

FCC Test Report

Report No.: RF190429C33

FCC ID: M82-WISE-1840

Test Model: WISE-1840

Received Date: Apr. 29, 2019

Test Date: May 17 ~ May 29, 2019 (For Test Mode A)
Aug. 28, 2019 (For Test Mode B, C)

Issued Date: Sep. 03, 2019

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FCC Registration / 788550 / TW0003
Designation Number:



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Table of Contents

Release Control Record	4
1 Certificate of Conformity.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information.....	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	7
3.2.1 Test Mode Applicability and Tested Channel Detail	8
3.1 Duty Cycle of Test Signal	9
3.2 Description of Support Units	10
3.2.1 Configuration of System under Test	10
3.3 General Description of Applied Standards	10
4 Test Types and Results	11
4.1 Radiated Emission and Bandedge Measurement.....	11
4.1.1 Limits of Radiated Emission and Bandedge Measurement	11
4.1.2 Test Instruments	12
4.1.3 Test Procedures.....	14
4.1.4 Deviation from Test Standard	14
4.1.5 Test Set Up	15
4.1.6 EUT Operating Conditions.....	16
4.1.7 Test Results	17
4.2 Conducted Emission Measurement	30
4.2.1 Limits of Conducted Emission Measurement	30
4.2.2 Test Instruments	30
4.2.3 Test Procedures.....	31
4.2.4 Deviation from Test Standard	31
4.2.5 Test Setup.....	31
4.2.6 EUT Operating Conditions.....	31
4.2.7 Test Results	32
4.3 6dB Bandwidth Measurement.....	36
4.3.1 Limits of 6dB Bandwidth Measurement.....	36
4.3.2 Test Setup.....	36
4.3.3 Test Instruments	36
4.3.4 Test Procedure	36
4.3.5 Deviation from Test Standard	36
4.3.6 EUT Operating Conditions.....	36
4.3.7 Test Result.....	37
4.4 Conducted Output Power Measurement.....	39
4.4.1 Limits of Conducted Output Power Measurement	39
4.4.2 Test Setup.....	39
4.4.3 Test Instruments	39
4.4.4 Test Procedures.....	39
4.4.5 Deviation from Test Standard	39
4.4.6 EUT Operating Conditions.....	39
4.4.7 Test Results	40
4.5 Power Spectral Density Measurement.....	41
4.5.1 Limits of Power Spectral Density Measurement	41
4.5.2 Test Setup.....	41
4.5.3 Test Instruments	41
4.5.4 Test Procedure	41
4.5.5 Deviation from Test Standard	41
4.5.6 EUT Operating Condition	41

4.5.7 Test Results	42
4.6 Conducted Out of Band Emission Measurement.....	45
4.6.1 Limits of Conducted Out of Band Emission Measurement	45
4.6.2 Test Setup.....	45
4.6.3 Test Instruments	45
4.6.4 Test Procedure	45
4.6.5 Deviation from Test Standard	45
4.6.6 EUT Operating Condition	45
4.6.7 Test Results	46
5 Pictures of Test Arrangements.....	48
Appendix – Information of the Testing Laboratories	49

Release Control Record

Issue No.	Description	Date Issued
RF190429C33	Original release	Sep. 03, 2019

1 Certificate of Conformity

Product: Mini-PCIe EPD control card

Brand: Advantech

Test Model: WISE-1840

Sample Status: Engineering sample

Applicant: ADVANTECH CO., LTD

Test Date: May 17 ~ May 29, 2019 (For Test Mode A)

Aug. 28, 2019 (For Test Mode B, C)

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 RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Sep. 03, 2019
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Sep. 03, 2019
Bruce Chen / Project Engineer

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 -17.34dB at 0.55959MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.4dB at 399.99MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna 1, 2: Antenna connector is SMA Male Reverse not a standard connector. Antenna 3: Antenna connector is Reverse SMA Plug not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Mini-PCle EPD control card
Brand	Advantech
Test Model	WISE-1840
Status of EUT	Engineering sample
Power Supply Rating	3.3Vdc (Battery)
Modulation Type	O-QPSK
Operating Frequency	2405 ~ 2480MHz
Number of Channel	16
Output Power	66.090mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Antenna
Data Cable Supplied	NA

Note: The following antennas were provided to the EUT.

Ant. No.	Antenna Type	P/N	Antenna Connector	Gain (dBi)
1	Dipole Antenna	AN2450-92K01BRS	SMA Male Reverse	5.03
2	Dipole Antenna	AN2450-5511BRS	SMA Male Reverse	2.89
3	Dipole Antenna	RFDPA131000SBLB808	Reverse SMA Plug	2.93

*Antenna 1 with maximum gain was chosen for the final tests.

3.2 Description of Test Modes

16 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
11	2405	15	2425	19	2445	23	2465
12	2410	16	2430	20	2450	24	2470
13	2415	17	2435	21	2455	25	2475
14	2420	18	2440	22	2460	26	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Module 1
B	√	√	√	√	Module 2
C	√	√	-	√	Module 1+2 (Co-located)

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

Note:

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

Radiated Emission Test (Above 1GHz):

- ☒ 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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B	11 to 26	11, 18, 26	O-QPSK
C	11 to 26	11 (Module 1) + 11 (Module 2)	O-QPSK

Radiated Emission Test (Below 1GHz):

- ☒ 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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B	11 to 26	11	O-QPSK
C	11 to 26	11 (Module 1) + 11 (Module 2)	O-QPSK

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B	11 to 26	11	O-QPSK

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ 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.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE
A, B	11 to 26	11, 18, 26	O-QPSK
C	11 to 26	11 (Module 1) + 11 (Module 2)	O-QPSK

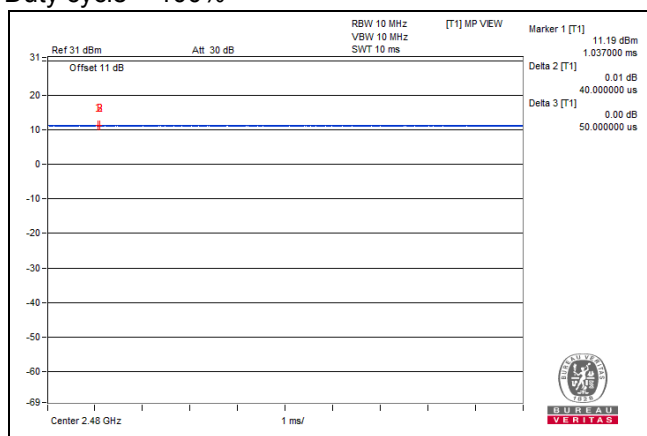
For Test Mode C: Conducted Output Power Measurement and Power Spectral Density Measurement only

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	24 deg. C, 67% RH 25 deg. C, 70% RH	3.3Vdc	Match Tsui Willy Cheng
RE<1G	25 deg. C, 70% RH	3.3Vdc	Noah Chang Willy Cheng
PLC	25 deg. C, 75% RH 25 deg. C, 69% RH	3.3Vdc	Jones Chang Willy Cheng
APCM	25 deg. C, 60% RH	3.3Vdc	Chris Lin

3.1 Duty Cycle of Test Signal

Duty cycle = 100%



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	DELL	E5520	8Y4DMQ1	FCC DoC Approved	-
B.	Convertible board	NA	NA	NA	NA	Provided by client

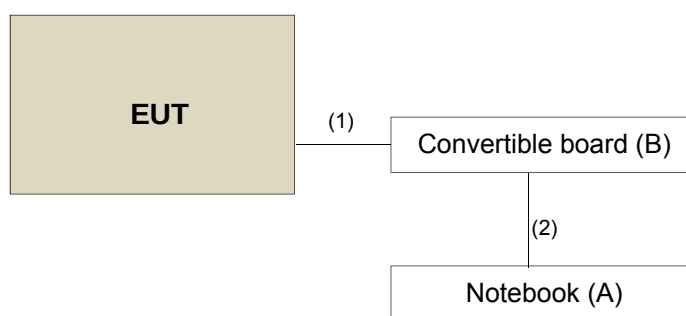
Note:

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.	Cable	1	1.0	N	0	-
2.	USB cable	1	1.8	Y	0	Provided by client

Note: The core(s) is(are) originally attached to the cable(s).

3.2.1 Configuration of System under Test



3.3 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

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

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

Test Date: May 17 ~ May 29, 2019

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Jan. 03, 2019	Jan. 02, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 25, 2018	Sep. 24, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 21, 2018	Nov. 20, 2019
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Aug. 08, 2018	Aug. 07, 2019
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jul. 02, 2018	Jul. 01, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 08, 2018	Aug. 07, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 08, 2018	Aug. 07, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY5519000 7/MY55210005	Jul. 17, 2018	Jul. 16, 2019

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 HwaYa Chamber 3.

Test Date: Aug. 28, 2019

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF Coaxial Cable WORKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY5519000 7/MY55210005	Jul. 15, 2019	Jul. 14, 2020

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 HwaYa Chamber 3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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:

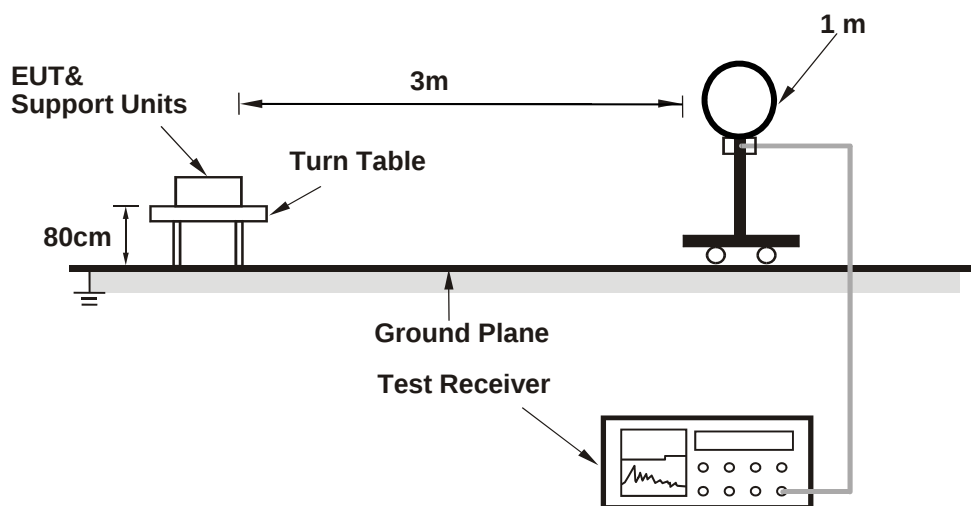
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

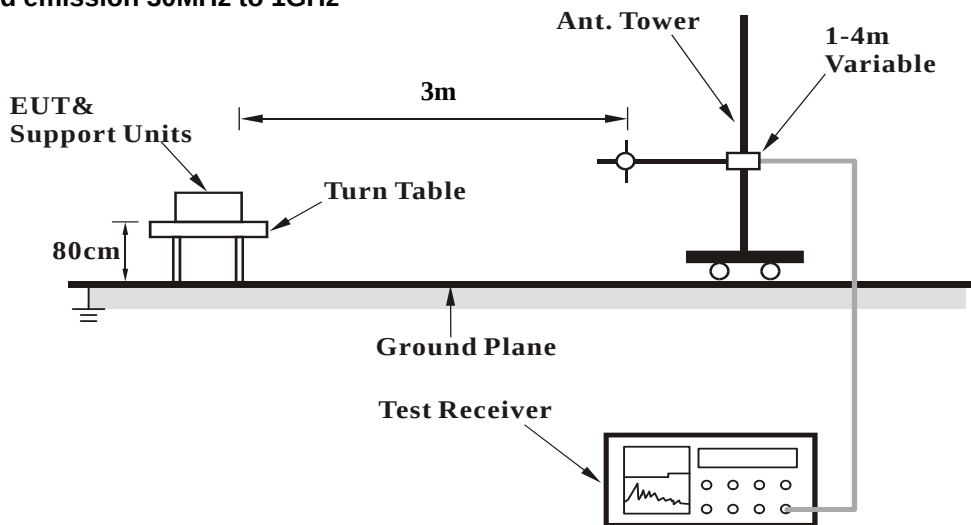
No deviation.

4.1.5 Test Set Up

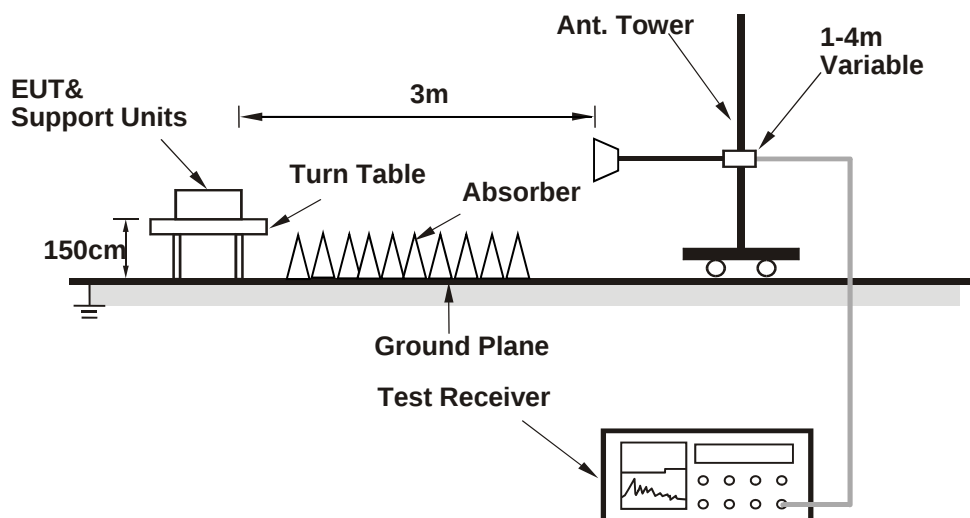
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz Data

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

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	2390.00	52.7 PK	74.0	-21.3	1.62 H	111	19.8	32.9
2	2390.00	42.9 AV	54.0	-11.1	1.62 H	111	10.0	32.9
3	*2405.00	104.8 PK			1.62 H	111	71.9	32.9
4	*2405.00	99.9 AV			1.62 H	111	67.0	32.9
5	4810.00	57.4 PK	74.0	-16.6	1.39 H	90	53.7	3.7
6	4810.00	49.5 AV	54.0	-4.5	1.39 H	90	45.8	3.7
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	2390.00	57.8 PK	74.0	-16.2	2.06 V	161	24.9	32.9
2	2390.00	47.8 AV	54.0	-6.2	2.06 V	161	14.9	32.9
3	*2405.00	114.0 PK			2.06 V	161	81.1	32.9
4	*2405.00	109.9 AV			2.06 V	161	77.0	32.9
5	4810.00	58.4 PK	74.0	-15.6	1.27 V	285	54.7	3.7
6	4810.00	52.6 AV	54.0	-1.4	1.27 V	285	48.9	3.7

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

CHANNEL	TX Channel 18	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

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	*2440.00	102.4 PK			1.58 H	110	69.5	32.9
2	*2440.00	98.1 AV			1.58 H	110	65.2	32.9
3	4880.00	55.1 PK	74.0	-18.9	1.35 H	95	51.1	4.0
4	4880.00	46.8 AV	54.0	-7.2	1.35 H	95	42.8	4.0
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	*2440.00	111.2 PK			2.09 V	163	78.3	32.9
2	*2440.00	106.7 AV			2.09 V	163	73.8	32.9
3	4880.00	51.5 PK	74.0	-22.5	1.27 V	195	47.5	4.0
4	4880.00	42.9 AV	54.0	-11.1	1.27 V	195	38.9	4.0

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

CHANNEL	TX Channel 26	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

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	*2480.00	101.2 PK			1.60 H	106	68.2	33.0
2	*2480.00	96.8 AV			1.60 H	106	63.8	33.0
3	2483.50	50.9 PK	74.0	-23.1	1.60 H	106	17.9	33.0
4	2483.50	46.5 AV	54.0	-7.5	1.60 H	106	13.5	33.0
5	4960.00	54.0 PK	74.0	-20.0	1.40 H	91	49.5	4.5
6	4960.00	45.9 AV	54.0	-8.1	1.40 H	91	41.4	4.5
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	*2480.00	110.1 PK			1.92 V	170	77.1	33.0
2	*2480.00	105.8 AV			1.92 V	170	72.8	33.0
3	2483.50	57.7 PK	74.0	-16.3	1.92 V	170	24.7	33.0
4	2483.50	53.5 AV	54.0	-0.5	1.92 V	170	20.5	33.0
5	4960.00	56.5 PK	74.0	-17.5	1.71 V	278	52.0	4.5
6	4960.00	48.7 AV	54.0	-5.3	1.71 V	278	44.2	4.5

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

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	2390.00	57.4 PK	74.0	-16.6	3.05 H	11	24.9	32.5
2	2390.00	45.6 AV	54.0	-8.4	3.05 H	11	13.1	32.5
3	*2405.00	109.5 PK			3.18 H	94	77.0	32.5
4	*2405.00	105.3 AV			3.18 H	94	72.8	32.5
5	4810.00	55.9 PK	74.0	-18.1	1.03 H	27	52.5	3.4
6	4810.00	52.3 AV	54.0	-1.7	1.03 H	27	48.9	3.4
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	2390.00	58.5 PK	74.0	-15.5	2.17 V	215	26.0	32.5
2	2390.00	45.9 AV	54.0	-8.1	2.17 V	215	13.4	32.5
3	*2405.00	109.4 PK			2.33 V	208	76.9	32.5
4	*2405.00	105.2 AV			2.33 V	208	72.7	32.5
5	4810.00	58.6 PK	74.0	-15.4	2.30 V	158	55.2	3.4
6	4810.00	51.4 AV	54.0	-2.6	2.30 V	158	48.0	3.4

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

CHANNEL	TX Channel 18	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

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	*2440.00	102.2 PK			1.80 H	230	69.8	32.4
2	*2440.00	98.1 AV			1.80 H	230	65.7	32.4
3	4880.00	52.9 PK	74.0	-21.1	1.22 H	29	49.2	3.7
4	4880.00	49.1 AV	54.0	-4.9	1.22 H	29	45.4	3.7
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	*2440.00	105.9 PK			2.20 V	102	73.5	32.4
2	*2440.00	101.7 AV			2.20 V	102	69.3	32.4
3	4880.00	56.0 PK	74.0	-18.0	1.17 V	46	52.3	3.7
4	4880.00	47.9 AV	54.0	-6.1	1.17 V	46	44.2	3.7

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

CHANNEL	TX Channel 26	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

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	*2480.00	101.3 PK			2.00 H	229	68.7	32.6
2	*2480.00	97.0 AV			2.00 H	229	64.4	32.6
3	2483.50	52.5 PK	74.0	-21.5	2.01 H	230	19.9	32.6
4	2483.50	48.2 AV	54.0	-5.8	2.01 H	230	15.6	32.6
5	4960.00	51.0 PK	74.0	-23.0	2.35 H	327	46.7	4.3
6	4960.00	45.1 AV	54.0	-8.9	2.35 H	327	40.8	4.3
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	*2480.00	106.5 PK			2.20 V	354	73.9	32.6
2	*2480.00	102.3 AV			2.20 V	354	69.7	32.6
3	2483.50	57.5 PK	74.0	-16.5	1.45 V	355	24.9	32.6
4	2483.50	53.3 AV	54.0	-0.7	1.45 V	355	20.7	32.6
5	4960.00	57.6 PK	74.0	-16.4	2.28 V	148	53.3	4.3
6	4960.00	49.9 AV	54.0	-4.1	2.28 V	148	45.6	4.3

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	C

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	2390.00	57.5 PK	74.0	-16.5	3.00 H	107	25.0	32.5
2	2390.00	45.6 AV	54.0	-8.4	3.00 H	107	13.1	32.5
3	*2405.00	112.2 PK			3.18 H	98	79.7	32.5
4	*2405.00	105.7 AV			3.18 H	98	73.2	32.5
5	4810.00	53.8 PK	74.0	-20.2	1.18 H	26	50.4	3.4
6	4810.00	49.8 AV	54.0	-4.2	1.18 H	26	46.4	3.4
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	2390.00	57.7 PK	74.0	-16.3	1.93 V	118	25.2	32.5
2	2390.00	45.9 AV	54.0	-8.1	1.93 V	118	13.4	32.5
3	*2405.00	115.1 PK			1.91 V	108	82.6	32.5
4	*2405.00	107.2 AV			1.91 V	108	74.7	32.5
5	4810.00	56.4 PK	74.0	-17.6	1.30 V	324	53.0	3.4
6	4810.00	47.1 AV	54.0	-6.9	1.30 V	324	43.7	3.4

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

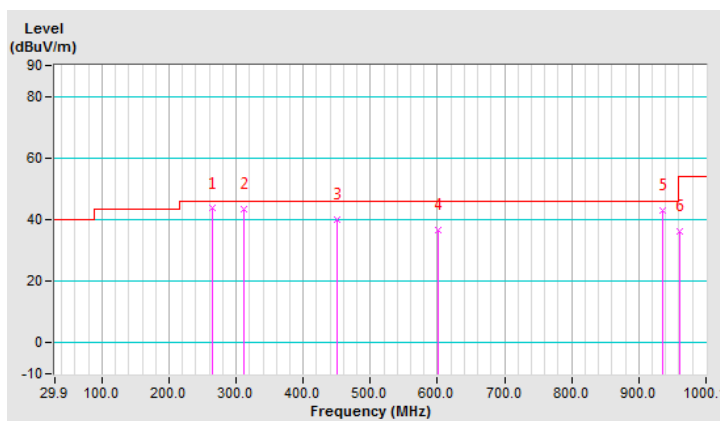
Below 1GHz worst-case data

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	264.69	43.6 QP	46.0	-2.4	1.00 H	309	52.6	-9.0
2	311.26	43.4 QP	46.0	-2.6	1.00 H	51	51.0	-7.6
3	450.97	39.8 QP	46.0	-6.2	1.99 H	77	45.5	-5.7
4	600.38	36.6 QP	46.0	-9.4	1.49 H	199	39.0	-2.4
5	936.07	43.1 QP	46.0	-2.9	1.99 H	7	39.1	4.0
6	961.29	36.1 QP	54.0	-17.9	1.49 H	345	31.6	4.5

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

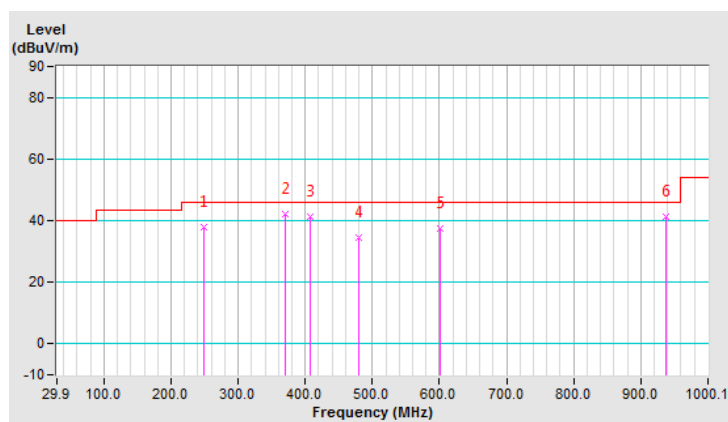


CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	249.17	37.7 QP	46.0	-8.3	2.00 V	263	47.2	-9.5
2	369.47	42.2 QP	46.0	-3.8	2.00 V	145	49.2	-7.0
3	408.28	41.1 QP	46.0	-4.9	2.00 V	174	47.6	-6.5
4	480.07	34.4 QP	46.0	-11.6	2.00 V	234	39.8	-5.4
5	600.38	37.5 QP	46.0	-8.5	1.01 V	313	39.9	-2.4
6	938.01	41.1 QP	46.0	-4.9	1.51 V	133	37.1	4.0

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

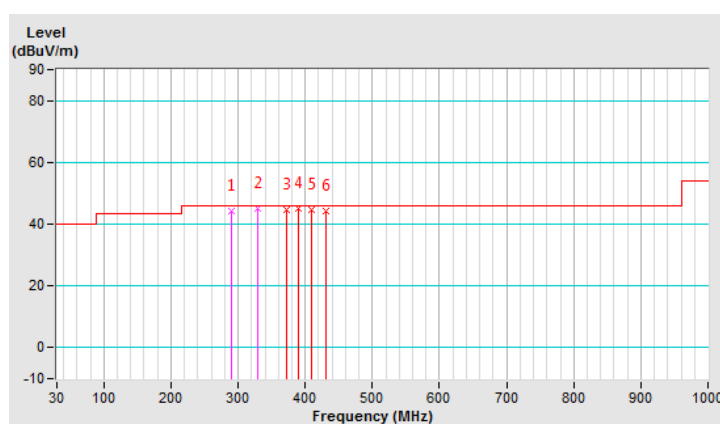


CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	290.48	44.1 QP	46.0	-1.9	1.01 H	233	51.8	-7.7
2	329.36	45.0 QP	46.0	-1.0	1.01 H	102	51.6	-6.6
3	371.43	44.6 QP	46.0	-1.4	1.24 H	112	50.0	-5.4
4	390.00	44.9 QP	46.0	-1.1	1.15 H	82	49.7	-4.8
5	410.02	44.8 QP	46.0	-1.2	1.13 H	108	49.0	-4.2
6	430.02	44.4 QP	46.0	-1.6	1.92 H	108	47.6	-3.2

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

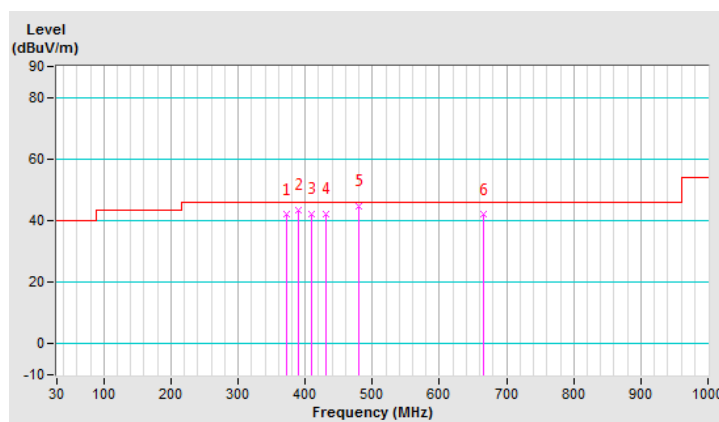


CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	372.12	41.9 QP	46.0	-4.1	1.00 V	161	47.3	-5.4
2	389.62	43.2 QP	46.0	-2.8	1.49 V	243	48.0	-4.8
3	409.06	42.3 QP	46.0	-3.7	1.00 V	164	46.5	-4.2
4	430.44	42.3 QP	46.0	-3.7	1.00 V	249	45.5	-3.2
5	479.04	44.8 QP	46.0	-1.2	1.00 V	150	46.9	-2.1
6	665.65	41.9 QP	46.0	-4.1	1.00 V	205	40.4	1.5

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

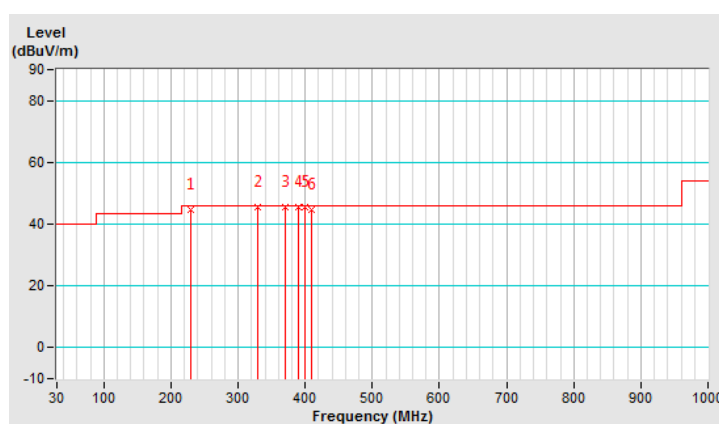


CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	C

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	228.57	44.8 QP	46.0	-1.2	1.37 H	79	55.2	-10.4
2	330.00	45.3 QP	46.0	-0.7	1.26 H	100	51.8	-6.5
3	370.02	45.5 QP	46.0	-0.5	1.48 H	97	50.9	-5.4
4	390.00	45.4 QP	46.0	-0.6	1.37 H	99	50.2	-4.8
5	399.99	45.6 QP	46.0	-0.4	1.11 H	312	50.2	-4.6
6	410.00	44.7 QP	46.0	-1.3	1.34 H	123	48.9	-4.2

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.

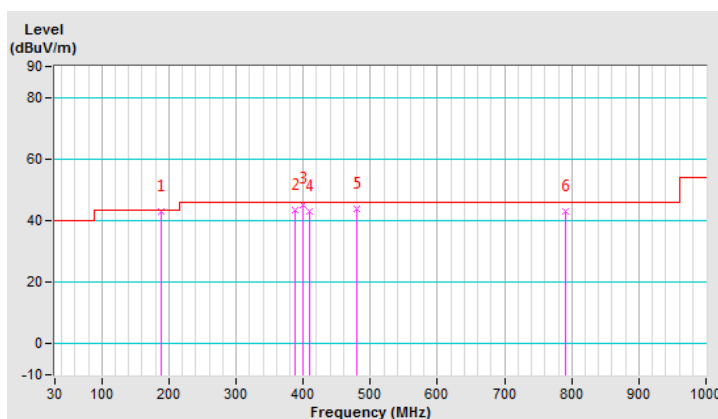


CHANNEL	TX Channel 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	C

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	187.45	42.9 QP	43.5	-0.6	1.00 V	68	53.4	-10.5
2	387.68	43.3 QP	46.0	-2.7	1.00 V	150	48.2	-4.9
3	399.34	45.3 QP	46.0	-0.7	1.99 V	174	49.9	-4.6
4	409.06	43.1 QP	46.0	-2.9	1.49 V	54	47.3	-4.2
5	479.04	43.7 QP	46.0	-2.3	1.49 V	16	45.8	-2.1
6	790.06	42.9 QP	46.0	-3.1	1.49 V	45	39.9	3.0

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz.



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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Feb. 14, 2019	Feb. 13, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 30, 2019	Jan. 29, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2018	Aug. 12, 2019
Software ADT	BV ADT_Cond_ V7.3.7.4	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 HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

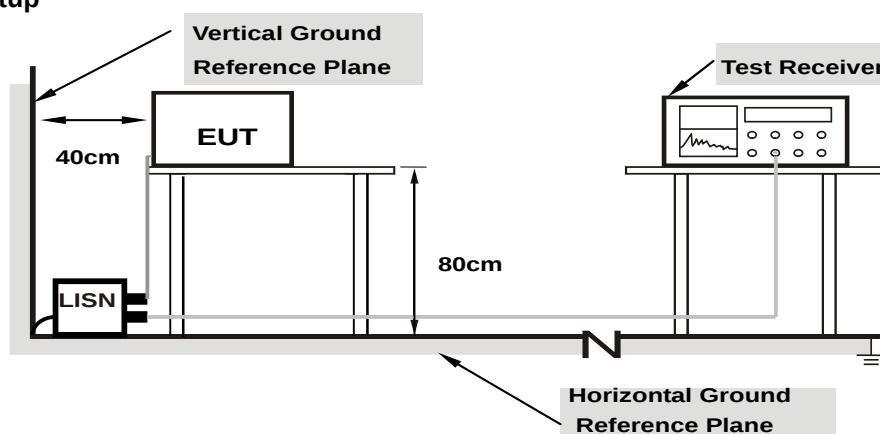
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

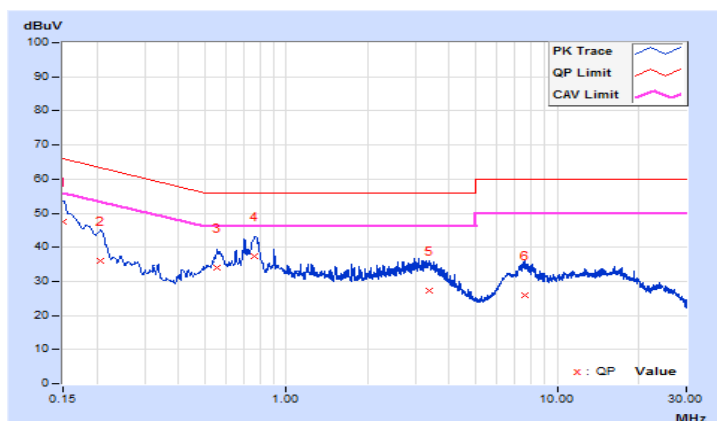
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.07	37.44	22.76	47.51	32.83	66.00	56.00	-18.49	-23.17
2	0.20627	10.07	26.11	9.27	36.18	19.34	63.35	53.35	-27.17	-34.01
3	0.55518	10.07	24.01	16.16	34.08	26.23	56.00	46.00	-21.92	-19.77
4	0.76617	10.08	27.20	12.93	37.28	23.01	56.00	46.00	-18.72	-22.99
5	3.39225	10.13	17.30	12.12	27.43	22.25	56.00	46.00	-28.57	-23.75
6	7.62450	10.22	15.61	10.64	25.83	20.86	60.00	50.00	-34.17	-29.14

Remarks:

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

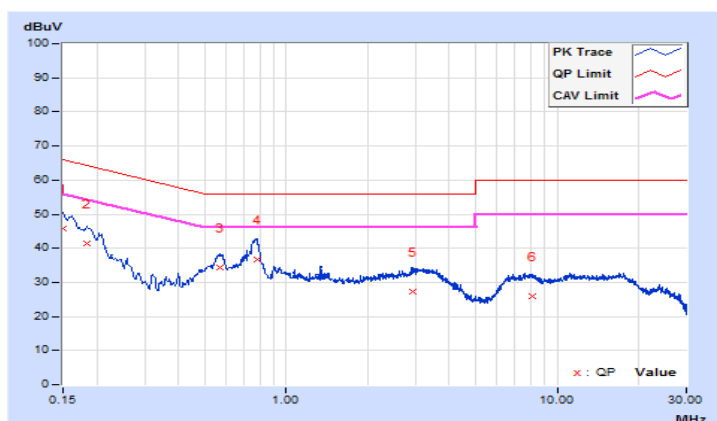


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.12	35.70	22.90	45.82	33.02	66.00	56.00	-20.18	-22.98
2	0.18316	10.13	31.16	14.79	41.29	24.92	64.34	54.34	-23.05	-29.42
3	0.56703	10.13	24.15	16.17	34.28	26.30	56.00	46.00	-21.72	-19.70
4	0.77841	10.14	26.58	12.95	36.72	23.09	56.00	46.00	-19.28	-22.91
5	2.94000	10.18	17.23	12.00	27.41	22.18	56.00	46.00	-28.59	-23.82
6	8.05650	10.33	15.75	10.82	26.08	21.15	60.00	50.00	-33.92	-28.85

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.

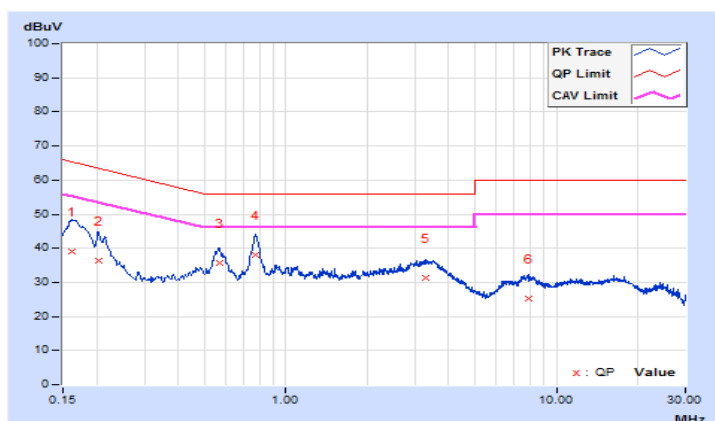


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16136	10.07	28.87	14.58	38.94	24.65	65.39	55.39	-26.45	-30.74
2	0.20249	10.07	26.17	10.84	36.24	20.91	63.51	53.51	-27.27	-32.60
3	0.56625	10.07	25.71	18.09	35.78	28.16	56.00	46.00	-20.22	-17.84
4	0.76875	10.08	27.96	14.47	38.04	24.55	56.00	46.00	-17.96	-21.45
5	3.29945	10.13	21.28	15.90	31.41	26.03	56.00	46.00	-24.59	-19.97
6	7.85175	10.23	15.13	10.07	25.36	20.30	60.00	50.00	-34.64	-29.70

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.

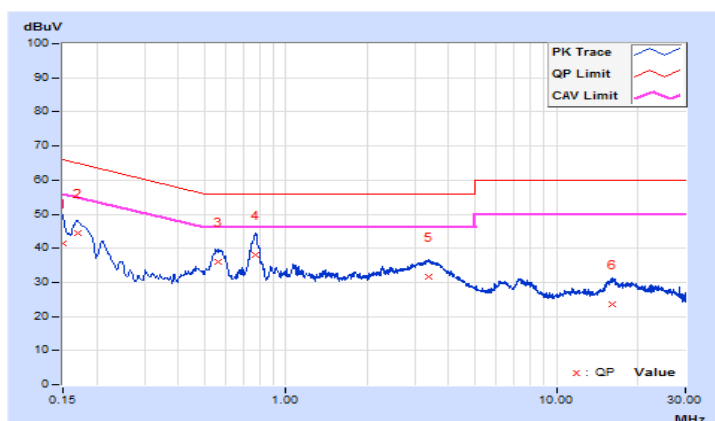


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.12	31.34	15.79	41.46	25.91	66.00	56.00	-24.54	-30.09
2	0.16966	10.12	34.32	20.62	44.44	30.74	64.98	54.98	-20.54	-24.24
3	0.55959	10.13	26.00	18.53	36.13	28.66	56.00	46.00	-19.87	-17.34
4	0.77226	10.14	27.76	14.14	37.90	24.28	56.00	46.00	-18.10	-21.72
5	3.37650	10.20	21.46	16.18	31.66	26.38	56.00	46.00	-24.34	-19.62
6	16.19250	10.58	13.00	7.18	23.58	17.76	60.00	50.00	-36.42	-32.24

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.

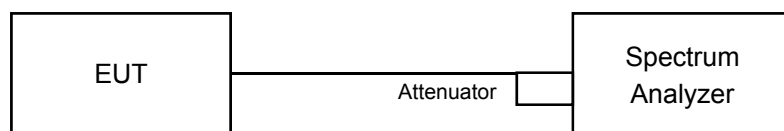


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

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 Procedure

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation from Test Standard

No deviation.

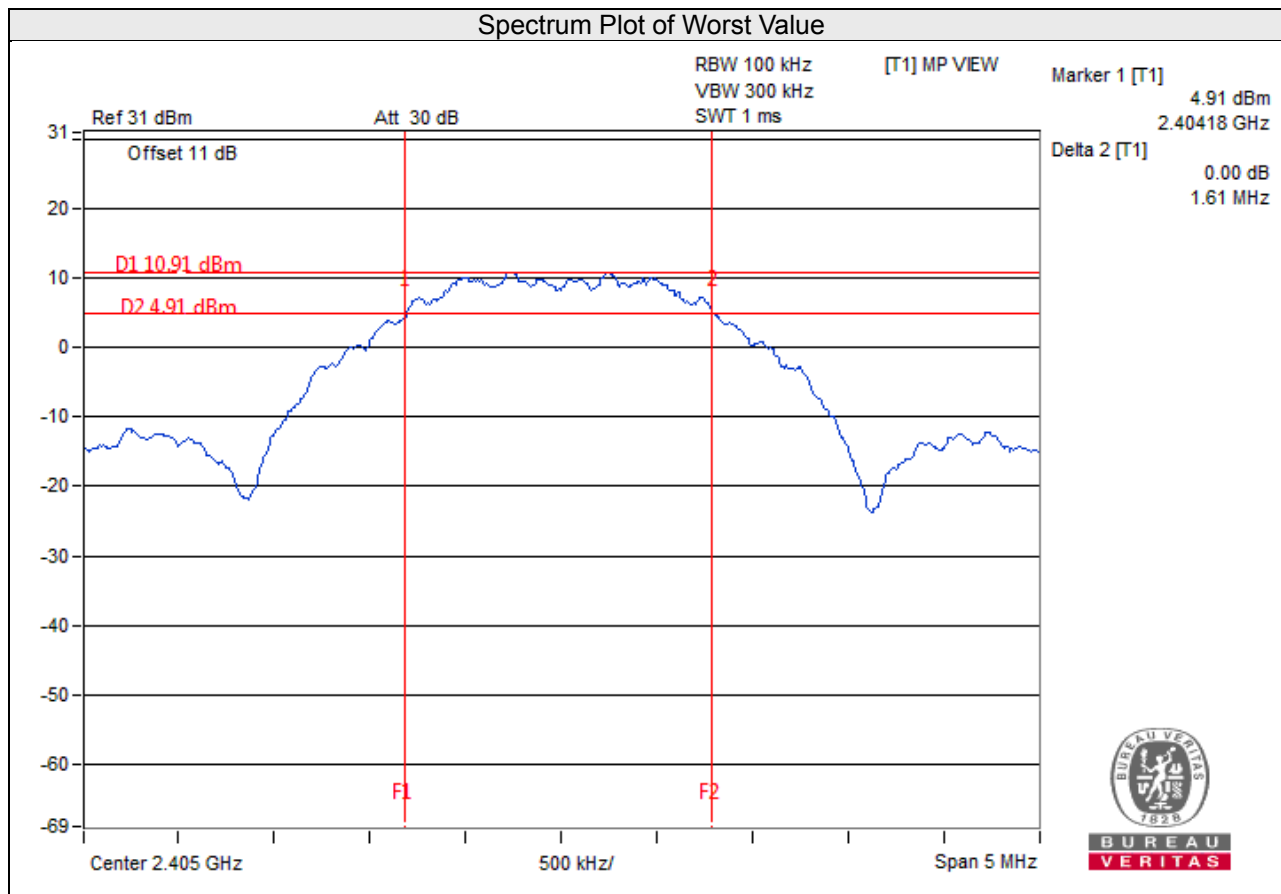
4.3.6 EUT Operating Conditions

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 Result

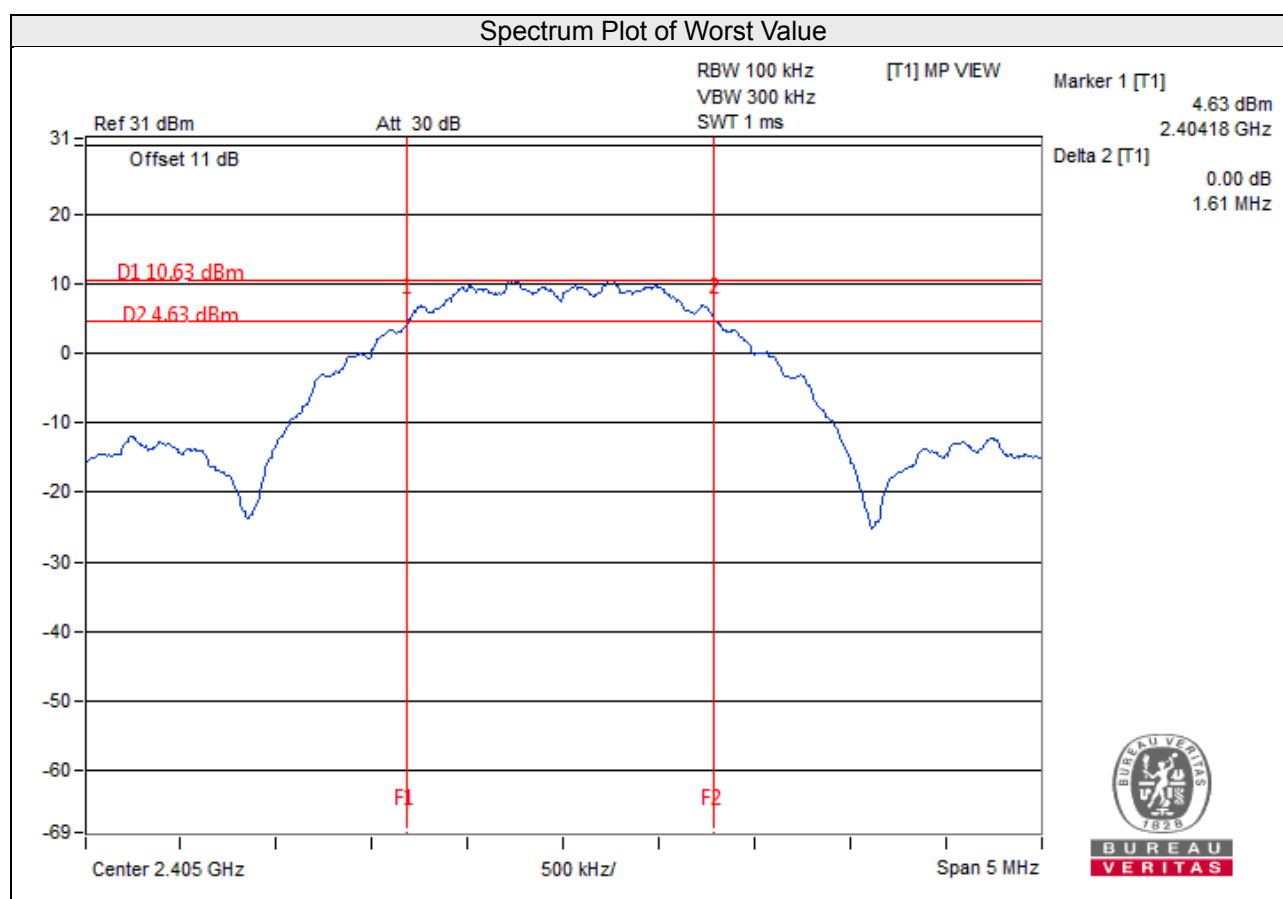
Test Mode A

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
11	2405	1.61	0.5	Pass
18	2440	1.61	0.5	Pass
26	2480	1.61	0.5	Pass



Test Mode B

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
11	2405	1.61	0.5	Pass
18	2440	1.61	0.5	Pass
26	2480	1.61	0.5	Pass

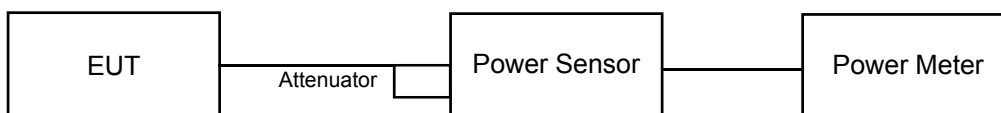


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

Test Mode A

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
11	2405	36.983	15.68	30	Pass
18	2440	19.454	12.89	30	Pass
26	2480	21.380	13.30	30	Pass

Test Mode B

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
11	2405	29.107	14.64	30	Pass
18	2440	22.961	13.61	30	Pass
26	2480	17.061	12.32	30	Pass

Test Mode C

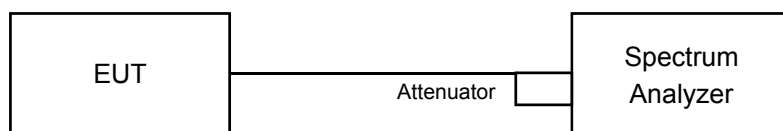
Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
11	2405	15.68	14.64	66.090	18.20	30.00	Pass
18	2440	12.89	13.61	42.415	16.28	30.00	Pass
26	2480	13.30	12.32	38.441	15.85	30.00	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm/3kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

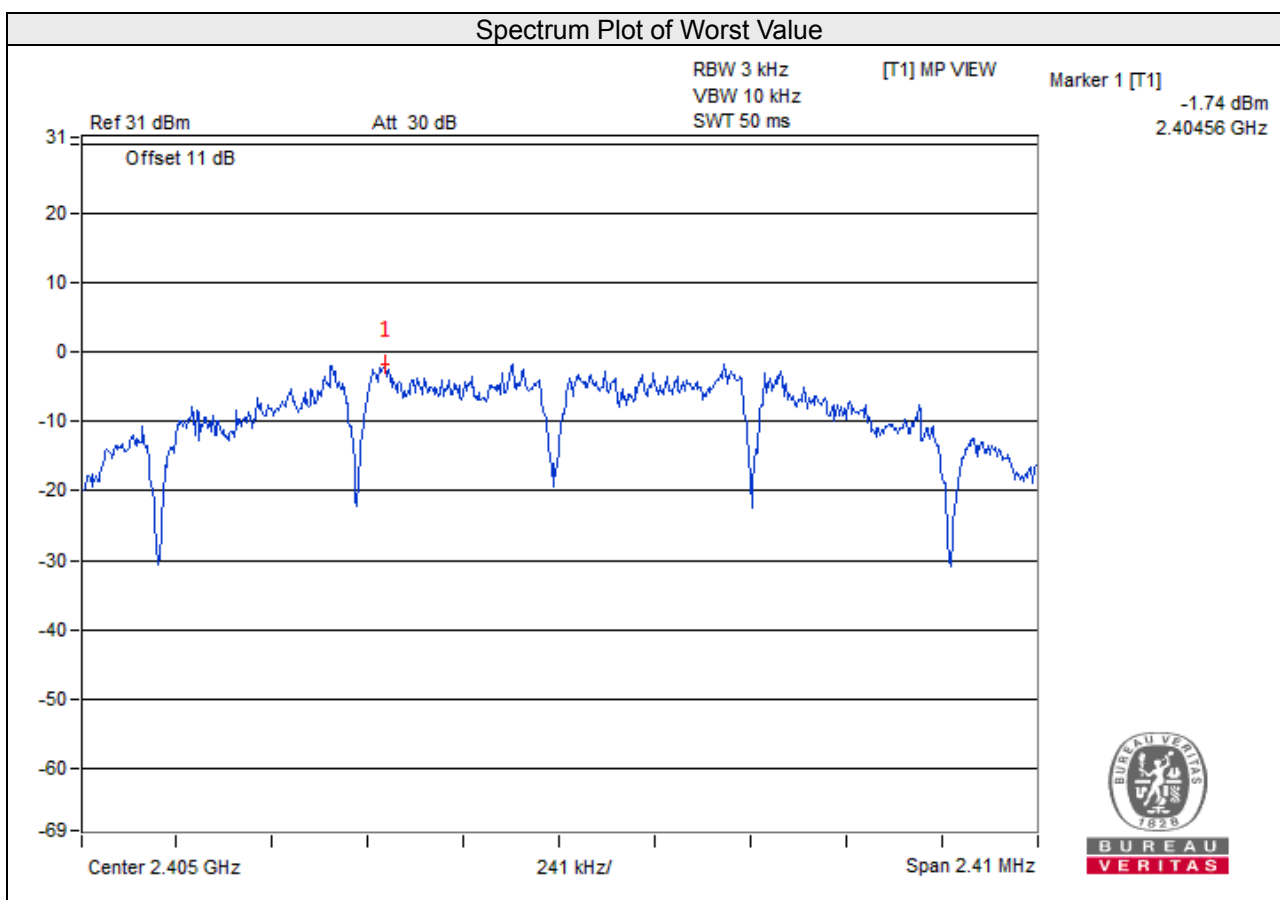
4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

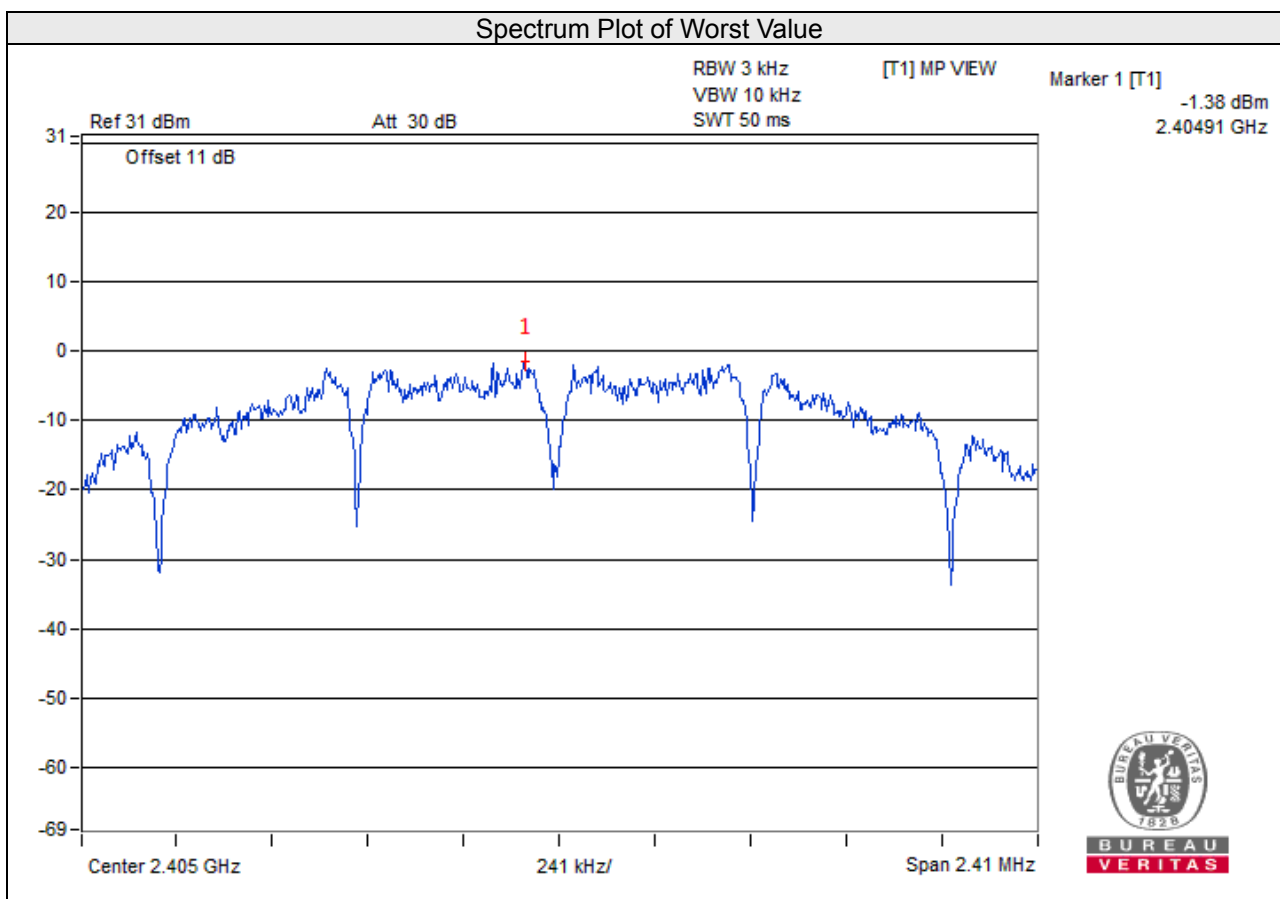
Test Mode A

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
11	2405	-1.74	8.00	Pass
18	2440	-4.44	8.00	Pass
26	2480	-4.67	8.00	Pass



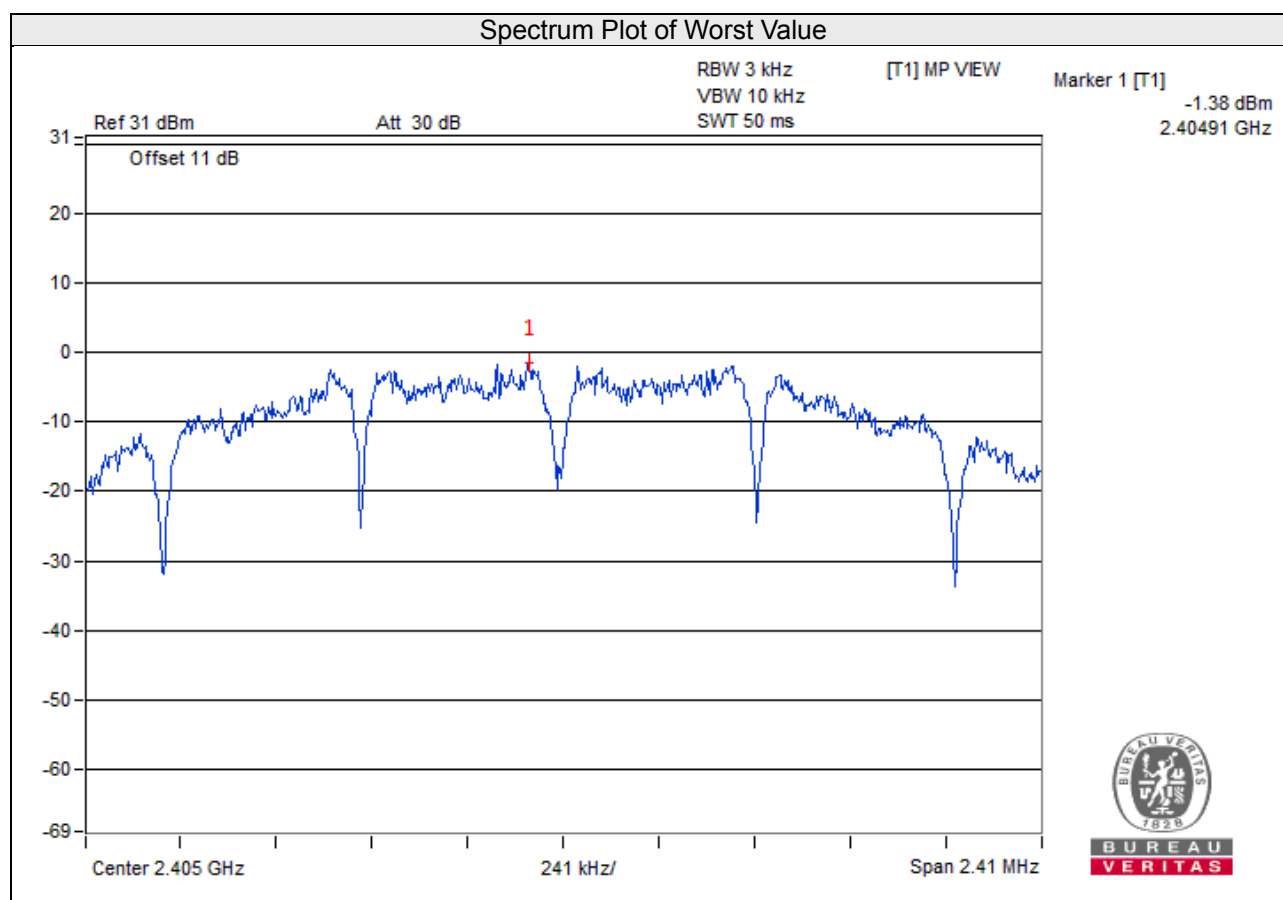
Test Mode B

Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
11	2405	-1.38	8.00	Pass
18	2440	-3.20	8.00	Pass
26	2480	-3.80	8.00	Pass



Test Mode C

TX chain	Channel	Frequency (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
0	11	2405	-1.74	3.01	1.27	8.00	Pass
	18	2440	-4.44	3.01	-1.43	8.00	Pass
	26	2480	-4.67	3.01	-1.66	8.00	Pass
1	11	2405	-1.38	3.01	1.63	8.00	Pass
	18	2440	-3.20	3.01	-0.19	8.00	Pass
	26	2480	-3.80	3.01	-0.79	8.00	Pass

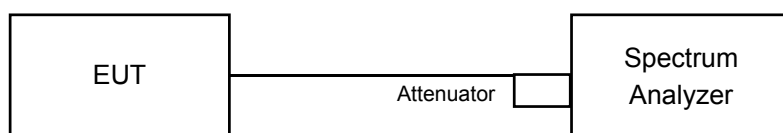


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW $\geq$ 300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

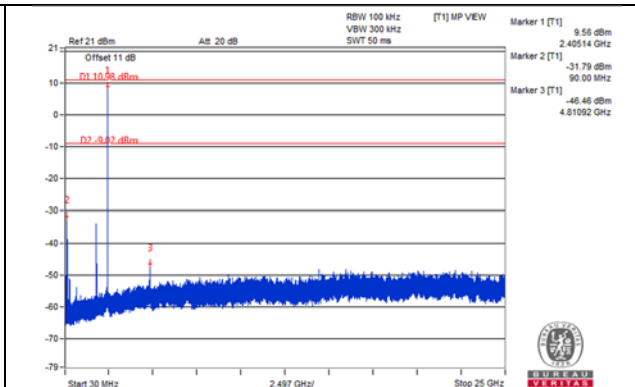
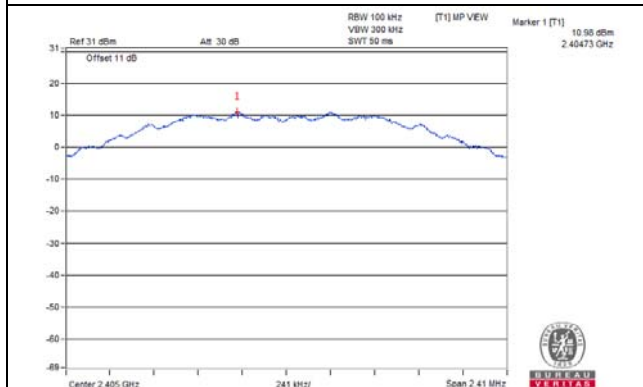
4.6.6 EUT Operating Condition

Same as Item 4.3.6

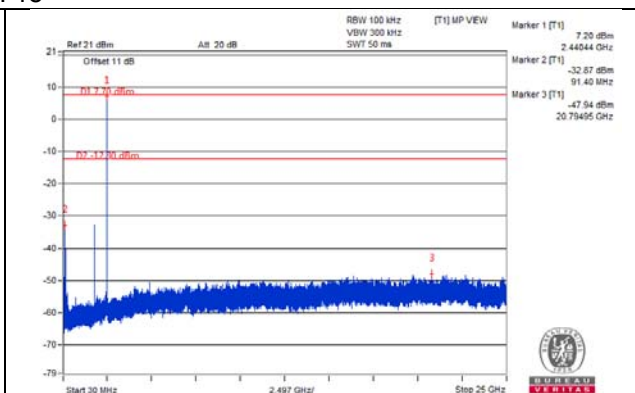
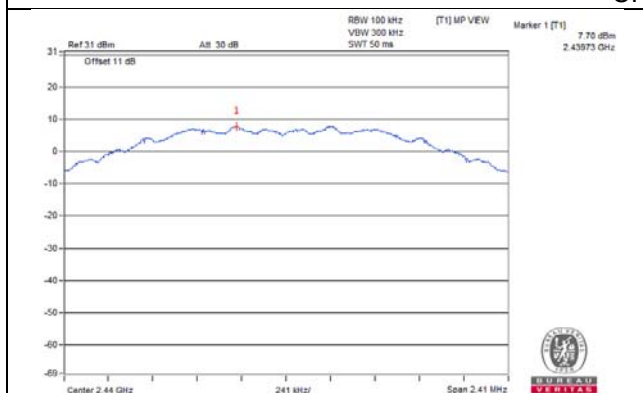
4.6.7 Test Results

Test Mode A

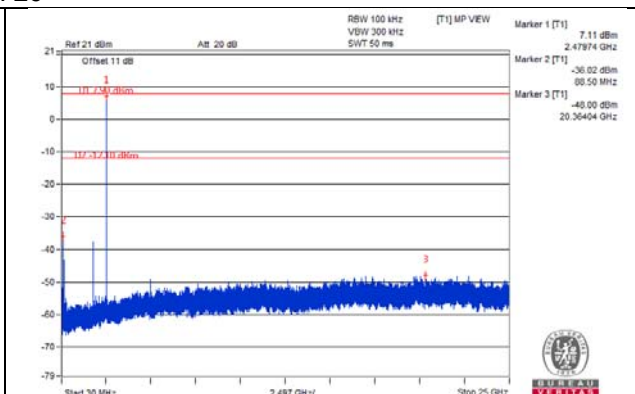
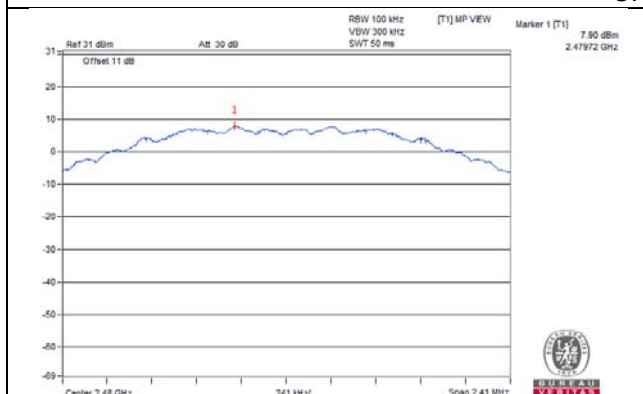
CH 11



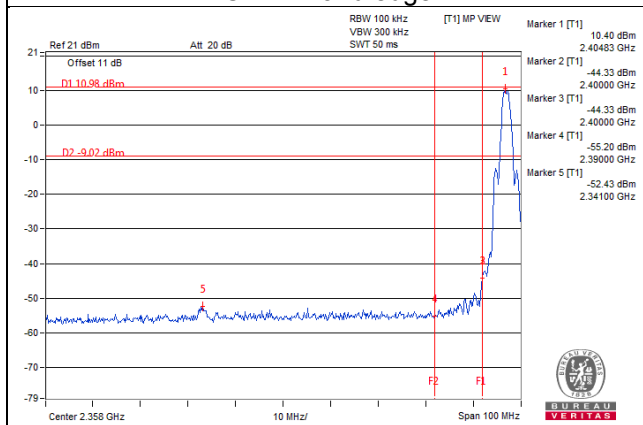
CH 18



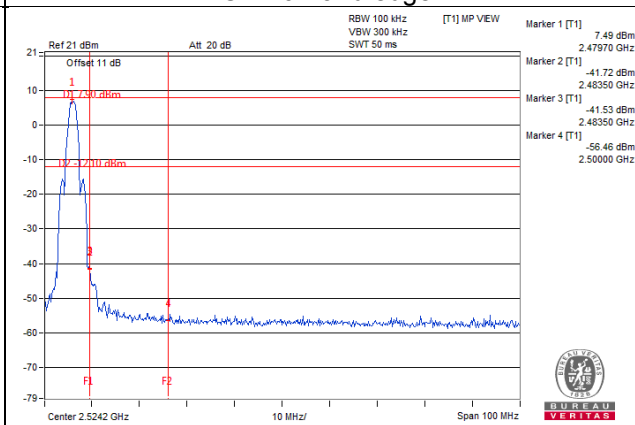
CH 26



CH 11 Band edge

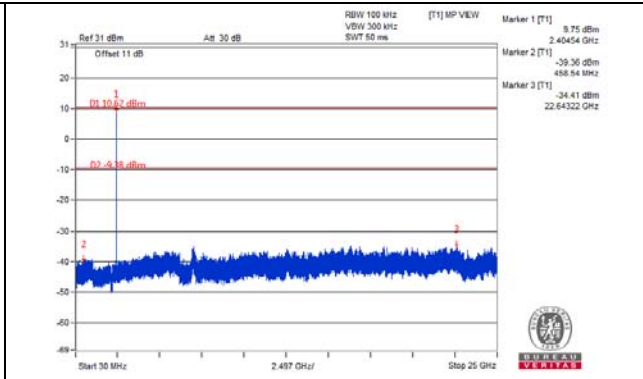
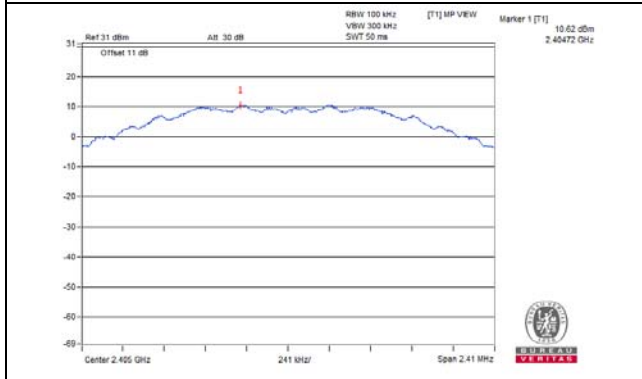


CH 26 Band edge

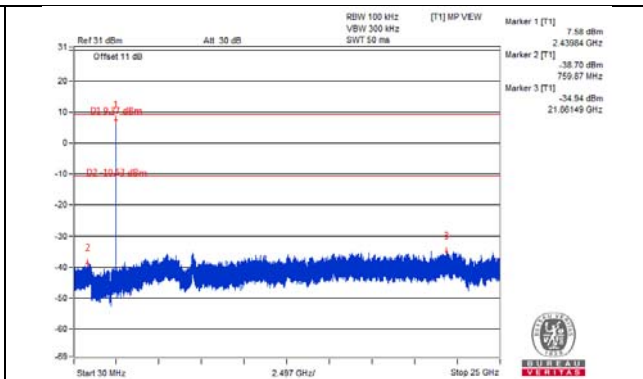
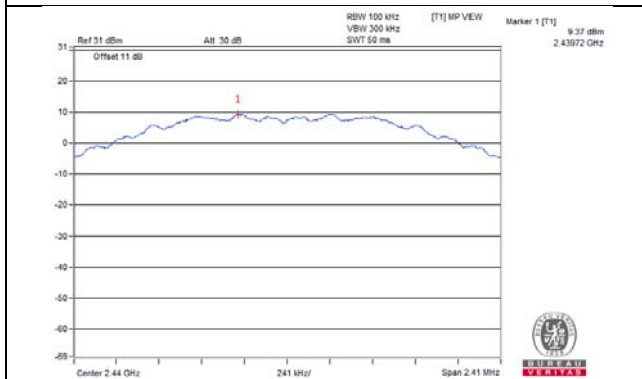


Test Mode B

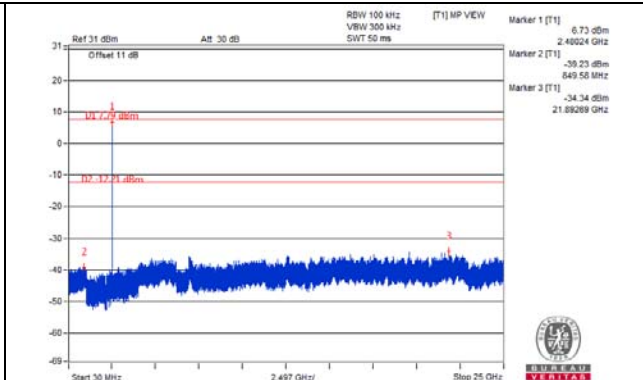
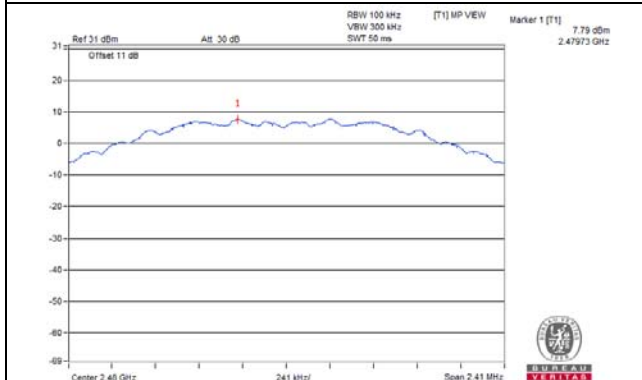
CH 11



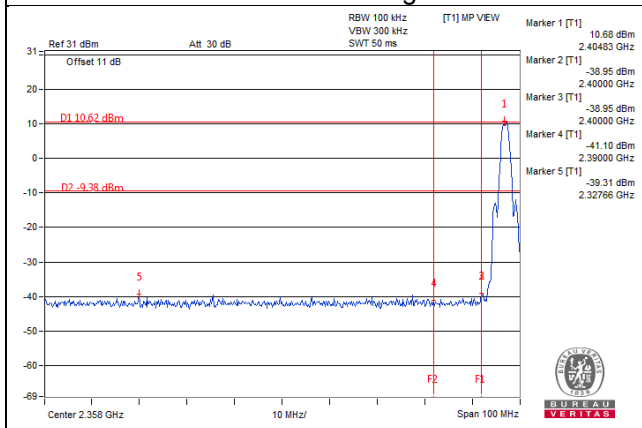
CH 18



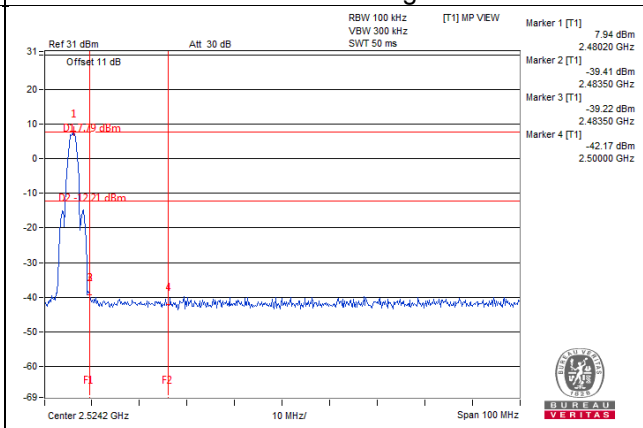
CH 26



CH 11 Band edge



CH 26 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

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Web Site: www.bureauveritas-adt.com

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

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