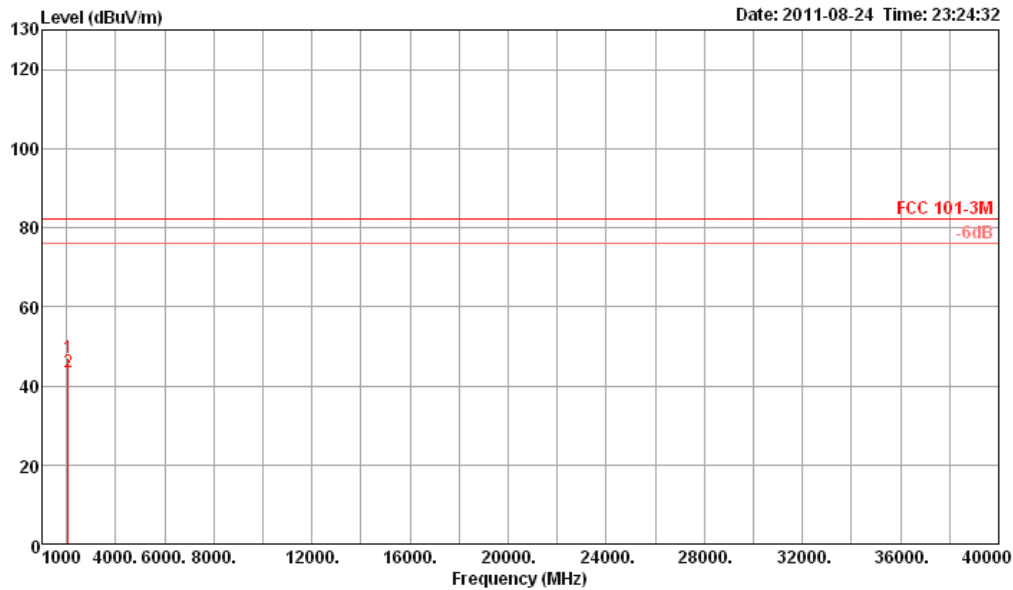


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp			
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	2076.67	43.74	82.20	-38.46	48.71	2.64	27.31	34.92	Average	VERTICAL
2	2076.73	47.47	82.20	-34.73	52.44	2.64	27.31	34.92	Peak	VERTICAL

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	6580MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Horizontal

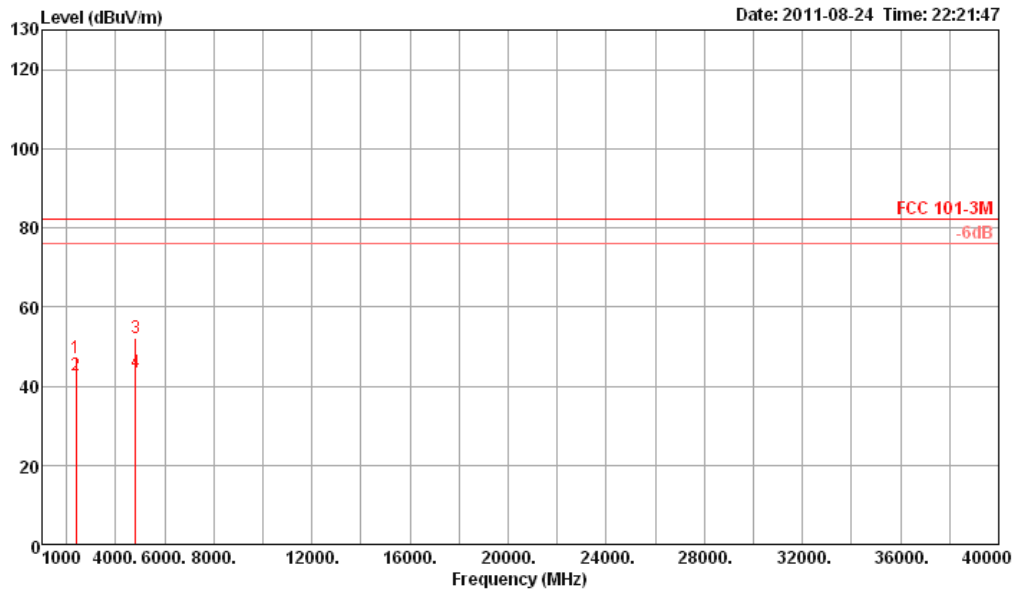


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		
	MHz	dBuV/m	dBuV/m	Limit	Level	Loss	Factor	Factor	Remark
				dB	dBuV	dB	dB/m	dB	
1	2076.61	47.01	82.20	-35.19	51.98	2.64	27.31	34.92	Peak
2	2076.66	43.37	82.20	-38.83	48.34	2.64	27.31	34.92	Average

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	6855MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Vertical

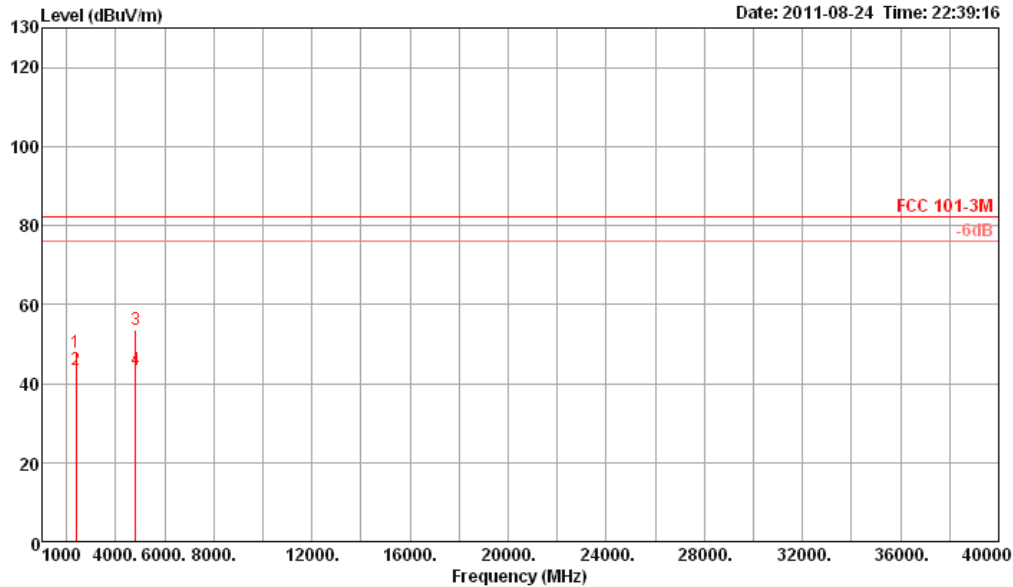


	Freq	Level	Limit	Over	Read	CableAntenna	Preamp			
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	2401.64	47.16	82.20	-35.04	51.17	2.88	28.09	34.98	Average	VERTICAL
2	2401.66	42.59	82.20	-39.61	46.60	2.88	28.09	34.98	Peak	VERTICAL
3	4803.16	52.29	82.20	-29.91	49.90	4.23	33.36	35.20	Peak	VERTICAL
4	4803.34	43.37	82.20	-38.83	40.98	4.23	33.36	35.20	Average	VERTICAL

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

Frequency Band:	5925 ~ 6875MHz Band	Test Frequency:	6855MHz
Modulation:	QPSK	Power Setting:	30
Test Range:	1 GHz – 40 GHz	Polarization:	Horizontal



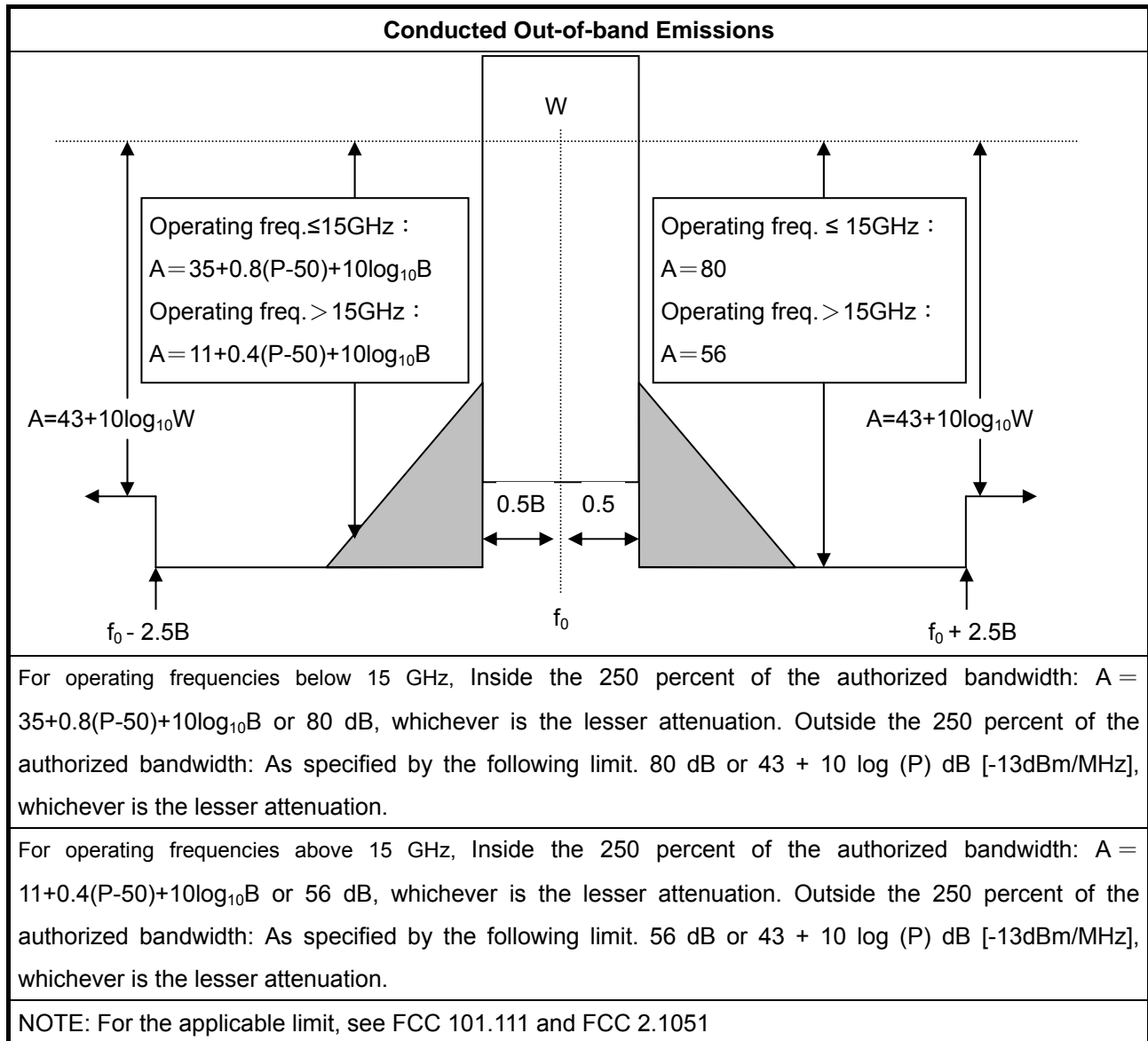
	Freq	Level	Limit	Over	Read	CableAntenna	Preamp			
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	Pol/Phase
1	2401.62	47.98	82.20	-34.22	51.99	2.88	28.09	34.98	Peak	HORIZONTAL
2	2401.66	43.47	82.20	-38.73	47.48	2.88	28.09	34.98	Average	HORIZONTAL
3	4803.34	53.45	82.20	-28.75	51.06	4.23	33.36	35.20	Average	HORIZONTAL
4	4803.34	43.30	82.20	-38.90	40.91	4.23	33.36	35.20	Peak	HORIZONTAL

NOTE 1: ">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 10.1.8.2.

NOTE 2: "N/F" means Nothing Found (No spurious emissions were detected.)

3.4 Conducted Out-of-band Emissions

3.4.1 Limit of Conducted Out-of-band Emissions



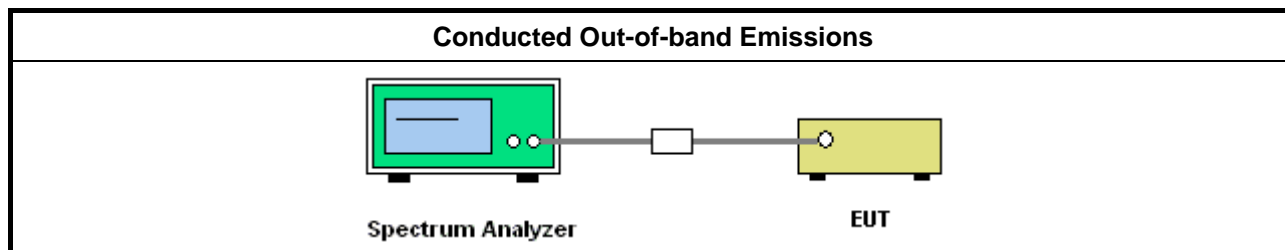
3.4.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.4.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.7.

3.4.4 Test Setup



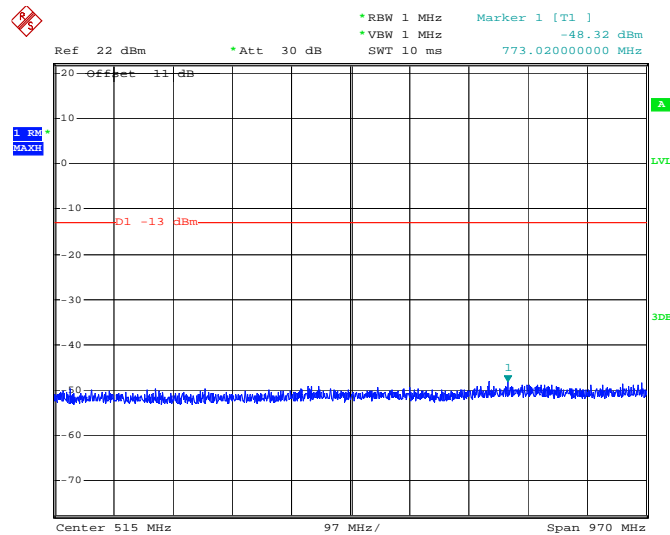
3.4.5 Test Information

Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/22 ~ 2011/08/25	TH01-CB
Measurement Uncertainty		30 – 1000 MHz	±0.51 dB
		1 – 18 GHz	±0.67 dB
		18 – 40 GHz	±0.83 dB
		40 – 60 GHz	±1.23 dB

3.4.6 Test Result of Conducted Out-of-band Emissions

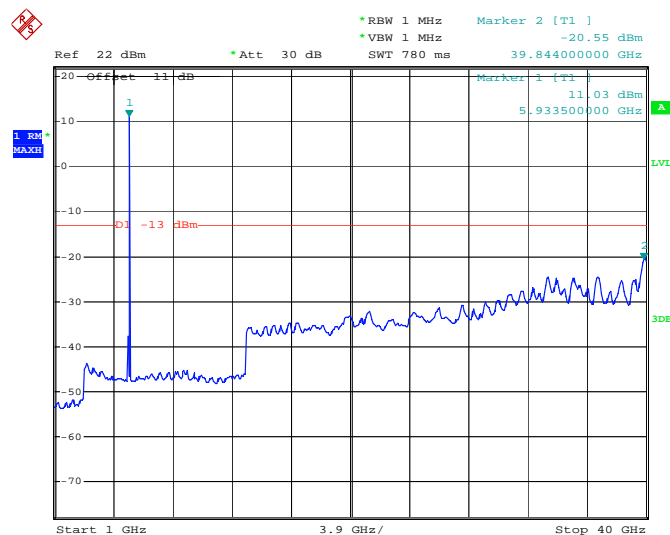
Frequency Band:	5925 ~ 6875MHz Band	Power Setting:	30
Modulation:	QPSK	Operating Mode:	QPSK
Test Frequency:	F1 (5940MHz)	Authorized Bandwidth #:	30 MHz

30 – 1000 MHz



Date: 22.AUG.2011 16:27:02

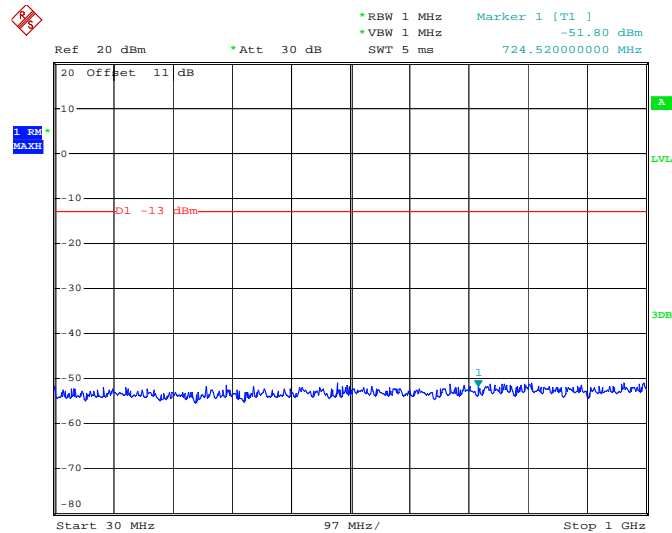
1 – 40 GHz



Date: 22.AUG.2011 16:34:12

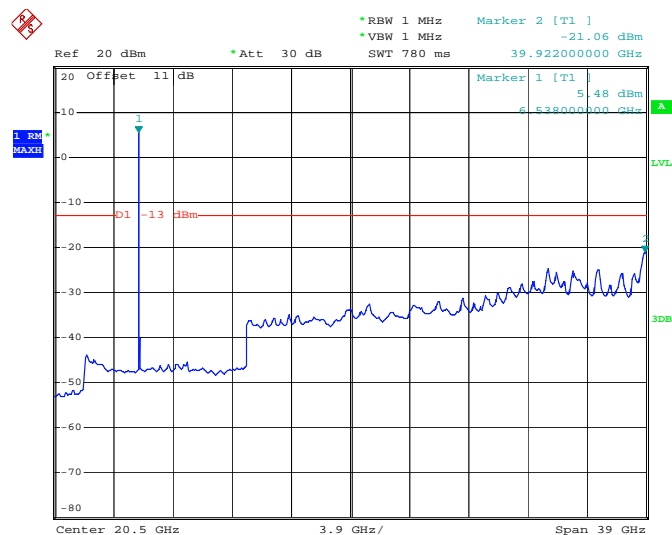
Frequency Band:	5925 ~ 6875MHz Band	Power Setting:	30
Modulation:	QPSK	Operating Mode:	QPSK
Test Frequency:	F2 (6580MHz)	Authorized Bandwidth #:	30 MHz

30 – 1000 MHz



Date: 25.AUG.2011 13:56:26

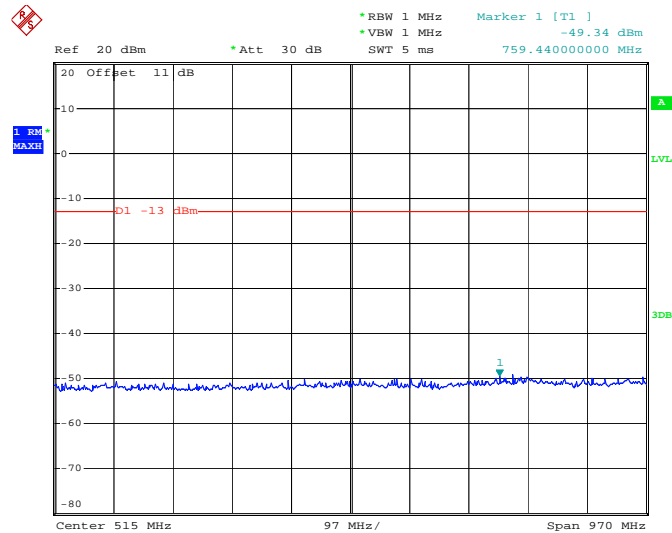
1 – 40 GHz



Date: 25.AUG.2011 13:55:45

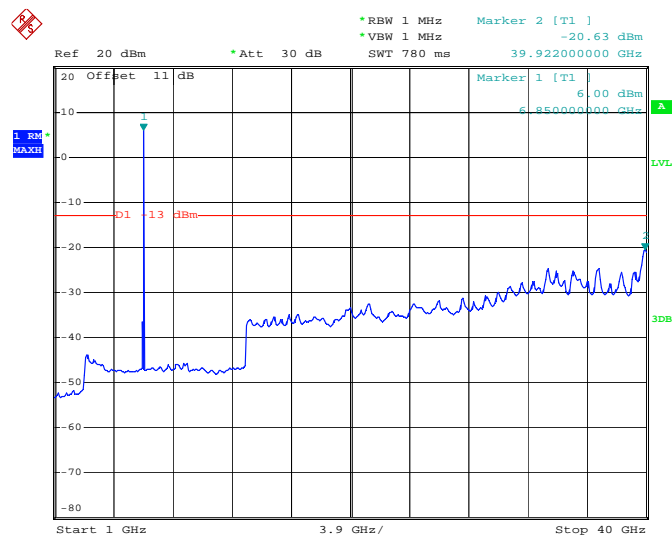
Frequency Band:	5925 ~ 6875MHz Band	Power Setting:	30
Modulation:	QPSK	Operating Mode:	QPSK
Test Frequency:	F3 (6855MHz)	Authorized Bandwidth #:	30 MHz

30 – 1000 MHz



Date: 25.AUG.2011 13:44:16

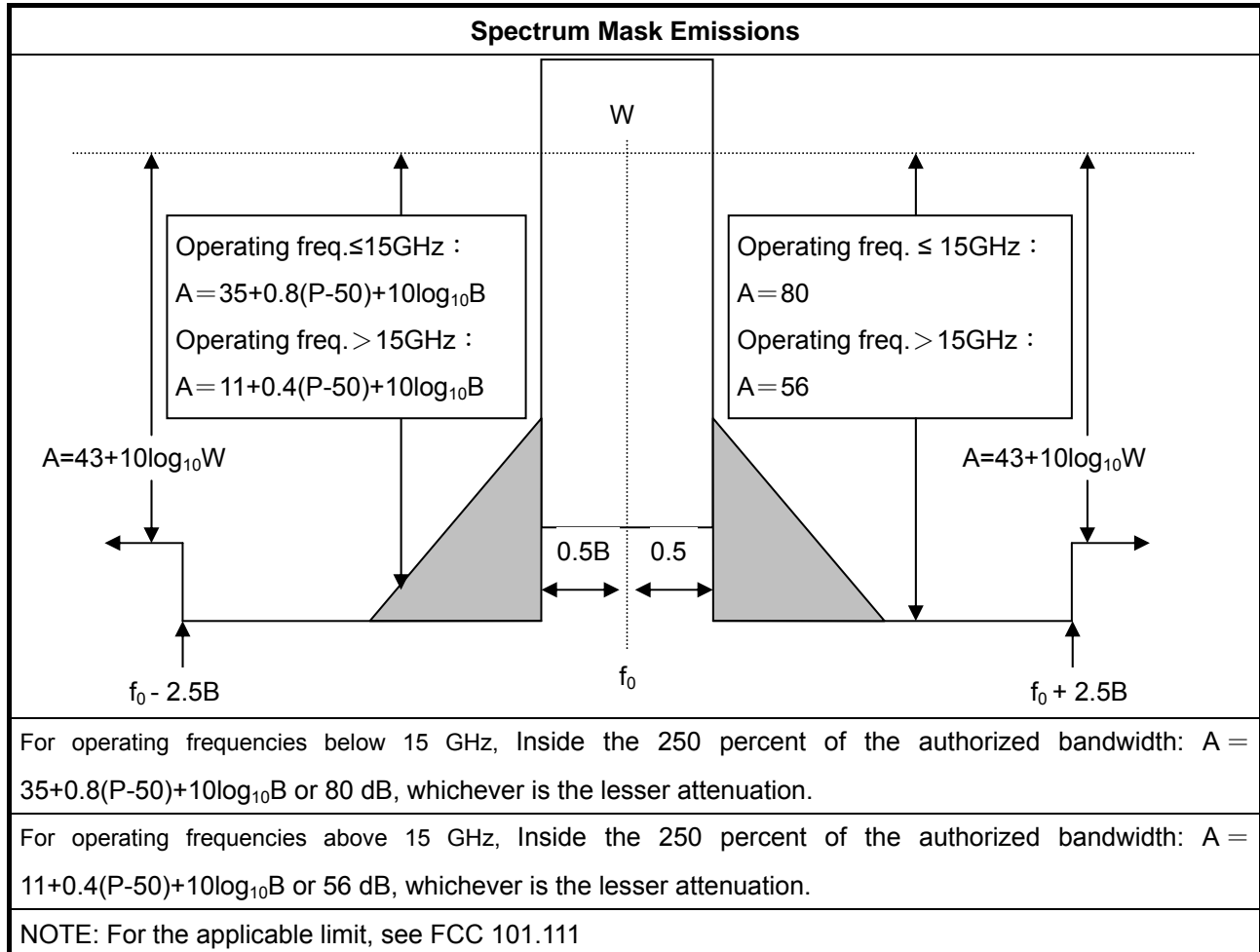
1 – 40 GHz



Date: 25.AUG.2011 13:46:09

3.5 Spectrum Mask Emissions

3.5.1 Limit of Spectrum Mask Emissions



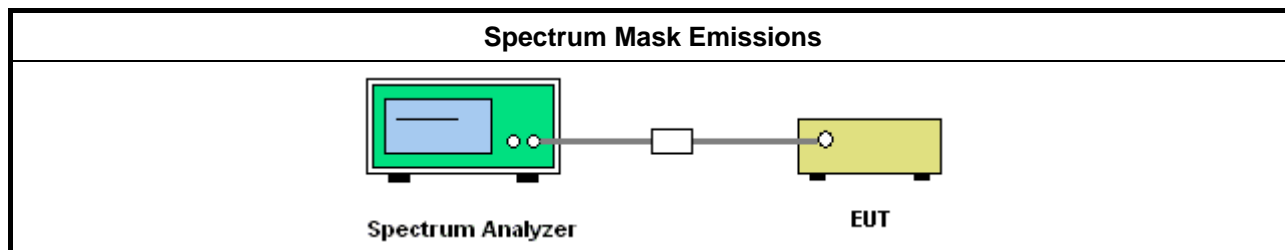
3.5.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.5.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.7.

3.5.4 Test Setup



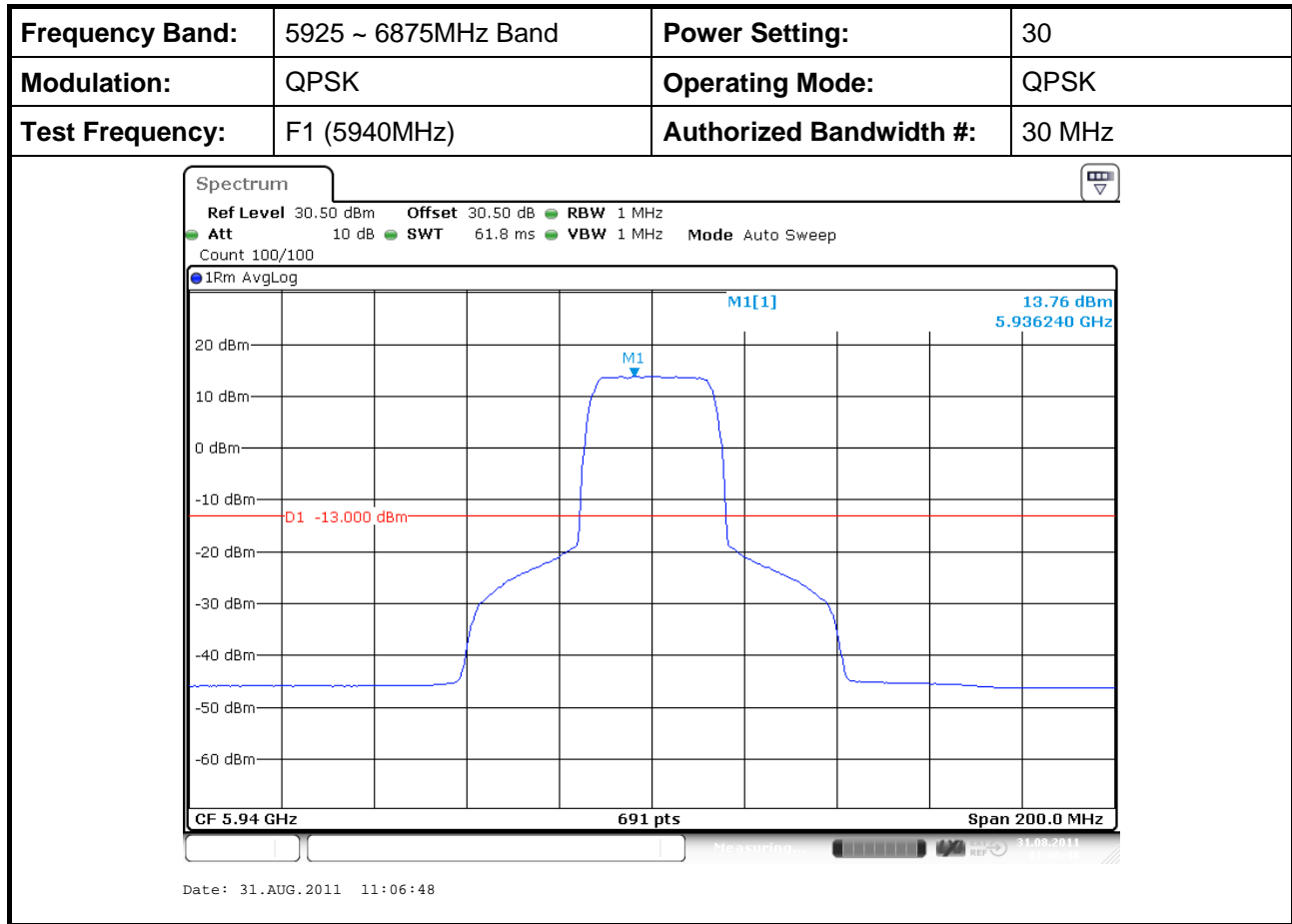
3.5.5 Test Information

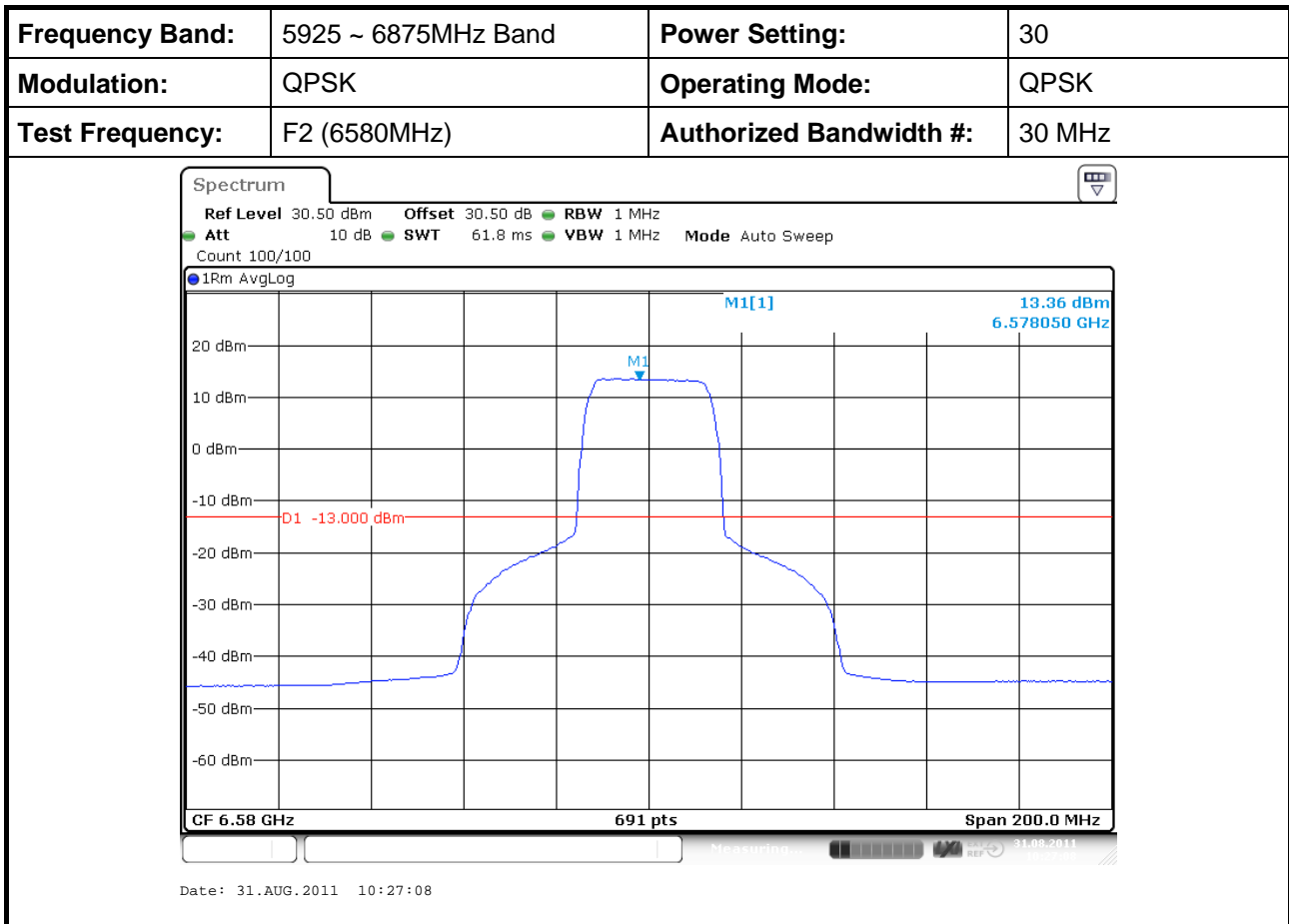
Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/31	TH01-CB
Measurement Uncertainty		1 – 18 GHz	±0.67 dB
		18 – 40 GHz	±0.83 dB

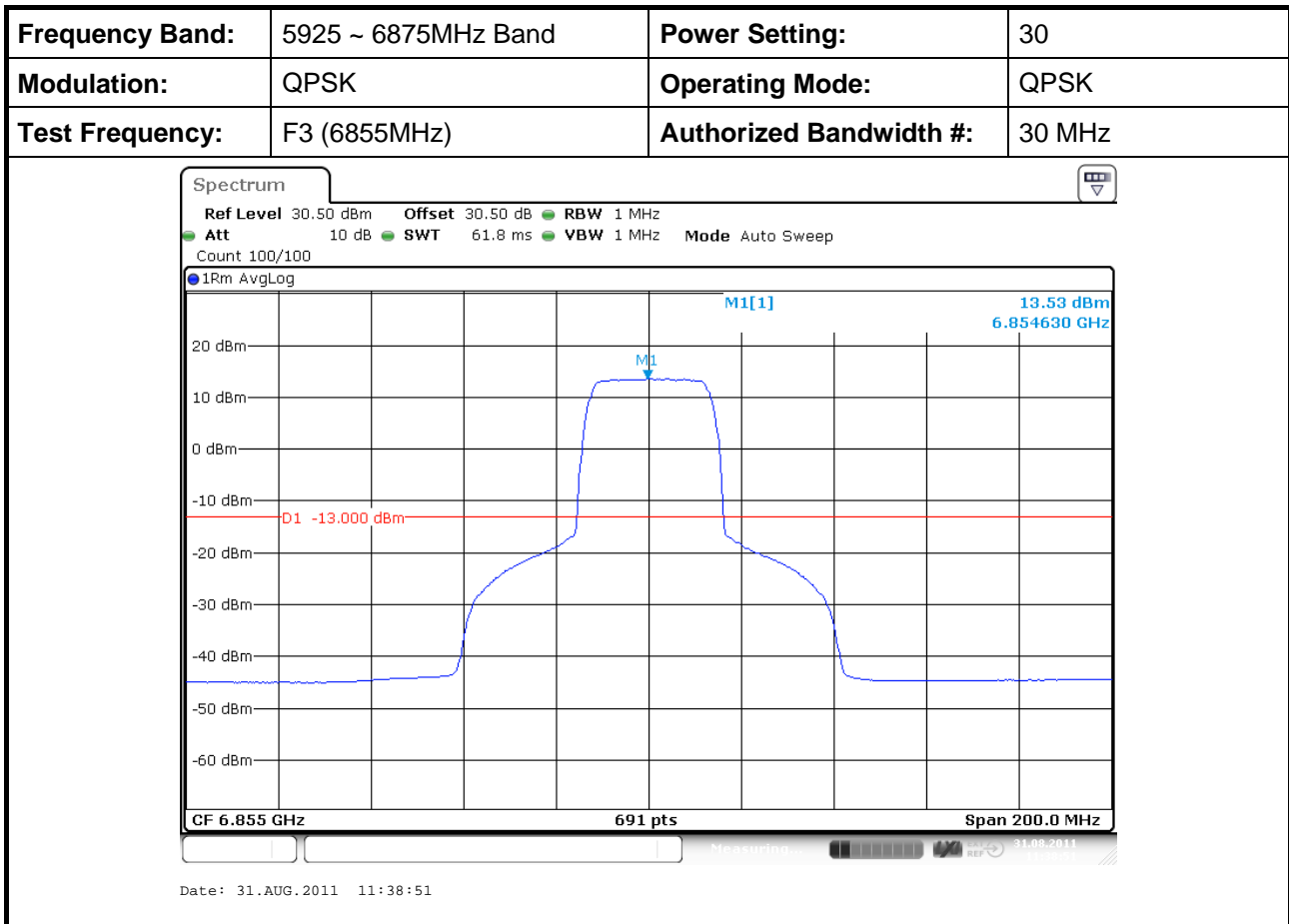
3.5.6 Test Result of Spectrum Mask Emissions

Spectrum Mask Emissions (5925 ~ 6875MHz)			
30 MHz-QPSK	F1 (5940MHz)	F2 (6580MHz)	F3 (6855MHz)
TxPwr	28.65	28.79	28.57
Complied Limit	Complied	Complied	Complied

3.5.6.1 Spectrum Mask Emissions







3.6 Frequency Tolerance

3.6.1 Limit of Frequency Tolerance

Frequency Tolerance	Limit
Refer as FCC 101.107	± 50 ppm
Note: These measurements shall also be performed at normal and extreme test conditions.	

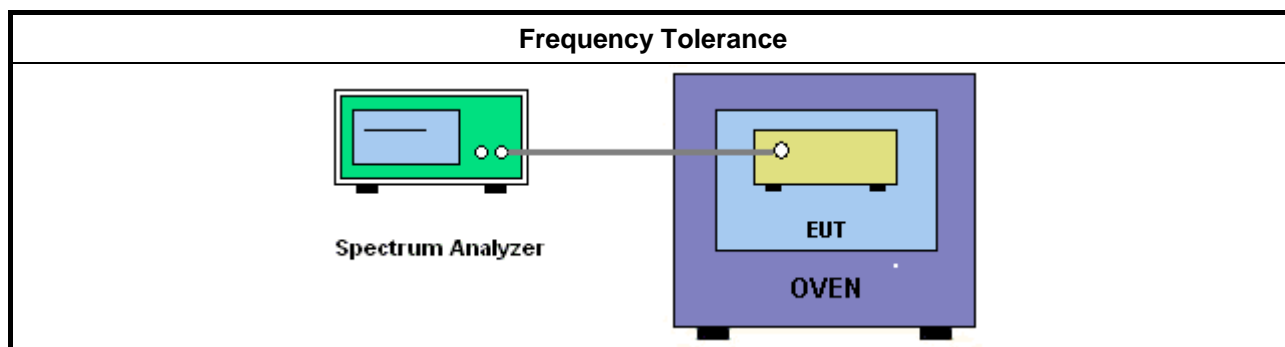
3.6.2 Measuring Instruments

Refer a measuring instruments list in this test report.

3.6.3 Test Procedures

Method of measurement: Refer as ANSI C63.10-2009, clauses 6.8.

3.6.4 Test Setup



3.6.5 Test Information

Test Information			
Test Engineer	Test Ambient Temp. / Rel. Humidity	Test Date	Test Site
Sean Ku	23 °C / 63 %	2011/08/31	TH01-CB
Measurement Uncertainty		$\pm 8.5 \times 10^{-8}$ Hz	-

3.6.6 Test Result of Frequency Tolerance

Frequency Tolerance with Varying Supply Voltage

Temperature vs. Frequency Tolerance				
Test Channel		F2 (6580MHz)	F2 (6580MHz)	F2 (6580MHz)
Measure Time (min)		2	5	10
30 MHz-QPSK		6580	6580	6580
55 °C	Vnom	6580.00660	6580.00660	6580.00660
40 °C	Vnom	6580.00600	6580.00600	6580.00600
30 °C	Vnom	6580.00540	6580.00540	6580.00540
20 °C	Vnom	6580.00480	6580.00480	6580.00480
10 °C	Vnom	6580.00420	6580.00420	6580.00420
0 °C	Vnom	6580.00420	6580.00420	6580.00420
-10 °C	Vnom	6580.00360	6580.00360	6580.00360
-20 °C	Vnom	6580.00360	6580.00360	6580.00360
-33 °C	Vnom	6580.00300	6580.00300	6580.00300
Maximum Frequency Tolerance (ppm)		1.00304		
Frequency Tolerance limit		± 50 ppm		
Complied Limit		Complied		

Frequency Tolerance with Varying Supply Voltage

Temperature vs. Frequency Tolerance				
Test Channel		F2 (6580MHz)	F2 (6580MHz)	F2 (6580MHz)
Measure Time (min)		2	5	10
30 MHz-QPSK		6580	6580	6580
20 °C	Vnom	6580.013590	6580.014870	6580.015100
20 °C	Vmin	6580.016834	6580.017656	6580.017000
20 °C	Vmax	6580.015338	6580.015560	6580.015700
Maximum Frequency Tolerance (ppm)		2.68328		
Frequency Tolerance limit		± 50 ppm		
Complied Limit		Complied		

4 Maximum Permissible Exposure

4.1 Maximum Permissible Exposure

4.1.1 Limit of Maximum Permissible Exposure

Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6
Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30
NOTE 1: f = frequency in MHz ; *Plane-wave equivalent power density				
NOTE 2: For the applicable limit, see FCC 1.1310				

4.1.2 MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

E = Electric field (V/m)

G = EUT Antenna numeric gain (numeric)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

P = RF output power (W)

d = Separation distance between radiator and human body (m)

4.1.3 Result of Maximum Permissible Exposure

MPE	30 MHz-QPSK			
MPE Limit	5	mW/cm ²		
RF Power (dBm)	Antenna Gain	EIRP (dBm)	EIRP (mW)	Distance (cm)
28.79	56.21	85	316227766.02	2243.99
28.79	38	66.79	4775292.74	275.75

Directional antennas										
Frequency (MHz)	Category	Maximum beamwidth	Min. antenna gain (dBi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
5925 ~ 6425MHz	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	21	25	29	32	35	39	45
6525 ~ 6875MHz	A	2.2	38	25	29	33	36	42	55	55
	B	2.2	38	21	25	29	32	35	39	45

5 List of Measuring Equipments


Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Oct. 17, 2010	Oct. 16, 2011	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 22, 2010	Nov. 21, 2011	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Oct. 08, 2010	Oct. 07, 2011	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 17, 2010	Nov. 16, 2011	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2010	Nov. 22, 2011	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 29, 2011	Jul. 28, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP	100304	9kHz ~ 40GHz	Nov. 22, 2010	Nov. 21, 2011	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 22, 2011	Mar. 21, 2012	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Sep. 08, 2012*	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N/A	N/A	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N/A	N/A	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2010	Nov. 16, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Nov. 16, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2010	Nov. 16, 2011	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP30	100023	9KHz~30GHz	Mar. 15, 2011	Mar. 14, 2012	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSV30	101026	9KHz~30GHz	Jul. 27, 2011	Jul. 26, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	May 20, 2011	May 19, 2012	Conducted (TH01-CB)
Thermo-Hygro Meter	N/A	HC 520	#1	15~70 degree	Nov. 02, 2010	Nov. 01, 2011	Conducted (TH01-CB)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Nov. 19, 2010	Nov. 18, 2011	Conducted (TH01-CB)
RF Power Divider	HP	11636A	00306	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)
RF Power Splitter	Anaren	44100	1839	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)
RF Power Splitter	Anaren	42100	17930	2GHz ~ 18GHz	N/A	N/A	Conducted (TH01-CB)
Signal generator	R&S	SMU200A	102782	10MHz-40GHz	Jun. 07, 2011	Jun. 06, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Until	Remark
Horn Antenna	COM-POWER	AH-118	071187	1GHz – 18GHz	Mar. 18, 2011	Mar. 17, 2012	Conducted (TH01-CB)
Horn Antenna	COM-POWER	AH-118	071042	1GHz – 18GHz	Oct. 14, 2010	Oct. 13, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-12	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-13	-	1 GHz – 26.5 GHz	Nov. 17, 2010	Nov. 16, 2011	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 08, 2010	Sep. 07, 2011	Conducted (TH01-CB)

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

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

6 Certification of TAF Accreditation



Certificate No. : L1190-110702

財團法人全國認證基金會
Taiwan Accreditation Foundation


Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Road, Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien,
Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	: ISO/IEC 17025:2005
Accreditation Number	: 1190
Originally Accredited	: December 15, 2003
Effective Period	: January 10, 2010 to January 09, 2013
Accredited Scope	: Testing Field, see described in the Appendix
Specific Accreditation Program	: Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangement with Foreign Authorities



Jay-San Chen
President, Taiwan Accreditation Foundation
Date : July 02, 2011

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix