EMC TEST REPORT

TEST STANDARD(S)	:	EN 55032 / CISPR 32
CLIENT / APPLICANT	:	TOGL TECHNOLOGY SDN BHD
CLIENT ADDRESS	:	G/F, Block D, Soho 2, Empire Damansara, Jalan PJU 8/8A Dmansara Perdana 47820 Petaling Jaya, Selangor Malaysia
TEST SAMPLE (EUT)	:	Yippi Application
MODEL NUMBER	:	N/A
REPORT NUMBER	:	TRE00808/20
DATE ISSUED	:	24/03/2020
REVISION	:	1.0

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Title: *Junior RF Test Engineer*

This test report was approved by: ***Name:*** *CJ Deysel*
Title: *Technical Director*

T0812

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DOCUMENT CONTROL

Revision	Date	Author	Pages affected	Change proposal
1.0	24/03/2020	HE Olivier	All	N/A

TEST LABORATORY INFORMATION

Established in 2017, iSERT (Pty) Ltd. Provides EMC, RF & Safety testing services by our skilled Engineers. Our services employ a wide variety of advanced cutting-edge test equipment with one of the widest ranges of accredited standards in the country.

The site and apparatus are constructed in conformance with the requirements of CISPR 16-1-4, EN 50147-1 and other equivalent standards. The laboratory is compliant with the requirements of ISO/IEC 17025

It is our definite objective to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with the best EMC, RF & Safety services by knowledgeable and accommodating staff.

Our test site is located at 129 Khai-Apple street, Montana, Pretoria, South Africa 0182.

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DEFINITIONS & ACRONYMS

AE – Associated Equipment. Equipment needed to exercise and/or monitor the operation of the EUT.

AM – Amplitude Modulation

Antenna Port – Port, other than a broadcast receiver tuner port, for connection of an antenna used for intentional transmission and/or reception of radiated RF energy.

Broadcast Receiver Tuner Port – Port intended for the reception of a modulated RF signal carrying terrestrial, satellite and/or cable transmissions of audio and/or video broadcast and similar services.

Class A device – A device that is marketed for use in a commercial, industrial or business environment. A 'Class A' device should not be marketed for use by the general public. A 'Class A' device should contain the following warning in its user manual: "Warning: Operation of this equipment in a residential environment could cause radio interference."

Class B device – A device that is marketed for use in a residential environment and may also be used in a commercial, business or industrial environment. NOTE: A residential environment is an environment where the use of broadcast radio and television receivers may be expected within a distance of 10m of the device concerned.

EMC – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

EMI – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.

EUT – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

ITE – Information Technology Equipment. Has a primary function of entry, storage, display, retrieval, transmission, processing, switching, or control of data and/or telecommunication messages and which may be equipped with one or more ports typically for information transfer.

LISN – Line Impedance Stabilization Network

NA – Not Applicable

NCR – No Calibration Required

NSA – Normalized Site Attenuation

Optical Fiber Port – Port at which an optical fiber is connected to an equipment.

RF – Radio Frequency

Signal/Control Port – Port intended for the interconnection of components of an EUT, or between an EUT and local AE and used in accordance with relevant functional specifications (for example for the maximum length of cable connected to it). (Examples include: RS-232, USB, HDMI, Fire Wire)

Wired Network Port – Point of connection for voice, data and signaling transfers intended to interconnect widely dispersed systems by direct connection to a single-user or multi-user communication network. (Examples include: CATV, PSTN, ISDN, xDSL, LAN and similar networks)

TABLE OF CONTENTS

1. INTRODUCTION

This report details the results of tests performed on the TOGA Resonance Technology (T-RT) Yippi Mobile Application. The testing was carried out on 20/03/2020 at the iSERT laboratory. Testing was conducted by Heinrich Olivier

2. STANDARDS APPLIED

1. EN 55032 (2015) / CISPR 32 (2015): 'Electromagnetic compatibility of multimedia equipment – Emissions requirements

3. SUMMARY OF TEST RESULTS

Test Standard	Description	Results
EN 55032 / CISPR 32	Radiated emissions 30 – 6000MHz (Ambient)	✓
EN 55032 / CISPR 32	Radiated emissions 30 – 6000MHz (Mobile phone on)	✓
EN 55032 / CISPR 32	Radiated emissions 30 – 6000MHz (Mobile phone on, App active)	✓
EN 55032 / CISPR 32	Radiated emissions 30 – 6000MHz (App on, 1 feature active)	✓

4. CONCLUSION

Based on the results of our investigation, we have concluded that the EUT (in the configuration tested) complies with the requirements of the standard(s) indicated above. There were very little difference between having just the mobile phone on but in idle, versus having the Yippi application on with some of the features active. The results obtained in this test report are only valid for the item(s) tested. iSERT (Pty) Ltd. does not make any claims of compliance for samples or variants which were not tested.

5. EMISSION CLASSES AND IMMUNITY CRITERIA

5.1 EMISSIONS

CISPR 32 / EN 55032 defines Class A equipment and Class B associated with two types of end-user environment.

The Class B requirements for equipment are intended to offer adequate protection to broadcast services within the residential environment.

Equipment intended primarily for use in a residential environment shall meet the Class B limits. All other equipment shall comply with the Class A limits.

Broadcast receiver equipment is class B equipment.

NOTE: Equipment meeting Class A requirements may not offer adequate protection to broadcast services within a residential environment.

Class A equipment shall have the following warning in the instructions for use, to inform the user of the risk of operating this equipment in a residential environment:

Warning:

This equipment is compliant with Class A of CISPR 32 / EN 55032. In a residential environment this equipment may cause interference

5.2 IMMUNITY

Description of performance criteria:

A: No loss of performance or function

B: Temporary loss of function or performance which is self-recoverable

C: Temporary loss of function or performance which requires operator intervention or system reset

D: Loss of function which is not recoverable

5.3 ENVIRONMENTAL CONDITIONS DURING ESD TEST:

Temperature	Relative Humidity
23°C	47%

5.4 CALIBRATION OF TEST EQUIPMENT

The computer-controlled EMI Measuring system is checked for amplitude and frequency accuracy with a signal generator (calibrated by a SANAS accredited laboratory and is traceable to the national standards maintained by NMISA) on a monthly basis. The calibration of the equipment is performed by Coral-i and Enterprise, University of Pretoria. All equipment Calibration Certificates are available on request.

5.5 MEASUREMENT OF UNCERTAINTY

ISO / IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions results be included in the test report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor of k = 2)

Measurement Uncertainty		
Test Item	**Frequency**	**Uncertainty (dB)**
Conducted Emissions from the AC mains power ports	150kHz – 30MHz	3.4
Radiated Emissions - Horizontal	> 200 MHz	4.84
	< 200 MHz	4.84
Radiated Emissions - Vertical	> 200 MHz	4.96
	< 200 MHz	5.16

5.5.1 Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF – AG

Where: FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBµV/m.

6. EQUIPMENT UNDER TEST

EUT name:	Yippi Application
Mobile phone brand:	Sony XPERIA (Android based)
Model number:	F5121
Serial number:	CB512ABMEB

6.1 EUT TEST SETUP DETAIL AND OPERATING CONDITION

The specific test methodology will be discussed under each relevant test if different to the general set-up guidelines below.

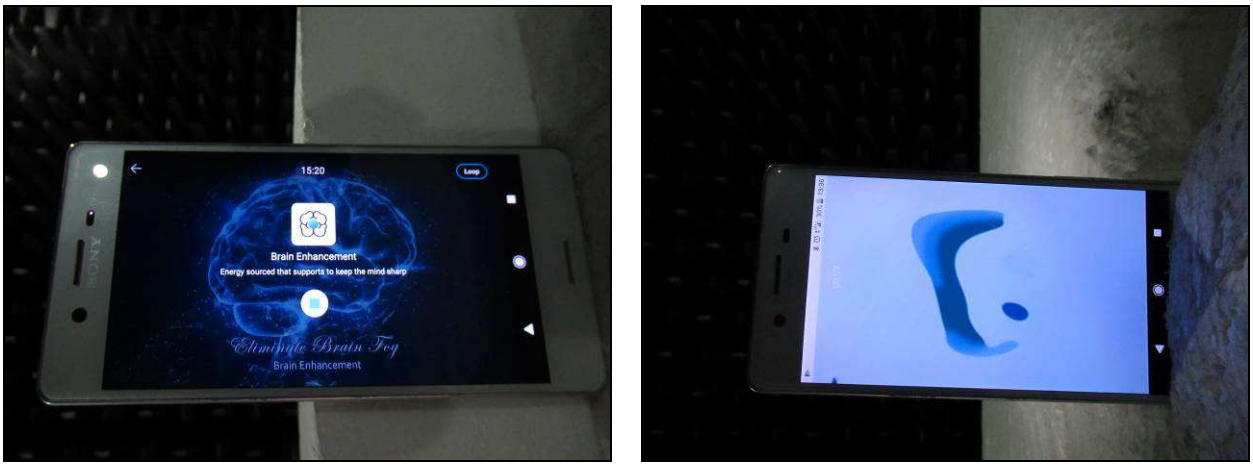
1. The EUT was switched on and operated in accordance with the manufacturer instructions.
2. Tests were performed while the device was fully operational.
3. Deviations from the above set-up will be noted in each specific case.

6.2 WORST CASE MEASUREMENT CONFIGURATION

The EUT was tested in the following modes of operation:

Radiated Emissions & Immunity	
Test Mode	**Operating description**
1.	The Yippi application was downloaded and installed on a Sony XPERIA mobile phone. The mobile phone was measured to determine a baseline of its emissions. The test was repeated with the following functions active in the 30 – 6000MHz bands.

6.3 DEVICE IMAGES



Figures 1 & 2: Yippi Brain Enhancement app

6.4 TEST EQUIPMENT LIST

No.	Equipment description	Serial number	Cal Due date
1.	California Instruments Model 4503L AC Power system	HK50775	July 2020
2.	Bulk Current Injection Probe CLCI-100	581149	July 2022
3.	RF Current Injection Probe	561383	July 2022
4.	M2 & M3 Coupling / de-Coupling Network CDN-M325E	521169	July 2022
5.	Telecommunications Coupling / de-Coupling Network CDN-T8SE	511434	July 2022
6.	Combilog Antenna AC-200	061128	July 2022
7.	TESEQ NSG 3040 EMC Immunity Test System	6074	October 2020
8.	TESEQ CDN 3425 Capacitive clamp	3082	June 2020
9.	TESEQ NSG 435 ESD Gun	7184	August 2020
10.	RS Pro ICM 33II Clamp meter	74700018	May 2021
11.	Agilent 83620B Signal Generator (10MHz – 20GHz)	98091	September 2020
12.	Rohde & Schwarz Universal communication tester – CMU200	103025	September 2020
13.	Rohde & Schwarz Wideband Radio Communication Tester – CMW500	112781	August 2020
14.	Rohde & Schwarz SML02 Signal generator	100679	October 2020
15.	Narda EP-600 Electric Field probe	611WX70397	Inter-laboratory comparison
16.	AFJ LISN LS16C\10	16011850466	Inter-laboratory comparison
17.	Thurlby Thandar HA1600A Power & harmonics analyzer	479560	August 2020
18.	AH Systems SAS-571	2455	March 2021
19.	Kalmus 757LC 75Watt Amplifier (10kHz – 1GHz)	7591	No calibration required
20.	Fluke 115 Multi-meter	3451488WS	October 2020
21.	AFJ FFT3010 EMI analyzer	301017460136	May 2020
22.	Keysight N9020A EMI Signal analyzer: ATO-8599	MY52330018	May 2020
23.	Flus Humidity and temperature meter: ET-951W	2015106449	November 2020

7. EMISSIONS

7.1 RADIATED EMISSIONS:

Method: Measurements were made in an 8-meter fully anechoic chamber that complies to CISPR 16. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 meters. The limit line was adjusted accordingly. The EUT was rotated 360° about its azimuth with the receive antenna located at a fixed height in horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360°. All frequencies within 10 dB of the limit were investigated in both horizontal and vertical antenna polarity, where applicable.

7.1.1 Test set-up

a. The EUT was tested within its intended operating conditions as specified by the manufacturer.
b. Automated scans in the frequency band 30MHz to 6000MHz (radiated emissions) were done in order to determine compliance emission results for the EUT.
c. The EUT was tested in both horizontal and vertical polarizations.
d. The EUT was tested while installed on a Sony XPERIA mobile phone
e. The test plan was to get a baseline first of what the contribution would be of ambient noise, mobile phone on, Application open and with one of the functions (WAVE) active.

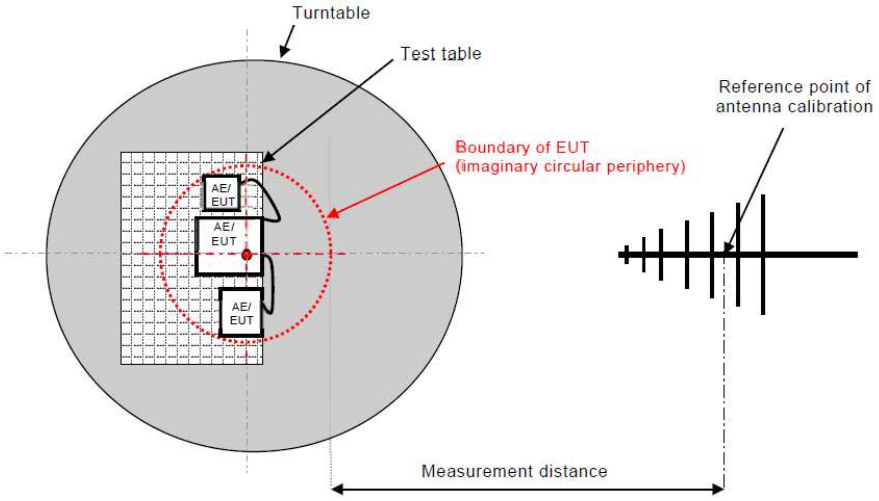
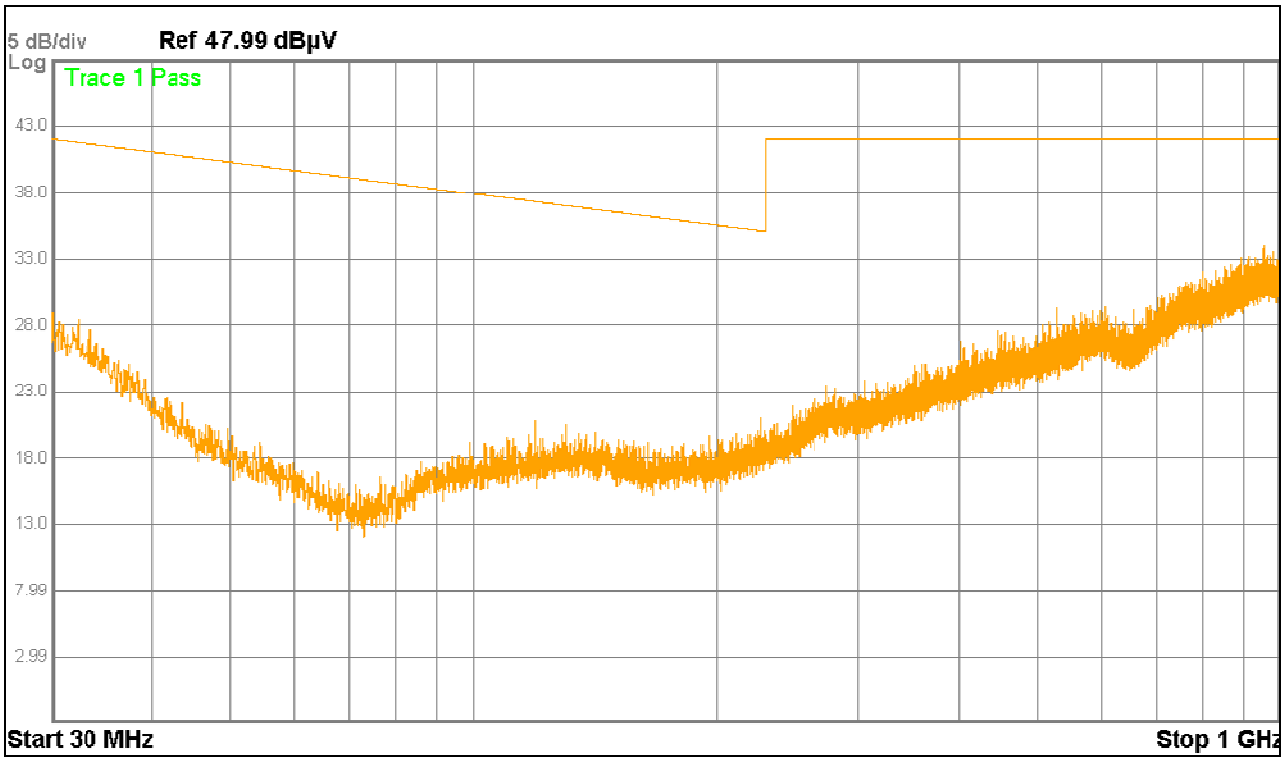


Figure 3: Typical Radiated emissions setup

7.1.2 **Radiated Emission: 30MHz – 1000MHz** (Ambient)

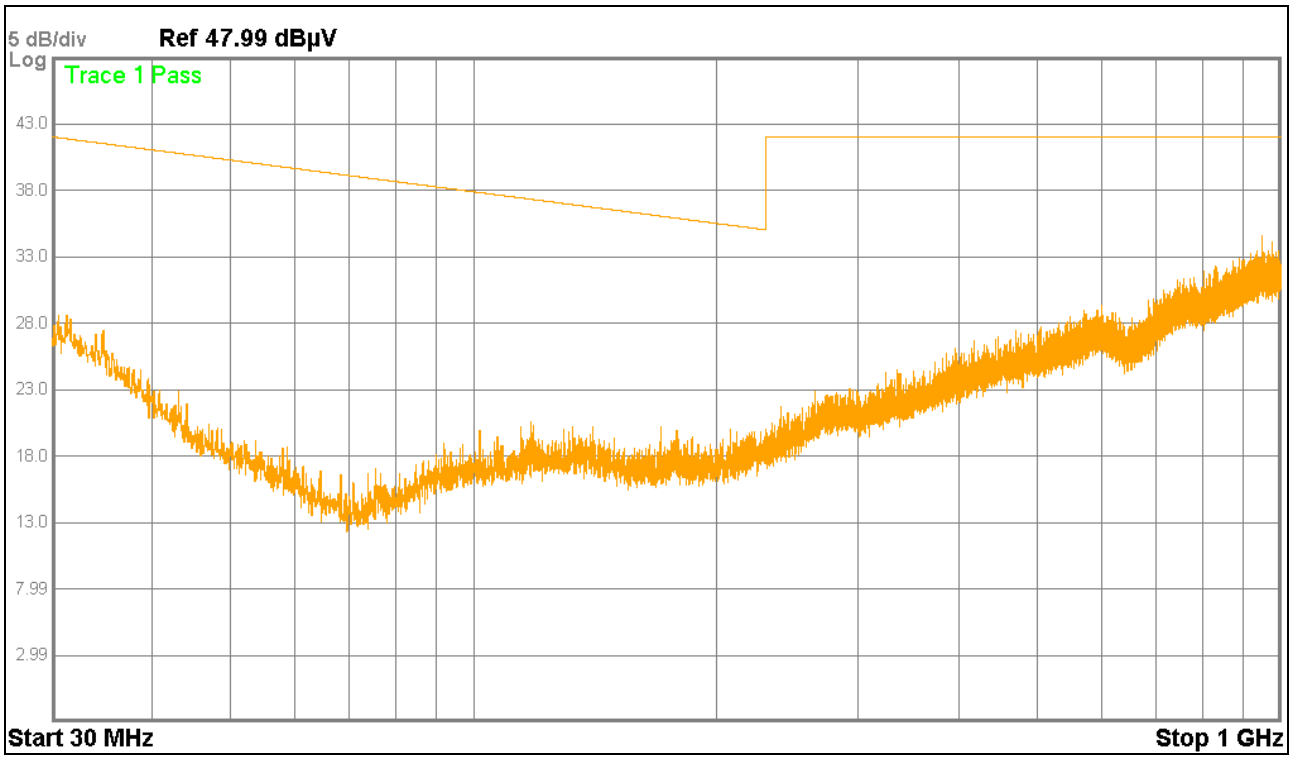
Graph 1: Represents radiated emissions measured from the EUT in the horizontal polarization



Graph 1: Radiated emissions results

7.1.3 **Radiated Emission: 30MHz – 1000MHz** (Ambient)

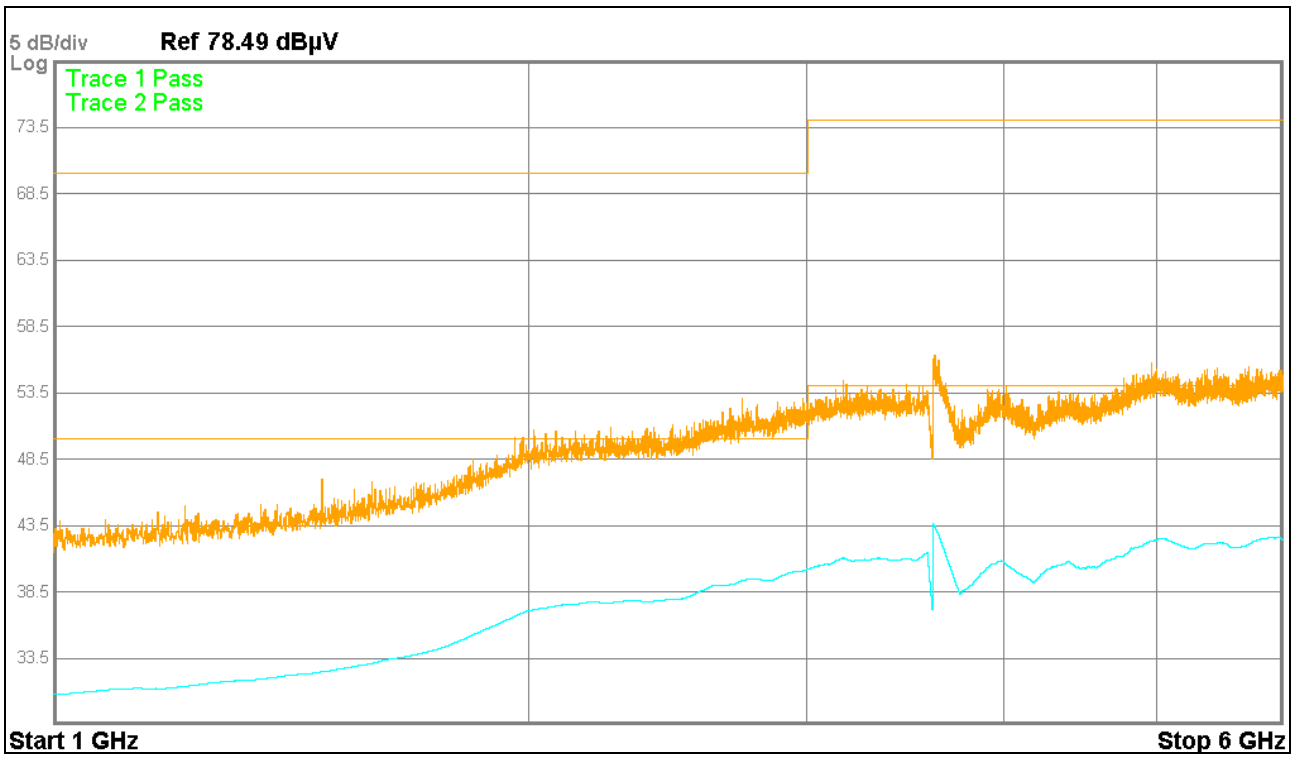
Graph 2: Represents radiated emissions measured from the EUT in the vertical polarization



Graph 2: Radiated emissions results

7.1.4 Radiated Emission: 1000MHz – 6000MHz (Ambient)

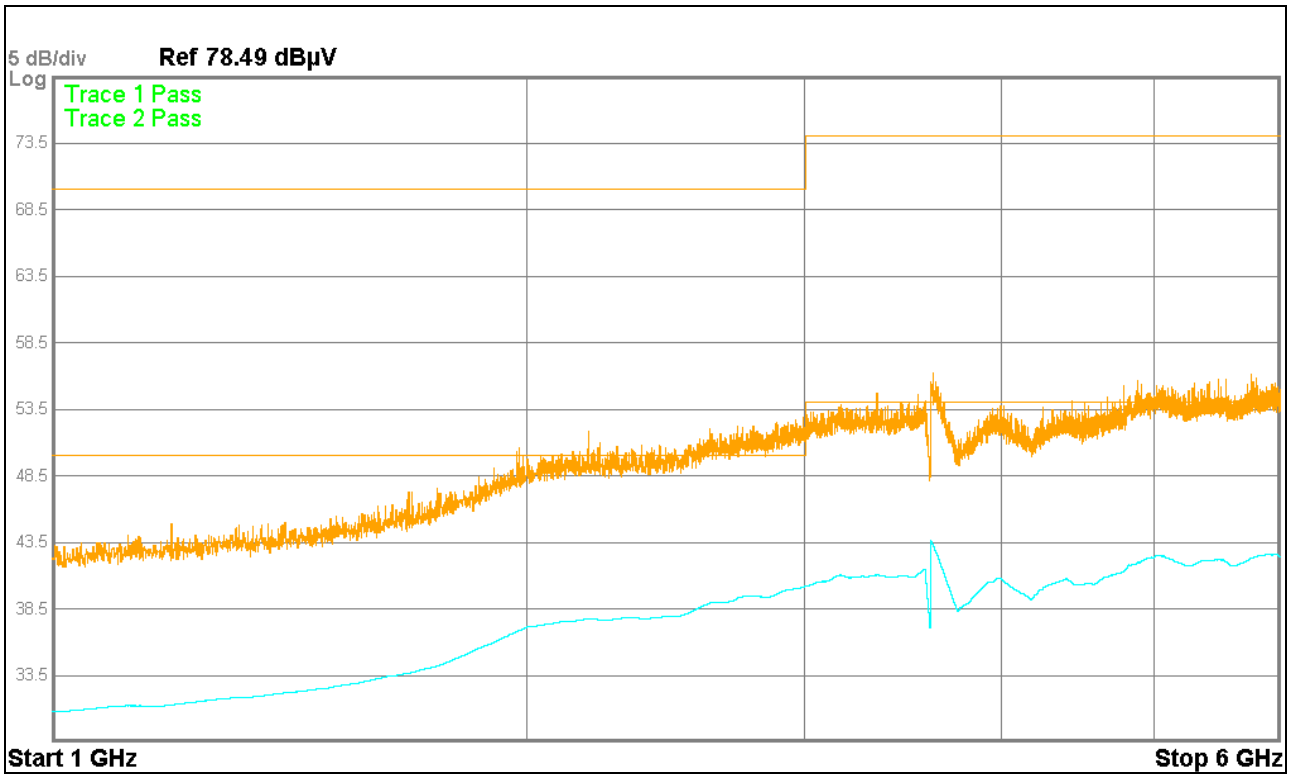
Graph 3: Represents peak and average radiated emissions measured from the EUT in the Horizontal polarization.



Graph 3: Radiated emissions results

7.1.5 Radiated Emission: 1000MHz – 6000MHz (Ambient)

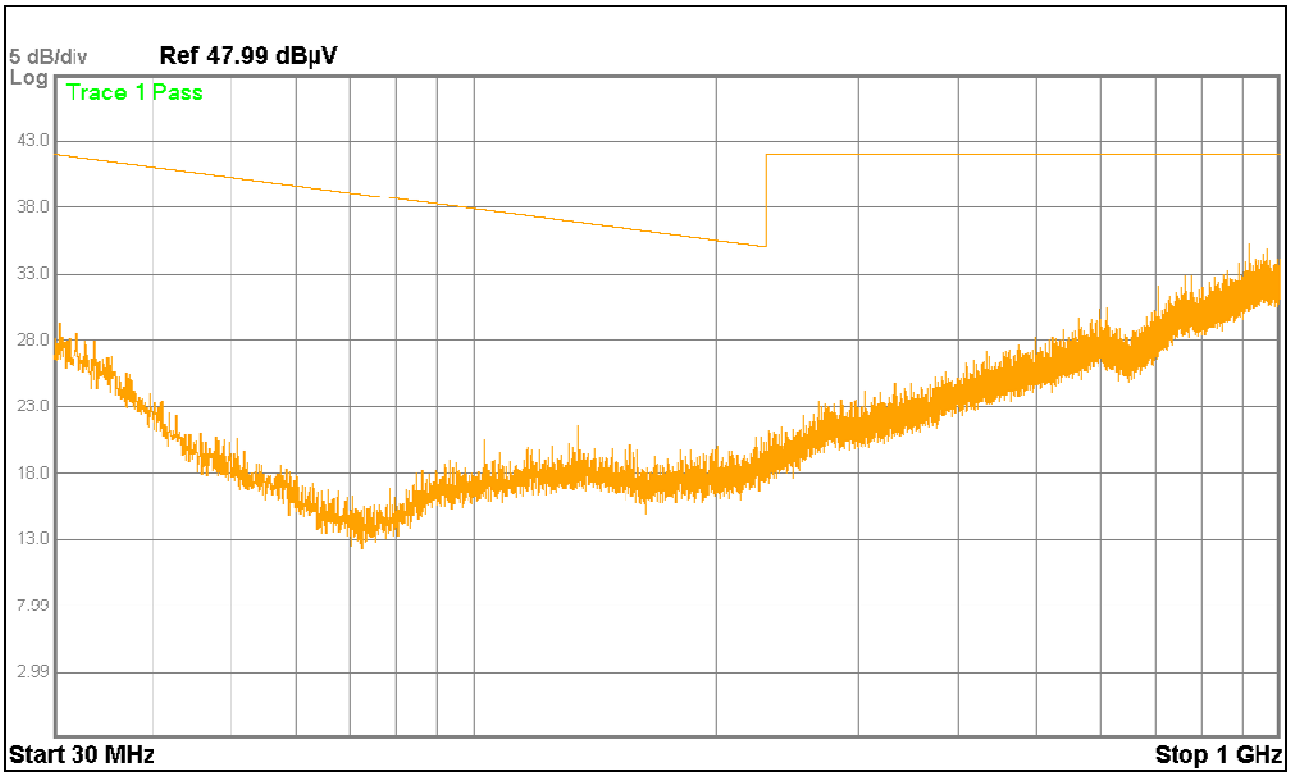
Graph 4: Represents peak and average radiated emissions measured from the EUT in the Vertical polarization.



Graph 4: Radiated emissions results

7.1.6 **Radiated Emission: 30MHz – 1000MHz** (Mobile phone on, App off)

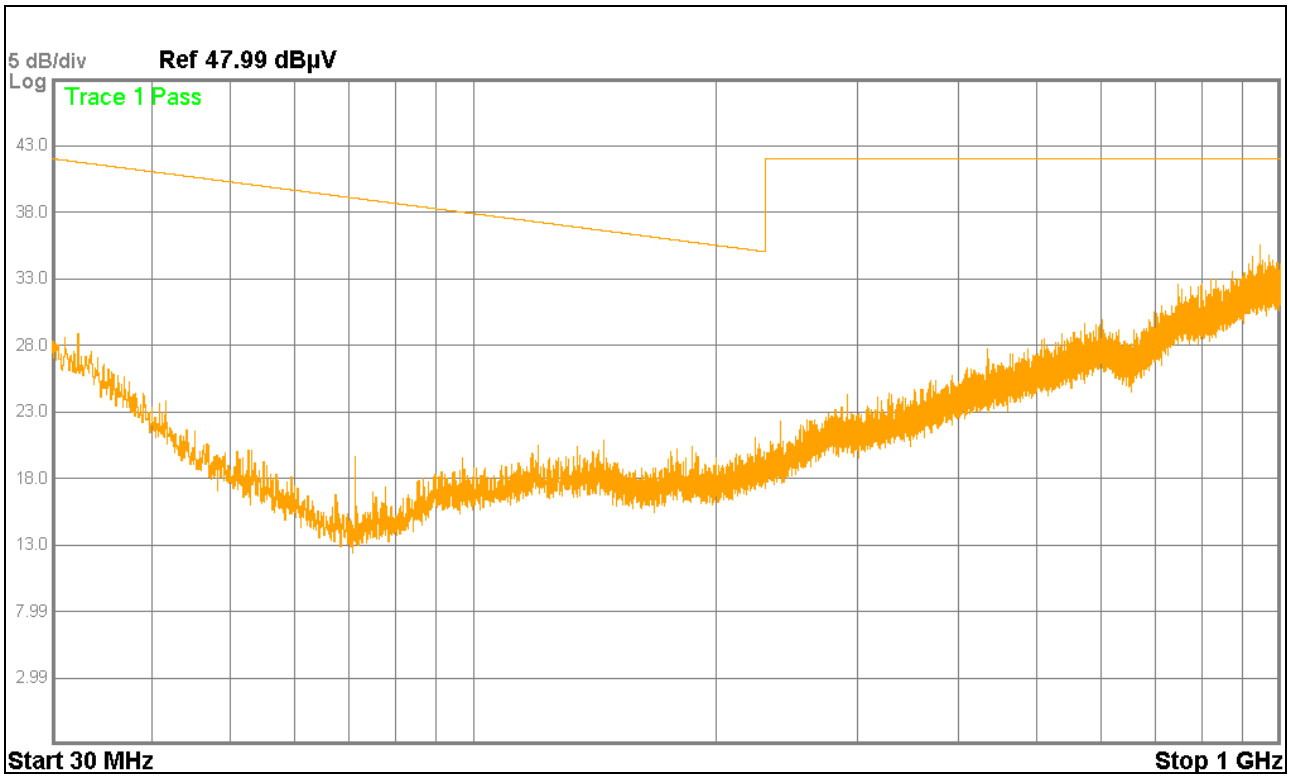
Graph 5: Represents radiated emissions measured from the EUT in the horizontal polarization



Graph 5: Radiated emissions results

7.1.7 **Radiated Emission: 30MHz – 1000MHz** (Mobile phone on, App off)

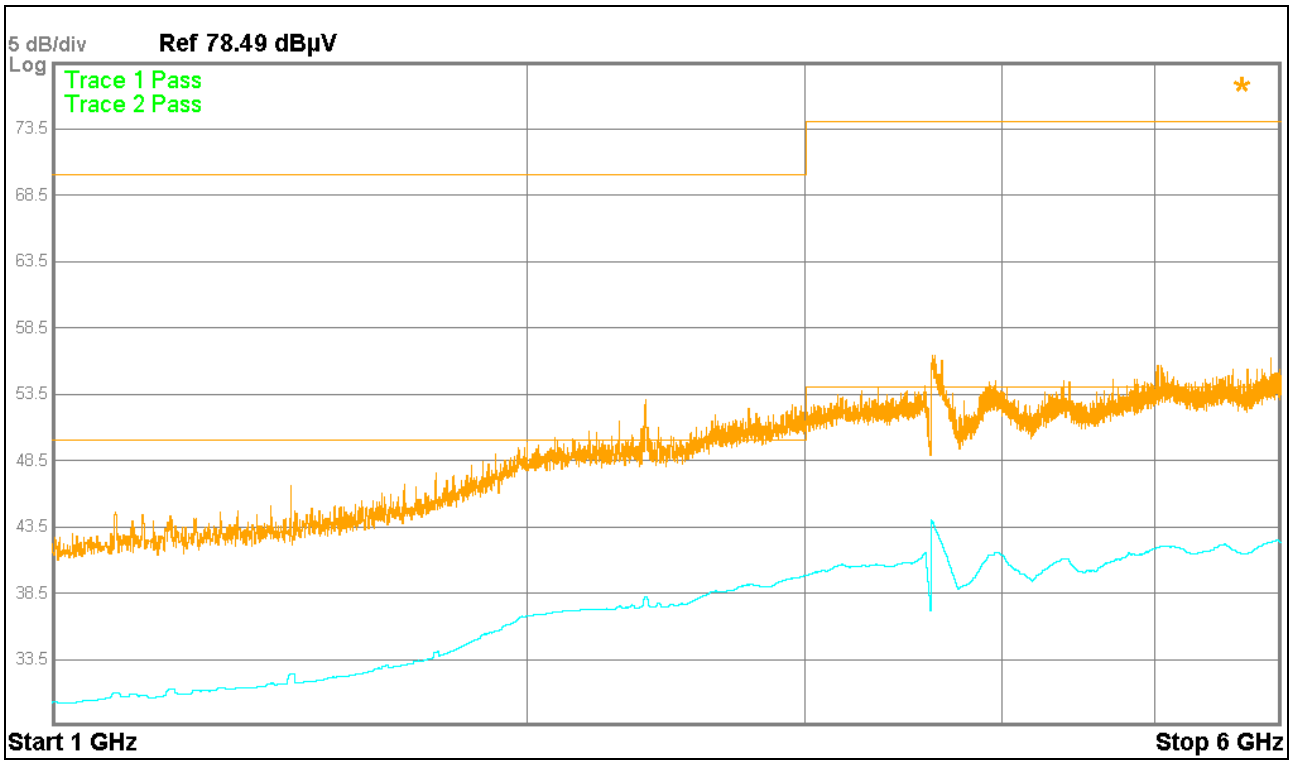
Graph 6: Represents radiated emissions measured from the EUT in the vertical polarization.



Graph 6: Radiated emissions results

7.1.8 **Radiated Emission: 1000MHz – 6000MHz** (Mobile phone on, App off)

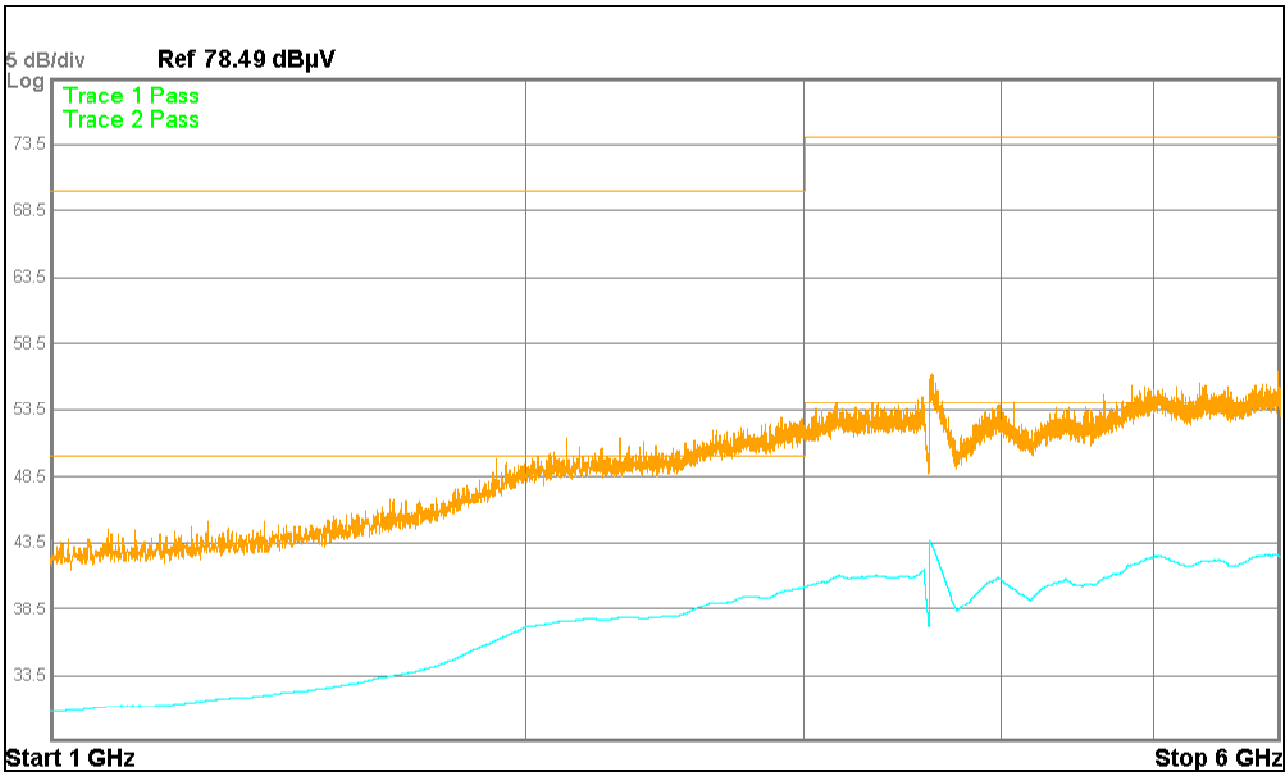
Graph 7: Represents peak and average radiated emissions measured from the EUT in the Horizontal polarization.



Graph 7: Radiated emissions results

7.1.9 **Radiated Emission: 1000MHz – 6000MHz** (Mobile phone on, App off)

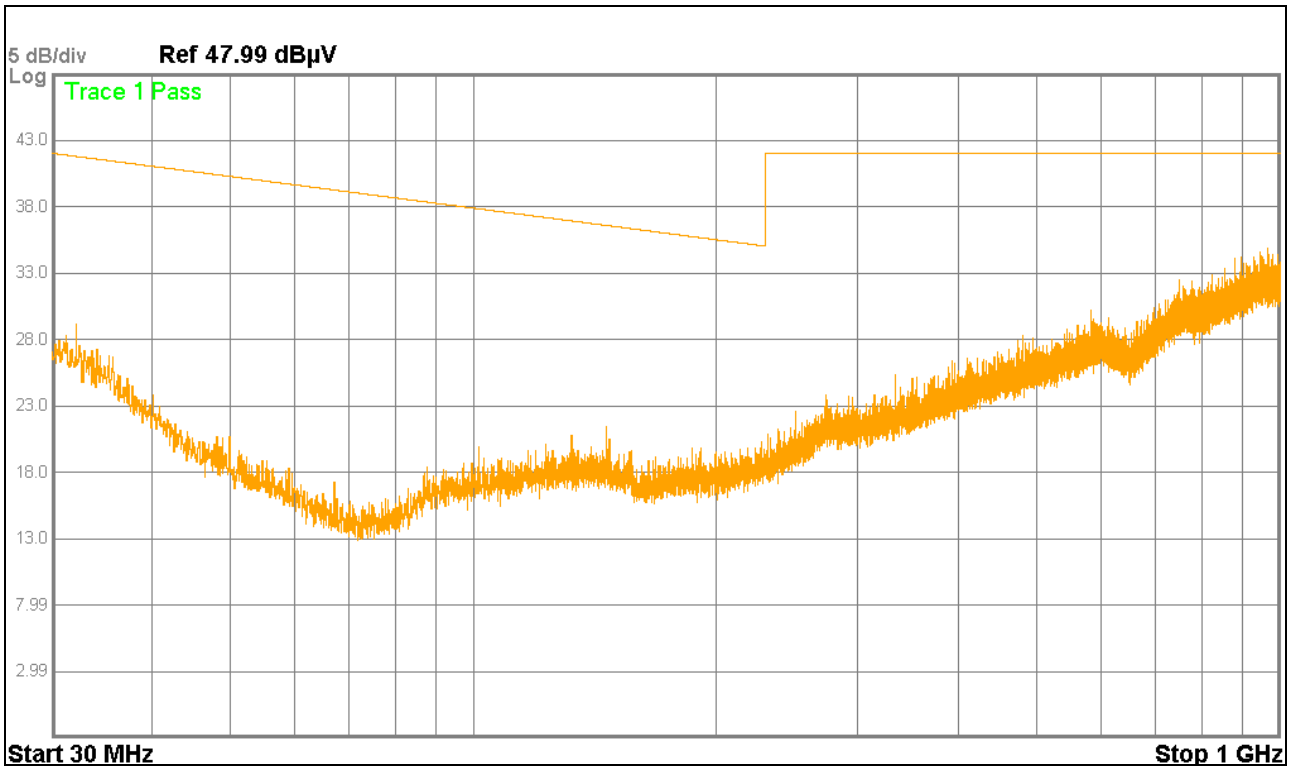
Graph 8: Represents peak and average radiated emissions measured from the EUT in the vertical polarization



Graph 8: Radiated emissions results

7.1.10 **Radiated Emission: 30MHz – 1000MHz** (Mobile phone on, App activated)

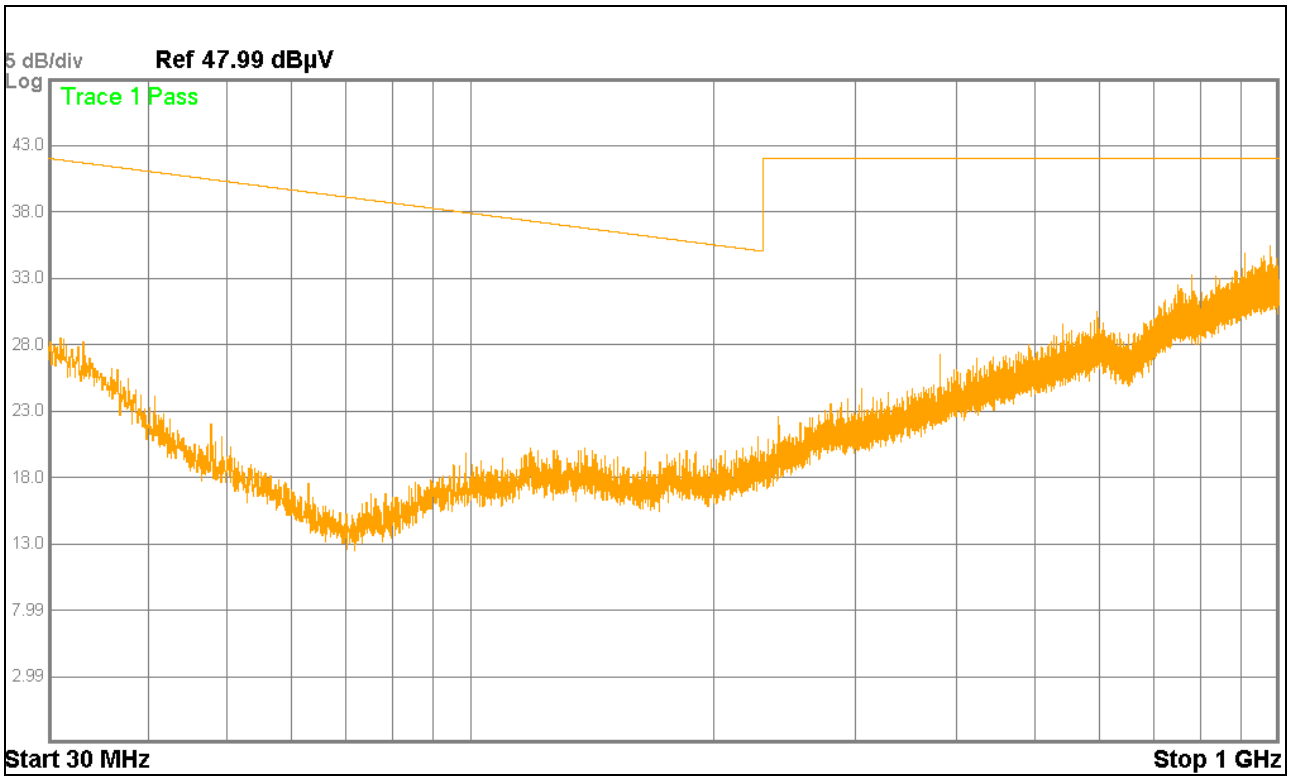
Graph 9: Represents radiated emissions measured from the EUT in the horizontal polarization



Graph 9: Radiated emissions results

7.1.11 **Radiated Emission: 30MHz – 1000MHz** (Mobile phone on, App activated)

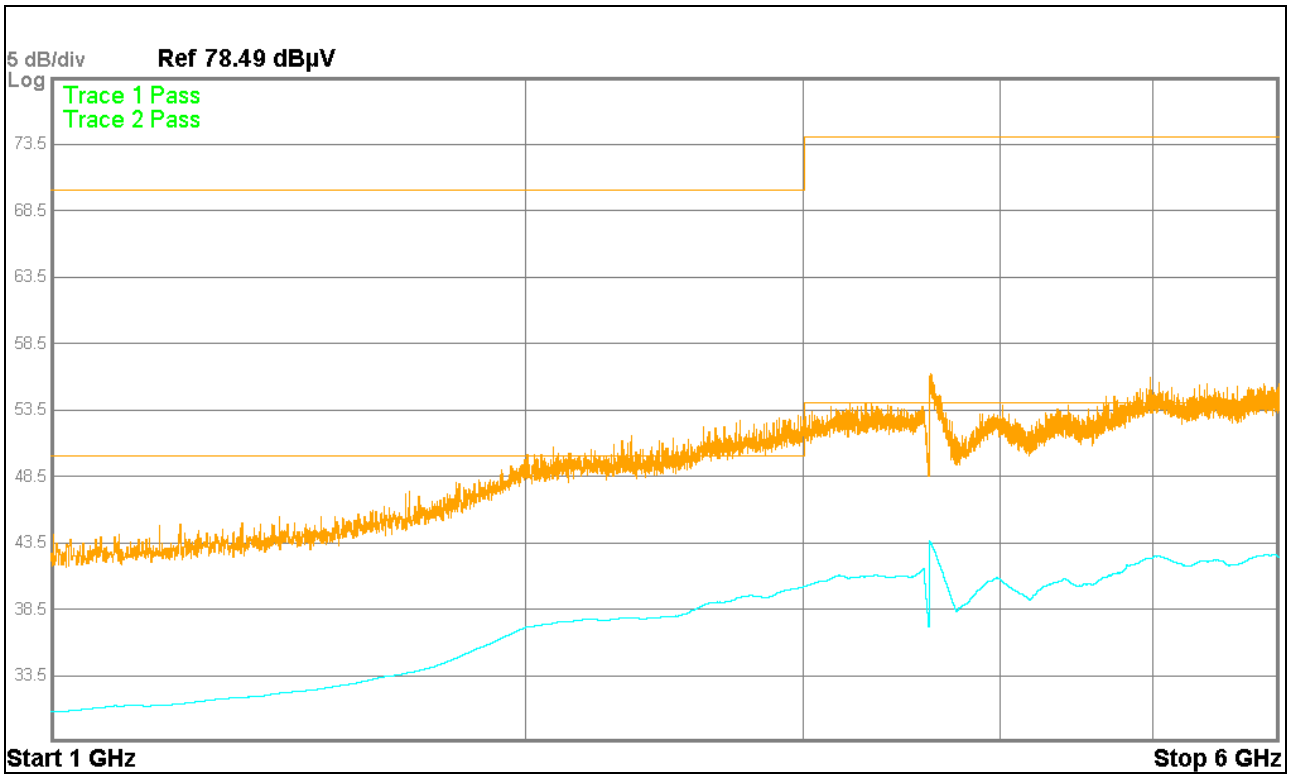
Graph 10: Represents radiated emissions measured from the EUT in the vertical polarization.



Graph 10: Radiated emissions results

7.1.12 **Radiated Emission: 1000MHz – 6000MHz** (Mobile phone on, App activated)

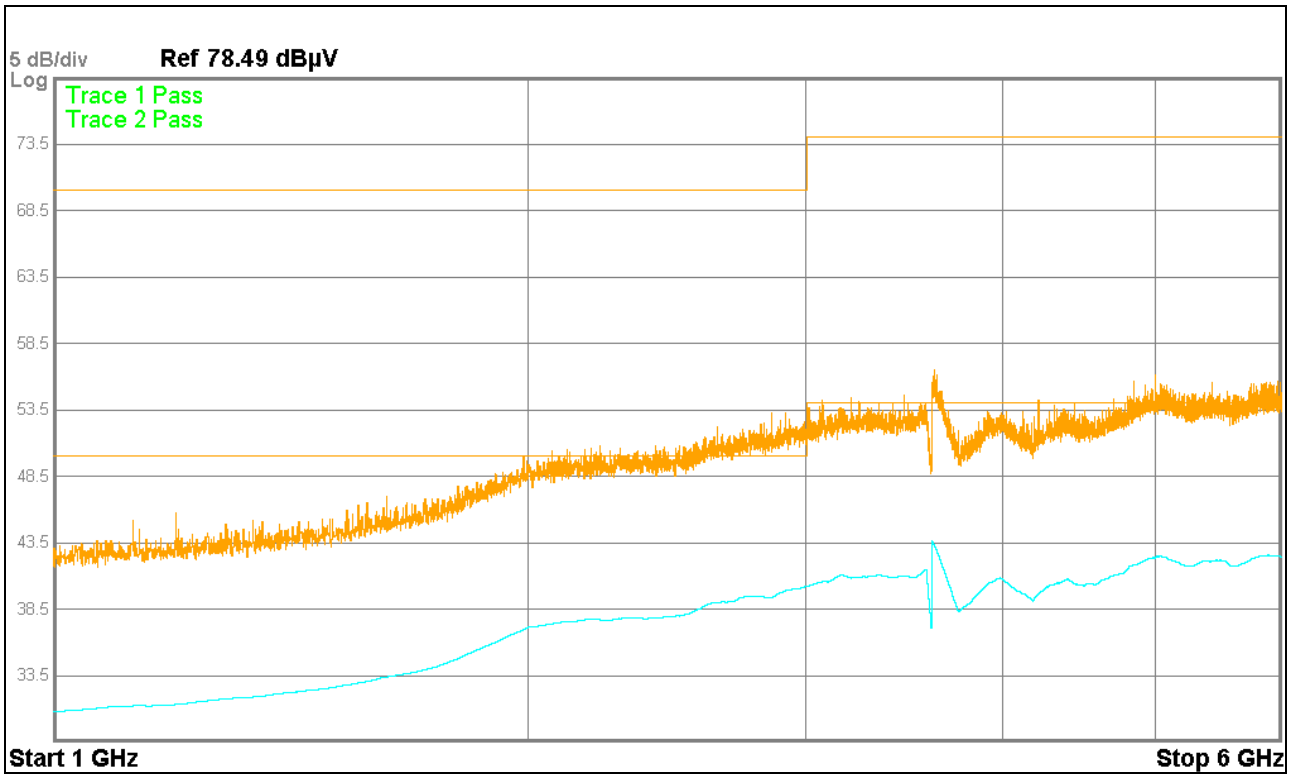
Graph 11: Represents peak and average radiated emissions measured from the EUT in the Horizontal polarization.



Graph 11: Radiated emissions results

7.1.13 **Radiated Emission: 1000MHz – 6000MHz** (Mobile phone on, App activated)

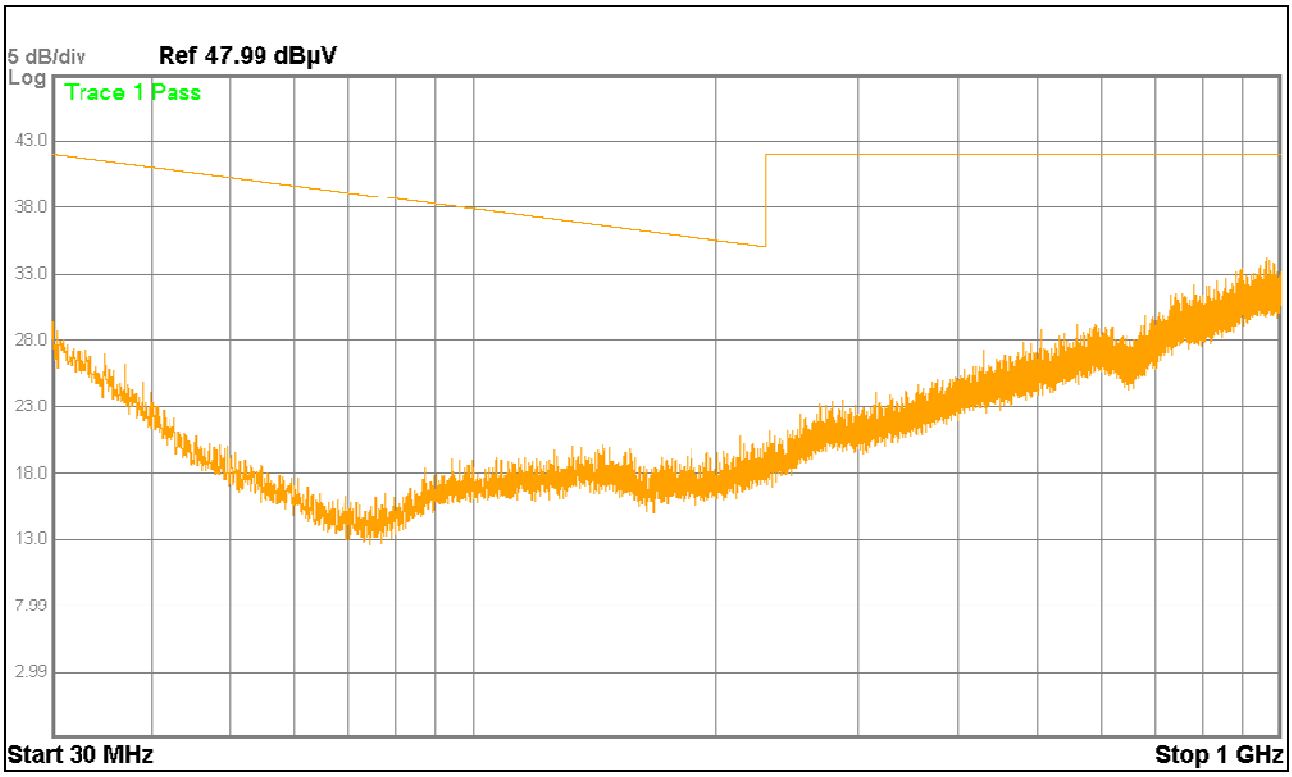
Graph 12: Represents peak and average radiated emissions measured from the EUT in the vertical polarization



Graph 12: Radiated emissions results

7.1.14 **Radiated Emission: 30MHz – 1000MHz** (WAVE function activated)

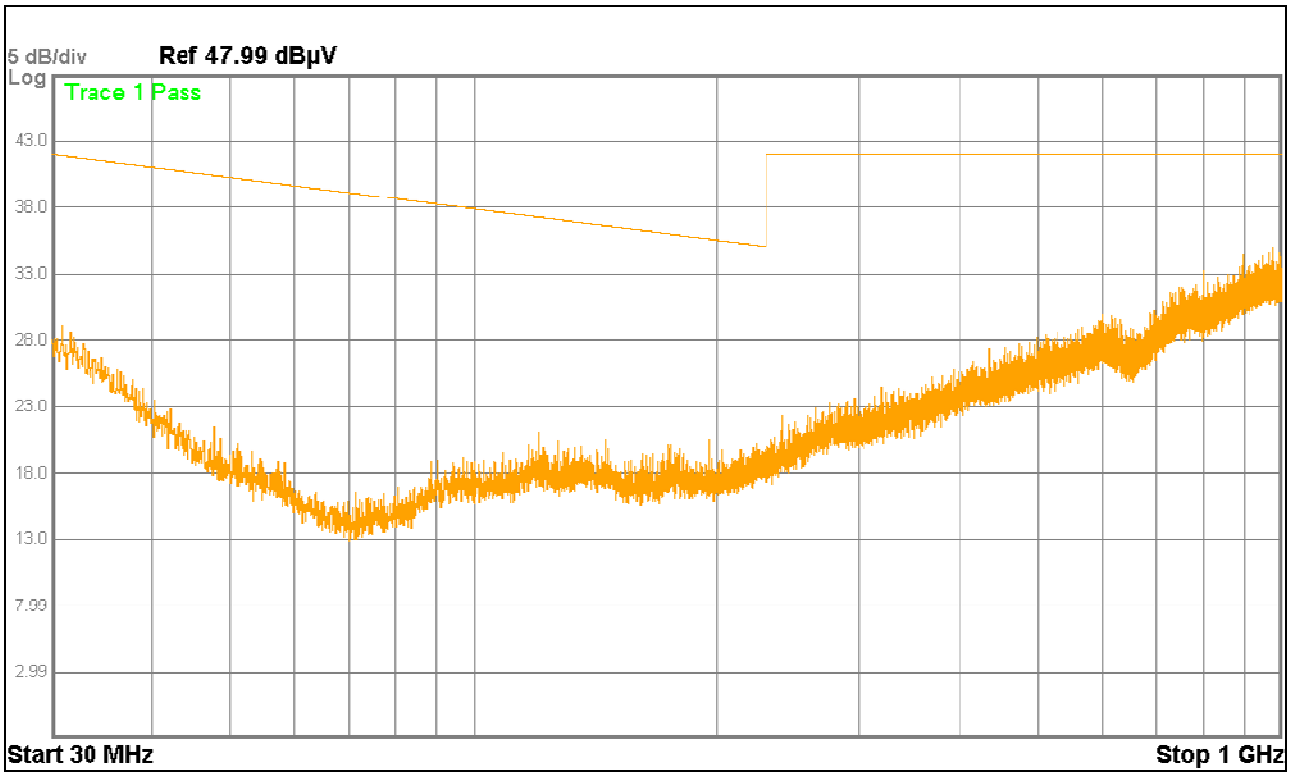
Graph 13: Represents radiated emissions measured from the EUT in the horizontal polarization



Graph 13: Radiated emissions results

7.1.15 Radiated Emission: 30MHz – 1000MHz (WAVE function activated)

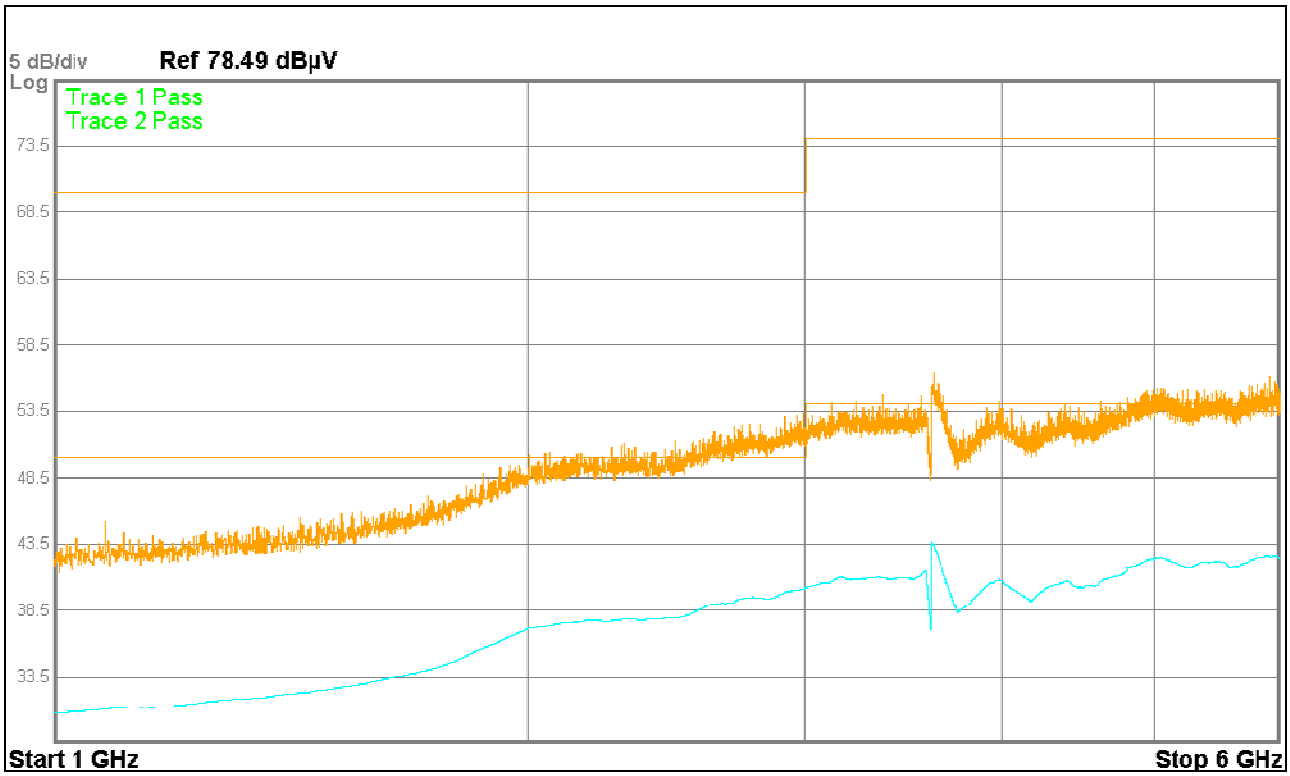
Graph 14: Represents radiated emissions measured from the EUT in the vertical polarization.



Graph 14: Radiated emissions results

7.1.16 Radiated Emission: 1000MHz – 6000MHz (WAVE function activated)

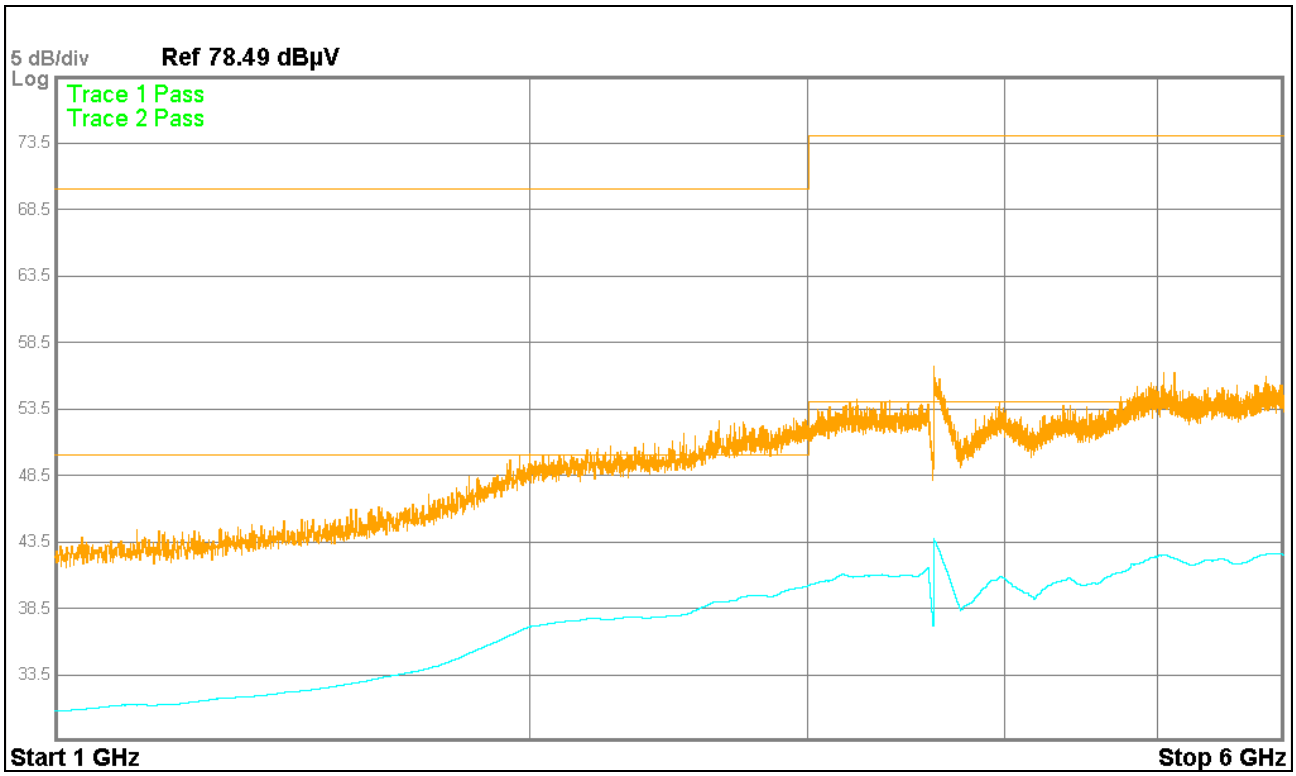
Graph 15: Represents peak and average radiated emissions measured from the EUT in the Horizontal polarization.



Graph 15: Radiated emissions results

7.1.17 **Radiated Emission: 1000MHz – 6000MHz** (WAVE function activated)

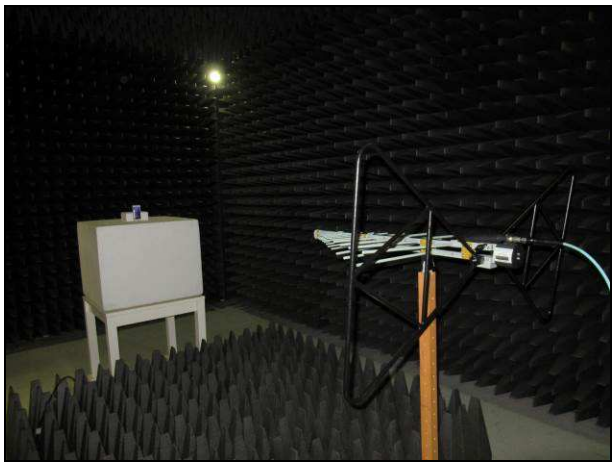
Graph 16: Represents peak and average radiated emissions measured from the EUT in the vertical polarization



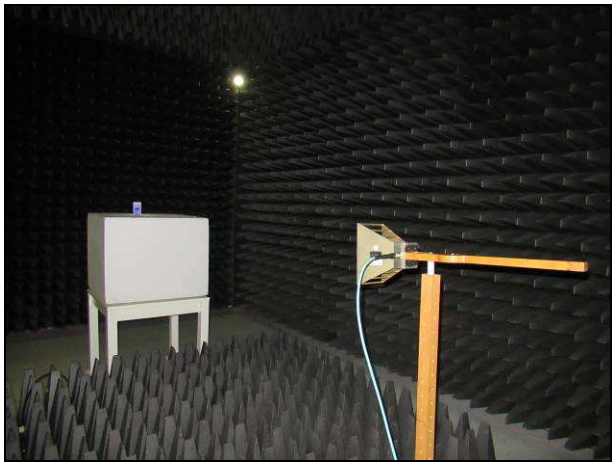
Graph 16: Radiated emissions results

8. APPENDIX A: Setup images

EN 55032 / CISPR 32: Radiated emissions device set-up



EN 55032 / CISPR 32: Radiated emissions (30 – 1000MHz) test set-up



EN 55032 / CISPR 32: Radiated emissions (1 – 6GHz) test set-up

*** END OF REPORT ***