

FCC Test Report

Product Name : Radio Identification device
Trade name : HELLA
Model No. : DM3
FCC ID. : NBGDM3

Applicant : Hella KGaA Hueck & Co.
Address : Rixbecker Str. 75, 59552 Lippstadt, Germany

Date of Receipt : Jun. 30, 2017
Issued Date : Jul. 27, 2017
Report No. : 1760743R-RFUSP14V00
Report Version : V1.0



The declaration results relate only to the samples calculated.

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Test Report Certification

Issued Date : Jul. 27, 2017

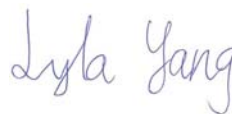
Report No. : 1760743R-RFUSP14V00



Product Name : Radio Identification device
Applicant : Hella KGaA Hueck & Co.
Address : Rixbecker Str. 75, 59552 Lippstadt, Germany
Manufacturer : Hella KGaA Hueck & Co.
Model No. : DM3
FCC ID. : NBGDM3
EUT Voltage : DC 3V
Testing Voltage : DC 3V
Trade Name : HELLA
Applicable Standard : FCC 15 Subpart C Section 15.231(b): 2015
Laboratory Name : Hsin Chu Laboratory
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township,
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TEL: +886-3-582-8001 / FAX: +886-3-582-8958
Test Result : Complied

Documented By

:



(Lyla Yang / Engineering Adm. Specialist)

Tested By

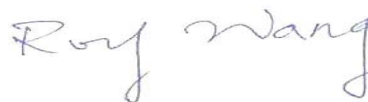
:



(Ricky Lee / Senior Engineer)

Approved By

:



(Roy Wang / Director)

Revision History

Report No.	Version	Description	Issued Date
1760743R-RFUSP14V00	V1.0	Initial issue of report.	Jul. 27, 2017

Laboratory Information

We, **DEKRA Testing and Certification Co., Ltd.**, are an independent RF consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted (audited or listed) by the following related bodies in compliance with ISO 17025 specified testing scopes:

Taiwan R.O.C.	:	TAF, Accreditation Number: 3024
USA	:	FCC, Registration Number: 0007939127
Canada	:	IC, Submission No: 181665 / IC Registration Number: 22397-1 / 22397-2 / 22397-3

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site :

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site : http://www.dekra.com.tw/index_en.aspx

If you have any comments, Please don't hesitate to contact us. Our test sites as below:

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1. General Information

1.1. EUT Description

Product Name	Radio Identification device
Trade Name	HELLA
Model No.	DM3
Frequency Range	314MHz/314.45MHz/314.9MHz
Channel Number	3
Type of Modulation	FSK

Working Frequency of Each Channel	
Channel	Frequency
001	314 MHz
002	314.45 MHz
003	314.9 MHz

Note:

1. This device is a Radio Identification device including 314MHz/314.45MHz/314.9MHz transmitting and receiving function.
2. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
3. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 1760743R-RFUSP01V00 under Declaration of Conformity.

1.2. Test Mode

DEKRA verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

Test Mode	
TX	Mode 1: Transmit

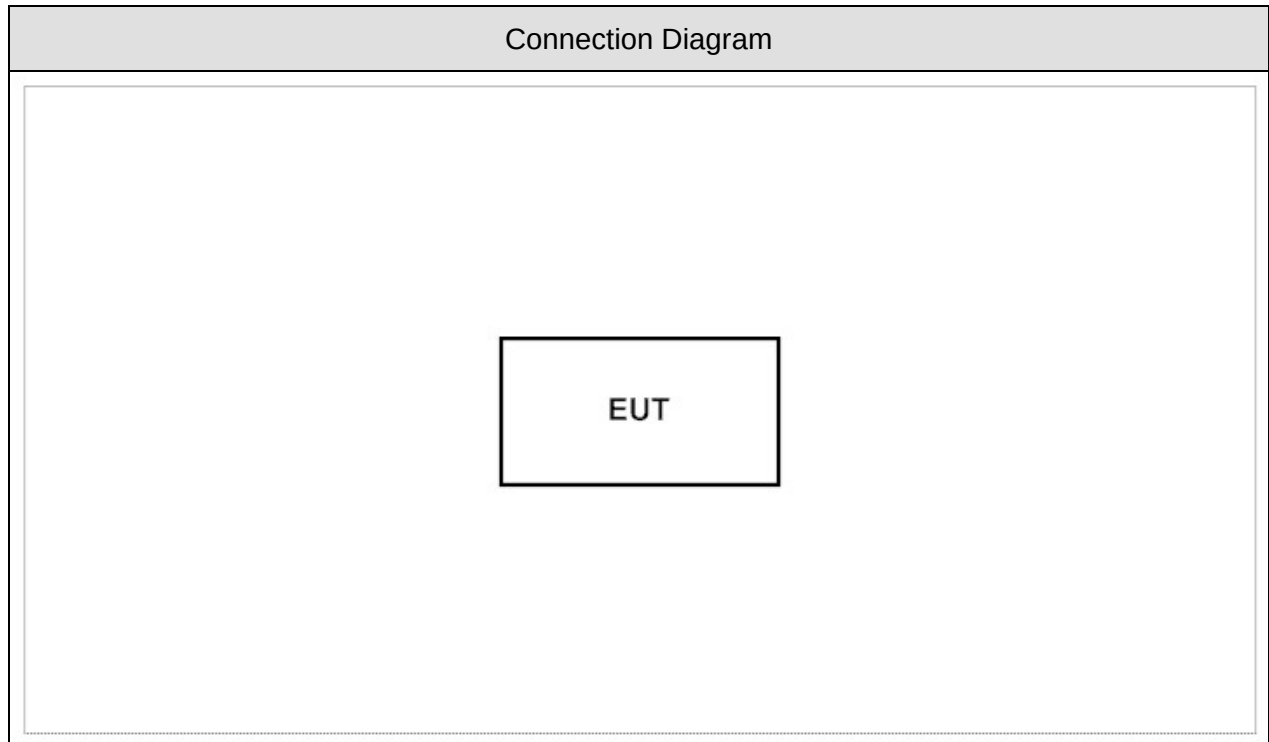
Emission	
Performed Item	Mode 1
Conducted Emission	Yes
Radiated Emission	Yes
Occupied Bandwidth	Yes
Duty cycle	Yes
Transmitter time	Yes

1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	N/A				

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in Section 1.4.
2	Press Button to start the continuous transmitting.
3	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual	Test Site
Temperature (°C)	FCC PART 15 C 15.231(b) Conducted Emission	15 - 35	20°C	--
Humidity (%RH)		25 - 75	50%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Radiated Emission	15 - 35	25°C	2
Humidity (%RH)		25 - 75	45%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Occupied Bandwidth	15 - 35	25°C	3
Humidity (%RH)		25 - 75	65%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Duty cycle	15 - 35	25°C	3
Humidity (%RH)		25 - 75	45%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	
Temperature (°C)	FCC PART 15 C 15.231(b) Transmitter time	15 - 35	25°C	3
Humidity (%RH)		25 - 75	48%RH	
Barometric pressure (mbar)		860 - 1060	950-1000	

Note: Test Site information refers to Laboratory Information.

2. Conducted Emission

2.1. Test Equipment

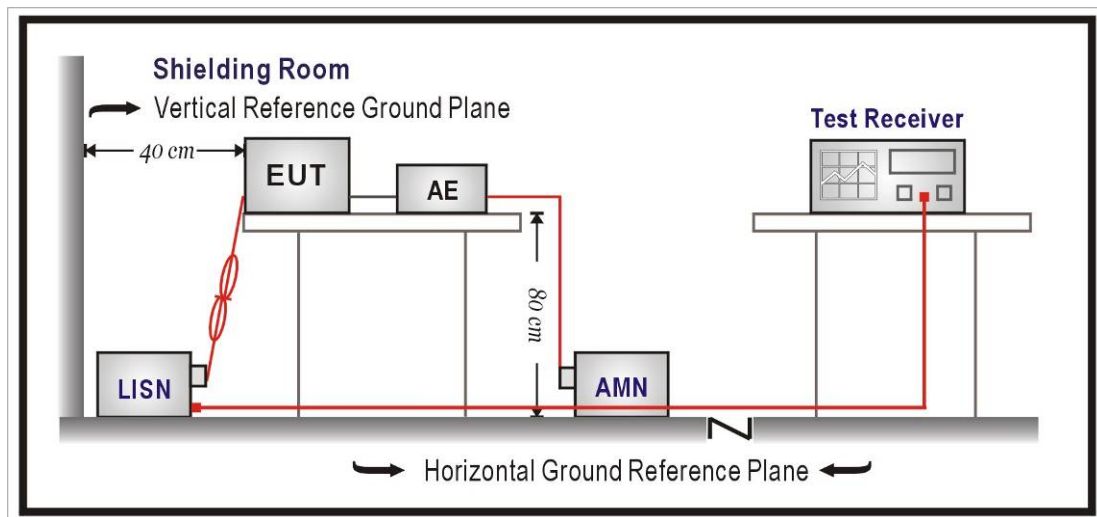
The following test equipment are used during the test:

Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2018/02/05
LISN	R&S	ENV216	100092	2017/08/16
Test Receiver	R&S	ESCS 30	836858/022	2018/04/11

Note: All equipment that need to calibrate are with calibration period of 1 year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2014

2.6. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB.

2.7. Test Result

Owing to the DC operation of EUT, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

The following test equipment are used during the test:

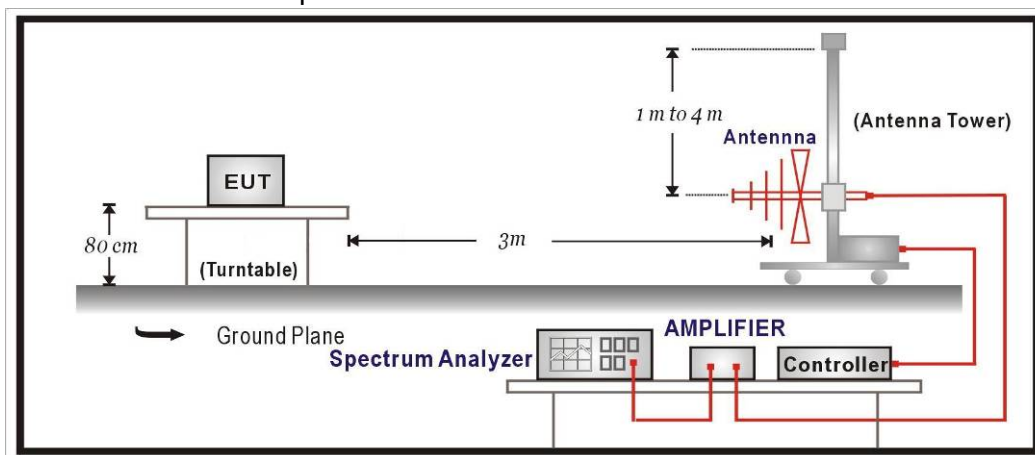
Radiated Emission / CB4-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum	Agilent	E4440A	MY46187335	2017/12/21
Bilog Antenna	Teseq	CBL6112D	23191	2018/06/27
Horn Antenna	Schwarzbeck	BBHA 9120 D	1640	2017/10/23
Pre-Amplifier	EMCI	EMC01820I	12143782	2018/03/08
Pre-Amplifier	EMCI	EMC01820I	980367	2018/02/09

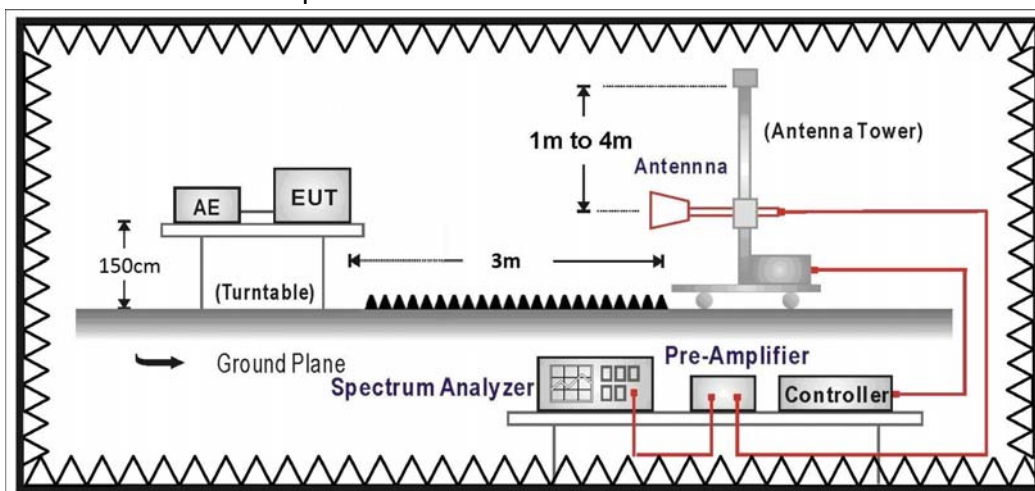
Note: All equipment that need to calibrate are with calibration period of 1 year.

3.2. Test Setup

Under 1GHz Test Setup:



Above 1GHz Test Setup:



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.231(b) Limits				
Fundamental Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66 - 40.70	2250	67.04	225	47.04
70 - 130	1250	61.94	125	41.94
130 - 174	1250 - 3750	61.94 - 71.48	125 - 375	41.94 - 51.48
174 - 260	3750	71.48	375	51.48
260 - 470	3750 - 12500	71.48 - 81.94	375 - 1250	51.48 - 61.94
above 470	12500	81.94	1250	61.94

Remarks: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
 3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➤ Spurious electric field strength limits

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009 - 0.490	2400/F(kHz)	See Remark ¹	300
0.490 - 1.705	24000/F(kHz)	See Remark ¹	30
1.705 - 30	30	29.5	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 and 1.5 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10: 2013 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB beamwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The frequency range from 30MHz to 10th harmonics is checked.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

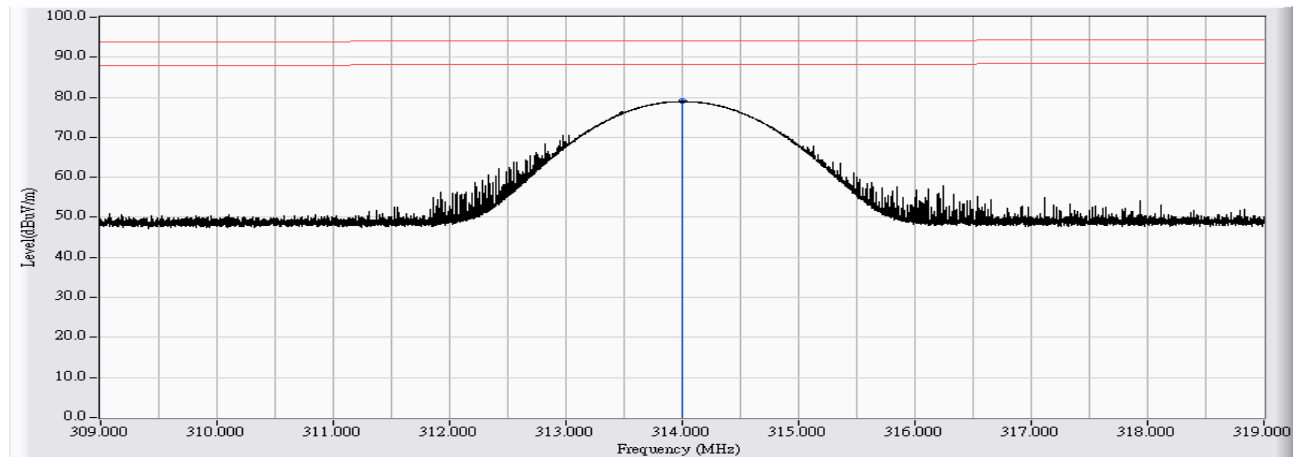
3.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

3.7. Test Result

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Xaxis

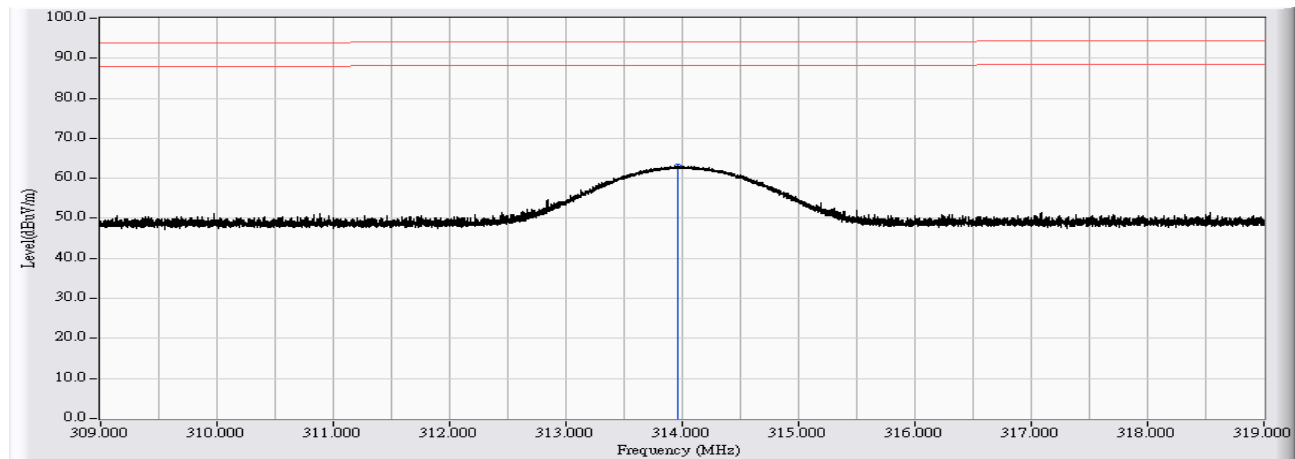


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.000	22.871	56.139	79.010	-16.553	95.563	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Xaxis

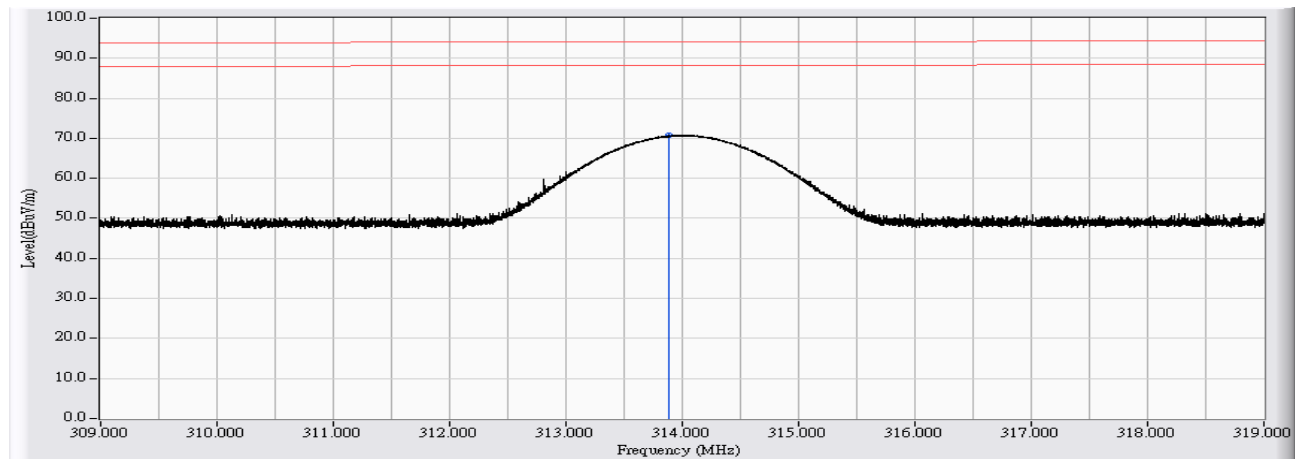


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	313.962	22.870	40.239	63.109	-32.452	95.561	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Yaxis

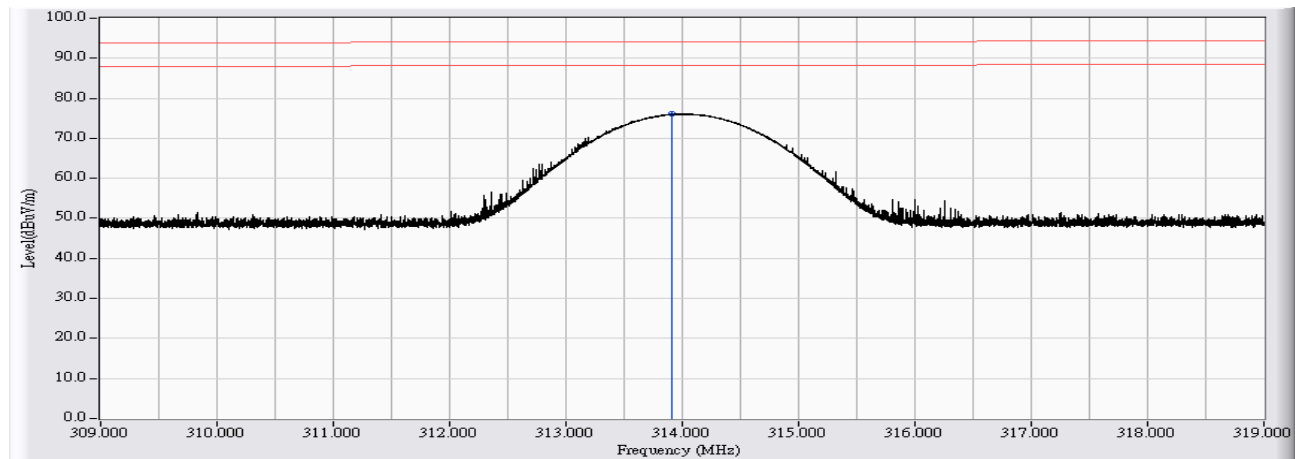


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	313.879	22.868	47.884	70.751	-24.805	95.556	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Yaxis

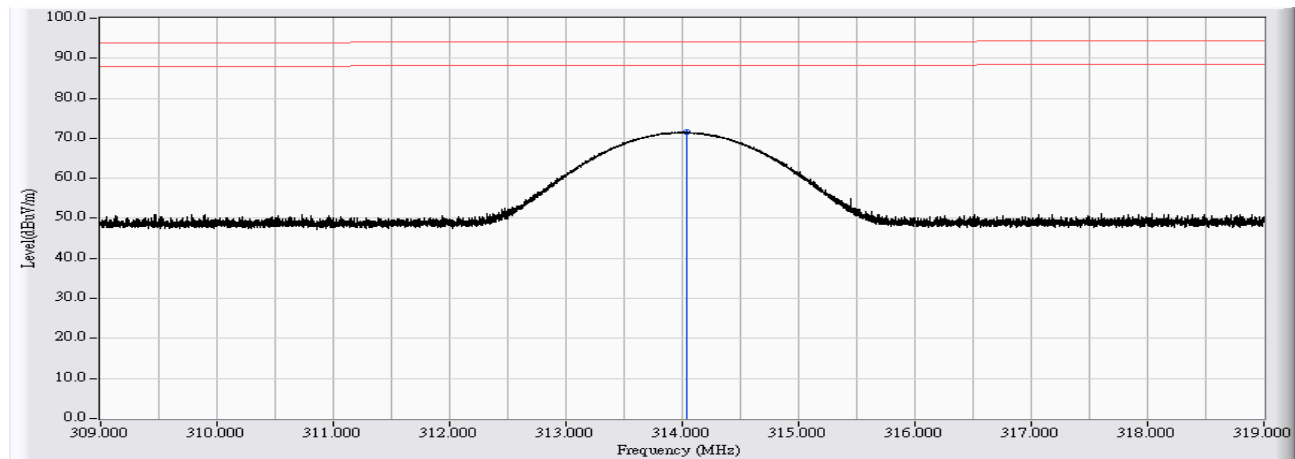


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	313.909	22.868	53.387	76.255	-19.303	95.558	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Zaxis

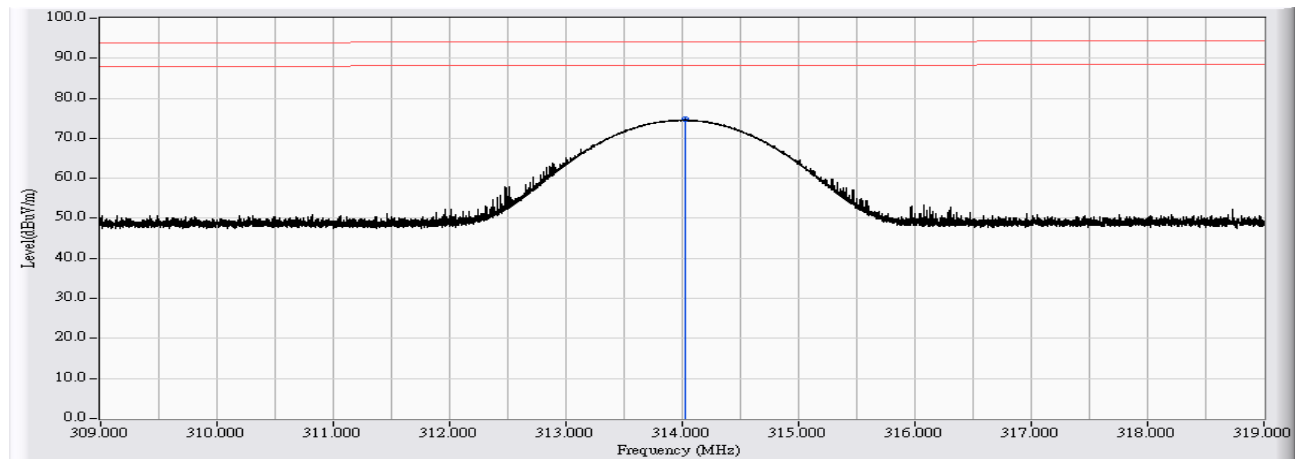


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.034	22.872	48.723	71.595	-23.970	95.565	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz_Zaxis

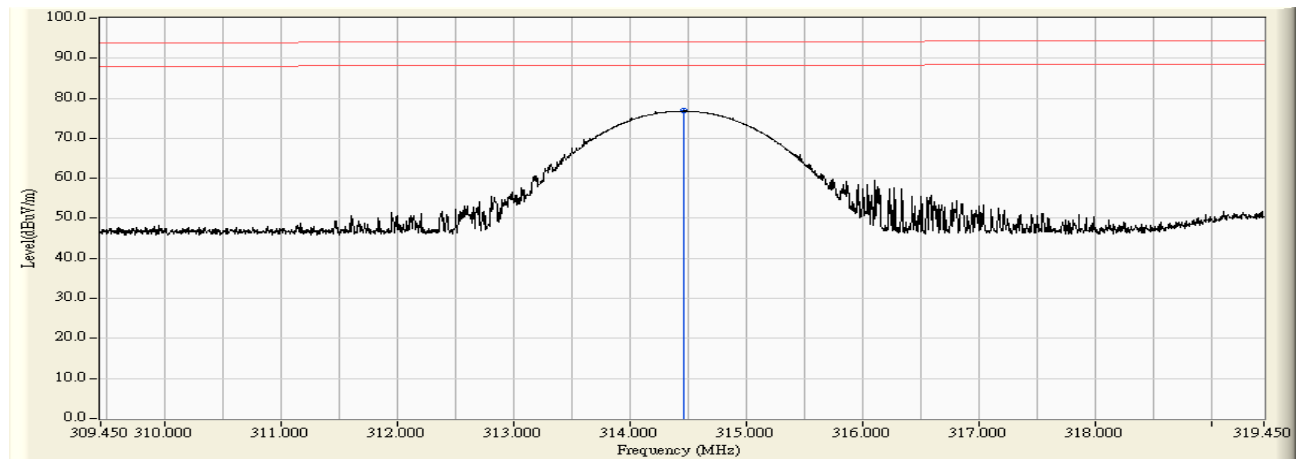


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.025	22.872	51.800	74.672	-20.893	95.565	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/26
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz_Xaxis

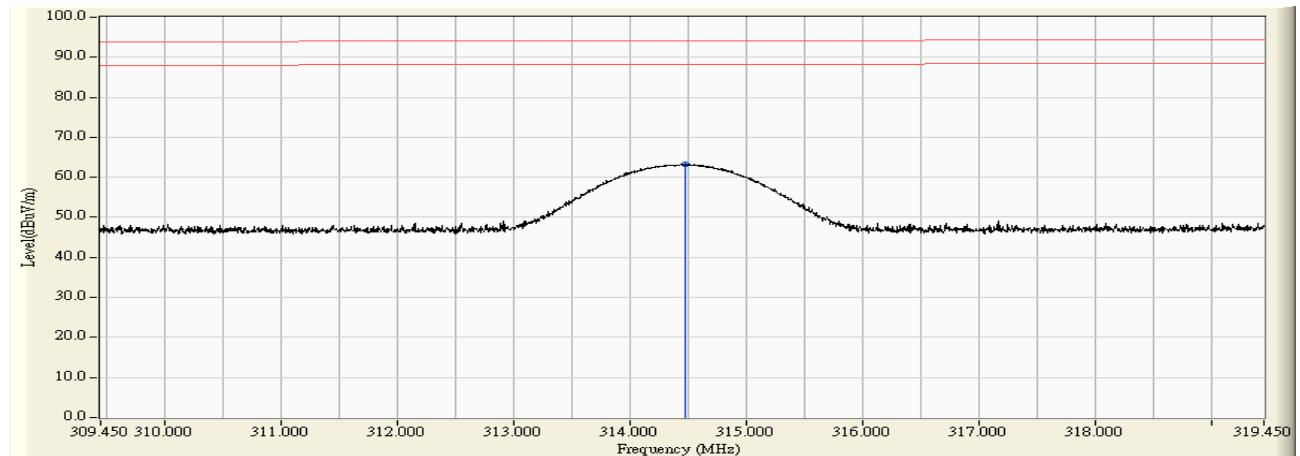


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.465	22.886	54.161	77.047	-17.143	95.591	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/26
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz_Xaxis

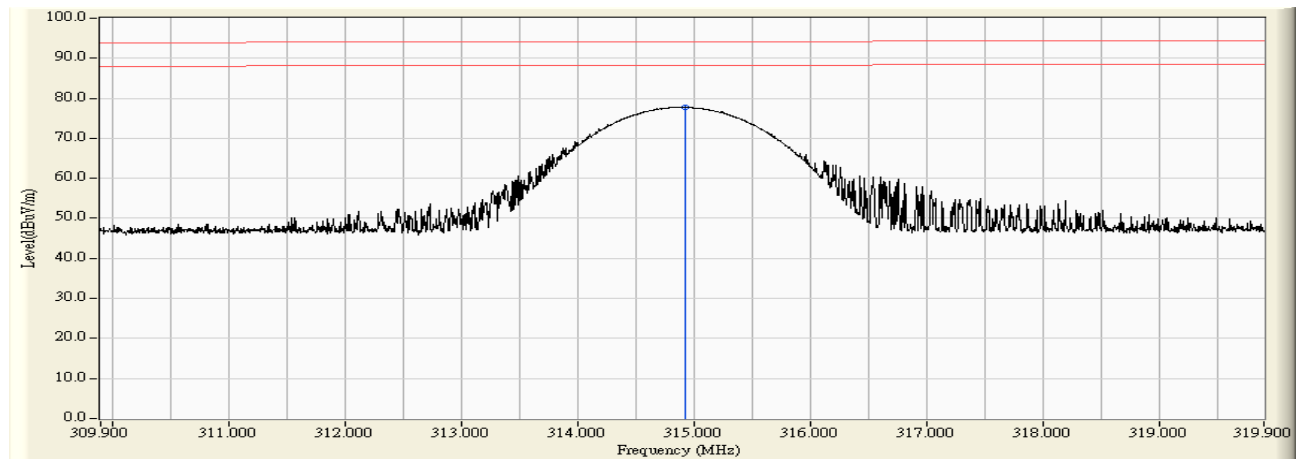


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.470	22.886	40.385	63.271	-30.920	95.591	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/26
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz_Xaxis

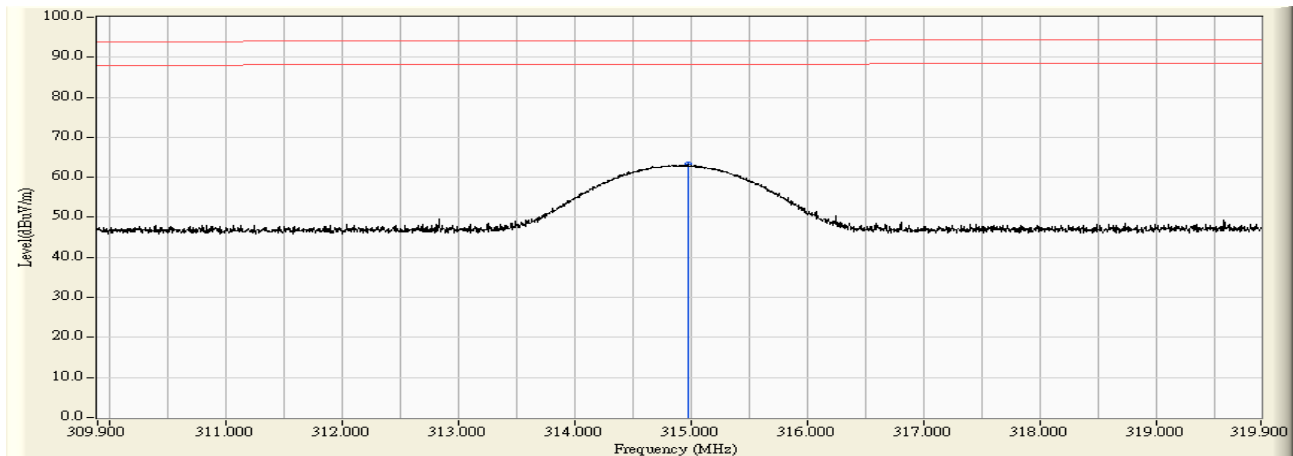


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.930	22.901	54.870	77.771	-16.442	95.619	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/26
Limit : FCC_SpartC_15.231(b)_F_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz_Xaxis



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	314.975	22.902	40.241	63.144	-31.072	95.622	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product	Radio Identification device		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/15	Test Site	CB4-H

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Peak Measurement Level (dBuV/m)	Average Measurement Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Horizontal						
314.000(X-axis)	22.871	56.139	79.010	74.999	95.563	75.563
314.000(Y-axis)	22.868	47.884	70.751	66.740	95.556	75.556
314.000(Z-axis)	22.872	48.723	71.595	67.584	95.565	75.565
Vertical						
314.000(X-axis)	22.870	40.239	63.109	59.098	95.561	75.561
314.000(Y-axis)	22.868	53.387	76.255	72.244	95.558	75.558
314.000(Z-axis)	22.872	51.800	74.672	70.661	95.565	75.565

Note1:

Peak Measurement Level = Reading Level +Correct factor

Average Measurement Level = Peak Measurement Level +20Log(Duty Cycle)

(Duty Cycle)=(Ton/(Ton+Toff)=210.5/334.05

20Log(Duty Cycle)= -4.011

Product	Radio Identification device		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/15	Test Site	CB4-H

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Peak Measurement Level (dBuV/m)	Average Measurement Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Horizontal						
314.450(X-axis)	22.886	54.161	77.047	73.036	95.563	75.563
Vertical						
314.450(X-axis)	22.886	40.385	63.271	59.260	95.561	75.561

Note1:

Peak Measurement Level = Reading Level +Correct factor

Average Measurement Level = Peak Measurement Level +20Log(Duty Cycle)

(Duty Cycle)=(Ton/(Ton+Toff)=210.5/334.05

20Log(Duty Cycle)= -4.011

Product	Radio Identification device		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/15	Test Site	CB4-H

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Peak Measurement Level (dBuV/m)	Average Measurement Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)
Horizontal						
314.900(X-axis)	22.901	54.870	77.771	73.760	95.563	75.563
Vertical						
314.900(X-axis)	22.902	40.241	63.144	59.133	95.561	75.561

Note1:

Peak Measurement Level = Reading Level +Correct factor

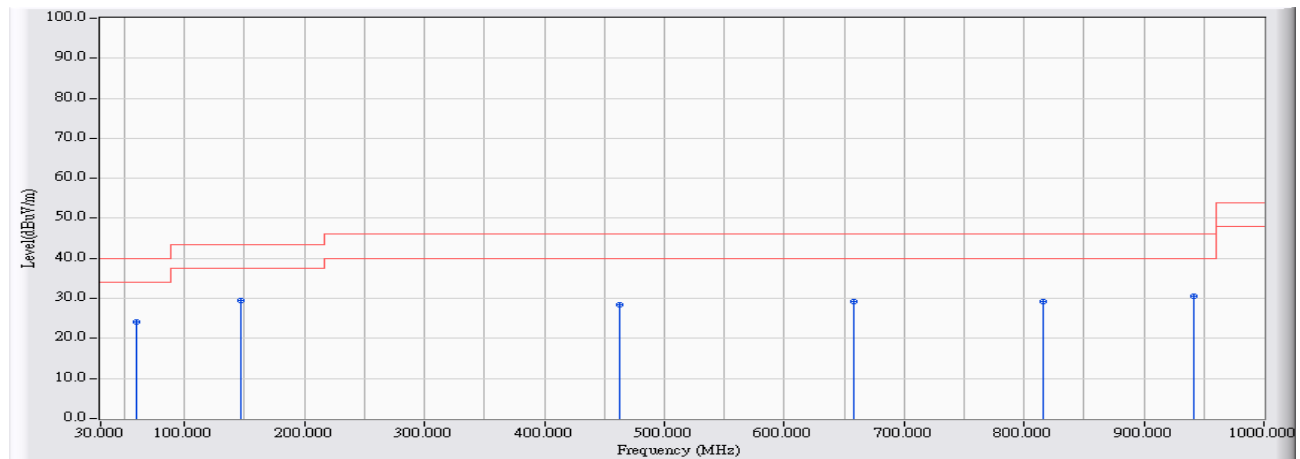
Average Measurement Level = Peak Measurement Level +20Log(Duty Cycle)

(Duty Cycle)=(Ton/(Ton+Toff)=210.5/334.05

20Log(Duty Cycle)= -4.011

30MHz-1GHz Spurious :

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz

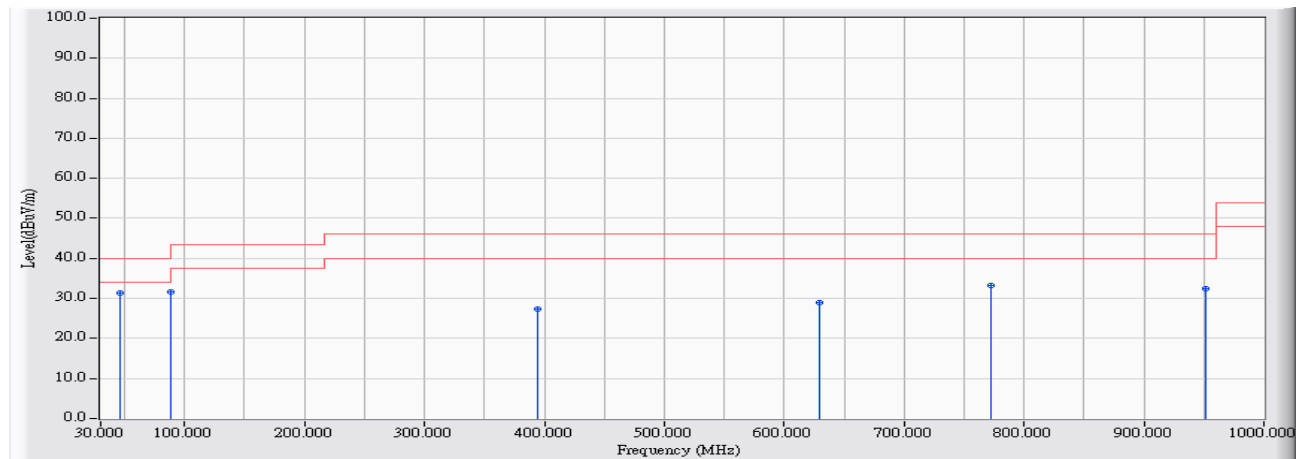


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	59.582	-20.522	44.689	24.167	-15.833	40.000	QUASIPeAK
2	*	147.455	-14.499	44.057	29.559	-13.941	43.500	QUASIPeAK
3		462.674	-7.485	36.023	28.539	-17.461	46.000	QUASIPeAK
4		658.109	-4.842	34.126	29.284	-16.716	46.000	QUASIPeAK
5		816.300	-2.766	32.061	29.295	-16.705	46.000	QUASIPeAK
6		942.000	-0.913	31.387	30.474	-15.526	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz

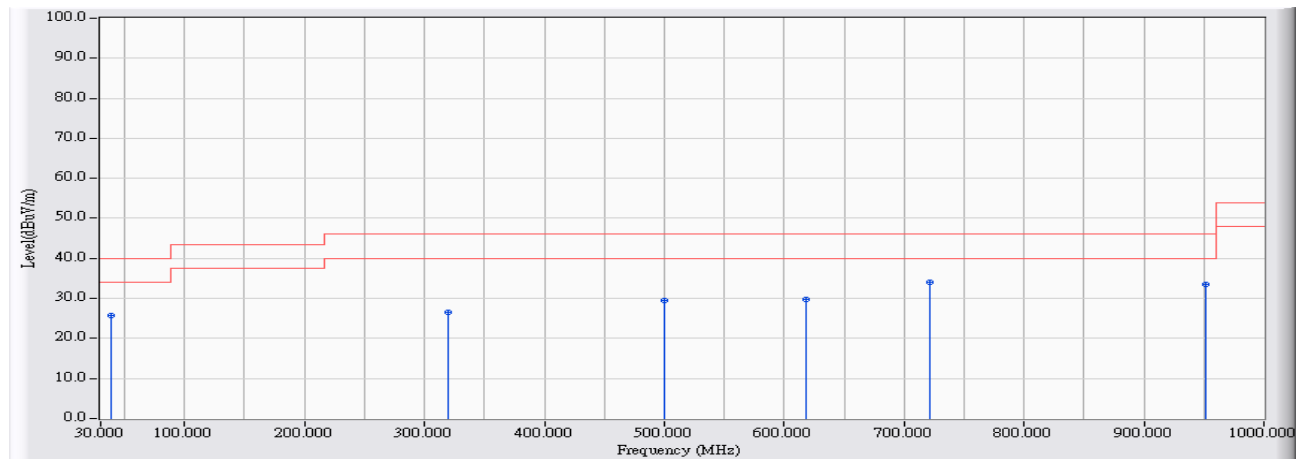


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	46.682	-16.155	47.522	31.366	-8.634	40.000	QUASIPeAK
2		89.067	-18.086	49.664	31.577	-11.923	43.500	QUASIPeAK
3		394.975	-8.840	36.154	27.315	-18.685	46.000	QUASIPeAK
4		629.982	-5.160	34.234	29.074	-16.926	46.000	QUASIPeAK
5		771.976	-3.396	36.558	33.162	-12.838	46.000	QUASIPeAK
6		951.117	-0.774	33.200	32.427	-13.573	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz

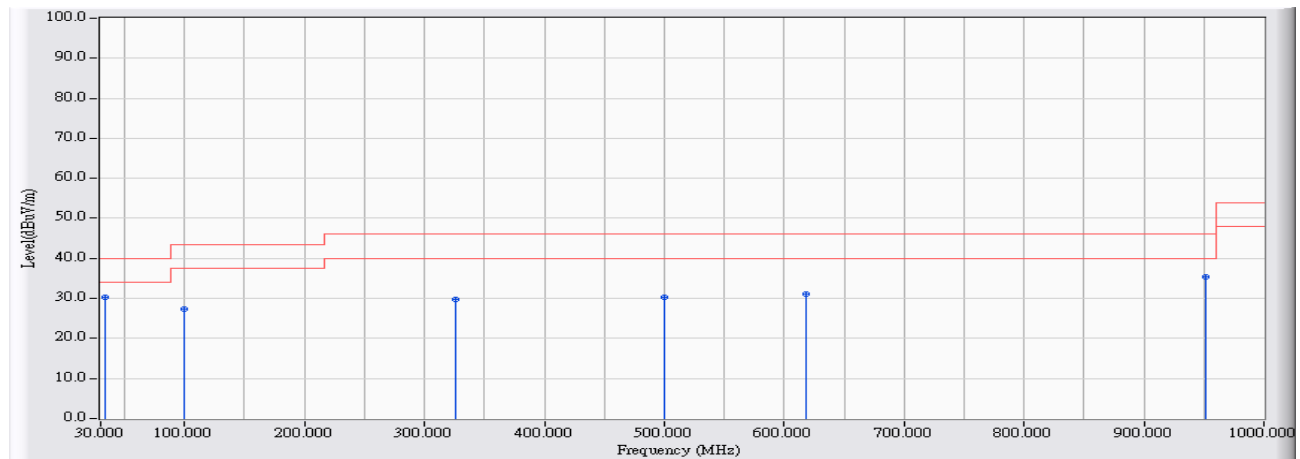


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		38.147	-9.279	35.021	25.741	-14.259	40.000	QUASIPeAK
2		319.516	-11.331	37.787	26.455	-19.545	46.000	QUASIPeAK
3		500.015	-6.806	36.387	29.581	-16.419	46.000	QUASIPeAK
4		617.955	-5.296	35.066	29.770	-16.230	46.000	QUASIPeAK
5	*	722.026	-4.075	38.105	34.030	-11.970	46.000	QUASIPeAK
6		951.117	-0.774	34.392	33.619	-12.381	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz

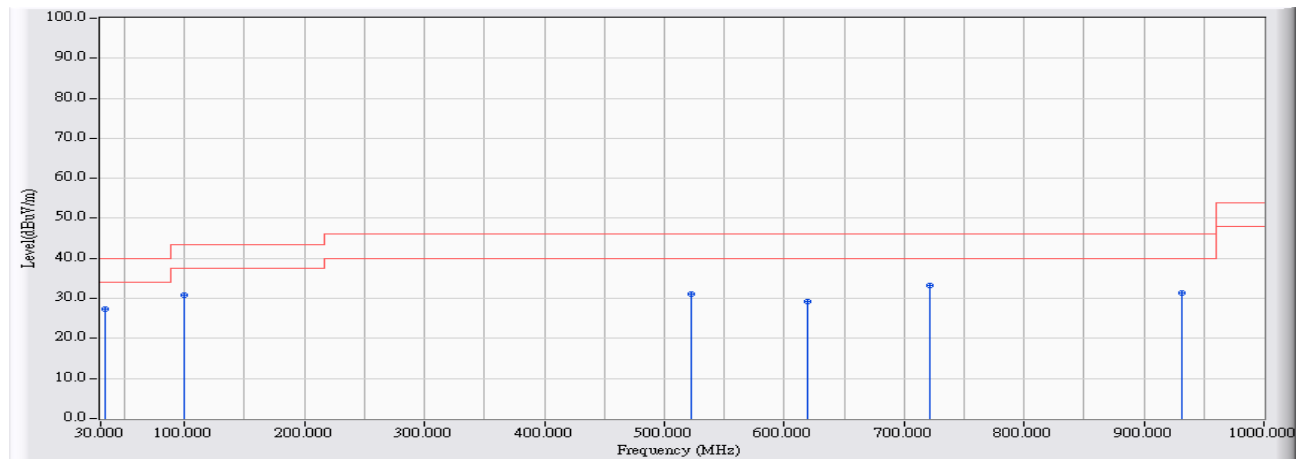


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	33.977	-9.551	39.799	30.248	-9.752	40.000	QUASIPeAK
2		99.251	-15.812	43.171	27.359	-16.141	43.500	QUASIPeAK
3		325.626	-11.128	41.013	29.884	-16.116	46.000	QUASIPeAK
4		500.015	-6.806	37.174	30.368	-15.632	46.000	QUASIPeAK
5		618.052	-5.296	36.262	30.967	-15.033	46.000	QUASIPeAK
6		951.214	-0.772	36.152	35.380	-10.620	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz

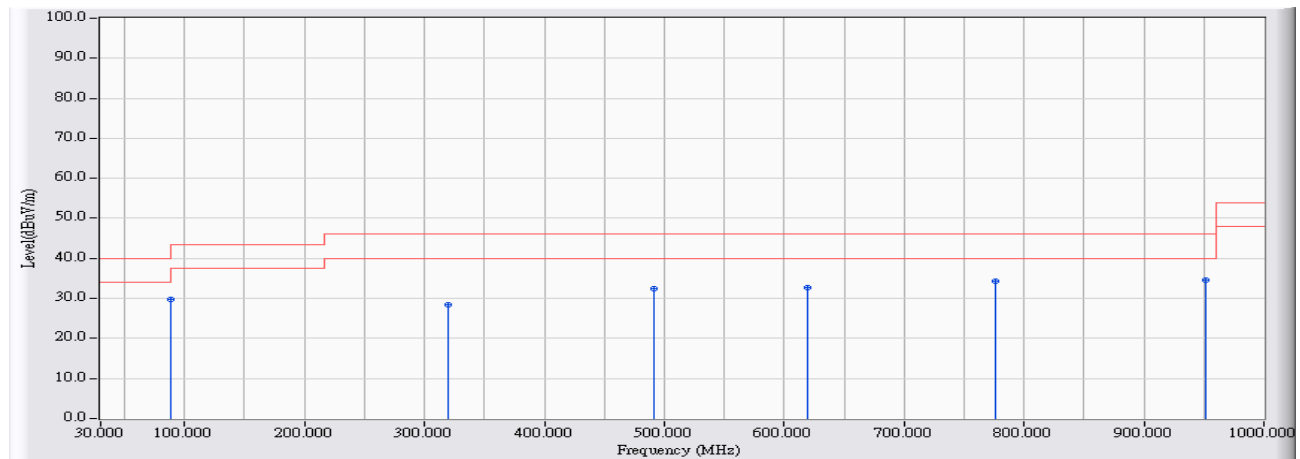


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1	*	34.074	-9.554	37.016	27.462	-12.538	40.000	QUASIPeAK
2		99.251	-15.812	46.625	30.813	-12.687	43.500	QUASIPeAK
3		522.517	-6.510	37.737	31.227	-14.773	46.000	QUASIPeAK
4		619.805	-5.275	34.540	29.265	-16.735	46.000	QUASIPeAK
5		720.862	-4.089	37.447	33.357	-12.643	46.000	QUASIPeAK
6		931.719	-1.070	32.566	31.496	-14.504	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : CB4-H	Time : 2017/07/14
Limit : FCC_CLASS_B_03M_QP	Margin : 6
Probe : CB4_FCC_EFS_S2_30M-1GHz_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		89.067	-18.086	47.759	29.672	-13.828	43.500	QUASIPeAK
2		319.516	-11.331	39.764	28.432	-17.568	46.000	QUASIPeAK
3		490.898	-6.970	39.299	32.328	-13.672	46.000	QUASIPeAK
4		619.798	-5.275	38.002	32.727	-13.273	46.000	QUASIPeAK
5		776.534	-3.332	37.566	34.234	-11.766	46.000	QUASIPeAK
6	*	951.311	-0.770	35.338	34.568	-11.432	46.000	QUASIPeAK

Note:

1. All Reading Levels are Quasi-Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Above 1GHz Spurious:

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1256.000	-4.874	39.480	34.606	-40.954	75.563	PEAK
2		1570.000	-3.546	42.260	38.714	-35.286	74.000	PEAK
3		1884.000	-2.437	37.650	35.213	-40.347	75.563	PEAK
4		2198.000	-1.244	38.440	37.197	-38.363	75.563	PEAK
5		2512.000	-0.024	36.810	36.786	-38.774	75.563	PEAK
6	*	2826.000	1.148	39.840	40.988	-33.012	74.000	PEAK
7		3140.000	2.057	38.240	40.297	-35.263	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 $\text{Duty Cycle(Only Ton)} = \text{Ton} / (\text{Ton} + \text{off}) = 210.5 / 334.05$
 $20 * \text{Log(Duty Cycle)} = -4.011$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1256.000	-4.874	40.660	35.786	-39.774	75.563	PEAK
2	*	1570.000	-3.546	44.240	40.694	-33.306	74.000	PEAK
3		1884.000	-2.437	42.040	39.603	-35.957	75.563	PEAK
4		2198.000	-1.244	40.320	39.077	-36.483	75.563	PEAK
5		2512.000	-0.024	38.440	38.416	-37.144	75.563	PEAK
6		2826.000	1.148	35.970	37.118	-36.882	74.000	PEAK
7		3140.000	2.057	36.420	38.477	-37.083	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. “ * ”, means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
Duty Cycle(Only Ton)= Ton/ (Ton+off)=210.5/334.05
20*Log(Duty Cycle) = -4.011
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1257.800	-4.865	40.880	36.014	-39.546	75.563	PEAK
2		1572.250	-3.538	46.500	42.962	-31.038	74.000	PEAK
3		1886.700	-2.428	43.800	41.372	-34.188	75.563	PEAK
4		2201.150	-1.230	41.270	40.040	-33.960	74.000	PEAK
5		2515.600	-0.011	40.010	39.999	-35.561	75.563	PEAK
6	*	2830.050	1.164	45.830	46.994	-27.006	74.000	PEAK
7		3144.500	2.064	40.900	42.964	-32.596	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 $\text{Duty Cycle(Only Ton)} = \text{Ton} / (\text{Ton} + \text{off}) = 210.5 / 334.05$
 $20 * \text{Log(Duty Cycle)} = -4.011$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.45MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1257.780	-4.865	42.520	37.654	-37.906	75.563	PEAK
2		1572.250	-3.538	48.420	44.882	-29.118	74.000	PEAK
3		1886.700	-2.428	43.530	41.102	-34.458	75.563	PEAK
4		2201.150	-1.230	38.790	37.560	-36.440	74.000	PEAK
5		2515.600	-0.011	39.670	39.659	-35.901	75.563	PEAK
6	*	2830.050	1.164	46.090	47.254	-26.746	74.000	PEAK
7		3144.500	2.064	39.810	41.874	-33.686	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. “ * ”, means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
 $\text{Duty Cycle(Only Ton)} = \text{Ton} / (\text{Ton} + \text{off}) = 210.5 / 334.05$
 $20 * \text{Log(Duty Cycle)} = -4.011$
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - HORIZONTAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1259.600	-4.858	42.140	37.282	-38.278	75.563	PEAK
2		1574.500	-3.530	41.110	37.580	-36.420	74.000	PEAK
3		1889.400	-2.420	42.530	40.110	-35.450	75.563	PEAK
4		2204.300	-1.217	39.990	38.773	-35.227	74.000	PEAK
5		2519.200	0.002	39.340	39.343	-36.217	75.563	PEAK
6		2834.100	1.179	40.330	41.509	-32.491	74.000	PEAK
7	*	3149.000	2.071	39.580	41.651	-33.909	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
Duty Cycle(Only Ton)= Ton/ (Ton+off)=210.5/334.05
20*Log(Duty Cycle) = -4.011
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

Site : CB4-H	Time : 2017/07/15
Limit : FCC_SpartC_15.231(b)_H_03M_PK	Margin : 6
Probe : CB4_FCC_EFS_B432_1-18GHz_3M_1116 - VERTICAL	Power : DC 3V
EUT : Radio Identification device	Note : 314.9MHz

		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1		1259.600	-4.858	40.310	35.452	-40.108	75.563	PEAK
2		1574.500	-3.530	45.010	41.480	-32.520	74.000	PEAK
3		1889.400	-2.420	42.390	39.970	-35.590	75.563	PEAK
4		2204.300	-1.217	40.620	39.403	-34.597	74.000	PEAK
5		2519.200	0.002	39.530	39.533	-36.027	75.563	PEAK
6	*	2834.100	1.179	40.980	42.159	-31.841	74.000	PEAK
7		3149.000	2.071	39.220	41.291	-34.269	75.563	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. " * ", means this data is the worst emission level.
4. Measurement Level = Reading Level + Correct Factor.
5. Average Measurement Level = Peak Measurement Level + 20Log (Duty Cycle)
Duty Cycle(Only Ton)= Ton/ (Ton+off)=210.5/334.05
20*Log(Duty Cycle) = -4.011
6. The average measurement was not performed when the peak measured data under the limit of peak detection.

4. Occupied Bandwidth

4.1. Test Equipment

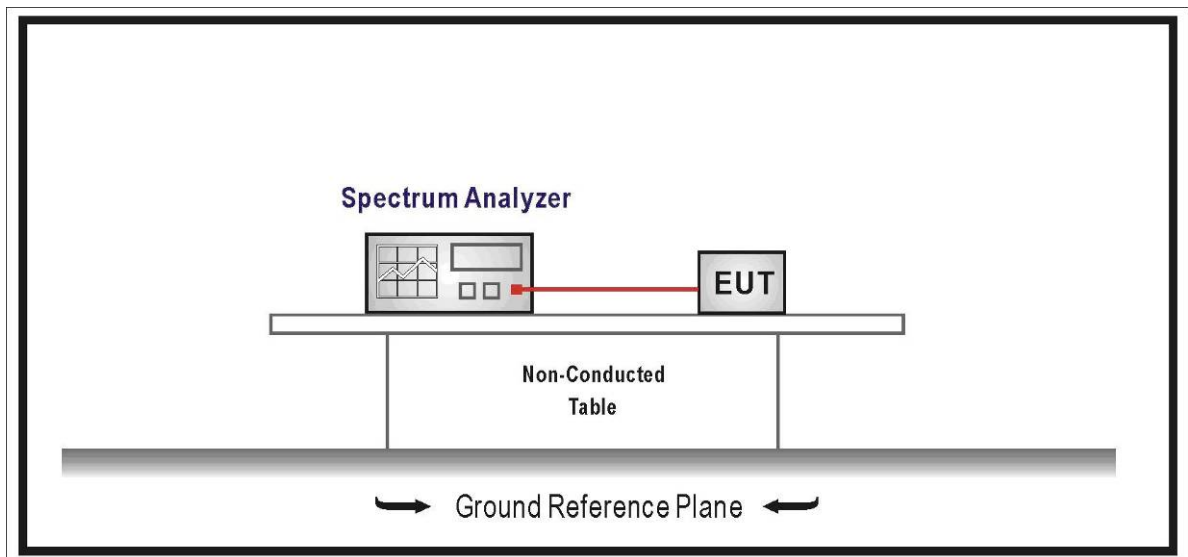
The following test equipment are used during the radiated emission tests:

Occupied Bandwidth / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/22

Note: All equipment that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

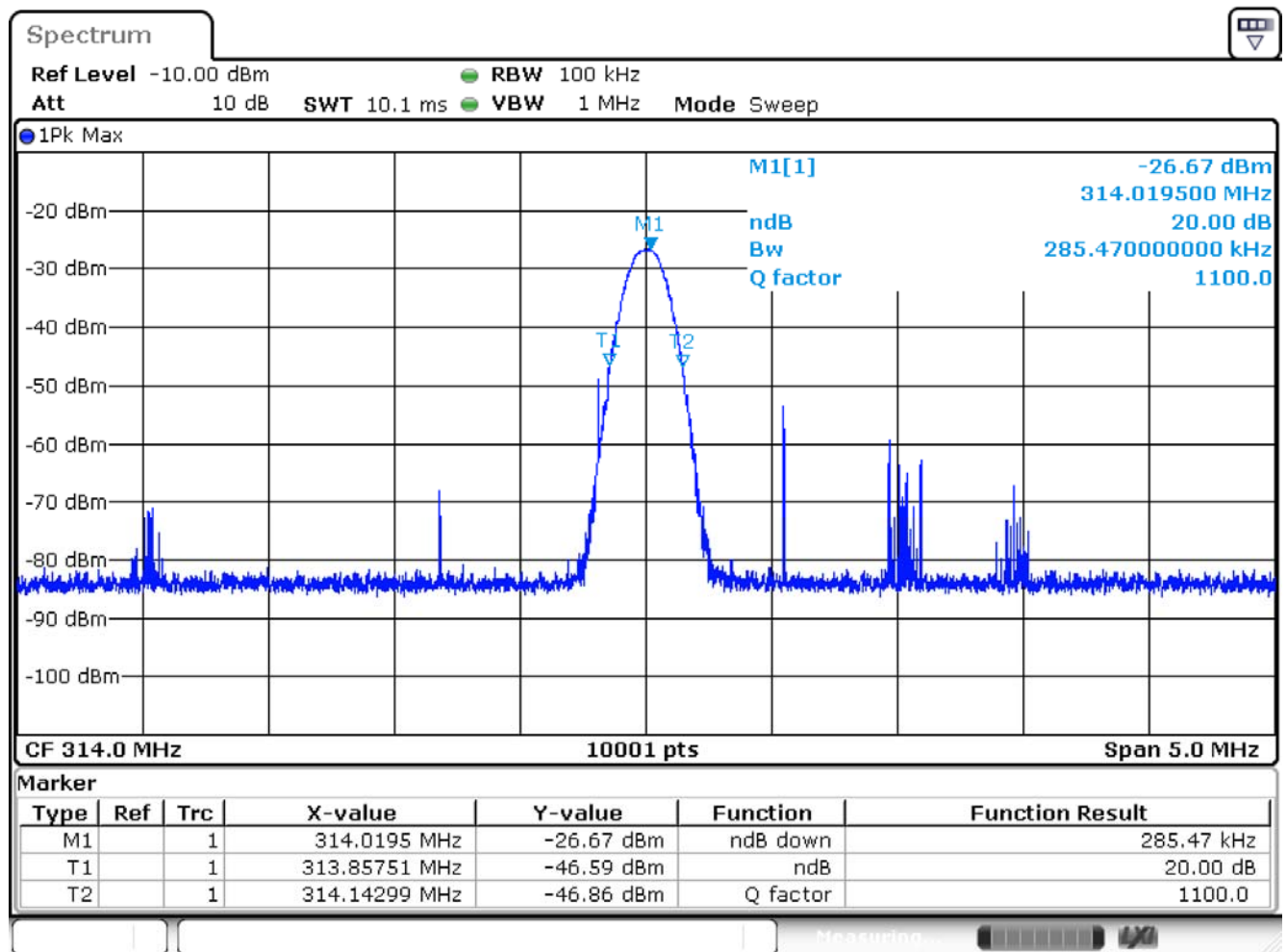
4.5. Uncertainty

$\pm 150\text{Hz}$

4.6. Test Result

Product	Radio Identification device		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

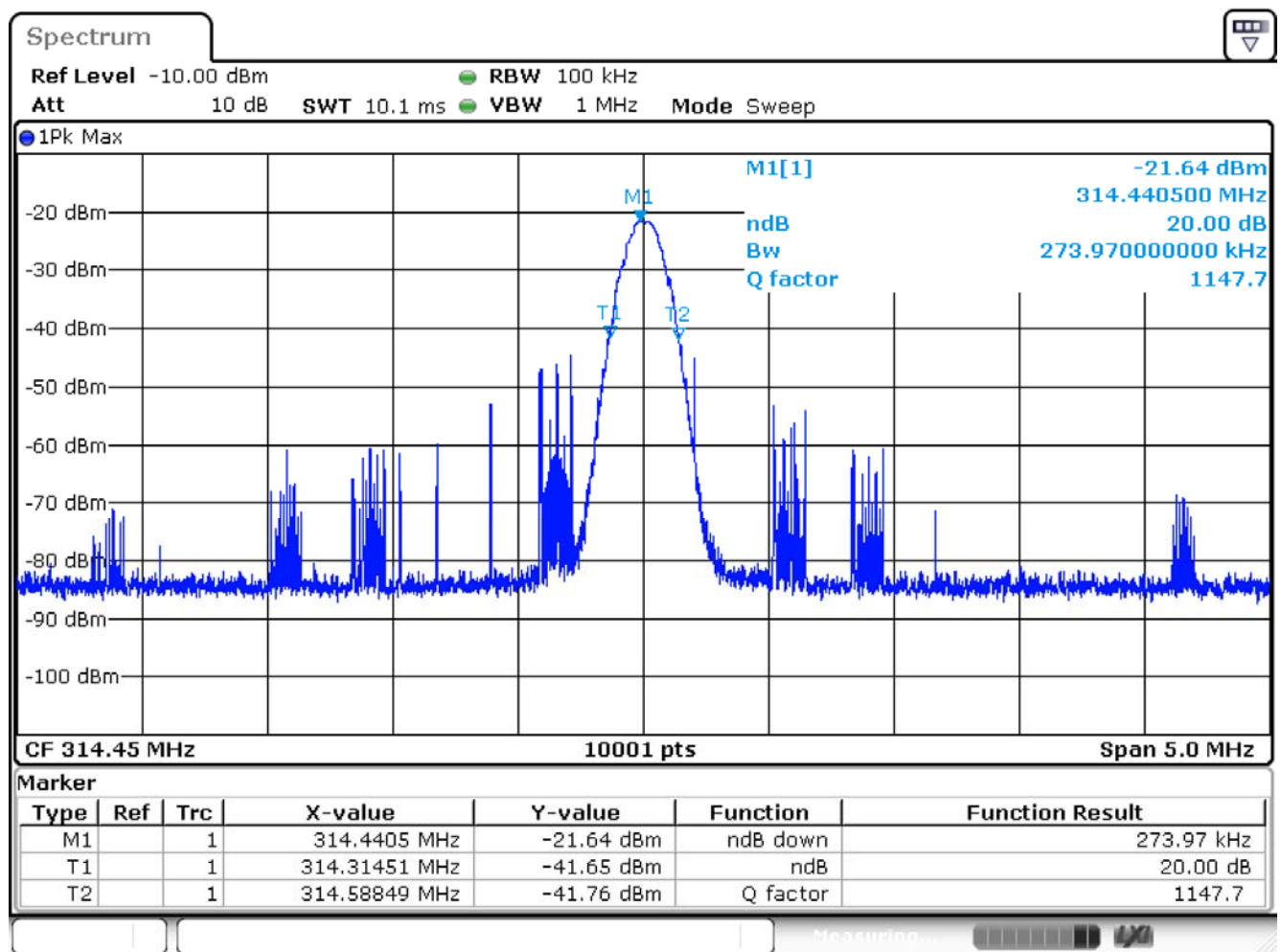
Center Frequency	314 MHz
Allowable Bandwidth (314 MHz: 0.25%)	785KHz
Bandwidth at 20dB down (Max)	285.47kHz
Result	PASS



Date: 12.JUL.2017 13:50:50

Product	Radio Identification device		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

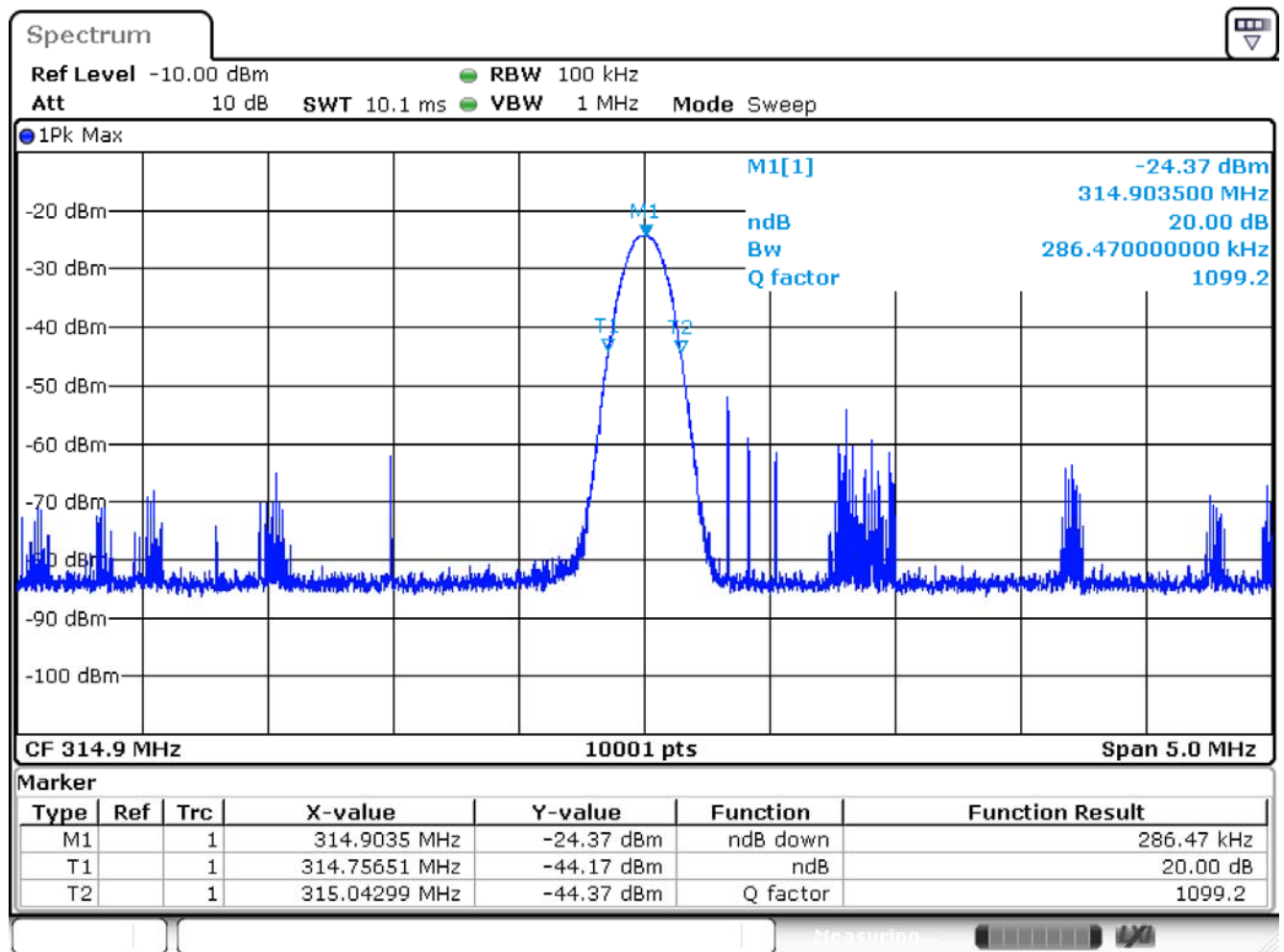
Center Frequency	314.45 MHz
Allowable Bandwidth (314.45 MHz: 0.25%)	786.1 KHz
Bandwidth at 20dB down (Max)	273.97kHz
Result	PASS



Date: 12.JUL.2017 13:48:42

Product	Radio Identification device		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

Center Frequency	314.9 MHz
Allowable Bandwidth (314.9MHz: 0.25%)	787.3 KHz
Bandwidth at 20dB down (Max)	286.47kHz
Result	PASS



Date: 12.JUL.2017 13:52:19

5. Duty cycle

5.1. Test Equipment

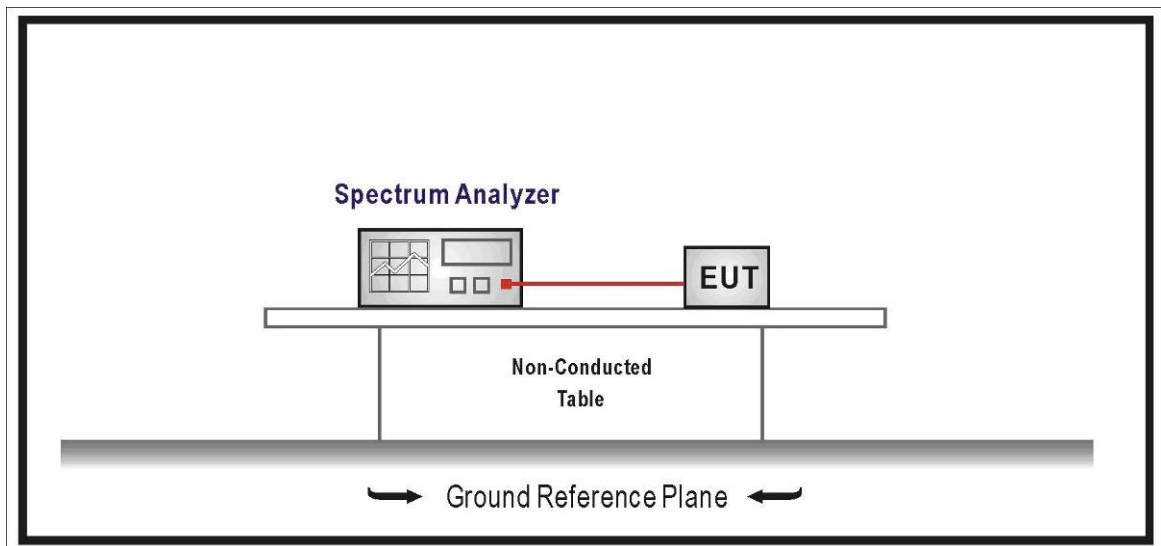
The following test equipment are used during the radiated emission tests:

Duty cycle / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/22

Note: All equipment that need to calibrate are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

N/A

5.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

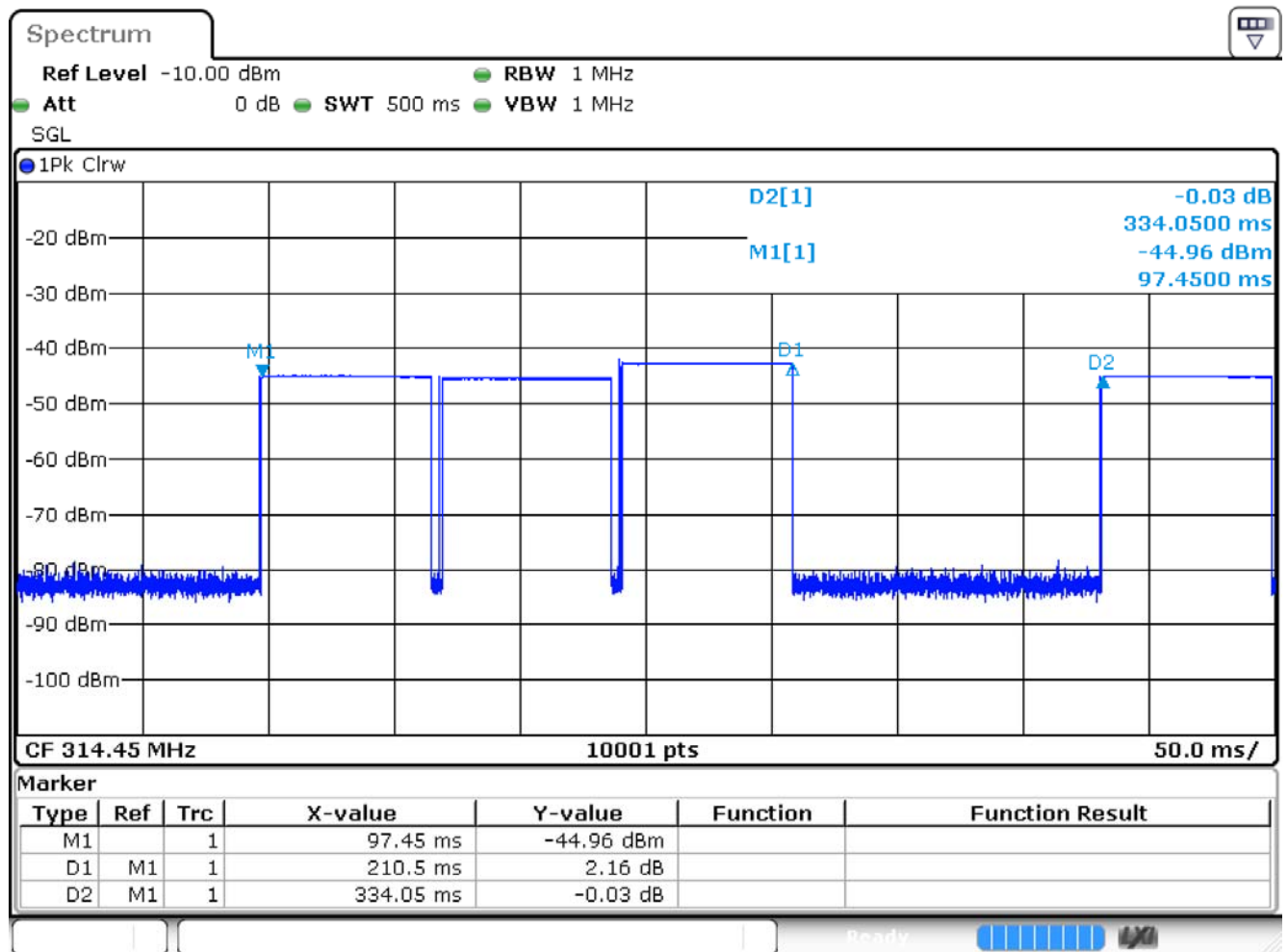
5.5. Uncertainty

± 25msec

5.6. Test Result

Product	Radio Identification device		
Test Item	Duty Cycle		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

Frequency (MHz)	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	Duty Factor(dB)
314.45	210.5	334.05	63.0%	4.011



Date: 26.JUL.2017 13:11:08

6. Transmitter time

6.1. Test Equipment

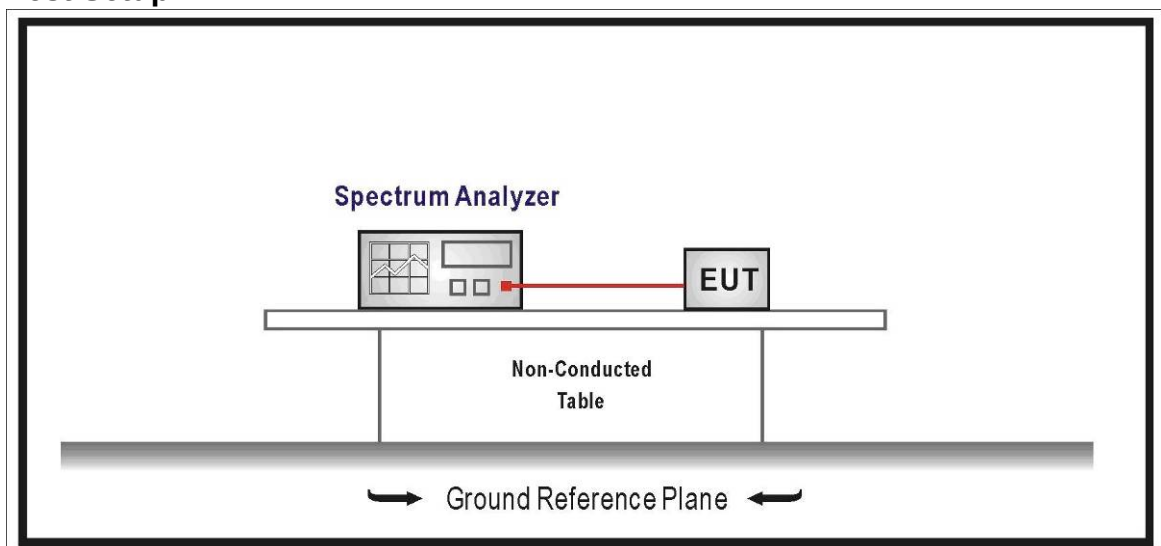
The following test equipment are used during the radiated emission tests:

Transmitter time / SR10-H

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	Agilent	N9010A	US47140172	2017/08/08
Signal & Spectrum Analyzer	R&S	FSV40	101049	2018/01/22

Note: All equipment that need to calibrate are with calibration period of 1 year.

6.2. Test Setup



6.3. Limits

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. A transmitter activated automatically shall cease transmission within 5 seconds after activation.

6.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231(b): 2015

6.5. Uncertainty

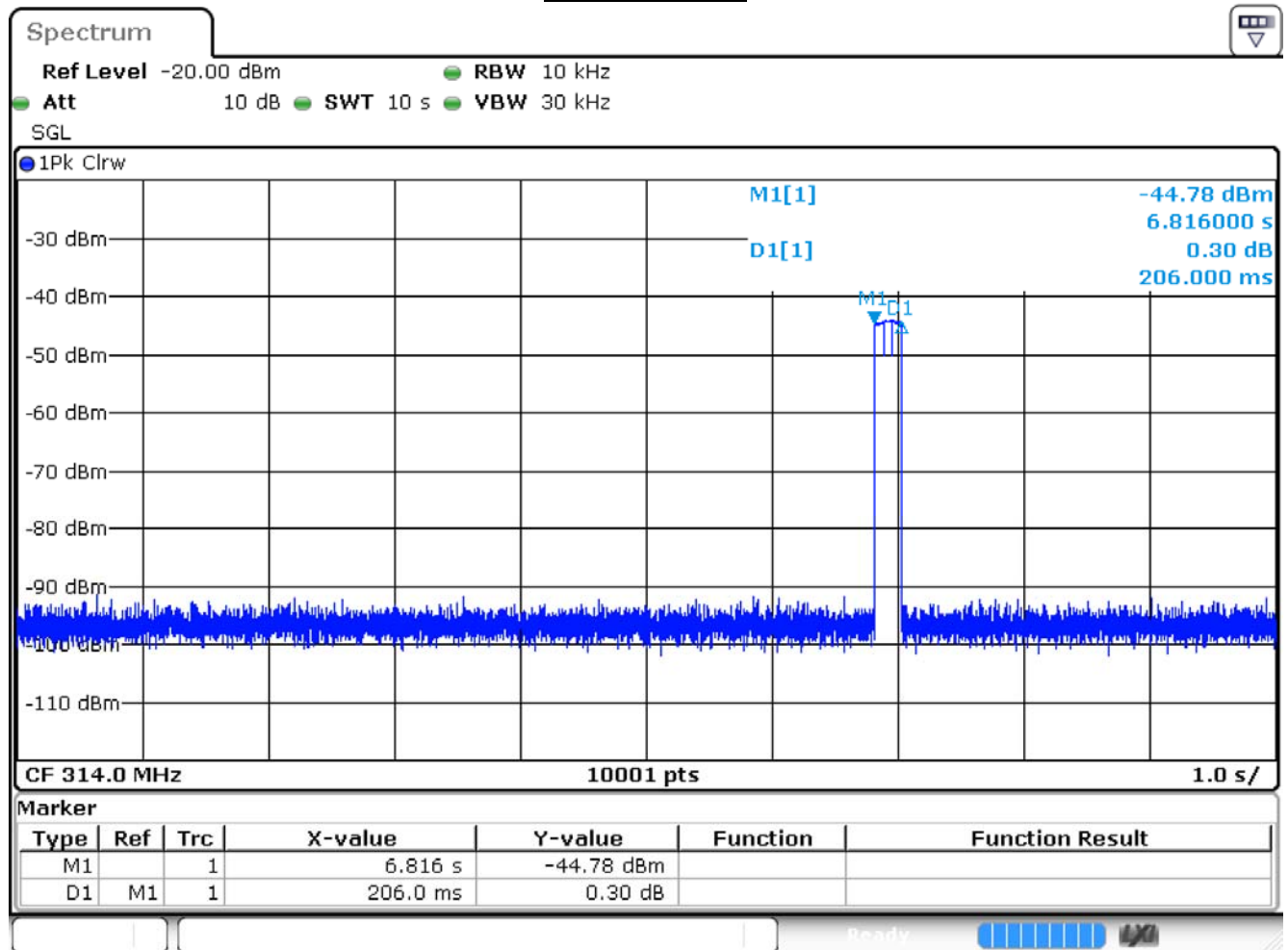
± 25msec

6.6. Test Result

Product	Radio Identification device		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

Center Frequency	314 MHz
Transmitter time = 206.0ms < 5 sec.	Below 5 sec.
Result	PASS

Transmitter time

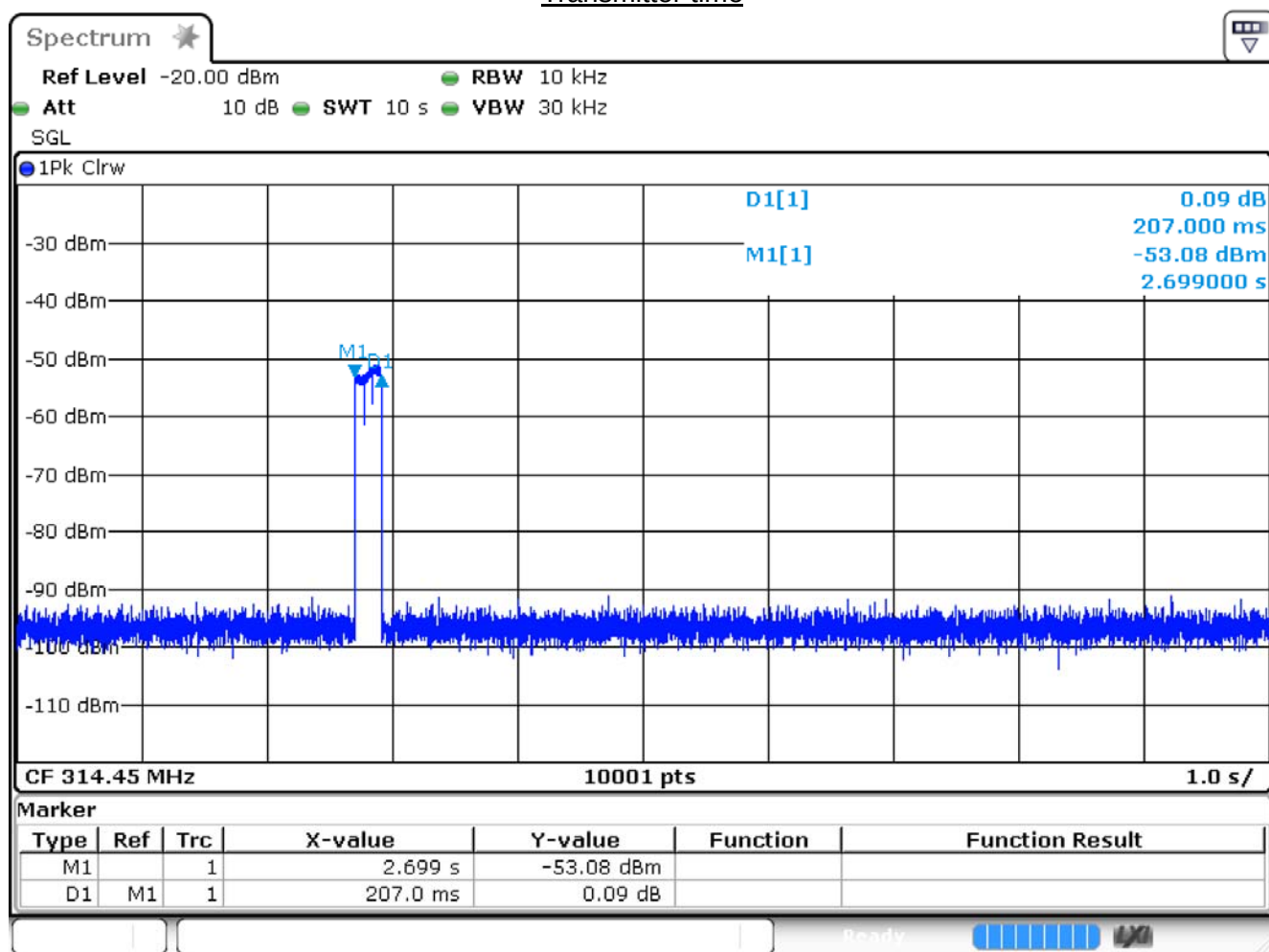


Date: 12.JUL.2017 14:27:48

Product	Radio Identification device		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

Center Frequency	314.45 MHz
Transmitter time = 207.0ms < 5 sec.	Below 5 sec.
Result	PASS

Transmitter time

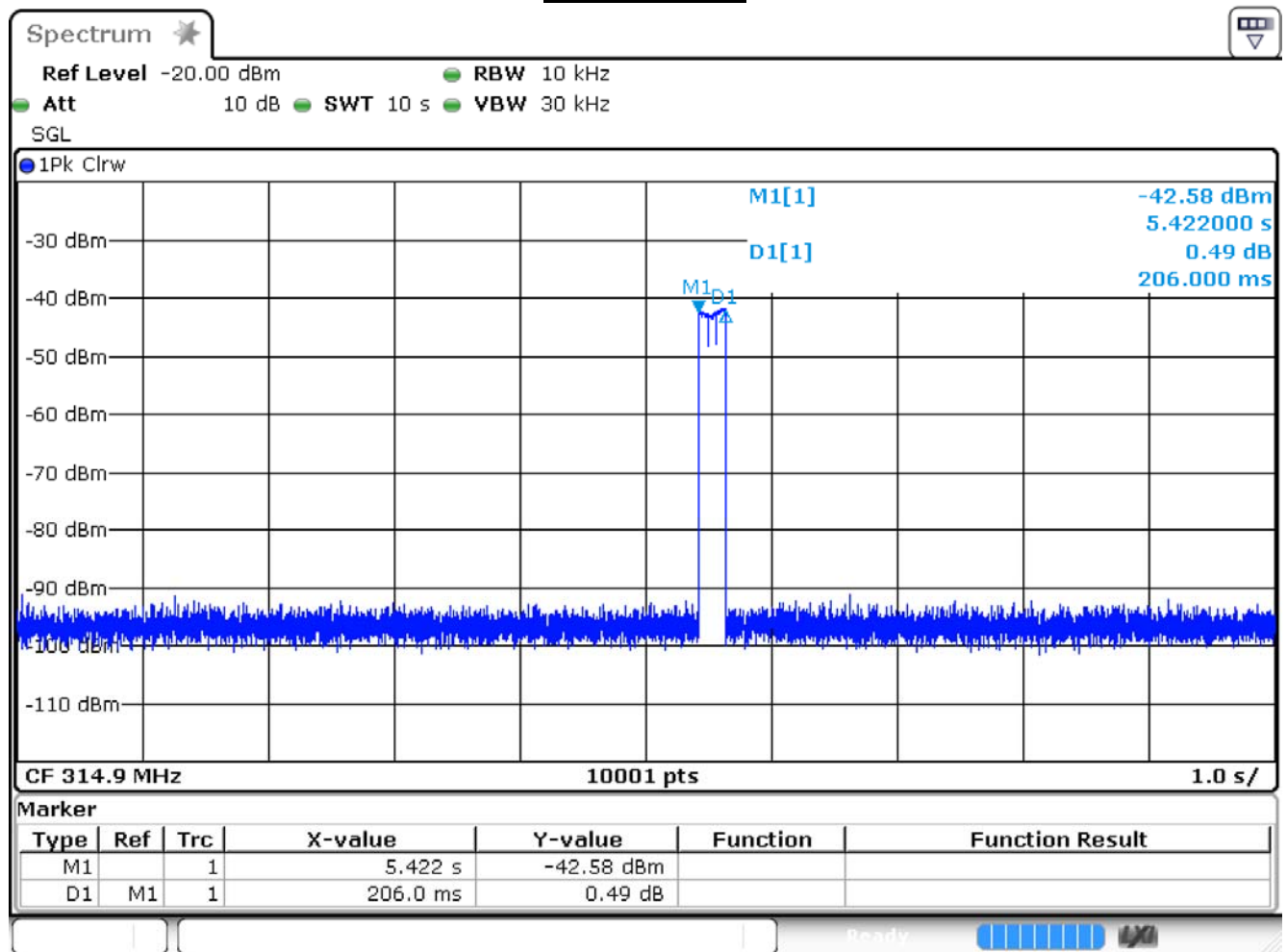


Date: 12.JUL.2017 14:29:51

Product	Radio Identification device		
Test Item	Transmitter time		
Test Mode	Mode 1: Transmit		
Date of Test	2017/07/12	Test Site	SR10-H

Center Frequency	3149 MHz
Transmitter time = 206.0ms < 5 sec.	Below 5 sec.
Result	PASS

Transmitter time



Date: 12.JUL.2017 14:33:28