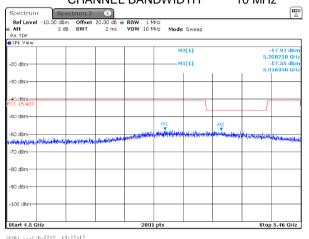
Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19

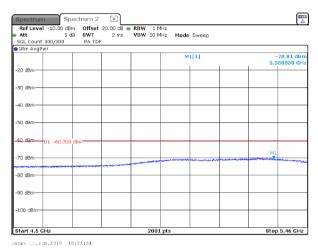


Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

Plot 7.9.8 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5845 MHz 10 MHz

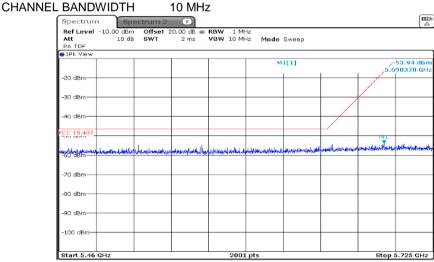




Plot 7.9.9 Conducted spurious emission measurements in the range $5.46-5.725\ \text{GHz}$

CARRIER FREQUENCY

5845 MHz 10 MHz



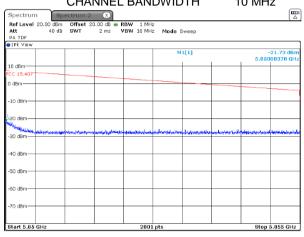
Date: 11.FBB.2019 16:35:55

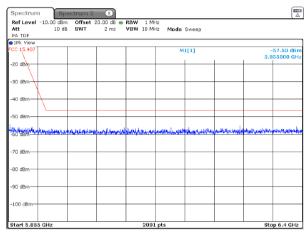




Plot 7.9.10 Conducted spurious emission measurements in the range $5.85 - 6.4 \; \text{GHz}$

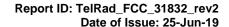
CARRIER FREQUENCY CHANNEL BANDWIDTH 5845 MHz 10 MHz





Date: 11.F3B.2019 | 16:33:52

Date: 11.FBB.2019 16:34:59

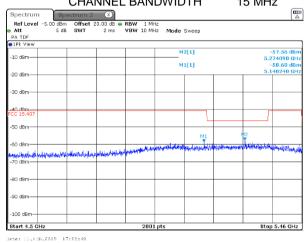


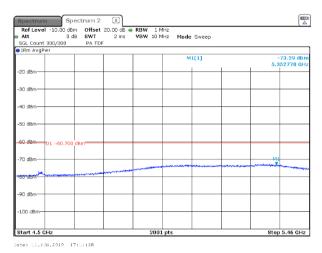


Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test procedure: Test mode: Compliance Verdict: **PASS** Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

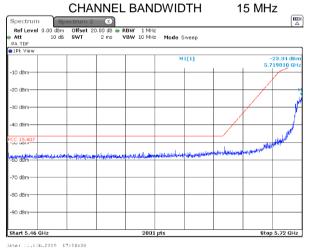
Plot 7.9.11 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

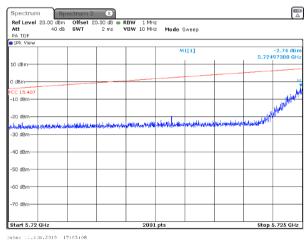
CARRIER FREQUENCY 5732.5 MHz
CHANNEL BANDWIDTH 15 MHz





Plot 7.9.12 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz CARRIER FREQUENCY 5732.5 MHz



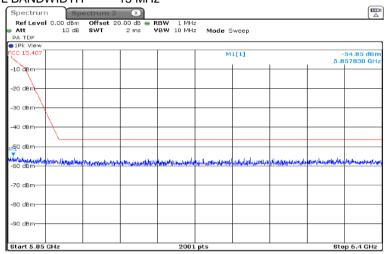




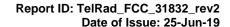


Plot 7.9.13 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5732.5 MHz
CHANNEL BANDWIDTH 15 MHz



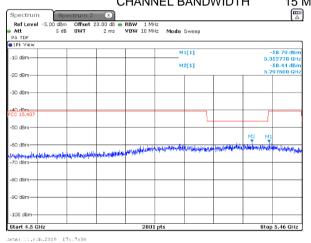
Date: 11.FEB.2019 17:07:12

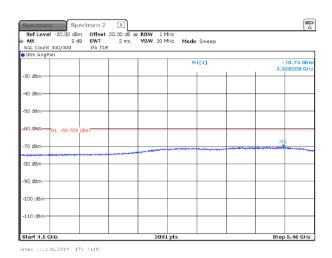




Plot 7.9.14 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

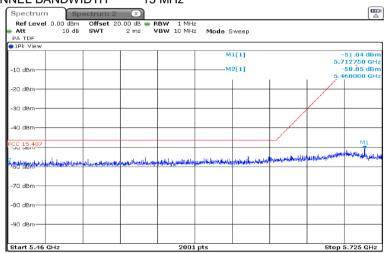
CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 15 MHz





Plot 7.9.15 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz

CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 15 MHz



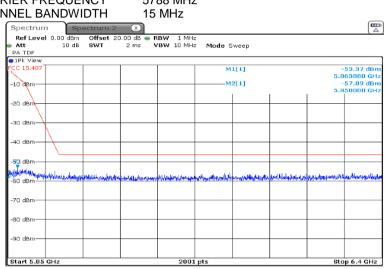
Date: 11.FBB.2019 17:19:09

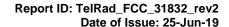




Plot 7.9.16 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5788 MHz CHANNEL BANDWIDTH 15 MHz

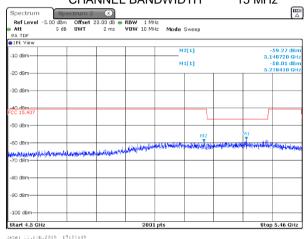


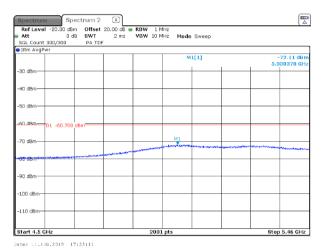




Plot 7.9.17 Conducted spurious emission measurements in the range 4.5 – 5.46 GHz

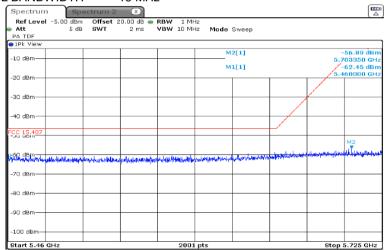
CARRIER FREQUENCY 5842.5 MHz
CHANNEL BANDWIDTH 15 MHz





Plot 7.9.18 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5842.5 MHz

CARRIER FREQUENCY 5842.5 MH CHANNEL BANDWIDTH 15 MHz



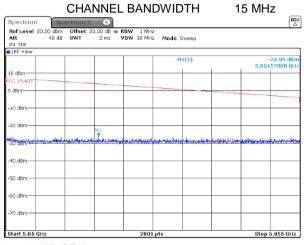
Date: 11.FBB.2019 17:25:47

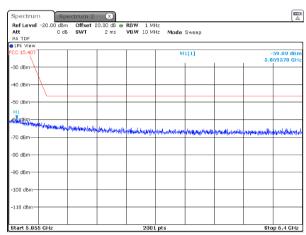


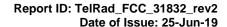


Plot 7.9.19 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5842.5 MHz



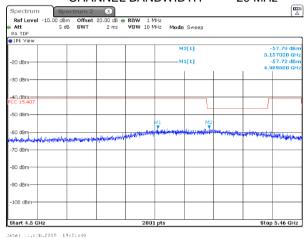


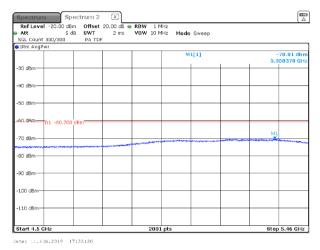




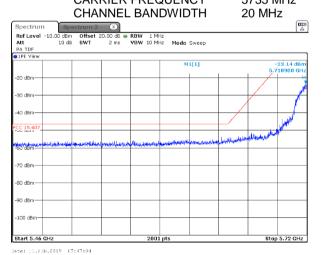
Plot 7.9.20 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

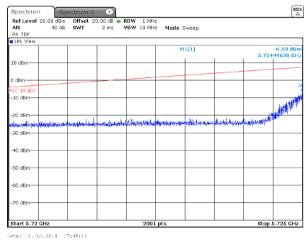
CARRIER FREQUENCY CHANNEL BANDWIDTH 5735 MHz 20 MHz





Plot 7.9.21 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5735 MHz



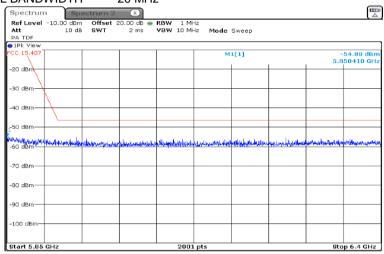




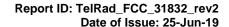


Plot 7.9.22 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5735 MHz
CHANNEL BANDWIDTH 20 MHz



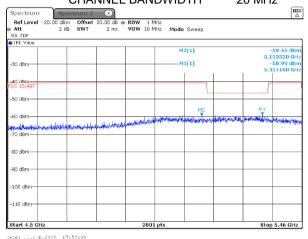
Date: 11.F3B.2019 17:45:58

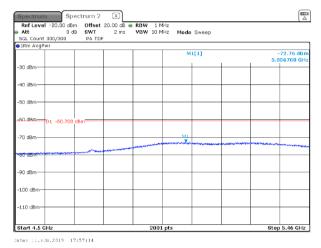




Plot 7.9.23 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5788 MHz 20 MHz





Plot 7.9.24 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz

CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 20 MHz

| Spectrum | Spectrum

Date: 11.F3B.2019 17:51:18

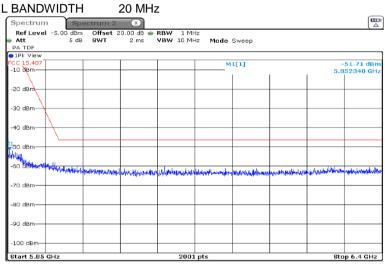
Start 5.46 GHz



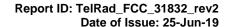


Plot 7.9.25 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 20 MHz



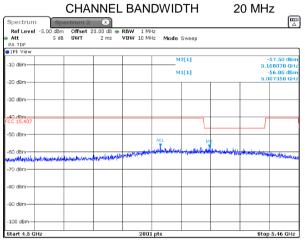
Date: 11.F3B.2019 17:52:32

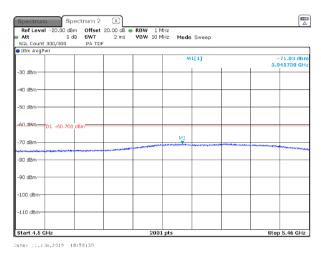




Plot 7.9.26 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

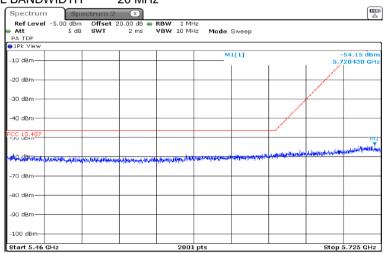
CARRIER FREQUENCY 5840 MHz CHANNEL BANDWIDTH



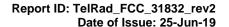


Plot 7.9.27 Conducted spurious emission measurements in the range 5.46 - 5.725 GHz 5840 MHz CARRIER FREQUENCY

CHANNEL BANDWIDTH 20 MHz



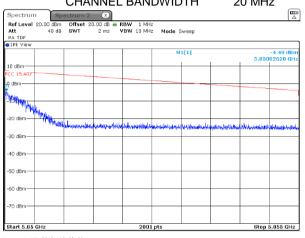
Date: 11.FSB.2019 19:03:43

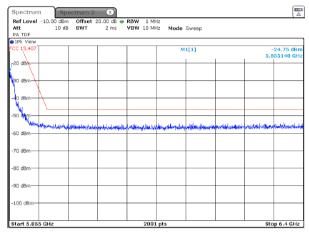




Plot 7.9.28 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5840 MHz 20 MHz





Date: 11.FEB.2019 19:05:00

Date: 11.F3B.2019 19:05:58

Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19



Test specification:	FCC section 15.407(b), RSS emissions					
Test procedure:	KDB 662911; KDB 789033, ANS	DB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7				
Test mode:	Compliance	Verdict:	PASS			
Date(s):	11-Feb-19	verdict.	PASS			
Temperature: 26 °C	Relative Humidity: 45 %	Air Pressure: 1020 hPa	Power: 48 VDC			
Remarks:						

7.10 Conducted out of band emissions at 5725 – 5850 MHz range

7.10.1 General

This test was performed to measure spurious emissions from the EUT near the band edges and within the pass band of the antenna. Specification test limits are given in Table 7.10.1 & EIRP of undesirable emission limits are given in Table 7.10.2

Table 7.10.1 Unwanted emissions limit within restricted bands above 1 GHz

Frequency, MHz	Field strength a	Equivalent	nt EIRP*, dBm		
Frequency, Minz	Peak	Average	Peak Average		
1000 - 40000	74.0	54.0	-21.2	-41.2	

^{*} Equivalent EIRP was calculated as follow: Field strength – 95.2

Table 7.10.2 EIRP of undesirable emission limits outside restricted bands above 1 GHz

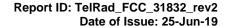
Frequency, MHz	EIRP of spurious, dBm/MHz
Outside 5725-5850 band	-27 (below 5.650 GHz and above 5.925 GHz) -27 increasing linearly to 10 (in 5.650 - 5.700 GHz and 5.925 – 5.875 GHz) 10 increasing linearly to 15.6 (in 5.700 - 5.720 GHz and 5.875 - 5.855 GHz) 15.6 increasing linearly to 27 (in 5.720 - 5.725 GHz and 5.855 - 5.850 GHz)

7.10.2 Test procedure

- **7.10.2.1** The EUT was set up as shown in Figure 7.
- Figure 7.10.1, energized and the performance check was conducted.
- 7.10.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- **7.10.2.3** The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set to 1 MHz.
- **7.10.2.4** The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- **7.10.2.5** The maximum band edge emission and modulation product outside of the band were measured as provided in the associated tables and plots.
- **7.10.2.6** The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the mid and highest carrier frequencies.
- 7.10.2.7 Test results are shown in the Table 7.10.3, Table 7.10.4, Table 7.10.5 and the associated plots.

Figure 7.10.1 Setup for conducted spurious emissions







FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band Test specification: emissions KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test procedure: Test mode: Compliance **PASS** Verdict: Date(s): 11-Feb-19 Relative Humidity: 45 % Power: 48 VDC Temperature: 26 °C Air Pressure: 1020 hPa Remarks:

Table 7.10.3 Conducted spurious emission within restricted band test results

ASSIGNED FREQUENCY: 5.725 - 5.850 GHz 4500 - 6400 MHz **INVESTIGATED FREQUENCY RANGE:**

MODULATION: QPSK **DETECTOR USED:** Peak/Average RESOLUTION BANDWIDTH: 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas),

coherent signal

CHANNEL	BANWID	TH:			10 MF	lz						
Fraguency	Antenna	Antenna		Peak				Averag	е			
Frequency, MHz	gain, dBi	gain	SA reading,	EIRP**,	Limit,	Margin***,	SA reading,	EIRP**,	Limit,	Margin***,	Verdict	
IVITIZ	gaiii, ubi	array*, dB	dBm	dBm/MHz	dBm	dB	dBm	dBm/MHz	dBm	dB		
Low carrier frequency												
5063.000	16.5	6.0	-59.15	-36.65	-21.2	-15.45	-71.66	-46.67	-41.2	-5.47	Pass	
Mid carrier frequency												
5048.130	16.5	6.0	-58.67	-36.17	-21.2	-14.97	-70.71	-45.72	-41.2	-4.52	Pass	
High carrie	er frequen	су										
5350.850	16.5	6.0	-58.62	-36.12	-21.2	-14.92	-70.81	-45.82	-41.2	-4.62	Pass	

CHANNEL BANWIDTH: 15 MHz

Frequency,	Antenna	Antenna		Peak			Averag	е				
MHz	gain, dBi	nain	SA reading, dBm	EIRP**, dBm/MHz	Limit, dBm	Margin***, dB	SA reading, dBm	EIRP**, dBm/MHz	Limit, dBm	Margin***, dB	Verdict	
Low carrier frequency												
5352.770	16.5	6.0	-58.73	-36.23	-21.2	-15.03	-73.29	-48.30	-41.2	-7.10	Pass	
Mid carrier	Mid carrier frequency											
5358.530	16.5	6.0	-58.79	-36.29	-21.2	-15.09	-70.73	-45.74	-41.2	-4.54	Pass	
High carrier frequency												
5030.370	16.5	6.0	-58.56	-36.06	-21.2	-14.86	-72.11	-47.12	-41.2	-5.92	Pass	

CHANNEL BANWIDTH: 20 MHz

		Antenna		Peak				Average	е			
Frequency, MHz	asin dRi	asin dRi	gain array*, dB	SA reading, dBm	Peak EIRP**, dBm/MHz	Limit, dBm	Margin***, dB	SA reading, dBm	Average EIRP****, dBm/MHz	**, Limit, IN	Margin***, dB	Verdict
Low carrier frequency												
5350.370	16.5	6.0	-58.45	-35.95	-21.2	-14.75	-70.81	-45.82	-41.2	-4.62	Pass	
Mid carrier	Mid carrier frequency											
5056.760	16.5	6.0	-59.16	-36.66	-21.2	-15.46	-72.76	-47.77	-41.2	-6.57	Pass	
High carrier frequency												
5045.730	16.5	6.0	-56.84	-34.34	-21.2	-13.14	-71.03	-46.04	-41.2	-4.84	Pass	

^{* -} Antenna gain array = 10log(N_{ant}), where N_{ant} = 4 (two cross-polarized antennas with coherent signals)

Table 7.10.4 Duty cycle factor calculation

Burst dration, ms	Burst period, ms	Duty cycle*	Duty cycle factor**, dB
2.82	5.00	0.564	2.49

^{*-} Duty cycle = Burst duration / Burst period

^{** -} Peak EIRP = SA reading + Antenna gain + Antenna gain array

^{*** -} Margin = EIRP - specified limit.

^{**** -} Average EIRP = SA reading + Antenna gain + Antenna gain array + Duty cycle factor

^{** -} Duty cycle factor = 10log(1/Duty cycle)

Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19



Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

Table 7.10.5 Conducted spurious emission outside restricted band test results

ASSIGNED FREQUENCY RANGE: 5.725 – 5.850 GHz INVESTIGATED FREQUENCY RANGE: 4500 - 6400 MHz

MODULATION: QPSK
DETECTOR USED: Peak
RESOLUTION BANDWIDTH 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas),

coherent signal

CHANNEL BANWIDTH:

10 MHz

Frequency, MHz	SA reading, dBm	Antenna gain, dBi	Antenna gain array*, dB	EIRP**, dBm/MHz	Limit, dBm/MHz	Margin***, dB	Verdict				
Low carrier frequency											
5244.350	-57.87	16.5	6.0	-35.37	-27.0	-8.37	Pass				
5719.680	-23.06	16.5	6.0	-0.56	15.5	-16.07	Pass				
5724.996	2.44	16.5	6.0	24.94	27.0	-2.05	Pass				
Mid carrier free	quency										
5295.680	-59.27	16.5	6.0	-36.77	-27.0	-9.77	Pass				
High carrier fre	High carrier frequency										
5157.030	-57.47	16.5	6.0	-34.97	-27.0	-7.97	Pass				

CHANNEL BANWIDTH:

15 MHz

Frequency, MHz	SA reading, dBm	Antenna gain, dBi	Antenna gain array*, dB	EIRP**, dBm/MHz	Limit, dBm/MHz	Margin***, dB	Verdict				
Low carrier fre	Low carrier frequency										
5274.090	-57.56	16.5	6.0	-35.06	-27.0	-8.06	Pass				
5718.510	-22.36	16.5	6.0	0.14	15.2	-15.04	Pass				
5724.974	-2.74	16.5	6.0	19.76	26.9	-7.18	Pass				
Mid carrier free	quency										
5297.600	-58.44	16.5	6.0	-35.94	-27.0	-8.94	Pass				
High carrier fre	High carrier frequency										
5278.410	-58.01	16.5	6.0	-35.51	-27.0	-8.51	Pass				



Test specification:	FCC section 15.407(b), RSS emissions	S-247 section 6.2.4.2, Cond	ucted out of band		
Test procedure:	KDB 662911; KDB 789033, AN	XDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7			
Test mode:	Compliance	Verdict:	PASS		
Date(s):	11-Feb-19	verdict.	PASS		
Temperature: 26 °C	Relative Humidity: 45 %	Air Pressure: 1020 hPa	Power: 48 VDC		
Remarks:					

Table 7.10.5 Conducted spurious emission outside restricted band test results

ASSIGNED FREQUENCY RANGE: 5.725 – 5.850 GHz INVESTIGATED FREQUENCY RANGE: 4500 - 6400 MHz

MODULATION: QPSK
DETECTOR USED: Peak
RESOLUTION BANDWIDTH 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas),

6.0

coherent signal

-2.25

15.6

-17.81

Pass

CHANNEL BANWIDTH:

CHANNEL BANWIDTH: 20 MHZ											
SA reading, dBm	Antenna gain, dBi	Antenna gain array*, dB	EIRP**, dBm/MHz	Limit, dBm/MHz	Margin***, dB	Verdict					
Low carrier frequency											
-58.33	16.5	6.0	-35.83	-27.0	-8.83	Pass					
-23.04	16.5	6.0	-0.54	15.5	-16.01	Pass					
-6.48	16.5	6.0	16.02	27.0	-10.94	Pass					
quency											
-58.55	16.5	6.0	-36.05	-27.0	-9.05	Pass					
equency											
-57.50	16.5	6.0	-35.00	-27.0	-8.00	Pass					
-3.85	16.5	6.0	18.65	26.9	-8.24	Pass					
	SA reading, dBm quency -58.33 -23.04 -6.48 quency -58.55 equency -57.50	SA reading, dBm again, dBi quency -58.33 16.5 -23.04 16.5 -6.48 16.5 quency -58.55 16.5 equency -57.50 16.5	SA reading, dBm Antenna gain, dBi Antenna gain array*, dB quency -58.33 16.5 6.0 -23.04 16.5 6.0 -6.48 16.5 6.0 quency -58.55 16.5 6.0 equency -57.50 16.5 6.0	SA reading, dBm	SA reading, dBm Antenna gain, dBi Antenna gain array*, dB EIRP**, dBm/MHz Limit, dBm/MHz quency -58.33 16.5 6.0 -35.83 -27.0 -23.04 16.5 6.0 -0.54 15.5 -6.48 16.5 6.0 16.02 27.0 quency -58.55 16.5 6.0 -36.05 -27.0 equency -57.50 16.5 6.0 -35.00 -27.0	SA reading, dBm Antenna gain, dBi Antenna gain array*, dB EIRP**, dBm/MHz Limit, dBm/MHz Margin***, dB quency -58.33 16.5 6.0 -35.83 -27.0 -8.83 -23.04 16.5 6.0 -0.54 15.5 -16.01 -6.48 16.5 6.0 16.02 27.0 -10.94 quency -58.55 16.5 6.0 -36.05 -27.0 -9.05 equency -57.50 16.5 6.0 -35.00 -27.0 -8.00					

^{* -} Antenna gain array = $10log(N_{ant})$, where $N_{ant} = 2$ (two cross-polarized antennas)

16.5

5855.140

Reference numbers of test equipment used

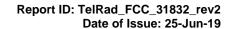
-24.75

_					
	HL 3901	HL 4355			

Full description is given in Appendix A.

^{** -} EIRP = SA reading + Antenna gain + Antenna gain array

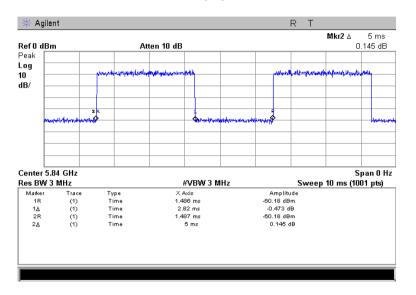
^{*** -} Margin = EIRP - specified limit.

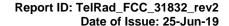




Test specification:	FCC section 15.407(b), RS emissions								
Test procedure:	KDB 662911; KDB 789033, AN	KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7							
Test mode:	Compliance	Verdict:	PASS						
Date(s):	11-Feb-19	verdict.	PASS						
Temperature: 26 °C	Relative Humidity: 45 %	Air Pressure: 1020 hPa	Power: 48 VDC						
Remarks:									

Plot 7.10.1 Duty cycle

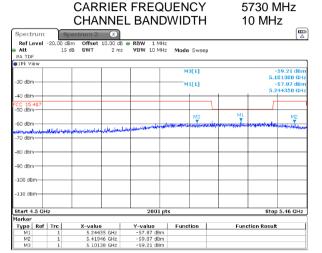


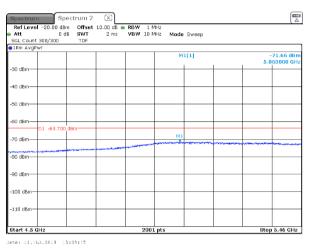




Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 11-Feb-19 Power: 48 VDC Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Remarks:

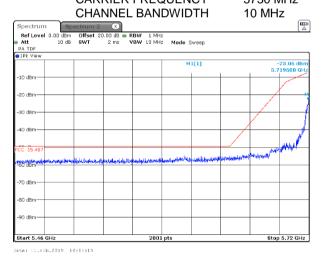
Plot 7.10.2 Conducted spurious emission measurements in the range $4.5-5.46\ GHz$



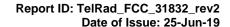


^{*}Applied Limit = Specification limit - Antenna Gain - Antenna Array gain

Plot 7.10.3 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5730 MHz



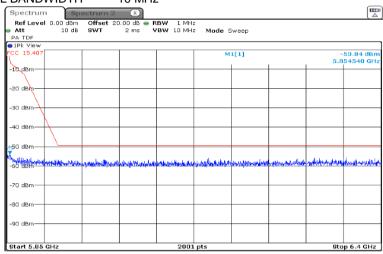






Plot 7.10.4 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5730 MHz
CHANNEL BANDWIDTH 10 MHz



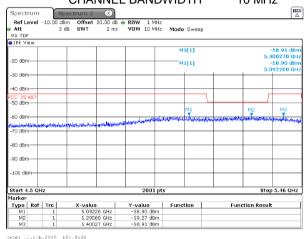
Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19

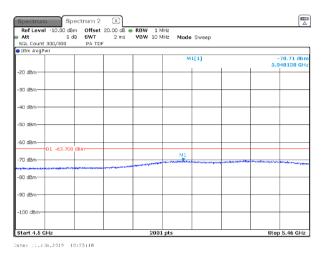


Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance Verdict: **PASS** Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

Plot 7.10.5 Conducted spurious emission measurements in the range $4.5-5.46\ GHz$

CARRIER FREQUENCY CHANNEL BANDWIDTH 5788 MHz 10 MHz

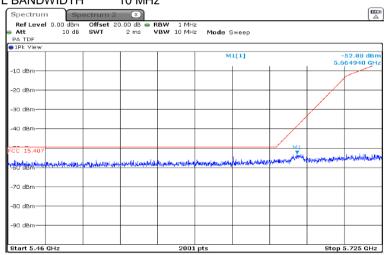




Plot 7.10.6 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5788 MHz

CHANNEL BANDWIDTH

5788 MHz 10 MHz



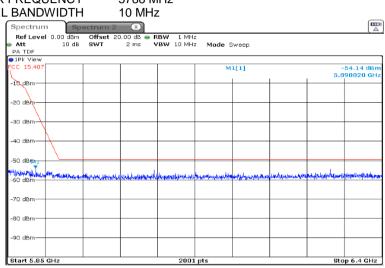
Date: 11.F3B.2019 16:17:51





Plot 7.10.7 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5788 MHz CHANNEL BANDWIDTH 10 MHz



Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19

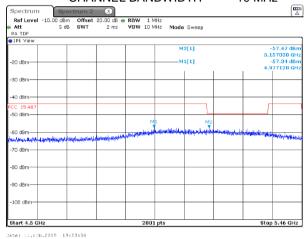


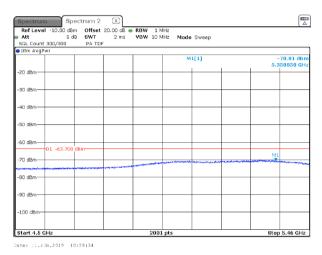
Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

Plot 7.10.8 Conducted spurious emission measurements in the range $4.5-5.46\ GHz$

CARRIER FREQUENCY CHANNEL BANDWIDTH

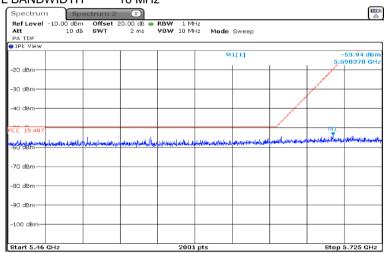
5845 MHz 10 MHz



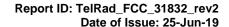


Plot 7.10.9 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz

CARRIER FREQUENCY 5845 MHz
CHANNEL BANDWIDTH 10 MHz



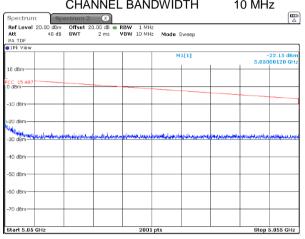
Date: 11.FEB.2019 16:36:45

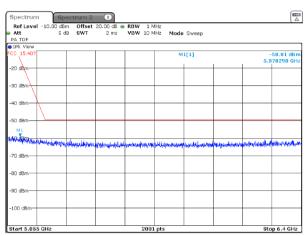




Plot 7.10.10 Conducted spurious emission measurements in the range 5.85 – 6.4 GHz

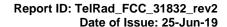
CARRIER FREQUENCY CHANNEL BANDWIDTH 5845 MHz 10 MHz





Date: 11.F3B.2019 16:38:06

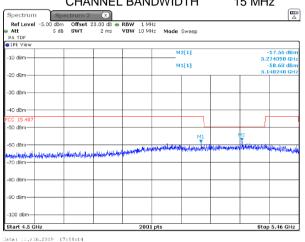
Date: 11.FBB.2019 16:39:44

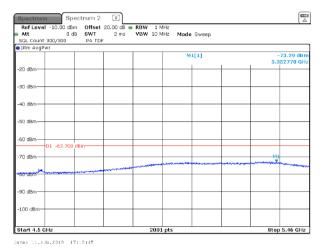




Plot 7.10.11 Conducted spurious emission measurements in the range 4.5 – 5.46 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5732.5 MHz 15 MHz





Plot 7.10.12 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5732.5 MHz

CHANNEL BANDWIDTH

Spectrum

Ref Level 0.00 d8m Offset 20.00 d8 RBW 1 MHz
Att 10 d8 BWT 2 ms VBW 10 MHz Mode Sweep

PA TOF

PP VWW

-10 d8m

-30 d8m

-40 d8m

-80 d8m

-90 d8m

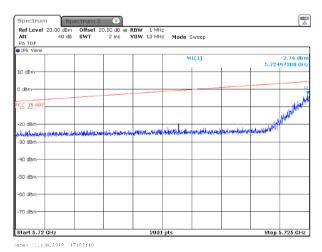
-90 d8m

-90 d8m

-90 d8m

-90 d8m

-90 d8m

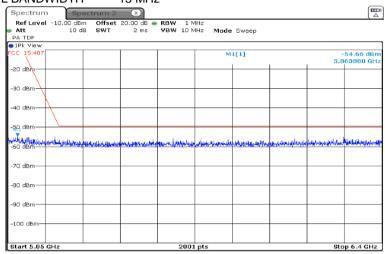






Plot 7.10.13 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5732.5 MHz
CHANNEL BANDWIDTH 15 MHz



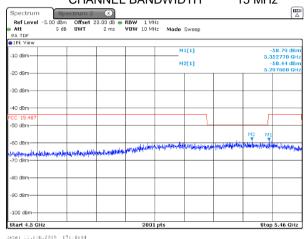
Date: 11.FSB.2019 17:00:16





Plot 7.10.14 Conducted spurious emission measurements in the range 4.5 – 5.46 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH 5788 MHz 15 MHz

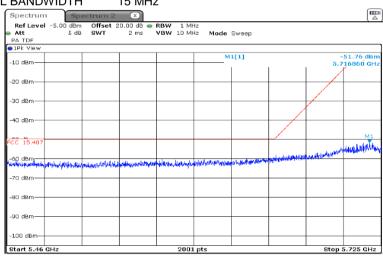




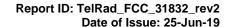
Plot 7.10.15 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz

CARRIER FREQUENCY CHANNEL BANDWIDTH

5788 MHz 15 MHz



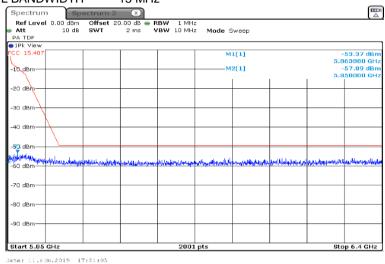
Date: 11.F3B.2019 17:22:22





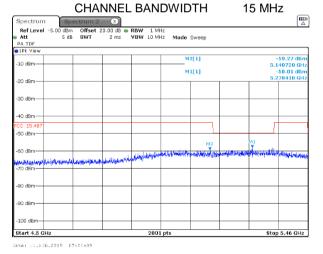
Plot 7.10.16 Conducted spurious emission measurements in the range $5.85 - 6.4 \; \text{GHz}$

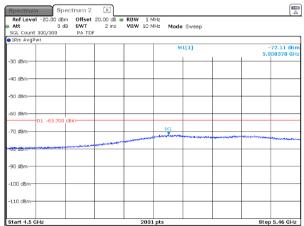
CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 15 MHz

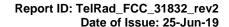


Plot 7.10.17 Conducted spurious emission measurements in the range 4.5 – 5.46 GHz CARRIER FREQUENCY 5842.5 MHz

Date: 11.FBB.2019 17:32:25



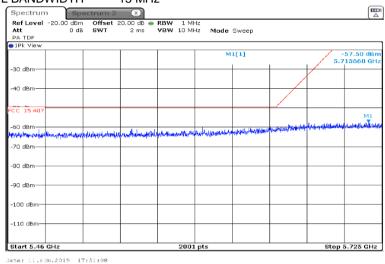




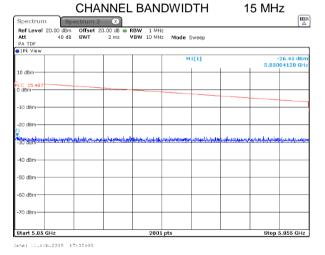


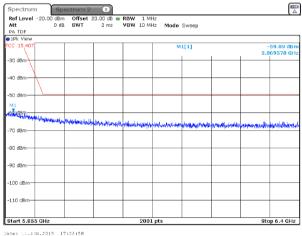
Plot 7.10.18 Conducted spurious emission measurements in the range 5.46 - 5.725 GHz

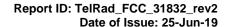
CARRIER FREQUENCY 5842.5 MHz
CHANNEL BANDWIDTH 15 MHz



Plot 7.10.19 Conducted spurious emission measurements in the range 5.85 – 6.4 GHz
CARRIER FREQUENCY 5842.5 MHz



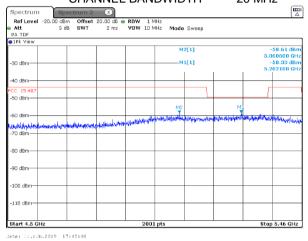


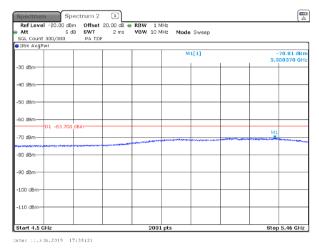




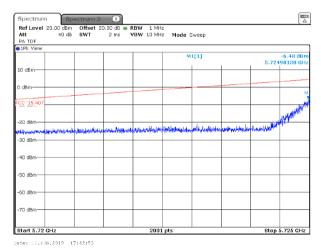
Plot 7.10.20 Conducted spurious emission measurements in the range 4.5 - 5.46 GHz

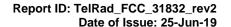
CARRIER FREQUENCY CHANNEL BANDWIDTH 5735 MHz 20 MHz





Plot 7.10.21 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz
CARRIER FREQUENCY 5735 MHz

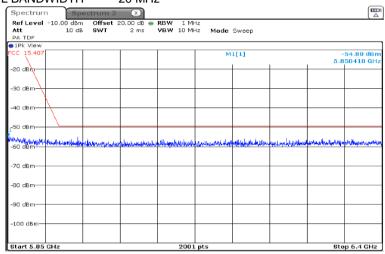


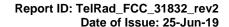




Plot 7.10.22 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5735 MHz
CHANNEL BANDWIDTH 20 MHz

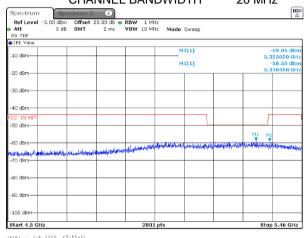


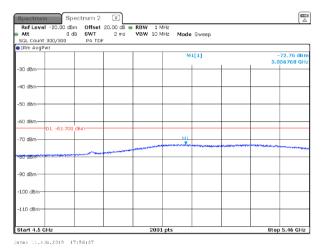




Plot 7.10.23 Conducted spurious emission measurements in the range $4.5-5.46\ \text{GHz}$

CARRIER FREQUENCY CHANNEL BANDWIDTH 5788 MHz 20 MHz

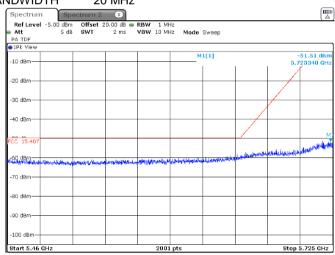




Plot 7.10.24 Conducted spurious emission measurements in the range 5.46 – 5.725 GHz

CARRIER FREQUENCY 5788 CHANNEL BANDWIDTH 20 M

5788 MHz 20 MHz



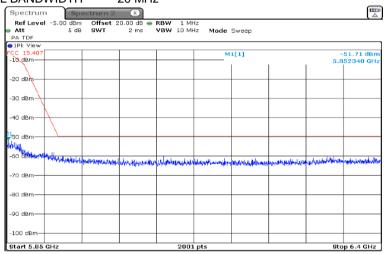
Date: 11.FEB.2019 17:54:28



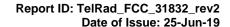


Plot 7.10.25 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

CARRIER FREQUENCY 5788 MHz
CHANNEL BANDWIDTH 20 MHz



Date: 11.F3B.2019 17:53:18





Spectrum
Ref Level -5.00
Att
PA TDF
1Pk View

-10 d8m-

-40 dBm

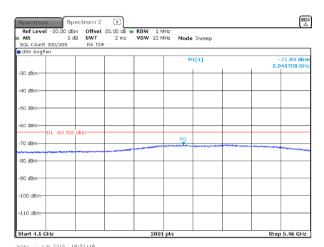
70 d8m

Start 4.5 GH

Test specification: FCC section 15.407(b), RSS-247 section 6.2.4.2, Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance Verdict: **PASS** Date(s): 11-Feb-19 Temperature: 26 °C Relative Humidity: 45 % Air Pressure: 1020 hPa Power: 48 VDC Remarks:

Plot 7.10.26 Conducted spurious emission measurements in the range 4.5 – 5.46 GHz
CARRIER FREQUENCY 5840 MHz

Stop 5.46 GHz

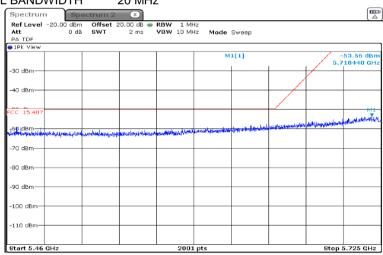


Date: 11.F3B.2019 19:01:54

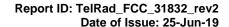
Plot 7.10.27 Conducted spurious emission measurements in the range 5.46 - 5.725 GHz

CARRIER FREQUENCY 5840 MHz
CHANNEL BANDWIDTH 20 MHz

2001 pts



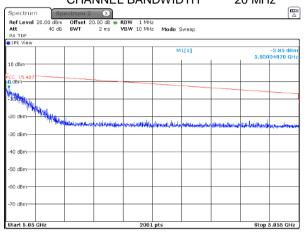
Date: 11.FBB.2019 19:08:29

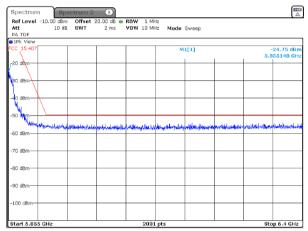




Plot 7.10.28 Conducted spurious emission measurements in the range 5.85 - 6.4 GHz

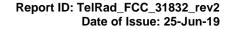
CARRIER FREQUENCY CHANNEL BANDWIDTH 5840 MHz 20 MHz





Date: 11.FEB.2019 19:07:31

Date: 11.FBB.2019 19:06:34





Test specification:	FCC section 15.407(b), RS emissions								
Test procedure:	KDB 662911; KDB 789033, AN	KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7							
Test mode:	Compliance	Verdict:	PASS						
Date(s):	10-Feb-19	verdict.	PASS						
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1019 hPa	Power: 48 VDC						
Remarks:									

7.11 Conducted out of band emissions at 5150 - 5250 MHz range

7.11.1 General

This test was performed to measure spurious emissions from the EUT near the band edges and within the pass band of the antenna. Specification test limits are given in Table 7.11.1 & EIRP of undesirable emission limits are given in Table 7.11.2

Table 7.11.1 Unwanted emissions limit within restricted bands above 1 GHz

Frequency, MHz	Field strength a	t 3 m, dB(μV/m)*	Equivalent EIRP*, dBm		
r requericy, wiriz	Peak	Average	Peak	Average	
1000 – 40000	74.0	54.0	-21.2	-41.2	

^{*} Equivalent EIRP was calculated as follow: Field strength - 95.2

Table 7.11.2 EIRP of undesirable emission limits outside restricted bands above 1 GHz

Frequency, MHz	EIRP of spurious, dBm/MHz
Outside 5150-5350 band	-27

7.11.2 Test procedure

- 7.11.2.1 The EUT was set up as shown in Figure 7.11.1, energized and the performance check was conducted.
- 7.11.2.2 The EUT was adjusted to produce maximum available to end user RF output power at the lowest carrier frequency.
- **7.11.2.3** The spectrum analyzer span was set to capture the carrier frequency and associated modulation products. The resolution bandwidth was set to 1 MHz.
- **7.11.2.4** The spectrum analyzer was set in max hold mode and allowed trace to stabilize. The highest emission level within the authorized band was measured.
- **7.11.2.5** The maximum band edge emission and modulation product outside of the band were measured as provided in the associated tables and plots.
- **7.11.2.6** The above procedure was repeated with the EUT adjusted to produce maximum RF output power at the mid and highest carrier frequencies.
- 7.11.2.7 Test results are shown in the Table 7.11.3, Table 7.11.4, Table 7.11.5 and the associated plots.

Figure 7.11.1 Setup for conducted spurious emissions



Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19



Test specification: FCC section 15.407(b), RSS-247 section 6.2.1.2 Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 10-Feb-19 Temperature: 25 °C Relative Humidity: 48 % Air Pressure: 1019 hPa Power: 48 VDC Remarks:

Table 7.11.3 Conducted spurious emission within restricted band test results

ASSIGNED FREQUENCY: 5.15 – 5.25 GHz INVESTIGATED FREQUENCY RANGE: 4500 - 6400 MHz

MODULATION: QPSK
DETECTOR USED: Peak/Average
RESOLUTION BANDWIDTH: 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas),

non-coherent signal

CHANNEL BANWIDTH:

CHANNE	L BANWIL	H:			10 M	ĦΖ							
Fraguenay	Antonno	Antenna		Peak				Averag	е				
Frequency, MHz	'	gain	SA reading,	EIRP**,	Limit,	Margin***,	SA reading,	EIRP**,	Limit,	Margin***,	Verdict		
IVITIZ	gain, dBi	array*, dB	dBm	dBm/MHz	dBm	dB	dBm	dBm/MHz	dBm	dB			
Low carrie	r frequen	су											
5149.840	16.5	3.0	-49.09	-29.59	-21.2	-8.39	-64.15	-42.18	-41.2	-0.98	Pass		
5406.750	16.5	3.0	-59.89	-40.39	-21.2	-19.19	-70.69	-48.72	-41.2	-7.52	Pass		
Mid carrie	r frequenc	су											
4915.300	16.5	3.0	-54.25	-34.75	-21.2	-13.55	-64.56	-42.59	-41.2	-1.39	Pass		
5406.750	16.5	3.0	-54.32	-34.82	-21.2	-13.62	-70.59	-48.62	-41.2	-7.42	Pass		
High carrie	High carrier frequency												
4915.300	16.5	3.0	-54.89	-35.39	-21.2	-24.19	-63.90	-41.93	-41.2	-0.73	Pass		
5366.210	16.5	3.0	-55.06	-35.56	-21.2	-14.36	-68.66	-46.69	-41.2	-5.49	Pass		

CHANNEL BANWIDTH: 15 MHz

• · · · · · · · · · · · · · · · · · · ·													
Fraguesia	Antonno	Antenna	Peak					Average	е				
Frequency, MHz			gain	SA reading,	EIRP**,	Limit,	Margin***,	SA reading,	EIRP**,	Limit,	Margin***,	Verdict	
IVITZ	gain, dBi	array*, dB	dBm	dBm/MHz	dBm	dB	dBm	dBm/MHz	dBm	dB			
Low carrier frequency													
5149.840	16.5	3.0	-56.98	-37.48	-21.2	-16.28	-64.05	-42.08	-41.2	-0.88	Pass		
5437.420	16.5	3.0	-60.02	-40.52	-21.2	-19.32	-72.53	-50.56	-41.2	-9.36	Pass		
Mid carrier	frequenc	y											
5068.950	16.5	3.0	-56.54	-37.04	-21.2	-15.84	-65.15	-43.18	-41.2	-1.98	Pass		
5437.530	16.5	3.0	-57.46	-37.96	-21.2	-16.76	-72.11	-50.14	-41.2	-8.94	Pass		
High carrie	High carrier frequency												
5147.560	16.5	3.0	-57.25	-37.75	-21.2	-16.55	-66.72	-44.75	-41.2	-3.55	Pass		
5437.530	16.5	3.0	-56.45	-36.95	-21.2	-15.75	-72.42	-50.45	-41.2	-9.25	Pass		

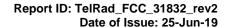




Table 7.11.3 Conducted spurious emission within restricted band test results

ASSIGNED FREQUENCY: 5.15 - 5.25 GHz INVESTIGATED FREQUENCY RANGE: 4500 - 6400 MHz

MODULATION: QPSK **DETECTOR USED:** Peak/Average **RESOLUTION BANDWIDTH:** 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas), non-coherent

signal 20 MHz

CHANNEL BANWIDTH:

	Antenna gain, dBi	nain	Peak				Average					
Frequency, MHz			SA reading, dBm	Peak EIRP**, dBm/MHz	Limit, dBm	Margin***, dB	SA reading, dBm	Average EIRP****, dBm/MHz	Limit, dBm	Margin***, dB	Verdict	
Low carrier frequency												
5149.840	16.5	3.0	-49.63	-30.13	-21.2	-8.93	-64.27	-42.30	-41.2	-1.10	Pass	
Mid carrier	frequenc	y										
4915.300	16.5	3.0	-52.43	-32.93	-21.2	-11.73	-63.46	-41.49	-41.2	-0.29	Pass	
5439.853	16.5	3.0	-51.78	-32.28	-21.2	-11.08	-69.53	-47.56	-41.2	-6.36	Pass	
High carrie	High carrier frequency											
4915.300	16.5	3.0	-54.38	-34.88	-21.2	-13.68	-63.31	-41.34	-41.2	-0.14	Pass	
5360.032	16.5	3.0	-54.65	-35.15	-21.2	-13.95	-68.59	-46.62	-41.2	-5.42	Pass	

^{* -} Antenna gain array = 10log(Nant), where Nant = 4 (two cross-polarized antennas with coherent signals)

Table 7.11.4 Duty cycle factor calculation

Burst dration, ms	Burst period, ms	Duty cycle*	Duty cycle factor**, dB
2.83	5.00	0.566	2.47

^{*-} Duty cycle = Burst duration / Burst period

^{** -} Peak EIRP = SA reading + Antenna gain + Antenna gain array

^{*** -} Margin = EIRP – specified limit.

**** - Average EIRP = SA reading + Antenna gain + Antenna gain array + Duty cycle factor

^{** -} Duty cycle factor = 10log(1/Duty cycle)

Report ID: TelRad_FCC_31832_rev2 Date of Issue: 25-Jun-19



Test specification: FCC section 15.407(b), RSS-247 section 6.2.1.2 Conducted out of band emissions KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test procedure: Test mode: Compliance **PASS** Verdict: Date(s): 10-Feb-19 Temperature: 25 °C Relative Humidity: 48 % Air Pressure: 1019 hPa Power: 48 VDC Remarks:

Table 7.11.5 Conducted spurious emission outside restricted band test results

ASSIGNED FREQUENCY RANGE: 5.15 – 5.25 GHz INVESTIGATED FREQUENCY RANGE: 4500 - 6400 MHz

MODULATION: QPSK
DETECTOR USED: Peak
RESOLUTION BANDWIDTH 1000 kHz

EUT CONFIGURATION: 1 carrier, 1 sector (4 ports to 2 dual slant antennas), non-

coherent signal

CHANNEL BANWIDTH:

CHAININEL BAIN	// ID I П.			10 MHZ								
Frequency, MHz dBm g		Antenna gain, dBi	Antenna gain array*, dB EIRP**, dBm/MHz		Limit, dBm/MHz Margin***, d		Verdict					
Low carrier frequency												
5655.790	-60.02	16.5	6.0	-37.52	-27.0	-10.52	Pass					
Mid carrier frequency												
5688.420	-51.35	16.5	6.0	-28.85	-27.0	-1.85	Pass					
High carrier from	equency											
5736 550	-51.35	16.5	6.0	-28 85	-27 0	-1 85	Pass					

CHANNEL BANWIDTH: 15 MHz

Frequency, MHz	SA reading, dBm	Antenna gain, dBi	Antenna gain array*, dB	EIRP**, dBm/MHz	Limit, dBm/MHz	Margin***, dB	Verdict				
Low carrier frequency											
5736.550	-52.38	16.5	6.0	-29.88	-27.0	-2.88	Pass				
Mid carrier free	quency										
5722.470	-60.55	16.5	6.0	-38.05	-27.0	-11.05	Pass				
High carrier frequency											
5750.640	-53.62	16.5	6.0	-31.12	-27.0	-4.12	Pass				

CHANNEL BANWIDTH: 20 MHz

Frequency, MHz	SA reading, dBm	Antenna gain, dBi	Antenna gain array*, dB	EIRP**, dBm/MHz	Limit, dBm/MHz	Margin***, dB	Verdict				
Low carrier frequency											
5792.900	-53.95	16.5	6.0	-31.45	-27.0	-4.45	Pass				
Mid carrier free	quency										
5541.230	-59.04	16.5	6.0	-36.54	-27.0	-9.54	Pass				
High carrier frequency											
5692.420	-48.92	16.5	6.0	-26.42	-27.0	0.58	Pass				

^{* -} Antenna gain array = 10log(N_{ant}), where N_{ant} = 2 (two cross-polarized antennas)

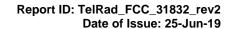
Reference numbers of test equipment used

_					
	HL 3901	HL 4355			

Full description is given in Appendix A.

^{** -} EIRP = SA reading + Antenna gain + Antenna gain array

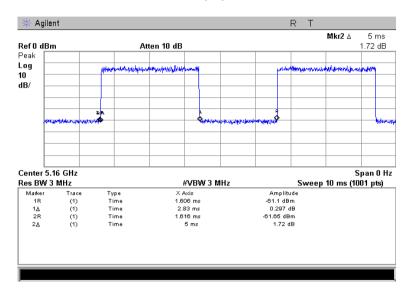
^{*** -} Margin = EIRP - specified limit.

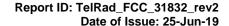




Test specification:	FCC section 15.407(b), RSS-247 section 6.2.1.2 Conducted out of band emissions		
Test procedure:	KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7		
Test mode:	Compliance	Verdict:	PASS
Date(s):	10-Feb-19		
Temperature: 25 °C	Relative Humidity: 48 %	Air Pressure: 1019 hPa	Power: 48 VDC
Remarks:			

Plot 7.11.1 Duty cycle



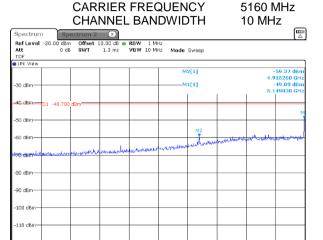


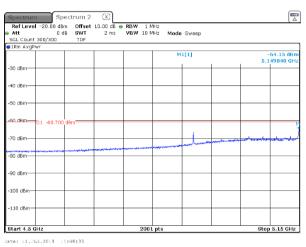


Start 4.5 GH:

Test specification: FCC section 15.407(b), RSS-247 section 6.2.1.2 Conducted out of band emissions Test procedure: KDB 662911; KDB 789033, ANSI C63.10, section 12.7.6 & 12.7.7 Test mode: Compliance **PASS** Verdict: Date(s): 10-Feb-19 Air Pressure: 1019 hPa Power: 48 VDC Temperature: 25 °C Relative Humidity: 48 % Remarks:

Plot 7.11.2 Conducted spurious emission measurements in the range 4.5 - 5.15 GHz

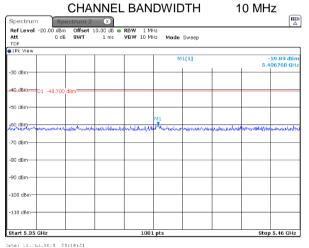


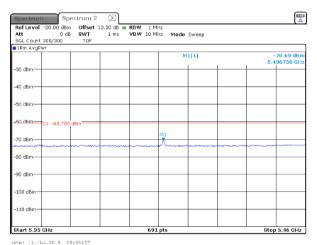


^{*}Applied Limit = Specification limit - Antenna Gain - Antenna Array gain

Plot 7.11.3 Conducted spurious emission measurements in the range 5.35 – 5.46 GHz CARRIER FREQUENCY 5160 MHz

Stop 5.15 GHz



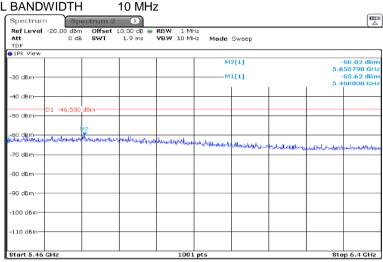






Plot 7.11.4 Conducted spurious emission measurements in the range 5.46 - 6.4 GHz

CARRIER FREQUENCY 5160 MHz
CHANNEL BANDWIDTH 10 MHz



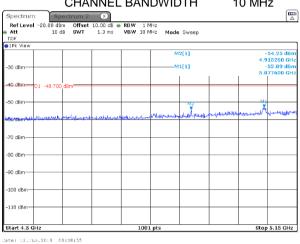
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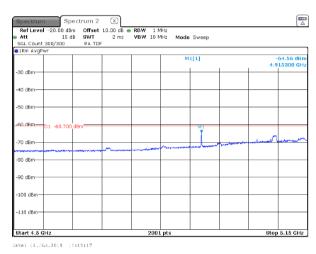




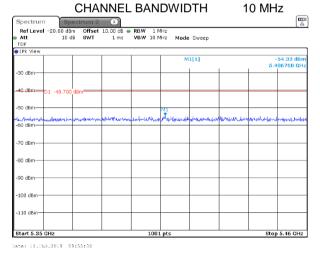
Plot 7.11.5 Conducted spurious emission measurements in the range 4.5 - 5.15 GHz

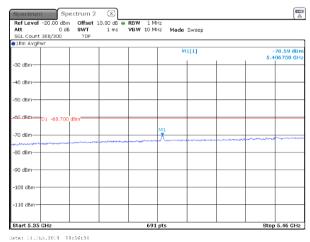
CARRIER FREQUENCY CHANNEL BANDWIDTH 5200 MHz 10 MHz





Plot 7.11.6 Conducted spurious emission measurements in the range 5.35 – 5.46 GHz
CARRIER FREQUENCY 5200 MHz



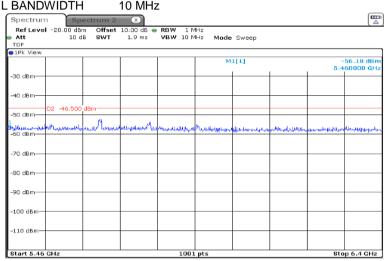






Plot 7.11.7 Conducted spurious emission measurements in the range 5.46 - 6.4 GHz

CARRIER FREQUENCY 5200 MHz
CHANNEL BANDWIDTH 10 MHz



Date: 11.FEB.2019 09:54:37