



FCC Test Report

FCC ID : 2AEIM-1089774
Equipment : Security Controller
Brand Name : Tesla
Model No. : 1089774
Applicant / Manufacturer : Tesla Motors, Inc.
3500 Deer Creek Road Palo Alto, California US 94304
United States Of America
Standard : 47 CFR FCC Part 15.247

The product sample received on May 03, 2017 and completely tested on May 17, 2019. We, SPORTON, 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.)



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PHOTOGRAPHS OF EUT V02



Summary of Test Result

Conformance Test Specifications				
Report Clause	Ref. Std. Clause	Description	Limit	Result
1.1.2	15.203	Antenna Requirement	FCC 15.203	Complied
3.1	15.247(d)	Emissions in Restricted Frequency Bands	Restricted Bands: FCC 15.209	Complied

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.



1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1	1TX

Note:

- ◆ Bluetooth LE uses a GFSK (1Mbps) modulation for DSSS.
- ◆ BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	-	-	PCB	fixed on board	3.94

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From DC Power Source
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 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	1	0	n/a (DC≥=0.98)	n/a (DC≥=0.98)



1.1.5 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FR741006AL

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

Modifications	Performance Checking
New second circuit design was added : 1. 12V to 5V transformer was changed 2. LED driver and layout was added, but not included components 3. Battery power monitor function was added	1. The worst case of Radiated Unwanted Emissions(above 1GHz) was evaluated, and the test result of original test report was found to be the worst case scenario. 2. Radiated Unwanted Emissions(below 1GHz) was evaluated



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
- ◆ KDB 558074 D01 v05r02

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. TW1190 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
Radiated	03CH03-HY	Ryan	24.5~25.1°C / 65~71%	17/May/2019

2 Test Configuration of EUT

2.1 The Worst Case Measurement Configuration

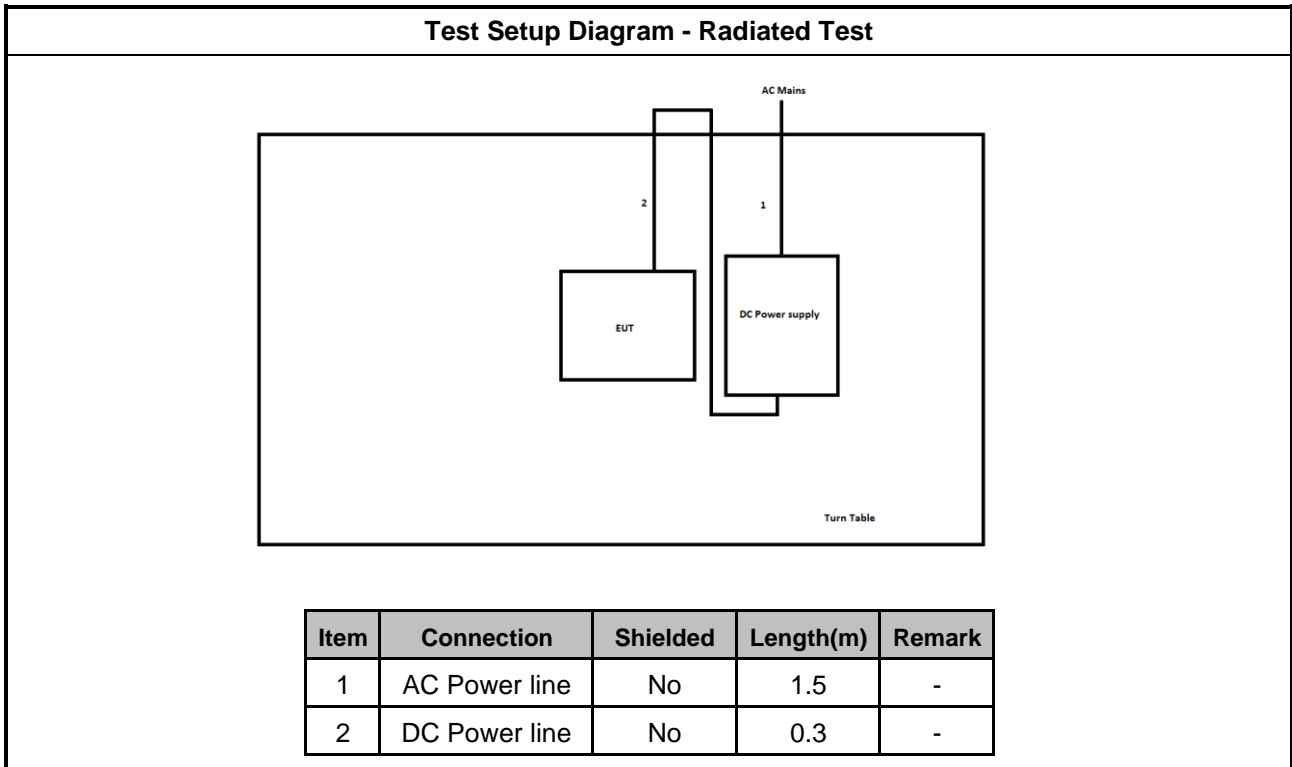
The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
Test Condition	Conducted measurement at transmit chains

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	DC Power Source	
Operating Mode > 1GHz	CTX	
Orthogonal Planes of EUT	X Plane	Z Plane
		
Worst Planes of EUT		V

2.2 Support Equipment

Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	DC Power Supply	G.W.	GPC-6030D	-

2.3 Test Setup Diagram





3 Transmitter Test Result

3.1 Emissions in Restricted Frequency Bands

3.1.1 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.

3.1.2 Measuring Instruments

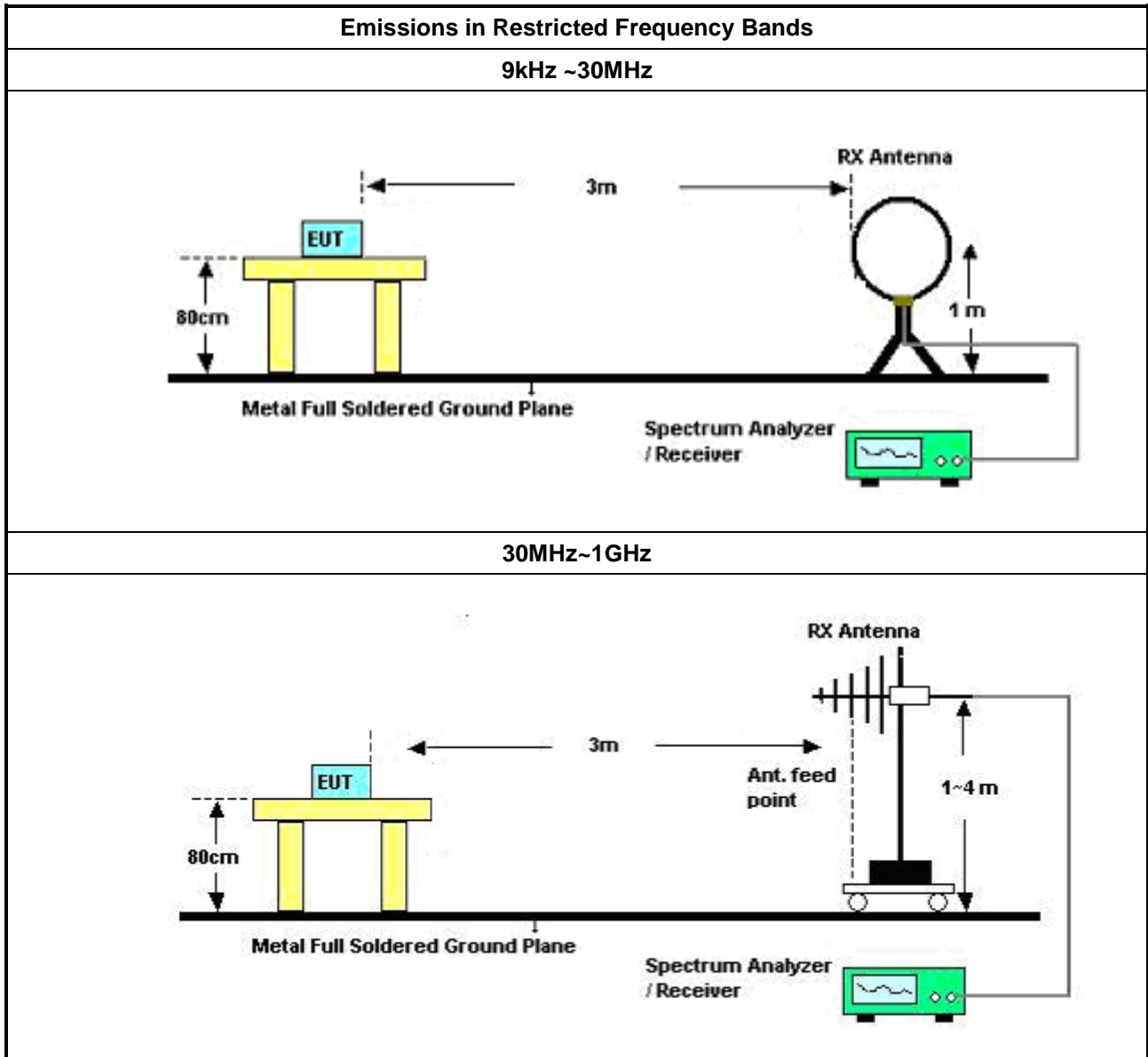
Refer a test equipment and calibration data table in this test report.

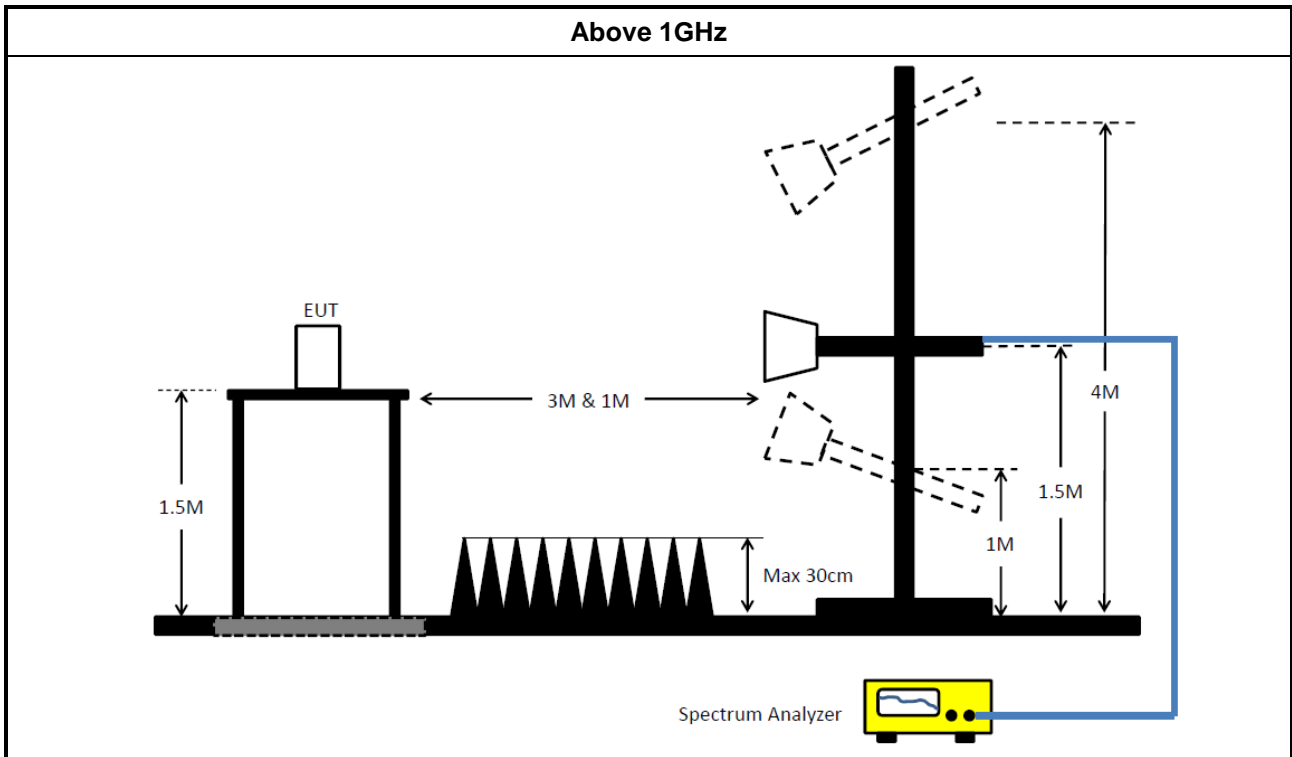


3.1.3 Test Procedures

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.
	<ul style="list-style-type: none">▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	<ul style="list-style-type: none">▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
	<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.
	<ul style="list-style-type: none">▪ Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.

3.1.4 Test Setup





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

3.1.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix A



4 Test Equipment and Calibration Data

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	30/Oct/2018	29/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 18GHz 3m	30/Oct/2018	29/Oct/2019
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	22/Apr/2019	21/Apr/2020
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
Bilog Antenna with 5dB Pad	ETS	3142B & MTJ6102-05	00022055	26 MHz - 3 GHz	19/Nov/2018	18/Nov/2019
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	22/Mar/2019	21/Mar/2020
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	15/Mar/2019	14/Mar/2020



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	893.3M	42.55	46.00	-3.45	-6.62	3	Horizontal	0	1.00	-



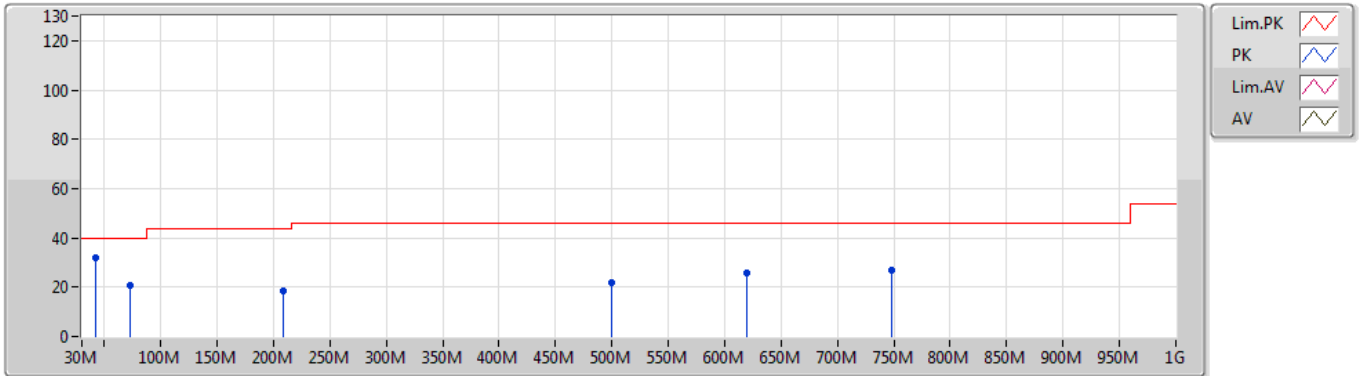
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	41.64M	31.87	40.00	-8.13	-19.06	3	Vertical	360	1.00	-
2440MHz	Pass	PK	72.68M	20.76	40.00	-19.24	-24.72	3	Vertical	360	1.00	-
2440MHz	Pass	PK	208.48M	18.56	43.50	-24.94	-20.93	3	Vertical	360	1.00	-
2440MHz	Pass	PK	499.48M	22.03	46.00	-23.97	-11.82	3	Vertical	360	1.00	-
2440MHz	Pass	PK	619.76M	25.97	46.00	-20.03	-9.87	3	Vertical	360	1.00	-
2440MHz	Pass	PK	747.8M	27.02	46.00	-18.98	-7.95	3	Vertical	360	1.00	-
2440MHz	Pass	PK	41.64M	26.01	40.00	-13.99	-19.06	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	121.18M	16.71	43.50	-26.79	-19.06	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	247.28M	20.20	46.00	-25.80	-17.52	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	309.36M	20.76	46.00	-25.24	-16.52	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	619.76M	27.08	46.00	-18.92	-9.87	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	893.3M	42.55	46.00	-3.45	-6.62	3	Horizontal	0	1.00	-

BT-LE(1Mbps)

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2440MHz_DC Power Supply

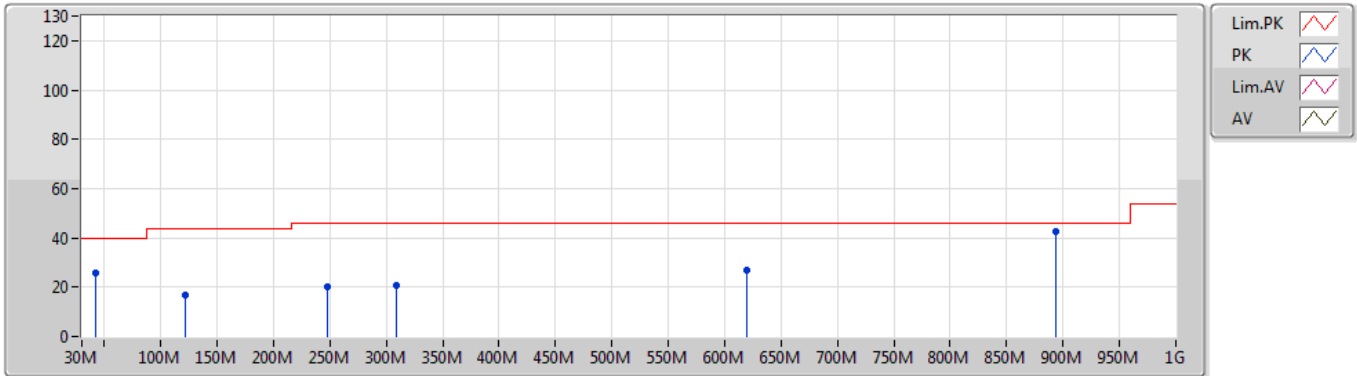


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
PK	41.64M	31.87	40.00	-8.13	-19.06	3	Vertical	360	1.00	-
PK	72.68M	20.76	40.00	-19.24	-24.72	3	Vertical	360	1.00	-
PK	208.48M	18.56	43.50	-24.94	-20.93	3	Vertical	360	1.00	-
PK	499.48M	22.03	46.00	-23.97	-11.82	3	Vertical	360	1.00	-
PK	619.76M	25.97	46.00	-20.03	-9.87	3	Vertical	360	1.00	-
PK	747.8M	27.02	46.00	-18.98	-7.95	3	Vertical	360	1.00	-

BT-LE(1Mbps)

17/05/2019

2440MHz_DC Power Supply



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
PK	41.64M	26.01	40.00	-13.99	-19.06	3	Horizontal	0	1.00	-
PK	121.18M	16.71	43.50	-26.79	-19.06	3	Horizontal	0	1.00	-
PK	247.28M	20.20	46.00	-25.80	-17.52	3	Horizontal	0	1.00	-
PK	309.36M	20.76	46.00	-25.24	-16.52	3	Horizontal	0	1.00	-
PK	619.76M	27.08	46.00	-18.92	-9.87	3	Horizontal	0	1.00	-
PK	893.3M	42.55	46.00	-3.45	-6.62	3	Horizontal	0	1.00	-