FCC Part 15.247

TEST REPORT

For

Avalue Technology Inc.

7F, 228, Lian-cheng Road, Zhonghe Dist., New Taipei City 235, Taiwan

FCC ID: XBG-EBC05M1

Report Type Original Report	**Product Type:** 5.65" E-ink Bedside Card
Report Producer :	**Himiko Chen**
Report Number :	**RLK1808008-00B**
Report Date :	**2018/10/07**
Reviewed By:	**Jerry Chang**
Prepared By: **Bay Area Compliance Laboratories Corp.(Taiwan)** **70, Lane 169, Sec. 2, Datong Road, Xizhi Dist.,** **New Taipei City 22183, Taiwan, R.O.C.** **Tel: +886 (2)2647 6898 Fax: +886 (2) 2647 6895** **www.bacl.com.tw**	

***Note**: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Taiwan)*

Revision History

Revision	Report Number	Issue Date	Description	Author/Revised by
1.0	RLK1808008-00B	2018/10/07	Original Report	Himiko Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	**Avalue Technology Inc.** 7F, 228, Lian-cheng Road, Zhonghe Dist., New Taipei City 235, Taiwan
Manufacturer	**Avalue Technology Inc.** 7F, 228, Lian-cheng Road, Zhonghe Dist., New Taipei City 235, Taiwan
Brand(Trade) Name	avalue Technology Inc.
Product (Equipment)	**5.65" E-ink Bedside Card**
Model Name	**EBC-05M1**
Frequency Range	903 MHz ~ 927 MHz
Number of Channels	9 channels
Output Power	7.89 dBm (0.0062W)
Received Date	Aug. 29, 2018.
Date of Test	Sep 21, 2018 ~ Sep 25, 2018
Modulation Type	GFSK
Related Submittal(s)/Grant(s)	FCC Part 15.247 DTS with FCC ID: 2AFXU-MA903A1

**All measurement and test data in this report was gathered from production sample serial number: 1810003 (Assigned by BACL, Taiwan).*

1.2 Operation Condition of EUT

Power Operation (Voltage Range)	☐ AC 120V/60Hz ☐ Adapter ☐ By Power Core
	☒ DC Type ☐ DC Power Supply ☒ Battery 3Vdc (4*AAAA. Two Battery were in series, then parallel) ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System

1.3 Objective and Test Methodology

The Objective of this Test Report was to document the compliance of the Avalue Technology Inc. Appliance (Model: EBC-05M1) to the requirements of the following Standards:

-Part 2, Subpart J, Part 15, Subparts A and C, section 15.247 of the Federal Communication Commission's rules.

- ANSI C63.10-2013 of t American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.4 Measurement Uncertainty

Parameter	Expanded Measurement uncertainty
RF output power with Power Meter	± 0.55 dB
Occupied Channel Bandwidth	± 4.45 %
RF Conducted test with Spectrum	± 1.45 dB
AC Power Line Conducted Emission	± 4.64 dB
Radiated Below 1G	± 5.83 dB
Radiated Above 1G-18G	± 5.35 dB
Radiated Above 18G-40G	± 4.49 dB

1.5 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Taiwan) to collect test data is located on

☒ 70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

☒ 68-3, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database. The FCC Registration No.: 974454. Designation No.: TW3180

2 System Test Configuration

2.1 Test Channels and Description of Worst Test Configuration

The system was configured for testing in testing mode which was provided by manufacturer.

No special accessory, No modification was made to the EUT and No special equipment used during test.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	**903**	6	921
2	906	7	924
3	909	**8**	**927**
4	915	9	923
5	**918**	-	-

Channel **1**, **5** and **8** were tested.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power and PSD across all date rates bandwidths, and modulations.

Radiated below 1G were tested worst output power mode.

Worst Case of Power Setting				
EUT Exercise Software		Command		
Configuration	**NTX**	**Low CH**	**Mid CH**	**High CH**
903 MHz ~ 927 MHz	1	10	10	10

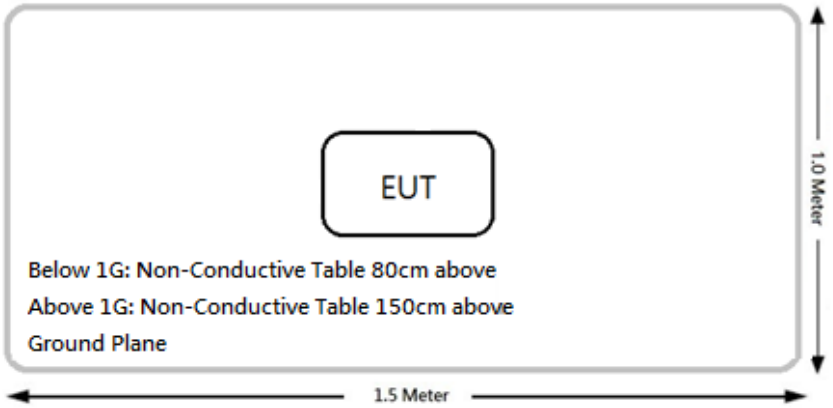
2.2 Support Equipment List and External Cable List

No.	Description	Manufacturer	Model Number	BSMI	FCC ID / DoC
A	Notebook PC	DELL	PP27LA	R33002	DoC

No.	Cable Description	Length (m)	From	To
1	N/A	N/A	N/A	N/A

2.3 Block Diagram of Test Setup

Radiation

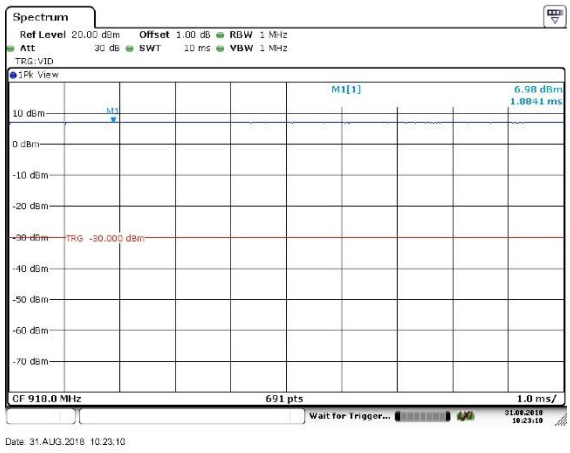


2.4 Duty Cycle

According to KDB 558074 D01 15.247 Meas Guidance v05,:

All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximum power transmission duration, T, are required for each tested mode of operation.

Configuration	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Factor (dB)
903 – 927 MHz Band	1.8841	1.8841	100 %	0 dB

903 MHz ~ 927 MHz Band	
	

**Note: Duty Factor = 10*log (1/Duty cycle)*

3 Summary of Test Results

FCC Rules	Description of Test	Result
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Not Appliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

* Not Appliance: EUT power by 4 x AAAA battery(3Vdc).

4 FCC§15.247(i), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

4.1 Applicable Standard

According to subpart 15.247(i)and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

*f = frequency in MHz; * = Plane-wave equivalent power density;*

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary: Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm2);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

4.2 RF Exposure Evaluation Result

MPE evaluation:

Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
	(dBi)	(numeric)	(dBm)	(mW)			
903-927	0.3	1.072	8.00	6.3096	20	0.0013	0.618

Result: MPE evaluation meet 20 cm the requirement of standard.

5 FCC §15.203 - Antenna Requirements

5.1 Applicable Standard

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi

5.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Antenna Gain	Result
Resilient Technology Co., Ltd.	AN13-000038	Internal Antenna	0.3 dBi	Compliance

The EUT has an internal antenna arrangement, which was permanently attached, fulfill the requirement of this section.

6 FCC §15.209, §15.205, §15.247(d) – Spurious Emissions

6.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	13.36-13.41	399.9-410	4.5-5.15
0.495-0.505	16.42-16.423	608-614	5.35-5.46
2.1735-2.1905	16.69475-16.69525	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6

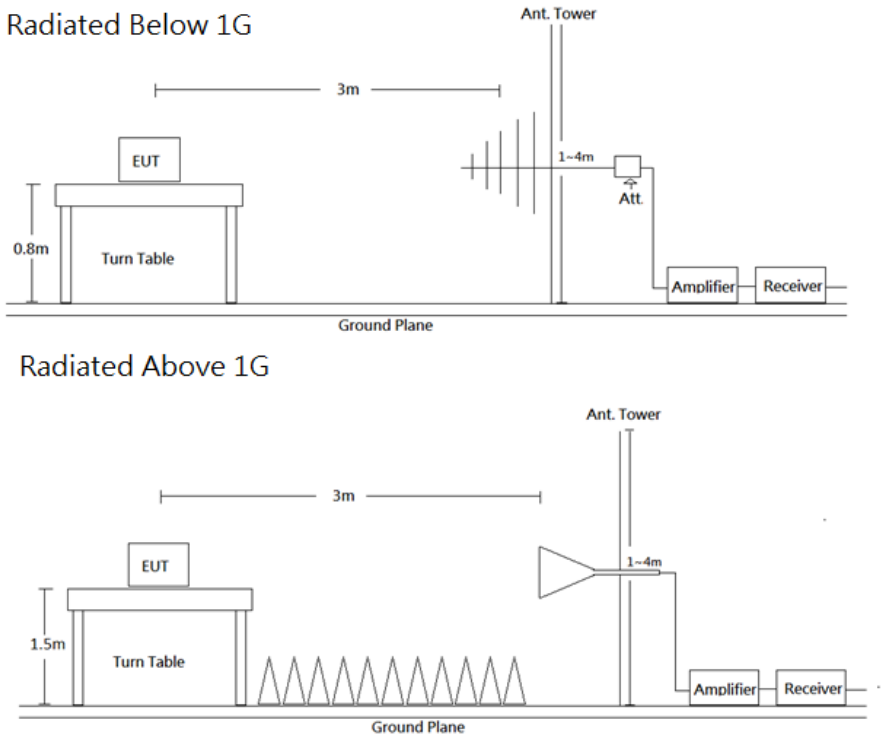
As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

6.2 EUT Setup and Test Procedure



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

The system was investigated from 30 MHz to 10 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Detector	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	QP	-	QP
Above 1 GHz	1 MHz	3 MHz	PK	-	PK
	1 MHz	3 MHz	RMS	>98%	Ave
	1 MHz	1/T	PK	<98%	Ave

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations. All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

6.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
966A Room					
Active Loop Antenna	ETS-Lindgren	6502	00035796	2018/03/13	2019/03/12
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2017/12/20	2018/12/19
Horn Antenna	EMCO	3115	9311-4158	2018/04/20	2019/04/19
Horn Antenna	ETS-Lindgren	3116	62638	2018/08/29	2019/08/28
Preamplifier	Sonoma	310N	130602	2018/07/04	2019/07/03
Preamplifier	EM Electronics Corp.	EM01G18G	060657	2017/12/14	2018/12/13
Microware Preamplifier	EM Electronics Corporation	EM18G40G	060656	2018/01/15	2019/01/14
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2017/11/06	2018/11/05
Spectrum Analyzer	Spectrum Analyzer	FSV40	101435	2018/02/12	2019/02/13
Micro flex Cable	UTIFLEX	FSCM 64639 / (2M)	93D0127	2018/07/31	2019/07/30
Micro flex Cable	UTIFLEX	UFA210A-1-3149-300300	MFR64639 226389-002	2017/11/10	2018/11/09
Micro flex Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2018/03/05	2019/03/04
Micro flex Cable	ROSNOL	K1K50-UP0264-K1K50-80CM	160309-2	2018/01/17	2019/01/16
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	60772	N.C.R	N.C.R
Software	AUDIX	e3	E3LK-01	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

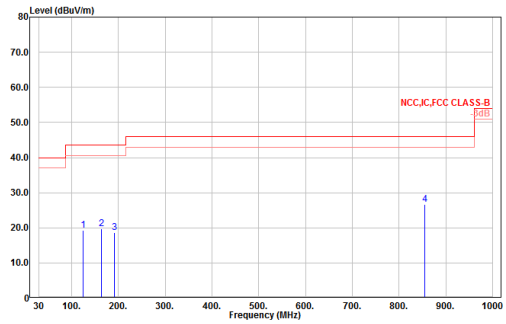
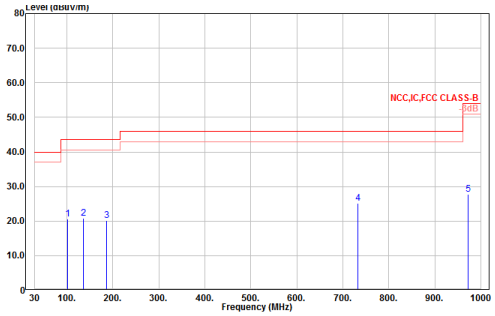
6.4 Test Environmental Conditions

Temperature:	23.3 ℃	**Relative Humidity:**	54.2 %
ATM Pressure:	1014hPa	**Test Engineer:**	Leo Chang
Conducted Test Date:	2018-09-21	**Radiated Test Date:**	2018-09-24

6.5 Radiated Emission Test Plot and Data

Transmitting mode (Pre-scan with three orthogonal axis, and worse case as Z axis)

Below 1G (30 MHz-1 GHz) test the output power worst mode: High Channel

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	124.090	19.29	43.50	-24.21	36.15	-16.86	Peak
2	163.860	19.72	43.50	-23.78	38.76	-19.04	Peak
3	191.020	18.70	43.50	-24.80	38.88	-20.18	Peak
4	855.470	26.67	46.00	-19.33	35.86	-9.19	Peak

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1	101.780	20.64	43.50	-22.86	40.84	-20.20	Peak
2	135.730	20.85	43.50	-22.65	38.20	-17.35	Peak
3	187.140	20.08	43.50	-23.42	40.41	-20.33	Peak
4	733.250	25.15	46.00	-20.85	35.92	-10.77	Peak
5	971.870	27.70	54.00	-26.30	35.66	-7.96	Peak

Result = Reading + Correct Factor

Margin = Result – Limit

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Band Edge

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
901.984	53.02	66.00	-12.98	61.95	-8.93	Peak
901.984	39.15	46.00	-6.85	48.08	-8.93	QP
902.840	105.07			113.99	-8.92	Peak
902.840	96.72			105.64	-8.92	QP

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
901.955	52.89	66.00	-13.11	61.82	-8.93	Peak
901.955	39.31	46.00	-6.69	48.24	-8.93	QP
903.215	104.48			113.39	-8.91	Peak
903.215	96.15			105.07	-8.92	QP

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
918.215	103.15			111.89	-8.74	Peak
918.215	95.01			103.76	-8.75	QP

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
917.841	103.00			111.75	-8.75	Peak
917.841	94.77			103.52	-8.75	QP

High CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
927.210	102.11			110.74	-8.63	Peak
927.210	96.86			105.49	-8.63	QP
928.000	50.67	66.00	-15.33	59.29	-8.62	Peak
928.000	39.49	46.00	-6.51	48.11	-8.62	QP

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
926.835	101.58			110.21	-8.63	Peak
926.835	96.26			104.89	-8.63	QP
928.000	51.51	66.00	-14.49	60.13	-8.62	Peak
928.000	39.29	46.00	-6.71	47.91	-8.62	QP

Above 1G (1 GHz-10 GHz)

Low CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1806.000	45.52	54.00	-8.48	55.23	-9.71	Average
1806.000	49.26	74.00	-24.74	58.97	-9.71	Peak
2709.000	40.25	54.00	-13.75	48.29	-8.04	Average
2709.000	47.59	74.00	-26.41	55.63	-8.04	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1806.000	47.94	54.00	-6.06	57.65	-9.71	Average
1806.000	51.62	74.00	-22.38	61.33	-9.71	Peak
2709.000	44.65	54.00	-9.35	52.69	-8.04	Average
2709.000	51.35	74.00	-22.65	59.39	-8.04	Peak

Middle CH

Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1836.000	42.37	54.00	-11.63	51.82	-9.45	Average
1836.000	47.05	74.00	-26.95	56.50	-9.45	Peak
2754.000	43.77	54.00	-10.23	51.65	-7.88	Average
2754.000	50.52	74.00	-23.48	58.40	-7.88	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1836.000	44.36	54.00	-9.64	53.87	-9.51	Average
1836.000	48.35	74.00	-25.65	57.86	-9.51	Peak
2754.000	47.75	54.00	-6.25	55.63	-7.88	Average
2754.000	53.94	74.00	-20.06	61.82	-7.88	Peak

High CH

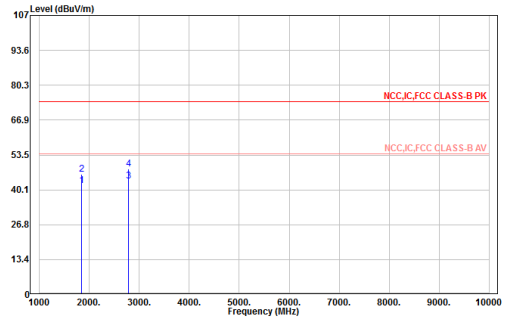
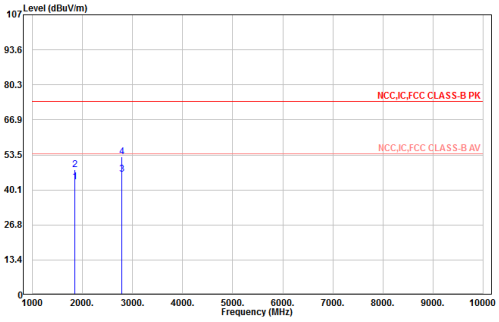
Horizontal

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1854.000	41.89	54.00	-12.11	51.19	-9.30	Average
1854.000	46.20	74.00	-27.80	55.50	-9.30	Peak
2781.000	43.51	54.00	-10.49	51.31	-7.80	Average
2781.000	48.03	74.00	-25.97	55.83	-7.80	Peak

Vertical

Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark
MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	
1854.000	43.34	54.00	-10.66	52.64	-9.30	Average
1854.000	47.74	74.00	-26.26	57.04	-9.30	Peak
2781.000	46.05	54.00	-7.95	53.85	-7.80	Average
2781.000	52.77	74.00	-21.23	60.57	-7.80	Peak

Above 1G (1 GHz-10 GHz): test the output power worst mode: High Channel

Horizontal	Vertical
	

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
1	1854.000	41.89	54.00	-12.11	51.19	-9.30	Average	Horizontal
2	1854.000	46.20	74.00	-27.80	55.50	-9.30	Peak	Horizontal
3	2781.000	43.51	54.00	-10.49	51.31	-7.80	Average	Horizontal
4	2781.000	48.03	74.00	-25.97	55.83	-7.80	Peak	Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		
1	1854.000	43.34	54.00	-10.66	52.64	-9.30	Average	Vertical
2	1854.000	47.74	74.00	-26.26	57.04	-9.30	Peak	Vertical
3	2781.000	46.05	54.00	-7.95	53.85	-7.80	Average	Vertical
4	2781.000	52.77	74.00	-21.23	60.57	-7.80	Peak	Vertical

Result = Reading + Correct Factor

Margin = Result – Limit

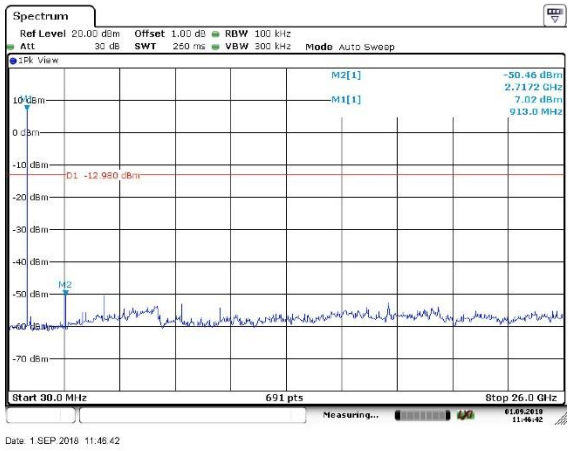
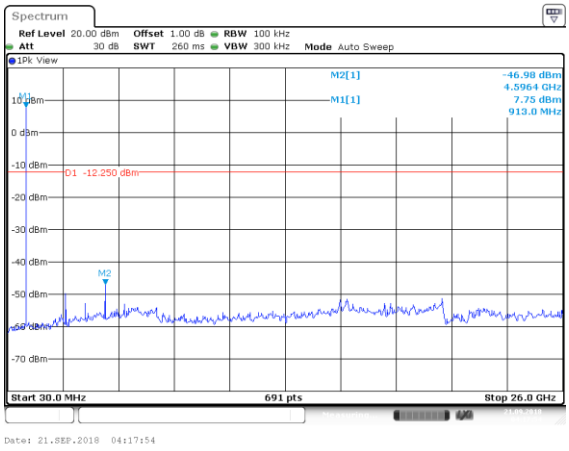
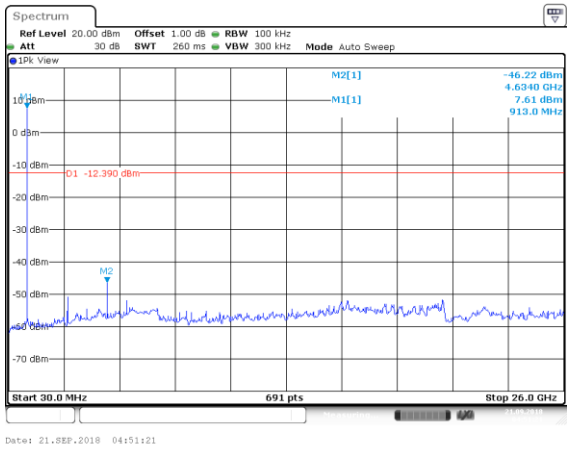
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

Spurious emissions more than 20 dB below the limit were not reported

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
Low	903	57.48	≥ 20	Compliance
Mid	918	54.73	≥ 20	Compliance
High	927	53.83	≥ 20	Compliance

903 MHz ~ 927 MHz

Low CH	Middle CH
	
High CH	
	

7 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

7.1 Applicable Standard

According to FCC §15.247(a) (2),

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 Test Procedure

According to ANSI C63.10-2013, the steps for the first option are as follows:
(1) Set RBW = 100 kHz. (2) Set the VBW ≥ [3 × RBW]. (3) Detector = peak. (4) Trace mode = max hold.
(5) Sweep = auto couple. (6) Allow the trace to stabilize. (7) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

7.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

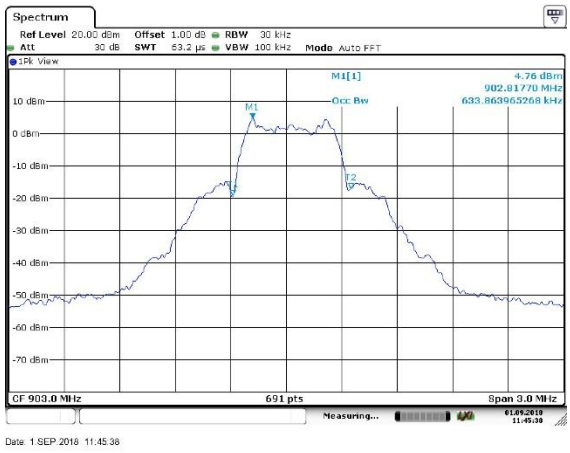
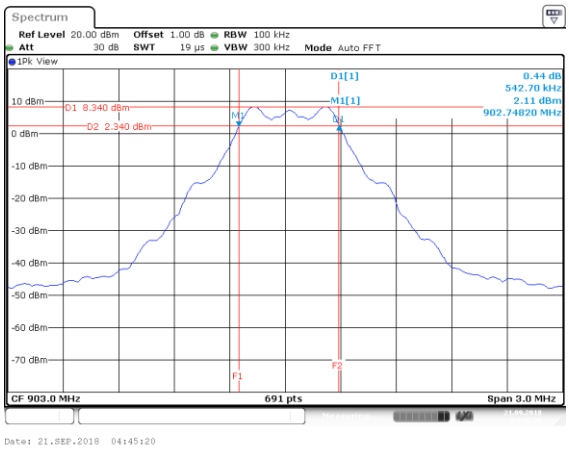
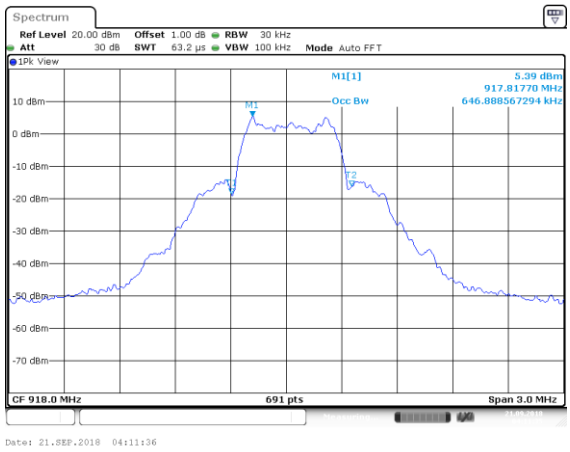
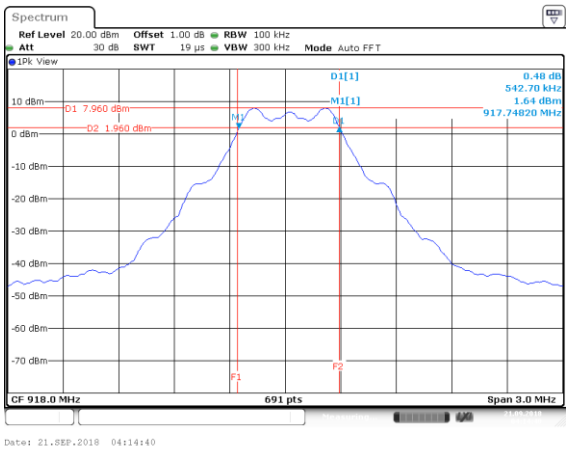
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

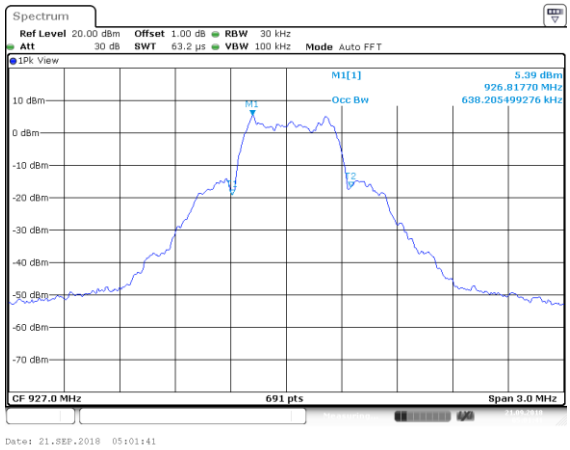
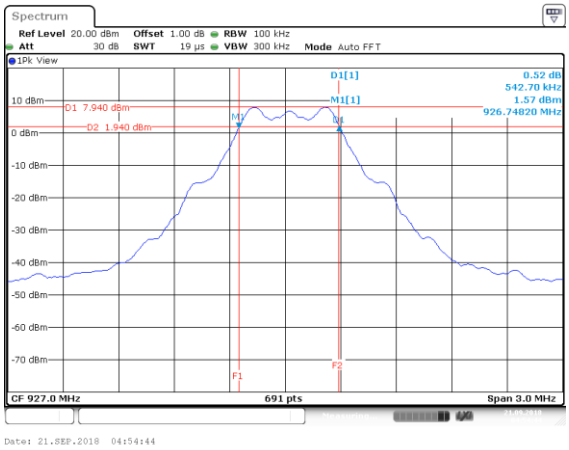
7.4 Test Environmental Conditions

Temperature:	23.5 ℃	**Relative Humidity:**	55.4 %
ATM Pressure:	1015hPa	**Test Engineer:**	Leo Chang
Conducted Test Date:	2018-09-21	-	-

7.5 Test Results

Channel	Frequency (MHz)	99% OBW (MHz)	6 dB BW (MHz)	6dB Limit (MHz)	Result
Low	903	0.634	0.543	> 0.5	Compliance
Middle	918	0.647	0.543	> 0.5	Compliance
High	927	0.638	0.543	> 0.5	Compliance

99% OBW	6 dB BW
Low CH	**Low CH**
	
Middle CH	**Middle CH**
	

99% OBW	6 dB BW
High CH	High CH
	

8 FCC §15.247(b) (3) – Maximum Output Power

8.1 Applicable Standard

According to FCC §15.247(b) (3),

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

8.2 Test Procedure

(1) Place the EUT on a bench and set it in transmitting mode.

(2) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment. (3). Add a correction factor to the display.

8.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

8.4 Test Environmental Conditions

Temperature:	23.5 ℃	**Relative Humidity:**	55.4 %
ATM Pressure:	1015hPa	**Test Engineer:**	Leo Chang
Conducted Test Date:	2018-09-21	-	-

8.5 Test Results

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (W)	Limit (dBm)	Result
Low	903	7.71	0.0059	30	Compliance
Middle	918	7.46	0.0056	30	Compliance
High	927	7.89	0.0062	30	Compliance

9 FCC §15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

9.1 Applicable Standard

According to FCC §15.247(d),

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

9.2 Test Procedure

(1) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
(2) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
(3) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
(4) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

9.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

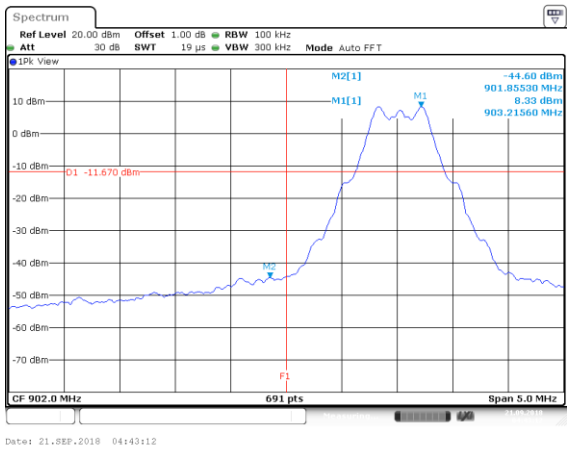
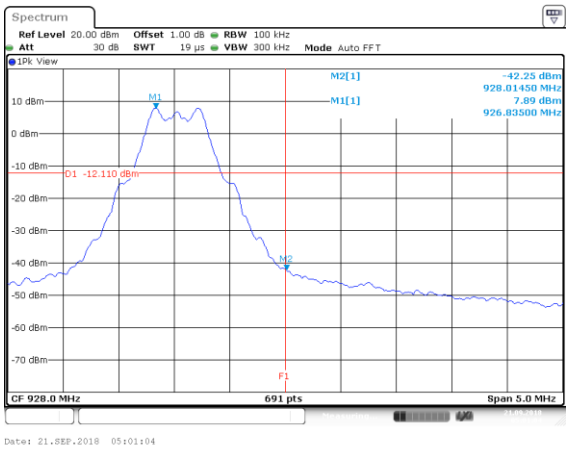
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

9.4 Test Environmental Conditions

Temperature:	23.5 ℃	**Relative Humidity:**	55.4 %
ATM Pressure:	1015hPa	**Test Engineer:**	Leo Chang
Conducted Test Date:	2018-09-21	-	-

9.5 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
Low	903	52.93	≥ 20	Compliance
High	927	50.14	≥ 20	Compliance

Low CH	High CH
	

10 FCC §15.247(e) – Power Spectral Density

10.1 Applicable Standard

According to FCC §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

10.2 Test Procedure

According to ANSI C63.10-2013,

(1) Set analyzer center frequency to DTS channel center frequency.

(2) Set the span to 1.5 times the DTS bandwidth. (3) Set the RBW to 3 kHz $\leq$ RBW $\leq$ 100 kHz.

(4) Set the VBW $\geq$ [3 $\times$ RBW]. (5) Detector = peak. (6) Sweep time = auto couple.

(7) Trace mode = max hold. (8) Allow trace to fully stabilize.

(9) Use the peak marker function to determine the maximum amplitude level within the RBW.

(10) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat.

10.3 Test Equipment List and Details

Description	Manufacture	Model	Serial No.	Cal. Date.	Cal. Due.
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2017/11/15	2018/11/14
Cable	WOKEN	SFL402	S02-160323-07	2018/02/12	2019/02/11

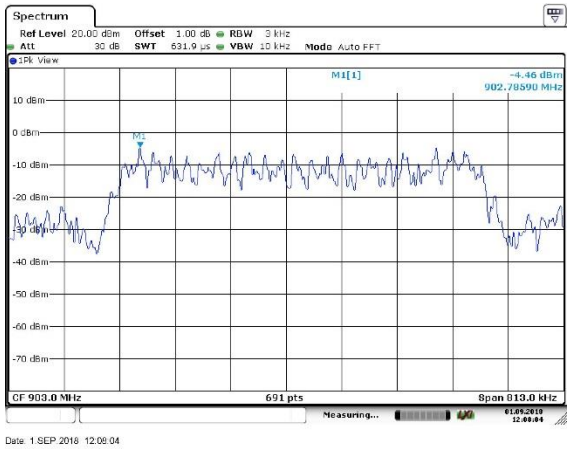
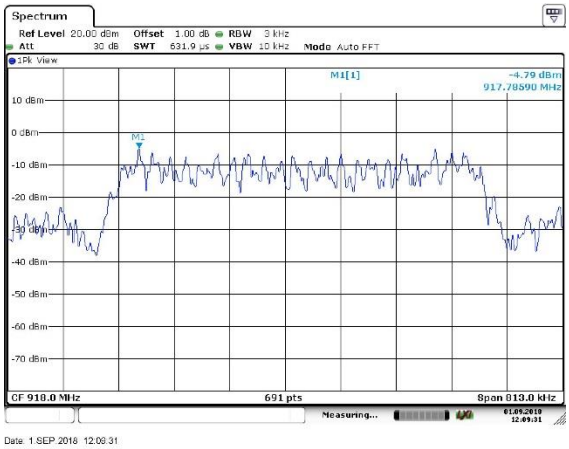
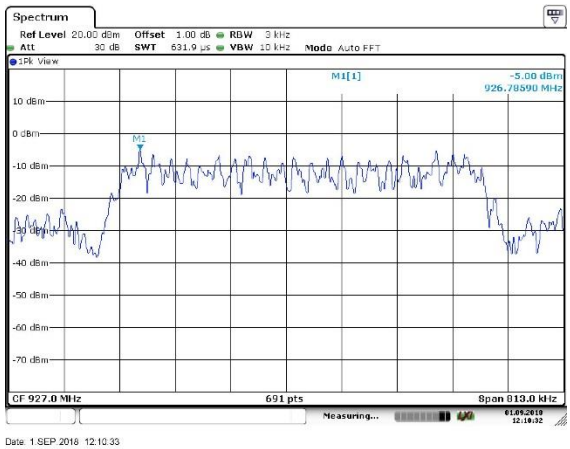
***Statement of Traceability:** The testing equipment's listed above have finished the calibration by Electronics Testing Center, Taiwan (ETC) or other laboratories which were accredited by TAF or equivalent organizations. The calibration result could be traceable to the International System of Units (SI).*

10.4 Test Environmental Conditions

Temperature:	23.5 ℃	**Relative Humidity:**	55.4 %
ATM Pressure:	1015hPa	**Test Engineer:**	Leo Chang
Conducted Test Date:	2018-09-21	-	-

10.5 Test Results

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
Low	903	-4.46	8	Compliance
Middle	918	-4.79	8	Compliance
High	927	-5.00	8	Compliance

Low CH	High CH
	
High CH	**-**
	-

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