

FCC Test Report

Report No.: RF180828D01

FCC ID: QE9Q17

Test Model: Q17

Received Date: Aug. 28, 2018

Test Date: Sep. 6 ~ Oct. 2, 2018

Issued Date: Oct. 30, 2018

Applicant: Quuppa Oy

Address: Keilaranta 1 2nd floor 02150 Espoo, Finland

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

**FCC Registration /
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Release Control Record

Issue No.	Description	Date Issued
RF180828D01	Original release.	Oct. 30, 2018

1 Certificate of Conformity

Product: Locator
Brand: Quuppa
Test Model: Q17
Sample Status: Engineering sample
Applicant: Quuppa Oy
Test Date: Sep. 6 ~ Oct. 2, 2018
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 : Annie Chang, **Date:** Oct. 30, 2018
Annie Chang / Senior Specialist

Approved by : Rex Lai, **Date:** Oct. 30, 2018
Rex Lai / Associate Technical 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 -13.83dB at 0.46280MHz.
15.205 & 209 & 15.247(d)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -5.12dB at 2483.50MHz.
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	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:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1000MHz	5.54 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.48 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Locator	
Brand	Quuppa	
Test Model	Q17	
Status of EUT	Engineering Sample	
Nominal Voltage	5Vdc from AC adapter or 55Vdc from PoE	
Modulation Type	GFSK	
Transfer Rate	Position	1Mbps
	Communication	1Mbps
Operating Frequency	Position	2401 ~ 2481MHz
	Communication	2402 ~ 2480MHz
Number of Channel	Position	81
	Communication	40
Output Power	Position	1.432mW
	Communication	2.032mW
Antenna Type	Position	Integrated printed patch (PCB) antenna with 0dBi gain
	Communication	2.4 GHz SMT MID Chip antenna with 0dBi gain
Antenna Connector	N/A	
Accessory Device	N/A	
Data Cable Supplied	N/A	

Note:

1. The EUT was pre-tested with the following modes:

- ✧ EUT Operating + power from PoE Adapter
- ✧ EUT Operating + power from AC Adapter
- ✧ EUT Operating + power from Notebook

The worst emission level was found when the EUT tested under **EUT Operating + power from PoE Adapter.**

2. 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.

3.2 Description of Test Modes

Position: 81 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2401	21	2422	41	2442	61	2462
1	2402	22	2423	42	2443	62	2463
2	2403	23	2424	43	2444	63	2464
3	2404	24	2425	44	2445	64	2465
4	2405	25	2426	45	2446	65	2466
5	2406	26	2427	46	2447	66	2467
6	2407	27	2428	47	2448	67	2468
7	2408	28	2429	48	2449	68	2469
8	2409	29	2430	49	2450	69	2470
9	2410	30	2431	50	2451	70	2471
10	2411	31	2432	51	2452	71	2472
11	2412	32	2433	52	2453	72	2473
12	2413	33	2434	53	2454	73	2474
13	2414	34	2435	54	2455	74	2475
14	2415	35	2436	55	2456	75	2476
15	2416	36	2437	56	2457	76	2477
16	2417	37	2438	57	2458	77	2478
17	2418	38	2439	58	2459	78	2479
18	2419	39	2440	59	2460	79	2480
19	2420	40	2441	60	2461	80	2481
20	2421						

Communication: 40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
A	√	√	-	√	Position (EUT Operating + power from PoE Adapter)
B	√	√	√	√	Communication (EUT Operating + power from PoE Adapter)
C	-	-	√	-	Communication (EUT Operating + power from AC Adapter)
D	-	-	√	-	Communication (EUT Operating + power from Notebook)

Where **RE \geq 1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission

RE $<$ 1G: Radiated Emission below 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**.

NOTE: "-" means no effect.

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	Data Rate (Mbps)
A	0 to 80	0, 40, 80	GFSK	1
B	0 to 39	0, 19, 39	GFSK	2

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	Data Rate (Mbps)
A	0 to 80	40	GFSK	1
B	0 to 39	19	GFSK	2

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	Data Rate (Mbps)
B~D	0 to 39	19	GFSK	2

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	Data Rate (Mbps)
A	0 to 80	0, 40, 80	GFSK	1
B	0 to 39	0, 19, 39	GFSK	2

Test Condition:

Applicable To	EUT Configure Mode	Environmental Conditions	Input Power	Tested By
RE\geq1G	A & B	30deg. C, 79%RH	120Vac, 60Hz (PoE)	Ian Chang
RE$<$1G	A & B	30deg. C, 79%RH	120Vac, 60Hz (PoE)	Ian Chang
PLC	B	23deg. C, 71%RH	120Vac, 60Hz (PoE)	Dalen Dai
	C	23deg. C, 71%RH	120Vac, 60Hz (PoE)	Dalen Dai
	D	23deg. C, 71%RH	120Vac, 60Hz (Adapter)	Dalen Dai
APCM	A & B	25deg. C, 76%RH	120Vac, 60Hz (System)	Saxon Lee

3.3 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.	PoE Adapter	SONICWALL	PD-9001GR/AC	N/A	N/A	Supplied by client
B.	Notebook PC	DELL	Latitude E5480	6HPQ8H2	FCC DoC Approved	Provided by Lab
C.	AC Adapter	LEI	MU12-G120100-C5	N/A	FCC DoC Approved	Provided by Lab
D.	Notebook PC	ASUS	F3J	F3APT2YDD-FBQCCCA4266	FCC DoC Approved	Provided by Lab

Note:

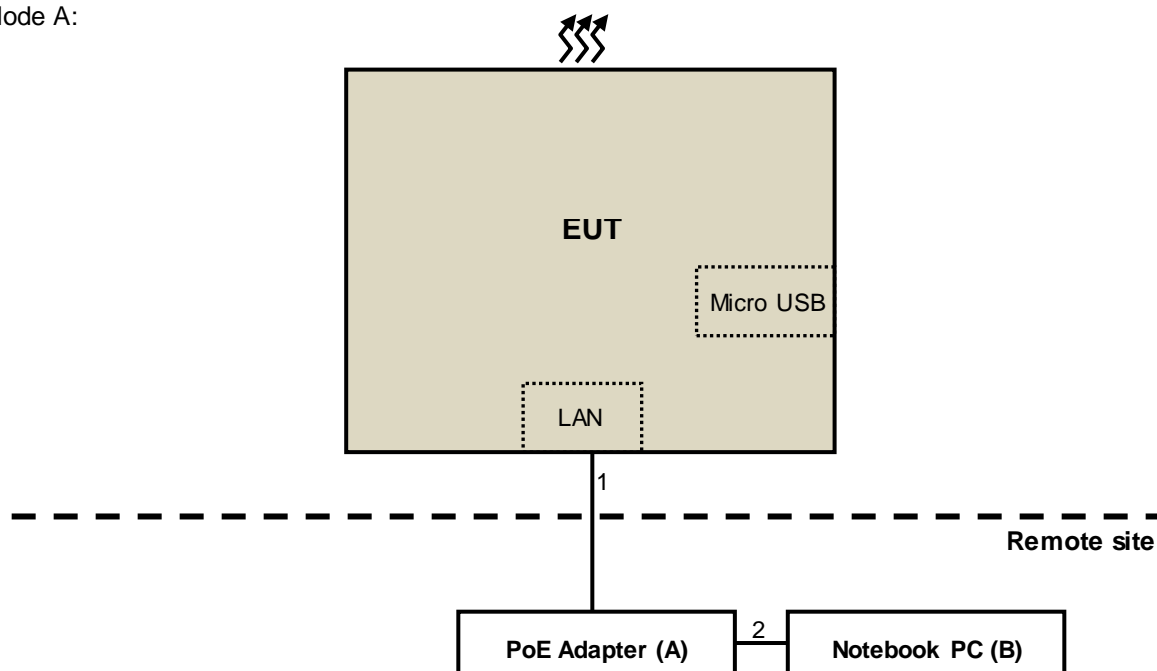
1. All power cords of the above support units are non-shielded (1.8m).
2. Items A-B acted as communication partners to transfer data.
3. The rating of support unit C was as below :
AC I/P: 100-240V 50/60Hz 0.5A
DC Output: 12V - 1.0A

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable (Cat.5e)	1	10	N	0	Provided by Lab
2.	LAN cable (Cat.5e)	1	1	N	0	Provided by Lab
3.	AC power cord	1	1.8	N	0	Provided by Lab
4.	Micro USB cable	1	1.5	Y	0	Provided by Lab

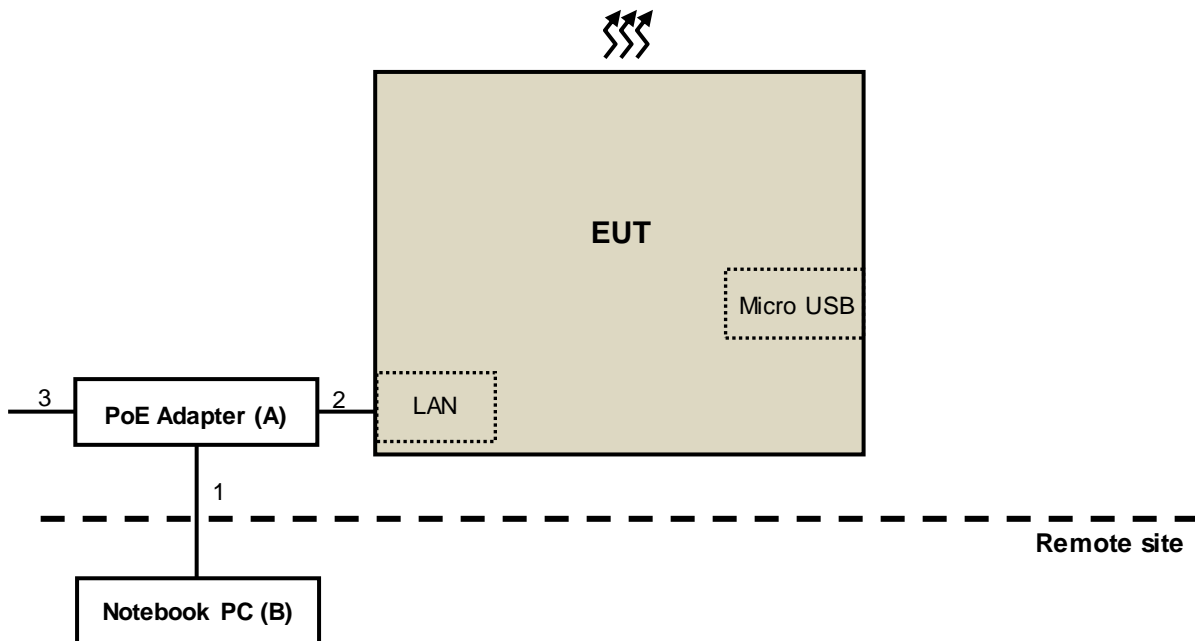
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

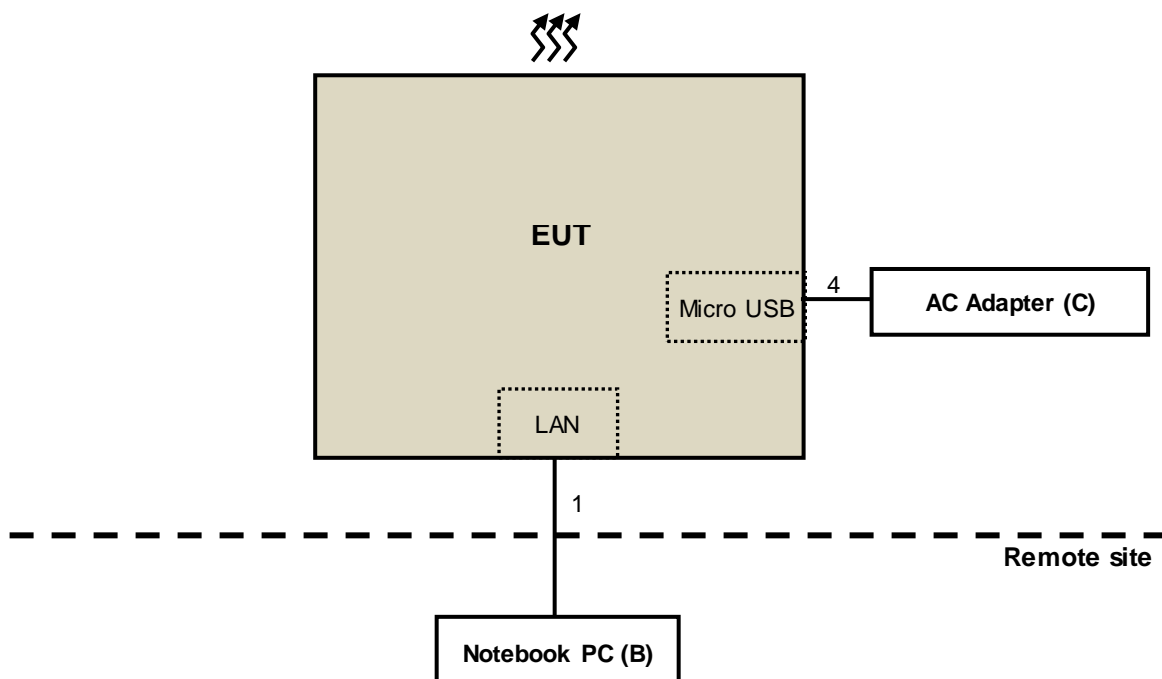
Mode A:



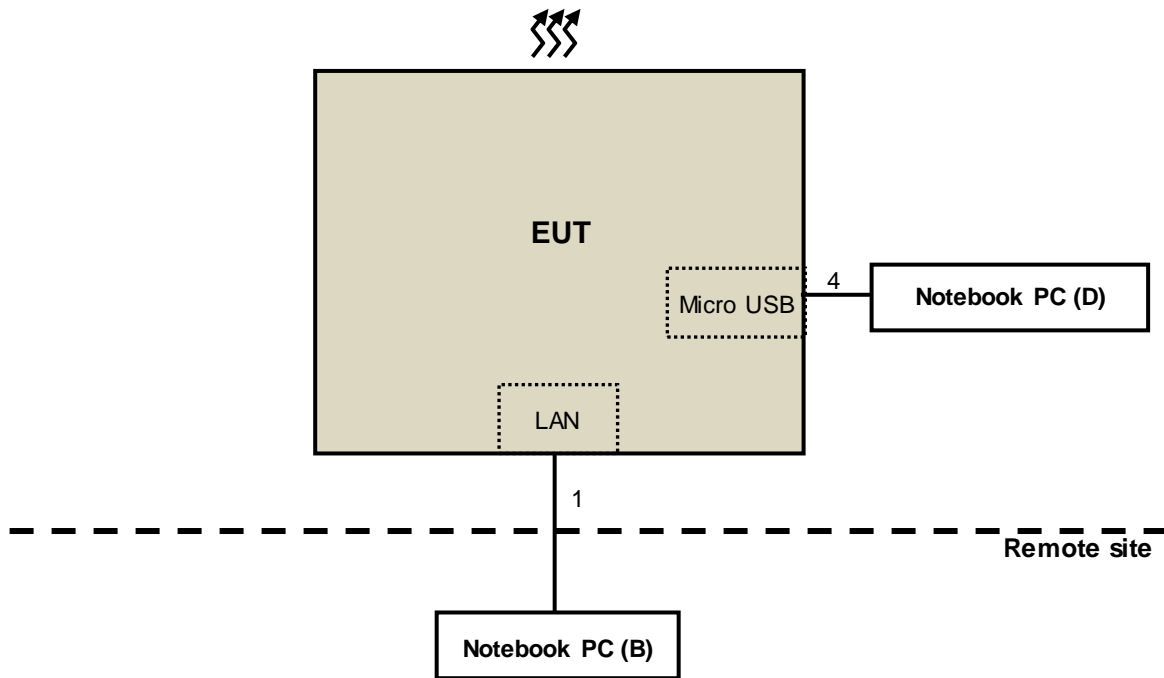
Mode B:



Mode C:



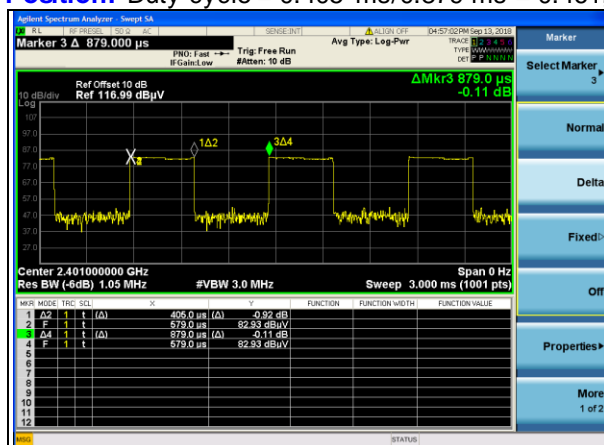
Mode D:



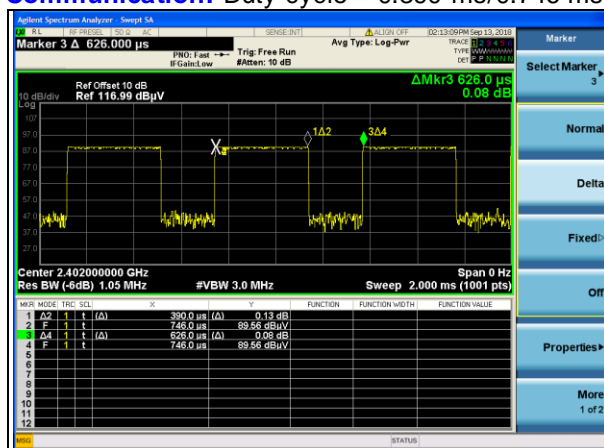
3.4 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %, duty factor shall be considered.

Position: Duty cycle = 0.405 ms/0.879 ms = 0.461, Duty factor = $10 * \log(1/0.461) = 3.36$



Communication: Duty cycle = 0.390 ms/0.746 ms = 0.523, Duty factor = $10 * \log(1/0.523) = 2.82$



3.5 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 v05
- 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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
HP Preamplifier	8447D	2432A03504	Feb. 21, 2018	Feb. 20, 2019
HP Preamplifier	8449B	3008A01201	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2018	Feb. 20, 2019
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 6, 2018	Feb. 5, 2019
Schwarzbeck Antenna	VULB 9168	139	Nov. 29, 2017	Nov. 28, 2018
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 1, 2017	Nov. 30, 2018
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 1, 2017	Nov. 30, 2018
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Aug. 13, 2018	Aug. 12, 2019
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8- 3.6m	Aug. 13, 2018	Aug. 12, 2019
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 4, 2018	Jun. 3, 2019
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Aug. 3, 2018	Aug. 2, 2019
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
EMCO Horn Antenna	3115	00028257	Nov. 30, 2017	Nov. 29, 2018
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 29, 2017 Sep. 27, 2018	Sep. 28, 2018 Sep. 26, 2019
Anritsu Power Sensor	MA2411B	0738404	Apr. 26, 2018	Apr. 25, 2019
Anritsu Power Meter	ML2495A	0842014	Apr. 26, 2018	Apr. 25, 2019

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in Chamber No. 6.
 4. The Industry Canada Reference No. IC 7450E-6.

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:

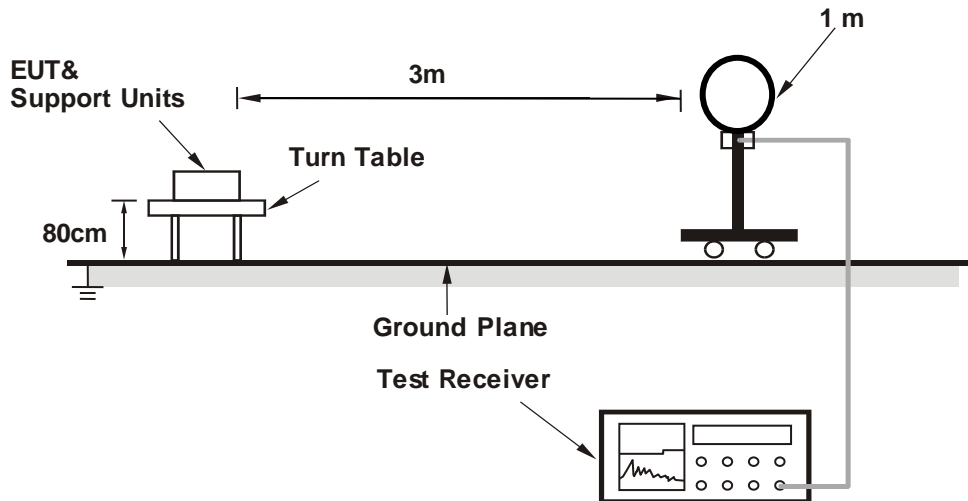
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

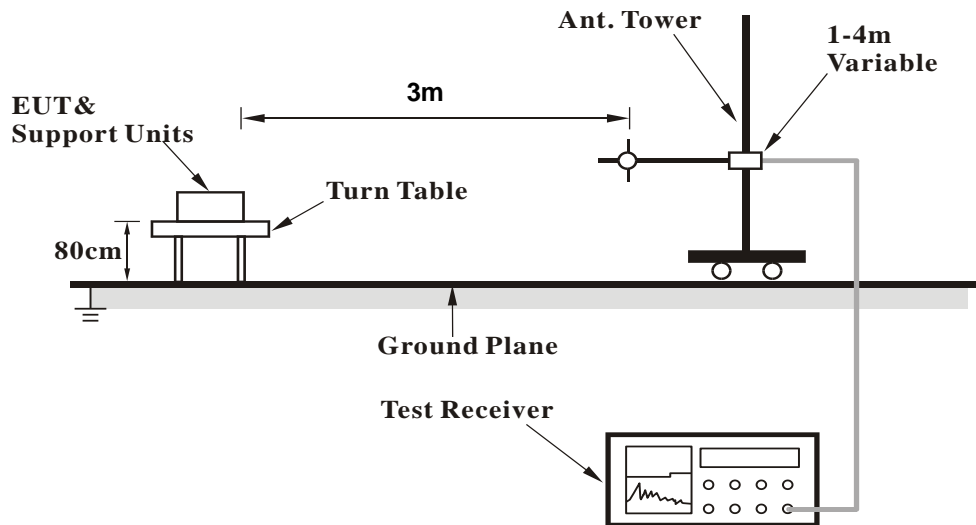
No deviation.

4.1.5 Test Setup

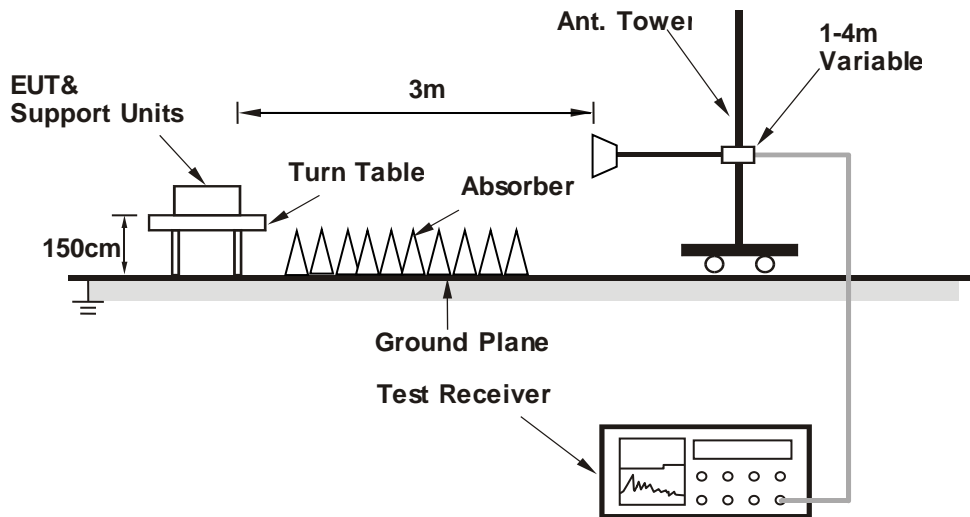
For Radiated emission below 30MHz



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

- a. Connected the EUT with PoE adapter placed on testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data :

Mode A:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	53.37 PK	74.00	-20.63	2.74 H	232	54.87	-1.50
2	2390.00	38.13 AV	54.00	-15.87	2.74 H	232	39.63	-1.50
3	*2401.00	81.71 PK			2.74 H	232	83.29	-1.58
4	*2401.00	81.42 AV			2.74 H	232	83.00	-1.58
5	4802.00	45.98 PK	74.00	-28.02	2.20 H	157	41.26	4.72
6	4802.00	38.91 AV	54.00	-15.09	2.20 H	157	34.19	4.72
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	52.21 PK	74.00	-21.79	3.18 V	2	53.71	-1.50
2	2390.00	38.00 AV	54.00	-16.00	3.18 V	2	39.50	-1.50
3	*2401.00	80.33 PK			3.18 V	2	81.91	-1.58
4	*2401.00	79.91 AV			3.18 V	2	81.49	-1.58
5	4802.00	47.20 PK	74.00	-26.80	1.41 V	96	42.48	4.72
6	4802.00	40.70 AV	54.00	-13.30	1.41 V	96	35.98	4.72

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 40	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2441.00	90.60 PK			2.68 H	241	92.36	-1.76
2	*2441.00	90.37 AV			2.68 H	241	92.13	-1.76
3	4882.00	46.71 PK	74.00	-27.29	2.18 H	118	41.84	4.87
4	4882.00	39.42 AV	54.00	-14.58	2.18 H	118	34.55	4.87

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	*2441.00	89.11 PK			3.23 V	17	90.87	-1.76
2	*2441.00	89.00 AV			3.23 V	17	90.76	-1.76
3	4882.00	47.74 PK	74.00	-26.26	1.69 V	204	42.87	4.87
4	4882.00	41.53 AV	54.00	-12.47	1.69 V	204	36.66	4.87

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 80	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2481.00	90.73 PK			2.51 H	239	92.08	-1.35
2	*2481.00	90.68 AV			2.51 H	239	92.03	-1.35
3	2483.50	68.88 PK	74.00	-5.12	2.51 H	239	70.20	-1.32
4	2483.50	41.32 AV	54.00	-12.68	2.51 H	239	42.64	-1.32
5	4962.00	46.29 PK	74.00	-27.71	1.99 H	285	41.56	4.73
6	4962.00	39.68 AV	54.00	-14.32	1.99 H	285	34.95	4.73

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	*2481.00	89.31 PK			2.61 V	23	90.66	-1.35
2	*2481.00	88.68 AV			2.61 V	23	90.03	-1.35
3	2483.50	65.09 PK	74.00	-8.91	2.61 V	23	66.41	-1.32
4	2483.50	39.95 AV	54.00	-14.05	2.61 V	23	41.27	-1.32
5	4962.00	47.57 PK	74.00	-26.43	1.66 V	258	42.84	4.73
6	4962.00	40.61 AV	54.00	-13.39	1.66 V	258	35.88	4.73

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.

Mode B:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	2390.00	53.41 PK	74.00	-20.59	1.15 H	200	54.91	-1.50
2	2390.00	39.34 AV	54.00	-14.66	1.15 H	200	40.84	-1.50
3	*2402.00	87.95 PK			1.15 H	200	89.54	-1.59
4	*2402.00	87.19 AV			1.15 H	200	88.78	-1.59
5	4804.00	49.06 PK	74.00	-24.94	1.84 H	255	44.33	4.73
6	4804.00	42.24 AV	54.00	-11.76	1.84 H	255	37.51	4.73
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	52.56 PK	74.00	-21.44	1.51 V	269	54.06	-1.50
2	2390.00	39.06 AV	54.00	-14.94	1.51 V	269	40.56	-1.50
3	*2402.00	83.04 PK			1.51 V	269	84.63	-1.59
4	*2402.00	81.90 AV			1.51 V	269	83.49	-1.59
5	4804.00	49.97 PK	74.00	-24.03	2.46 V	184	45.24	4.73
6	4804.00	42.14 AV	54.00	-11.86	2.46 V	184	37.41	4.73

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 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2440.00	87.93 PK			1.31 H	259	89.68	-1.75
2	*2440.00	86.81 AV			1.31 H	259	88.56	-1.75
3	4880.00	49.39 PK	74.00	-24.61	1.94 H	268	44.52	4.87
4	4880.00	42.56 AV	54.00	-11.44	1.94 H	268	37.69	4.87

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	83.03 PK			1.56 V	278	84.78	-1.75
2	*2440.00	81.94 AV			1.56 V	278	83.69	-1.75
3	4880.00	50.50 PK	74.00	-23.50	2.58 V	196	45.63	4.87
4	4880.00	42.75 AV	54.00	-11.25	2.58 V	196	37.88	4.87

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 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	*2480.00	87.28 PK			1.25 H	260	88.65	-1.37
2	*2480.00	86.32 AV			1.25 H	260	87.69	-1.37
3	2483.50	54.45 PK	74.00	-19.55	1.25 H	260	55.77	-1.32
4	2483.50	40.55 AV	54.00	-13.45	1.25 H	260	41.87	-1.32
5	4960.00	49.31 PK	74.00	-24.69	1.97 H	142	44.58	4.73
6	4960.00	42.36 AV	54.00	-11.64	1.97 H	142	37.63	4.73

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	82.41 PK			1.67 V	281	83.78	-1.37
2	*2480.00	81.32 AV			1.67 V	281	82.69	-1.37
3	2483.50	53.39 PK	74.00	-20.61	1.67 V	281	54.71	-1.32
4	2483.50	39.26 AV	54.00	-14.74	1.67 V	281	40.58	-1.32
5	4960.00	50.47 PK	74.00	-23.53	2.32 V	195	45.74	4.73
6	4960.00	42.97 AV	54.00	-11.03	2.32 V	195	38.24	4.73

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.

Below 1GHz Data:

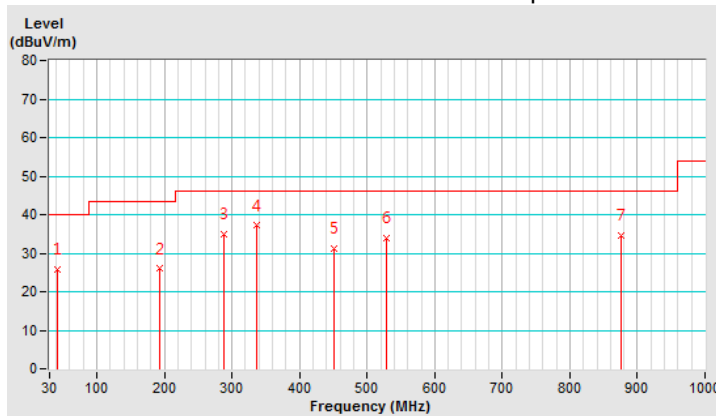
Mode A:

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	40.82	25.93 QP	40.00	-14.07	2.15 H	6	33.57	-7.64
2	191.99	25.97 QP	43.50	-17.53	2.61 H	227	35.58	-9.61
3	288.02	35.07 QP	46.00	-10.93	1.85 H	121	40.57	-5.50
4	335.99	37.17 QP	46.00	-8.83	2.36 H	227	41.72	-4.55
5	450.01	31.20 QP	46.00	-14.80	1.43 H	132	33.21	-2.01
6	528.00	34.06 QP	46.00	-11.94	1.77 H	148	34.86	-0.80
7	875.02	34.74 QP	46.00	-11.26	1.88 H	116	29.57	5.17

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. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

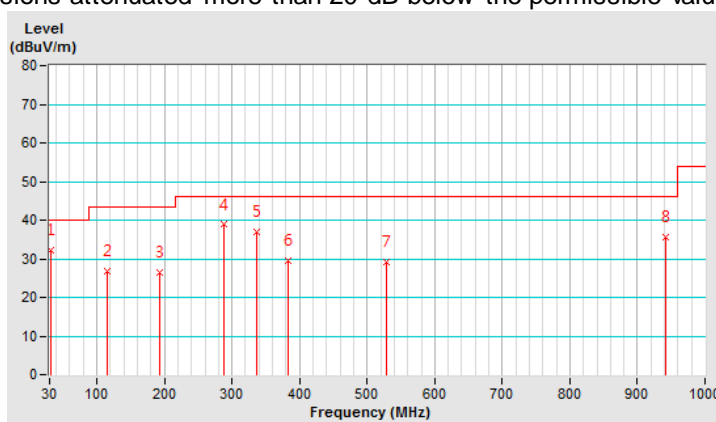


CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	32.67	32.31 QP	40.00	-7.69	2.31 V	105	40.95	-8.64
2	115.21	26.85 QP	43.50	-16.65	1.94 V	153	36.70	-9.85
3	191.99	26.52 QP	43.50	-16.98	2.51 V	273	36.13	-9.61
4	288.02	38.82 QP	46.00	-7.18	1.87 V	212	44.32	-5.50
5	335.99	37.06 QP	46.00	-8.94	1.66 V	178	41.61	-4.55
6	384.00	29.45 QP	46.00	-16.55	2.07 V	160	33.01	-3.56
7	528.34	29.15 QP	46.00	-16.85	1.45 V	146	29.95	-0.80
8	941.85	35.74 QP	46.00	-10.26	1.28 V	339	29.26	6.48

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. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



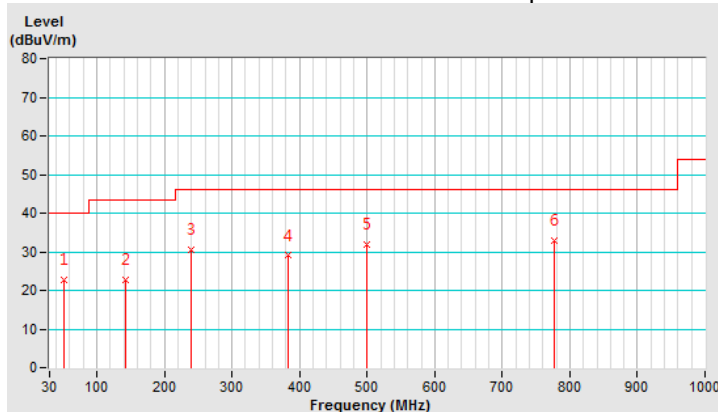
Mode B:

CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 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	52.12	22.88 QP	40.00	-17.12	2.23 H	141	29.92	-7.04
2	142.13	22.74 QP	43.50	-20.76	1.82 H	107	30.13	-7.39
3	240.00	30.47 QP	46.00	-15.53	1.96 H	84	38.38	-7.91
4	384.00	28.99 QP	46.00	-17.01	1.72 H	123	32.55	-3.56
5	500.01	31.85 QP	46.00	-14.15	2.51 H	197	33.09	-1.24
6	776.71	32.97 QP	46.00	-13.03	1.06 H	51	28.86	4.11

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. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

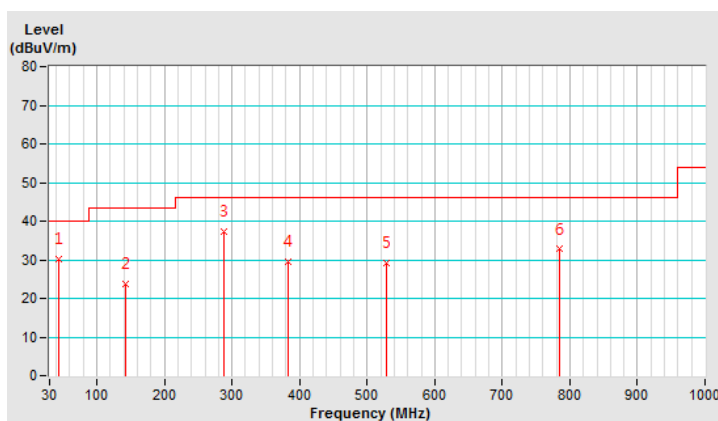


CHANNEL	TX Channel 19	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	43.92	30.15 QP	40.00	-9.85	1.52 V	352	37.52	-7.37
2	142.13	23.71 QP	43.50	-19.79	2.31 V	65	31.10	-7.39
3	288.02	37.24 QP	46.00	-8.76	2.10 V	212	42.74	-5.50
4	384.00	29.45 QP	46.00	-16.55	1.77 V	160	33.01	-3.56
5	528.34	29.15 QP	46.00	-16.85	1.63 V	146	29.95	-0.80
6	784.27	32.77 QP	46.00	-13.23	2.04 V	26	28.80	3.97

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz :the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESR3	102414	Feb. 7, 2018	Feb. 6, 2019
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 23, 2018	May 22, 2019
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 23, 2018	May 22, 2019
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 23, 2017	Nov. 22, 2018
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 3, 2018	May 2, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK 8121	8121-808	Mar. 5, 2018	Mar. 4, 2019
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 14, 2018	Feb. 13, 2019
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 8, 2018	May 7, 2019
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 14, 2017	Nov. 13, 2018
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 14, 2017	Nov. 13, 2018

- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Shielded Room No. 10.
 3. The VCCI Site Registration No. C-1852.

4.2.3 Test Procedures

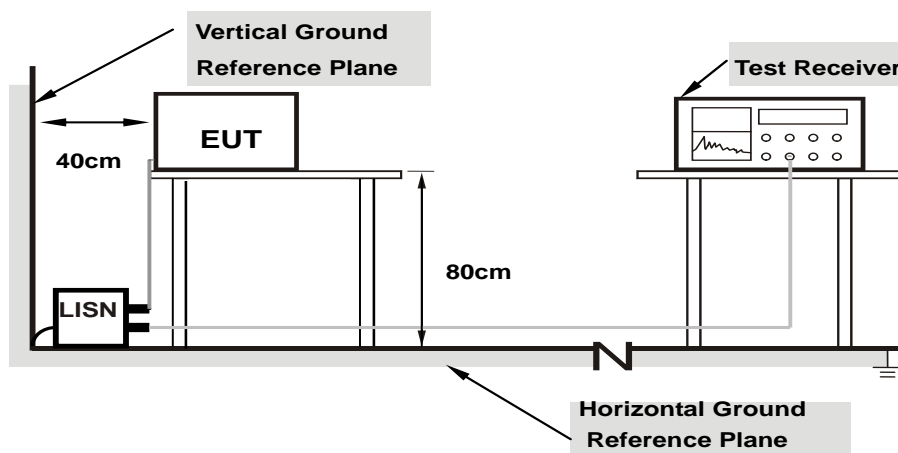
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

- a. Connected the EUT with PoE adapter / AC Adapter / Notebook placed on testing table.
- b. Set the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

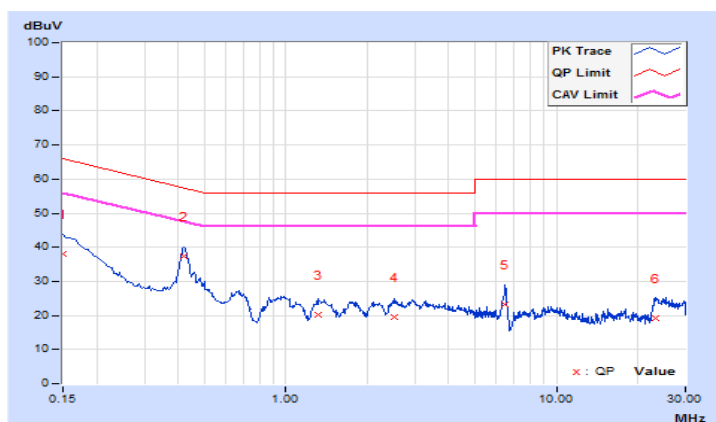
Mode B:

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.66	28.25	16.82	37.91	26.48	66.00	56.00	-28.09	-29.52
2	0.41979	9.70	27.65	21.61	37.35	31.31	57.45	47.45	-20.10	-16.14
3	1.32110	9.76	10.52	6.13	20.28	15.89	56.00	46.00	-35.72	-30.11
4	2.52538	9.80	9.83	4.17	19.63	13.97	56.00	46.00	-36.37	-32.03
5	6.46625	9.87	13.34	7.75	23.21	17.62	60.00	50.00	-36.79	-32.38
6	23.18541	10.07	9.27	4.36	19.34	14.43	60.00	50.00	-40.66	-35.57

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

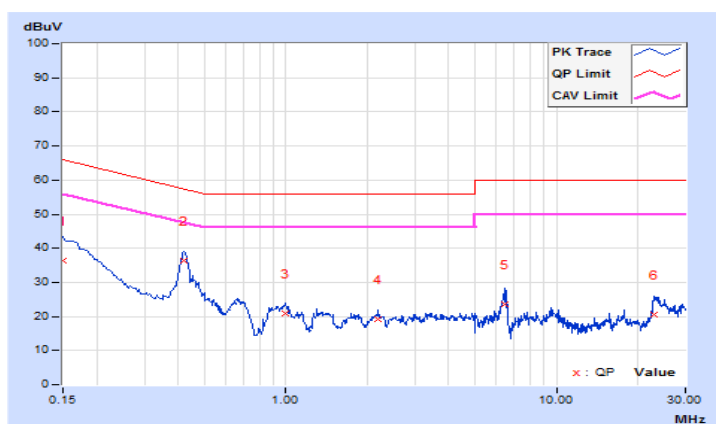


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.67	26.71	15.20	36.38	24.87	66.00	56.00	-29.62	-31.13
2	0.41979	9.71	26.78	20.79	36.49	30.50	57.45	47.45	-20.96	-16.95
3	1.00048	9.76	11.01	7.55	20.77	17.31	56.00	46.00	-35.23	-28.69
4	2.19694	9.81	9.50	6.13	19.31	15.94	56.00	46.00	-36.69	-30.06
5	6.47016	9.89	13.79	9.98	23.68	19.87	60.00	50.00	-36.32	-30.13
6	23.08766	10.09	10.54	5.44	20.63	15.53	60.00	50.00	-39.37	-34.47

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



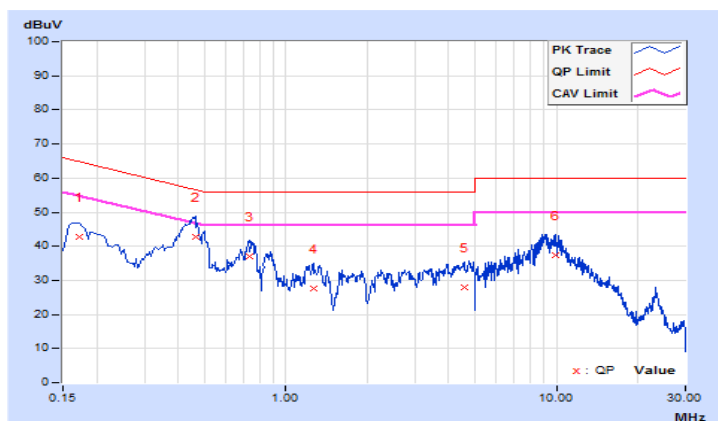
Mode C:

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17346	9.69	33.22	13.12	42.91	22.81	64.79	54.79	-21.88	-31.98
2	0.46280	9.77	33.04	16.50	42.81	26.27	56.64	46.64	-13.83	-20.37
3	0.73851	9.82	27.06	8.84	36.88	18.66	56.00	46.00	-19.12	-27.34
4	1.26245	9.89	17.63	4.57	27.52	14.46	56.00	46.00	-28.48	-31.54
5	4.57813	10.08	17.79	7.69	27.87	17.77	56.00	46.00	-28.13	-28.23
6	9.91878	10.22	27.11	14.67	37.33	24.89	60.00	50.00	-22.67	-25.11

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

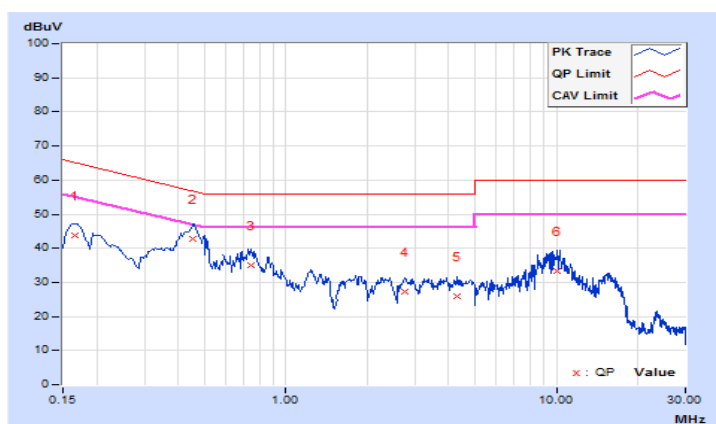


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.70	34.05	18.09	43.75	27.79	65.18	55.18	-21.43	-27.39
2	0.45498	9.81	32.88	22.53	42.69	32.34	56.78	46.78	-14.09	-14.44
3	0.74633	9.85	25.32	16.47	35.17	26.32	56.00	46.00	-20.83	-19.68
4	2.74825	10.02	17.23	10.79	27.25	20.81	56.00	46.00	-28.75	-25.19
5	4.31616	10.08	15.85	9.92	25.93	20.00	56.00	46.00	-30.07	-26.00
6	10.05563	10.20	23.14	10.72	33.34	20.92	60.00	50.00	-26.66	-29.08

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



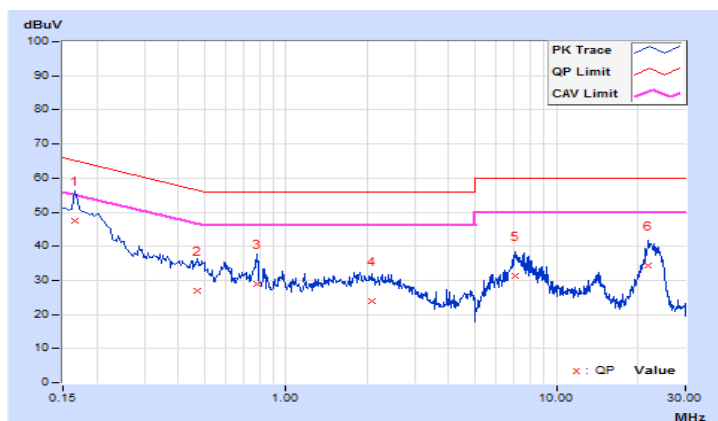
Mode D:

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.66	37.74	16.15	47.40	25.81	65.18	55.18	-17.78	-29.37
2	0.47062	9.70	17.23	8.37	26.93	18.07	56.50	46.50	-29.57	-28.43
3	0.78543	9.73	19.11	10.66	28.84	20.39	56.00	46.00	-27.16	-25.61
4	2.08746	9.79	13.98	6.90	23.77	16.69	56.00	46.00	-32.23	-29.31
5	7.03711	9.88	21.55	10.74	31.43	20.62	60.00	50.00	-28.57	-29.38
6	21.89902	10.05	24.35	16.22	34.40	26.27	60.00	50.00	-25.60	-23.73

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

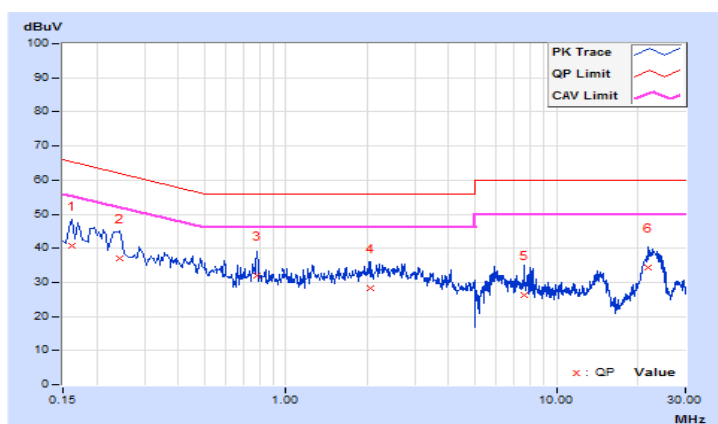


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16173	9.67	31.09	14.03	40.76	23.70	65.37	55.37	-24.61	-31.67
2	0.24384	9.69	27.30	9.10	36.99	18.79	61.96	51.96	-24.97	-33.17
3	0.78543	9.74	22.08	12.49	31.82	22.23	56.00	46.00	-24.18	-23.77
4	2.06400	9.81	18.35	10.20	28.16	20.01	56.00	46.00	-27.84	-25.99
5	7.58451	9.91	16.42	9.75	26.33	19.66	60.00	50.00	-33.67	-30.34
6	21.91466	10.09	24.10	16.35	34.19	26.44	60.00	50.00	-25.81	-23.56

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

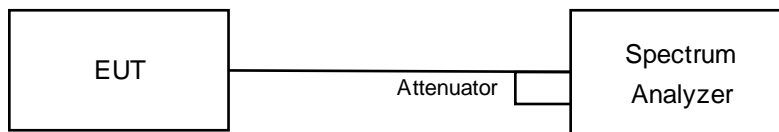


4.3 6dB Bandwidth Measurement

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

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. 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.

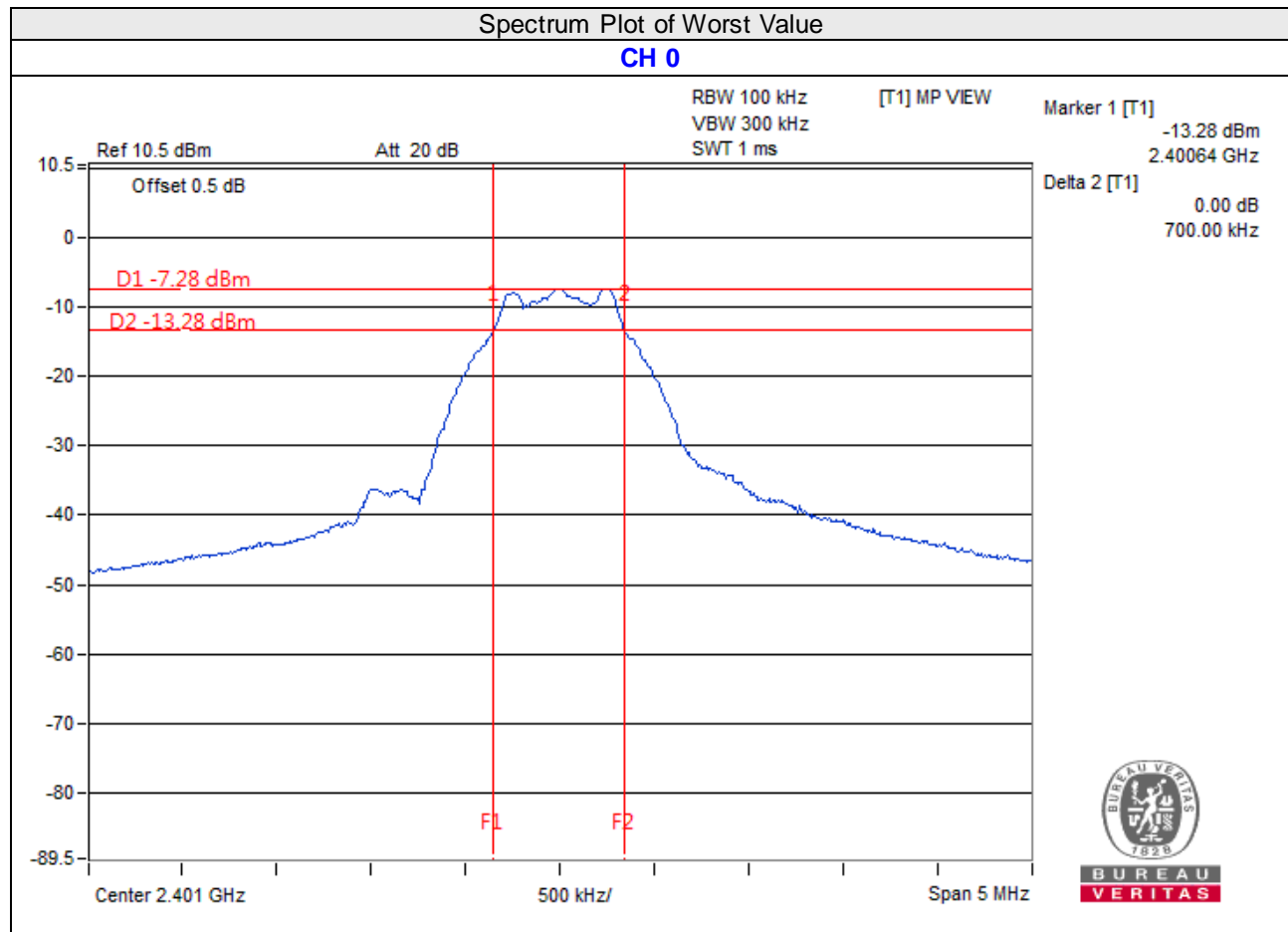
4.3.6 EUT Operating Conditions

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

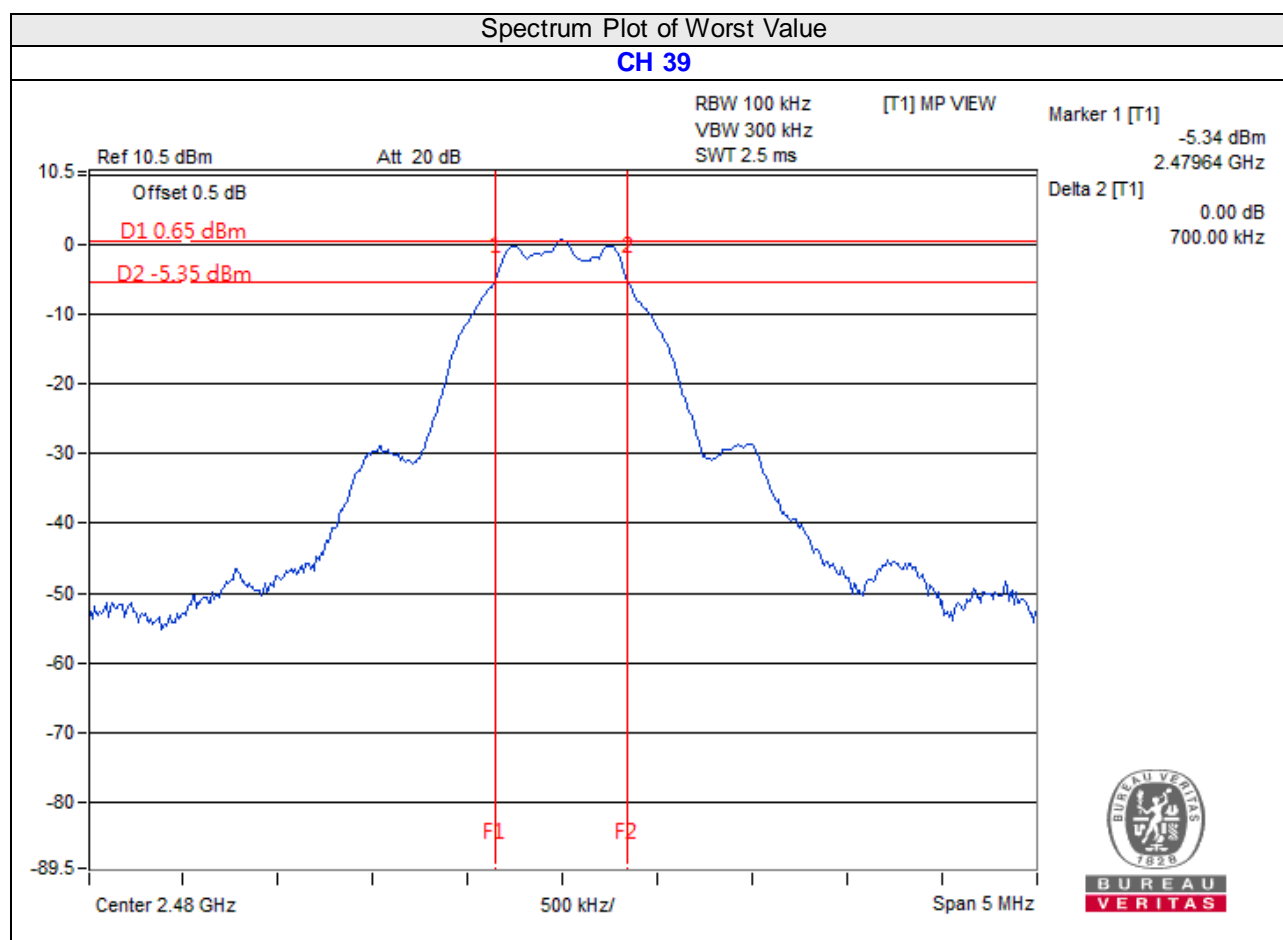
Mode A:

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2401	0.70	0.5	Pass
40	2441	0.71	0.5	Pass
80	2481	0.72	0.5	Pass



Mode B:

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
0	2402	0.73	0.5	Pass
19	2440	0.71	0.5	Pass
39	2480	0.70	0.5	Pass

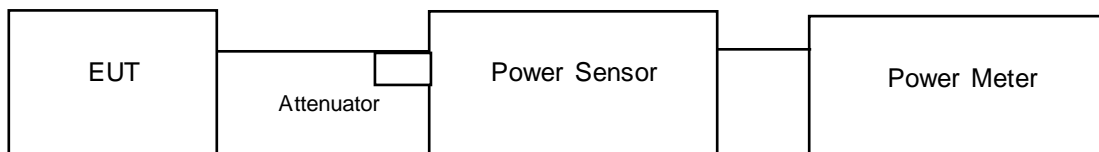


4.4 Conducted Output Power Measurement

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.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

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

Mode A:

FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2401	0.280	-5.53	30	Pass
40	2441	1.432	1.56	30	Pass
80	2481	1.416	1.51	30	Pass

FOR AVERAGE POWER

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2401	0.229	-6.41
40	2441	1.403	1.47
80	2481	1.390	1.43

Mode B:

FOR PEAK POWER

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
0	2402	2.032	3.08	30	Pass
19	2440	1.687	2.27	30	Pass
39	2480	1.199	0.79	30	Pass

FOR AVERAGE POWER

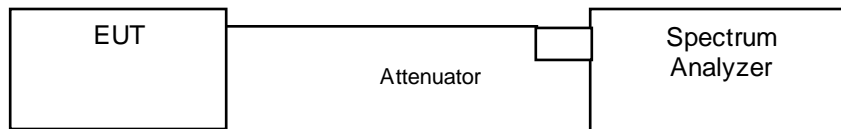
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	2.000	3.01
19	2440	1.656	2.19
39	2480	1.172	0.69

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

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

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

4.5.5 Deviation from Test Standard

No deviation.

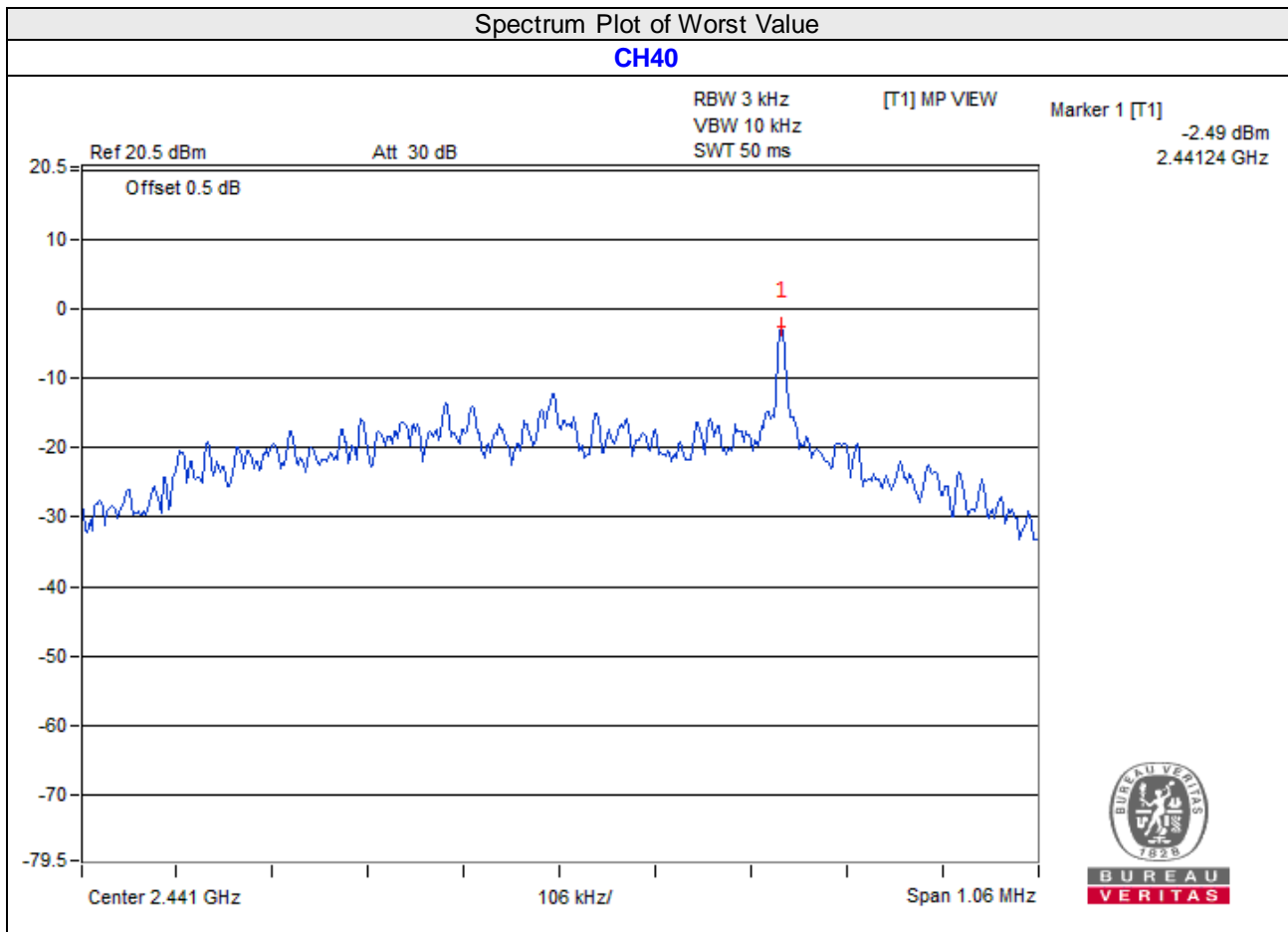
4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

Mode A:

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2401	-10.70	8	Pass
40	2441	-2.49	8	Pass
80	2481	-2.77	8	Pass

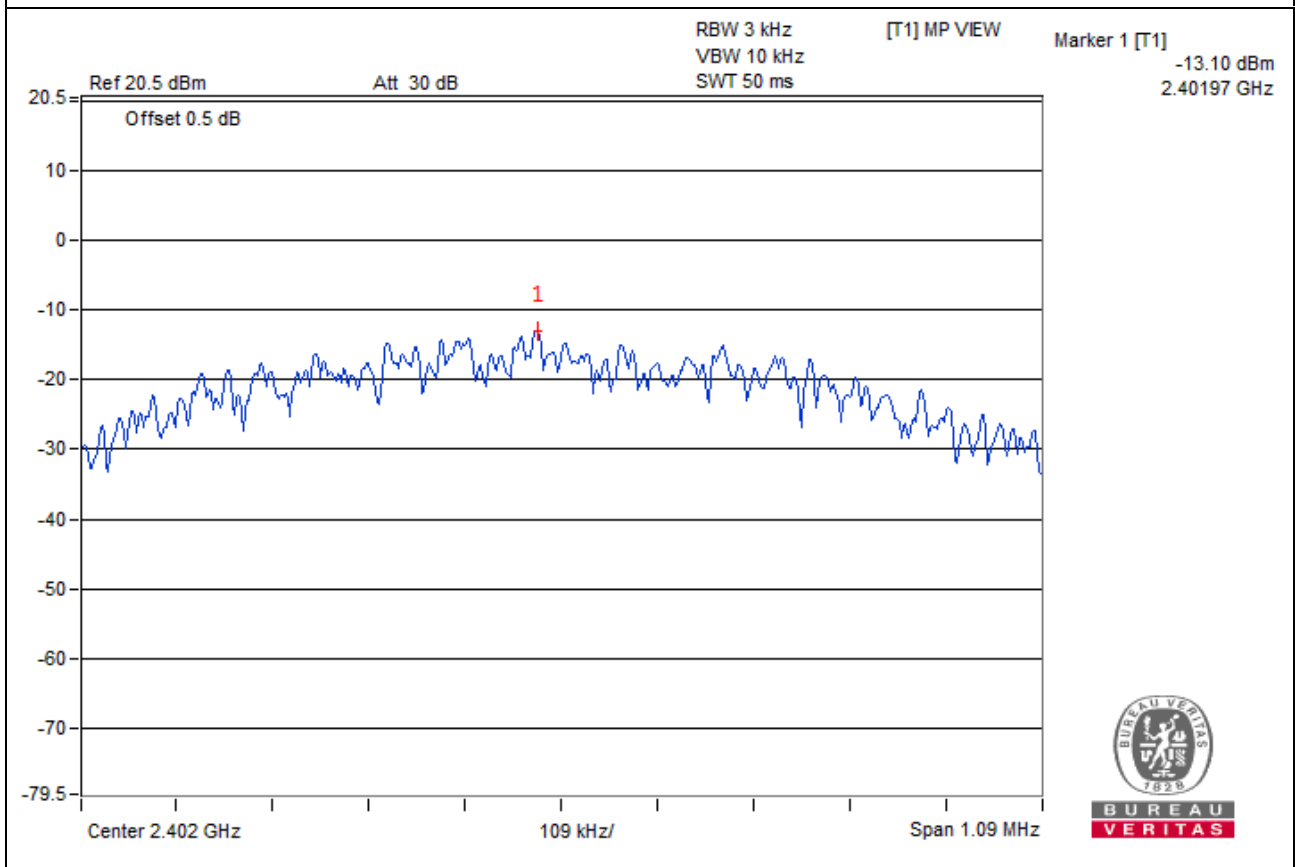


Mode B:

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	2402	-13.10	8	Pass
19	2440	-14.64	8	Pass
39	2480	-14.93	8	Pass

Spectrum Plot of Worst Value

CHO

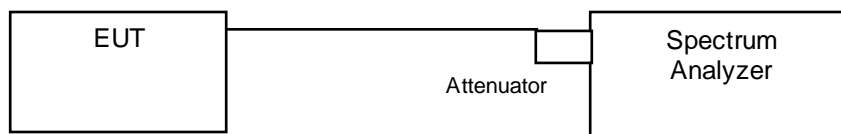


4.6 Conducted Out of Band Emission Measurement

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

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 OOB

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.

4.6.5 Deviation from Test Standard

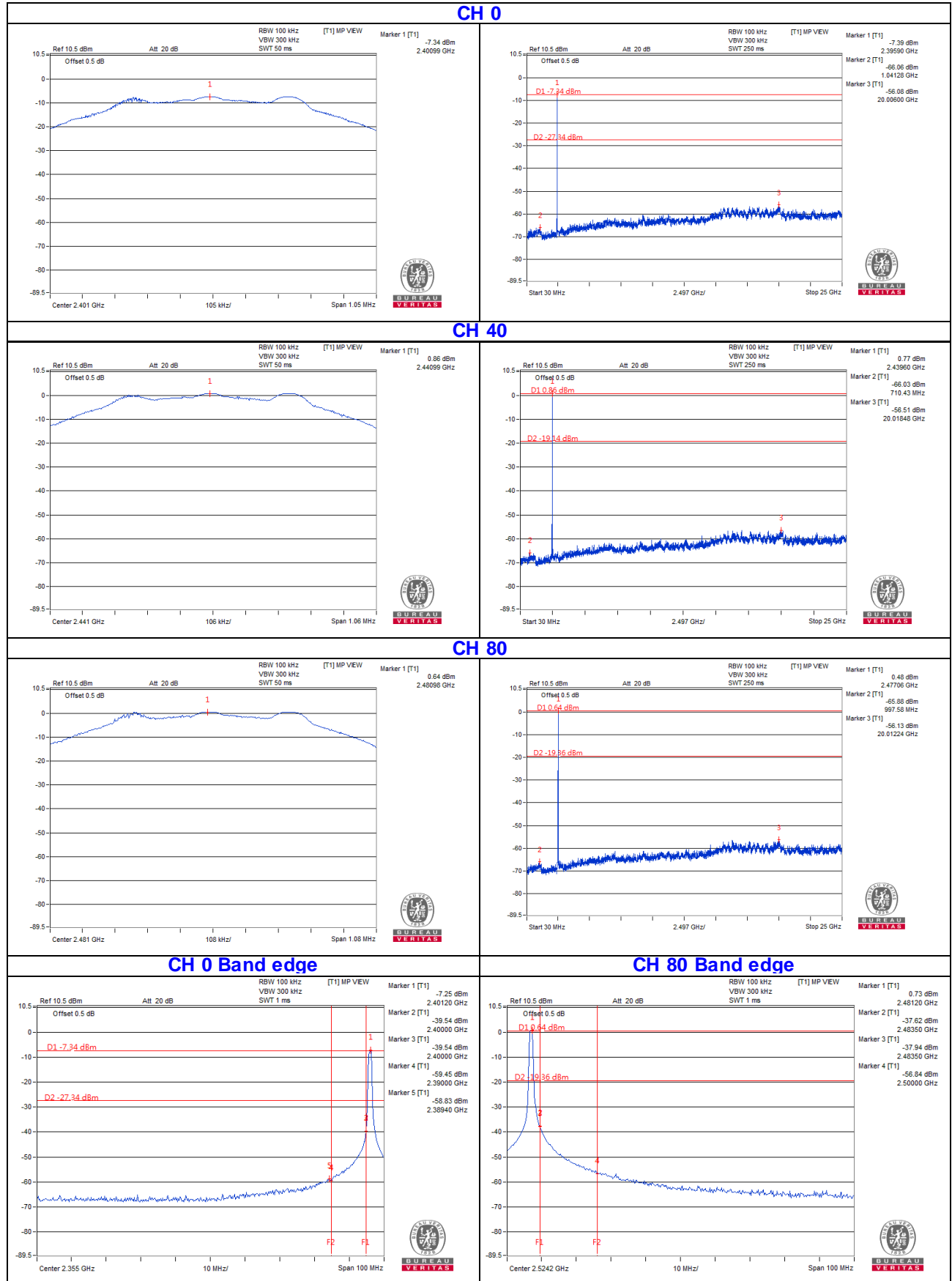
No deviation.

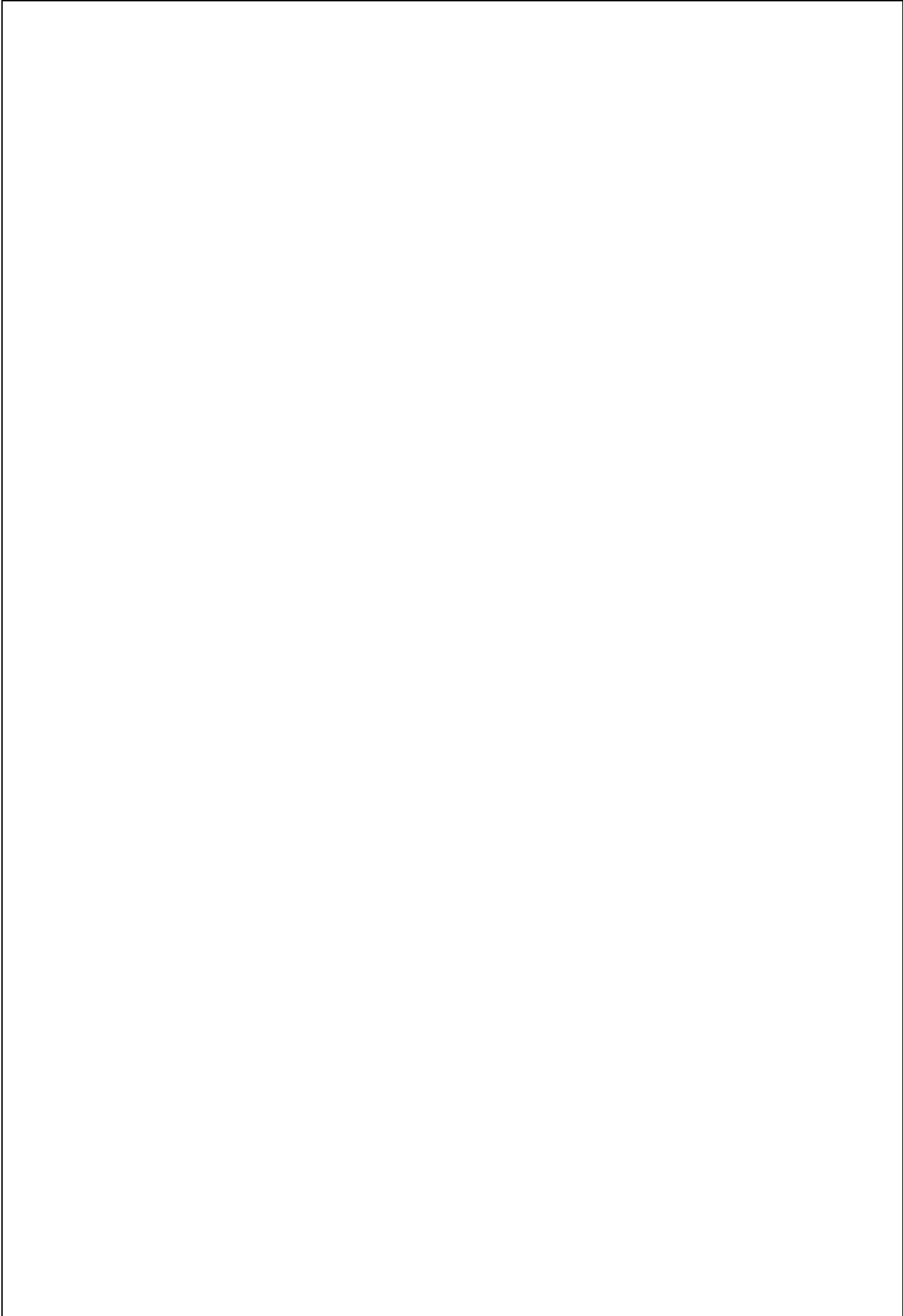
4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

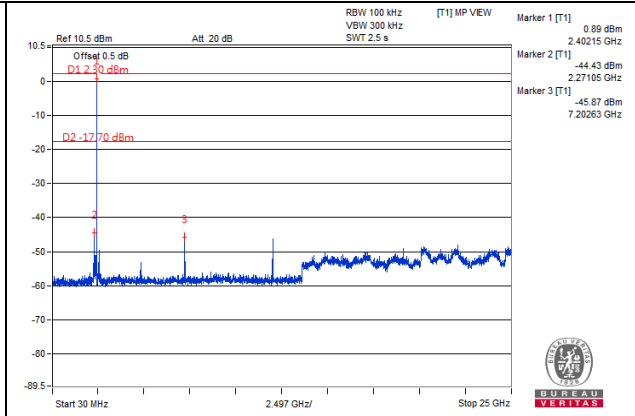
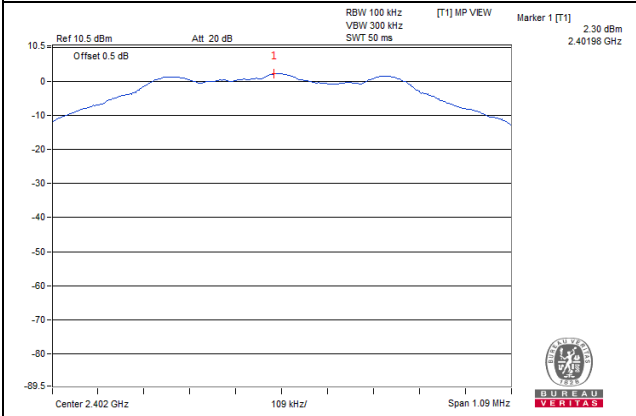
Mode A:



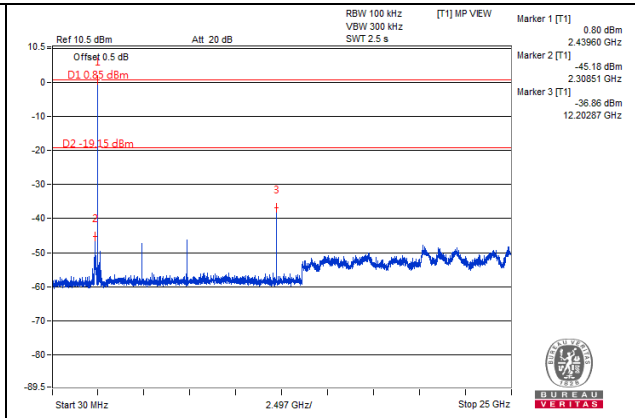
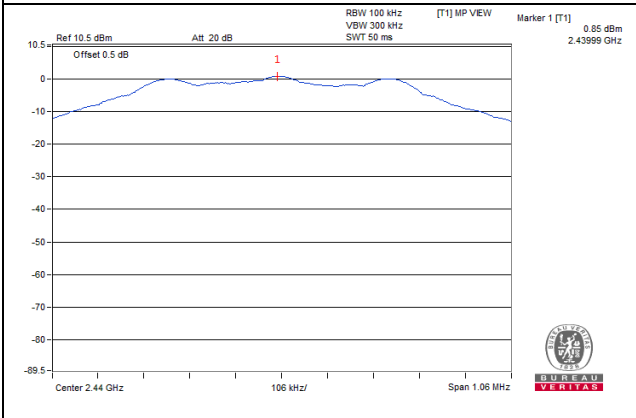


Mode B:

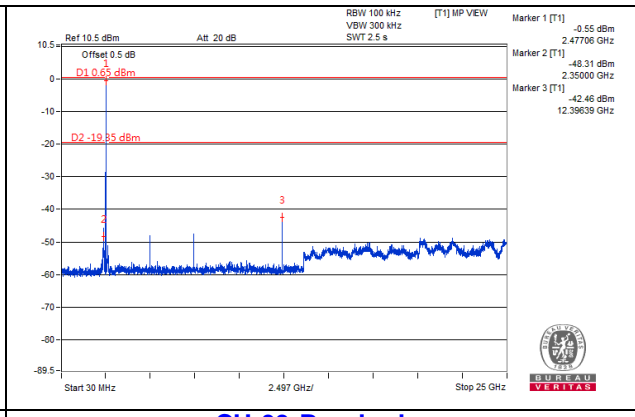
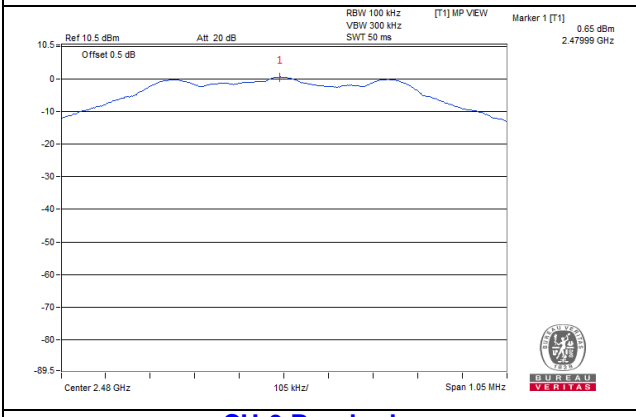
CH 0



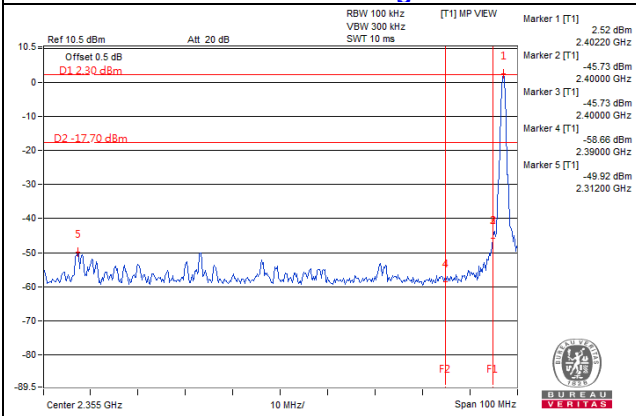
CH 19



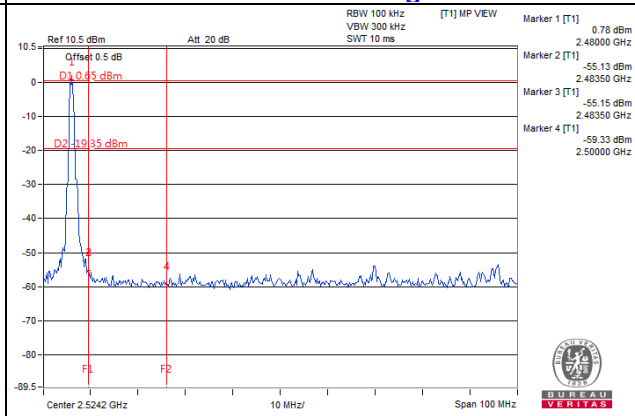
CH 39



CH 0 Band edge



CH 39 Band edge



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 FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

Linkou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

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.

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