

FCC Test Report

Product Name	Radio Identification Device
Model No.	FS1744M
FCC ID.	NBGFS1744M

Applicant	HELLA GmbH & Co. KGaA
Address	Rixbecker Strasse 75, 59552 Lippstadt, Germany

Date of Receipt	Dec. 18, 2017
Issued Date	Jan. 12, 2018
Report No.	17C0211R-RFUSP14V00
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.

Test Report

Issued Date: Jan. 12, 2018

Report No.: 17C0211R-RFUSP14V00



Product Name	Radio Identification Device
Applicant	HELLA GmbH & Co. KGaA
Address	Rixbecker Strasse 75, 59552 Lippstadt, Germany
Manufacturer	HELLA GmbH & Co. KGaA
Factory	1.HELLA GmbH & Co. KGaA 2.Hella Shanghai Electronics Co. Ltd (HSE)
Address	1.Rixbecker Strasse 75, 59552 Lippstadt, Germany 2.No. 411 Jianye Road, Pudong, Shanghai 201201, China
Model No.	FS1744M
FCC ID.	NBGFS1744M
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 : Nova chu
(Engineer / Nova Chu)

Approved By : 
(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. General Information	4
1.1. EUT Description.....	4
1.2. Operation Description	5
1.3. Tested System Details.....	6
1.4. Configuration of tested System	6
1.5. EUT Exercise Software	6
1.6. Test Facility	7
1.7. List of Test Equipment	8
2. Conducted Emission.....	9
2.1. Test Setup	9
2.2. Limits	9
2.3. Test Procedure	9
2.4. Uncertainty	9
2.5. Test Result	10
3. Radiated Emission.....	11
3.1. Test Setup	11
3.2. Limits	12
3.3. Test Procedure	13
3.4. Uncertainty	13
3.5. Test Result	14
4. Transmit time.....	20
4.1. Test Setup	20
4.2. Limits	20
4.3. Uncertainty	20
4.4. Test Result	21
5. Occupied Bandwidth.....	22
5.1. Test Setup	22
5.2. Limits	22
5.3. Uncertainty	22
5.4. Test Result	23

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. General Information

1.1. EUT Description

Product Name	Radio Identification Device
Trade Name	HELLA
Model No.	FS1744M
FCC ID	NBGFS1744M
Frequency Range	434.42 MHz
Number of Channels	1
Type of Modulation	OOK
Antenna Type	PCB loop antenna

Frequency of Each Channel:

Channel	Frequency
Channel 1:	434.42 MHz

Note:

1. The EUT is a Radio Identification Device with a built-in 434.42 MHz transmitter.
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 and they are identical except the material of enclosure (Metal / Plastic). DEKRA has 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
-----------	------------------

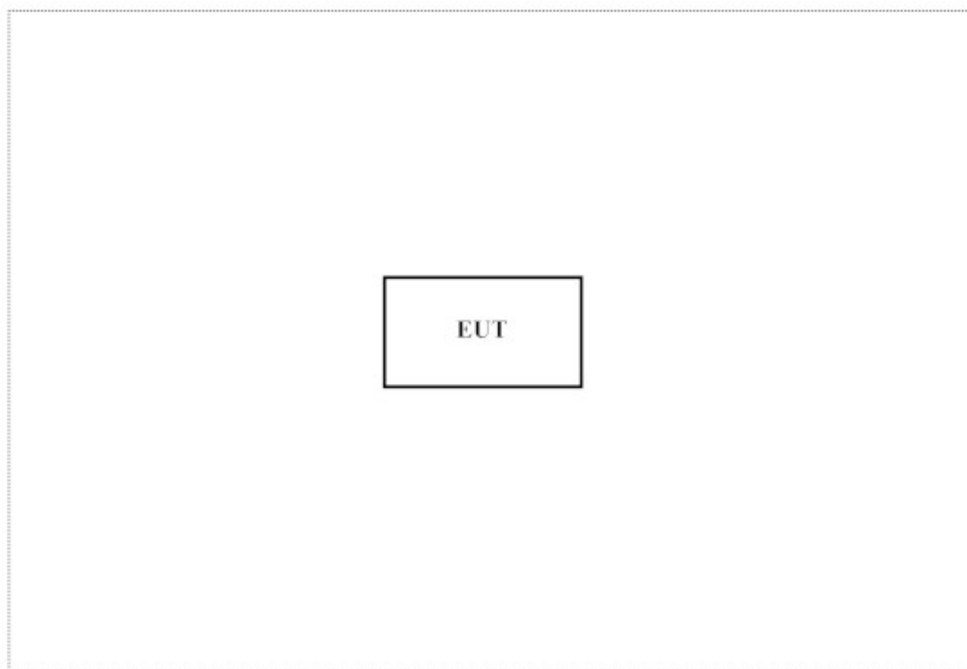
1.3. Tested System Details

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: TW3023

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	101602	2017.12.11	2018.12.10
	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	2017.05.24	2018.05.23

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	103465	2017.01.24	2018.01.23
	Power Meter	Anritsu	ML2496A	1548003	2017.12.11	2018.12.10
	Power Sensor	Anritsu	MA2411B	1531024	2017.12.11	2018.12.10
	Power Sensor	Anritsu	MA2411B	1531025	2017.12.11	2018.12.10

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 Conduction Test System V8.0.110

For Radiated measurements /ACB1

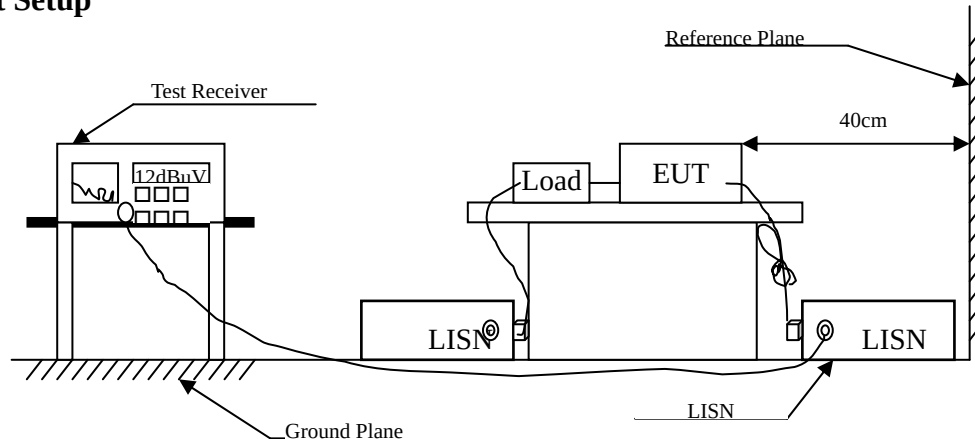
	Equipment	Manufacturer	Model No.	Serial No.	Cali. Data	Due. Data
X	Loop Antenna	A.H.	SAS-562B	272	2016.03.18	2018.03.17
X	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-674	2017.02.13	2018.02.12
X	Horn Antenna	ETS-Lindgren	3117	00203800	2017.11.10	2018.11.09
	Horn Antenna	Com-Power	AH-840	101087	2017.05.24	2018.05.23
X	Pre-Amplifier	EMCI	EMC001330	980316	2017.05.16	2018.05.15
X	Pre-Amplifier	EMCI	EMC051835SE	980311	2017.05.17	2018.05.16
	Pre-Amplifier	EMCI	EMC05820SE	980310	2017.05.17	2018.05.16
	Pre-Amplifier	EMCI	EMC184045SE	980314	2017.05.17	2018.05.16
	Filter	MICRO TRONICS	BRM50702	G251	2017.08.30	2018.08.29
	Filter	MICRO TRONICS	BRM50716	G188	2017.08.30	2018.08.29
X	EMI Test Receiver	R&S	ESR7	101602	2017.12.11	2018.12.10
X	Spectrum Analyzer	R&S	FSV40	101148	2017.01.24	2018.01.23
X	Coaxial Cable	SUHNER	SUCOFLEX 106	RF002	2017.05.25	2018.05.24
	Mircoflex Cable	HUBER SUHNER	SUCOFLEX 102	MY3381/2	2017.08.11	2018.08.10

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

2.4. Uncertainty

$\pm 2.35\text{dB}$

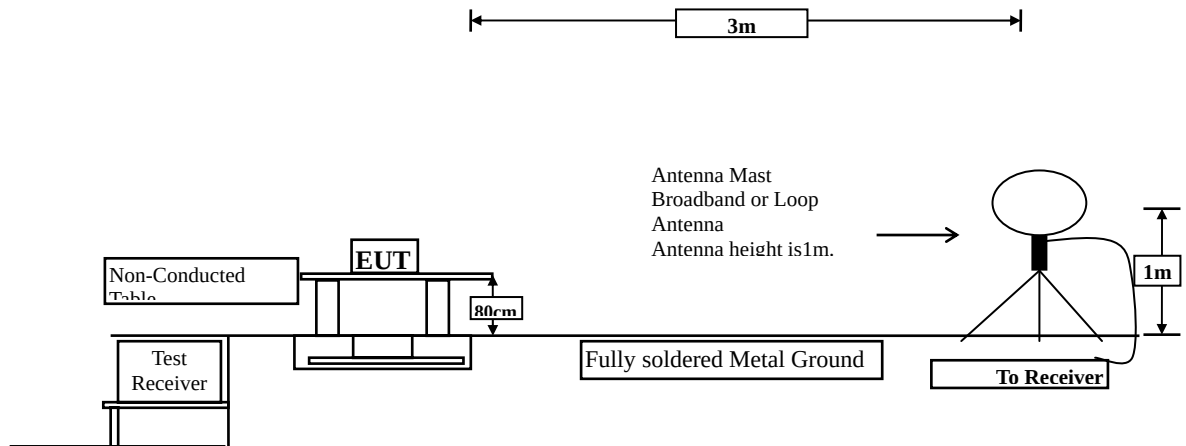
2.5. Test Result

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

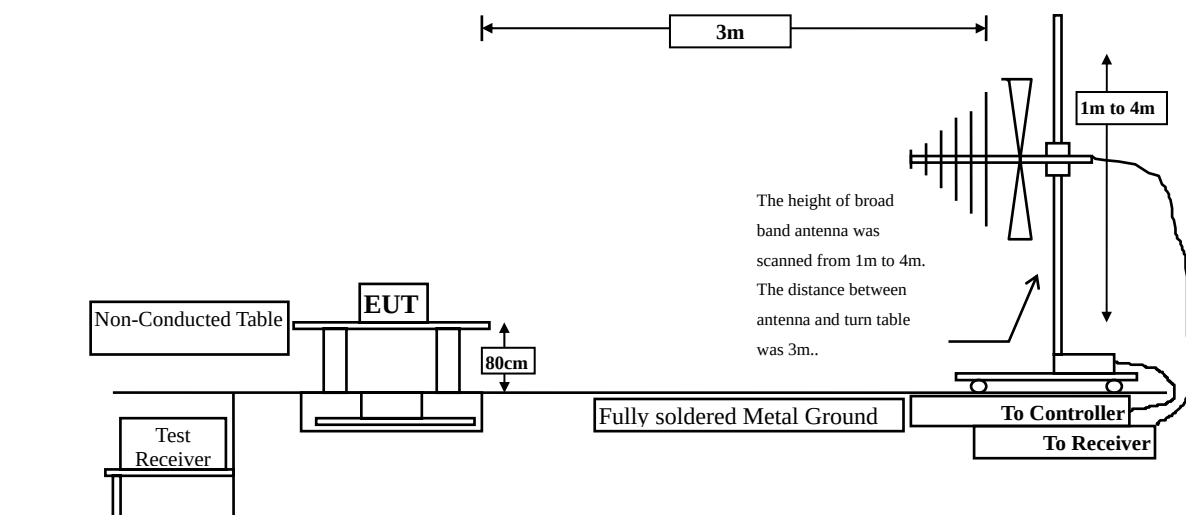
3. Radiated Emission

3.1. Test Setup

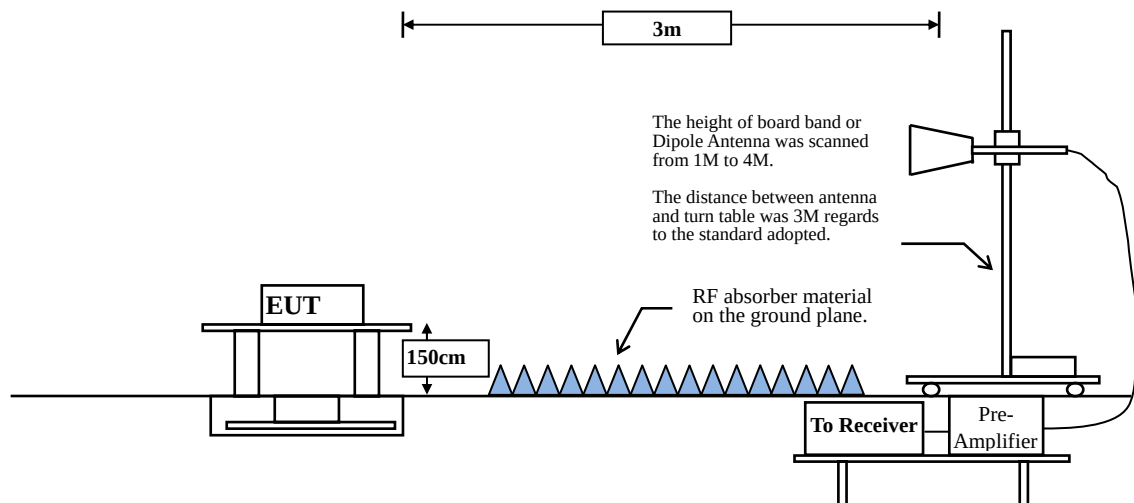
Radiated Emission Under 30MHz



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 an 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: $\pm 4.08\text{dB}$; 300M-1GHz: $\pm 3.86\text{dB}$; 1-18GHz: $\pm 3.77\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

Vertical polarization :

30-300MHz: $\pm 4.81\text{dB}$; 300M-1GHz: $\pm 3.87\text{dB}$; 1-18GHz : $\pm 3.83\text{dB}$; 18-40GHz: $\pm 3.98\text{dB}$

3.5. Test Result

Product	Radio Identification Device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.42 MHz)
Date of Test	2018/01/10

Fundamental Power (X-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	90.930	84.389	-16.451	100.841
---------	--------	--------	--------	---------	---------

Vertical

434.420	-6.541	87.210	80.669	-20.171	100.841
---------	--------	--------	--------	---------	---------

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	81.900	75.359	-5.481	80.841
---------	--------	--------	--------	--------	--------

Vertical

434.420	-6.541	75.700	69.159	-11.681	80.841
---------	--------	--------	--------	---------	--------

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(11017.514)=80.841 dBuV 、Peak Limit=100.841 dBuV

Product	Radio Identification Device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.42 MHz)
Date of Test	2018/01/10

Fundamental Power (Y-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	83.580	77.039	-23.801	100.841
---------	--------	--------	--------	---------	---------

Vertical

434.420	-6.541	91.080	84.539	-16.301	100.841
---------	--------	--------	--------	---------	---------

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	73.300	66.759	-14.081	80.841
---------	--------	--------	--------	---------	--------

Vertical

434.420	-6.541	82.100	75.559	-5.281	80.841
---------	--------	--------	--------	--------	--------

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(11017.514)=80.841 dBuV 、Peak Limit=100.841 dBuV

Product	Radio Identification Device
Test Item	Fundamental Radiated Emission
Test Mode	Mode 1: Transmit (434.42 MHz)
Date of Test	2018/01/10

Fundamental Power (Z-Line)

Peak Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	83.960	77.419	-23.421	100.841
---------	--------	--------	--------	---------	---------

Vertical

434.420	-6.541	91.580	85.039	-15.801	100.841
---------	--------	--------	--------	---------	---------

Average Detector:

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

434.420	-6.541	75.000	68.459	-12.381	80.841
---------	--------	--------	--------	---------	--------

Vertical

434.420	-6.541	82.500	75.959	-4.881	80.841
---------	--------	--------	--------	--------	--------

Note:

1. Measurement Level = Reading Level + Correct Factor
2. Average Limit=20log(11017.514)=80.841 dBuV 、Peak Limit=100.841 dBuV

Product	Radio Identification Device
Test Item	Harmonic Radiated Emission
Test Mode	Mode 1: Transmit (434.42 MHz)
Date of Test	2017/12/30

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak					
1303.260	-11.054	46.050	34.996	-39.004	74.000
1737.680	-8.910	46.290	37.380	-36.620	74.000
2172.100	-6.497	46.100	39.603	-34.397	74.000
2606.520	-5.610	47.680	42.070	-31.930	74.000
3040.940	-4.985	45.830	40.845	-33.155	74.000
3475.360	-4.850	46.210	41.360	-32.640	74.000
3909.780	-4.460	46.050	41.589	-32.411	74.000
4344.200	-3.413	45.080	41.668	-32.332	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 (434.42 MHz)
Date of Test	2017/12/30

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak					
1303.260	-11.054	46.100	35.046	-38.954	74.000
1737.680	-8.910	46.390	37.480	-36.520	74.000
2172.100	-6.497	46.180	39.683	-34.317	74.000
2606.520	-5.610	46.170	40.560	-33.440	74.000
3040.940	-4.985	45.850	40.865	-33.135	74.000
3475.360	-4.850	47.440	42.590	-31.410	74.000
3909.780	-4.460	45.570	41.109	-32.891	74.000
4344.200	-3.413	45.440	42.028	-31.972	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 (434.42 MHz)
Date of Test	2017/12/27

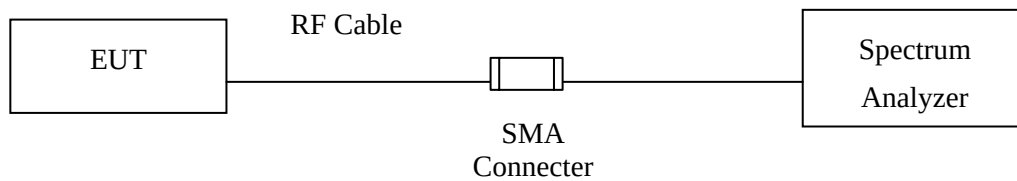
Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Quasi-Peak					
153.710	-10.542	29.722	19.180	-24.320	43.500
281.638	-10.312	30.282	19.970	-26.030	46.000
396.913	-7.428	29.364	21.936	-24.064	46.000
561.391	-3.994	29.303	25.309	-20.691	46.000
731.493	-1.159	29.723	28.564	-17.436	46.000
960.638	1.605	29.540	31.145	-22.855	54.000
Vertical					
Quasi-Peak					
159.333	-10.440	31.006	20.566	-22.934	43.500
365.986	-8.310	30.637	22.327	-23.673	46.000
533.275	-4.610	29.932	25.322	-20.678	46.000
678.072	-2.079	29.965	27.886	-18.114	46.000
817.246	-0.114	29.630	29.516	-16.484	46.000
966.261	1.690	29.856	31.546	-22.454	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.

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.

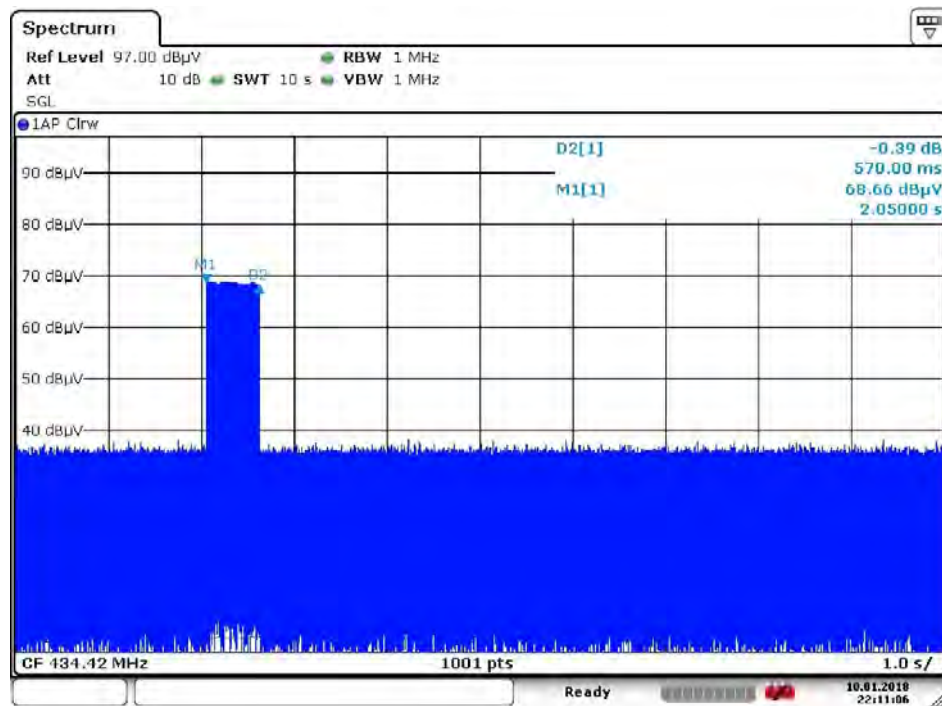
4.3. Uncertainty

$\pm 2.31\text{ms}$

4.4. Test Result

Product Radio Identification Device
 Test Item Transmit time
 Test Mode Mode 1: Transmit (434.42 MHz)

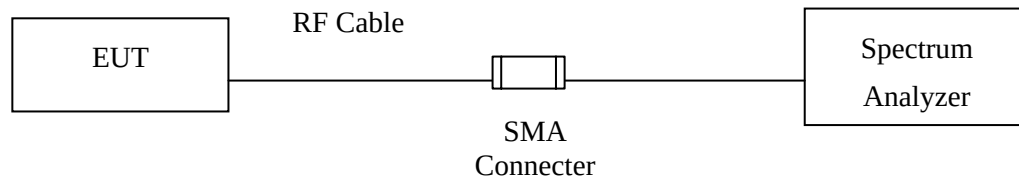
Channel No.	Frequency (MHz)	Measurement Value (Sec)	Limit (Sec)	Result
1	434.42	0.57	< 5	Pass



Date: 10 JAN 2018 22:11:06

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

$\pm 279.2\text{Hz}$

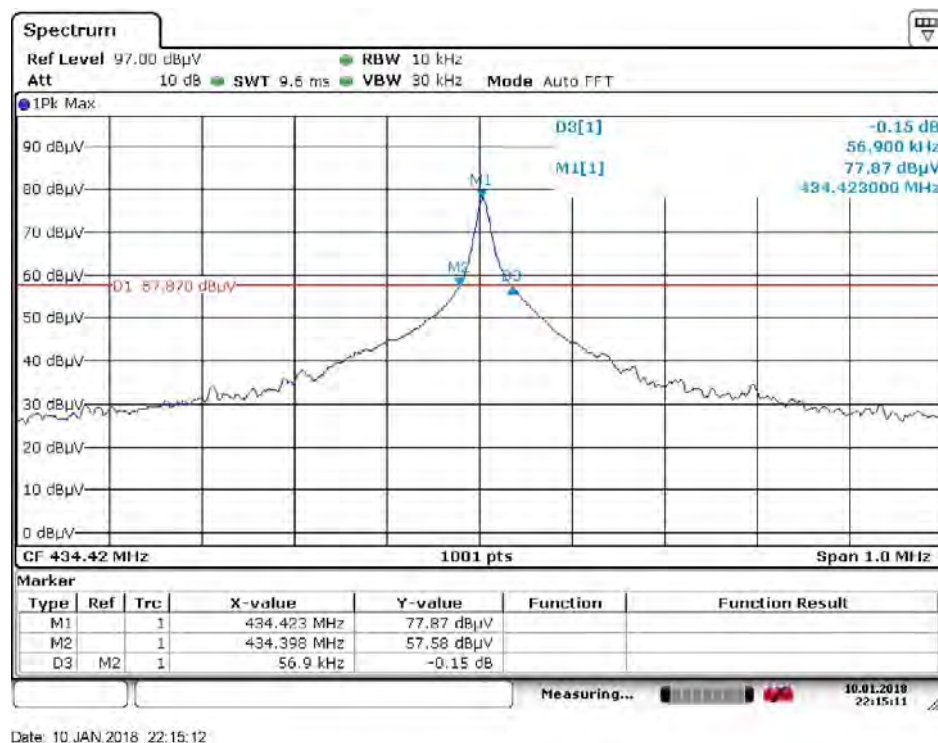
5.4. Test Result

Product Radio Identification Device
 Test Item Occupied Bandwidth
 Test Mode Mode 1: Transmit (434.42 MHz)

Channel No.	Frequency (MHz)	Measurement Value (MHz)	Limit (MHz)	Result
1	434.42	0.0569	1.08605	Pass

Note: Limit = 434.42 MHz * 0.25% = 1.08605MHz

Figure Channel 1:



Date: 10. JAN. 2018 22:15:12