Product Service

FCC - TEST REPORT

Report Number	:	**708881833512-00**	Date of Issue:	September 26, 2018

FCC ID	:	RQ9CMFB
Model	:	R013-CMFB, R013PH2-X07, R013PH2-1DIN R013-CMFB WDAB, R013PH2-X07 WDAB, R013PH2-1DIN WDAB
Product Type	:	Car Radio With Bluetooth
Applicant	:	Yanfeng Visteon Automotive Electronics Co.,Ltd
Address	:	300 Minolta Road Songjiang County Shanghai, China
Manufacturer	:	Yanfeng Visteon Automotive Electronics Co.,Ltd
Address	:	300 Minolta Road Songjiang County Shanghai, China

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	81

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai Branch No.16 Lane, 1951 Du Hui Road, Shanghai 201108, P.R. China
FCC Registration Number:	904822
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3 Description of the Equipment Under Test

Product:	Car Radio With Bluetooth
Model no.:	R013-CMFB, R013PH2-X07, R013PH2-1DIN R013-CMFB WDAB, R013PH2-X07 WDAB, R013PH2-1DIN WDAB
FCC ID:	RQ9CMFB
Options and accessories:	
Rating:	12VDC
RF Transmission Frequency:	2402~2480MHz
No. of Operated Channel:	79
Modulation:	GFSK, π/4DQPSK,8DPSK
Duty Cycle:	less than 100%
Antenna Type:	PCB
Bluetooth Antenna Gain:	-1dBi
Description of the EUT:	Car Radio With Bluetooth

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2014 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to Public Notice DA 00-705 -Frequency Hopper Spread Spectrum Test Procedure released by FCC on March 30, 2000 and C63.10 (2013).

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C,				
Test Condition		Pages	Test Site	Test Result
§15.207	Conducted emission AC power port	12	Site 1	N/A
§15.247(b)(1)	Conducted peak output power	13	Site 1	Pass
§15.247(a)(2)	6dB bandwidth	---	---	N/A
§15.247(a)(1)	20dB Bandwidth	18	Site 1	Pass
§15.247(a)(1)	Carrier frequency separation	23	Site 1	Pass
§15.247(a)(1)(iii)	Number of hopping frequencies	26	Site 1	Pass
§15.247(a)(1)(iii)	Dwell Time	28	Site 1	Pass
§15.247(e)	Power spectral density*	---	---	N/A
§15.247(d)	Spurious RF conducted emissions	31	Site 1	Pass
§15.247(d)	Band edge	35	Site 1	Pass
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	54	Site 1	Pass
§15.203	Antenna requirement	See note 2		Pass

Remark
Note 1: N/A=Not Applicable.
Note 2: The EUT uses a permanently PCB Antenna, which gain is 0dBi. In accordance to §15.203, It is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: RQ9CMFB complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

Model Number	DAB	Bluetooth (Y/N)	Mass (Kg)	LCD Panel (Y/N)	Speaker SPEC.
R013-CMFB WDAB	Y	Y	1,34	99.98mm*23.98mm	4× 25W(4Ω)
R013–CMFB	N	Y	1,33	99.98mm*23.98mm	4× 25W(4Ω)
R013PH2-X07 WDAB	Y	Y	1,15	99.98mm*23.98mm	4 × 25W(4Ω)
R013PH2-X07	N	Y	1,14	99.98mm*23.98mm	4 × 25W(4Ω)
R013PH2-1DIN WDAB	Y	Y	0.91	70mm*20mm	4 x 25W(4Ω)
R013PH2-1DIN	N	Y	0.90	70mm*20mm	4 x 25W(4Ω)

Above 6 car radios are use same Bluetooth module. Main PCB board is same in these 6 models.
So we choose the most complicated model R013-CMFB WDAB to perform all the tests.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: August 8, 2018

Testing Start Date: August 12, 2018

Testing End Date: August 15, 2018

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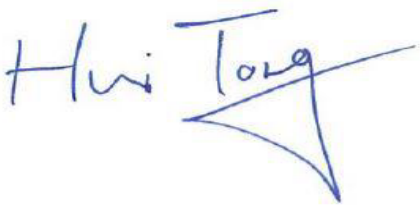
Reviewed by: Prepared by:



Hui TONG
Review Engineer

Jiaxi XU
Project Engineer

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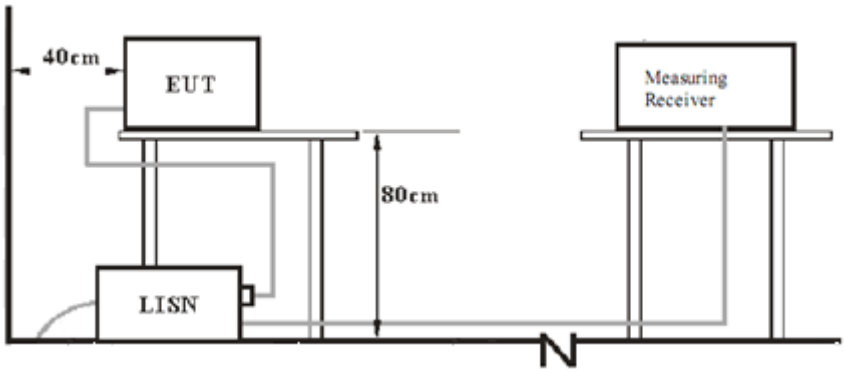
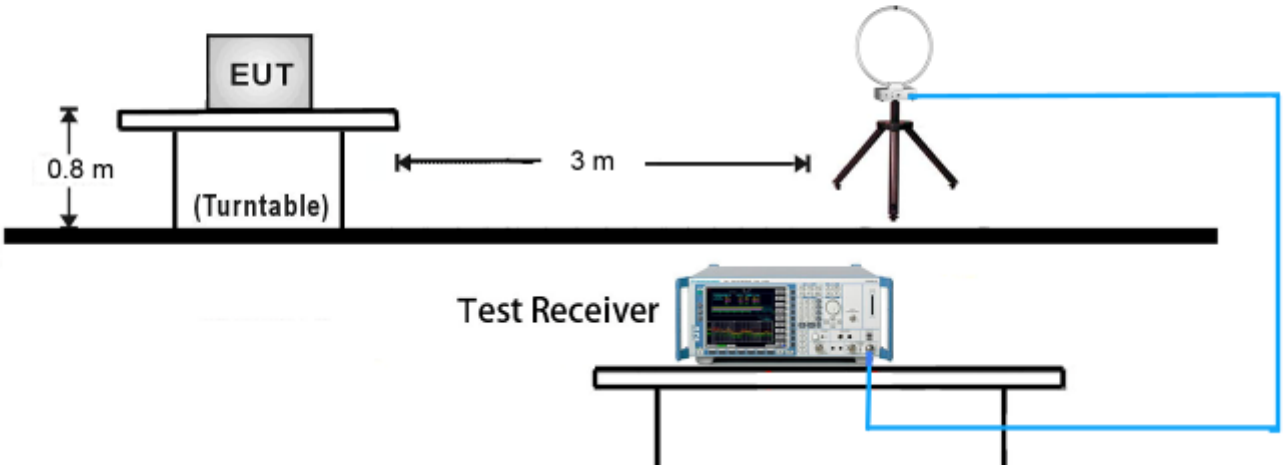
7 Test Setups

7.1 AC Power Line Conducted Emission test setups



7.2 Radiated test setups

9kHz ~ 30MHz Test Setup:



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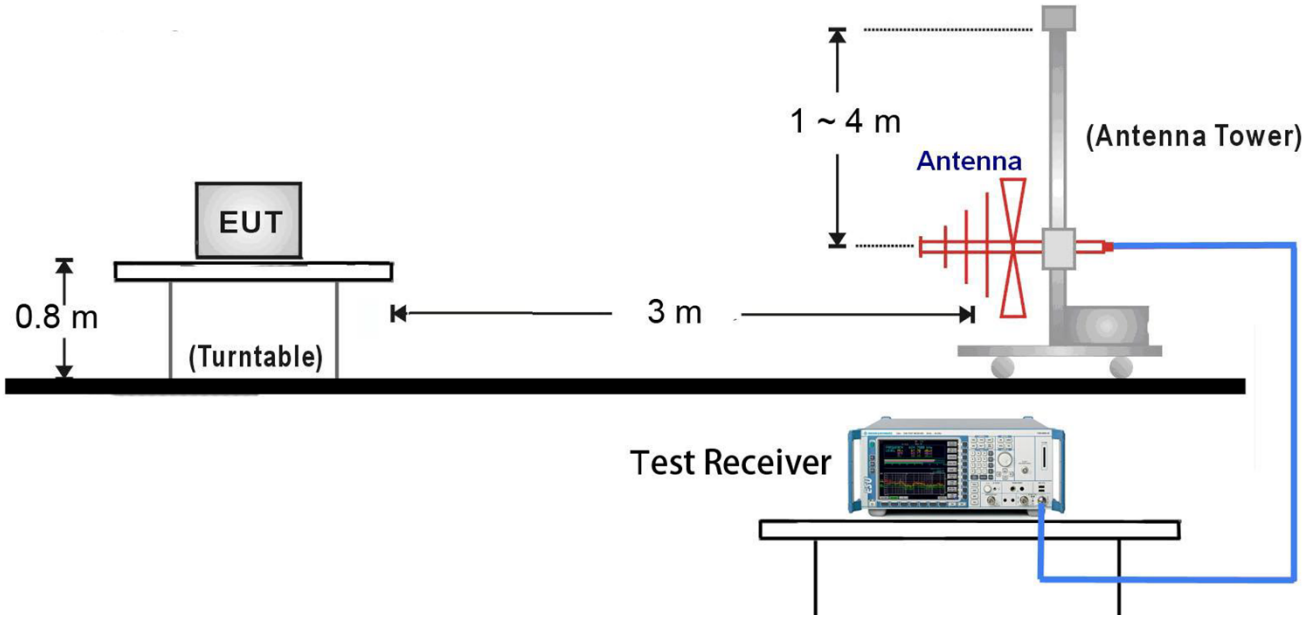
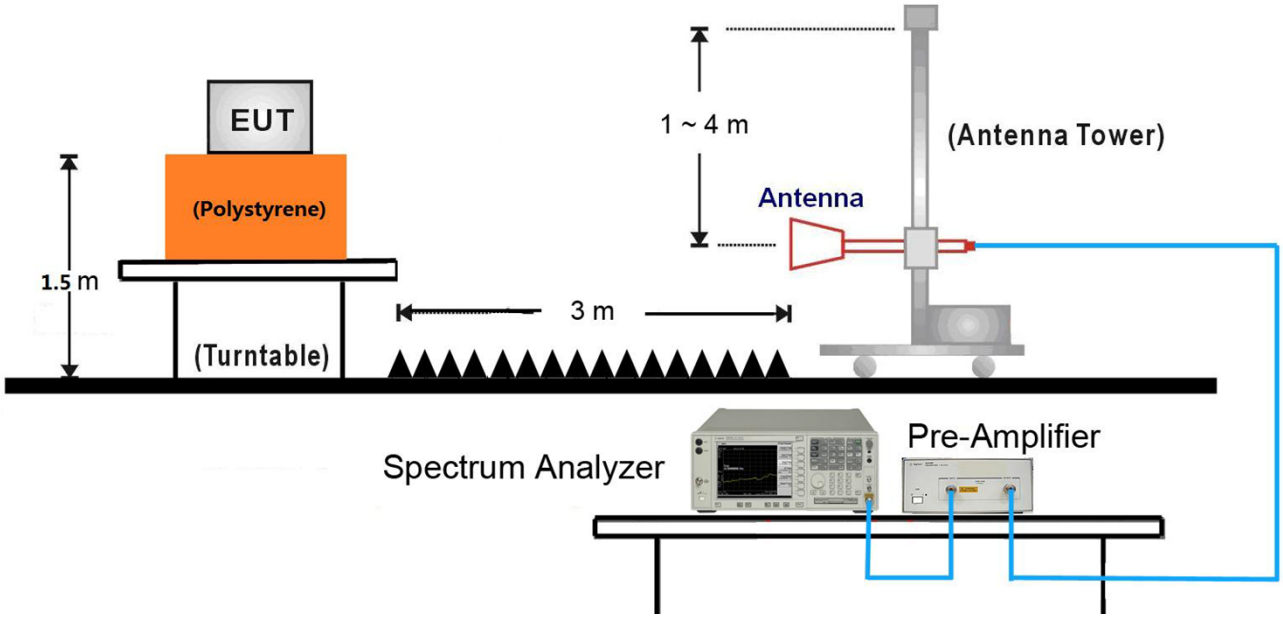
30MHz ~ 1GHz Test Setup:



1GHz ~ 18GHz Test Setup:



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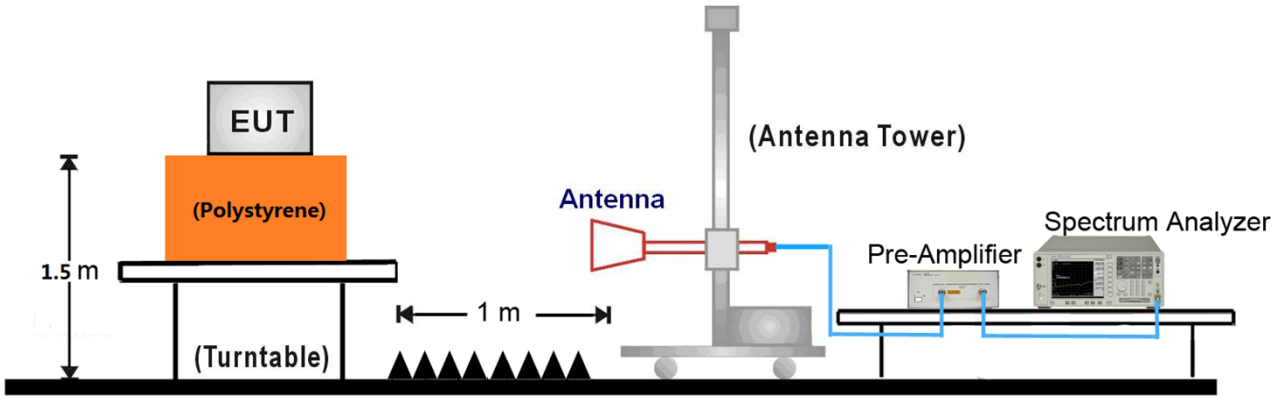
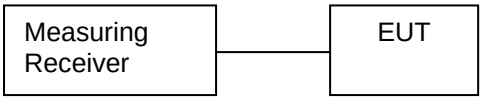
18GHz ~25GHz Test Setup:



7.3 Conducted RF test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Laptop	Lenovo	X230	---

Test software: BlueTest 3, which used to control the EUT in continues transmitting mode

The system was configured to hopping mode and non-hopping mode.

Hopping mode: typical working mode (normal hopping status)

Non-hopping mode: The system was configured to operate at a signal channel transmitting. The test software allows the configuration and operation at the worst-case duty and the highest transmit power

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50
Decreasing linearly with logarithm of the frequency		

Test Result

Power supply is by 12V DC Source, so this item is not evaluated.

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9.2 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
   Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel
   RBW > the 20 dB bandwidth of the emission being measured, VBW≥RBW,
   Sweep = auto, Detector function = peak, Trace = max hold
2. Add a correction factor to the display.
3. Allow the 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

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

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Conducted peak output power

Test Result

Test Mode	Channel No.	Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)
DH5	00	2402	3.82	< 30
DH5	39	2441	6.02	< 30
DH5	78	2480	6.9	< 30
2DH5	00	2402	2.14	< 30
2DH5	39	2441	5.12	< 30
2DH5	78	2480	5.81	< 30
3DH5	00	2402	2.53	< 30
3DH5	39	2441	5.32	< 30
3DH5	78	2480	6.08	< 30

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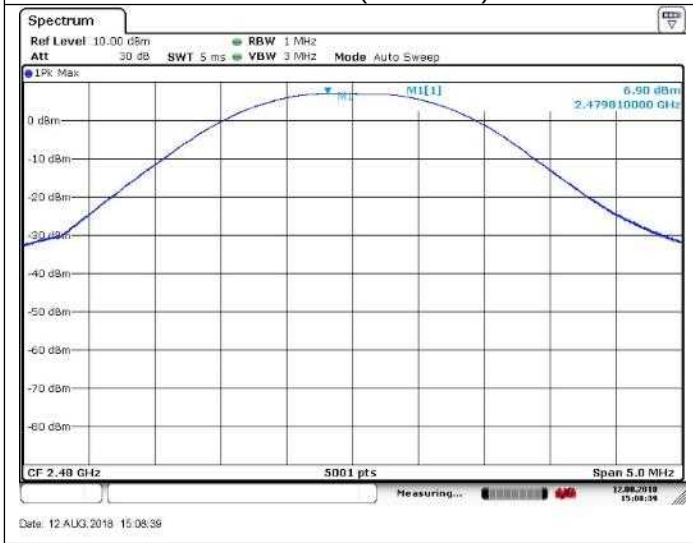
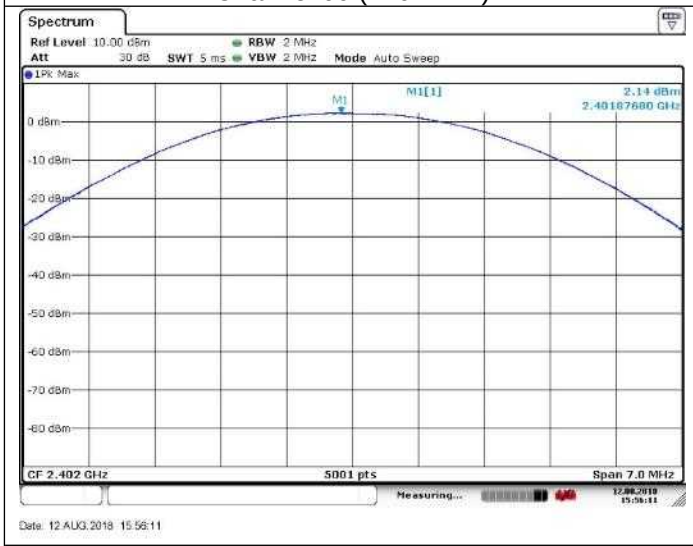
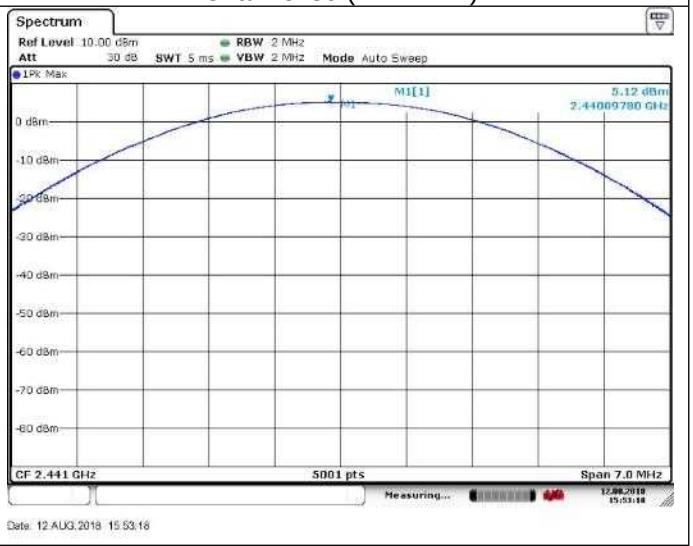
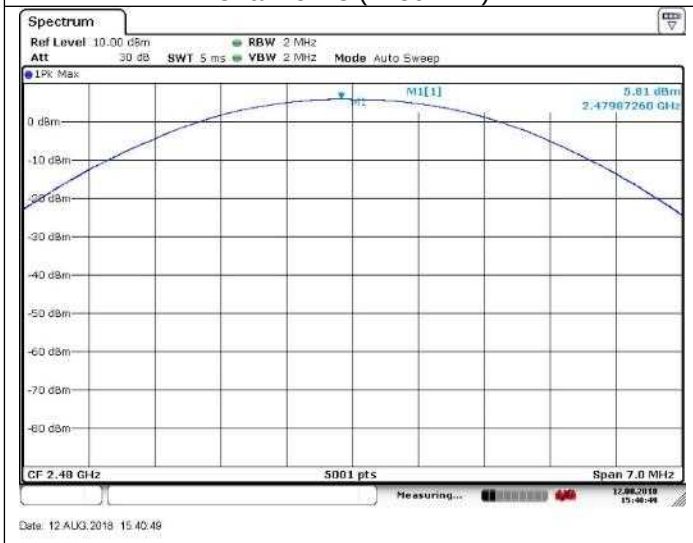
DH5 Output Power	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

Product Service

2DH5 Output Power	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

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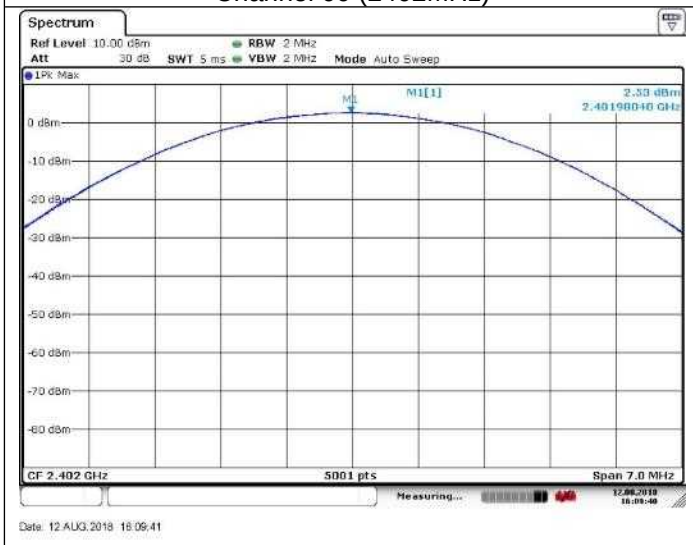
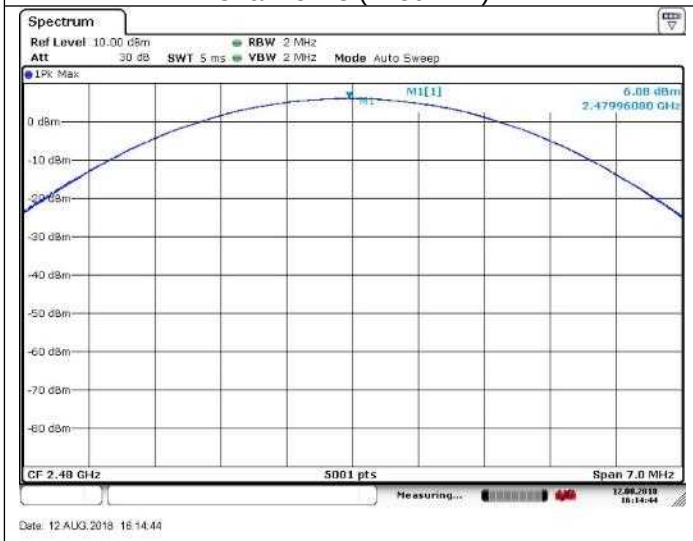
3DH5 Output Power	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

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9.3 20 dB Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit [kHz]
N/A

20 dB Bandwidth

Test Result

Test Mode	Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)	Result
DH5	00	2402	920.82	Pass
DH5	39	2441	920.22	Pass
DH5	78	2480	920.82	Pass
2DH5	00	2402	1274.75	Pass
2DH5	39	2441	1261.55	Pass
2DH5	78	2480	1279.54	Pass
3DH5	00	2402	1274.15	Pass
3DH5	39	2441	1279.54	Pass
3DH5	78	2480	1279.54	Pass

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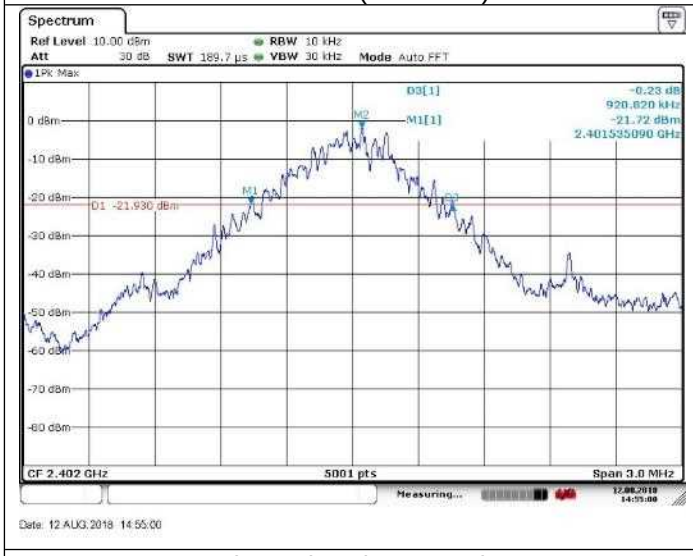
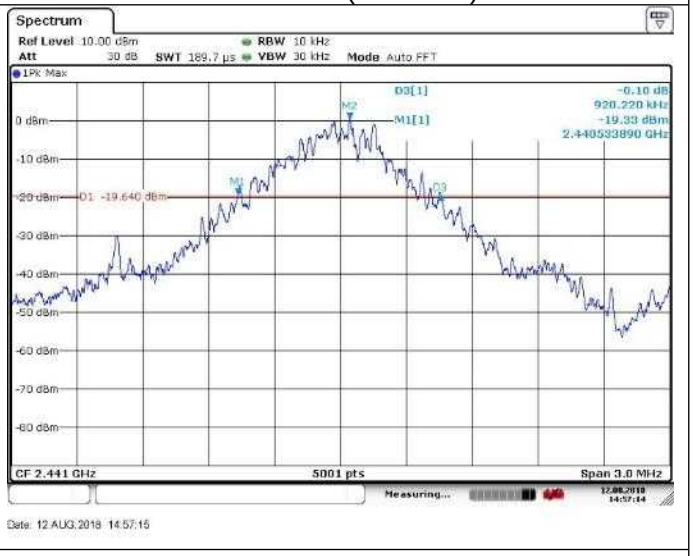
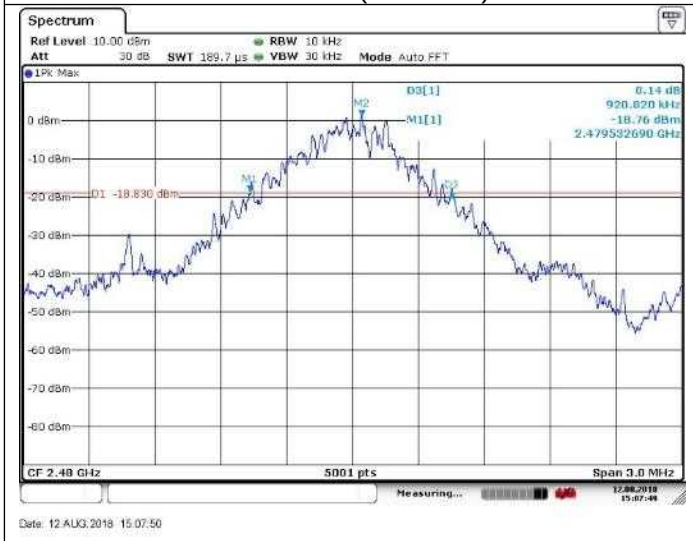
DH5 20dB Bandwidth	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

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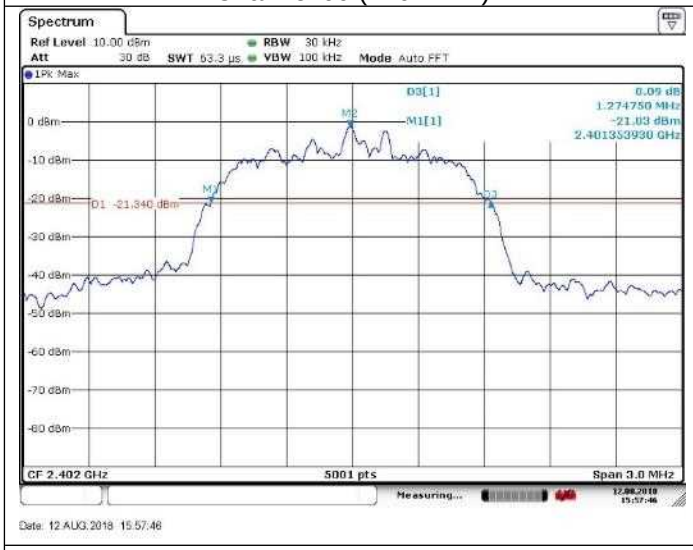
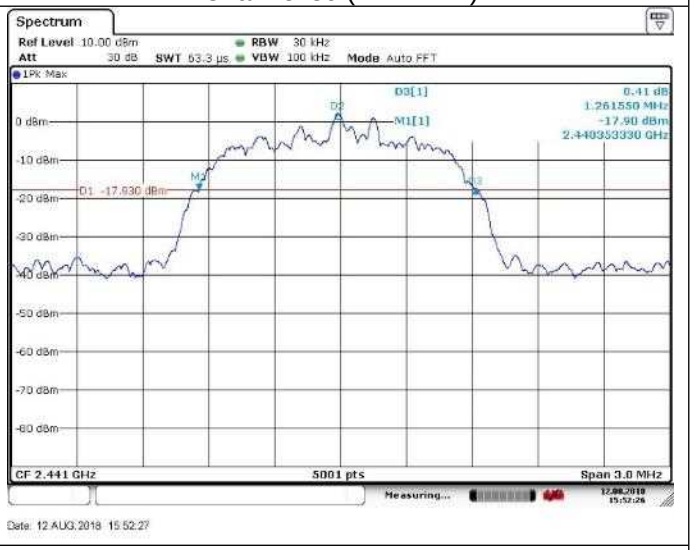
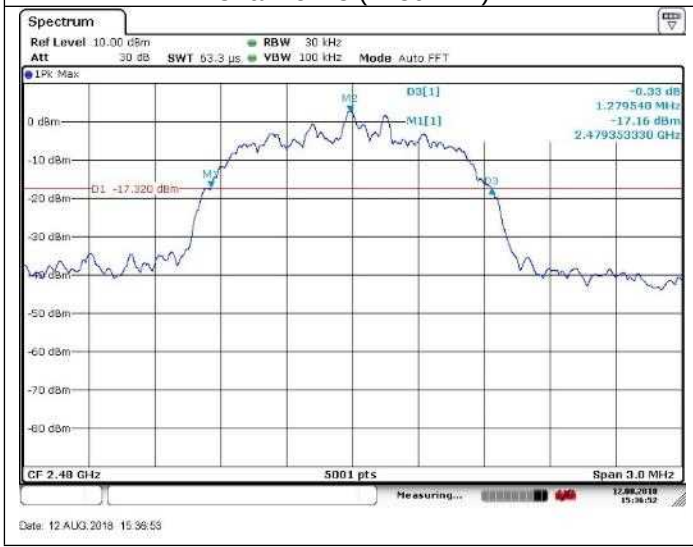
2DH5 20dB Bandwidth	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

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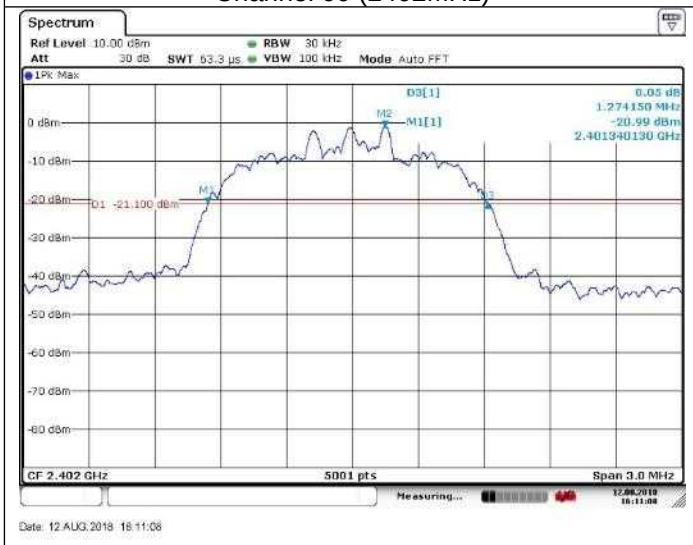
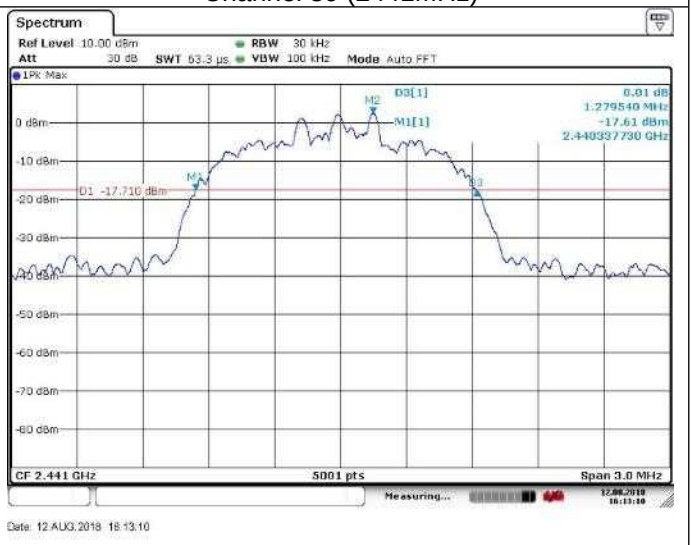
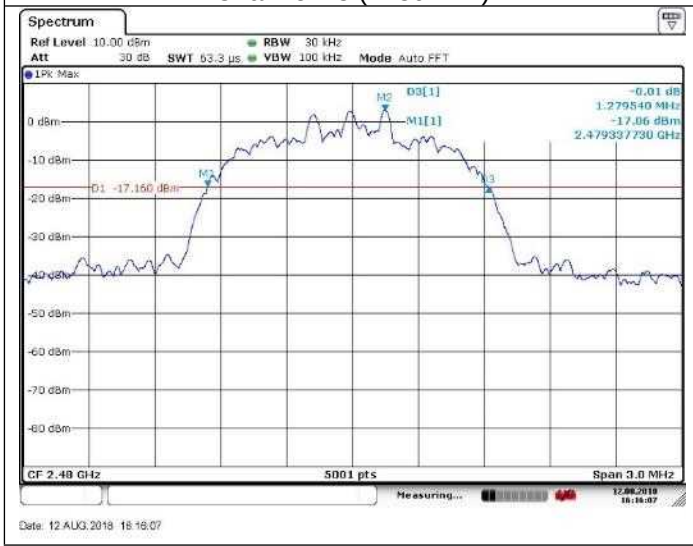
3DH5 20dB Bandwidth	
Channel 00 (2402MHz)	Channel 39 (2441MHz)
	
Channel 78 (2480MHz)	
	

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9.4 Carrier Frequency Separation

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit kHz
≥25KHz or 2/3 of the 20 dB bandwidth which is greater

DH5

Frequency MHz	2/3 of 20 dB Bandwidth kHz
2402	613.88
2441	613.48
2480	613.88

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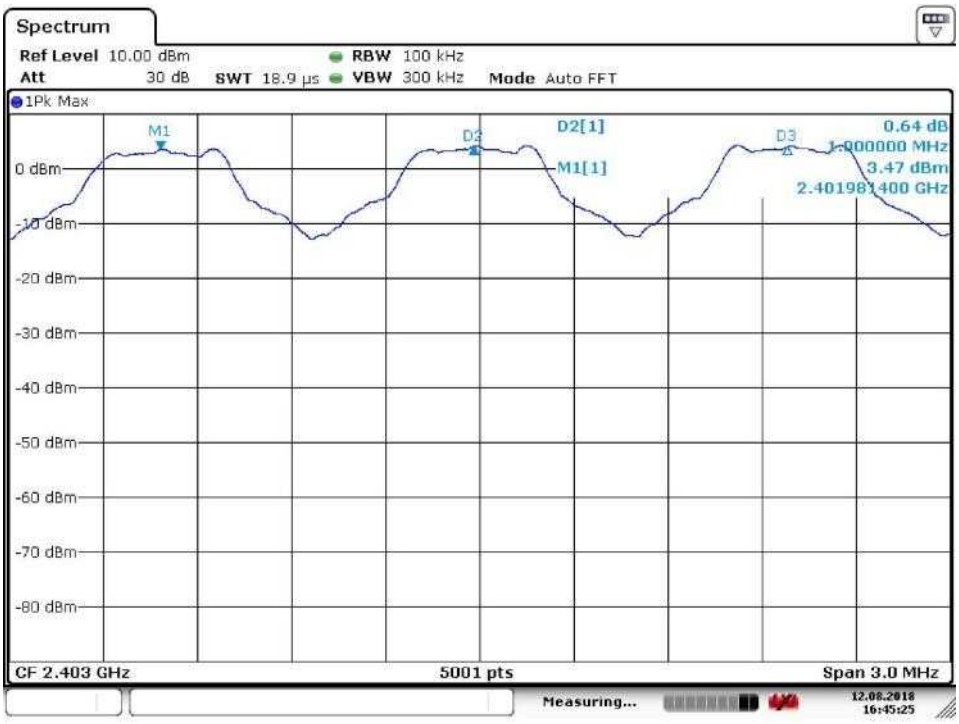
Carrier Frequency Separation

Test result: The measurement was performed with the typical configuration (normal hopping status), here GFSK modulation mode was used to show compliance.

DH5 test result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1000	Pass
2441	1000	Pass
2480	1000	Pass



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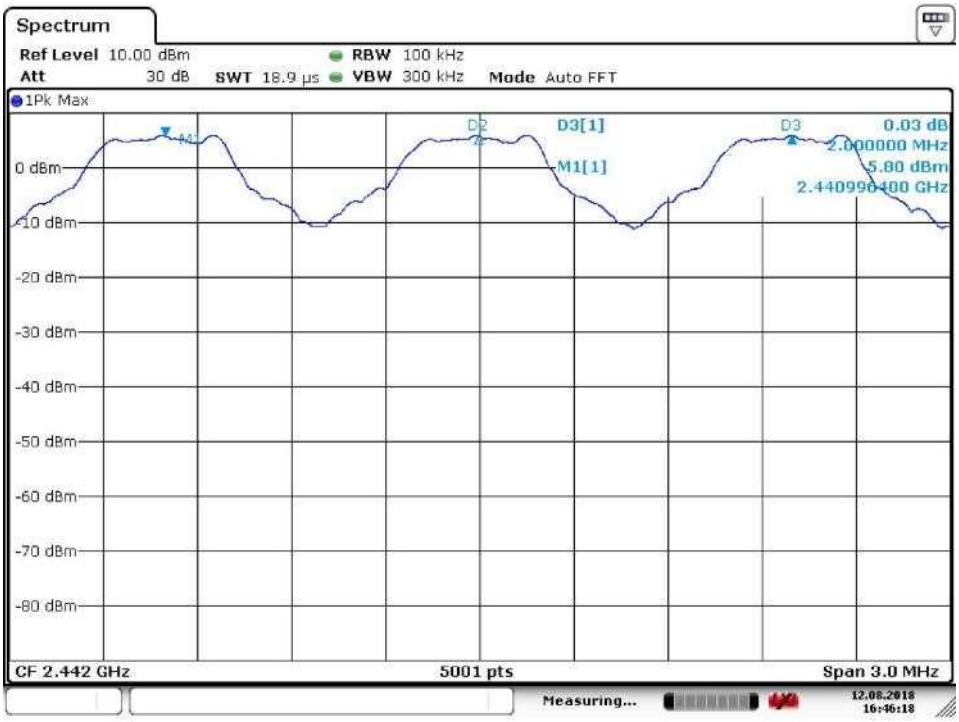

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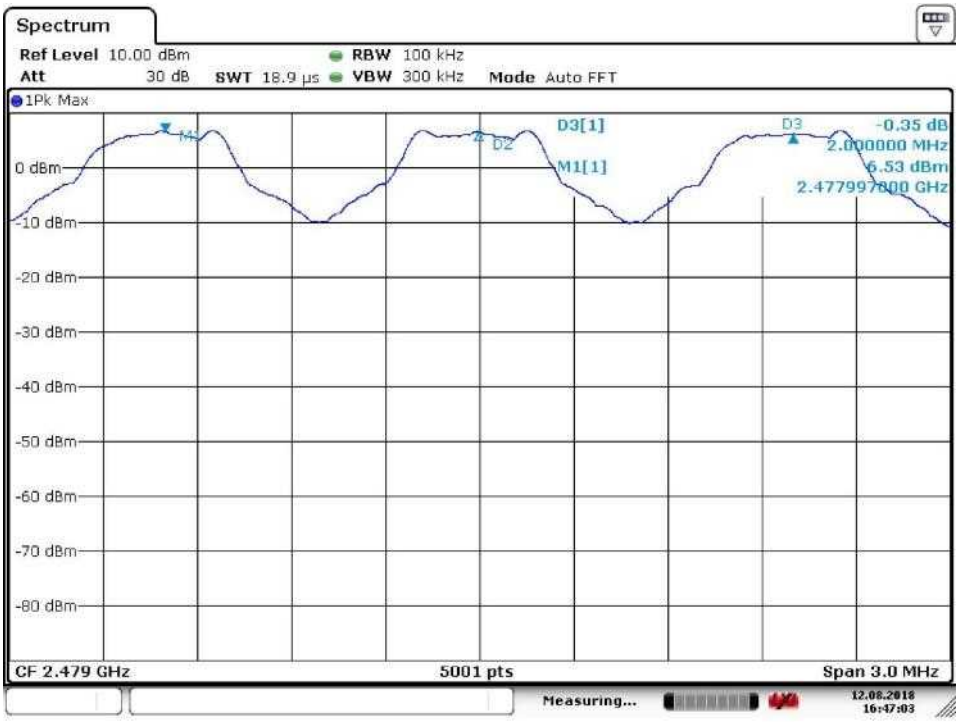

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9.5 Number of hopping frequencies

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels, RBW ≥ 1% of the span, VBW) ≥RBW, Sweep = auto, Detector function = peak
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode.
3. Record all the signals from each channel until each one has been recorded.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
≥ 15

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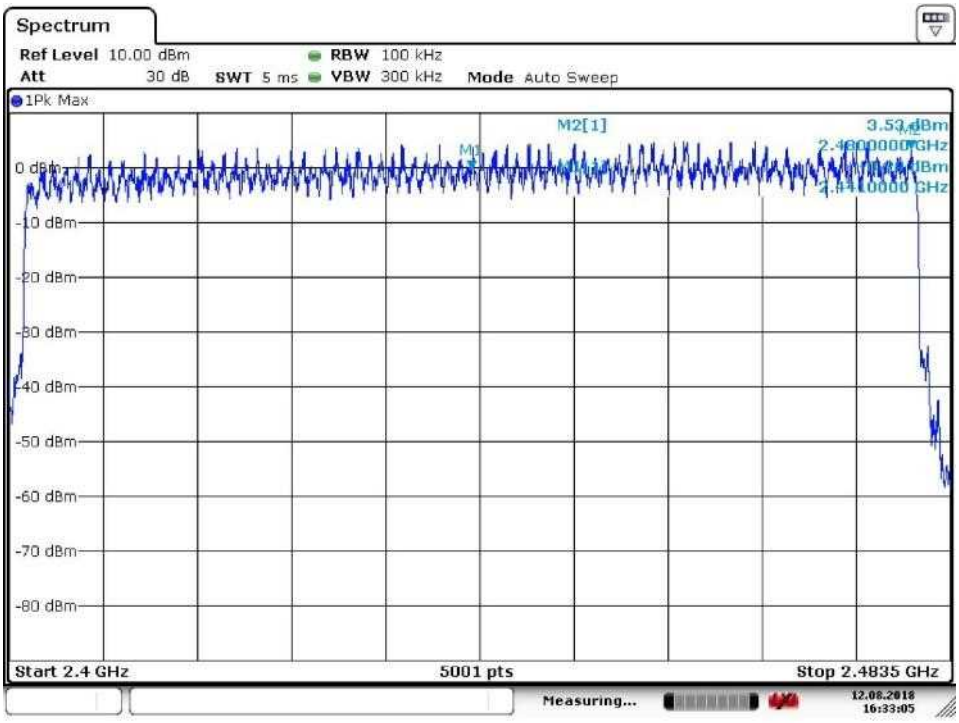
Product Service

Number of hopping frequencies

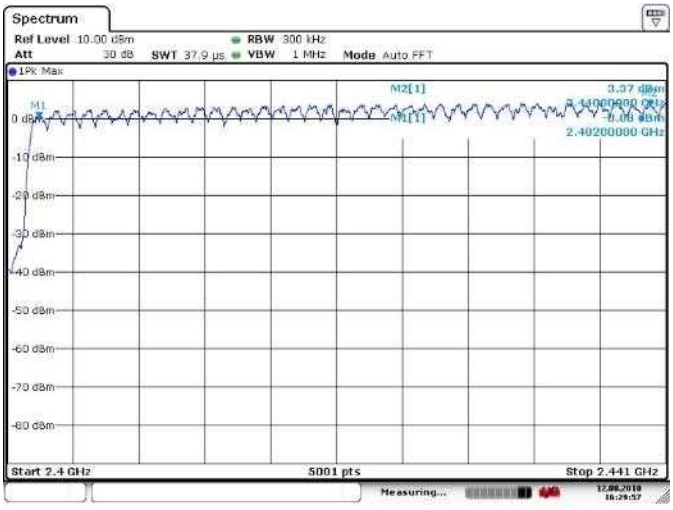
Test result: The measurement was performed with the typical configuration (normal hopping status), and the total hopping channels is constant for the all modulation mode according with the Bluetooth Core Specification. Here GFSK modulation mode was used to show compliance.

Number of hopping frequencies	Result
79	Pass

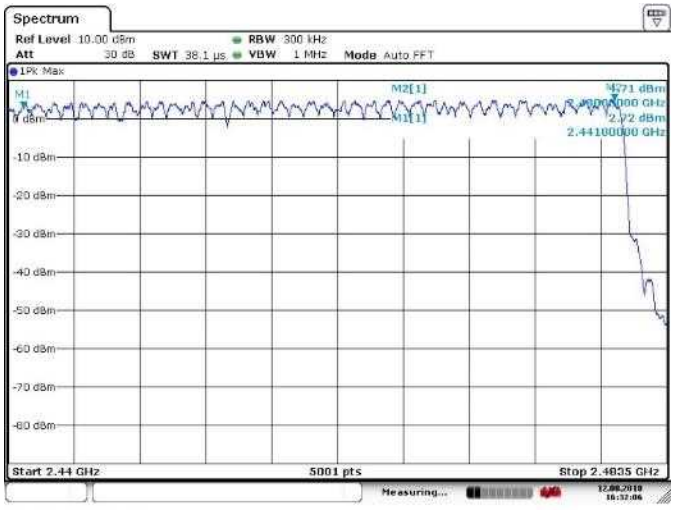
DH5 test result



Date: 12.AUG.2018 16:33:05



Date: 12.AUG.2018 16:29:57



Date: 12.AUG.2018 16:32:06

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Product Service

9.6 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
2. RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
3. Adjust the center frequency of spectrum analyzer on any frequency be measured.
4. Measure the Dwell Time by spectrum analyzer Marker function.
5. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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Product Service

Dwell Time

Dwell time

The maximum dwell time shall be 0,4 s.
According to the Bluetooth Core Specification, the worse result (DH5 mode) was reported to show compliance.

The Dwell Time = Burst Width * Total Hops. The detailed calculations are showed as follows:
The duration for dwell time calculation: 0.4 [s] * hopping number = 0.4 [s] * 79 [ch] = 31.6 [s*ch];

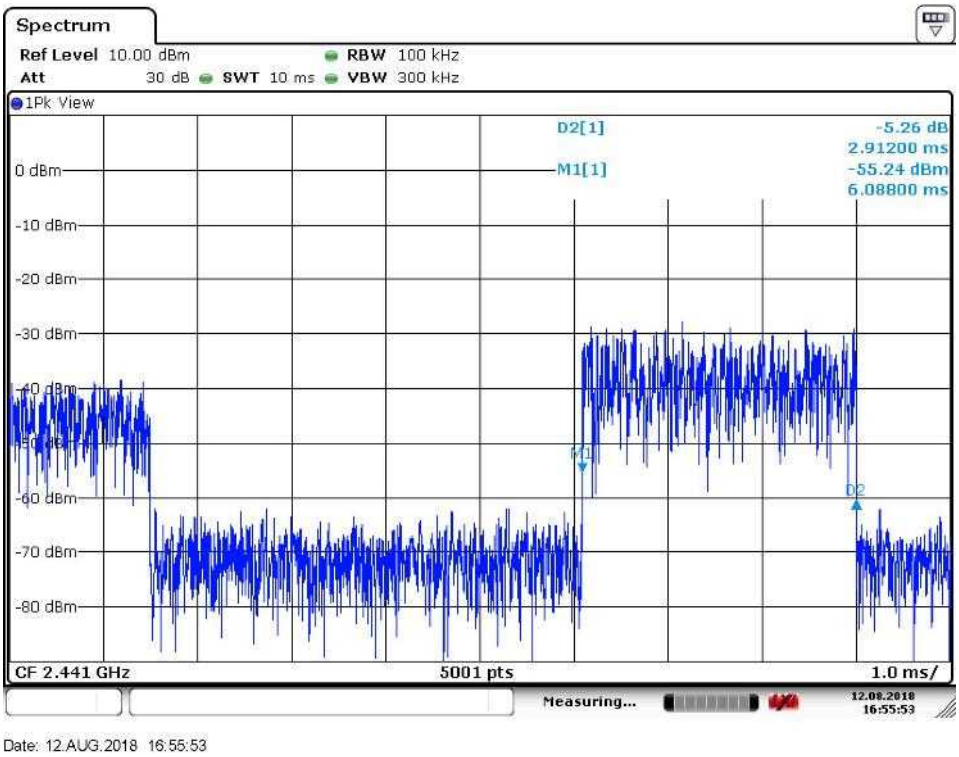
The burst width, which is directly measured, refers to the duration on one channel hop.

The maximum number of hopping channels in 31.6s for DH5=1600 / 6 / 79 *31.6=106.67

Test Result

Modulation	Mode	Reading (μs)	Total Hops	Test Result (ms)	Limit (ms)	Result
GFSK	DH5	2912	106.67	310.62	< 400	Pass
π/4-DQPSK	2DH5	2920	106.67	311.48	< 400	Pass
8-DPSK	3DH5	2932	106.67	312.76	< 400	Pass

DH5



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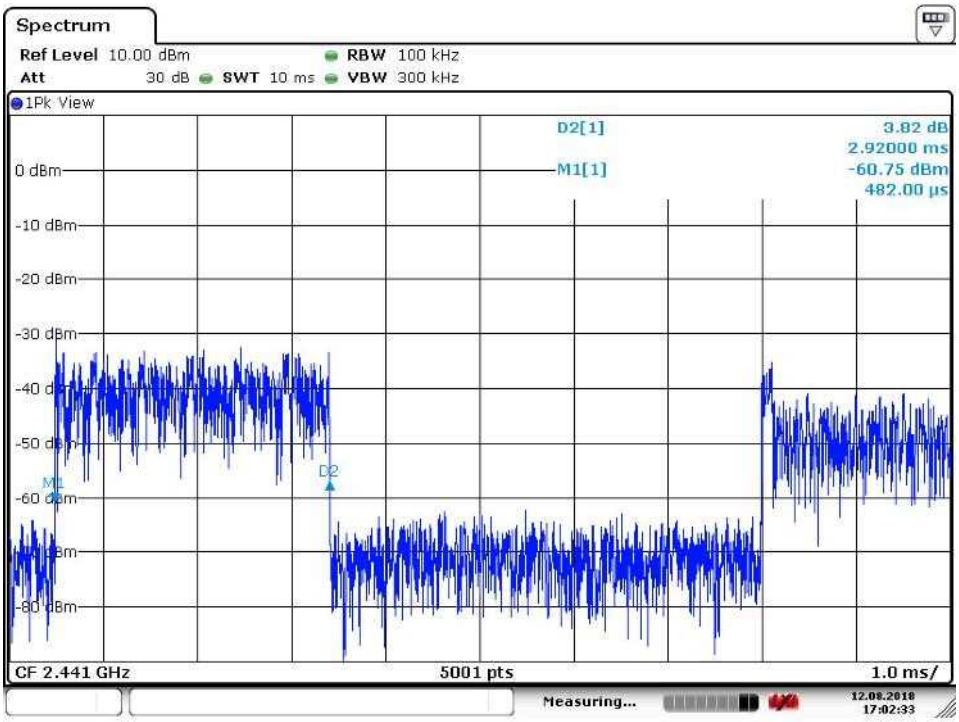
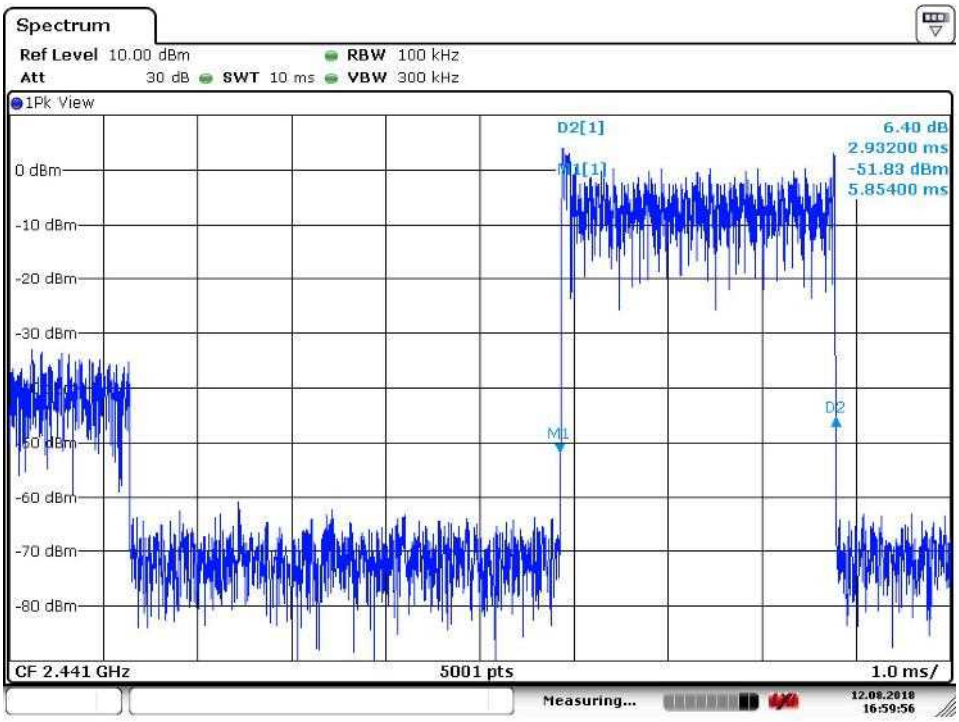
Product Service

2DH5



Date: 12.AUG.2018 17:02:33

3DH5



Date: 12.AUG.2018 16:59:56

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Product Service

9.7 Spurious RF conducted emissions

Test Method

1. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
3. The level displayed must comply with the limit specified in this Section. Submit these plots.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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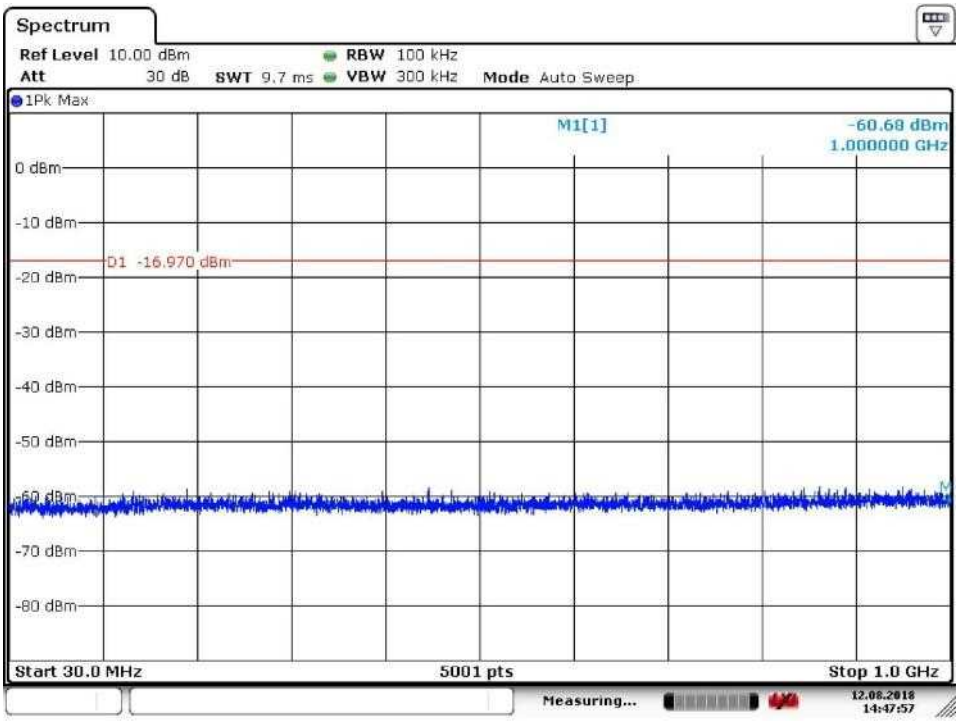
Product Service

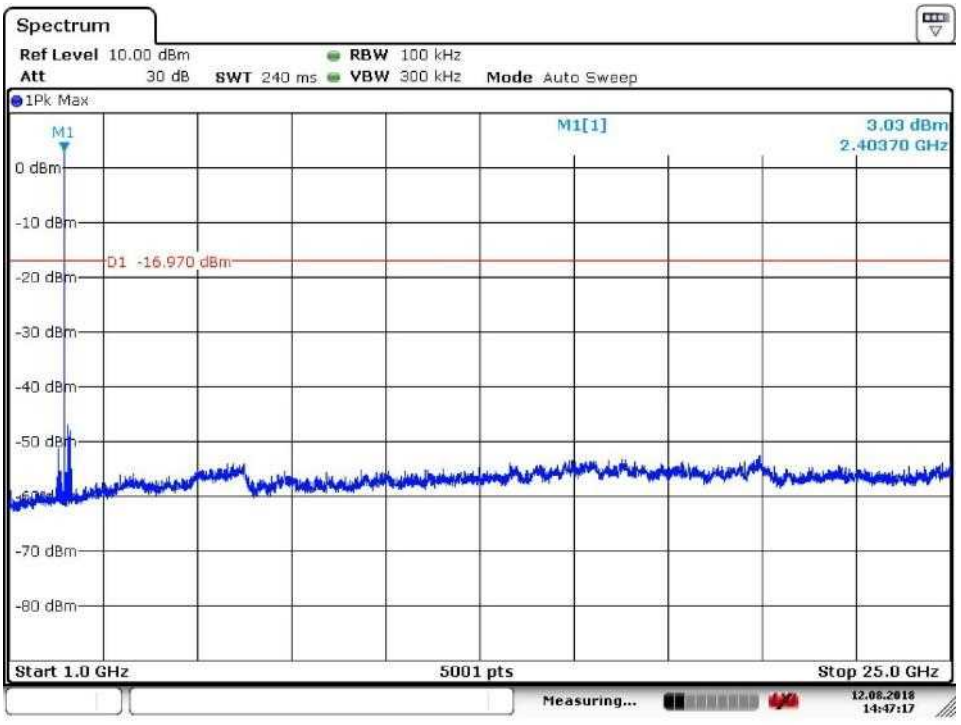
Spurious RF conducted emissions

Only the worse case (which is subject to the maximum EIRP, DH5 mode) test result is listed in the report.

2402MHz



Date: 12.AUG.2018 14:47:56



Date: 12.AUG.2018 14:47:17

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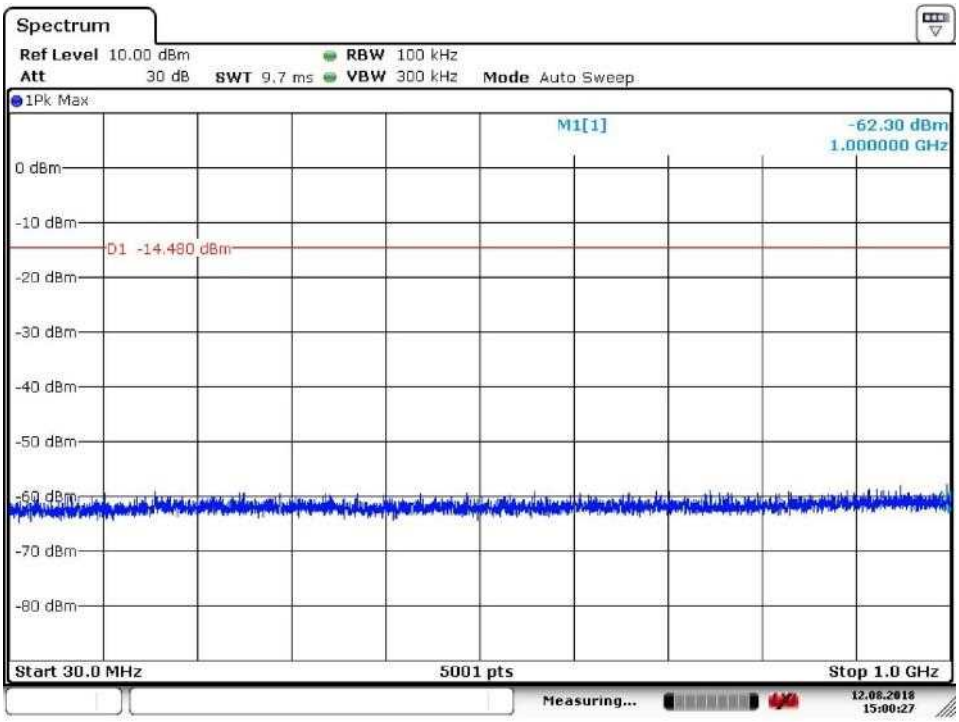
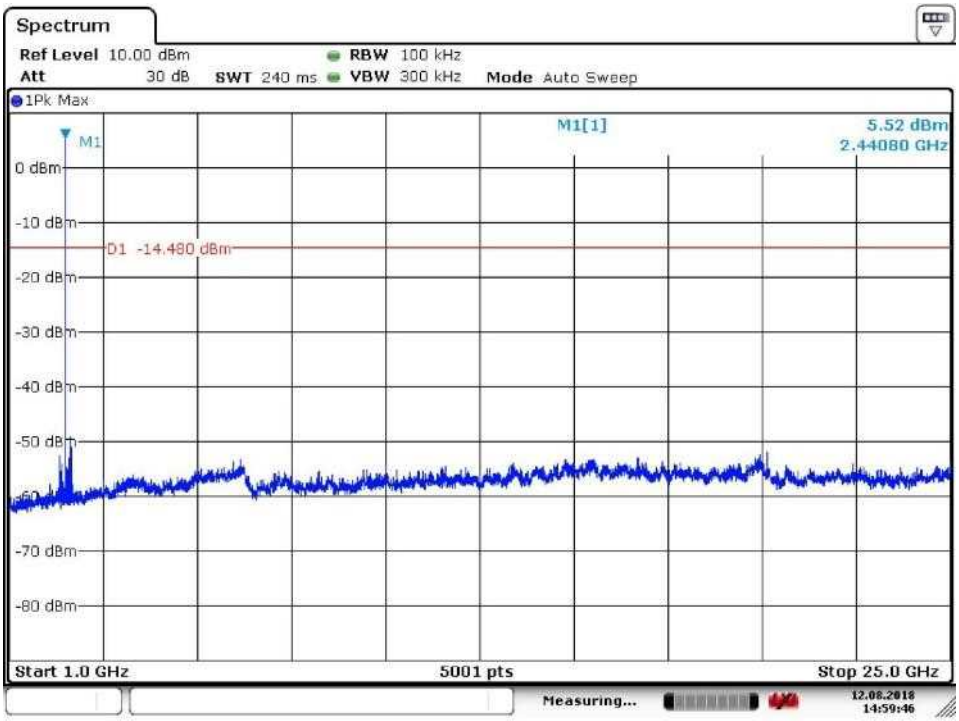
Product Service

2441MHz



Date: 12.AUG.2018 15:00:28



Date: 12.AUG.2018 14:59:46

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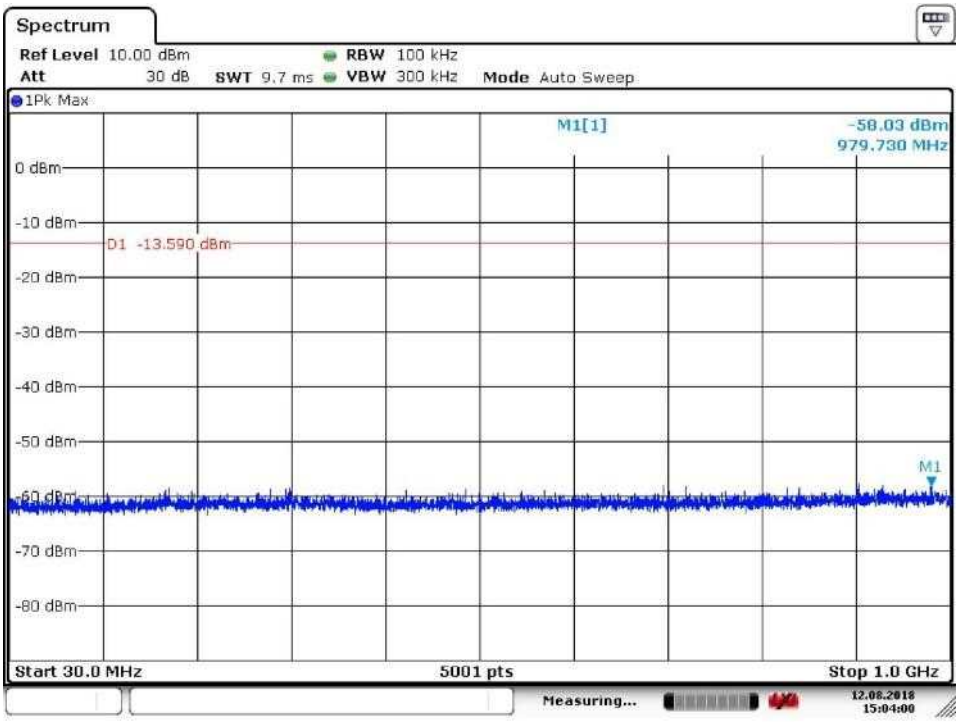
Product Service

2480MHz



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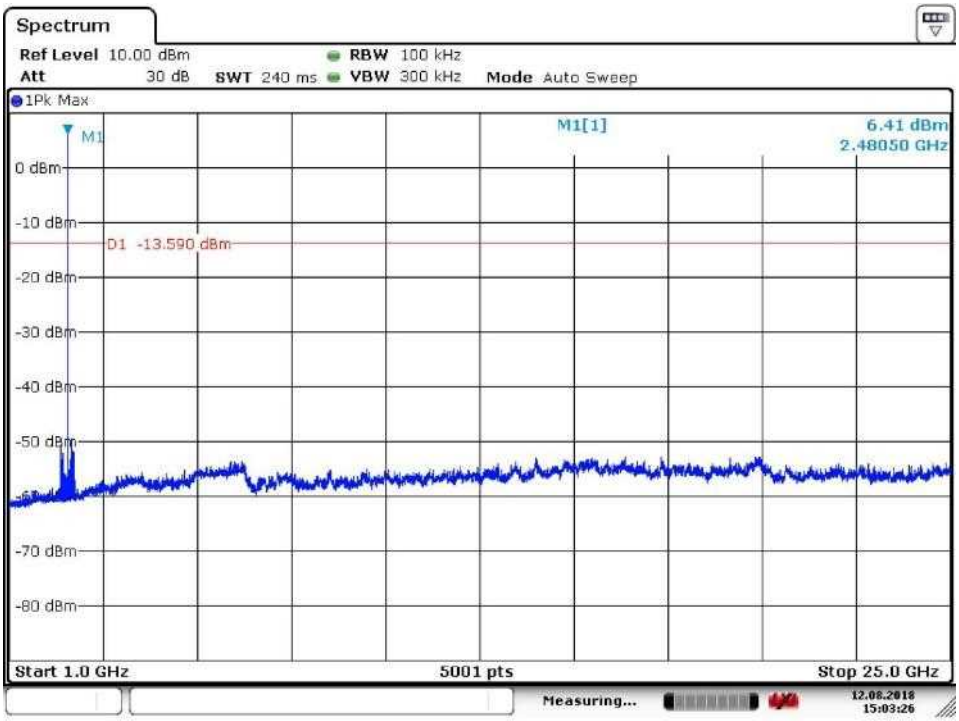

Date: 12.AUG.2018 15:03:27

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Product Service

9.8 Band edge testing

Test Method

1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW≥RBW, Sweep = auto, Detector function = peak, Trace = max hold
2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
3 The level displayed must comply with the limit specified in this Section. .
4 Repeat the test at the hopping off and hopping on mode, submit all the plots.

Limit:

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated 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) (see Section 15.205(c)).

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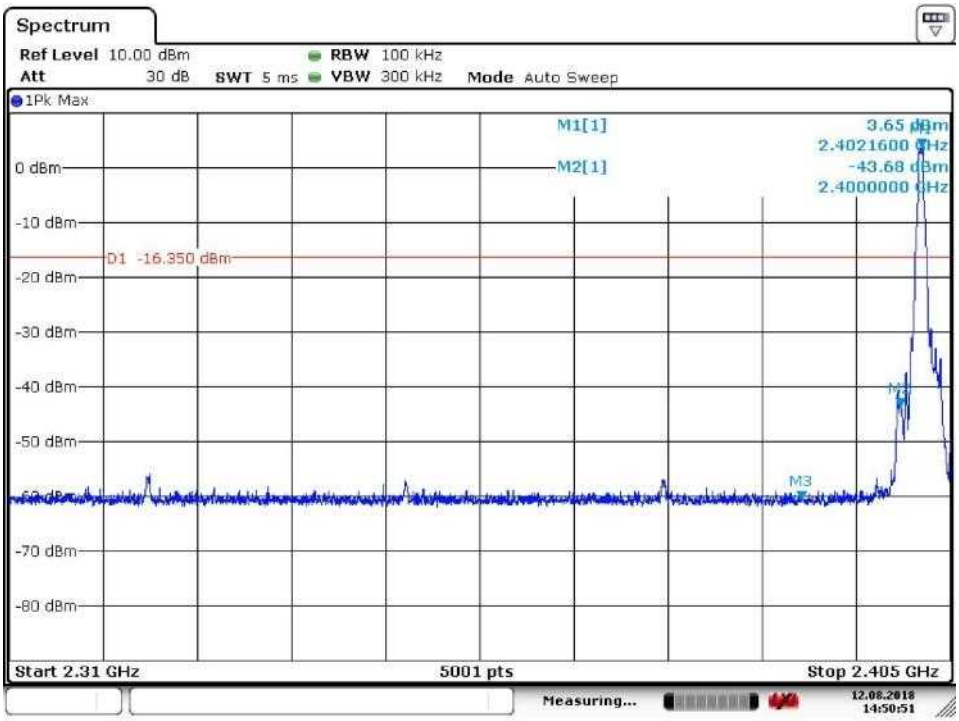
Product Service

Band edge testing

DH5



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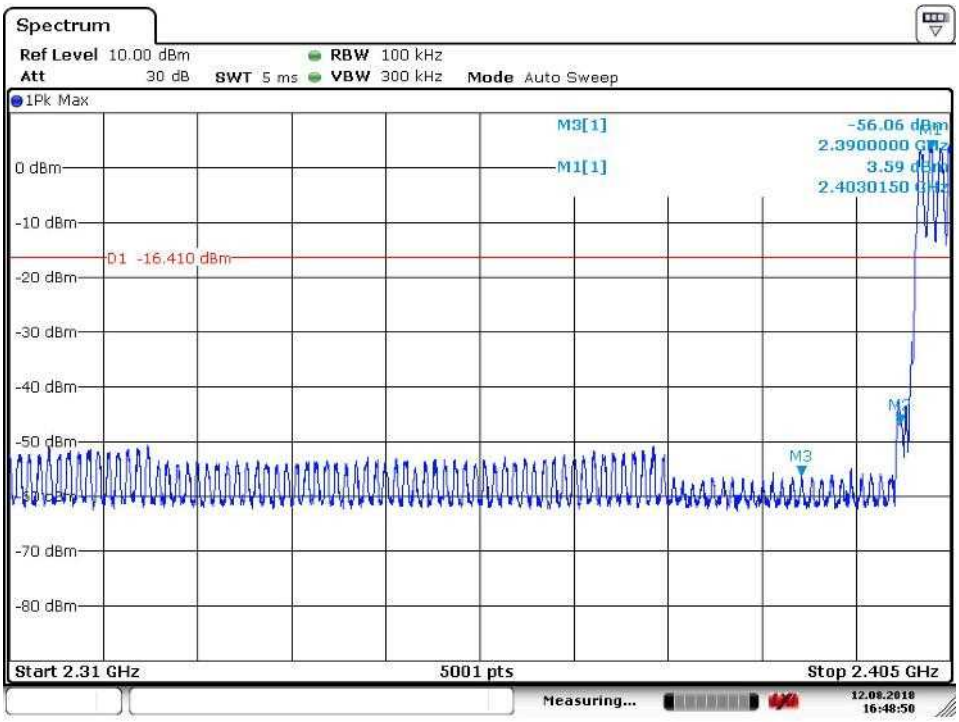

Date: 12.AUG.2018 16:48:50

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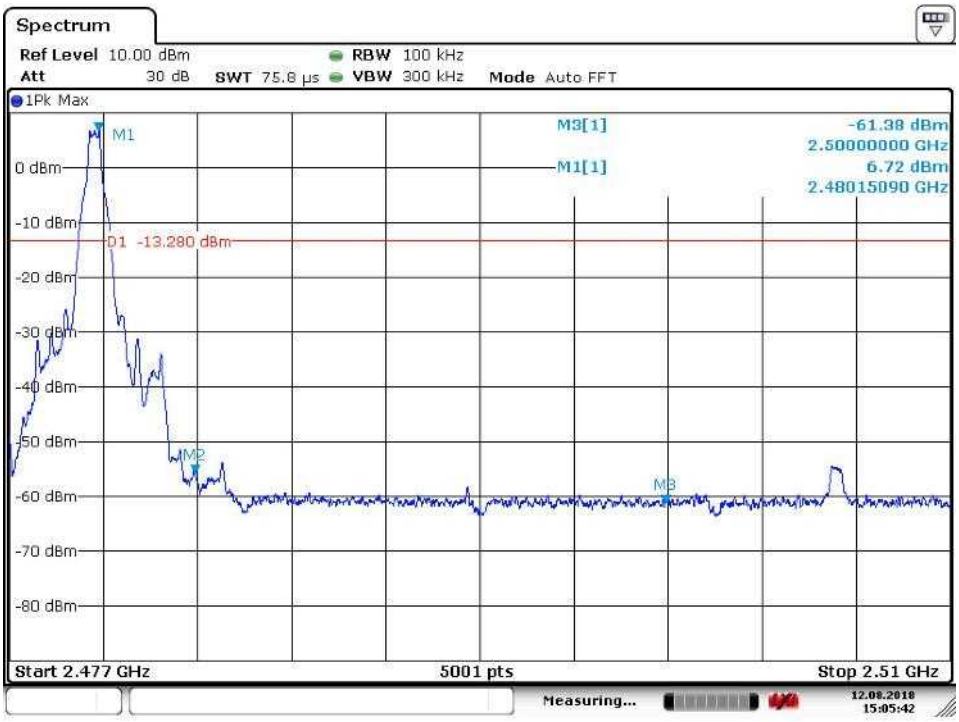
Product Service



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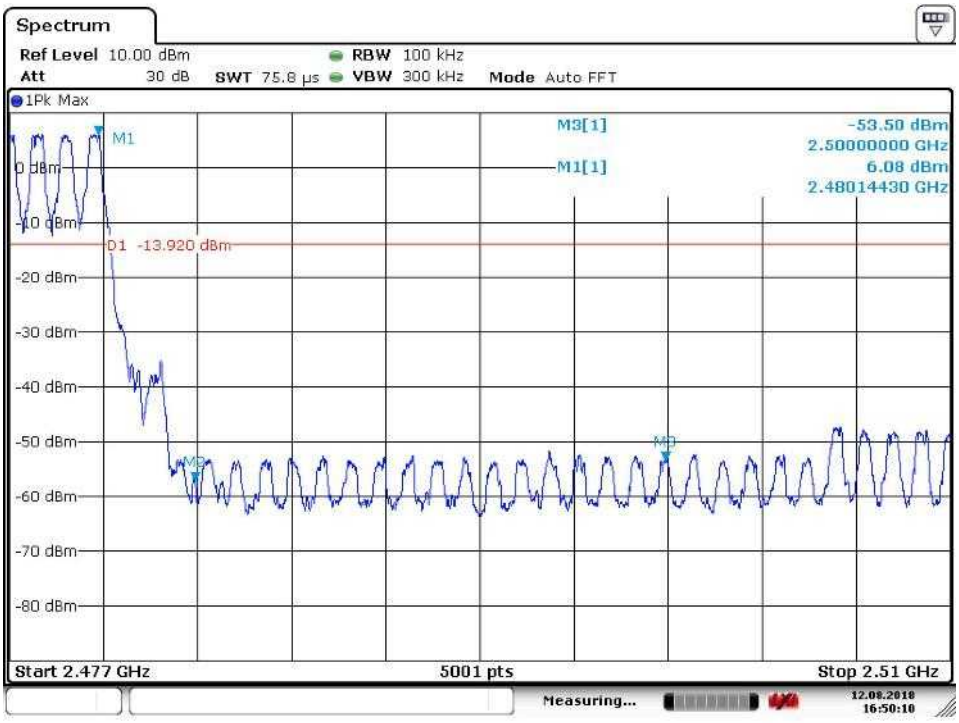

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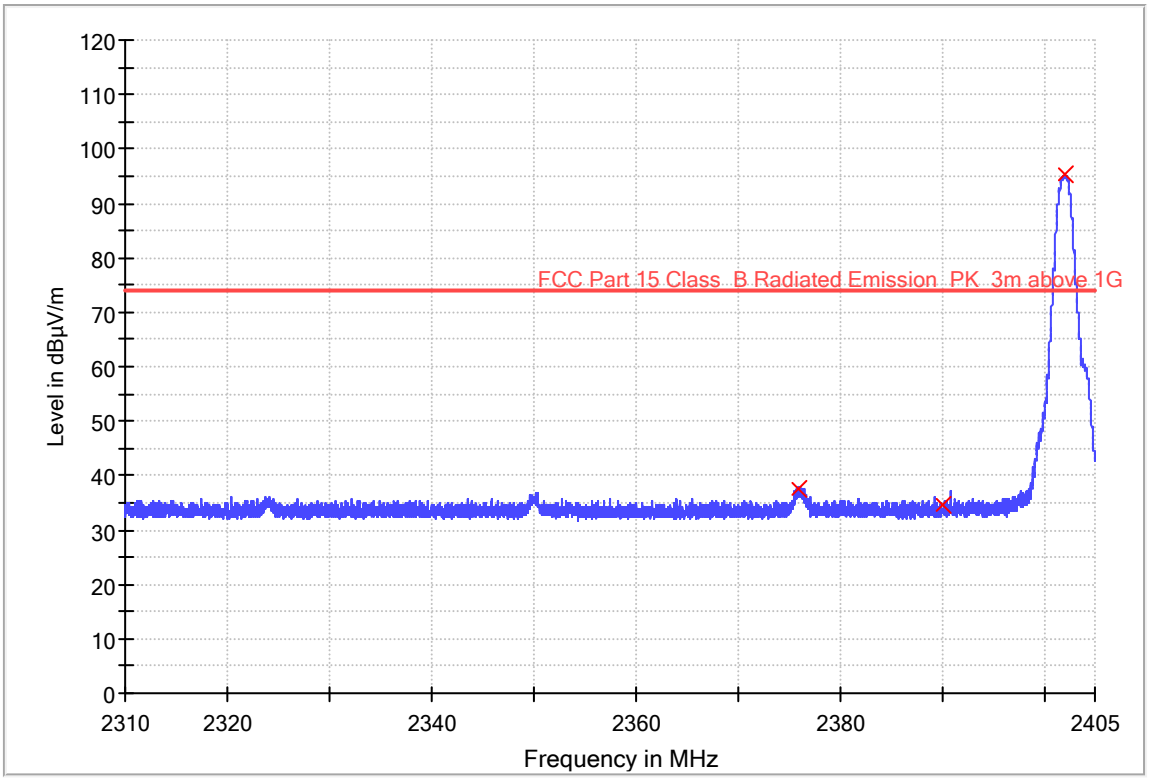
Transmit by DH5 at Channel 2402MHz Horizontal

RE_HF907_pre Low Channel bandedge 2402 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2376.000000	37.6	H
2390.000000	34.4	H
2402.000000	95.2	H

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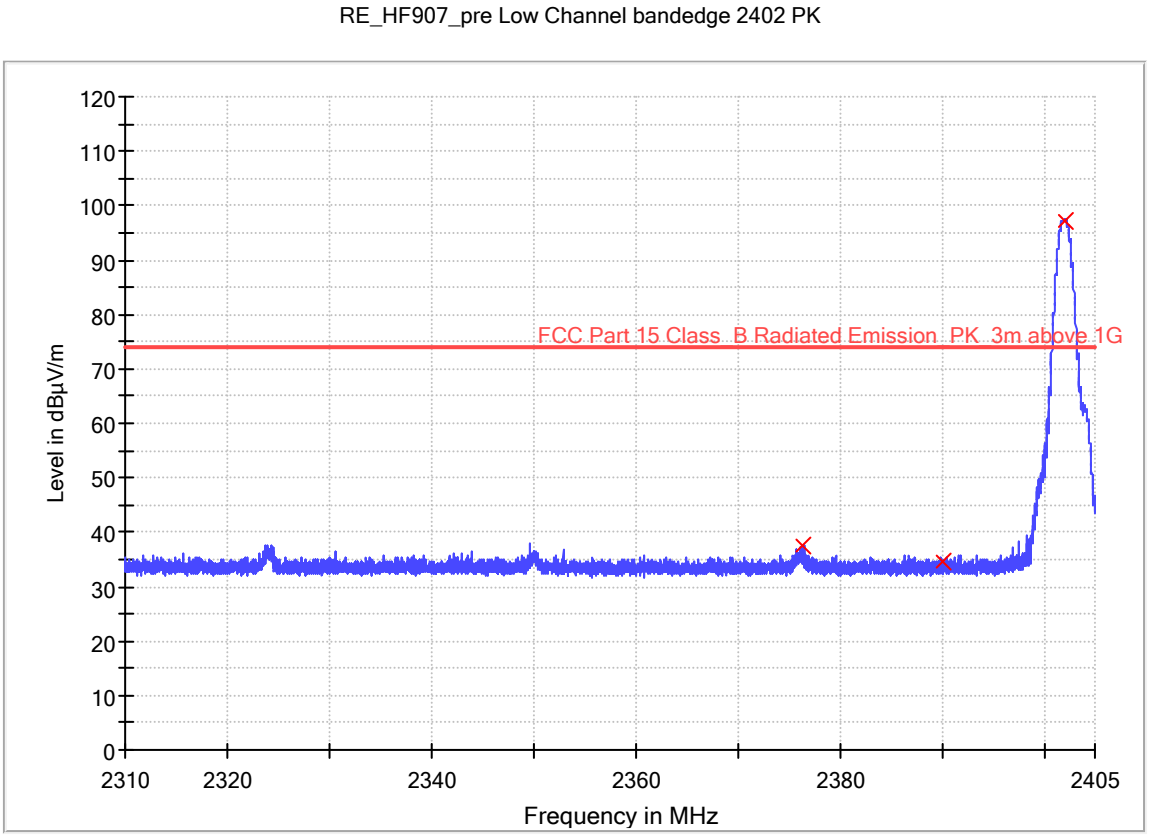
Transmit by DH5 at Channel 2402MHz Vertical



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2376.400000	37.5	V
2390.000000	34.7	V
2402.000000	97.3	V

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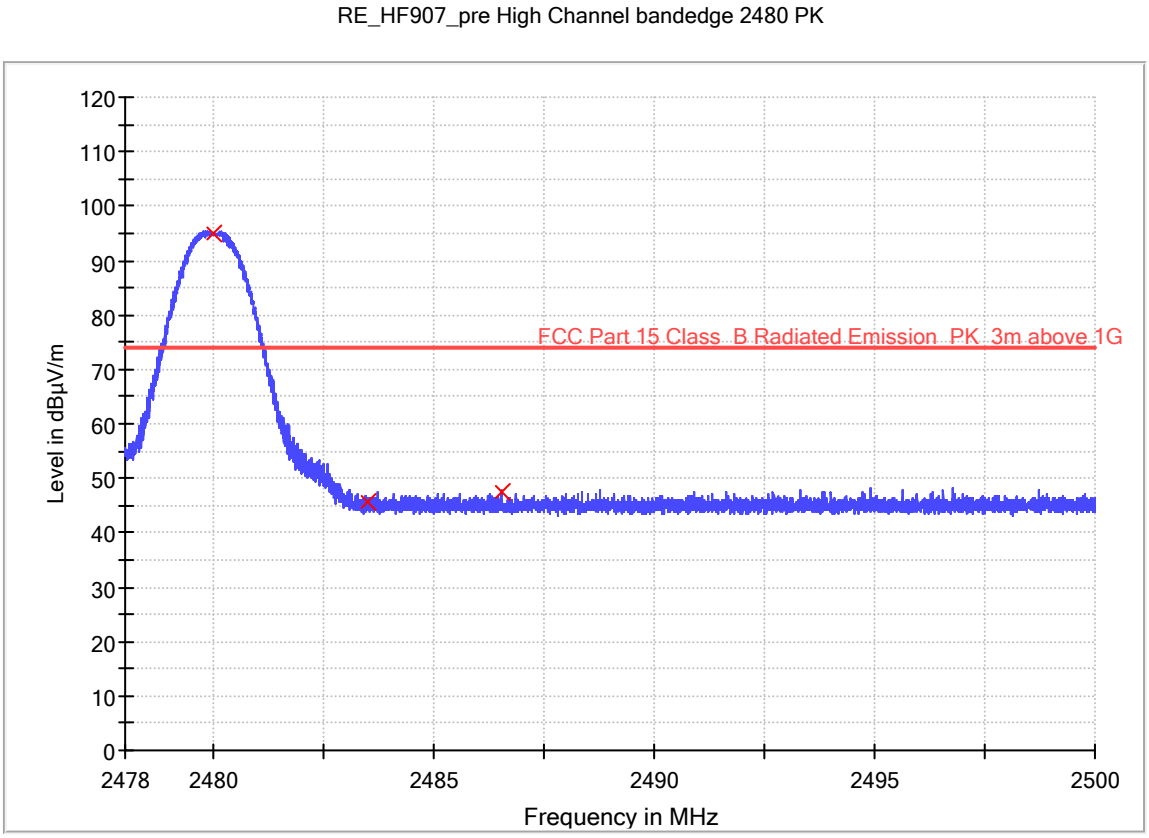
Transmit by DH5 at Channel 2480MHz Horizontal



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2480.000000	94.8	H
2483.500000	45.6	H
2486.522800	47.5	H

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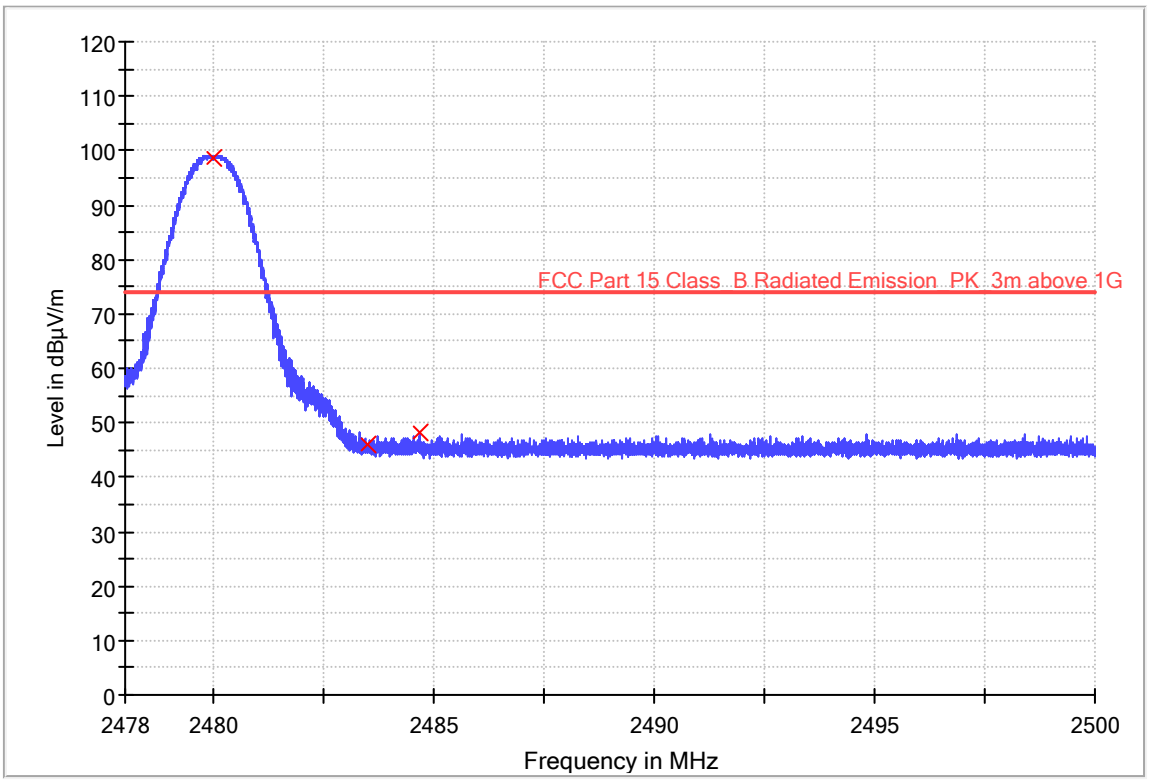
Transmit by DH5 at Channel 2480MHz Vertical

RE_HF907_pre High Channel bandedge 2480 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2480.000000	94.5	V
2484.800000	37.9	V
2483.600000	40.4	V

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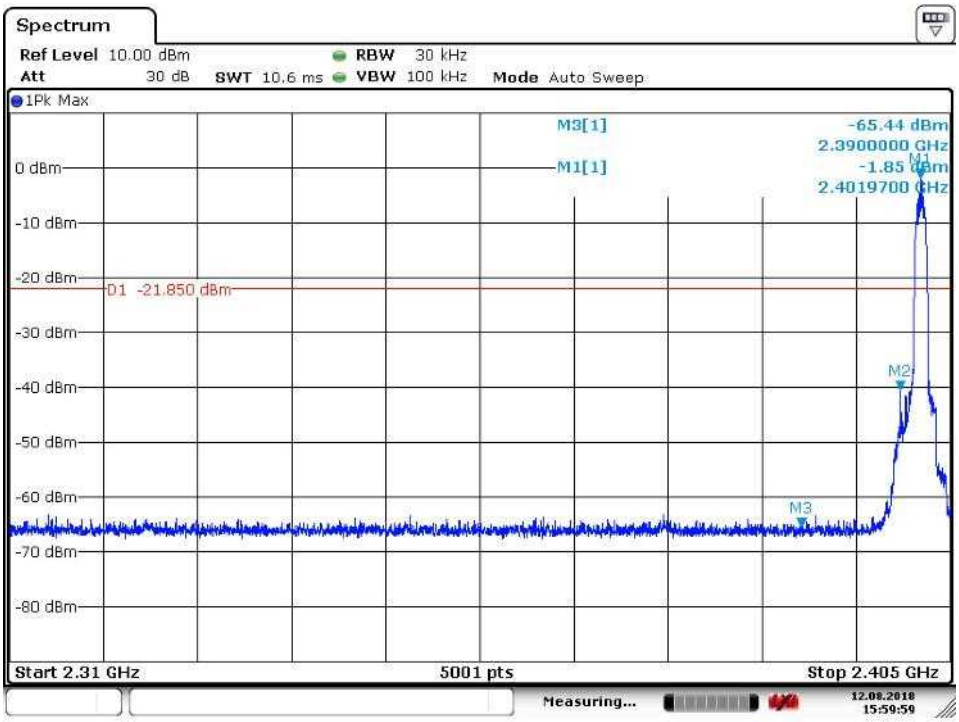
Product Service

2DH5



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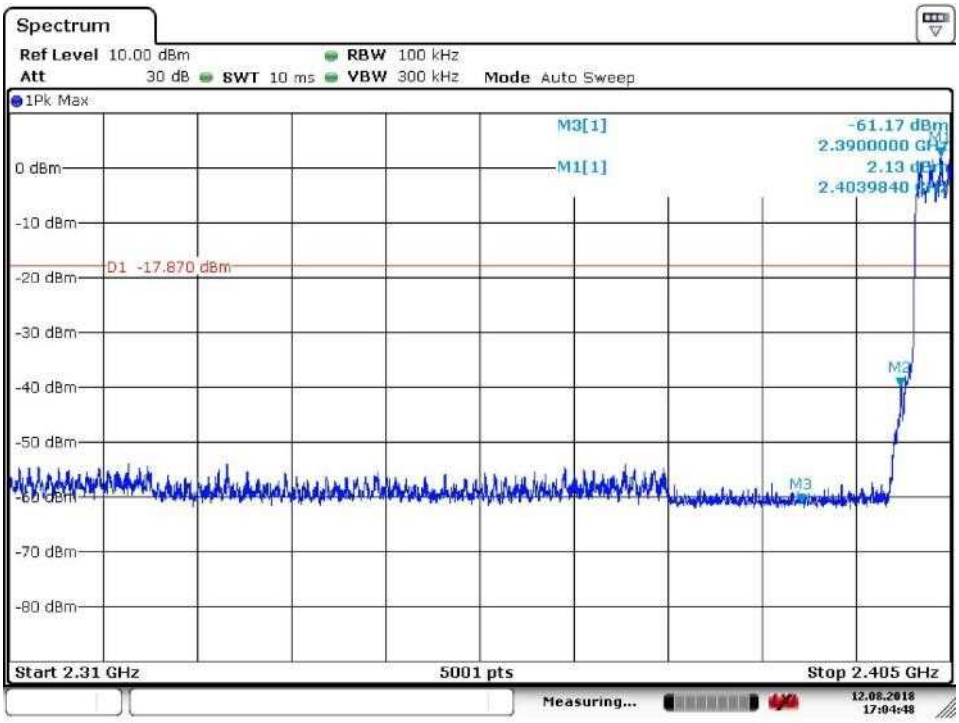

Date: 12.AUG.2018 17:04:48

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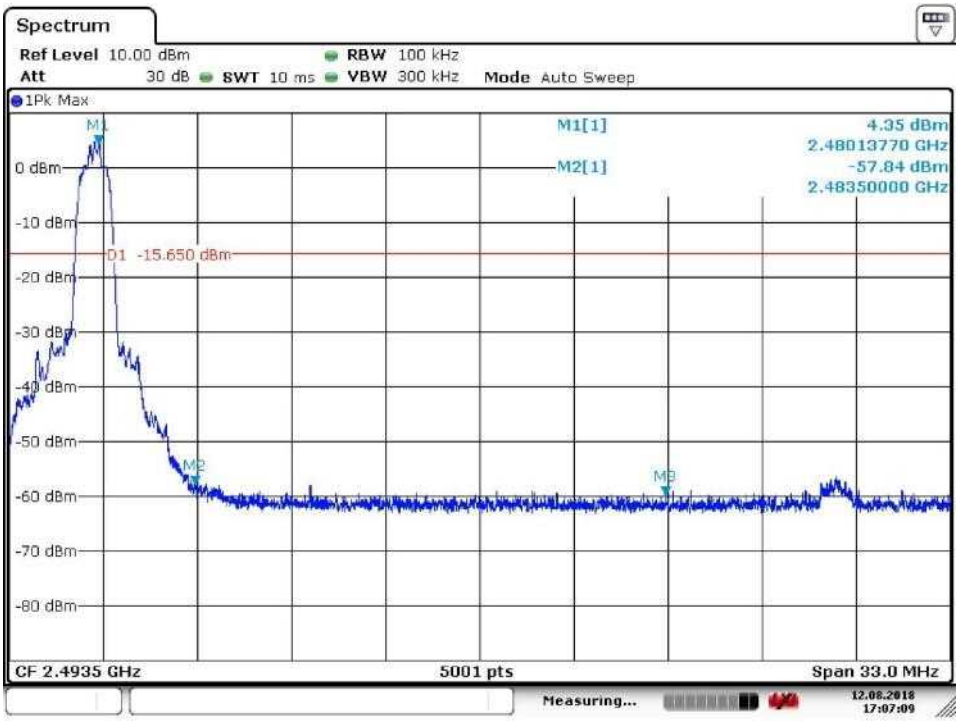
Product Service



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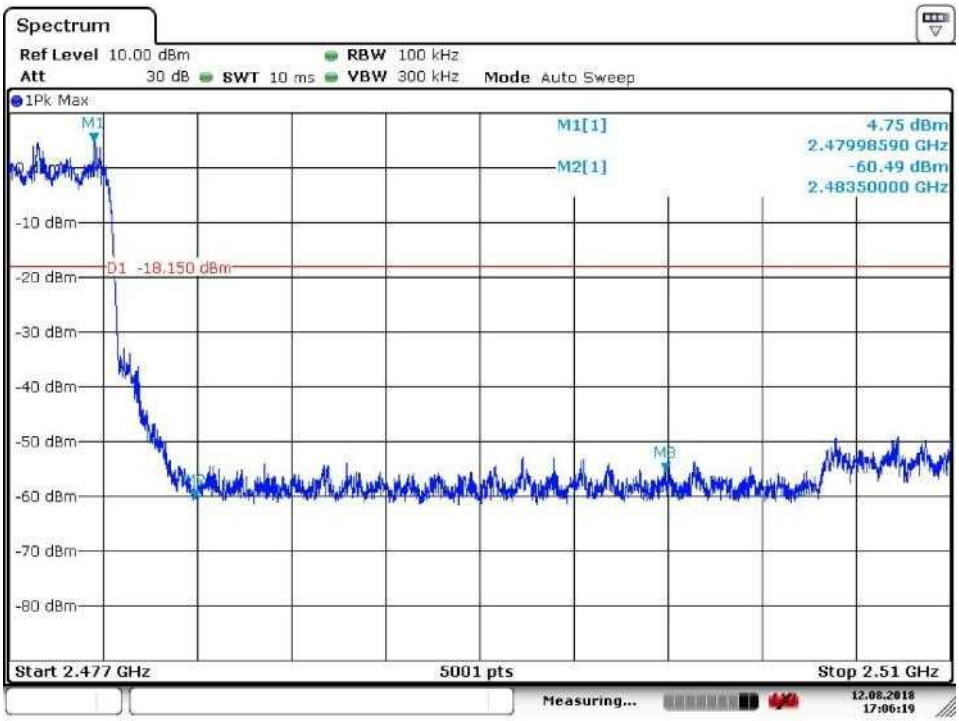

Date: 12.AUG.2018 17:06:19

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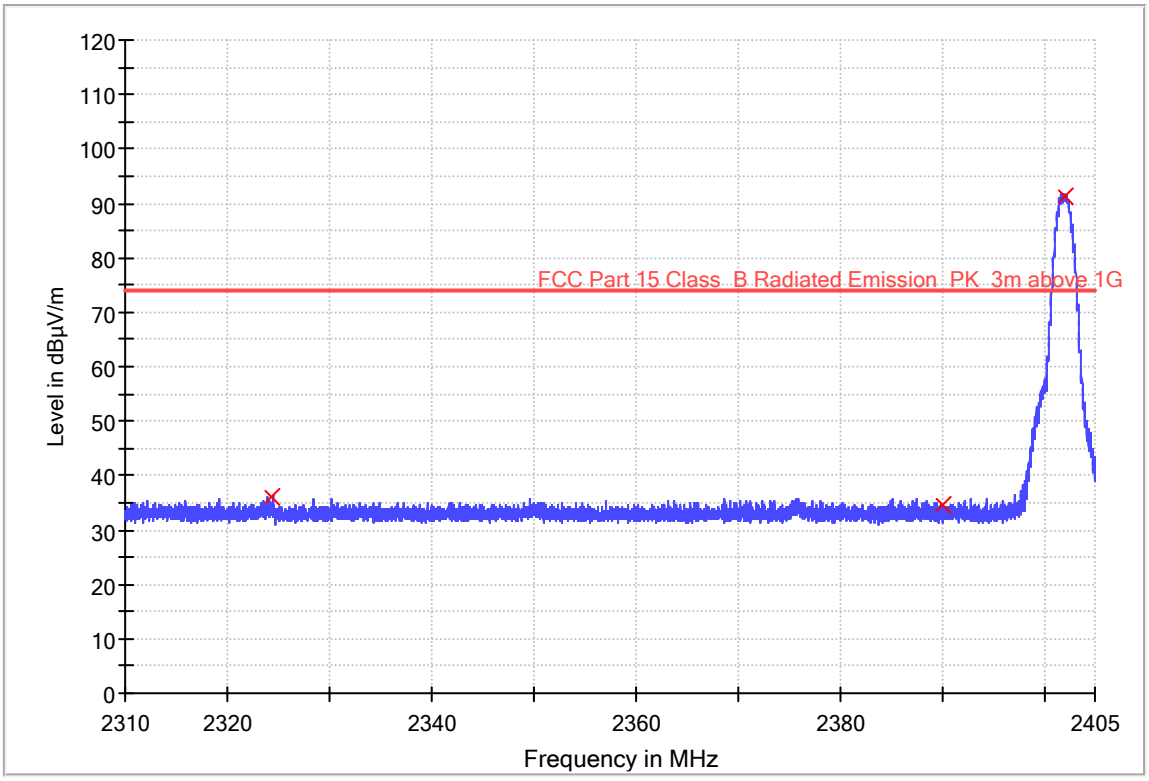
Transmit by 2DH5 at Channel 2402MHz Horizontal

RE_HF907_pre Low Channel bandedge 2402 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Height (cm)	Pol
2402.000000	91.4	100.4	H
2390.000000	34.5	100.4	H
2324.400000	36.0	100.4	H

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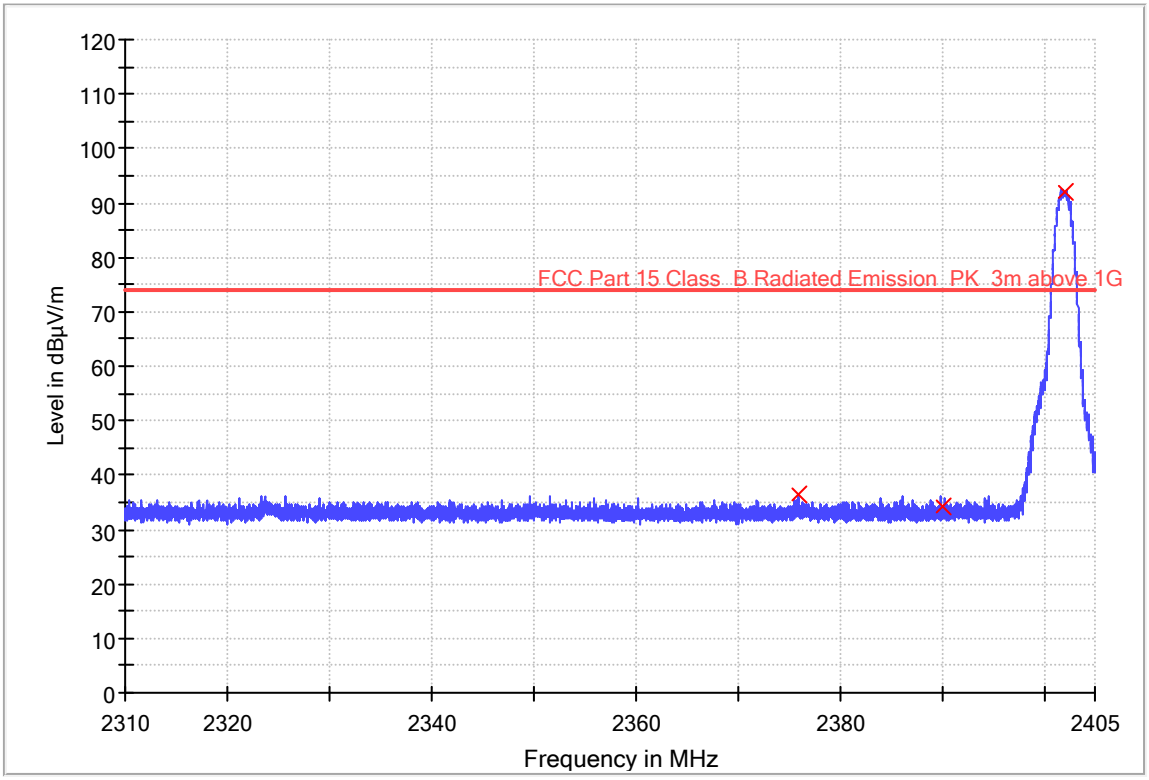
Transmit by 2DH5 at Channel 2402MHz Vertical

RE_HF907_pre Low Channel bandedge 2402 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2402.000000	91.9	V
2390.000000	34.3	V
2375.930000	36.3	V

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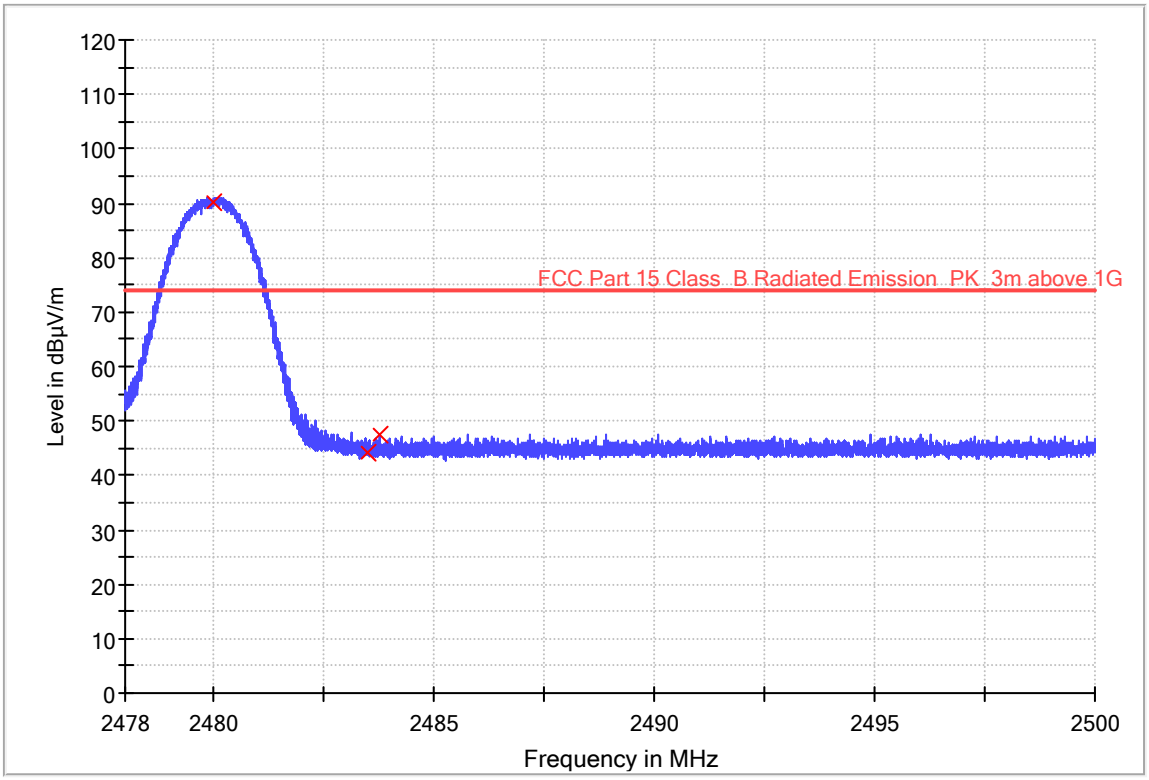
Transmit by 2DH5 at Channel 2480MHz Horizontal

RE_HF907_pre High Channel bandedge 2480 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2480.000000	90.2	H
2483.500000	44.1	H
2483.777200	47.6	H

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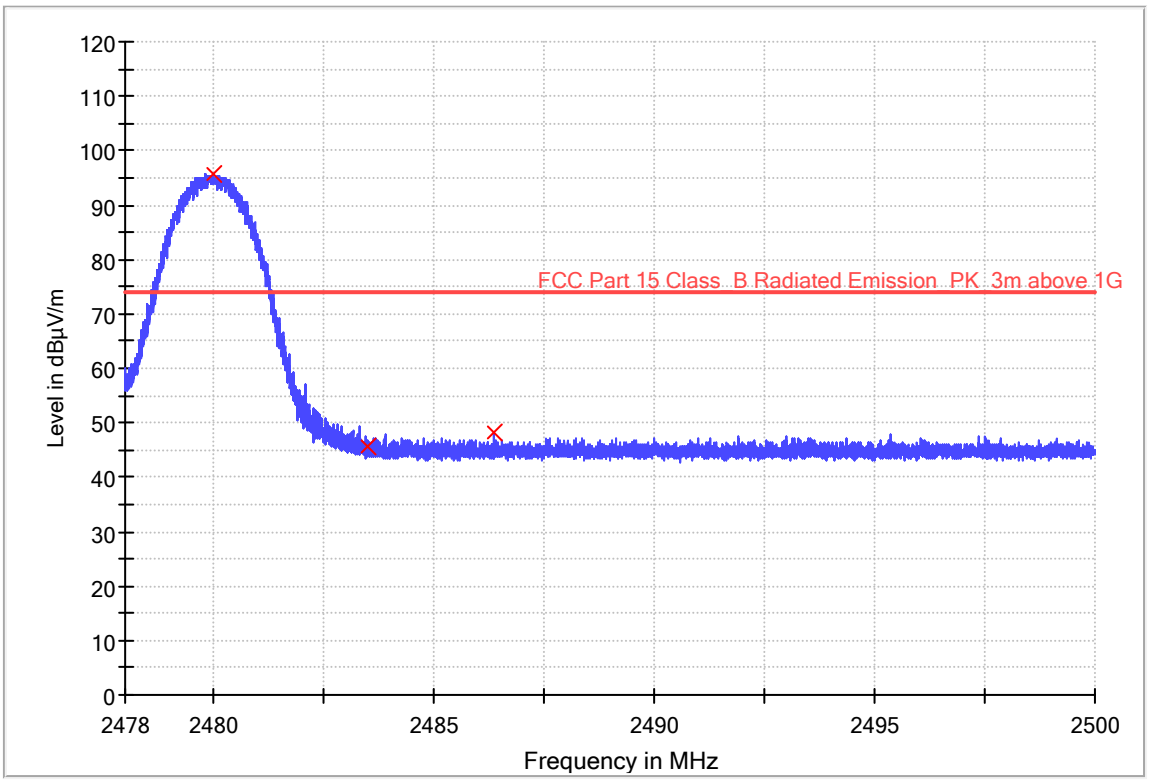
Transmit by 2DH5 at Channel 2480MHz Vertical

RE_HF907_pre High Channel bandedge 2480 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2480.000000	95.6	V
2486.360000	48.1	V
2483.500000	45.6	V

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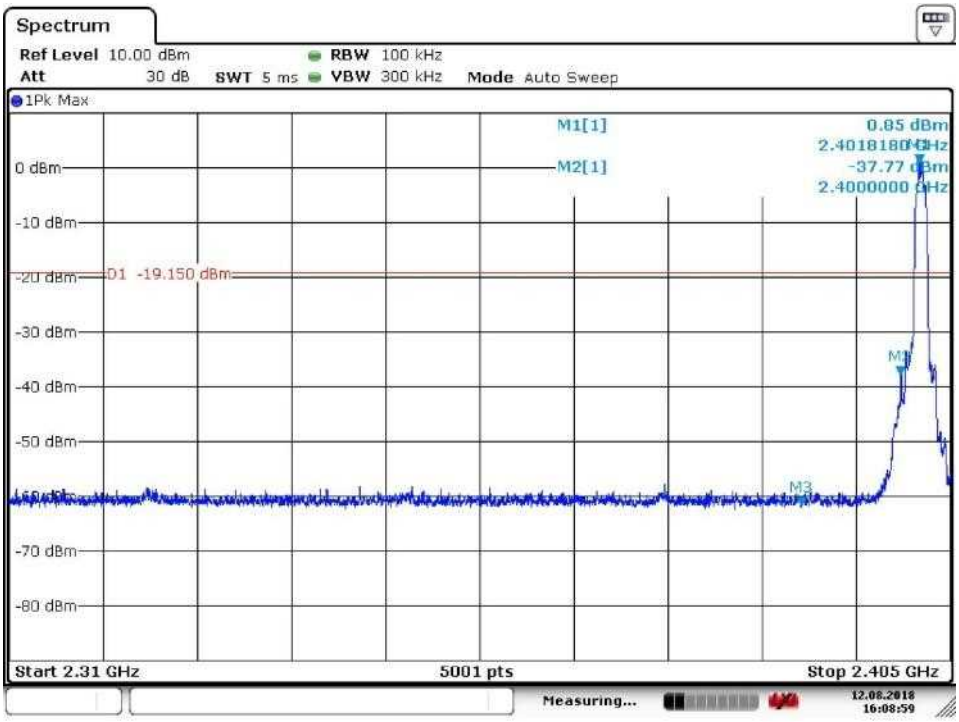
Product Service

3DH5



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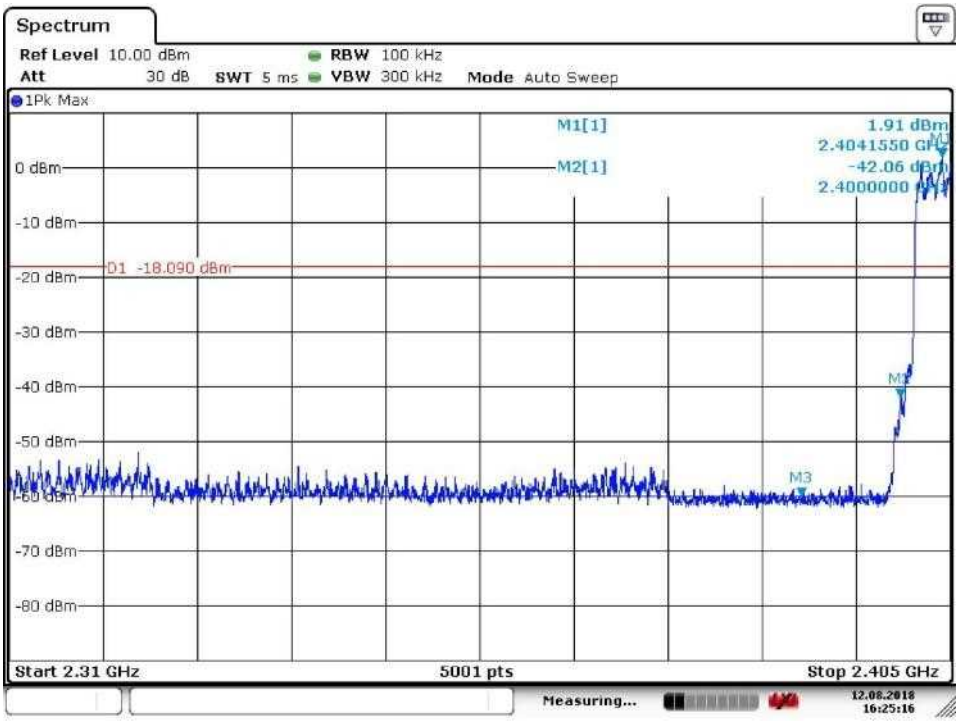

Date: 12.AUG.2018 16:25:16

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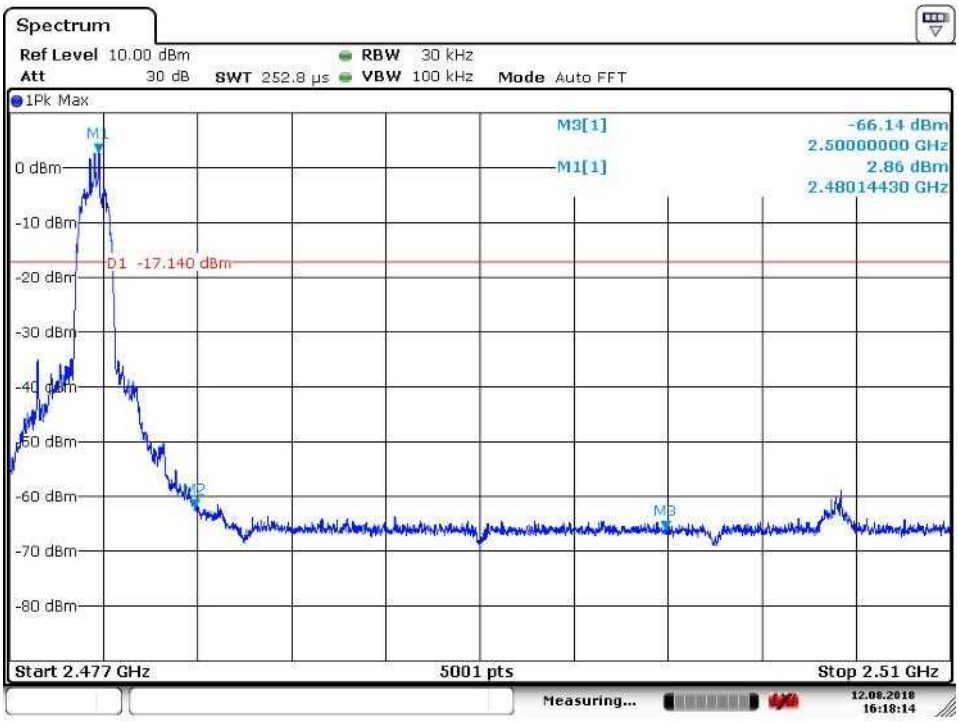
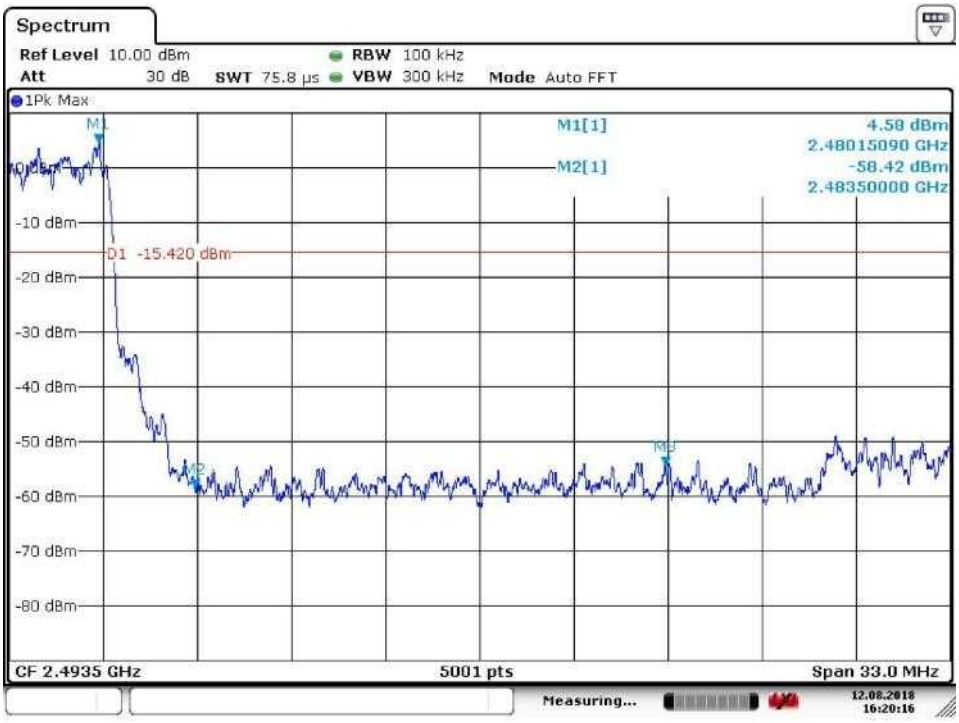
Product Service



Date: 12.AUG.2018 16:18:15



Date: 12.AUG.2018 16:20:16

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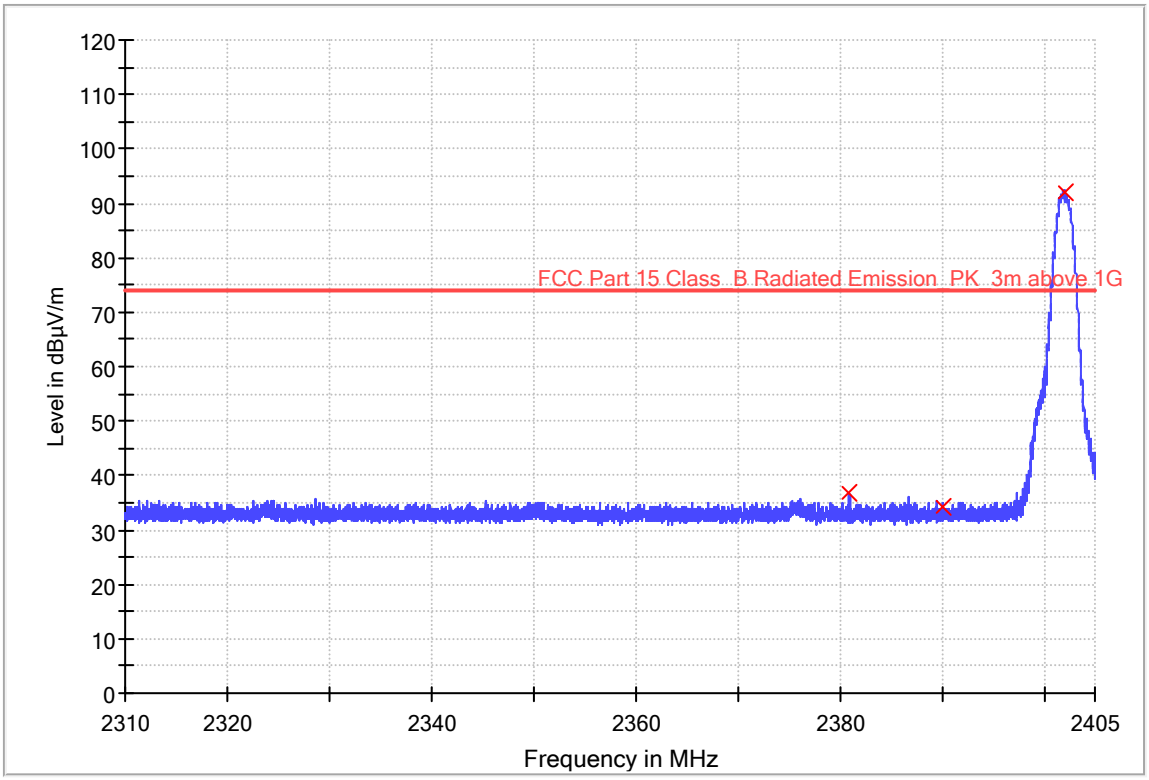
Transmit by 3DH5 at Channel 2402MHz Horizontal

RE_HF907_pre Low Channel bandedge 2402 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2380.955500	36.8	H
2402.000000	92.0	H
2390.000000	34.1	H

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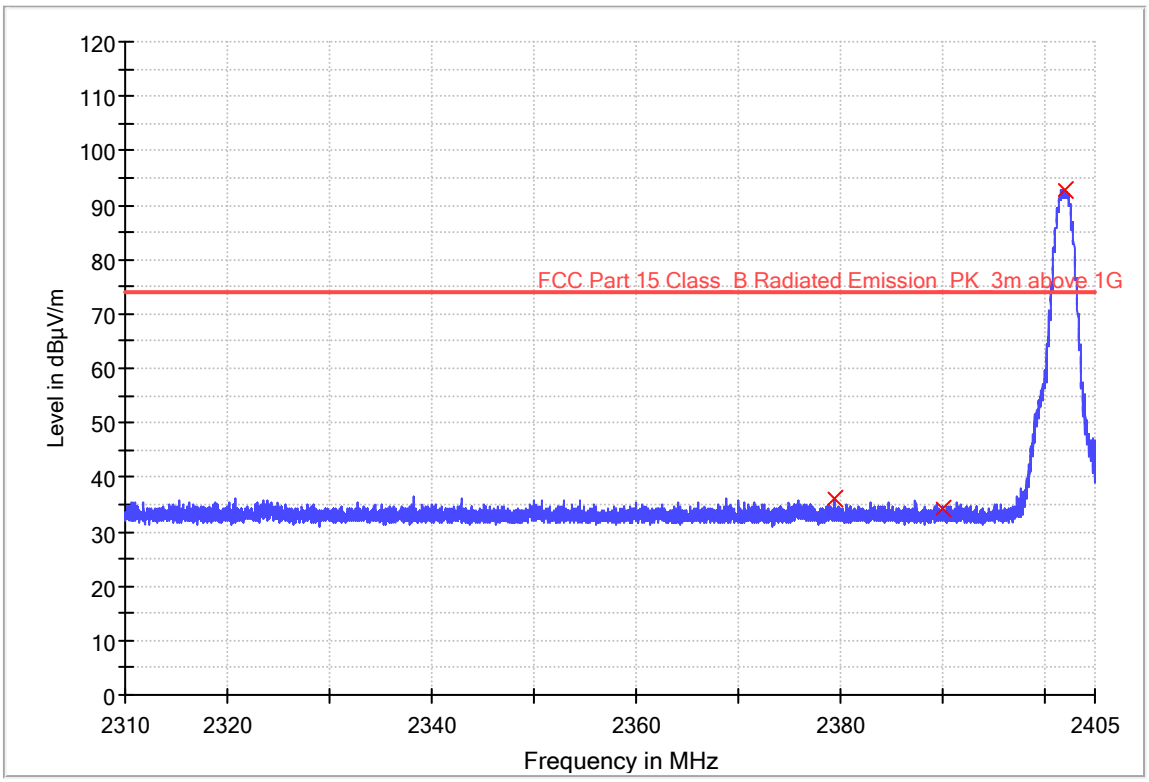
Transmit by 3DH5 at Channel 2402MHz Vertical

RE_HF907_pre Low Channel bandedge 2402 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2402.000000	92.6	V
2390.000000	34.3	V
2379.464000	36.1	V

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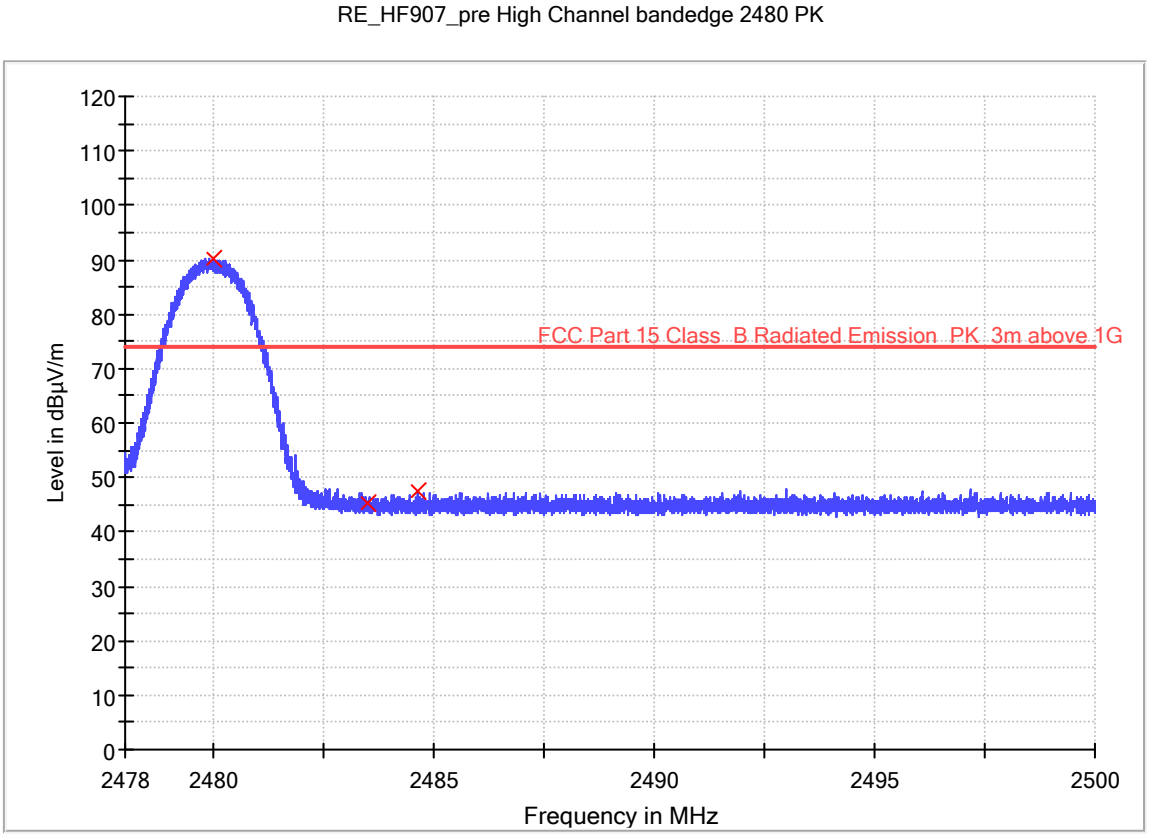
Transmit by 3DH5 at Channel 2480MHz Horizontal



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2484.628600	47.5	H
2483.500000	45.3	H
2480.000000	90.2	H

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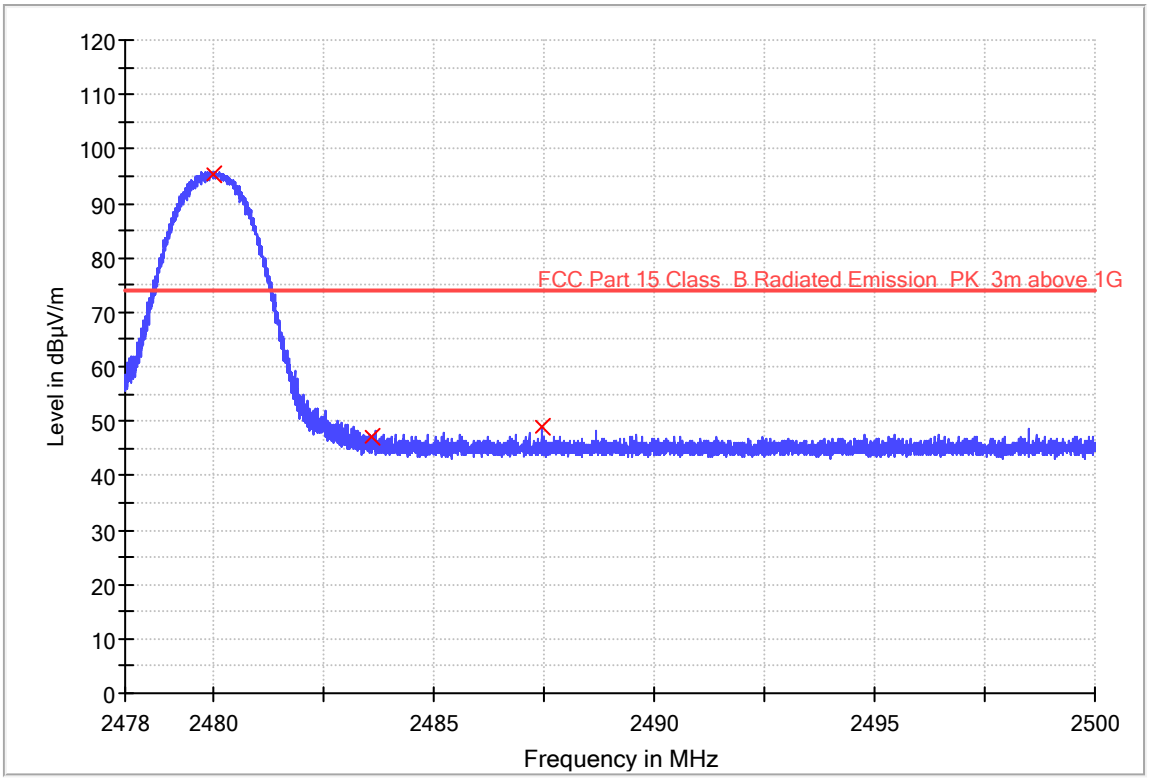
Transmit by 3DH5 at Channel 2480MHz Vertical

RE_HF907_pre High Channel bandedge 2480 PK



Result Table_Single

Frequency (MHz)	MaxPeak (dBµV/m)	Pol
2480.000000	95.4	V
2487.446800	48.9	V
2483.600000	47.0	V

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Product Service

9.9 Spurious radiated emissions for transmitter and receiver

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
   Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-2009 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc.
   The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log(duty cycle/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter and receiver

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (which is subject to the maximum EIRP, DH5 mode) test result is listed in the report.

Transmitting spurious emission test result as below:

DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4804	48.4	H	74	PK	25.6	Pass
7206	40.6	H	74	PK	33.4	Pass
9608	36.6	H	74	PK	37.4	Pass
4804	47.8	V	74	PK	26.2	Pass
7206	41.9	V	74	PK	32.1	Pass
9608	38.7	V	74	PK	35.3	Pass

DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4882	46.7	H	74	PK	27.3	Pass
7324	40.1	H	74	PK	33.9	Pass
9764	35.3	H	74	PK	38.7	Pass
4882	45.8	V	74	PK	28.2	Pass
7324	39.6	V	74	PK	34.4	Pass
9764	36.2	V	74	PK	37.8	Pass

DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4960	47.8	H	74	PK	26.2	Pass
7440	42.5	H	74	PK	31.5	Pass
9920	37.8	H	74	PK	36.2	Pass
4960	47.2	V	74	PK	26.8	Pass
7440	41.6	V	74	PK	32.4	Pass
9920	34.7	V	74	PK	39.3	Pass

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2DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4804	46.5	H	74	PK	27.5	Pass
7206	40.1	H	74	PK	33.9	Pass
9608	35.9	H	74	PK	38.1	Pass
4804	45.3	V	74	PK	28.7	Pass
7206	40.7	V	74	PK	33.3	Pass
9608	37.4	V	74	PK	36.6	Pass

2DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4882	46.2	H	74	PK	27.8	Pass
7324	39.3	H	74	PK	34.7	Pass
9764	34.4	H	74	PK	39.6	Pass
4882	44.2	V	74	PK	29.8	Pass
7324	40.1	V	74	PK	33.9	Pass
9764	37.9	V	74	PK	36.1	Pass

2DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4960	45.6	H	74	PK	28.4	Pass
7440	40.1	H	74	PK	33.9	Pass
9920	35.7	H	74	PK	38.3	Pass
4960	46.2	V	74	PK	27.8	Pass
7440	40.3	V	74	PK	33.7	Pass
9920	38.2	V	74	PK	35.8	Pass

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Product Service

3DH5 2402MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4804	47.3	H	74	PK	26.7	Pass
7206	40.8	H	74	PK	33.2	Pass
9608	37.1	H	74	PK	36.9	Pass
4804	46.4	V	74	PK	27.6	Pass
7206	40.8	V	74	PK	33.2	Pass
9608	37.5	V	74	PK	36.5	Pass

3DH5 2441MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4882	47.8	H	74	PK	26.2	Pass
7324	40.4	H	74	PK	33.6	Pass
9764	35.3	H	74	PK	38.7	Pass
4882	46.2	V	74	PK	27.8	Pass
7324	40.7	V	74	PK	33.3	Pass
9764	35.2	V	74	PK	38.8	Pass

3DH5 2480MHz

Frequency	Emission Level	Polarization	Limit	Detector	Margin	Result
MHz	dBuV/m		dBµV/m		dBµV/m	
4960	47.6	H	74	PK	26.4	Pass
7440	40.2	H	74	PK	33.8	Pass
9920	36.5	H	74	PK	37.5	Pass
4960	46.9	V	74	PK	27.1	Pass
7440	40.6	V	74	PK	33.4	Pass
9920	37.2	V	74	PK	36.8	Pass

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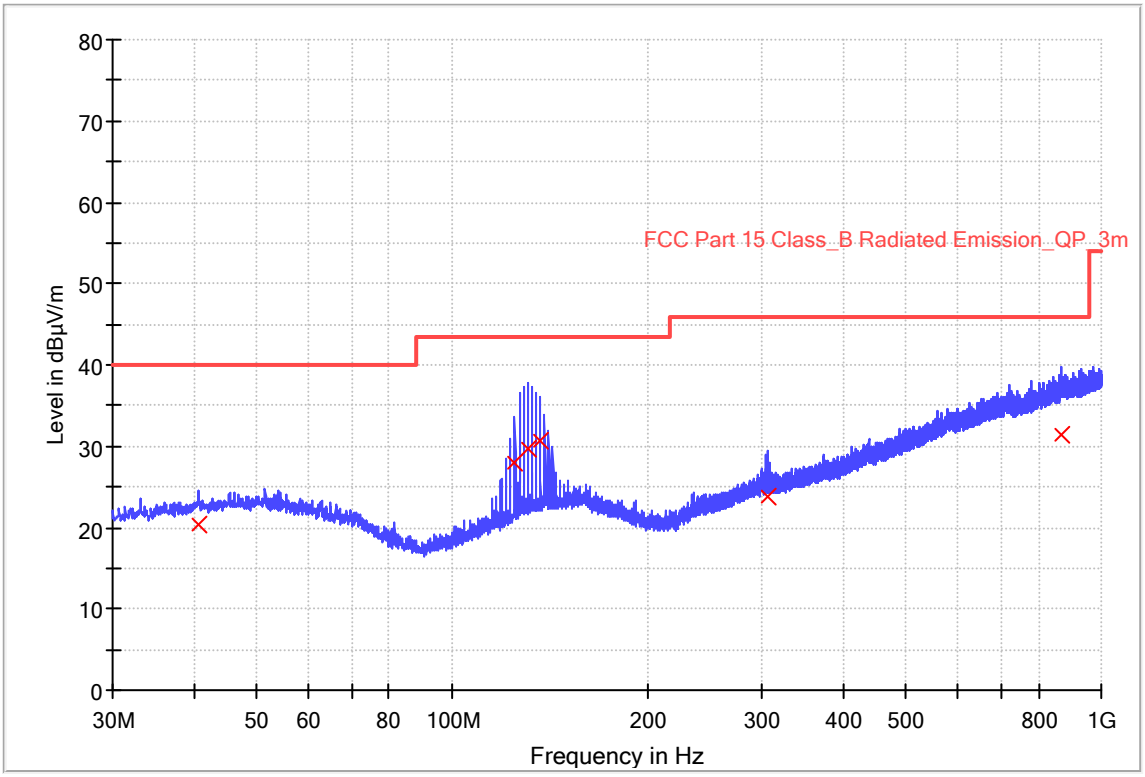
Product Service

The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2018/08/15 - 13:05
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Jiaxi XU
Probe: VULB9163_0.03-8GHz	Polarity: Horizontal
EUT: Car Radio With Bluetooth	Power: 12VDC
Note: Transmit by GFSK DH5 at channel 2480MHz. Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9163_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
40.680000	20.4	H	19.6	40.0
124.960000	28.1	H	15.4	43.5
130.960000	29.7	H	13.8	43.5
137.000000	30.7	H	12.8	43.5
306.480000	23.9	H	22.2	46.0
870.680000	31.3	H	14.7	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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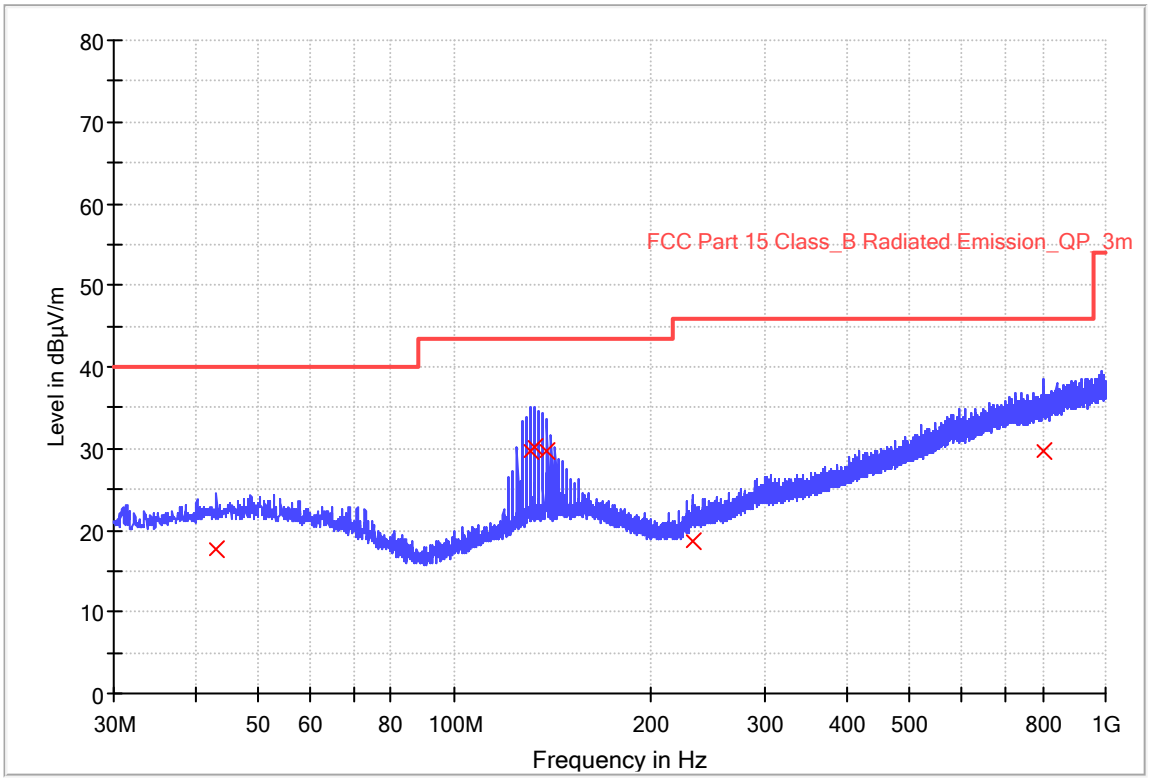
Product Service

Site: 3 meter chamber	Time: 2018/08/15 - 13:25
Limit: FCC_Part15.109_RE(3m)_ClassB	Engineer: Jiaxi XU
Probe: VULB9163_0.03-8GHz	Polarity: Vertical
EUT: Car Radio With Bluetooth	Power: 12VDC
Note: Transmit by GFSK DH5 at channel 2480MHz. Note: There is the worst case within frequency range 30MHz~1GHz.	

RE_VULB9163_pre_Cont_30-1000



Limit and Margin

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Margin - QPK (dB)	Limit - QPK (dBµV/m)
43.160000	17.7	V	22.3	40.0
130.960000	29.8	V	13.7	43.5
132.960000	30.2	V	13.3	43.5
138.960000	29.7	V	13.8	43.5
233.040000	18.7	V	27.3	46.0
800.240000	29.7	V	16.3	46.0

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)
Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

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Product Service

10 Test Equipment List

List of Test Instruments
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2019-8-6
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2019-8-6
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2019-8-6
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2019-9-4
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	848	2021-6-10
	Horn Antenna	Rohde & Schwarz	HF907	102393	2021-4-1
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2019-8-6
	3m Semi-anechoic chamber	TDK	9X6X6	----	2021-5-10
CE	EMI Test Receiver	Rohde & Schwarz	ESR 3	101907	2019-8-6
	LISN	Rohde & Schwarz	ENV4200	100224	2019-8-6
	LISN	Rohde & Schwarz	ENV216	101924	2019-8-6

C - Conducted RF tests

- Conducted peak output power
- 6dB Occupied Bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Conducted Band edge

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Product Service

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

Test Site1

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, ±2.73dB
Radiated Disturbance	30MHz to 1GHz, ±5.03dB (Horizontal) ±5.11dB (Vertical) 1GHz to 18GHz, ±5.15dB (Horizontal) ±5.12dB (Vertical) 18GHz to 25GHz, ±4.76dB

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12 Photographs of Test Set-ups

Radiated Emission Setup
9k~30MHz

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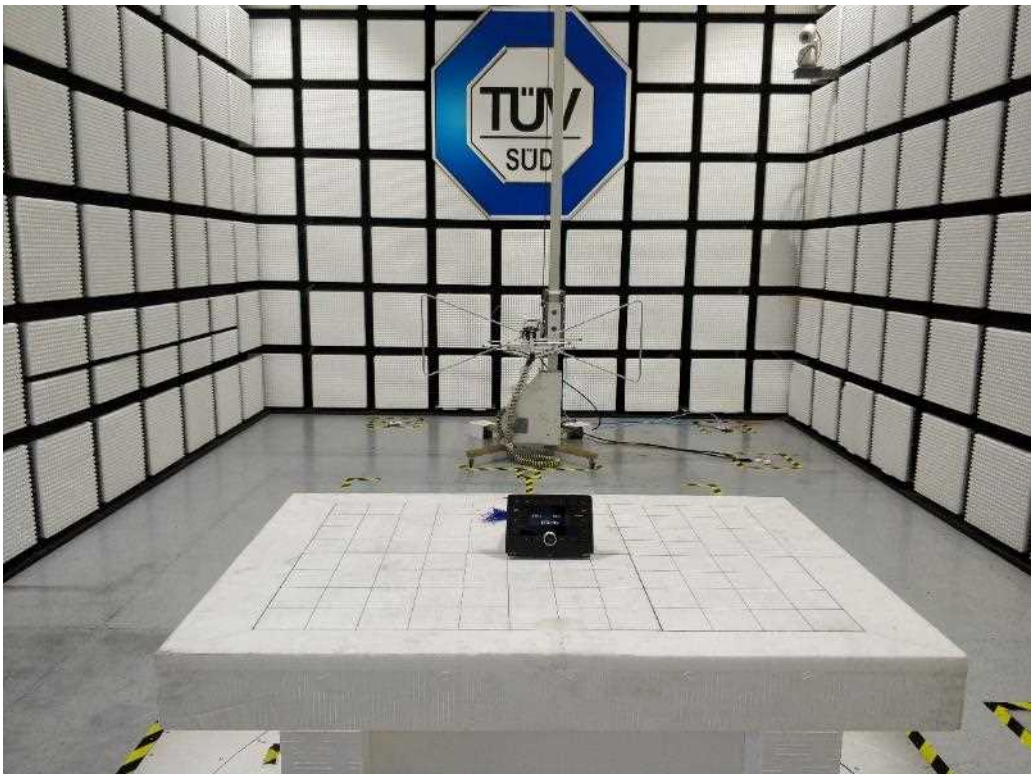
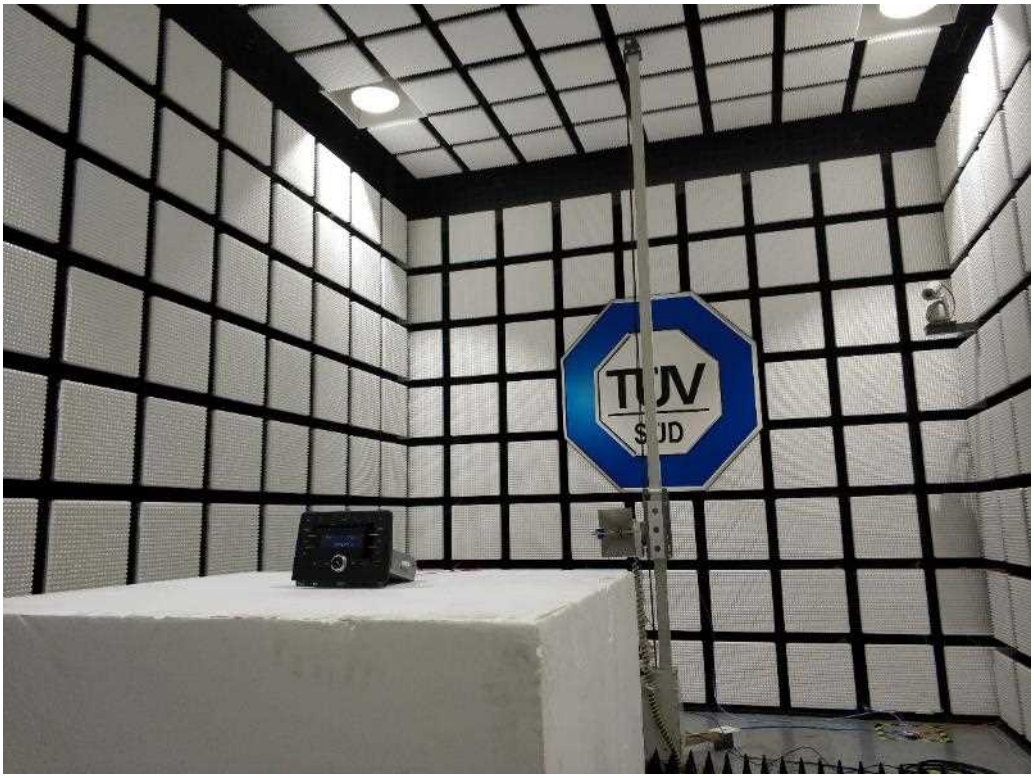
30MHz~1GHz



1GHz~18GHz



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Product Service

13 Photographs of EUT

External Photographs

Photo 1 Front view (R013-CMFB WDAB)

Photo 2 Rear view(R013-CMFB WDAB)

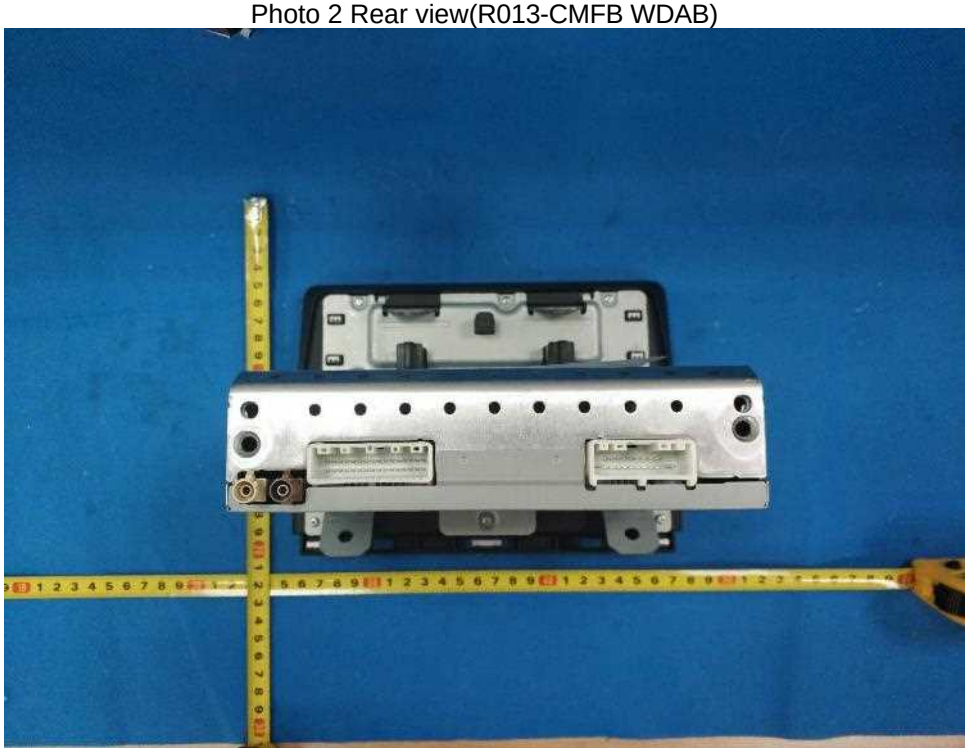

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Photo 3 Rear view(R013-CMFB)

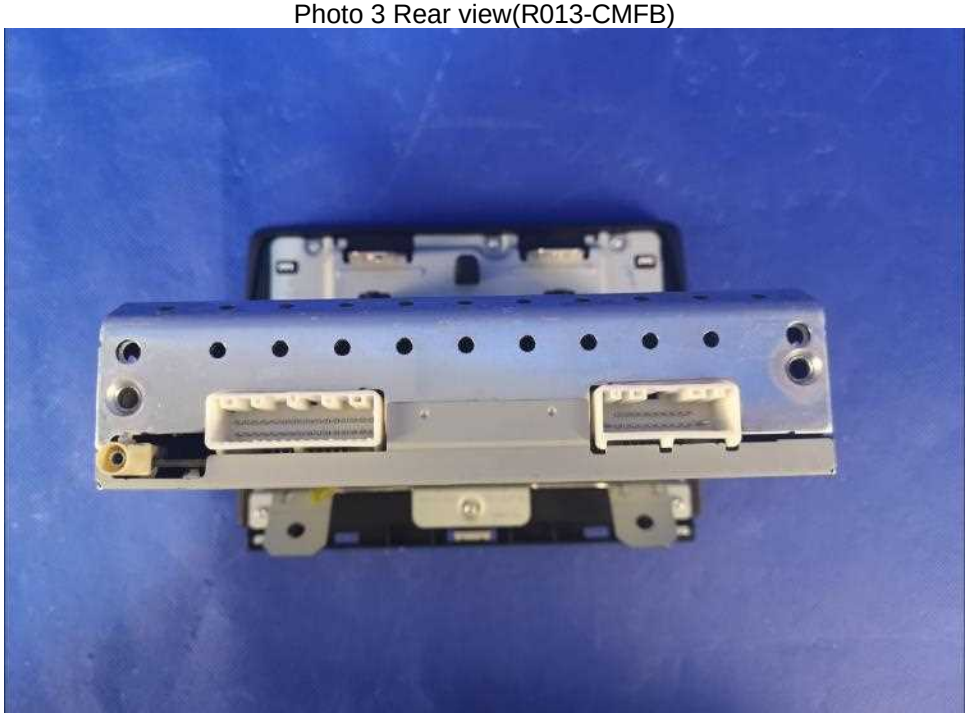

Photo 4 Bottom view(R013-CMFB WDAB)

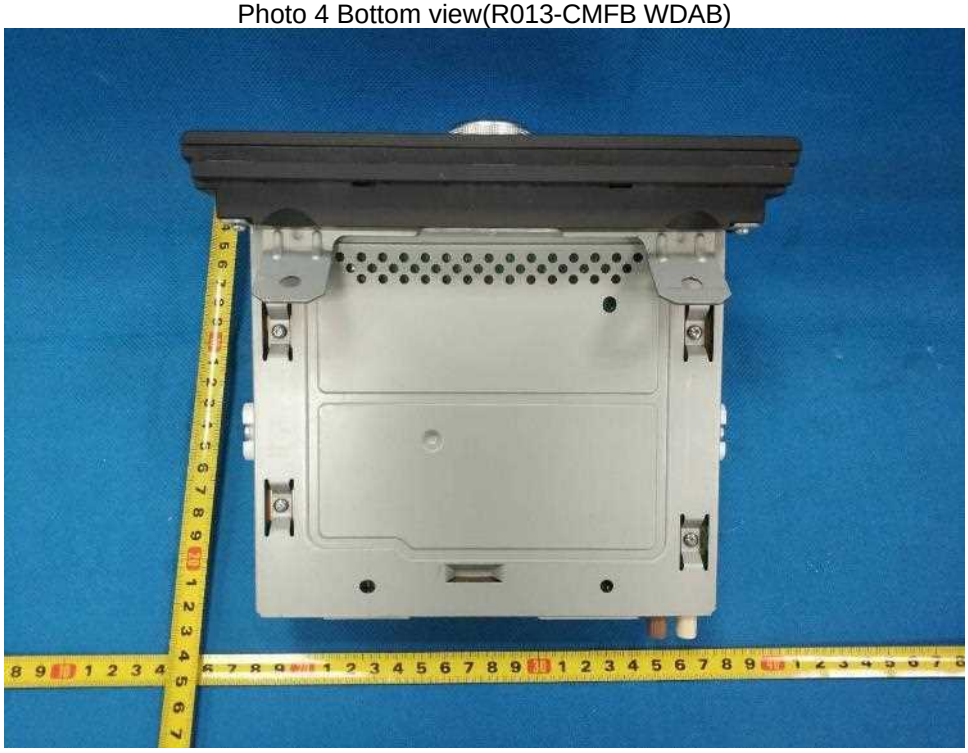

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Photo 5 Top view(R013-CMFB WDAB)

Photo 6 Left side view(R013-CMFB WDAB)

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Photo 7 Right side view(R013-CMFB WDAB)

Photo 8 Internal view(R013-CMFB WDAB)

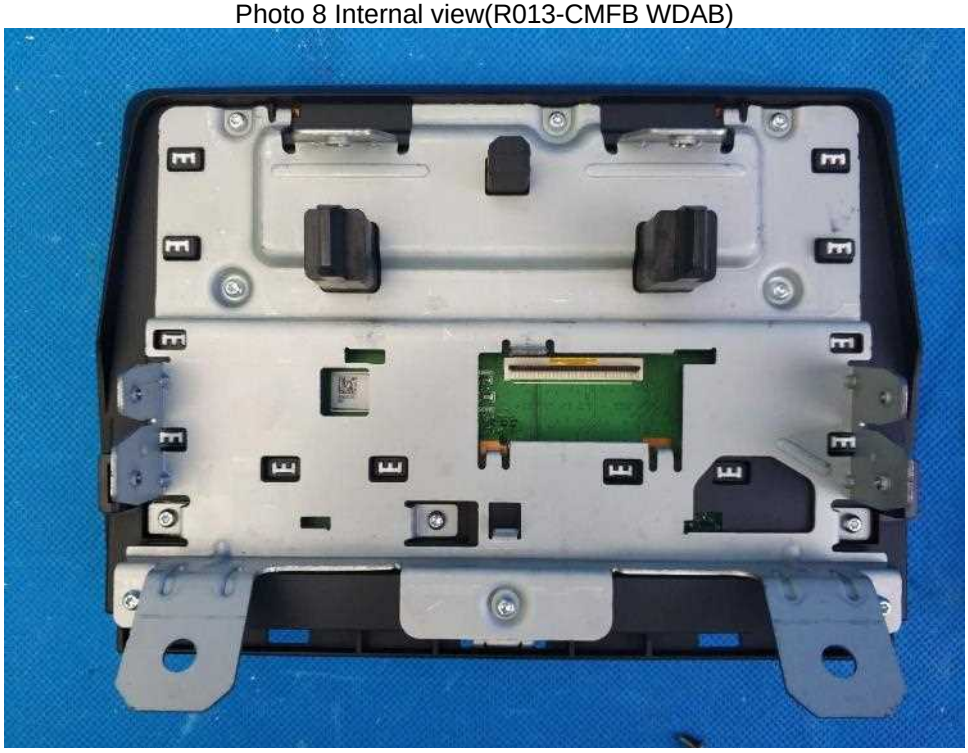

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Photo 9 Internal view

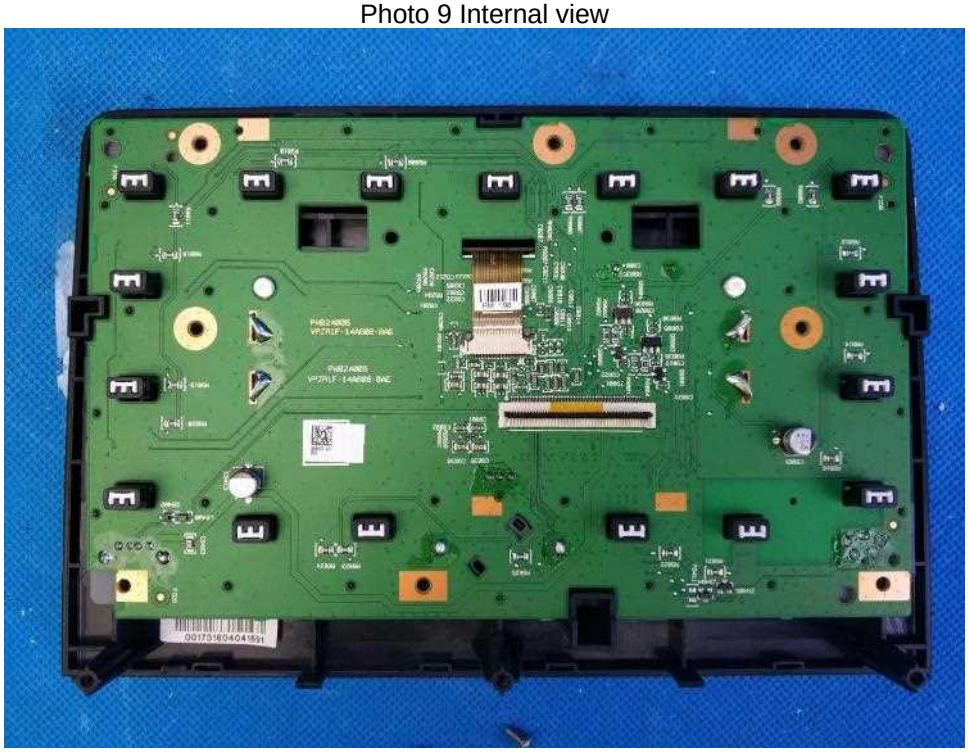

Photo 10 Internal view (R013-CMFB WDAB)

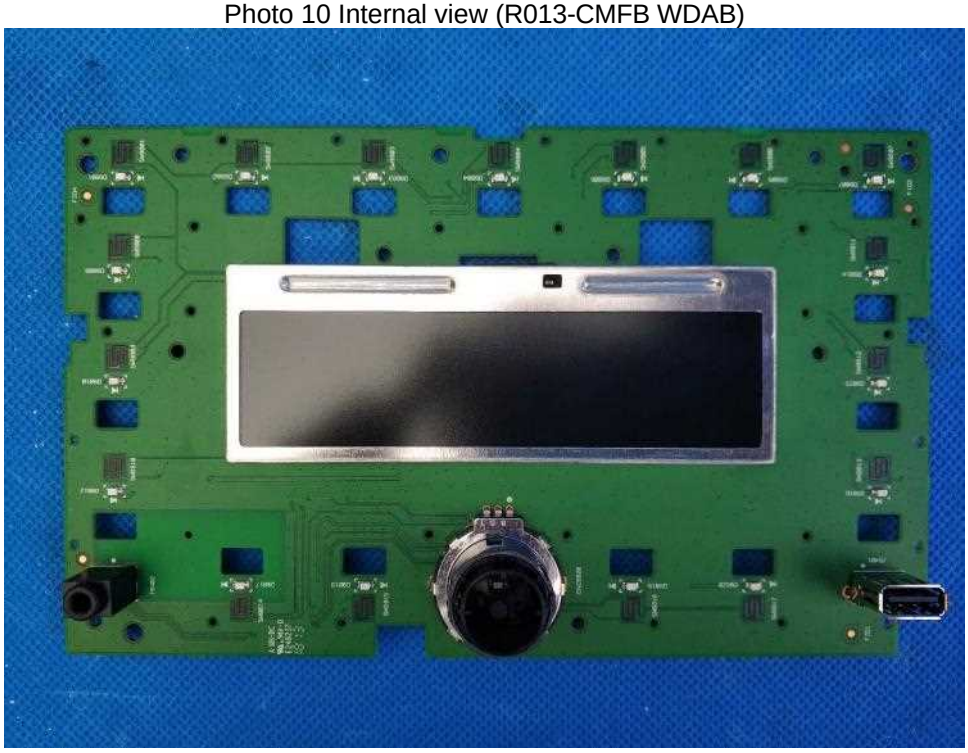

Photo 11 Internal view (R013-CMFB WDAB)

Photo 12 Internal view (R013-CMFB WDAB)

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Photo 13 Front view (R013 PH2-X07 WDAB)

Photo 14 Rear view (R013 PH2-X07)

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Photo 15 Rear view (R013 PH2-X07 WDAB)

Photo 16 Bottom view (R013 PH2-X07 WDAB)

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Photo 17 Top view (R013 PH2-X07 WDAB)

Photo 18 Left side view (R013 PH2-X07 WDAB)

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Photo 19 Right side view (R013 PH2-X07 WDAB)

Photo 20 Internal view (R013 PH2-X07 WDAB)

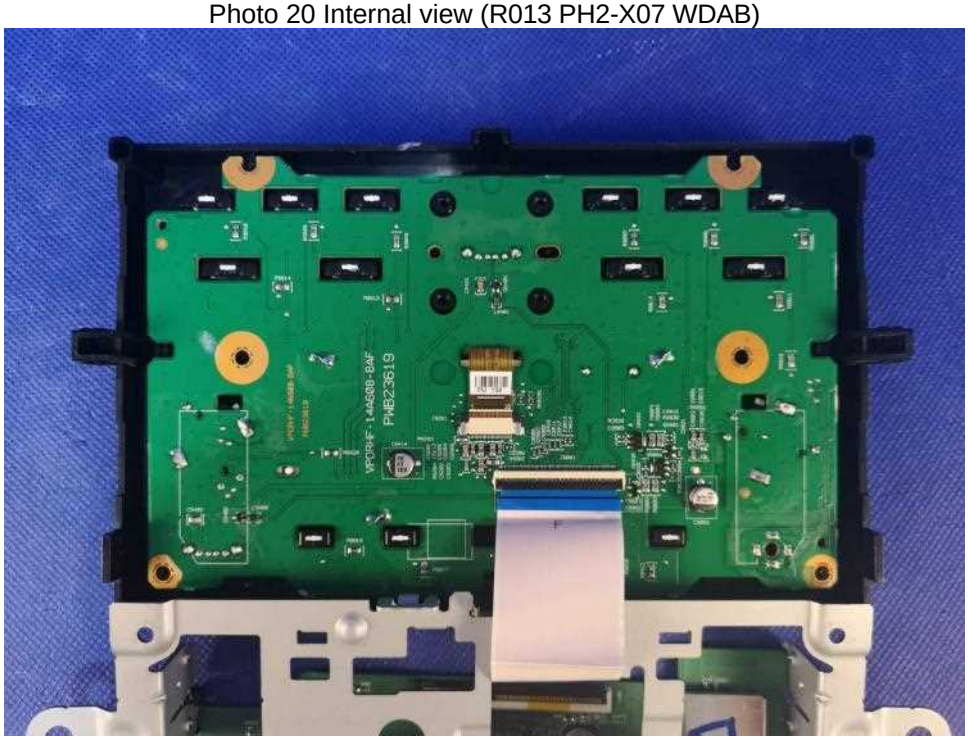

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Photo 21 Internal view (R013 PH2-X07 WDAB)

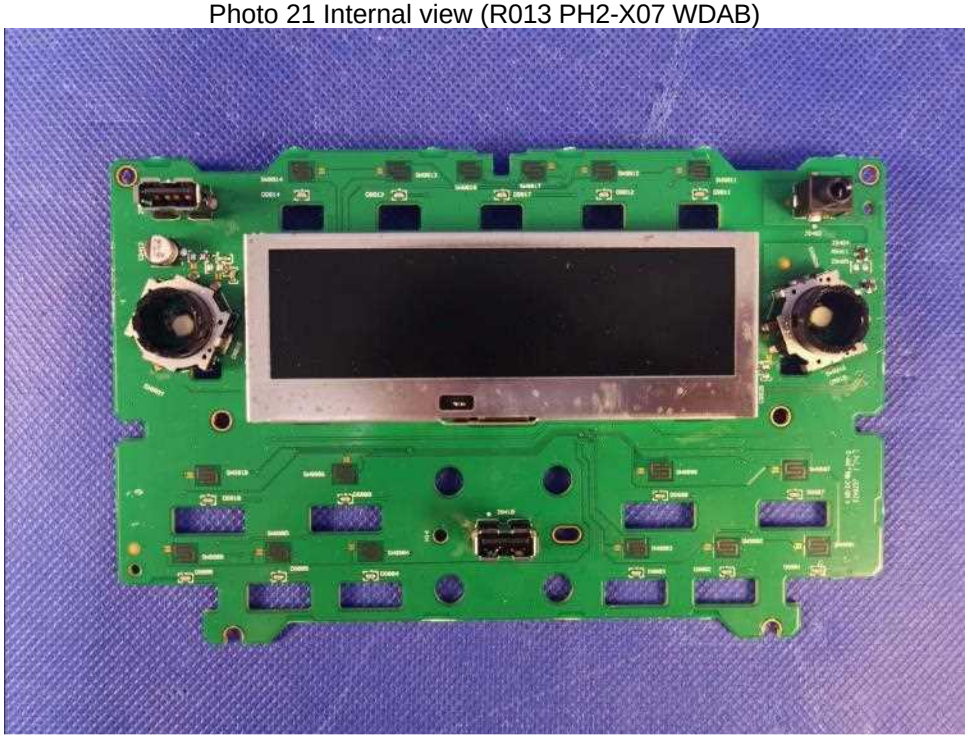

Photo 22 Internal view (R013 PH2-X07 WDAB)

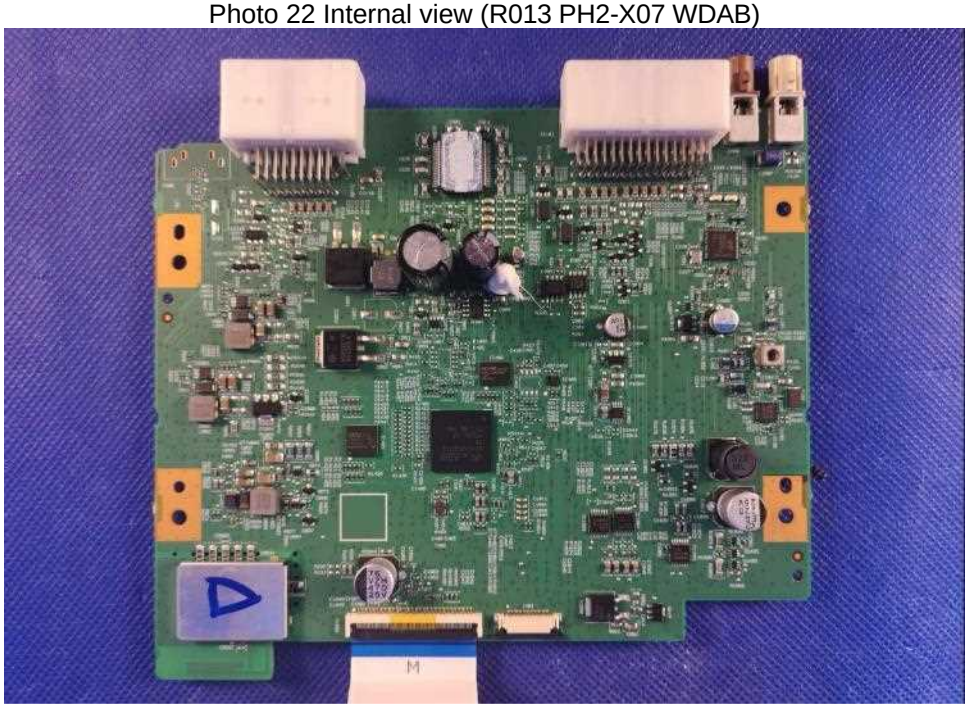

Photo 23 Internal view (R013 PH2-X07 WDAB)

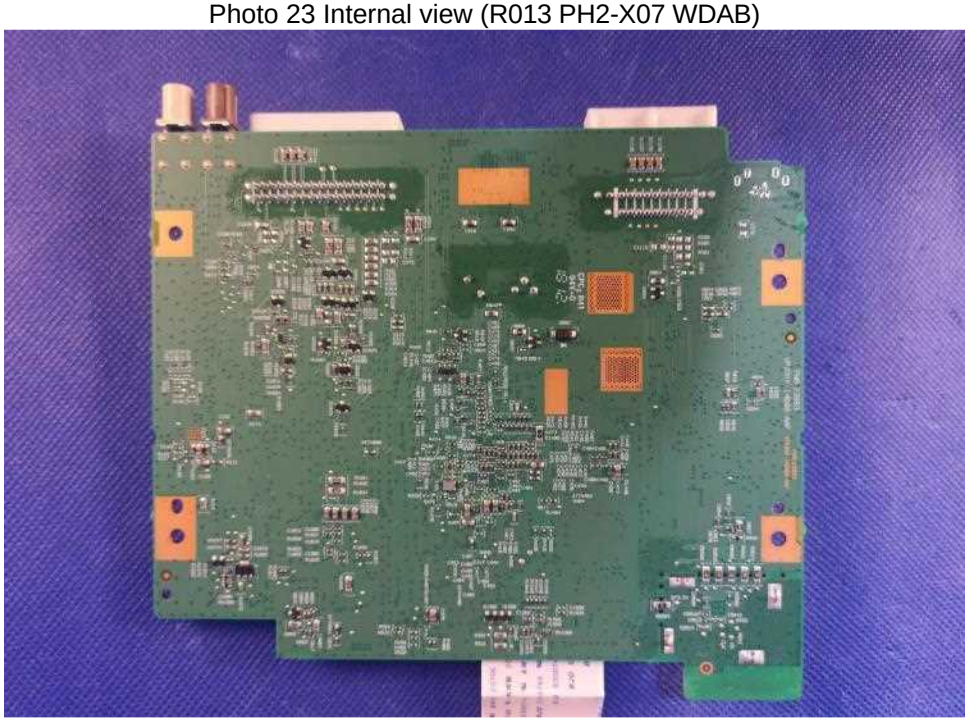

Photo 24 Front view (R013 PH2-1DIN WDAB)

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Photo 25 Rear view (R013 PH2-1DIN)

Photo 26 Rear view (R013 PH2-1DIN WDAB)

Photo 27 Bottom view (R013 PH2-1DIN WDAB)

Photo 28 Top view (R013 PH2-1DIN WDAB)

Photo 29 Left side view(R013 PH2-1DIN WDAB)

Photo 30 Right side view (R013 PH2-1DIN WDAB)

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Photo 31 Internal view(R013 PH2-1DIN WDAB)

Photo 32 Internal view (R013 PH2-1DIN WDAB)

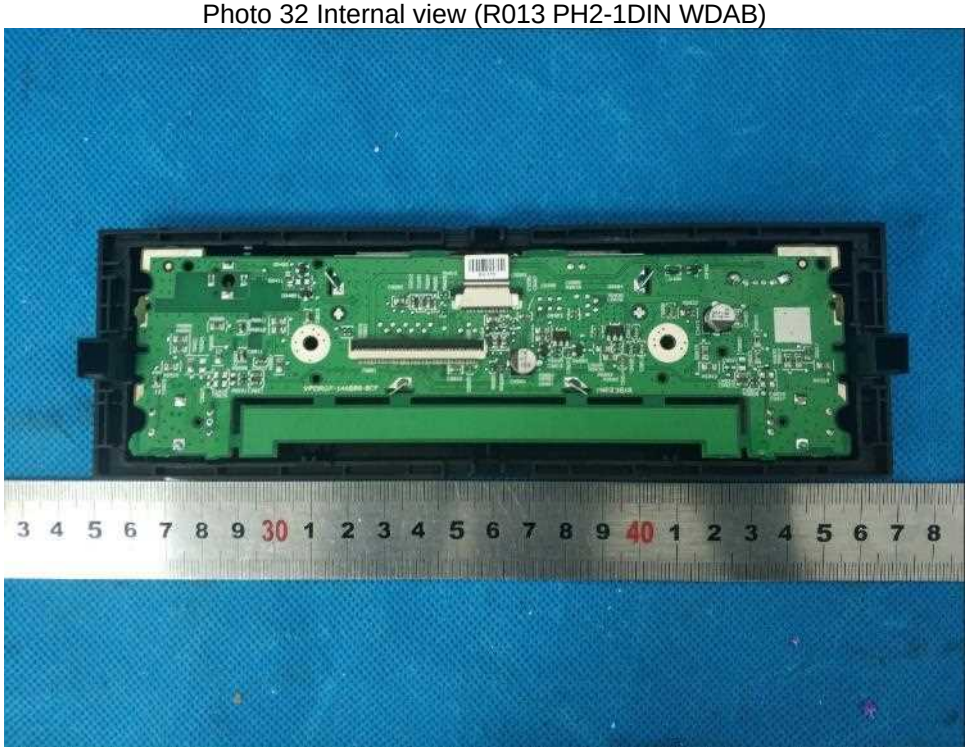

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Photo 33 Internal view (R013 PH2-1DIN WDAB)

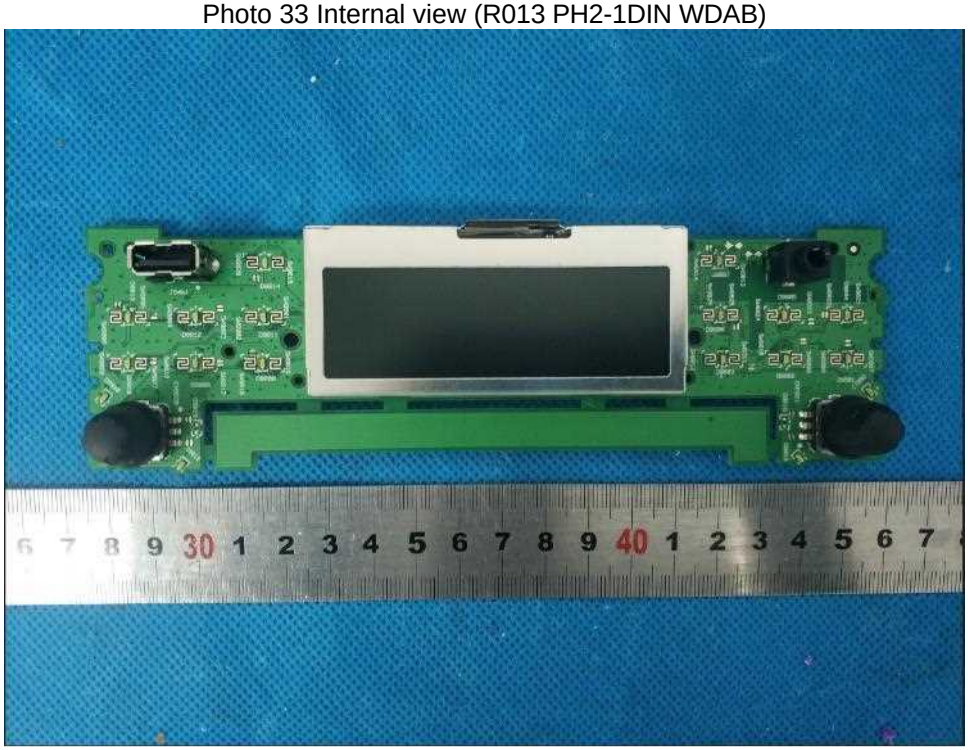

Photo 34 Internal view (R013 PH2-1DIN WDAB)

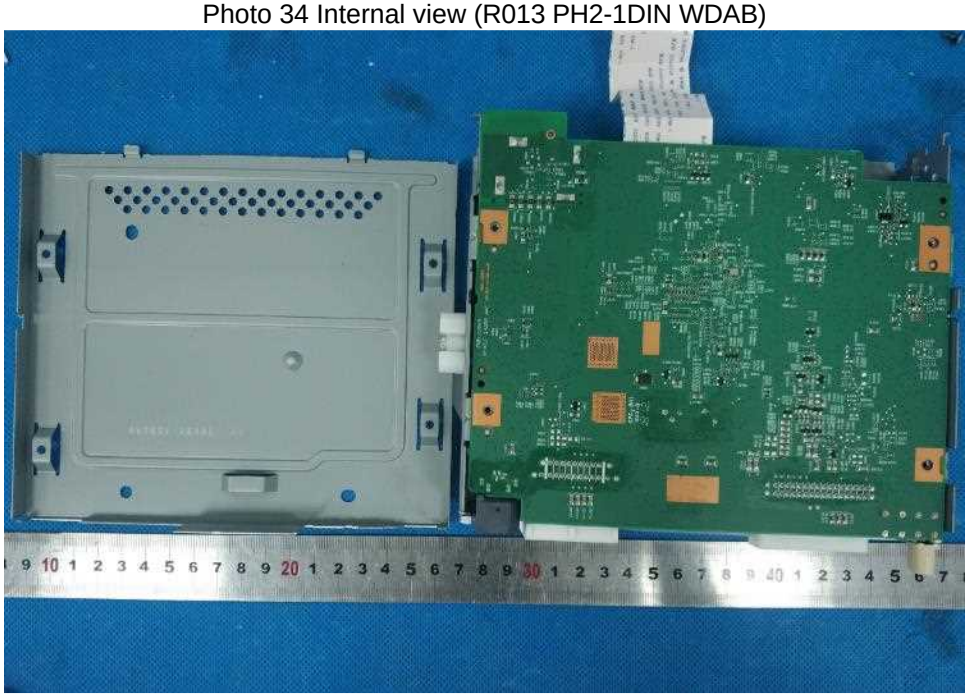

Photo 35 Internal view (R013 PH2-1DIN WDAB)

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