

RED-Radio Test Report

For

iDTRONIC GmbH

HF Reader Module

Model No.: M900-TTL, M890-TTL, M890-232,
R835-TTL, M890-USB, MF890-USB

Prepared For : iDTRONIC GmbH
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Report Number : R0217110088W
Date of Test : Nov. 21~22, 2017
Date of Report : Nov. 22, 2017

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TEST REPORT

Applicant : iDTRONIC GmbH
Manufacturer : iDTRONIC GmbH
Product Name : HF Reader Module
Model No. : M900-TTL, M890-TTL, M890-232, R835-TTL, M890-USB, MF890-USB
Trade Mark : N.A.
Rating(s) : DC 3.3-5V, 35mA

Test Standard(s) : ETSI EN 300 330 V2.1.1 (2017-02)

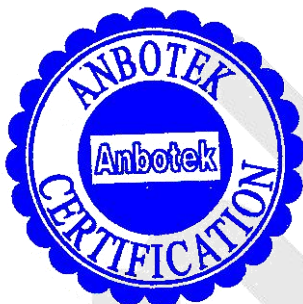
The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the EN 300 330 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Test

Nov. 21~22, 2017

Prepared By



Winkey Wang

(Tested Engineer / Winkey Wang)

Reviewer

May Lu

(Project Manager / May Lu)

Approved & Authorized Signer

Tom Chen

(Manager / Tom Chen)

1. General Information

1.1. Client Information

Applicant	:	iDTRONIC GmbH
Address	:	Donnersbergweg 1, 67059 Ludwigshafen am Rhein, Germany
Manufacturer	:	iDTRONIC GmbH
Address	:	Donnersbergweg 1, 67059 Ludwigshafen am Rhein, Germany

1.2. Description Of Device (Eut)

Product Name	:	HF Reader Module	
Model No.	:	M900-TTL, M890-TTL, M890-232, R835-TTL, M890-USB, MF890-USB (Note: All samples are the same except the model number and colour, so we prepare "M900-TTL" for test only.)	
Trade Mark	:	N.A.	
Test Power Supply	:	DC 3-4.5V via USB Port	
Product Description	:	Operation Frequency:	13.56MHz
		Number of Channel:	1 Channel
		Modulation Type:	ASK, NRZ
		Antenna Type:	Coil Antenna
		Antenna Gain(Peak):	0 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer’s specifications or the User’s Manual.			

1.3. Auxiliary Equipment Used During Test

N/A

1.4. Description of Test Modes

Test Mode Applicability and tested channel detail

EUT CONFIGU RE MODE	APPLICABLE TO												DESCRIPTI ON
	PRO F	OF R	OFR M	TH F	TRF C	TRE F	TCS E	TRS E	TF S	RS E	AC S	RB D	
-	√	√	√	-	-	-	√	√	√	√	√		-

Where **PROF**: Permitted range of operating frequency

OFR: Operating frequency ranges

OFRM: Operating frequency range of the modulation bandwidth

THF: Transmitter H-field requirements, Only for equipment under class 1 and class 2

TRFC: Transmitter RF carrier current, Only for equipment under class 3

TREF: Transmitter radiated E-field, Only for equipment under class 4

TCSE: Transmitter conducted spurious emissions, Only for equipment under class 3

TRSE: Transmitter radiated spurious domain emission

TFS: Transmitter Frequency stability, Only for channelized systems

RSE: Receiver spurious emissions, Only apply to receivers which are not co-located with transmitters

ACS: Adjacent channel selectivity, Only for channelized systems

RBD: Receiver blocking or desensitization, Only for channelized systems

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

Transmitter H-Field Requirements

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	ASK, NRZ

Permitted Range of Operating Frequency / Operating Frequency Ranges

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	ASK, NRZ

Operating Frequency Range of the Modulation Bandwidth

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	ASK, NRZ

Transmitter Radiated Spurious Domain Emissions

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	ASK, NRZ

Receiver Spurious Emissions

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
-	1	1	ASK, NRZ

1.5. List of channels

Channel	Frequency (MHz)
1	13.56(ASK, NRZ)

1.6. Test Conditions

	Normal Test Conditions	Extreme Test Conditions
Temperature	15°C ~ 35°C	-20°C ~ 55°C Note: (1)
Relative Humidity	20% ~ 75%	N/A
Supply Voltage	DC 5.0V via USB Port	DC 4.5V , DC 5.5V via USB Port
Note: (1) The HT 55°C and LT -20°C was declared by manufacturer, The EUT couldn't be operate normally with higher or lower temperature.		

1.7. Test Equipment List

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	100055	May 27, 2017	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	May 27, 2017	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	May 27, 2017	1 Year
4.	Spectrum Analysis	Agilent	E4407B	US39390582	May 27, 2017	1 Year
5.	Spectrum Analysis	Agilent	N9038A	MY53227295	May 27, 2017	1 Year
6.	Preamplifier	SKET Electronic	BK1G18G30D	KD17503	May 27, 2017	1 Year
7.	EMI Test Receiver	Rohde & Schwarz	ESPI	101604	May 27, 2017	1 Year
8.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	May 31, 2017	1 Year
9.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	May 31, 2017	1 Year
10.	Loop Antenna	Schwarzbeck	HFH2-Z2	100047	Apr. 03, 2017	1 Year
11.	Horn Antenna	Schwarzbeck	BBHA9170	9170-375	May 27, 2017	1 Year
12.	Pre-amplifier	SONOMA	310N	186860	May 27, 2017	1 Year
13.	Pre-amplifier	SKET Electronic	BK1G40G50A	KD25352	May 27, 2017	1 Year
14.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A
15.	Power Sensor	DAER	RPR3006W	15I00041SN045	May 27, 2017	1 Year
16.	Power Sensor	DAER	RPR3006W	15I00041SN046	May 27, 2017	1 Year
17.	MXA Spectrum Analysis	Agilent	N9020A	MY51170037	May 27, 2017	1 Year
18.	MXG RF Vector Signal Generator	Agilent	N5182A	MY48180656	May 27, 2017	1 Year
19.	Signal Generator	Agilent	E4421B	MY41000743	May 27, 2017	1 Year
20.	DC Power supply	IVYTECH	IV6003	1601D6030007	May 26, 2017	1 Year
21.	TEMP&HUMI PROGRAMMABLE CHAMBER	Sertep	ZJ-HWHS80 B	ZJ-17042804	Mar. 03, 2017	1 Year

1.8. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

Parameter	Uncertainty
RF frequency	$\pm 1.1 \times 10^{-8}$
RF power, conducted	± 0.6
RF power, radiated	± 3.2 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.9. Maximum Measurement Uncertainty

For the test methods, according to the present document the uncertainty figures shall be calculated according to the methods described in the TR 100 028 [3] and shall correspond to an expansion factor (coverage factor) $k = 1,96$ or $k = 2$ (which provide confidence levels of respectively 95 % and 95,45 % in case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

Parameter	Uncertainty
RF frequency	$\pm 1 \times 10^{-7}$
RF power, conducted	± 1
RF power, radiated	± 6 dB

1.10. Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 184111

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No. 184111, July 31, 2017.

ISED-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited, EMC Laboratory has been registered and fully described in a report filed with the (ISED) Innovation, Science and Economic Development Canada. The acceptance letter from the ISED is maintained in our files. Registration 8058A-1, June 13, 2016.

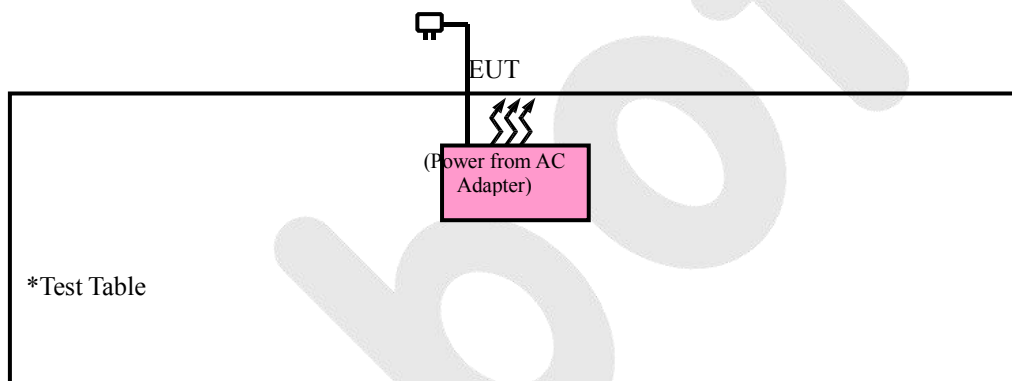
Test Location

All Emissions tests were performed at

Shenzhen Anbotek Compliance Laboratory Limited.

1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong, China

1.11. Configuration of System under Test



2. Summary Of Test Results

The EUT has been tested according to the following specifications:

EN 300 330 V2.1.1		
Clause	Test Parameter	Result
Transmitter Parameters		
4.3.1	Permitted range of operating frequencies	Pass
4.3.2	Operating frequency ranges	Pass
4.3.2	Operating frequency range of the modulation bandwidth	Pass
4.3.4	Transmitter H-field requirements Only for equipment under class 1 and class 2	Pass
4.3.5	Transmitter RF carrier current Only for equipment under class 3	Not Applicable
4.3.6	Transmitter radiated E-field Only for equipment under class 4	Not Applicable
4.3.7	Transmitter conducted spurious emissions Only for equipment under class 3	Not Applicable
4.3.8	Transmitter radiated spurious domain emission limits < 30 MHz	Pass
4.3.9	Transmitter radiated spurious domain emission limits > 30 MHz For equipment under class 1, 2 and 4	Pass
4.3.10	Transmitter Frequency stability Only for channelized systems	Not Applicable
Receiver Parameters		
4.4.2	Receiver spurious emissions, Only apply to receivers which are not co-located with transmitters	Pass
4.4.3	Adjacent channel selectivity Only for channelized systems	Not Applicable
4.4.4	Receiver blocking or desensitization Only for channelized systems	Not Applicable

The equipment was tested as Product Class 1 in accordance with EN 300 330 V2.1.1, clause 6.1.2 and annex B.

3. Transmitter Carrier Output Levels

3.1.Limits Of Transmitter Carrier Output Levels

The maximum H-field strengths for certain frequency bands are given in table 2.

Table 2: H-field limits at 10 m	
Frequency Range (MHz)	H-field strength limit (H_f) dB μ A/m at 10 m or specified in mW e.r.p.
$0,009 \leq f < 0,090$	72 descending 3 dB/oct above 0,03 MHz or according to note 1 (see note 5)
$0,09 \leq f < 0,119$	42
$0,119 \leq f < 0,135$	66 descending 3 dB/oct above 0,119 MHz or according to note 1 (see notes 3 and
$0,135 \leq f < 0,140$	42
$0,140 \leq f < 0,1485$	37,7
$0,1485 \leq f < 30$	-5 (see note 4)
$0,315 \leq f < 0,600$	-5
$3,155 \leq f < 3,400$	13.5
4,234	9
4,516	7
$7,400 \leq f < 8,800$	9
$10,2 \leq f < 11,00$	9
$12,5 \leq f \leq 20$	-7
$6,765 \leq f \leq 6,795$ $13,553 \leq f \leq 13,567$ $26,957 \leq f \leq 27,283$	42 (see note 3 and 9)
$13,410 \leq f \leq 13,553, 13,567 \leq f \leq 13,710$	9 (see note 6)
$13,110 \leq f \leq 13,410, 13,710 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-10 (see note 6)
$11,810 \leq f \leq 12,660, 14,460 \leq f \leq 15,310$	-16 (see note 6)
$13,460 \leq f \leq 13,553, 13,567 \leq f \leq 13,660$	27 (see note 7)
$13,360 \leq f \leq 13,460, 13,660 \leq f \leq 13,760$	Linear transition from 27 to -3,5 (see note 6)
$13,110 \leq f \leq 13,360, 13,760 \leq f \leq 14,010$	-3,5 (see note 6)
$12,660 \leq f \leq 13,110, 14,010 \leq f \leq 14,460$	-5 (see note 6)
$13,553 \leq f \leq 13,567$	60 (see notes 2 and 3)
27,095	42
26,995, 27,045, 27,095, 27,145, 27,195 (see note 8)	100 mW

- NOTE 1: For the frequency ranges 9 kHz to 135 kHz, the following additional restrictions apply to limits above 42 dB μ A/m:
- for loop coil antennas with an area $\geq 0,16 \text{ m}^2$ this table and table B.1 with the antenna limitations apply;
 - for loop coil antennas with an area between $0,05 \text{ m}^2$ and $0,16 \text{ m}^2$ table B.1 applies with a correction factor. The limit is: table value + $10 \times \log (\text{area}/0,16 \text{ m}^2)$;
 - for loop coil antennas with an area $< 0,05 \text{ m}^2$ the limit is 10 dB below table B.1.
- NOTE 2: For RFID and EAS applications only.
- NOTE 3: Spectrum mask limit, see annex J.
- NOTE 4: For further information see annex H.
- NOTE 5: Limit is 42 dB μ A/m for the following spot frequencies:
60 kHz \pm 250 Hz, 66,6 kHz \pm 750 Hz, 75 kHz \pm 250 Hz, 77,5 kHz \pm 250 Hz, and 129,1 kHz \pm 500Hz.
- NOTE 6: Only in conjunction with spectrum mask, see annex J.
- NOTE 7: The frequency range 6,765 MHz - 6,795 MHz is not a harmonized ISM frequency band according article 5.138 of the ITU Radio Regulations [i.13]. For the decision scheme in table 3 only Case 2 may therefore be applicable in some countries.
- NOTE 8: Center frequencies for channelized system by using 10 kHz bandwidth.

For calculation rules for limits at other measurement distances, see annex I of EN 300 330.

The measurements shall be made during normal or extreme test conditions. During extreme test conditions, both extreme temperature and voltage apply simultaneously.

3.2.Test Procedures

Refer to clause 6.2.4 of EN 300 330 V2.1.1.

3.3.Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (provided by manufacturer) has been activated to set the EUT on specific status.
3. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

3.4. Test Results

FREQUENCY: 13.56 MHz(ASK)				H-field Strength Limit (Hf) dB μ A/m at 10 m		
TEST CONDITION				Level	Limit	Pass / Fail
Tnor	25°C	Vnor	5.0V	1.494	42	Pass
		Vmin	4.5V	1.305		
		Vmax	5.5V	1.823		
Tmin	0°C	Vnor	5.0V	1.572		
		Vmin	4.5V	1.394		
		Vmax	5.5V	1.501		
Tmax	50°C	Vnor	5.0V	1.629		
		Vmin	4.5V	1.771		
		Vmax	5.5V	1.515		

FREQUENCY: 13.56 MHz(NRZ)				H-field Strength Limit (Hf) dB μ A/m at 10 m		
TEST CONDITION				Level	Limit	Pass / Fail
Tnor	25°C	Vnor	5.0V	1.417	48	Pass
		Vmin	4.5V	1.330		
		Vmax	5.5V	1.894		
Tmin	0°C	Vnor	5.0V	1.380		
		Vmin	4.5V	1.564		
		Vmax	5.5V	1.619		
Tmax	50°C	Vnor	5.0V	1.445		
		Vmin	4.5V	1.764		
		Vmax	5.5V	1.768		

4. Permitted Range of Operating Frequency / Operating Frequency Ranges

4.1.Limits of Permitted Range of Operating Frequency / Operating Frequency Ranges

The permitted range of operating frequency for intentional emissions shall be from 9 kHz to 30 MHz, see table1.

Outside the permitted range of operating frequencies the unintentional emissions shall be reduced to the limits given in clauses 4.3.8, 4.3.9 and 4.3.10 of EN 300 330.

Table 1: Short Range Devices within the 9 kHz to 30 MHz permitted frequency bands		
	Frequency Bands/Frequencies	Applications
Transmit and Receive	9 kHz to 90 kHz	Inductive devices, Generic use
Transmit and Receive	90 kHz to 119 kHz	Inductive devices, Generic use
Transmit and Receive	119 kHz to 140 kHz	Inductive devices, Generic use
Transmit and Receive	140 kHz to 148,5 kHz	Inductive devices, Generic use
Transmit and Receive	148,5 kHz to 5 MHz	Inductive devices, Generic use
Transmit and Receive	400 kHz to 600 kHz	RFID only
Transmit and Receive	5 kHz to 30 MHz	Inductive devices, Generic use
Transmit and Receive	3 155 kHz to 3 400 kHz	Inductive devices, Generic use
Transmit and Receive	4 234 kHz	Inductive devices, Railway applications
Transmit and Receive	4 516 kHz	Inductive devices, Railway applications
Transmit and Receive	6 765 kHz to 6 795 kHz	Inductive devices, Generic use
Transmit and Receive	7 400 kHz to 8 800 kHz	Inductive devices, Generic use
Transmit and Receive	10 200 kHz to 11,000 MHz	Inductive devices, Generic use
Transmit and Receive	11,810 MHz to 15,310 MHz	RFID only
Transmit and Receive	12,5 MHz to 20 MHz	Inductive devices, Wireless healthcare
Transmit and Receive	13,553 MHz to 13,567 MHz	Inductive devices, Generic use
Transmit and Receive	26,957 MHz to 27,283 MHz	Inductive devices, Generic use
Transmit and Receive	27,090 - 27,100 kHz	Inductive devices, Railway applications

4.2.Test Procedure

Refer to clause 6.2.2 of EN 300 330 V2.1.1.

4.3.Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (provided by manufacturer) has been activated to set the EUT on specific status.

4.4. Test Results

Frequency Range			13.56MHz(ASK)	
Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	+20	V _{nom} (5.0V)	13.553	13.564
T _{min} (°C)	-10	V _{min} (4.5V)	13.557	13.561
		V _{max} (5.5V)	13.556	13.564
T _{max} (°C)	+55	V _{min} (4.5V)	13.556	13.563
		V _{max} (5.5V)	13.557	13.563
Measured frequencies (lowest and highest)			FL = > 13.553MHZ	FH = <13.567MHZ

Frequency Range			13.56MHz(NRZ)	
Test Condition			Frequency (MHz)	
			Lowest	Highest
T _{nom} (°C)	+20	V _{nom} (5.0V)	13.554	13.559
T _{min} (°C)	-10	V _{min} (4.5V)	13.555	13.562
		V _{max} (5.5V)	13.556	13.563
T _{max} (°C)	+55	V _{min} (4.5V)	13.557	13.560
		V _{max} (5.5V)	13.556	13.565
Measured frequencies (lowest and highest)			FL = > 13.553MHZ	FH = <13.567MHZ

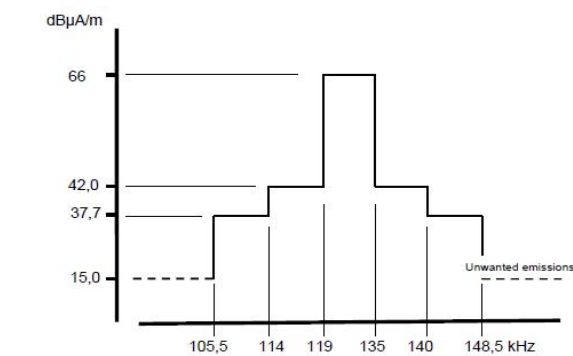
5. Operating Frequency Range of the Modulation Bandwidth

5.1. Limits of Operating Frequency Range of the Modulation Bandwidth

The permitted range of the modulation bandwidth shall be within the assigned frequency band see table 1 (refer to clause 4.2.1) or $\pm 7,5\%$ of the carrier frequency whichever is the smallest. For RFID and EAS Systems, the permitted modulation bandwidth shall be within the transmitter emission boundary of EN 300330 figures J.1, J.2, J.3 and J.4.

For further information see CEPT/ERC/REC 70-03 or ERC/ECC/CEPT Decisions as implemented through

National Radio Interfaces (NRI) and additional NRI as relevant.



NOTE: The limit at 129.1 kHz \pm 500 Hz is maximum 42 dBμA/m at 10 m.

Figure J.1: Emission boundary for LF RFID systems

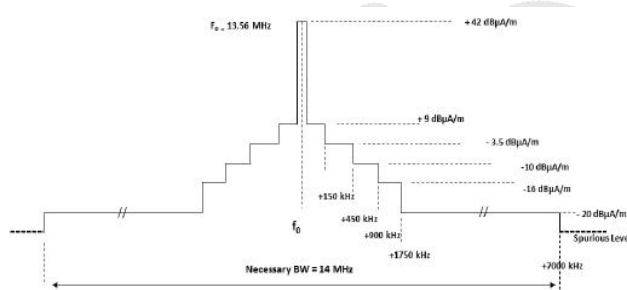
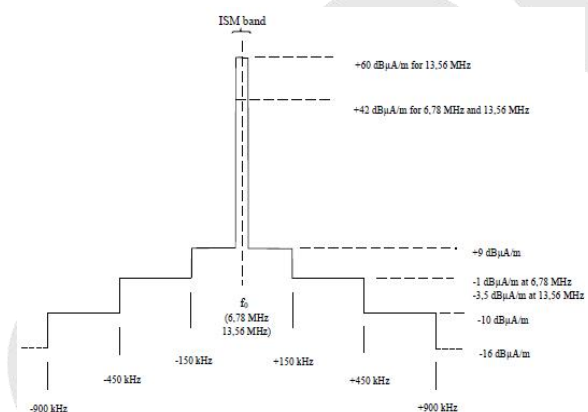


Figure J.3: Spectrum mask limit for wideband RFIDs in the 13.56 MHz range

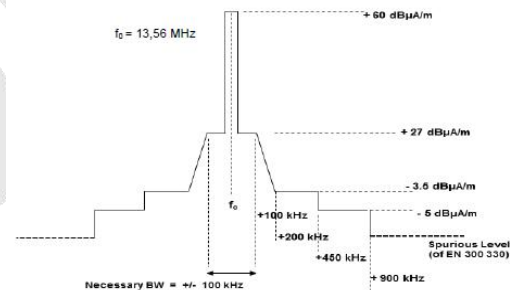


Figure J.4: Spectrum mask limit for narrowband RFIDs in the 13.56 MHz range

5.2. Test Procedure

Refer to clause 6.2.3 of EN 300 330 V2.1.1.

5.3. Test Setup

The EUT was placed on the turntable in semi anechoic chamber (10 m) and supplied with nominated power source. It was adjusted to the maximum output power during the test.

5.4. Test Results

Frequency Range	13.56 MHz(ASK)
Test Results	Pass

Frequency Range	13.56 MHz(NRZ)
Test Results	Pass

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6. Transmitter spurious Emissions

6.1. Limits Of Transmitter Spurious Emissions

Limits Of Transmitter Spurious Emissions Below 30MHz

State	Frequency $9\text{ kHz} \leq f < 10\text{MHz}$	Frequency $10\text{MHz} \leq f < 30\text{MHz}$
Operating	27 dB μ A/m descending 3 dB/oct	-3.5 dB μ A/m
Standby	5.5 dB μ A/m descending 3 dB/oct	-25 dB μ A/m

Limits Of Radiated Spurious Emissions Above 30mhz

Transmitter state	47 MHz to 74 MHz 87.5 MHz to 118 MHz 174 MHz to 230 MHz 470 MHz to 790 MHz	Other frequencies between 30 MHz to 1000 MHz
Operating	4 nW e.r.p.	250 nW e.r.p.
Standby	2 nW e.r.p.	2 nW e.r.p.

6.2. Test Procedures

Refer to clause 6.2.8 & 6.2.9 of EN 300 330 V2.1.1.

6.3. Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (provided by manufacturer) has been activated to set the EUT on specific status.
3. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.(Frequency Below 30MHz)
4. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.(Frequency 30MHz~1GHz)

6.4. Test Results

Spurious Emission Frequency Range	9kHz ~ 30MHz*	TEST MODE	Operating
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Frequency Range		13.56MHz(A SK)		
Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.555	H	-8.05	-3.50	-4.55
27.110	H	-22.52	-3.50	-19.02
13.557	V	-8.41	-3.50	-4.91
27.114	V	-22.28	-3.50	-18.78

Frequency Range		13.56MHz(N RZ)		
Spurious Emission Level				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.555	H	-8.81	-3.50	-5.31
27.110	H	-22.16	-3.50	-18.66
13.557	V	-8.75	-3.50	-5.25
27.114	V	-22.16	-3.50	-18.66

Note: The limit in dBμA/m at 10 m

BELOW 1GHz WORST-CASE DATA:

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING STATE	Operating
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Frequency Range		13.56MHz(A SK)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.52	H	-41.19	-36.00	-5.19
95.22	H	-67.68	-54.00	-13.68
291.45	H	-60.12	-36.00	-24.12
402.80	H	-64.88	-36.00	-28.88
493.87	H	-61.26	-54.00	-7.26
761.42	H	-63.92	-54.00	-9.92
32.52	V	-41.95	-36.00	-5.95
95.22	V	-69.61	-54.00	-15.61
291.45	V	-61.57	-36.00	-25.57
402.80	V	-60.39	-36.00	-24.39
493.87	V	-61.42	-54.00	-7.42
761.42	V	-64.22	-54.00	-10.22

Frequency Range		13.56MHz(N RZ)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.29	H	-42.47	-36.00	-6.47
94.49	H	-69.94	-54.00	-15.94
288.12	H	-64.63	-36.00	-28.63
409.45	H	-61.30	-36.00	-25.30
488.73	H	-61.98	-54.00	-7.98
766.57	H	-61.14	-54.00	-7.14
31.29	V	-41.01	-36.00	-5.01
94.49	V	-68.53	-54.00	-14.53
288.12	V	-61.56	-36.00	-25.56
409.45	V	-62.46	-36.00	-26.46
488.73	V	-62.36	-54.00	-8.36
766.57	V	-63.46	-54.00	-9.46

Note: The limit in dBμA/m at 3 m

SPURIOUS EMISSION	9kHz ~ 30MHz*	TEST MODE	Standby
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FREQUENCY RANGE			
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Frequency Range		13.56MHz(A SK)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.557	H	-34.82	-25.00	-9.82
27.114	H	-49.47	-25.00	-24.47
13.558	V	-34.29	-25.00	-9.29
27.115	V	-49.76	-25.00	-24.76

Frequency Range		13.56MHz(N RZ)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.557	H	-34.34	-25.00	-9.34
27.114	H	-49.85	-25.00	-24.85
13.555	V	-34.97	-25.00	-9.97
27.109	V	-49.39	-25.00	-24.39

Note: The limit in dB μ A/m at 10 m

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz	OPERATING STATE	Standby
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Frequency Range		13.56MHz(A SK)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
31.32	H	-61.53	-57.00	-4.53
98.73	H	-66.27	-57.00	-9.27
291.40	H	-74.50	-57.00	-17.50
403.01	H	-80.52	-57.00	-23.52
495.27	H	-79.71	-57.00	-22.71
760.13	H	-77.90	-57.00	-20.90
31.32	V	-61.26	-57.00	-4.26
98.73	V	-66.73	-57.00	-9.73
291.40	V	-71.55	-57.00	-14.55
403.01	V	-84.31	-57.00	-27.31
495.27	V	-78.31	-57.00	-21.31
760.13	V	-79.84	-57.00	-22.84

Frequency Range		13.56MHz(N RZ)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.90	H	-61.27	-57.00	-4.27
96.94	H	-65.58	-57.00	-8.58
290.35	H	-74.39	-57.00	-17.39
398.89	H	-81.14	-57.00	-24.14
488.82	H	-78.11	-57.00	-21.11
759.47	H	-79.01	-57.00	-22.01
32.90	V	-60.51	-57.00	-3.51
96.94	V	-65.16	-57.00	-8.16
290.35	V	-73.97	-57.00	-16.97
398.89	V	-84.83	-57.00	-27.83
488.82	V	-80.29	-57.00	-23.29
759.47	V	-79.15	-57.00	-22.15

Note: The limit in dB μ A/m at 3 m

7.Receiver Spurious Emissions

7.1.Limits Of Radiated Spurious Emissions

Limits Of Radiated Spurious Emissions Below 30MHz

Frequency $9\text{ kHz} \leq f < 10\text{MHz}$	Frequency $10\text{MHz} \leq f < 30\text{MHz}$
5.5 dB μ A/m descending 3 dB/oct	-25 dB μ A/m

Limits Of radiated spurious Emissions Above 30MHz

The measured values shall not exceed 2 nW(-57dBm) (e.r.p).

7.2.Test Procedures

Refer to clause 7.2 of EN 300 330 V2.1.1.

7.3.Test Setup

1. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).
2. The test setup has been constructed as the normal use condition. Controlling software (provided by manufacturer) has been activated to set the EUT on specific status.
3. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.(Frequency Below 30MHz)
4. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.(Frequency 30MHz~1GHz)

7.4.Test Results

SPURIOUS EMISSION FREQUENCY RANGE	9kHz ~ 30MHz*
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Frequency Range		13.56MHz(A SK)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.553	H	-34.71	-25.00	-9.71
27.106	H	-49.64	-25.00	-24.64
13.557	V	-34.17	-25.00	-9.17
27.113	V	-49.19	-25.00	-24.19

Frequency Range		13.56MHz(N RZ)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level dBμA/m	Limit dBμA/m	Margin (dB)
13.557	H	-34.19	-25.00	-9.19
27.114	H	-49.56	-25.00	-24.56
13.553	V	-34.07	-25.00	-9.07
27.107	V	-49.16	-25.00	-24.16

Note: The limit in dBμA/m at 10 m.

SPURIOUS EMISSION FREQUENCY RANGE	30MHz ~ 1GHz
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Frequency Range		13.56MHz(A SK)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.13	H	-61.53	-57.00	-4.53
98.06	H	-65.55	-57.00	-8.55
293.82	H	-74.96	-57.00	-17.96
408.24	H	-83.91	-57.00	-26.91
497.74	H	-82.66	-57.00	-25.66
761.43	H	-78.92	-57.00	-21.92
32.13	V	-61.45	-57.00	-4.45
98.06	V	-63.47	-57.00	-6.47
293.82	V	-73.13	-57.00	-16.13
408.24	V	-81.63	-57.00	-24.63
497.74	V	-79.02	-57.00	-22.02
761.43	V	-79.53	-57.00	-22.53

Frequency Range		13.56MHz(N RZ)		
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
32.80	H	-60.40	-57.00	-3.40
94.76	H	-67.94	-57.00	-10.94
296.15	H	-70.84	-57.00	-13.84
400.97	H	-83.95	-57.00	-26.95
488.71	H	-78.58	-57.00	-21.58
765.65	H	-80.10	-57.00	-23.10
32.80	V	-60.99	-57.00	-3.99
94.76	V	-67.76	-57.00	-10.76
296.15	V	-73.36	-57.00	-16.36
400.97	V	-84.70	-57.00	-27.70
488.71	V	-80.90	-57.00	-23.90
765.65	V	-79.93	-57.00	-22.93

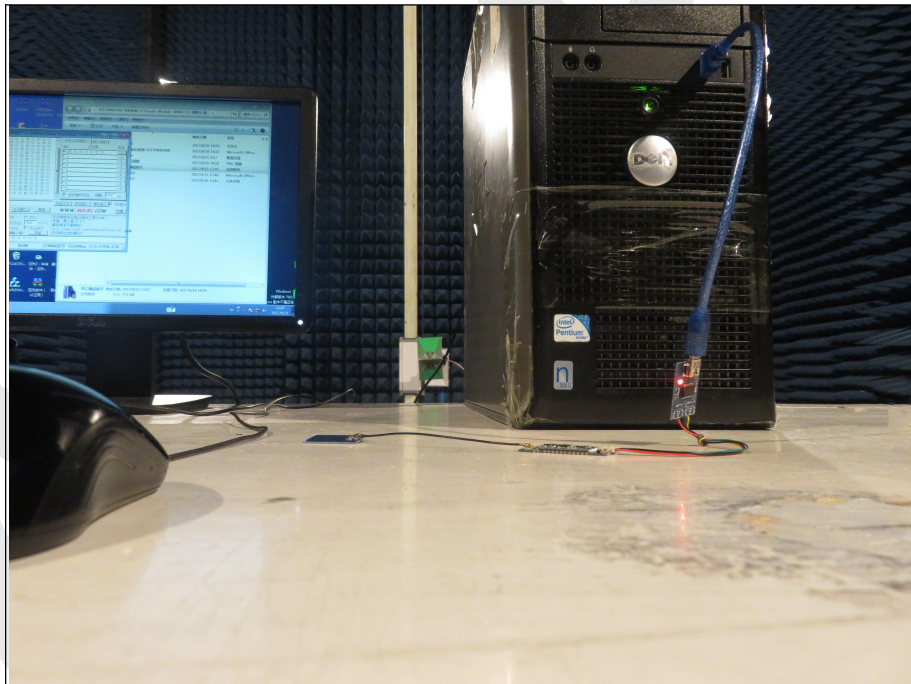
Note: The limit in dBμA/m at 3 m.

APPENDIX I -- TEST SETUP PHOTOGRAPH

SPURIOUS EMISSION TEST (BELOW 30MHz)



SPURIOUS EMISSION TEST (30MHz~1GHz)



----- End of Report -----