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Testing of

# **Electromagnetic Emissions**

per

USA:CFR Title 47, Part 15.519(Emissions)USA:CFR Title 47, Part 2.1091;2.1093(Exposure)Canada:ISED RSS-220(Emissions)Canada:ISED RSS-102(Exposure)

are herein reported for

# Lear Corporation KOBJXF18A

Test Report No.: 20170616-RPTWAC0100054Br0 Copyright © 2017

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Prepared by:	- Amaril 10	Date of Issue:	June 16, 2017
	Dr. Joseph Brunett, EMC-002790-NE		

/

Results of testing completed on (or before) April 10, 2017 are as follows.

**Emissions:** The transmitter intentional emissions **COMPLY** with the regulatory limit(s) by no less than 1.5 dB. Transmit chain spurious or harmonic emissions **COMPLY** by no less than 4.7 dB. Unintentional spurious emissions from digital circuitry **COMPLY** with radiated emission limit(s) by at least 20 dB.

Report No.: 20170616-RPTWAC0100054Br0

# **Revision History**

Re	ev. No.	Date	Details	Revised By	
r0		June 16, 2017	Split from A report + updates.	J. Brunett	
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Rev	vision Histo	ory			2
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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: 688478) and with ISED Canada, Ottawa, ON (File Ref. No: IC8719A-1 and IC22227-1).

#### **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 June 2027.

#### 1.3 Subcontracted Testing

This report does not contain data produced under subcontract.

#### 1.4 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.

#### 1.5 Copyright

This report shall not be reproduced, except in full, without the written approval of Willow Run (WR) Test Labs, Inc..

#### **1.6** Endorsements

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

#### 1.7 Test Location

The EUT was fully tested by **Willow Run (WR) Test Labs, Inc.**, 7117 Fieldcrest Dr., Brighton, Michigan 48116 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 (3 meter)	8501 Beck Rd. Bldg 2227, Belleville MI 48111	OATSA			

#### 1.8 Traceability and Equipment Used

Pertinent test equipment used for measurements at this facility is listed in Table 2. The quality system employed at Willow Run (WR) Test Labs, Inc. 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
Spectrum Analyzer	Rohde & Schwarz / FSV30	101660	RSFSV30001	RS / May-2018
Spectrum Analyzer	Rohde & Schwarz / FSV4	101222	RSFSV4001	RS / Mar-2018
Biconical	EMCO / 93110B	9802-3039	BICEMCO01	Lib. Labs / Aug-2017
Log Periodic Antenna	EMCO / 3146	9305 - 3614	LOGEMCO01	Lib. Labs / Aug-2017
Quad Ridge Horn	ETS Lind. / 3164-04	00066988	HRNQR316401	Lib. Labs / Aug-2017
Quad Ridge Horn	Singer / A6100	C35200	HQR2TO18S01	Lib. Labs / Aug-2017
K-Band Horn	JEF / NRL Std.	001	HRNK01	WRTL / Jul-2017
Ka-Band Horn	JEF / NRL Std.	001	HRNKA001	WRTL / Jul-2017

# 2 Test Specifications and Procedures

# 2.1 Test Specification and General Procedures

The ultimate goal of Lear Corporation 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 Lear Corporation KOB-JXF18A for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.519
Canada	ISED Canada	ISED RSS-220

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 El cal 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"			
CFR 47 2.1091/1093	"447498 D01 General RF Exposure Guidance v06: RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices"			
ISED Canada	"The Measurement of Occupied Bandwidth"			
ICES-003; Issue 6 (2016)	"Information Technology Equipment (ITE) Limits and methods of measurement"			
ISED Canada RSS-102	"Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)"			
ISED Canada SPR-002	"Supplementary Procedure for Assessing Compliance with RSS-102 Nerve Stim- ulation Exposure Limits."			

#### Date: June 16, 2017

# 3 Configuration and Identification of the Equipment Under Test

#### 3.1 Description and Declarations

The equipment under test is an automotive UWB Transceiver. The EUT is approximately 5 x 3 x 1 cm in dimension, and is depicted in Figure 1. It is powered by 3 VDC Lithium coin-cell battery. In use, this device is hand held. Table 3 outlines provider declared EUT specifications.



Figure 1: Photos of EUT.

Table 3:	EUT	Declarations.

General Declarations			
Equipment Type:	UWB Transceiver	Country of Origin:	Spain
Nominal Supply:	3  VDC	<b>Oper.</b> Temp Range:	$-40^{\circ}$ C to $+85^{\circ}$ C
Frequency Range:	3615 - 4337  MHz	Antenna Dimension:	3 cm
Antenna Type:	Integral	Antenna Gain:	Chip (UWB)
Number of Channels:	1(UWB)	Channel Spacing:	None
Alignment Range:	Not Declared	Type of Modulation:	PPM(UWB)
United States			
FCC ID Number:	KOBJXF18A	Classification:	DSC, UWB
Canada			
IC Number:	3521A-JXF18A	Classification:	Remote Control Device, UWB Device

#### 3.1.1 EUT Configuration

Concerl Declarations

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

#### 3.1.2 Modes of Operation

There are two principle modes of operation for this device. The first mode (UHF-MODE) is addressed in WRTL report 20170411-RPTWAC0100054Ar4.

The second principle mode addressed herein is that of a UWB transceiver (UWB-MODE) which is automatically activated upon detection of an encoded 125 kHz LF signal from a paired RFA module within the vehicle. The UWB-MODE then sends inquiry frames to paired in-vehicle UWB transceivers (SATs) which triangulate the position of the keyfob for passive entry and passive start operations. In normal operation the EUT sends a single PPM UWB frame as an inquiry to and then as a response to a paired SAT. If no SAT is present, the EUT will continue to inquire for no more than 1 second.

**EUT** Lear Corporation Type/Model: KOBJXF18A FCC ID: KOBJXF18A IC: 3521A-JXF18A

Figure 2: EUT Test Configuration Diagram.

#### 3.1.3 Variants

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

#### 3.1.4 Test Samples

Four samples of the EUT were provided for testing. One normal operating sample paired with a corresponding SAT UWB transceiver and RFA UHF receiver for encoding and timing tests, one software modified sample capable of transmitting UWB frames repeatedly at a higher than normal rate (once every 10 ms), a third sample with custom UHF CW and continuously modulated UHF transmitter modes (see WRTL report 20170411-RPTWAC0100054Ar4 for details), and a fourth sample apart for photographs.

#### 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

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 shielded anechoic chamber or GTEM test cell. Spectrum and modulation characteristics of all emissions are recorded. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.7 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.

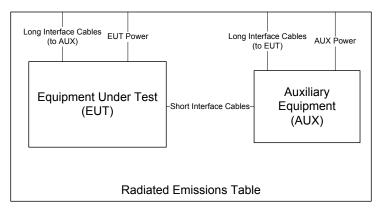


Figure 3: Radiated Emissions Diagram of the EUT.

If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied. For devices with intentional emissions below 30 MHz, a shielded loop antenna is used. It is placed at a 1 meter receive height. Emissions between 30 MHz and 1 GHz are measured using tuned dipoles and/or 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 horn or broadband ridge-horn antennas on our OATS with a  $4 \times 5$  m rectangle of H-4 absorber placed over the ground screen 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  $dB\mu V/m$  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.

When microwave measurements are made at a range different than the regulatory distance or made at closerange to improve receiver sensitivity, the reading is corrected back to the regulatory distance. This is done using a 20 dB/decade field behavior as dictated by the test procedures. When measurements are made in the near-field, the near-field/far-field boundary (N/F) is reported. It is computed as

$$N/F = 2D^2/\lambda$$

where D is the maximum dimension of the transmitter or receive antenna, and  $\lambda$  is the wavelength at the measurement frequency. Typically for high frequency measurements the receive antenna is connected to test receiver / analyzer through an external mixer. In this case, cable loss, IF amplifier gain, and mixer conversion losses are corrected for in the data table, or directly in the spectrum analyzer.

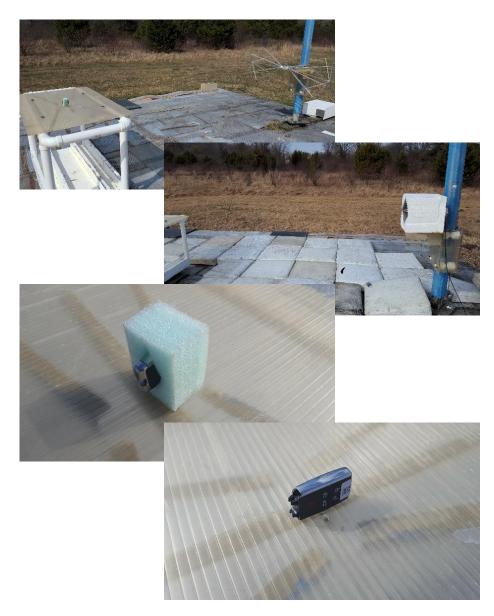


Figure 4: Radiated Emissions Test Setup Photograph(s).

#### 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.

#### 4.1.4 Thermal Variation

Tests at extreme temperatures are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report. The provider has declared that the EUT is designed for operation over the temperature range  $-40^{\circ}$ C to  $+85^{\circ}$ C. Before any temperature measurements are made, the equipment is allowed to reach a thermal balance in the test chamber, temperature and humidity are recorded, and thermal balance is verified via a thermocouple–based probe.

#### 4.2 Intentional 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 measured using the maximum possible receiver IFBW for the purpose of computing RF exposure compliance and documenting the encoding employed by the EUT. The test equipment employed includes RSFSV30001, HRNQR316401.

**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.

-	uency Range 1 000 MHz		<b>Det</b> Pk	IFBW 28 MHz	<b>VBW</b> 28 MHz			Test Date: Test Engineer: EUT Ieas. Distance:	23-Mar-17 Joseph Brunett Normal Operating 60 cm
				Pulsed (	Operation / Duty	v Cycle			
Transmit Mode	Voltage	Oper. Freq	Min. Cycle Time	Total Off- Time/s*	EN 302-065-3 Total Off- Time/s Limit	Mean Off-Time Limit	On-Time**	EN 302-065-3 On-Time LDC Limit	Exposure Duty Correction***
	(V)	(MHz)	(ms)	(ms)	(ms)	(ms)	(ms)	(ms)	(dB)
UWB PPM (Paired) subfigure (c)	3.0	3993.6	21.10	998.77	950.00	38.00	1.23	5.00	12.3
UWB PPM (Unpaired)	3.0	3993.6	10.40	999.69	950.00	38.00	0.31	5.00	15.3

Table 4: Fundamental Emission Pulsed Operation.

\* Total Off-time/sec is equal to 1000ms – duration of the four frames observed due to a single manual activation per second (maximum possible repetition rate of system unlock response time observed by test laboratory > 1 sec).

\*\* Maximum two-frame on-time measured.

subfigure (d)

\*\*\* Worst-case Exposure duty cycle correction (due to burst-modulated carrier) computed as 10\*Log(On-Time/ Min Cycle-Time). Overestimate due to finite transmission length of only four frames in the actual paired use system.

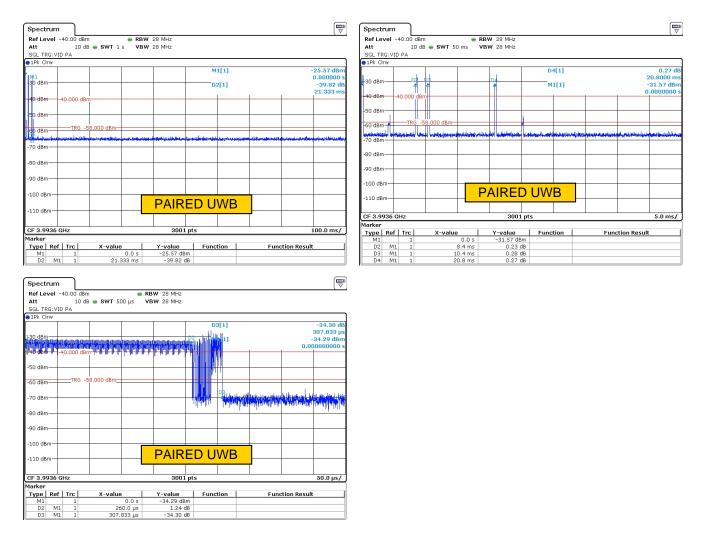


Figure 5(a): Fundamental Emission Pulsed Operation.

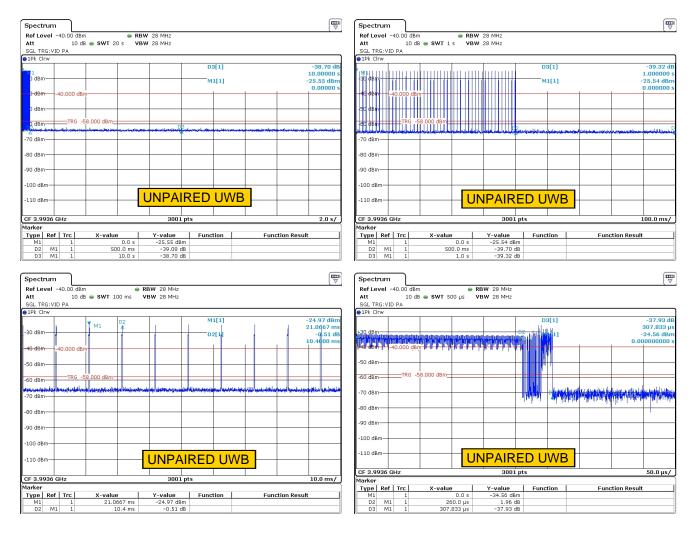


Figure 5(b): Fundamental Emission Pulsed Operation.

#### 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 following the UWB measurement procedures in ANSI C63.10:2013/RSS-220. The test equipment employed includes RSFSV30001, HRNQR316401.

**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.

Table 5: Fundamental Emission Bandwidth.

<b>Frequency Range</b>	<b>Det</b>	<b>IFBW</b>	<b>VBW</b>	<b>Span</b>	Test Date:	23-Mar-17
f < 1 000 MHz	Pk	30 kHz	100 kHz	3 MHz	Test Engineer:	Joseph Brunett
f > 1 000 MHz	Pk	1 MHz	3 MHz	1 GHz	EUT	Lear PEPS UWB Fob
					Meas. Distance:	60 cm

						UWB Occupi	ed Bandwidth						
Transmit Mode	Symbol Rate	Data Rate	Voltage	Oper. Freq	99% OBW	10 dB EBW	10 dB EBW Limit	fL	fL Limit	fH	fH Limit	fmax	Pass/Fail
Transmit Wode	(Msym/s)	(Mbps)	(V)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	(MHz)	
UWB PPM	-	-	3.0	3993.6	748.4	784.4	500.0	3574.4	3100.0	4358.8	10600.0	3838.3	Pass

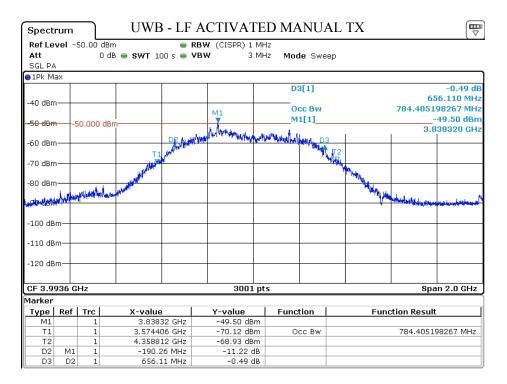


Figure 6: Fundamental Emission Bandwidth.

#### 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. The fundamental emission is measured at the regulatory distance on our OATS following the UWB measurement procedures in ANSI C63.10:2013/RSS-220. The test equipment employed includes RSFSV30001, HRNQR316401.

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

Table 6: Fundamental Emission Field Strength.

																EUT N	Modes:			W mode											
																		a2	UHF N	lormal O	perating	g Mode	e – Ma	nual Ac	ctivation	n by bu	tton pre	ess.			
									Tes	t Date:	(	03/22/1	7					a3	UWB (	continuou	isly mo	dulated	1 at hig	her tha	n norma	al perio	dic rate	e, max f	rame w	idth.	
								Т	'est En	gineer:	Jos	eph Bru	inett					a4	UWB	Normal C	peratin	ig Mod	le – Ac	tuated l	by detec	ction of	LF inte	errogati	on.		
	Frequ	iencv			Site				EUT		Te	st Ante	nna	Cable	1	Rece	eiver			Field	Streng	th @ ]	DR				EUT	EIRP			Details
	Start	Stop	Temp.		DR	N/F	CF					Dim.		Kg	Rx F	ower	Band	width		Pk			RMS			Pk		[	RMS		
RO			•					Mode	Volt.	Dim				0	Pk	RMS	RBW	VBW	Meas.	Limi	it N	Aeas.	Liı	nit	Meas.	Li	mit	Meas.	Li	mit	Pass
								see												USA 0	CAN		USA	CAN		USA	CAN		USA	CAN	Fail
	MHz	MHz	(C)		m		dB	table	(V)	cm	H/V	cm	dB/m	dB	dBu	V/m	м	Hz			dBuV	/m			'			3m			dB
R1	SET	UP	. ,	C	ATS	4		LE	EAR PE	PS	HRN	JOR31	6401			RSFS\	/30001		NOTE	S: NOTE	S: Max	all ori	ientatio	ons of E	EUT and	i both T	Fest An	tenna P	olariza	ions	
R2	3837.0	3837.0	-2.0	3.0	3.0	1.2	0.0	a3	3.0	4.0	H/V	22.0	34.2	-0.4			28.00	28.00	88.9												
R3	3837.0		-2.0	3.0	3.0	1.2	0.0	a3	3.0	4.0	H/V	22.0	34.2	-0.4			50.00	50.00	93.9						-1.3	.0	.0				1.3
R4																															
R5	3837.0	3837.0	-2.0	3.0	3.0	1.2	0.0	a3	2.7	4.0	H/V	22.0	34.2	-0.4			1.00	3.00				52.4						-42.8	-41.3	-41.3	1.5
R6	3837.0	3837.0	-2.0	3.0	3.0	1.2	0.0	a3	3.0	4.0	H/V	22.0	34.2	-0.4			1.00	3.00			1	52.5						-42.7	-41.3	-41.3	1.4
R7	3837.0	3837.0	-2.0	3.0	3.0	1.2	0.0	a3	3.3	4.0	H/V	22.0	34.2	-0.4			1.00	3.00			1	52.4						-42.8	-41.3	-41.3	1.5
R8																															
R9																															
#	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	C30	C31
(R	OW)	(COLU	JMN)	NOTE	3:																										
1	R0	С	4	MR is	Mea	sureme	nt Rang	ge, whic	h is rec	luced fro	om DR	to achi	eve nece	essary SN	R.																
1	R0	C	5	DR is	the re	gulator	y Desi	red Ran	ge mea	suremer	nt dista	nce.																			
1	R0	С	6	N/F is	Near	-Field /	Far-Fi	ield dist	ance co	mputed	for ma	x of EU	T Ante	nna Dime	nsion (	C10) an	d Test .	Antenn	a dimen	sion (C12	2), when	re appl	licable.								
1	R0	С	7	CF is	comp	uted us	ing a 2	0 dB/de	cade D	ecay Ra	te.																				
I	R0	CI	5	When	E-fie	ld or El	RP is 1	reported	directl	y from S	Spectru	m Anal	yzer, Aı	ntenna Fa	ctors an	d Cable	losses	are inc	luded di	irectly in	SA sett	ings ar	nd Pr is	s not rej	ported.						
R	-R7	C19,	C22	PEAK	and	RMS P	ower n	neasured	l with 1	GHz S	pan, 10	01 Fre	q Sampl	les, 1 sec	sweep,	Max-He	eld.														
1	3	CI	9	Peak i	in 50 l	MHz B	W con	puted fi	rom (R	2;C19)	using 2	0*log1	0(50MF	Iz / 28MF	łz)																
р	5-7	C3	0	ISED	Corre	sponde	nce reg	arding	this par	ticular j	product	permit	ted use a	at propose	ed powe	er rating	under	RSS-22	20 Hand	l-Held Re	gulatio	ns. Se	e corre	sponde	nce inc	luded in	1 this a	pplicati	on.		

#### 4.2.4 Exposure and Potential Health Hazard

To demonstrate compliance with with regulations that place limitations on human electromagnetic field exposure for both the general public and for workers, we compute EIRP from measured emission data. These levels are compared with limits placed by the directives and recommendations detailed in Section 2.1. Table 7 details the results of these computations.

#### Table 7: Electromagnetic Field Exposure.

М		RSS-102 Issue	(1093, 447498 D01 5, Safety Code 6 e)	General RF Expos	ure Guidance v06				Test Date: Test Engineer: EUT: EUT Mode: Meas. Distance:	Joseph LEAR Worst	Brunett SAT 4 Case
	Frequen	cy Band	E-Field	EIRP	H-Field	Ca	nada ISED RSS-102 MPE			USA FCC 1.1310 MP	E
Mode	Start	Stop	@ 3m (Avg)	(Avg)	@ MSP (Avg)	SC6 Limit @ MSP	SC6 Limit @ MSP	MPE Ratio	SAR Threshold	SAR Threshold	Worst Case MPE Rati
	MHz	MHz	dBuV/m	mW	dBuA/m	dBuV/m	dBuA/m			Limit	

Other											
	Frequen	cy Band	Pk EIRP + Duty	E-Field	Pwr Density	EIRP + Duty	Minimum			Minimum	
Mode	Start	Stop	(Avg/RMS)	@20cm (RMS)	@20cm (RMS)*	(RMS)	1g / 10g SAR Threshold	MPE Ratio	SAR Threshold	1g / 10g SAR Threshold	MPE Ratio
	MHz	MHz	dBm	dBuV/m	mW/cm2	mW	Limit			Limit	
UHF	314.7	315.3	-26.7	92.0	0.00000	0.00212	69.1	0.00003	0.00008	3	
UWB	3574.40	4358.80	-20.2	98.6	0.00000	0.00966	1.5	0.00644	0.00039	3	0.00013
IF SUM	OF ALL MPE R	ATIOS IS > 1, TI	HEN THE EUT M	UST UNDERGO S	AR TESTING PER	FCC AND ISED (IC)	MPE RATIO Total (<1):	.006		MPE RATIO Total (<1):	.000
REGUL	ATIONS.						REOUIRES SAR TESTING	No		REOUIRES SAR TESTING	No

\* EIRP (mW) = S (mW/cm^2) x 4 x PI x 20cm^2

#### 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 made following the UWB measurement procedures in ANSI C63.10:2013/RSS-220 up to 40 GHz. The test equipment employed includes RSFSV30001, BICEMCO01, LOGEMCO01, HRNQR316401, HQR2TO18S01, HRNK01, HRNKA01.

**Measurement Results** The details and results of testing the EUT are summarized in Table 8.

Table 8(a): Transmit Chain Spurious Emissions.

EUT Modes: a1 UHF CW mode on Center Channel a2 UHF Normal Operating Mode - Manual Activation by button press 03/29/17 a3 UWB continuously modulated at higher than normal periodic rate, max frame width. Test Date: Test Engineer: Joseph Brunet a4 UWB Normal Operating Mode - Actuated by detection of LF interrogation. Site Field Strength @ DR EUT EIRF Details Frequ EU Test Antenn Cabl Stop Start Гетр MR DR N/F CF Pol. Dim. Ka Kg Rx Pc wer Bandwidth Pk RMS Pk RMS RBW VBW R0 Mode Volt Dim Pk RMS Meas Limit Limit Meas Limit Limit Pass USA CAN USA CAN USA CAN USA CAN Fail see dBuV MH MHz dB/1 MHz OATSA 3.0 1.3 SETUP: LEAR PEPS BICEMCO01 RSFSV4001 NOTES: R1 All background nois 3.0 4.0 H/V 150.0 16.9 30.0 88.0 20 3.0 0.0 a3 35.0 0.1 0.3 32.1 40.0 40.0 7.9 R2 R3 88.0 216.0 20 3.0 3.0 a3 3.0 4.0 H/V 150.0 16.9 0.1 0.3 33.1 43.5 43.5 10.4 3.2 0.0 35.0 R4 SETUP: LEAR PEPS LOGEMCO01 RSFSV4001 NOTES: Max all orientations of EUT, noise floor data 3.0 OATSA a3 3.0 4. LEAR PEPS 4.0 H/V 100.0 20. PS HRNQR316401 0.3 38.0 NOTES: Max all orient. of EUT, not 46.0 46.0 216.0 960.0 20 3.0 6.4 0.0 20.1 29.9 0.1 8.0 ise floor data in R7-R11, m SETUP: R6 RSFSV30001 ured signal R12, R13 R7 1164.0 1240.0 20 0.6 3.0 0.4 14.0 a3 3.0 4.0 H/V 22.0 25.2 0.001 0.001 -3.0 -98.2 -85.3 -85.3 12.9 -0.4 R8 1559.0 1610.0 20 0.6 3.0 0.5 14.0 a3 3.0 4.0 H/V 22.0 21.9 -0.4 0.001 0.001 -0.1 -95 3 -85.3 -85.3 10.0 R9 960.0 1610.0 20 0.6 3.0 0.5 14.0 a3 3.0 4.0 H/V 22.0 27.6 20 0.6 3.0 0.6 14.0 a3 3.0 4.0 H/V 22.0 21.7 19.3 1 3 22.0 12.0 -73.2 -34.0 -34.0 -83.2 -75.3 -75.3 7.9

RIU	1010.0	1990.0	20	0.0	5.0	0.0	14.0	as	5.0	4.0	Π/ V	22.0	21.7	19.1			1	1 3	20.1			15.9			-09.1	-54.0	-54.0	-19.5	-05.5	-70.0	9.5
R11	1990.0	3100.0	20	0.6	3.0	1.0	14.0	a3	3.0	4.0	H/V	22.0	20.6	18.2			1	3	32.1			19.8			-63.1	-34.0	-34.0	-75.4	-61.3	-70.0	5.4
R12	3100.0	3615.0	20	0.6	3.0	1.2	14.0	a3	3.0	4.0	H/V	22.0	27.4	18.0			1	3	53.9			41.1			-41.3	-34.0	-34.0	-54.1	-41.3	-41.3	7.3
R13	4337.0	4750.0	20	0.6	3.0	1.5	14.0	a3	3.0	4.0	H/V	22.0	52.5	17.3			1	3	54.9			41.0			-40.3	-34.0	-34.0	-54.2	-41.3	-41.3	6.3
R14	SET	UP:			OATSA	4		LE	EAR PE	PS	HQH	2701	8S01			RSFSV	/30001		NOTE	S: Max	all orie	entation	s of EU	T, nois	e floor	data					
R15	4750.0	10600.0	20	0.6	3.0	1.6	14.0	a3	3.0	4.0	H/V	15.0	35.3	29.1			1	3	25.2			15.1			-70.0	-34.0	-34.0	-80.1	-41.3	-41.3	36.0
R16	10600.0	18000.0	20	0.6	3.0	2.7	14.0	a3	3.0	4.0	H/V	15.0	34.3	23.5			1	3	26.9			16.1			-68.3	-34.0	-34.0	-79.1	-61.3	-61.3	17.8
R17	SET	UP:			OATS/	Á.		LE	EAR PE	PS	Н	RNK0	01			RSFSV	/30001		NOTE	S: Max	all orie	entation	s of EU	T, nois	e floor	data					
R18	18000.0	26500.0	20	0.3	3.0	1.8	20.0	a3	3.0	4.0	H/V	10.2	33.7	36.5			1	3	33.1			23.8			-62.1	-34.0	-34.0	-71.4	-61.3	-61.3	10.1
R19	SET	UP:			OATSA	Á		LE	EAR PE	PS	H	RNKA(	001			RSFSV	/30001		NOTE	S: Max	all orie	entation	s of EU	T, nois	e floor	data					
R20	26500.0	40000.0	20	0.2	3.0	2.3	23.5	a3	3.0	4.0	H/V	9.2	37.2	12.5	39	28	1	3	42.5			29.2			-52.7	-34.0	-34.0	-66.0	-61.3	-61.3	4.7
#	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	C30	C31
. (	ROW)	(COLUI	MN)	NOTE																											
	R0	C4		MR is	Measur	rement	Range,	which	is reduc	ed fron	n DR to	achiev	e neces	sary SNR.																	
	R0	C5		DR is	the regu	ulatory	Desired	Range	measu	rement	distanc	а.																			
	R0	C6		N/F is	Near-F	ield / F	ar-Field	l distan	ce com	puted fo	or max (	of EUT	Antenr	a Dimension	(C10) a	and Tes	st Anter	nna din	nension	(C12),	where a	pplicat	ole.								
	DO	07		on :			20.1	D (1																							

R0 C7 CF is computed using a 20 dB/decade Decay Rate. R0 C15

When E-field or EIRP is reported directly from Spectrum Analyzer, Antenna Factors and Cable losses are included directly in SA settings and Pr (C15/16) is not reported

R19 C19,C22 PEAK and RMS Power measured with 1 GHz Span, 1001 Freq Samples, 1 sec sweep, Max-Held. R20 C19 Peak in 50 MHz BW computed from (R19;C19) using 20\*log10(50MHz / 28MHz)

R12-13 C30 ISED Correspondence regarding this particular product permitted use at prop osed power rating under RSS-220 Hand-Held Regulations. See correspondence included in this application dB

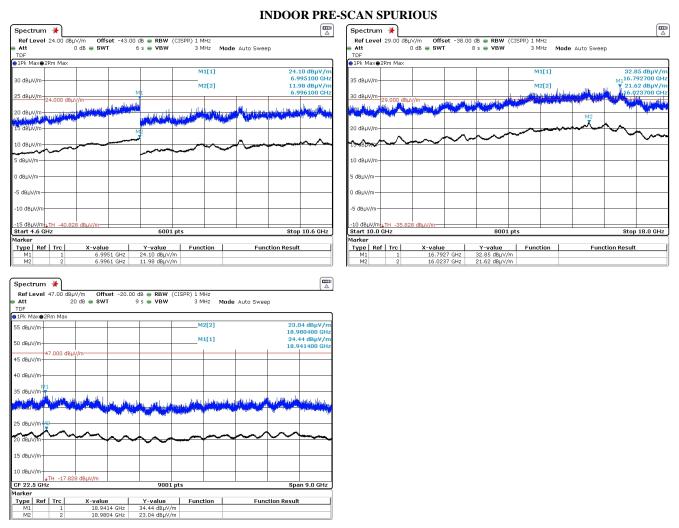
Ref Level 57.00			V 1 kHz							57.00 dBµV			₩ 1 kHz					
Att	0 dB 👄 SW1	1 s 👄 VB	N/3 kHz N	lode Auto I	FT				Att	0	dB 👄 SWT	1 s 👄 VB\	N/3 kHz N	lode Auto	FFT			
PA TDF 1Pk Max									PA TDF 1Pk Max									
i0 dBµV/m				M	1[1]	1		04 dBµV/m 32950 GHz	50 dBµV/m-					м	1[1]	1		09 dBµV/ 172230 GF
0 dBµV/m									40 dBµV/m-									
0 dBµV/m									30 dBµV/m-									
0 dBµV/m									20 dBµV/m-									
0 dBµV/m									10 dBµV/m-									
dBµV/m ศพษณะเมิน	our and the second second	her here way to a f	allahardera	and a start and a start and a start as a star	nmplikaihtemm	alarmahana	anto-materia	M1	0 dBµV/m— Նեսեններություն	hanya Maharah Mahal	ballounanana	welling and the second second	and the second	الموالحينية فلامتح والتص	4.o.d.b.fac.statadao	anna farain	H-gliphowny	M1 yayuddadaa
0 dBµV/m									-10 dBµV/m									
0 dBµV/m									-20 dBµV/m									
0 dBµV/m									-30 dBµV/m									
40 dBµV/m									-40 dBµV/m									<u> </u>

### Table 8(b): Transmit Chain Spurious Emissions.

Table 8(c): Transmit Chain Spurious Emissions.

Spectrun					Ē	Spectrum						
	44.00 dB	uV/m Offset -33	.00 dB 🖷 RBW (C	ISPR) 1 MHz		Ref Level	44.00.dBuV	/m Offset -33.0	0 dB 👄 RBW (	CISPR) 1 MHz		
Att TDF			41 ms 🖷 VBW		Mode Auto Sweep	Att     TDF			1 s 👄 VBW		Node Auto Swe	эр
●1Pk Max●	2Rm Max					●1Pk Max●2P	Rm Max					
				M2[2]	9.87 dBµV/m					M2[2]		17.70 dBµV/r
40 dBµV/m-					1.597500 GHz	40 dBµV/m						2.699500 GH
				M1[1]	21.77 dBµV/m 1.598500 GHz					M1[1]		28.61 dBµV/r 2.598600 GH
35 dBµV/m-					TIO SOUCH AND	35 dBµV/m-			-			2.050000 011
												M1
30 dBµV/m-						30 dBµV/m						
25 dBµV/m-						25 dBµV/m-					فافاصدار مطربان وروا	us how which and the second of the
					M	Lo doptym	المعا ويرا	والمعشارات والمستحد	and an all of south	-dubling had bruch and a point	Water Market Research	
20 dBµV/m-				the state of the	with a strate the second stand and the	relondere lidyalitye Al	And the second	papersite and provide and the	Alex-Inc.			a la optimited and a horal and a second
HALL & DA	and the she	1 may de mar marte marte	- Martinardownand whe	withink	"Composed and a second se							
15 dBµV/m-	devilor A device a l	AP APARTINE ALC.				15 dBµV/m-			_			and the second s
					M							
10 dBµV/m-						~10 d8µV/m						
- 10 JU						E dB Aller						
5 dBµV/m-						5 dBµV/m						
0 dBµV/m—						0 dBµV/m						
0.000000												
-5 dBµV/m-	↓TH -30.8	28 dBµV/m				-5 dBµV/m-41	TH -30.828	dBµV/m	_			
Start 960.	0 MHz		641 pt	s	Stop 1.6 GHz	Start 1.6 GH	z		1101	pts		Stop 2.7 GHz
Marker						Marker						
Type Re M1	f Trc	X-value 1.5985 GHz	Y-value 21.77 dBµV/m	Function	Function Result	Type Ref M1	Trc 1	2.5986 GHz	28.61 dBµV/n	Function	Fun	ction Result
M2	2	1.5975 GHz	9.87 dBµV/m			M2	2	2.6995 GHz	17.70 dBµV/n			
						<u></u>						
Spectrun	n					Spectrum		· · · · · ·				Ē
	n 1 35.00 dB	µV/m <b>Offset</b> -32	.00 db 👄 RBW (C:	ISPR) 1 MHz		Spectrum Ref Level		/m Offset -14.0	0 dB 👄 RBW (			
Ref Leve Att		µV/m Offset -32 0 dB <b>● SWT</b>	.00 dB • RBW (C 1.1 s • VBW		Ande Auto Sweep	Ref Level 5 Att	53.00 dBµV,			CISPR) 1 MHz	<b>1ode</b> Auto Swe	
Ref Leve Att PA TDF	I 35.00 dB				3	Ref Level 1 Att PA TDF	53.00 dBµV,		0 dB 👄 RBW (	CISPR) 1 MHz	<b>4ode</b> Auto Swei	
Ref Leve Att	I 35.00 dB			3 MHz M	Mode Auto Sweep	Ref Level 5 Att	53.00 dBµV,		0 dB 👄 RBW (	CISPR) 1 MHz 3 MHz y	<b>Node</b> Auto Swe	∋p
Ref Leve Att PA TDF 1Pk Maxe	I 35.00 dB				Node Auto Sweep	Ref Level 1 Att PA TDF	53.00 dBµV,		0 dB 👄 RBW (	CISPR) 1 MHz	<b>Yode</b> Auto Swe	ερ 54.71 dBμV/r
Ref Leve Att PA TDF	I 35.00 dB			3 MHz M	1ode Auto Sweep 17.23 dBµV/m 3.571500/GHz 29.69 dBµV/m	Ref Level 3 Att PA TDF 1Pk Max 2P	53.00 dBµV,		0 dB 👄 RBW (	CISPR) 1 MHz 3 MHz y	Mode Auto Swe	<sup>39</sup> p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r
Ref Leve Att PA TDF P1Pk Maxe 30 dBµV/m-	I 35.00 dB			3 MHz M M2[2]	10de Auto Sweep 17.23 dBµV/m 3.571500f@Hz	Ref Level 5 Att PA TDF PIPk Max 2PF 60 dBµV/m 41 \$5 dBµV/m	53.00 dBµV, 0 r	dB SWT 1	0 dB 👄 RBW (	CISPR) 1 MHz 3 MHz 1 	Node Auto Swe	∋p 54.71 dBμV/r 4.303500 GH
Ref Leve Att PA TDF 1Pk Maxe	I 35.00 dB			3 MHz M M2[2]	1ode Auto Sweep 17.23 dBµV/m 3.571500/GHz 29.69 dBµV/m	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF 1Pk Max 30 dBµV/m- 25 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	10de Auto Sweep 17.23 dBµV/m 3.57150/04 29.60 dBµV/m 3.5685fr 1 3.5685fr 1	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF 1Pk Max 30 dBµV/m- 25 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	1ode Auto Sweep 17.23 dBµV/m 3.571500/GHz 29.69 dBµV/m	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve ● Att PA TDF ● 1Pk Max ● 30 dBµV/m- 25 dBµV/m- 20 dBµV/m-	1 35.00 dB			3 MHz M2[2] M1[1]	10de Auto Sweep 17.23 dBµV/m 3.57150/04 29.60 dBµV/m 3.5685fr 1 3.5685fr 1	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF 1Pk Max 30 dBµV/m- 25 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	10de Auto Sweep 17.23 dBµV/m 3.57150/04 29.60 dBµV/m 3.5685fr 1 3.5685fr 1	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve ● Att PA TDF ● 1Pk Max ● 30 dBµV/m- 25 dBµV/m- 20 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF ● 1Pk Max 30 d8µV/m- 25 d8µV/m- 20 d8µV/m- 15 d8µV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	10de Auto Sweep 17.23 dBµV/m 3.57150/04 29.60 dBµV/m 3.5685fr 1 3.5685fr 1	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF ● 1Pk Max 30 d8µV/m- 25 d8µV/m- 20 d8µV/m- 15 d8µV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	dB • SWT 1	0 dB ● RBW ( 1 s ● VBW	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF 9 TDF 9 TDF 9 TDF 9 DFk Max 25 dBµV/m- 25 dBµV/m- 15 dBµV/m- 5 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 3 Att PA TDF 1Pk Max 2PF 60 dBµV/m 11 50 dBµV/m	53.00 dBµV, 0	m M M M M M M M M M M M M M M M M M M M	0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		<sup>39</sup> p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r
Ref Leve Att PA TDF ● 1Pk Max ● 30 dBµV/m- 25 dBµV/m- 20 dBµV/m- 15 dBµV/m- 10 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 1 Att PA TOF PA T	53.00 dBµV, 0	dB • SWT 1	0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF IPk Max 30 dBµV/m- 25 dBµV/m- 20 dBµV/m- 15 dBµV/m- 10 dBµV/m- 0 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 1 Att PA TOF IPK Max 2F 60 dBuV/m 11 55 dBuV/m 45 dBuV/m 40 dBuV/m 30 dBpV/m	53.00 dBµV, 0	m M M M M M M M M M M M M M M M M M M M	0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve           Att           PA TDF           IPk Max           30 dBµV/m-           25 dBµV/m-           20 dBµV/m-           15 dBµV/m-           5 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 1           Att           PA TOF           IPK Max 2F           60 dBµ/m           11 dBµ/m           50 dBµ/m           45 dBµ/m           30 dBµ/m           30 dBµ/m           25 dBµ/m	53.00 dBµV, 0	m M M M M M M M M M M M M M M M M M M M	0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF ■ 1Pk Max.e ■ 1Pk Max.e ■ 1Pk Max.e ■ 25 dBµV/m- 20 dBµV/m- 10 dBµV/m- 0 dBµV/m- -5 dBµV/m-	1 35.00 dB	0 dB • SWT		3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 1 Att PA TOF PA T	53.00 dBµV, 0	m M M M M M M M M M M M M M M M M M M M	0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF IPk Max 30 dBµV/m- 25 dBµV/m- 20 dBµV/m- 15 dBµV/m- 10 dBµV/m- 0 dBµV/m-	1 35.00 dB			3 MHz M2[2] M1[1]	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 1           Att           PA TOF           IPK Max 2F           60 dBµ/m           50 dBµ/m           45 dBµ/m           40 dBµ/m           30 dBµ/m           25 dBµ/m           20 dBµ/m           20 dBµ/m	3.000 dBµV/		0 dB = RBW (	CISPR) 1 MHz 3 MHZ 1 		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve Att PA TDF PA TDF 1Pk Max. 30 dBµV/m- 25 dBµV/m- 10 dBµV/m- 5 dBµV/m- 5 dBµV/m- -5 dBµV/m -10 dBµV/m-	1 35.00 dB 2Rm Max ////////////////////////////////////	0 dB • SWT		3 MH2 M M2[2] M1[1] willipeople area of a	17.23 dBµV/m           3.37130 dBµV/m           3.37130 dBµV/m           3.37130 dBµV/m           3.36831 dBµV/m           3.66831 dBµV/m <t< td=""><td>Ref Level 1 Att PA TOF IPK Max 2F 60 dBµ/m 15 dBµ/m 40 dBµ/m 25 dBµ/m 26 dBµ/m 15 dBµ/m 15 dBµ/m 16 dBµ/m</td><td>3,000 dBµV/ 0 3,000 dBµV/ 1 1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 2 2 1 1 1 1 2 1</td><td></td><td>D de RBW ( 1.1 s VBW</td><td>CISPR) 1 MH2 3 MH2 M1[1] M2[2]</td><td></td><td>эр 54.71 dBµV/r 4.303500 GH 4.300500 GH</td></t<>	Ref Level 1 Att PA TOF IPK Max 2F 60 dBµ/m 15 dBµ/m 40 dBµ/m 25 dBµ/m 26 dBµ/m 15 dBµ/m 15 dBµ/m 16 dBµ/m	3,000 dBµV/ 0 3,000 dBµV/ 1 1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 2 2 1 1 1 1 2 1		D de RBW ( 1.1 s VBW	CISPR) 1 MH2 3 MH2 M1[1] M2[2]		эр 54.71 dBµV/r 4.303500 GH 4.300500 GH
Ref Leve PA TDF PA TDF ■ 1Pk Max ● 30 dBµV/m- 25 dBµV/m- 25 dBµV/m- 10 dBµV/m- 5 dBµV/m- -5 dBµV/m- -10 dBµV/m- Statt 2.7 C	1 35.00 dB 2Rm Max ////////////////////////////////////			3 MH2 M M2[2] M1[1] willipeople area of a	40de Auto Sweep 17.23 dBµV/m 3.37130 dBµ 29.60 dBµ 3.665310 3.665510 4.06 4.07 4.06 4.	Ref Level 3 Att PA TOF IPK Max 22F 60 dBµV/m 11 50 dBµV/m 45 dBµV/m 40 dBµV/m 30 dBµV/m 25 dBµV/m 20 dBµV/m 15 dBµV/m 15 dBµV/m 15 dBµV/m	3,000 dBµV/ 0 3,000 dBµV/ 1 1 1 1 1 1 1 1 1 1 1 1 2 2 1 1 1 1 2 2 1 1 1 2 2 1 1 1 1 2 1		0 dB = RBW (	CISPR) 1 MH2 3 MH2 M1[1] M2[2]		≥p 54.71 dBµV/r 4.303500 GH 36.27 dBµV/r 4.300500 GH
Ref Leve           Att           PA TDF           ● IPk Max.●           ● 1Pk Max.●           ● 1Pk Max.●           ● 1Pk Max.●           ● 25 dBµv/m-           20 dBµv/m-           10 dBµv/m-           5 dBµv/m-           0 dBµv/m-           -10 dBµv/m-           -10 dBµv/m-           Start 2.7 C           Marker	1 35.00 dB 2Rm Max 4,44,44,444 4,44,44,444 4,44,44,444 4,44,4	0 dB • SWT	1.1 s vew	3 MH2 M M2[2] M1[1] toollyddyddyddyddyddyddyddyddyddyddyddyddyd	Adde Auto Sweep           17.23 dBµV/m           3.571500/cz           3.66831/cz           3.66831/cz           Auto-should a start a starta	Ref Level 1           Att           PA TOF           IPK Max 2F           60 dBu//m           11 dBu//m           50 dBu//m           40 dBu//m           30 dBu//m           25 dBu//m           20 dBu//m           20 dBu//m           20 dBu//m           15 dBu//m           Start 4.3 dH           Marker	3.000 dBµV/ 0 3m Max 3.000 dBµV/ 1 1 1 1 1 1 1 1 1 2		0 d6 • RBW ( 1 s • VBW	CISPR) 1 MH2 3 MH2 M1[1] M2[2]		54.71 dBµV/r 4.30300 GH
Ref Leve PA TDF PA TDF ■ 1Pk Max ● 30 dBµV/m- 25 dBµV/m- 25 dBµV/m- 10 dBµV/m- 5 dBµV/m- -5 dBµV/m- -10 dBµV/m- Statt 2.7 C	1 35.00 dB 2Rm Max 4,44,44,444 4,44,44,444 4,44,44,444 4,44,4			3 MH2 M M2[2] M1[1] bull yeart a	17.23 dBµV/m           3.37130 dBµV/m           3.37130 dBµV/m           3.37130 dBµV/m           3.36831 dBµV/m           3.66831 dBµV/m <t< td=""><td>Ref Level 3 Att PA TOF IPK Max 22F 60 dBµV/m 11 50 dBµV/m 45 dBµV/m 40 dBµV/m 30 dBµV/m 25 dBµV/m 20 dBµV/m 15 dBµV/m 15 dBµV/m 15 dBµV/m</td><td>3.000 dBµV/ 0 3m Max 3.000 dBµV/ 1 1 1 1 1 1 1 1 1 2</td><td></td><td>D de RBW ( 1.1 s VBW</td><td>CISPR) 1 MH2 3 MH2 1 M1[1] M2[2] M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4</td><td></td><td>эр 54.71 dBµV/r 4.303500 GH 4.300500 GH</td></t<>	Ref Level 3 Att PA TOF IPK Max 22F 60 dBµV/m 11 50 dBµV/m 45 dBµV/m 40 dBµV/m 30 dBµV/m 25 dBµV/m 20 dBµV/m 15 dBµV/m 15 dBµV/m 15 dBµV/m	3.000 dBµV/ 0 3m Max 3.000 dBµV/ 1 1 1 1 1 1 1 1 1 2		D de RBW ( 1.1 s VBW	CISPR) 1 MH2 3 MH2 1 M1[1] M2[2] M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4 M4		эр 54.71 dBµV/r 4.303500 GH 4.300500 GH

# INDOOR PRE-SCAN SPURIOUS



# Table 8(d): Transmit Chain Spurious Emissions.

🔆 Agilent 09:31:08 May	26,2017	e e e e e e e e e e e e e e e e e e e	🔆 <b>Agilent</b> 09:40:08 May 2	26, 2017	
Ref 56.99 dBµV/m E	Ext Mix Ext PG 60 dB	Mkr1 34.419 GHz 34.54 dBµV/m F	Ref56.99 dBµV/m Ex	t Mix Ext PG 60 dB	Mkr1 38.949 GH 35.29 dBµV/m
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34.54 dBµV∕	ſ <b>m</b>		35.29 dBµV/n		
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A AA		Ě	A AA		
Start 27 GHz		Stop 35 GHz S	Start 35 GHz		 Stop 40 GH
Res BW 1 MHz	VBW 3 MHz	#Sweep 8 s (8001 pts)	Res BW 1 MHz	VBW 3 MHz	#Sweep 5 s (5001 pts)
	VDN 3 TINZ			VDM 3 MHZ	*0#eeb 2 2 (2001 pts
		9	₩ <b>Agilent</b> 09:40:59 May 2		
∰ <b>Agilent</b> 09:28:38 May Ref 56.99 dB⊔V/m E		Mkr1 34.431 GHz 24.63 dB⊔V/m F	<b>⊯ Agilent</b> 09:40:59 May 2 Ref 56.99 dB⊔V/m Ex:		Mkr1 38.892 GF
<mark>⊯ Agilent</mark> 09:28:38 May Ref56.99 dBµV/m E •Rvg _og	<sup>,</sup> 26, 2017	Mkr1 34.431 GHz 24.63 dBµV/m F	<mark>⊯ Agilent</mark> 09:40:59 May 2 Ref 56.99 dBµV∕m Ex •Rvg _og	26, 2017	Mkr1 38.892 G
♣ Agilent 09:28:38 May Ref 56.99 dBµV/m E Avg .og .0	<sup>,</sup> 26, 2017	Mkr1 34.431 GHz 24.63 dBµV/m 1	<mark>⊯ Agilent</mark> 09:40:59 May 2 Ref 56.99 dBµV/m Ex #Avg 	26, 2017	Mkr1 38.892 G
<mark>₩ Agilent</mark> 09:28:38 May Ref 56.99 dBµV/m E #Avg Log 10	<sup>,</sup> 26, 2017	Mkr1 34.431 GHz 24.63 dBµV/m 1	<mark>⊯ Agilent</mark> 09:40:59 May 2 Ref 56.99 dBµV∕m Ex •Rvg _og	26, 2017	Mkr1 38.892 GF 25.11 dBµV/n
★ Agilent 09:28:38 May           Ref 56.99 dBµV/m         E           #Avg	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m L 1 1	♣ Agilent 09:40:59 May 2           Ref 56.99 dBµV/m         Ex           *Avg	26, 2017	Mkr1 38.892 G
	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m L 1	★ Agilent         09:40:59         May 2           Ref 56.99         dBµV/m         Ex:           #Avg	26, 2017 t Mix Ext PG 60 dB	Mkr1 38.892 GF 25.11 dBµV/r
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<ul> <li>★ Agilent 09:28:38 May</li> <li>Ref 56.99 dBµV/m E</li> <li>#Avg</li> <li>Log</li> <li>10</li> <li>4B/</li> <li>Marker</li> <li>34.431000000</li> <li>24.63 dBµV/</li> </ul>	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m 1 1 1 1 1 1 1 1 1 1	<ul> <li>★ Agilent 09:40:59 May 2</li> <li>Ref 56.99 dBµV/m Ex</li> <li>*Avg</li> <li>.09</li> <li>.00</li> <li>.00</li> <li>.00</li> <li>.01</li> <li>.01<!--</td--><td>26, 2017 t Mix Ext PG 60 dB</td><td>Mkr1 38.892 GF 25.11 dBµV/r</td></li></ul>	26, 2017 t Mix Ext PG 60 dB	Mkr1 38.892 GF 25.11 dBµV/r
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★ Agilent         09:28:38         May           Ref         56.99         dBµV/m         E           #Avg	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m 1 1 1 1 1 1 1 1 1 1	<ul> <li>★ Agilent 09:40:59 May 2</li> <li>Ref 56.99 dBµV/m Ex</li> <li>*Avg</li> <li>.09</li> <li>.09<!--</td--><td>26, 2017 t Mix Ext PG 60 dB</td><td>Mkr1 38.892 GH 25.11 dBµV/n</td></li></ul>	26, 2017 t Mix Ext PG 60 dB	Mkr1 38.892 GH 25.11 dBµV/n
★ Agilent 09:28:38 May          Ref 56.99 dBµV/m       E         #Avg       E         Log       Image: Constraint of the second sec	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m L 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<ul> <li>★ Agilent 09:40:59 May 2</li> <li>Ref 56.99 dBµV/m Ex</li> <li>*Avg</li> <li>.09</li> <li>.09<!--</td--><td>26, 2017 t Mix Ext PG 60 dB</td><td>Mkr1 38.892 GH 25.11 dBµV/n</td></li></ul>	26, 2017 t Mix Ext PG 60 dB	Mkr1 38.892 GH 25.11 dBµV/n
<ul> <li>★ Agilent 09:28:38 May</li> <li>Ref 56.99 dBµV/m E</li> <li>#Avg</li> <li>Log</li> <li>10</li> <li>dB/</li> <li>Marker,</li> <li>34.431000001</li> <li>24.63 dBµV/</li> <li>ABµV/</li> </ul>	26, 2017 Ext Mix Ext PG 60 dB	Mkr1 34.431 GHz 24.63 dBµV/m L 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<ul> <li>★ Agilent 09:40:59 May 2</li> <li>Ref 56.99 dBµV/m Ex</li> <li>*Avg</li> <li>.09</li> <li>.09<!--</td--><td>26, 2017 t Mix Ext PG 60 dB</td><td>Mkr1 38.892 GF 25.11 dBµV/n</td></li></ul>	26, 2017 t Mix Ext PG 60 dB	Mkr1 38.892 GF 25.11 dBµV/n

# Table 8(e): Transmit Chain Spurious Emissions. INDOOR PRE-SCAN SPURIOUS (TOP PEAK, BOTTOM RMS)

### 4.3.2 Radiated Digital Spurious

The results for the measurement of digital spurious emissions are not reported herein as all digital emissions were greater than 20 dB below the regulatory limit. Radiation from digital components was measured to 4 GHz, or to five times the maximum digital component operating frequency, whichever is greater.

## 5 Measurement Uncertainty

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.

Measured Parameter	${\bf Measurement} ~ {\bf Uncertainty}^{\dagger}$
Radio Frequency	$\pm (f_{Mkr}/10^7 + RBW/10 + (SPN/(PTS - 1))/2 + 1 \text{ Hz})$
Conducted Emm. Amplitude	$\pm 1.8\mathrm{dB}$
Radiated Emm. Amplitude $(30 - 200 \text{ MHz})$	$\pm 2.7\mathrm{dB}$
Radiated Emm. Amplitude $(200 - 1000 \text{ MHz})$	$\pm 2.5\mathrm{dB}$
Radiated Emm. Amplitude $(f > 1000 \text{ MHz})$	$\pm 3.7\mathrm{dB}$
DC and Low Frequency Voltages	$\pm 2\%$
Temperature	$\pm 0.5^{\circ}\mathrm{C}$
Humidity	$\pm 5\%$

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