

Ι



Compliance Engineering Ireland Ltd

Clonross Lane, Derrockstown, Dunshaughlin Co. Meath, Ireland A85 XN59 Ph +353 1 8017000, 8256722 www.cei.ie

Project Num	20E8928-2b	
Quotation	Q20-1410-1	
Prepared For	Sensata Technologies Ltd	
Company Address	11 Technology Park, Belfast Road, Antrim,	
	Northern Ireland BT41 1QS	
Contact	James Kyle	
Contact Email	jakyle@sensata.com	
Contact Phone	+44 28 9448 3067	
Prepared By	Compliance Engineering Ireland	
Test Lab Address	Clonross Lane, Derrockstown,	
	Dunshaughlin, Co. Meath, Ireland	
Tested By	Joy Dalayap Michael Kirby	
Test Report By	Michael Kirby	
FCC Test Firm Registration	409640	
IC Site Registration	IE0001	
Date	15 th Mar 2021	
EUT Description	HUBA	
FCC ID	2ATIMHUBA	
IC ID	25094-HUBA	
Authorised by	Paul Reilly	
Authorised Signature:	Part Bug	

TEST SUMMARY

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

FCC 15.247 Section	RSS-247 Section	TEST PARAMETERS	Test Result
15.247 (a)2	RSS-247 5.2a	6dB bandwidth	Pass
15.247 (e)	RSS-247 5.2b	Power Spectral Density	Pass
15.247 (b)3	RSS-247 5.4d	Output power Conducted	Pass
15.247 (d)	RSS-247 5.5	Conducted Spurious Emissions	Pass
15.205	RSS Gen 8.9	Radiated Spurious Emissions	Pass
15.209	RSS Gen 8.10		
	RSS Gen 6.7	99% bandwidth	Pass

RSS 247-2 (Feb 2017) RSS Gen Issue5 Amd 2 (Feb 2021)

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

Exhibit A – Technical Report

1.0	EUT DESCRIPTION	
1.1	EUT OPERATION	5
1.5	DESCRIPTION OF TEST MODES	-
2.0	EMISSIONS MEASUREMENTS	7
3.0	CONDUCTED EMISSIONS ON THE MAINS MEASUREMENTS	8
4.0	CONDUCTED MEASUREMENTS ON THE ANTENNA PORT	-
5.0	SPURIOUS EMISSIONS	
6.0	LIST OF TEST EQUIPMENT	
7.0	MEASUREMENT UNCERTAINTY	29
	IDIX A SCANS FOR CONDUCTED MEASUREMENTS	
	IDIX B SCANS FOR RADIATED BAND EDGE /RESTRICTED BAND PCB ANTENNA	
APPEN	IDIX C SCANS FOR RADIATED SPURIOUS EMISSIONS PCB ANTENNA	38
APPEN	IDIX D SCANS FOR RADIATED BAND EDGE /RESTRICTED BAND MODULE ANTENNA	45
	IDIX E SCANS FOR RADIATED SPURIOUS EMISSIONS MODULE ANTENNA	
APPEN	IDIX F EUT ORIENTATION	55

Please review in conjunction with report "Sensata Technologies 20E8928-2b HUBA Wifi AppendixCDEF FCCIC.pdf" for remaining items listed above

1.0 EUT Description

Model:	HUBA	
Туре:	Wireless Gateway	
Type of radio:	Stand-alone	
Transmitter Type:	802.15.4 (Thread), 802.11G 802.11N Wifi	
Operating Frequency Range(s):	2.405 GHz - 2.480GHz Thread	
	2.412-2.462GHz Wifi	
Number of Channels:	16 Thread	
	11 Wifi	
Antenna:	Integral	
Power configuration:	12 v Battery.	
Ports:	None	
Classification:	DTS, CYY	
HVIN:	HUBA	
PMN:	HUBA	
Test Standards:	15.247 RSS-247	
Test Methodology:	Measurements performed according to the procedures in	
	ANSI C63.10-2013	
	KDB 558074 V5 R02	

The EUT was a Gateway for use in the vehicles. Its purpose was to relay packets received on the 433MHz band using a transmitter in the 2.4GHz band.

The EUT contained transmitters using Wifi and Thread technology and also a 433MHz receiver.

For Wifi it was possible to switch between 2 internal antennas, one an internal module antenna and the other one a printed pcb antenna.

The Thread radio had its own dedicated pcb antenna.

This report details test carried out on the Wifi transmitter.

Please review in conjunction with report "Sensata Technologies 20E8928-2a HUBA Wifi AppendixCDEF FCCIC.pdf"

1.1 EUT Operation Operating Conditions during Test:

Conducted measurements were carried out on a sample where the antenna was replaced by cable and SMA.

Radiated measurements were performed on a sample with standard internal antenna.

The EUT was operated in test mode where the channel and modulation was set on the EUT from a laptop. The EUT was powered from a bench PSU set to 12Vdc. for all tests

Environmental conditions

	Temperature	Relative Humidity
Test	°C	%
Conducted Emissions	20	47
Radiated Emissions <1GHz	17	41
Radiated Emissions >1GHz	21	44

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 21st 22nd Dec 2020, 6th -15th Jan 15th-19th Feb 2021

1.4 Special Software

Tests were performed manually, and no special software was used.

1.5 Description of Test modes

Channel List

Channel	Freq MHz	Channel	Freq MHz
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

Available Data Rates

802.11 G	802.11 N
MB/s	MB/s
6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65
6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65
6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65

Evaluation test for max power test carried out on the following

Channel	Freq	G	Ν
	MHz	MB/s	MB/s
1	2412	6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65
6	2437	6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65
11	2462	6,9,12,18,24,36,48,54	6.5,13,19.5,26,39,52,58.5,65

Complete test was carried out on the worst cases for Ch1 G/N Ch6 G/N and Ch11 G/N

It was found that the highest output levels were recorded on the 802.11G modulation

All tests were performed with the EUT on the low mid and high channels.

2 Emissions Measurements

2.1 Conducted Emissions Measurements

Radio Conducted measurements were carried out on the EUT as per section 1.1 above.

All results were measured as conducted on the antenna except radiated spurious emissions.

2.2 Radiated Emissions Measurements

Emissions below 1GHz were measured using a test antenna positioned at a distance of 3 metres from the EUT (as measured from the closest point of the EUT) which was placed on a turntable allowing 360 degree rotation, in a semi anechoic chamber. 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. In this case the resolution bandwidth was 100kHz.

Emissions in the above 1GHz were measured using a horn antenna located at 3 metres distance from the EUT in a fully anechoic chamber.

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

Emissions above 18GHz were measured using a horn antenna located at 1 metre distance from the EUT in a fully anechoic chamber. The radiated emissions were maximised by configuring the EUT and by rotating the EUT and raising the test and antenna from 1 to 4 metres.

The resolution bandwidth was 1MHz and video bandwidth was 3 MHz for peak measurements for radiated emissions above 1GHz.

A pre-scan was performed to determine the worst case EUT orientation for the radiated measurements. All radiated tests were performed with the EUT in orientation O1 for Horizontal polarization measurements and with the EUT in orientation O2 for Vertical polarisation measurements. Ref Appendix F for orientations.

3.0 Results for Conducted emissions on the mains

Test not performed as the host for the EUT is battery powered only

Conducted Measurements

4.1 Bandwidth

4.1.1 6dB bandwidth

Test Method

4.

As per Ansi 63.10 Section 11.8.2

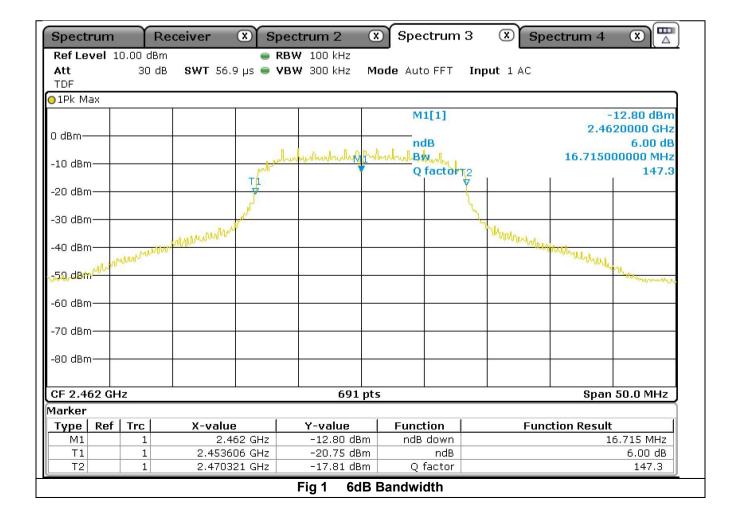
Ansi63.10 Section 11.8.2 Option 2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW \ge 3 × RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \ge 6 dB.

802.11G			
Frequency	6dB Bandwidth	Limit Min	Margin
GHz	MHz	KHz	MHz
2.412	16.715	500	16.215
2.437	16.715	500	16.215
2.462	16.715	500	16.215

802.11N

Frequency	6dB Bandwidth	Limit Min	Margin
GHz	MHz	KHz	MHz
2.412	16.715	500	16.215
2.437	16.715	500	16.215
2.462	16.715	500	16.215



4.1.2 99% bandwidth

Test Method

As per Ansi 63.10 Section 6.9.3

Ansi63.10 Section 6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.

c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

d) Step a) through step c) might require iteration to adjust within the specified range.

e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.

f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.

g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

h) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

802.11G

Frequency	99% Bandwidth	Limit Min
GHz	MHz	KHz
2.412	16.463	N/A
2.437	16.984	N/A
2.462	16.359	N/A

802.11N

Frequency	99% Bandwidth	Limit
GHz	MHz	MHz
2.412	16.359	N/A
2.437	16.984	N/A
2.462	16.359	N/A

Result :- Pass

Page 11 of 38

Spectrum	Re	ceiver	× E	Spectrum 2	×	Spectru	m 3	×	Spectrum 4	× A
Ref Level 1				(BW 200 kHz						
Att	25 dB	SWT 19	µs 👄 ٧	/BW 1 MHz	Mode	Auto FFT	Input	1 AC		
PS TDF										
∋1Pk Max										
						M1[1]				-6.94 dBm
									2.46	20000 GHz
			mmm	mound	han	Qec Br	in motion	T2	16.3589	00145 MHz
-10 dBm		T1	part -		<u> </u>	M2[1]	- my	w V	-	32.26 dBm
		1						1	2.44	95480 GHz
-20 dBm——								1		
	M2	1						1	мз	
-30 dBm	num								multi	
-40 dBm-									MIS	monen
-40 aBm										
-50 dBm		4								
-50 0000										
-60 dBm-+		-								
-70 dBm——		-								
-80 dBm										
CF 2.462 GH	łz		<u>1</u>	691	pts	R.	191		Span	36.0 MHz
Marker										
Type Ref	Trc	X-valu	е	Y-value		Function		F	- unction Result	
M1	1	2.4	462 GHz	-6.94 di	3m					
Τ1	1	2,4537	585 GHz	-11.46 dł	3m	Осс Ви	v		16.3589	00145 MHz
T2	1	2.4701:	274 GHz	-10.60 dł	3m					
M2	1	2,449	548 GHz	-32.26 di	3m					
M3	1	2,474	399 GHz	-32.94 di	3m					
				Fig 2 99	NO/ D	andwidth				

4.2 Duty Cycle

Test Method

As per Ansi 63.10 Section 11.6 KDB 558074 zero span measurement method

Ansi63.10 Section **11.6 Duty cycle** (*D*), transmission duration (*T*), and maximum power control level Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (*T*) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed *T* at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered). KDB 558074 D01 FAQ section

Results

Toff mS	Period mS	Duty cycle	Duty cycle %
0.02493	1.37899	0.9819	98.19

Duty Cycle >98%

Note the duty cycle results below show how the sample operated during testing.

-		-	
Page	13	of	38

Spectrum Receiver Column Spectrum 2 Spectrum 3 Column 2 Ref Level 20.00 dBm RBW 1 MHz Att 40 dB SWT 2 ms VBW 3 MHz Input 1 AC SGL TRG: VID TDF Input 1 AC IPk Max					
SGL TRG:VID TDF					
O 1PK Max D3[1] -3.20 d					
1.37899 m					
10 dBm					
-10 dBm					
-20 dBm					
TRG -25.000 dBm					
-30 dBm					
-40 dBm					
-50 dBm					
-60 dBm					
-70 dBm					
CF 2.437 GHz 691 pts 200.0 µs/					
Marker Type Ref Trc X-value Y-value Function Function Result					
Type Ref TC X-Value Function Function Function M1 1 180.43 μs 4.73 dBm 1 180.43 μs 4.73 dBm 1					
D2 M1 1 25.36 µs -1.14 dB					
D3 M1 1 1.37899 ms -3.20 dB					
Fig 3a Duty Cycle					
Spectrum Receiver Spectrum 2 Spectrum 3 Spectrum 3					
Ref Level 20.00 dBm					
Att 40 dB • SWT 100 μs • VBW 3 MHz Input 1 AC					
SGL TRG: VID TDF					
O 1Pk Max					
D3[1] -1.96 dB					
10 dBm M1 91.014 µ 4.93 dBu					
10 dBm $\frac{M1}{M1}$ $D^2_{DD} = 0.01 + 0.010 + 0.010 + 0.010 + 0.000 +$					
10 dBm M1 91.014 µ 4.93 dBu					
10 dBm M1 91.014 µ 4.93 dBn c1dBm -10 dBm					
10 dBm M1 0 dBm M1 0 dBm M1 -10 dBm					
10 dBm M1 91.014 µ 4.93 dBn c1dBm -10 dBm					
10 dBm M1 Pl dBm M1 Pl dBm M1 -10 dBm M					
10 dBm M1 10 dBm M1 0 dBm M1 -10 dBm -20 dBm -30 dBm					
10 dBm M1 0 dBm M1 0 dBm M1 -10 dBm					
10 dBm M1 0 dBm M1 0 dBm M1 -10 dBm					
10 dBm M1[1] 4.93 dBu 0 dBm D2 M1[1] 4.93 dBu -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -50 dBm -10 dBm -10 dBm -10 dBm -10 dBm					
10 dBm M1[1] 4.93 dBu 0 dBm D2 M1[1] 4.93 dBu -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -30 dBm -10 dBm -10 dBm					
10 dBm M1 4.93 dBm 0 D2 M1 4.93 dBm -10 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -20 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -30 dBm -10 dBm -10 dBm -10 dBm -10 dBm -50 dBm -10 dBm -10 dBm -10 dBm -10 dBm					
10 dBm 91.014 µ 10 dBm 02 0 dGm 02 0 dGm 02 -10 dBm 04 -20 dBm 04 -30 dBm 04 -40 dBm 04 -50 dBm 04 -60 dBm 04					
10 dBm					
10 dBm 91.014 µ 10 dBm D2 10 dBm D2 10 dBm D2 -10 dBm -10 dBm -20 dBm -20 dBm -30 dBm -30 dBm -4U dBm -30 dBm -50 dBm -30 dBm -50 dBm -30 dBm -50 dBm -30 dBm -50 dBm -30 dBm -60 dBm -30 dBm -70 dBm					
10 dBm-M1 91.014 p 10 dBm-M1 02 mt[1] 4.93 dBn -10 dBm -10 dBm -20 dBm -20 dBm -30 dBm -20 dBm -30 dBm -20 dBm -30 dBm -20 dBm -30 dBm -20 dBm -40 dBm -20 dBm -50 dBm -20 dBm -50 dBm -20 dBm -70 dBm -70 dBm -70 dBm -70 dBm -					
10 dBm 91.014 μ 10 dBm 92 M1[1] 4.93 dBn -10 dBm -20 dBm -20 dBm -20 dBm -30 dBm -20 dBm -40 dBm -40 dBm -70 dBm -10.01 μs -1.014 μs 4.93 dBm					
10 dBm 91.014 p 10 dBm 02 0 dBm 02 -10 dBm 04 -20 dBm 04 -30 dBm 04 -30 dBm 04 -30 dBm 04 -70 dBm 04					

4.3 Power Spectral Density

Test Method

As per Ansi 63.10 Section 11.10.2

Ansi 63.10 Section11.10.3 Method AVGPSD-1

Method AVGPSD-1 uses trace averaging with EUT transmitting at full power throughout each sweep. The following procedure may be used when the maximum (average) conducted output power was used to determine compliance to the fundamental output power limit. This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, then it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously ($D \ge 98\%$), or else sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter OFF time to be considered):

a) Set instrument center frequency to DTS channel center frequency.

b) Set span to at least 1.5 times the OBW.

c) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.

d) Set VBW ≥ [3 × RBW].

e) Detector = power averaging (rms) or sample detector (when rms not available).

f) Ensure that the number of measurement points in the sweep \geq [2 × span / RBW].

g) Sweep time = auto couple.

h) Employ trace averaging (rms) mode over a minimum of 100 traces.

i) Use the peak marker function to determine the maximum amplitude level.

j) If the measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced)..

802.11G

Frequency	Measurement	Conducted Peak	Limit	Margin
GHz	dBm	dBm	dBm	dB
2.412	-20.6	-20.6	8	28.6
2.437	-0.8	-0.8	8	8.8
2.462	-20.43	-20.43	8	28.43

802.11N

Frequency	Measurement	Conducted Peak	Limit	Margin
GHz	dBm	dBm	dBm	dB
2.412	-20	-20	8	28
2.437	-0.42	-0.42	8	8.42
2.462	-20.06	-20.06	8	28.06

Result :- Pass

лι	Rel. ZUE	000	57.	-20
	Page	15	of	38

Spectrum		ceiver		trum 2	X Spe	ctrum 3	X Sp	ectrum 4	
Ref Level Att Count 100/	30 dB /100	SWT 1.3 TDF	e RBW ms e VBW	10 kHz 30 kHz I	Mode Auto	FFT Inpu	t 1 AC		
⊖1Rm AvgP\	wr				1				
					M	1[1]			20.43 dBm 23040 GHz
0 dBm					6			2.40	23040 GHZ
-10 dBm									
-20 dBm					M1				
-20 ubiii		٨٨٨	MMMM	MMMM	hann		AA		
-30 dBm							- WW		
-40 dBm		N					h,		
-50 dBm	. No.							N.	
Mag ab MVV	WW.							WWW	AAAAAAAA
									12.2.2.2.2
-70 dBm									
-80 dBm									
05 0 460 0	· · · · ·			601	Inte				20.0 MU
CF 2.462 G	ITZ		Ein /	691		Donaity		span	30.0 MHz
			Fig 4	+ Power	Spectral I	Jensity			

4.4 Output power Conducted

4.4.1 Test Method As per Ansi 63.10 Section 11.9.2.2

11.9.2.2.2 Method AVGSA-1

Method AVGSA-1 uses trace averaging with the EUT transmitting at full power throughout each sweep. The procedure for this method is as follows:

a) Set span to at least 1.5 times the OBW.

b) Set RBW = 1% to 5% of the OBW, not to exceed 1 MHz.

c) Set VBW \geq [3 × RBW].

d) Number of points in sweep \geq [2 × span / RBW]. (This gives bin-to-bin spacing \leq RBW / 2, so that narrowband signals are not lost between frequency bins.)

e) Sweep time = auto.

f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode. g) If transmit duty cycle < 98%, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at the maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle \geq 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run."

h) Trace average at least 100 traces in power averaging (rms) mode.

i) Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

4.4.2 Results

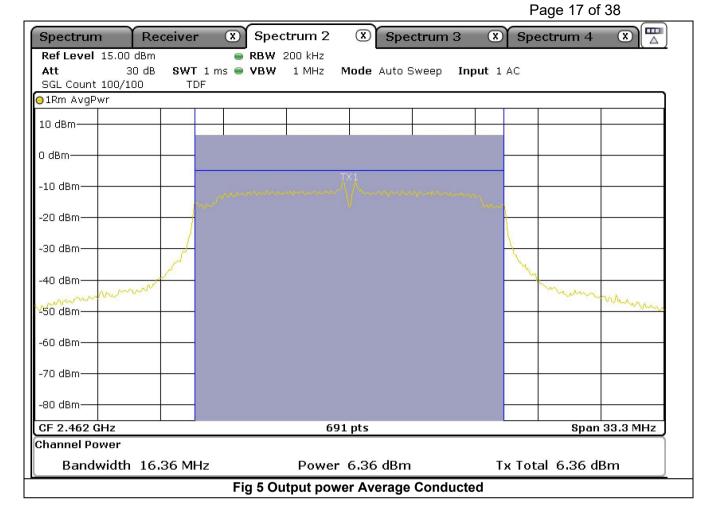
		Conducted		
Frequency	Measurement	Average	Limit	Margin
GHz	dBm	dBm	dBm	dB
2.412	6.86	6.86	30	23.14
2.437	10.35	10.35	30	19.65
2.462	6.36	6.36	30	23.64

802.11G

802.11N

		Conducted		
Frequency	Measurement	Average	Limit	Margin
GHz	dBm	dBm	dBm	dB
2.412	6.82	6.82	30	23.18
2.437	10.36	10.36	30	19.64
2.462	6.4	6.4	30	23.6

Test Result :- Pass



5. Spurious Emissions Measurements

5.1 Conducted Emissions

5.1.1 Test Method As per Ansi63.10 Section 11.11.1 and 6.10.4

Ansi63.10 Section 11.11.1 General

Typical regulatory requirements specify that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

a) If the maximum peak conducted output power procedure was used to determine compliance as described in 11.9.1, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 20 dBc).

b) If maximum conducted (average) output power was used to determine compliance as described in 11.9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

Ansi63.10 Section **6.10.4 Authorized-band band-edge measurements (relative method)** These procedures are applicable for determining compliance at authorized-band band-edges where the requirements are expressed as a value relative to the in-band signal level. Procedures for determining compliance with field strength limits at or close to the band-edges are given in 6.10.6 (see also Table A.2).

5.1.2 Results

Frequency	100KHz RBW	dBc Limit Min	Margin
GHz	dBm	dB	dB
2.412	-4.31	30	-
4.824	-57.56	30	23.25

Frequency	100KHz RBW	dBc Limit Min	Margin
GHz	dBm	dB	dB
2.437	-0.4	30	-
4.874	-58.13	30	27.73

Frequency	100KHz RBW	dBc Limit Min	Margin
GHz	dBm	dB	dB
2.462	-4.5	30	-
4.924	-59.06	30	24.56

Ref Appendix A for Scans

Test Result: - Pass

5.2 Radiated Spurious Emissions in Restricted bands

5.2.1 Test Method

As per Ansi63.10 Section 11.12.1 and 6.10.5

Ansi63.10 Section 11.12.1 Radiated emission measurements

Because the typical emission requirements are specified in terms of radiated field strength levels, measurements performed to determine compliance have traditionally relied on a radiated test configuration. Radiated measurements remain the principal method for determining compliance to the specified requirements; however antenna-port conducted measurements are also now acceptable to determine compliance (see 11.12.2 for details). When radiated measurements are utilized, test site requirements and procedures for maximizing and measuring radiated emissions that are described in 6.3, 6.5, and 6.6 shall be followed

6.10.5 Restricted-band band-edge measurements

These procedures are applicable for determining compliance at band edges of restricted bands. **6.10.5.1 Test setup**

Restricted-band band-edge tests shall be performed as radiated measurements, on a test site meeting the specifications in 5.2 at the measurement distances specified in 5.3.57

The instrumentation shall meet the requirements in 4.1.1 using the bandwidths and detectors specified in 4.1.4.2. Considering the requirements of 5.8, the antenna(s) shall be connected to the antenna ports. When performing radiated measurements, the measurement antenna(s) shall meet the specifications in 4.3. The EUT shall be connected to an antenna and operated at the highest power settings following procedures in 6.3, and the relevant procedure in 6.4, 6.5, or 6.6

5.2.2 Radiated Spurious Emissions PCB antenna

Frequency MHz	Quasi Peak Level dBuV/m	Antenna Polarity	Antenna Factor dB	Cable loss dB	Final Field Strength Quasi Peak dBuV/m	Quasi Peak Limit dBuV/m	Margin dB
57.55	13.3	Vertical	9.7	1	24	40.0	16.0
96.325	14.5	Vertical	9.3	1.1	24.9	43.5	18.6
159.925	18	Vertical	12.1	1.2	31.3	43.5	12.2
592	4.4	Vertical	19.5	1.8	25.7	46.0	20.3
162.75	18.9	Horizontal	12.2	1.2	32.3	43.5	11.2
240	11.2	Horizontal	15.7	1.4	28.3	46.0	17.7
744.075	0.8	Horizontal	21.6	2.1	24.5	46.0	21.5

Frequency	Measured Peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Peak Level	Average Limit +20dB	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
4.824	44.3	32.4	37.1	5.2	Vertical	0.00	44.8	74	29.2
12.060	40.3	40.3	37.1	7.4	Horizontal	0.00	50.9	74	23.2
14.472	39.9	41.8	35.8	9.1	Vertical	0.00	55.0	74	19.0
4.824	43.5	32.4	37.1	5.2	Vertical	0.00	44.0	74	30.0
12.060	41.4	40.3	37.1	7.4	Horizontal	0.00	52.0	74	22.0
14.472	40.3	41.8	35.8	9.1	Horizontal	0.00	55.4	74	18.6

Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Average Level	Average Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
14.472	32.6	41.8	35.8	9.1	Vertical	0.00	47.66	54	6.3
14.472	32.8	41.8	35.8	9.1	Horizontal	0.00	47.9	54	6.1

Frequency	Measured Peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Peak Level	Average Limit +20dB	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
4.874	44.8	32.4	37.3	5.2	Vertical	0.00	45.1	74	28.9
7.311	37.4	37.7	38	6.7	Vertical	0.00	43.8	74	30.2
12.185	38.5	40.3	37.7	8.9	Horizontal	0.00	50.0	74	24.0
4.874	43.5	32.4	37.3	5.2	Horizontal	0.00	43.8	74	30.2
7.311	40.7	37.7	38	6.7	Horizontal	0.00	47.1	74	26.9
12.185	39.8	40.3	37.7	8.9	Horizontal	0.00	51.3	74	22.7

Frequency	Measured Peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Peak Level	Average Limit +20dB	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
4.924	44.1	32.4	37.3	5.2	Vertical	0.00	44.4	74	29.6
7.386	40.9	37.7	37.5	6.3	Vertical	0.00	47.4	74	26.6
12.310	38.5	40.3	36.4	8.4	Vertical	0.00	50.8	74	23.2
4.924	44.1	32.4	37.3	5.2	Horizontal	0.00	44.4	74	29.6
7.386	40.5	37.7	37.5	6.3	Horizontal	0.00	47.0	74	27.0
12.310	38.4	40.3	36.4	8.4	Horizontal	0.00	50.7	74	23.3

Average measurements were not performed, where recorded peak levels were less than the average limit of 54dBuV/m

Test Result: - Pass

5.2.3 Radiated Spurious Emissions Module antenna

Frequency MHz	Quasi Peak Level dBuV/m	Antenna Polarity	Antenna Factor dB	Cable loss dB	Final Field Strength Quasi Peak dBuV/m	Quasi Peak Limit dBuV/m	Margin dB
50.175	17.9	Vertical	10.1	0.8		40.0	11.2
81.3	18.5	Vertical	9.1	1	28.6	40.0	11.4
96.325	12.1	Vertical	9.3	1.1	22.5	43.5	21.0
154.85	21.4	Vertical	11.9	1.2	34.5	43.5	9.0
592.025	4.8	Vertical	19.5	1.8	26.1	46.0	19.9
640	6	Vertical	20.1	2	28.1	46.0	17.9
703.95	-0.6	Vertical	21	2.1	22.5	46.0	23.5
154.8	21.8	Horizontal	11.9	1.2	34.9	43.5	8.6
336	17.8	Horizontal	15.5	1.5	34.8	46.0	11.2
479.95	2.3	Horizontal	17.8	1.7	21.8	46.0	24.2
744.05	-1	Horizontal	21.6	2.1	22.7	46.0	23.3
792.05	-1.2	Horizontal	21.8	2.2	22.8	46.0	23.2

Frequency	Measured Peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Peak Level	Average Limit +20dB	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
4.824	43.6	32.4	37.1	5.2	Vertical	0.00	44.1	74	29.9
12.060	40.7	40.3	37.1	7.4	Vertical	0.00	51.3	74	22.7
14.472	39.7	41.8	35.8	9.1	Vertical	0.00	54.8	74	19.2
4.824	43.7	32.4	37.1	5.2	Horizontal	0.00	44.2	74	29.8
12.060	40.9	40.3	37.1	7.4	Horizontal	0.00	51.5	74	22.5
14.472	39.1	41.8	35.8	9.1	Horizontal	0.00	54.2	74	19.9

Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Average Level	Average Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
14.472	31.9	41.8	35.8	9.1	Vertical	0.00	46.99	54	7.0
14.472	33.0	41.8	35.8	9.1	Horizontal	0.00	48.1	54	6.0

Frequency	Measured Peak Level dBuV/m	Antenna Factor dB	Preamp Gain dB	Cable Loss dB	Antenna Polarity V/H	Duty Cycle Correction dB	Final Peak Level dBuV/m	Average Limit +20dB dBuV/m	<u>Margin</u> dB
4.874	43.8	32.4	37.3	5.2	Vertical	0.00	44.1	74	29.9
7.311	39.6	37.7	38	6.7	Vertical	0.00	46.0	74	28.0
12.185	38.6	40.3	37.7	8.9	Vertical	0.00	50.1	74	23.9
4.874	43.0	32.4	37.3	5.2	Horizontal	0.00	43.3	74	30.7
7.311	40.5	37.7	38	6.7	Horizontal	0.00	46.9	74	27.1
12.185	37.7	40.3	37.7	8.9	Horizontal	0.00	49.2	74	24.9

Frequency	Measured Peak Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Duty Cycle Correction	Final Peak Level	Average Limit +20dB	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dB	dBuV/m	dBuV/m	dB
4.924	45.0	32.4	37.3	5.2	Vertical	0.00	45.3	74	28.7
7.386	40.1	37.7	37.5	6.3	Vertical	0.00	46.6	74	27.4
12.310	37.9	40.3	36.4	8.4	Vertical	0.00	50.2	74	23.8
4.924	43.4	32.4	37.3	5.2	Horizontal	0.00	43.7	74	30.3
7.386	41.6	37.7	37.5	6.3	Horizontal	0.00	48.1	74	26.0
12.310	38.1	40.3	36.4	8.4	Horizontal	0.00	50.4	74	23.6

Average measurements were not performed, where recorded peak levels were less than the average limit of 54dBuV/m

Test Result: - Pass

5.3 Radiated Power at fundamental

5.3.1 Radiated Power at fundamental-PCB Antenna

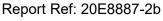
Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Final Average Level	Transmitted power	Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dBuV/m	dBm	dBm	dB
2.412	105.2	27.4	38.5	3.5	Vertical	97.6	2.4	30.0	27.6
2.412	104.6	27.4	38.5	3.5	Horizontal	97.0	1.8	30.0	28.2
2.437	110.6	27.4	38.5	3.5	Vertical	103.0	7.8	30.0	22.3
2.437	110.3	27.4	38.5	3.5	Horizontal	102.7	7.5	30.0	22.5
2.462	103.9	28.7	38.3	3.4	Vertical	97.7	2.5	30.0	27.5
2.462	105.2	28.7	38.3	3.4	Horizontal	99.0	3.8	30.0	26.2

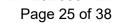
802.11N

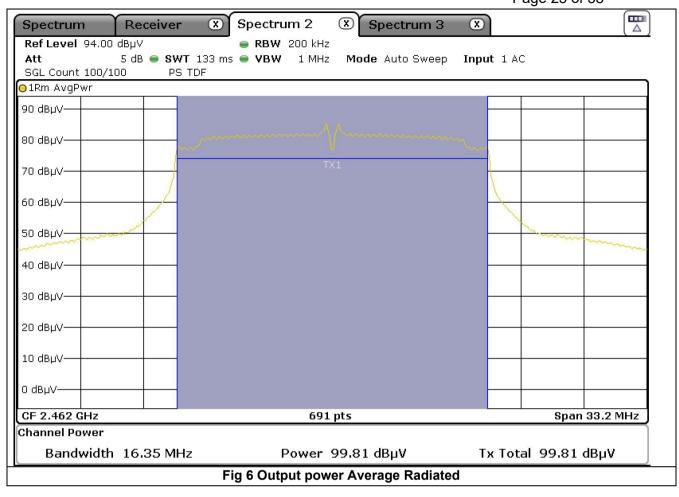
Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Final Average Level	Transmitted power	Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dBuV/m	dBm	dBm	dB
2.412	105.7	27.4	38.5	3.5	Vertical	98.1	2.9	30.0	27.1
2.412	105.2	27.4	38.5	3.5	Horizontal	97.6	2.4	30.0	27.6
2.437	109.4	27.4	38.5	3.5	Vertical	101.8	6.6	30.0	23.5
2.437	107.9	27.4	38.5	3.5	Horizontal	100.3	5.1	30.0	24.9
2.462	106.0	28.7	38.3	3.4	Vertical	99.8	4.6	30.0	25.4
2.462	104.8	28.7	38.3	3.4	Horizontal	98.6	3.4	30.0	26.6

Note the Radiated field strength was measured at 3 metres and the conversion formula below was used to determine the EIRP in dBm EIRP (dBm) = E3m (dBuV/m) - 95.2

Test result Pass







5.3.2 Radiated Power at fundamental- Module Antenna

Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Final Peak Level	Transmitted power	Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dBuV/m	dBm	dBm	dB
2.412	105.3	27.4	38.5	3.5	Vertical	96.10	0.9	30.0	29.1
2.412	106.6	27.4	38.5	3.5	Horizontal	97.43	2.2	30.0	27.8
2.437	108.9	27.4	38.5	3.5	Vertical	100.53	5.3	30.0	24.7
2.437	107.9	27.4	38.5	3.5	Horizontal	100.26	5.1	30.0	24.9
2.480	107.6	28.7	38.3	3.4	Vertical	96.66	1.5	30.0	28.5
2.480	107.6	28.7	38.3	3.4	Horizontal	95.75	0.5	30.0	29.5

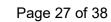
802.11G

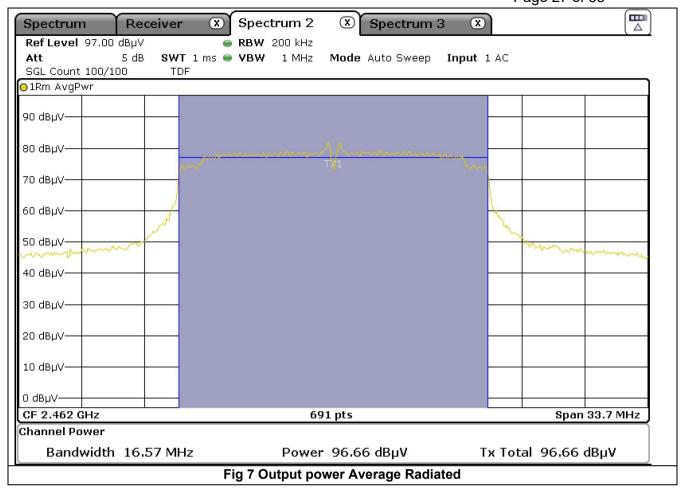
802.11N

Frequency	Measured Average Level	Antenna Factor	Preamp Gain	Cable Loss	Antenna Polarity	Final Peak Level	Transmitted power	Limit	Margin
GHz	dBuV/m	dB	dB	dB	V/H	dBuV/m	dBm	dBm	dB
2.412	108.9	27.4	38.5	3.5	Vertical	96.01	0.8	30.0	29.2
2.412	108.9	27.4	38.5	3.5	Horizontal	95.76	0.6	30.0	29.4
2.437	108.9	27.4	38.5	3.5	Vertical	99.33	4.1	30.0	25.9
2.437	107.9	27.4	38.5	3.5	Horizontal	99.24	4.0	30.0	26.0
2.480	107.6	28.7	38.3	3.4	Vertical	95.72	0.5	30.0	29.5
2.480	107.6	28.7	38.3	3.4	Horizontal	95.62	0.4	30.0	29.6

Note the Radiated field strength was measured at 3 metres and the conversion formula below was used to determine the EIRP in dBm EIRP (dBm) = E3m (dBuV/m) - 95.2

Test Result Pass





6 List of Test Equipment

Instrument	Manufacturer	Model	Serial Num	CEI Ref	Cal Due Date	Cal Interval Months
Spectrum Analyser 30Hz-	Rohde &					
40GHz	Schwarz	FSP40	100053	850	11-Dec-21	36
Test Receiver 3.6GHz	Rohde & Schwarz	ESR	1316.3003k03- 101625-s	869	28-May-23	36
Antenna Biconical	Schwarzbeck	VHBB 9124	9124 667	871	03-Sep-21	36
Antenna Horn	EMCO	3115	9905-5809	655	14-Mar-21	24
Anechoic Chamber	CEI	SAR 10M	845	845	16-May-22	36
Antenna Log Periodic	Chase	UPA6108	1072	609	03-Sep-21	36
Fully Anechoic Chamber	CEI	FAR 3M	906	906	22-Mar-21	36
Microwave Preamplifier	Hewlett Packard	83017A	3123A00175	805	30-Sep-21	12
Antenna Horn Standard Gain 18-26.5GHz	A-Info	LB-42-25-C- KF	J2021091103028	877	05-Oct-21	12

7 Measurement Uncertainties

Measurement	Uncertainty			
Radio Frequency	+/- 5x10 ⁻⁷			
Maximum Frequency Deviation	+/- 1.7 %			
Conducted Emissions	+/- 1 dB			
Radiated Emission 30MHz-100MHz	+/- 5.3 dB			
Radiated Emission 100MHz-300MHz	+/- 4.7 dB			
Radiated Emission 300MHz-1GHz	+/- 3.9 dB			
Radiated Emission 1GHz-40GHz	+/- 3.8 dB			
Modulation bandwidth	+/- 5x10 ⁻⁷			
Duty Cycle	+/- 5 %			
Power supply	±0.1 VDC			
Temperature	±0.2 °C			
Frequency	±0.01 ppm			

The measurement uncertainties stated were calculated with a k=2 for a confidence level of over 95% as per ETS TR100 028.

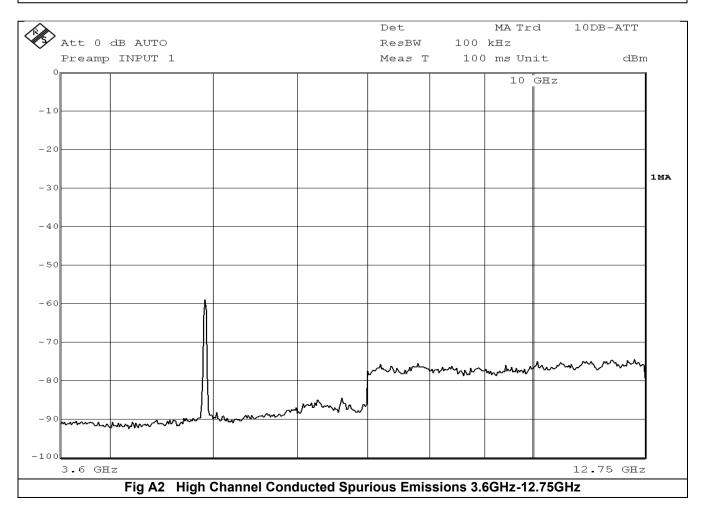
The test data can be compared directly to the specification limit to determine compliance, as the calculated measurement uncertainty meets the requirements of the applicable specification.

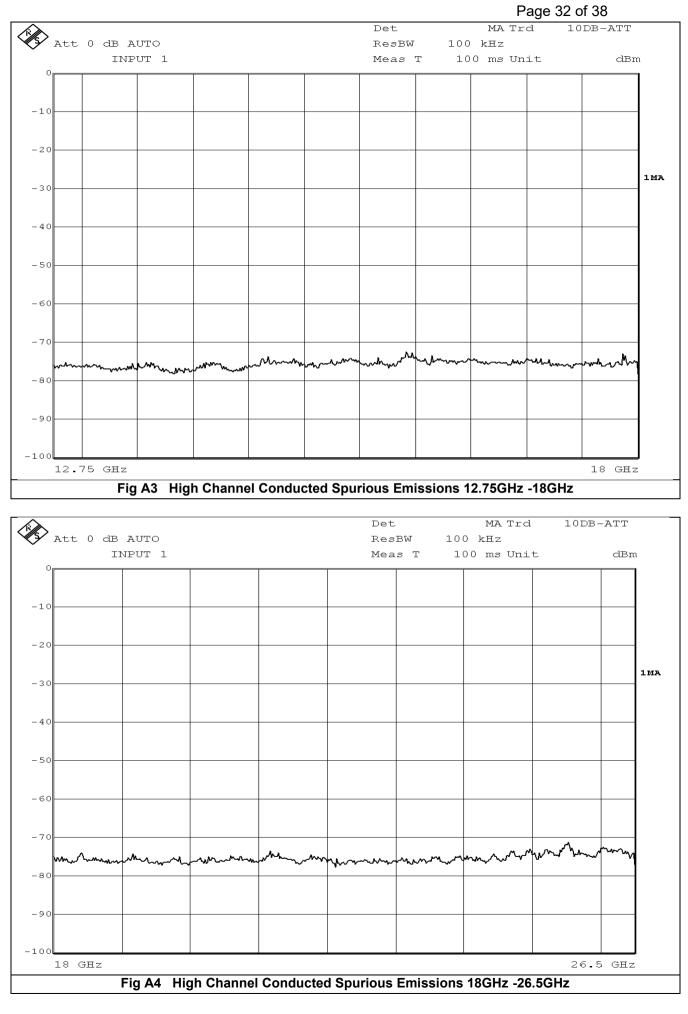
Appendix A

Conducted Measurements on the Antenna Port

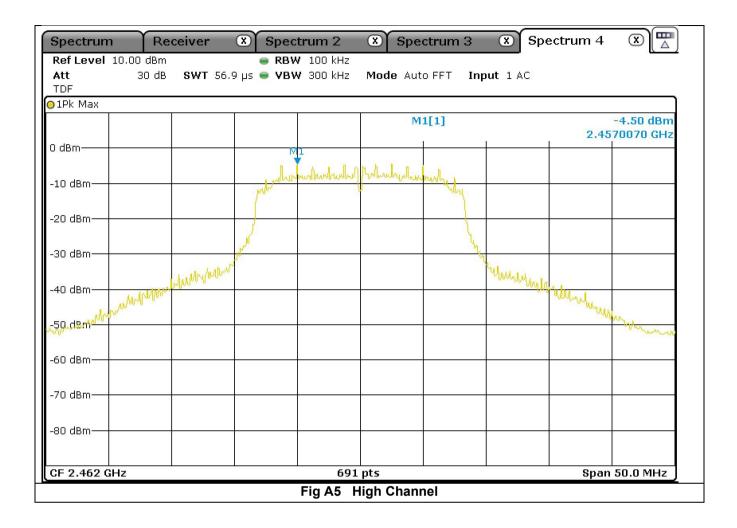
Report Ref: 20E8887-2b Page 31 of 38

Spectrum	Receive	r 🗵	Spect	rum 2 🛛 🗴	Spectrum 3	X	Spectrum 4	× 🔛
	₩ 100 kHz		100 ms		1 10dB_att			
Input 1 AC 👄 Att	0 dB	Preamp	OFF	Step TD Scan				
Scan 🔾 1Pk Max				,]
	100	MHz	1			1 GHz		
10 dBm							1 1 1	1 1 1 1
D.dBm								
10 dBm								
20 dBm								
30 dBm								
-40 dBm							1 1 1 1 1 1	_
-50 dBm								
-60 dBm								
-70 dBm								
-80 dBm							month	Mr. M. Lun
-90 dBm							1 1 1 1	
							1	TE
Start 30.0 MHz	1 1 1	1	1	1 1	1 1 1 1		Śto	p 3.6 GHz
	Fia A1	High Cha	nnel C	onducted Spu	rious Emission	s 30M	Hz -3.6GHz	





Report Ref: 20E8887-2b Page 33 of 38



_	_		
Page	32	1 ∩f	38

								age e i ei	
Spectrum		Receiver	-	ectrum 2	X Spe	ctrum 3	🗴 Sp	ectrum 4	× A
Ref Level 1	0.00 de	Зm		RBW 100 kHz					
Att	30 (dB SWT 132	.7 μs 💻	VBW 300 kHz	Mode Au	ito FFT 🛛 🛙 I	nput 1 AC		
TDF							~		
⊖1Pk Max									1
					M	1[1]		1. de	-4.19 dBm
0 dBm						641		2.4	14520 GHz
					M	M1 2[1]		-:	35.48 dBm
-10 dBm					www	march		2.40	00000 GHz
-IO UBIII					p o	4			
-20 dBm——									
-20 ubiii					1	1			
-30 dBm									
-So abin					X	Sud.			
-40 dBm				June 1			Und and and and and and and and and and a		
-to ubiii				M3			The		
-50 dBm				N. Contraction of the second s			Mu		
- martin was	urney	Manusharaha	unharismu	unan			no series and s	adress of the second	instruction bolies
-60 dBm									
00 0.0111									
-70 dBm							-		
-80 dBm									
					•				
Start 2.3365	5 GHZ			691	DTS			Stop 2.	4635 GHz
Marker									
Type Ref		X-value		Y-value	Func	tion	Fun	ction Result	
M1	1		52 GHz	-4.19 dBr					
M2	1		.4 GHz	-35.48 dBr					
M3	1	2,:	39 GHz	-48.71 dBr	n				
		Fig		er Band Edg		annal Ca	nductod		

FIG A6 Lower Band Edge Low Channel Conducted

Spectrum	Re	eceiver	Spe	ectrum 2	Spe Spe	ctrum	3 🗶 9	Spectrum 4	
Ref Level 1	10.00 dBm		🔵 RE	3W 100 kHz					
Att	30 dB	SWT 56.	9 µs 🦲 ۷	3W 300 kHz	Mode Aut	O FFT	Input 1 AC		
TDF							_		
∋1Pk Max									
					M	1[1]			-4.65 dBm
o. (o								2.46	44700 GHz
	₩ 1				M	2[1]		-	49.21 dBm
-10 dBm	Andrealin	A						2.48	35000 GHz
-10 aBm	10	- Vy							
-20 dBm		1							
-20 uBiii		۲.							
-30 dBm		Z							
-30 ubiii		a la							
-40 dBm—			When Assol						
-+0 ubiii				WWWWWWWWWW)				
-50 dBm				mun				MЗ	
oo abiii				20 A	mound	another	multim	alle termen	nonno
-60 dBm——									
-70 dBm									
-80 dBm									
									50.0101
CF 2.4835 (iHZ			691	ns			span	50.0 MHz
Marker		20-53				· · · ·		50 K-53	
Type Ref		X-value		Y-value	Func	tion	F	unction Result	
M1	1		47 GHz	-4.65 dBr					
M2	1		35 GHz	-49.21 dBr					
M3	1	2	2.5 GHz	-53.20 dBr	n				
		Fig /	A7 Uppe	er band edge	High Ch	annel	Conducted		

Appendix B

Radiated tests for Band Edges /Restricted band PCB antenna

Page 36 of 38

Spectru	ım	Re	ceive	er 🗷 Sp	ectrum	2 X				
	R	BW 1	MHz	MT 100 m	าร	6	55Rx			
Input 1	AC 🔵 🗛	tt (D dB	Preamp C	N Step	TD Scan				
Scan 🔾	1Pk Ma	x ⊝ 2A∖	/ Max]
100 dBµV							M3[2] 0.000 s M1[1] 0.000 s			36.03 dBµV 0000000 GHz 94.82 dBµ2 0750000 GHz
90 dBµV- 80 dBµV-								_		
70 dBµV-									M2	
60 dBµV-								-)
50 dBµV-			~		-					
40 dBµV-		\sim					\sim		M3	
30 dBµV	_	-	-					+		
20 dBµV–	_									
10 dBµV−				TF						
Start 2.3	31 GHz			9		I			Sto	p 2.412 GHz
Marker									215-7 633-1433	
Diagr	Туре	Ref	Trc	Stimulu	is	Respons	se Fun	ction	Function	Result
Scan	N1		1	2,410	075 GHz	94.82				
Scan	N2		1		.39 GHz	60.19				
Scan	N3		2	2	.39 GHz	36.03	dBµV		·	
	Fig B1 Low Channel Band Edge Vertical peak and average at 3 metres									

Spectru	ım	Re	ceive	r 🙁 :	Spectrum	12 🗴)				
	R	BW 1	MHz M	мт 1 <u>00</u>) ms		655Rx				
Input 1	AC 👄 A i	tt !	5 dB 🛛	Preamp	ON Step	TD Scan					
Scan 🔾	1Pk Ma	xo2Av	(Max								
100 dBµV							0.0	[2])00 s [1]		2	41.61 dBµY .390000000 GHz 100,45 dBµV
90 dBµV-)00 s		2	.410750000 GHz
80 dBµV-											
70 dBµV-										M2	
60 dBµV-									~ <		
50 dBµV- 40 dBµV-	m	~~~~	~~~	~~~~~	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			\sim		МЗ	
		_	_								
20 dBµV-											
10 dBµV-											TF
Start 2.	31 GHz			l							Stop 2.412 GHz
Marker											
Diagr	Туре	Ref	Trc	Stimu	ulus	Respo	inse	Functi	on I	Funct	ion Result
Scan	.,po N1		1	77.00.00.00	1075 GHz		5 dBµV				
Scan	N2		1		2.39 GHz		7 dBµV				
Scan	NЗ		2		2.39 GHz		1 dBµV				
	Fic	g B2	Low	/ Channel	Band E	dae Ho	rizontal	peak an	d avera	ige at 3 n	netres

Report Ref: 20E8887-2b Page 37 of 38

Spectru	um	Rece	eiver	Spec	trum	2 🗴	Spec	trum 3	×		
	RBV	V 1 MH	Hz MT	100 ms			655Rx				
	AC 🔵 Att		dB Pre a	amp ION	Step [*]	TD Scan					
Scan 🔾	1Pk Max)2AV N	Иах			~					
 100 dBµV	<u>, M1</u>							[2]		2.500	31.98 dBµV 0000000 GHz
 _90 dBµV- 								.[1])00 s	ì	2.467	97.08 dBµV 7000000 GHz
80 dBµV-			1		×						
70 dBµV-					-	M2					
60 dBµV-			L								
50 dBµV-						M4				- N	3
40 dBµV-						-				M	5
30 dвµV-											
20 dBµV- 											0
10 dBµV-		r					2				
Start 2 4	462 GHz					TF				Sto	p 2.505 GHz
Marker										0.0	21000 0112
Diagr	Type F	Ref 1	Frc	Stimulus	1	Respo	inse	Functio	n I	Function	Result
Scan	N1		1	2.467	GHz)8 dBµV	i unctio		ranodon	
Scan	N2		1	2.4835			34 dBµV				
Scan	NЗ		1		GHz		64 dBµV				
Scan	N4		2	2.4835			9 dBµV				
Scan	N5		2	2.5	GHz		98 dBµV				
	Fia			Channal E							

Fig B3 High Channel Band Edge Vertical peak and average at 3 metres

Spectru	um	Re	eceive	r 🗶	Spectrun	n 2 🕱	Spec	trum 3	×		
			MHz I				655Rx				
Input 1				Preamp	ON Step	TD Scan					
Scan 🔾	1Pk Max	< <mark>0</mark> 2A	v Max]
100 dBµV- <u>M1</u>					M5[2] M1[1]				31.85 dBµV 2.50000000 GHz 97.04 dBµV		
90 dBµV-			-					000 s		2.46	57000000 GHz
 80 dBµV-			~				-				
 70 dBµV-			1			M2					
 60 dBµV-			1								
											мз
50 dBµV-					1	- M4					
40 dBµV-						T					M5
30 dBµv-										-	*
1 20 dBµV-											
 10 dBµV-											
TF											
Start 2.4	462 GH:	z		L.	(L		Ste	op 2.505 GHz
Marker											
Diagr	Type	Ref	Trc	Stimu	ulus	Respo	nse	Functi	ion	Functior	n Result
Scan	N1		1	2	2.467 GHz		4 dBµV				
Scan	N2		1	2.	.4835 GHz	63.1	5 dBµV				
Scan	NЗ		1		2.5 GHz	48.6	2 dBµV				
Scan	N4		2	2.	.4835 GHz	38.1	0 dBµV				
Scan	N5		2		2.5 GHz	31.8	5 dBµV				
	Fig	R4	Hiat	n Channel	Band E	dae Ho	rizonta	l neak a	nd ave	rage at 3 me	tres