FCC Test Report (Part 90S)

Report No.:	RFBEOO-WTW-P22041058-1
FCC ID:	MADG060708-50-02B
Test Model:	G060708-50-02B
Received Date:	2022/4/29
Test Date:	2022/6/19 ~ 2022/6/22
Issued Date:	2022/7/15
Applicant:	Microelectronics Technology Inc.
Address:	No. 1, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RFBEOO-WTW-P22041058-1	Original release	2022/7/15

1 Certificate of Conformity

Product:	Triple Low Band RU
Brand:	MTI (Microelectronics Technology Inc.)
Test Model:	G060708-50-02B
Sample Status:	Engineering sample
Applicant:	Microelectronics Technology Inc.
Test Date:	2022/6/19 ~ 2022/6/22
Standards:	FCC Part 90, Subpart S

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** 2022/7/15

Claire Kuan / Specialist

Approved by : _____ , **Date:** 2022/7/15

May Chen / Manager

2 Summary of Test Results

Applied Standard: FCC Part 90S & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 90.635 (a)	Effective radiated power	PASS	Meet the requirement of limit.
2.1047	Modulation characteristics	PASS	Meet the requirement
2.1055 90.213	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 90.209	Occupied Bandwidth	PASS	Meet the requirement of limit.
2.1051 90.691	Emission Mask	PASS	Meet the requirement of limit.
2.1051 90.691	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 90.691	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -49.13dB at 2163.75MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Test Site and Instruments

For radiated spurious emissions test:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXE EMI Receiver(20 Hz to 44 GHz) Keysight	N9038A	MY54450088	2021/7/6	2022/7/5
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Pre_Amplifier Agilent	8447D	2944A10636	2022/3/19	2023/3/18
LOOP ANTENNA Electro-Metrics	EM-6879	264	2022/3/18	2023/3/17
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2022/1/6	2023/1/5
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2022/1/6	2023/1/5
Pre_Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	2021/10/19	2022/10/18
Trilog Broadband Antenna Schwarzbeck	VULB 9168	9168-361	2021/10/26	2022/10/25
RF Coaxial Cable COMMATE/PEWC	8D	966-4-1	2022/3/8	2023/3/7
RF Coaxial Cable COMMATE/PEWC	8D	966-3-2	2022/2/26	2023/2/25
RF Coaxial Cable COMMATE/PEWC	8D	966-3-3	2022/2/26	2023/2/25
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2021/9/23	2022/9/22
Horn Antenna Schwarzbeck	BBHA9120-D	9120D-406	2021/11/14	2022/11/13
Pre_Amplifier EMCI	EMC12630SE	980384	2022/1/10	2023/1/9
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180504	2022/4/25	2023/4/24
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180601	2022/6/6	2023/6/5
RF Cable EMCI	EMC104-SM-SM-6000	210201	2022/5/10	2023/5/9
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	NA	NA
Spectrum Analyzer Keysight	N9030A	MY54490679	2021/7/9	2022/7/8
Pre_Amplifier EMCI	EMC184045SE	980387	2022/1/10	2023/1/9
Horn Antenna Schwarzbeck	BBHA 9170	9170-739	2021/11/14	2022/11/13
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2022/1/10	2023/1/9
RF Coaxial Cable EMCI	EMC-KM-KM-4000	200214	2022/3/8	2023/3/7

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: 2022/6/21 ~ 2022/6/22

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	2022/3/7	2023/3/6
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2022/4/5	2023/4/4
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA
DC POWER SUPPLY Topward	6603D	795558	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	2022/1/14	2023/1/13
True RMS Clamp Meter Fluke	325	31130711WS	2022/06/09	2023/06/08

NOTE: 1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2022/6/19

3 General Information

3.1 General Description of EUT

Product	Triple Low Band RU						
Brand	MTI (Microelectronics Technology Inc.)						
Test Model	G060708-50-02B						
Status of EUT	Engineering sample						
Power Supply Rating	DC :-40.5V~-58.5V						
Modulation Type	QPSK, 16QAM, 64QAM, 256QAM						
Operating Frequency	Band n26	ANT2 ANT3	Channel Bandwidth 5MHz		866.5MHz		
Max. ERP Power	Band n26	ANT2 ANT3	Channel Bandwidth 5MHz		990.83 W(QPSK)		
Modulation Technology	5G NR FDD						
Emission Designator	Band	BW combination	ANT No.	QPSK	16QAM	64QAM	256QAM
	Band n26	Channel Bandwidth 5MHz	ANT2	4M48G7D	4M49D7W	4M47D7W	4M47D7W
			ANT3	4M49G7D	4M49D7W	4M47D7W	4M47D7W
Antenna Type	Directional Cross-Polarized Sector antenna with : Band n26 Gain = 16 dBi Band n29 Gain = 17 dBi Band n71 Gain = 17 dBi						
Antenna Connector	4x4.3-10 Female						
Accessory Device	NA						
Data Cable Supplied	NA						

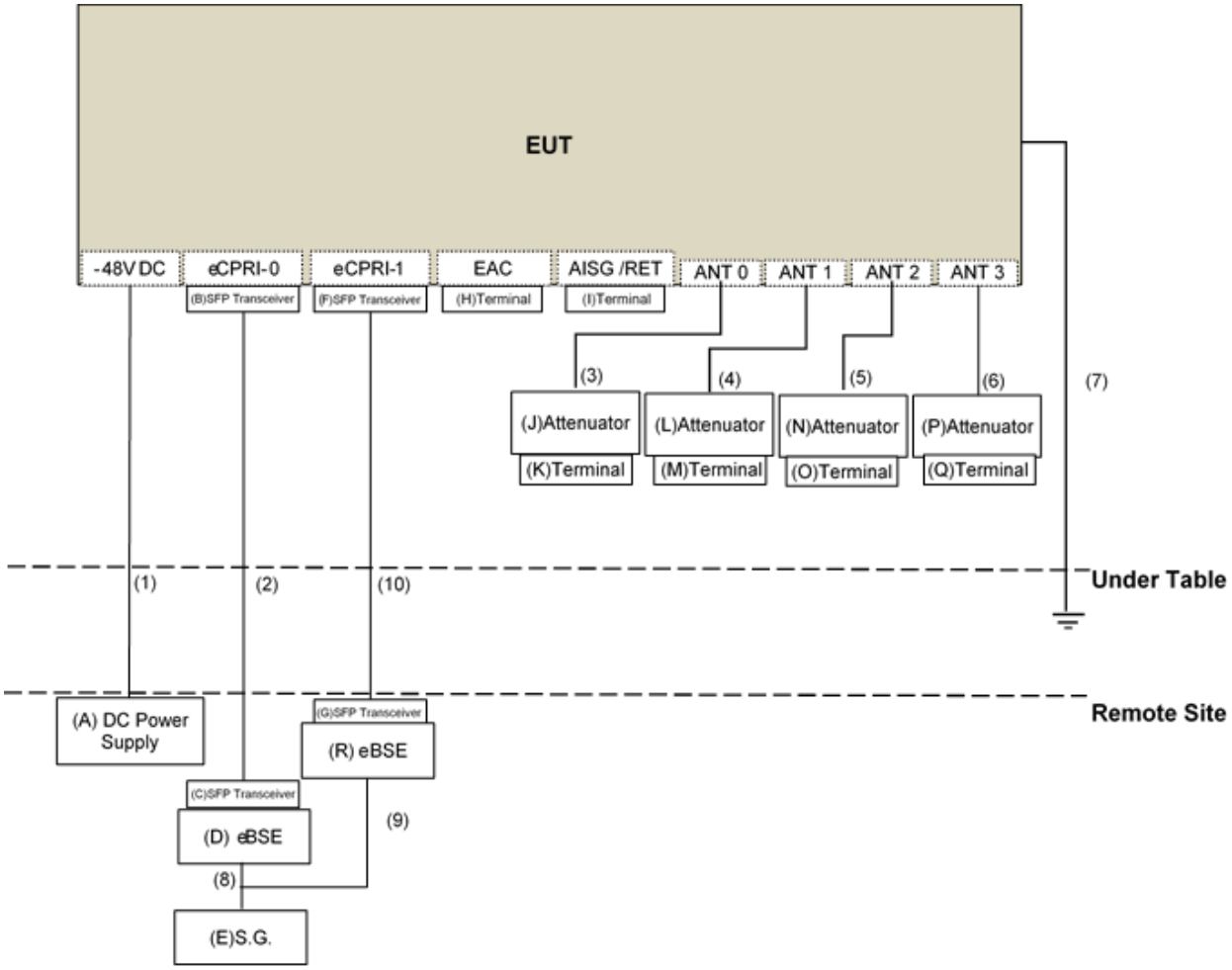
Note:

1. The EUT incorporates a MIMO function for 5GNR mode.

Band n26			
Channel Bandwidth	Modulation	TX & RX configuration	
5MHz	QPSK, 16QAM, 64QAM, 256QAM	2TX	4RX

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.
3. The above antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
4. Based on the maximum RF power (conducted & EIRP) listed in this report, considerations pertaining to the maximum allowed EIRP (conducted power level), signal type and antenna gain should be considered for each installation.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	DC Power Supply	NA	NA	NA	NA	Supplied by applicant
B	SFP Transceiver	NA	NA	NA	NA	Supplied by applicant
C	SFP Transceiver	NA	NA	NA	NA	Supplied by applicant
D	eBSE	NA	NA	NA	NA	Supplied by applicant
E	S.G	Agilent	E4438C	NA	NA	Provided by Lab
F	SFP Transceiver	NA	NA	NA	NA	Supplied by applicant
G	SFP Transceiver	NA	NA	NA	NA	Supplied by applicant
H	Terminal	NA	NA	NA	NA	Supplied by applicant
I	Terminal	NA	NA	NA	NA	Supplied by applicant
J	Attenuator	NA	NA	NA	NA	Supplied by applicant
K	Terminal	NA	NA	NA	NA	Supplied by applicant
L	Attenuator	NA	NA	NA	NA	Supplied by applicant
M	Terminal	NA	NA	NA	NA	Supplied by applicant
N	Attenuator	NA	NA	NA	NA	Supplied by applicant
O	Terminal	NA	NA	NA	NA	Supplied by applicant
P	Attenuator	NA	NA	NA	NA	Supplied by applicant
Q	Terminal	NA	NA	NA	NA	Supplied by applicant
R	eBSE	NA	NA	NA	NA	Supplied by applicant

NOTE:

1. All power cords of the above support units are non-shielded (1.8 m).
2. eBSE: evolved Based Station Emulator which is to transmit/receive the waveform.

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	DC Power Cable	1	10	Yes	0	Supplied by applicant
2	Coaxial Cable	1	10	Yes	0	Supplied by applicant
3	RF Cable	1	1.5	Yes	0	Supplied by applicant
4	RF Cable	1	1.5	Yes	0	Supplied by applicant
5	RF Cable	1	1.5	Yes	0	Supplied by applicant
6	RF Cable	1	1.5	Yes	0	Supplied by applicant
7	GND Cable	1	3	No	0	Provided by Lab
8	RF Cable	1	3	No	0	Supplied by applicant
9	RF Cable	1	3	No	0	Supplied by applicant
10	Coaxial Cable	1	10	Yes	0	Supplied by applicant

3.3 Test Mode Applicability and Tested Channel Detail

Band n26:

Following channel(s) was (were) selected for the final test as listed below:

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION
Output Power	173300	866.5MHz	5MHz(20W)	QPSK, 16QAM, 64QAM, 256QAM
Frequency Stability	173300	866.5MHz	5MHz(20W)	QPSK
Occupied Bandwidth	173300	866.5MHz	5MHz(20W)	QPSK, 16QAM, 64QAM, 256QAM
Emission Mask	173300	866.5MHz	5MHz(20W)	QPSK
Conducted Emission	173300	866.5MHz	5MHz(20W)	QPSK
Radiated Emission	173300	866.5MHz	5MHz(20W)	QPSK

NOTE:

The product is a base station, only test type full RB. All supported modulation types were evaluated.The Worst case of QPSK was selected. Therefore, the Frequency Stability, Condcudeted Emission and Radiated Emission were presented under QPSK mode only.

Test Condition:

Test Item	Environmental Conditions	Input Power (System)	Tested By
Output Power	25deg. C, 63%RH	120Vac, 60Hz	Kevin Ko
Frequency Stability	25deg. C, 63%RH	120Vac, 60Hz	Kevin Ko
Occupied Bandwidth	25deg. C, 63%RH	120Vac, 60Hz	Kevin Ko
Emission Mask	25deg. C, 63%RH	120Vac, 60Hz	Kevin Ko
Conducted Emission	25deg. C, 63%RH	120Vac, 60Hz	Kevin Ko
Radiated Emission	20deg. C, 70%RH	120Vac, 60Hz	Ryan Du

Note: Above input power with the AC/DC PSU used during testing.

3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 90, Subpart S

ANSI/TIA/EIA-603-E 2016

ANSI C63.26-2015

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

All test items have been performed and recorded as per the above standards and KDB test guidance.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement and Antenna Height

According to 90.635 (a), the effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table. These are maximum values, and applicants will be required to justify power levels and antenna heights requested.

4.1.2 Test Procedures

EIRP / ERP Measurement:

Conducted Power Measurement:

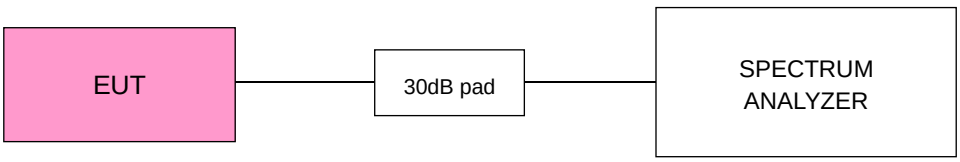
a. A spectrum analyzer was used on the output port of the EUT and recorded output power from the spectrum analyzer.
b. The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

   EIRP = PMeas + GT
   ERP = PMeas + GT- 2.15

   Where ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as PMeas, e.g., dBm or dBW)

   PMeas : measured transmitter output power or PSD, in dBm or dBW
   GT : gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.3 Test Setup



4.1.4 Test Results

Band n26

Channel Number	Freq. (MHz)	QPSK							PASS /FAIL
		Conducted Average Power(dBm)			Directional Gain (dBi)	ERP(dBm)	ERP(W)	Limit (W)	
		ANT2	ANT3	Total					
173300	866.5	43.12	43.07	46.11	16.00	59.96	990.83	1000.00	PASS

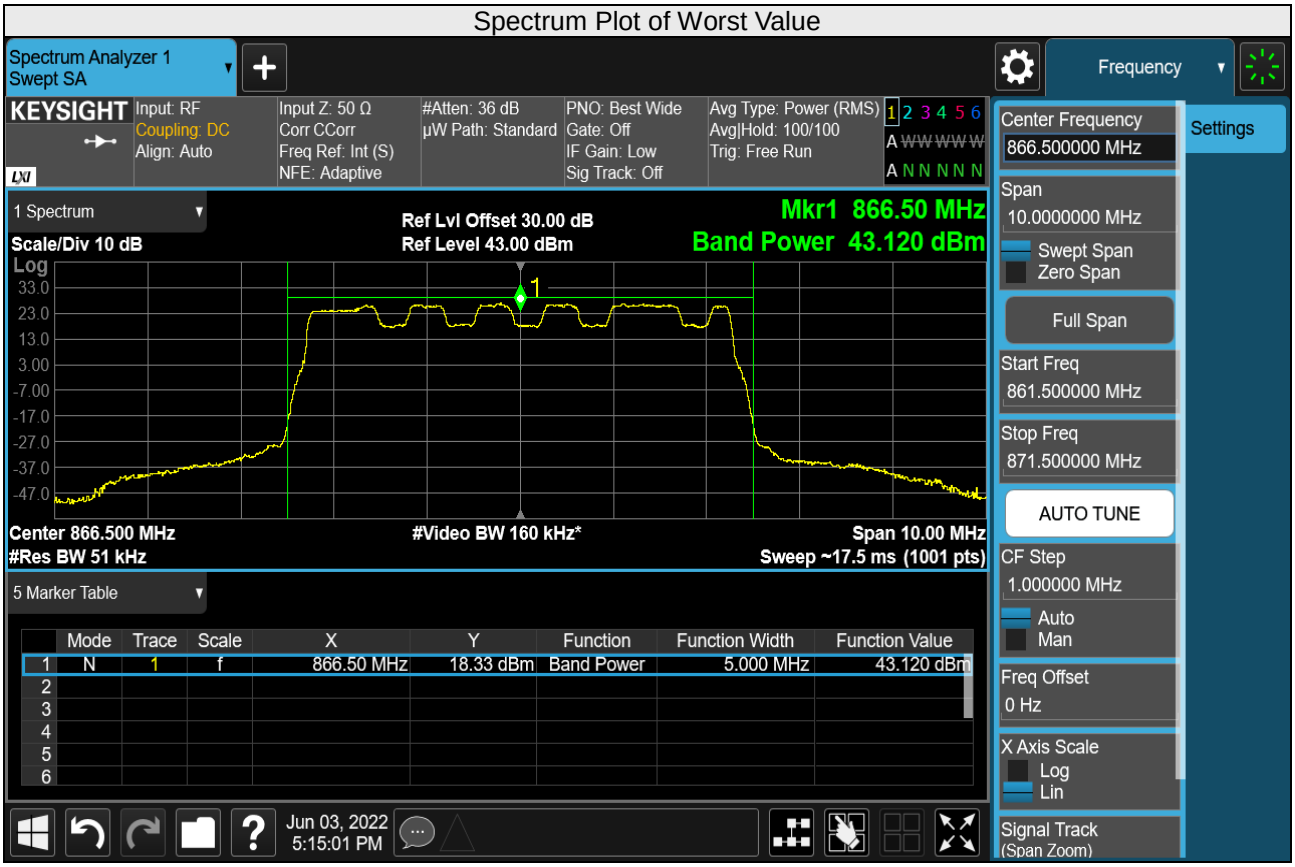
Channel Number	Freq. (MHz)	16QAM							PASS /FAIL
		Conducted Average Power(dBm)			Directional Gain (dBi)	ERP(dBm)	ERP(W)	Limit (W)	
		ANT2	ANT3	Total					
173300	866.5	43.24	42.93	46.10	16.00	59.95	988.55	1000.00	PASS

Channel Number	Freq. (MHz)	64QAM							PASS /FAIL
		Conducted Average Power(dBm)			Directional Gain (dBi)	ERP(dBm)	ERP(W)	Limit (W)	
		ANT2	ANT3	Total					
173300	866.5	42.94	42.99	45.98	16.00	59.83	961.61	1000.00	PASS

Channel Number	Freq. (MHz)	256QAM							PASS /FAIL
		Conducted Average Power(dBm)			Directional Gain (dBi)	ERP(dBm)	ERP(W)	Limit (W)	
		ANT2	ANT3	Total					
173300	866.5	42.73	43.20	45.98	16.00	59.83	961.61	1000.00	PASS

*ERP = Conducted + Directional gain (16dBi) - 2.15dB
*The antenna gain was declared by client.

Spectrum Plot of Worst Value



4.2 Modulation characteristics Measurement

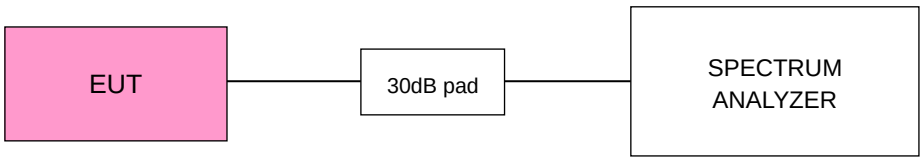
4.2.1 Limits of Modulation characteristics

N/A

4.2.2 Test Procedure

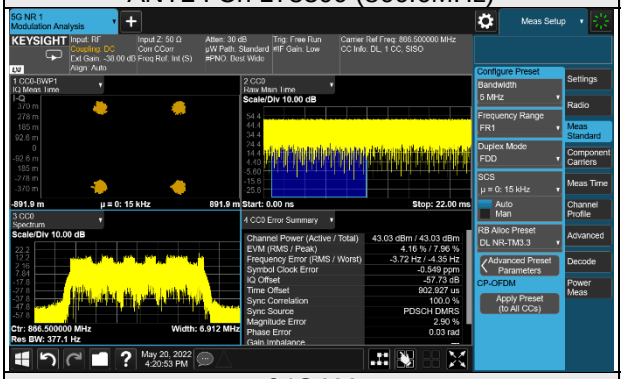
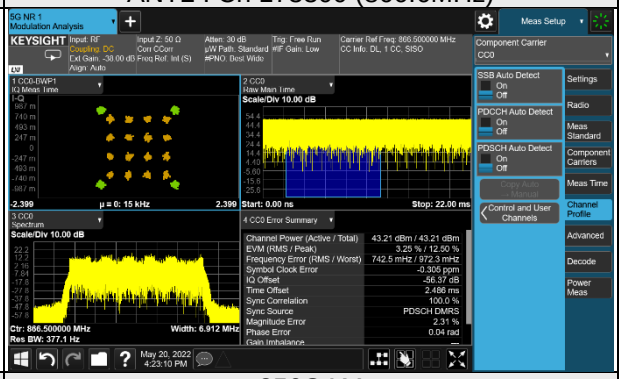
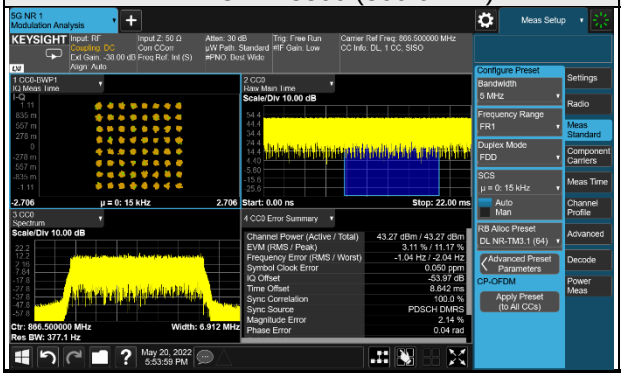
Connect the EUT to spectrum analyzer. The frequency band is set as EUT supported modulation and channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.3 Test Setup



4.2.4 Test Results

Band n26

Spectrum Plot of Measurement Value	
5MHz	
QPSK	16QAM
ANT2 : Ch 173300 (866.6MHz)	ANT2 : Ch 173300 (866.6MHz)
	
64QAM	256QAM
ANT2 : Ch 173300 (866.6MHz)	ANT2 : Ch 173300 (866.6MHz)
	

4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stabiliity Measurement

Follow the 90.213(a), 1.5ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

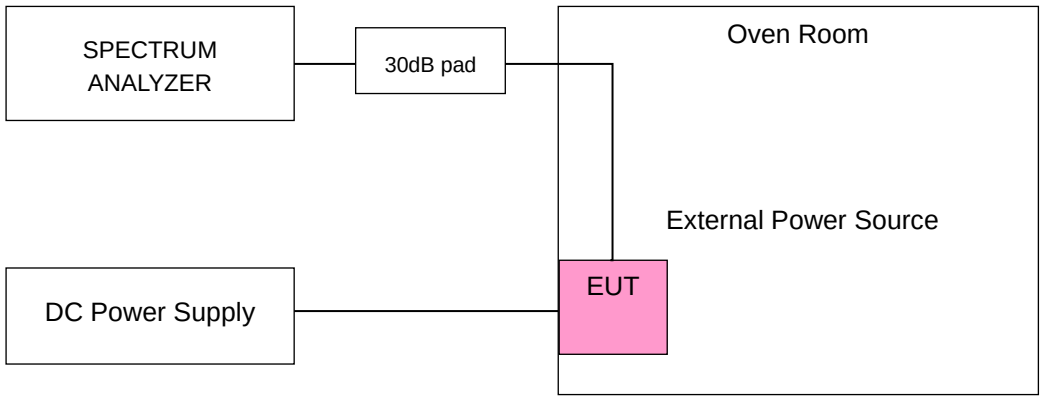
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 ℃ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded from the spectrum analyzer.

4.3.3 Test Setup



4.3.4 Test Results

Band n26

ANT2

FREQUENCY ERROR vs. VOLTAGE		Limit (ppm)	PASS/FAIL
Voltage (Volts)	Test result (ppm)		
	BW: 5MHz		
	866.5MHz		
-40.5	-0.0159	±1.5	PASS
-58.5	-0.0323	±1.5	PASS

FREQUENCY ERROR vs. Temperature		Limit (ppm)	PASS/FAIL
Temp. (℃)	Test result (ppm)		
	BW: 5MHz		
	866.5MHz		
55	-0.04360	±1.5	PASS
50	-0.03843	±1.5	PASS
40	-0.04150	±1.5	PASS
30	-0.03231	±1.5	PASS
20	-0.04409	±1.5	PASS
10	-0.03707	±1.5	PASS
0	-0.03368	±1.5	PASS
-10	-0.03845	±1.5	PASS
-20	-0.04616	±1.5	PASS
-30	-0.02544	±1.5	PASS
-40	-0.0467	±1.5	PASS

ANT3

FREQUENCY ERROR vs. VOLTAGE		Limit (ppm)	PASS/FAIL
Voltage (Volts)	Test result (ppm)		
	BW: 5MHz		
	866.5MHz		
-40.5	-0.0307	±1.5	PASS
-58.5	-0.0292	±1.5	PASS

FREQUENCY ERROR vs. Temperature		Limit (ppm)	PASS/FAIL
Temp. (℃)	Test result (ppm)		
	BW: 5MHz		
	866.5MHz		
55	-0.02597	±1.5	PASS
50	-0.02795	±1.5	PASS
40	-0.03594	±1.5	PASS
30	-0.03241	±1.5	PASS
20	-0.03725	±1.5	PASS
10	-0.02894	±1.5	PASS
0	-0.03864	±1.5	PASS
-10	-0.03236	±1.5	PASS
-20	-0.04367	±1.5	PASS
-30	-0.04097	±1.5	PASS
-40	-0.0445	±1.5	PASS

4.4 Occupied Bandwidth Measurement

4.4.1 Limits of Occupied Bandwidth Measurement

The frequency shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

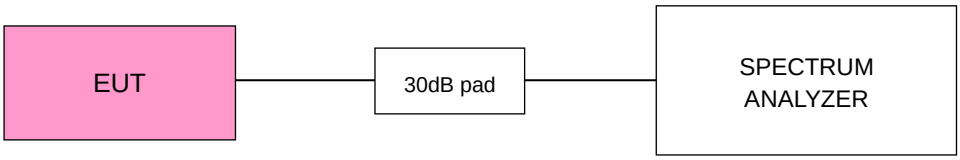
4.4.2 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with RBW≥1% x OBW and VBW≥3 x VBW.

26 dB Bandwidth Measurement:
The emission bandwidth is defined as the width of the signal between two points,one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26dB below the transmitter power.

Occupied Bandwdith Measurement:
Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.4.3 Test Setup



4.4.4 Test Result (-26dB Bandwidth)

Band n26

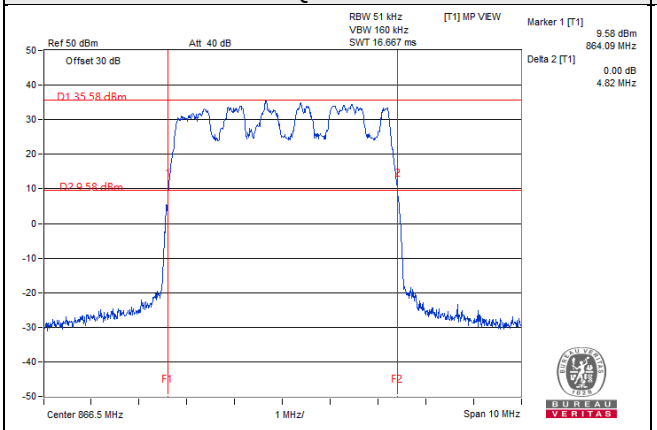
5MHz

Channel Number	Freq. (MHz)	-26dBc Bandwidth (MHz)							
		ANT2				ANT3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
173300	866.5	4.82	4.80	4.82	4.83	4.81	4.82	4.81	4.84

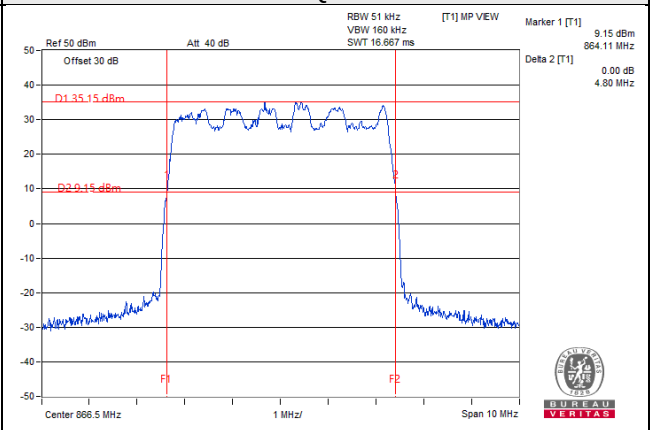
ANT2

-26dBc Bandwidth

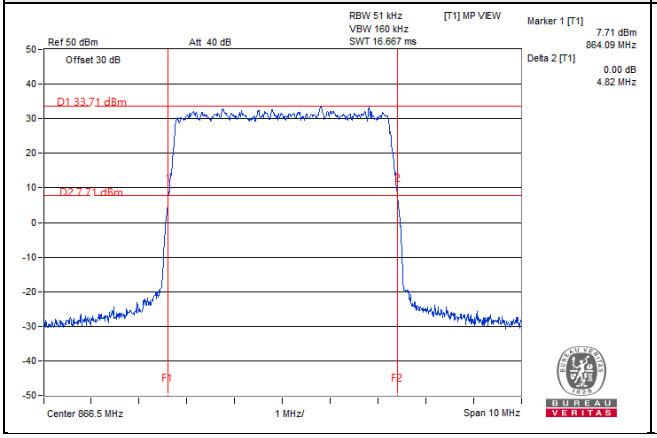
QPSK



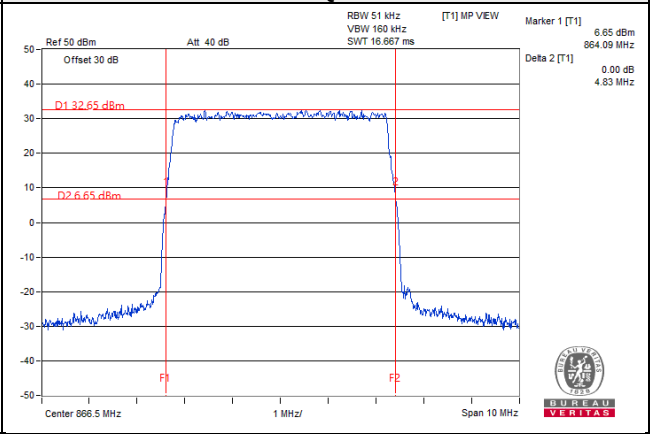
16QAM



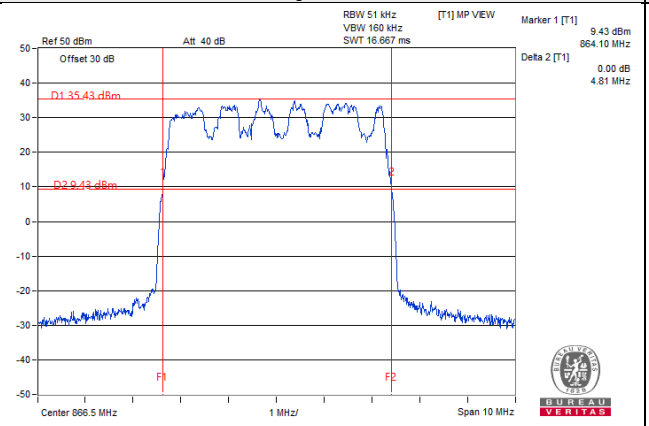
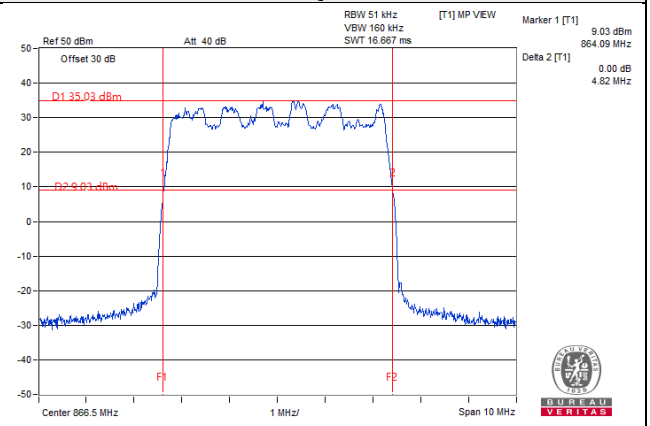
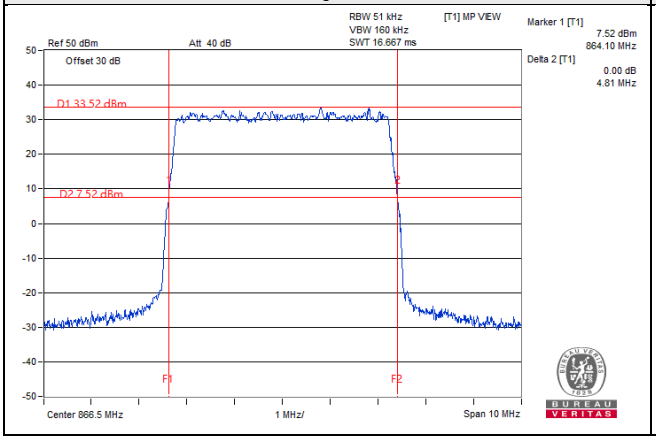
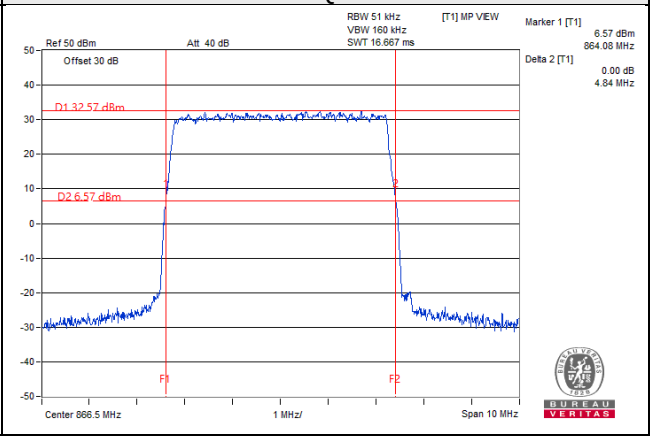
64QAM



256QAM



ANT3

-26dBc Bandwidth	
QPSK	16QAM
	
64QAM	256QAM
	

4.4.5 Test Result (Occupied Bandwidth)

Band n26

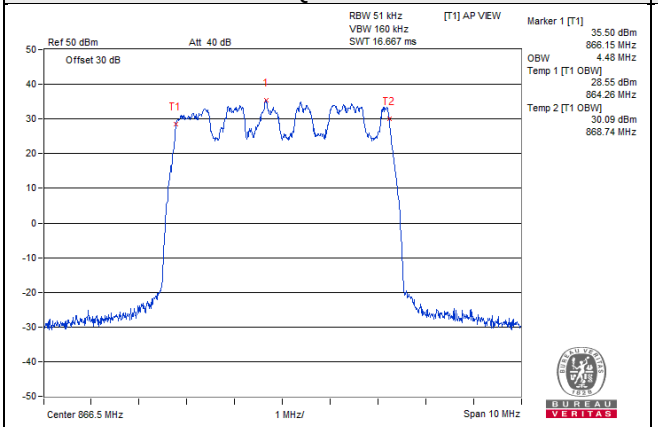
5MHz

Channel Number	Freq. (MHz)	99% Occupied Bandwidth (MHz)							
		ANT2				ANT3			
		QPSK	16QAM	64QAM	256QAM	QPSK	16QAM	64QAM	256QAM
173300	866.5	4.48	4.49	4.47	4.47	4.49	4.49	4.47	4.47

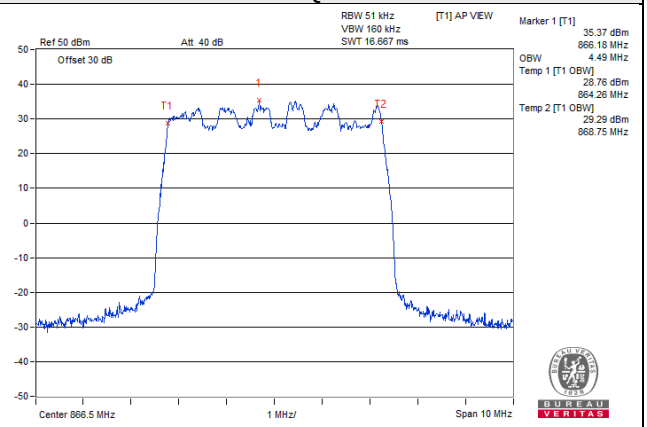
ANT2

99% Occupied Bandwidth

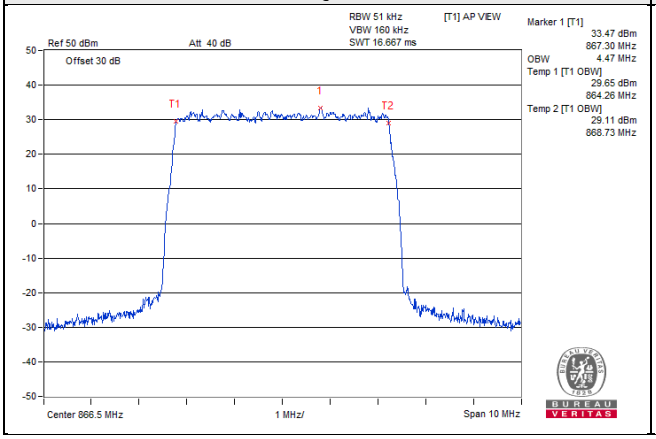
QPSK



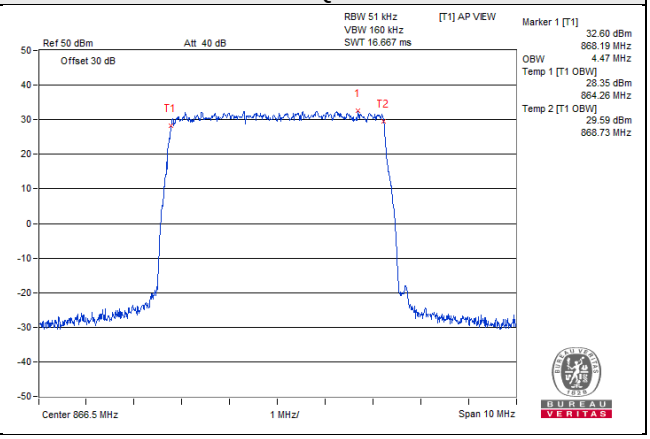
16QAM



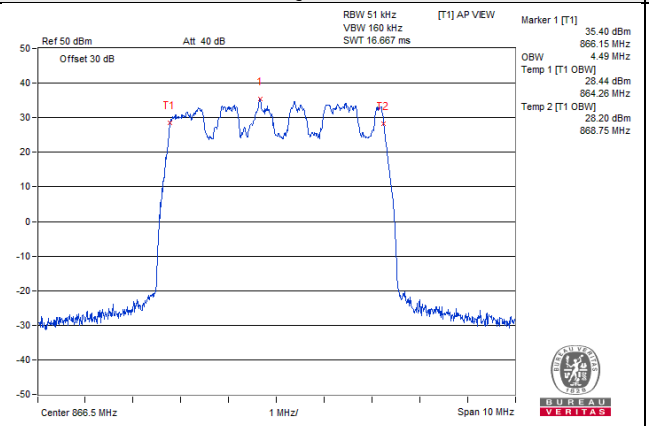
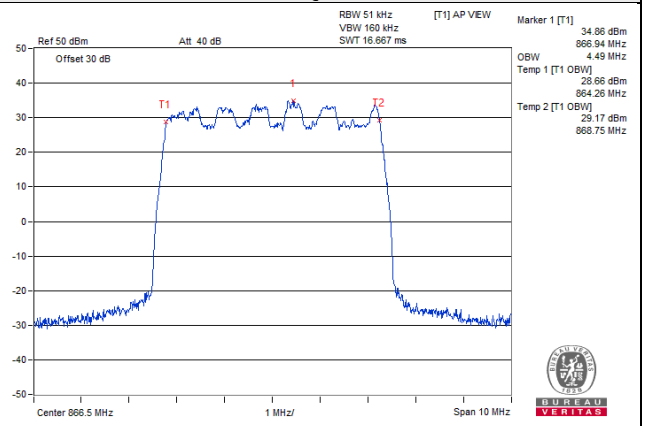
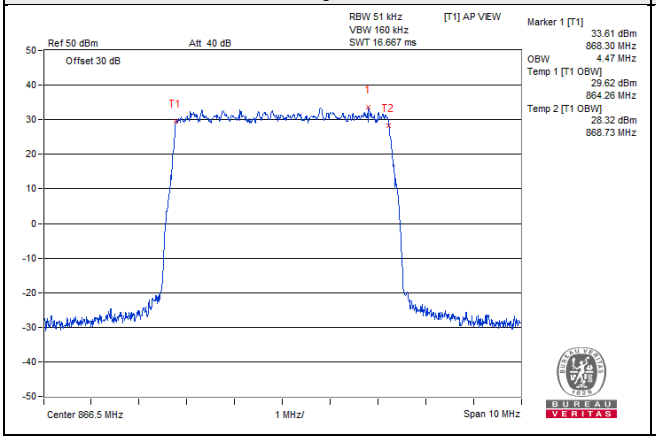
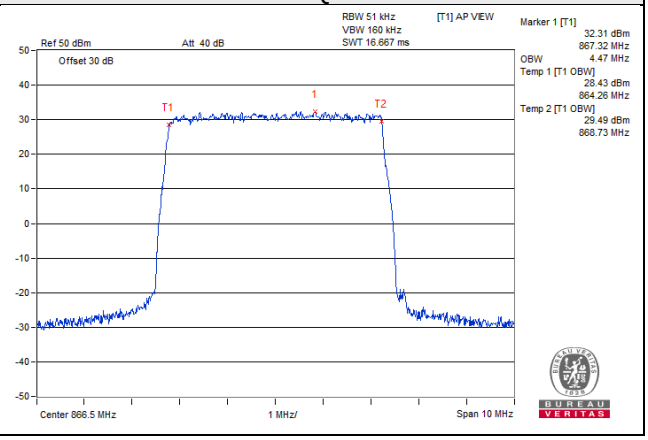
64QAM



256QAM



ANT3

99% Occupied Bandwidth (MHz)	
QPSK	16QAM
	
64QAM	256QAM
	

4.5 Emission Mask Measurement

4.5.1 Limits of Emission Mask Measurement

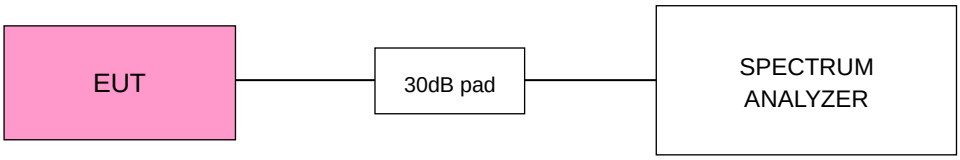
Per 90.210, equipment used in 809-824/854-869 MHz licensed band to EA or non-EA systems shall comply with the emission mask provisions of §90.691.

Per 90.691, Emission mask requirements
(a) Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:
(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz. (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.
(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

4.5.2 Test Procedures

1. 30dB attenuation pad is connected with spectrum analyzer. RBW=300Hz and VBW=900Hz is used for measurement.
2. Record the test plot.

4.5.3 Test Setup

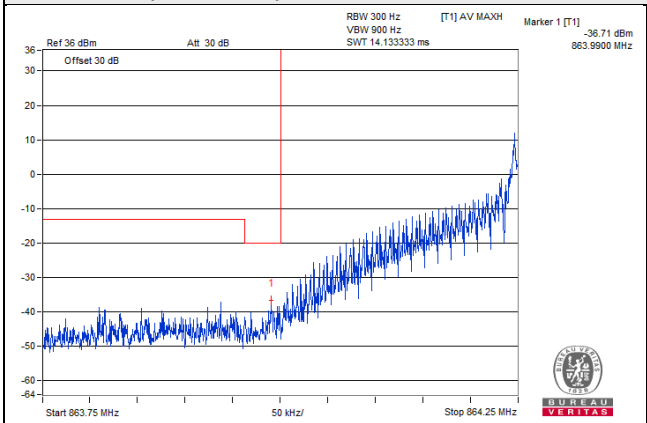


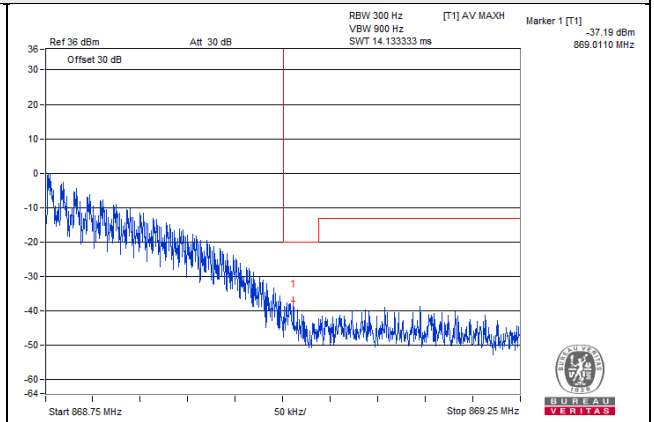
4.5.4 Test Results

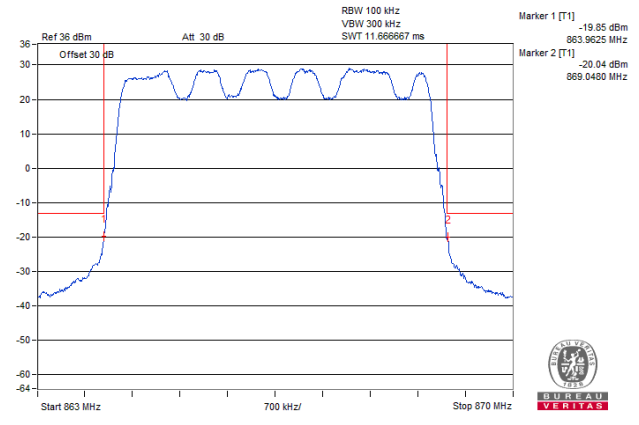
Band n26

5MHz-ANT2

QPSK
Ch 173300 (866.5MHz)

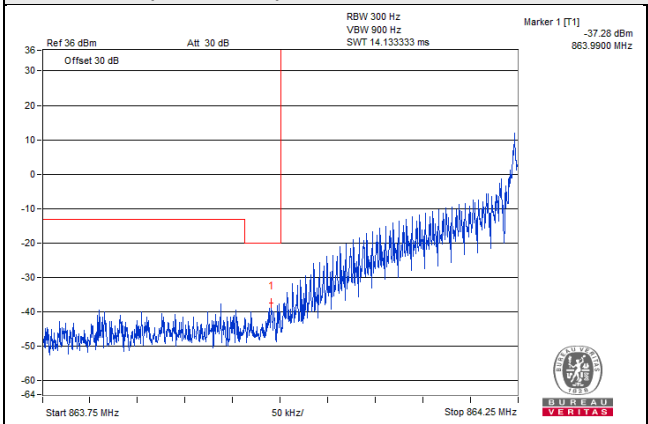


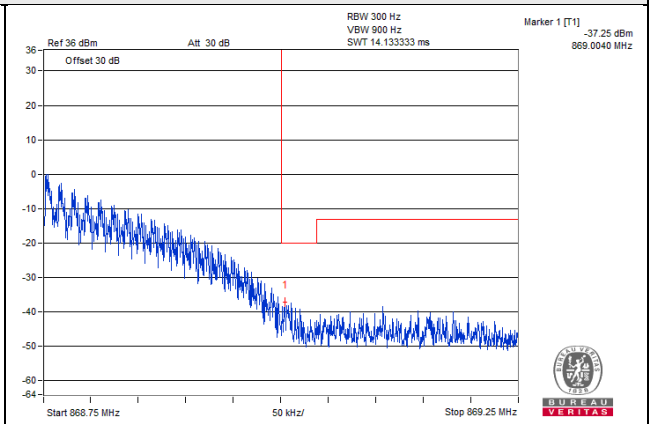


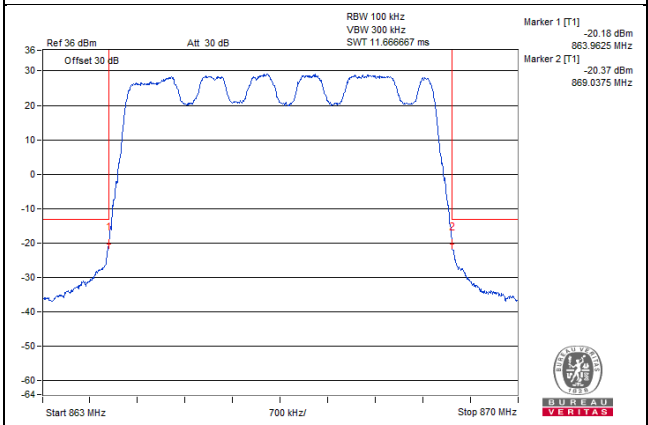


5MHz-ANT3

QPSK
Ch 173300 (866.5MHz)







4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm.

Note:
This device can be impelement MIMO function, so the limit of spurious emissions needs to be reduced by 10log(NumbersAnt) according to FCC KDB 662911 D01 guidance.

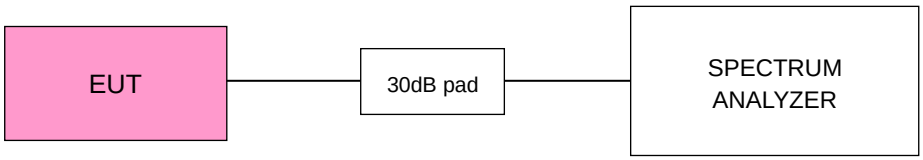
{2TX: The limit is adjusted to -13dBm – 10*log(2) = -16.01dBm.}

4.6.2 Test Procedure

a. When the spectrum scanned from 9kHz to the tenth harmonic of the highest fundamental frequency, it shall be connected to the 30dB pad attenuated the carried frequency. The spectrum set RBW: 100kHz and VBW=3*RBW is used for measurement.

b. Record the test plot.

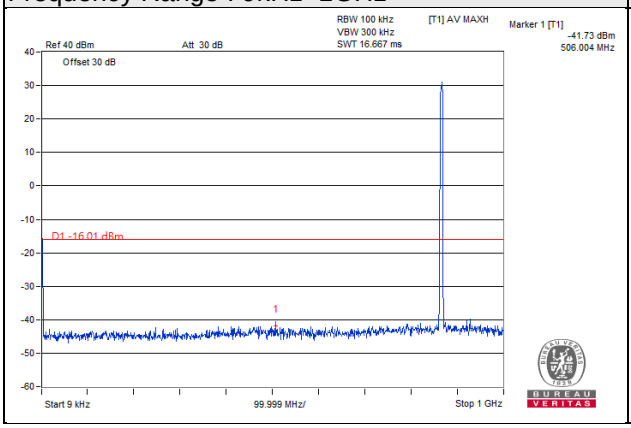
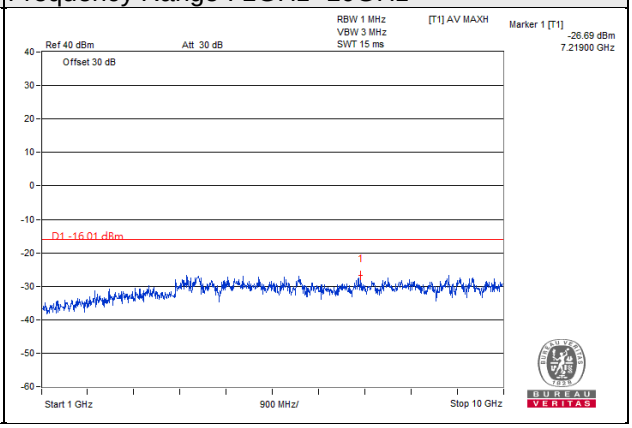
4.6.3 Test Setup



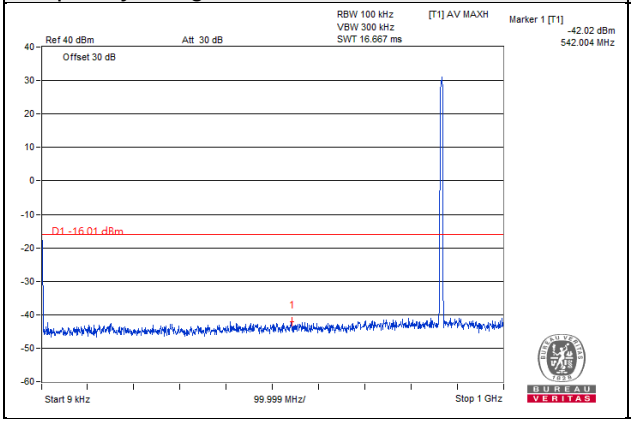
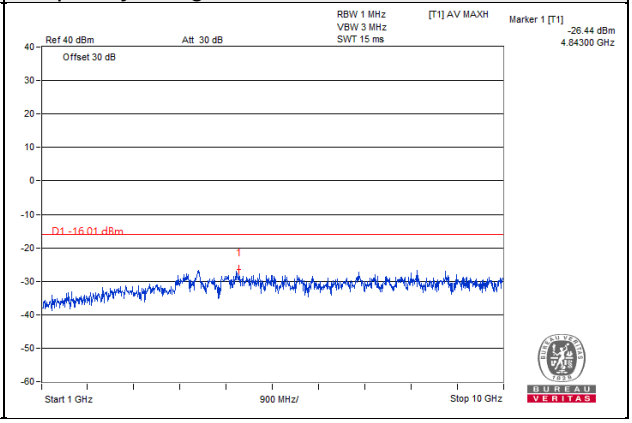
4.6.4 Test Results

Band n26

5MHz- ANT2

QPSK	
Ch 173300 (866.5MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~10GHz
	

5MHz- ANT3

QPSK	
Ch 173300 (866.5MHz)	
Frequency Range : 9kHz~1GHz	Frequency Range : 1GHz~10GHz
	

Note: The signal of 9kHz is IF signal from spectrum analyzer.

4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measuremen

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

4.7.2 Test Procedure

a. The field strength was measured with Spectrum Analyzer.

b. Measurement in the semi-anechoic chamber, EUT placed on the 0.8m/1.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor.

c. Perform a field strength measurement and then mathematically convert the measured field strength level to EIRP level.

d. Follow ANSI C63.26 section 5.2.7 d),

   E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

   EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

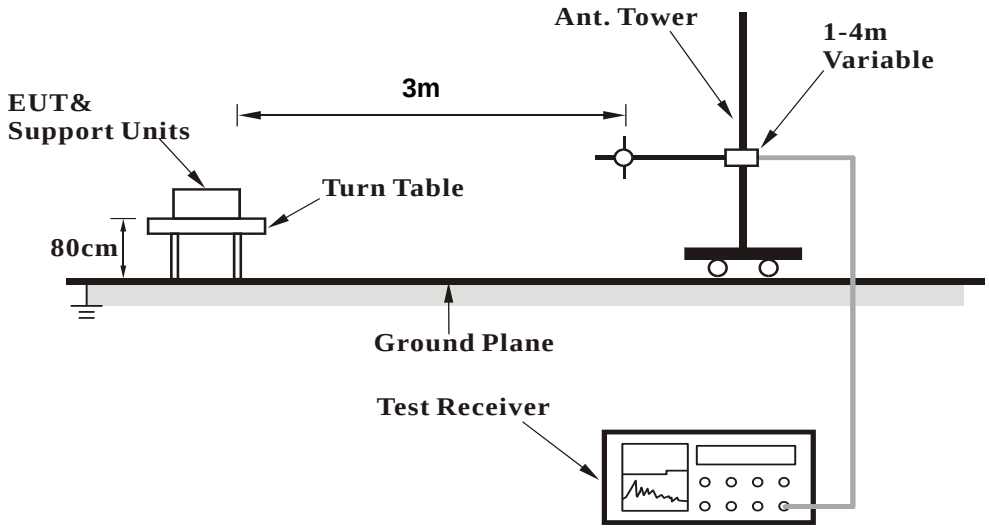
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.7.3 Deviation from Test Standard

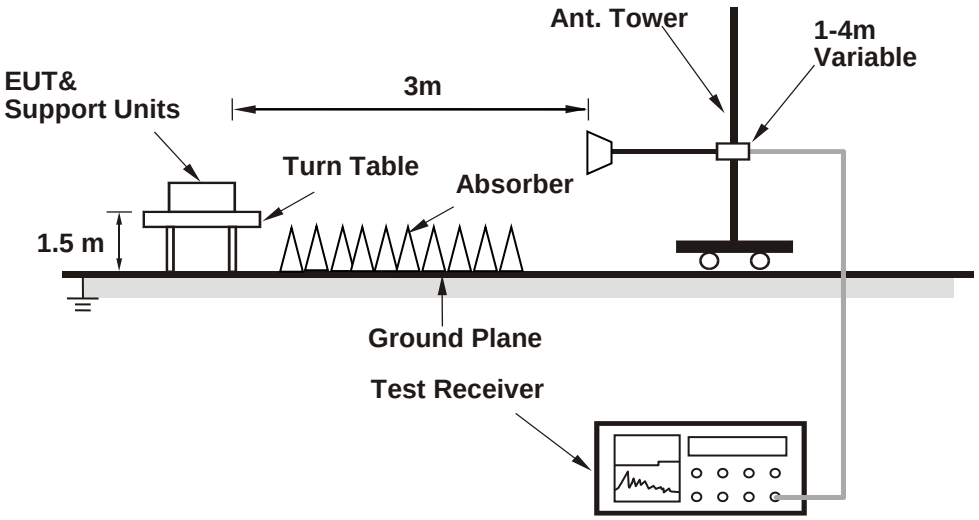
No deviation.

4.7.4 Test Setup

For Radiated emission below 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 Test Results

Band n26

Below 1GHz

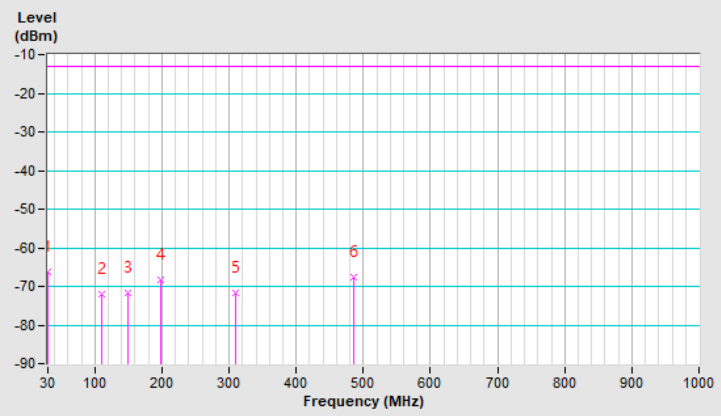
5MHz

Test Frequency	Ch 173300 (866.5MHz)	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.80	-66.11	-13.00	-53.11	2.00 H	32	38.55	-104.66
2	109.52	-72.07	-13.00	-59.07	1.50 H	74	34.23	-106.30
3	149.54	-71.81	-13.00	-58.81	2.00 H	253	31.50	-103.31
4	197.25	-68.46	-13.00	-55.46	1.50 H	52	37.94	-106.40
5	310.31	-71.83	-13.00	-58.83	1.50 H	268	30.68	-102.51
6	485.58	-67.61	-13.00	-54.61	1.50 H	211	30.81	-98.42

Remarks:

1. Follow ANSI C63.26 section 5.2.7 d), EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m) @ 3m
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) − 104.8

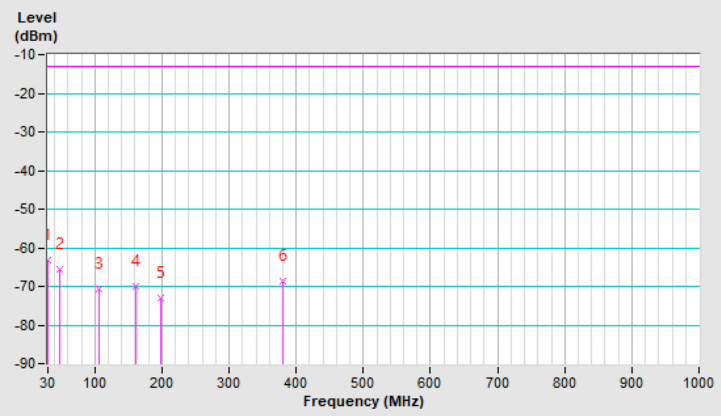


Test Frequency	Ch 173300 (866.5MHz)	Frequency Range	Below 1000 MHz

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	30.71	-63.31	-13.00	-50.31	1.00 V	133	41.32	-104.63
2	48.39	-65.73	-13.00	-52.73	1.00 V	152	37.69	-103.42
3	106.71	-70.69	-13.00	-57.69	1.50 V	342	35.98	-106.67
4	160.83	-69.98	-13.00	-56.98	1.00 V	26	33.60	-103.58
5	197.96	-73.21	-13.00	-60.21	1.00 V	281	33.21	-106.42
6	379.48	-68.76	-13.00	-55.76	1.00 V	277	32.43	-101.19

Remarks:

1. Follow ANSI C63.26 section 5.2.7 d), EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m) @ 3m
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) − 104.8



Above 1GHz

Test Frequency	Ch 173300 (866.5MHz)	Frequency Range	Above 1000 MHz

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1731.00	-64.15	-13.00	-51.15	1.50 H	122	34.93	-99.08
2	2163.75	-63.28	-13.00	-50.28	2.00 H	267	32.62	-95.90
3	2596.50	-62.90	-13.00	-49.90	1.50 H	297	33.04	-95.94
4	3029.25	-63.30	-13.00	-50.30	1.50 H	72	31.68	-94.98
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**EIRP (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	1731.00	-62.99	-13.00	-49.99	1.50 V	132	36.09	-99.08
2	**2163.75**	**-62.13**	**-13.00**	**-49.13**	**1.50 V**	**268**	**33.77**	**-95.90**
3	2596.50	-62.70	-13.00	-49.70	1.50 V	172	33.24	-95.94
4	3029.25	-63.86	-13.00	-50.86	1.50 V	287	31.12	-94.98

Remarks:

1. Follow ANSI C63.26 section 5.2.7 d), EIRP(dBm) = Raw Value(dBuV) + Correction Factor(dB/m) @ 3m
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB) + 20log(D) − 104.8

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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