

FCC C2PC Test Report

FCC ID : MXF-WMDS183

Equipment : LoRa RF Board

Model No. : WMDS-183

Brand Name : Gemtek

Applicant : Gemtek Technology Co., Ltd.

Address : No.15-1 Zhoughua Rd, Hsinchu Industrial

Park, Hukou, Hsinchu, Taiwan, R.O.C

Standard : 47 CFR FCC Part 15.247

Received Date : Oct. 24, 2018

Tested Date : Oct. 26 ~ Oct. 30, 2018

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
FR782401-06	Rev. 01	Initial issue	Nov. 14, 2018

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Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.300MHz 41.67 (Margin -8.57dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 110.14MHz 38.65 (Margin -4.85dB) - PK	Pass

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1 General Description

1.1 Information

This report is prepared for FCC class II change.

This report is issued as a supplementary report to original ICC report no. FR782401. The difference is concerned with following items:

- ♦ Adding 2nd baseband IC, Model name: SX1308 (pin for pin compatible)
- ♦ Adding components on exist path to switch transmission path

In this report, conducted emission and radiated emission tests had been re-tested and only its data was presented in the following sections.

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]	980 ~ 21900	12 ~ 7	500		

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.

Note 2: The device uses CSS modulation.

1.1.2.1 Antenna of Host

Ant. No.	Brand	Part Number	Туре	Connector	Gain (dBi)
1	GSC-TECH	OMA-G04A	Dipole	N-Type	3
2	GSC-TECH	OMA-G03A	Dipole	N-Type	5
3	GSC-TECH	OMA-G01	Dipole	N-Type	8
4	Auden	A40816-90	Dipole	N-Type	3
5	Lynwave	OOX17X-021030-00	Dipole	N-Type	3
6	Lynwave	OOX17X-021050-00	Dipole	N-Type	5
7	Lynwave	OOX17X-021080-00	Dipole	N-Type	8

Note: The Ant. 3 with highest gain was selected for final testing

1.1.2.2 Power Supply Type of Host

Davier Complex Torne	
Power Supply Type	5Vdc from host

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1.1.2.3 Accessories of Host

N/A

1.1.2 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

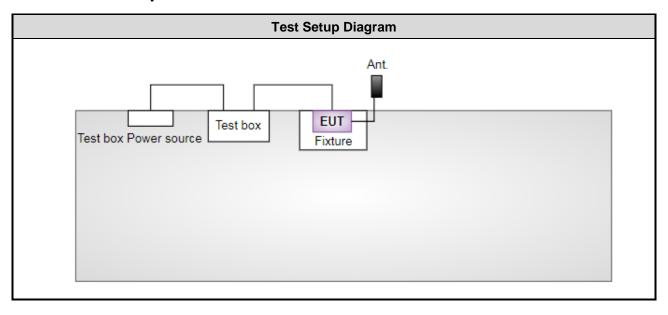
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1.2 Local Support Equipment List

	Support Equipment List							
No.	Equipment	Remarks						
1	Test box	machineQ	HXQX1AM0S		Provided by applicant.			
2	Test box Power source	PHIHONG	PSAC24A-120L 6		Provided by applicant.			
3	Fixture							

1.3 Test Setup Chart



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1.4 The Equipment List

Test Item	Conducted Emission	Conducted Emission					
Test Site	Conduction room 1 / (Conduction room 1 / (CO01-WS)					
Tested Date	Oct. 30, 2018	Oct. 30, 2018					
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until		
Receiver	R&S	ESR3	101657	Jan. 05, 2018	Jan. 04, 2019		
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 13, 2017	Nov. 12, 2018		
RF Cable-CON	EMC	EMCCFD300-BM-B M-6000	50821	Dec. 18, 2017	Dec. 17, 2018		
Measurement Software AUDIX e3 6.120210k NA NA							
Note: Calibration Interval of instruments listed above is one year.							

Test Item	Radiated Emission	Radiated Emission						
Test Site	966 chamber1 / (03CH01-WS)							
Tested Date	Oct. 26, 2018	Oct. 26, 2018						
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until			
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2017	Dec. 03, 2018			
Receiver	R&S	ESR3	101658	Nov. 20, 2017	Nov. 19, 2018			
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 18, 2018	Jul. 17, 2019			
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 20, 2017	Dec. 19, 2018			
Preamplifier	EMC	EMC02325	980225	Jul. 20, 2018	Jul. 19, 2019			
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019			
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019			
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	May 09, 2018	May 08, 2019			
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 07, 2017	Dec. 06, 2018			
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 07, 2017	Dec. 06, 2018			
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	16052	Dec. 07, 2017	Dec. 06, 2018			
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 07, 2017	Dec. 06, 2018			
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 07, 2017	Dec. 06, 2018			
Measurement Software	AUDIX	e3	6.120210g	NA	NA			
Note: Calibration Inter	rval of instruments liste	d above is one year.						

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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 15.247 Meas Guidance v05

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			

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2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	24°C / 57%	Alex Tsai
Radiated Emissions	03CH01-WS	26°C / 60%	Akun Chung

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	Test Configuration
Conducted Emissions	923.3 / 927.5	500	CSS / 12	
Radiated Emissions	923.3 / 927.5	500	CSS / 12	

NOTE:

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^{1.} The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report. .



3 Transmitter Test Results

3.1 Conducted Emissions

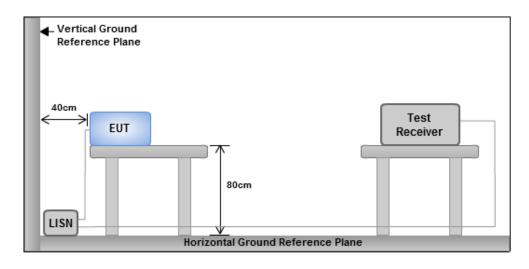
3.1.1 Limit of Conducted Emissions

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 logarith	m 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



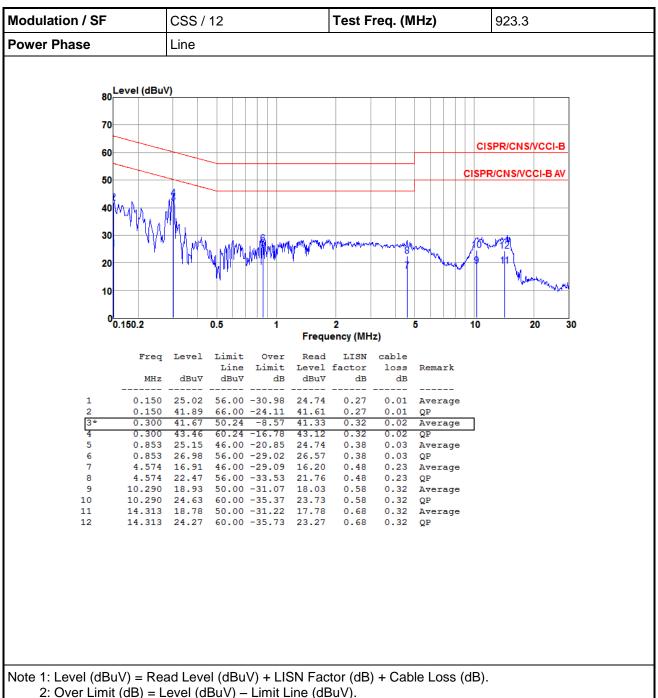
Note: 1. Support units were connected to second LISN.

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

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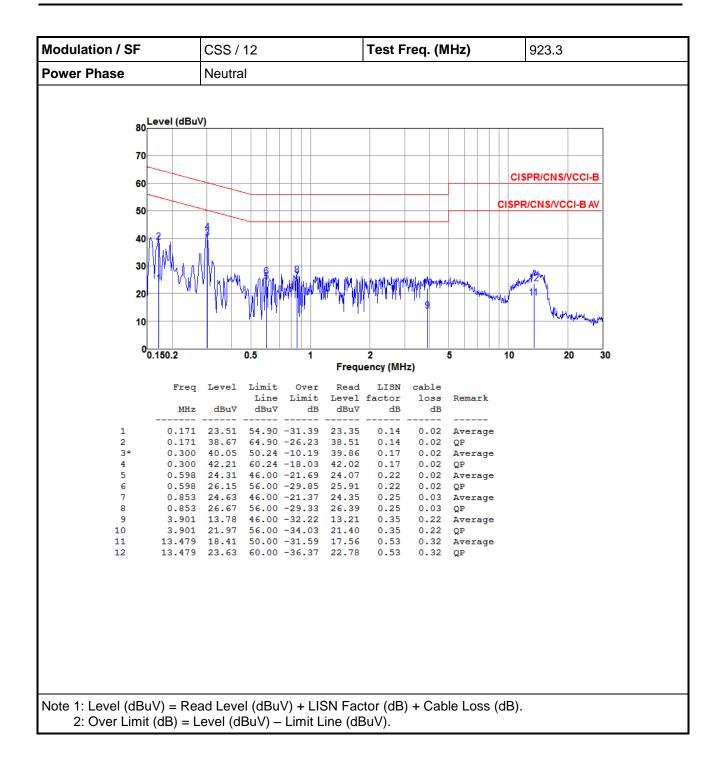
Test Result of Conducted Emissions 3.1.4



2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

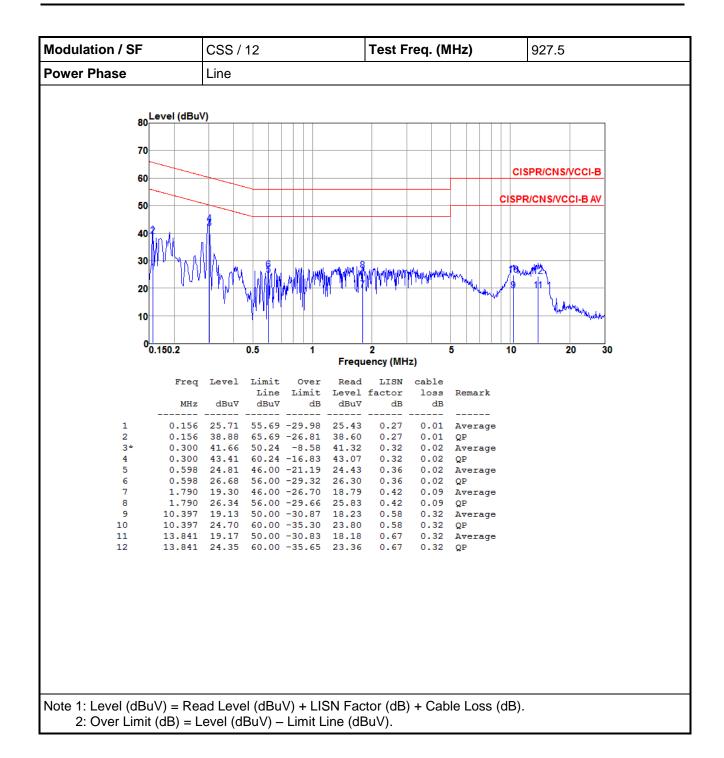
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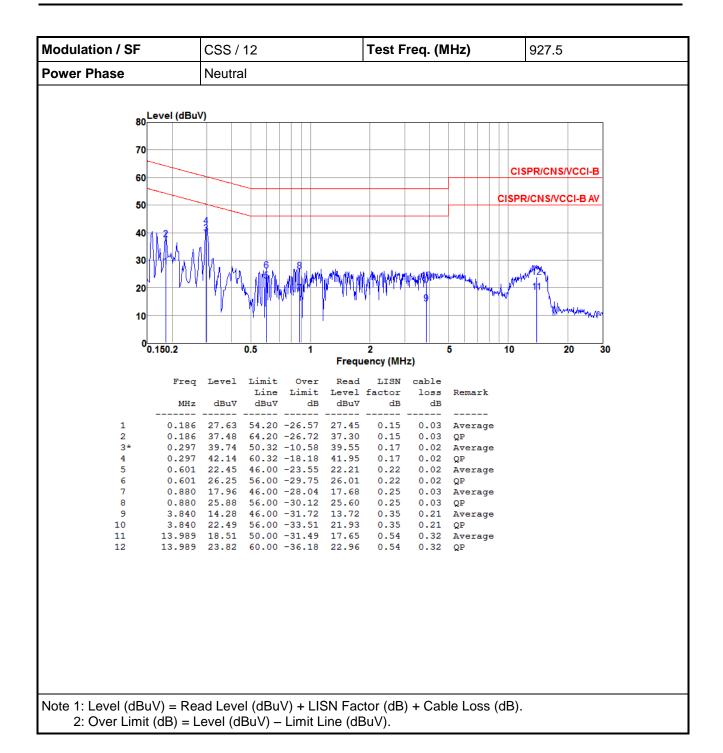
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3.2 Unwanted Emissions into Restricted Frequency Bands

3.2.1 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.

3.2.2 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.

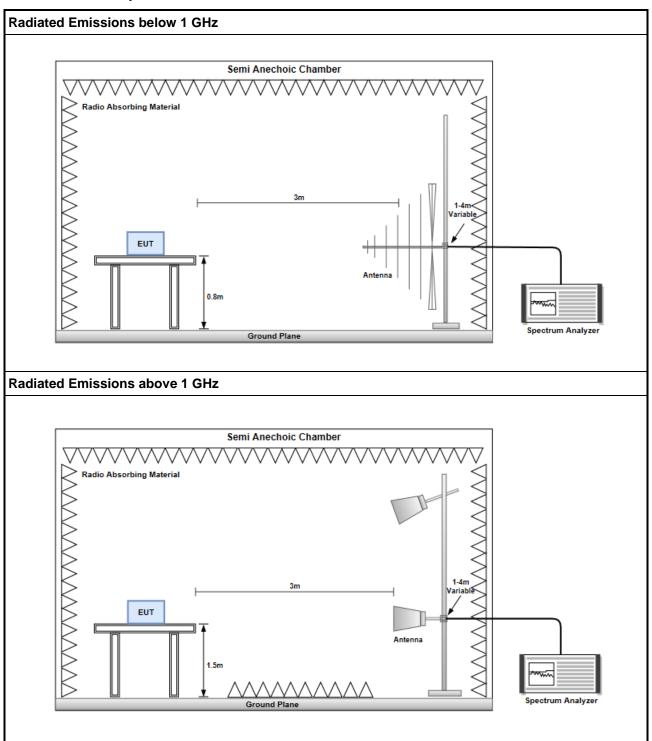
Note:

- 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.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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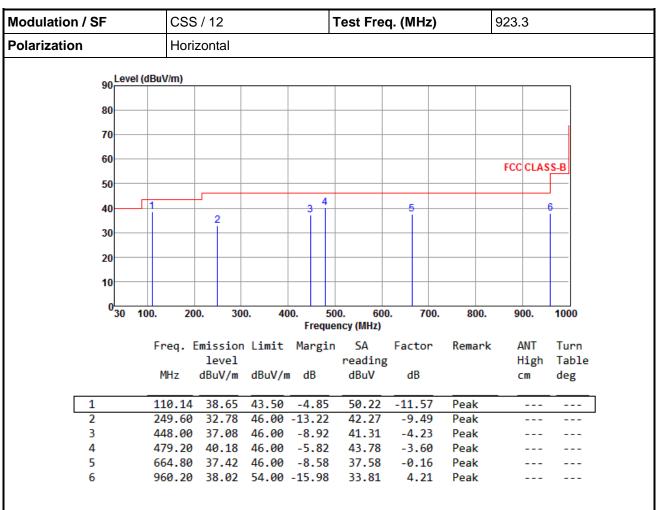
3.2.3 Test Setup



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3.2.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



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.

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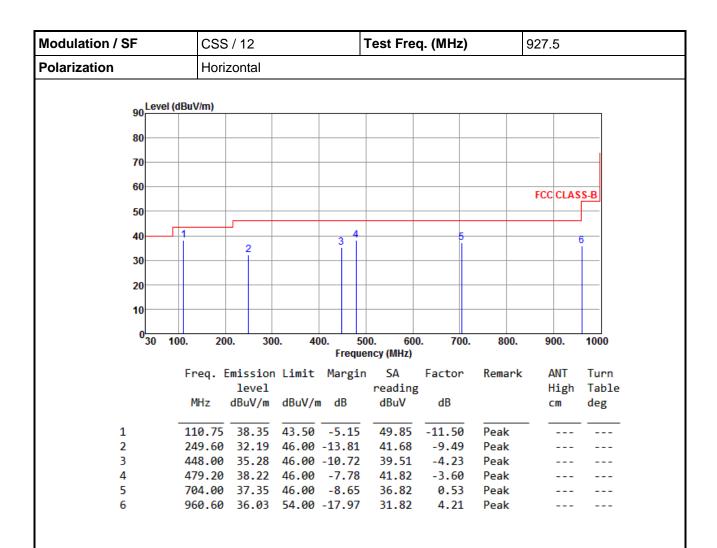
Modulation / SF	CSS / 12			Test Freq. (MHz)			923.3		
Polarization	Vertical			1					
90 Leve	el (dBuV/m)								
80									
70									
60								500 01 4	22.5
50								FCC CLA	32-B
40		-3		5					6
30		23	4	Ĭ					
20									
10									
030	100. 200	. 30	0. 4		00. 600 ency (MHz)	0. 700.	800.	900.	1000
	Freq. E	mission	Limit			Factor	Remark	ANT	Turn
		level		_	reading	•		High	
	MHz	dBuV/m	dBuV/ı	n dB	dBuV	dB		cm	deg
1	68.25	35.12	40.00	-4.88	45.57	-10.45	QP	108	200
2	230.40	33.39	46.00	-12.61	43.78	-10.39	Peak		
3				-11.16	44.47	-9.63	Peak		
4	352.00			-12.23	40.38	-6.61	Peak		
5 6	479.20 960.30				38.93 36.65	-3.60 4.21	Peak Peak		

*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.

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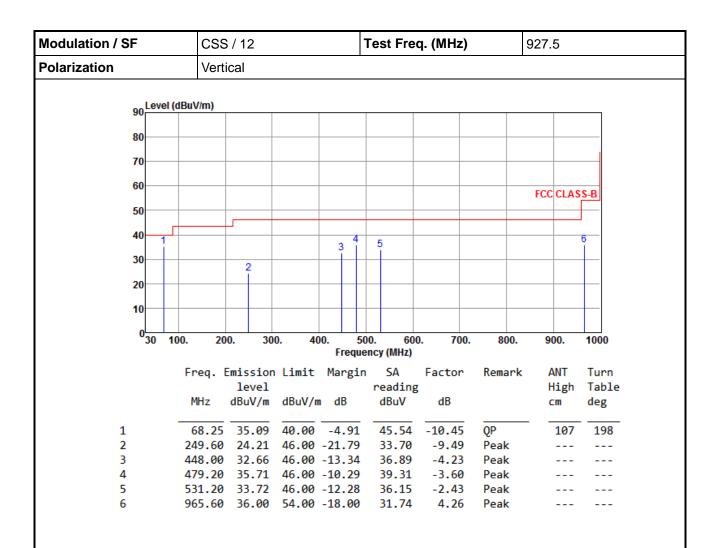
*Factor includes antenna factor, cable loss and amplifier gain

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.

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*Factor includes antenna factor, cable loss and amplifier gain

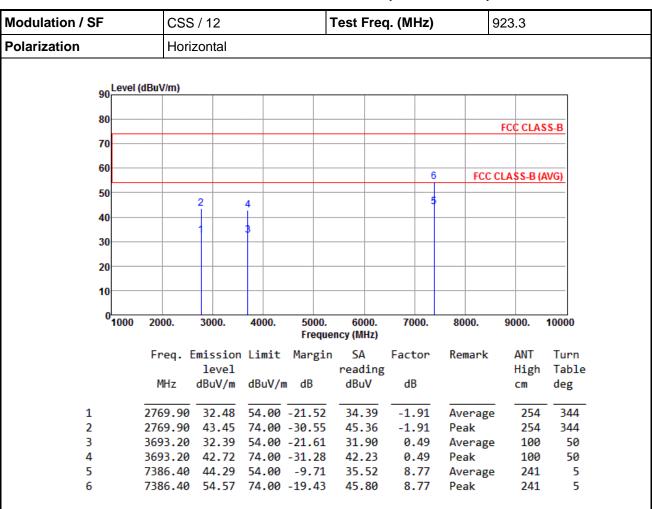
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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3.2.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)



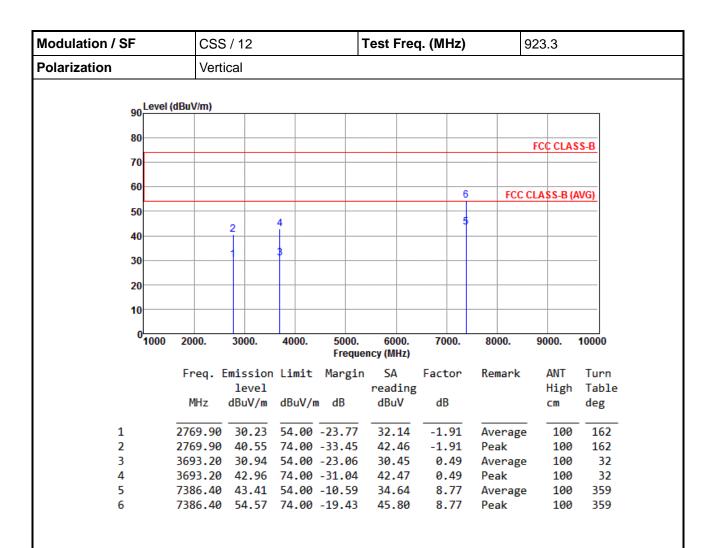
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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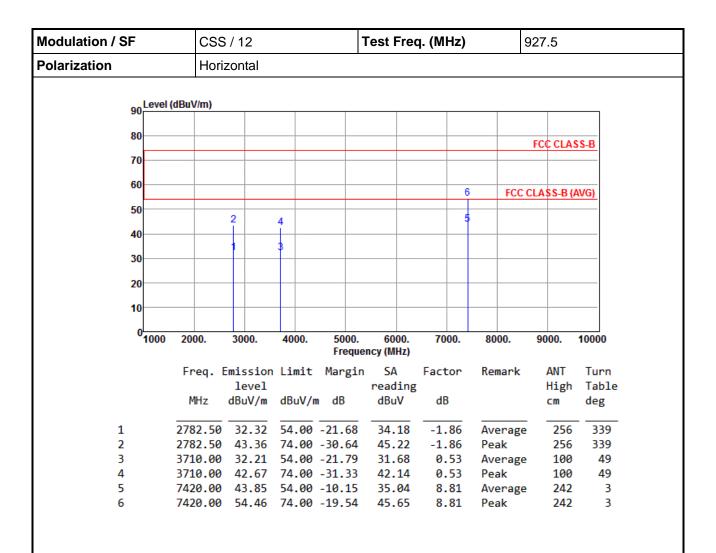


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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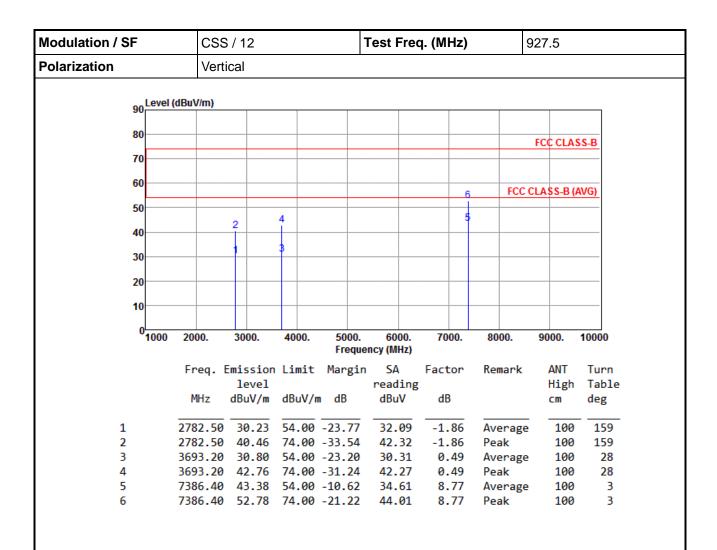


*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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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

Tel: 886-2-2601-1640 No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City,

Taiwan, R.O.C.

Kwei Shan

Tel: 886-3-271-8666 No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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

==END==

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