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FCC Test Report (RFID)

Report No.: RF150423E12-2

FCC ID: UZ7RFD8500

Test Model: RFD8500

Received Date: Apr. 26, 2015

Test Date: June 02 to July 02, 2015

Issued Date: July 20, 2015

Applicant: Zebra Technologies Corporation

Address: 1 Zebra Plaza, Holtsville, NY 11742

Manufacturer: Zebra Technologies Corporation

Address: 1 Zebra Plaza, Holtsville, NY 11742

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

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



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150423E12-2	Original release	July 20, 2015



A D T

1 CERTIFICATION

Product: RFD8500 UHF RFID READER

Brand: ZEBRA

Test Model: RFD8500

Sample Status: ENGINEERING SAMPLE

Applicant: Zebra Technologies Corporation

Test Date: June 02 to July 02, 2015

Standards: FCC Part 15, Subpart C (Section 15.247)

ANSI C63.10-2009

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 : *C K* , **Date:** July 20, 2015
Claire Kuan / Specialist

Approved by : *M Chen* , **Date:** July 20, 2015
May Chen / Manager



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 -17.59dB at 0.32578MHz.
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, whichever 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 -4.9dB at 9027.50MHz.
15.247(d)	Conducted Out-Band Emission 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(RFID)

Product	RFD8500 UHF RFID READER
Brand	ZEBRA
Test Model	RFD8500
Status of EUT	ENGINEERING SAMPLE
Operating Software	GENX_DEVICE 1.2.28 NGE 1.4.32.0
Power Supply Rating	DC 4.2V/3.7V from battery DC 5V or DC 12V from Cradle
Modulation Type	PR-ASK
Modulation Technology	FHSS
Operating Frequency	902.75MHz ~ 927.25MHz
Number of Channel	50
Output Power	981.748mW
Antenna Type	Please see next page
Antenna Connector	NA
Accessory Device	NA
Data Cable Supplied	Battery x 1

Note:

1. There are BT and RFID technology used for the EUT.
2. Conducted emission and Radiated emission of the simultaneous operation (Bluetooth & RFID) has been evaluated and no non-compliance was found.
3. The EUT could be supplied with a Cradle and battery as below table:

Cradle 1 (TC55 Rugged Charging Cable, not for sale together)	
Brand:	MOTOROLA / Symbol
Model No.:	CBL-TC55-CHG1-01
Input power :	+5V ----- 1.2A
Cradle 2 (USB power supply cable, not for sale together)	
Brand:	MOTOROLA / no Brand
Model No.:	25-MCXUSB-01R
Cradle 3 (5-slot, not for sale together)	
Brand:	MOTOROLA / Symbol
Model No.:	CRDUNIV
Input power :	+12V ----- 4.16A
Associated Devices:	Adapter x 2 (Adapter 1: Part No.: PWRS-124306-01R) (Adapter 2: Part No.: PWRS-14000-148C)

Adapter 1 (for Cradle 1 & 2, and not for sale together)

Brand: MOTOROLA / Symbol
 Model No.: IU08-2050120-WP
 Part No.: PWRS-124306-01R
 Input power : 100-240V, 50-60Hz, 0.2A
 Output power : +5V ----- 1.2A

Adapter 2 (for Cradle 3 only, and not for sale together)

Brand: HIPRO
 Model No.: HP-A0502R3D
 Part No.: PWRS-14000-148C
 Input power : 100-240V, 50-60Hz, 2.4A
 Output power : +12V ----- 4.16A
 Remark: Core *1pcs

Battery

Brand:	MOTOROLA / Symbol
Part No.:	82-172087-01
Rating:	4.2V/ 3.7V, 4410mAh, 16.32Wh

4. The EUT antennas information:

Bluetooth							
No.	Brand	Antenna Type	Gain (dBi) < excluded cable loss>	Connector Type	Frequency range (MHz)	Cable Loss (dB)	
1	Auden	PIFA and PCB chip	2.6	NA	2400~2483.5	1	
RFID Antenna Spec.							
No.	Brand	Antenna Type	Gain (dBi) < included cable loss>	Connector Type	Frequency range (MHz)	Cable Loss (dB)	Cable Length (mm)
1	Auden	Patch	4.63	U.fl	902~928	0.4	130

5. The EUT was pre-tested under following test modes:

Pre-test Mode	Description
Mode A	Cradle 1 + Battery
Mode B	Cradle 2 + Battery
Mode C	Cradle 3 + Battery

The worst radiated emission was found in **Mode C**. Therefore only the test data of the modes were recorded in this report.

6. 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.

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	
-	√	√	√	√	-

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ≥ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted 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	0	FHSS	PR-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	PR-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	PR-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	PR-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	PR-ASK

※ TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 63%RH	120Vac, 60Hz (System)	JyunChun.Lin
RE≥1G	25deg. C, 70%RH	3.7Vdc	Tim Ho
RE<1G	24deg. C, 76%RH	3.7Vdc	Tim Ho
	27deg. C, 76%RH		
	26deg. C, 75%RH		
APCM	25deg. C, 60%RH	3.7Vdc	Anderson Chen
OB	25deg. C, 60%RH	3.7Vdc	Anderson Chen



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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.

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.

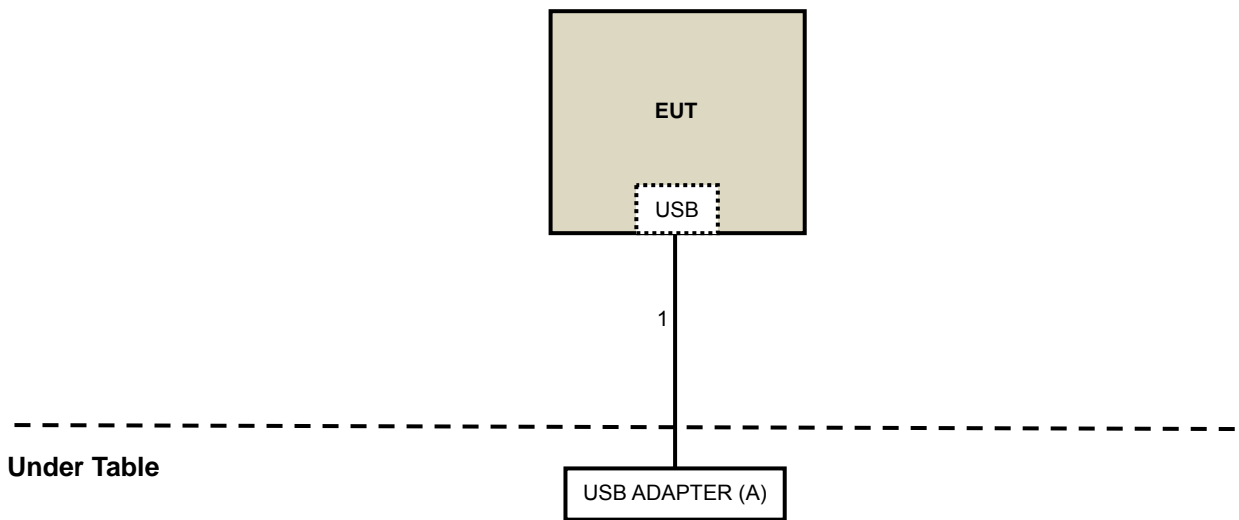
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	USB ADAPTER	Nicelink	US-T12B(W)	NA	NA	Supplied by client

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	USB	1	1	Yes	0	Supplied by client

3.6 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 (dB μ V)	
	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 R&S	ESCS 30	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
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 BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 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: June 02, 2015

4.1.3 TEST PROCEDURES

- a. The EUT 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.

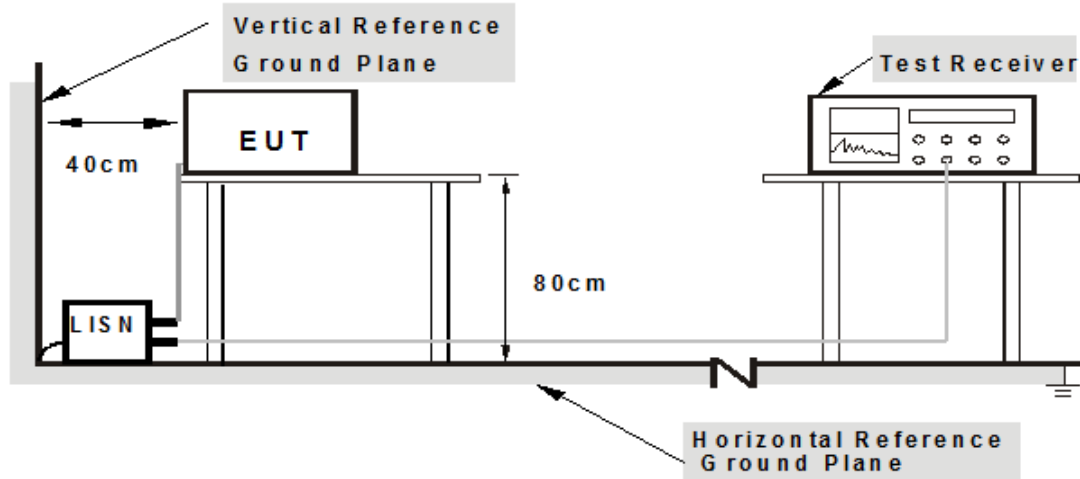
NOTE:

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 condition continuously at specific channel frequency.

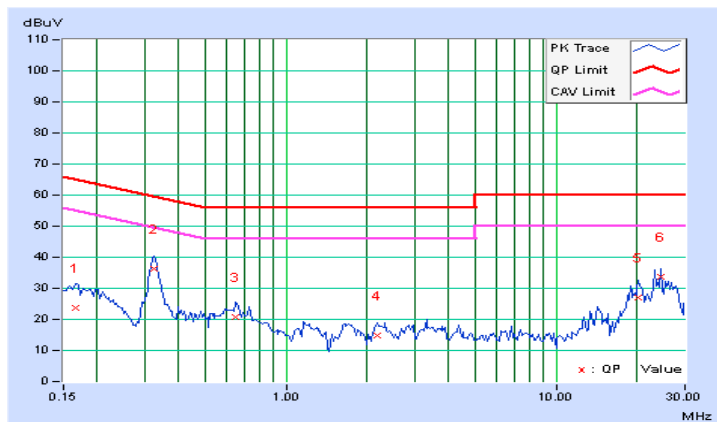
4.1.7 TEST RESULTS

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

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.14	23.74	10.95	23.88	11.09	65.18	55.18	-41.29	-44.08
2	0.32578	0.16	36.02	26.59	36.18	26.75	59.56	49.56	-23.38	-22.81
3	0.65391	0.18	20.50	12.74	20.68	12.92	56.00	46.00	-35.32	-33.08
4	2.17188	0.27	14.38	5.35	14.65	5.62	56.00	46.00	-41.35	-40.38
5	20.25781	1.12	25.96	18.73	27.08	19.85	60.00	50.00	-32.92	-30.15
6	24.45313	1.27	32.33	16.79	33.60	18.06	60.00	50.00	-26.40	-31.94

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

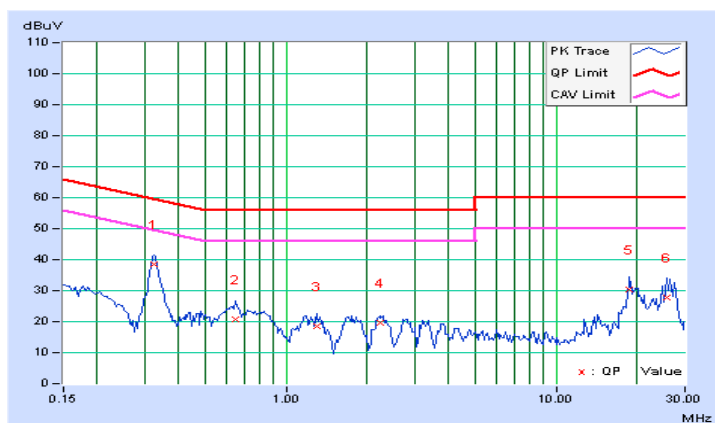


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
--------------	-------------	--------------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.32578	0.18	38.42	31.79	38.60	31.97	59.56	49.56	-20.96	-17.59
2	0.65000	0.21	20.63	12.44	20.84	12.65	56.00	46.00	-35.16	-33.35
3	1.29688	0.26	18.34	10.68	18.60	10.94	56.00	46.00	-37.40	-35.06
4	2.22266	0.31	19.36	11.14	19.67	11.45	56.00	46.00	-36.33	-34.55
5	18.62500	1.17	29.03	13.31	30.20	14.48	60.00	50.00	-29.80	-35.52
6	25.64844	1.40	26.55	15.02	27.95	16.42	60.00	50.00	-32.05	-33.58

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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

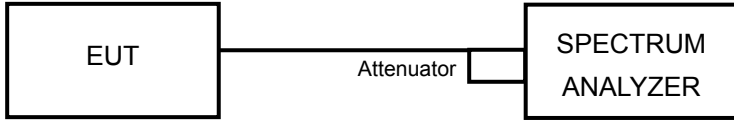
4.2.3 TEST PROCEDURES

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

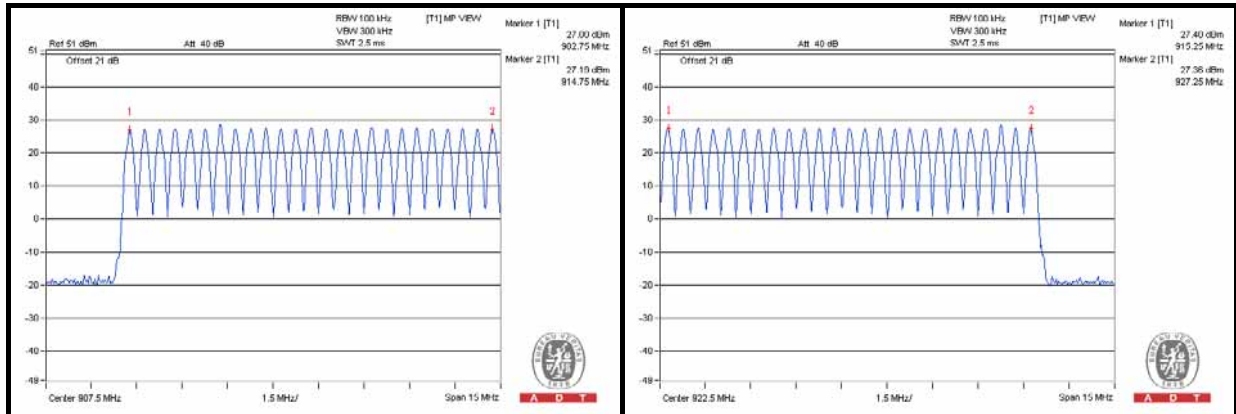
4.2.5 TEST SETUP



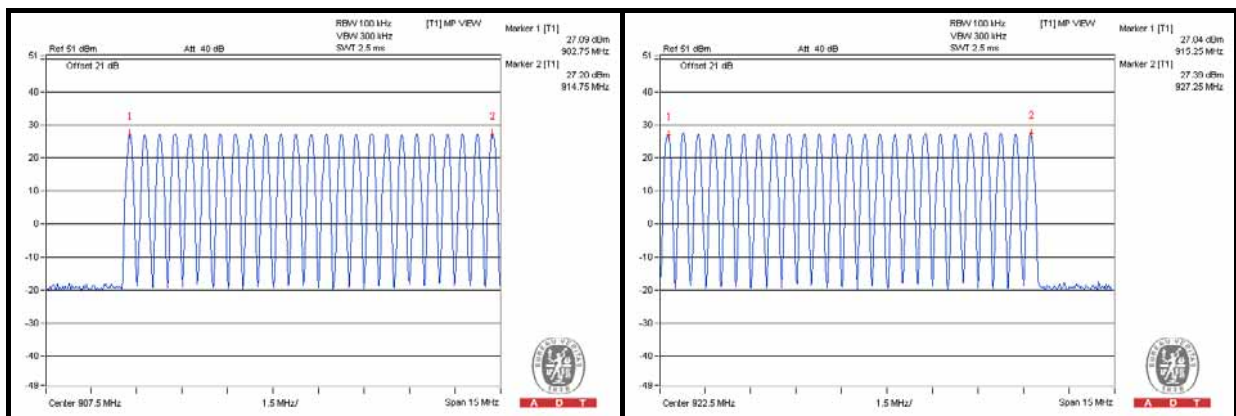
4.2.6 TEST RESULTS

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.

Link Profile 1



Link Profile 13



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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

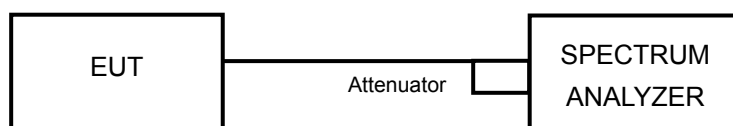
4.3.3 TEST PROCEDURES

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

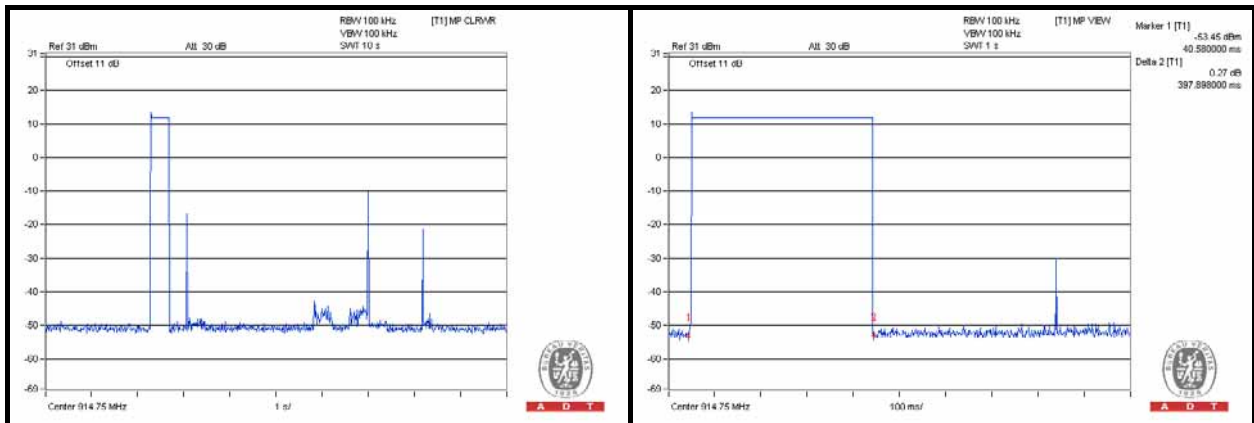
4.3.5 TEST SETUP



4.3.6 TEST RESULTS

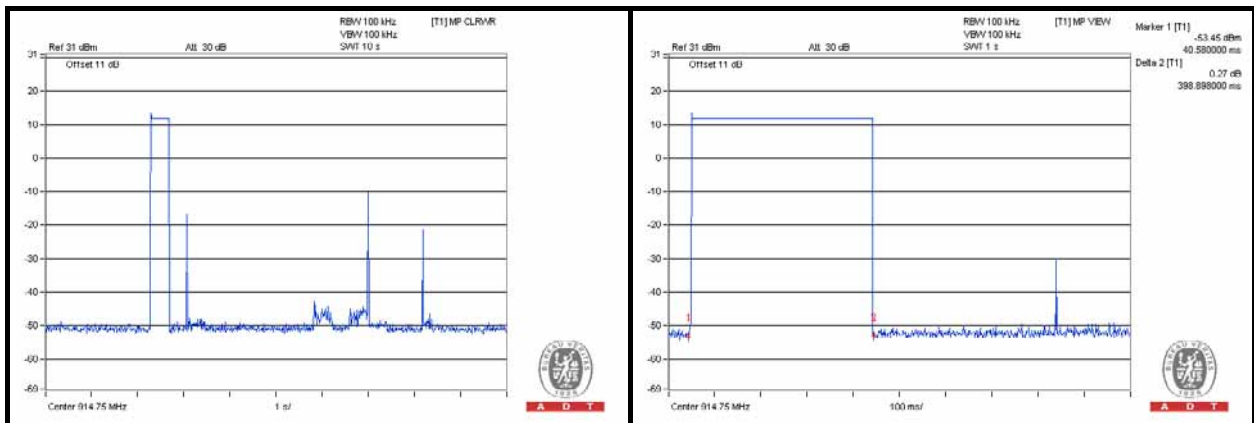
Link Profile 1

Number of transmission in a 20 s	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	397.9	397.9	400



Link Profile 13

Number of transmission in a 20 s	Length of transmission time (msec)	Result (msec)	Limit (msec)
1 time	398.9	398.9	400



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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

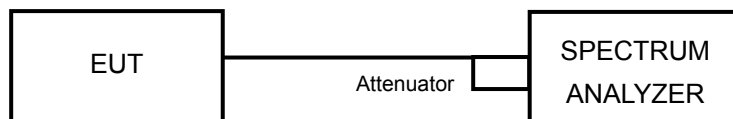
4.4.2 TEST PROCEDURE

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. Detector = peak.
5. 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

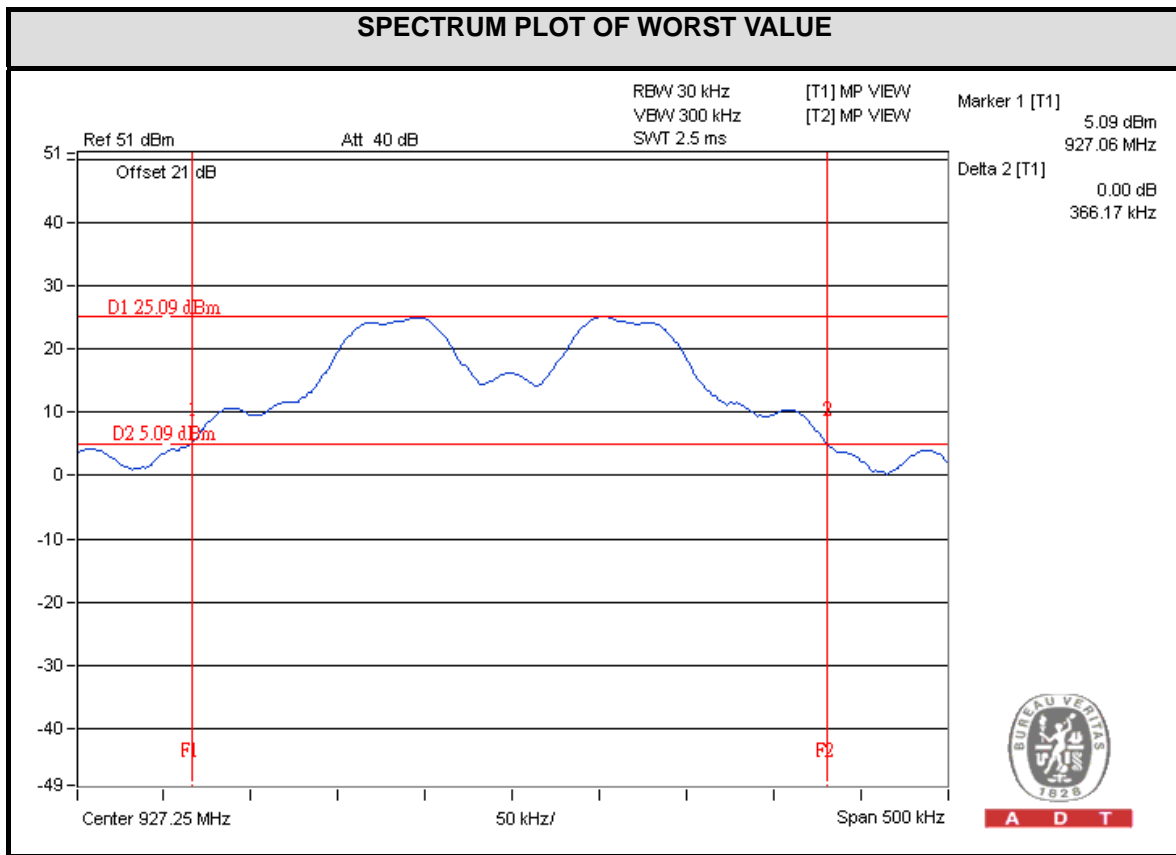
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



4.4.6 TEST RESULTS

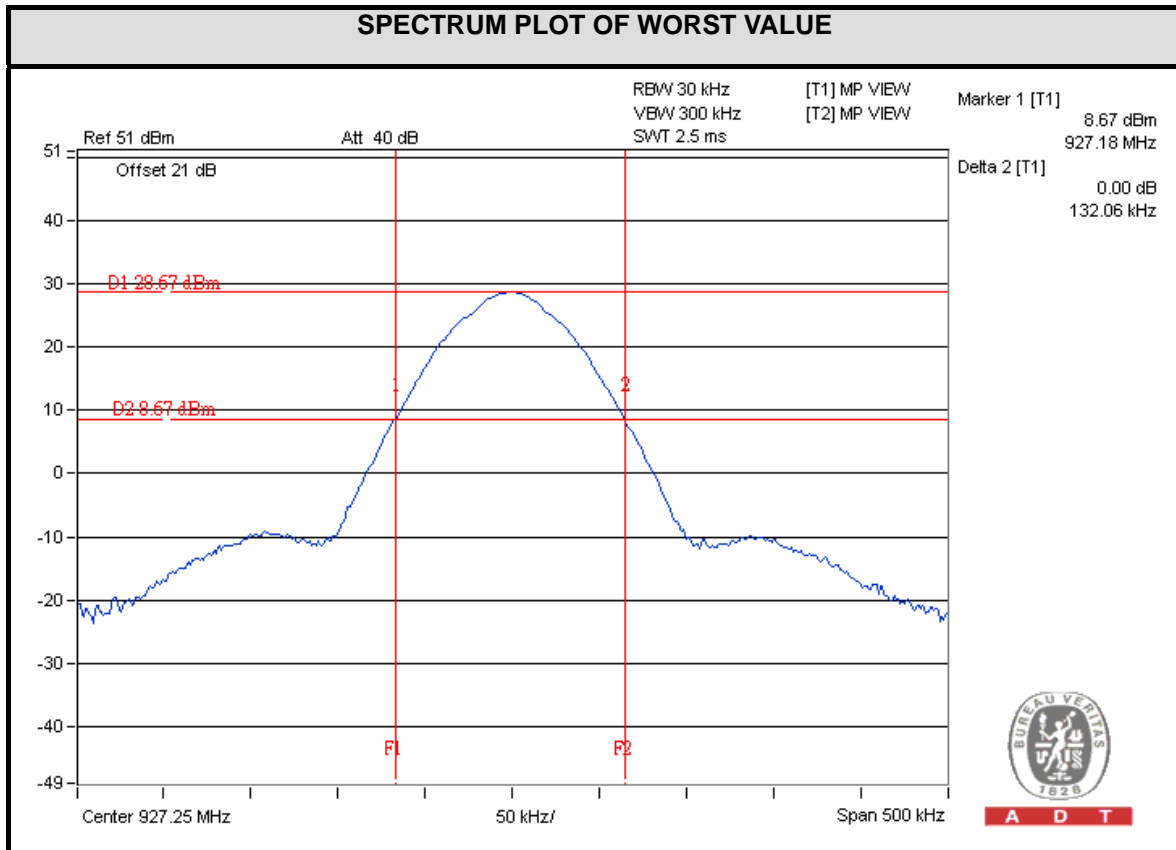
Link Profile 1

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	902.75	0.35
24	914.75	0.36
49	927.25	0.36



Link Profile 13

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	902.75	0.12
24	914.75	0.12
49	927.25	0.13



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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

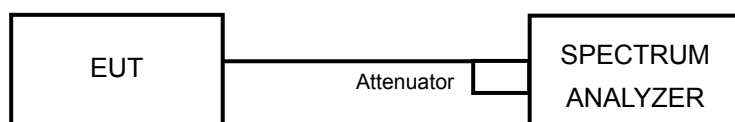
4.5.3 TEST PROCEDURES

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

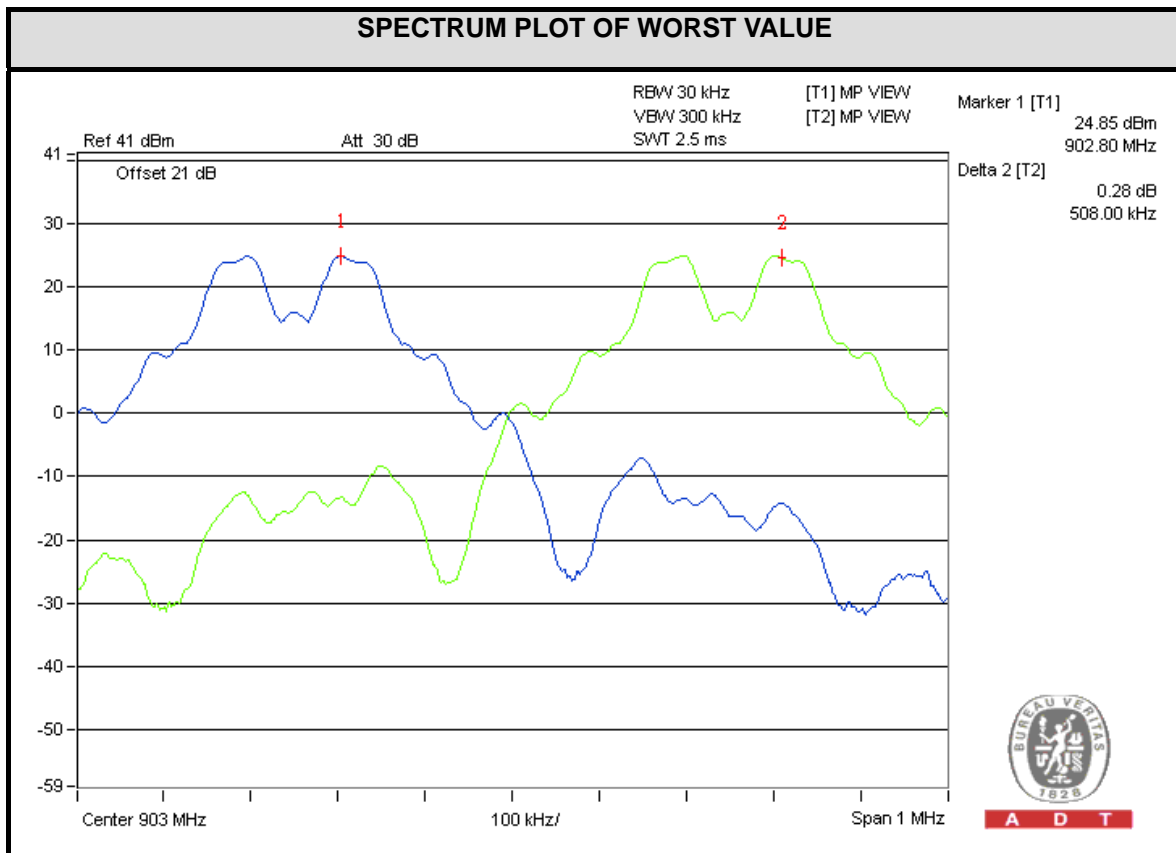


4.5.6 TEST RESULTS

Link Profile 1

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	902.75	0.51	0.35	PASS
24	914.75	0.51	0.36	PASS
49	927.25	0.51	0.36	PASS

The minimum limit is 20dB bandwidth.



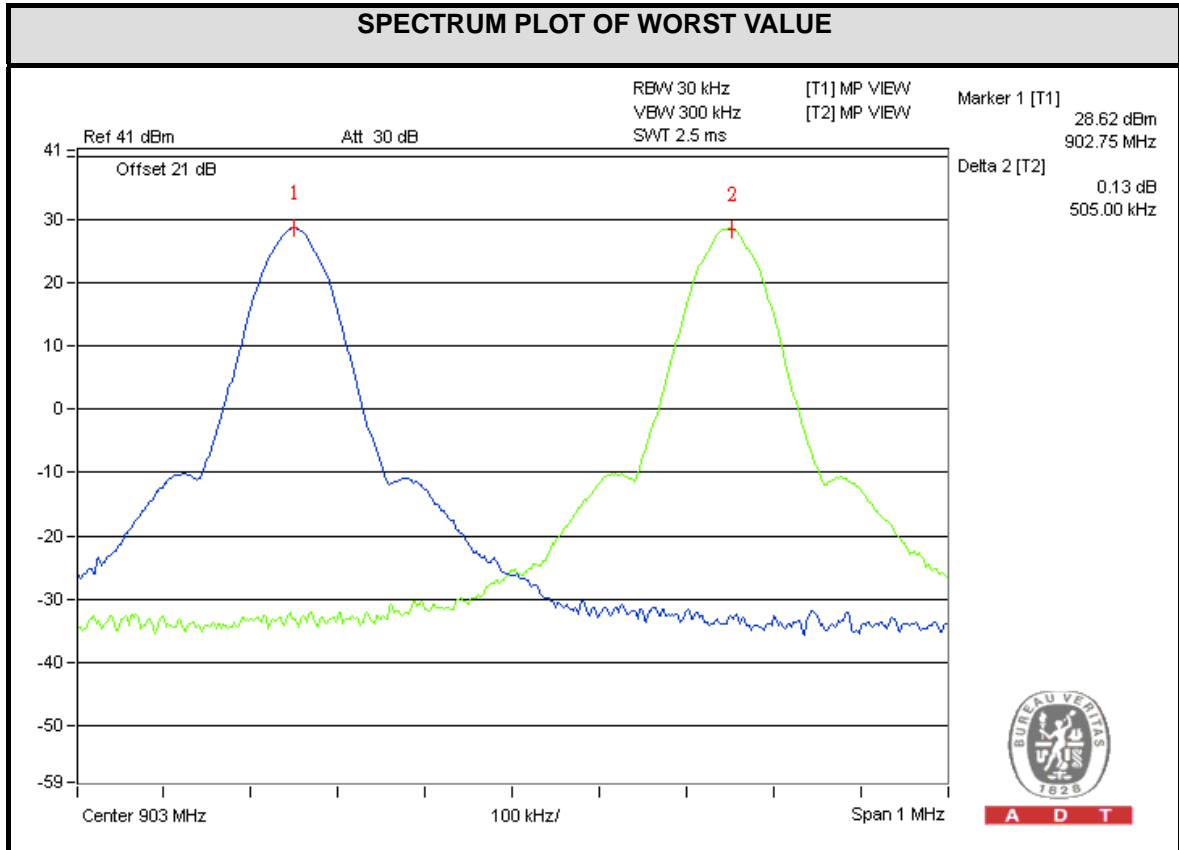


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Link Profile 13

Channel	Frequency (MHz)	Adjacent Channel Separation (MHz)	Minimum Limit (MHz)	Pass / Fail
0	902.75	0.51	0.12	PASS
24	914.75	0.50	0.12	PASS
49	927.25	0.50	0.13	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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

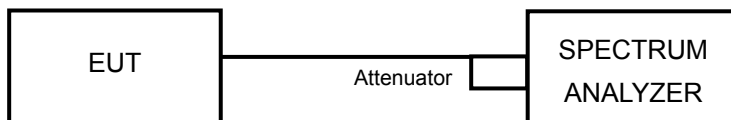
4.6.3 TEST PROCEDURES

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. Detector = peak.
5. Measure the captured power within the band and recording the plot.
6. 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 (HyperTerminal Paste Command) provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.6.7 TEST RESULTS

Link Profile 1

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	902.75	968.278	29.86	30	PASS
24	914.75	954.993	29.80	30	PASS
49	927.25	974.990	29.89	30	PASS

Link Profile 13

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (mW)	PASS/FAIL
0	902.75	981.748	29.92	30	PASS
24	914.75	961.612	29.83	30	PASS
49	927.25	968.278	29.86	30	PASS

4.7 AVERAGE OUTPUT POWER

4.7.1 FOR REFERENCE.

4.7.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016

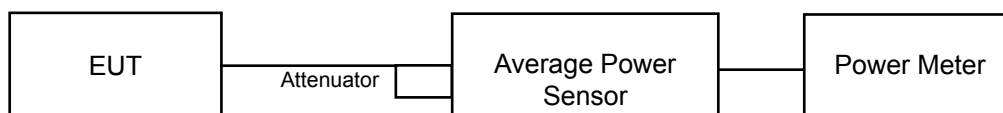
Note:

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 : June 18, 2015

4.7.3 TEST PROCEDURES

A average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

4.7.4 TEST SETUP



4.7.5 EUT OPERATING CONDITIONS

Same as Item 4.6.6



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4.7.6 TEST RESULTS

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	902.75	671.429	28.27
24	914.75	622.300	27.94
49	927.25	636.796	28.04

4.8 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.8.1 LIMITS OF RADIATED EMISSION AND BANDEDGE 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.



4.8.2 TEST INSTRUMENTS

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test 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. 09, 2015	Feb. 08, 2016
RF Cable	8D-FB	CHHCAB-001-1 CHHCAB-001-2	Oct. 05, 2014	Oct. 04, 2015
	RF-141	CHHCAB-004	Oct. 05, 2014	Oct. 04, 2015
Software	ADT_Radiated _V8.7.07	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 test was performed in 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: June 16, 2015



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For above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 21,2014	July 20,2015
Horn_Antenna AISI	AIH.8018	000032009111 0	Feb. 09, 2015	Feb. 08, 2016
Pre-Amplifier Agilent	8449B	3008A02578	June 23, 2015	June 22, 2016
RF Cable	NA	131205 131216 131217 SNMY23684/ 4	Jan. 16, 2015	Jan. 15, 2016
Software	ADT_Radiated _V8.7.07	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 test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The VCCI Site Registration No. is G-137.
5. The CANADA Site Registration No. is IC 7450H-2.
6. Tested Date: July 02, 2015

4.8.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

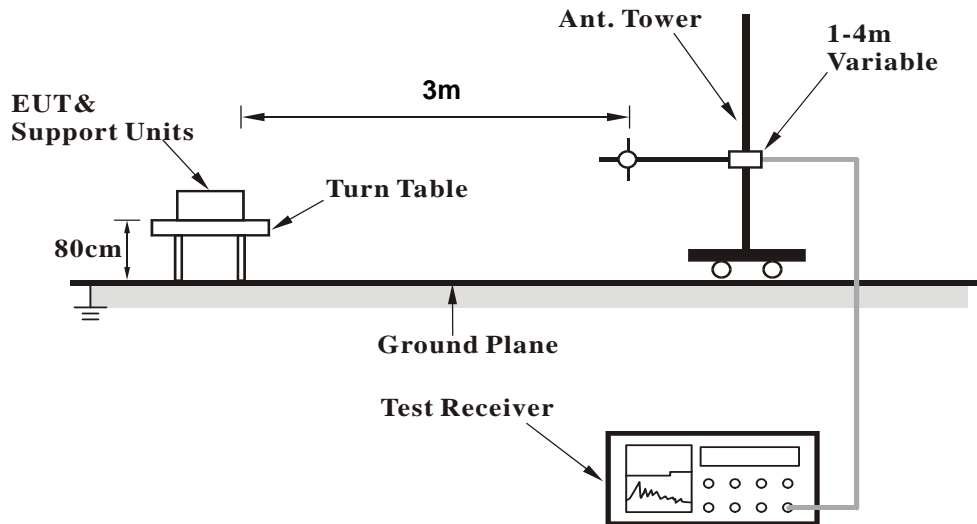
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.8.4 DEVIATION FROM TEST STANDARD

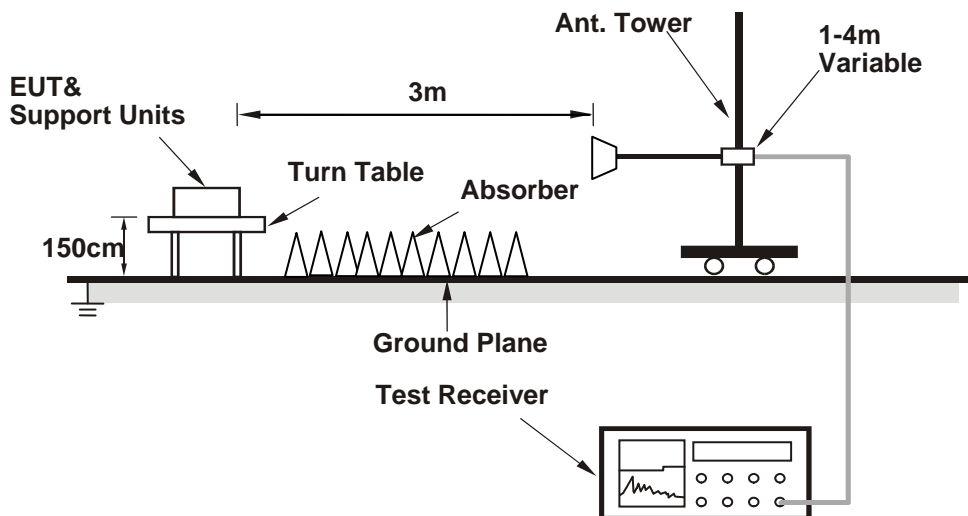
No deviation

4.8.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.8.6 EUT OPERATING CONDITION

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

4.8.7 TEST RESULTS

Link Profile 1

BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 0	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	139.86	26.4 QP	43.5	-17.1	1.10 H	110	39.75	-13.37
2	259.36	26.4 QP	46.0	-19.6	1.20 H	200	40.04	-13.64
3	432.32	24.1 QP	46.0	-21.9	1.00 H	280	32.51	-8.39
4	504.12	24.3 QP	46.0	-21.7	1.00 H	130	31.36	-7.06
5	611.38	25.4 QP	46.0	-20.6	1.20 H	115	29.84	-4.42
6	777.32	29.4 QP	46.0	-16.6	1.30 H	186	30.99	-1.57
7	902.00	76.4 QP	100.6	-24.2	1.49 H	132	76.16	0.22
8	*902.75	120.6 QP	-	-	1.49 H	132	120.37	0.25

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	32.22	28.3 QP	40.0	-11.7	1.00 V	280	43.15	-14.83
2	108.71	24.4 QP	43.5	-19.1	1.10 V	100	40.53	-16.15
3	141.19	34.4 QP	43.5	-9.1	1.00 V	298	47.69	-13.27
4	182.68	26.6 QP	43.5	-16.9	1.10 V	103	41.37	-14.81
5	247.68	30.4 QP	46.0	-15.6	1.00 V	270	44.32	-13.90
6	956.90	31.4 QP	46.0	-14.6	1.10 V	111	30.23	1.16
7	901.99	72.4 QP	99.4	-27.0	1.02 V	146	72.16	0.22
8	*902.75	119.4 QP	-	-	1.02 V	146	119.13	0.25

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 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	139.86	22.4 QP	43.5	-21.1	1.00 H	100	35.77	-13.37
2	259.38	26.4 QP	46.0	-19.6	1.00 H	260	40.06	-13.64
3	432.32	24.0 QP	46.0	-22.0	1.10 H	305	32.41	-8.39
4	504.10	24.3 QP	46.0	-21.7	1.10 H	100	31.38	-7.06
5	611.42	25.4 QP	46.0	-20.6	1.00 H	103	29.81	-4.42
6	777.48	29.4 QP	46.0	-16.6	1.60 H	195	30.95	-1.57
7	*914.75	120.3 QP	-	-	1.42 H	154	119.68	0.60

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	32.20	28.3 QP	40.0	-11.7	1.10 V	190	43.12	-14.84
2	108.68	24.4 QP	43.5	-19.1	1.00 V	120	40.57	-16.15
3	141.16	34.4 QP	43.5	-9.1	1.20 V	278	47.68	-13.27
4	182.72	26.2 QP	43.5	-17.3	1.00 V	113	41.04	-14.81
5	247.72	30.4 QP	46.0	-15.6	1.10 V	220	44.28	-13.90
6	956.78	31.4 QP	46.0	-14.6	1.00 V	101	30.26	1.16
7	*914.75	119.8 QP	-	-	1.06 V	138	119.16	0.60

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

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	139.78	22.4 QP	43.5	-21.1	1.10 H	102	35.80	-13.38
2	259.16	26.3 QP	46.0	-19.7	1.10 H	286	39.97	-13.65
3	432.15	24.1 QP	46.0	-21.9	1.10 H	315	32.52	-8.40
4	504.11	24.4 QP	46.0	-21.6	1.20 H	103	31.44	-7.06
5	611.38	25.3 QP	46.0	-20.7	1.10 H	33	29.74	-4.42
6	777.60	29.2 QP	46.0	-16.9	1.90 H	205	30.71	-1.56
7	*927.25	120.2 QP	-	-	1.50 H	132	119.30	0.92
8	928.12	81.0 QP	100.2	-19.2	1.50 H	132	80.09	0.93

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	32.16	28.3 QP	40.0	-11.7	1.00 V	160	43.17	-14.85
2	108.76	24.4 QP	43.5	-19.1	1.20 V	110	40.54	-16.14
3	141.11	34.4 QP	43.5	-9.1	1.10 V	270	47.67	-13.29
4	182.71	26.3 QP	43.5	-17.2	1.10 V	103	41.13	-14.81
5	247.68	30.3 QP	46.0	-15.8	1.00 V	190	44.15	-13.90
6	956.72	31.4 QP	46.0	-14.6	1.20 V	160	30.22	1.16
7	*927.25	119.1 QP	-	-	1.06 V	140	118.21	0.92
8	928.00	76.3 QP	99.1	-22.9	1.06 V	140	75.33	0.93

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.



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	3611.00	43.3 PK	74.0	-30.7	1.42 H	222	41.69	1.61
2	3611.00	33.6 AV	54.0	-20.4	1.42 H	222	31.99	1.61
3	4513.75	52.0 PK	74.0	-22.0	1.09 H	242	46.03	5.97
4	4513.75	45.1 AV	54.0	-8.9	1.09 H	242	39.13	5.97
5	5416.50	49.6 PK	74.0	-24.4	1.00 H	0	40.62	8.98
6	5416.50	37.9 AV	54.0	-16.1	1.00 H	0	28.92	8.98
7	8124.75	58.5 PK	74.0	-15.5	2.01 H	202	44.82	13.68
8	8124.75	46.9 AV	54.0	-7.1	2.01 H	202	33.22	13.68
9	9027.50	58.8 PK	74.0	-15.2	1.91 H	335	45.28	13.52
10	9027.50	47.6 AV	54.0	-6.4	1.91 H	335	34.08	13.52

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	3611.00	41.8 PK	74.0	-32.2	1.61 V	183	40.19	1.61
2	3611.00	31.1 AV	54.0	-22.9	1.61 V	183	29.49	1.61
3	4513.75	52.3 PK	74.0	-21.7	1.93 V	215	46.33	5.97
4	4513.75	45.9 AV	54.0	-8.1	1.93 V	215	39.93	5.97
5	5416.50	50.7 PK	74.0	-23.3	1.25 V	203	41.72	8.98
6	5416.50	40.1 AV	54.0	-13.9	1.25 V	203	31.12	8.98
7	8124.75	59.5 PK	74.0	-14.5	1.94 V	311	45.82	13.68
8	8124.75	47.6 AV	54.0	-6.4	1.94 V	311	33.92	13.68
9	9027.50	59.7 PK	74.0	-14.3	1.23 V	6	46.18	13.52
10	9027.50	49.1 AV	54.0	-4.9	1.23 V	6	35.58	13.52

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



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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	45.6 PK	74.0	-28.4	2.34 H	289	46.53	-0.93
2	2744.25	35.8 AV	54.0	-18.2	2.34 H	289	36.73	-0.93
3	3659.00	43.6 PK	74.0	-30.4	1.46 H	229	41.78	1.82
4	3659.00	31.0 AV	54.0	-23.0	1.46 H	229	29.18	1.82
5	4573.75	47.7 PK	74.0	-26.3	1.12 H	255	41.54	6.16
6	4573.75	38.7 AV	54.0	-15.3	1.12 H	255	32.54	6.16
7	7318.00	55.9 PK	74.0	-18.1	1.94 H	11	41.43	14.47
8	7318.00	45.5 AV	54.0	-8.5	1.94 H	11	31.03	14.47
9	8232.75	54.0 PK	74.0	-20.0	1.26 H	313	40.57	13.43
10	8232.75	44.3 AV	54.0	-9.7	1.26 H	313	30.87	13.43
11	9147.50	56.6 PK	74.0	-17.4	1.57 H	148	43.19	13.41
12	9147.50	46.7 AV	54.0	-7.3	1.57 H	148	33.29	13.41

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	44.9 PK	74.0	-29.1	1.89 V	253	45.83	-0.93
2	2744.25	33.7 AV	54.0	-20.3	1.89 V	253	34.63	-0.93
3	3659.00	43.1 PK	74.0	-30.9	1.37 V	154	41.28	1.82
4	3659.00	32.6 AV	54.0	-21.4	1.37 V	154	30.78	1.82
5	4573.75	47.1 PK	74.0	-26.9	1.19 V	56	40.94	6.16
6	4573.75	38.3 AV	54.0	-15.7	1.19 V	56	32.14	6.16
7	7318.00	56.7 PK	74.0	-17.3	1.87 V	220	42.23	14.47
8	7318.00	45.6 AV	54.0	-8.4	1.87 V	220	31.13	14.47
9	8232.75	54.5 PK	74.0	-19.5	2.09 V	159	41.07	13.43
10	8232.75	43.5 AV	54.0	-10.5	2.09 V	159	30.07	13.43
11	9147.50	58.6 PK	74.0	-15.4	2.04 V	164	45.19	13.41
12	9147.50	47.9 AV	54.0	-6.1	2.04 V	164	34.49	13.41

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



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	44.6 PK	74.0	-29.4	2.33 H	292	45.52	-0.92
2	2781.75	34.9 AV	54.0	-19.1	2.33 H	292	35.82	-0.92
3	3709.00	43.9 PK	74.0	-30.1	1.44 H	237	41.84	2.06
4	3709.00	34.1 AV	54.0	-19.9	1.44 H	237	32.04	2.06
5	4636.25	49.9 PK	74.0	-24.1	2.18 H	250	43.53	6.37
6	4636.25	39.1 AV	54.0	-14.9	2.18 H	250	32.73	6.37
7	7418.00	57.1 PK	74.0	-16.9	2.31 H	308	42.57	14.53
8	7418.00	45.5 AV	54.0	-8.5	2.31 H	308	30.97	14.53
9	8345.25	54.7 PK	74.0	-19.3	1.18 H	314	41.38	13.32
10	8345.25	44.7 AV	54.0	-9.3	1.18 H	314	31.38	13.32

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	45.3 PK	74.0	-28.7	2.06 V	188	46.22	-0.92
2	2781.75	32.9 AV	54.0	-21.1	2.06 V	188	33.82	-0.92
3	3709.00	45.8 PK	74.0	-28.2	1.87 V	197	43.74	2.06
4	3709.00	35.6 AV	54.0	-18.4	1.87 V	197	33.54	2.06
5	4636.25	51.2 PK	74.0	-22.8	2.08 V	19	44.83	6.37
6	4636.25	42.2 AV	54.0	-11.8	2.08 V	19	35.83	6.37
7	7418.00	55.5 PK	74.0	-18.5	1.96 V	77	40.97	14.53
8	7418.00	46.2 AV	54.0	-7.8	1.96 V	77	31.67	14.53
9	8345.25	55.4 PK	74.0	-18.6	1.91 V	75	42.08	13.32
10	8345.25	42.7 AV	54.0	-11.3	1.91 V	75	29.38	13.32

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

Link Profile 13
BELOW 1GHz WORST-CASE DATA

CHANNEL	TX Channel 0	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	139.80	22.4 QP	43.5	-21.1	1.10 H	112	35.80	-13.38
2	259.20	26.4 QP	46.0	-19.6	1.10 H	310	40.03	-13.65
3	432.15	24.1 QP	46.0	-21.9	1.10 H	305	32.52	-8.40
4	504.11	24.1 QP	46.0	-21.9	1.50 H	103	31.19	-7.06
5	611.40	25.4 QP	46.0	-20.6	1.40 H	233	29.81	-4.42
6	777.61	29.2 QP	46.0	-16.9	1.90 H	235	30.71	-1.56
7	902.00	52.9 QP	102.5	-49.6	1.42 H	215	52.08	0.82
8	*902.75	122.4 QP	-	-	1.42 H	215	121.53	0.85

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	32.18	28.2 QP	40.0	-11.8	1.10 V	301	43.00	-14.84
2	108.72	24.4 QP	43.5	-19.1	1.00 V	103	40.55	-16.15
3	141.20	34.4 QP	43.5	-9.1	1.10 V	302	47.65	-13.27
4	182.68	26.6 QP	43.5	-16.9	1.20 V	73	41.43	-14.81
5	247.52	30.4 QP	46.0	-15.6	1.10 V	290	44.28	-13.90
6	956.91	31.3 QP	46.0	-14.7	1.20 V	121	30.16	1.16
7	902.00	46.4 QP	101.9	-55.6	1.16 V	76	45.56	0.82
8	*902.75	121.9 QP	-	-	1.16 V	76	121.09	0.85

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 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	139.85	22.4 QP	43.5	-21.1	1.00 H	122	35.75	-13.37
2	259.21	26.3 QP	46.0	-19.7	1.00 H	308	39.92	-13.65
3	432.02	24.1 QP	46.0	-21.9	1.00 H	315	32.48	-8.40
4	504.14	24.3 QP	46.0	-21.7	1.50 H	43	31.33	-7.06
5	611.42	25.5 QP	46.0	-20.6	1.50 H	73	29.87	-4.42
6	777.63	29.0 QP	46.0	-17.0	2.00 H	245	30.59	-1.56
7	*914.75	122.4 QP	-	-	1.42 H	186	121.25	1.19

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	32.43	28.3 QP	40.0	-11.7	1.50 V	341	43.08	-14.78
2	108.86	24.5 QP	43.5	-19.0	1.00 V	83	40.64	-16.13
3	141.31	34.5 QP	43.5	-9.0	1.50 V	360	47.77	-13.27
4	182.78	26.7 QP	43.5	-16.8	1.00 V	34	41.55	-14.81
5	247.57	30.6 QP	46.0	-15.4	1.00 V	46	44.49	-13.90
6	956.98	31.1 QP	46.0	-14.9	1.50 V	161	29.97	1.16
7	*914.75	121.5 QP	-	-	1.12 V	75	120.34	1.19

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 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	139.78	22.4 QP	43.5	-21.1	1.00 H	102	35.76	-13.38
2	259.19	26.4 QP	46.0	-19.6	1.00 H	303	40.07	-13.65
3	432.11	24.0 QP	46.0	-22.0	1.00 H	300	32.43	-8.40
4	504.11	24.1 QP	46.0	-21.9	1.10 H	115	31.17	-7.06
5	611.40	25.4 QP	46.0	-20.6	1.10 H	203	29.84	-4.42
6	777.56	29.1 QP	46.0	-16.9	1.80 H	215	30.68	-1.57
7	*927.25	122.5 QP	-	-	1.40 H	222	121.15	1.38
8	928.06	53.3 QP	102.5	-49.3	1.40 H	222	51.87	1.39

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	32.40	28.3 QP	40.0	-11.7	1.60 V	311	43.07	-14.79
2	108.81	24.4 QP	43.5	-19.1	1.10 V	73	40.56	-16.14
3	141.30	34.5 QP	43.5	-9.0	1.30 V	310	47.73	-13.27
4	182.71	26.7 QP	43.5	-16.8	1.20 V	64	41.51	-14.81
5	247.56	30.3 QP	46.0	-15.7	1.20 V	360	44.19	-13.90
6	956.91	31.4 QP	46.0	-14.6	1.60 V	131	30.22	1.16
7	*927.25	121.5 QP	-	-	1.25 V	76	120.08	1.38
8	928.10	48.5 QP	101.5	-53.0	1.25 V	76	47.07	1.39

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.



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	3611.00	44.4 PK	74.0	-29.6	1.75 H	257	42.79	1.61
2	3611.00	32.3 AV	54.0	-21.7	1.75 H	257	30.69	1.61
3	4513.75	50.9 PK	74.0	-23.1	1.96 H	245	44.93	5.97
4	4513.75	42.7 AV	54.0	-11.3	1.96 H	245	36.73	5.97
5	5416.50	49.1 PK	74.0	-24.9	1.06 H	206	40.12	8.98
6	5416.50	38.5 AV	54.0	-15.5	1.06 H	206	29.52	8.98
7	8124.75	56.5 PK	74.0	-17.5	2.05 H	318	42.82	13.68
8	8124.75	45.2 AV	54.0	-8.8	2.05 H	318	31.52	13.68
9	9027.50	58.5 PK	74.0	-15.5	1.75 H	333	44.98	13.52
10	9027.50	47.1 AV	54.0	-6.9	1.75 H	333	33.58	13.52

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	3611.00	44.5 PK	74.0	-29.5	1.70 V	339	42.89	1.61
2	3611.00	31.9 AV	54.0	-22.1	1.70 V	339	30.29	1.61
3	4513.75	50.3 PK	74.0	-23.7	1.58 V	218	44.33	5.97
4	4513.75	41.4 AV	54.0	-12.6	1.58 V	218	35.43	5.97
5	5416.50	49.1 PK	74.0	-24.9	1.59 V	8	40.12	8.98
6	5416.50	36.4 AV	54.0	-17.6	1.59 V	8	27.42	8.98
7	8124.75	57.2 PK	74.0	-16.8	1.96 V	359	43.52	13.68
8	8124.75	45.3 AV	54.0	-8.7	1.96 V	359	31.62	13.68
9	9027.50	59.6 PK	74.0	-14.4	1.77 V	9	46.08	13.52
10	9027.50	48.4 AV	54.0	-5.6	1.77 V	9	34.88	13.52

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



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	45.4 PK	74.0	-28.6	2.32 H	289	46.33	-0.93
2	2744.25	35.3 AV	54.0	-18.7	2.32 H	289	36.23	-0.93
3	3659.00	44.2 PK	74.0	-29.8	1.70 H	261	42.38	1.82
4	3659.00	32.3 AV	54.0	-21.7	1.70 H	261	30.48	1.82
5	4573.75	51.5 PK	74.0	-22.5	1.93 H	233	45.34	6.16
6	4573.75	43.1 AV	54.0	-10.9	1.93 H	233	36.94	6.16
7	7318.00	56.4 PK	74.0	-17.6	2.02 H	125	41.93	14.47
8	7318.00	45.5 AV	54.0	-8.5	2.02 H	125	31.03	14.47
9	8232.75	57.5 PK	74.0	-16.5	2.07 H	206	44.07	13.43
10	8232.75	46.6 AV	54.0	-7.4	2.07 H	206	33.17	13.43
11	9147.50	56.7 PK	74.0	-17.3	1.65 H	145	43.29	13.41
12	9147.50	47.4 AV	54.0	-6.6	1.65 H	145	33.99	13.41

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	44.1 PK	74.0	-29.9	1.52 V	345	45.03	-0.93
2	2744.25	33.2 AV	54.0	-20.8	1.52 V	345	34.13	-0.93
3	3659.00	42.6 PK	74.0	-31.4	1.71 V	360	40.78	1.82
4	3659.00	32.9 AV	54.0	-21.1	1.71 V	360	31.08	1.82
5	4573.75	50.4 PK	74.0	-23.6	1.93 V	200	44.24	6.16
6	4573.75	43.7 AV	54.0	-10.3	1.93 V	200	37.54	6.16
7	7318.00	56.7 PK	74.0	-17.3	1.99 V	227	42.23	14.47
8	7318.00	45.8 AV	54.0	-8.2	1.99 V	227	31.33	14.47
9	8232.75	53.8 PK	74.0	-20.2	1.84 V	68	40.37	13.43
10	8232.75	44.2 AV	54.0	-9.8	1.84 V	68	30.77	13.43
11	9147.50	57.9 PK	74.0	-16.1	1.92 V	164	44.49	13.41
12	9147.50	48.1 AV	54.0	-5.9	1.92 V	164	34.69	13.41

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



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	45.8 PK	74.0	-28.2	2.31 H	288	46.72	-0.92
2	2781.75	36.1 AV	54.0	-17.9	2.31 H	288	37.02	-0.92
3	3709.00	44.7 PK	74.0	-29.3	1.78 H	259	42.64	2.06
4	3709.00	32.5 AV	54.0	-21.5	1.78 H	259	30.44	2.06
5	4636.25	51.1 PK	74.0	-22.9	2.25 H	67	44.73	6.37
6	4636.25	40.2 AV	54.0	-13.8	2.25 H	67	33.83	6.37
7	7418.00	56.4 PK	74.0	-17.6	1.86 H	122	41.87	14.53
8	7418.00	44.9 AV	54.0	-9.1	1.86 H	122	30.37	14.53
9	8345.25	56.8 PK	74.0	-17.2	2.07 H	197	43.48	13.32
10	8345.25	46.4 AV	54.0	-7.6	2.07 H	197	33.08	13.32

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	44.9 PK	74.0	-29.1	1.63 V	161	45.82	-0.92
2	2781.75	32.3 AV	54.0	-21.7	1.63 V	161	33.22	-0.92
3	3709.00	45.8 PK	74.0	-28.2	1.94 V	345	43.74	2.06
4	3709.00	35.2 AV	54.0	-18.8	1.94 V	345	33.14	2.06
5	4636.25	52.4 PK	74.0	-21.6	1.81 V	195	46.03	6.37
6	4636.25	44.7 AV	54.0	-9.3	1.81 V	195	38.33	6.37
7	7418.00	57.1 PK	74.0	-16.9	1.79 V	202	42.57	14.53
8	7418.00	46.6 AV	54.0	-7.4	1.79 V	202	32.07	14.53
9	8345.25	55.1 PK	74.0	-18.9	1.82 V	248	41.78	13.32
10	8345.25	42.6 AV	54.0	-11.4	1.82 V	248	29.28	13.32

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

4.9 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
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: June 18, 2015

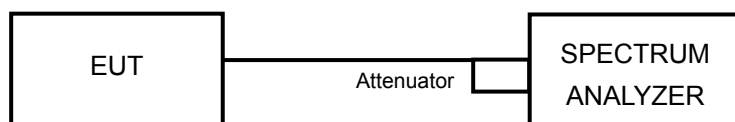
4.8.3 TEST PROCEDURE

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



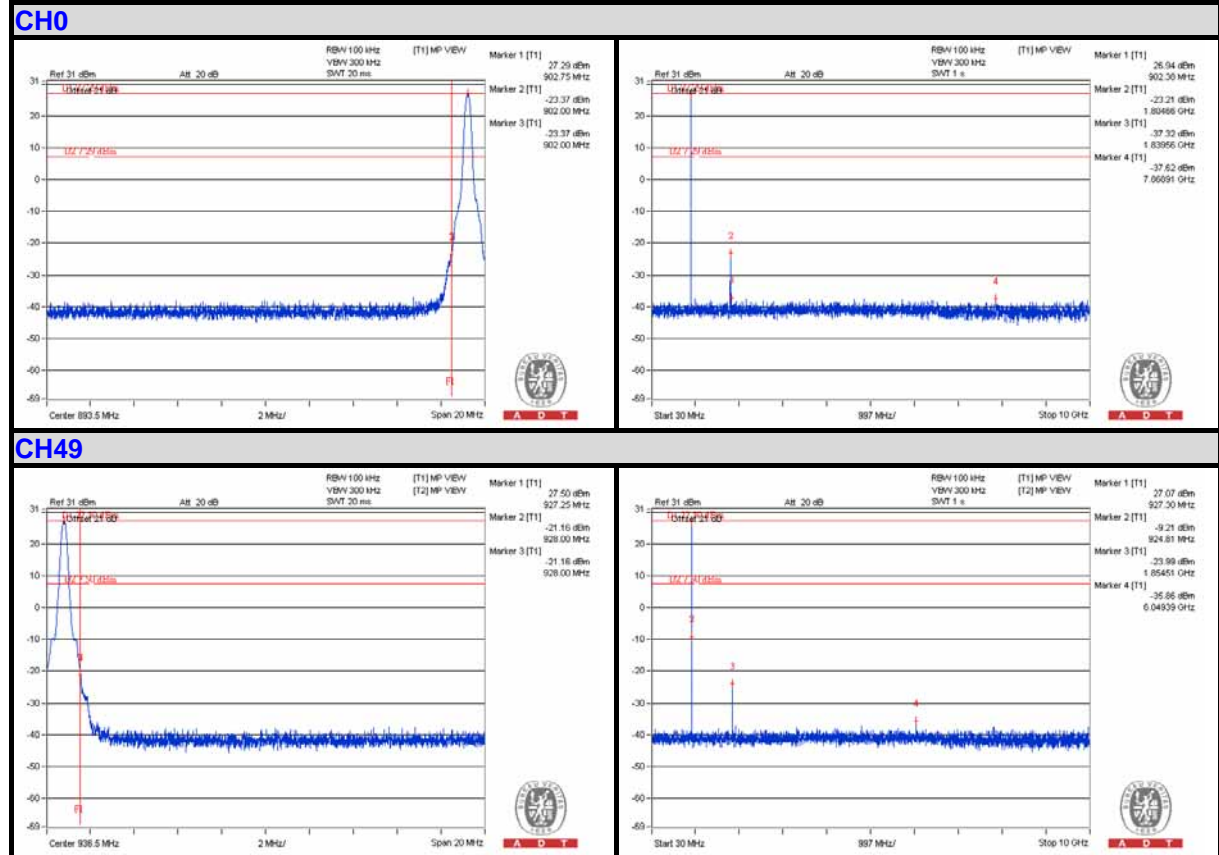
4.8.6 EUT OPERATING CONDITION

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

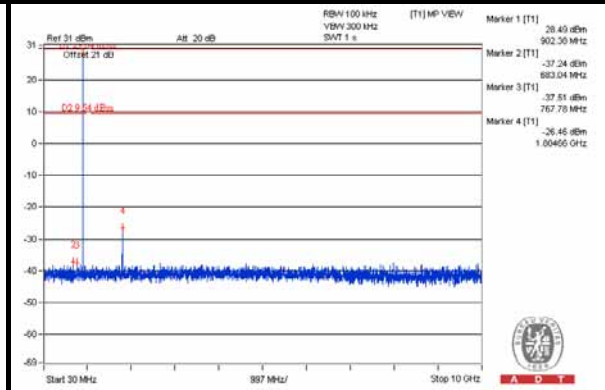
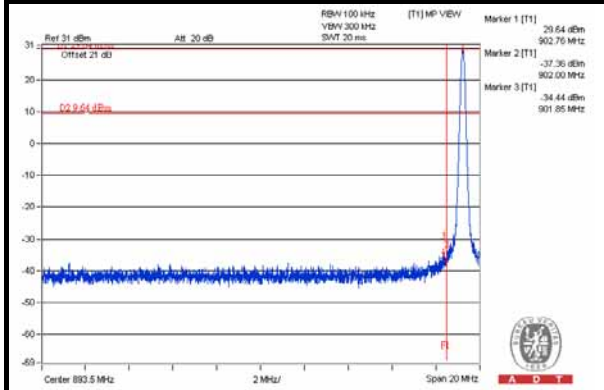
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

Link Profile 1

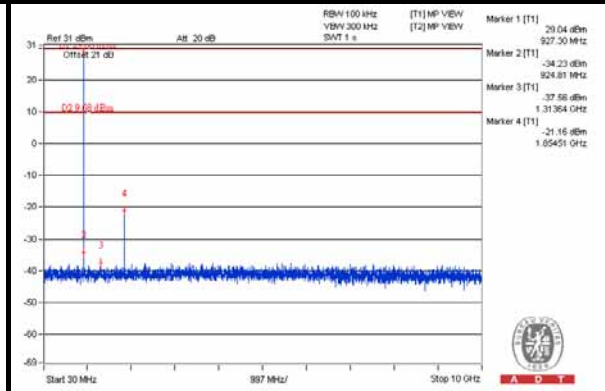
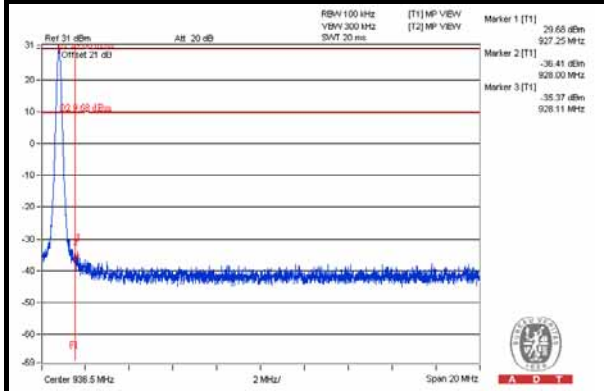


Link Profile 13

CH0



CH49





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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Fax: 886-2-26051924

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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.

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