# Amber Helm Development L.C.

92723 Michigan Hwy-152 Sister Lakes, Michigan 49047 USA Tel: 888-847-8027

# **EMC** Test Report

ZWAVEP-WR1801 Issued: August 10, 2018

regarding

USA: CFR Title 47, Part 15.249 (Emissions) Canada: IC RSS-210/GENe (Emissions)

for



# **BE468ZP**, **BE469ZP**

## **Category: Electronic Door Lock**

Judgements: FCC 15.249, ISED RSS-210 Compliant Testing Completed: August 8, 2018



Prepared for:

# Allegion, PLC

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Data Recorded by:

Report Prepared by:

## **Revision History**

R	ev. No.	Date	Details	Revised By
r0 r1		August 10, 2018 August 31, 2018	Initial Release. Data table limit corrections.	J. Brunett J. Brunett
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		cations and Procedur cification and General 1	<b>res</b> Procedures	<b>6</b> 
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	on and Declarations . UT Configuration Iodes of Operation ariants est Samples unctional Exerciser Iodifications Made roduction Intent	of the Equipment Under Test	7         8 <td< td=""></td<>
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	adiated Test Setup and onducted Emissions Te ower Supply Variation al Emissions undamental Emission F undamental Emission F ional Emissions ransmit Chain Spuriou	I Procedures	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
<b>5</b>	Measuremen	t Uncertainty and A	Accreditation Documents	18

### List of Tables

1	Test Site List.
2	Equipment List.
3	EUT Declarations.
4	Fundamental Emission Pulsed Operation
5	Fundamental Emission Bandwidth.
6	Fundamental Emission Field Strength
$\overline{7}$	Transmit Chain Spurious Emissions
8	Radiated Digital Spurious Emissions
9	Measurement Uncertainty.

# List of Figures

1	Photos of EUT
2	EUT Test Configuration Diagram
3	Radiated Emissions Diagram of the EUT
4	Radiated Emissions Test Setup Photograph(s)
5	Fundamental Emission Pulsed Operation
6	Fundamental Emission Bandwidth
7	Accreditation Documents

### 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 August 2028.

#### 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.**, 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	$\mathbf{SN}$	Quality Num.	Last Cal By / Date Due
Discusional	EMOO / 02110D	0000 2020	DICEMCO01	Kanadaria ( Asar 2010
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Keysight / Aug-2019
Log Periodic Antenna	EMCO / 3146	9305 - 3614	LOGEMCO01	Keysight / Aug-2019
BNC-BNC Coax	WRTL / $RG58/U$	001	CAB001-BLACK	AHD / Sept-2018
BNC-BNC Coax	WRTL / $RG58/U$	001	CAB002-BLACK	AHD / Sept-2018
3.5-3.5MM Coax	PhaseFlex / PhaseFlex	001	CAB015- PURPLE	AHD / Sept-2018
Spectrum Analyzer	Rohde & Schwarz / FSV30	101660	RSFSV30001	RS / Apr-2019
Quad Ridge Horn	Singer / A6100	C35200	HQR2TO18S01	Keysight / Aug-2019

# 2 Test Specifications and Procedures

Date: August 10, 2018

### 2.1 Test Specification and General Procedures

The ultimate goal of Allegion, PLC 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 Allegion, PLC BE468ZP, BE469ZP for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.249
Canada	ISED Canada	IC RSS-210/GENe

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 Unli- censed Wireless Devices"
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 measure- men"

### 3 Configuration and Identification of the Equipment Under Test

#### 3.1 Description and Declarations

The EUT is wireless enabled electronic door lock. The EUT is approximately 23 x 8 x 6 cm in dimension, and is depicted in Figure 1. It is powered by 6 VDC alkaline batteries. This product is used as an electronic entry door latch with Zwave+ Radio Interface. Table 3 outlines provider declared EUT specifications.



Figure 1: Photos of EUT.

Table 3	EUT	Declarations.
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General Declarations			
Equipment Type:	Electronic Door Lock	Country of Origin:	USA
Nominal Supply:	6 VDC	Oper. Temp Range:	not declared
Frequency Range:	$908.4$ and $916~\mathrm{MHz}$	Antenna Dimension:	Integral
Antenna Type:	Integral	Antenna Gain:	Not Declared
Number of Channels:	2	Channel Spacing:	Not Applicable
Alignment Range:	Not Declared	Type of Modulation:	FSK
United States			
FCC ID Number:	XPB-ZWPLUS	Classification:	DSC
Canada			
IC Number:	8053B-ZWPLUS	Classification:	Low Power Device (902-
io ivumbel.	0000D-2001 E00	Classification.	928 MHz)

#### 3.1.1 EUT Configuration

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

#### 3.1.2 Modes of Operation

The EUT is capable of operating as a Zwave+ enabled lock at either 908.4 MHz or 916.0 MHz as a single channel Zwave transceiver with data rates of 9 kbps, 40 kbps, and 100 kbps. Both channels and all modulation rates are tested herein on the most populated BE469ZP variant and for both sets of escucheon faceplates.

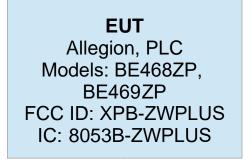


Figure 2: EUT Test Configuration Diagram.

#### 3.1.3 Variants

There are two models of the EUT, a fully populated version (model BE469ZP) and a variant with digital buzzer and accelerometer functionality depopulated (model BE468ZP). Both models employ identical RF electronics and PCBs.

#### 3.1.4 Test Samples

Two samples of the EUT were provided for emissions testing, both radiated samples. The EUT can employ two different escutcheon faceplates, both of which were provided for testing. To place the EUT into CW and CM modes on the EUT's two operating channels, a serial UART interface cable was provided and interfaced via a laboratory PC terminal program. This interface was then disconnected during testing.

#### 3.1.5 Functional Exerciser

EUT functionality was confirmed by observation of transmitted signal.

#### 3.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory. However, in order to bring the device into compliance with band fundamental emissions limits the manufacturer decreased the maximum power setting on the Zwave chipset to a level of 0x11. Manufacturer states the EUT will be sold only with this firmware encoded power setting.

#### 3.1.7 Production Intent

The EUT appears to be a production ready sample.

#### 3.1.8 Declared Exemptions and Additional Product Notes

None.

#### 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.

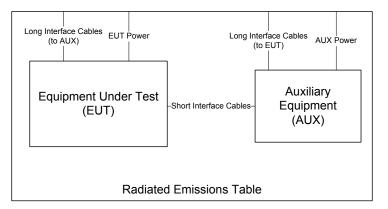


Figure 3: Radiated Emissions Diagram of the EUT.

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  $360^{\circ}$  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  $4 \times 5$  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  $dB\mu V/m$  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.

Where regulations call for substitution method measurements, the EUT is replaced by a substitution antenna if field strength measurements indicate the emission is close to the regulatory limit. This antenna is co-polarized with the test antenna and tuned (when necessary) to the emission frequency, after which the test antenna height is again optimized. The substitution antenna's signal level is adjusted such that its emission is equal to the level measured from the EUT. The signal level applied to the substitution antenna is then recorded. Effective isotropic radiated power (EIRP) and effective radiated power (ERP) in dBm are formulated from

$$EIRP = P_T - G_A = ERP + 2.16,\tag{1}$$

where  $P_T$  is the power applied to substitution antenna in dBm, including correction for cable loss, and  $G_A$  is the substitution antenna gain, in dBi.

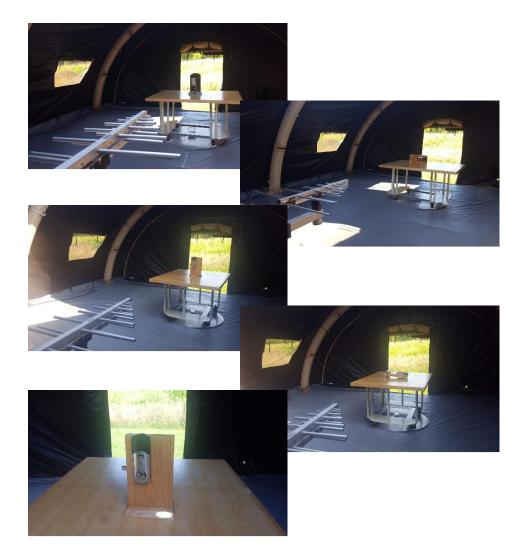


Figure 4: Radiated Emissions Test Setup Photograph(s).

#### 4.1.2 Conducted Emissions Test Setup and Procedures

**Battery Power Conducted Spurious** The EUT is not subject to measurement of power line conducted emissions as it is powered solely by its internal battery.

#### 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 the EUT is designed for operation from a battery power source, the extreme test voltages are evaluated over the range specified in the test standard; no less than  $\pm 10\%$  of the nominal battery voltage declared by the manufacturer. For all battery operated equipment, worst case intentional and spurious emissions are re-checked employing a new (fully charged) battery.

Test Date:

18-Jan-18

#### 4.2Intentional Emissions

#### 4.2.1**Fundamental Emission Pulsed Operation**

Test Setup & Procedure The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 2.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Duty cycle is reported for all relevant modes of operation. The test equipment employed includes RSFSV30001, LOGEMCO01.

Measurement Results The details and results of testing the EUT are summarized in Table 4. Plots showing the measurements made to obtain these values are provided in Figure 5.

Table 4:	Fundamental	Emission	Pulsed	Operation.
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			Detector Pk	<b>Span</b> 0	IF Bandwidth 1 MHz		<b>Bandwidth</b> MHz	Test Engineer: EUT: EUT Mode: Meas. Distance:	BE4 Modu	469 ilated cm
Overall Transmission Internal Frame Characteristics							FCC/IC			
#	Frequency (MHz)	EUT Test Mode*	Min. Repetition Rate (sec)	Max. No. of Frames	Total Transmission Length (sec)	Max. Frame Length (ms)	Min. Frame Period (ms)	Frame Encoding	Compute Cyc (%)	
4	908.4	Cont. Mod.	-	-	inf.	inf.	-	EUT capable of continuous FSK/GFSK transmission.	100.0	0.0
4	916	Cont. Mod.	-	-	inf.	inf.	-	EUT capable of continuous FSK/GFSK transmission.	100.0	0.0

Example Calculation: Worst Case FSK Duty (%) = 100 %

Spectrum				Spectrum			
Ref Level -:	10 00 dBm 😑 R	BW 1 MHz	<b>`</b>	Ref Level -10 00 dBm	🖶 RBW 1 MHz		
Att	10 dB 🖶 SWT 100 ms 🖶 V	BW 3 MHz		Att 10 dB 🖷	9 SWT 100 ms 🖷 VBW 3 MHz		
SGL				SGL			
⊖1Pk Crw				●1Pk Citw			]
		M1[1]	-32.06 dBm 83.0000 ms			M1[1]	-32.24 dBm 83.0000 ms
-20 dBm				-20 d2m			
-30 dBm			M1	-30 dBm			M1
-40 dBm				-40 dDm			
-50 dBm				-50 dBm			
-60 d0m				-60 dBm			
-7J dBu				-/J dem			
-80 dBm				-80 dBm			
-90 dem				-90 dBm			
-100 сБт				-100 c6m			
CF 908.4 MH	iz	1001 pts	10.0 ms/	CF 916.0 MHz	1001 pt	s	10.0 ms/

Figure 5: Fundamental Emission Pulsed Operation.

#### 4.2.2 Fundamental Emission Bandwidth

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 2.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. 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. 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 reported. The test equipment employed includes RSFSV30001, LOGEMCO01.

**Measurement Results** The details and results of testing the EUT are summarized in Table 5. Plots showing the measurements made to obtain these values are provided in Figure 6.

	<b>Detector</b> Pk	<b>IF Bandwidth</b> 10 kHz	<b>Video Bandwidth</b> 30 kHz		Test Date: Test Engineer: EUT: EUT Mode: Meas. Distance:	22-Jul-18 Joseph Brunett BE469 Modulated 10 cm
						FCC/I
		Center Frequency	20 dB EBW	99% OBW		
#	Modulation	(MHz)	(MHz)	(MHz)		
1	FSK, 9kbps	908.4	0.085	0.081		
2	FSK, 40kbps	908.4	0.101	0.093		
3	GFSK, 100 kbps	908.4	0.129	0.115		
4	FSK, 9kbps	916.0	0.097	0.089		
5	FSK, 40kbps	916.0	0.101	0.093		
6	GFSK, 100 kbps	916.0	0.129	0.114		

Table 5: Fundamental Emission Bandwidth.

Spectrum	9 KBP	S DATA F	RATE			Spectrum								
Ref Level -10 00 dBn	m	🖶 RBW 10 kHz			(*.	Ref Level	-10 00 dE			V 10 kHz				
ALL 5 di D1Pk Yew	IB 🖶 SWT 30 ms	● VBW G0 kH₂	Mode Auto FFT			All 1 Pk Max	5 -	18 🖷 SWT 31	0 ms 🖷 VB1	W SD kH∠	Mode Auto FFT			
			D0[1]		0.15 dB	S					D0[1]		-0.1	
-20 dBr i			Occ Bw		84.900 kHz 180919 kHz	-20 dBr 1					Occ Bw		96.900 88.911088911	
-31 dPm		N	1M1[1]	-	-33.40 dBm	-31 dPm				м	1M1[1]		-32.89	
		1	ί Λ	908.4	IOOOO MH2					7	Λ.	1 1	916.000000	
-40 dBm			V L			-40 dBm				(	Vì			
-50 dBm			12			-50 dBm		-		J				
-6J d8m-		- Ê	<u> </u>			-6J dBm				, f	<u> </u>			
			J.							5	h.			
-70 dBm		m	- may			-70 dBm			man	1		20		
80 dBr i	month	<u></u>		mon -		so den			and .			- Mrow	<u>~</u>	
93, the same				www	man	-anderia	$\sim$	vr -				-	The way	
100 c6m						-100 сБт—								
F 900.4 MI Iz		1001	pts	Spa	in 1.0 MHz	CF 916.0 N	li iz			1001	pts		Span 1.0 M	
arker						Marker								
Type Ref Trc Mi 1	X-value 908.4 MF	Y-value Iz -33.40 dB	Function	Function Result	t	Type Rei Mi	Tnc 1	X-value 916	e	Y-value -32.89 dB	Function	Func	tion Result	
T1 1	908.379021 MH	lz -51.63 dB	m Occ Bw	30.9190	080919 kHz	T1	1	915.9730	27 MHz	-52.59 dB	m Occ Bw		38.911088911	
T2 1 D2 M1 1	900.45994 MI -23.0 kF					T2 D2 M	1 1	₹16.06190 -30	DO MHZ 1.C kHZ	51.16 dB				
D3 D2 1	84.0 kt					D3 D			5.C kHz	-0.11 0				
			<b>D</b> 4 <b>T C</b>		_		_							
Spectrum		PS DATA	RAIE			Spectrum								
RefLevel - 10 00 dBn All 5 di		RBW 10 kHz	Mode Auto FET		RefLevel -10 00 dBm ● RBW 10 kHz All 5 dB ● SWT 30 ms ● VBW 30 kHz Mode Auto FFT									
1Pk Yew					⊖1Pk Yew									
			D0[1]	1	-0.20 dB 00.900 kHz						D0[1]		-0.2 100.900	
20 dBri			Occ Bw	92,9070	192907 kHz	-20 dBr i					Occ Bw		92.907092907	
an dem			M1 M1[1]		-32.71 dBm	-31 dPm				M1	M1[1]		-32.70	
40 den		A	Δ			-40 d8m				(N	Δ			
		T V	12							T#	#2			
50 dBm		2	- the second sec			-50 dBm				2	- <del>(</del>			
en qau				_		-6U dBu				$\mathcal{N}$	$- \bigvee_{t}$			
70 dem		$\sim$	<u>\</u>			-70 dBm			. A	/	$ \lambda $			
o den		$\vee$ 1	- N					01	$\Lambda \mathcal{N}^{-}$		~ V	$\mathcal{M}$		
						SD UBI I	~ ^ ^	$\mathbb{N}^{\sim}$					Am I	
\$~#A~	~				$\nabla \Delta_{i} \Delta_{i}$	6 6 (	· •							
						Ad Plance								
130 c6m						-100 c6m-								
130 cBm						-100 c6m-								
F 900.4 Milz		1001	pts	Spa	in 1.0 Miliz	CF 916.0 N	11 Iz			1001	pts		Span 1.0 M	
:F 900.4 MHz arker	X-value	1001 Y-value	pts	Spa Function Result				X-value		1001 Y-value	pts Function	Func	Span 1.0 M	
T 900.4 MHz arker Type Ref Trc M1 1	908.419 MH	Y-value	Function	Function Result	t	CF 916.0 M Marker Type Re Mi	f Tnc	915.9	98 MHz	Y-value -32.70 dB	Function	Func	tion Result	
T 900.4 MIIz arker Fype Ref Trc M_ 1 T_ 1 T_ 1 T_ 1	908.419 MH 908.353047 MH 900.445954 MI	Y-value 1z -32.71 dB 1z -48.78 dB 1z 49.00 dD	Function m m Occ Bw m	Function Result		CF 916.0 M Marker Type Rei M1 T1 T2	f Tric 1 1	915.9 915.9530- 916.0439	98 MHz 47 MHz 54 MHz	Y-value -32.70 dB -49.01 dB 40.76 dD	Function m m Occ Bw m	Func		
F 900.4 Milz           arker           Fype         Ref         Trc         1           T1         1         1         1           T2         1         1         1           T2         1         1         1           D2         M1         1         1	908.353047 MH 908.353047 MH 900.445954 MI -69.5 kH	Y-value 12 -32.71 dB 12 -48.78 dB 12 49.00 dD 12 -20.02 (	Function m m Occ Bw m IB	Function Result	t	CF 916.0 M Marker Type Re M1 T1 T2 D2 M	f Tric 1 1 1 1	915.9 915.9530- 916.04599 -3:	98 MHz 47 MHz 54 MHz 1.C kHz	Y-value -32.70 dB -49.01 dB 40.76 dB -20.19 d	Function m Occ Bw m B	Func	tion Result	
CT 900.4 MI Iz larker Type   Ref   Trc   M_ 1 T_ 1 T_ 1 T_ 1	908.419 MH 908.353047 MH 900.443954 MH -69.5 kH 100.5 kH	Y-value           12         -32.72 dB           12         -48.78 dB           12         49.03 dD           12         -20.32 (11)           12         -20.32 (11)	Function m Occ Bw m BB BB	Function Result	t	CF 916.0 M Marker Type Rei M1 T1 T2	f Tric 1 1 1 1	915.9 915.9530- 916.04599 -3:	98 MHz 47 MHz 54 MHz	Y-value -32.70 dB -49.01 dB 40.76 dD	Function m Occ Bw m B	Func	tion Result	
ST         900.4 MI Iz           arker         Trc           M2         1           T2         1           D2         M1           D3         D2	908.419 MH 908.353047 MH 900.443954 MH -69.5 kH 100.5 kH	Y-value 12 -32.71 dB 12 -48.78 dB 12 49.00 dD 12 -20.02 (	Function m Occ Bw m BB BB	Function Result	t	CF 916.0 M Marker Type Re M1 T1 T2 D2 M	f Trnc 1 1 1 1 2 1	915.9 915.9530- 916.04599 -3:	98 MHz 47 MHz 54 MHz 1.C kHz	Y-value -32.70 dB -49.01 dB 40.76 dB -20.19 d	Function m Occ Bw m B	Func	tion Result	
T 900.4 Milz           arker           Tr.         1           T.2         1           D2         Mil         1           D3         D2         1           D3         D2         1           Spectrum         Ref Level - 10 00 dBin         Code dBin	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           4z         -32.7. dB           4z         -48.78 dB           1z         -49.03 dB           4z         -20.02 dB           3PS DAT           ■ RBW 10 kHz	Function m m Occ Bw m B B B B B A RATE	Function Result	t	CF 916.0 M Marker Type Re ML T1 T2 D2 M D3 D Spectrum Ref Level	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 ( -0.27 ( V 10 kHz	Function m Occ Bw m B B	Func	tion Result	
T 900.4 M IIz           arker           Trge         Ref         Trc           M2         1         1           T2         1         1           D2         M1         1           D3         D2         1           Spectrum           Ref Level -10 00 dBn           Atl         5 dit	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           4z         -32.7_1 d8           4z         -40.76 d8           1z         49.09 d8           1z         -20.02 d8           4z         -20.02 d8           8PS DAT.	Function m m Occ Bw m B B B B B A RATE	Function Result	t	CF 916.0 M Marker Type Re T: T2 D2 M D3 D Spectrum	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 ( -0.27 ( V 10 kHz	Function m Occ Bw m B	Func	tion Result	
T 900.4 M IIz           arker           Trge         Ref         Trc           M2         1         1           T2         1         1           D2         M1         1           D3         D2         1           Spectrum           Ref Level -10 00 dBn           Atl         5 dit	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           4z         -32.7. dB           4z         -48.78 dB           1z         -49.03 dB           4z         -20.02 dB           3PS DAT           ■ RBW 10 kHz	Function m m Occ Bw m B B B B B A RATE	Function Result	t] 092907 kHz ♥ ♥	CF 916.0 M Marker Type Rei ML T2 T2 D2 M D3 D Spectrum Ref Level All @1Pk V ew	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 ( -0.27 ( ₩ 10 kHz	Function m Occ Bw m B B	Func	tion Result 92.907092907	
T 900.4 Milz           arker           ML         1           TL         1           D2         M1         1           D2         M1         1           D3         D2         1         1           Spectrum         3         5         4           NL         5         4         5         4           IPk V #w         10         00         dBn         4	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           4z         -32.7. dB           4z         -48.78 dB           1z         -49.03 dB           4z         -20.02 dB           3PS DAT           ■ RBW 10 kHz	Function m m Occ Bw m BB BB A RATE Mode Auto FFT	Function Result	t] 092907 kHz (\	CF 916.0 M Marker Type Re ML T2 D2 M D3 D Spectrum Ref Level Att	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 ( -0.27 ( ₩ 10 kHz	Function m Occ Bw m B B B Mode Auto FFT	Func	tion Result 92.907092907	
F         900.4 Milz           Grker         Trc           M1         1           M2         1           T2         1           D2         M1           D3         D2           Spectrum         State           Ref Level -10         00 dBn           NL         5 dl           IPK Y #W         22 dBi	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           4z         -32.7. dB           4z         -48.78 dB           1z         -49.03 dB           4z         -20.02 dB           3PS DAT           ■ RBW 10 kHz	Function m Occ Bw m BB BB A RATE Mode Autc FFT DO[1]	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CF 916.0 M Marker Type Rei T2 D2 M D3 D Spectrum Ref Level Att • 1Pk 9 ew -20 dBi	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 ( -0.27 ( ₩ 10 kHz	Mode Auto FFT	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F         900.4 Milz           orker         Tree           ML         1           T2         1           D2         M1           D3         D2           Bipectrum         1           Spectrum         5 ull           Ref Level - 10         00 dBn           NL         5 ull           Pk V ew         20 dBi	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 d0 28.900 kHz	Cr 916.0 h Marker Typel Re M_ T1 D2 M D3 D Spectrum Ref Lavel All •1Pk V ew -23 dPn-	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 c -0.27 c -0.27 c	Mode Auto FFT	Func	tion Result 92.907092907 0.5 128.90 113.086 11306	
F         900.4 Milz           orker         Tree           ML         1           T2         1           D2         M1           D3         D2           Bipectrum         1           Spectrum         5 ull           Ref Level - 10         00 dBn           NL         5 ull           Pk V ew         20 dBi	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CT 916.0 M Marker Type Rei ML T2 D2 M D3 D Spectrum Ref Lavel All 91Pk V ew -20 uBi i=	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 dB -49.01 dB 40.76 dD -20.19 c -0.27 c -0.27 c	Mode Auto FFT	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F         900.4 Milz           orker         Tree           Type   Ref         Tre           1         1           1         1           12         1           D2         1           D3         D2           Spectrum         5 ui           Ref Level -10 00 den           NL         5 ui           J1k V ew         20 den           40 den         40 den	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	Cr 916.0 h Marker Typel Re M_ T1 D2 M D3 D Spectrum Ref Lavel All •1Pk V ew -23 dPn-	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F         900.4 Milz           arker         Frypel Ref         Trc           1         1         1           T2         1         1           D2         1         1           D3         D2         1           B3pectrum         Substantian State         5 dil           1Pk Y ew         20 den         40 den           50 den         50 den         50 den	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	Cr 916.0 P M Marker Type Ref M. T2 D2 M D3 D Spectrum Ref Lavel All •1Pk V ew -20 dB1	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 50 kHz M1	Mode Auto FFT	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F 900.4 Milz           arker         Tro           Fypel Ref         Tro           T2         1           D2         1           D3         D2           Bpectrum         Substrate           Ref         Substrate           T2         1           D3         D2           D4         5 d8           19k Vew         22 d8n           20 d8n         50 d8n           50 d8n         50 d8n	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CT 916.0 F           Marker           Type         Ref           T:         T:           T2         D2         M           D3         D         Spectrum           Ref Level         All         Spectrum         Spectrum           ●1Pk V ew         -31 dPm         -43 dPm         -53 dPm           -5.3 dPm         -6.3 dPm         -6.3 dPm         -7.3 dPm	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530- 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F 900.4 Milz           arker         Tro           Fypel Ref         Tro           T2         1           D2         1           D3         D2           Bpectrum         Substrate           Ref         Substrate           T2         1           D3         D2           D4         5 d8           19k Vew         22 d8n           20 d8n         50 d8n           50 d8n         50 d8n	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-velue 12 -32.7.08 12 49.708 12 49.000 12 49.0000 12 49.00000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.0000 12 49.00000 12 49.000000 12 49.00000 12 49.000000 12 49.0000000 12 49.00000000 12 49.000000000000000000000000000000000000	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CT 916.0 P Marker Type Re T: T: T: T: T: T: T: T: T: T:	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F 900.4 M IIz           arker           Type         Ref         Trc           M_2         1           T2         1           D2         M1           D3         D2           Spectrum	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           12         -32.7.68           12         49.796           12         49.036           12         49.036           12         49.036           12         -20.32           2         -0.20           BPS DAT,           ■ RBW 10 MH           ■ VBW 50 MH	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CT 916.0 F           Marker           Type         Ref           T:         T:           T2         D2         M           D3         D         Spectrum           Ref Level         All         Spectrum         Spectrum           ●1Pk V ew         -31 dPm         -43 dPm         -53 dPm           -5.3 dPm         -6.3 dPm         -6.3 dPm         -7.3 dPm	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2	Func	tion Result 92.907092907 12.907092907 113.905 113.905 11306 - 94.54	
F 900.4 M IIz           arker           Type I Ref         Trc           M1         1           T2         1           D2         M1           D3         D2           Spectrum	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           12         -32.7.68           12         49.796           12         49.036           12         49.036           12         49.036           12         -20.32           2         -0.20           BPS DAT,           ■ RBW 10 MH           ■ VBW 50 MH	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 d0 28,900 kHz	CT 916.0 P Marker Type Re T: T2 D2 M 03 D Spectrum Ref Level All •12k V ew -23 dBr -31 dBr -53 dBr -53 dBr -53 dBr -91 gBr -77 dBr	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2		tion Result 92.907092907 10.5 113.406 1300 113.406 1300 113.406 1300 134.54 915.970000	
F 900.4 M Iz           arker           Type I Ref         Tre           1         1           T2         1           D2         M1           D3         D2           Ref Level -10         00 dBn           ML         5 dI           JRk Y ew           S0 dBn           S0 dBn           S0 dBn           S0 dBn           S0 dBn           S0 dBn	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           12         -32.7.68           12         49.796           12         49.036           12         49.036           12         49.036           12         -20.32           2         -0.20           BPS DAT,           ■ RBW 10 MH           ■ VBW 50 MH	M Coc BW M Coc BW B B B B B B B B C C C C C C C C C C C C C	Function Result 92,9070 1 114,885	0.00 dB 28.900 kHz 114685 kHz	CT 916.0 P Marker Type Re D2 M D3 D Spectrum Ref Level All 91Pk V ew -23 UR	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2		tion Result 92.907092907 10.5 113.406 1300 113.406 1300 113.406 1300 134.54 915.970000	
F         900.4 Milz           arker         Tree         1           M1         1         1           T2         1         1           D2         M1         1           D3         D2         1           Spectrum	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           12         -32.7.68           12         49.796           12         49.036           12         49.036           12         49.036           12         -20.32           2         -0.20           BPS DAT,           ■ RBW 10 MH           ■ VBW 50 MH	M Coc BW M Coc BW B B B B B B B B Coc BW Mode Auto FFT Do[1] Occ BW	Function Result 92,9070 1 114,885	0.00 d0 28,900 kHz	CT 916.0 P Marker Type Re T: T2 D2 M 03 D Spectrum Ref Level All •12k V ew -23 dBr -31 dBr -53 dBr -53 dBr -53 dBr -91 gBr -77 dBr	f Trc 1 1 1 1 2 1 -10 00 dE	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1] DD[1] DD[1] DD[2] DD[2		tion Result 92.907092907 10.5 113.406   1306 113.406   1306 -34.54 915.970000	
Bit         Superior           Spectrum         Superior           Spectrum         Superior           Spectrum         Superior           Spectrum         Superior           Spectrum         Superior           Spectrum         Superior           Superior         Superior	938.419 MF 908.353047 MF 900.443954 MI -69.5 kF 100.5 kF 100.5 kF	Y-value           12         -32.7.68           12         49.796           12         49.036           12         49.036           12         49.036           12         -20.32           2         -0.20           BPS DAT,           ■ RBW 10 MH           ■ VBW 50 MH	Mode Auto FFT	Function Result	0.00 d0 28,900 kHz	CT 916.0 P Marker Type Re D2 M D3 D Spectrum Ref Level All 91Pk V ew -23 UR	1 Trc 1 1 1 1 1 1 1 1 1 1 1 1 1 1	915.9 915.9530 916.04599 -3: 100	98 MHz 47 MHz 54 MHz 1.C KHz 0.C KHz 0.C KHz	Y-value -32.70 db -90.1 db -90.1 db -20.19 c -0.27 c V 10 kHz W 10 kHz M1 M1 T	Mode ALLC FFT DD[1] DD[1]		tion Result 92.907092907 10.5 113.406   1306 113.406   1306 -34.54 915.970000	
Stress     Stress       37 900.4 Milz       arker       Type   Ref     Trc       1     1       T2     1       D3     D2       D3     D2       3pectrum     Sub       Ref Level - 10 00 den       Atl     Sub       11     Sub       20 den     Sub       40 den     Sub       53 den     Sub       54 den     Sub       50 den     Sub       100 c6m     Sub       3r 900.4 Milz     arker	930.439 M +	Y-value           12         -32.7.48           12         -40.78 div           12         -40.78 div           12         -20.32 div           2         -0.20 div           BPS DAT.         BWW 10 kHz           • RBW 10 kHz         • VBW 20 kHz	Punction m Occ 2w m Bis Bis A RATE Mode Aute FFT DO[1] Orce RW M1[1] Mode Aute FFT	Function Result 92.9070 1 114.0051 908.3	0.00 dD 20.900 kHz 0.00 dD 20.900 kHz 	CT 916.01 Marker Marker Type Re M. T: T2 D2 M D D2 M	1 Trc   1   1   1   1   1   1   1   1   1	915.5 915.9590. 916.04599 33 100 100 100	98 MHz 74 MHz 54 MHz 16 HHz 0 ns • <b>RB</b> 0 ns • <b>VB</b>	Y-value -22.70 db -49.76 db -20.19 d -0.27 d	Mode Auto FFT DD[1] DD[1		100 Result 32.907092907 12.907 12.906 13.906 13.906 13.906 1.93.56 94.54 94.5	
Type         Ref         Trc           ML         1         1           T2         1         1           D2         M1         1           D3         D2         1	2014.59 M 2014.59 M 2015.55 M 2015.5	Y-value           12         -32.7.48           12         -40.78           12         -40.78           12         -20.32           2         -0.20           BPS DAT,           • RBW 10 kHz           • RBW 10 kHz           • VBW 20 kHz	Market State	Function Result	0.00 dD 20.900 kHz 0.00 dD 20.900 kHz 	CT 916.0 P Marker Type Re ML TC D2 M D3 D Spectrum Ref Level All 9 DF V ew -23 dEn -43 dEn -53 dEn -53 dEn -73 dEn -73 dEn -71 dEn	1 Trc   1   1   1   1   1   1   1   1   1	715.5 715.9500 716.9500 100 100 m B S SWT 31	98 MHz 47 MHz 54 MHz 54 MHz 0.5 KHz 0.5 KHz 0 ms • VB1	Y-value -22.70 db -49.76 db -20.19 c -0.27 c	Punction  m  CCC PW  M  B  B  Mode Autr FFT  D0[1]  CCC BW  N1[1]  P  P  P  P  P  P  P  P  P  P  P  P  P		100 Result 32.907092907 12.907 12.906 13.906 13.906 13.906 13.97 14.90 94.54	
F         900.4 Milz           arker         I           Type I Ref         Trc           M1         1           T2         1           T2         1           D2         M1           D3         D2           Spectrum	2014.59 M + 2016.353047 M + 2016.353047 M + 2016.3453047 M + - - - - - - - - - -	Y-velue           iz         -32, 7; 61           iz         -40, 78, 69           iz         -0, 20           BPS DAT,           mRBW 10 HHz           VBW 50 kHz	m m Cocc Bw m m Cocc Bw m B B Cocc Bw m Cocc Bw m S Cocc Bw MI[1] Cocc Bw MI[1] Cocc Bw MI[2] Cocc Bw M M Cocc Bw M M Cocc Bw	Function Result	0.00 dD 20.900 kHz 0.00 dD 20.900 kHz 	CT 916.0 P Marker Type Re M. T: T2 D2 M D3 D Spectrum Ref Lavel All 6 JPk V ew -23 UB:	Inc     I	715.5 915.9590 916.04.99 100 100 100 100 100 100 100 100 100 1	98 MHz 98 MHz 94 MHz 94 MHz 94 MHz 94 MHz 95 MHz 97 MHz 96 MHz 96 MHz	Y-value -32.70 dB -49.76 dD -20.39 c -0.27 c +0.27	Punction  m  Cocc Pw  B  B  Mode Autc FFT  D0[1]  Occ Bw M1[1]  P  D0  F  Cocc Bw M1[1]  P  D0  F  Cocc Bw M1[1]  D0  F  Cocc Bw M1[1]  D0  F  Cocc Bw M1  Cocc Bw		100 Result 32.907092907 12.907 12.906 13.906 13.906 13.906 1.93.56 94.54 94.5	
Stress     Stress       arker     Trc       Type   Ref     Trc       T2     1       D2     1       D3     D2       Bacture     5 utility       Bacture	2014.59 M 2014.59 M 2015.55 M 2015.5	Y-velue           iz         -32, 7; eff           iz         -40, 78, 69, 94           iz         -0, 20, 12           iz         -0, 20, 12           iz         -0, 20, 12           iz         -0, 20, 12           iz         -0, 20, 10           iz         -0, 20, 20           iz         -0, 20, 20           iz         -0, 20, 20           iz         -10, 20, 20	m m Cocc Bw m m Cocc Bw m B B Cocc Bw m B Cocc Bw MI[1] Cocc Bw MI[1] Cocc Bw MI[1] Cocc Bw MI[2] Cocc Bw M M B Cocc Bw M M M M M M M M M M M M M M M M M M M	Function Result	0.00 dD 20.900 kHz 0.00 dD 20.900 kHz 	CT 916.0 F           Marker           Type Re           M:           D2           D3           D           D2           D3           D           Spectrum           Ref Level           All           ●1Pk V ew           -31 dPn           +32 dPn           -53 dPn           -53 dPn           -91 dPn           -70 dPn           80 dPi i           -100 c6m           CT 916.0 F           Marker           Type Re           Type Re	I Trc     I	P15.15 P15.9500 P16.04.99 	98 MHz 98 MHz 94 MHz 94 MHz 94 MHz 94 MHz 95 MHz 97 MHz 96 MHz 96 MHz	Y-value -22.70 db -49.76 db -20.19 c -0.27 c	pts		100 Result 32.907092907 12.907 12.906 13.906 13.906 13.906 13.97 14.90 94.54	

Figure 6: Fundamental Emission Bandwidth.

#### 4.2.3 Fundamental Emission Field Strength

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 2.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Fundamental emissions are measured at the regulatory distance on our OATS. The test equipment employed includes RSFSV30001, LOGEMCO01.

Measurement Results The details and results of testing the EUT are summarized in Table 6.

Table 6: Fundamental Emission Field Strength.

																	EUT N	Modes:			908.4					,			
																					916 M			-		,			
										Tes	t Date:		07/18	8/18					a3	BE469	908.41	MHz –	CW (C	Camelot	Escuto	heon)			
									Т	Test Engineer: J. Brunett						a4 BE469 916 MHz - CW (Camelot Escutcheon)													
	Freq	uency			Sit	e				EUT Test Antenna			Cable	Receiver				Field Strength @ DR							RP	Details			
	Start	Stop	Temp.	Table	MR	DR	N/F	CF				Pol.	Ant.	Dim.	Ka	Kg	Rx P	ower	Band	width		Qpk		Ē	Qpk				1
R0			c.	Angle					Mode	Volt.	Dim		Height				Pk	Avg	RBW	VBW	Meas.		mit	Meas.	Li	mit	Calc.	Limit	Pass
			RH						see				-					-				USA	CAN		USA	CAN			Fail
	MHz	MHz	%	deg		m		dB	table	(V)	cm	H/V	m	cm	dB/m	dB	dBu	V/m	М	Hz			dBu	ıV/m		1	dE	m	dB
R1	SE	TUP			OAT	SC				BE468			LOGEN	1CO01				RSFSV	/30001		NOTE	S: WO	RST EU	UT ORI	ENTA	FION (	HPOL: SIDE, VPOL: END)		
R2	908.4	908.4	29/58	0.0	3.0	3.0		0.0	al	3.0	8.0	Н	1.0	100.0	22.7	-7.0			0.12	0.30	89.3	94.0	94.0	89.3	94.0	94.0	-5.9		4.7
R3	908.4	908.4	29/58	45.0	3.0	3.0		0.0	al	3.0	8.0	V	1.2	100.0	22.7	-7.0			0.12	0.30	93.2	94.0	94.0	93.2	94.0	94.0	-2.0		0.8
R4	SE	TUP			OAT	sc				BE468			LOGEN	1CO01				RSFSV	/30001		NOTE	S: WO	RST EU	UT ORI	ENTA	FION (	HPOL: S	SIDE, VI	POL: END)
R5	916.0	916.0	29/58	0.0	3.0	3.0		0.0	al	3.0	8.0	Н	1.0	100.0	22.8	-7.1			0.12	0.30	88.3	94.0	94.0	88.3	94.0	94.0	-6.9		5.7
R6	916.0	916.0	29/58	45.0	3.0	3.0		0.0	al	3.0	8.0	V	1.2	100.0	22.8	-7.1			0.12	0.30	93.7	94.0	94.0	93.7	94.0	94.0	-1.5		0.3
R7	SE	TUP			OAT	SC				B469			LOGEN	4CO01			RSFSV30001				NOTES: WORST EUT ORIENTATION (					HPOL: S	SIDE, VI	POL: END)	
R8	908.4	908.4	29/58	0.0	3.0	3.0		0.0	al	3.0	8.0	Н	1.0	100.0	22.7	-7.0			0.12	0.30	90.0	94.0	94.0	90.0	94.0	94.0	-5.2		4.0
R9	908.4	908.4	29/58	45.0	3.0	3.0		0.0	al	3.0	8.0	V	1.2	100.0	22.7	-7.0			0.12	0.30	89.2	94.0	94.0	89.2	94.0	94.0	-6.0		4.8
R10	SE	TUP			OAT	SC				B469			LOGEN					RSFSV	/30001		NOTE:	S: WO	RST EU	UT ORI	ENTA	FION (	HPOL: S	SIDE, VI	POL: END)
R11	916.0	916.0	29/58	0.0	3.0	3.0		0.0	al	3.0	8.0	Н	1.0	100.0	22.8	-7.1			0.12	0.30	89.3	94.0	94.0	89.3	94.0	94.0	-5.9		4.7
R12	916.0	916.0	29/58	45.0	3.0	3.0		0.0	al	3.0	8.0	v	1.2	100.0	22.8	-7.1			0.12	0.30	93.2	94.0	94.0	93.2	94.0	94.0	-2.0		0.8
R13																													
R14																													
R15																													
#	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	C29
(F	OW)	(COLU	(MN)		NOT	E:																							

R0 C5

R0

R0

R0

R0

MR is Measurement Range, which is reduced from DR to achieve necessary SNR.

C6 DR is the regulatory Desired Range measurement distance C7 N/F is Near-Field / Far-Field distance computed for max or

N/F is Near-Field / Far-Field distance computed for max of EUT Antenna Dimension (C10) and Test Antenna dimension (C12), where applicable.

C8 CF is computed using a 20 dB/decade Decay Rate. C18/19 When E-field or EIRP is reported directly from Sp

When E-field or EIRP is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings and Pr is not reported.

#### 4.3 Unintentional Emissions

#### 4.3.1 Transmit Chain Spurious Emissions

**Test Setup & Procedure** The test equipment and facilities were setup in accordance with the standards and procedures listed in Section 2.1. Environmental conditions were set at the appropriate temperature and thermal balance was checked with a thermocouple based probe. Spurious radiated emissions measurements are performed to 10 times the highest fundamental operating frequency. The test equipment employed includes RSFSV30001, LOGEMCO01, HQR2TO18S01, HRNK01.

Measurement Results The details and results of testing the EUT are summarized in Table 7.

Table 7: Transmit Chain Spurious Emissions.

EUT Modes: a1 BE469 908.4 MHz – CM (9kbps) a2 BE469 916 MHz – CM (9kbps)

										Tes	t Date:		07/2	1/18					a3	DL40,	, ,10 14	1112 – C	.01 (78	ops)					
									Т	est En	gineer:		J. Bri	inett					a4										
_					014								m			6.11					Field Strength @ DR							DD	<b>D</b> ( <b>P</b>
		uency			Sit	÷				EUT			Test A	1	w	Cable			eiver				d Strei	, e			EI	RP	Details
	Start	Stop	Temp.	Table	MR	DR	N/F	CF				Pol.	Ant.	Dim.	Ka	Kg	1	ower		width		Pk		1 ~	pk or A	0			_
R0			С	Angle					Mode	Volt.	Dim		Height				Pk	Avg	RBW	VBW	Meas.			Meas.	Liı		Calc.	Limit	Pass
			RH						see													USA			USA	CAN			Fail
	MHz	MHz	%	deg		m		dB	table	(V)	cm	H/V	m		dB/m	dB	dBu	V/m		Hz			dBu	ıV/m			dł	Bm	dB
R1		TUP			OAT	-	1			BE468			LOGEN					RSFSV	/30001		NOTE								
R2	890.0	902.0	29/58	0.0		3.0		0.0	al	3.0	8.0	Н	1.0	100.0		-7.0				0.30	34.4	46.0	46.0	34.4		46.0			11.6
R3	890.0	902.0	29/58	45.0		3.0		0.0	al	3.0	8.0	V	1.2	100.0		-7.0			0.12	0.30	38.3	46.0	46.0	38.3	46.0	46.0			7.7
<b>R</b> 4	928.0	940.0	29/58	0.0		3.0		0.0	al	3.0	8.0	Н	1.0	100.0		-7.2			0.12	0.30	29.9	46.0	46.0	29.9	46.0	46.0			16.2
25	928.0	940.0	29/58	45.0		3.0		0.0	al	3.0	8.0	V	1.2	100.0	23.1	-7.2			0.12	0.30	35.3	46.0	46.0	35.3	46.0	46.0			10.8
26		TUP			OAT					BE468			HQR2TO					RSFSV						entation					
۲7	1816.8	1816.8	29/58	max all		3.0	0.3	0.0	al	3.0	4.0	H/V	max all		30.2	-4.3			1.00	3.00	43.4	74.0	74.0	43.2	54.0	54.0			10.7
88	2725.2	2725.2	29/58	max all	-	3.0	0.4	0.0	al	3.0	8.0	H/V	max all		30.2	-5.4			1.00	3.00	45.6	74.0	74.0	45.6	54.0	54.0			8.4
89	3633.6	3633.6	29/58	max all	3.0	3.0	0.5	0.0	al	3.0	8.0	H/V	max all	15.0	31.5	-6.2			1.00	3.00	46.6	74.0	74.0	46.3	54.0	54.0			7.6
10	4542.0	4542.0	29/58	max all	3.0	3.0	0.7	0.0	al	3.0	8.0	H/V	max all	15.0	32.3	-6.8			1.00	3.00	50.9	74.0	74.0	50.8	54.0	54.0			3.2
11	5450.4	5450.4	29/58	max all	3.0	3.0	0.8	0.0	al	3.0	8.0	H/V	max all	15.0	32.6	-7.4			1.00	3.00	50.4	74.0	74.0	50.1	54.0	54.0			3.9
12	6358.8	6358.8	29/58	max all	3.0	3.0	1.0	0.0	al	3.0	8.0	H/V	max all	15.0	33.0	-8.0			1.00	3.00	53.0	74.0	74.0	52.4	54.0	54.0			1.6
.13	7267.2	7267.2	29/58	max all	3.0	3.0	1.1	0.0	al	3.0	8.0	H/V	max all	15.0	33.5	-8.6			1.00	3.00	53.0	74.0	74.0	52.0	54.0	54.0			1.9
.14	8175.6	8175.6	29/58	max all	4.0	4.0	1.2	0.0	al	3.0	8.0	H/V	max all	15.0	34.1	-9.3			1.00	3.00	51.6	74.0	74.0	50.7	54.0	54.0			3.3
.15	9084.0	9084.0	29/58	max all	5.0	5.0	1.4	0.0	al	4.0	8.0	H/V	max all	15.0	34.7	-9.9			1.00	3.00	52.0	74.0	74.0	51.0	54.0	54.0			2.9
16																													
17	SE	TUP			OAT	SC				BE468			LOGEN	4CO01				RSFSV	/30001		NOTE	S: max	all orie	entation	s of EU	Т			
18	890.0	902.0	29/58	0.0	3.0	3.0		0.0	a2	3.0	8.0	Н	1.0	100.0	22.6	-7.0			0.12	0.30	33.5	46.0	46.0	33.5	46.0	46.0			12.5
19	890.0	902.0	29/58	45.0	3.0	3.0		0.0	a2	3.0	8.0	v	1.0	100.0	22.6	-7.0			0.12	0.30	38.9	46.0	46.0	38.9	46.0	46.0			7.1
20	928.0	940.0	29/58	0.0	3.0	3.0		0.0	a2	3.0	8.0	Н	1.2	100.0	23.1	-7.2			0.12	0.30	32.5	46.0	46.0	32.5	46.0	46.0			13.5
.21	928.0	940.0	29/58	45.0	3.0	3.0		0.0	a2	3.0	8.0	V	1.2	100.0		-7.2			0.12	0.30	31.7	46.0	46.0	31.7	46.0	46.0			14.3
22		TUP			OAT					BE468			HQR2TO					RSFSV						entation					
23	1832.0	1832.0	29/58	max all			0.3	0.0	a2	3.0	4.0	H/V	max all		30.1	-4.3	-93.4			3.00	44.7	74.0	74.0		54.0				9.3
24	2748.0	2748.0	29/58	max all	_	3.0	0.4	0.0	a2	3.0	8.0	H/V	max all		30.3	-5.4	-92.2		1.00	3.00	46.2	74.0	74.0	46.1	54.0	54.0			7.9
25	3664.0	3664.0	29/58	max all		3.0	0.5	0.0	a2	3.0	8.0	H/V	max all		31.5	-6.2	-91.1		1.00	3.00	47.9	74.0	74.0	47.6		54.0			6.4
26	4580.0	4580.0	29/58	max all		3.0	0.7	0.0	a2	3.0	8.0	H/V	max all		32.3	-6.9	-90.5		1.00	3.00	51.7	74.0	74.0	51.6	54.0	54.0			2.3
.27	5496.0	5496.0	29/58	max all		3.0	0.8	0.0	a2	3.0	8.0	H/V	max all	15.0	32.6	-7.5	-89.7		1.00	3.00	49.7	74.0	74.0	49.3	54.0	54.0			4.7
28	6412.0	6412.0	29/58	max all		3.0	1.0	0.0	a2	3.0	8.0	H/V	max all	15.0	33.0	-8.1	-85.7		1.00	3.00	52.9	74.0	74.0	52.3	54.0	54.0			1.7
29	7328.0	7328.0	29/58	max all	3.0	-	1.1	0.0	a2	3.0	8.0	H/V	max all	15.0	33.5	-8.7	-96.4		1.00	3.00	51.9	74.0	74.0	50.9	54.0	54.0			3.1
30	8244.0 9160.0	8244.0 9160.0	29/58 29/58	max all max all	4.0	4.0	1.2	0.0	a2 a2	3.0	8.0 8.0	H/V H/V	max all	15.0	34.2	-9.3	-97.6 -96.9	-	1.00	3.00	52.2 53.0	74.0	74.0	51.3 52.0	54.0 54.0	54.0 54.0			2.7
31	9100.0	9100.0	29/38	max all	5.0	5.0	1.4	0.0	az	4.0	8.0	H/V	max all	15.0	34.8	-10.0	-90.9	-	1.00	3.00	55.0	/4.0	/4.0	52.0	54.0	54.0			2.0
32	C1	C2	C3	C4	05	66	07	C8	C9	C10	C11	C12	C12	C14	C15	CIC	017	C19	C10	C20	C21	C22	C22	C24	C25	C26	007	C28	C20
#	C1			C4	C5		C7	1 68	09	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	0.28	C29
(1	ROW)	(COLU			NOT																								
	R0	C	,		MR i	s Mea	sureme	ent Rang	ge, whie	ch is ree	iuced f	rom DI	R to achie	eve nec	essary S	SNR.													

R0 C5 R0 C6

R0

R0 R0 MR is Measurement Range, which is reduced from DR to achieve necessary SNR

C6 DR is the regulatory Desired Range measurement distance. C7 N/F is Near-Field / Far-Field distance computed for max of

N/F is Near-Field / Far-Field distance computed for max of EUT Antenna Dimension (C10) and Test Antenna dimension (C12), where applicable.

C8 CF is computed using a 20 dB/decade Decay Rate. C18/19 When E-field or EIRP is reported directly from Sp

When E-field or EIRP is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings and Pr is not reported.

#### 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.

			tency Range Det					dwidth	Vic	leo Bandwi	dth		est Date:		15-Jul-18				
			25 MH	lz f 1	000 MHz	Pk/	QPk		120	kHz		300 kHz		Test E	ngineer:		Joseph	n Brunett	
			f	$> 1\ 000\ 1$	MHz	F	Pk		1 M	IHz		3 MHz			EUT:		BI	E469	
			f	$> 1\ 000\ 1$	MHz	Α	vg		1 M	IHz		3 MHz		EU	T Mode:		A	ctive	
														Meas. I	Distance:		3 n	neters	
					Dig	ital Sp	urious 1	Emissions								FCC/IC + CE(CISPR)			
	Test	Antenna		Pr (P	wr Rx.)			E-Field	1 @ 3m	FCC/IC	Class B	CE Cl	ass B	FCC/IC C	Class A	CE Cla	iss A		
	Freq.	Туре	Test	Pk	QPk/Avg	Ka	Kg	Pk	QPk/Avg	E3lim	Pass	E3lim	Pass	E3lim	Pass	E3lim	Pass		
#	MHz	Used	Pol.	dBm	dBm*	dB/m	dB		dBµV/m	$dB\mu V/m$	dB	$dB\mu V/m$	dB	$dB\mu V/m$	dB	dBµV/m	dB	Comments	
1	45.1	BICEMCO01	H			-1.9	-1.2	29.9		40.0	10.1	40.5	10.6	49.5	19.6	50.5	20.6	background	
2	45.1	BICEMCO01	V			-1.9	-1.2	30.3		40.0	9.7	40.5	10.2	49.5	19.2	50.5	20.2	background	
3	77.3	BICEMCO01	Н			2.0	-1.6	30.1		40.0	9.9	40.5	10.4	49.5	19.4	50.5	20.4		
4	77.3	BICEMCO01	V			2.0	-1.6	28.8		40.0	11.2	40.5	11.7	49.5	20.7	50.5	21.7		
5	115.3	BICEMCO01	Н			5.6	-2.0	30.1		43.5	13.4	40.5	10.4	54.0	23.9	50.5	20.4	background	
6	115.3	BICEMCO01	V			5.6	-2.0	34.3		43.5	9.2	40.5	6.2	54.0	19.7	50.5	16.2	background	
7	180.2	BICEMCO01	Н			9.7	-2.6	32.9		43.5	10.6	40.5	7.6	54.0	21.1	50.5	17.6	background	
8	180.2	BICEMCO01	V			9.7	-2.6	28.7		43.5	14.8	40.5	11.8	54.0	25.3	50.5	21.8	background	
9	220.0	BICEMCO01	Н			11.4	-3.0	36.7		46.0	9.3	40.5	3.8	56.9	20.2	50.5	13.8	background	
10	220.0	BICEMCO01	V			11.4	-3.0	38.0		46.0	8.0	40.5	2.5	56.9	18.9	50.5	12.5	background	
11	305.9	LOGEMCO01	Н			13.9	-3.7	32.1		46.0	13.9	47.5	15.4	56.9	24.8	57.5	25.4	background	
12	305.9	LOGEMCO01	V			13.9	-3.7	29.8		46.0	16.2	47.5	17.7	56.9	27.1	57.5	27.7	background	
13	472.7	LOGEMCO01	Н			17.0	-4.8	27.8		46.0	18.2	47.5	19.7	56.9	29.1	57.5	29.7	background	
14	472.7	LOGEMCO01	V			17.0	-4.8	29.0		46.0	17.0	47.5	18.5	56.9	27.9	57.5	28.5	background	
15	642.5	LOGEMCO01	Н			19.6	-5.8	31.9		46.0	14.1	47.5	15.6	56.9	25.0	57.5	25.6	background	
16	642.5	LOGEMCO01	V			19.6	-5.8	36.7		46.0	9.3	47.5	10.8	56.9	20.2	57.5	20.8	background	
17	703.3	LOGEMCO01	Н			20.4	-6.1	38.6		46.0	7.4	47.5	8.9	56.9	18.3	57.5	18.9	background	
18	703.3	LOGEMCO01	V			20.4	-6.1	40.0		46.0	6.0	47.5	7.5	56.9	16.9	57.5	17.5	background	
19																			
20																			
21																			
22																			
23																			
24																			
25																			
*OF	N datac	tion below 1 GH:	z Avad	etection	at or above	1 GHz	with rea	aiver ban	dwidth as s	necified at	top of tab	10							

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

#### 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 9: Measurement Uncertainty.

${\bf Measurement} ~ {\bf Uncertainty}^{\dagger}$
$\pm (f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS - 1))/2 + 1 \text{ Hz})$
$\pm 1.9\mathrm{dB}$
$\pm 4.0\mathrm{dB}$
$\pm 5.2\mathrm{dB}$
$\pm 3.7\mathrm{dB}$

<sup>†</sup>Ref: CISPR 16-4-2:2011+A1:2014

United States Department of Commerce National Institute of Standards and Technology	FEDERAL COMMUNICATIONS COMMISSION Laboratory Division 7435 Oakkind Willi Road Columbia, MD 21046 July 06, 2018
Certificate of Accreditation to ISO/IEC 17025:2005	National Voluntary Laboratory Accreditation Program 100 Bitrau Drive, Gaithersburg, MD 20899-2140
NVLAF LAB CODE: 200129-0 AHD (Amber Helm Development, L.C.) Sitter Lakes, MI	Attention: Timothy Rasinski Re: Accreditation of AHD (Amber Helm Development, L.C.) Designation Number US3318 Tes Firm Registration 4: 639064
is eccretized by the Validonal Voluctory Laboratory Accreditation (Program for specific services, label on the Scope of Accreditation (Program for specific services, <b>Determinant of the Scope of Accreditation (Program for Scope C 1705</b> 2005) This accreditation demonstrates therhoris compressions for a definate access and the operation of a laboratory guider management system (refer to joint ISC-LAC-UAF Community) dated January 2009).	Dear Sir or Madam: We have been notified by National Voluntary Laboratory Accreditation Program that AHD (Amber Helm Development, L.C.) has been accredited as a testing laboratory. At this time AHD (Amber Helm Development, L.C.) is brevby recognized to perform compliance resting o equipment subject to Declaration Of Conformity (DOC) and Certification of the Commission's Rules. This recognition will expire upon expiration of the accreditation or arotification of withdrawal of recognition Any quastions about this recognition should be submitted as an inquiry to the FCC Knowledge Database at www.fcc.ov/kdb.
"tois a"	Sincerely, George Tannabill Electronics Engineer



Figure 7: Accreditation Documents