



RFID 13.56 MHz Radio Test Report

FCC ID: WXAER755

This report concerns (check one) : Original Grant Class II Change

Issued Date : Jun. 19, 2012
Project No. : 1205068
Equipment : Mifare Ethernet Reader
Model Name : ER755; ER750-XX; ER755-XX (XX: 0~9, A~Z)

Applicant : GIGA-TMS INC.
Address : 8F, No. 31, Lane 169, Kang-Ning St.,
His-Choh, New Taipei City, Taiwan

Tested by: Neutron Engineering Inc. EMC Laboratory
Date of Receipt: May 11, 2012
Date of Test: May 11, 2012 ~ May 24, 2012

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Declaration

Neutron represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

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1 CERTIFICATION

Equipment : Mifare Ethernet Reader
Brand Name : GIGATEK; PROMAG ; ProData
Model Name : ER755; ER750-XX; ER755-XX (XX: 0~9, A~Z)
Applicant : GIGA-TMS INC.
Date of Test : May 11, 2012 ~ May 24, 2012
Standards : FCC Part 15, Subpart C: 2010
ANSI C63.4: 2009

The above equipment has been tested and found compliance with the requirement of the relative standards by Neutron Engineering Inc. EMC Laboratory.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. NEI-FCCP-1-1205068) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of NVLAP and TAF according to the ISO-17025 quality assessment standard and technical standard(s).



2 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 15, Subpart C: 2010			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted emission	N/A	
15.35 / 15.205 / 15.209 / 15.225	Radiated emission	PASS	
15.225(e)	Frequency Stability	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) Portable device; SAR report is required.



2.1 TEST FACILITY

CB08: (VCCI RN: G-91; FCC RN: 614388; FCC DN: TW1054; IC Assigned Code: 4428C-1)
 1F., No. 61, Ln. 77, Sing-ai Rd., Neihu Dist., Taipei City 114, Taiwan (R.O.C.)

2.2 MEASUREMENT UNCERTAINTY

The measurement uncertainty is not specified by FCC rules and for reference only.
 The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately **95%**.
 The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2.

Test Site	Item	Measurement Frequency Range	Uncertainty	NOTE	
CB08	Radiated emission at 3m	Horizontal Polarization	30 - 200MHz	3.35 dB	
			200 - 1000MHz	3.11 dB	
			1 - 18GHz	3.97 dB	
			18 - 40GHz	4.01 dB	
		Vertical Polarization	30 - 200MHz	3.22 dB	
			200 - 1000MHz	3.24 dB	
			1 - 18GHz	4.05 dB	
			18 - 40GHz	4.04 dB	

Our calculated Measurement Instrumentation Uncertainty is shown in the tables above. These are our U_{lab} values in CISPR 16-4-2 terminology.
 Since Table 1 of CISPR 16-4-2 has values of measurement instrumentation uncertainty, called U_{CISPR} , as follows:
 Conducted Disturbance (mains port) – 150 kHz – 30 MHz : 3.6 dB
 Radiated Disturbance (electric field strength on an open area test site or alternative test site) – 30 MHz – 1000 MHz : 5.2 dB
 It can be seen that our U_{lab} values are smaller than U_{CISPR} .



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	Mifare Ethernet Reader						
Brand Name	GIGATEK; PROMAG ; ProData						
Model Name	ER755; ER750-XX; ER755-XX (XX: 0~9, A~Z)						
OEM Brand/Model Name	N/A						
Model Difference	<p>All models are based on similar electrical circuit except the difference of list below:</p> <table border="1"> <thead> <tr> <th>Model Name</th> <th>PoE Function</th> </tr> </thead> <tbody> <tr> <td>ER755; ER755-XX</td> <td>YES</td> </tr> <tr> <td>ER750-XX</td> <td>NONE</td> </tr> </tbody> </table> <p>All the above models were tested, and the model: ER755 was found to be the worst case during the pre-scanning test. This model of the worst case was used for final testing and collecting test data included in this report.</p>	Model Name	PoE Function	ER755; ER755-XX	YES	ER750-XX	NONE
Model Name	PoE Function						
ER755; ER755-XX	YES						
ER750-XX	NONE						
Product Description	<p>The EUT is a Mifare Ethernet Reader.</p> <table border="1"> <tr> <td>Operation Frequency:</td> <td>13.56 MHz</td> </tr> <tr> <td>Antenna Designation:</td> <td>LOOP Antenna</td> </tr> </table> <p>Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</p>	Operation Frequency:	13.56 MHz	Antenna Designation:	LOOP Antenna		
Operation Frequency:	13.56 MHz						
Antenna Designation:	LOOP Antenna						
Power Source	<p>1. DC Voltage supplied from DC Source. 2. PoE.</p>						
Power Rating	<p>1. I/P: DC 9V 2. I/P: DC 48V</p>						
Connecting I/O Port(s)	Please refer to the User's Manual						
Products Covered	N/A						
EUT Modification(s)	N/A						

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.



3.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Test Mode	Description
Mode 1	TX (DC 9V)
Mode 2	TX (POE 48V)

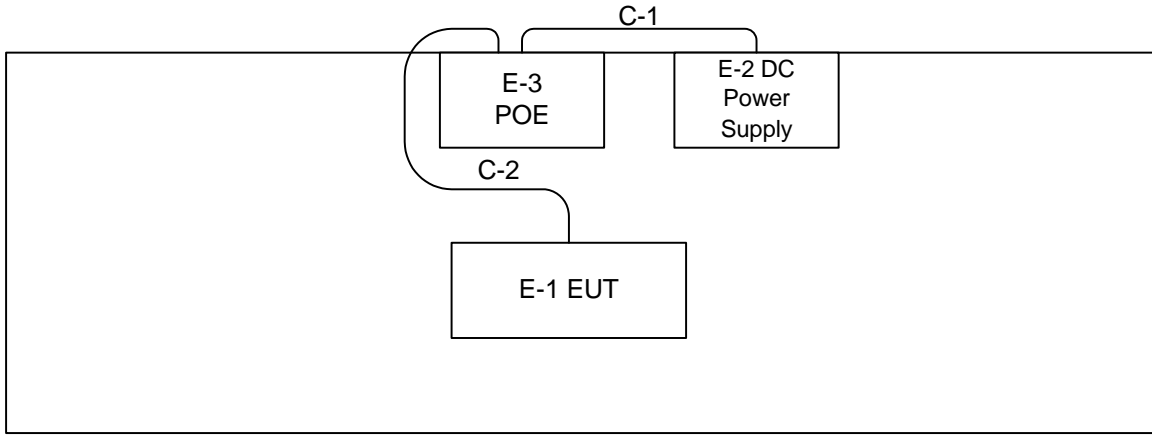
Radiated emission test	
Final Test Mode	Description
Mode 2	TX (POE 48V)

Frequency Stability test	
Final Test Mode	Description
Mode 2	TX (POE 48V)

Antenna Requirement test	
Final Test Mode	Description
Mode 2	TX (POE 48V)



3.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



C-1 DC Power Cable
C-2 RJ-45 Cable



3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
E-1	Mifare Ethernet Reader	GIGATEK; PROMAG ; ProData	ER755	WXAER755	N/A	EUT
E-2	DC Power Supply	GOOD WILL	GPC-3030D	N/A	B710591	
E-3	POE	N/A	N/A	N/A	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.2M	
C-2	NO	NO	1.0M	

Note:

- (1) The support equipment was authorized by Declaration of Conformity (DOC).



4 EMC EMISSION TEST

4.1 RADIATED EMISSION TEST

4.1.1 LIMIT

FCC Part 15.209				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
0.009 – 0.490	2400 / F(KHz)	300m	10000 * 2400/F(KHz)	20log 2400/F(KHz) + 80
0.490 – 1.705	24000 / F(KHz)	30m	100 * 24000/F(KHz)	20log 24000/F(KHz) + 40
1.705 – 30.00	30	30m	100* 30	20log 30 + 40
30.0 – 88.0	100	3m	100	20log 100
88.0 – 216.0	150	3m	150	20log 150
216.0 – 960.0	200	3m	200	20log 200
Above 960.0	500	3m	500	20log 500
FCC Part 15.225(a)/(b)/(c)				
Frequency (MHz)	Field Strength Limitation		Field Strength Limitation at 3m Measurement Dist	
	(uV/m)	Dist	(uV/m)	(dBuV/m)
13.553 – 13.567	15,848	30 m	15,848*100	124
13.567 – 13.710	334	30 m	334*100	90.5
13.110 – 13.410 13.710 – 14.010	106	30 m	106*100	80.5

Note:

- (1) The tighter limit shall apply at the boundary between two frequency range.
- (2) Limitation expressed in dBuV/m is calculated by 20log Emission Level (uV/m).
- (3) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula of $L_{d1} = L_{d2} * (d_2/d_1)^2$.
 Example:
 F.S Limit at 30m distance is 30uV/m , then F.S Limitation at 3m distance is adjusted as $L_{d1} = L_1 = 30uV/m * (10)^2 = 100 * 30 uV/m$
- (4) The test result calculated as following:
 Measurement Value = Reading Level + Correct Factor
 Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
 Margin Level = Measurement Value – Limit Value



4.1.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012
2	Microflex Cable	N/A	N/A	1m	May. 14, 2013
3	Test Cable	N/A	LMR-400	966_12m	Jun. 16, 2012
4	Test Cable	N/A	LMR-400	966_3m	Jun. 16, 2012
5	Pre-Amplifier	EMC	EMC-330	980001	Jun. 02, 2012
6	Log-Bicon Antenna	Schwarzbeck	VULB9168-352	9168-352	Jun. 20, 2012
7	Loop Ant.	EMCO	6502	00042960	Jan. 12,2013

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

4.1.3 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m or 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

NOTE: (FCC PART 15.209)

- a. Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode with Detector BW=120 kHz.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.

NOTE: (FCC PART 15.225)

- a. Spectrum Setting:
 9 KHz – 150 KHz, RBW= 200Hz, VBW=200Hz, Sweep time = 200 ms.
 150 K Hz – 30 MHz, RBW= 10 KHz, VBW=10 KHz, Sweep time = 200 ms.
 30 MHz – 1000 MHz, RBW= 100KHz, VBW=100KHz, Sweep time = 200 ms.
- b. All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform.
- c. The Log-Bicon Antenna will use to test frequency range from 30MHz to 1000MHz and the Loop Antenna will use to test frequency below 30MHz.

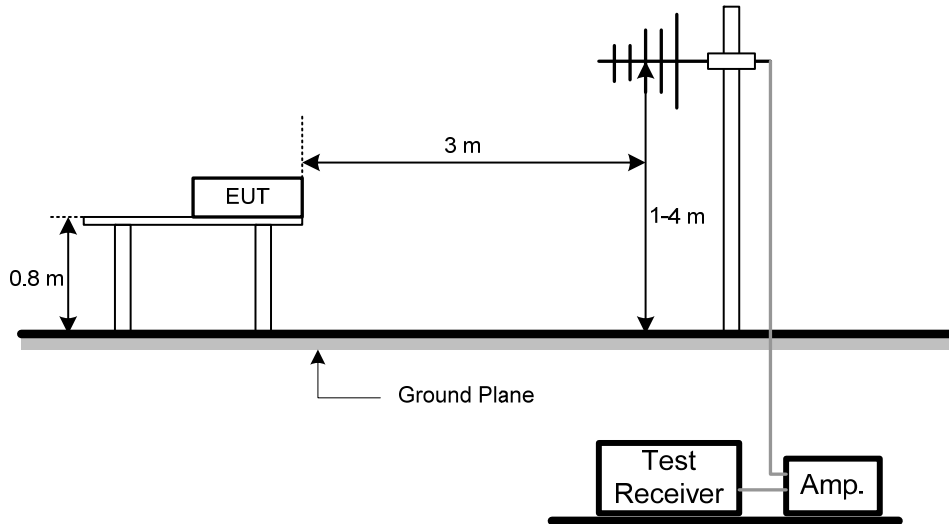
4.1.4 DEVIATION FROM TEST STANDARD

No deviation

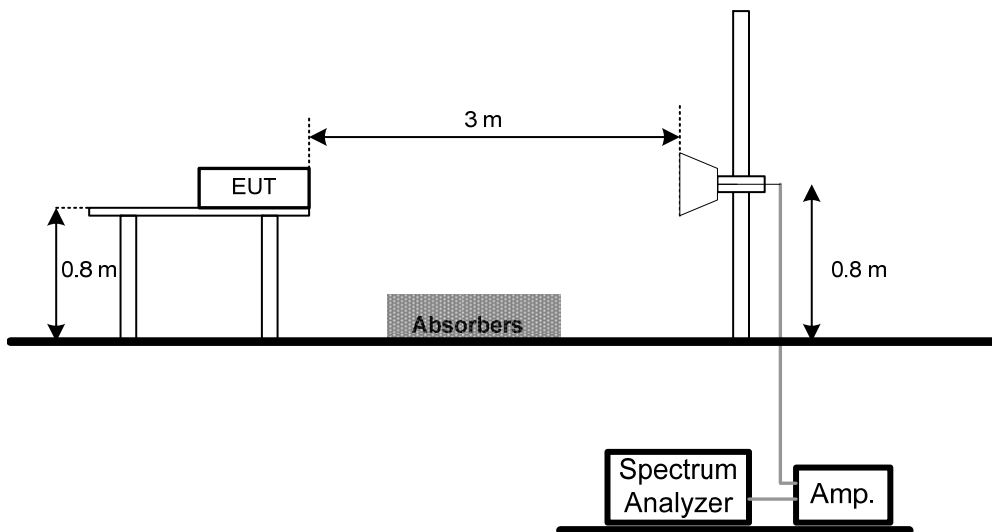


4.1.5 TEST SETUP

Below 1 GHz



Above 1 GHz





4.1.6 EUT OPERATING CONDITIONS

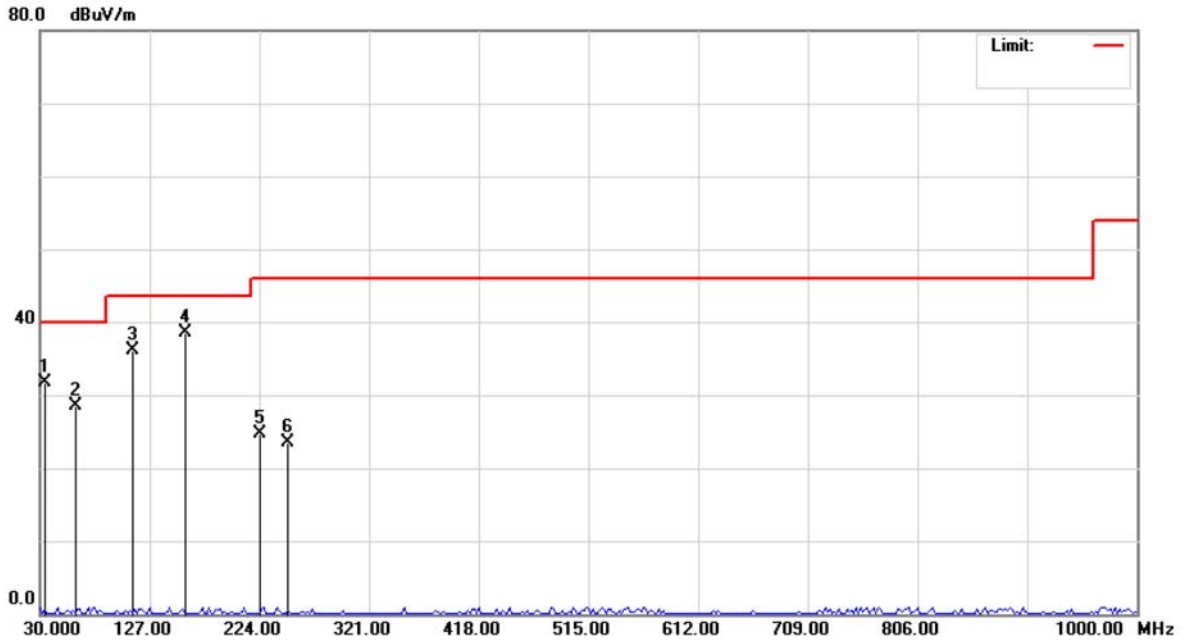
The EUT exercise program used during radiated emission measurement was designed to exercise the various system components in a manner similar to a typical use.



4.1.7 TEST RESULTS- FCC PART 15.209

E.U.T	Mifare Ethernet Reader	Model Name	ER755
Temperature	26 °C	Relative Humidity	60%
Test Voltage	DC 48V		
Test Mode	TX (POE 48V)		

Polarization: Vertical

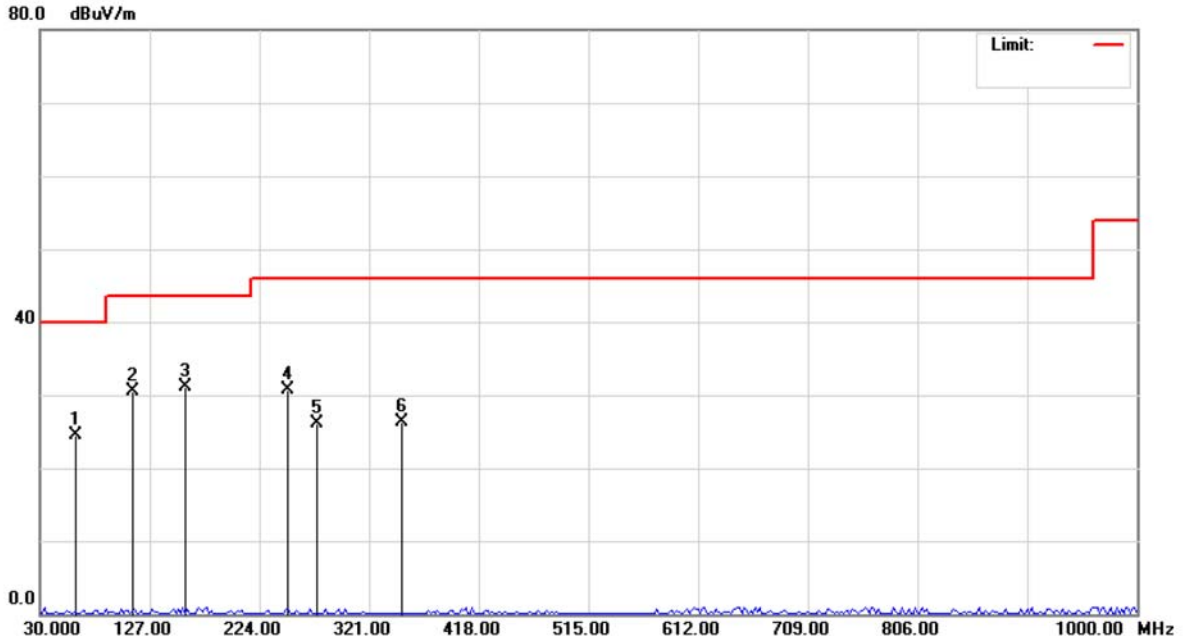


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	33.8800	44.53	-12.92	31.61	40.00	-8.39	peak	
2	61.0400	41.47	-12.87	28.60	40.00	-11.40	peak	
3	111.4800	52.01	-15.84	36.17	43.50	-7.33	peak	
4 *	158.0400	51.29	-12.82	38.47	43.50	-5.03	peak	
5	224.0000	39.64	-14.89	24.75	46.00	-21.25	peak	
6	249.2200	37.45	-13.88	23.57	46.00	-22.43	peak	



E.U.T	Mifare Ethernet Reader	Model Name	ER755
Temperature	26 °C	Relative Humidity	60%
Test Voltage	DC 48V		
Test Mode	TX (POE 48V)		

Polarization: Horizontal

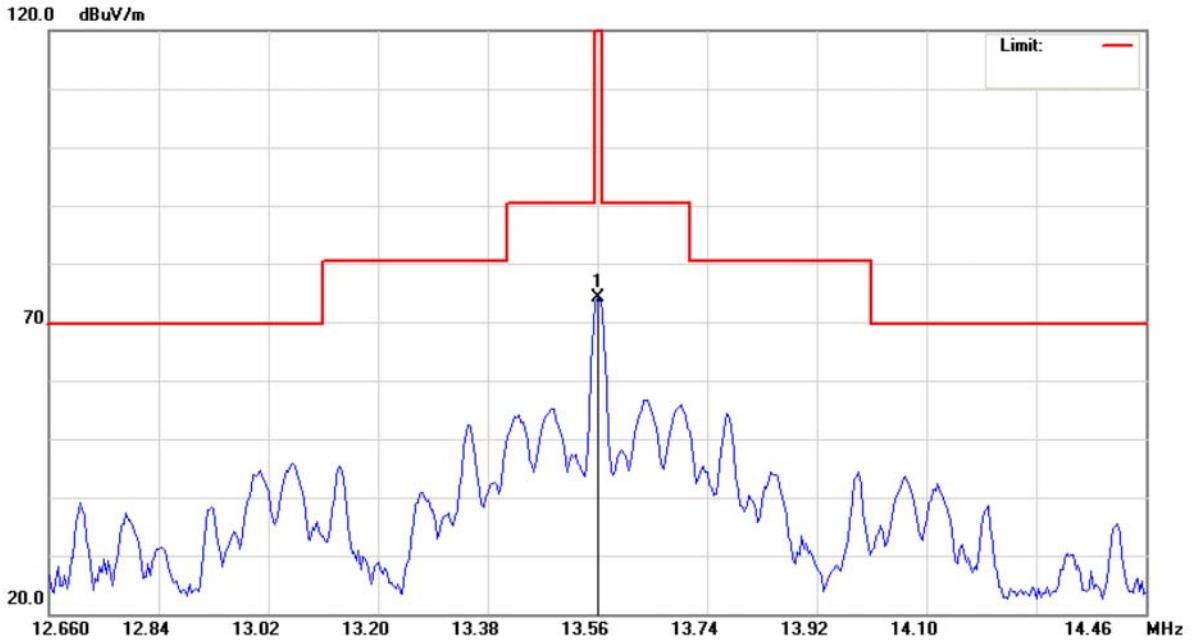


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1		61.0400	37.30	-12.87	24.43	40.00	-15.57	peak	
2		111.4800	46.34	-15.84	30.50	43.50	-13.00	peak	
3	*	158.0400	43.96	-12.82	31.14	43.50	-12.36	peak	
4		249.2200	44.67	-13.88	30.79	46.00	-15.21	peak	
5		274.4400	39.05	-12.86	26.19	46.00	-19.81	peak	
6		350.1000	37.46	-11.14	26.32	46.00	-19.68	peak	



4.1.8 TEST RESULTS- FCC PART 15.225

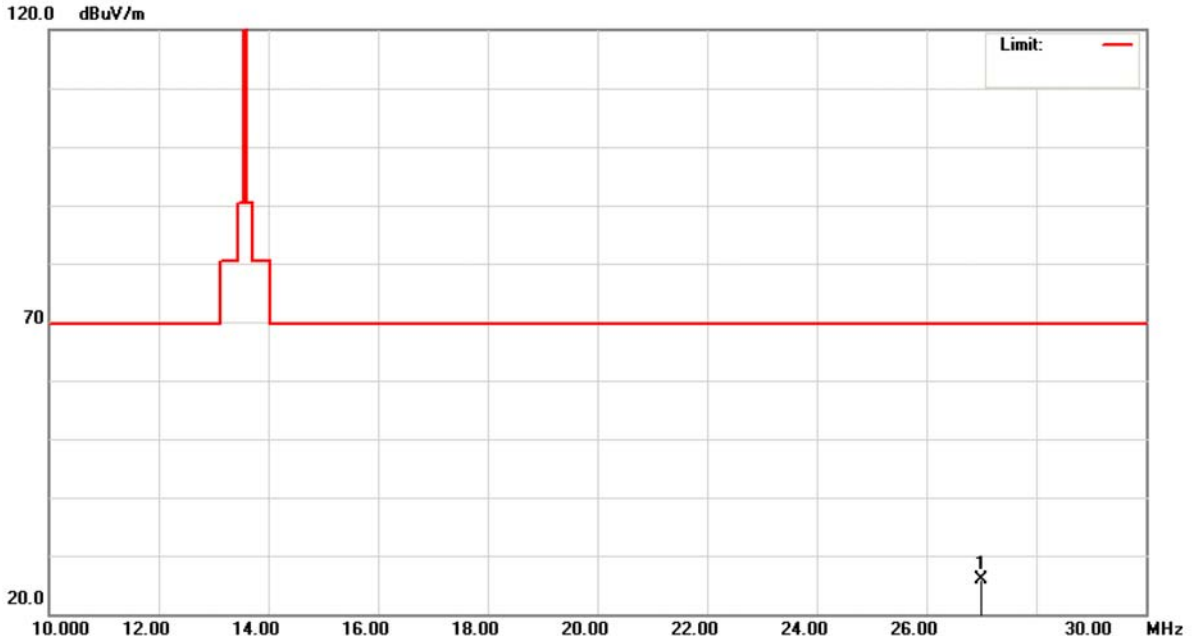
E.U.T	Mifare Ethernet Reader	Model Name	ER755
Temperature	26 °C	Relative Humidity	60%
Test Voltage	DC 48V		
Test Mode	TX (POE 48V)		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB		
1	*	13.5600	63.09	10.99	74.08	124.0	-49.92	peak	



E.U.T	Mifare Ethernet Reader	Model Name	ER755
Temperature	26 °C	Relative Humidity	60%
Test Voltage	DC 48V		
Test Mode	TX (POE 48V)		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Comment
1	*	26.9980	16.52	9.33	25.85	69.54	-43.69	peak	



4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMIT

FCC Part 15.225(e)
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.

4.2.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	R&S	FSP-40	100129	Oct. 06, 2012

Remark: "N/A" denotes No Model Name, No Serial No. or No Calibration specified.

4.2.3 TEST PROCEDURE

- a. The equipment under test was connected to an external AC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber.
After the temperature stabilized for approximately 20 minutes, the frequency of the output signal was recorded from the counter.
- b. At room temperature (25±5°C), an external variable AC power supply was connected to the EUT. The frequency of the transmitter was measured for 115%, 100% and 85% of the nominal operating input voltage.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of **4.1.6** Unless otherwise a special operating condition is specified in the follows during the testing.



4.2.6 TEST RESULTS

E.U.T	Mifare Ethernet Reader	Model Name	ER755
Temperature	26 °C	Relative Humidity	60%
Test Voltage	DC 48V		
Test Mode	TX		

Frequency Stability Versus Environmental Temperature

	Temperature (°C)	Voltage (AC)	Frequency (MHz)	Frequency Error (kHz)	Limit (kHz)	Result
	20	48V	13.56040			
0 min	50	48V	13.56040	0.000	+/- 1.356	PASS
	-20	48V	13.56040	0.000	+/- 1.356	PASS
2 min	50	48V	13.56040	0.000	+/- 1.356	PASS
	-20	48V	13.56060	0.200	+/- 1.356	PASS
5 min	50	48V	13.56080	0.400	+/- 1.356	PASS
	-20	48V	13.56080	0.400	+/- 1.356	PASS
10 min	50	48V	13.56060	0.200	+/- 1.356	PASS
	-20	48V	13.56080	0.400	+/- 1.356	PASS

Frequency Stability Versus Input Voltage

Temperature (°C)	Voltage (AC)		Frequency (MHz)	Frequency Error (kHz)	Limit (kHz)	Result
20	V-nom	48V	13.56000			
20	V-min	43.2V	13.5608	0.8	+/- 1.356	PASS
20	V-max	52.8V	13.5604	0.4	+/- 1.356	PASS