



FCC RADIO TEST REPORT

:	Ubiquiti Inc.			
:	685 Third Avenue, New York, New York 10017, USA			
:	UniFi Protect G4 Doorbell Pro			
:	UVC-G4 Doorbell Pro			
:	UBIQUITI			
:	SWX-UVCG4DP			
	: : :			

I HEREBY CERTIFY THAT :

The sample was received on May. 10, 2021 and the testing was completed on Jul. 03, 2021 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:

1000

Mark Liao / Supervisor

Laboratory Accreditation:

Cerpass Technology Corporation Test Laboratory



CERPASS TECHNOLOGY CORP.

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History of this test report

Aug. 24, 2021	Original



1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013

. Description of Test	Result	
. CO-LOCATION	PASS	

*The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.

*This EUT has been also tested and compiled with the requirement of FCC Part 15, Subpart B, recorded in a separate test report(21050068-TEFV01).

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2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

	NFC: 13.553MHz~13.567MHz
Frequency Range	BT / BLE: 2402MHz~2480MHz 802.11b/g/n: 2412MHz~2462MHzMHz
Trequency Range	802.11a/n/ac: 5180-5240MHz, 5260-5320MHz,
	5500-5720MHz, 5745-5825MHz
	NFC: ASK
	BT: GFSK, π /4-DQPSK, 8DPSK
	BLE: GFSK
	WLAN:
Modulation Turne	2.4GHz:
Modulation Type	802.11b: CCK, DQPSK, DBPSK
	802.11g/n: BPSK, QPSK, 16QAM, 64QAM
	5GHz:
	802.11n/a: BPSK, QPSK, 16QAM, 64QAM
	802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM
Modulation Technology	DSSS, OFDM, FHSS, DTS
	BT:
	GFSK: 1Mbps, π /4-DQPSK: 2Mbps, 8DPSK: 3Mbps
	BLE:
	GFSK: 1Mbps, GFSK: 2Mbps
	WLAN: 2.4GHz:
Data Rate	802.11b: 1, 2, 5.5, 11Mbps
Data Nate	802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
	802.11n: MCS0 – MCS7, HT20/40
	5GHz:
	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps
	802.11n: MCS0 – MCS7, HT20/40
	802.11ac: MCS0 – MCS9, VHT20/40/80
Antenna Type	Internal Antenna
	For NFC:
	13.553MHz~13.567MHz: 0.00dBi
	For BT / BLE:
	2402MHz~2480MHz: 2.00dBi
Antenna Gain	
	2412MHz~2462MHz: 2.00dBi
	5180-5240 MHz: 4.00dBi 5260-5320MHz: 4.00dBi
	5500-5720MHz: 4.00dBi
	5745-5825MHz: 4.00dBi
Firmware Number	4.37.45.67-fcddbg.a12730a.210428.0858

Note:

1. EUT support TPC Function.

2. WLAN 5GHz and BT can simultaneously transmission.

3. EUT supports DFS Client Mode, without radar detection.

4. EUT support indoor / outdoor function.

5. For more details, please refer to the User's manual of the EUT.



2.2 Test Mode and Test Software

- a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4.
- b. The complete test system included Notebook and EUT for RF test.
- c. An executive program, "hcitool command" under Windows OS system was executed to transmit and receive data via Bluetooth.
- d. An executive program, " wl command" under Windows OS system was executed to transmit and receive data via WLAN.
- e. The following test modes were performed for the test:

Conducted	Emissions from the AC mains power ports	
Test Mode	Operating Description	
1	BT GFSK CH39 + 5G 11a CH60	
caused "Te	st Mode 1" generated the worst case, it was reported as the final data.	
Radiation E	missions (9KHz ~30MHz & 30MHz ~ 1GHz)	
Test Mode	Operating Description	
1	BT GFSK CH39 + 5G 11a CH60	
caused "Test Mode 1" generated the worst case, it was reported as the final data.		
Radiation E	missions (1GHz ~ 25GHz)	
Test Mode	Operating Description	
1	BT GFSK CH39 + 5G 11a CH60	
caused "Test Mode 1" generated the worst case, it was reported as the final data.		



2.3 Description of Test System

RF Conducted						
Equipment	Brand	Model	Length/Type	Power cord/Length/Type		
Transformer	N/A	2420	N/A	N/A		
	Radiated Emissions					
Equipment	Brand	Model	Length/Type	Power cord/Length/Type		
Transformer	N/A	2420	N/A	N/A		
AC Power Line Conducted Emission						
Equipment	Brand	Model	Length/Type	Power cord/Length/Type		
Transformer	N/A	2420	N/A	N/A		



2.4 General Information of Test

	Address Taiwan (Tel:+886	Cerpass Technology Corporation Test Laboratory Address: No.10, Ln. 2, Lianfu St., Luzhu Dist., Taoyuan City 33848, Taiwan (R.O.C.) Tel:+886-3-3226-888 Fax:+886-3-3226-881			
Test Site	FCC	TW1439, TW1079			
	IC	4934E-1, 4934E-2			
	VCCI	T-2205 for Telecommunication test C-4663 for Conducted emission test R-4218 for Radiated emission test G-10812, G-10813 for radiated disturbance above 1GHz			
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 40,000MHz				
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.				

Test Item	Test Site	Test Period	Environmental Conditions	Tested By
RF Conducted	RFCON01-NK	2021/05/31	28°C / 42%	Nick Guan
Radiated Emissions	3M02-NK	2021/05/29~2021/07/01	23~24℃ / 42~45%	Nick Guan
AC Power Line Conducted Emission	CON01-NK	2021/07/03	26℃ / 54%	Dian Chen

2.5 Measurement Uncertainty

Measurement Item	Uncertainty
AC Power Line Conduction(150K~30MHz)	±3.63dB
Radiated Spurious Emission(9KHz~30MHz)	±3.4dB
Radiated Spurious Emission(30MHz~1GHz)	±5.6dB
Radiated Spurious Emission(1GHz~40GHz)	±6.6dB
Conducted Spurious Emission	±1.8dB



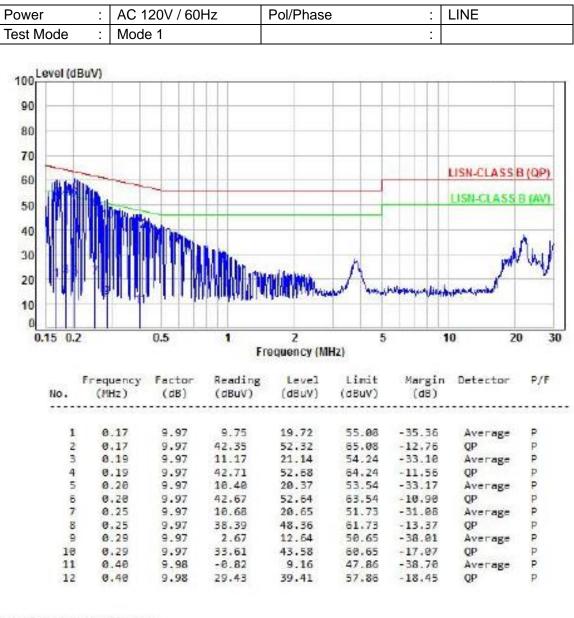
3. Test Equipment and Ancillaries Used for Tests

Test Site	Test Item Radiated Emissions Test Site Semi Anechoic Room(3M02-NK)						
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date		
Bilog Antenna	Schwarzbeck	VULB9168	369	2021/04/26	2022/04/25		
Active Loop Antenna	EMCO	6507	40855	2020/05/21	2021/05/20		
Active Loop Antenna	EMCO	6507	40855	2021/06/10	2022/06/09		
Horn Antenna	EMCO	3115	31601	2020/10/16	2021/10/15		
Horn Anrenna	EMCO	3116	31974	2020/09/24	2021/09/23		
EMI Receiver	ROHDE & SCHWARZ	ESCI	101200	2020/09/11	2021/09/10		
Spectrum Analyzer	ROHDE & SCHWARZ	FSV 40-N	102151	2020/08/03	2021/08/02		
Preamplifier	EM Electronics corp.	EM330	60658	2020/10/20	2021/10/19		
Preamplifier	EM Electronics corp.	EM330	60660	2021/03/18	2022/03/17		
Preamplifier	Agilent	8449B	3008A01954	2021/03/22	2022/03/21		
Preamplifier	EMC INSTRUMENTS	EMC184045	980065	2020/11/06	2021/11/05		
Bluetooth Tester	ROHDE & SCHWARZ	CBT	101133	2021/04/19	2022/04/18		
Cable-3in1(30M-1G)	HARBOUR INDUSTRIES	LL142	CCE1315	2021/04/12	2022/04/11		
Cable-0.5m(1G-18G)	EMEC	EM104-SMSM-0.5M	CCE1354	2021/05/06	2022/05/05		
Cable-3m(1G-18G)	EMEC	EM104-SMSM-3M	CCE1355	2021/05/06	2022/05/05		
Cable-8m(1G-18G)	EMEC	EM104-SMSM-8M	CCE1356	2021/05/06	2022/05/05		
Cable-0.5m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	28420/2	2021/04/03	2022/04/02		
Cable-3m(30M-40G)	HUBER SUHNER	SUCOFLEX 102	MY2608/2	2021/04/09	2022/04/08		
Cable-0.5m(1G-40G)	Rapidtek	40GHZ 50CM	38MS-38MS50314	2021/04/08	2022/04/07		
Cable-6m(9k~300M)	NA	EMC5D-BM-BM-6	130605	2020/09/18	2021/09/17		
E3	AUDIX	v8.2014-8-6	RK-000529	NA	NA		
Test Item	RF Conducted						
Test Site	RFCON01-NK						
				Calibration			
				Date	Valid Date		
					2021/08/02		
					2022/04/18		
					2021/12/24		
					2022/04/08		
					2021/08/24		
					2022/04/13		
Power Sensor	Anritsu	MA2411B	1207295	2021/04/14	2022/04/13		
Test Item	AC Power Line Conduct	ed Emission					
Instrument	Manufacturer	Model No	Serial No	Calibration Date	Valid Date		
EMI Receiver	ROHDE & SCHWARZ	ESCI	100821	2020/09/11	2021/09/10		
Line Impedance	Schwarzbeck	NSLK 8127	8127-516	2020/09/26	2021/09/25		
	ROHDE & SCHWARZ	ESH3-Z2	101933	2020/09/17	2021/09/16		
Cable-6m(9k~300M)	NA	EMC5D-BM-BM-6	130605	2020/09/18	2021/09/17		
E3	AUDIX	v8.2014-8-6	RK-000531	NA	NA		
Instrument Spectrum Analyzer Bluetooth Tester CAX Signal Analyzer Attenuator TEMP & HUMI CHAMBER Power Meter Power Sensor Test Item Test Site Instrument EMI Receiver Line Impedance Stabilization Network Pulse Limiter Cable-6m(9k~300M)	Manufacturer ROHDE & SCHWARZ ROHDE & SCHWARZ KEYSIGHT KEYSIGHT T-MACHINE Anritsu Anritsu AC Power Line Conducte CON01-NK Manufacturer ROHDE & SCHWARZ Schwarzbeck ROHDE & SCHWARZ NA	Model No ESCI NSLK 8127 ESH3-Z2 EMC5D-BM-BM-6	100821 8127-516 101933 130605	2020/08/03 2021/04/19 2020/12/25 2021/04/09 2020/08/25 2021/04/14 2021/04/14 Calibration Date 2020/09/11 2020/09/17 2020/09/18	2021/0 2022/0 2022/0 2022/0 2022/0 2022/0 2022/0 2022/0 2021/0 2021/0 2021/0 2021/0		



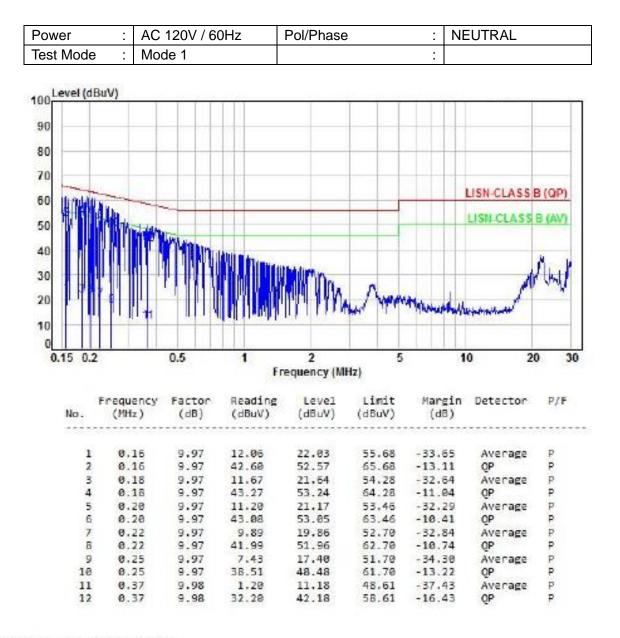
4. Test of AC Power Line Conducted Emission

4.1 Test Result and Data



Note: Level=Reading+Factor Margin-Level-Limit Factor=(LISN or ISN or Current Probe)Factor + Cable Loss





Note: Level-Reading+Factor Margin=Level-Limit Factor-(LISN or ISN or Current Probe)Factor + Cable Loss



5. Test of Spurious Emission (Radiated)

5.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/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
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

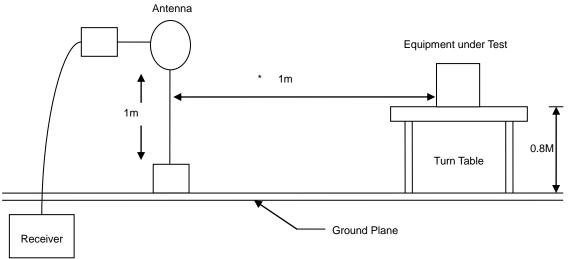


5.2 Test Procedures

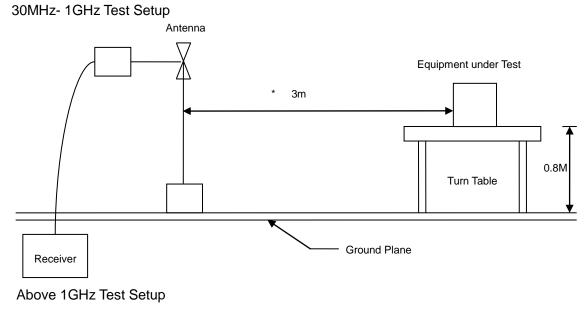
- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
- h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- i. "Cone of radiation" has been considered to be 3dB bandwidth of the measurement antenna.
 - Note: The supporting fixture shall permit orientation of the EUT in each of three orthogonal axis positions such that emissions from the EUT are maximized. (Y-AXIS is the worst.)

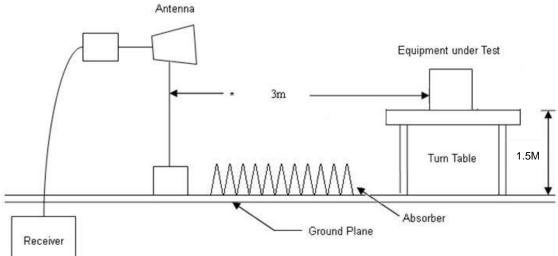
5.3 Typical Test Setup

Below 30MHz test setup









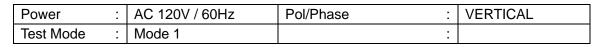
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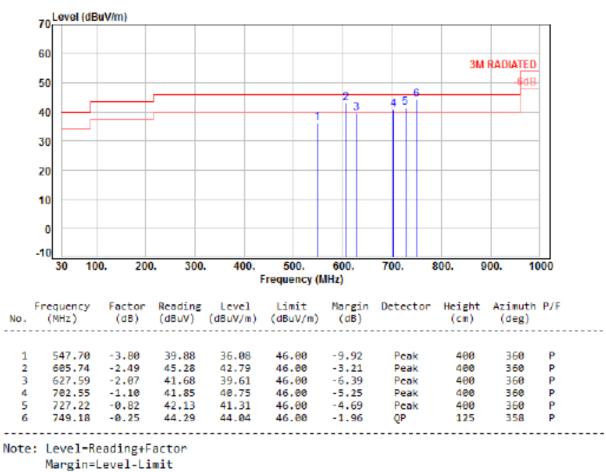


5.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

5.5 Test Result and Data (30MHz ~ 1GHz)

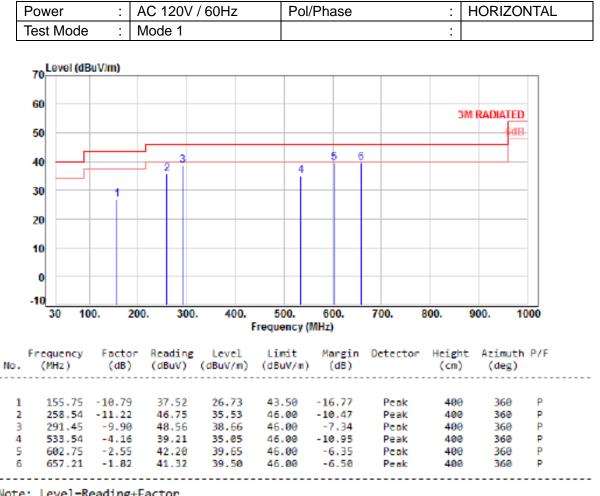




Factor-Antenna Factor + cable loss - Amplifier Factor

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Note: Level-Reading+Factor

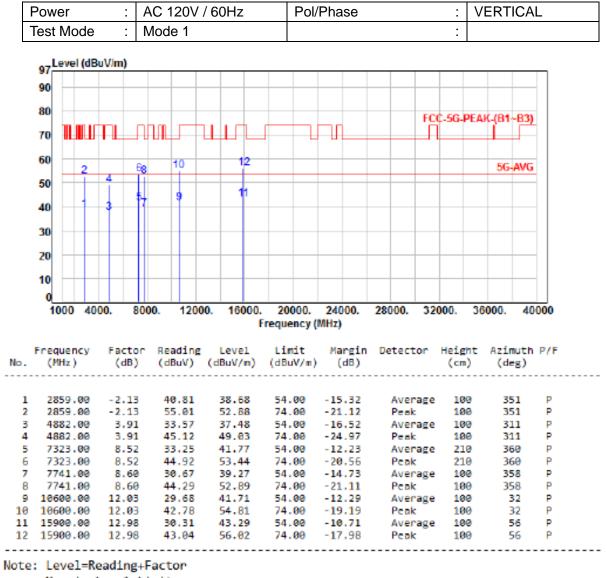
Margin=Level-Limit

Factor-Antenna Factor + cable loss - Amplifier Factor

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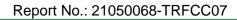
5.6 Test Result and Data (1GHz ~ 40GHz)



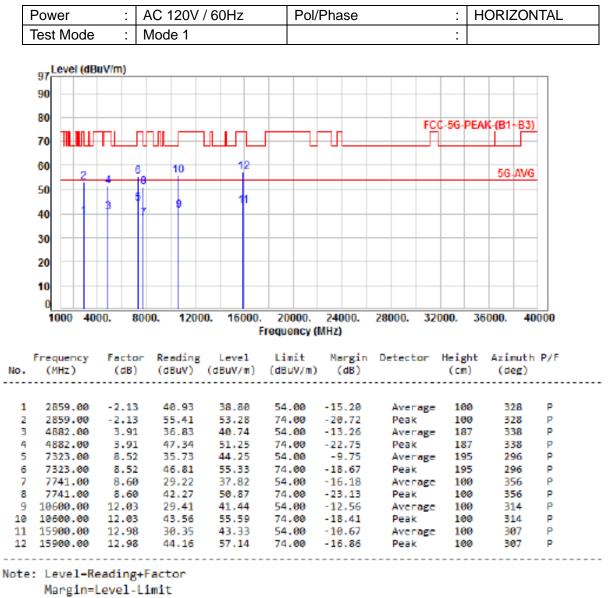
Margin-Level-Limit

Factor=Antenna Factor + cable loss - Amplifier Factor

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Factor-Antenna Factor + cable loss - Amplifier Factor

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5.7 Restricted Bands of Operation

MHz	MHz	MHz	GHz
0.09000 - 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.250
0.49500 - 0.505**	16.69475 – 16.69525	608.0 - 614.0	5.350 - 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 - 4.12800	25.50000 - 25.67000	1300.0 – 1427.0	8.025 - 8.500
4.17725 – 4.17775	37.50000 - 38.25000	1435.0 – 1626.5	9.000 - 9.200
4.20725 – 4.20775	73.00000 - 74.60000	1645.5 – 1646.5	9.300 - 9.500
6.21500 - 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 - 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 - 138.00000	2200.0 - 2300.0	14.470 – 14.500
8.29100 - 8.29400	149.90000 - 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 - 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 - 8.38675	156.70000 - 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 - 3267.0	23.600 - 24.000
12.29000 - 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 - 285.00000	3345.8 – 3358.0	36.430 - 36.500
12.57675 – 12.57725	322.00000 - 335.40000	3600.0 - 4400.0	Above 38.6
13.36000 - 13.41000			

Only spurious emissions are permitted in any of the frequency bands listed below:

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

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6. Test of Conducted Spurious Emission

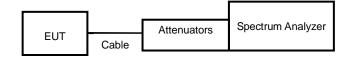
6.1 Test Limit

Below –20dB of the highest emission level of operating band (In 100 kHz Resolution Bandwidth)

6.2 Test Procedure

- a. The transmitter output was connected to the spectrum analyzer via a low loss cable.
- b. Set RBW of spectrum analyzer to 100 KHz and VBW of spectrum analyzer to 300 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
- c. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20dB relative to the maximum measured in-band peak PSD level.
- d. The band edges was measured and recorded.

6.3 Test Setup Layout



6.4 Test Result and Data

Note: Test plots refers to the following pages.

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Modulation Type: BT GFSK CH39 + 5G 11a CH60

pectrum Ana wept SA			+					Freque	····y · · 🔁
EYSIGH L	Coupling Align: A	a: AC	Input Z: 50 D Corrections: On Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log-P Trig: Free Run	DWWW 123456 MWWWWWW PNNNNN	Center Frequency 1.215000000 GHz Span	Settings
Spectrum cale/Div 10		•		tef Lvi Offset 11 tef Level 20.00 c		Mkr1	2.148 19 GHz -53.21 dBm	Span 2.37000000 GHz Swept Span Zero Span	
1.00							0L1 1341 dBm	Full Span	
20.0								Start Freq 30.000000 MHz	
40.0 50.0 60.0 (1.) minin			والداولة مناسبة محاسبة المطل		والمتحدية والمتحد الأمنان		1	Stop Freq 2.40000000 GHz	
70.0 itart 0.030 G	Hz			#Video BW 300	kHz		Stop 2,400 GHz	AUTO TUNE	
Res BW 100						Sweep	227 ms (8001 pts)	CF Step 237.000000 MHz	
Mode		Scale	x	Y	Function	Function Width	Function Value	Auto Man	
1 N 2 3	1	1	2.148 19 GHz	-53.21 dBm				Freq Offset 0 Hz	
4 5 6								X Axis Scale Log Lin	
1	C		May 31, 2021 9:28:08 PM	đ			X - X	Signal Track (Span Zoom)	

EYSIGH L -►- I		ng: AC	Input Z: 50 D Corrections: On Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Best Wide Gate: Off IF Gain: Low Sig Track: Off	Avg Type: Log-Pow Trig: Free Run	er 123456 MWWWWW PNNNNN	Center Frequency 2.441000000 GHz Span	Settin
Spectrum ale/Div 10	dB	•		Ref Lvi Offset 11. Ref Level 20.00 d		Mkr2 2.39	1 012 5 GHz -53.99 dBm	100.000000 MHz Swept Span Zero Span	
							QL1-13-41 dBm	Full Span	
				Å				Start Freq 2.391000000 GHz	
0 0 0	ومليطينهم		-	marine \			وتحلقهم المرجع ومحاكرها	Stop Freq 2.491000000 GHz	
nter 2.441	00 GHz			#Video BW 300	kHz		Span 100.0 MHz	AUTO TUNE	
s BW 100 arker Table						Sweep 9	.60 ms (8001 pts)	CF Step 10.000000 MHz	
Mode	Trace	Scale	x	Y	Function F	unction Width F	unction Value	Auto Man	
1 N 2 N 3	1	1	2.441 175 0 GH 2.391 012 5 GH					Freq Offset 0 Hz	
4 5 6								X Axis Scale Log Lin	
2	3		May 31, 2021 9:27:46 PM	\square			5 - X	Signal Track (Span Zoom)	



-----THE END OF REPORT------

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