FCC Test Report

Product Name	Radio Identification device
Model No.	DM4
FCC ID.	NBGDM4

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

Date of Receipt	Mar. 27, 2017
Issued Date	May 23, 2017
Report No.	1740004R-RFUSP14V00
Report Version	V1.0

Test Report

Issued Date: May 23, 2017
Report No.: 1740004R-RFUSP14V00

Product Name	Radio Identification device
Applicant	Hella KGaA Hueck & Co.
Address	Rixbecker Strasse 75, 59552 Lippstadt, Germany
Manufacturer	1. Hella KGaA Hueck & Co. 2. Hella Shanghai Electronics Co. Ltd (HSE)
Model No.	DM4
FCC ID.	NBGDM4
EUT Rated Voltage	DC 3V (Power by Battery)
EUT Test Voltage	DC 3V (Power by Battery)
Trade Name	HELLA
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2016 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By : Jinn Chen

(Senior Adm. Specialist / Jinn Chen)

Tested By : Ivan Chuang

(Senior Engineer / Ivan Chuang)

Approved By :

(Director / Vincent Lin)

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1. General Information

1.1. EUT Description

Product Name	Radio Identification device
Trade Name	HELLA
Model No.	DM4
FCC ID	NBGDM4
Frequency Range	433.47MHz, 433.92MHz, 434.37MHz
Number of Channels	3
Type of Modulation	FSK
Antenna Type	Integrated PCB loop antenna

Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	433.47 MHz	Channel 2:	433.92 MHz	Channel 3:	434.37 MHz

Note:

1. The EUT is a Radio Identification device with a built-in 433.47MHz, 433.92MHz, 434.37MHz transceiver.
2. The antenna of EUT is conform to FCC 15.203
3. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
4. This product has different enclosure. DEKRA have initially checked both enclosure variants regarding the power value and found that the metal enclosure is the worst case. The test report considered the worst case variant (metal enclosure) to make sure the remaining test items.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

Test Mode	Mode 1: Transmit

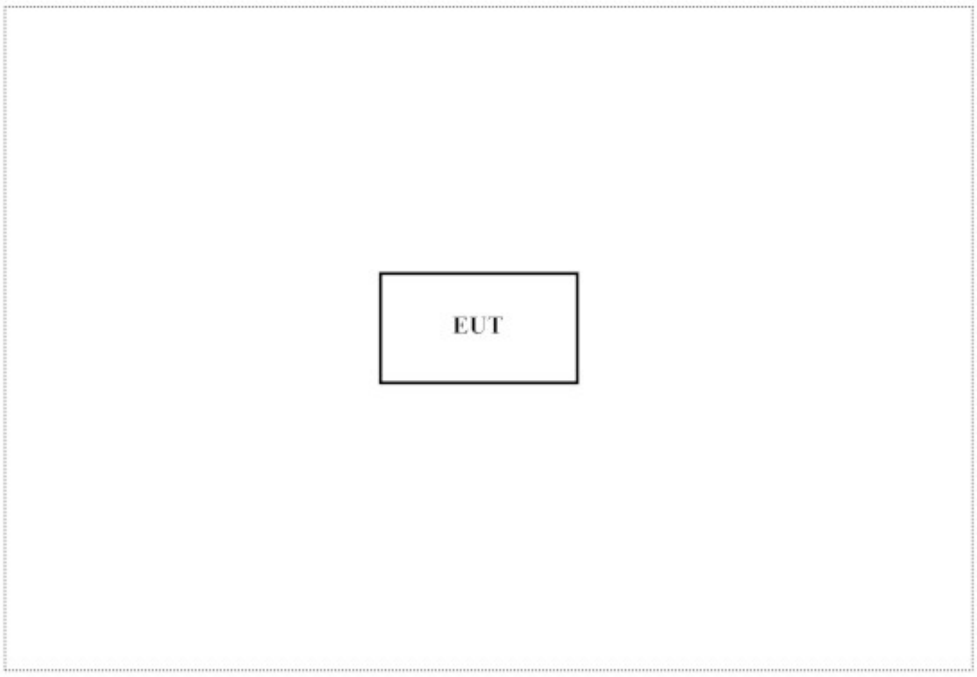
1.3. Tested System Details

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

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

Signal Cable Type	Signal cable Description
N/A	

1.4. Configuration of tested System



1.5. EUT Exercise Software

1	Setup the EUT as shown in section 1.4.
2	Push the button, start transmit continually.
3	Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Corporation's Web Site: http://www.dekra.com.tw/chinese/about/certificates.aspx?bval=5

The address and introduction of DEKRA Corporation's laboratories can be founded in our Web site: http://www.dekra.com.tw

Site Description: Accredited by TAF
Accredited Number: 3023

Site Name: DEKRA Testing and Certification Co., Ltd.
Site Address: No.159, Sec. 2, Wenhua 1st Rd., Linkou Dist.,
New Taipei City 24457, Taiwan.
TEL: 886-2-2602-7968 / FAX : 866-2-2602-3286
E-Mail : info.tw@dekra.com

FCC Accreditation Number: TW1014

1.7. List of Test Equipment

For Conduction measurements /ASR1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
	EMI Test Receiver	R&S	ESR7	161601	2017.01.06	2018.01.05
	Two-Line V-Network	R&S	ENV216	101306	2017.02.16	2018.02.15
	Two-Line V-Network	R&S	ENV216	101307	2017.03.17	2018.03.16
	Coaxial Cable	Quietek	RG400_BNC	RF001	2016.05.25	2017.05.24

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

For Conducted measurements /ASR4

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Spectrum Analyzer	R&S	FSV30	103464	2017.01.09	2018.01.08
	Power Meter	Anritsu	ML2496A	1548003	2016.12.15	2017.12.14
	Power Sensor	Anritsu	MA2411B	1531024	2016.12.15	2017.12.14
	Power Sensor	Anritsu	MA2411B	1531025	2016.12.15	2017.12.14
	Bluetooth Tester	R&S	CBT	101238	2017.01.03	2018.01.02

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : QuieTek Conduction Test System V8.0.110

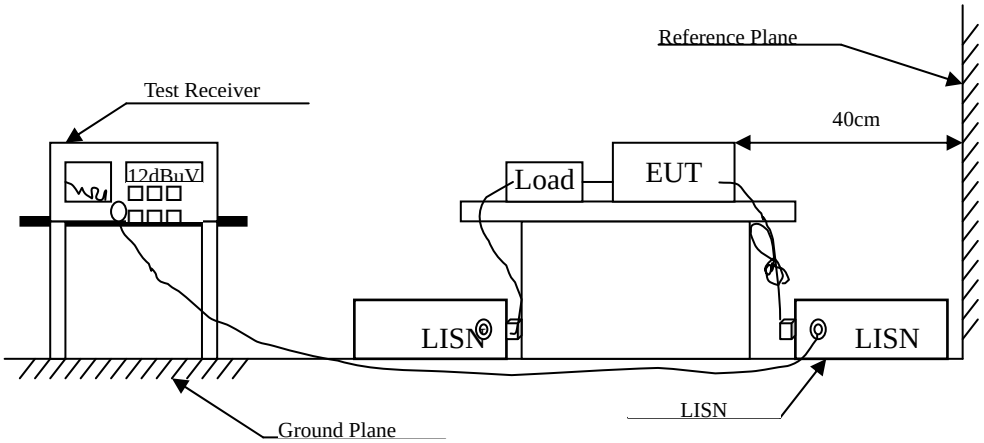
For Radiated measurements /ACB1

	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.07.21	2017.07.20
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.09	2018.02.08
X	Horn Antenna	ETS-Lindgren	3117	00203800	2016.10.13	2017.10.12
	Horn Antenna	Com-Power	AH-840	101087	2017.05.03	2018.05.02
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.14	2018.05.15
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.15	2018.05.16
	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.15	2018.05.16
	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.18
	Filter	MICRO TRONICS	BRM50702	G251	2016.08.11	2017.08.10
	Filter	MICRO TRONICS	BRM50716	G188	2016.08.11	2017.08.10
X	EMI Test Receiver	R&S	ESR7	101602	2016.12.15	2017.12.14
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2016.05.25	2017.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2016.08.11	2017.08.10

Note:
1. All equipments are calibrated every one year.
2. The test instruments marked with “X” are used to measure the final test results.
3. Test Software version : QuieTek EMI 2.0 V2.1.113

2. Conducted Emission

2.1. Test Setup



2.2. 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.

2.3. Test Procedure

The EUT and Peripherals are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

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

2.4. Uncertainty

±2.35dB

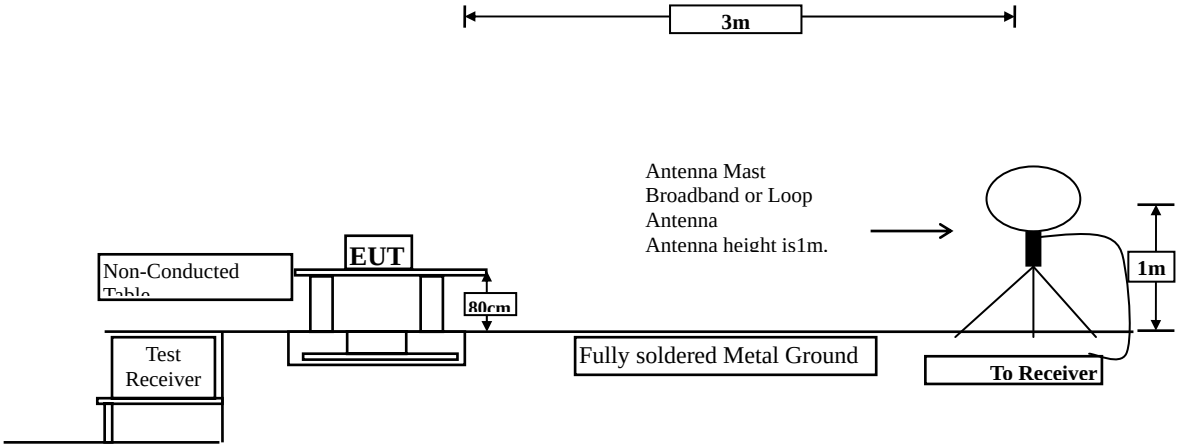
2.5. Test Result

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

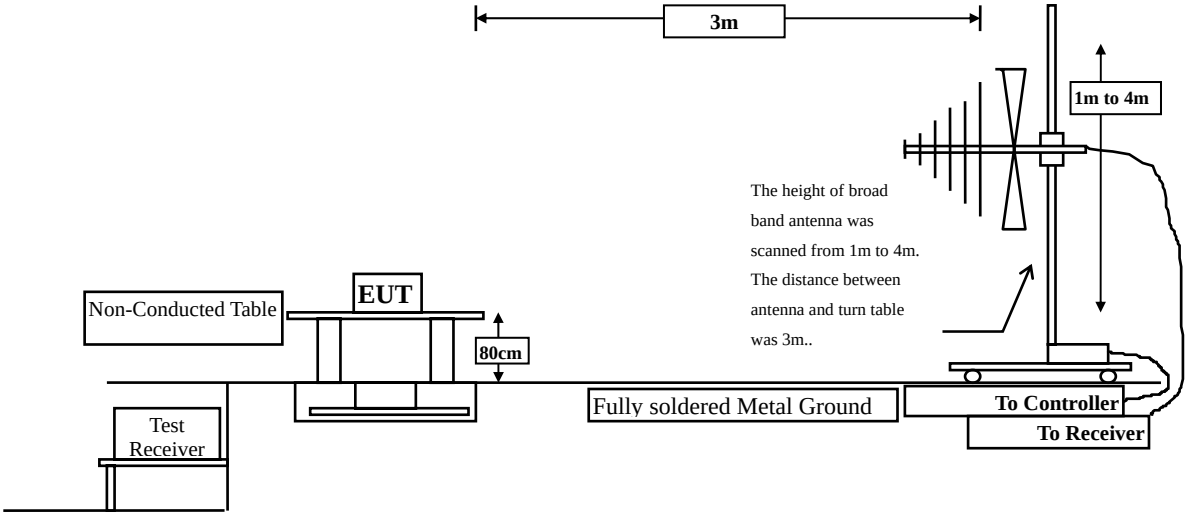
3. Radiated Emission

3.1. Test Setup

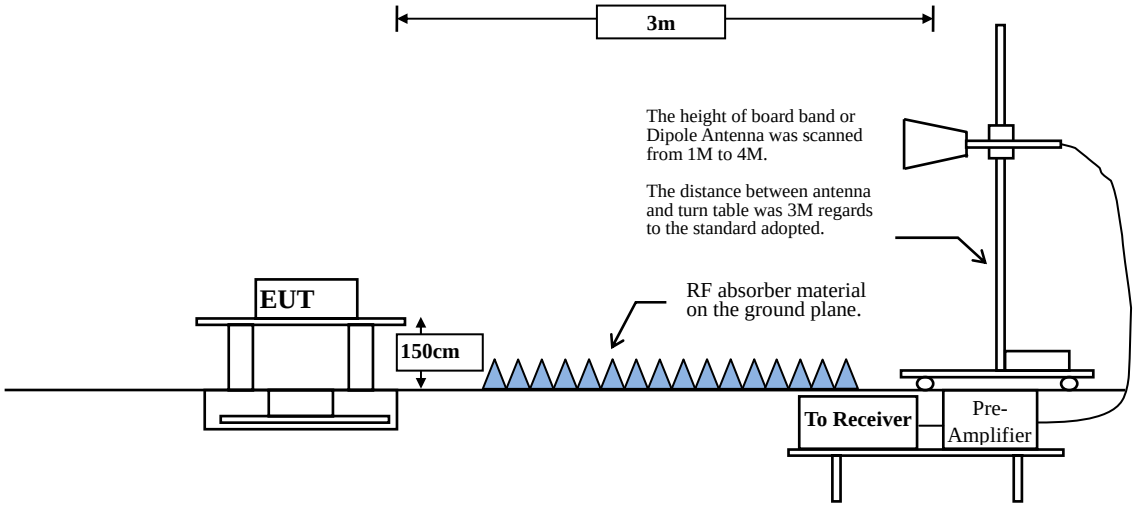
Radiated Emission Under 30MHz



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.2. Limits

➢ Fundamental and Harmonics Emission Limits

Fundamental Frequency MHz	Field Strength of Fundamental	Field Strength of Spurious Emission
40.66-40.70	2250	225
70-130	1250	125
130-174	1250-3750	125-375
174-260	3750	375
260-470	3750-12500	375-1250
above 470	12500	1250

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.

3.3. Test Procedure

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The turn table can rotate 360 degrees to determine the position of the maximum emission level.

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

Both horizontal and vertical polarization 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.

On the field strength of fundamental and harmonics, the limits shown are based on measuring equipment employing a average detector function. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

On the field strength of spurious electric, on any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function.

When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

3.4. Uncertainty

Horizontal polarization：

30-300MHz: ±4.08dB；300M-1GHz: ±3.86dB；1-18GHz: ±3.77dB；18-40GHz: ±3.98dB

Vertical polarization：

30-300MHz: ±4.81dB；300M-1GHz: ±3.87dB；1-18GHz：±3.83dB；18-40GHz: ±3.98dB

3.5. Test Result

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/18

Fundamental Power (X-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	84.550	77.746	-23.064	100.810
Vertical					
433.470	-6.805	70.330	63.526	-37.284	100.810

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	83.680	76.876	-3.934	80.810
Vertical					
433.470	-6.805	69.850	63.046	-17.764	80.810

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/18

Fundamental Power (Y-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	79.610	72.806	-28.004	100.810
Vertical					
433.470	-6.805	86.380	79.576	-21.234	100.810

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	78.630	71.826	-8.984	80.810
Vertical					
433.470	-6.805	85.630	78.826	-1.984	80.810

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/18

Fundamental Power (Z-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	84.350	77.546	-23.264	100.810
Vertical					
433.470	-6.805	86.010	79.206	-21.604	100.810

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.470	-6.805	83.850	77.046	-3.764	80.810
Vertical					
433.470	-6.805	85.820	79.016	-1.794	80.810

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/18

Fundamental Power (X-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	83.600	76.806	-24.014	100.820
Vertical					
433.920	-6.794	68.700	61.906	-38.914	100.820

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	82.570	75.776	-5.044	80.820
Vertical					
433.920	-6.794	67.850	61.056	-19.764	80.820

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/18

Fundamental Power (Y-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	77.960	71.166	-29.654	100.820
Vertical					
433.920	-6.794	85.200	78.406	-22.414	100.820

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	76.840	70.046	-10.774	80.820
Vertical					
433.920	-6.794	84.650	77.856	-2.964	80.820

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/18

Fundamental Power (Z-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	77.920	71.126	-29.694	100.820
Vertical					
433.920	-6.794	84.740	77.946	-22.874	100.820

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
433.920	-6.794	76.850	70.056	-10.764	80.820
Vertical					
433.920	-6.794	83.650	76.856	-3.964	80.820

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/18

Fundamental Power (X-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	84.530	77.747	-23.093	100.840
Vertical					
434.370	-6.783	72.060	65.277	-35.563	100.840

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	83.740	76.957	-3.883	80.840
Vertical					
434.370	-6.783	71.850	65.067	-15.773	80.840

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/18

Fundamental Power (Y-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	79.410	72.627	-28.213	100.840
Vertical					
434.370	-6.783	86.500	79.717	-21.123	100.840

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	78.460	71.677	-9.163	80.840
Vertical					
434.370	-6.783	85.280	78.497	-2.343	80.840

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/18

Fundamental Power (Z-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	79.680	72.897	-27.943	100.840
Vertical					
434.370	-6.783	86.270	79.487	-21.353	100.840

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
434.370	-6.783	78.850	72.067	-8.773	80.840
Vertical					
434.370	-6.783	85.550	78.767	-2.073	80.840

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(10988.3)=80.81dBuV、Peak Limit=100.81 dBuV

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak					
1300.410	-12.773	57.520	44.747	-29.253	74.000
1733.880	-11.346	56.250	44.904	-29.096	74.000
2167.350	-9.424	47.520	38.096	-35.904	74.000
2600.820	-8.472	46.520	38.048	-35.952	74.000
3034.290	-8.168	45.280	37.113	-36.887	74.000
3467.760	-7.742	46.740	38.998	-35.002	74.000
3901.230	-7.279	45.850	38.570	-35.430	74.000
4334.700	-6.798	47.850	41.052	-32.948	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak					
1300.410	-12.773	58.540	45.767	-28.233	74.000
1733.880	-11.346	56.850	45.504	-28.496	74.000
2167.350	-9.424	48.520	39.096	-34.904	74.000
2600.820	-8.472	47.950	39.478	-34.522	74.000
3034.290	-8.168	48.060	39.893	-34.107	74.000
3467.760	-7.742	47.190	39.448	-34.552	74.000
3901.230	-7.279	48.020	40.740	-33.260	74.000
4334.700	-6.798	46.180	39.382	-34.618	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak					
1301.760	-12.778	56.330	43.553	-30.447	74.000
1735.680	-11.330	55.870	44.539	-29.461	74.000
2169.600	-9.426	48.050	38.625	-35.375	74.000
2603.520	-8.470	46.180	37.711	-36.289	74.000
3037.440	-8.162	47.180	39.018	-34.982	74.000
3471.360	-7.741	45.280	37.539	-36.461	74.000
3905.280	-7.275	46.310	39.035	-34.965	74.000
4339.200	-6.787	45.770	38.983	-35.017	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak					
1301.760	-12.778	56.980	44.203	-29.797	74.000
1735.680	-11.330	55.820	44.489	-29.511	74.000
2169.600	-9.426	45.080	35.655	-38.345	74.000
2603.520	-8.470	46.390	37.921	-36.079	74.000
3037.440	-8.162	47.180	39.018	-34.982	74.000
3471.360	-7.741	46.090	38.349	-35.651	74.000
3905.280	-7.275	45.820	38.545	-35.455	74.000
4339.200	-6.787	45.110	38.323	-35.677	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak					
1303.110	-12.781	56.250	43.469	-30.531	74.000
1737.480	-11.316	56.020	44.704	-29.296	74.000
2171.850	-9.426	52.840	43.414	-30.586	74.000
2606.220	-8.468	47.180	38.713	-35.287	74.000
3040.590	-8.157	45.330	37.173	-36.827	74.000
3474.960	-7.740	47.180	39.440	-34.560	74.000
3909.330	-7.270	45.190	37.920	-36.080	74.000
4343.700	-6.776	46.280	39.504	-34.496	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/23

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak					
1303.110	-12.781	58.140	45.359	-28.641	74.000
1737.480	-11.316	56.300	44.984	-29.016	74.000
2171.850	-9.426	45.880	36.454	-37.546	74.000
2606.220	-8.468	48.740	40.273	-33.727	74.000
3040.590	-8.157	47.190	39.033	-34.967	74.000
3474.960	-7.740	43.850	36.110	-37.890	74.000
3909.330	-7.270	47.840	40.570	-33.430	74.000
4343.740	-6.776	47.220	40.444	-33.556	74.000
Average					
--					54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product	Radio Identification device
Test Item	General Radiated Emission
Test Mode	Mode 1: Transmit (433.47MHz)
Date of Test	2017/05/13

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
295.780	-10.168	29.107	18.939	-27.061	46.000
474.260	-5.993	29.332	23.340	-22.660	46.000
666.320	-2.598	28.961	26.363	-19.637	46.000
823.460	-0.380	29.044	28.665	-17.335	46.000
866.940	0.140	29.226	29.367	-16.633	46.000
1000.000	1.822	29.175	30.996	-23.004	54.000
Vertical					
Quasi-Peak					
41.640	-11.068	27.961	16.893	-23.107	40.000
134.760	-11.593	30.328	18.735	-24.765	43.500
227.880	-12.716	30.059	17.343	-28.657	46.000
439.340	-6.668	31.959	25.292	-20.708	46.000
866.940	0.140	29.889	30.030	-15.970	46.000
1000.000	1.822	30.354	32.175	-21.825	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product	Radio Identification device
Test Item	General Radiated Emission
Test Mode	Mode 1: Transmit (433.92MHz)
Date of Test	2017/05/13

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
159.980	-10.586	30.802	20.216	-23.284	43.500
386.960	-7.944	30.396	22.453	-23.547	46.000
563.500	-4.207	29.845	25.637	-20.363	46.000
773.020	-0.972	30.579	29.606	-16.394	46.000
867.840	0.151	30.224	30.375	-15.625	46.000
1000.000	1.822	30.354	32.175	-21.825	54.000
Vertical					
Quasi-Peak					
159.980	-10.586	30.802	20.216	-23.284	43.500
282.200	-10.476	30.530	20.054	-25.946	46.000
365.620	-8.541	29.971	21.430	-24.570	46.000
613.940	-3.224	29.486	26.261	-19.739	46.000
867.840	0.151	30.119	30.270	-15.730	46.000
1000.000	1.822	30.354	32.175	-21.825	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product	Radio Identification device
Test Item	General Radiated Emission
Test Mode	Mode 1: Transmit (434.37MHz)
Date of Test	2017/05/13

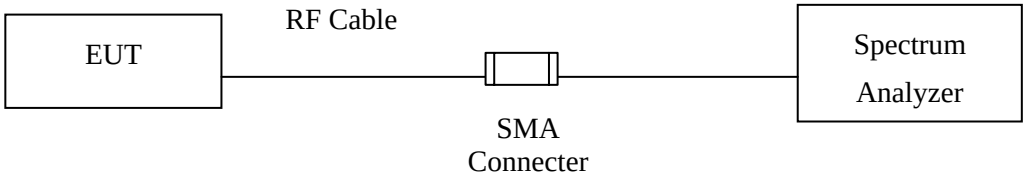
Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
61.040	-12.095	30.164	18.068	-21.932	40.000
224.000	-12.806	29.524	16.718	-29.282	46.000
449.040	-6.438	29.321	22.883	-23.117	46.000
629.460	-3.098	29.983	26.884	-19.116	46.000
868.740	0.161	29.854	30.016	-15.984	46.000
994.180	1.747	29.611	31.358	-22.642	54.000
Vertical					
Quasi-Peak					
45.520	-10.917	28.395	17.478	-22.522	40.000
134.760	-11.593	31.292	19.699	-23.801	43.500
433.520	-6.804	33.968	27.165	-18.835	46.000
741.980	-1.352	29.580	28.228	-17.772	46.000
868.740	0.161	29.547	29.709	-16.291	46.000
998.060	1.804	29.196	31.000	-23.000	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss –Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
9. The emission levels of other frequencies are very lower than the limit and not show in test report.
10. No emission found between lowest internal used/generated frequency to 30MHz.

4. Transmit time

4.1. Test Setup



4.2. 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.

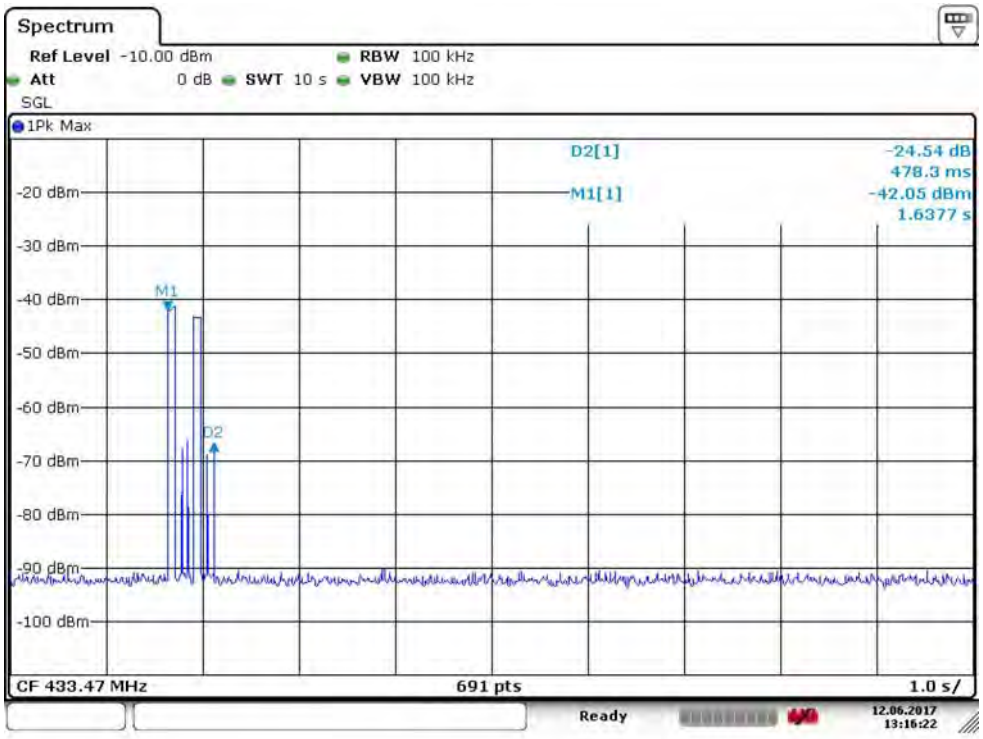
4.3. Uncertainty

± 2.31ms

4.4. Test Result

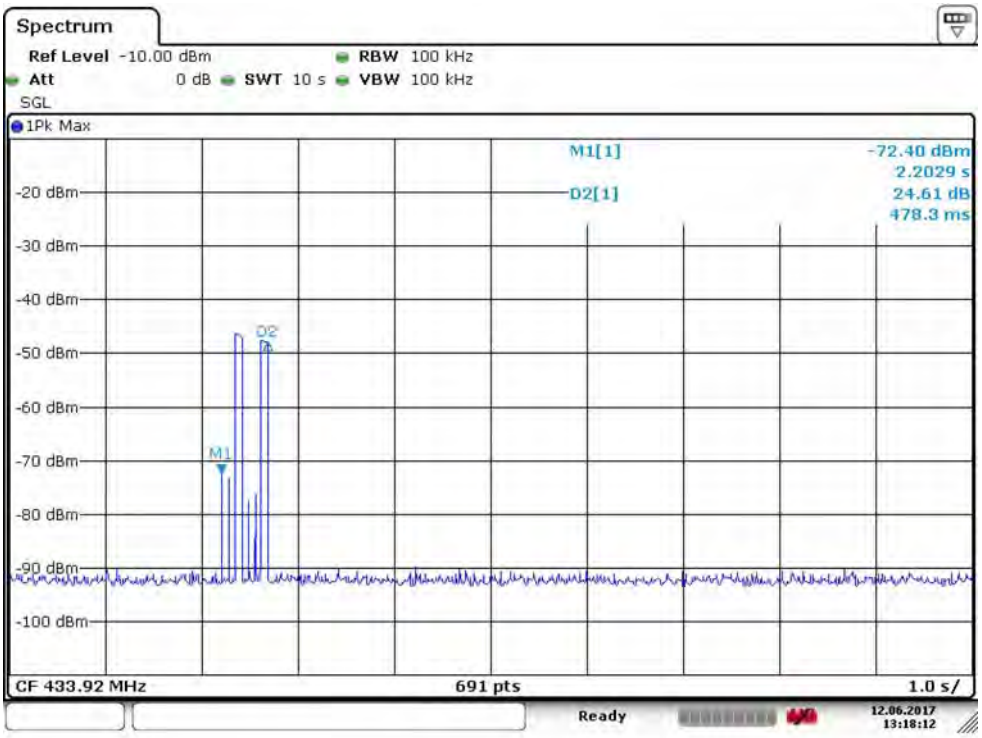
Product Radio Identification device
Test Item Transmit time
Test Mode Mode 1: Transmit (433.47MHz)

Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
1	433.47	0.4783	< 5	Pass



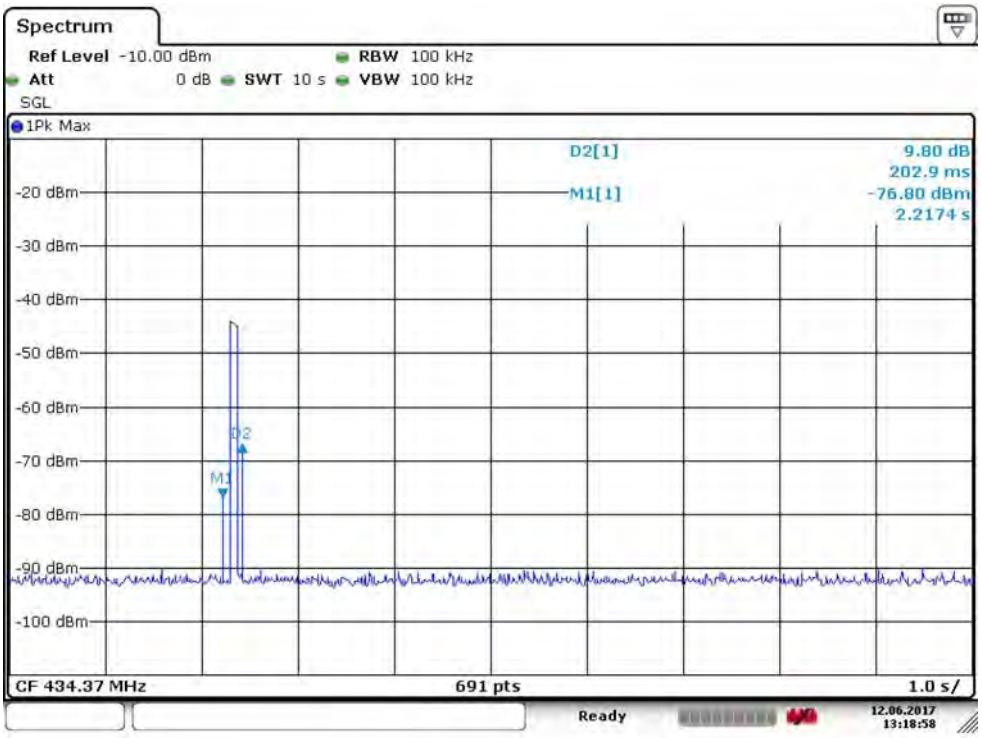
Product Radio Identification device
Test Item Transmit time
Test Mode Mode 1: Transmit (433.92MHz)

Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
2	433.92	0.4783	< 5	Pass



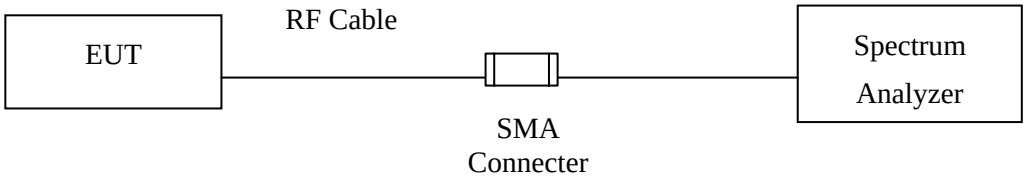
Product Radio Identification device
Test Item Transmit time
Test Mode Mode 1: Transmit (434.37MHz)

Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
3	434.37	0.2029	< 5	Pass



5. Occupied Bandwidth

5.1. Test Setup



5.2. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, 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

5.3. Uncertainty

±279.2Hz

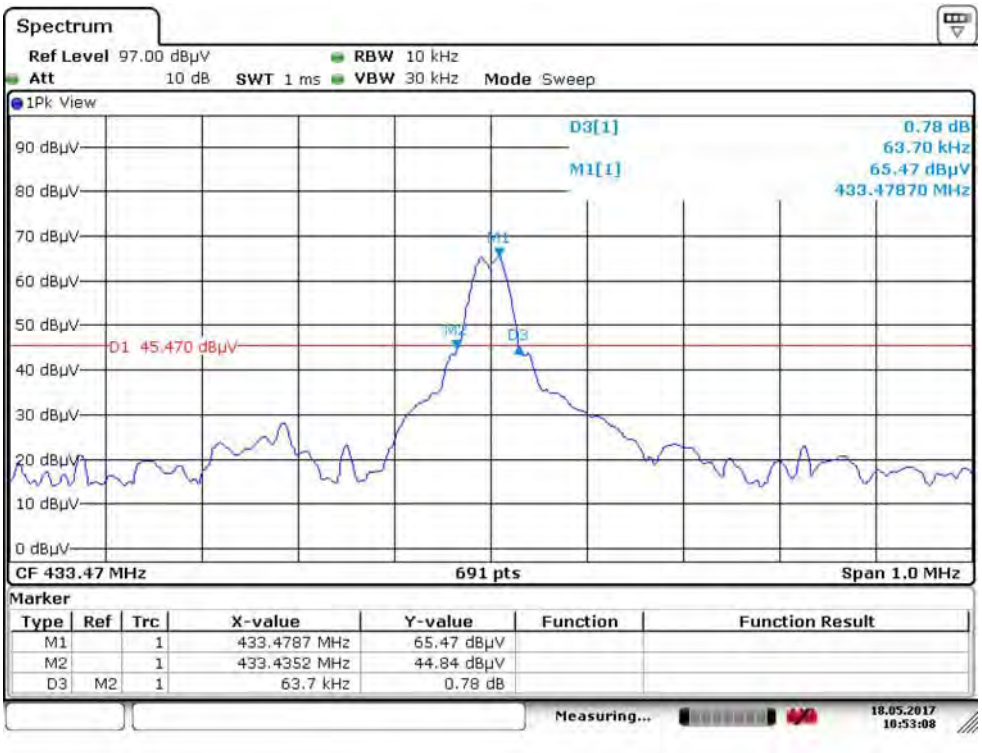
5.4. Test Result

Product Radio Identification device
Test Item Occupied Bandwidth
Test Mode Mode 1: Transmit (433.47MHz)

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
1	433.47	0.0637	1.0837	Pass

Note: Limit = 433.47MHz * 0.25%= 1.0837MHz

Figure Channel 1:

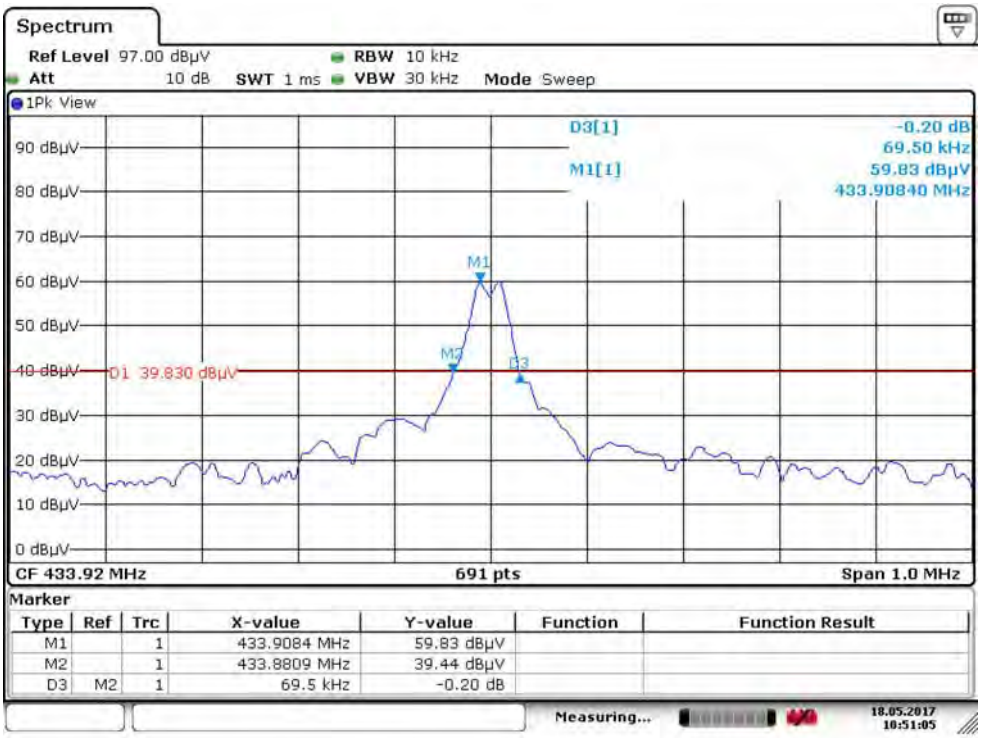


Product Radio Identification device
Test Item Occupied Bandwidth
Test Mode Mode 1: Transmit (433.92MHz)

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
2	433.92	0.0695	1.0848	Pass

Note: Limit = 433.92MHz * 0.25%= 1.0848MHz

Figure Channel 2:



Product Radio Identification device
Test Item Occupied Bandwidth
Test Mode Mode 1: Transmit (434.37MHz)

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
2	434.37	0.0608	1.0859	Pass

Note: Limit = 434.37MHz * 0.25%= 1.0859MHz

Figure Channel 2: