



FCC Test Report

FCC ID : 2AT6813002019
Equipment : CBRSYS1300-WTE-3S
Brand Name : CBRSYS1300-WTE-3S
Model Name : CBRSYS1300-WTE-3S
**Applicant/
Manufacturer** : Celliber Technologies Private Limited
2nd Floor VYSHAK CENTRE, 1027, 24th Main 11th
Cross, Sector 1 HSR Layout, Bangalore 560102 India
Standard : 47 CFR FCC Part 15.247

The product was received on Mar. 13, 2020, and testing was started from Apr. 07, 2020 and completed on Apr. 27, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



Table of Contents

HISTORY OF THIS TEST REPORT	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Information.....	5
1.2 Testing Applied Standards	7
1.3 Testing Location Information	7
1.4 Measurement Uncertainty	7
2 TEST CONFIGURATION OF EUT.....	8
2.1 The Worst Case Measurement Configuration.....	8
2.2 Accessories	9
2.3 Test Setup Diagram	10
3 TRANSMITTER TEST RESULT	12
3.1 AC Power-line Conducted Emissions	12
3.2 Emissions in Restricted Frequency Bands.....	14
4 TEST EQUIPMENT AND CALIBRATION DATA	18
APPENDIX A. TEST RESULTS OF AC POWER-LINE CONDUCTED EMISSIONS	
APPENDIX B. TEST RESULTS OF EMISSIONS IN RESTRICTED FREQUENCY BANDS	
APPENDIX C. TEST PHOTOS	
PHOTOGRAPHS OF EUT V01	



History of this test report



Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
-	15.247(a)	DTS Bandwidth	Not Performed	-
-	15.247(b)	Maximum Conducted Output Power	Not Performed	-
-	15.247(e)	Power Spectral Density	Not Performed	-
-	15.247(d)	Emissions in Non-restricted Frequency Bands	Not Performed	-
3.2	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and explanations:

None

Reviewed by: Sam Tsai

Report Producer: Jenny Yang



1 General Description

1.1 Information

There are three WiFi Modules in the CQ30 Series Vehicle PC in the EUT. The antenna signals Tx transmit by only one connector and other connectors are restricted to Rx only mode with switches controlled by software.

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std. 802.11	Ch. Frequency (MHz)	Channel Number
2400-2483.5	b, g, n (HT20)	2412-2462	1-11 [11]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	802.11b	20	1TX
2.4-2.4835GHz	802.11g	20	1TX
2.4-2.4835GHz	802.11n HT20	20	1TX

Note:

- 11b mode uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.
- 11g and HT20 use a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Function
1	Mobile Mark	RM-WHF-DN-BLK	Omni	N Type	TX/RX
2	Mobile Mark	MGRM-WHF-3C-BLK-120	Omni	Cable with SMA Male	TX/RX
3	Mobile Mark	LP-2400-6000	Directional	SMA Female	RX
4	Mobile Mark	LP-2400-6000	Directional	SMA Female	RX
5	Mobile Mark	LP-2400-6000	Directional	SMA Female	RX
6	Mobile Mark	LP-2400-6000	Directional	SMA Female	RX

Ant.	Port	Gain (dBi)	
		2.4G	5G
1	1	5	5
2	-	5	5
3	-	7.5	11
4	-	7.5	11
5	-	7.5	11
6	-	7.5	11

Note 1: The antenna 1 was used to test by transmit function.

**For 2.4GHz function:**

For IEEE 802.11 b/g/n mode

Ant. 1 or Ant. 2 could transmit/receive.

Ant. 3, Ant. 4, Ant. 5 and Ant. 6 could receive only.

For 5GHz function:

For IEEE 802.11 a/n mode

Ant. 1 or Ant. 2 could transmit/receive.

Ant. 3, Ant. 4, Ant. 5 and Ant. 6 could receive only.

1.1.3 EUT Information

Operational Condition				
EUT Power Type		From Switching Power Supply		
EUT Function	<input checked="" type="checkbox"/>	Point-to-multipoint	<input type="checkbox"/>	Point-to-point
Beamforming Function	<input type="checkbox"/>	With beamforming	<input checked="" type="checkbox"/>	Without beamforming
Type of EUT				
<input checked="" type="checkbox"/>	Stand-alone			
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)			
Combined Equipment - Brand Name / Model No.:		...		
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)			
Host System - Brand Name / Model No.:		...		
<input type="checkbox"/>	Other:			

1.1.4 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR971005AC

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
5825MHz was added	N/A
Added a relay system power	AC Conducted Emissions and Emissions in Restricted Frequency Bands below 1GHz
Add one power cord for 1.8m	
GPS function can be working	
Equipment, Brand Name and Model Name was updated	N/A
Spilter/Combiner (MPN: ZACS622-100WS) was removed	



1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF:

- ♦ KDB 558074 D01 v05r02
- ♦ KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location						
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)				
		TEL : 886-3-327-3456	FAX : 886-3-327-0973			
Test site Designation No. TW1190 with FCC.						
<input type="checkbox"/>	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)				
		TEL : 886-3-656-9065	FAX : 886-3-656-9085			
Test site Designation No. TW0006 with FCC.						
<input type="checkbox"/>	Wen Shan	ADD : No.14-1, Ln. 19, Wen 33rd St., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
		TEL : 886-3-318-0787	FAX : 886-3-318-0287			
Test site Designation No. TW1097 with FCC.						

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Edward Wang	20.1~21.9°C / 56~ 59%	07/Apr/2020
Radiated	03CH02-HY	Daniel Lin	21.1~23.8°C / 51~ 62%	27/Apr/2020

1.4 Measurement Uncertainty

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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	0.9 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.7 dB	Confidence levels of 95%



2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	Switching Power Supply

The Worst Case Mode for Following Conformance Tests	
Tests Item	Emissions in Restricted Frequency Bands
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
Operating Mode < 1GHz	CTX
1	Switching Power Supply
Orthogonal Planes of EUT	Z Plane 
Worst Planes of EUT	V



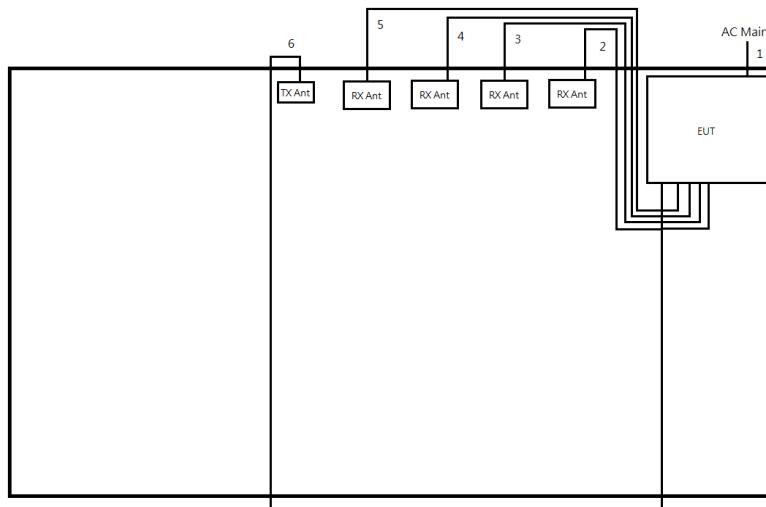
2.2 Accessories

AC power Cord	Brand Name	AC Power cord	Model Name	11-00022
	Manufacturer	Tensility		
	Power Rating	I/P: 110 -250 Vac, 2.5 A		
	Power Cord	1 meter, non-shielded cable, w/o ferrite core		
Universal Adaptor	Brand Name	Universal Adapter	Model Name	APK01AP-52
	Manufacturer	Targus		
Additional power cable with Fischer connector for DC	Brand Name	Open ended cable with 2 pin Ficher	Model Name	600090256
	Manufacturer	Celliber		
	Power Cord	2 meter, non-shielded cable, w/o ferrite core		
M12 Ethernet cable	Brand Name	M12 08 pos Male to RJ45 cable	Model Name	1407415
	Manufacturer	Phoenix Contact		
	Power Cord	2 meter, shielded cable, w/o ferrite core		
M12 Ethernet cable	Brand Name	Circular M12 08 pos Male to M12 08 pos Male	Model Name	1408748
	Manufacturer	Phoenix Contact		
	Power Cord	0.5 meter, shielded cable, w/o ferrite core		
VGA Cable	Brand Name	VGA Cable	Model Name	P502-006
	Manufacturer	P502-006		
	Power Cord	1.83 meter, shielded cable, w/o ferrite core		
RX Antenna Assembly	Brand Name	RX Antenna Assembly	Model Name	800090085-01
	Manufacturer	Celliber	PN	LP-2400-6000
TX Antenna	Brand Name	TX Antenna	Model Name	MGRM-WHF-3C-BLK-120
	Manufacturer	Mobile Mark Antennas Solutions		
	Power Cord	3 meter, shielded cable, w/o ferrite core		
TX Antenna	Brand Name	TX Antenna	Model Name	RM-WHF-DN-BLK
	Manufacturer	Mobile Mark Antennas Solutions		
GPS antenna	Brand Name	GPS Antenna	Model Name	33-4721-00-3000
	Manufacturer	Tallysman Wireless Inc.		
	Power Cord	3 meter, shielded cable, w/o ferrite core		
N Type to SMA adapter	Brand Name	Adapter	Model Name	53S132-K00L5
	Manufacturer	Rosenberger		
RX Cable	Brand Name	Rx Cable	Model Name	ULC-10FT-SMSM+
	Manufacturer	Mini-Circuits		
	Power Cord	3 meter, shielded cable, w/o ferrite core		
TX Cable	Brand Name	TX Cable	Model Name	SPU400FR/11SMA/11SM A/004600
	Manufacturer	HUBER+SUHNER		
	Power Cord	4.6 meter, shielded cable, w/o ferrite core		
AC power cord (Add)	Power Cord	1.8meter, non-shielded cable, w/o ferrite core		

Reminder: Regarding to more detail and other information, please refer to user manual.

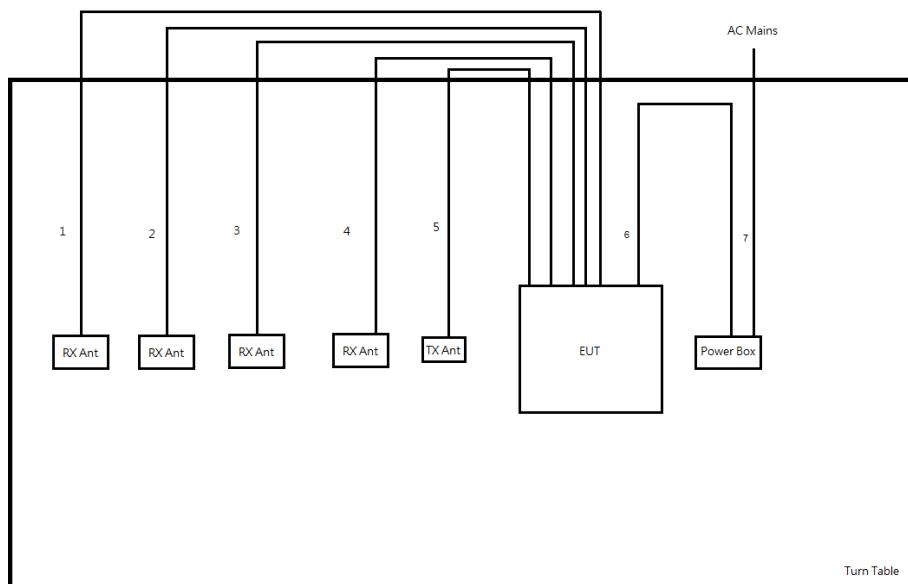
2.3 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded(Yes or No)	Length(m)	Remark
1	AC Power Cord	No	1.8	-
2	RX Cable	Yes	3.0	-
3	RX Cable	Yes	3.0	-
4	RX Cable	Yes	3.0	-
5	RX Cable	Yes	3.0	-
6	TX RF Cable	Yes	4.6	-

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	RX Cable	No	3.0	-
2	RX Cable	No	3.0	-
3	RX Cable	No	3.0	-
4	RX Cable	No	3.0	-
5	TX Cable	No	4.6	-
6	AC Power Cord	No	1.8	-
7	Power Cable	No	1.8	-



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

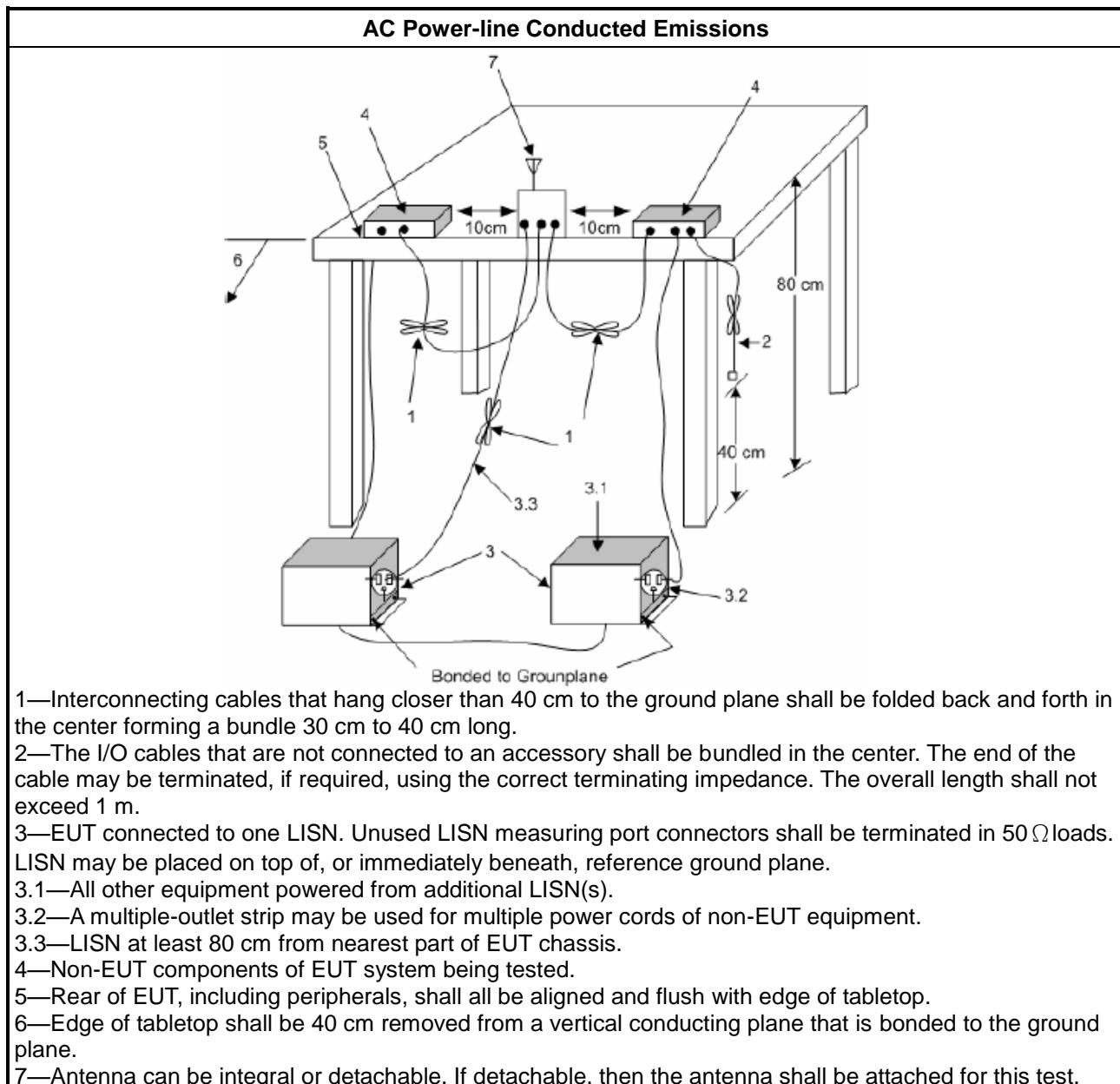
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

3.1.4 Test Setup



3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A



3.2 Emissions in Restricted Frequency Bands

3.2.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

3.2.2 Measuring Instruments

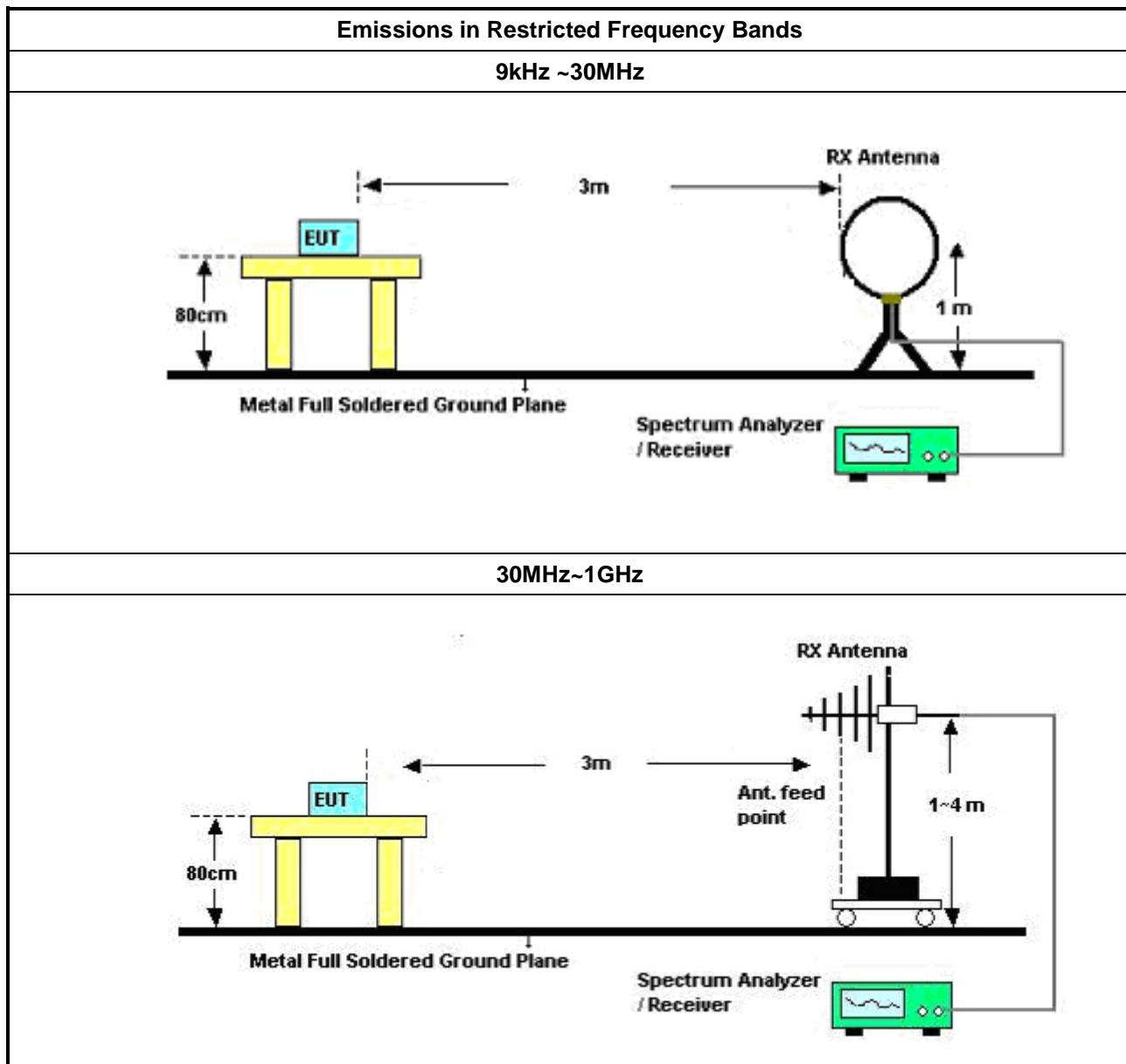
Refer a test equipment and calibration data table in this test report.

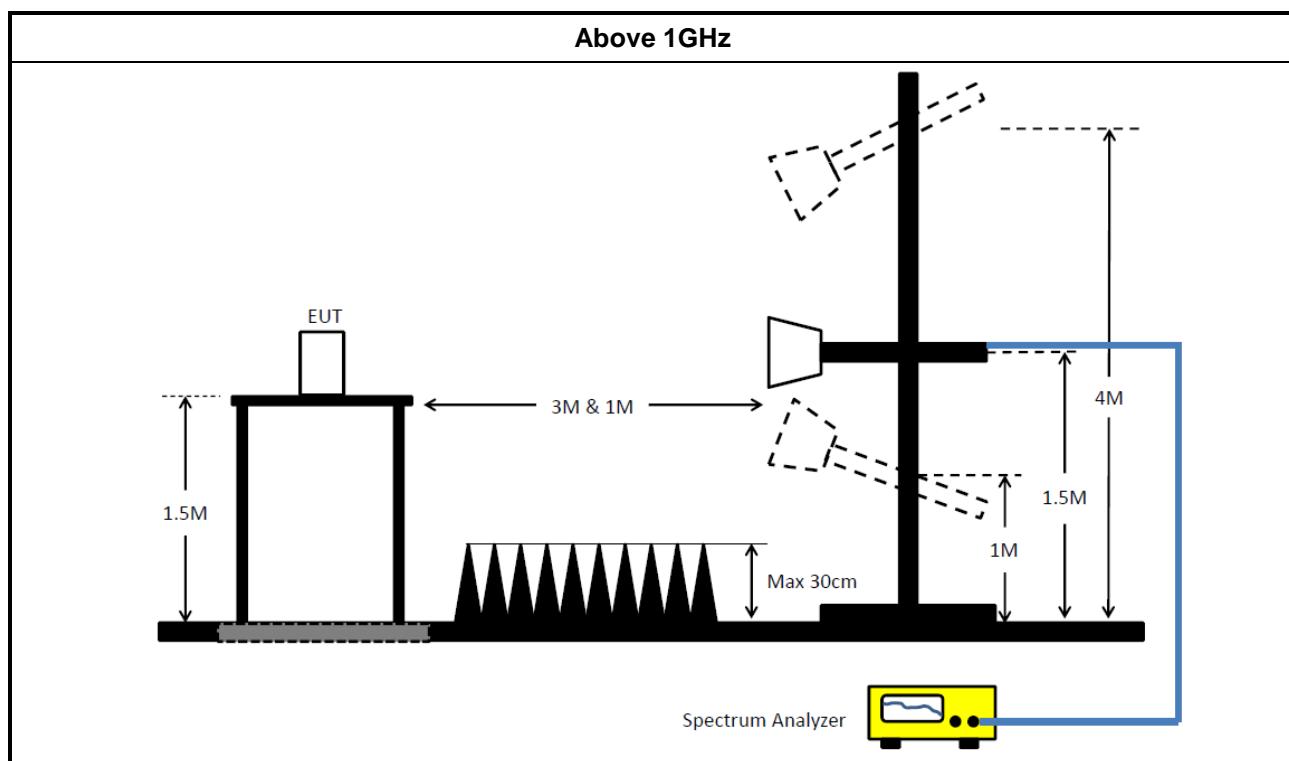


3.2.3 Test Procedures

Test Method
<ul style="list-style-type: none">▪ The average emission levels shall be measured in [duty cycle \geq 98 or duty factor].
<ul style="list-style-type: none">▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<ul style="list-style-type: none">▪ For the transmitter unwanted emissions shall be measured using following options below:<ul style="list-style-type: none">▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
<ul style="list-style-type: none">▪ For the transmitter band-edge emissions shall be measured using following options below:<ul style="list-style-type: none">▪ Refer as KDB 558074 clause 8.7.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels.
<ul style="list-style-type: none">▪ Use the following spectrum analyzer settings:<ul style="list-style-type: none">▪ Set RBW=100 kHz for $f < 1$ GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.▪ Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.
<ul style="list-style-type: none">▪ KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.
<ul style="list-style-type: none">▪ Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

3.2.4 Test Setup





3.2.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

3.2.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix B



4 Test Equipment and Calibration Data

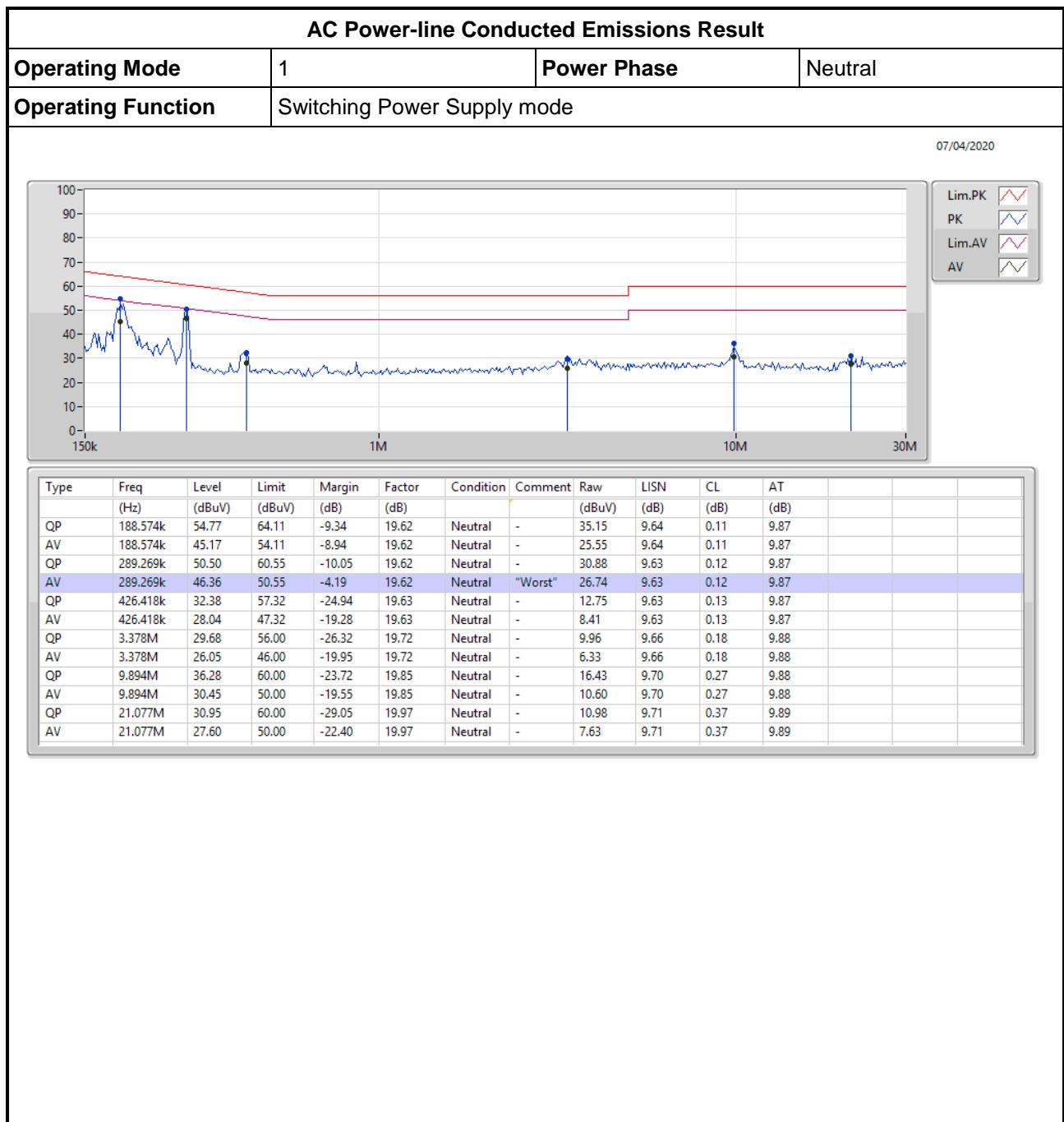
Instrument for AC Conduction

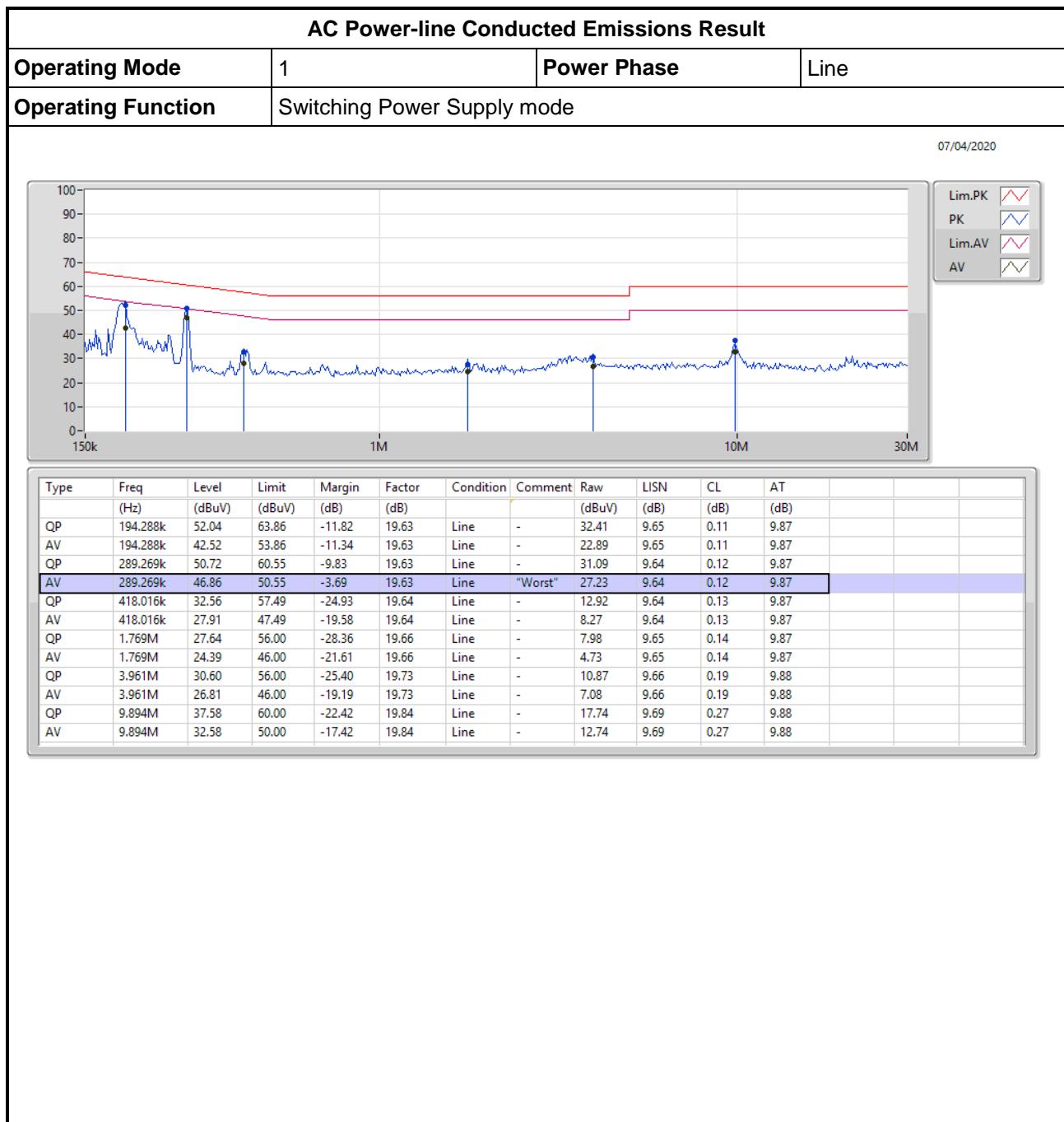
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	04/Nov/2019	05/Nov/2020
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	12/Sep/2019	11/Sep/2020
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	24/Sep/2019	23/Sep/2020

NCR: Non-Calibration Require

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	29/Aug/2019	28/Aug/2020
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	29/Aug/2019	28/Aug/2020
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	02/Jul/2019	01/Jul/2020
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9kHz - 40GHz	27/Feb/2020	26/Feb/2021
EMI Test Receiver	R&S	ESR3	102051	9kHz ~ 3.6GHz	28/May/2019	27/May/2020
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	21/Mar/2020	20/Mar/2021
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	28/Feb/2020	27/Feb/2021
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	16/Mar/2020	15/Mar/2021





**Summary**

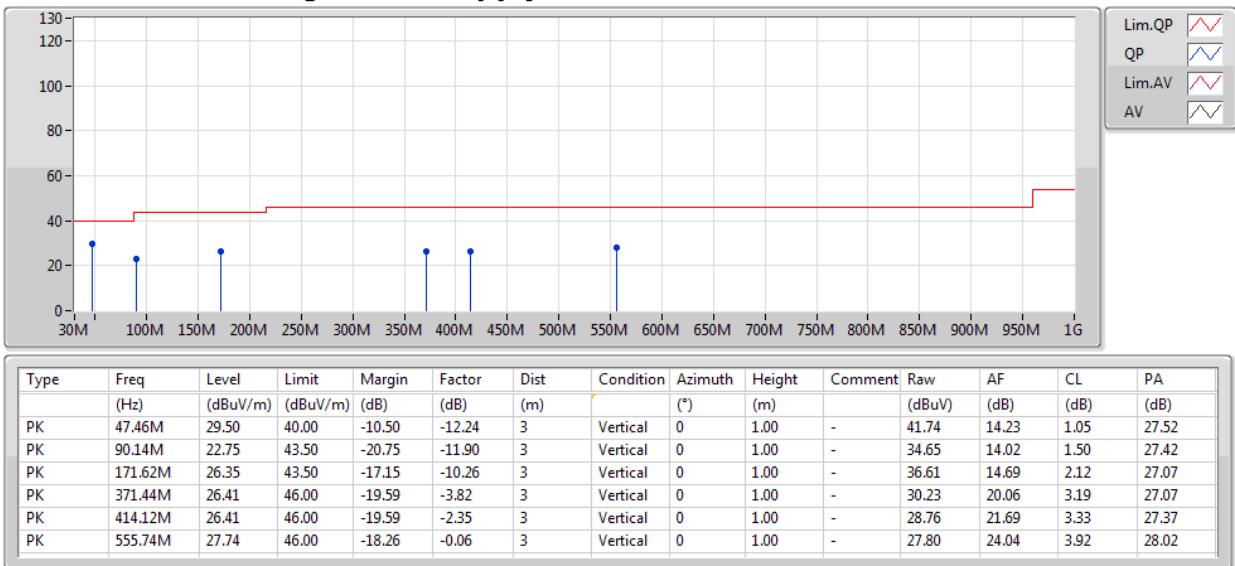
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
802.11n HT20_Nss1,(MCS0)_1TX	Pass	PK	47.46M	29.50	40.00	-10.50	3	Vertical	0	1.00	-

**Result**

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-
2437MHz	Pass	PK	47.46M	29.50	40.00	-10.50	3	Vertical	0	1.00	-
2437MHz	Pass	PK	90.14M	22.75	43.50	-20.75	3	Vertical	0	1.00	-
2437MHz	Pass	PK	171.62M	26.35	43.50	-17.15	3	Vertical	0	1.00	-
2437MHz	Pass	PK	371.44M	26.41	46.00	-19.59	3	Vertical	0	1.00	-
2437MHz	Pass	PK	414.12M	26.41	46.00	-19.59	3	Vertical	0	1.00	-
2437MHz	Pass	PK	555.74M	27.74	46.00	-18.26	3	Vertical	0	1.00	-
2437MHz	Pass	PK	41.64M	25.75	40.00	-14.25	3	Horizontal	360	1.00	-
2437MHz	Pass	PK	90.14M	20.21	43.50	-23.29	3	Horizontal	360	1.00	-
2437MHz	Pass	PK	171.62M	19.39	43.50	-24.11	3	Horizontal	360	1.00	-
2437MHz	Pass	PK	402.48M	24.86	46.00	-21.14	3	Horizontal	360	1.00	-
2437MHz	Pass	PK	493.66M	26.14	46.00	-19.86	3	Horizontal	360	1.00	-
2437MHz	Pass	PK	610.06M	28.36	46.00	-17.64	3	Horizontal	360	1.00	-

802.11n HT20_Nss1,(MCS0)_1TX

27/04/2020

2437MHz_Switching Power Supply


802.11n HT20_Nss1,(MCS0)_1TX

27/04/2020

2437MHz_Switching Power Supply
