FCC Test Report

Report No.:	RF180517E07 R1
FCC ID:	2ACY3-IPOSPLUSSL
Test Model:	BEETLE /iPOS plus SL
Received Date:	May 17, 2018
Test Date:	June 21 to 26, 2018
Issued Date:	Oct. 01, 2018
Applicant:	Diebold Nixdorf Singapore Pte Ltd.
Address:	151 Lorong Chuan New Tech Park #05-01 A/B 556741 SINGAPORE
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF180517E07	Original release.	Aug. 08, 2018
RF180517E07 R1	Modify Power Supply Rating.	Oct. 01, 2018

1 Certificate of Conformity

Product:	POS Terminal
Brand:	
Test Model:	BEETLE /iPOS plus SL
Sample Status:	ENGINEERING SAMPLE
Applicant:	Diebold Nixdorf Singapore Pte Ltd.
Test Date:	June 21 to 26, 2018
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.225) 47 CFR FCC Part 15, Subpart C (Section 15.215) 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 : Mary Ko , **Date:** Oct. 01, 2018

Mary Ko / Specialist

Approved by : , **Date:** Oct. 01, 2018

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.225, 15.215)			
FCC Clause	Test Item	Result	Remarks
---	Occupied Bandwidth Measurement	-	Reference only.
15.207	Conducted emission test	PASS	Meet the requirement of limit. Minimum passing margin is -10.50dB at 0.15000MHz.
15.225 (a)	The field strength of any emissions within the band 13.553-13.567 MHz	PASS	Meet the requirement of limit.
15.225 (b)	The field strength of any emissions within the bands 13.410-13.553 MHz and 13.567-13.710 MHz	PASS	Meet the requirement of limit.
15.225 (c)	The field strength of any emissions within the bands 13.110-13.410 MHz and 13.710-14.010 MHz	PASS	Meet the requirement of limit.
15.225 (d)	The field strength of any emissions appearing outside of the 13.110-14.010 MHz band	PASS	Meet the requirement of limit. Minimum passing margin is -7.3dB at 63.78MHz.
15.225 (e)	The frequency tolerance	PASS	Meet the requirement of limit.
15.215 (c)	20dB Bandwidth	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	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.53 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	POS Terminal
Brand	DIEBOLD NIXDORF
Test Model	BEETLE /iPOS plus SL
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	24Vdc from adapter
Modulation Type	ASK
Operating Frequency	13.56MHz
Number of Channel	1
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. There are WLAN, Bluetooth and NFC technology used for the EUT. The EUT has below radios as following table:

Radio 1	Radio 2
WLAN (2.4GHz+5GHz) + Bluetooth	NFC

2. The EUT contains certified WLAN/Bluetoth modular which FCC ID: PD93168NG.
3. Simultaneously transmission condition.

Condition	Technology		
1	WLAN 2.4GHz	Bluetooth	NFC
2	WLAN 5GHz	Bluetooth	NFC
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.			

4. The EUT must be supplied with a power adapter as following table:

Brand	Model No.	Spec.
AcBel	ADC029	Input: 100-240Vac, 2A, 50/60Hz Output: 24V, 5A, (shielded, 1.2m with one core)

5. The EUT's internal components as following information

CPU	intel Celeron N4200
	intel Celeron N3350
RAM	1x DDR3L SODIMM Socket 4GB
Storage	M.2 2280 SATA SSD
Panel	Brand : Innolux; Part Number : N140HCA-EAB
From the above CPUs, **intel Celeron N4200** was selected as representative model for the test and its data was recorded in this report.	

6. The EUT has three types according to NFC technology as following table:

Mode	Type	Modulation	Data rate
Active	A	100%, ASK	106 kbit/s
	B	10%, ASK	106 kbit/s
	F	8-30%, ASK	212 kbit/s, 424 kbit/s

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

WLAN antenna spec.						
Brand	Model	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
Smart Approach	SE-EYISL-001 (Main)	-3.69	2.4~2.4835	PIFA	i-pex(MHF)	230
		3.08	5.15~5.35			
		3.14	5.47~5.725			
		3.14	5.725~5.85			

Bluetooth antenna spec.						
Brand	Model	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
Smart Approach	SE-EYISL-002 (Aux)	-3.87	2.4~2.4835	PIFA	i-pex(MHF)	380

NFC antenna spec.				
Brand	Model	Frequency range (MHz)	Antenna Type	Antenna Connector
Smart Approach	51-MYISL-001	13.56	Loop	None

8. 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

One channel was provided to this EUT:

Channel	FREQ. (MHz)
1	13.56

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to					Description
	RE	PLC	FS	EB	BW	
-	√	√	√	√	√	-

Where **RE:** Radiated Emission **PLC:** Power Line Conducted Emission
FS: Frequency Stability **EB:** 20dB Bandwidth measurement
BW: Occupied Bandwidth measurement

Radiated 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.

Available Channel	Tested Channel	Modulation Type
1	1	ASK

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.

Available Channel	Tested Channel	Modulation Type
1	1	ASK

Frequency Stability:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel	Modulation Type
1	1	ASK

20dB Bandwidth:

☒ 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.

Available Channel	Tested Channel	Modulation Type
1	1	ASK

Occupied Bandwidth:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

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

Available Channel	Tested Channel	Modulation Type
1	1	ASK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE	23deg. C, 67%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
FS	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen
EB	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen
BW	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

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.

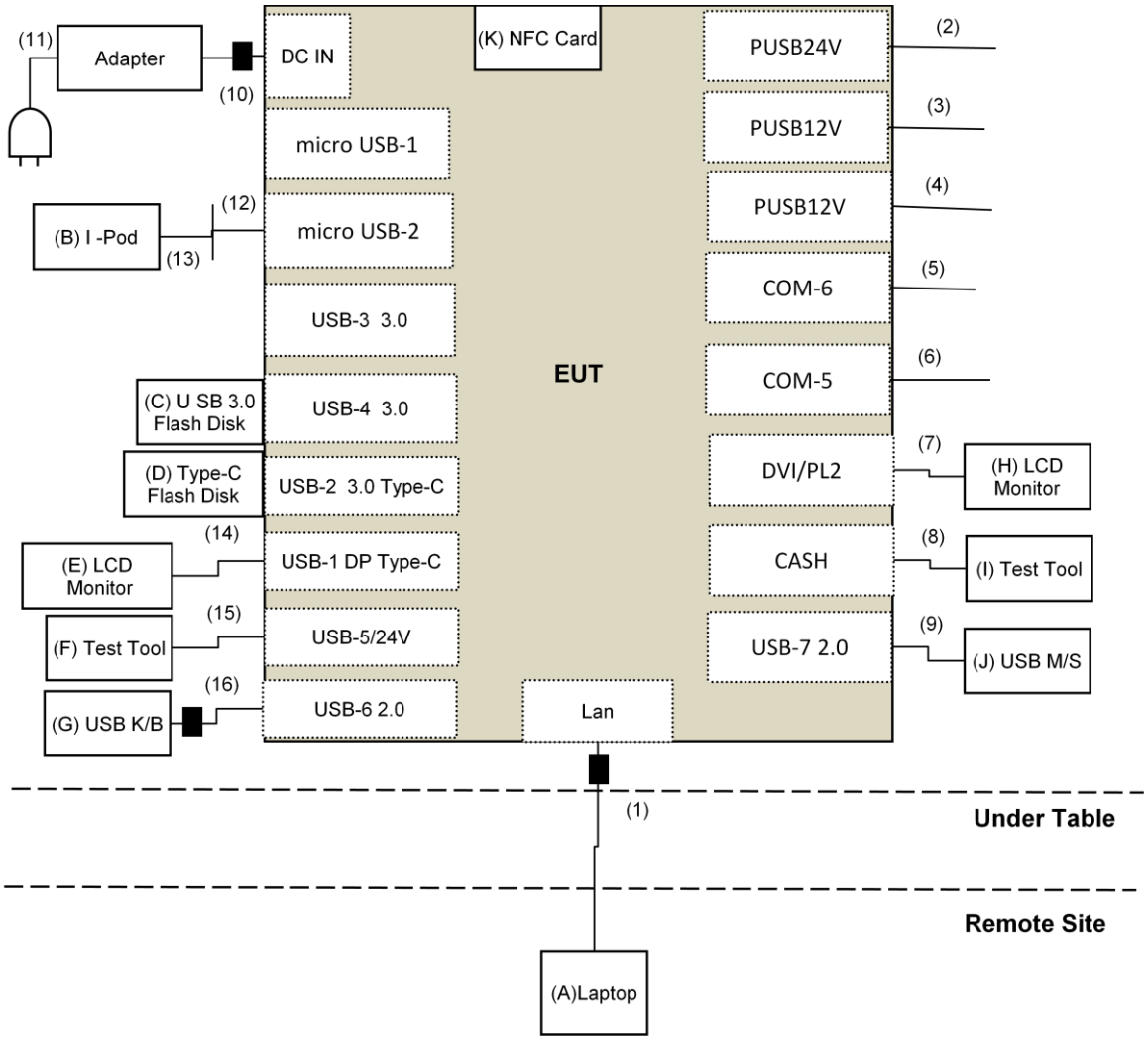
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	I-Pod	Apple	MD778TA/A	CC4JL03FF4T1	NA	Provided by Lab
C.	USB 3.0 Flash Disk	Transcend	16GB	NA	NA	Provided by Lab
D.	Type-C Flash Disk	SP	16GB	NA	NA	Supplied by client
E.	LCD Monitor	ASUS	MB169	NA	NA	Supplied by client
F.	Test Tool	NA	NA	NA	NA	Supplied by client
G.	USB K/B	DELL	SK-8115	MY-0DJ325-71619-99B-0476	FCC DoC	Provided by Lab
H.	LCD Monitor	DIEBOLD NIXDORF	BA91	NA	NA	Supplied by client
I.	Test Tool	NA	NA	NA	NA	Supplied by client
J.	USB M/S	HP	M-UAE96	NA	NA	Provided by Lab
K.	NFC Card	NA	NA	NA	NA	Supplied by client

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	1	Supplied by client
2.	PUSB24V	1	1.8	Yes	0	Supplied by client
3.	PUSB12V	1	1.8	Yes	0	Supplied by client
4.	PUSB12V	1	1.8	Yes	0	Supplied by client
5.	RS232	1	1.8	Yes	0	Supplied by client
6.	RS232	1	1.8	Yes	0	Supplied by client
7.	DVI	1	5	Yes	0	Supplied by client
8.	CASH	1	1.8	Yes	0	Supplied by client
9.	USB Cable	1	1.6	Yes	0	Provided by Lab
10.	DC Cable	1	1.2	Yes	1	Supplied by client
11.	AC Cable	1	1.8	No	0	Provided by Lab
12.	Micro USB	1	0.5	Yes	0	Supplied by client
13.	USB Cable	1	0.5	Yes	0	Provided by Lab
14.	USB Type-C	1	5	Yes	0	Supplied by client
15.	PUSB24V	1	1.8	Yes	0	Supplied by client
16.	USB Cable	1	1.6	Yes	1	Provided by Lab

3.3.1 Configuration of System under Test



*The configuration is specified according to the applicant's requirement.

3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.225)

FCC Part 15, Subpart C (15.215)

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 Measurement

4.1.1 Limits of Radiated Emission Measurement

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209 as below table:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-3-1 966-3-2 966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 03, 2017	Oct. 02, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
True RMS Clamp Meter FLUKE	325	31130711WS	May 22, 2018	May 21, 2019

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The CANADA Site Registration No. is 20331-1
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: June 21 to 26, 2018

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) 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.

Note:

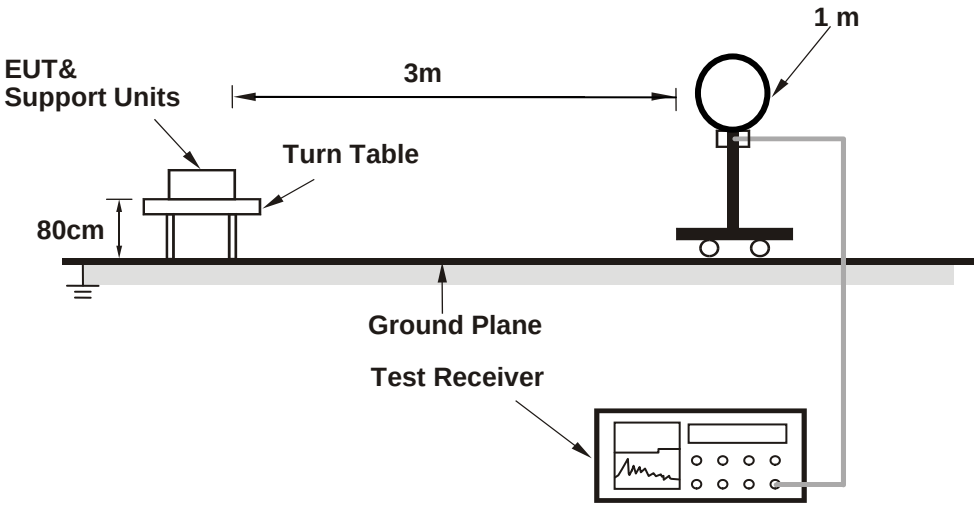
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

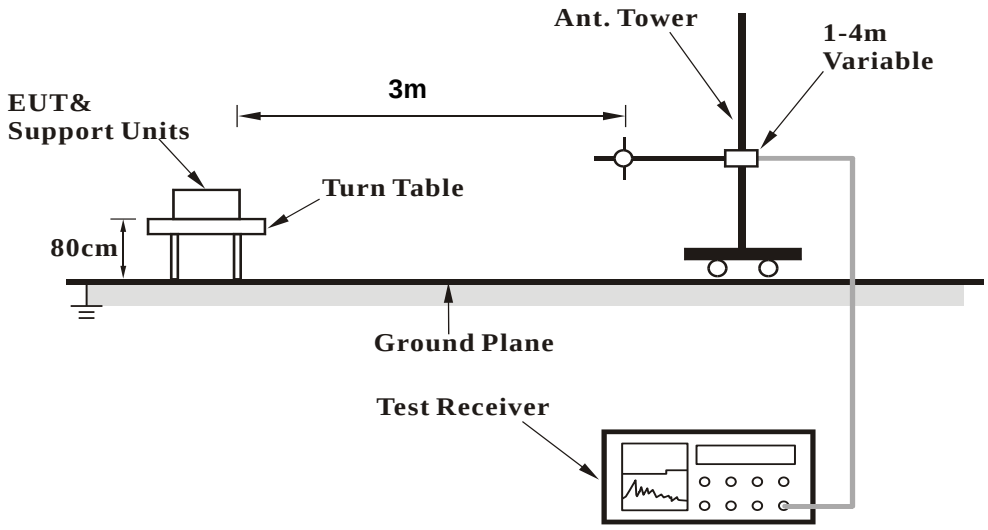
No deviation.

4.1.5 Test Setup

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Notebook Computer which is placed on remote site.

b. Controlling software (csScriptor (2.0.5227.19896)) has been activated to set the EUT on specific status.

4.1.7 Test Results

Type A

Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

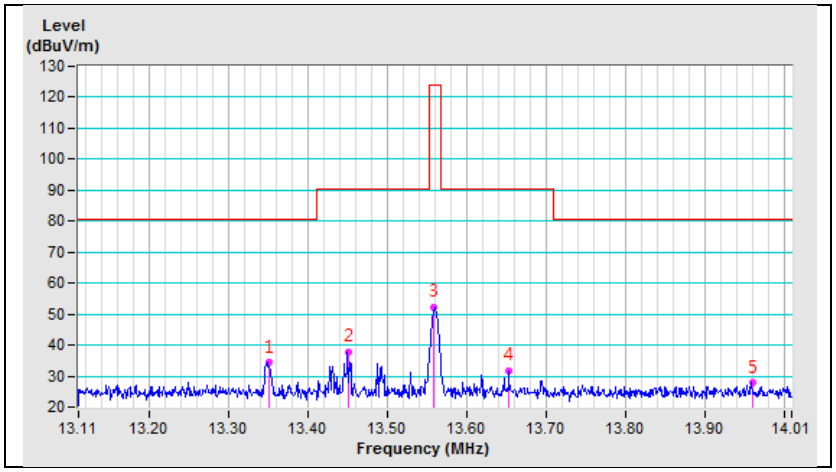
Antenna Polarity & Test Distance: Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.350	34.34 QP	80.50	-46.16	1.00	352	37.79	-3.45
2	13.450	37.81 QP	90.47	-52.66	1.00	352	41.28	-3.47
3	13.559*	52.17 QP	124.00	-71.83	1.00	352	55.65	-3.48
4	13.653	31.60 QP	90.47	-58.87	1.00	352	35.10	-3.50
5	13.960	27.80 QP	80.50	-52.70	1.00	352	31.34	-3.54

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

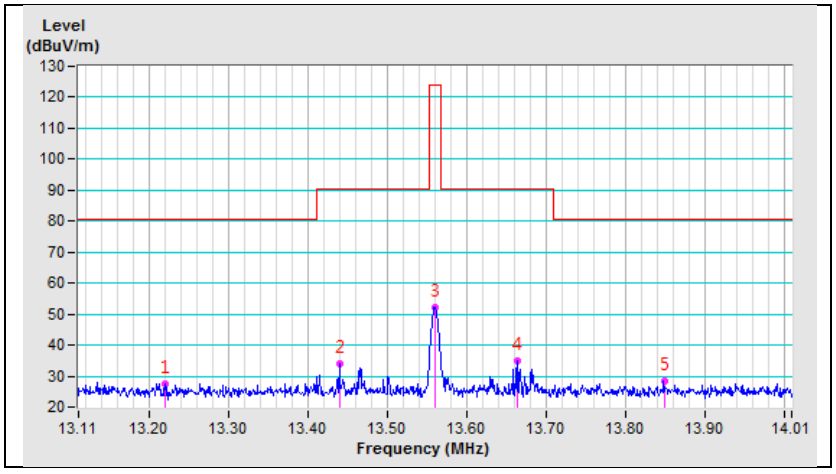
Antenna Polarity & Test Distance: Perpendicylar at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.219	27.44 QP	80.50	-53.06	1.00	86	30.87	-3.43
2	13.439	33.96 QP	90.47	-56.51	1.00	86	37.43	-3.47
3	13.560*	52.26 QP	124.00	-71.74	1.00	86	55.74	-3.48
4	13.663	35.01 QP	90.47	-55.46	1.00	86	38.51	-3.50
5	13.849	28.29 QP	80.50	-52.21	1.00	86	31.82	-3.53

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

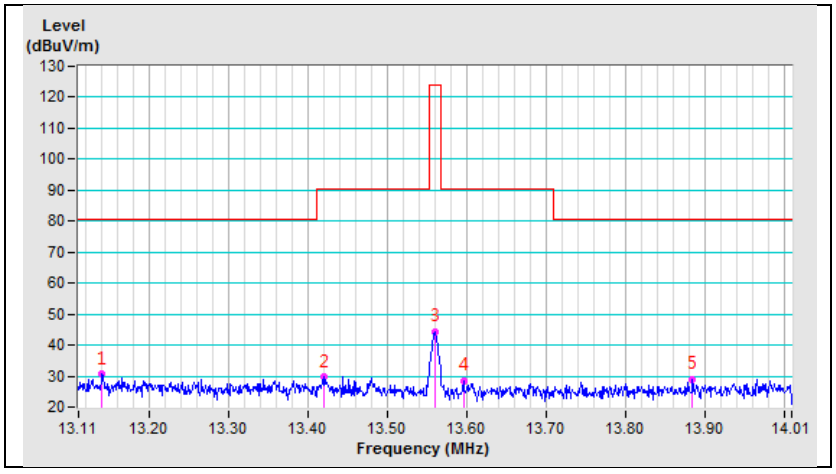
Antenna Polarity & Test Distance: Ground Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.140	30.51 QP	80.50	-49.99	1.00	186	33.93	-3.42
2	13.419	29.68 QP	90.47	-60.79	1.00	186	33.14	-3.46
3	13.560*	44.27 QP	124.00	-79.73	1.00	186	47.75	-3.48
4	13.596	28.29 QP	90.47	-62.18	1.00	186	31.78	-3.49
5	13.884	29.07 QP	80.50	-51.43	1.00	186	32.60	-3.53

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m

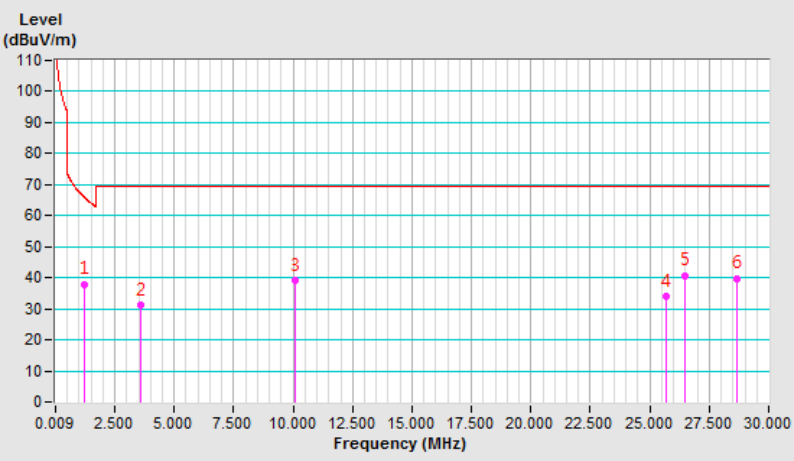


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Parallel at 3m								
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	1.216	37.80 QP	65.91	-28.11	1.00	256	37.63	0.17
2	3.602	31.01 QP	69.50	-38.49	1.00	109	34.06	-3.05
3	10.096	39.02 QP	69.50	-30.48	1.00	78	41.98	-2.96
4	25.708	33.87 QP	69.50	-35.63	1.00	306	37.06	-3.19
5	26.489	40.67 QP	69.50	-28.83	1.00	360	43.70	-3.03
6	28.69	39.58 QP	69.50	-29.92	1.00	312	42.12	-2.54

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

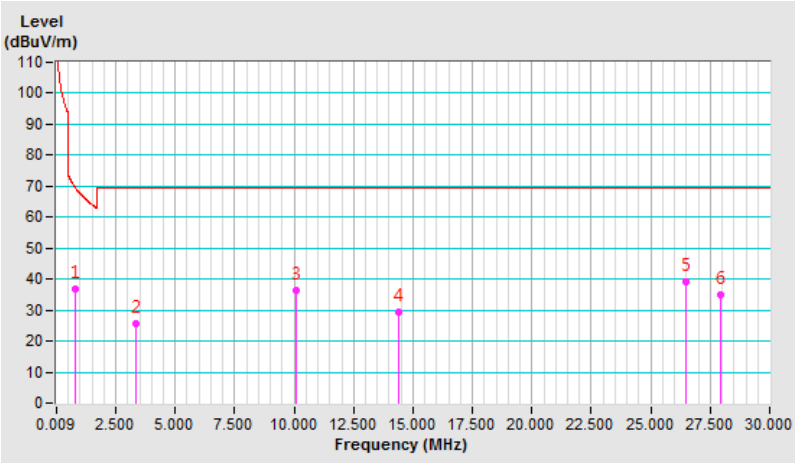


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Perpendicylar at 3m								
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	0.780	36.86 QP	69.76	-32.90	1.00	360	34.48	2.38
2	3.372	25.69 QP	69.50	-43.81	1.00	340	28.73	-3.04
3	10.096	36.59 QP	69.50	-32.91	1.00	285	39.55	-2.96
4	14.410	29.31 QP	69.50	-40.19	1.00	64	32.92	-3.61
5	26.487	39.20 QP	69.50	-30.30	1.00	246	42.23	-3.03
6	27.955	35.11 QP	69.50	-34.39	1.00	228	37.81	-2.70

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

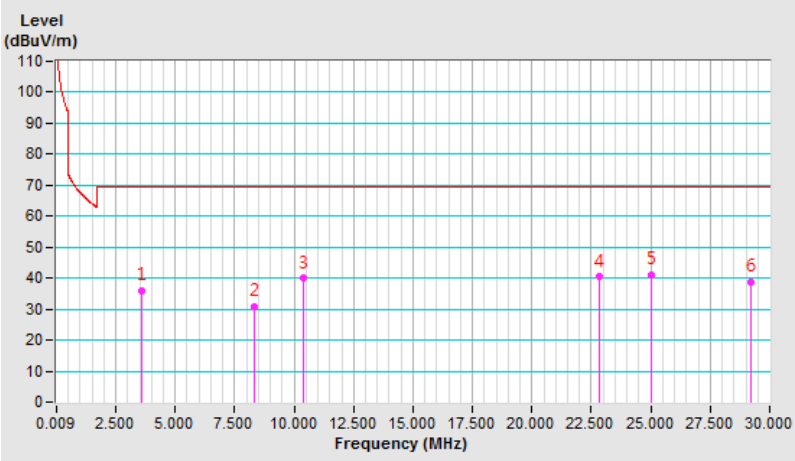


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Ground Parallel at 3m								
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	3.604	36.07 QP	69.50	-33.43	1.00	286	39.12	-3.05
2	8.340	30.68 QP	69.50	-38.82	1.00	333	33.68	-3.00
3	10.385	39.94 QP	69.50	-29.56	1.00	345	42.95	-3.01
4	22.864	40.42 QP	69.50	-29.08	1.00	171	44.23	-3.81
5	25.002	41.20 QP	69.50	-28.30	1.00	312	44.55	-3.35
6	29.237	38.70 QP	69.50	-30.80	1.00	28	41.12	-2.42

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



Frequency Range	30MHz ~ 1000MHz	Detector Function	Quasi-Peak

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	87.08	31.2 QP	40.0	-8.8	2.00 H	156	44.9	-13.7
2	195.00	30.8 QP	43.5	-12.7	1.00 H	184	41.6	-10.8
3	259.99	29.2 QP	46.0	-16.8	1.00 H	172	37.7	-8.5
4	355.19	36.6 QP	46.0	-9.4	1.00 H	305	42.2	-5.6
5	432.02	32.1 QP	46.0	-13.9	2.00 H	11	35.3	-3.2
6	516.26	36.6 QP	46.0	-9.4	1.50 H	360	38.4	-1.8
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	63.76	29.5 QP	40.0	-10.5	1.00 V	160	38.6	-9.1
2	357.30	36.7 QP	46.0	-9.3	1.50 V	32	42.2	-5.5
3	399.38	34.8 QP	46.0	-11.2	1.50 V	360	39.3	-4.5
4	493.66	33.1 QP	46.0	-12.9	1.00 V	346	35.3	-2.2
5	530.54	35.3 QP	46.0	-10.7	1.50 V	360	36.9	-1.6
6	647.43	33.0 QP	46.0	-13.0	2.00 V	0	31.8	1.2

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Type B

Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

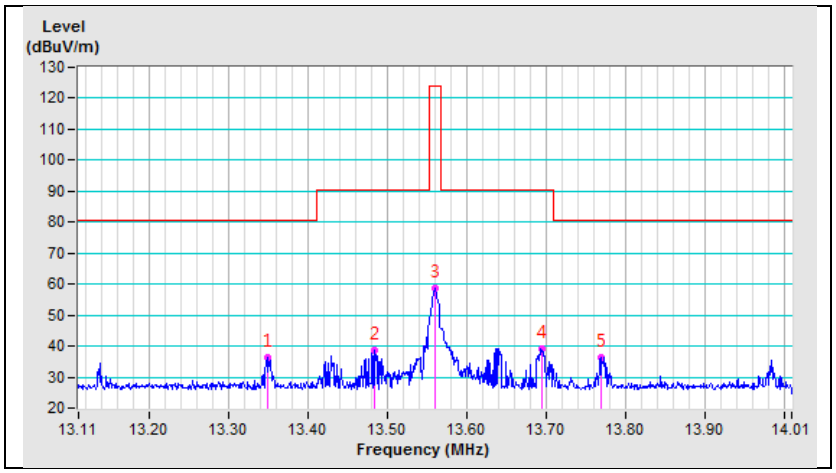
Antenna Polarity & Test Distance: Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.348	36.34 QP	80.50	-44.16	1.00	346	39.79	-3.45
2	13.484	38.67 QP	90.47	-51.80	1.00	346	42.14	-3.47
3	13.560*	58.64 QP	124.00	-65.36	1.00	346	62.12	-3.48
4	13.694	39.17 QP	90.47	-51.30	1.00	346	42.67	-3.50
5	13.769	36.42 QP	80.50	-44.08	1.00	346	39.94	-3.52

REMARKS:
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Perpendicylar at 3m								
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	13.134	35.41 QP	80.50	-45.09	1.00	93	38.83	-3.42
2	13.478	27.16 QP	90.47	-63.31	1.00	93	30.63	-3.47
3	13.560*	58.89 QP	124.00	-65.11	1.00	93	62.37	-3.48
4	13.695	29.05 QP	90.47	-61.42	1.00	93	32.55	-3.50
5	13.981	39.45 QP	80.50	-41.05	1.00	93	43.00	-3.55

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

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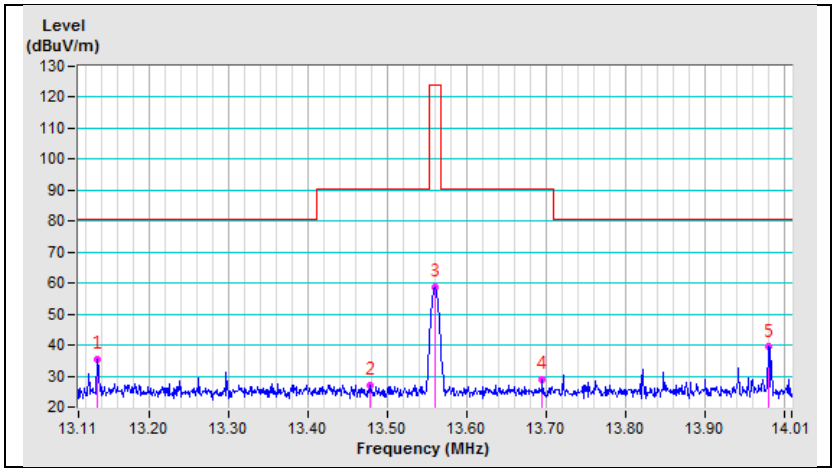


Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

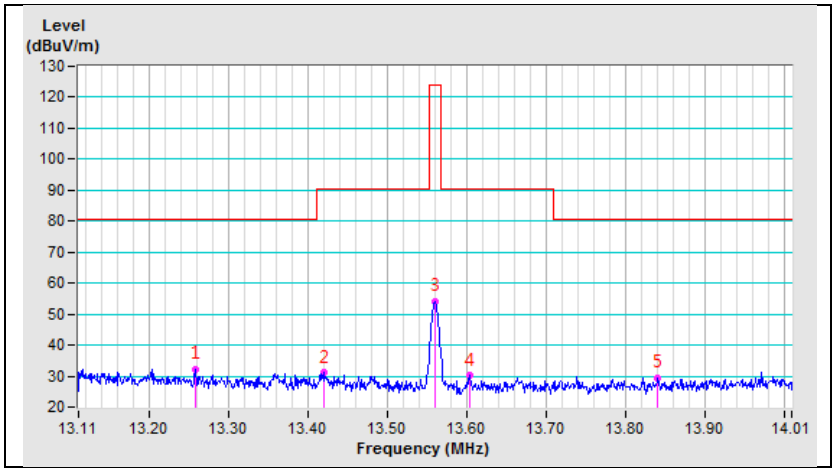
Antenna Polarity & Test Distance: Ground Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.257	32.21 QP	80.50	-48.29	1.00	356	35.65	-3.44
2	13.419	30.98 QP	90.47	-59.49	1.00	356	34.44	-3.46
3	13.560*	54.23 QP	124.00	-69.77	1.00	356	57.71	-3.48
4	13.604	30.14 QP	90.47	-60.33	1.00	356	33.63	-3.49
5	13.841	29.54 QP	80.50	-50.96	1.00	356	33.07	-3.53

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m

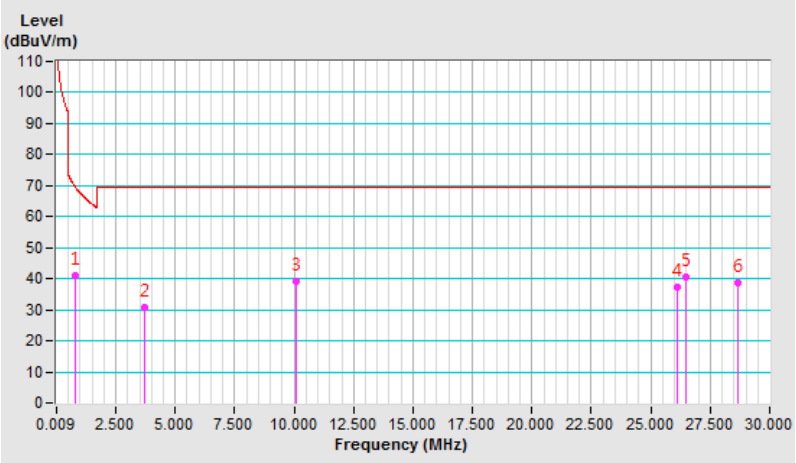


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Parallel at 3m								
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	0.806	40.92 QP	69.48	-28.56	1.00	270	38.76	2.16
2	3.691	30.95 QP	69.50	-38.55	1.00	267	34.01	-3.06
3	10.094	39.10 QP	69.50	-30.40	1.00	206	42.06	-2.96
4	26.100	37.50 QP	69.50	-32.00	1.00	360	40.61	-3.11
5	26.487	40.55 QP	69.50	-28.95	1.00	186	43.58	-3.03
6	28.686	38.61 QP	69.50	-30.89	1.00	325	41.15	-2.54

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

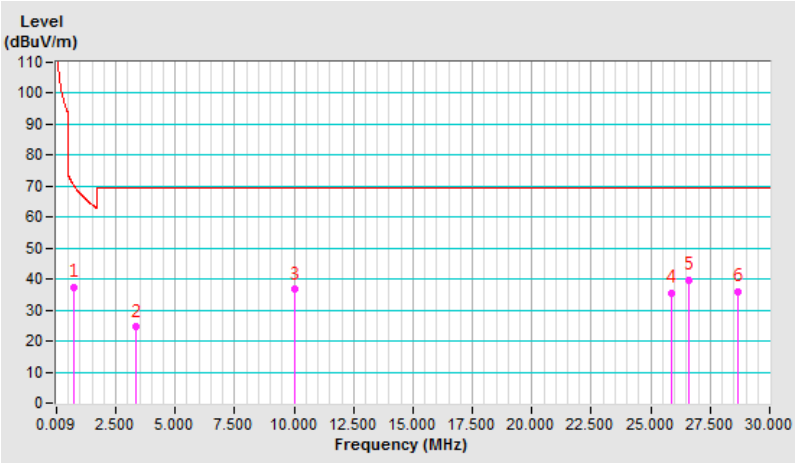


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Perpendicylar at 3m								
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	0.742	37.48 QP	70.20	-32.72	1.00	360	34.80	2.68
2	3.319	24.57 QP	69.50	-44.93	1.00	12	27.61	-3.04
3	10.039	36.71 QP	69.50	-32.79	1.00	36	39.67	-2.96
4	25.875	35.46 QP	69.50	-34.04	1.00	307	38.62	-3.16
5	26.611	39.76 QP	69.50	-29.74	1.00	162	42.75	-2.99
6	28.687	35.92 QP	69.50	-33.58	1.00	62	38.46	-2.54

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

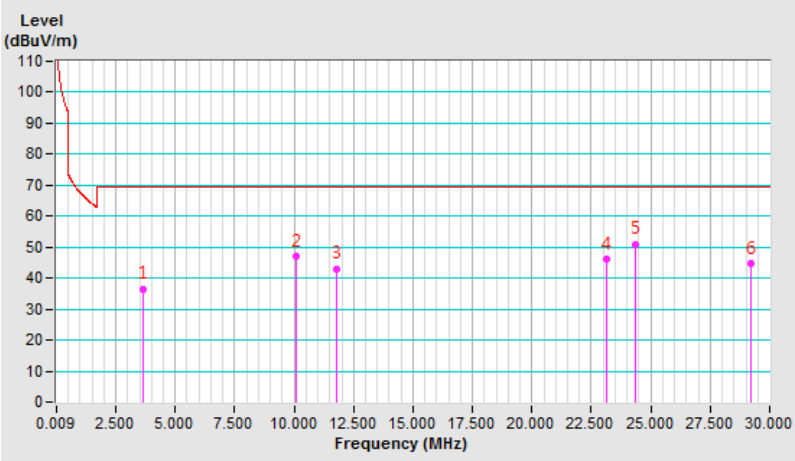


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Ground Parallel at 3m								
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	3.661	36.40 QP	69.50	-33.10	1.00	48	39.46	-3.06
2	10.096	46.84 QP	69.50	-22.66	1.00	155	49.80	-2.96
3	11.803	42.88 QP	69.50	-26.62	1.00	8	46.10	-3.22
4	23.129	45.91 QP	69.50	-23.59	1.00	360	49.66	-3.75
5	24.382	50.85 QP	69.50	-18.65	1.00	298	54.34	-3.49
6	29.236	44.52 QP	69.50	-24.98	1.00	168	46.94	-2.42

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



Frequency Range	30MHz ~ 1000MHz	Detector Function	Quasi-Peak

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	63.76	30.3 QP	40.0	-9.7	2.00 H	292	39.4	-9.1
2	87.06	31.4 QP	40.0	-8.6	2.00 H	304	45.1	-13.7
3	195.00	28.8 QP	43.5	-14.7	1.50 H	160	39.6	-10.8
4	355.99	36.2 QP	46.0	-9.8	1.00 H	304	41.8	-5.6
5	431.99	31.9 QP	46.0	-14.1	1.50 H	360	35.1	-3.2
6	516.36	35.4 QP	46.0	-10.6	1.50 H	360	37.2	-1.8
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	72.70	28.8 QP	40.0	-11.2	1.00 V	72	39.6	-10.8
2	361.52	36.3 QP	46.0	-9.7	1.50 V	40	41.7	-5.4
3	398.16	34.5 QP	46.0	-11.5	1.50 V	23	39.0	-4.5
4	530.25	35.5 QP	46.0	-10.5	1.00 V	339	37.1	-1.6
5	648.57	33.6 QP	46.0	-12.4	1.50 V	355	32.4	1.2
6	729.78	34.2 QP	46.0	-11.8	1.00 V	360	31.9	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Type F

Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

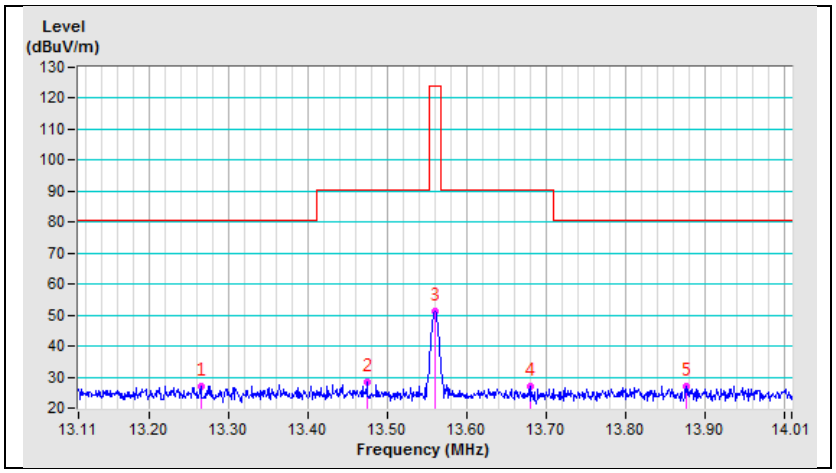
Antenna Polarity & Test Distance: Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.264	27.09 QP	80.50	-53.41	1.00	345	30.53	-3.44
2	13.474	28.31 QP	90.47	-62.16	1.00	345	31.78	-3.47
3	13.560*	51.35 QP	124.00	-72.65	1.00	345	54.83	-3.48
4	13.681	27.18 QP	90.47	-63.29	1.00	345	30.68	-3.50
5	13.877	27.12 QP	80.50	-53.38	1.00	345	30.65	-3.53

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m



Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Perpendicylar at 3m								
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	13.369	27.30 QP	80.50	-53.20	1.00	78	30.76	-3.46
2	13.519	27.54 QP	90.47	-62.93	1.00	78	31.02	-3.48
3	13.560*	50.01 QP	124.00	-73.99	1.00	78	53.49	-3.48
4	13.604	27.52 QP	90.47	-62.95	1.00	78	31.01	-3.49
5	13.871	28.76 QP	80.50	-51.74	1.00	78	32.29	-3.53

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

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= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
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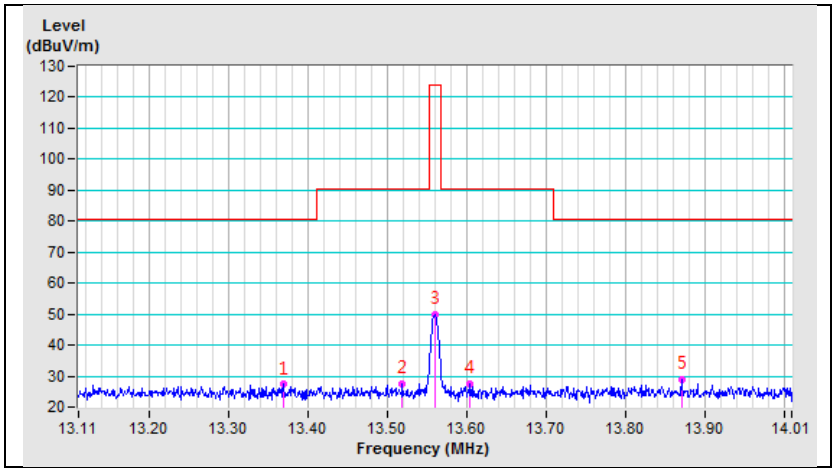


Frequency Range	13.110 ~ 14.010MHz	Detector Function	Quasi-Peak

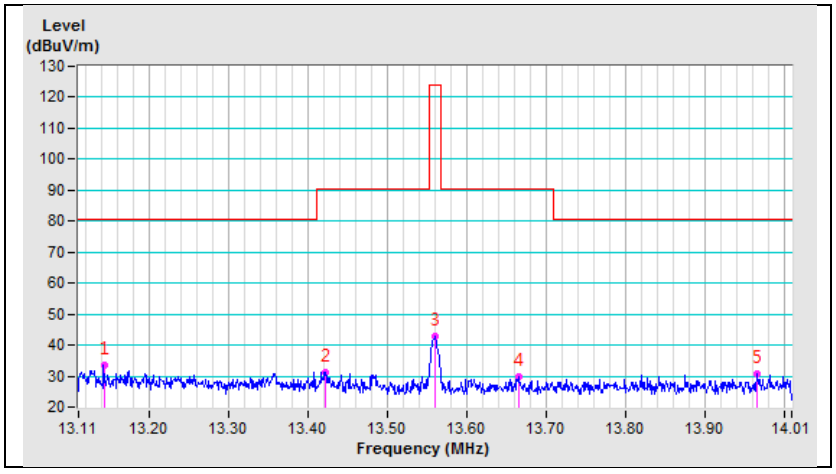
Antenna Polarity & Test Distance: Ground Parallel at 3m								
No.	Freq. (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	13.142	33.53 QP	80.50	-46.97	1.00	339	36.95	-3.42
2	13.422	31.27 QP	90.47	-59.20	1.00	339	34.73	-3.46
3	13.560*	42.89 QP	124.00	-81.11	1.00	339	46.37	-3.48
4	13.666	29.84 QP	90.47	-60.63	1.00	339	33.34	-3.50
5	13.966	30.80 QP	80.50	-49.70	1.00	339	34.34	-3.54

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. Above limits have been translated by the formula
6. " * ": Fundamental frequency.

The measured field strength was extrapolated to distance 30 meters, using the formula that the limit of field strength varies as the inverse distance square (40dB per decade of distance)

Example:

13.56MHz = 15848uV/m 30m
= 84dBuV/m 30m
= $84+20\log(30/3)^2$ 3m
= 124dBuV/m

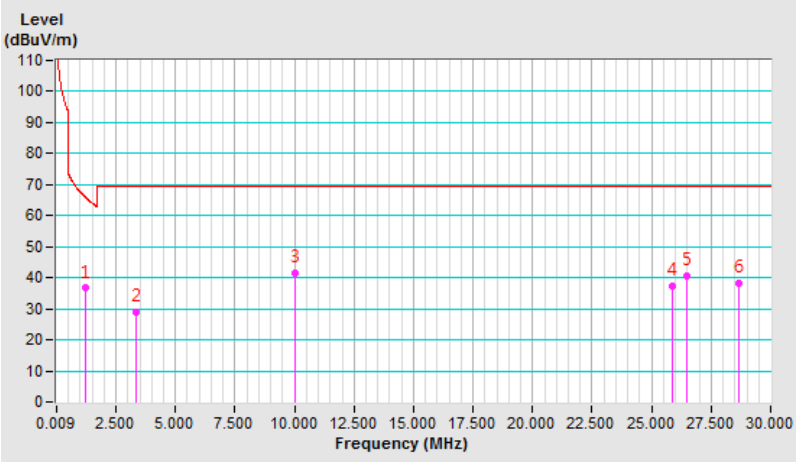


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Parallel at 3m								
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	1.220	36.62 QP	65.88	-29.26	1.00	261	36.45	0.17
2	3.351	29.01 QP	69.50	-40.49	1.00	133	32.05	-3.04
3	10.052	41.57 QP	69.50	-27.93	1.00	16	44.53	-2.96
4	25.875	37.48 QP	69.50	-32.02	1.00	181	40.64	-3.16
5	26.488	40.63 QP	69.50	-28.87	1.00	1	43.66	-3.03
6	28.685	38.31 QP	69.50	-31.19	1.00	306	40.85	-2.54

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

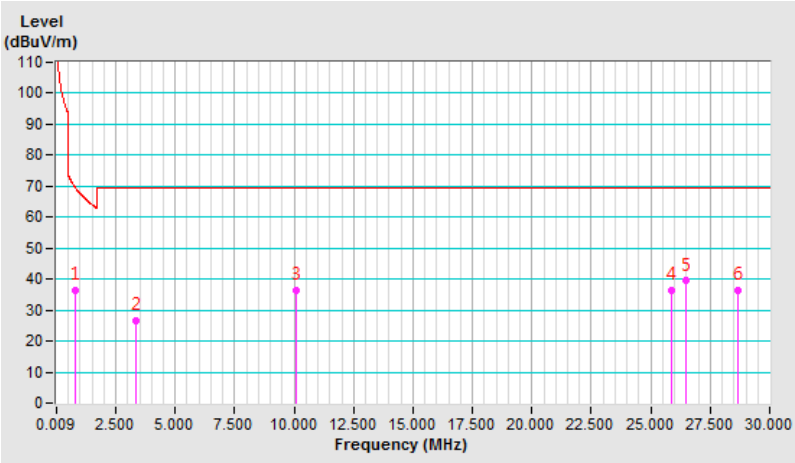


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Perpendicylar at 3m								
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	0.781	36.44 QP	69.75	-33.31	1.00	181	34.07	2.37
2	3.367	26.67 QP	69.50	-42.83	1.00	323	29.71	-3.04
3	10.095	36.55 QP	69.50	-32.95	1.00	188	39.51	-2.96
4	25.875	36.57 QP	69.50	-32.93	1.00	1	39.73	-3.16
5	26.487	39.49 QP	69.50	-30.01	1.00	199	42.52	-3.03
6	28.686	36.36 QP	69.50	-33.14	1.00	322	38.90	-2.54

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

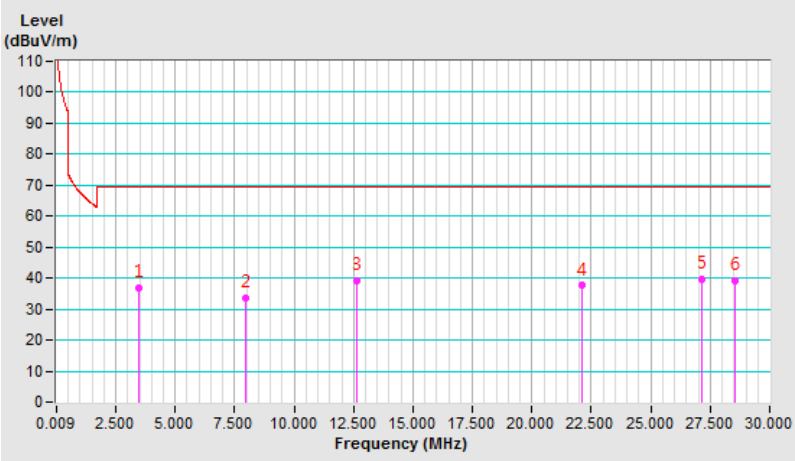


Frequency Range	Below 30MHz	Detector Function	Quasi-Peak

Antenna Polarity & Test Distance: Ground Parallel at 3m								
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	3.490	37.05 QP	69.50	-32.45	1.00	65	40.11	-3.06
2	7.990	33.68 QP	69.50	-35.82	1.00	118	36.69	-3.01
3	12.656	39.08 QP	69.50	-30.42	1.00	234	42.43	-3.35
4	22.085	37.59 QP	69.50	-31.91	1.00	352	41.57	-3.98
5	27.159	39.57 QP	69.50	-29.93	1.00	205	42.45	-2.88
6	28.563	39.10 QP	69.50	-30.40	1.00	248	41.66	-2.56

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



Frequency Range	30MHz ~ 1000MHz	Detector Function	Quasi-Peak

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	**63.78**	**32.7 QP**	**40.0**	**-7.3**	**2.00 H**	**143**	**41.8**	**-9.1**
2	105.22	32.3 QP	43.5	-11.2	2.00 H	223	43.7	-11.4
3	195.02	30.1 QP	43.5	-13.4	1.00 H	206	40.9	-10.8
4	362.44	38.2 QP	46.0	-7.8	1.50 H	0	43.5	-5.3
5	398.65	34.9 QP	46.0	-11.1	1.50 H	4	39.4	-4.5
6	516.31	36.4 QP	46.0	-9.6	1.50 H	0	38.2	-1.8
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	63.83	30.9 QP	40.0	-9.1	1.00 V	218	40.0	-9.1
2	103.72	28.4 QP	43.5	-15.1	1.00 V	344	40.0	-11.6
3	362.54	36.6 QP	46.0	-9.4	1.50 V	171	41.9	-5.3
4	516.31	36.7 QP	46.0	-9.3	1.00 V	360	38.5	-1.8
5	657.74	33.8 QP	46.0	-12.2	1.50 V	9	32.6	1.2
6	729.81	33.5 QP	46.0	-12.5	1.50 V	360	31.2	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Nov. 01, 2017	Oct. 31, 2018
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 2017	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: June 23, 2018

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.

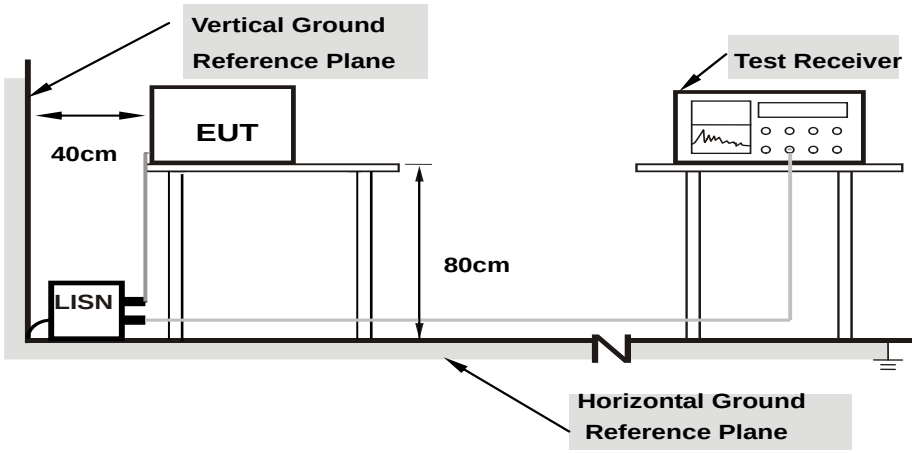
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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.

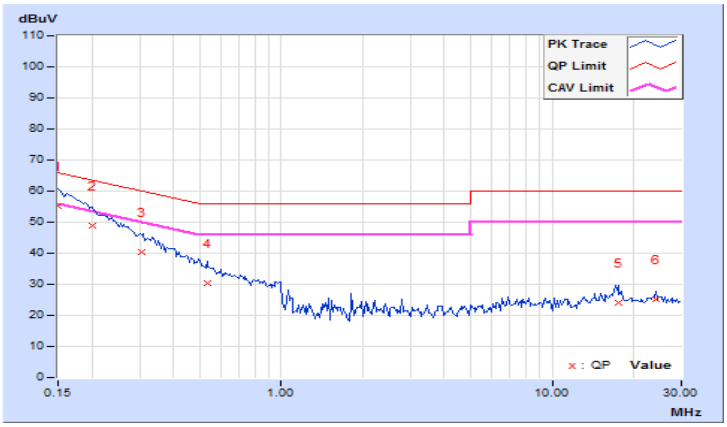
4.2.7 Test Results

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

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	0.15000	10.03	45.12	30.27	55.15	40.30	66.00	56.00	-10.85	-15.70
2	0.20078	10.06	38.78	23.85	48.84	33.91	63.58	53.58	-14.74	-19.67
3	0.30625	10.09	30.23	13.90	40.32	23.99	60.07	50.07	-19.75	-26.08
4	0.53281	10.12	20.21	9.11	30.33	19.23	56.00	46.00	-25.67	-26.77
5	17.63672	10.97	13.14	7.55	24.11	18.52	60.00	50.00	-35.89	-31.48
6	24.05469	11.14	13.92	11.97	25.06	23.11	60.00	50.00	-34.94	-26.89

Remarks:

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

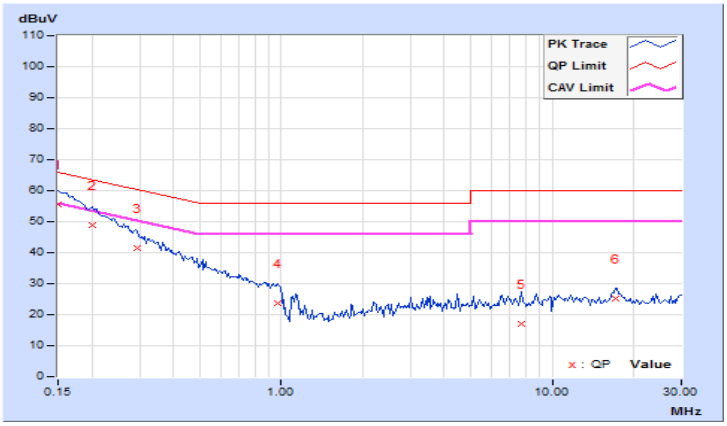


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. 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	**0.15000**	**9.94**	**45.56**	**30.51**	**55.50**	**40.45**	**66.00**	**56.00**	**-10.50**	**-15.55**
2	0.20078	9.96	39.00	23.59	48.96	33.55	63.58	53.58	-14.62	-20.03
3	0.29453	9.98	31.52	14.51	41.50	24.49	60.40	50.40	-18.90	-25.91
4	0.96641	10.03	13.50	2.42	23.53	12.45	56.00	46.00	-32.47	-33.55
5	7.68359	10.29	6.92	-1.69	17.21	8.60	60.00	50.00	-42.79	-41.40
6	17.04688	10.76	14.53	8.83	25.29	19.59	60.00	50.00	-34.71	-30.41

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

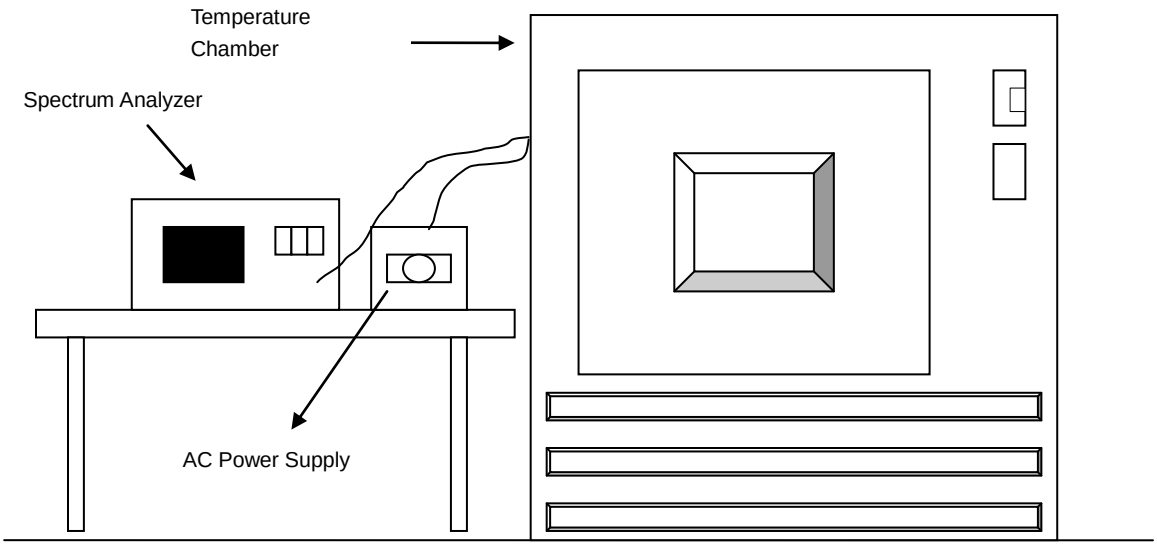


4.3 Frequency Stability

4.3.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of –20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

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. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.

b. Turned the EUT on and coupled its output to a spectrum analyzer.

c. Turned the EUT off and set the chamber to the highest temperature specified.

d. Allowed sufficient time (approximately 30 min) for the temperature of the chamber to stabilize then turned the EUT on and measured the operating frequency after 2, 5, and 10 minutes.

e. Repeated step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.1.6.

4.3.7 Test Result

Frequemcy Stability Versus Temp.									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	13.55993	-0.00052	13.55993	-0.00052	13.55993	-0.00052	13.55993	-0.00052
40	120	13.56003	0.00022	13.56003	0.00022	13.56003	0.00022	13.56003	0.00022
30	120	13.56	0.00000	13.55999	-0.00007	13.55999	-0.00007	13.55999	-0.00007
20	120	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029
10	120	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029
0	120	13.56002	0.00015	13.56004	0.00029	13.56003	0.00022	13.56003	0.00022
-10	120	13.56005	0.00037	13.56004	0.00029	13.56005	0.00037	13.56005	0.00037
-20	120	13.55998	-0.00015	13.55996	-0.00029	13.55997	-0.00022	13.55997	-0.00022

Frequemcy Stability Versus Voltage									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029
	120	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029
	102	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029	13.55996	-0.00029

4.4 20dB bandwidth

4.4.1 Limits of 20dB bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

4.4.2 Test Setup

Same as Item 4.1.5.

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 1kHz RBW and 3kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

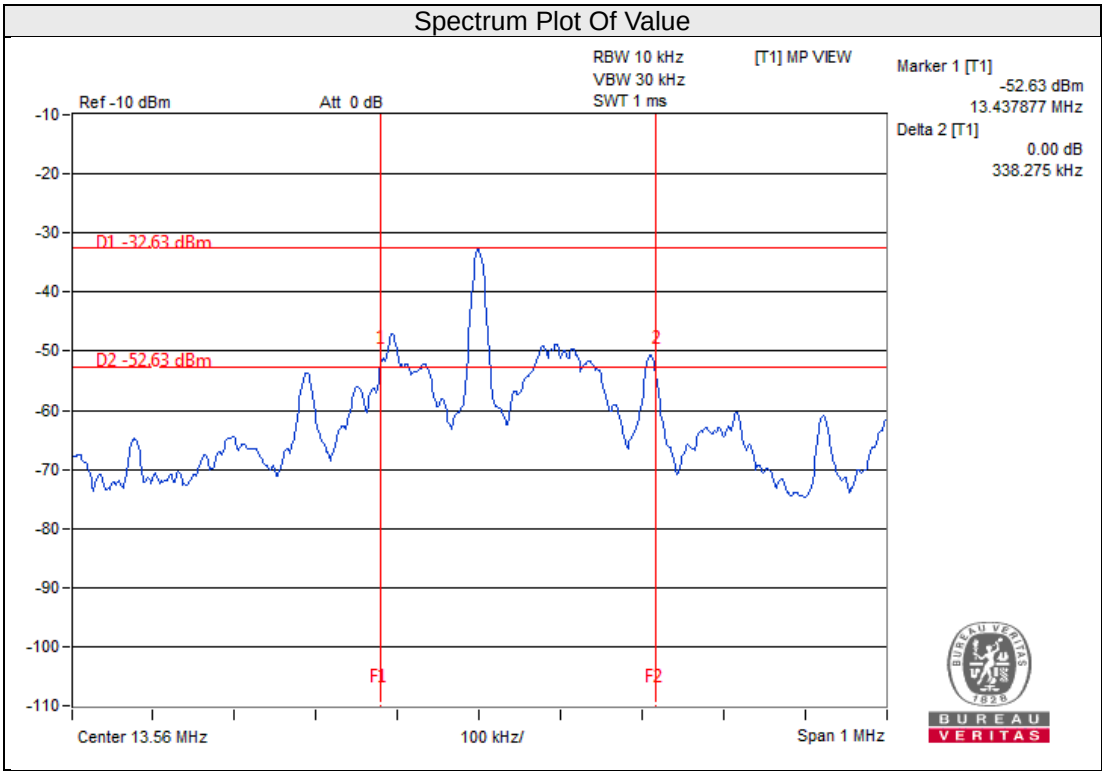
Same as Item 4.1.6.

4.4.7 Test Results

Type A

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass/Fail
13.437877	13.776152	13.11 – 14.01	PASS

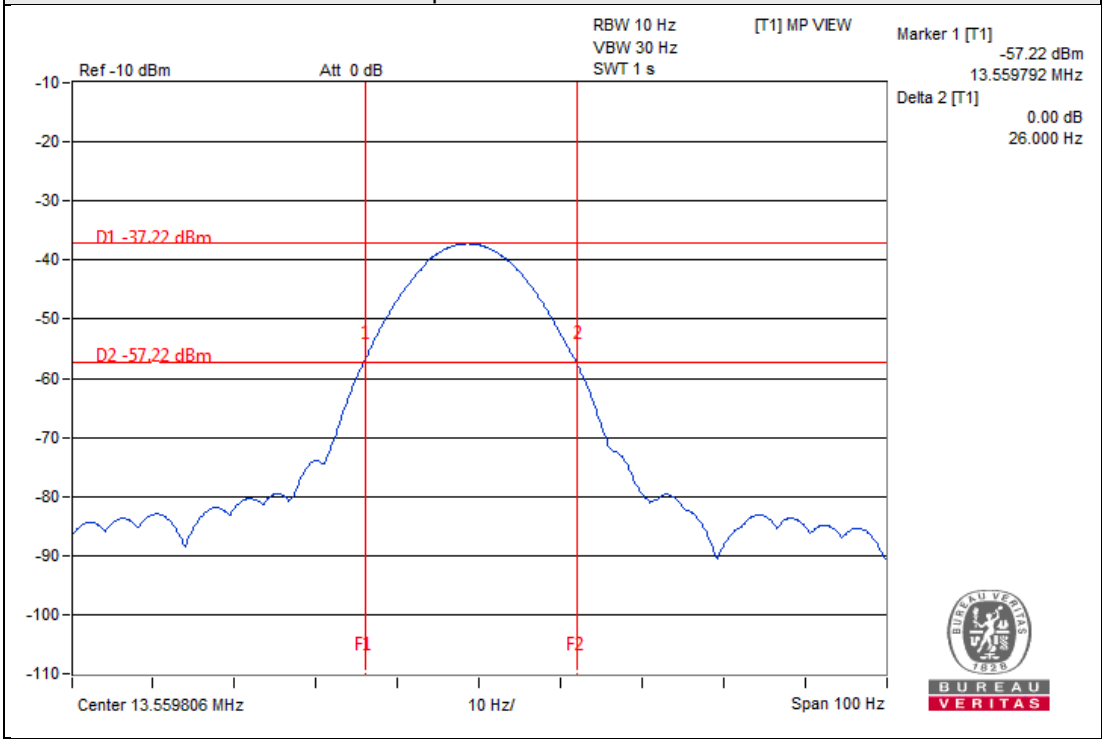
Spectrum Plot Of Value



Type B

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass/Fail
13.559792	13.559818	13.11 – 14.01	PASS

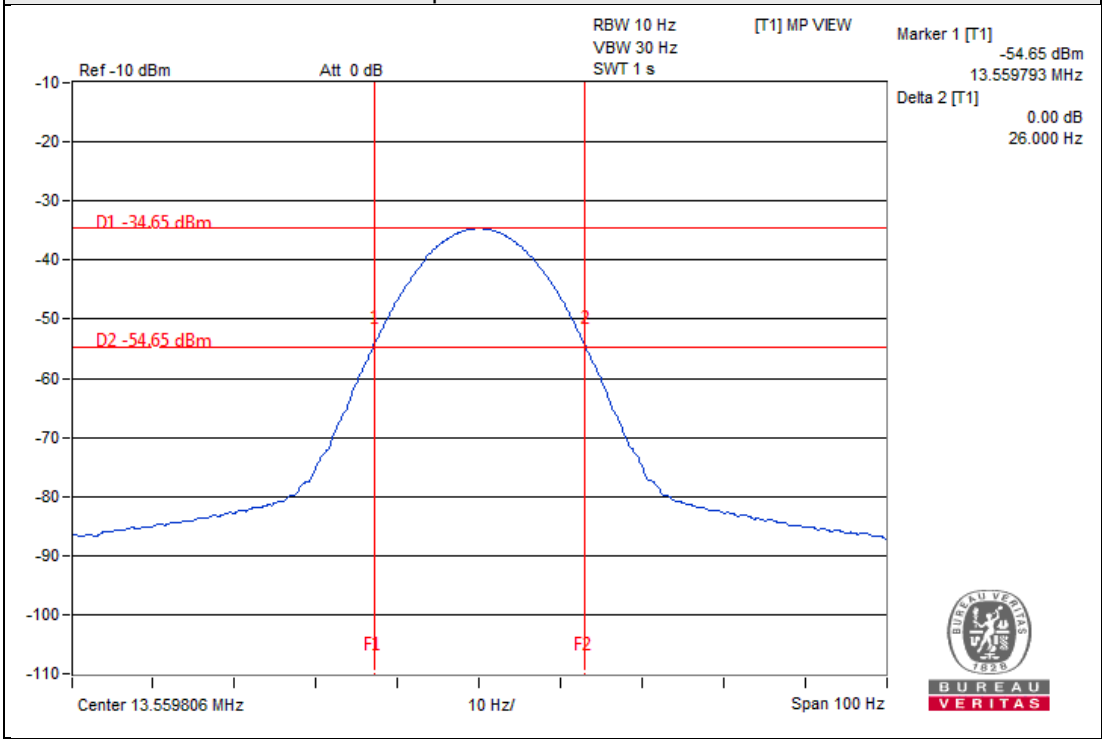
Spectrum Plot Of Value



Type F

20dBc point (Low)	20dBc point (High)	Operating frequency band (MHz)	Pass/Fail
13.559793	13.559819	13.11 – 14.01	PASS

Spectrum Plot Of Value



4.5 Occupied Bandwidth Measurement

4.5.1 Test Setup

Same as Item 4.1.5.

4.5.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.3 Test Procedures

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to Sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.5.4 Deviation from Test Standard

No deviation.

4.5.5 EUT Operating Conditions

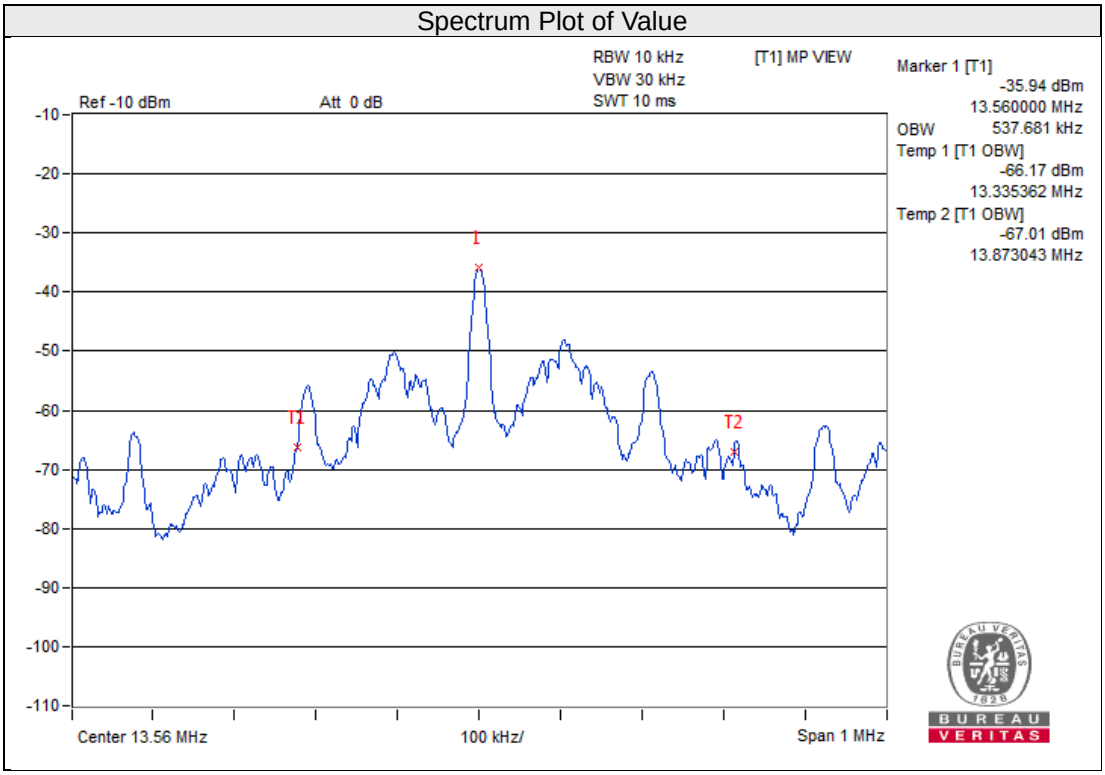
Same as Item 4.1.6.

4.5.6 Test Results

Type A

Operating frequency band (MHz)	Occupied Bandwidth (MHz)	Pass/Fail
13.56	0.5377	Pass

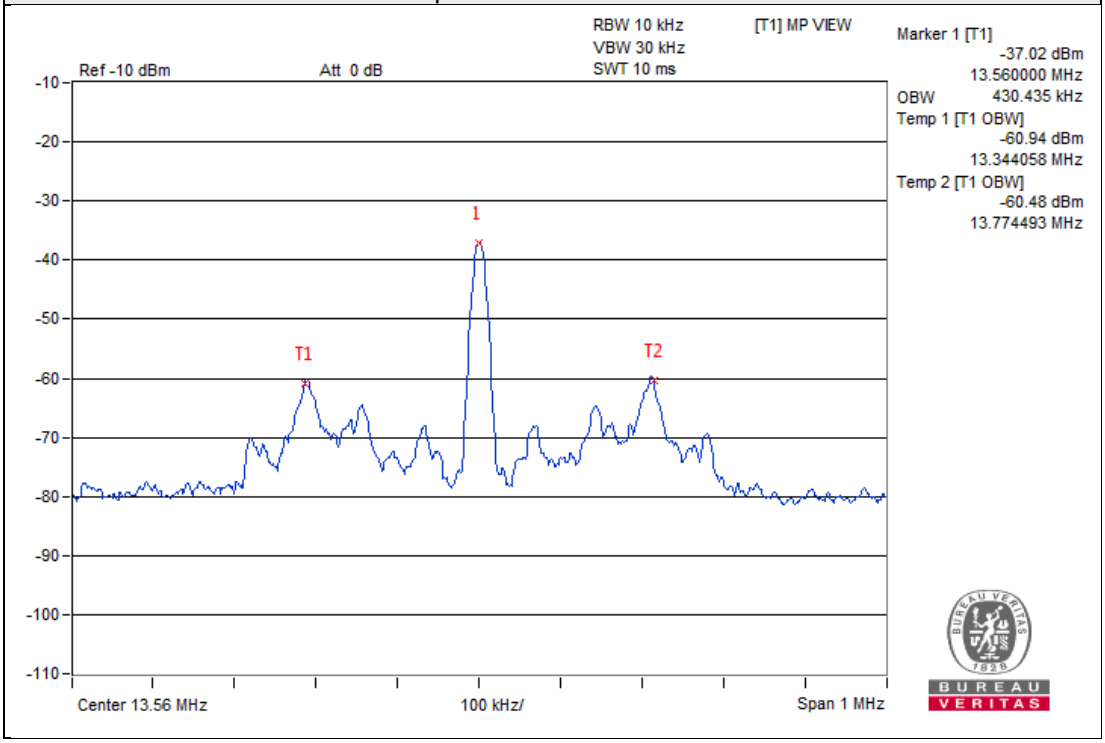
Spectrum Plot of Value



Type B

Operating frequency band (MHz)	Occupied Bandwidth (MHz)	Pass/Fail
13.56	0.43044	Pass

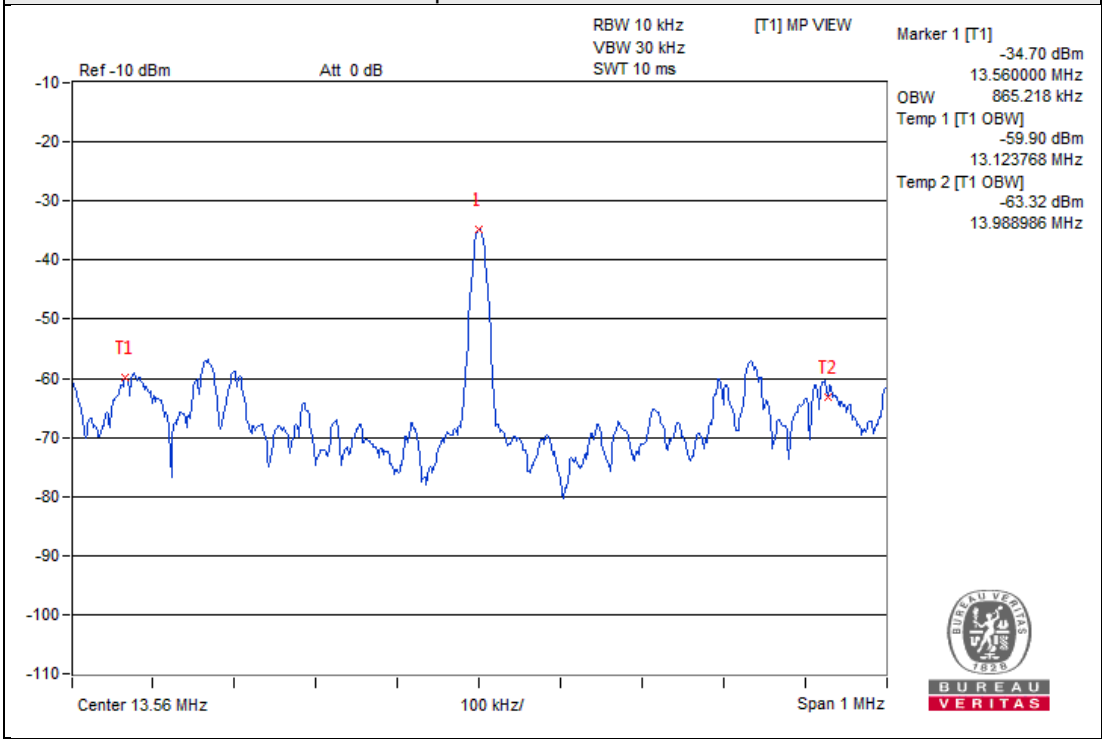
Spectrum Plot of Value



Type F

Operating frequency band (MHz)	Occupied Bandwidth (MHz)	Pass/Fail
13.56	0.86522	Pass

Spectrum Plot of Value



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

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Web Site: www.bureauveritas-adt.com

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

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