

CFR 47 FCC PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Tablet

MODEL NUMBER: CP3667AT

FCC ID: R38YLCP3667AT

REPORT NUMBER: 4789517523-2

ISSUE DATE: June 29, 2020

Prepared for

Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

Building 10, Innovation Technology Park, No. 1, Li Bin Road, Song Shan Lake Hi-Tech Development Zone Dongguan, 523808, People's Republic of China

> Tel: +86 769 22038881 Fax: +86 769 33244054 Website: www.ul.com



Revision History

Rev.	Issue Date	Revisions	Revised By
V0	06/29/2020	Initial Issue	



Summary of Test Results			
Clause	Test Items	FCC/ISED Rules	Test Results
1	20dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a) (1)	Pass
2	Conducted Output Power	FCC 15.247 (b) (1)	Pass
3	Carrier Hopping Channel Separation	FCC 15.247 (a) (1)	Pass
4	Number of Hopping Frequency	15.247 (a) (1) III	Pass
5	Time of Occupancy (Dwell Time)	15.247 (a) (1) III	Pass
6	Conducted Bandedge	FCC 15.247 (d)	Pass
7	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205	Pass
8	Conducted Emission Test for AC Power Port	FCC 15.207	Pass
9	Antenna Requirement	FCC 15.203	Pass

Note:

1. This test report is only published to and used by the applicant, and it is not for evidence purpose in China.

2. The measurement result for the sample received is <Pass> according to < CFR 47 FCC PART 15 SUBPART C > when <Accuracy Method> decision rule is applied.



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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
Manufacturer Information	
Company Name:	Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd
Address:	Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen
EUT Information	
EUT Name:	Tablet

EUT Name:	Tablet
Model:	CP3667AT
Sample Received Date:	June 12, 2020
Sample Status:	Normal
Sample ID:	3120775
Date of Tested:	June 12, 2020 ~ June 29, 2020

APPLICABLE STANDARDS		
STANDARD	TEST RESULTS	
CFR 47 FCC PART 15 SUBPART C	PASS	

Prepared By:

Kebo. zhong.

Shemmy lies

Checked By:

Kebo Zhang Project Engineer

Approved By:

ephentruo

Stephen Guo Laboratory Manager

Shawn Wen Laboratory Leader



2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, CFR 47 FCC Part 2, CFR 47 FCC Part 15 and ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

	A2LA (Certificate No.: 4102.01) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1187) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules ISED (Company No.: 21320)
Accreditation Certificate	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320.
	VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)
	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
	has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.
	Facility Name:
	Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B, the VCCI registration No. is C-20012 and T-20011

Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.

Note 3: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OFS.



4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty	
Conduction emission	3.62dB	
Radiated Emission (Included Fundamental Emission) (9kHz ~ 30MHz)	2.2dB	
Radiated Emission (Included Fundamental Emission) (30MHz ~ 1GHz)	4.00dB	
Radiated Emission	5.78dB (1GHz ~ 18GHz)	
(Included Fundamental Emission) (1GHz to 26GHz)	5.23dB (18GHz ~ 26GHz)	
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		



5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

EUT Name	Tablet			
Model	CP3667AT			
Technology	Bluetooth – BR	& EDR		
Transmit Frequency Range	2402 MHz ~ 2480 MHz			
Mode	Basic Rate		Enhanced Data Rate	
Modulation	GFSK		∏/4-DQPSK	8DPSK
Packet Type (Maximum Payload):	DH5		2DH5	3DH5
Data Rate	1Mbps		2Mbps	3Mbps
Power Supply	Power5Vdc===3Adapter9Vdc===2			
Battery		3.82Vdc		

5.2. MAXIMUM PEAK OUTPUT POWER

Bluetooth Mode	Frequency (MHz)	Channel Number	Maximum Peak Output Power (dBm)	Maximum EIRP (dBm)
GFSK	2402-2480	0-78[79]	2.70	3.50
8DPSK	2402-2480	0-78[79]	3.04	3.84

5.3. PACKET TYPE CONFIGURATION

Test Mode	Packet Type	Setting(Packet Length)	
	DH1	27	
GFSK	DH3	183	
	DH5	339	
	2-DH1	54	
∏/4-DQPSK	2-DH3	367	
	2-DH5	679	
	3-DH1	83	
8DPSK	3-DH3	552	
	3-DH5	1021	



Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	/	/

5.4. CHANNEL LIST

5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency	
GFSK	CH0, CH39, CH78/ Low, Middle, High	2402MHz, 2441MHz, 2480MHz	
GFSK- Hopping Mode	/	2402~2480MHz	
8DPSK	CH0, CH39, CH78/ Low, Middle, High	2402MHz, 2441MHz, 2480MHz	
8DPSK- Hopping Mode	/	2402~2480MHz	

5.6. WORST-CASE CONFIGURATIONS

Bluetooth Mode	Modulation Technology	Modulation Type	Data Rate	Packet Type
BR	FHSS	GFSK	1Mbit/s	DH5
EDR	FHSS	8DPSK	3Mbit/s	3-DH5

Note: Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates. Only GFSK and 8DPSK test data were report in this report.

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The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Se	QRCT						
Modulation Type	Transmit Antenna	Test Software setting value					
	Number	CH 00	CH 39	CH 78			
GFSK	1	7	7	7			
8DPSK	1	7	7	7			

5.7. THE WORSE CASE POWER SETTING PARAMETER

5.8. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna No.	Antenna No. Frequency (MHz)		MAX Antenna Gain (dBi)	
1	2402-2480	PIFA	0.8	

Test Mode	Transmit and Receive Mode	Description
GFSK	⊠1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.
8DPSK	⊠1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

Note: 1. The value of the antenna gain was declared by customer.

2. The customer declared that BT&WLAN 2.4G, BT& WLAN 5G cannot transmit simultaneously, WLAN2.4G& WLAN 5G cannot transmit simultaneously.



5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Remarks
1	Laptop	ThinkPad	E42-80	/

I/O CABLES

Item	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	Туре-С	NA	0.6	/

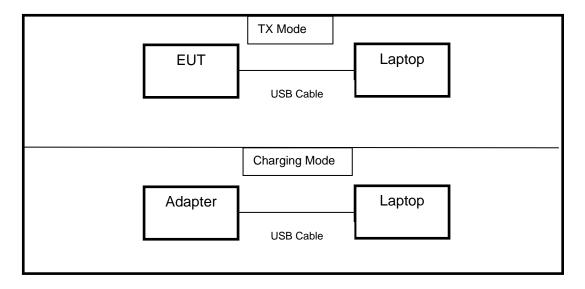
ACCESSORIES

Item	Accessory	Brand Name	Model Name	Description
1	TRAVEL CHARGER	N/A	Q3W18-1U-A	Input: AC 100~240V, 50/60Hz, 0.5A Max Output: 5Vdc=== 3A, 9Vdc=== 2A, 12Vdc=== 1.5A,

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



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6. MEASURING INSTRUMENT AND SOFTWARE USED

	Conducted Emissions							
	Instrument							
Used	Equipment	Manufacturer	Mode	el No.	Serial No.		Last Cal.	Next Cal.
V	EMI Test Receiver	R&S	ES	R3	101961		Dec.05,2019	Dec.05,2020
V	Two-Line V- Network	R&S	EN∖	/216	101983		Dec.05,2019	Dec.05,2020
			Sof	tware		[
Used	Desc	ription		Ma	nufacturer		Name	Version
	Test Software for Co	onducted distu	irbance	e	Farad		EZ-EMC	Ver. UL-3A1
		Ra	diated	Emiss	sions			
			Instr	rument	1			
Used	Equipment	Manufacturer	Mode	el No.	Serial No.		Last Cal.	Next Cal.
V	MXE EMI Receiver	KESIGHT	N90	38A	MY5640003	36	Dec.06,2019	Dec.06,2020
V	Hybrid Log Periodic Antenna	TDK	HLP-3003C		130960		Sep.17, 2018	Sep.17, 2021
\checkmark	Preamplifier	HP	8447D		2944A0909	9	Dec.05,2019	Dec.05,2020
V	EMI Measurement Receiver	R&S	ESR26		101377		Dec.05,2019	Dec.05,2020
\checkmark	Horn Antenna	TDK	HRN-0118		130939		Sep.17, 2018	Sep.17, 2021
V	High Gain Horn Antenna	Schwarzbeck	BBHA	-9170	691		Aug.11, 2018	Aug.11, 2021
V	Preamplifier	TDK	PA-02	2-0118	TRS-305- 00066		Dec.05,2019	Dec.05,2020
V	Preamplifier	TDK	PA-(02-2	TRS-307- 00003		Dec.05,2019	Dec.05,2020
\checkmark	Loop antenna	Schwarzbeck	151	19B	80000		Jan.07, 2019	Jan.07, 2022
V	Preamplifier	TDK		2-001- 000	TRS-302- 00050		Dec.5, 2019	Dec.5, 2020
V	Band Reject Filter	Wainwright	WRCJV8- 2350-2400- 2483.5- 2533.5- 40SS		4		Dec.05,2019	Dec.05,2020
V	High Pass Filter	Wi	WHKX10- 2700-3000- 18000-40SS		23		Dec.05,2019	Dec.05,2020
			Sof	tware				
Used			Ν	lanufa	cturer Name		Version	
\checkmark	Test Software disturb			Fara	ad	E	Z-EMC	Ver. UL-3A1

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	Other instruments								
Used	ed Equipment Manufacturer Model No. Serial No. Last Cal. Next Ca								
\checkmark	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.06,2019	Dec.06,2020			
\checkmark	Spectrum Analyzer	Keysight	N9020A	MY49100060	Dec.06,2019	Dec.06,2020			
\checkmark	Power Meter	Keysight	N1911A	MY55416024	Dec.06,2019	Dec.06,2020			
\checkmark	Power Sensor	Keysight	U2021XA	MY5100022	Dec.06,2019	Dec.06,2020			



7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

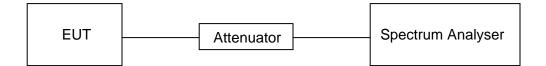
LIMITS

None; for reporting purposes only.

PROCEDURE

Refer to ANSI C63.10-2013 Zero – Span Spectrum Analyzer method.

TEST SETUP



TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix I.



7.2. 20 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

CFR 47FCC Part15 (15.247) Subpart C				
Section Test Item Limit Frequency Range (MHz)				
CFR 47 FCC 15.247 (a) (1)	20 dB Bandwidth	None; for reporting purposes only.	2400-2483.5	
ANSI C63.10 Section 6.9.3	99% Occupied Bandwidth	None; for reporting purposes only.	2400-2483.5	

TEST PROCEDURE

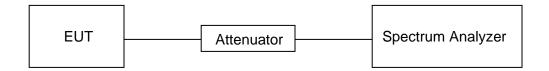
Refer to ANSI C63.10-2013 clause 6.9.2.

Center Frequency	The center frequency of the channel under test
Detector	Peak
IBBW/	For 20dB Bandwidth: 1% to 5% of the 20dB bandwidth For 99% Occupied Bandwidth: 1% to 5% of the occupied bandwidth
IV BWV	For 20dB Bandwidth: approximately 3×RBW For 99% Occupied Bandwidth: ≥ 3×RBW
Span	Approximately 2 to 3 times the 20dB bandwidth
Trace	Max hold
Sweep	Auto couple

Connect the EUT to the spectrum analyser and use the following settings:

a) Use the occupied bandwidth function of the instrument, allow the trace to stabilize and report the measured 99% occupied bandwidth and 20dB Bandwidth.

TEST SETUP





TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix A and B.



7.3. CONDUCTED OUTPUT POWER

<u>LIMITS</u>

CFR 47 FCC Part15 (15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	
CFR 47 FCC 15.247 (b) (1)	Peak Conducted Output Power	Hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel: 1 watt or 30dBm; Hopping channel carrier frequencies that are separated by 25 kHz or two- thirds of the 20dB bandwidth of the hopping channel: 125 mW or 21dBm	2400-2483.5	

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 7.8.5.

Center Frequency	The center frequency of the channel under test
Frequency Span	≥3 × RBW
Detector	Peak
RBW	≥ 20 dB bandwidth of the emission being measured
VBW	≥3 × RBW
Trace	Max hold
Sweep	Auto couple

Connect the EUT to the spectrum analyser and use the following settings:

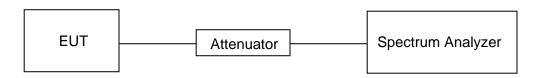
Allow trace to fully stabilize and Use the marker-to-peak function to set the marker to the peak of the emission.

The indicated level is the peak output power, after any corrections for external attenuators and cables.

Connect the EUT to a low loss RF cable from the antenna port to the power sensor (video bandwidth is greater than the occupied bandwidth).

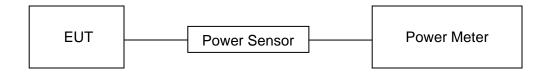
Measure peak emission level, the indicated level is the peak output power, after any corrections for external attenuators and cables.

TEST SETUP



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TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix C.



7.4. CARRIER FREQUENCY SEPARATION

LIMITS

CFR 47 FCC Part15 (15.247),			
Section	Test Item	Limit	Frequency Range (MHz)
CFR 47 FCC 15.247 (a) (1)	Carrier Frequency Separation	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel.	2400-2483.5

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 7.8.2.

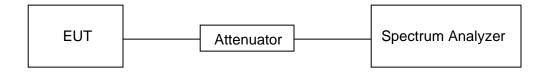
Connect the EUT to the spectrum analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Span	wide enough to capture the peaks of two adjacent channels
Detector	Peak
	Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
VBW	≥RBW
Trace	Max hold
Sweep time	Auto couple

Allow the trace to stabilize and use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Compliance of an EUT with the appropriate regulatory limit shall be determined.

TEST SETUP





TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to Appendix D.



7.5. NUMBER OF HOPPING FREQUENCIES

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C			
Section Test Item Limit			
CFR 47 15.247 (a) (1) III	Number of Hopping Frequency	at least 15 hopping channels	

TEST PROCEDURE

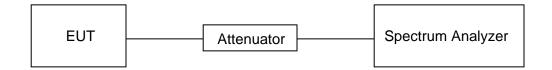
Refer to ANSI C63.10-2013 clause 7.8.3.

Connect the EUT to the spectrum Analyzer and use the following settings:

Detector	Peak
RBW	To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20dB bandwidth, whichever is smaller.
VBW	≥RBW
Span	The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
Trace	Max hold
Sweep time	Auto couple

Set EUT to transmit maximum output power and switch on frequency hopping function. then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer, count the quantity of peaks to get the number of hopping channels.

TEST SETUP





TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix F.



7.6. TIME OF OCCUPANCY (DWELL TIME)

LIMITS

CFR 47 FCC Part15 (15.247), Subpart C			
Section Test Item Limit			
CFR 47 15.247 (a) (1) III	Time of Occupancy (Dwell Time)	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds, multiplied by the number of hopping channels employed.	

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 7.8.4.

Connect the EUT to the spectrum Analyzer and use the following settings:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	1 MHz
VBW	≥RBW
Span	Zero span, centered on a hopping channel
Trace	Max hold
Sweep time	As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel

Use the marker-delta function to determine the transmit time per hop (Burst Width). If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

For FHSS Mode (79 Channel):

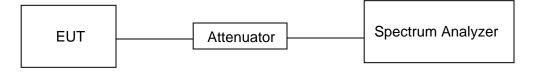
DH1 Dwell Time: Burst Width * (1600/2) * 31.6 / (channel number) DH3 Dwell Time: Burst Width * (1600/4) * 31.6 / (channel number) DH5 Dwell Time: Burst Width * (1600/6) * 31.6 / (channel number)

For AFHSS Mode (20 Channel):

DH1 Dwell Time: Burst Width * (1600/2) * 8 / (channel number) DH3 Dwell Time: Burst Width * (1600/4) * 8 / (channel number) DH5 Dwell Time: Burst Width * (1600/6) * 8 / (channel number)



TEST SETUP



TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix E.



7.7. CONDUCTED BANDEDGE AND SPURIOUS EMISSION

<u>LIMITS</u>

CFR 47 FCC Part15 (15.247), Subpart C		
Section Test Item Limit		
CFR 47 FCC §15.247 (d) Conducted Spurious Emission		at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 7.8.6 and 7.8.8.

Connect the EUT to the spectrum analyser and use the following settings for reference level measurement:

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level.

Change the settings for emission level measurement:

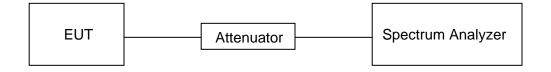
	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100kHz
VBW	≥3 × RBW
measurement points	≥span/RBW
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum PSD level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements.

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TEST SETUP



TEST ENVIRONMENT

Temperature	25.5°C	Relative Humidity	61.2%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

RESULTS

Please refer to appendix G and H.



8. RADIATED TEST RESULTS

<u>LIMITS</u>

Please refer to CFR 47 FCC §15.205 and §15.209.

Radiation Disturbance Test Limit for FCC (Class B) (9kHz-1GHz)

Emissions radiated outside of the specified frequency bands above 30MHz			
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m Quasi-Peak	
30 - 88	100	40	
88 - 216	150	43.5	
216 - 960	200	46	
Above 960	500	54	
Above 1000	500	Peak	Average
		74	54

FCC Emissions radiated outside of the specified frequency bands below 30MHz			
Frequency (MHz) Field strength (microvolts/meter) Measurement distance (meters)			
0.009-0.490	2400/F(kHz)	300	
0.490-1.705	24000/F(kHz)	30	
1.705-30.0	30	30	



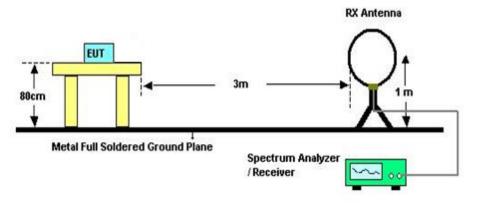
FCC Restricted bands of operation refer to FCC §15.205 (a):

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

Note: ¹Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. ²Above 38.6c

TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9kHz (From 0.15MHz to 30MHz)
Sweep	Auto
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.4.

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

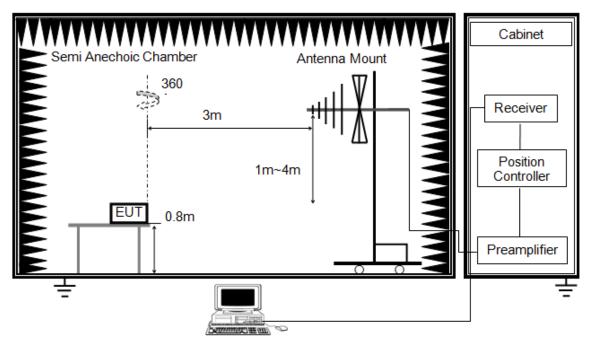
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak and average detector mode remeasured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak and average detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field site based on KDB 414788.



Below 1G and above 30MHz



The setting of the spectrum analyser

RBW	120kHz
VBW	300kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.5.

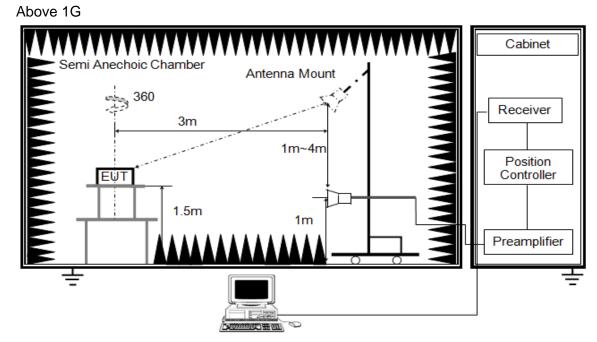
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.





The setting of the spectrum analyser

RBW	1MHz			
IV BW	PEAK: 3MHz AVG: see note 6			
Sweep	Auto			
Detector	Peak			
Trace	Max hold			

1. The testing follows the guidelines in ANSI C63.10-2013 clause 6.6.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 1.5m above ground.

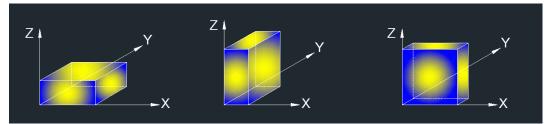
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements and 1 MHz resolution bandwidth with 1/T video bandwidth with peak detector for average measurements. For the Duty Cycle please refer to clause 7.1.ON TIME AND DUTY CYCLE.



X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report.

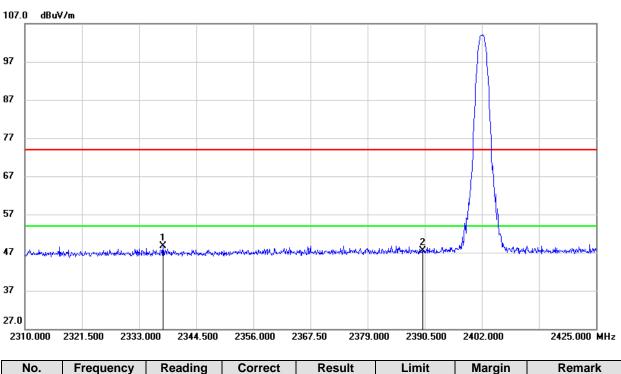
TEST ENVIRONMENT

Temperature	22.7°C	Relative Humidity	61%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V



8.1. RESTRICTED BANDEDGE

8.1.1. GFSK MODE



RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2337.830	16.03	32.77	48.80	74.00	-25.20	peak
2	2390.000	14.54	32.94	47.48	74.00	-26.52	peak

Note: 1. Measurement = Reading Level + Correct Factor.

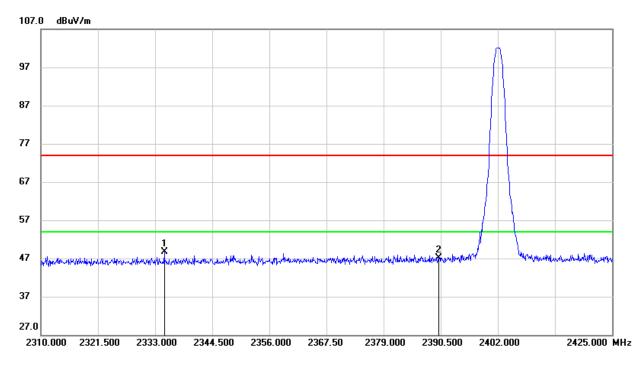
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2334.840	15.96	32.76	48.72	74.00	-25.28	peak
2	2390.000	14.19	32.94	47.13	74.00	-26.87	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

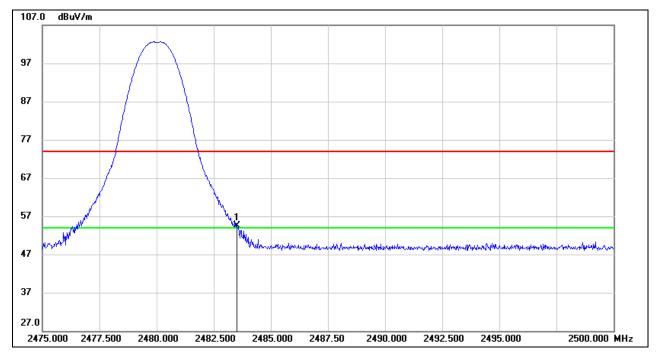
3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

PEAK



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	21.02	33.58	54.60	74.00	-19.40	peak

Note: 1. Measurement = Reading Level + Correct Factor.

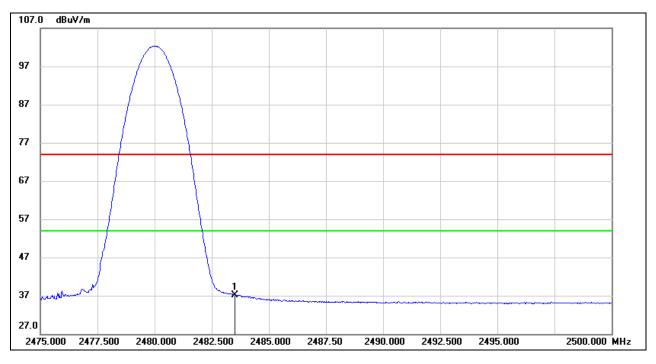
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Only the worst data was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



<u>AVG</u>



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	3.51	33.58	37.09	54.00	-16.91	AVG

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

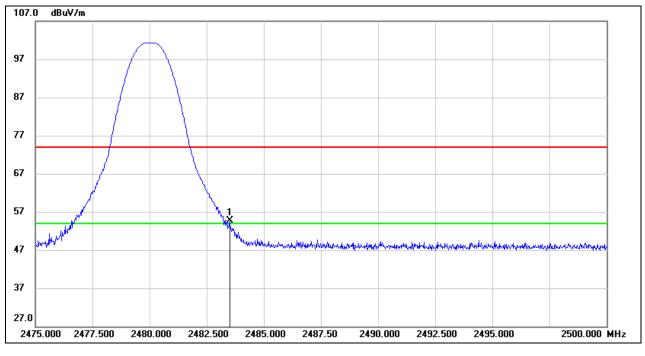
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

<u>PEAK</u>



N	0.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1	2483.500	21.20	33.58	54.78	74.00	-19.22	peak

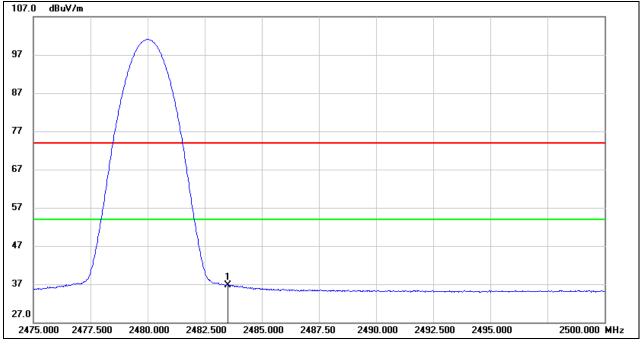
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



<u>AVG</u>



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	3.22	33.58	36.80	54.00	-17.20	AVG

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

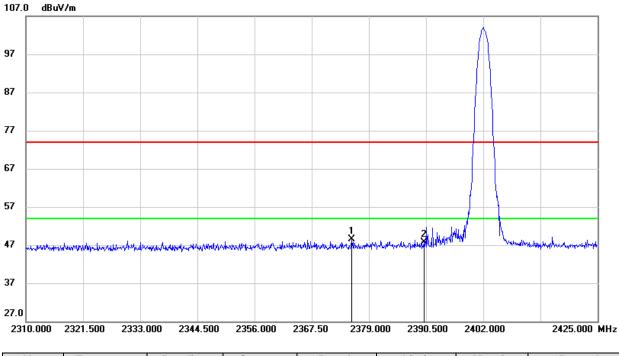
4. AVG: VBW=1/Ton, where: Ton is the transmitting duration.

5. For the transmitting duration, please refer to clause 7.1.



8.1.2. 8DPSK MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2375.550	15.68	32.90	48.58	74.00	-25.42	peak
2	2390.000	14.76	32.94	47.70	74.00	-26.30	peak

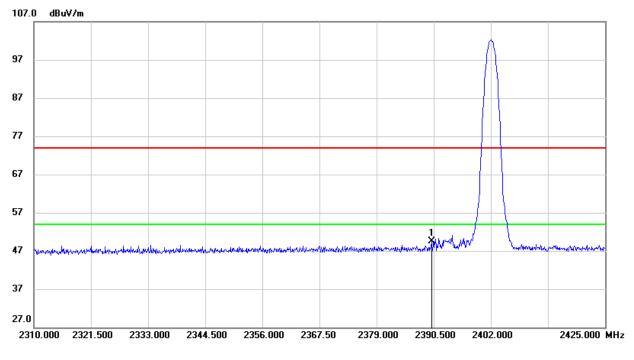
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2390.000	16.57	32.94	49.51	74.00	-24.49	peak

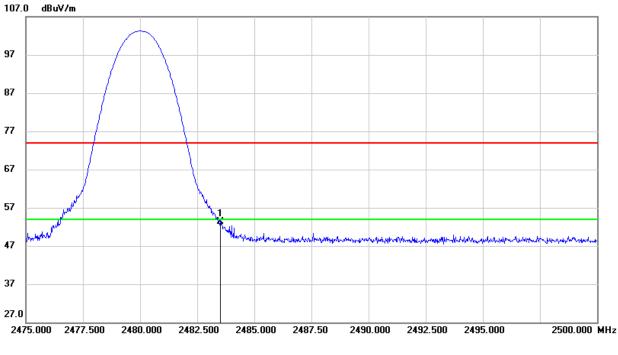
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	19.66	33.58	53.24	74.00	-20.76	peak

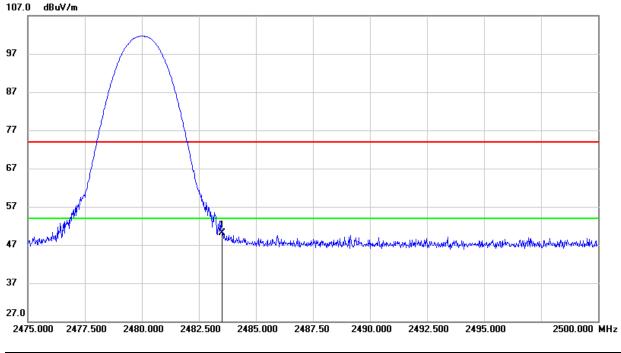
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	16.47	33.58	50.05	74.00	-23.95	peak

Note: 1. Measurement = Reading Level + Correct Factor.

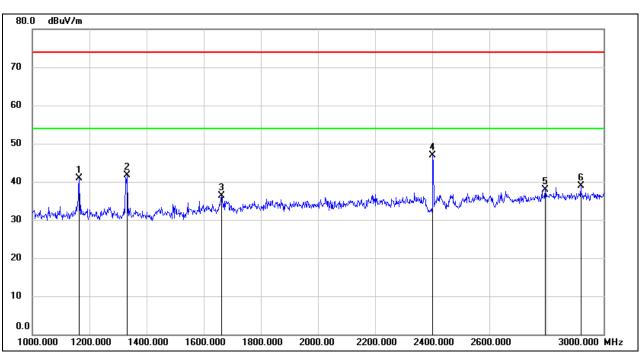
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



8.2. SPURIOUS EMISSIONS (1GHz ~ 3GHz)

8.2.1. GFSK MODE



HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1164.000	53.90	-12.97	40.93	74.00	-33.07	peak
2	1332.000	54.01	-12.35	41.66	74.00	-32.34	peak
3	1662.000	47.37	-11.09	36.28	74.00	-37.72	peak
4	2402.000	54.67	-7.85	46.82	/	/	fundamental
5	2796.000	43.95	-6.10	37.85	74.00	-36.15	peak
6	2920.000	44.36	-5.48	38.88	74.00	-35.12	peak

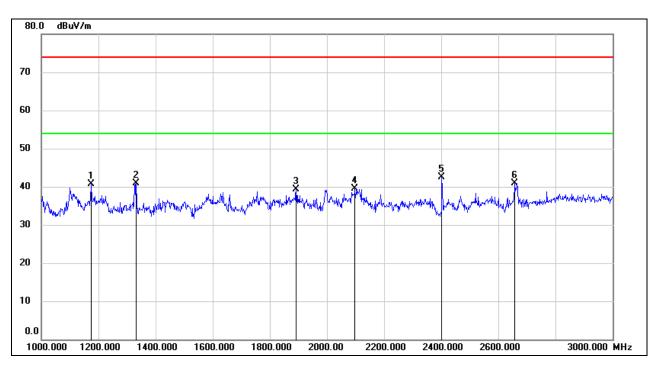
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1174.000	53.51	-12.90	40.61	74.00	-33.39	peak
2	1332.000	53.30	-12.35	40.95	74.00	-33.05	peak
3	1892.000	49.26	-9.95	39.31	74.00	-34.69	peak
4	2098.000	48.61	-9.17	39.44	74.00	-34.56	peak
5	2402.000	50.44	-7.85	42.59	/	/	fundamental
6	2658.000	48.28	-7.37	40.91	74.00	-33.09	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.



40

30

20

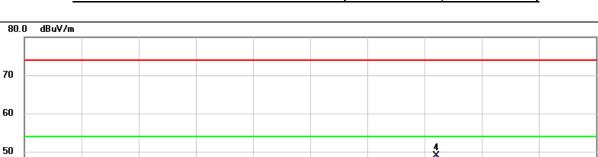
10

0.0

nati li

1200.000

1400.000



HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1330.000	53.31	-12.36	40.95	74.00	-33.05	peak
2	1572.000	51.02	-11.63	39.39	74.00	-34.61	peak
3	2000.000	49.00	-9.82	39.18	74.00	-34.82	peak
4	2441.000	56.57	-7.57	49.00	/	/	fundamental
5	2654.000	46.56	-7.39	39.17	74.00	-34.83	peak
6	2998.000	43.60	-5.31	38.29	74.00	-35.71	peak

2000.00

2200.000

2400.000

2600.000

3000.000 MHz

Note: 1. Measurement = Reading Level + Correct Factor.

1600.000

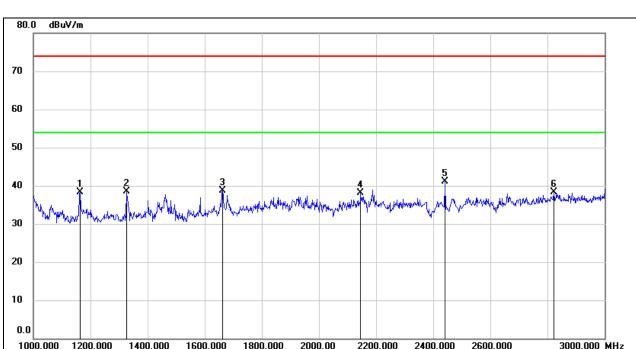
1800.000

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1164.000	51.37	-12.97	38.40	74.00	-35.60	peak
2	1326.000	50.81	-12.35	38.46	74.00	-35.54	peak
3	1662.000	49.82	-11.09	38.73	74.00	-35.27	peak
4	2146.000	47.03	-8.93	38.10	74.00	-35.90	peak
5	2441.000	48.61	-7.58	41.03	/	/	fundamental
6	2822.000	44.21	-5.93	38.28	74.00	-35.72	peak

Note: 1. Measurement = Reading Level + Correct Factor.

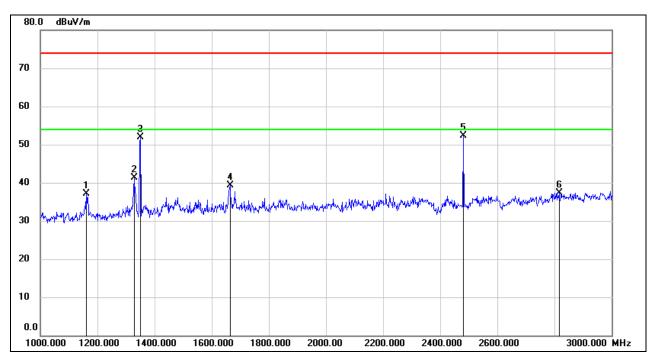
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.







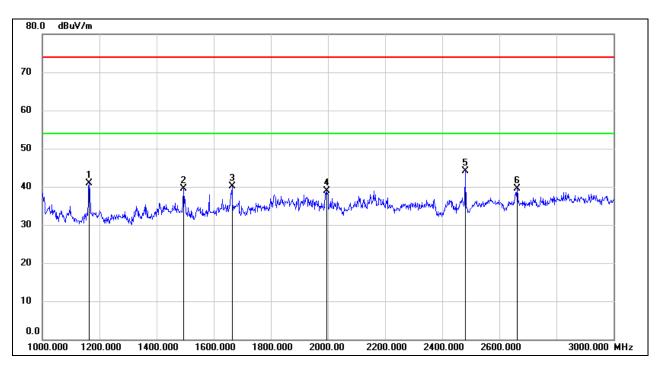
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1160.000	50.11	-13.01	37.10	74.00	-36.90	peak
2	1328.000	53.72	-12.36	41.36	74.00	-32.64	peak
3	1350.000	64.31	-12.36	51.95	74.00	-22.05	peak
4	1664.000	50.39	-11.09	39.30	74.00	-34.70	peak
5	2480.000	59.62	-7.31	52.31	/	/	fundamental
6	2816.000	43.34	-5.97	37.37	74.00	-36.63	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1164.000	53.92	-12.97	40.95	74.00	-33.05	peak
2	1494.000	51.66	-12.22	39.44	74.00	-34.56	peak
3	1664.000	51.18	-11.09	40.09	74.00	-33.91	peak
4	1996.000	48.75	-9.83	38.92	74.00	-35.08	peak
5	2480.000	51.51	-7.31	44.20	/	/	fundamental
6	2662.000	46.84	-7.35	39.49	74.00	-34.51	peak

Note: 1. Measurement = Reading Level + Correct Factor.

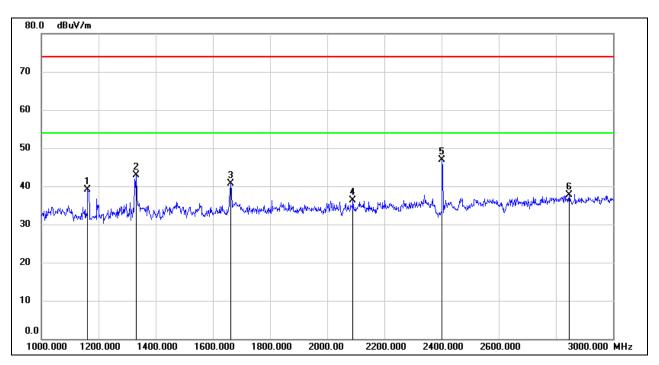
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.



8.2.2. 8DPSK MODE



HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1162.000	52.04	-13.00	39.04	74.00	-34.96	peak
2	1332.000	55.19	-12.35	42.84	74.00	-31.16	peak
3	1662.000	51.74	-11.09	40.65	74.00	-33.35	peak
4	2090.000	45.57	-9.22	36.35	74.00	-37.65	peak
5	2402.000	54.77	-7.85	46.92	/	/	fundamental
6	2846.000	43.57	-5.80	37.77	74.00	-36.23	peak

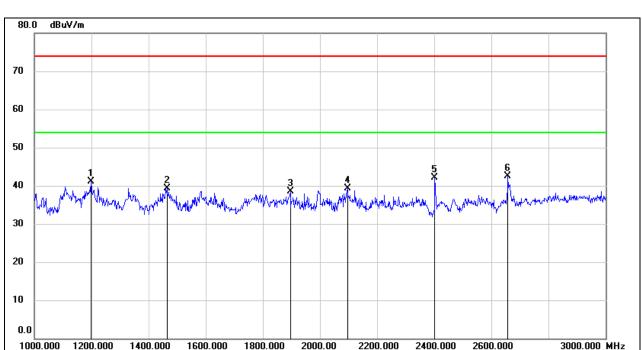
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1198.000	53.75	-12.69	41.06	74.00	-32.94	peak
2	1464.000	51.62	-12.26	39.36	74.00	-34.64	peak
3	1896.000	48.51	-9.95	38.56	74.00	-35.44	peak
4	2096.000	48.52	-9.19	39.33	74.00	-34.67	peak
5	2402.000	49.93	-7.85	42.08	/	/	fundamental
6	2658.000	49.81	-7.37	42.44	74.00	-31.56	peak

Note: 1. Measurement = Reading Level + Correct Factor.

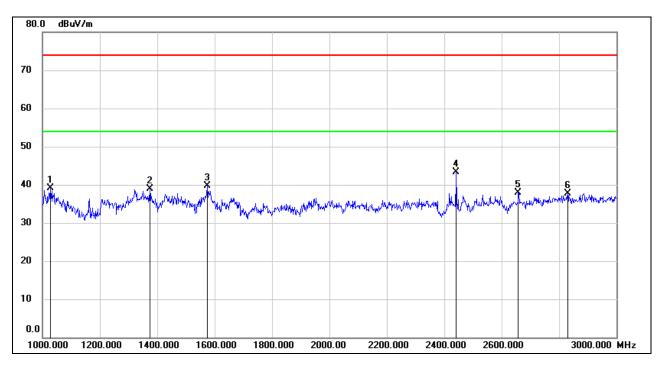
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.







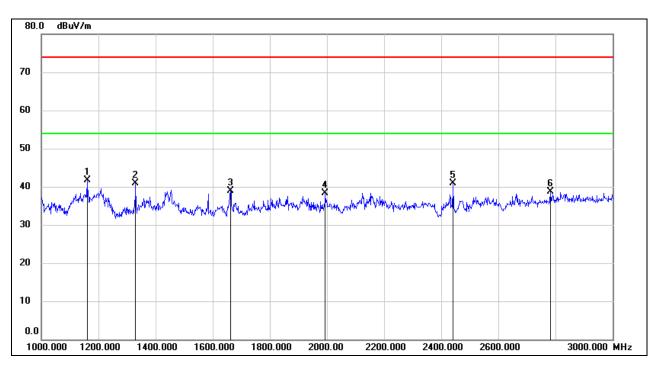
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1028.000	52.73	-13.58	39.15	74.00	-34.85	peak
2	1374.000	51.29	-12.38	38.91	74.00	-35.09	peak
3	1574.000	51.24	-11.61	39.63	74.00	-34.37	peak
4	2441.000	50.95	-7.57	43.38	/	/	fundamental
5	2658.000	45.28	-7.37	37.91	74.00	-36.09	peak
6	2830.000	43.65	-5.89	37.76	74.00	-36.24	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1160.000	54.77	-13.01	41.76	74.00	-32.24	peak
2	1330.000	53.32	-12.36	40.96	74.00	-33.04	peak
3	1662.000	50.01	-11.09	38.92	74.00	-35.08	peak
4	1994.000	48.17	-9.83	38.34	74.00	-35.66	peak
5	2441.000	48.50	-7.58	40.92	/	/	fundamental
6	2782.000	45.04	-6.25	38.79	74.00	-35.21	peak

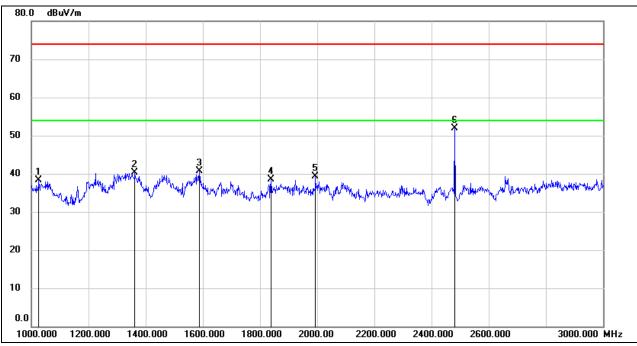
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.







No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1026.000	51.86	-13.56	38.30	74.00	-35.70	peak
2	1362.000	52.64	-12.37	40.27	74.00	-33.73	peak
3	1588.000	52.24	-11.50	40.74	74.00	-33.26	peak
4	1838.000	48.36	-9.93	38.43	74.00	-35.57	peak
5	1994.000	49.11	-9.83	39.28	74.00	-34.72	peak
6	2480.000	59.21	-7.31	51.90	/	/	fundamental

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.

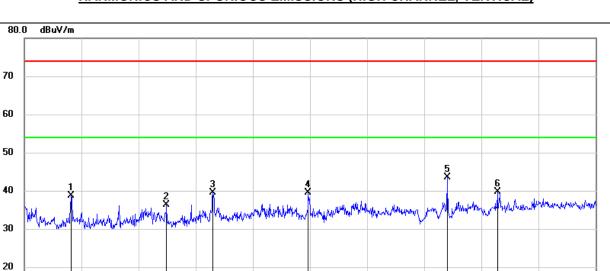


10

0.0

1200.000

1400.000



HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	1164.000	51.73	-12.97	38.76	74.00	-35.24	peak
2	1498.000	48.51	-12.21	36.30	74.00	-37.70	peak
3	1660.000	50.61	-11.10	39.51	74.00	-34.49	peak
4	1994.000	49.30	-9.83	39.47	74.00	-34.53	peak
5	2480.000	50.87	-7.31	43.56	/	/	fundamental
6	2656.000	47.04	-7.38	39.66	74.00	-34.34	peak

2000.00

2200.000

2400.000

2600.000

3000.000 MHz

Note: 1. Measurement = Reading Level + Correct Factor.

1600.000

1800.000

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

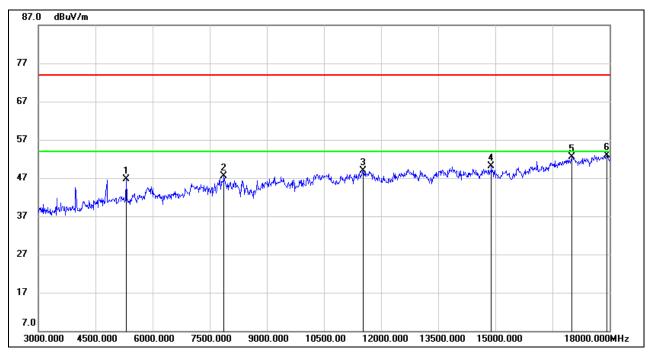
3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.



8.3. SPURIOUS EMISSIONS (3GHz ~ 18GHz)

8.3.1. GFSK MODE



HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5310.000	44.75	2.02	46.77	74.00	-27.23	peak
2	7875.000	40.09	7.40	47.49	74.00	-26.51	peak
3	11535.000	35.57	13.33	48.90	74.00	-25.10	peak
4	14895.000	34.06	16.01	50.07	74.00	-23.93	peak
5	17010.000	32.15	20.43	52.58	74.00	-21.42	peak
6	17925.000	29.57	23.37	52.94	74.00	-21.06	peak

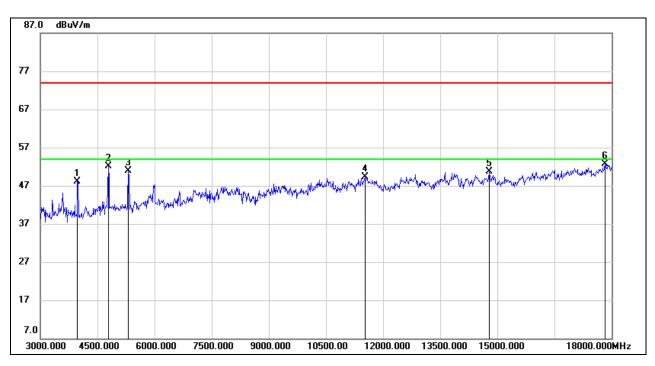
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





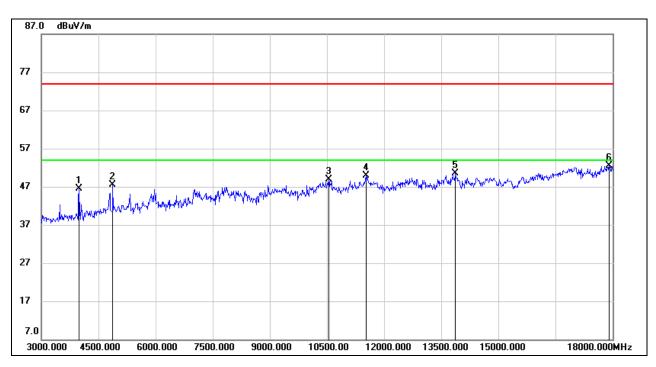
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3975.000	51.06	-2.90	48.16	74.00	-25.84	peak
2	4785.000	51.62	0.42	52.04	74.00	-21.96	peak
3	5310.000	48.97	2.02	50.99	74.00	-23.01	peak
4	11520.000	35.90	13.38	49.28	74.00	-24.72	peak
5	14790.000	34.71	15.93	50.64	74.00	-23.36	peak
6	17820.000	29.45	23.30	52.75	74.00	-21.25	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)
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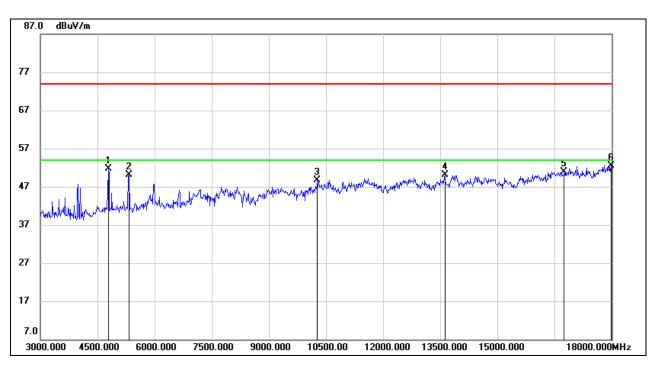
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3990.000	49.48	-2.89	46.59	74.00	-27.41	peak
2	4875.000	46.72	0.76	47.48	74.00	-26.52	peak
3	10545.000	37.34	11.64	48.98	74.00	-25.02	peak
4	11520.000	36.49	13.38	49.87	74.00	-24.13	peak
5	13875.000	34.07	16.44	50.51	74.00	-23.49	peak
6	17910.000	29.12	23.35	52.47	74.00	-21.53	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4785.000	51.29	0.42	51.71	74.00	-22.29	peak
2	5325.000	48.02	1.99	50.01	74.00	-23.99	peak
3	10275.000	37.95	10.85	48.80	74.00	-25.20	peak
4	13620.000	34.16	15.99	50.15	74.00	-23.85	peak
5	16755.000	30.97	19.94	50.91	74.00	-23.09	peak
6	17985.000	29.10	23.44	52.54	74.00	-21.46	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

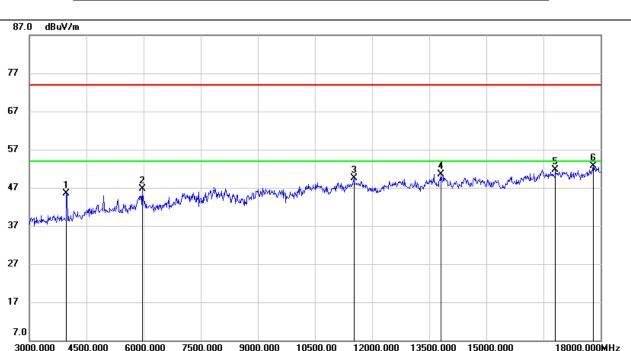
4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.



3000.000

4500.000

6000.000



HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3975.000	48.48	-2.90	45.58	74.00	-28.42	peak
2	5970.000	42.87	3.79	46.66	74.00	-27.34	peak
3	11520.000	36.15	13.38	49.53	74.00	-24.47	peak
4	13800.000	33.47	17.10	50.57	74.00	-23.43	peak
5	16815.000	31.81	19.96	51.77	74.00	-22.23	peak
6	17805.000	29.32	23.31	52.63	74.00	-21.37	peak

12000.000 13500.000

15000.000

Note: 1. Peak Result = Reading Level + Correct Factor.

7500.000

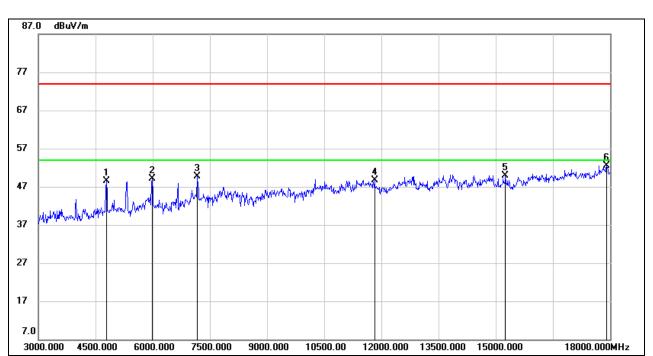
9000.000

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	4785.000	48.14	0.42	48.56	74.00	-25.44	peak
2	5985.000	45.48	3.54	49.02	74.00	-24.98	peak
3	7170.000	43.88	5.84	49.72	74.00	-24.28	peak
4	11820.000	35.54	13.19	48.73	74.00	-25.27	peak
5	15255.000	33.65	16.20	49.85	74.00	-24.15	peak
6	17910.000	29.19	23.35	52.54	74.00	-21.46	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

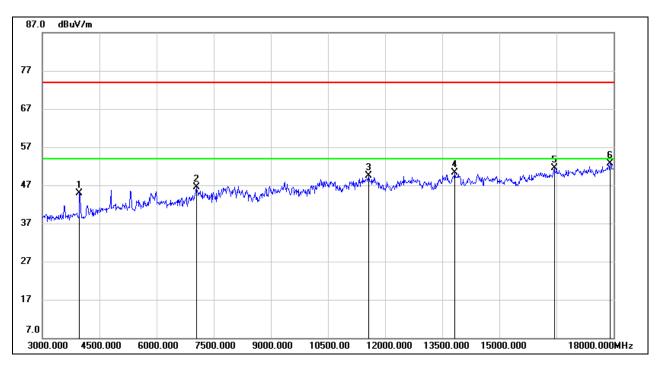
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.



8.3.2. 8DPSK MODE



HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3975.000	47.81	-2.90	44.91	74.00	-29.09	peak
2	7050.000	40.69	5.84	46.53	74.00	-27.47	peak
3	11565.000	36.17	13.26	49.43	74.00	-24.57	peak
4	13830.000	33.46	16.84	50.30	74.00	-23.70	peak
5	16440.000	32.65	18.94	51.59	74.00	-22.41	peak
6	17910.000	29.40	23.35	52.75	74.00	-21.25	peak

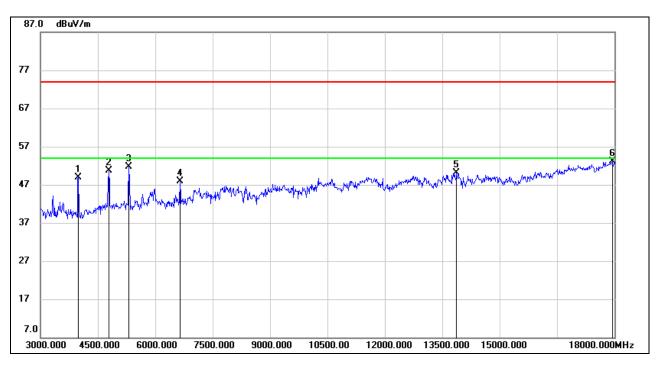
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3990.000	51.89	-2.89	49.00	74.00	-25.00	peak
2	4785.000	50.38	0.42	50.80	74.00	-23.20	peak
3	5310.000	49.62	2.02	51.64	74.00	-22.36	peak
4	6645.000	42.76	5.22	47.98	74.00	-26.02	peak
5	13875.000	33.60	16.44	50.04	74.00	-23.96	peak
6	17940.000	29.66	23.39	53.05	74.00	-20.95	peak

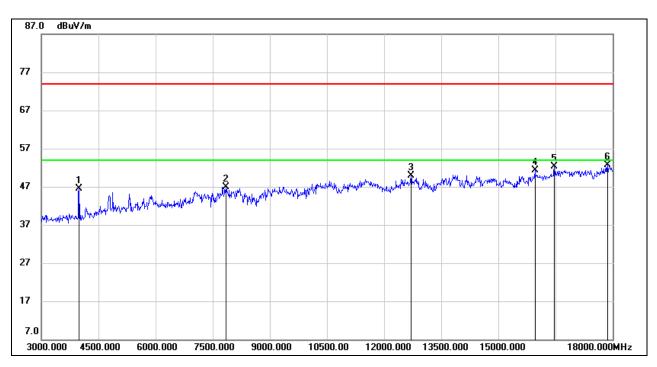
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3990.000	49.36	-2.89	46.47	74.00	-27.53	peak
2	7845.000	39.35	7.62	46.97	74.00	-27.03	peak
3	12705.000	35.60	14.35	49.95	74.00	-24.05	peak
4	15960.000	33.63	17.63	51.26	74.00	-22.74	peak
5	16470.000	33.15	19.06	52.21	74.00	-21.79	peak
6	17865.000	29.40	23.33	52.73	74.00	-21.27	peak

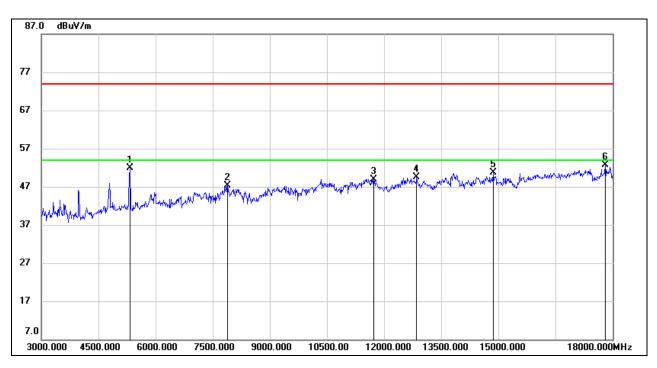
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	5325.000	49.88	1.99	51.87	74.00	-22.13	peak
2	7890.000	39.91	7.30	47.21	74.00	-26.79	peak
3	11730.000	35.96	13.02	48.98	74.00	-25.02	peak
4	12855.000	34.25	15.23	49.48	74.00	-24.52	peak
5	14865.000	34.64	15.98	50.62	74.00	-23.38	peak
6	17805.000	29.41	23.31	52.72	74.00	-21.28	peak

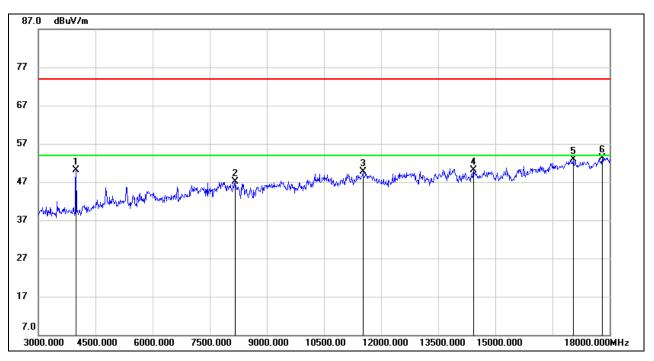
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.





HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3990.000	52.92	-2.89	50.03	74.00	-23.97	peak
2	8160.000	38.94	8.18	47.12	74.00	-26.88	peak
3	11520.000	36.37	13.38	49.75	74.00	-24.25	peak
4	14430.000	33.70	16.35	50.05	74.00	-23.95	peak
5	17040.000	32.34	20.49	52.83	74.00	-21.17	peak
6	17805.000	30.08	23.31	53.39	74.00	-20.61	peak

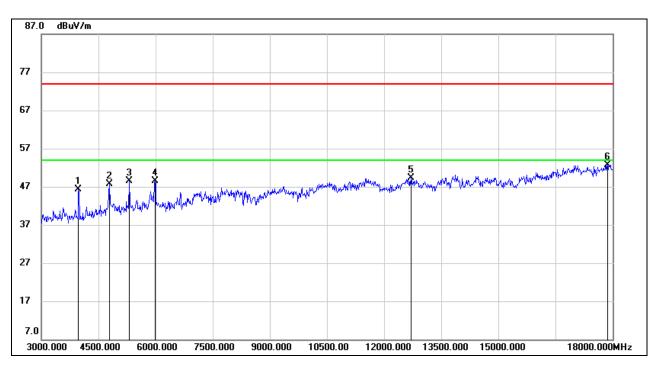
Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.



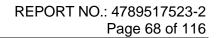


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	3975.000	49.13	-2.90	46.23	74.00	-27.77	peak
2	4785.000	47.22	0.42	47.64	74.00	-26.36	peak
3	5310.000	46.56	2.02	48.58	74.00	-25.42	peak
4	5985.000	44.90	3.54	48.44	74.00	-25.56	peak
5	12705.000	34.91	14.35	49.26	74.00	-24.74	peak
6	17865.000	29.35	23.33	52.68	74.00	-21.32	peak

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. Filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for High Pass Filter losses.

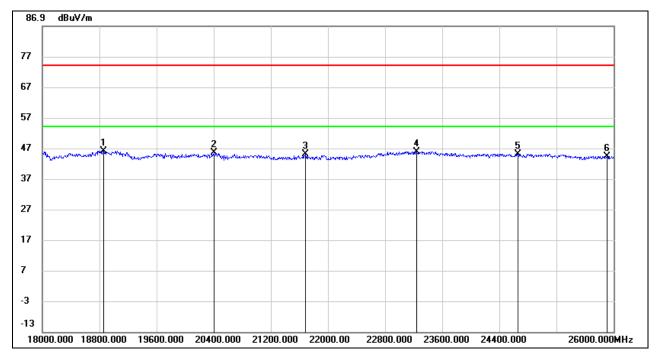




8.4. SPURIOUS EMISSIONS 18GHz ~ 26GHz

8.4.1. GFSK MODE

SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	18856.000	50.99	-4.87	46.12	74.00	-27.88	peak
2	20400.000	50.46	-4.93	45.53	74.00	-28.47	peak
3	21680.000	50.74	-5.76	44.98	74.00	-29.02	peak
4	23240.000	51.16	-5.27	45.89	74.00	-28.11	peak
5	24664.000	47.32	-2.18	45.14	74.00	-28.86	peak
6	25912.000	46.44	-2.06	44.38	74.00	-29.62	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

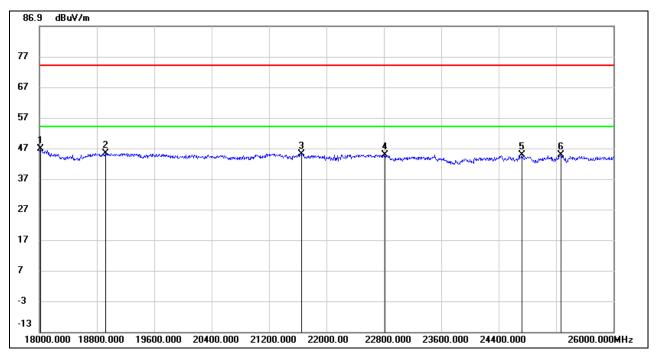
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.



SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	18016.000	50.58	-3.90	46.68	74.00	-27.32	peak
2	18920.000	50.19	-4.89	45.30	74.00	-28.70	peak
3	21656.000	50.91	-5.76	45.15	74.00	-28.85	peak
4	22816.000	50.58	-5.71	44.87	74.00	-29.13	peak
5	24720.000	46.87	-2.02	44.85	74.00	-29.15	peak
6	25272.000	46.10	-1.23	44.87	74.00	-29.13	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

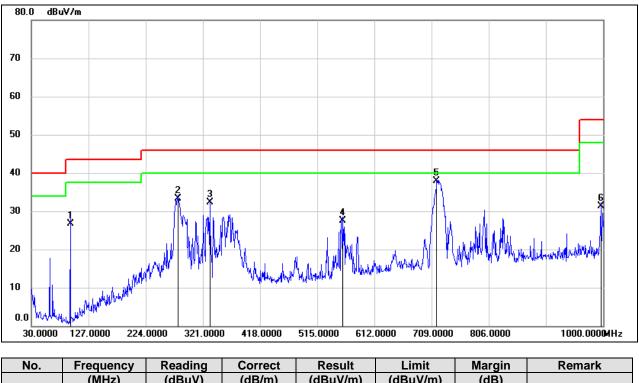
3. Peak: Peak detector.

4. The preamplifier only effect to the above 18GHz signal and no filter added to the measurement chain.

Note: All the modes have been tested, only the worst data was recorded in the report.

8.5. SPURIOUS EMISSIONS 30MHz ~ 1 GHz

8.5.1. GFSK MODE



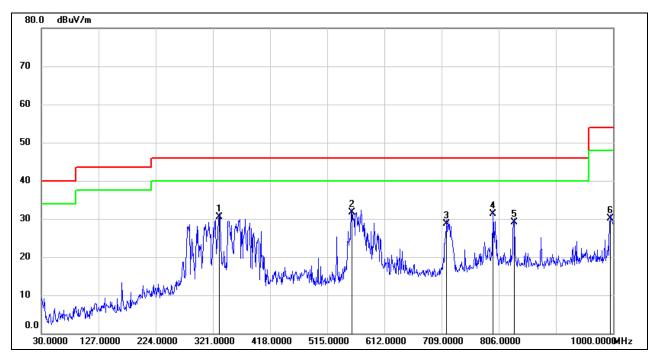
SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	95.9600	48.21	-21.56	26.65	43.50	-16.85	QP
2	279.2900	50.50	-17.21	33.29	46.00	-12.71	QP
3	332.6400	47.08	-14.86	32.22	46.00	-13.78	QP
4	558.6500	38.18	-10.66	27.52	46.00	-18.48	QP
5	717.7300	46.52	-8.56	37.96	46.00	-8.04	QP
6	996 1200	36 13	-4 77	31.36	54 00	-22 64	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss. 2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



SPURIOUS EMISSIONS (MID CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	331.6700	45.44	-14.89	30.55	46.00	-15.45	QP
2	556.7100	42.33	-10.69	31.64	46.00	-14.36	QP
3	717.7300	37.19	-8.56	28.63	46.00	-17.37	QP
4	796.3000	39.10	-7.81	31.29	46.00	-14.71	QP
5	832.1900	36.31	-7.13	29.18	46.00	-16.82	QP
6	995.1500	34.84	-4.77	30.07	54.00	-23.93	QP

Note: 1. Result Level = Read Level + Antenna Factor + Cable loss. 2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.

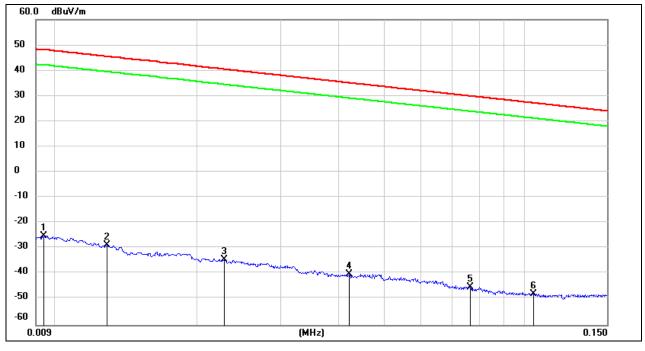
Note: All the modes have been tested, only the worst data was recorded in the report.



8.6. SPURIOUS EMISSIONS BELOW 30M

8.6.1. GFSK MODE

(MID CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)



<u>9kHz~ 150kHz</u>

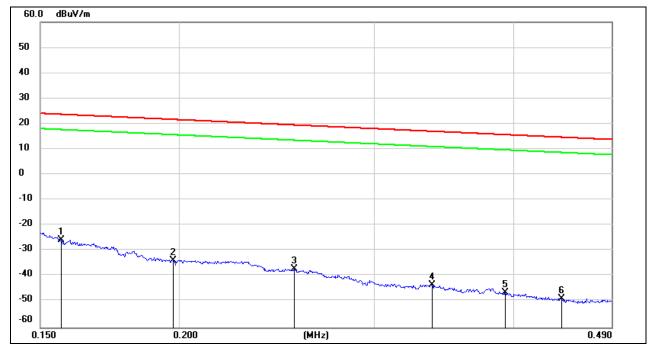
No.	Frequency	Reading	Correct	FCC Result	FCC Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.0094	76.16	-101.35	-25.19	48.05	-73.24	peak
2	0.0128	72.87	-101.38	-28.51	45.46	-73.97	peak
3	0.0228	67.08	-101.36	-34.28	40.44	-74.72	peak
4	0.0420	61.34	-101.44	-40.10	35.14	-75.24	peak
5	0.0767	56.59	-101.61	-45.02	29.91	-74.93	peak
6	0.1044	54.06	-101.78	-47.72	27.23	-74.95	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

<u>150kHz ~ 490kHz</u>



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1567	75.95	-101.65	-25.70	23.70	-49.40	peak
2	0.1975	68.08	-101.71	-33.63	21.69	-55.32	peak
3	0.2535	64.64	-101.80	-37.16	19.52	-56.68	peak
4	0.3379	58.69	-101.90	-43.21	17.03	-60.24	peak
5	0.3933	55.72	-101.96	-46.24	15.71	-61.95	peak
6	0.4420	53.33	-102.01	-48.68	14.69	-63.37	peak

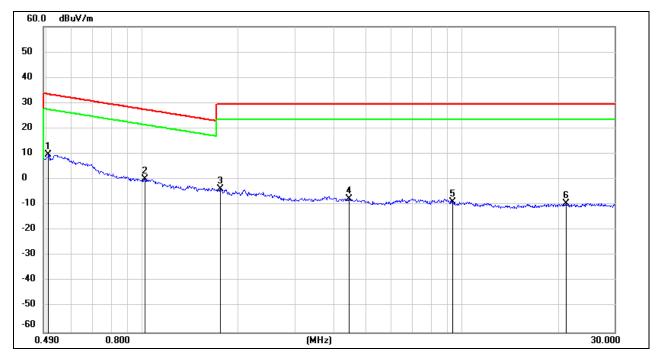
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.



<u>490kHz ~ 30MHz</u>



No.	Frequency	Reading	Correct	FCC Result	FCC Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.5080	71.85	-62.07	9.78	33.49	-23.71	peak
2	1.0212	62.49	-62.25	0.24	27.42	-27.18	peak
3	1.7580	58.08	-61.93	-3.85	29.54	-33.39	peak
4	4.4443	53.79	-61.40	-7.61	29.54	-37.15	peak
5	9.3429	52.07	-60.89	-8.82	29.54	-38.36	peak
6	21.2056	51.23	-60.74	-9.51	29.54	-39.05	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All the modes have been tested, only the worst data was recorded in the report.



9. AC POWER LINE CONDUCTED EMISSIONS

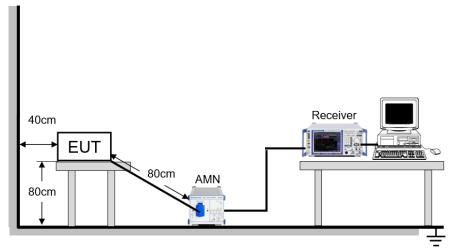
<u>LIMITS</u>

Please refer to CFR 47 FCC §15.207 (a).

FREQUENCY (MHz)	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

TEST SETUP AND PROCEDURE

Refer to ANSI C63.10-2013 clause 6.2.



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

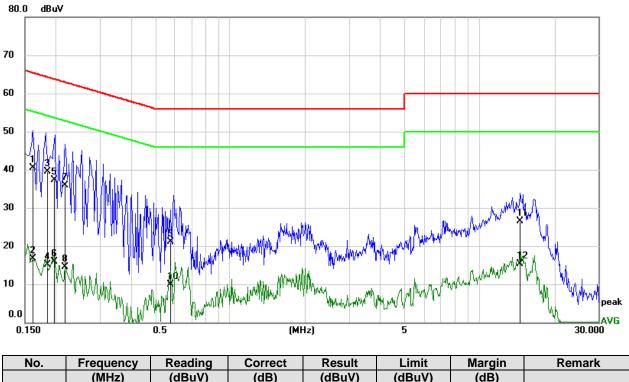
TEST ENVIRONMENT

Temperature	23.5°C	Relative Humidity	65.4%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.82V

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9.1.1. GFSK MODE



LINE L RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1619	40.44	0.01	40.45	65.37	-24.92	QP
2	0.1619	16.63	0.01	16.64	55.37	-38.73	AVG
3	0.1857	39.56	0.01	39.57	64.23	-24.66	QP
4	0.1857	15.06	0.01	15.07	54.23	-39.16	AVG
5	0.1962	37.28	0.01	37.29	63.77	-26.48	QP
6	0.1962	15.82	0.01	15.83	53.77	-37.94	AVG
7	0.2168	35.91	0.01	35.92	62.94	-27.02	QP
8	0.2168	14.57	0.01	14.58	52.94	-38.36	AVG
9	0.5769	21.12	0.01	21.13	56.00	-34.87	QP
10	0.5769	9.84	0.01	9.85	46.00	-36.15	AVG
11	14.5036	26.39	0.06	26.45	60.00	-33.55	QP
12	14.5036	15.21	0.06	15.27	50.00	-34.73	AVG

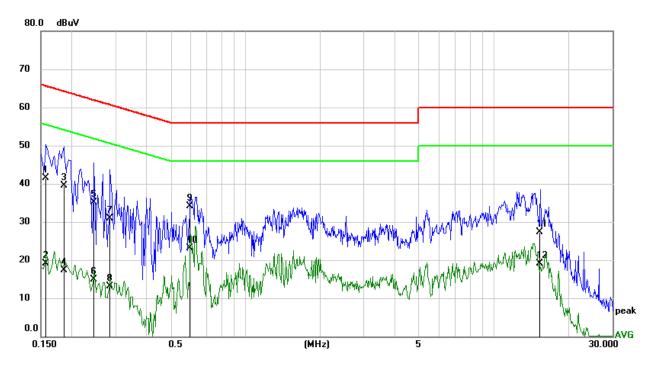
Note: 1. Result = Reading +Correct Factor.

- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz-150 kHz), 9 kHz (150 kHz-30 MHz).
- 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

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LINE N RESULTS (LOW CHANNEL, WORST-CASE CONFIGURATION)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	
1	0.1567	41.54	0.01	41.55	65.64	-24.09	QP
2	0.1567	19.15	0.01	19.16	55.64	-36.48	AVG
3	0.1845	39.47	0.01	39.48	64.28	-24.80	QP
4	0.1845	17.38	0.01	17.39	54.28	-36.89	AVG
5	0.2446	35.13	0.01	35.14	61.94	-26.80	QP
6	0.2446	14.87	0.01	14.88	51.94	-37.06	AVG
7	0.2830	30.95	0.01	30.96	60.73	-29.77	QP
8	0.2830	13.01	0.01	13.02	50.73	-37.71	AVG
9	0.5975	34.16	0.01	34.17	56.00	-21.83	QP
10	0.5975	23.12	0.01	23.13	46.00	-22.87	AVG
11	15.3118	27.31	0.06	27.37	60.00	-32.63	QP
12	15.3118	18.99	0.06	19.05	50.00	-30.95	AVG

Note: 1. Result = Reading +Correct Factor.

- 2. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.
- 3. Test setup: RBW: 200 Hz (9 kHz-150 kHz), 9 kHz (150 kHz-30 MHz).
- 4. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.

Note: All the modes have been tested, only the worst data was recorded in the report.



10. ANTENNA REQUIREMENTS

APPLICABLE REQUIREMENTS

Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RESULTS

Complies



APPENDIX A: DUTY CYCLE

Test Result

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2.884	3.751	0.769	76.90	1.14	0.35	0.5
8DPSK	2.888	3.751	0.770	77.00	1.14	0.77	1

Note:

Duty Cycle Correction Factor=10log(1/x).

Where: x is Duty Cycle (Linear)

Where: T is On Time (transmit duration)

If that calculated VBW is not available on the analyzer then the next higher value should be used.



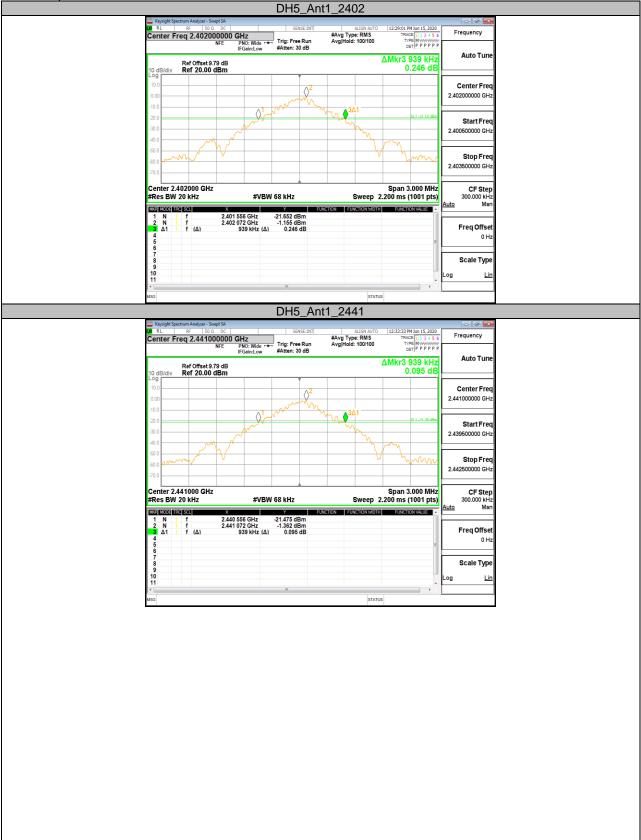
DH5_Ant1_2441	
	×
Center Freq 2.441000000 GHz Trig Delay 200.0 µs #Avg Type: RMS Trig: Video Trig: Video Trig: Video Trig: Video Del P P P P P	-
Ref Offsets 79 dB ΔMkr3 3.751 ms Auto Tu 10 dB/div Ref 20.00 dBm 10.91 dB	ine
100 000 1 301 Center FI 2.41100000 C	
-100	
400 - Stop Fr 400 - Stop Fr 2.4100000 G	
Center 2.441000000 GHz Center 2.441000000 GHz Res BW 8 MHz #VBW 8.0 MHz Sweep 10.13 ms (8000 pts)	iep IHz Ian
Like Woode Hard Soci. X Y Function	_
6 7 8 9 9	ире Lin
3DH5_Ant1_2441	
Kynight Spectrum Analyzer - Swept SA K	
Ref Offset 9.79 dB ΔMkr3 3.751 ms Auto Tu 10 dB/div Ref 20.00 dBm 5.10 dB	ine
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-20.0	
400 400 400 400 400 400 400 400	
Store Store <th< td=""><td>ep</td></th<>	ep
Store And training Store	ii-fiz iep Mitz fan
500 FUE FUE Stop Fr 600	Hz dan Hz Hz Hz Hz



Appendix A: 20dB Emission Bandwidth

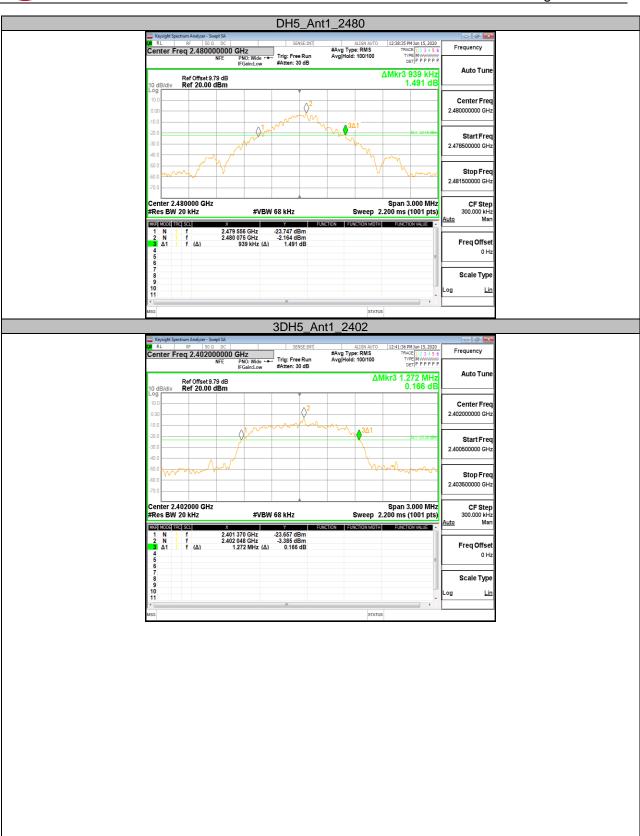
Test Mode	Antenna	Channel	20db EBW[MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.939	2401.556	2402.495		PASS
DH5	Ant1	2441	0.939	2440.556	2441.495		PASS
		2480	0.939	2479.556	2480.495		PASS
		2402	1.272	2401.370	2402.642		PASS
3DH5	Ant1	2441	1.272	2440.370	2441.642		PASS
		2480	1.260	2479.373	2480.633		PASS







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Appendix B: Occupied Channel Bandwidth

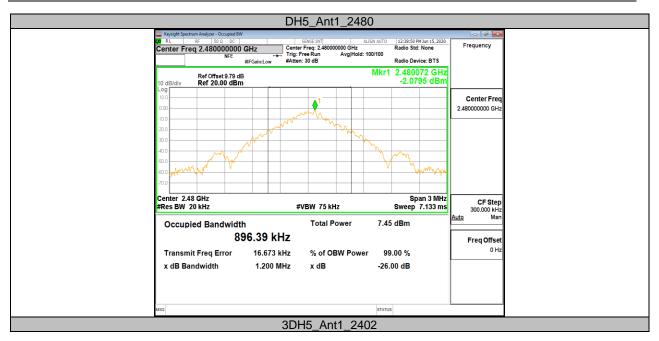
Test Mode	Antenna	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
		2402	0.88320	2401.575	2402.458		PASS
DH5	Ant1	2441	0.88203	2440.572	2441.454		PASS
		2480	0.89639	2479.568	2480.465		PASS
		2402	1.1786	2401.425	2402.604		PASS
3DH5	Ant1	2441	1.1896	2440.416	2441.605		PASS
		2480	1.1893	2479.416	2480.605		PASS

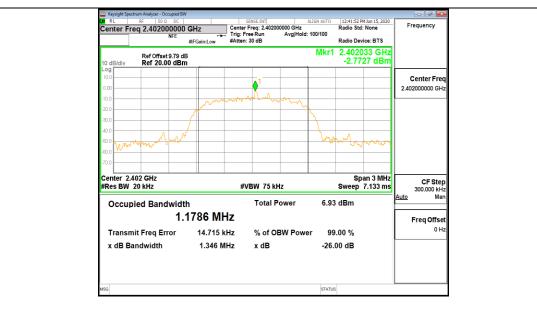






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Appendix C: Maximum conducted output power

Test Mode	Antenna	Channel	Result[dBm]	Limit[dBm]	Verdict
		2402	2.35	<=30	PASS
DH5	Ant1	2441	2.70	<=30	PASS
		2480	1.78	<=30	PASS
	Ant1	2402	2.94	<=30	PASS
3DH5		2441	3.04	<=30	PASS
		2480	2.08	<=30	PASS



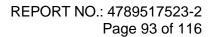
Appendix D: Carrier frequency separation

Test Mode	Antenna	Channel	Result[MHz]	Limit[MHz]	Verdict
DH5	Ant1	Нор	1.008	>=0.939	PASS
3DH5	Ant1	Нор	1.040	>=1.272	PASS

			DH5_Ar	nt1_Hop		
	Keysight Spectrum Analyzer - Swept S					- 3 -
(20	RL RF 50 Ω D nter Freq 2.4415000	C	SENSE:INT	ALIGN AUTO #Avg Type: RMS	12:52:35 PM Jun 15, 2020 TRACE 1 2 3 4 5 6	Frequency
Ce	NFE	PNO: Wide +++ IFGain:Low	Trig: Free Run #Atten: 30 dB	Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P P P P P P	
	Ref Offset 9.79 d	в		ΔΜ	kr2 1.008 MHz 0.074 dB	Auto Tune
10 Log	dB/div Ref 20.00 dBr	m			0.074 dB	
			Ĭ			Center Freq
10.	0		∆ ¹	2∆1		2.441500000 GHz
0.0		-	×			Ctort Ever
-10.		\bigvee				Start Freq 2.439500000 GHz
10.						
-20.						Stop Freq
-30.	0					2.443500000 GHz
						CF Step
-40.						400.000 kHz Auto Man
-60.						
-60.						Freq Offset
						0 Hz
-70.						Scale Type
C+-	art 2.439500 GHz				op 2.443500 GHz	
	es BW 300 kHz	#VBW	910 kHz	Sweep 2.0	00 ms (1001 pts)	
MSG				STATUS		
			3DH5_A	nt1_Hop		
	Keysight Spectrum Analyzer - Swept S	A				- 6 -
Sta	RL RF 50Ω D art Freq 2.43950000	0 GHz	SENSE:INT	#Avg Type: RMS Avg Hold: 100/100	01:03:11 PM Jun 15, 2020 TRACE 1 2 3 4 5 6 TYPE M WWWWW	Frequency
	NFE	PNO: Wide ↔ IFGain:Low	#Atten: 30 dB		DET P P P P P P	Auto Tune
40	Ref Offset 9.79 d dB/div Ref 20.00 dBr	B		ΔΜ	kr1 1.040 MHz 0.505 dB	Auto Tulle
Log			Y			
10.	0					Center Freq 2.441500000 GHz
	0	1∆2				
0.0		What what when when when when when when when when	and an and a second second	alther and a factor of the second sec	Parking and a second second	Start Freq
-10.	0					2.439500000 GHz
-20.						Stop Erog
						Stop Freq 2.443500000 GHz
-30.	0					
-30.						CF Step
-40.	0					
	0					CF Step 400.000 kHz Auto Man
-40.	0					CF Step 400.000 kHz
-40.	0					CF Step 400.000 kHz <u>Auto</u> Man Freq Offset
-40. -50.	0					CF Step 400.000 kHz <u>Auto</u> Man Freq Offset
40. 60. 70. Sta	a				op 2.443500 GHz	CF Step 400.000 HHz Auto Man Freq Offset 0 Hz Scale Type
40. 60. 70. Sta	1	#vBw	910 kHz	Streep 2.0		CF Step 400.000 HHz Auto Man Freq Offset 0 Hz Scale Type

Appendix E: Time of occupancy

Test Mode	Antenna	Channel	BurstWidth [ms]	TotalHops [Num]	Result[s]	Limit[s]	Verdict
DH1	Ant1	Нор	0.38	330	0.125	<=0.4	PASS
DH3	Ant1	Нор	1.64	170	0.278	<=0.4	PASS
DH5	Ant1	Нор	2.88	80	0.231	<=0.4	PASS
3DH1	Ant1	Нор	0.39	330	0.127	<=0.4	PASS
3DH3	Ant1	Нор	1.63	180	0.294	<=0.4	PASS
3DH5	Ant1	Нор	2.89	130	0.375	<=0.4	PASS

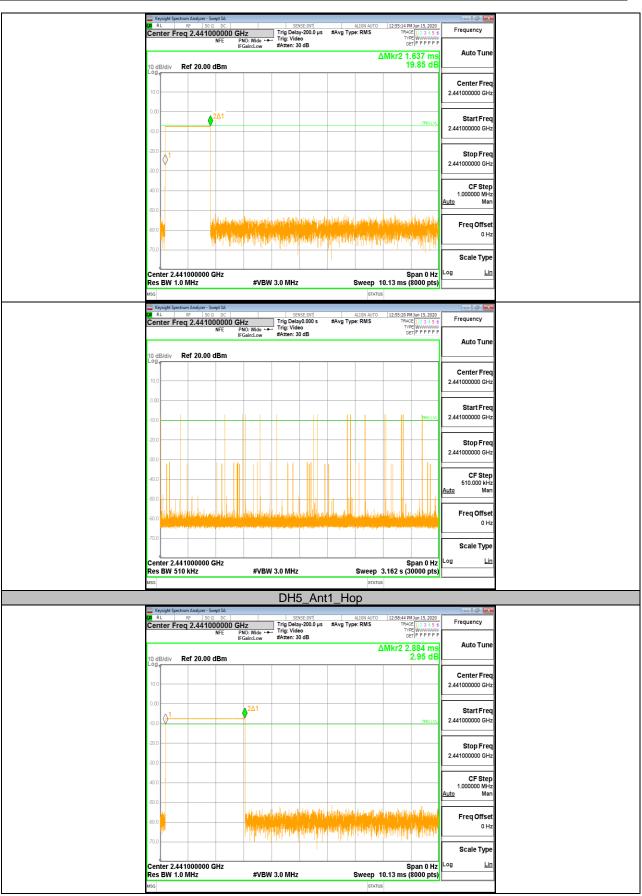




DH1_Ant1_Hop	
👞 Keysight Spectrum Analyzer - Swept SA	
M K 6F 190.0 DC SENSE:NT ALIGN AUTO 12:54:22 PM is 5,202.0 Frequency Center Freq 2.44100000 GHz Trig Delay 200.0 µs #Avg Type: RMS Trik Cell 1:3:53 Frequency NFE PND: Wide Trig Video ort P P P P Frequency Federation #Avg Type: RMS Trik 200.0 µs #Avg Type: RMS Trik 200.0 µs	
ΔMkr2 378.9 μs Auto Tune	
10 dB/div Ref 20.00 dBm 4.76 dB	
10.0 Center Freq 2.41000000 GHz	
0.00 TROLING Start Freq	
.10.0 2.441000000 GHz	
300 Stop Freq 2.4100000 GHz	
40.0 CF Step 1.00000 MHz	
600 400 Man	
 Alter and Department of the interview of the	
Scale Type	
Center 2.441000000 GHz Span 0 Hz Log Lin Res BW 1.0 MHz #VBW 3.0 MHz Sweep 15.46 ms (8000 pts)	
MSG STATUS	
 usg stratus	
 NSG STATUS	
 MSG STATUS Spectrum Analyzer - Swept SA (日本) 12,54:29 PM Jun 15,2020	
 Inscience status Inscience Inscience	
 NSG STATUS If Resignt Spectrum Analyzer - Swept SA SENSE::NIT ALIGN AUTO 12:55:29 PM Jan 15,2020 If RL RF 30 0.0 Center Freq 2.4410000000 GHz Trig Delay0.000 s #Avg Type::RMS Trivce[]: 3:4:5:6 Frequency NFE PNC: Wide → Trig: Video Trig: Video Trig: Video Trig: Video Trivce[]: WWWWWW DeT [P P P P P Auto Tune 10 dB/div Ref 20.00 dBm Auto Tune Auto Tune Auto Tune	
Inscription True Inscription Keysight Spectrum Analyzer - Swept SA Image: Spectr	
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Intrus Intrus Intrus Center Freq 2.441000000 GHz Trig Delsy0.00 s ME PNC: Wide + Trig Video addition of the second of the sec	
Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscience Inscince Inscience Inscience	
Intrus Intrus Registria Section Autor Number - Swept SA Center Freq 2.441000000 GHz Trig Delay0.00 s #Avg Type: RMS TRUE [1: 3.4.5 for the presence of the	

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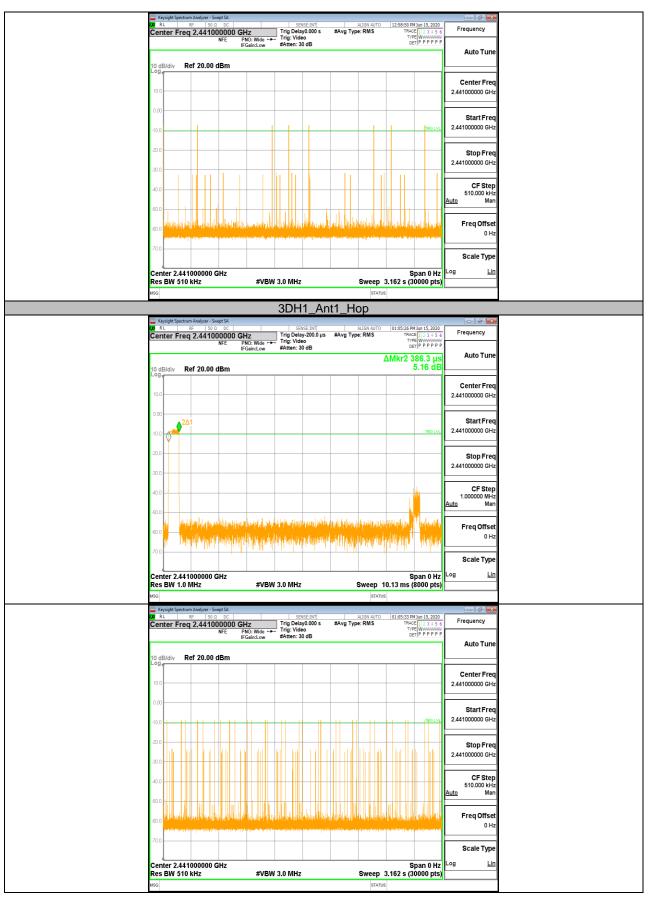




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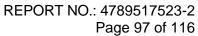


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3DH3_Ant1_Hop Center Freq 2.441000000 GHz NFE FIND: Wide - Trip Delay-2000 μs ALION MUTO Center Freq 2.441000000 GHz Trip Delay-2000 μs Frequency 0 dbldiv Ref 20.00 dBm Center Freq 2.441000000 GHz Trip Delay-2000 μs Trip Delay-2000 μs ALION MUTO Center Freq 2.441000000 GHz Trip Delay-2000 μs Trip Delay-2000 μs Center Freq 2.44100000 GHz Trip Delay-2000 μs Autor Tune 10 dbldiv Ref 20.00 dBm Center Freq 2.441000000 GHz 10 0 Trip Delay-2000 μs Autor Tune 10 Center Freq 2.441000000 GHz 10 Trip Delay-201 Trip Delay-201 10 Trip Delay-201 <
M N F S = 00 C S = S = 00 S = S = 00 F = C = 00
ΔMkr2 1.632 ms 0.24 dB 0.24 dB 0.00 dBm 0.24 dB 0.00 GHz 2.44100000 GHz 2.44100000 GHz 2.44100000 GHz 2.44100000 GHz
Center Freq 2.44100000 GHz 0.000 0.00
1 start Freq
-10.0 5 10.0 10.0 10.0 10.0 10.0 10.0 10.
-20.0
-0.0 CF Step 1.00000 MHz Auto
Center 2.441000000 GHz Res BW 1.0 MHz #VBW 3.0 MHz Sweep 25.06 ms (8000 pts) MSG STATUS
🔤 Keysight Spectrum Analyzer - Swept SA 💦 🕞 🥵
DI RL RF ISO 0. ISOBERIUT ALIGN AUTO 01198-5567M Jun 15,2020 Frequency Center Freq 2.441000000 GHz Trig Delay0.000 s #Avg Type: RMS TRACE 12.3 + 5.6 Frequency NFE PNO: Wide +
10 dB/div Ref 20.00 dBm
10.0 Center Freq 10.0 2.44100000 GHz
0.00 Start Freq
-100 1900/06Hz
-20.0 Stop Freq
300 StopFreq 2.44100000 GHz
300
300 400
300 2.44100000 GHz 400 CF Step 510.000 Hz 400 Freq Offset
300 2.441000000 GHz 400 2.44100000 GHz 500 510.000 KHz 400 400 500 FreqOffset 700 900



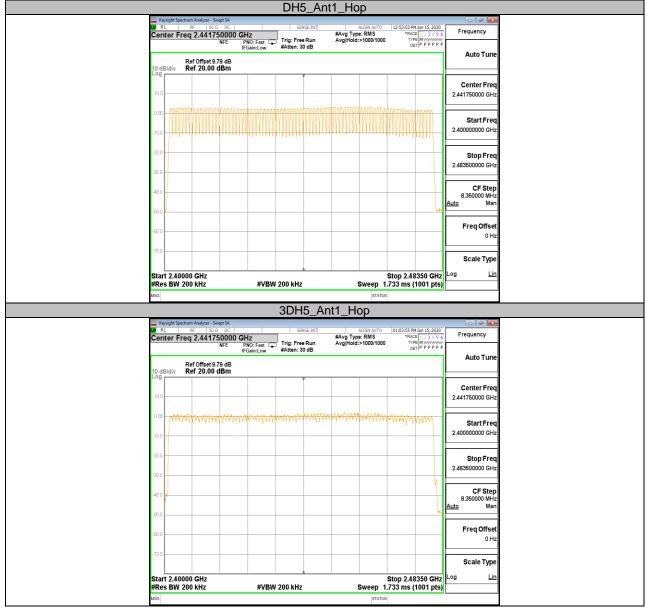


	_				_								
Ke		ctrum Analyze	r - Swept SA 50 Ω DC			52	NSE:INT		ALIGN AUTO	01:04:12 P	M Jun 15, 2020	- 6 💌	4
			1000000 NFE	PNO: Wi	de 🔸	Trig Dela	y-200.0 µs eo	#Avg Typ	e: RMS	TRAC	CE 1 2 3 4 5 6 PE WWWWW ET P P P P P P	Frequency	
_				IFGain:L	DW	#Atten: 3	0 dB				.888 ms	Auto Tune	
10 di Log	B/div	Ref 20.	00 dBm								4.94 dB		
3												Center Freq	
10.0		_										2.441000000 GHz	
0.00													
				24	1						TRIG LVL	Start Freq 2.441000000 GHz	
-10.0	Ŷ										100 212	2.44100000 0.12	
-20.0	<u> </u>											Stop Freq	
-30.0												2.441000000 GHz	
-30.0													
-40.0	⊬											CF Step 1.000000 MHz	
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1					with.	1 July 1	heldly	ha luna sele	allibriu	والالالالالية	Nd hu halitan	Freq Offset	
-60.0				link		hiliw	halldhaut		(Kulapa)u			0 Hz	
-70.0				- Inter	h n shi	իսիսի	o no de	den de la	and ha	ուտի	te de todate d		
												Scale Type	
Cen	ter 2.4	410000	00 GHz							5	ipan 0 Hz	Log <u>Lin</u>	
Res	BW 1	.0 MHz		77	ARM	3.0 MHz			SWeep 1		8000 pts)		J
	and the Court	ctrum Analyze	· Count Ch									- 8 X	
(XI R	L	RF	50 Ω DC				NSE:INT	40 m T	ALIGN AUTO	01:04:18 P	MJun 15, 2020	Frequency	
Cen	iter Fi	req 2.44	1000000 NFE	PNO: Wi IFGain:L	de 🔸	Trig Dela Trig: Vid #Atten: 3	0	#Avg Typ	e. Rivia	TYI	DE 1 2 3 4 5 6 PE WWWWWWW ET P P P P P P		
				IFGain:L	ow	wattern o	0 00					Auto Tune	
10 di Log,	Bídiv	Ref 20.	00 dBm										
	1											Center Freq	
10.0												2.441000000 GHz	
0.00													
												Start Freq 2.441000000 GHz	
-10.0											TRIGLVL	2.44 100000 GHZ	
-20.0	<u> </u>				_	_						Stop Freq	
								h 11	l n l i	1 11		2.441000000 GHz	
-30.0													
-40.0												CF Step 510.000 kHz	
-50.0												<u>Auto</u> Man	
55.0						د و و و	$\ \ _{\mu} \ $				41.65	Freq Offset	
-60.0	THE PARTY	n ti Nav Mar	MANDAL TT	RANA MANANA Manana manana	alut la fi	n in dinda fa	N SPANNAL P	and the other is	nadal ana alifa la	an dindalari	orials we fill de	0 Hz	
-70.0			- Sector design	1	and prove		Cold Carlos		an an India	10 million 10 million	The second second		
												Scale Type	
Cen	ter 2.4	410000	00 GHz						.	5		Log <u>Lin</u>	4
Res	BW 5	10 kHz		#	VBW	3.0 MHz			Sweep :	<u> </u>	0000 pts)		1
									0.000	1			1

Appendix F: Number of hopping channels

Test Mode	Antenna	Channel	Result[Num]	Limit[Num]	Verdict
DH5	Ant1	Нор	79	>=15	PASS
3DH5	Ant1	Нор	79	>=15	PASS



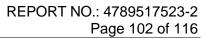


Appendix G: Band edge measurements

Test Mode	Antenna	ChName	Channel	Verdict
		Low	2402	PASS
DH5	Ant1	High	2480	PASS
DIIS	Anti	Low	Hop_2402	PASS
		High	Hop_2480	PASS
		Low	2402	PASS
3DH5	A n+1	High	2480	PASS
3003	Ant1	Low	Hop_2402	PASS
		High	Hop_2480	PASS

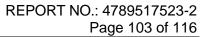


	DH5_Ant1_	Low_2402		
	um Analyzer - Swept SA			
	RF 50 Ω DC SENSE:INT q 2.352500000 GHz	ALIGN AUTO 12:29:32 PM Jun 15, 2020 #Avg Type: RMS TRACE 1 2 3 4 5 6 AvgIHold: 300/300 TYPE M	Frequency	
	NFE PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Hold: 300/300 TYPE M		
		Mkr5 2.360 480 GHz	Auto Tune	
10 dB/div	Ref Offset 9.79 dB Ref 20.00 dBm	-50.924 dBm		
Log				
10.0			Center Freq	
0.00		l l l l l l l l l l l l l l l l l l l	2.352500000 GHz	
-10.0		DL1 -17.59 dBm		
-20.0			Start Freq	
-30.0			2.30000000 GHz	
-40.0	A4	5 3 2		
	where and the general well and an and the second	the herean and here and the and the second	Stop Freq	
-60.0			2.405000000 GHz	
-70.0				
Start 2.3000		Stop 2.40500 GHz	CF Step	
#Res BW 10		Sweep 3.867 ms (1001 pts)	10.500000 MHz <u>Auto</u> Man	
NKR MODE TRC 1 N 1	SCL X Y FU f 2.402 165 GHz 2.411 dBm	NCTION FUNCTION WIDTH FUNCTION VALUE		
2 N 1	f 2.400 000 GHz -53.471 dBm		Freq Offset	
2 N 1 3 N 1 4 N 1	f 2.390 000 GHz -53.975 dBm f 2.310 000 GHz -53.849 dBm		0 Hz	
<mark>5</mark> N 1 6	f 2.360 480 GHz -50.924 dBm			
7 8			Scale Type	
9				
10 11		-	Log <u>Lin</u>	
	#	STATUS		
MSG				
		High_2480		
	um Analyzer - Swept SA RF 50 Ω DC SENSE:INT	ALIGN AUTO 12:39:04 PM Jun 15, 2020		
	q 2.510000000 GHz	#Avg Type: RMS TRACE 1 2 3 4 5 6	Frequency	
	NFE PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Hold: 300/300 TYPE MWWWW DET P P P P P		
	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz	Auto Tune	
10 dB/div	NFL PNC: Fast Agencies and B IFGain:Low #Atten: 30 dB Ref 20.00 dBm	DETPPPPP	Auto Tune	
10 dBldiv Log	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz		
10 dB/div Log 10.0	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz	Center Freq	
10 dB/div Log	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz		
10 dB/d/v Log 10.0	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz	Center Freq 2.51000000 GHz	
10 dB1div Log 10 0 	IFGain:Low #Atten: 30 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz Start Freq	
10 dB1div 10 0 	IFGainLow #Atten: 30 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz	
10 dBldiv 10 0 	IFGainLow #Atten: 30 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz	
10 dB1div Log 10 0 -10 0 -10 0 -30 0 -40 0 -40 0	IFGainLow #Atten: 30 dB Ref Offset 9.75 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq	
10 0 10 0	IFGainLow #Atten: 30 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz	
10.0	IF GainLow #Atten: 30 dB	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.510000000 GHz Start Freq 2.470000000 GHz Stop Freq 2.55000000 GHz	
10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Image: Comparison of the set	Mkr4 2.488 24 GHz -50.674 dBm	Start Freq 2.510000000 GHz Start Freq 2.470000000 GHz Stop Freq 2.550000000 GHz CF Step 8.000000 MHz	
10 dt3/dt/ 10 0 10 0	IF Gain-Low #Atten: 30 dB Ref Offsets 575 dB Ref 20.00 dBm	Mkr4 2.488 24 GHz -50.674 dBm	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step	
10 dEX/d/v 10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5 75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step CF Step Auto Man	
10 dts/dv 10 d 10 d 1	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Start Freq 2.50000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset	
10 dt3(d) 10 0 10 0 1	IF Gain Low #Atten: 30 dB Ref Offset 5.75 dB Ref 20.00 dBm 1 1 <th>Configuration of the second se</th> <th>Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step CF Step Auto Man</th> <th></th>	Configuration of the second se	Center Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step CF Step Auto Man	
10 dt3/div 10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Start Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz	
10 dt3/div 10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Start Freq 2.50000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset	
10 dEX/d/v 10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Start Freq 2.51000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.000000 MHz Auto Man Freq Offset 0 Hz	
10 dt3/div 10 0 10 0	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Configuration of the second se	Center Freq 2.510000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz Scale Type	
10 dB/d/v 10 0 10 0 1	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Operation Operation <t< td=""><td>Center Freq 2.510000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz Scale Type</td><td></td></t<>	Center Freq 2.510000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz Scale Type	
10 dBJd/v 10 d 11 h 12 h 13 h 10 d 11 h 12 h 13 h 10 d 11 d 11 d 12 h 13 h 14 d 15 d 16 d 17 d 18 d 19 d 10 d 11 d	IFGainLow #Atten: 30 dB Sef Offset 5.75 dB Ref 20.00 dBm 1 1	Bit of the second sec	Center Freq 2.510000000 GHz Start Freq 2.47000000 GHz Stop Freq 2.55000000 GHz CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz Scale Type	



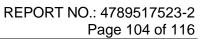




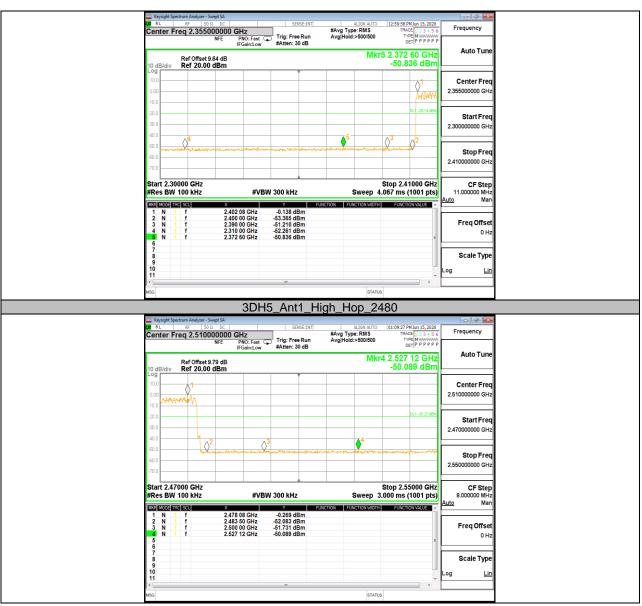












Appendix H: Conducted Spurious Emission

Test Mode	Antenna	Channel	Free-range [MHz]	Verdict
			Reference	PASS
		2402	30~1000	PASS
			1000~26500	PASS
			Reference	PASS
DH5	Ant1	2441	30~1000	PASS
			1000~26500	PASS
			Reference	PASS
		2480	30~1000	PASS
			1000~26500	PASS
			Reference	PASS
		2402	30~1000	PASS
			1000~26500	PASS
			Reference	PASS
3DH5	Ant1	2441	30~1000	PASS
			1000~26500	PASS
			Reference	PASS
		2480	30~1000	PASS
			1000~26500	PASS

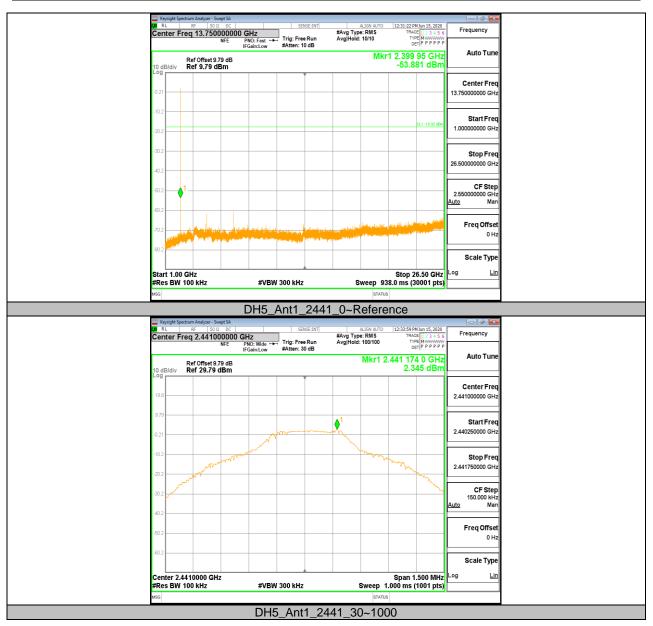


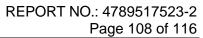
		DH5_Ant1_240	2_0~Reference		
Key	ysight Spectrum Analyzer - Swept SA				
Ceni	L RF 50 Ω DC ter Freq 2.402000000	SENSE:INT	ALIGN AUTO 12:30:54 PM Jun 15, 2020 #Avg Type: RMS TRACE 1 2 3 4 5 6	Frequency	
	NFE	PNO: Wide +++ Trig: Free Run IFGain:Low #Atten: 30 dB	Avg Hold: 100/100 TYPE MWWWWW DET P P P P P		
		iroam:Low #Atten. 30 db	Mkr1 2.402 003 0 GHz	Auto Tune	
10 dE	Ref Offset 9.79 dB Bidiv Ref 29.79 dBm		2.002 dBm		
Log		Y			
				Center Freq	
19.8				2.402000000 GHz	
0.70					
9.79 -		1		Start Freq	
-0.21			mm	2.401250000 GHz	
0.41		~~~~ · · · ·	m la		
-10.2		www.w.		Stop Freq	
	and water and a		Maria	2.402750000 GHz	
-20.2 -	- day at		· · · · · · · · · · · · · · · · · · ·		
	- Anna		Vorte	CF Step	
-30.2 -			10	150.000 kHz	
				<u>Auto</u> Man	
-40.2 -					
-50.2				Freq Offset	
-50.2				0 Hz	
-60.2					
				Scale Type	
				Log <u>Lin</u>	
	ter 2.4020000 GHz s BW 100 kHz	#VBW 300 kHz	Span 1.500 MHz Sweep 1.000 ms (1001 pts)		
WKG3	S DW TOO KITZ	#VDVV 300 KHZ	status		
NOC					
		DH5_Ant1_24	102_30~1000		
Key	ysight Spectrum Analyzer - Swept SA	erver auf			
		MHz SENSE:INT	ALIGN AUTO 12:30:59 PM Jun 15, 2020 #Avg Type: RMS TRACE 1 2 3 4 5 6	Frequency	
	ter Freq 515.000000	MHz PNO: Fast +++ Trig: Free Run	ALIGN AUTO 12:30:59 PM Jun 15,2020 #Avg Type: RMS TRACE 2:34 5 6 Avg Hold: 10/10 TYPE WWWWW DET P P P P P P	Frequency	
	ter Freq 515.000000 NFE	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS TRACE 1 2 3 4 5 6 Avg Hold: 10/10 TYPE M	Frequency Auto Tune	
Cen	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	Aug Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm		
	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 TYPE M WWWWW DET P P P P P P Mkr1 880.24 MHz	Auto Tune	
Cen 10 dE Log	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 TYPE M WWWWW DET P P P P P P Mkr1 880.24 MHz	Auto Tune Center Freq	
Ceni 10 dE	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 TYPE M WWWWW DET P P P P P P Mkr1 880.24 MHz	Auto Tune	
Cen 10 dE 10 d 0.21	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 TYPE M WWWWW DET P P P P P P Mkr1 880.24 MHz	Auto Tune Center Freq	
Cen 10 dE Log	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq	
Cen 10 dE 10 d 0.21	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 TYPE M WWWWW DET P P P P P P Mkr1 880.24 MHz	Auto Tune Center Freq 515.00000 MHz	
Cen 10 de 4021 -10 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq	
Cen 10 de 4021 -10 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz	
Cen 10 df -0.21 -10.2 -20.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq	
Cen 10 df -0.21 -10.2 -20.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz	
Cen 10 df -0.21 -10 2 -30 2 -30 2 -40 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.0000000 GHz	
Cen 10.gt -0.21 -10.2 -20.2 -30.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz OF Step 97.000000 MHz	
Cen 10.gt -0.21 -10.2 -30.2 -40.2 -50.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz CF Step	
Cen 10 df -0.21 -10 2 -30 2 -30 2 -40 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz S7.000000 MHz	
Cen 10 df - 0.21 - 10 2 - 30 2 - 40 2 - 60 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB	MHz PNO: Fast +++ Trig: Free Run	#Avg Type: RMS Avg Hold: 10/10 Mkr1 880.24 MHz -72.588 dBm	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz S7.000000 MHz	
Cen 10.gt -0.21 -10.2 -30.2 -40.2 -50.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz Trig: Free Run PRO: Fast Trig: Free Run IFGaintLow #Atten: 10 dB	#Avgilledid: 1010	Auto Tune Center Freq 515.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz CF Step 97.00000 MHz	
Cen 10.df -0.21 -10.2 -30.2 -30.2 -40.2 -50.2 -50.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz Trig: Free Run PRO: Fast	#Avgilloid: 1010 TRACE 13.34 5 Mygilloid: 1010 Mkr1 88.248 Mkr2 88.248 Mkr1 88.248 Mkr2 88.248 Mkr2 88.248 Image: State S	Start Freq 30.00000 MHz Start Freq 30.00000 MHz Stop Freq 1.00000000 GHz CF Step 97.00000 MHz Man Freq Offset	
Cen 10 df - 0.21 - 10 2 - 30 2 - 40 2 - 60 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz Trig: Free Run PRO: Fast	#Avgilloid: 1010 TRACE 13.34 5 Mygilloid: 1010 Mkr1 88.248 Mkr2 88.248 Mkr1 88.248 Mkr2 88.248 Mkr2 88.248 Image: State S	Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.000000000 GHz CF Step 97.000000 MHz Man Freq Offset 0 Hz	
Cen 10 df -0.21 -10 2 -30 2 -30 2 -40 2 -50 2 -50 2 -70.2 -80 2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz Trig: Free Run PRO: Fast	#Avgilloid: 1010 TRUCE III 324 56 TRUCE III 32	Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.00000000 GHz OF Step 97.000000 MHz Man Freq Offset 0 Hz Scale Type	
Cen 10.gf 4.21 -10.2 -20.2 -30.2 -40.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz PRO: Fast	#Avgilloid: 1010 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE TRACE TRACE 13.4 5 6 TRACE TRACE	Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.000000000 GHz CF Step 97.000000 MHz Man Freq Offset 0 Hz	
Cen 10.df 10.df -0.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz Trig: Free Run PRO: Fast	#Avgilloid: 1010 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 14.5 7 TRACE 14.5 7 T	Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.00000000 GHz OF Step 97.000000 MHz Man Freq Offset 0 Hz Scale Type	
Cen 10.gf 4.21 -10.2 -20.2 -30.2 -40.2	ter Freq 515.000000 NFE Ref Offset 9.79 dB Ref 9.79 dB I I I I I I I I I I I I I I I I I I I	MHz PRO: Fast	#Avgilloid: 1010 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE 13.4 5 6 TRACE TRACE TRACE 13.4 5 6 TRACE TRACE	Auto Tune Center Freq 515.000000 MHz Start Freq 30.000000 MHz Stop Freq 1.00000000 GHz OF Step 97.000000 MHz Man Freq Offset 0 Hz Scale Type	

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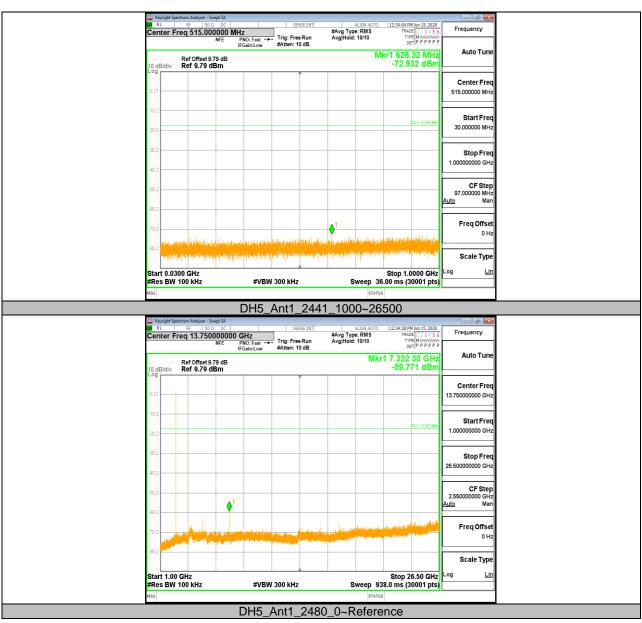


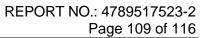
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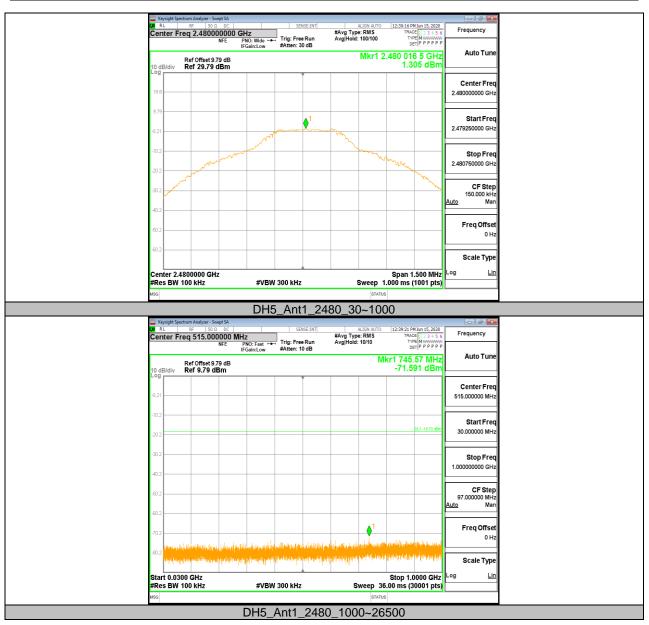


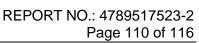




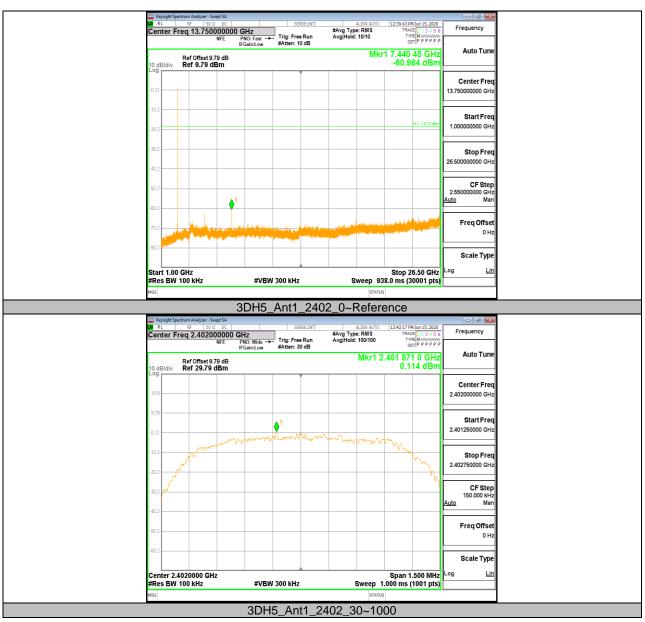


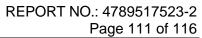




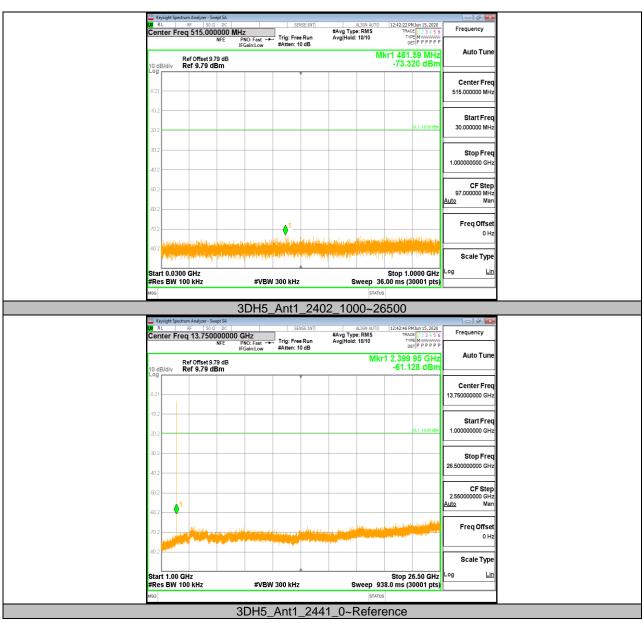






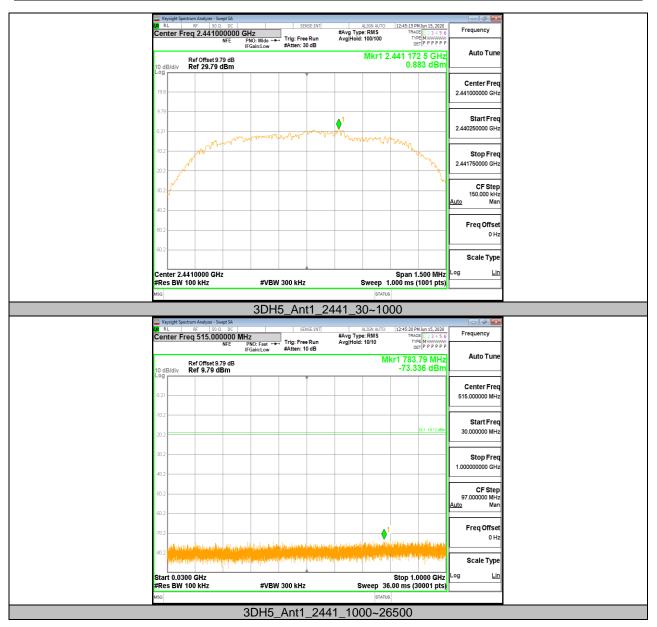


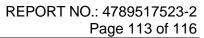




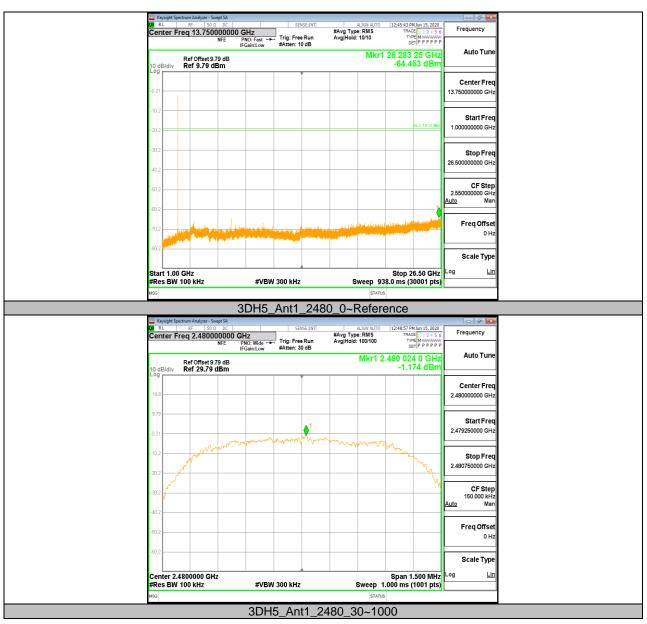


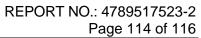
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www.cearstantering	Spectrum Analyzer - Sw						- 8 ×	
LXI RL	RF 50 Ω	DC	SENSE:	NT	ALIGN AUTO	12:49:02 PM Jun 15, 2020	-	
Center	Freq 515.000	0000 MHz	Trin Fr. C	#Avg Typ	be: RMS	TRACE 1 2 3 4 5 TYPE MWWWW DET P P P P P	6 Frequency	
		NFE PNO: Fa IFGain:Lo	Trig: Free Ru		. 10/10	DET P P P P P	P	
		IFGain:Lo	w #Atten. 10 dt					
	Ref Offset 9.7	79 dB			Mk	r1 743.56 MH		
10 dB/div	Ref 9.79 dl	Bm				-72.647 dBn		
Log								
							Center Freq	
-0.21							515.000000 MHz	
-0.21							515.000000 MHZ	
-10.2								
							Start Freq	
-20.2						0L1-21.17 (Br	30.000000 MHz	
-20.2								
-30.2							Stop Freq	
							1.000000000 GHz	
-40.2								
							-	
-50.2							CF Step	
							97.000000 MHz	
							<u>Auto</u> Man	
-60.2								
							5	
-70.2							Freq Offset	
					1 H	will be to be a set of	0 Hz	
() Market ()	وتدهدا أأذاذ فأداده والمقر	وملاجا الموازان الاتفاط ال	penderseland	والتعارضه والتزعة بالتز	and the last of	and drive and delet		
-80.2				a transminula	والتعمد مريذا	ر السيدين القاطأ الأنباط في مثلاً بالدفاء		
144	libe and a state print	a ta	ond an attack	and a full of a second	a de la companya de l	and the second second	Scale Type	
	0300 GHz					Stop 1.0000 GHz	Log <u>Lin</u>	
#Res Bi	W 100 kHz	#	VBW 300 kHz		weep 36.	00 ms (30001 pts)	
MSG					STATUS			
		3DF	l5_Ant1_2	2480_10	00~26	500		
Verite	Seastown Analyzer C						- 3 -	
RL RL	Spectrum Analyzer - Sw RF 50 Ω	DC	SENSE:	ITI	ALIGN AUTO	12:49:25 PM Jun 15, 2020		
	Freq 13.7500	000000 GHz		#Ava Tva	e: RMS	TRACE 1 2 3 4 5	Frequency	
		NFE PNO: Fa	t Trig: Free Ru	in Avg Hold	i: 10/10	TRACE 1 2 3 4 5 TYPE M WWWW DET P P P P P	P	
		IFGain:Lo	#Atten: 10 dE	,				
	Ref Offset 9.7	79 dB			Mkr1	25.586 25 GH	4 1	
10 dB/div		Bm				-64.371 dBn		
Log			Y.					
							Center Freq	
-0.21								
-0.21							Center Freq 13.75000000 GHz	
-0.21							13.750000000 GHz	
							13.750000000 GHz	
-10.2						DL1-21-17 of	13.750000000 GHz	
						DL1-21.12 dB	13.750000000 GHz	
-10.2						DL1-21.17 cBr	13.750000000 GHz	
-10.2						DL1-2117-69	13.750000000 GHz Start Freq 1.00000000 GHz	
-10.2						D.1.2117 46	13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq	
-10.2 -20.2 -30.2						0.1 -21 -17 -09	13.750000000 GHz Start Freq 1.00000000 GHz	
-10.2						D(1-21-37-69	13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq	
-10.2 -20.2 -30.2						D(1-2117 dB	13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz	
-10.2 -20.2 -30.2						0.1-21-37 db	13.750000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step	
-10.2						1.1.21.27.45	13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz	
-10.2						<u></u>	13.750000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step	
-10.2							13.75000000 GHz Start Freq 1.00000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz	
-10.2						<u></u>	13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz Auto	
-10.2							13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz Auto Man Freq Offset	
-10.2							13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz Auto	
-10.2							13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz Auto Man Freq Offset	
-10.2							13.750000000 GHz Start Freq 1.00000000 GHz 26.5000000 GHz 2.55000000 GHz Auto Freq Offset 0 Hz	
-10.2							13.750000000 GHz Start Freq 1.000000000 GHz Stop Freq 26.50000000 GHz CF Step 2.550000000 GHz Auto Man Freq Offset	
-10.2 -30.2 -40.2 -60.2 -70.2 -80.2							13.750000000 GHz Start Freq 1.00000000 GHz 26.5000000 GHz 25.5000000 GHz 2.55000000 GHz Auto Freq Offset 0 Hz Scale Type	
-10.2						Stop 26.50 GHz	13.750000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz 26.50000000 GHz 255000000 GHz Auto Freq Offset 0 Hz Scale Type Log Lin	
-10.2	00 GHz W 100 kHz		VBW 300 kHz		Sweep 938		13.750000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz 26.50000000 GHz 255000000 GHz Auto Freq Offset 0 Hz Scale Type Log Lin	
-10.2			VBW 300 KHz			Stop 26.50 GHz	13.750000000 GHz Start Freq 1.00000000 GHz 26.50000000 GHz 26.50000000 GHz 255000000 GHz Auto Freq Offset 0 Hz Scale Type Log Lin	



Appendix I: Duty Cycle

Test Result

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final setting For VBW (kHz)
GFSK	2.884	3.751	0.769	76.9%	1.14	0.35	0.36
8DPSK	2.888	3.751	0.770	77.0%	1.14	0.35	0.36

Note:

Duty Cycle Correction Factor= $10\log(1/x)$. Where: x is Duty Cycle (Linear) Where: T is On Time (transmit duration)

If that calculated VBW is not available on the analyzer then the next higher value should be used.



DH5_Ant1_2441	
Keysight Spectrum Analyzer - Swept SA	
ML RF ISOL DEFINEENT ALIGN AUTO 12:33:08 PM/Aut 5, 202 Center Freq 2.441000000 GHz Trip Delay-2000 µs #Avg Type: RMS TRACE[1:3:3 TRACE[1:3:3:4 NFE PN0: Fest Trig: Video Trig: Video Trig: Video Trig: Video	6 Frequency
IFGaint.ow #Atten: 30 dB Det(PPPP) Ref Offset 9.79 dB ΔMkr3 3.751 ms	Auto Tune
	Center Freq
	Start Freq 2.441000000 GHz
	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Span 0 H: Res BW 8 MHz #VBW 8.0 MHz Sweep 10.13 ms (8000 pts	8.000000 MHz
INCREMENDENTING X Y FUNCTION FUNCTION WOTH FUN	Auto Man Freq Offset
4 5 6 7	e 0 Hz
8 9 10 11	Log Lin
۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰	
3DH5_Ant1_2441	
Keylight Spectrum Analyzer - Swept SA	
Mar RL RF S0 Ω DC SEISE:INT ALIGN AUTO 12:44:23 PM Jun 15, 202 Center Freq 2.441000000 GHz Trig Delay-200.0 µs #Avg Type: RMS TRACE[]: 3 + 5	6 Frequency
IFGainLow #Atten: 30 dB DET[PPPP	P
Ref 0ffset 9.79 dB △Mkr3 3.751 m 10 dB/div Ref 20.00 dBm 5.10 dB	51
	Center Freq 2.441000000 GHz
	Start Freq 2.441000000 GHz
-50.0 -60.0 -70.0	Stop Freq 2.441000000 GHz
Center 2.441000000 GHz Span 0 Hz Res BW 8 MHz #VBW 8.0 MHz Sweep 10.13 ms (8000 pts UMR INDE TRC[SEL] X Y Function Notify Function Notify	
1 N 1 t 2.176 ms -5.51 dBm 2 Δ1 1 t (Δ) 2.888 ms (Δ) 6.31 dB	Freq Offset
Δ1 1 1 t (Δ) 3.751 ms (Δ) 5.10 dB	0 Hz
Δ1 1 t (Δ) 3.751 ms (Δ) 5.10 dB 4 5 6 7 8 9	Scale Type
Δ1 1 t (Δ) 3.761 ms (Δ) 5.10 dB 4 5 6 7 8	=

END OF REPORT