

Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS-210

OF

Product Name: Bluetooth Headset

Brand Name: Plantronics

Model No.: M25, M55

Model Difference: Exterior difference

FCC ID: AL8-M25

IC: 457A-M25

Report No.: EF/2011/C0007

Issue Date: Jan. 10, 2012

Rule Part: §15.247, Cat: DSS

RSS-210 issue 8:2010, Annex 8

Plantronics, Inc.

Prepared for: 345 Encinal Street, Santa Cruz, CA 95060,

USA

SGS Taiwan Ltd.

Prepared by: Electronics & Communication Laboratory

No. 134, Wu Kung Rd., Wuku Industrial

Zone, Taipei County, Taiwan.





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CERTIFICATION OF COMPLIANCE

Applicant: Plantronics, Inc.

345 Encinal Street, Santa Cruz, CA 95060, USA

Product Name: Bluetooth Headset

Brand Name: Plantronics

FCC ID: AL8-M25

IC: 457A-M25

Model No.: M25, M55

Model Difference: Exterior difference

File Number: EF/2011/C0007

Date of test: Dec. 28, 2011 ~ Jan. 09, 2011

Date of EUT Received: Dec. 28, 2011

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and RSS-Gen. issue 3:2010, the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15C:2007, §15.247 and RSS-210 issue 8: 2010 Annex 8.

The test results of this report relate only to the tested sample identified in this report.

| Test By: | Lion Wang | Date: | Jan. 10, 2012 |
|--------------|----------------------------------|-------|---------------|
| Prepared By: | Lion Wang / Engineer Tiffany Kao | Date: | Jan. 10, 2012 |
| Approved By: | Jim Chang / Supervisor | Date: | Jan. 10, 2012 |

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GENERAL INFORMATION

1.1. Product Description

| Bluetooth I | Bluetooth Headset | | | | |
|---------------|--|--|--|--|--|
| Plantronics | Plantronics | | | | |
| M25, M55 | | | | | |
| Exterior dif | ference | | | | |
| v1.0 | v1.0 | | | | |
| BCM20745 | BCM20745A0_MP_001.001.048.0201.0202 | | | | |
| 3.7 Vdc re- | chargeable battery or 5Vdc by AC/DC power adapter | | | | |
| Battery: | Model No.: N/A, Supplier:N/A | | | | |
| Adapter | 1. Model No.: SSA-3W-05 050060F, Supplier: SIL 2. Model No.: SSA-5W-05 US 050018F, Supplier: SIL | | | | |
| | | | | | |
| □ V1.1 (GFSK) | | | | | |
| 1= | GFSK) | | | | |
| | Plantronics M25, M55 Exterior diff v1.0 BCM20745 3.7 Vdc re- Battery: Adapter V1.1 (| | | | |

| Diuctootii. | |
|---------------------|--|
| Bluetooth Version | V1.1 (GFSK) □ V1.2 (GFSK) □ V2.0 (GFSK) □ V2.1 (GFSK) □ V2.0 + EDR (GFSK + /4DQPSK + 8DPSK) □ V2.1 + EDR (GFSK + /4DQPSK + 8DPSK) □ V3.0 + EDR (GFSK + π/4DQPSK + 8DPSK) |
| Frequency Range | 2402 – 2480MHz |
| Channel number | 79 channels max. |
| Rated Power | 5.99 dBm (Peak) |
| Modulation type | Frequency Hopping Spread Spectrum |
| Antenna Designation | Monopole antenna, -1.4dBi. |

The EUT is compliance with Bluetooth V3.0 + EDR standard.

This test report applies for Bluetooth.

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID:** <u>AL8-M25</u> filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules. And **IC:** <u>457A-M25</u> filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

2.3. Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7, 13 of ANSI C63.4-2003 and RSS-Gen:2010.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 of ANSI C63.4-2003 and DA 00-705...

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2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Radiated Emission

EUT

Remote Side

Bluetooth Test Set

Table 2-1 Equipment Used in Tested System

| Item | Equipment | Mfr/Brand | Model/ Type No. | Series No. |
|------|--------------------|-----------|--------------------|------------|
| 1. | Bluetooth Test Set | Anritsu | MT8852B | 6k00006107 |

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3. SUMMARY OF TEST RESULTS

| Description Of Test | Result | |
|------------------------------------|---|--|
| A.C. Powar line Conducted Emission | Compliant | |
| AC Fower fine Conducted Emission | Compilant | |
| Paak Outnut Power | Compliant | |
| reak Output rower | Compilant | |
| 100 KHz Bandwidth Of | Compliant | |
| Frequency Band Edges | Compliant | |
| | | |
| TX/RX Spurious Emission | Compliant | |
| | | |
| Eraguanay Caparatian | Compliant | |
| rrequency Separation | Compilant | |
| Number of hopping frequency | Compliant | |
| Number of nopping frequency | Compilant | |
| Time of Occupancy | Compliant | |
| Time of Occupancy | Compilant | |
| Pagk Power Dancity | Compliant | |
| 2 | Compilant | |
| 20dB Bandwidth | | |
| | Compliant | |
| 77/01 OWEI Bandwidth | | |
| Antenna Requirement | Compliant | |
| 7 internia requirement | Compilant | |
| | Frequency Band Edges TX/RX Spurious Emission Frequency Separation Number of hopping frequency Time of Occupancy Peak Power Density | |

4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz) · mid (2441MHz) and high (2480MHz) with worst case EDR mode and DH5 highest data rate are chosen for full testing.

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5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.2, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

| Limits Frequency range dB(uV) | | | |
|-------------------------------|------------|----------|--|
| MHz | Quasi-peak | Average | |
| 0.15 to 0.50 | 66 to 56 | 56 to 46 | |
| 0.50 to 5 | 56 | 46 | |
| 5 to 30 | 60 | 50 | |

Note

- 1. The lower limit shall apply at the transition frequencies
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

5.2. Measurement Equipment Used:

| Conducted Emission Test Site | | | | | | |
|------------------------------|------------|-------------------------|------------|------------|------------|--|
| EQUIPMENT | MFR | MODEL | SERIAL | LAST | CAL DUE. | |
| TYPE | | NUMBER | NUMBER | CAL. | | |
| EMI Test Receiver | R&S | ESCS30 | 828985/004 | 09/23/2011 | 09/22/2012 | |
| LISN | Rolf-Heine | NNB-2/16Z | 99012 | 03/31/2011 | 03/30/2012 | |
| LISN | FCC | FCC-LISN-50/250-25-2-01 | 04034 | 03/31/2011 | 03/30/2012 | |
| Coaxial Cables | N/A | WK CE Cable | N/A | 01/05/2012 | 01/04/2013 | |

5.3. EUT Setup:

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
- 2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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5.4. Measurement Procedure:

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Note: Refer to next page for measurement data and plots.

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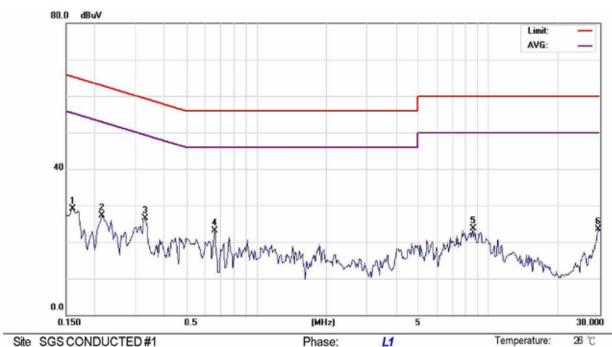
Humidity:

Air Pressure:

hpa

AC POWER LINE CONDUCTED EMISSION TEST DATA

| Operation Mode: | Normal mode | | | Test Date: | Jan. 04, 2012 |
|-----------------|-------------|-----------|------|------------|---------------|
| Temperature: | 23 | Humidity: | 58 % | Test By: | Lion |



Power:

Distance:

Site SGS CONDUCTED #1

Limit: CISPR22/11/EN55022 Class B (QP)

23.56

23.14

0.17

0.32

EUT: Bluetooth Headset

Freq.

MHz

0.1600

0.2150

0.3300

0.6600

8.6000

29.9800

M/N: M25

No. Mk.

1

2

3

4 5

6

Note: BT LINK Mode

| Reading Level | Factor | Measure- ment | Limit | Over | | | |
|------------------|--------|------------------|-------|--------|----------|---------|--|
| dBuV | dВ | dBuV | dBuV | dВ | Detector | Comment | |
| 29.07 | 0.11 | 29.18 | 65.46 | -36.28 | peak | | |
| 27.21 | 0.09 | 27.30 | 63.01 | -35.71 | peak | | |
| 26.47 | 0.08 | 26.55 | 59.45 | -32.90 | peak | | |
| 23.01 | 0.08 | 23.09 | 56.00 | -32.91 | peak | | |

peak

peak

AC 120V/60Hz

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23.73

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-36.27

-36.54

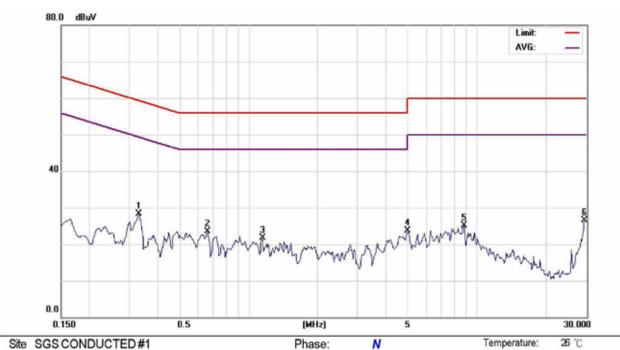


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Humidity:

Air Pressure:



Power:

Distance:

Site SGS CONDUCTED#1

Limit: CISPR22/11/EN55022 Class B (QP)

EUT: Bluetooth Headset

M/N: M25/M55 Note: BTLINK Mode

| No. | Mk. | Freq. | Reading Level | Factor | Measure- ment | Limit | Over | | | |
|-----|-----|---------|------------------|--------|------------------|-------|--------|----------|---------|--|
| | | MHz | dBuV | dΒ | dBuV | dBuV | dВ | Detector | Comment | |
| 1 | * | 0.3300 | 28.15 | 0.12 | 28.27 | 59.45 | -31.18 | peak | | |
| 2 | | 0.6600 | 23.32 | 0.12 | 23.44 | 56.00 | -32.56 | peak | | |
| 3 | | 1.1500 | 21.60 | 0.12 | 21.72 | 56.00 | -34.28 | peak | | |
| 4 | | 4.9900 | 23.52 | 0.16 | 23.68 | 56.00 | -32.32 | peak | | |
| 5 | | 8.7800 | 24.81 | 0.20 | 25.01 | 60.00 | -34.99 | peak | | |
| 6 | | 29.7600 | 26.04 | 0.40 | 26.44 | 60.00 | -33.56 | peak | | |

AC 120V/60Hz

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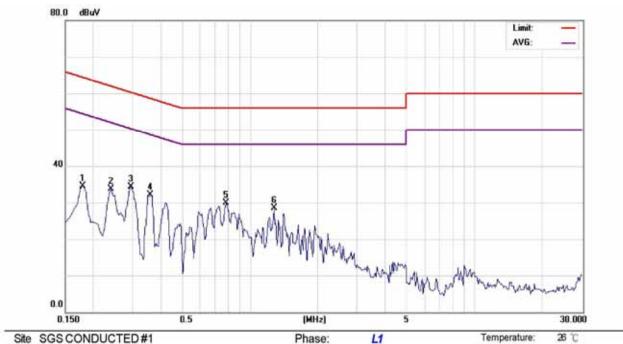
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Humidity:

Air Pressure:

AC POWER LINE CONDUCTED EMISSION TEST DATA

| Operation Mode: | Normal mode | | | Test Date: | Jan. 10, 2012 |
|-----------------|-------------|-----------|------|------------|---------------|
| Temperature: | 23 | Humidity: | 58 % | Test By: | Lion |



Power:

Distance:

Site SGS CONDUCTED#1

Limit: FCC Class B Conduction(QP)

EUT: Bluetooth Headset

M/N: M25M55

Note: BT LINK (New Adapter)

| No. Mk. | Freq. | Reading Level | Factor | Measure- ment | Limit | Over | | |
|---------|--------|------------------|--------|------------------|-------|--------|----------|---------|
| | MHz | dBuV | dВ | dBuV | dBuV | dΒ | Detector | Comment |
| 1 | 0.1800 | 34.44 | 0.10 | 34.54 | 64.49 | -29.95 | peak | |
| 2 | 0.2400 | 33.52 | 0.09 | 33.61 | 62.10 | -28.49 | peak | |
| 3 | 0.2950 | 34.22 | 0.09 | 34.31 | 60.38 | -26.07 | peak | |
| 4 | 0.3600 | 32.10 | 80.0 | 32.18 | 58.73 | -26.55 | peak | |
| 5 * | 0.7800 | 29.92 | 80.0 | 30.00 | 56.00 | -26.00 | peak | |
| 6 | 1.2800 | 28.34 | 80.0 | 28.42 | 56.00 | -27.58 | peak | |

AC 120V/60Hz

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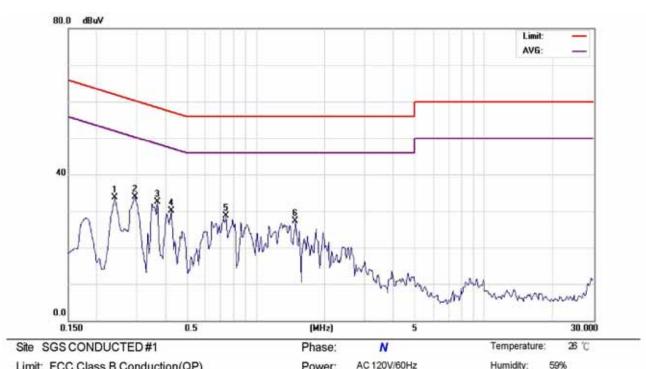
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Air Pressure:



Limit: FCC Class B Conduction(QP)

EUT: Bluetooth Headset

M/N: M25M55

Note: BT LINK (New Adapter)

| No. Mk. | Freq. | Reading Level | Factor | Measure- ment | Limit | Over | | |
|---------|--------|------------------|--------|------------------|-------|--------|----------|---------|
| | MHz | dBuV | dΒ | dBuV | dBuV | dВ | Detector | Comment |
| 1 | 0.2400 | 33.54 | 0.13 | 33.67 | 62.10 | -28.43 | peak | |
| 2 | 0.2950 | 33.80 | 0.13 | 33.93 | 60.38 | -26.45 | peak | |
| 3 * | 0.3700 | 32.48 | 0.12 | 32.60 | 58.50 | -25.90 | peak | |
| 4 | 0.4250 | 29.94 | 0.12 | 30.06 | 57.35 | -27.29 | peak | |
| 5 | 0.7400 | 28.58 | 0.12 | 28.70 | 56.00 | -27.30 | peak | |
| 6 | 1.4900 | 27.12 | 0.13 | 27.25 | 56.00 | -28.75 | peak | |

Power:

Distance:

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6. PEAK OUTPUT POWER MEASUREMENT

6.1. Standard Applicable:

According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

According to RSS-210 issue 8,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

6.2. Measurement Equipment Used:

| 1 1 1 2 as ar ement Eq | . Weusurement Equipment escu. | | | | | | | | | |
|------------------------|-------------------------------|--------------------|-------------|------------|------------|--|--|--|--|--|
| | Conducted Emission Test Site | | | | | | | | | |
| EQUIPMENT | MFR | MODEL | SERIAL LAST | | CAL DUE. | | | | | |
| TYPE | | NUMBER | NUMBER | CAL. | | | | | | |
| Spectrum Analyzer | Agilent | E4446A | MY43360126 | 04/19/2010 | 04/18/2012 | | | | | |
| Spectrum Analyzer | Agilent | E4440A | MY45304525 | 01/25/2011 | 01/24/2012 | | | | | |
| DC Block | Agilent | BLK-18 | 155452 | 07/05/2012 | 07/04/2013 | | | | | |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA | N/A | 01/05/2012 | 01/04/2013 | | | | | |
| Attenuator | Mini-Circuit | BW-S6W5 | 001 | 01/05/2012 | 01/04/2013 | | | | | |
| Attenuator | Mini-Circuit | BW-S10W5 | 001 | 01/05/2012 | 01/04/2013 | | | | | |
| Attenuator | Mini-Circuit | BW-S20W5 | 001 | 01/05/2012 | 01/04/2013 | | | | | |
| Splitter | Agilent | 11636B | N/A | 01/05/2012 | 01/04/2013 | | | | | |

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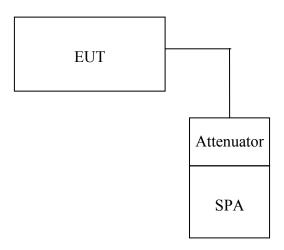
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6.3. .Test Set-up:



6.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Max peak function, RBW> 20dB bandwidth, VBW>RBW)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

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6.5. Measurement Result:

BDR mode:

| Frequency (MHz) | Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------------|--------------------|------------------|--------------|
| 2402.00 | 2.91 | 2.91 | 0.00195 | 1 |
| 2441.00 | 3.31 | 3.31 | 0.00214 | 1 |
| 2480.00 | 3.63 | 3.63 | 0.00231 | 1 |

EDR mode:

| Frequency (MHz) | Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------------|--------------------|------------------|--------------|
| 2402.00 | 5.16 | 5.16 | 0.00328 | 1 |
| 2441.00 | 5.77 | 5.77 | 0.00378 | 1 |
| 2480.00 | 5.99 | 5.99 | 0.00397 | 1 |

*Note: offset 16dB

Refer to next page for plots.

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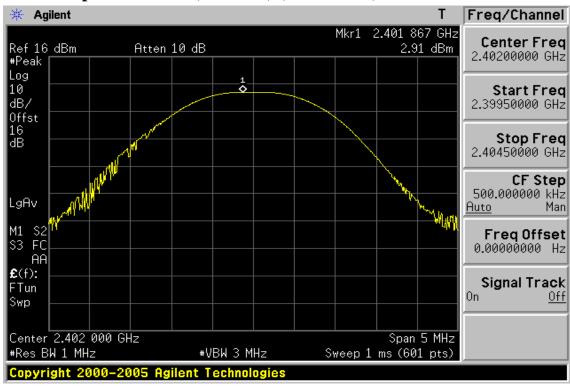
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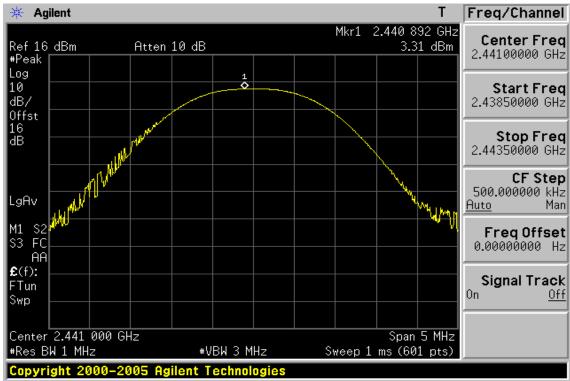
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Peak Power Output Data Plot (CH Low) (BDR mode)



Peak Power Output Data Plot (CH Mid) (BDR mode)



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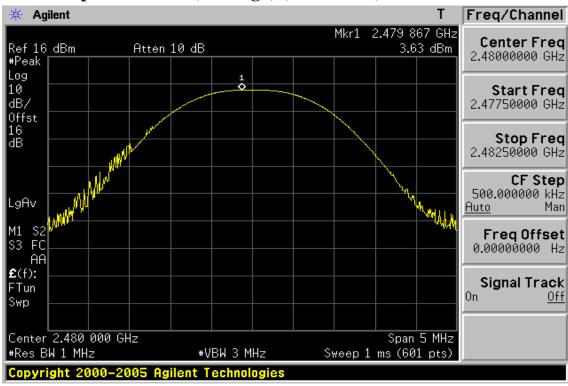
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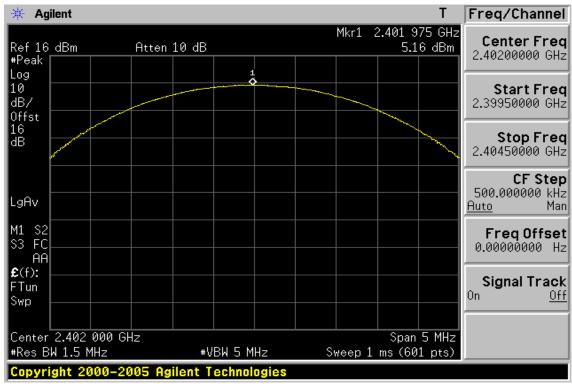
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Peak Power Output Data Plot (CH High) (BDR mode)



Peak Power Output Data Plot (CH Low) (EDR mode)



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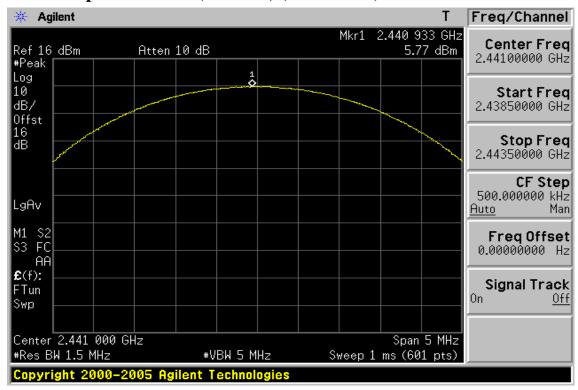
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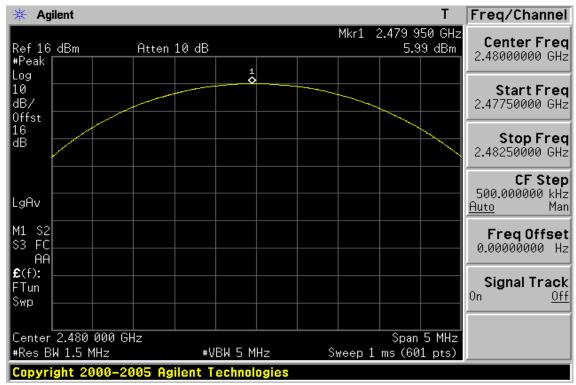
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Peak Power Output Data Plot (CH Mid) (EDR mode)



Peak Power Output Data Plot (CH High) (EDR mode)



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7. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

7.1. Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

According to RSS-210 issue 8,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

7.2. Measurement Equipment Used:

7.2.1. Conducted Emission at antenna port:

| Conducted Emission Test Site | | | | | | | | | |
|------------------------------|-------------------------|---------------------|------------|------------|------------|--|--|--|--|
| EQUIPMENT | MFR | MODEL | SERIAL | LAST | CAL DUE. | | | | |
| TYPE | | NUMBER | NUMBER | CAL. | | | | | |
| Spectrum Analyzer | Agilent | E4446A | MY43360126 | 04/19/2010 | 04/18/2012 | | | | |
| Spectrum Analyzer | Agilent | E4440A | MY45304525 | 01/25/2011 | 01/24/2012 | | | | |
| Spectrum Analyzer | R&S | FSP 40 | 100034 | 03/30/2011 | 03/29/2012 | | | | |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA | N/A | 01/05/2012 | 01/04/2013 | | | | |
| Attenuator | Attenuator Mini-Circuit | | N/A | 01/05/2012 | 01/04/2013 | | | | |
| Software | Audix | Ver 6.2009 – 23B | N/A | N/A | N/A | | | | |

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7.2.2. Radiated emission:

| | 90 | 66 Chamber | | | |
|-------------------|--------------|------------------------|------------|------------|------------|
| EQUIPMENT | MFR | MODEL | SERIAL | LAST | CAL DUE. |
| TYPE | | NUMBER | NUMBER | CAL. | |
| Spectrum Analyzer | R&S | FSP 40 | 100034 | 03/30/2011 | 03/29/2012 |
| Bilog Antenna | SCHWAZBECK | VULB9160 | 3136 | 11/19/2011 | 11/18/2013 |
| Horn antenna | ETS.LINDGREN | 3117 | 123995 | 03/19/2011 | 03/18/2013 |
| Pre-Amplifier | Agilent | 8447D | 1937A02834 | 11/28/2011 | 11/27/2013 |
| Pre-Amplifier | Agilent | 8449B | 3008A01973 | 01/05/2012 | 01/04/2013 |
| Turn Table | HD | DT420 | N/A | N.C.R | N.C.R |
| Antenna Tower | HD | MA240-N | 240/657 | N.C.R | N.C.R |
| Controller | HD | HD100 | N/A | N.C.R | N.C.R |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA-10M | 10m | 01/05/2012 | 01/04/2013 |
| Low Loss Cable | HUBER+SUHNER | SUCOFLEX 104PEA-3M | 3m | 01/05/2012 | 01/04/2013 |
| 3m Site | SGS | 966 chamber | N/A | 07/15/2011 | 07/14/2012 |

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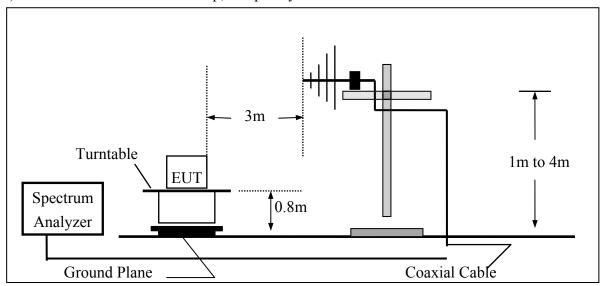
7.3. Test SET-UP:

7.3.1. Conducted Emission at antenna port:

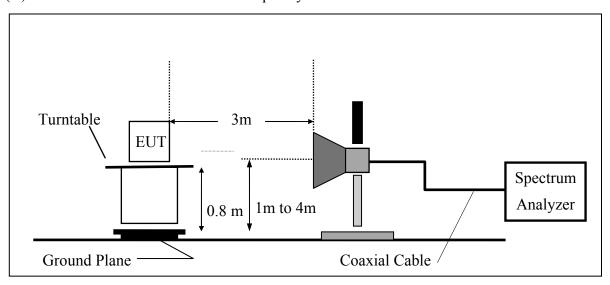
Refer to section 6.3 for details.

7.3.2. Radiated emission:

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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7.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
- 5. Mark Peak, 2.390GHz and 2.4835GHz and record the max. level.
- 6. Repeat above procedures until all frequency measured were complete.

7.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| Where | FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
|-------|------------------------|--|
| | RA = Reading Amplitude | AG = Amplifier Gain |
| | AF = Antenna Factor | |

7.6. Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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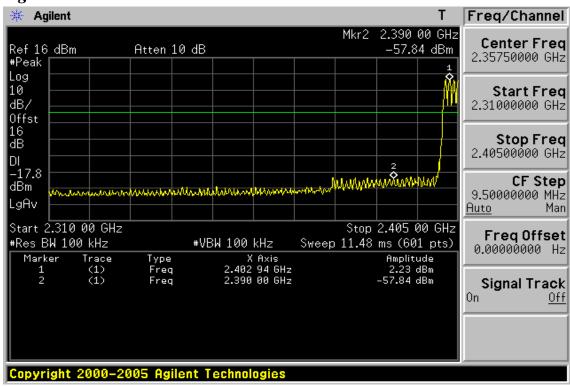
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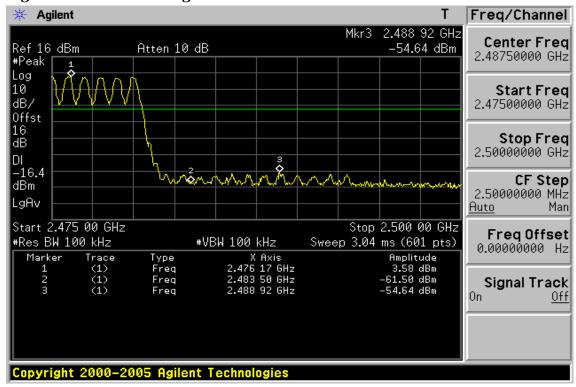
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BDR Mode (GFSK) Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Radiated Emission: (BDR mode) (GFSK)

Operation Band :BDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :Bandedge Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---|---------|--------------------------------------|---------------|-------------------------------------|---------------|-------------|-----------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2390.00 | E | Average | 32.57 | 6.15 | 38.72 | 54.00 | -15.28 |
| 2390.00 | E | Peak | 44.44 | 6.15 | 50.59 | 74.00 | -23.41 |
| Operation Band Fundamental Frequency Operation Mode EUT Pol. | | :BDR :2402 MHz :Bandedge :H | | Test Date Temp./Humi Engineer | | :Lion | C / 66 RH |
| 201101. | | | | Measuremen | t Antenna Pol | | J., |

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2390.00 | E | Average | 32.78 | 6.77 | 39.55 | 54.00 | -14.45 |
| 2390.00 | E | Peak | 43.41 | 6.77 | 50.18 | 74.00 | -23.82 |

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Radiated Emission:

Operation Band :BDR Test Date :2012-01-04 Fundamental Frequency :2480 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :Bandedge Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---|-----------|--------------------------------------|---------------|-------------------------------|---------------|-------------|-----------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2483.50 | E | Average | 32.70 | 6.57 | 39.27 | 54.00 | -14.73 |
| 2483.50 | E | Peak | 43.71 | 6.57 | 50.28 | 74.00 | -23.72 |
| Operation Ba Fundamental Operation Mo EUT Pol. | Frequency | :BDR :2480 MHz :Bandedge :H | | Test Date Temp./Humi Engineer | | :Lion | C / 66 RH |
| EUT Pol. | | :H | | Measuremen | t Antenna Pol | :HORIZO | ONTAL |

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2483.50 | E | Average | 32.51 | 7.60 | 40.11 | 54.00 | -13.89 |
| 2483.50 | E | Peak | 43.58 | 7.60 | 51.18 | 74.00 | -22.82 |

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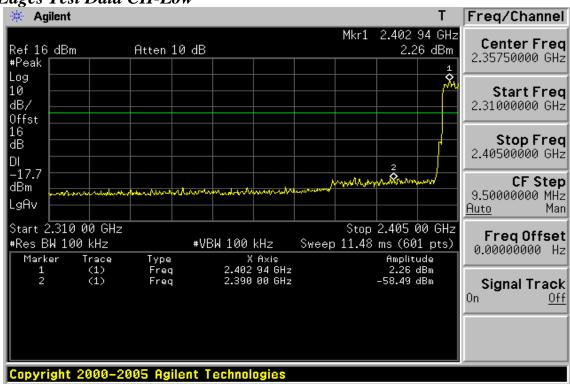


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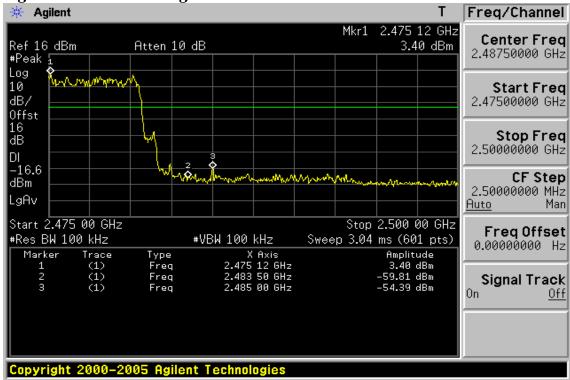
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EDR Mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Emission:

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :Bandedge Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---|-----------|--------------------------------------|---------------|-------------------------------------|---------------|-------------|-----------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2390.00 | E | Average | 32.52 | 6.15 | 38.67 | 54.00 | -15.33 |
| 2390.00 | E | Peak | 44.69 | 6.15 | 50.84 | 74.00 | -23.16 |
| Operation Ba Fundamental Operation Mo EUT Pol. | Frequency | :EDR :2402 MHz :Bandedge :H | | Test Date Temp./Humi Engineer | | :Lion | C / 66 RH |
| LU1101. | | .11 | | Measuremen | t Antenna Pol | .11OIXIZ | JINIIIL |

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2390.00 | E | Average | 32.78 | 6.77 | 39.55 | 54.00 | -14.45 |
| 2390.00 | Е | Peak | 44.91 | 6.77 | 51.68 | 74.00 | -22.32 |

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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Emission:

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2480 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :Bandedge Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---|-----------|--------------------------------------|---------------|-------------------------------------|---------------|-------------|-----------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2483.50 | E | Average | 32.87 | 6.57 | 39.44 | 54.00 | -14.56 |
| 2483.50 | E | Peak | 43.69 | 6.57 | 50.26 | 74.00 | -23.74 |
| Operation Ba Fundamental Operation Mo EUT Pol. | Frequency | :EDR :2480 MHz :Bandedge :H | | Test Date Temp./Humi Engineer | | :Lion | C / 66 RH |
| LUIIUI. | | .11 | | Measuremen | t Antenna Pol | .11OIXIZX | JINIIIL |

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|---------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 2483.50 | E | Average | 32.53 | 7.60 | 40.13 | 54.00 | -13.87 |
| 2483.50 | Е | Peak | 44.80 | 7.60 | 52.40 | 74.00 | -21.60 |

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8. SPURIOUS EMISSION TEST

8.1. Standard Applicable:

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-Gen §7.2.3 and RSS-210 issue 8,§A2.9, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

8.2. Measurement Equipment Used:

8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

8.2.2. Radiated emission:

Refer to section 7.2.2 for details.

8.3. Test SET-UP:

8.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

8.3.2. Radiated emission:

Refer to section 7.3.2 for details.

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8.4. Measurement Procedure:

- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. Repeat above procedures until all frequency measured were complete.

Conducted Emission:

- 1. To connect Antenna Port of EUT to Spectrum.
- 2. Set RBW = 100K & VBW = 100K on Spectrum.
- 3. Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 3G, 3G to 8G, 8G to 13G, 13G to 18G and 18G to 26.5GHz
- Via Software, combine 5 spans of frequency range into one plot 4.

8.5. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

| Where | FS = Field Strength | CL = Cable Attenuation Factor (Cable Loss) |
|-------|------------------------|--|
| | RA = Reading Amplitude | AG = Amplifier Gain |
| | AF = Antenna Factor | |

8.6. Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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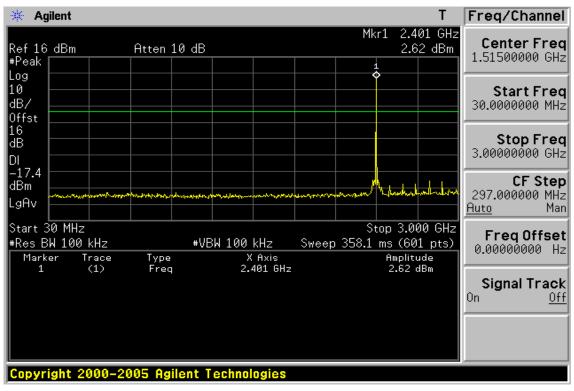
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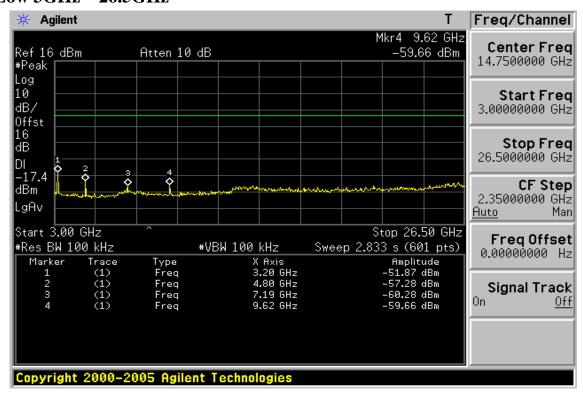
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Conducted Spurious Emission Measurement Result (Worst EDR mode) Ch Low 30MHz – 3GHz



Ch Low 3GHz - 26.5GHz



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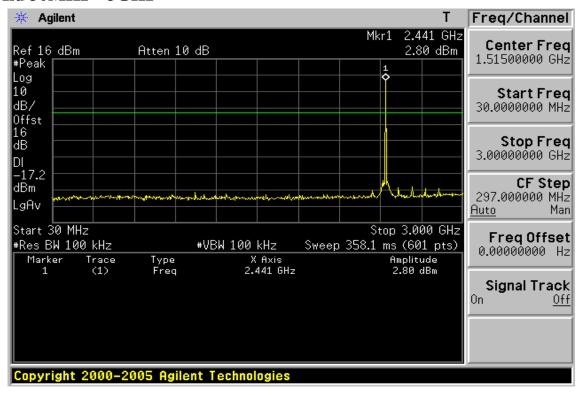
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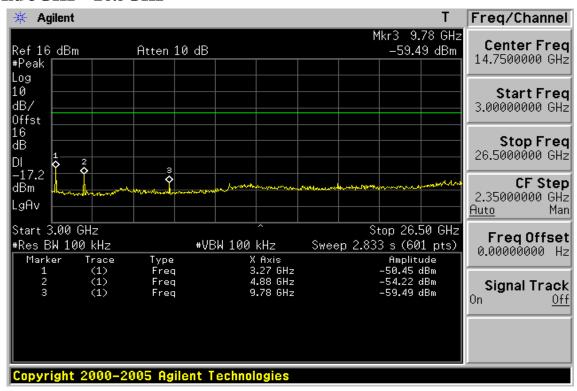
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Ch Mid 30MHz - 3GHz



Ch Mid 3GHz – 26.5GHz



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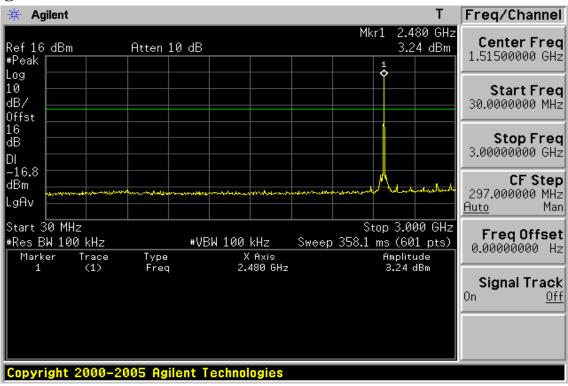
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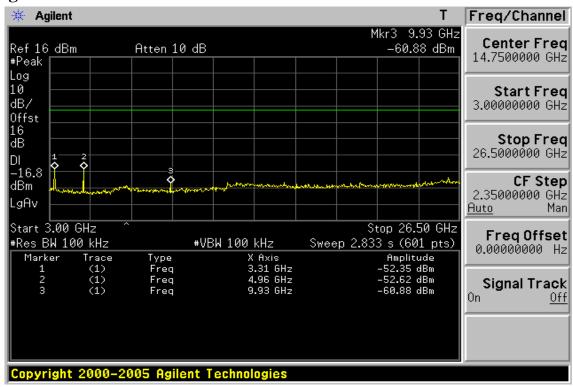
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Ch High 30MHz - 3GHz



Ch High 3GHz - 26.5GHz



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Radiated Spurious Emission Measurement Result (Worst EDR mode)

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :TX LOW Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 150.28 | S | Peak | 37.73 | -11.81 | 25.92 | 63.50 | -37.58 |
| 262.80 | S | Peak | 37.28 | -12.86 | 24.42 | 66.00 | -41.58 |
| 361.74 | S | Peak | 37.04 | -10.73 | 26.31 | 66.00 | -39.69 |
| 443.22 | S | Peak | 37.51 | -9.41 | 28.10 | 66.00 | -37.90 |
| 657.59 | S | Peak | 38.33 | -5.74 | 32.59 | 66.00 | -33.41 |
| 834.13 | S | Peak | 38.48 | -3.07 | 35.41 | 66.00 | -30.59 |
| 4804.00 | Н | Peak | 36.30 | 9.95 | 46.25 | 74.00 | -27.75 |
| 7206.00 | Н | | | | | | |
| 9608.00 | Н | | | | | | |
| 12010.00 | Н | | | | | | |
| 14412.00 | Н | | | | | | |
| 16814.00 | Н | | | | | | |
| 19216.00 | Н | | | | | | |
| 21618.00 | Н | | | | | | |
| 24020.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :TX LOW Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :HORIZONTAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 147.37 | S | Peak | 37.12 | -11.90 | 25.22 | 63.50 | -38.28 |
| 287.05 | S | Peak | 37.44 | -12.13 | 25.31 | 66.00 | -40.69 |
| 366.59 | S | Peak | 37.20 | -10.64 | 26.56 | 66.00 | -39.44 |
| 437.40 | S | Peak | 37.36 | -9.53 | 27.83 | 66.00 | -38.17 |
| 492.69 | S | Peak | 38.01 | -8.88 | 29.13 | 66.00 | -36.87 |
| 840.92 | S | Peak | 38.23 | -2.94 | 35.29 | 66.00 | -30.71 |
| 4804.00 | Н | Peak | 35.02 | 9.99 | 45.01 | 74.00 | -28.99 |
| 7206.00 | Н | | | | | | |
| 9608.00 | Н | | | | | | |
| 12010.00 | Н | | | | | | |
| 14412.00 | Н | | | | | | |
| 16814.00 | Н | | | | | | |
| 19216.00 | Н | | | | | | |
| 21618.00 | Н | | | | | | |
| 24020.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2441 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :TX MID Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | $dB\mu V/m$ | dBμV/m | dB |
| | | | | | | | |
| 152.22 | S | Peak | 37.75 | -11.62 | 26.13 | 63.50 | -37.37 |
| 287.05 | S | Peak | 37.32 | -12.13 | 25.19 | 66.00 | -40.81 |
| 371.44 | S | Peak | 37.06 | -10.60 | 26.46 | 66.00 | -39.54 |
| 428.67 | S | Peak | 37.96 | -9.69 | 28.27 | 66.00 | -37.73 |
| 496.57 | S | Peak | 37.51 | -8.83 | 28.68 | 66.00 | -37.32 |
| 871.96 | S | Peak | 37.38 | -2.56 | 34.82 | 66.00 | -31.18 |
| 4882.00 | Н | Average | 37.59 | 10.28 | 47.87 | 54.00 | -6.13 |
| 4882.00 | Н | Peak | 40.90 | 10.28 | 51.18 | 74.00 | -22.82 |
| 7323.00 | Н | | | | | | |
| 9764.00 | Н | | | | | | |
| 12205.00 | Н | | | | | | |
| 14646.00 | Н | | | | | | |
| 17087.00 | Н | | | | | | |
| 19528.00 | Н | | | | | | |
| 21969.00 | Н | | | | | | |
| 24410.00 | Н | | | | | | |

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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2441 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :TX MID Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :HORIZONTAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 158.04 | S | Peak | 37.81 | -11.77 | 26.04 | 63.50 | -37.46 |
| 286.08 | S | Peak | 37.03 | -12.09 | 24.94 | 66.00 | -41.06 |
| 367.56 | S | Peak | 37.40 | -10.62 | 26.78 | 66.00 | -39.22 |
| 447.10 | S | Peak | 37.71 | -9.36 | 28.35 | 66.00 | -37.65 |
| 499.48 | S | Peak | 38.06 | -8.79 | 29.27 | 66.00 | -36.73 |
| 869.05 | S | Peak | 38.00 | -2.61 | 35.39 | 66.00 | -30.61 |
| 4882.00 | Н | Peak | 39.70 | 10.22 | 49.92 | 74.00 | -24.08 |
| 7323.00 | Н | | | | | | |
| 9764.00 | Н | | | | | | |
| 12205.00 | Н | | | | | | |
| 14646.00 | Н | | | | | | |
| 17087.00 | Н | | | | | | |
| 19528.00 | Н | | | | | | |
| 21969.00 | Н | | | | | | |
| 24410.00 | Н | | | | | | |

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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2480 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :TX HIGH Engineer :Lion

EUT Pol. :VERTICAL :H Measurement Antenna Pol.

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 194.90 | S | Peak | 41.88 | -15.13 | 26.75 | 63.50 | -36.75 |
| 281.23 | S | Peak | 36.96 | -12.22 | 24.74 | 66.00 | -41.26 |
| 367.56 | S | Peak | 37.09 | -10.62 | 26.47 | 66.00 | -39.53 |
| 448.07 | S | Peak | 37.43 | -9.33 | 28.10 | 66.00 | -37.90 |
| 498.51 | S | Peak | 38.04 | -8.82 | 29.22 | 66.00 | -36.78 |
| 879.72 | S | Peak | 37.45 | -2.40 | 35.05 | 66.00 | -30.95 |
| 4960.00 | Н | Average | 41.25 | 10.91 | 52.16 | 54.00 | -1.84 |
| 4960.00 | Н | Peak | 44.95 | 10.91 | 55.86 | 74.00 | -18.14 |
| 7440.00 | Н | | | | | | |
| 9920.00 | H | | | | | | |
| 12400.00 | H | | | | | | |
| 14880.00 | Н | | | | | | |
| 17360.00 | Н | | | | | | |
| 19840.00 | Н | | | | | | |
| 22320.00 | Н | | | | | | |
| 24800.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2480 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :TX HIGH Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :HORIZONTAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 146.40 | S | Peak | 37.56 | -11.97 | 25.59 | 63.50 | -37.91 |
| 288.02 | S | Peak | 37.52 | -12.07 | 25.45 | 66.00 | -40.55 |
| 375.32 | S | Peak | 36.88 | -10.55 | 26.33 | 66.00 | -39.67 |
| 446.13 | S | Peak | 37.40 | -9.35 | 28.05 | 66.00 | -37.95 |
| 495.60 | S | Peak | 37.84 | -8.84 | 29.00 | 66.00 | -37.00 |
| 872.93 | S | Peak | 37.33 | -2.55 | 34.78 | 66.00 | -31.22 |
| 4960.00 | Н | Peak | 39.56 | 10.76 | 50.32 | 74.00 | -23.68 |
| 7440.00 | Н | | | | | | |
| 9920.00 | Н | | | | | | |
| 12400.00 | Н | | | | | | |
| 14880.00 | Н | | | | | | |
| 17360.00 | Н | | | | | | |
| 19840.00 | Н | | | | | | |
| 22320.00 | Н | | | | | | |
| 24800.00 | Н | | | | | | |

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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :RX LOW Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 143.49 | S | Peak | 38.25 | -12.20 | 26.05 | 63.50 | -37.45 |
| 297.72 | S | Peak | 36.33 | -12.00 | 24.33 | 66.00 | -41.67 |
| 355.92 | S | Peak | 37.27 | -10.99 | 26.28 | 66.00 | -39.72 |
| 448.07 | S | Peak | 37.12 | -9.42 | 27.70 | 66.00 | -38.30 |
| 487.84 | S | Peak | 38.82 | -9.04 | 29.78 | 66.00 | -36.22 |
| 883.60 | S | Peak | 37.55 | -2.44 | 35.11 | 66.00 | -30.89 |
| 4804.00 | Н | Peak | 34.06 | 9.95 | 44.01 | 74.00 | -29.99 |
| 7206.00 | Н | | | | | | |
| 9608.00 | Н | | | | | | |
| 12010.00 | Н | | | | | | |
| 14412.00 | Н | | | | | | |
| 16814.00 | Н | | | | | | |
| 19216.00 | Н | | | | | | |
| 21618.00 | Н | | | | | | |
| 24020.00 | Н | | | | | | |

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Report No.: EF/2011/C0007 Issue Date: Jan. 10, 2012

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2402 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :RX LOW Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :HORIZONTAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|-------------|-------------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $dB\mu V$ | dB | $dB\mu V/m$ | $dB\mu V/m$ | dB |
| | | | | | | | |
| 147.37 | S | Peak | 36.56 | -11.93 | 24.63 | 63.50 | -38.87 |
| 272.50 | S | Peak | 37.82 | -12.64 | 25.18 | 66.00 | -40.82 |
| 360.77 | S | Peak | 37.66 | -10.80 | 26.86 | 66.00 | -39.14 |
| 441.28 | S | Peak | 38.42 | -9.52 | 28.90 | 66.00 | -37.10 |
| 492.69 | S | Peak | 38.34 | -8.96 | 29.38 | 66.00 | -36.62 |
| 865.17 | S | Peak | 37.43 | -2.72 | 34.71 | 66.00 | -31.29 |
| 4804.00 | Н | Peak | 34.69 | 9.99 | 44.68 | 74.00 | -29.32 |
| 7206.00 | Н | | | | | | |
| 9608.00 | Н | | | | | | |
| 12010.00 | Н | | | | | | |
| 14412.00 | Н | | | | | | |
| 16814.00 | Н | | | | | | |
| 19216.00 | Н | | | | | | |
| 21618.00 | Н | | | | | | |
| 24020.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2441 MHz Temp./Humi. :27 deg_C / 66 RH

Operation Mode :RX MID Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|----------------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | $\mathrm{d} B \mu V$ | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 192.96 | S | Peak | 41.80 | -15.14 | 26.66 | 63.50 | -36.84 |
| 296.75 | S | Peak | 36.29 | -11.99 | 24.30 | 66.00 | -41.70 |
| 362.71 | S | Peak | 37.15 | -10.80 | 26.35 | 66.00 | -39.65 |
| 439.34 | S | Peak | 37.84 | -9.59 | 28.25 | 66.00 | -37.75 |
| 500.45 | S | Peak | 37.52 | -8.84 | 28.68 | 66.00 | -37.32 |
| 889.42 | S | Peak | 36.92 | -2.34 | 34.58 | 66.00 | -31.42 |
| 4882.00 | Н | Peak | 34.27 | 10.28 | 44.55 | 74.00 | -29.45 |
| 7323.00 | Н | | | | | | |
| 9764.00 | Н | | | | | | |
| 12205.00 | Н | | | | | | |
| 14646.00 | Н | | | | | | |
| 17087.00 | Н | | | | | | |
| 19528.00 | Н | | | | | | |
| 21969.00 | Н | | | | | | |
| 24410.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2441 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :RX MID Engineer :Lion

EUT Pol. :HORIZONTAL :H Measurement Antenna Pol.

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 155.13 | S | Peak | 37.23 | -11.72 | 25.51 | 63.50 | -37.99 |
| 287.05 | S | Peak | 37.09 | -12.24 | 24.85 | 66.00 | -41.15 |
| 370.47 | S | Peak | 36.80 | -10.72 | 26.08 | 66.00 | -39.92 |
| 440.31 | S | Peak | 37.49 | -9.56 | 27.93 | 66.00 | -38.07 |
| 490.75 | S | Peak | 38.14 | -9.01 | 29.13 | 66.00 | -36.87 |
| 882.63 | S | Peak | 37.59 | -2.45 | 35.14 | 66.00 | -30.86 |
| 4882.00 | Н | Peak | 34.75 | 10.22 | 44.97 | 74.00 | -29.03 |
| 7323.00 | Н | | | | | | |
| 9764.00 | Н | | | | | | |
| 12205.00 | Н | | | | | | |
| 14646.00 | Н | | | | | | |
| 17087.00 | Н | | | | | | |
| 19528.00 | Н | | | | | | |
| 21969.00 | Н | | | | | | |
| 24410.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2480 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :RX HIGH Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :VERTICAL

Actual $FS(dB\mu V/m) = SPA$. Reading level $(dB\mu V) + Factor(dB)$

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 143.49 | S | Peak | 39.05 | -12.20 | 26.85 | 63.50 | -36.65 |
| 290.93 | S | Peak | 37.08 | -12.15 | 24.93 | 66.00 | -41.07 |
| 347.19 | S | Peak | 37.16 | -11.08 | 26.08 | 66.00 | -39.92 |
| 444.19 | S | Peak | 37.36 | -9.50 | 27.86 | 66.00 | -38.14 |
| 491.72 | S | Peak | 37.90 | -9.01 | 28.89 | 66.00 | -37.11 |
| 845.77 | S | Peak | 38.16 | -3.02 | 35.14 | 66.00 | -30.86 |
| 4960.00 | Н | Peak | 33.68 | 10.91 | 44.59 | 74.00 | -29.41 |
| 7440.00 | Н | | | | | | |
| 9920.00 | Н | | | | | | |
| 12400.00 | Н | | | | | | |
| 14880.00 | Н | | | | | | |
| 17360.00 | Н | | | | | | |
| 19840.00 | Н | | | | | | |
| 22320.00 | Н | | | | | | |
| 24800.00 | Н | | | | | | |

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Radiated Spurious Emission Measurement Result

Operation Band :EDR Test Date :2012-01-04

Fundamental Frequency :2480 MHz Temp./Humi. :27 deg C / 66 RH

Operation Mode :RX HIGH Engineer :Lion

EUT Pol. :H Measurement Antenna Pol. :HORIZONTAL

Actual FS($dB\mu V/m$) = SPA. Reading level($dB\mu V$) + Factor(dB)

Factor(dB) = Antenna Factor(dB μ V/m) + Cable Loss(dB) – Pre Amplifier Gain(dB)

Note: "F": denotes Fundamental Frequency.; "H": denotes Harmonic Frequency.

"E": denotes Band Edge Frequency.; "S": denotes Spurious Frequency.

"---": denotes Noise Floor.

| Freq. | Note | Detector | Spectrum | Factor | Actual | Limit | Safe |
|----------|---------|----------|---------------|--------|--------|--------|--------|
| | | Mode | Reading Level | | FS | @3m | Margin |
| MHz | F/H/E/S | PK/QP/AV | dΒμV | dB | dBμV/m | dBμV/m | dB |
| | | | | | | | |
| 156.10 | S | Peak | 36.68 | -11.68 | 25.00 | 63.50 | -38.50 |
| 287.05 | S | Peak | 37.43 | -12.24 | 25.19 | 66.00 | -40.81 |
| 371.44 | S | Peak | 37.51 | -10.74 | 26.77 | 66.00 | -39.23 |
| 441.28 | S | Peak | 37.15 | -9.52 | 27.63 | 66.00 | -38.37 |
| 500.45 | S | Peak | 37.84 | -8.84 | 29.00 | 66.00 | -37.00 |
| 867.11 | S | Peak | 37.31 | -2.71 | 34.60 | 66.00 | -31.40 |
| 4960.00 | Н | Peak | 33.68 | 10.76 | 44.44 | 74.00 | -29.56 |
| 7440.00 | Н | | | | | | |
| 9920.00 | Н | | | | | | |
| 12400.00 | Н | | | | | | |
| 14880.00 | Н | | | | | | |
| 17360.00 | Н | | | | | | |
| 19840.00 | Н | | | | | | |
| 22320.00 | Н | | | | | | |
| 24800.00 | Н | | | | | | |

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9. FREQUENCY SEPARATION

9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

According to RSS 210 issue 8, A8.1(b), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

9.3. Test Set-up:

Refer to section 6.3 for details.

9.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = middle of hopping channel.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Adjust Span to 3.0 MHz, Sweep = auto.
- 5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

9.5. Measurement Result:

| Channel separation | | |
|--------------------|--------------------------|--------|
| (MHz) | Limit | Result |
| | >=25KHz or | |
| 1 | 2/3 times 20dB bandwidth | PASS |

Note: Refer to next page for plots.

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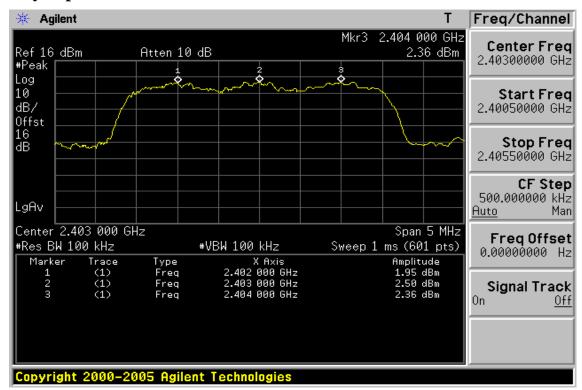
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Frequency Separation Test Data



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10. NUMBER OF HOPPING FREQUENCY

10.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

According to RSS-210 issue 8,§A8.1(d), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

10.2. Measurement Equipment Used:

Refer to section 6.2 for details.

10.3. Test Set-up:

Refer to section 6.3 for details.

10.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 4. Set the spectrum analyzer as RBW=430KHz, VBW=1.5MHz,
- 5. Max hold, view and count how many channel in the band.

10.5. Measurement Result:

Note: Refer to next page for plots.

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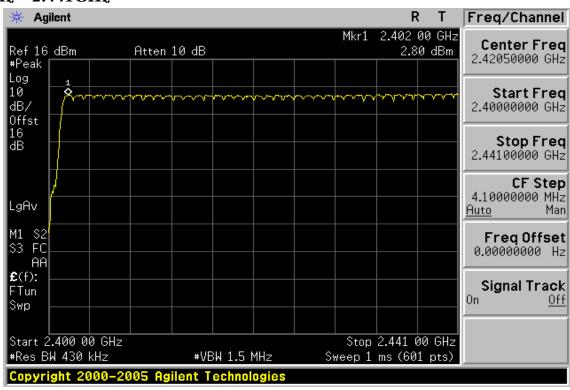
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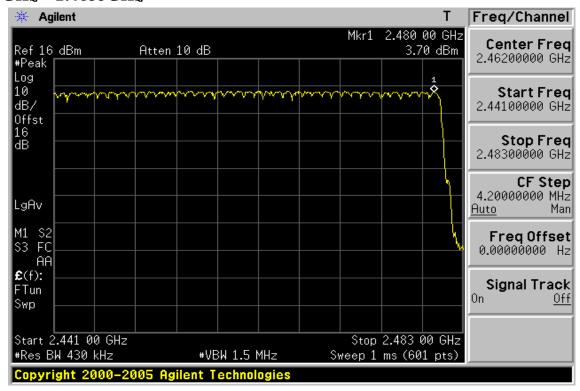
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Channel Number 2.4 GHz - 2.441GHz



2.441 GHz - 2.4835GHz



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11. TIME OF OCCUPANCY (DWELL TIME)

11.1. Standard Applicable:

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz. The average time of occupancy on any frequency shall not greater than 0.4 s within period of 0.4 seconds multiplied by the number of hopping channel employed.

According to RSS-210 issue 8,§A8.1(d), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

11.2. Measurement Equipment Used:

Refer to section 6.2 for details

11.3. Test Set-up:

Refer to section 6.3 for details.

11.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span = 0Hz, Adjust Sweep = 15ms.
- 5. Repeat above procedures until all frequency measured were complete.

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11.5. Measurement Result:

A period time = 0.4 (s) * 79 = 31.6 (s)

CH Low: DH1 time slot = 0.383 (ms) * (1600/(2*79)) * 31.6 = 122.56 (ms)

DH3 time slot = 1.642 (ms) * (1600/(4*79)) * 31.6 = 262.72 (ms)

DH5 time slot = 2.883 (ms) * (1600/(6*79)) * 31.6 = 307.52 (ms)

CH Mid: DH1 time slot = 0.383 (ms) * (1600/(2*79)) * 31.6 = 122.56 (ms)

DH3 time slot = 1.642 (ms) * (1600/(4*79)) * 31.6 = 262.72 (ms)

DH5 time slot = 2.883 (ms) * (1600/(6*79)) * 31.6 = 307.52 (ms)

CH High: DH1 time slot = 0.387 (ms) * (1600/(2*79)) * 31.6 = 122.56 (ms)

DH3 time slot = 1.633 (ms) * (1600/(4*79)) * 31.6 = 262.72 (ms)

DH5 time slot = 2.895 (ms) * (1600/(6*79)) * 31.6 = 307.52 (ms)

Note: Refer to next page for plots.

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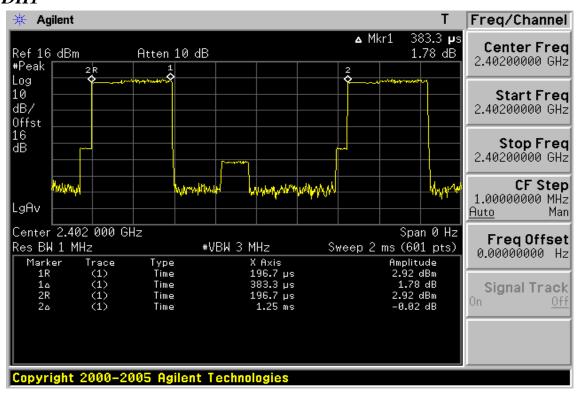
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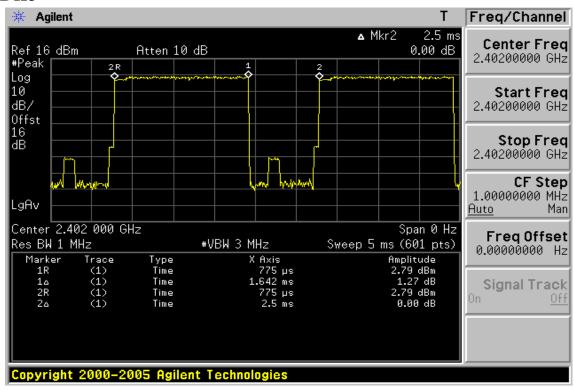
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CH-Low DH1



DH3



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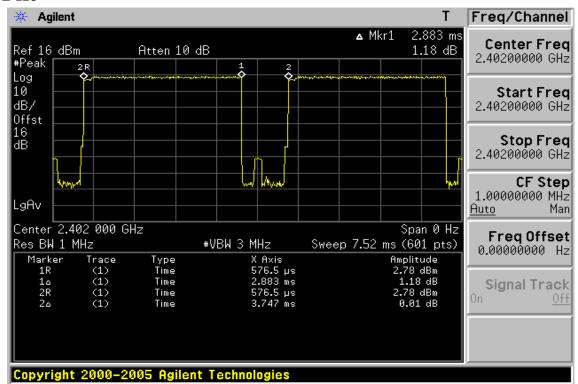
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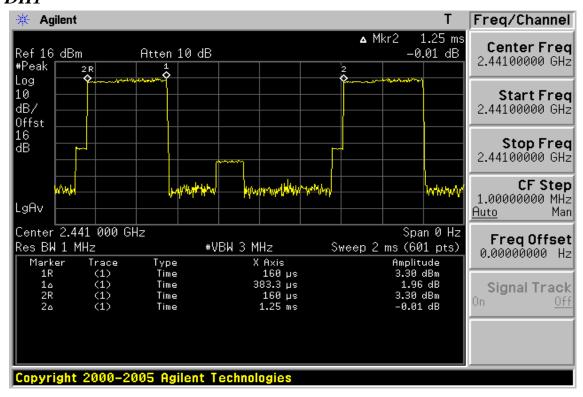
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DH5



CH-Mid DH1



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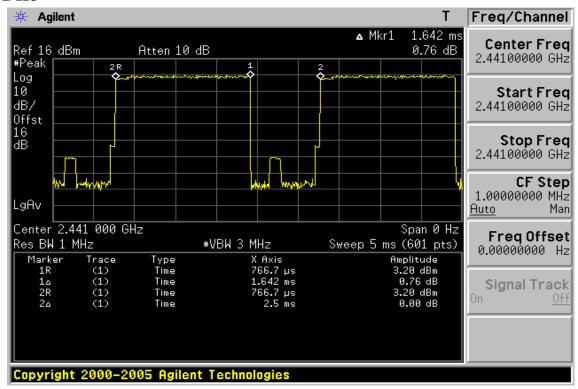
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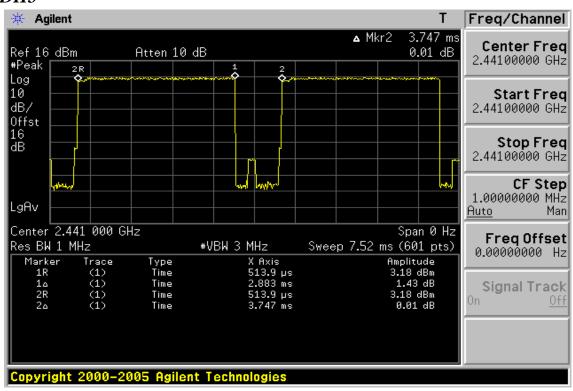
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DH3



DH5



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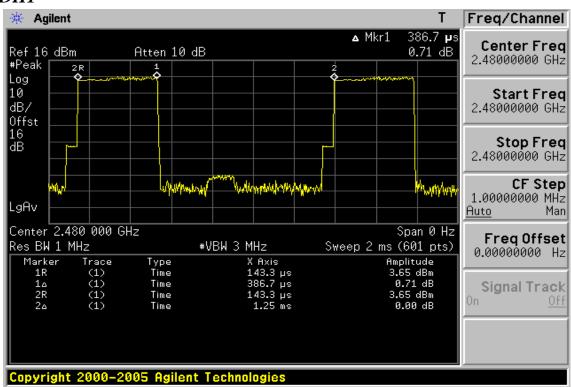
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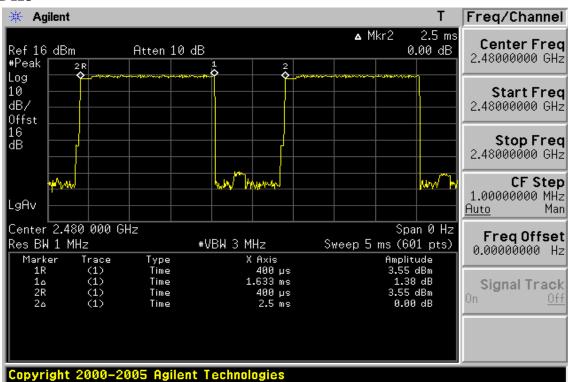
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CH-High DH1



DH3



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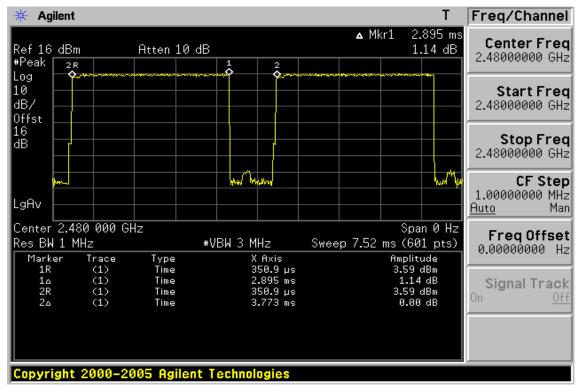
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DH5



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12. Peak Power Spectral Density

12.1. Standard Applicable:

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

According to RSS-210 issue 8, §A8.2(b) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

12.2. Measurement Equipment Used:

Refer to section 6.2 for details.

12.3. Test Set-up:

Refer to section 6.3 for details.

12.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 1.5MHz, Sweep=100s
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

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12.5. Measurement Result:

BDR Mode

| СН | RF Power Density | RF Power Density | Maximum Limit | Result |
|------|-------------------------|-------------------------|---------------|--------|
| | Reading (dBm) | Level (dBm) | (dBm) | |
| Low | -8.18 | -8.18 | 8 | PASS |
| Mid | -7.82 | -7.82 | 8 | PASS |
| High | -7.44 | -7.44 | 8 | PASS |

EDR Mode

| СН | RF Power Density | RF Power Density | Maximum Limit | Result |
|------|-------------------------|-------------------------|---------------|--------|
| | Reading (dBm) | Level (dBm) | (dBm) | |
| Low | -11.46 | -11.46 | 8 | PASS |
| Mid | -11.08 | -11.08 | 8 | PASS |
| High | -10.72 | -10.72 | 8 | PASS |

Note: Offset: 16dB

Refer to next page for plots.

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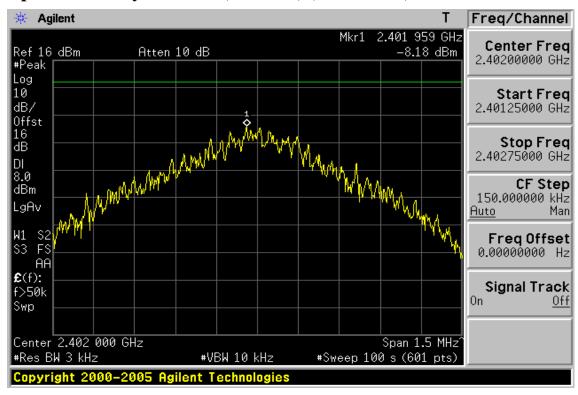
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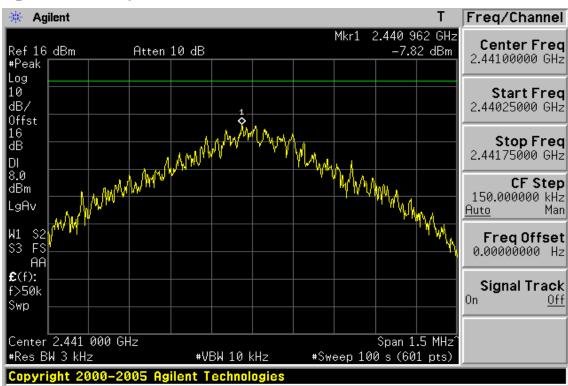
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Power Spectral Density Test Plot (CH-Low) (BDR Mode)



Power Spectral Density Test Plot (CH-Mid) (BDR Mode)



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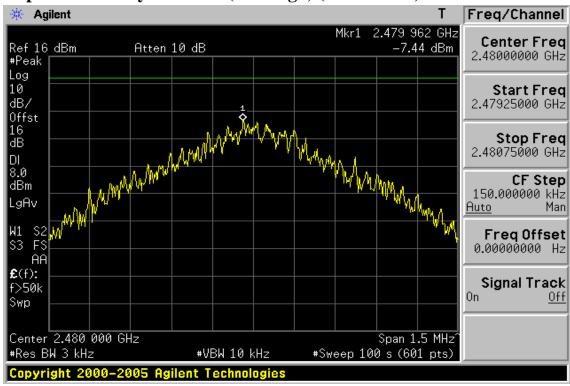
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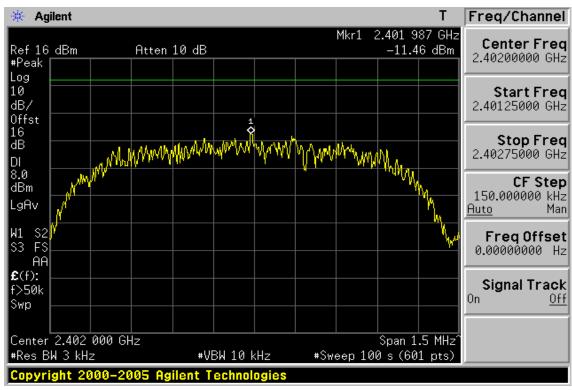
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Power Spectral Density Test Plot (CH-High) (BDR Mode)



Power Spectral Density Test Plot (CH-Low) (EDR Mode)



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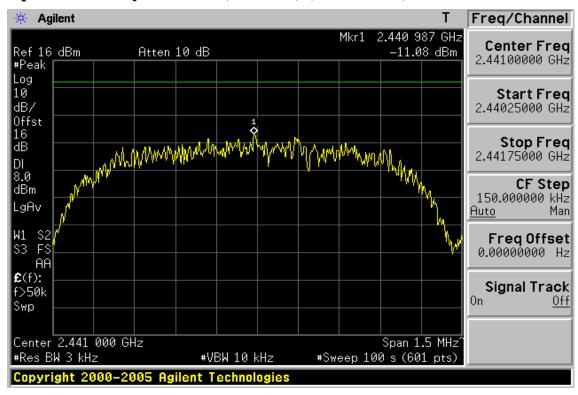
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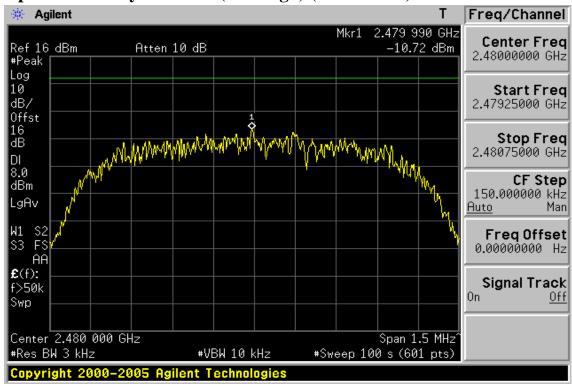
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Power Spectral Density Test Plot (CH-Mid) (EDR Mode)



Power Spectral Density Test Plot (CH-High) (EDR Mode)



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13. 20dB Bandwidth & 99% Bandwidth

13.1. Standard Applicable:

According to §15.247(a)(1),and RSS210 A8.1(b) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

13.2. Measurement Equipment Used:

Refer to section 6.2 for details.

13.3. Test Set-up:

Refer to section 6.3 for details.

13.4. Measurement Procedure:

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW≥ 1 % of Bandwidth.VBW≥RBW, Span= 3MHz, Sweep=auto
- 4. Mark the peak frequency and –20dB (upper and lower) frequency.
- 5. Repeat above procedures until all frequency measured were complete.

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13.5. Measurement Result:

20dB Bandwidth: BDR Mode

| СН | Bandwidth | |
|--------|-----------|--|
| | (kHz) | |
| Lower | 920.477 | |
| Mid | 919.782 | |
| Higher | 922.922 | |

20dB Bandwidth: EDR Mode

| СН | Bandwidth | 2/3 Bandwidth |
|--------|-----------|---------------|
| | (MHz) | (MHz) |
| Lower | 1.288 | 0.859 |
| Mid | 1.332 | 0.888 |
| Higher | 1.287 | 0.858 |

99% Bandwidth: BDR Mode

| СН | Bandwidth | |
|--------|-----------|--|
| | (kHz) | |
| Lower | 862.765 | |
| Mid | 879.223 | |
| Higher | 867.240 | |

99% Bandwidth: EDR Mode

| СН | Bandwidth |
|--------|-----------|
| | (MHz) |
| Lower | 1.1828 |
| Mid | 1.1830 |
| Higher | 1.1871 |

Note: Refer to next page for plots.

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BDR Mode 20dB Bandwidth & 99% Bandwidth Test Data CH-Low



20dB Bandwidth & 99% Bandwidth Test Data CH-Mid



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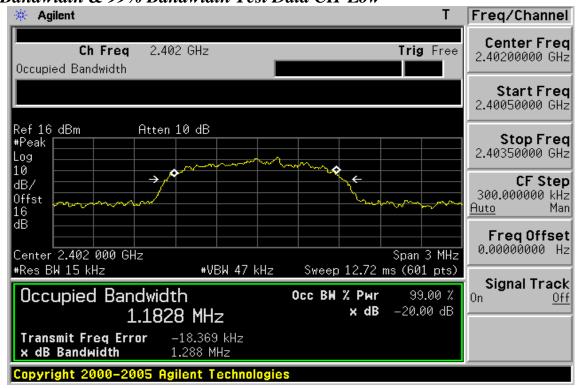
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20dB Bandwidth & 99% Bandwidth Test Data CH-High



EDR Mode

20dB Bandwidth & 99% Bandwidth Test Data CH-Low



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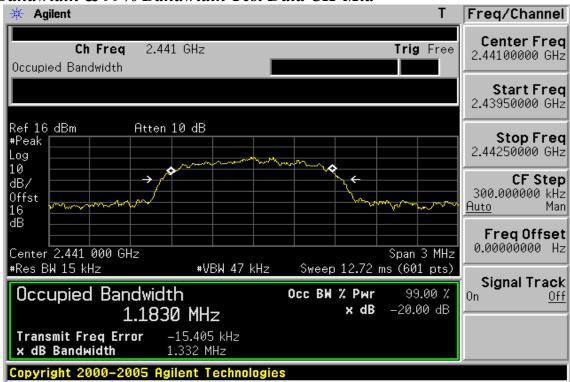
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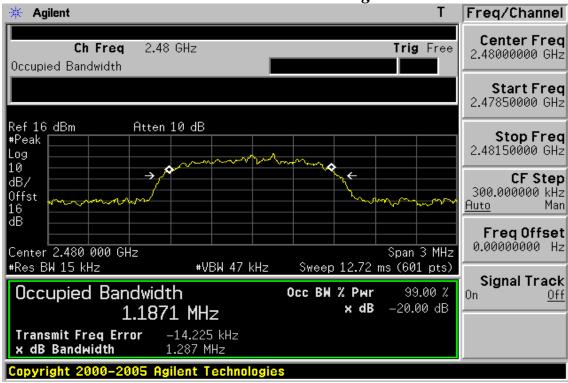
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20dB Bandwidth & 99% Bandwidth Test Data CH-Mid



20dB Bandwidth & 99% Bandwidth Test Data CH-High



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14. ANTENNA REQUIREMENT

14.1. Standard Applicable:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.246(1), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

14.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is -1.4dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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15. RF EXPOSURE

15.1. Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a portable device.

15.2. Measurement Result:

This is a portable device and the Max peak output power is 5.99 dBm (0.00397W) lower than low threshold 60/fGHz mW (24.48mW), d<2.5cm in general population category;

The SAR measurement is not necessary.

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