

Supplemental “Transmit Simultaneously” Test Report

Report No.: RF160314E01-8

FCC ID: G95TCA300

Test Model: TCA300COM

Received Date: Mar. 14, 2016

Test Date: Apr. 28 to 29, 2016

Issued Date: May 26, 2016

Applicant: Technicolor Connected Home USA LLC

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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A D T

Release Control Record

Issue No.	Description	Date Issued
RF160314E01-8	Original release.	May 26, 2016




1 Certificate of Conformity

Product: Integrated Device
Brand: Technicolor
Test Model: TCA300COM
Sample Status: ENGINEERING SAMPLE
Applicant: Technicolor Connected Home USA LLC
Test Date: Apr. 28 to 29, 2016
Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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

Prepared by :  _____, **Date:** _____ May 26, 2016
Claire Kuan / Specialist

Approved by :  _____, **Date:** _____ May 26, 2016
May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.98dB at 0.28672MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.0dB at 32.71MHz.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Integrated Device
Brand	Technicolor
Test Model	TCA300COM
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter or 4Vdc from battery
Modulation Type	For WLAN: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM For Bluetooth: GFSK, $\pi/4$ -DQPSK, 8DPSK for FHSS GFSK for DTS For WWAN: BPSK for WCDMA, HSDPA, HSUPA
Modulation Technology	For WLAN: DSSS, OFDM For Bluetooth: FHSS, DTS For WWAN: WCDMA, HSDPA, HSUPA
Transfer Rate	For WLAN: 802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps For Bluetooth: up to 3Mbps
Operating Frequency	For WLAN: 2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18~5.24GHz, 5.26~5.32GHz, 5.50~5.70GHz, 5.745~5.825GHz For Bluetooth: 2.402 ~ 2.480GHz For WWAN: WCDMA, HSDPA, HSUPA: 826.4MHz ~ 846.6MHz & 1852.4MHz ~ 1907.6MHz
Number of Channel	For WLAN: 2.4GHz 802.11b, 802.11g, 802.11n (20MHz): 11 802.11n (40MHz): 7 5GHz 802.11a, 802.11n (20MHz): 24 802.11n (40MHz): 11 For Bluetooth: BT-EDR mode: 79 BT-LE mode: 40

Output Power	<p>For WLAN: 2.4GHz 1TX Antenna 1 127.644mW Antenna 2 125.314mW 2TX 126.409mW 5GHz 1TX Antenna 1 5.18~5.24GHz 125.026mW 5.26~5.32GHz 122.462mW 5.50~5.70GHz 91.622mW 5.745~5.825GHz 94.624mW Antenna 2 5.18~5.24GHz 108.143mW 5.26~5.32GHz 110.662mW 5.50~5.70GHz 73.451mW 5.745~5.825GHz 67.92mW 2TX 5.18~5.24GHz 229.018mW 5.26~5.32GHz 227.54mW 5.50~5.70GHz 156.97mW 5.745~5.825GHz 150.418mW For Zigbee: Antenna 1 109.901mW Antenna 2 119.399mW For Bluetooth: BT-EDR mode: 2.729mW BT-LE mode: 1.897mW</p>
Max. ERP Power	<p>For WWAN: WCDMA Band V: 370.68mW</p>
Max. EIRP Power	<p>For WWAN: WCDMA Band II: 378.44mW</p>

Antenna Type	Please see NOTE
Antenna Connector	Please see NOTE
Accessory Device	Adapter x1 Battery x1
Data Cable Supplied	NA
HW Version	FGR

Note:

1. There are WLAN, Bluetooth, Zigbee and WWAN(3G) technology used for the EUT.
2. The EUT power needs to be supplied from one power adapter or battery, the information is as below table:

Adapter		
Brand	Model	Spec.
XHPSU-TC	37469780	Input: 100-120Vac, 50/60Hz, 0.7A Output: 12V, 1.5A DC output cable (Unshielded, 3m)
Battery		
Brand	Model	Spec.
Li-polymer	U46P313.00	4V, 2520mAh, 10.08Wh

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

Antenna NO.	Brand	Antenna Gain(dBi) (Including cable loss)	Frequency range (GHz)	Antenna Type	Connector Type
Zigbee 1	INPAQ	2.84	2.4~2.4835GHz	PCB	i-pex(MHF)
Zigbee 2	INPAQ	3.1	2.4~2.4835GHz	PCB	i-pex(MHF)
WiFi 1 & BT	INPAQ	2.06	2.4~2.4835GHz	PCB	Pogo pin
		3.13	5.15~5.25GHz		
		3.79	5.25~5.35GHz		
		3.9	5.47~5.725GHz		
		2.39	5.725~5.85GHz		
WiFi 2	INPAQ	0.73	2.4~2.4835GHz	PCB	i-pex(MHF)
		2.86	5.15~5.25GHz		
		3.02	5.25~5.35GHz		
		3.33	5.47~5.725GHz		
		3.84	5.725~5.85GHz		
WWAN	INPAQ	2.56	824~849MHz	PCB	Pogo pin
		3.72	1850~1960MHz		

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX diversity	2RX
802.11g	6 ~ 54Mbps	1TX diversity / 2TX	2RX
802.11n (20MHz)	MCS 0~7	1TX diversity / 2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (40MHz)	MCS 0~7	1TX diversity / 2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11a	6 ~ 54Mbps	1TX diversity / 2TX	2RX
802.11n (20MHz)	MCS 0~7	1TX diversity / 2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (40MHz)	MCS 0~7	1TX diversity / 2TX	2RX
	MCS 8~15	2TX	2RX

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION
	RE≥1G	RE<1G	PLC	
1, 2	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

Radiated Emission Test (Above 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	802.11g	1 to 11	6	OFDM	BPSK
	+ Bluetooth EDR	0 to 78	78	FHSS	8DPSK
	+ WWAN(2G/3G)	9262 to 9538	9400	WCDMA	BPSK
	+ Zigbee	11 to 25	11	OFDM	O-QPSK
2	802.11a	36 to 165	52	OFDM	BPSK
	+ Bluetooth EDR	0 to 78	78	FHSS	8DPSK
	+ WWAN(2G/3G)	9262 to 9538	9400	WCDMA	BPSK
	+ Zigbee	11 to 25	11	OFDM	O-QPSK

Radiated Emission Test (Below 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	802.11g	1 to 11	6	OFDM	BPSK
	+ Bluetooth EDR	0 to 78	78	FHSS	8DPSK
	+ WWAN(2G/3G)	9262 to 9538	9400	WCDMA	BPSK
	+ Zigbee	11 to 25	11	OFDM	O-QPSK
2	802.11a	36 to 165	52	OFDM	BPSK
	+ Bluetooth EDR	0 to 78	78	FHSS	8DPSK
	+ WWAN(2G/3G)	9262 to 9538	9400	WCDMA	BPSK
	+ Zigbee	11 to 25	11	OFDM	O-QPSK

Power Line Conducted Emission Test:
 Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE
1	802.11g + Bluetooth EDR + WWAN(2G/3G) + Zigbee	1 to 11	6	OFDM	BPSK
		0 to 78	78	FHSS	8DPSK
		9262 to 9538	9400	WCDMA	BPSK
		11 to 25	11	OFDM	O-QPSK
2	802.11a + Bluetooth EDR + WWAN(2G/3G) + Zigbee	36 to 165	52	OFDM	BPSK
		0 to 78	78	FHSS	8DPSK
		9262 to 9538	9400	WCDMA	BPSK
		11 to 25	11	OFDM	O-QPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY	TEST LOCATION
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Tim Ho	1
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Tim Ho	1
PLC	25deg. C, 64%RH	120Vac, 60Hz	Anderson Chen	2

3.2 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.

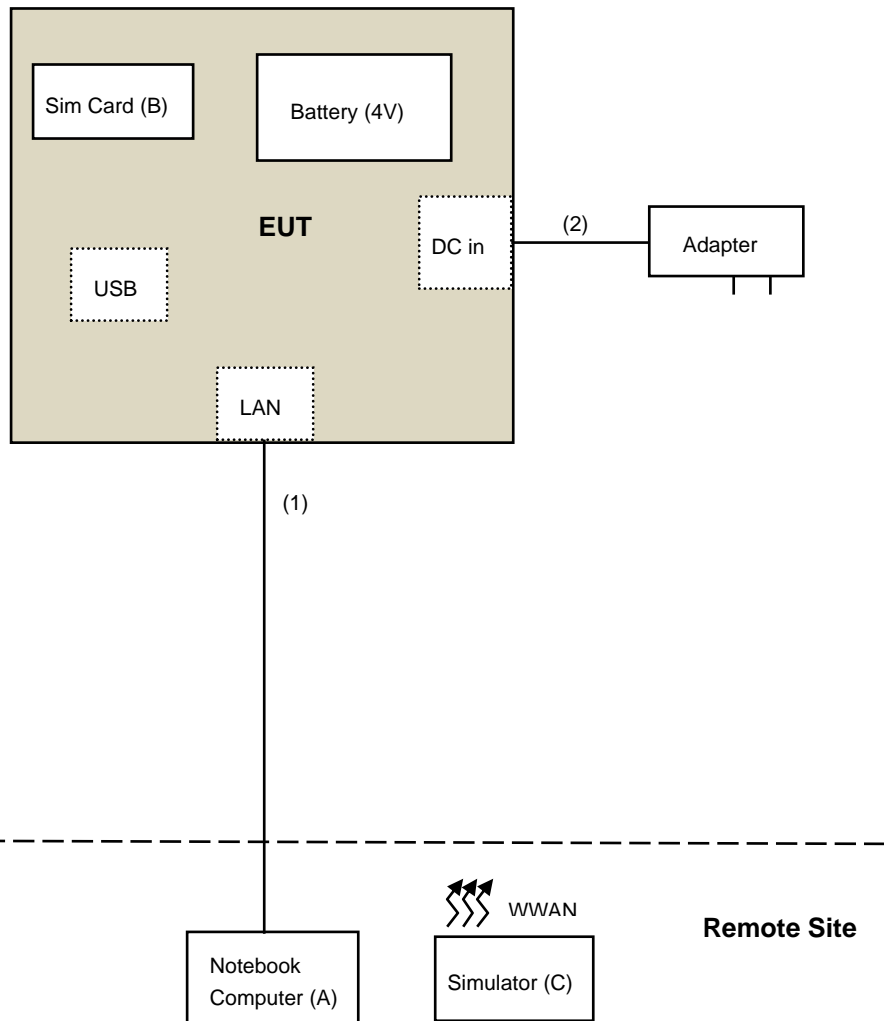
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook Computer	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab
B.	Sim Card	R&S	CRT-Z3	NA	NA	Provided by Lab
C.	Simulator	R&S	CMU200	121040	NA	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	10	No	0	Provided by Lab
2.	DC cable	1	3	No	0	Supplied by Client

3.2.1 Configuration of System under Test



4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 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.

**4.1.2 Test Instruments**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 12, 2015	Aug. 11, 2016
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-07	May 08, 2015	May 07, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-156	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 02, 2016	Apr. 01, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 05, 2016	Apr. 04, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 30, 2016	Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 26, 2015	July 25, 2016
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Boresight Antenna Fixture	NA	NA	NA	NA
SPECTRUM ANALYZER R&S	FSP 40	100060	May 08, 2015	May 07, 2016
Power meter Anritsu	ML2495A	0824006	May 25, 2015	May 24, 2016
Power sensor Anritsu	MA2411B	0738172	May 25, 2015	May 24, 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. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
Loop antenna was used for all emissions below 30 MHz.
3. The test was performed in 966 Chamber No. 3.
4. The FCC Site Registration No. is 147459
6. The CANADA Site Registration No. is 20331-1
8. Tested Date: Apr. 28 to 29, 2016

4.1.3 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:

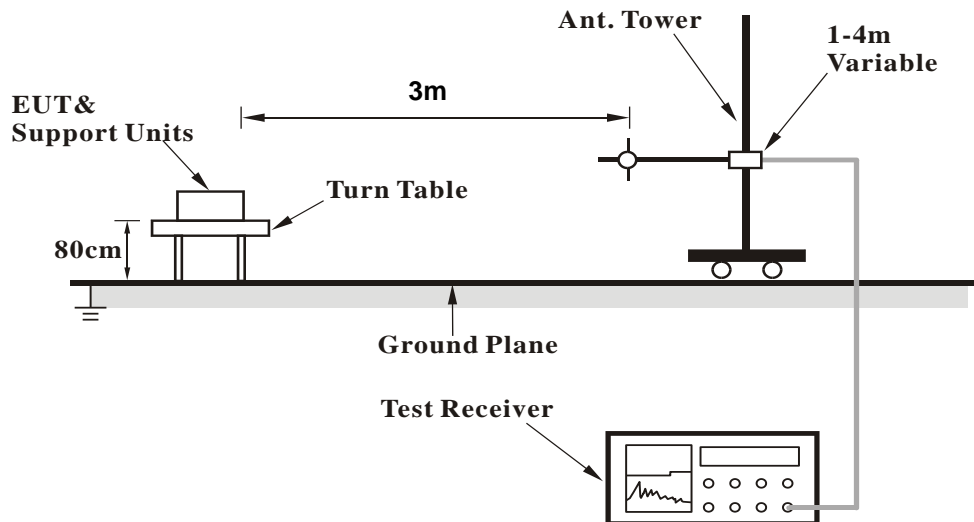
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. 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 ($10 \log(1/\text{duty cycle})$).
4. 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.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

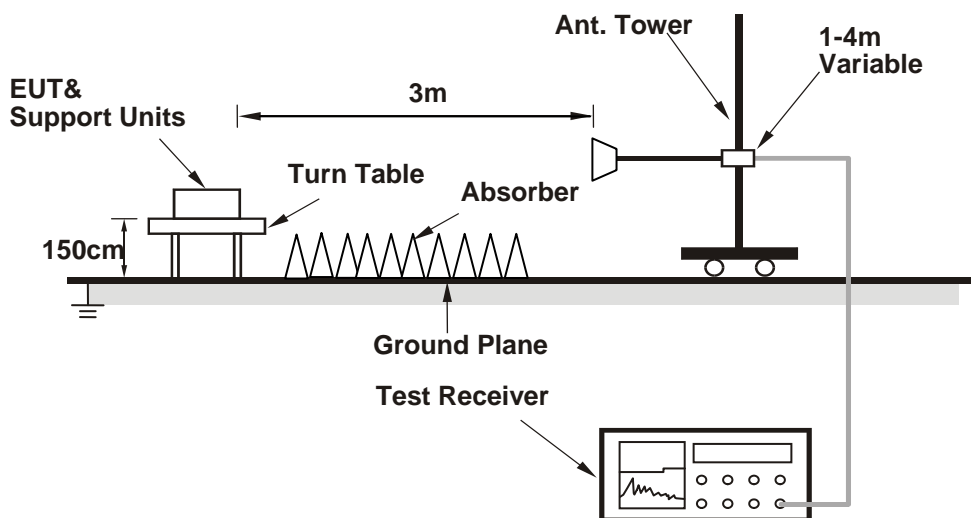
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

1. The EUT which is placed on test table.
2. The communication partners(A)&(C) run test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results (Mode 1)

Above 1GHz Data:

FREQUENCY RANGE	1GHz ~ 25GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)
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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	4810.00	43.8 PK	74.0	-30.2	1.05 H	93	43.85	-0.05
2	4810.00	34.7 AV	54.0	-19.3	1.05 H	93	34.75	-0.05
3	4874.00	44.9 PK	74.0	-29.1	1.03 H	248	44.79	0.11
4	4874.00	34.1 AV	54.0	-19.9	1.03 H	248	33.99	0.11
5	4960.00	33.7 PK	74.0	-40.3	1.03 H	247	33.51	0.19
6	4960.00	4.0 AV	54.0	-50.0	1.03 H	247	3.81	0.19
7	7311.00	44.7 PK	74.0	-29.3	1.12 H	96	38.44	6.26
8	7311.00	34.5 AV	54.0	-19.5	1.12 H	96	28.24	6.26
9	7440.00	33.6 PK	74.0	-40.4	1.08 H	194	26.97	6.63
10	7440.00	3.5 AV	54.0	-50.5	1.08 H	194	-3.13	6.63
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	4810.00	46.1 PK	74.0	-27.9	1.05 V	33	46.15	-0.05
2	4810.00	37.8 AV	54.0	-16.2	1.05 V	33	37.85	-0.05
3	4874.00	43.6 PK	74.0	-30.4	1.00 V	350	43.49	0.11
4	4874.00	33.1 AV	54.0	-20.9	1.00 V	350	32.99	0.11
5	4960.00	35.7 PK	74.0	-38.3	1.00 V	96	35.51	0.19
6	4960.00	5.5 AV	54.0	-48.5	1.00 V	96	5.31	0.19
7	7311.00	44.8 PK	74.0	-29.2	2.12 V	314	38.54	6.26
8	7311.00	34.5 AV	54.0	-19.5	2.12 V	314	28.24	6.26
9	7440.00	32.3 PK	74.0	-41.7	1.05 V	115	25.67	6.63
10	7440.00	1.9 AV	54.0	-52.1	1.05 V	115	-4.73	6.63

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

Below 1GHz Data:

FREQUENCY RANGE	Below 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
------------------------	------------	--------------------------	-----------------

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	49.84	30.3 QP	40.0	-9.7	1.00 H	304	29.31	1.02
2	149.99	32.3 QP	43.5	-11.2	1.00 H	74	31.30	0.96
3	250.00	42.9 QP	46.0	-3.1	1.00 H	301	43.09	-0.17
4	350.00	31.4 QP	46.0	-14.6	1.00 H	78	28.59	2.78
5	391.49	38.6 QP	46.0	-7.4	1.00 H	197	34.74	3.89
6	783.04	36.2 QP	46.0	-9.8	1.00 H	204	24.54	11.66

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	32.71	37.0 QP	40.0	-3.0	1.00 V	17	37.36	-0.36
2	42.03	36.2 QP	40.0	-3.9	1.00 V	311	35.56	0.59
3	49.79	34.2 QP	40.0	-5.8	1.00 V	147	33.17	1.02
4	67.15	31.4 QP	40.0	-8.6	1.00 V	160	31.86	-0.50
5	250.00	35.5 QP	46.0	-10.5	1.00 V	360	35.67	-0.17
6	391.49	33.2 QP	46.0	-12.8	1.00 V	308	29.32	3.89

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

4.1.8 Test Results (Mode 2)

Above 1GHz Data:

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)
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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	4810.00	43.3 PK	74.0	-30.7	1.01 H	101	43.35	-0.05
2	4810.00	34.3 AV	54.0	-19.7	1.01 H	101	34.35	-0.05
3	4960.00	34.3 PK	74.0	-39.7	1.01 H	252	34.11	0.19
4	4960.00	4.4 AV	54.0	-49.6	1.01 H	252	4.21	0.19
5	7440.00	33.4 PK	74.0	-40.6	1.00 H	193	26.77	6.63
6	7440.00	3.2 AV	54.0	-50.8	1.00 H	193	-3.43	6.63
7	10520.00	49.0 PK	74.0	-25.0	2.23 H	284	38.14	10.86
8	10520.00	35.5 AV	54.0	-18.5	2.23 H	284	24.64	10.86
9	15780.00	55.2 PK	74.0	-18.8	1.89 H	26	43.38	11.82
10	15780.00	41.6 AV	54.0	-12.4	1.89 H	26	29.78	11.82

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	4810.00	46.1 PK	74.0	-27.9	1.04 V	31	46.15	-0.05
2	4810.00	37.8 AV	54.0	-16.2	1.04 V	31	37.85	-0.05
3	4960.00	36.0 PK	74.0	-38.0	1.00 V	92	35.81	0.19
4	4960.00	5.9 AV	54.0	-48.1	1.00 V	92	5.71	0.19
5	7440.00	32.3 PK	74.0	-41.7	1.00 V	109	25.67	6.63
6	7440.00	2.2 AV	54.0	-51.8	1.00 V	109	-4.43	6.63
7	10520.00	49.7 PK	74.0	-24.3	1.00 V	321	38.84	10.86
8	10520.00	35.7 AV	54.0	-18.3	1.00 V	321	24.84	10.86
9	15780.00	49.6 PK	74.0	-24.4	1.20 V	20	37.78	11.82
10	15780.00	39.0 AV	54.0	-15.0	1.20 V	20	27.18	11.82

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



Below 1GHz Data:

FREQUENCY RANGE	Below 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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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	43.41	30.3 QP	40.0	-9.7	1.00 H	145	29.43	0.83
2	149.99	33.5 QP	43.5	-10.0	1.00 H	71	32.52	0.96
3	250.00	42.9 QP	46.0	-3.1	1.00 H	301	43.03	-0.17
4	349.98	32.2 QP	46.0	-13.8	1.00 H	82	29.44	2.78
5	391.52	38.2 QP	46.0	-7.8	1.00 H	163	34.27	3.89
6	783.01	36.3 QP	46.0	-9.7	1.00 H	205	24.61	11.66

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	32.49	36.2 QP	40.0	-3.8	1.00 V	56	36.60	-0.39
2	39.68	36.7 QP	40.0	-3.3	1.00 V	353	36.34	0.38
3	49.81	34.4 QP	40.0	-5.6	1.00 V	145	33.35	1.02
4	115.21	30.8 QP	43.5	-12.7	1.00 V	25	32.55	-1.77
5	250.00	36.1 QP	46.0	-9.9	1.00 V	360	36.24	-0.17
6	391.49	33.5 QP	46.0	-12.6	1.00 V	308	29.56	3.89

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 23, 2015	Oct. 22, 2016
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 28, 2015	Oct. 27, 2016
RF Cable	5D-FB	COACAB-002	Mar. 04, 2016	Mar. 03, 2017
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. 1.
3. Tested Date: Apr. 29, 2016

4.2.3 Test Procedures

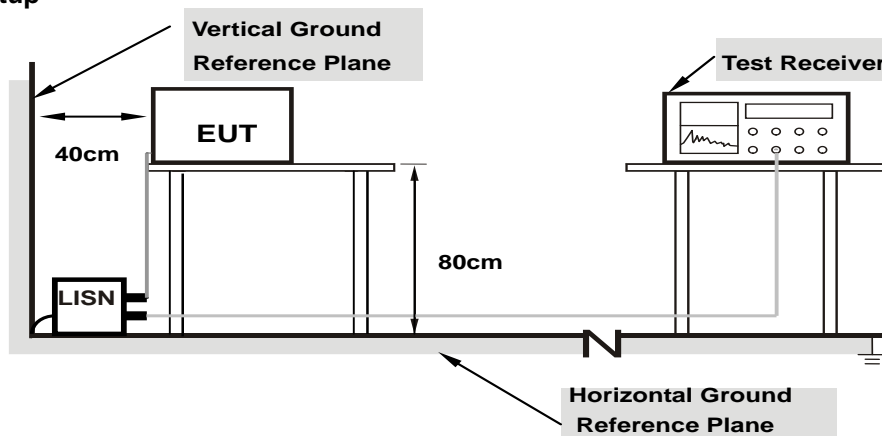
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

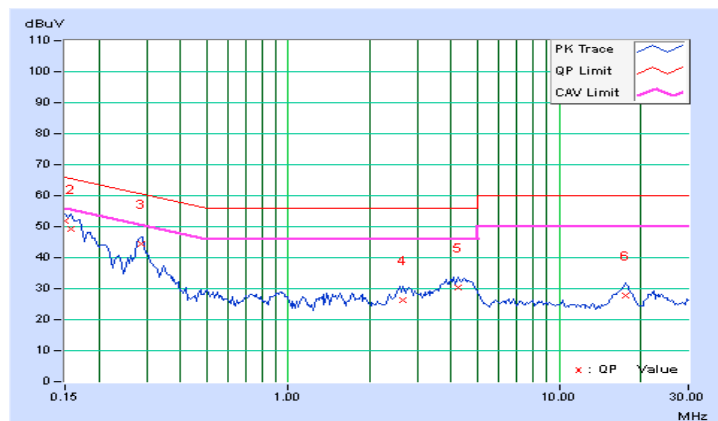
4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.34	41.65	25.57	51.99	35.91	66.00	56.00	-14.01	-20.09
2	0.15781	10.33	38.99	21.61	49.32	31.94	65.58	55.58	-16.26	-23.64
3	0.28672	10.31	34.30	26.33	44.61	36.64	60.62	50.62	-16.01	-13.98
4	2.66406	10.45	16.03	8.90	26.48	19.35	56.00	46.00	-29.52	-26.65
5	4.22266	10.63	19.62	12.75	30.25	23.38	56.00	46.00	-25.75	-22.62
6	17.58594	11.54	16.07	11.09	27.61	22.63	60.00	50.00	-32.39	-27.37

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

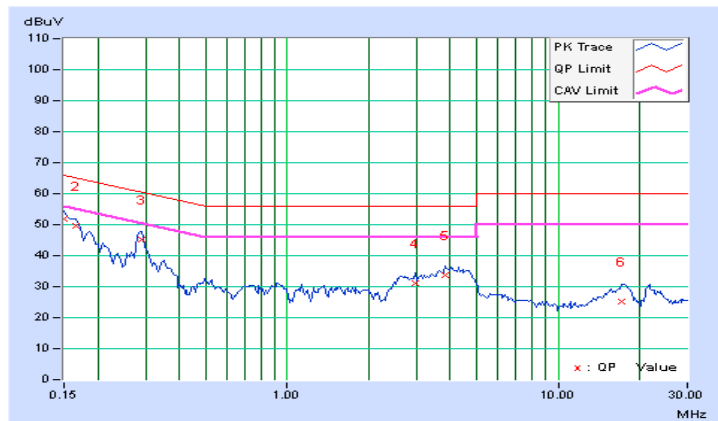


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.32	41.65	25.27	51.97	35.59	66.00	56.00	-14.03	-20.41
2	0.16562	10.31	39.37	25.12	49.68	35.43	65.18	55.18	-15.50	-19.75
3	0.29063	10.30	34.91	23.46	45.21	33.76	60.51	50.51	-15.30	-16.75
4	2.95703	10.46	20.63	14.56	31.09	25.02	56.00	46.00	-24.91	-20.98
5	3.82031	10.56	23.23	16.89	33.79	27.45	56.00	46.00	-22.21	-18.55
6	17.10156	11.31	14.02	9.05	25.33	20.36	60.00	50.00	-34.67	-29.64

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



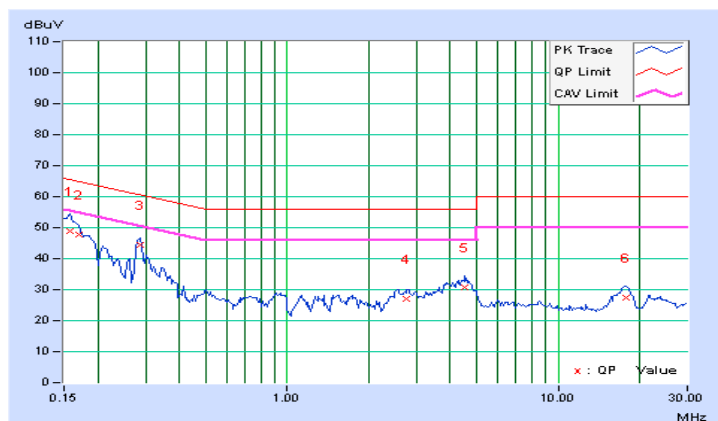
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15781	10.33	38.47	21.00	48.80	31.33	65.58	55.58	-16.78	-24.25
2	0.16953	10.32	37.31	25.27	47.63	35.59	64.98	54.98	-17.35	-19.39
3	0.28672	10.31	33.95	26.23	44.26	36.54	60.62	50.62	-16.36	-14.08
4	2.76563	10.47	16.48	10.48	26.95	20.95	56.00	46.00	-29.05	-25.05
5	4.51563	10.65	19.97	14.95	30.62	25.60	56.00	46.00	-25.38	-20.40
6	17.74609	11.55	15.84	11.00	27.39	22.55	60.00	50.00	-32.61	-27.45

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

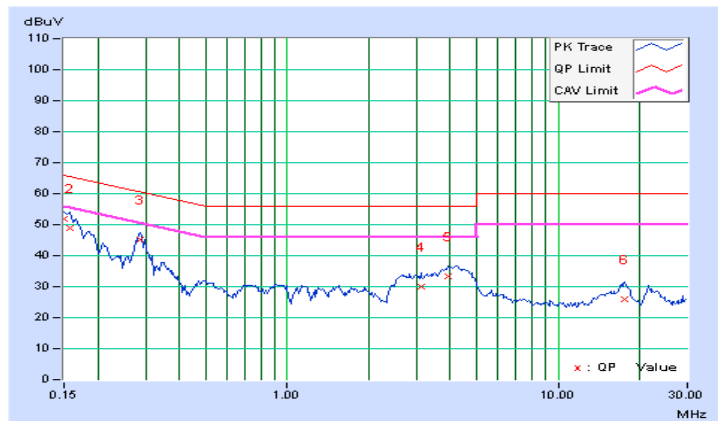


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.32	41.46	24.98	51.78	35.30	66.00	56.00	-14.22	-20.70
2	0.15781	10.31	38.65	21.00	48.96	31.31	65.58	55.58	-16.62	-24.27
3	0.28672	10.30	34.96	28.34	45.26	38.64	60.62	50.62	-15.36	-11.98
4	3.10938	10.48	19.64	12.91	30.12	23.39	56.00	46.00	-25.88	-22.61
5	3.93750	10.57	22.84	16.14	33.41	26.71	56.00	46.00	-22.59	-19.29
6	17.69922	11.34	14.69	9.99	26.03	21.33	60.00	50.00	-33.97	-28.67

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

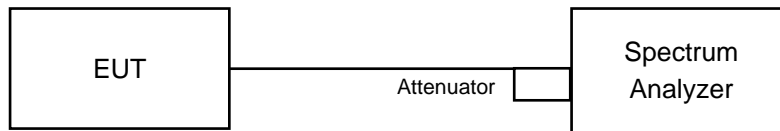


4.3 Conducted Out of Band Emission Measurement (For concurrent transmit at same TX path)

4.3.1 Limits of Conducted Out of Band Emission Measurement

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedures

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

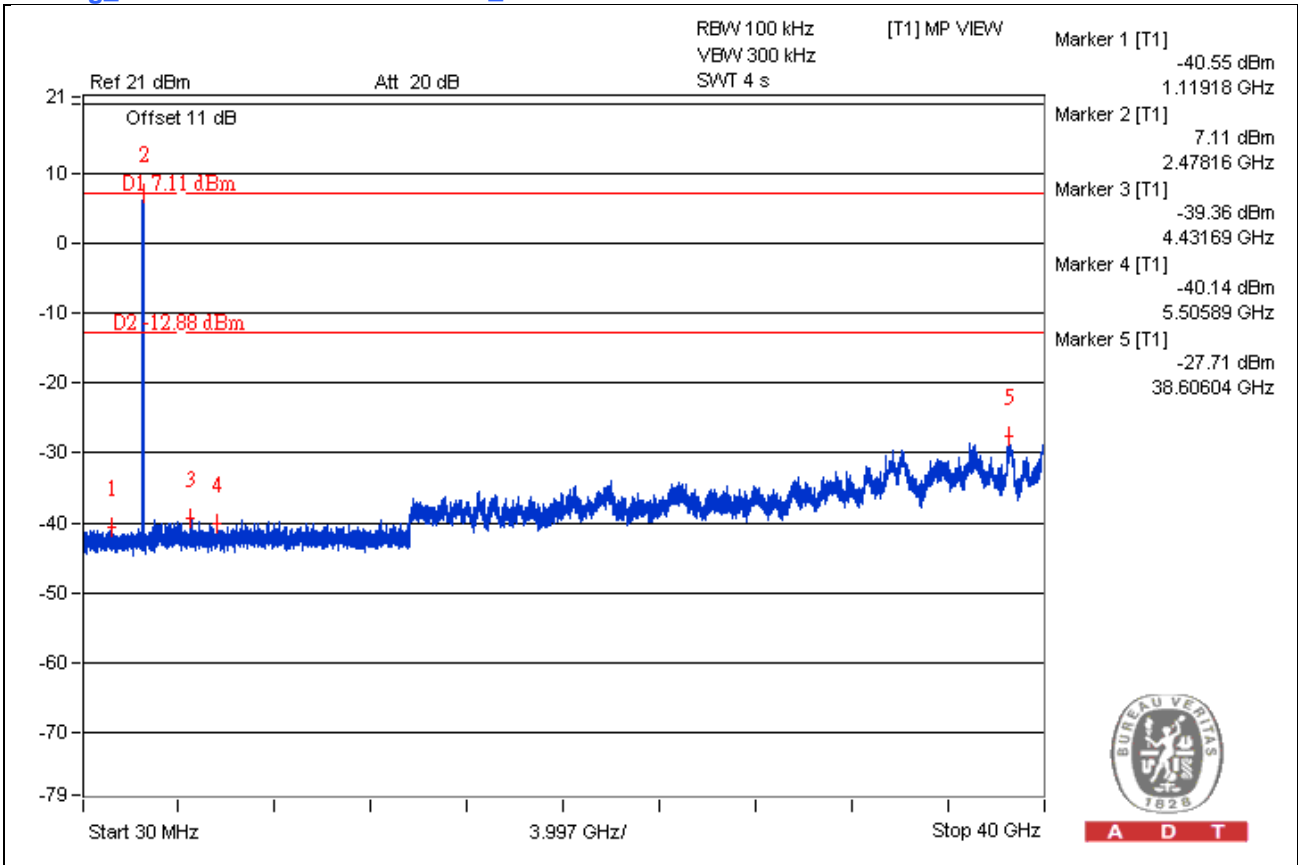
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

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

For concurrent transmit at same TX path:

802.11g_CH6 + Bluetooth EDR-8DPSK_CH78



5 Pictures of Test Arrangements

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





Appendix – 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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Web Site: www.bureauveritas-adt.com

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

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