



Test Report

Product Name : RFID Hand Held Reader
Model No. : SLH-10200
FCC ID. : T39SLH10200

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

Date of Receipt : March 15, 2006
Issued Date : March 31, 2006
Report No. : 063L094-RF-US-P06V01

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: March 31, 2006

Report No.: 063L094-RF-US-P06V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : RFID Hand Held 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. : SLH-10200

FCC ID. : T39SLH10200

Rated Voltage : AC 120V/60Hz

Working Voltage : DC 4.5V

Trade Name :  日晶科技股份有限公司 / Sunlit System Technology Corp.
μ-Chip System Development

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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(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 Hand Held Reader |
| Trade Name | :  日晶科技股份有限公司 / Sunlit System Technology Corp. μ-Chip System Development |
| FCC ID. | : T39SLH10200 |
| Model No. | : SLH-10200 |
| Frequency Range | : 2402 - 2477MHz |
| 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 Hand Held 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 063L094-RF-US-P01V02, certified under Declaration of Conformity.
5. Quietek verified among construction and function in typical operation, then shown in this test report.

1.2. Operational Description

The EUT is a RFID Hand Held 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

| | |
|------------|---------------------|
| Test Mode: | Mode 1: Transmitter |
|------------|---------------------|

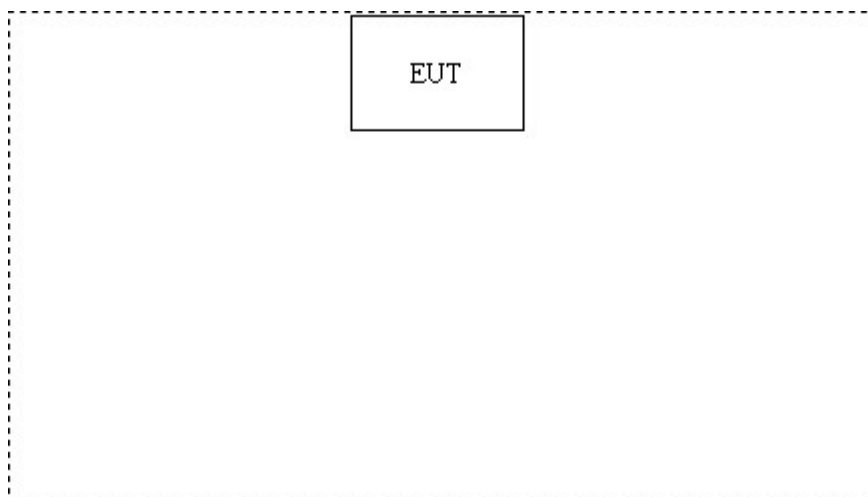
1.3. Tested System Details

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) | N/A | N/A | N/A | N/A | N/A |

| 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) Install the batteries of the EUT.
- (3) Setup the test TX channel.
- (4) Press the right button to start the continuous transmission.
- (5) Verify the EUT operation 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: June 22, 2001 File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2



July 03, 2001 Accreditation on NVLAP
NVLAP Lab Code: 200533-0



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E-Mail : service@quietek.com



2. Conducted Emission

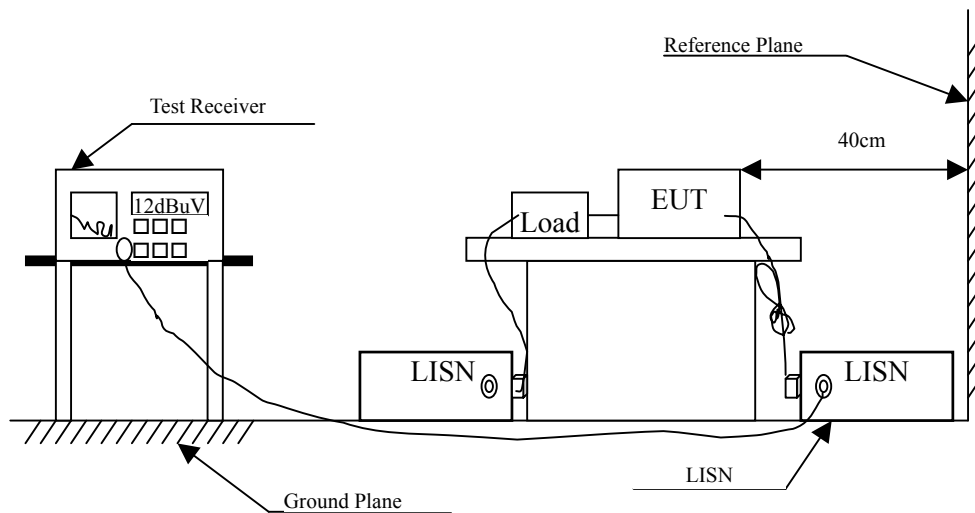
2.1. Test Equipment

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., 2005 | |
| 2 | L.I.S.N. | R & S | ENV4200 / 848411/10 | Feb., 2006 | EUT |
| 3 | L.I.S.N. | Kyoritsu | KNW-407/8-1420-3 | May, 2005 | 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 ± 2.02 dB

2.6. Test Result of Conducted Emission

The EUT is powered by batteries. This test item is not performed.

3. Peak Power Output

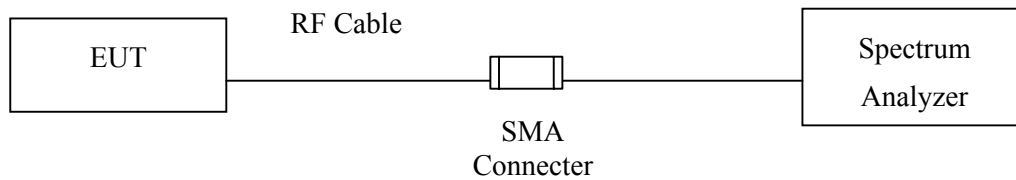
3.1. Test Equipment

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, 2005 |

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

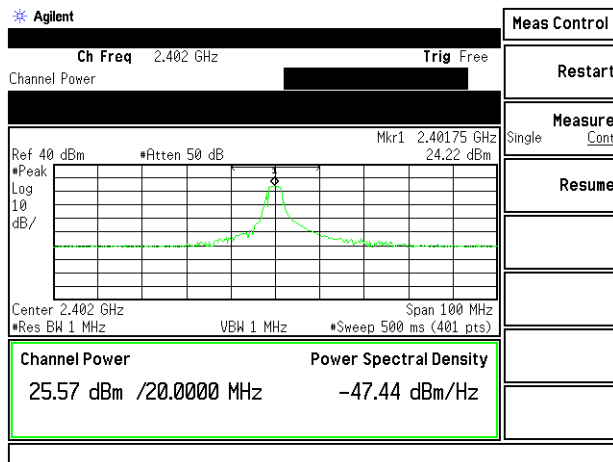
The measurement uncertainty is defined as ± 1.27 dB

3.5. Test Result of Peak Power Output

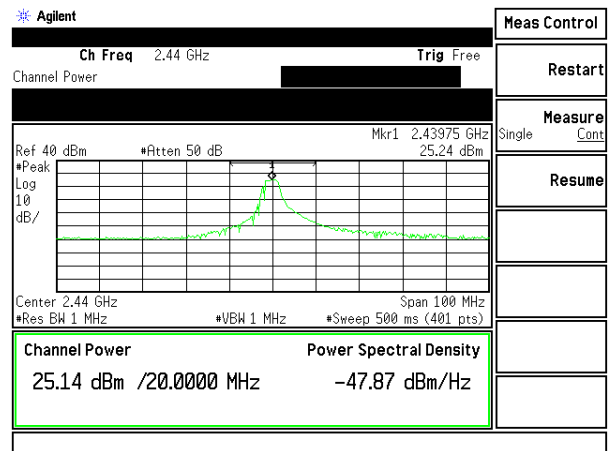
Product : RFID Hand Held Reader
 Test Item : Peak Power Output
 Test Site : CTR01
 Test Mode : Mode 1: Transmitter

| Channel No. | Frequency (MHz) | Measurement | Required Limit | Result |
|-------------|-----------------|-------------|----------------|--------|
| Channel 01 | 2402.00 | 25.57dBm | 1 Watt= 30 dBm | Pass |
| Channel 38 | 2440.00 | 25.14dBm | 1 Watt= 30 dBm | Pass |
| Channel 75 | 2477.00 | 25.58dBm | 1 Watt= 30 dBm | Pass |

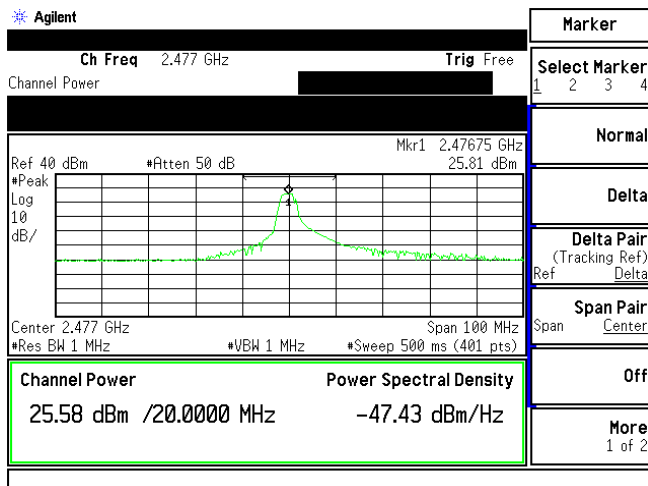
Channel 01



Channel 38



Channel 76



4. Radiated Emission

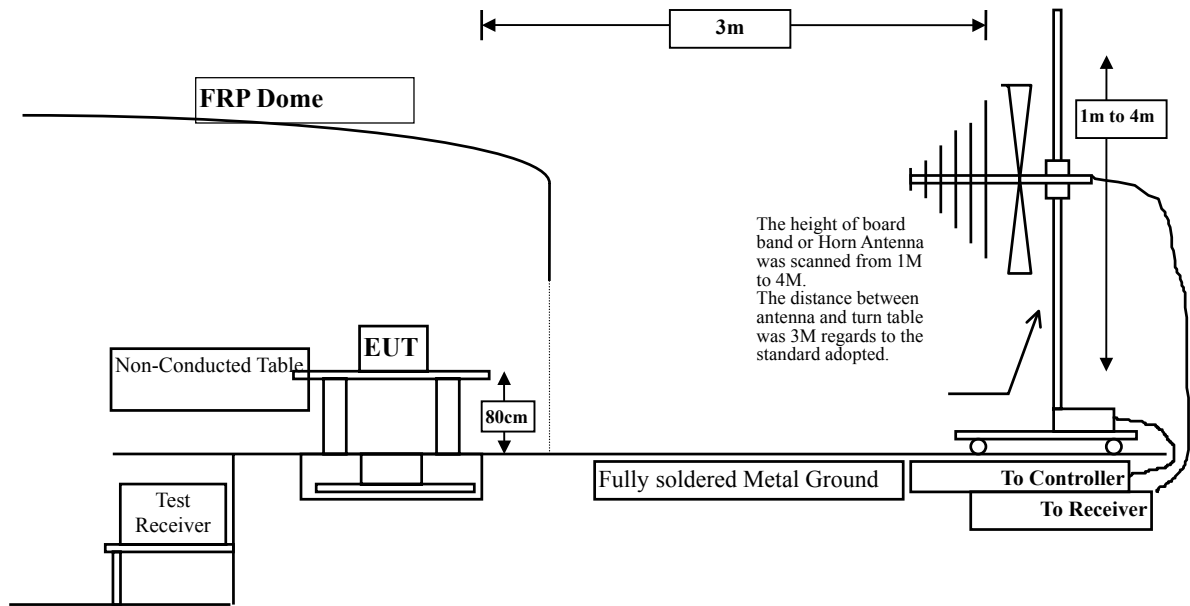
4.1. Test Equipment

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, 2005 |
| | Spectrum Analyzer | Advantest | R3162/ 00803480 | May, 2005 |
| | Pre-Amplifier | Advantest | BB525C/ 3307A01812 | May, 2005 |
| | Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | Sep., 2005 |
| <input type="checkbox"/> Site # 2 | Test Receiver | R & S | ESCS 30 / 836858 / 022 | May, 2005 |
| | Spectrum Analyzer | Advantest | R3162 / 100803466 | May, 2005 |
| | Pre-Amplifier | Advantest | BB525C/3307A01814 | May, 2005 |
| | Bilog Antenna | SCHAFFNER | CBL6112B / 2705 | May, 2005 |
| | Horn Antenna | ETS | 3115 / 0005-6160 | Sep., 2005 |
| | Pre-Amplifier | QTK | QTK-AMP-01/ 0001 | May, 2005 |
| <input checked="" type="checkbox"/> Site # 3 | Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2005 |
| | Spectrum Analyzer | Advantest | R3162 / 100803480 | May, 2005 |
| | Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2005 |
| | Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | May, 2005 |
| | Horn Antenna | Schwarzbeck | 9120D / 305, 306 | July, 2005 |
| | Horn Antenna | Schwarzbeck | BBHA9170 / 208, 209 | July, 2005 |
| | Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | July, 2005 |
| | Pre-Amplifier | HP | 8449B / 3008A01123 | July, 2005 |
| | Pre-Amplifier | MITEQ | AMF-4D-180400-45-6P | May, 2005 |

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 ± 3.9 dB
under 1G is defined as ± 3.8 dB

4.6. Test Result of Radiated Emission

Product : RFID Hand Held Reader
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter (Channel 00)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|--------------------------|---------|---------|-------------|---------|--------|
| MHz | Factor | Level | Level | | |
| | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| Peak Detector: | | | | | |
| 4804.000 | 4.345 | 44.398 | 48.743 | -25.227 | 74.000 |
| 7206.000 | 11.561 | 42.186 | 53.747 | -20.223 | 74.000 |
| 9608.000 | 15.813 | 38.703 | 54.516 | -19.454 | 74.000 |
| 12010.000 | 17.911 | 36.157 | 54.068 | -19.902 | 74.000 |
| Average Detector: | | | | | |
| 9608.000 | 15.814 | 32.253 | 48.066 | -5.904 | 74.000 |
| 12010.000 | 17.911 | 32.250 | 50.161 | -3.809 | 74.000 |
| Vertical | | | | | |
| Peak Detector: | | | | | |
| 4804.000 | 4.345 | 43.161 | 47.506 | -26.464 | 74.000 |
| 7206.000 | 11.557 | 43.795 | 55.352 | -18.618 | 74.000 |
| 9608.000 | 15.813 | 40.148 | 55.961 | -18.009 | 74.000 |
| Average Detector: | | | | | |
| 7206.000 | 11.559 | 33.332 | 44.891 | -9.079 | 74.000 |
| 9608.000 | 15.813 | 31.408 | 47.221 | -6.749 | 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 Hand Held Reader
 Test Item : Harmonic Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 38)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|--------------------------|---------|---------|-------------|---------|--------|
| MHz | Factor | Level | Level | | |
| | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| Peak Detector: | | | | | |
| 4880.000 | 4.555 | 42.702 | 47.257 | -26.713 | 74.000 |
| 7320.000 | 12.443 | 42.175 | 54.618 | -19.352 | 74.000 |
| 9760.000 | 14.650 | 38.575 | 53.224 | -20.746 | 74.000 |
| Average Detector: | | | | | |
| 7320.000 | 12.444 | 35.665 | 48.108 | -5.862 | 74.000 |
| Vertical | | | | | |
| Peak Detector: | | | | | |
| 4880.000 | 4.554 | 45.068 | 49.622 | -24.348 | 74.000 |
| 7320.000 | 12.445 | 42.328 | 54.773 | -19.197 | 74.000 |
| 9760.000 | 14.657 | 42.029 | 56.686 | -17.284 | 74.000 |
| Average Detector: | | | | | |
| 7320.000 | 12.442 | 35.306 | 47.748 | -6.222 | 74.000 |
| 9760.000 | 14.657 | 33.253 | 47.910 | -6.060 | 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 Hand Held Reader
Test Item : Harmonic Radiated Emission
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter (Channel 75)

| Frequency MHz | Correct Factor dB | Reading Level dBuV | Measurement Level dBuV/m | Margin dB | Limit dBuV/m |
|--------------------------|-------------------------|--------------------------|--------------------------------|--------------|-----------------|
| Horizontal | | | | | |
| Peak Detector: | | | | | |
| 4954.600 | 4.782 | 43.202 | 47.985 | -25.985 | 74.000 |
| 7431.000 | 12.876 | 41.108 | 53.985 | -19.985 | 74.000 |
| 9908.000 | 14.269 | 42.999 | 57.268 | -16.702 | 74.000 |
| Average Detector: | | | | | |
| 9908.000 | 14.269 | 36.138 | 50.407 | -3.563 | 74.000 |
| Vertical | | | | | |
| Peak Detector: | | | | | |
| 4954.600 | 4.782 | 42.802 | 47.584 | -26.386 | 74.000 |
| 7431.000 | 12.878 | 40.266 | 53.145 | -20.825 | 74.000 |
| 9908.000 | 14.270 | 43.025 | 57.294 | -16.676 | 74.000 |
| Average Detector: | | | | | |
| 9908.000 | 14.269 | 34.107 | 48.376 | -5.594 | 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 Hand Held Reader
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| MHz | Factor | Level | Level | | |
| | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| 37.280 | 16.378 | 19.400 | 35.778 | -4.222 | 40.000 |
| 42.100 | 13.527 | 14.600 | 28.128 | -11.872 | 40.000 |
| 71.200 | 7.650 | 13.100 | 20.749 | -19.251 | 40.000 |
| 449.500 | 18.236 | 19.100 | 37.336 | -8.664 | 46.000 |
| 454.300 | 18.478 | 9.280 | 27.758 | -18.242 | 46.000 |
| 694.000 | 21.092 | 15.100 | 36.192 | -9.808 | 46.000 |
| Vertical | | | | | |
| 37.200 | 15.490 | 18.800 | 34.290 | -5.710 | 40.000 |
| 42.100 | 12.264 | 20.300 | 32.564 | -7.436 | 40.000 |
| 46.900 | 8.880 | 15.010 | 23.891 | -16.109 | 40.000 |
| 442.200 | 18.958 | 15.700 | 34.658 | -11.342 | 46.000 |
| 454.300 | 18.667 | 9.280 | 27.947 | -18.053 | 46.000 |
| 932.100 | 24.140 | 6.360 | 30.500 | -15.500 | 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

Product : RFID Hand Held Reader
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 38)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| | Factor | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| 163.300 | 10.384 | 12.160 | 22.544 | -20.956 | 43.500 |
| 199.700 | 9.709 | 11.700 | 21.408 | -22.092 | 43.500 |
| 231.200 | 10.997 | 17.600 | 28.597 | -17.403 | 46.000 |
| 461.600 | 18.641 | 15.600 | 34.241 | -11.759 | 46.000 |
| 478.600 | 18.930 | 11.860 | 30.790 | -15.210 | 46.000 |
| 493.100 | 18.351 | 18.100 | 36.451 | -9.549 | 46.000 |
| Vertical | | | | | |
| 262.800 | 14.735 | 16.700 | 31.435 | -14.565 | 46.000 |
| 451.900 | 18.739 | 10.760 | 29.499 | -16.501 | 46.000 |
| 459.230 | 18.400 | 12.680 | 31.080 | -14.920 | 46.000 |
| 466.500 | 18.457 | 16.800 | 35.257 | -10.743 | 46.000 |
| 505.300 | 18.595 | 16.100 | 34.695 | -11.305 | 46.000 |
| 539.200 | 19.991 | 15.630 | 35.621 | -10.379 | 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

Product : RFID Hand Held Reader
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 75)

| Frequency | Correct | Reading | Measurement | Margin | Limit |
|-------------------|---------|---------|-------------|---------|--------|
| | Factor | Level | Level | | |
| MHz | dB | dBuV | dBuV/m | dB | dBuV/m |
| Horizontal | | | | | |
| 262.800 | 14.395 | 16.700 | 31.095 | -14.905 | 46.000 |
| 284.600 | 13.562 | 14.780 | 28.341 | -17.659 | 46.000 |
| 459.200 | 18.565 | 12.580 | 31.145 | -14.855 | 46.000 |
| 466.600 | 18.605 | 12.840 | 31.445 | -14.555 | 46.000 |
| 519.800 | 18.603 | 15.400 | 34.004 | -11.996 | 46.000 |
| 544.100 | 19.945 | 16.100 | 36.045 | -9.955 | 46.000 |
| Vertical | | | | | |
| 46.890 | 8.886 | 16.100 | 24.986 | -15.014 | 40.000 |
| 199.700 | 9.711 | 10.110 | 19.821 | -23.679 | 43.500 |
| 231.200 | 11.297 | 17.700 | 28.997 | -17.003 | 46.000 |
| 461.600 | 18.488 | 15.100 | 33.588 | -12.412 | 46.000 |
| 478.600 | 18.642 | 11.300 | 29.943 | -16.057 | 46.000 |
| 493.100 | 18.451 | 17.100 | 35.551 | -10.449 | 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:

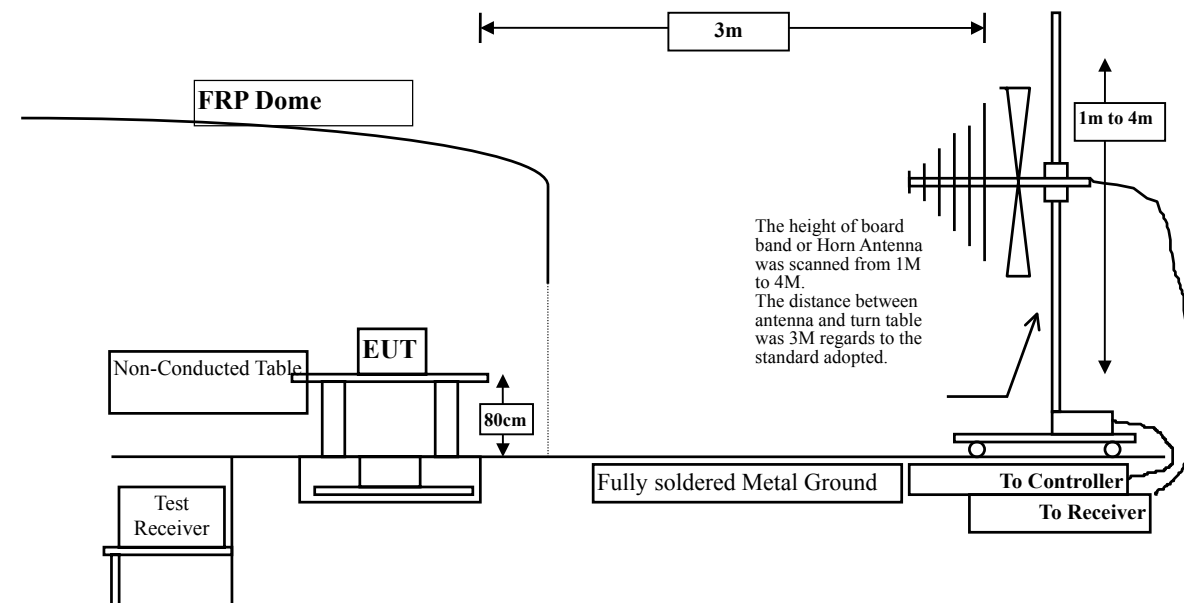
| Equipment | Manufacturer | Model No./Serial No. | Last Cal. |
|---------------------|--------------|-----------------------|------------|
| X Test Receiver | R & S | ESI 26 / 838786 / 004 | May, 2005 |
| X Spectrum Analyzer | Advantest | R3162 / 100803480 | May, 2005 |
| X Pre-Amplifier | QTK | QTK-AMP-03 / 0003 | May, 2005 |
| X Bilog Antenna | SCHAFFNER | CBL6112B / 2697 | May, 2005 |
| X Horn Antenna | Schwarzbeck | 9120D / 305, 306 | July, 2005 |
| X Horn Antenna | Schwarzbeck | BBHA9170 / 208, 209 | July, 2005 |
| X Pre-Amplifier | QTK | QTK-AMP-01 / 0001 | July, 2005 |
| X Pre-Amplifier | HP | 8449B / 3008A01123 | July, 2005 |
| X Pre-Amplifier | MITEQ | AMF-4D-180400-45-6P | May, 2005 |

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 ± 3.9 dB
under 1G is defined as ± 3.8 dB

5.6. Test Result of Band Edge

Product : RFID Hand Held Reader
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00)

RF Radiated Measurement:

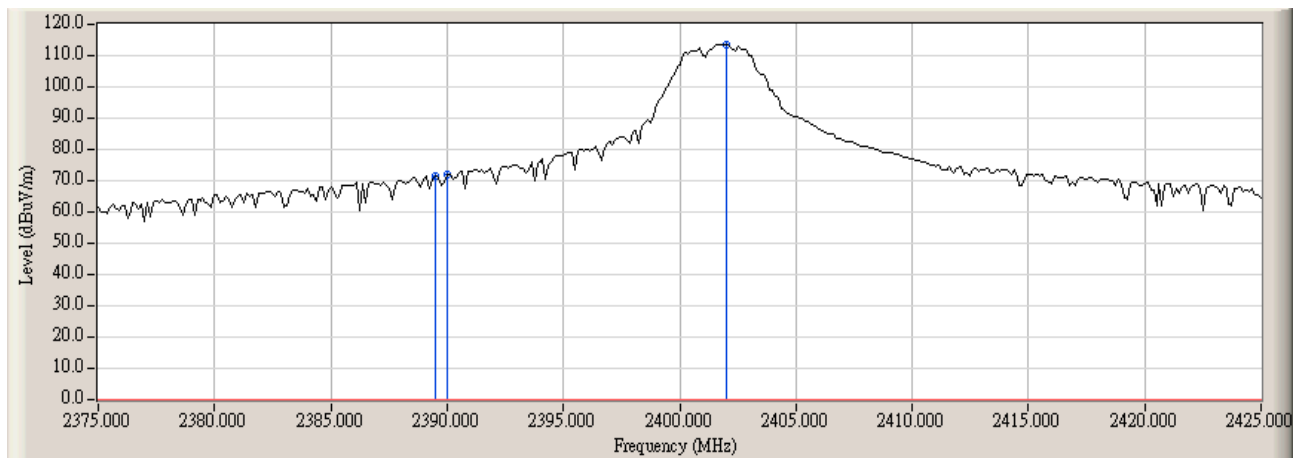
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 00 | <2400 | >20 | Pass |

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) | 2389.500 | 73.790 | 71.410 | 74.00 | 54.00 | Pass |
| 00 (Average) | 2389.500 | 48.760 | 46.380 | 74.00 | 54.00 | Pass |

Figure Channel 00:

Horizontal (Peak)

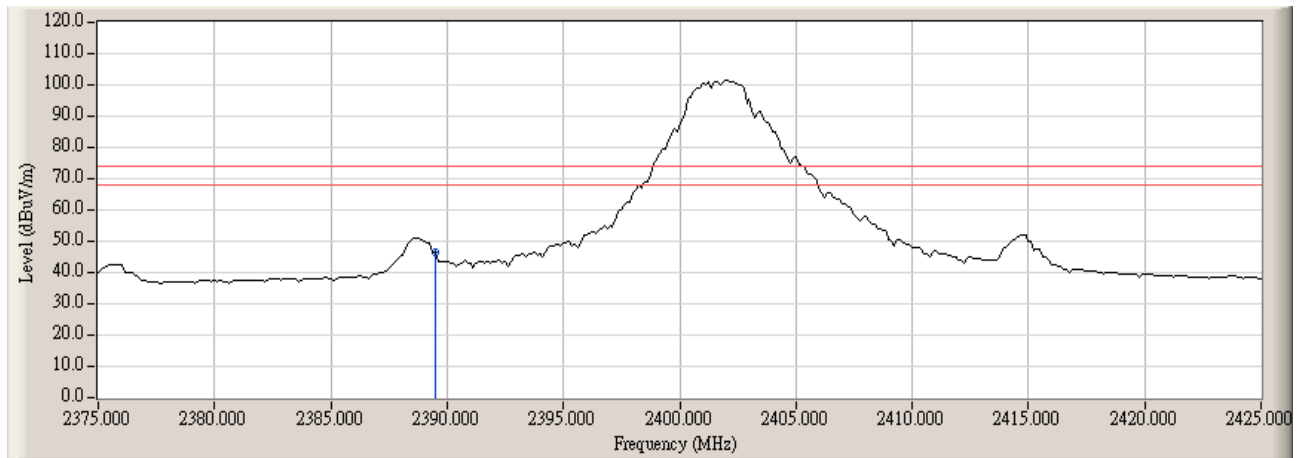


Note:

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

Figure Channel 00:

Horizontal (Average)



Note:

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

Product : RFID Hand Held Reader
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 00)

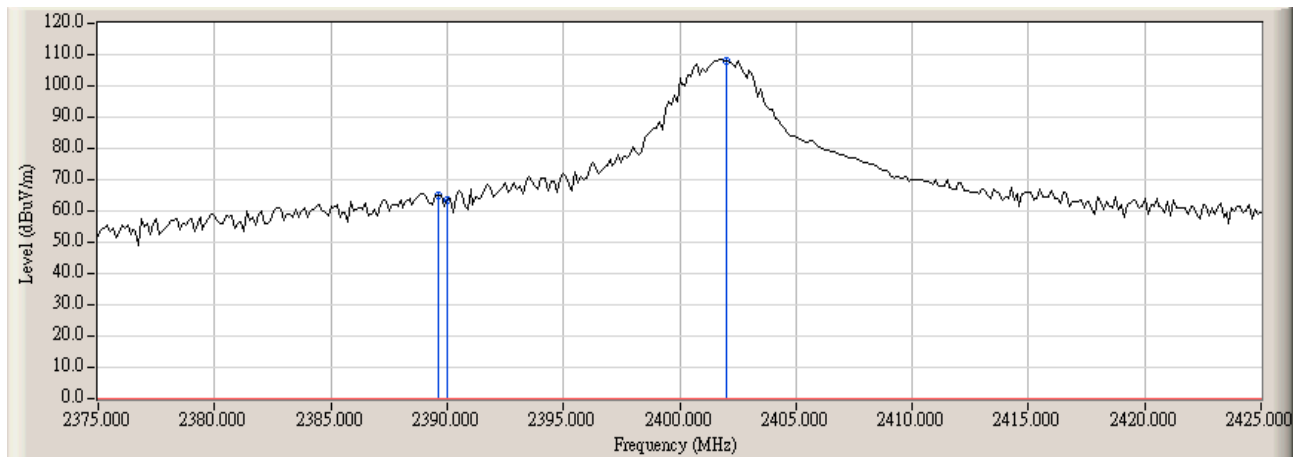
RF Radiated Measurement:

| 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) | 2389.620 | 67.479 | 65.100 | 74.00 | 54.00 | Pass |
| 00 (Average) | 2389.620 | 44.849 | 42.470 | 74.00 | 54.00 | Pass |

Figure Channel 00: Vertical (Peak)

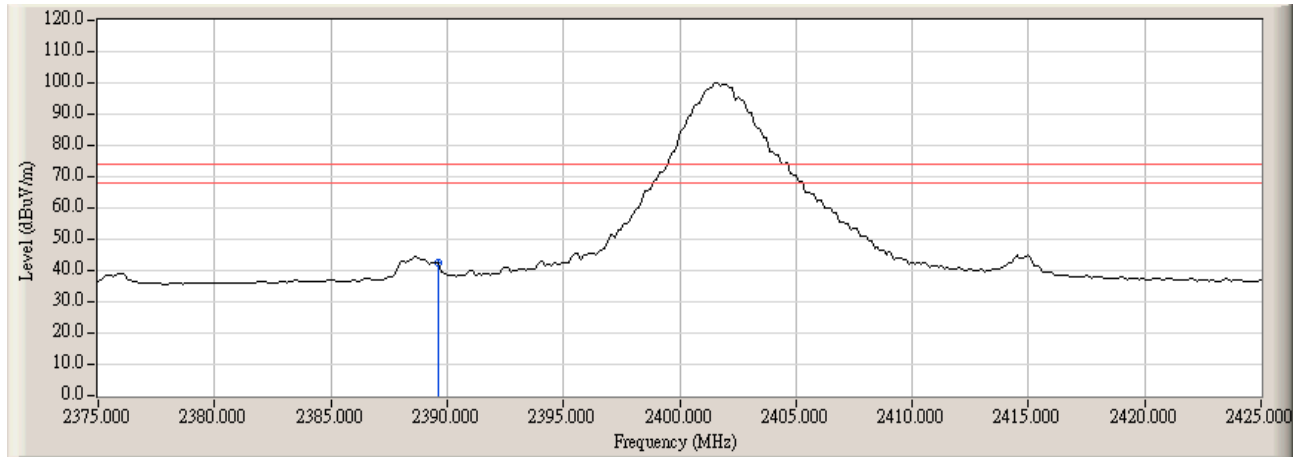


Note:

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

Figure Channel 00:

Vertical (Average)



Note:

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

Product : RFID Hand Held Reader
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 78)

RF Radiated Measurement:

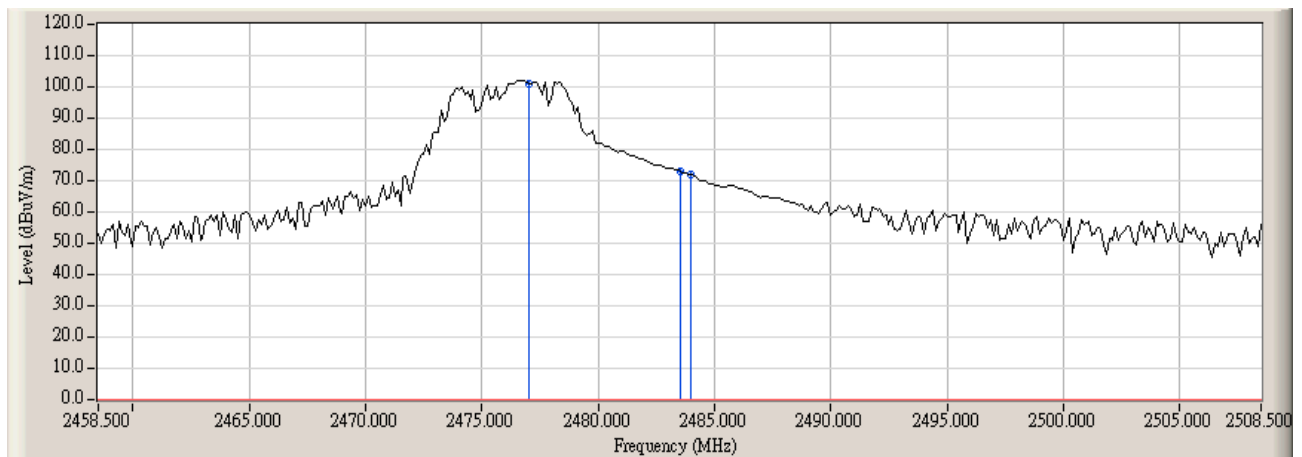
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 75 | >2483.5 | >20 | Pass |

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) | 2484.000 | 73.695 | 71.760 | 74.00 | 54.00 | Pass |
| 75(Average) | 2484.000 | 44.695 | 42.760 | 74.00 | 54.00 | Pass |

Figure Channel 75:

Horizontal (Peak)

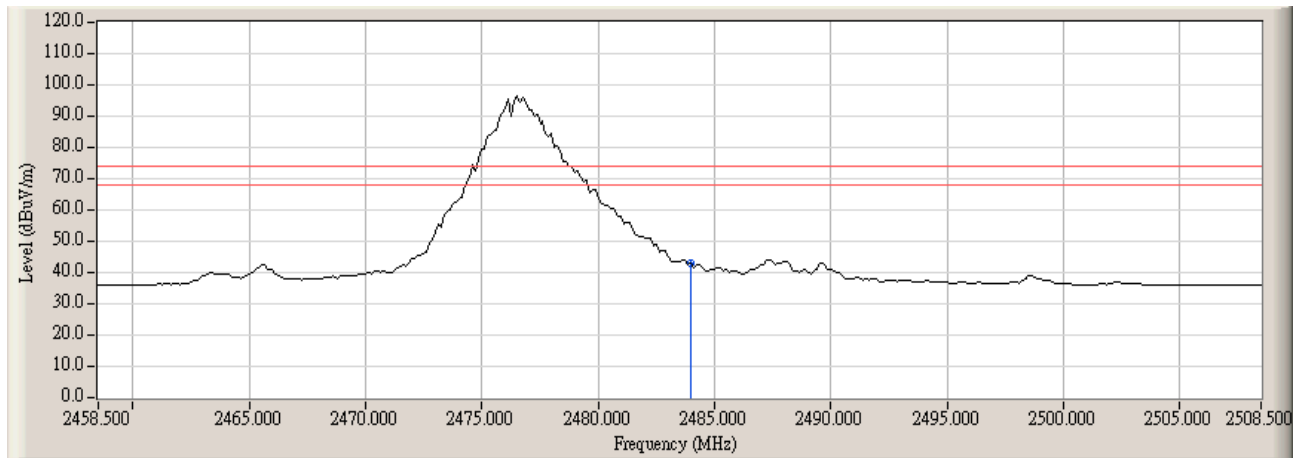


Note:

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

Figure Channel 75:

Horizontal (Average)



Note:

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

Product : RFID Hand Held Reader
 Test Item : Band Edge
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (Channel 78)

RF Radiated Measurement:

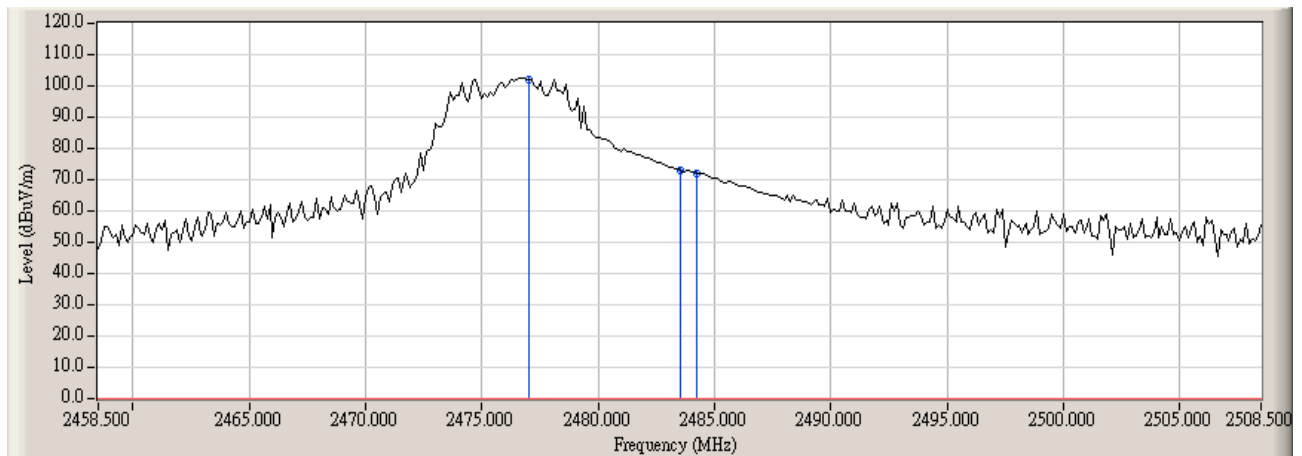
| Channel No. | Frequency (MHz) | Required Limit (dBc) | Result |
|-------------|-----------------|----------------------|--------|
| 75 | >2483.5 | >20 | Pass |

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) | 2484.250 | 74.165 | 72.230 | 74.00 | 54.00 | Pass |
| 75(Average) | 2484.250 | 44.785 | 42.850 | 74.00 | 54.00 | Pass |

Figure Channel 75:

Vertical (Peak)

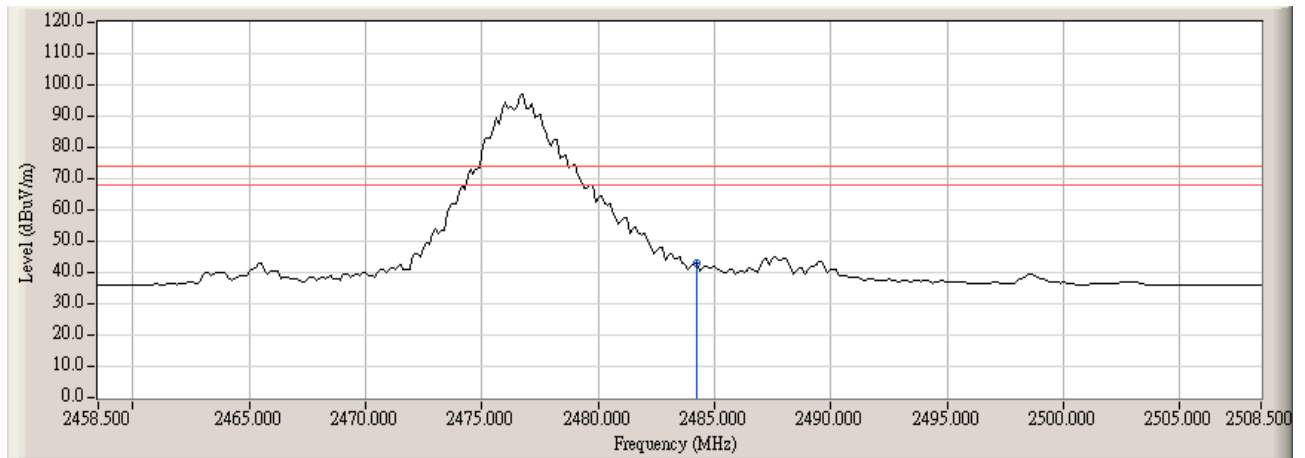


Note:

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

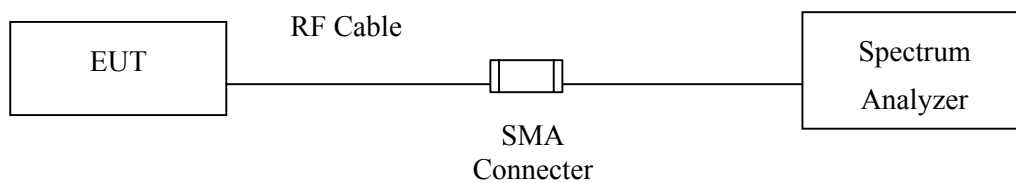
6.1. Test Equipment

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, 2005 |

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

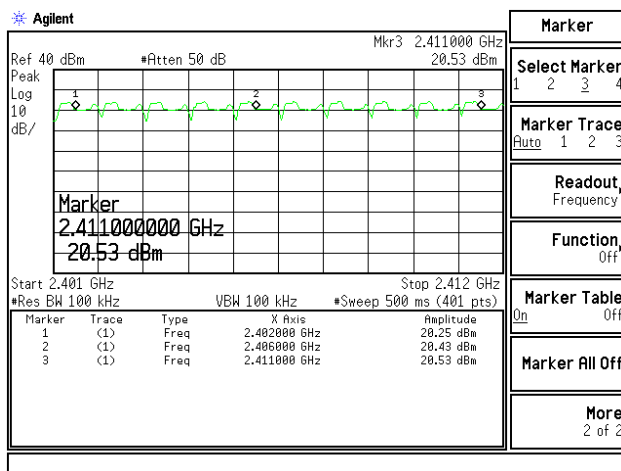
The measurement uncertainty is defined as $\pm 200\text{kHz}$

6.5. Test Result of Channel Number

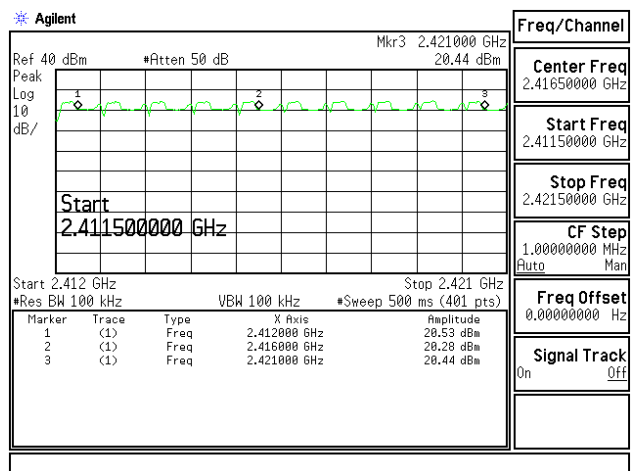
Product : RFID Hand Held Reader
 Test Item : Channel Number
 Test Site : CTR01
 Test Mode : Mode 1: Transmitter

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

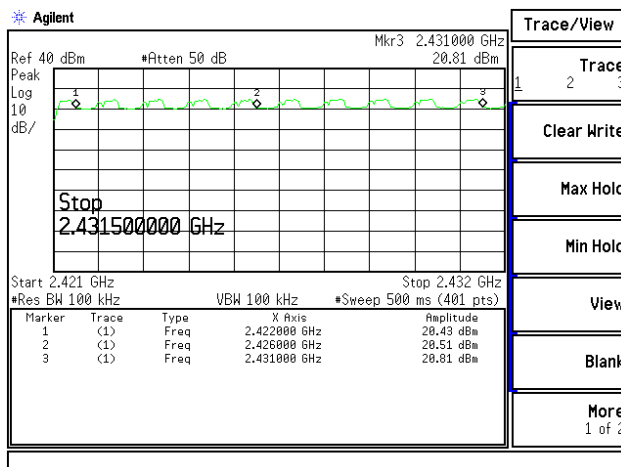
2402-2411MHz



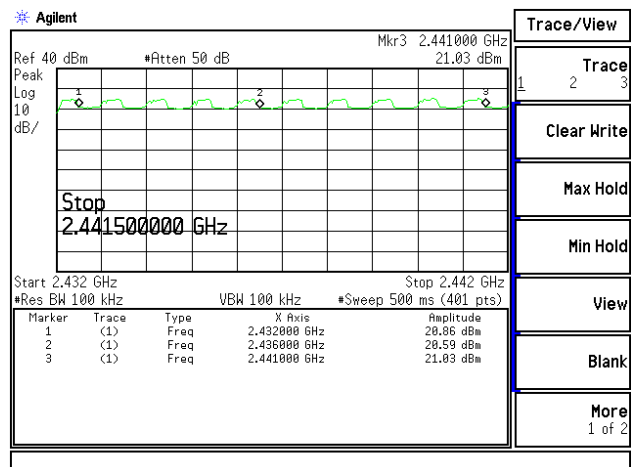
2412-2421MHz



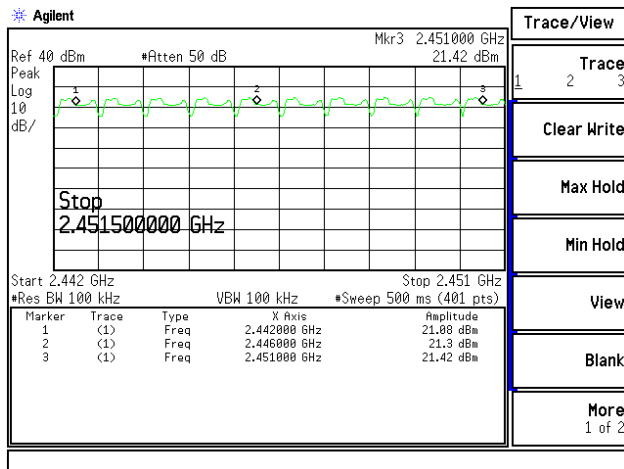
2422-2431MHz



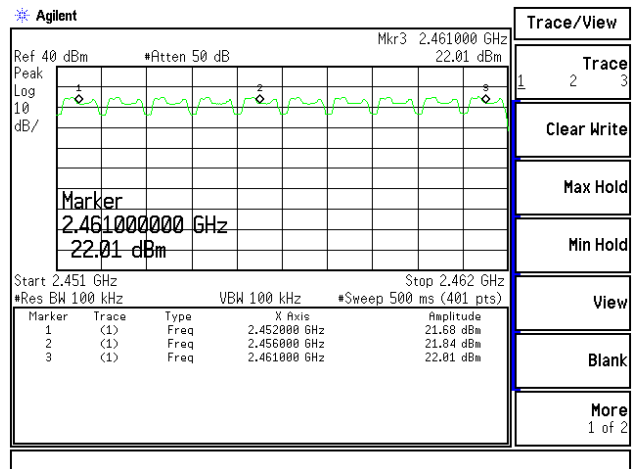
2432-2441MHz



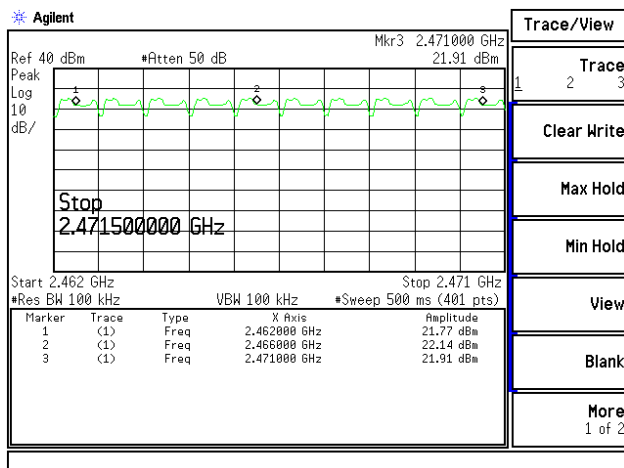
2442-2451MHz



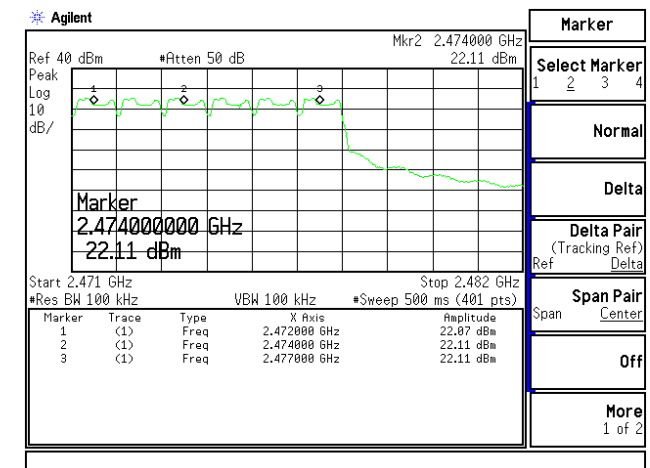
2452-2461MHz



2462-2471MHz



2472-2477MHz



7. Channel Separation

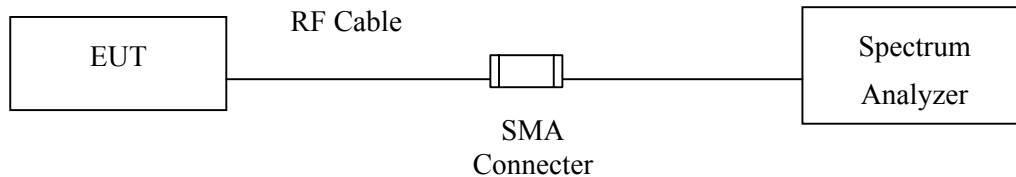
7.1. Test Equipment

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, 2005 |

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

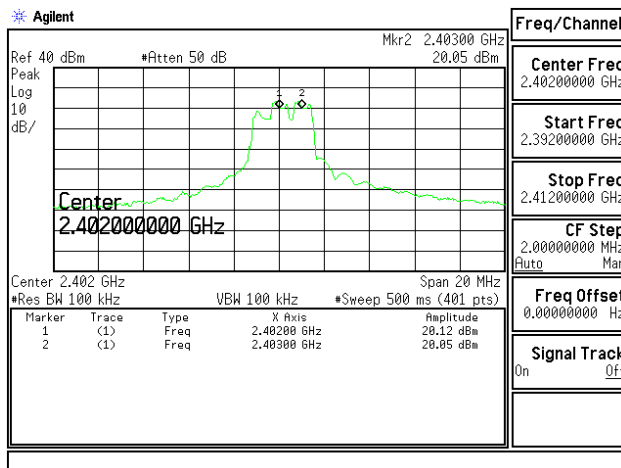
The measurement uncertainty is defined as $\pm 150\text{Hz}$

7.5. Test Result of Channel Separation

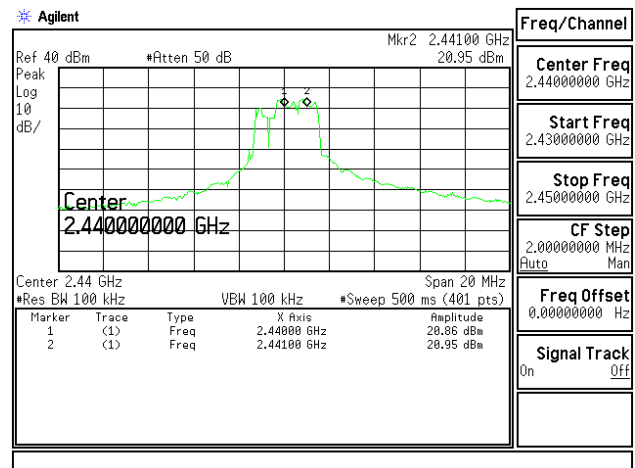
Product : RFID Hand Held Reader
 Test Item : Channel Separation
 Test Site : CTR01
 Test Mode : Mode 1: Transmitter

| 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 |

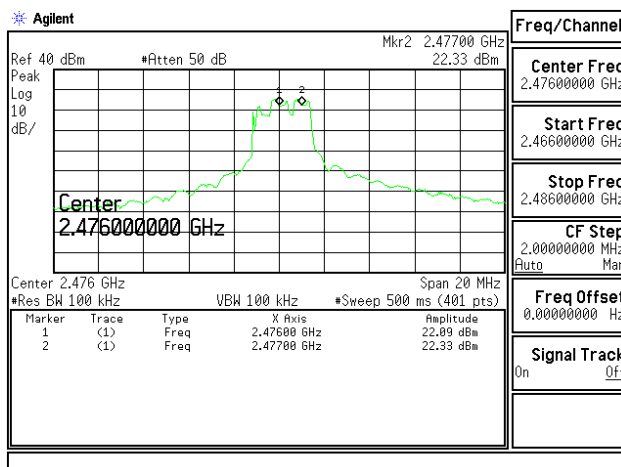
Channel 01 2402MHz



Channel 38 2440MHz



Channel 75 2477 MHz



8. Dwell Time

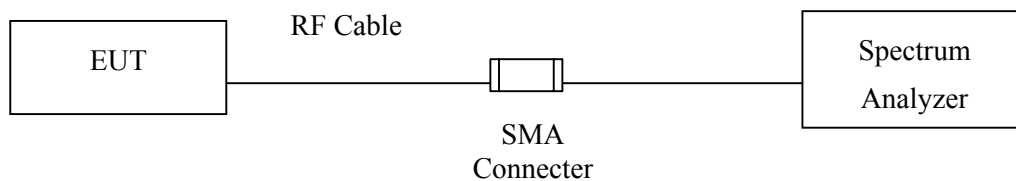
8.1. Test Equipment

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, 2005 |

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.

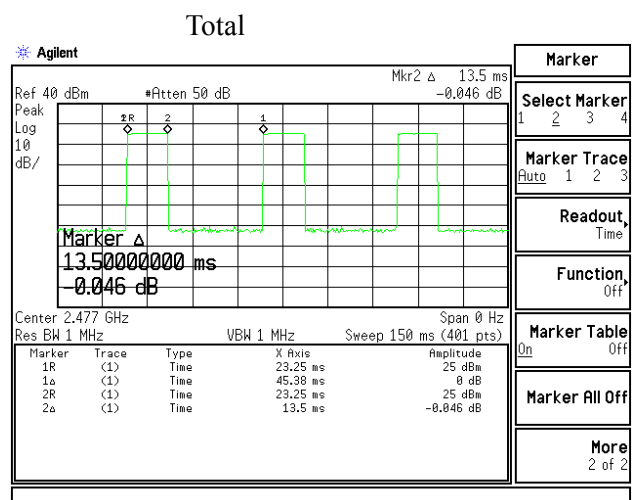
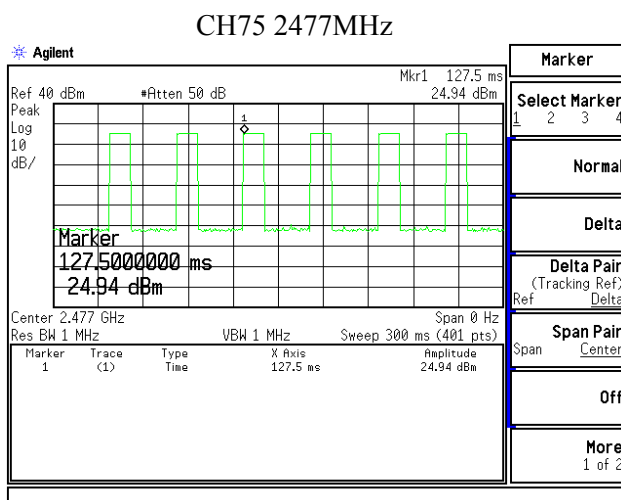
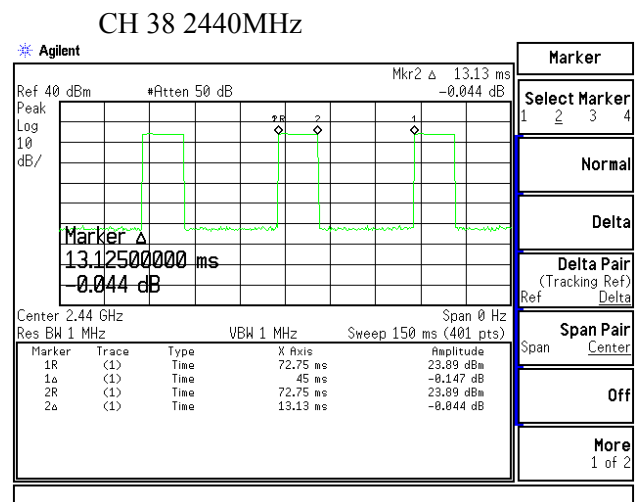
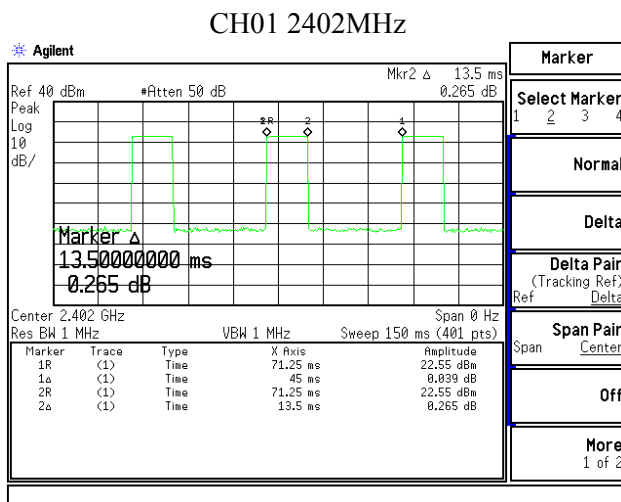
8.4. Uncertainty

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

8.5. Test Result of Dwell Time

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

| Channel (MHz) | Measurement Level (ms) | Required Limit (sec.) | Result |
|---------------|------------------------|-----------------------|--------|
| CH 00 2402 | 116.863 | < 0.4 | Pass |
| CH 38 2440 | 113.660 | < 0.4 | Pass |
| CH 75 2477 | 116.863 | < 0.4 | Pass |



Note: Dwell time = time slot length * hop rate / number of hopping channels * period

Occupancy Time of Frequency Hopping System

Test Time Period: $0.4 \times 76 = 30.4\text{sec}$, Hopping Times Within 1sec: $6/300\text{msec} = 0.02 \text{ hops/msec}$.

A) 2402MHz The Maximum Occupancy Time Within 30.4sec: $(13500 \mu\text{s} \times 20) / (76 \times 30.4) = 116.863\text{msec}$ °

B) 2441MHz The Maximum Occupancy Time Within 30.4sec: $(13130 \mu\text{s} \times 20) / (76 \times 30.4) = 113.660\text{msec}$ °

C) 2480MHz The Maximum Occupancy Time Within 30.4sec: $(13500 \mu\text{s} \times 20) / (76 \times 30.4) = 116.863\text{msec}$ °

Test Result: The Average Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard °

PS: (1) From Bluetooth Specification , It Hops 1640 Times in 1sec ° The Average Occupancy Time of Each 79 Channels is $1600/79$ Times , Therefore , We Calculate The Maximum Occupancy Time (worse cars)As Below:

A) 2402Mhz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640/79 \times 31.6 = 289.056\text{msec}$

B) 2441MHz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640/79 \times 31.6 = 289.056\text{msec}$

C) 2480MHz The Occupancy Time of Each Pulse is 0.4msec , The Maximum Occupancy Time within 31.6sec is $0.4\text{msec} \times 1640/79 \times 31.6 = 289.056\text{msec}$

Test Result: The Maximum Occupancy Time of Each Highest , Middle and Lowest Channel Is Less Than 0.4sec , And Corresponds to The Standard °

9. Occupied Bandwidth

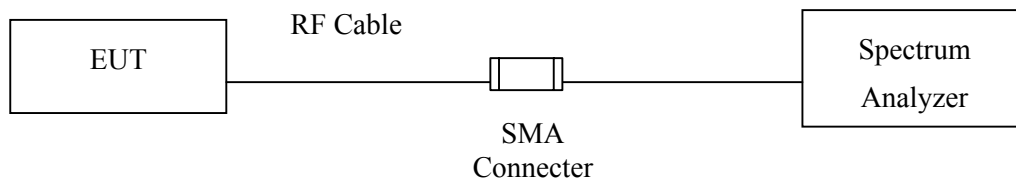
9.1. Test Equipment

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, 2005 |

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

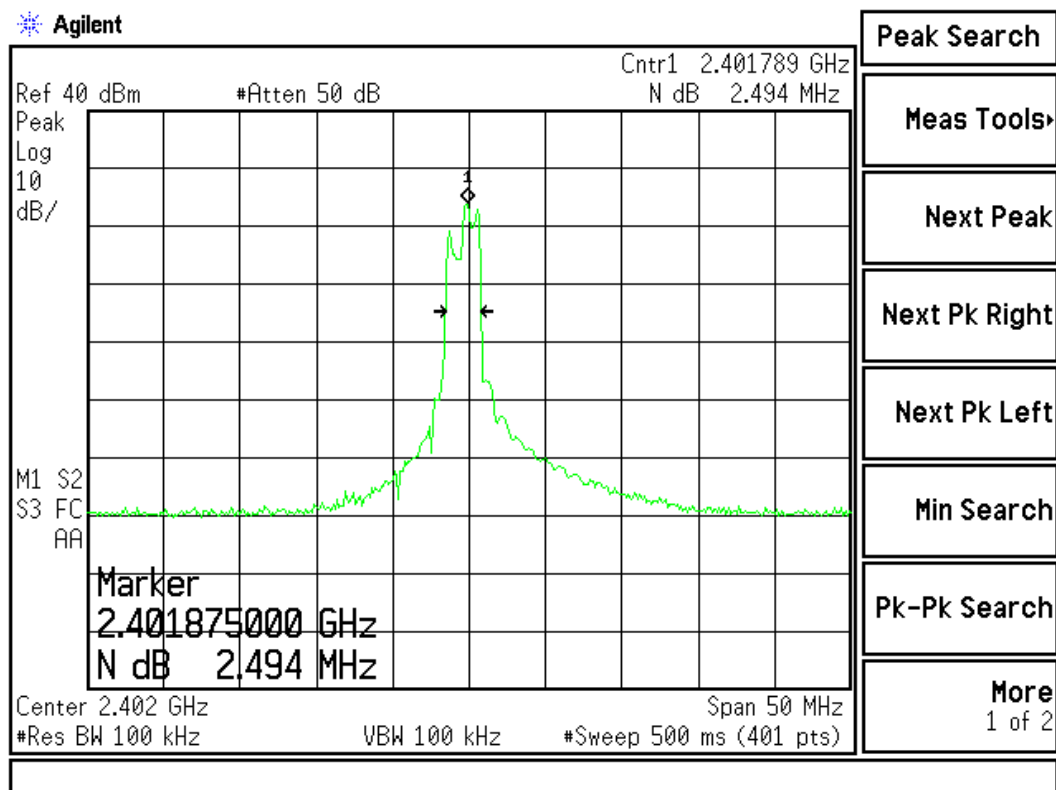
The measurement uncertainty is defined as ± 1.27 dB

9.5. Test Result of Occupied Bandwidth

Product : RFID Hand Held 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 | 2494 | >500 | Pass |

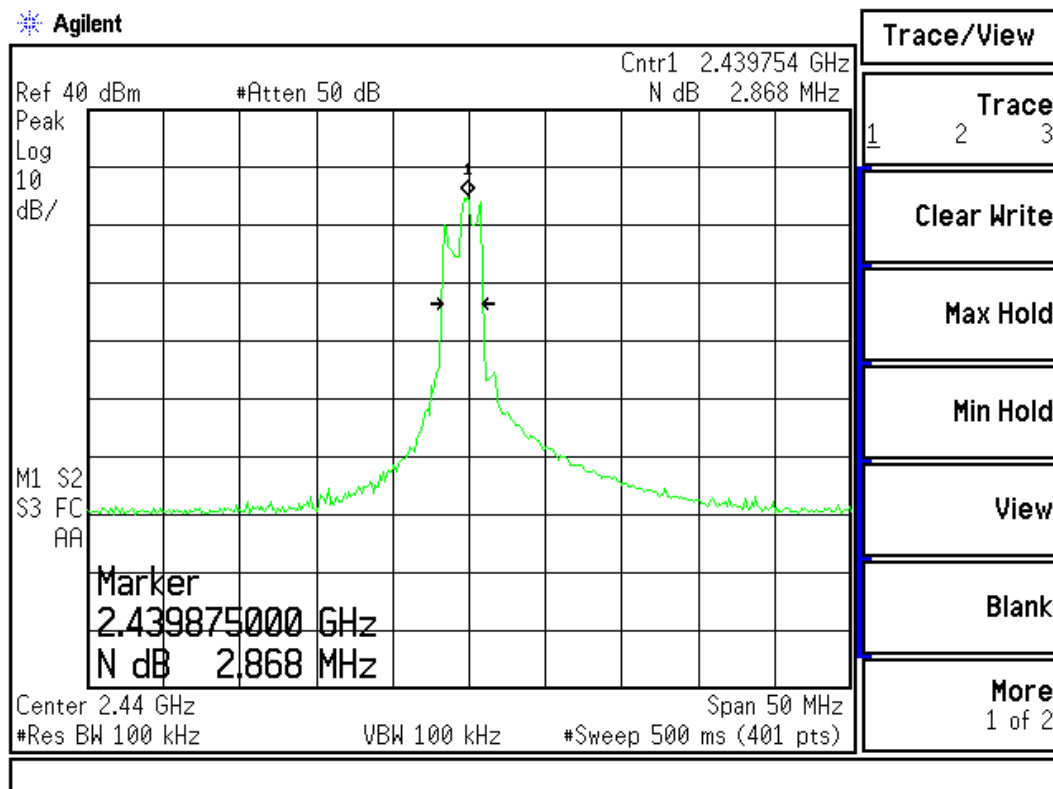
Figure Channel 00:



Product : RFID Hand Held 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 | 2868 | >500 | Pass |

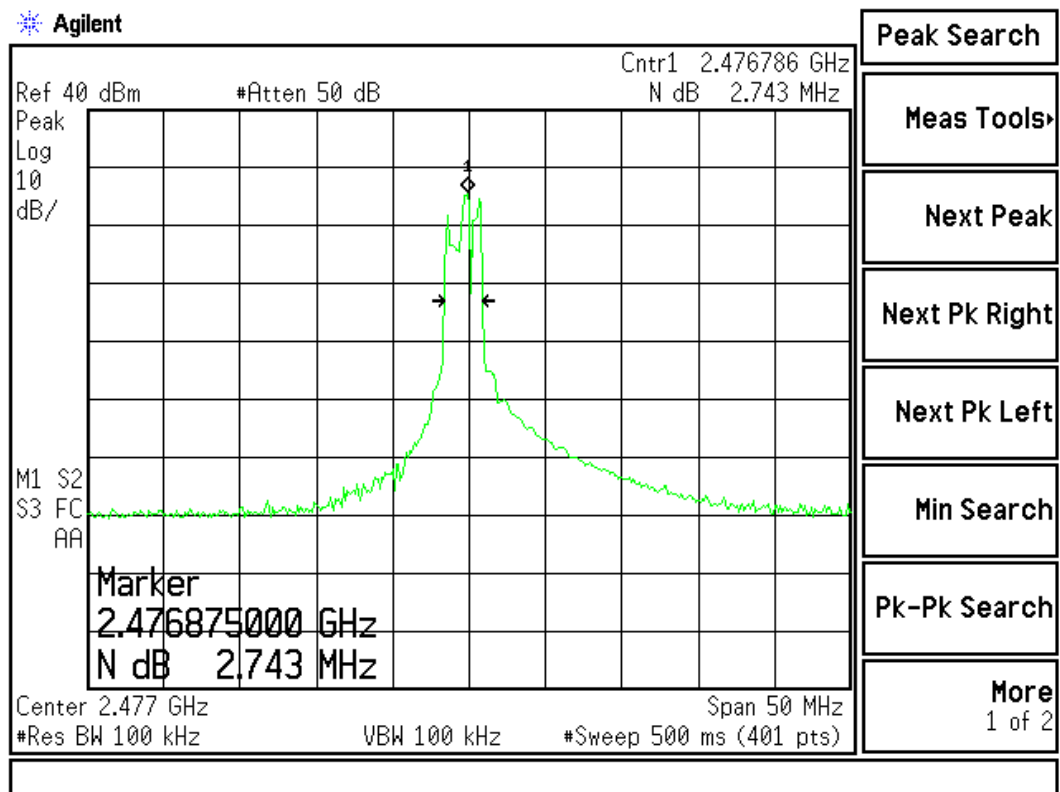
Figure Channel 39:



Product : RFID Hand Held 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 | 2743 | >500 | Pass |

Figure Channel 78:



10. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 1: EUT Test Setup Photographs

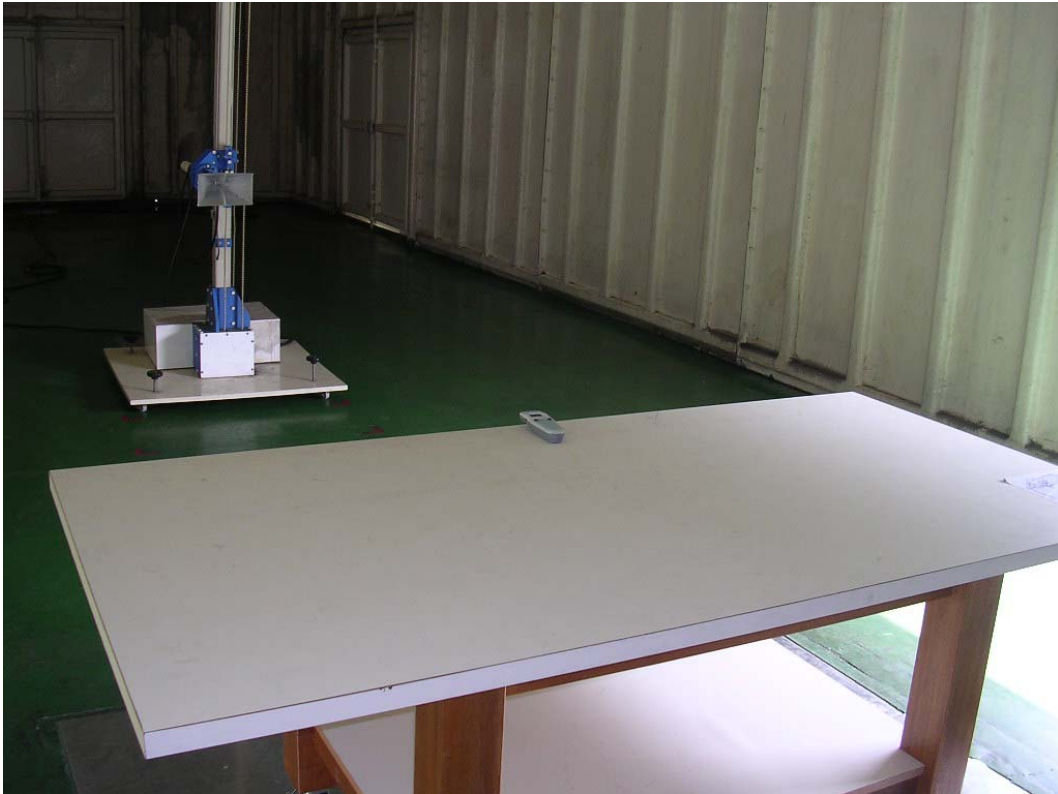
Front View of Radiated Test



Back View of Radiated Test



Front View of Radiated Test (Horn)



Back View of Radiated Test (Horn)



Attachment 2: EUT Detailed Photographs

Attachment 2 : EUT Detailed Photographs

(1) EUT Photo



(2) EUT Photo



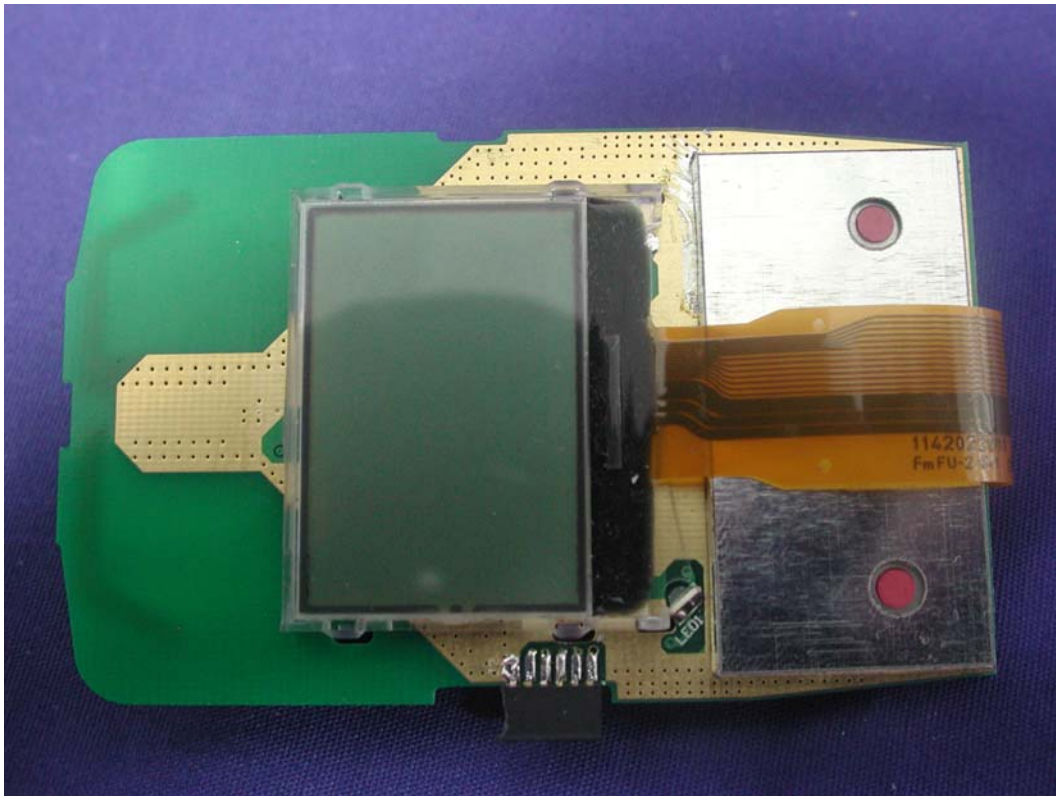
(3) EUT Photo



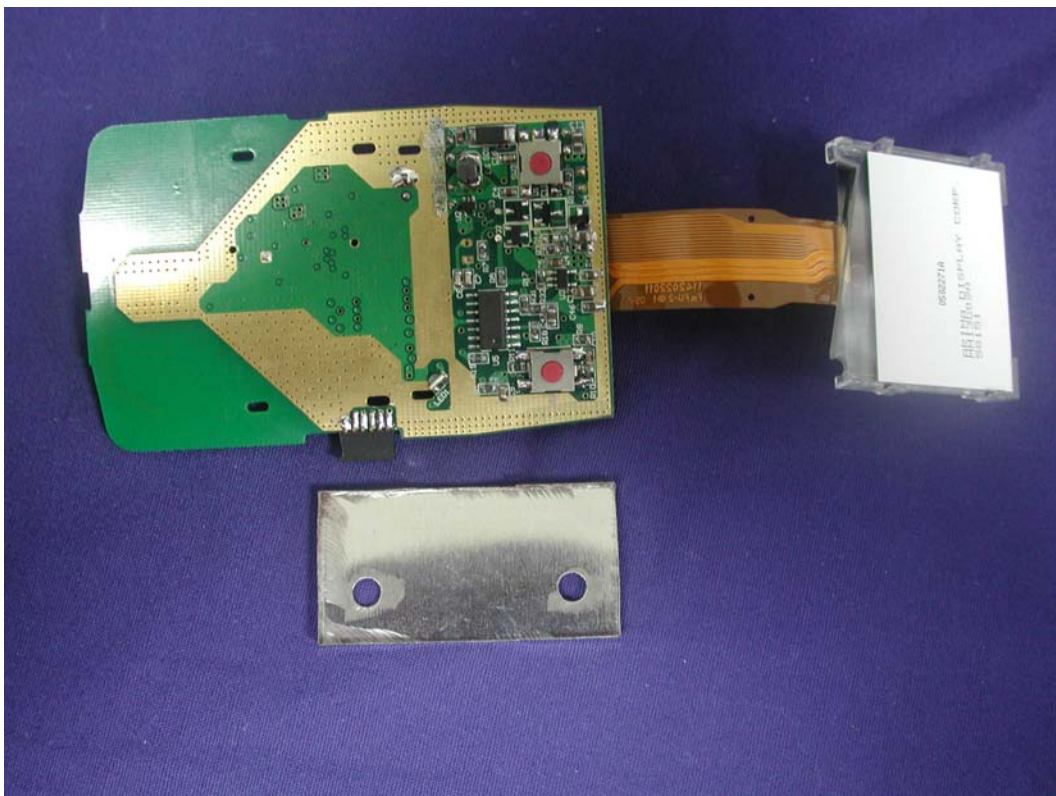
(4) EUT Photo



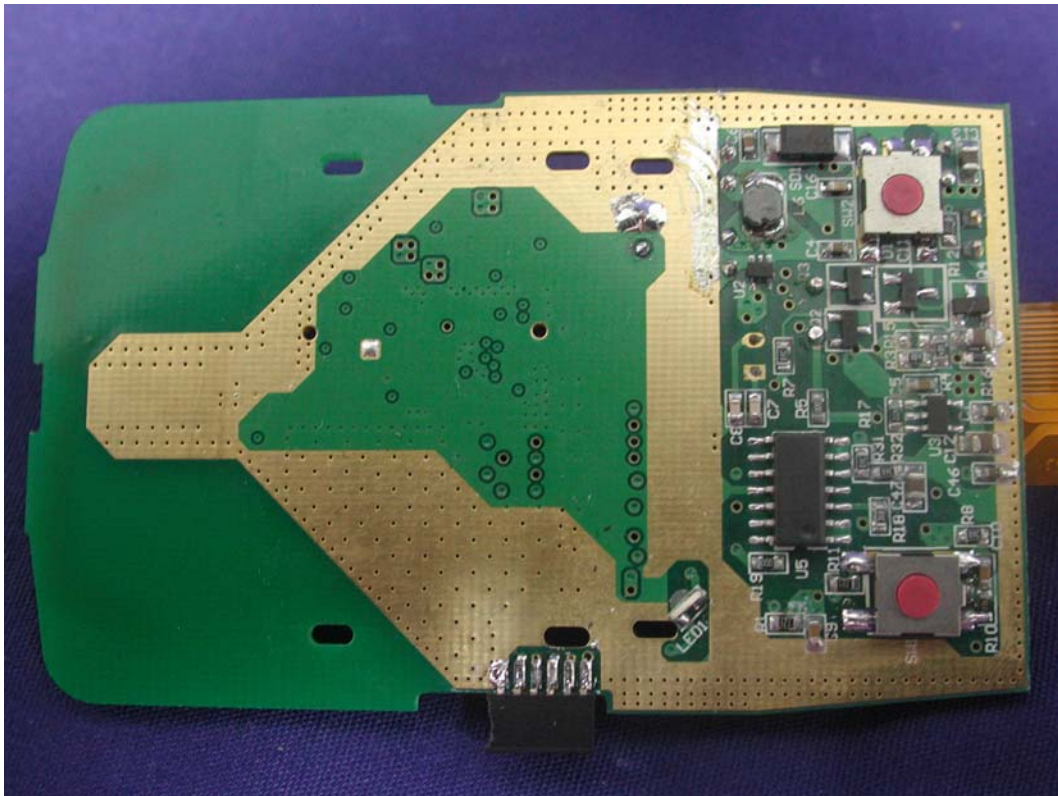
(5) EUT Photo



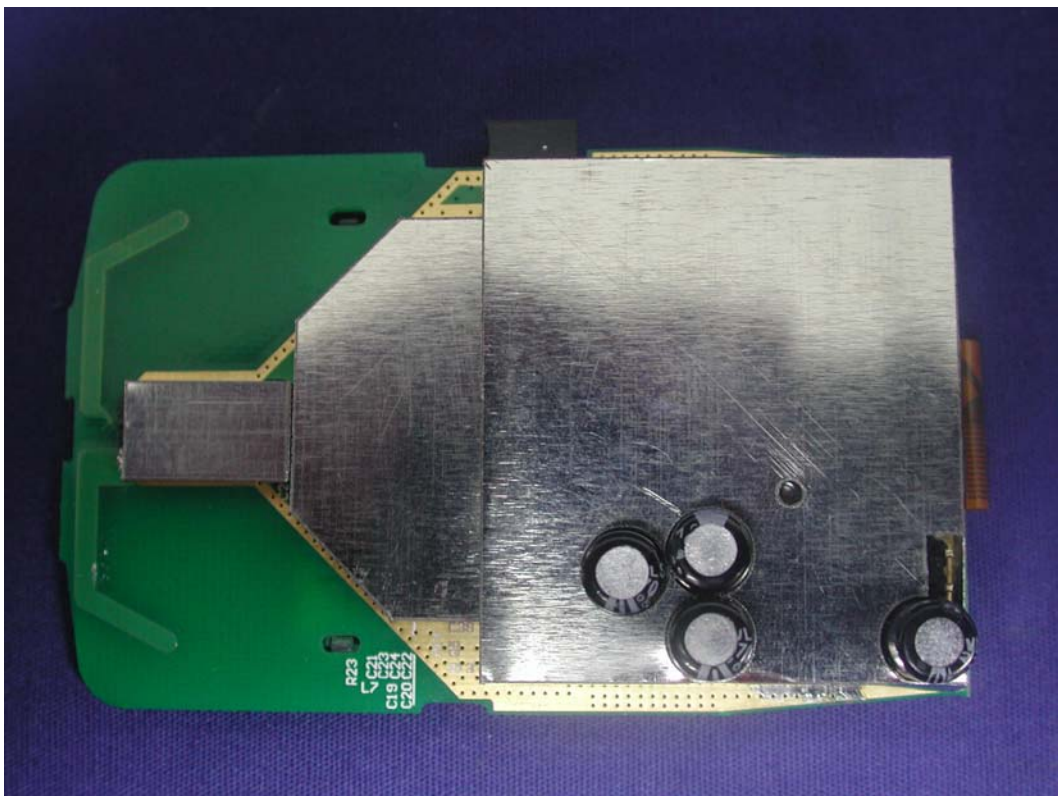
(6) EUT Photo



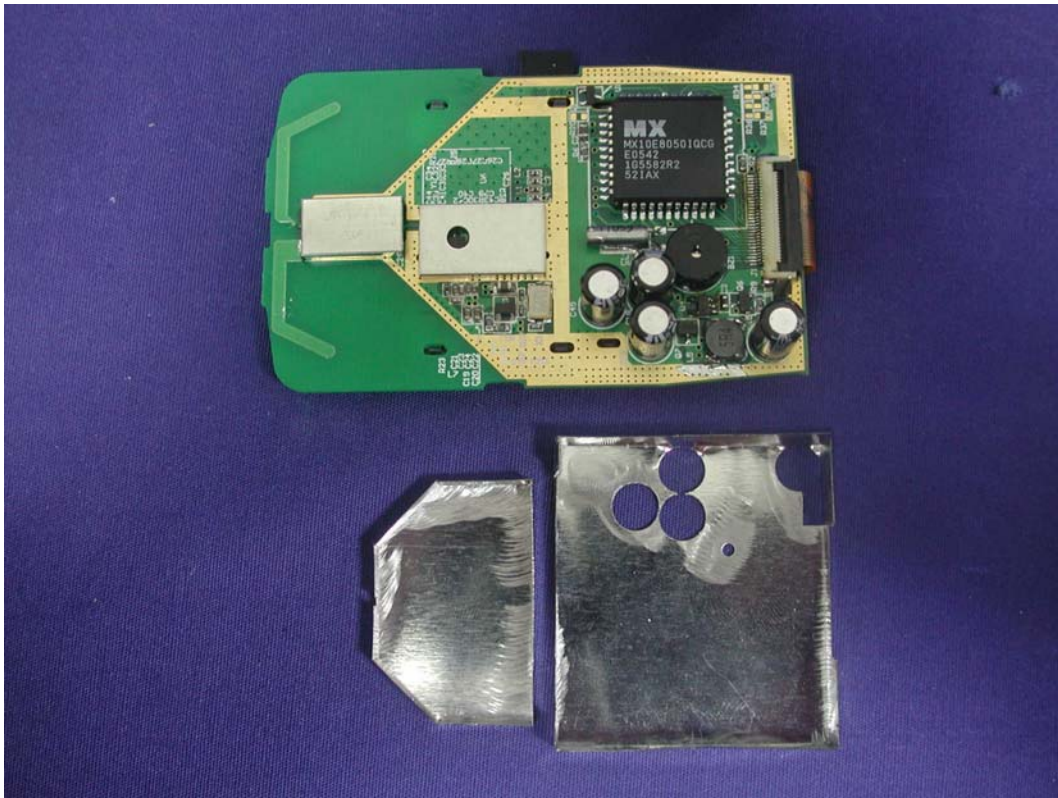
(7) EUT Photo



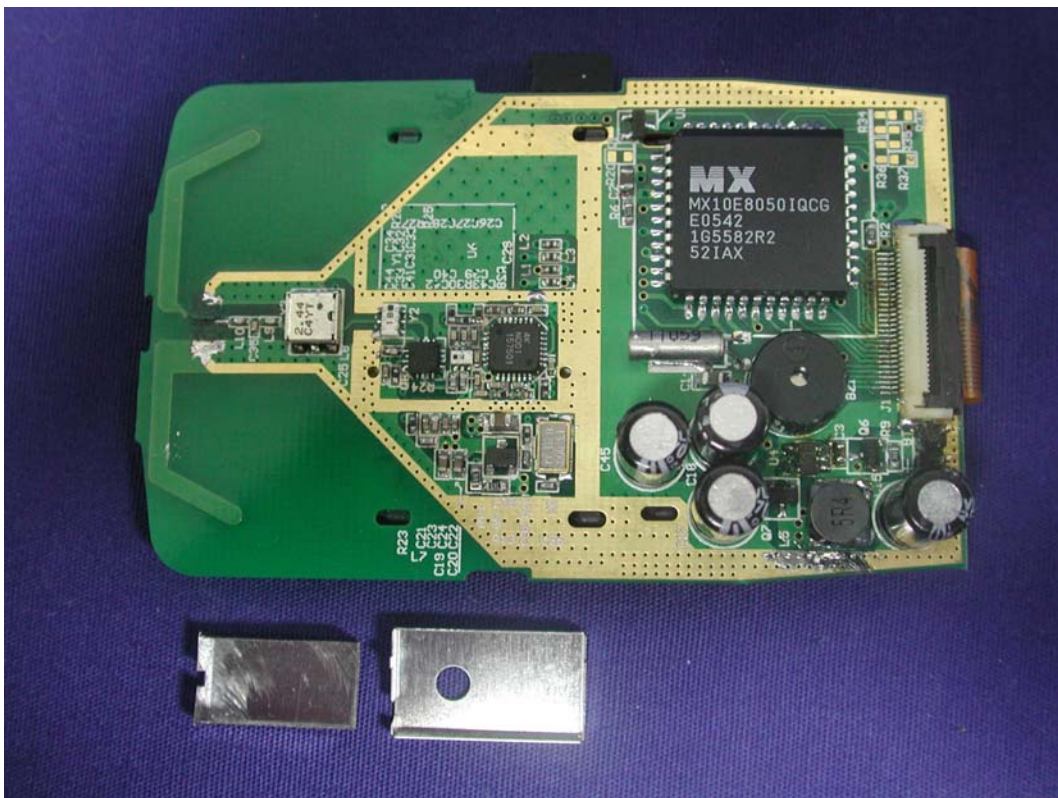
(8) EUT Photo



(9) EUT Photo



(10) EUT Photo



(11) EUT Photo

