FCC Test Report

FCC ID	:	**2AQ68-GME840U-915U**
Equipment	:	**Wireless Gateway**
Model No.	:	**GME840U-915U**
Multiple Listing	:	**Refer to item 1.1.1 for more details.**
Applicant	:	**HON LIN TECHNOLOGY CO., LTD.**
Address	:	**11F, No.32, Jihu Rd., Neihu Dist., Taipei City,Taiwan 114**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Sep. 04, 2020**
Tested Date	:	**Oct. 20 ~ Oct. 23, 2020**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
FR970401-04	Rev. 01	Initial issue	Nov. 10, 2020

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.437MHz 43.57 (Margin -3.54dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 7420.00MHz 53.70 (Margin -0.30dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 25.97	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	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.

1 General Description

1.1 Information

1.1.1 Product Details

The following models are provided to this EUT.

Model Name	Description	Remark
GME840U-915U	without LTE function	PCB is identical to each model. Difference between both models is only certified LTE module (FCC ID: ZMOL850GL) is embed or not.
GML840U-915U	with LTE function	

1.1.2 Specification of the Equipment under Test (EUT)

RF General Information				
Operating Frequency (MHz)	**Channel Number**	**Data Rate**	**Spread Factor**	**Channel Bandwidth**
923.3 ~ 927.5	8	980 ~ 21.9 kbps	7 ~ 12	500 kHz
Note 1: RF output power specifies thatMaximum Conducted (Average) Output Power. Note 2: The device uses CSS modulation.				

1.1.3 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)	Jumper cable
1	WHA YU	C107-511326-A	Dipole	N-type plug standard	-0.79	X
2	WHA YU	C107-511380-A	Dipole	N-type plug standard	2.88	X
3	WHA YU	C107-821521-A	Dipole	N-type Jack standard	1.17	O
4	WHA YU	C107-821527-A	Dipole	N-type Jack female	7.04	O
5	TESSWAVE	TOF-900R-8V	Dipole	N-type Jack female	6.5	O

Note: Ant. No. 4 with highest gain was chosen for final test.

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type 1 (PoE)	I/P: 100-240Vac, 50/60Hz, 1.5A max. O/P: 50Vdc, 1.2A
Power Supply Type 2 (DC power source)	I/P: 11-57Vdc O/P: 10.8Vdc, 2.36A

1.1.5 Accessories

Accessories		
No.	**Equipment**	**Description**
1	POE	Brand: Gospell Model: G0566-500-120 Power Rating: I/P: 100-240Vac, 50/60Hz, 1.5A max. O/P: 50Vdc, 1.2A Power Line: 0.67m non-shielded without core
2	Ground cable	1m non-shielded without core
3	Jumper cable for Lora	0.609m non-shielded without core
4	GPS Antenna	Brand: INPAQ Model: GPSGLONASS08H-S6-1510

1.1.6 Channel List

Frequency (MHz)	Frequency (MHz)
923.3	925.7
923.9	926.3
924.5	926.9
925.1	927.5

1.1.7 Test Tool and Duty Cycle

Test Tool	Putty command, V0.6	
Duty Cycle and Duty Factor	**Duty Cycle (%)**	**Duty Factor (dB)**
	100.00%	0.00

1.1.8 Power Index of Test Tool

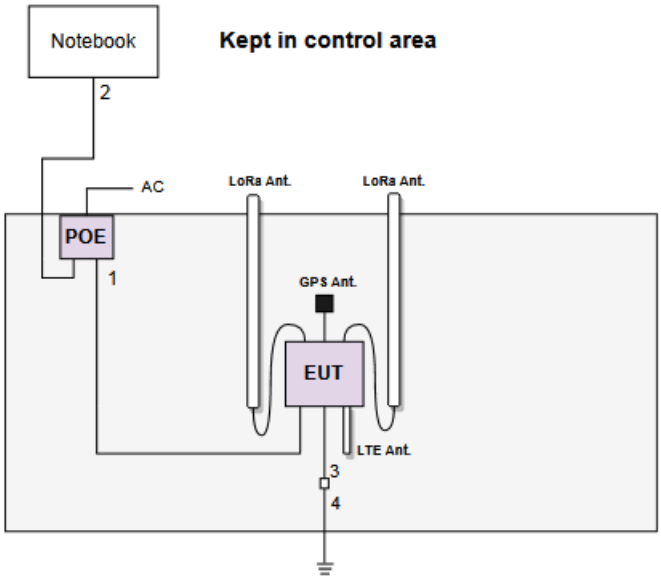
Modulation Mode	Test Frequency (MHz)	Power Index
CSS	923.3	16
CSS	927.5	15

1.2 Local Support Equipment List

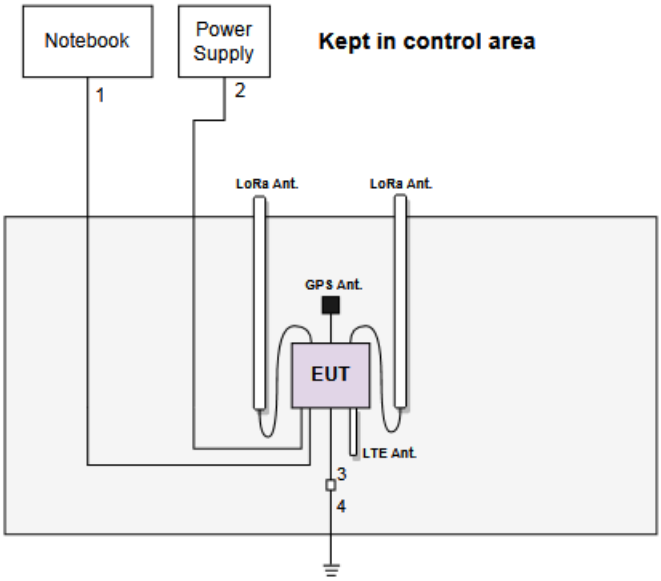
Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5420	DoC	---

1.3 Test Setup Chart

Test Setup Diagram (PoE mode)



No.	Signal cable / Length (m)
1	RJ45, 1.3m non-shielded.
2	RJ45, 10m non-shielded.
3	Ground, 1m non-shielded.
4	Ground, 2.3m non-shielded.

Test Setup Diagram (DC mode)


No.	Signal cable / Length (m)
1	RJ45, 10m non-shielded.
2	DC, 10m non-shielded.
3	Ground, 1m non-shielded.
4	Ground, 2.3m non-shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Oct. 23, 2020				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Dec. 12, 2019	Dec. 11, 2020
LISN	R&S	ENV216	101579	Mar. 12, 2020	Mar. 11, 2021
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 21, 2020	Oct. 20, 2021
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Oct. 20 ~ Oct. 21, 2020				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101499	Jan. 09, 2020	Jan. 08, 2021
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 29, 2020	Apr. 28, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 27, 2019	Dec. 26, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2019	Nov. 14, 2020
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 13, 2019	Nov. 12, 2020
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
Preamplifier	EMC	EMC02325	980187	Aug. 05, 2020	Aug. 04, 2021
Preamplifier	Agilent	83017A	MY39501309	Sep. 02, 2020	Sep. 01, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 21, 2020	Jul. 20, 2021
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/**4**	Sep. 26, 2020	Sep. 25, 2021
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 26, 2020	Sep. 25, 2021
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Sep. 26, 2020	Sep. 25, 2021
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Sep. 26, 2020	Sep. 25, 2021
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 26, 2020	Sep. 25, 2021
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 26, 2020	Sep. 25, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Oct. 21, 2020				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101063	Apr. 30, 2020	Apr. 29, 2021
Power Meter	Anritsu	ML2495A	1241002	Oct. 23, 2019	Oct. 22, 2020
Power Sensor	Anritsu	MA2411B	1207366	Oct. 23, 2019	Oct. 22, 2020
DC POWER SOURCE	GW INSTEK	GPC-6030D	GES855395	Oct. 29, 2019	Oct. 28, 2020
AC POWER SOURCE	APC	AFC-500W	F312060012	Dec. 02, 2019	Dec. 01, 2020
Measurement Software	ICC	SENSE-15247_DTS	V5.10.7	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.247
ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.96 dB
Radiated emission > 1GHz	±4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corp.
Test Site	CO01-WS, TH01-WS
Address of Test Site	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.
Test Site	03CH03-WS
Address of Test Site	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Separating Factor	Test Configuration
Conducted Emissions Radiated Emissions ≤1GHz	CSS	923.3 / 927.5	SF12	1, 2
Maximum Output Power 6dB bandwidth Power spectral density Radiated Emissions >1GHz	CSS	923.3 / 927.5	SF12	1

NOTE:

1. This device consumes power from POE or DC power source. Each power supply was selected for final testing as below configuration.

   Test configurations are listed as below:

   1) Test Configuration 1: POE mode

   2) Test Configuration 2: DC mode

3 Transmitter Test Results

3.1 Conducted Emissions

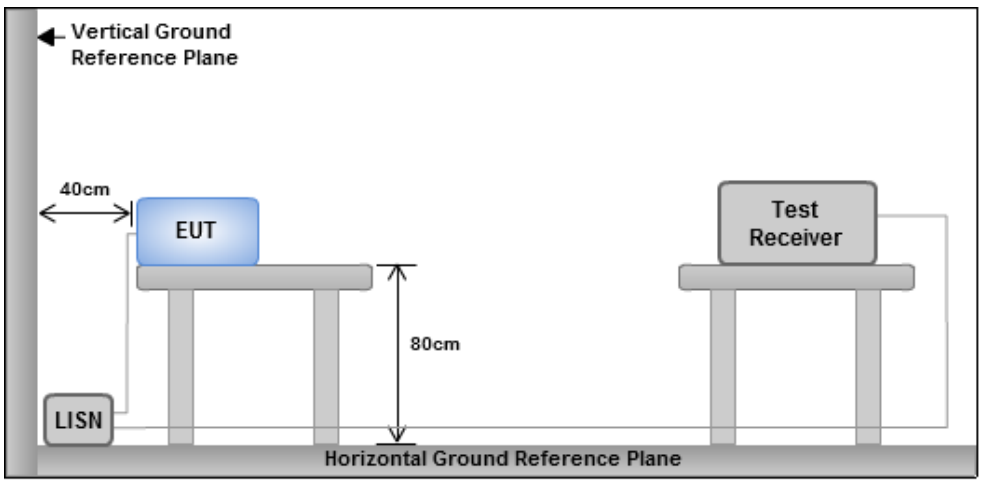
3.1.1 Limit of Conducted Emissions

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 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

3.1.3 Test Setup



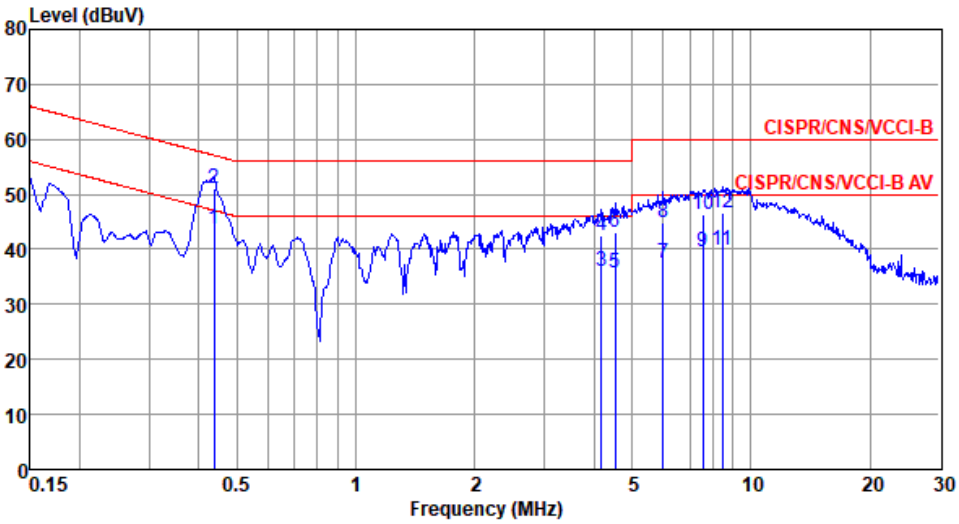
Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

Modulation	CSS	Test Freq. (MHz)	923.3
Power Phase	Line	Test Configuration	1

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

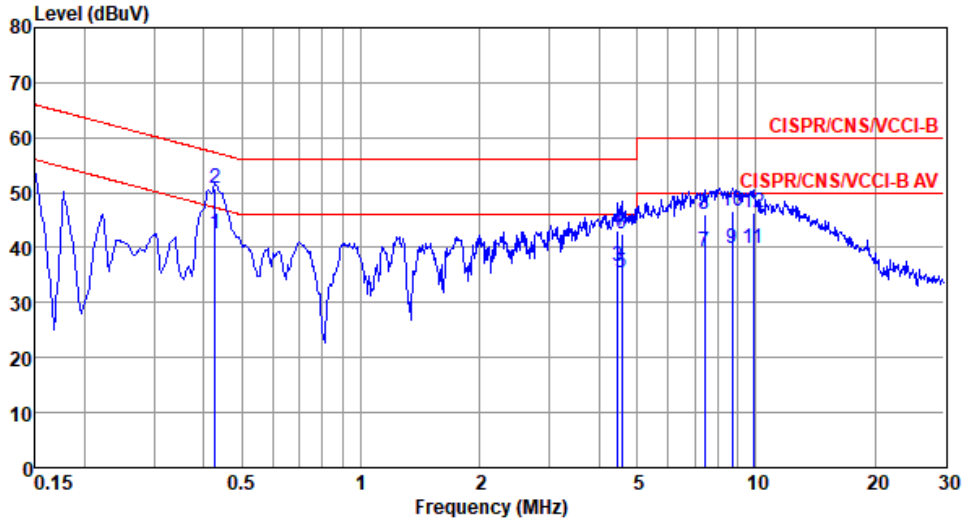


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1*	0.437	43.57	47.11	-3.54	33.60	9.63	0.08	Average
2	0.437	51.16	57.11	-5.95	41.19	9.63	0.08	QP
3	4.180	36.01	46.00	-9.99	25.70	9.65	0.29	Average
4	4.180	42.50	56.00	-13.50	32.19	9.65	0.29	QP
5	4.525	35.85	46.00	-10.15	25.52	9.66	0.30	Average
6	4.525	43.16	56.00	-12.84	32.83	9.66	0.30	QP
7	5.993	37.61	50.00	-12.39	27.23	9.67	0.33	Average
8	5.993	44.88	60.00	-15.12	34.50	9.67	0.33	QP
9	7.566	39.55	50.00	-10.45	29.12	9.68	0.36	Average
10	7.566	46.31	60.00	-13.69	35.88	9.68	0.36	QP
11	8.456	39.83	50.00	-10.17	29.39	9.68	0.37	Average
12	8.456	46.60	60.00	-13.40	36.16	9.68	0.37	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	Test Freq. (MHz)	923.3
Power Phase	Neutral	Test Configuration	1

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

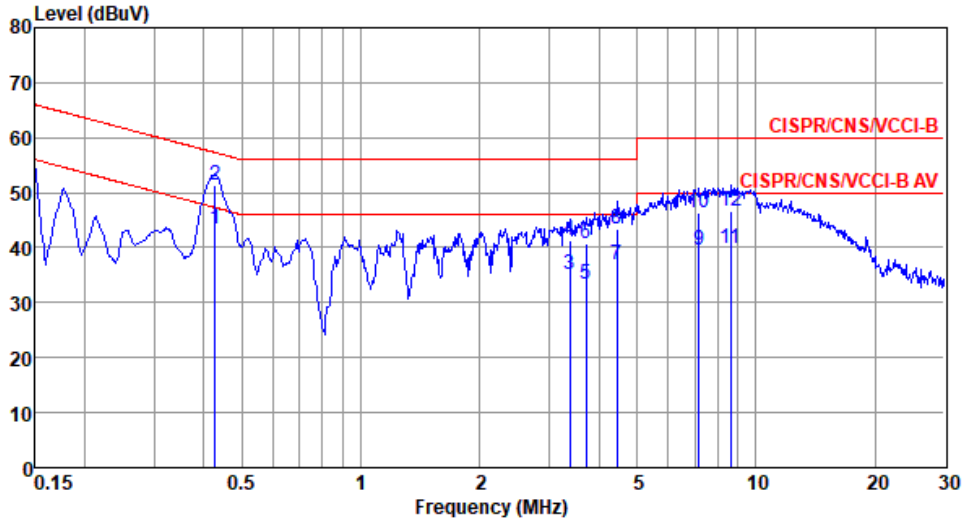


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1*	0.428	42.55	47.29	-4.74	32.65	9.65	0.08	Average
2	0.428	50.90	57.29	-6.39	41.00	9.65	0.08	QP
3	4.478	36.60	46.00	-9.40	26.35	9.68	0.30	Average
4	4.478	43.17	56.00	-12.83	32.92	9.68	0.30	QP
5	4.574	35.36	46.00	-10.64	25.11	9.68	0.30	Average
6	4.574	42.50	56.00	-13.50	32.25	9.68	0.30	QP
7	7.407	39.19	50.00	-10.81	28.81	9.71	0.36	Average
8	7.407	46.06	60.00	-13.94	35.68	9.71	0.36	QP
9	8.729	39.79	50.00	-10.21	29.38	9.72	0.37	Average
10	8.729	46.60	60.00	-13.40	36.19	9.72	0.37	QP
11	9.861	39.71	50.00	-10.29	29.26	9.73	0.39	Average
12	9.861	46.39	60.00	-13.61	35.94	9.73	0.39	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	**Test Freq. (MHz)**	927.5
Power Phase	Line	**Test Configuration**	1

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

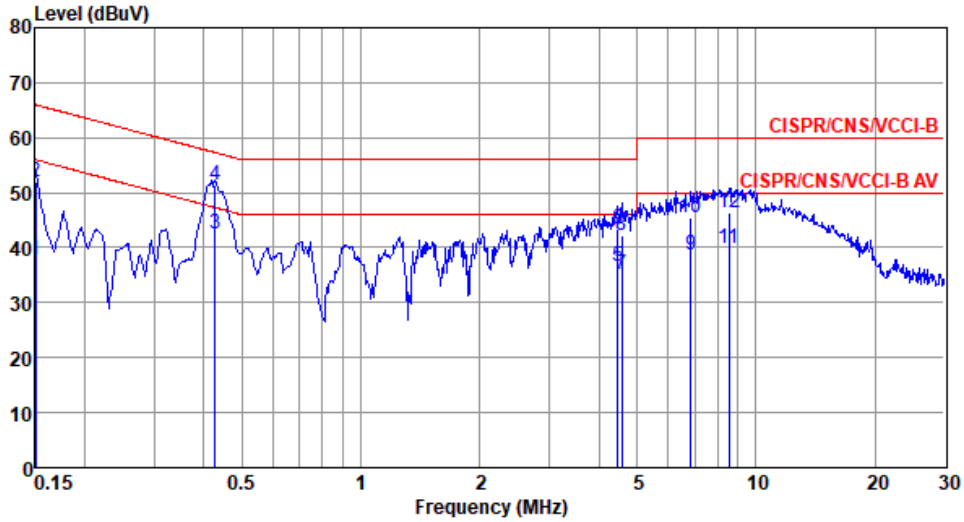


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1*	0.428	43.26	47.29	-4.03	33.29	9.63	0.08	Average
2	0.428	51.50	57.29	-5.79	41.53	9.63	0.08	QP
3	3.381	35.01	46.00	-10.99	24.74	9.65	0.26	Average
4	3.381	41.29	56.00	-14.71	31.02	9.65	0.26	QP
5	3.720	33.46	46.00	-12.54	23.16	9.65	0.28	Average
6	3.720	40.79	56.00	-15.21	30.49	9.65	0.28	QP
7	4.454	36.77	46.00	-9.23	26.45	9.65	0.30	Average
8	4.454	43.36	56.00	-12.64	33.04	9.65	0.30	QP
9	7.175	39.45	50.00	-10.55	29.03	9.68	0.35	Average
10	7.175	46.28	60.00	-13.72	35.86	9.68	0.35	QP
11	8.637	39.91	50.00	-10.09	29.46	9.68	0.37	Average
12	8.637	46.59	60.00	-13.41	36.14	9.68	0.37	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	Test Freq. (MHz)	927.5
Power Phase	Neutral	Test Configuration	1

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

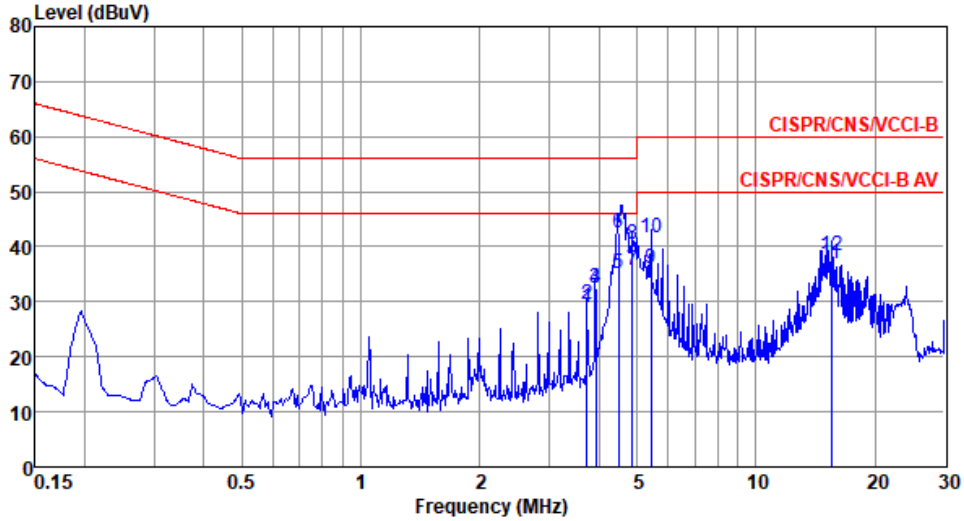


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	0.150	37.88	56.00	-18.12	28.05	9.66	0.05	Average
2	0.150	52.08	66.00	-13.92	42.25	9.66	0.05	QP
3*	0.428	42.53	47.29	-4.76	32.63	9.65	0.08	Average
4	0.428	51.25	57.29	-6.04	41.35	9.65	0.08	QP
5	4.478	36.66	46.00	-9.34	26.41	9.68	0.30	Average
6	4.478	43.47	56.00	-12.53	33.22	9.68	0.30	QP
7	4.574	35.03	46.00	-10.97	24.78	9.68	0.30	Average
8	4.574	42.26	56.00	-13.74	32.01	9.68	0.30	QP
9	6.841	38.74	50.00	-11.26	28.38	9.71	0.35	Average
10	6.841	45.61	60.00	-14.39	35.25	9.71	0.35	QP
11	8.546	39.74	50.00	-10.26	29.33	9.72	0.37	Average
12	8.546	46.42	60.00	-13.58	36.01	9.72	0.37	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	Test Freq. (MHz)	923.3
Power Phase	Line	Test Configuration	2

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

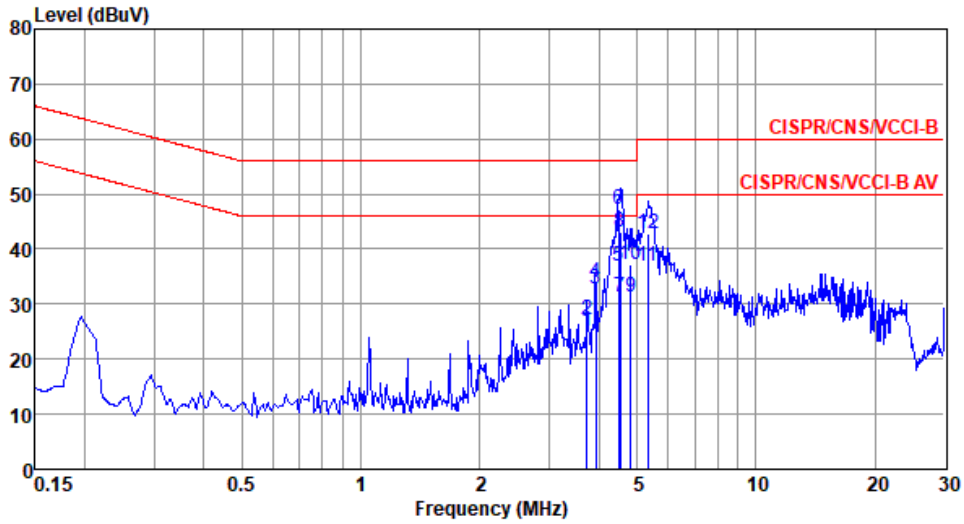


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	3.742	28.95	46.00	-17.05	19.02	9.65	0.28	Average
2	3.742	29.40	56.00	-26.60	19.47	9.65	0.28	QP
3	3.929	32.34	46.00	-13.66	22.40	9.65	0.29	Average
4	3.929	32.51	56.00	-23.49	22.57	9.65	0.29	QP
5	4.492	35.05	46.00	-10.95	25.09	9.66	0.30	Average
6	4.492	42.43	56.00	-13.57	32.47	9.66	0.30	QP
7*	4.864	35.67	46.00	-10.33	25.70	9.66	0.31	Average
8	4.864	40.52	56.00	-15.48	30.55	9.66	0.31	QP
9	5.420	36.08	50.00	-13.92	26.10	9.66	0.32	Average
10	5.420	41.50	60.00	-18.50	31.52	9.66	0.32	QP
11	15.530	36.84	50.00	-13.16	26.52	9.71	0.61	Average
12	15.530	38.44	60.00	-21.56	28.12	9.71	0.61	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	**Test Freq. (MHz)**	923.3
Power Phase	Neutral	**Test Configuration**	2

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

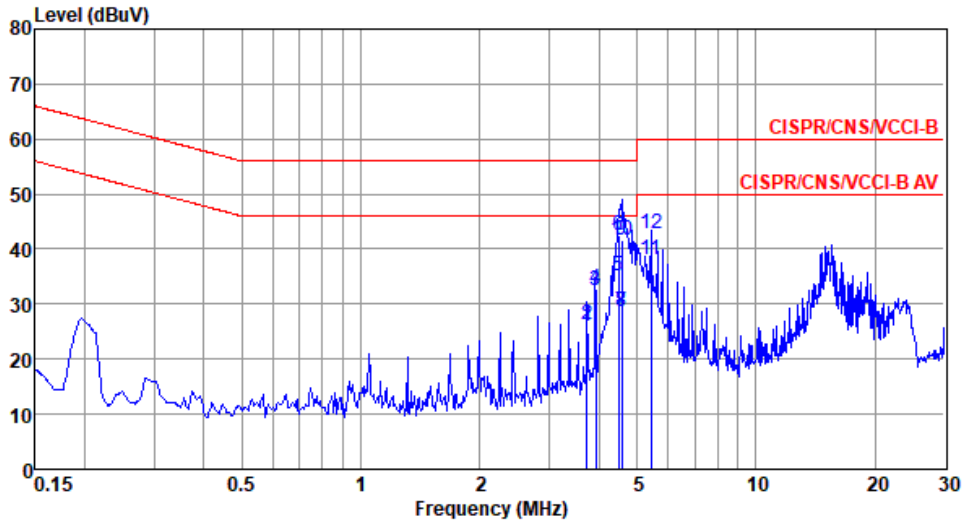


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	3.740	25.03	46.00	-20.97	15.08	9.67	0.28	Average
2	3.740	27.17	56.00	-28.83	17.22	9.67	0.28	QP
3	3.930	32.65	46.00	-13.35	22.69	9.67	0.29	Average
4	3.930	33.84	56.00	-22.16	23.88	9.67	0.29	QP
5	4.493	37.01	46.00	-8.99	27.03	9.68	0.30	Average
6*	4.493	47.15	56.00	-8.85	37.17	9.68	0.30	QP
7	4.525	31.16	46.00	-14.84	21.18	9.68	0.30	Average
8	4.525	43.10	56.00	-12.90	33.12	9.68	0.30	QP
9	4.822	31.34	46.00	-14.66	21.35	9.68	0.31	Average
10	4.822	37.26	56.00	-18.74	27.27	9.68	0.31	QP
11	5.333	36.94	50.00	-13.06	26.93	9.69	0.32	Average
12	5.333	42.67	60.00	-17.33	32.66	9.69	0.32	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	Test Freq. (MHz)	927.5
Power Phase	Line	Test Configuration	2

Test by : Alex Tsai Temperature: 25°C Humidity: 61%

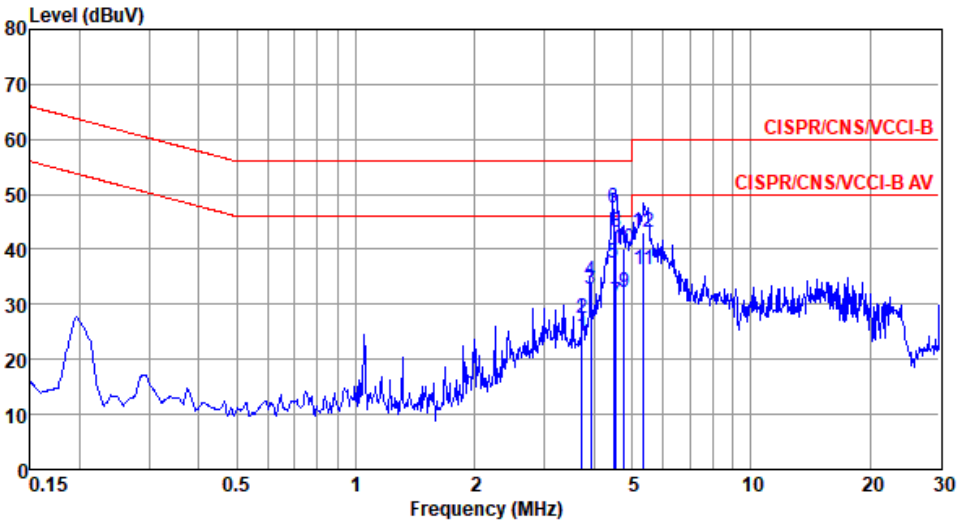


	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	3.740	25.86	46.00	-20.14	15.93	9.65	0.28	Average
2	3.740	26.34	56.00	-29.66	16.41	9.65	0.28	QP
3	3.930	32.56	46.00	-13.44	22.62	9.65	0.29	Average
4	3.930	32.70	56.00	-23.30	22.76	9.65	0.29	QP
5*	4.493	35.16	46.00	-10.84	25.20	9.66	0.30	Average
6	4.493	42.53	56.00	-13.47	32.57	9.66	0.30	QP
7	4.574	28.61	46.00	-17.39	18.65	9.66	0.30	Average
8	4.574	28.61	46.00	-17.39	18.65	9.66	0.30	Average
9	4.574	41.55	56.00	-14.45	31.59	9.66	0.30	QP
10	4.574	41.55	56.00	-14.45	31.59	9.66	0.30	QP
11	5.419	37.94	50.00	-12.06	27.96	9.66	0.32	Average
12	5.419	42.77	60.00	-17.23	32.79	9.66	0.32	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Modulation	CSS	Test Freq. (MHz)	927.5
Power Phase	Neutral	Test Configuration	2

Test by : Alex Tsai Temperature: 25°C Humidity: 61%



	Freq	Level	Limit Line	Over Limit	Read Level	LISN factor	cable loss	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	
1	3.742	24.32	46.00	-21.68	14.37	9.67	0.28	Average
2	3.742	27.60	56.00	-28.40	17.65	9.67	0.28	QP
3	3.930	32.86	46.00	-13.14	22.90	9.67	0.29	Average
4	3.930	34.19	56.00	-21.81	24.23	9.67	0.29	QP
5*	4.493	37.58	46.00	-8.42	27.60	9.68	0.30	Average
6	4.493	47.48	56.00	-8.52	37.50	9.68	0.30	QP
7	4.549	30.42	46.00	-15.58	20.44	9.68	0.30	Average
8	4.549	43.09	56.00	-12.91	33.11	9.68	0.30	QP
9	4.772	32.22	46.00	-13.78	22.23	9.68	0.31	Average
10	4.772	40.04	56.00	-15.96	30.05	9.68	0.31	QP
11	5.362	36.36	50.00	-13.64	26.35	9.69	0.32	Average
12	5.362	43.16	60.00	-16.84	33.15	9.69	0.32	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

3.2 6dB and Occupied Bandwidth

3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

3.2.2 Test Procedures

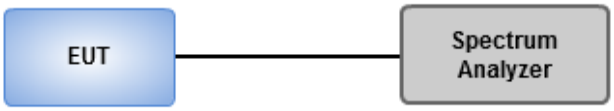
6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3 Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

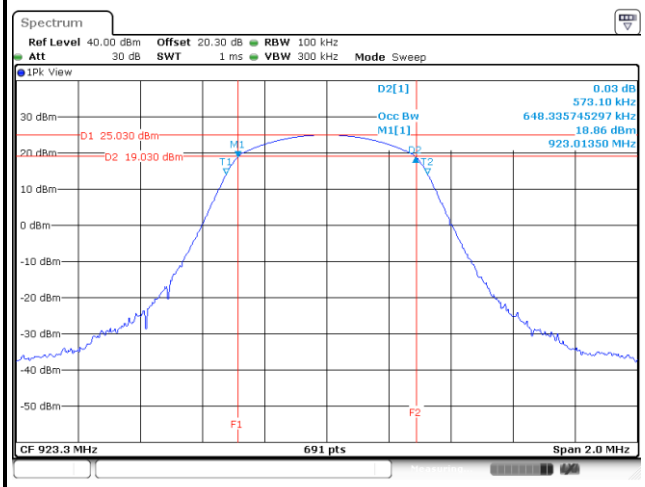
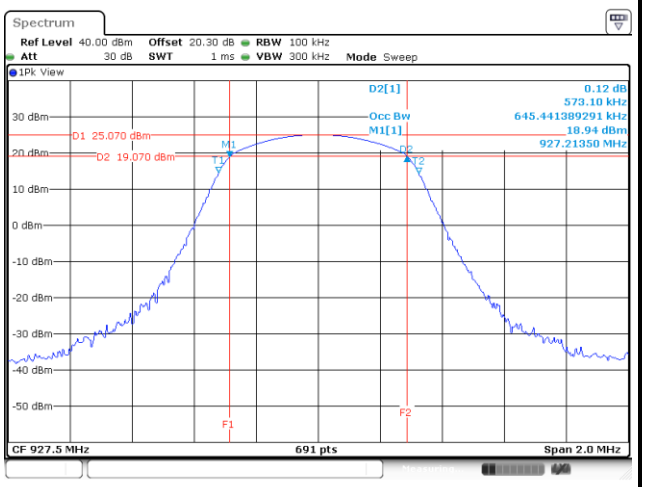
3.2.3 Test Setup



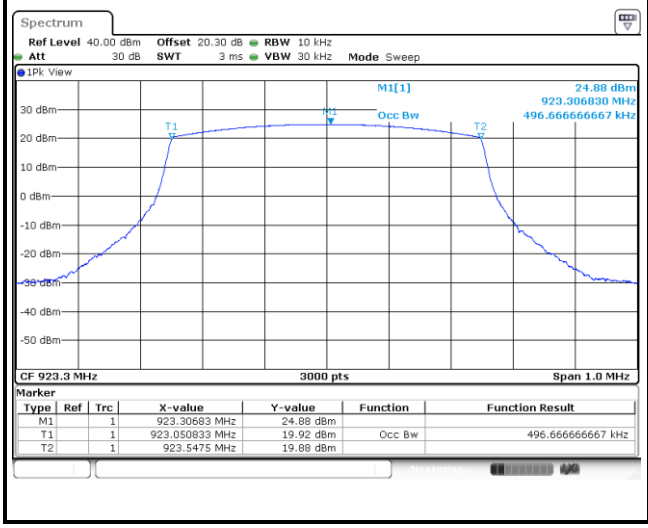
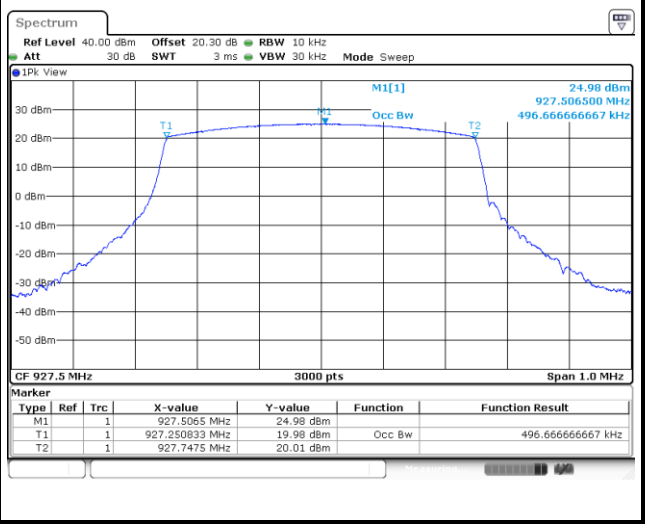
3.2.4 Test Result of 6dB and Occupied Bandwidth

Ambient Condition	23°C / 66%	Tested By	Brad Wu

Modulation / SF	Freq. (MHz)	6dB Bandwidth (kHz)	Limit (kHz)
CSS / 12	923.3	573.1	500
CSS / 12	927.5	573.1	500

923.3 MHz	927.5 MHz
	

Modulation / SF	Freq. (MHz)	Occupied Bandwidth (MHz)
CSS / 12	923.3	0.497
CSS / 12	927.5	0.497

923.3 MHz	927.5 MHz
	

3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.

3.3.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

3.3.3 Test Setup

3.3.4 Test Result of Maximum Output Power

Ambient Condition	23°C / 66%	Tested By	Brad Wu

Modulation / SF	Freq. (MHz)	AV Power (mW)	AV Power (dBm)	Limit (dBm)
CSS / 12	923.3	364.75	25.62	28.96
CSS / 12	927.5	395.37	**25.97**	28.96

Note: The maximum antenna gain 7.04dBi is higher than 6dBi, so the limit shall be reduced 30dBm – (7.04dBi-6dBi) = 28.96dBm.

3.4 Power Spectral Density

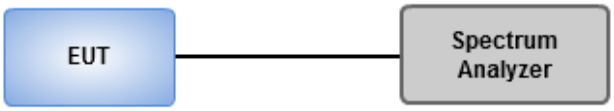
3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.4.2 Test Procedures

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = RMS, Sweep time = auto couple.
3. Sweep time = auto couple.
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

3.4.3 Test Setup

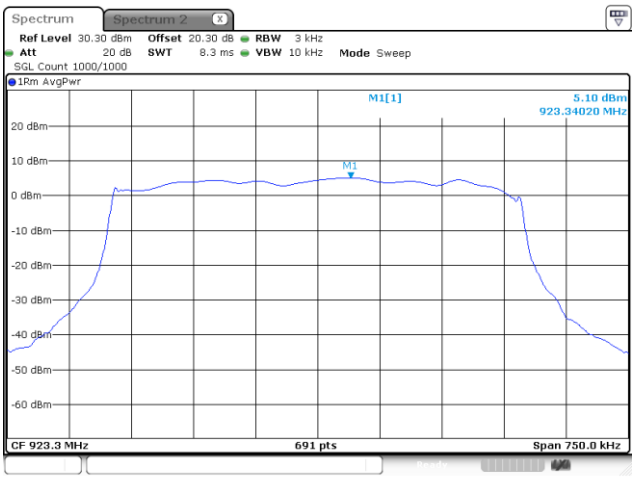
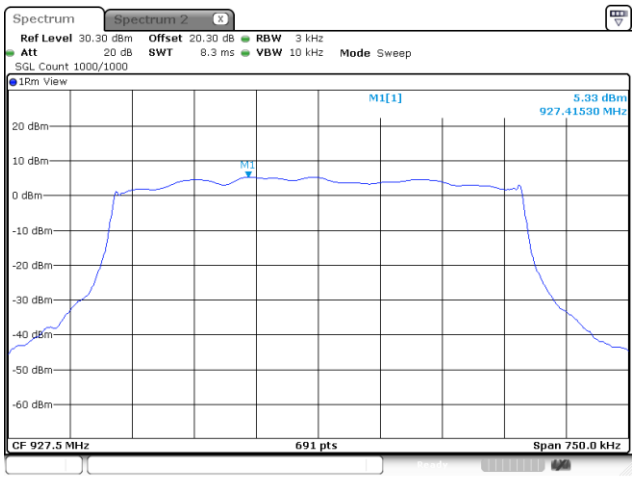


3.4.4 Test Result of Power Spectral Density

Ambient Condition	23°C / 66%	Tested By	Brad Wu

Modulation / SF	Freq. (MHz)	PSD (mW)	PSD (dBm)	Limit (dBm)
CSS / 12	923.3	3.2	5.10	6.96
CSS / 12	927.5	3.4	5.33	6.96

Note: The maximum antenna gain 7.04dBi is higher than 6dBi, so the limit shall be reduced 8dBm – (7.04dBi-6dBi) = 6.96dBm.

923.3 MHz	927.5 MHz
	

3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.5.2 Test Procedures

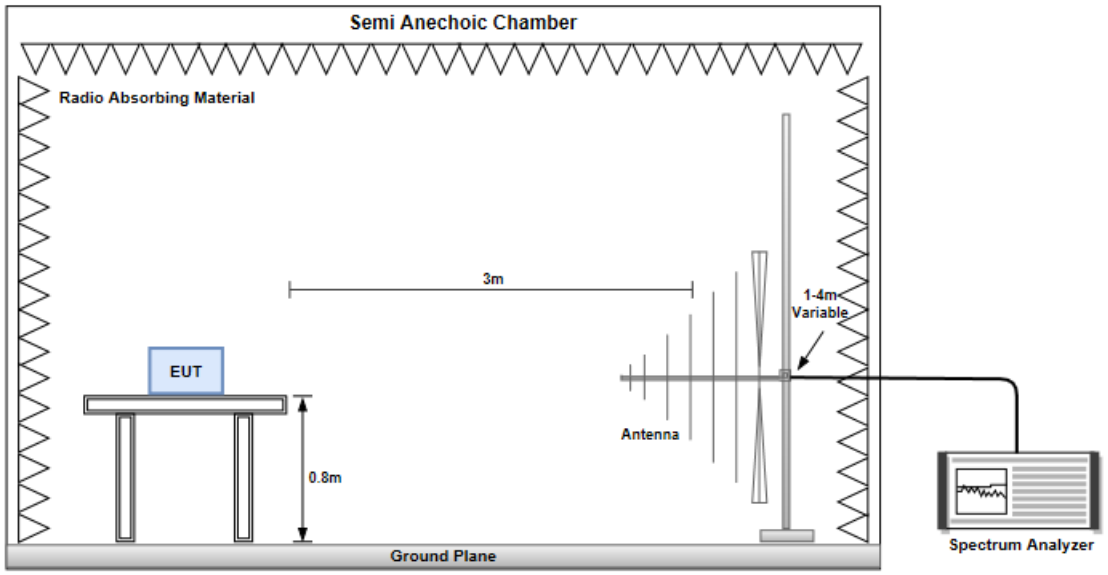
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

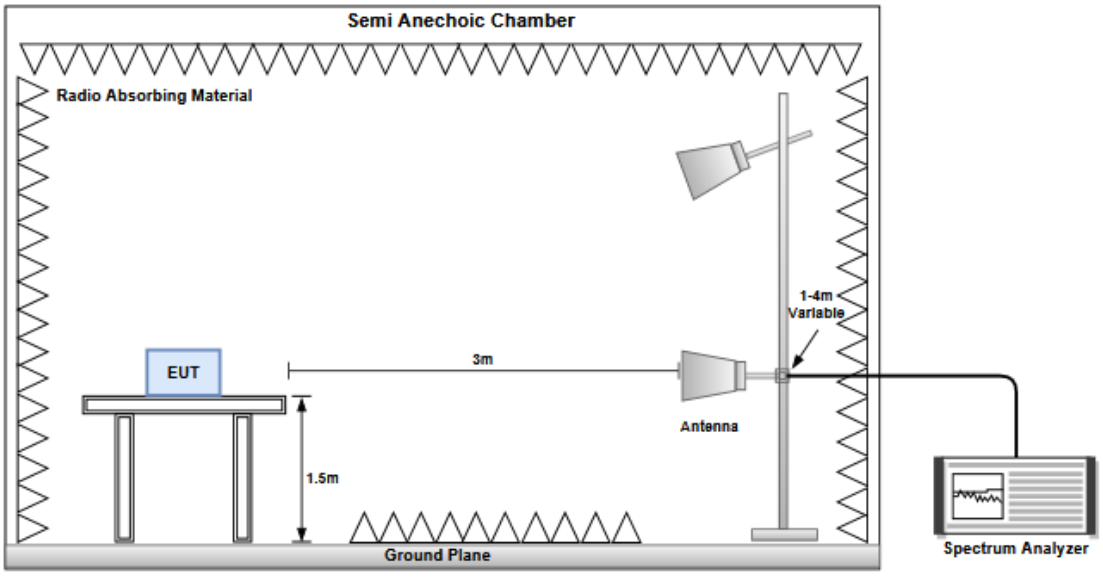
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.5.3 Test Setup

Radiated Emissions below 1 GHz



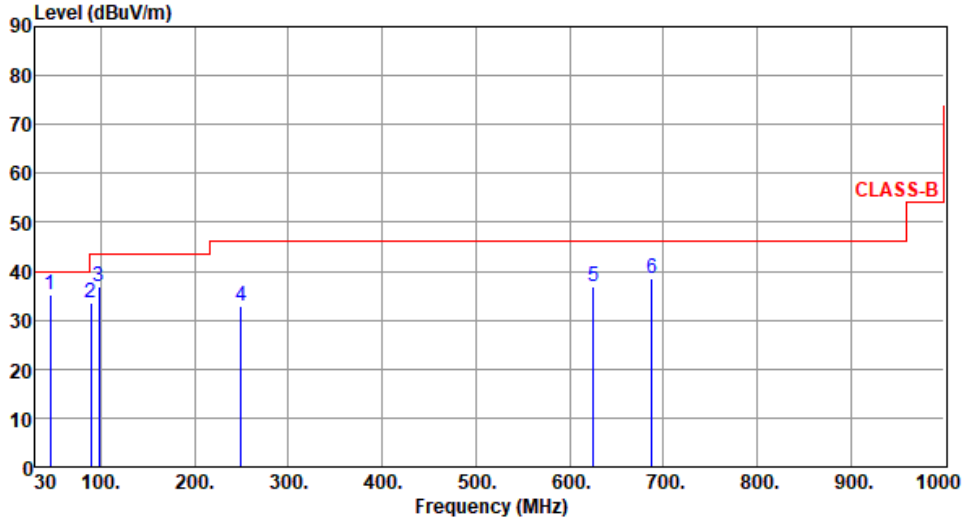
Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Horizontal	Test Configuration	1

Test By :Roger Lu Temperature(℃):23 Humidity(%):66

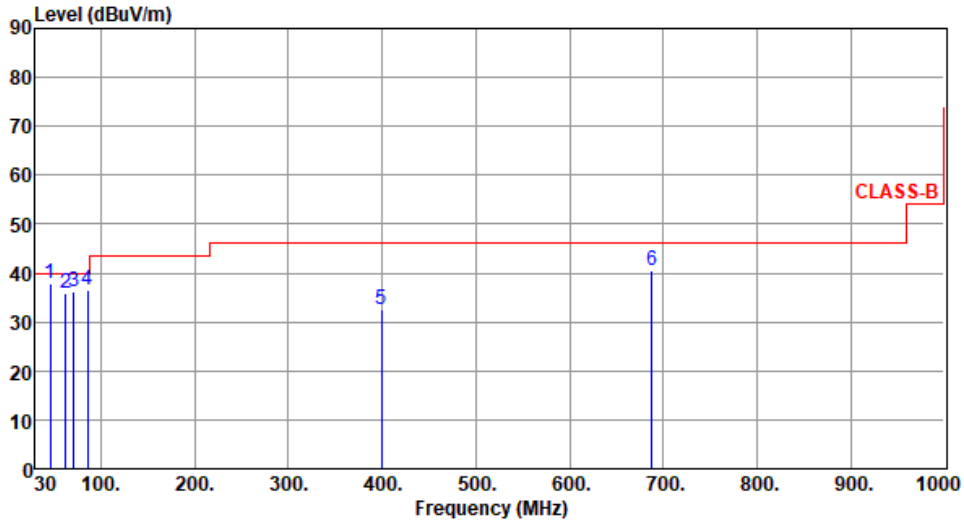


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.49	35.27	40.00	-4.73	44.02	-8.75	Peak	---	---
2	89.26	33.62	43.50	-9.88	48.47	-14.85	Peak	---	---
3	97.86	36.76	43.50	-6.74	50.82	-14.06	Peak	---	---
4	249.60	32.86	46.00	-13.14	43.04	-10.18	Peak	---	---
5	625.60	36.80	46.00	-9.20	36.83	-0.03	Peak	---	---
6	688.00	38.38	46.00	-7.62	37.35	1.03	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Vertical	Test Configuration	1

Test By :Roger Lu Temperature(℃):23 Humidity(%):66

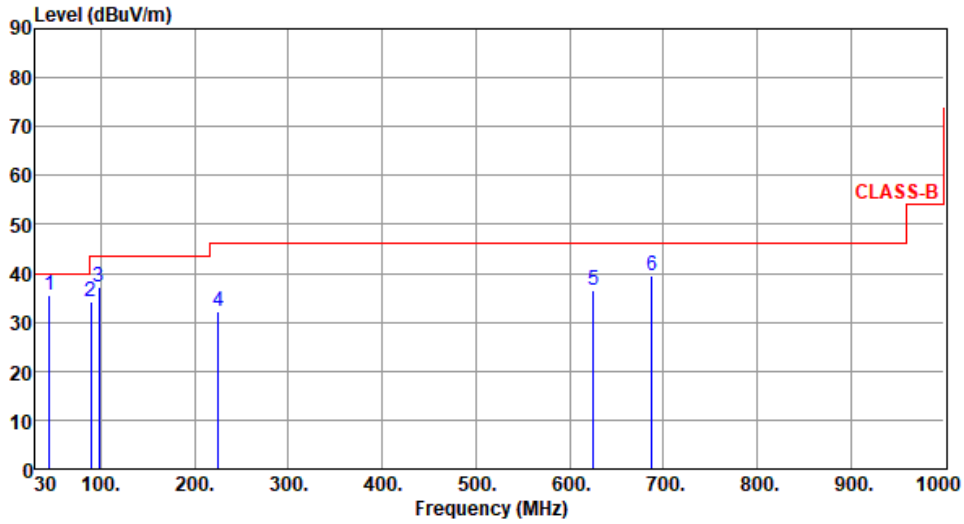


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.15	37.95	40.00	-2.05	46.63	-8.68	QP	188	316
2	62.43	35.75	40.00	-4.25	45.48	-9.73	QP	100	256
3	70.79	36.22	40.00	-3.78	47.31	-11.09	QP	100	18
4	85.56	36.67	40.00	-3.33	51.12	-14.45	QP	100	345
5	399.20	32.55	46.00	-13.45	38.30	-5.75	Peak	---	---
6	688.00	40.67	46.00	-5.33	39.64	1.03	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	**Test Freq. (MHz)**	927.5
Polarization	Horizontal	**Test Configuration**	1

Test By :Roger Lu Temperature(℃):23 Humidity(%):66

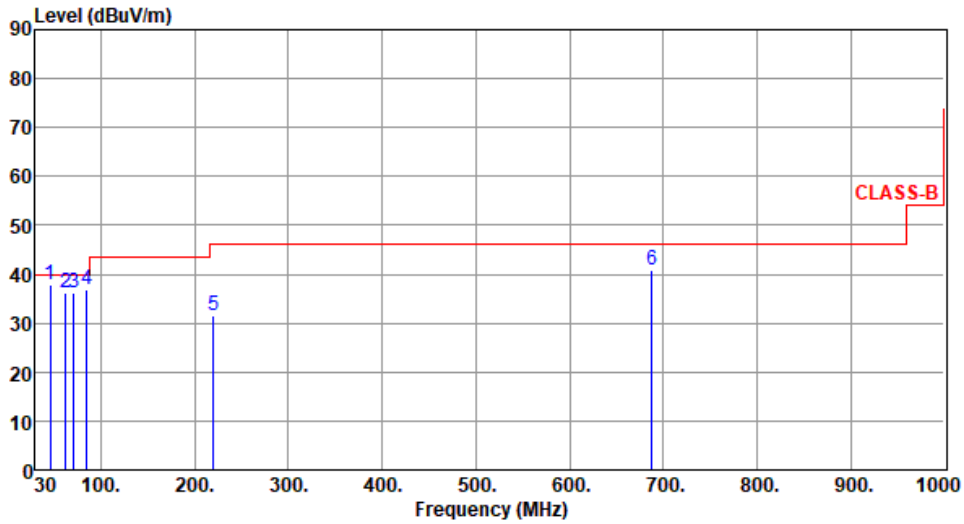


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	45.46	35.45	40.00	-4.55	44.21	-8.76	Peak	---	---
2	89.22	34.11	43.50	-9.39	48.96	-14.85	Peak	---	---
3	97.85	37.18	43.50	-6.32	51.24	-14.06	Peak	---	---
4	225.60	32.33	46.00	-13.67	44.69	-12.36	Peak	---	---
5	625.60	36.38	46.00	-9.62	36.41	-0.03	Peak	---	---
6	688.00	39.68	46.00	-6.32	38.65	1.03	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	Test Freq. (MHz)	927.5
Polarization	Vertical	Test Configuration	1

Test By :Roger Lu Temperature(℃):23 Humidity(%):66

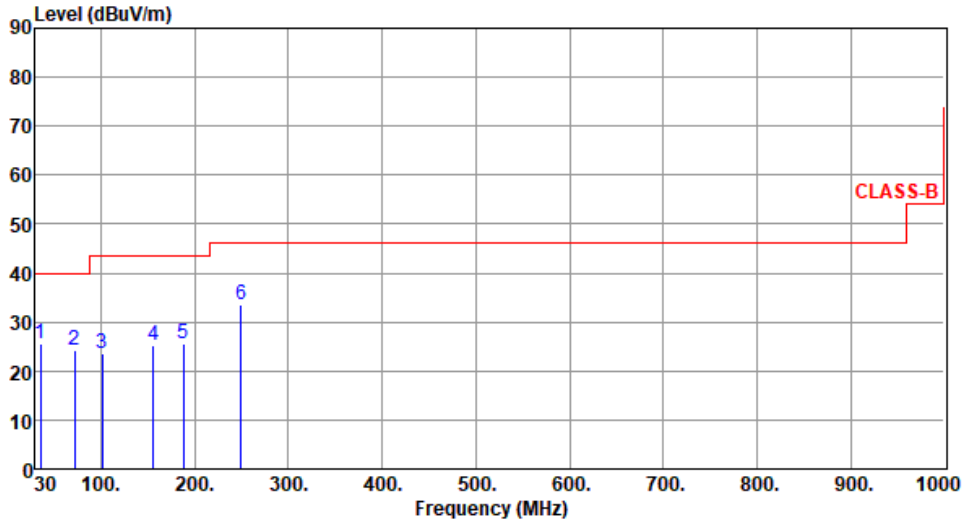


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.13	37.99	40.00	-2.01	46.67	-8.68	QP	185	312
2	62.48	36.10	40.00	-3.90	45.84	-9.74	QP	100	251
3	70.79	36.22	40.00	-3.78	47.31	-11.09	QP	100	18
4	85.26	36.95	40.00	-3.05	51.34	-14.39	QP	100	345
5	220.00	31.53	46.00	-14.47	43.89	-12.36	Peak	---	---
6	688.00	40.94	46.00	-5.06	39.91	1.03	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Horizontal	Test Configuration	2

Test By :BRAD WU Temperature(℃):23 Humidity(%):66

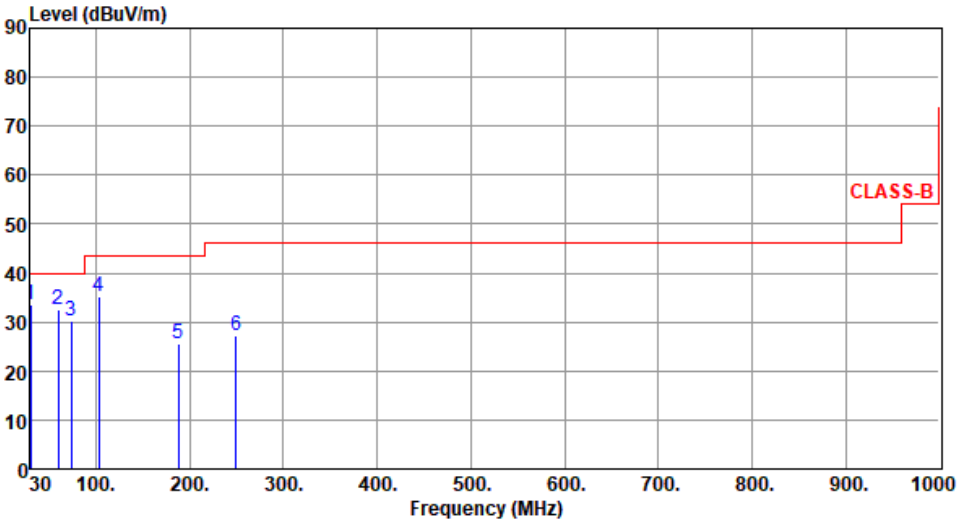


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	35.82	25.68	40.00	-14.32	35.28	-9.60	Peak	---	---
2	71.71	24.14	40.00	-15.86	35.27	-11.13	Peak	---	---
3	101.78	23.48	43.50	-20.02	36.84	-13.36	Peak	---	---
4	156.10	25.33	43.50	-18.17	34.27	-8.94	Peak	---	---
5	188.11	25.44	43.50	-18.06	36.98	-11.54	Peak	---	---
6	249.22	33.60	46.00	-12.40	43.79	-10.19	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Vertical	Test Configuration	2

Test By :BRAD WU Temperature(℃):23 Humidity(%):66

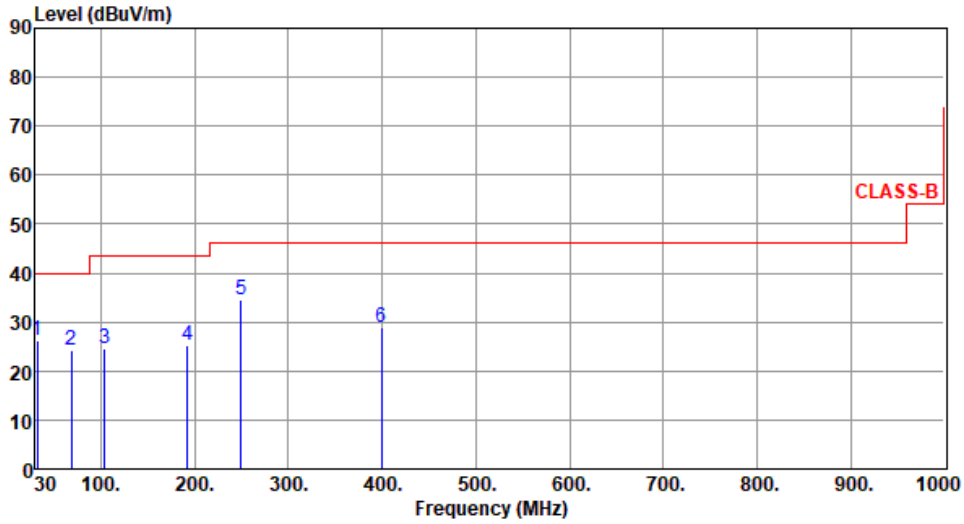


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	30.64	33.45	40.00	-6.55	43.59	-10.14	QP	100	24
2	60.07	32.44	40.00	-7.56	41.65	-9.21	Peak	---	---
3	73.65	30.12	40.00	-9.88	42.01	-11.89	Peak	---	---
4	102.75	35.06	43.50	-8.44	48.32	-13.26	Peak	---	---
5	188.11	25.44	43.50	-18.06	36.98	-11.54	Peak	---	---
6	249.22	27.13	46.00	-18.87	37.32	-10.19	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	**Test Freq. (MHz)**	927.5
Polarization	Horizontal	**Test Configuration**	2

Test By :BRAD WU Temperature(℃):23 Humidity(%):66

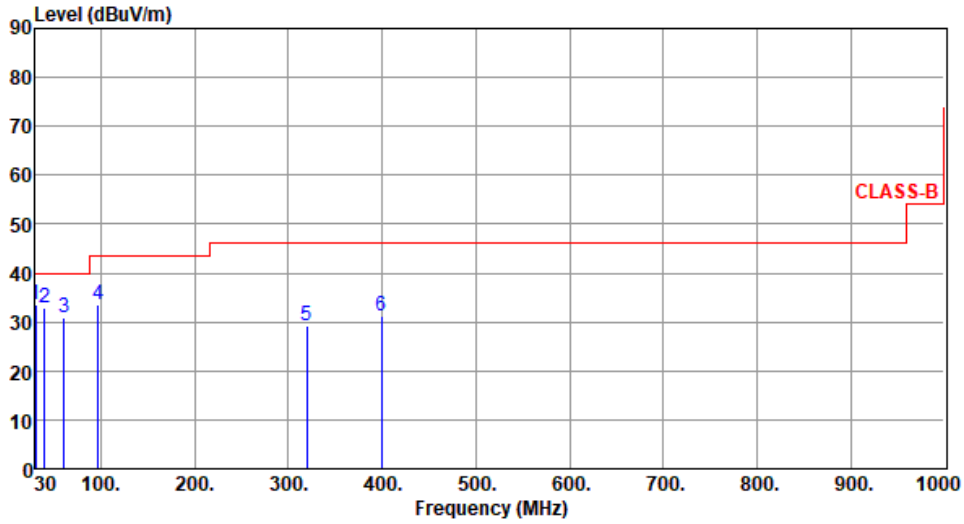


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	31.94	26.33	40.00	-13.67	36.39	-10.06	Peak	---	---
2	68.80	24.19	40.00	-15.81	35.03	-10.84	Peak	---	---
3	103.72	24.54	43.50	-18.96	37.65	-13.11	Peak	---	---
4	191.99	25.25	43.50	-18.25	37.18	-11.93	Peak	---	---
5	249.22	34.54	46.00	-11.46	44.73	-10.19	Peak	---	---
6	399.57	29.05	46.00	-16.95	34.79	-5.74	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

Modulation	CSS	**Test Freq. (MHz)**	927.5
Polarization	Vertical	**Test Configuration**	2

Test By :BRAD WU Temperature(℃):23 Humidity(%):66



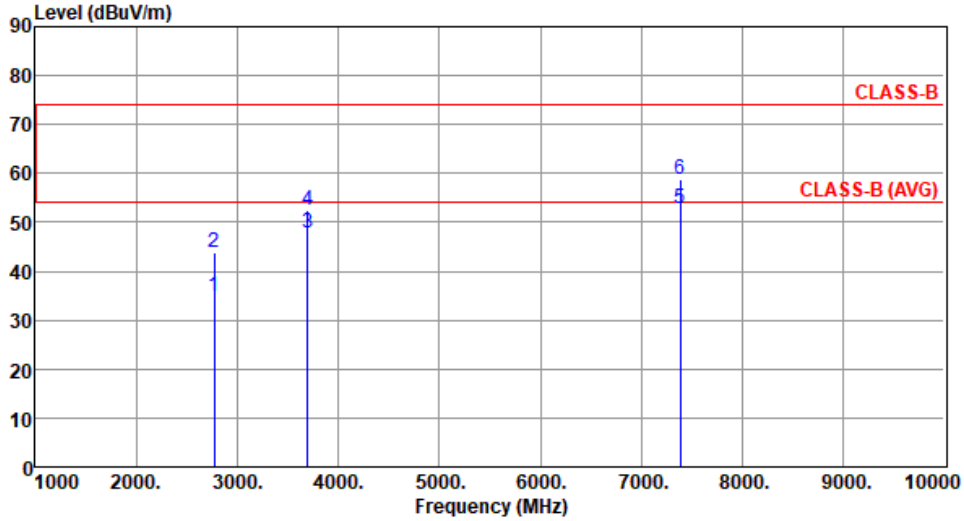
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	30.56	33.62	40.00	-6.38	43.78	-10.16	QP	100	21
2	39.70	32.89	40.00	-7.11	42.08	-9.19	Peak	---	---
3	61.04	30.90	40.00	-9.10	40.39	-9.49	Peak	---	---
4	96.93	33.38	43.50	-10.12	47.55	-14.17	Peak	---	---
5	320.03	29.30	46.00	-16.70	37.23	-7.93	Peak	---	---
6	399.57	31.12	46.00	-14.88	36.86	-5.74	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).
Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Horizontal		

Test By :Roger Lu Temperature(°C):23 Humidity(%):62

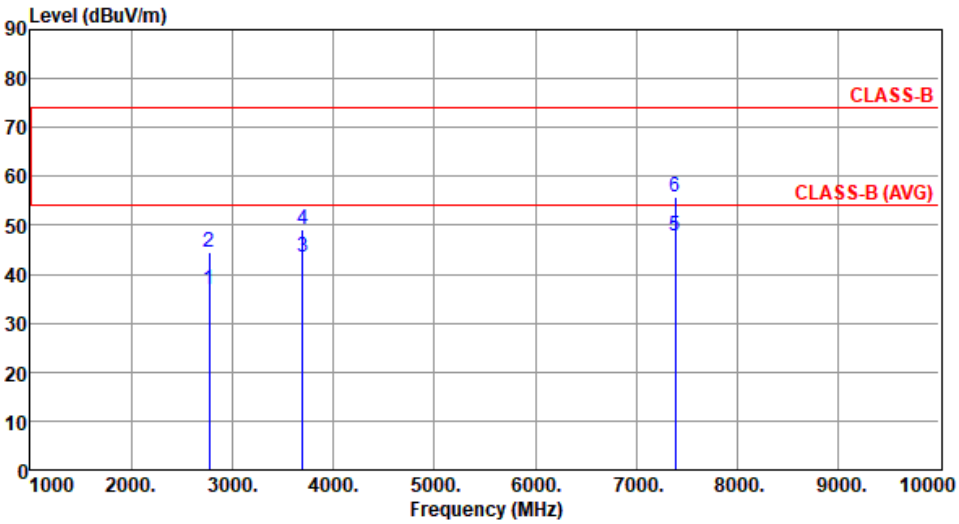


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2769.90	35.00	54.00	-19.00	35.91	-0.91	Average	103	63
2	2769.90	43.70	74.00	-30.30	44.61	-0.91	Peak	103	63
3	3693.20	47.77	54.00	-6.23	45.96	1.81	Average	250	327
4	3693.20	52.44	74.00	-21.56	50.63	1.81	Peak	250	327
5	7386.40	52.69	54.00	-1.31	42.42	10.27	Average	106	348
6	7386.40	58.88	74.00	-15.12	48.61	10.27	Peak	106	348

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	CSS	Test Freq. (MHz)	923.3
Polarization	Vertical		

Test By :Roger Lu Temperature(℃):23 Humidity(%):62

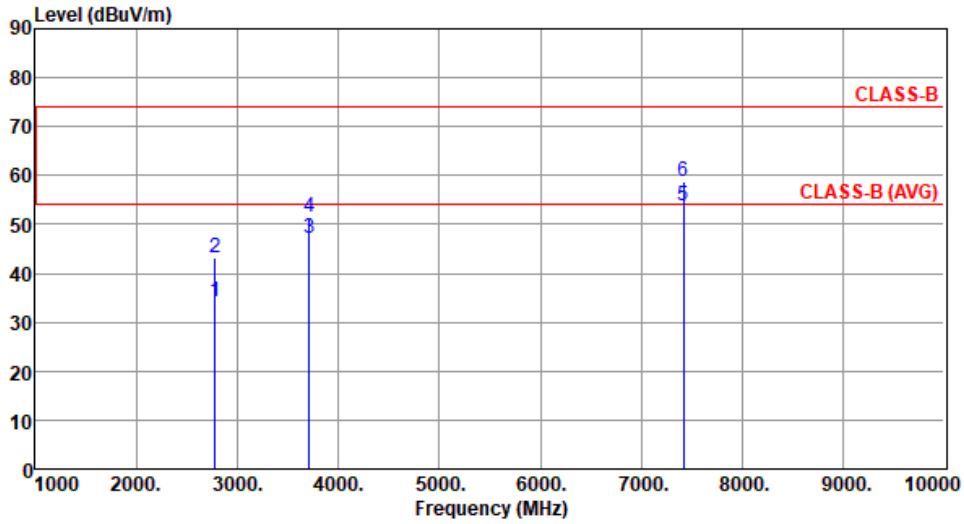


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2769.90	36.91	54.00	-17.09	37.82	-0.91	Average	204	339
2	2769.90	44.53	74.00	-29.47	45.44	-0.91	Peak	204	339
3	3693.20	43.48	54.00	-10.52	41.67	1.81	Average	100	11
4	3693.20	49.22	74.00	-24.78	47.41	1.81	Peak	100	11
5	7386.40	47.96	54.00	-6.04	37.69	10.27	Average	139	356
6	7386.40	55.86	74.00	-18.14	45.59	10.27	Peak	139	356

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	CSS	Test Freq. (MHz)	927.5
Polarization	Horizontal		

Test By :Roger Lu Temperature(℃):23 Humidity(%):62

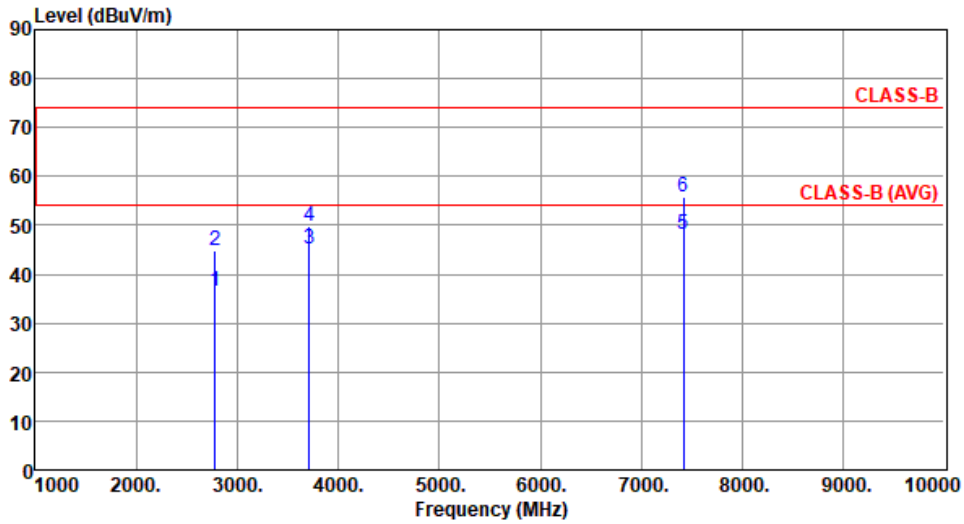


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2782.50	34.37	54.00	-19.63	35.19	-0.82	Average	119	66
2	2782.50	43.28	74.00	-30.72	44.10	-0.82	Peak	119	66
3	3710.00	47.28	54.00	-6.72	45.42	1.86	Average	255	325
4	3710.00	51.56	74.00	-22.44	49.70	1.86	Peak	255	325
5	7420.00	53.70	54.00	-0.30	43.47	10.23	Average	103	348
6	7420.00	58.71	74.00	-15.29	48.48	10.23	Peak	103	348

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	CSS	Test Freq. (MHz)	927.5
Polarization	Vertical		

Test By :Roger Lu Temperature(℃):23 Humidity(%):62



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2782.50	36.42	54.00	-17.58	37.24	-0.82	Average	208	337
2	2782.50	44.78	74.00	-29.22	45.60	-0.82	Peak	208	337
3	3710.00	45.04	54.00	-8.96	43.18	1.86	Average	100	9
4	3710.00	49.97	74.00	-24.03	48.11	1.86	Peak	100	9
5	7420.00	48.15	54.00	-5.85	37.92	10.23	Average	125	352
6	7420.00	55.67	74.00	-18.33	45.44	10.23	Peak	125	352

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.6 Emissions in Non-Restricted Frequency Bands

3.6.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.6.2 Test Procedures

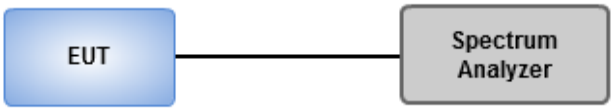
Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

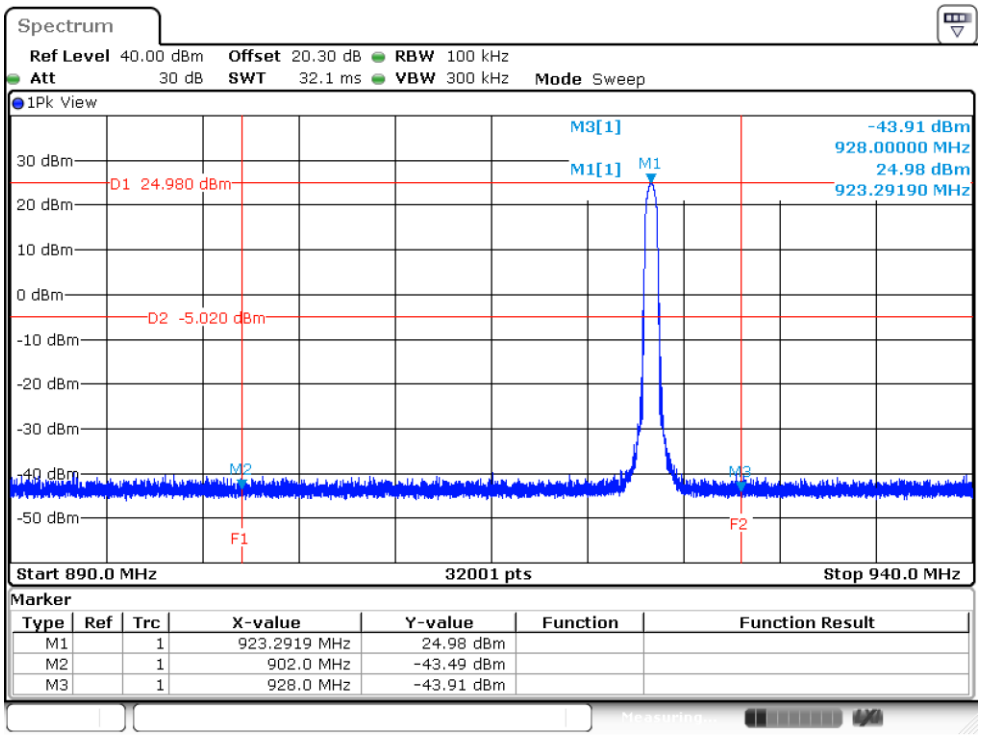
3.6.3 Test Setup

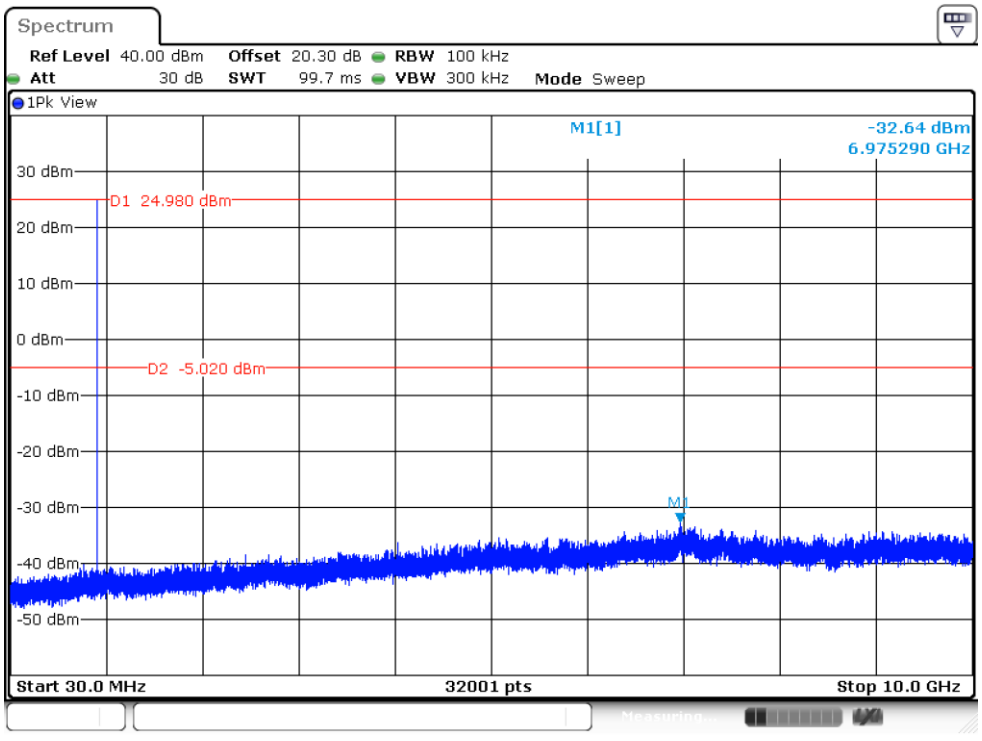


3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

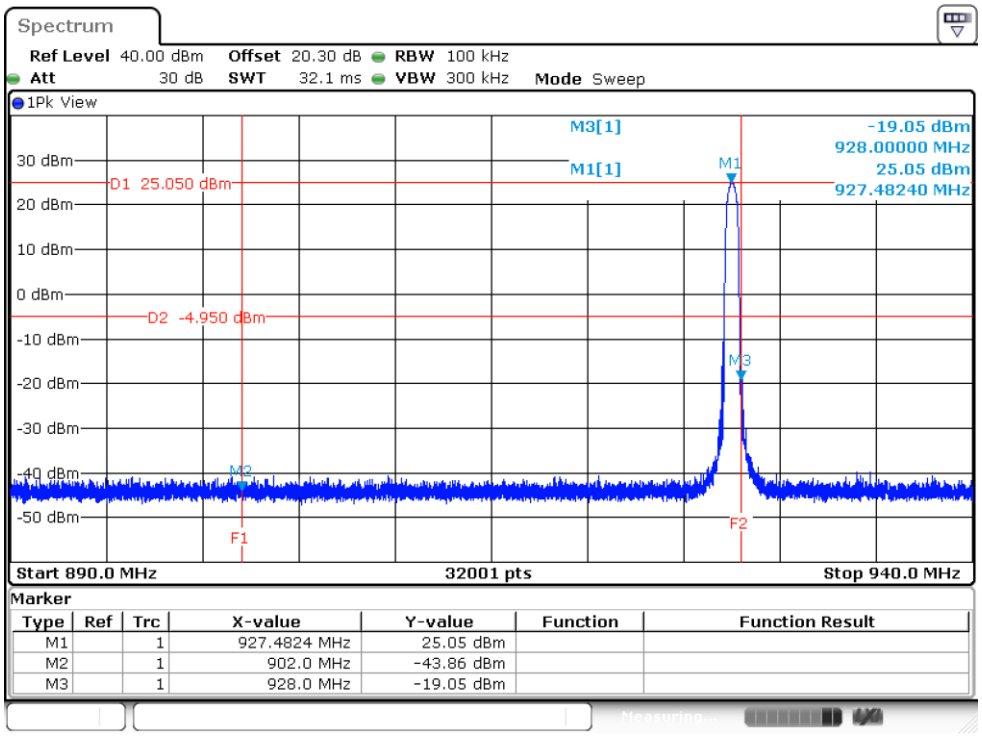
Ambient Condition	23°C / 66%	Tested By	Brad Wu

923.3 MHz



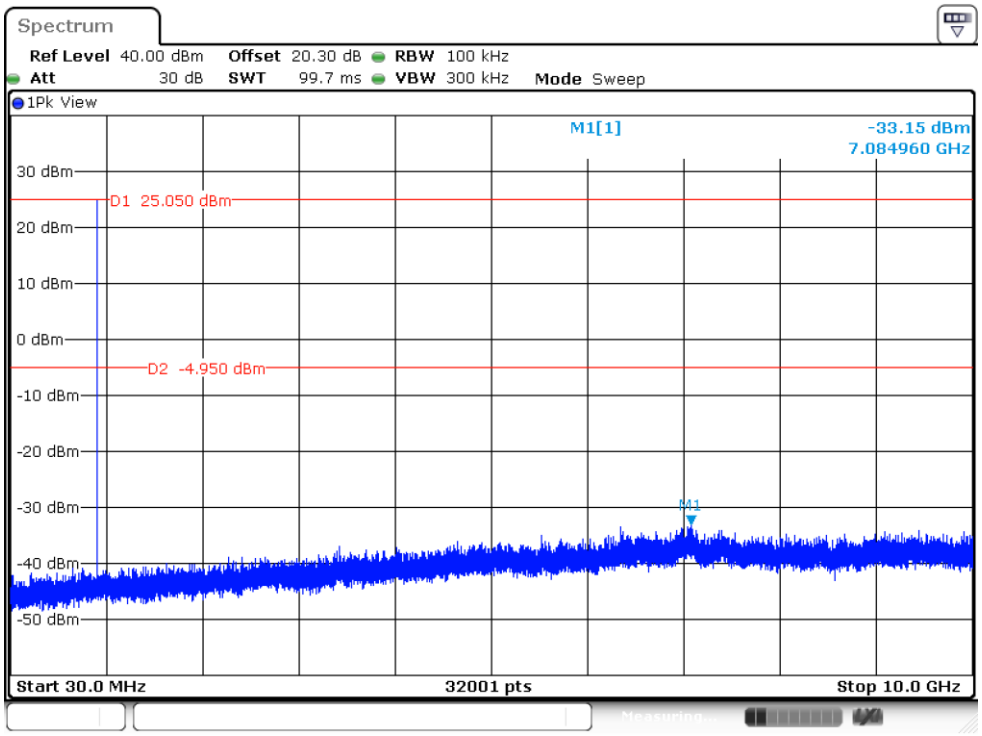


927.5 MHz



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	927.4824 MHz	25.05 dBm		
M2		1	902.0 MHz	-43.86 dBm		
M3		1	928.0 MHz	-19.05 dBm		



4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan, R.O.C.	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.	No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0155
Email: ICC_Service@icertifi.com.tw

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