ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

Product Name:	**PDA Phone**
Brand Name:	**Sony**
Model No.:	**C2004**
Type No.:	**PM-0481-BV**
Model Difference:	**N/A**
FCC ID:	**PY7PM-0481**
IC:	**4170B-PM0481**
Report No.:	**EH/2013/70024**
Issue Date:	**Aug. 05, 2013**
FCC Rule Part:	**§15.247, Cat: DTS**
IC Rule Part:	**RSS-210 issue 8 :2010, Annex 8**
Prepared for:	**Sony Mobile Communications AB Nya Vattentornet 22188 Lund/SWEDEN**
Prepared by:	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

VERIFICATION OF COMPLIANCE

Applicant:	Sony Mobile Communications AB Nya Vattentornet 22188 Lund/SWEDEN
Product Name:	PDA Phone
Brand Name:	Sony
Model No.:	C2004
Type No.:	PM-0481-BV
Model Difference:	N/A
FCC ID:	PY7PM-0481
IC :	4170B-PM0481
File Number:	EH/2013/70024
Date of test:	Apr. 01, 2013 ~ Jul. 23, 2013
Date of EUT Received:	Apr. 01, 2013

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 & ANSI C63.10:2009 and RSS-Gen. issue 3 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 and IC 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:	Marcus Tseng	***Date***	Aug. 05, 2013
	Marcus Tseng / Engineer		
Prepared By:	Violetta Tang	***Date***	Aug. 05, 2013
	Violetta Tang / Clerk		
Approved By:	Jim Chang	***Date***	Aug. 05, 2013
	Jim Chang / Supervisor		

Revision History

Report Number	Revision	Description	Issue Date
EH/2013/70024	Rev.01	Initial creation of document	Jul. 26, 2013
EH/2013/70024	Rev.02	Inappropriate section of referenced standard is updated on page 32	Aug. 05, 2013

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1 GENERAL INFORMATION

1.1 Product Description

General:

Product Name:	PDA Phone	
Brand Name:	Sony	
Model No.:	C2004	
Type No.:	PM-0481-BV	
Model Difference:	N/A	
Data Cable (USB):	Model No.: EC450, Supplier: K-one Part No.: 1242-6715.3, Length: 100 cm	
Simple Hands-Free (SHF-White):	Model No.: MH410c, Supplier: Foster Electric Type No.: AG-1100	
Simple Hands-Free (SHF-Black):	Model No.: MH410c, Supplier: Foster Electric Type No.: CCA-0004017	
Car Charger:	Model No.: AN400, Supplier: Salcomp Type No.: CAA-0003013	
Hi-Fi Wireless Headset:	Model No.: MW600, Supplier: BALDA Type No.: DDA-0002029.B coupling with Simple Hands Free (Model No.: MH755, Supplier: BALDA Type No.: AG-0502)	
Hardware Version:	A	
Software Version:	15.2.A.0.17	
Power Supply:	3.7Vdc	
	Battery:	Model No.: BA900, Supplier: Sony Type No.: AB-0500
	Adapter:	Model No.: EP800, Supplier: Salcomp Type No.: CAA-0002016-US

Bluetooth BR+EDR:

Bluetooth Version:	V3.0+HS
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	10.11dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	<= 0.4s
Antenna Designation:	PIFA Antenna, Gain: 2.55dBi
Type of Emission:	915KF7D (GFSK) / 1M15G7D (π/4DQPSK) /1M20G7D (8DPSK)

Bluetooth Low Energy:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	V4.0 Dual mode
Channel number:	40 channels
Modulation type:	GFSK
Transmit Power:	1.24dBm (Peak)
Antenna Designation:	PIFA Antenna, Gain: 2.55dBi
Type of Emission	1M05F7D

NFC:

Operating Frequency:	13.56MHz
Transmit Power:	< 123dBuV/m at 3m.
Number of Channels:	1
Antenna Type:	Loop Antenna
Modulation Type:	ASK, BPSK
Type of Emission:	15K0F1D

WLAN 2.4GHz+5.7GHz:

Wi-Fi	Frequency Range	Channels	Rated Power	Modulation Technology	Type of Emission
11b/g	2412-2462	11	b: 17.27dBm g: 20.82dBm	DSSS, OFDM	b: 13M5G1D g: 16M6D1D
11n	HT20 2412-2462	11	HT20: 20.84dBm	OFDM	n: 17M8D1D
11a	5725-5850	5	a: 19.54dBm	OFDM	a: 16M7D1D
11n (5GHz)	HT20 5725-5850	5	HT20: 19.62dBm		n_20HT:17M8D1D
11n (5GHz)	HT40 5725-5850	2	HT40: 19.18dBm		n_40HT:36M0D1D
Antenna Designation:		PIFA Antenna, 2.4GHz Gain: 2.55dBi 5GHz Gain: 1.66dBi (5725MHz-5850MHz)			
Modulation type:		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM			
Transition Rate:		802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 b: 1/2/5.5/11 Mbps 802.11 g: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 65.0Mbps 802.11 n_40MHz: 13.5 – 135.0Mbps			

WLAN 5GHz:

Wi-Fi	Frequency Range	Channels	Rated Power (Avg)	Rated Power (EIRP)	Modulation Technology	Type of Emission
11a	5150~5250	4	12.77dBm	12.03dBm	OFDM	16M7D1D
	5250~5350	4	12.78dBm	13.79dBm		16M7D1D
	5470~5725	11	12.87dBm	15.57dBm		16M6D1D
11n	HT20 5150~5250	4	HT20: 12.85dBm	HT20: 12.11dBm	OFDM	17M7D1D
	HT20 5250~5350	4	HT20: 12.84dBm	HT20: 13.85dBm		17M8D1D
	HT20 5470~5725	8	HT20: 12.88dBm	HT20: 15.58dBm		17M7D1D
11n	HT40 5150~5250	2	HT40: 11.76dBm	HT40: 11.05dBm	OFDM	36M1D1D
	HT40 5250~5350	2	HT40: 11.79dBm	HT40: 12.80dBm		36M1D1D
	HT40 5470~5725	3	HT40: 11.87dBm	HT40: 14.57dBm		36M0D1D
Antenna Designation:	PIFA Antenna, 5GHz Gain: -0.74dBi (5150MHz-5250MHz) 5GHz Gain: 1.01dBi (5250MHz-5350MHz) 5GHz Gain: 2.70dBi (5470MHz-5725MHz)					
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM					
Transition Rate:	802.11 a: 6/9/12/18/24/36/48/54 Mbps 802.11 n_20MHz: 6.5 – 65.0Mbps 802.11 n_40MHz: 13.5 – 135.0Mbps					

GSM / WCDMA:

Cellular Phone Standards Frequency Range and Power.	Operating Frequency		Rated Power
	GSM/GPRS 850, Class 12	824.2 MHz– 848.8 MHz	33dBm
	EDGE 850, Class 12	824.2 MHz– 848.8 MHz	27dBm
	GSM/GPRS 1900, Class 12	1850.2MHz – 1909.8MHz	30dBm
	EDGE 1900, Class 12	1850.2MHz – 1909.8MHz	26dBm
	WCDMA/HSUPA/HSDPA /HSPA+ Band II	1852.4MHz – 1907.6MHz	24dBm
	WCDMA/HSUPA/HSDPA /HSPA+ Band IV	1712.4MHz - 1752.6MHz	24dBm
	WCDMA/HSUPA/HSDPA /HSPA+ Band V	826.4MHz - 846.6MHz	24dBm
Type of Emission:	GSM 850: 248KGXW, GSM 1900: 247KGXW GPRS 850: 247KGXW, GPRS 1900: 247KGXW EDGE 850: 244KG7W, EDGE 1900: 242KG7W WCDMA Band II: 4M20F9W, WCDMA Band IV: 4M16F9W, WCDMA Band V: 4M26F9W HSDPA Band II: 4M22F9W, HSDPA Band IV: 4M23F9W, HSDPA Band V: 4M17F9W HSUPA Band II: 4M20F9W, HSUPA Band IV: 4M25F9W, HSUPA Band V: 4M27F9W		
IMEI:	004402146722479		

The report applied for Bluetooth Low Energy.

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: PY7PM-0481** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. And **IC: 4170B-PM0481** filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 8. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4:2009 & ANSI C63.10:2009 and RSS-Gen: 2010. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with Apr 2013 KDB558074 D01 V03 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. Electronics & Communication Laboratory No.134, Wu Kung Road, Wuku Industrial Zone, Taipei County, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2009. & ANSI C63.10:2009. FCC Registration Number is: 990257, 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.

1.5 Special Accessories

There are no special accessories used while test was conducted.

1.6 Equipment Modifications

There was no modification incorporated into the EUT.

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

An engineering test mode (software/firmware) that applicant provided was utilized to manipulate the EUT into transmit, selection of the test channel, and modulation scheme.

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 general criterion in Section 7.1 of ANSI C63.4:2009 & 6.2 ANSI 63.10:2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz, and the measurement procedure 7.3 in ANSI 63.4:2009 & 6.2.2, and 6.2.3 in ANSI 63.10:2009 is followed to carry out the test. The CISPR Quasi-Peak and Average detector mode is employed according to §15.107

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 and of ANSI C63.4:2009, & Section 6.3, 6.4, 6.5, and 6.6 of ANSI 63.10:2009.ANSI C63.10:2009.

2.4 Configuration of Tested System

Fig. 2-1 Radiated Emission

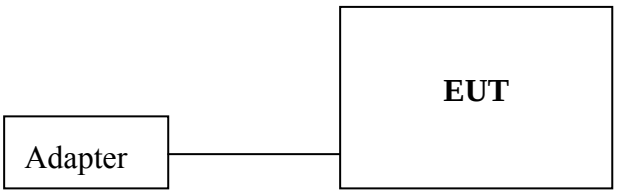


Fig. 2-2 Conducted (Antenna Port) Configuration

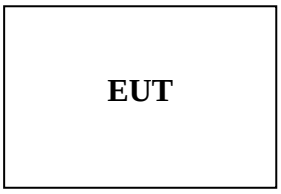


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	QRCT	2.4.83.0	N/A	N/A	N/A

Fig. 2-3 AC Power Line Conducted Emission

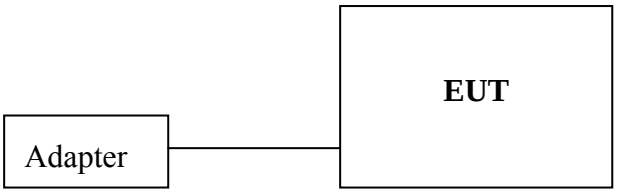


Table 2-2 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	Bluetooth Test Software	QRCT	2.4.83.0	N/A	N/A	N/A

3 SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a) RSS-Gen §7.2.4	AC Power Line Conducted Emission	Compliant
§15.247(b) (3) RSS-210 §A8.4(4)	Peak Output Power	Compliant
§15.247(a)(2) RSS-210 §A8.2(a) RSS-Gen §4.6.2	6dB Bandwidth	Compliant
§15.247(d) RSS-210 §A8.5	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.247(d) RSS-210 §A8.5	Spurious Emission	Compliant
§15.247(e) RSS-210 §A8.2(b)	Peak Power Density	Compliant
§15.203 RSS-GEN §7.1.2,	Antenna Requirement	Compliant
RSS-Gen §4.6.1	99% Power Bandwidth	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 (2402MHz)、mid (2442MHz) and high (2480MHz) with BT4.0 mode is chosen for full testing.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for BT4.0 mode Transmitter for channel Low, Mid and High, the worst case E2 position was reported.

The given application is dual SIM build of certified product, PY7PM-0480, 4170B-PM-0480. It differs only in the mental shield covering the portion of slot space that is preserved in the built applicable PY7PM-0480, and 4170B-PM-0480. Except for the change as aforementioned above, all hardware, software relevant to RF Parameter of Physical layer, I/O signal remains unchanged, and the data as measured in the authorization of PY7M-0480, 4170B-PM-0480, and remains, and entails representative.

This test report only demonstrates the result of spot-check on Radiated Spurious Emission in order to reveal of the evidence of compliance record proving the implementation of dual SIM built causes no degradation as compared to build, PY7PM-0480/4170B-PM-0480.

5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
AC Power Line Conducted Emission	+/- 2.586 dB
Peak Output Power	+/- 1.42 dB
6dB Bandwidth	+/- 123.36 Hz
100 KHz Bandwidth Of Frequency Band Edges	+/- 1.55 dB
Peak Power Density	+/- 1.55 dB
99% Power Bandwidth	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

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

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

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

6 CONDUCTED EMISSION TEST

6.1 Standard Applicable:

According to §15.207 and RSS-Gen §7.2.4, 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.		

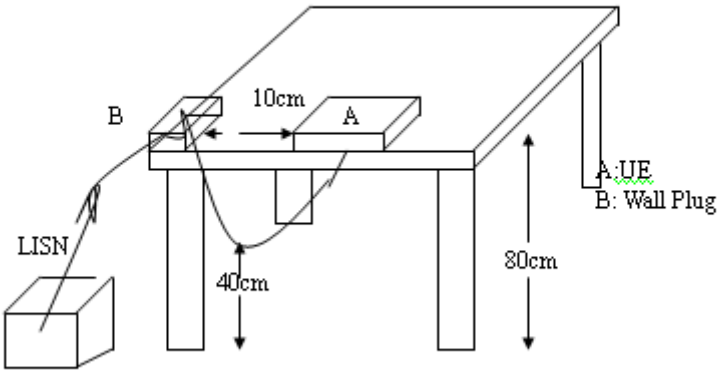
6.2 Measurement Equipment Used:

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	03/23/2013	03/22/2014
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2013	03/22/2014
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 & ANSI C63.10:2009.
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.

6.4 Test SET-UP (Block Diagram of Configuration)



6.5 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 phases of power being supplied by given UE are completed

6.6 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.

Note2: The * reveals the worst-case results that closet to the limit

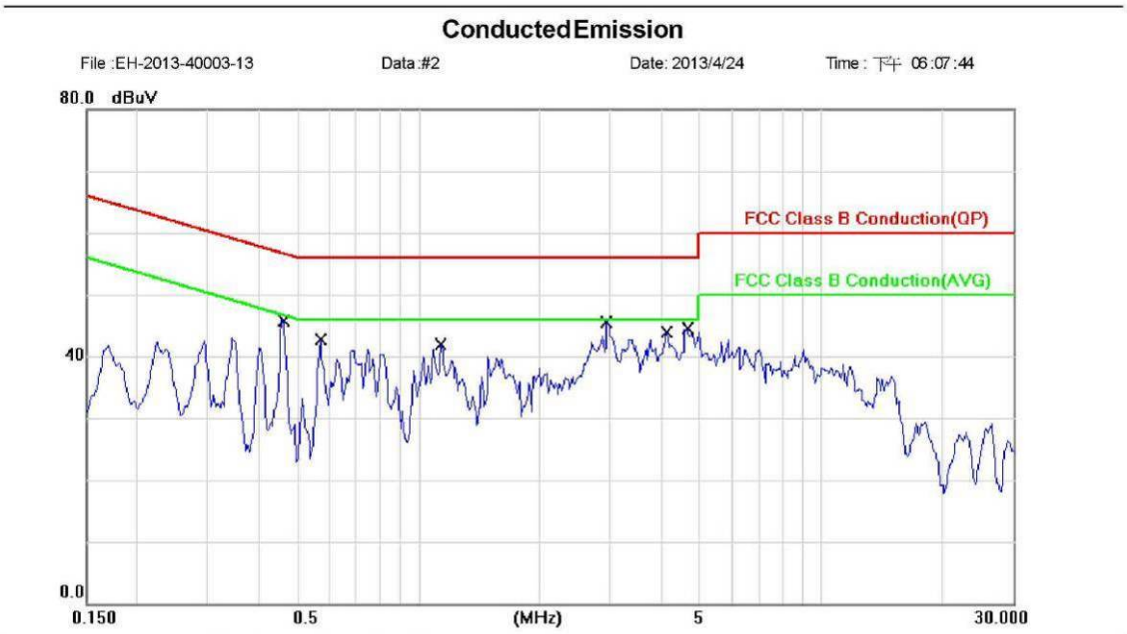
AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation mode			Test Date:	Apr. 24, 2013
Temperature:	26 ℃	Humidity:	60 %	Test By:	Marcus

Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: PDA Phone
M/N: C2004
Note:

Phase: L1
Power: AC 120V/60Hz
Distance:
Mode: Operationmode

Temperature: 26 ℃
Humidity: 60%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4681	37.79	0.07	37.86	56.55	-18.69	QP	
2		0.4681	27.37	0.07	27.44	46.55	-19.11	AVG	
3		0.5703	22.96	0.08	23.04	56.00	-32.96	QP	
4		0.5703	18.65	0.08	18.73	46.00	-27.27	AVG	
5	*	1.1406	41.78	0.08	41.86	56.00	-14.14	QP	
6		2.9336	31.45	0.10	31.55	56.00	-24.45	QP	
7		2.9336	20.71	0.10	20.81	46.00	-25.19	AVG	
8		4.1406	33.27	0.12	33.39	56.00	-22.61	QP	
9		4.1406	21.85	0.12	21.97	46.00	-24.03	AVG	
10		4.6523	33.13	0.13	33.26	56.00	-22.74	QP	
11		4.6523	23.59	0.13	23.72	46.00	-22.28	AVG	

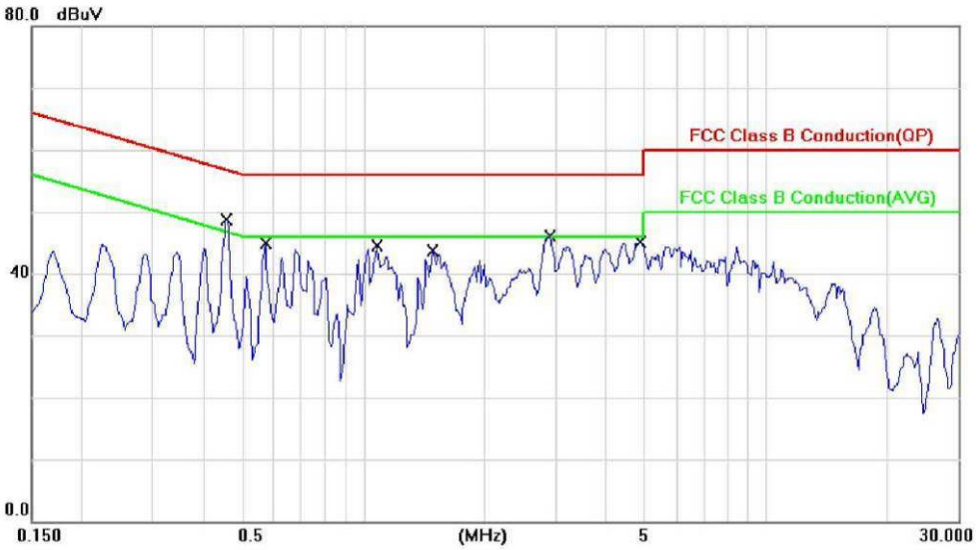
Site ConductionRoom
Limit: FCC Class B Conduction(QP)
EUT: PDA Phone
M/N: C2004
Note:

Phase: N
Power: AC 120V/60Hz
Distance:
Mode: Operationmode

Temperature: 26 ℃
Humidity: 60%

ConductedEmission

File :EH-2013-40003-13 Data:#1 Date: 2013/4/24 Time : 下午 06:02:23



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4586	47.21	0.12	47.33	56.72	-9.39	QP	
2	*	0.4586	41.62	0.12	41.74	46.72	-4.98	AVG	
3		0.5703	42.78	0.14	42.92	56.00	-13.08	QP	
4		0.5703	37.22	0.14	37.36	46.00	-8.64	AVG	
5		1.0781	38.71	0.16	38.87	56.00	-17.13	QP	
6		1.0781	30.31	0.16	30.47	46.00	-15.53	AVG	
7		1.4805	38.88	0.16	39.04	56.00	-16.96	QP	
8		1.4805	29.48	0.16	29.64	46.00	-16.36	AVG	
9		2.9141	40.99	0.17	41.16	56.00	-14.84	QP	
10		2.9141	31.72	0.17	31.89	46.00	-14.11	AVG	
11		4.8711	38.96	0.20	39.16	56.00	-16.84	QP	
12		4.8711	29.23	0.20	29.43	46.00	-16.57	AVG	

7 PEAK OUTPUT POWER MEASUREMENT

7.1 Standard Applicable:

According to §15.247 (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 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

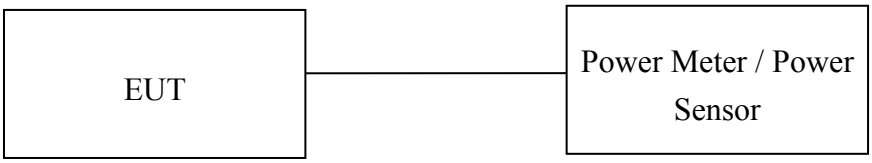
According to RSS-210 issue 8,§A8.4(4), for systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W. Except as provided in Section A8.4 (5), the e.i.r.p. shall not exceed 4 W.

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	04/15/2013	04/14/2014
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014
Splitter	Agilent	11636B	N/A	02/28/2013	02/27/2014

7.3 Test Set-up:



7.4 Measurement Procedure:

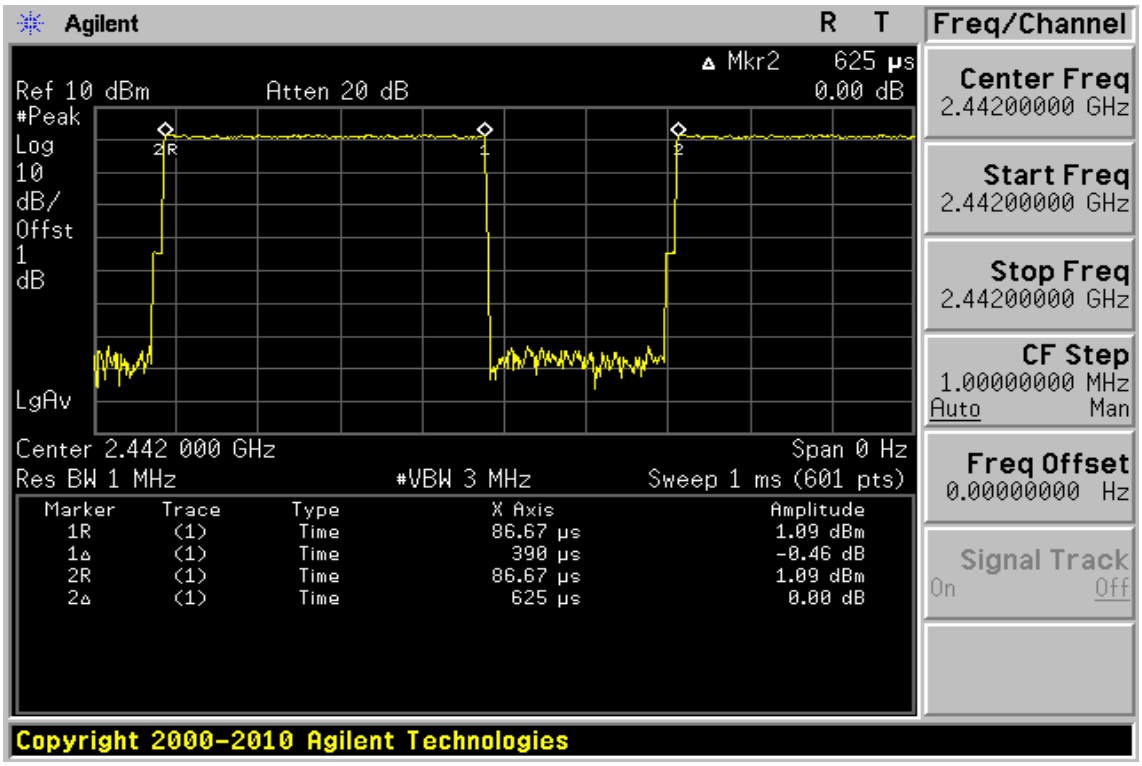
1. Place the EUT on the table and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (**Peak power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =peak, Sweep = Auto. Setting on spectrum is adjusted based on the mandatory procedure in 9.1.2 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.1.3 in KDB558074 is followed.
(**Avg. power setting on Spectrum:** Channel power function, RBW = 1MHz, VBW = 3MHz, Span: 30/60MHz, Detector =Avg., Trace avg =100, Sweep = Auto, Setting on spectrum is adjusted based on the mandatory procedure in 9.2.2.4 of the KDB558074). Power Meter is used as the auxiliary test equipment to conduct the output power measurement. 9.2.3, option 3 in KDB558074 is followed.

3. Record the max. Reading as observed from Spectrum or Power Meter.

4. Repeat above procedures until all test default channel measured was complete.

Duty Factor:



7.5 Measurement Result:

BT4.0 mode:

CH	Frequency (MHz)	Peak Power Output(dBm)	Required Limit
0	2402	1.21	1 Watt = 30 dBm
20	2442	1.24	1 Watt = 30 dBm
39	2480	0.79	1 Watt = 30 dBm

CH	Frequency (MHz)	Average Power Output(dBm)	Required Limit
0	2402	-0.99	1 Watt = 30 dBm
20	2442	-0.97	1 Watt = 30 dBm
39	2480	-1.41	1 Watt = 30 dBm

Note: Measured by power meter,* ***cable loss as 1dB that offsets on the power meter in Peak*

Note: Measured by power meter,* ***as cable loss+ Duty cycle factor that offsets on the power meter*

8 6dB BANDWIDTH

8.1 Standard Applicable:

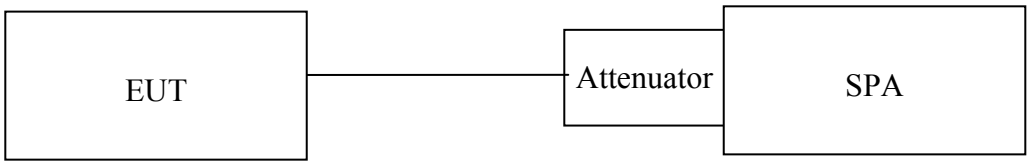
According to §15.247(a)(2), Systems using digital modulation techniques may operate in the 902 - 928 MHz,2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500kHz.

According to RSS 210 issue 8: 2010 Annex 8.2. Systems employing digital modulation techniques (which includes direct sequence) can now be certified under RSS-210 provided they comply with the following requirements: The minimum 6 dB bandwidth shall be at least 500 kHz.

8.2 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	04/15/2013	04/14/2014
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014
Splitter	Agilent	11636B	N/A	02/28/2013	02/27/2014

8.3 Test Set-up:



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 = 100 kHz, VBW = 3*RBW, Span = 5MHz, Detector=Peak, Sweep=auto, the setting on spectrum is adjusted based on the procedure as guide in 8.1 option 1 of KDB558074.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat above procedures until all test default channel measured were complete.

8.5 Measurement Result:

BT4.0 mode

Frequency (MHz)	Bandwidth (kHz)	Bandwidth (kHz)	Result
2402	664.593	> 500	PASS
2442	682.451	> 500	PASS
2480	707.118	> 500	PASS

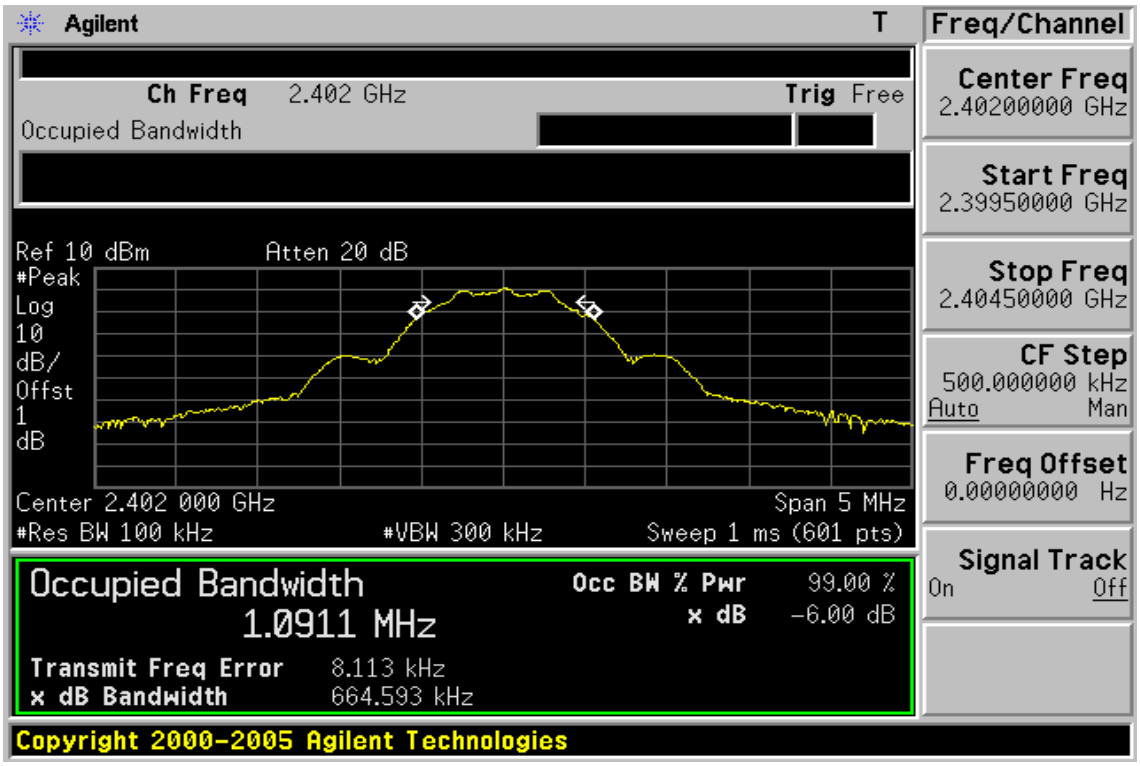
**** Cable loss as 1dB that offsets on the spectrum.***

** Note: The arrow "->" reveals X decibel level*

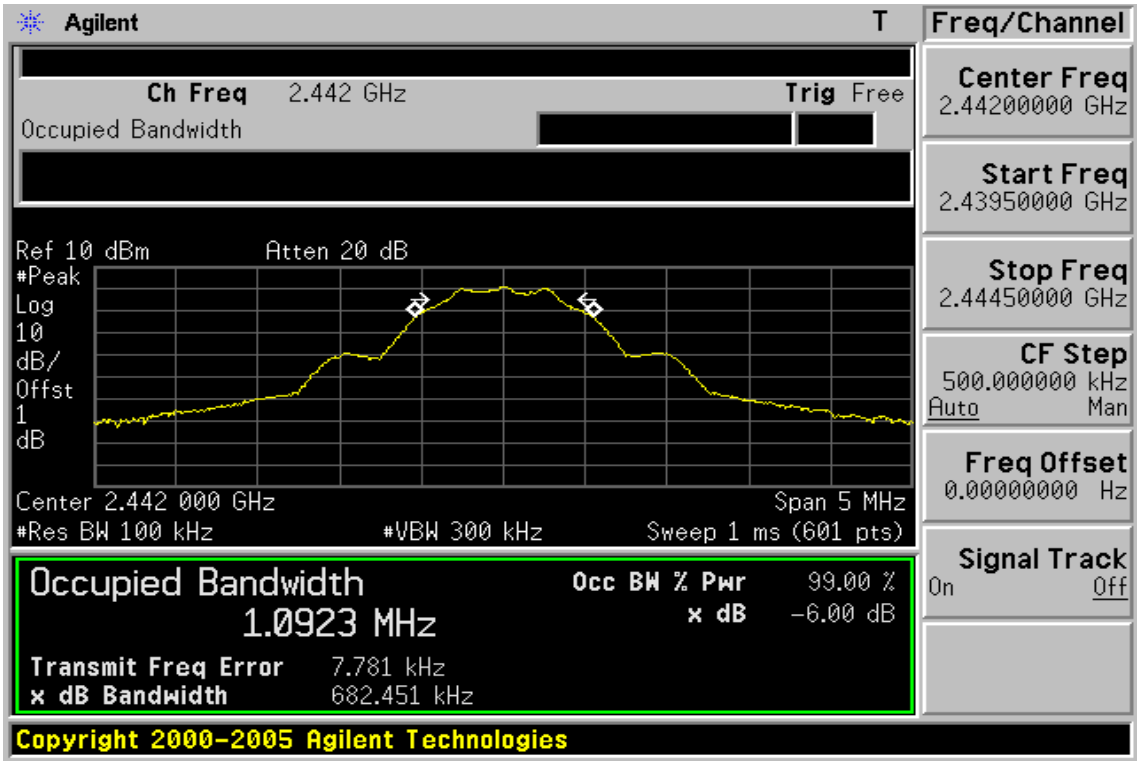
Note: Refer to next page for plots.

BT4.0 mode

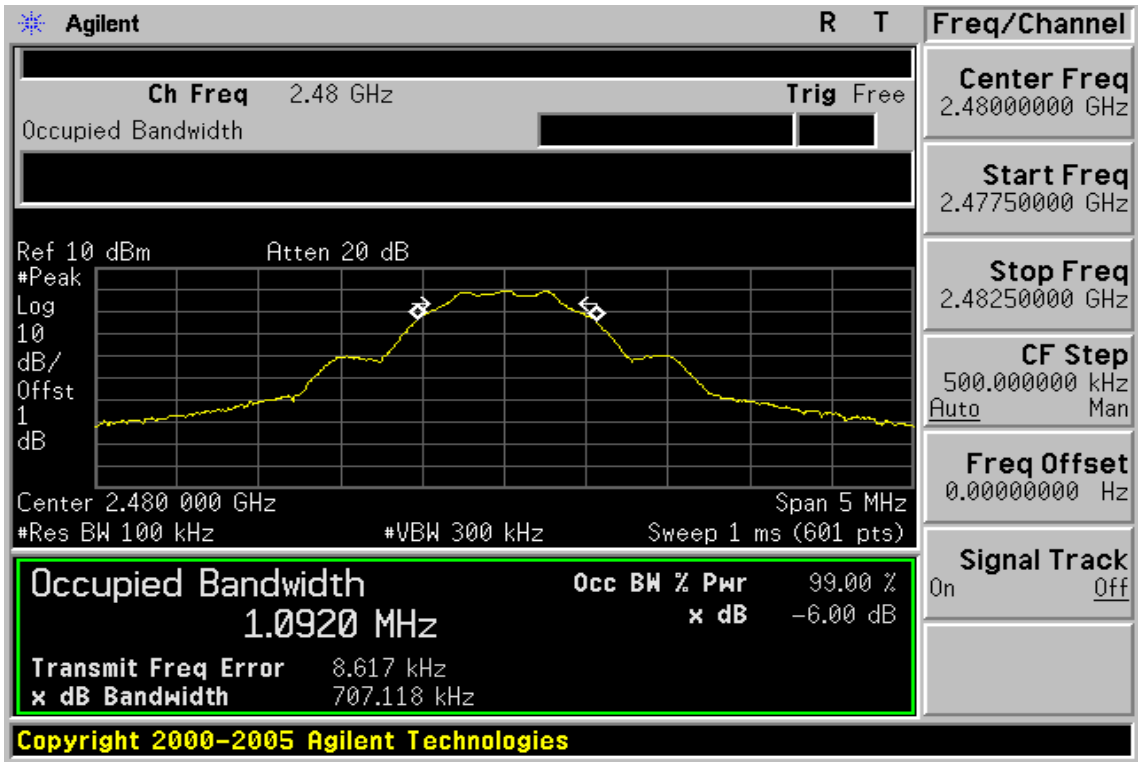
6dB Band Width Test Data CH-Low



6dB Band Width Test Data CH-Mid



6dB Band Width Test Data CH-High



9 BAND EDGES MEASUREMENT

9.1 Standard Applicable:

According to §15.247(c), 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 in15.209(a).

According to RSS-Gen §7.2.5 and 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 5 and 6 is not required. In addition, radiated emissions which fall in the restricted bands of Table 3 must also comply with the radiated emission limits specified in Tables 5 and 6.

9.2 Measurement Equipment Used:

9.2.1 Conducted Emission at antenna port:

Refer to section 7.2 for details.

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	04/15/2013	04/14/2014
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/06/2013	02/07/2014
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
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2013	01/03/2014
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2013	01/03/2014
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/28/2013	02/28/2014
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2013	02/27/2014
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

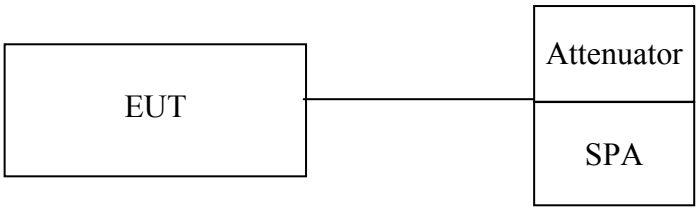
966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	02/08/2013	02/07/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/31/2013	05/30/2014
Horn Antenna	Schwarzbeck	BBHA9170	184	01/17/2012	01/16/2014
3m Site NSA	SGS	966 chamber	N/A	07/15/2013	07/14/2014

Note: The measurement was taken place with the long duration of the time, and additional equipment list as shown above indicate those equipment of which has been subject to undertake the calibration in intermediate period of time of the measurement.

NOTE: N.C.R refers to Not Calibrated Required.

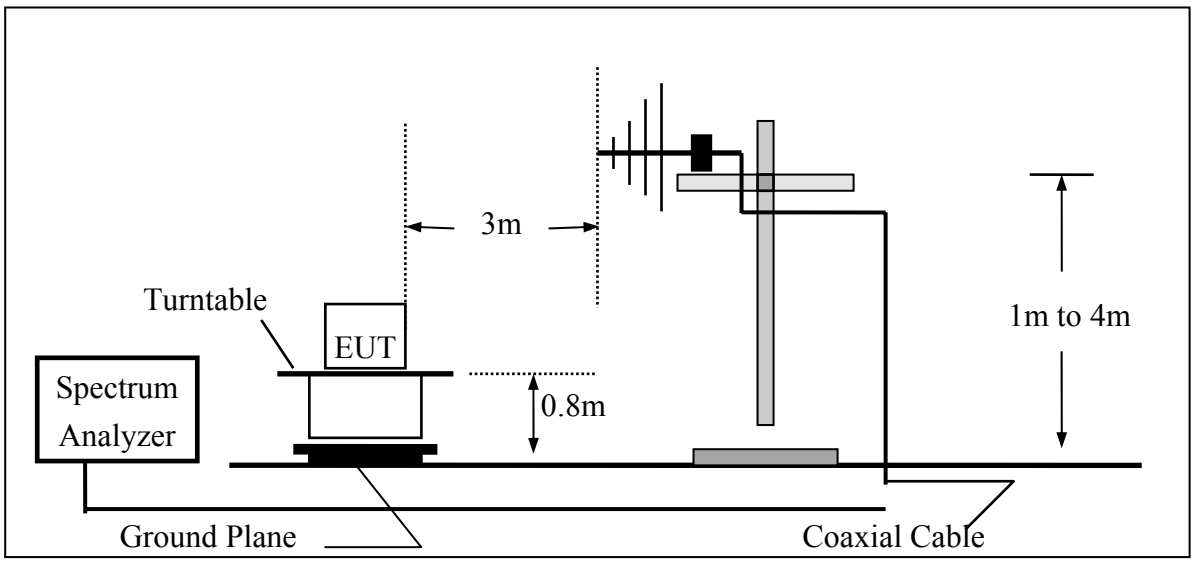
9.3 Test SET-UP:

9.3.1 Conducted Emission at antenna port:

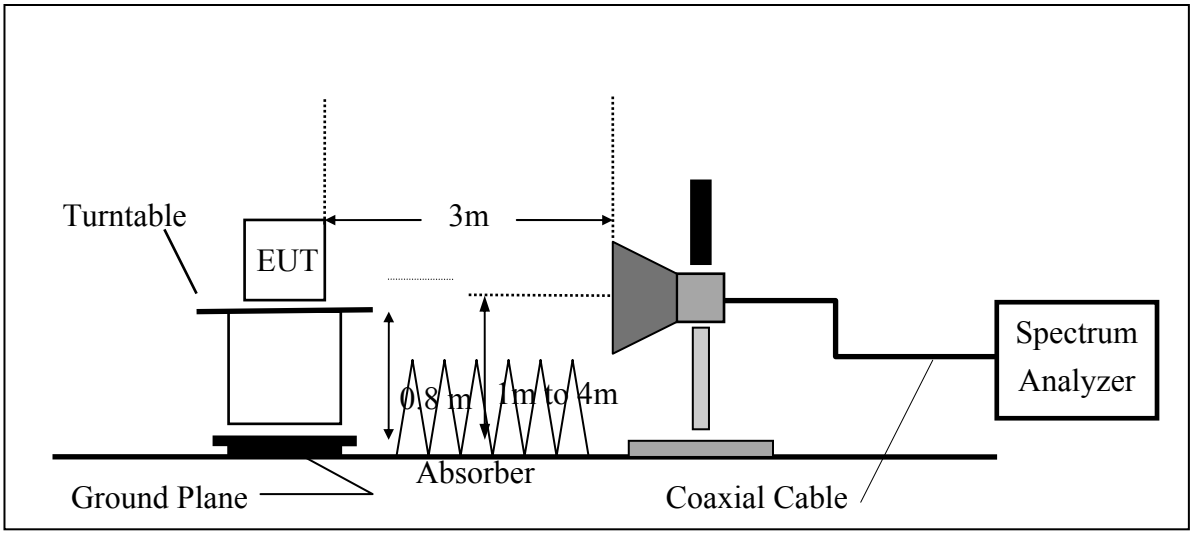


9.3.2 Radiated emission:

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



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



9.4 Measurement Procedure:

Unwanted Emissions into Non-Restricted Frequency Bands, Measurement Procedure followed by 11.1 of KDB558074 D01

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 start to edge frequency, and stop frequency of spectrum analyzer so as to encompass the spectrum to be examined.
4. Set the spectrum analyzer as RBW, VBW=300KHz, Detector = Peak, Sweep = auto
5. Mark the highest reading of the emission as the reference level measurement.
6. Set DL as the limit = reading on marker 1 – 20dBm
7. Marker on frequency, 2.3999GHz and 2.4836GHz, and examine shall 100 KHz immediately outside the authorized (2400~2483.5) be attenuated by 20dB at least relative to the maximum emission of power.
8. Repeat above procedures until all default test channel (low, middle, and high) was complete.

Unwanted Emission falling into Restricted Frequency Bands, Measurement Procedure followed by 12.1 of KDB558074:

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. On spectrum, following 8.1.2, and RBW = 1MHz, VBW = 3MHz, & Marker 2390MHz, and 2483.5MHz (Peak Measurement). Average Measurement: following 8.2 with the modification span to 1MHz, &RBW = 1MHz, VBW = 3MHz and peak marker function to obtain the highest reading on 2390, and 2483.5MHz.

Repeat above procedures until all default test channel (low, middle, and high) was complete

9.5 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

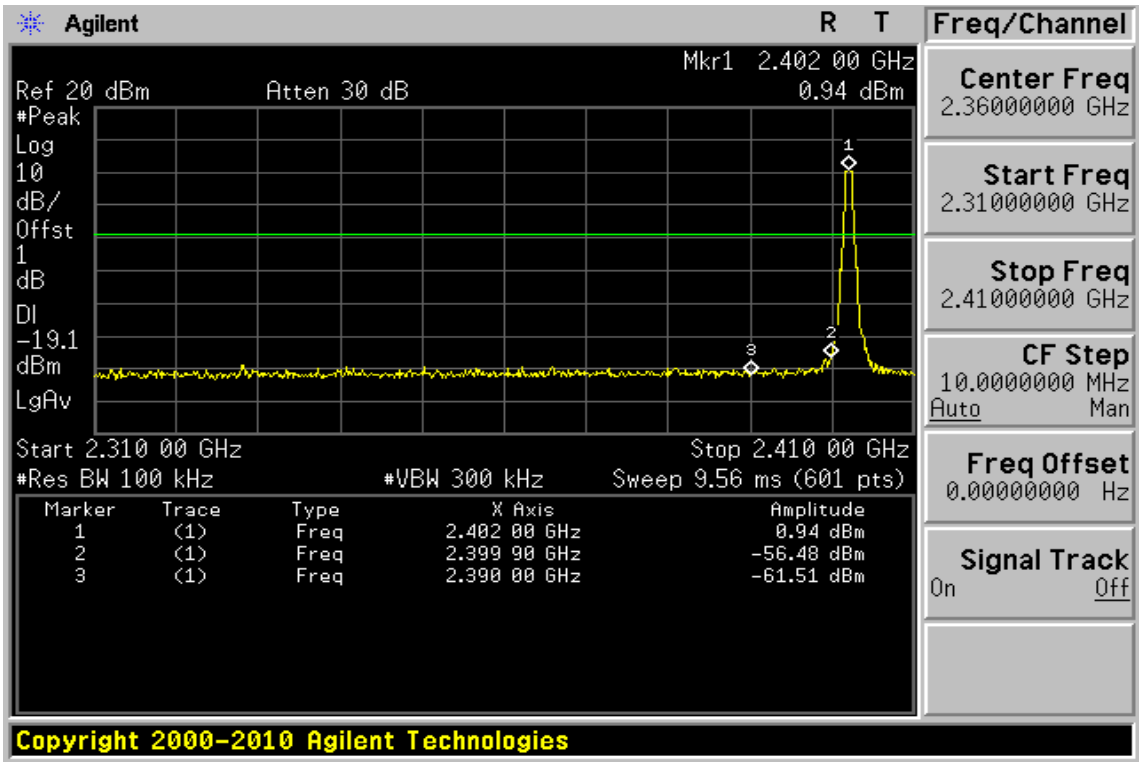
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

9.6 Measurement Result:

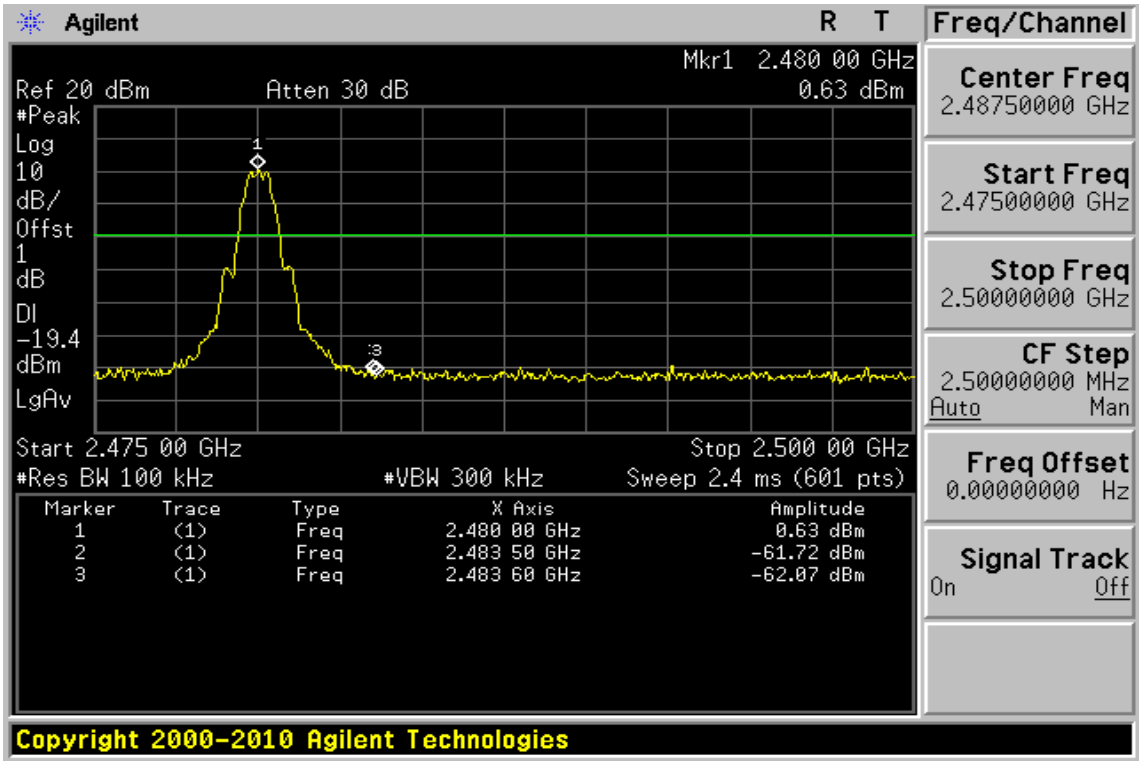
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

BT4.0 mode

Band Edges Test Data CH-Low



Band Edges Test Data CH-High



Tabular Results:

BT4.0

Frequency (GHz)	Results (dBm)	Ref (dBm)	Limit (dBm)	Verdict
2.3999	-56.48	0.94	-19.1	Pass
2.4835	-61.72	0.63	-19.4	Pass

Note: Limit = Ref (The highest level of emission) dBm – 20dBm

Radiated Emission: BT4.0 mode:

For measurement plot of radiation revealing the compliance of 15.209, please refer to Appendix I.

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
2390.00	E	Average	30.26	2.12	32.38	54.00	-21.62
2390.00	E	Peak	43.01	2.12	45.13	74.00	-28.87

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
2390.00	E	Average	30.19	2.74	32.93	54.00	-21.07
2390.00	E	Peak	42.61	2.74	45.35	74.00	-28.65

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
2483.50	E	Average	30.03	2.53	32.56	54.00	-21.44
2483.50	E	Peak	42.74	2.53	45.27	74.00	-28.73

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
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.

The trace on RE(radiation emission) plot is as colored blue, and the detection manner we've employed is peak detector.

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
2483.50	E	Average	30.03	3.56	33.59	54.00	-20.41
2483.50	E	Peak	42.80	3.56	46.36	74.00	-27.64

10 SPURIOUS RADIATED EMISSION TEST

10.1 Standard Applicable

According to §15.247(d),

Emission at antenna port:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, 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 paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Radiated Spurious Emission

Attenuation below the general limits specified in § 15.209(a) is not required. 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) (see § 15.205(c)).

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 §7.2.5 and 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 5 and 6 is not required. In addition, radiated emissions which fall in the restricted bands of Table 3 must also comply with the radiated emission limits specified in Tables 5 and 6 of RSS-GEN.

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 8.3 for details.

10.3.2 Radiated emission:

Refer to section 9.3.2 for details.

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. On spectrum, change spectrum mode in linear display mode, and reduce VBW = 10Hz if average reading is measured.
7. Repeat above procedures until all default test channel 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, 18G to 40GHz (applicable if operation mode is 5GHz)
4. Via Software, combine 5 spans of frequency range into one plot
5. Repeat above procedures until all default test channel measured were complete.

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

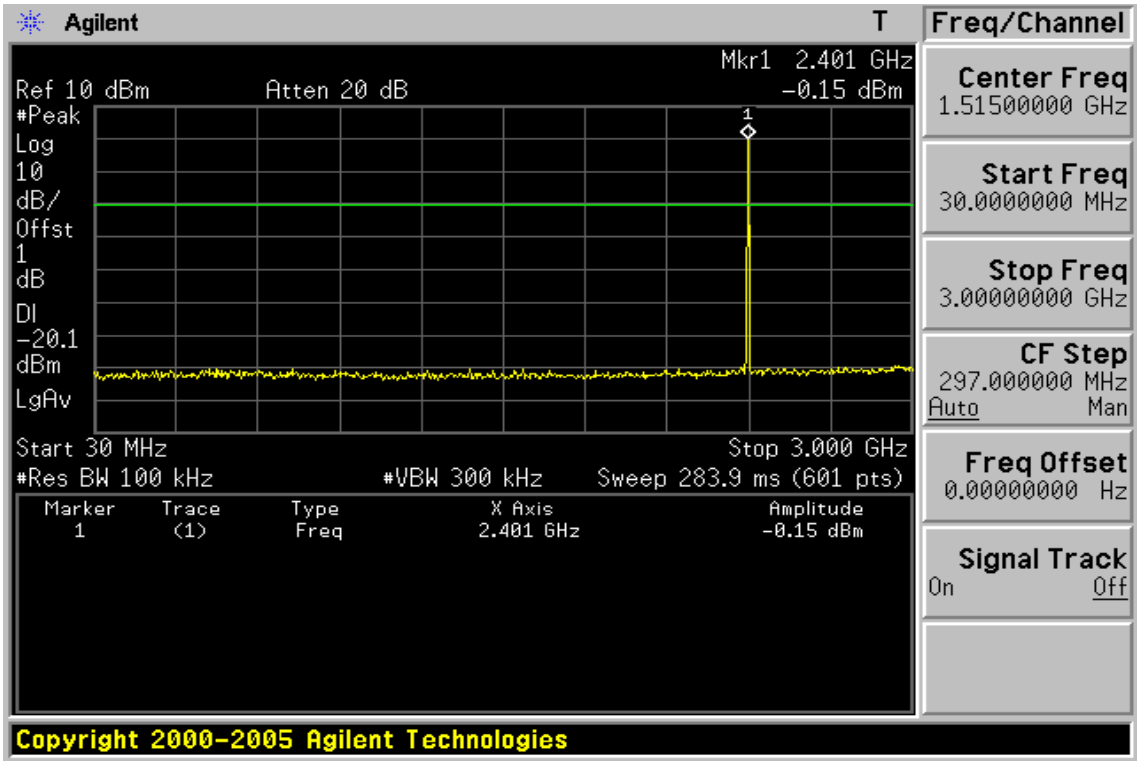
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

10.6 Measurement Result:

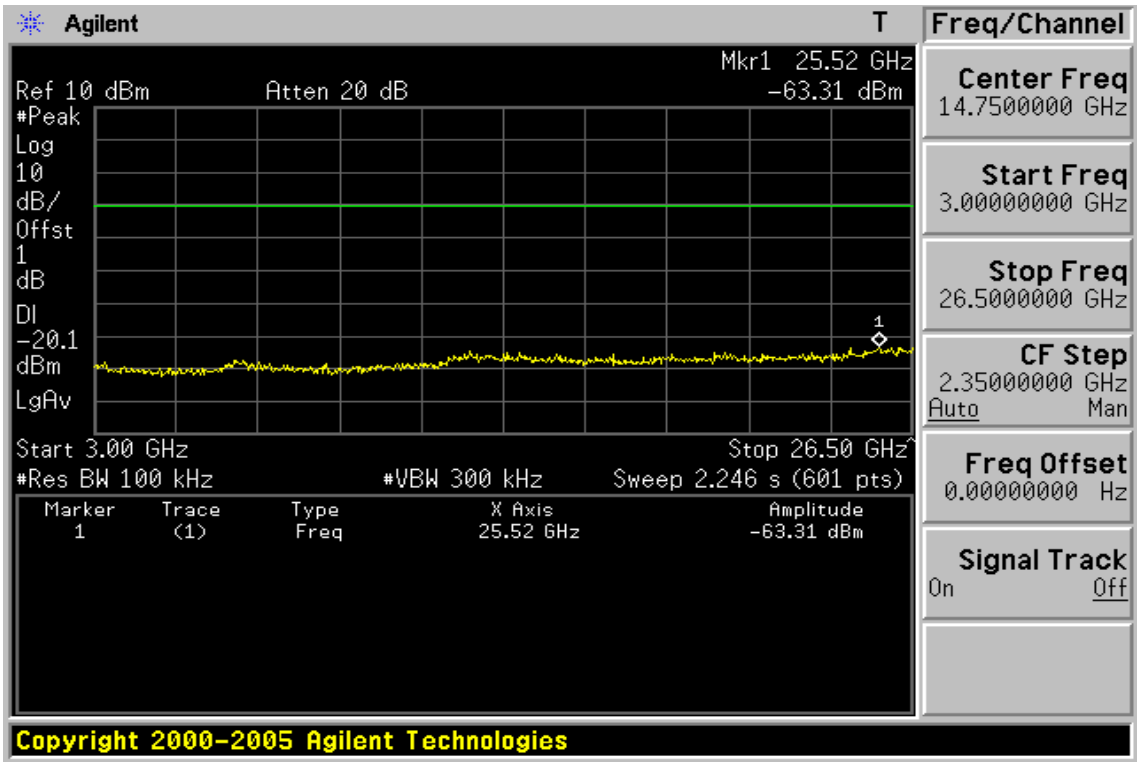
Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Conducted Spurious Emission Measurement Result (BT4.0 mode)

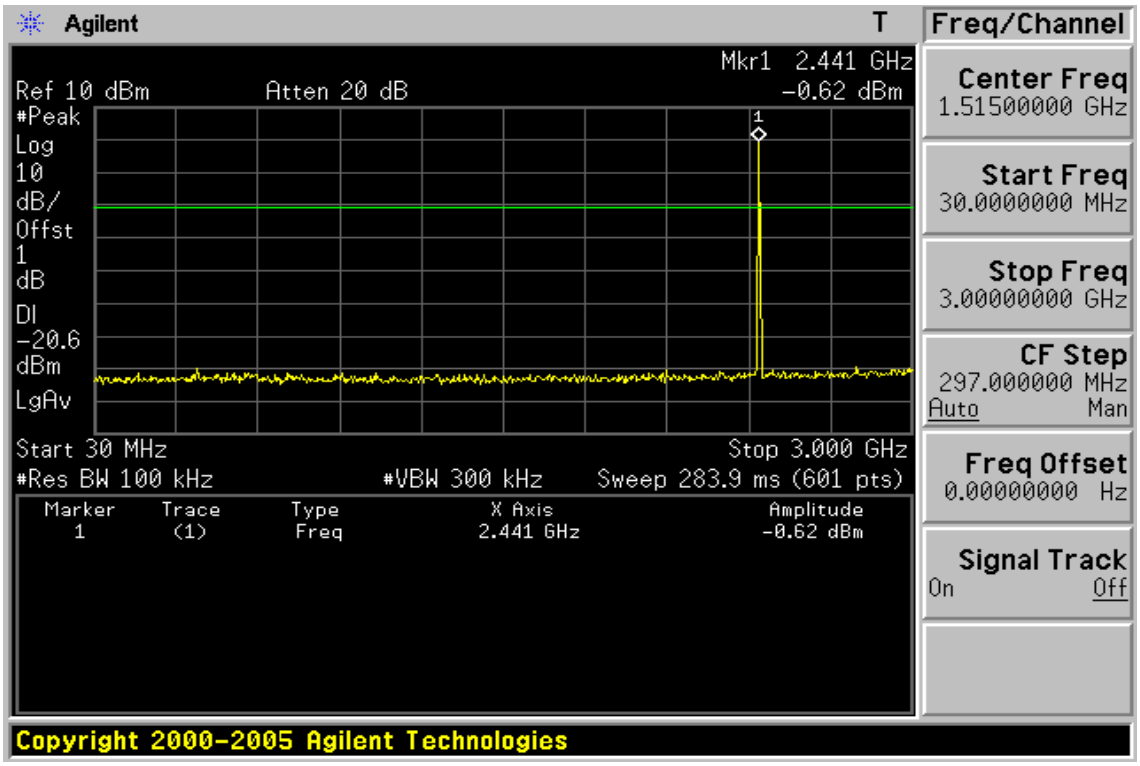
Ch Low 30MHz – 3GHz



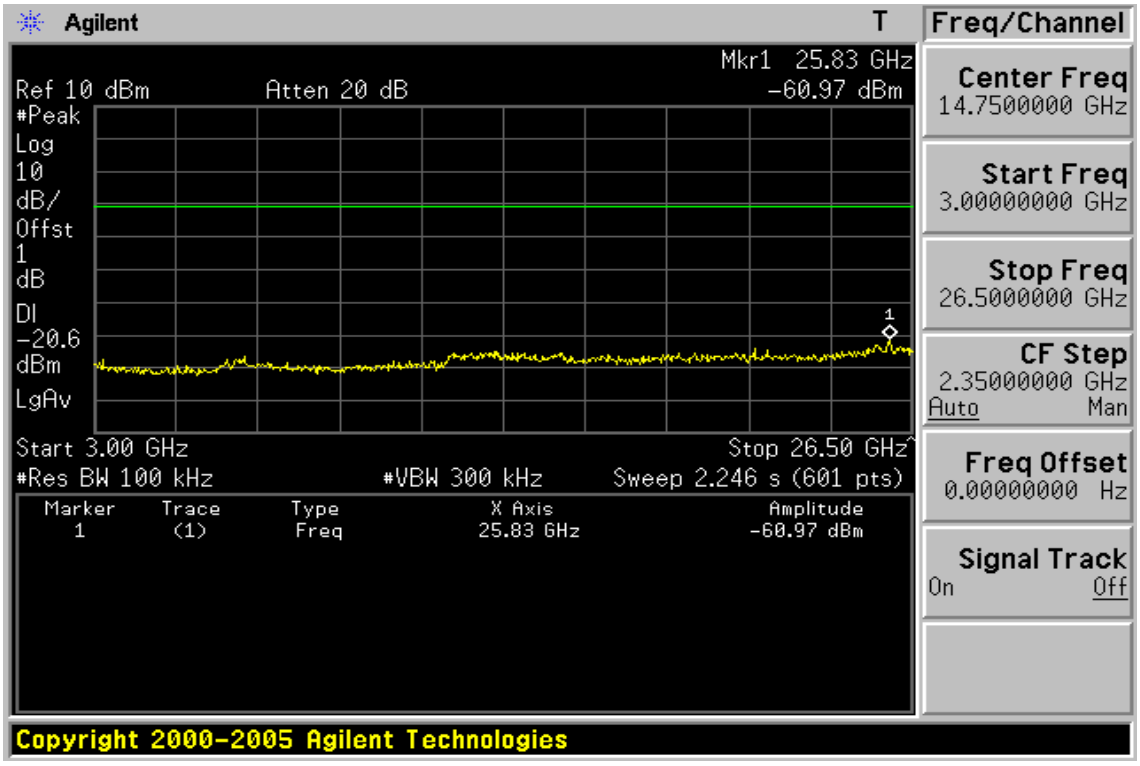
Ch Low 3GHz – 26.5GHz



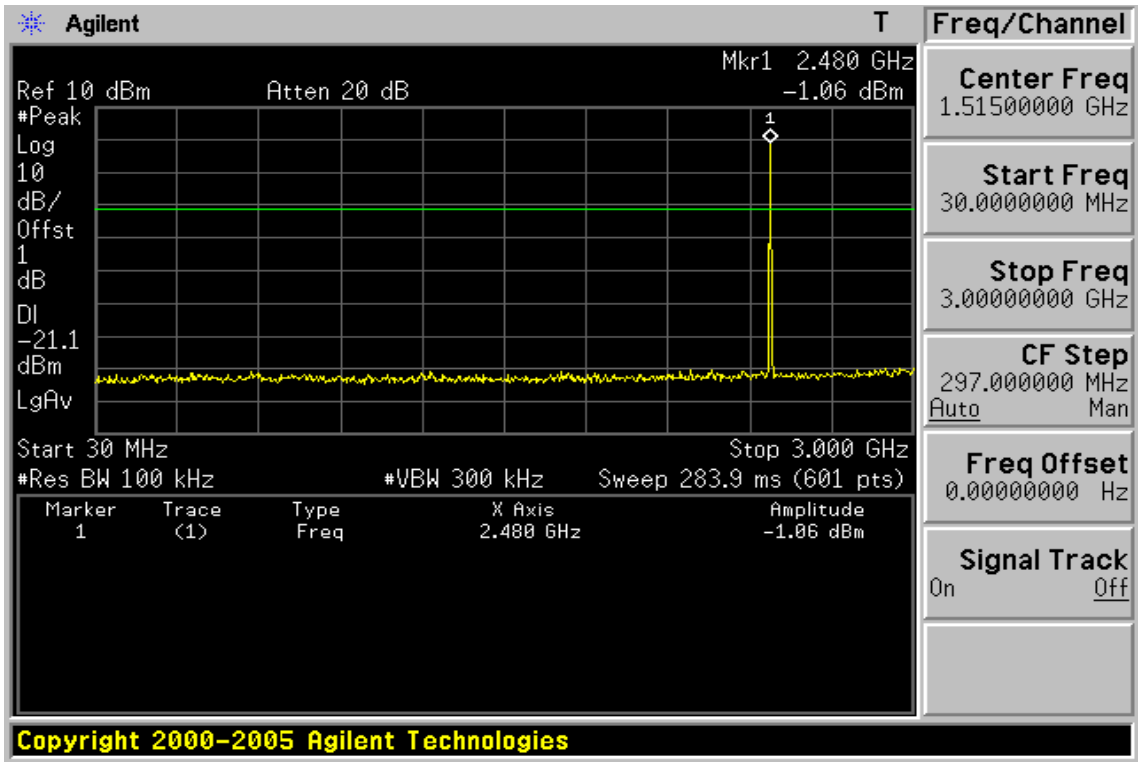
Ch Mid 30MHz – 3GHz



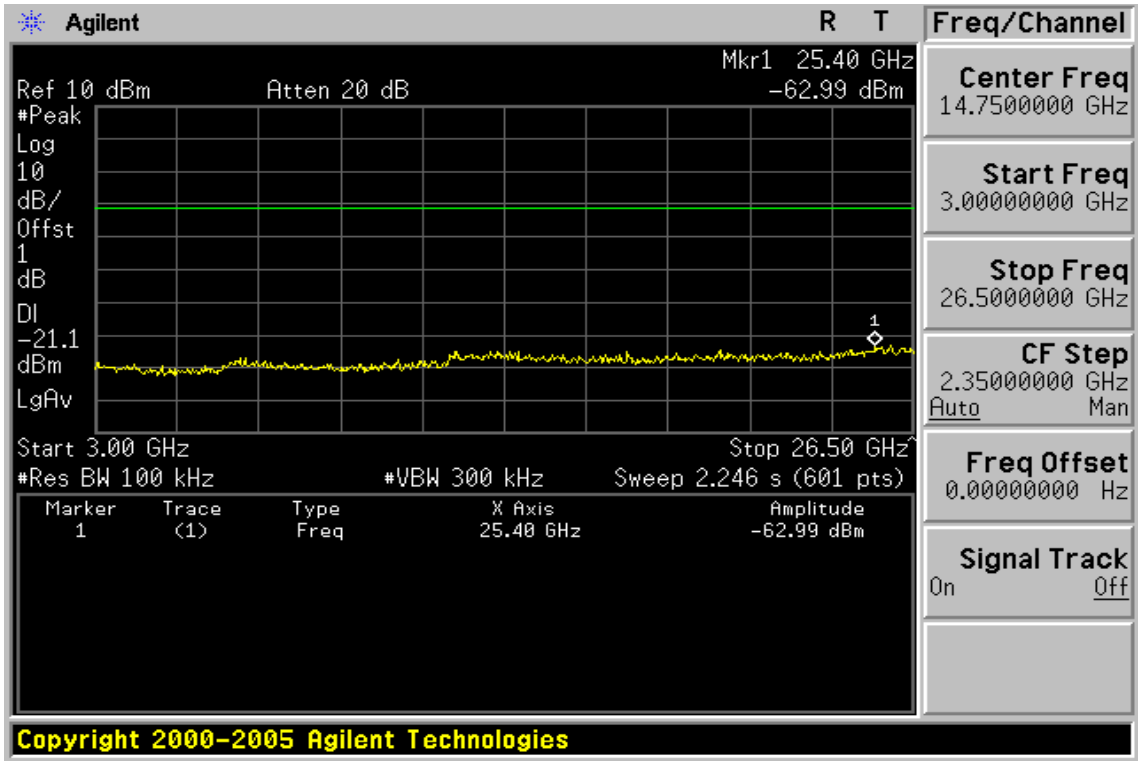
Ch Mid 3GHz – 26.5GHz



Ch High 30MHz – 3GHz



Ch High 3GHz – 26.5GHz



Tabular Results:

Out of Band emission at antenna terminals – BT 4.0

Fundamental Frequency 2402 MHz Engineer :Nick
Operation Mode :TX Low

Freq. (MHz)	Note F/H/E/S	Reading dBm	Limit dBm	Safe Margin dB
2402.00	Ref	-0.15	---	---
<30	S	---	-20.10	---
30-1000	S	---	-20.10	---
4804.00	H	---	-20.10	---
7206.00	H	---	-20.10	---
9608.00	H	---	-20.10	---
12010.00	H	---	-20.10	---
14412.00	H	---	-20.10	---
16814.00	H	---	-20.10	---
19216.00	H	---	-20.10	---
21618.00	H	---	-20.10	---
24020.00	H	---	-20.10	---
25520.00	S	-63.31	-20.10	43.21

Note : "H" : denotes Harmonic Frequency. "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor. Ref: Reference Signal

Note2: Limit = Ref (the highest emission of the fundamental) – 20dBm

Fundamental Frequency 2442 MHz Engineer :Nick
Operation Mode :TX Mid

Freq. (MHz)	Note F/H/E/S	Reading dBm	Limit dBm	Safe Margin dB
2442.00	Ref	-0.62	---	---
<30	S	---	-20.60	---
30-1000	S	---	-20.60	---
4884.00	H	---	-20.60	---
7326.00	H	---	-20.60	---
9768.00	H	---	-20.60	---
12210.00	H	---	-20.60	---
14652.00	H	---	-20.60	---
17094.00	H	---	-20.60	---
19536.00	H	---	-20.60	---
21978.00	H	---	-20.60	---
24420.00	H	---	-20.60	---
25830.00	S	-60.97	-20.60	40.37

Note : "H" : denotes Harmonic Frequency. "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Note2: Limit = Ref (the highest emission of the fundamental) – 20dBm

Fundamental Frequency 2480 MHz Engineer :Nick
Operation Mode :TX High

Freq. (MHz)	Note F/H/E/S	Reading dBm	Limit dBm	Safe Margin dB
2480.00	Ref	-1.06	---	---
<30	S	---	-21.10	---
30-1000	S	---	-21.10	---
4960.00	H	---	-21.10	---
7440.00	H	---	-21.10	---
9920.00	H	---	-21.10	---
12400.00	H	---	-21.10	---
14880.00	H	---	-21.10	---
17360.00	H	---	-21.10	---
19840.00	H	---	-21.10	---
22320.00	H	---	-21.10	---
24800.00	H	---	-21.10	---
2540.00	S	-62.99	-21.10	41.89

Note : "H" : denotes Harmonic Frequency. "S" : denotes Spurious Frequency.

"---" : denotes Noise Floor.

Note2: Limit = Ref (the highest emission of the fundamental) – 20dBm

Radiated Spurious Emission Measurement Result (BT4.0 mode)

For measurement plot of radiation, please refer to Appendix I.

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX LOW	Engineer	:Louis
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
41.64	S	Peak	43.38	-13.56	29.82	40.00	-10.18
114.39	S	Peak	32.50	-15.22	17.28	43.50	-26.22
457.77	S	Peak	28.04	-9.99	18.05	46.00	-27.95
599.39	S	Peak	27.67	-7.57	20.10	46.00	-25.90
724.52	S	Peak	27.04	-5.37	21.67	46.00	-24.33
897.18	S	Peak	34.33	-2.87	31.46	46.00	-14.54
4804.00	H	Average	24.33	6.99	31.32	54.00	-22.68
4804.00	H	Peak	35.92	6.99	42.91	74.00	-31.09
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX LOW	Engineer	:Louis
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 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
40.67	S	Peak	30.65	-13.48	17.17	40.00	-22.83
157.07	S	Peak	26.68	-12.29	14.39	43.50	-29.11
339.43	S	Peak	28.89	-11.82	17.07	46.00	-28.93
589.69	S	Peak	27.72	-7.77	19.95	46.00	-26.05
781.75	S	Peak	27.28	-4.43	22.85	46.00	-23.15
963.14	S	Peak	26.91	-2.04	24.87	54.00	-29.13
4804.00	H	Average	24.03	7.03	31.06	54.00	-22.94
4804.00	H	Peak	36.73	7.03	43.76	74.00	-30.24
7206.00	H	---					
9608.00	H	---					
12010.00	H	---					
14412.00	H	---					
16814.00	H	---					
19216.00	H	---					
21618.00	H	---					
24020.00	H	---					

Operation Band	:BT 4.0	Test Date	:2013-07-14
Fundamental Frequency	:2442 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX MID	Engineer	:Allen
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
87.23	S	Peak	43.52	-17.69	25.83	40.00	-14.17
231.76	S	Peak	34.54	-14.45	20.09	46.00	-25.91
547.98	S	Peak	27.83	-8.61	19.22	46.00	-26.78
684.75	S	Peak	27.16	-5.96	21.20	46.00	-24.80
722.58	S	Peak	28.39	-5.39	23.00	46.00	-23.00
938.89	S	Peak	26.95	-2.20	24.75	46.00	-21.25
4884.00	H	Average	24.36	7.16	31.52	54.00	-22.48
4884.00	H	Peak	37.74	7.16	44.90	74.00	-29.10
7326.00	H	---					
9768.00	H	---					
12210.00	H	---					
14652.00	H	---					
17094.00	H	---					
19536.00	H	---					
21978.00	H	---					
24420.00	H	---					

Operation Band	:BT 4.0	Test Date	:2013-07-14
Fundamental Frequency	:2442 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX MID	Engineer	:Allen
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 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
88.20	S	Peak	32.92	-17.68	15.24	43.50	-28.26
312.27	S	Peak	26.78	-12.27	14.51	46.00	-31.49
511.12	S	Peak	27.95	-9.38	18.57	46.00	-27.43
644.01	S	Peak	27.94	-6.70	21.24	46.00	-24.76
839.95	S	Peak	27.41	-3.79	23.62	46.00	-22.38
927.25	S	Peak	27.19	-2.30	24.89	46.00	-21.11
4884.00	H	Average	24.35	7.10	31.45	54.00	-22.55
4884.00	H	Peak	37.14	7.10	44.24	74.00	-29.76
7326.00	H	---					
9768.00	H	---					
12210.00	H	---					
14652.00	H	---					
17094.00	H	---					
19536.00	H	---					
21978.00	H	---					
24420.00	H	---					

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX HIGH	Engineer	:Louis
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
40.67	S	Peak	42.65	-13.48	29.17	40.00	-10.83
307.42	S	Peak	27.04	-12.40	14.64	46.00	-31.36
446.13	S	Peak	27.63	-10.09	17.54	46.00	-28.46
596.48	S	Peak	27.71	-7.64	20.07	46.00	-25.93
772.05	S	Peak	28.07	-4.57	23.50	46.00	-22.50
897.18	S	Peak	32.30	-2.87	29.43	46.00	-16.57
4960.00	H	Average	23.47	7.17	30.64	54.00	-23.36
4960.00	H	Peak	36.00	7.17	43.17	74.00	-30.83
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX HIGH	Engineer	:Louis
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 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
39.70	S	Peak	29.71	-13.47	16.24	40.00	-23.76
145.43	S	Peak	27.06	-12.68	14.38	43.50	-29.12
342.34	S	Peak	28.04	-11.78	16.26	46.00	-29.74
567.38	S	Peak	27.62	-8.24	19.38	46.00	-26.62
682.81	S	Peak	27.44	-5.98	21.46	46.00	-24.54
905.91	S	Peak	27.30	-2.68	24.62	46.00	-21.38
4960.00	H	Average	23.95	7.02	30.97	54.00	-23.03
4960.00	H	Peak	35.64	7.02	42.66	74.00	-31.34
7440.00	H	---					
9920.00	H	---					
12400.00	H	---					
14880.00	H	---					
17360.00	H	---					
19840.00	H	---					
22320.00	H	---					
24800.00	H	---					

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 8 dBm 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.

According to RSS-210 issue 8, §A8.2(b) 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.

11.2 Measurement Equipment Used:

Refer to section 7.2 for details.

11.3 Test Set-up:

Refer to section 8.3 for details.

11.4 Measurement Procedure: (following the measurement procedure 10.2 of KDB558074):

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 ≥ 3 kHz.
4. Set the VBW ≥ 3 x 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.

11.5 Measurement Result:

BT4.0 mode

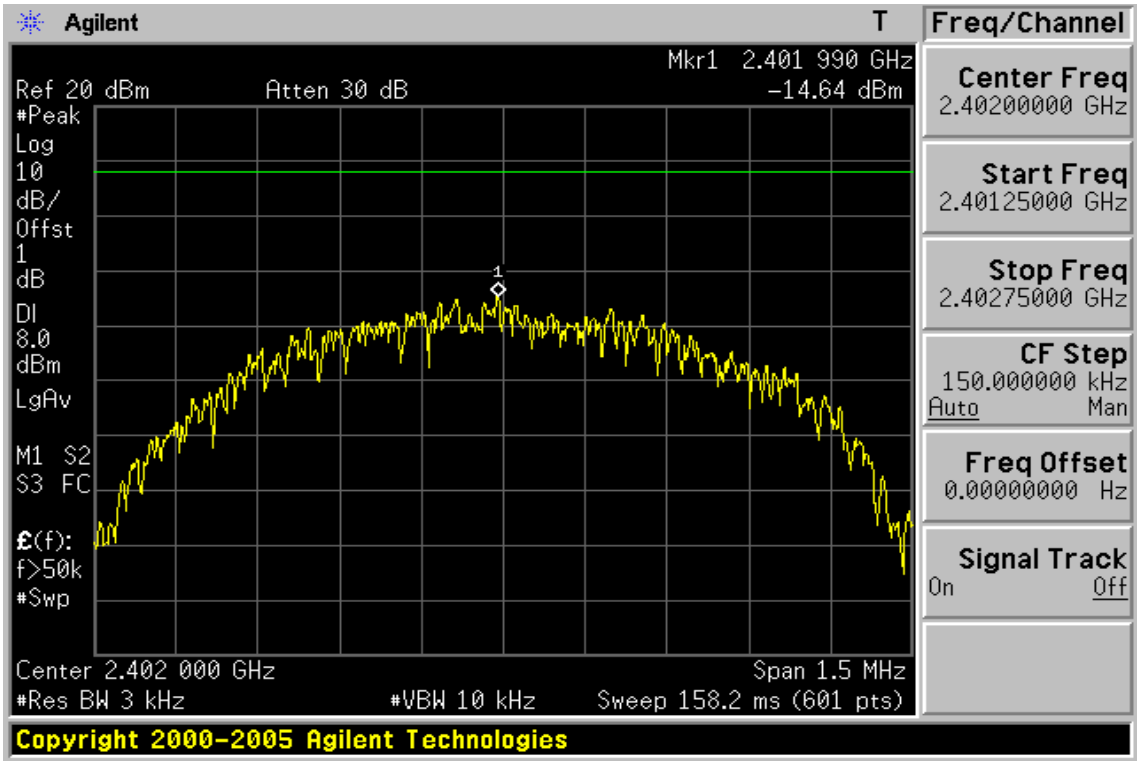
Frequency MHz	RF Power Density Reading (dBm)	Maximum Limit (dBm)	Result
2402	-14.64	8	PASS
2442	-14.32	8	PASS
2480	-15.20	8	PASS

NOTE: cable loss as 1dB that offsets in the spectrum

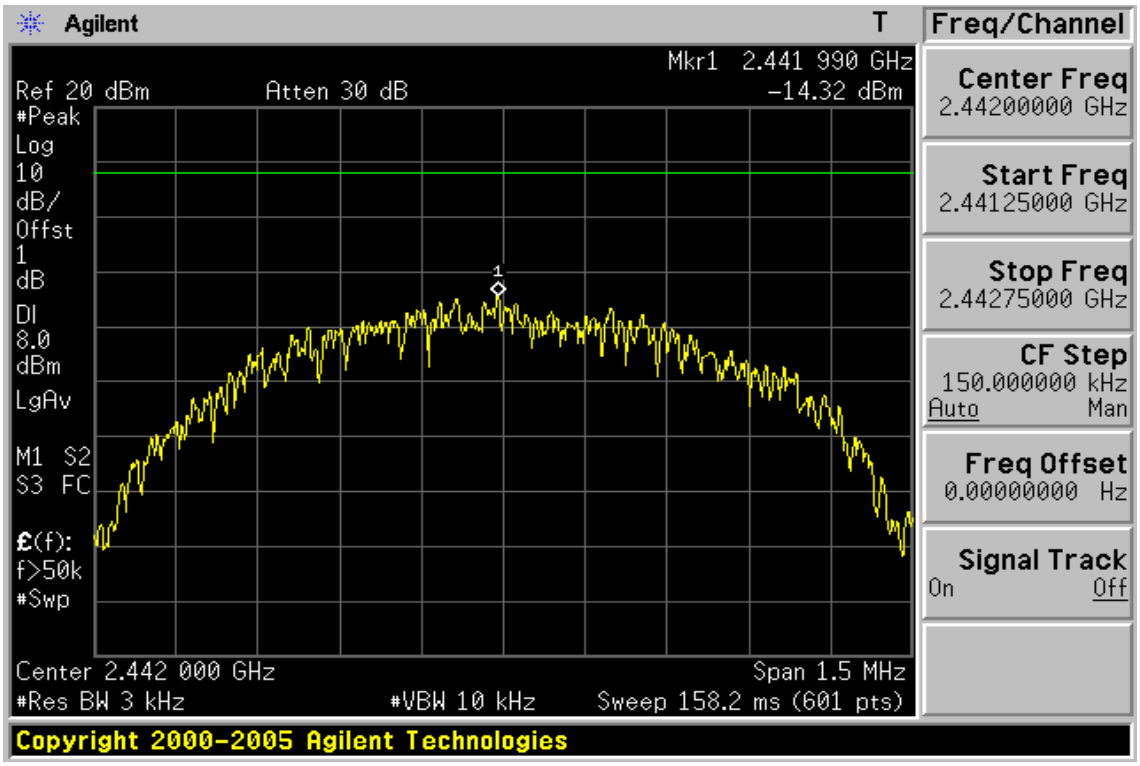
Note: Refer to next page for plots.

BT4.0 mode

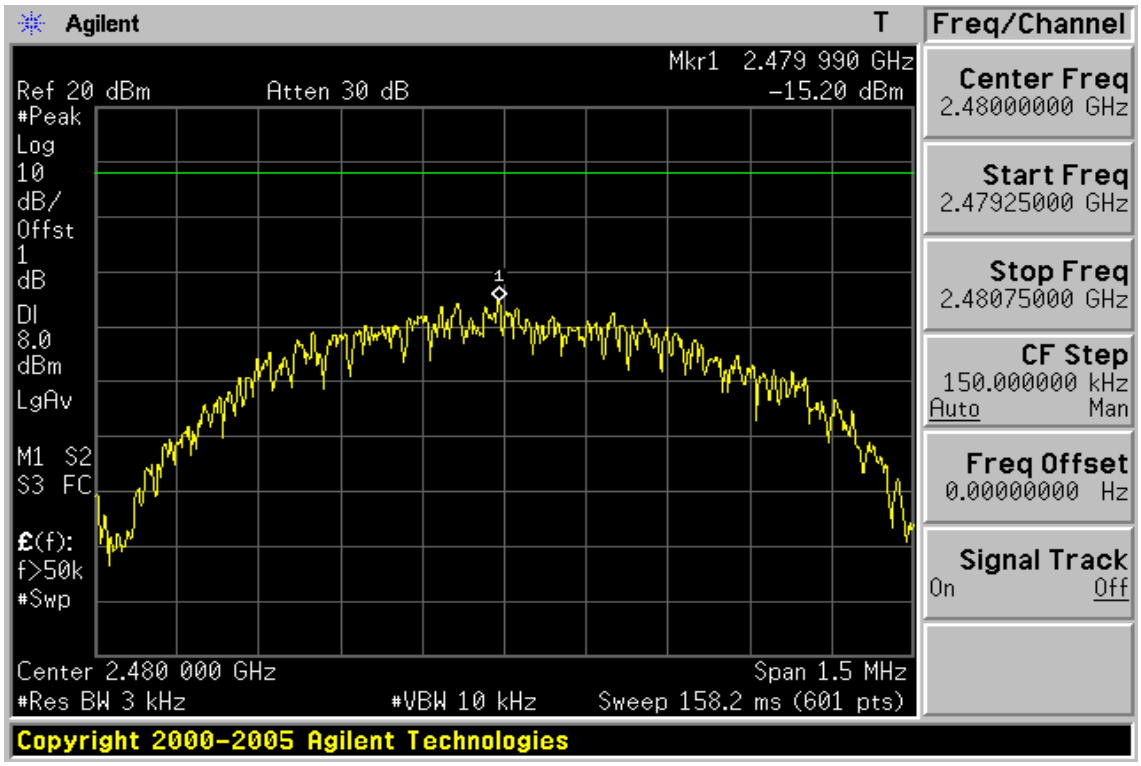
Power Spectral Density Test Plot (CH-Low)



Power Spectral Density Test Plot (CH-Mid)



Power Spectral Density Test Plot (CH-High)



12 ANTENNA REQUIREMENT

12.1 Standard Applicable:

For intentional device, 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.

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.

12.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 2.55dBi, 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.

13 99% BANDWIDTH MEASUREMENT

13.1 Standard Applicable:

RSS-Gen §4.6.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

The span between the two recorded frequencies is the occupied bandwidth.

13.2 Measurement Equipment Used:

Refer to section 7.2 for details.

13.3 Test Set-up:

Refer to section 8.3 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 the Span, VBW = 3 times RBW, Span= 2MHz.
4. Turn on the 99% bandwidth function, max reading.
5. Repeat above procedures until all frequency measured were complete.

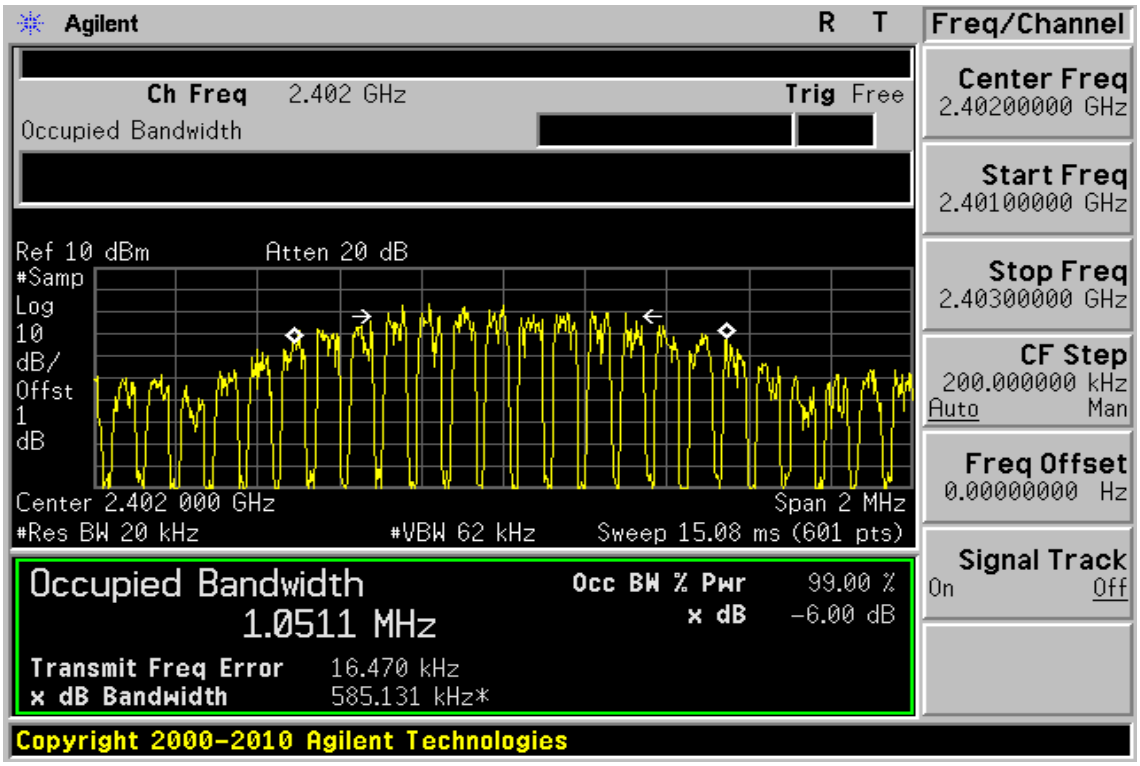
NOTE: cable loss as 1dB that offsets in the spectrum

13.5 Measurement Result:

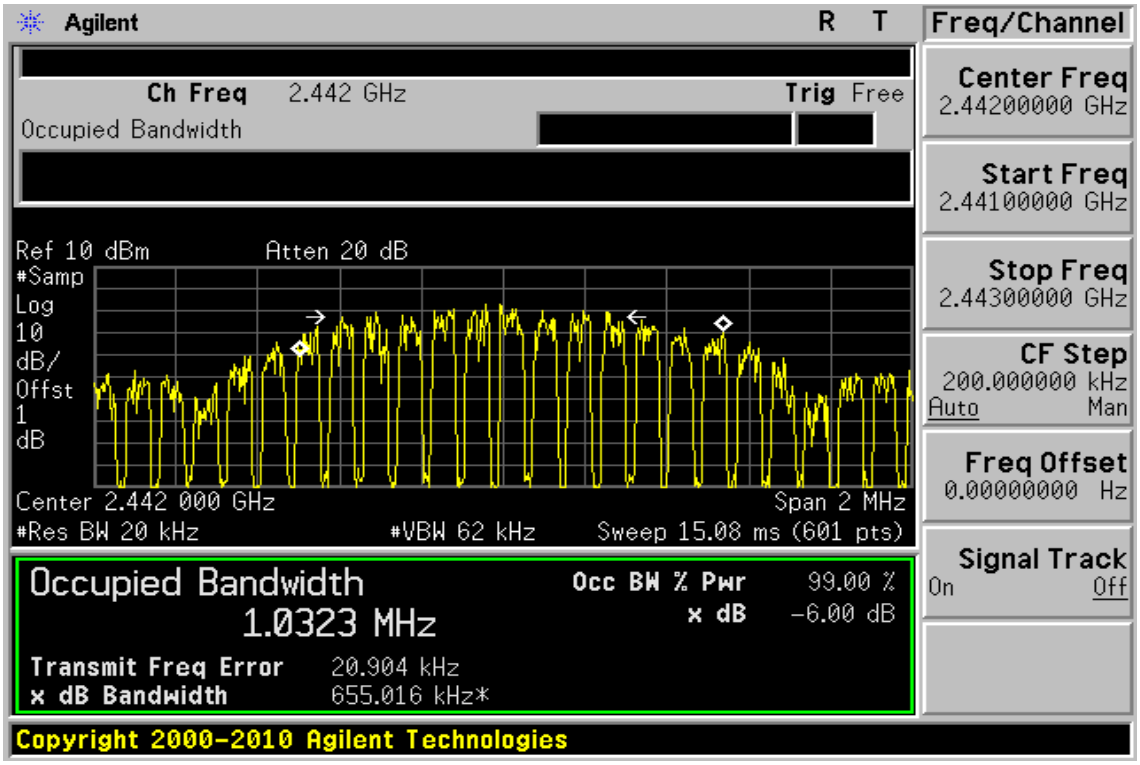
BT4.0 mode

Frequency MHz	99%Bandwidth (MHz)
2402	1.0511
2442	1.0323
2480	1.0468

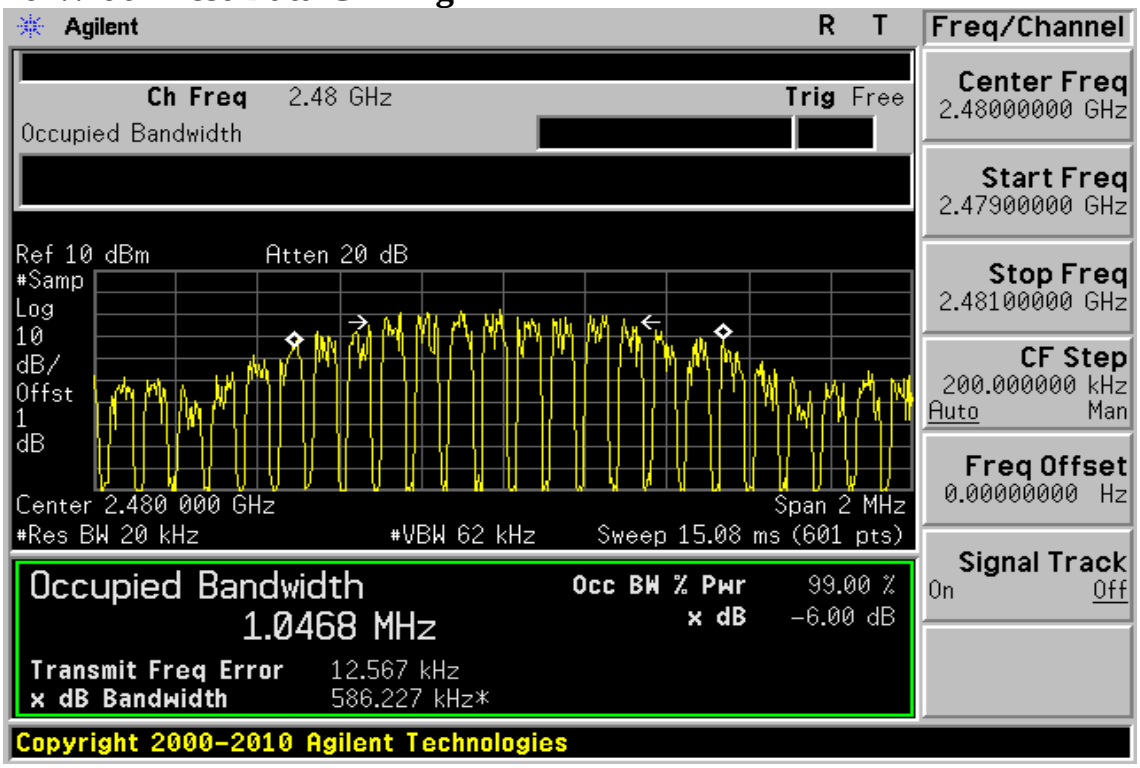
BT4.0 mode
99% Band Width Test Data CH-Low



99% Band Width Test Data CH-Mid



99% Band Width Test Data CH-High



APPENDIX 1

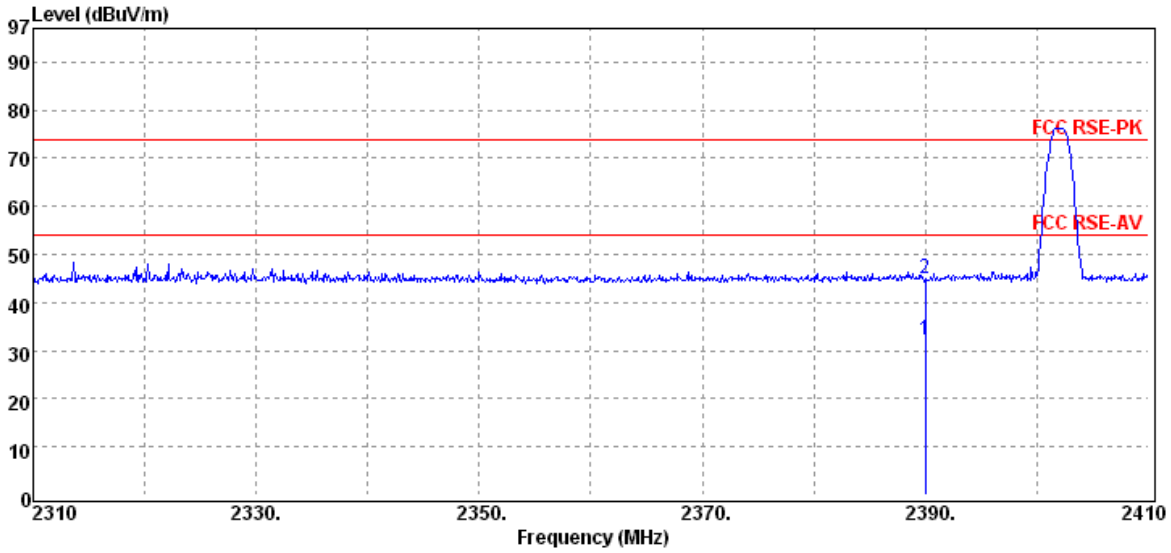
MEASUREMENT PLOT OF RADIATED SPURIOUS EMISSION

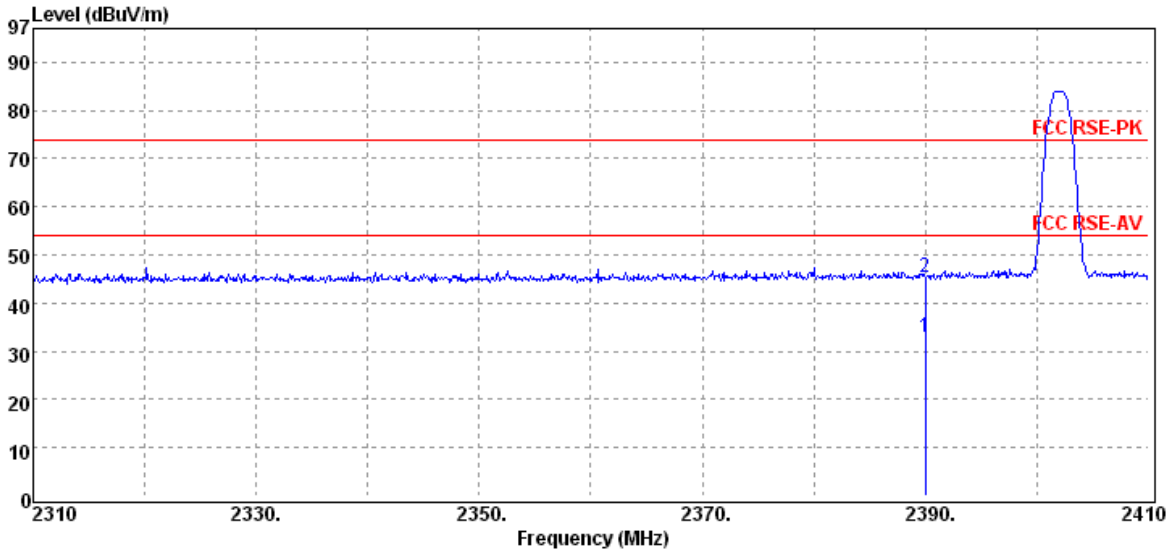
Band Edges Radiated Emission:

Note: The emission that surpasses the limit of peak represents the fundamental emission of the operation that does not account to be conformed to the limit of the interest.

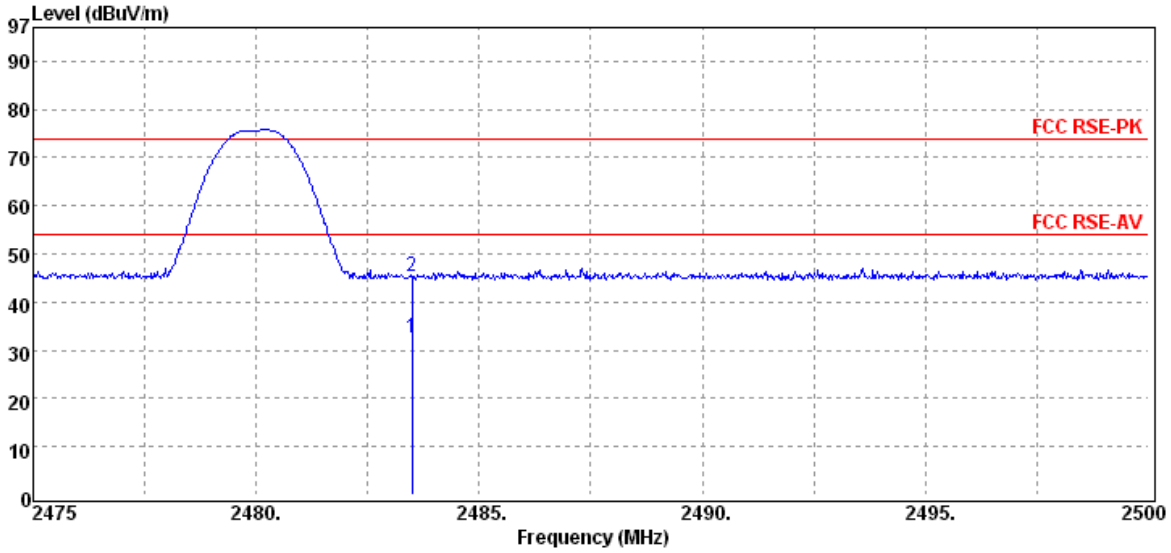
BT4.0 mode

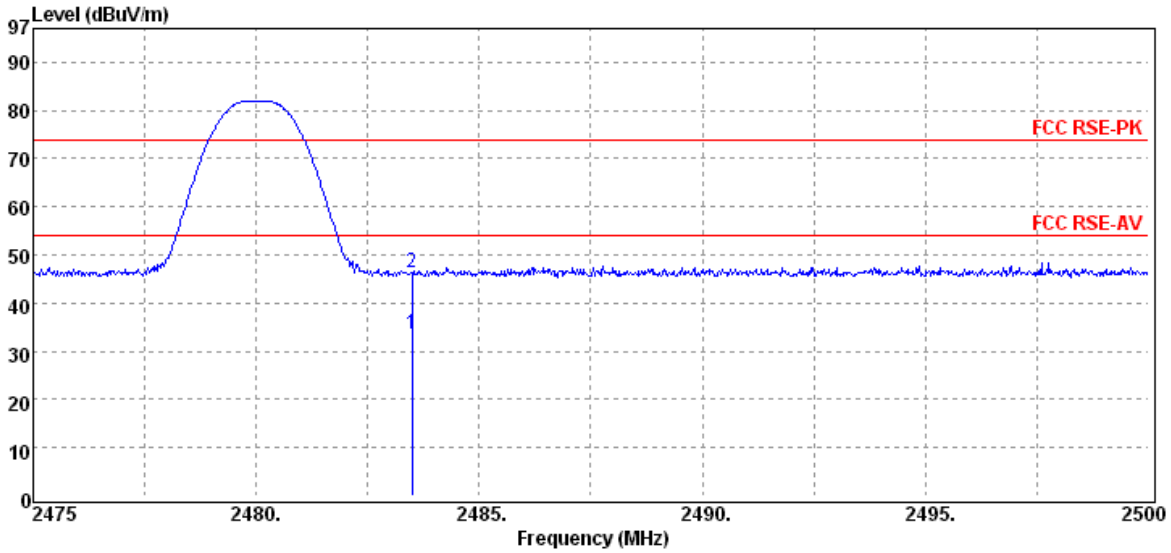
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge LOW	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:Ver. / Hor.





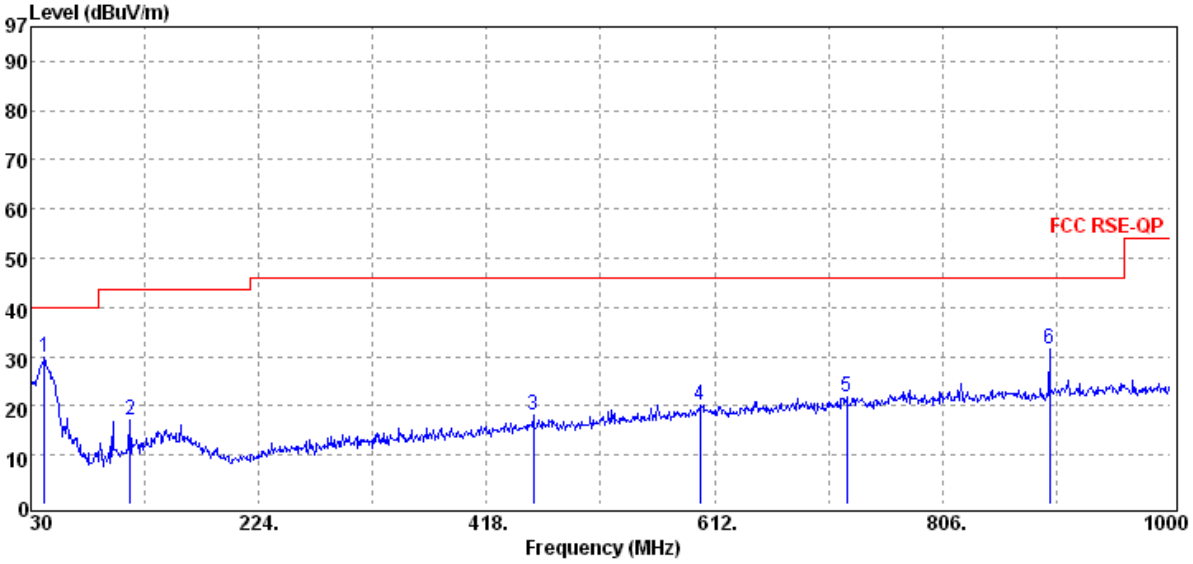
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:24deg_C/58RH
Operation Mode	:Bandedge HIGH	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:Ver. / Hor.

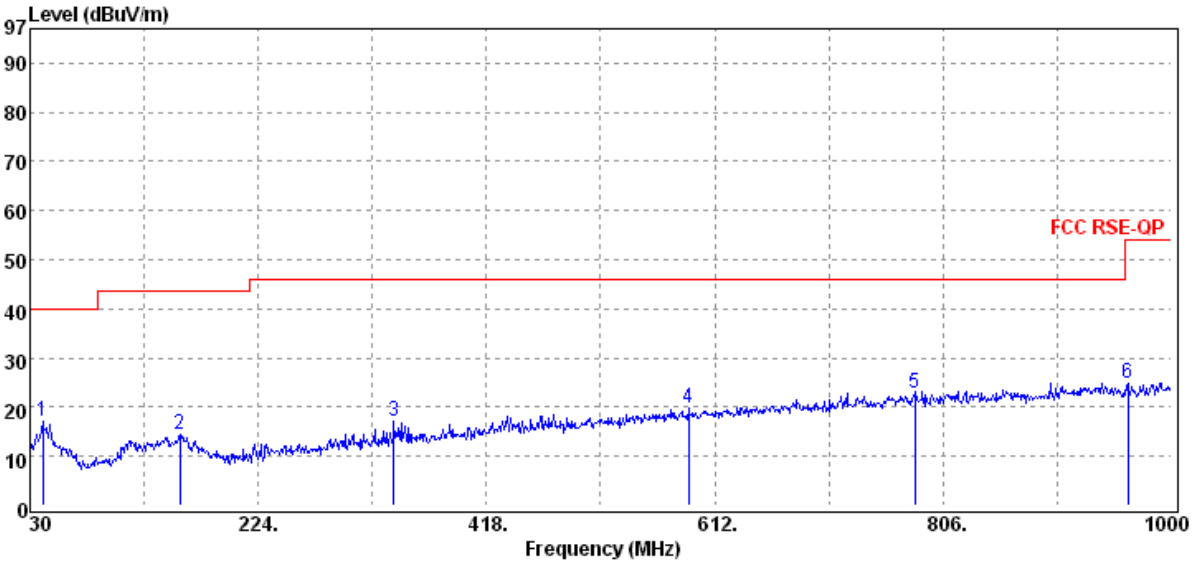




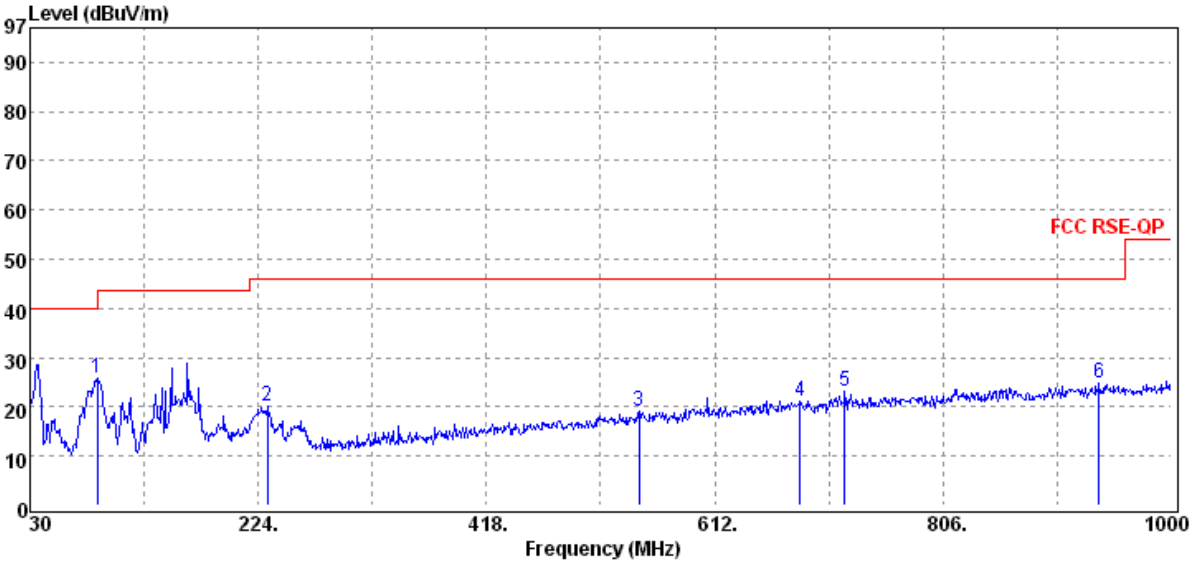
Radiated Spurious Emission Measurement photos Result (below 1GHz)

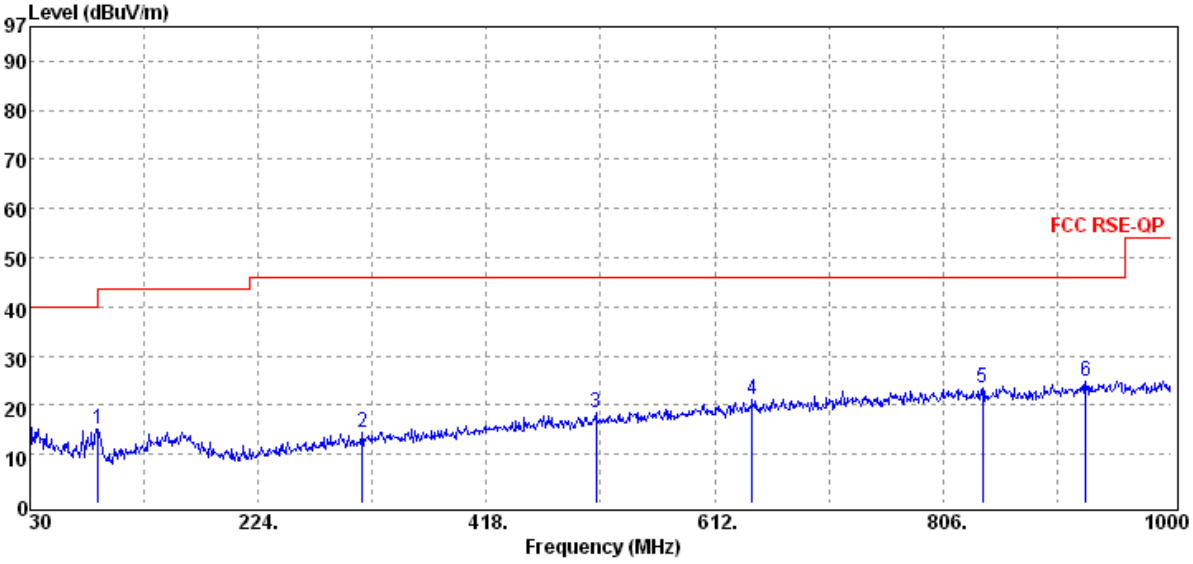
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:Ver. / Hor.



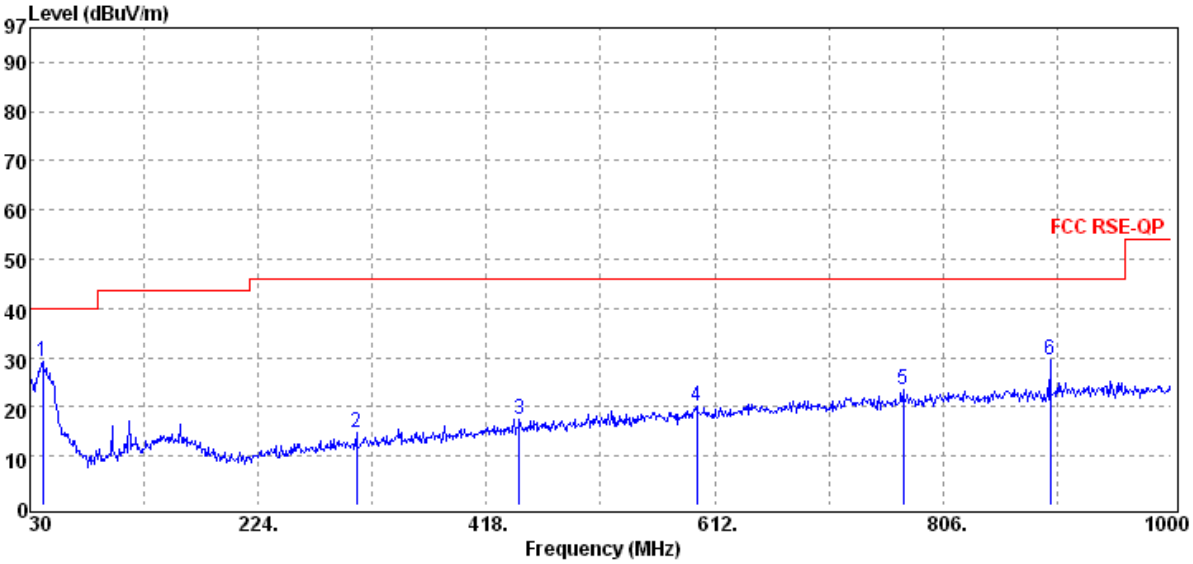


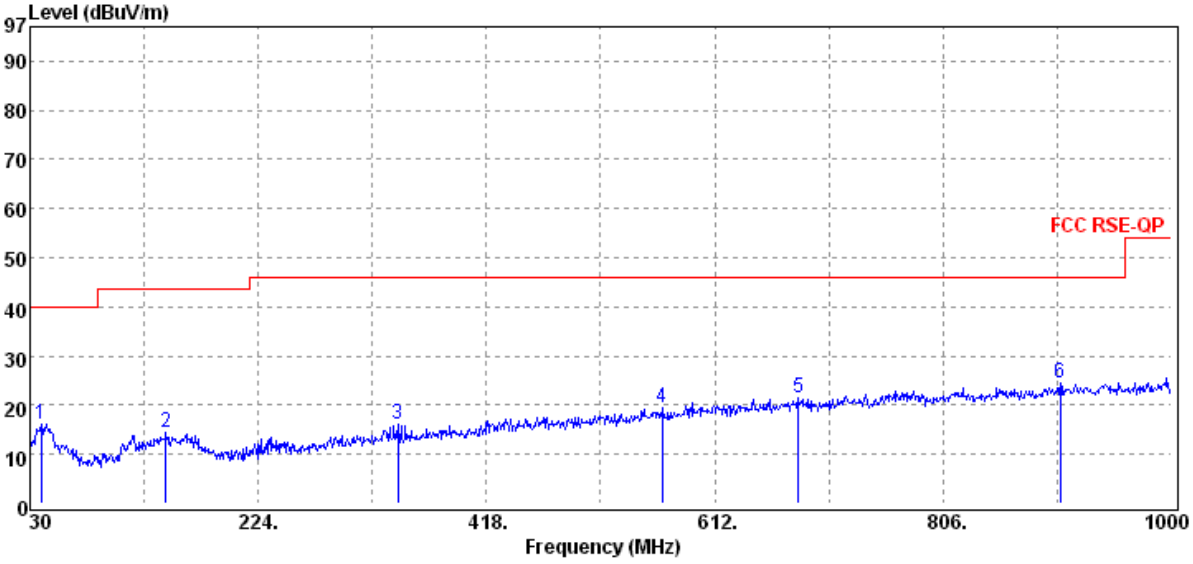
Operation Band	:BT 4.0	Test Date	:2013-07-14
Fundamental Frequency	:2442 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:Ver. / Hor.





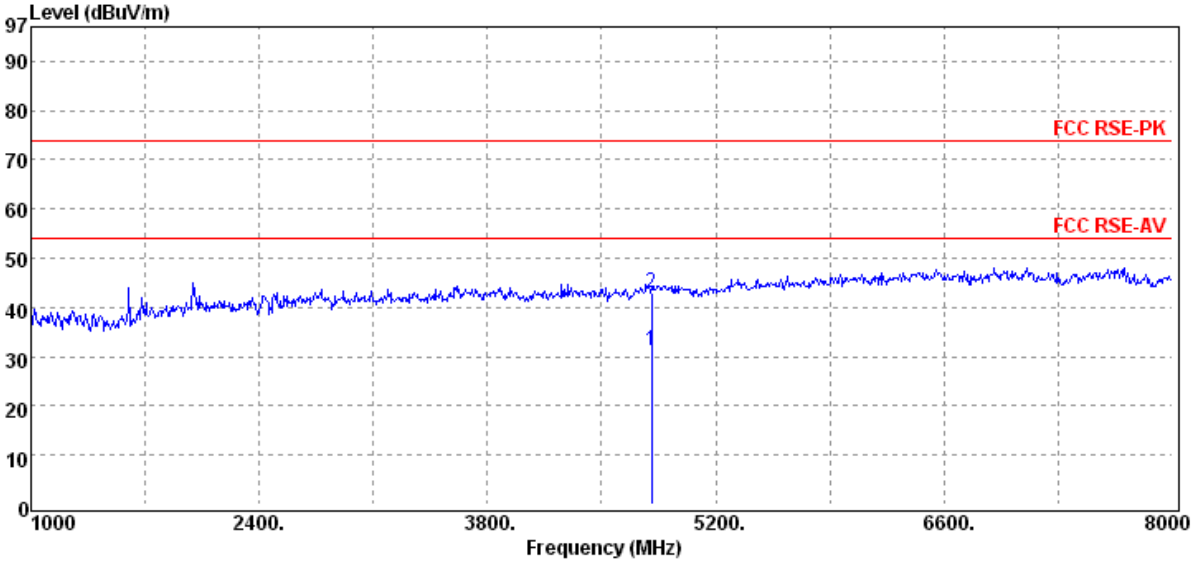
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:Ver. / Hor.

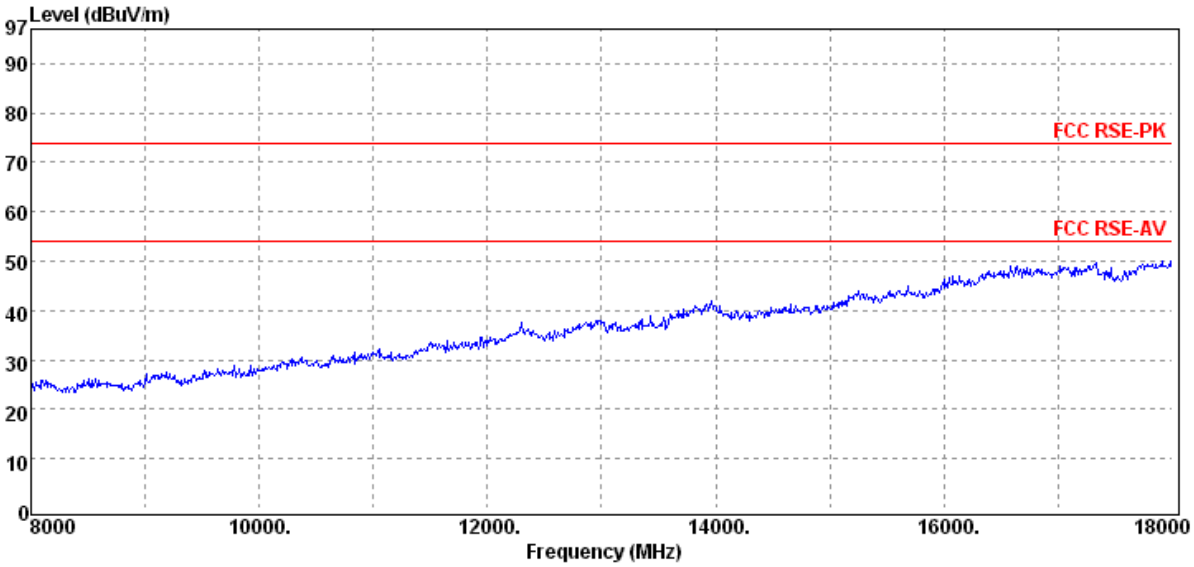


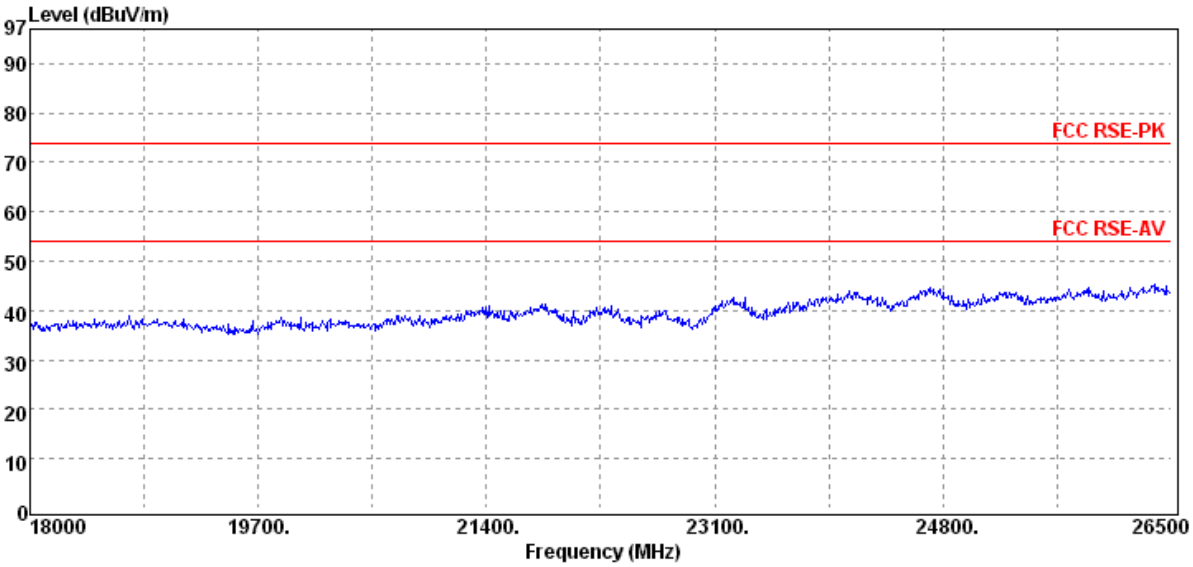


Radiated Spurious Emission Measurement photos Result (above 1GHz)

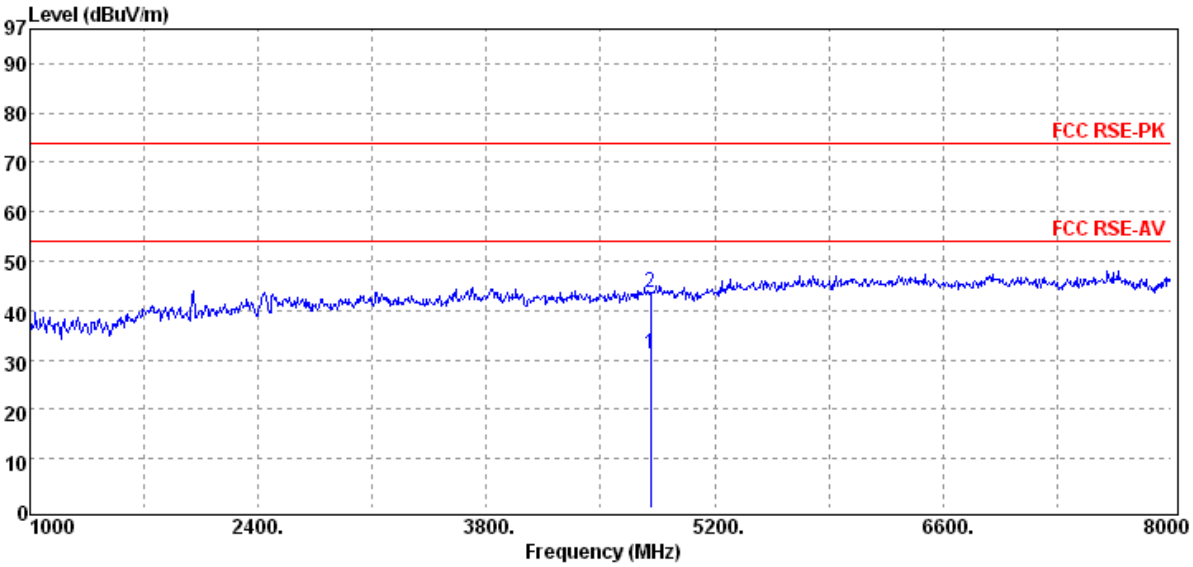
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

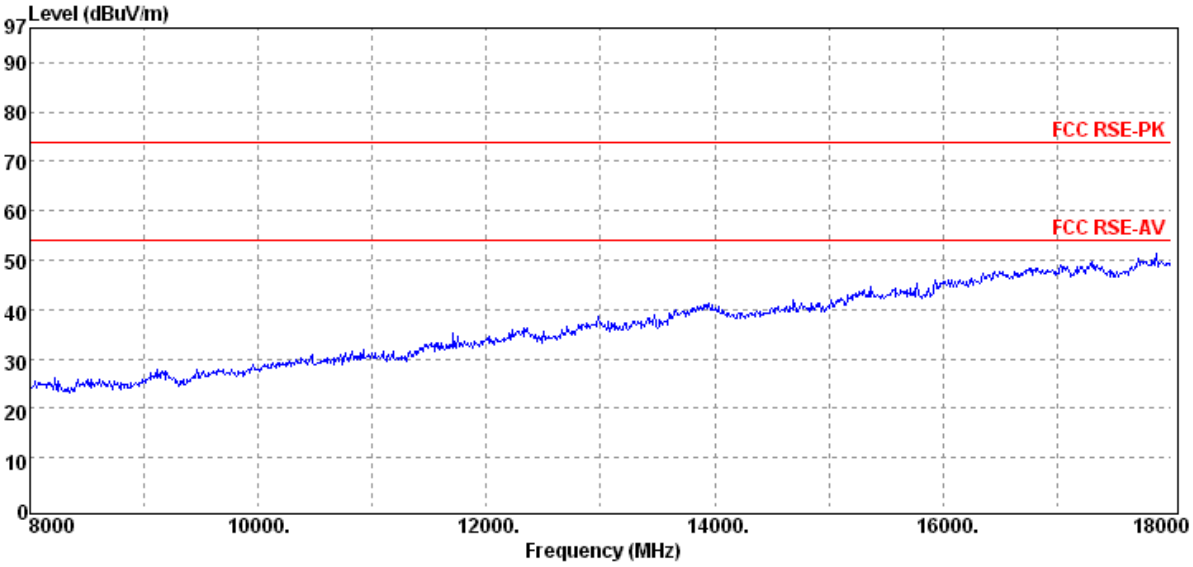


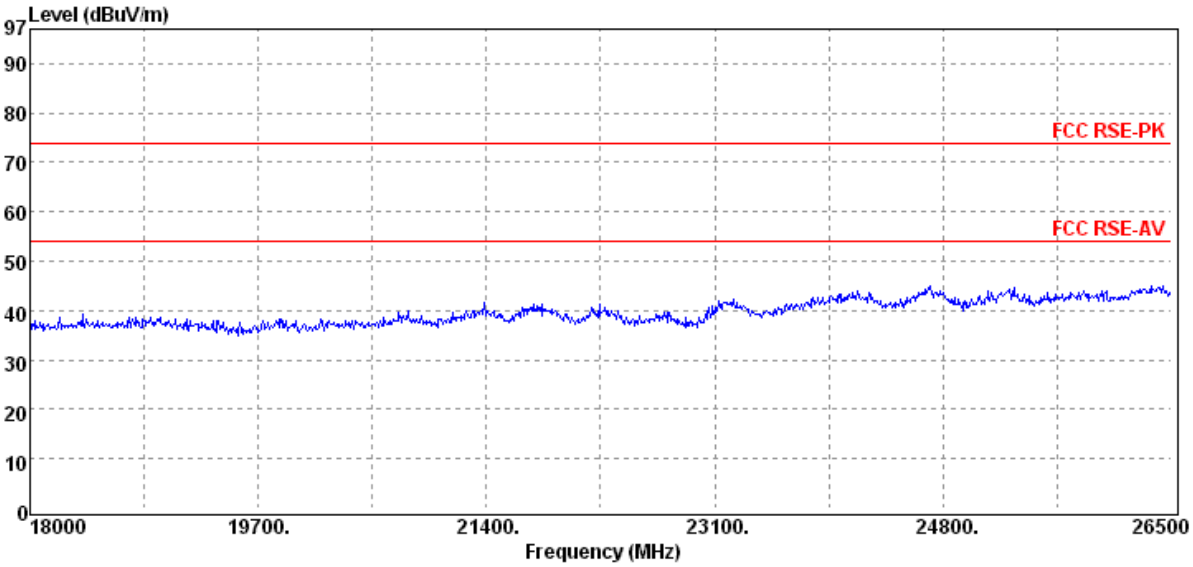




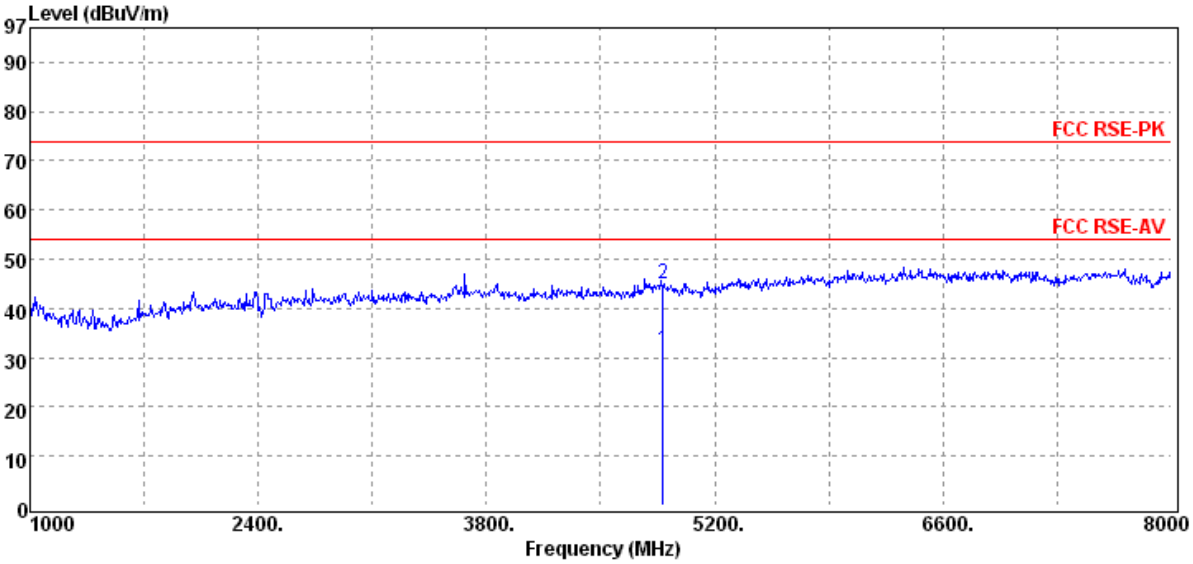
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2402 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX LOW	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

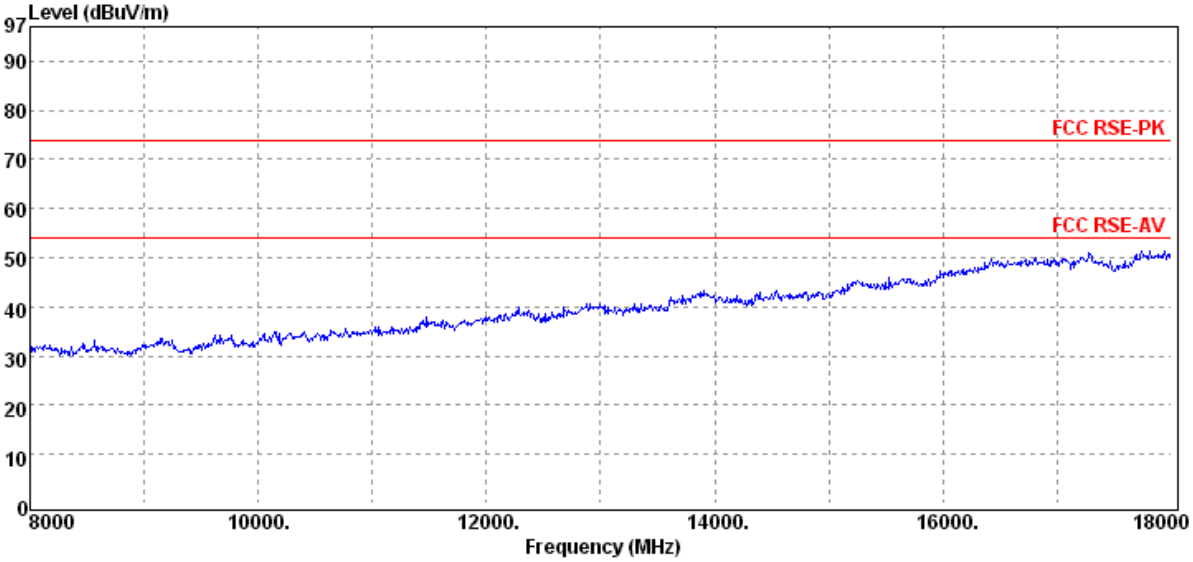


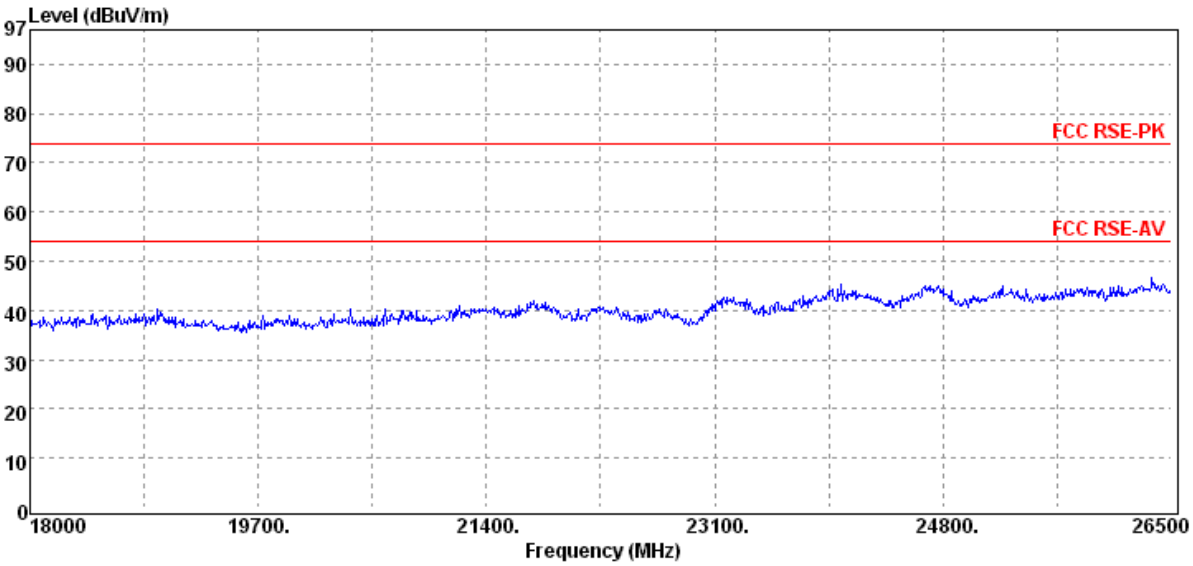




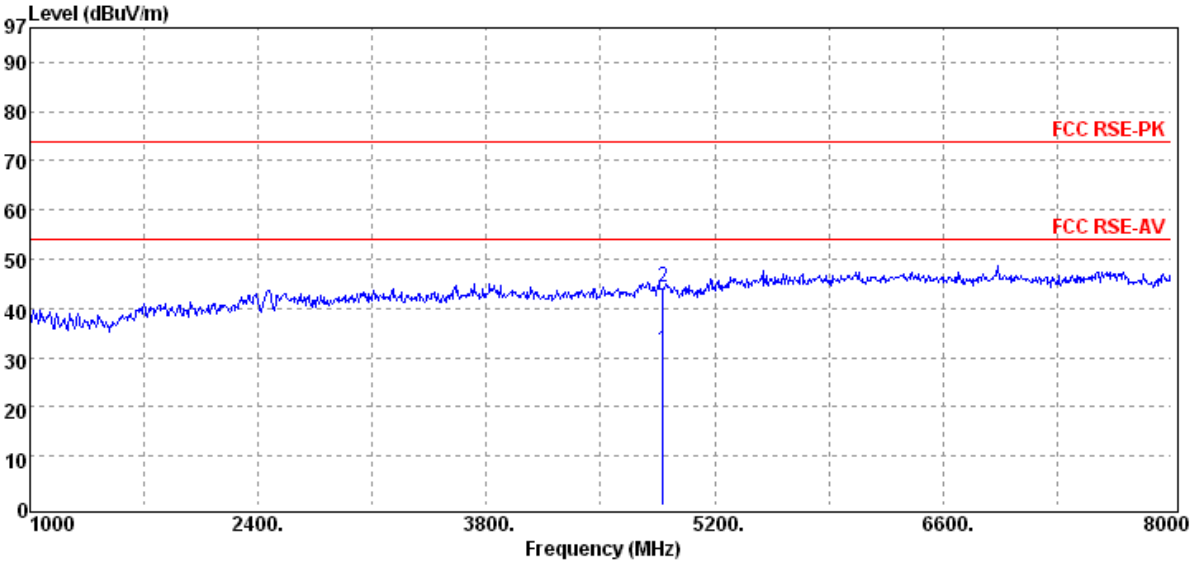
Operation Band	:BT 4.0	Test Date	:2013-07-14
Fundamental Frequency	:2442 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

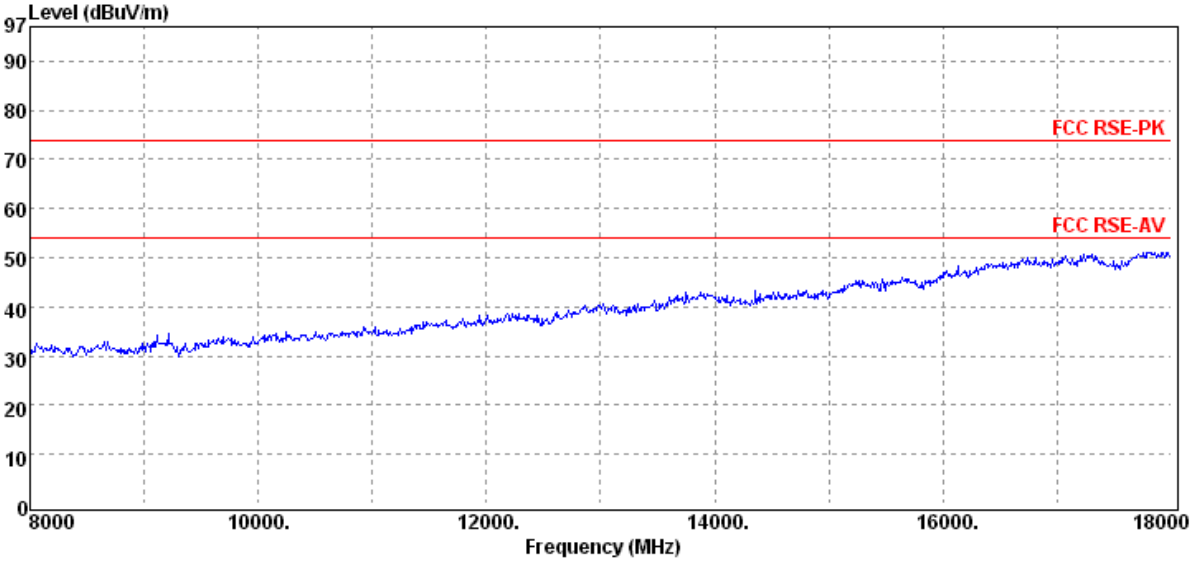


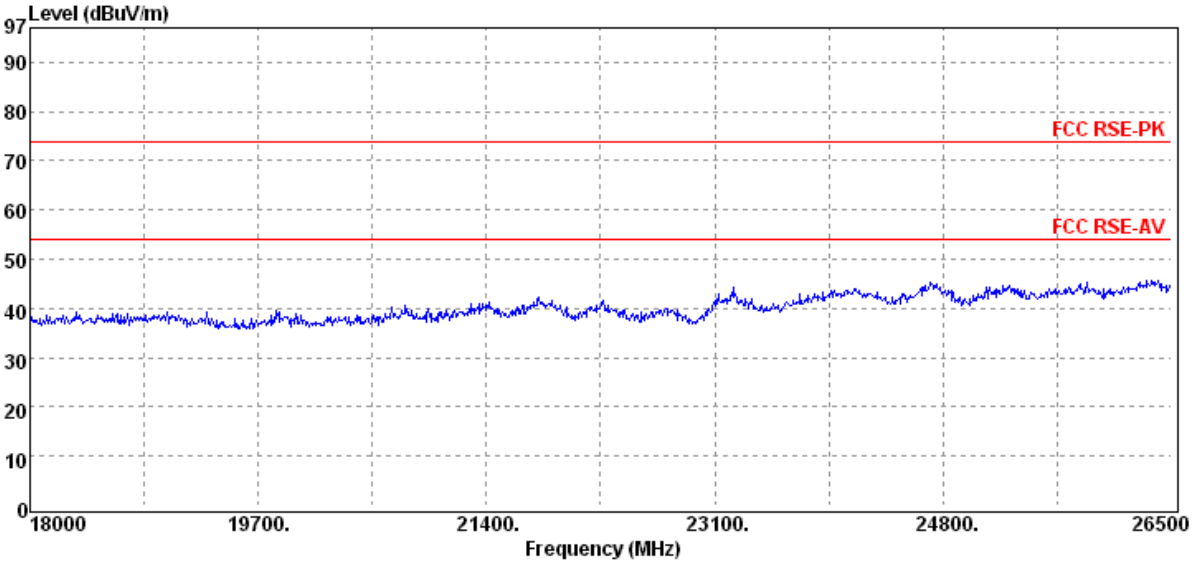




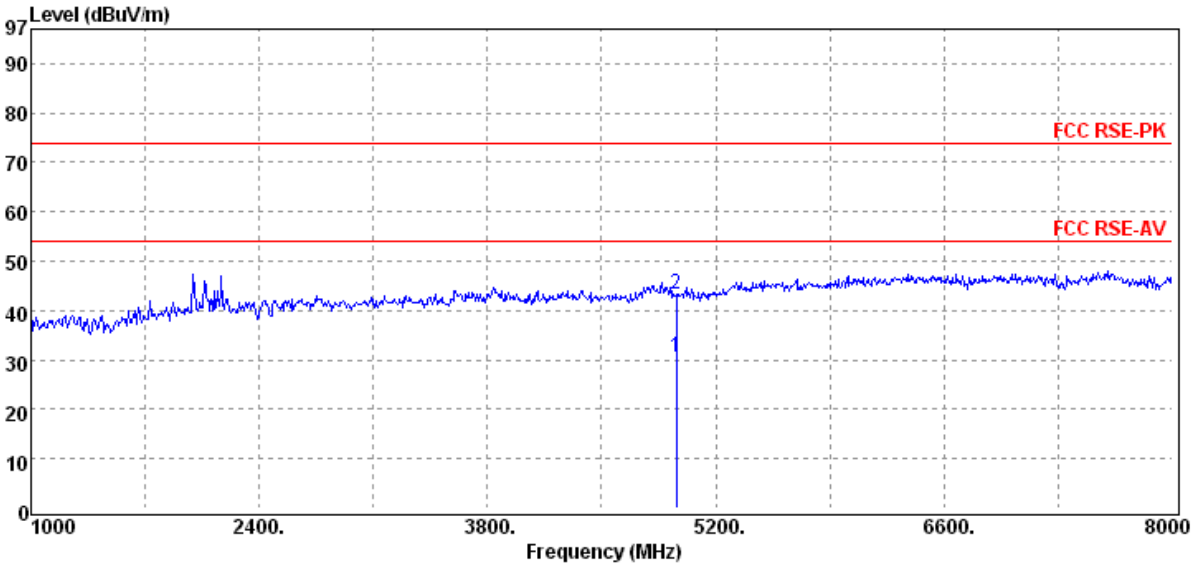
Operation Band	:BT 4.0	Test Date	:2013-07-14
Fundamental Frequency	:2442 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX MID	Engineer	:Allen
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL

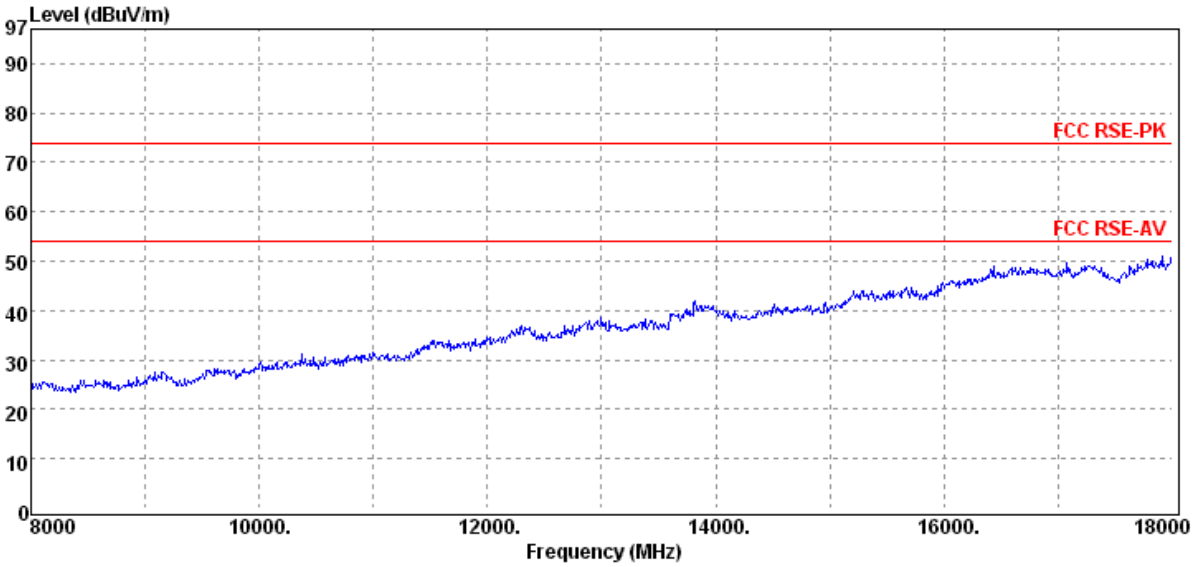


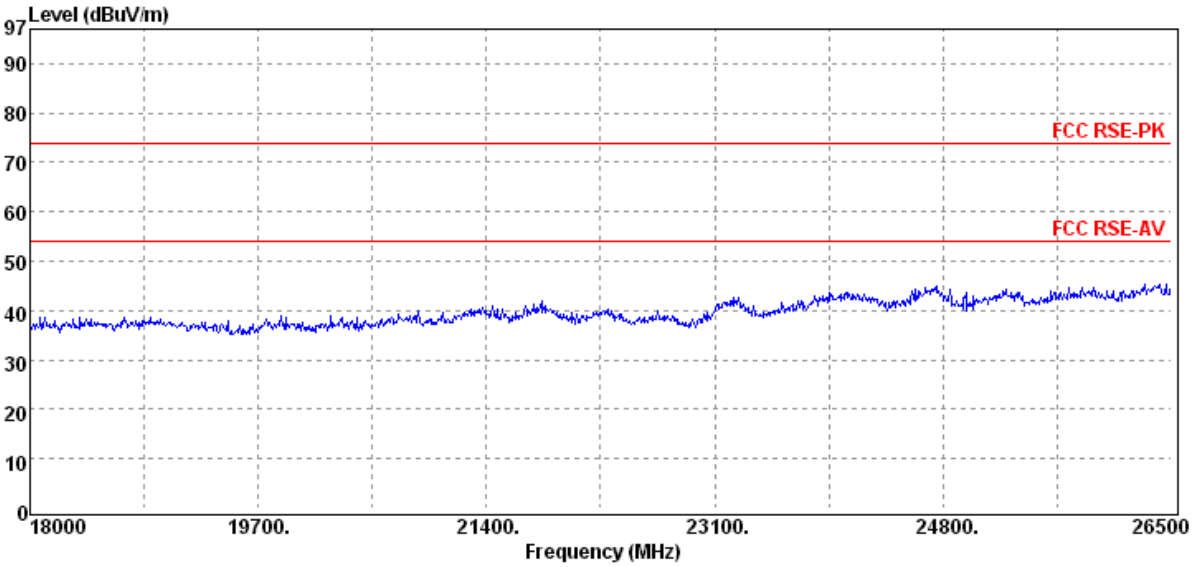




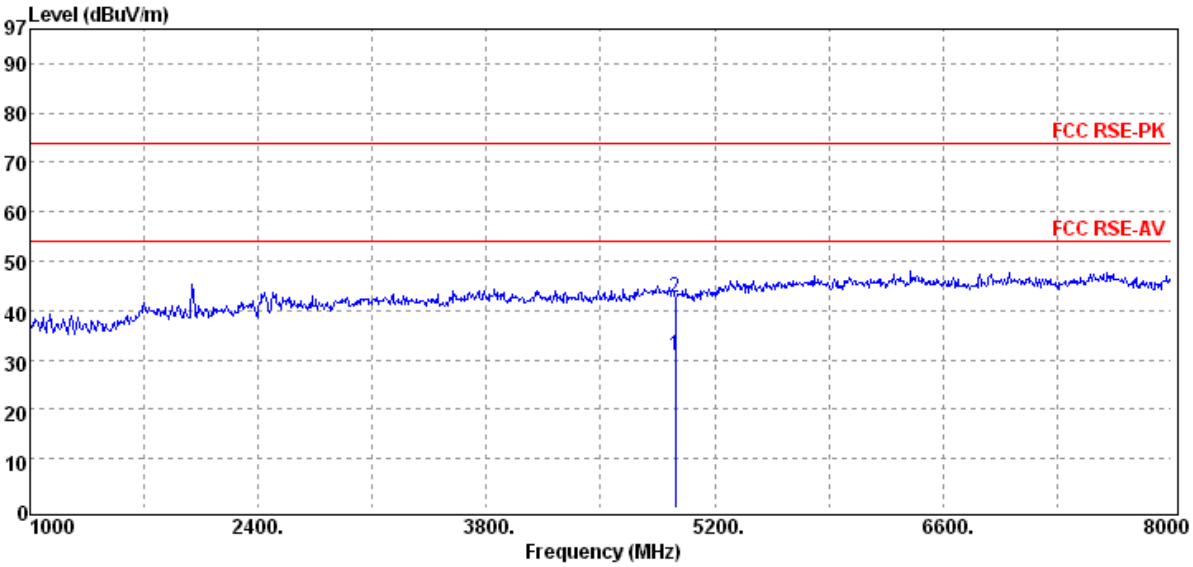
Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL

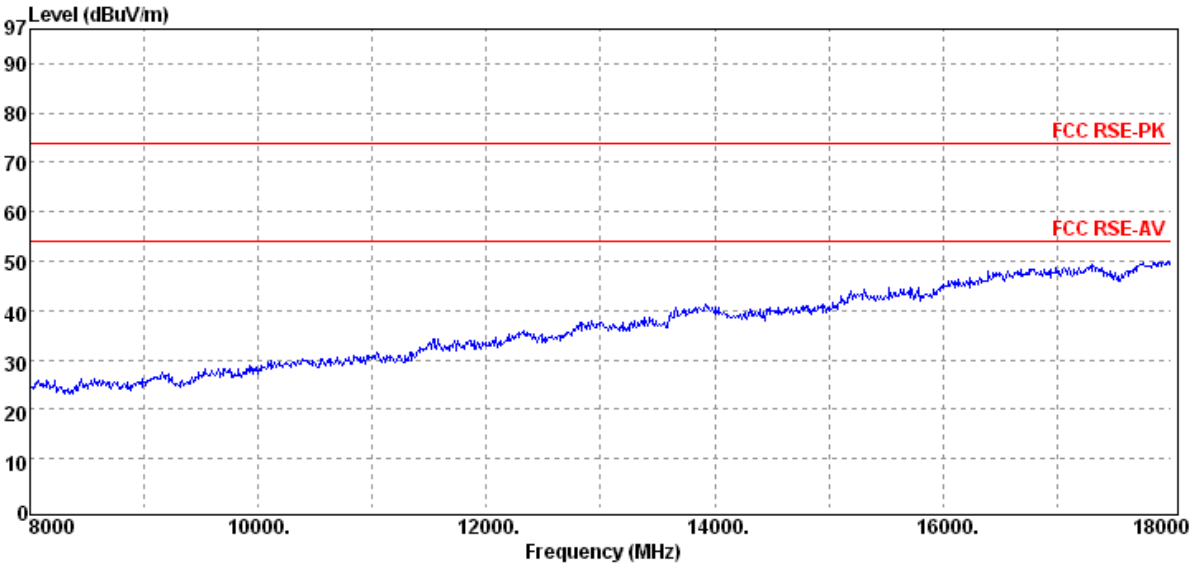


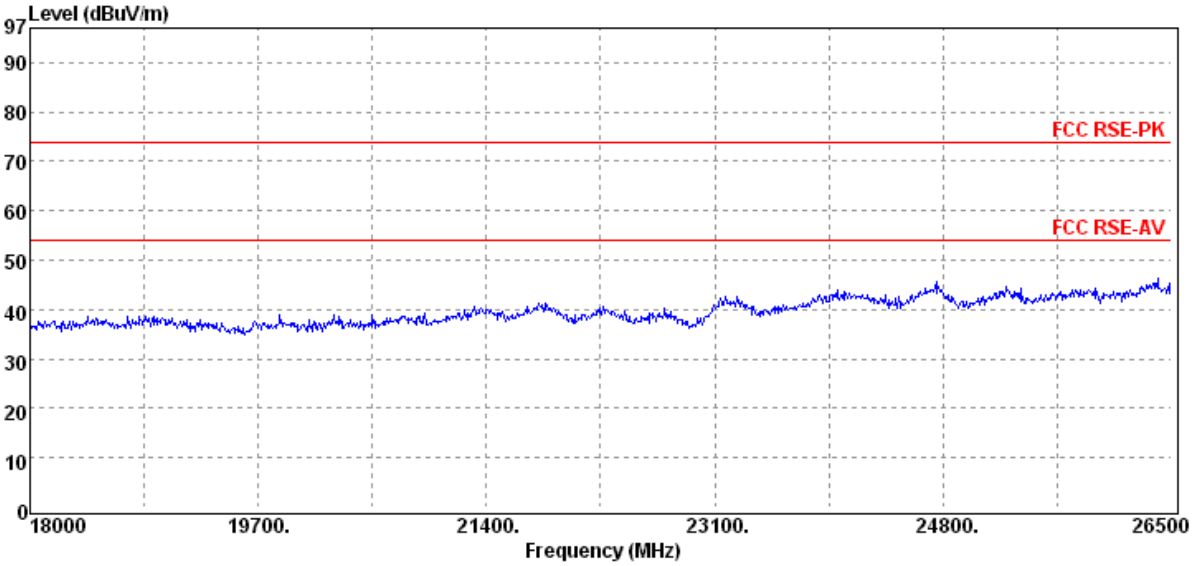




Operation Band	:BT 4.0	Test Date	:2013-04-26
Fundamental Frequency	:2480 MHz	Temp./Humi.	:23deg_C/52RH
Operation Mode	:TX HIGH	Engineer	:Louis
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL







~ End of Report ~