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Confidential Report

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FCC Test Firm Registration	409640			
IC Site Registration	IE0001			
Date	6 th Apr 2020			
EUT Description	Tyre Pressure and Temperature Monitor			
FCC ID	MRXAHMPD4			
IC ID	2546A-AHMPD4			
Authorised by	Paul Reilly			
Authorised Signature:	Part Ruly			

TEST SUMMARY

The equipment complies with the requirements according to the following standards.

FCC Part Section(s)	Industry Canada	TEST PARAMETERS	Test Result
15.231(e) 15.35	RSS-210 A1.4 RSS-Gen 6.10	Duty Cycle	PASS
15.231(e) 15.209	RSS-210 A.1.4 RSS-210 8.9	RADIATED EMISSIONS	PASS
15.231(c)	RSS-210 A1.3	20dB BANDWIDTH 99% Bandwidth	PASS

RSS 210 Issue 10 Dec 2019 RSS-Gen Issue 5 Mar 2019

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF COMPLIANCE ENGINEERING IRELAND LTD

Exhibit A – Technical Report

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1.0 EUT Description

The EUT was monitor using a short range 433.914 MHz band transmitter for reporting of tyre pressure and temperature in cars/trucks.

Model:	AHMPD4		
Туре:	Tyre Pressure and Temperature Monitor		
Type of radio:	Stand-alone		
Transmitter Type:	FSK		
Operating Frequency Range(s):	433.914 MHz		
Number of Channels:	One		
Antenna:	Integral		
Transmitter power configuration:	3 VDC Internal Battery.		
Operating. Temp Range:	-40° C to +85° C		
Classification:	DSC		
Test Methodology:	Measurements performed according to the		
	procedures in ANSI C63.10-2013		

1.1 EUT Operation

Operating Conditions during Test:

The equipment under test was operated during the measurement under the following conditions:

A sample of EUT which was programmed to operate in test mode (CW mode) was used for all tests except duty cycle and bandwidth.

The duty cycle test was performed on a sample of EUT programmed to operate at the highest duty cycle possible.

Environmental conditions

During the measurement the environmental conditions were within the listed ranges: \square Normal

Normal Temperature: Humidity:

+15 to +35 ° C 20-75 %

1.2 Modifications

No modifications were required in order to pass the test specifications.

1.3 Date of Test

The tests were carried out on one sample of the EUT on 26th and 27th of Nov 2019 and 23rd Jan 2020.

1.4 Electromagnetic Emissions Testing

The guidelines of CISPR 16-4 were used for all uncertainty calculations, estimates and expressions thereof for EMC testing. A copy of Compliance Engineering Ireland Ltd.'s policy for EMC Measurement Uncertainty is available on request.

RF Requirements: Spurious emissions in accordance with FCC CFR 15.107, 15.109 and 15.209. Tests were carried out to the requirements of CISPR 16-4 and ANSI C63.4-2014 and C63.10-2013.

1.4.1 Measurement Uncertainty

The measurement uncertainty (with a 95% confidence level) for the conducted emissions test was ± 3.5 dB.

The measurement uncertainty (with a 95% confidence level) for the radiated emissions test was ± 5.3 dB (from 30 to 100 MHz), ± 4.7 dB (from 100 to 300 MHz),

±3.9 dB (from 300 to 1000 MHz) and ±3.8 dB (from 1 GHz to 40 GHz).

1.5 Special Test Software

Tests were performed manually and no special test software was used

2.0 Emissions Measurements

2.1 Conducted Emissions Measurements

Test not performed as EUT is powered from battery.

2.2 Radiated Emissions Measurements

Radiated Power measurements were made at the Compliance Engineering Ireland Ltd anechoic chamber located in Dunshaughlin, Co. Meath, Ireland to determine the radio noise radiated from the EUT. A "Description of Measurement Facilities" has been submitted to the FCC and approved pursuant to Section 2.948 of CFR 47 of the FCC rules.

2.2.1 General

Emissions below 1GHz were measured using resolution bandwidth 100kHz at a measurement distance of 3 metres with EUT on a motorised turntable which allowed 360 degrees rotation.

Emissions above 1GHz were measured with resolution bandwidth of 1MHz at a measurement distance of 3 metres with EUT on a motorised turntable which allowed 360 degrees rotation.

2.2.2 Measurements in Transmit mode

A Radiated Emission pre-scan was performed which covered the x, y and z orientations in horizontal and vertical polarizations. In each case the emission was maximised. The result of this pre-scan showed that the highest emission for vertical polarization was with the EUT vertical (orientation3 O3)

The EUT in a vertical orientation (orientation2 O2) gave the highest emissions for horizontal polarization.

A full scan for radiated emission was performed in orientation O3 for vertical polarization and in orientation O2 for horizontal polarization.

The radiated emissions were maximised by configuring the EUT, by rotating the EUT, and by raising and lowering the antenna from 1 to 4 metres.

Significant peaks from the EUT were then recorded to determine margin to the limits.

Tests were carried out as per Ansi C63.10 -2013

2.3 Antenna Requirements

According to FCC 47 CFR 15.203:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

* The antenna of this E.U.T is permanently attached.

*The E.U.T Complies with the requirement of 15.203

2.4 **Occupied Bandwidth**

Requirement -15.231 (c) & IC RSS-210 A1.3

The bandwidth of the emission shall be no wider than 0.25% of the centre frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz. the emission shall be no wider than 0.5% of the centre frequency. Bandwidth is determined at the points 20dB down from the modulated carrier.

TEST PROCEDURE

₽ (X) Spectrum Receiver Ref Level 82.00 dBµV 🔵 RBW 2 kHz SWT 944.7 µs 👄 VBW 5 kHz Att 10 dB Mode Auto FFT Input 1 AC PS PA TDF ⊖1Pk Max -19.98 dB D3[1] 30.540 kHz 70 dBµVndB 20.00 dB 20.26000000 kHz M1 Bw 60 dBµV-D1 57.680 dBµV-V. Q factor 21416.7 57.68 dBµV M1[1] 50 dBuV 433.912550 MHz T2 Τī 40 dBµV--D2 37.680 dBµV-A 30 dBµV-20 dBµV-10 dBuV-0 dBµV--10 dBµV-CF 433.91443 MHz 691 pts Span 100.0 kHz Marker X-value **Function Result** Type Ref | Trc Y-value Function M1 1 433.91255 MHz 57.68 dBµV ndB down 20.26 kHz 37.48 dBµV 433.90256 MHz Τ1 1 ndB 20.00 dB Τ2 433.92282 MHz 37.63 dBµV Q factor 21417 1 D2 Μ1 1 -19.02 kHz -20.41 dB 30.54 kHz -19.98 dB D3 M1 1 Fig 1 Occupied Bandwidth 20dB down

Operating Frequency (MHz)	20dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
433.914	49.56	1084.785	1035.225	Pass

RESULTS

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Receiv	/er	<u>ا</u>	Spectrum	∞]						[₩
Ref Le	vel 8:	2.00 d	Вµ∨		RBW 2 kHz					
Att		10	D dB SWT 94	8.4 µs 👄	VBW 5 kHz M	lode Auto	FFT	Input 1 AC		
PS PA	TDF									
⊖1Pk Ma	эх									
						D3[[1]			-37.24 di
									1	.44.730 kH
70 dBµV	/					Oct	c Bw			648336 kH
60 dBµV	/				M1	M1	[1]			56.22 dBµ
00 00 00					7				433.9	12980 MH
50 dBµV	r									
					M					
40 dBµ\						A				
30 dBµV	,				TI AND	AAT				
зо ивру					X A A	° TAA	AA	T2		
20 dBuV	·		D2	AAA	AAV	• U V	VV	AAAA	www	
mm	MA	MAN	mmm	www.~				······································	MANNA	www
10 dBµV	<u> </u>									
0 dBµV-										
-10 dBµ'										
-ro dop	Č.									
CF 433	.9144	13 MH	z	1	691 pt	:5			Span	500.0 kHz
Marker									-	
Туре	Ref	Trc	X-valu	e	Y-value	Functi	on l	Fun	ction Resul	t
M1		1	433.912	98 MHz	56.22 dBµV					
T1		1	433.857	99 MHz	25.40 dBµV	Oct	сBw		167.8726	548336 kHz
T2		1	434.0258	63 MHz	22.97 dBµV					
D2	M1	1		.49 kHz	-38.45 dB					
D3	M1	1	144	73 kHz	-37.24 dB					
				F	ig 2 99% Occup	iaal Davaduui	altia			

Operating Frequency	99% Bandwidth	Limit	Margin	Result
MHz	KHz	KHz	KHz	
433.914	167.87	1084.785	916.915	Pass

3.0 MAXIMUM MODULATION PERCENTAGE (M%) / Duty cycle LIMIT

Requirement 15.35 (c) 15.231(e) IC RSS210 A1.4 IC RSS-Gen 6.10

The measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative(provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 seconds interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted with any application for certification or shall be retained in the measurement data file for equipment subject to notification or verification.

TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer or radiated field strength. The RBW was set to 100 kHz and the VBW is set to 300KHz. The sweep time was coupled and the span was set to 0 Hz. The number of pulses was measured and calculated in a 100 ms scan.

RESULTS

MAXIMUM MODULATION PERCENTAGE /Duty Cycle

One	Pulse	No of	Duty Cycle	Duty	Test
Period(mS)	Width (mS)	Pulses		Cycle %	Result
100	17.39	1	0.1739	17.4	Pass

CALCULATION

Average Reading = Peak Reading $dB(\mu V/m) + 20\log (Duty Cycle)$, where Duty Cycle is (No of pulses*pulse width)/100 or T Note correction for pulse mode operation is

20 log duty cycle (dB)				
-15.2				

15.231e duty cycle limits

The duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds

Result

Duration of each transmission = 465.2	22mS	Limit 1sec	Comply
Silent period between transmissions	>32Secs	Limit 13.95secs	Comply

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Receiver S	oectrum	\boxtimes						
Ref Level 81.00 dB	Vμ	e RBW	100 kHz					
	dB 画 SWT 1	s 👄 VBW	300 kHz	Input	1 AC			
SGL TRG: VID PS PA	TDF							
)1Pk Max		1						
				D	4[1]			0.43 d
70 dBµV				M	1[1]			465.22 m 26.07 dBµ
	-	-	-	IVI	1[1]			20.07 ивр -1.45 m
60 dBµV								
50 dBµV								
80								
40 dBµV-TRG 42.0	00 dBµV <u></u>							
					~			
30 dBUV Miles	3 mayun	in theman	hours hours	Mary Barrow	and much lound	nonimphan	and march the	he representation
20 dBµV						12		
10 dBµV								
O dBµV								
-10 dBµV								-
Soundard Safe								
CF 433.91443 MHz			691	pts				100.0 ms/
/larker								
Type Ref Trc	X-value	e	Y-value	Func	tion	Fund	ction Resul	t
M1 1		1.45 ms	26.07 dBµ					
D2 M1 1		7.39 ms	0.14 0					
D3 M1 1	10)0.0 ms	0.35 (1B				
rsat saal al	400			In .				
D4 M1 1	465	5.22 ms	0,43 (
Receiver S	pectrum	®	0.43 c Fig 3 Single					
Receiver S Ref Level 81.00 dB Att 10	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz					
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	e pulse train				T T
Receiver S Ref Level 81.00 dB Att 10	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	e pulse train Inpu	t 1 AC			
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	e pulse train Inpu				-38.47 d
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA 1Pk Max	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC			-38.47 d 32.029 67.59 dBμ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBμ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA 1Pk Max 70 dBµV M1	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBμ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA 1Pk Max 70 dBµV M1 60 dBµV	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBμ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA TPk Max 70 dBµV M1 60 dBµV TRG TRG 54.0	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBμ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA 1Pk Max 70 dBµV M1 60 dBµV	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Sj Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 70 dBµV M1 60 dBµV TRG 50 dBµV TRG	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver S Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA TPk Max 70 dBµV M1 60 dBµV TRG TRG 54.0	Dectrum	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 70 dBµV M1 60 dBµV TRG 50 dBµV TRG	Dectrum	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 70 dBµV M1 60 dBµV TRG 50 dBµV TRG	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c Fig 3 Single V 100 kHz	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBμ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID SIL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 40 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID SIL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 40 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 TPk Max 10 O dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV 20 dBµV 20 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 TPk Max 10 O dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 IPk Max 10 O dBµV M1 60 dBµV TRG 50 dBµV 10 40 dBµV 10 20 dBµV 10 10 dBµV 10	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV 20 dBµV 20 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 IPk Max 10 O dBµV M1 60 dBµV TRG 50 dBµV 10 40 dBµV 10 20 dBµV 10 10 dBµV 10	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PS PA IPk Max 10 IPk Max 10 O dBµV M1 60 dBµV TRG 50 dBµV 10 40 dBµV 10 20 dBµV 10 10 dBµV 10	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV 10 dBµV 10 dBµV 10 dBµV 0 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	pulse train Inpu	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ
Receiver Si Ref Level 81.00 dB Att 10 SGL TRG: VID PIPk Max 70 dBµV M1 60 dBµV TRG 50 dBµV TRG 40 dBµV 20 dBµV 10 dBµV 10 dBµV 10 dBµV 0 dBµV	Dectrum µV dB ● SWT 11 TDF 00 dBµV	(X)	0.43 c	e pulse train	t 1 AC 2[1]			-38.47 d 32.029 67.59 dBµ 0.000

4.0 Field Strength of Radiated Emissions

Test Specification: FCC 15.231(e) and RSS-210 A1.4

Fundamental Frequency (MHz)	Field Strength of fundamental (µV/m)	Strength of Spurious Emissions (µV/m).
40.66 ~ 40.70	22.50	225
70 ~ 130	1250	125
130 ~ 174	1250 to 3750 **	125 to 375 **
174 ~ 260	3750	375
260 ~ 470	3750 to 12500 **	375 to 1250 **
Above 470	12500	1250

** Linear interpolations Interpolation Formula = 16.67 x Freq MHz - 2833.33

For operating frequency of 433.948 MHz the following limits apply (using interpolation formula above)

Fundamental Frequency	Field Strength of fundamental	Field Strength of fundamental	Field Strength of Spurious Emissions	Field Strength of Spurious Emissions
MHz	μV/m	dBµV/m	μV/m	dBµV/m
433.948	4400.913	72.871	440.091	52.871

Test Specification: FCC PART 15, SECTION 47 CFR 15.209, RSS Gen 8.9

Frequency (MHz)	Field Strength (µV/m)	Field Strength (dBµV/m)
30-88	100	40.0
88-216	150	43.5
216-960	200	46.0
Above 960	500	54.0

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Sections 15.231 and 15.241

Duty cycle correction =20Log (duty cycle) dB **Duty Cycle correction for Average measurement of pulsed signal =Peak -15.3dB** as per ANSI C63.10-2013 Section 7.5

4.1 Results for Radiated emissions Test Specification: FCC 15.231(e) and RSS-210 A1.4

Appendix A shows the results of the scans in the anechoic chamber. Ref Appendix B for EUT orientation

4.1.1 Fundamental Measurements with Trilog Antenna (30MHz to 1GHz)

Frequency	Reading Peak	EUT Orientation	Antenna Polarity	Antenna Factor	Preamp Gain	Cable loss	Final Field Strength Peak	Average Limit	Margin for Peak V Average Limit +20dB
MHz	dBuV/m		V/H	dB	dB	dB	dBuV/m	dBuV/m	dB
433.948	54.5	O3	Vertical	16.1	0	1.2	71.8	72.9	21.1
433.948	54.0	O2	Horizontal	16.1	0	1.2	71.3	72.9	21.6

Frequency	Final Field Strength Peak	EUT Orientation	Antenna Polarity	Average Level (Peak plus -15.2dB Duty Cycle factor)	Average Limit	Margin
MHz	dBuV/m		V/H	dBuV/m	dBuV/m	dB
433.948	71.8	O3	Vertical	56.6	72.9	16.3
433.948	71.3	O2	Horizontal	56.1	72.9	16.8

4.1.2 Harmonics Measurements in the range (30MHz to 1GHz) **Test Specification: FCC 15.231(e) and RSS-210 A1.1.5**

Frequency	Reading Peak	EUT Orientation	Antenna Polarity	Antenna Factor	Preamp Gain	Cable loss	Final Field Strength Peak	Average Limit	Margin for Peak v Average Limit +20dB
MHz	dBuV/m		V/H	dB	dB	dB	dBuV/m	dBuV/m	dB
867.900	6.9	O3	Vertical	22.2	0	1.4	30.5	52.9	42.4
867.900	6.8	O2	Vertical	22.2	0	1.4	30.4	52.9	42.5

Frequency MHz	Final Field Strength Peak dBuV/m	EUT Orientation	Antenna Polarity V/H	Average Level (Peak plus - 15.2dB Duty Cycle factor) dBuV/m	Average Limit dBuV/m	Margin dB
867.900	30.5	O3	Vertical	15.2	52.9	37.6
867.900	30.4	O2	Vertical	15.2	52.9	37.7

4.1.3 Spurious Emissions Measurements above 1GHz (1GHz – 6 GHz) Test Specification: FCC 15.231(e) and RSS-210 A1.4

Frequency	Reading Peak	EUT Orientation	Antenna Polarity	Antenna Factor	Preamp Gain	Cable loss	Final Field Strength Peak	Average Limit	Margin for Peak V Average Limit +20dB
GHz	dBuV/m		V/H	dB	dB	dB	dBuV/m	dBuV/m	dB
1.301	52.4	O3	Vertical	23.6	39.8	3.8	40.0	52.9	32.9
1.734	55.2	O3	Vertical	24.8	39.3	2.8	43.5	52.9	29.4
2.170	49.8	O3	Vertical	28	39	3.2	42.0	52.9	30.9
1.301	52.1	O2	Horizontal	23.6	39.8	3.8	39.7	52.9	33.2
1.734	60.5	O2	Horizontal	24.8	39.3	2.8	48.8	52.9	24.1
2.170	50.0	O2	Horizontal	28	39	3.2	42.2	52.9	30.7

Frequency GHz	Final Field Strength Peak dBuV/m	EUT Orientation	Antenna Polarity V/H	Average Level (Peak plus - 15.2dB Duty Cycle factor) dBuV/m	Average Limit dBuV/m	Margin dB
1.301	40.0	O3	Vertical	24.8	52.9	28.1
1.734	43.5	O3	Vertical	28.3	52.9	24.6
2.170	42.0	O3	Vertical	26.8	52.9	26.1
1.301	39.7	O2	Horizontal	24.5	52.9	28.4
1.734	48.8	O2	Horizontal	33.6	52.9	19.3
2.170	42.2	O2	Horizontal	27.0	52.9	25.9

Duty cycle correction =20Log (duty cycle) dB **Duty Cycle correction for Average measurement of pulsed signal =Peak -15.2dB** as per ANSI C63.10-2013 Section 7.5

Result: Pass

5 List of Test Equipment

Instrument	Manufacturer	Model	Serial Num	CEI Ref	Cal Due Date	Cal Interval Months
Microwave Preamplifier	Hewlett Packard	83017A	3123A00175	805	30-Sep-20	12
Spectrum Analyser 30Hz-40GHz	Rohde& Schwarz	FSP40	100053	850	11-Dec-21	36
Test Receiver 3.6GHz	Rohde& Schwarz	ESR	1316.3003k03- 101625-s	869	07-Jun-20	36
LISN	Rohde& Schwarz	ESH3-Z5	825460/003	604	16-Feb-22	36
Antenna Horn	AH Systems	SAS-200/571	373	839	14-Mar-21	36
Fully Anechoic Chamber	CEI	FAR 3M	906	906	23-Jul-22	36
Anechoic Chamber	CEI	SAR 10M	845	845	16-May-22	36
Antenna Biconical	Schwarzbeck	VHBB 9124	9124 667	871	03-Sep-21	36
Antenna Log Periodic	Chase	UPA6108	1072	609	03-Sep-21	36

Appendix A Additional Test Results

Transmitter Spurious Emissions

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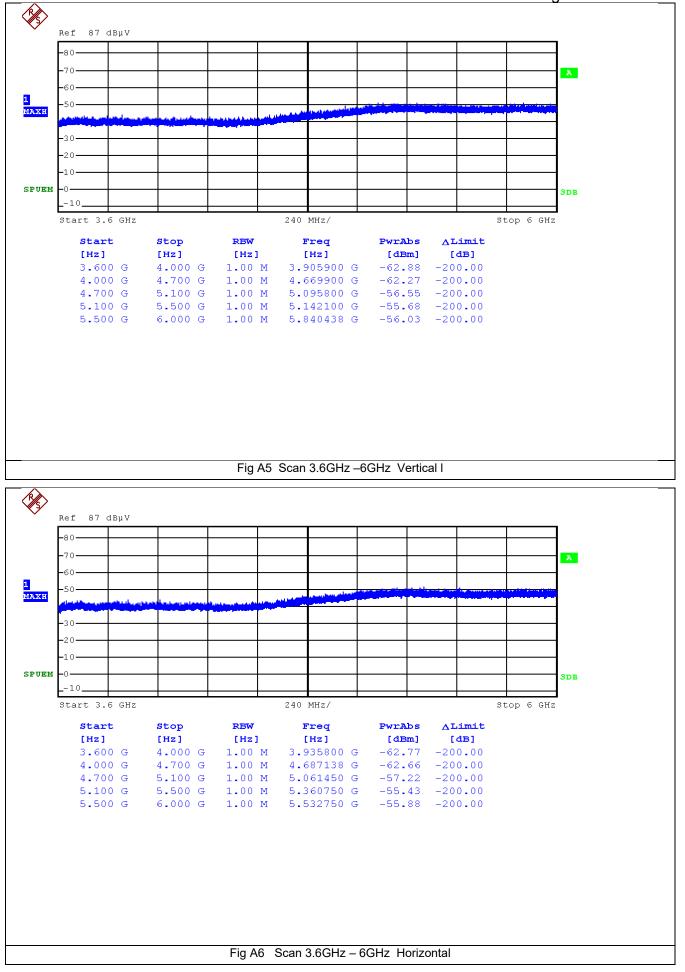
Page 17 of 21 Receiver Δ RBW (CISPR) 120 kHz MT 100 ms 871_3mx Input 1 AC Att 0 dB Preamp ON Step TD Scan dBµV 300.0000000 MHz Level Frequency Max Peak 14.64 75.9 433.9480469 MHz) 30 -30 Scan 😑 1Pk Clrw 100 MHz M1[1] 11.87 dBµV 299.640000 MHz 0.000 s 90 dBµV— 80 dBuV-70 dBµV---60 dBµV— 50 dBµV-40 dBµV-30 dBµV-20 dBµVantimati Work Allew Moort Moundary Start 30.0 MHz Stop 300.0 MHz Fig A1 Scan 30MHz – 300MHz Vertical Receiver Δ RBW (CISPR) 120 kHz MT 100 ms 871_3mx Input 1 AC Att 0 dB Preamp ON Step TD Scan dBµV 300.0000000 MHz Leve Frequency 75.9 13.95 Max Peak 433.9480469 MHz) 30 10 -30 10 Scan O1Pk Clrw 100 MHz M1[1] 12.86 dBµV 0.000 s 299.880000 MHz 90 dBµV---80 dBµV-70 dBµV-60 dBµV-50 dBµV-40 dBµV-30 dBµV-20 dBµV-1. Martinhalus dorothe 10 de with White and the second when the second s Stop 300.0 MHz Start 30.0 MHz Fig A2 Scan 30MHz – 300MHz Horizontal

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Level	₀ dB dBµV			1.000	00000 GHz
Max Peak	28.21	Frec (44.9			59531 MHz)
-30	-10	10	0	50	70
Scan <mark>O</mark> 1Pk Clrw	,				
90 dBµV					
80 dBµV					
70 dBµV					
60 dBµV			1 1 1		
50 dBµV					
 40 dBµV					
	i i				
30 dBµV		www.water.and		A	man for man and the particular of
20 dBµV	and a superior	warman warman warman and	www.campations.	Martin Marina Annaly and	
10 dBµV	Antogen and a second	<u></u>	1		
					1
Start 300.0 MHz					Stop 1.0 GHz
		Fig A3 Scan 300MHz	z - 1GHz Vertica	al	
Receiver					
Receiver RBN	₩ (CISPR) 120 kHz		609_		
Receiver RBN	W (CISPR) 120 kHz O dB	MT 100 ms Preamp ON Step	609_	,3mx	
Receiver RBN Input 1 AC Att Level	W (CISPR) 120 kHz 0 dB dBµV	MT 100 ms Preamp ON Step	609_ TD Scan	. ^{3mx}	۳ <u>۷</u> 20000 GHz
Receiver RBN Input 1 AC Att	W (CISPR) 120 kHz 0 dB dBµV	MT 100 ms Preamp ON Step Frec	609_ TD Scan	. ^{3mx}	
Receiver RBV Input 1 AC Att Level Max Peak	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBV Input 1 AC Att Level Max Peak 30 Scan ©1Pk Clrw	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBN Input 1 AC Att Level Max Peak -30 Scan • 1Pk Clrw 90 dBµV-	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBN Input 1 AC Att Level Max Peak -30 Scan • 1Pk Clrw 30 dBµV	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBV Input 1 AC Att Level Max Peak -30	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBN Input 1 AC Att Level Max Peak -30 Scan • 1Pk Clrw 30 dBµV	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBN Input 1 AC Att Level Max Peak -30 Scan • 1Pk Clrw 50 dBµV	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBY Input 1 AC Att Level Max Peak 30 Scan ●1Pk Clrw 30 dBµV	w (CISPR) 120 kHz 0 dB dBµV 28.19 -10	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan JUENCY	^{3mx} 1.000 52.946	200000 GHz 59531 MHz)
Receiver RBV Input 1 AC Att Level Max Peak 30 Scan ● 1Pk Clrw 30 dBµV 30 dBµV 50 dBµV 50 dBµV 40 dBµV	<pre></pre>	MT 100 ms Preamp ON Step Frec (44.9 10	609_ TD Scan Juency	3mx 1.00(52.946 50	00000 GHz 59531 MHz) 70
Receiver RBV Input 1 AC Att Level Max Peak 30 Scan ● 1Pk Clrw 30 dBµV 30 dBµV 50 dBµV 50 dBµV 40 dBµV	<pre></pre>	MT 100 ms Preamp ON Step Frec (44.9 10	609_ TD Scan Juency	3mx 1.00(52.946 50	00000 GHz 59531 MHz) 70
Receiver RBV Input 1 AC Att Level Max Peak 30 Scan ● 1Pk Clrw 30 dBµV 30 dBµV 50 dBµV 50 dBµV 40 dBµV	<pre></pre>	MT 100 ms Preamp ON Step Frec (44.9	609_ TD Scan Juency	3mx 1.00(52.946 50	00000 GHz 59531 MHz) 70

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Input 1 AC Att	W (CISPR) 1 MHz O dB		655Rx FD Scan		
Level	dBµV	Fre	quency	3.599	7500 GHz
Max Peak	44.94	(46.9 30		3.599	7500 GHz)
		30		50	- 70
Scan 😑 1Pk Max					
90 dBµV					
80 dBµV					
70 dBµV					
60 dBuV					
50 dBµV					
					man and the start
Manhahan	have made and a start of the st	and a superior and the	warder warder and		
10 dBµV					
Start 1.0 GHz			i		Stop 3.6 GH
		Fig A5 Scan 1GHz –			
Receiver					[□
L RBV Input 1 AC Att	W (CISPR) 1 MHz 0 dB		655Rx ID Scan		
L RB1	0 dB	Preamp ON Step 1		3.598	5000 GHz
Input 1 AC Att Level Max Peak	о _{dB} dBµV	Preamp ON Step T Free (59.4	TD Scan		
Input 1 AC Att Level Max Peak	ο dB dBμV 45.63	Preamp ON Step T Free	TD Scan		5000 GHz
Input 1 AC Att Level Max Peak	ο dB dBμV 45.63	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Level Max Peak	ο dB dBμV 45.63	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Level Max Peak	ο dB dBμV 45.63	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Level Max Peak	0 dB dBμV 45.63 10	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Level Max Peak 10 Scan ⊙1Pk Max 90 dBµV- 80 dBµV-	0 dB dBμV 45.63	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Level Max Peak -10 Scan ●1Pk Max 90 dBµV	0 dB dBμV 45.63	Preamp ON Step T Free (59.4	TD Scan	3.471	5000 GHz
Input 1 AC Att Input 1 AC Att Level Max Peak -10 Scan ●1Pk Max 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV	0 dB dBμV 45.63 10	Preamp ON Step 7 Free (59.4 30	rD Scan quency	3.471	5000 GHz 1000 GHz)
Input 1 AC Att RBY Input 1 AC Att Level Max Peak -10 Scan ●1Pk Max 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV	0 dB dBμV 45.63 10	Preamp ON Step T Free (59.4	rD Scan quency	3.471	5000 GHz 1000 GHz)
Input 1 AC Att Level	0 dB dBµV 45.63 10	Preamp ON Step 7 Free (59.4 30	rD Scan quency	3.471	5000 GHz 1000 GHz)
Input 1 AC Att RBN Input 1 AC Att Level Scan ●1Pk Max 90 dBµV	0 dB dBμV 45.63 10	Preamp ON Step 7 Free (59.4 30	rD Scan quency	3.471	5000 GHz 1000 GHz)
Input 1 AC Att RBY Input 1 AC Att Level Max Peak -10 Scan ●1Pk Max 90 dBµV 80 dBµV 70 dBµV 60 dBµV 50 dBµV 40 dBµV 40 dBµV	0 dB dBµV 45.63 10	Preamp ON Step 7 Free (59.4 30	rD Scan quency	3.471	5000 GHz 1000 GHz)



Appendix B



Orientations for Radiated Emissions

End of Report