FCC Test Report

FCC ID	:	**MCLGPE810U**
Equipment	:	**LoRa Express Gateway**
Model No.	:	**GPE810U**
Brand Name	:	**ufiSpace**
Applicant	:	**HON HAI PRECISION IND.CO., LTD.**
Address	:	**5F-1, 5 Hsin-An Road, Hsinchu, Science Industrial Park, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Mar. 28, 2017**
Tested Date	:	**Apr. 05 ~ Apr. 10, 2017**

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**

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Release Record

Report No.	Version	Description	Issued Date
FR732802	Rev. 01	Initial issue	May 10, 2017

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.345MHz 31.93 (Margin -17.16dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 50.42MHz 34.55 (Margin -5.45dB) - PK	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 24.04	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

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	Ch. Freq. (MHz)	Channel Number	Data Rate (bit/sec)	Spread Factor	Channel Bandwidth (kHz)
902 ~ 928	923.3 ~ 927.5	1 ~ 8 [8]	1172 ~ 21875	12 ~ 7	500
Note 1: RF output power specifies thatMaximum Conducted (Average) Output Power. Note 2: The device uses CSS modulation.					

1.1.2 Antenna Details

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)
1	Wha Yu	C107-511393-A(SRF2017311)	helix	R-SMA	1.5

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter

1.1.4 Accessories

Accessories		
No.	**Equipment**	**Description**
1	AC adapter	Brand: DVE Model: DSA-18PFM-12FUS 120150 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.6A O/P: 12Vdc, 1.5A Power Line: 1.5m non-shielded without core

1.1.5 Channel List

Channel	Frequency(MHz)
1	923.3
2	923.9
3	924.5
4	925.1
5	925.7
6	926.3
7	926.9
8	927.5

1.1.6 Test Tool and Duty Cycle

Test Tool	HyperTerminal, version: 5.1.2600.0	
Duty Cycle and Duty Factor	**Duty Cycle (%)**	**Duty Factor (dB)**
	100%	0

1.1.7 Power Setting

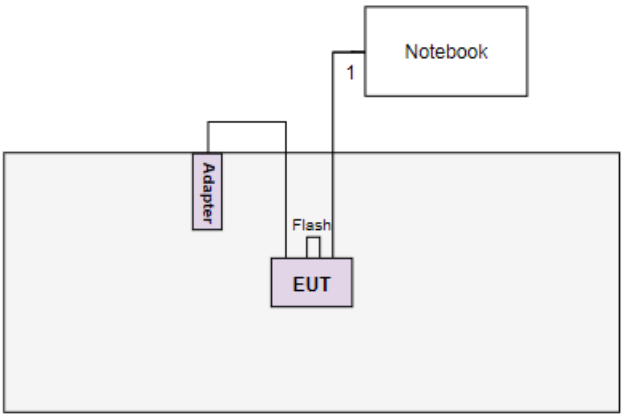
Modulation Mode	Test Frequency (MHz)	
	923.3	**927.5**
CSS	dig 0 --dac 3 --pa 3 --mix 15	dig 0 --dac 3 --pa 3 --mix 15

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Signal cable / Length (m)**
1	Notebook	DELL	Latitude E6430	DoC	USB, 1m shielded.
2	USB 3.0 Flash	SONY	USM16GU	---	---

1.3 Test Setup Chart

Test Setup Diagram



1. RJ45, 10m non-shielded

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Dec. 21, 2016	Dec. 20, 2017
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 08, 2016	Nov. 07, 2017
RF Cable-CON	EMC	EMCCFD300-BM-BM-6000	50821	Dec. 20, 2016	Dec. 19, 2017
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 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Nov. 25, 2016	Nov. 24, 2017
Receiver	R&S	ESR3	101658	Nov. 24, 2016	Nov. 23, 2017
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 04, 2016	Aug. 03, 2017
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 21, 2016	Dec. 20, 2017
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 10, 2016	Nov. 09, 2017
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 09, 2016	Dec. 08, 2017
Preamplifier	EMC	EMC02325	980225	Aug. 05, 2016	Aug. 04, 2017
Preamplifier	Agilent	83017A	MY39501308	Oct. 06, 2016	Oct. 05, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 09, 2016	Dec. 08, 2017
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 09, 2016	Dec. 08, 2017
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	16052	Dec. 09, 2016	Dec. 08, 2017
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 09, 2016	Dec. 08, 2017
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 09, 2016	Dec. 08, 2017
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)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Mar. 15, 2017	Mar. 14, 2018
Power Meter	Anritsu	ML2495A	1241002	Oct. 06, 2016	Oct. 05, 2017
Power Sensor	Anritsu	MA2411B	1207366	Oct. 06, 2016	Oct. 05, 2017
AC POWER SOURCE	APC	AFC-500W	F312060012	Oct. 28, 2016	Oct. 27, 2017
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
ANSI C63.10-2013
FCC KDB 558074 D01 DTS Meas Guidance v04

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±34.134 Hz
Conducted power	±0.808 dB
Power density	±0.463 dB
Conducted emission	±2.670 dB
AC conducted emission	±2.90 dB
Radiated emission ≤ 1GHz	±3.66 dB
Radiated emission > 1GHz	±5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 57%	Howard Huang
Radiated Emissions	03CH01-WS	23°C / 65%	Kevin Lee Aska Huang
RF Conducted	TH01-WS	22°C / 63%	Brad Wu

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Test Frequency (MHz)	Channel Bandwidth (kHz)	Modulation / SF
Conducted Emissions Radiated Emissions ≤1GHz Radiated Emissions >1GHz Maximum Output Power 6dB Bandwidth Power Spectral Density	923.3 / 927.5	500	CSS / 12

3 Transmitter Test Results

3.1 Conducted Emissions

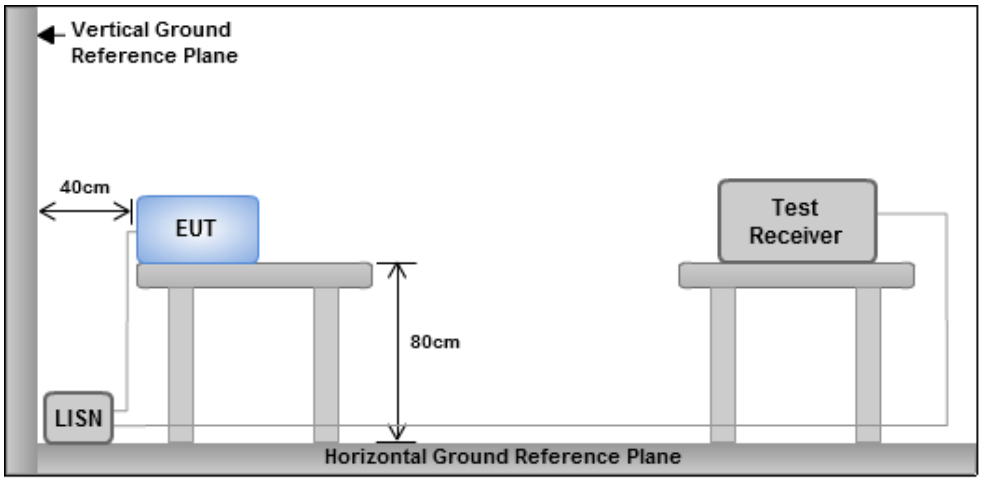
3.1.1 Limit of Conducted Emissions

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.

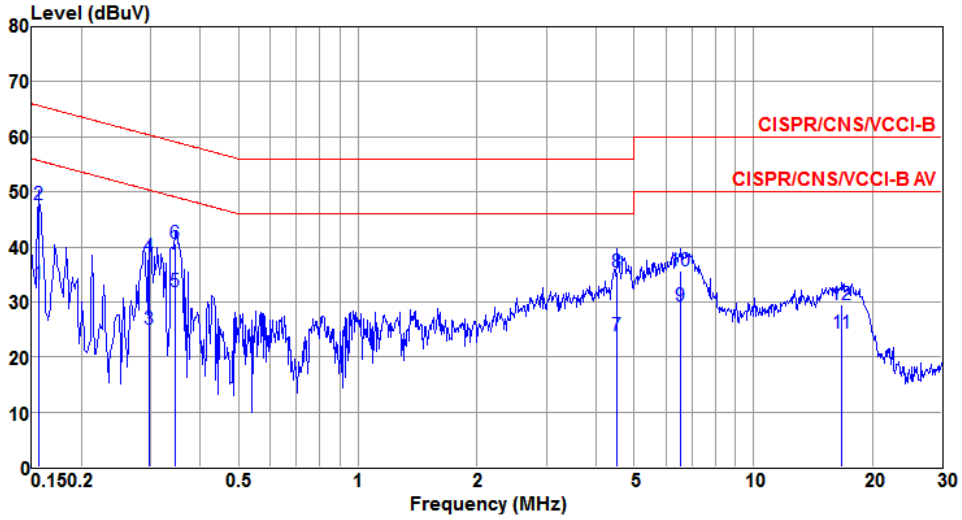
3.1.3 Test Setup



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

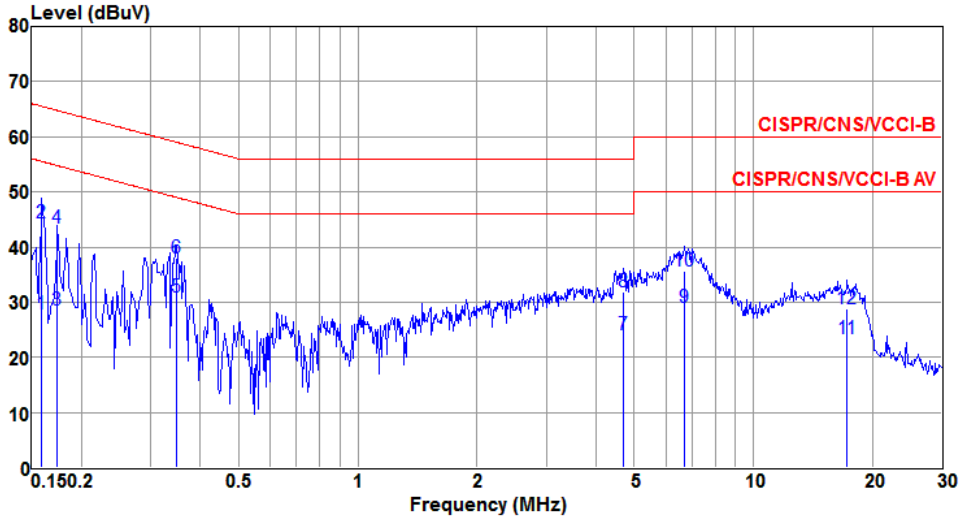
Modulation / SF	CSS / 12	Test Freq. (MHz)	923.3
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.156	33.37	55.69	-22.32	32.95	0.38	0.04	Average
2	0.156	47.79	65.69	-17.90	47.37	0.38	0.04	QP
3	0.297	25.00	50.32	-25.32	24.60	0.36	0.04	Average
4	0.297	38.33	60.32	-21.99	37.93	0.36	0.04	QP
5@	0.345	31.93	49.09	-17.16	31.54	0.35	0.04	Average
6	0.345	40.62	59.09	-18.47	40.23	0.35	0.04	QP
7	4.525	23.90	46.00	-22.10	23.07	0.66	0.17	Average
8	4.525	35.40	56.00	-20.60	34.57	0.66	0.17	QP
9	6.557	29.35	50.00	-20.65	28.31	0.85	0.19	Average
10	6.557	35.65	60.00	-24.35	34.61	0.85	0.19	QP
11	16.750	24.28	50.00	-25.72	23.65	0.39	0.24	Average
12	16.750	29.39	60.00	-30.61	28.76	0.39	0.24	QP

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

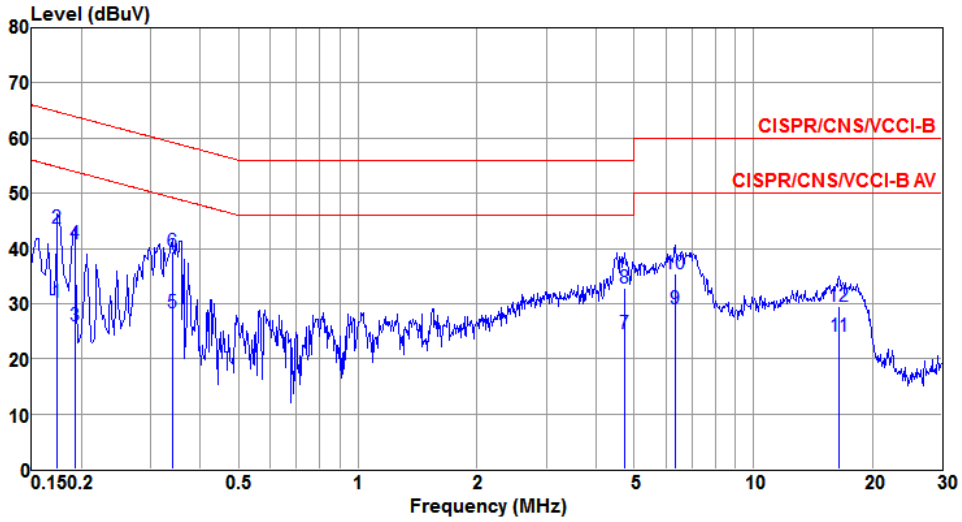
Modulation / SF	CSS / 12	Test Freq. (MHz)	923.3
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.159	27.81	55.52	-27.71	27.43	0.34	0.04	Average
2	0.159	44.32	65.52	-21.20	43.94	0.34	0.04	QP
3	0.174	28.51	54.77	-26.26	28.13	0.34	0.04	Average
4	0.174	43.36	64.77	-21.41	42.98	0.34	0.04	QP
5@	0.348	31.02	49.00	-17.98	30.61	0.37	0.04	Average
6	0.348	37.99	59.00	-21.01	37.58	0.37	0.04	QP
7	4.696	24.07	46.00	-21.93	23.32	0.58	0.17	Average
8	4.696	31.95	56.00	-24.05	31.20	0.58	0.17	QP
9	6.698	28.95	50.00	-21.05	28.14	0.62	0.19	Average
10	6.698	35.70	60.00	-24.30	34.89	0.62	0.19	QP
11	17.291	23.40	50.00	-26.60	22.78	0.38	0.24	Average
12	17.291	28.74	60.00	-31.26	28.12	0.38	0.24	QP

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

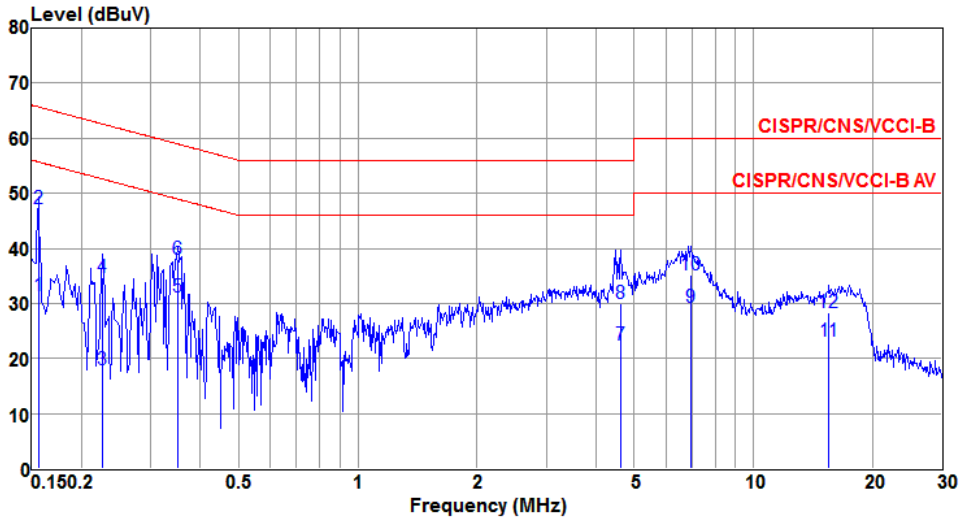
Modulation / SF	CSS / 12	Test Freq. (MHz)	927.5
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.174	30.10	54.77	-24.67	29.67	0.39	0.04	Average
2	0.174	43.75	64.77	-21.02	43.32	0.39	0.04	QP
3	0.192	25.92	53.93	-28.01	25.49	0.39	0.04	Average
4	0.192	40.80	63.93	-23.13	40.37	0.39	0.04	QP
5	0.339	28.34	49.22	-20.88	27.95	0.35	0.04	Average
6@	0.339	39.47	59.22	-19.75	39.08	0.35	0.04	QP
7	4.721	24.54	46.00	-21.46	23.69	0.68	0.17	Average
8	4.721	32.86	56.00	-23.14	32.01	0.68	0.17	QP
9	6.352	29.13	50.00	-20.87	28.11	0.83	0.19	Average
10	6.352	35.33	60.00	-24.67	34.31	0.83	0.19	QP
11	16.486	24.03	50.00	-25.97	23.42	0.37	0.24	Average
12	16.486	29.46	60.00	-30.54	28.85	0.37	0.24	QP

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

Modulation / SF	CSS / 12	Test Freq. (MHz)	927.5
Power Phase	Neutral		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.156	31.49	55.69	-24.20	31.11	0.34	0.04	Average
2	0.156	47.18	65.69	-18.51	46.80	0.34	0.04	QP
3	0.226	17.96	52.61	-34.65	17.57	0.35	0.04	Average
4	0.226	34.60	62.61	-28.01	34.21	0.35	0.04	QP
5@	0.350	31.06	48.96	-17.90	30.65	0.37	0.04	Average
6	0.350	37.90	58.96	-21.06	37.49	0.37	0.04	QP
7	4.622	22.31	46.00	-23.69	21.56	0.58	0.17	Average
8	4.622	29.89	56.00	-26.11	29.14	0.58	0.17	QP
9	6.951	29.18	50.00	-20.82	28.35	0.63	0.20	Average
10	6.951	35.26	60.00	-24.74	34.43	0.63	0.20	QP
11	15.552	23.11	50.00	-26.89	22.60	0.28	0.23	Average
12	15.552	28.40	60.00	-31.60	27.89	0.28	0.23	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

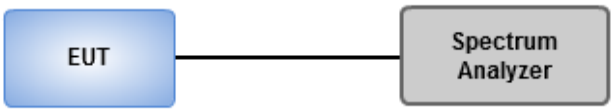
6dB Bandwidth

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) = 10kHz, Video bandwidth = 30kHz.
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.

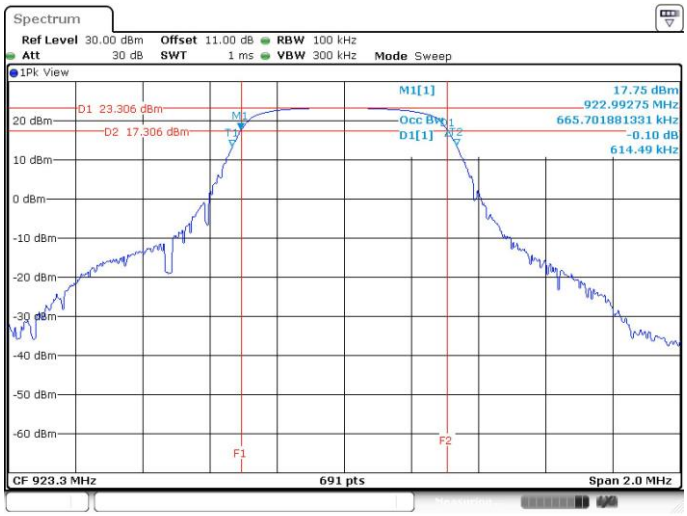
3.2.3 Test Setup



3.2.4 Test Result of 6dB and Occupied Bandwidth

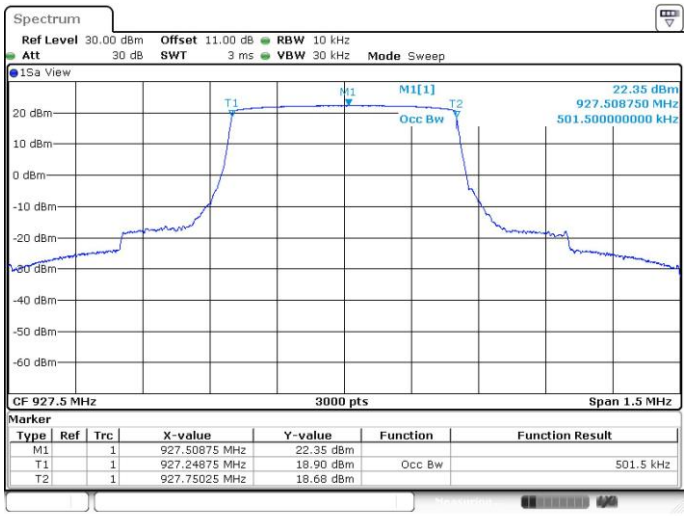
Modulation / SF	Freq. (MHz)	6dB Bandwidth (MHz)	Limit (MHz)
CSS / 12	923.3	0.614	0.5
CSS / 12	927.5	0.617	0.5

Worst Plot



Modulation / SF	Freq. (MHz)	99% Occupied Bandwidth (MHz)
CSS / 12	923.3	0.501
CSS / 12	927.5	0.502

Worst Plot



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.

☐ Antenna gain > 6dBi

Transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi

3.3.2 Test Procedures

☐ Maximum Peak Conducted Output Power

☐ **Spectrum analyzer**

1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

☐ **Power meter**

1. A broadband Peak 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.

☒ Maximum Conducted Output Power

☒ **Power meter**

1. A broadband Average 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

Modulation / SF	Freq. (MHz)	Output Power (mW)	Output Power (dBm)	Limit (dBm)
CSS / 12	923.3	253.5129	24.04	30
CSS / 12	927.5	206.538	23.15	30

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

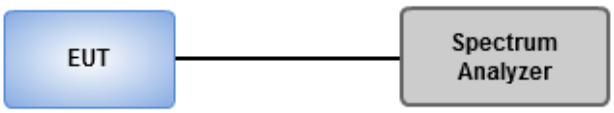
☐ Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.

1. Set the RBW = 3kHz, VBW = 10kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

☒ Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.

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

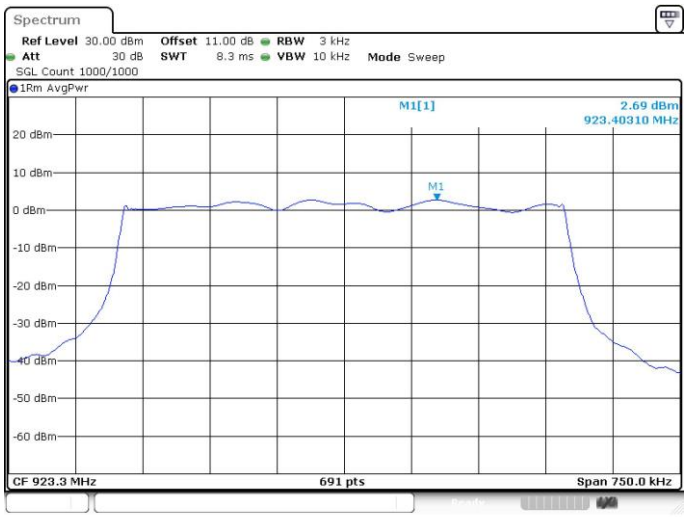
3.4.3 Test Setup



3.4.4 Test Result of Power Spectral Density

Modulation / SF	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
CSS / 12	923.3	2.69	8.00
CSS / 12	927.5	1.49	8.00

Worst Plot



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

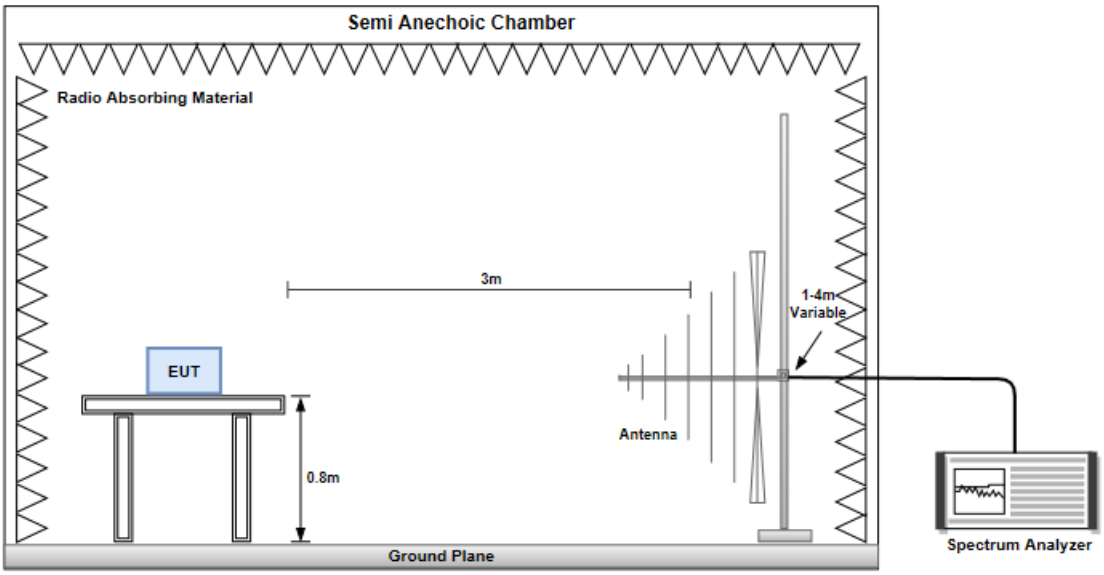
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

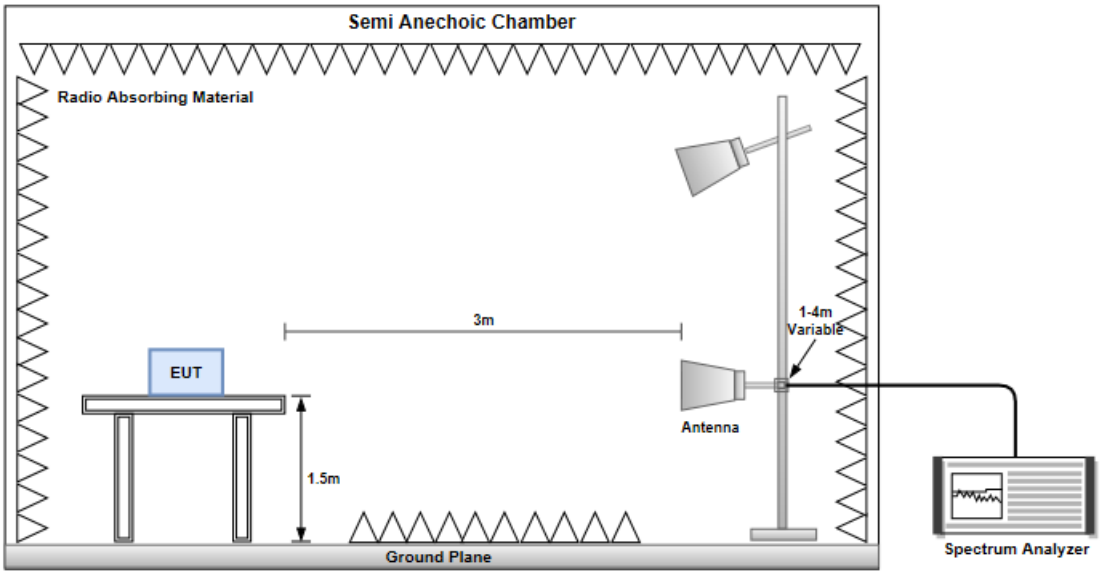
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

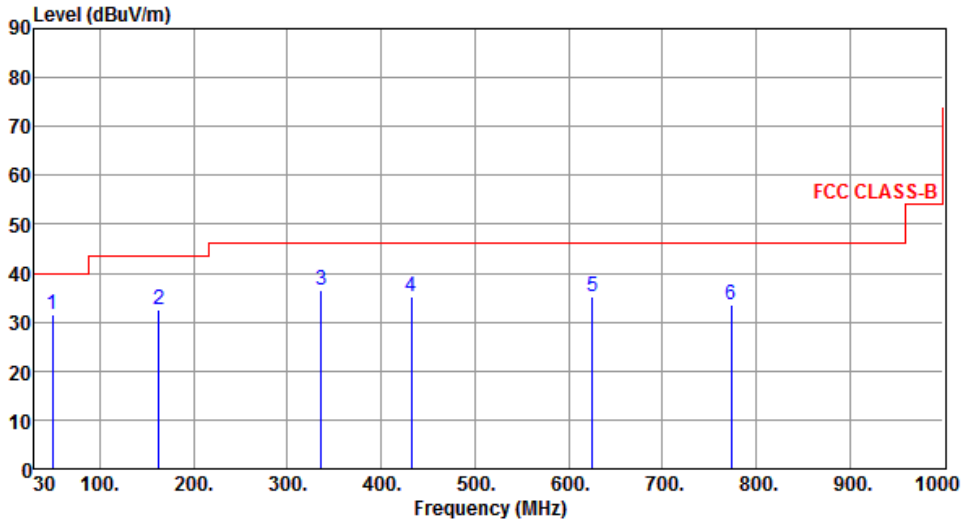


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

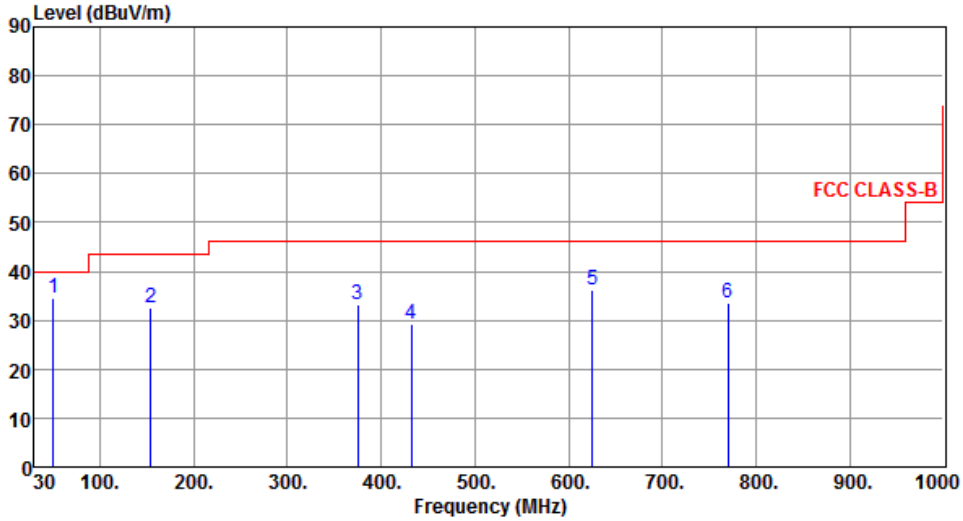
Modulation / SF	CSS / 12	**Test Freq. (MHz)**	923.3
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	49.52	31.52	40.00	-8.48	39.15	-7.63	Peak	---	---
2	162.54	32.47	43.50	-11.03	40.67	-8.20	Peak	---	---
3	336.47	36.52	46.00	-9.48	43.11	-6.59	Peak	---	---
4	432.16	35.16	46.00	-10.84	39.34	-4.18	Peak	---	---
5	625.58	35.11	46.00	-10.89	35.44	-0.33	Peak	---	---
6	773.24	33.52	46.00	-12.48	31.43	2.09	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.

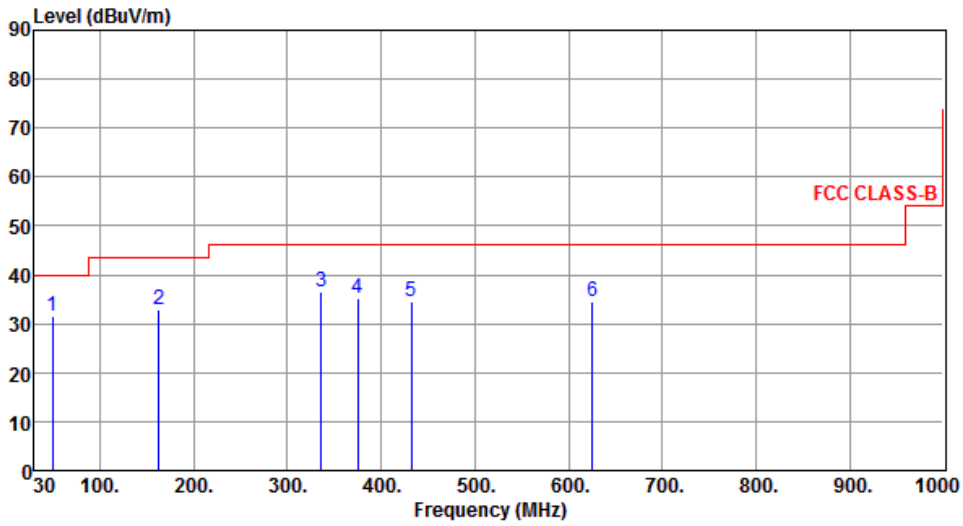
Modulation / SF	CSS / 12	Test Freq. (MHz)	923.3
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	50.42	34.55	40.00	-5.45	42.24	-7.69	Peak	---	---
2	154.26	32.41	43.50	-11.09	40.55	-8.14	Peak	---	---
3	375.16	33.31	46.00	-12.69	38.93	-5.62	Peak	---	---
4	432.41	29.15	46.00	-16.85	33.33	-4.18	Peak	---	---
5	625.23	36.15	46.00	-9.85	36.49	-0.34	Peak	---	---
6	770.21	33.65	46.00	-12.35	31.60	2.05	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.

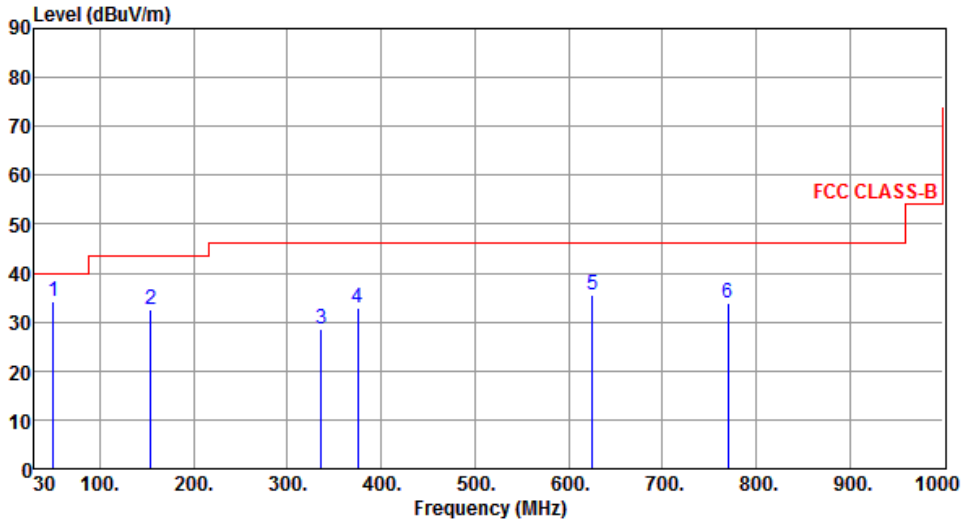
Modulation / SF	CSS / 12	Test Freq. (MHz)	927.5
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	49.40	31.64	40.00	-8.36	39.27	-7.63	Peak	---	---
2	162.89	32.85	43.50	-10.65	41.06	-8.21	Peak	---	---
3	336.52	36.39	46.00	-9.61	42.98	-6.59	Peak	---	---
4	375.32	35.25	46.00	-10.75	40.86	-5.61	Peak	---	---
5	432.55	34.58	46.00	-11.42	38.75	-4.17	Peak	---	---
6	625.58	34.44	46.00	-11.56	34.77	-0.33	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 / SF	CSS / 12	Test Freq. (MHz)	927.5
Polarization	Vertical		

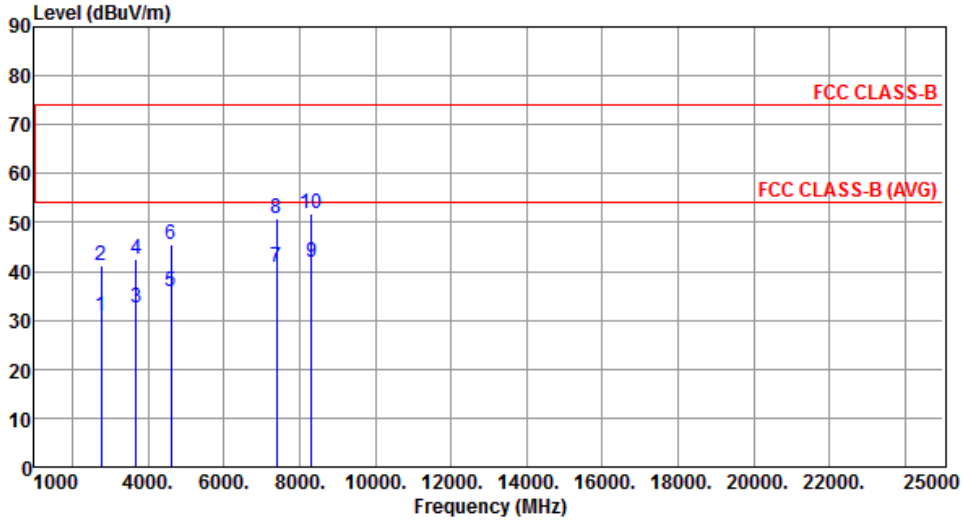


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	50.37	34.29	40.00	-5.71	41.98	-7.69	Peak	---	---
2	154.16	32.53	43.50	-10.97	40.67	-8.14	Peak	---	---
3	336.52	28.47	46.00	-17.53	35.06	-6.59	Peak	---	---
4	375.32	32.90	46.00	-13.10	38.51	-5.61	Peak	---	---
5	625.58	35.64	46.00	-10.36	35.97	-0.33	Peak	---	---
6	770.11	33.86	46.00	-12.14	31.81	2.05	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)

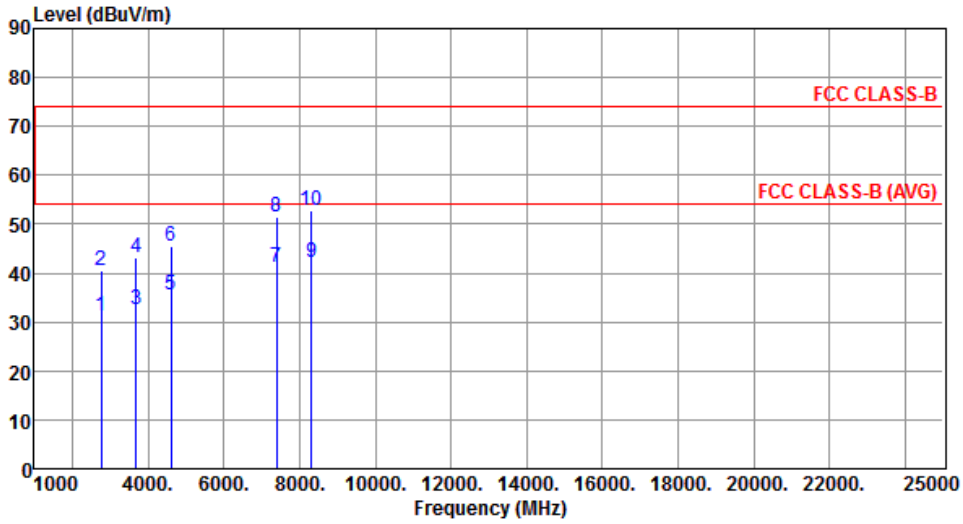
Modulation / SF	CSS / 12	**Test Freq. (MHz)**	923.3
Polarization	Horizontal		



	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	30.87	54.00	-23.13	32.69	-1.82	Average	100	147
2	2769.90	41.07	74.00	-32.93	42.89	-1.82	Peak	100	147
3	3693.20	32.71	54.00	-21.29	32.34	0.37	Average	183	174
4	3693.20	42.39	74.00	-31.61	42.02	0.37	Peak	183	174
5	4616.50	35.80	54.00	-18.20	32.56	3.24	Average	291	318
6	4616.50	45.62	74.00	-28.38	42.38	3.24	Peak	291	318
7	7386.40	40.92	54.00	-13.08	32.48	8.44	Average	271	243
8	7386.40	50.83	74.00	-23.17	42.39	8.44	Peak	271	243
9	8309.70	41.89	54.00	-12.11	32.37	9.52	Average	125	206
10	8309.70	51.81	74.00	-22.19	42.29	9.52	Peak	125	206

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).

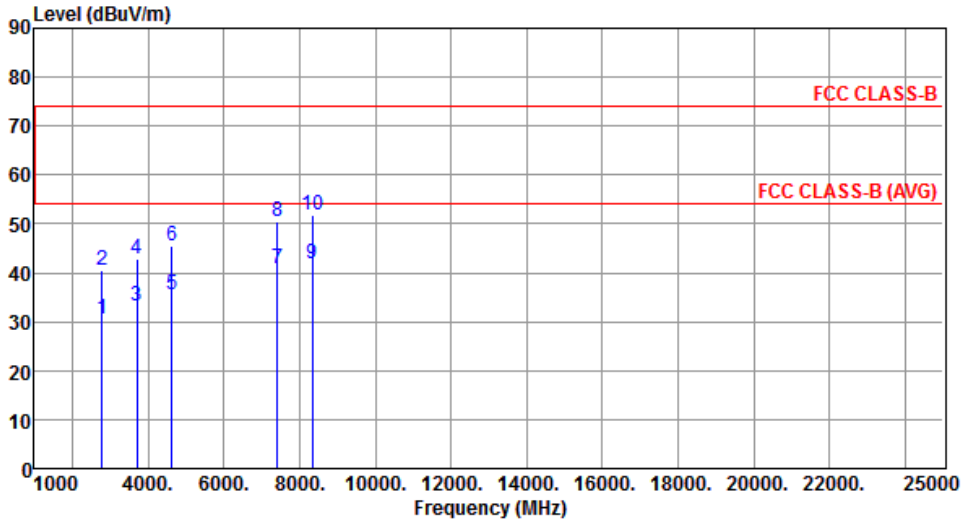
Modulation / SF	CSS / 12	Test Freq. (MHz)	923.3
Polarization	Vertical		



	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	31.34	54.00	-22.66	33.16	-1.82	Average	331	359
2	2769.90	40.62	74.00	-33.38	42.44	-1.82	Peak	331	359
3	3693.20	32.61	54.00	-21.39	32.24	0.37	Average	148	261
4	3693.20	43.23	74.00	-30.77	42.86	0.37	Peak	148	261
5	4616.50	35.61	54.00	-18.39	32.37	3.24	Average	215	194
6	4616.50	45.47	74.00	-28.53	42.23	3.24	Peak	215	194
7	7386.40	41.34	54.00	-12.66	32.90	8.44	Average	195	130
8	7386.40	51.35	74.00	-22.65	42.91	8.44	Peak	195	130
9	8309.70	42.03	54.00	-11.97	32.51	9.52	Average	284	337
10	8309.70	52.67	74.00	-21.33	43.15	9.52	Peak	284	337

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).

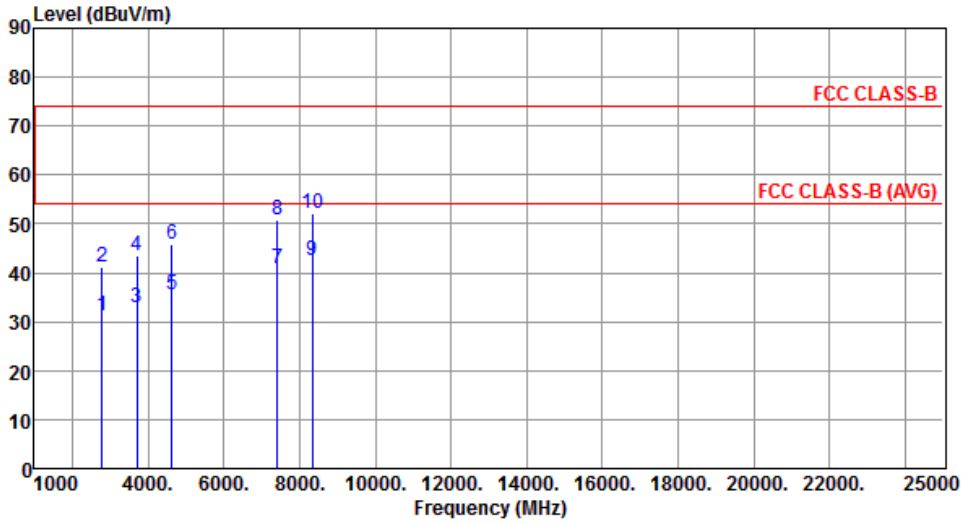
Modulation / SF	CSS / 12	Test Freq. (MHz)	927.5
Polarization	Horizontal		



	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	30.56	54.00	-23.44	32.34	-1.78	Average	215	183
2	2782.50	40.40	74.00	-33.60	42.18	-1.78	Peak	215	183
3	3710.00	33.10	54.00	-20.90	32.69	0.41	Average	142	230
4	3710.00	42.89	74.00	-31.11	42.48	0.41	Peak	142	230
5	4637.50	35.61	54.00	-18.39	32.32	3.29	Average	193	206
6	4637.50	45.64	74.00	-28.36	42.35	3.29	Peak	193	206
7	7420.00	40.75	54.00	-13.25	32.26	8.49	Average	328	114
8	7420.00	50.56	74.00	-23.44	42.07	8.49	Peak	328	114
9	8347.50	41.99	54.00	-12.01	32.48	9.51	Average	113	164
10	8347.50	51.88	74.00	-22.12	42.37	9.51	Peak	113	164

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 / SF	CSS / 12	Test Freq. (MHz)	927.5
Polarization	Vertical		



	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	31.18	54.00	-22.82	32.96	-1.78	Average	251	23
2	2782.50	41.06	74.00	-32.94	42.84	-1.78	Peak	251	23
3	3710.00	32.78	54.00	-21.22	32.37	0.41	Average	168	283
4	3710.00	43.35	74.00	-30.65	42.94	0.41	Peak	168	283
5	4637.50	35.55	54.00	-18.45	32.26	3.29	Average	207	94
6	4637.50	45.73	74.00	-28.27	42.44	3.29	Peak	207	94
7	7420.00	40.99	54.00	-13.01	32.50	8.49	Average	175	204
8	7420.00	50.71	74.00	-23.29	42.22	8.49	Peak	175	204
9	8347.50	42.56	54.00	-11.44	33.05	9.51	Average	130	63
10	8347.50	52.07	74.00	-21.93	42.56	9.51	Peak	130	63

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 30 dB relative to the maximum in-band peak PSD level in 100 kHz

3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Reference level measurement

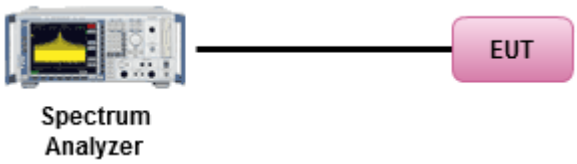
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

Emission level measurement

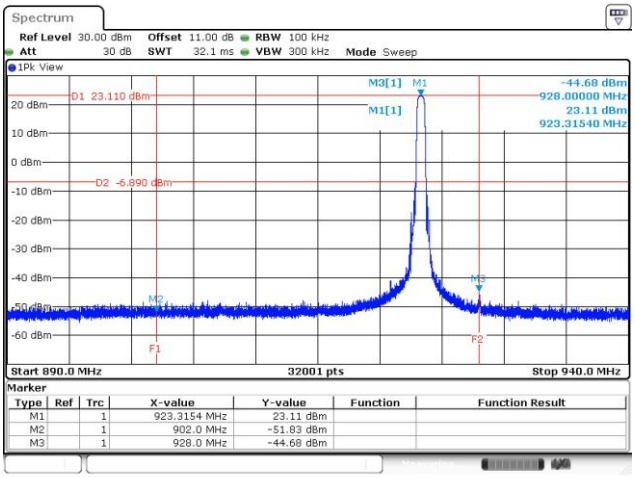
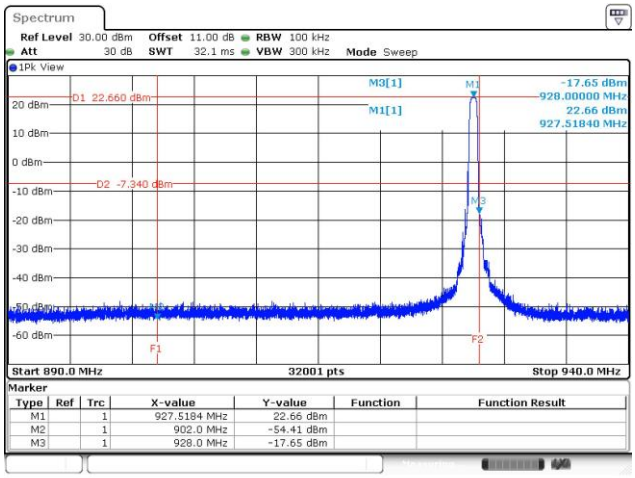
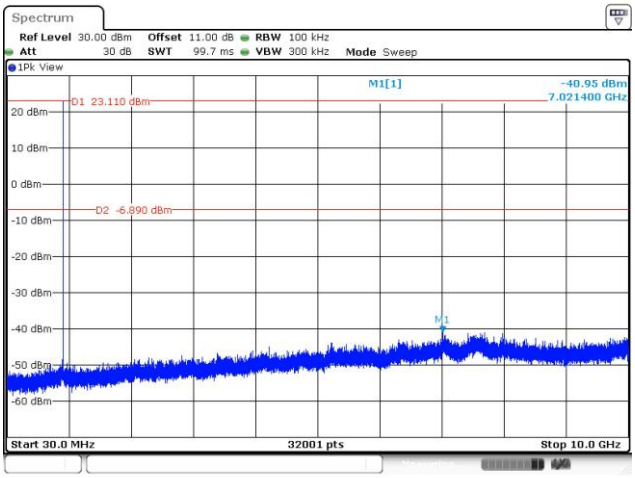
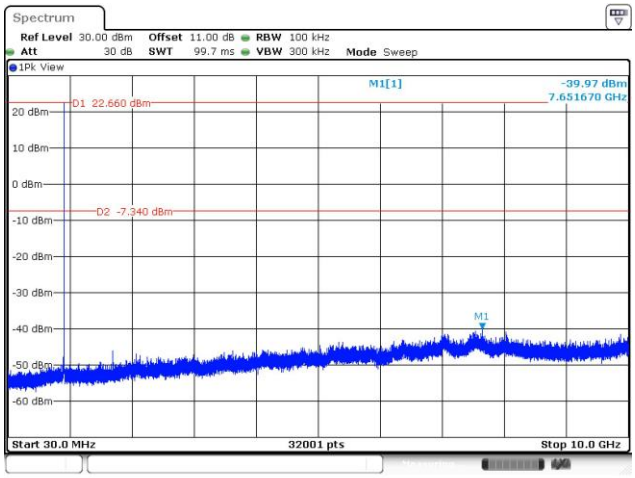
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 10GHz
4. Use the peak marker function to determine the maximum amplitude level

3.6.4 Test Setup

Transmitter Radiated Bandedge Emissions



3.6.5 Unwanted Emissions into Non-Restricted Frequency Bands

TX Freq 923.3MHz / 30MHz~10GHz (down 30dBc)	TX Freq 927.5MHz / 30MHz~10GHz (down 30dBc)
	
	

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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