

EMC Test Report

regarding

USA: CFR Title 47, Part 15.209 (Emissions)
Canada: ISSED RSS-210v10/GENv5 (Emissions)

for



Tech450Pro/Tech550Pro/Tech600Pro

Category: LF Transmitter

Judgments:

15.209/RSS-210v10 Compliant Transmitter

Testing Completed: September 5, 2022



Prepared for:

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Revision History

Rev. No.	Date	Details	Revised By
r0	August 15, 2022	Initial Release.	J. Brunett
r1	September 5, 2022	Updated OBW + Duty Plots.	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: US5348 and US5356) and with ISED Canada, Ottawa, ON (File Ref. No: 3161A and 24249). Amber Helm Development L.C. holds accreditation under NVLAP Lab Code 200129-0.

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 October 2032.

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 laboratory's scope of accreditation. Any data in this report that is not covered under the laboratory's scope is clearly identified.

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.**, headquartered at 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 where needed.

Table 1: Test Site List.

Description	Location	Quality Num.
OATS (3 meter)	3615 E Grand River Rd., Williamston, Michigan 48895	OATSC

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.	Cal/Ver By / Date Due
Spectrum Analyzer	R & S / FPC1500	101692	RSFPC15001	RS / Oct-2022
Spectrum Analyzer	R & S / FSV30	101660	RSFSV30001	RS / Apr-2023
Shielded Loop Antenna	EMCO / 6507	9012-1264	EMCOLOOP1	Keysight / Aug-2023
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2023
Log Periodic Antenna	EMCO / 3146	9305-3614	LOGEMCO01	Keysight / Aug-2023
Quad Ridge Horn	Singer / A6100	C35200	HQR1TO18S01	Keysight / Aug-2024
BNC-BNC Coax	WRTL / RG58/U	001	CAB001-BLACK	AHD / March-2023
3.5-3.5MM Coax	PhaseFlex / PhaseFlex	001	CAB015-PURP	AHD / Dec-2022
LISN	Solar / 8012-50-R-24-BNC	970917	LISNB	AHD / February-2023

2 Test Specifications and Procedures

2.1 Test Specification and General Procedures

The 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 Tech450Pro/Tech550Pro/Tech600P 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-210v10/GENv5

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	"American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"
TP0102RA	"AHD Internal Document TP0102 - Radiated Emissions Test Procedure"
ISED Canada	"The Measurement of Occupied Bandwidth"
ICES-003; Issue 7 (2020)	"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 433.9s MHz) from Tire Pressure Monitor (TPM) Sensors. The EUT is approximately 19 x 11 x 5 cm in dimension, and is depicted in Figure 1. It is powered by 4.2 VDC lithium polymer rechargeable 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 Transmitter
Country of Origin:	Not Declared
Nominal Supply:	4.2 VDC
Oper. Temp Range:	Not Declared
Frequency Range:	125 kHz
Antenna Dimension:	Not Declared
Antenna Type:	coil
Antenna Gain:	Not Declared
Number of Channels:	1
Channel Spacing:	Not Applicable
Alignment Range:	Not Declared
Type of Modulation:	AM
United States	
FCC ID Number:	SX8DSW9
Classification:	DSC
Canada	
IC Number:	5736A-DSW9
Classification:	Remote Control Device

3.1.1 EUT Configuration

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

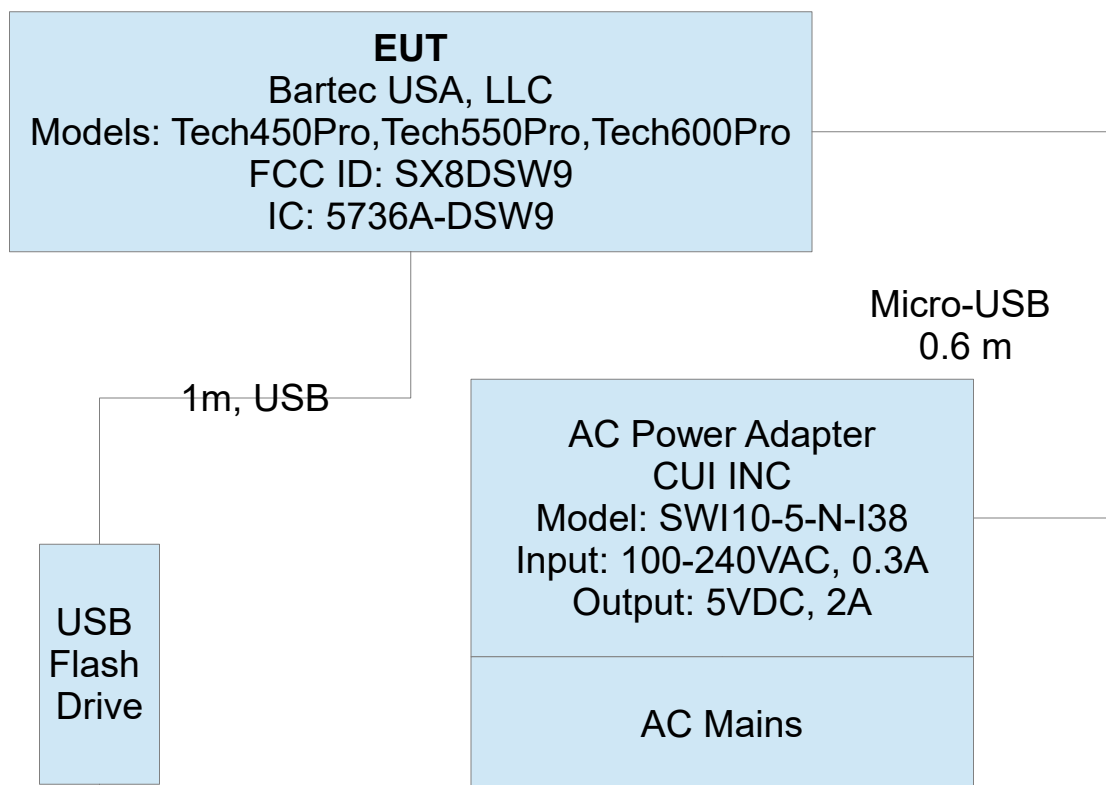


Figure 2: EUT Test Configuration Diagram.

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 the battery charge state. In normal use (once charged) AM modulated LF encodings are selected by the user based on selecting a matching vehicle make and model, then transmitted. The CW emission mode was determined to have the highest fundamental and harmonic emissions and is fully reported. Worst case EBW was measured with the EUT test software stepping through all AM modulated LF encodings. Spurious emissions were measured with the EUT LF transmitter, both UHF receivers, and integral BLE/WLAN module all in active states, as well as when the EUT is in charging mode.

3.1.3 Variants

There are three variants of the EUT, the Tech450Pro, the Tech550Pro, and the Tech600Pro. RF and LF circuitry in all variants is identical, except that the Tech450Pro and Tech550Pro both populate a 25 pin digital interface connector while the Tech600Pro populates a USB connector for an external flash drive.

3.1.4 Test Samples

Samples were provided for testing with custom test software that repetitively transmitted the worst-case LF encodings. One normal operating sample was also provided. The custom test software allowed for modulated 125 kHz transmission at the highest possible data rate and 125 kHz CW transmission with the 315 MHz / 433 MHz receiver forced into active mode.

3.1.5 Functional Exerciser

Normal operating 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 BLE+WLAN radio, FCC ID: SX8ESPWROOM32, IC: 5736A-ESPWROOM32 with integral antenna. The LF transmitter and digital spurious emissions from this fully assembled EUT are detailed in this report. UHF Receiver emissions and digital emissions for this product as a PC Peripheral are addressed separately by the manufacturer under SDoC procedures.

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.

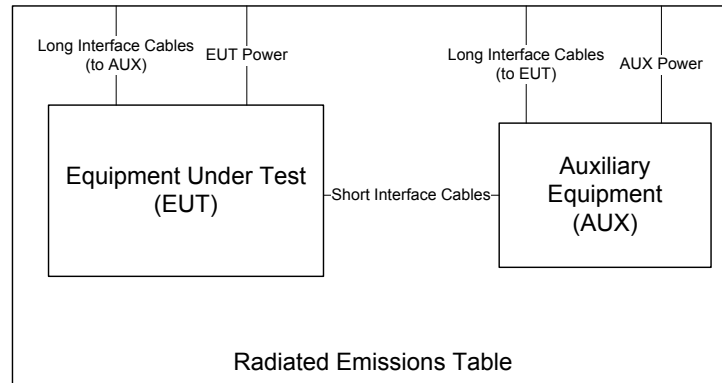


Figure 3: Radiated Emissions Diagram of the EUT.

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 regulation. Shielded loops are placed at a 1 meter receive height at the desired measurement distance. For exposure in this band, 10cm diameter single-axis broadband probes meeting the requirements of ISSED SPR-002 section 5.2 are employed. Measurements are repeated and summed over three axes, and the entire frequency range is measured with and without the EUT transmitting.

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 and a 1.5m table height. 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 dBμV/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

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

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

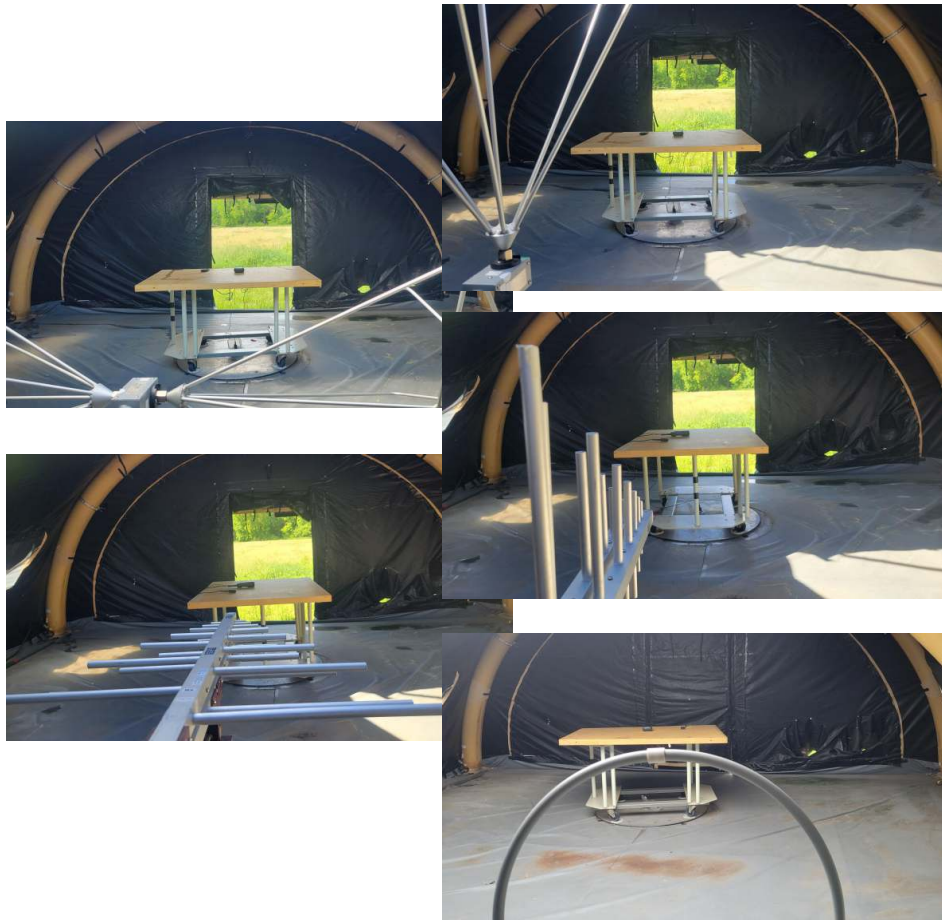


Figure 4: Radiated Emissions Test Setup Photograph(s).

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.

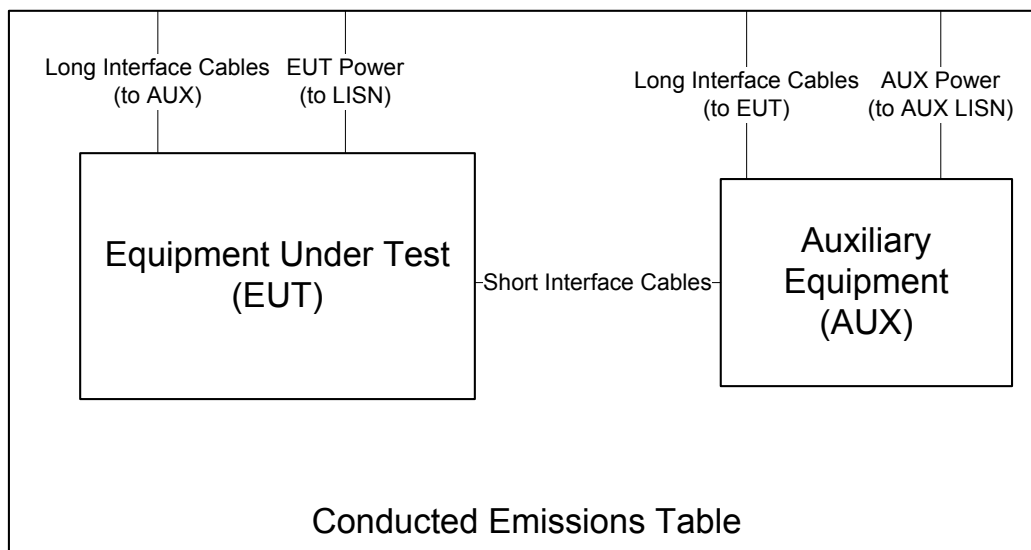


Figure 5: Conducted Emissions Setup Diagram of the EUT.

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.



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

4.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by 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.

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
9 kHz ≤ f ≤ 150 kHz

Det
Pk

IF Bandwidth
10 kHz

Video Bandwidth
30 kHz

Test Date: 5-Sep-22
Test Engineer: Joseph Brunett
EUT Mode: See Below
Meas. Distance: 30 CM
EUT Tested: Bartec Tech600/550/450

#	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	Test Code – All Encodings	1.00	1	> 20sec	4.0	-	In the worst case transmissino mode the EUT can exhibit a CW transmission that is greater than 4 seconds in length. Thus, no duty cycle is applied for this EUT.	100.000	*

* No Duty Cycle is employed when demonstrating compliance.

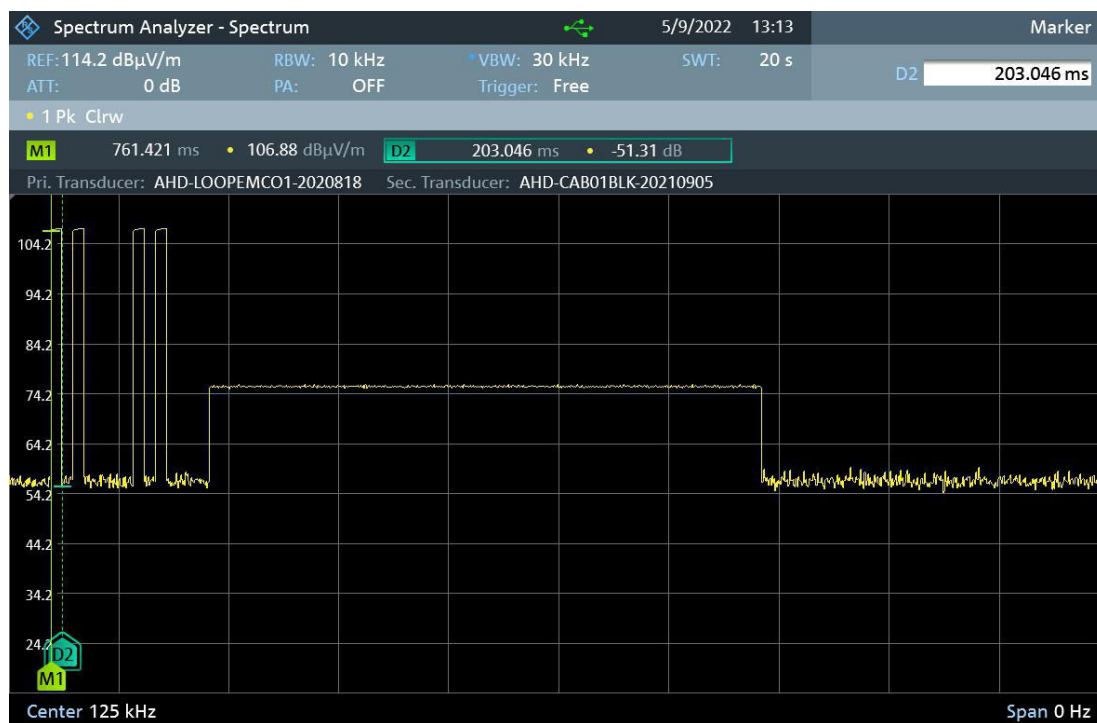


Figure 7: Pulsed Emission Characteristics (Duty Cycle).

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 8.

Table 5: Intentional Emission Bandwidth.

Frequency Range				Det	IF Bandwidth	Video Bandwidth	Test Date:	
9 kHz ≤ f ≤ 150 kHz				Pk	> 1% Span	≥ 3 * IFBW	5-Sep-22	
							Test Engineer:	
							Joseph Brunett	
							EUT Mode:	
							See Below	
							Meas. Distance:	
							0.6 m	
							EUT Tested:	
							Bartec Tech600/550/450	

#	Mode	Frequency (MHz)	Temp (C)	Supply (VDC)	20 dB EBW (kHz)	99% EBW (kHz)	110 kHz Restricted Band* (dBc)
1	Test Code – All encodings	0.125	21	Fully Charged	0.761	0.761	>-44.6

* Note: The EUT emissions in the 90-110 kHz restricted band is down > 26 dB from the fundamental. The FCC requests that the sideband of the modulated spectrum be at least 26 dB down in the restricted band, and the emissions from the EUT that fall into that band is outside of the first null of the modulated spectrum, and thus are not considered part of the fundamental emission, per FCC guidelines.



Figure 8: 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 along all three axes, including when the EUT loop axes are aligned in the same axis as the test loop and aligned coplanar (in the same plane) with the test loop antenna. Table 6 details the results of these measurements.

Table 6: Fundamental Radiated Emissions.

Frequency Range
9 kHz ≤ f ≤ 150 kHz

Det
Pk/QPk

IF Bandwidth
200 Hz

Video Bandwidth
300 Hz

Test Date: 2-Aug-22
Test Engineer: J. Brunett
EUT Mode: See Table
Meas. Distance: 6 meters
EUT Tested: Bartec Tech600/550/450

Fundamental Emissions Measurements																		
#	Mode	EUT Orientation	Freq. kHz	Ant. Used QN	Ant.** Height m	Table Azim deg	Ka dB/m	Kg dB	C*** 6m / 300m dB	E-field @ 6m Pk Qpk dBuV/m	H-field @ 6m Pk Qpk dBuA/m	FCC E-field @ 300m			ISED H-field @ 300m			Pass By***
												Pk Qpk dBuV/m	Limit Qpk dBuV/m	Pk Qpk dBuA/m	Limit Qpk dBuA/m			
1	Test Code – All Encodings	Flat	125.0	EMCOLOOP1	1.0	300	10.1	0.0	68.0	89.2	37.9	21.2		25.7	-30.1		-25.8	4.4
2		Side	125.0	EMCOLOOP1	1.0	300	10.1	0.0	68.0	83.7	32.4	15.7		25.7	-35.6		-25.8	9.9
3		End	125.0	EMCOLOOP1	1.0	300	10.1	0.0	68.0	81.1	29.8	13.1		25.7	-38.2		-25.8	12.5

#	Mode	Test Antenna Polarization	Freq. kHz	Battery State (%)	E-field @ 3m (Calc.) dBuV/m
4	Test Code – All Encodings	Flat	125.0	100%	101.2
5			125.0	50%	101.2
6			125.0	4%	101.2

* 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.

*** FCC E-field 40 dB/dec decay assumed. EUT field decay rate was not measured over a range of distances to determine CF between measurement and limit distance.

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 placed in all three axes, including when they are aligned along the same axis as the test loop antenna and are aligned coplanar with the test loop antenna. For all arrangements, test loop is rotated for maximum field. 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:	2-Aug-22
9 kHz ≤ f ≤ 150 kHz	Pk/QPk	200 Hz	300 Hz	Test Engineer:	J. Brunett
150 kHz ≤ f ≤ 30 MHz	Pk/QPk	9 kHz	30 kHz	EUT Mode:	See Table
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	Meas. Distance:	6 meters
f > 1 000 MHz	Pk/Avg	1 MHz	3MHz	EUT Tested:	Bartec Tech600/550/450

Transmit Chain Spurious Emissions																		
#	Mode	EUT Orientation	Freq. kHz	Ant. Used	Ant.** Height m	Table Azim deg	Ka dB/m	Kg dB	CF*** (6 to 30/300m) dB	E-field @ 6m Pk Qpk dBuV/m	FCC E-field @ 30/300m Pk Qpk Limit (Qpk) dBuV/m			ISED H-field @ 30/300m Pk Qpk Limit (Qpk) dBuV/m			Pass By	Comments
1	Test Code - All Encodings	Max All, Worst	250.0	EMCOLOOP1	1.0	300	10.0	0.0	68.0	51.9	-16.0		19.6	-67.5		-31.9	35.7	
2		Max All, Worst	375.0	EMCOLOOP1	1.0	300	10.0	0.0	68.0	50.5	-17.4		16.1	-68.9		-35.4	33.5	
3		Max All, Worst	500.0	EMCOLOOP1	1.0	300	10.2	0.0	28.0	29.2	1.3		33.6	-50.2		-17.9	32.3	
4		Max All, Worst	625.0	EMCOLOOP1	1.0	300	10.2	0.0	28.0	44.8	16.9		31.7	-34.6		-19.8	14.8	background
5		Max All, Worst	750.0	EMCOLOOP1	1.0	300	10.1	0.0	28.0	25.8	-2.1		30.1	-53.6		-21.4	32.2	
6		Max All, Worst	875.0	EMCOLOOP1	1.0	300	10.3	0.0	28.0	33.9	6.0		28.8	-45.5		-22.7	22.8	
7		Max All, Worst	1000.0	EMCOLOOP1	1.0	300	11.5	0.0	28.0	23.9	-4.0		27.6	-55.5		-23.9	31.6	
8		Max All, Worst	1125.0	EMCOLOOP1	1.0	300	11.3	0.0	28.0	31.0	3.1		26.6	-48.4		-24.9	23.5	background
9		Max All, Worst	1250.0	EMCOLOOP1	1.0	300	12.3	0.0	28.0	24.0	-3.9		25.7	-55.4		-25.8	29.6	
10																		

* 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 from 9 kHz to 30 MHz. No significant spurious were observed past the 10th harmonic.

*** FCC E-field 40 dB/dec decay assumed. EUT field decay rate was not measured over a range of distances to determine CF between measurement and limit distance.

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: Radiated Digital Spurious Emissions.

Frequency Range		Det	IF Bandwidth	Video Bandwidth		Test Date:				2-Jun-22						
25 MHz ≤ f ≤ 1 000 MHz		Pk/QPk	120 kHz	300 kHz		Test Engineer:				Joseph Brunett						
f > 1 000 MHz		Pk	1 MHz	3 MHz		EUT:				Bartec Tech600/550/450						
f > 1 000 MHz		Avg	1 MHz	10kHz		EUT Mode:				LF+UHF+Module RF Active						
						Meas. Distance:				3 meters						
Digital Spurious Emissions																FCC/IC + CE(CISPR)
#	Test Freq. MHz	Antenna QN Used	Test Pol.	Ka dBm	Kg dB	E-Field @ 3m**		FCC/IC Class B		CE Class B		FCC/IC Class A		CE Class A		Comments
						Pk dBμV/m	QPk/Avg dBμV/m	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	
1	Worst Case Emissions from both Tech450Pro/Tech550Pro/Tech650Pro Variants – WLAN/BLE Module Active (Paired)															
2	67.4	BICEMCO01	H	7.7	-4	21.5	12.6	40.0	27.4	40.5	27.9	49.5	36.9	50.5	37.9	
3	67.4	BICEMCO01	V	7.7	-4	32.7	21.8	40.0	18.2	40.5	18.7	49.5	27.7	50.5	28.7	
4	115.1	BICEMCO01	H	9.6	-6	22.2	13.3	43.5	30.2	40.5	27.2	54.0	40.7	50.5	37.2	
5	115.1	BICEMCO01	V	9.6	-6	48.7	25.3	43.5	18.2	40.5	15.2	54.0	28.7	50.5	25.2	
6	135.4	BICEMCO01	H	11.3	-6	21.5	14.4	43.5	29.1	40.5	26.1	54.0	39.6	50.5	36.1	
7	135.4	BICEMCO01	V	11.3	-6	27.8	22.5	43.5	21.0	40.5	18.0	54.0	31.5	50.5	28.0	
8	184.0	BICEMCO01	H	14.3	-8	29.7	19.0	43.5	24.5	40.5	21.5	54.0	35.0	50.5	31.5	
9	184.0	BICEMCO01	V	14.3	-8	33	28.5	43.5	15.0	40.5	12.0	54.0	25.5	50.5	22.0	
10	298.0	LOGEMCO01	H	13.7	-1.1	25.4	16.6	46.0	29.4	47.5	30.9	56.9	40.3	57.5	40.9	
11	298.0	LOGEMCO01	V	13.7	-1.1	21.9	16.4	46.0	29.6	47.5	31.1	56.9	40.5	57.5	41.1	
12	308.0	LOGEMCO01	H	13.9	-1.2	27.5	18.3	46.0	27.7	47.5	29.2	56.9	38.6	57.5	39.2	
13	308.0	LOGEMCO01	V	13.9	-1.2	22.9	17.6	46.0	28.4	47.5	29.9	56.9	39.3	57.5	39.9	
14	319.0	LOGEMCO01	H	14.2	-1.2	22.5	16.9	46.0	29.1	47.5	30.6	56.9	40.0	57.5	40.6	
15	319.0	LOGEMCO01	V	14.2	-1.2	22.1	16.9	46.0	29.1	47.5	30.6	56.9	40.0	57.5	40.6	
16	480.0	LOGEMCO01	H	17.1	-1.7	31.9	26.7	46.0	19.3	47.5	20.8	56.9	30.2	57.5	30.8	
17	480.0	LOGEMCO01	V	17.1	-1.7	28.6	23.2	46.0	22.8	47.5	24.3	56.9	33.7	57.5	34.3	
18	2390.0	QRHRN1TO1801	H/V	30.5	-6.5		44.9	54.0	9.1	50.0	5.1					Check WLAN/BLE
19	2483.5	QRHRN1TO1801	H/V	30.8	-6.7		46.3	54.0	7.7	50.0	3.7					Check WLAN/BLE
20																
21																
22																
23																
24																
25																

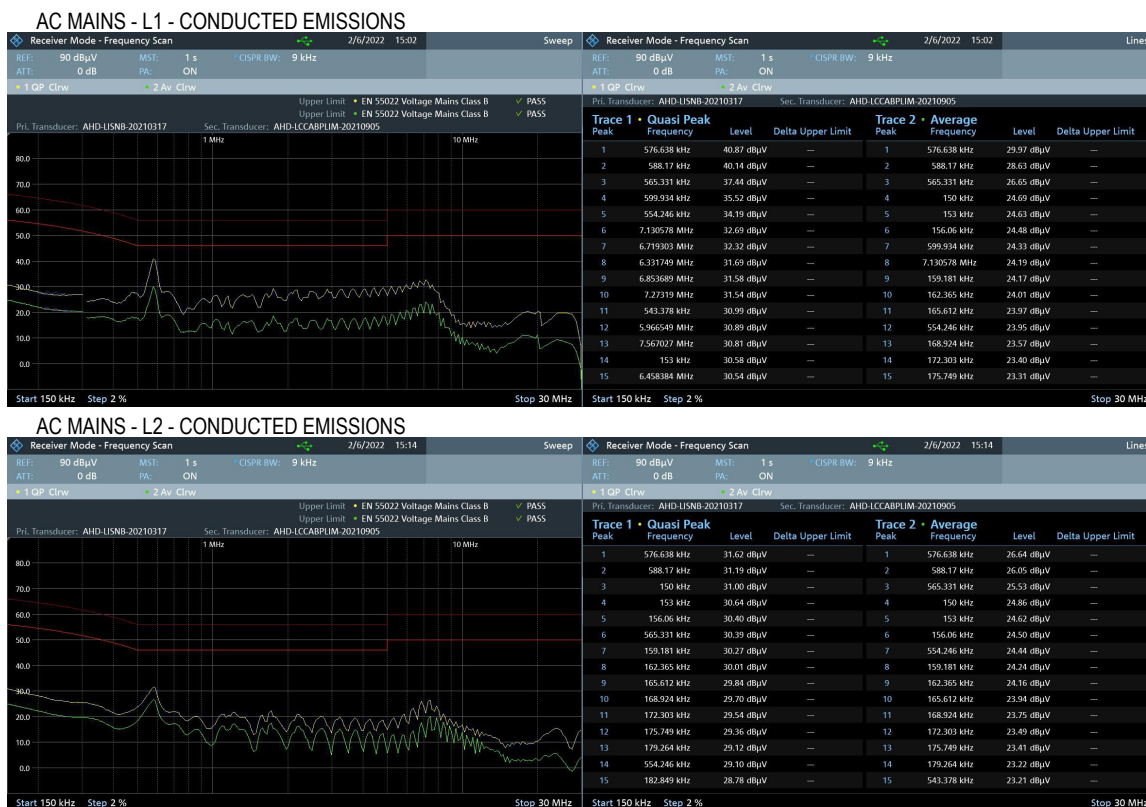
*QPk detection below 1 GHz, Avg detection at or above 1 GHz with receiver bandwidth as specified at top of table.

** When E-field is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings.

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: 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 ($f < 30 \text{ MHz}$)	$\pm 3.1 \text{ dB}$
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 9: Accreditation Documents