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TEST REPORT

Report No.: 18051136HKG-001

Application For Original Grant of 47 CFR Part 15 Certification

Single New of RSS-210 Issue 9 Equipment Certification

On/Off Module

FCC ID: SBP26352A
IC: 5202A-26352A

Prepared and Checked by:	**Approved by:**
Signed On File Wong Cheuk Ho, Herbert Lead Engineer	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Ltd. Wong Kwok Yeung, Kenneth Senior Lead Engineer Date: June 25, 2018

TEST REPORT

GENERAL INFORMATION

Grantee:	SmartLabs, Inc.
Grantee Address:	1621 Alton Parkway, Suite 100, Irvine, CA 92606, United States.
FCC Specification Standard:	FCC Part 15, October 1, 2016 Edition
FCC ID:	SBP26352A
FCC Model(s):	2635-222A
IC Specification Standard:	RSS-210 Issue 9, August 2016 RSS-Gen Issue 4, November 2014
IC:	5202A-26352A
HVIN	2635-222A
PMN	On/Off Module
Type of EUT:	Transceiver
Description of EUT:	On/Off Module
Serial Number:	N/A
Sample Receipt Date:	May 18, 2018
Date of Test:	May 18, 2018 to June 20, 2018
Report Date:	June 25, 2018
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-210/ RSS-Gen#/ RSS-310^ Section	Results	Details See Section
Antenna Requirement	15.203	8.3#	Pass	2.1
Security Code Information	15.214(d)	2.4	Pass	2.1
Radiated Emission	15.249(a), 209, & 109	A2.9(a)	Pass	4.2
Radiated Emission on the Bandedge	15.249(d)	A2.9(b)	Pass	4.3
Radiated Emission in Restricted Bands	15.205	2.2	Pass	4.2
AC Power Line Conducted Emission	15.207 & 15.107	8.8#	Pass	4.4

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2016 Edition
RSS-210 Issue 9, August 2016
RSS-Gen Issue 4, November 2014

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2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment Under Test (EUT) is the Appliance Controller (model: 2635-222A) which is a plug-in on/off switch that receives and transmits signals via 915MHz radio frequency and AC power line signals (131.65kHz) in order to control 120-volt loads.

The antenna used in unit is integral, and the test sample is a prototype.

The circuit description is saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in Radiated Emission Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.3 Test Facility

The radiated emission test sites and conducted measurement facility used to collect the radiated data and conducted data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC and IC No. 2042V.

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3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit continuously mode to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 120AC.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable which is four feet in diameter and approximately 0.8m in height above the ground plane for emission measurement at or below 1GHz and 1.5m in height above the ground plane for emission measurement above 1GHz. If the base unit attached to peripherals, they were connected and operational to simulate typical use. The handset was remotely located as far from the antenna and the base as possible to ensure full power transmission from the base. Else, the base was wired to transmit full power.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 1 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter was performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

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3.1 Justification - Cont'd

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.2.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was 625µs. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst case data was included in this report.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

TEST REPORT

3.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.

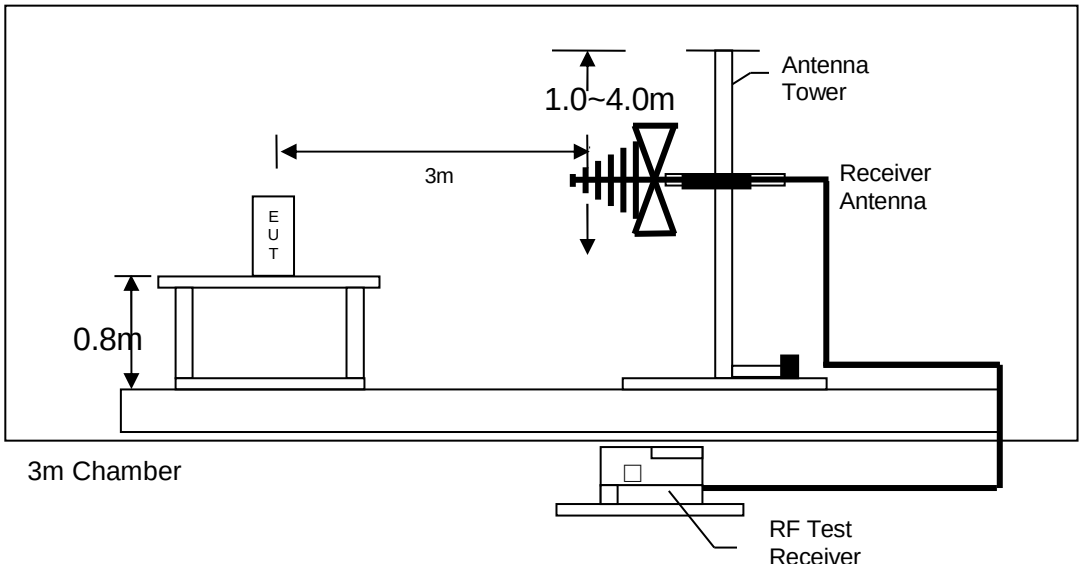

Figure 3.3.1 Test setup of radiated emissions up to 1GHz

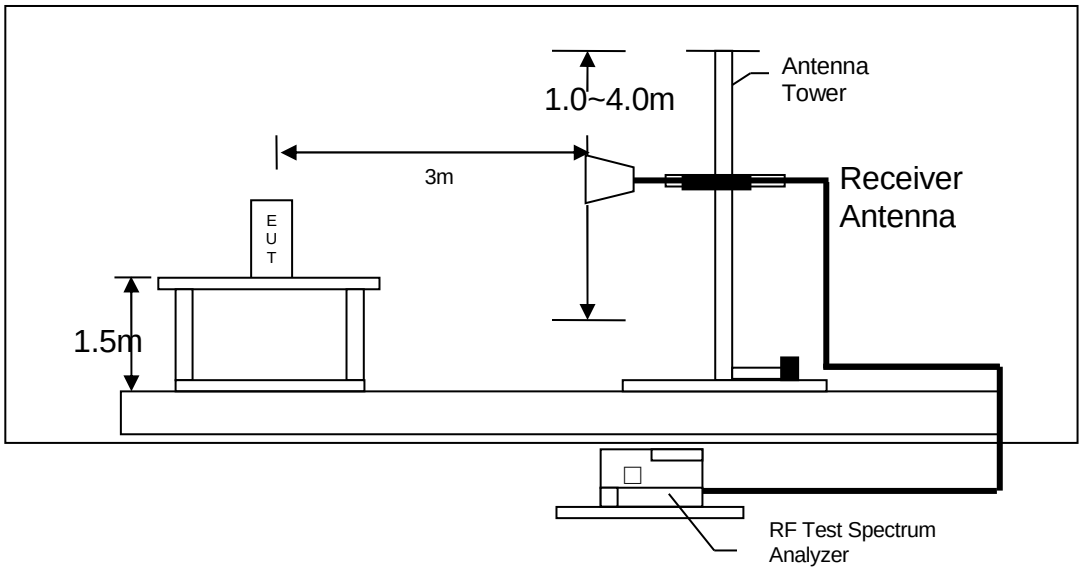

Figure 3.3.2 Test setup of radiated emissions above 1GHz

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3.4 Conducted Emission Test Setup

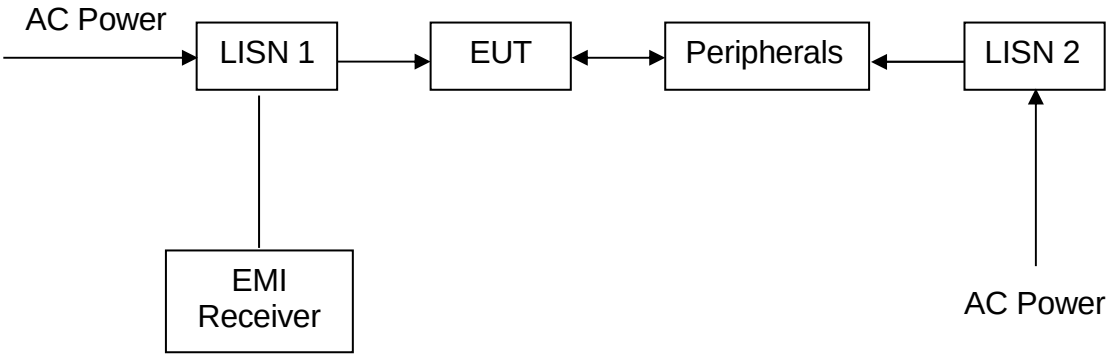

Figure 3.4.1

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3.5 Details of EUT and Description of Accessories

Details of EUT:

The EUT is powered by 120VAC

Description of Accessories:

(1) 15A load with cable of 0.5m in length
(Provided by Intertek)

3.6 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered. The values of the Measurement uncertainty for radiated emission test, AC line conducted emission test and RF conducted test, frequency stability and timing jitter are ± 5.3dB, ± 4.2dB, ±1dB, ±23Hz, 0.1μs respectively.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

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4.0 TEST RESULTS

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

4.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

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
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 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. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

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4.2 Radiated Emissions

4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at

914.926 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.2.2 Radiated Emission Data

The data in tables 1-2 list the significant emission frequencies, the limit and the margin of compliance. Test setup is shown in section 3.3 Figure 3.3.1 and 3.3.2.

Judgement -

Passed by 0.2 dB margin

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RADIATED EMISSION DATA

Mode: Transmitting

Table 1

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	1829.852	58.0	33	27.2	52.2	0	52.2	54.0	-1.8
H	2744.778	38.9	33	30.4	36.3	0	36.3	54.0	-17.7
V	3659.704	38.0	33	33.3	38.3	0	38.3	54.0	-15.7
V	4574.630	36.8	33	34.9	38.7	0	38.7	54.0	-15.3
H	5489.556	38.0	33	35.7	40.7	0	40.7	54.0	-13.3
H	6404.482	37.9	33	36.9	41.8	0	41.8	54.0	-12.2
H	7319.408	37.6	33	37.9	42.5	0	42.5	54.0	-11.5
V	8234.334	36.9	33	39.0	42.9	0	42.9	54.0	-11.1
V	9149.260	37.8	33	40.4	45.2	0	45.2	54.0	-8.8

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	914.926	76.8	16	33.0	93.8	94.0	-0.2
V	1829.852	58.0	33	27.2	52.2	74.0	-21.8
H	2744.778	38.9	33	30.4	36.3	74.0	-37.7
V	3659.704	38.0	33	33.3	38.3	74.0	-35.7
V	4574.630	36.8	33	34.9	38.7	74.0	-35.3
H	5489.556	38.0	33	35.7	40.7	74.0	-33.3
H	6404.482	37.9	33	36.9	41.8	74.0	-32.2
H	7319.408	37.6	33	37.9	42.5	74.0	-31.5
V	8234.334	36.9	33	39.0	42.9	74.0	-31.1
V	9149.260	37.8	33	40.4	45.2	74.0	-28.8

NOTES:

1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

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Mode: Transmitter Operating

Table 2

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	31.333	34.8	16	10.0	28.8	40.0	-11.2
V	59.989	32.2	16	10.0	26.2	40.0	-13.8
V	112.813	30.2	16	14.0	28.2	43.5	-15.3
V	131.769	44.5	16	14.0	42.5	43.5	-1.0
V	150.360	33.5	16	14.0	31.5	43.5	-12.0
V	207.146	30.2	16	17.0	31.2	43.5	-12.3
V	356.445	18.6	16	24.0	26.6	46.0	-19.4
V	549.475	15.3	16	28.0	27.3	46.0	-18.7
H	739.999	20.3	16	30.0	34.3	46.0	-11.7
H	769.988	21.0	16	31.0	36.0	46.0	-10.0
H	948.387	15.4	16	33.0	32.4	46.0	-13.6

NOTES:

1. Quasi-Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

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4.2.3 Transmitter Duty Cycle Calculation

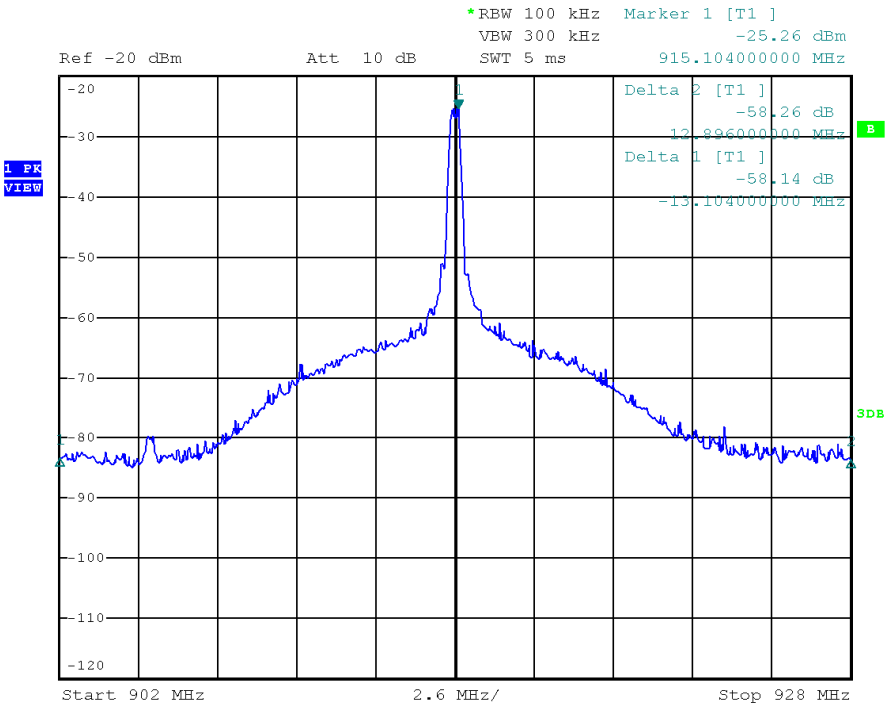
It is not necessary to apply average factor as the measured (peak) data has been complied with average limit of the radiated emission.

4.3 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (902MHz to 928MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.10 (2013) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in FCC Part 15 Section 15.209 / Table 4 of RSS-Gen, whichever is the lesser attenuation, which meet the requirement of FCC Part 15 Section 15.249(d) / RSS-210 A2.9(b).

The plots of radiated emission on the bandedge are saved as below.



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4.4 AC Power Line Conducted Emission

[ ] Not applicable – EUT is only powered by battery for operation.

[×] EUT connects to AC power line. Emission Data is listed in following pages.

[ ] Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

Test setup is shown in section 3.4 Figure 3.4.1.

4.4.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

0.713 MHz

The worst case line conducted configuration photographs are saved with filename: config photos.pdf.

4.4.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 12.0 dB margin compared with CISPR average limit

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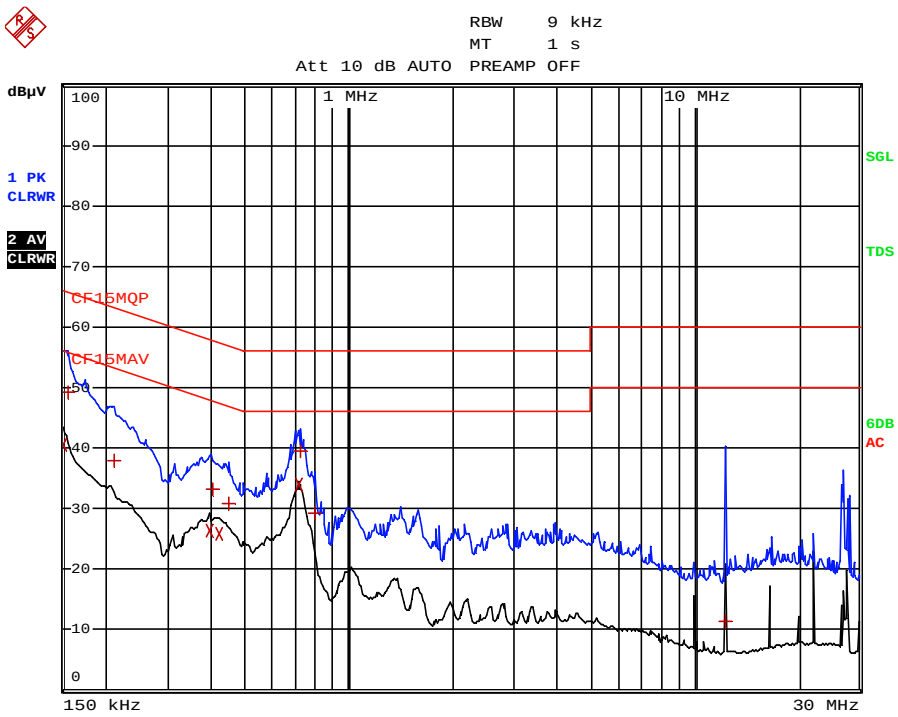
CONDUCTED EMISSION DATA

Worst Case: Transmitter Operating



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Worst Case: Transmitter Operating

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	150 kHz	40.44	L1	-15.55
1	Quasi Peak	154.5 kHz	49.24	N	-16.50
1	Quasi Peak	213 kHz	38.00	L1	-25.08
2	CISPR Average	393 kHz	26.34	N	-21.65
1	Quasi Peak	402 kHz	33.24	N	-24.56
2	CISPR Average	420 kHz	25.74	L1	-21.70
1	Quasi Peak	447 kHz	30.92	N	-26.01
2	CISPR Average	712.5 kHz	34.02	L1	-11.98
1	Quasi Peak	721.5 kHz	39.47	N	-16.52
1	Quasi Peak	793.5 kHz	29.21	L1	-26.78
1	Quasi Peak	12.2775 MHz	11.48	N	-48.51

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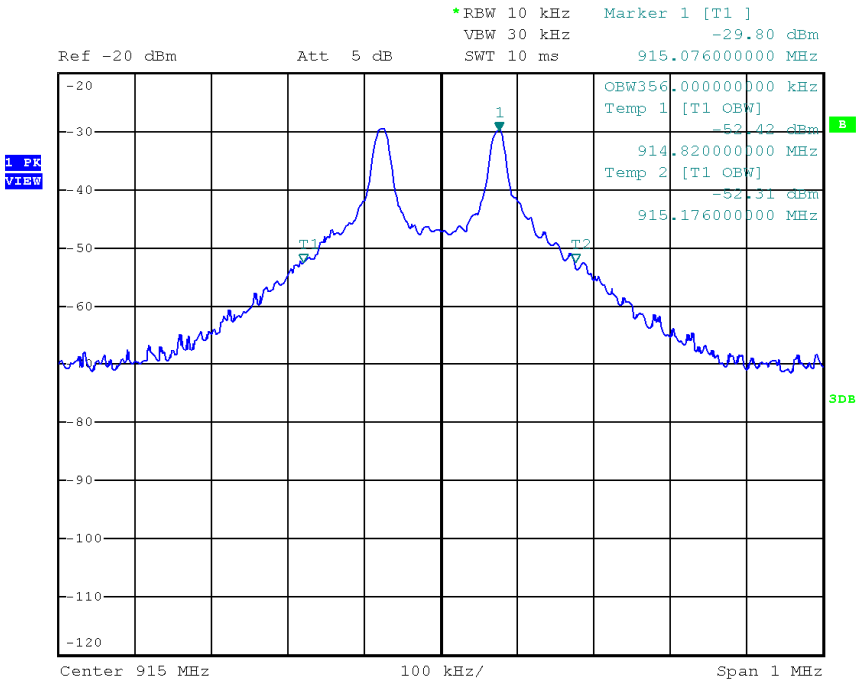
4.5 Occupied Bandwidth

Occupied Bandwidth Results:

Frequency (MHz)	Occupied Bandwidth (kHz)
915	356

The worst case is shown as below



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5.0 EQUIPMENT LIST

1) Radiated Emissions Test

EQUIPMENT	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2500	EW-0571	EW-1042
Manufacturer	ROHDESCHWARZ	EMCO	EMCO
Model No.	ESCI	3104C	3148
Calibration Date	Oct. 13, 2017	Feb. 27, 2018	Jun. 19, 2017
Calibration Due Date	Oct. 13, 2018	Aug. 27, 2019	Dec. 19, 2018

EQUIPMENT	Spectrum Analyzer	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0905	EW-0194
Manufacturer	ROHDESCHWARZ	EMCO	EMCO
Model No.	FSP40	3160-09	3115
Calibration Date	Jul. 24, 2017	Aug. 18, 2017	Mar. 14, 2018
Calibration Due Date	Jul. 24, 2018	Feb. 18, 2019	Sep. 14, 2019

Equipment	Active Loop H-field (9kHz to 30MHz)	12m Double Shield RF Cable (20MHz to 6GHz)	RF Cable 14m (1GHz to 26.5GHz)
Registration No.	EW-3326	EW-1852	EW-2781
Manufacturer	EMCO	RADIALL	GREATBILLION
Model No.	6502	N(m)-RG142 - N(m)	SMA m/SHF5MPU /SMA m ra14m,26G
Calibration Date	Sep. 27, 2017	Jan. 19, 2018	Sep. 25, 2017
Calibration Due Date	Mar. 27, 2019	Jan. 19, 2019	Sep. 25, 2018

Equipment	RF Pre-Amplifier 3 PCS (9kHz To 40GHz)
Registration No.	EW-3229
Manufacturer	BONN ELEKTRO
Model No.	BLMA 0118-5G
Calibration Date	Jan. 30, 2018
Calibration Due Date	Jan. 30, 2019

2) Conducted Emissions Test

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Equipment	Artificial Mains Network	RF Cable 120cm (RG142) (9kHz to 30MHz)	EMI Test Receiver
Registration No.	EW-2501	EW-2453	EW-2500
Manufacturer	ROHDESCHWARZ	RADIALL	ROHDESCHWARZ
Model No.	ENV-216	SMA-M to SMA-M	ESCI
Calibration Date	Feb. 14, 2018	Sep. 15, 2017	Oct. 13, 2017
Calibration Due Date	Feb. 14, 2019	Sep. 15, 2018	Oct. 13, 2018

3) Bandedge/Bandwidth Measurement

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Equipment	RF Cable 30cm (1-26)GHz	Spectrum Analyzer
Registration No.	EW-2268	EW-2253
Manufacturer	RADIALL	ROHDESCHWARZ
Model No.	SMA(M)/SHF5M/SMA(M)30cm	FSP40
Calibration Date	Aug. 23, 2017	Jul. 24, 2017
Calibration Due Date	Aug. 23, 2018	Jul. 24, 2018

END OF TEST REPORT