

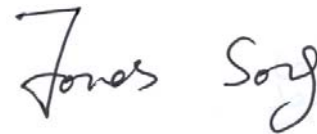
# FCC RADIO TEST REPORT

Prepared For	BESS(Best Security Solutions)
Product Name:	PROXIMITY ACCESS READER
Trade Name:	N/A
Model Name :	BSR-10
<b>FCC ID:</b>	R9T13EAR9T
Prepared By	DongGuan Precise Testing Service Co.,Ltd.
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Report No.	PTS2013010632F
Test Date:	16. Feb 2013 ~22.Feb. 2013
Date of Report :	22.Feb. 2013

## VERIFICATION OF COMPLIANCE

Applicant:	BESS(Best Security Solutions)
Address	#1313 Hyosung Intellian, 426 Gangseo-ro, Gangseo-gu, Seoul, 157-030 Korea
Manufacturer Name:	BESS(Best Security Solutions)
Address:	#1313 Hyosung Intellian, 426 Gangseo-ro, Gangseo-gu, Seoul, 157-030 Korea
Product Description:	PROXIMITY ACCESS READER
Brand Name:	N/A
Model Name:	BSR-10
Model difference:	N/A
Test procedure	ANSI C63.4
Standards	FCC Part15.225

Prepared by :



Assistant

Reviewer :



Supervisor

Approved & Authorized Signer :



Jacky Ou / Manager

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## 1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15, Subpart C (15.225)			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	Pass	
15.215(c)	20dB Bandwidth	Pass	
15.203	Antenna Requirement	Pass	
15.225(a)	Field strength in the 13.553–13.567 MHz band	Pass	
15.225(b)	Field strength in the 13.410–13.553 MHz and 13.567–13.710 MHz band	Pass	
15.225(c)	Field strength in the 13.110–13.410 MHz and 13.710–14.010 MHz band	Pass	
15.225(d)	Field strength of any emissions appearing outside of the 13.110–14.010MHz band	Pass	
15.225(e)	Frequency tolerance of the carrier signal	Pass	
15.225(f)	Radio frequency powered tags	N/A	Note(1)

NOTE:

(1) "N/A" denotes test is not applicable in this Test Report.

## 1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add. : 1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC FRN Registration No.:238937; IC Registration No.:9270A-1

## 1.2 MEASUREMENT UNCERTAINTY

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 %** .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^{\circ}\text{C}$
7	Humidity	$\pm 2\%$

## 2. GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

Equipment	PROXIMITY ACCESS READER	
Trade Name	N/A	
Model Name	BSR-10	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a PROXIMITY ACCESS READER	
	Product Type	RFID
	Operation Frequency:	13.56MHz
	Modulation Type:	AM
	Number Of Channel	1CH.
	Antenna Designation:	Printed PCB antenna
	Antenna Gain(Peak)	0.5 dBi
	Output Power:	59.9dBuV/m (PK Max.)
	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.	
Channel List	N/A	
Adapter(Auxiliary equipment)	Model:M05020 AC Power Input: 100-240V~, 50/60Hz, 0.3A Output: 12.0V $\equiv$ 1.0A	
Battery (Auxiliary equipment)	DC 12V	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- 2.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Printed PCB antenna	NA	0.5	Antenna

## 2.2 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 Mode	Description
Mode 1	TX

For Conducted Emission	
Final Test Mode	Description
Mode 1	TX

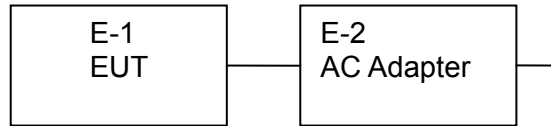
For Radiated Emission	
Final Test Mode	Description
Mode 1	TX

NOTE: (1)" N/A" denotes test is not applicable in this Test Report

## 2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

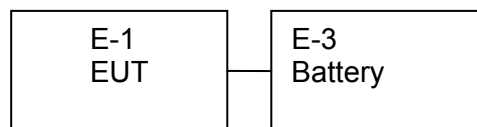
### Conducted Emission Test

C1



### Radiated Spurious Emission Test

C1





## 2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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.	Series No.	Note
E-1	PROXIMITY ACCESS READER	N/A	BSR-10	N/A	EUT
E-2	Adapter	N/A	M05020	N/A	Auxiliary equipment
E-2	Battery	N/A	UX3	N/A	Auxiliary equipment

Item	Shielded Type	Ferrite Core	Length	Note
C1	No	No	1.0m	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

## 2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

### Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2012.07.06	2013.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2012.06.07	2013.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2012.07.06	2013.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2012.06.07	2013.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2012.06.07	2013.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2012.07.06	2013.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2012.07.06	2013.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2012.12.22	2013.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2012.06.08	2013.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2012.07.06	2013.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2012.07.06	2013.07.05	1 year

### Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2012.06.06	2013.06.05	1 year
2	LISN	R&S	ENV216	101313	2012.08.24	2013.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2012.08.24	2013.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2012.06.07	2013.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2012.06.07	2013.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2012.06.08	2013.06.07	1 year

### **3. ANTENNA REQUIREMENT**

#### **3.1 STANDARD REQUIREMENT**

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

#### **3.2 EUT ANTENNA**

The EUT antenna is PCB Antenna. It comply with the standard requirement.

### 3.3 CONDUCTED EMISSION MEASUREMENT

#### 3.3.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5			66 - 56 *	56 - 46 *	LP002.
0.50 -5.0			56.00	46.00	LP002.
5.0 -30.0			60.00	50.00	LP002.

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

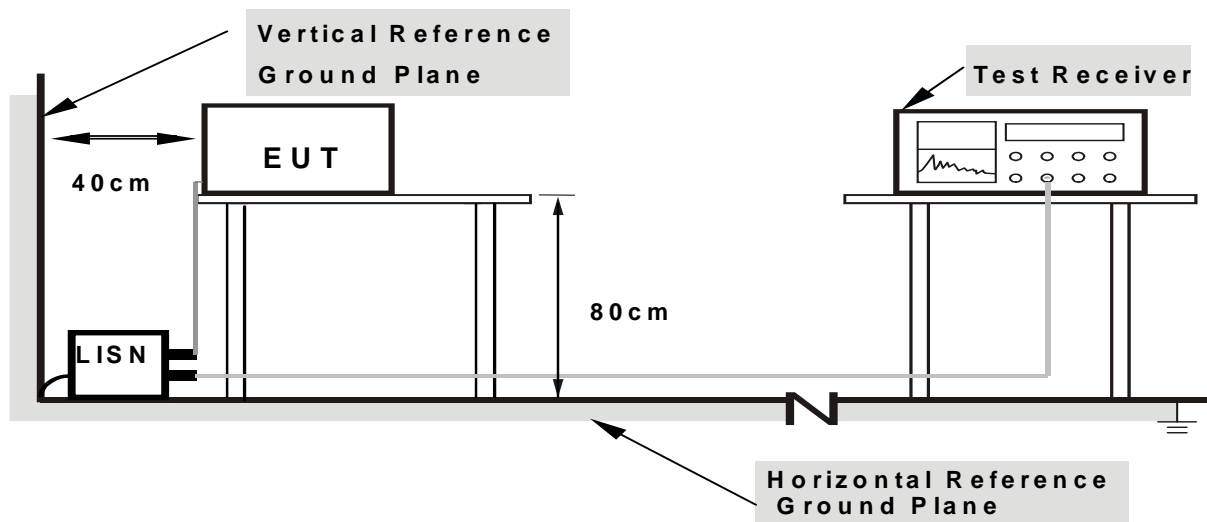
### 3.3.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 3.3.3 DEVIATION FROM TEST STANDARD

No deviation

### 3.3.4 TEST SETUP



Note: 1.Support units were connected to second LISN.

2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

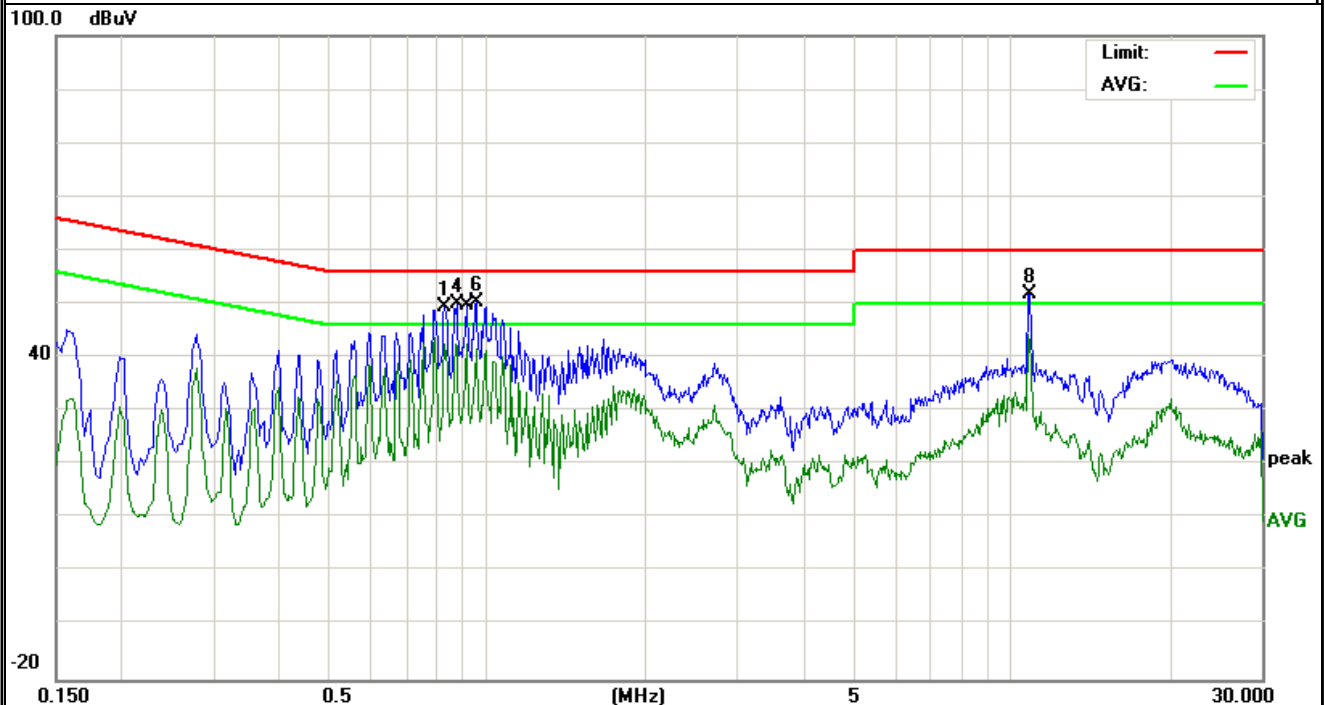
### 3.2.5 TEST RESULT

EUT :	PROXIMITY ACCESS READER	Model Name. :	BSR-10
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC 120V/60Hz	Test Mode :	TX

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.83	38.95	10.41	49.36	56	-6.64	peak
0.83	32.26	10.41	42.67	46	-3.33	AVG
0.87	32.03	10.41	42.44	46	-3.56	AVG
0.874	39.53	10.41	49.94	56	-6.06	peak
0.91	32.03	10.41	42.44	46	-3.56	AVG
0.95	39.81	10.41	50.22	56	-5.78	peak
13.56	33.74	10.67	44.41	50	-5.59	AVG
13.56	41.33	10.67	52	60	-8	peak

#### Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

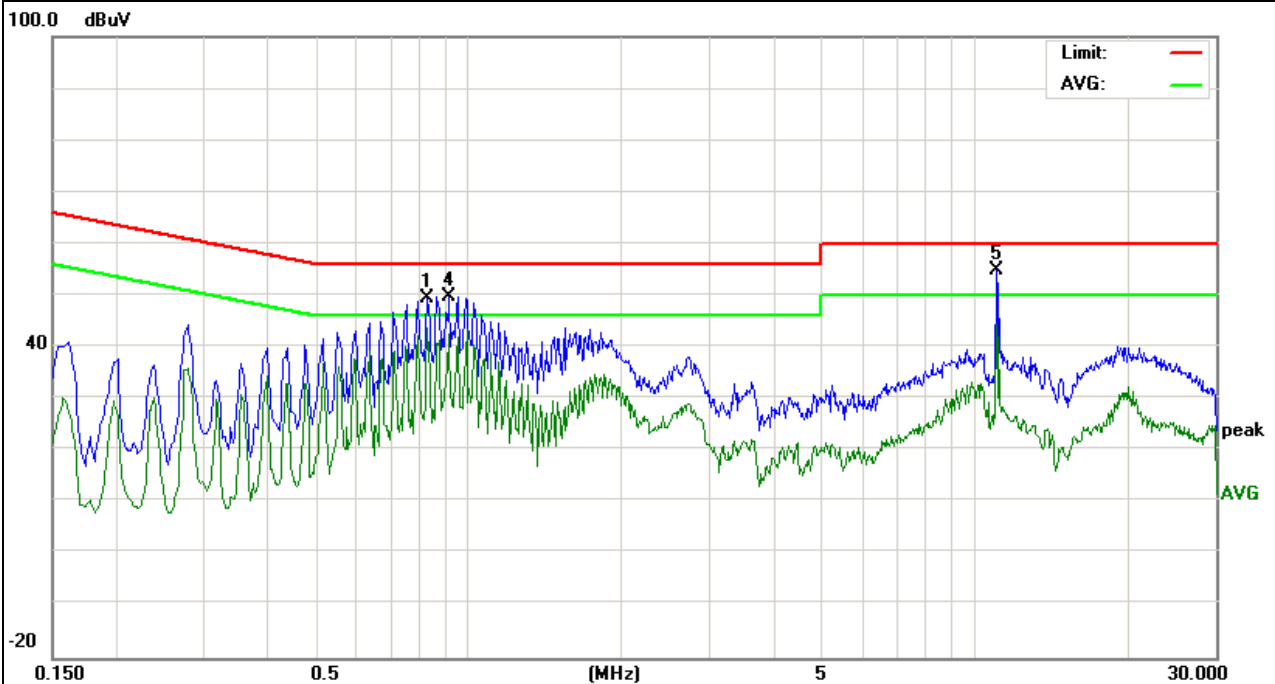


EUT :	PROXIMITY ACCESS READER	Model Name. :	BSR-10
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC 120V/60Hz	Test Mode :	TX

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.83	39.02	10.42	49.44	56	-6.56	peak
0.83	33.27	10.42	43.69	46	-2.31	AVG
0.91	32.19	10.43	42.62	46	-3.38	AVG
0.914	39.41	10.44	49.85	56	-6.15	peak
13.56	44.09	10.71	54.8	60	-5.2	peak
13.56	33.6	10.71	44.31	50	-5.69	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



### 3.4 RADIATED EMISSION MEASUREMENT

#### 3.4.1 Radiated Emission Limits ( FCC 15.209 )

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note:

- (1) The tighter limit applies at the band edges.
- (2) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 3.4.2 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 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.
- d. The initial step in collecting conducted 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:**

Only one antenna polarities was tested for below 30MHz.

Both horizontal and vertical antenna polarities were tested for above 30MHz.

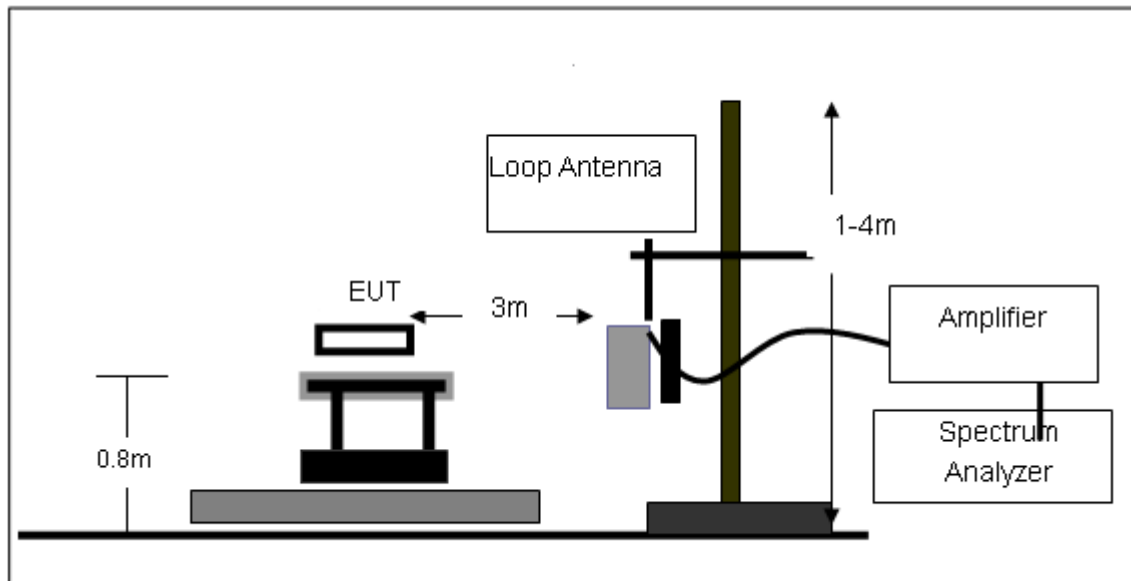
and performed pretest to three orthogonal axis. The worst case emissions were reported.

**3.4.3 DEVIATION FROM TEST STANDARD**

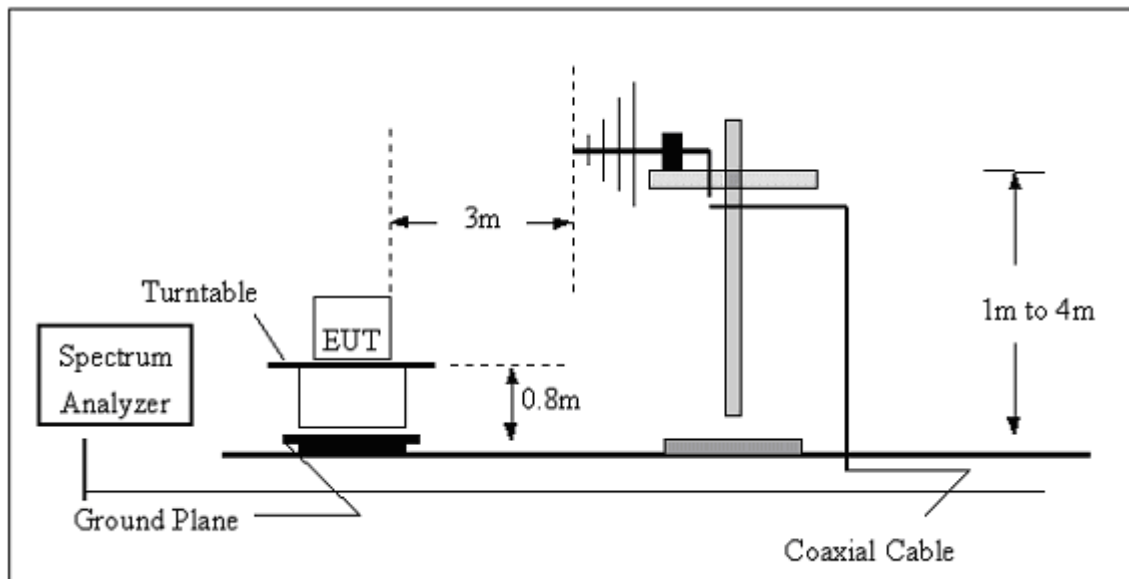
No deviation

### 3.4.4 TEST SETUP

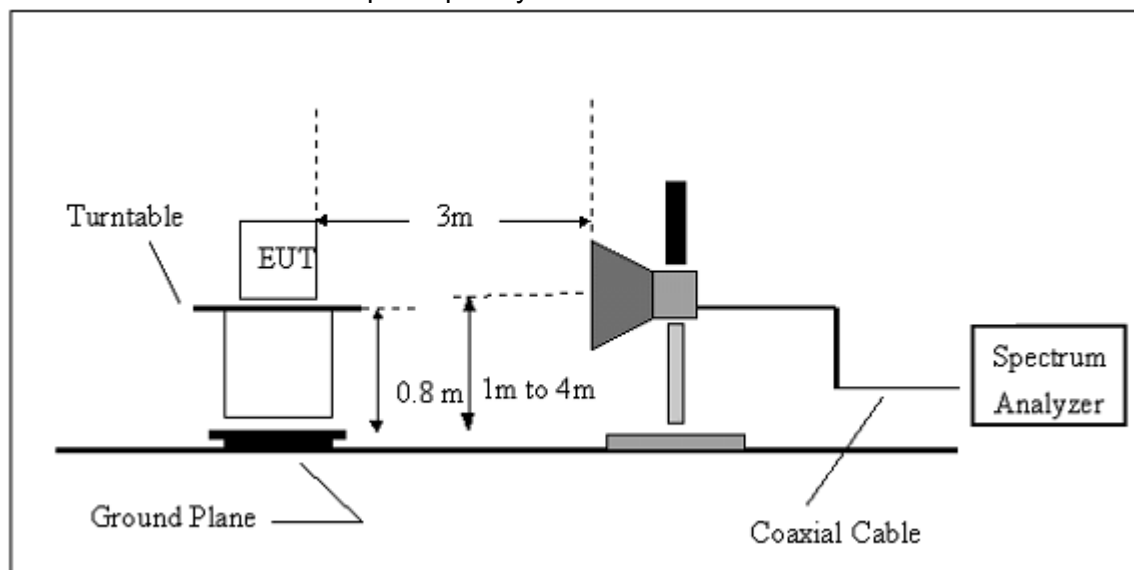
#### (A) Radiated Emission Test-Up Frequency Below 30MHz



#### (B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz



### 3.4.5 FIELD STRENGTH IN THE 13.553–13.567 MHz BAND( a)

The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848  $\mu\text{V/m}$  (84 dB $\mu\text{V/m}$ ) at 30 meters.

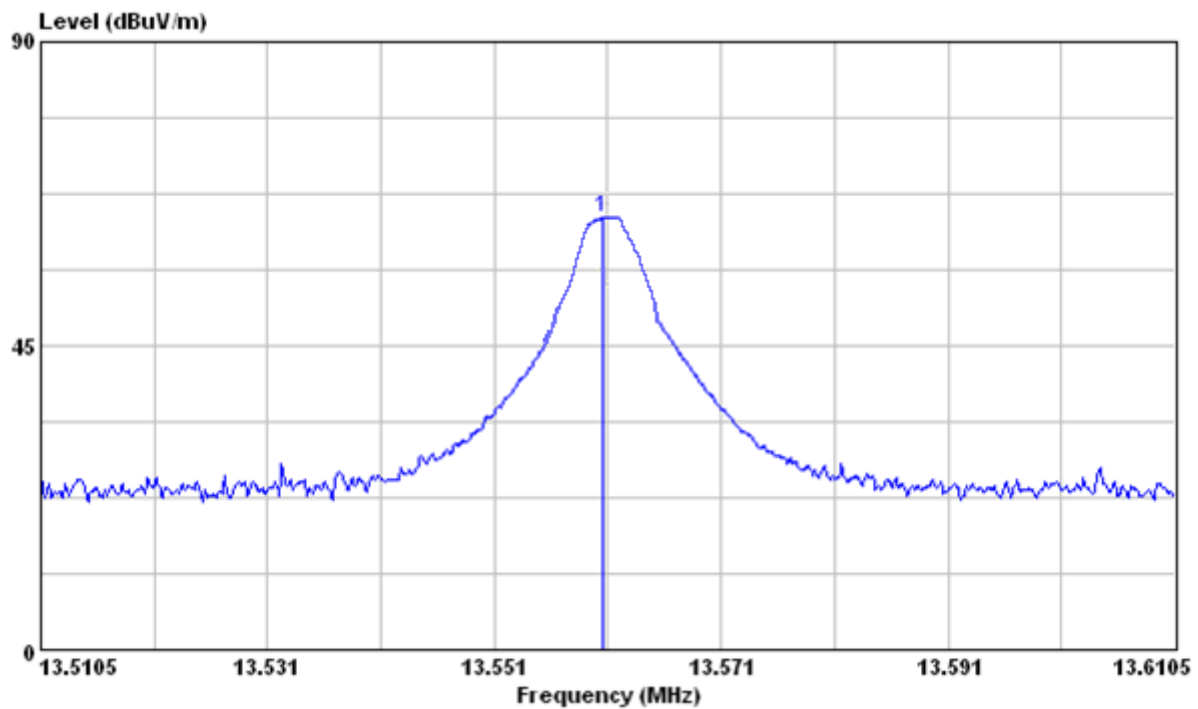
#### Special notes:

The measurements were performed using peak detector with 200 kHz RBW at the distance of 3 m. Distance correction\* was applied to the measurement result in order to comply with 30 m limits. The EUT was measured on three orthogonal axis and was rotated 360°

30 m to 3 m correction factor calculation (for 13.56 MHz band):

$$40 \times \text{Log} (30 \text{ m}/3 \text{ m}) = 40 \text{ dB}$$

Freq.	Peak field strength	Correction	Peak limit	Margin	P/F
(MHz)	(dB $\mu\text{V/m}$ )	(dB)	(dB $\mu\text{V/m}$ )	(dB)	
13,56	59.9	11.3	124.0	64.1	PASS



**Note:** Correction factor includes antenna, cable loss, amplifier, and attenuators.

### 3.4.6 FIELD STRENGTH IN THE 13.410 – 13.553 MHZ AND 13.567 – 13.710(b)

Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334  $\mu\text{V/m}$  (50.5 dB $\mu\text{V/m}$ ) at 30 meters.

#### pecial notes:

The measurements were performed using peak detector with 10 kHz RBW at the distance of 3 m.

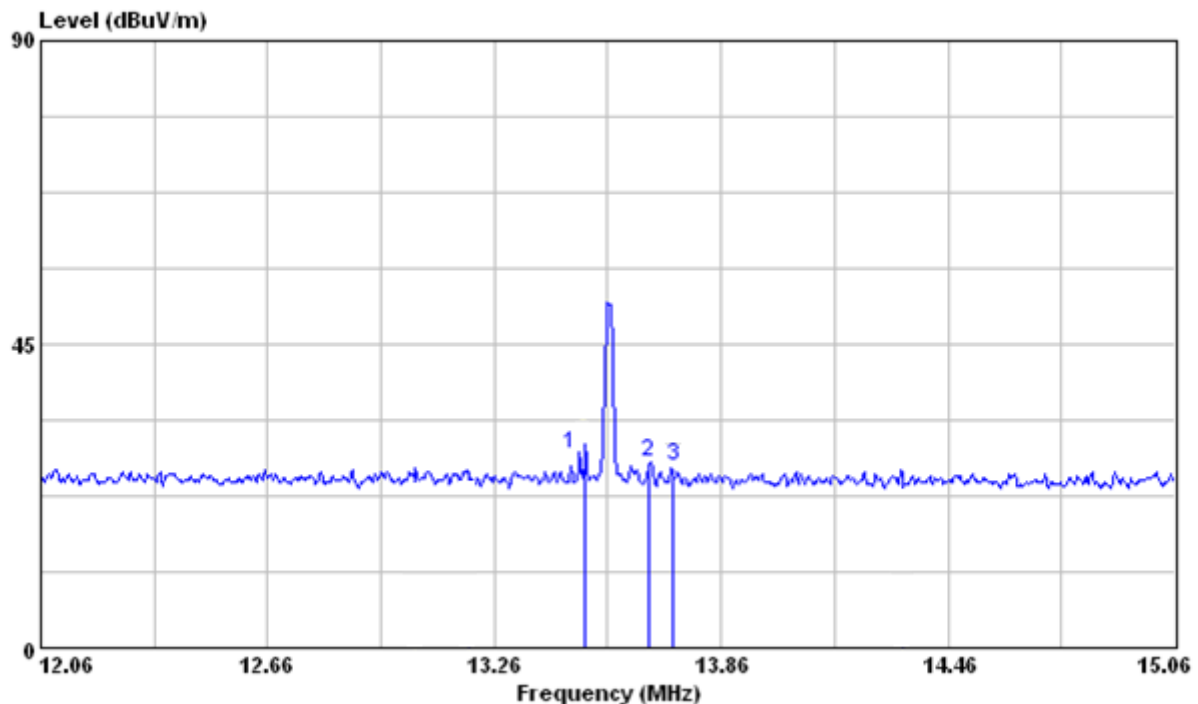
Distance correction\* was applied to the measurement result in order to comply with 30 m limits.

The EUT was measured on three orthogonal axis and was rotated 360°

30 m to 3 m correction factor calculation (for 13 MHz band):

$$40 \times \text{Log} (30 \text{ m}/3 \text{ m}) = 40 \text{ dB}$$

Freq.	Peak field strength	Correction	Peak limit	Margin
(MHz)	(dB $\mu\text{V/m}$ )	(dB)	(dB $\mu\text{V/m}$ )	(dB)
13.491	30.30	11.3	90.5	60.20
13.621	28.24	11.3	90.5	62.26
13.678	27.43	11.3	90.5	63.07



Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

### 3.4.7 Field Strength in the 13.110–13.410 MHz and 13.710–14.010MHz bands(c)

Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106  $\mu\text{V/m}$  (40.5 dB $\mu\text{V/m}$ ) at 30 meters.

#### pecial notes:

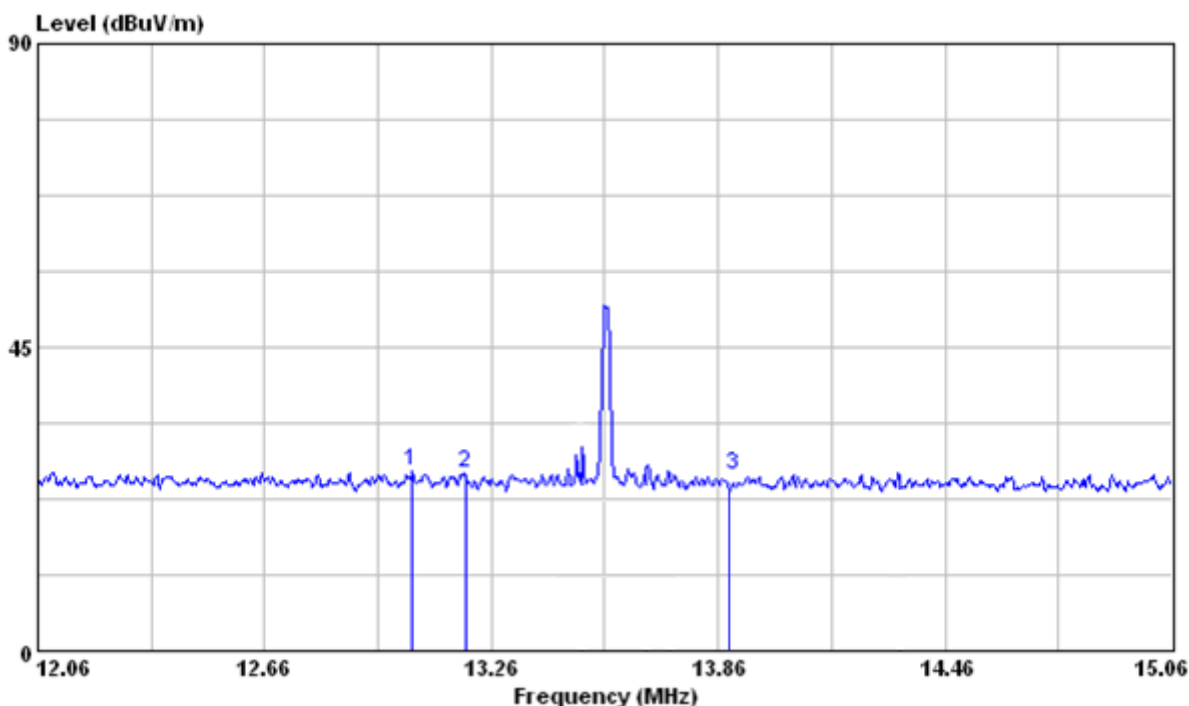
The measurements were performed using peak detector with 10 kHz RBW at the distance of 3 m. Distance correction\* was applied to the measurement result in order to comply with 30 m limits. The EUT was measured on three orthogonal axis and was rotated 360°

30 m to 3 m correction factor calculation (for 13 MHz band):

$$40 \times \text{Log} (30 \text{ m}/3 \text{ m}) = 40 \text{ dB}$$

Freq.	Peak field strength	Correction	Peak limit	Margin
(MHz)	(dB $\mu\text{V/m}$ )	(dB)	(dB $\mu\text{V/m}$ )	(dB)
13.141	27.30	11.3	80.5	53.20
13.191	26.24	11.3	80.5	54.26
13.881	26.02	11.3	80.5	54.48

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.



### **3.4.8 FIELD STRENGTH OF ANY EMISSIONS APPEARING OUTSIDE OF THE 13.110–14.010 MHz BAND(d)**

The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209

**pecial notes:**

1. The spectrum was searched from 9 kHz to the 10th harmonic.
2. The EUT was measured on three orthogonal axis.
3. All measurements were performed at a distance of 3 m.
4. All measurements were performed:
5. Below 30 MHz: using a peak detector with 10 kHz/30 kHz RBW/VBW,
6. Within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
7. Only the worst data presented in the test report.
8. The Spectrum was searched from 30 MHz to the 10th Harmonic.

**Note:** The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported for below 30MHz.

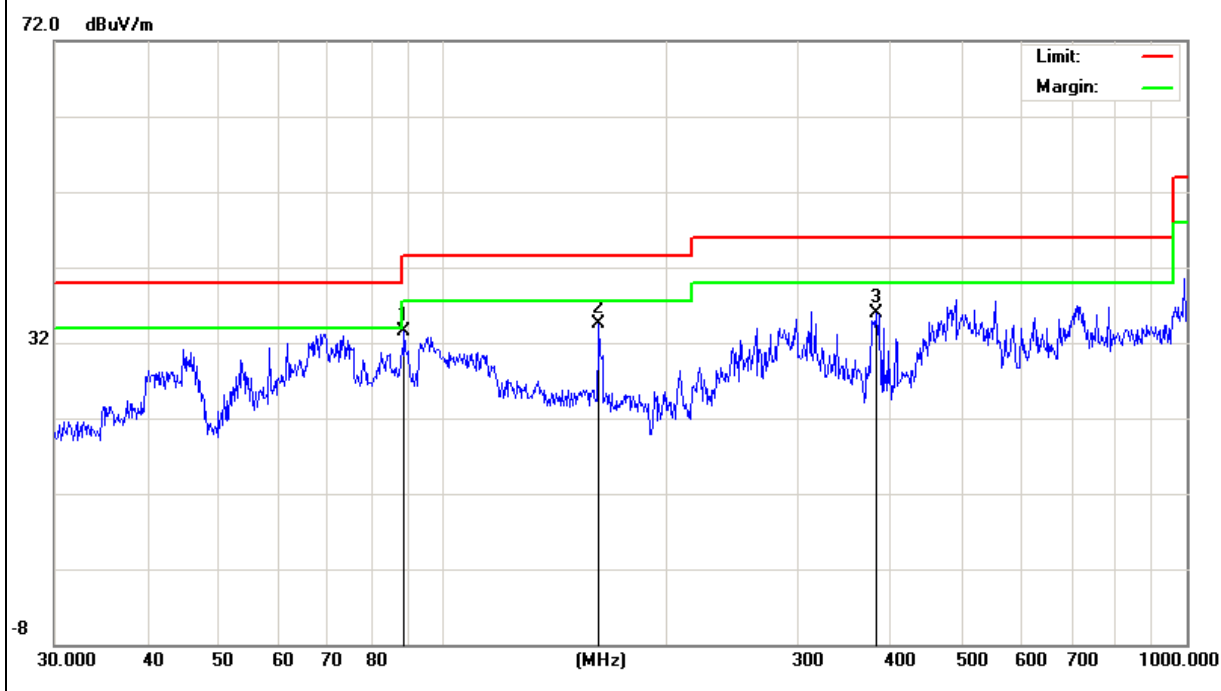
## ABOVE 30MHZ TEST RWSULT

EUT :	PROXIMITY ACCESS READER	Model Name. :	BSR-10
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Horizontal
Test Voltage :	DC 12.0V from battery		
Test Mode :	TX		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
88.6524	24.33	9.17	33.5	43.5	-10	QP
162.0414	23.99	10.56	34.55	43.5	-8.95	QP
382.5878	19.46	16.54	36	46	-10	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



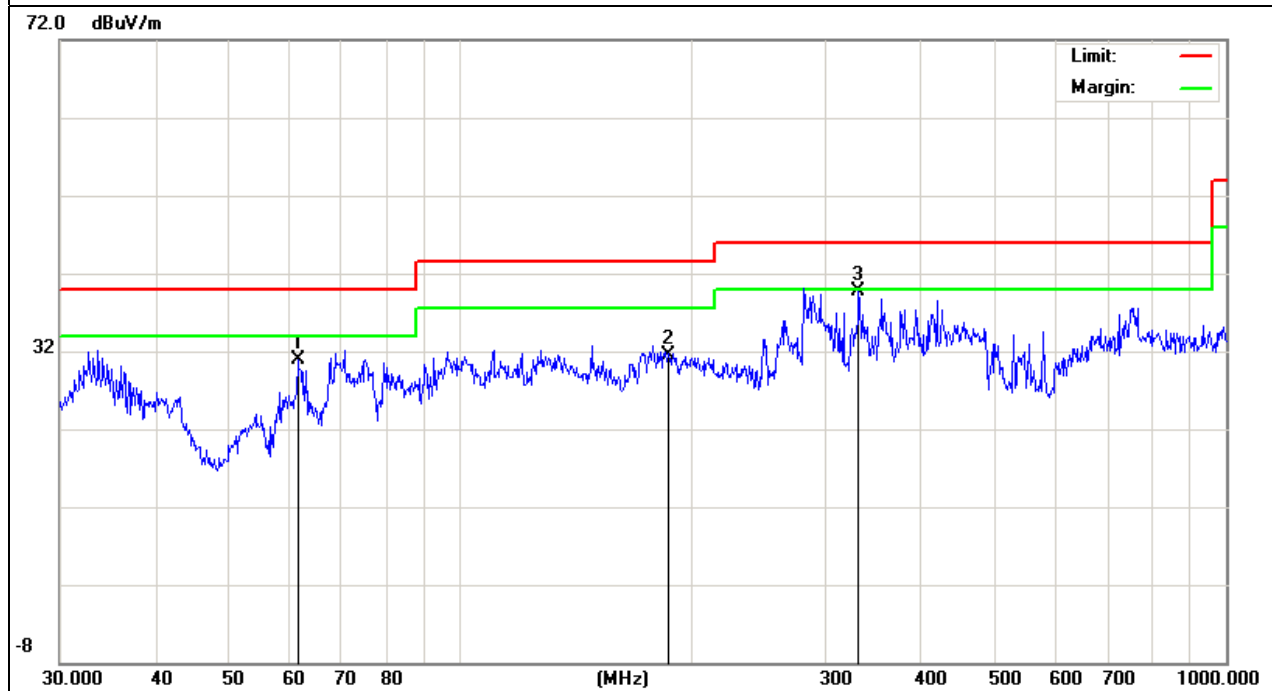


EUT :	PROXIMITY ACCESS READER	Model Name. :	BSR-10
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	Vertical
Test Voltage :	DC 12.0V from battery		
Test Mode :	TX		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
61.3462	25.75	5.19	30.94	40	-9.06	QP
187.0956	22.49	9.11	31.6	43.5	-11.9	QP
331.3546	24.7	14.97	39.67	46	-6.33	QP

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.



### 3.4.9 FREQUENCY TOLERANCE OF THE CARRIER SIGNAL

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  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  $20^{\circ}\text{C}$ .

For battery-operated equipment, the equipment tests shall be performed using a new battery.

#### pecial notes:

The test was performed using peak detector of the spectrum analyzer with RBW no narrower than 1 % of the emission bandwidth.

Conditions	Frequency (MHz)	Within $\pm 0.01\%$ operating frequency (MHz)
+50 ° C, Nominal voltage	13.56069	13.558644 ~ 13.561356
+40 ° C, Nominal voltage	13.56068	
+30 ° C, Nominal voltage	13.56071	
+20 ° C, 85 % Normal voltage	13.56073	
+20 ° C, Nominal voltage	13.56074	
+20 ° C, 115 % Normal voltage	13.56075	
+10 ° C, Nominal voltage	13.56075	
0 ° C, Nominal voltage	13.56063	
-10 ° C, Nominal voltage	13.56091	
-20 ° C, Nominal voltage	13.56088	

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

Normal voltage =12V

85 % Normal voltage =10.2V

115 % Normal voltage=13.8V

### **3.4.10. 20 BANDWIDTH TEST TEST PROCEDURE**

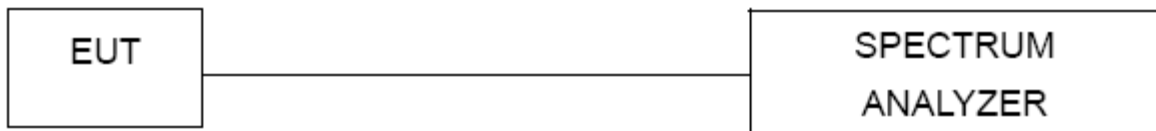
#### **According to the 15.215:**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80 % of the permitted band in order to minimize the possibility of out-of-band operation

#### **3.4.11 DEVIATION FROM STANDARD**

No deviation.

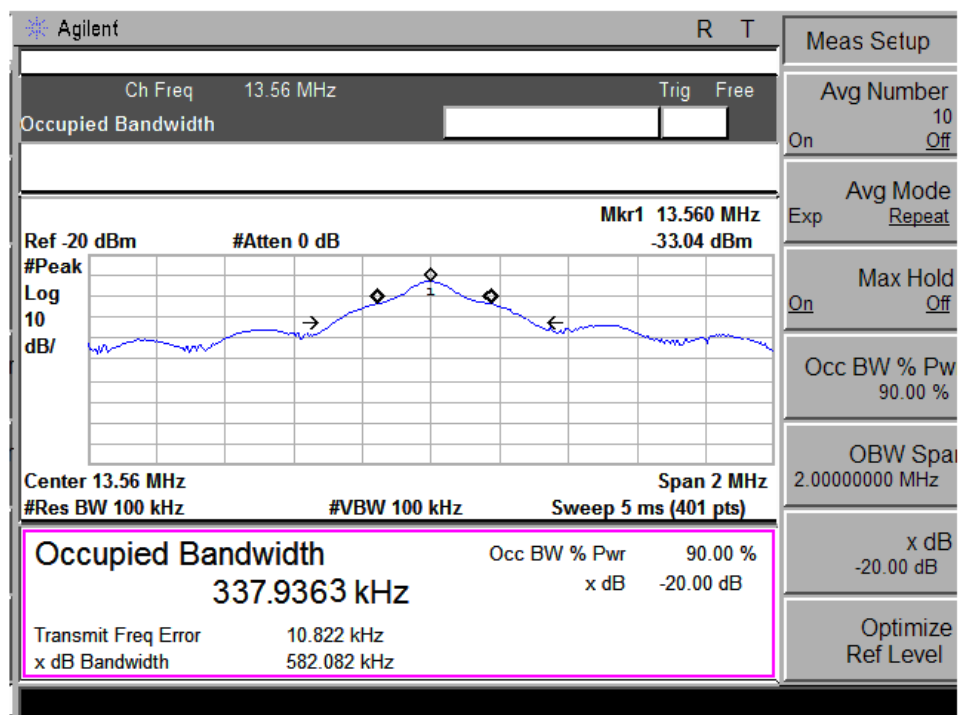
#### **3.4.12 TEST SETUP**



### 3.4.13 TEST RESULTS

EUT :	PROXIMITY ACCESS READER	Model Name :	BSR-10
Temperature :	26 °C	Relative Humidity :	53%
Pressure :	1020 hPa	Test Power :	DC 12.0V
Test Mode :	TX CH 1		

Frequency (MHz)	20 dBc Bandwidth (kHz)
13.56	582.082



#### 4. EUT TEST PHOTO

Radiated Measurement Photos



**Conducted Measurement Photos**

