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TEST REPORT For FCC

Test Report No. : 2010100069
Date of Issue : October 28, 2010
FCC ID : YWVDH-R1
Model/Type : DH-R1
Kind of Product : UHF Band RFID Reader (Low power transceiver – RX verified)
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 : +82-2-2113-7587
Received Date : October 15, 2010
Test period : Start : October 15, 2010 End : October 28, 2010
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: October 28, 2010

Reviewed by

Young-Joon, Park
Technical Manager
Date: October 28, 2010



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REPORT REVISION HISTORY

Date	Revision	Page No
October 28, 2010	Issued (2010100069)	All

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1.0 General Product Description

Type of equipment : UHF Band RFID Reader (Low power transceiver – RX verified)
Equipment model name : DH-R1
FCC ID : YWVDH-R1
Frequency Range : 433.92 MHz
Type of Modulation : Frequency Shift Keying
Data Rate : 27.8 kHz
Air Protocol : ISO/IEC 18000-7
Number of channels : 1
Antenna type : WHIP antenna Gain 11.83 dBi
Power Source : 100-240 Vac, 50/60 Hz, 25 A

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.

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 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	 805871
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	 R-948, C-986, T-1843
KOREA	KCC	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	 No. 51, KR0025
International	KOLAS	EMC	
Europe	GLAS	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	 No.13000796-02



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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	C
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:

☒ Complies

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
0.6045	41.1	4.9	Average



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Test Data

[HOT]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.204000	44.9	1000.0	9.000	On	L1	10.0	18.5	63.4
0.469500	41.1	1000.0	9.000	On	L1	10.2	15.4	56.5
0.537000	40.6	1000.0	9.000	On	L1	10.2	15.4	56.0
0.672000	39.6	1000.0	9.000	On	L1	10.1	16.4	56.0
1.207500	38.9	1000.0	9.000	On	L1	9.9	17.1	56.0
1.545000	38.9	1000.0	9.000	On	L1	9.9	17.1	56.0
2.013000	38.2	1000.0	9.000	On	L1	9.9	17.8	56.0
3.421500	39.5	1000.0	9.000	On	L1	9.8	16.5	56.0
3.624000	36.7	1000.0	9.000	On	L1	9.8	19.3	56.0
19.500000	44.0	1000.0	9.000	On	L1	10.0	16.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.469500	40.4	1000.0	9.000	On	L1	10.2	6.1	46.5
0.604500	41.1	1000.0	9.000	On	L1	10.1	4.9	46.0
0.672000	39.7	1000.0	9.000	On	L1	10.1	6.3	46.0
1.140000	38.9	1000.0	9.000	On	L1	9.9	7.1	46.0
1.477500	37.5	1000.0	9.000	On	L1	9.9	8.5	46.0
1.545000	38.9	1000.0	9.000	On	L1	9.9	7.1	46.0
2.013000	38.2	1000.0	9.000	On	L1	9.9	7.8	46.0
2.886000	37.2	1000.0	9.000	On	L1	9.9	8.8	46.0
3.354000	38.5	1000.0	9.000	On	L1	9.8	7.5	46.0
19.500000	44.0	1000.0	9.000	On	L1	10.0	6.0	50.0

[NEUTRAL]

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.267000	42.0	1000.0	9.000	On	N	10.1	19.2	61.2
0.469500	41.1	1000.0	9.000	On	N	10.2	15.4	56.5
0.604500	40.9	1000.0	9.000	On	N	10.2	15.1	56.0
0.672000	39.7	1000.0	9.000	On	N	10.1	16.3	56.0
1.207500	39.0	1000.0	9.000	On	N	10.0	17.0	56.0
1.477500	38.1	1000.0	9.000	On	N	9.9	17.9	56.0
1.612500	39.4	1000.0	9.000	On	N	9.9	16.6	56.0
2.080500	38.0	1000.0	9.000	On	N	9.9	18.0	56.0
3.358500	40.3	1000.0	9.000	On	N	9.9	15.7	56.0
19.500000	44.4	1000.0	9.000	On	N	10.1	15.6	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.469500	40.5	1000.0	9.000	On	N	10.2	6.0	46.5
0.604500	40.9	1000.0	9.000	On	N	10.2	5.1	46.0
0.672000	39.8	1000.0	9.000	On	N	10.1	6.2	46.0
1.140000	38.8	1000.0	9.000	On	N	10.0	7.2	46.0
1.477500	37.5	1000.0	9.000	On	N	9.9	8.5	46.0
1.612500	39.4	1000.0	9.000	On	N	9.9	6.6	46.0
2.013000	37.9	1000.0	9.000	On	N	9.9	8.1	46.0
2.485500	36.9	1000.0	9.000	On	N	9.9	9.1	46.0
3.358500	39.9	1000.0	9.000	On	N	9.9	6.1	46.0
19.500000	44.3	1000.0	9.000	On	N	10.1	5.7	50.0



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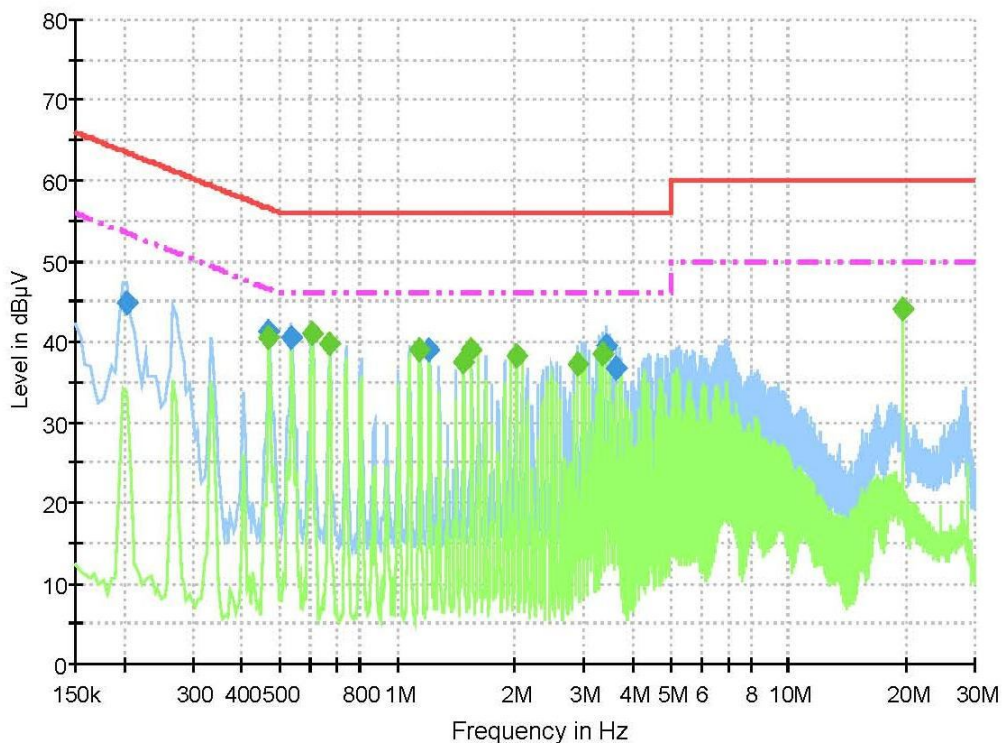
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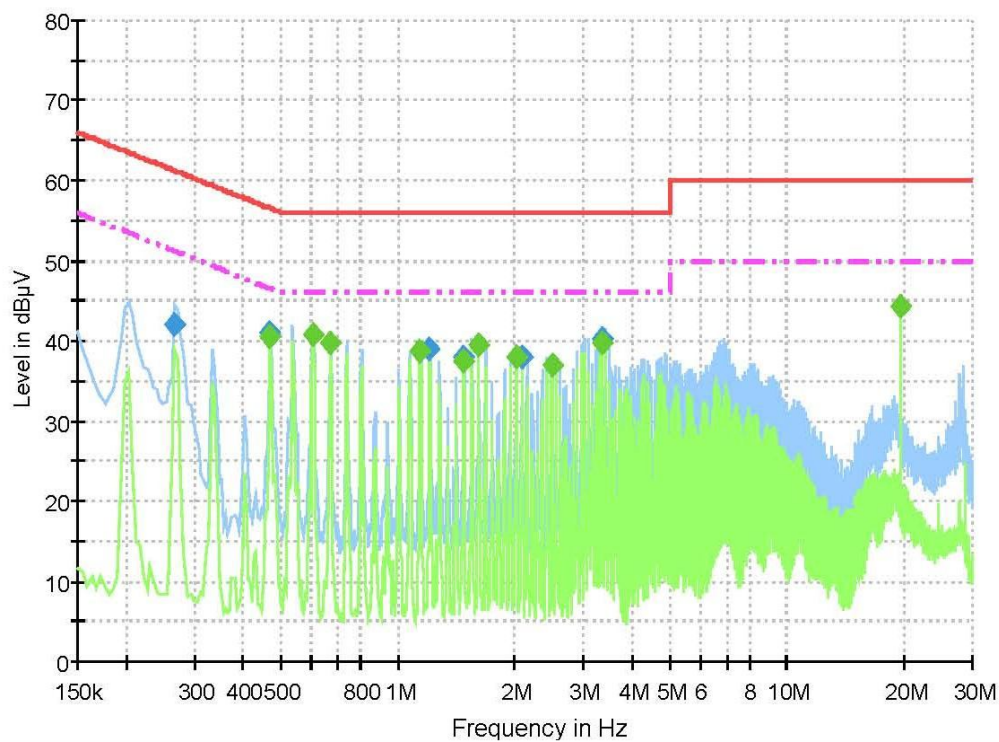
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[HOT]



[NEUTRAL]



2.1.2 RADIATED EMISSION MEASUREMENT (Section 15.209 & 240)

Test Location

☒ Testing was performed at a test distance of 3 meter Open Area 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:

Center frequency = the worst channel

Frequency Range = 30 MHz ~ 10th harmonic

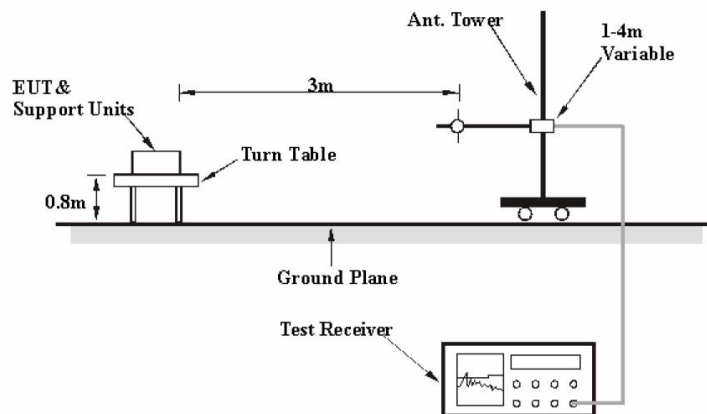
RBW = 120 kHz (30 MHz ~ 1 GHz) VBW ≥ RBW

= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Detector function = Quasi-peak, peak, Average

Trace = max hold



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

** 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.



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Test Results

EUT	UHF Band RFID Reader	Measurement Detail	
Model	DH-R1	Frequency Range	Below 1000MHz
		Detector function	Quasi-peak, peak, Average

The requirements are:

☒ Complies
Test Data

Frequency [MHz]	Reading [dBμV/m]		Pol.	Height [m]	Correction Factor			Limits		Result		Margin	
	AV	Peak			Antenna	Cable	Amp. Gain	[dBμV/m]		[dBμV/m]		[dB]	
								AV	Peak	AV	Peak	AV	Peak
433.92	91.7	96.2	V	2.0	14.5	3.0	31.3	80.8	94.8	77.9	82.4	3.0	12.4

Frequency [MHz]	Reading [dB μ V/m] QP	Pol.	Height [m]	Correction Factor			Limits [dB μ V/m] QP	Result [dB μ V/m] QP	Margin [dB] QP
				Antenna	Cable	Amp. Gain			
124.60	58.5	H	1.8	9.6	1.1	31.5	43.5	37.7	5.8
551.40	49.5	V	1.2	16.4	3.8	31.4	46.0	38.3	7.7
599.90	48.6	V	2.2	17.3	3.8	31.3	46.0	38.4	7.6
682.30	44.8	H	2.0	18.3	3.9	31.3	46.0	35.7	10.3
912.70	40.8	H	1.0	21.0	4.7	30.4	46.0	36.1	9.9
961.20	42.2	V	1.0	21.3	4.6	30.0	54.0	38.1	10.6

H : Horizontal, V : Vertical

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 Reader	Measurement Detail	
Model	DH-R1	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
3040.2	38.2 / 43.5	15.8 / 30.5	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				
3040.20	34.7 : 40.0	V	1.5	29.9	35.5	9.1	54.0 : 74.0	38.2 : 43.5	15.8 : 30.5	



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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.

2.1.3 DURATION OF TRANSMISSIONS (Section 15.240(b))

Description

The maximum transmit time is about 2.7s.

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

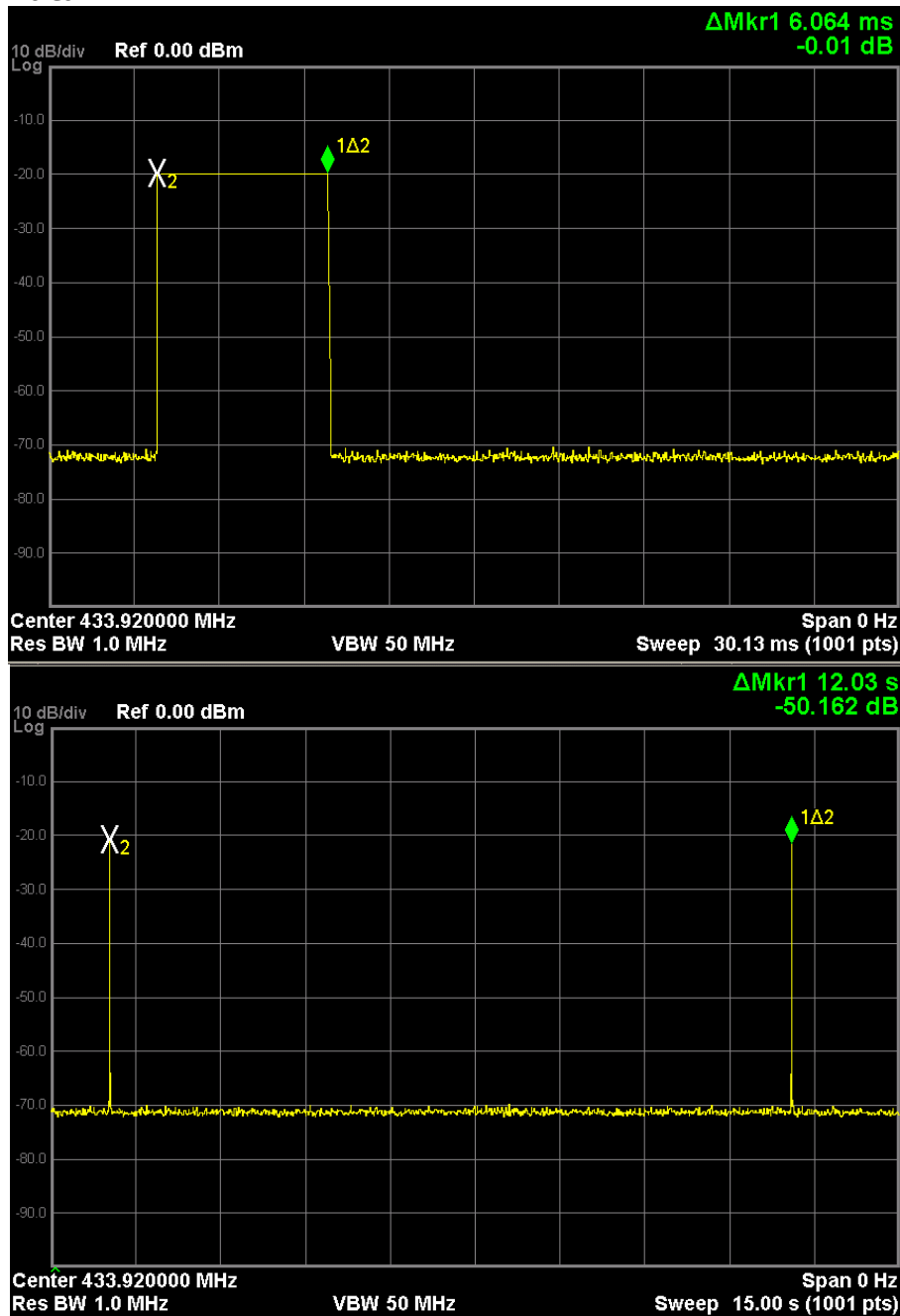
The client declare that a silent period is longer than 10s.

Test Results

maximum transmit time : 6.064 ms

silent period between transmission : 12.03 s

Test Data





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	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	2010-10-30
2	Spectrum Analyzer	Rohde & Schwarz	FSP-30	100994	2010-10-30
3	EMI Test Receiver	Rohde & Schwarz	ESVS30	826638/008	2011-07-12
4	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2011-11-18
5	LOOP ANTENNA	EMCO	6502	9107-2652	2011-10-13
7	System Power Supply	HP	6032A	3440A-10521	2011-07-07
8	EPM Series Power Meter	HP	E4418A	GB38272734	2010-10-30
9	Power Sensor	HP	8487A	3318A03524	2011-07-12
10	Audio Analyzer	HP	8903B	2747A03432	2010-11-03
11	ESG-D Series Signal Generator	Agilent	E4432B	US40054094	2010-10-30
12	SYNTHESIZED SWEEPER	HP	8341B	2819A01563	2010-10-30
13	Modulation Analyzer	HP	8901B	3438A05228	2010-11-06
14	Attenuator	HP	8494A	3308A33351	2010-11-02
15	Temp&Humi Chamber	Kunpoong	KP-1000	2002KP050041	2011-01-25
16	DC POWER SUPPLY	Agilent	E3632A	MY40011638	2010-10-30
17	EMC Analyzer	Agilent	E7405A	MY45110859	2011-01-25
18	Horn Antenna	ETS-Lindgren	3115	00078894	2010-12-18
19	Horn Antenna	ETS-Lindgren	3115	00078895	2010-12-18
20	Dipole Antenna	SCHWARZBECK	VHA 9103	VHA91032557	2010-11-27
21	Dipole Antenna	SCHWARZBECK	UHA 9105	UHA91052417	2010-11-27
22	OPT H64 AMPLIFIER	HP	8447F	3113A06814	2011-03-13
23	PREAMPLIFIER	Agilent	8449B	3008A02307	2010-10-30
24	Radio Communication Tester	Rohde & Schwarz	CMU200	106765	2011-02-23
25	Band Reject Filter	Wainwright Instruments	WRCG824	-	2011-04-11
26	Band Reject Filter	Wainwright Instruments	WRCG1750	-	2011-04-11
27	LISN	Rohde & Schwarz	ESH3-Z5	100207	2010-12-15
28	LISN	EMCO	3825/2	9206-1971	2010-12-16