



RADIO TEST REPORT

Test Report No. : 31CE0169-HO-02-B-R1

Applicant : Murata Manufacturing Co., Ltd.
Type of Equipment : Communication Module
Model No. : LBEE69QSYC
FCC ID : VPYLBSY
Test regulation : FCC Part 15 Subpart C: 2010
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 31CE0169-HO-02-B. 31CE0169-HO-02-B is replaced with this report.

Date of test:

February 14 to 17, 2011

**Representative
test engineer:**

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Approved by:

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NVLAP LAB CODE: 200572-0

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MF058b (12.01.11)

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SECTION 1: Customer information

Company Name : Murata Manufacturing Co., Ltd.
Address : 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555 Japan
Telephone Number : +81-75-955-7059
Facsimile Number : +81-75-955-7098
Contact Person : Takaharu Kawakatsu

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Communication Module
Model No. : LBEE69QSYC
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC1.8, 3.3V
Receipt Date of Sample : January 17, 2011
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

General Specification

Clock frequency(ies) in the system : 26MHz (WLAN), 38.4MHz (Bluetooth)
Operating temperature range : -20 to +75 deg. C

Radio Specification

WLAN 11b/g/n-20

Radio Type : Transceiver
Frequency of Operation : 2412-2462MHz
Modulation : 11b: DSSS, 11g/n-20: OFDM
Power Supply (radio part input) : DC1.8, 3.3V
Antenna type : Inverted F antenna
Antenna Gain : 3.05dBi

*For WLAN11b/g/n-20 part, see Test Report No. 31CE0169-HO-02-A-R1 issued by UL Japan, Inc.

Bluetooth

Radio Type : Transceiver
Frequency of Operation : 2402-2480MHz
Modulation : FHSS
Power Supply (radio part input) : DC3.3V
Antenna type : Inverted F antenna
Antenna Gain : 3.05dBi

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2010, final revised on December 6, 2010 and effective January 5, 2011

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst Margin | Results | Remarks | |
|--|--|---|--|---------------------------------|-----------|------------------------|
| Conducted Emission | FCC: ANSI C63.4:2003 7. AC powerline conducted emission measurements IC: RSS-Gen 7.2.4 | FCC: Section 15.207 ----- IC: RSS-Gen 7.2.4 | QP 25.3dB, 10.13610MHz, L AV 16.4dB, 10.13610MHz, L | Complied | - | |
| Carrier Frequency Separation | FCC: FCC Public Notice DA 00-705 ----- IC: - | FCC: Section15.247(a)(1) ----- IC: RSS-210 A8.1 (b) | See data. | Complied | Conducted | |
| 20dB Bandwidth | FCC: FCC Public Notice DA 00-705 ----- IC: - | FCC: Section15.247(a)(1) ----- IC: RSS-210 A8.1 (a) | | - | Conducted | |
| Number of Hopping Frequency | FCC: FCC Public Notice DA 00-705 ----- IC: - | FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d) | | Complied | Conducted | |
| Dwell time | FCC: FCC Public Notice DA 00-705 ----- IC: - | FCC: Section15.247(a)(1)(iii) ----- IC: RSS-210 A8.1 (d) | | Complied | Conducted | |
| Maximum Peak Output Power | FCC: FCC Public Notice DA 00-705 ----- IC: RSS-Gen 4.8 | FCC: Section15.247(a)(b)(1) ----- IC: RSS-210 A8.4 (2) | | Complied | Conducted | |
| Spurious Emission & Band Edge Compliance | FCC: FCC Public Notice DA 00-705 ----- IC: RSS-Gen 4.9 | FCC: Section15.247(d) ----- IC: RSS-210 A8.5 RSS-Gen 7.2.3 | | 6.7dB 2400.000MHz, AV, Vert. | Complied | Conducted/ Radiated |
| Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15. | | | | | | |

* In case any questions arise about test procedure, ANSI C63.4: 2003 is also referred.

FCC 15.31 (e)

The stable voltage (DC1.8, 3.3V) is constantly provided with the EUT through the regulator installed in the end product. Therefore, the EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because it is soldered on the circuit board. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

3.3 Addition to standard

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|----------------------------|-------------------|-------------------|------------------------------------|----------|-----------|
| 99% Occupied Bandwidth | IC: RSS-Gen 4.6.1 | IC: RSS-Gen 4.6.1 | N/A | - | Conducted |
| Receiver Spurious Emission | IC: RSS-Gen 4.10 | IC: RSS-Gen 6 | 9.0dB 2442.500MHz, AV, Hori. | Complied | Radiated |

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

| Test room (semi-anechoic chamber) | Conducted emission (+dB) |
|--------------------------------------|-----------------------------|
| | 150kHz-30MHz |
| No.1 | 3.1dB |
| No.2 | 3.3dB |
| No.3 | 3.7dB |
| No.4 | 3.2dB |

| Test room (semi-anechoic chamber) | Radiated emission | | | | | | |
|--------------------------------------|-------------------|------------------|-----------------|----------------|-----------------|-------------------|-------------------|
| | (3m*)(+dB) | | | | (1m*)(+dB) | | (0.5m*)(+dB) |
| | 9kHz -30MHz | 30MHz -300MHz | 300MHz -1GHz | 1GHz -10GHz | 10GHz -18GHz | 18GHz -26.5GHz | 26.5GHz -40GHz |
| No.1 | 3.5dB | 5.1dB | 5.2dB | 4.8dB | 5.1dB | 4.4dB | 4.3dB |
| No.2 | 4.0dB | 5.1dB | 5.2dB | 4.8dB | 5.0dB | 4.3dB | 4.2dB |
| No.3 | 4.2dB | 4.7dB | 5.2dB | 4.8dB | 5.0dB | 4.5dB | 4.2dB |
| No.4 | 4.0dB | 5.0dB | 5.1dB | 4.8dB | 5.0dB | 5.1dB | 4.2dB |

*3m/1m/0.5m = Measurement distance

| Power meter (+dB) | |
|-------------------|------------|
| Below 1GHz | Above 1GHz |
| 1.0dB | 1.0dB |

| Antenna terminal conducted emission and Power density (+dB) | | | Antenna terminal conducted emission (+dB) | | Channel power (+dB) |
|---|-----------|------------|---|---------------|---------------------|
| Below 1GHz | 1GHz-3GHz | 3GHz-18GHz | 18GHz-26.5GHz | 26.5GHz-40GHz | |
| 1.0dB | 1.1dB | 2.7dB | 3.2dB | 3.3dB | 1.5dB |

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

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3.5 Test Location

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| | FCC Registration Number | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms |
|----------------------------|-------------------------|------------------------|----------------------------|--|------------------------|
| No.1 semi-anechoic chamber | 313583 | 2973C-1 | 19.2 x 11.2 x 7.7m | 7.0 x 6.0m | No.1 Power source room |
| No.2 semi-anechoic chamber | 655103 | 2973C-2 | 7.5 x 5.8 x 5.2m | 4.0 x 4.0m | - |
| No.3 semi-anechoic chamber | 148738 | 2973C-3 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.3 Preparation room |
| No.3 shielded room | - | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.4 semi-anechoic chamber | 134570 | 2973C-4 | 12.0 x 8.5 x 5.9m | 6.8 x 5.75m | No.4 Preparation room |
| No.4 shielded room | - | - | 4.0 x 6.0 x 2.7m | N/A | - |
| No.5 semi-anechoic chamber | - | - | 6.0 x 6.0 x 3.9m | 6.0 x 6.0m | - |
| No.6 shielded room | - | - | 4.0 x 4.5 x 2.7m | 4.75 x 5.4 m | - |
| No.6 measurement room | - | - | 4.75 x 5.4 x 3.0m | 4.75 x 4.15 m | - |
| No.7 shielded room | - | - | 4.7 x 7.5 x 2.7m | 4.7 x 7.5m | - |
| No.8 measurement room | - | - | 3.1 x 5.0 x 2.7m | N/A | - |
| No.9 measurement room | - | - | 8.0 x 4.5 x 2.8m | 2.0 x 2.0m | - |
| No.10 measurement room | - | - | 2.6 x 2.8 x 2.5m | 2.4 x 2.4m | - |
| No.11 measurement room | - | - | 3.1 x 3.4 x 3.0m | 2.4 x 3.4m | - |

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9
Receiving (Rx)
Inquiry

Details of Operating Mode(s)

| Test Item | Mode | Tested frequency |
|--|--|-------------------------------|
| Conducted Emission, Spurious Emission (Conducted/Radiated) | Tx (Hopping off) DH5, 3DH5 | 2402MHz 2441MHz 2480MHz |
| | Rx | 2441MHz |
| Carrier Frequency Separation | Tx (Hopping on) DH5, 3DH5 Inquiry | 2402MHz 2441MHz 2480MHz |
| 20dB Bandwidth | Tx (Hopping off) DH5, 3DH5 Inquiry | 2402MHz 2441MHz 2480MHz |
| Number of Hopping Frequency | Tx (Hopping on) DH5, 3DH5 Inquiry | - |
| Dwell time | Tx (Hopping on), -DH1, DH3, DH5 -3DH1, 3DH3, 3DH5 Inquiry | - |
| Maximum Peak Output Power | Tx (Hopping off) DH5, 3DH5 Inquiry | 2402MHz 2441MHz 2480MHz |
| Band Edge Compliance (Conducted) | Tx DH5, 3DH5 -Hopping on -Hopping off | 2402MHz 2480MHz |
| 99% Occupied Bandwidth | Tx DH5, 3DH5 -Hopping on -Hopping off | 2402MHz 2441MHz 2480MHz |
| <p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test) *EUT has the power settings by the software as follows; Power settings: BDR: Ext.=0, Int.=47 EDR: Ext.=0, Int.=53 Software: CSR BlueSuite BlueTest Version 2.2.0.0 CSR BlueSuite BtCliCtrl Version 2.2.0.0 (Inquiry mode only) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.</p> | | |

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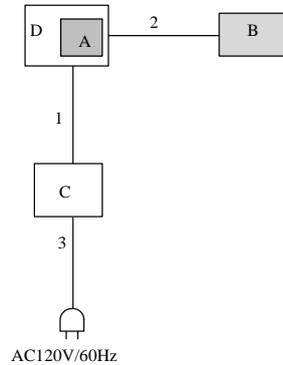
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4.2 Configuration and peripherals



* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

Description of EUT

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|----------------------|----------------------|---------------|--------------------------------|---------|
| A | Communication Module | LBEE69QSYC | 001 | Murata Manufacturing Co., Ltd. | EUT |
| B | Antenna | WDAN-F1SN1001-DF-REF | 4 | Murata Manufacturing Co., Ltd. | EUT |
| C | DC Power Supply *1) | PW18-1.3AT | 08016530 | KENWOOD | - |
| D | Jig Board | - | - | Murata Manufacturing Co., Ltd. | - |

*1) Used for Conducted Emission test only

List of cables used

| No. | Name | Length (m) | Shield | | Remarks |
|-----|---------------|------------|------------|------------|---------|
| | | | Cable | Connector | |
| 1 | DC Cable | 1.6 | Unshielded | Unshielded | - |
| 2 | Antenna Cable | 0.5 | Unshielded | Unshielded | - |
| 3 | AC Cable *1) | 2.4 | Unshielded | Unshielded | - |

*1) Used for Conducted Emission test only

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0m by 0.5m, raised 0.8m above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. All unused 50ohm connectors of the LISN(AMN) were resistivity terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber. The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

| | |
|--------------------------|---------------------|
| Detector | : QP and AV |
| Measurement range | : 0.15-30MHz |
| Test data | : APPENDIX |
| Test result | : Pass |

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SECTION 6: Radiated Spurious Emission

Test Procedure

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

The height of the measuring antenna varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

| | | | | |
|--------------|-------------|-----------------|----------------|------------|
| Frequency | Below 30MHz | 30MHz to 300MHz | 300MHz to 1GHz | Above 1GHz |
| Antenna Type | Loop | Biconical | Logperiodic | Horn |

| | | | |
|-----------------|----------------|--|---|
| Frequency | Below 1GHz | Above 1GHz | |
| Instrument used | Test Receiver | Spectrum Analyzer | |
| Detector | QP | PK | AV |
| IF Bandwidth | BW 120kHz(T/R) | RBW: 1MHz VBW: 3MHz | RBW: 1MHz VBW: 10Hz or RBW: 1MHz VBW: 270Hz *1) |
| Test Distance | 3m | 3m (below 10GHz), 1m*2) (above 10GHz) | |

*1) Used for the band edge of the carrier and the harmonics that can be measured. The VBW is based on the inverse of the duty cycle (see Appendix).

*2) Distance Factor: $20 \times \log(3.0\text{m}/1.0\text{m}) = 9.5\text{dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of module and antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

The test results and limit are rounded off to one decimal place, so some differences might be observed.

Measurement range : 30M-25GHz
Test data : APPENDIX
Test result : Pass

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SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

| Test | Span | RBW | VBW | Sweep time | Detector | Trace | Instrument used |
|--|--|-----------------|--------------------|--|-----------------|--------------|--------------------------------|
| 20dB Bandwidth | 3MHz | 30kHz | 100kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99% Occupied Bandwidth | Enough width to display 20dB Bandwidth | 1 to 3% of Span | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| Maximum Peak Output Power | - | - | - | Auto | Peak | - | Power Meter (Sensor: 50MHz BW) |
| Carrier Frequency Separation | 5MHz | 30kHz | 100kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| Number of Hopping Frequency | 30MHz | 300kHz | 1MHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| Dwell Time | Zero Span | 1MHz | 3MHz | As necessary capture the entire dwell time per hopping channel | Peak | Max Hold | Spectrum Analyzer |
| Conducted Spurious Emission | Less or equal to 5GHz (Range: 30MHz-25GHz) | 100kHz | 300kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| Conducted Spurious Emission Band Edge compliance | 20MHz | 300kHz | 1MHz | Auto | Peak | Max Hold | Spectrum Analyzer |

The test results and limit are rounded off to two decimals place, so some differences might be observed.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Photographs of test setup

Conducted Emission



Photo 1

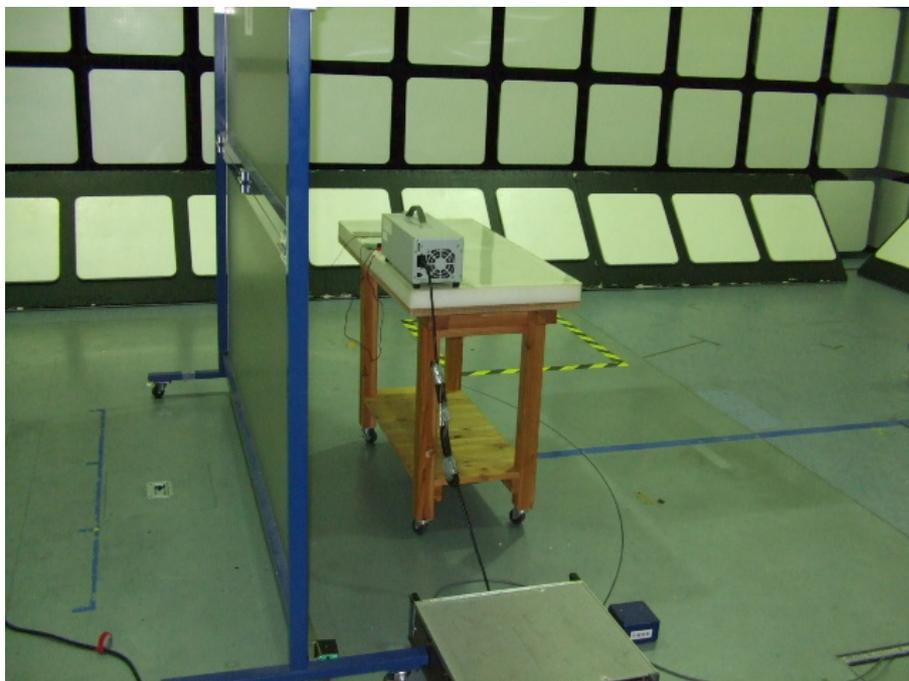


Photo 2

Radiated Spurious Emission



Photo 1

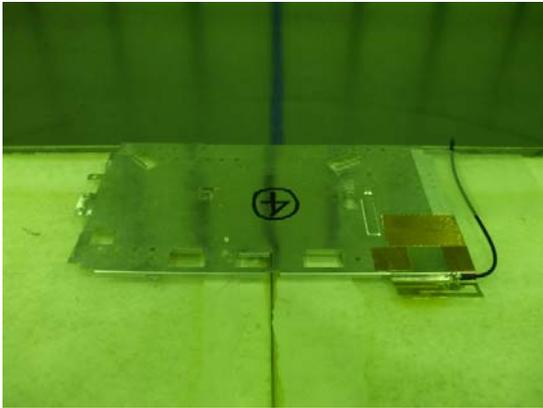


Photo 2

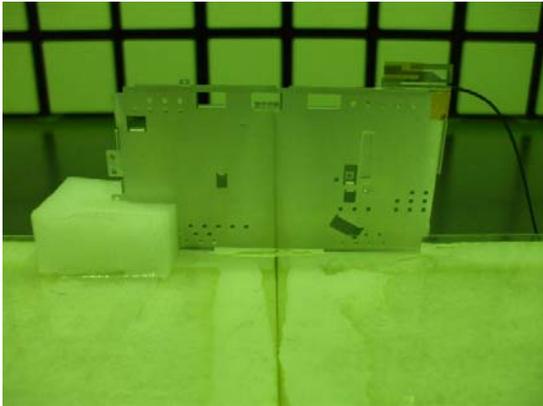
Worst Case Position

ANT(Hori:X-axis/Vert:Y-axis)

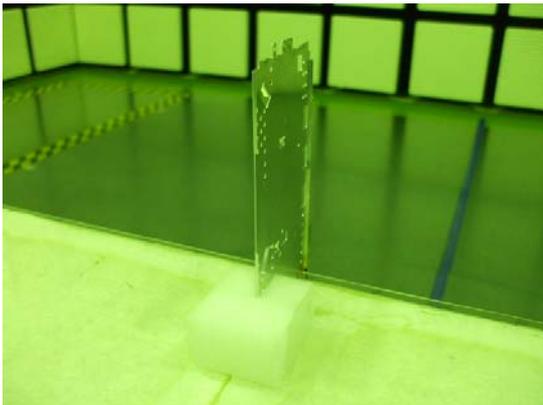
X-axis



Y-axis

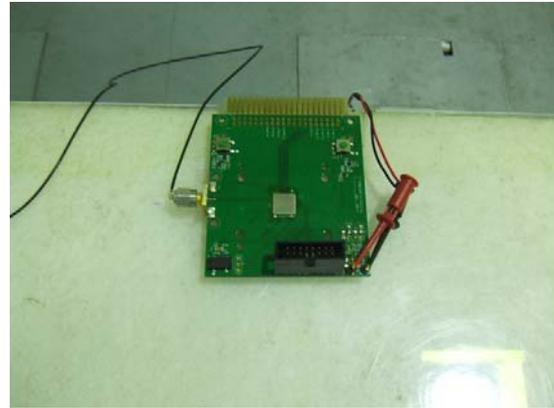


Z-axis

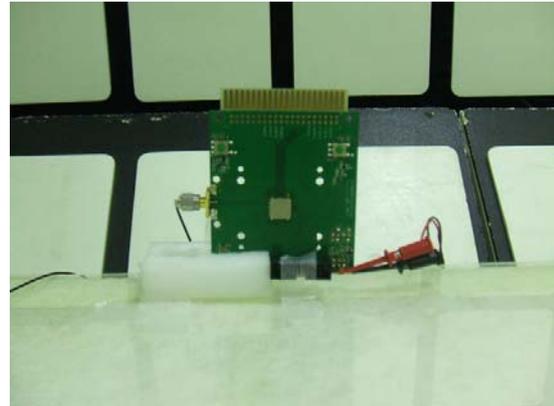


Module(Hori:X-axis/Vert:Z-axis)

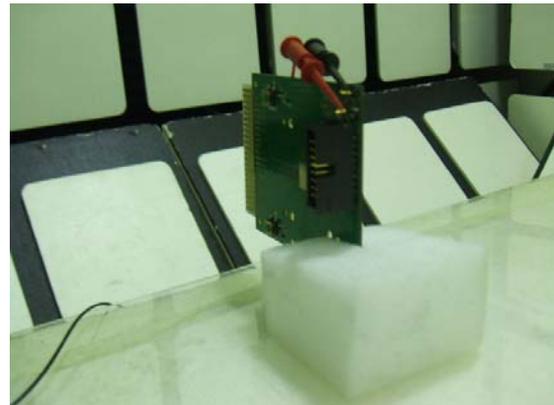
X-axis



Y-axis



Z-axis



APPENDIX 2: Data of EMI test

Conducted Emission

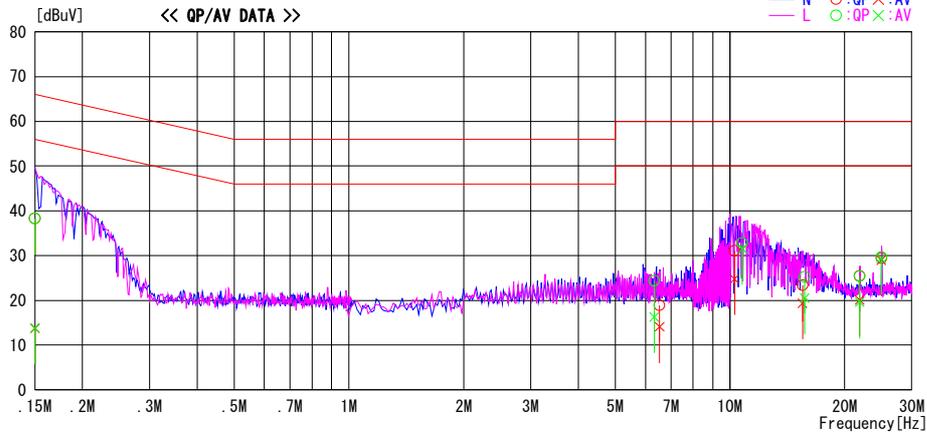
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2011/02/16

Report No. : 31CE0169-HO-02
 Temp./Humi. : 22deg. C / 29%
 Engineer : Hiroshi Kukita

Mode / Remarks : BT Tx DH5 2441MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

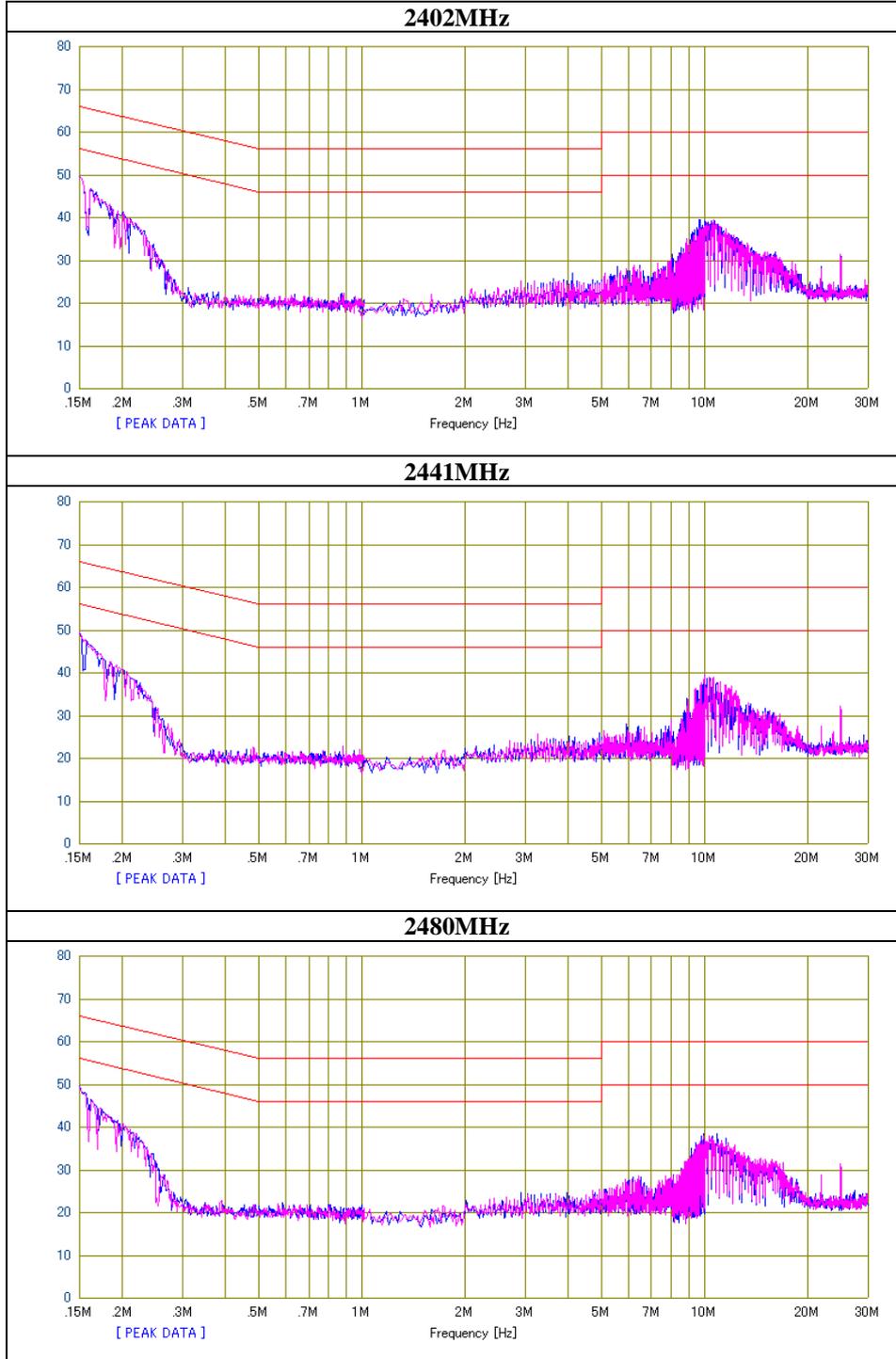


| Frequency [MHz] | Reading Level | | Corr. Factor [dB] | Results | | Limit | | Margin | | Phase | Comment |
|--------------------|---------------|--------------|-------------------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | | |
| 0.15000 | 25.0 | 0.5 | 13.3 | 38.3 | 13.8 | 66.0 | 56.0 | 27.7 | 42.2 | N | |
| 0.15000 | 25.0 | 0.5 | 13.3 | 38.3 | 13.8 | 66.0 | 56.0 | 27.7 | 42.2 | L | |
| 6.32572 | 10.5 | 2.4 | 13.9 | 24.4 | 16.3 | 60.0 | 50.0 | 35.6 | 33.7 | L | |
| 6.53316 | 5.0 | 0.2 | 13.9 | 18.9 | 14.1 | 60.0 | 50.0 | 41.1 | 35.9 | N | |
| 10.28060 | 16.8 | 10.5 | 14.3 | 31.1 | 24.8 | 60.0 | 50.0 | 28.9 | 25.2 | N | |
| 15.49570 | 8.7 | 4.7 | 14.7 | 23.4 | 19.4 | 60.0 | 50.0 | 36.6 | 30.6 | N | |
| 10.77820 | 18.5 | 17.3 | 14.3 | 32.8 | 31.6 | 60.0 | 50.0 | 27.2 | 18.4 | L | |
| 15.70700 | 10.5 | 5.8 | 14.7 | 25.2 | 20.5 | 60.0 | 50.0 | 34.8 | 29.5 | L | |
| 21.87820 | 10.2 | 4.4 | 15.2 | 25.4 | 19.6 | 60.0 | 50.0 | 34.6 | 30.4 | L | |
| 21.88090 | 10.3 | 4.9 | 15.2 | 25.5 | 20.1 | 60.0 | 50.0 | 34.5 | 29.9 | N | |
| 24.94644 | 14.0 | 13.6 | 15.4 | 29.4 | 29.0 | 60.0 | 50.0 | 30.6 | 21.0 | N | |
| 24.94668 | 14.3 | 14.0 | 15.4 | 29.7 | 29.4 | 60.0 | 50.0 | 30.3 | 20.6 | L | |

CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C. F (LISN LOSS+CABLE LOSS+ATTEN. LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

| | |
|-----------------------|---|
| Test place | Head Office EMC Lab. No.2 Semi Anechoic Chamber |
| Report No. | 31CE0169-HO |
| Date | 02/16/2011 |
| Temperature/ Humidity | 22 deg.C./ 29% |
| Engineer | Hiroshi Kukita |
| Mode | Tx DH5 |



Conducted Emission

DATA OF CONDUCTED EMISSION TEST

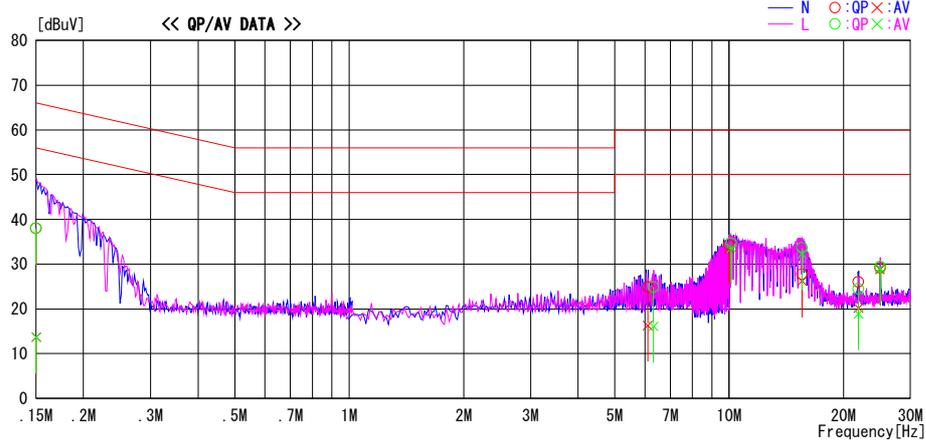
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2011/02/16

Report No. : 31CE0169-HO-02

Temp./Humi. : 22deg. C / 29%
 Engineer : Hiroshi Kukita

Mode / Remarks : BT Tx 3DH5 2441MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV

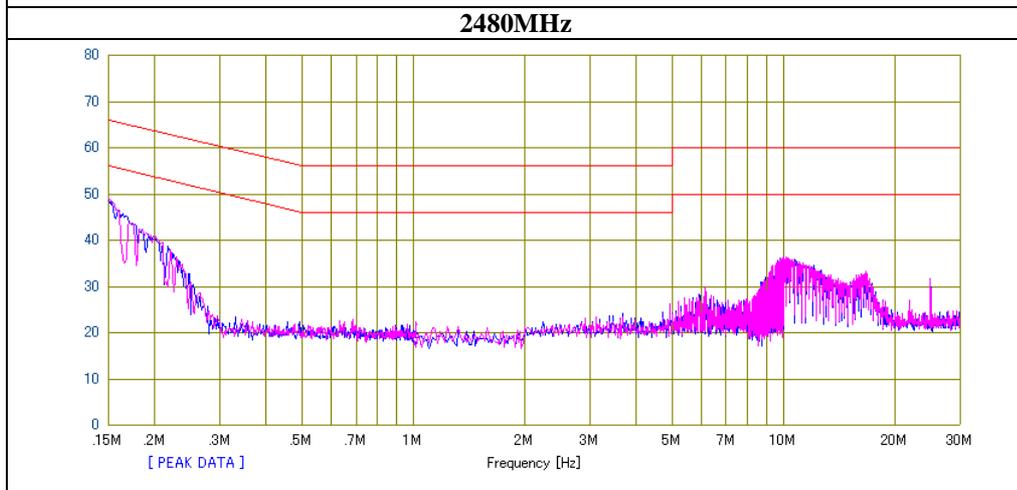
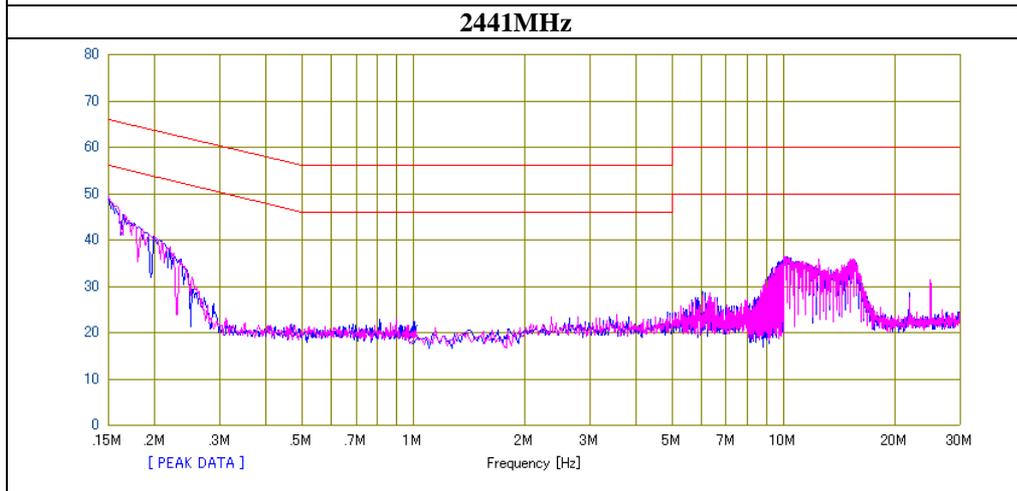
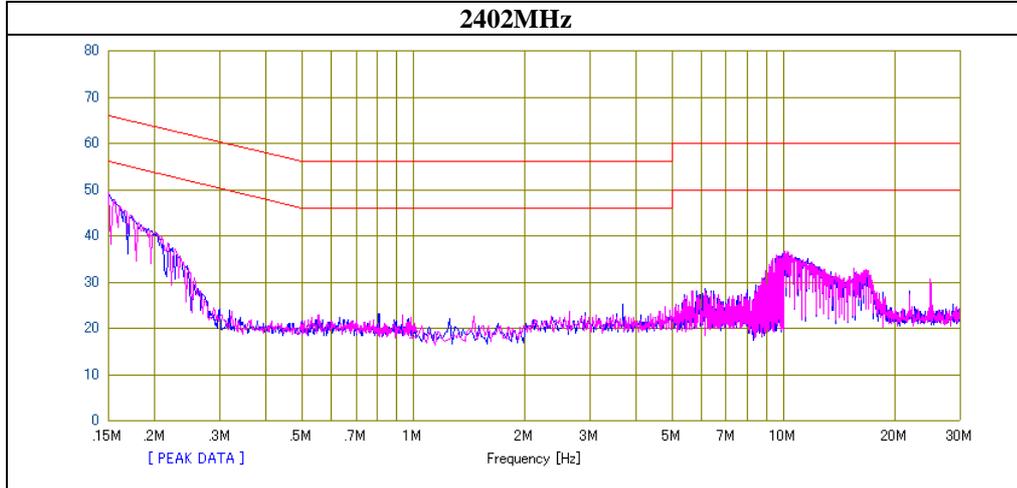


| Frequency [MHz] | Reading Level | | Corr. Factor | Results | | Limit | | Margin | | Phase |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | |
| 0.15000 | 24.7 | 0.4 | 13.3 | 38.0 | 13.7 | 66.0 | 56.0 | 28.0 | 42.3 | N |
| 6.10920 | 11.0 | 2.4 | 13.9 | 24.9 | 16.3 | 60.0 | 50.0 | 35.1 | 33.7 | N |
| 9.99488 | 20.1 | 19.2 | 14.2 | 34.3 | 33.4 | 60.0 | 50.0 | 25.7 | 16.6 | N |
| 15.54700 | 13.0 | 11.5 | 14.7 | 27.7 | 26.2 | 60.0 | 50.0 | 32.3 | 23.8 | N |
| 21.87824 | 10.8 | 5.0 | 15.2 | 26.0 | 20.2 | 60.0 | 50.0 | 34.0 | 29.8 | N |
| 24.94540 | 13.8 | 13.4 | 15.4 | 29.2 | 28.8 | 60.0 | 50.0 | 30.8 | 21.2 | N |
| 0.15000 | 24.7 | 0.4 | 13.3 | 38.0 | 13.7 | 66.0 | 56.0 | 28.0 | 42.3 | L |
| 6.31928 | 11.0 | 2.2 | 13.9 | 24.9 | 16.1 | 60.0 | 50.0 | 35.1 | 33.9 | L |
| 10.13610 | 20.4 | 19.3 | 14.3 | 34.7 | 33.6 | 60.0 | 50.0 | 25.3 | 16.4 | L |
| 15.55080 | 18.9 | 17.6 | 14.7 | 33.6 | 32.3 | 60.0 | 50.0 | 26.4 | 17.7 | L |
| 21.87760 | 9.3 | 3.7 | 15.2 | 24.5 | 18.9 | 60.0 | 50.0 | 35.5 | 31.1 | L |
| 24.94540 | 14.0 | 13.7 | 15.4 | 29.4 | 29.1 | 60.0 | 50.0 | 30.6 | 20.9 | L |

CHART: WITH FACTOR. Peak hold data. CALCULATION: RESULT=READING+C.F (LISN LOSS+CABLE LOSS+ATTEN. LOSS)
 Except for the above table : adequate margin data below the limits.

Conducted Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 31CE0169-HO
Date : 02/16/2011
Temperature/ Humidity : 22 deg.C./ 29%
Engineer : Hiroshi Kukita
Mode : Tx 3DH5



Conducted Emission

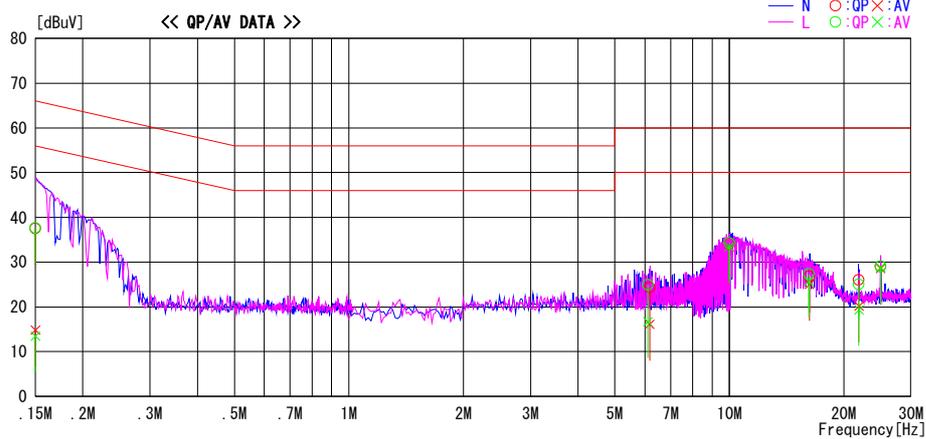
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber
 Date : 2011/02/16

Report No. : 31CE0169-HO-02
 Temp./Humi. : 22deg. C / 29%
 Engineer : Hiroshi Kukita

Mode / Remarks : BT Rx DH5 2441MHz

LIMIT : FCC15.207 QP
 FCC15.207 AV



| Frequency [MHz] | Reading Level | | Corr. Factor | Results | | Limit | | Margin | | Phase |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|
| | QP [dBuV] | AV [dBuV] | | QP [dBuV] | AV [dBuV] | QP [dBuV] | AV [dBuV] | QP [dB] | AV [dB] | |
| 0.15000 | 24.2 | 1.5 | 13.3 | 37.5 | 14.8 | 66.0 | 56.0 | 28.5 | 41.2 | N |
| 6.17276 | 10.4 | 2.2 | 13.9 | 24.3 | 16.1 | 60.0 | 50.0 | 35.7 | 33.9 | N |
| 9.99160 | 20.0 | 19.2 | 14.2 | 34.2 | 33.4 | 60.0 | 50.0 | 25.8 | 16.6 | N |
| 16.23436 | 12.0 | 10.2 | 14.8 | 26.8 | 25.0 | 60.0 | 50.0 | 33.2 | 25.0 | N |
| 21.87750 | 10.8 | 5.0 | 15.2 | 26.0 | 20.2 | 60.0 | 50.0 | 34.0 | 29.8 | N |
| 24.94532 | 13.6 | 13.2 | 15.4 | 29.0 | 28.6 | 60.0 | 50.0 | 31.0 | 21.4 | N |
| 0.15000 | 24.4 | 0.2 | 13.3 | 37.7 | 13.5 | 66.0 | 56.0 | 28.3 | 42.5 | L |
| 6.10540 | 11.1 | 2.8 | 13.9 | 25.0 | 16.7 | 60.0 | 50.0 | 35.0 | 33.3 | L |
| 9.99260 | 20.1 | 19.2 | 14.2 | 34.3 | 33.4 | 60.0 | 50.0 | 25.7 | 16.6 | L |
| 16.16440 | 12.7 | 11.0 | 14.7 | 27.4 | 25.7 | 60.0 | 50.0 | 32.6 | 24.3 | L |
| 21.87682 | 9.9 | 4.2 | 15.2 | 25.1 | 19.4 | 60.0 | 50.0 | 34.9 | 30.6 | L |
| 24.94570 | 13.7 | 13.4 | 15.4 | 29.1 | 28.8 | 60.0 | 50.0 | 30.9 | 21.2 | L |

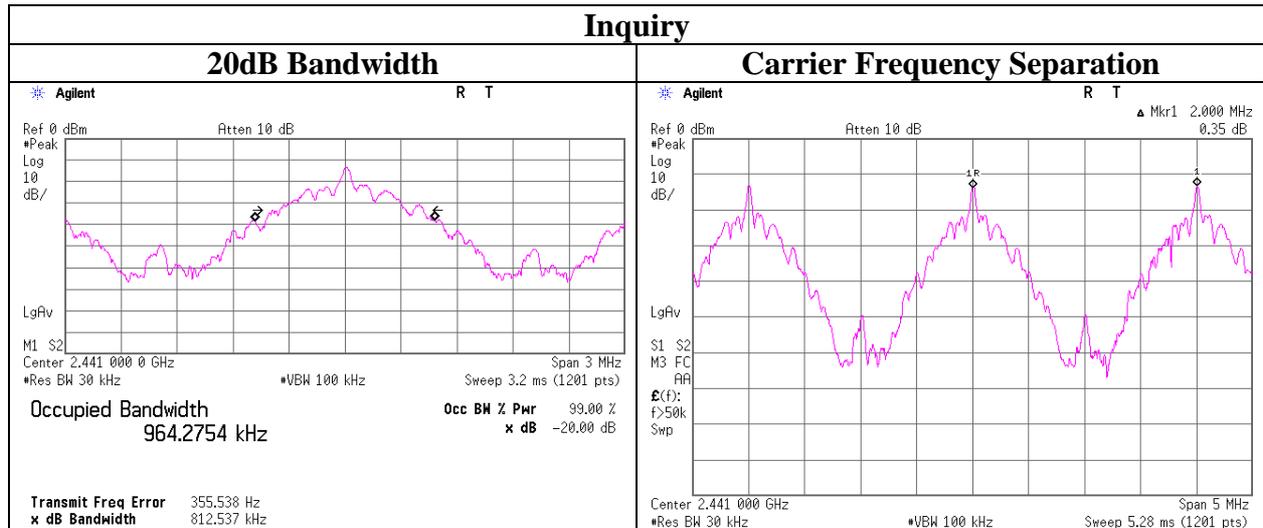
CHART: WITH FACTOR, Peak hold data. CALCULATION: RESULT=READING+C.F (LISM LOSS+CABLE LOSS+ATTEN. LOSS)
 Except for the above table : adequate margin data below the limits.

20dB Bandwidth and Carrier Frequency Separation

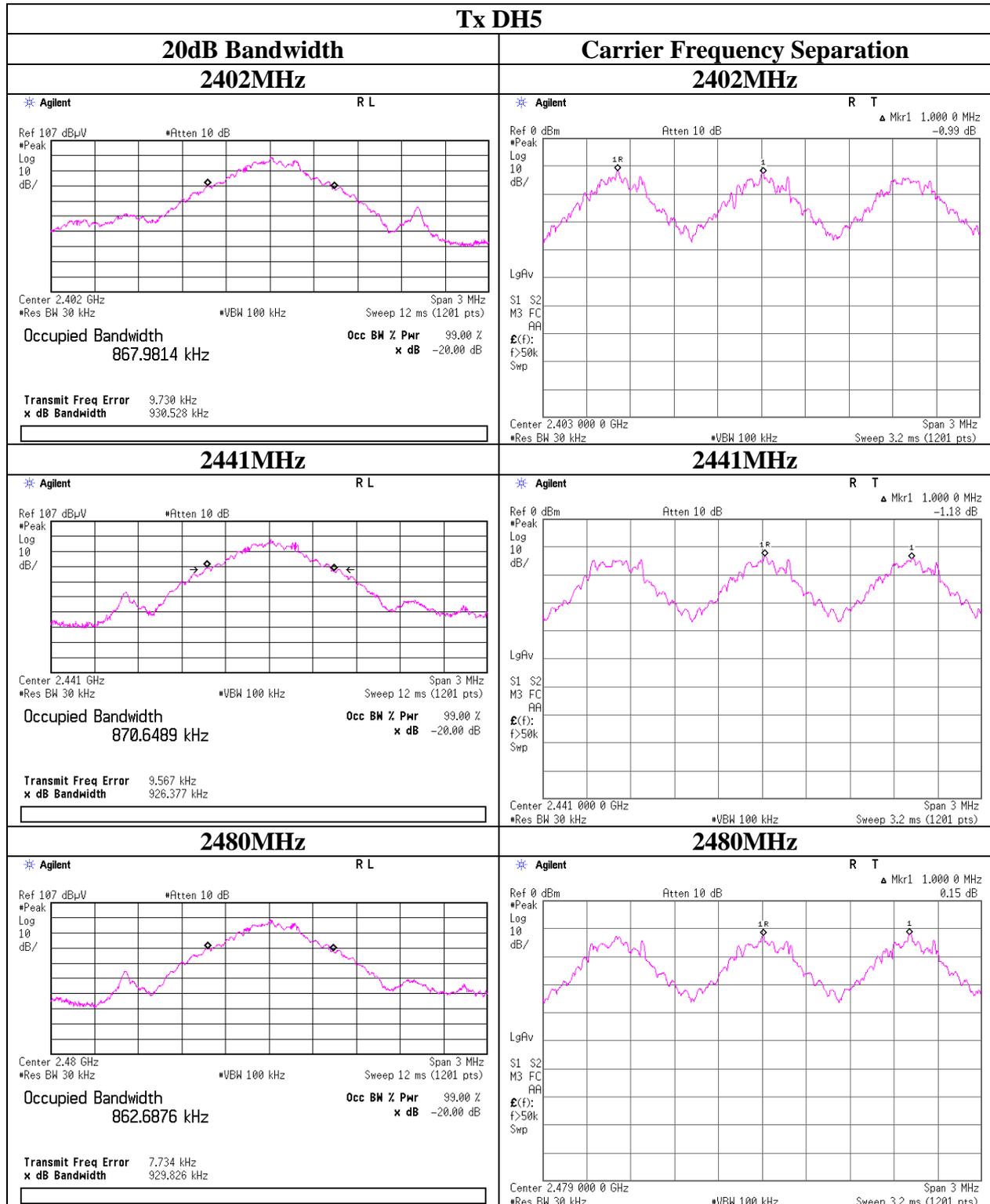
| | | |
|-----------------------|---|------------------|
| Test place | Head Office EMC Lab. No.2 and 6Measurement Room | |
| Report No. | 31CE0169-HO-02 | |
| Date | 02/15/2010 | 02/16/2011 |
| Temperature/ Humidity | 20 deg.C./ 30% | 21 deg.C./ 31% |
| Engineer | Takeshi Choda | Keisuke Kawamura |
| Mode | Tx (Hopping on) DH5/3DH5/Inquiry | |

| Mode | Freq. [MHz] | 20dB Bandwidth [MHz] | Carrier Frequency Separation [MHz] | Limit for Carrier Frequency separation [MHz] |
|---------|----------------|-------------------------|--|--|
| DH5 | 2402.0 | 0.931 | 1.000 | ≥ 0.620 |
| DH5 | 2441.0 | 0.926 | 1.000 | ≥ 0.618 |
| DH5 | 2480.0 | 0.930 | 1.000 | ≥ 0.620 |
| 3DH5 | 2402.0 | 1.274 | 1.008 | ≥ 0.849 |
| 3DH5 | 2441.0 | 1.263 | 1.018 | ≥ 0.842 |
| 3DH5 | 2480.0 | 1.266 | 1.000 | ≥ 0.844 |
| Inquiry | 2441.0 | 0.813 | 2.000 | ≥ 0.542 |

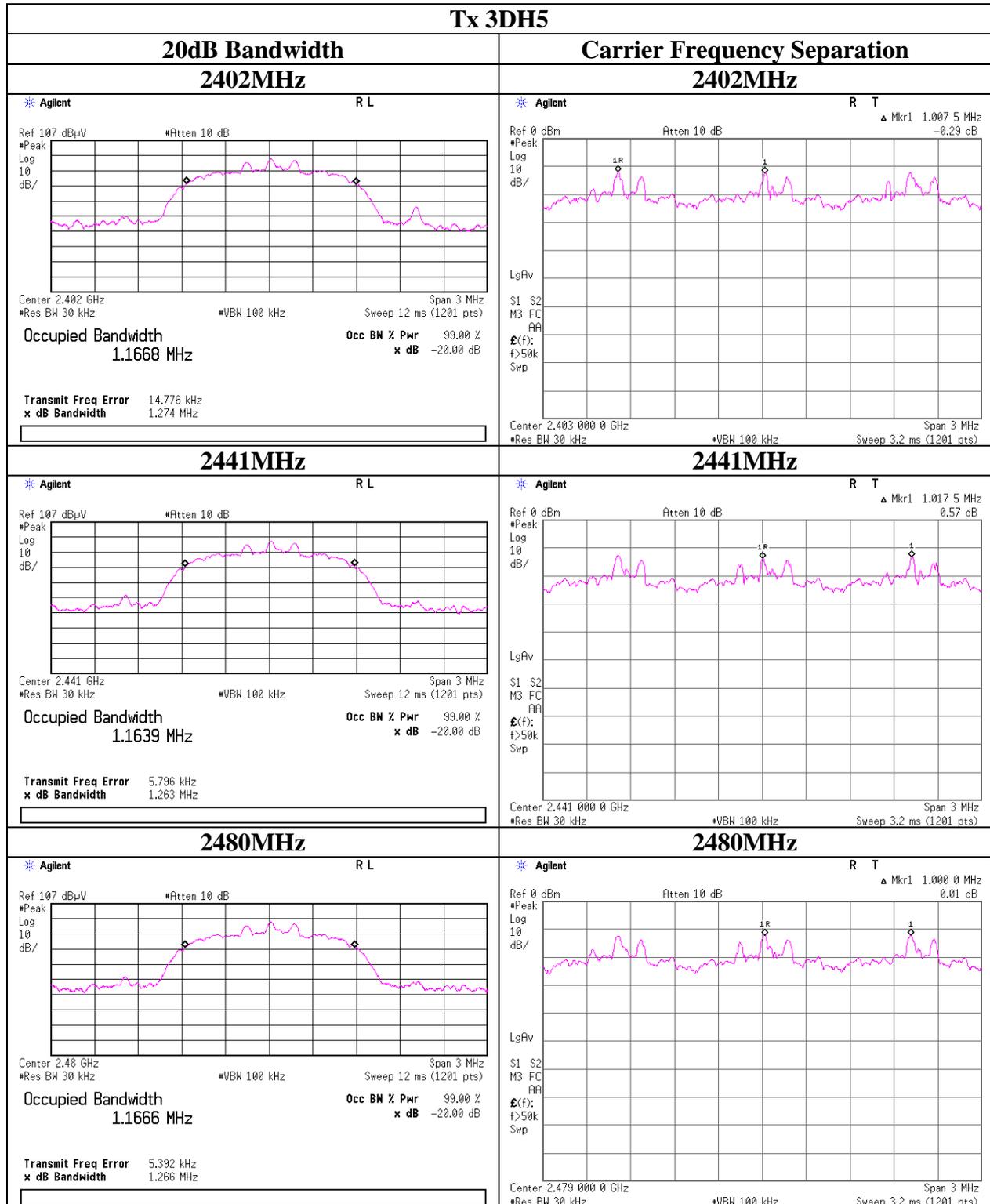
Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).
 No limit applies to 20dB Bandwidth.



20dB Bandwidth and Carrier Frequency Separation



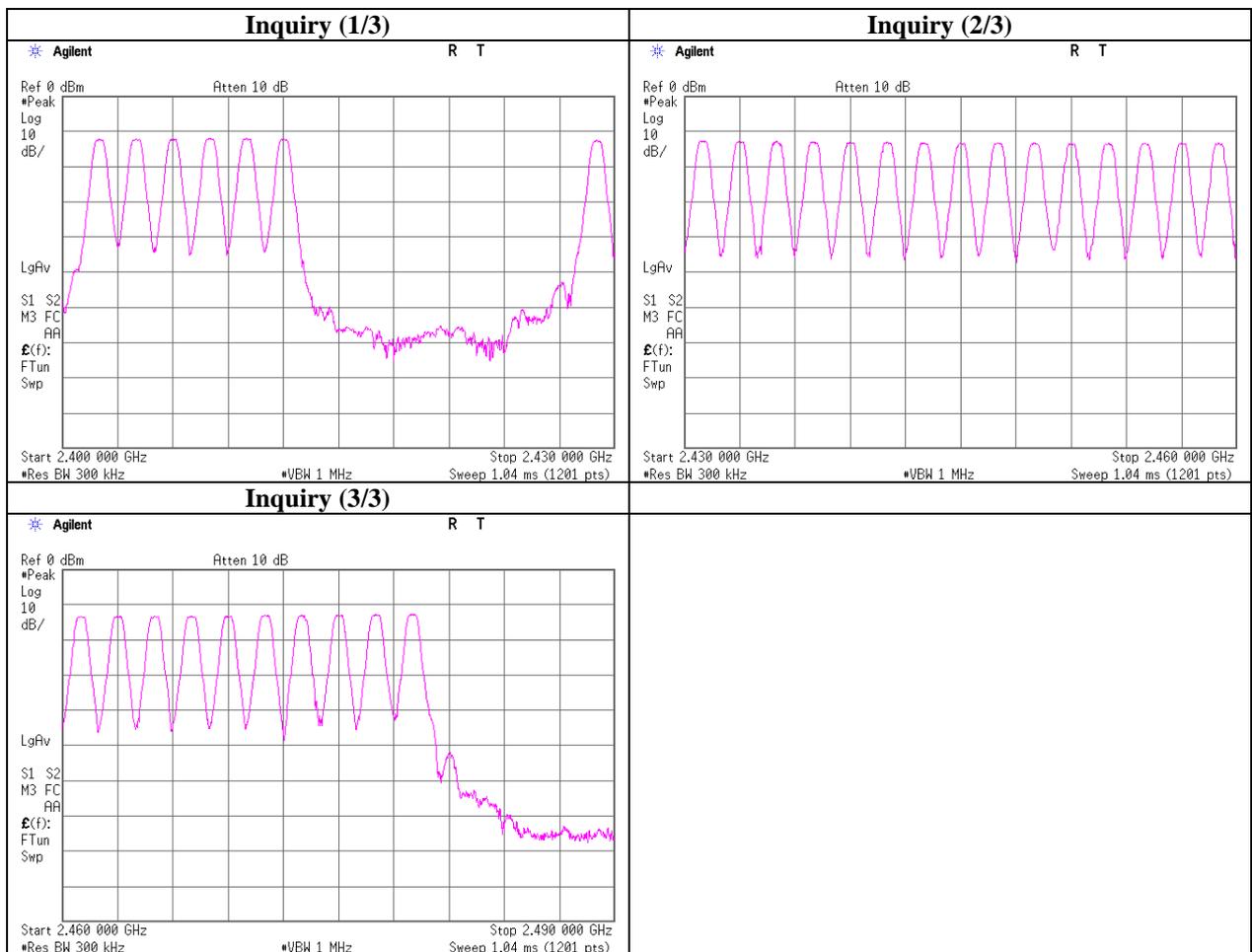
20dB Bandwidth and Carrier Frequency Separation



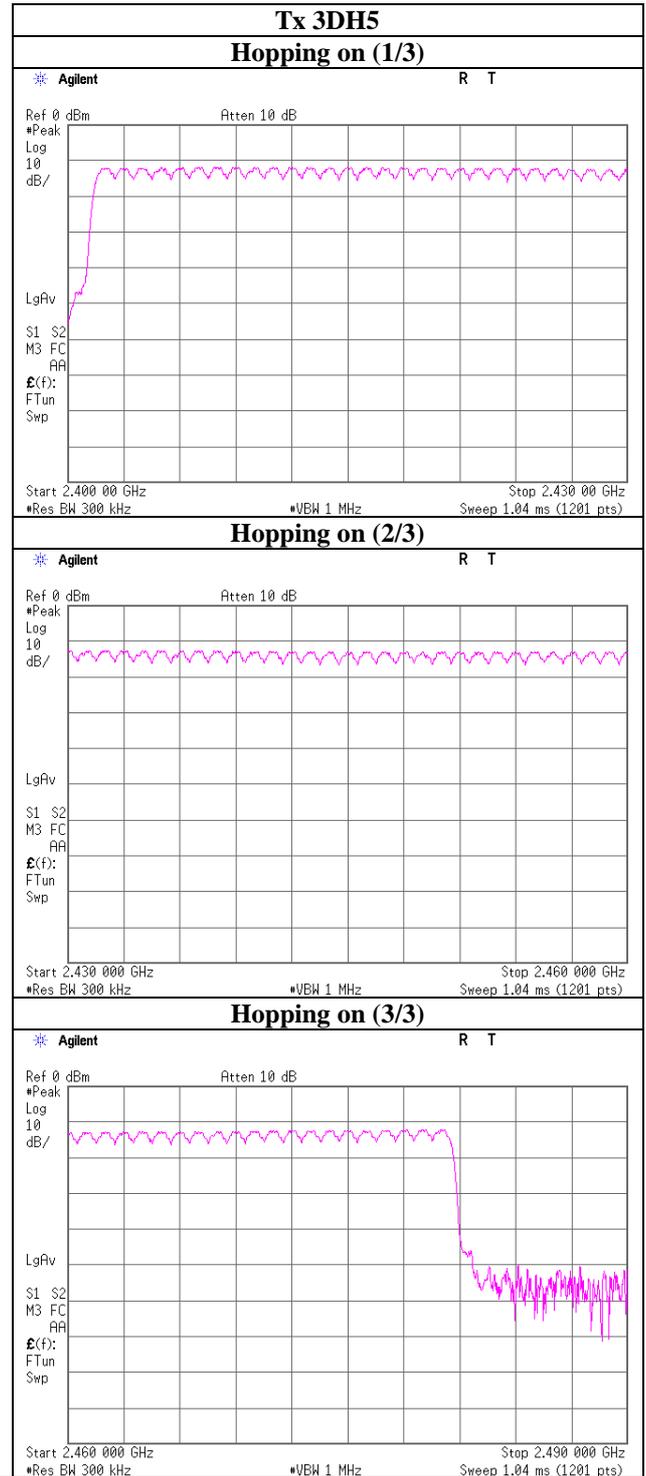
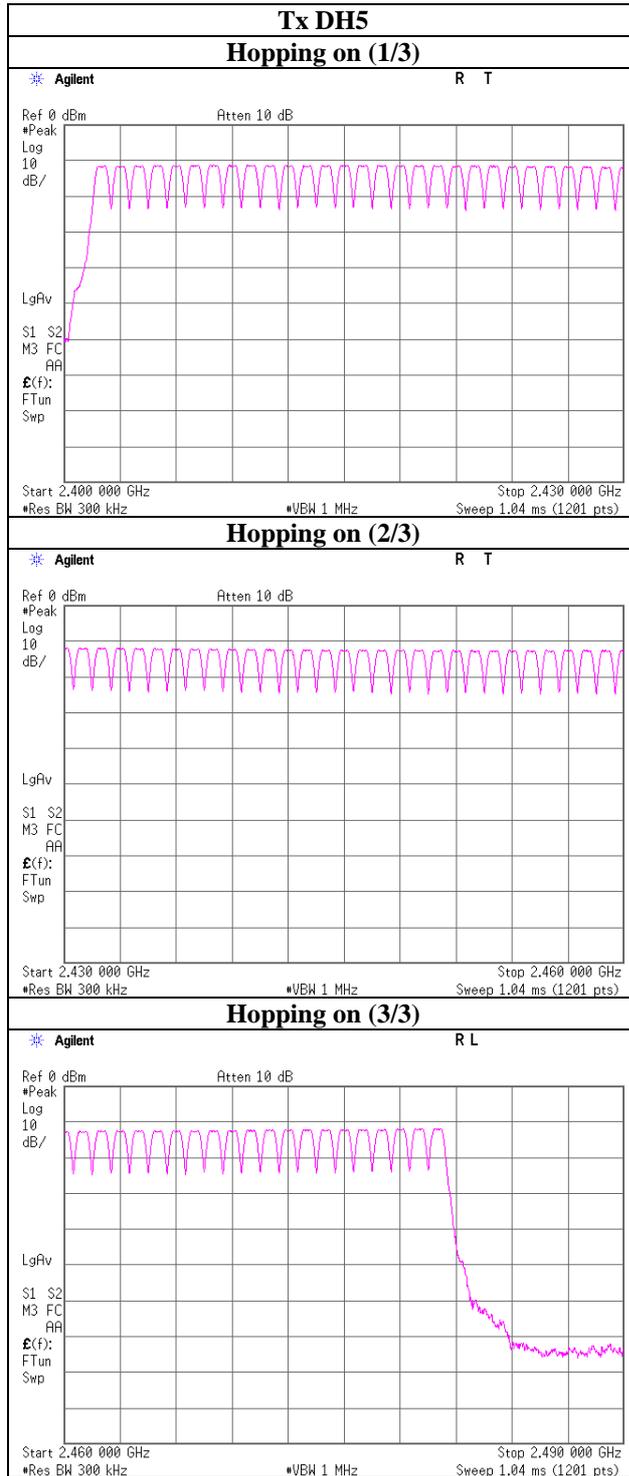
Number of Hopping Frequency

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.6 Measurement Room |
| Report No. | 31CE0169-HO-02 |
| Date | 02/16/2011 |
| Temperature/ Humidity | 21 deg.C./ 31% |
| Engineer | Keisuke Kawamura |
| Mode | Tx (Hopping on) DH5/3DH5/Inquiry |

| Mode | Number of channel [times] | Limit [times] |
|---------|------------------------------|------------------|
| DH5 | 79 | >= 15 |
| 3DH5 | 79 | >= 15 |
| Inquiry | 32 | >= 15 |



Number of Hopping Frequency



Dwell time

| | |
|-----------------------|--|
| Test place | Head Office EMC Lab. No.6 Measurement Room |
| Report No. | 31CE0169-HO-02 |
| Date | 02/16/2011 |
| Temperature/ Humidity | 21 deg.C./ 31% |
| Engineer | Keisuke Kawamura |
| Mode | Tx (Hopping on) DH5/3DH5/Inquiry |

| Mode | Number of transmission in a 31.6(79 Hopping x 0.4) / 12.8(32 Hopping x 0.4)second period | Length of transmission time [msec] | Result [msec] | Limit [msec] |
|---------|--|--|------------------|-----------------|
| DH1 | 51.2 times / 5 sec. x 31.6 sec. = 324 times | 0.519 | 168 | 400 |
| DH3 | 26.2 times / 5 sec. x 31.6 sec. = 166 times | 1.778 | 295 | 400 |
| DH5 | 17.4 times / 5 sec. x 31.6 sec. = 110 times | 3.028 | 333 | 400 |
| 3DH1 | 50.8 times / 5 sec. x 31.6 sec. = 322 times | 0.537 | 173 | 400 |
| 3DH3 | 25.2 times / 5 sec. x 31.6 sec. = 160 times | 1.799 | 288 | 400 |
| 3DH5 | 17.2 times / 5 sec. x 31.6 sec. = 109 times | 3.045 | 332 | 400 |
| Inquiry | 100.0 times / 1 sec. x 12.8 sec. = 1280 times | 0.220 | 282 | 400 |

Sample Calculation

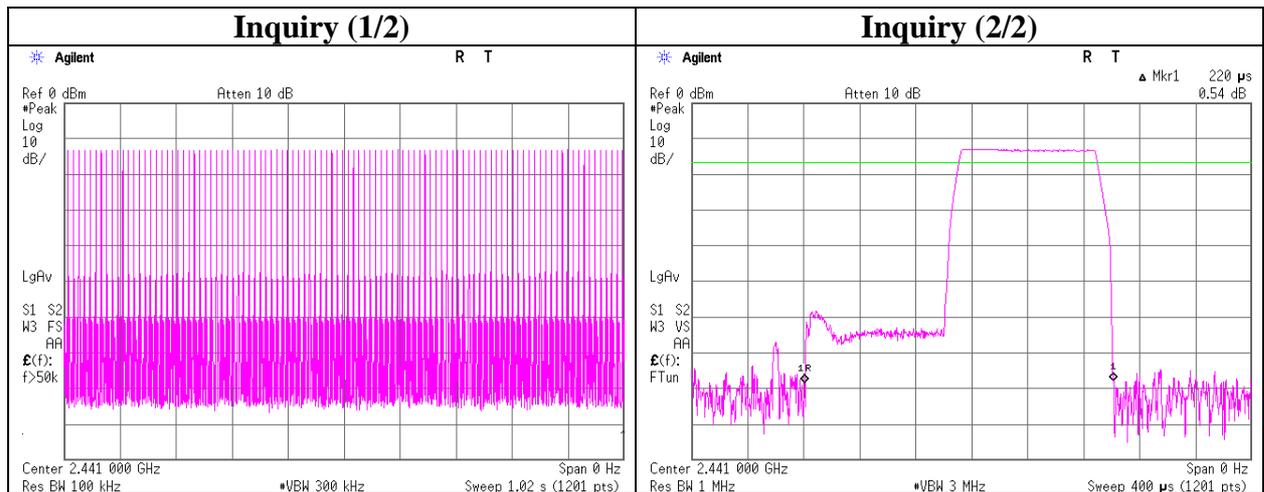
Result = Number of transmission x Length of transmission time

*Average data of 5 tests.(except Inquiry)

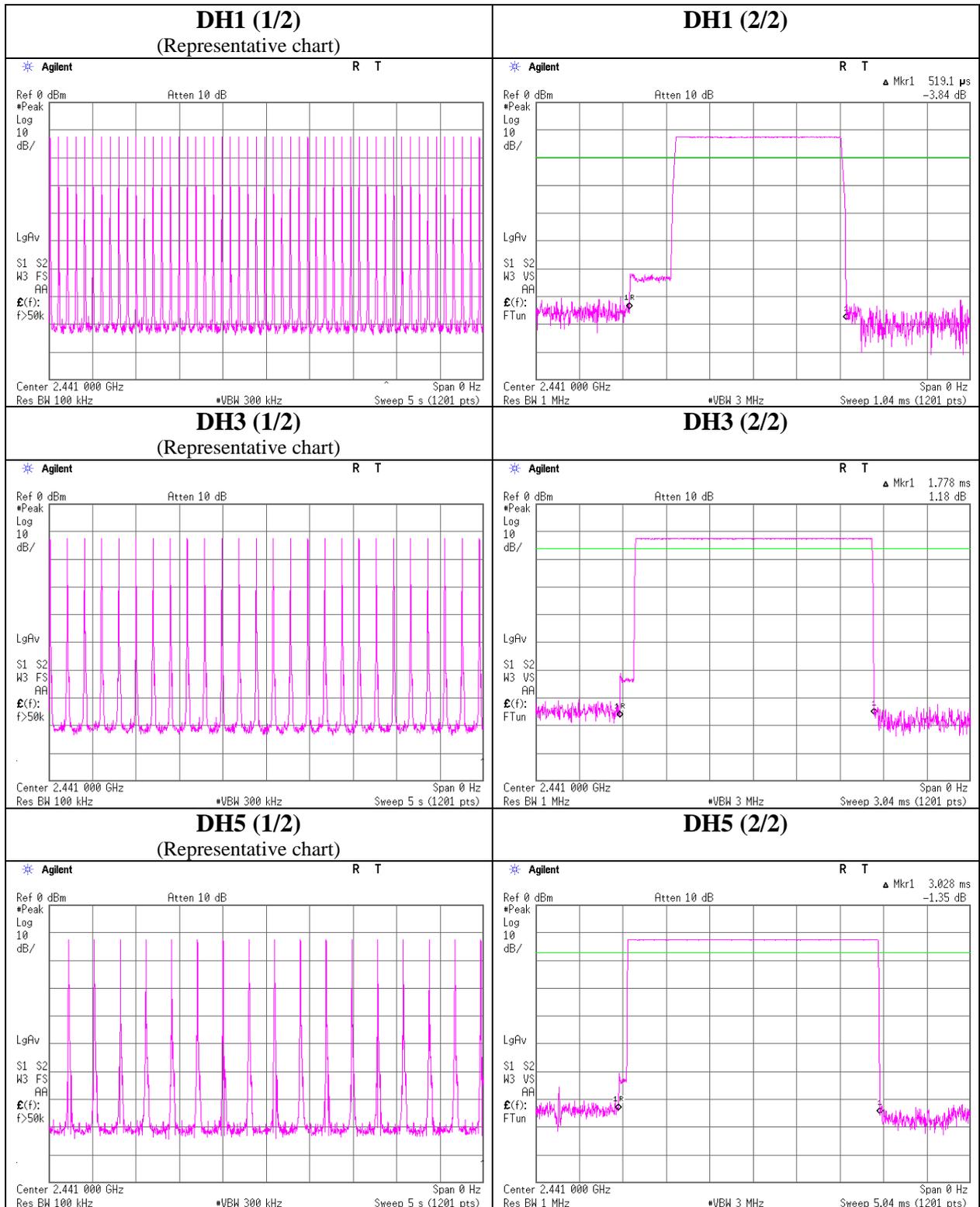
| Mode | Sampling [times] | | | | | Average [times] |
|------|------------------|----|----|----|----|--------------------|
| | 1 | 2 | 3 | 4 | 5 | |
| DH1 | 51 | 51 | 51 | 52 | 51 | 51.2 |
| DH3 | 26 | 26 | 27 | 26 | 26 | 26.2 |
| DH5 | 17 | 17 | 18 | 18 | 17 | 17.4 |
| 3DH1 | 50 | 51 | 51 | 51 | 51 | 50.8 |
| 3DH3 | 25 | 25 | 25 | 26 | 25 | 25.2 |
| 3DH5 | 17 | 17 | 17 | 18 | 17 | 17.2 |

Sample Calculation

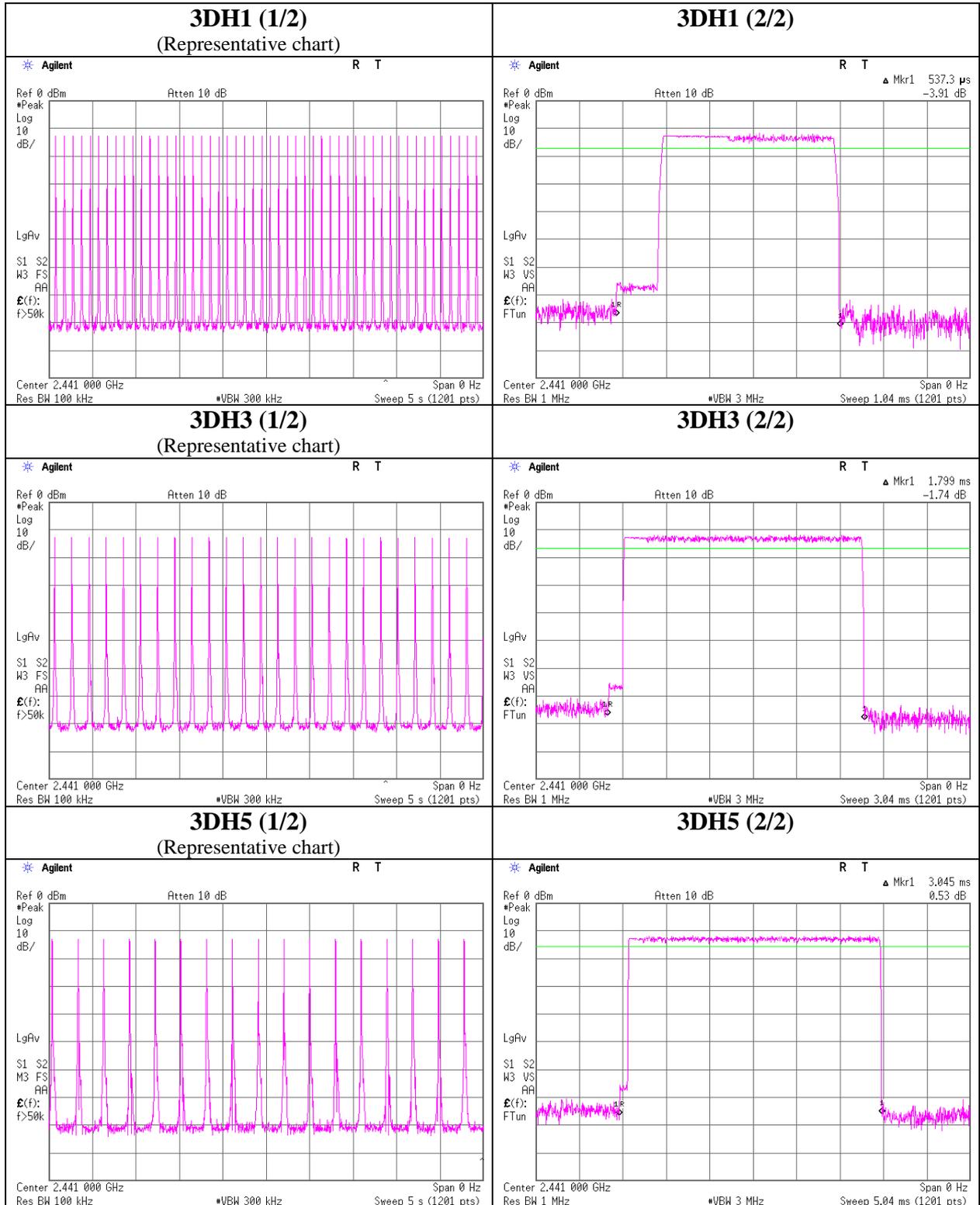
Average= Summation(Sampling 1 to 5) / 5



Dwell time



Dwell time



Maximum Peak Output Power

| | | |
|-----------------------|---|------------------|
| Test place | Head Office EMC Lab. No.2 and 6Measurement Room | |
| Report No. | 31CE0169-HO-02 | |
| Date | 02/15/2011 | 02/16/2011 |
| Temperature/ Humidity | 20 deg.C./ 30% | 21 deg.C./ 31% |
| Engineer | Takeshi Choda | Keisuke Kawamura |
| Mode | Tx (Hopping off) DH5/3DH5/Inquiry | |

| Mode | Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. [dB] | Result | | Limit | | Margin [dB] |
|---------|----------------|------------------|-----------------------|----------------|--------|------|-------|------|----------------|
| | | | | | [dBm] | [mW] | [dBm] | [mW] | |
| DH5 | 2402.0 | -10.94 | 0.27 | 10.08 | -0.59 | 0.87 | 20.97 | 125 | 21.56 |
| DH5 | 2441.0 | -11.50 | 0.27 | 10.08 | -1.15 | 0.77 | 20.97 | 125 | 22.12 |
| DH5 | 2480.0 | -11.13 | 0.27 | 10.08 | -0.78 | 0.84 | 20.97 | 125 | 21.75 |
| 3DH5 | 2402.0 | -10.43 | 0.27 | 10.08 | -0.08 | 0.98 | 20.97 | 125 | 21.05 |
| 3DH5 | 2441.0 | -11.22 | 0.27 | 10.08 | -0.87 | 0.82 | 20.97 | 125 | 21.84 |
| 3DH5 | 2480.0 | -10.71 | 0.27 | 10.08 | -0.36 | 0.92 | 20.97 | 125 | 21.33 |
| Inquiry | 2441.0 | -12.41 | 0.98 | 9.97 | -1.46 | 0.71 | 20.97 | 125 | 22.43 |

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.

Radiated Spurious Emission

Test place Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. 31CE0169-HO-02
Date 02/14/2011 02/15/2011 02/17/2011
Temperature/ Humidity 22 deg.C./ 31% 25 deg.C./ 29% 25 deg.C./ 31%
Engineer Takeshi Choda Takeshi Choda Takumi Shimada
Mode Tx, DH5 2402MHz (below 1GHz) (1-10GHz) (10-26.5GHz)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Hori | 128.000 | QP | 31.0 | 13.8 | 7.7 | 28.3 | 24.2 | 43.5 | 19.3 | |
| Hori | 256.000 | QP | 21.2 | 17.6 | 8.5 | 27.8 | 19.5 | 46.0 | 26.5 | |
| Hori | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Hori | 512.000 | QP | 22.0 | 18.2 | 9.7 | 28.9 | 21.0 | 46.0 | 25.0 | |
| Hori | 640.000 | QP | 22.1 | 19.8 | 10.2 | 28.6 | 23.5 | 46.0 | 22.5 | |
| Hori | 2390.000 | PK | 43.8 | 27.4 | 2.3 | 32.4 | 41.1 | 73.9 | 32.8 | |
| Hori | 2399.967 | PK | 58.5 | 27.4 | 2.3 | 32.4 | 55.8 | 73.9 | 18.1 | |
| Hori | 2400.000 | PK | 59.2 | 27.4 | 2.3 | 32.4 | 56.5 | 73.9 | 17.4 | |
| Hori | 4804.000 | PK | 42.0 | 31.3 | 4.8 | 31.4 | 46.7 | 73.9 | 27.2 | |
| Hori | 7206.000 | PK | 41.5 | 35.5 | 5.8 | 31.6 | 51.2 | 73.9 | 22.7 | |
| Hori | 9608.000 | PK | 40.7 | 38.4 | 6.7 | 31.9 | 53.9 | 73.9 | 20.0 | |
| Hori | 24020.000 | PK | 46.5 | 40.5 | -0.9 | 29.6 | 56.5 | 73.9 | 17.4 | |
| Hori | 2390.000 | AV | 31.6 | 27.4 | 2.3 | 32.4 | 28.9 | 53.9 | 25.0 | |
| Hori | 2399.967 | AV | 46.8 | 27.4 | 2.3 | 32.4 | 44.1 | 53.9 | 9.8 | |
| Hori | 2400.000 | AV | 48.7 | 27.4 | 2.3 | 32.4 | 46.0 | 53.9 | 7.9 | |
| Hori | 4804.000 | AV | 30.6 | 31.3 | 4.8 | 31.4 | 35.3 | 53.9 | 18.6 | |
| Hori | 7206.000 | AV | 29.5 | 35.5 | 5.8 | 31.6 | 39.2 | 53.9 | 14.7 | |
| Hori | 9608.000 | AV | 28.8 | 38.4 | 6.7 | 31.9 | 42.0 | 53.9 | 11.9 | |
| Hori | 24020.000 | AV | 34.4 | 40.5 | -0.9 | 29.6 | 44.4 | 53.9 | 9.5 | |
| Vert | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Vert | 128.000 | QP | 27.3 | 13.8 | 7.7 | 28.3 | 20.5 | 43.5 | 23.0 | |
| Vert | 256.000 | QP | 21.1 | 17.6 | 8.5 | 27.8 | 19.4 | 46.0 | 26.6 | |
| Vert | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Vert | 512.000 | QP | 22.0 | 18.2 | 9.7 | 28.9 | 21.0 | 46.0 | 25.0 | |
| Vert | 640.000 | QP | 22.2 | 19.8 | 10.2 | 28.6 | 23.6 | 46.0 | 22.4 | |
| Vert | 2390.000 | PK | 43.5 | 27.4 | 2.3 | 32.4 | 40.8 | 73.9 | 33.1 | |
| Vert | 2399.967 | PK | 58.3 | 27.4 | 2.3 | 32.4 | 55.6 | 73.9 | 18.3 | |
| Vert | 2400.000 | PK | 59.1 | 27.4 | 2.3 | 32.4 | 56.4 | 73.9 | 17.5 | |
| Vert | 4804.000 | PK | 41.7 | 31.3 | 3.4 | 31.4 | 45.0 | 73.9 | 28.9 | |
| Vert | 7206.000 | PK | 41.6 | 35.5 | 5.8 | 31.6 | 51.3 | 73.9 | 22.6 | |
| Vert | 9608.000 | PK | 41.0 | 38.4 | 6.7 | 31.9 | 54.2 | 73.9 | 19.7 | |
| Vert | 24020.000 | PK | 46.8 | 40.5 | -0.9 | 29.6 | 56.8 | 73.9 | 17.1 | |
| Vert | 2390.000 | AV | 31.4 | 27.4 | 2.3 | 32.4 | 28.7 | 53.9 | 25.2 | |
| Vert | 2399.967 | AV | 46.3 | 27.4 | 2.3 | 32.4 | 43.6 | 53.9 | 10.3 | |
| Vert | 2400.000 | AV | 48.1 | 27.4 | 2.3 | 32.4 | 45.4 | 53.9 | 8.5 | |
| Vert | 4804.000 | AV | 31.5 | 31.3 | 3.4 | 31.4 | 34.8 | 53.9 | 19.1 | |
| Vert | 7206.000 | AV | 29.7 | 35.5 | 5.8 | 31.6 | 39.4 | 53.9 | 14.5 | |
| Vert | 9608.000 | AV | 28.9 | 38.4 | 6.7 | 31.9 | 42.1 | 53.9 | 11.8 | |
| Vert | 24020.000 | AV | 34.5 | 40.5 | -0.9 | 29.6 | 44.5 | 53.9 | 9.4 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz $20\log(3.0m/1.0m) = 9.5dB$

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 31CE0169-HO-02
Date : 02/14/2011 02/15/2011 02/17/2011
Temperature/ Humidity : 22 deg.C./ 31% 25 deg.C./ 29% 25 deg.C./ 31%
Engineer : Takeshi Choda Takeshi Choda Takumi Shimada
Mode : (below 1GHz) (1-10GHz) (10-26.5GHz)
Tx, DH5 2441MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Hori | 128.000 | QP | 24.1 | 13.8 | 7.7 | 28.3 | 17.3 | 43.5 | 26.2 | |
| Hori | 256.000 | QP | 21.2 | 17.6 | 8.5 | 27.8 | 19.5 | 46.0 | 26.5 | |
| Hori | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Hori | 512.000 | QP | 22.0 | 18.2 | 9.7 | 28.9 | 21.0 | 46.0 | 25.0 | |
| Hori | 640.000 | QP | 22.2 | 19.8 | 10.2 | 28.6 | 23.6 | 46.0 | 22.4 | |
| Hori | 4882.000 | PK | 42.4 | 31.5 | 4.8 | 31.3 | 47.4 | 73.9 | 26.5 | |
| Hori | 7323.000 | PK | 42.2 | 35.7 | 5.9 | 31.6 | 52.2 | 73.9 | 21.7 | |
| Hori | 9764.000 | PK | 41.6 | 38.5 | 6.8 | 31.8 | 55.1 | 73.9 | 18.8 | |
| Hori | 24410.000 | PK | 45.4 | 40.4 | -1.0 | 29.5 | 55.3 | 73.9 | 18.6 | |
| Hori | 4882.000 | AV | 30.1 | 31.5 | 4.8 | 31.3 | 35.1 | 53.9 | 18.8 | |
| Hori | 7323.000 | AV | 29.7 | 35.7 | 5.9 | 31.6 | 39.7 | 53.9 | 14.2 | |
| Hori | 9764.000 | AV | 28.9 | 38.5 | 6.8 | 31.8 | 42.4 | 53.9 | 11.5 | |
| Hori | 24410.000 | AV | 33.1 | 40.4 | -1.0 | 29.5 | 43.0 | 53.9 | 10.9 | |
| Vert | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Vert | 128.000 | QP | 28.2 | 13.8 | 7.7 | 28.3 | 21.4 | 43.5 | 22.1 | |
| Vert | 256.000 | QP | 21.2 | 17.6 | 8.5 | 27.8 | 19.5 | 46.0 | 26.5 | |
| Vert | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Vert | 512.000 | QP | 22.0 | 18.2 | 9.7 | 28.9 | 21.0 | 46.0 | 25.0 | |
| Vert | 640.000 | QP | 22.2 | 19.8 | 10.2 | 28.6 | 23.6 | 46.0 | 22.4 | |
| Vert | 4882.000 | PK | 41.9 | 31.5 | 4.8 | 31.3 | 46.9 | 73.9 | 27.0 | |
| Vert | 7323.000 | PK | 41.8 | 35.7 | 5.9 | 31.6 | 51.8 | 73.9 | 22.1 | |
| Vert | 9764.000 | PK | 41.5 | 38.5 | 6.8 | 31.8 | 55.0 | 73.9 | 18.9 | |
| Vert | 24410.000 | PK | 45.0 | 40.4 | -1.0 | 29.5 | 54.9 | 73.9 | 19.0 | |
| Vert | 4882.000 | AV | 30.4 | 31.5 | 4.8 | 31.3 | 35.4 | 53.9 | 18.5 | |
| Vert | 7323.000 | AV | 29.7 | 35.7 | 5.9 | 31.6 | 39.7 | 53.9 | 14.2 | |
| Vert | 9764.000 | AV | 28.8 | 38.5 | 6.8 | 31.8 | 42.3 | 53.9 | 11.6 | |
| Vert | 24410.000 | AV | 33.2 | 40.4 | -1.0 | 29.5 | 43.1 | 53.9 | 10.8 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

Radiated Spurious Emission

Test place : Head Office EMC Lab. No.2 Semi Anechoic Chamber
Report No. : 31CE0169-HO-02
Date : 02/14/2011 02/15/2011 02/17/2011
Temperature/ Humidity : 22 deg.C./ 31% 25 deg.C./ 29% 25 deg.C./ 31%
Engineer : Takeshi Choda Takeshi Choda Takumi Shimada
Mode : (below 1GHz) (1-10GHz) (10-26.5GHz)
Tx, DH5 2480MHz

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|-----------------|----------------|-------------|--------|
| Hori | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Hori | 128.000 | QP | 28.1 | 13.8 | 7.7 | 28.3 | 21.3 | 43.5 | 22.2 | |
| Hori | 256.000 | QP | 21.2 | 17.6 | 8.5 | 27.8 | 19.5 | 46.0 | 26.5 | |
| Hori | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Hori | 512.000 | QP | 22.0 | 18.2 | 9.7 | 28.9 | 21.0 | 46.0 | 25.0 | |
| Hori | 640.000 | QP | 21.8 | 19.8 | 10.2 | 28.6 | 23.2 | 46.0 | 22.8 | |
| Hori | 2483.500 | PK | 47.4 | 27.6 | 2.3 | 32.4 | 44.9 | 73.9 | 29.0 | |
| Hori | 2484.267 | PK | 48.2 | 27.6 | 2.3 | 32.4 | 45.7 | 73.9 | 28.2 | |
| Hori | 4960.000 | PK | 42.4 | 31.7 | 4.8 | 31.3 | 47.6 | 73.9 | 26.3 | |
| Hori | 7440.000 | PK | 41.7 | 35.8 | 6.0 | 31.7 | 51.8 | 73.9 | 22.1 | |
| Hori | 9920.000 | PK | 41.9 | 38.7 | 7.0 | 31.8 | 55.8 | 73.9 | 18.1 | |
| Hori | 24800.000 | PK | 47.6 | 40.3 | -1.0 | 29.4 | 57.5 | 73.9 | 16.4 | |
| Hori | 2483.500 | AV | 35.9 | 27.6 | 2.3 | 32.4 | 33.4 | 53.9 | 20.5 | |
| Hori | 2484.267 | AV | 38.3 | 27.6 | 2.3 | 32.4 | 35.8 | 53.9 | 18.1 | |
| Hori | 4960.000 | AV | 31.2 | 31.7 | 4.8 | 31.3 | 36.4 | 53.9 | 17.5 | |
| Hori | 7440.000 | AV | 29.7 | 35.8 | 6.0 | 31.7 | 39.8 | 53.9 | 14.1 | |
| Hori | 9920.000 | AV | 29.7 | 38.7 | 7.0 | 31.8 | 43.6 | 53.9 | 10.3 | |
| Hori | 24800.000 | AV | 35.3 | 40.3 | -1.0 | 29.4 | 45.2 | 53.9 | 8.7 | |
| Vert | 64.000 | QP | 22.2 | 7.6 | 7.1 | 28.6 | 8.3 | 40.0 | 31.7 | |
| Vert | 128.000 | QP | 27.5 | 13.8 | 7.7 | 28.3 | 20.7 | 43.5 | 22.8 | |
| Vert | 256.000 | QP | 21.2 | 17.6 | 8.5 | 27.8 | 19.5 | 46.0 | 26.5 | |
| Vert | 384.000 | QP | 21.5 | 16.9 | 9.2 | 28.2 | 19.4 | 46.0 | 26.6 | |
| Vert | 512.000 | QP | 22.1 | 18.2 | 9.7 | 28.9 | 21.1 | 46.0 | 24.9 | |
| Vert | 640.000 | QP | 22.0 | 19.8 | 10.2 | 28.6 | 23.4 | 46.0 | 22.6 | |
| Vert | 2483.500 | PK | 48.1 | 27.6 | 2.3 | 32.4 | 45.6 | 73.9 | 28.3 | |
| Vert | 2484.267 | PK | 48.1 | 27.6 | 2.3 | 32.4 | 45.6 | 73.9 | 28.3 | |
| Vert | 4960.000 | PK | 42.3 | 31.7 | 4.8 | 31.3 | 47.5 | 73.9 | 26.4 | |
| Vert | 7440.000 | PK | 41.5 | 35.8 | 6.0 | 31.7 | 51.6 | 73.9 | 22.3 | |
| Vert | 9920.000 | PK | 41.4 | 38.7 | 7.0 | 31.8 | 55.3 | 73.9 | 18.6 | |
| Vert | 24800.000 | PK | 47.4 | 40.3 | -1.0 | 29.4 | 57.3 | 73.9 | 16.6 | |
| Vert | 2483.500 | AV | 35.8 | 27.6 | 2.3 | 32.4 | 33.3 | 53.9 | 20.6 | |
| Vert | 2484.267 | AV | 38.3 | 27.6 | 2.3 | 32.4 | 35.8 | 53.9 | 18.1 | |
| Vert | 4960.000 | AV | 31.7 | 31.7 | 4.8 | 31.3 | 36.9 | 53.9 | 17.0 | |
| Vert | 7440.000 | AV | 29.8 | 35.8 | 6.0 | 31.7 | 39.9 | 53.9 | 14.0 | |
| Vert | 9920.000 | AV | 29.8 | 38.7 | 7.0 | 31.8 | 43.7 | 53.9 | 10.2 | |
| Vert | 24800.000 | AV | 35.4 | 40.3 | -1.0 | 29.4 | 45.3 | 53.9 | 8.6 | |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

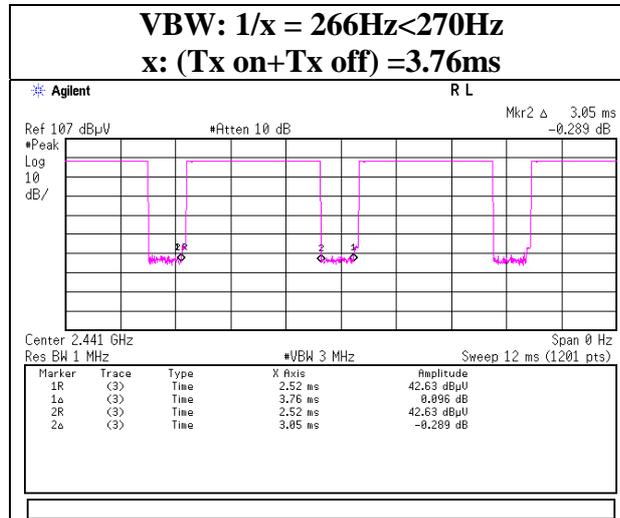
*The 10th harmonic was not seen so the result was its base noise level.

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB

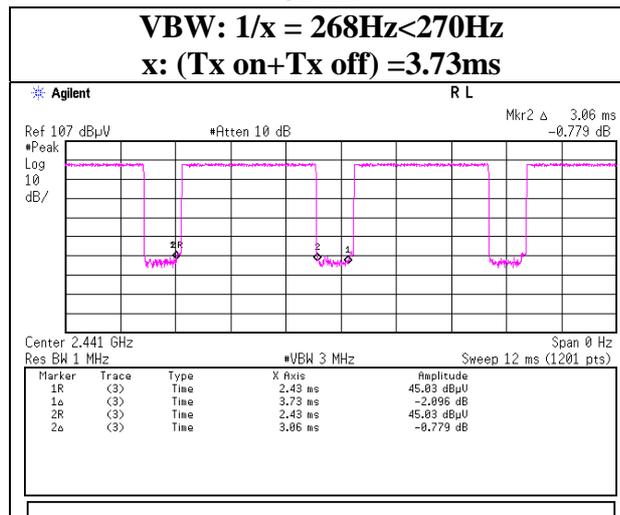
*For the band edge of the carrier and the harmonics that emission was found, the test was performed with VBW of the average detector set at 270Hz. For other average detectors, VBW was set at 10Hz.

VBW (AV) Calculation

DH5

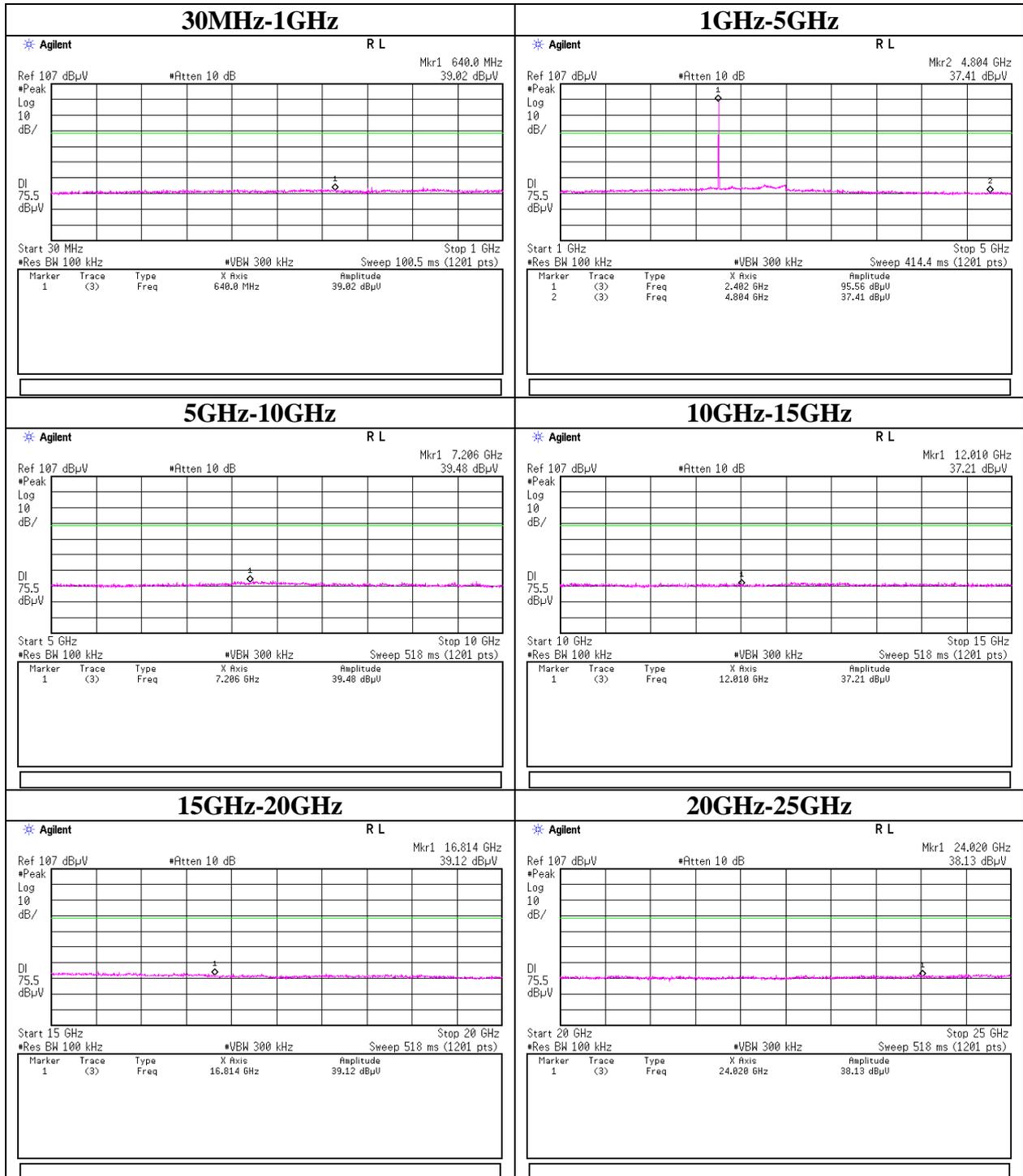


3DH5



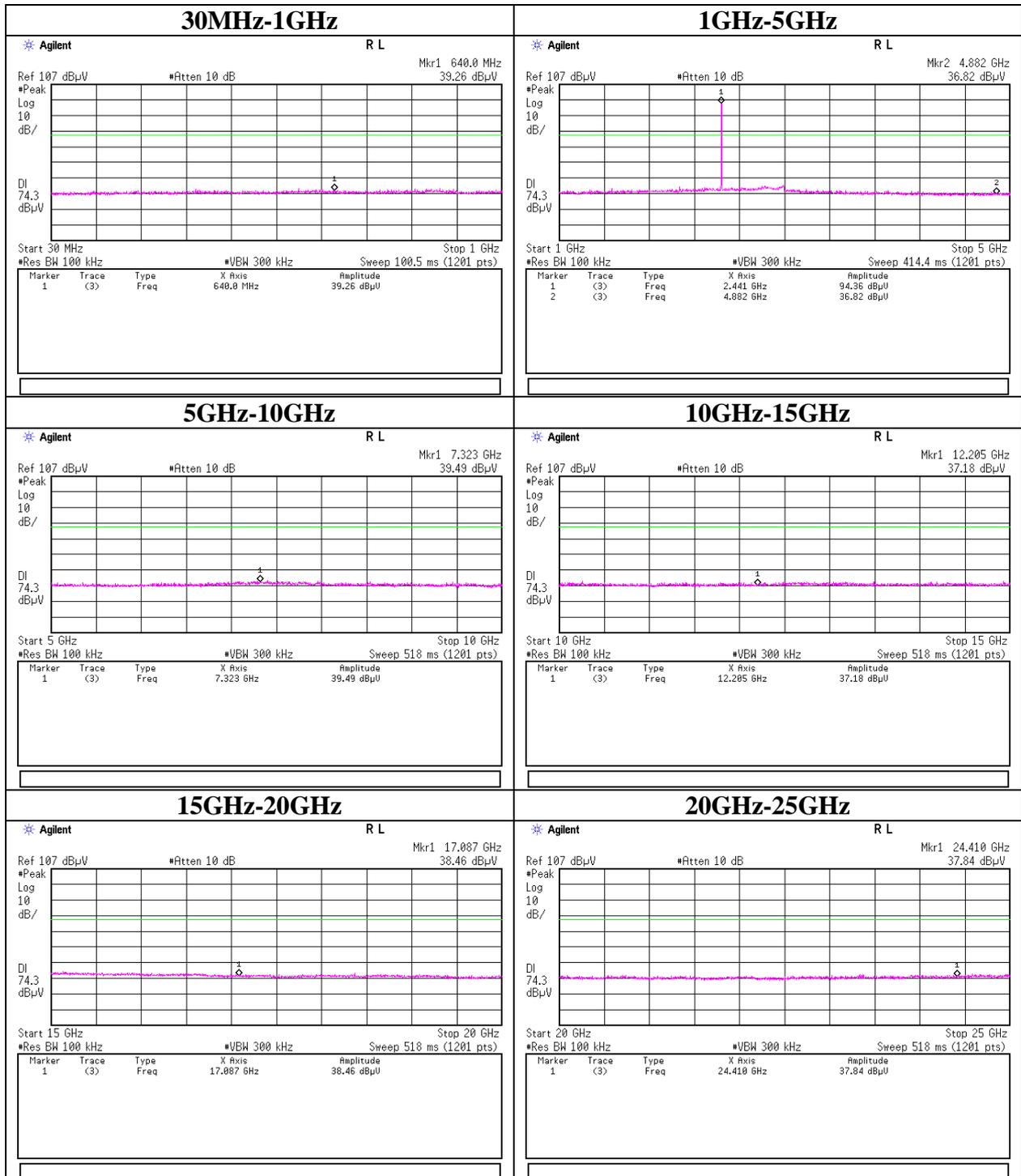
Conducted Spurious Emission

Tx DH5 2402MHz



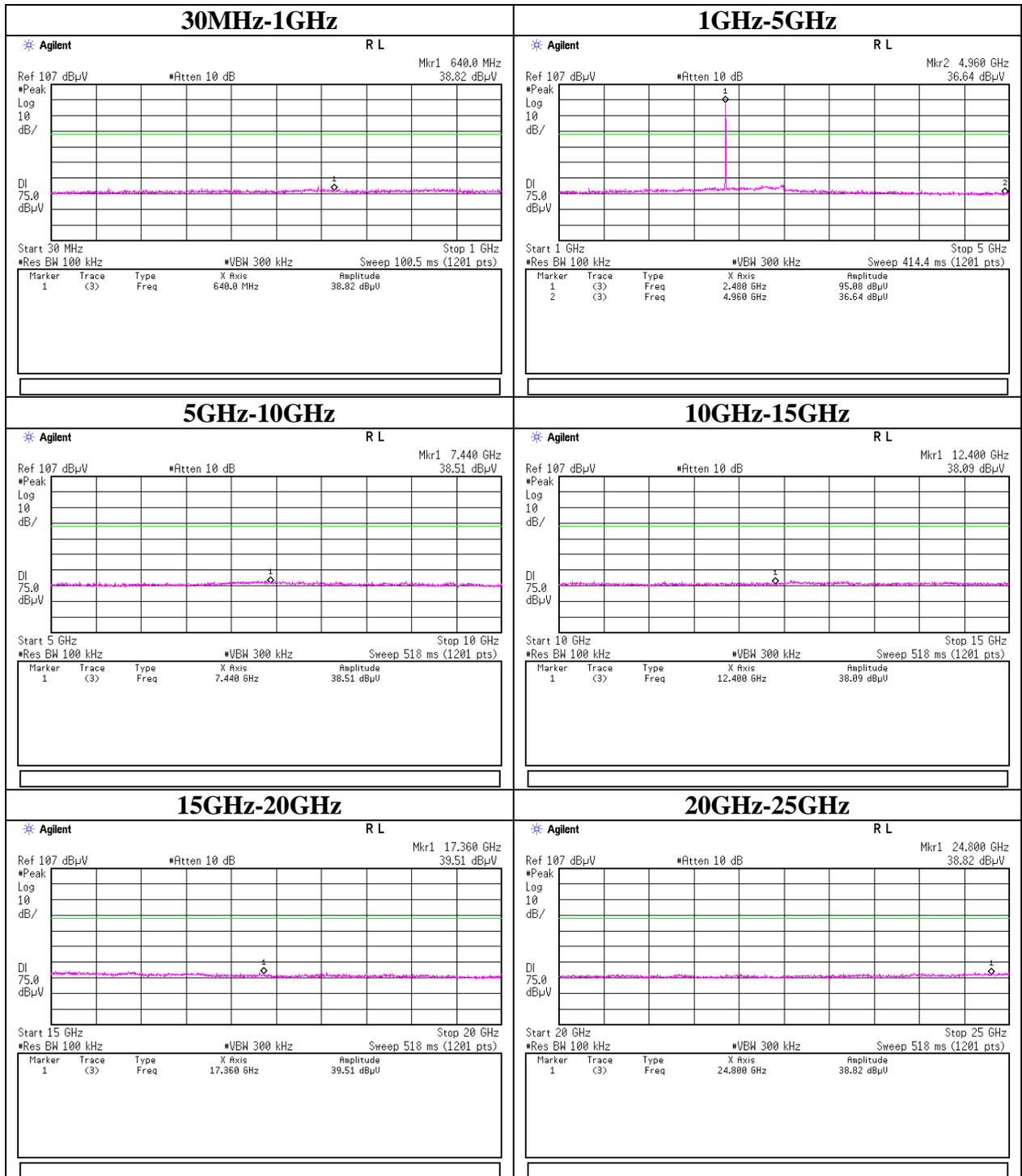
Conducted Spurious Emission

Tx DH5 2441MHz



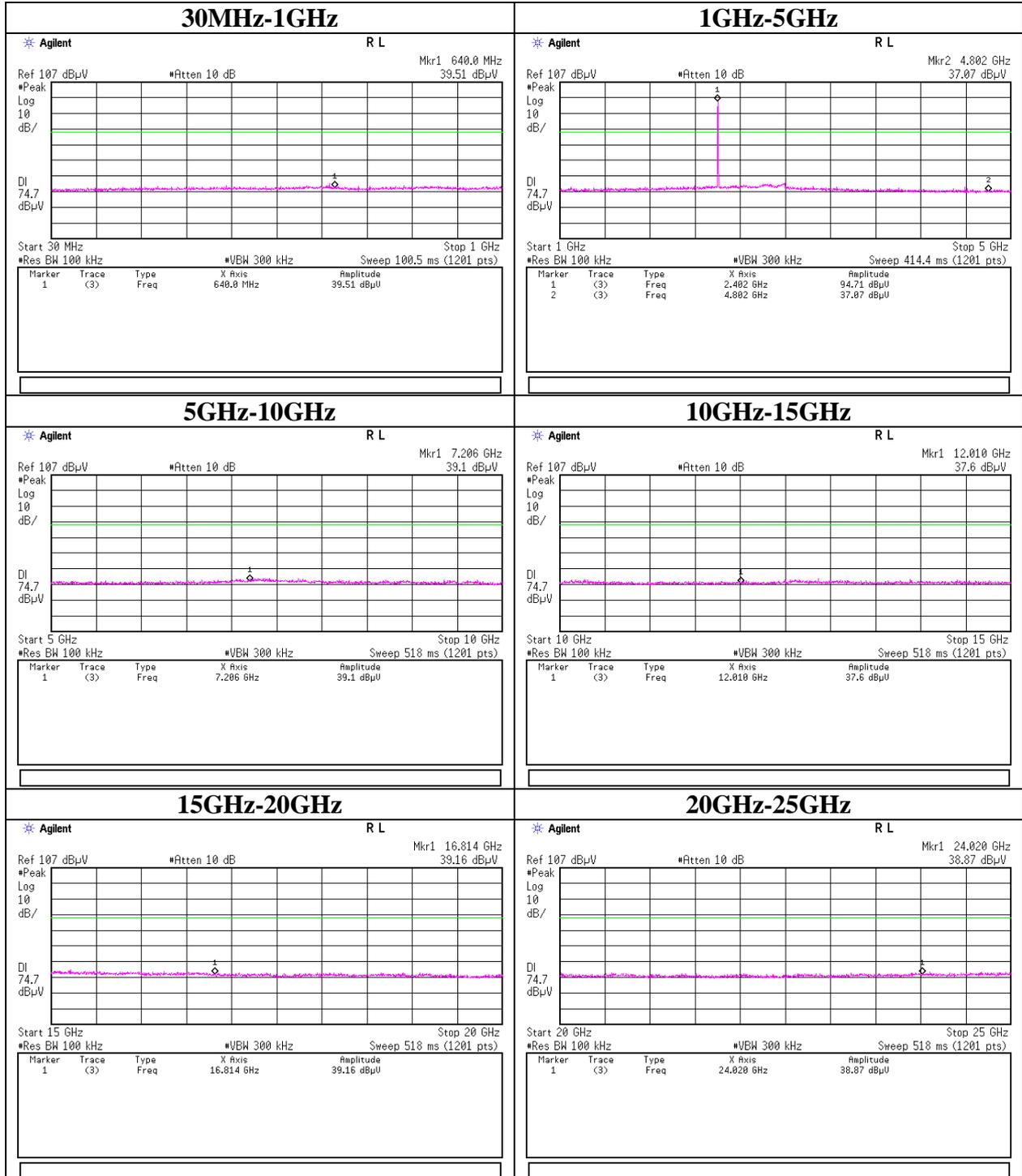
Conducted Spurious Emission

Tx DH5 2480MHz



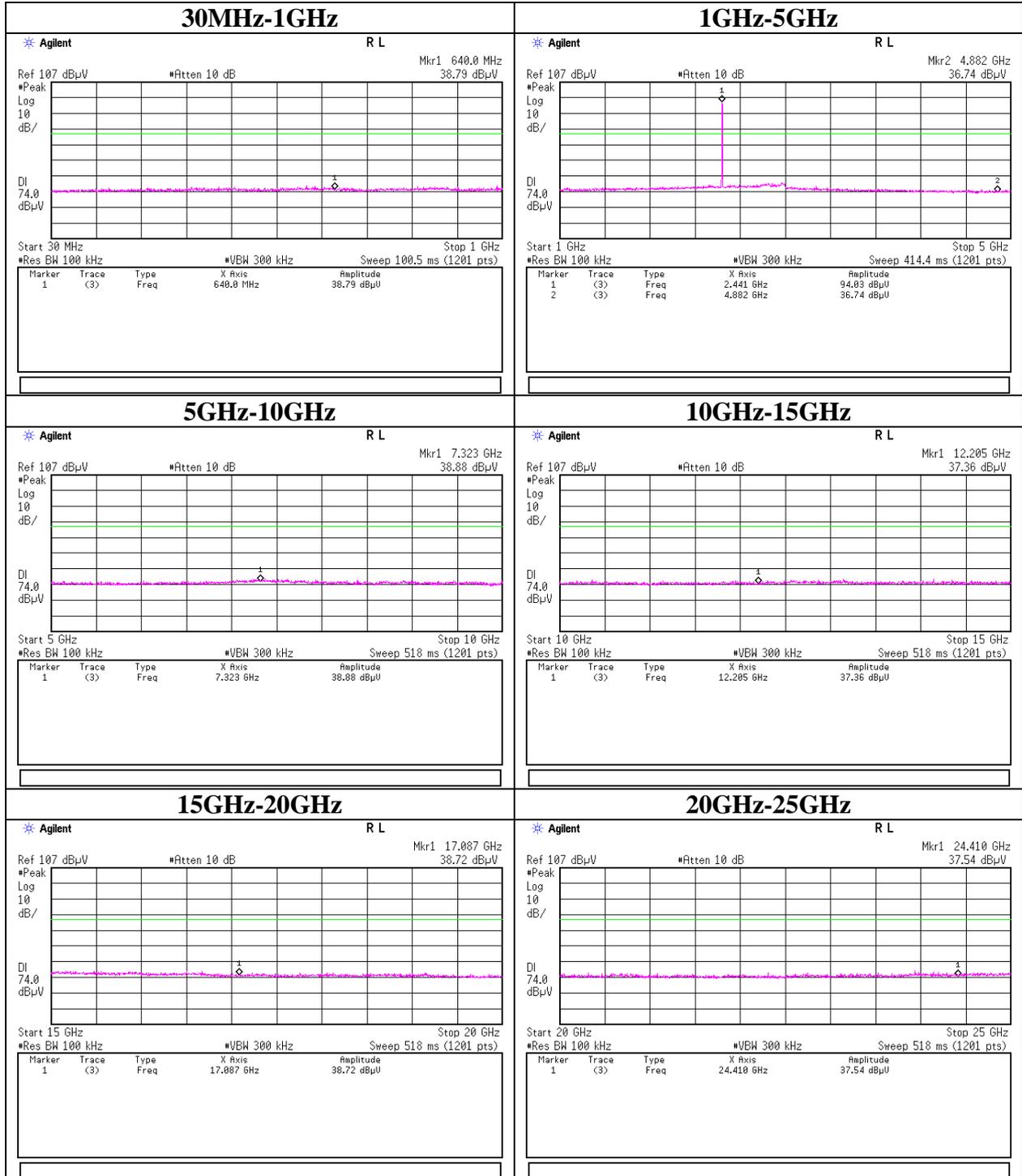
Conducted Spurious Emission

Tx 3DH5 2402MHz



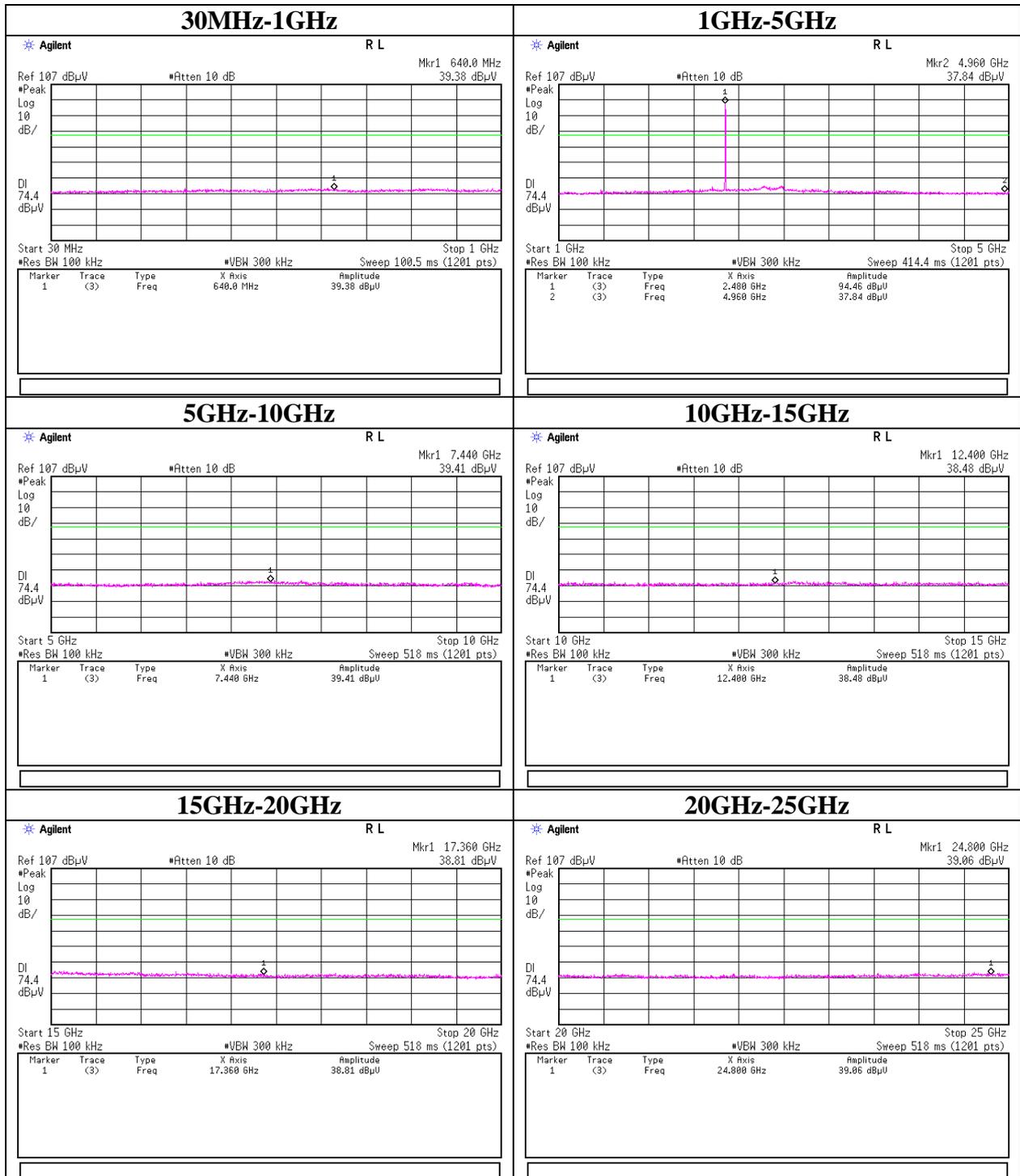
Conducted Spurious Emission

Tx 3DH5 2441MHz



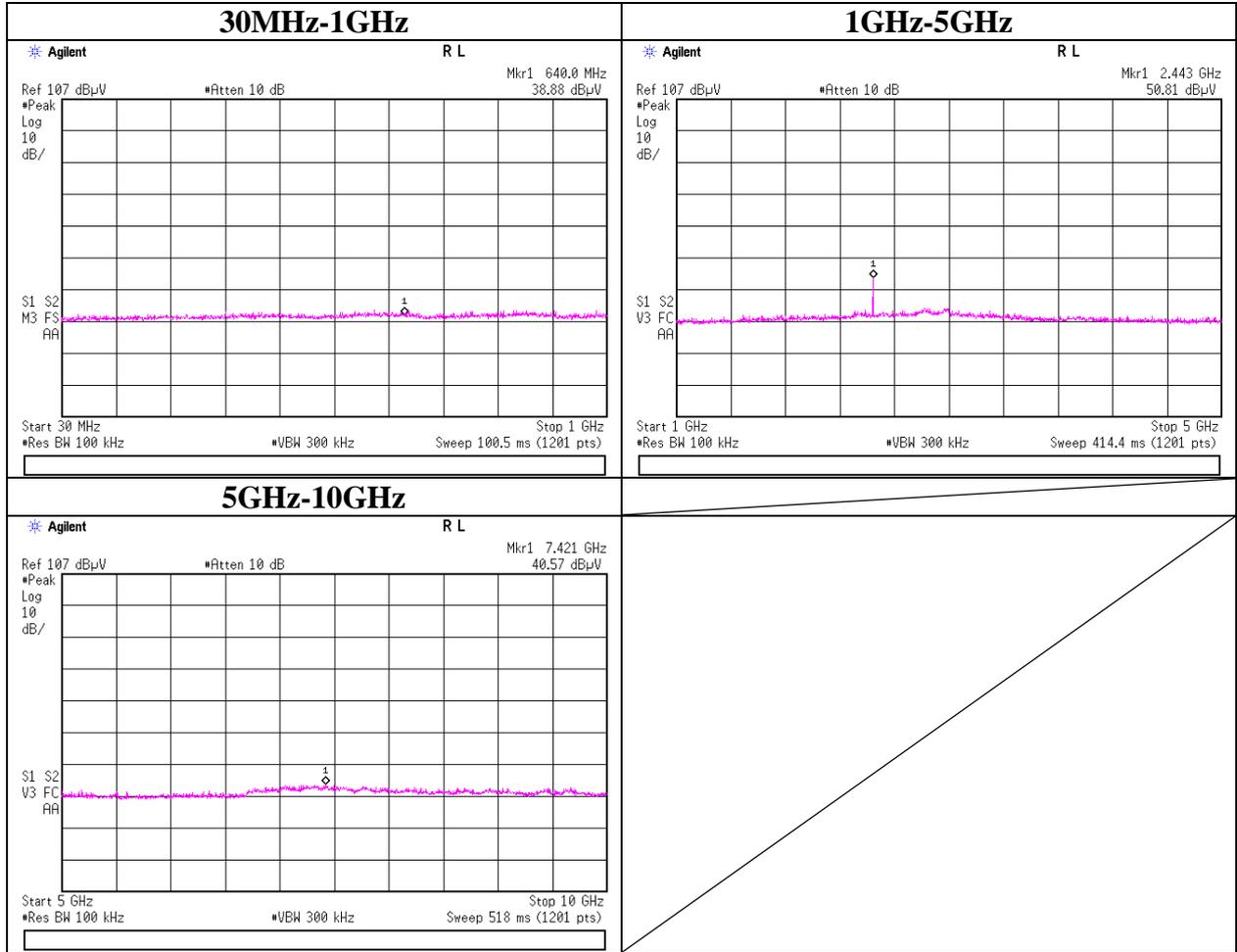
Conducted Spurious Emission

Tx 3DH5 2480MHz



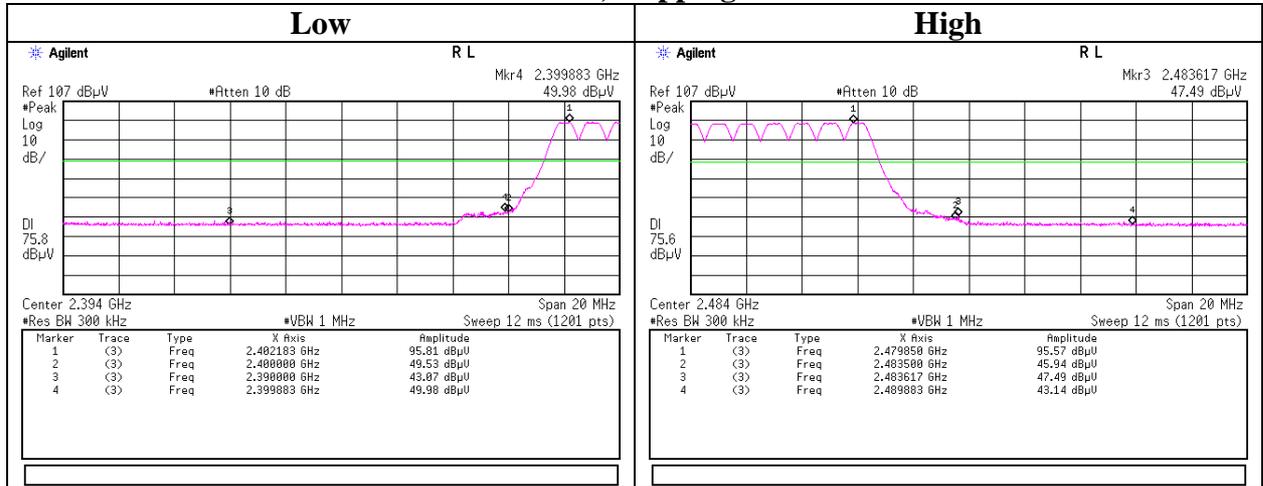
Conducted Spurious Emission

Rx 2441MHz

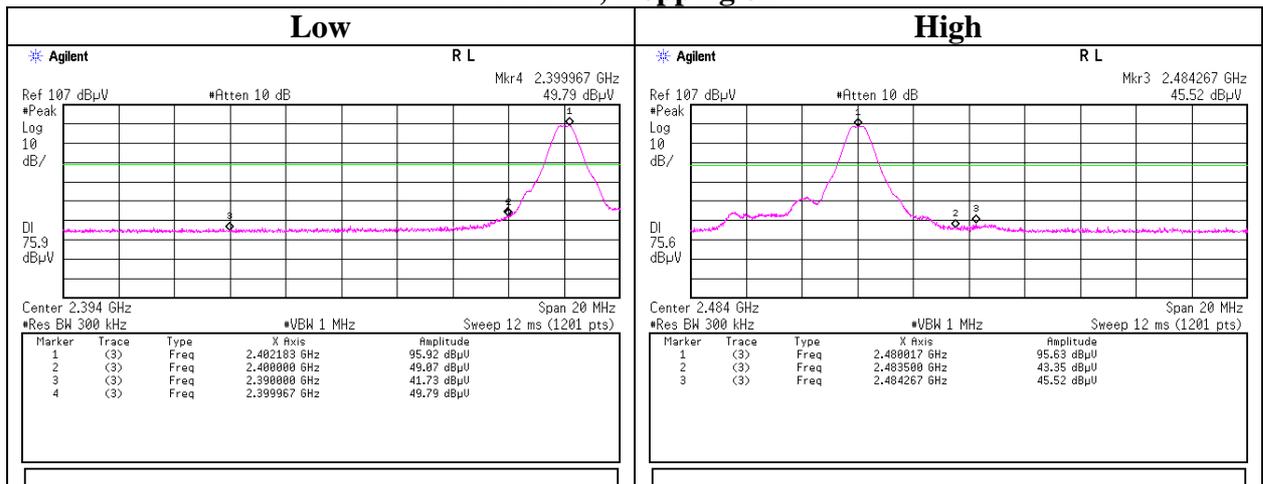


Conducted Emission Band Edge compliance

Tx DH5, Hopping on

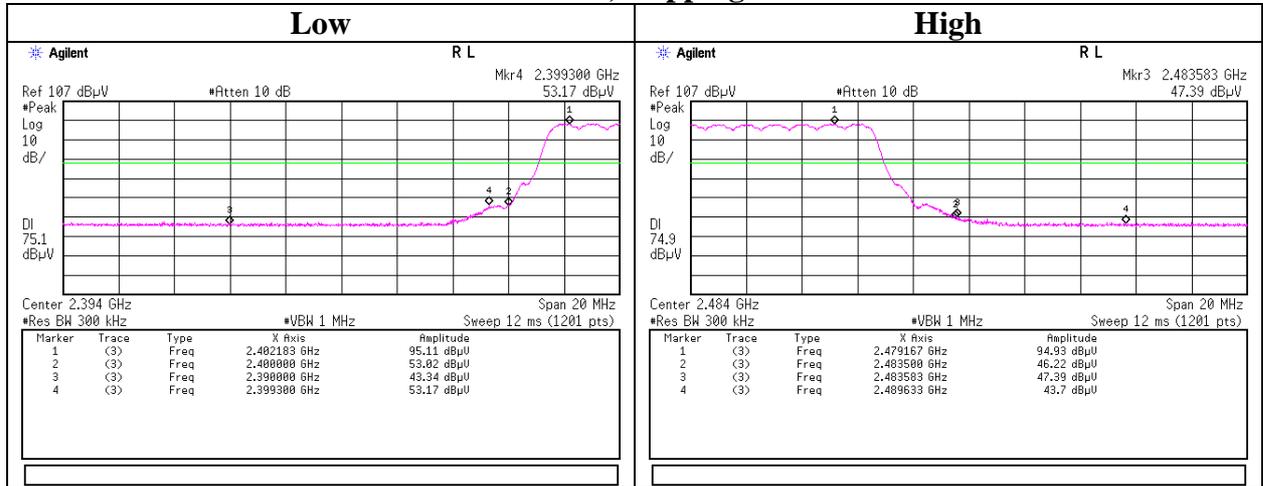


Tx DH5, Hopping off

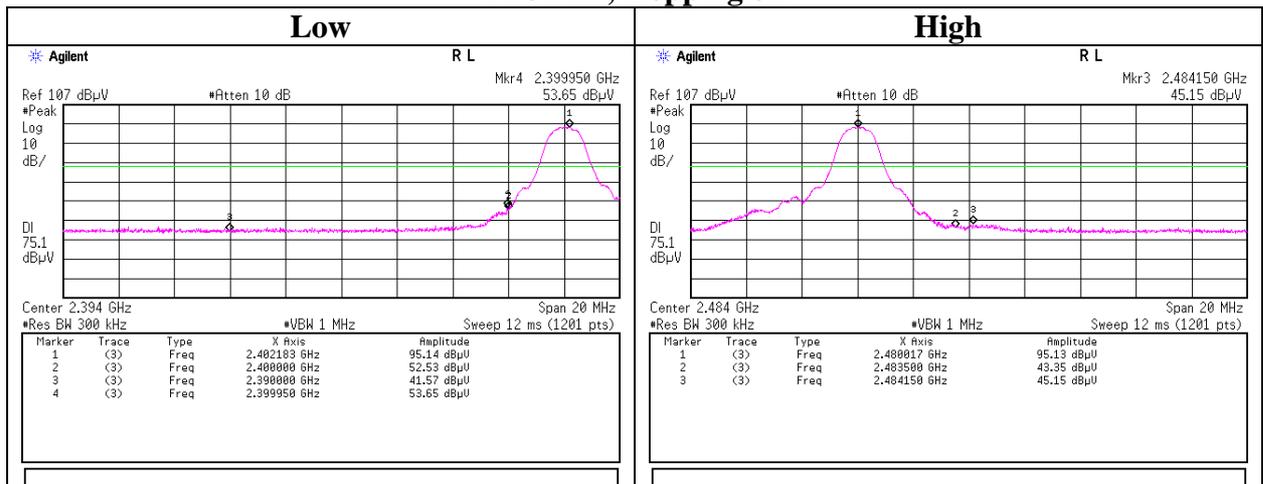


Conducted Emission Band Edge compliance

Tx 3DH5, Hopping on



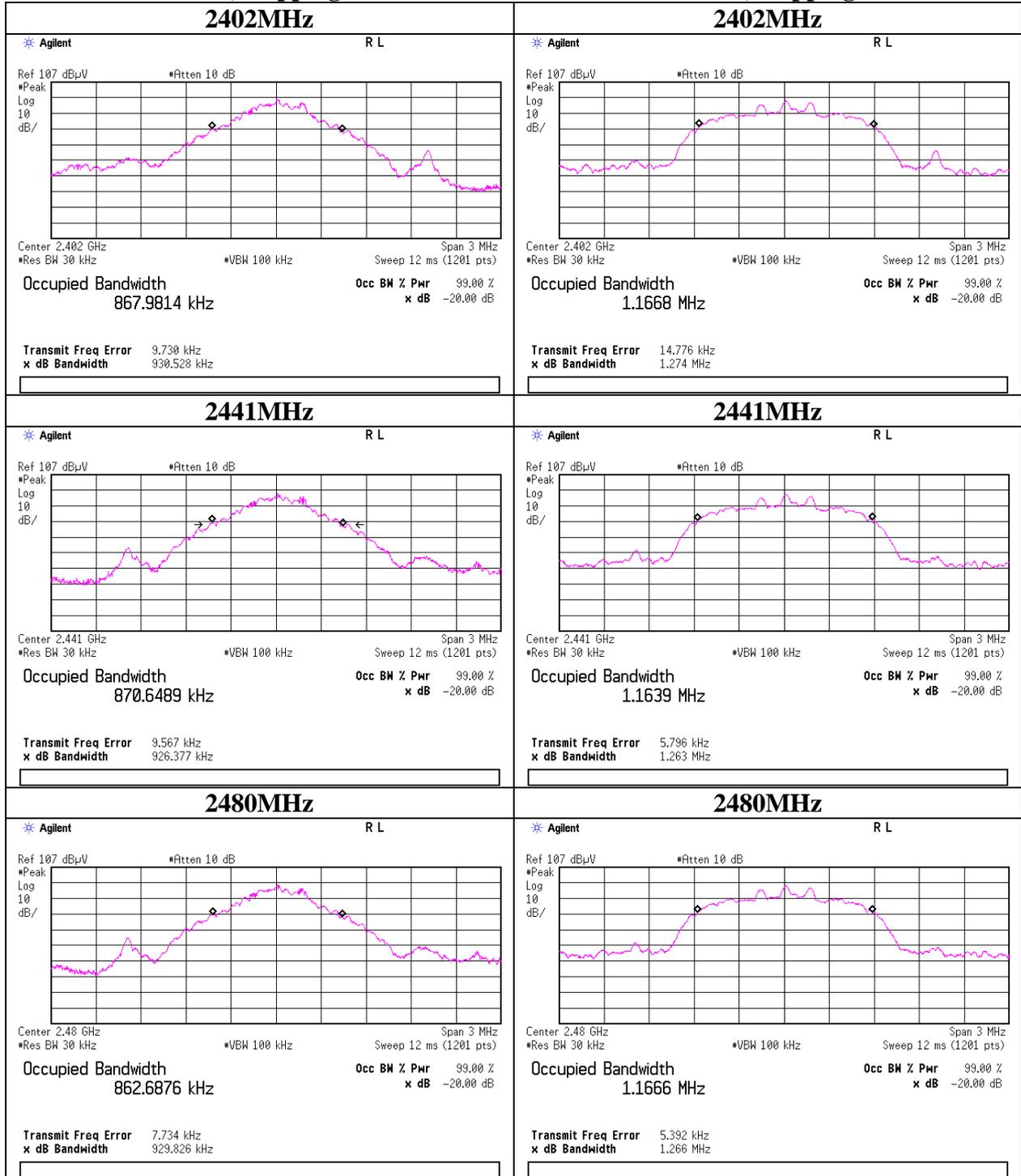
Tx 3DH5, Hopping off



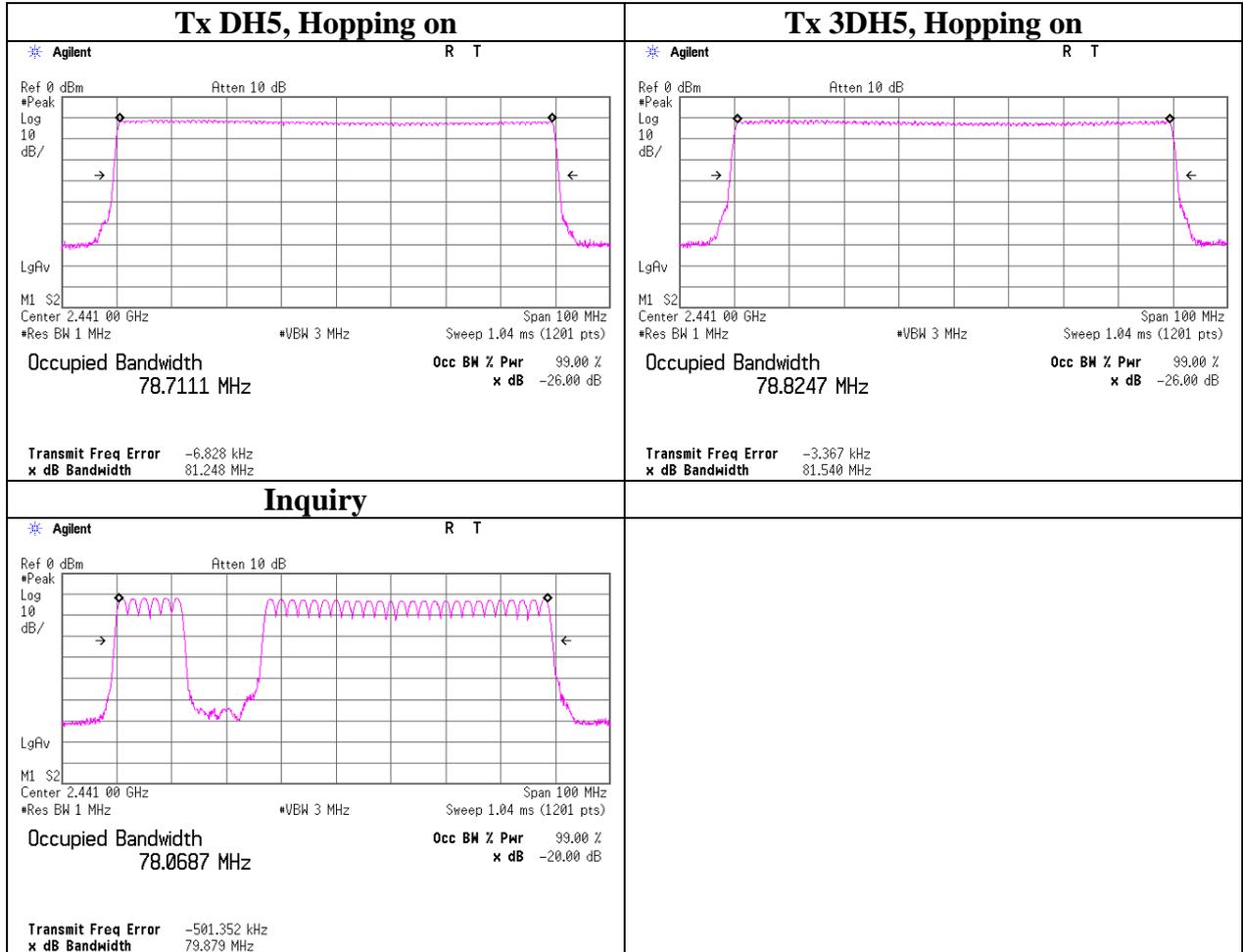
99% Occupied Bandwidth

Tx DH5, Hopping off

Tx 3DH5, Hopping off



99% Occupied Bandwidth



APPENDIX 3: Test instruments

EMI test equipment (1/2)

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|------------------------------|--------------------------|--------------------------|-----------------------------|-----------|---------------------------------------|
| MAEC-04 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-10005 | RE | 2010/02/02 * 12 |
| MOS-15 | Thermo-Hygrometer | Custom | CTH-180 | - | RE | 2010/02/09 * 12 |
| MJM-07 | Measure | PROMART | SEN1955 | - | RE | - |
| COTS-MEMI | EMI measurement program | TSJ | TEPTO-DV | - | RE | - |
| MSA-10 | Spectrum Analyzer | Agilent | E4448A | MY46180655 | RE/AT | 2010/02/03 * 12 |
| MHA-21 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 9120D-557 | RE | 2010/08/08 * 12 |
| MCC-57 | Microwave Cable | Suhner | SUCOFLEX104 | 267195/4(0.6m) / 292411(5m) | RE | 2010/11/26 * 12 |
| MPA-12 | MicroWave System Amplifier | Agilent | 83017A | MY39500780 | RE | 2010/03/16 * 12 |
| MCC-114 | Microwave Cable 1G-26.5GHz | Suhner | SUCOFLEX104 | 290212/4 | AT | 2010/08/05 * 12 |
| MAT-21 | Attenuator(20dB)(above 1GHz) | HIROSE ELECTRIC CO.,LTD. | AT-120 | 901247 | AT | 2011/01/06 * 12 |
| MAEC-02 | Semi Anechoic Chamber(NSA) | TDK | Semi Anechoic Chamber 3m | DA-06902 | RE/CE | 2010/09/01 * 12 |
| MOS-22 | Thermo-Hygrometer | Custom | CTH-201 | 0003 | RE/CE | 2010/02/09 * 12 |
| MJM-05 | Measure | PROMART | SEN1955 | - | RE/CE | - |
| MHA-06 | Horn Antenna 1-18GHz | Schwarzbeck | BBHA9120D | 254 | RE | 2011/01/16 * 12 |
| MPA-10 | Pre Amplifier | Agilent | 8449B | 3008A02142 | RE | 2010/09/30 * 12 |
| MHA-02 | Horn Antenna 18-26.5GHz | EMCO | 3160-09 | 1265 | RE | 2011/01/16 * 12 |
| MHF-06 | High Pass Filter 3.5-24GHz | TOKIMEC | TF323DCA | 601 | RE | 2010/05/19 * 12 |
| MSA-03 | Spectrum Analyzer | Agilent | E4448A | MY44020357 | RE | 2010/11/30 * 12 |
| MTR-03 | Test Receiver | Rohde & Schwarz | ESCI | 100300 | RE | 2010/04/19 * 12 |
| MBA-02 | Biconical Antenna | Schwarzbeck | BBA9106 | VHA91032008 | RE | 2010/10/11 * 12 |
| MLA-02 | Logperiodic Antenna | Schwarzbeck | USLP9143 | 201 | RE | 2010/10/11 * 12 |
| MCC-12 | Coaxial Cable | Fujikura/Agilent | - | - | RE | 2010/02/22 * 12 |
| MAT-07 | Attenuator(6dB) | Weinschel Corp | 2 | BK7970 | RE | 2010/11/05 * 12 |
| MPA-09 | Pre Amplifier | Agilent | 8447D | 2944A10845 | RE | 2010/09/09 * 12 |

EMI test equipment (2/2)

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|-------------|------------------------------|----------------------|--|------------|-----------|---------------------------------------|
| MLS-07 | LISN(AMN) | Schwarzbeck | NSLK8127 | 8127364 | CE(EUT) | 2010/02/05 * 12 |
| MCC-13 | Coaxial Cable | Fujikura | 3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m) | - | CE | 2010/02/22 * 12 |
| MAT-65 | Attenuator(13dB) | JFW Industries, Inc. | 50FP-013H2 N | - | CE | 2010/02/04 * 12 |
| MPM-08 | Power Meter | Anritsu | ML2495A | 6K00003338 | AT | 2010/09/10 * 12 |
| MPSE-11 | Power sensor | Anritsu | MA2411B | 011737 | AT | 2010/09/10 * 12 |
| MAT-24 | Attenuator(10dB)(above 1GHz) | Agilent | 8493C | 71389 | AT | 2010/06/14 * 12 |
| MOS-14 | Thermo-Hygrometer | Custom | CTH-201 | - | AT | 2010/05/19 * 12 |

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

**Test Item: CE: Conducted Emission
RE: Radiated Emission
AT: Antenna Terminal Conducted test**