

Prüfbericht - Nr.: 15048276 001		Seite 1 von 24 Page 1 of 24	
<i>Test Report No.:</i>			
Auftraggeber: <i>Client:</i>		Checkpoint Systems, Inc. 101 Wolf Drive, P.O. Box 188, Thorofare, NJ 08086, United States	
Gegenstand der Prüfung: <i>Test item:</i>		Electronic Article Surveillance Detection System	
Bezeichnung: <i>Identification:</i>	CLASSIC IP STREET	Serien-Nr.: <i>Serial No.:</i>	Engineering sample
Wareneingangs-Nr.: <i>Receipt No.:</i>	153176095	Eingangsdatum: <i>Date of receipt:</i>	22.09.2011
Prüfört: <i>Testing location:</i>	Refer to section 1.1		
Prüfgrundlage: <i>Test specification:</i>	FCC Part 15:2009 RSS-210 (Issue 8):2010 RSS-Gen (Issue 3):2010		
Prüfergebnis: <i>Test Result:</i>	Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test item passed the test specification(s).</i>		
Prüflaboratorium: <i>Testing Laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.		
geprüft/ tested by:		kontrolliert/ reviewed by:	
12.01.2012 Shi Li/PE <i>Li Shi</i> Datum Name/Stellung Unterschrift Date Name/Position Signature		12.01.2011 Kong Xiangming/TCKong Xiangming Datum Name/Stellung Unterschrift Date Name/Position Signature	
Sonstiges/ Other Aspects: FCC ID: DO4EVOLVEREM IC: 3356B-EVOLVEREM			
Abkürzungen: P(ass) = entspricht Prüfgrundlage F(ail) = entspricht nicht Prüfgrundlage N/A = nicht anwendbar N/T = nicht getestet		Abbreviations: P(ass) = passed F(ail) = failed N/A = not applicable N/T = not tested	
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i>			

TEST SUMMARY

4.1.1 CONDUCTED EMISSION

Result:

Passed

4.1.2 RADIATED EMISSION UP TO 30MHz

Result:

Passed

4.2.1 RADIATED EMISSION ABOVE 30MHz

Result:

Passed

4.3 EMISSION BANDWIDTH

Result:

N/A

4.4 DUTY CYCLE

Result:

N/A

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1 Test Sites

1.1 Test Facilities

Laboratory 1: TÜV Rheinland (Shanghai) Co., Ltd.

Address: 10-15/F, Huatsing Building, No. 88, Lane 777, West Guangzhong Road, Zhabei District, Shanghai 200072, P.R. China
(FCC registration No.: 657274; IC site No.: 2932F-1)

Laboratory 2: Shanghai Institute of Measurement and Testing Technology

Address: No. 716, Yi Shan Road, Shanghai 200233, P. R. China
(FCC registration No.: 142171; IC site No.: 6625A)

The used test equipments are in accordance with CISPR 16-1 series standards for measurement of radio interference. Part of the tests was conducted by “Shanghai Institute of Measurement and Testing Technology” under supervision of TÜV Rheinland’s engineer.

1.2 List of Test and Measurement Instruments

Table 1: List of test and measurement equipment

No.	Equipment	Model	Serial no.	Cal. due date
Lab 1:				
1.	3m modified semi-anechoic chamber	SAC	N/A	22.11.2012
2.	EMI test receiver	ESCI	100280	22.11.2012
3.	Broadband antenna	BTA-H	040005H	12.03.2012
4.	Spectrum analyzer	FSP30	100192	22.05.2012
5.	EMI test receiver	ESIB 26	100227	22.05.2012
6.	Artificial mains network	NNB 42	04/10048	15.02.2012
Lab 2:				
7.	EMI test receiver	ESI 26	Rong-001-01	22.12.2011
8.	Loop Field Strength Measuring System	FMZB 1516	Rong-001-07	29.11.2011

2 General Product Information

2.1 Product Function and Intended Use

The CLASSIC IP STREET system is an Electronic Article Surveillance System (EAS). The system detects target tags attached to merchandise. The targets resonate in the region of 8.2 MHz. When an article of merchandise is purchased, the target is deactivated which causes it to no longer resonate. The CLASSIC IP STREET system monitors an area of 3-feet on either side of the antenna in the 7.4 to 8.9 MHz range, and triggers an alarm when a non-deactivated target is detected.

2.2 Ratings and System Details

System input	: AC 100-240V, 50-60Hz
Protection class	: I
Type of antenna	: Loop antenna
Antenna info	: CLASSIC IP STREET PSB/SSB W: 344 mm H: 1540 mm
Adaptor info	: Trade name: GlobTek Model name: GT-2S5024D-R-ES Input: AC 100-240V, 50-60Hz Output: DC 24V, 2.1A

2.3 Operation in Restricted Bands

The EUT is a digital swept frequency hopping transmitter. The EUT hops on discrete frequencies. The discrete frequencies that can be transmitted by the EUT are as follows:

8.2MHz sweep table

0	1	2	3	4	5	6	7	8
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667
7600000	7660000	7720000	7780000	7840000	7900000	7960000	8020000	8080000
7600000	7686667	7773333	7860000	7946667	8033333	8120000	8206667	8294100
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667
7600000	7673333	7746667	7820000	7893333	7966667	8040000	8113333	8186667
7600000	7660000	7720000	7780000	7840000	7900000	7960000	8020000	8080000
7600000	7686667	7773333	7860000	7946667	8033333	8120000	8206667	8294100
7400000	7486667	7573333	7660000	7746667	7833333	7920000	8006667	8093333
7400000	7486667	7573333	7660000	7746667	7833333	7920000	8006667	8093333
7400000	7473333	7546667	7620000	7693333	7766667	7840000	7913333	7986667
7400000	7500000	7600000	7700000	7800000	7900000	8000000	8100000	8200000
7800000	7860000	7920000	7980000	8040000	8100000	8160000	8220000	8280000
7800000	7860000	7920000	7980000	8040000	8100000	8160000	8220000	8280000
7800000	7846667	7893333	7940000	7986667	8033333	8080000	8126667	8173333
7800000	7873333	7946667	8020000	8093333	8166667	8240000	8313333	8392334
9	10	11	12	13	14	15		
8260000	8333333	8406667	8480000	8553333	8626667	8700000		
8260000	8333333	8406667	8480000	8553333	8626667	8700000		
8140000	8200000	8260000	8320000	8392334	8440000	8500000		
8392334	8466667	8553333	8640000	8726667	8813333	8900000		
8260000	8333333	8406667	8480000	8553333	8626667	8700000		
8260000	8333333	8406667	8480000	8553333	8626667	8700000		
8140000	8200000	8260000	8320000	8392334	8440000	8500000		
8392334	8466667	8553333	8640000	8726667	8813333	8900000		
8180000	8266667	8353333	8440000	8526667	8613333	8700000		
8180000	8266667	8353333	8440000	8526667	8613333	8700000		
8060000	8133333	8206667	8280000	8353333	8426667	8500000		
8300000	8400000	8500000	8600000	8700000	8800000	8900000		
8340000	8400000	8460000	8520000	8580000	8640000	8700000		
8340000	8400000	8460000	8520000	8580000	8640000	8700000		
8220000	8266667	8313333	8360000	8406667	8453333	8500000		
8460000	8533333	8606667	8680000	8753333	8826667	8900000		

The restricted frequency bands (per FCC Part 15 Clause 15.205) in the operating frequency band of the EUT are as follows:

8.291 – 8.294MHz

8.362 – 8.366MHz

8.37625 – 8.38675MHz

8.41425 – 8.41475MHz

Note: The used hopping frequency 8.2941MHz is near to the restricted band, but according to FCC Part 15.205(1) the following devices are exempt from the requirements of this section:

Swept frequency field disturbance sensors operating between 1.705 and 37 MHz provided their emissions only sweep through the bands listed above, the sweep never stopped with the fundamental emission within this band and the fundamental emission is outside of the band more than 99% of the time the device is actively transmitting, without compensation for duty cycle.

The transmitter fulfils these requirements and so this unit is exempt of this section.

2.4 Independent Operation Modes

The CLASSIC IP STREET system was operated in two conditions, with and without a security tag in the field of the antenna. It was determined that higher signal levels were exhibited without the security tag in the field. All emissions were recorded in this condition.

2.5 Submitted Documents

N/A.

2.6 Related Submittal(s) Grants

None.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

3.2 Test Operation and Test Software

The system software was set as follows,

Antenna type	Frequency of Tx band	Tx power level
CLASSIC IP STREET PSB/SSB	8.2MHz	[27]

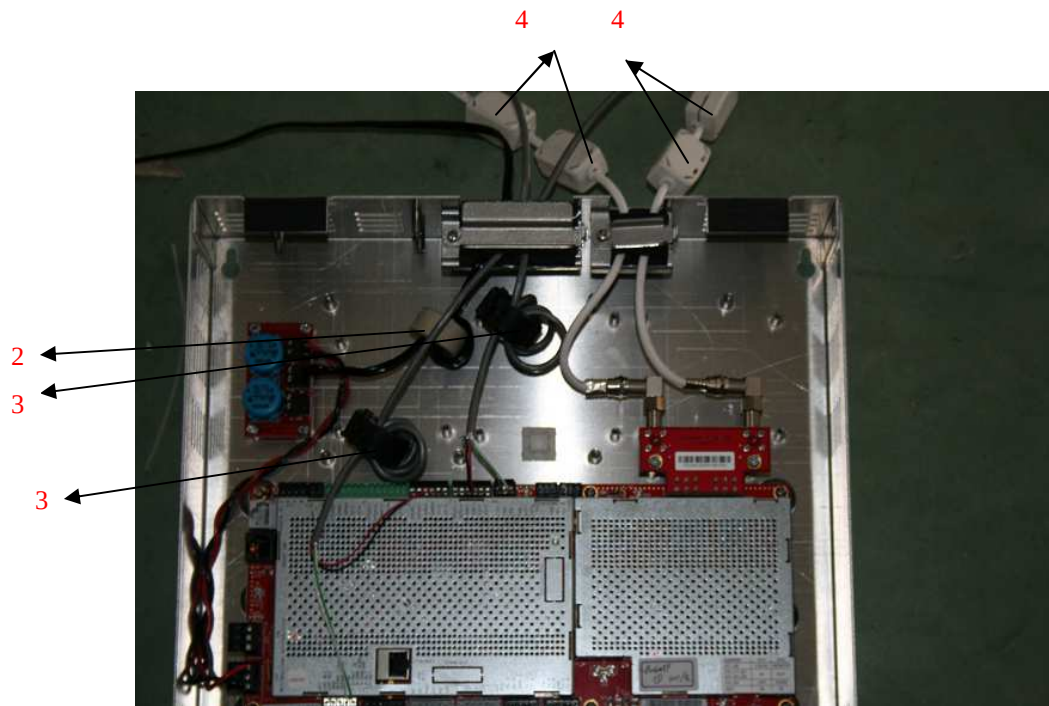
3.3 Special Accessories and Auxiliary Equipment

None.

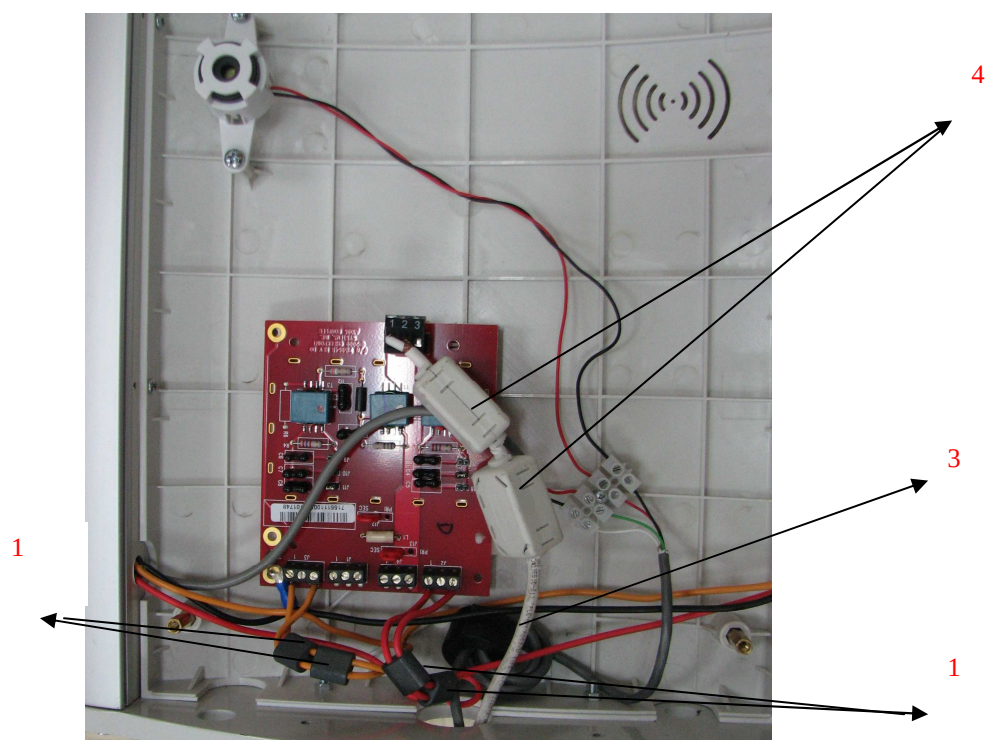
3.4 Countermeasures to achieve EMC Compliance

The tested sample contains the ferrite cores shown as following figures:

CLASSIC IP STREET PSB



CLASSIC IP STREET SSB



Ferrite info & location

1. Checkpoint P/N 7221412 (Fair Rite P/N 2865-000-202) – Add 3 ferrites on each end of the Rx3 and Rx4 connection with one turn.
2. Checkpoint P/N 284760 (Fair Rite P/N 0443806406) – Add a ferrite on the DC output end of power cable with four turns.
3. Checkpoint P/N 284760 (Fair Rite P/N 0443806406) – Add a ferrite on each end of lamp/sounder cable with four turns.
4. Checkpoint P/N 7784420 (Würth P/N 74271111) – Add 2 ferrites on each end of RG59 cable with one turn.

4 Test Result

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Conducted Emission

Result:	Passed
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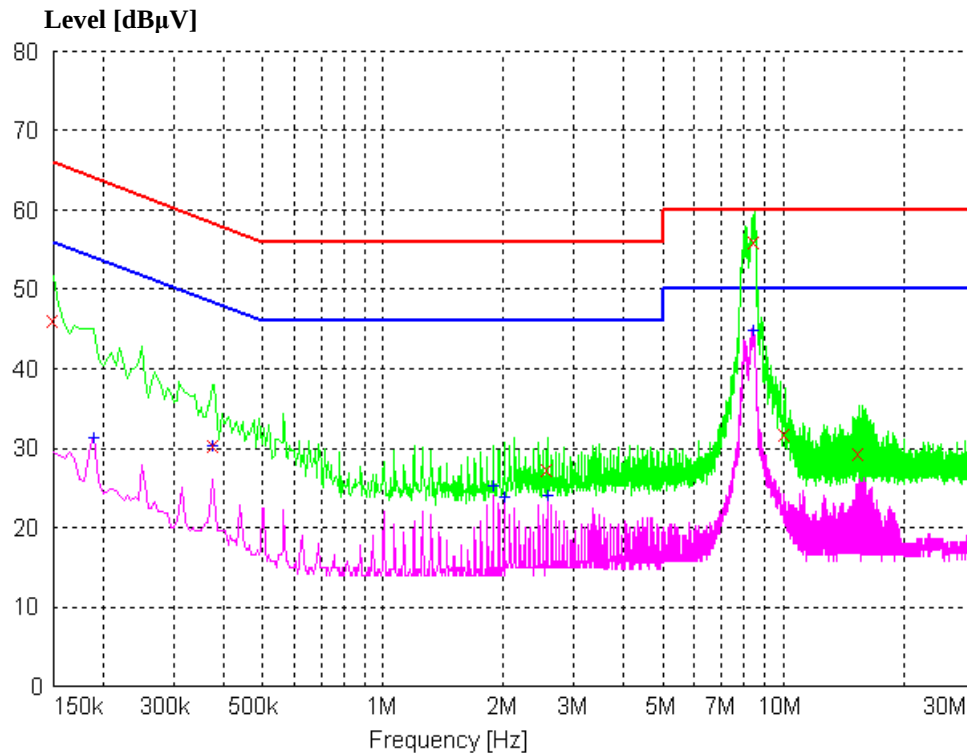
Date of testing : 12.12.2012
 Test specification : FCC Part 15 Section 15.207 & RSS-GEN 7.2.2
 Test method : ANSI 63.4-2003
 Measurement location : Shielded room
 Detector : Quasi-peak, Average
 Measurement BW : 9 kHz
 Supply voltage : AC 120V, 60Hz
 Measuring frequency range : 0.15-30MHz
 Ambient condition : Temperature: 24°C; Relative humidity: 60%
 Operational mode : Continuous sweep

Limit Section 15.207 & RSS-GEN 7.2.2,

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average values were measured. Quasi-peak and average values were measured and listed respectively where they had a maximum in previous scanning survey. In the following figures, “×” means quasi-peak result and “+” means average result which was measured in final measurement.

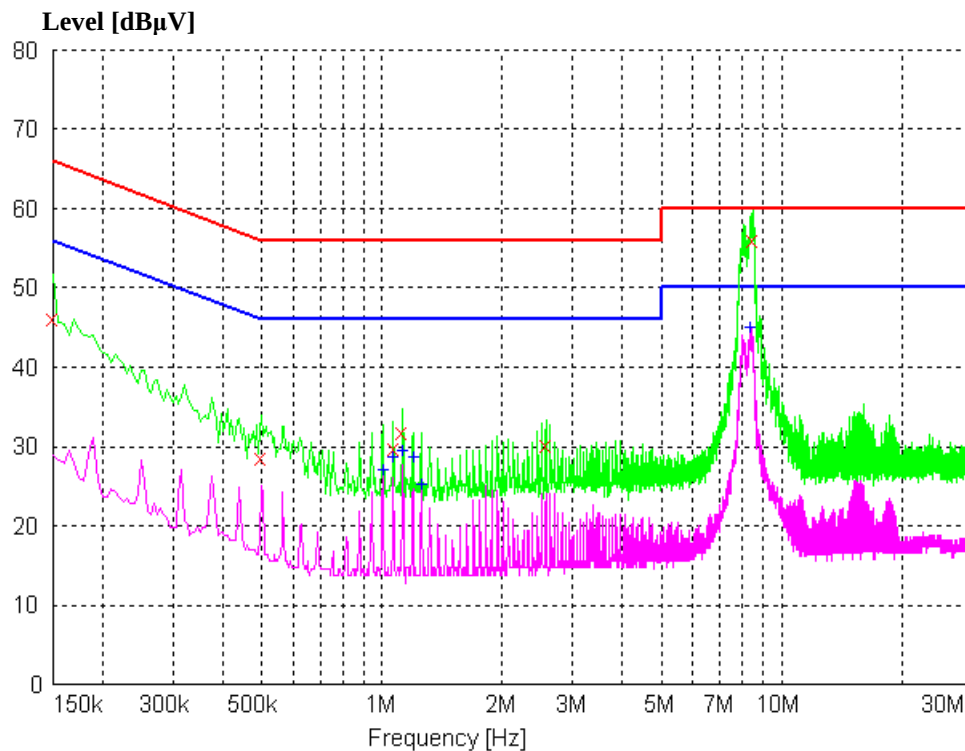
Figure 1: Spectral diagram, conducted emission, 150kHz - 30MHz, L


Final quasi-peak measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
0.150000	46.30	20.3	66.0	19.7	L1
0.380000	30.50	20.5	58.3	27.8	L1
2.575000	27.50	20.4	56.0	28.5	L1
8.485000	56.00	20.9	60.0	4.0	L1
10.110000	31.80	21.2	60.0	28.2	L1
15.450000	29.50	21.4	60.0	30.5	L1

Final average measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
0.190000	31.20	20.4	54.0	22.8	L1
0.375000	30.30	20.5	48.4	18.0	L1
1.885000	25.20	20.4	46.0	20.8	L1
2.010000	23.80	20.4	46.0	22.2	L1
2.575000	24.10	20.4	46.0	21.9	L1
8.425000	44.70	20.9	50.0	5.3	L1

Figure 2: Spectral diagram, conducted emission, 150kHz - 30MHz, N


Final quasi-peak measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
0.150000	46.30	20.0	66.0	19.7	N
0.500000	28.60	20.3	56.0	27.4	N
1.070000	29.90	20.2	56.0	26.1	N
1.130000	31.90	20.2	56.0	24.1	N
2.575000	30.20	20.3	56.0	25.8	N
8.485000	56.00	20.6	60.0	4.0	N

Final average measurement results:

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line
1.005000	27.10	20.2	46.0	18.9	N
1.065000	28.60	20.2	46.0	17.4	N
1.130000	29.50	20.2	46.0	16.5	N
1.195000	28.60	20.2	46.0	17.4	N
1.255000	25.30	20.2	46.0	20.7	N
8.370000	44.90	20.6	50.0	5.1	N

4.1.2 Radiated Emission up to 30MHz

Result:	Passed
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Date of testing	:	27.09.2011
Test specification	:	FCC Part 15 Section 15.223 & RSS-210 A2.3
Test method	:	ANSI 63.4-2003
Measurement location	:	Semi anechoic chamber
Measurement distance	:	10m
Detector	:	Peak
Measurement BW	:	200Hz (9-150kHz) 9kHz (150kHz-30MHz)
Supply voltage	:	AC 120V, 60Hz
Measuring frequency range	:	9kHz - 30MHz
Ambient condition	:	Temperature: 22°C; Relative humidity: 60%

Limit Section 15.223 & RSS-210 A2.3,

(a) The field strength of any emission within the band 1.705-10.0MHz shall not exceed 100 microvolts/meter at a distance of 30 meters. However, if the bandwidth of the emission is less than 10% of the center frequency, the field strength shall not exceed 15 microvolts/meter or (the bandwidth of the device in kHz) divided by (the center frequency of the device in MHz) microvolts/meter at a distance of 30 meters, whichever is the higher level.

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
1.705-10	89.26	39.01	30

Remark: The field strength was derived from clause 4.3 of this report using following equation:

Field strength = $750 \text{ (6dB bandwidth in kHz)} / 8.2 \text{ (center frequency in MHz)} = 89.26$ microvolts/meter.

(b) The field strength of emissions outside of the band 1.705-10.0 MHz shall not exceed the general radiated emission limits in Section 15.209.

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dB μ V/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)		300
0.490-1.705	24000/F(kHz)		30
1.705-30	30	29.5	30

The radiated emission measurement was made at 10m. The EUT was placed on a nonconductive support 0.1m above the ground plane. The antenna height was set at 1 m. The spectrum was examined from 9kHz - 30MHz. At each frequency, the EUT was rotated 360° in order to determine the emission's maximum level. Measurements were taken using 3 antenna polarizations.

The field strength level was established by adding the meter reading of the EMI test receiver to the factors associated with antenna correction factor & cable loss. In addition, pulse correction factor (duty cycle) $K_E = -29.89\text{dB}$ derived from clause 4.4 of this report was used to calculate the average level.

The equation is expressed as follows:

$$FS = R + AF + CF + (K_E)$$

Where FS = Field strength level in $\text{dB}\mu\text{V/m}$;

R = Reading of EMI test receiver in $\text{dB}\mu\text{V}$;

AF = Antenna factor in dB/m ;

CF = Cable attenuation factor in dB ;

K_E = Pulse correction factor (for calculating average levels only).

In the following table for measurement results, Correction factor (Corr.) = $AF + CF$.

Table 2: Radiated emission results, 9kHz - 30MHz, Peak & Average or QP

Freq. (MHz)	Peak level ($\text{dB}\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m}$)	Margin (dB)	AV level ($\text{dB}\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m}$)	Margin (dB)	Pol.
8.50	58.90	78.09	19.19	29.01	58.09	29.08	X
8.45	63.41	78.09	14.68	33.52	58.09	24.57	Y
7.92	39.22	78.09	38.87	9.33	58.09	48.76	Z

Freq. (MHz)	QP level ($\text{dB}\mu\text{V/m}$)	Limit ($\text{dB}\mu\text{V/m}$)	Margin (dB)	Pol.
25.39	39.3	48.62	9.32	X
24.97	43.93	48.62	4.69	Y
24.99	36.64	48.62	11.98	Z

Remark: Polarization of antenna to ground plane: X - along measurement axis, Y - vertical axis, Z - horizontal axis.

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated Emission above 30MHz

Result:
Passed

Date of testing : 09.11.2011
 Test specification : FCC Part 15 Section 15.223(b) & RSS-210 A2.3
 Test method : ANSI 63.4-2003
 Measurement location : Semi anechoic chamber
 Measurement distance : 3m
 Detector : Quasi-peak
 Measurement BW : 120 kHz
 Supply voltage : AC 120V, 60Hz
 Measuring frequency range : 30 - 1000MHz
 Ambient condition : Temperature: 23°C; Relative humidity: 39%

Limit Section 15.223(b) & RSS-210 A2.3,

(b) The field strength of emissions outside of the band 1.705-10.0 MHz shall not exceed the general radiated emission limits in Section 15.209.

Frequency (MHz)	Field strength (microvolt/meter)	Field strength (dBμV/m)	Measurement distance (meters)
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

The radiated emission measurement was made at 3m. The EUT was placed on a nonconductive support 0.1m above the ground plane. The spectrum was examined from 30 - 1000MHz. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 m in order to determine the emission's maximum level. Measurements were taken using both horizontal and vertical antenna polarizations. The rotation through the three orthogonal axes is normally not needed for equipment that is not hand-held or body-worn.

The field strength level was established by adding the meter reading of the EMI test receiver to the factors associated with antenna correction factor & cable loss.

The equation is expressed as follows:

$$FS = R + AF + CF$$

Where FS = Field strength level in dBμV/m;

R = Reading of EMI test receiver in dBμV;

AF = Antenna factor in dB/m;

CF = Cable attenuation factor in dB.

In the following table for measurement results, Correction factor (Corr.) = AF + CF.

Table 3: Radiated emission results, 30MHz - 1GHz, Quasi-peak

Freq. (MHz)	QP level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Antenna height (cm)	Angle (deg)	Pol.
411.81	43.4	46.0	2.6	150.0	70	H
447.81	42.9	46.0	3.1	210.0	70	H
477.07	45.0	46.0	1.0	260	70	H
422.50	43.9	46.0	2.1	100.0	70	V
477.17	40.9	46.0	5.1	100.0	-15	V

4.3 Emission Bandwidth

Result:
N/A

Date of testing : 27.12.2012
 Test specification : FCC Part 15 Section 15.223(a) & RSS-210 A2.3
 Ambient condition : Temperature: 24°C; Relative humidity: 42%

Table 4: Emission bandwidth measurement result

Max Peak (MHz)	6dB Bandwidth F1 (MHz)	6dB Bandwidth F2 (MHz)	Measured Bandwidth (MHz)
8.422	7.858	8.590	0.732

The following figure was that measured by spectrum analyzer.

Figure 3: Spectral diagram, emission bandwidth measurement


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4.4 Duty Cycle

Result:**N/A**

Date of testing : 27.12.2012
Ambient condition : Temperature: 24°C; Relative humidity: 42%

The duty cycle factor, expressed in dB, is arrived by taking the following formula:

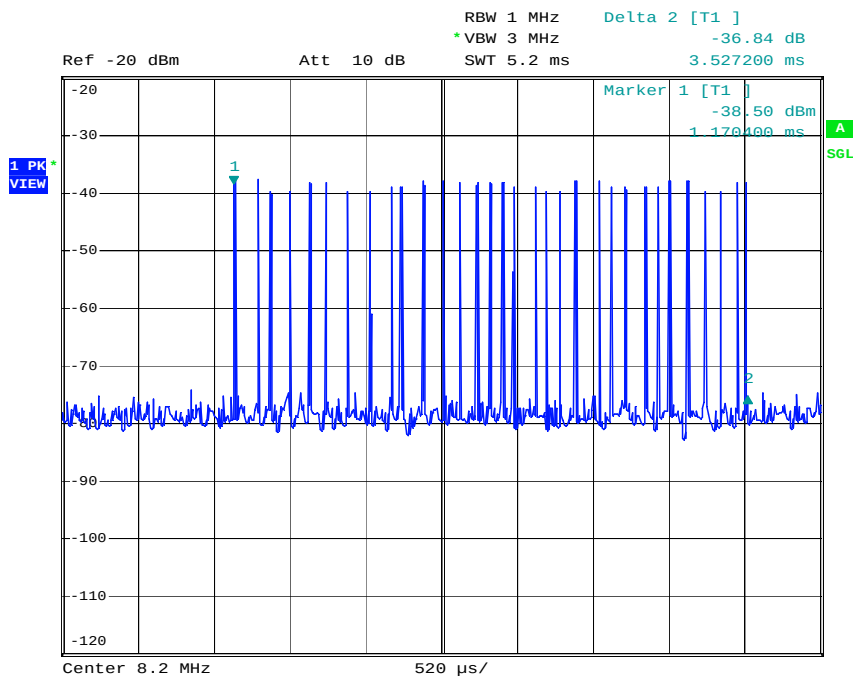
$$K_E = 20 \log [(t_{iB} * p) / T_w]$$

K_E : pulse operation correction factor (dB);
 t_{iw} : pulse duration for one complete pulse track (msec);
 t_{iB} : pulse duration for one pulse (µsec);
 T_w : a period of the pulse track (msec);
 p : number of pulses in one train.

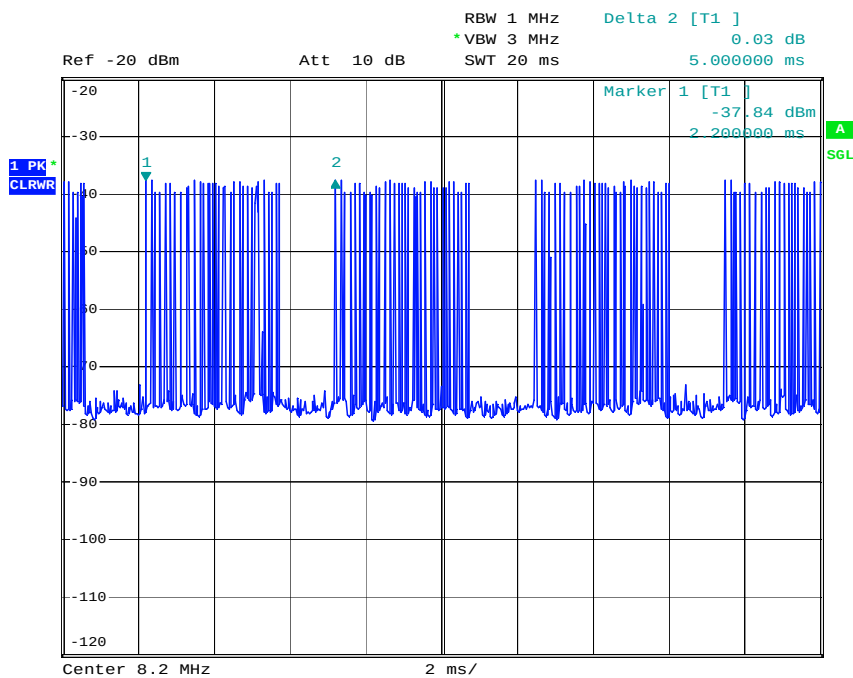
Table 5: Duty cycle measurement result

t_{iw} (msec)	T_w (msec)	t_{iB} (µsec)	p	K_E (dB / %)
3.527	5.00	4.88	32	-29.89 / 3.12

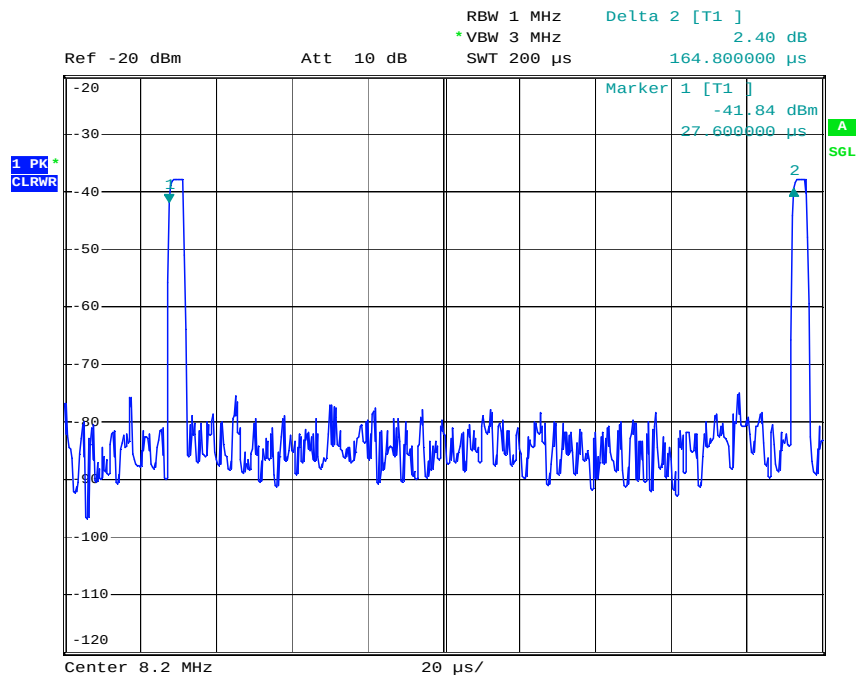
The following figures were those measured by spectrum analyzer.

Figure 4: Duty cycle measurement result


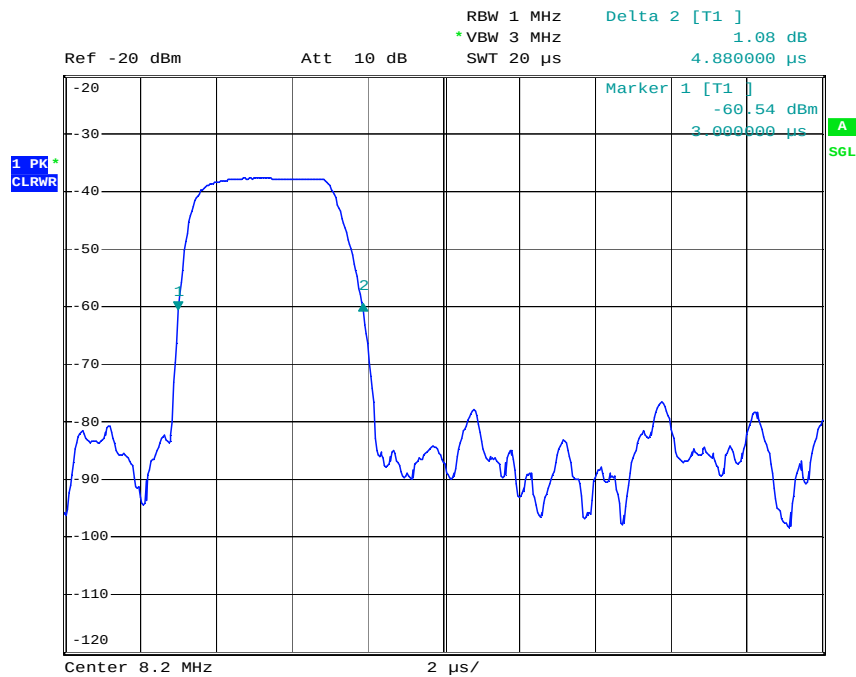
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Date: 27.DEC.2011 15:28:37



Date: 27.DEC.2011 15:33:11



Date: 27.DEC.2011 15:34:23

5 Photographs of the Test Set-Up

Photograph 1: Set-up for conducted emission



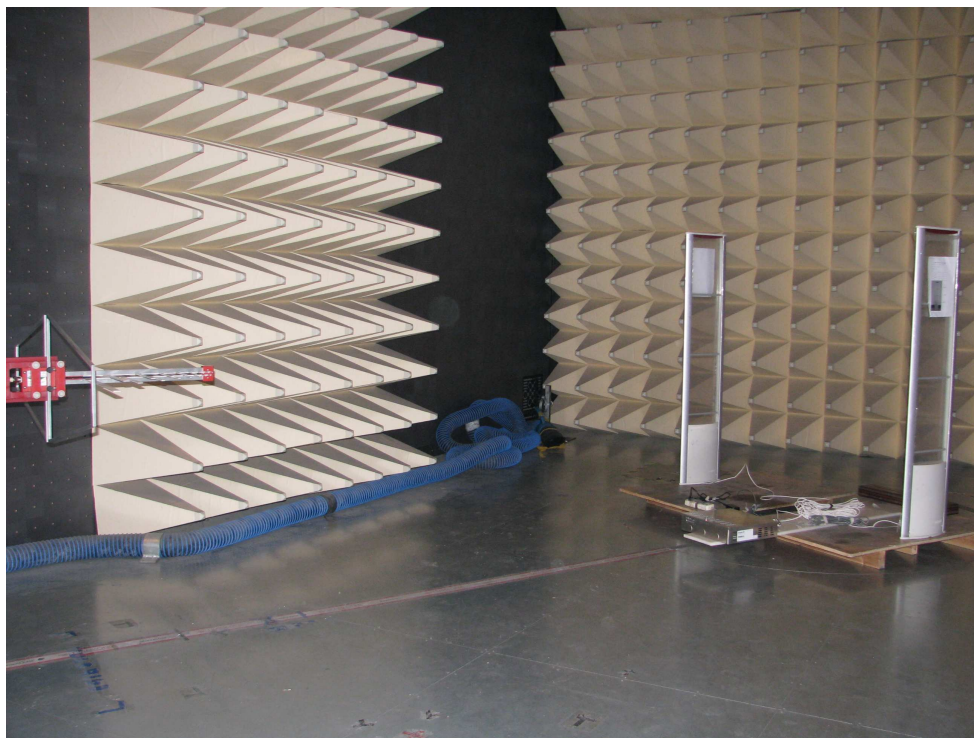
Photograph 2: Set-up for radiated emission (9kHz - 30MHz)



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Photograph 3: Set-up for radiated emission (30 - 1000MHz)



Photograph 4: Set-up for emission bandwidth & duty cycle



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