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LP-009

Test report

Number:	**T251-0284/16**	Project file:	C20160278
		Date:	2016-03-07
		Pages:	59
Product:	**Electronic Lock**		
Type reference:	**Electronic Lock RFID ISO MT**		
Ratings:	12 Vdc (powered via Metra EasyWire)		
Trademark:	METRA EASY WIRE		
Applicant:	**METRA INŽENIRING d.o.o.** **Špruha 19, SI-1236 Trzin, Slovenia**		
Manufacturer:	METRA INŽENIRING d.o.o. Špruha 19, SI-1236 Trzin, Slovenia		
Place of manufacture:	METRA INŽENIRING d.o.o. Špruha 19, SI-1236 Trzin, Slovenia		

Summary of testing

Testing method:	FCC Part 15, Subpart C
Testing location:	SIQ Ljubljana, Trpinčeva ulica 37 A, SI-1000 Ljubljana, Slovenia
Remarks:	Date of receipt of test items: 2015-08-25 Number of items tested: 1 Date of performance of tests: 2015-09-10 - 2016-01-22 The test results presented in this report relate only to the items tested. The product complies with the requirements of the testing methods.

Tested by: Andrej Škof

Approved by: Marjan Mak

The report shall not be reproduced except in full.

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CONTENTS page

1 GENERAL

History sheet			
Date	Report No.	Change	Revision
2016-03-07	T251-0284/15	Initial Test Report issued.	--

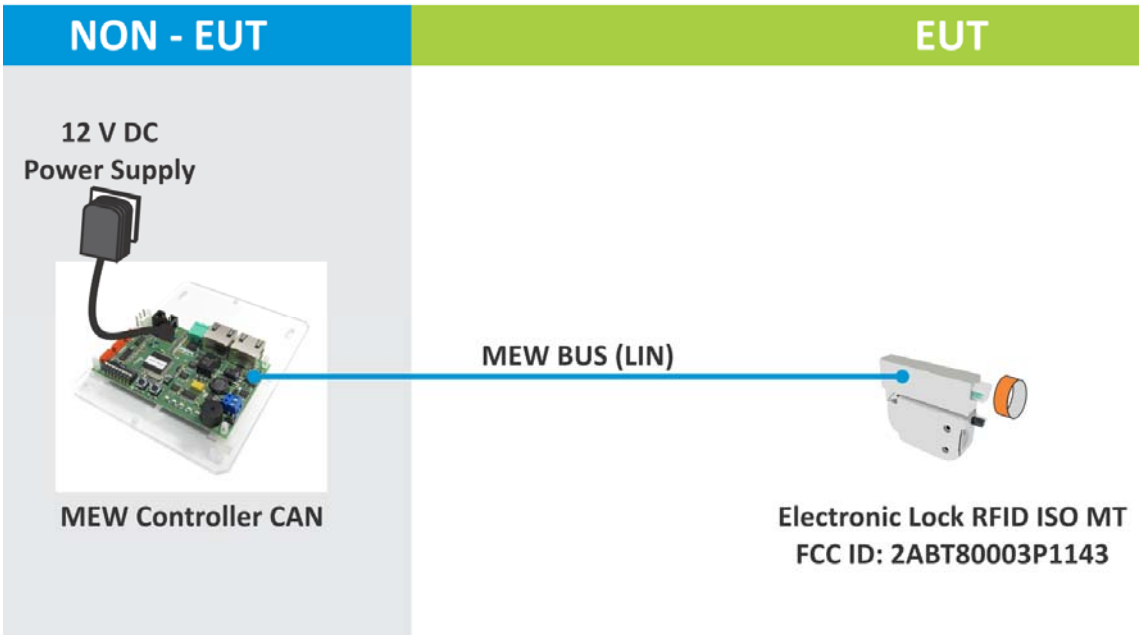
Environmental conditions:
Ambient temperature: 15°C to 35°C
Relative humidity: 30% to 60%
Atmospheric pressure: 860 mbar to 1060 mbar

1.1 Equipment under test

Electronic Lock
Type: Electronic Lock RFID ISO MT
FCC ID: 2ABT80003P1143

Hardware Version: MEWSLC1_ISOv4 (Electronic Lock RFID ISO)
Software Version: MEWSLC1_ISO_RGB_LINprofile_7_6.hex

Tested SIQ sample number: S20154648



1.1.1 General product information

Electronic Lock RFID ISO and Metal Door RFID Antenna form complete operational product named Electronic Lock RFID ISO MT.
Electronic Lock RFID ISO emits RF field 13,56 MHz that is transmitted through air gap between it and Metal Door RFID Antenna. This air gap is well defined by construction of both parts. Metal Door RFID Antenna acts as passive antenna booster tuned to operating frequency of 13,56 MHz.
The Electronic Lock RFID ISO transmits RF energy only when the Metal Locker Door is closed and Metal Door RFID Antenna is in its defined position. Positioning of the Metal Door RFID Antenna in relation to Electronic Lock RFID ISO is provided by passive plastic part called Metal Door Strike.

Processor Used:
NXP1225 Cortex-M0, Internal RC oscillator 12 MHz +-1% internally multiplied by PLL VCO to 192 MHz then divided to operating frequency 48 MHz

LIN communication:
19200 Baud

RFID Interface:
NXP Reader chip - CLRC 663 13,56 MHz
Quarz oscillator 27,12 MHz used by CLRC663

RFID Antenna Name: Metal Door RFID Antenna
Antenna Type: Copper Ring RFID Antenna Tuned to 13,56 MHz used for metal door.

Picture of Electronic Lock RFID ISO and Metal Door RFID Antenna

Type label

1.2 ANSI C63.4 Subpart selection

Subpart C: Intentional Radiators

1.3 Class statement requirements

- The Class A statement cautions that operation of the device in a residential area is likely to cause harmful interference.
- The Class B statement offers several suggestions for minimizing interference to radio or TV receivers, including reorienting the receiving antenna and moving the Class B device farther away from the receiver.

1.4 List of measurements performed

PART 15 section	Test name
15.207	Conducted emission
15.209	Radiated emission
15.215	Bandwidth of the emission
15.225	Radiated emission

1.5 Occupied bandwidth measurement

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1 kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

1.6 Quasi-peak detector

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	Full range (wideband)
10 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz

1.7 Peak, rms, and average detectors

Frequency range	Bandwidth (-6dB)
10 Hz to 20 kHz	10, 100, 1000 Hz
10 kHz to 150 kHz	1 and 10 kHz
150 kHz to 30 MHz	1 and 10 kHz
30 MHz to 1 GHz	10 and 100 kHz
1 GHz to 40 GHz	0.1, 1.0 and 10 MHz

2 LIMITS FOR ALL SUBPARTS

Subpart C: Intentional Radiators

2.1.1 Conducted emission limits:

Limits:

Frequency Range (MHz)	Limits (dBµV)	
	Quasi-peak	Average
0.15 to 0.5	66 – 56*	56 – 46*
0.5 to 5.0	56	46
5.0 to 30.0	60	50

* Decreases with the logarithm of the frequency.

The shown limits in table shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- For carrier current systems containing their fundamental emission within the frequency band 535-1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- For all other carrier current systems: 1000 µV within the frequency band 535-1705 kHz, as measured using a 50 µH/50 ohms LISN.
- Carrier current systems operating below 30 MHz are also subject to the radiated emission limits as appropriate.

2.1.2 Radiated emission limits:

Limits:

Frequency Range (MHz)	Limits (dBµV/m)		Test distance (m)
	VERTICAL	HORIZONTAL	
0,009 to 0,490	20*log(2400/F(kHz))	20*log(2400/F(kHz))	300
0,490 to 1,705	20*log(2400/F(kHz))	20*log(2400/F(kHz))	30
1,705 to 30,0	30	30	30
30 to 88	40**	40**	3
88 to 216	43.5**	43.5**	3
216 to 960	46**	46**	3
Above 960	54	54	3

** Except as provided in paragraph below, fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz.

Perimeter protection systems may operate in the 54-72 MHz and 76-88 MHz bands under the provisions of this section. The use of such perimeter protection systems is limited to industrial, business and commercial applications.

Additional FCC requirements per clause 15.215.
Intentional radiators operating under the alternative provisions to the general emission limits must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

Additional FCC requirements per clause 15.225.

Fundamental Frequency (MHz)	Field strength of fundamental (μV/m)	Test distance (m)
13.553-13.567	15,848	30
13.410-13.553 and 13.567-13.710	334	30
13.110-13.410 and 13.710-14.010	106	30
Outside band 13.110-14.010	As per clause 15.209	30

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

3 ALL TEST EQUIPMENT AND THEIR DESCRIPTION

3.1 General information

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU26	100428	2015-12	2017-12	24 months	/
Rohde & Schwarz, Artificial main network	ESH2-Z5	106899	2015-05	2017-05	24 months	X
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
R&S, Antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
EMCO, Antenna	3142B	104351	2015-09	2017-09	24 months	X
EMCO, Antenna	3115	103002	2015-09	2017-09	24 months	/
Heinrich Deisel, Turn table	DS 420.00	103337	N/A	N/A	N/A	X
Antenna tower	/	/	N/A	N/A	N/A	X
Controller for turn table and antenna tower	/	/	N/A	N/A	N/A	X

3.2 Other instrument information and auxiliary equipment

Description	Model No.	Bandwidth	Detector functions	Antenna factors	Cable loss	Range
Rohde-Schwarz, AMN	ENV216	/	/	/	/	9 kHz do 30 MHz
Rohde-Schwarz, RFI receiver	ESU8	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 8 GHz
Rohde-Schwarz, RFI receiver	ESU26	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	20 Hz – 26.5 GHz
Hewlett Packard, RF Spectrum Analyzer	8593E	200Hz, 9kHz, 120kHz, 1MHz	Peak, Q-peak, Average	/	/	9 kHz – 26.5 GHz
Rohde & Schwarz, Artificial main network	ESH 2-Z5	/	/	/	/	9 kHz – 30 MHz
ETS, Anechoic chamber	3m	/	/	/	/	30 MHz – 18 GHz
EMCO, Antenna	3142B	/	/	See tables below	/	26 MHz – 2 GHz
EMCO, Antenna	3115	/	/	See tables below	/	1 GHz – 18 GHz
Schwarzbeck Mess-Elektronik, Horn antenna	BBHA9120E	/	/	See tables below	/	450 MHz – 6 GHz
SIQ, Conducted emission cable	SIQ	/	/	/	See tables below	/
SIQ, Radiated emission cable	SIQ	/	/	/	See tables below	/

3.2.1 Cable loss and attenuation of radiated emission

3.2.1.1 Conducted emission cable (SIQ-K024)

Point	Frequency (9kHz-30MHz)	Cable length (meters)	Loss (dBm)
1	190 kHz	1	0,4
2	530 kHz	1	0,26
3	2,53 MHz	1	0,16
4	5,19 MHz	1	0,07
5	11,05 MHz	1	0,03
6	22,01 MHz	1	0,06
7	24,03 MHz	1	0,04

3.2.1.2 Radiated emission attenuation

Point	Frequency (30 MHz – 26,5 GHz)	Attenuation (dBm)
1	30 MHz	0,501
2	150 MHz	1,174
3	400 MHz	2,034
4	800 MHz	2,995
5	1 GHz	3,416
6	1,363	1,666667
7	2,686	3,58333
8	5,332	5,25
9	7,978	6,25
10	10,624	7,5
11	13,27	8,333333
12	15,916	9,166666
13	18,562	9,833333
14	21,208	10,66667
15	23,854	11,5
16	26,5	12,16667

4 CONVERSION FACTORS AND ALL OTHER FORMULAS

Unit	Conversion unit	Formula of conversion
dBμV	dBμV/m	dBμV/m = dBμV + AF
μV/m	dBμV/m	dBμV/m = 20log(X(μV/m)/1μV)

	Test distance stated in standard	Test distance of measurement	Conversion factor
Class B	3 m	3 m	/
Class A	10 m	3 m	20dB/decade

5 GENERAL AND SPECIAL CONDITIONS DESCRIPTION

5.1 General condition description

Interconnect and power cabling (or wiring)

5.1.1 Test arrangement for conducted emissions

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground-plane.
All other equipment powered from additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
LISN at least 80 cm from nearest part of EUT chassis.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground-plane.

5.1.2 Test arrangement for conducted emissions- floor-standing equipment

Excess I/O cables shall be bundled in the center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling shall not exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

EUT connected to one LISN. LISN can be placed on top of, or immediately beneath, the ground-plane.
All other equipment powered from a second LISN or additional LISN(s).
Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

5.1.3 Test arrangement for radiated emissions tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance. The total length shall not exceed 1 m.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

Non-EUT components of EUT system being tested.

Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

No vertical conducting plane used.

Power cords drape to the floor and are routed over to receptacle.

5.1.4 Test arrangement for radiated emissions floor-standing equipment

Excess I/O cables shall be bundled in center. If bundling is not possible, the cables shall be arranged in serpentine fashion. Bundling not to exceed 40 cm in length.

Excess power cords shall be bundled in the center or shortened to appropriate length.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. If bundling is not possible, the cable shall be arranged in a serpentine fashion.

EUT and all cables shall be insulated, if required, from the ground-plane by up to 12 mm of insulating material.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground plane.

Overhead cable trays and suspended ceilings

5.1.5 Test arrangement for floor-standing equipment

Only one vertical riser may be used where typical of system under test.

Excess power cord shall be bundled in the center or shortened to appropriate length.

EUT and cables shall be insulated from ground-plane by up to 12 mm. Where the manual has specified or there exists a code of practice for installation of the EUT, the test arrangement shall allow the use of this practice for the tests.

Power cords being measured connected to one LISN. All other system power cords powered through other LISN(s). A multiple receptacle strip may be used for other power cords.

For *conducted* tests, the LISNs may be placed on top of or immediately beneath and bonded directly to the ground-plane. For *radiated* tests, the LISN(s), if used, should be installed under, with the receptacle flush with the ground-plane.

5.1.6 Placement and manipulation of interconnect cabling (or wiring) of tabletop equipment

LISN(s) may have to be positioned to the side of the table to meet the criterion that the LISN receptacle shall be 80 cm away from the EUT. LISN(s) may be above ground-plane only for conducted emission measurements.

Accessories, such as ac power adapter, if typically table-mounted, shall occupy peripheral positions as is applicable.

Accessories, which are typically floor-mounted, shall occupy a floor position directly below the portion of the EUT to which they are typically connected. T

Table length may be extended beyond 1.5 m with peripherals aligned with the back edge. The table depth may be extended beyond 1 m. The 40 cm distance to the vertical conducting plane shall be maintained for conducted emission testing.

Placement of wall-mounted equipment

5.1.7 Test configuration/arrangement for combination floor-standing and tabletop equipment

Interconnecting cables that hang closer than 40 cm to the ground-plane shall be folded back and forth in the center, forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated if required using the correct terminating impedance.

If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground-plane with the receptacle flush with the ground-plane.

Cables of hand-operated devices, such as keyboards, mice, etc., have to be placed as for normal use.

Non-EUT components of EUT system being tested.

I/O cable to floor-standing unit drapes to the ground-plane and shortened or excess bundled. Cables not reaching the metal ground-plane are draped to the height of the connector or 40 cm, whichever is lower.

Power cords and signal cables shall drape to the floor. No extension cords shall be used to the power receptacles.

The floor-standing unit can be placed under the table if its height permits.

5.2 Special condition description

If for some reason the above measurement conditions can’t be met, the description below should be used as an appropriate measurement condition and placement.

(Description is written additionally as the measurements differ – all is within test procedure)

6 TEST SUMMARY

STANDARDS (details on first page)	Tested yes	Tested no	Sample pass	Sample not pass
ANSI C63.4-2014; FCC Part 15, Subpart C	☑	☐	☑	☐

Test	Section within the report	Class	Conclusion
Conducted emission	7.1	B	PASS
Radiated emission	7.2	B	PASS

6.1 Operating voltages/frequencies used for testing

Section.	Test	Operating conditions
7.1	Conducted emission	12 Vdc powered via Metra EasyWire
7.2	Radiated emission	12 Vdc powered via Metra EasyWire

7 EMISSION TESTS

7.1 Conducted emission measurement (intentional radiator)

Section 15.207 Conducted limits

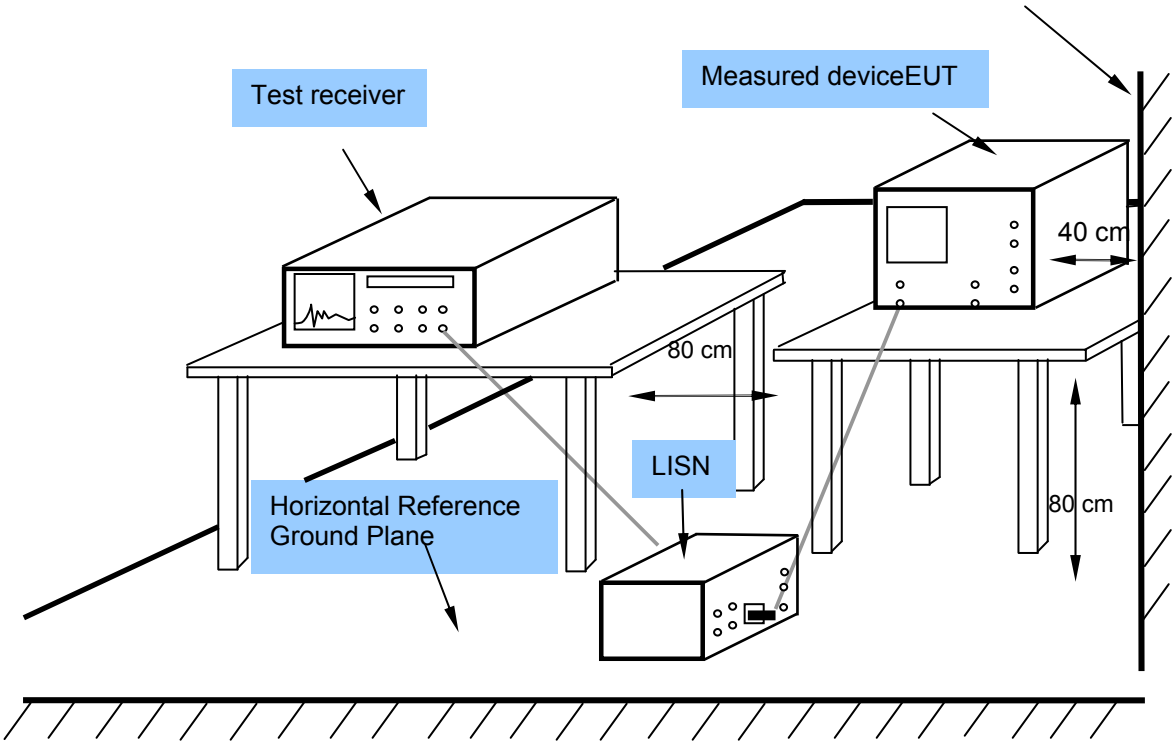
7.1.1 Test instruments

Description	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	X
Rohde & Schwarz, Artificial main network	ESH2-Z5	100406	2015-05	2017-05	24 months	X

7.1.2 Test procedure

- The EUT is placed on a non-conductive 0.8 meters high table, 0.4 meters from the vertical conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). LISN provide 50 Ohm / 50 μH + 5 Ohm of coupling impedance for the measuring instrument.
- Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.
- AC power lines of EUT are checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz is searched using PEAK, QUASI-PEAK and AVERAGE function of the receiver. Bandwidth is set to 9kHz.
- If applicable functions are changed (data transfer speed, clock speed,…)

7.1.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.1.4 Test results (15.207)

Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.

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Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WATING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 120 V, 60 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	397.500000000 kHz	51.16		Positive Peak	-6.75
2	417.750000000 kHz	38.56		Average	-8.93
2	487.500000000 kHz	32.76		Average	-13.45
1	6.688500000 MHz	52.07		Positive Peak	-7.93
1	13.560000000 MHz	54.68		Positive Peak	-5.32
2	13.560000000 MHz	52.05		Average	2.05

Final Results

Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.87		CISPR AV	-1.13
1	13.560000000 MHz	52.28		Quasi Peak	-7.72
2	417.750000000 kHz	38.03		CISPR AV	-9.46
1	397.500000000 kHz	48.26		Quasi Peak	-9.65
1	6.688500000 MHz	46.28		Quasi Peak	-13.72
2	487.500000000 kHz	31.89		CISPR AV	-14.32

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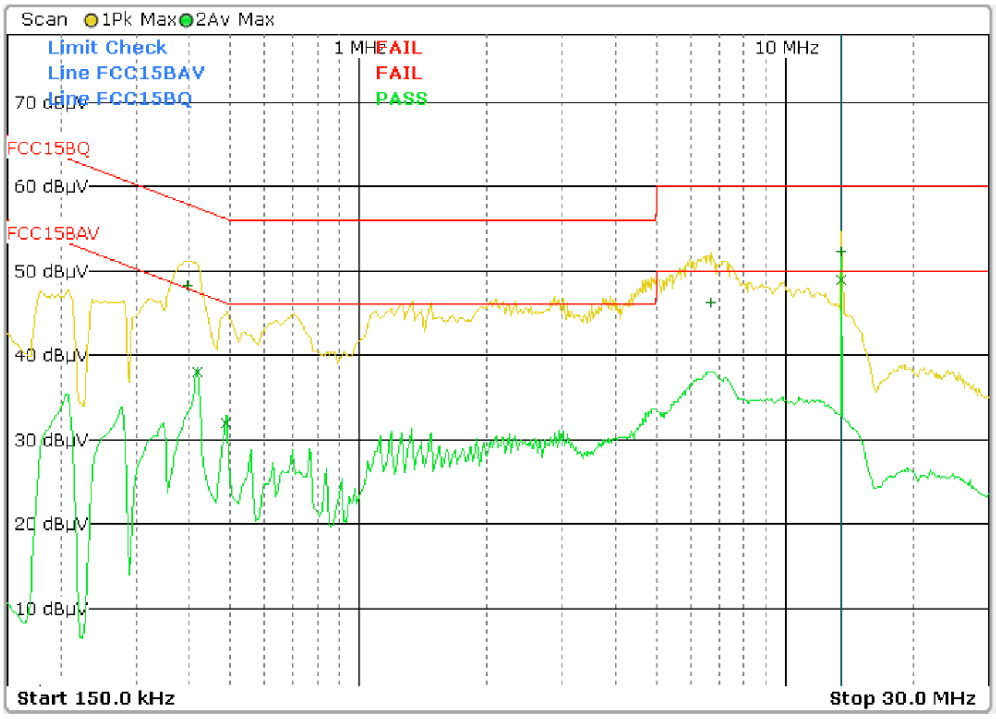
Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WATING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 120 V, 60 Hz

Scan Diagram



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Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WATING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 120 V, 60 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	179.250000000 kHz	50.68		Positive Peak	-13.84
1	386.250000000 kHz	48.48		Positive Peak	-9.66
1	6.414000000 MHz	49.03		Positive Peak	-10.97
1	13.560000000 MHz	53.51		Positive Peak	-6.49
2	13.560000000 MHz	48.35		Average	-1.65

Final Results

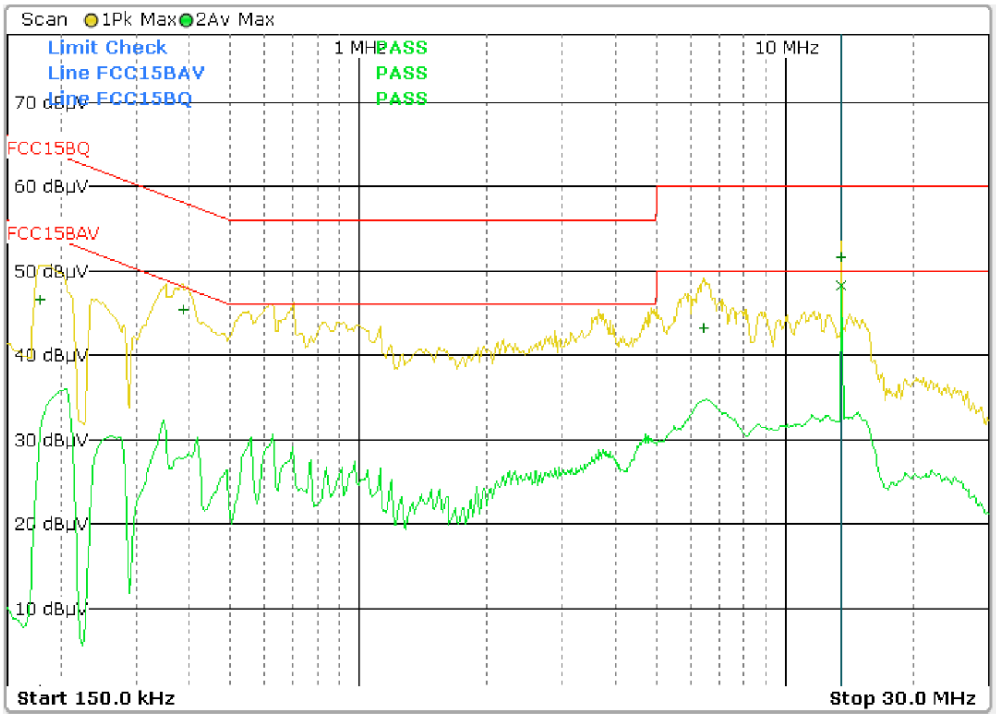
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.20		CISPR AV	-1.80
1	13.560000000 MHz	51.59		Quasi Peak	-8.41
1	386.250000000 kHz	45.42		Quasi Peak	-12.72
1	6.414000000 MHz	43.21		Quasi Peak	-16.79
1	179.250000000 kHz	46.62		Quasi Peak	-17.90

27.11.2015 08:57:14

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WATING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 120 V, 60 Hz

Scan Diagram



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Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 120 V, 60 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	395.250000000 kHz	51.29		Positive Peak	-6.66
2	417.750000000 kHz	38.75		Average	-8.74
1	6.614250000 MHz	52.24		Positive Peak	-7.76
1	13.560000000 MHz	59.70		Positive Peak	-0.30
2	13.560000000 MHz	57.48		Average	7.48

Final Results

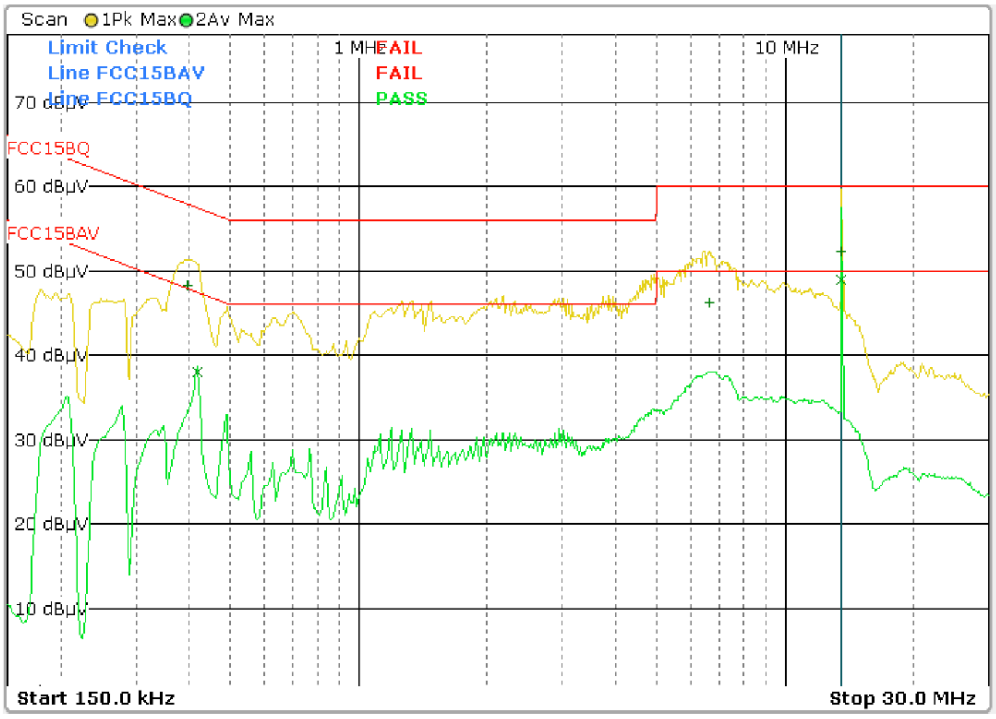
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.90		CISPR AV	-1.10
1	13.560000000 MHz	52.31		Quasi Peak	-7.69
2	417.750000000 kHz	38.01		CISPR AV	-9.48
1	395.250000000 kHz	48.21		Quasi Peak	-9.74
1	6.614250000 MHz	46.29		Quasi Peak	-13.71

27.11.2015 09:06:08

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 120 V, 60 Hz

Scan Diagram



27.11.2015 09:07:45

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 120 V, 60 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	179.250000000 kHz	51.39		Positive Peak	-13.13
1	253.500000000 kHz	47.06		Positive Peak	-14.58
2	348.000000000 kHz	35.62		Average	-13.39
1	381.750000000 kHz	49.19		Positive Peak	-9.05
1	13.560000000 MHz	58.42		Positive Peak	-1.58
2	13.560000000 MHz	56.97		Average	6.97

Final Results

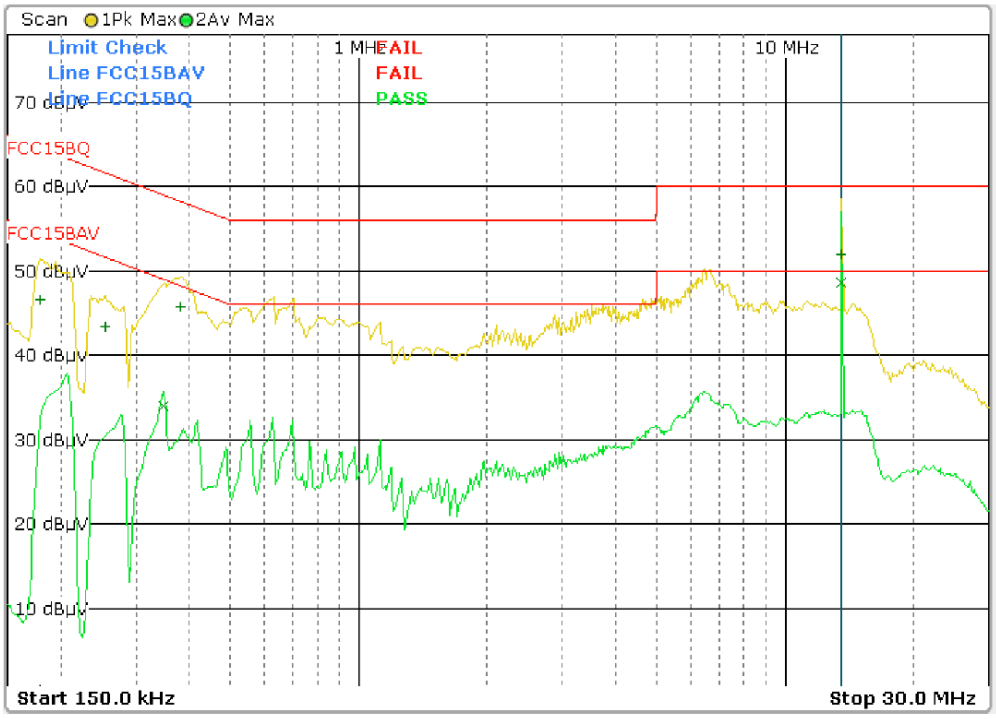
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.52		CISPR AV	-1.48
1	13.560000000 MHz	51.94		Quasi Peak	-8.06
1	381.750000000 kHz	45.65		Quasi Peak	-12.59
2	348.000000000 kHz	33.95		CISPR AV	-15.06
1	179.250000000 kHz	46.63		Quasi Peak	-17.89
1	253.500000000 kHz	43.44		Quasi Peak	-18.20

27.11.2015 09:07:45

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 120 V, 60 Hz

Scan Diagram



27.11.2015 09:19:58

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 240 V, 50 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	399.750000000 kHz	53.01		Positive Peak	-4.85
2	417.750000000 kHz	39.22		Average	-8.27
1	6.906750000 MHz	51.92		Positive Peak	-8.08
1	13.560000000 MHz	54.85		Positive Peak	-5.15
2	13.560000000 MHz	52.02		Average	2.02

Final Results

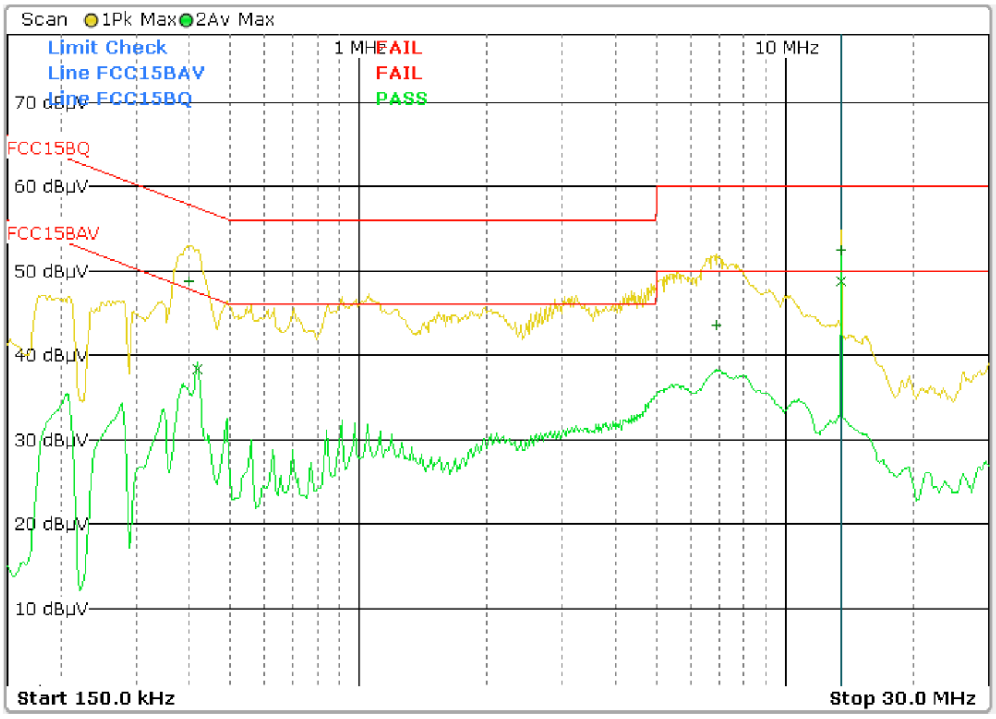
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.83		CISPR AV	-1.17
1	13.560000000 MHz	52.45		Quasi Peak	-7.55
2	417.750000000 kHz	38.41		CISPR AV	-9.08
1	399.750000000 kHz	48.74		Quasi Peak	-9.12
1	6.906750000 MHz	43.59		Quasi Peak	-16.41

27.11.2015 09:19:58

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 240 V, 50 Hz

Scan Diagram



27.11.2015 09:22:15

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 240 V, 50 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	188.250000000 kHz	51.64		Positive Peak	-12.47
2	206.250000000 kHz	38.55		Average	-14.80
1	246.750000000 kHz	48.21		Positive Peak	-13.66
1	395.250000000 kHz	51.80		Positive Peak	-6.15
2	417.750000000 kHz	37.97		Average	-9.52
2	768.750000000 kHz	32.55		Average	-13.45
1	13.560000000 MHz	54.60		Positive Peak	-5.40
2	13.560000000 MHz	51.77		Average	1.77

Final Results

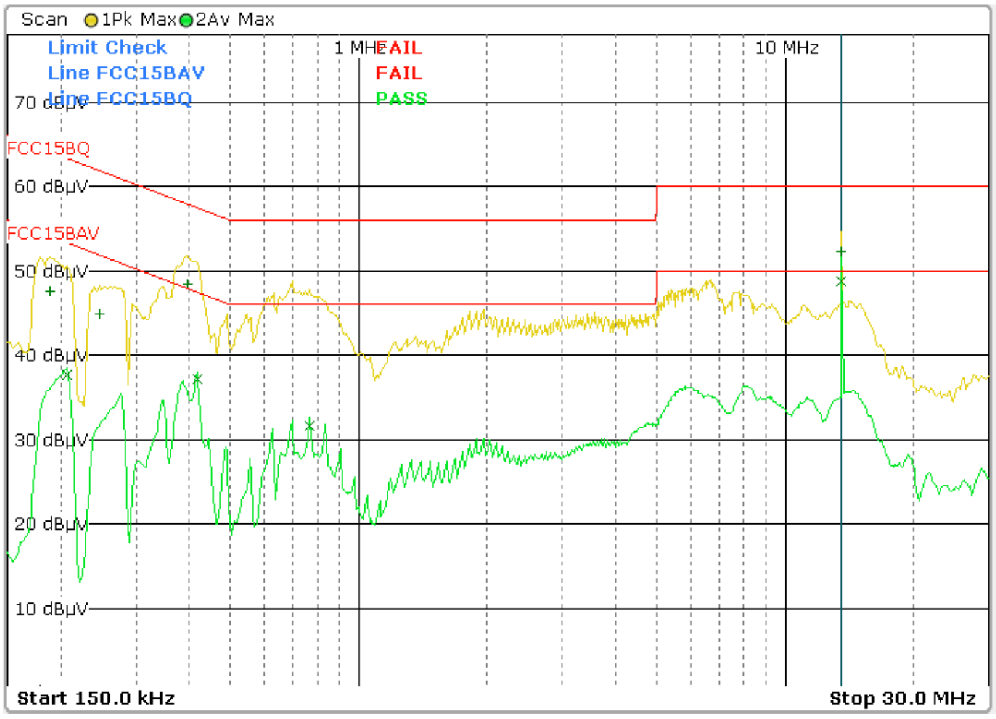
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	48.71		CISPR AV	-1.29
1	13.560000000 MHz	52.34		Quasi Peak	-7.66
1	395.250000000 kHz	48.45		Quasi Peak	-9.50
2	417.750000000 kHz	37.08		CISPR AV	-10.41
2	768.750000000 kHz	31.56		CISPR AV	-14.44
2	206.250000000 kHz	37.68		CISPR AV	-15.67
1	188.250000000 kHz	47.61		Quasi Peak	-16.50
1	246.750000000 kHz	44.82		Quasi Peak	-17.05

27.11.2015 09:22:15

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 240 V, 50 Hz

Scan Diagram



27.11.2015 09:30:52

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 240 V, 50 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	271.500000000 kHz	46.37		Positive Peak	-14.70
1	402.000000000 kHz	53.10		Positive Peak	-4.71
2	415.500000000 kHz	39.72		Average	-7.82
1	6.841500000 MHz	52.24		Positive Peak	-7.76
1	13.560000000 MHz	59.26		Positive Peak	-0.74
2	13.560000000 MHz	56.85		Average	6.85

Final Results

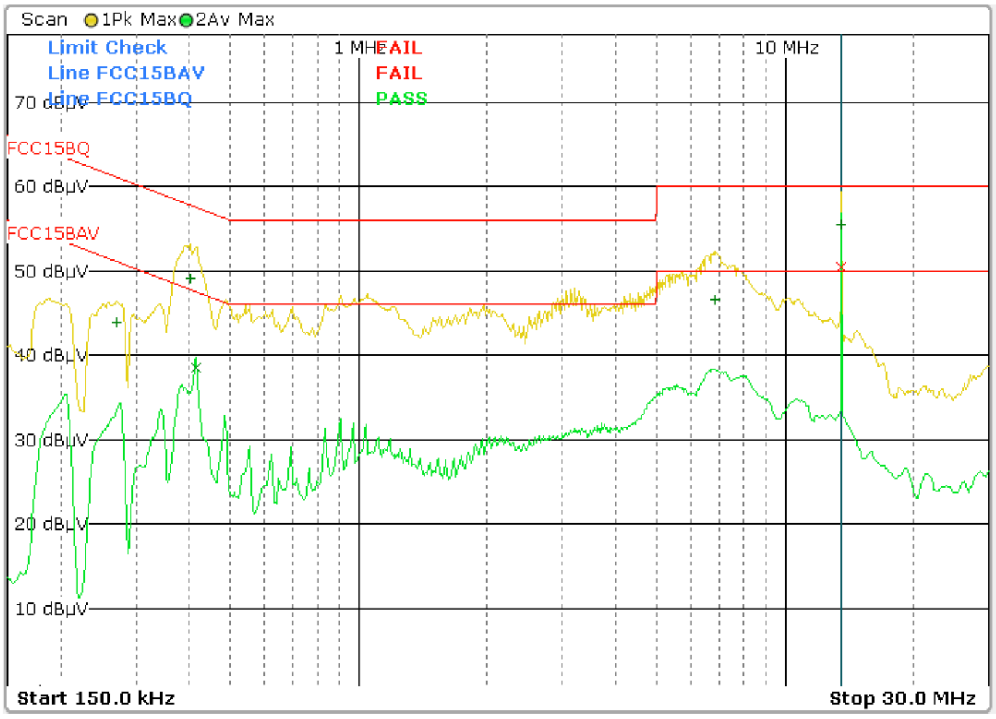
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	50.51		CISPR AV	0.51
1	13.560000000 MHz	55.50		Quasi Peak	-4.50
1	402.000000000 kHz	49.09		Quasi Peak	-8.72
2	415.500000000 kHz	38.50		CISPR AV	-9.04
1	6.841500000 MHz	46.61		Quasi Peak	-13.39
1	271.500000000 kHz	43.92		Quasi Peak	-17.15

27.11.2015 09:30:52

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	PHASE, Uin: 240 V, 50 Hz

Scan Diagram



27.11.2015 09:28:51

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 240 V, 50 Hz

Settings

Scan Start	150.000000000 kHz	Preamp State	Off
Scan Stop	30.000000000 MHz	Preamp Value	0.0 dB
RBW	9.0 kHz	Input Selection	INP2
IF RBW	10.0 kHz	Input Coupling	DC
Meas Time	1.0 s	Scan Type	TD Scan
RF Att	10.0 dB	Transducer	ENV216.TDF

Scan Table

Scan Start	150.000000000 kHz
Scan Stop	30.000000000 MHz
Scan Type	TD Scan
Transducer	ENV216.TDF
Detector	Trace 1: Max Peak Trace 2: Average

Start Frequency	Stop Frequency	Step Size	RBW	Meas Time	RF Atten	Preamp	Input
150.000 kHz	30.000 MHz	2.250 kHz	9.0 kHz	30.0 ms	10.0 dB	0.0 dB	INPUT2

Peak List

Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
1	186.000000000 kHz	51.94		Positive Peak	-12.27
2	206.250000000 kHz	39.05		Average	-14.30
1	246.750000000 kHz	48.67		Positive Peak	-13.20
2	276.000000000 kHz	35.95		Average	-14.99
1	393.000000000 kHz	52.48		Positive Peak	-5.52
2	415.500000000 kHz	39.03		Average	-8.51
2	694.500000000 kHz	33.65		Average	-12.35
1	13.560000000 MHz	54.45		Positive Peak	-5.55
2	13.560000000 MHz	50.80		Average	0.80

Final Results

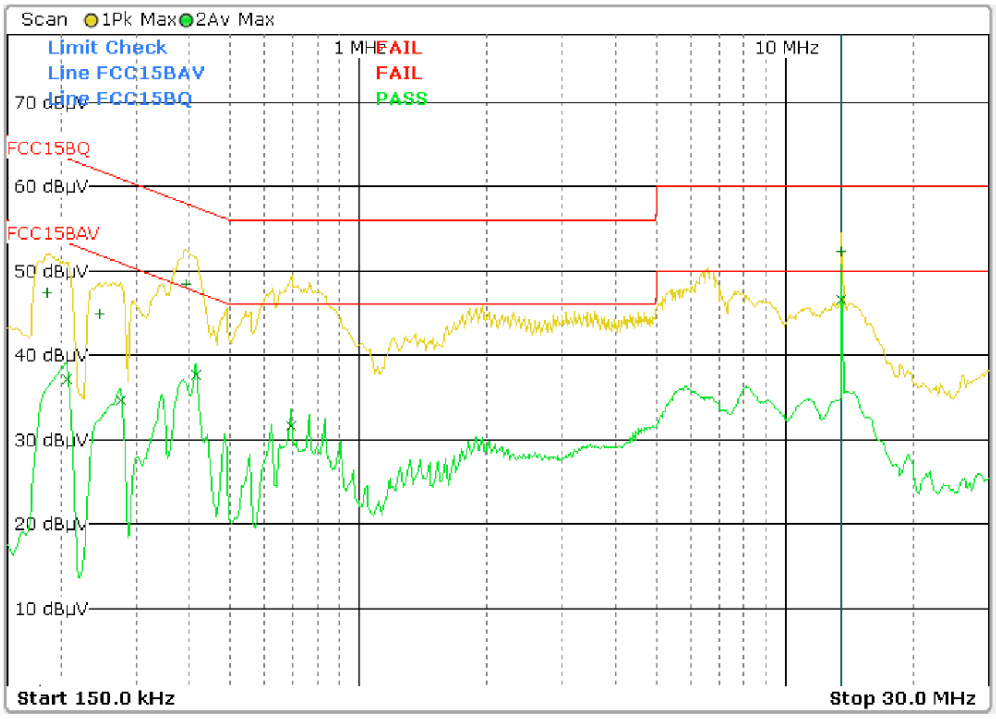
Meas Time	1.0 s
Margin	15.0 dB
Peaks	10

Trace	Frequency	Level (dBµV)	Phase	Detector	Delta Limit/dB
2	13.560000000 MHz	46.56		CISPR AV	-3.44
1	13.560000000 MHz	52.29		Quasi Peak	-7.71
1	393.000000000 kHz	48.43		Quasi Peak	-9.57
2	415.500000000 kHz	37.60		CISPR AV	-9.94
2	694.500000000 kHz	31.64		CISPR AV	-14.36
2	206.250000000 kHz	37.22		CISPR AV	-16.13
2	276.000000000 kHz	34.62		CISPR AV	-16.32
1	186.000000000 kHz	47.36		Quasi Peak	-16.85
1	246.750000000 kHz	44.82		Quasi Peak	-17.05

27.11.2015 09:28:51

Meas Type	CONDUCTED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A TAG
Operator	ANDREJ SKOF
Test Spec	NEUTRAL, Uin: 240 V, 50 Hz

Scan Diagram



7.2 Radiated emission measurement (intentional radiator)

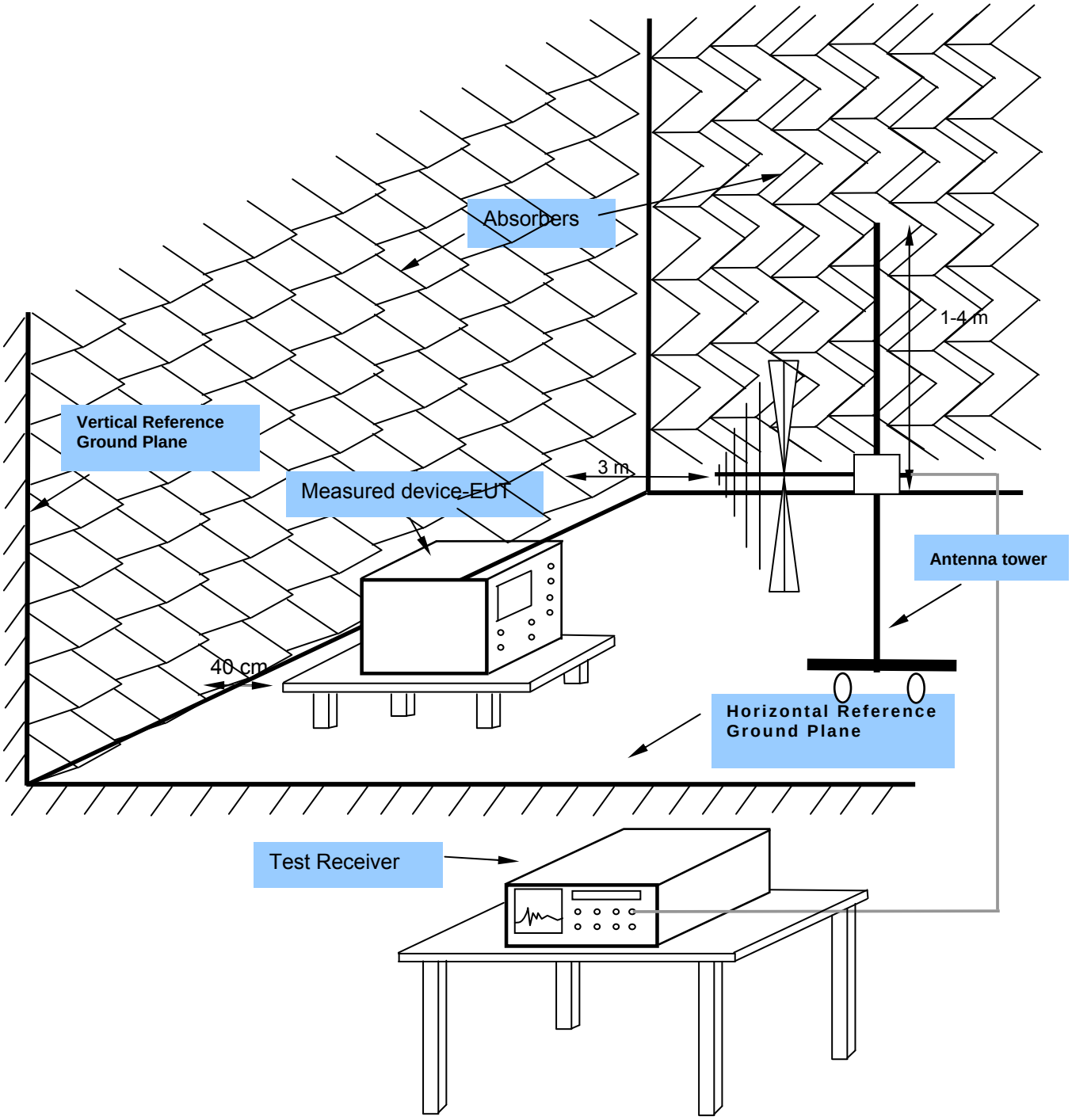
7.2.1 Test instruments

Description & Manufacturer	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU26	100428	2015-12	2017-12	24 months	/
R&S, Antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
EMCO, Antenna	3142B	104351	2015-09	2017-09	24 months	X
EMCO, Antenna	3115	103002	2015-09	2017-09	24 months	/
Heinrich Deisel, Turn table	DS 420.00	103337	N/A	N/A	N/A	X
Antenna tower	/	/	N/A	N/A	N/A	X
Controller for turn table and antenna tower	/	/	N/A	N/A	N/A	X

7.2.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m and 10 m away from the interference-receiving antenna, which was mounted on the top of variable-height antenna tower. Highest peaks were recalculated to proper distance requirement.
3. The antenna is a loop and a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to PEAK and QUAS-PEAK Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The highest points would be re-tested one by one using the quasi-peak method.

7.2.3 Test setup



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

7.2.4 Test result (15.209)

Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.
Preliminary measurement at 3 m in SAC:

ROHDE&SCHWARZ

C20160278 30.Sep 15 07:23

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Waiting a card
Operator	Andrej Skof

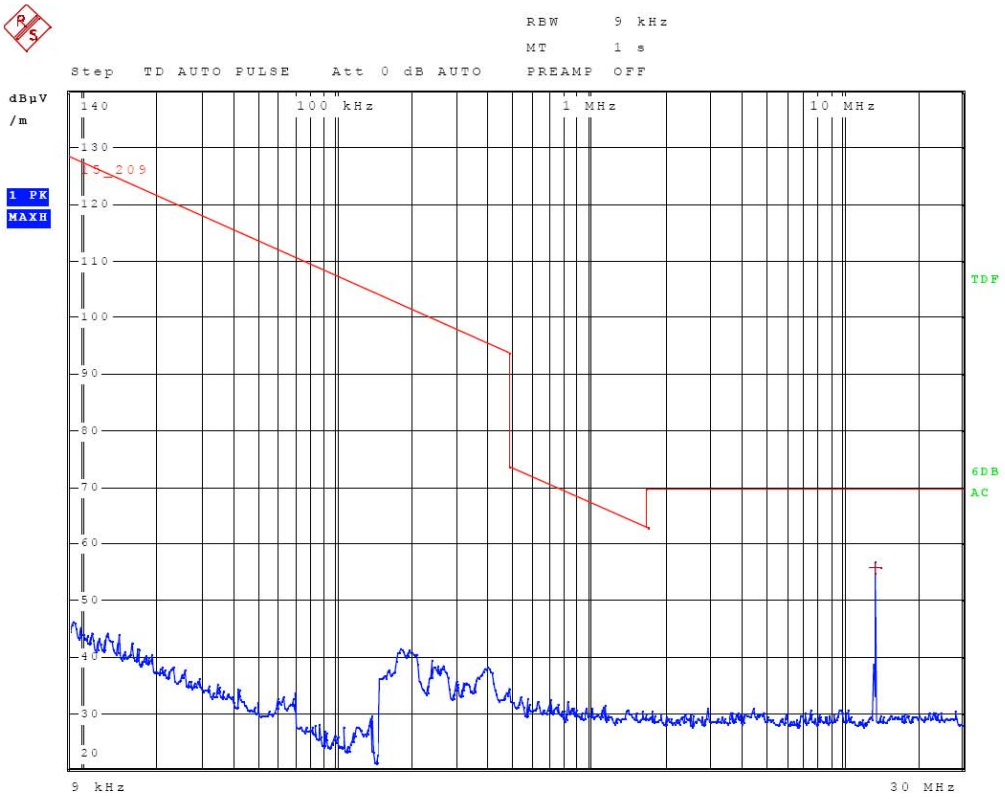
Test Spec

Antenna: 315 deg, Sample: 320 deg

Time Domain Scan (2 Ranges)

Scan Start: 9 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
9.000000 kHz	149.950000 kHz	50.00 Hz	200.00 Hz	200 ms	Auto	0 dB	INPUT2
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160278

30.Sep 15 07:23

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Waiting a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Final Measurement

Meas Time:	1 s
Margin:	20 dB
Peaks:	1

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	13.560000000 MHz	55.74	Quasi Peak	-13.76

ROHDE&SCHWARZ

C20160278

30.Sep 15 07:22

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Reading a card
Operator	Andrej Skof

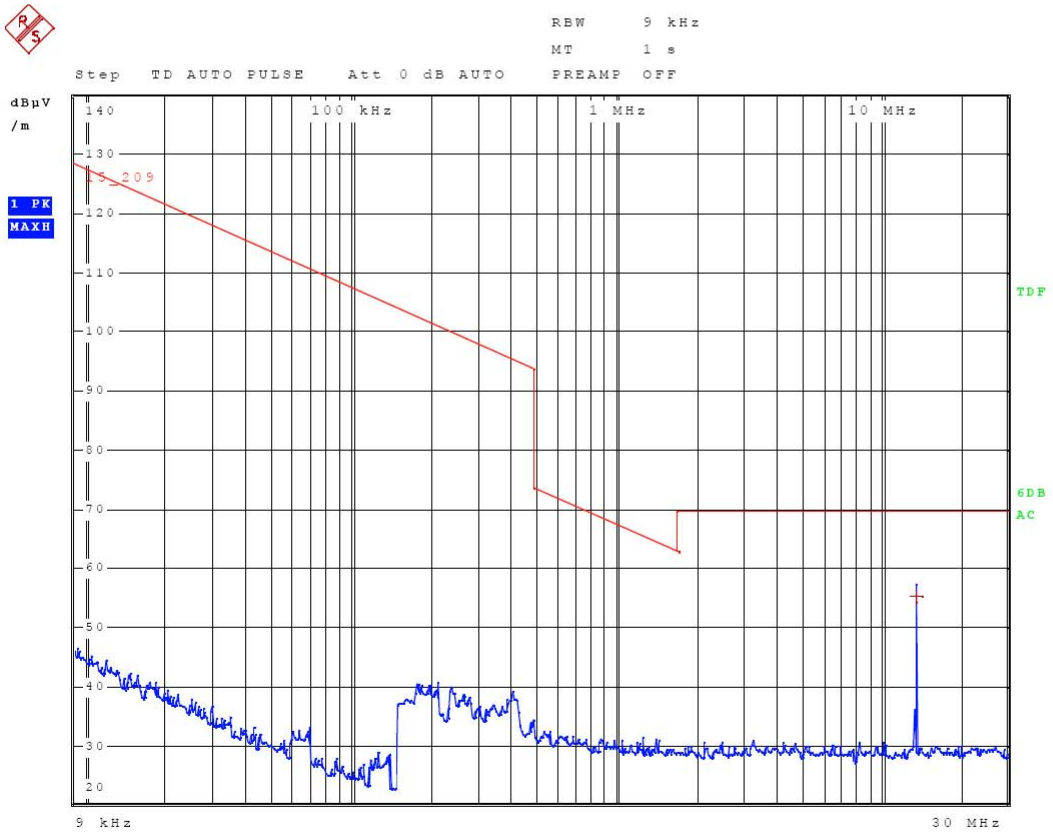
Test Spec

Antenna: 315 deg, Sample: 320 deg

Time Domain Scan (2 Ranges)

Scan Start: 9 kHz
Scan Stop: 30 MHz
Detector: Trace 1: MAX PEAK
Transducer: HFH2-Z2V

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
9.000000 kHz	149.950000 kHz	50.00 Hz	200.00 Hz	200 ms	Auto	0 dB	INPUT2
150.000000 kHz	30.000000 MHz	2.25 kHz	9.00 kHz	30 ms	Auto	0 dB	INPUT2



ROHDE&SCHWARZ

C20160278

30.Sep 15 07:22

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Reading a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Final Measurement

Meas Time:	1 s
Margin:	20 dB
Peaks:	1

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	13.560000000 MHz	55.23	Quasi Peak	-14.27

Final measurement at 10 m in OATS

Results with measuring distance of 10 m				
Mode	**Frequency (MHz)**	**Measured value (dBµV/m)**	**Limit (dBµV/m)**	**Margin (dB)**
Reading a card	13.56	43.37	104.00	- 60.63
Waiting for a card	13.56	51.36	104.00	- 52.64

Calculated value from 10 m to 30 m						
Mode	**Frequency (MHz)**	**Measured value at 10 m (dBµV/m)**	**Correction factor from 10 m to 30 m (dB)**	**Calculated value at 30 m (dBµV/m)**	**Limit at 30 m (dBµV/m)**	**Margin (dB)**
Reading a card	13.56	43.37	20	23.37	84.00	- 60.63
Waiting for a card	13.56	51.36	20	31.36	84.00	- 52.64

NOTE: Antenna factor and cable loss are already included in measurement correction.

ROHDE&SCHWARZ

C20160278

22.Jan 16 13:32

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING FOR A CARD
Operator	Andrej Skof

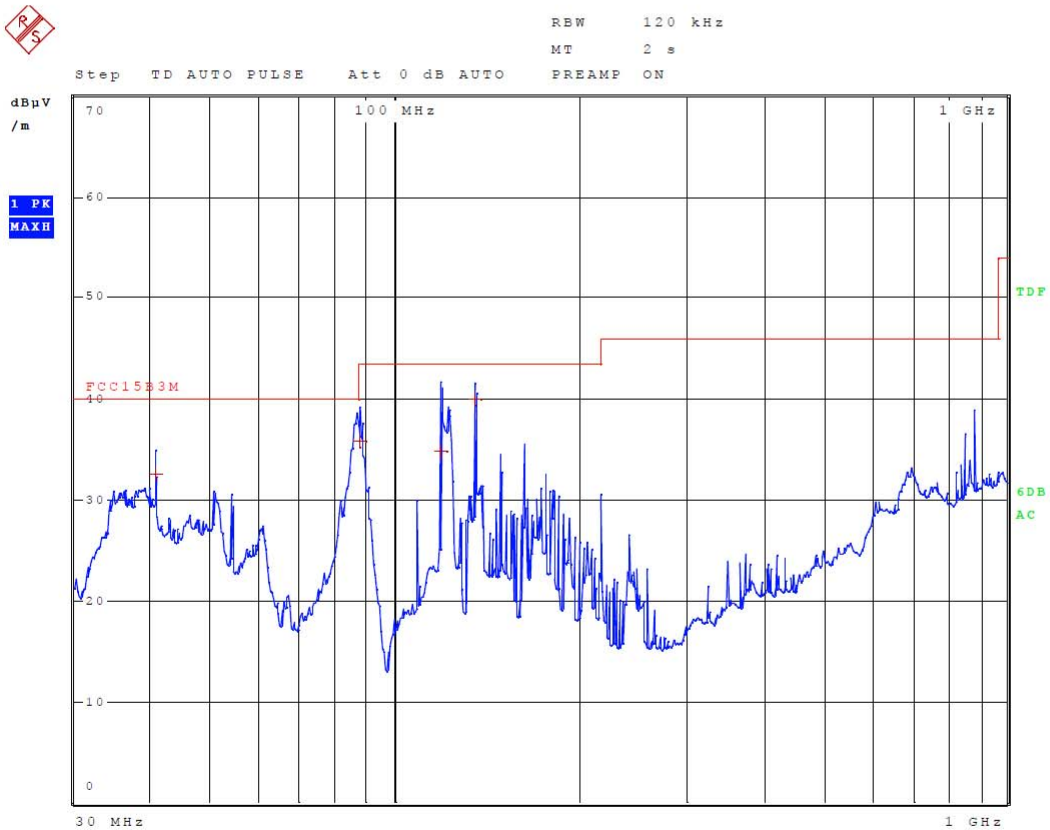
Test Spec

VERTICAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	2 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20160278

22.Jan 16 13:32

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING FOR A CARD
Operator	Andrej Skof

Test Spec

VERTICAL 100 cm, 0 deg

Final Measurement

Meas Time:	2 s
Margin:	6 dB
Peaks:	4

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	135.600000000 MHz	39.89	Quasi Peak	-3.61
1	87.690000000 MHz	35.76	Quasi Peak	-4.24
1	40.680000000 MHz	32.61	Quasi Peak	-7.39
1	119.070000000 MHz	34.83	Quasi Peak	-8.67

ROHDE&SCHWARZ

C20160278

22.Jan 16 13:34

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING FOR A CARD
Operator	Andrej Skof

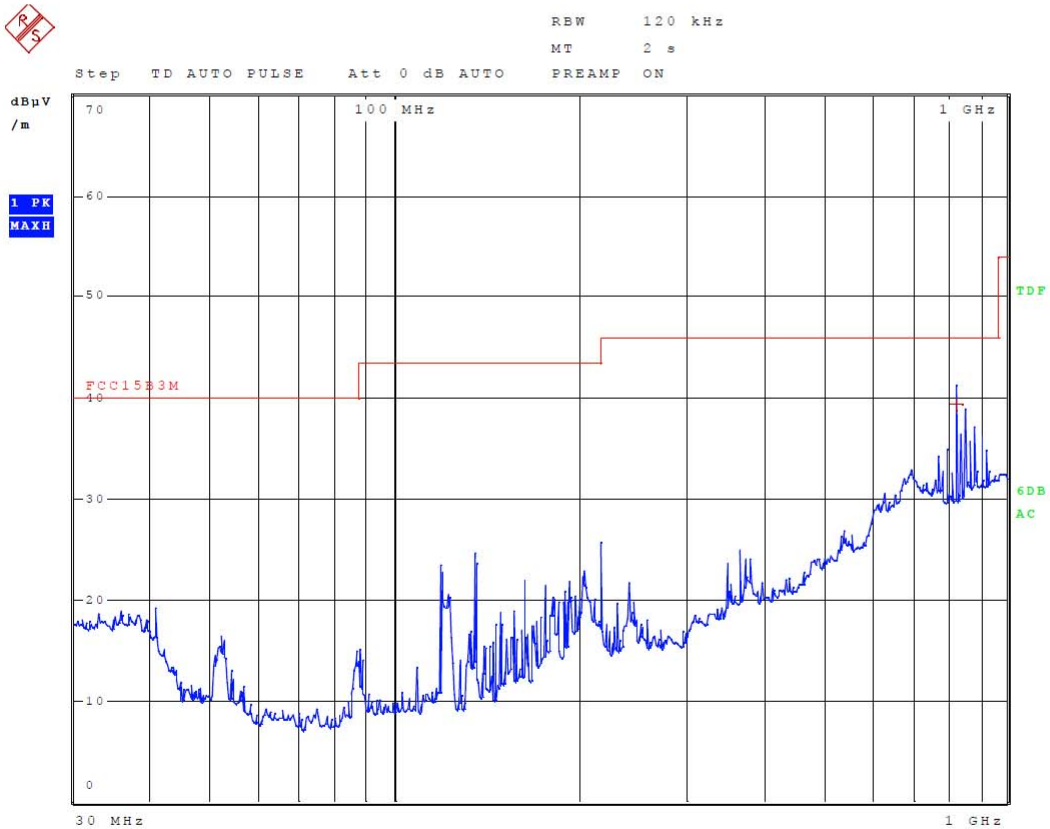
Test Spec

HORIZONTAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	2 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20160278

22.Jan 16 13:34

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	WAITING FOR A CARD
Operator	Andrej Skof

Test Spec

HORIZONTAL 100 cm, 0 deg

Final Measurement

Meas Time:	2 s
Margin:	6 dB
Peaks:	1

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	827.190000000 MHz	39.34	Quasi Peak	-6.66

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C20160278

22.Jan 16 13:47

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

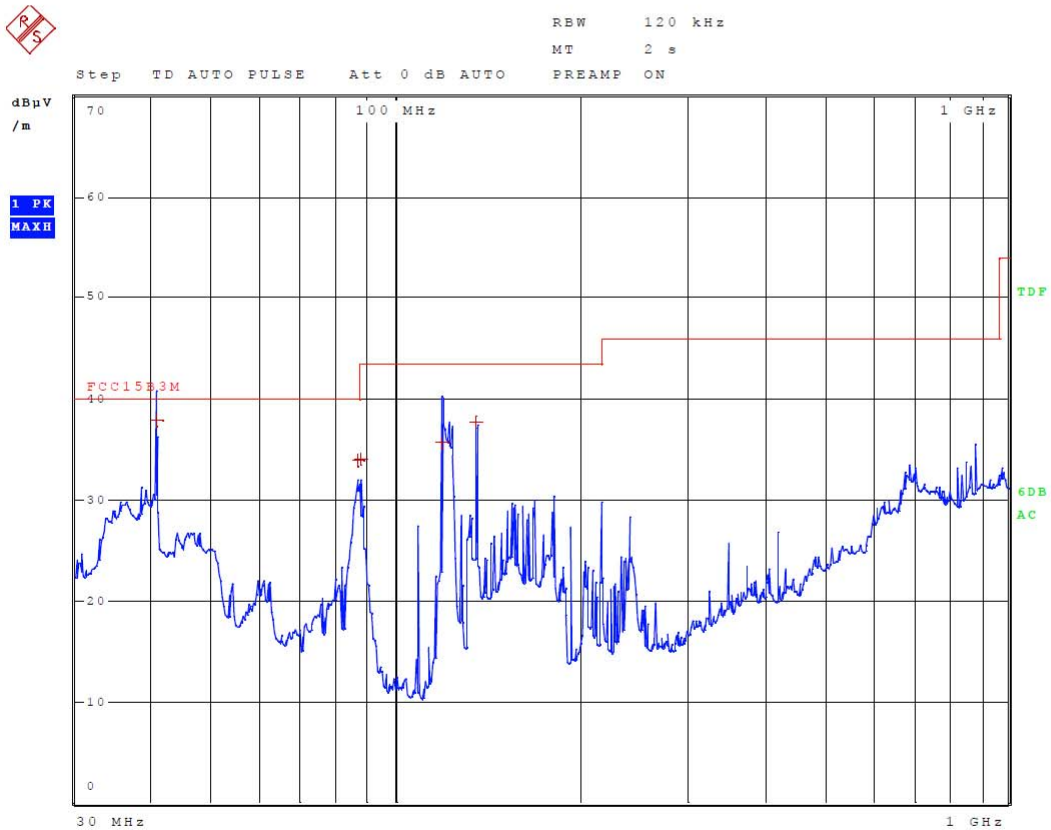
Test Spec

VERTICAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	2 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20160278

22.Jan 16 13:47

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

Test Spec

VERTICAL 100 cm, 0 deg

Final Measurement

Meas Time:	2 s
Margin:	10 dB
Peaks:	5

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	40.680000000 MHz	37.91	Quasi Peak	-2.09
1	135.600000000 MHz	37.69	Quasi Peak	-5.81
1	87.600000000 MHz	33.98	Quasi Peak	-6.02
1	86.640000000 MHz	33.92	Quasi Peak	-6.08
1	119.160000000 MHz	35.72	Quasi Peak	-7.78

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C20160278

22.Jan 16 13:45

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

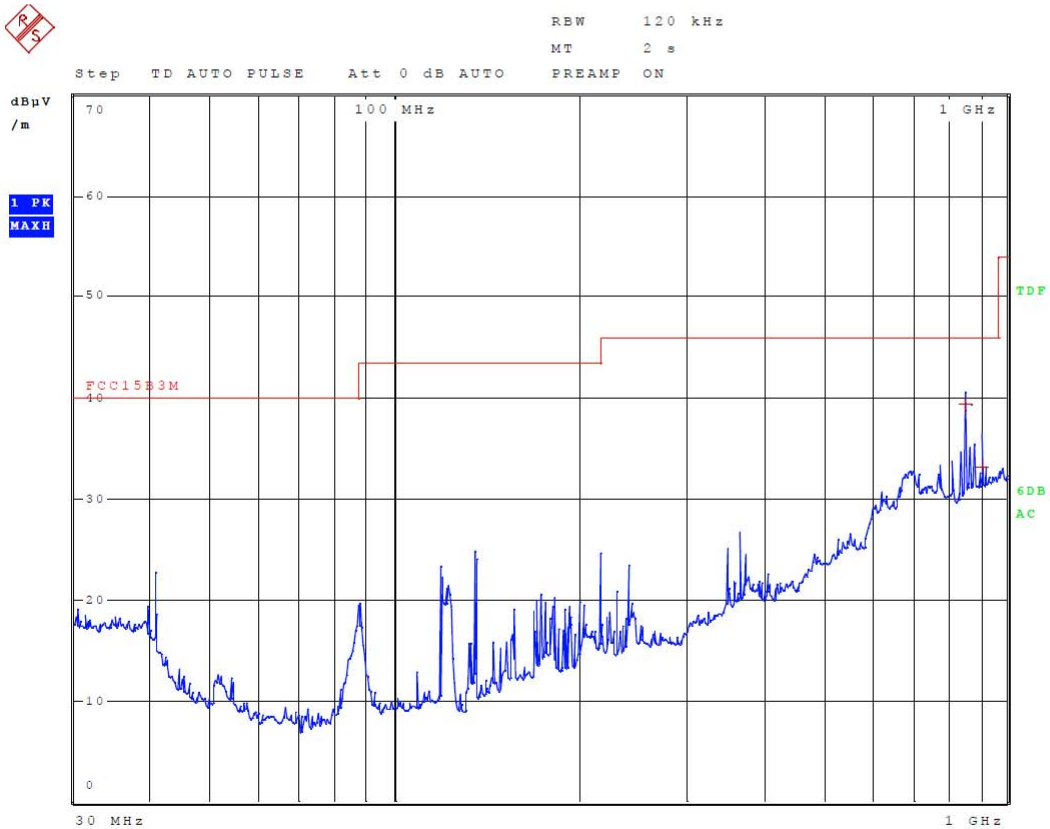
Test Spec

HORIZONTAL 100 cm, 0 deg

Time Domain Scan (1 Range)

Scan Start: 30 MHz
Scan Stop: 1 GHz
Detector: Trace 1: MAX PEAK
Transducer: 3142B3m

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	2 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20160278

22.Jan 16 13:45

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

Test Spec

HORIZONTAL 100 cm, 0 deg

Final Measurement

Meas Time:	2 s
Margin:	10 dB
Peaks:	2

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	854.310000000 MHz	39.27	Quasi Peak	-6.73
1	908.550000000 MHz	33.23	Quasi Peak	-12.77

Worst case measurement:

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C20160278

22.Jan 16 14:04

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

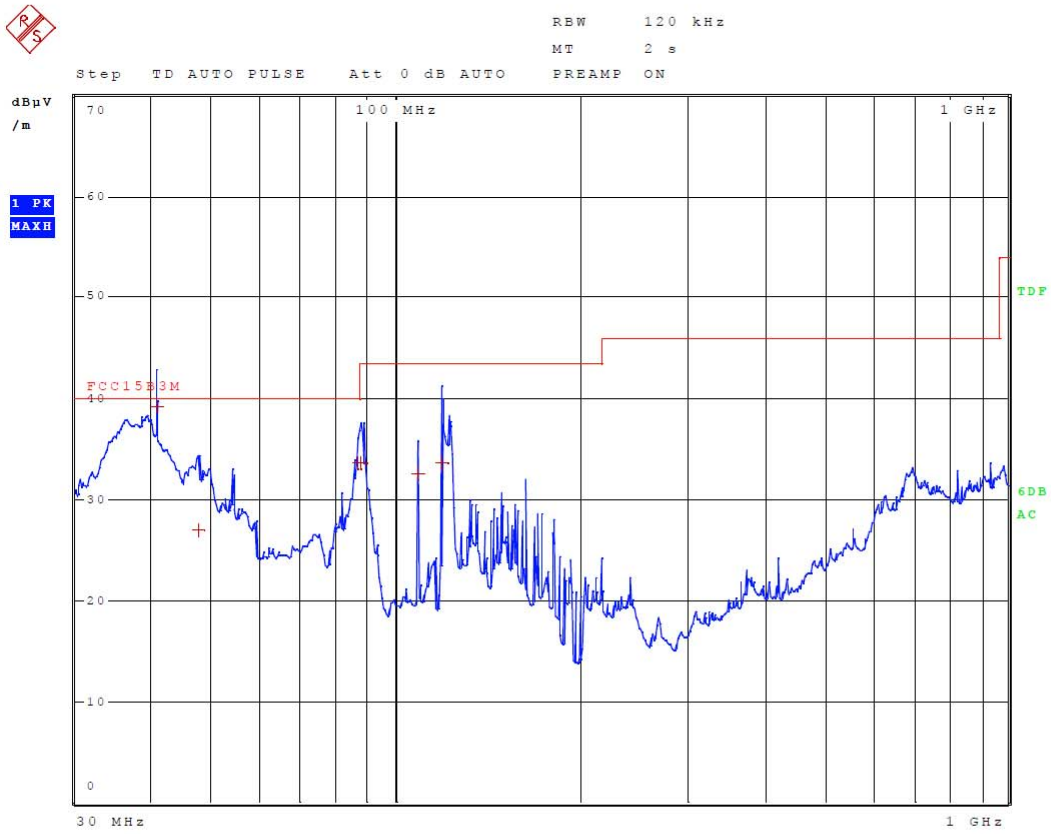
Test Spec

VERTICAL 100 cm, 80 deg

Time Domain Scan (1 Range)

Scan Start:	30 MHz
Scan Stop:	1 GHz
Detector:	Trace 1: MAX PEAK
Transducer:	3142B3m

Start Frequency	Stop Frequency	Step Size	Res BW	Meas Time	RF Atten	Preamp	Input
30.000000 MHz	1.000000 GHz	30.00 kHz	120.00 kHz	2 ms	Auto	20 dB	INPUT2



ROHDE&SCHWARZ

C20160278

22.Jan 16 14:04

Meas Type	RADIATED EMISSION
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	METRA INZENIRING D.O.O.
OP Condition	READING A CARD
Operator	Andrej Skof

Test Spec

VERTICAL 100 cm, 80 deg

Final Measurement

Meas Time:	2 s
Margin:	10 dB
Peaks:	6

Trace	Frequency	Level (dBµV/m)	Detector	Delta Limit/dB
1	40.680000000 MHz	39.13	Quasi Peak	-0.87
1	87.600000000 MHz	33.55	Quasi Peak	-6.45
1	86.610000000 MHz	33.55	Quasi Peak	-6.45
1	119.010000000 MHz	33.64	Quasi Peak	-9.86
1	108.480000000 MHz	32.64	Quasi Peak	-10.86
1	47.580000000 MHz	27.05	Quasi Peak	-12.95

7.3 Bandwidth of the emission (intentional radiator)

Section 15.215 Additional provisions to the general radiated emission limitations

7.3.1 Test instruments

Description & Manufacturer	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	X
EMCO, Antenna	3142B	06/068	2015-09	2017-09	24 months	
Rohde & Schwarz, Active loop antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
Heinrich Deisel, Turn table	DS 420.00	103337	NA	NA	NA	X
ETS, Antenna tower	/	/	NA	NA	NA	X
ETS, Controller for turn table and antenna tower	/	/	NA	NA	NA	X

7.3.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Resolution bandwidth is set to a value greater than 5% of the allowed bandwidth. If no bandwidth specifications are given, the guidelines in Section 1.4 are used

7.3.3 Test results (15.215)

Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.

ROHDE&SCHWARZ

C20160278

30.Sep 15 07:29

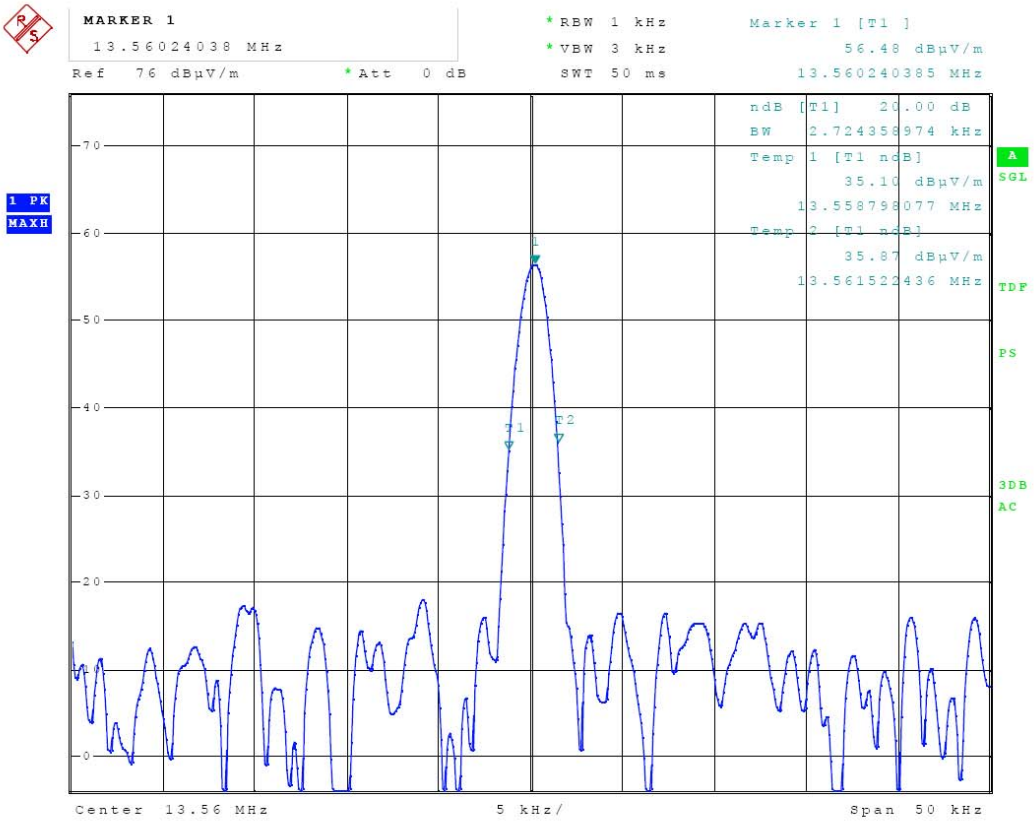
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Waiting a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	76.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	50.000000 kHz	Ref Position	100.000 %
Start Frequency	13.535000 MHz	Level Range	80.000 dB
Stop Frequency	13.585000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	50.00 ms	Y-Axis	LOG



ROHDE&SCHWARZ

C20160278

30.Sep 15 07:28

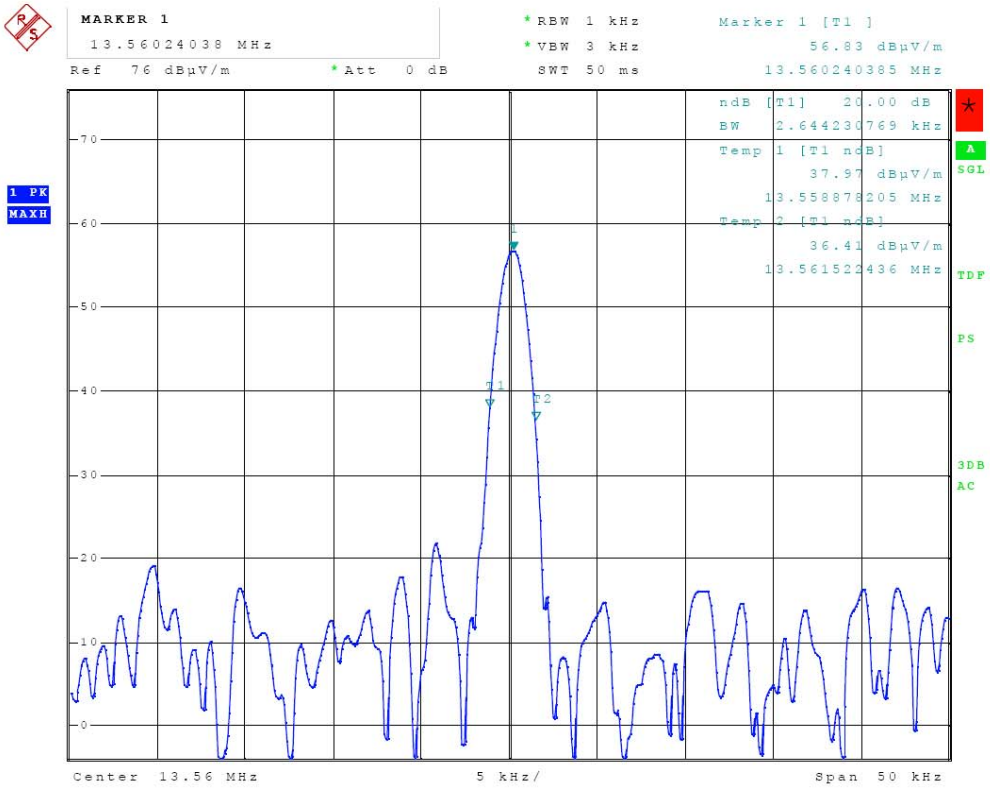
Meas Type	OCCUPIED BANDWIDTH
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Reading a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	76.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	50.000000 kHz	Ref Position	100.000 %
Start Frequency	13.535000 MHz	Level Range	80.000 dB
Stop Frequency	13.585000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	50.00 ms	Y-Axis	LOG



Page 1 of 1

Frequency (MHz)	Permitted frequency band (MHz)	20 dB bandwidth (kHz)	PASS/FAIL
13.56	13.110 – 14.010	2.64	PASS

7.4 Spectrum mask (intentional radiator)

Section 15.225 Operation within the band 13.110 – 14.010 MHz – clause a – clause d

7.4.1 Test instruments

Description & Manufacturer	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
ETS, Anechoic chamber	3m	103949	2014-11	2016-11	24 months	X
Rohde-Schwarz, RFI receiver	ESU26	106897	2015-12	2017-12	24 months	X
EMCO, Antenna	3142B	06/068	2015-09	2017-09	24 months	
Rohde & Schwarz, Active loop antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
Heinrich Deisel, Turn table	DS 420.00	103337	NA	NA	NA	X
ETS, Antenna tower	/	/	NA	NA	NA	X
ETS, Controller for turn table and antenna tower	/	/	NA	NA	NA	X

7.4.2 Test procedure

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground in an Anechoic Chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 m away from the interference-receiving antenna.
3. Frequencies with maximum emission were retested on OATS.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.

7.4.3 Test results (15.225)

Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.

ROHDE&SCHWARZ

C20160278 30.Sep 15 07:25

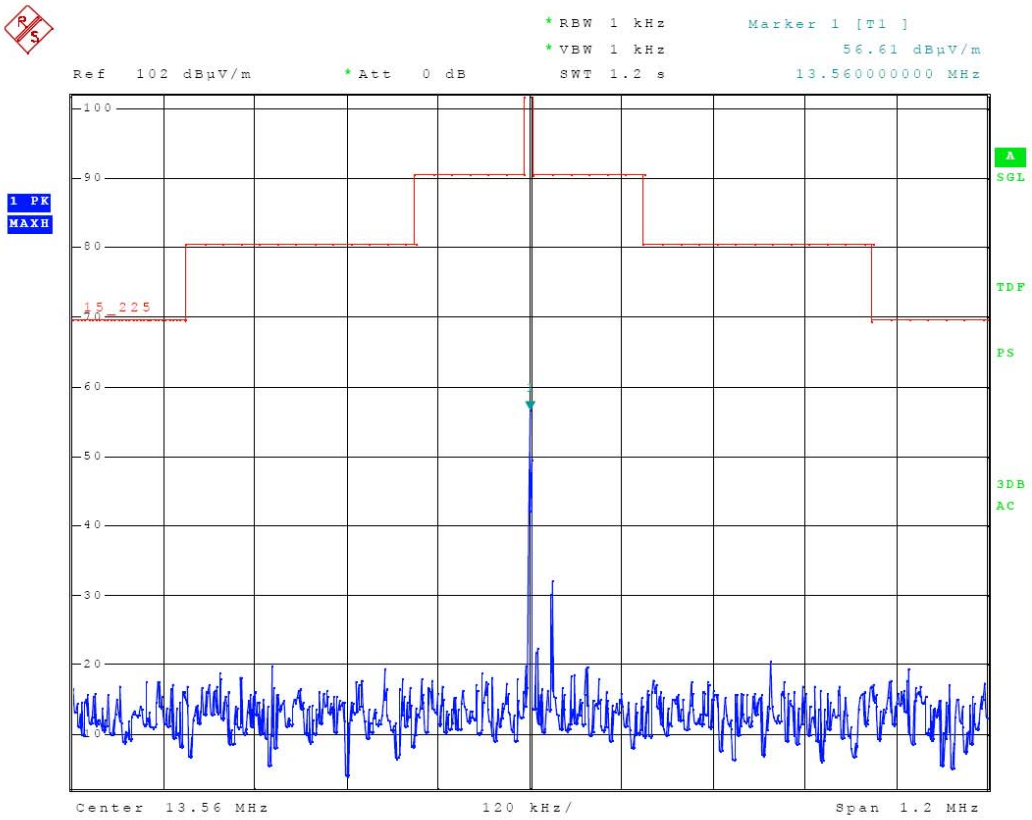
Meas Type	SPECTRUM MASK
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Waiting a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	102.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	1.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



ROHDE&SCHWARZ

C20160278

30.Sep 15 07:27

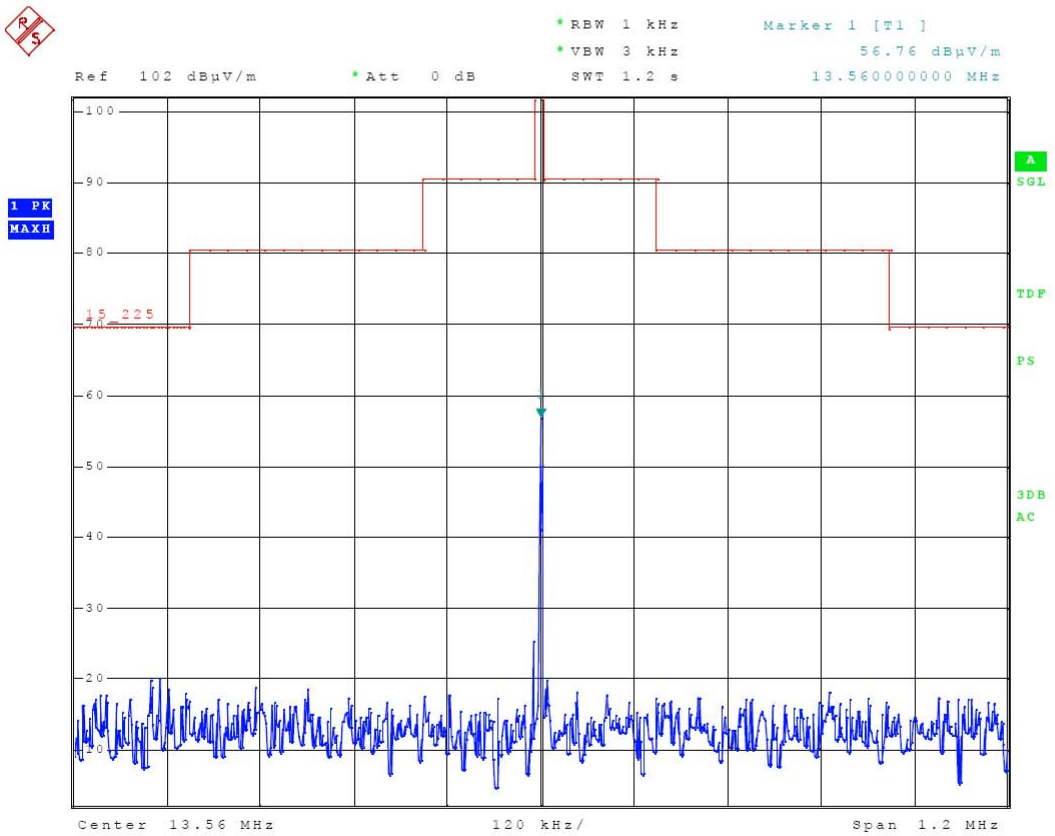
Meas Type	SPECTRUM MASK
Equipment under Test	Electronic Lock RFID ISO MT
Manufacturer	Metra inzeniring d.o.o.
OP Condition	Reading a card
Operator	Andrej Skof

Test Spec

Antenna: 315 deg, Sample: 320 deg

Sweep Settings Screen A

Center Frequency	13.560000 MHz	Ref Level	102.000 dBµV/m
Frequency Offset	0.000000 Hz	Ref Level Offset	0.000 dB
Span	1.200000 MHz	Ref Position	100.000 %
Start Frequency	12.960000 MHz	Level Range	100.000 dB
Stop Frequency	14.160000 MHz	RF Att	0.000 dB
RBW	1.000000 kHz		
VBW	3.000000 kHz	X-Axis	LIN
Sweep Time	1.20 s	Y-Axis	LOG



7.5 Frequency tolerance of the carrier signal

Section 15.225 Operation within the band 13.110 – 14.010 MHz

7.5.1 Test instruments:

Description & Manufacturer	Model No.	SIQ No.	Last calibration	Calibrated until	Calibration period	Used
Rohde-Schwarz, RFI receiver	ESU8	105187	2015-11	2017-11	24 months	X
Rohde & Schwarz, Active loop antenna	HFH2-Z2	/	2015-09	2017-09	24 months	X
Fluke, Digital Multimeter	179	106728	2015-07	2016-07	12 months	X
Kambič, Temperature chamber	I-190 CK	107298	Na	Na	/	X

7.5.2 Test requirements:

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

7.5.3 Test results (15.225)

Device passed the requirements stated in ANSI C63.4, FCC Part 15, Subpart C.

Temperature (°C)	Supply voltage (V)	Minutes after switch on	Measured Frequency (MHz)	Allowed tolerance	Measured tolerance (kHz)	RESULT
50	12,00	0	13,559783000	Fref±1.356 kHz	-0,043	PASS
	12,00	2	13,559783000	Fref±1.356 kHz	-0,043	PASS
	12,00	5	13,559768000	Fref±1.356 kHz	-0,058	PASS
	12,00	10	13,559768000	Fref±1.356 kHz	-0,058	PASS
40	12,00	0	13,559812000	Fref±1.356 kHz	-0,014	PASS
	12,00	2	13,559797000	Fref±1.356 kHz	-0,029	PASS
	12,00	5	13,559797000	Fref±1.356 kHz	-0,029	PASS
	12,00	10	13,559783000	Fref±1.356 kHz	-0,043	PASS
30	12,00	0	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	2	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	5	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	10	13,559812000	Fref±1.356 kHz	-0,014	PASS
20	10,20	0	13,559841000	Fref±1.356 kHz	0,015	PASS
	10,20	2	13,559841000	Fref±1.356 kHz	0,015	PASS
	10,20	5	13,559826000	Fref±1.356 kHz	0,000	PASS
	10,20	10	13,559826000	Fref±1.356 kHz	0,000	PASS
20	12,00	0	13,559841000	Fref±1.356 kHz	0,015	PASS
	12,00	2	13,559841000	Fref±1.356 kHz	0,015	PASS
	12,00	5	13,559841000	Fref±1.356 kHz	0,015	PASS
	12,00	**10**	**13,559826000**	**Fref**	0,000	
20	13,80	0	13,559841000	Fref±1.356 kHz	0,015	PASS
	13,80	2	13,559826000	Fref±1.356 kHz	0,000	PASS
	13,80	5	13,559826000	Fref±1.356 kHz	0,000	PASS
	13,80	10	13,559826000	Fref±1.356 kHz	0,000	PASS
10	12,00	0	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	2	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	5	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	10	13,559826000	Fref±1.356 kHz	0,000	PASS
0	12,00	0	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	2	13,559841000	Fref±1.356 kHz	0,015	PASS
	12,00	5	13,559841000	Fref±1.356 kHz	0,015	PASS
	12,00	10	13,559826000	Fref±1.356 kHz	0,000	PASS
-10	12,00	0	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	2	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	5	13,559826000	Fref±1.356 kHz	0,000	PASS
	12,00	10	13,559826000	Fref±1.356 kHz	0,000	PASS
-20	12,00	0	13,559738064	Fref±1.356 kHz	-0,088	PASS
	12,00	2	13,559781333	Fref±1.356 kHz	-0,045	PASS
	12,00	5	13,559790949	Fref±1.356 kHz	-0,035	PASS
	12,00	10	13,559790949	Fref±1.356 kHz	-0,035	PASS