FCC Test Report

Report No.:	RF170421C58A-3
FCC ID:	UZ7TC200J
Test Model:	TC200J
Received Date:	Jun. 28, 2017
Test Date:	Jul. 13 ~ Aug. 18, 2017
Issued Date:	Aug. 24, 2017
Applicant:	Zebra Technologies Corporation
Address:	1 Zebra Plaza Holtsville New York United States 11742
Manufacturer:	Zebra Technologies Corporation
Address:	1 Zebra Plaza Holtsville New York United States 11742
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.
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF170421C58A-3	Original release.	Aug. 24, 2017

1 Certificate of Conformity

Product:	Touch Computer
Brand:	ZEBRA
Test Model:	TC200J
Sample Status:	Engineering sample
Applicant:	Zebra Technologies Corporation
Test Date:	Jul. 13 ~ Aug. 18, 2017
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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

Prepared by : _____ , **Date:** Aug. 24, 2017

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Aug. 24, 2017

Ken Liu / Senior 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 -8.26dB at 4.44318Hz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.3dB at 30.00MHz.
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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 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	Touch Computer
Brand	ZEBRA
Test Model	TC200J
Status of EUT	Engineering sample
MFD	28MAR17 (For TC200J without keypad using)
	26MAY17 (For TC200J with keypad using)
HW Version	EV
SW Version	90-04-03-N-00-E1
Power Supply Rating	5Vdc from adapter or host equipment 12 or 24Vdc from Vehicle Cigarette Adaptor 5Vdc from power pack 3.85Vdc from battery
Modulation Type	GFSK
Transfer Rate	1Mbps
Operating Frequency	2402 ~ 2480MHz
Number of Channel	40
Channel Spacing	2MHz
Output Power	2.404mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter, Gun Handle, Headset (1.25m non-shielded cable without core), Arm Mount, Holster, Vehicle Cigarette Adaptor, Power Pack (Refer to note 5 for more details)
Data Cable Supplied	1.5m shielded USB Type C to Type A cable without core (Refer to note 5 for more details)

Note:

1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report to the original report no. RF170421C58-3. The differences compared with the original design are adding power bank, Vehicle Cigarette Adaptor, Holster and sale type. All test data had been re-tested.
2. The EUT has four types for sale. (New sale type is marked in boldface.)

Brand	Model	Difference (sale type)
ZEBRA	TC200J	Scanner SE4710 with camera, with 2pin, without keypad
		Scanner SE4710 with camera, with 8pin (option), without keypad
		Scanner SE2100 without camera, with blank, without keypad
		Scanner SE4710 with camera, with blank, with keypad

3. The EUT consumes power from the following adapter, Vehicle Cigarette Adaptor, power pack and battery.

Adapter	
Brand	ZEBRA
Model	SAWA-65-20005A
Input Power	100-240Vac, 0.5A, 50-60Hz
Output Power	5Vdc, 2.5A

Vehicle Cigarette Adaptor	
Brand	ZEBRA
Model	SAWA-68-25005A
Input Power	12-24V(3.5A)
Output Power	5V(2.5A)

Power Pack	
Brand	ZEBRA
Model	BT-000343
Rate capacity	2900mAh
Min capacity	2800mAh
Rate Voltage	3.85Vdc

Battery	
Brand	ZEBRA
Model	BT-000334
Rate capacity(mAh)	3000mAh
Min capacity(mAh)	2800mAh
Rate Voltage	3.85Vdc

4. The following antennas were provided to the EUT.

For TC200J without keypad using

Type	Connector	Gain (dBi)		
		2.4GHz	5GHz	BT
PIFA	NA	2.25	4.22	2.25

For TC200J with keypad using

Type	Connector	Gain (dBi)		
		WLAN (2.4GHz)	WLAN (5GHz)	BT
PIFA	NA	1.93	4.48	1.92

5. Accessory devices of EUT are list as below:

Specification of Accessory		
AC Adapter	Brand Name	ZEBRA
	Model Name	SAWA-65-20005A
USB Type C cable	Brand Name	ZEBRA
	P/N Number	CBL-MPM-USB1-01
Ear Headset	Brand Name	ZEBRA
	Model Name	HDST-35MM-PTVP-01
Headset Adapter Cable	Brand Name	ZEBRA
	Model Name	CBL-TC51-HDST35-01
Gun Handle	Brand Name	ZEBRA
	P/N Number	TRG-TC2X-SNP1-01
Vehicle Cigarette Adaptor	Brand Name	ZEBRA
	P/N Number	SAWA-68-25005A
Arm Mount for TC200J without keypad using	Brand Name	ZEBRA
	P/N Number	SG-TC2X-ARMNT-01
Holster for TC200J without keypad using	Brand Name	ZEBRA
	P/N Number	SG-TC2X-HLSTR1-01
Holster for TC200J with keypad using	Brand Name	ZEBRA
	P/N Number	SG-TC20K-HLST1-01
Power Pack	Brand Name	ZEBRA
	P/N Number	BT-000343

6. 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

40 channels are provided to this EUT:

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
A	-	√	√	-	Scanner SE4710 (8pin), EUT with adapter+USB+Power Pack
B	-	√	√	-	Scanner SE4710 (8pin), EUT with USB+ Vehicle Cigarette Adaptor
C	√	√	√	√	Scanner SE4710 (Blank), EUT with adapter+USB
D	-	√	√	-	Scanner SE4710 (Blank), EUT with adapter+USB+Power Pack
E	-	√	√	-	Scanner SE4710 (Blank), EUT with USB+ Vehicle Cigarette Adaptor

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 Y-plane (For Test Mode A, B), X-plane (For Test Mode C, D, E).
2. "-": 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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
C	0 to 39	37, 17, 39	GFSK	1

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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
A, B, C, D, E	0 to 39	17	GFSK	1

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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
A, B, C, D, E	0 to 39	17	GFSK	1

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 CONFIGUURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
C	0 to 39	37, 17, 39	GFSK	1

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	20deg. C, 69%RH	120Vac, 60Hz	James Yang
RE<1G	25deg. C, 70%RH	120Vac, 60Hz	Frank Liu
PLC	25deg. C, 75%RH	120Vac, 60Hz	Luis Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Edward Lin

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.

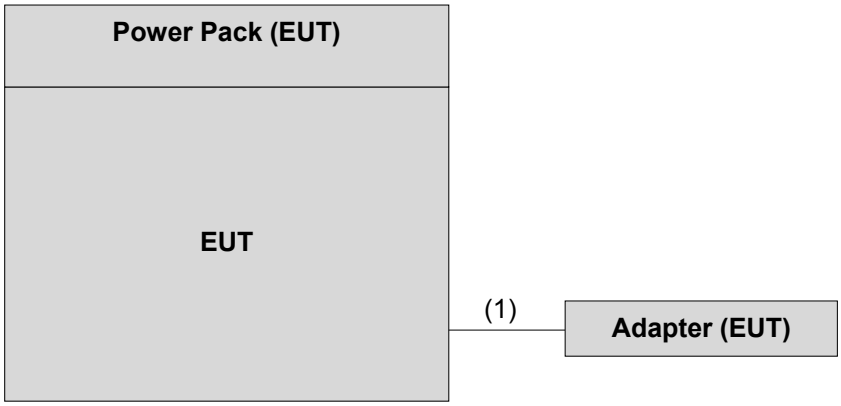
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	DC power supply	Keysight	U8002A	MY56330015	NA	-

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

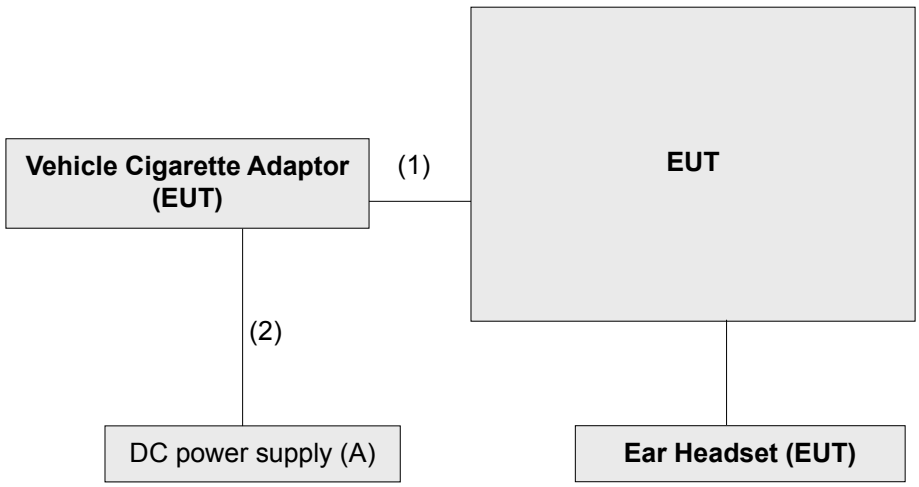
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Type C	1	1.5	Y	1	Accessory of EUT
2.	DC cable	1	1.0	N	0	-

3.3.1 Configuration of System under Test

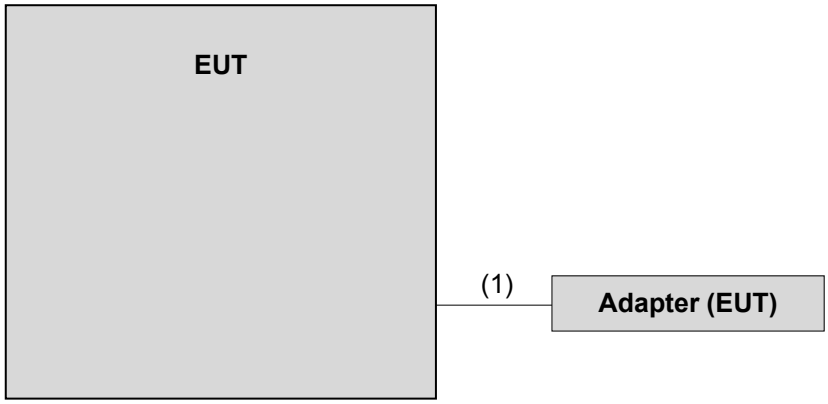
Test Mode A, D



Test Mode B, E

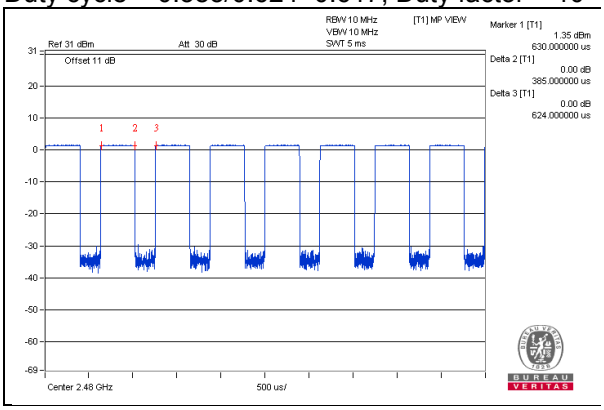


Test Mode C



3.4 Duty Cycle of Test Signal

Duty cycle = 0.385/0.624=0.617, Duty factor = 10 * log(1/0.617) = 2.10



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)

558074 D01 DTS Meas Guidance v04

ANSI C63.10-2013

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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
Test Receiver KEYSIGHT	N9038A	MY55420137	Mar. 27, 2017	Mar. 26, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May. 11, 2017	May. 10, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna TESEQ	HLA 6121	45745	May 19, 2017	May 18, 2018
Preamplifier Agilent	8449B	3008A01638	Feb. 22, 2017	Feb. 21, 2018
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02 (248780+MY13377)	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/ 4)	Aug. 09, 2016	Aug. 08, 2017
			Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
High Speed Peak Power Meter	ML2495A	0842014	Apr. 24, 2017	Apr. 23, 2018
Power Sensor	MA2411B	0738404	Apr. 24, 2017	Apr. 23, 2018

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 9.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The IC Site Registration No. is IC 7450F-9.

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. Both X and Y axes 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:

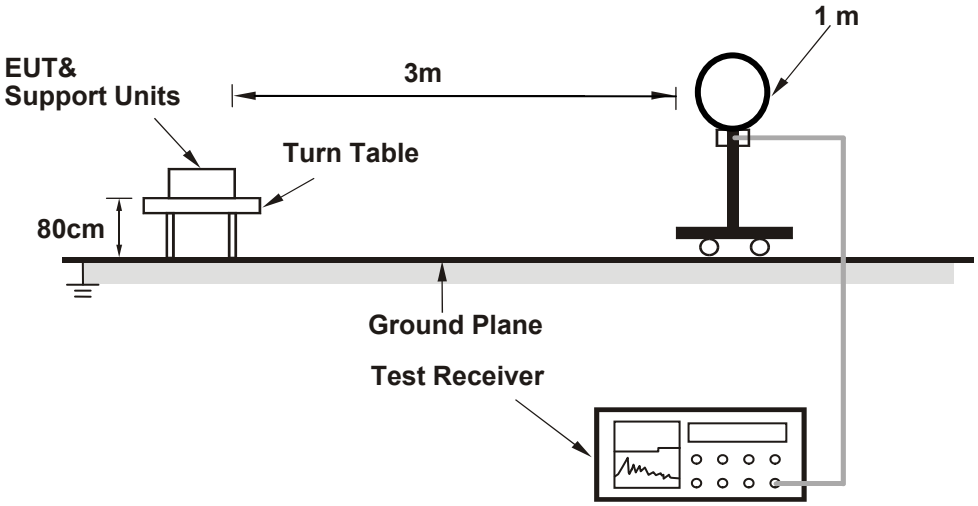
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 3 x RBW (Duty cycle ≥ 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

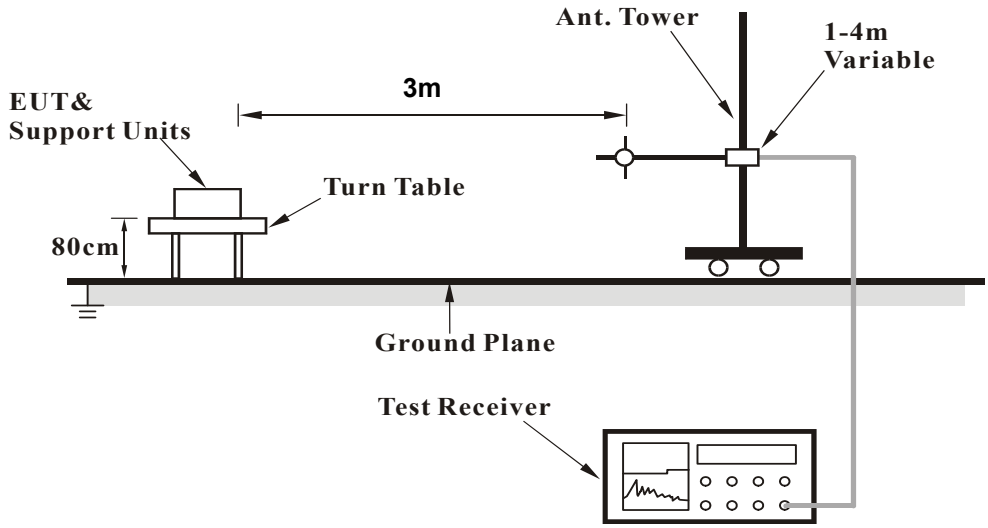
No deviation.

4.1.5 Test Set Up

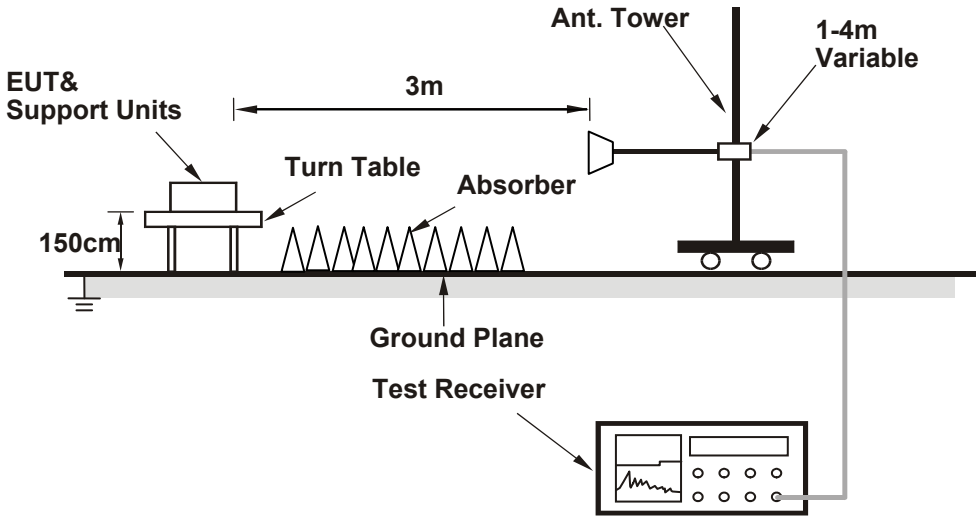
For Radiated emission below 30MHz



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

The EUT has been tested as an independent unit together with other necessary accessories or support units.

4.1.7 Test Results

Above 1GHz Worst-Case Data

CHANNEL	TX Channel 37	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	56.3 PK	74.0	-17.7	1.33 H	10	24.1	32.2
2	2390.00	44.6 AV	54.0	-9.4	1.33 H	10	12.4	32.2
3	*2402.00	97.1 PK			2.25 H	3	64.8	32.3
4	*2402.00	92.5 AV			2.25 H	3	60.2	32.3
5	4804.00	45.0 PK	74.0	-29.0	2.49 H	166	42.9	2.1
6	4804.00	31.7 AV	54.0	-22.3	2.49 H	166	29.6	2.1
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	55.4 PK	74.0	-18.6	1.09 V	314	23.2	32.2
2	2390.00	44.4 AV	54.0	-9.6	1.09 V	314	12.2	32.2
3	*2402.00	89.5 PK			1.00 V	344	57.2	32.3
4	*2402.00	86.1 AV			1.00 V	344	53.8	32.3
5	4804.00	43.6 PK	74.0	-30.4	2.91 V	301	41.5	2.1
6	4804.00	30.9 AV	54.0	-23.1	2.91 V	301	28.8	2.1

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 17	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	97.0 PK			2.17 H	4	64.5	32.5
2	*2440.00	92.7 AV			2.17 H	4	60.2	32.5
3	4880.00	43.9 PK	74.0	-30.1	2.19 H	233	41.7	2.2
4	4880.00	31.5 AV	54.0	-22.5	2.19 H	233	29.3	2.2
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	91.8 PK			1.00 V	350	59.3	32.5
2	*2440.00	88.4 AV			1.00 V	350	55.9	32.5
3	4880.00	43.1 PK	74.0	-30.9	2.94 V	163	40.9	2.2
4	4880.00	30.9 AV	54.0	-23.1	2.94 V	163	28.7	2.2

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)
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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	95.2 PK			2.42 H	4	62.5	32.7
2	*2480.00	90.6 AV			2.42 H	4	57.9	32.7
3	2483.50	56.5 PK	74.0	-17.5	2.58 H	19	23.8	32.7
4	2483.50	44.9 AV	54.0	-9.1	2.58 H	19	12.2	32.7
5	4960.00	45.2 PK	74.0	-28.8	2.52 H	279	42.7	2.5
6	4960.00	31.7 AV	54.0	-22.3	2.52 H	279	29.2	2.5
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	89.8 PK			1.00 V	353	57.1	32.7
2	*2480.00	86.4 AV			1.00 V	353	53.7	32.7
3	2483.50	56.2 PK	74.0	-17.8	1.07 V	341	23.5	32.7
4	2483.50	44.6 AV	54.0	-9.4	1.07 V	341	11.9	32.7
5	4960.00	44.0 PK	74.0	-30.0	1.99 V	143	41.5	2.5
6	4960.00	31.1 AV	54.0	-22.9	1.99 V	143	28.6	2.5

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.

Below 1GHz worst-case data

CHANNEL	TX Channel 17	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	65.66	21.5 QP	40.0	-18.5	2.00 H	209	37.1	-15.6
2	110.75	23.7 QP	43.5	-19.8	1.50 H	166	40.8	-17.1
3	193.15	30.2 QP	43.5	-13.3	1.00 H	248	46.2	-16.0
4	256.90	35.5 QP	46.0	-10.5	1.00 H	216	49.2	-13.7
5	280.22	35.0 QP	46.0	-11.0	1.00 H	244	47.4	-12.4
6	291.11	31.3 QP	46.0	-14.7	1.00 H	266	43.5	-12.2
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	47.00	28.0 QP	40.0	-12.0	1.01 V	285	42.5	-14.5
2	64.11	29.2 QP	40.0	-10.8	1.01 V	285	44.4	-15.2
3	112.30	21.0 QP	43.5	-22.5	1.51 V	165	37.9	-16.9
4	193.15	23.5 QP	43.5	-20.0	1.01 V	58	39.5	-16.0
5	255.35	30.1 QP	46.0	-15.9	1.51 V	274	43.9	-13.8
6	280.22	29.5 QP	46.0	-16.5	1.01 V	282	41.9	-12.4

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)
   – 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 17	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	129.41	20.4 QP	43.5	-23.1	1.51 H	311	35.8	-15.4
2	188.49	21.1 QP	43.5	-22.4	2.00 H	79	36.9	-15.8
3	235.13	28.1 QP	46.0	-17.9	1.01 H	269	43.2	-15.1
4	314.43	28.6 QP	46.0	-17.4	1.51 H	55	40.2	-11.6
5	521.22	26.4 QP	46.0	-19.6	1.51 H	230	34.4	-8.0
6	746.67	37.9 QP	46.0	-8.1	1.51 H	14	40.7	-2.8
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	29.90	26.9 QP	40.0	-13.1	1.00 V	6	42.9	-16.0
2	137.18	24.8 QP	43.5	-18.7	1.49 V	273	39.2	-14.4
3	224.25	21.6 QP	46.0	-24.4	1.49 V	105	37.7	-16.1
4	314.43	28.4 QP	46.0	-17.6	1.49 V	13	40.0	-11.6
5	376.62	28.1 QP	46.0	-17.9	1.49 V	318	38.7	-10.6
6	415.49	29.0 QP	46.0	-17.0	1.00 V	181	39.1	-10.1

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 17	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	30.00	33.7 QP	40.0	-6.3	1.51 H	213	49.7	-16.0
2	59.10	21.1 QP	40.0	-18.9	2.00 H	178	35.3	-14.2
3	177.44	18.1 QP	43.5	-25.4	1.01 H	160	32.2	-14.1
4	301.60	19.9 QP	46.0	-26.1	1.51 H	303	31.0	-11.1
5	427.70	23.5 QP	46.0	-22.5	2.00 H	12	31.7	-8.2
6	953.44	35.3 QP	46.0	-10.7	1.51 H	37	31.2	4.1
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	**30.00**	**36.7 QP**	**40.0**	**-3.3**	**1.00 V**	**351**	**52.7**	**-16.0**
2	76.56	23.8 QP	40.0	-16.2	1.00 V	187	41.0	-17.2
3	119.24	23.2 QP	43.5	-20.3	1.00 V	327	38.9	-15.7
4	262.80	20.9 QP	46.0	-25.1	1.00 V	292	33.5	-12.6
5	515.00	25.3 QP	46.0	-20.7	1.00 V	88	31.4	-6.1
6	939.86	34.5 QP	46.0	-11.5	2.00 V	192	30.8	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)
   – 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 17	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	D

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	115.41	26.7 QP	43.5	-16.8	2.00 H	282	43.3	-16.6
2	191.60	30.7 QP	43.5	-12.8	1.00 H	275	46.7	-16.0
3	214.92	32.3 QP	43.5	-11.2	1.00 H	275	48.4	-16.1
4	250.68	38.7 QP	46.0	-7.3	1.00 H	239	52.7	-14.0
5	263.12	37.7 QP	46.0	-8.3	1.00 H	243	51.1	-13.4
6	745.11	37.0 QP	46.0	-9.0	2.00 H	7	39.9	-2.9
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	45.45	29.6 QP	40.0	-10.4	1.00 V	26	44.3	-14.7
2	68.77	30.5 QP	40.0	-9.5	1.50 V	19	46.4	-15.9
3	121.63	26.2 QP	43.5	-17.3	1.00 V	197	42.1	-15.9
4	197.82	31.9 QP	43.5	-11.6	1.00 V	237	48.1	-16.2
5	263.12	33.8 QP	46.0	-12.2	1.50 V	178	47.2	-13.4
6	420.16	22.7 QP	46.0	-23.3	1.00 V	178	32.6	-9.9

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 17	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	E

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	135.63	26.7 QP	43.5	-16.8	1.00 H	298	41.4	-14.7
2	222.70	26.3 QP	46.0	-19.7	1.50 H	100	42.3	-16.0
3	256.90	22.2 QP	46.0	-23.8	1.00 H	287	35.9	-13.7
4	314.43	29.1 QP	46.0	-16.9	1.00 H	49	40.7	-11.6
5	584.97	26.6 QP	46.0	-19.4	1.50 H	320	33.1	-6.5
6	731.12	38.6 QP	46.0	-7.4	1.50 H	28	42.0	-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	29.90	26.3 QP	40.0	-13.7	1.01 V	208	42.3	-16.0
2	74.99	22.8 QP	40.0	-17.2	1.51 V	288	39.6	-16.8
3	314.43	29.5 QP	46.0	-16.5	1.51 V	32	41.1	-11.6
4	390.62	28.0 QP	46.0	-18.0	1.01 V	126	38.4	-10.4
5	415.49	28.5 QP	46.0	-17.5	1.01 V	193	38.6	-10.1
6	477.68	27.6 QP	46.0	-18.4	1.01 V	355	36.5	-8.9

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	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

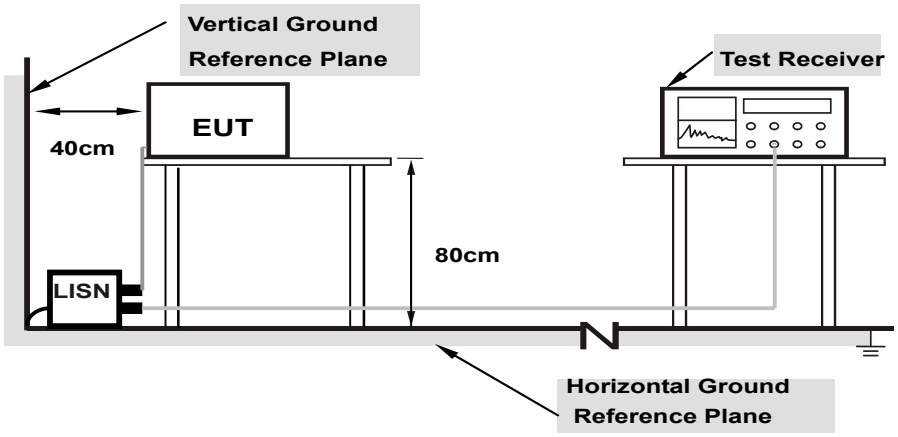
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

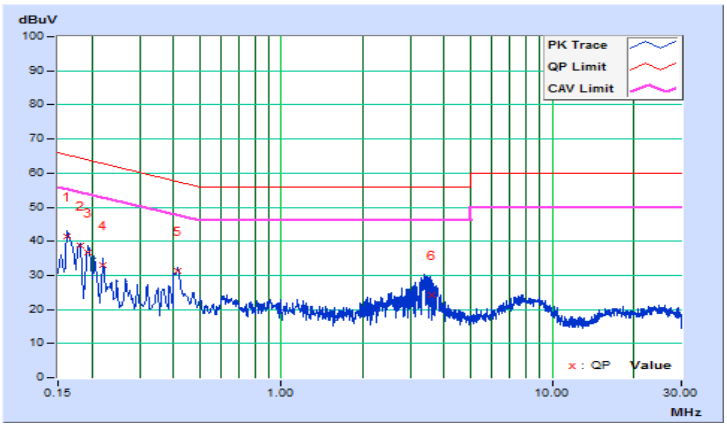
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	A

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16096	10.41	31.04	16.39	41.45	26.80	65.41	55.41	-23.96	-28.61
2	0.18075	10.42	28.38	14.22	38.80	24.64	64.45	54.45	-25.65	-29.81
3	0.19255	10.43	26.17	11.48	36.60	21.91	63.93	53.93	-27.33	-32.02
4	0.21851	10.44	22.53	8.80	32.97	19.24	62.88	52.88	-29.91	-33.64
5	0.41233	10.51	20.74	10.61	31.25	21.12	57.60	47.60	-26.35	-26.48
6	3.57907	10.63	13.70	3.83	24.33	14.46	56.00	46.00	-31.67	-31.54

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.

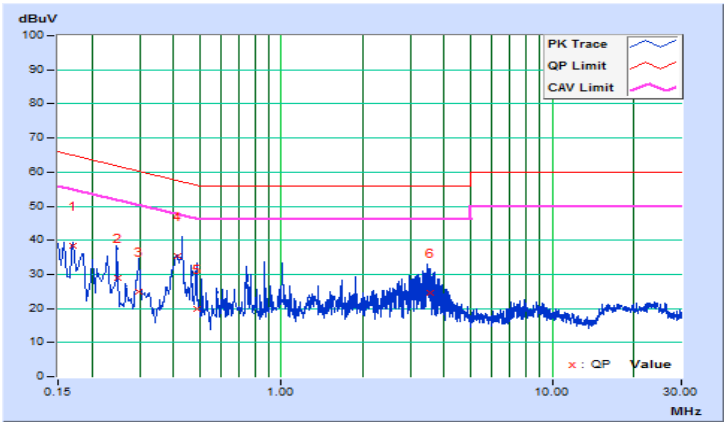


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	A

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16967	10.17	28.24	13.88	38.41	24.05	64.98	54.98	-26.57	-30.93
2	0.24796	10.21	18.67	8.30	28.88	18.51	61.83	51.83	-32.95	-33.32
3	0.29662	10.21	14.72	7.00	24.93	17.21	60.34	50.34	-35.41	-33.13
4	0.41197	10.23	25.08	17.17	35.31	27.40	57.61	47.61	-22.30	-20.21
5	0.48678	10.23	9.47	2.51	19.70	12.74	56.22	46.22	-36.52	-33.48
6	3.52824	10.39	14.15	4.49	24.54	14.88	56.00	46.00	-31.46	-31.12

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.

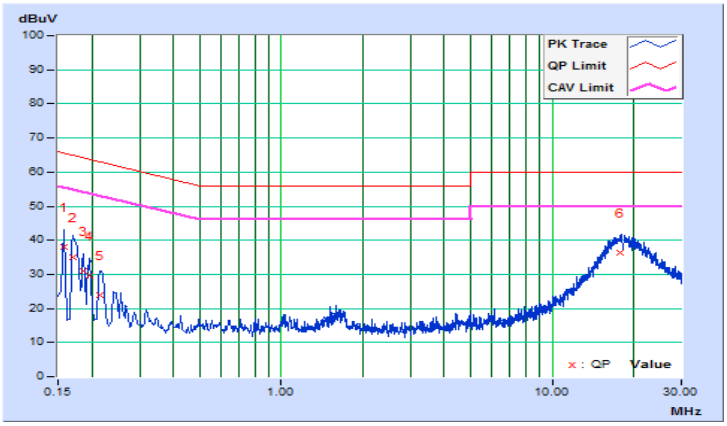


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15719	10.41	27.62	3.06	38.03	13.47	65.61	55.61	-27.58	-42.14
2	0.16967	10.41	24.72	1.67	35.13	12.08	64.98	54.98	-29.85	-42.90
3	0.18508	10.42	20.41	-0.24	30.83	10.18	64.25	54.25	-33.42	-44.07
4	0.19510	10.43	19.04	-0.78	29.47	9.65	63.82	53.82	-34.35	-44.17
5	0.21282	10.44	13.57	-1.62	24.01	8.82	63.09	53.09	-39.08	-44.27
6	17.70981	11.30	25.02	18.53	36.32	29.83	60.00	50.00	-23.68	-20.17

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.

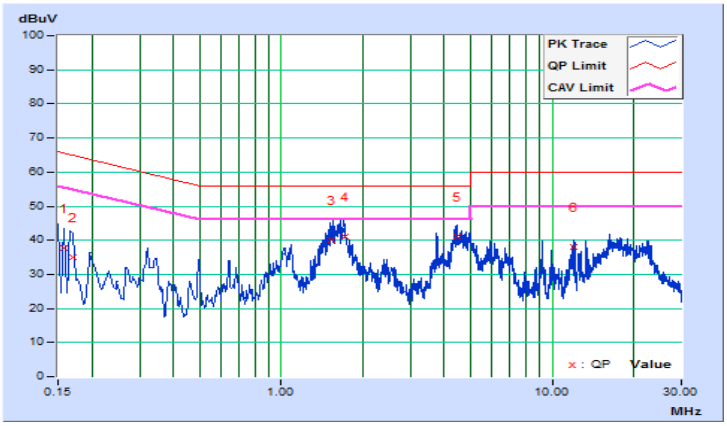


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	B

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15719	10.16	27.58	8.30	37.74	18.46	65.61	55.61	-27.87	-37.15
2	0.16955	10.17	24.85	7.74	35.02	17.91	64.98	54.98	-29.96	-37.07
3	1.52632	10.28	29.73	23.16	40.01	33.44	56.00	46.00	-15.99	-12.56
4	1.71009	10.29	30.90	26.51	41.19	36.80	56.00	46.00	-14.81	-9.20
5	**4.44318**	**10.44**	**30.65**	**27.30**	**41.09**	**37.74**	**56.00**	**46.00**	**-14.91**	**-8.26**
6	11.95038	10.72	27.24	22.89	37.96	33.61	60.00	50.00	-22.04	-16.39

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.

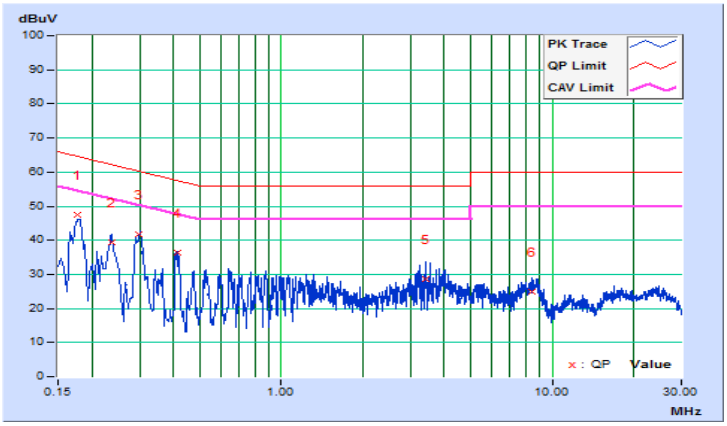


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	C

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17698	10.42	36.90	28.43	47.32	38.85	64.63	54.63	-17.31	-15.78
2	0.23586	10.44	29.01	23.32	39.45	33.76	62.24	52.24	-22.79	-18.48
3	0.29976	10.47	31.38	24.00	41.85	34.47	60.25	50.25	-18.40	-15.78
4	0.41588	10.51	25.84	19.52	36.35	30.03	57.53	47.53	-21.18	-17.50
5	3.42267	10.62	18.12	3.28	28.74	13.90	56.00	46.00	-27.26	-32.10
6	8.37273	10.83	14.09	5.30	24.92	16.13	60.00	50.00	-35.08	-33.87

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.

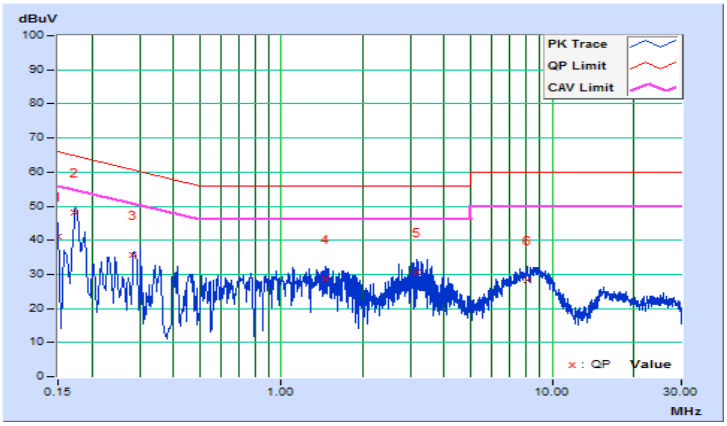


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	C

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.15	31.05	14.31	41.20	24.46	66.00	56.00	-24.80	-31.54
2	0.17346	10.18	37.85	28.20	48.03	38.38	64.79	54.79	-16.76	-16.41
3	0.28438	10.21	25.34	11.32	35.55	21.53	60.69	50.69	-25.14	-29.16
4	1.46376	10.27	18.28	5.16	28.55	15.43	56.00	46.00	-27.45	-30.57
5	3.17243	10.37	20.23	5.24	30.60	15.61	56.00	46.00	-25.40	-30.39
6	8.12640	10.57	17.71	9.82	28.28	20.39	60.00	50.00	-31.72	-29.61

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.

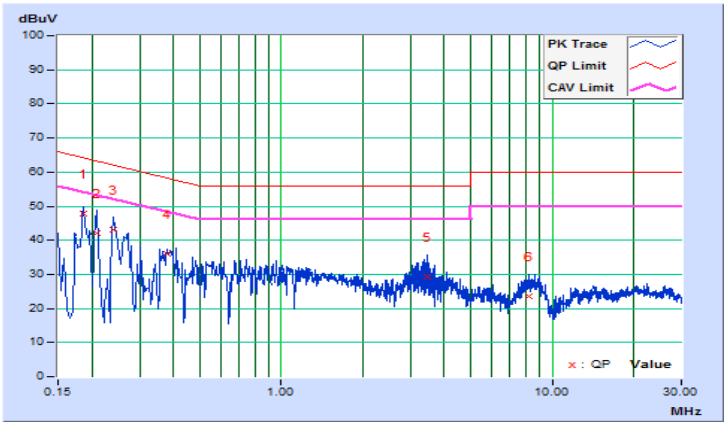


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	D

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18519	10.42	37.52	24.64	47.94	35.06	64.25	54.25	-16.31	-19.19
2	0.20865	10.43	31.76	13.16	42.19	23.59	63.26	53.26	-21.07	-29.67
3	0.23993	10.45	32.58	19.84	43.03	30.29	62.10	52.10	-19.07	-21.81
4	0.38069	10.50	25.39	10.73	35.89	21.23	58.26	48.26	-22.37	-27.03
5	3.45004	10.62	18.54	7.03	29.16	17.65	56.00	46.00	-26.84	-28.35
6	8.18505	10.83	12.68	6.30	23.51	17.13	60.00	50.00	-36.49	-32.87

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.

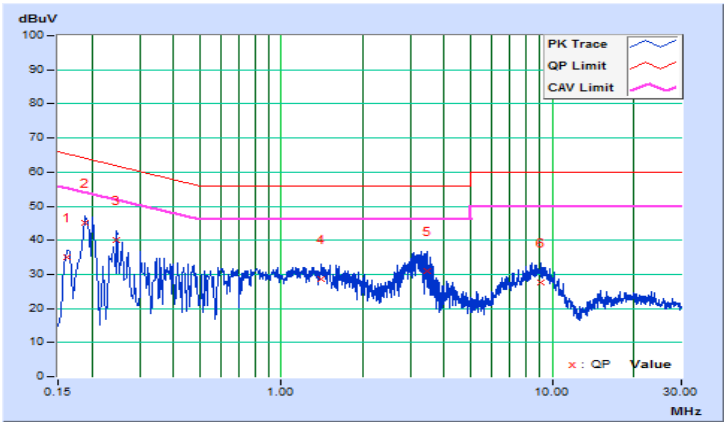


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	D

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16139	10.17	24.96	4.41	35.13	14.58	65.39	55.39	-30.26	-40.81
2	0.18910	10.19	34.90	20.94	45.09	31.13	64.08	54.08	-18.99	-22.95
3	0.24775	10.21	29.80	17.19	40.01	27.40	61.83	51.83	-21.82	-24.43
4	1.40902	10.27	18.33	6.87	28.60	17.14	56.00	46.00	-27.40	-28.86
5	3.44613	10.39	20.65	7.72	31.04	18.11	56.00	46.00	-24.96	-27.89
6	9.11172	10.61	16.95	11.61	27.56	22.22	60.00	50.00	-32.44	-27.78

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.

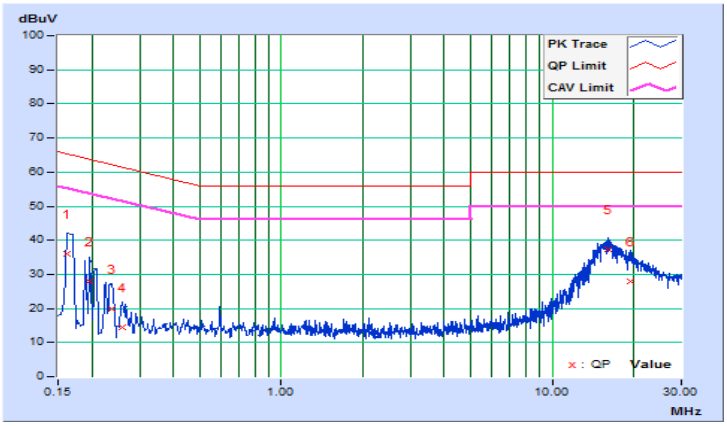


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	E

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	10.41	25.58	3.60	35.99	14.01	65.37	55.37	-29.38	-41.36
2	0.19692	10.43	17.64	2.49	28.07	12.92	63.74	53.74	-35.67	-40.82
3	0.23586	10.44	9.30	0.04	19.74	10.48	62.24	52.24	-42.50	-41.76
4	0.25932	10.45	4.14	0.65	14.59	11.10	61.45	51.45	-46.86	-40.35
5	16.04806	11.21	26.06	15.86	37.27	27.07	60.00	50.00	-22.73	-22.93
6	19.35983	11.39	16.65	8.11	28.04	19.50	60.00	50.00	-31.96	-30.50

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.

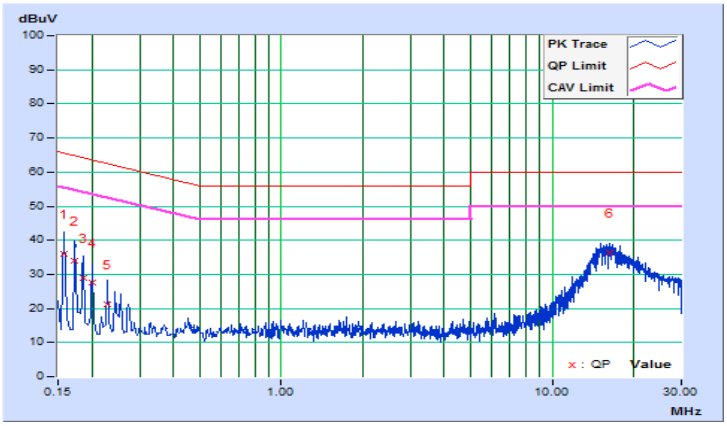


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	Channel 17	Test Mode	E

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	10.16	25.91	3.69	36.07	13.85	65.58	55.58	-29.51	-41.73
2	0.17346	10.18	23.73	2.70	33.91	12.88	64.79	54.79	-30.88	-41.91
3	0.18519	10.19	18.63	1.22	28.82	11.41	64.25	54.25	-35.43	-42.84
4	0.20084	10.20	17.55	1.50	27.75	11.70	63.58	53.58	-35.83	-41.88
5	0.22820	10.20	11.03	0.84	21.23	11.04	62.51	52.51	-41.28	-41.47
6	16.25138	10.90	25.49	16.28	36.39	27.18	60.00	50.00	-23.61	-22.82

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.

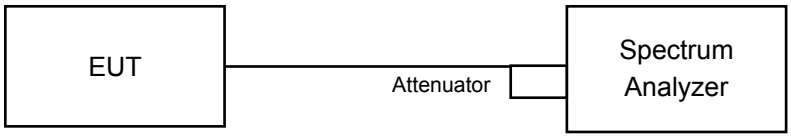


4.3 6dB Bandwidth Measurement

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) ≥ 3 x 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.

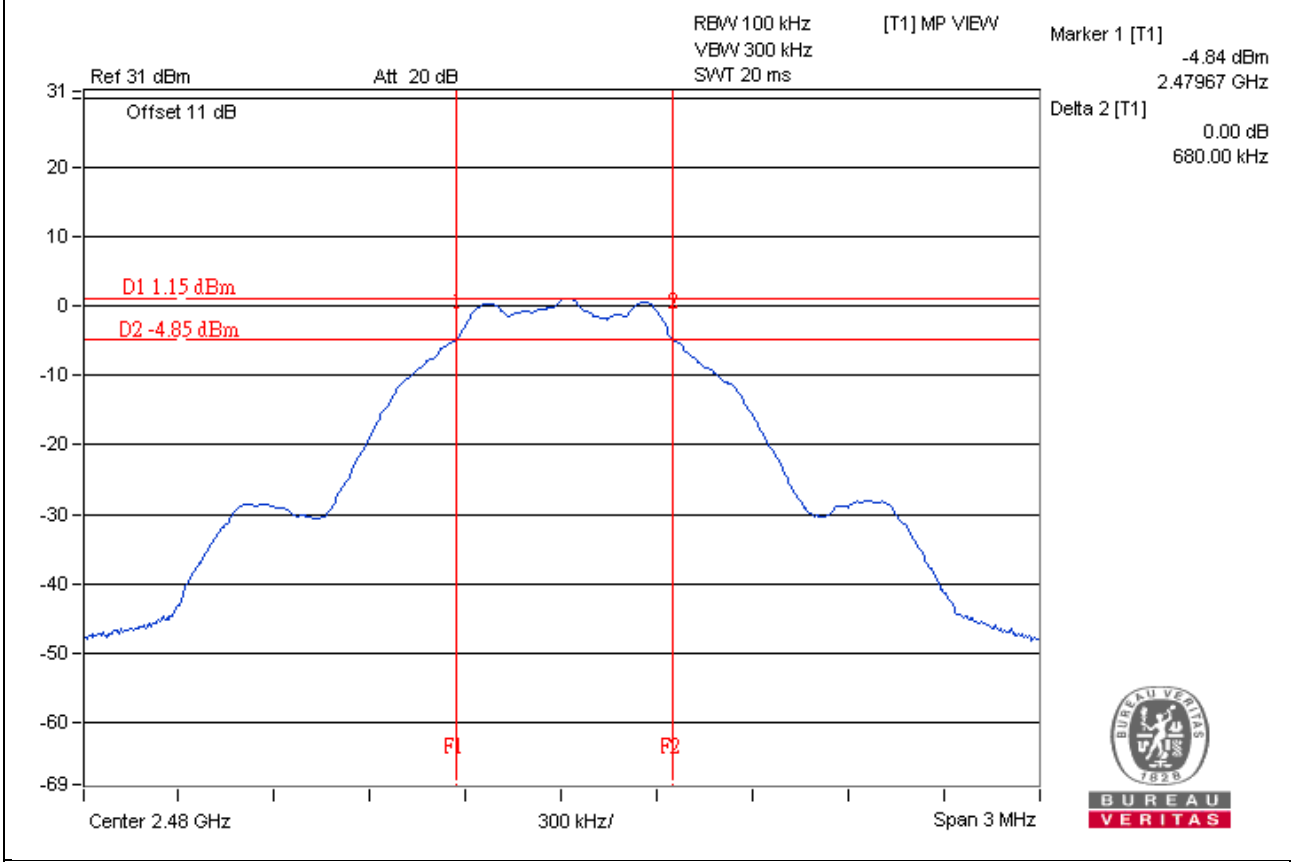
4.3.6 EUT Operating Conditions

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

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
37	2402	0.67	0.5	Pass
17	2440	0.68	0.5	Pass
39	2480	0.68	0.5	Pass

Spectrum Plot of Worst Value

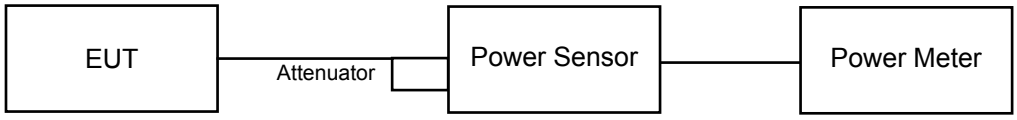


4.4 Conducted Output Power Measurement

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

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
37	2402	1.928	2.85	30	Pass
17	2440	**2.404**	3.81	30	Pass
39	2480	1.626	2.11	30	Pass

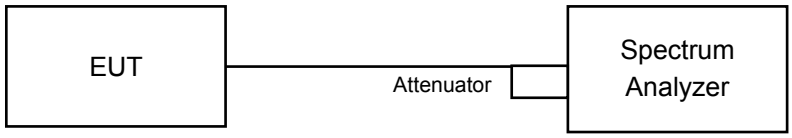
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
37	2402	1.197	0.78
17	2440	1.742	2.41
39	2480	1.012	0.05

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 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × 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.

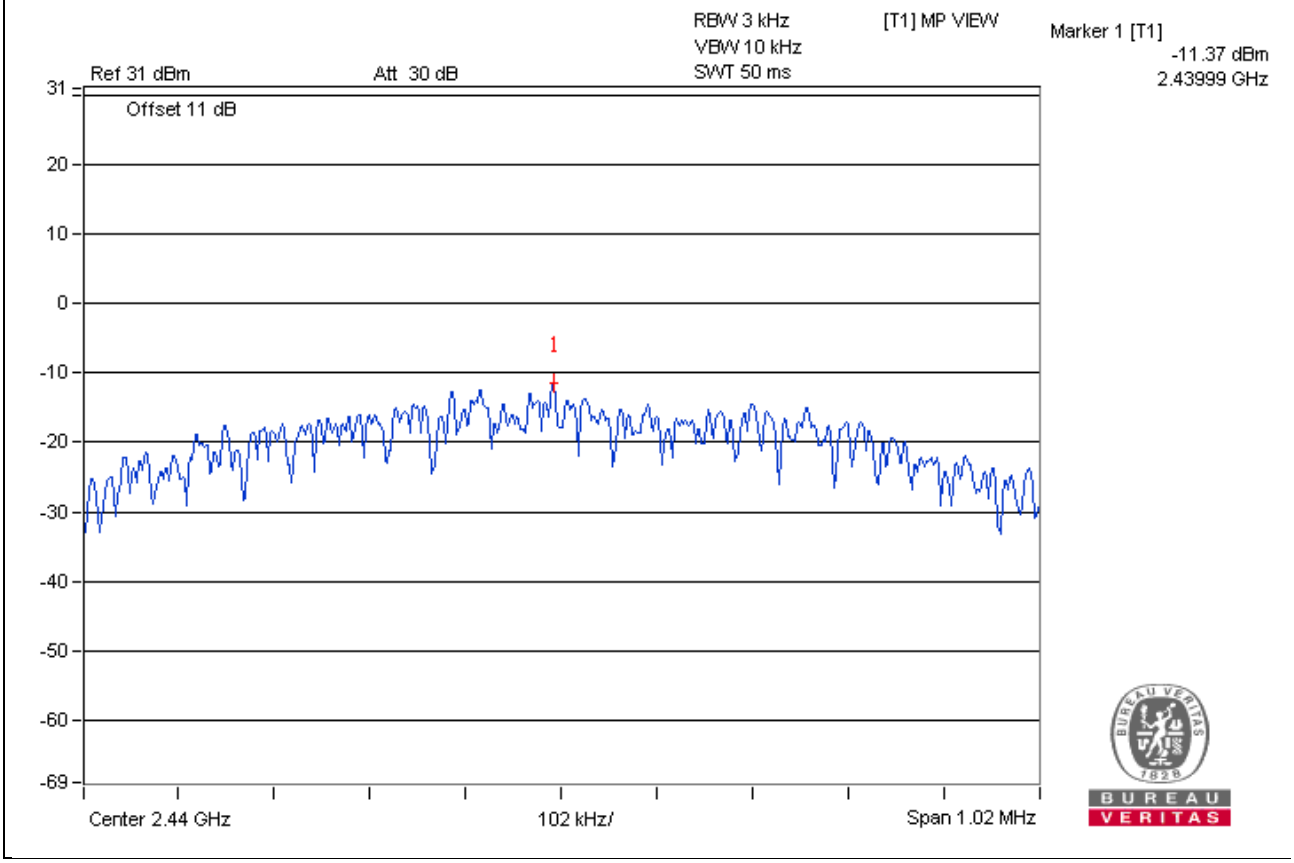
4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
37	2402	-12.79	8	Pass
17	2440	-11.37	8	Pass
39	2480	-13.61	8	Pass

Spectrum Plot of Worst Value

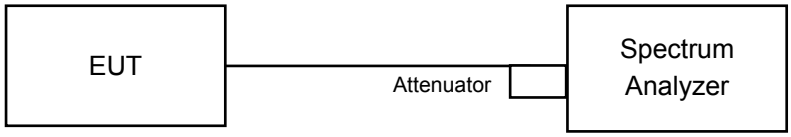


4.6 Conducted Out of Band Emission Measurement

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

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Detector = peak.
d. Sweep = auto couple.
e. Trace Mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

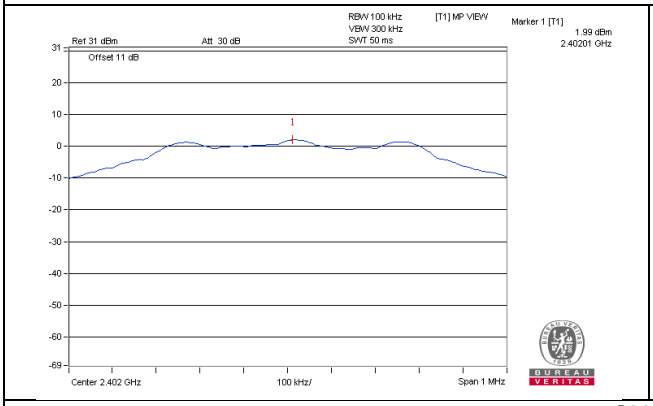
No deviation.

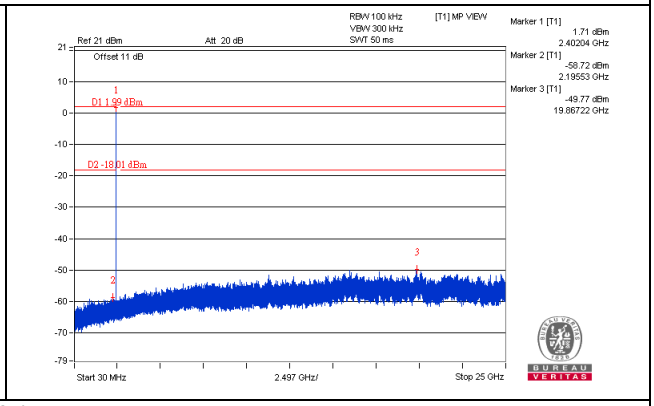
4.6.6 EUT Operating Condition

Same as Item 4.3.6

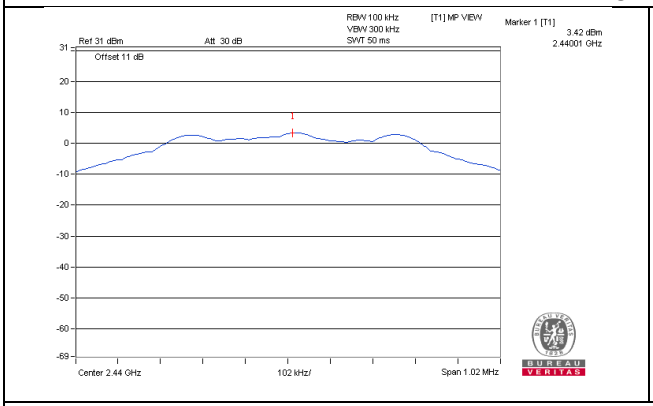
4.6.7 Test Results

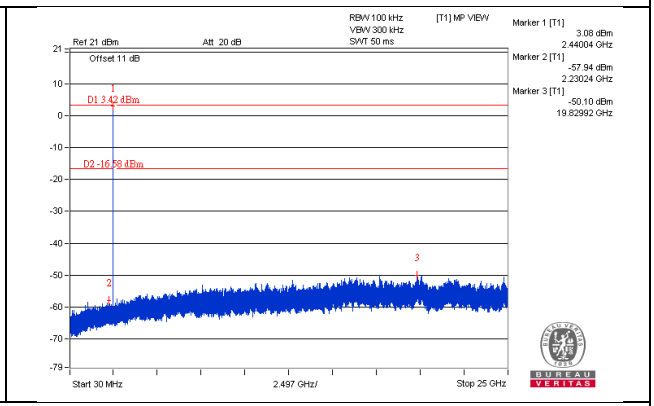
CH 37



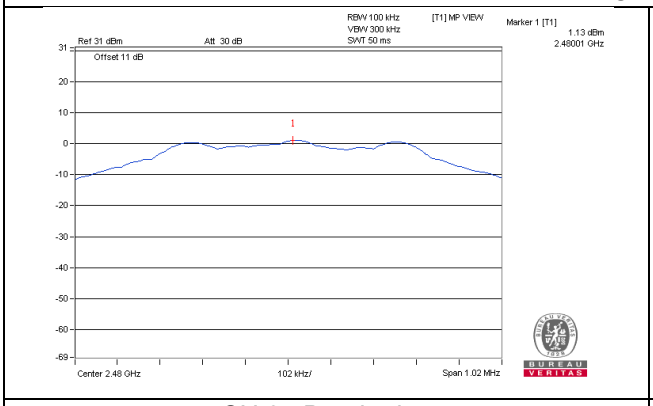


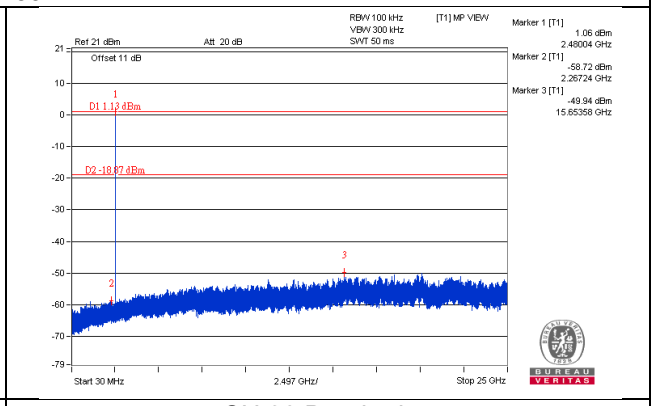
CH 17



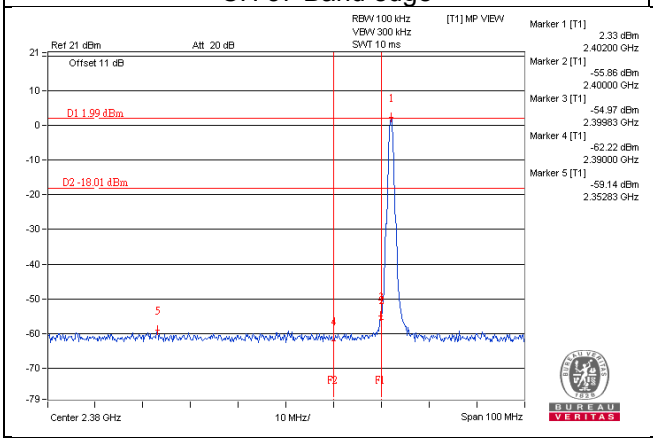


CH 39

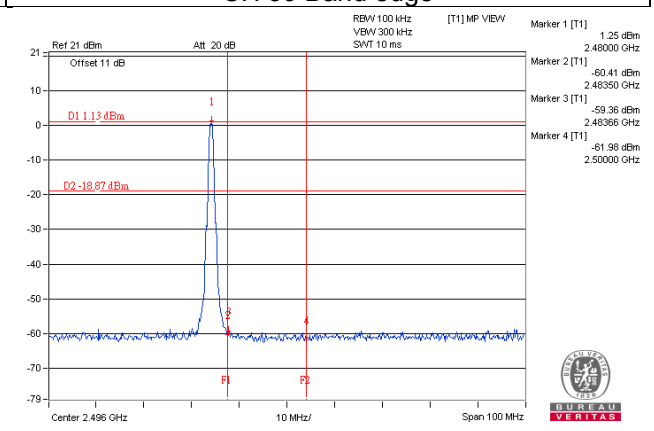




CH 37 Band edge



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 accredited and approved according to ISO/IEC 17025.

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

Linko 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.

--- END ---