RF TEST REPORT

Test Report No.	:	TK-FR11025
Standards	:	Part 15 Subpart C 15.225
FCC ID	:	ZKYPMD-B01M
Description of Product	:	PMC DEAD-BOLT SYSTEM
Applicant	:	SAEHAN HITEC CO., LTD
Manufacturer	:	SAEHAN HITEC CO., LTD
Model Name	:	PMD-B01M
Date of test(s)	:	2011.05.13 ~ 2011.05.18
Date of issue	:	2011.05.19

The test results relate only to the items tested.

Test and Report Completed by :	**Report Approval by :**
	
Jeff Do Test Engineer	Gyu-cheol Shin Technical Manager

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Revision history

Revision	Date of issue	Test report No.	Description
-			Initial

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1.0 General product description

Equipment model name	:	PDM-B01M
Serial number	:	Prototype
EUT condition	:	Pre-production, not damaged
Antenna type	:	PCB antenna
Frequency Range	:	13.56 ㎒
Number of channels	:	1
Type of Modulation	:	ASK
Power Source	:	DC 6 V(1.5 V battery×4)

1.1 Test frequency

	Low channel	Middle channel	High channel
Frequency (㎒)	13.56	N/A	N/A

1.2 Test mode

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

1.3 Model differences

Not applicable

1.4 Device modifications

The following modifications were necessary for compliance: Not applicable manufacturer

1.5 Peripheral devices

Device	Manufacturer	Model No.	Serial No.
N/A			

1.6 Test facility

The measurement facility is located at 477-6, Hageo-ri, Yeoju-eup, Yeoju-gun, Gyeonggi-do, 469-803, Korea. Tel: +82-31-883-5092/Fax: +82-31-883-5169.
The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.7 Laboratory accreditations and listings

Country	Agency	Scope of accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	343818
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1

2.0 Summary of tests

Section in FCC Part 15	Parameter	Status
15.225(a)	The field strength of fundamental	C
15.225(b)(c)	The field strength of spurious emission(In-band)	C
15.225(d) 15.209	The field strength of spurious emission(Out-band)	C
15.225(e)	The frequency tolerance	C
15.215(c)	20 dB bandwidth	C
Note 1: C=Complies NC=Not complies NT=Not tested NA=Not applicable		
Note 2: The data in this test report are traceable to the national or international standards.		
Note 3: The sample was tested according to the following specification: FCC Part 15.225, ANSI C63.4-2003		

2.1 Technical characteristic test

2.1.1 Fundamental, spurious emission

Test location

Testing was performed at a test distance of 3 meter Open Area Test Site

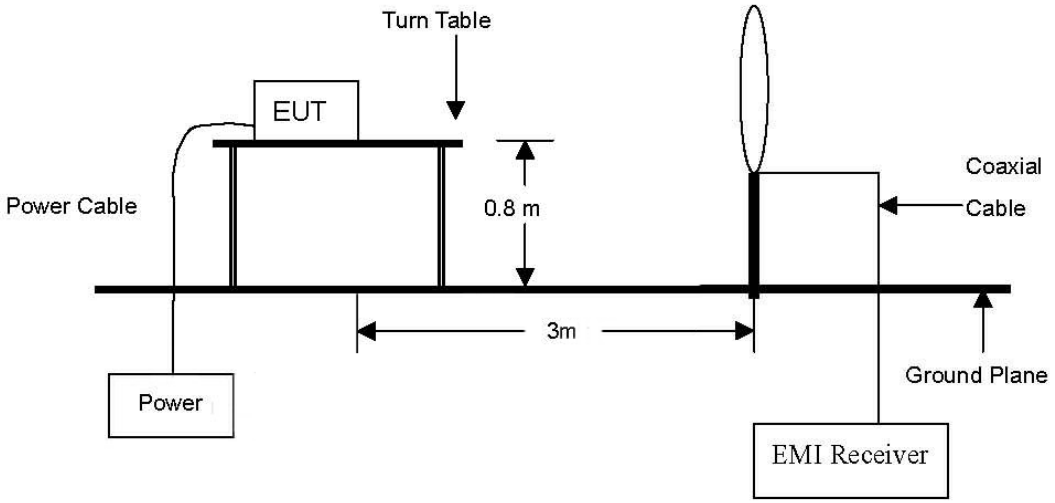
Test procedures

[9 ㎑ to 30 ㎒]
The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

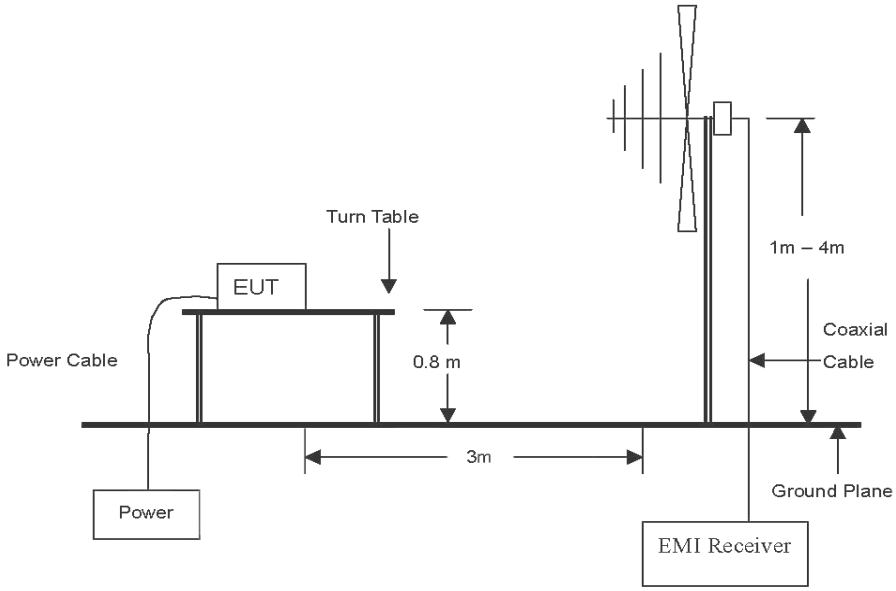
[30 ㎒ to 1 ㎓]
The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.
The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 30 ㎒.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 ㎑ for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 ㎓.

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



Limit

In the section 15.209:
Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009 – 0.490	2400/F(㎑)	300
0.490 – 1.705	2400/F(㎑)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 – 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 ㎒, 76-88 ㎒, 174-216 ㎒ or 470-806 ㎒. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241

In the section 15.225:

(a) The field strength of any emissions within the band 13.553-13.567 ㎒ shall not exceed 15,848 microvolts/meter (= 84 ㏈㎶/m) at 30 meters.

(b) Within the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter (=50.5 ㏈㎶/m) at 30 meters.

(c) Within the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒ the field strength of any emissions shall not exceed 106 microvolts/meter (=40.5 ㏈㎶/m) at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in § 15.209.

(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.

Test results for fundamental

Radiated emissions		Ant.	Correction factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Distance (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
13.561	39.16	H	18.30	0.16	-40	17.62	84	66.38
13.561	39.13	V	18.30	0.16	-40	17.59	84	66.41

Test results for in-band & out-band(9 ㎑ to 14.010 ㎒)

Radiated emissions		Ant.	Correction factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Distance (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
1.681	32.86	H	18.20	2.62	-40	13.68	23.09	9.41
1.681	35.61	V	18.20	2.62	-40	16.43	23.09	6.66

Test results for in-band & out-band(14.010 ㎒ to 30 ㎒)

Radiated emissions		Ant.	Correction factors			Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Distance (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
15.641	19.08	H	18.41	0.11	-40	-2.40	29.5	31.90
16.498	18.93	V	18.49	0.10	-40	-2.48	29.5	31.98

※ Remark

1. Actual = Reading + Ant. factor + Cable loss + Distance
2. Distance correction below 30 ㎒ = 40log(3 m/30 m)
3. Detector mode: Quasi peak
4. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

Test results (Below 1000 ㎒)

Radiated emissions		Ant.	Correction factors		Total	Limit	
Frequency (㎒)	Reading (dB㎶)	Pol.	Ant. factor (dB/m)	Cable loss (dB)	Actual (dB㎶/m)	Limit (dB㎶/m)	Margin (dB)
31.9	20.47	V	13.28	0.25	34.00	40.00	6.00
36.4	16.46	V	13.58	0.28	30.32	40.00	9.68
49.8	8.77	V	13.54	0.36	22.67	40.00	17.33
200.5	13.87	V	9.91	1.07	24.85	43.50	18.65
214.9	11.46	V	10.63	1.11	23.20	43.50	20.30
300.1	14.25	V	12.80	1.38	28.43	46.00	17.57
352.8	27.32	H	13.88	1.57	42.77	46.00	3.23
366.8	11.56	V	14.16	1.61	27.33	46.00	18.67
457.6	9.64	V	16.04	1.82	27.50	46.00	18.50
732.5	19.97	H	20.06	2.29	42.32	46.00	3.68
759.6	20.44	H	20.37	2.34	43.15	46.00	2.85
786.8	20.27	H	20.62	2.39	43.28	46.00	2.72
813.9	20.93	H	20.79	2.44	44.16	46.00	1.84
841.1	21.11	H	20.98	2.48	44.57	46.00	1.43
868.2	20.65	H	21.24	2.52	44.41	46.00	1.59
895.2	20.03	H	21.58	2.56	44.17	46.00	1.83
922.5	18.24	H	21.94	2.61	42.79	46.00	3.21

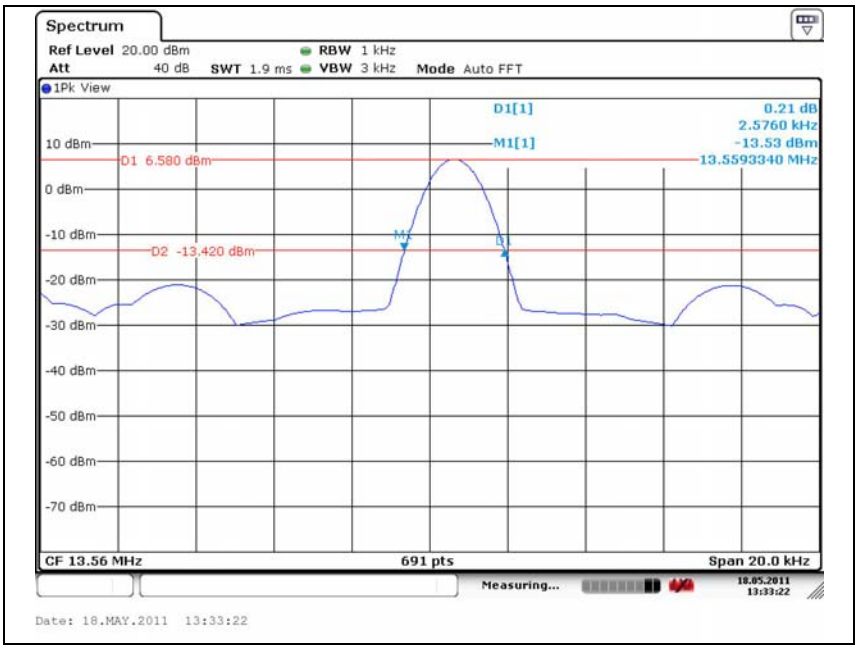
※ Remark

1. Actual = Reading + Ant. factor + Cable loss
2. Detector mode: Quasi-peak
3. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

2.1.2 20 dB bandwidth

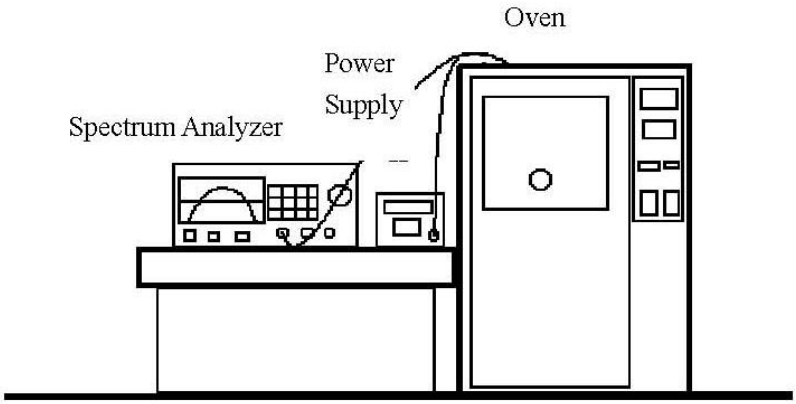
Test setup: The EUT was connected to a spectrum analyzer.

Test procedure: The 20 dB bandwidth was measured by using a spectrum analyzer.



2.1.3 Frequency tolerance

Test setup



Test procedure

1. According to FCC Part 15 Section 15.225 (e), the frequency stability shall be measured with variation of ambient temperature from –20 ℃ to +50 ℃ centigrade.
2. According to FCC Part 15 Section 15.225 (e), for 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. The frequency tolerance of the carrier signal shall be maintained within +/- 0.01 % of the operating frequency.

Limit

In the section 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.

Test results

Test voltage (%)	Test voltage (V)	Temperature (℃)	Measure frequency (㎒)	Frequency deviation (㎐)	Deviation (%)
100 %	6 V	-20	13.560622	622	0.004587%
100 %		-10	13.560654	654	0.004823%
100 %		0	13.560657	657	0.004845%
100 %		10	13.560629	629	0.004639%
100 %		20	13.560594	594	0.004381%
100 %		30	13.560561	561	0.004137%
100 %		40	13.560533	533	0.003931%
100 %		50	13.560535	535	0.003945%

Appendix A – Test equipment used for test

Equipment	Manufacturer	Model	Calibration due.
Spectrum Analyzer	R&S	FSV30	2012-01-07
Loop Antenna	R&S	HFH2-Z2.335.4711.52	2013-03-10
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	2013-03-18
Temperature chamber	SAMWON TECH	TEMI550N-10	2012-01-12
EMI Test Receiver	R&S	ESHS10	2011-06-01

Test setup photo and configuration

Radiated field emissions