



Full

TEST REPORT

No. I16D00097-RFB

For

Client : Haier Telecom (Qingdao)Co.,Ltd

Production : GSM/WCDMA/LTE handset

Model Name : L30

FCC ID: SG7201605L30

Hardware Version: V1.01

Software Version: L30-H02-S021-Tigo

Issued date: 2016-06-15

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

Test Laboratory:

ECIT Shanghai, East China Institute of Telecommunications

Add: 7-8F, G Area, No.668, Beijing East Road, Huangpu District, Shanghai, P. R. China

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Revision Version

Report Number	Revision	Date	Memo
I16D00097-RFB	00	2016-06-15	Initial creation of test report

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1. Test Laboratory

1.1. Testing Location

Company Name:	ECIT Shanghai, East China Institute of Telecommunications
Address:	7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China
Postal Code:	200001
Telephone:	(+86)-021-63843300
Fax:	(+86)-021-63843301

1.2. Testing Environment

Normal Temperature:	15-35°C
Extreme Temperature:	-10/+55°C
Relative Humidity:	20-75%

1.3. Project data

Project Leader:	Xu Yuting
Testing Start Date:	2016-05-28
Testing End Date:	2016-06-14

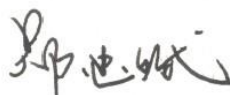
1.4. Signature



Wang Changqing
(Prepared this test report)



Liu Jianquan
(Reviewed this test report)



Zheng Zhongbin
Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: Haier Telecom (Qingdao)Co.,Ltd
Address: No1,Haier Road,Hi-tech Zone,Qingdao, China
Telephone: 0532-88937273
Postcode: 266101

2.2. Manufacturer Information

Company Name: Haier Telecom (Qingdao)Co.,Ltd
Address: No1,Haier Road,Hi-tech Zone,Qingdao, China
Telephone: 0532-88937273
Postcode: 266101

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

EUT Description	GSM/WCDMA/LTE handset
Model name	L30
UMTS Frequency Band	WCDMA BandII and V
GSM Frequency Band	GSM850/900/1800/1900
Bluetooth Frequency	2402MHz-2480Mhz
Bluetooth Channel	Channel0-Channel78
Bluetooth Modulation	GMSK; $\pi/4$ DQPSK;8DPSK
Extreme Temperature	-10/+55°C
Nominal Voltage	3.8V
Extreme High Voltage	4.35V
Extreme Low Voltage	3.6V

Note: Photographs of EUT are shown in ANNEX A of this test report.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
N01	861864030000217	V1.01	L30-H02-S021-Tigo	2016-05-27

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN
AE1	RF cable	---
AE2	---	---

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part15	FCC CFR 47, Part 15,Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz.	Jun,2016 Edition
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Summary of Test Results

A brief summary of the tests carried out is shown as following.

Measurement Items	Sub-clause of Part15C	Sub-clause of IC	Verdict
Maximum Peak Output Power	15.247(b)	/	P
Peak Power Spectral Density	15.247(d)	/	NA
20dB Occupied Bandwidth	15.247(a)	/	P
Band Edges Compliance	15.247(b)	/	P
Transmitter Spurious Emission-Conducted	15.247	/	P
Transmitter Spurious Emission-Radiated	15.247,15.209,	/	P
AC Powerline Conducted Emission	15.107,15.207	/	P

Please refer to part 5 for detail.

The measurements are according to and ANSI C63.10.

Terms used in Verdict column

P	Pass, the EUT complies with the essential requirements in the standard.
NP	Not Perform, the test was not performed by ECIT.
NA	Not Applicable, the test was not applicable.
F	Fail, the EUT does not comply with the essential requirements in the standard.

Test Conditions

Tnom	Normal Temperature
Tmin	Low Temperature
Tmax	High Temperature
Vnom	Normal Voltage
Vmin	Low Voltage
Vmax	High Voltage
Hnom	Norm Humidity
Anom	Norm Air Pressure

For this report, all the test case listed above are tested under Normal Temperature and Normal Voltage, and also under norm humidity, the specific conditions as following:

Temperature	Tnom	22°C
Voltage	Vnom	3.7V
Humidity	Hnom	32%
Air Pressure	Anom	1010hPa

Note:

- a. All the test data for each data were verified, but only the worst case was reported.
- b. The GFSK, $\pi/4$ DQPSK and 8DPSK were set in DH1 for GFSK, 2-DH1 for $\pi/4$ DQPSK, 3-DH1 for 8DPSK.
- c. The DC and low frequency voltages' measurement uncertainty is $\pm 2\%$.

5.1. Notes

All reported tests were carried out on a sample equipment to demonstrate limited compliance with section 3.

The test results of this test report relate exclusively to the item(s) tested as specified in section 5.

The following deviation from, additions to, or exclusions from the test specifications have been made. See section 3.

5.2. Statements

The product name L30, supporting GSM/GPRS/EDGE/WCDMA/HSDPA/HSUPA/HSPA+/LTE/WLAN/BT/BLE, manufactured by Haier Telecom (Qingdao)Co.,Ltd is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

6. Test result

6.1. Peak Output Power-Conducted

6.1.1 Measurement Limit

Standard	Limit (dBm)
FCC Part 15.247(b)(1)	< 30

6.1.2 Test Condition:

Hopping Mode	RBW	VBW	Span	Sweeptime
Hopping OFF	3MHz	10MHz	9MHz	Auto

6.1.3 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.5.

1. The output power of EUT was connected to the spectrum analyzer and CBT32 by cable and divide. The path loss was compensated to the results for each measurement.
2. Enable EUT transmitter maximum power continuously.
3. Measure the conducted output power and record the results it.

6.1.4 Measurement Results:

For GFSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.07	7.93	6.95	P
	Fig.1	Fig.2	Fig.3	

For $\pi/4$ DQPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	7.36	8.14	7.07	P
	Fig.4	Fig.5	Fig.6	

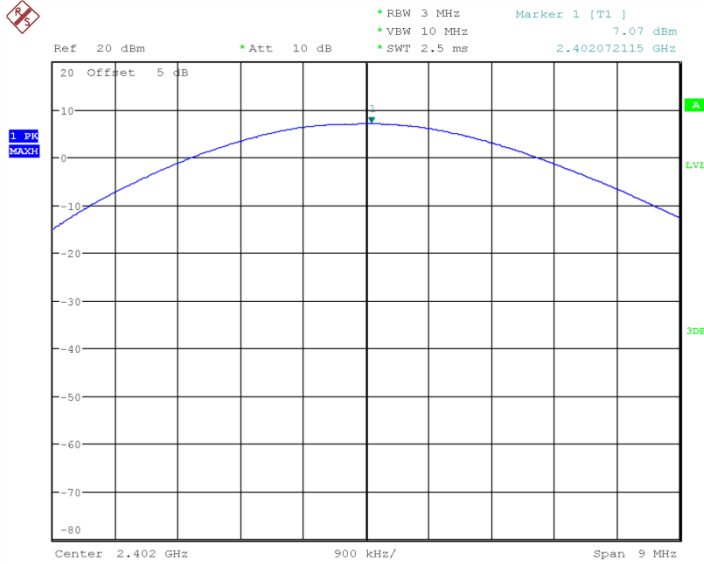
For 8DPSK

Channel	Ch0 2402 MHz	Ch39 2441 MHz	CH78 2480 MHz	Conclusion
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Peak Conducted Output Power (dBm)	7.59	8.26	7.25	P
	Fig.7	Fig.8	Fig.9	

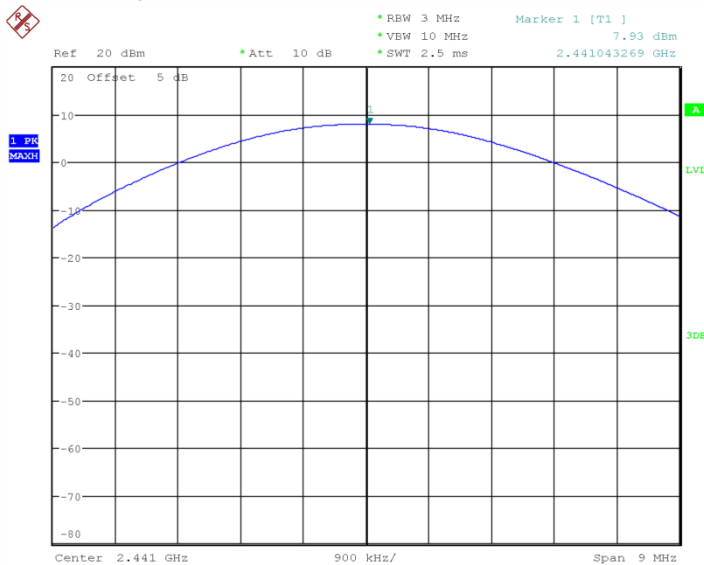
Conclusion: PASS

Test graphs an below



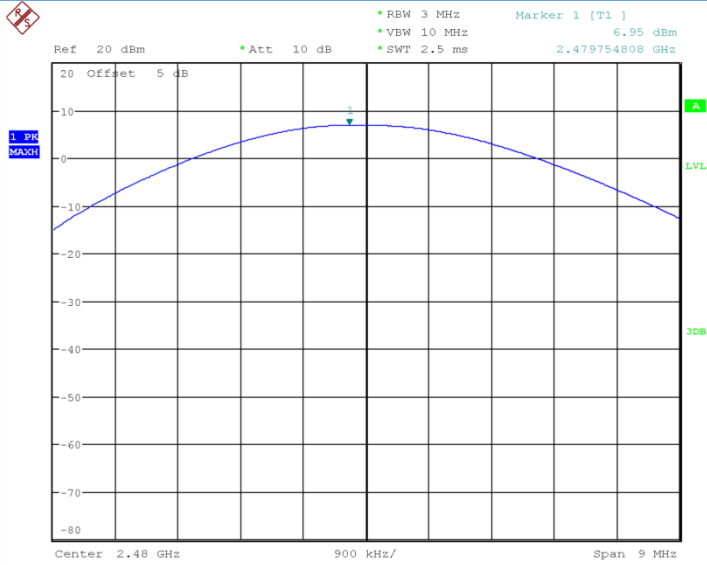
Date: 29.MAY.2016 11:19:45

Fig.1 Peak Conducted Output Power CH0, DH1



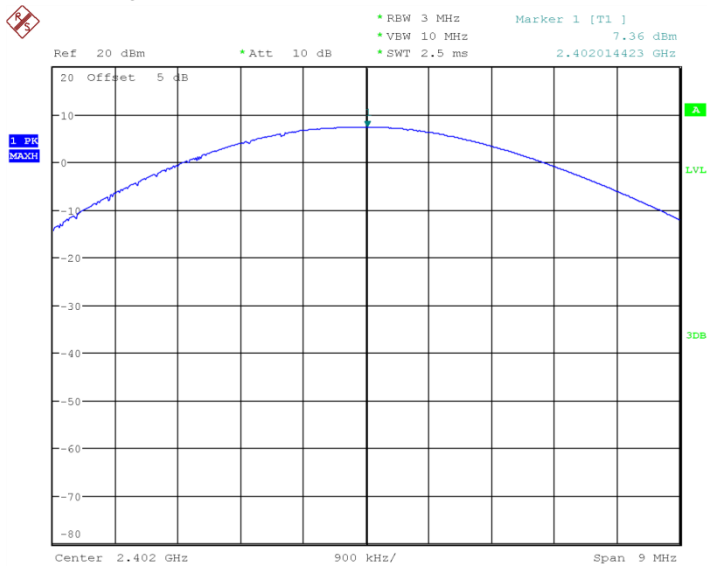
Date: 29.MAY.2016 11:19:57

Fig.2 Peak Conducted Output Power CH39, DH1



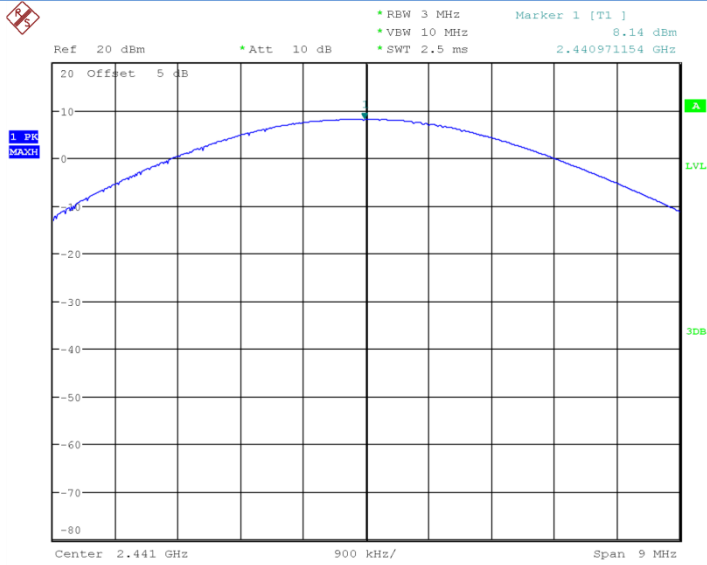
Date: 29.MAY.2016 11:20:08

Fig.3 Peak Conducted Output Power CH78, DH1



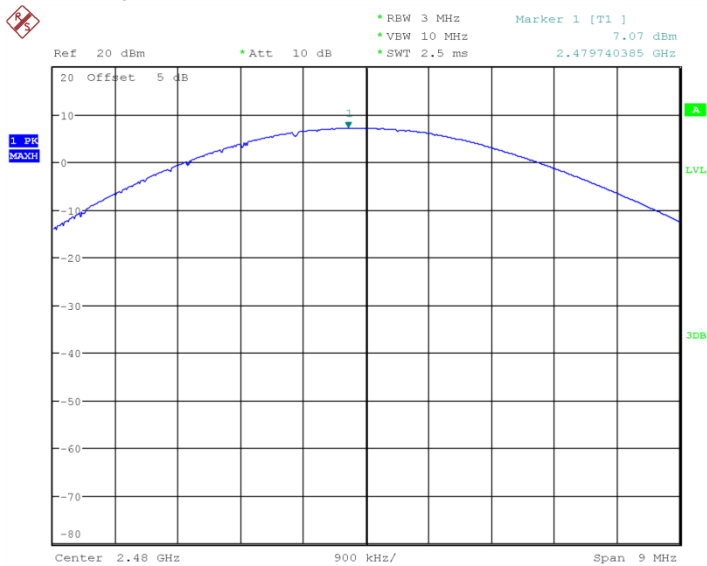
Date: 29.MAY.2016 11:20:20

Fig.4 Peak Conducted Output Power CH0, 2DH1



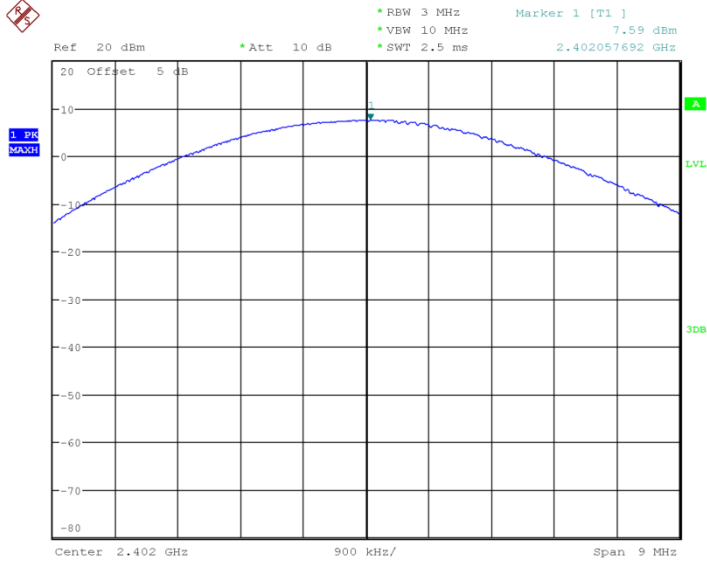
Date: 29.MAY.2016 11:20:32

Fig.5 Peak Conducted Output Power CH39, 2DH1



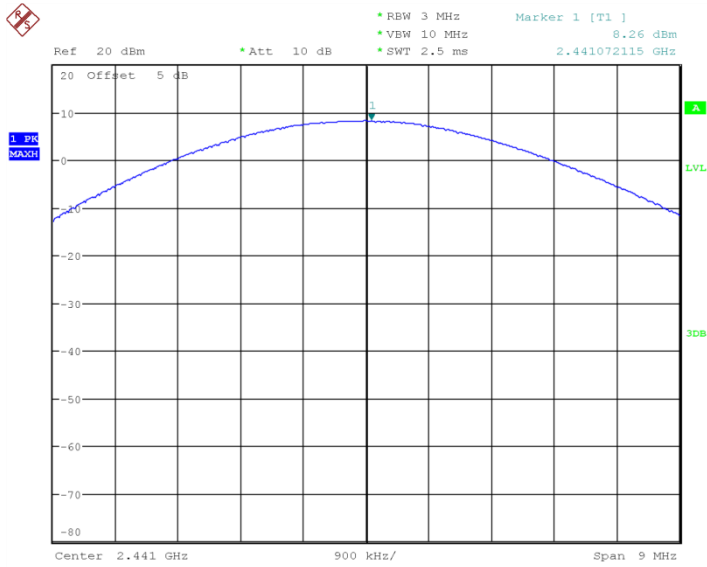
Date: 29.MAY.2016 11:20:44

Fig.6 Peak Conducted Output Power CH78, 2DH1



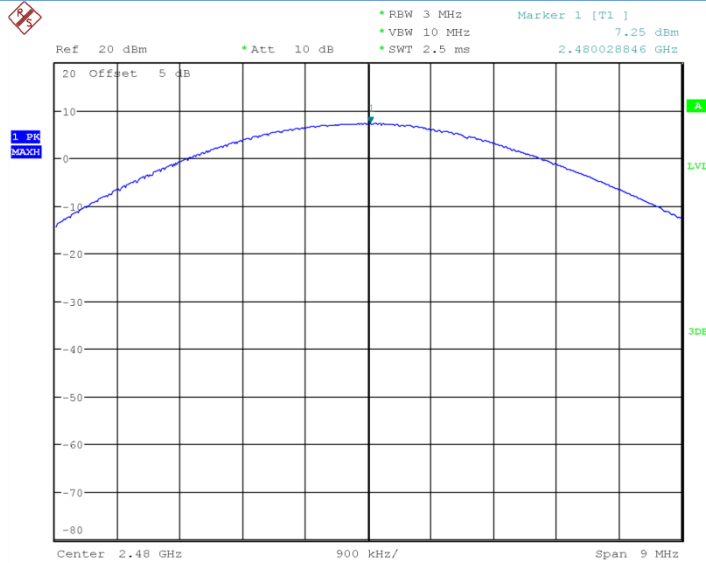
Date: 29.MAY.2016 11:20:56

Fig.7 Peak Conducted Output Power CH0, 3DH1



Date: 29.MAY.2016 11:21:08

Fig.8 Peak Conducted Output Power CH39, 3DH1



Date: 29.MAY.2016 11:21:19

Fig.9 Peak Conducted Output Power CH78, 3DH1

6.2. Frequency Band Edges-Conducted

6.2.1 Measurement Limit:

Standard	Limited(dBc)
FCC 47 CFR Part 15.247(d)	>20

6.2.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.6.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz, span more than 1.5 times channel bandwidth (2MHz).
3. Detector =peak, sweep time=auto couple, trace mode=max hold.
4. Allow sweep to continue until the trace stabilizes.

6.2.3 Measurement results

For GFSK

Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.10	P
	Hopping ON	Fig.11	P
78	Hopping OFF	Fig.12	P

	Hopping ON	Fig.13	P
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For $\pi/4$ DQPSK

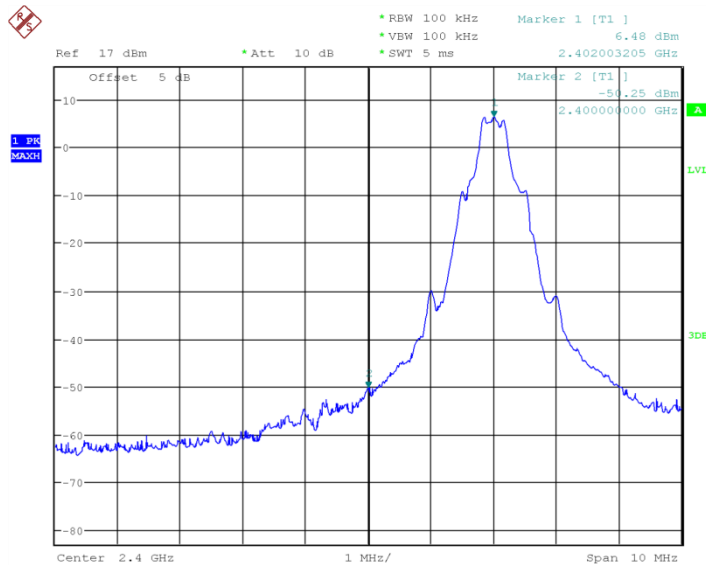
Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.14	P
	Hopping ON	Fig.15	P
78	Hopping OFF	Fig.16	P
	Hopping ON	Fig.17	P

For 8DPSK

Channel	Hopping	Band Edge Power (dBc)	Conclusion
0	Hopping OFF	Fig.18	P
	Hopping ON	Fig.19	P
78	Hopping OFF	Fig.20	P
	Hopping ON	Fig.21	P

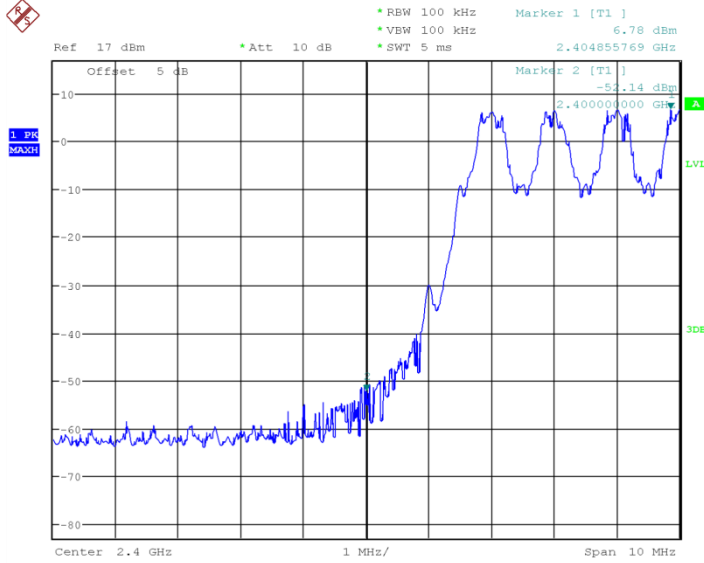
Conclusion: PASS

Test graphs an below



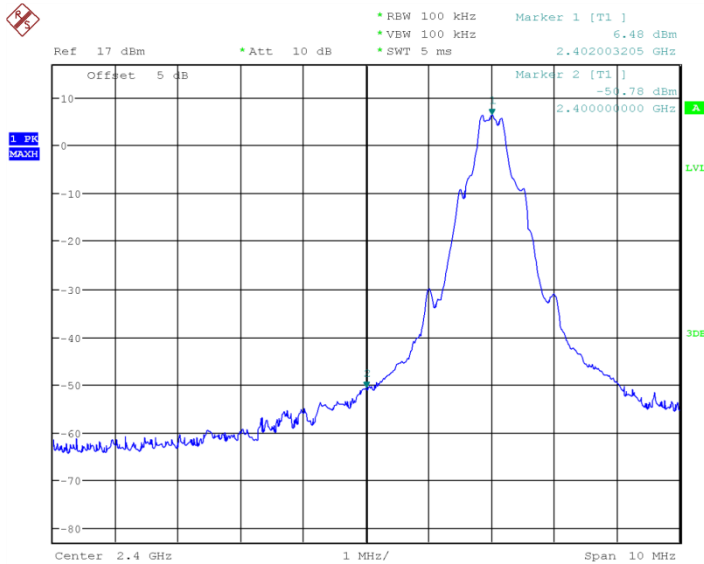
Date: 29.MAY.2016 11:23:08

Fig.10 Frequency Band Edge: GFSK, Ch0, Hopping OFF



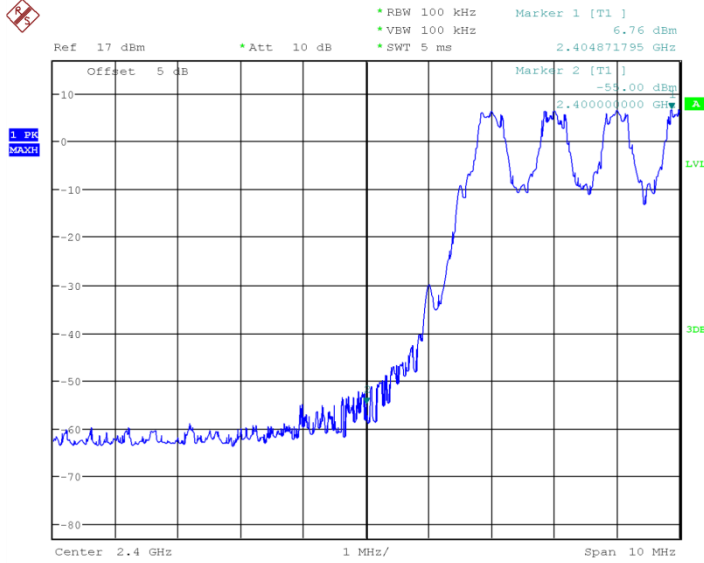
Date: 29.MAY.2016 11:25:12

Fig.11 Frequency Band Edge: GFSK, Ch0, Hopping ON



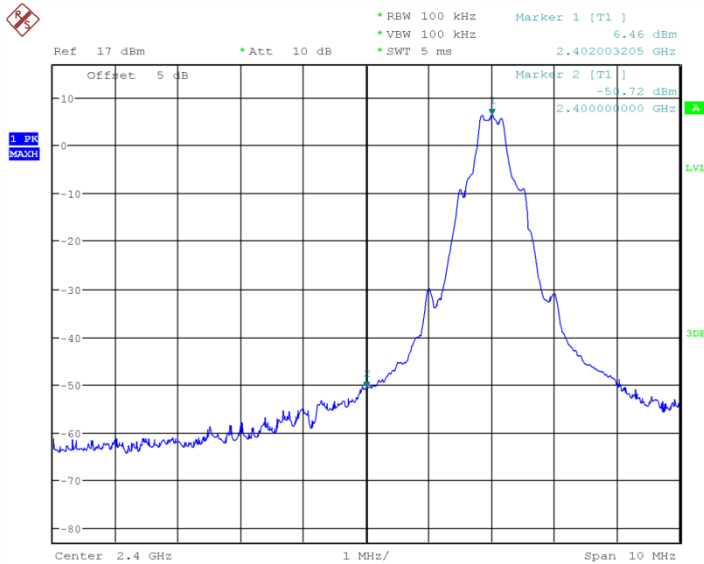
Date: 29.MAY.2016 11:25:46

Fig.12 Frequency Band Edge: GFSK, Ch78, Hopping OFF



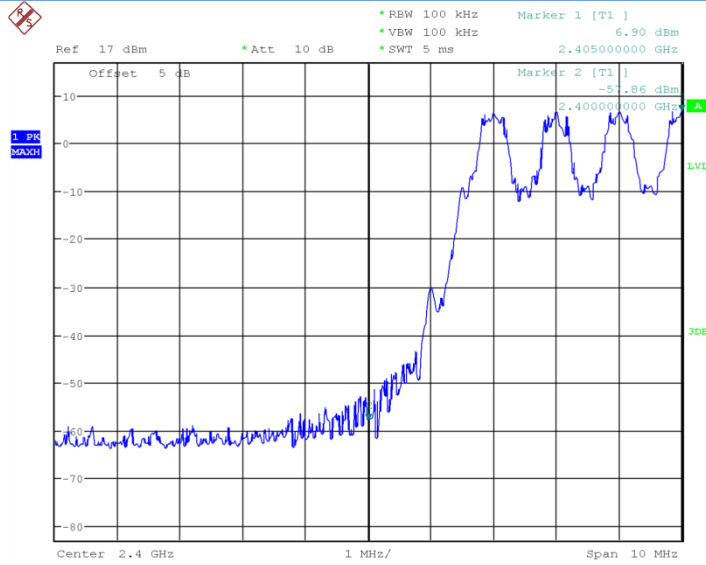
Date: 29.MAY.2016 11:27:50

Fig.13 Frequency Band Edge: GFSK, Ch78, Hopping ON



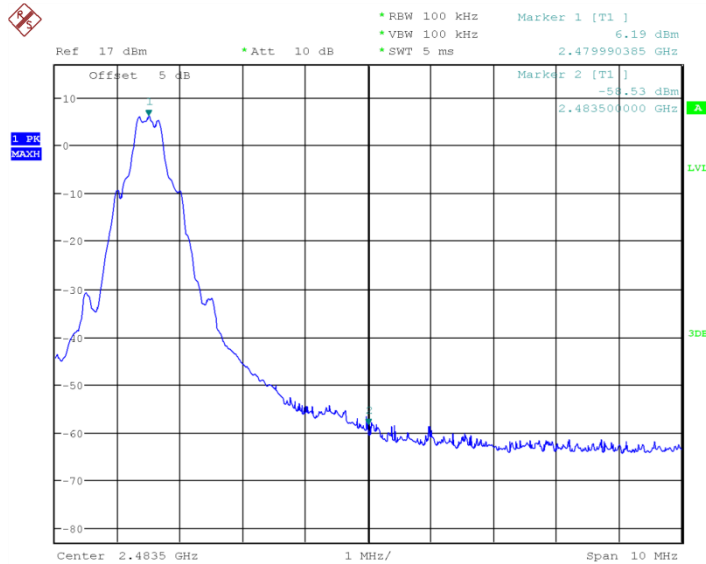
Date: 29.MAY.2016 11:28:25

Fig.14 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping OFF



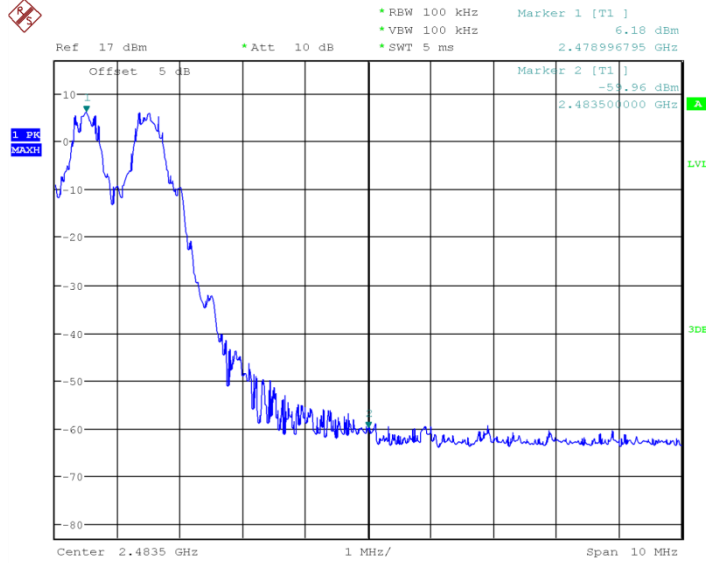
Date: 29.MAY.2016 11:30:29

Fig.15 Frequency Band Edge: $\pi/4$ DQPSK, Ch0, Hopping ON



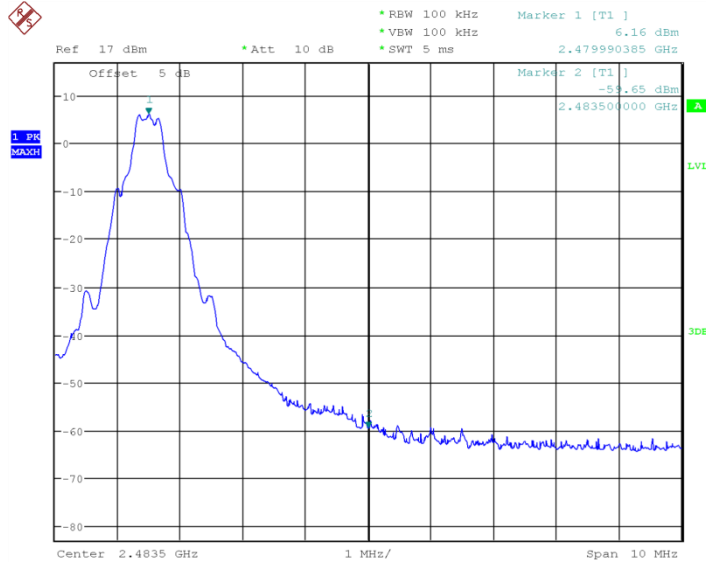
Date: 29.MAY.2016 11:31:05

Fig.16 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping OFF



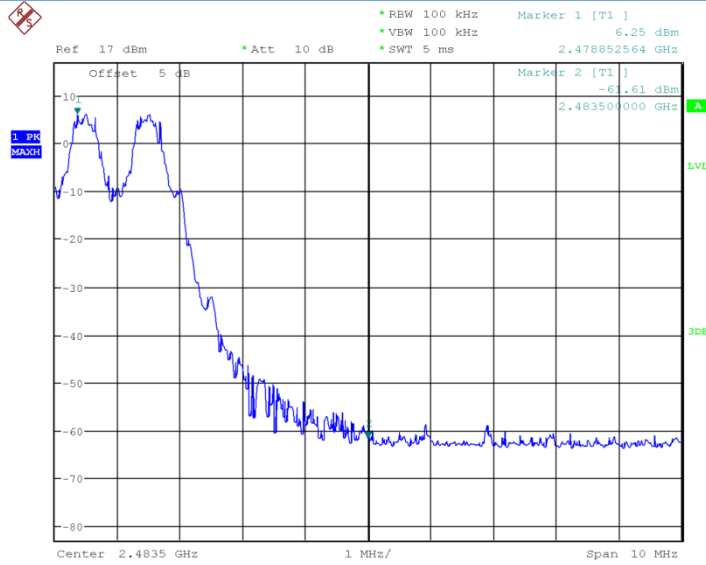
Date: 29.MAY.2016 11:33:09

Fig.17 Frequency Band Edge: $\pi/4$ DQPSK, Ch78, Hopping ON



Date: 29.MAY.2016 11:33:43

Fig.18 Frequency Band Edge: 8DPSK, Ch0, Hopping OFF



Date: 29.MAY.2016 11:38:25

Fig.21 Frequency Band Edge: 8DPSK, Ch78, Hopping ON

6.3. Conducted Emission

6.3.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part15.247 (d)	20dB below peak output power in 100KHz bandwidth

6.3.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.8.

1. Connect the EUT to spectrum analyzer.
2. Set RBW=100KHz, VBW=300KHz.
3. Detector =peak, sweep time=auto couple, trace mode=max hold.

6.3.3 Measurement Results:

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.22	P
	30MHz~26GHz	Fig.23	P
Ch39 2441MHz	Center Freq.	Fig.24	P
	30MHz~26GHz	Fig.25	P
Ch78 2480MHz	Center Freq.	Fig.26	P

	30MHz~26GHz	Fig.27	P
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For $\pi/4$ DQPSK

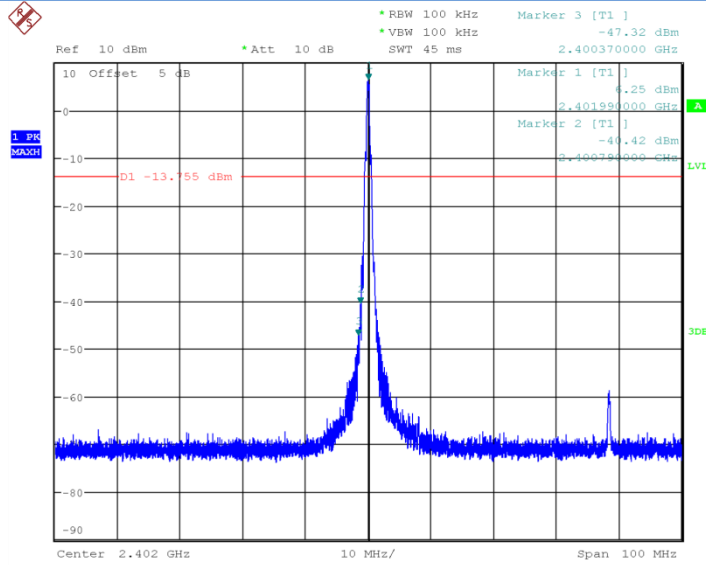
Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.28	P
	30MHz~26GHz	Fig.29	P
Ch39 2441MHz	Center Freq.	Fig.30	P
	30MHz~26GHz	Fig.31	P
Ch78 2480MHz	Center Freq.	Fig.32	P
	30MHz~26GHz	Fig.33	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	Center Freq.	Fig.34	P
	30MHz~26GHz	Fig.35	P
Ch39 2441MHz	Center Freq.	Fig.36	P
	30MHz~26GHz	Fig.37	P
Ch78 2480MHz	Center Freq.	Fig.38	P
	30MHz~26GHz	Fig.39	P

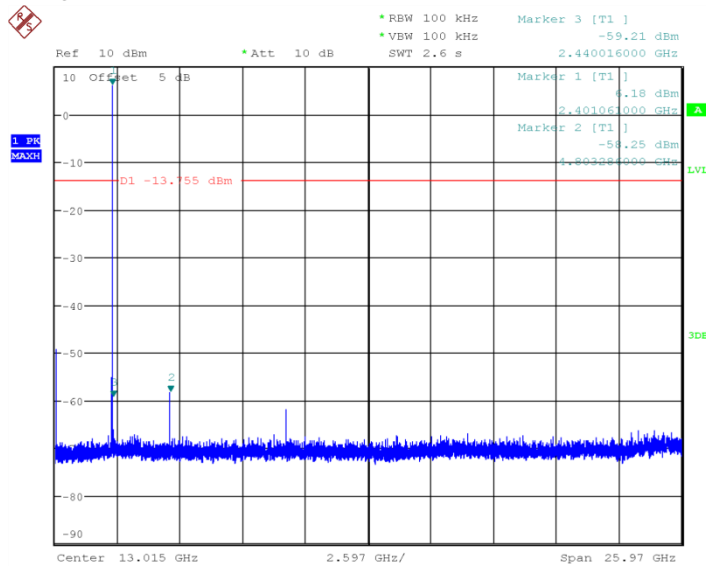
Conclusion: PASS

Test graphs as below



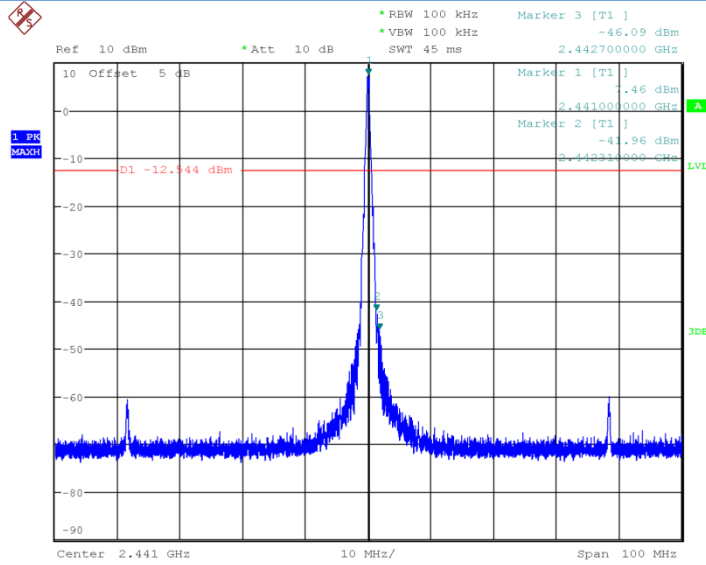
Date: 29.MAY.2016 11:40:00

Fig.22 Conducted spurious emission: GFSK, Ch0, 2402MHz



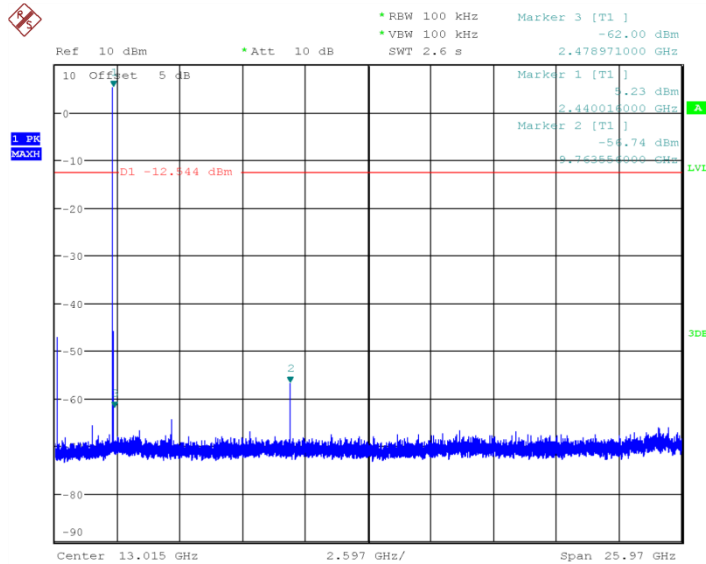
Date: 29.MAY.2016 11:40:23

Fig.23 Conducted spurious emission: GFSK, Ch0, 30MHz~26GHz



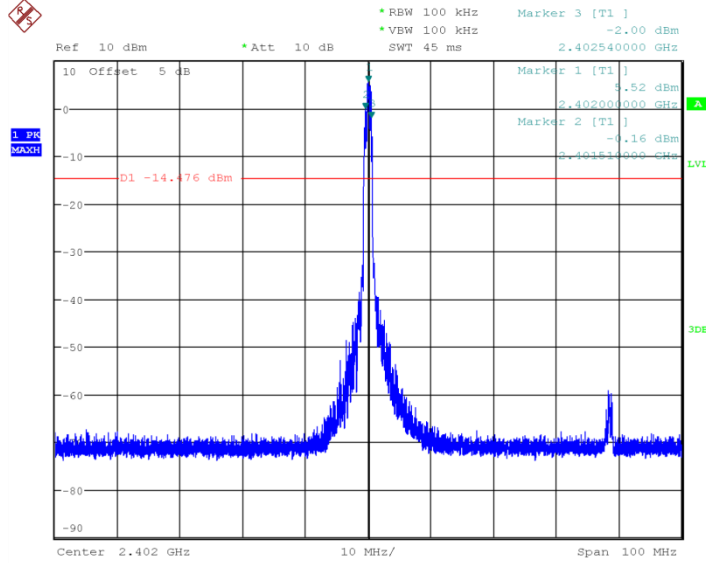
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Fig.24 Conducted spurious emission: GFSK, Ch39, 2441MHz



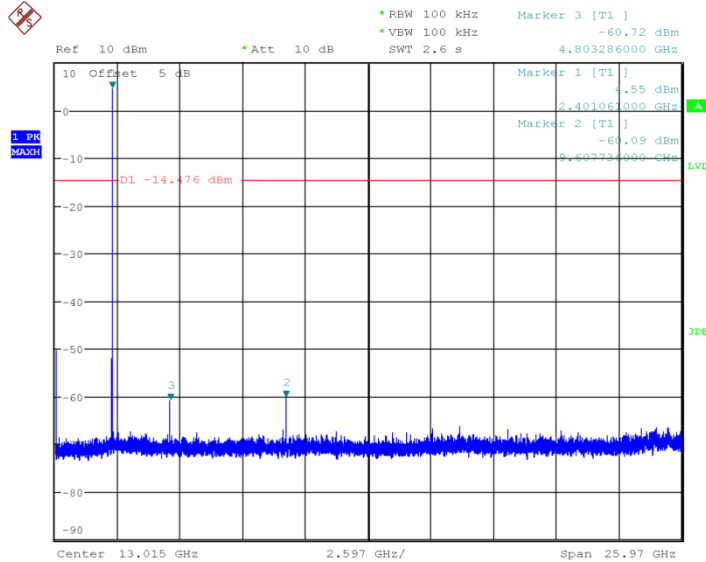
Date: 29.MAY.2016 11:41:11

Fig.25 Conducted spurious emission: GFSK, Ch39, 30MHz~26GHz



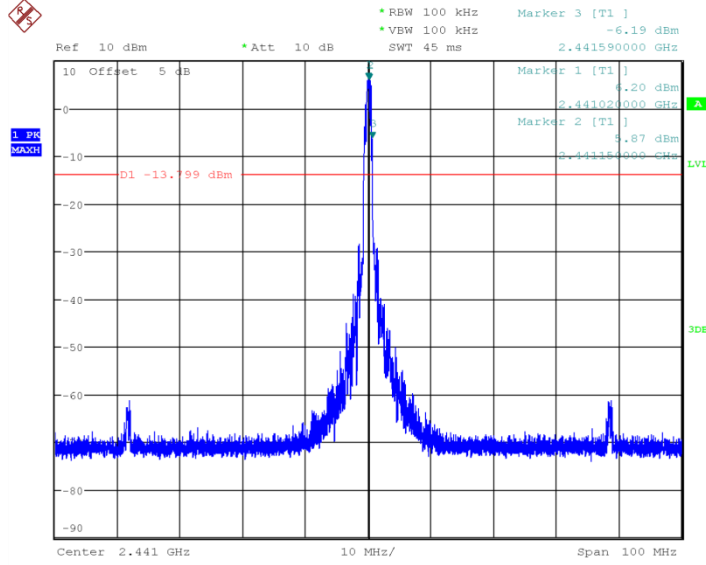
Date: 29.MAY.2016 11:42:23

Fig.28 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 2402MHz



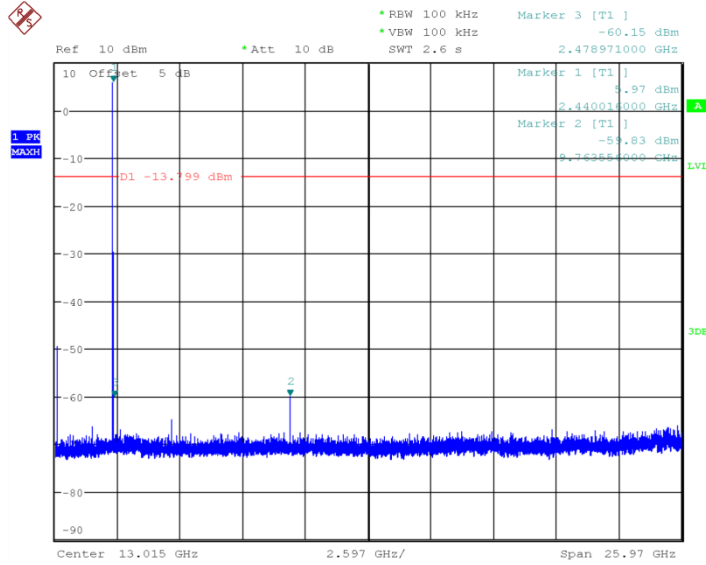
Date: 29.MAY.2016 11:42:46

Fig.29 Conducted spurious emission: $\pi/4$ DQPSK, Ch0, 30MHz~26GHz



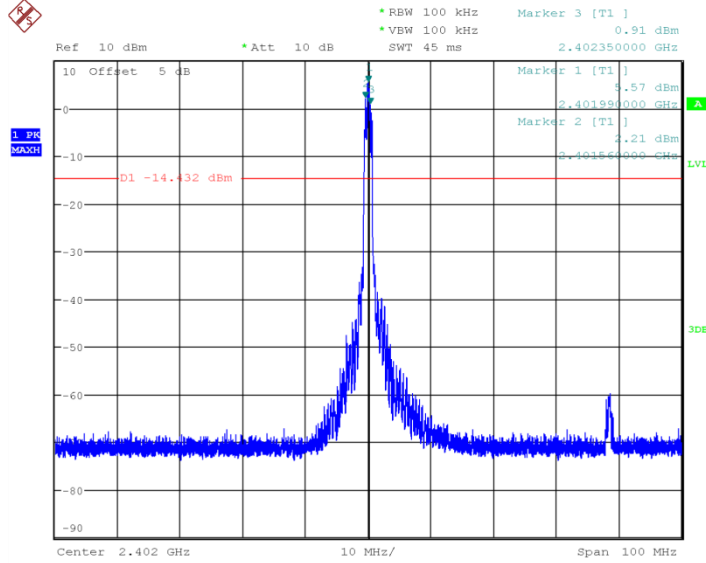
Date: 29.MAY.2016 11:43:11

Fig.30 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 2441MHz



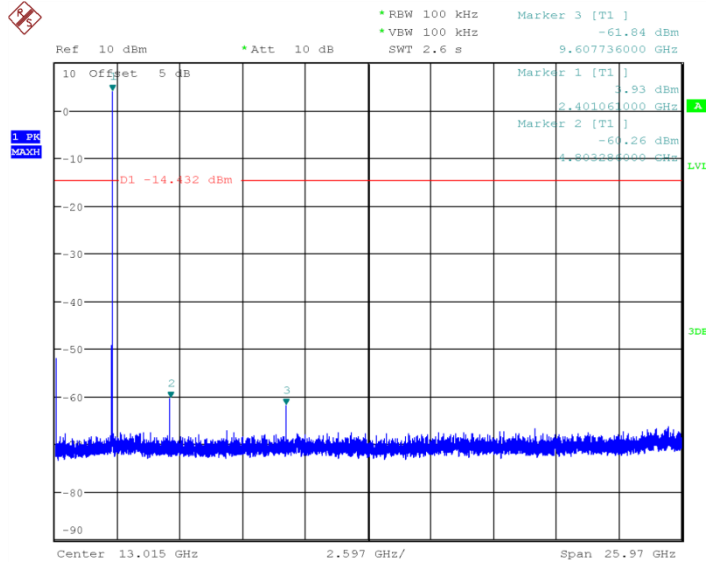
Date: 29.MAY.2016 11:43:34

Fig.31 Conducted spurious emission: $\pi/4$ DQPSK, Ch39, 30MHz~26GHz



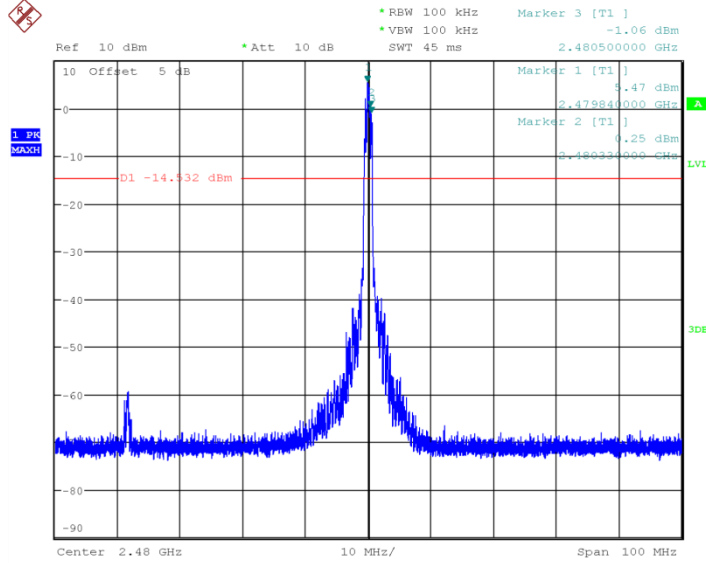
Date: 29.MAY.2016 11:44:46

Fig.34 Conducted spurious emission: 8DPSK, Ch0, 2402MHz



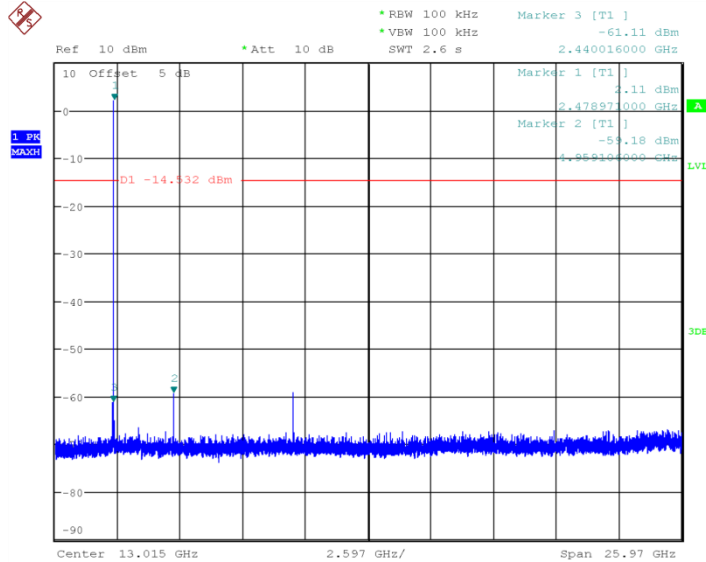
Date: 29.MAY.2016 11:45:09

Fig.35 Conducted spurious emission: 8DPSK, Ch0, 30MHz~26GHz



Date: 29.MAY.2016 11:46:21

Fig.38 Conducted spurious emission: 8DPSK, Ch78, 2480MHz



Date: 29.MAY.2016 11:46:44

Fig.39 Conducted spurious emission: 8DPSK, Ch78, 30MHz~26GHz

6.4. Radiated Emission

6.4.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB below peak output power

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 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength (uV/m)	Field strength (dBuV/m)
30~88	100	40
88~216	150	43.5
216~960	200	46
Above 960	500	54

6.4.2 Test Method

Portable, small, lightweight, or modular devices that may be handheld, worn on the body, or placed on a table during operation shall be positioned on a non-conducting platform, the top of which is 80 cm above the reference ground plane. The preferred area occupied by the EUT arrangement is 1 m by 1.5 m, but it may be larger or smaller to accommodate various sized EUTs. For testing purposes, ceiling- and wall-mounted devices also shall be positioned on a tabletop (see also ANSI C63.10-2013 section 6.3.4 and 6.3.5). In making any tests involving handheld, body-worn, or ceiling-mounted equipment, it is essential to recognize that the measured levels may be dependent on the orientation (attitude) of the three orthogonal axes of the EUT. Thus, exploratory tests as specified in 8.3.1 shall be carried out for various axes orientations to determine the attitude having maximum or near-maximum emission level.

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time (s)
30~1000	100KHz/300KHz	5
1000~4000	1MHz/1MHz	15
4000~18000	1MHz/1MHz	40
18000~26500	1MHz/1MHz	20

6.4.3 Measurement Results:

A “reference path loss” is established and $A_{R_{pi}}$ is the attenuation of “reference path loss”, and including the gain of receive antenna , the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

$$A_{R_{pi}} = \text{Cable loss} + \text{Antenna Gain} - \text{Preamplifier gain}$$

Result= $P_{Mea} + A_{Rpi}$

For GFSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.40	P
	1GHz~3GHz	Fig.41	P
	3GHz~18GHz	Fig.42	P
Power	2.38GHz~2.4GHz	Fig.43	P
Power	2.45GHz~2.5GHz	Fig.44	P
All channels	18GHz~26GHz	Fig.45	P

For $\pi/4$ DQPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.46	P
	1GHz~3GHz	Fig.47	P
	3GHz~18GHz	Fig.48	P
Power	2.38GHz~2.4GHz	Fig.49	P
Power	2.45GHz~2.5GHz	Fig.50	P
All channels	18GHz~26GHz	Fig.51	P

For 8DPSK

Channel	Frequency Range	Test Results	Conclusion
Ch0 2402MHz	30MH~1GHz	Fig.52	P
	1GHz~3GHz	Fig.53	P
	3GHz~18GHz	Fig.54	P
Power	2.38GHz~2.4GHz	Fig.55	P
Power	2.45GHz~2.5GHz	Fig.56	P
All channels	18GHz~26GHz	Fig.57	P

GFSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.258540	12.58	-25.9	38.48	V

34.760240	12.05	-25.9	37.95	V
47.805320	15.58	-24.9	41.38	V
51.271236	4.69	-25.0	29.29	V
117.624684	11.05	-25.0	35.65	V
934.788480	21.61	-7.0	46.31	V

GFSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
1596.020800	43.28	-0.4	69.18	V
2105.521600	47.05	4.0	72.95	H
2582.303462	51.22	9.2	77.02	V
2749.874231	53.43	10.1	78.03	H
2814.205577	53.59	10.5	78.19	V
2928.784424	53.80	11.3	78.5	H

GFSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9607.916467	53.08	8.3	78.98	H
12083.107800	49.94	14.9	75.84	V
12828.394200	52.40	16.7	78.2	V
14882.012533	56.27	21.8	80.87	H
16539.074067	58.93	26.4	83.53	H
17528.099133	62.29	8.3	86.99	H

 $\pi/4$ DQPSK Ch0 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
34.571388	11.64	-25.9	37.54	V
35.756608	9.61	-25.7	35.51	V
47.332024	17.56	-24.9	43.36	V

57.030532	8.11	-25.0	32.71	V
117.529980	9.24	-25.0	33.84	V
931.758668	21.80	-7.0	46.5	V

 $\pi/4$ DQPSK Ch0 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2648.644424	52.40	9.9	78.3	V
2665.507500	53.63	10.0	79.53	H
2780.437308	53.07	10.3	78.87	V
2896.385576	54.66	11.3	79.26	V
2935.595577	53.66	11.3	78.26	V
2976.807885	53.52	11.5	78.22	V

 $\pi/4$ DQPSK Ch0 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
9608.028133	54.60	8.3	80.5	V
14309.108467	55.39	20.7	81.29	V
14940.413933	56.14	22.0	81.94	H
15818.975267	57.97	24.7	82.57	V
16484.779933	58.58	26.7	83.18	H
17304.183533	60.96	8.3	85.66	V

8DPSK 30MHz-1GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
32.989728	10.17	-25.9	36.07	V
34.531544	9.37	-25.9	35.27	V
47.418168	16.08	-24.9	41.88	V
53.990440	7.25	-25.0	31.85	V
117.249500	9.97	-25.0	34.57	V

688.203824	17.34	-11.4	42.04	H
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8DPSK 1GHz-3GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
2190.034400	48.34	5.0	74.24	V
2589.439231	52.18	9.2	78.08	V
2694.153846	52.80	10.1	78.6	V
2889.814231	53.93	11.2	78.53	H
2945.626346	54.30	11.2	78.9	H
2975.676346	54.42	11.5	79.12	H

8DPSK 3GHz-18GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
11019.027000	50.15	14.3	76.05	H
12694.585333	51.65	16.4	77.55	V
14372.677067	55.11	19.9	80.91	V
15536.476267	55.72	23.2	80.32	V
16488.149600	59.60	26.8	84.2	V
17607.048867	62.24	14.3	86.94	H

All Ch 18GHz~26.5GHz

Frequency(MHz)	Result(dBuV/m)	ARpl (dB)	PMea(dBuV/m)	Polarity
19525.786000	49.0	6.97	42.03	V
20684.980000	47.7	6.97	40.73	H
22119.789000	45.3	3.05	42.05	V
23627.899000	43.8	3.05	40.75	H
24606.319000	43.4	3.05	40.35	V
25244.558000	43.6	3.05	40.55	H

Note: all the test data shown was peak detected.

Conclusion: PASS

Test graphs as below:

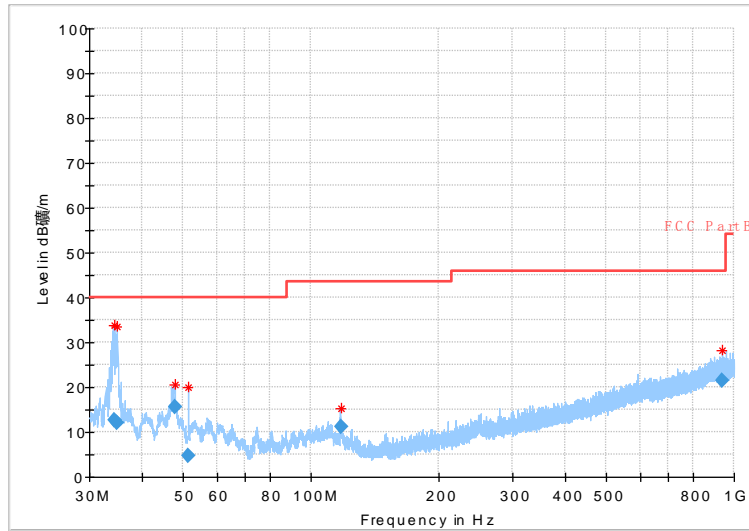


Fig.40 Radiated emission: GFSK, Ch0, 30MHz~1GHz

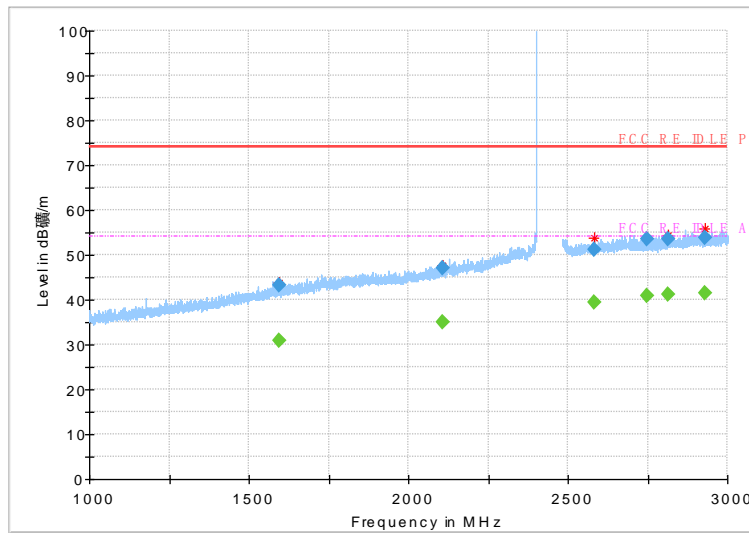


Fig.41 Radiated emission: GFSK, Ch0, 1GHz~3GHz

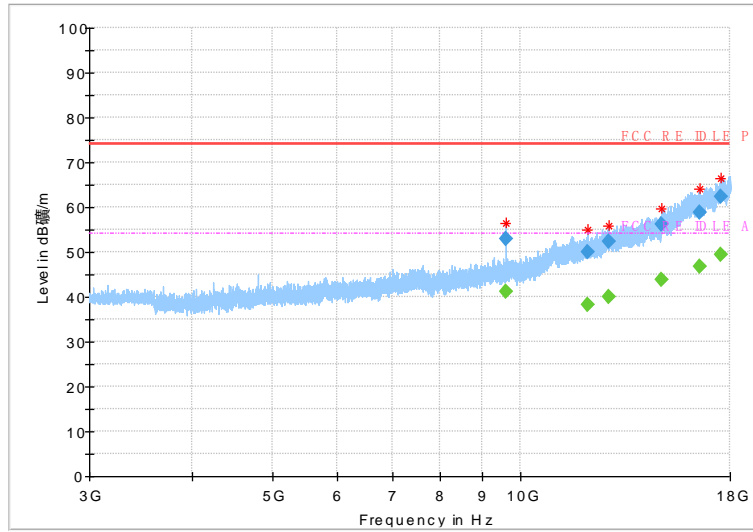


Fig.42 Radiated emission: GFSK, Ch0, 3GHz~18GHz

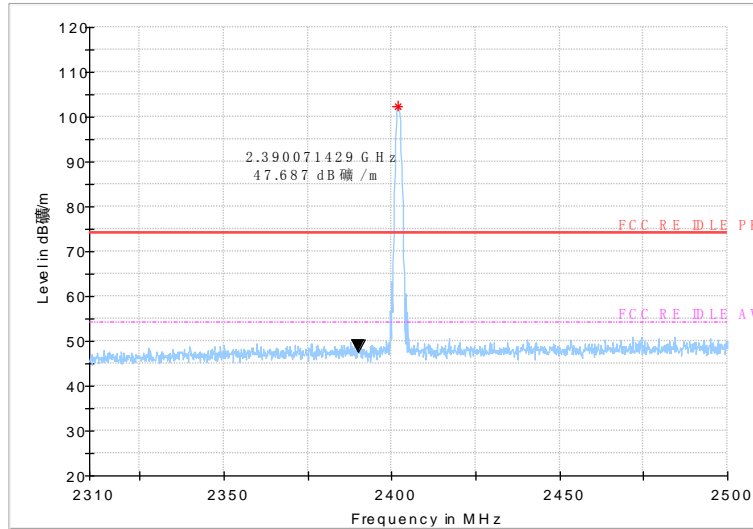


Fig.43 Radiated emission (Power): GFSK, low channel

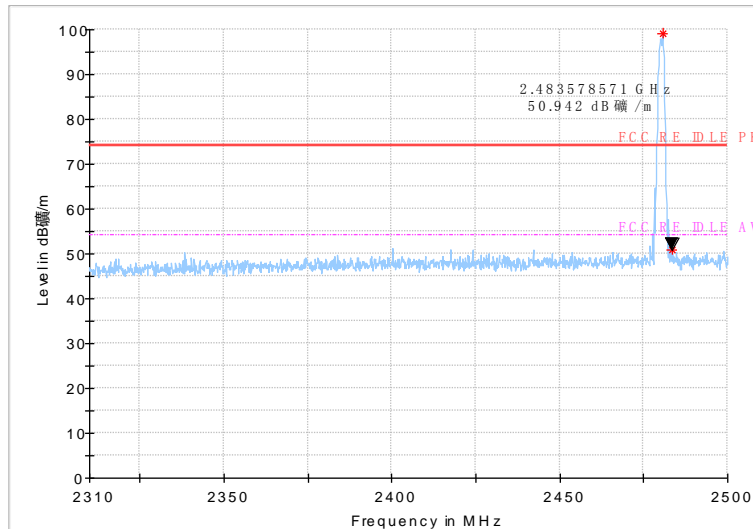


Fig.44 Radiated emission (Power): GFSK, high channel

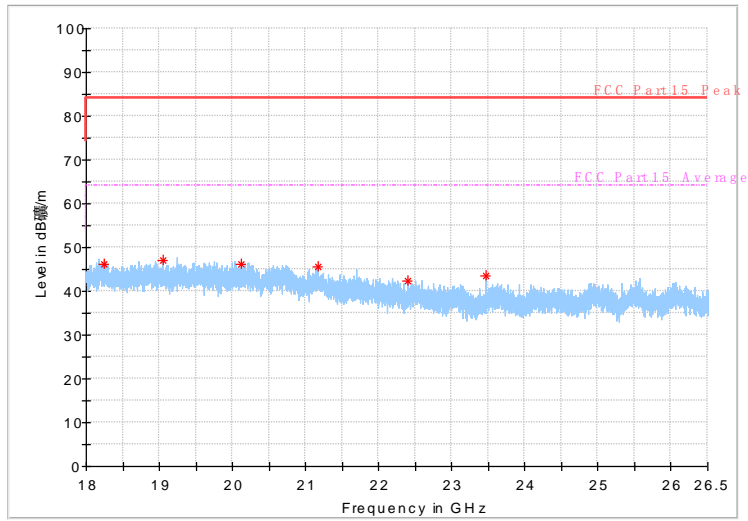


Fig.45 Radiated emission: GFSK, 18 GHz - 26 GHz

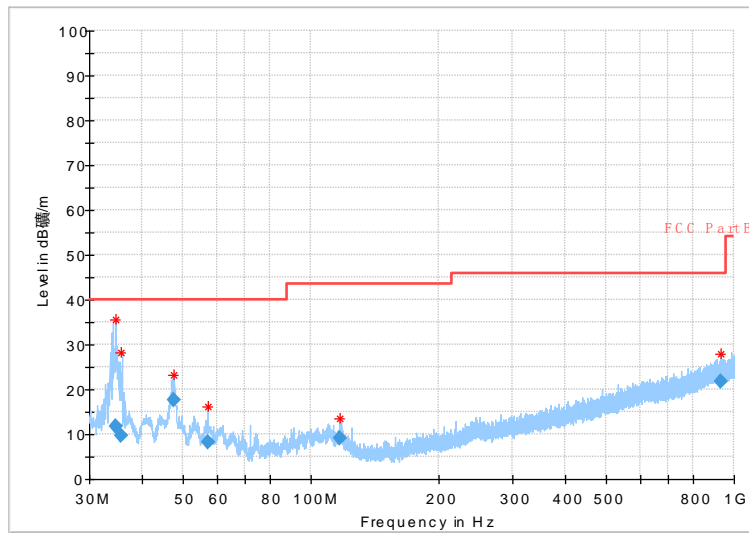


Fig.46 Radiated emission: $\pi/4$ DQPSK, Ch0, 30MHz~1GHz

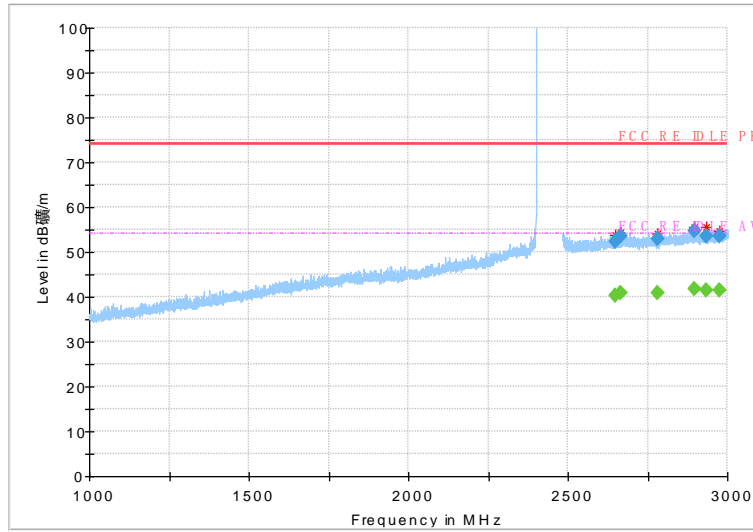


Fig.47 Radiated emission: $\pi/4$ DQPSK, Ch0, 1GHz~3GHz

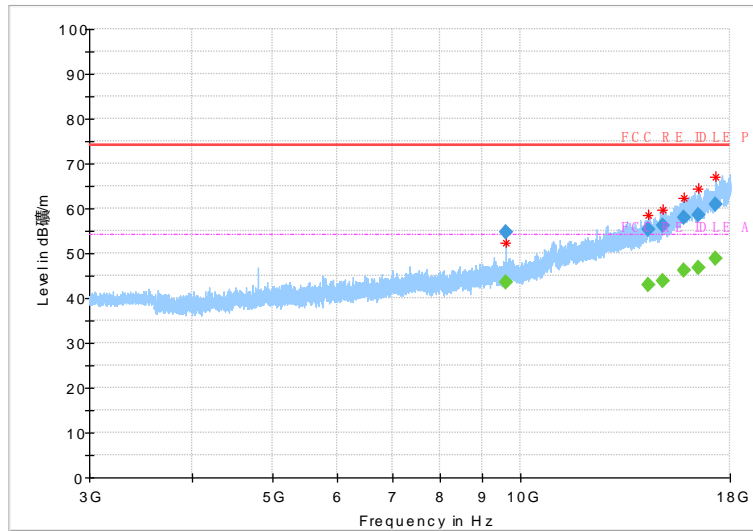


Fig.48 Radiated emission: $\pi/4$ DQPSK, Ch0, 3GHz~18GHz

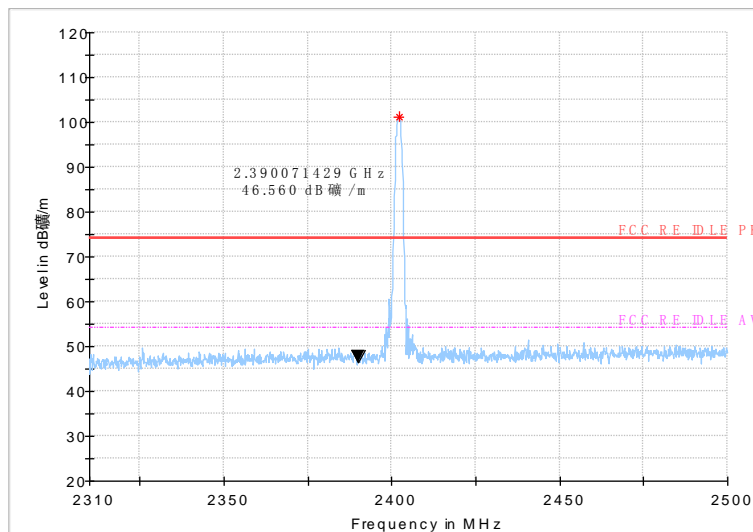


Fig.49 Radiated emission (Power): $\pi/4$ DQPSK, low channel

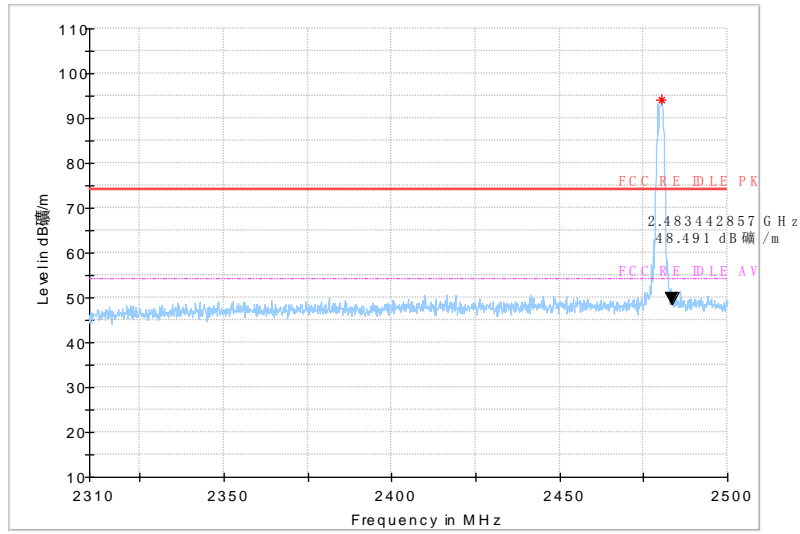


Fig.50 Radiated emission (Power): $\pi/4$ DQPSK, high channel

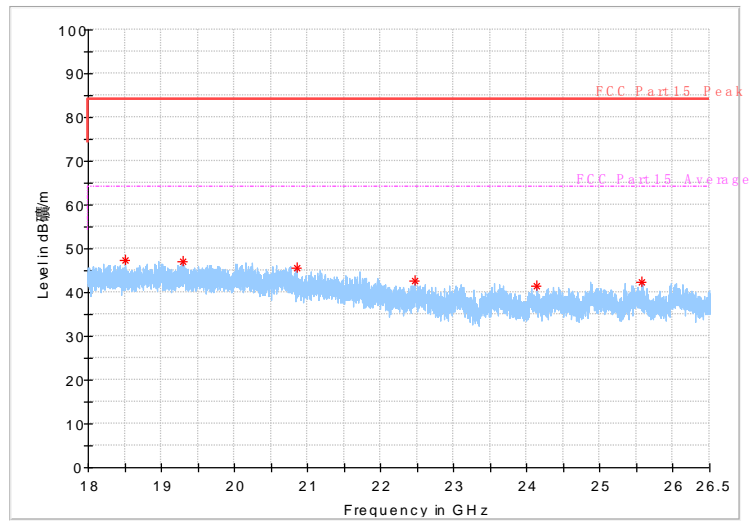


Fig.51 Radiated emission: $\pi/4$ DQPSK, 18 GHz - 26 GHz

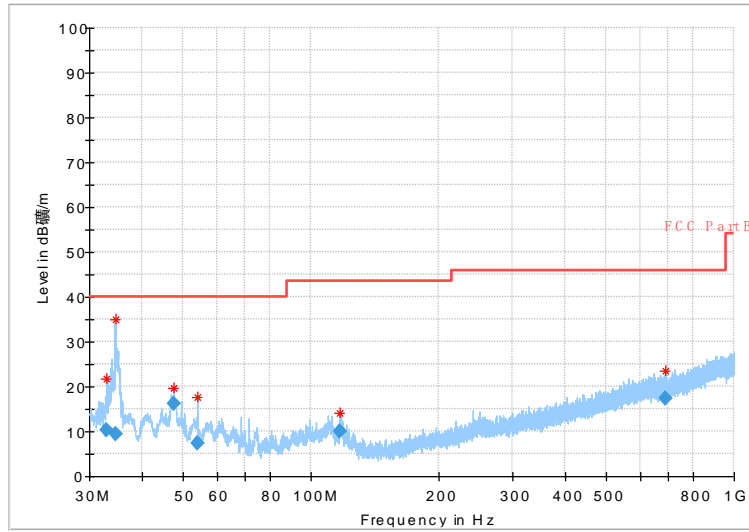


Fig.52 Radiated emission: 8DPSK, Ch0, 30MHz~1GHz

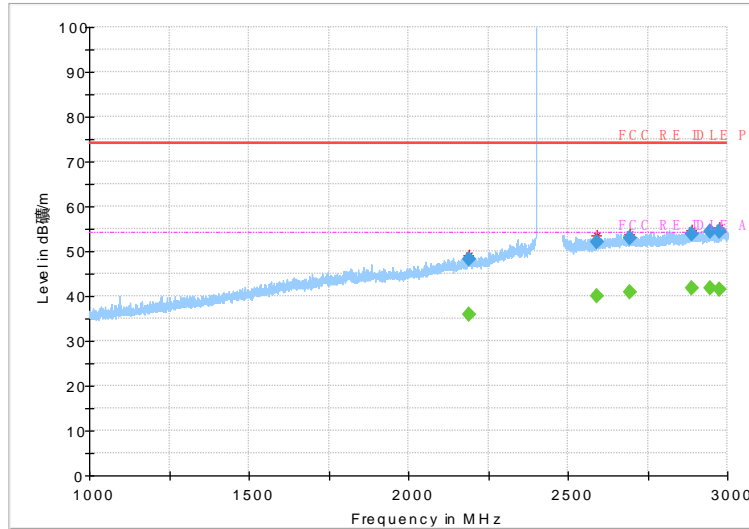


Fig.53 Radiated emission: 8DPSK, Ch0, 1GHz~3GHz

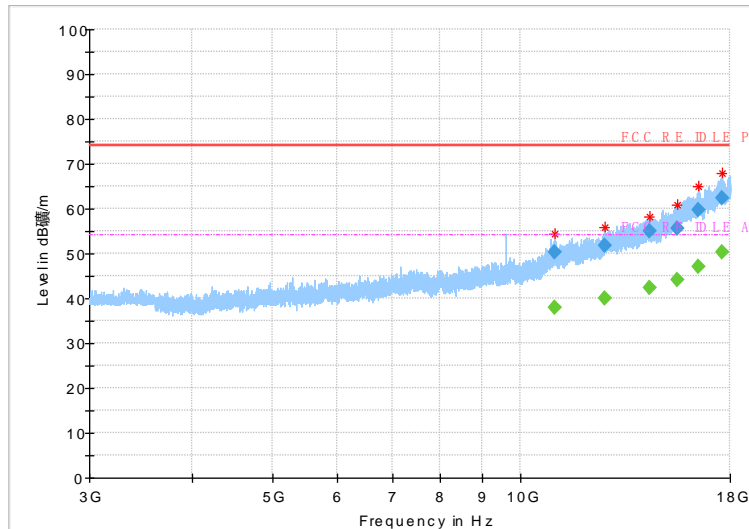


Fig.54 Radiated emission: 8DPSK, Ch0, 3GHz~18GHz

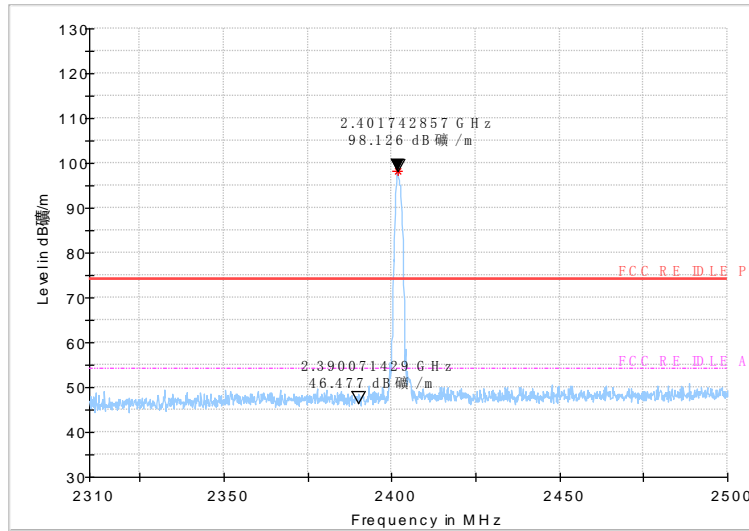


Fig.55 Radiated emission (Power): 8DPSK, low channel

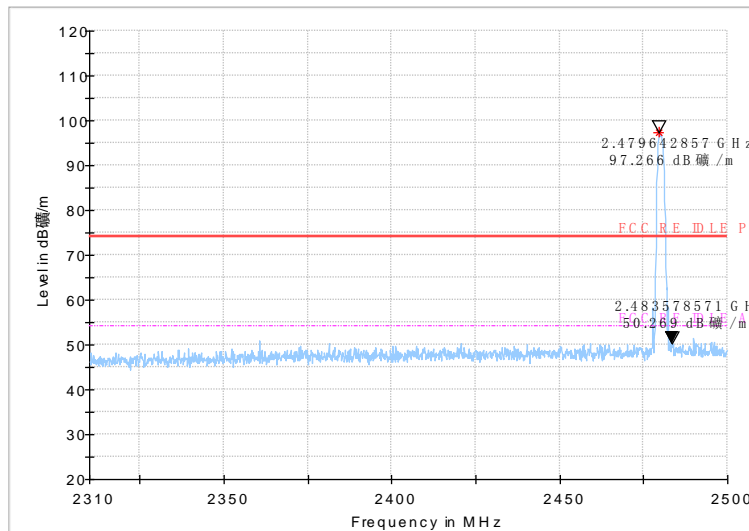


Fig.56 Radiated emission (Power): 8DPSK, high channel

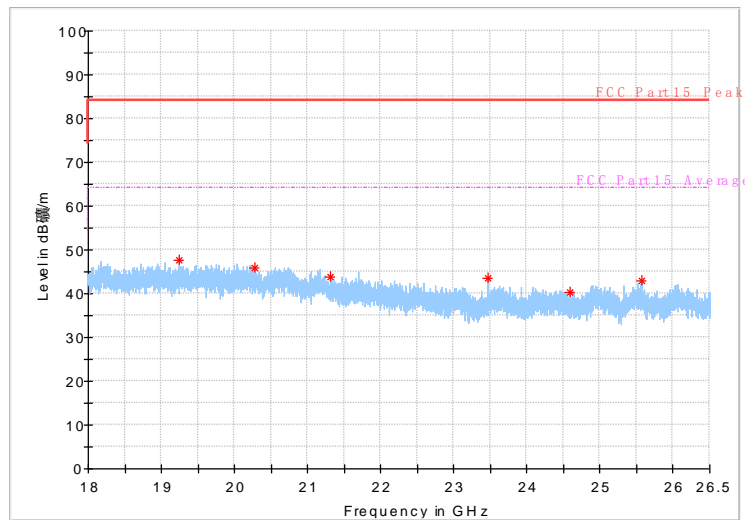


Fig.57 Radiated emission: 8DPSK, 18 GHz - 26 GHz

6.5. Time Of Occupancy (Dwell Time)

6.5.1 Measurement Limit:

Standard	Limit (ms)
FCC 47CFR Part 15.247 (a) (1) (iii)	< 400

6.5.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.4

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as step 4 to step 8.
4. Span: Zero span, centered on a hopping channel.
5. RBW shall be \leq channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected dwell time per channel.
6. 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.
7. Detector function: Peak.
8. Trace: Max hold.
9. Use the marker-delta function, and record it.

6.5.3 Measurement Result

For GFSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	DH1	Fig.58	166.192	P
		Fig.59		
	DH3	Fig.60	283.899	P
		Fig.61		
	DH5	Fig.62	322.177	P
		Fig.63		

For $\pi/4$ DQPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	2DH1	Fig.64	166.830	P
		Fig.65		
	2DH3	Fig.66	283.899	P
		Fig.67		
	2DH5	Fig.68	322.177	P
		Fig.69		

For 8DPSK

Channel	Packet	Dwell Time (ms)		Conclusion
39	3DH1	Fig.70	169.063	P
		Fig.71		
	3DH3	Fig.72	283.899	P
		Fig.73		
	3DH5	Fig.74	322.177	P
		Fig.75		

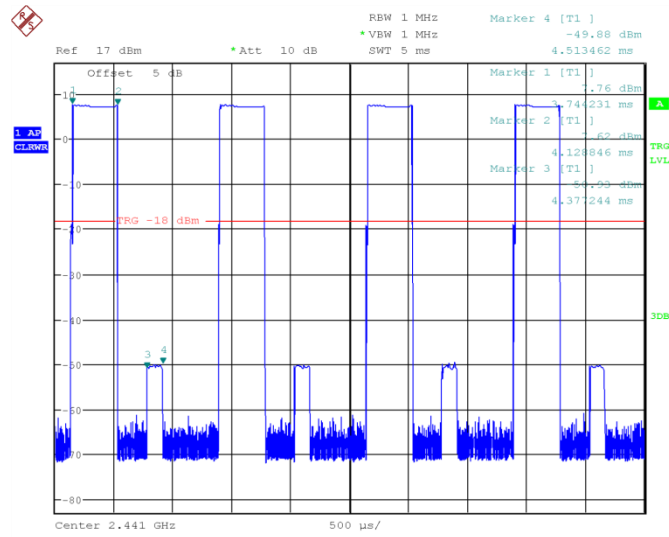
Note: the dwell time is Calculated of the sum of test time about 31.5 seconds.

Equation: dwell time = pusletime \times (1600/N)/79 \times T . N is the number of timeslot; T is the time about 31.5s.

The time of DH5=3.03 \times (1600/6)/79 \times 31.6=322.177ms.

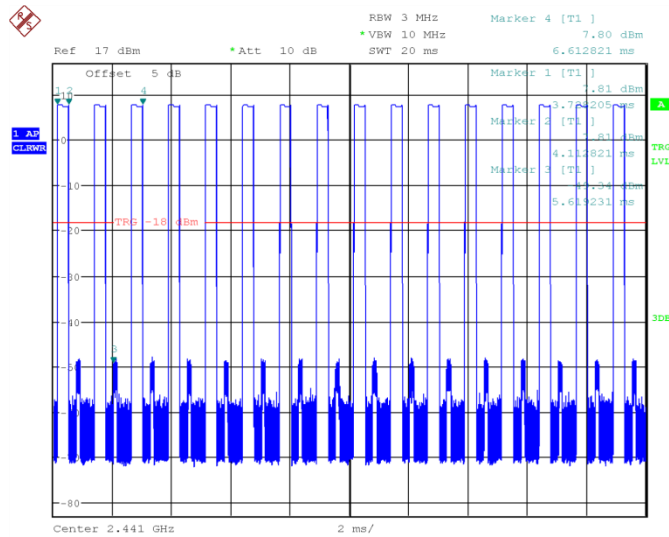
Conclusion: PASS

Test graphs as below:



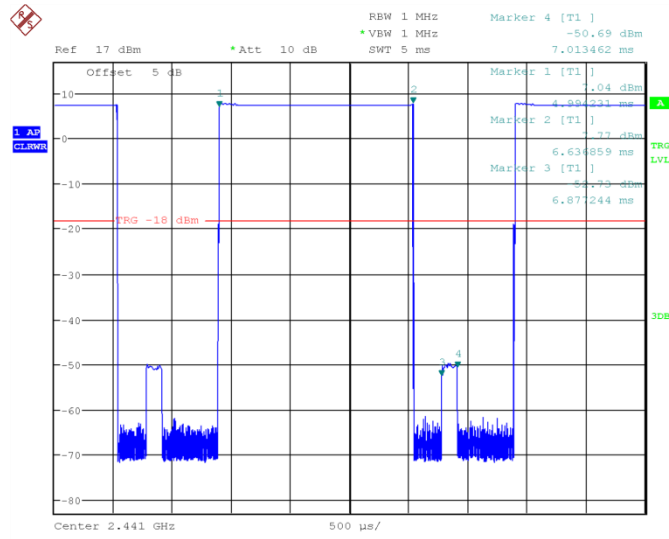
Date: 29.MAY.2016 11:48:08

Fig.58 Time of occupancy (Dwell Time): Ch39, Packet DH1



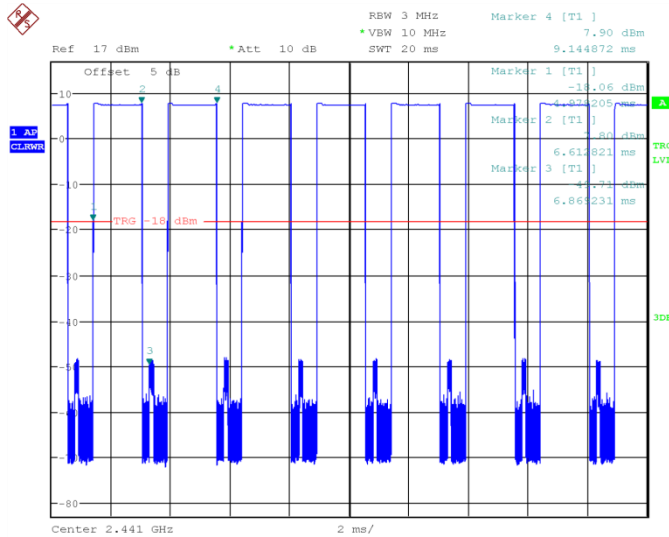
Date: 29.MAY.2016 11:48:16

Fig.59 Number of Transmissions Measurement: Ch39, Packet DH1



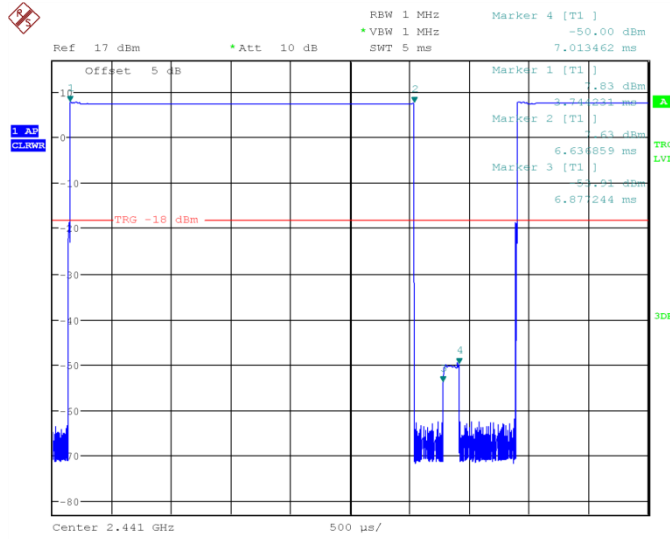
Date: 29.MAY.2016 11:48:25

Fig.60 Time of occupancy (Dwell Time): Ch39, Packet DH3



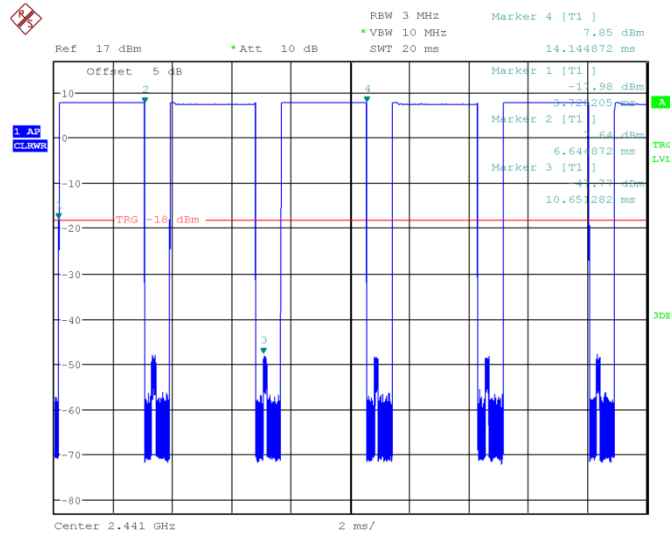
Date: 29.MAY.2016 11:48:34

Fig.61 Number of Transmissions Measurement: Ch39, Packet DH3



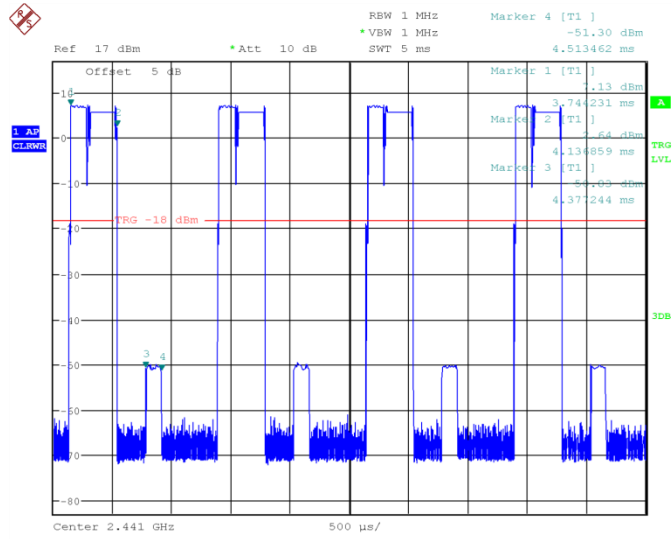
Date: 29.MAY.2016 11:48:42

Fig.62 Time of occupancy (Dwell Time): Ch39,Packet DH5



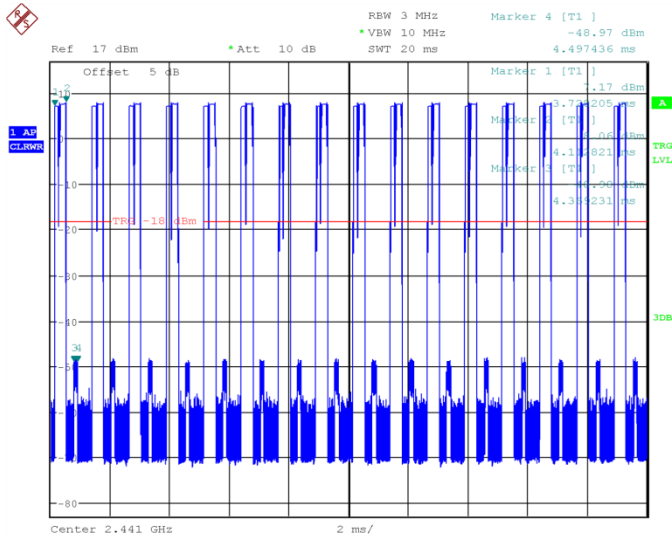
Date: 29.MAY.2016 11:48:51

Fig.63 Number of Transmissions Measurement: Ch39, Packet DH5



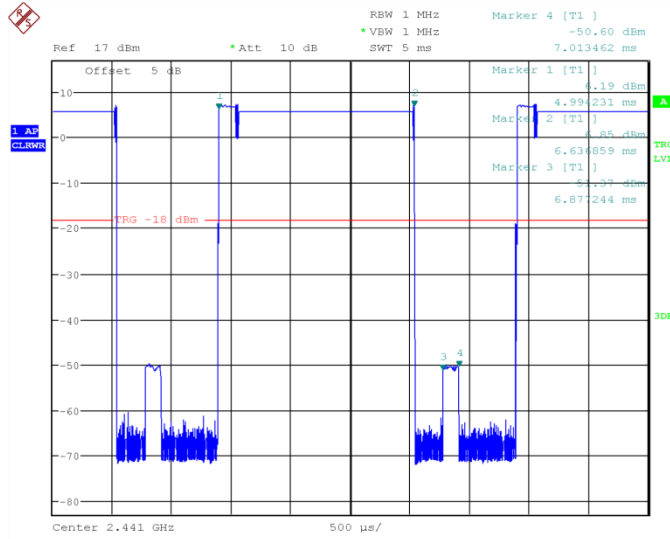
Date: 29.MAY.2016 11:49:00

Fig.64 Time of occupancy (Dwell Time): Ch39,Packet 2-DH1



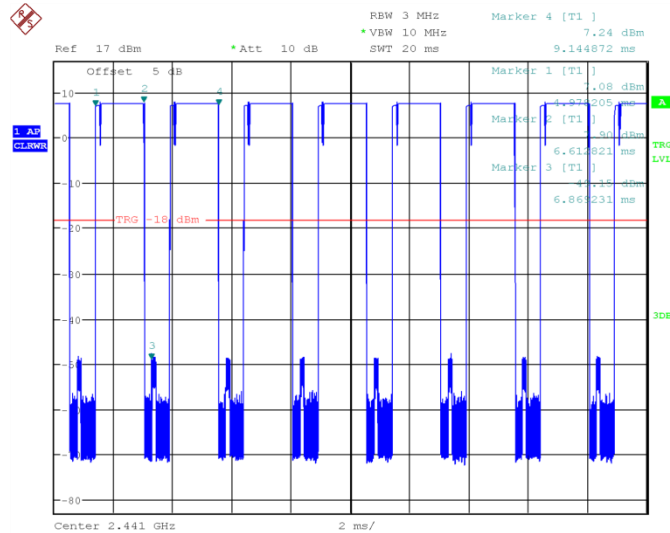
Date: 29.MAY.2016 11:49:08

Fig.65 Number of Transmissions Measurement: Ch39, Packet 2-DH1



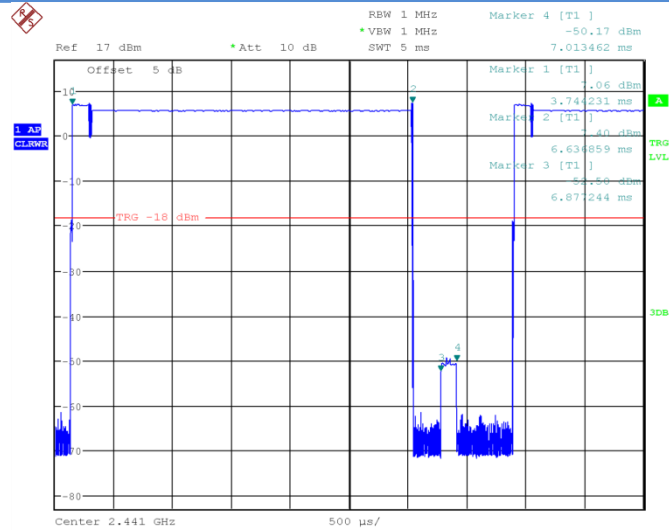
Date: 29.MAY.2016 11:49:17

Fig.66 Time of occupancy (Dwell Time): Ch39,Packet 2-DH3



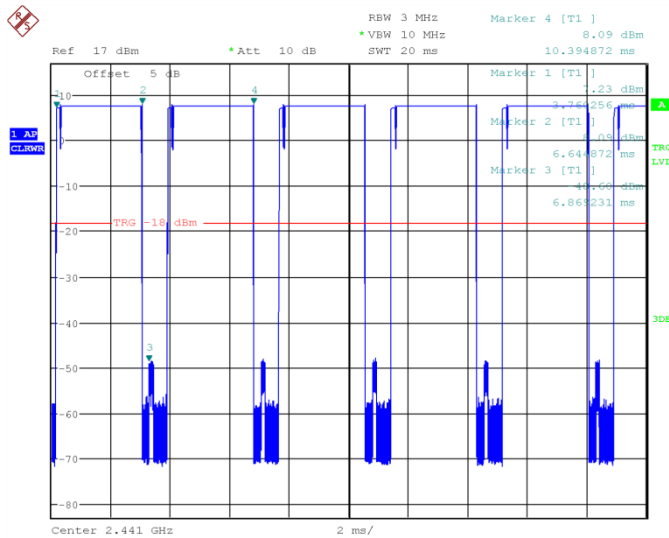
Date: 29.MAY.2016 11:49:26

Fig.67 Number of Transmissions Measurement: Ch39, Packet 2-DH3



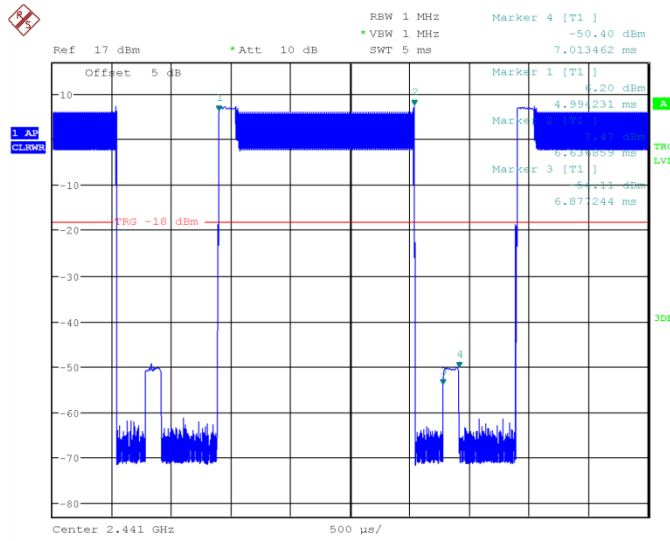
Date: 29.MAY.2016 11:49:34

Fig.68 Time of occupancy (Dwell Time): Ch39,Packet 2-DH5



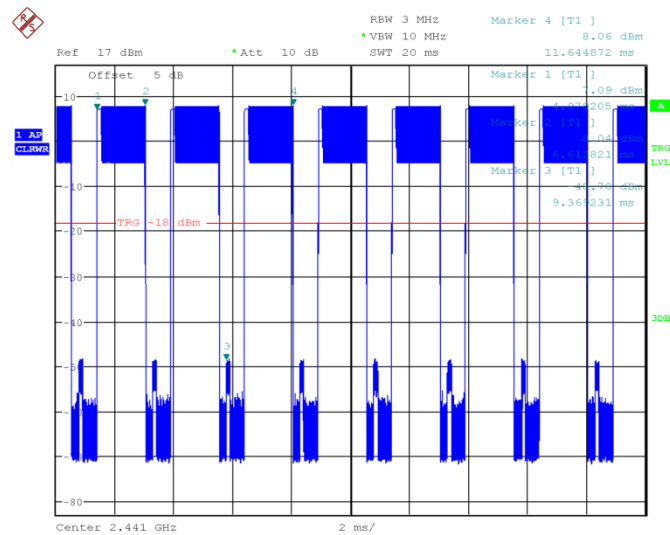
Date: 29.MAY.2016 11:49:43

Fig.69 Number of Transmissions Measurement: Ch39, Packet 2-DH5



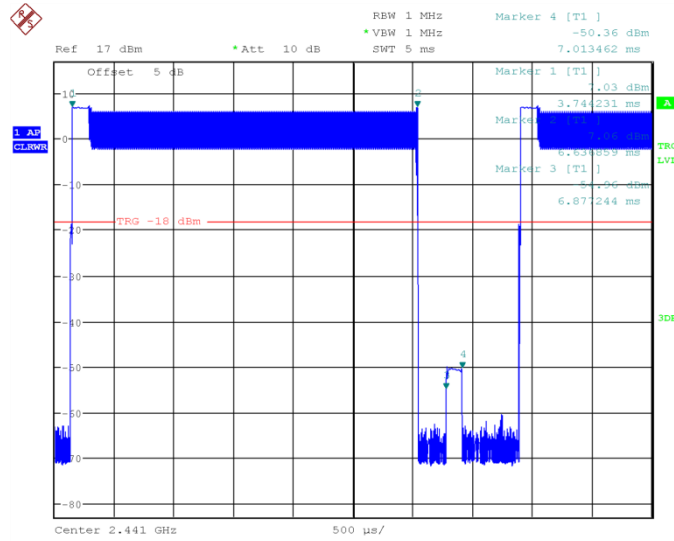
Date: 29.MAY.2016 11:50:09

Fig.72 Time of occupancy (Dwell Time): Ch39,Packet 3-DH3



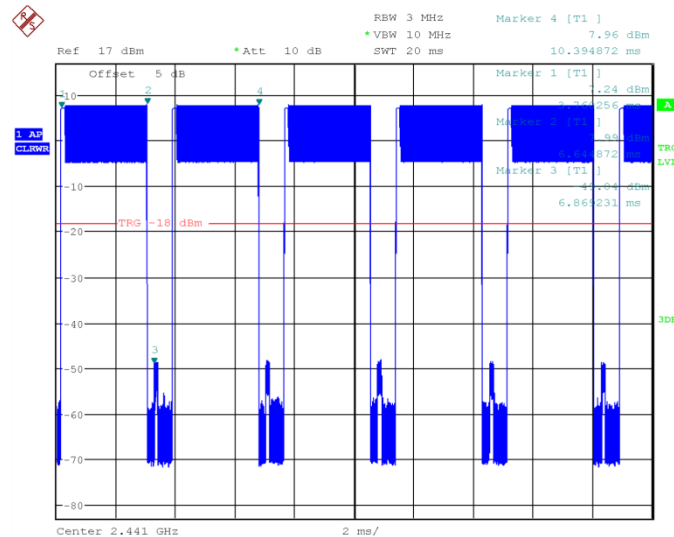
Date: 29.MAY.2016 11:50:18

Fig.73 Number of Transmissions Measurement: Ch39, Packet 3-DH3



Date: 29.MAY.2016 11:50:27

Fig.74 Time of occupancy (Dwell Time): Ch39,Packet 3-DH5



Date: 29.MAY.2016 11:50:35

Fig.75 Number of Transmissions Measurement: Ch39, Packet 3-DH5

6.6. 20dB Bandwidth

6.6.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a) (1)	N/A

6.6.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.7

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit maximum power.
3. Set the spectrum analyzer as
4. Span: two or five times of OBW
5. RBW= 1% to 5% of the OBW; VBW \geq 3RBW; Max Hold.
6. Select the max peak, and N DB DOWN=20dB.
7. Record the results.

Measurement Result:

For GFSK

Channel	20dB Bandwidth (MHz)		Conclusion
0	Fig.76	1.034	P
39	Fig.77	1.034	P
78	Fig.78	1.034	P

For $\pi/4$ DQPSK

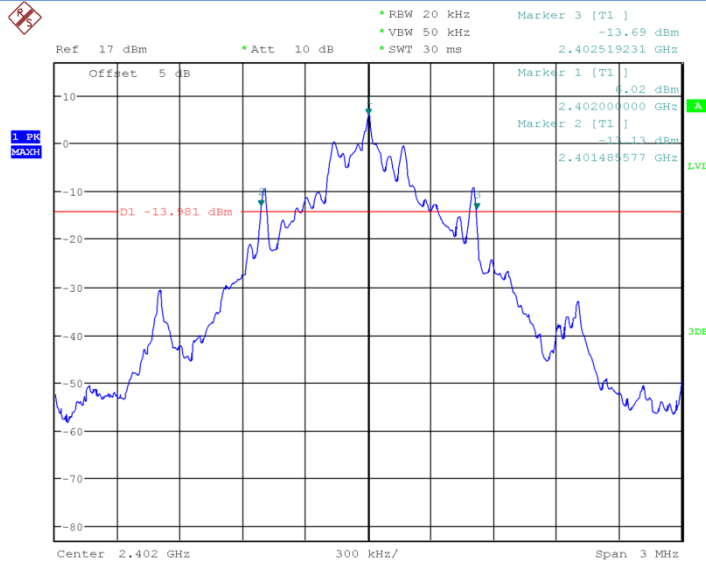
Channel	20dB Bandwidth (MHz)		Conclusion
0	Fig.79	1.178	P
39	Fig.80	1.178	P
78	Fig.81	1.183	P

For 8DPSK

Channel	20dB Bandwidth (MHz)		Conclusion
0	Fig.82	1.163	P
39	Fig.83	1.178	P
78	Fig.84	1.173	P

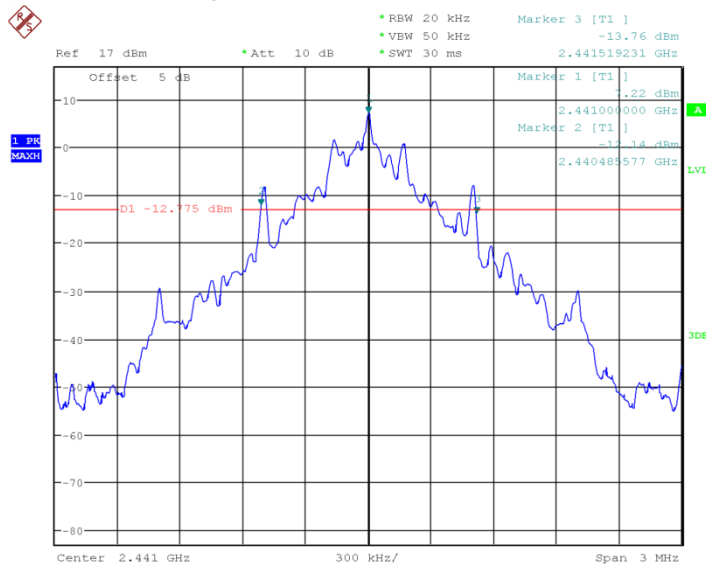
Conclusion: PASS

Test graphs as below:



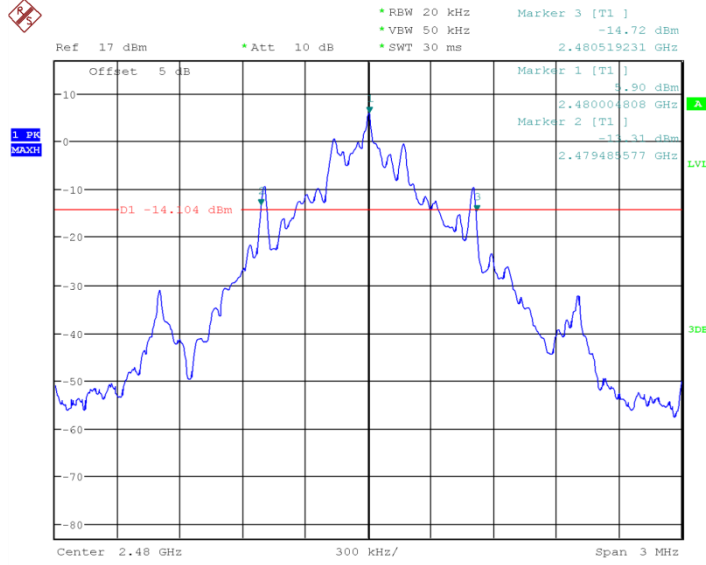
Date: 29.MAY.2016 11:52:00

Fig.76 20dB Bandwidth: GFSK, Ch0



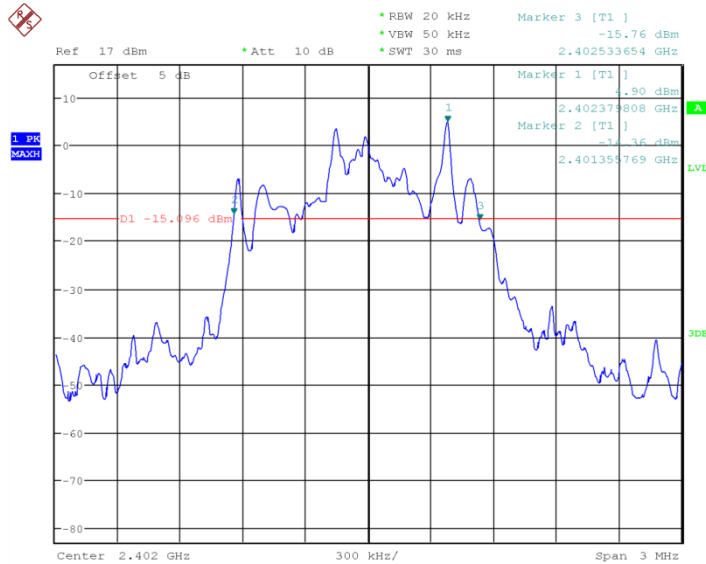
Date: 29.MAY.2016 11:52:14

Fig.77 20dB Bandwidth: GFSK, Ch39



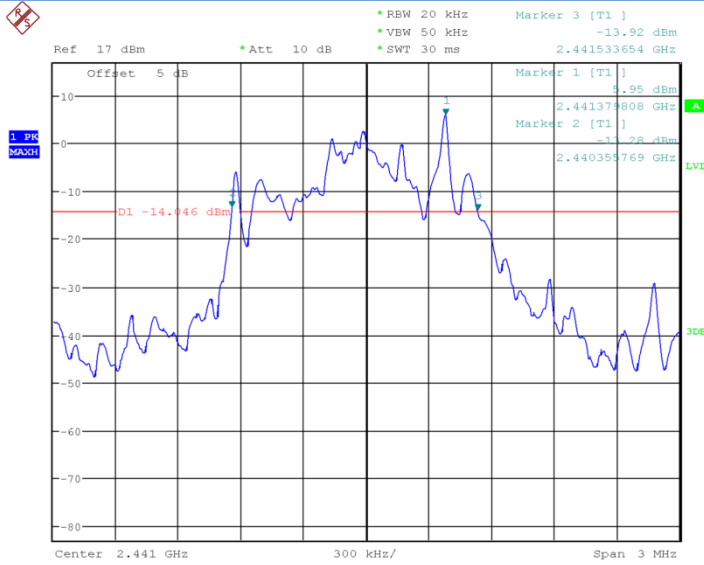
Date: 29.MAY.2016 11:52:28

Fig.78 20dB Bandwidth: GFSK, Ch78



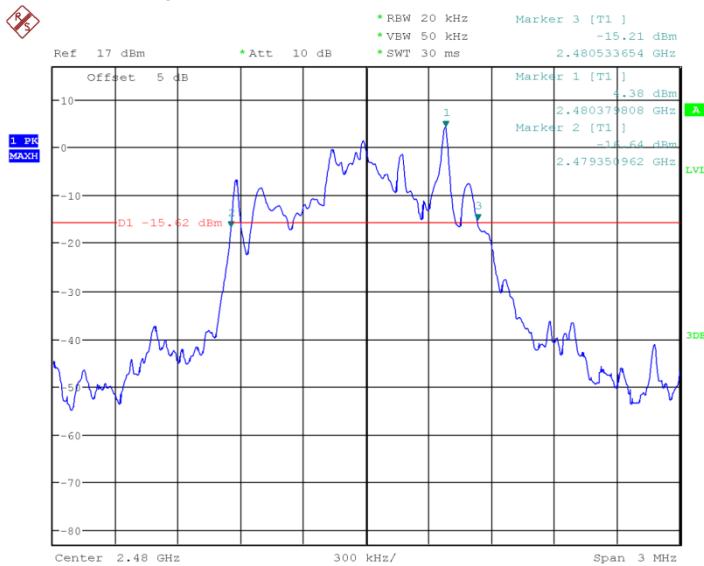
Date: 29.MAY.2016 11:52:42

Fig.79 20dB Bandwidth: $\pi/4$ DQPSK, Ch0



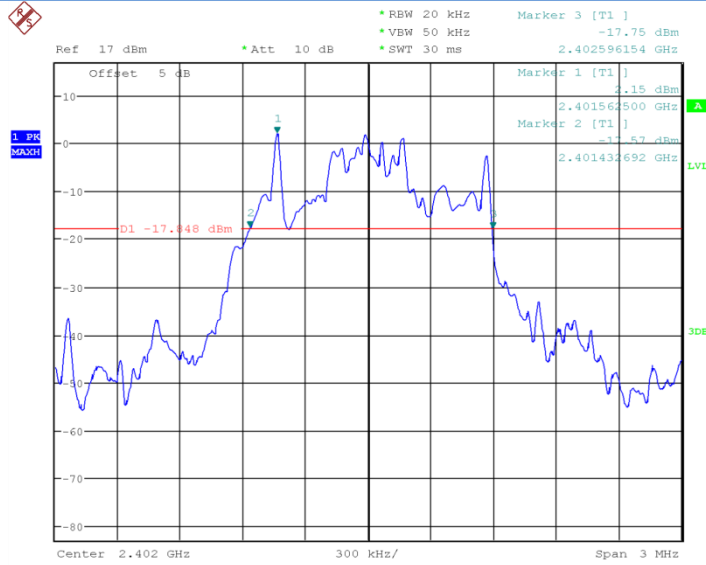
Date: 29.MAY.2016 11:52:56

Fig.80 20dB Bandwidth: $\pi/4$ DQPSK, Ch39



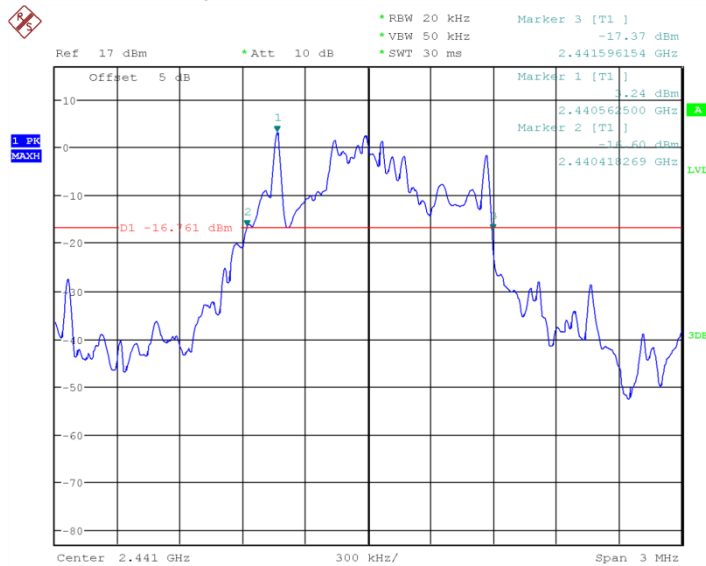
Date: 29.MAY.2016 11:53:10

Fig.81 20dB Bandwidth: $\pi/4$ DQPSK, Ch78



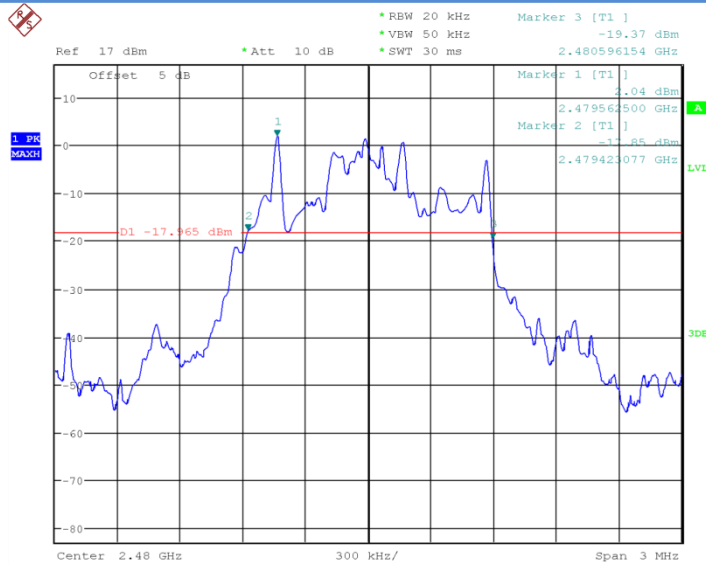
Date: 29.MAY.2016 11:53:24

Fig.82 20dB Bandwidth: 8DPSK, Ch0



Date: 29.MAY.2016 11:53:38

Fig.83 20dB Bandwidth: 8DPSK, Ch39



Date: 29.MAY.2016 11:53:52

Fig.84 20dB Bandwidth: 8DPSK, Ch78

6.7. Carrier Frequency Separation

6.7.1 Measurement Limit:

Standard	Limit (KHz)
FCC 47 CFR Part 15.247 (a) (1)	Over 25KHz or (2/3)*20dB bandwidth

6.7.2 Test procedures

The measurement is according to ANSI C63.10 clause 7.8.2.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. Span: Wide enough to capture the peaks of two adjacent channels.
4. 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.
5. Video (or average) bandwidth (VBW) \geq RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.

6.7.3 Measurement Result:

For GFSK

Channel	Carrier separation (KHz)	Conclusion

39	Fig.85	990.384	P
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For $\pi/4$ DQPSK

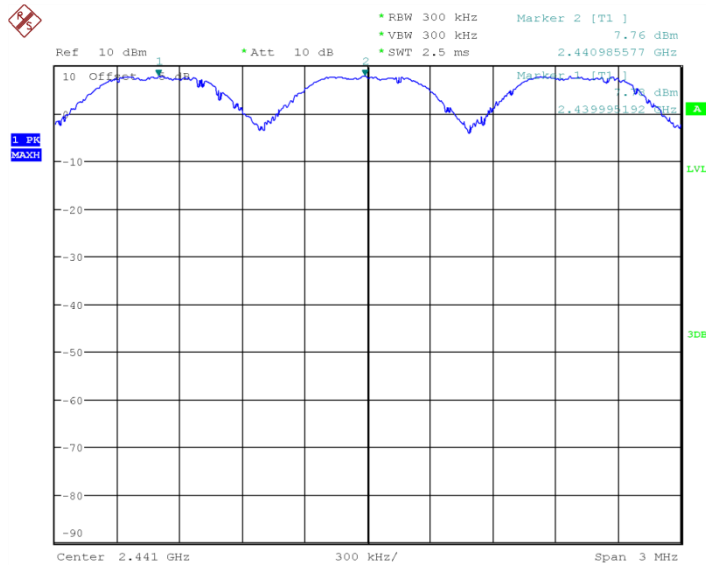
Channel	Carrier separation (KHz)	Conclusion
39	Fig.86	P

For 8DPSK

Channel	Carrier separation (KHz)	Conclusion
39	Fig.87	P

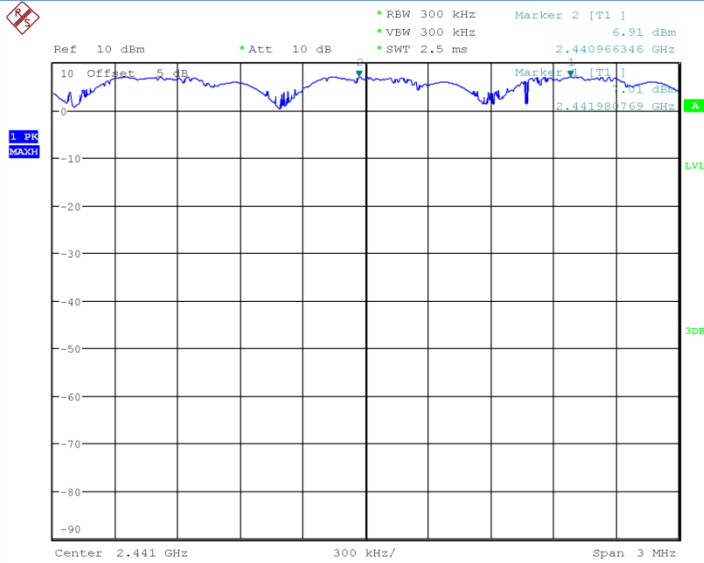
Conclusion: PASS

Test graphs as below:



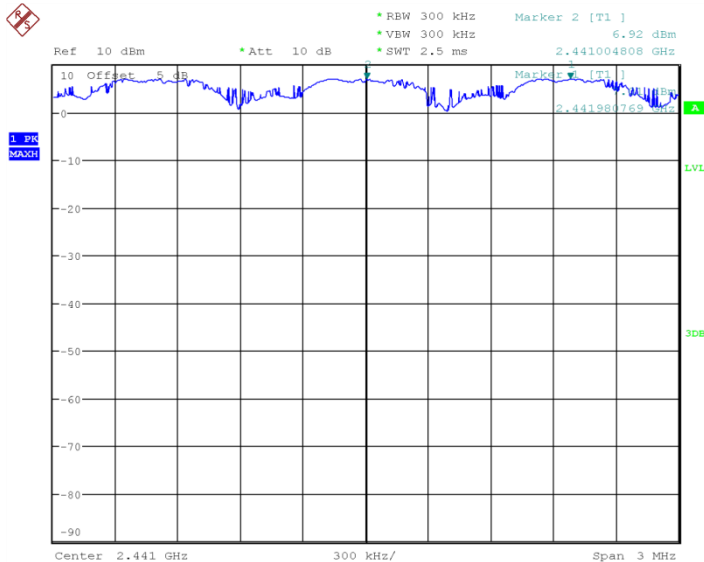
Date: 29.MAY.2016 12:00:50

Fig.85 Carrier separation measurement: GFSK, Ch39



Date: 29.MAY.2016 12:02:01

Fig.86 Carrier separation measurement: $\pi/4$ DQPSK, Ch39



Date: 29.MAY.2016 12:03:12

Fig.87 Carrier separation measurement: 8DPSK, Ch39

6.8. Number Of Hopping Channels

6.8.1 Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a)(1)(iii)	At least 15 non-overlapping channels

6.8.2 Test procedure

The measurement is according to ANSI C63.10 clause 7.8.3.

1. Connect the EUT through cable and divide with CBT32 and spectrum analyzer.
2. Enable the EUT transmit in hopping mode.
3. 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.
4. 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.
5. VBW \geq RBW.
6. Sweep: Auto.
7. Detector function: Peak.
8. Trace: Max hold.
9. Allow the trace to stabilize.
10. Record the test results.

6.8.3 Measurement Result:

For GFSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.88	79	P
40~78	Fig.89		P

For $\pi/4$ DQPSK

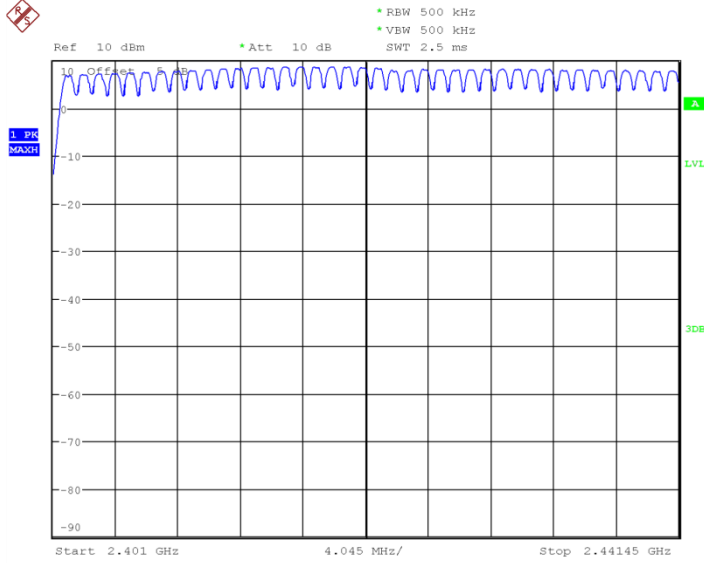
Channel	Number of hopping channels		Conclusion
0~39	Fig.90	79	P
40~78	Fig.91		P

For 8DPSK

Channel	Number of hopping channels		Conclusion
0~39	Fig.92	79	P
40~78	Fig.93		P

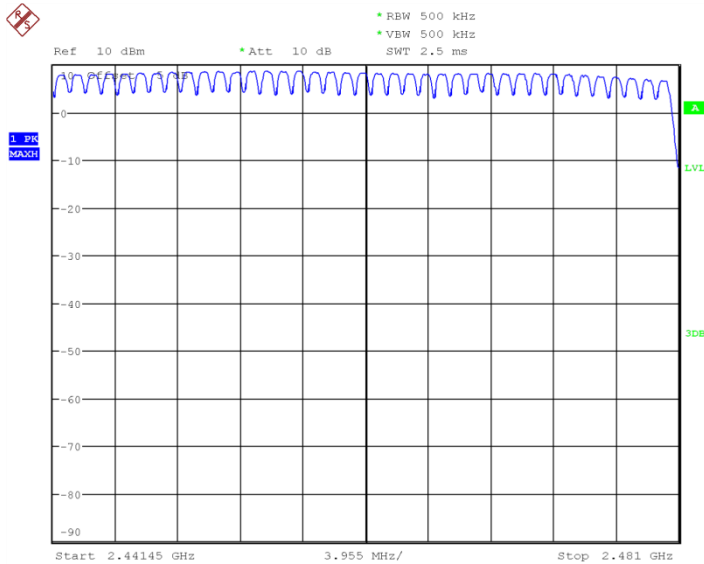
Conclusion: PASS

Test graphs as below:



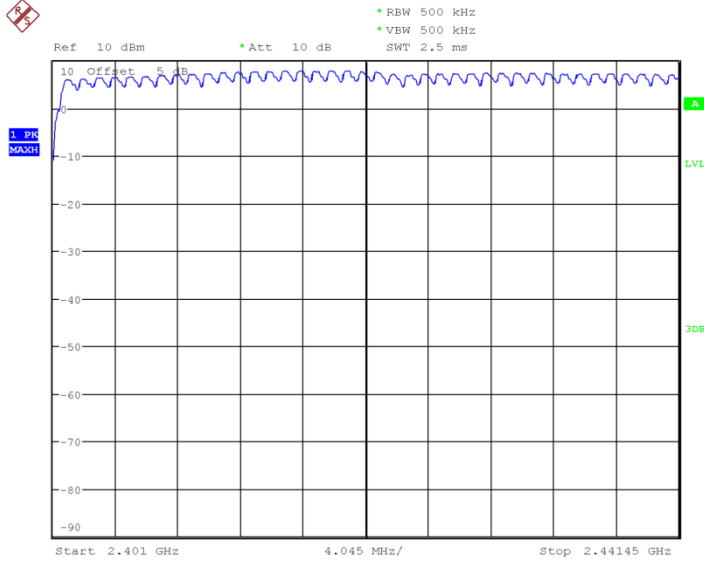
Date: 29.MAY.2016 12:06:28

Fig.88 Number of hopping frequency: GFSK, Ch0~39



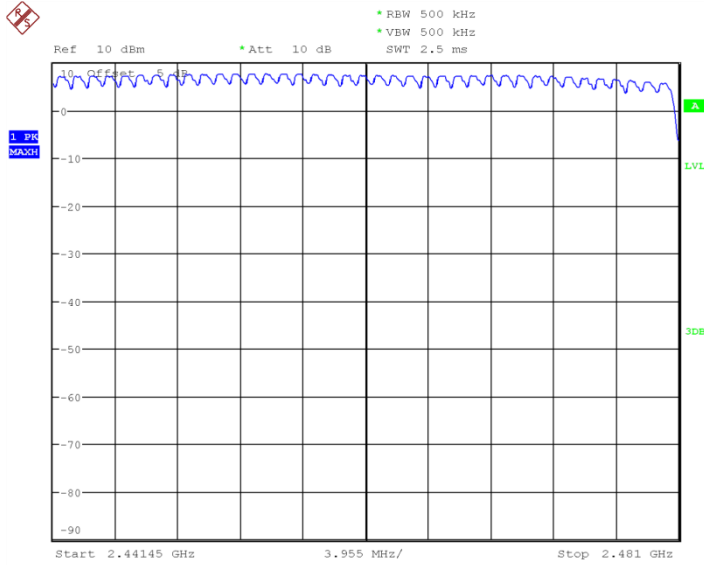
Date: 29.MAY.2016 12:08:33

Fig.89 Number of hopping frequency: GFSK, Ch40~78



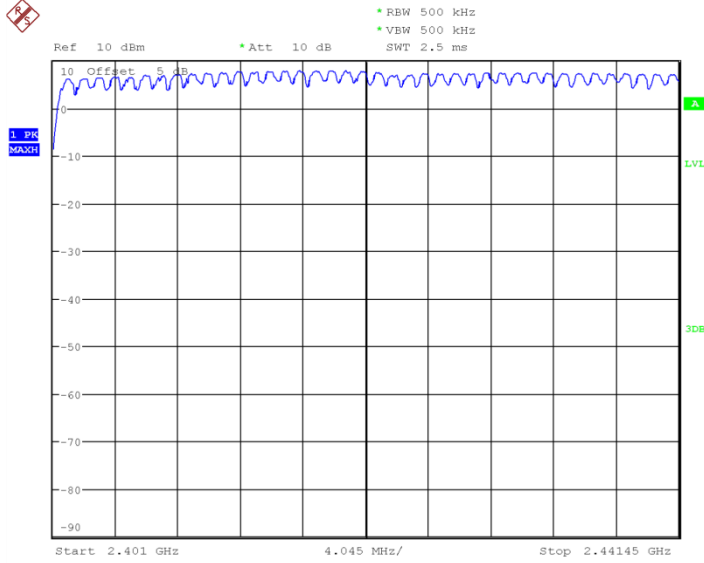
Date: 29.MAY.2016 12:10:38

Fig.90 Number of hopping frequency: $\pi/4$ DQPSK, Ch0~39



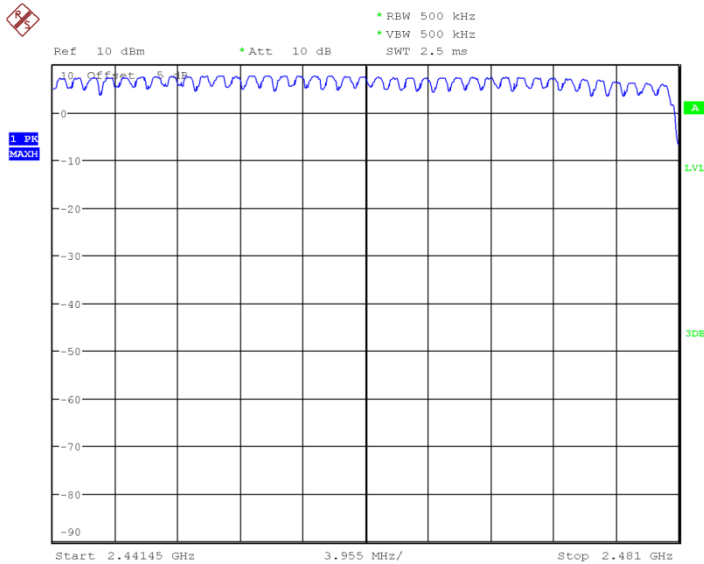
Date: 29.MAY.2016 12:12:43

Fig.91 Number of hopping frequency: $\pi/4$ DQPSK, Ch40~78



Date: 29.MAY.2016 12:14:48

Fig.92 Number of hopping frequency: 8DPSK, Ch0~39



Date: 29.MAY.2016 12:16:53

Fig.93 Number of hopping frequency: 8DPSK, Ch40~78

7. Test Equipments and Ancillaries Used For Tests

The test equipments and ancillaries used are as follows.

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Vector Signal Analyser	FSQ26	101096	Rohde&Schwarz	2016-05-12	1
2	Bluetooth Tester	CBT32	100785	Rohde&Schwarz	2016-05-12	1
3	DC Power Supply	ZUP60-14	LOC-220Z006-0007	TDL-Lambda	2016-05-12	1

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Date	Cal.interval
1	Universal Radio Communicati	CMU200	123126	R&S	2016-05-12	1
2	Test Receiver	ESU40	100307	R&S	2016-05-12	1
3	Trilog Antenna	VULB9163	VULB9163-515	Schwarzbeck	2014-11-05	3
4	Double Ridged Guide Antenna	ETS-3117	00135885	ETS	2014-05-06	3
5	2-Line V-Network	ENV216	101380	R&S	2016-05-12	1

Anechoic chamber

Fully anechoic chamber by Frankonia German.

8. Test Environment

Shielding Room1 (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Control room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber1 (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80MHz to 3000 MHz

Fully-anechoic chamber2 (Tapered Section: 8.75 meters×3.66 meters×3.66 meters, Rectangular Section: 7.32 meters×3.97 meters×3.66 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %



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Shielding effectiveness	> 110 dB
Electrical insulation	> 10 k Ω
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 30MHz to 40000MHz

ANNEX A. Deviations from Prescribed Test Methods

No deviation from Prescribed Test Methods.

*****End The Report*****