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FCC TEST REPORT

REPORT NO.: RF130520E10
MODEL NO.: RU-865, RU-865-XXXX (X :0~9 , A~Z , Configuration Code)
FCC ID: MAD-RU-865
RECEIVED: May 20, 2013
TESTED: May 21 to 28, 2013
TESTEFFD: June 05, 2013

APPLICANT: Microelectronics Technology Inc.

ADDRESS: 1, Innovation Road II, Hsinchu Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

LAB ADDRESS : No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (1): No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

TEST LOCATION (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130520E10	Original release	June 05, 2013



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1 CERTIFICATION

PRODUCT : RFID Mini PCI-E Card Module
BRAND NAME : MTI
MODEL NO. : RU-865, RU-865-XXXX (X :0~9 , A~Z ,
Configuration Code)
APPLICANT : Microelectronics Technology Inc.
TESTED DATE: May 21 to 28, 2013
TEST SAMPLE : ENGINEERING SAMPLE
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (Model: RU-865) 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:** June 05, 2013
(Phoenix Huang, Specialist)

APPROVED BY : May Chen , **DATE:** June 05, 2013
(May Chen, Manager)



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2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit Minimum passing margin is -16.79dB at 10.55469 MHz
15.247(a)(1) (i)	Number of Hopping Frequency Used Spec.:	PASS	Meet the requirement of limit
15.247(a)(1) (i)	Dwell Time on Each Channel Spec. : Max. 0.4 second	PASS	Meet the requirement of limit
15.247(a)(1)	Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, which ever is greater	PASS	Meet the requirement of limit
15.247(a)(1)(i)	Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System Spec.: Max. 0.5 MHz	PASS	Meet the requirement of limit
15.247(b)(2)	Maximum Peak Output Power	PASS	Meet the requirement of limit
15.247(d)	Transmitter Radiated Emissions Spec.: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -5.9dB at 84.03MHz
15.247(d)	Conducted Out-Band Emission Measurement	PASS	Meet the requirement of limit
15.203	Antenna Requirement	-	Antenna connector is a SMA Female standard connector of Patch antenna and a I-PEX standard connector of PCB antenna.



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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	2.98 dB
Radiated emissions (30MHz-1GHz)	5.59 dB
Radiated emissions (1GHz ~6GHz)	3.73 dB
Radiated emissions (6GHz ~18GHz)	3.90 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	RFID Mini PCI-E Card Module
MODEL NO.	RU-865, RU-865-XXXX (X :0~9 , A~Z , Configuration Code)
POWER SUPPLY	DC 3.3V
MODULATION TYPE	ASK
MODULATION TECHNOLOGY	FHSS
FREQUENCY RANGE	902.75MHz ~ 927.25MHz
NUMBER OF CHANNEL	50
OUTPUT POWER	691.831mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

- The EUT has below model names which are identical to each other in all aspects except for the following table:

Brand	Model No.	Difference
MTI	RU-865	For marketing requirement
	RU-865-XXXX (X :0~9 , A~Z , Configuration Code)	

From the above models, model: **RU-865** was selected as representative model for the test and their data were recorded in this report.

- The antennas provided to the EUT, please refer to the following table:

Ant. No.	Antenna Type	Gain(dBi) (Include cable loss)	Antenna Connector	Cable Loss(dB)	Frequency range (MHz to MHz)
1	Patch	5.25	SMA-Female	0.75	902~928
2	PCB	2	I-PEX	NA	902~928

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



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3.2 DESCRIPTION OF TEST MODES

50 channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	902.75	21	913.25	42	923.75
1	903.25	22	913.75	43	924.25
2	903.75	23	914.25	44	924.75
3	904.25	24	914.75	45	925.25
4	904.75	25	915.25	46	925.75
5	905.25	26	915.75	47	926.25
6	905.75	27	916.25	48	926.75
7	906.25	28	916.75	49	927.25
8	906.75	29	917.25		
9	907.25	30	917.75		
10	907.75	31	918.25		
11	908.25	32	918.75		
12	908.75	33	919.25		
13	909.25	34	919.75		
14	909.75	35	920.25		
15	910.25	36	920.75		
16	910.75	37	921.25		
17	911.25	38	921.75		
18	911.75	39	922.25		
19	912.25	40	922.75		
20	912.75	41	923.25		



3.3 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	OB	
1	√	√	√	√	√	Antenna No.: 1 (Patch Antenna)
2	-	√	√	-	-	Antenna No.: 2 (PCB Antenna)

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ≥ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Power Line Conducted Emission:

- Pre-Scan to determine the worst-case mode from all possible combinations between available modulations and packet types.
- Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Technology	Modulation Type
0 to 49	24	FHSS	ASK

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 Technology	Modulation Type
0 to 49	0, 24, 49	FHSS	ASK

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 Technology	Modulation Type
0 to 49	0, 24, 49	FHSS	ASK

Antenna Port Conducted 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 Technology	Modulation Type
0 to 49	0, 24, 49	FHSS	ASK

Conducted Out-Band 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 Technology	Modulation Type
0 to 49	0, 49	FHSS	ASK

※ **TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	25deg. C, 65%RH	120Vac, 60 Hz	Anderson Chen
RE ³ 1G	24deg. C, 69%RH	120Vac, 60 Hz	Tim Ho
RE<1G	25deg. C, 67%RH	120Vac, 60 Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60 Hz	James Chan
OB	25deg. C, 60%RH	120Vac, 60 Hz	James Chan



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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:

FCC Part 15, Subpart C. (15.247)

ANSI C63.10-2009

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



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3.5 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.

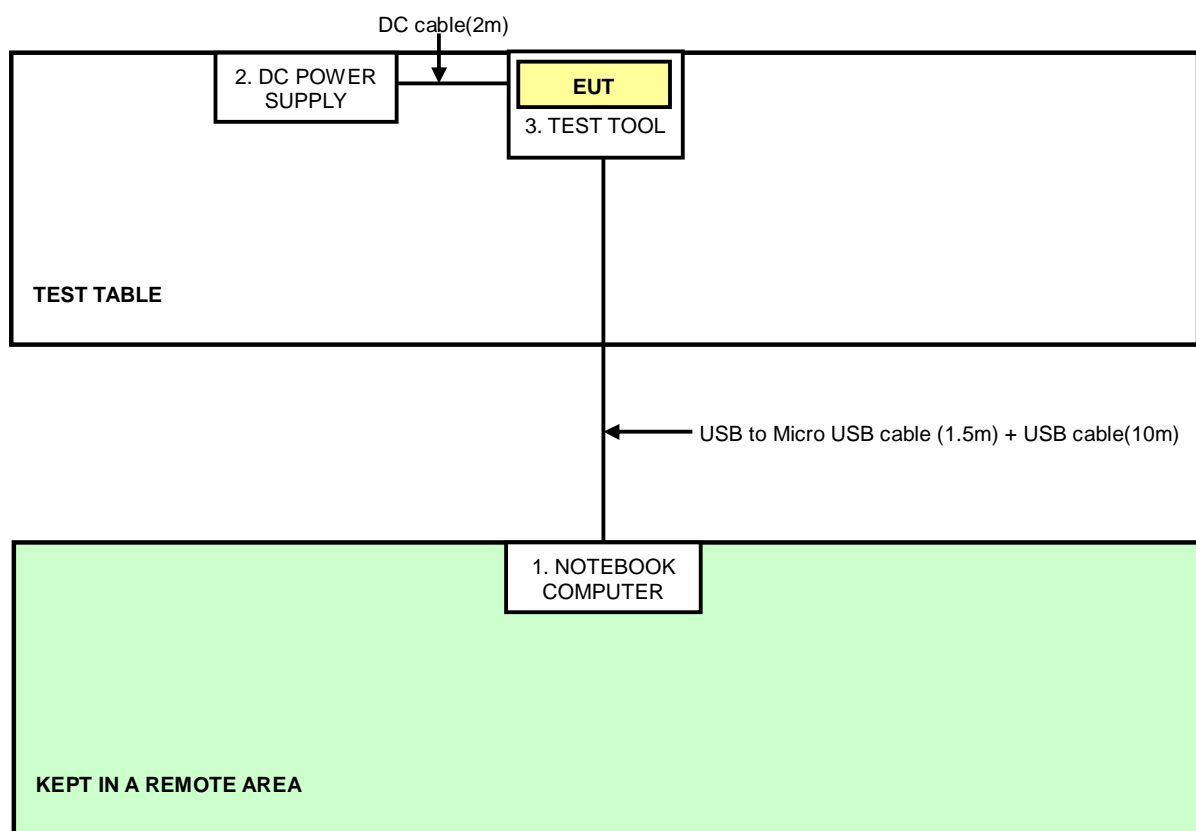
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	DC POWER SUPPLY	Topward	6603D	795558	NA
3	TEST TOOL	MTI	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB to Micro USB cable (1.5m) + USB cable(10m)
2	DC cable, 2m
3	NA

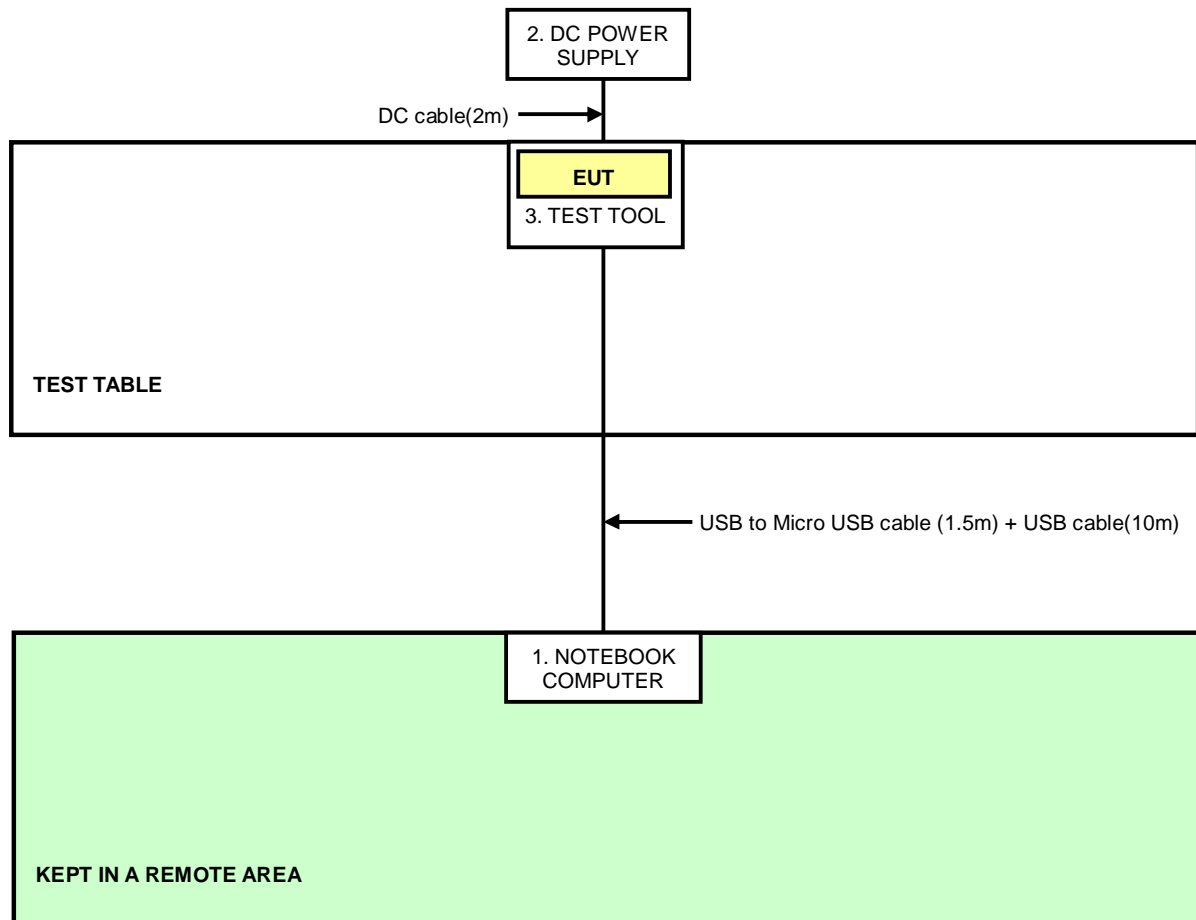
NOTE: All power cords of the above support units are non shielded (1.8m).

3.6 CONFIGURATION OF SYSTEM UNDER TEST

For Conducted Emission Test:



For Other Test Items:





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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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	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	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 06, 2012	Sep. 05, 2013
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 08, 2012	June 07, 2013
RF Cable (JYEBAO)	5DFB	COCCAB-003	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-3	Sep. 25, 2012	Sep. 24, 2013
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: May 28, 2013



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4.1.3 TEST PROCEDURES

- a. The EUT/HOST placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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.

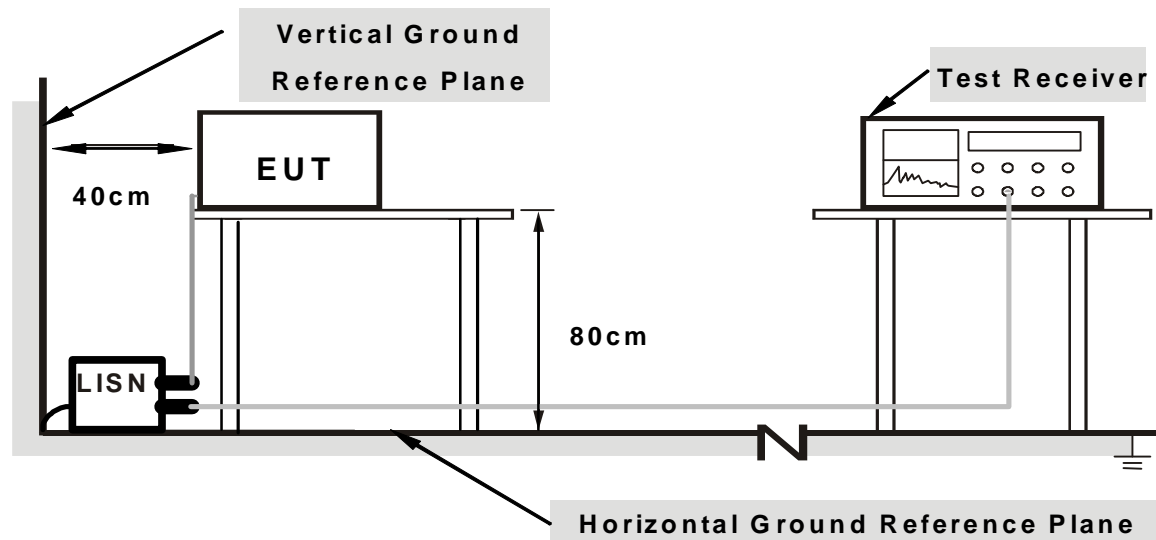
NOTE:

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

1. Placed the EUT on the testing table.
2. The support unit 1 (NB) ran test program “MTI RFID ME Setup v1.0.15.exe” to enable EUT under transmission condition continuously at specific channel frequency.

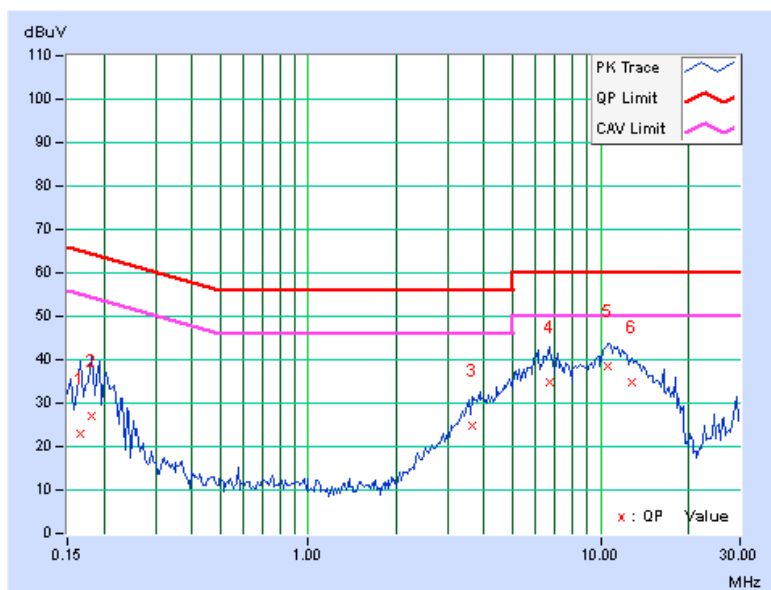
4.1.7 TEST RESULTS

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.13	22.74	-0.09	22.87	0.04	65.18	55.18	-42.31	-55.14
2	0.18125	0.13	26.97	0.80	27.10	0.93	64.43	54.43	-37.33	-53.50
3	3.64063	0.35	24.40	19.48	24.75	19.83	56.00	46.00	-31.25	-26.17
4	6.70313	0.50	34.35	29.16	34.85	29.66	60.00	50.00	-25.15	-20.34
5	10.55469	0.68	37.78	32.53	38.46	33.21	60.00	50.00	-21.54	-16.79
6	12.73438	0.78	33.97	28.77	34.75	29.55	60.00	50.00	-25.25	-20.45

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





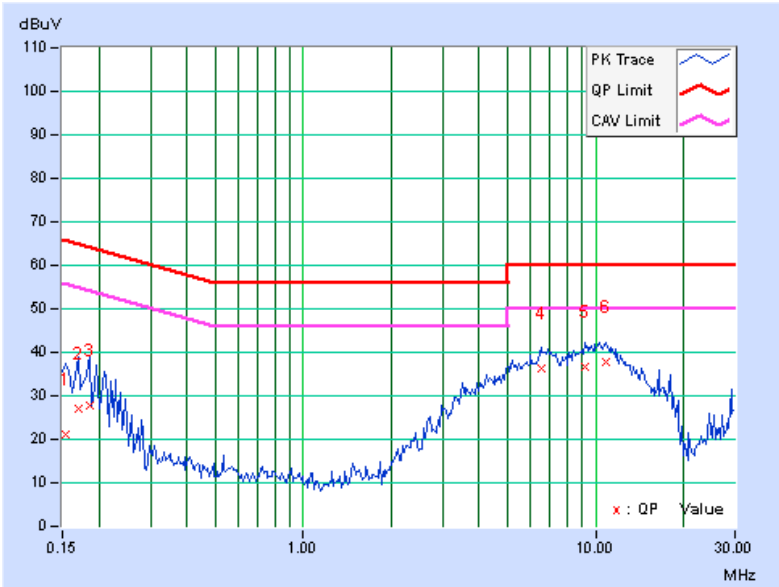
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PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.10	21.07	-0.07	21.17	0.03	65.79	55.79	-44.61	-55.75
2	0.16953	0.11	26.96	0.87	27.07	0.98	64.98	54.98	-37.92	-54.01
3	0.18516	0.11	27.56	1.69	27.67	1.80	64.25	54.25	-36.58	-52.45
4	6.53516	0.41	35.73	30.13	36.14	30.54	60.00	50.00	-23.86	-19.46
5	9.20703	0.49	36.15	31.02	36.64	31.51	60.00	50.00	-23.36	-18.49
6	10.79297	0.54	37.31	32.33	37.85	32.87	60.00	50.00	-22.15	-17.13

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 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

CONDITION	HOPPING FREQUENCY USED	APPLICATION
20dB Bandwidth <250kHz	hopping channels ≥ 50	v
20dB Bandwidth >250kHz	hopping channels ≥ 25	x

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

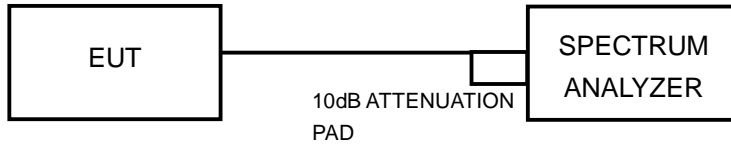
4.2.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement 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 the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.2.4 DEVIATION FROM TEST STANDARD

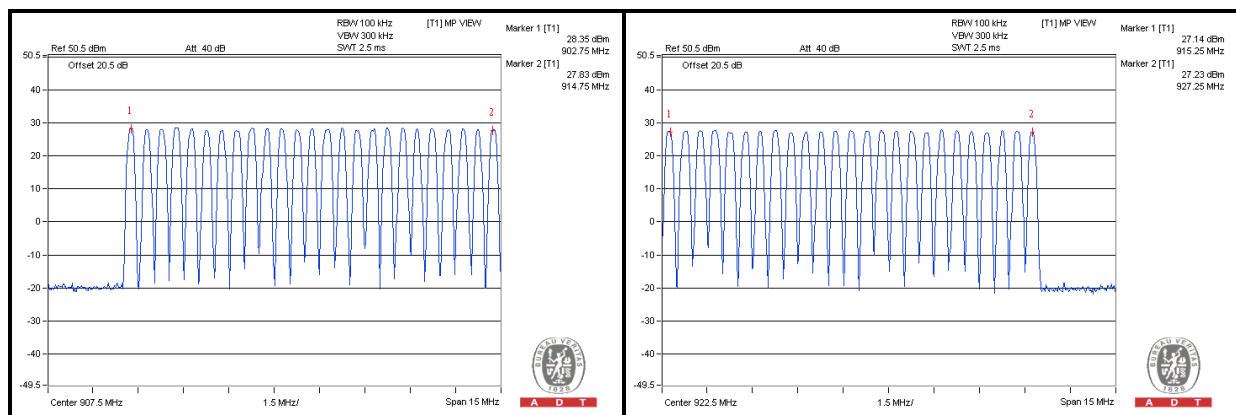
No deviation

4.2.5 TEST SETUP



4.2.6 TEST RESULTS

There are 50 hopping frequencies in the hopping mode. Please refer to next page for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

For FHSS, the average time of occupancy on any frequency shall not be greater than as below:

CONDITION	DWELL TIME	APPLICATION
20dB Bandwidth <250kHz (hopping channels ≥ 50)	0.4 seconds within a 20 second period	v
20dB Bandwidth >250kHz (hopping channels ≥ 25)	0.4 seconds within a 10 second period	x

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

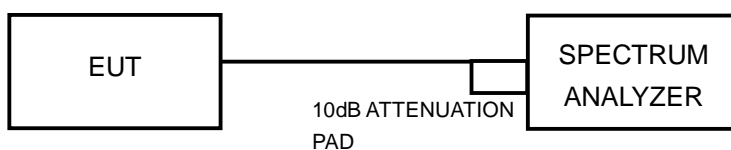
4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement 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. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP

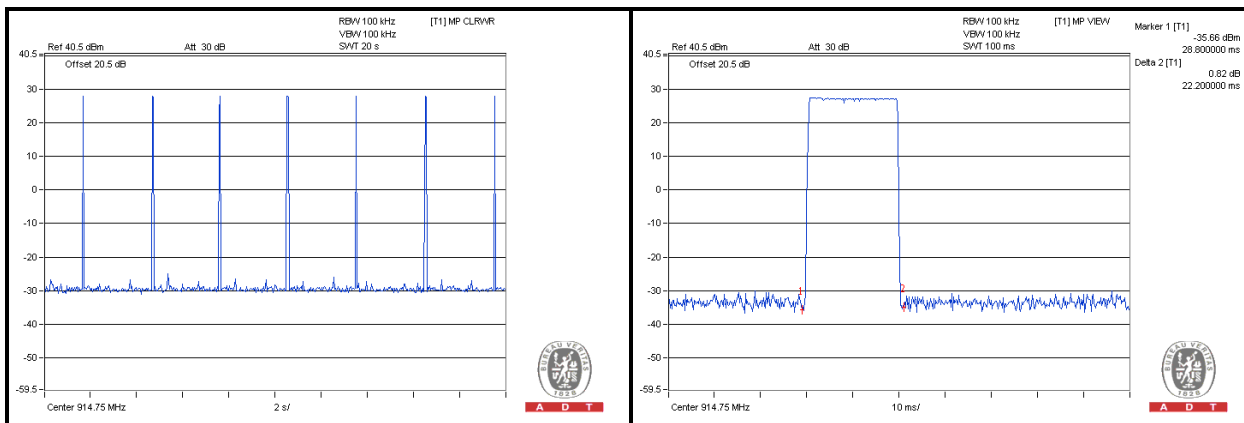




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4.3.6 TEST RESULTS

Number of transmission in a 20 s	Length of transmission time (msec)	Result (msec)	Limit (msec)
7 time	22.2	155.4	400





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4.4 CHANNEL BANDWIDTH

For frequency hopping system operating in the 902-928MHz, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.

CONDITION	APPLICATION
20dB Bandwidth <250kHz (hopping channels ≥ 50)	V
20dB Bandwidth >250kHz (hopping channels ≥ 25)	X

4.4.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

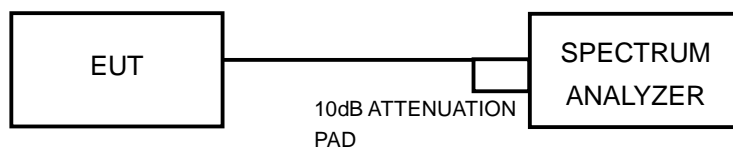
4.4.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

4.4.3 DEVIATION FROM TEST STANDARD

No deviation

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITION

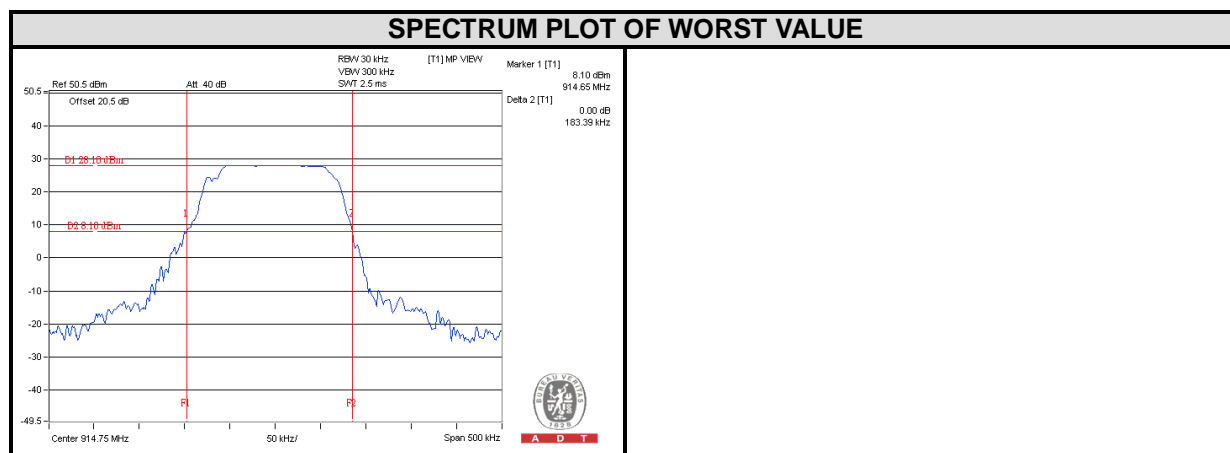
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



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4.4.6 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	902.75	0.15
24	914.75	0.18
49	927.25	0.16



4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25 kHz or 20dB hopping channel bandwidth (whichever is greater).

4.5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

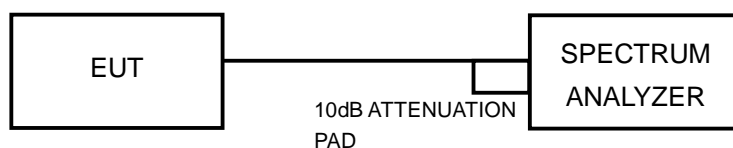
4.5.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



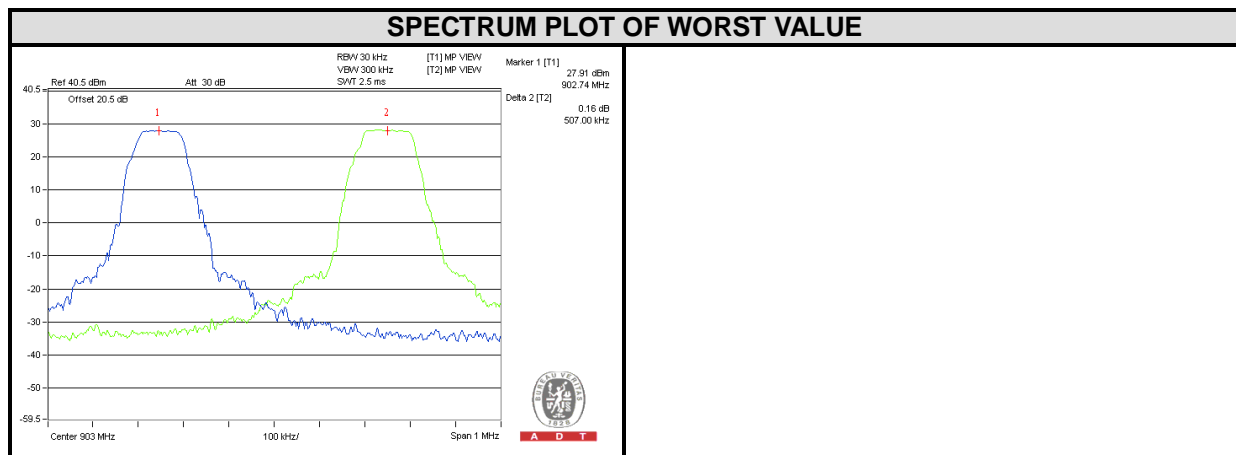


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4.5.6 TEST RESULTS

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	902.75	0.51	0.15	PASS
24	914.75	0.51	0.18	PASS
49	927.25	0.50	0.16	PASS

The minimum limit is 20dB bandwidth.



4.6 MAXIMUM PEAK OUTPUT POWER

4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement as below:

CONDITION	OUTPUT POWER	APPLICATION
hopping channels ≥ 50	1 W	v
hopping channels ≥ 25 & ≤ 50	0.25W	x

4.6.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

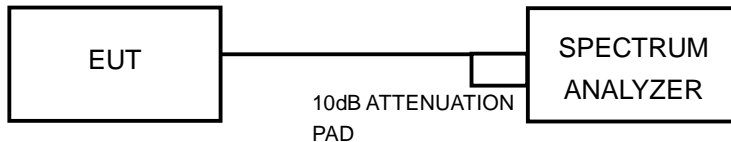
4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies measured were complete.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



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

4.6.6 EUT OPERATING CONDITION

The software (MTI RFID ME Setup v1.0.15.exe) provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 TEST RESULTS

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	902.75	668.344	28.25	1000	PASS
24	914.75	672.977	28.28	1000	PASS
49	927.25	691.831	28.40	1000	PASS

4.7 RADIATED EMISSION AND BANDEGE MEASUREMENT

4.7.1 LIMITS OF RADIATED EMISSION AND BANDEGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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.



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4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer Agilent	E4446A	MY48250253	Sep. 03, 2012	Sep. 02, 2013
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 26, 2012	June 25, 2013
Pre-Amplifier SPACEK LABS	SLKka-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
Horn_Antenna AISII	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 12, 2012	Oct. 11, 2013
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
RF Cable	NA	CHGCAB_001	Oct. 06, 2012	Oct. 05, 2013
Software	ADT_Radiated _V8.7.05	NA	NA	NA
Antenna Tower & Turn Table CT	NA	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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: May 21 to 27, 2013

4.7.3 TEST PROCEDURES

- 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 test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

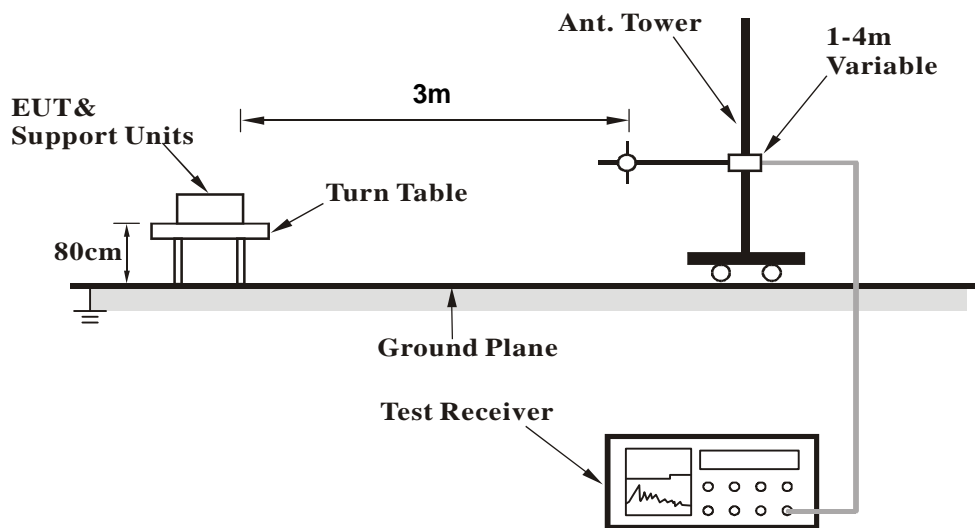
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

4.7.5 TEST SETUP



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

4.7.6 EUT OPERATING CONDITION

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.



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4.7.7 TEST RESULTS (MODE 1)

BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 0	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	101.15	30.3 QP	43.5	-13.2	2.00 H	265	48.22	-17.88
2	169.83	37.3 QP	43.5	-6.2	1.50 H	271	51.13	-13.81
3	264.06	38.6 QP	46.0	-7.4	1.50 H	360	52.70	-14.10
4	274.05	36.6 QP	46.0	-9.4	1.50 H	257	50.28	-13.67
5	385.80	37.7 QP	46.0	-8.3	1.00 H	360	48.35	-10.61
6	461.00	34.9 QP	46.0	-11.1	1.50 H	244	43.63	-8.71
7	*902.75	126.0 QP			1.16 H	343	126.30	-0.30
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	38.24	26.5 QP	40.0	-13.5	1.00 V	154	40.68	-14.22
2	169.20	37.3 QP	43.5	-6.2	1.00 V	184	51.13	-13.87
3	180.00	31.4 QP	43.5	-12.1	1.50 V	122	46.36	-14.98
4	291.56	38.1 QP	46.0	-7.9	1.00 V	356	51.17	-13.08
5	417.13	36.0 QP	46.0	-10.0	1.00 V	268	45.88	-9.89
6	569.80	36.7 QP	46.0	-9.3	1.00 V	313	43.24	-6.55
7	*902.75	128.5 QP			1.00 V	358	128.80	-0.30

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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ABOVE 1GHz DATA

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2708.25	42.2 PK	74.0	-31.8	1.00 H	43	43.07	-0.87
2	2708.25	34.5 AV	54.0	-19.5	1.00 H	43	35.37	-0.87
3	3611.00	43.7 PK	74.0	-30.3	1.00 H	354	42.31	1.39
4	3611.00	36.3 AV	54.0	-17.7	1.00 H	354	34.91	1.39
5	4513.75	46.7 PK	74.0	-27.3	1.00 H	349	42.39	4.31
6	4513.75	39.5 AV	54.0	-14.5	1.00 H	349	35.19	4.31
7	5416.50	49.8 PK	74.0	-24.2	1.00 H	44	43.24	6.56
8	5416.50	42.4 AV	54.0	-11.6	1.00 H	44	35.84	6.56
9	8124.75	53.4 PK	74.0	-20.6	1.00 H	64	40.05	13.35
10	8124.75	44.4 AV	54.0	-9.6	1.00 H	64	31.05	13.35
11	9027.50	53.5 PK	74.0	-20.5	1.00 H	10	40.21	13.29
12	9027.50	44.7 AV	54.0	-9.3	1.00 H	10	31.41	13.29

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	2708.25	43.0 PK	74.0	-31.0	1.00 V	58	43.87	-0.87
2	2708.25	34.5 AV	54.0	-19.5	1.00 V	58	35.37	-0.87
3	3611.00	44.1 PK	74.0	-29.9	1.00 V	40	42.71	1.39
4	3611.00	36.3 AV	54.0	-17.7	1.00 V	40	34.91	1.39
5	4513.75	47.8 PK	74.0	-26.2	1.00 V	44	43.49	4.31
6	4513.75	39.5 AV	54.0	-14.5	1.00 V	44	35.19	4.31
7	5416.50	51.0 PK	74.0	-23.0	1.00 V	44	44.44	6.56
8	5416.50	42.4 AV	54.0	-11.6	1.00 V	44	35.84	6.56
9	8124.75	53.0 PK	74.0	-21.0	1.00 V	258	39.65	13.35
10	8124.75	44.2 AV	54.0	-9.8	1.00 V	258	30.85	13.35
11	9027.50	52.4 PK	74.0	-21.6	1.00 V	360	39.11	13.29
12	9027.50	44.4 AV	54.0	-9.6	1.00 V	360	31.11	13.29

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	84.02	25.6 QP	40.0	-14.4	2.00 H	136	45.13	-19.53
2	168.80	35.0 QP	43.5	-8.5	2.00 H	241	48.91	-13.91
3	180.01	37.4 QP	43.5	-6.1	1.00 H	20	52.34	-14.98
4	228.03	35.5 QP	46.0	-10.5	1.00 H	268	51.95	-16.48
5	272.65	36.8 QP	46.0	-9.2	1.50 H	250	50.50	-13.67
6	410.63	36.2 QP	46.0	-9.9	2.00 H	306	46.25	-10.10
7	*914.75	126.0 QP			1.15 H	342	125.97	0.03

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	73.46	30.3 QP	40.0	-9.7	1.00 V	187	46.80	-16.54
2	84.03	34.1 QP	40.0	-5.9	1.00 V	119	53.65	-19.53
3	168.76	37.1 QP	43.5	-6.4	1.00 V	131	51.04	-13.91
3	282.69	38.3 QP	46.0	-7.7	1.50 V	275	51.63	-13.33
4	387.49	38.2 QP	46.0	-7.8	1.50 V	87	48.69	-10.52
5	398.75	36.9 QP	46.0	-9.1	1.00 V	41	47.25	-10.34
6	*914.75	127.5 QP			1.00 V	357	127.47	0.03

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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ABOVE 1GHz DATA

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2744.25	41.9 PK	74.0	-32.1	1.00 H	360	42.63	-0.73
2	2744.25	34.7 AV	54.0	-19.3	1.00 H	360	35.43	-0.73
3	3659.00	44.2 PK	74.0	-29.8	1.00 H	329	42.65	1.55
4	3659.00	36.8 AV	54.0	-17.2	1.00 H	329	35.25	1.55
5	4573.75	46.6 PK	74.0	-27.4	1.00 H	277	42.19	4.41
6	4573.75	39.9 AV	54.0	-14.1	1.00 H	277	35.49	4.41
7	7318.00	51.5 PK	74.0	-22.5	1.00 H	274	39.42	12.08
8	7318.00	44.4 AV	54.0	-9.6	1.00 H	274	32.32	12.08
9	8232.75	52.6 PK	74.0	-21.4	1.00 H	256	39.33	13.27
10	8232.75	44.5 AV	54.0	-9.5	1.00 H	256	31.23	13.27
11	9147.50	52.1 PK	74.0	-21.9	1.00 H	360	38.50	13.60
12	9147.50	44.5 AV	54.0	-9.5	1.00 H	360	30.90	13.60

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	2744.25	42.8 PK	74.0	-31.2	1.00 V	159	43.53	-0.73
2	2744.25	34.5 AV	54.0	-19.5	1.00 V	159	35.23	-0.73
3	3659.00	44.1 PK	74.0	-29.9	1.00 V	277	42.55	1.55
4	3659.00	36.8 AV	54.0	-17.2	1.00 V	277	35.25	1.55
5	4573.75	45.9 PK	74.0	-28.1	1.00 V	277	41.49	4.41
6	4573.75	39.9 AV	54.0	-14.1	1.00 V	277	35.49	4.41
7	7318.00	52.2 PK	74.0	-21.8	1.00 V	277	40.12	12.08
8	7318.00	44.5 AV	54.0	-9.5	1.00 V	277	32.42	12.08
9	8232.75	53.2 PK	74.0	-20.8	1.00 V	267	39.93	13.27
10	8232.75	44.5 AV	54.0	-9.5	1.00 V	267	31.23	13.27
11	9147.50	52.1 PK	74.0	-21.9	1.00 V	360	38.50	13.60
12	9147.50	44.3 AV	54.0	-9.7	1.00 V	360	30.70	13.60

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 49	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	83.98	33.0 QP	40.0	-7.1	2.00 H	255	52.47	-19.52
2	168.17	35.4 QP	43.5	-8.1	2.00 H	262	49.41	-13.97
3	274.69	36.0 QP	46.0	-10.0	1.50 H	351	49.63	-13.65
4	397.24	34.5 QP	46.0	-11.5	2.00 H	360	44.83	-10.37
5	412.76	38.1 QP	46.0	-7.9	2.00 H	311	48.15	-10.06
6	539.59	33.6 QP	46.0	-12.4	2.00 H	323	40.81	-7.21
7	*927.25	125.4 QP			1.14 H	345	125.10	0.30

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	83.99	26.6 QP	40.0	-13.4	2.00 V	7	46.14	-19.53
2	167.95	35.0 QP	43.5	-8.5	1.00 V	168	48.98	-13.99
3	182.10	36.6 QP	43.5	-7.0	1.00 V	171	52.04	-15.49
4	284.09	36.8 QP	46.0	-9.2	1.50 V	315	50.14	-13.33
5	331.82	38.4 QP	46.0	-7.7	1.00 V	306	50.16	-11.81
6	383.89	30.2 QP	46.0	-15.8	1.00 V	317	40.92	-10.70
7	*927.25	125.5 QP			1.00 V	353	125.20	0.30

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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ABOVE 1GHz DATA

CHANNEL	RX Channel 49	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2781.75	41.7 PK	74.0	-32.3	1.00 H	221	42.27	-0.57
2	2781.75	34.6 AV	54.0	-19.4	1.00 H	221	35.17	-0.57
3	3709.00	44.8 PK	74.0	-29.2	1.05 H	203	43.07	1.73
4	3709.00	36.9 AV	54.0	-17.1	1.05 H	203	35.17	1.73
5	4636.25	47.7 PK	74.0	-26.3	1.04 H	200	43.12	4.58
6	4636.25	40.7 AV	54.0	-13.3	1.04 H	200	36.12	4.58
7	7418.00	51.4 PK	74.0	-22.6	1.05 H	195	39.09	12.31
8	7418.00	44.1 AV	54.0	-9.9	1.05 H	195	31.79	12.31
9	8345.25	50.9 PK	74.0	-23.1	1.00 H	216	37.48	13.42
10	8345.25	44.7 AV	54.0	-9.3	1.00 H	216	31.28	13.42

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	2781.75	42.1 PK	74.0	-31.9	1.00 V	208	42.67	-0.57
2	2781.75	34.8 AV	54.0	-19.2	1.00 V	208	35.37	-0.57
3	3709.00	44.7 PK	74.0	-29.3	1.05 V	200	42.97	1.73
4	3709.00	36.8 AV	54.0	-17.2	1.05 V	200	35.07	1.73
5	4636.25	47.7 PK	74.0	-26.3	1.01 V	209	43.12	4.58
6	4636.25	40.6 AV	54.0	-13.4	1.01 V	209	36.02	4.58
7	7418.00	51.3 PK	74.0	-22.7	1.05 V	198	38.99	12.31
8	7418.00	44.1 AV	54.0	-9.9	1.05 V	198	31.79	12.31
9	8345.25	51.2 PK	74.0	-22.8	1.00 V	208	37.78	13.42
10	8345.25	44.1 AV	54.0	-9.9	1.00 V	208	30.68	13.42

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value

4.7.8 TEST RESULTS (MODE 2)

BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 0	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	119.94	29.1 QP	43.5	-14.4	2.00 H	360	44.76	-15.65
2	136.07	16.5 QP	43.5	-27.0	1.50 H	360	30.53	-14.03
3	179.95	36.9 QP	43.5	-6.6	1.50 H	26	51.84	-14.97
4	203.97	33.7 QP	43.5	-9.8	1.00 H	360	50.28	-16.62
5	398.31	20.1 QP	46.0	-25.9	1.50 H	10	30.46	-10.34
6	431.97	35.4 QP	46.0	-10.6	1.00 H	24	44.69	-9.31
7	*902.75	120.7 QP			1.00 H	311	121.00	-0.30
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	131.94	32.1 QP	43.5	-11.4	1.00 V	11	46.78	-14.66
2	155.95	34.7 QP	43.5	-8.8	1.00 V	264	48.22	-13.55
3	166.07	30.8 QP	43.5	-12.7	1.00 V	7	44.94	-14.16
4	191.96	29.1 QP	43.5	-14.4	1.00 V	264	45.59	-16.49
5	389.53	39.4 QP	46.0	-6.6	1.50 V	360	49.86	-10.48
6	590.13	39.2 QP	46.0	-6.8	1.50 V	325	45.01	-5.82
7	*902.75	114.7 QP			1.00 V	321	115.00	-0.30

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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ABOVE 1GHz DATA

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2708.25	42.9 PK	74.0	-31.1	1.01 H	53	44.36	-1.46
2	2708.25	34.9 AV	54.0	-19.1	1.01 H	53	36.36	-1.46
3	3611.00	44.0 PK	74.0	-30.0	1.05 H	353	42.73	1.27
4	3611.00	36.8 AV	54.0	-17.2	1.05 H	353	35.53	1.27
5	4513.75	46.9 PK	74.0	-27.1	1.00 H	360	42.08	4.82
6	4513.75	39.9 AV	54.0	-14.1	1.00 H	360	35.08	4.82
7	5416.50	49.6 PK	74.0	-24.4	1.00 H	50	41.64	7.96
8	5416.50	42.4 AV	54.0	-11.6	1.00 H	50	34.44	7.96
9	8124.75	53.7 PK	74.0	-20.3	1.05 H	71	40.61	13.09
10	8124.75	44.8 AV	54.0	-9.2	1.05 H	71	31.71	13.09
11	9027.50	53.4 PK	74.0	-20.6	1.05 H	10	40.58	12.82
12	9027.50	44.5 AV	54.0	-9.5	1.05 H	10	31.68	12.82

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	2708.25	42.6 PK	74.0	-31.4	1.00 V	57	43.47	-0.87
2	2708.25	34.1 AV	54.0	-19.9	1.00 V	57	34.97	-0.87
3	3611.00	44.0 PK	74.0	-30.0	1.03 V	48	42.61	1.39
4	3611.00	36.1 AV	54.0	-17.9	1.03 V	48	34.71	1.39
5	4513.75	47.1 PK	74.0	-26.9	1.04 V	29	42.79	4.31
6	4513.75	39.0 AV	54.0	-15.0	1.04 V	29	34.69	4.31
7	5416.50	50.7 PK	74.0	-23.3	1.01 V	38	44.14	6.56
8	5416.50	41.9 AV	54.0	-12.1	1.01 V	38	35.34	6.56
9	8124.75	53.1 PK	74.0	-20.9	1.00 V	245	39.75	13.35
10	8124.75	44.3 AV	54.0	-9.7	1.00 V	245	30.95	13.35
11	9027.50	52.6 PK	74.0	-21.4	1.04 V	360	39.31	13.29
12	9027.50	44.4 AV	54.0	-9.6	1.04 V	360	31.11	13.29

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 24	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	119.94	29.5 QP	43.5	-14.0	2.00 H	360	45.16	-15.65
2	136.07	26.8 QP	43.5	-16.7	1.50 H	360	40.79	-14.03
3	179.95	36.7 QP	43.5	-6.8	1.50 H	26	51.66	-14.97
4	203.97	33.5 QP	43.5	-10.0	1.00 H	360	50.13	-16.62
5	398.31	25.1 QP	46.0	-20.9	1.50 H	10	35.46	-10.34
6	431.97	35.2 QP	46.0	-10.8	1.00 H	24	44.47	-9.31
7	*914.75	120.7 QP			1.00 H	314	120.67	0.03

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	131.94	32.0 QP	43.5	-11.6	1.00 V	11	46.61	-14.66
2	155.95	34.3 QP	43.5	-9.2	1.00 V	264	47.87	-13.55
3	166.07	30.5 QP	43.5	-13.0	1.00 V	7	44.68	-14.16
4	191.96	29.5 QP	43.5	-14.0	1.00 V	264	45.99	-16.49
5	389.53	39.1 QP	46.0	-7.0	1.50 V	360	49.53	-10.48
6	590.13	38.9 QP	46.0	-7.1	1.50 V	325	44.71	-5.82
7	*914.75	115.5 QP			1.00 V	353	115.47	0.03

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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ABOVE 1GHz DATA

CHANNEL	TX Channel 24	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2744.25	42.2 PK	74.0	-31.8	1.00 H	360	42.93	-0.73
2	2744.25	34.9 AV	54.0	-19.1	1.00 H	360	35.63	-0.73
3	3659.00	44.1 PK	74.0	-29.9	1.01 H	334	42.55	1.55
4	3659.00	36.5 AV	54.0	-17.5	1.01 H	334	34.95	1.55
5	4573.75	47.1 PK	74.0	-26.9	1.00 H	285	42.69	4.41
6	4573.75	40.2 AV	54.0	-13.8	1.00 H	285	35.79	4.41
7	7318.00	51.6 PK	74.0	-22.4	1.00 H	277	39.52	12.08
8	7318.00	44.3 AV	54.0	-9.7	1.00 H	277	32.22	12.08
9	8232.75	52.9 PK	74.0	-21.1	1.00 H	241	39.63	13.27
10	8232.75	44.8 AV	54.0	-9.2	1.00 H	241	31.53	13.27
11	9147.50	52.0 PK	74.0	-22.0	1.02 H	360	38.40	13.60
12	9147.50	44.4 AV	54.0	-9.6	1.02 H	360	30.80	13.60

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	2744.25	42.3 PK	74.0	-31.7	1.00 V	166	43.03	-0.73
2	2744.25	34.1 AV	54.0	-19.9	1.00 V	166	34.83	-0.73
3	3659.00	44.5 PK	74.0	-29.5	1.10 V	290	42.95	1.55
4	3659.00	36.9 AV	54.0	-17.1	1.10 V	290	35.35	1.55
5	4573.75	46.6 PK	74.0	-27.4	1.03 V	287	42.19	4.41
6	4573.75	40.4 AV	54.0	-13.6	1.03 V	287	35.99	4.41
7	7318.00	51.8 PK	74.0	-22.2	1.00 V	282	39.72	12.08
8	7318.00	44.3 AV	54.0	-9.7	1.00 V	282	32.22	12.08
9	8232.75	53.5 PK	74.0	-20.5	1.04 V	264	40.23	13.27
10	8232.75	44.1 AV	54.0	-9.9	1.04 V	264	30.83	13.27
11	9147.50	52.5 PK	74.0	-21.5	1.01 V	360	38.90	13.60
12	9147.50	44.5 AV	54.0	-9.5	1.01 V	360	30.90	13.60

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 49	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	119.94	29.7 QP	43.5	-13.8	2.00 H	360	45.35	-15.65
2	136.07	27.0 QP	43.5	-16.5	1.50 H	360	41.04	-14.03
3	179.95	36.3 QP	43.5	-7.2	1.50 H	26	51.26	-14.97
4	203.97	33.2 QP	43.5	-10.3	1.00 H	360	49.83	-16.62
5	398.31	25.5 QP	46.0	-20.5	1.50 H	10	35.82	-10.34
6	431.97	34.9 QP	46.0	-11.1	1.00 H	24	44.20	-9.31
7	*927.25	120.6 QP			1.00 H	313	120.30	0.30

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	131.94	31.8 QP	43.5	-11.7	1.00 V	11	46.45	-14.66
2	155.95	34.0 QP	43.5	-9.5	1.00 V	264	47.57	-13.55
3	166.07	30.2 QP	43.5	-13.3	1.00 V	7	44.35	-14.16
4	191.96	29.9 QP	43.5	-13.6	1.00 V	264	46.39	-16.49
5	389.53	38.8 QP	46.0	-7.2	1.50 V	360	49.30	-10.48
6	590.13	38.5 QP	46.0	-7.5	1.50 V	325	44.31	-5.82
7	*927.25	116.3 QP			1.00 V	351	116.00	0.30

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value
5. " * ": Fundamental frequency.



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ABOVE 1GHz DATA

CHANNEL	TX Channel 49	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 10GHz		Average (AV)

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	2781.75	42.4 PK	74.0	-31.6	1.00 H	225	42.97	-0.57
2	2781.75	35.1 AV	54.0	-18.9	1.00 H	225	35.67	-0.57
3	3709.00	44.7 PK	74.0	-29.3	1.03 H	188	42.97	1.73
4	3709.00	36.6 AV	54.0	-17.4	1.03 H	188	34.87	1.73
5	4636.25	48.2 PK	74.0	-25.8	1.01 H	211	43.62	4.58
6	4636.25	41.2 AV	54.0	-12.8	1.01 H	211	36.62	4.58
7	7418.00	51.1 PK	74.0	-22.9	1.05 H	199	38.79	12.31
8	7418.00	44.9 AV	54.0	-9.1	1.05 H	199	32.59	12.31
9	8345.25	50.4 PK	74.0	-23.6	1.02 H	225	36.98	13.42
10	8345.25	44.4 AV	54.0	-9.6	1.02 H	225	30.98	13.42

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	2781.75	42.3 PK	74.0	-31.7	1.00 V	202	42.87	-0.57
2	2781.75	34.8 AV	54.0	-19.2	1.00 V	202	35.37	-0.57
3	3709.00	45.0 PK	74.0	-29.0	1.00 V	196	43.27	1.73
4	3709.00	36.9 AV	54.0	-17.1	1.00 V	196	35.17	1.73
5	4636.25	48.4 PK	74.0	-25.6	1.00 V	222	43.82	4.58
6	4636.25	41.0 AV	54.0	-13.0	1.00 V	222	36.42	4.58
7	7418.00	51.9 PK	74.0	-22.1	1.08 V	191	39.59	12.31
8	7418.00	44.7 AV	54.0	-9.3	1.08 V	191	32.39	12.31
9	8345.25	52.0 PK	74.0	-22.0	1.02 V	222	38.58	13.42
10	8345.25	44.5 AV	54.0	-9.5	1.02 V	222	31.08	13.42

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) if use
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value



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4.8 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz RBW).

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
R&S Spectrum Analyzer	FSP40	100037	Nov. 01, 2012	Oct. 31, 2013

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 : May 28, 2013

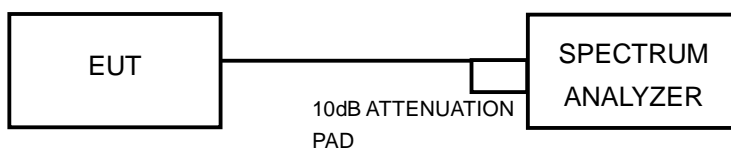
4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW of spectrum analyzer to 100kHz and VBW of spectrum analyzer to 300kHz with suitable frequency span including 20 MHz bandwidth from band edge. The band edges was measured and recorded.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP

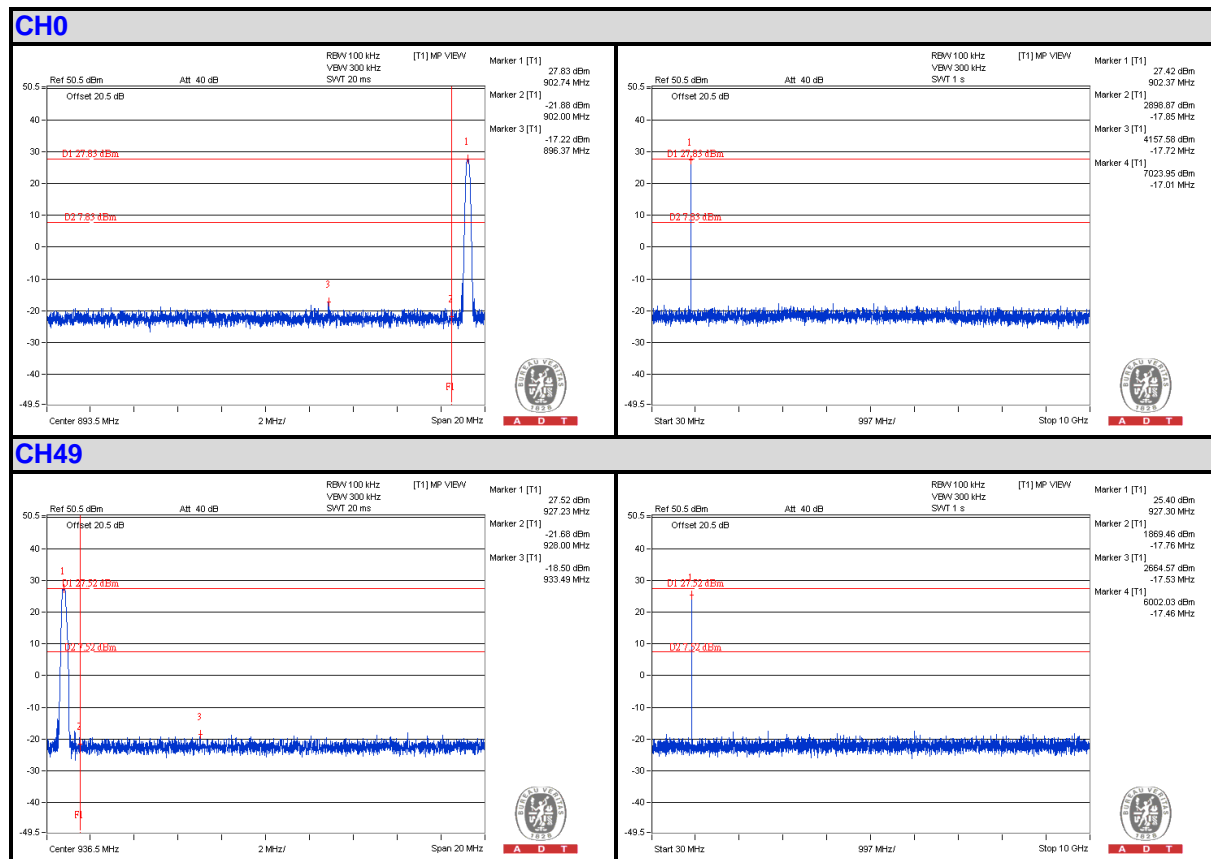


4.8.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.7 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.





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



A D T

6 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.

--- END ---