

The FCC logo, consisting of the letters 'F' and 'C' in a stylized, bold, black font, with a circle around the 'C'.

# Test Report

Product Name : RFID CF Type Reader  
Model No. : SLC-10100  
FCC ID. : T39SLC10100

Applicant : Sunlit SystemTechnology Corp.  
Address : 8F., No. 19, Land 120, Sec. 1, Neihu Rd., Taipei 114,  
Taiwan R.O.C.

Date of Receipt : Apr. 03, 2007  
Issued Date : Apr. 17, 2007  
Report No. : 074L045-RFUSP05V01

The Test Results relate only to the samples tested.  
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.  
This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Issued Date: Apr. 17, 2007

Report No.: 074L045-RFUSP05V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : RFID CF Type Reader

Applicant : Sunlit SystemTechnology Corp.

Address : 8F., No. 19, Land 120, Sec. 1, Neihu Rd., Taipei 114, Taiwan  
: R.O.C.

Manufacturer : Sunlit SystemTechnology Corp.

Model No. : SLC-10100

FCC ID. : T39SLC10100

Rated Voltage : AC 120V/60Hz

Working Voltage : DC 3.3V

Trade Name : Sunlit

Applicable Standard : FCC CFR Title 47 Part 15 Subpart C: 2005  
ANSI C63.4: 2003  
CISPR 22: 2005

Test Result : Complied

The Test Results relate only to the samples tested.

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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By :



( Genie Chang )



0914

Tested By :



( Tom Hsieh )

Approved By :



( Gene Chang )



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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	: RFID CF Type Reader
Trade Name	: Sunlit
FCC ID.	: T39SLC10100
Model No.	: SLC-10100
Frequency Range	: 2400 – 2483.5MHz
Channel Number	: 76
Type of Modulation	: FHSS
Antenna Type	: Printed
Antenna Gain	: 0 dBi
Channel Control	: Auto

#### Center Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz		
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz		
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz		
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 76 channels and over the minimum number of hopping channels (75 channels).

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Note:

1. This device is RFID CF Type Reader with a built-in 2.4GHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle, and highest frequency are selected to perform the test.
4. This device is a composite device in accordance with Part 15 Subpart B regulations. The function for the receiver was measured and made a test report that the report number is 074L045-RFUSP01V02, certified under Declaration of Conformity.
5. QuietTek verified among construction and function in typical operation, then shown in this test report.

## 1.2. Operational Description

The EUT is a RFID CF Type Reader with 76 channels.

This device provides wireless technology that revolutionizes personal connectivity. It is the solution for the seamless integration of RFID technology into an automatic identification method, relying on storing and remotely retrieving data using devices called RFID tags or transponders. This device uses frequency hopping spread spectrum modulation. The carries are synthesized by a 13MHz crystal.

Test Mode:	Mode 1: Transmitter
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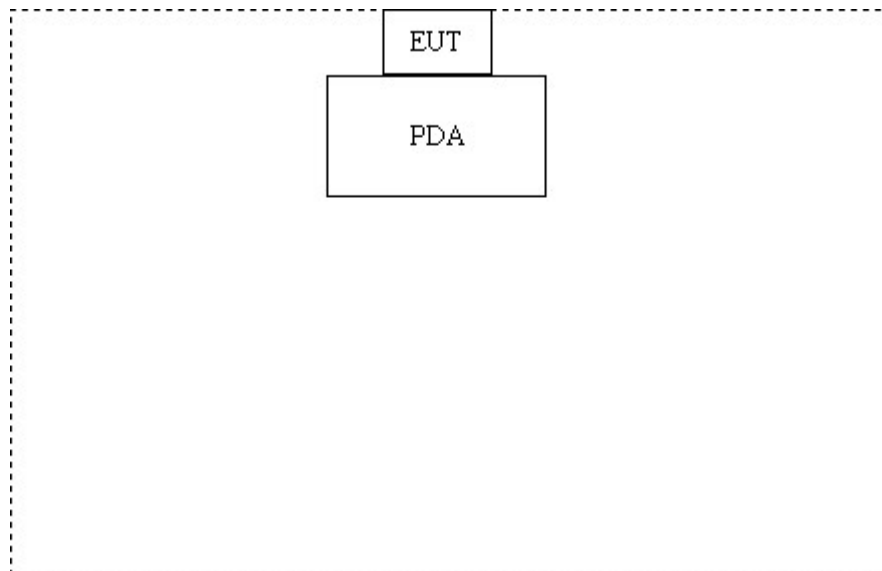
### 1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	Power Cord
(1)	PDA	HP	TPAQhx2110	2CK52107R2	Non-Shielded, 1.7m

Signal Cable Type	Signal cable Description
A. N/A	N/A

### 1.4. Configuration of Tested System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute DLLTestVC.exe on the PDA.
- (3) Configure the test channel.
- (4) Press “OK” to start continuous transmission.
- (5) Verify that the EUT works properly.

## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description:

Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Reference 31040/SIT1300F2



Accreditation on NVLAP  
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation

Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
Lin-Kou Shiang, Taipei,  
Taiwan, R.O.C.  
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789  
E-Mail : [service@quietek.com](mailto:service@quietek.com)





## 2. Conducted Emission

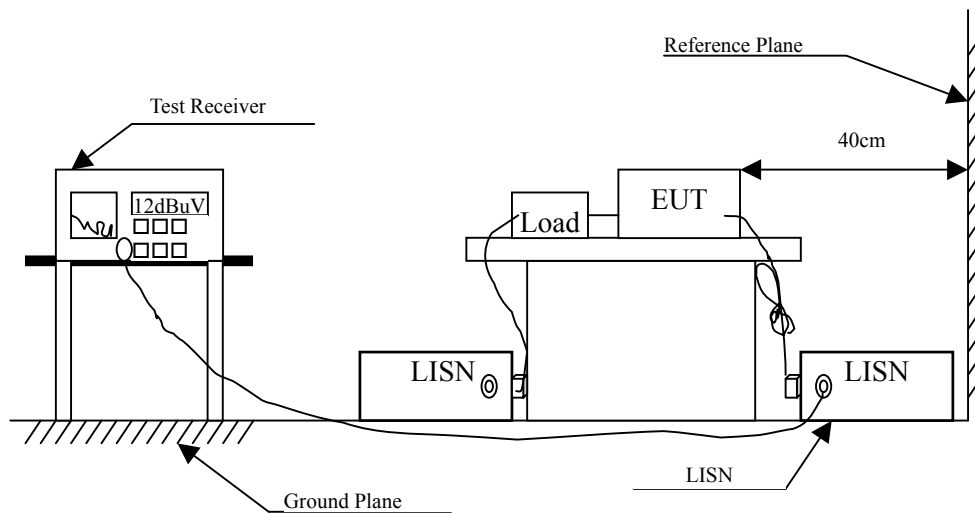
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2006	
2	L.I.S.N.	R & S	ENV4200 / 848411/10	Feb., 2007	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2006	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2006	
5	No.1 Shielded Room				

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

### 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

### 2.5. Uncertainty

The measurement uncertainty is defined as  $\pm 2.02$  dB

## 2.6. Test Result of Conducted Emission

Product : RFID CF Type Reader  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter (2440MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.158	0.202	33.530	33.732	-32.039	65.771
0.283	0.213	40.200	40.413	-21.787	62.200
0.425	0.215	30.420	30.635	-27.508	58.143
0.715	0.229	35.760	35.989	-20.011	56.000
0.860	0.231	34.120	34.351	-21.649	56.000
1.003	0.233	32.390	32.623	-23.377	56.000
<b>Average</b>					
0.158	0.202	7.530	7.732	-48.039	55.771
0.283	0.213	32.680	32.893	-19.307	52.200
0.425	0.215	22.080	22.295	-25.848	48.143
0.715	0.229	25.620	25.849	-20.151	46.000
0.860	0.231	23.860	24.091	-21.909	46.000
1.003	0.233	22.010	22.243	-23.757	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product : RFID CF Type Reader  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter (2440MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.285	0.206	40.700	40.906	-21.237	62.143
0.433	0.215	29.940	30.155	-27.759	57.914
0.561	0.217	29.770	29.987	-26.013	56.000
0.716	0.229	37.450	37.679	-18.321	56.000
0.861	0.231	35.970	36.201	-19.799	56.000
1.001	0.233	34.520	34.753	-21.247	56.000
<b>Average</b>					
0.285	0.206	34.030	34.236	-17.907	52.143
0.433	0.215	20.130	20.345	-27.569	47.914
0.561	0.217	15.870	16.087	-29.913	46.000
0.716	0.229	27.160	27.389	-18.611	46.000
0.861	0.231	25.710	25.941	-20.059	46.000
1.001	0.233	24.560	24.793	-21.207	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

### 3. Peak Power Output

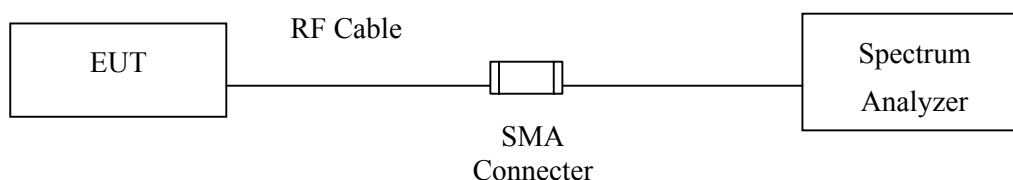
#### 3.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

#### 3.2. Test Setup



#### 3.3. Limit

The maximum peak power shall be less 1Watt.

#### 3.4. Uncertainty

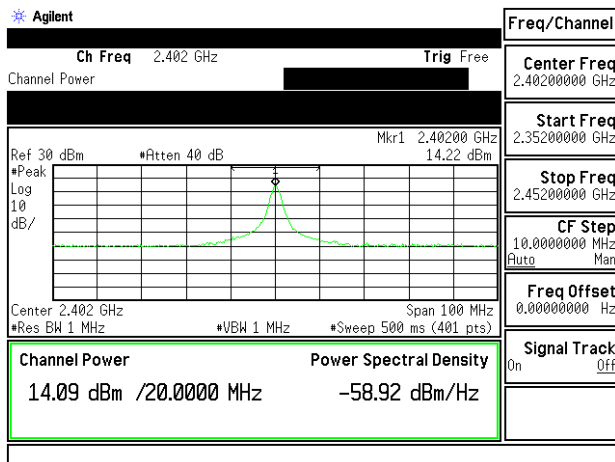
The measurement uncertainty is defined as  $\pm 1.27$  dB

### 3.5. Test Result of Peak Power Output

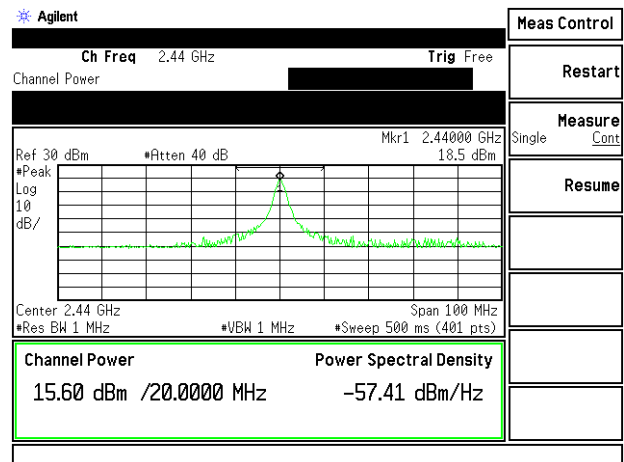
Product : RFID CF Type Reader  
 Test Item : Peak Power Output  
 Test Site : CTR01  
 Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 01	2402.00	14.09dBm	1 Watt= 30 dBm	Pass
Channel 38	2440.00	15.60dBm	1 Watt= 30 dBm	Pass
Channel 75	2477.00	13.25dBm	1 Watt= 30 dBm	Pass

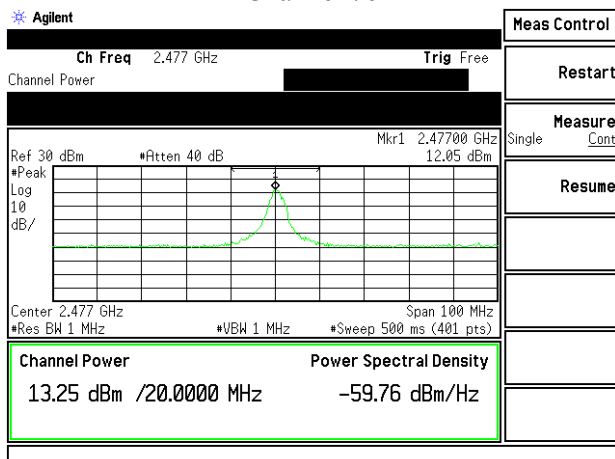
Channel 01



Channel 38



Channel 76



#### 4. Radiated Emission

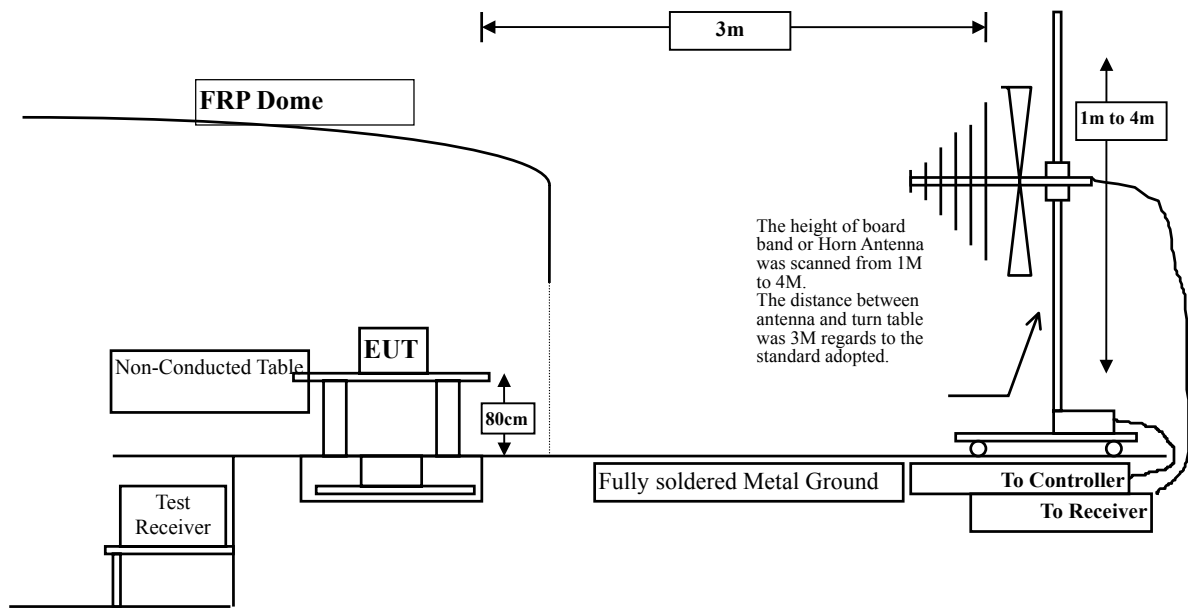
##### 4.1. Test Equipment

The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	May, 2006
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2006
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2006
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2006
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2006
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2006
	Horn Antenna	ETS	3115 / 0005-6160	Sep., 2006
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2006
<input checked="" type="checkbox"/> Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
	Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2006
	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006
	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P	May, 2006

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

## 4.2. Test Setup



## 4.3. Limits

### ➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.



#### 4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2003 on radiated measurement.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30 )is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

#### 4.5. Uncertainty

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB  
under 1G is defined as  $\pm 3.8$  dB

#### 4.6. Test Result of Radiated Emission

Product : RFID CF Type Reader  
Test Item : Harmonic Radiated Emission  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter (2402MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4804.100	3.663	50.392	54.055	-19.915	74.000
7206.100	9.357	37.344	46.700	-27.270	74.000
9608.100	11.841	37.536	49.378	-24.592	74.000
12010.100	15.057	37.593	52.650	-21.320	74.000
<b>Average Detector:</b>					
4804.100	3.663	46.543	50.206	-3.764	74.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4804.100	3.663	50.633	54.296	-19.674	74.000
7206.100	9.357	38.915	48.271	-25.699	74.000
9608.100	11.841	42.142	53.984	-19.986	74.000
12010.100	15.057	39.727	54.784	-19.186	74.000
<b>Average Detector:</b>					
4804.100	3.663	40.457	44.120	-9.850	74.000
12010.100	15.057	31.206	46.263	-7.707	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : RFID CF Type Reader  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2440MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4880.100	3.915	48.842	52.756	-21.214	74.000
7320.100	9.648	39.340	48.989	-24.981	74.000
9760.100	11.799	38.689	50.488	-23.482	74.000
<b>Average Detector:</b>					
--					
<b>Vertical</b>					
<b>Peak Detector:</b>					
4880.100	3.915	49.575	53.489	-20.481	74.000
7320.100	9.648	38.337	47.986	-25.984	74.000
9760.100	11.799	40.842	52.641	-21.329	74.000
<b>Average Detector:</b>					
--					

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : RFID CF Type Reader  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2477MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m

#### Horizontal

##### Peak Detector:

4954.100	4.176	48.702	52.878	-21.092	74.000
7431.100	9.933	38.374	48.307	-25.663	74.000
9908.100	11.851	38.514	50.365	-23.605	74.000

##### Average Detector:

--

#### Vertical

##### Peak Detector:

4954.100	4.176	48.901	53.077	-20.893	74.000
7431.100	9.933	37.693	47.626	-26.344	74.000
9908.100	11.851	40.560	52.411	-21.559	74.000

##### Average Detector:

--

#### Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz °
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:10MHz °
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : RFID CF Type Reader  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2440MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
122.100	12.872	20.800	33.671	-9.829	43.500
165.800	10.339	19.300	29.639	-13.861	43.500
434.900	17.653	14.400	32.053	-13.947	46.000
473.700	18.641	13.900	32.540	-13.460	46.000
544.100	19.945	15.700	35.645	-10.355	46.000
648.300	20.951	15.200	36.151	-9.849	46.000
<b>Vertical</b>					
112.400	11.958	13.300	25.258	-18.242	43.500
124.500	11.387	12.800	24.187	-19.313	43.500
364.600	16.449	17.600	34.049	-11.951	46.000
520.800	18.734	14.600	33.334	-12.666	46.000
779.300	22.242	14.500	36.742	-9.258	46.000
832.600	21.400	14.800	36.200	-9.800	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. “ ” means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

## 5. Band Edge

### 5.1. Test Equipment

The following test equipments are used during the band edge tests:

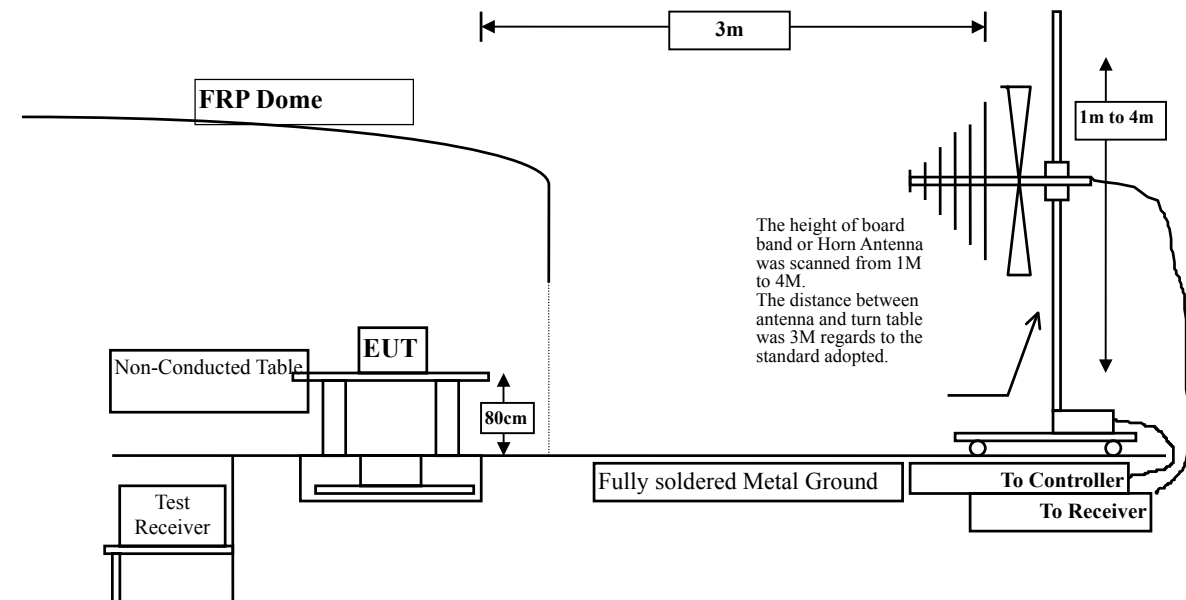
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2006
X Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
X Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
X Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2006
X Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
X Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2006
X Pre-Amplifier	HP	8449B / 3008A01123	July, 2006
X Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P	May, 2006

Test Site: No.3 OATS

- Note:
1. All equipments that need to calibrate are with calibration period of 1 year.
  2. Mark "X" test instruments are used to measure the final test results.

### 5.2. Test Setup

#### RF Radiated Measurement:



### **5.3. Limit**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### **5.4. Test Procedure**

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter (R&S Test Receiver ESCS 30 )is 120 kHz, above 1GHz are 1 MHz.

### **5.5. Uncertainty**

The measurement uncertainty above 1G is defined as  $\pm 3.9$  dB  
under 1G is defined as  $\pm 3.8$  dB

## 5.6. Test Result of Band Edge

Product : RFID CF Type Reader  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2402MHz)

### RF Radiated Measurement:

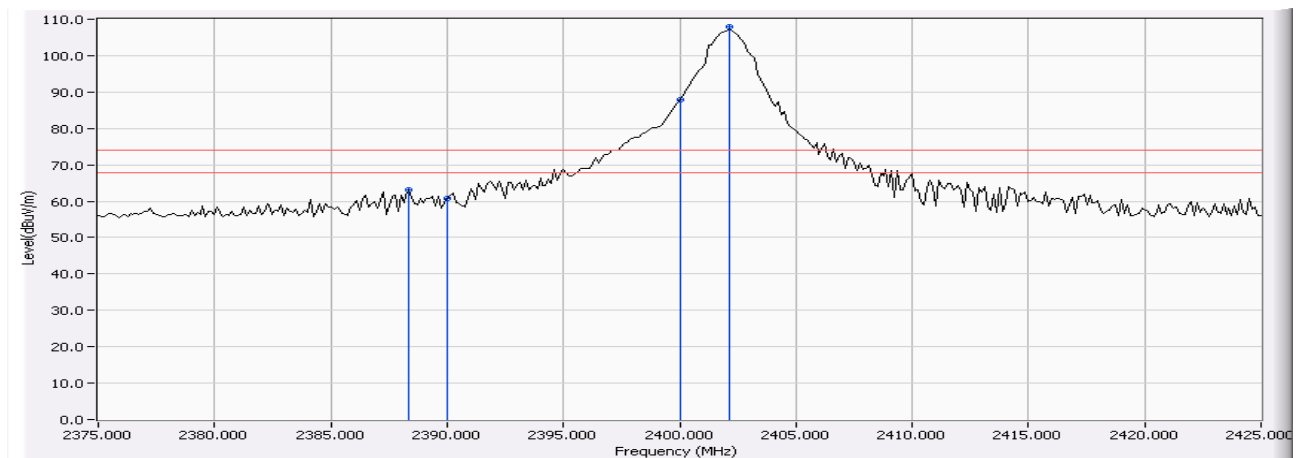
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

### RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Reading Level (dBUV)	Emission Level (dBUV/m)	Peak Limit (dBUV/m)	Average Limit (dBUV/m)	Result
00 (Peak)	2388.375	64.566	63.154	74.00	54.00	Pass
00 (Average)	2388.750	52.874	51.463	74.00	54.00	Pass

Figure Channel 00:

Horizontal (Peak)



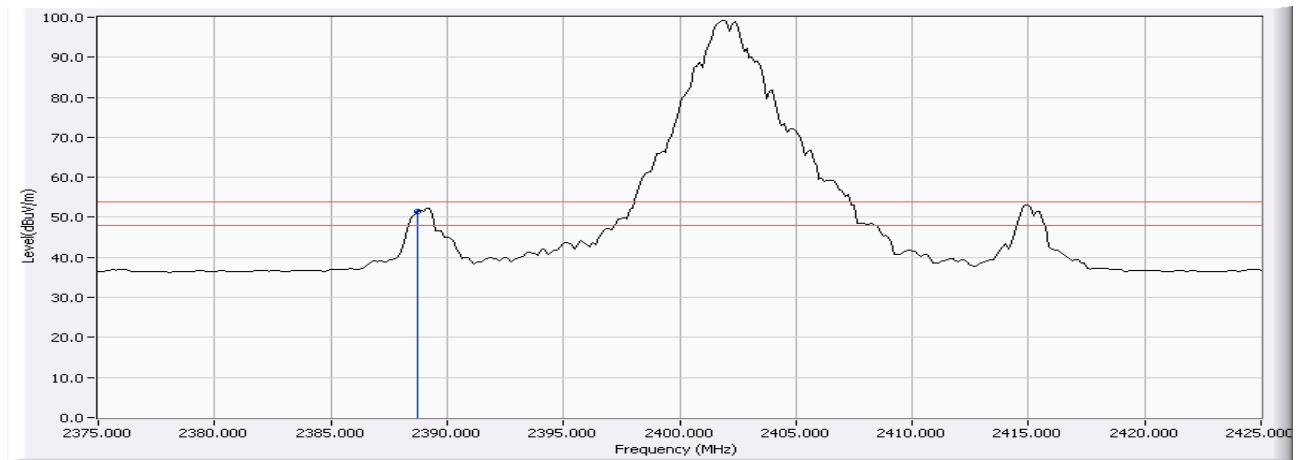
Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.



Figure Channel 00:

Horizontal (Average)



Note:

RBW=1MHz, VBW=30Hz, Sweep Time=Auto

Product : RFID CF Type Reader  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2402MHz)

**RF Radiated Measurement:**

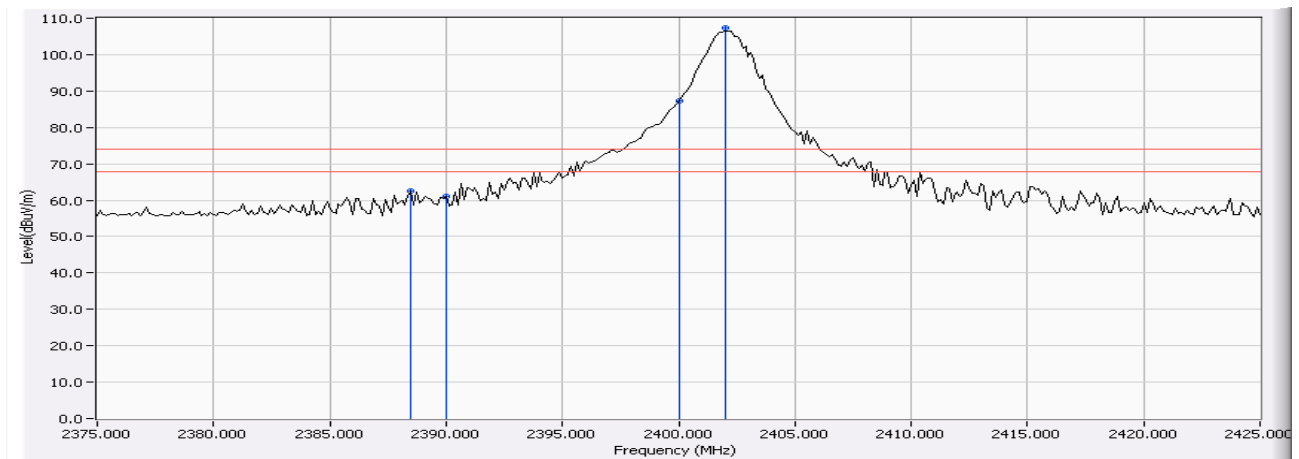
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00	<2400	>20	Pass

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2388.500	63.978	62.566	74.00	54.00	Pass
00 (Average)	2388.500	50.614	49.202	74.00	54.00	Pass

**Figure Channel 00:**

Vertical (Peak)

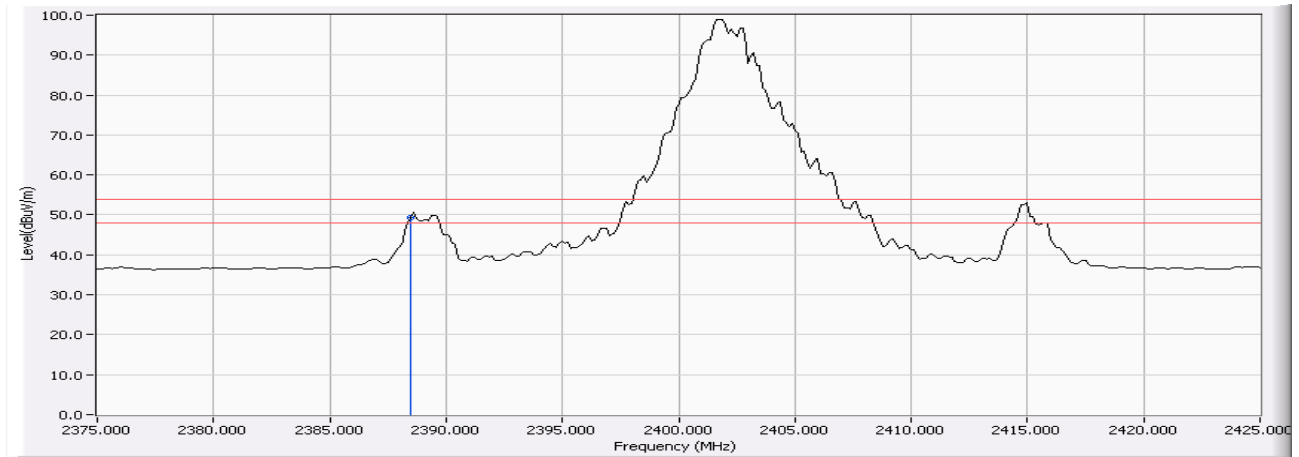


Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 00:

Vertical (Average)



Note:

RBW=1MHz, VBW=30Hz, Sweep Time=Auto

Product : RFID CF Type Reader  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2477MHz)

**RF Radiated Measurement:**

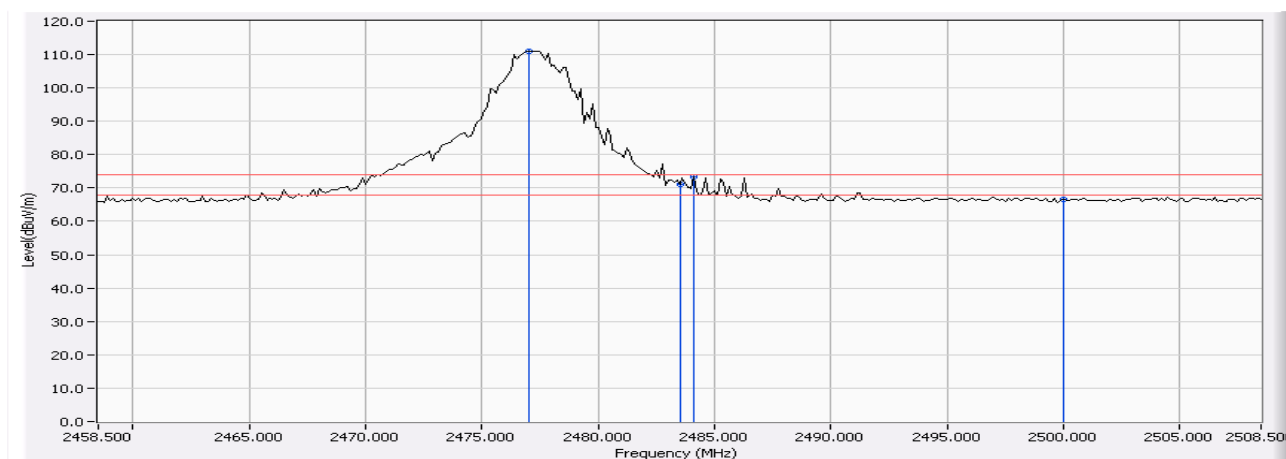
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
75	>2483.5	>20	Pass

**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
75(Peak)	2484.125	74.453	73.418	74.00	54.00	Pass
75(Average)	2484.125	53.112	52.077	74.00	54.00	Pass

**Figure Channel 75:**

Horizontal (Peak)

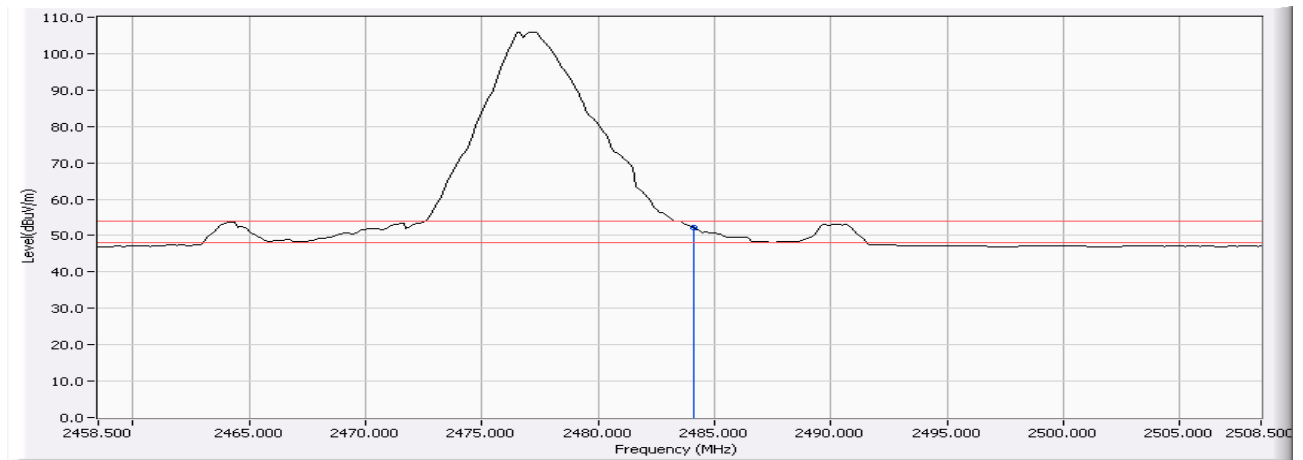


Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Figure Channel 75:

Horizontal (Average)



Note:

RBW=1MHz, VBW=30Hz, Sweep Time=Auto

Product : RFID CF Type Reader  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2477MHz)

**RF Radiated Measurement:**

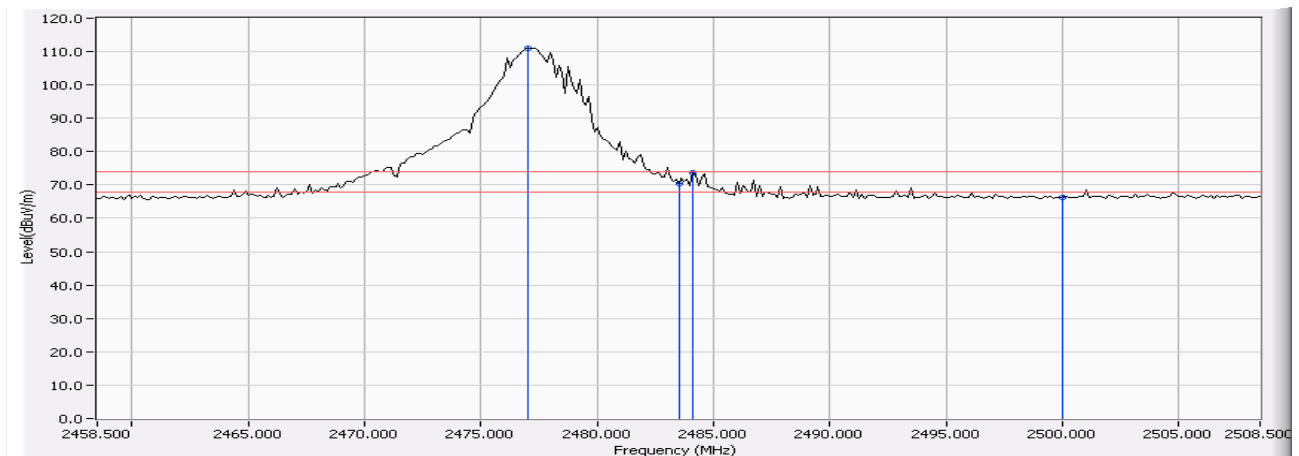
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
75	>2483.5	>20	Pass

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
75(Peak)	2484.125	74.732	73.697	74.00	54.00	Pass
75(Average)	2484.125	53.099	52.064	74.00	54.00	Pass

**Figure Channel 75:**

Vertical (Peak)

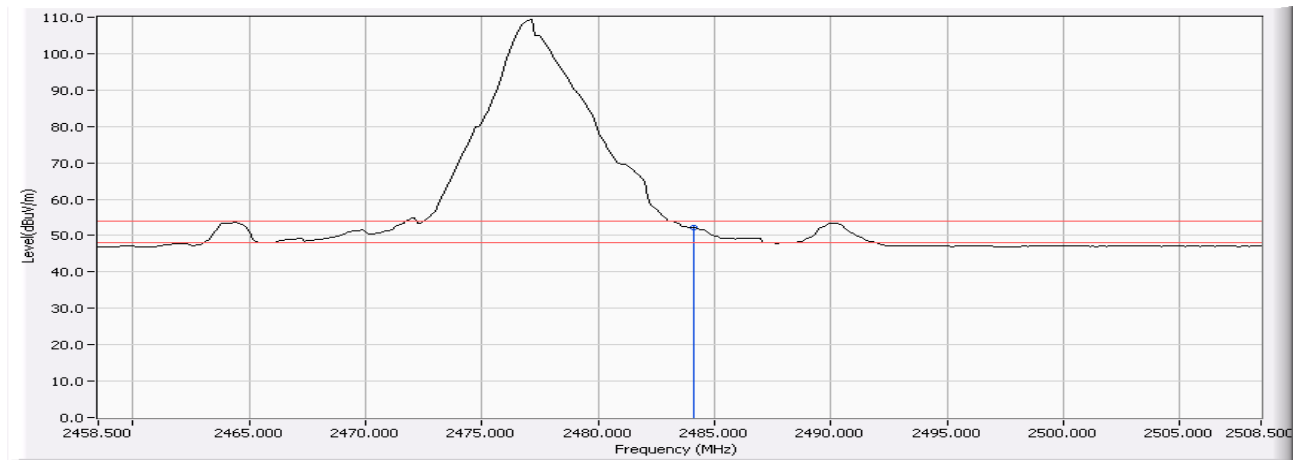


Note:

RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 75:

Vertical (Average)



Note:

RBW=1MHz, VBW=30Hz, Sweep Time=Auto

Note: The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

## 6. Channel Number

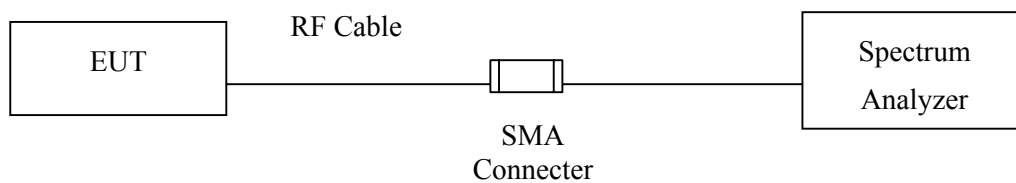
### 6.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

### 6.2. Test Setup



### 6.3. Limit

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

### 6.4. Uncertainty

The measurement uncertainty is defined as  $\pm 200\text{kHz}$

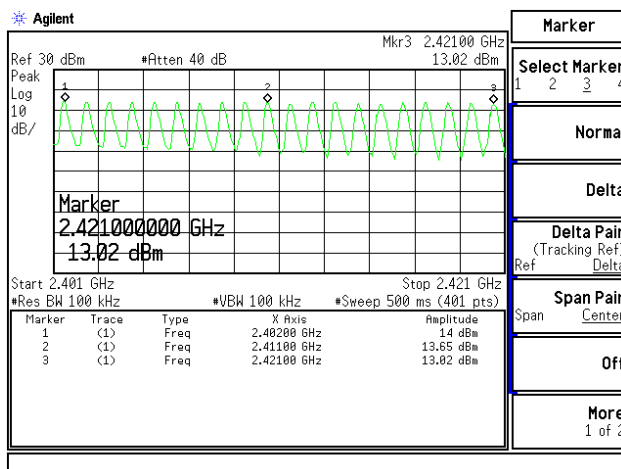


## 6.5. Test Result of Channel Number

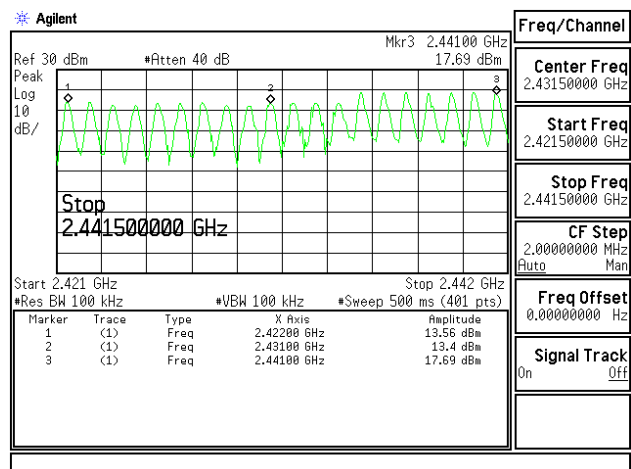
Product : RFID CF Type Reader  
 Test Item : Channel Number  
 Test Site : CTR01  
 Test Mode : Mode 1: Transmitter

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2477	76	>75	Pass

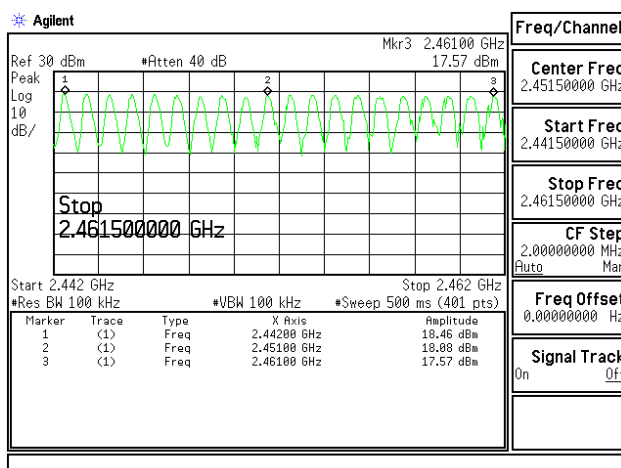
2402-2421MHz



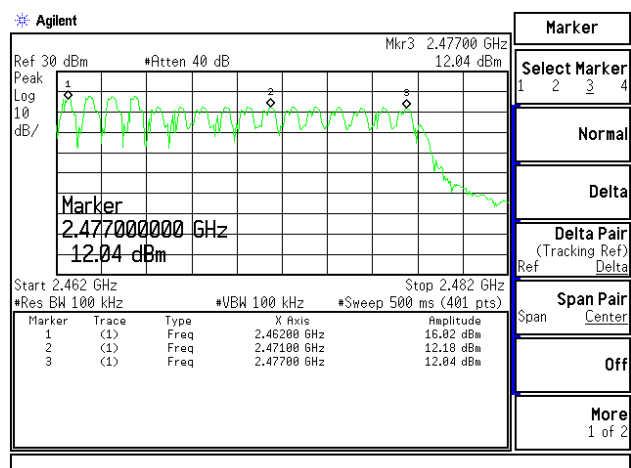
2422-2441MHz



2442-2461MHz



2462-2477MHz



## 7. Channel Separation

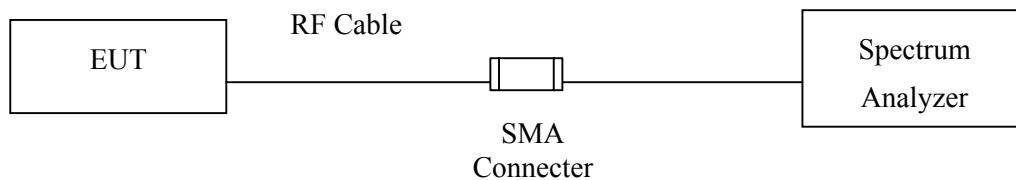
### 7.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

### 7.2. Test Setup



### 7.3. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

### 7.4. Uncertainty

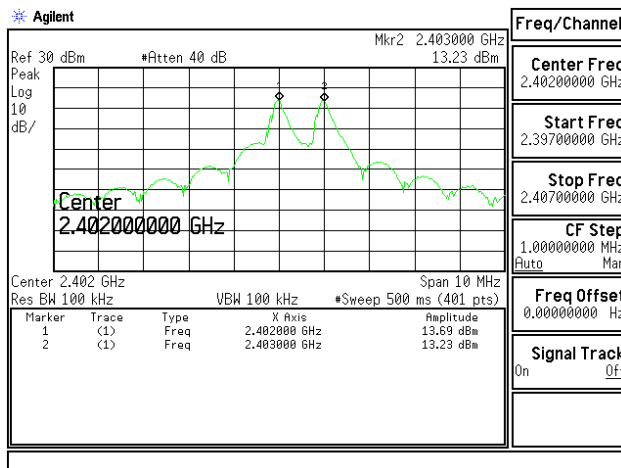
The measurement uncertainty is defined as  $\pm 150\text{Hz}$

## 7.5. Test Result of Channel Separation

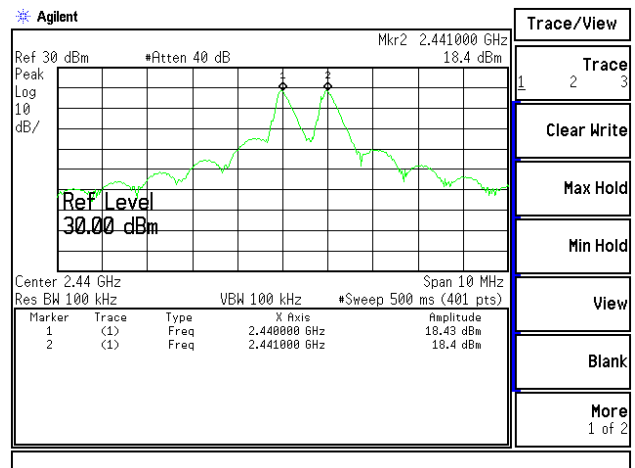
Product : RFID CF Type Reader  
 Test Item : Channel Separation  
 Test Site : CTR01  
 Test Mode : Mode 1: Transmitter

Frequency (MHz)	Measurement Level (MHz)	Required Limit	Result
2402	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2440	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2477	1.00	>25 kHz or 2/3 * 20 dB BW	Pass

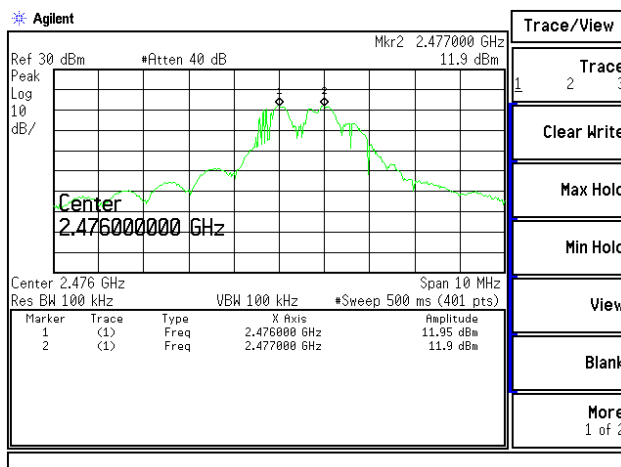
Channel 01 2402MHz



Channel 38 2440MHz



Channel 75 2477 MHz



## 8. Dwell Time

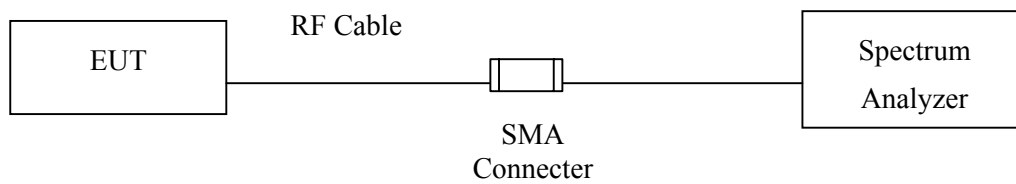
### 8.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

### 8.2. Test Setup



### 8.3. Limit

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

### 8.4. Uncertainty

The measurement uncertainty is defined as  $\pm 25\text{msec}$

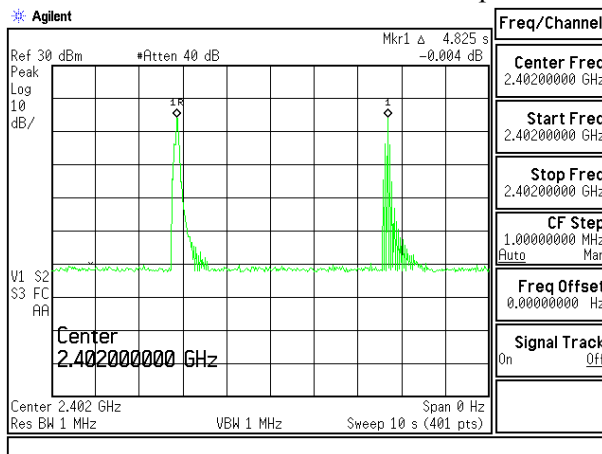
## 8.5. Test Result of Dwell Time

Product : RFID CF Type Reader  
 Test Item : Dwell Time  
 Test Site : CTR01  
 Test Mode : Mode 1: Transmitter (Channel 00,38,75)

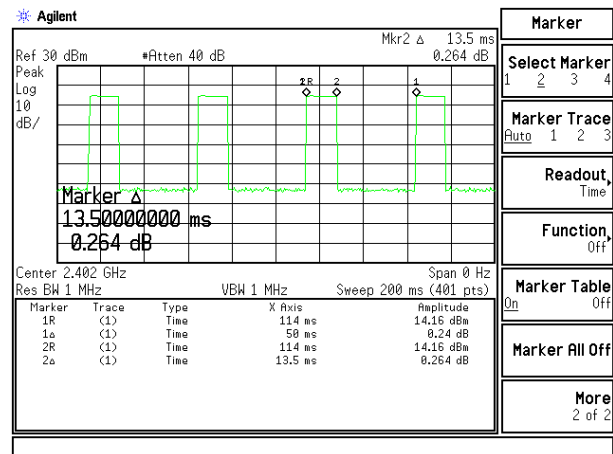
Channel (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
2402	4825	13500	88.41450777	400	Pass
2440	4825	13000	85.13989637	400	Pass
2477	4800	13000	85.58333333	400	Pass

Note: Dwell Time =  $79 * 400 / \text{Time Interval Between Hops} * \text{Transmission Time} / 1000$

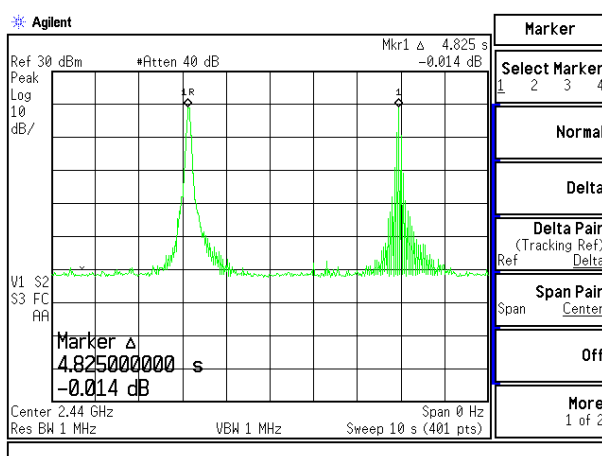
CH 2402MHz Time Interval between hops



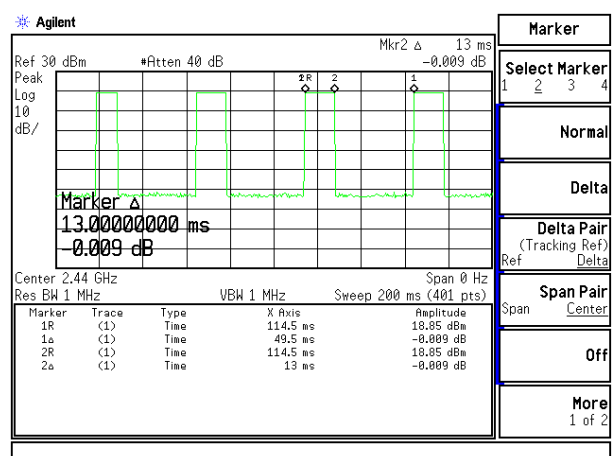
Transmission Time



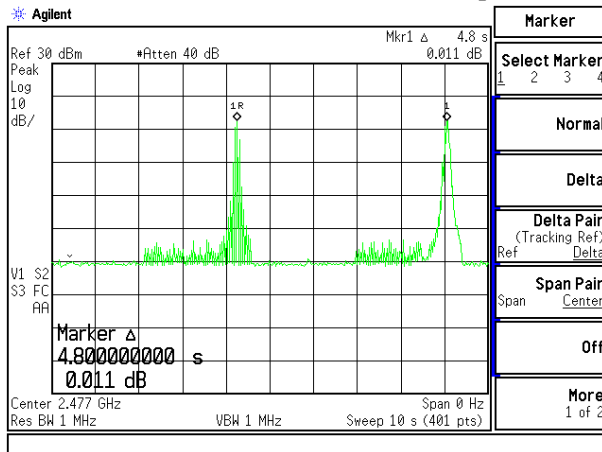
CH 2440MHz Time Interval between hops



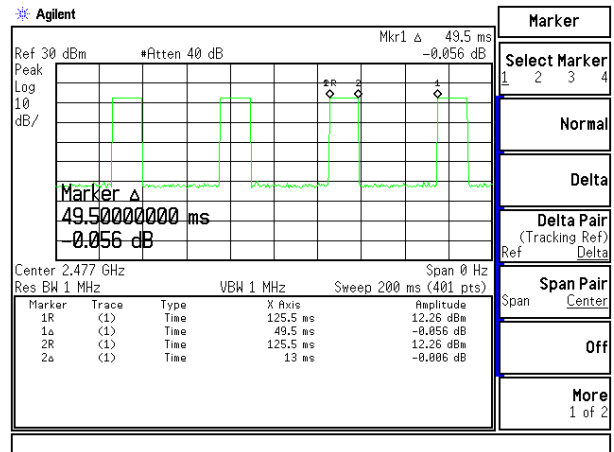
Transmission Time



### CH 2477MHz Time Interval between hops



### Transmission Time



## 9. Occupied Bandwidth

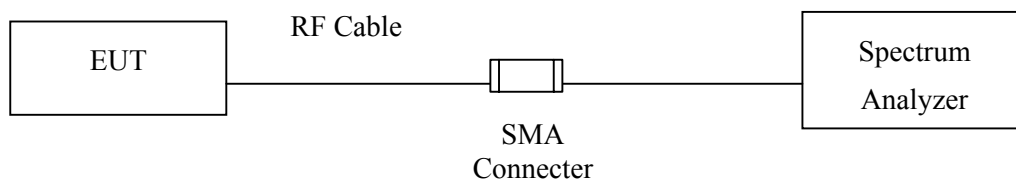
### 9.1. Test Equipment

The following test equipments are used during the radiated emission tests:

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipment upon which need to calibrated are with calibration period of 1 year.  
2. Mark "X" test instruments are used to measure the final test results.

### 9.2. Test Setup



### 9.3. Limits

The minimum bandwidth shall be at least 500kHz.

### 9.4. Uncertainty

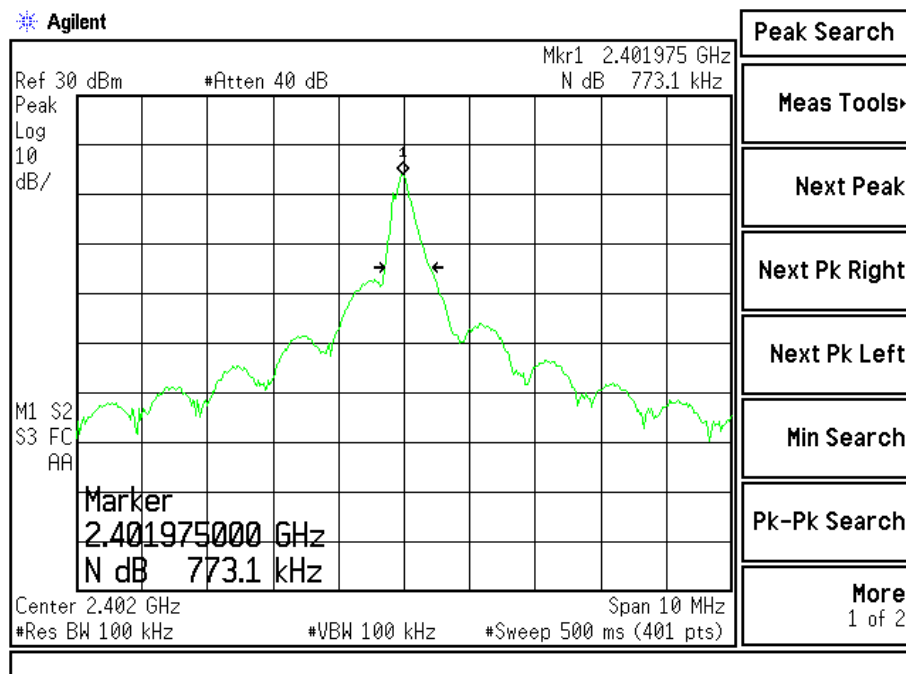
The measurement uncertainty is defined as  $\pm 1.27$  dB

## 9.5. Test Result of Occupied Bandwidth

Product : RFID CF Type Reader  
 Test Item : Occupied Bandwidth Data  
 Test Site : CTR01  
 Test Mode : Mode 1: Transmitter (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	7731	>500	Pass

Figure Channel 00:

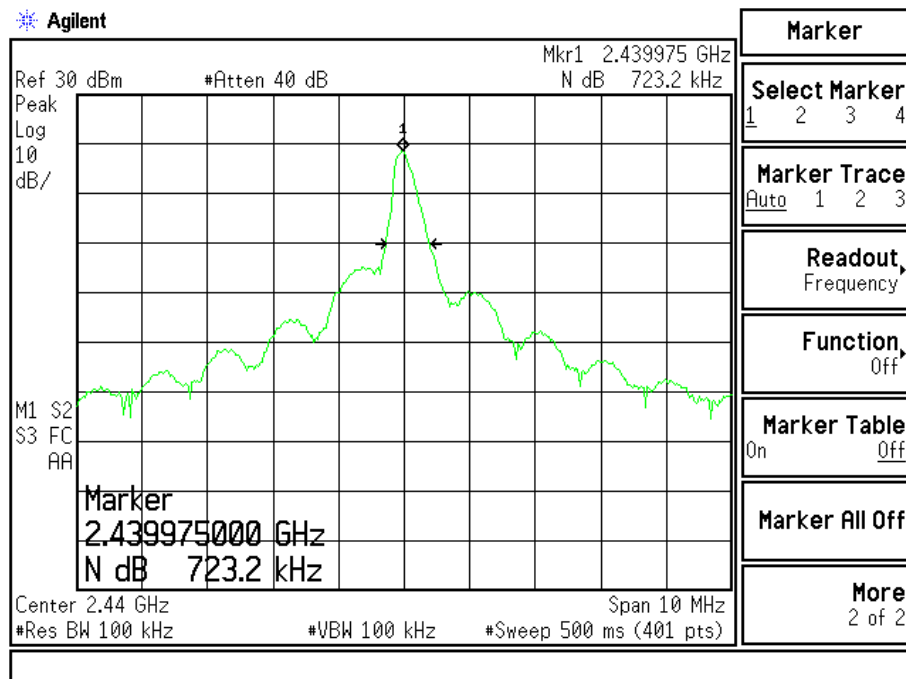




Product : RFID CF Type Reader  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
38	2440	7232	>500	Pass

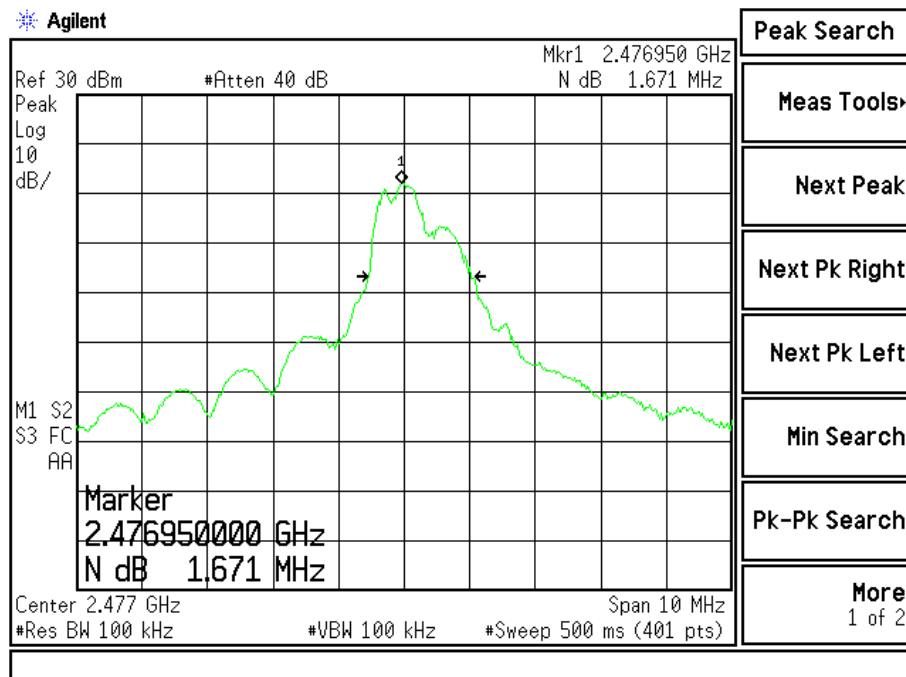
**Figure Channel 39:**



Product : RFID CF Type Reader  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2477MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
75	2477	1671	>500	Pass

Figure Channel 78:



## **10. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## Attachment 1: EUT Test Photographs

## Attachment 2: EUT Detailed Photographs