

FCC

EMC

TEST REPORT

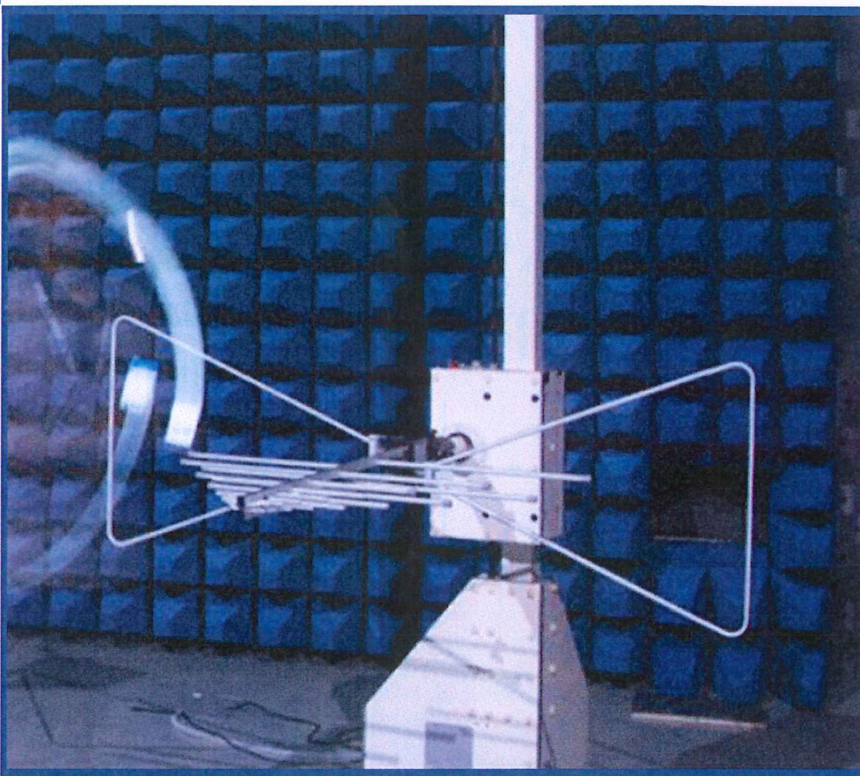
ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Rugged Smart Phone

ISSUED TO
Trimble Europe BV

Meerheide, 45, Eersel 5521, NETHERLANDS



Tested by: Xia Long
Xia Long

(Engineer)

Date: Dec. 26, 2018

Approved by: Wei Yanquan

Wei Yanquan

(Chief Engineer)

Date: Dec. 26, 2018

Report No.: BL-EC18B0415-401
EUT Name: Rugged Smart Phone
Model Name: TDC600 (refer section 2.4)
Brand Name: Trimble/ Spectra Geospatial
Test Standard: 47 CFR Part 15 Subpart B

Test Conclusion: Pass
Test Date: Nov. 20, 2018 ~ Dec. 21, 2018
Date of Issue: Dec. 26, 2018

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Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>Dec. 26, 2018</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co.,Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1. The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. The laboratory is a testing organization accredited by American Association for Laboratory Accreditation(A2LA) according to ISO/IEC 17025.The accreditation certificate is 4344.01. The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Laboratory Condition

Ambient Temperature	20°C to 25°C
Ambient Relative Humidity	45% to 55%
Ambient Pressure	100 kPa to 102 kPa

1.4 Announce

- (1) The test report refer to the BALUN report mode v6.7.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Trimble Europe BV
Address	Meerheide, 45, Eersel 5521, NETHERLANDS

2.2 Manufacturer Information

Manufacturer	Trimble Europe BV
Address	Meerheide, 45, Eersel 5521, NETHERLANDS

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Rugged Smart Phone
Model Name Under Test	TDC600
Series Model Name	TDC600, MobileMapper60
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only different on model name, brand name and colors.
Hardware Version	C601_V1.00_PCB
Software Version	TDC600.53.80.10
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	SJYEnergy
	Model No.	BA7800
	Serial No.	N/A
	Capacity	8000 mAh
	Rated Voltage	3.8 V
	Limit Charge Voltage	4.35 V
Ancillary Equipment 2	Adapter	
	Brand Name	N/A
	Model No.	ASUC71w-050912300
	Serial No.	N/A
	Rated Input	100-240 V~, 0.7 A, 50/60 Hz
	Rated Output	5 V $\overline{=}$ 3 A or 9 V $\overline{=}$ 2 A or 12 V $\overline{=}$ 1.5 A
Ancillary Equipment 3	USB Cable	
	Length (Approx.)	1.0 m

2.6 Technical Information

Network and Wireless connectivity	2G Network GSM/GPRS/EDGE 850/900/1800/1900 MHz 3G Network WCDMA/HSDPA/HSUPA Band 1/2/5/8 TD-SCDMA Band 34/39 4G Network FDD LTE Band 1/2/3/4/5/7/8/12/13/17/20/25/28 TDD LTE Band 38/39/40/41 Bluetooth, WIFI, NFC, GPS, GLONASS, BDS, Galileo
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3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	FCC 47 CFR Part 15 Subpart B (10-1-17 Edition)	Unintentional Radiators
2	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low- Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

3.2 Verdict

No.	Description	FCC Rule	Test Verdict	Result
1	Radiated Emission	15.109	Pass	Annex A .1
2	Conducted Emission, AC Ports	15.107	Pass	Annex A .2

3.3 Test Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions (9 kHz-30 MHz)	3.23 dB
Radiated emissions (30 MHz-1 GHz)	4.30 dB
Radiated emissions (1 GHz-18 GHz)	4.81 dB
Radiated emissions (18 GHz-40 GHz)	5.71 dB

4 GENERAL TEST CONFIGURATIONS

4.1 Test Environments

Environment Parameter	Selected Values During Tests			
	Temperature	Voltage	Relative Humidity	Ambient Pressure
Normal Temperature, Normal Voltage (NTNV)	23°C to 25°C	AC 120 V/60 Hz or DC 3.8 V from Battery	50% to 55%	100 kPa to 102 kPa

4.2 Test Equipment List

Radiated Emission Test For Frequency Below 1 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2018.06.13	2019.06.12	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-977	2017.07.22	2019.07.21	☒
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1600	2018.07.11	2020.07.10	☐
Anechoic Chamber	EMC Electronic Co., Ltd	9m*6m*6m	N/A	2017.02.21	2019.02.20	☒
Test Software	BALUN	BL410_E	V18.717	--	--	☒

Radiated Emission Test For Frequency 1 GHz - 18 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	KEYSIGHT	N9038A	MY53220118	2018.11.07	2019.11.06	☒
Test Antenna-Bi-Log	SCHWARZBECK	VULB 9163	9163-624	2017.07.22	2019.07.21	☐
Test Antenna-Horn	SCHWARZBECK	BBHA 9120D	9120D-1148	2018.07.11	2020.07.10	☒
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20	☒
Test Software	BALUN	BL410_E	V18.717	--	--	☒

Radiated Emission Test For Frequency Above 18 GHz						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE & SCHWARZ	FSV40	101544	2018.2.16	2019.2.15	☒
Test Antenna-Horn	A-INFOMW	LB-180400KF	J211060273	2017.01.06	2019.01.05	☒
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2019.02.20	☒
Test Software	BALUN	BL410_E	V18.717	--	--	☒

Conducted Emission Test						
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due	Use
EMI Receiver	ROHDE&SCHWARZ	ESRP	101036	2018.06.13	2019.06.12	☒
LISN	SCHWARZBECK	NSLK 8127	8127-687	2018.06.13	2019.06.12	☒
LISN	SCHWARZBECK	NNLK 8129	8129-462	2018.11.07	2019.11.06	☐
ISN	TESEQ	ISN T800	34449	2017.12.05	2019.12.04	☐
Shielded Enclosure	ChangNing	CN-130701	130703	N/A	N/A	☒
Test Software	BALUN	BL410_E	V18.717	--	--	☒

4.3 Test Enclosure list

Description	Manufacturer	Model	Serial No.	Length	Description	Use
PC	Dell	015K3N	N/A	N/A	Special Handled	☐
Laptop	Apple	A1465	N/A	N/A	N/A	☒
Printer	HP	DESKJET 1000	N/A	N/A	N/A	☐
Keyboard	Logitech	Y-BP62a	N/A	N/A	N/A	☐
Mouse	Logitech	M100	N/A	N/A	N/A	☐
USB disk	Kingston	N/A	N/A	N/A	N/A	☐
TF Card	Kingston	N/A	N/A	N/A	N/A	☒
VGA Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
HDMI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DVI Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
Coaxial video cable	N/A	N/A	N/A	2.0 m	Shielded with core	☐
iPhone	Apple	A1586	N/A	N/A	N/A	☐
Phone	MI	M4	N/A	N/A	N/A	☐
Bluetooth Earphone	SAMSUNG	Gear Circle	N/A	N/A	N/A	☒
Wireless Communications Test Set	R&S	CMW500	142028	N/A	Cal. Due 2018.06.11	☒
WIFI Router	TP-LINK	TL-WDR7500	N/A	N/A	N/A	☒
GPS/GLONASS Vector signal generator	R&S	N5172B EXG	N/A	N/A	N/A	☒
Car Battery	Camel	55530	N/A	N/A	12 V/55 Ah	☐
Artificial load	N/A	N/A	N/A	N/A	2.5 Ω /100 W	☐
Artificial load	N/A	N/A	N/A	N/A	5 Ω /100 W	☐
Electronic Load	ITECH	IT8511	N/A	N/A	N/A	☐
USB Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐
DC Power Supply	ITECH	IT6863A	60001401068 7210006	N/A	N/A	☐
LCD Monitor	SAMSUNG	UA32C4000P	N/A	N/A	N/A	☐
LCD Monitor	Dell	U241HB	N/A	N/A	N/A	☐
IC Card	N/A	N/A	N/A	N/A	N/A	☒
RJ45 Cable	N/A	N/A	N/A	1.5 m	Shielded with core	☐

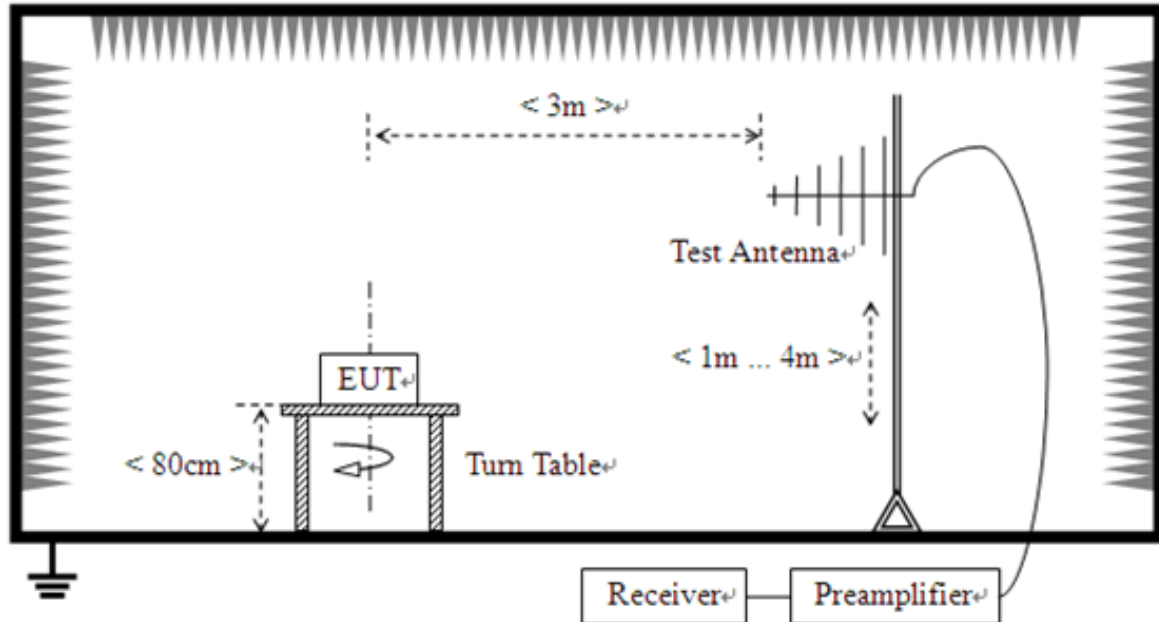
4.4 Test Configurations

Test Configurations (TC) No.	Description
Traffic Test Mode	
TC01	<u>The GSM 850 MHz Test Mode</u> GSM 850 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC02	<u>The EDGE 850 MHz Test Mode</u> EDGE 850 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC03	<u>The GSM 900 MHz Test Mode</u> GSM 900 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC04	<u>The EDGE 900 MHz Test Mode</u> EDGE 900 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC05	<u>The GSM 1800 MHz Test Mode</u> GSM 1800 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC06	<u>The GPRS 1800 MHz Test Mode</u> GPRS 1800 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC07	<u>The GSM 1900 MHz Test Mode</u> GSM 1900 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC08	<u>The GPRS 1900 MHz Test Mode</u> GPRS 1900 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC09	<u>The WCDMA Band 1 Test Mode</u> WCDMA Band 1 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC10	<u>The WCDMA Band 2 Test Mode</u> WCDMA Band 2 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC11	<u>The WCDMA Band 5 Test Mode</u> WCDMA Band 5 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC12	<u>The WCDMA Band 8 Test Mode</u> WCDMA Band 8 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC13	<u>The TD-SCDMA Band 34 Test Mode</u> TD-SCDMA Band 34 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC14	<u>The TD-SCDMA Band 39 Test Mode</u> TD-SCDMA Band 39 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC15	<u>The FDD LTE Band 1 Test Mode</u> LTE Band 1 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC16	<u>The FDD LTE Band 2 Test Mode</u> LTE Band 2 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC17	<u>The FDD LTE Band 3 Test Mode</u> LTE Band 3 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC18	<u>The FDD LTE Band 4 Test Mode</u> LTE Band 4 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC19	<u>The FDD LTE Band 5 Test Mode</u>

	LTE Band 5 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC20	<u>The FDD LTE Band 7 Test Mode</u> LTE Band 7 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC21	<u>The FDD LTE Band 8 Test Mode</u> LTE Band 8 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC22	<u>The FDD LTE Band 12 Test Mode</u> LTE Band 12 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC23	<u>The FDD LTE Band 13 Test Mode</u> LTE Band 13 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC24	<u>The FDD LTE Band 17 Test Mode</u> LTE Band 17 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC25	<u>The FDD LTE Band 20 Test Mode</u> LTE Band 20 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC26	<u>The FDD LTE Band 25 Test Mode</u> LTE Band 25 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC27	<u>The FDD LTE Band 28 Test Mode</u> LTE Band 28 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + BDS RX
TC28	<u>The TDD LTE Band 38 Test Mode</u> LTE Band 38 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC29	<u>The TDD LTE Band 39 Test Mode</u> LTE Band 39 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GPS RX
TC30	<u>The TDD LTE Band 40 Test Mode</u> LTE Band 40 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + GLONASS RX
TC31	<u>The TDD LTE Band 41 Test Mode</u> LTE Band 41 Link + Adapter + USB Cable + Battery + BT Link + WIFI Link + Galileo RX
TC32	<u>The NFC Test Mode</u> EUT + Adapter + USB Cable + Battery + NFC Link + IC Card
TC33	<u>The Idle Test Mode</u> GSM 850(Idle) + Adapter + Battery + USB Cable + NFC RX
Amusement Test Mode	
TC34	<u>The Camera Test Mode</u> EUT + Adapter + USB Cable + Battery + TF Card
TC35	<u>The Video Play Test Mode</u> EUT + Adapter + USB Cable + Battery + TF Card
TC36	<u>The USB Test Mode</u> EUT + USB Cable + Battery + Laptop + TF Card

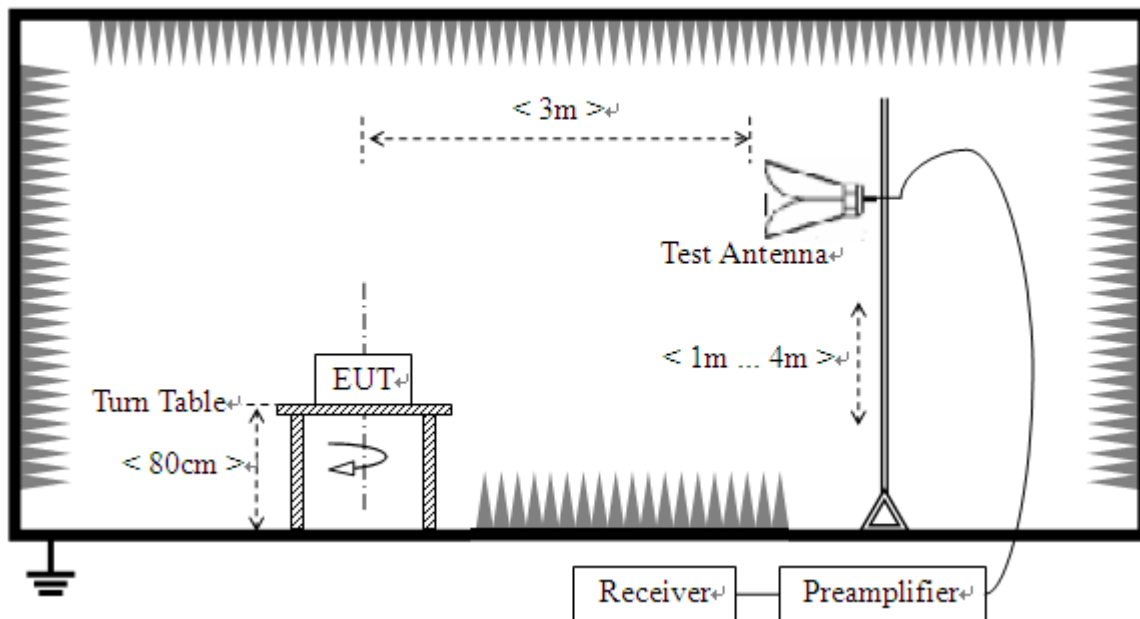
4.5 Test Setups

Test Setup 1



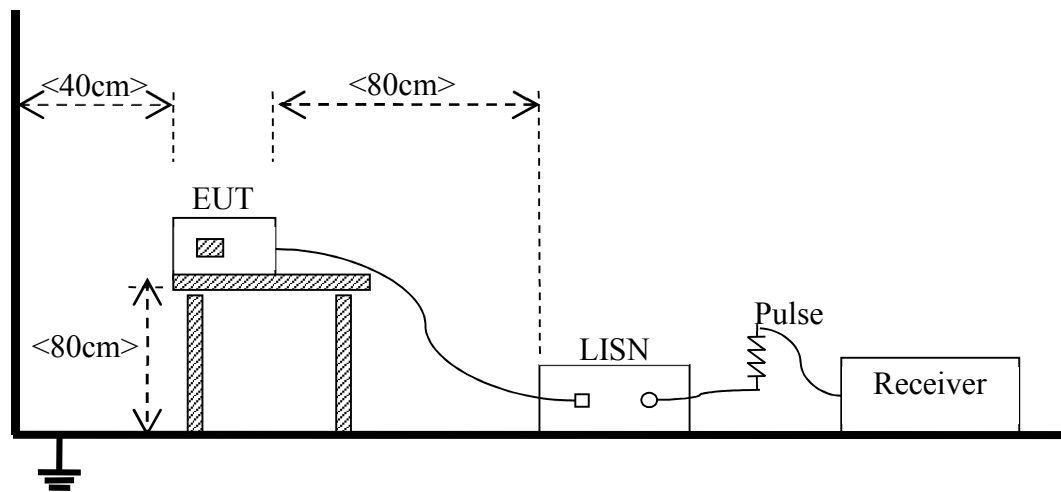
(For Radiated Emission Test (30 MHz-1 GHz))

Test Setup 2



(For Radiated Emission Test (above 1 GHz))

Test Setup 3



(For Conducted Emission, AC Ports Test)

4.6 Test Conditions

Test Case	Test Conditions	
Radiated Emission	Test Env.	NTNV
	Test Setup	Test Setup 1&2
	Test Configuration	TC01~TC36 ^{Note}
Conducted Emission, AC Ports	Test Env.	NTNV
	Test Setup	Test Setup 3
	Test Configuration	TC01~TC36 ^{Note}
Note: Based on client request, all normal using modes of the normal function were tested but only the worst test data of the worst mode is reported by this report. The GSM 850 MHz Test Mode is the worst mode in this report.		

5 TEST ITEMS

5.1 Emission Tests

5.1.1 Radiated Emission

5.1.1.1 Limit

Frequency range (MHz)	Class B (at 3 m)		Class B (at 10 m)	Class A (at 10 m)	
	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)
30 - 88	100	40	30	90	39
88 - 216	150	43.5	33.5	150	43.5
216 - 960	200	46	36	210	46.4
Above 960	500	54	44	300	49.5

NOTE:

- 1) Field Strength (dB $\mu\text{V/m}$) = $20 \times \log [\text{Field Strength } (\mu\text{V/m})]$.
- 2) In the emission tables above, the tighter limit applies at the band edges.

5.1.1.2 Test Setup

Refer to 4.5 section (test setup 1 to test setup 2) for radiated emission test, the photo of test setup please refer to ANNEX B.

5.1.1.3 Test Procedure

All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

An initial pre-scan was performed in the chamber using the EMI Receiver in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by Bi-Log antenna with 2 orthogonal polarities.

5.1.1.4 Test Result

Please refer to ANNEX A.1.

NOTE:

1. Results (dB $\mu\text{V/m}$) = Reading (dB μV) + Factor (dB/m)

The reading level is calculated by software which is not shown in the sheet

2. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain (dB)

3. Over limit = Results – Limit.

5.1.2 Conducted Emission

5.1.2.1 Test Limit

Frequency range (MHz)	Class A	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	79	66
0.50 - 30	73	60

Frequency range (MHz)	Class B	
	Quasi-peak (dB μ V)	Average (dB μ V)
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

NOTE:

- 1) The lower limit shall apply at the band edges.
- 2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50 MHz.

5.1.2.2 Test Setup

Refer to 4.5 section test (test setup 3) for conducted emission, the photo of test setup please refer to ANNEX B.

5.1.2.3 Test Procedure

The EUT is connected to the power mains through a LISN which provides 50 Ω /50 μ H of coupling impedance for the measuring instrument. The test frequency range is from 150 kHz to 30 MHz. The maximum conducted interference is searched using Peak (PK), Quasi-peak (QP) and Average (AV) detectors; the emission levels that are more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed.

Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.1.2.4 Test Result

Please refer to ANNEX A.2.

NOTE:

$$1. \text{ Results (dB}\mu\text{V/m)} = \text{Reading (dB}\mu\text{V)} + \text{Factor (dB/m)}$$

The reading level is calculated by software which is not shown in the sheet

$$2. \text{ Factor} = \text{Insertion loss} + \text{Cable loss}$$

$$3. \text{ Over limit} = \text{Results} - \text{Limit.}$$

ANNEX A TEST RESULTS

A.1 Radiated Emission

Note 1: The symbol of “--” in the table which means not application.

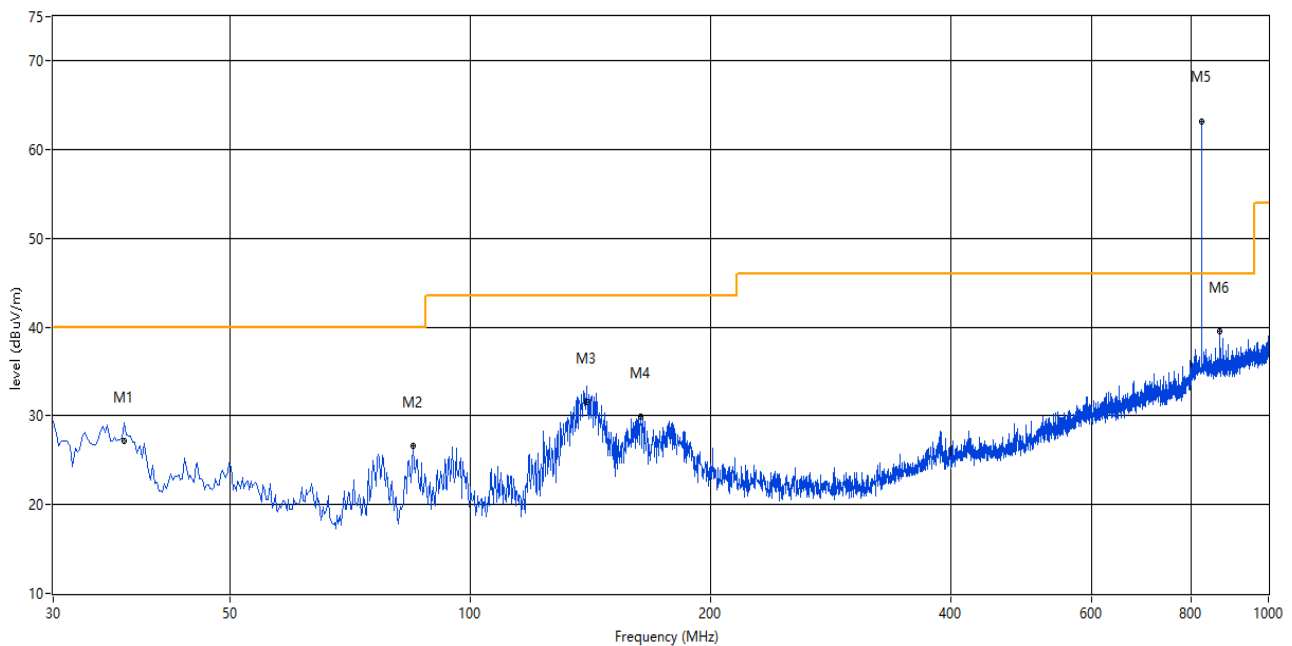
Note 2: For the test data above 1 GHz, according the ANSI C63.4-2014, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

Note 3: This frequency which near 869 MHz with circle should be ignored because they are MS and SS carrier frequency, the marked spikes near 2400 MHz with circle should be ignored because they are Bluetooth or WIFI carrier frequency.

Test Data and Plots

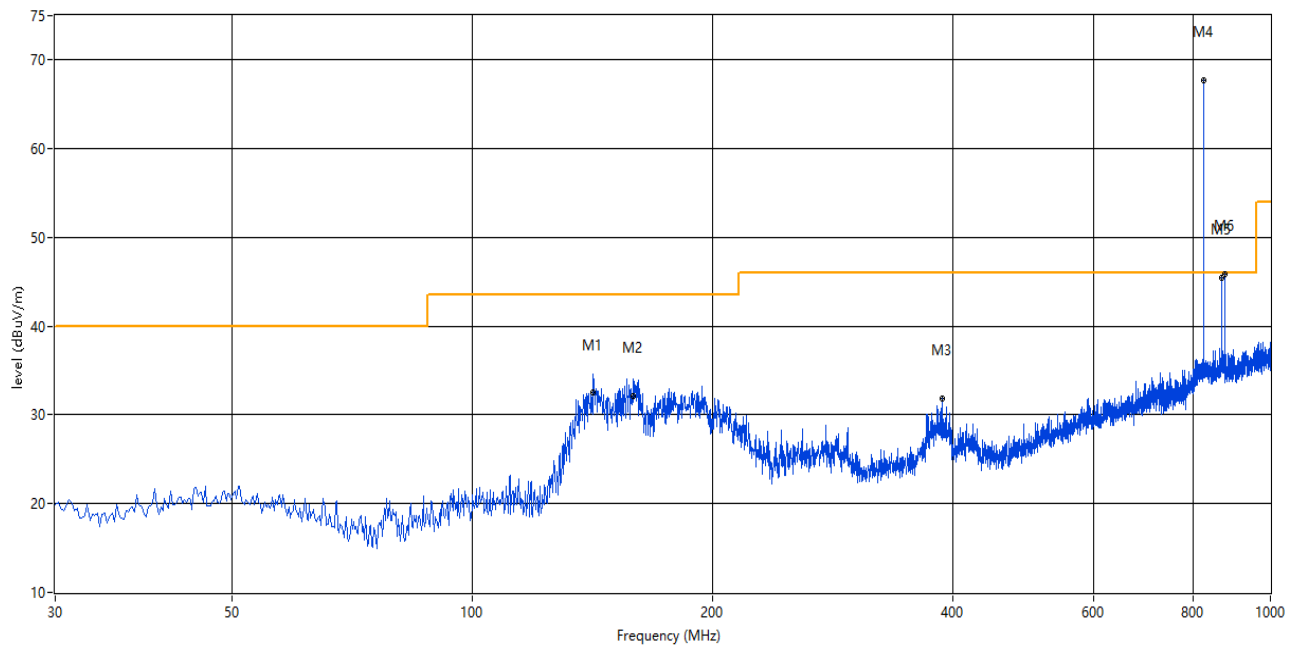
The GSM 850 MHz Test Mode

A.1.1 Test Antenna Vertical, 30 MHz – 1 GHz



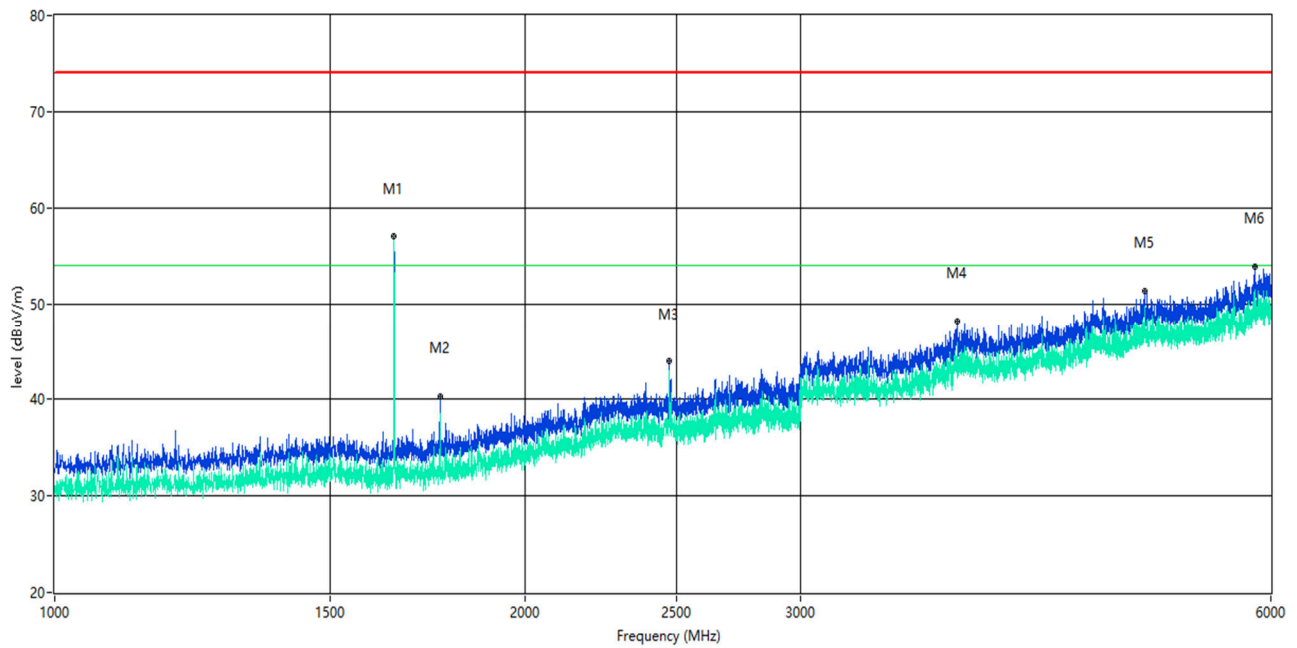
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
36.788	29.20	27.23	--	-27.93	--	40.0	--	12.77	124.80	100	Vertical	Pass
84.791	26.61	--	--	-31.70	--	40.0	--	13.39	354.60	100	Vertical	Pass
139.825	33.31	31.57	--	-31.82	--	43.5	--	11.93	54.10	100	Vertical	Pass
163.584	29.87	--	--	-30.93	--	43.5	--	13.63	235.80	100	Vertical	Pass
824.231	63.24	--	--	-13.10	--	46.0	--	-17.24	260.20	100	Vertical	N.A
869.083	39.52	--	--	-13.06	--	46.0	--	6.48	273.60	100	Vertical	N.A

A.1.2 Test Antenna Horizontal, 30 MHz – 1 GHz



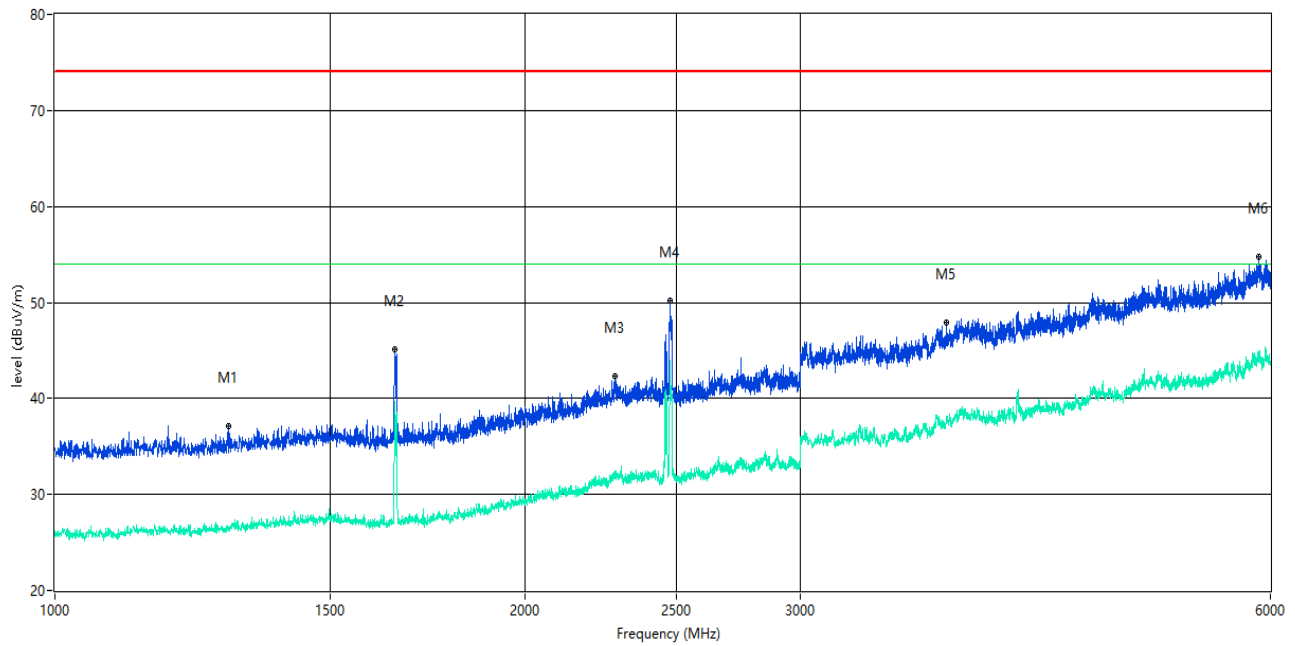
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
141.765	34.59	32.54	--	-31.81	--	43.5	--	10.96	346.20	100	Horizontal	Pass
159.220	34.03	32.07	--	-31.05	--	43.5	--	11.43	24.20	100	Horizontal	Pass
387.356	31.91	--	--	-24.15	--	46.0	--	14.09	13.40	100	Horizontal	Pass
823.989	67.74	--	--	-13.10	--	46.0	--	-21.74	303.00	100	Horizontal	N.A
869.083	45.43	--	--	-13.06	--	46.0	--	0.57	360.00	100	Horizontal	N.A
875.871	45.92	--	--	-13.29	--	46.0	--	0.08	170.10	100	Horizontal	N.A

A.1.3 Test Antenna Vertical, 1 GHz – 6 GHz



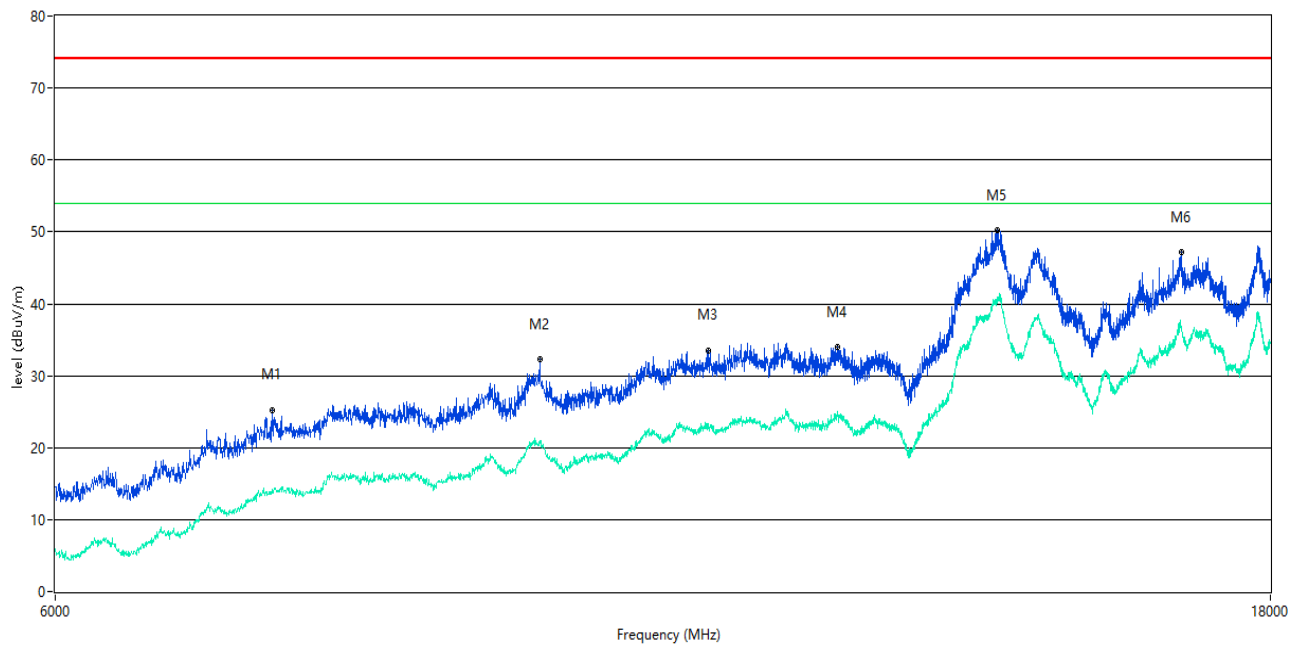
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1648.338	57.25	--	57.0	-14.76	74.0	--	54.0	-3.00	37.10	150	Vertical	N/A
1764.309	40.34	--	38.5	-14.15	74.0	--	54.0	15.50	120.40	150	Vertical	N/A
2472.632	43.95	--	43.0	-8.81	74.0	--	54.0	11.00	1.10	150	Vertical	N/A
3778.305	48.18	--	45.8	-2.64	74.0	--	54.0	8.20	151.80	150	Vertical	Pass
4983.254	51.28	--	49.7	1.24	74.0	--	54.0	4.30	88.80	150	Vertical	Pass
5864.284	53.93	--	50.9	3.69	74.0	--	54.0	3.10	25.50	150	Vertical	Pass

A.1.4 Test Antenna Horizontal, 1 GHz – 6 GHz



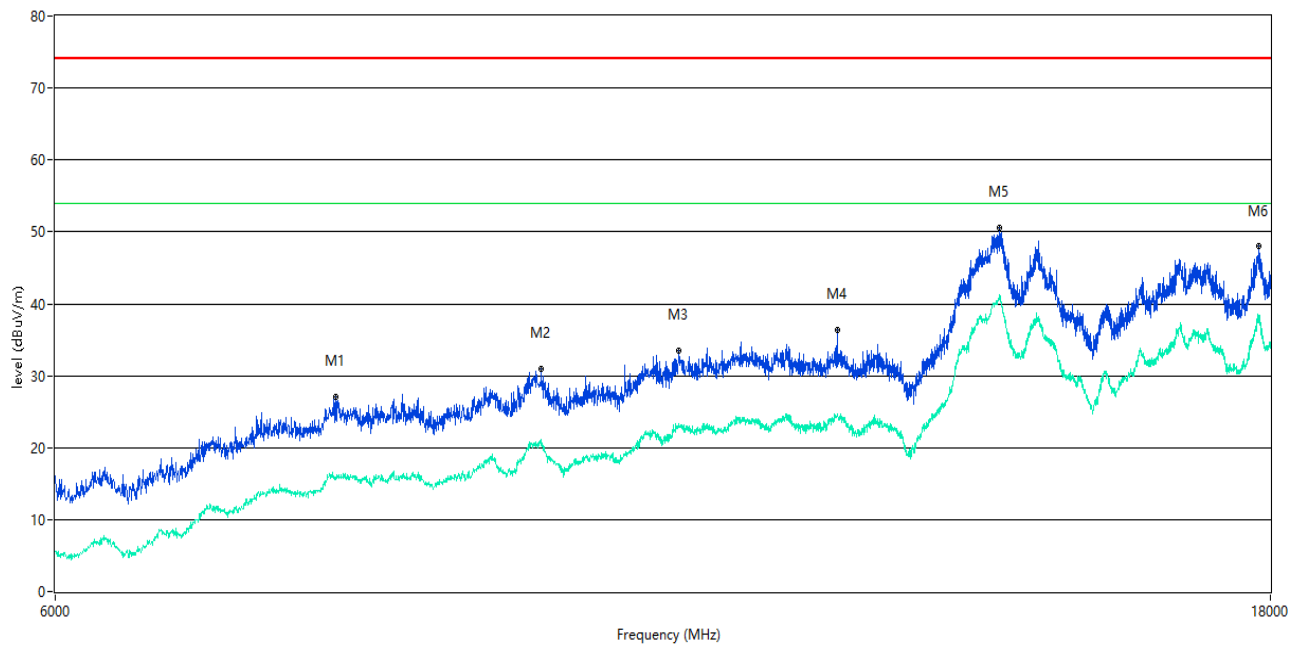
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1291.927	37.11	--	26.2	-15.00	74.0	--	54.0	27.80	345.00	150	Horizontal	Pass
1650.837	45.16	--	39.7	-14.74	74.0	--	54.0	14.30	231.00	150	Horizontal	N/A
2283.179	42.39	--	32.0	-8.97	74.0	--	54.0	22.00	175.20	150	Horizontal	Pass
2477.131	50.25	--	42.6	-8.65	74.0	--	54.0	11.40	2.60	150	Horizontal	N/A
3723.569	47.96	--	38.1	-3.27	74.0	--	54.0	15.90	118.70	150	Horizontal	Pass
5898.775	54.69	--	44.4	3.81	74.0	--	54.0	9.60	263.70	150	Horizontal	Pass

A.1.5 Test Antenna Vertical, 6 GHz – 18 GHz



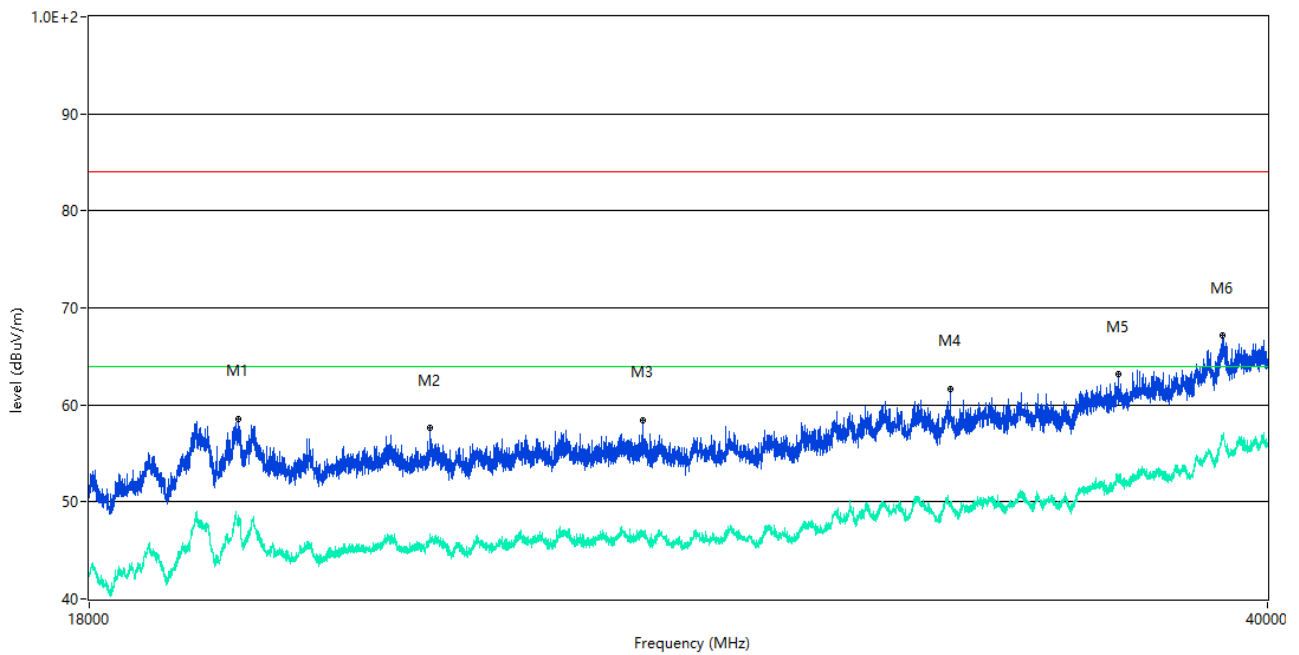
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
7301.675	25.20	--	14.2	-5.08	74.0	--	54.0	39.80	266.00	150	Vertical	Pass
9296.176	32.26	--	20.7	1.74	74.0	--	54.0	33.30	347.00	150	Vertical	Pass
10831.792	33.56	--	23.0	6.14	74.0	--	54.0	31.00	290.00	150	Vertical	Pass
12166.458	34.05	--	25.1	6.50	74.0	--	54.0	28.90	22.00	150	Vertical	Pass
14064.984	50.18	--	40.9	24.30	74.0	--	54.0	13.10	94.00	150	Vertical	Pass
16602.349	47.17	--	36.8	19.53	74.0	--	54.0	17.20	205.00	150	Vertical	Pass

A.1.6 Test Antenna Horizontal, 6 GHz – 18 GHz



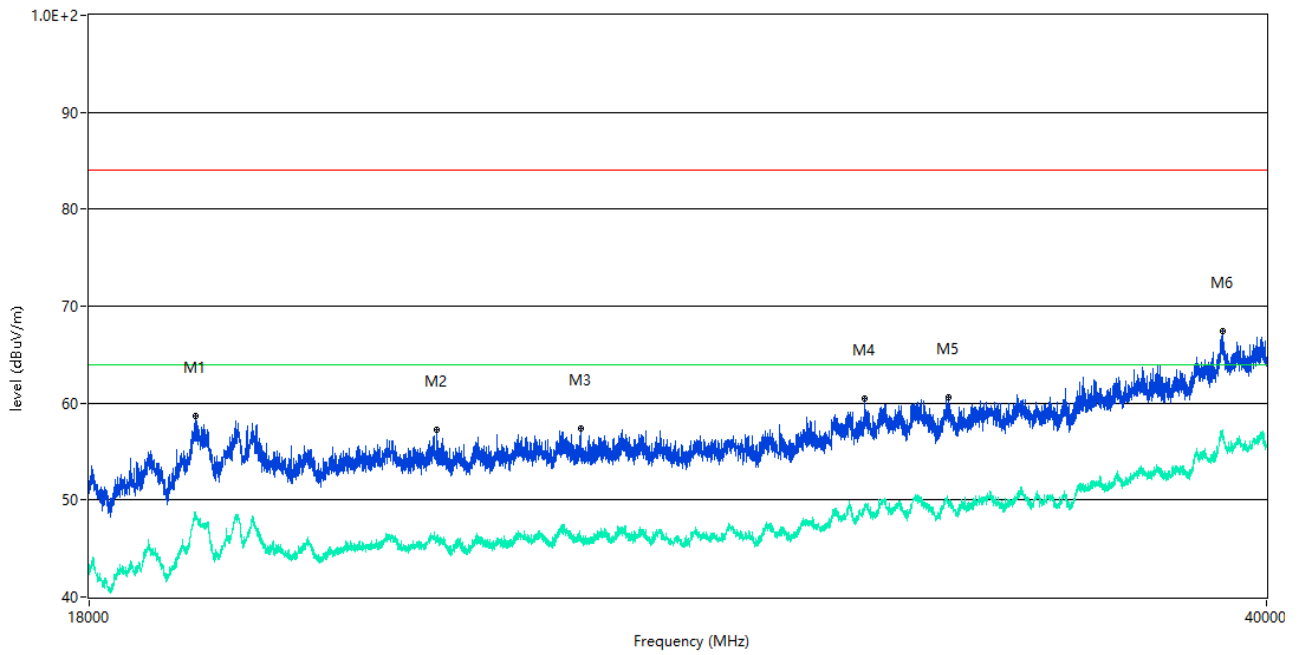
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
7730.567	27.03	--	15.7	-3.35	74.0	--	54.0	38.30	183.00	150	Horizontal	Pass
9308.173	30.88	--	20.3	1.55	74.0	--	54.0	33.70	290.00	150	Horizontal	Pass
10546.863	33.57	--	23.0	5.18	74.0	--	54.0	31.00	206.00	150	Horizontal	Pass
12166.458	36.43	--	24.7	6.50	74.0	--	54.0	29.30	72.00	150	Horizontal	Pass
14082.979	50.56	--	40.9	24.62	74.0	--	54.0	13.10	9.00	150	Horizontal	Pass
17814.046	47.96	--	38.0	19.55	74.0	--	54.0	16.00	342.00	150	Horizontal	Pass

A.1.7 Test Antenna Vertical, 18 GHz – 40 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	19918.395	48.04	22.67	64.0	-15.96	AV	29.00	100	V	Pass
1	19918.395	58.50	22.67	84.0	-25.50	Peak	29.00	100	V	Pass
2**	22678.080	46.04	21.33		-17.96	AV	114.00	100	V	Pass
2	22678.080	57.58	21.33	84.0	-26.42	Peak	114.00	100	V	Pass
3**	26196.201	46.90	21.14	64.0	-17.10	AV	19.00	100	V	Pass
3	26196.201	58.41	21.14	84.0	-25.59	Peak	19.00	100	V	Pass
4**	32259.685	49.85	23.05	64.0	-14.15	AV	185.00	100	V	Pass
4	32259.685	61.63	23.05	84.0	-22.37	Peak	185.00	100	V	Pass
5**	36146.713	52.54	23.69	64.0	-11.46	AV	133.00	100	V	Pass
5	36146.713	63.15	23.69	84.0	-20.85	Peak	133.00	100	V	Pass
6**	38808.923	56.89	24.39	64.0	-7.11	AV	11.00	100	V	Pass
6	38808.923	67.11	24.39	84.0	-16.89	Peak	11.00	100	V	Pass

A.1.8 Test Antenna Horizontal, 18 GHz – 40 GHz

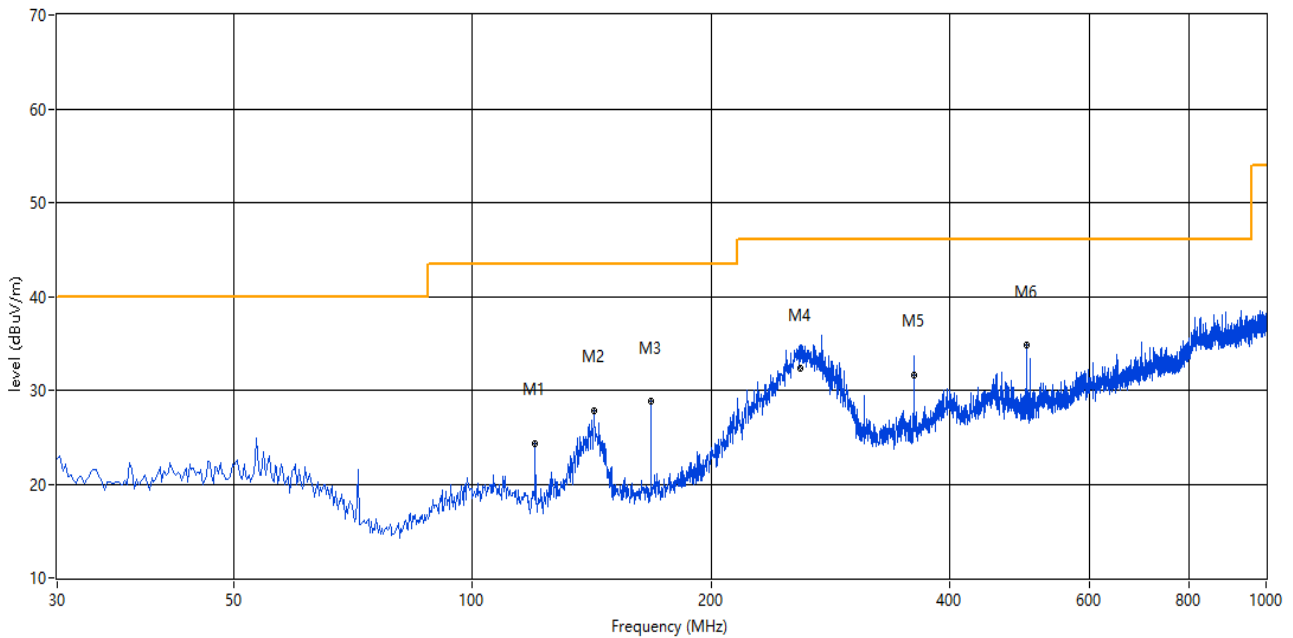


No.	Frequency (MHz)	Results (dBuH/m)	Factor (dB)	Limit (dBuH/m)	OHer Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Herdict
1**	19351.162	48.79	21.88	64.0	-15.21	AV	132.00	100	H	Pass
1	19351.162	58.63	21.88	84.0	-25.37	Peak	132.00	100	H	Pass
2**	22782.179	46.10	21.32	64.0	-17.90	AV	15.00	100	H	Pass
2	22782.179	57.28	21.32	84.0	-26.72	Peak	15.00	100	H	Pass
3**	25119.095	46.14	20.98	64.0	-17.86	AV	110.00	100	H	Pass
3	25119.095	57.44	20.98	84.0	-26.56	Peak	110.00	100	H	Pass
4**	30468.008	49.20	22.36	64.0	-14.80	AV	121.00	100	H	Pass
4	30468.008	60.52	22.36	84.0	-23.48	Peak	121.00	100	H	Pass
5**	32236.066	49.95	23.03	64.0	-14.05	AV	12.00	100	H	Pass
5	32236.066	60.61	23.03	84.0	-23.39	Peak	12.00	100	H	Pass
6**	38829.168	56.68	24.40	64.0	-7.32	AV	134.00	100	H	Pass
6	38829.168	67.40	24.40	84.0	-16.60	Peak	134.00	100	H	Pass

Test Data and Plots

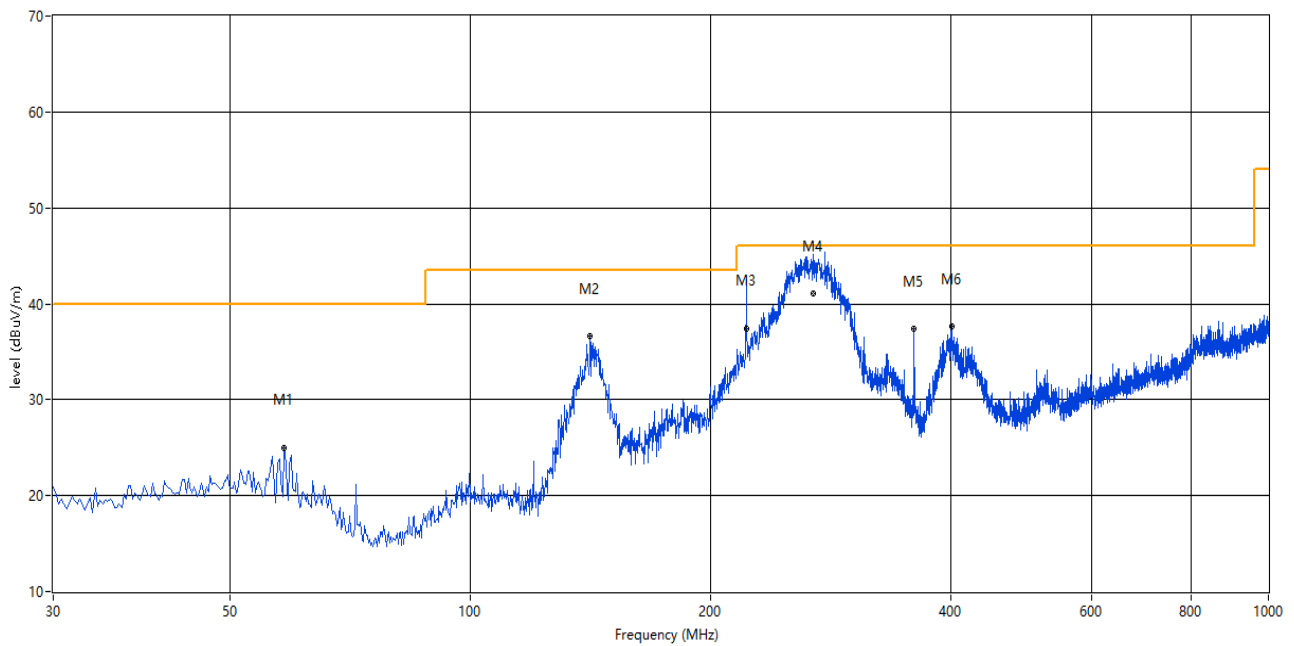
The USB Test Mode

A.1.9 Test Antenna Vertical, 30 MHz – 1 GHz



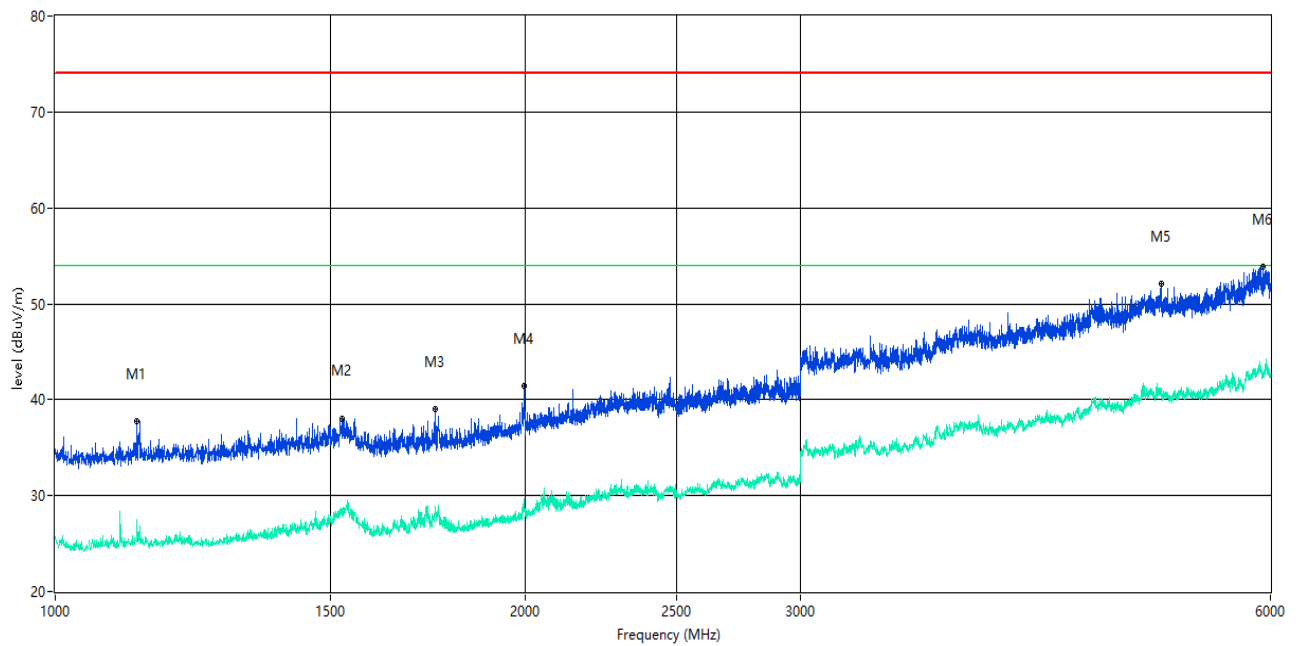
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
119.945	24.24	--	--	-30.22	--	43.5	--	19.26	226.30	100	Vertical	Pass
142.492	27.80	--	--	-31.80	--	43.5	--	15.70	95.80	200	Vertical	Pass
167.948	28.85	--	--	-30.85	--	43.5	--	14.65	289.60	100	Vertical	Pass
258.620	34.86	32.27	--	-27.03	--	46.0	--	13.73	93.10	200	Vertical	Pass
359.960	33.66	31.66	--	-24.73	--	46.0	--	14.34	0.00	200	Vertical	Pass
499.848	34.81	--	--	-21.56	--	46.0	--	11.19	7.10	100	Vertical	Pass

A.1.10 Test Antenna Horizontal, 30 MHz – 1 GHz



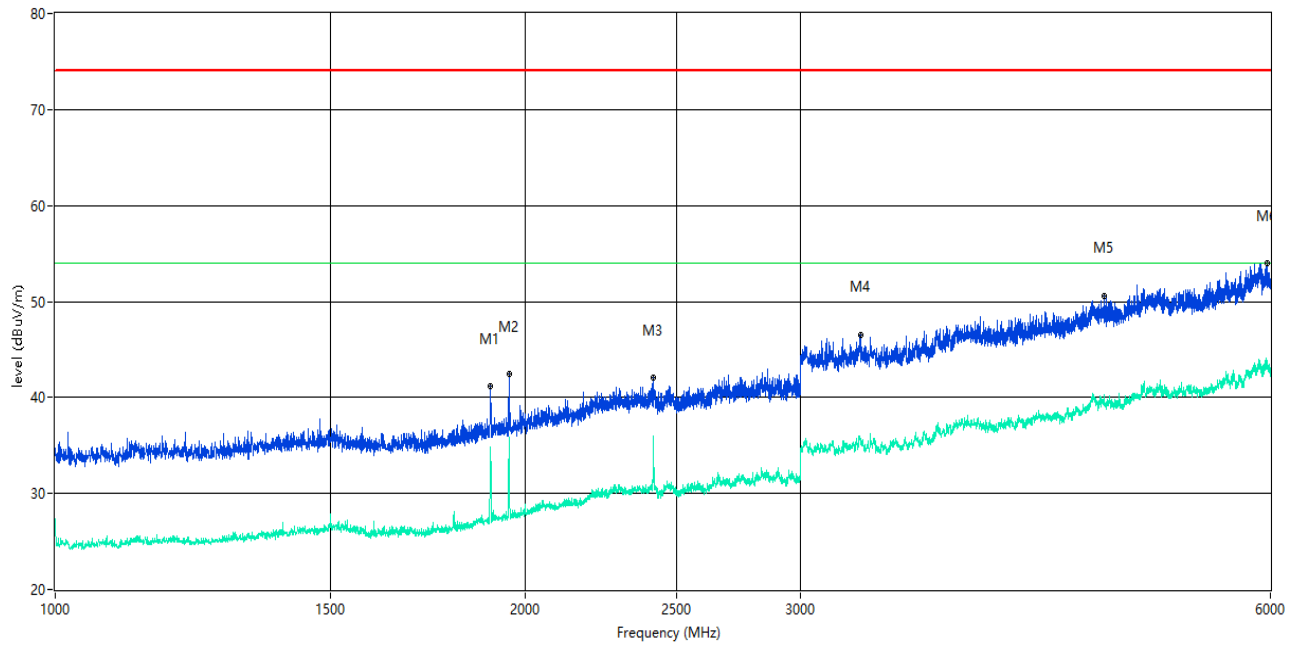
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
58.365	25.02	--	--	-27.83	--	40.0	--	14.98	68.70	200	Horizontal	Pass
141.280	36.65	--	--	-31.81	--	43.5	--	6.85	202.20	200	Horizontal	Pass
222.019	42.45	37.35	--	-28.09	--	46.0	--	8.65	199.50	148	Horizontal	Pass
268.889	45.82	41.12	--	-26.83	--	46.0	--	4.88	360.00	117	Horizontal	Pass
359.960	37.40	--	--	-24.73	--	46.0	--	8.60	122.10	100	Horizontal	Pass
401.417	37.62	--	--	-23.49	--	46.0	--	8.38	40.30	100	Horizontal	Pass

A.1.11 Test Antenna Vertical, 1 GHz – 6 GHz



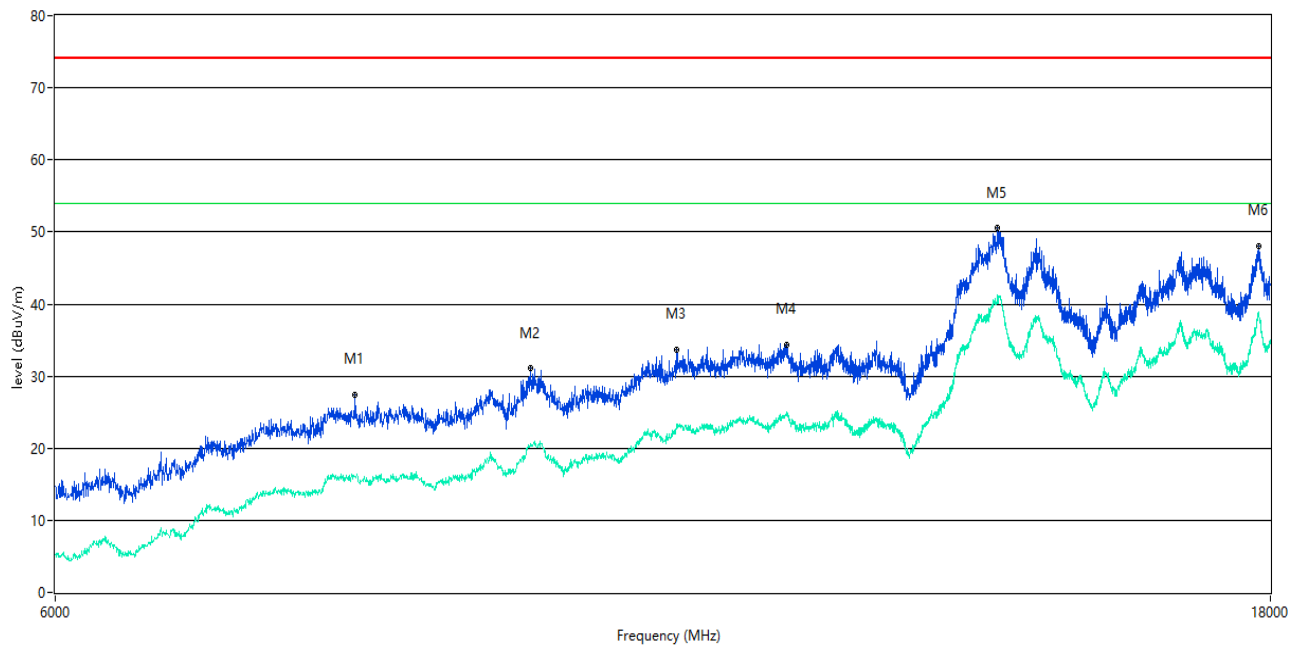
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1127.968	37.76	--	27.4	-14.65	74.0	--	54.0	26.60	179.90	150	Vertical	Pass
1526.368	37.99	--	28.0	-15.25	74.0	--	54.0	26.00	0.00	150	Vertical	Pass
1752.312	39.04	--	28.9	-14.87	74.0	--	54.0	25.10	120.60	150	Vertical	Pass
1995.751	41.41	--	29.6	-12.54	74.0	--	54.0	24.40	10.40	150	Vertical	Pass
5105.474	52.03	--	40.9	1.49	74.0	--	54.0	13.10	313.50	150	Vertical	Pass
5934.016	53.81	--	42.8	3.72	74.0	--	54.0	11.20	302.80	150	Vertical	Pass

A.1.12 Test Antenna Horizontal, 1 GHz – 6 GHz



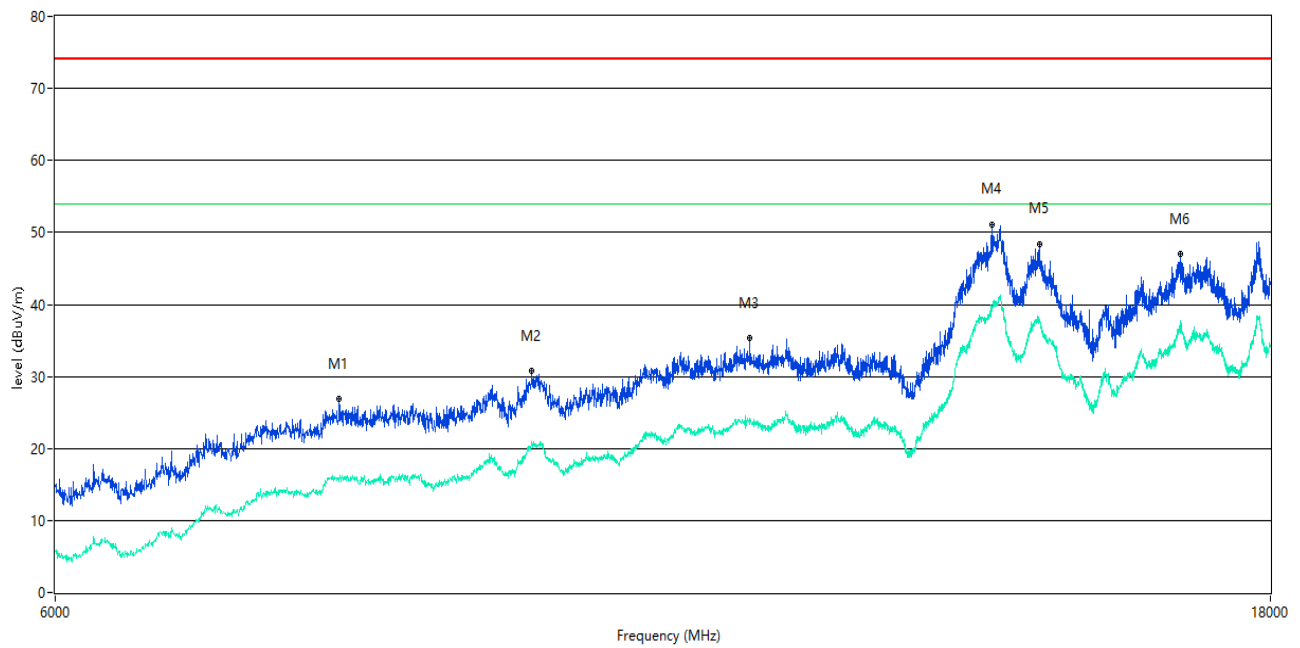
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
1899.775	41.15	--	34.8	-13.53	74.0	--	54.0	19.20	40.60	150	Horizontal	Pass
1953.762	42.44	--	35.9	-13.18	74.0	--	54.0	18.10	91.00	150	Horizontal	Pass
2415.646	42.03	--	35.9	-9.69	74.0	--	54.0	18.10	91.00	150	Horizontal	Pass
3277.431	46.56	--	35.4	-4.06	74.0	--	54.0	18.60	358.00	150	Horizontal	Pass
4697.576	50.61	--	39.2	-0.44	74.0	--	54.0	14.80	164.20	150	Horizontal	Pass
5974.506	53.97	--	43.6	4.59	74.0	--	54.0	10.40	259.10	150	Horizontal	Pass

A.1.13 Test Antenna Vertical, 6 GHz – 18 GHz



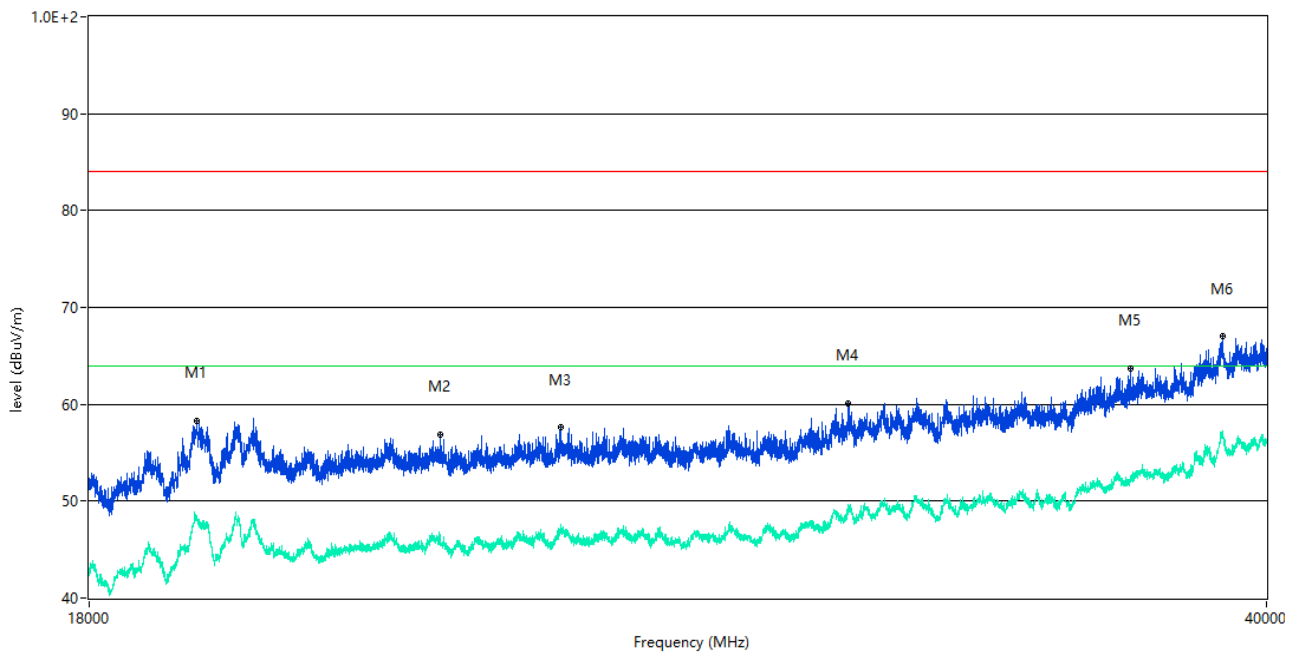
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
7868.533	27.32	--	16.1	-3.83	74.0	--	54.0	37.90	107.00	150	Vertical	Pass
9221.195	31.07	--	20.6	0.93	74.0	--	54.0	33.40	115.00	150	Vertical	Pass
10525.869	33.68	--	23.3	5.00	74.0	--	54.0	30.70	207.00	150	Vertical	Pass
11623.594	34.38	--	24.6	7.01	74.0	--	54.0	29.40	290.00	150	Vertical	Pass
14064.984	50.53	--	41.3	24.30	74.0	--	54.0	12.70	86.00	150	Vertical	Pass
17811.047	48.07	--	38.4	19.65	74.0	--	54.0	15.60	199.00	150	Vertical	Pass

A.1.14 Test Antenna Horizontal, 6 GHz – 18 GHz



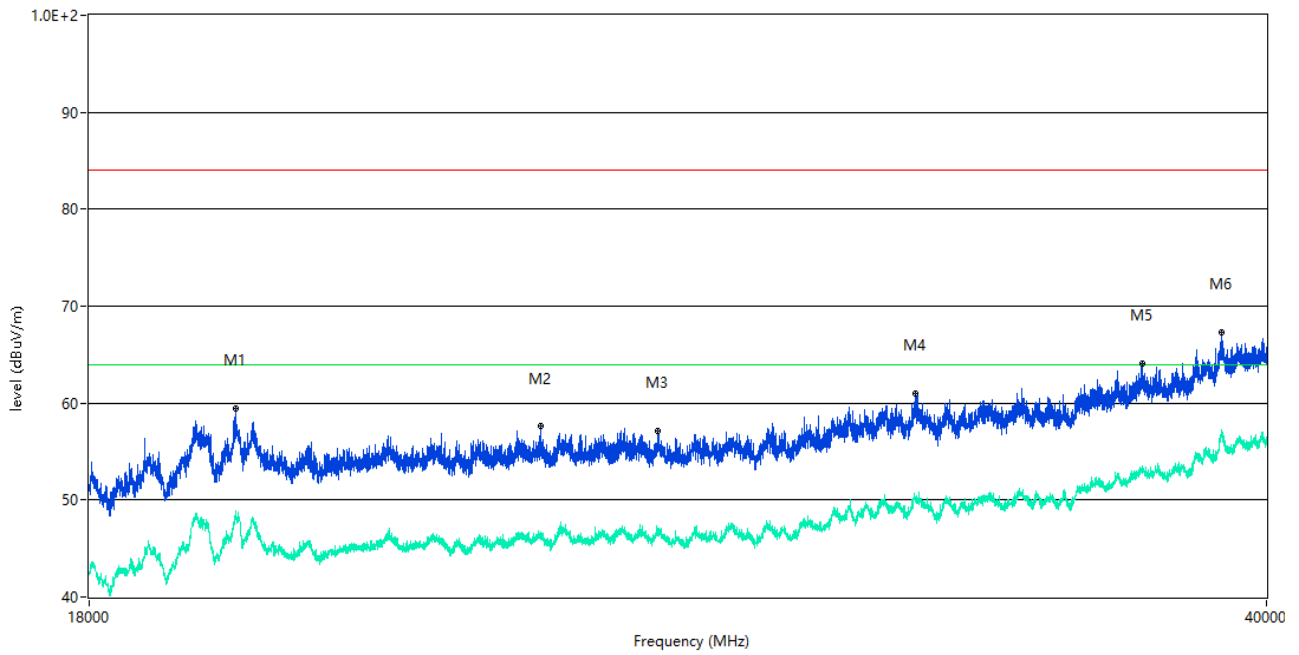
Frequency (MHz)	Peak Level (dBuV/m)	Q-peak Level (dBuV/m)	Average Level (dBuV/m)	Factor (dB)	PK Limit (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Table (o)	Height (cm)	ANT	Verdict
7757.561	26.87	--	15.4	-3.54	74.0	--	54.0	38.60	5.00	150	Horizontal	Pass
9233.192	30.72	--	21.0	1.03	74.0	--	54.0	33.00	30.00	150	Horizontal	Pass
11239.690	35.32	--	24.1	6.23	74.0	--	54.0	29.90	277.00	150	Horizontal	Pass
13996.001	51.16	--	39.0	23.67	74.0	--	54.0	15.00	12.00	150	Horizontal	Pass
14607.848	48.39	--	37.8	20.38	74.0	--	54.0	16.20	197.00	150	Horizontal	Pass
16599.350	46.94	--	37.8	19.59	74.0	--	54.0	16.20	5.00	150	Horizontal	Pass

A.1.15 Test Antenna Vertical, 18 GHz – 40 GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1**	19366.033	48.42	21.33	64.0	-15.58	AV	22.00	100	V	Pass
1	19366.033	58.29	21.33	84.0	-25.71	Peak	22.00	100	V	Pass
2**	22845.914	45.53	21.32	64.0	-18.47	AV	171.00	100	V	Pass
2	22845.914	56.89	21.32	84.0	-27.11	Peak	171.00	100	V	Pass
3**	24787.678	46.72	20.94	64.0	-17.28	AV	62.00	100	V	Pass
3	24787.678	57.58	20.94	84.0	-26.42	Peak	62.00	100	V	Pass
4**	30127.218	49.07	22.25	64.0	-14.93	AV	135.00	100	V	Pass
4	30127.218	60.10	22.25	84.0	-23.90	Peak	135.00	100	V	Pass
5**	36474.006	52.10	23.73	64.0	-11.90	AV	122.00	100	V	Pass
5	36474.006	63.70	23.73	84.0	-20.30	Peak	122.00	100	V	Pass
6**	38822.419	57.11	24.40	64.0	-6.89	AV	18.00	100	V	Pass
6	38822.419	66.98	24.40	84.0	-17.02	Peak	18.00	100	V	Pass

A.1.16 Test Antenna Horizontal, 18 GHz – 40 GHz



No.	Frequency (MHz)	Results (dBuH/m)	Factor (dB)	Limit (dBuH/m)	Other Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Herdict
1**	19882.279	48.53	22.12	64.0	-15.47	AV	17.00	100	H	Pass
1	19882.279	59.46	22.12	84.0	-24.54	Peak	17.00	100	H	Pass
2**	24447.763	46.53	20.89	64.0	-17.47	AV	142.00	100	H	Pass
2	24447.763	57.60	20.89	84.0	-26.40	Peak	142.00	100	H	Pass
3**	26463.884	46.28	21.20	64.0	-17.72	AV	91.00	100	H	Pass
3	26463.884	57.13	21.20	84.0	-26.87	Peak	91.00	100	H	Pass
4**	31520.745	50.34	22.65	64.0	-13.66	AV	62.00	100	H	Pass
4	31520.745	61.05	22.65	84.0	-22.95	Peak	62.00	100	H	Pass
5**	36784.429	53.07	23.77	64.0	-10.93	AV	25.00	100	H	Pass
5	36784.429	64.08	23.77	84.0	-19.92	Peak	25.00	100	H	Pass
6**	38795.426	57.23	24.39	64.0	-6.77	AV	84.00	100	H	Pass
6	38795.426	67.32	24.39	84.0	-16.68	Peak	84.00	100	H	Pass

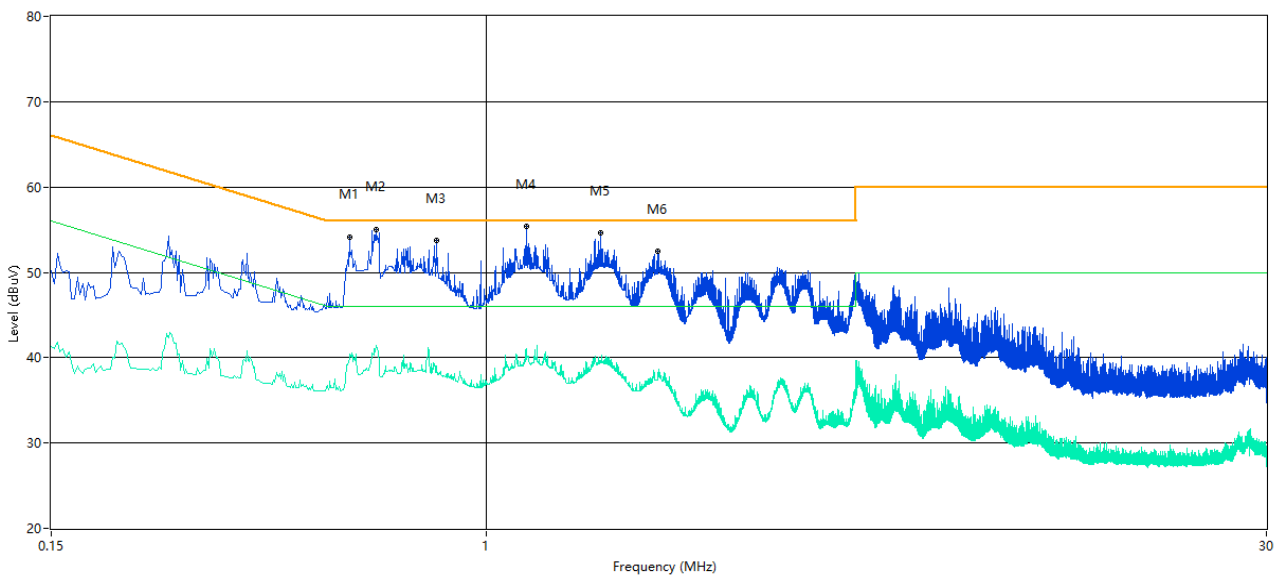
A.2 Conducted Emission

Note: Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. So, The configuration 120 VAC, 60 Hz and 240 VAC, 50 Hz were tested respectively, but only the worst configuration (120 VAC, 60 Hz) shown here.

Test Data and Plots

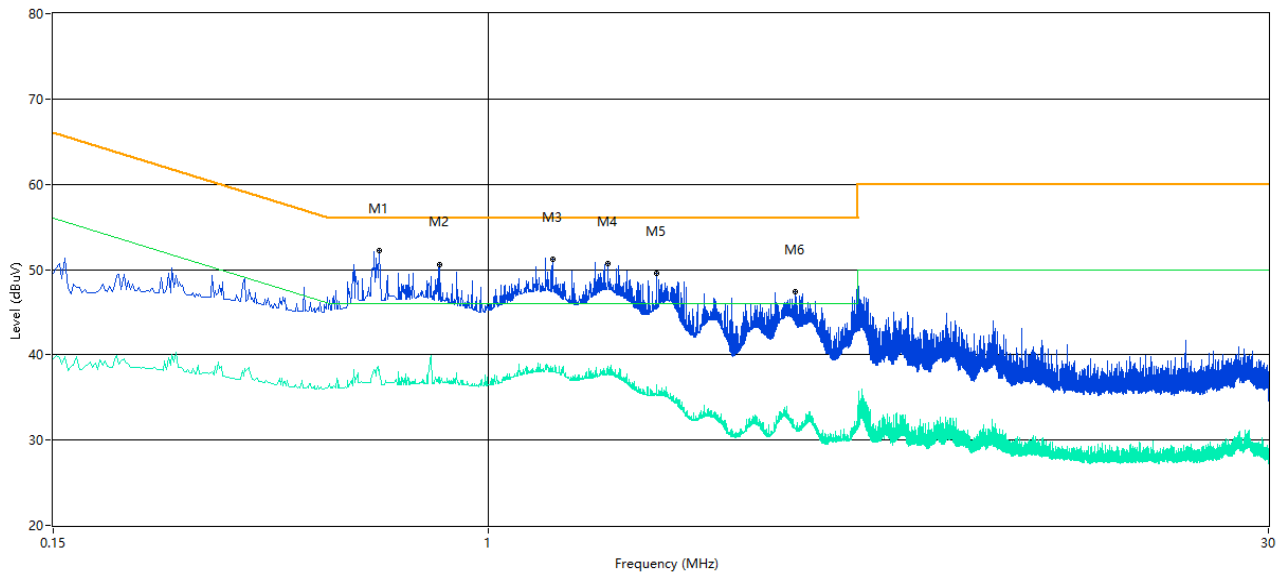
The GSM 850 MHz Test Mode

A.2.1 L Phase



Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.550	51.97	47.19	37.75	10.54	56.0	46.0	8.25	L Line	Pass
0.618	55.08	51.65	39.28	10.53	56.0	46.0	4.35	L Line	Pass
0.804	51.87	47.04	33.75	10.54	56.0	46.0	8.96	L Line	Pass
1.190	52.91	47.96	37.32	10.55	56.0	46.0	8.04	L Line	Pass
1.642	52.05	47.01	35.72	10.55	56.0	46.0	8.99	L Line	Pass
2.114	51.57	45.31	35.07	10.55	56.0	46.0	10.69	L Line	Pass

A.2.2 N Phase

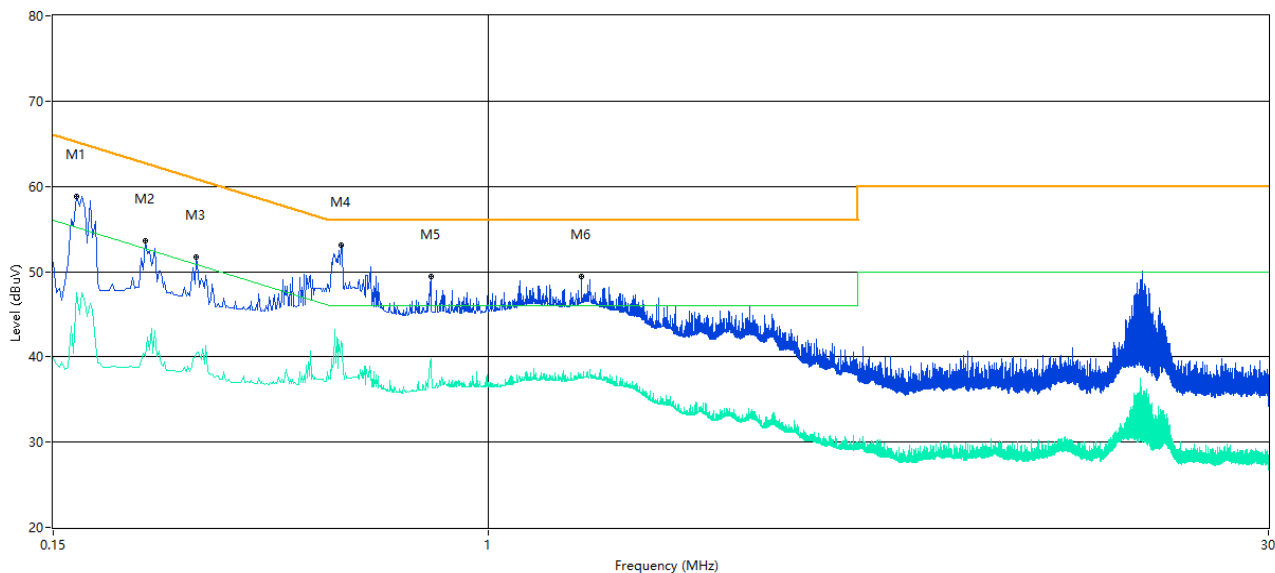


Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.622	51.04	47.41	32.37	10.53	56.0	46.0	8.59	N Line	Pass
0.810	46.33	41.33	26.78	10.54	56.0	46.0	14.67	N Line	Pass
1.324	45.86	39.66	26.87	10.54	56.0	46.0	16.34	N Line	Pass
1.686	47.34	42.39	30.56	10.55	56.0	46.0	13.61	N Line	Pass
2.080	47.06	40.90	29.99	10.55	56.0	46.0	15.10	N Line	Pass
3.810	46.94	39.30	26.81	10.58	56.0	46.0	16.70	N Line	Pass

Test Data and Plots

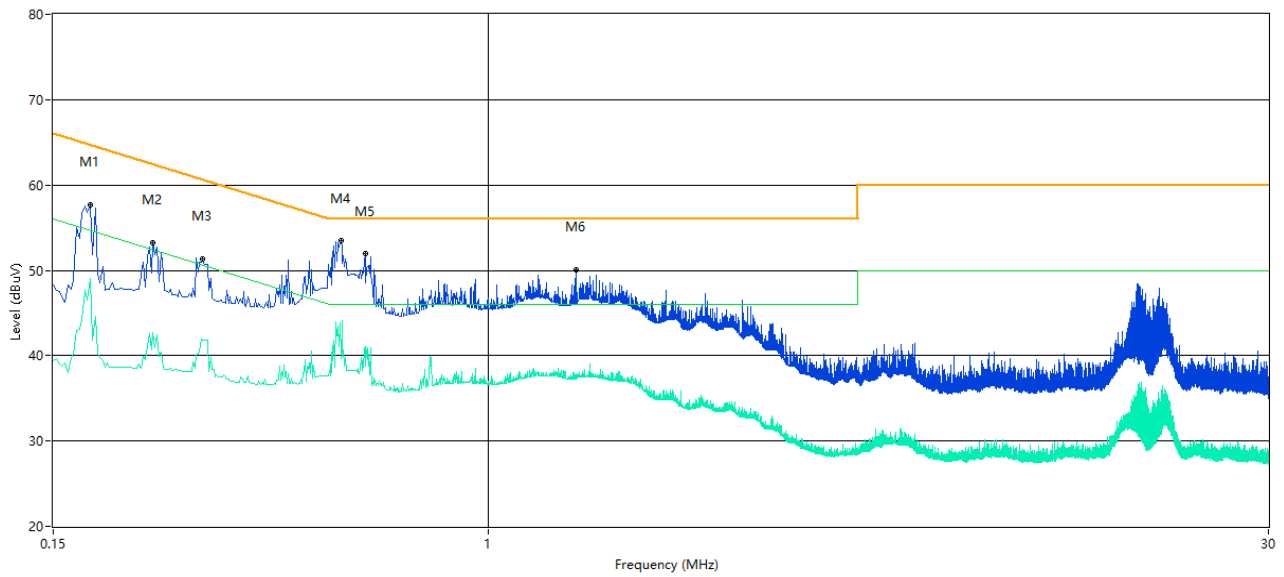
The USB Test Mode

A.2.3 L Phase



Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.166	58.05	54.86	41.43	10.53	65.2	55.2	10.34	L Line	Pass
0.224	52.18	49.01	35.87	10.53	62.7	52.7	13.69	L Line	Pass
0.280	48.32	44.85	33.09	10.53	60.8	50.8	15.95	L Line	Pass
0.526	51.79	49.03	39.49	10.54	56.0	46.0	6.51	L Line	Pass
0.778	42.47	36.30	26.29	10.54	56.0	46.0	19.70	L Line	Pass
1.502	41.05	36.55	27.11	10.55	56.0	46.0	18.89	L Line	Pass

A.2.4 N Phase



Frequency (MHz)	Peak Level (dBuV)	Q-peak Level (dBuV)	Average Level (dBuV)	Factor (dB)	QP Limit (dBuV)	AV Limit (dBuV)	Margin (dB)	Line	Verdict
0.176	57.44	54.60	47.18	10.53	64.7	54.7	7.52	N Line	Pass
0.232	51.22	48.43	40.75	10.53	62.4	52.4	11.65	N Line	Pass
0.288	49.07	46.29	38.79	10.53	60.6	50.6	11.81	N Line	Pass
0.526	52.31	49.93	40.46	10.54	56.0	46.0	5.54	N Line	Pass
0.584	50.00	47.46	37.77	10.54	56.0	46.0	8.23	N Line	Pass
1.464	42.19	37.26	26.98	10.55	56.0	46.0	18.74	N Line	Pass

ANNEX B TEST SETUP PHOTOS

Please refer the document “BL-EC18B0415-AE.PDF”.

ANNEX C EUT EXTERNAL PHOTOS

Please refer the document “BL-EC18B0415-AW.PDF”.

ANNEX D EUT INTERNAL PHOTOS

Please refer the document “BL-EC18B0415-AI.PDF”.

--END OF REPORT--