FCC TEST REPORT

REPORT NO.:	RF141028D03
MODEL NO.:	MDU2000
FCC ID:	ROO-MDU2000
RECEIVED:	Oct. 28, 2014
TESTED:	Dec. 01 to 16, 2014
ISSUED:	July 24, 2015

APPLICANT:	Microwave Solutions Ltd
ADDRESS:	Secure House, Braithwell Way Hellaby Rotherham N/A United Kingdom S66 8QY

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141028D03	Original release	July 24, 2015

1 CERTIFICATION

PRODUCT :	MDU2000 X-Band Doppler Motion Detector
BRAND NAME :	Microwave-Solutions
MODEL NO. :	MDU2000
TEST SAMPLE :	MASS-PRODUCTION
APPLICANT :	Microwave Solutions Ltd
TESTED :	Dec. 01 to 16, 2014
STANDARDS :	**FCC Part 15, Subpart C (Section 15.245)** ANSI C63.10-2009

The above equipment (Model: MDU2000) 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 : Phoenix Huang , **Date:** July 24, 2015
(Phoenix Huang, Specialist)

Approved by : , **Date:** July 24, 2015
(May Chen, Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C			
Standard Paragraph	**Test Type**	**Result**	**Remark**
15.207	AC Power Conducted Emission	PASS	Minimum passing margin is -4.94dB at 0.82578MHz.
15.245	Radiated Emission Test	PASS	Minimum passing margin is -1.5dB at 37.12MHz
15.215 (c)	Bandedge Measurement	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	No antenna connector is used.

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	**Value**
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.43 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	MDU2000 X-Band Doppler Motion Detector
MODEL NO.	MDU2000
POWER SUPPLY	DC: +5V +/-0.25V
MODULATION TYPE	GFSK
CARRIER FREQUENCY	10.525GHz
NUMBER OF CHANNEL	1
ANTENNA TYPE	Planar slot antenna with 5dBi gain
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

NOTE:

1. MDU2000 X-Band Doppler Motion Detector is a 10.525GHz device that is applying Doppler radar phenomenon to sense motion. It transmits a low power microwave and receives energy reflected by objects.
2. To facilitate functional testing the EUT was tested whilst installed in this Line Voltage Dual-Tech Wall Switch Sensor system, please refer to the following table:

Product Name	Brand Name	Coding Guidelines				
		Model Series	X (INPUT Type)	Housing Type	Sensor	Color Type
Line Voltage Dual-Tech Wall Switch Sensor	IR-TEC	LD	S= ONE LOOP T= TWO LOOP	700	May be A-Z, 0-9 or blank ; S = With ambient light sensor built-in Other=Different ambient light sensor	May be A-Z, 0-9 or blank ; I=Ivory W=White B=Brown G=Gray A=Almond Other=Different color
From the above models, model: LDS-700S and LDT-700S were pre-tested in chamber, the worse case was found in Model: **LDT-700S**. Therefore only the test data of the model was recorded in this report.						

3. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

1 channel is provided in this EUT.

Channel	Freq. (GHz)
1	10.525

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	BE	
-	√	√	√	√	-

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz **BE:** Bandedge Emission Measurement

Note:

The EUT had been pre-tested on the positioned of laying-flat and wall-mount. The worst case was found when positioned of on **X-plane** (for below 1GHz) and **Y-plane** (for above 1GHz).

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	GFSK

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	GFSK

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	GFSK

BANDEDGE EMISSION MEASUREMENT:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
1	1	GFSK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	23deg. C, 70%RH	120Vac, 60Hz	Wythe Lin
RE<1G	23deg. C, 71%RH	120Vac, 60Hz	Gary Cheng
RE≥1G	24deg. C, 71%RH	120Vac, 60Hz	Gary Cheng
BE	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 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:

FCC Part 15, Subpart C (Section 15.245)

ANSI C63.10-2009

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

3.4 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.

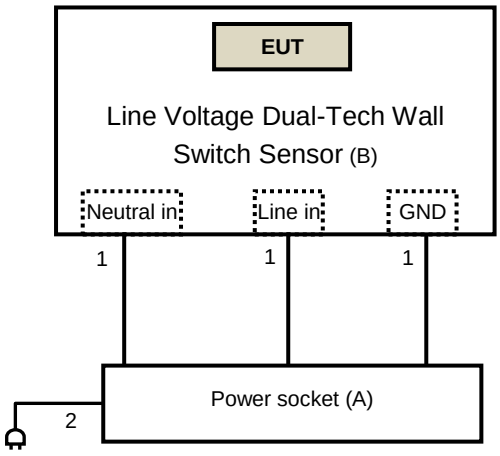
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	Power socket	NA	NA	NA	NA	Provided by Lab
B	Line Voltage Dual-Tech Wall Switch Sensor	IR-TEC	LDT-700S	NA	NA	Provided by Client

NOTE:

1. All power cords of the above support units are non-shielded (1.8 m).

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	AC	1	0.2	No	0	Provided by Client
2	AC	1	1	No	0	Provided by Lab

3.5 CONFIGURATION OF SYSTEM UNDER TEST



4 TEST PROCEDURES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 56 60	56 to 46 46 50

NOTE: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10 , 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7.3	NA	NA	NA

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 Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Dec. 15, 2014

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN.
b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

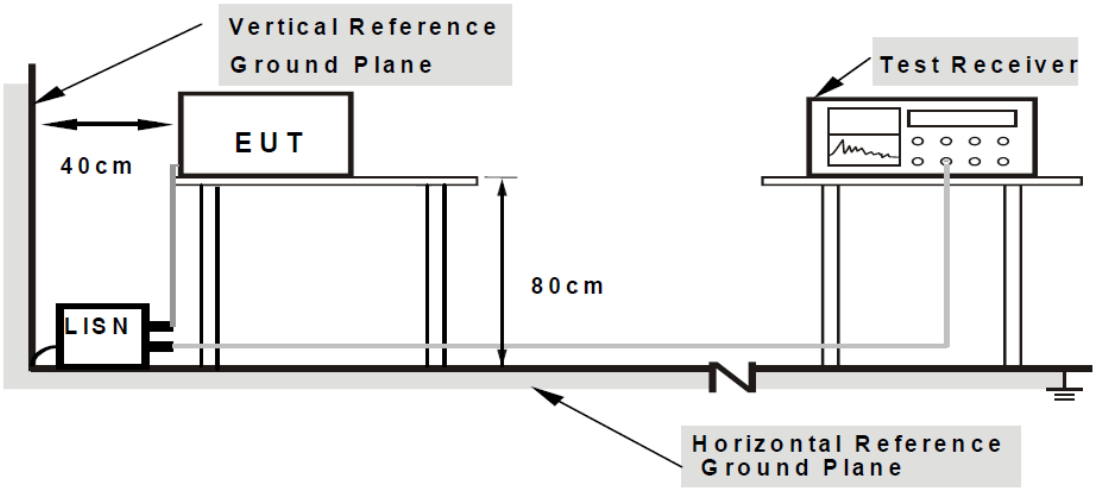
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

Set the EUT under transmission / receiver condition continuously at specific channel frequency.

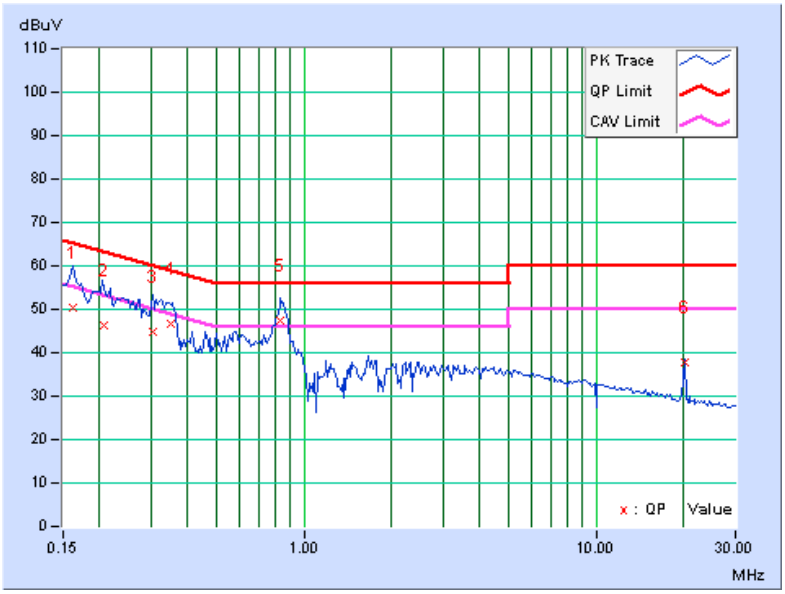
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.07	50.42	36.92	50.49	36.99	65.38	55.38	-14.89	-18.39
2	0.20569	0.07	46.38	34.62	46.45	34.69	63.38	53.38	-16.93	-18.69
3	0.30234	0.08	44.92	31.78	45.00	31.86	60.18	50.18	-15.18	-18.32
4	0.34984	0.08	46.60	34.04	46.68	34.12	58.97	48.97	-12.28	-14.84
5	0.82969	0.12	47.22	39.20	47.34	39.32	56.00	46.00	-8.66	-6.68
6	20.12741	0.70	37.20	32.16	37.90	32.86	60.00	50.00	-22.10	-17.14

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

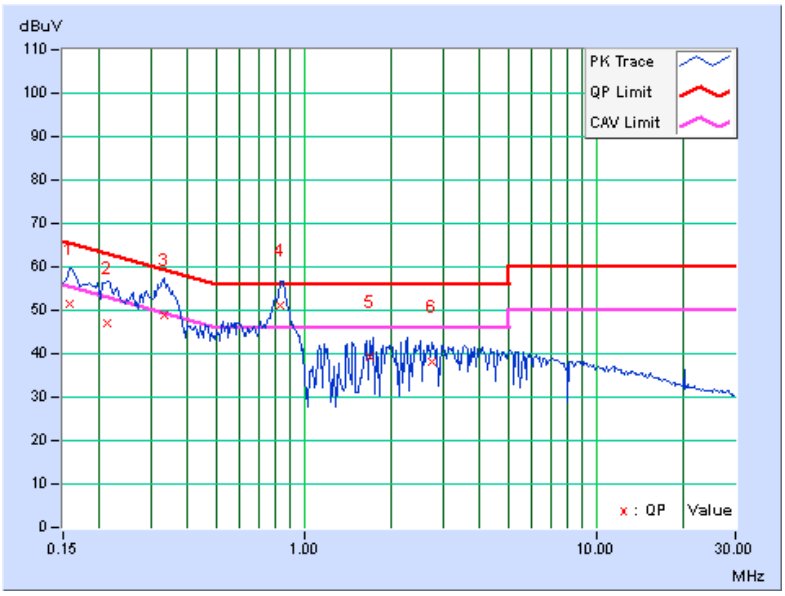


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.06	51.26	37.90	51.32	37.96	65.58	55.58	-14.25	-17.61
2	0.21250	0.06	47.04	34.34	47.10	34.40	63.11	53.11	-16.01	-18.71
3	0.33359	0.08	48.72	35.68	48.80	35.76	59.36	49.36	-10.56	-13.60
4	**0.82578**	**0.12**	**50.94**	**39.64**	**51.06**	**39.76**	**56.00**	**46.00**	**-4.94**	**-6.24**
5	1.68359	0.16	39.26	28.76	39.42	28.92	56.00	46.00	-16.58	-17.08
6	2.74219	0.21	38.08	27.28	38.29	27.49	56.00	46.00	-17.71	-18.51

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission Level – Limit value
4. Correction Factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

According to 15.245 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBuV/m)	
	Peak	Average
10500 ~ 10550	147.9	127.9
	Field Strength of Harmonics (dBuV/m)	
	107.9	87.9

Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

Application	Field Strength of Harmonics (dBuV/m)
Field disturbance sensors operating in the 24075-24175 MHz band and for Other field disturbance sensors designed for use only within a building or to open building doors.	87.9
All other field disturbance sensors	77.5

Note: Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075-24175 MHz band, fully comply with the limits given in Section15.209.

(1) Field strength limits are specified at a distance of 3 meters.
(2) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 27, 2014	Feb. 26, 2015
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Aug. 26, 2014	Aug. 25, 2015
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131215 SNMY23685/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier EMCI	EMC184045	980143	Jan. 17, 2014	Jan. 16, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Agilent Spectrum Analyzer	E4446A	MY48250254	Nov. 19, 2014	Nov. 18, 2015
*OML Harmonic Mixer (33~55GHz)	M22HWD	110215-1	Mar. 28, 2013	Mar. 27, 2015
*OML Horn Antenna (33~55GHz)	M22RH	110215-1	Mar. 28, 2013	Mar. 27, 2015
*Diplexer	DPL26	110215-1	Feb. 27, 2013	Feb. 26, 2015

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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The test was performed in 966 Chamber No. H.
5. The FCC Site Registration No. is 797305.
6. The CANADA Site Registration No. is IC 7450H-3.
7. Tested Date: Dec. 01, 2014

4.2.3 TEST PROCEDURES

PROCEDURE FOR BELOW 18 GHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The spectrum analyzer system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The spectrum analyzer system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection (PK) at frequency from 1GHz to 40GHz.
4. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 10Hz for Average detection (AV) at frequency from 1GHz to 40GHz.

PROCEDURE FOR ABOVE 18 GHz

External harmonic mixers are utilized.

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The distance at which limits are typically specified is 3 meter; however, closer measurement distances may be utilized.

c. Begin handheld measurements with the test antenna (horn) at a distance of 1 meter from the EUT, in a horizontally polarized position. Slowly adjust its position, entirely covering the plane 1 meter from the EUT.

d. Repeat (b) with the horn in a vertically polarized position.

e. If the emission cannot be detected at 1 meter, reduce the RBW in order to increase system sensitivity. Note the value. If the emission still cannot be detected, move the horn closer to the EUT, noting the distance at which a measurement is made.

f. Note the maximum level indicated on the Spectrum Analyzer.

g. Based on the distance at which the measurement was made and the calculated distance to the edge of the far field, determine the appropriate distance attenuation factor. Apply this factor to the calculated field strength in order to determine the equivalent field strength at the distance at which the regulatory limit is specified. Compare to the appropriate limits

h. Repeat (a) - (f) for every emission that must be measured, up through the required frequency range of investigation

NOTE:

1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 50MHz for Peak and Average detection at frequency above 40GHz.
3. Shorter measurement distances may be used to improve the measurement system's noise floor. As ANSI C63.10 description is based on the measurement in distance of 3 meters, the data obtained at 0.8-meter distance was extrapolate results to the 3-m distance:

   Test value at 3-meter distance (dBuV)

   = Test value at 0.8 meter distance (dBuV) -20log(3/0.8)(dB)

   = Test value at 0.8 meter distance (dBuV) -11.5(dB).

* Measurements made at 0.8 meter distance. Test value converted to account for 3-meter measurement distance.

FAR FIELD BOUNDARY CALCULATIONS
The far-field boundary is given as:
R far field = (2 * L^2) /λ
where: L = Largest Antenna Dimension, including the reflector, in meters
入= wavelength in meters

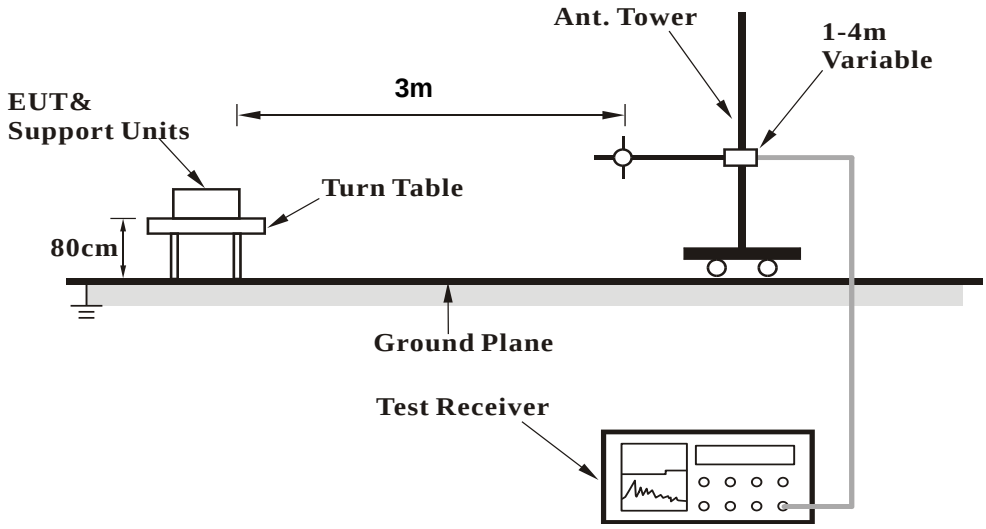
FREQUENCY (GHz)	L (m)	Lambda (m)	R (Far Field) (m)
10.525	0.015	0.029	0.016

4.2.4 DEVIATION FROM TEST STANDARD

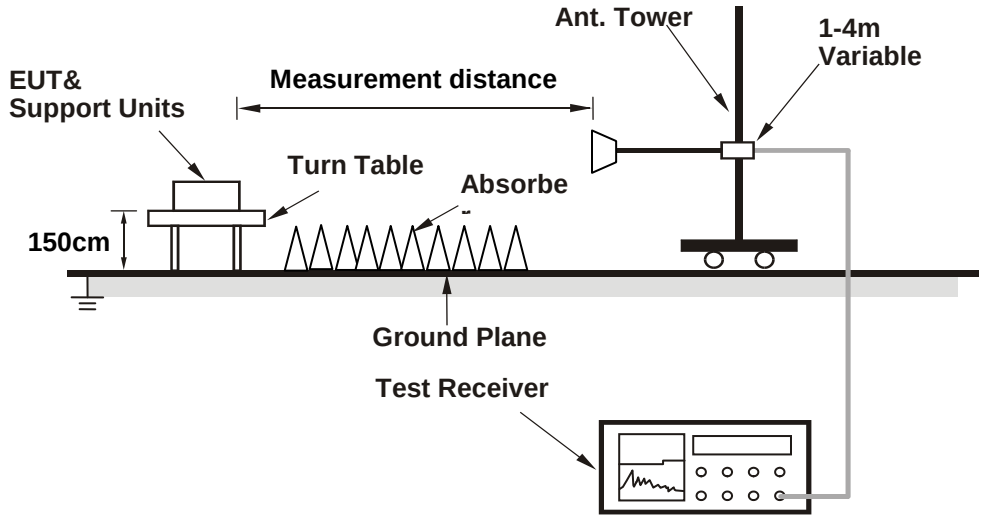
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS

BELOW 1GHz DATA

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	37.47	28.6 QP	40.0	-11.4	2.00 H	256	42.68	-14.06
2	47.02	23.3 QP	40.0	-16.7	2.00 H	274	36.68	-13.38
3	96.25	29.1 QP	43.5	-14.4	2.00 H	251	47.40	-18.28
4	201.74	34.7 QP	43.5	-8.8	1.00 H	305	50.78	-16.12
5	221.92	41.6 QP	46.0	-4.4	1.00 H	0	57.63	-16.00
6	242.09	41.6 QP	46.0	-4.4	1.00 H	16	55.59	-13.99
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	**37.12**	**38.5 QP**	**40.0**	**-1.5**	**1.00 V**	**274**	**52.60**	**-14.12**
2	46.98	35.4 QP	40.0	-4.6	1.00 V	195	48.78	-13.38
3	149.26	33.3 QP	43.5	-10.2	1.00 V	332	46.23	-12.89
4	201.74	33.3 QP	43.5	-10.2	1.00 V	267	49.41	-16.12
5	242.09	35.9 QP	46.0	-10.1	1.50 V	80	49.92	-13.99
6	940.59	34.9 QP	46.0	-11.1	1.00 V	207	33.91	0.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

ABOVE 1GHz DATA

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 18GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	10500.00	52.9 PK	74.0	-21.1	1.04 H	230	42.61	10.29
2	10500.00	41.3 AV	54.0	-12.7	1.04 H	230	31.01	10.29
3	*10525.00	101.6 PK	147.9	-46.3	1.04 H	230	91.38	10.22
4	*10525.00	98.3 AV	127.9	-29.6	1.04 H	230	88.08	10.22
5	10550.00	59.7 PK	74.0	-14.3	1.04 H	230	49.55	10.15
6	10550.00	48.4 AV	54.0	-5.6	1.04 H	230	38.25	10.15
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	10500.00	54.3 PK	74.0	-19.7	1.09 V	11	44.01	10.29
2	10500.00	42.2 AV	54.0	-11.8	1.09 V	11	31.91	10.29
3	*10525.00	110.1 PK	147.9	-37.8	1.09 V	11	99.88	10.22
4	*10525.00	108.7 AV	127.9	-19.2	1.09 V	11	98.48	10.22
5	10550.00	60.2 PK	74.0	-13.8	1.09 V	11	50.05	10.15
6	10550.00	49.2 AV	54.0	-4.8	1.09 V	11	39.05	10.15

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	18GHz ~ 53GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	21050.00	66.8 PK	97.5	-30.7	1.06 H	360	65.20	1.60
2	21050.00	63.7 AV	77.5	-13.8	1.06 H	360	62.10	1.60
3	31575.00	66.7 PK	97.5	-30.8	1.02 H	360	57.50	9.20
4	31575.00	63.6 AV	77.5	-13.9	1.02 H	360	54.40	9.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	21050.00	67.8 PK	97.5	-29.7	1.00 V	352	65.90	1.90
2	21050.00	65.2 AV	77.5	-12.3	1.00 V	352	63.30	1.90
3	31575.00	68.2 PK	97.5	-29.3	1.00 V	36	26.70	41.50
4	31575.00	65.5 AV	77.5	-12.0	1.00 V	36	24.00	41.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.3 BANDEDGE MEASUREMENT

4.3.1 LIMITS OF BANDEDGE

According to 15.215(c), the requirement is to ensure the 20dB bandwidth of the emission, or whatever bandwidth may otherwise be specified, is contained within the frequency band designated in the rule section under which the equipment is operated.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2014	May 07, 2015

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. Tested date : Dec. 16, 2014

4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span from band edge. The band edges was measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

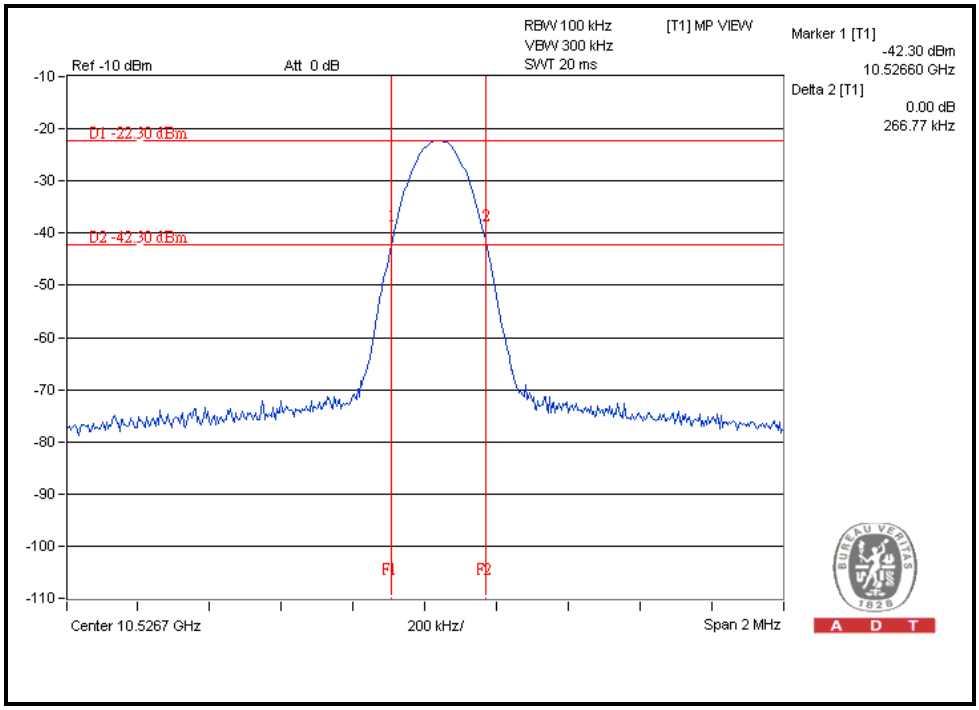
No deviation

4.3.5 EUT OPERATING CONDITION

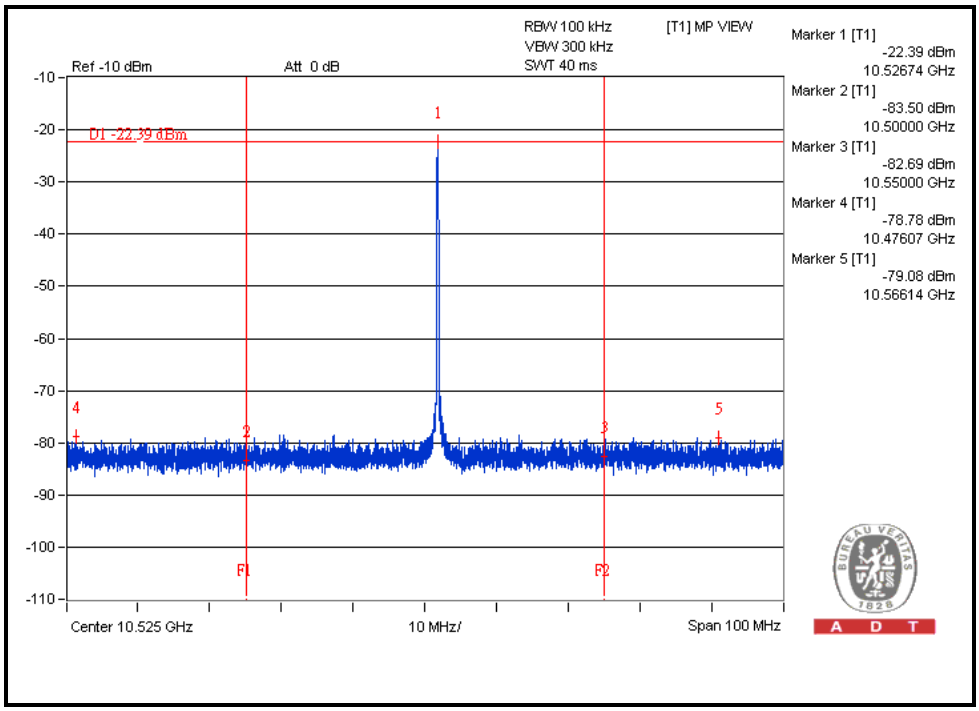
Set the EUT under transmission / receiver condition continuously at specific channel frequency.

4.3.6 TEST RESULTS

FOR 20dB BANDWIDTH



FOR BANDEDGE



5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6 INFORMATION ON 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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Fax: 886-2-26052943

Hsin Chu EMC/RF/Telecom Lab Lab:
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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.

7 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

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