



CTK Co., Ltd.
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TEST REPORT For FCC

Test Report No. : CTK-2012-00344
Date of Issue : May 9, 2012
FCC ID : YWVDH-ST1
Model/Type : DH-ST1
Kind of Product : UHF Band RFID Tag
Applicant : DH Technology, Inc.
Applicant Address : 3rd Floor, 249-12, Seodaesin-dong 3-ga, Seo-gu, Busan 602-825, Korea
Manufacturer : TEKMO Co., Ltd.
Manufacturer Address : 705 World Meridian Venture Center-1 60-24, Gasan-dong, Geumcheon-gu, Seoul, Korea
Contact Person : Hyun Chul, Kim/ President, CEO
Telephone : +82-51-247-1807
Received Date : April 16, 2012
Test period : Start : April 17, 2010 End : May 8, 2012
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Won-Jae, Hwang
Test Engineer
Date: May 9, 2012

Reviewed by

Young-Joon, Park
Technical Manager
Date: May 9, 2012



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REPORT REVISION HISTORY

Date	Revision	Page No
May 9, 2012	Issued (CTK-2012-00344)	All

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1.0 General Product Description

Type of equipment : UHF Band RFID Tag
Equipment model name : DH-ST1
FCC ID : YWVDH-ST1
Frequency Range : 433.92 MHz
Type of Modulation : Frequency Shift Keying
Air Protocol : ISO/IEC 18000-7
Number of channels : 1
Antenna type : PCB antenna Gain -21.32 dBi
Power Source : Internal Lithium ion Battery (DC 3.6V)

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
-	-	-	-	-
-	-	-	-	-

1.4 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.



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1.5 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea.

1.6 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m OATS, 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	10 m OATS, 3 m & 10 m SAC and Conducted Test Site	 R-948, C-986, T-1843
KOREA	KCC	EMI (10 m OATS, 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	 No. 51, KR0025
International	KOLAS	EMC	



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2.0 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.207	AC CONDUCTED EMISSION	Line Conducted	NA
15.209 & 15.240(c)	RADIATED EMISSION	Radiated	C
15.240(b)	DURATION OF TRANSMISSIONS	Conducted	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

The sample was tested according to the following specification:

- FCC Part 15.240, ANSI C63.4-2003



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2.1.1 AC Conducted Emissions(Section 15.207)

Test Location

Shielded Room

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Limit

- 15.207(a)

Frequency (MHz)	Conducted Limit (dBuV)	
	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.

Test Results

The requirements are:

☒ **Not Applicable**

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
Not applicable because the DUT is battery operated.			

2.1.2 RADIATED EMISSION MEASUREMENT (Section 15.209 & 240)

Test Location

☑ Testing was performed at a test distance of 3 meter Conducted Test Site

Test Procedures

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:

Below 1GHz :

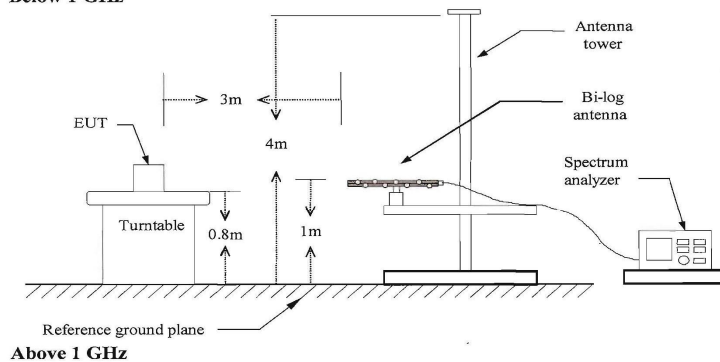
RBW=100KHz/VBW=300KHz/Sweep=AUTO

Above 1GHz:

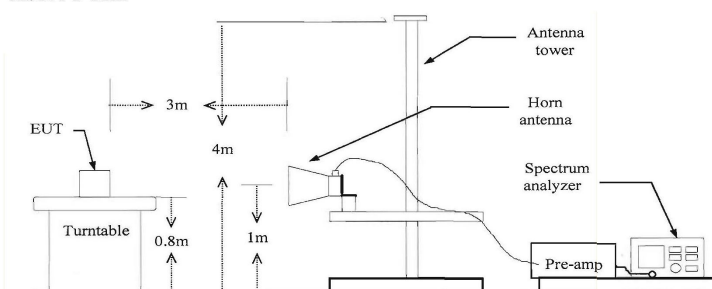
(a) PEAK:RBW=VBW=1MHz/Sweep=AUTO

(b) AVERAGE:RBW=1MHz/VBW=10Hz/Sweep=AUTO

Below 1 GHz



Above 1 GHz



Limit

- 15.240(b)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
433.92	55000	94.81

- 15.209(a)

Frequency(MHz)	Field Strength uV/m@3m	Field Strength dBuV/m@3m
30-88	100**	40
88-216	150**	43.5
216-960	200**	46
Above 960	500	54



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** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

Test Results

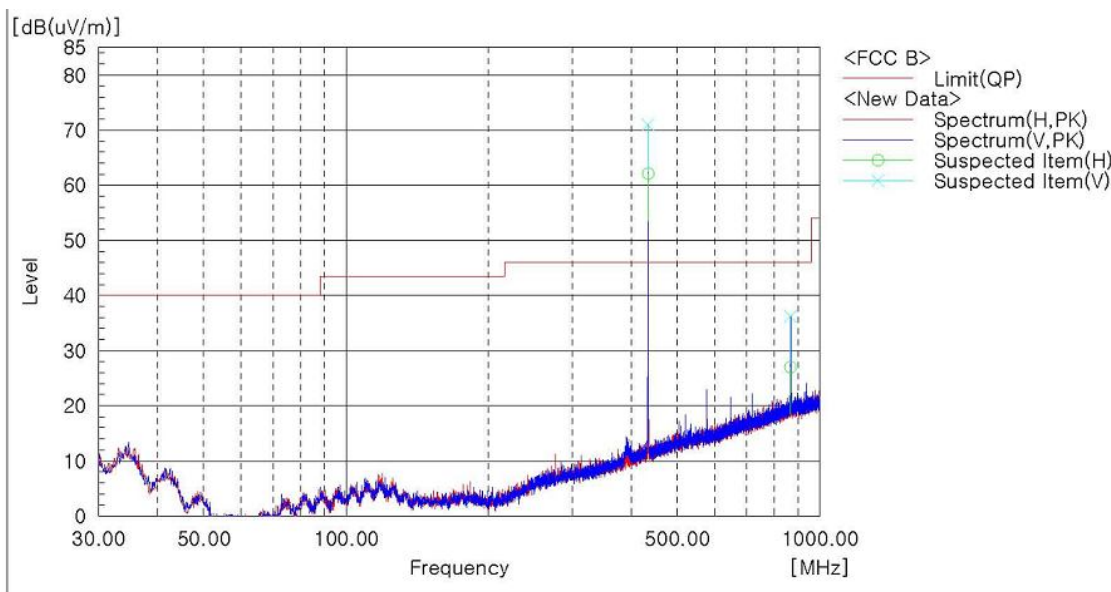
EUT	UHF Band RFID Tag	Measurement Detail	
Model	DH-ST1	Frequency Range	Below 1000MHz
		Detector function	Quasi-Peak

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
433.92	71.0	23.81	Quasi-Peak
867.84	36.2	9.8	

Test Data



Spectrum Selection

No.	Frequency (P)	Reading	c.f	Result PK	Limit QP	Margin QP	Height	Angle
	[MHz]	[dB(uV)]	[dB(1/m)]	[dB(uV/m)]	[dB(uV/m)]	[dB]	[cm]	[deg]
1	433.884	V	83.3	-12.3	71.0		100.0	332.0
2	434.005	H	74.4	-12.3	62.1		208.0	333.0
3	867.838	V	39.8	-3.6	36.2	46.0	100.0	0.0
4	867.838	H	30.6	-3.6	27.0	46.0	208.0	296.0

Remark :

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.



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Test Results

EUT	UHF Band RFID Tag	Measurement Detail	
Model	DH-ST1	Frequency Range	1-25GHz
		Detector function	Average, Peak

Remarks

We have tested three mode (X, Y, Z). The worst mode (X axis) for final test.

The requirements are:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
-	-	-	Average / Peak

Test Data

Frequency [MHz]	Reading [dBuV/m] AV / Peak	Pol.	Height [m]	Correction Factor			Limits [dBuV/m] AV / Peak	Result [dBuV/m] AV / Peak	Margin [dB] AV / Peak
				Antenna	Amp. Gain	Cable			
No emissions were detected at a level greater than 20dB below limit.									



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Note ;

1. Fundamental emissions from the intentional radiators were not located within any of frequency bands described in section 15.205(a) listed below ;

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.25
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.1775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	13.36-13.41

The field strength of emissions appearing within above frequency bands did not exceed the limits shown in section 15.209. At frequency equal to or less than 1000MHz, compliance with the limits section 15.209 was demonstrated using measurement employing a CISPR quasi-peak detector. Above 1000MHz, demonstrated based on the average value of the measured emissions.

2. If the intentional radiator was operated under the radiated emission limits of the general requirements of section 15.209, it's fundamental emissions were not located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-860MHz
3. The level of any unwanted emissions from an intentional radiator did not exceed the level of the fundamental emission.
4. Radiated and spurious emissions were checked from 30MHz to 3GHz. And all other emissions not reported on data were more than 20 dB below the permitted level.



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2.1.3 DURATION OF TRANSMISSIONS (Section 15.240(b))

Description

The period of the pulse train is determined by observing it on a spectrum analyzer with zero frequency span.

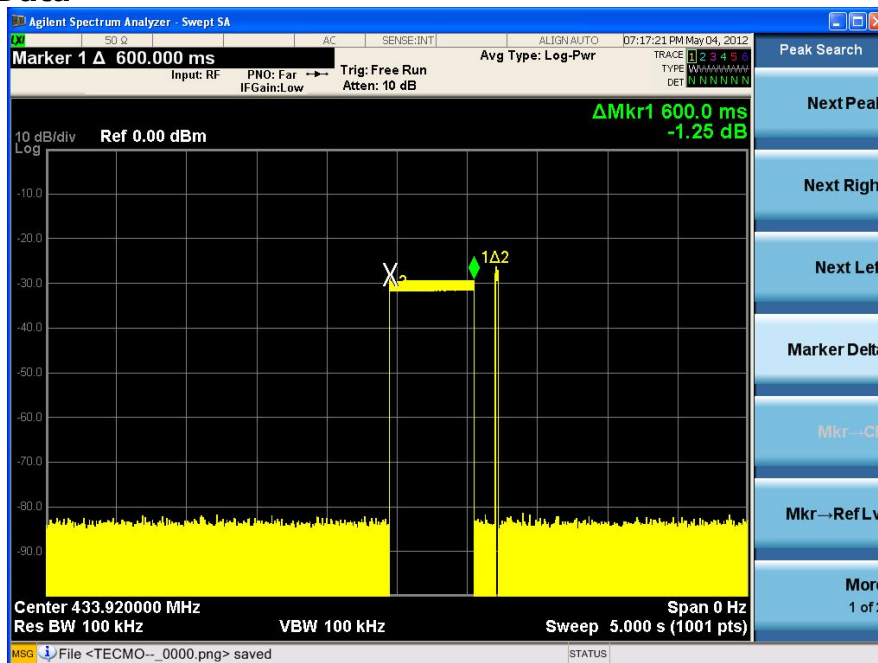
The Reader is triggered by the user to send transmissions under 15.240(b).

The duration of the tag transmission is 600 ms which complies with duration limit "within 60 seconds".

Test Results

maximum transmit time : 600 ms

Test Data





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APPENDIX A – Test Equipment Used For Tests

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2012-11-10
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2012-11-10
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2012-07-07
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2013-11-03
5	LOOP ANTENNA	EMCO	6502	9107-2652	2012-10-29
6	Attenuator	HP	8498A	1801A06913	2012-11-14
7	EPM Series Power Meter	HP	E4418A	GB38272734	2012-11-10
8	Power Sensor	HP	8487A	3318A03524	2012-07-07
9	Audio Analyzer	HP	8903B	2747A03432	2012-11-10
10	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2012-11-21
11	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2012-11-10
12	Modulation Analyzer	HP	8901B	3438A05228	2012-11-18
13	Attenuator	HP	8494A	3308A33351	2012-11-14
14	Temp&Humi Chamber	Kunpoong	JT-TH-556-1	9QE5-002	2013-01-12
15	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
16	EMC Analyzer	Agilent	E7405A	MY45110859	2013-02-13
17	Horn Antenna	ETS-Lindgren	3115	00078894	2013-03-22
18	Horn Antenna	ETS-Lindgren	3115	00078895	2013-03-22
19	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2013-11-04
20	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2013-11-04
21	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2013-03-27
22	PREAMPLIFIER	Agilent	8449B	3008A02307	2012-11-17
23	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2013-02-09
24	LISN	Rohde & Schwarz	ENV216	101235	2012-08-18
25	LISN	Rohde & Schwarz	ENV216	101236	2012-08-18
26	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2012-11-10
27	EMI Test Receiver	Rohde & Schwarz	ESCI3	100032	2013-02-09