

Amber Helm Development L.C.

92723 Michigan Hwy-152

Sister Lakes, Michigan 49047 USA

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EMC Test Report

TAP3-1702200
Issued: November 9, 2017

regarding

USA: CFR Title 47, Part 15.209 (Emissions)
Canada: ISED RSS-GEN (Emissions)

for



SX8TAP3

Category: LF Transceiver

Judgements:

FCC 15.209 / ISED RSS-GEN Compliant

Tested: November 9, 2017



NVLAP LAB CODE 200129-0

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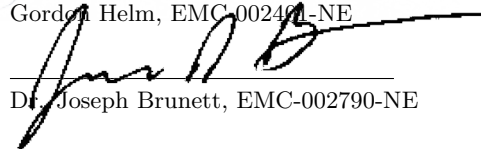
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Revision History

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0	November 9, 2017	Initial Release.	J. Brunett
1	November 12, 2017	AC Mains clarification.	J. Brunett

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1 Test Report Scope and Limitations

1.1 Laboratory Authorization

Test Facility description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: 90413) and with ISED Canada, Ottawa, ON (File Ref. No: IC3161). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0 and includes within its scope CFR Title 47 Part 15 Subparts B and C.

1.2 Report Retention

For equipment verified to comply with the regulations herein, the manufacturer is obliged to retain this report with the product records for the life of the product, and no less than ten years. A copy of this Report will remain on file with this laboratory until November 2027.

1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

1.4 Test Data

This test report contains data included within the laboratories scope of accreditation.

1.5 Limitation of Results

The test results contained in this report relate only to the item(s) tested. Any electrical or mechanical modification made to the test item subsequent to the test date shall invalidate the data presented in this report. Any electrical or mechanical modification made to the test item subsequent to this test date shall require reevaluation.

1.6 Copyright

This report shall not be reproduced, except in full, without the written approval of Amber Helm Development L.C..

1.7 Endorsements

This report shall not be used to claim product endorsement by any accrediting, regulatory, or governmental agency.

1.8 Test Location

The EUT was fully tested by **Amber Helm Development L.C.**, 92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA. Table 1 lists all sites employed herein. Specific test sites utilized are also listed in the test results sections of this report.

Table 1: Test Site List.

Description	Location	Quality Num.
OATS (3m & 10m)	92723 Michigan Hwy-152, Sister Lakes, Michigan 49047 USA	OATSA

1.9 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 2. The quality system employed at Amber Helm Development L.C. has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 2: Equipment List.

Description	Manufacturer/Model	SN	Quality Num.	Last Cal By / Date Due
Spectrum Analyzer	Rohde & Schwarz / FSV30	101660	RSFSV30001	RS / May-2018
EMI Receiver	HP / 85460A/85462A	3704A00422, 3807A00465	HP8546A	Techmaster / Apr-2018
(3m) RG8 Coax	CS-3227 / CS-3227	C060914	CS3227	AHD / Mar-2018
(3m) LMR-400 Coax	AHD / LMR400	C090804	LMR400	AHD / Mar-2018
(LCI) DS Coax	AHD / RG58/U	920809	RG58U	AHD / Jan-2018
Shielded Loop Antenna	EMCO / 6502	9502-2926	EMCOLOOP1	Lib. Labs. / Aug-2018
BiconiLog Antenna	EMCO / 3142	1169	BILO3142	Lib.Labs / May-2018
Double Ridged Horn	EMCO / 3115	2788	RH3115	Lib.Labs. / July-2018

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The ultimate goal of Bartec USA, LLC is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the Bartec USA, LLC SX8TAP3 for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.209
Canada	ISED Canada	ISED RSS-GEN

It has been determined that the equipment under test is subject to the rules and directives above at the date of this testing. In conjunction with these rules and directives, the following specifications and procedures are followed herein to demonstrate compliance (in whole or in part) with these regulations.

ANSI C63.4:2014	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
ANSI C63.10:2013 (USA)	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
IEEE Trans. EMC, Vol. 47, No. 3 August 2005	"Extrapolating Near-Field Emissions of Low-Frequency Loop Transmitters," J.D.Brunett, V.V.Liepa, D.L.Sengupta
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"
ISED Canada	"The Measurement of Occupied Bandwidth"
ICES-003; Issue 6 (2016)	"Information Technology Equipment (ITE) Limits and methods of measurement"

3 Configuration and Identification of the Equipment Under Test

3.1 Description and Declarations

The equipment under test is a transceiver designed for LF activation (125 kHz) and RF reception (315 MHz and 433 MHz) from Tire Pressure Monitor (TPM) Sensors. The EUT is approximately 20 x 6 x 8 cm in dimension, and is depicted in Figure 1. It is powered by 4.2 VDC lithium polymer battery. In use, this device is used by tire shops and dealers who install TPM sensors into vehicle rims. Table 3 outlines provider declared EUT specifications.



Figure 1: Photos of EUT.

Table 3: EUT Declarations.

General Declarations			
Equipment Type:	LF Transceiver	Country of Origin:	Not Declared
Nominal Supply:	4.2 VDC	Oper. Temp Range:	Not Declared
Frequency Range:	125 kHz	Antenna Dimension:	4 cm
Antenna Type:	coil	Antenna Gain:	Integral
Number of Channels:	1	Channel Spacing:	None
Alignment Range:	Not Declared	Type of Modulation:	AM+CW
United States			
FCC ID Number:	SX8TAP3	Classification:	DCD
Canada			
IC Number:	5736A-TAP3	Classification:	Remote Control Device

3.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

3.1.2 Modes of Operation

When the EUT is in charging mode, no LF or RF radios are in operation and the display only shows battery state. In normal use (once charged) a large number of LF transmit protocols can be selected by the user on this device based

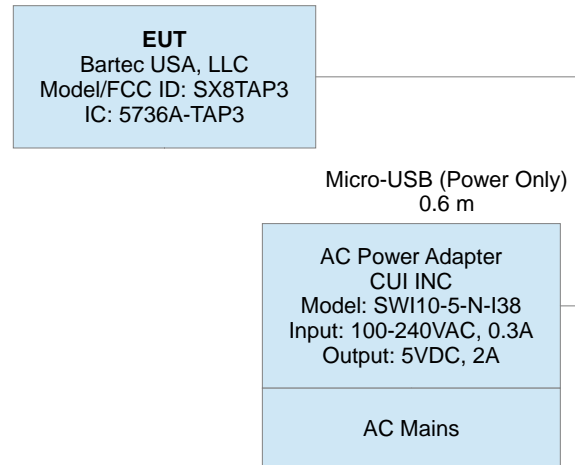


Figure 2: EUT Test Configuration Diagram.

on vehicle make and model. The range of LF protocols are provided in an associated exhibit, and the worst case emissions are reported herein. The CW test mode was determined to have the highest fundamental and harmonic emissions and is fully reported. Worst case EBW was measured for the maximum and minimum AM modulated protocols. Spurious emissions were measured with the EUT LF transmitter, both UHF receivers, and integral BLE module all in active states, as well as when the EUT is in charging mode.

3.1.3 Variants

There is only a single variant of the EUT, as tested.

3.1.4 Test Samples

Two samples were provided for testing; one sample for photographs and one normal operating sample with additional custom test software that produced the worst-case modes of operation. The custom test software allowed for modulated 125 kHz transmission at the highest possible data rate, 125 kHz CW transmission, a 315 MHz / 433 MHz receiver active mode, and continuous transmission by the integral (pre-approved) Bluetooth module.

3.1.5 Functional Exerciser

EUT functionality was verified by observation of transmitted signal.

3.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory.

3.1.7 Production Intent

The EUT appears to be a production ready sample.

3.1.8 Declared Exemptions and Additional Product Notes

This EUT also employs a pre-certified fully modular Bluetooth radio, FCC ID: QOQWT12, IC: 5123A-BGTWT12A with integral antenna. The LF transmitter, active UHF receiver, and digital spurious emissions from this fully assembled EUT are detailed in this report.

4 Emissions

4.1 General Test Procedures

4.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first pre-scanned in our screen room. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.8 are employed. After pre-scan, emission measurements are made on the test site of record. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in relevant test standards are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3. All intentionally radiating elements that are not fixed-mounted in use are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded. If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied.

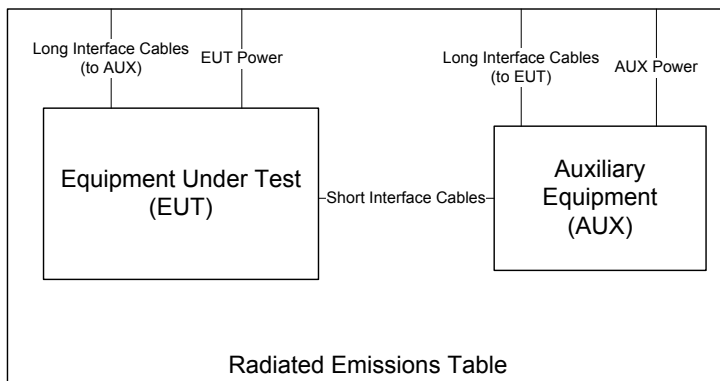


Figure 3: Radiated Emissions Diagram of the EUT.

For devices with intentional emissions below 30 MHz, a shielded loop antenna and/or E-field and H-Field broadband probes are used depending on the regulations. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, the broadband probes employed are 10cm diameter single-axis shielded transducers and measurements are repeated and summed over three axes.

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360° in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Emissions above 1 GHz are characterized using standard gain or broadband ridge-horn antennas on our OATS with a 4×5 m rectangle of ECCOSORB absorber covering the OATS ground screen. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to $\text{dB}\mu\text{V}/\text{m}$ at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is computed, it is computed as

$$EIRP(\text{dBm}) = E_{3m}(\text{dB}\mu\text{V}/\text{m}) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.



Figure 4: Radiated Emissions Test Setup Photograph(s).

4.1.2 Conducted Emissions Test Setup and Procedures

AC Port Conducted Spurious For this device, AC power line conducted emissions are measured in our screen room. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.4 / CISPR 22 are employed. Alternatively, an on-table layout more representative of actual use may be employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 5.

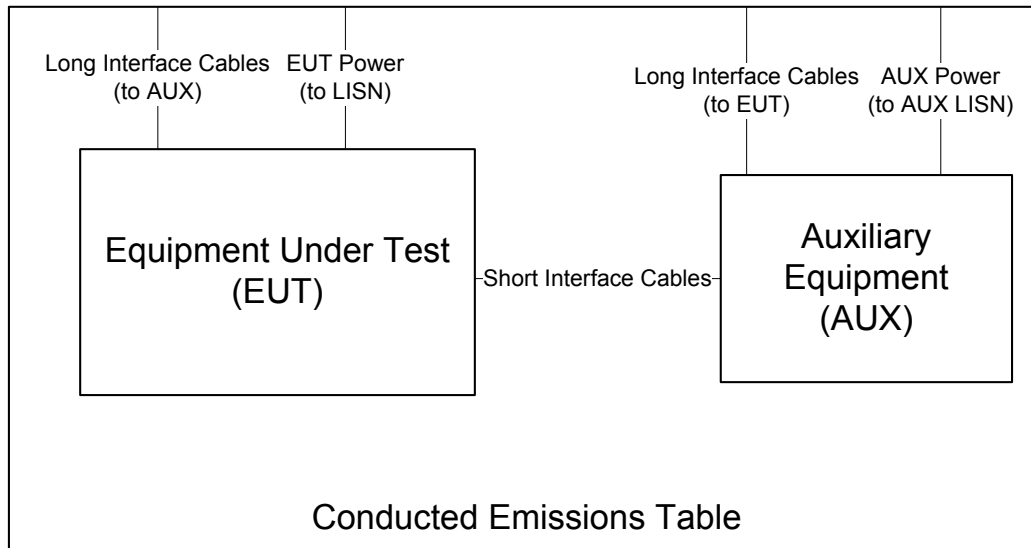


Figure 5: Conducted Emissions Setup Diagram of the EUT.

Conducted emissions are measured and recorded for each AC mains power source over the spectrum 0.15 MHz to 30 MHz for both the ungrounded (HI/PHASE) and grounded (LO/GND) conductors with the EUT placed in its highest current draw operating mode(s). The test receiver is set to peak-hold mode in order to record the peak emissions throughout the course of functional operation. Only if an emission exceeds or is near the limit are quasi-peak and average detection applied. Photographs of the test setup employed are depicted in Figure 6.

4.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case of this EUT, measurements of the worst-case radiated emissions are performed with the supply voltage varied by no less than 85% and 115% of the nominal rated value for devices connecting to AC power mains.



Figure 6: Conducted Emissions Test Setup Photograph(s).

4.2 Intentional Emissions

4.2.1 Fundamental Emission Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 4.

Table 4: Pulsed Emission Characteristics (Duty Cycle).

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	3-Nov-17
9 kHz f 150 kHz	Pk/QPk	200 Hz	300 Hz	Test Engineer:	Gordon Helm
150 kHz f 30 MHz	Pk/QPk	9 kHz/10 kHz	30 kHz	EUT Mode:	Normal Operating
25 MHz f 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Meas. Distance:	60 cm
f > 1 000 MHz	Pk	3 MHz	3MHz	EUT Tested:	Bartec SX8TAP3
f > 1 000 MHz	Avg	3 MHz	10kHz		

#	EUT Mode	Overall Transmission			Internal Frame Characteristics			Computed Duty Cycle*	
		Min. Repetition Rate (sec)	Max. No. of Frames	Total Transmission Length (sec)	Max. Frame Length (ms)	Min. Frame Period (s)	Frame Encoding	(%)	Duty (dB)
1	Normal (125 kHz)	CW	N/A	>100ms	N/A	N/A	The EUT employs a CW signal > 100ms, so duty cycle is not applied for this product.	100.000	0.0

* No Duty Cycle is employed when demonstrating compliance.

4.2.2 Fundamental Emission Bandwidth

Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available frame length and minimum frame spacing. Radiated emissions are recorded following the test procedures listed in Section 2.1. The 20 dB EBW is measured as the max-held peak-detected signal when the IF bandwidth is greater than or equal to 1% of the receiver span. For complex modulations other than ASK and FSK, the 99% emission bandwidth per IC test procedures has a different result, and is also separately reported. The results of EBW testing are summarized in Table 5. Plots showing measurements employed to obtain the emission bandwidth reported are provided in Figure 7.

Table 5: Intentional Emission Bandwidth.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	6-Nov-17
9 kHz f 150 kHz	Pk	> 1% Span	>= 3 * IFBW	Test Engineer:	Joseph Brunett
150 kHz f 30 MHz	Pk	> 1% Span	>= 3 * IFBW	EUT Mode:	Normal Operating
				Meas. Distance:	0.6 m
				EUT Tested:	Bartec SX8TAP3

#	Mode	Freq. (kHz)	Supply (VDC)	20 dB EBW (kHz)	99% PWR BW (kHz)	110 kHz Restricted Band dBc			
1	CW	125	4.7	2.6	2.0	> 50			
2	Max Data Rate	125	4.7	32.5	48.6	24.9			
3	Min Data Rate	125	4.7	4.5	11.7	>35			

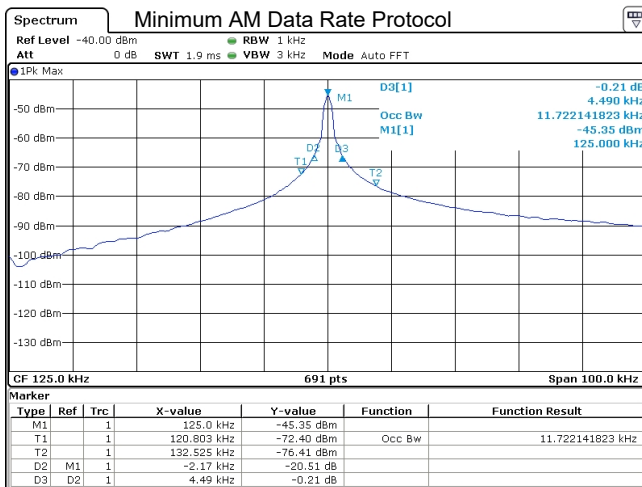
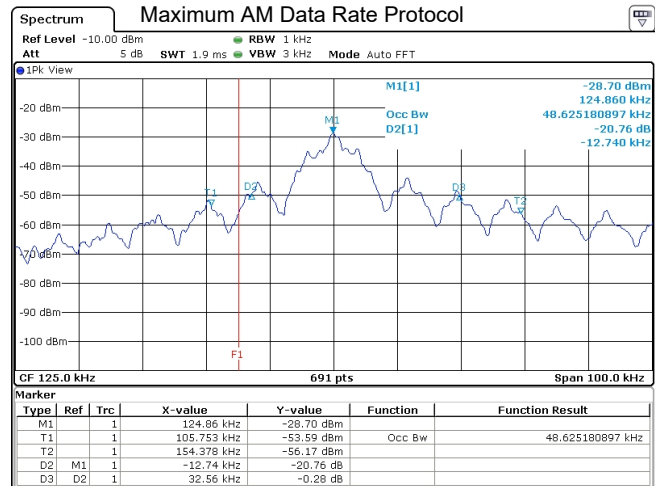
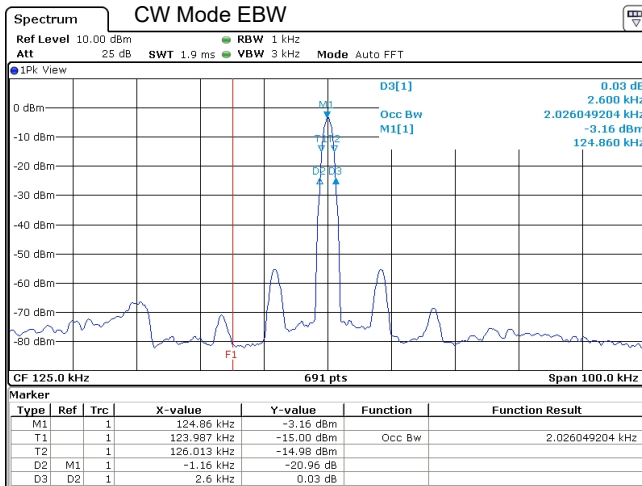


Figure 7: Intentional Emission Bandwidth.

4.2.3 Fundamental Emission

Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT’s loop antenna(s) are measured when the EUT loop axes are (1) aligned along the same axis as the test loop antenna and horizontal with respect to the test site ground plane, (2) aligned coplanar (in the same plane) with the test antenna and aligned horizontal with respect to the test site ground plane, and (3) aligned coplanar (in the same plane) with the test antenna and vertical with respect to the test site ground plane. Table 6 details the results of these measurements.

Table 6: Fundamental Radiated Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	3-Nov-17
9 kHz f 150 kHz	Pk/QPk	200 Hz	300 Hz	Test Engineer:	Gordon Helm
150 kHz f 30 MHz	Pk/QPk	9 kHz	30 kHz	EUT Mode:	CW +Max Modulated
25 MHz f 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Meas. Distance:	3 meters
f > 1 000 MHz	Pk	1 MHz	3MHz	EUT Tested:	Bartec SX8TAP3
f > 1 000 MHz	Avg	1 MHz	3MHz		

Fundamental Emissions Measurements															
#	Mode	EUT Orientation	Freq. MHz	Ant. Used QN	Ant.** Height m	Table Azim deg	Ka dB/m	Kg dB	Cf** 3m / 300m dB	E-field @ 3m		E-field @ 300m			Pass By***
										Pk dBuV/m	Avg dBuV/m	Pk dBuV/m	Avg dBuV/m	Limit Avg dBuV/m	
1	CW + Modulated	Flat	0.125	EMCOLOOP1	1.0	90	10.1	0.0	80.0	76.0		-4.0		25.7	29.7
2		Side	0.125	EMCOLOOP1	1.0	90	10.1	0.0	80.0	76.6		-3.4		25.7	29.1
3		End	0.125	EMCOLOOP1	1.0	90	10.1	0.0	80.0	66.0		-14.0		25.7	39.7

* EUT was tested in CW mode. No averaging applies and Quasi-Peak data was not needed to demonstrate compliance.

** Emissions were evaluated at 1m test antenna height. Cf computed as 40 dB/dec per FCC / ISED guidelines (Near Field < 30 MHz)

4.3 Unintentional Emissions

4.3.1 Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Following the test procedures listed in Section 2.1, field emissions measurements are made on the EUT for both Horizontal and Vertically polarized coupling fields. The EUT's loop antenna(s) are measured when the EUT loop axes are (1) aligned along the same axis as the test loop antenna and horizontal with respect to the test site ground plane, (2) aligned coplanar (in the same plane) with the test antenna and aligned horizontal with respect to the test site ground plane, and (3) aligned coplanar (in the same plane) with the test antenna and vertical with respect to the test site ground plane. The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 7. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 7: Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	3-Nov-17
9 kHz f 150 kHz	Pk/QPk	200 Hz	300 Hz	Test Engineer:	Gordon Helm
150 kHz f 30 MHz	Pk/QPk	9 kHz	30 kHz	EUT Mode:	Normal + Load
25 MHz f 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Meas. Distance:	3 m
f > 1 000 MHz	Pk	3 MHz	3MHz	EUT Tested:	Bartec TAP3
f > 1 000 MHz	Avg	3 MHz	10kHz		

Transmit Chain Spurious Emissions																
#	Mode	EUT Orientation	Freq. kHz	Ant. Used	Ant.** Height m	Table Azim deg	Ka dB/m	Kg dB	Cf** (3 to 300m) dB	E-field @ 3m*		E-field @ 300m/30m			Pass By	Comments
										Pk dBuV/m	Avg/Qpk dBuV/m	Pk dBuV/m	Qpk dBuV/m	Limit Avg/Qpk dBuV/m		
1	CW + Max Rate Modulated	Max All, Worst	375.0	EMCOLOOP1	1.0	90.0	10.0	0.0	80.0	61.0		-19.0		16.1	35.1	
2		Max All, Worst	625.0	EMCOLOOP1	1.0	90.0	10.0	0.0	40.0	59.0		19.0		31.7	12.7	
3		Max All, Worst	875.0	EMCOLOOP1	1.0	80.0	10.2	0.0	40.0	51.0		11.0		28.8	17.8	
4		Max All, Worst	1362.0	EMCOLOOP1	1.0	100.0	10.2	0.0	40.0	54.0		14.0		24.9	10.9	
5		Max All, Worst	5375.0	EMCOLOOP1	1.0	80.0	10.1	0.0	40.0	46.0		6.0		29.5	23.5	
6																

* EUT was tested for CW and max-rate modulated modes. No averaging is applied below 490 kHz and Quasi-Peak data was not needed to demonstrate compliance.

** Emissions were evaluated at 1m test antenna height. Test antenna was rotated 360 degrees.

4.3.2 General Radiated Spurious

The results for the measurement of general spurious emissions (emissions arising from digital circuitry) at the nominal voltage and temperature are provided in Table 8. Radiation from digital components are measured up to 1000 MHz or to the highest frequency required by the applied standards, whichever is greater.

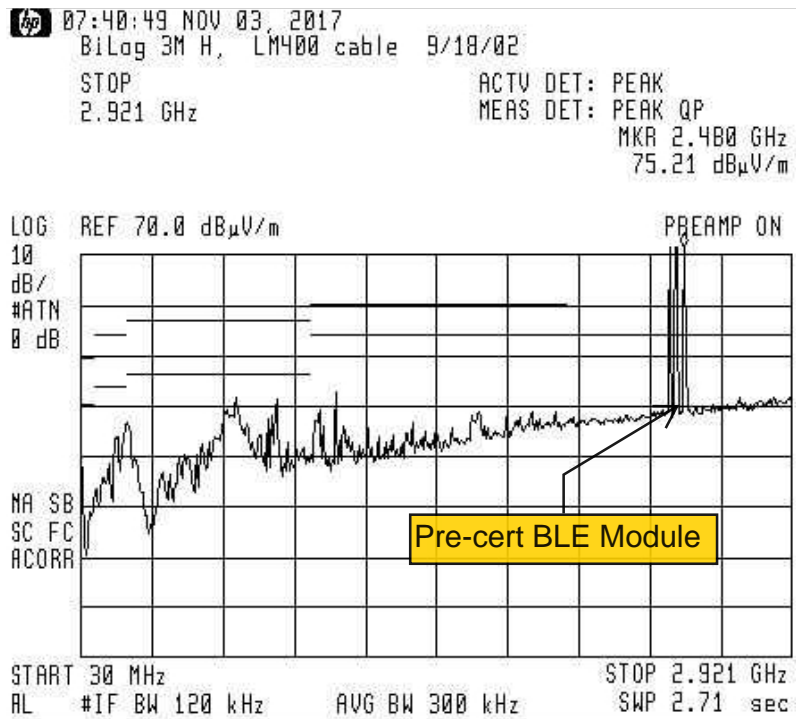
Table 8(a): Radiated Digital Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth	Test Date:	3-Nov-17
25 MHz f 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Test Engineer:	Gordon Helm
f > 1 000 MHz	Pk	1 MHz	3 MHz	EUT:	Bartec SX8TAP3
f > 1 000 MHz	Avg	1 MHz	10kHz	EUT Mode:	CW + Max Mod
				Meas. Distance:	3 meters

Digital Spurious Emissions													FCC/IC
#	Freq. MHz	Ant. Used	Ant. Pol.	Table Azim. deg	Ant Height m	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(QPk/Avg) dBµV/m	FCC/IC E3lim (Pk) dBµV/m	FCC/IC E3lim (Qpk/Avg) dBµV/m	Pass dB	Comments
1	64.0	BILO3142	H	90.0	1.4	9.6	-4	24.9	18.9	60.0	40.0	21.1	
2	72.0	BILO3142	V	140.0	1.0	8.7	-5	36.5	31.9	60.0	40.0	8.1	
3	72.6	BILO3142	V	150.0	1.0	8.6	-5	25.7	18.0	60.0	40.0	22.0	
4	74.6	BILO3142	H	180.0	1.0	8.4	-5	23.2	17.8	60.0	40.0	22.2	
5	105.0	BILO3142	H	180.0	1.0	7.2	-6	24.3	19.0	63.5	43.5	24.5	
6	105.1	BILO3142	V	230.0	1.0	7.2	-6	32.4	28.3	63.5	43.5	15.2	
7	194.0	BILO3142	H	180.0	1.6	12.0	-8	33.0	29.0	63.5	43.5	14.5	
8	199.8	BILO3142	V	140.0	1.0	12.4	-8	27.5	23.1	63.5	43.5	20.4	
9	200.0	BILO3142	V	230.0	1.0	12.4	-8	30.7	25.1	63.5	43.5	18.4	
10	202.5	BILO3142	H	170.0	1.6	12.6	-8	32.5	28.6	63.5	43.5	14.9	
11	204.8	BILO3142	H	230.0	1.0	12.7	-9	26.9	21.3	63.5	43.5	22.2	
12	206.4	BILO3142	V	100.0	1.0	12.8	-9	29.4	24.3	63.5	43.5	19.2	
13	216.0	BILO3142	H	180.0	1.0	13.4	-9	20.0	17.0	63.5	43.5	26.5	
14	463.0	BILO3142	V	130.0	1.0	17.5	-1.6	31.7	26.7	66.0	46.0	19.3	
15	539.0	BILO3142	V	0.0	1.0	18.0	-1.8	34.7	30.7	66.0	46.0	15.3	
16	540.0	BILO3142	H	340.0	1.7	18.0	-1.8	34.9	26.0	66.0	46.0	20.0	
17	648.0	BILO3142	V	270.0	1.0	20.6	-2.1	33.0	32.5	66.0	46.0	13.5	
18	824.0	BILO3142	V	150.0	1.0	24.9	-2.6	35.5	33.5	66.0	46.0	12.5	
19	824.0	BILO3142	H	20.0	1.5	24.9	-2.6	35.4	33.4	66.0	46.0	12.6	
20	840.0	BILO3142	V	150.0	1.0	25.1	-2.7	39.3	37.3	66.0	46.0	8.7	
21	840.0	BILO3142	H	20.0	1.5	25.1	-2.7	36.7	34.4	66.0	46.0	11.6	
22													
23													

Table 8(b): Radiated Digital Spurious Emissions.

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4.3.3 Conducted Emissions Test Results - AC Power Port(s)

The results of emissions from the EUT's AC mains power port(s) are reported in Table 9.

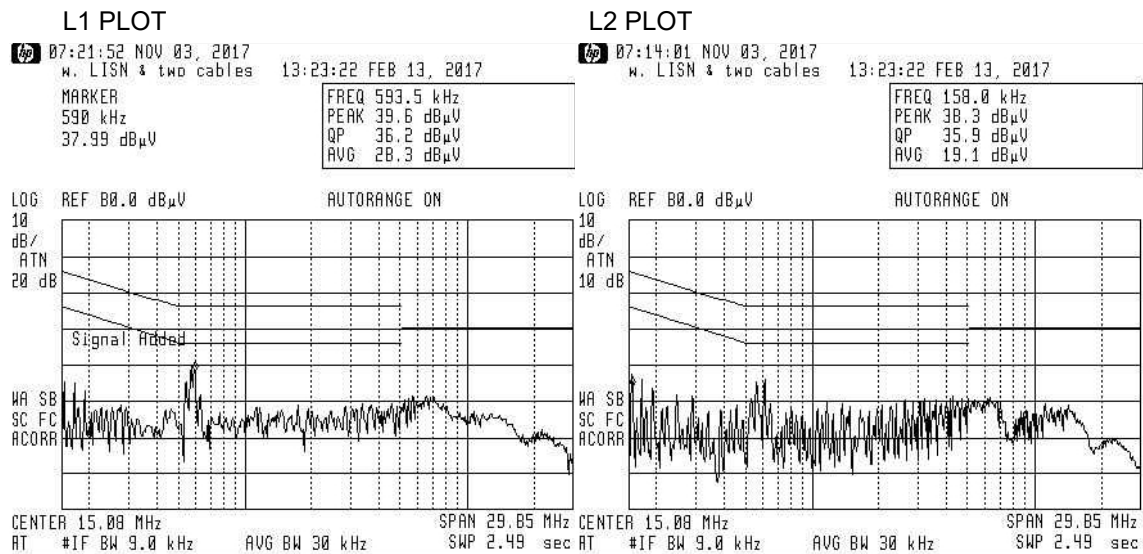
Table 9(a): AC Mains Power Conducted Emissions Results.

Frequency Range 150kHz f 30 MHz	Det Pk/QPk/Avg	IF Bandwidth 9 kHz	Video Bandwidth 30 kHz	Test Date: 3-Nov-17
				Test Engineer: Gordon Helm
				EUT Mode: CW + Modulating
AC Mains: 115 VAC, 60 Hz.				EUT: Bartec TAP3
				Meas. Distance: AC Mains Conducted

AC Mains Power Conducted Emissions														
#	Freq. MHz	Line Side	Vmeas			Class A Qpk		Class A Avg		Class B Qpk		Class B Avg		Comments
			Pk dBuV	Qpk dBuV	Avg dBuV	Vlim* dBuV	Margin dB	Vlim* dBuV	Margin dB	Vlim* dBuV	Margin dB	Vlim* dBuV	Margin dB	
1	0.158	L1		35.9	19.1	79.0	43.1	66.0	46.9	65.6	29.7	55.5	36.4	
2	0.300	L1		26.0	12.0	79.0	53.0	66.0	54.0	60.3	34.3	50.2	38.2	
3	0.581	L1		35.0	24.0	73.0	38.0	60.0	36.0	54.8	19.8	46.0	22.0	
4	4.900	L1		27.0	14.0	73.0	46.0	60.0	46.0	56.0	29.0	46.0	32.0	
5	5.900	L1		27.0	14.0	73.0	46.0	60.0	46.0	60.0	33.0	50.0	36.0	
6	11.800	L1		24.0	9.0	73.0	49.0	60.0	51.0	60.0	36.0	50.0	41.0	
7														
8	0.162	L2		29.0	15.0	79.0	50.0	66.0	51.0	65.4	36.4	55.3	40.3	
9	0.176	L2		32.0	21.0	79.0	47.0	66.0	45.0	64.7	32.7	54.6	33.6	
10	0.217	L2		29.0	20.0	79.0	50.0	66.0	46.0	62.9	33.9	52.9	32.9	
11	0.593	L2		36.2	28.3	73.0	36.8	60.0	31.7	56.0	19.8	46.0	17.7	
12	1.100	L2		28.0	17.0	73.0	45.0	60.0	43.0	56.0	28.0	46.0	29.0	
13	6.600	L2		29.0	21.0	73.0	44.0	60.0	39.0	60.0	31.0	50.0	29.0	
14														
15														

*In all cases, VPk VQpk VAve. If VPk < Vavg limit, then VQPk limit and Vavg limit are met.

Table 9(b): AC Mains Power Conducted Emissions Results.



5 Measurement Uncertainty and Accreditation Documents

The maximum values of measurement uncertainty for the laboratory test equipment and facilities associated with each test are given in the table below. This uncertainty is computed for a 95.45% confidence level based on a coverage factor of $k = 2$.

Table 10: Measurement Uncertainty.

Measured Parameter	Measurement Uncertainty [†]
Radio Frequency	$\pm(f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS - 1))/2 + 1 \text{ Hz})$
Conducted Emm. Amplitude	$\pm 1.9 \text{ dB}$
Radiated Emm. Amplitude (30 – 200 MHz)	$\pm 4.0 \text{ dB}$
Radiated Emm. Amplitude (200 – 1000 MHz)	$\pm 5.2 \text{ dB}$
Radiated Emm. Amplitude ($f > 1000 \text{ MHz}$)	$\pm 3.7 \text{ dB}$

[†]Ref: CISPR 16-4-2:2011+A1:2014

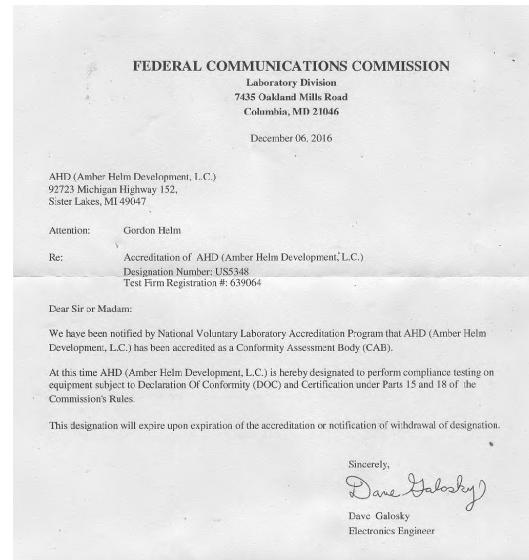


Figure 8: Accreditation Documents