

# **TEST REPORT**

# FCC PART 15 SUBPART C 15.247

Test report On Behalf of Shenzhen Gospell Smarthome Electronic Co., Ltd. For 2.4GHz Digital Wireless Baby Monitor

Model No.: GD8206

FCC ID: TW5GD8206

Prepared for : Shenzhen Gospell Smarthome Electronic Co., Ltd. F/12 F518 Idea Land Baoyuan Road Baoan Central Area Shenzhen City P.R China

Prepared By :Shenzhen HUAK Testing Technology Co., Ltd.1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping<br/>Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

 Date of Test:
 Dec. 21, 2018 ~ Dec. 27, 2018

 Date of Report:
 Jan. 09, 2019

 Report Number:
 HK1901090058E



# **TEST RESULT CERTIFICATION**

Applicant's name	. Shenzhen Gospell Smarthome Electronic Co., Ltd.
Address	F/12 F518 Idea Land Baoyuan Road Baoan Central Area Shenzhen City P.R China
Manufacture's Name	. Shenzhen Gospell Smarthome Electronic Co., Ltd.
Address	East of 01st-04st Floor, Block A, No.1 Industrial park, Fenghuanggang, South of No.1 Baotian Road, Xixiang street, Bao'an District, Shenzhen City, Guangdong Province 518126, P.R.China
Factory	Shenzhen Gospell Smarthome Electronic Co., Ltd.
Address	East of 01st-04st Floor, Block A, No.1 Industrial park, Fenghuanggang, South of No.1 Baotian Road, Xixiang street, Bao'an District, Shenzhen City, Guangdong Province 518126, P.R.China
Product description	
Trade Mark:	N/A
Product name	. 2.4GHz Digital Wireless Baby Monitor
Model and/or type reference	. GD8206

#### Standards...... 47 CFR FCC Part 15 Subpart C 15.247

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen HUAK Testing Technology Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen HUAK Testing Technology Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Date of Test	
Date (s) of performance of tests:	Dec. 21, 2018 ~ Dec. 27, 2018
Date of Issue	Jan. 09, 2019
Test Result:	Pass

÷

2

**Testing Engineer** 

Gary Qian)

**Technical Manager** 

Edon Hu

(Eden Hu)

Authorized Signatory :

(Jason Zhou)



#### TABLE OF CONTENTS

1.	SUMMARY	4
1	.1. TEST STANDARDS	
	<ul> <li>.2. TEST DESCRIPTION</li> <li>.3. TEST FACILITY</li> </ul>	
	<ul> <li>.3. TEST FACILITY</li> <li>.4. STATEMENT OF THE MEASUREMENT UNCERTAINTY</li> </ul>	ə 5
	GENERAL INFORMATION	
	2.1. ENVIRONMENTAL CONDITIONS 2.2. GENERAL DESCRIPTION OF EUT	
	2.3. DESCRIPTION OF TEST MODES AND TEST FREQUENCY	
	2.4. RELATED SUBMITTAL(S) / GRANT (S)	
	2.5.     MODIFICATIONS       2.6.     RECEIVER INPUT BANDWIDTH	
	2.7. EXAMPLE OF A HOPPING SEQUENCE IN DATA MODE	
	2.8. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR	
	2.9. EQUIPMENT USED	
3.	PEAK OUTPUT POWER	
	8.1. MEASUREMENT PROCEDURE	
	3.2.       TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)         3.3.       LIMITS AND MEASUREMENT RESULT	10 11
	20DB BANDWIDTH	
	I.1. MEASUREMENT PROCEDURE I.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
	I.3. LIMITS AND MEASUREMENT RESULTS	
	CONDUCTED SPURIOUS EMISSION	
	5.1. MEASUREMENT PROCEDURE	
	5.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
	5.3. LIMITS AND MEASUREMENT RESULT	
6.	RADIATED EMISSION	22
6	6.1. MEASUREMENT PROCEDURE	
	3.2. TEST SETUP	24
	3.3. LIMITS AND MEASUREMENT RESULT	
7.	FCC LINE CONDUCTED EMISSION TEST	35
	7.1. LIMITS OF LINE CONDUCTED EMISSION TEST	
	7.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST 7.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	
	7.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	
7	7.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	37
8.	NUMBER OF HOPPING FREQUENCY	39
8	B.1. MEASUREMENT PROCEDURE	39
	3.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
	3.3. LIMITS AND MEASUREMENT RESULT	
9.	TIME OF OCCUPANCY (DWELL TIME)	
	0.1.       MEASUREMENT PROCEDURE         0.2.       TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
-	0.3. LIMITS AND MEASUREMENT RESULT	
10.	FREQUENCY SEPARATION	
-	0.1. MEASUREMENT PROCEDURE	
	0.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
1	0.3. LIMITS AND MEASUREMENT RESULT	
11.	TEST SETUP PHOTOS OF THE EUT	45
12.	PHOTOGRAPH OF EUT	47
FR	ONT VIEW OF EUT	49
	CK VIEW OF EUT	



# 1. SUMMARY

# 1.1. **TEST STANDARDS**

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10:2013 : American National Standard for Testing Unlicensed Wireless Devices

# 1.2. Test Description

FCC PART 15.247				
FCC Part 15.207	AC Power Conducted Emission	PASS		
FCC Part 15.247(a)(1)(i)	20dB Bandwidth	PASS		
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS		
FCC Part 15.247(b)	Maximum Peak Output Power	PASS		
FCC Part 15.247(b)	Pseudorandom Frequency Hopping Sequence	PASS		
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency& Time of Occupancy	PASS		
FCC Part 15.247(a)(1)	Frequency Separation	PASS		
FCC Part 15.205/15.209	Radiated Emissions	PASS		
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS		



### 1.3. Test Facility

### 1.3.1 Address of the test laboratory

Shenzhen HUAK Testing Technology Co., Ltd. Add.:1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park,Heping Community, Fuhai Street, Bao'an District, Shenzhen, China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4 and CISPR 32/EN 55032 requirements.

### 1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

# IC Registration No.: 21210

The 3m alternate test site of Shenzhen HUAK Testing Technology Co., Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration No.: 21210 on May 24, 2016.

### FCC Registration No.: CN1229

Test Firm Registration Number : 616276

#### 1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen HUAK Testing Technology Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test	Measurement Uncertainty	Notes
Transmitter power conducted	±0.57 dB	(1)
Transmitter power Radiated	±2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	±2.20 dB	(1)
Occupied Bandwidth	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

Hereafter the best measurement capability for HUAK laboratory is reported:

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



# 2. GENERAL INFORMATION

### 2.1. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

# 2.2. General Description of EUT

Product Name:	2.4GHz Digital Wireless Baby Monitor
Model/Type reference:	GD8206
Power supply:	Input: AC 100-240V, 50/60Hz, 0.25A Output: DC 5.0V, 1000A
Modulation:	GFSK
Operation frequency:	2410MHz~2477MHz
Channel number:	23
Channel separation:	Minimum 3MHz
Antenna type:	Fixed Antenna
Antenna gain:	1dBi
Hardware Version:	GD8206M_03
Software Version:	V116

Note: For more details, refer to the user's manual of the EUT.

# 2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing.

There are 23 channels provided to the EUT and Channel 00/10/22 was selected for testing.

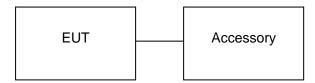
Channel Number	Frequency(MHz)	Channel Number	Frequency(MHz)
0	2410	12	2447
1	2414	13	2450
2	2417	14	2453
3	2420	15	2456
4	2423	16	2459
5	2426	17	2462
6	2429	18	2465
7	2432	19	2468
8	2435	20	2471
9	2438	21	2474
10	2441	22	2477
11	2444		



NO.	TEST MODE DESCRIPTION	
1	Low channel TX	
2	Middle channel TX	
3	High channel TX	
4	Normal Operating (Hopping)	

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.



Item	Equipment	Model No.	ID or Specification	Remark
1	Adapter	HA-19050100UU	-19050100UU DC 5V	
2	USB Cable	N/A	2m length with a ferrite core	Marketed
3	ferrite core	BF0730	35*18mm	Marketed



# 2.4. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

# 2.5. Modifications

A ferrite core has been used to suppress the emissions on the charging cable.

# 2.6. Receiver Input Bandwidth

The input bandwidth of the receiver is 5MHz.

# 2.7. Example of a Hopping Sequence in Data Mode

Example of a 23 hopping sequence in data mode: 21,02 ,00,15,22,05,17,03,19,06,10,20,01,18,07,11,09,16, 13, 04,12, 08,14; 18,04,22,11,03,20,15,14,01,07,19 ,05,21,16,08,17,09,02,00,06, 10,12,13

# 2.8. Equally Average Use of Frequencies and Behaviour

After the EUT(baby part) is power on, it should be at listen mode and hopping at a fixed sequence which is preinstall and waiting for the parent part. After the baby and parent part are synchronized, the parent would tell the baby part for the next hopping sequence, and then the baby operate synchronized with parent. The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. The hopping sequence will always differ from the first one. Each hopping channel will be changed after each hopping time. The each hopping time is 3.5ms.

Hereby each frequency is used equally on the average by each transmitter.



# 2.9. Equipment Used

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	R&S	ENV216	HKE-002	Dec. 28, 2017	1 Year
2.	Receiver	R&S	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
3.	RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 28, 2017	1 Year
4.	Horn Antenna	Schewarzbeck	BBHA 9170	HKE-090	Dec. 27, 2018	1 Year
5.	Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 28, 2017	1 Year
6.	Preamplifier	Schwarzbeck	BBV 9743	HKE-006	Dec. 28, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESCI 7	HKE-010	Dec. 28, 2017	1 Year
8.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	HKE-012	Dec. 28, 2017	1 Year
9.	Loop Antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 28, 2017	1 Year
10.	Horn Antenna	Schewarzbeck	9120D	HKE-013	Dec. 28, 2017	1 Year
11.	Pre-amplifier	EMCI	EMC051845 SE	HKE-015	Dec. 28, 2017	1 Year
12.	Pre-amplifier	Agilent	83051A	HKE-016	Dec. 28, 2017	1 Year
13.	EMI Test Software EZ-EMC	Tonscend	JS1120-B Version	HKE-083	Dec. 28, 2017	N/A
14.	Shielded room	Shiel Hong	4*3*3	HKE-039	Dec. 28, 2017	3 Year

The calibration interval was one year



# 3. Peak Output Power

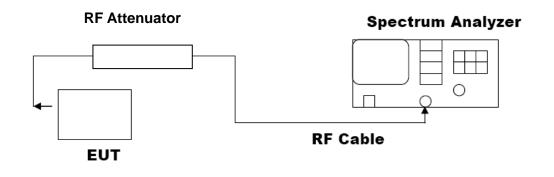
# 3.1. Measurement Procedure

For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW  $\geq$ RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

Allow trace to stabilize. 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.

# 3.2. Test Set-Up (Block Diagram of Configuration)





# 3.3. Limits and Measurement Result

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION						
Frequency (GHz)Peak Power (dBm)Applicable Limits (dBm)Pass or Fail						
2.410	8.964	30	Pass			
2.441	8.596	30	Pass			
2477	2477 8.405 30 Pass					

		0110		
Keysight Spectrum Analyzer - Swept SA				
RF 50 Ω AC		E:INT ALIGN AUTO		Peak Search
larker 1 2.408410000000	CHZ PNO: Fast IFGain:Low Trig: Free I #Atten: 30		TRACE 123456 TYPE MWWWWW DET P NNNNN	
0 dB/div Ref 20.00 dBm		Mk	r1 2.408 41 GHz 8.964 dBm	NextPea
10.0	<b>↓</b> 1			Next Pk Righ
				Next Pk Le
.0.0				Marker Del
0.0				Mkr→C
0.0				Mkr→RefL
/0.0				Mo
enter 2.410000 GHz Res BW 5 MHz	#VBW 5.0 MHz	Sweep	Span 10.00 MHz 1.000 ms (1001 pts)	1 of
SG		STATU	IS	

#### CH0



Page 12 of 55

Keysight Spectrum Analyzer - Swept SA           RF         50 Ω         AC		SENSE:INT	ALIGN AUTO		
larker 1 2.43935000000	PNO: Fast	rig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE <b>12345</b> 6 TYPE M <del>WWWW</del> DET PNNNNN	Peak Search
D dB/div Ref 20.00 dBm			Mkr1	2.439 35 GHz 8.596 dBm	Next Pea
0.0	<b>↓</b> 1				Next Pk Righ
0.0					Next Pk Le
0.0					Marker Del
0.0					Mkr→C
0.0					Mkr→RefL
enter 2.441000 GHz	#\/D\\/_C			Span 10.00 MHz	<b>Mo</b> 1 of
Res BW 5 MHz	#VBW 5.	0 MHz	Sweep 1.0	00 ms (1001 pts)	

# CH39

CH78

Keysight Spectrum Analyzer - Swept SA				
RF         50 Ω         AC           Marker 1 2.475340000000         Δ	GHz PNO: Fast Trig: Free Run	Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6 TYPE MWWWWW	Peak Search
10 dB/div Ref 20.00 dBm	IFGain:Low #Atten: 30 dB		DET PNNNN 1 2.475 34 GHz 8.405 dBm	NextPeak
10.0	<b>↓</b> 1			Next Pk Right
-10.0				Next Pk Left
-20.0				Marker Delta
-40.0				Mkr→CF
-60.0				Mkr→RefLvl
-70.0 Center 2.477000 GHz #Res BW 5 MHz	#VBW 5.0 MHz	Sweep 1	Span 10.00 MHz 000 ms (1001 pts)	More 1 of 2
MSG		STATUS		

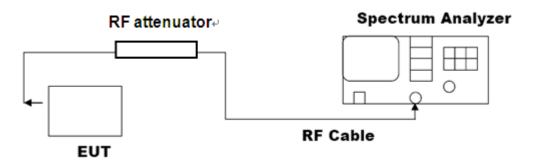


# 4. 20dB Bandwidth

# 4.1. Measurement Procedure

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

# 4.2. Test Set-Up (Block Diagram of Configuration)





### 4.3. Limits and Measurement Results

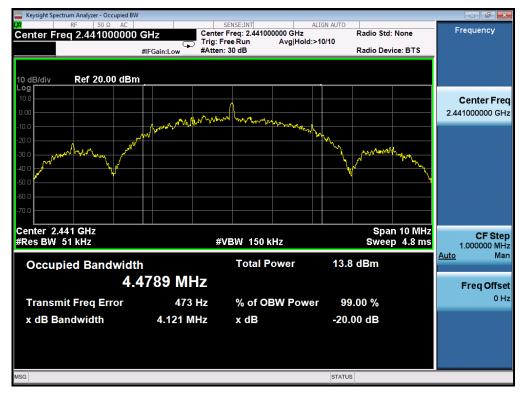
MEASUREMENT RESULT FOR GFSK MOUDULATION				
Annlinghin Limite	Measurement Result			
Applicable Limits	Test Data (MHz) Crite		Criteria	
	Low Channel	4.099	PASS	
N/A	Middle Channel	4.121	PASS	
	High Channel	4.105	PASS	

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL





#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





# 5. Conducted Spurious Emission

# 5.1. Measurement Procedure

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- 3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
   RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

# 5.2. Test Set-Up (Block Diagram of Configuration)

The same as described in section 4.2

# 5.3. Limits and Measurement Result

LIMITS AND MEASUREMENT RESULT				
Angliaghta Linsita	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit			
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS		
intentional radiator is operating, the radio	Channel			
frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS		



# TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL

Keysight Spectrum Analyzer - Swe					
RF 50 Ω Center Freq 2.41000		SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 123456 TYPE MWWWWW DET P N N N N N	Frequency
10 dB/div <b>Ref 20.00 c</b>	IFGain:Low	#Atten: 30 dB	Mkr1 2.4	09 961 87 GHz 8.678 dBm	Auto Tune
10.0					Center Free 2.410000000 GH
-10.0	Awn M		Marine Marine Marine	DL1 -11.32 dBm	Start Fred 2.405000000 GH;
-20.0				Man	Stop Fred 2.415000000 GH:
-40.0					CF Step 1.000000 MH: <u>Auto</u> Mar
-60.0					Freq Offse 0 H:
					Scale Type
Center 2.410000 GHz #Res BW 100 kHz	#VBW	300 kHz	Sweep 2.6	Span 10.00 MHz 67 ms (40000 pts)	Log <u>Lir</u>
ISG					
			STATUS		
Keysight Spectrum Analyzer - Swe					
Keysight Spectrum Analyzer - Swo RF 50 Ω Marker 3 15.7833423	AC	SENSE:INT Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 123456 TYPE MUNUMUNU DET P. N.N.N.N	Peak Search
₩ 50 Ω Marker 3 15.783342	AC 583565 GHz PNO: Fast IFGain:Low	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	DET P N N N N N	Peak Search
X/ RF 50 Ω	AC 583565 GHz PNO: Fast IFGain:Low	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	TYPE MIAAAAAAAAAA	Peak Search Next Peal
Marker 3 15.7833424	AC 583565 GHz PNO: Fast IFGain:Low	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	<sup>TYPE</sup> PNNNNN JET PNNNNN 3 15.783 3 GHz -51.963 dBm	Peak Search Next Peal Next Pk Righ
N         RF         50 Ω           Marker 3 15.7833424         Ref 20.00 c           10 dB/div         Ref 20.00 c           10 0	AC 583565 GHz PNO: Fast IFGain:Low	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	<sup>TYPE</sup> PNNNNN JET PNNNNN 3 15.783 3 GHz -51.963 dBm	Peak Search Next Peak Next Pk Righ Next Pk Lef
RF         50 Ω           Marker 3 15.7833424           10 dB/div         Ref 20.00 d           10 dB/div         Ref	AC 583565 GHz PRO: Fast IFGain:Low dBm #VBW	Trig: Free Run #Atten: 30 dB	ALISN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	<sup>TYPE</sup> PNNNNN JET PNNNNN 3 15.783 3 GHz -51.963 dBm	Peak Search Next Peal Next Pk Righ Next Pk Lef
RF         50 Ω           Marker 3 15.7833424           Ref 20.00 c           Log           10 dB/div         Ref 20.00 c           Log         10 c           10 dB/div         Ref 20.00 c	AC 583565 GHz PNO: Fast IFGain:Low dBm #VBW	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	15.783 3 GHz -51.963 dBm 0(1-11.32.05m	Peak Search Next Peak Next Pk Righ Next Pk Lef Marker Delta Mkr→Cf
N         PF         50 Ω           Marker 3 15.7833424         10 dB/div         Ref 20.00 d           L0 dB/div         Ref 20.00 d         0           Start 30 MHz         Ref 20.00 d         0           XHR MODE TRC         Scl         1           L N 1 f         1         1           J N 1 f         1         1           J N 1 f         5         0	AC 583565 GHz PNO: Fast IFGain:Low dBm dBm #VBW X 20.938 5 GHz 17.063 7 GHz	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	15.783 3 GHz -51.963 dBm 0(1-11.32.05m	



### Page 18 of 55

<b>RF</b> 50 Ω	AC	SENSE:INT	ALIGN AUTO	TRACE	
Center Freq 2.44100	00000 GHz PNO: Wid	Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P N N N N N	- requercy-
	IFGain:Lo				
	B		Mkr1 2.4	40 969 12 GHz 8.125 dBm	Autorune
10 dB/div Ref 20.00 c	11 <b>-</b> 111			0.120 0.511	
		1			Center Freq
10.0					2.441000000 GHz
0.00					
0.00	Maria	My man	M Mannut A		Start Freq
-10.0	/MM <sup>MM</sup>			DL1-11.87 dBm	2.436000000 GHz
			×.		
-20.0				t mod	Stop Freq
A WW				No mark	2.446000000 GHz
-30.0					
-40.0	Y				CF Step
					1.000000 MHz <u>Auto</u> Man
-50.0					
					Freq Offset
-60.0					0 Hz
-70.0					
470.0					Scale Type
					Log <u>Lin</u>
Center 2.441000 GHz #Res BW 100 kHz	#\	/BW 300 kHz	Sweep 2.6	Span 10.00 MHz 67 ms (40000 pts)	
MSG			STATUS		
	ant SA		STATUS		
🧰 Keysight Spectrum Analyzer - Swe 🗶 RF 50 Ω	AC	SENSE:INT	ALIGN AUTO		Peak Search
	AC 842746 GHz	Trig: Free Run		TRACE 1 2 3 4 5 6 TYPE MWWWWW	Peak Search
🧰 Keysight Spectrum Analyzer - Swe 🗶 RF 50 Ω	AC	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100		Peak Search
Keysight Spectrum Analyzer - Swu RF 50 Ω Marker 3 16.5337098	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz	Peak Search
🧰 Keysight Spectrum Analyzer - Swe 🗶 RF 50 Ω	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100		
Keysight Spectrum Analyzer - Swu RF 50 Ω Marker 3 16.5337098	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz	Peak Search Next Peak
Keysight Spectrum Analyzer - Sw Keysight Spectrum Analyzer - So Q Marker 3 16.5337098 10 dB/div Ref 20.00 d	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak
Keysight Spectrum Analyzer - Switt Keysight Spectrum Analyzer - Switt Marker 3 16.5337098     Since A state of the stat	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz	Peak Search Next Peak
Keysight Spectrum Analyzer - Switt Keysight Spectrum Analyzer - Switt Marker 3 16.5337098     Since A state of the stat	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right
Keysight Spectrum Analyzer - Switt Keysight Spectrum Analyzer - Switt Marker 3 16.5337098     Since A state of the stat	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak
Keysight Spectrum Analyzer - Switt Keysight Spectrum Analyzer - Switt Marker 3 16.5337098     Si 0.2     Control Contrectific Control Control Control Contro Control Control Control C	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right
Keysight Spectrum Analyzer - Swa           RF         50 Ω           Marker 3 16.5337095           0 dB/div         Ref 20.00 c           10 dB/div         Ref 20.00 c           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00           -00         -00	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right Next Pk Left
Keysight Spectrum Analyzer - Swa CV RF 50 Ω Marker 3 16.5337095 10 dB/div Ref 20.00 c 10 0 20 0 -10 0 -20 0 -30 0 -40 0 -50 0 -50 0 -50 0 -50 0 -50 0 -50 0 -50 Ω	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	3 16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right
Keysight Spectrum Analyzer - Swa           RF         50 Ω           Marker 3 16.5337095           0 dB/div         Ref 20.00 c           10 dB/div         Ref 20.00 c           -00         -00           -00         -00           -00         -00           -10.0         -00           -20.0         -00           -40.0         -00           -50.0         -00	AC 842746 GHz PNO: Fas IFGain:Lo	Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100	CL1.41.37 dBn	Peak Search Next Peak Next Pk Right Next Pk Left
Keysight Spectrum Analyzer - So Ω           Marker 3 16.5337098           Io dB/div         Ref 20.00 c           Log	AC B42746 GHz PNO: Fas IFGain:Lot dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Keysight Spectrum Analyzer - Sw           Xi         RF         50 Ω           Marker 3 16.5337098           10 dB/div         Ref 20.00 d	AC B42746 GHz PNO: Fas IFGain:Lo dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 00000000000000000000000000000000000	Peak Search Next Peak Next Pk Right Next Pk Left
Keysight Spectrum Analyzer - So Ω           Marker 3 16.5337098           Io dB/div         Ref 20.00 c           Log	AC B42746 GHz B42746 GHz PN0: Fas IFGain:Lot dBm define a second	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Keysight Spectrum Analyzer - So Ω           Marker 3 16.5337098           IO         RF         50 Ω           Marker 3 16.5337098           IO         B/div         Ref 20.00 d           Log	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 00000000000000000000000000000000000	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Keysight Spectrum Analyzer - Swa           Xi         RF         50 Ω           Marker 3 16.5337098           10 dB/div         Ref 20.00 d           0 000	AC B42746 GHz B42746 GHz PN0: Fas IFGain:Lot dBm define a second	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 00000000000000000000000000000000000	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Keysight Spectrum Analyzer - Sw           Marker 3 16.5337098           0 dB/div         Ref 20.00 c           0 000         000           10 0         Ref 20.00 c           20 0         Ref 20.00 c           30 0         Ref 20.00 c           4 1 f         F           4 5 6         Ref 20.00 c	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0000 gtz .387 s (40000 pts)	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Keysight Spectrum Analyzer - Suw           Xi         RF         S0 Q           Narker 3 16.5337098           10 dB/div         Ref 20.00 c           0 dB/div         Ref 20.00 c           10 dB/div         Ref 20.00 c           30 0         30 0	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0000 gtz .387 s (40000 pts)	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl
Keysight Spectrum Analyzer - Sw           Warker 3 16.5337098           Io dB/div         Ref 20.00 d           Io dD/div         Ref 20.00 d           Io dD/div         Io div           Io div         Io div           Io dio div	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0000 gtz .387 s (40000 pts)	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Keysight Spectrum Analyzer - Suw           RF         50 Q           Marker 3 16.5337098           Ref 20.00 c           9         9           10 dB/div         Ref 20.00 c           10 dB/div         Ref 20.00 c           9         9	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB ////////////////////////////////////	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	16.533 7 GHz -52.602 dBm 0⊔.41.87.686 0⊔.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0∪.41.87.686 0000 gtz .387 s (40000 pts)	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→Ref Lvl More
Keysight Spectrum Analyzer - Swa           Warker 3 16.5337098           Io dB/div         Ref 20.00 c           Log	AC B42746 GHz B42746 GHz PNO: Fas IFGain:Lot dBm dBm dBm dBm dBm dBm dBm dBm dBm dBm	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold:>100/100 Mkr3	TYPE DET P NNNNN 3 16.533 7 GHz -52.602 dBm CLI.11.87.498 CLI.11.87.498 2 2 3 2 2 5 2 2 2 5 2 2 2 5 2 2 2 2 2 2 5 2 2 2 2 2 2 5 2 2 2 2 2 2 2 5 2 2 2 2 2 2 2 2 5 2 2 2 2 2 2 2 2 2 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→Ref Lvl More

# TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN MIDDLE CHANNEL



#### Page 19 of 55

Keysight Spectrum Analyzer - Swept SA				
RF 50 Ω AC Center Freq 2.477000000 (	PNO: Wide 😱 Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWW DET PNNNNN	Frequency
10 dB/div Ref 20.00 dBm	IFGain:Low #Atten: 30 dB	Mkr1	2.476 965 GHz 7.151 dBm	Auto Tune
	Ţ			
10.0	1			Center Freq 2.477000000 GHz
				2.477000000 0112
0.00	Not the has	morten		Start Freq
-10.0	Maria			2.472000000 GHz
		- M	DL1 -12.85 dBm	
-20.0			a mal	Stop Freq
-30.0			Nº m.	2.482000000 GHz
$\sim$			N X	CF Step
-40.0				1.000000 MHz
-50.0				<u>Auto</u> Man
				Freq Offset
-60.0				0 Hz
-70.0				
				Scale Type
Center 2.477000 GHz		<b>.</b>	Span 10.00 MHz	Log <u>Lin</u>
#Res BW 100 kHz	#VBW 300 kHz	Sweep	1.066 ms (1000 pts) s	
Keysight Spectrum Analyzer - Swept SA			-	
Keysight opectrum Analyzer owepcon				
X RF 50 Ω AC	SENSE:IN			Peak Search
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr	TRACE 123456 TYPE MWWWW DET P N N N N N	
Marker 3 16.879552988825	5 GHz	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P. NNNNN 3 16.879 6 GHz	
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	TRACE 1 2 3 4 5 6 TYPE MWWWWWW DET PNNNN 3 16.879 6 GHz -52.234 dBm	Peak Search
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz	Peak Search Next Peak
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz	Peak Search Next Peak
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz	Peak Search Next Peak
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz -52.234 dBm	Peak Search Next Peak Next Pk Right
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz -52.234 dBm	Peak Search Next Peak Next Pk Right
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz -52.234 dBm	Peak Search Next Peak Next Pk Right
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz -52.234 dBm	Peak Search Next Peak Next Pk Right Next Pk Left
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hold:>100/100	3 16.879 6 GHz -52.234 dBm	Peak Search Next Peak Next Pk Right Next Pk Left
Marker 3 16.879552988825	GHz PN0: Fast IFGain:Low       Trig: Free Run #Atten: 30 dB         Trig: Free Run #Atten: 30 dB         Trig: Free Run #Atten: 30 dB	Avg Type: Log-Pwr Avg Hold:>100/100 MK1	3 16.879 6 GHz -52.234 dBm 0L1-12.85 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Marker 3 16.879552988825	OGHZ PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left
Marker 3 16.879552988825         10 dB/div       Ref 20.00 dBm         00       000         100       000         -100       000         -200       000         -300       000         -40.0       000         -50.0       000         -60.0       000         -70.0       000         Start 30 MHz         #Res BW 100 kHz         MKRI MODEL TRCI SCL       X         1       N       1	FO: Fast PNO: Fast FGain:Low Trig: Free Run #Atten: 30 dB #Atten: 30 dB #VBW 300 kHz 50 3 GHz -50.169 dBm	Avg Type: Log-Pwr Avg Hold:>100/100 MK1	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Marker 3 16.879552988825         10 dB/div       Ref 20.00 dBm         100	For the second s	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Marker 3 16.879552988825           Io dB/div         Ref 20.00 dBm           Io g         Io dB/div         Io dB/div           Io g         Io dB/div         Io dB/div           Io g         Io dB/div         Io dB/div           Start 30 MHz         KHz         X           I f         21.00 KHz         X           I f         24.33         N         I f         16.87           Io dB/div         Io dB/div         Io dB/div         Io dB/div	<b>GHz</b> PN0: Fast IFGain:Low       Trig: Free Run #Atten: 30 dB         #Xten: 30 dB         #VBW 300 kHz         #VBW 300 kHz         50 3 GHz         -50.169 dBm         39 GHz         -50.169 dBm	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Marker 3 16.879552988825         10 dB/div       Ref 20.00 dBm         0 g       0.00         10 0       0.00         -10 0       0.00         -20 0       0.00         -30 0       0.00         -40 0       0.00         -50 0       0.00         -60 0       0.00         -70 0       0.00<	<b>GHz</b> PN0: Fast IFGain:Low       Trig: Free Run #Atten: 30 dB         #Xten: 30 dB         #VBW 300 kHz         #VBW 300 kHz         50 3 GHz         -50.169 dBm         39 GHz         -50.169 dBm	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Marker 3 16.879552988825         10 dB/div       Ref 20.00 dBm         log	<b>GHz</b> PN0: Fast IFGain:Low       Trig: Free Run #Atten: 30 dB         #Xten: 30 dB         #VBW 300 kHz         #VBW 300 kHz         50 3 GHz         -50.169 dBm         39 GHz         -50.169 dBm	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Marker 3 16.879552988825         10 dB/div       Ref 20.00 dBm         0 g       0.00         10 0       0.00         -10 0       0.00         -20 0       0.00         -30 0       0.00         -40 0       0.00         -50 0       0.00         -60 0       0.00         -70 0       0         -60 0       0.00 kHz         MRR MODE TRC SCL       X         1       N       1         2       N       1       1         3       N       1       1         6       0       0.00       1         70 0       0       0.00       1         9       0       0.00       1	<b>GHz</b> PN0: Fast IFGain:Low       Trig: Free Run #Atten: 30 dB         #Xten: 30 dB         #VBW 300 kHz         #VBW 300 kHz         50 3 GHz         -50.169 dBm         39 GHz         -50.169 dBm	Avg Type: Log-Pwr Avg Hoid:>100/100 MKr	3 16.879 6 GHz -52.234 dBm 0.1 -1285 dBm	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl More

# TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN HIGH CHANNEL

Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit.

#### TEST RESULT FOR BAND EDGE

#### GFSK MODULATION IN LOW CHANNEL

Hopping off



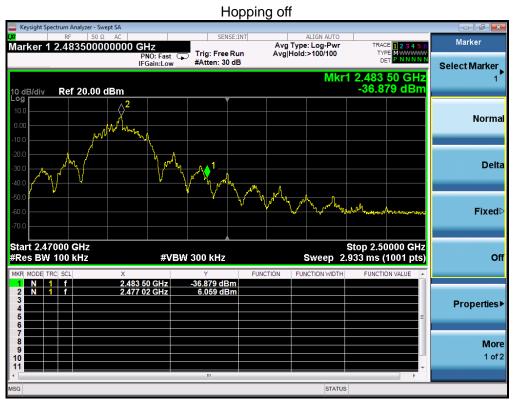
Hopping on





### GFSK MODULATION IN HIGH CHANNEL

Page 21 of 55



Hopping on





# 6. Radiated Emission

# 6.1. Measurement Procedure

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average 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 for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions 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.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.



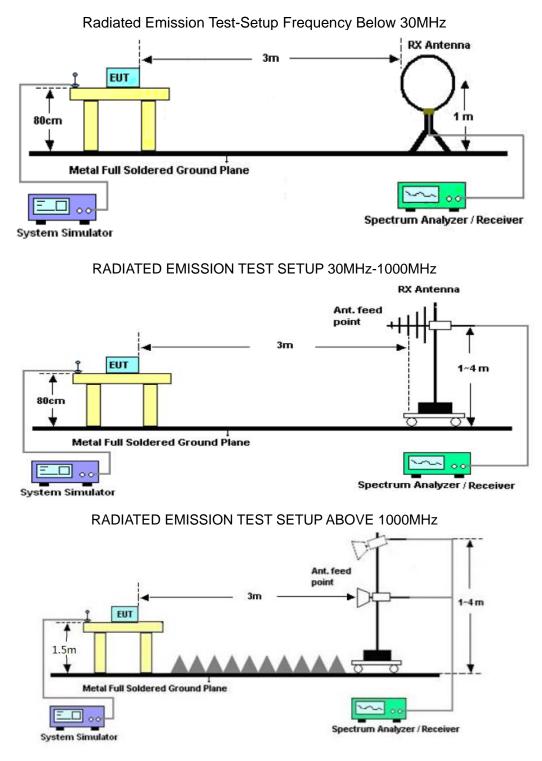
### The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz
Start ~Stop Frequency	1MHz/3MHz for Peak, 1MHz/10Hz for Average

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP



# 6.2. Test Setup





# 6.3. Limits and Measurement Result

15.209&RSS-GEN Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,

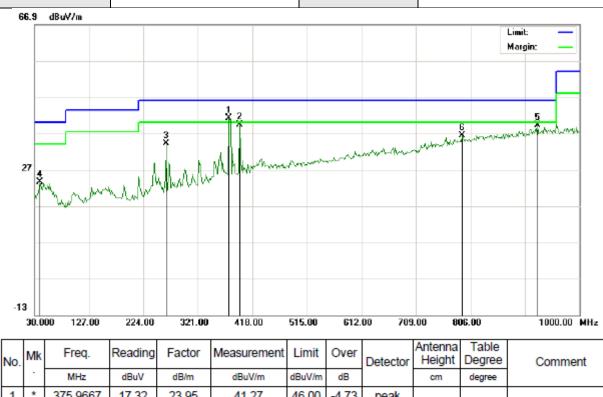
the test records reported below are the worst result compared to other modes.



#### **RADIATED EMISSION BELOW 30MHZ**

#### No emission found between lowest internal used/generated frequencies to 30MHz. **RADIATED EMISSION BELOW 1GHZ**

EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206	
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 1	Antenna	Horizontal	

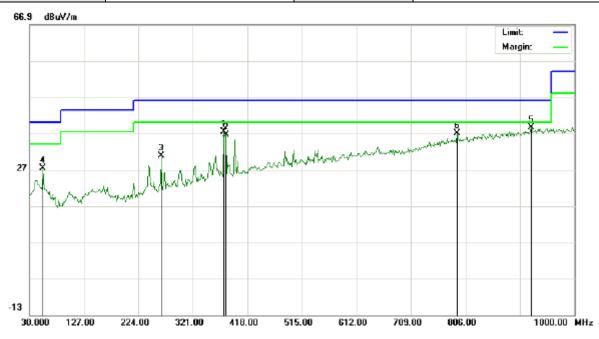


		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	375.9667	17.32	23.95	41.27	46.00	-4.73	peak			
2		395.3667	14.66	24.67	39.33	46.00	-6.67	peak			
3		264.4167	14.13	20.12	34.25	46.00	-11.75	peak			
4		39.7000	2.17	21.51	23.68	40.00	-16.32	peak			
5		925.6333	4.34	34.93	39.27	46.00	-6.73	peak			
6		791.4500	3.44	32.96	36.40	46.00	-9.60	peak			

**RESULT: PASS** 



EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	•	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		375.9667	13.40	23.95	37.35	46.00	-8.65	peak			
2		379.2000	12.57	24.07	36.64	46.00	-9.36	peak			
3		264.4167	10.63	20.12	30.75	46.00	-15.25	peak			
4		54.2500	6.37	21.01	27.38	40.00	-12.62	peak			
5	*	922.4000	3.73	34.89	38.62	46.00	-7.38	peak			
6		791.4500	4.12	32.96	37.08	46.00	-8.92	peak			

# **RESULT: PASS**

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 1 is the worst case and recorded in the report.



#### **RADIATED EMISSION ABOVE 1GHZ**

EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206				
Temperature	25°C	Relative Humidity	55.4%				
Pressure	960hPa	Test Voltage	Normal Voltage				
Test Mode	Mode 1	Antenna	Horizontal				

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)			
4820.062	58.69	3.76	62.45	74.00	-11.55	peak		
4820.062	44.57	3.76	48.33	54.00	-5.67	AVG		
7230.093	51.24	8.17	59.41	74.00	-14.59	peak		
7230.093	39.01	8.17	47.18	54.00	-6.82	AVG		
Remark:								
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Frequency	Meter	Factor	Emission	Limits	Margin			
	Reading		Level			Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)			
4820.062	57.57	3.76	61.33	74.00	-12.67	peak		
4820.062	43.49	3.76	47.25	54.00	-6.75	AVG		
7230.093	50.11	8.17	58.28	74.00	-15.72	peak		
7230.093	37.62	8.17	45.79	54.00	-8.21	AVG		
Remark:								
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.							



EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)			
4882.062	58.96	3.78	62.74	74.00	-11.26	peak		
4882.062	44.67	3.78	48.45	54.00	-5.55	AVG		
7323.093	51.55	8.23	59.78	74.00	-14.22	peak		
7323.093	39.46	8.23	47.69	54.00	-6.31	AVG		
Remark:								
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.							

EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter	Factor	Emission	Limits	Margin			
Trequency	Reading	1 20101	Level	Linits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)			
4882.062	57.69	3.78	61.47	74.00	-12.53	peak		
4882.062	43.91	3.78	47.69	54.00	-6.31	AVG		
7323.093	50.89	8.23	59.12	74.00	-14.88	peak		
7323.093	38.65	8.23	46.88	54.00	-7.12	AVG		
Remark:								
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.							



EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency	Meter Reading	Factor		Limits	Margin	Value Type			
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)				
4954.062	57.44	3.81	61.25	74.00	-12.75	peak			
4954.062	44.23	3.81	48.04	54.00	-5.96	AVG			
7431.093	50.78	8.27	59.05	74.00	-14.95	peak			
7431.093	38.26	8.27	46.53	54.00	-7.47	AVG			
Remark:									
Factor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.								

EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Fraguanay	Meter	Factor	Emission	Emission Limits				
Frequency	Reading	Factor	Level	Limits	Margin	Value Type		
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)			
4954.062	56.63	3.81	60.44	74.00	-13.56	AVG		
4954.062	42.31	3.81	46.12	54.00	-7.88	peak		
7431.093	50.47	8.27	58.74	74.00	-15.26	AVG		
7431.093	37.36	8.27	45.63	54.00	-8.37	peak		
Remark:								
Factor = Antenna Factor + Cable Loss – Pre-amplifier.								

# **RESULT: PASS**

Note:

Other emissions from 1G to 25 GHz are considered as ambient noise. No recording in the test report.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.



### TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

	TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS									
EUT	2.4GHz Digital Wireless Baby Monitor Model Name		GD8206							
Temperature	25°C	Relative Humidity	55.4%							
Pressure	960hPa	Test Voltage	Normal Voltage							
Test Mode	Mode 1	Antenna	Horizontal							

ΡK



AV

Keysight Spectrum Analyzer - Swept SA					- 0 ×
Marker 1 2.410135135135	GHz		ALIGN AUTO Type: Log-Pwr	TRACE 1 2 3 4 5 6	Peak Search
	PNO: Fast Trig: Fro IFGain:Low #Atten:		Hold:>100/100	DET PNNNN	
10 dB/div Ref 106.99 dBµV			Mkr1	2.410 14 GHz 87.156 dBµV	Next Peak
				1	Next Pk Right
77.0 67.0					
67.0 47.0				J Lun	Next Pk Left
37.0	Q <sup>2</sup>	~~~~			Marker Delta
17.0					Marker Della
Start 2.37000 GHz #Res BW 1.0 MHz	#VBW 1.3 kHz		s Sweep 27	Stop 2.41500 GHz .04 ms (1000 pts)	Mkr→CF
MKR MODE TRC SCL X	0 14 GHz 87.156 d	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f 2.39 3 4 5	0 00 GHz 32.534 d	BμV		Ξ.	Mkr→RefLvl
6 7 8					More
9 10 11				-	1 of 2
MSG			STATUS		

**RESULT: PASS** 



EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical





RF 50 Ω AC ter 1 2.409954954955 GHz PNO: Fast IFGain:Low #Atten: 10 dB Peak Search Aug Type: Log-Pwr Avg Hold:>100/100 Next Peak 2.409 9 85.204 Ref 106.99 dBµV Next Pk Right Next Pk Left \_\_\_\_\_\_\_**2**\_\_\_\_\_ Marker Delta Start 2.37000 GHz #Res BW 1.0 MHz Stop 2.41500 GHz 27.04 ms (1000 pts) #VBW 1.3 kHz Mkr→CF Sweep 2.409 95 GHz 2.390 00 GHz 85.204 dBµV 31.705 dBµV 1 f 1 f N Mkr→RefLvl More 1 of 2 STATUS

**RESULT: PASS** 



EUT	2.4GHz Digital Wireless Baby Monitor Model Name		GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

ΡK



										A٧								
	ght Spec		Analyzer - S															- 0 -
Mark	er 1	RF 2.47	<sup>50</sup> 75915		PI	VO: Fast		Trig: Fre				Туре	ALIGN AUTO : Log-Pwi >100/100	r	TY	CE 1 2 3 4 PE MWAA	AAAA	Peak Search
10 dB/	/div	Rei	f 106.9	19 dBj		Gain:Lov	v	#Atten: *	10 dB				Mk	( <b>r1</b>	□ 2.475 101.56	92 G	12	Next Peak
Log 97.0 87.0				1_	~													Next Pk Right
67.0 <b>4</b> 7.0								mad 2	****	Selen United Vige		hall dry from	۳یال <i>ار</i> ادار					Next Pk Left
37.0 - 27.0 - 17.0 -															manhl	whilling a	<u> </u>	Marker Delta
Start #Res	BW	1.0 1	VIHz			#V	/BW	3.0 MHz	z	FUNC	TION		Sweep	1.0				Mkr→CF
1 2 3 4 5 6	V 1	f		2	2.475 9 2.483 5	2 GHz 0 GHz		01.567 dl 66.292 dl	BμV BμV									Mkr→RefLvl
7 8 9 10 11																	Ţ	More 1 of 2
MSG	_	_					_	m	_			_	STAT	rus			•	

**RESULT: PASS** 



EUT	2.4GHz Digital Wireless Baby Monitor	Model Name	GD8206
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



#### **RESULT: PASS**

**Note**: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB( $\mu$ V) to represent the Amplitude. Use the F dB( $\mu$ V/m) to represent the Field Strength. So A=F. All test modes had been pre-tested.



# FCC LINE CONDUCTED EMISSION TEST

# 6.4. LIMITS OF LINE CONDUCTED EMISSION TEST

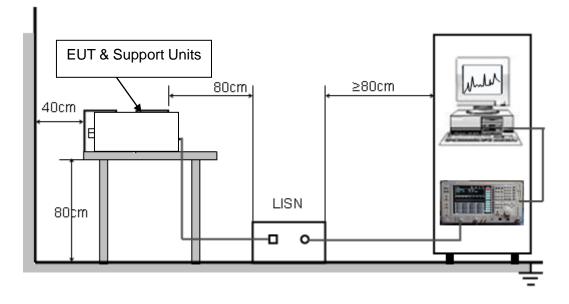
Frequency	Maximum RF Line Voltage				
Frequency	Q.P.( dBuV)	Average( dBuV)			
150kHz~500kHz	66-56	56-46			
500kHz~5MHz	56	46			
5MHz~30MHz	60	50			

Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

# 6.5. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST





# 6.6. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received charging voltage by adapter which received 120V/60Hzpower by a LISN..
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

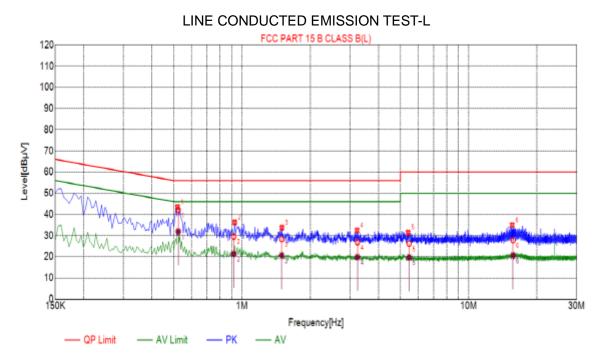
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

# 6.7. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.



# 6.8. TEST RESULT OF LINE CONDUCTED EMISSION TEST



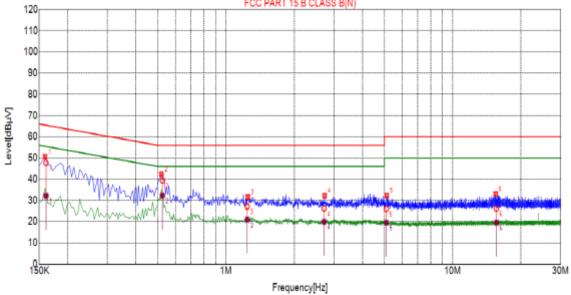
Suspected List								
NO.	Freq. [MHz]	Level [dBµV]	Factor [diB]	Limit [dBµV]	Margin [dB]	Detector		
1	0.5190	43.47	10.04	56.00	12.53	PK		
2	0.9285	36.23	10.06	56.00	19.77	PK		
3	1.5000	33.73	10.10	56.00	22.27	PK		
4	3.2190	32.44	10.23	56.00	23.56	PK		
5	5.4105	31.37	10.26	60.00	28.63	PK		
6	15.5715	34.94	9.97	60.00	25.06	PK		

Final	Final Data List									
NO.	Freq. [MHz]	Factor (dB)	QP Value [d8µV]	QP Limit (d8µV)	QP Margin (dB)	AV Value (dBµV]	AV Limit (dBµV)	AV Margin [dB]		
1	0.5229	10.04	42.17	56.00	13.83	31.85	46.00	14.15		
2	0.9192	10.06	29.55	56.00	26.45	21.29	46.00	24.71		
3	1.4970	10.10	28.39	56.00	27.61	20.57	46.00	25.43		
4	3.2329	10.23	26.91	56.00	29.09	19.86	46.00	26.14		
5	5.4645	10.26	26.24	60.00	33.76	19.79	50.00	30.21		
6	15.7049	9.97	27.83	60.00	32.17	20.58	50.00	29.42		

**RESULT: PASS** 



#### LINE CONDUCTED EMISSION TEST-N FCC PART 15 B CLASS B(N)



Suspected List									
NO.	Freq. [MHz]	Level [dBµV]	Factor [dB]	Limit [dBµV]	Margin [dB]	Detector			
1	0.1590	50.61	10.01	65.52	14.91	PK			
2	0.5190	42.41	10.04	56.00	13.59	PK			
3	1.2480	31.59	10.09	56.00	24.41	PK			
4	2.7240	32.19	10.21	56.00	23.81	PK			
5	5.1180	32.25	10.26	60.00	27.75	PK			
6	15.4905	33.10	9.97	60.00	26.90	PK			

Final	Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [d8µV]	QP Limit [d8µV]	QP Margin (dB)	AV Value [dBµV]	AV Limit [dBµV]	AV Margin (dB)		
1	0.1606	10.00	47.66	65.43	17.77	32.14	55.43	23.29		
2	0.5242	10.04	39.47	56.00	16.53	32.25	46.00	13.75		
3	1.2401	10.09	27.14	56.00	28.86	20.93	46.00	25.07		
4	2.7101	10.21	26.21	56.00	29.79	19.97	46.00	26.03		
5	5.0968	10.26	25.99	60.00	34.01	19.53	50.00	30.47		
6	15.6030	9.97	26.16	60.00	33.84	19.54	50.00	30.46		

**RESULT: PASS** 

---- QP Limit

- AV Limit

— РК

---- AV



# 7. Number of Hopping Frequency

## 7.1. Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. 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.

2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

3. VBW  $\geq$  RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.

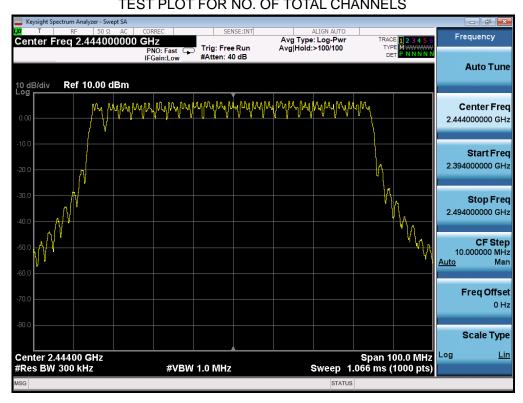
4. Allow the trace to stabilize.

## 7.2. Test Setup (Block Diagram of Configuration)

Same as described in section 4.2

### 7.3. Limits and Measurement Result

TOTAL NO. OF	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT	
HOPPING CHANNEL	>=15	23	PASS	
1				





# 8. Time Of Occupancy (Dwell Time)

# 8.1. Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.

2. RBW shall be  $\leq$  channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

3. Sweep: 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; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

4. Detector function: Peak. Trace: Max hold.

5. Use the marker-delta function to determine the transmit time per hop.

6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer)  $\times$  (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

# 8.2. Test Setup (Block Diagram of Configuration)

Same as described in section 4.2

#### Time of Pulse Number of hops in the period Limit Sweep Time Channel (ms) specified in the requirements (ms) (ms) 3.226 Low 274.210 400 85 Middle 3.231 87 281.097 400 3.224 83 267.592 400 High

# 8.3. Limits and Measurement Result

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer)  $\times$  (period specified in the requirements / analyzer sweep time)

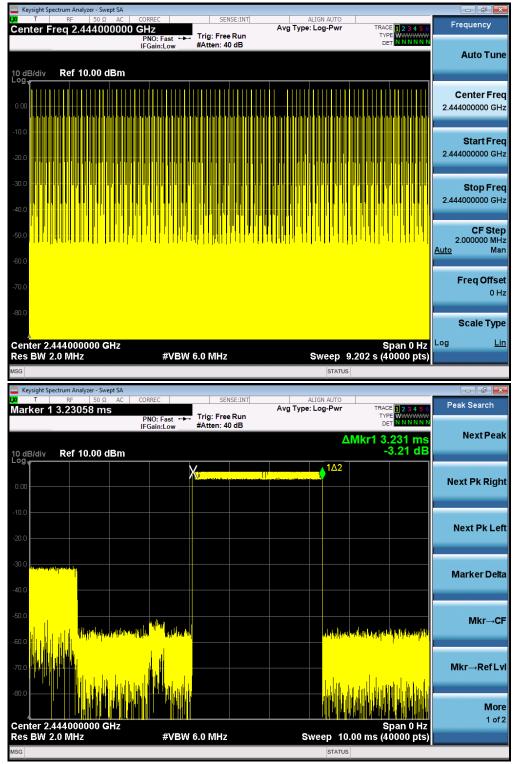
analyzer sweep time=0.4\*23s=9.2s period specified in the requirements / analyzer sweep time=1

# TEST PLOT OF LOW CHANNEL

Keysight Spectrum Analyzer - Swept SA				
Image: T         RF         50 Ω         AC         CORREC           Center Freq 2.410000000 GHz	SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	TRACE 1 2 3 4 5 6	Frequency
PNO: Fa IFGain:L	st ↔ Trig: Free Run ow #Atten: 40 dB		TYPE WWWWWW DET N N N N N N	
				Auto Tune
10 dB/div Ref 10.00 dBm				
0.00				Center Freq 2.410000000 GHz
				2.410000000 GH2
-10.0				Start Freq
-20.0				2.410000000 GHz
-30.0				Stop Freq
-40.0				2.410000000 GHz
				CE Step
-50.0		IN THE REAL PROPERTY OF THE		CF Step 2.000000 MHz
-60.0				<u>Auto</u> Man
				Freq Offset
-70.0				0 Hz
-80.0				
				Scale Type
Center 2.410000000 GHz			Span 0 Hz	Log <u>Lin</u>
		<b>A</b>	aa = (1 aa aa a + +)	
Res BW 2.0 MHz #	VBW 6.0 MHz		02 s (40000 pts)	
Res BW 2.0 MHz #	VBW 6.0 MHz	Sweep 9.2	02 s (40000 pts)	
Res BW 2.0 MHz         #           MsG	VBW 6.0 MHz	STATUS ALIGN AUTO	02 s (40000 pts)	Peak Search
Res BW 2.0 MHz         #           MsG	sense:int st ↔ Trig: Free Run	STATUS	02 s (40000 pts)	Peak Search
Res BW 2.0 MHz         #           Msg	sense:int st ↔ Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr	02 s (40000 pts) TRACE 123456 TYPE WWWWWW DET NNNNNN	Peak Search
Res BW 2.0 MHz     #       Msg	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	02 s (40000 pts)	Peak Search
Res BW 2.0 MHz     #       MsG	sense:int st ↔ Trig: Free Run	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak
Res BW 2.0 MHz     #       Msg	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak
Res BW 2.0 MHz     #       MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 12 3 4 5 6 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left
Res BW 2.0 MHz         #           MsG         MsG           MsG         Correction           Marker 1 3.22558 ms         PNO: Failed and the second and	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Res BW 2.0 MHz         #           Msg	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left
Res BW 2.0 MHz         #           Msg	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Res BW 2.0 MHz         #           MsG	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta
Res BW 2.0 MHz         #           MsG         MsG           Keysight Spectrum Analyzer - Swept SA         MsG           W T         FF         50 Ω         AC         CORREC           Marker 1 3.22558 ms         PRO: Fairs         PRO: Fairs         PRO: Fairs           10 dE/div         Ref 10.00 dBm         PRO: Fairs         PRO: Fairs           0.00         AC         CORREC         PRO: Fairs           0.00         AC         AC         CORREC           0.00         AC         AC         CORREC           0.00         AC         AC         AC           0.00         AC         AC         AC           -0.00	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF
Res BW 2.0 MHz         #           MsG         MsG           Keysight Spectrum Analyzer - Swept SA         MsG           W T         FF         50 Ω         AC         CORREC           Marker 1 3.22558 ms         PRO: Fairs         PRO: Fairs         PRO: Fairs           10 dE/div         Ref 10.00 dBm         PRO: Fairs         PRO: Fairs           0.00         AC         CORREC         PRO: Fairs           0.00         AC         AC         CORREC           0.00         AC         AC         CORREC           0.00         AC         AC         AC           0.00         AC         AC         AC           -0.00	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl
Res BW 2.0 MHz         #           MSG         MSG           MSG         CORREC           Marker 1 3.22558 ms         PNO: Failed in the second	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO Avg Type: Log-Pwr	17RACE 2.3456 TYPE WANNIN kr1 3.226 ms 0.27 dB	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→Ref Lvl More
Res BW 2.0 MHz         #           MsG         MsG           Keysight Spectrum Analyzer - Swept SA         CORREC           Marker 1 3.22558 ms         PRO: Failer Spectrum Analyzer - Swept SA           10 dE/div         Ref 10.00 dBm           0.00         AC           10 dE/div         Ref 10.00 dBm           20.0         AC           -10.0         AC           -20.0         AC           -30.0         AC           -40.0         AC           -60.0         AC           -70.0         AC           -80.0         AC <td>st →→ Trig: Free Run #Atten: 40 dB</td> <td>ALIGN AUTO       Avg Type: Log-Pwr</td> <td>TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms</td> <td>Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl</td>	st →→ Trig: Free Run #Atten: 40 dB	ALIGN AUTO       Avg Type: Log-Pwr	TRACE 23456 TYPE WWWWWW DET NNNNN kr1 3.226 ms	Peak Search Next Peak Next Pk Right Next Pk Left Marker Delta Mkr→CF Mkr→Ref Lvl

#### Page 42 of 55

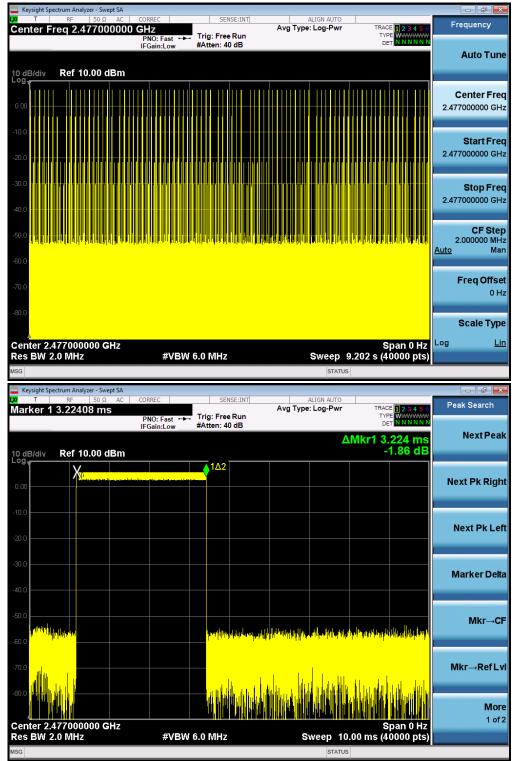
#### TEST PLOT OF MIDDLE CHANNEL





### Page 43 of 55

#### TEST PLOT OF HIGH CHANNEL





# 9. Frequency Separation

# 9.1. Measurement Procedure

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.

2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

3. Video (or average) bandwidth (VBW)  $\geq$  RBW.

4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

# 9.2. Test Setup (Block Diagram of Configuration)

Same as described in section 4.2

## 9.3. Limits and Measurement Result

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	Data
CH01-CH02	2996	>=25 KHz or 2/3 20 dB BW	Pass
	TEST PLOT FO	R FREQUENCY SEPARATION	

Keysight Sp	ectrum Analyzer - Swep RF 50 Ω		050		or we					
Marker 1	RF 50 Ω Δ 2.995995	996 MHz					ALIGN AUTO	TRA	CE 1 2 3 4 5 6	Peak Search
			IO: Fast 🕞 Sain:Low	#Atten: 4		Avginoid				Next Peak
10 dB/div Log	Ref 10.00 d	Bm					Δ	Mkr1 2.9 (	96 MHz 0.013 dB	Nextreak
0.00	m hannarde		-	2	m	Same Same	1 <u>∆</u> 2	NW Margan		Next Pk Right
								-	Mr.	
-10.0									- Area -	Next Pk Left
-30.0										Marker Delta
-40.0										
-50.0										Mkr→CF
-60.0										
70.0										Mice Doff vi
-70.0										Mkr→RefLv
-80.0										More
Start 2.47	70000 GHz							Ston 2.49	0000 GHz	1 of 2
#Res BW			#VBW	1.0 MHz			Sweep	1.066 ms	(1000 GH2 (1000 pts)	
MSG							STATU	JS		

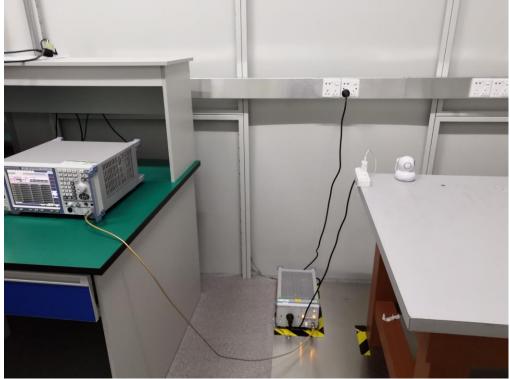


# Test Setup Photos of the EUT





**Conducted Emission** 





# 10. Photograph of EUT





TOP VIEW OF EUT



BOTTOM VIEW OF EUT





FRONT VIEW OF EUT



#### BACK VIEW OF EUT





#### LEFT VIEW OF EUT

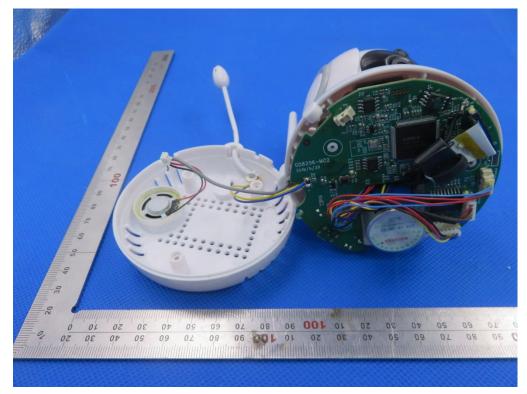


#### **RIGHT VIEW OF EUT**

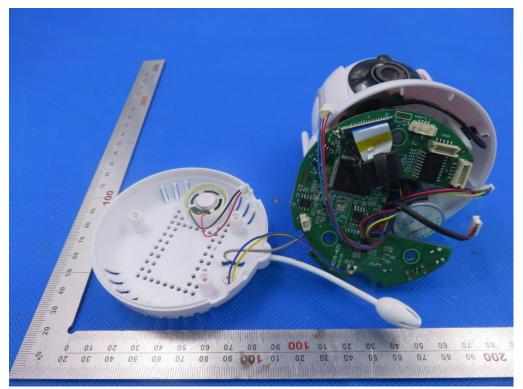




**OPEN VIEW-1 OF EUT** 

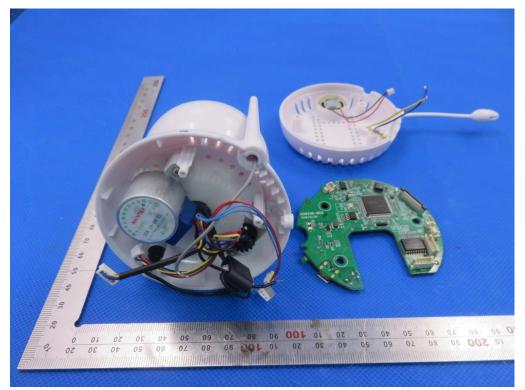


OPEN VIEW-2 OF EUT

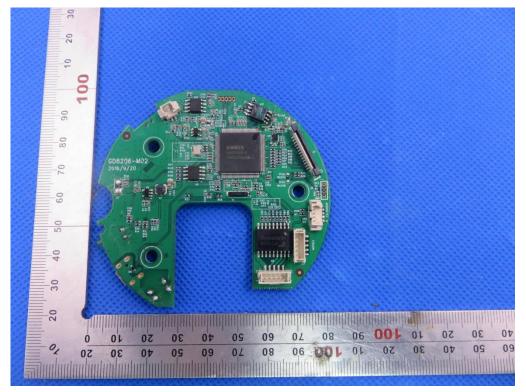




**OPEN VIEW-3 OF EUT** 

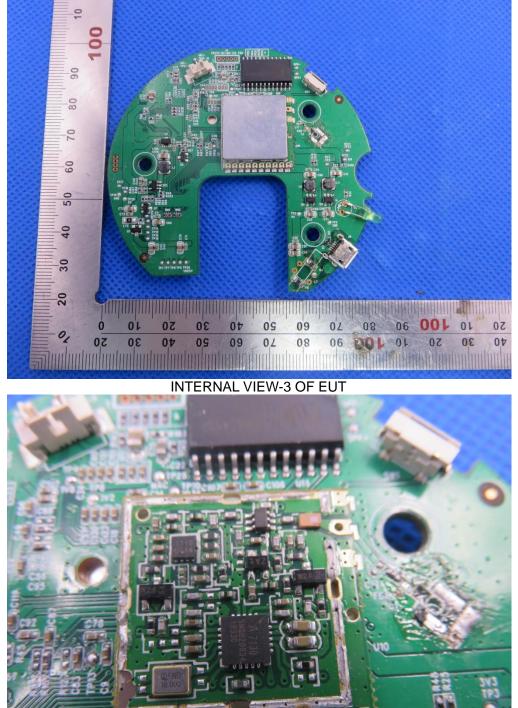


INTERNAL VIEW-1 OF EUT





#### INTERNAL VIEW-2 OF EUT

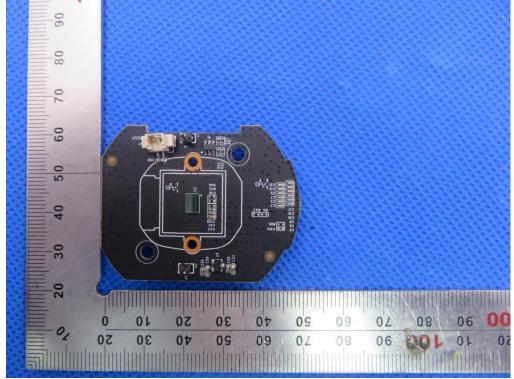




#### INTERNAL VIEW-4 OF EUT



## INTERNAL VIEW-5 OF EUT





INTERNAL VIEW-6 OF EUT

