

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

## INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** Creative D3XM

**Brand Name:** Creative

**Model No.:** MF8155

**Model Difference:** N/A

**FCC ID:** IBAMF8155

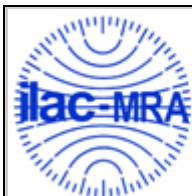
**Report No.:** EF/2012/C0010

**Issue Date:** Jan. 14, 2013

**FCC Rule Part:** §15.247, Cat: DTS

**Prepared for:** Creative Technology Ltd.  
31 International Business Park Creative Resource Singapore 609921  
SGS Taiwan Ltd.  
Electronics & Communication Laboratory

**Prepared by:** No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803



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## VERIFICATION OF COMPLIANCE

**Applicant:** Creative Technology Ltd.  
31 International Business Park Creative Resource Singapore 609921

**Product Name:** Creative D3XM

**Brand Name:** Creative

**FCC ID:** IBAMF8155

**Model No.:** MF8155

**Model Difference:** N/A

**File Number:** EF/2012/C0010

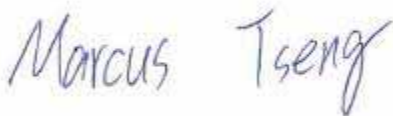
**Date of test:** Dec. 13, 2012 ~ Jan. 07, 2013

**Date of EUT Received:** Dec. 13, 2012

**We hereby certify that:**

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. 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 2009 and 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 15.247.

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

**Test By:****Date**

Jan. 14, 2013

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**Marcus Tseng / Engineer****Prepared By:****Date**

Jan. 14, 2013

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**Tiffany Kao / Clerk****Approved By:****Date**

Jan. 14, 2013

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**Jim Chang / Supervisor**

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## Version

Version No.	Date	Description
00	Jan. 14, 2013	Initial creation of document

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## 1 GENERAL INFORMATION

### General:

Product Name:	Creative D3XM	
Brand Name:	Creative	
Model No.:	MF8155	
Model Difference:	N/A	
Hardware Version:	A	
Software Version:	1.0	
Power Supply:	100-240V by AC/DC power adapter	
	Adapter:	Model: SRC14001900, Supplier: TJIN GOAN INDUSTRIAL LTD

### 5GHz:

Operation Frequency:	5736-5814MHz
Channel Number:	3
Transmit Power:	10.65 dBm
Modulation Type:	QPSK
Antenna Designation:	Printed Antenna, Gain: 3.0 dBi

This report applies for frequency bands: 5736MHz-5762MHz, 5814MHz.

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### 1.1 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: IBAMF8155** to comply with Section 15.247 of the FCC Part 15, Subpart E Rules. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

### 1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with KDB558074 (Measurement on Digital Systems Operating Under §15.247) and KDB662911 D01 & D02 are employed to carry out the DTS test for which compliant with to radio device with multiple output transmission.

### 1.3 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. Electronics & Communication Laboratory 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: 2009. 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. Electronics & Communication Laboratory 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.

### 1.4 Special Accessories

Not available for this EUT intended for grant.

### 1.5 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 operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 7.3.1 of ANSI C63.4-2009, conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is placed on a 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 C63.4-2009.

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## 2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission Configuration

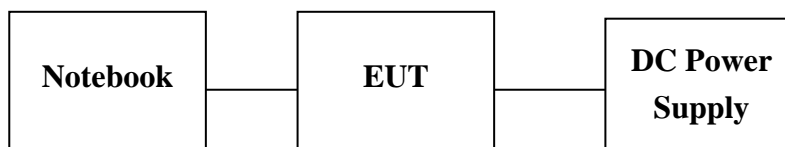


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Notebook	DELL	D505	34056609472	shield	Un-shield
2.	5GHz Test Software	N/A	N/A	N/A	N/A	N/A

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### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§ 15.207(a)	AC Power Line Conducted Emission	Compliant
§ 15.247(b) (3),(4)(c)	Peak Output Power	Compliant
§ 15.247(a)(2)	6dB Bandwidth	Compliant
§ 15.247(d)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§ 15.247(d)	Spurious Emission	Compliant
§ 15.247(e)	Peak Power Density	Compliant
§ 15.203	Antenna Requirement	Compliant

### 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 (5736MHz)、mid (5762MHz) and high (5814MHz) with highest data rate are chosen for full testing.

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## 5 MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : <b>Vertical</b> )	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

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## 6 CONDUCTED EMISSION TEST

### 6.1 Standard Applicable:

According to §15.207 frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Frequency range MHz	Limits dB(uV)	
	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.		

### 6.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2013	01/04/2014

### 6.3 EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2009.
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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#### 6.4 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.

#### 6.5 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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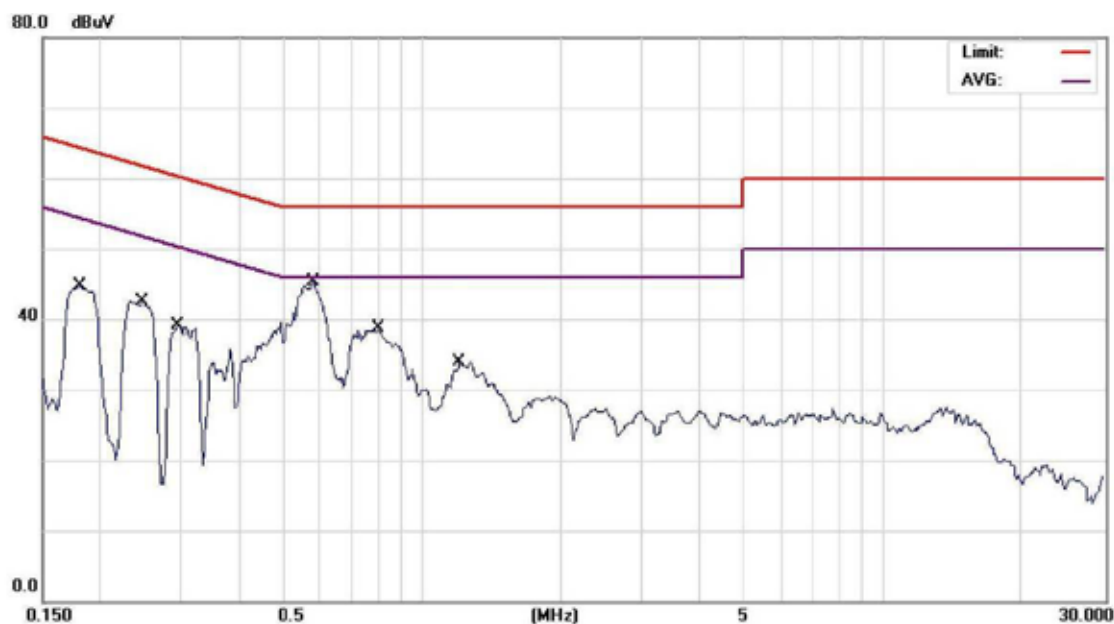
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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode			Test Date:	Dec. 22, 2012
Temperature:	26	Humidity:	60%	Test By:	Marcus



Site ConductionRoom

Phase: L1

Temperature: 26 °C

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60%

EUT: Creative U3XM

Distance:

M/N: MF8155

Mode: BT Link

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBμV	dB	dBμV	dBμV	dB		
1		0.1813	44.41	0.23	44.64	64.43	-19.79	QP	
2		0.2477	42.36	0.22	42.58	61.83	-19.25	QP	
3		0.2947	38.82	0.23	39.05	60.39	-21.34	QP	
4	*	0.5821	45.15	0.23	45.38	56.00	-10.62	QP	
5		0.8050	38.41	0.23	38.64	56.00	-17.36	QP	
6		1.2077	33.74	0.24	33.98	56.00	-22.02	QP	

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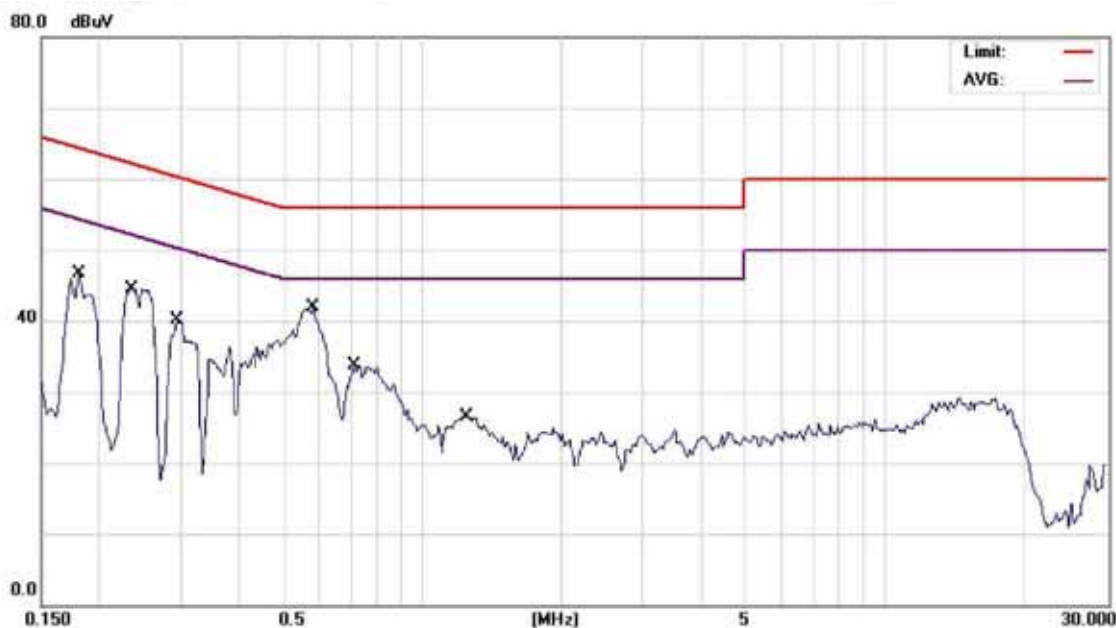
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Site ConductionRoom

Phase: **N**

Temperature: 25 °C

Limit: FC Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60%

EUT: CreativeD3XM

Distance:

M/N: MF8155

Mode: BT Link

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1813	46.28	0.33	46.61	64.43	-17.82	QP	
2		0.2360	44.12	0.32	44.44	62.24	-17.80	QP	
3		0.2947	39.80	0.34	40.14	60.39	-20.25	QP	
4	*	0.5821	41.62	0.34	41.96	56.00	-14.04	QP	
5		0.7150	33.47	0.33	33.80	56.00	-22.20	QP	
6		1.2429	26.25	0.33	26.58	56.00	-29.42	QP	

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## 7 PEAK OUTPUT POWER MEASUREMENT

### 7.1 Standard Applicable:

According to §15.247(a)(2), (b)(3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(c) Operation with directional antenna gains greater than 6dBi.

(1) Fixed point-to-point operation:

(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted output power.

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As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

## 7.2 Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Sensor	Anritsu	ML2495A	1005007	02/08/2012	02/07/2014
Power Meter	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/17/2012	03/16/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2012	02/27/2013
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Splitter	Agilent	11636B	N/A	02/28/2012	02/27/2013

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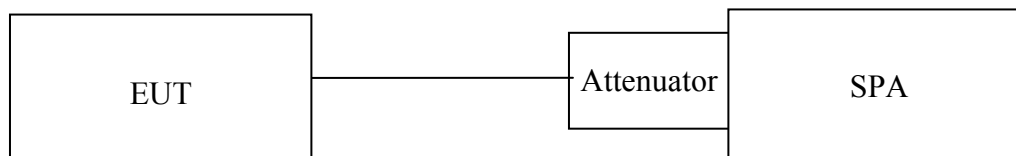
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### 7.3 Test Set-up:



### 7.4 Measurement Procedure:

#### Peak Power:

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. (Channel power function, RBW = 1MHz, VBW = 3MHz, span  $\geq 30\%$  of EBW, where Bandwidth = 26dB occupied Bandwidth, Detector = peak, Sweep = Auto)
3. Using integrated band power measurement function by setting limit equal to EBW's band edges
4. Record the max. reading.
5. Repeat above procedures until all measurement of required selective channel (low, mid, high) is completed.

#### Average Power:

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. (Channel power function, RBW = 1MHz, VBW = 3MHz, span  $\geq 30\%$  of EBW, where Bandwidth = 26dB occupied Bandwidth, Detector = power average, Sweep = Auto)
3. Set average trace = 100 times in power average mode
4. Using integrated band power measurement function by setting limit equal to EBW's band edges
5. Record the max. reading.
6. Repeat above procedures until all measurement of required selective channel (low, mid, high) is completed.

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## 7.5 Measurement Result:

### Peak Power Output (dBm)

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5736.00	9.99	9.99	0.00998	1
5762.00	10.36	10.36	0.01086	1
5814.00	10.65	10.65	0.01161	1

### Average Power Output (dBm)

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5736.00	8.430	8.43	0.00697	1
5762.00	8.165	8.17	0.00655	1
5814.00	8.149	8.15	0.00653	1

*\*Note: Offset 10.5dB*

Note: Refer to next page for plots.

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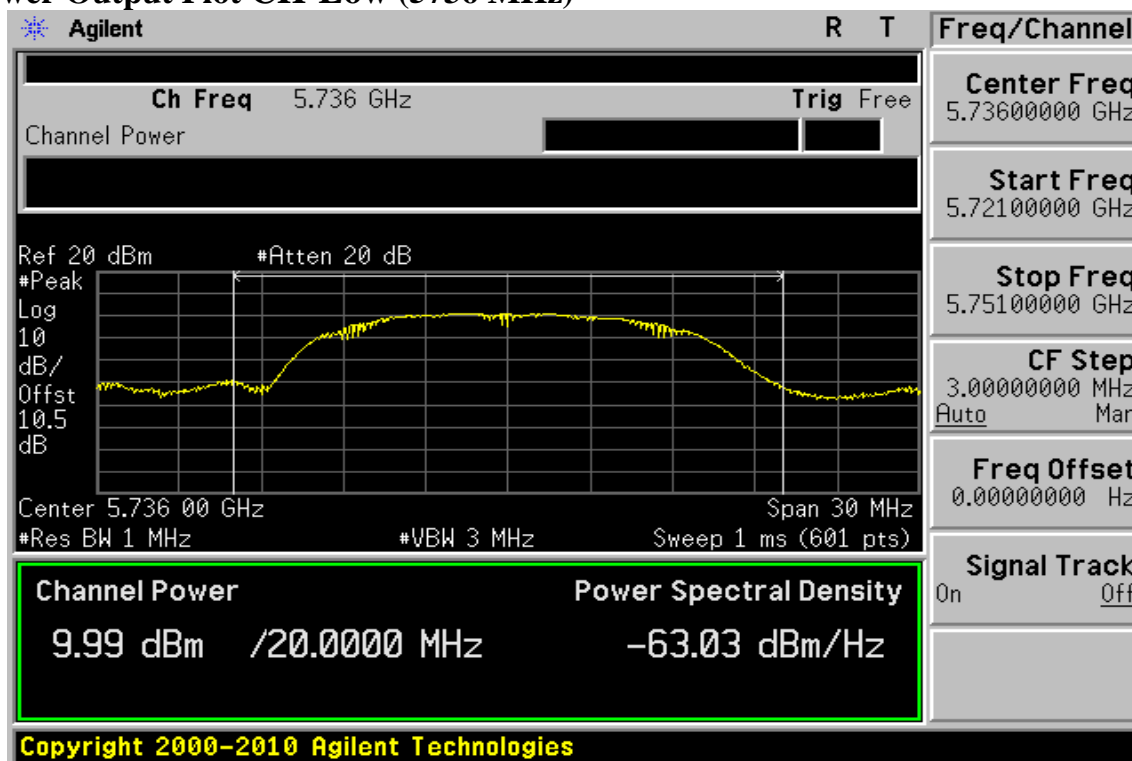
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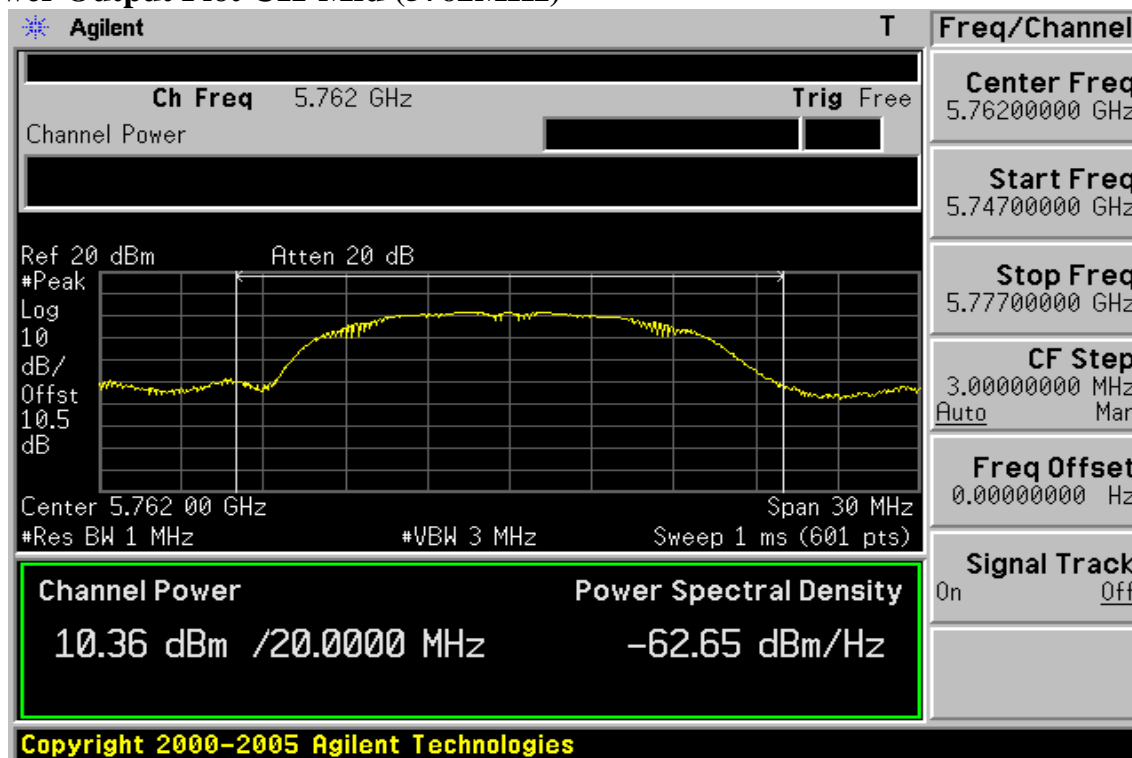
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## Peak Power Output Plot CH-Low (5736 MHz)



## Peak Power Output Plot CH-Mid (5762MHz)



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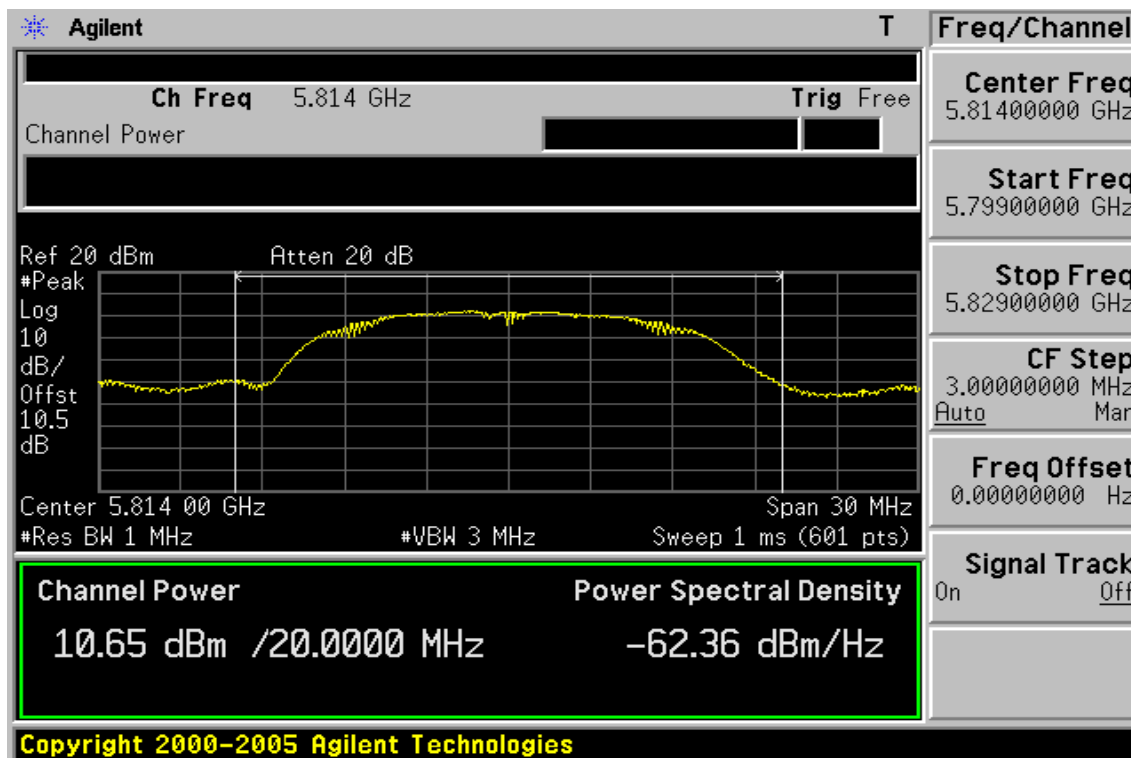
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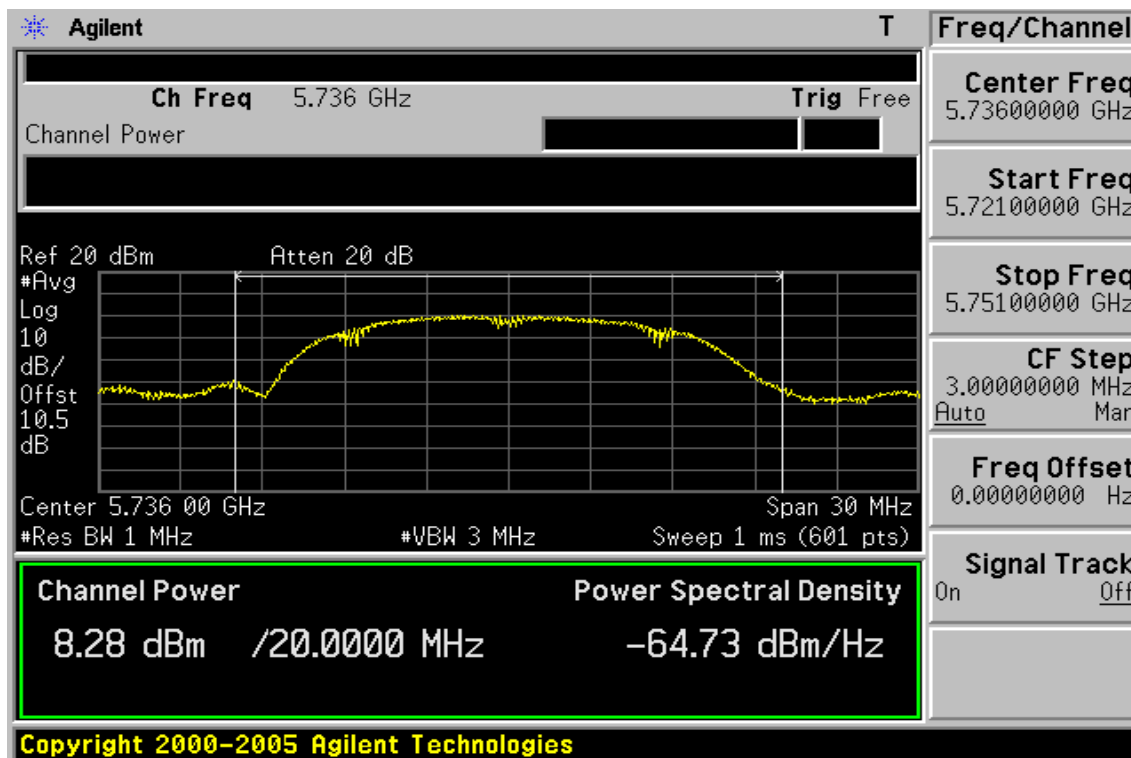
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## Peak Power Output Plot CH-High (5814 MHz)



## Average Power Output Plot CH-Low (5736 MHz)

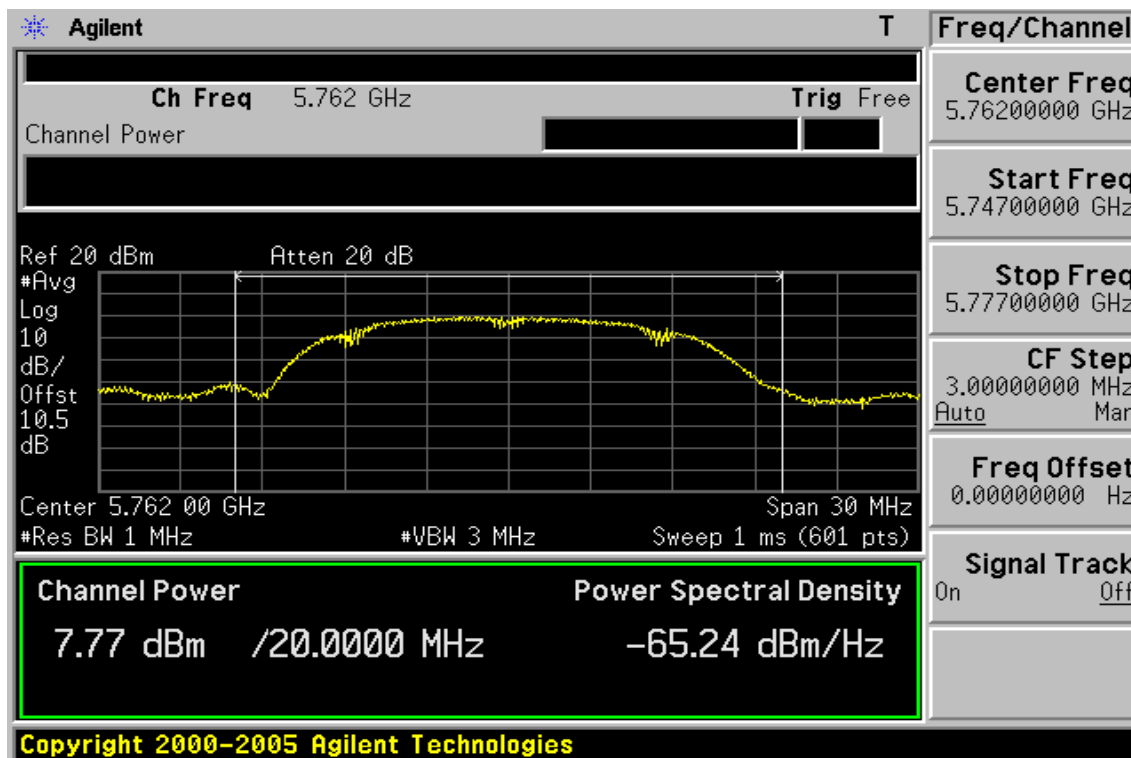


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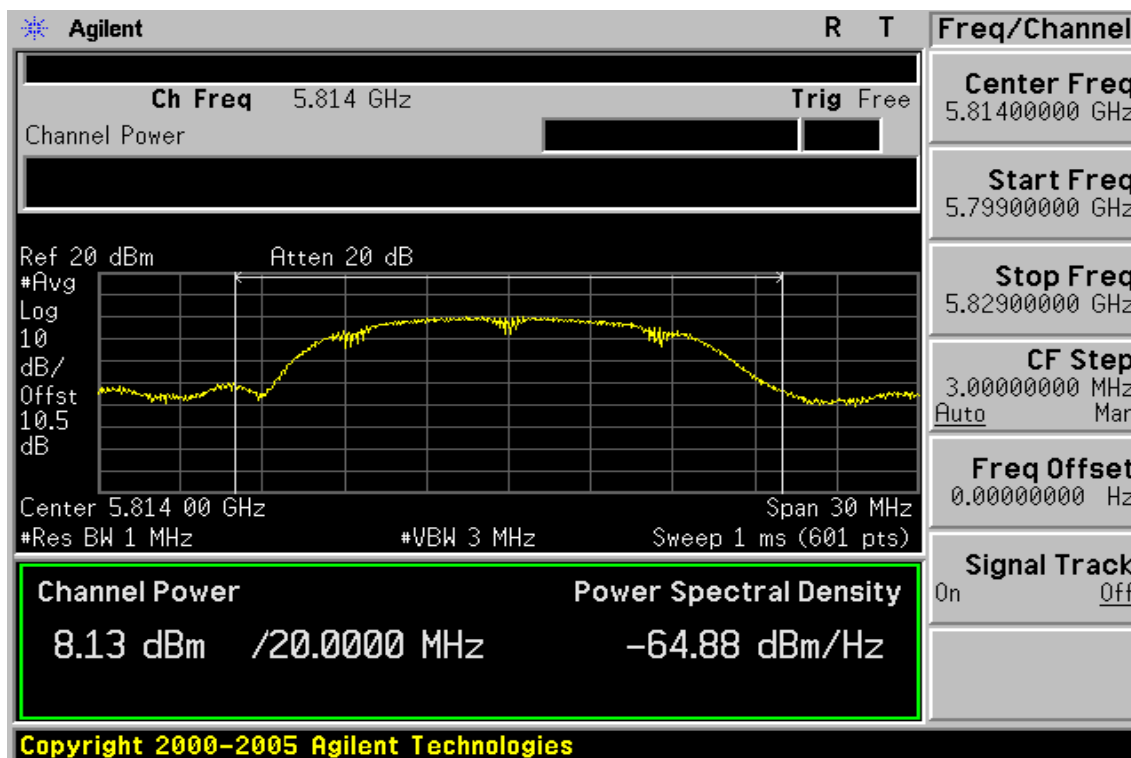
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## Average Power Output Plot CH-Mid (5762 MHz)



## Average Power Output Plot CH-High (5814 MHz)



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## 8 6dB BANDWIDTH

### 8.1 Standard Applicable:

According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

### 8.2 Measurement Equipment Used:

Refer to section 7.2 for details.

### 8.3 Test Set-up:

Refer to section 7.3 for details.

### 8.4 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 = 200 kHz, VBW = 3\*RBW, Span = 30MHz-50MHz, Sweep=auto
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat above procedures until all measurement of required selective channel (low, mid, high) is completed.

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## 8.5 Measurement Result:

Frequency (MHz)	Bandwidth (MHz)	Bandwidth (KHz)	Result
5736	9.927	> 500	PASS
5762	9.920	> 500	PASS
5814	9.925	> 500	PASS

*\*Note: Offset 10.5dB*

Note: Refer to next page for plots.

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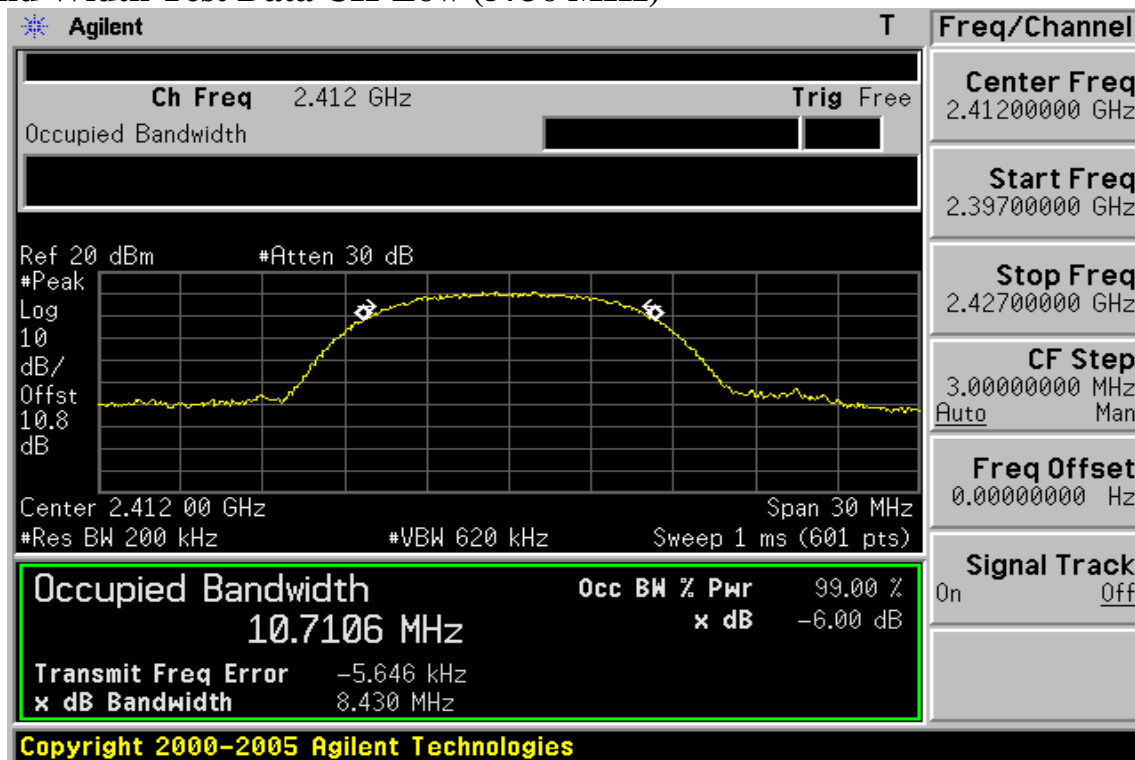
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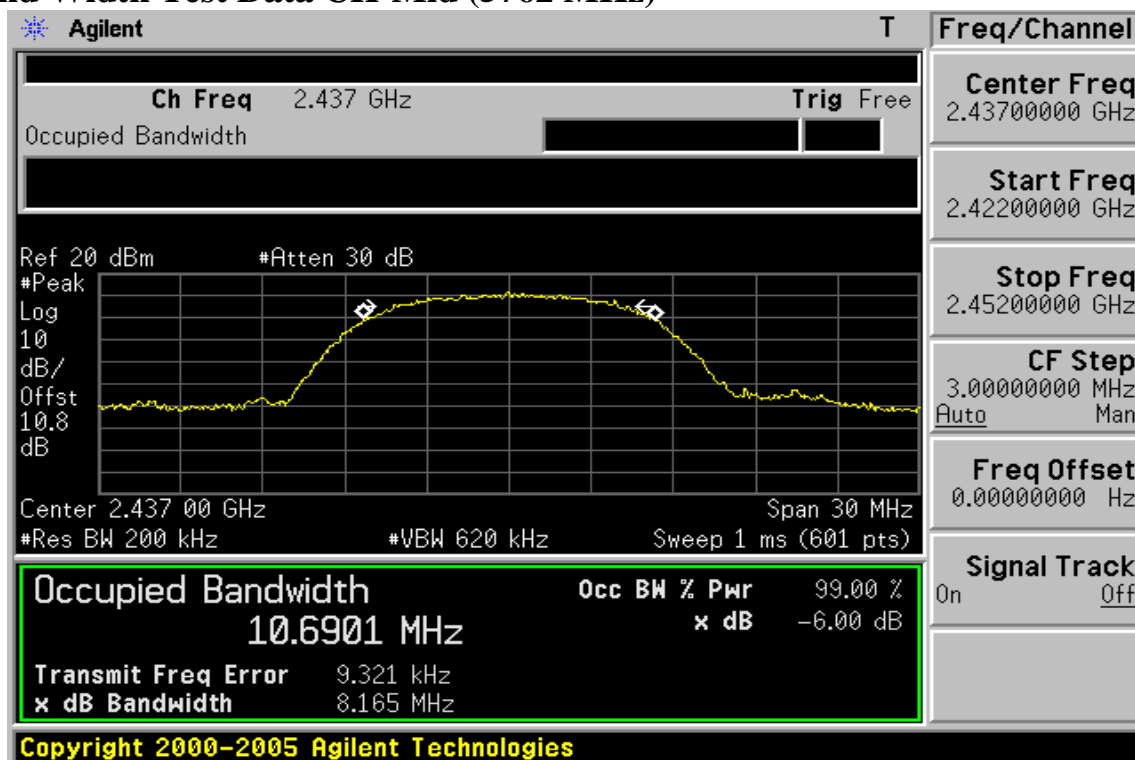
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## 6dB Band Width Test Data CH-Low (5736 MHz)



## 6dB Band Width Test Data CH-Mid (5762 MHz)



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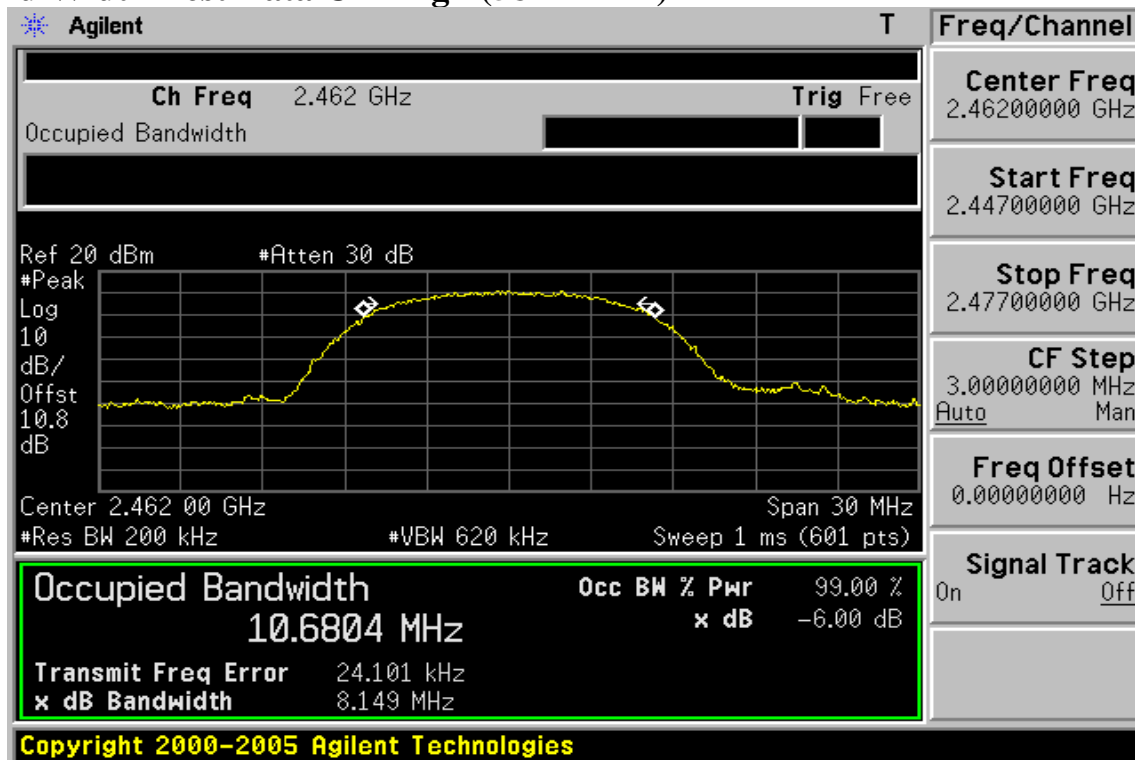
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## 6dB Band Width Test Data CH-High (5814 MHz)



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## 9 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 9.1 Standard Applicable:

According to §15.247(d), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is 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).

### 9.2 Measurement Equipment Used:

#### 9.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

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## 9.2.2 Radiated emission:

966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
RF amplifier	Miteq	AMF-6F-2600 400-40-8P	971576	12/28/2012	12/27/2013
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2013	01/03/2014
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2013	01/03/2014
5150-5350 Band Reject Filter	Micro-Tronics	BRM50703	1	01/04/2013	01/03/2014
5470-5725 Band Reject Filter	Micro-Tronics	BRM50704	1	01/04/2013	01/03/2014
5725-5875 Band Reject Filter	Micro-Tronics	BRM50705	1	01/04/2013	01/03/2014
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	02/28/2012	02/27/2013
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	02/28/2012	02/27/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
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	966_Rx	9	01/04/2013	01/03/2014
3m Site NSA	SGS	966 chamber	N/A	07/15/2012	07/14/2013

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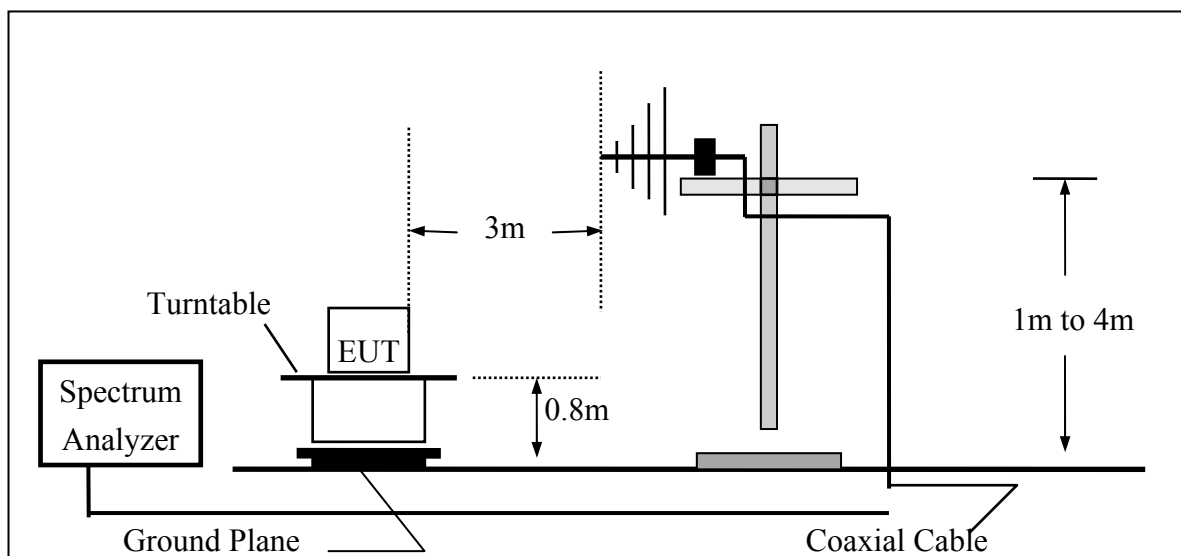
## 9.3 Test SET-UP:

### 9.3.1 Conducted Emission at antenna port:

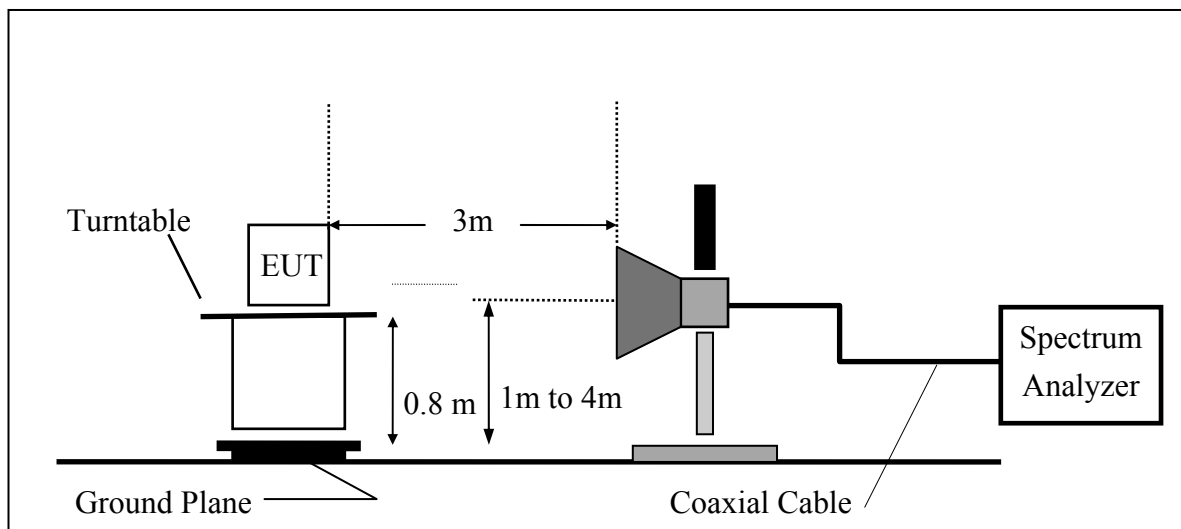
Refer to section 7.3 for details.

### 9.3.2 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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#### 9.4 Measurement Procedure:

##### Conducted Emission Test:

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, 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.

#### 9.5 Measurement Result:

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

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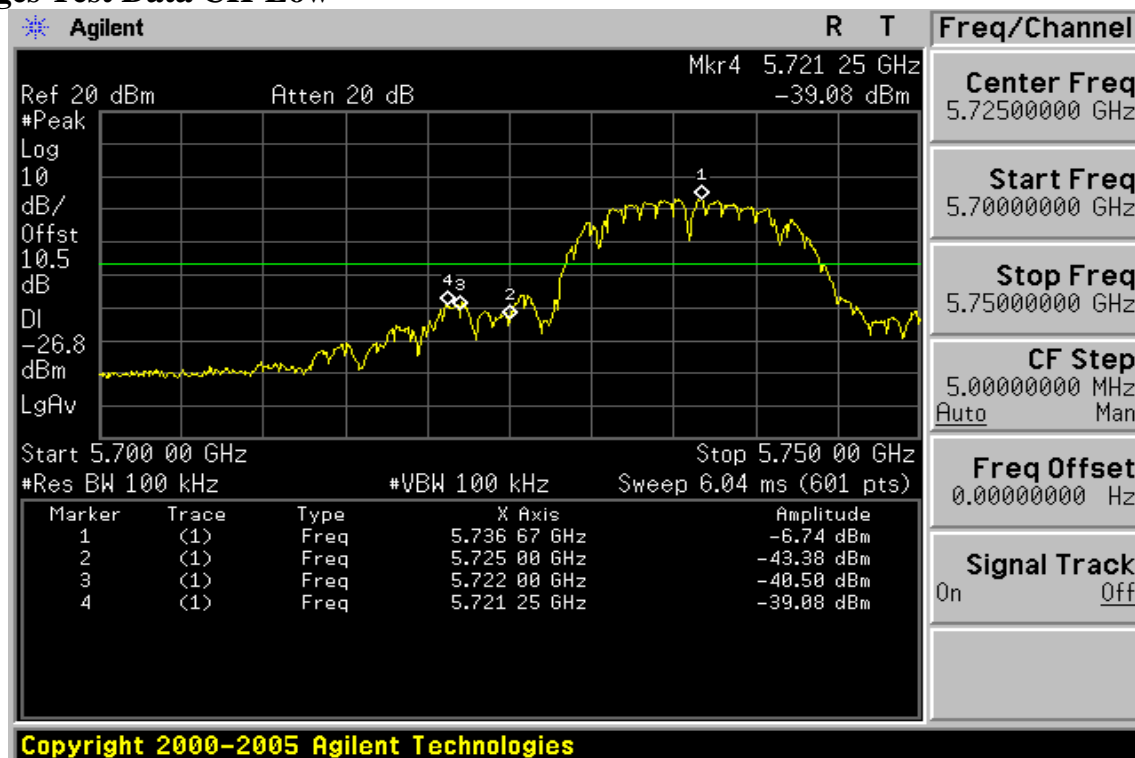
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## Band Edges Test Data CH-Low



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## 10 SPURIOUS RADIATED EMISSION TEST

### 10.1 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.

### 10.2 Measurement Equipment Used:

#### 10.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

#### 10.2.2 Radiated emission:

Refer to section 9.2.2 for details.

### 10.3 Test SET-UP:

#### 10.3.1 Conducted Emission at antenna port:

Refer to section 7.3 for details.

#### 10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

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#### 10.4 Measurement Procedure:

##### Radiated Emission:

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 = 300K 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
4. Via Software, combine 5 spans of frequency range into one plot

#### 10.5 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	

#### 10.6 Measurement Result:

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

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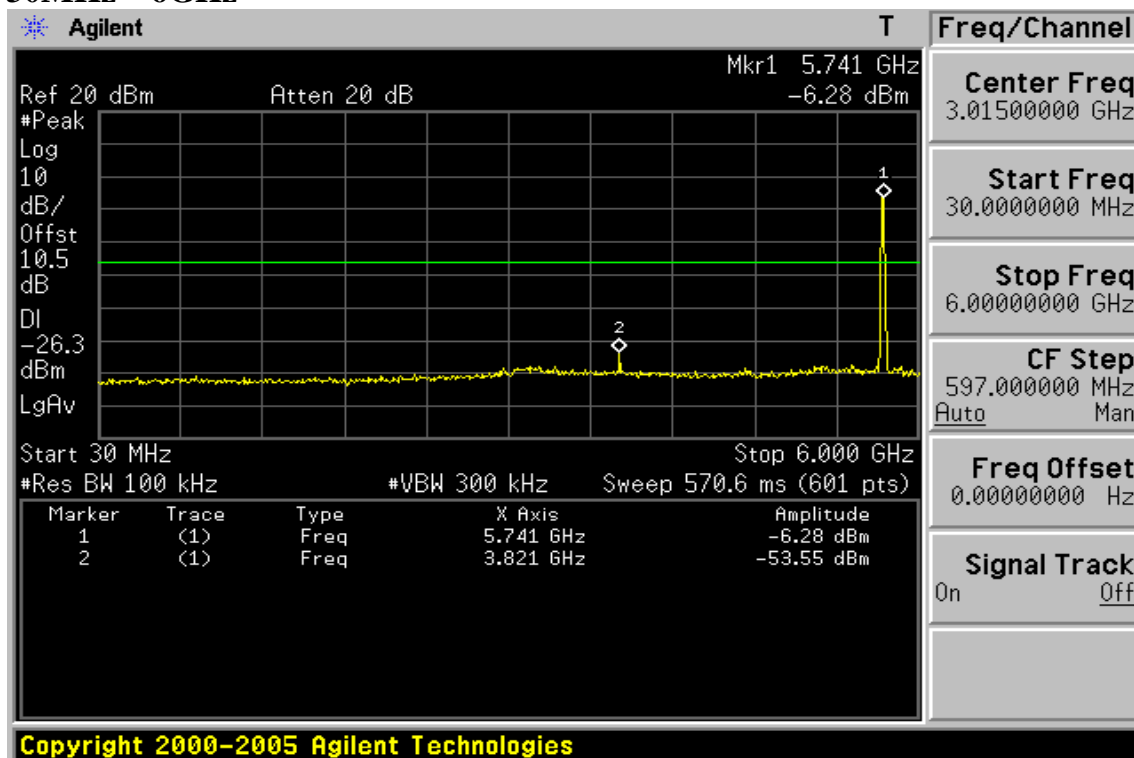
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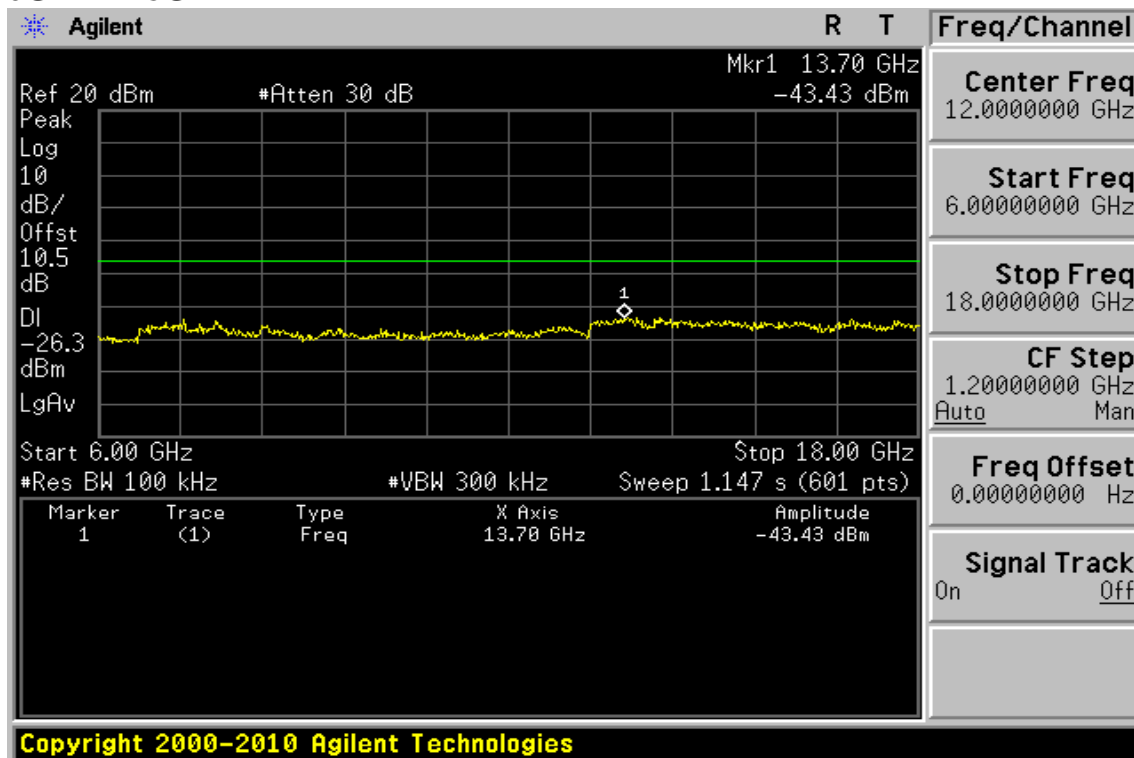
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## Conducted Spurious Emission Measurement Result Ch Low 30MHz – 6GHz



## Ch Low 6GHz – 18GHz



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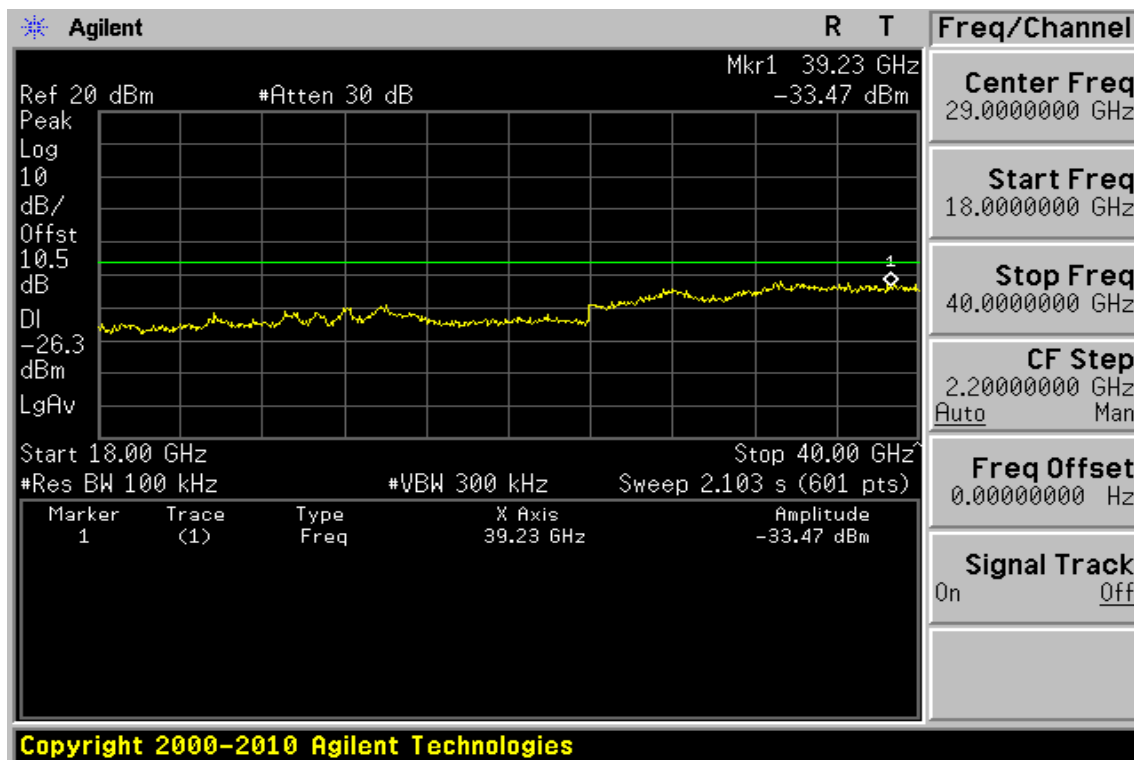
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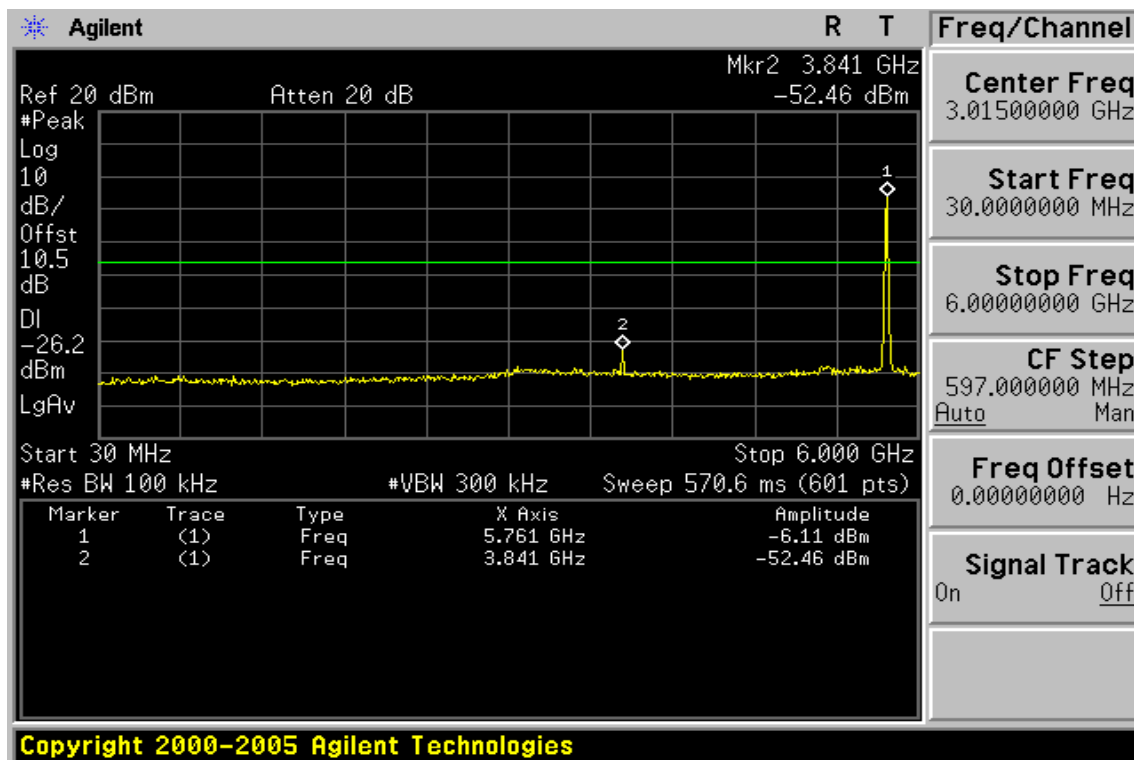
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## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz



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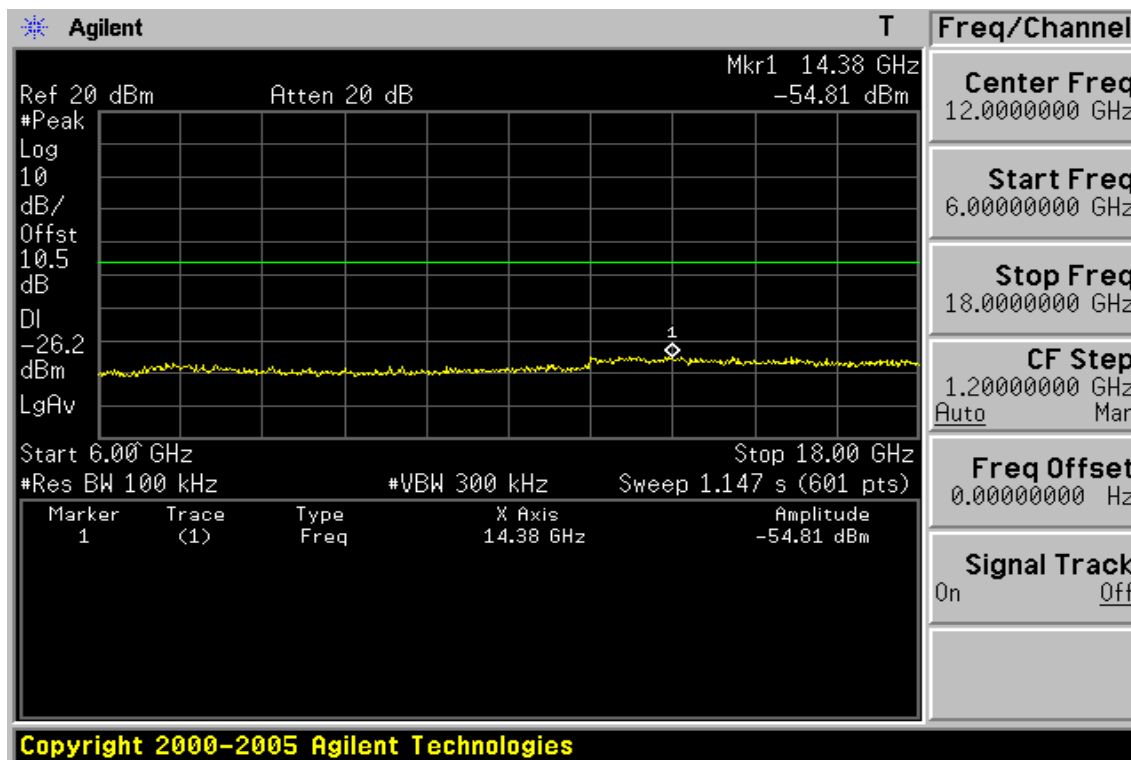
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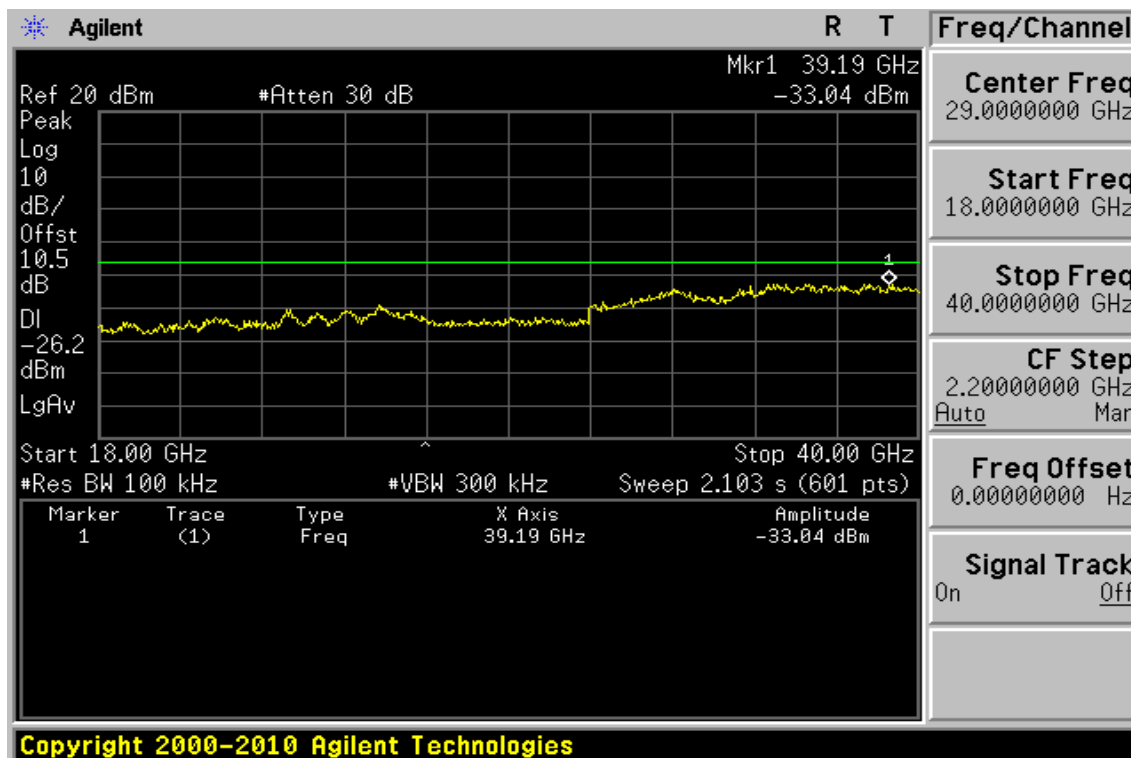
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## Ch Mid 6GHz – 18GHz



## Ch Mid 18GHz – 40GHz



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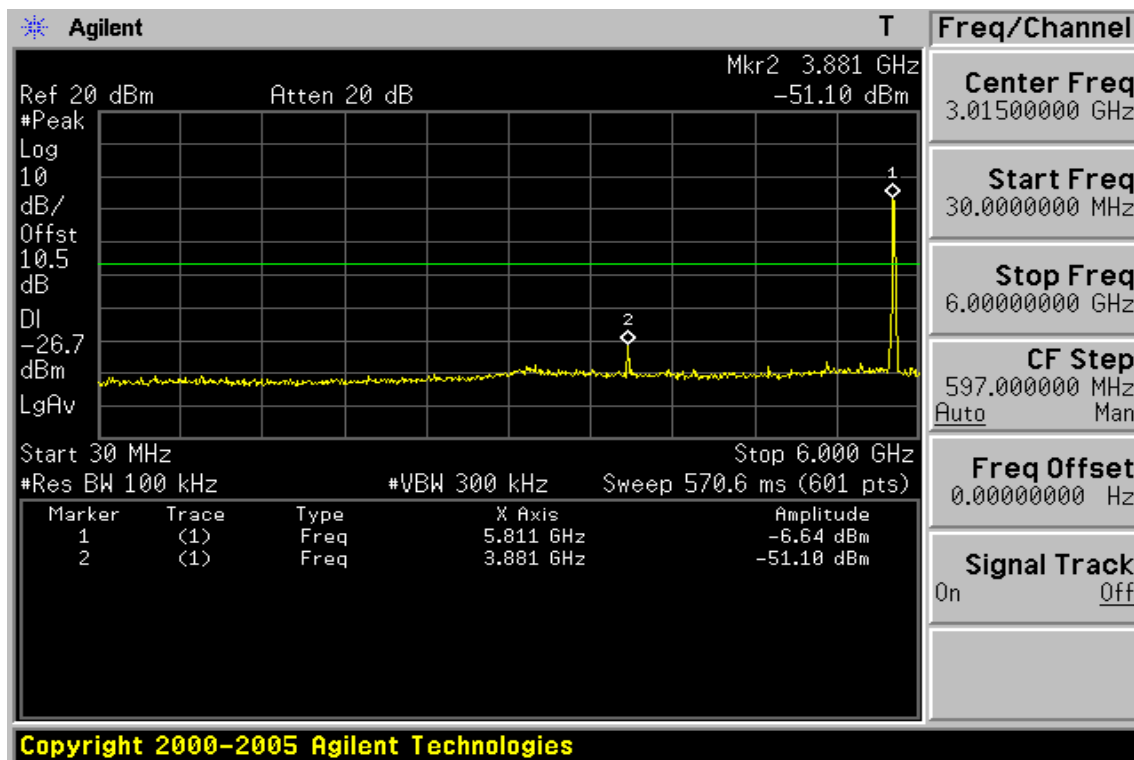
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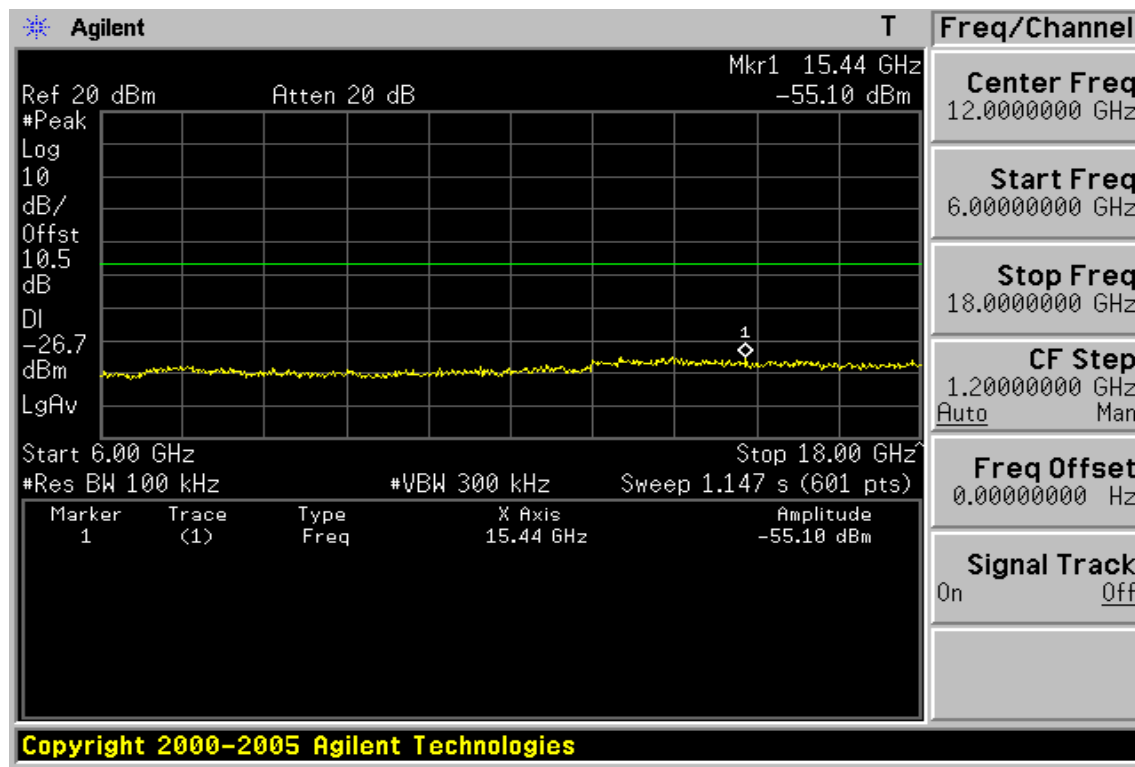
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## Ch High 30MHz – 6GHz



## Ch High 6GHz – 18GHz



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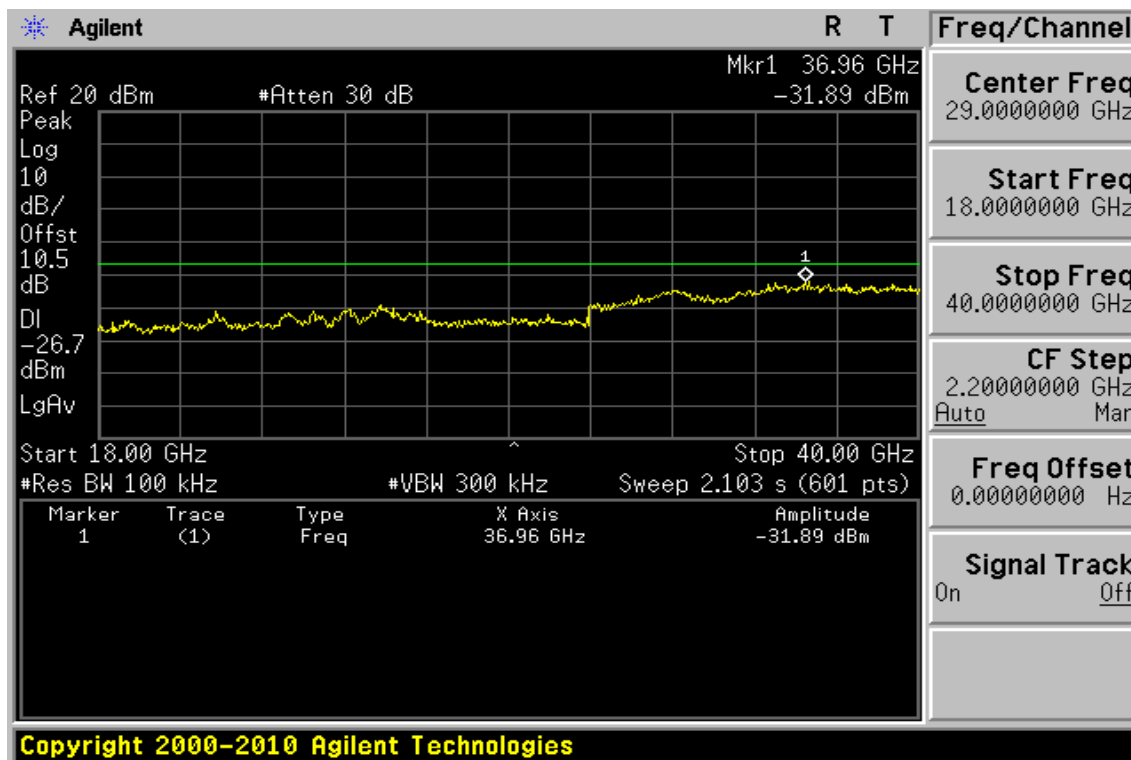
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## Ch High 18GHz – 40GHz



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**Radiated Spurious Emission Measurement Result**

Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5736 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/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 Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
43.58	S	Peak	41.72	-13.70	28.02	40.00	-11.98
149.31	S	Peak	50.06	-12.38	37.68	43.50	-5.82
392.78	S	Peak	35.51	-11.14	24.37	46.00	-21.63
540.22	S	Peak	36.18	-8.78	27.40	46.00	-18.60
613.94	S	Peak	33.89	-7.25	26.64	46.00	-19.36
687.66	S	Peak	32.68	-5.91	26.77	46.00	-19.23
11472.00	H	Peak	18.62	17.53	36.15	74.00	-37.85
17208.00	H	---					
22944.00	H	---					
28680.00	H	---					
34416.00	H	---					

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Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5736 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX LOW	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/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	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
152.22	S	Peak	49.56	-12.32	37.24	43.50	-6.26
198.78	S	Peak	47.97	-16.05	31.92	43.50	-11.58
392.78	S	Peak	42.82	-11.14	31.68	46.00	-14.32
423.82	S	Peak	41.53	-10.56	30.97	46.00	-15.03
442.25	S	Peak	39.49	-10.16	29.33	46.00	-16.67
786.60	S	Peak	33.97	-4.38	29.59	46.00	-16.41
11472.00	H	Peak	18.93	17.31	36.24	74.00	-37.76
17208.00	H	---					
22944.00	H	---					
28680.00	H	---					
34416.00	H	---					

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Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5762 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre\_Amplifier Gain(dB)

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.

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“---” : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
43.58	S	Peak	41.77	-13.70	28.07	40.00	-11.93
151.25	S	Peak	50.01	-12.34	37.67	43.50	-5.83
191.99	S	Peak	43.79	-15.76	28.03	43.50	-15.47
392.78	S	Peak	35.32	-11.14	24.18	46.00	-21.82
540.22	S	Peak	35.91	-8.78	27.13	46.00	-18.87
613.94	S	Peak	33.78	-7.25	26.53	46.00	-19.47
11524.00	H	Peak	20.61	17.70	38.31	74.00	-35.69
17286.00	H	---					
23048.00	H	---					
28810.00	H	---					
34572.00	H	---					

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Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5762 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX MID	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/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	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
123.12	S	Peak	43.49	-14.35	29.14	43.50	-14.36
151.25	S	Peak	49.29	-12.34	36.95	43.50	-6.55
392.78	S	Peak	43.09	-11.14	31.95	46.00	-14.05
512.09	S	Peak	36.15	-9.36	26.79	46.00	-19.21
687.66	S	Peak	33.97	-5.91	28.06	46.00	-17.94
884.57	S	Peak	31.93	-3.11	28.82	46.00	-17.18
11524.00	H	Peak	18.86	17.50	36.36	74.00	-37.64
17286.00	H	---					
23048.00	H	---					
28810.00	H	---					
34572.00	H	---					

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Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5814 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/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	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
43.58	S	Peak	41.54	-13.70	27.84	40.00	-12.16
151.25	S	Peak	50.63	-12.34	38.29	43.50	-5.21
540.22	S	Peak	35.74	-8.78	26.96	46.00	-19.04
613.94	S	Peak	33.42	-7.25	26.17	46.00	-19.83
663.41	S	Peak	32.99	-6.32	26.67	46.00	-19.33
786.60	S	Peak	31.89	-4.38	27.51	46.00	-18.49
11628.00	H	Peak	18.31	17.76	36.07	74.00	-37.93
17442.00	H	---					
23256.00	H	---					
29070.00	H	---					
34884.00	H	---					

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Operation Band	:5.8G	Test Date	:2012-12-17
Fundamental Frequency	:5814 MHz	Temp./Humi.	:21.9 deg_C / 65 RH
Operation Mode	:TX HIGH	Engineer	:Marcus
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/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	Margin
		Mode	Reading Level		FS	@3m	
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
152.22	S	Peak	48.41	-12.32	36.09	43.50	-7.41
392.78	S	Peak	43.10	-11.14	31.96	46.00	-14.04
423.82	S	Peak	41.10	-10.56	30.54	46.00	-15.46
687.66	S	Peak	34.92	-5.91	29.01	46.00	-16.99
786.60	S	Peak	33.77	-4.38	29.39	46.00	-16.61
903.97	S	Peak	33.72	-2.73	30.99	46.00	-15.01
11628.00	H	Peak	18.45	17.56	36.01	74.00	-37.99
17442.00	H	---					
23256.00	H	---					
29070.00	H	---					
34884.00	H	---					

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## 11 PEAK POWER SPECTRAL DENSITY

### 11.1 Standard Applicable:

According to §15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

### 11.3 Test Set-up:

Refer to section 7.3 for details.

### 11.4 Measurement Procedure:

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW  $\geq 3$  kHz.
4. Set the VBW  $\geq 3 \times$  RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

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### 11.5 Measurement Result:

Frequency MHz	RF Power Density Reading (dBm)	BWCF dB	RF Power Density Level (dBm)	Maximum Limit (dBm)
5736	-9.00	15.20	-24.20	8
5762	-8.60	15.20	-23.80	8
5814	-8.52	15.20	-23.72	8

*\*Note: Offset 10.5dB*

Note: Refer to next page for plots.

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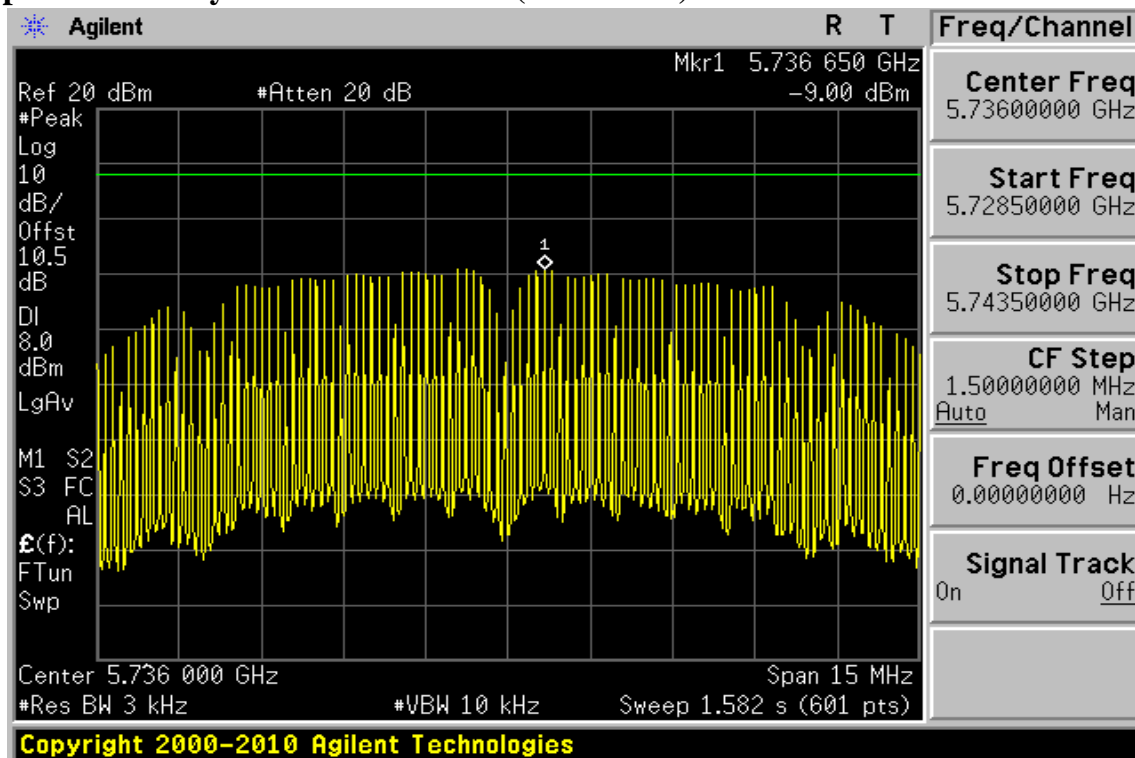
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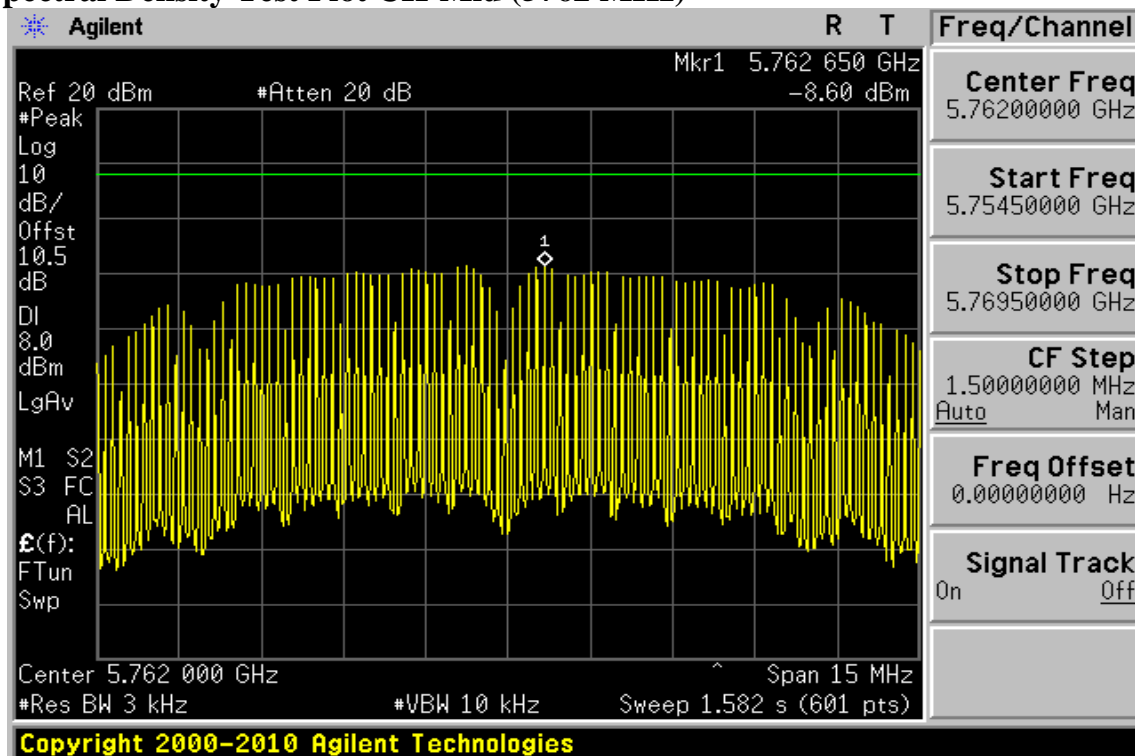
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## Power Spectral Density Test Plot CH-Low (5736 MHz)



## Power Spectral Density Test Plot CH-Mid (5762 MHz)



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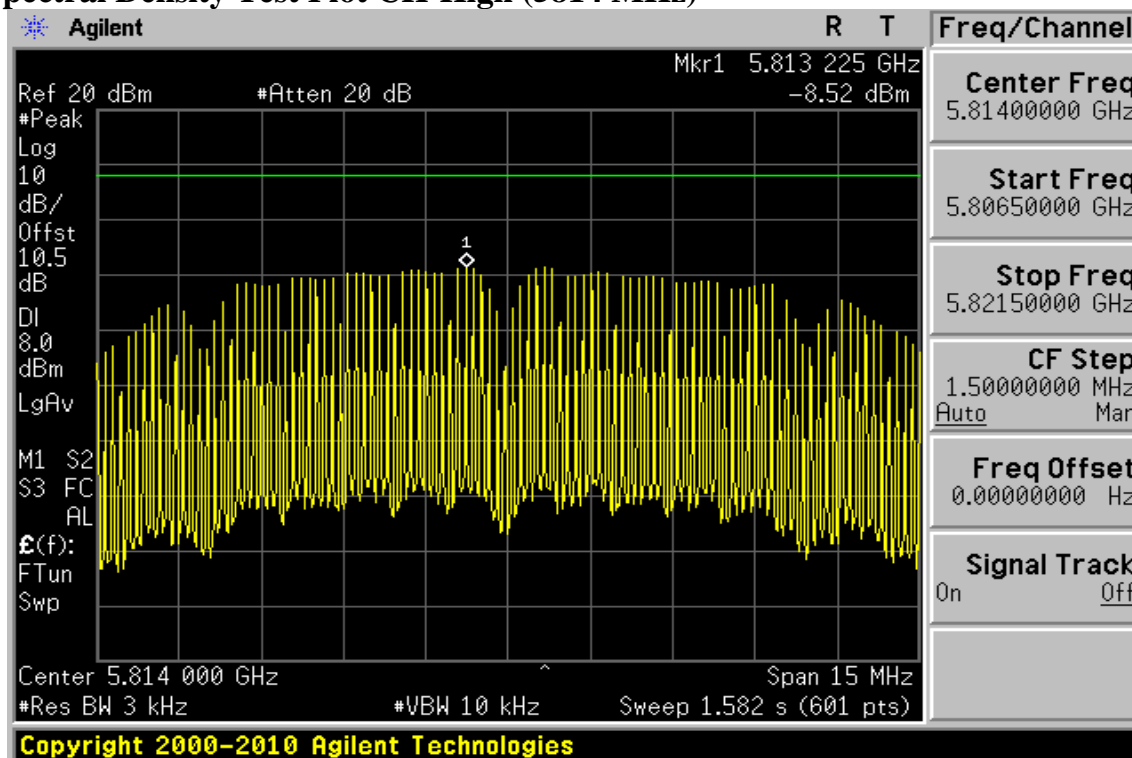
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## Power Spectral Density Test Plot CH-High (5814 MHz)



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## 12 ANTENNA REQUIREMENT

### 12.1 Standard Applicable:

According to §15.203, Antenna requirement.

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

### 12.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting are 3.0dBi and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

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## 13 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### 13.1 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 Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

\* = Plane-wave equipment power density

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### 13.2 Maximum Permissible Exposure (MPE) Evaluation:

#### Peak Power Output (dBm)

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5736.00	10.90	10.90	0.01230	1
5762.00	10.36	10.36	0.01086	1
5814.00	10.65	10.65	0.01161	1

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### 15.3. MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG / 4 \pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	10.65	(dBm)
Maximum peak output power at antenna input terminal:	11.61448614	(mW)
Duty cycle:	96	(%)
Maximum Pav :	11.14990669	(mW)
Antenna gain (typical):	3	(dBi)
Maximum antenna gain:	1.995262315	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5814	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.0044281	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.00443 mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5814.

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**Simultaneous MPE:**

As per KDB 447498 D01, Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is  $\leq 1.0$ .

MPE 1 as obtains in 5.8GHz module transmission:  $0.0044281 \text{ mW/cm}^2$

MPE 2 as obtains in Bluetooth transmission:  $0.0006144 \text{ mW/cm}^2$ , where derivation of the power density can be referred EF/2012/C0011

$\Sigma \text{ MPE ratio} = \text{MPE1/MPE Limit} + \text{MPE2/MPE Limit} = 0.0044281/1 + 0.0006144/1 = 0.0050425$   
 $0.0050425 < 1.0$ ,

Therefore, simultaneous transmission MPE test can be excluded.

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