

Test Report No. 7191020377-EEC11/01
dated 03 Jan 2012



PSB Singapore

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH
47 CFR FCC Parts 15B & C & E: 2011
OF A
HOME THEATER AUDIO SYSTEM
[Model : SU-HTB550 & SU-HTB350]
[FCC ID : ACJ-11AT1201]

TEST FACILITY TÜV SÜD PSB Pte Ltd,
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FCC REG. NO. 99142 (3m and 10m Semi-Anechoic Chamber, Science Park)

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TEST PERIOD 14 Nov 2011 – 03 Jan 2012

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TEST SUMMARY

The product was tested in accordance with the customer's specifications.

Test Results Summary

Test Standard	Description	Pass / Fail
47 CFR FCC Part 15: 2011		
15.107(a), 15.207	Conducted Emissions	Pass
15.109(a), 15.205, 15.209	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.407(b)	RF Spurious Emissions (Radiated)	Pass
15.407(a)	Emission Bandwidth (26dB Bandwidth Measurement)	Pass
15.247(b)(3), 15.407(a)	Maximum Conducted Output Power	Pass
15.407(b)	RF Spurious Emissions (Conducted)	Pass
15.407(b)(7)	Band Edge Compliance (Radiated)	Pass
15.407(a)	Peak Power Spectral Density	Pass
15.407(a)(6)	Peak Excursion	Pass
15.247(a)(2)	Spectrum Bandwidth (6dB Bandwidth Measurement)	Pass
15.247(d)	RF Conducted Spurious Emissions	Pass
15.247(d)	Band Edge Compliance (Conducted)	Pass
15.247(d)	Band Edge Compliance (Radiated)	Pass
15.247(e)	Peak Power Spectral Density	Pass
1.1310	Maximum Permissible Exposure	Pass



TEST SUMMARY

Notes

- Three channels as listed below, which respectively represent the lower, middle and upper channels of the Equipment Under Test (EUT) were chosen and tested. For each channel, the EUT was configured to operate in the test mode.

<u>Transmit Channel</u>	<u>Frequency (GHz)</u>
<u>Lower Band (5150GHz – 5250GHz)</u>	
Channel 0	5.180
Channel 2	5.220
Channel 3	5.240
<u>Upper Band (5725GHz – 5825GHz)</u>	
Channel 4	5.745
Channel 6	5.785
Channel 8	5.825

- The EUT is a Class B device when in non-transmitting state and meets the 47 CFR FCC Part15B Class B requirements.
- All test measurement procedures are according to ANSI C63.4: 2003.
- The maximum measured RF power of the Equipment Under Test (SU-HTB550) is 15.0dBm.
- The EUT was tested in continuous transmission mode; ie 0dB duty cycle.
- Panasonic AVC Networks Singapore Pte Ltd declared that the models **SC-HTB550, SC-HTB450, SC-HTB350 & SC-HTB351** are using the same RF module and identical in term of components, circuitry design, PCB layouts and mechanical structures. The model **SC-HTB550** is the worst case model among the declared models in view of RF and EMC performance. Shall the model **SC-HTB550** passes the RF and EMC test, the declared models **SC-HTB450, SC-HTB350 & SC-HTB351** are deemed to meet the same requirements. See below tables for the differences:

	Basic model	Similar model	Similar model	Similar model	Similar model
	SC-HTB550 US	SC-HTB550 Canada	SC-HTB450 Canada	SC-HTB350 US	SC-HTB351 US
Main Unit	SU-HTB550	SU-HTB550	SU-HTB450	SU-HTB350	SU-HTB350
HDMI Input	Yes (2X)	Yes (2X)	Yes (2X)	No	No
HDMI Output	Yes	Yes	Yes	No	No
Analog Input	No	No	No	Yes (Stereo)	Yes (Stereo)
Function Indicator	8 LEDS	8 LEDS	8 LEDS	7 LEDS	7 LEDS
Active Subwoofer	SB-HWA550	SB-HWA550	SB-HWA450	SB-HWA350	SB-HWA350
Wooden Box	Glossy	Glossy	Matt	Matt	Matt
Front Speaker	SB-HTB550	SB-HTB550	SB-HTB350	SB-HTB350	SB-HTB350
Metal Mesh	Anodizing	Anodizing	ED Coating	ED Coating	ED Coating

TEST SUMMARY

Notes (Continued)

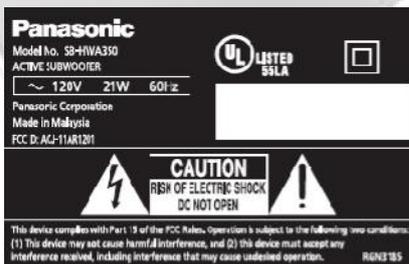
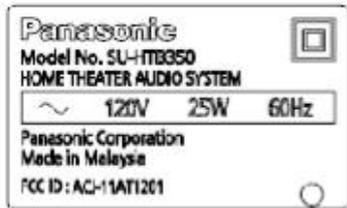
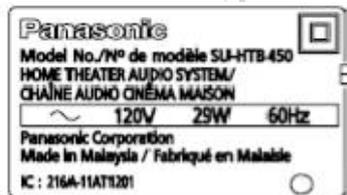
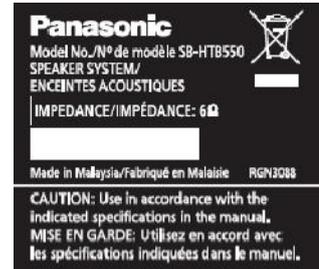
MAIN UNIT NAME PLATE



ACTIVE SUBWOOFER NAME PLATE



SPEAKER NAME PLATE



Modifications

No modifications were made.



PRODUCT DESCRIPTION

Description : The Equipment Under Test (EUT) is a **HOME THEATER AUDIO SYSTEM.**

Applicant : Panasonic AVC Networks (S) Pte Ltd
202, Bedok South Avenue 1,
Singapore 469332

Manufacturer : Panasonic Corporation
1006, Oaza Kadoma, Kadoma-City,
Osaka 571 8501, Japan

Factor(ies) : Panasonic AVC Networks Johor Malaysia Sdn Bhd
IE, PLO 460, Jalan Bandar, 81700
Pasir Gudang, Johor, Malaysia

Model Number : SU-HTB550 & SU-HTB350

FCC ID : ACJ-11AT1201

Serial Number : Nil

Microprocessor : Avnera AV7621

Operating / Transmitting Frequency : 5.180GHz (lower channel) to 5.825GHz (upper channel)
9 channels.

Clock / Oscillator Frequency : 16MHz

Modulation : $\pi/4$ DQPSK / OFDM

Antenna Gain : 2.0 dBi

Port / Connectors : 2xHDMI Input
1xHDMI Output
2xOptical In

Rated Input Power : 120V 60Hz

Accessories : 1. Remote Control with Battery
2. AC Cord
3. OI Book
4. Easy Setup Guide



SUPPORTING DESCRIPTION DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
Panasonic Speaker System	M/N: SB-HTB550 S/N: TN1JA001008 FCC ID: DoC	2.00m unshielded speaker cable
Lenovo Laptop	M/N: R400 S/N: L3-ALB2G 09/03 FCC ID: DoC	1.80m unshielded power cable
Lenovo AC Adapter (Laptop)	M/N: PA-1650-161 S/N: 11S92P1158Z1 FCC ID: DoC	2.00m unshielded power cable
Avena TX Module Jig	M/N: AVTF123-01A S/N: Nil FCC ID: DoC	1.00m unshielded USB cable
Avena RX Module Jig	M/N: AVTF123-02A S/N: Nil FCC ID: DoC	1.00m unshielded USB cable
Antel Electronics Co., Ltd. AC Adapter (Avena Jig)	M/N: SF-789 S/N: Nil FCC ID: DoC	1.00m unshielded power cable
JVC DVD Player	M/N: XV-N680 S/N: 124R1026 FCC ID: DoC	1.00m unshielded power cable 1.00m unshielded HDMI cable

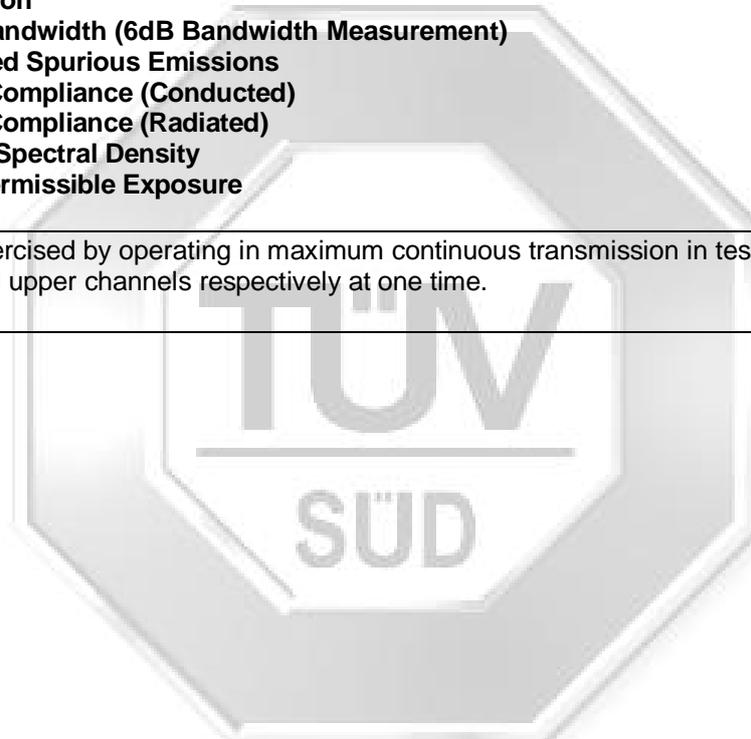


EUT OPERATING CONDITIONS

47 CFR FCC Part 15

1. **Conducted Emissions**
2. **Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)**
3. **RF Spurious Emissions (Radiated)**
4. **Emission Bandwidth (26dB Bandwidth Measurement)**
5. **Maximum Conducted Output Power**
6. **RF Spurious Emissions (Conducted)**
7. **Band Edge Compliance (Radiated)**
8. **Peak Power Spectral Density**
9. **Peak Exclusion**
10. **Spectrum Bandwidth (6dB Bandwidth Measurement)**
11. **RF Conducted Spurious Emissions**
12. **Band Edge Compliance (Conducted)**
13. **Band Edge Compliance (Radiated)**
14. **Peak Power Spectral Density**
15. **Maximum Permissible Exposure**

The EUT was exercised by operating in maximum continuous transmission in test mode, i.e transmitting at lower, middle and upper channels respectively at one time.





CONDUCTED EMISSION TEST

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Limits

Frequency Range (MHz)	Limit Values (dBμV)	
	Quasi-peak (QP)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50

* Decreasing linearly with the logarithm of the frequency

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent EMC Analyzer	E7403A	US41160166	12 Jul 2012
Schaffner EMI Receiver	SMR4503	040	10 Jun 2012
Agilent EMC Analyzer-SA7	E7403A	US41160167	27 May 2012
Schaffner LISN –LISN7 (Ref)	NNB42	00008	16 Jun 2012
EMCO LISN (for supporting) – LISN6	3825/2	9309-2127	29 Jul 2012





CONDUCTED EMISSION TEST

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another LISN.

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
3. High peaks, relative to the limit line, were then selected.
4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.
5. Steps 2 to 4 were then repeated for the LIVE line.

Sample Calculation Example

At 20 MHz Q-P limit (Class B) = 1000 μV = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV
(Calibrated for system losses)
Therefore, Q-P margin = 40.0 - 60.0 = -20.0 i.e. 20.0 dB below Q-P limit



CONDUCTED EMISSION TEST

47 CFR FCC Parts 15.107(a) and 15.207 Conducted Emission Results

Test Input Power	110V 60Hz	Temperature	19°C
Line Under Test	AC Mains	Relative Humidity	67%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Operating Mode	BD / DVD Input (Worst non-wireless mode)	Tested By	Chelmin Li Li

Frequency (MHz)	Q-P Value (dB μ V)	Q-P Margin (dB)	AV Value (dB μ V)	AV Margin (dB)	Line
0.3836	44.0	-14.2	39.7	-8.5	Neutral
1.3349	35.8	-20.2	27.5	-18.5	Live
1.6973	30.0	-26.0	27.8	-18.2	Neutral
2.2423	38.7	-17.3	26.2	-19.8	Live
8.1863	42.1	-17.9	26.5	-23.5	Neutral
14.1130	44.0	-16.0	41.7	-8.3	Neutral

Test Input Power	110V 60Hz	Temperature	19°C
Line Under Test	AC Mains	Relative Humidity	67%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Operating Mode	Wireless mode (5GHz transmission)	Tested By	Li Chelmin

Frequency (MHz)	Q-P Value (dB μ V)	Q-P Margin (dB)	AV Value (dB μ V)	AV Margin (dB)	Line	Channel
0.7662	42.9	-13.1	35.8	-10.2	Live	0
0.8294	38.4	-17.6	31.2	-14.8	Live	0
0.8888	44.5	-11.5	37.6	-8.4	Live	0
0.9505	45.0	-11.0	35.8	-10.2	Neutral	0
1.0126	48.8	-7.2	41.3	-4.7	Live	0
1.0736	46.4	-9.6	37.8	-8.2	Live	0

Notes

- All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
9kHz - 30MHz
RBW: 9kHz VBW: 30kHz
- Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 9kHz – 30MHz is ± 2.2 dB.



RADIATED EMISSION TEST

47 CFR FCC Part 15.205 Restricted Bands

MHz		MHz		MHz		GHz	
0.090	- 0.110	16.42	- 16.423	399.9	- 410	4.5	- 5.15
0.495	- 0.505	16.69475	- 16.69525	608	- 614	5.35	- 5.46
2.1735	- 2.1905	16.80425	- 16.80475	960	- 1240	7.25	- 7.75
4.125	- 4.128	25.5	- 25.67	1300	- 1427	8.025	- 8.5
4.17725	- 4.17775	37.5	- 38.25	1435	- 1626.5	9.0	- 9.2
4.20725	- 4.20775	73	- 74.6	1645.5	- 1646.5	9.3	- 9.5
6.215	- 6.218	74.8	- 75.2	1660	- 1710	10.6	- 12.7
6.26775	- 6.26825	108	- 121.94	1718.8	- 1722.2	13.25	- 13.4
6.31175	- 6.31225	123	- 138	2200	- 2300	14.47	- 14.5
8.291	- 8.294	149.9	- 150.05	2310	- 2390	15.35	- 16.2
8.362	- 8.366	156.52475	- 156.52525	2483.5	- 2500	17.7	- 21.4
8.37625	- 8.38675	156.7	- 156.9	2690	- 2900	22.01	- 23.12
8.41425	- 8.41475	162.0125	- 167.17	3260	- 3267	23.6	- 24.0
12.29	- 12.293	167.72	- 173.2	3332	- 3339	31.2	- 31.8
12.51975	- 12.52025	240	- 285	3345.8	- 3358	36.43	- 36.5
12.57675	- 12.57725	322	- 335.4	3600	- 4400	Above 38.6	
13.36	- 13.41						

47 CFR FCC Parts 15.109(a) and 15.209 Radiated Emission Limits

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

47 CFR FCC Parts 15.109(a) and 15.209 Radiated Emission Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012
Schaffner Bilog Antenna –(30MHz-2GHz) BL3 (Ref)	CBL6112B	2549	06 Jan 2012
EMCO Horn Antenna(1GHz-18GHz) – H15 (Ref)	3115	0003-6008	20 May 2012
ETS Horn Antenna(18GHz-40GHz)(Ref)	3116	0004-2474	19 Apr 2012
Toyo Preamplifier (26.5GHz-40GHz)	HAP26-40W	00000005	19 Apr 2012
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	08 Oct 2012
Teseq Preamplifier (9kHz-1GHz)	LNA6901	72266	23 Jun 2012
Micro-tronics Bandreject Filter	BRC14719	001	13 Aug 2012
Micro-tronics Bandreject Filter	BRC50705	008	13 Aug 2012



RADIATED EMISSION TEST

47 CFR FCC Parts 15.109(a) and 15.209 Radiated Emission Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

47 CFR FCC Parts 15.109(a) and 15.209 Radiated Emission Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point that above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 30MHz to 10th harmonics of the EUT fundamental frequency, using the Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

Sample Calculation Example

At 300 MHz Q-P limit (Class B) = 200 μ V/m = 46.0 dB μ V/m

Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB

Q-P reading obtained directly from EMI Receiver = 40.0 dB μ V/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 40.0 - 46.0 = -6.0 i.e. 6 dB below Q-P limit



RADIATED EMISSION TEST

47 CFR FCC Part 15.109(a) Radiated Emission Results

Test Input Power	110V 60Hz	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	SU-HTB550	Atmospheric Pressure	1030mbar
Operating Mode	BD / DVD Input (Worst non-wireless mode)	Tested By	Calvin Diego

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dB μ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)
86.9360	22.0	-18.0	168	301	H
132.0930	27.0	-16.5	200	100	H
145.8360	26.3	-17.2	4	301	H
245.9660	29.5	-16.5	346	100	H
328.4260	28.1	-17.9	346	100	H
958.6530	28.0	-18.0	184	100	H

Spurious Emissions above 1GHz

Frequency (GHz)	Peak Value (dB μ V/m)	Peak Margin (dB)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)
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Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
 RBW: 120kHz VBW: 1MHz
>1GHz
 RBW: 1MHz VBW: 1MHz
- "--" indicates no emissions were found and shows compliance to the limits.
- Radiated Emissions Measurement Uncertainty
 All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 40.0GHz is ± 4.0 dB.

Test Report No. 7191020377-EEC11/01
dated 03 Jan 2012



PSB Singapore

RADIATED EMISSION TEST

47 CFR FCC Parts 15.205 and 15.209 Radiated Emission Results

Test Input Power	110V 60Hz	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0 (Worst)	Tested By	Calvin Diego
Operating Mode	Wireless mode (5GHz transmission)		

Spurious Emissions ranging from 30MHz – 1GHz (Worst lower band channel)

Frequency (MHz)	Q-P Value (dB μ V/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Ch
30.0000	17.2	-22.8	219	400	H	2
73.1930	8.1	-31.9	138	100	V	2
134.0560	14.0	-29.5	30	400	V	2
171.3600	13.8	-29.7	290	100	V	2
787.8440	30.4	-15.6	210	100	H	2
836.9270	30.0	-16.0	229	100	H	2

Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Lower channel of lower band)

Frequency (GHz)	Peak Value (dB μ V/m)	Peak Margin (dB)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
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Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Mid channel of lower band)

Frequency (GHz)	Peak Value (dB μ V/m)	Peak Margin (dB)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
11.2400	56.7	-17.3	50.1	-3.9	35	283	H	2
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RADIATED EMISSION TEST

47 CFR FCC Parts 15.205 and 15.209 Radiated Emission Results

Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Upper channel of lower band)

Frequency (GHz)	Peak Value (dB μ V/m)	Peak Margin (dB)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- "--" indicates no emissions were found and shows compliance to the limits.
- Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
 RBW: 120kHz VBW: 1MHz
>1GHz
 RBW: 1MHz VBW: 3MHz
- The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
- The channel in the table refers to the transmit channel of the EUT.
- Radiated Emissions Measurement Uncertainty
 All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 40GHz is ± 4.0 dB.



RADIATED EMISSION TEST

47 CFR FCC Parts 15.205 and 15.209 Radiated Emission Results

Test Input Power	110V 60Hz	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0 (Worst)	Tested By	Calvin Diego
Operating Mode	Wireless mode (5GHz transmission)		

Spurious Emissions ranging from 30MHz – 1GHz (Worst upper band channel)

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Margin (dB)	Azimuth (Degrees)	Height (cm)	Polarisation (H/V)	Channel
30.000	17.9	-22.1	123	400	V	6
126.203	14.1	-29.4	208	100	V	6
171.360	15.4	-28.1	174	100	V	6
318.609	18.3	-27.7	176	100	H	6
738.761	28.1	-17.9	188	100	H	6
787.844	29.0	-17.0	182	100	H	6

Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Lower channel of upper band)

Frequency (GHz)	Peak Value (dBµV/m)	Peak Margin (dB)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Mid channel of upper band)

Frequency (GHz)	Peak Value (dBµV/m)	Peak Margin (dB)	Average Value (dBµV/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
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RADIATED EMISSION TEST

47 CFR FCC Parts 15.205 and 15.209 Radiated Emission Results

Spurious Emissions above 1GHz – 40GHz (Restricted Bands – Upper channel of upper band)

Frequency (GHz)	Peak Value (dB μ V/m)	Peak Margin (dB)	Average Value (dB μ V/m)	Average Margin (dB)	Azimuth (Degrees)	Height (cm)	Pol (H/V)	Ch
5.4100	50.0	-24.0	39.7	-14.3	55	108	H	8
11.9400	55.0	-19.0	46.1	-7.9	83	138	H	8
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--

Notes

- All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- "--" indicates no emissions were found and shows compliance to the limits.
- Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
- A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
30MHz - 1GHz
 RBW: 120kHz VBW: 1MHz
>1GHz
 RBW: 1MHz VBW: 3MHz
- The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
- The channel in the table refers to the transmit channel of the EUT.
- Radiated Emissions Measurement Uncertainty
 All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 40GHz is ± 4.0 dB.



RF SPURIOUS EMISSIONS (RADIATED) TEST

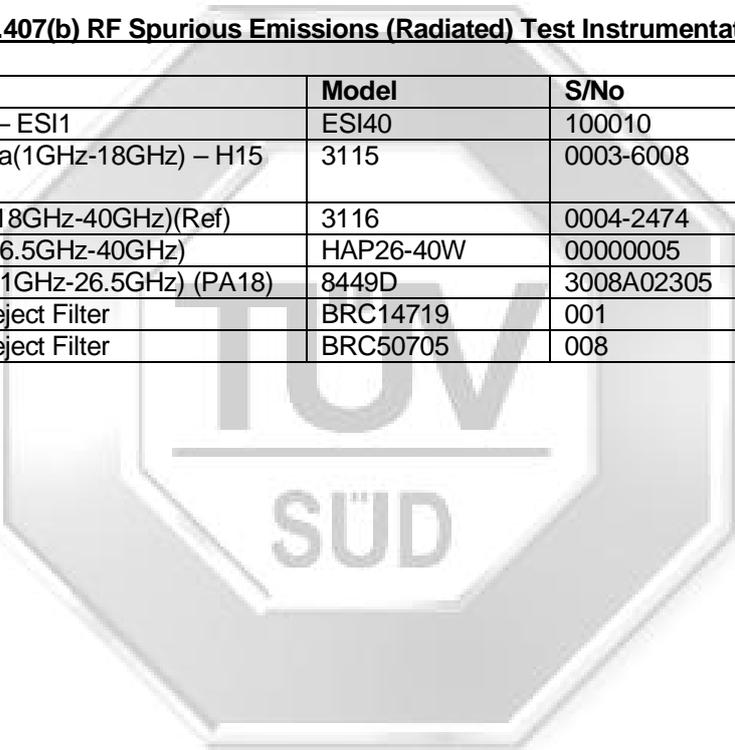
47 CFR FCC Part 15.407(b) RF Spurious Emissions (Radiated) Limits

The EUT shows compliance to the requirements of this section, which states:

1. For transmitters operating in the 5.15GHz – 5.25GHz band: all emissions outside of the 5.15GHz – 5.35GHz band shall not exceed an EIRP of -27 dBm/MHz.
2. For transmitters operating in the 5.725GHz – 5.825GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012
EMCO Horn Antenna(1GHz-18GHz) – H15 (Ref)	3115	0003-6008	20 May 2012
ETS Horn Antenna(18GHz-40GHz)(Ref)	3116	0004-2474	19 Apr 2012
Toyo Preamplifier (26.5GHz-40GHz)	HAP26-40W	00000005	19 Apr 2012
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	08 Oct 2012
Micro-tronics Bandreject Filter	BRC14719	001	13 Aug 2012
Micro-tronics Bandreject Filter	BRC50705	008	13 Aug 2012





RF SPURIOUS EMISSIONS (RADIATED) TEST

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Radiated) Test Setup

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Radiated) Test Method

2. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
 - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
 - b. The EUT was then rotated to the direction that gave the maximum emission.
 - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A peak measurement was made for that frequency point.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from 1GHz to 10th harmonics of the EUT fundamental frequency, using Horn antenna.
7. For each spurious emission found, the EIRP of the spurious emission was computed based on the following formula:
EIRP (dBm) = E (dB μ V/m) – 95.2 (based on 3m test distance)
where E is the electric field strength at 3m test distance



RF SPURIOUS EMISSIONS (RADIATED) TEST

47 CFR FCC Part 15.407(b) RFSpurious Emissions (Radiated) Results

Test Input Power	110V 60Hz	Temperature	23°C
Test Distance	3m	Relative Humidity	60%
EUT	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0 (Worst)	Tested By	Calvin Diego
Operating Mode	Wireless mode (5GHz transmission)		

Non-Restricted Band Spurious Emissions above 1GHz – 40GHz

Frequency (GHz)	Amplitude (dBm)	Limit (dBm)	Channel
8.6725	-37.8	-27.0	0
10.5400	-36.3	-27.0	2
11.4800	-33.9	-27.0	4
14.0200	-29.3	-27.0	0
14.3600	-30.1	-27.0	6
14.6400	-29.5	-27.0	3

Notes

- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:
>1GHz
RBW: 1MHz VBW: 3MHz
- The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
- The channel in the table refers to the transmit channel of the EUT.
- RF Spurious Emissions (Radiated) Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 40GHz is ± 4.0 dB.



EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

47 CFR FCC Part 15.407(a) Emission Bandwidth (26dB Bandwidth Measurement) Limits

The EUT shows compliance to the requirements of this section, which states:

1. For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or 4 dBm + 10 log B, where B is the 26dB emission bandwidth in MHz.
2. For the band 5.725–5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26dB emission bandwidth in MHz.

47 CFR FCC Part 15.407(a) Emission Bandwidth (26dB Bandwidth Measurement) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

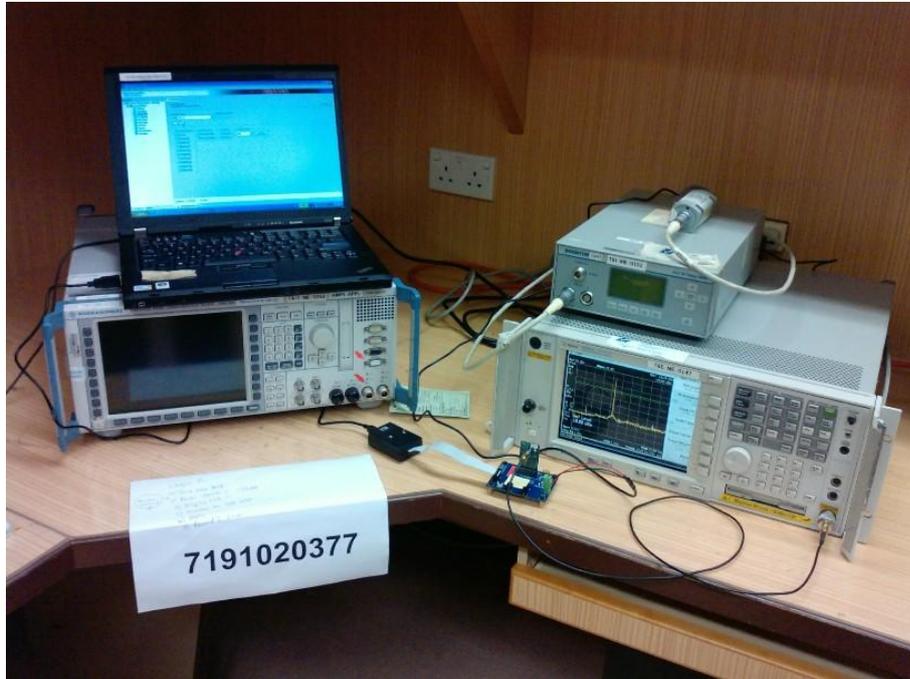
47 CFR FCC Part 15.407(a) Emission Bandwidth (26dB Bandwidth Measurement) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) was set to approximately 1% of the emission bandwidth and the video bandwidth (VBW) of the spectrum analyser was set to > RBW.
5. The detector of the spectrum analyser was set to Peak.
6. All other supporting equipment were powered separately from another filtered mains.

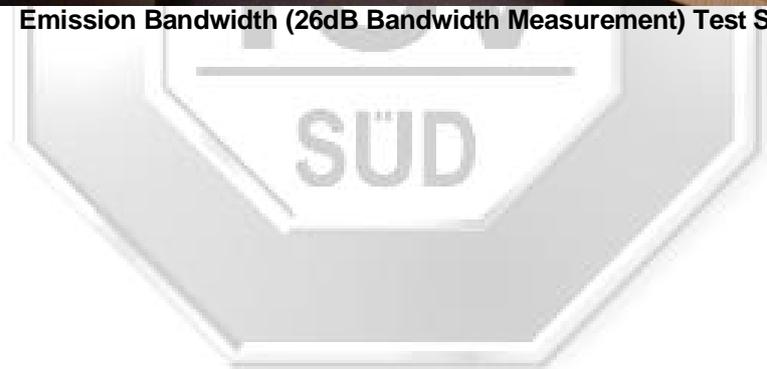
47 CFR FCC Part 15.407(a) Emission Bandwidth (26dB Bandwidth Measurement) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 0 (5.180GHz).
2. The center frequency of the spectrum analyser was set to the transmitting frequency with the frequency span wide enough to capture the 26dB bandwidth of the transmitting frequency.
3. The spectrum analyser was set to max hold to capture the transmitting frequency. The signal capturing was continuous until no further changes were observed.
4. The peak of the transmitting frequency was detected with the marker peak function of the spectrum analyser. The frequencies below the 26dB peak frequency at lower (f_L) and upper (f_H) sides of the transmitting frequency were marked and measured by using the marker-delta function of the spectrum analyser.
5. The RBW of the spectrum analyzer was readjusted as needed until the RBW / EBW ratio is approximately 1%.
6. The 26dB bandwidth of the transmitting frequency is the frequency difference between the marked lower and upper frequencies, $|f_H - f_L|$.
7. The steps 2 to 6 were repeated with the transmitting frequency was set to Channel 2 (5.220GHz), Channel 3 (5.240GHz), Channel 4 (5.745GHz), Channel 6 (5.785GHz) and Channel 8 (5.825GHz) respectively.

EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST



Emission Bandwidth (26dB Bandwidth Measurement) Test Setup





EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

47 CFR FCC Part 15.407(a) Emission Bandwidth (26dB Bandwidth Measurement) Results

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	1 – 6	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	26dB Bandwidth (MHz)
0	5.180	39.67
2	5.220	38.17
3	5.240	37.25
4	5.745	27.92
6	5.785	29.42
8	5.825	32.92

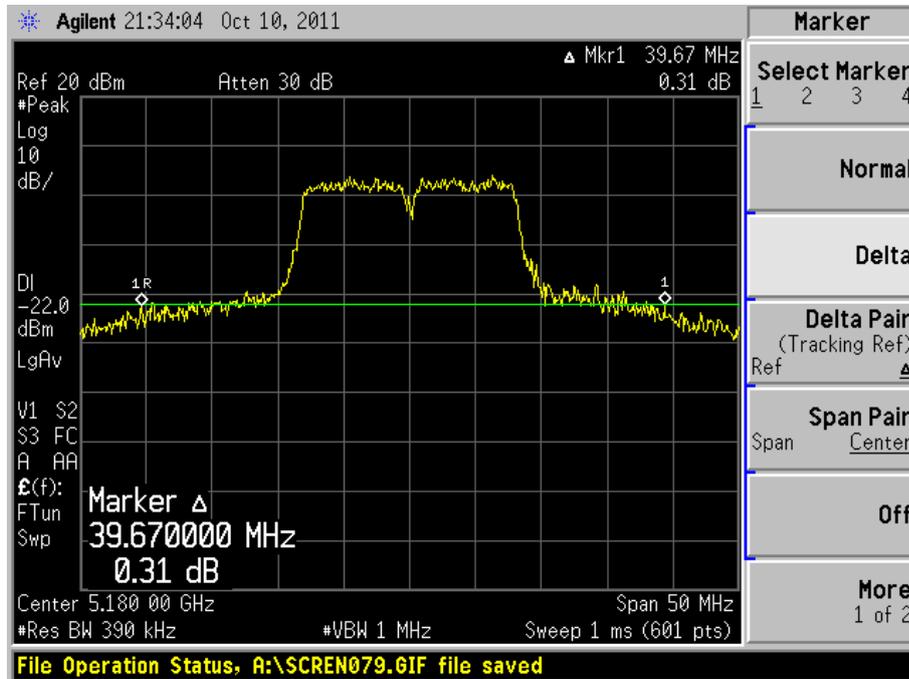
Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	7 - 12	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	26dB Bandwidth (MHz)
0	5.180	39.75
2	5.220	39.92
3	5.240	39.17
4	5.745	28.08
6	5.785	30.33
8	5.825	33.00

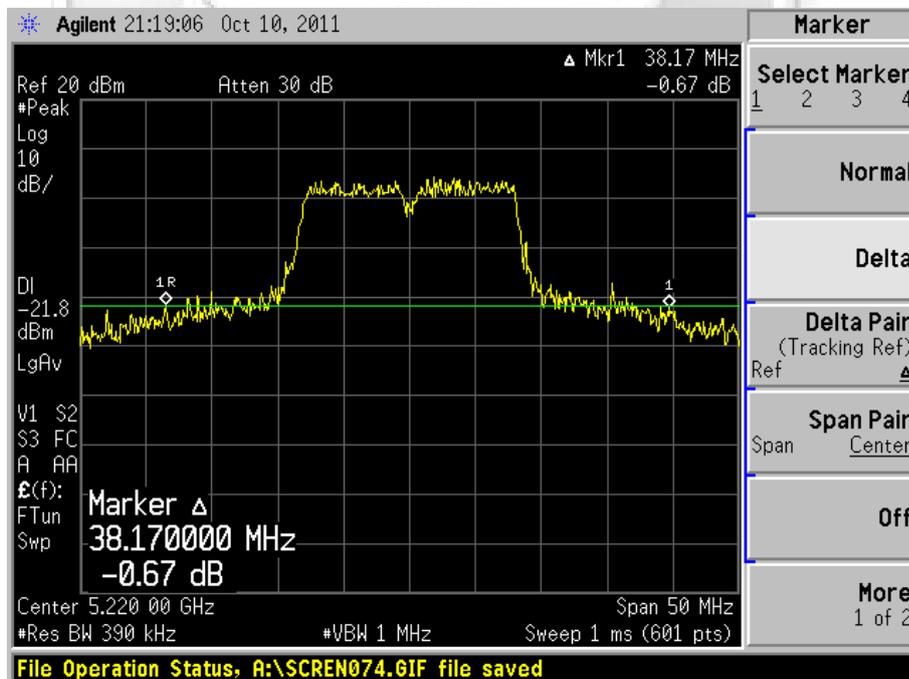


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 0)



Plot 1 - Channel 0

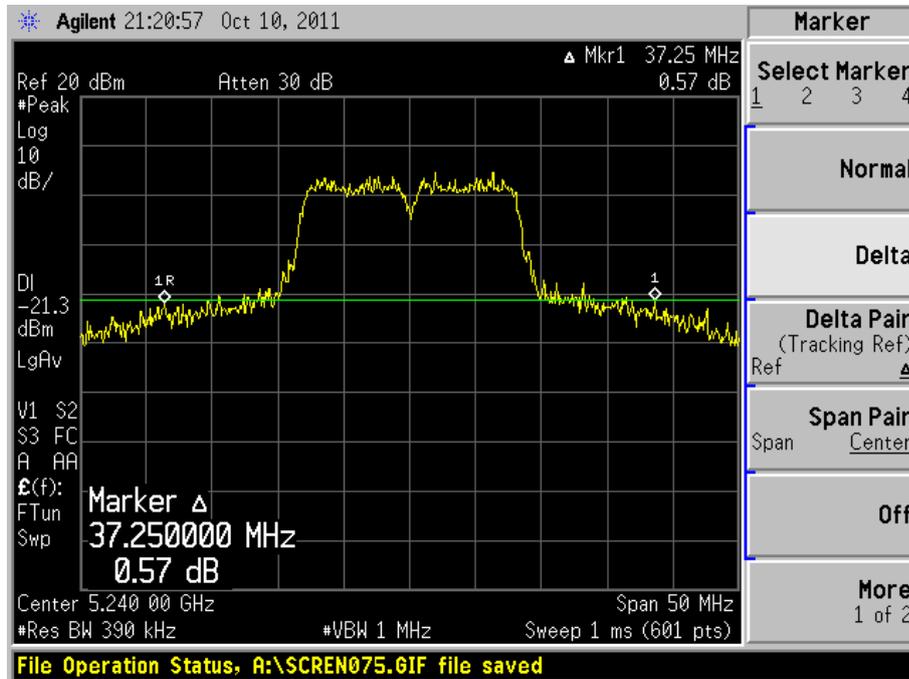


Plot 2 - Channel 2

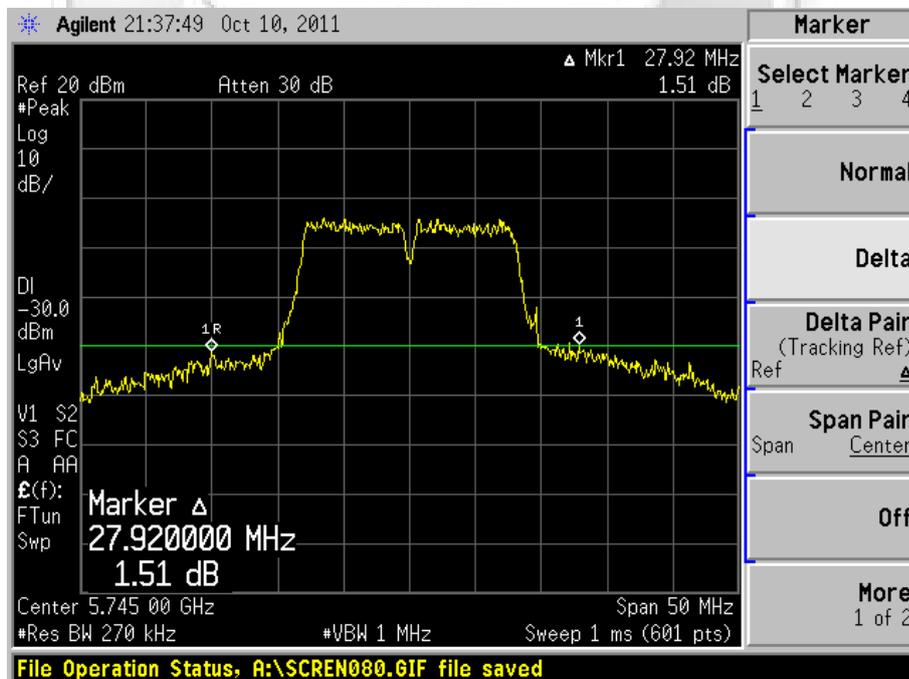


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 0)



Plot 3 - Channel 3

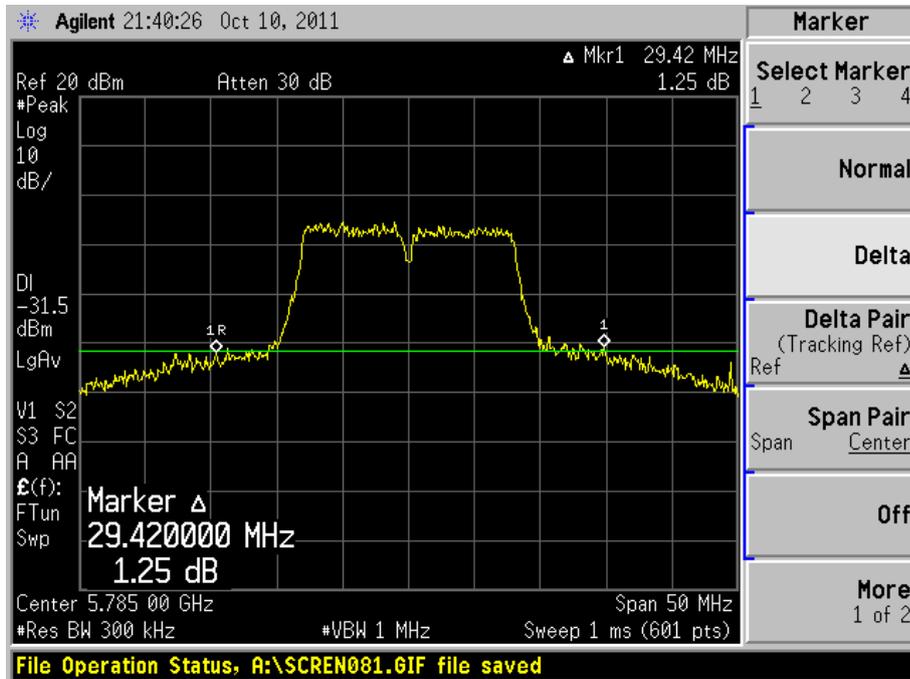


Plot 4 - Channel 4

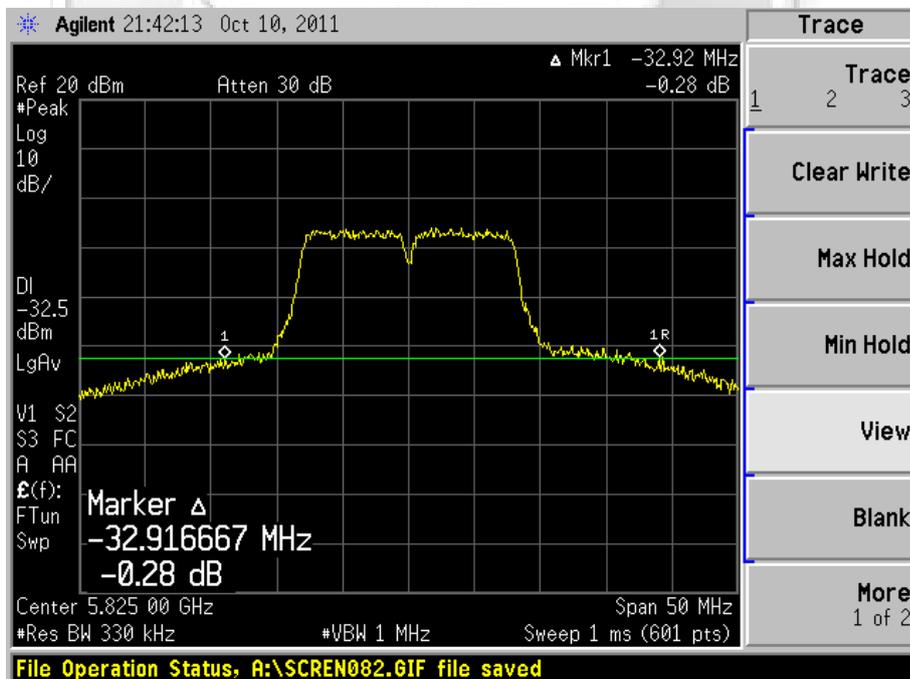


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 0)



Plot 5 - Channel 6

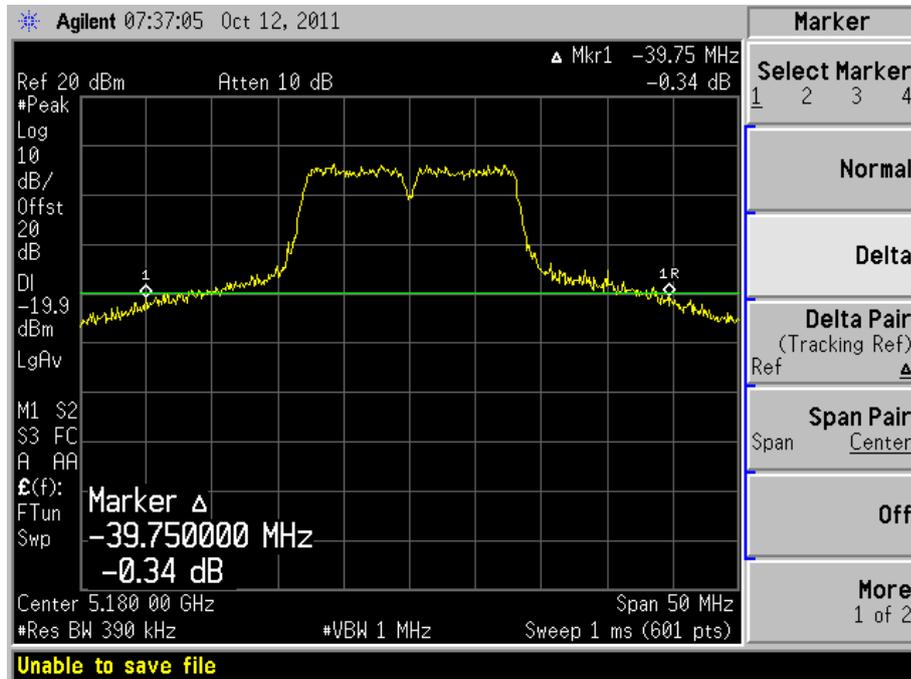


Plot 6 - Channel 8

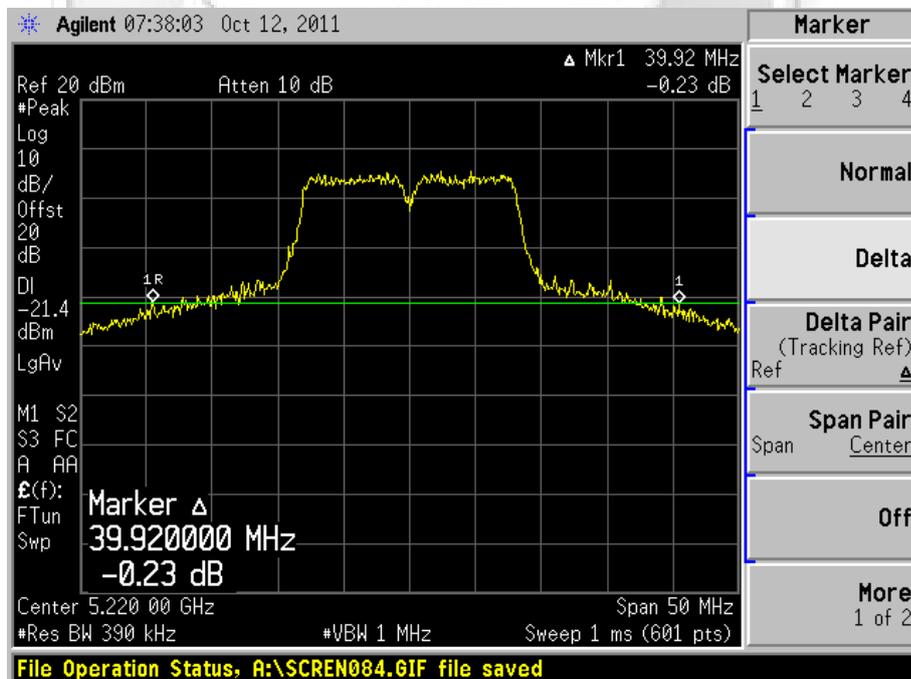


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 1)



Plot 7 - Channel 0

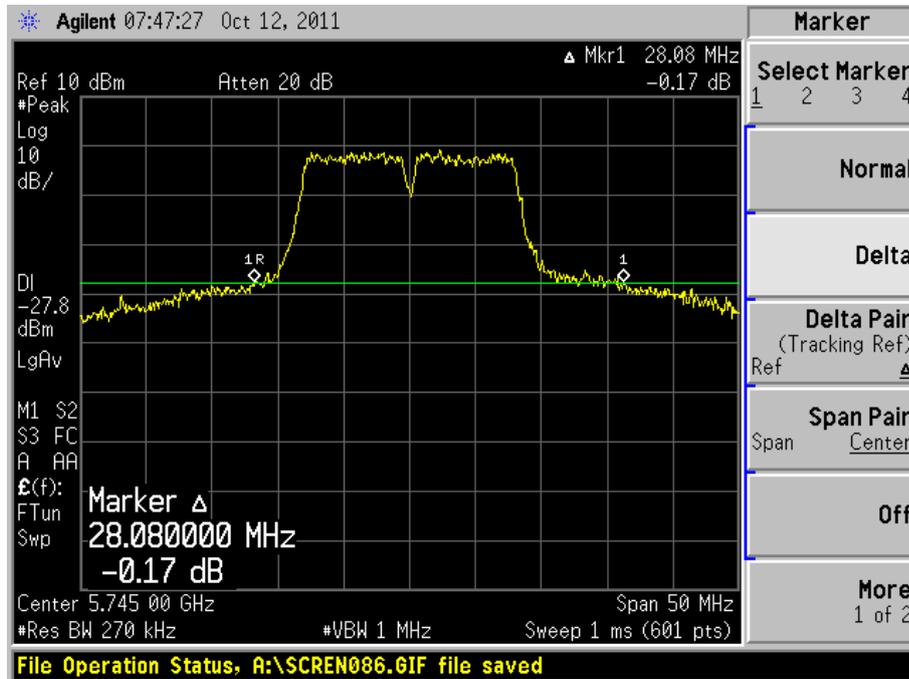


Plot 8 - Channel 2

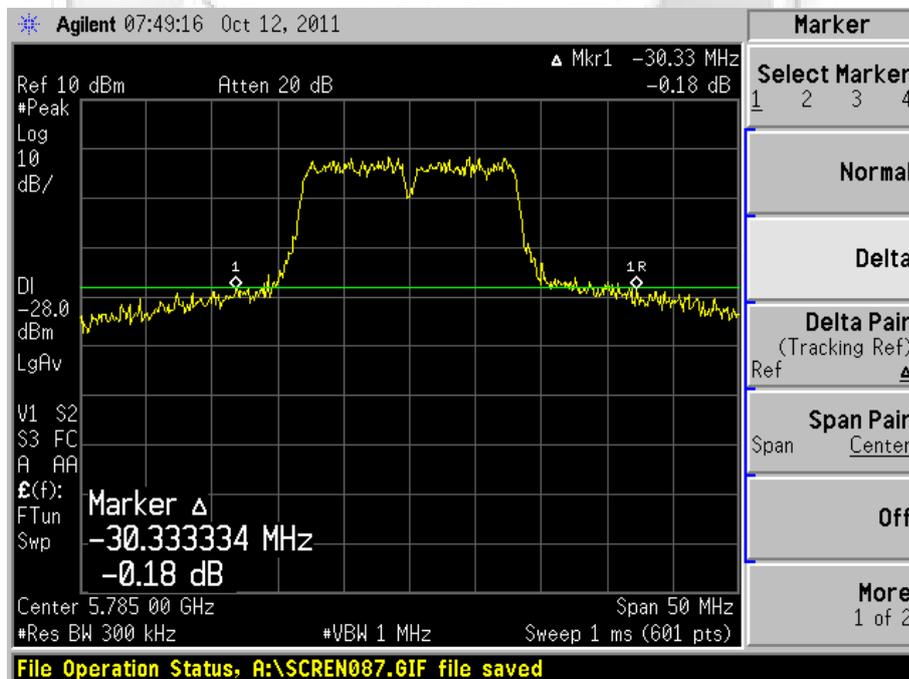


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 1)



Plot 9 - Channel 3

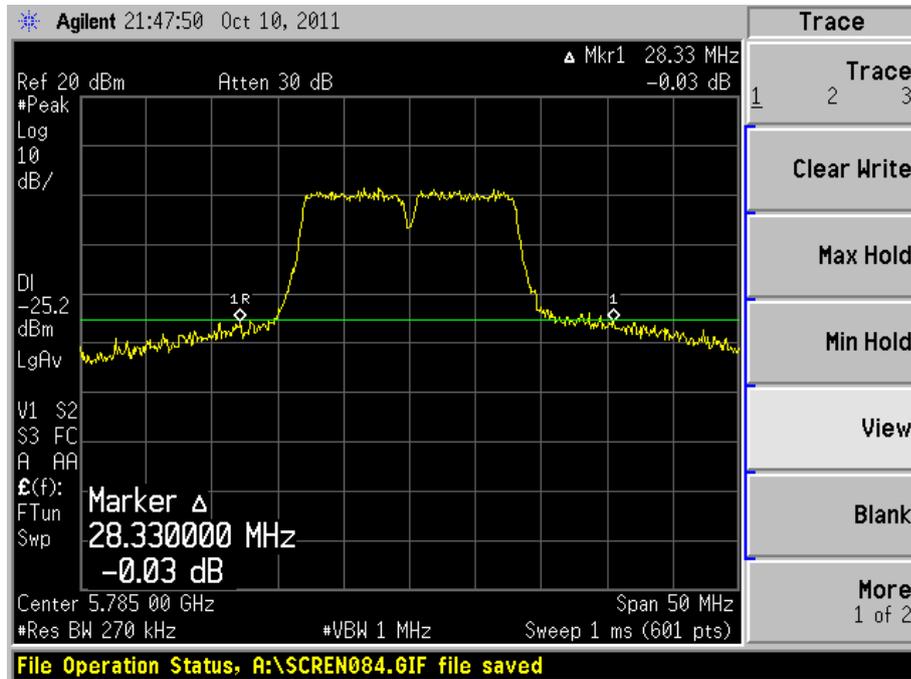


Plot 10 - Channel 4

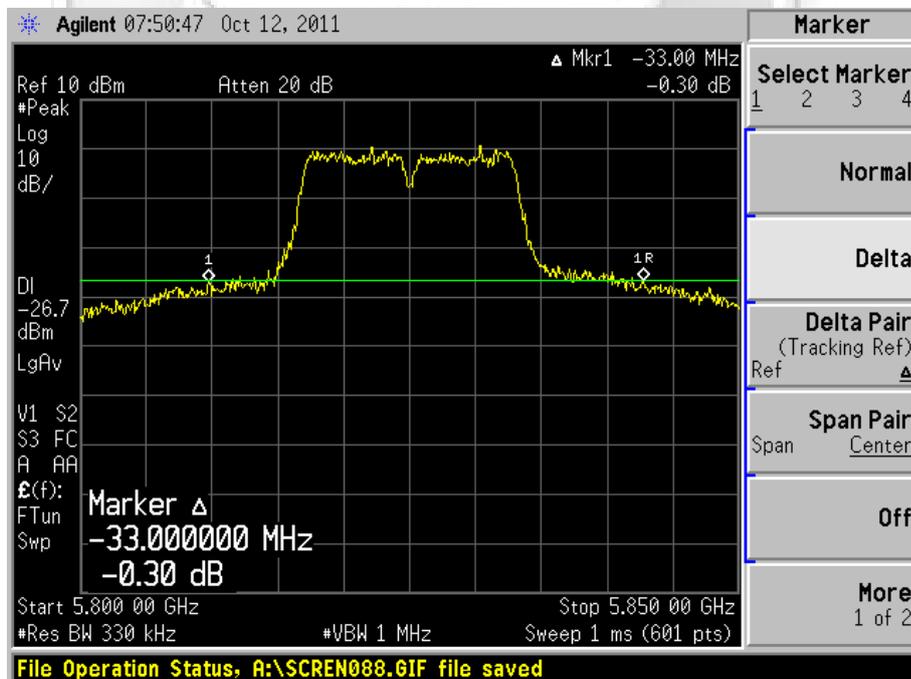


EMISSION BANDWIDTH (26dB BANDWIDTH MEASUREMENT) TEST

Emission Bandwidth (26dB Bandwidth Measurement) Plots (SU-HTB550 Antenna 1)



Plot 11 - Channel 6



Plot 12 - Channel 8



MAXIMUM CONDUCTED OUTPUT POWER TEST

47 CFR FCC Parts 15.247(b)(3) and 15.407(a) Maximum Conducted Output Power Limits

The EUT shows compliance to the requirement of 15.247(b)(3) for band 5.725GHz – 5.850GHz, which states the maximum peak power of the EUT employing digital modulation shall not exceed 1W (30dBm).

The EUT shows compliance to the requirements of 15.407(a), which states the maximum conducted output power of the EUT shall not exceed the lesser of the following:

Frequency Range (GHz)	Limit Values
5.15 – 5.25	50mW or 4dBm + 10logB*
5.725 – 5.825	1000mW or 17dBm + 10logB*

* whichever is the lower limit and B refers to the 26dB emission bandwidth in MHz.

47 CFR FCC Parts 15.247(b)(3) and 15.407(a) Maximum Conducted Output Power Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Boonton RF Power Meter	4532	72901	24 Mar 2012
Boonton Power Sensor	56218-S/1	1417	24 Mar 2012

47 CFR FCC Parts 15.247(b)(3) and 15.407(a) Maximum Conducted Output Power Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the power meter via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another filtered mains.

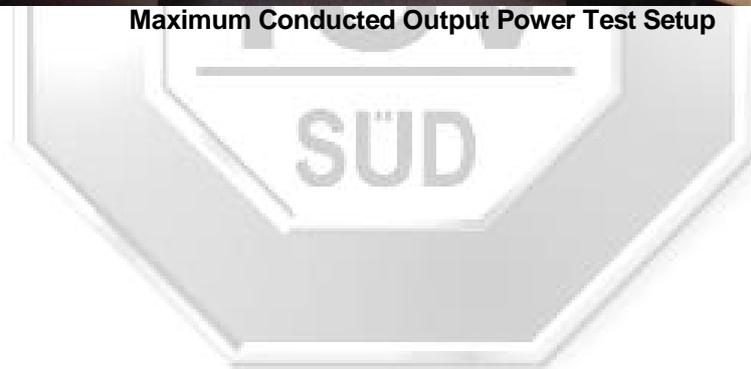
47 CFR FCC Parts 15.247(b)(3) and 15.407(a) Maximum Conducted Output Power Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 0 (5.180GHz).
2. The maximum peak power of the transmitting frequency was detected and recorded.
3. The Equivalent Isotropic Radiated Power (EIRP) of the EUT was computed by adding its antenna gain to the measured maximum conducted output power.
4. The steps 2 to 3 were repeated with the transmitting frequency was set to Channel 2 (5.220GHz), Channel 3 (5.240GHz), Channel 4 (5.745GHz), Channel 6 (5.785GHz) and Channel 8 (5.825GHz) respectively.

MAXIMUM CONDUCTED OUTPUT POWER TEST



Maximum Conducted Output Power Test Setup





MAXIMUM CONDUCTED OUTPUT POWER TEST

47 CFR FCC Parts 15.247(b)(3) and 15.407(a) Maximum Conducted Output Power Results

Test Input Power	110V 60Hz	Temperature	23°C
Antenna Gain	2.0 dBi	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Maximum Peak Power (mW)	Maximum EIRP (mW)	Limit (mW)
0	5.180	27.143	43.019	50
2	5.220	26.891	42.620	50
3	5.240	27.051	42.873	50
4	5.745	31.230	49.497	1000
6	5.785	21.200	33.600	1000
8	5.825	18.261	28.942	1000

Test Input Power	110V 60Hz	Temperature	23°C
Antenna Gain	2.0 dBi	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Maximum Peak Power (mW)	Maximum EIRP (mW)	Limit (mW)
0	5.180	20.680	32.776	50
2	5.220	27.733	43.954	50
3	5.240	28.051	44.458	50
4	5.745	31.001	49.134	1000
6	5.785	20.123	31.893	1000
8	5.825	18.004	28.535	1000



RF SPURIOUS EMISSIONS (CONDUCTED) TEST

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Conducted) Limits

The EUT shows compliance to the requirements of this section, which states:

1. For transmitters operating in the 5.15GHz – 5.25GHz band: all emissions outside of the 5.15GHz – 5.35GHz band shall not exceed an EIRP of -27 dBm/MHz.
2. For transmitters operating in the 5.725GHz – 5.825GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Conducted) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Conducted) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 1MHz and 3MHz.
5. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Conducted) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode with transmitting frequency at Channel 0 (5.180GHz).
2. The start and stop frequencies of the spectrum analyser were set to 30MHz and 7GHz.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with frequency span was set from 7GHz to 26.25GHz.
5. The steps 2 to 3 were repeated with frequency span was set from 26.25Hz to 40GHz.
6. The steps 2 to 5 were repeated with the transmitting frequency was set to Channel 2 (5.220GHz), Channel 3 (5.240GHz), Channel 4 (5.745GHz), Channel 6 (5.785GHz) and Channel 7 (5.825GHz) respectively.

RF SPURIOUS EMISSIONS (CONDUCTED) TEST



RF Spurious Emissions (Conducted) Test Setup

47 CFR FCC Part 15.407(b) RF Spurious Emissions (Conducted) Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	13 – 36	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Dylan Lin

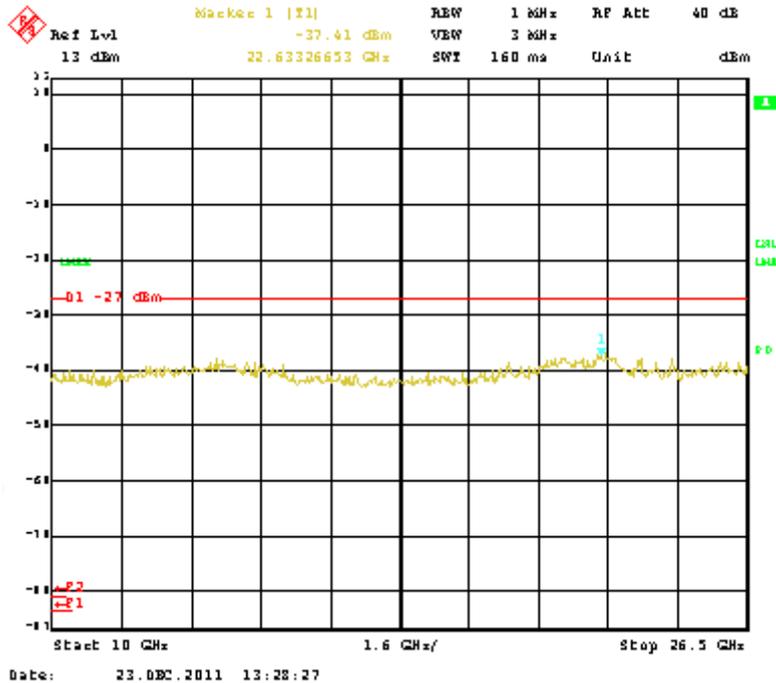
Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	37 – 60	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Dylan Lin

All spurious signals found were below the specified limit. Please refer to the attached plots.

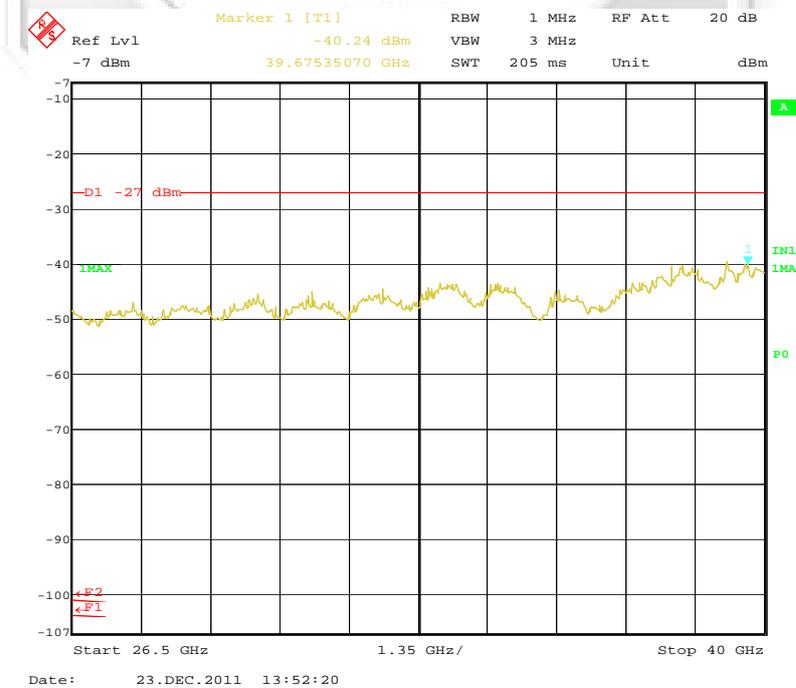


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 15 - Channel 0

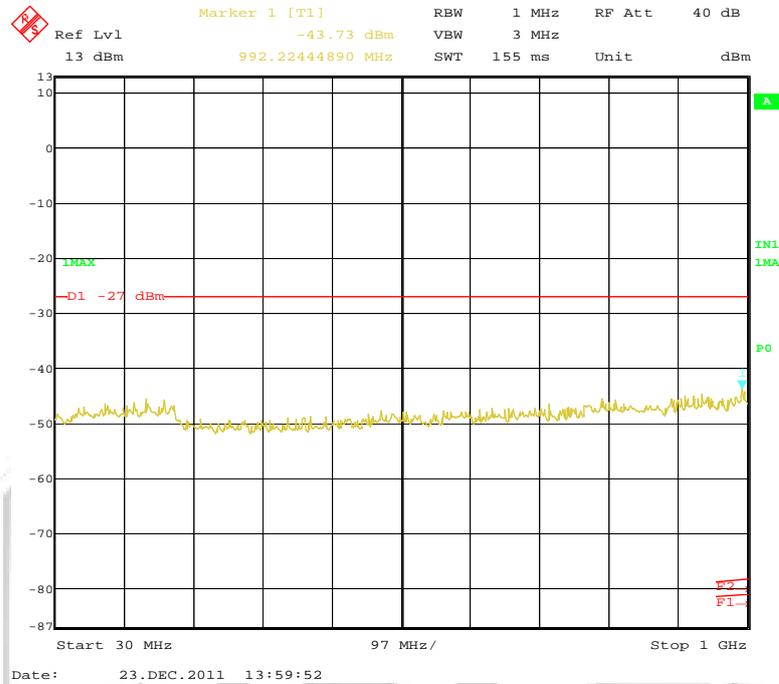


Plot 16 - Channel 0

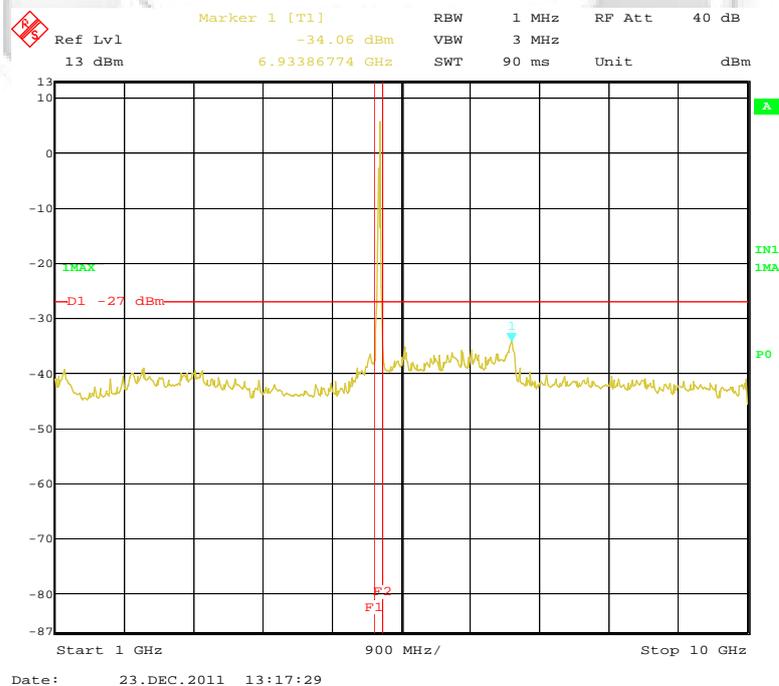


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 17 - Channel 2

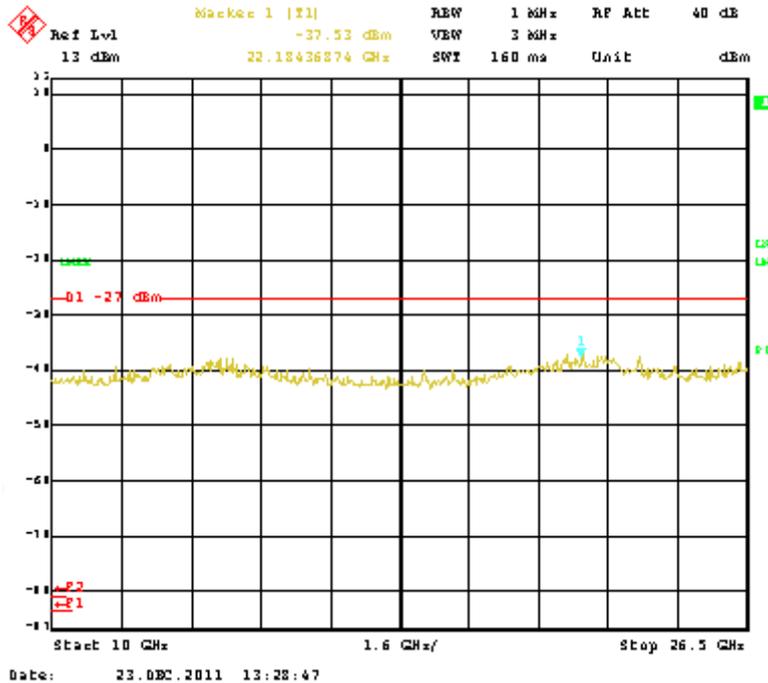


Plot 18 - Channel 2

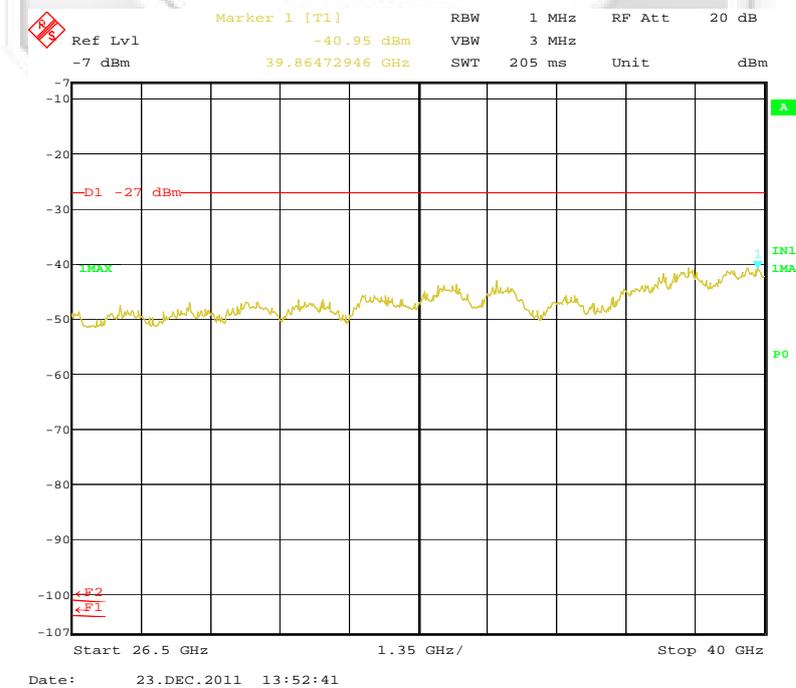


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 19 - Channel 2

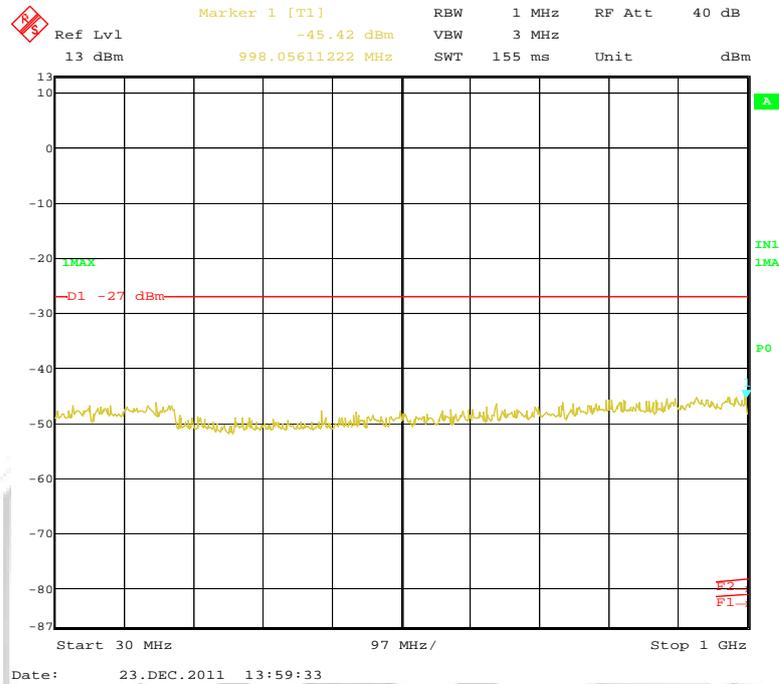


Plot 20 - Channel 2

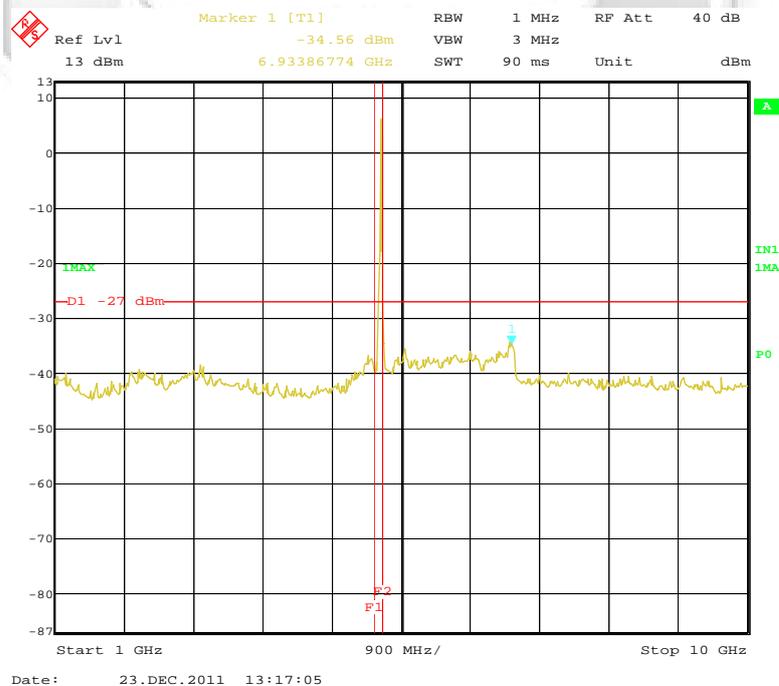


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 21 - Channel 3

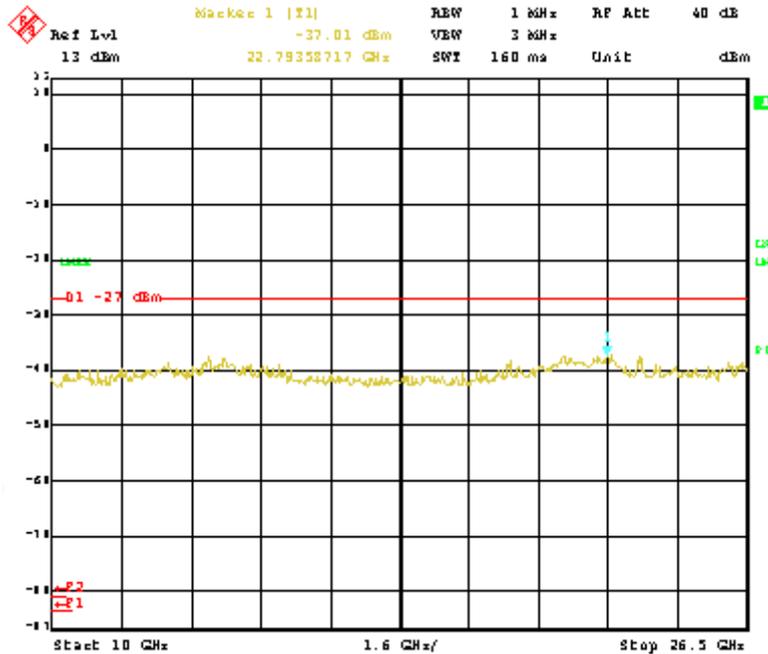


Plot 22 - Channel 3



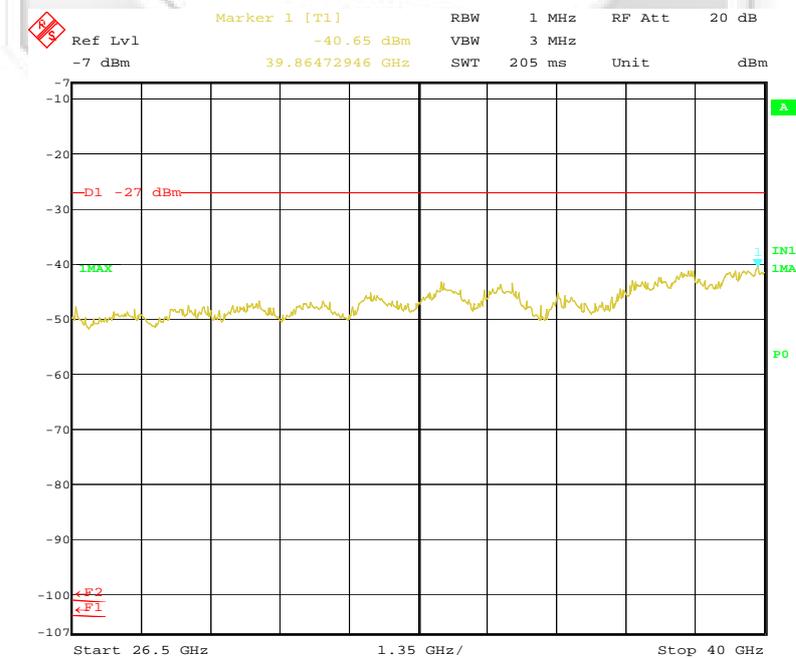
RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Date: 23.DEC.2011 13:29:14

Plot 23 - Channel 3



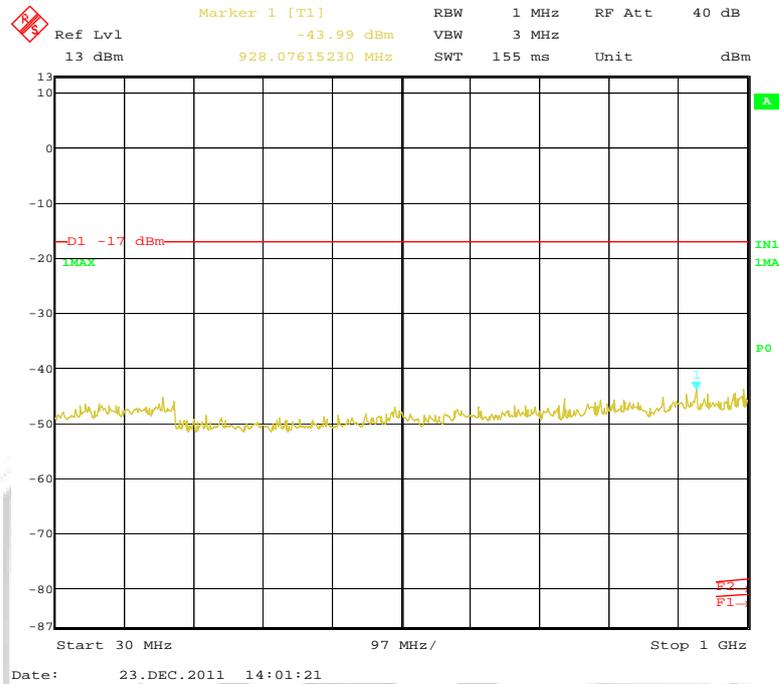
Date: 23.DEC.2011 13:53:01

Plot 24 - Channel 3

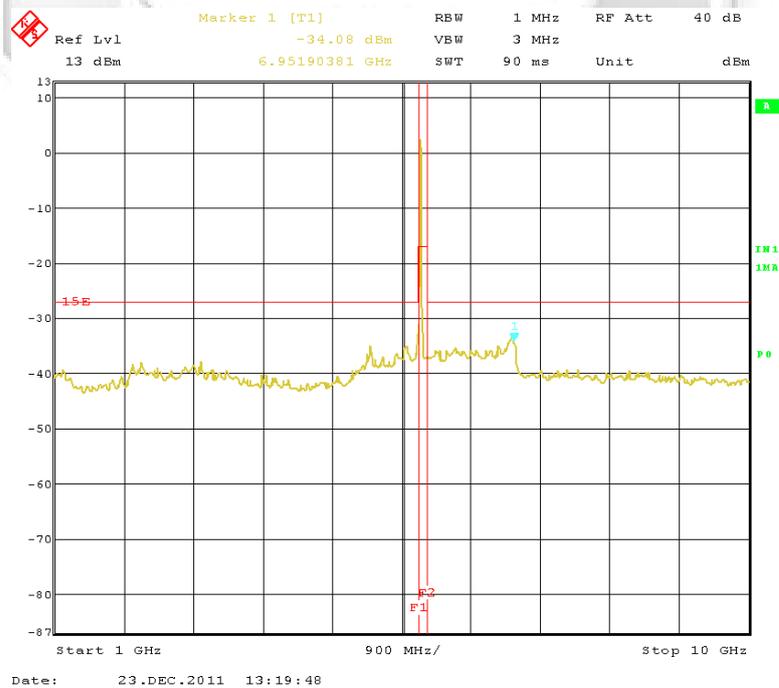


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 25 - Channel 4

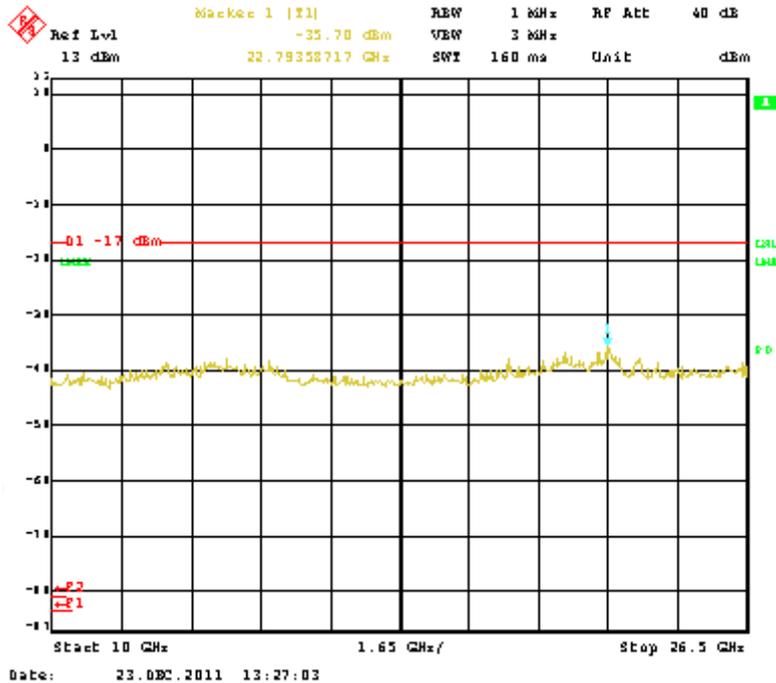


Plot 26 - Channel 4

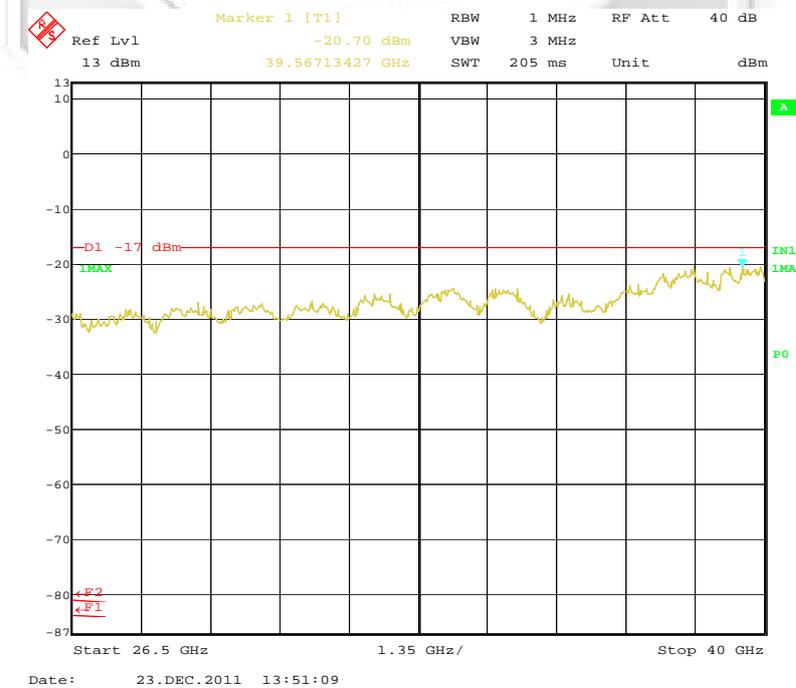


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 27 - Channel 4

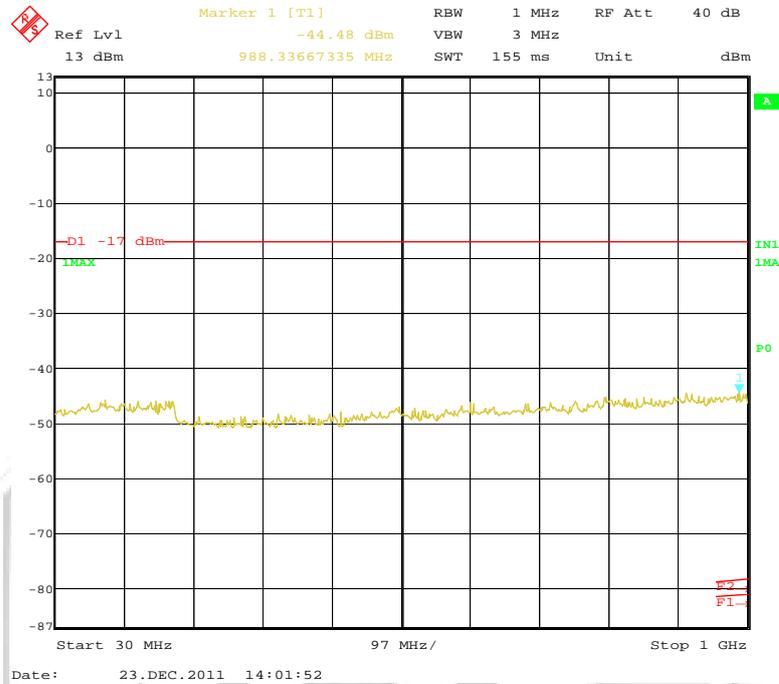


Plot 28 - Channel 4

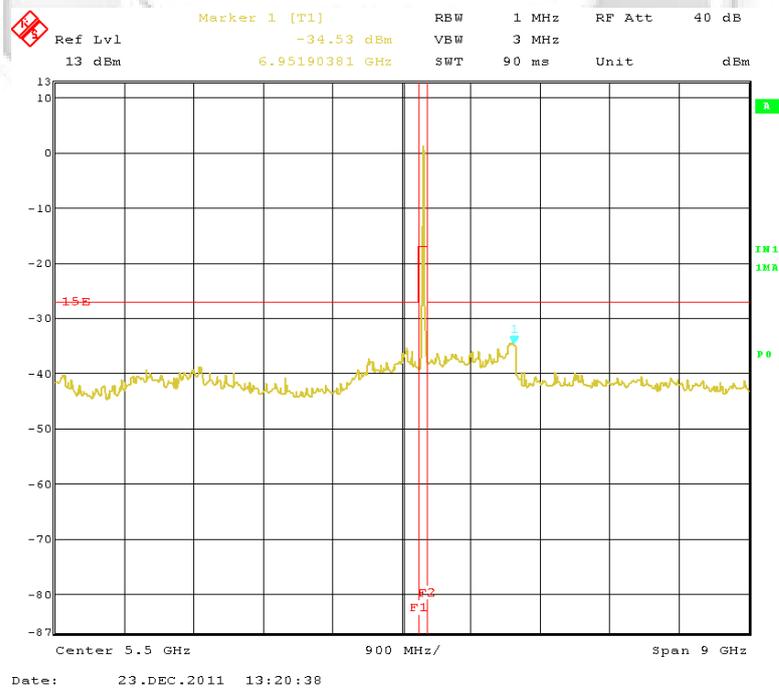


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 29 - Channel 6

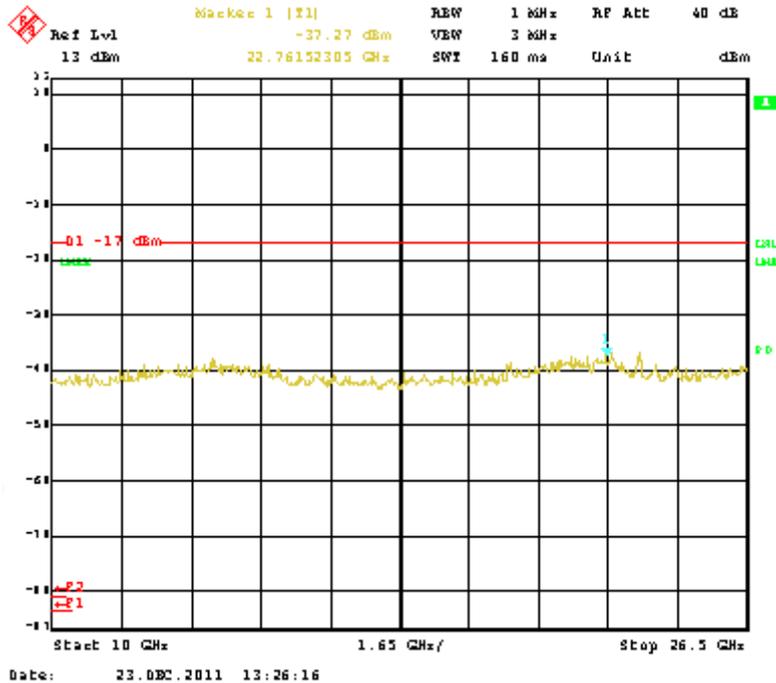


Plot 30 - Channel 6

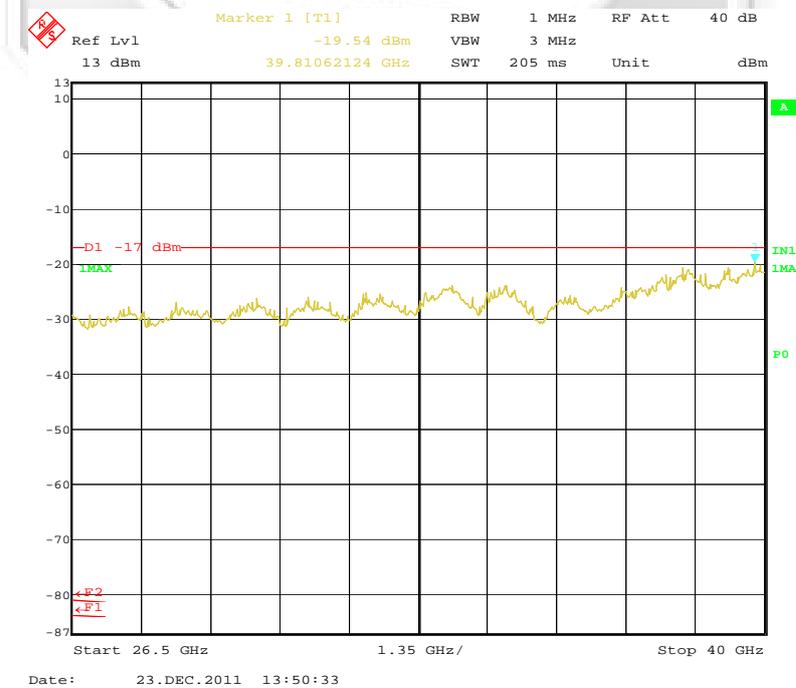


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 31 - Channel 6

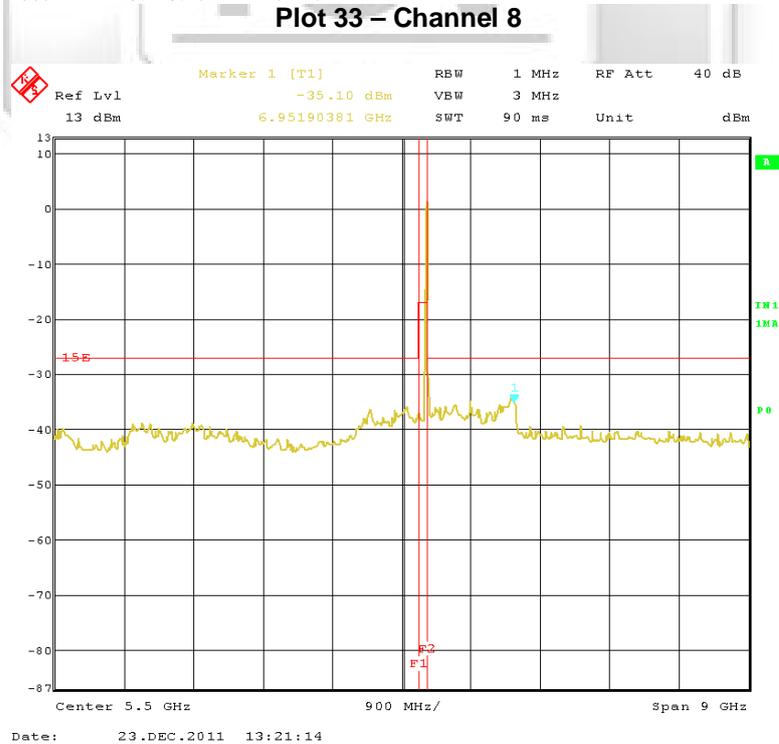
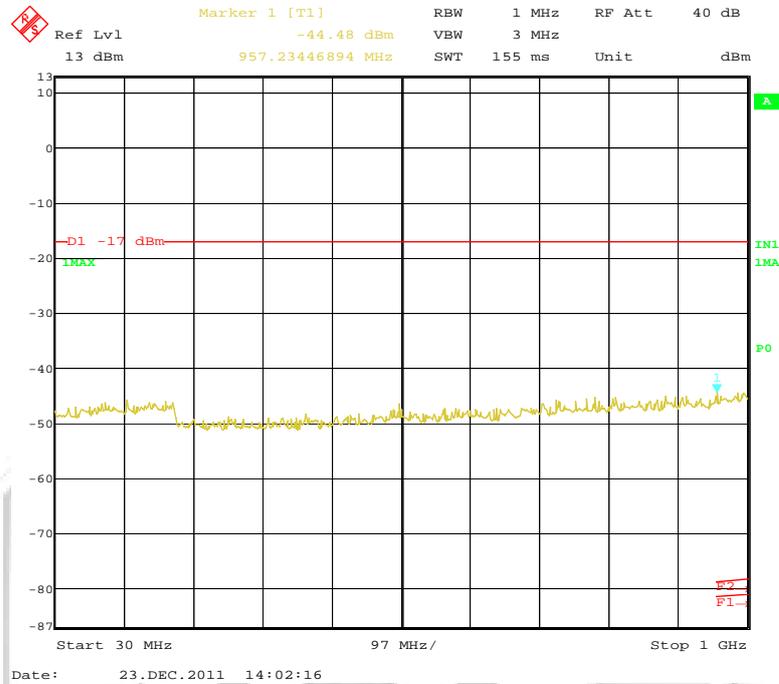


Plot 32 - Channel 6



RF SPURIOUS EMISSIONS (CONDUCTED) TEST

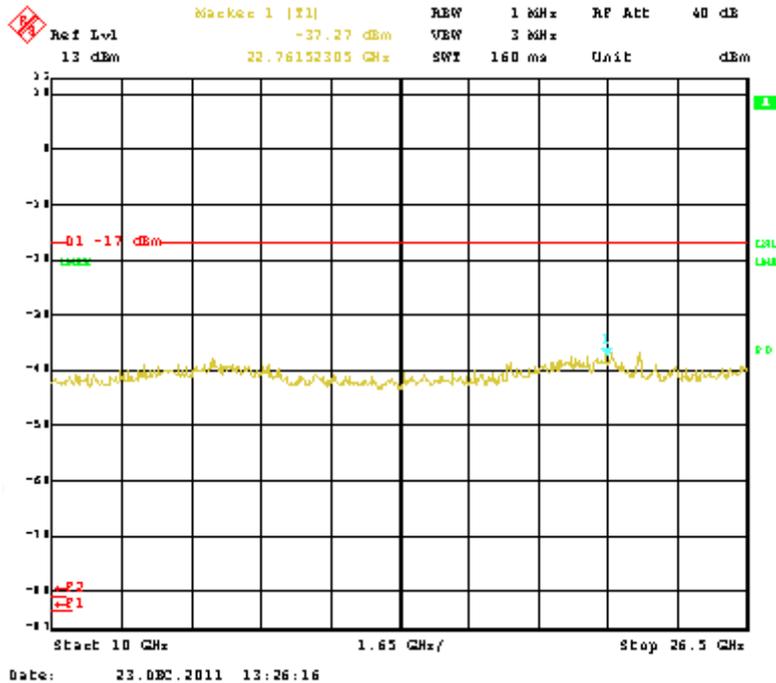
RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



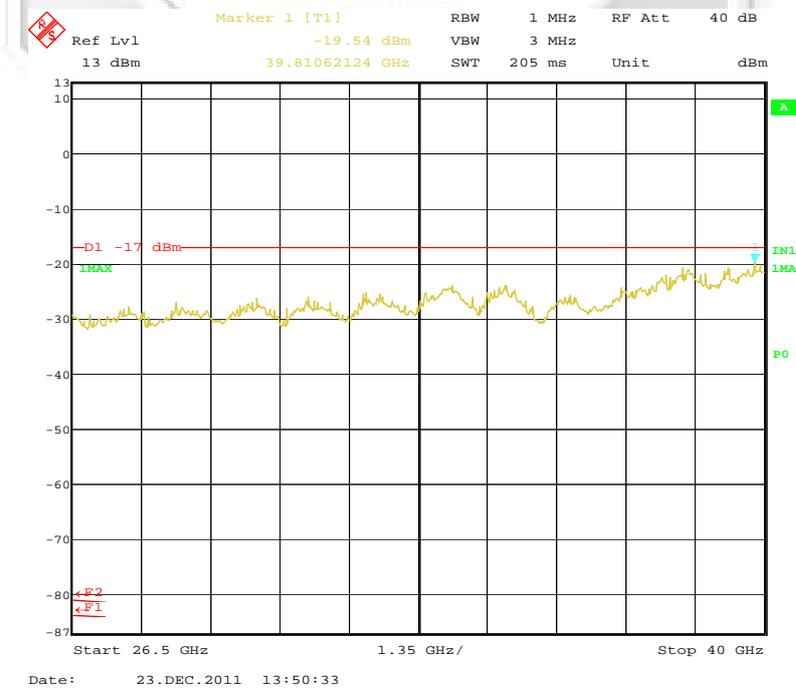


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 0)



Plot 35 - Channel 8

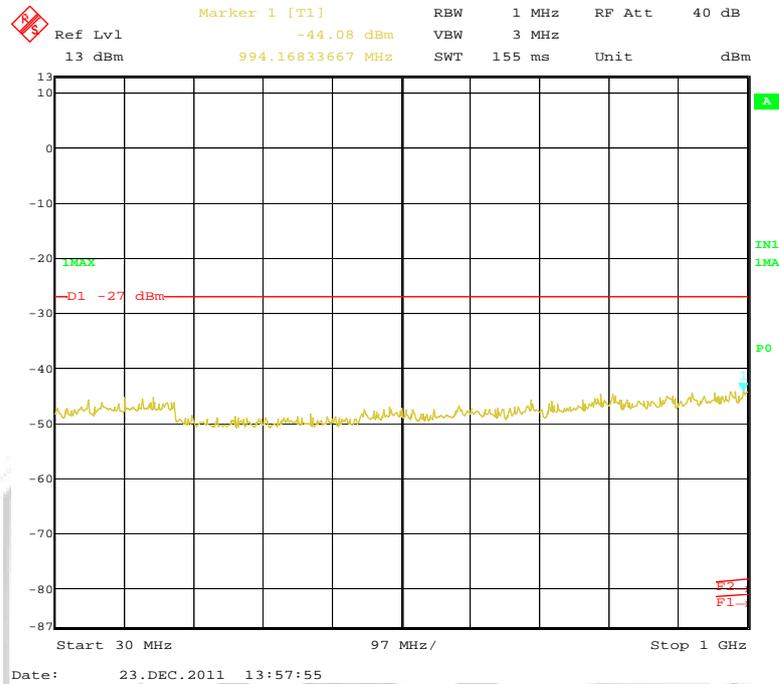


Plot 36 - Channel 8

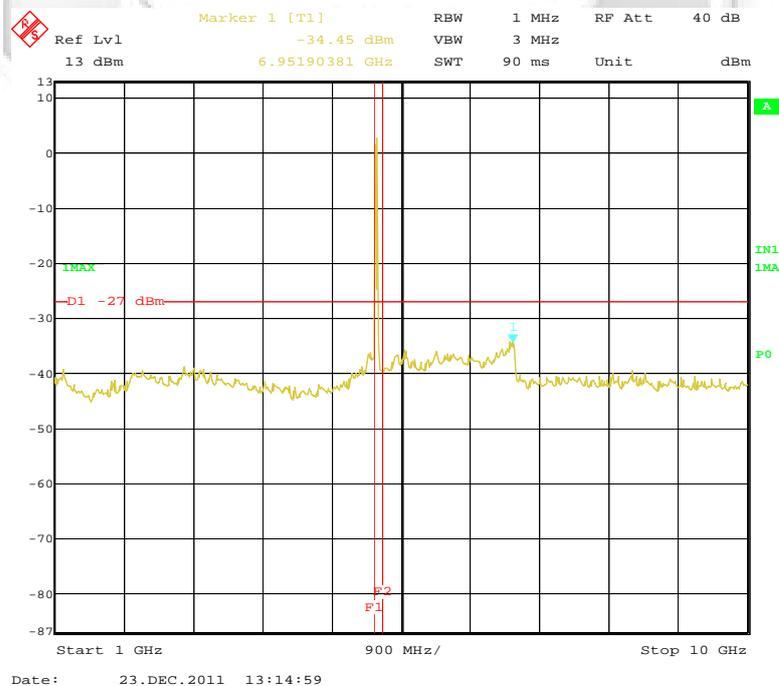


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 37 - Channel 0

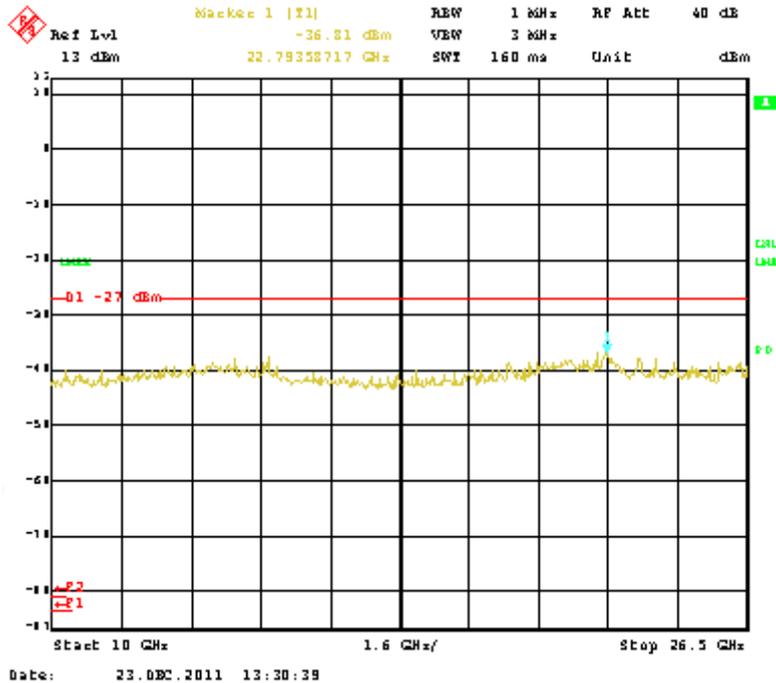


Plot 38 - Channel 0

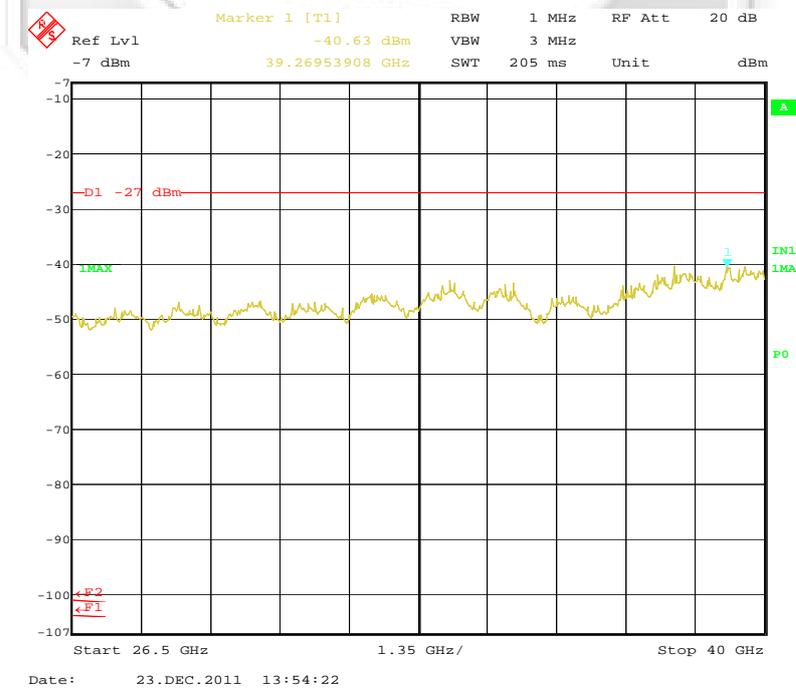


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 39 - Channel 0

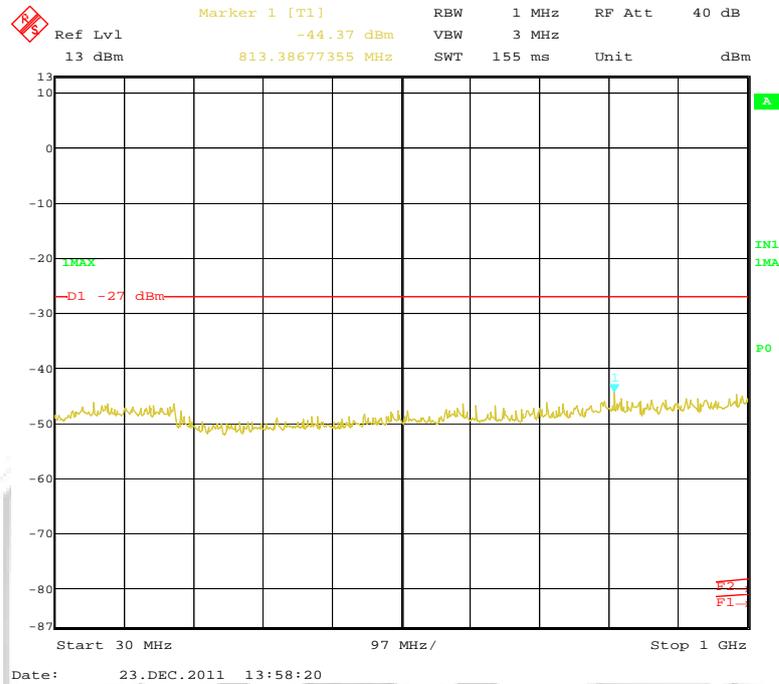


Plot 40 - Channel 0

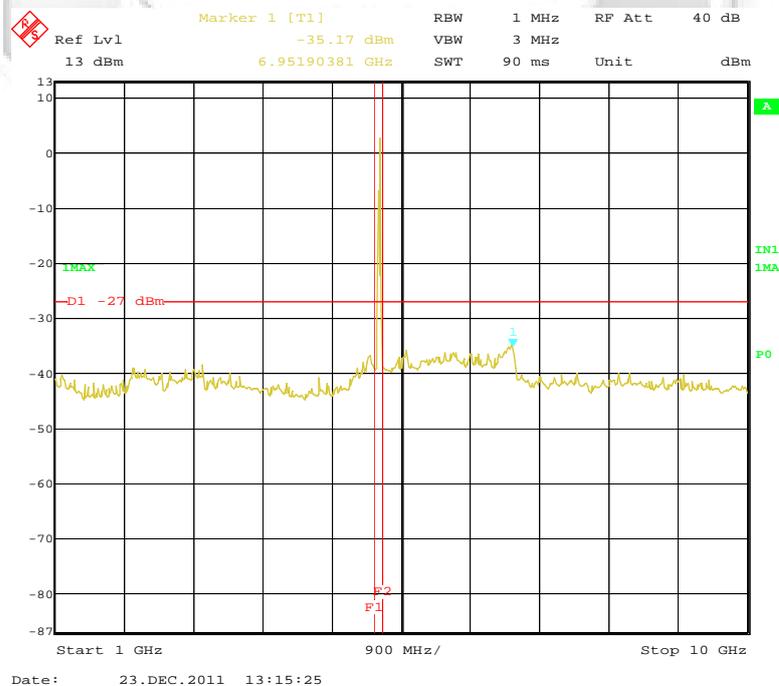


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 41 - Channel 2

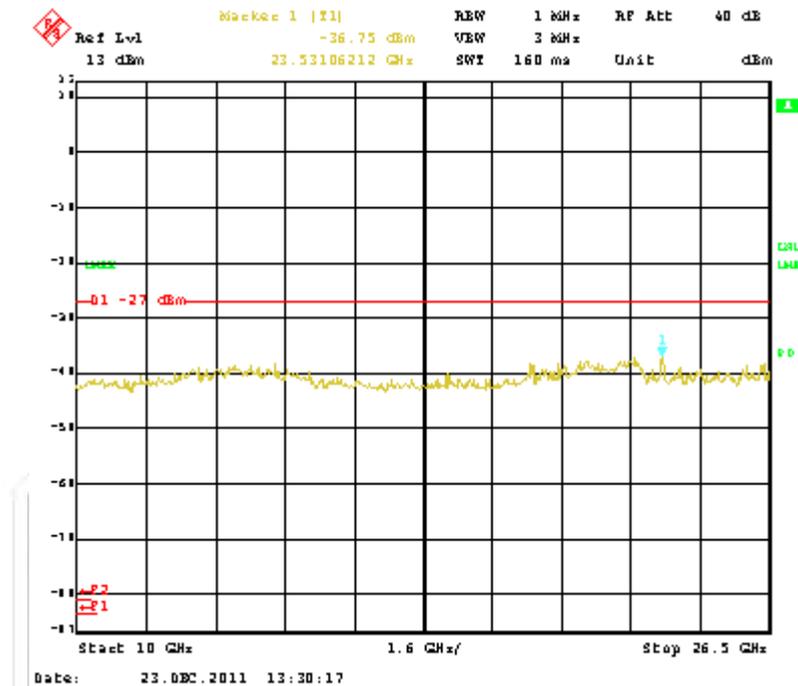


Plot 42 - Channel 2

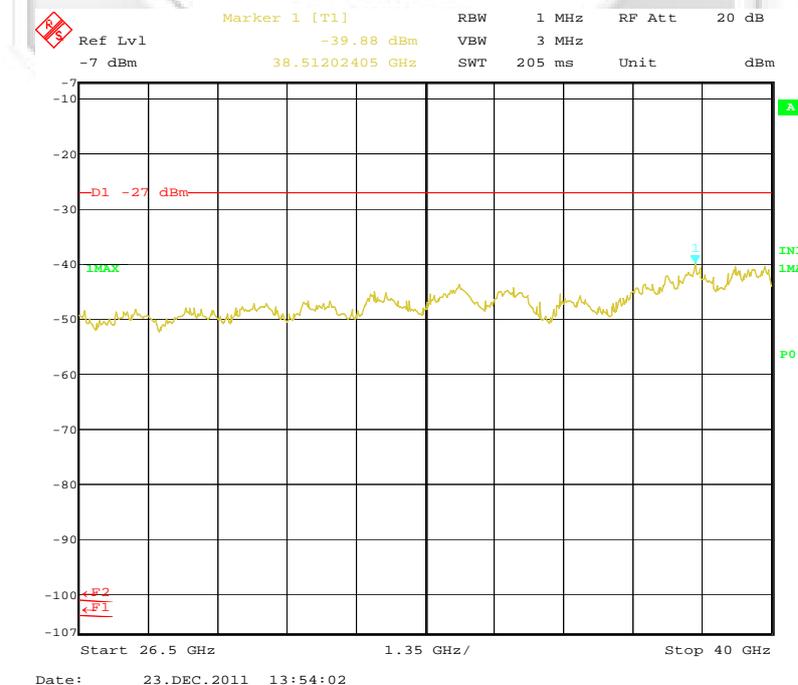


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 43 - Channel 2

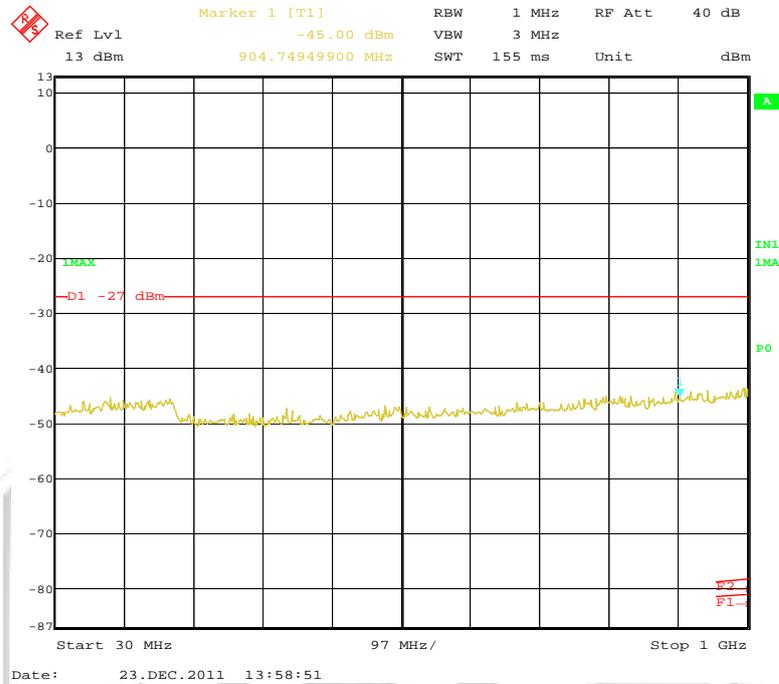


Plot 44 - Channel 2

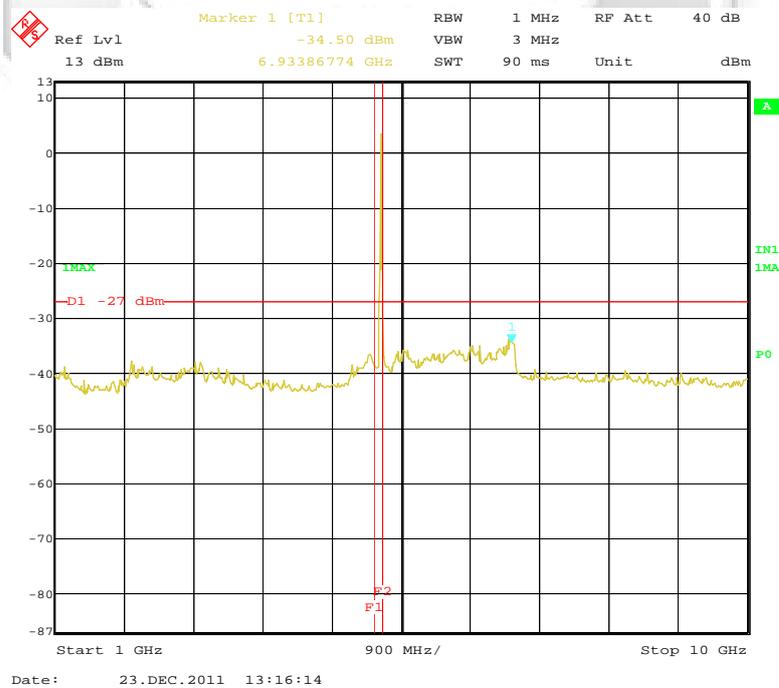


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 45 - Channel 3

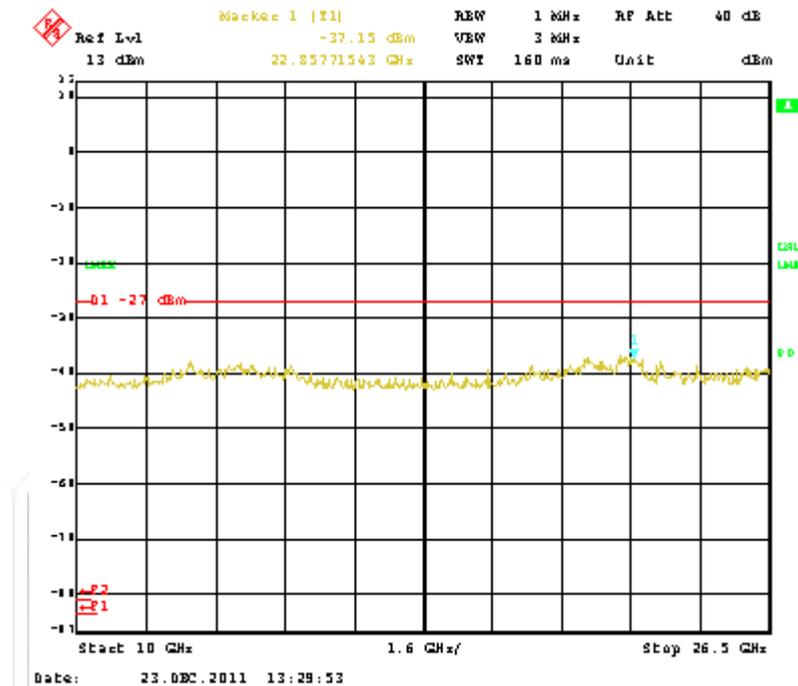


Plot 46 - Channel 3

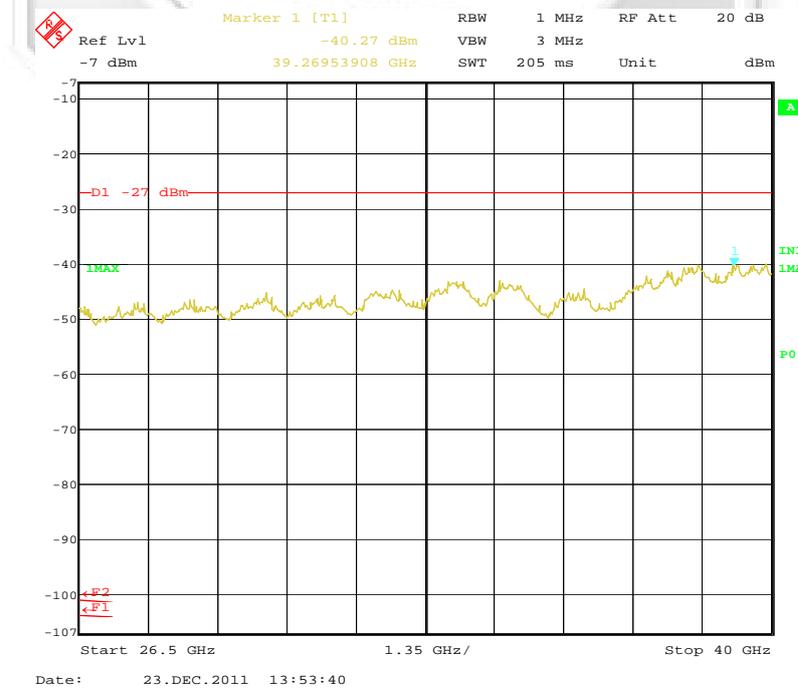


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 47 - Channel 3

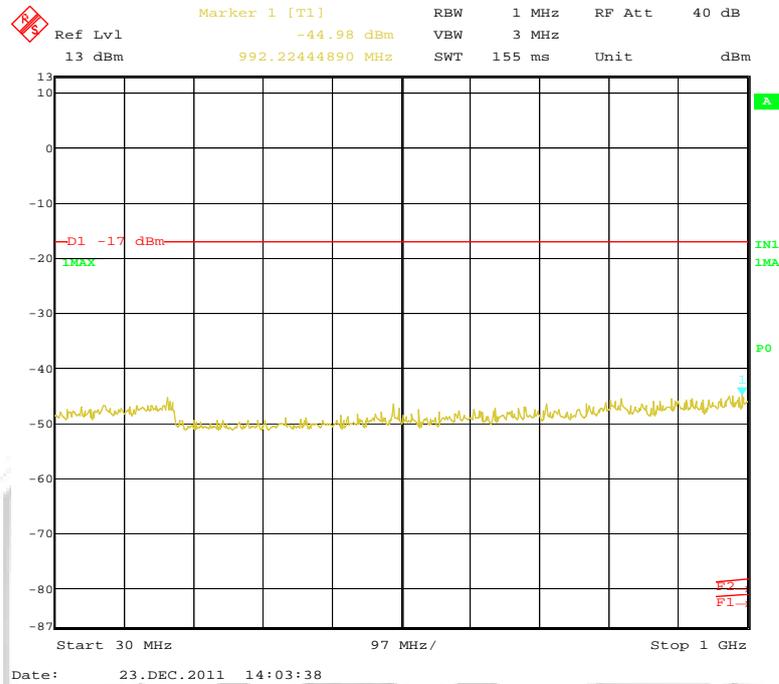


Plot 48 - Channel 3

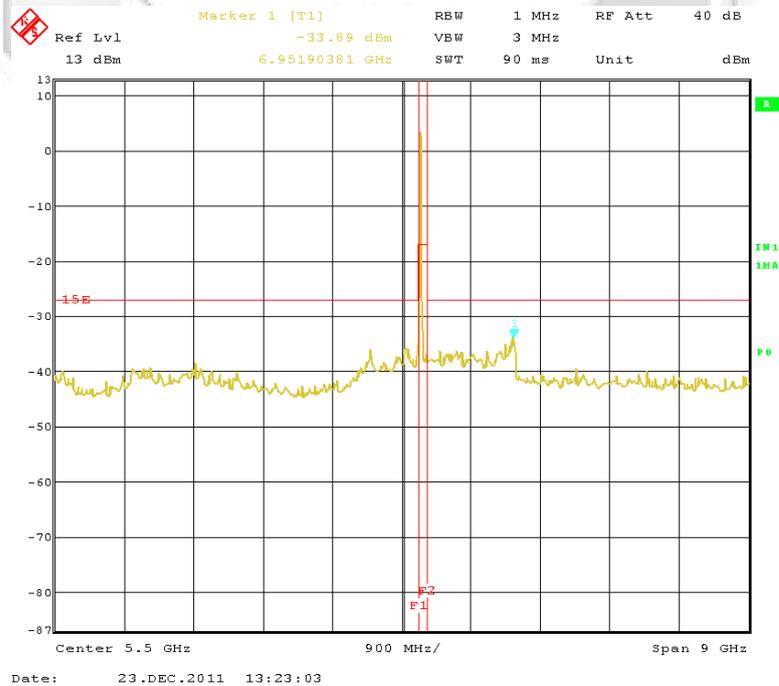


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 49 - Channel 4

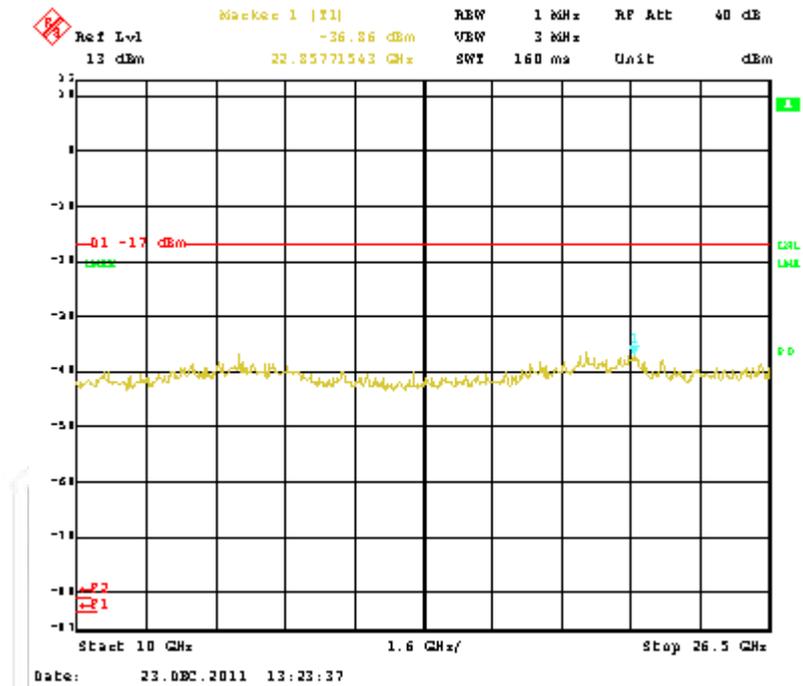


Plot 50 - Channel 4

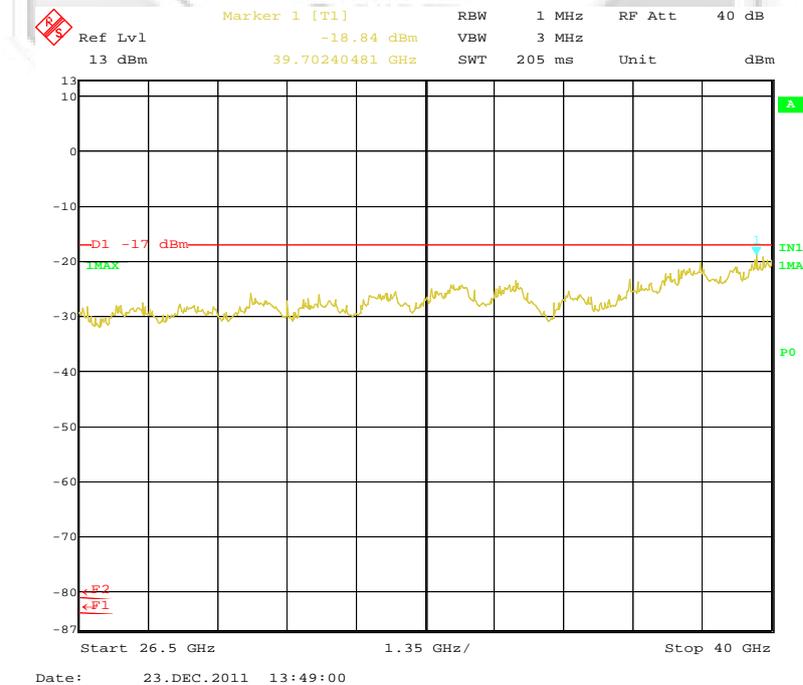


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 51 - Channel 4

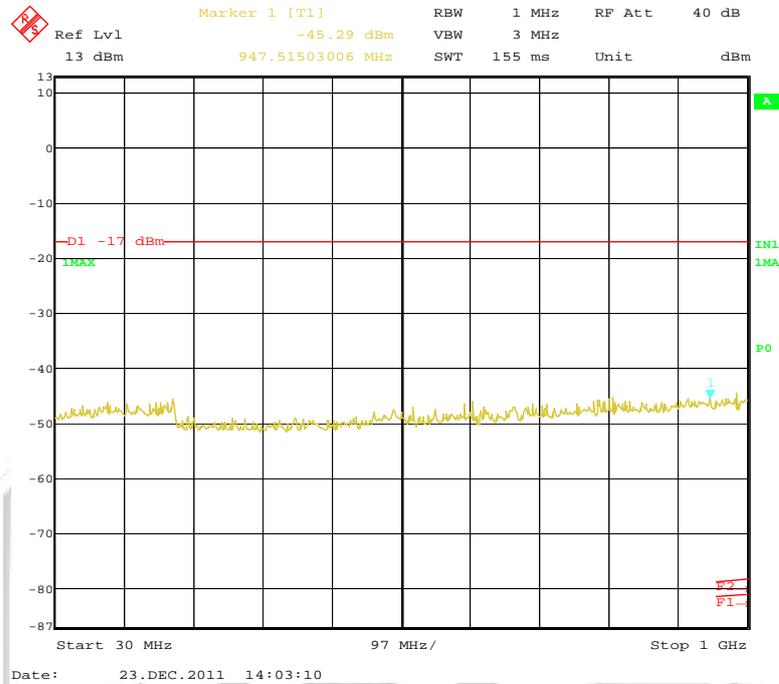


Plot 52 - Channel 4

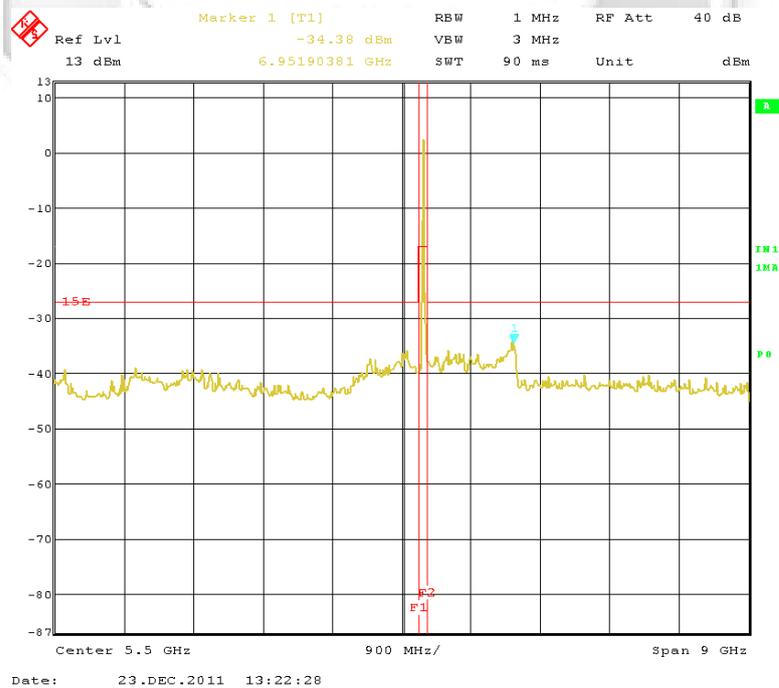


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 53 - Channel 6

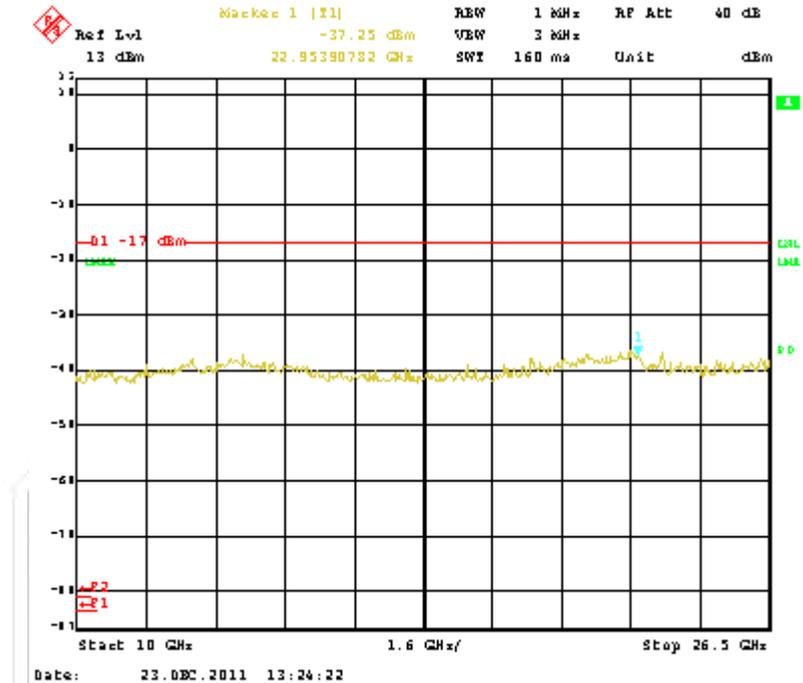


Plot 54 - Channel 6

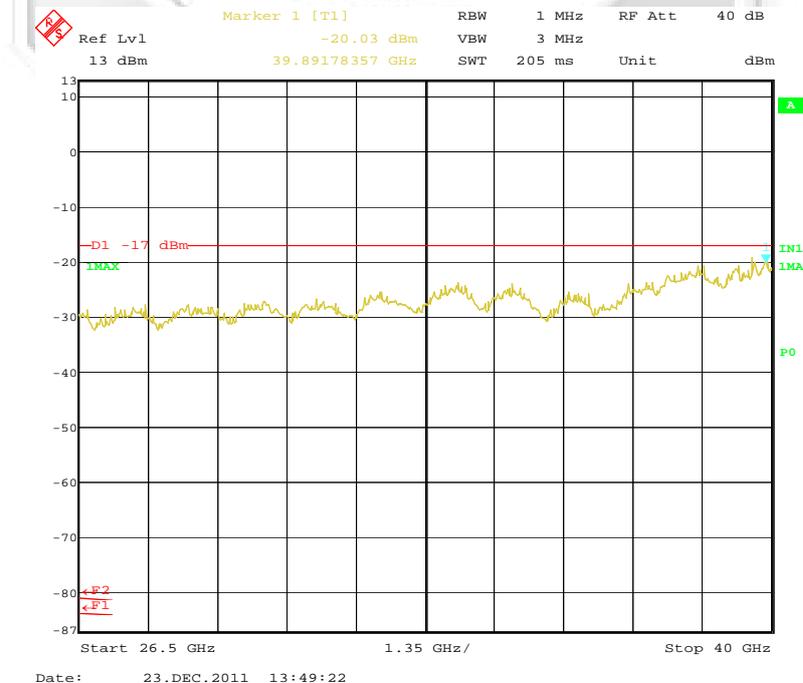


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 55 - Channel 6

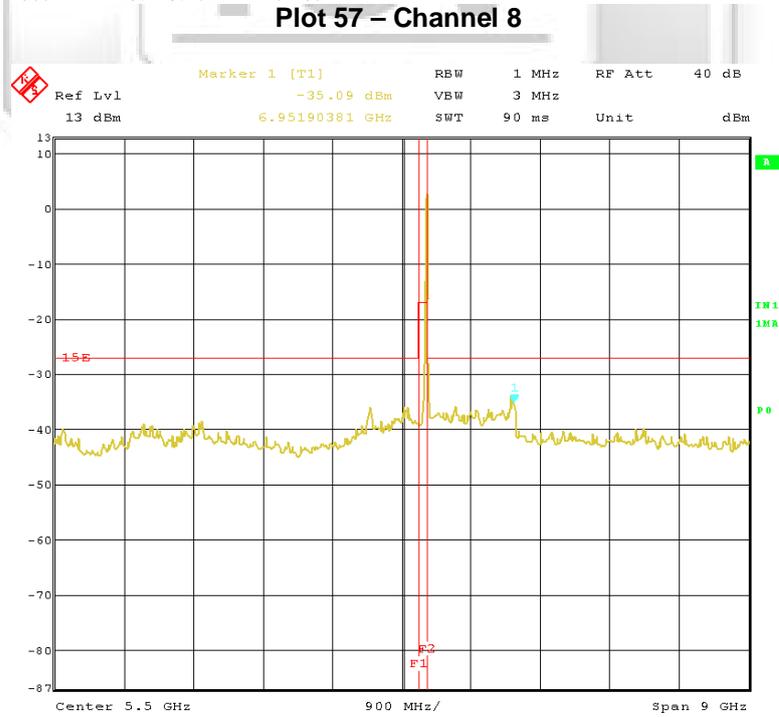
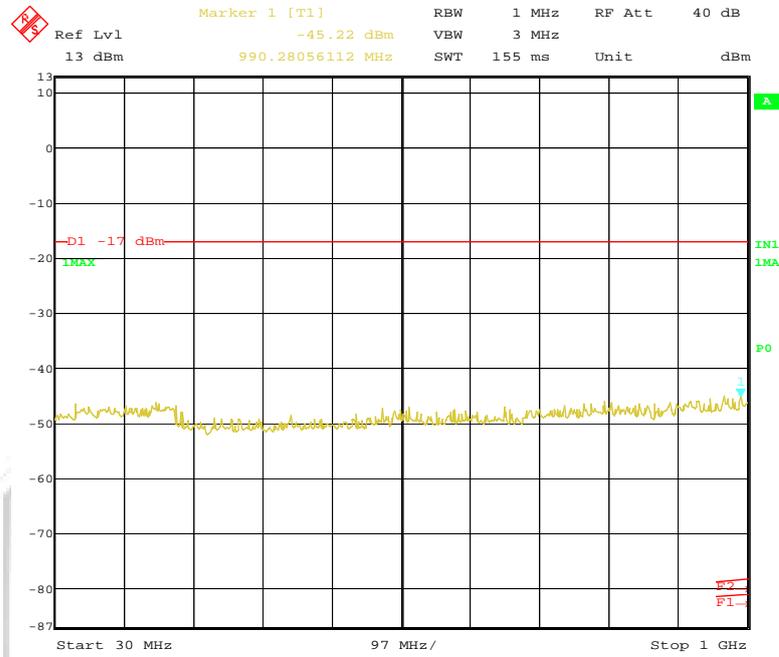


Plot 56 - Channel 6



RF SPURIOUS EMISSIONS (CONDUCTED) TEST

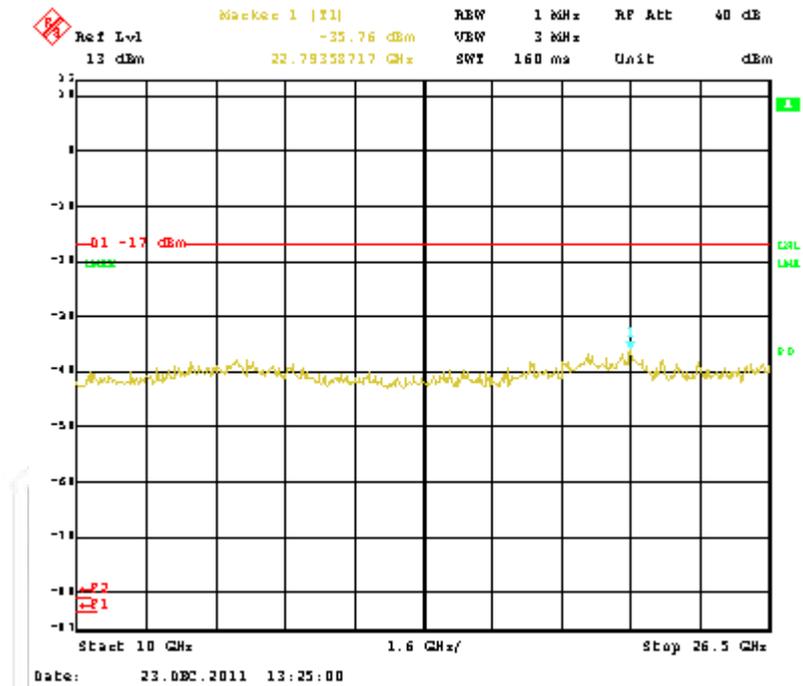
RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



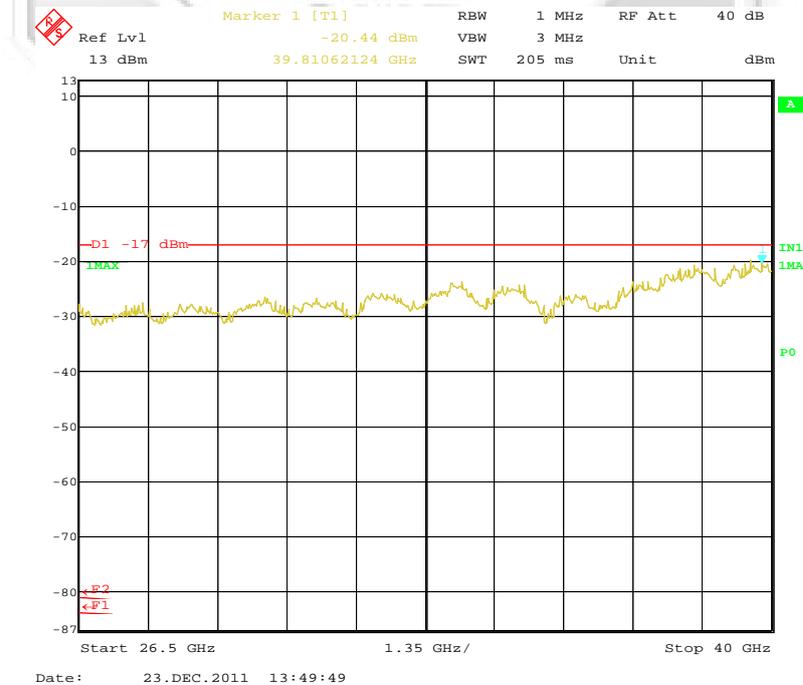


RF SPURIOUS EMISSIONS (CONDUCTED) TEST

RF Spurious Emissions (Conducted) Plots (SU-HTB550 Antenna 1)



Plot 59 - Channel 8



Plot 60 - Channel 8



BAND EDGE COMPLIANCE (RADIATED) TEST

47 CFR FCC Part 15.407(b)(7) Band Edge Compliance (Radiated) Limits

The EUT shows compliance to the requirements of this section, which states the spurious emissions fall within the restricted bands shall complies to the limits as shown below:

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m) @ 3m
30 - 88	40.0
88 - 216	43.5
216 - 960	46.0
Above 960	54.0*

* Above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

47 CFR FCC Part 15.407(b)(7) Band Edge Compliance (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012
EMCO Horn Antenna(1GHz-18GHz) – H15 (Ref)	3115	0003-6008	20 May 2012
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	08 Oct 2012
ETS Horn Antenna (18GHz-40GHz)(Ref)	3116	0004-2474	19 Apr 2012
Toyo Preamplifier (26.5GHz-40GHz)	HAP26-40W	00000005	19 Apr 2012
Agilent EMC Analyzer (9kHz-26.5GHz)	E7405A	US40240195	16 Mar 2012

47 CFR FCC Part 15.407(b)(7) Band Edge Compliance (Radiated) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to the following setting:
 - a. Peak Plot:
RBW = VBW = 1MHz
 - b. Average Plot
RBW = 1MHz, VBW = 10Hz
4. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.407(b)(7) Band Edge Compliance (Radiated) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the lower transmission band, 5.150GHz and any spurious emissions within the restricted band (4.5GHz – 5.15GHz) which is adjacent to the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the lower transmission band, 5.35GHz and the any spurious emissions within the restricted band (5.35GHz – 5.46GHz) which is adjacent to the band edge.

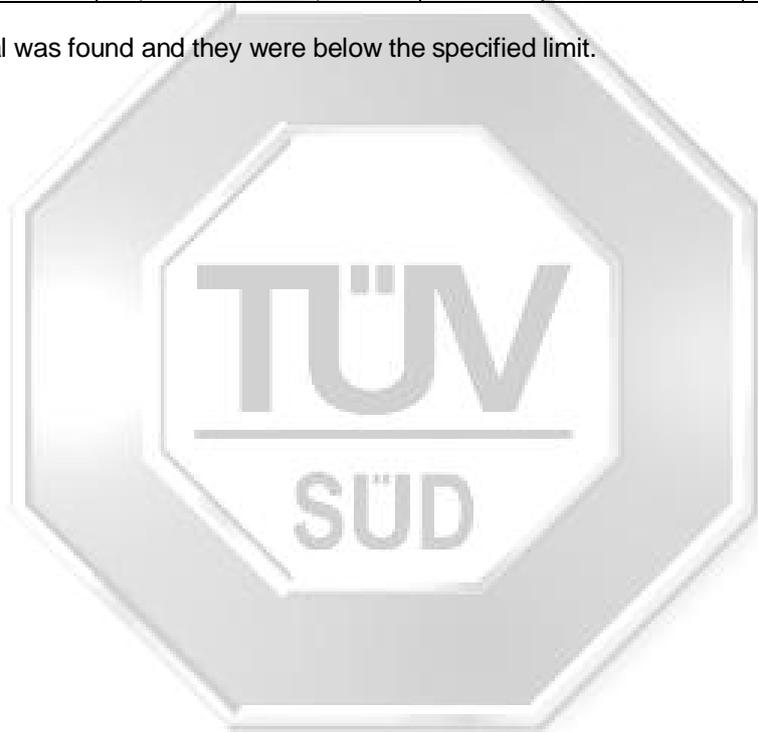


BAND EDGE COMPLIANCE (RADIATED) TEST

47 CFR FCC Part 15.407(b)(7) Band Edge Compliance (Radiated) Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	61 – 64	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0 (Worst Antenna)	Tested By	Dylan Lin

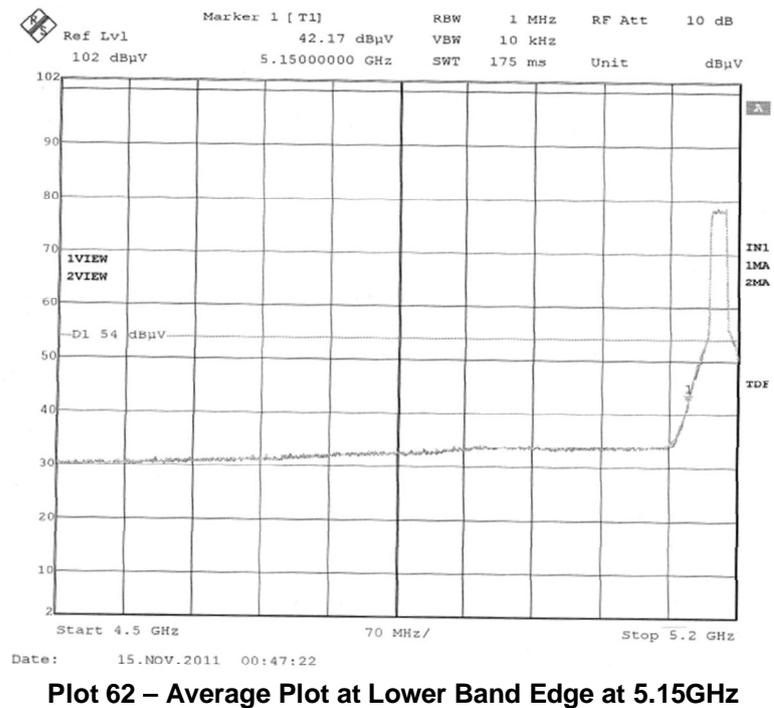
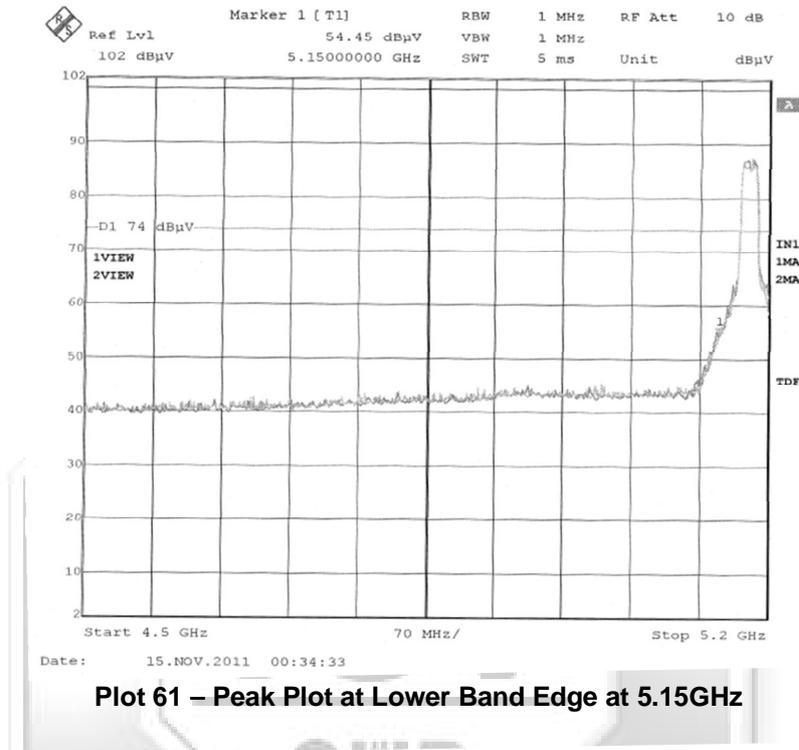
No significant signal was found and they were below the specified limit.





BAND EDGE COMPLIANCE (RADIATED) TEST

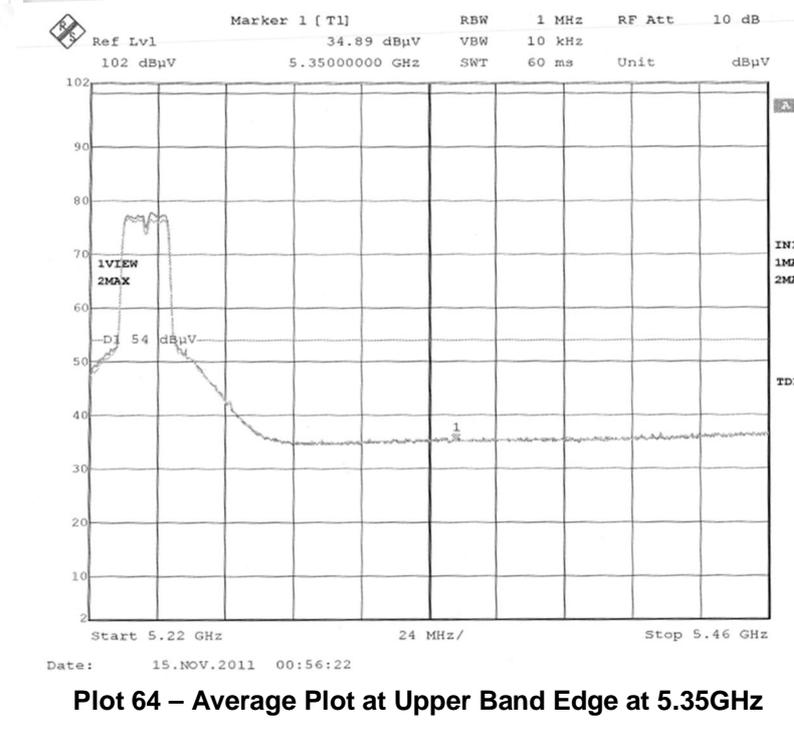
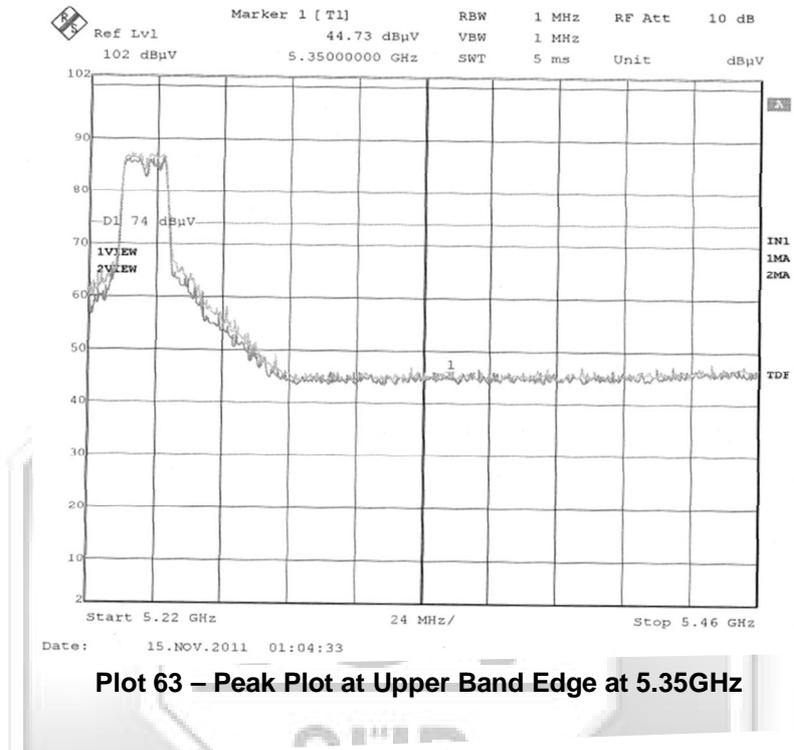
Band Edge Compliance (Radiated) Plots (Restricted Band)





BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band)





PEAK POWER SPECTRAL DENSITY TEST

47 CFR FCC Part 15.407(a) Peak Power Spectral Density Limits

Frequency Range (GHz)	Limit Values (dBm)
5.15 – 5.25	4.0
5.725 – 5.825	17.0

*Note: If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

47 CFR FCC Part 15.407(a) Peak Power Spectral Density Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

47 CFR FCC Part 15.407(a) Peak Power Spectral Density Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 1MHz and 3MHz.
5. All other supporting equipment were powered separately from another filtered mains.

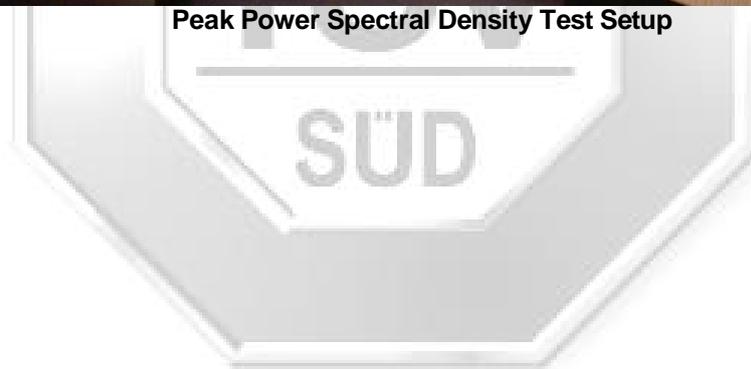
47 CFR FCC Part 15.407(a) Peak Power Spectral Density Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 0 (5.180GHz).
2. The number of sweep and detector of the spectrum analyser was set to the value of $\geq 2 \times \text{SPAN} / \text{RBW}$ and RMS respectively.
3. The peak power density of the transmitting frequency was trace average ≥ 100 traces and recorded.
4. The step 3 was repeated with the transmitting frequency was set to Channel 2 (5.220GHz), Channel 3 (5.240GHz), Channel 4 (5.745GHz), Channel 6 (5.785GHz) and Channel 8 (5.825GHz) respectively.

PEAK POWER SPECTRAL DENSITY TEST



Peak Power Spectral Density Test Setup





PEAK POWER SPECTRAL DENSITY TEST

47 CFR FCC Part 15.407(a) Peak Power Spectral Density Results

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	65 – 70	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (dBm)	Limit (dBm)
0	5.180	-1.588	4.0
2	5.220	-1.900	4.0
3	5.240	-2.002	4.0
4	5.745	-5.101	17.0
6	5.785	-6.372	17.0
8	5.825	-6.325	17.0

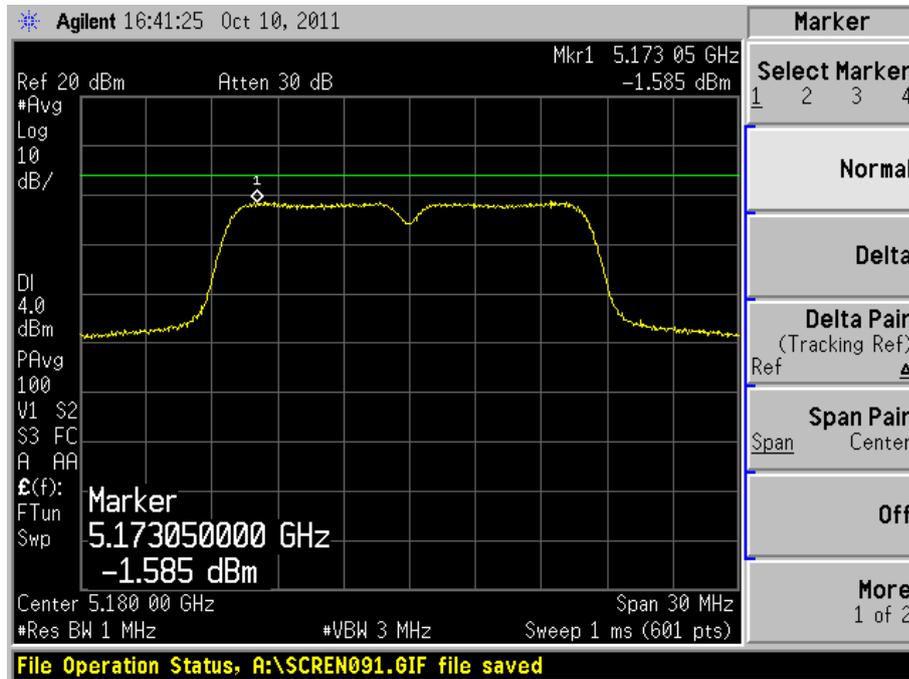
Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	71 – 76	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (dBm)	Limit (dBm)
0	5.180	-5.699	4.0
2	5.220	-5.988	4.0
3	5.240	-5.633	4.0
4	5.745	-2.631	17.0
6	5.785	-3.369	17.0
8	5.825	-3.067	17.0

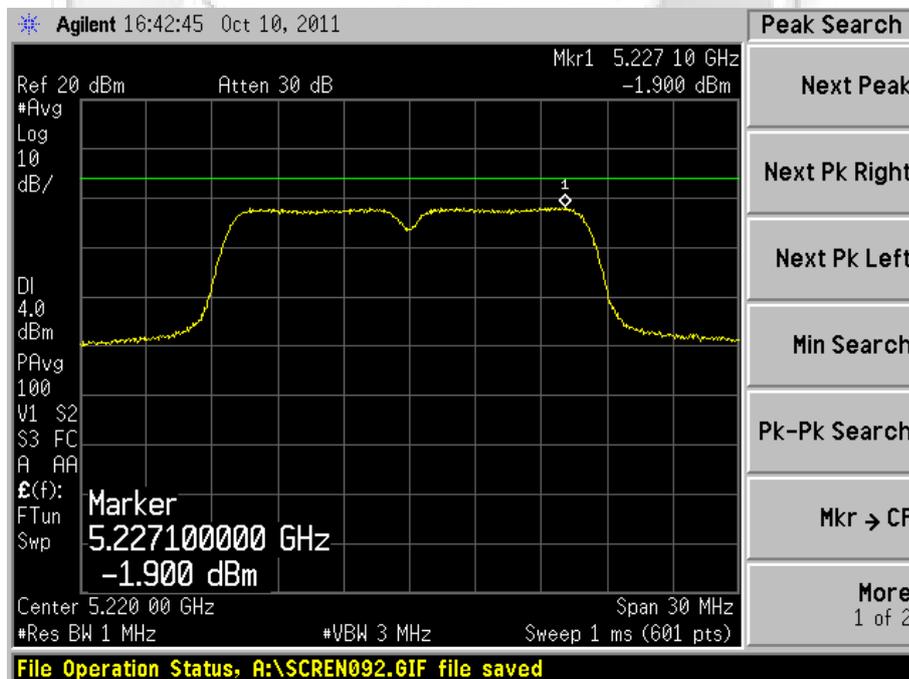


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots (SU-HTB550 Antenna 0)



Plot 65 – Channel 0

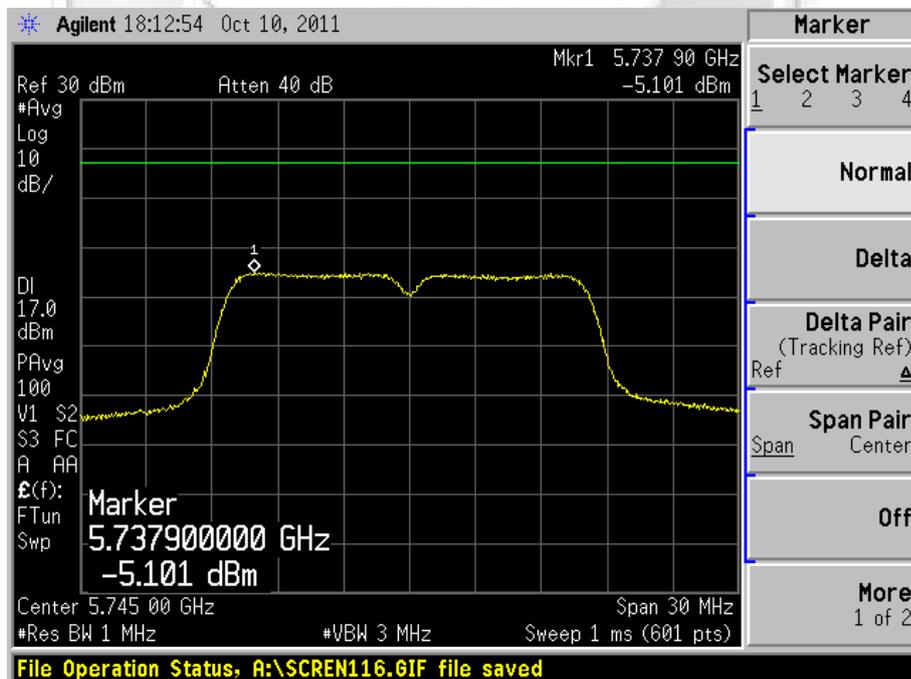
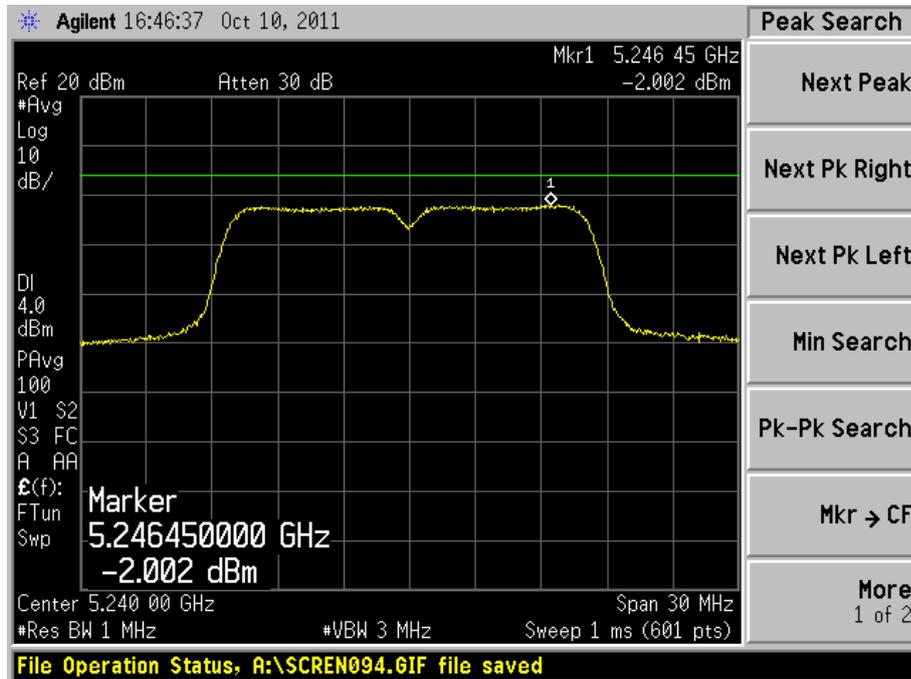


Plot 66 – Channel 2



PEAK POWER SPECTRAL DENSITY TEST

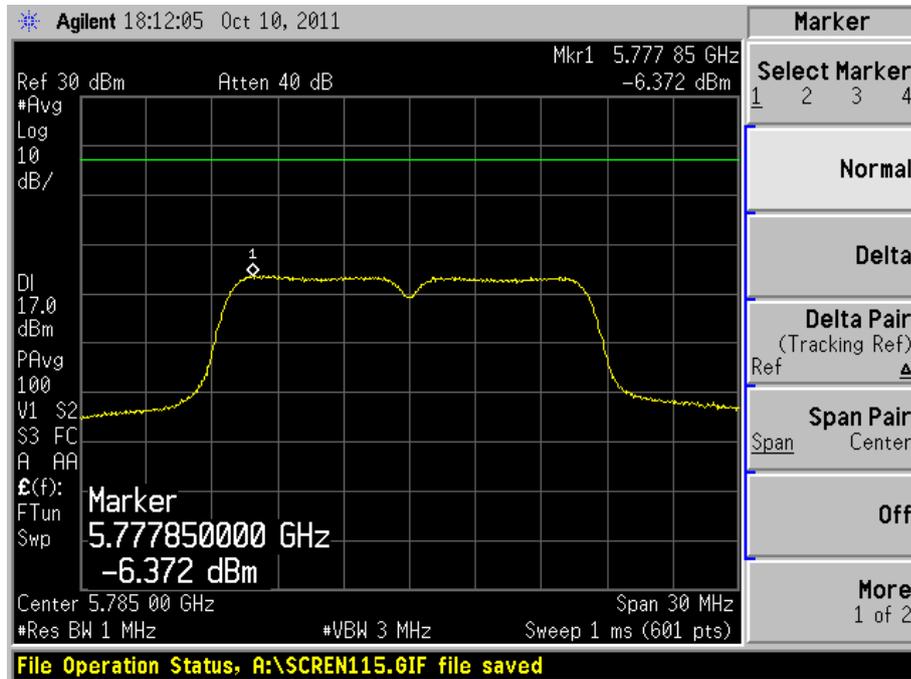
Peak Power Spectral Density Plots (SU-HTB550 Antenna 0)



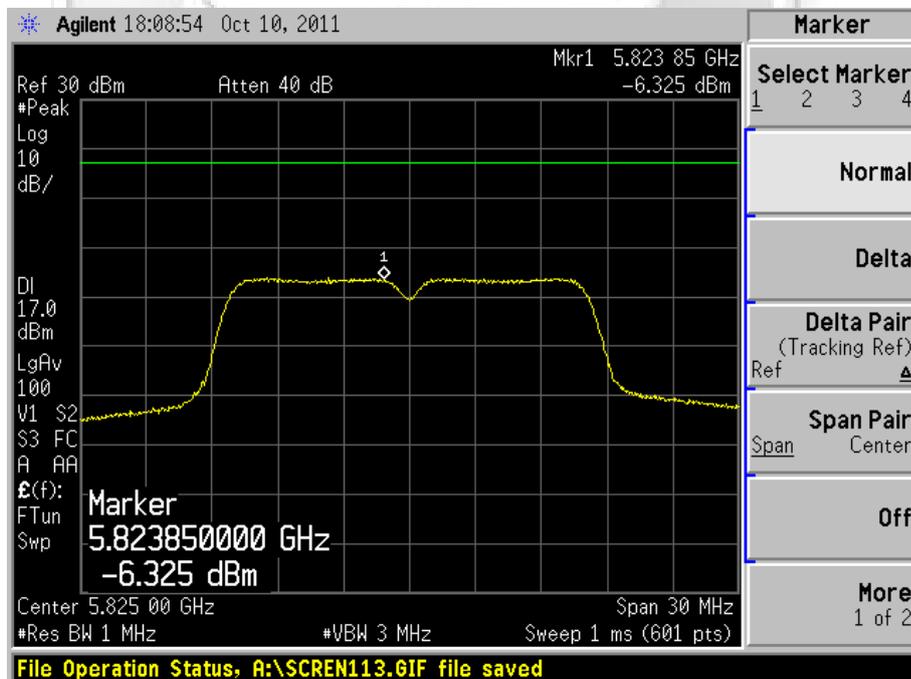


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots (SU-HTB550 Antenna 0)



Plot 69 – Channel 6

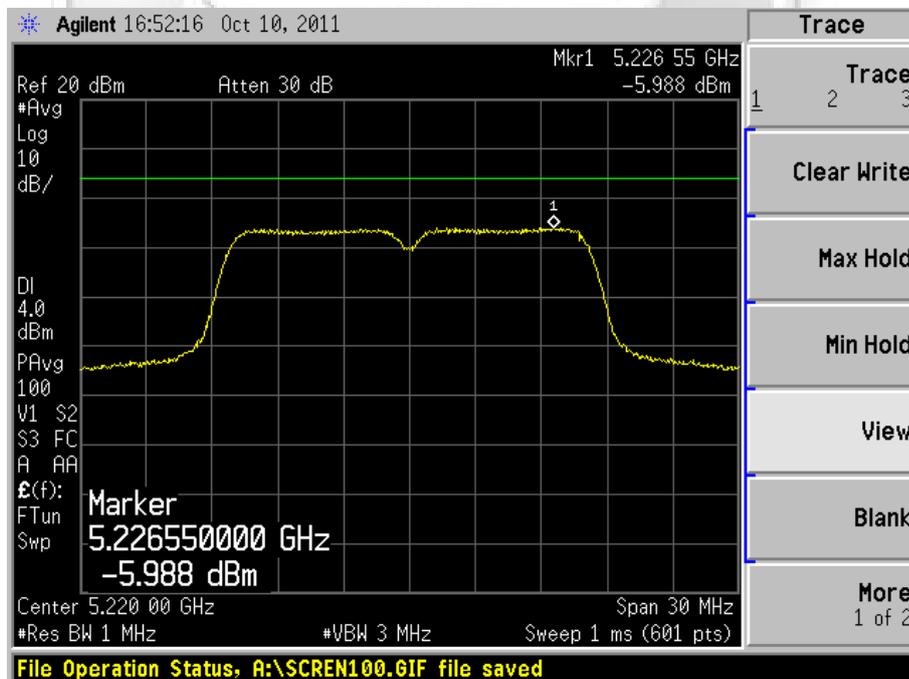
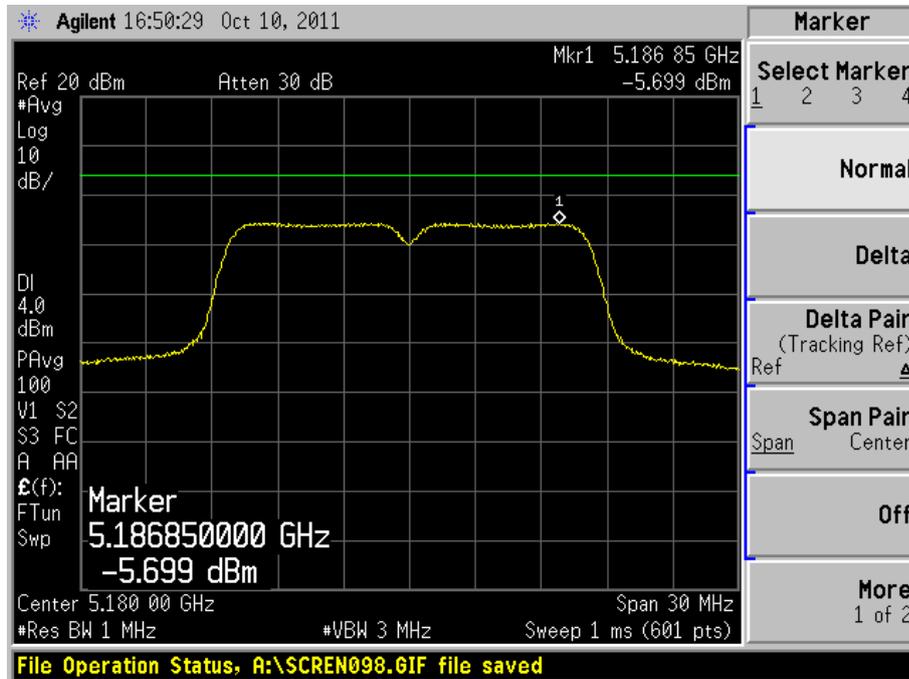


Plot 70 – Channel 8



PEAK POWER SPECTRAL DENSITY TEST

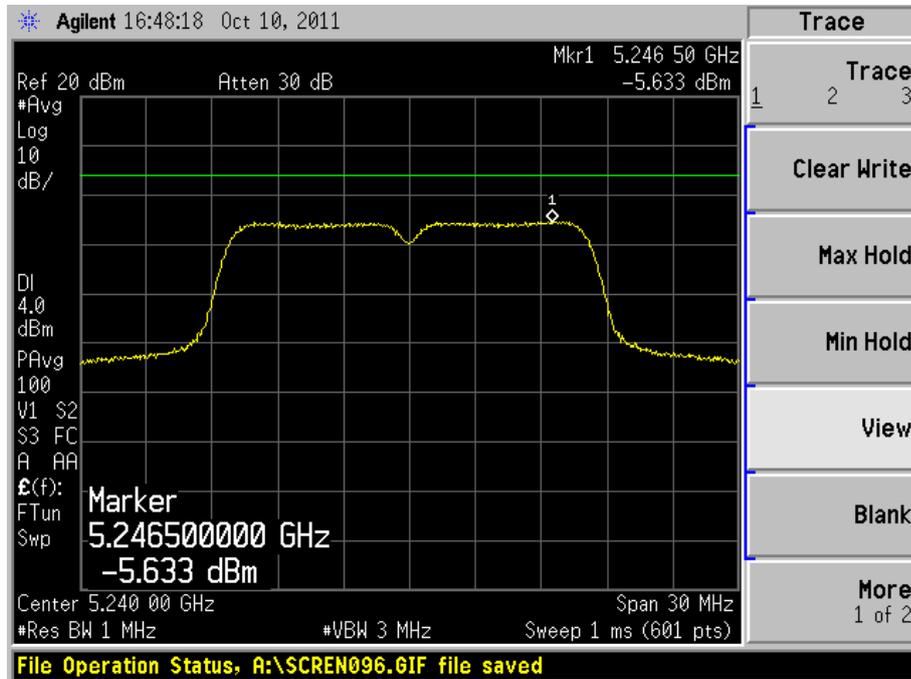
Peak Power Spectral Density Plots (SU-HTB550 Antenna 1)



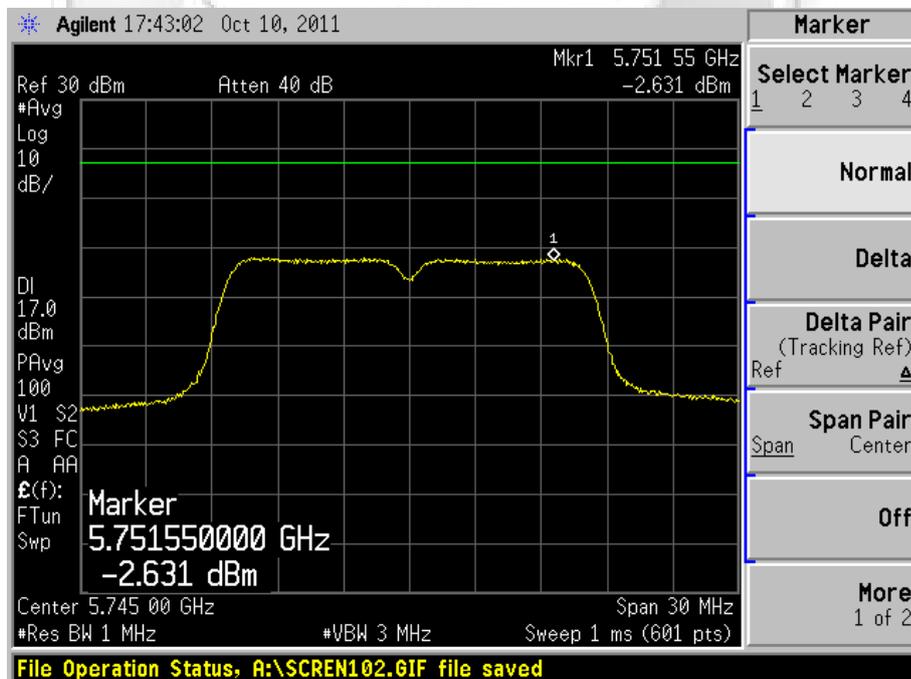


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots (SU-HTB550 Antenna 1)



Plot 73 – Channel 3

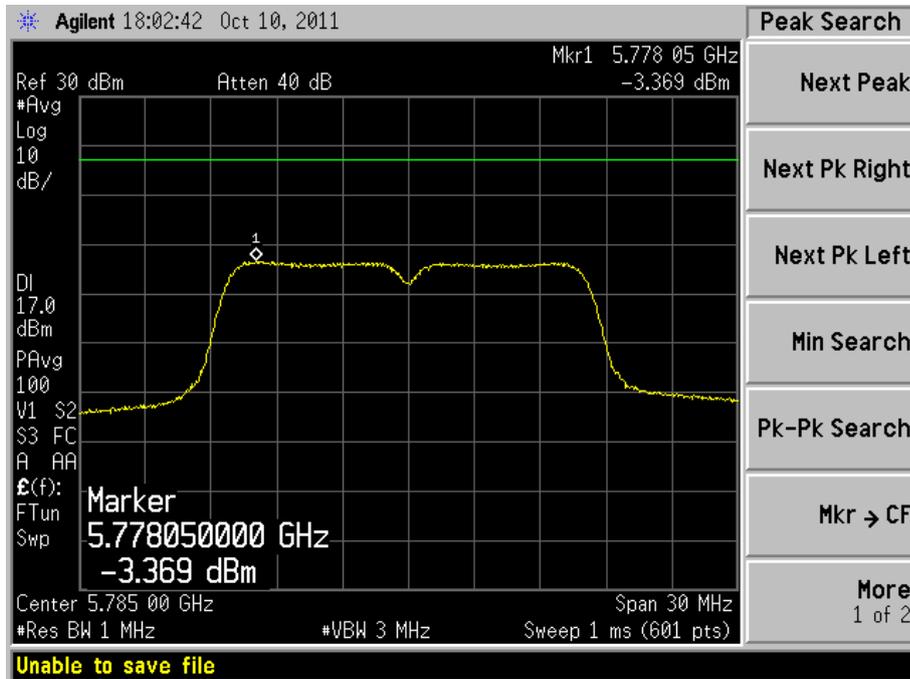


Plot 74 – Channel 4

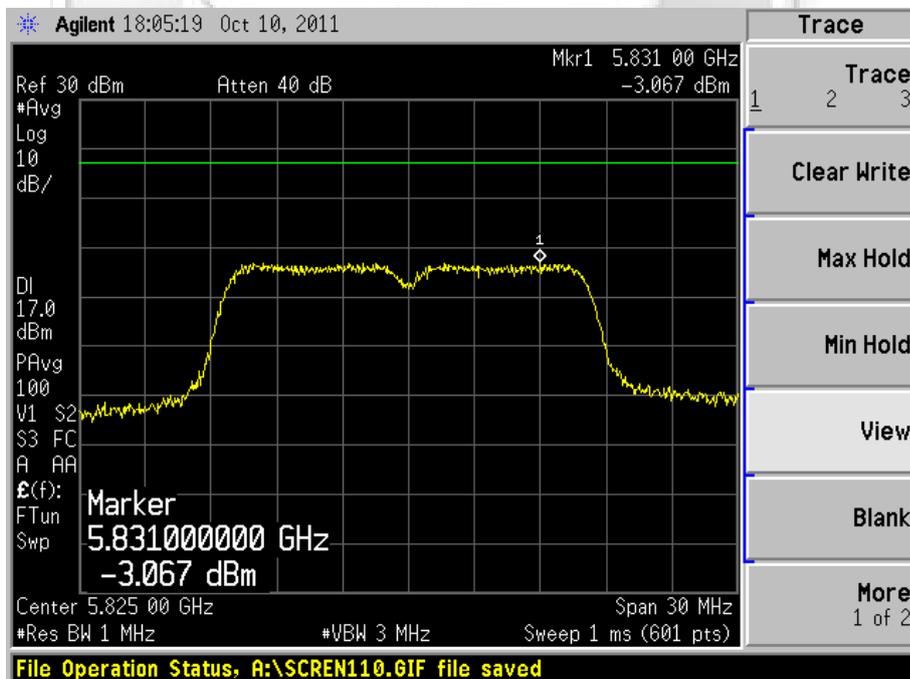


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots (SU-HTB550 Antenna 1)



Plot 75 – Channel 6



Plot 76 – Channel 8



PEAK EXCURSION TEST

47 CFR FCC Part 15.407(a)(6) Peak Excursion Limits

The EUT shows compliance to the requirements of this section, which states the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

47 CFR FCC Part 15.407(a)(6) Peak Excursion Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

47 CFR FCC Part 15.407(a)(6) Peak Excursion Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 1MHz and 3MHz.
5. All other supporting equipment were powered separately from another filtered mains.

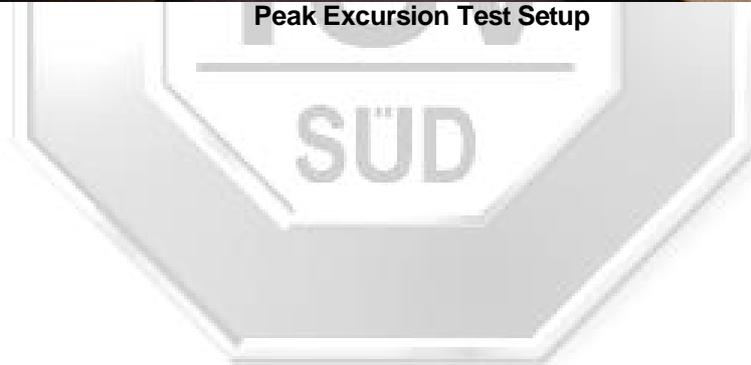
47 CFR FCC Part 15.407(a)(6) Peak Excursion Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 0 (5.180GHz).
2. The number of sweep and detector of the spectrum analyser was set to the value of $\geq 2 \times \text{SPAN} / \text{RBW}$ and peak respectively.
3. Captured the emission envelope using max hold and recorded the plot when the captured emission profile had stabilised and no further emission was captured.
4. Repeat the same measurement using a separate trace with the detector of the spectrum analyser was set to RMS.
5. Using the marker feature of the spectrum analyser, locate the level difference between the two plots at at which the peak of the emission was found.
6. The steps 3 to 5 were repeated with the transmitting frequency was set to Channel 2 (5.220GHz), Channel 3 (5.240GHz), Channel 4 (5.745GHz), Channel 6 (5.785GHz) and Channel 8 (5.825GHz) respectively.

PEAK EXCURSION TEST



Peak Excursion Test Setup





PEAK EXCURSION TEST

47 CFR FCC Part 15.407(a)(6) Peak Excursion Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	77 – 82	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Peak Excursion (dB)	Limit (dB)
0	5.180	7.23	≤13.0
2	5.220	7.15	≤13.0
3	5.240	5.60	≤13.0
4	5.745	7.33	≤13.0
6	5.785	6.34	≤13.0
8	5.825	7.30	≤13.0

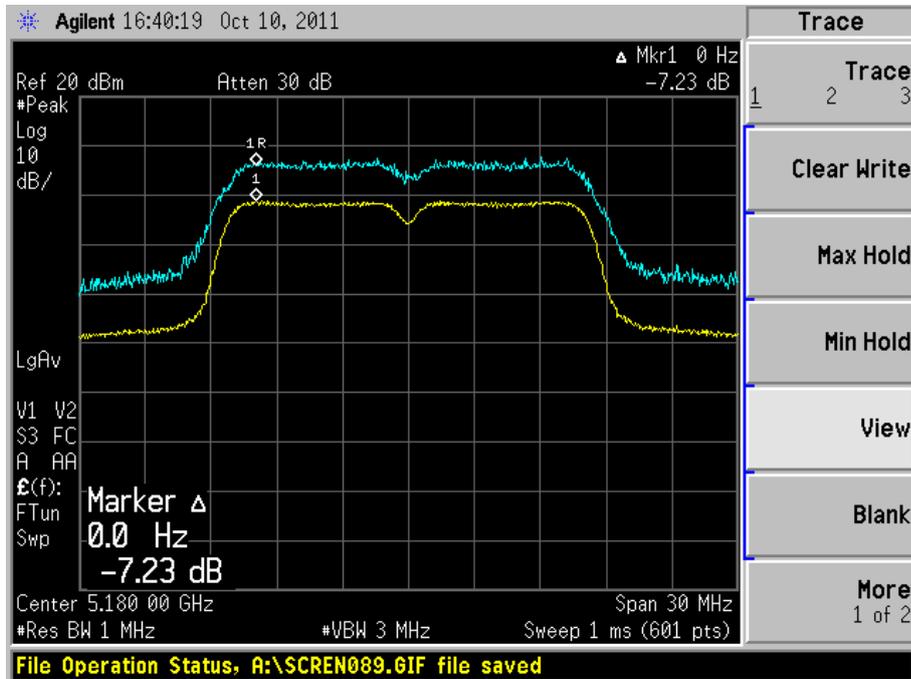
Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	83 – 88	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Chelmin Li

Channel	Channel Frequency (GHz)	Peak Excursion (dB)	Limit (dB)
0	5.180	6.33	≤13.0
2	5.220	7.23	≤13.0
3	5.240	6.38	≤13.0
4	5.745	3.54	≤13.0
6	5.785	7.67	≤13.0
8	5.825	7.02	≤13.0

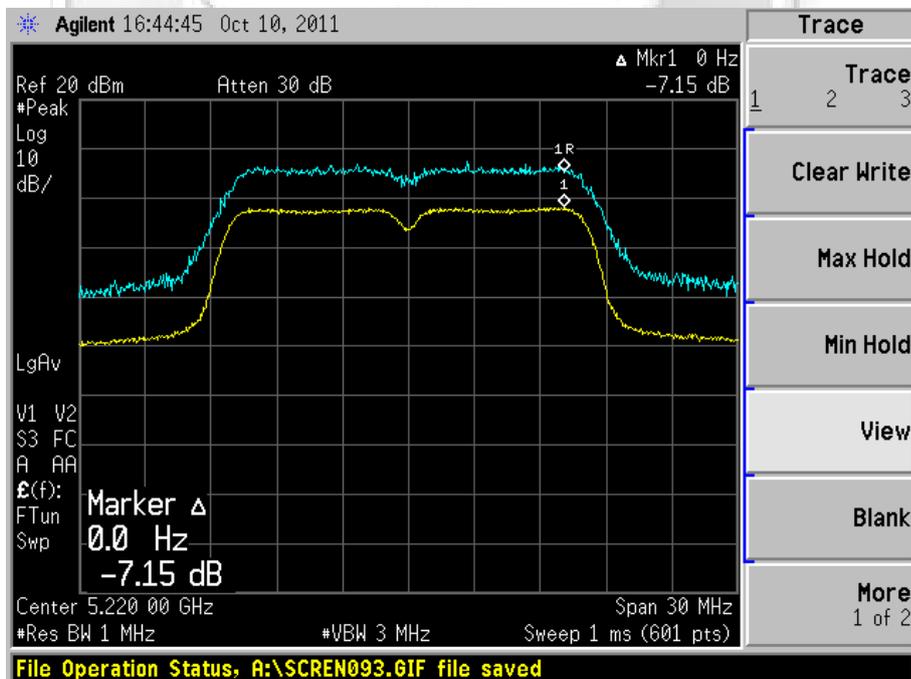


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 0)



Plot 77 – Channel 0

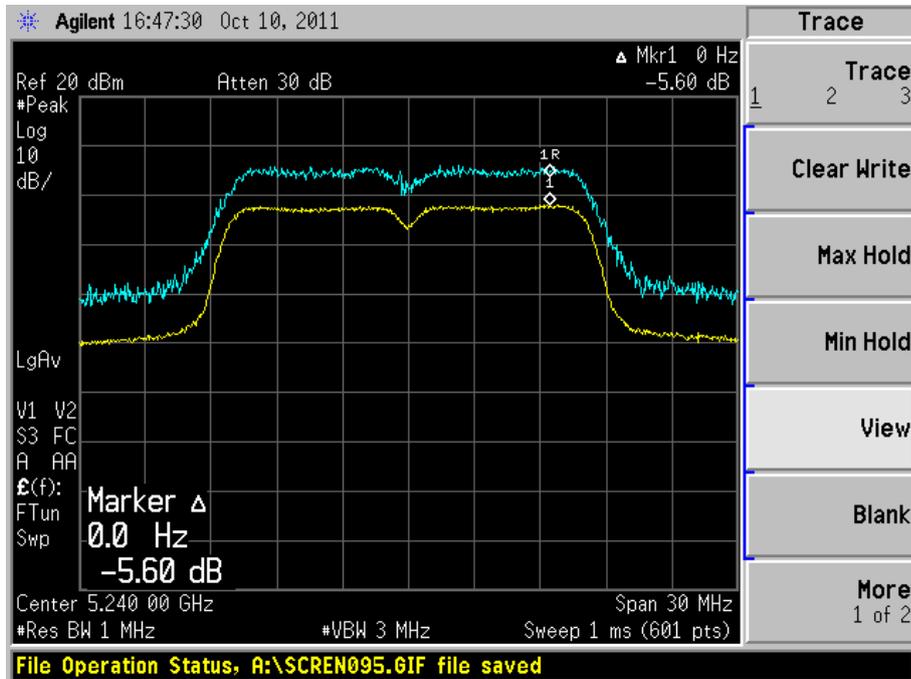


Plot 78 – Channel 2

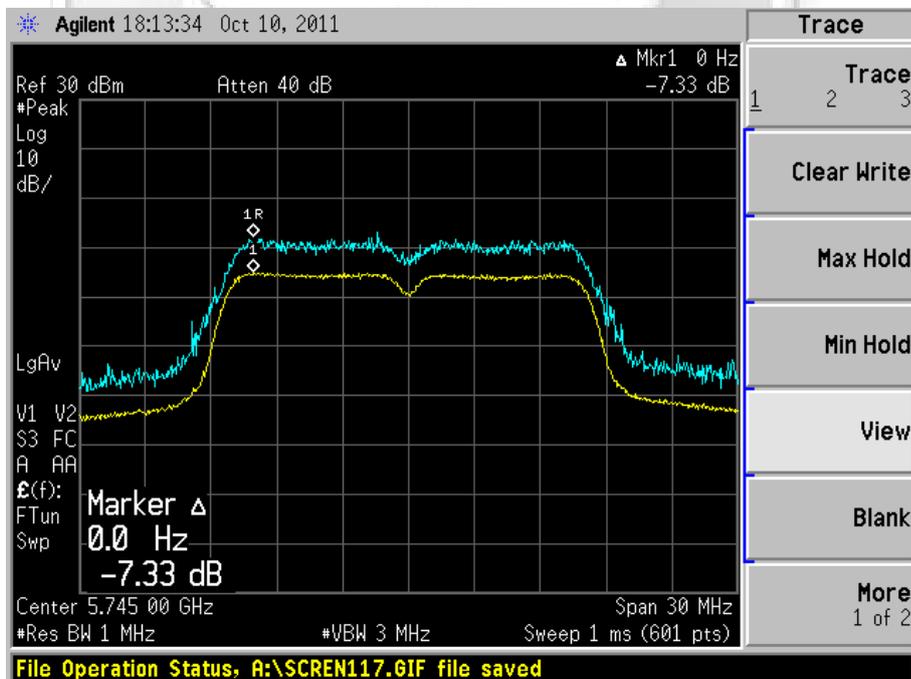


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 0)



Plot 79 – Channel 3

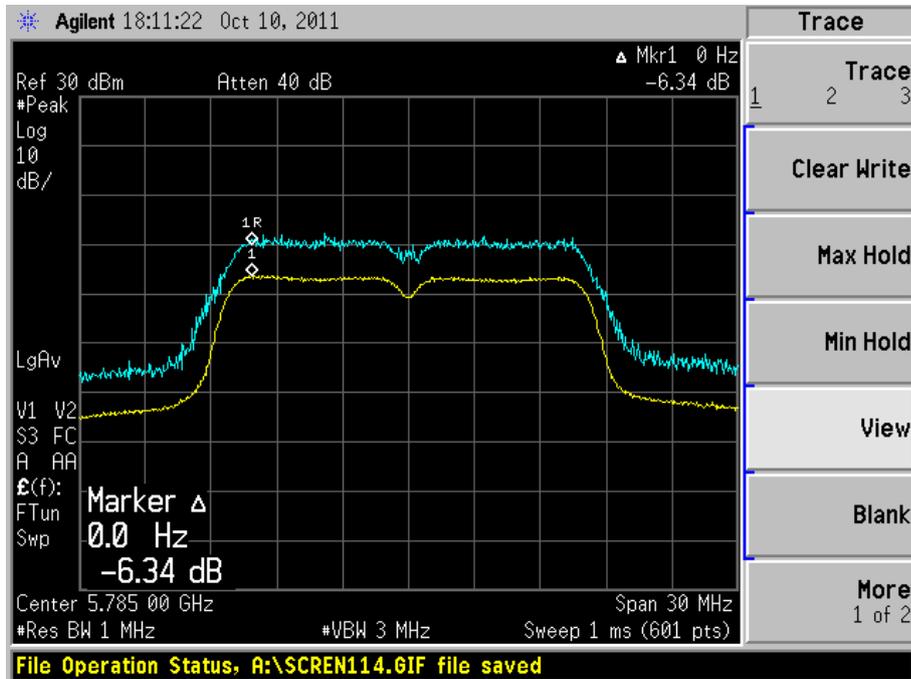


Plot 80 – Channel 4

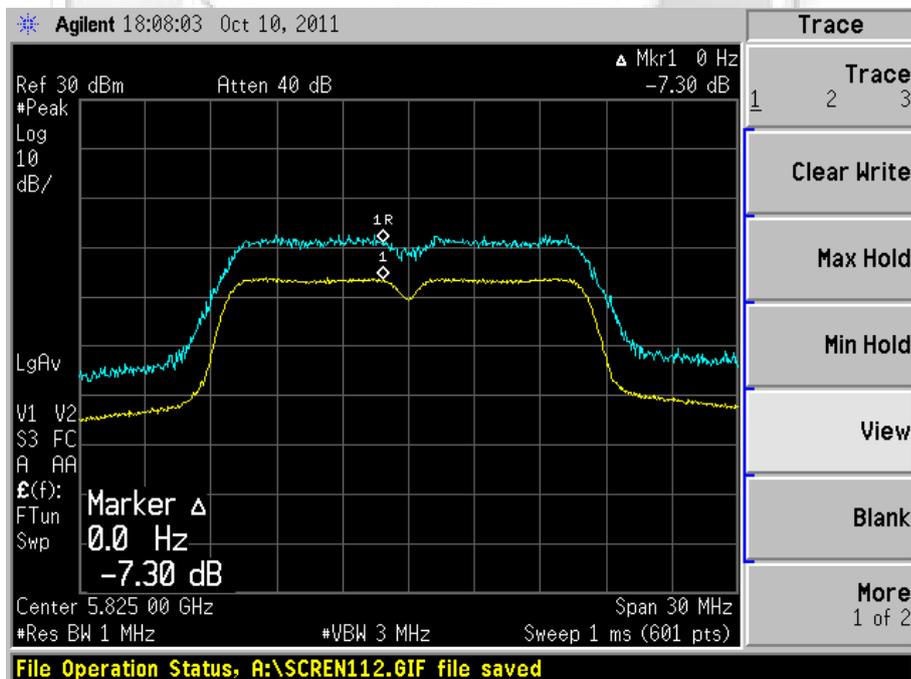


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 0)



Plot 81 – Channel 6

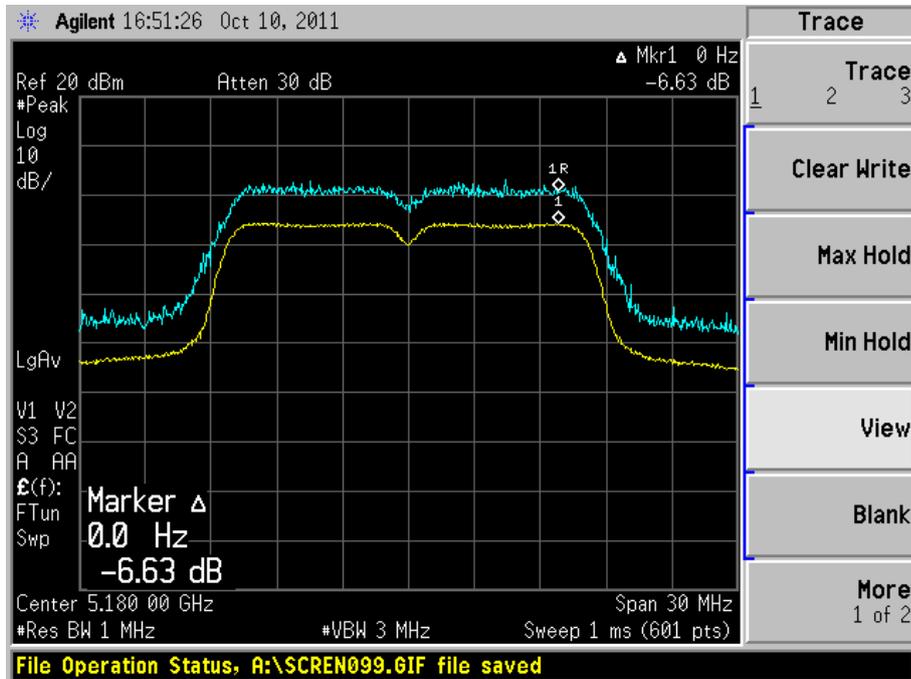


Plot 82 – Channel 8

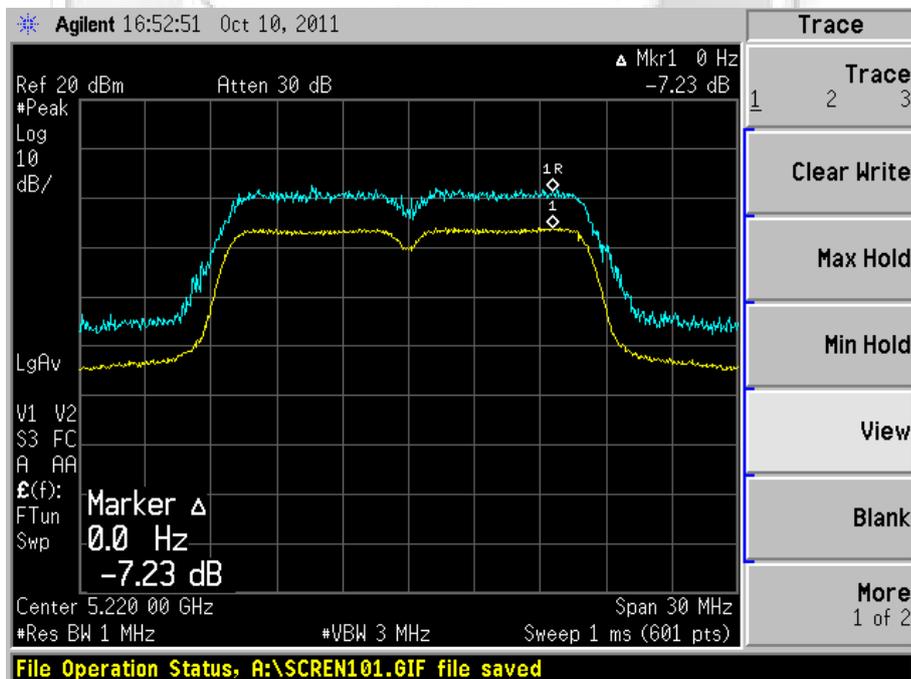


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 1)



Plot 83 - Channel 0

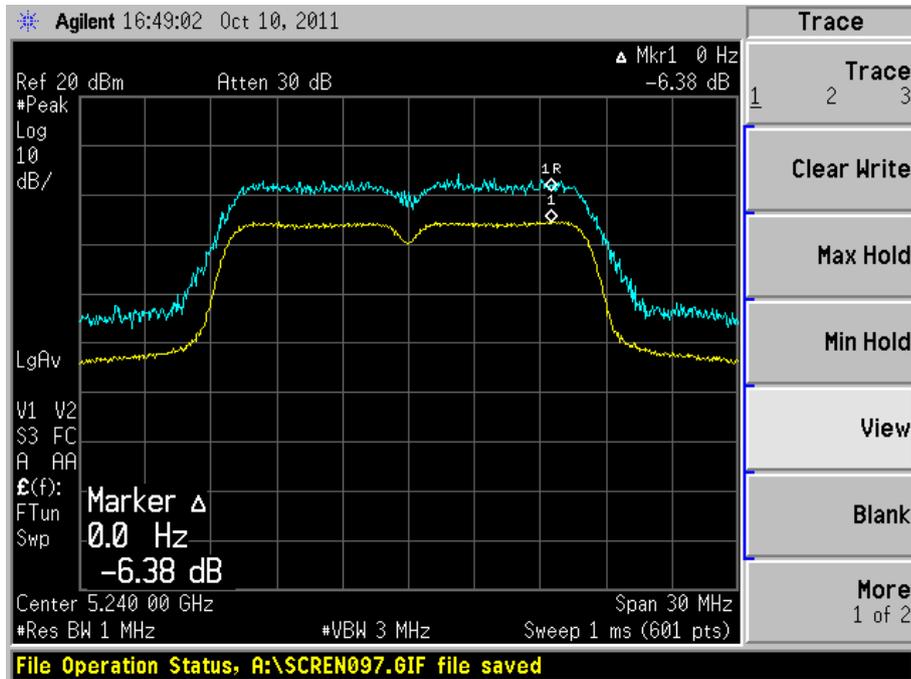


Plot 84 - Channel 2

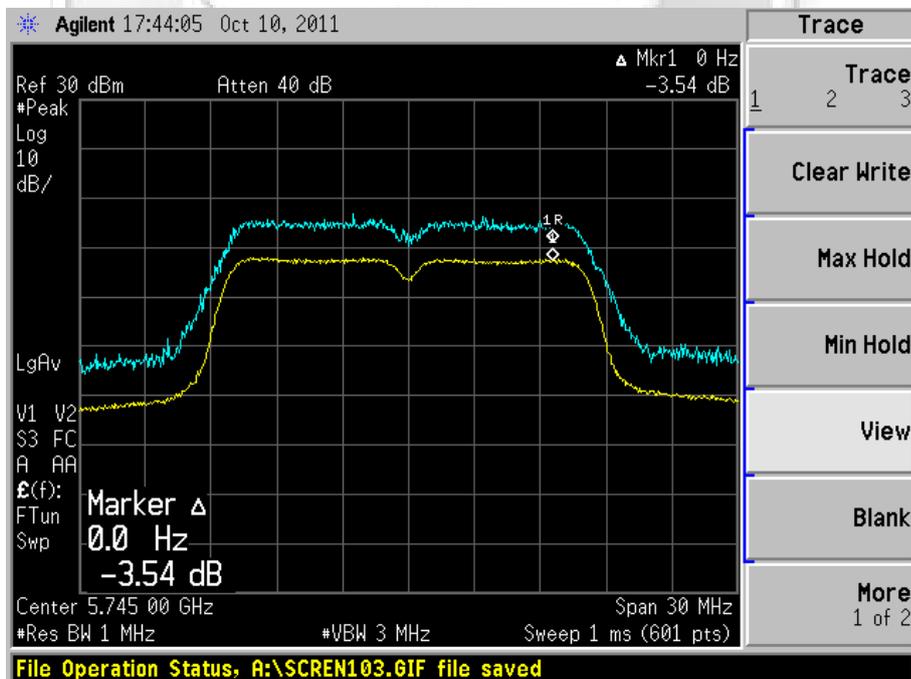


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 1)



Plot 85 – Channel 3

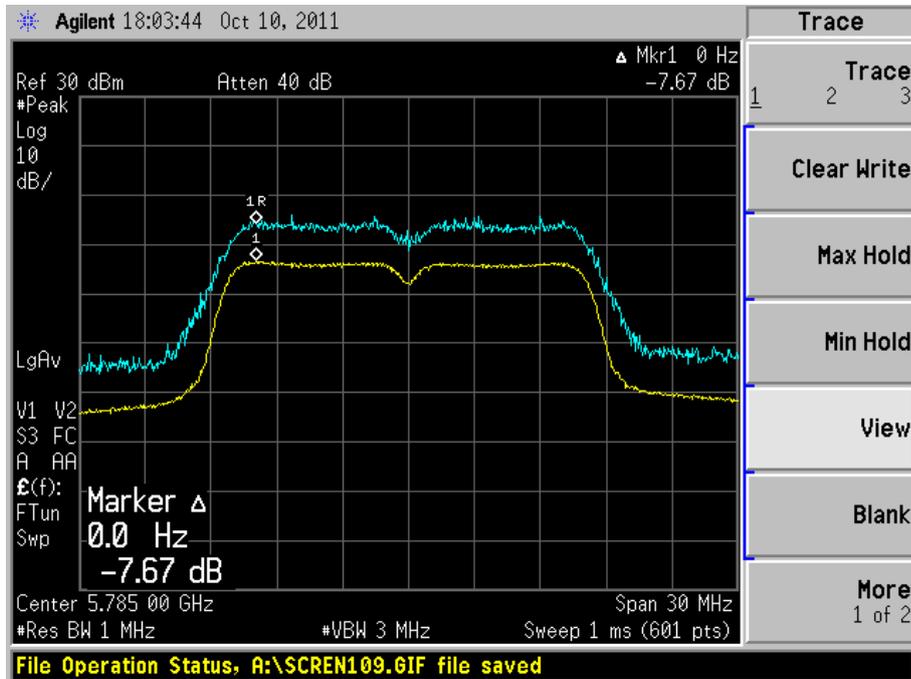


Plot 86 – Channel 4

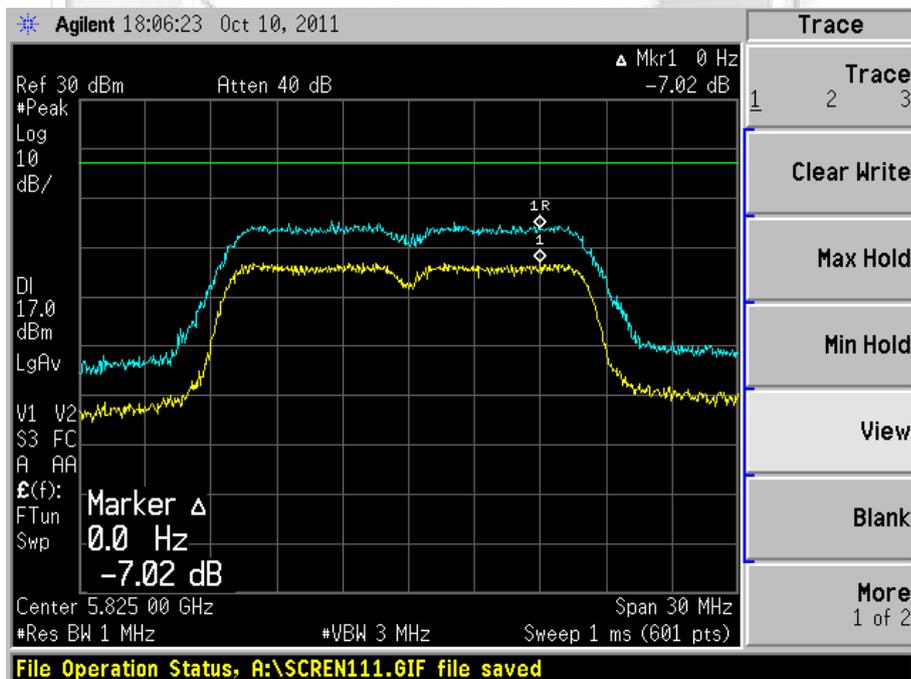


PEAK EXCURSION TEST

Peak Excursion Plots (SU-HTB550 Antenna 1)



Plot 87 – Channel 6



Plot 88 – Channel 8



SPECTRUM BANDWIDTH (6dB BANDWIDTH MEASUREMENT) TEST

47 CFR FCC Part 15.247(a)(2) Spectrum Bandwidth (6dB Bandwidth Measurement) Limits

The EUT shows compliance to the requirements of this section (5.725GHz – 5.850GHz), which states that the minimum bandwidth of the EUT employing digital modulation techniques shall be at least 500kHz.

47 CFR FCC Part 15.247(a)(2) Spectrum Bandwidth (6dB Bandwidth Measurement) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

47 CFR FCC Part 15.247(a)(2) Spectrum Bandwidth (6dB Bandwidth Measurement) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

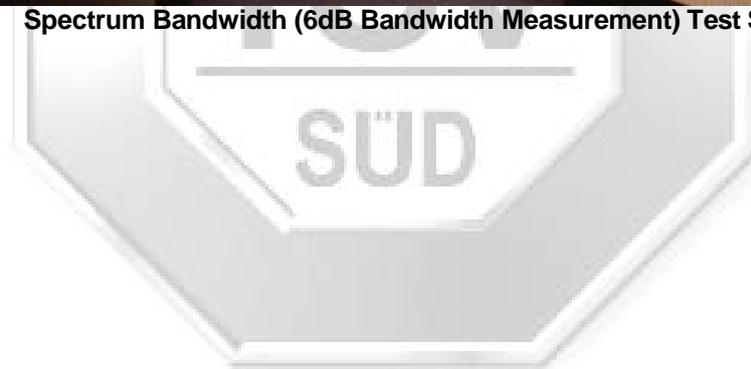
47 CFR FCC Part 15.247(a)(2) Spectrum Bandwidth (6dB Bandwidth Measurement) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 8 (5.825GHz) with specified modulation and data rate.
2. The center frequency of the spectrum analyser was set to the transmitting frequency with the frequency span wide enough to capture the 6dB bandwidth of the transmitting frequency.
3. The spectrum analyser was set to max hold to capture the transmitting frequency. The signal capturing was continuous until no further changes were observed.
4. The peak of the transmitting frequency was detected with the marker peak function of the spectrum analyser. The frequencies below the 6dB peak frequency at lower (f_L) and upper (f_H) sides of the transmitting frequency were marked and measured by using the marker-delta function of the spectrum analyser.
5. The 6dB bandwidth of the transmitting frequency is the frequency difference between the marked lower and upper frequencies, $|f_H - f_L|$.

SPECTRUM BANDWIDTH (6dB BANDWIDTH MEASUREMENT) TEST



Spectrum Bandwidth (6dB Bandwidth Measurement) Test Setup





SPECTRUM BANDWIDTH (6dB BANDWIDTH MEASUREMENT) TEST

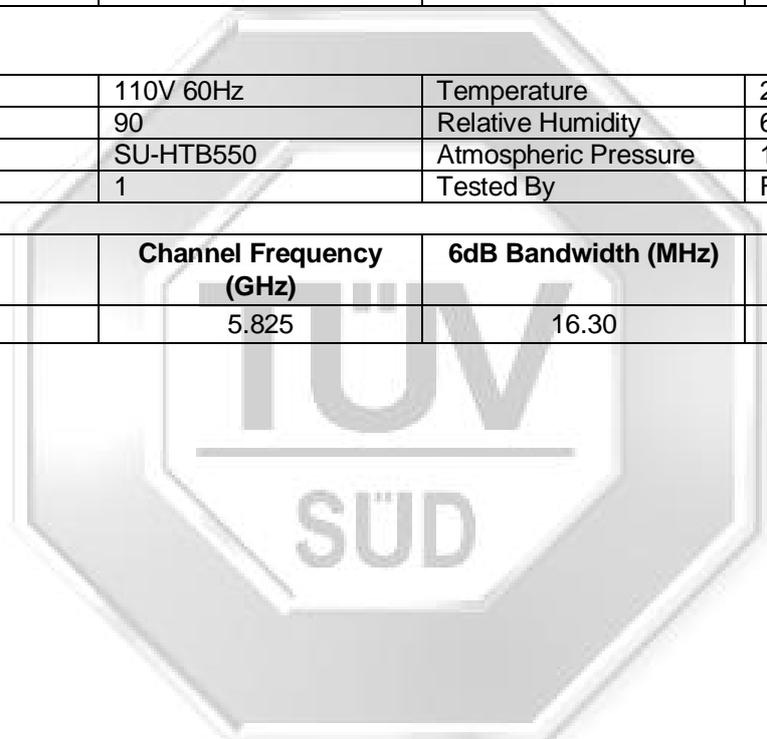
47 CFR FCC Part 15.247(a)(2) Spectrum Bandwidth (6dB Bandwidth Measurement) Results

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	89	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	0	Tested By	Foo Kai Maun

Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	Limit (MHz)
8	5.825	16.25	≥0.50

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	90	Relative Humidity	60%
Model	SU-HTB550	Atmospheric Pressure	1030mbar
Antenna	1	Tested By	Foo Kai Maun

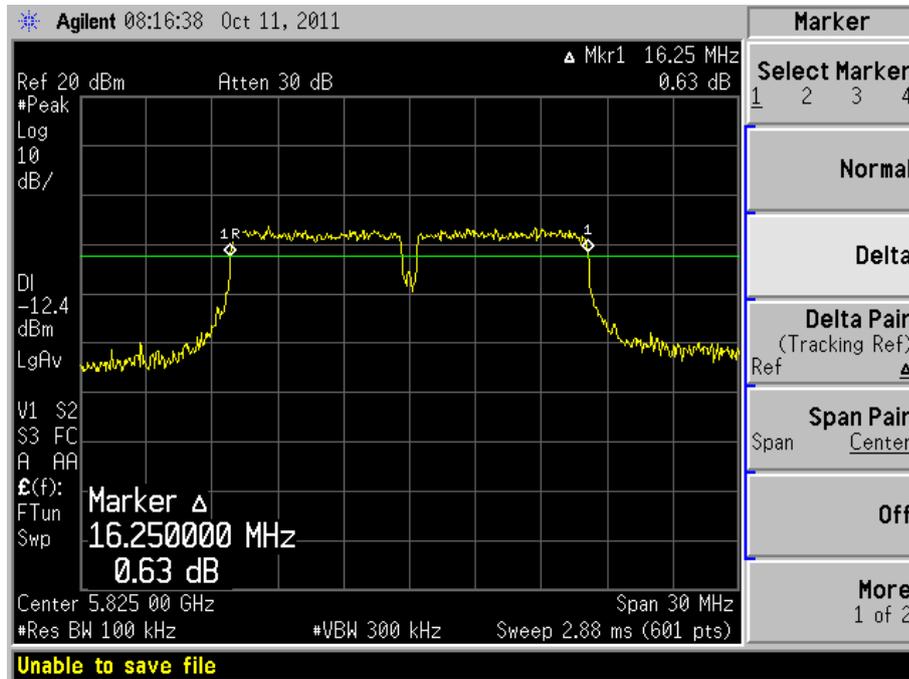
Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	Limit (MHz)
8	5.825	16.30	≥0.50



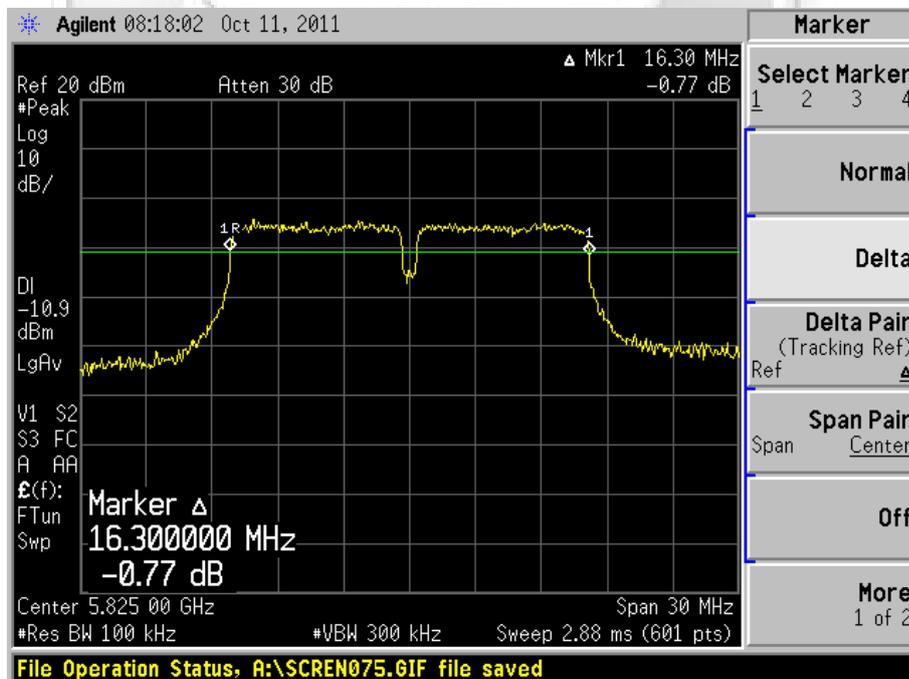


SPECTRUM BANDWIDTH (6dB BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (6dB Bandwidth Measurement) Plots



Plot 89 - Channel 8 (Antenna 0)



Plot 90 - Channel 8 (Antenna 1)



RF CONDUCTED SPURIOUS EMISSIONS TEST

47 CFR FCC Part 15.247(d) RF Conducted Spurious Emissions Limits

The EUT shows compliance to the requirements of this section (5.725GHz – 5.850GHz), which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

47 CFR FCC Part 15.247(d) RF Conducted Spurious Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

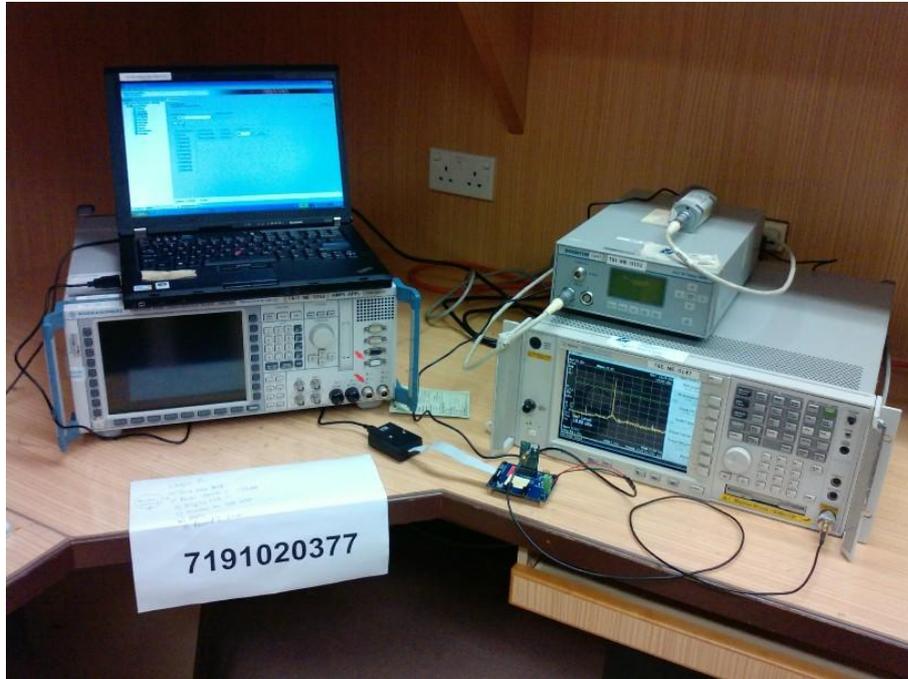
47 CFR FCC Part 15.247(d) RF Conducted Spurious Emissions Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.247(d) RF Conducted Spurious Emissions Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, non-hopping with transmitting frequency at Channel 8 (5.825GHz).
2. The start and stop frequencies of the spectrum analyser were set to 30MHz and 7GHz.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with frequency span was set from 7GHz to 25GHz.
5. The steps 2 to 3 were repeated with frequency span was set from 25Hz to 40GHz.

RF CONDUCTED SPURIOUS EMISSIONS TEST



RF Conducted Spurious Emissions Test Setup

47 CFR FCC Part 15.247(d) RF Conducted Spurious Emissions Results

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	91 – 93	Relative Humidity	60%
Antenna	0	Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

All spurious signals found were below the specified limit. Please refer to the attached plots.

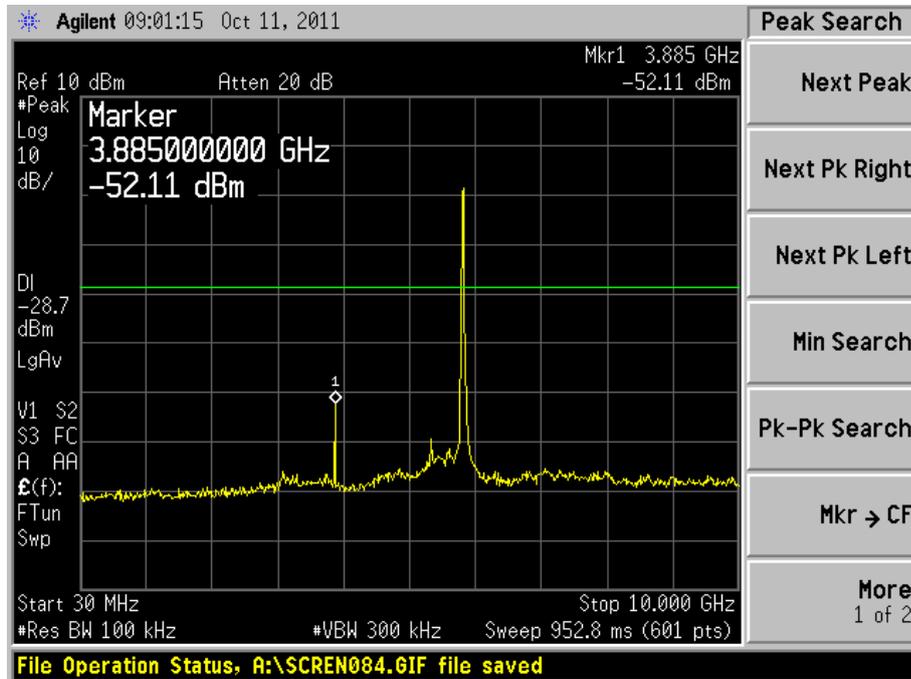
Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	94 – 96	Relative Humidity	60%
Antenna	1	Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

All spurious signals found were below the specified limit. Please refer to the attached plots.

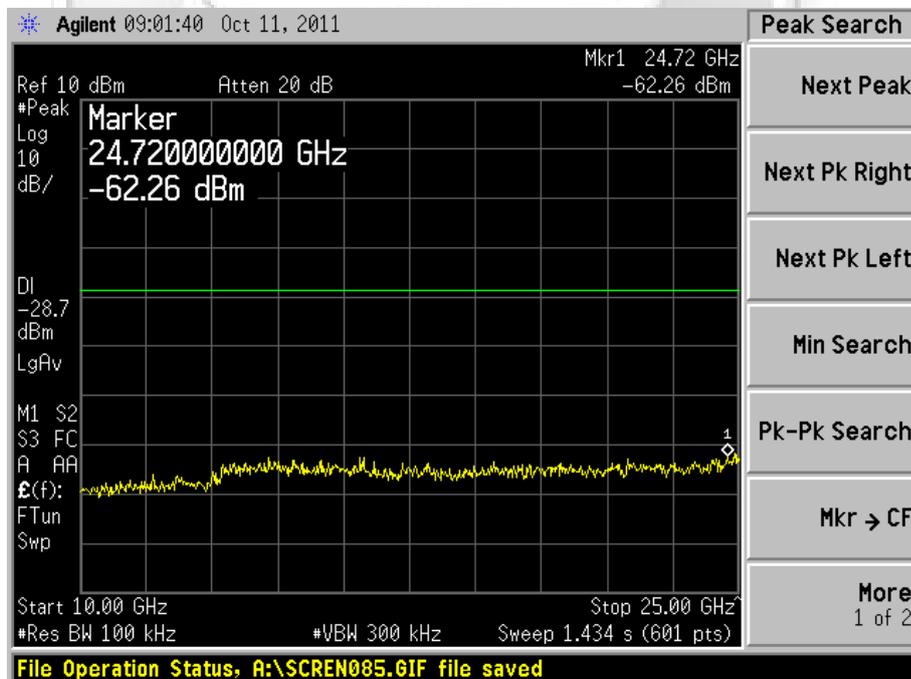


RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots (SU-HTB550 Antenna 0)



Plot 91 – Channel 8

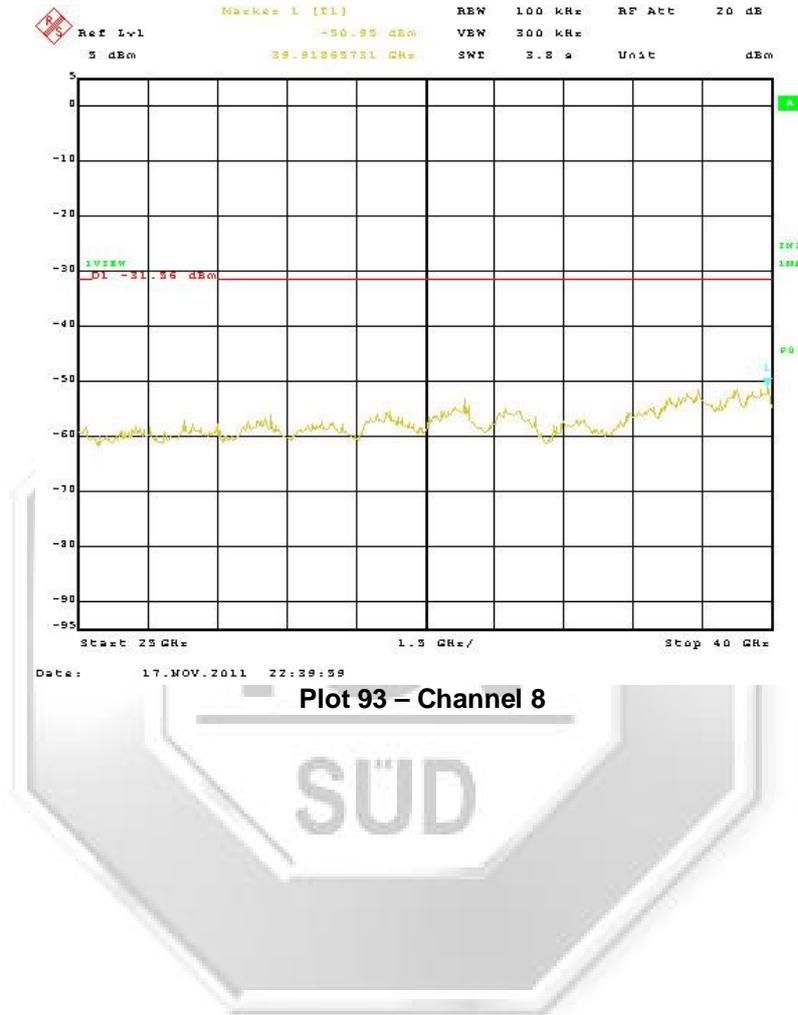


Plot 92 – Channel 8



RF CONDUCTED SPURIOUS EMISSIONS TEST

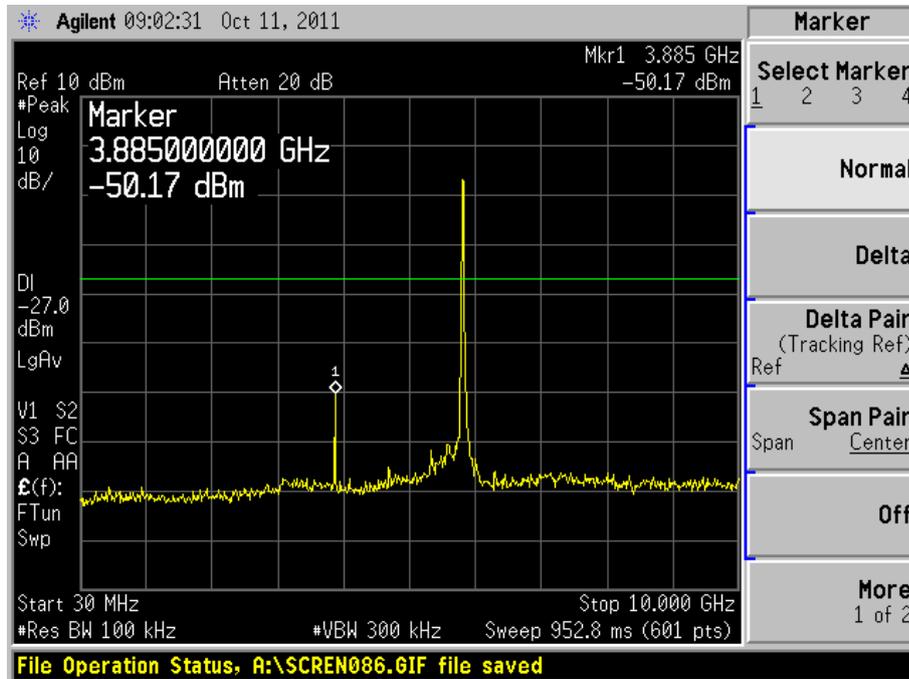
RF Conducted Spurious Emissions Plots (SU-HTB550 Antenna 0)



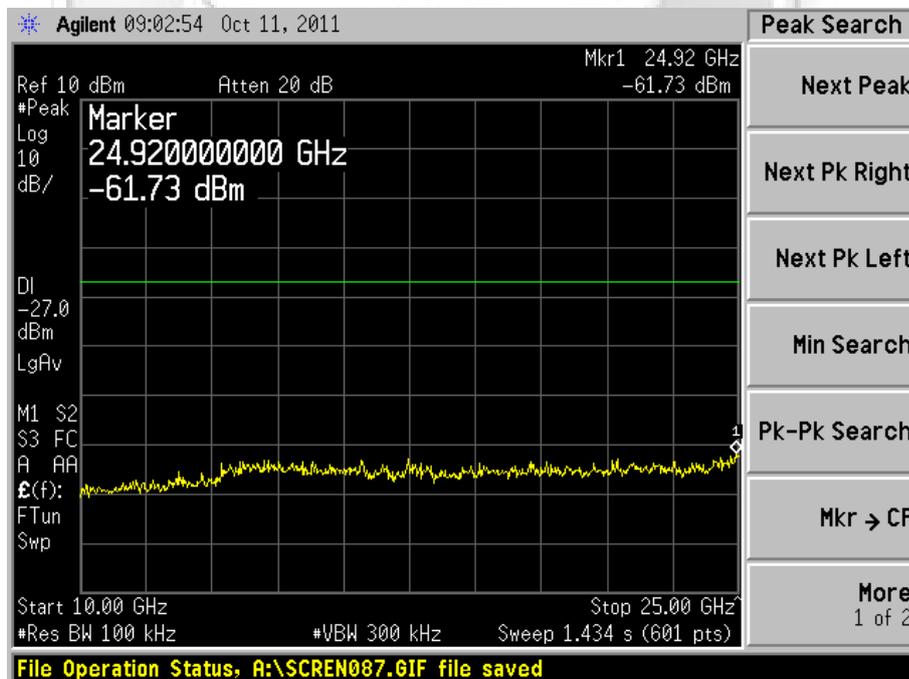


RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots (SU-HTB550 Antenna 1)



Plot 94 – Channel 8

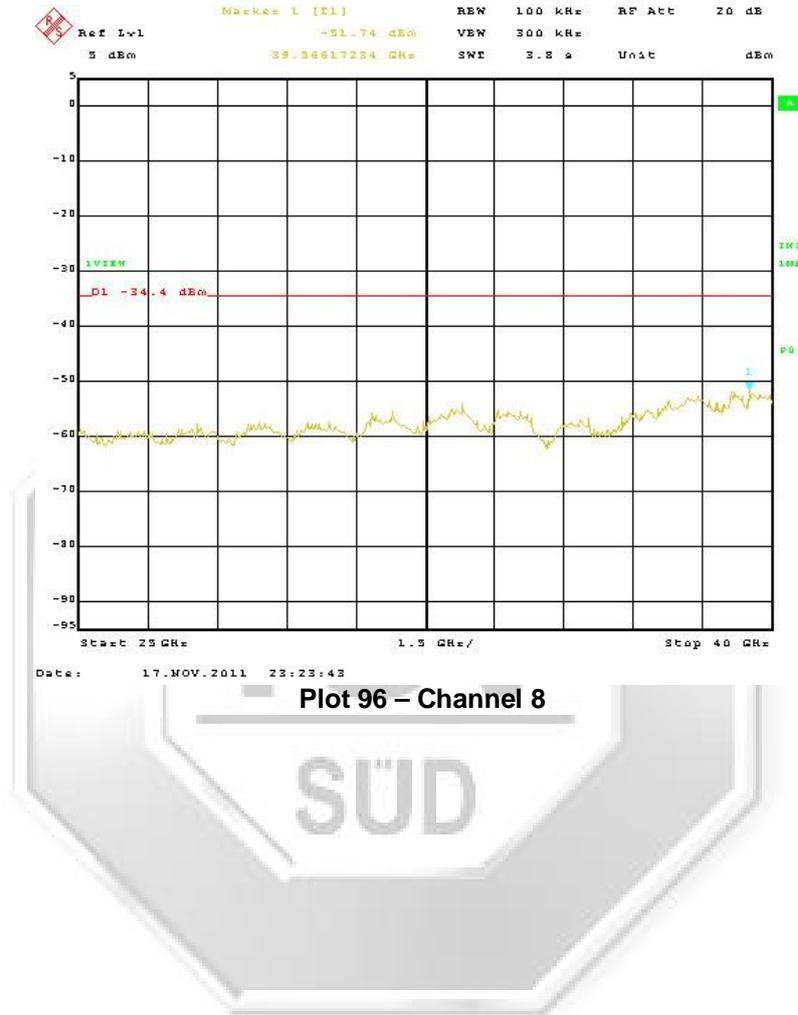


Plot 95 – Channel 8



RF CONDUCTED SPURIOUS EMISSIONS TEST

RF Conducted Spurious Emissions Plots (SU-HTB550 Antenna 1)





BAND EDGE COMPLIANCE (CONDUCTED) TEST

47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Limits

The EUT shows compliance to the requirements of this section (5.725GHz – 5.850GHz), which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

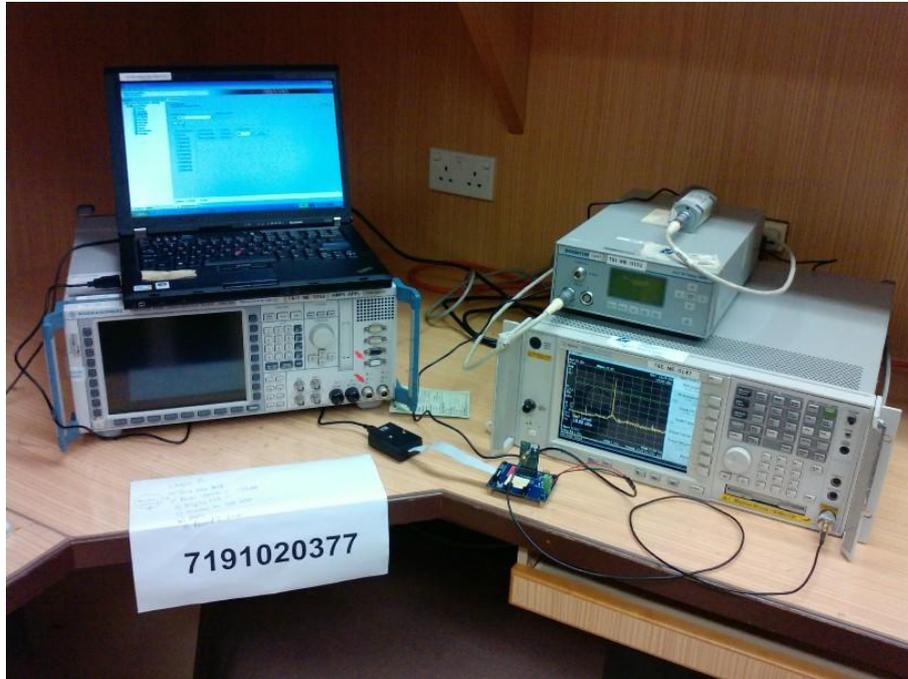
47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 5.725GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 5.850GHz and the any spurious emissions at the band-edge.

BAND EDGE COMPLIANCE (CONDUCTED) TEST



Band Edge Compliance (Conducted) Test Setup

47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Results

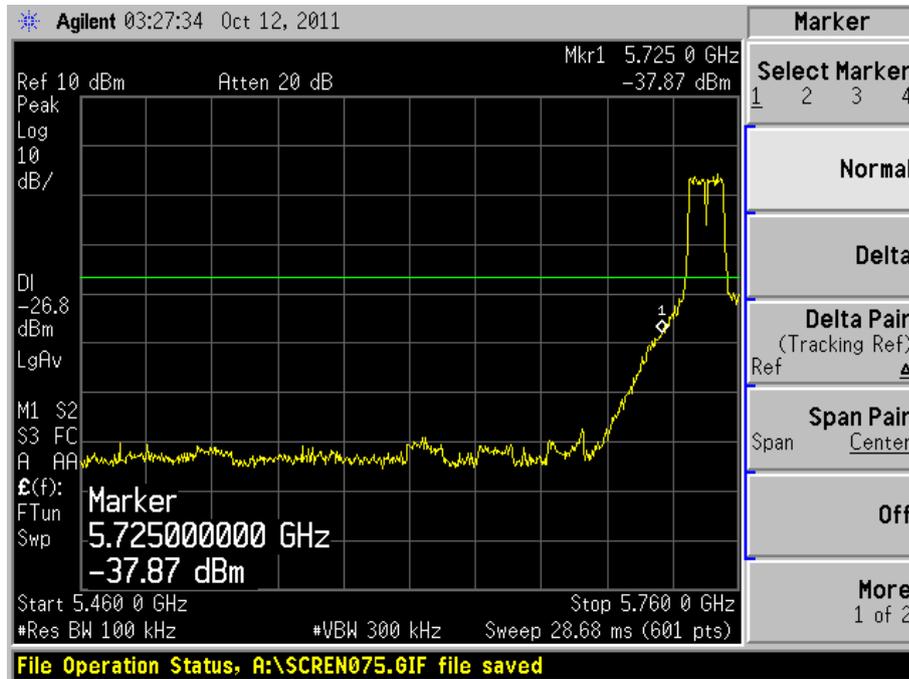
Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	97 - 98	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

No significant signal was found and they were below the specified limit.



BAND EDGE COMPLIANCE (CONDUCTED) TEST

Band Edge Compliance (Conducted) Plots



Plot 97 – Lower Band Edge at 5.725GHz



Plot 98 – Upper Band Edge at 5.850GHz



BAND EDGE COMPLIANCE (RADIATED) TEST

47 CFR FCC Part 15.247(d) Band Edge Compliance (Radiated) Limits

The EUT shows compliance to the requirements of this section (5.725GHz – 5.850GHz), which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power. In addition, radiated emissions which fall in the restricted bands shall comply to the radiated emission limits specified in 15.209.

47 CFR FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver – ESI1	ESI40	100010	06 Jun 2012
EMCO Horn Antenna(1GHz-18GHz) – H15 (Ref)	3115	0003-6008	20 May 2012
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	08 Oct 2012
ETS Horn Antenna (18GHz-40GHz)(Ref)	3116	0004-2474	19 Apr 2012
Toyo Preamplifier (26.5GHz-40GHz)	HAP26-40W	00000005	19 Apr 2012
Agilent EMC Analyzer (9kHz-26.5GHz)	E7405A	US40240195	16 Mar 2012

47 CFR FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz to show compliance of spurious at band edges are at least 20dB below the carriers. For restricted band spurious at band edges, peak and average measurement plots were taken using the following setting:
 - a. Peak Plot:
RBW = VBW = 1MHz
 - b. Average Plot
RBW = 1MHz, VBW = 10Hz
4. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.247(d) Band Edge Compliance (Radiated) Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 5.725GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 5.850GHz and the any spurious emissions at the band-edge.

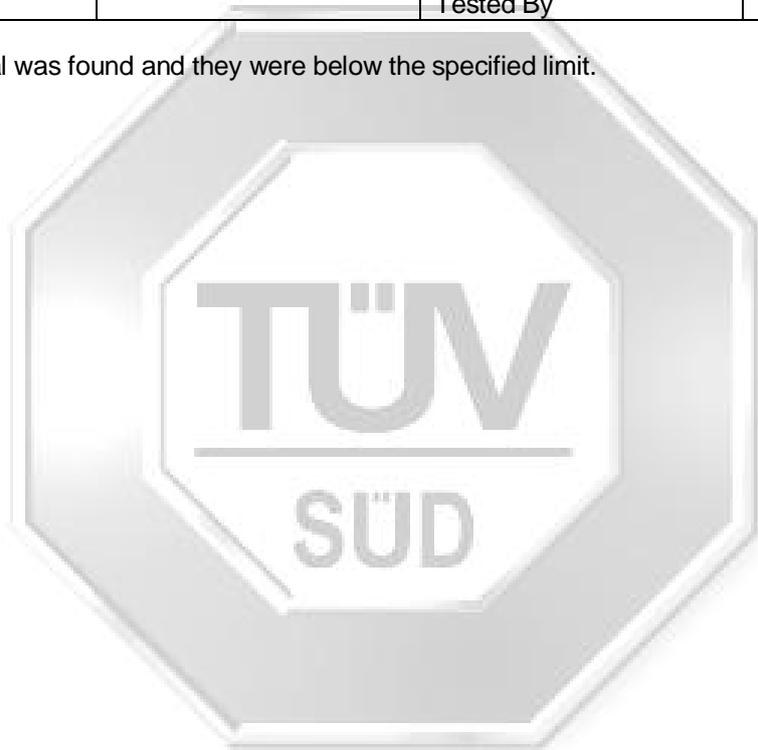


BAND EDGE COMPLIANCE (RADIATED) TEST

47 CFR FCC Part 15.247(d) Band Edge Compliance (Radiated) Results

Test Input Power	110V 60Hz	Temperature	24°C
Attached Plots	99 - 100	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

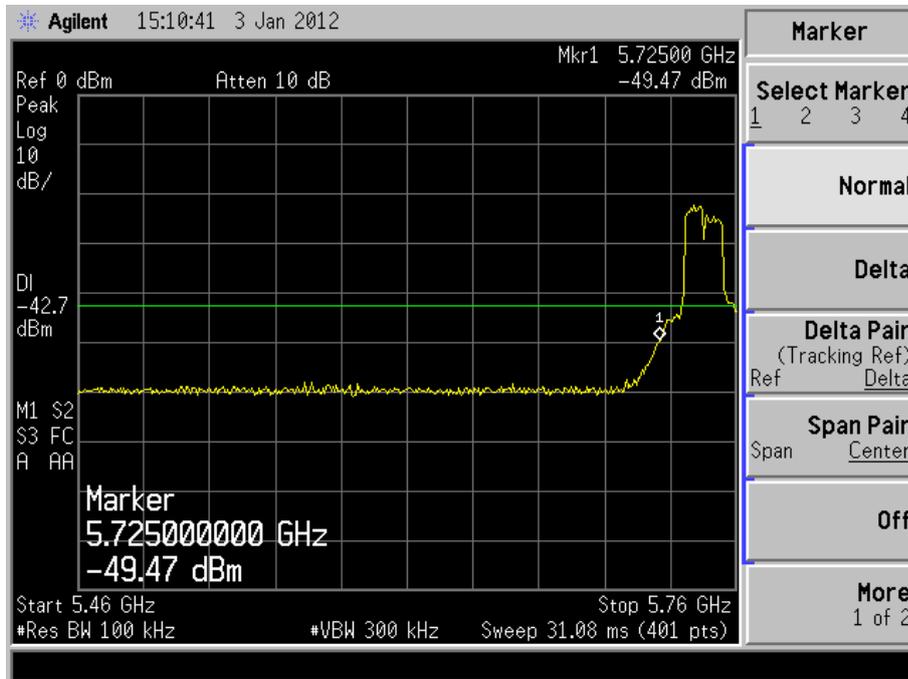
No significant signal was found and they were below the specified limit.



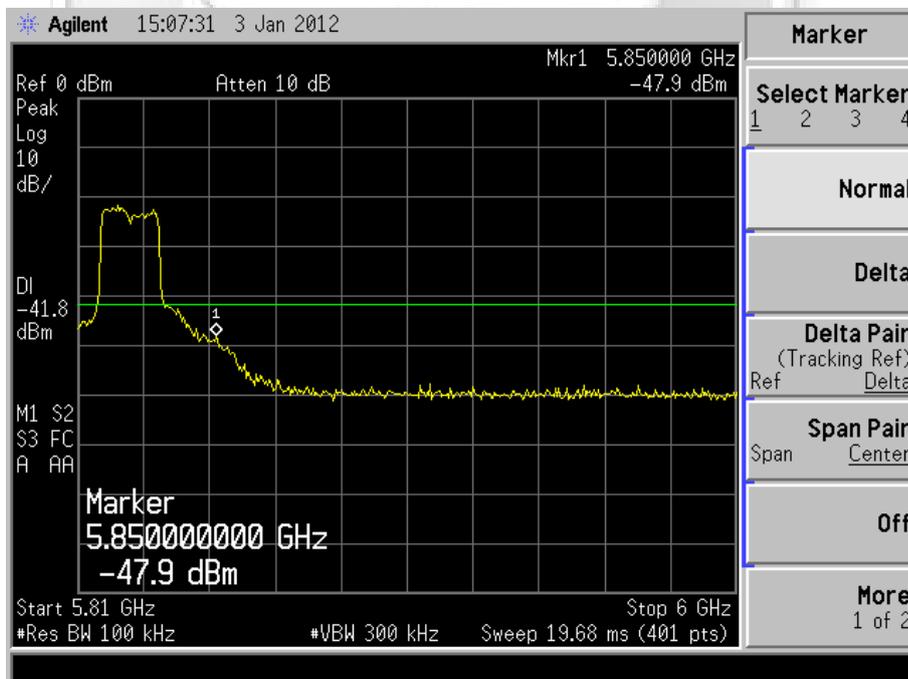


BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (20dB Delta from Carrier at Band Edge)



Plot 99 – Lower Band Edge at 5.725GHz



Plot 100 – Upper Band Edge at 5.850GHz



PEAK POWER SPECTRAL DENSITY TEST

47 CFR FCC Part 15.247(e) Peak Power Spectral Density Limits

The EUT shows compliance to the requirements of this section, which states the peak power spectral density conducted from the intentional radiator (EUT) to the antenna shall not be greater than 8dBm (6.3mW) in any 3kHz band during any time interval of continuous transmission.

47 CFR FCC Part 15.247(e) Peak Power Spectral Density Test Instrumentation

Instrument	Model	S/No	Cal Due Date
Agilent E4440A Spectrum Analyzer	E4440A	MY45304764	10 Jun 2012

47 CFR FCC Part 15.247(e) Peak Power Spectral Density Test Setup

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 3kHz and 10kHz.
5. All other supporting equipment were powered separately from another filtered mains.

47 CFR FCC Part 15.247(e) Peak Power Spectral Density Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at Channel 8 (5.825GHz) with specified modulation and data rate.
2. The sweep time of the spectrum analyser was set to the value of the ratio of the frequency span divided by the RBW.
3. The peak power density of the transmitting frequency was detected and recorded.

PEAK POWER SPECTRAL DENSITY TEST



Peak Power Spectral Density Test Setup

47 CFR FCC Part 15.247(e) Peak Power Spectral Density Results

Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	101	Relative Humidity	60%
Antenna	0	Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
8	5.825	0.01827	6.3

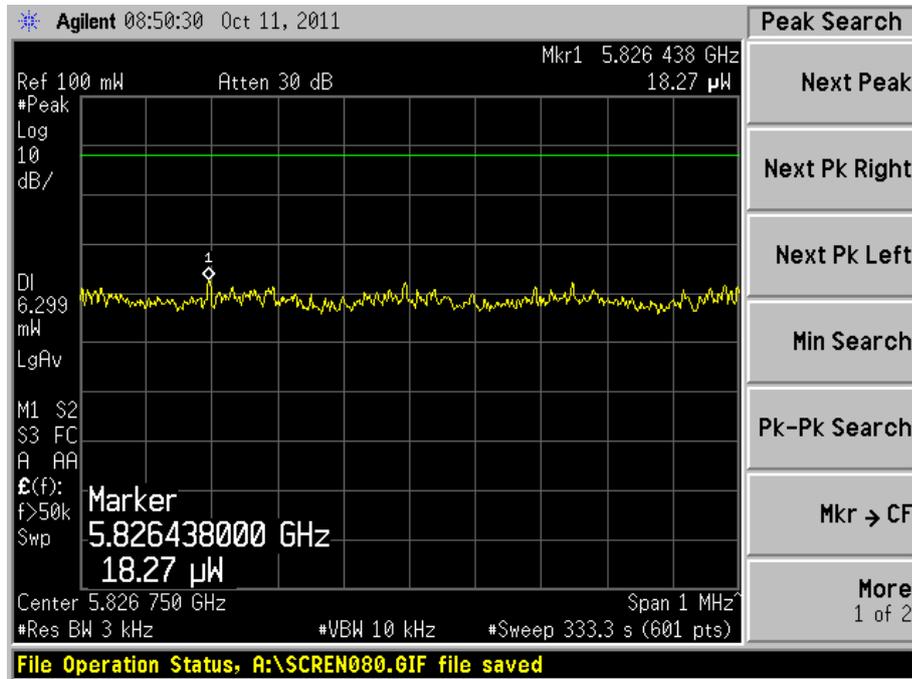
Test Input Power	110V 60Hz	Temperature	23°C
Attached Plots	102	Relative Humidity	60%
Antenna	1	Atmospheric Pressure	1030mbar
		Tested By	Foo Kai Maun

Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
8	5.825	0.02525	6.3

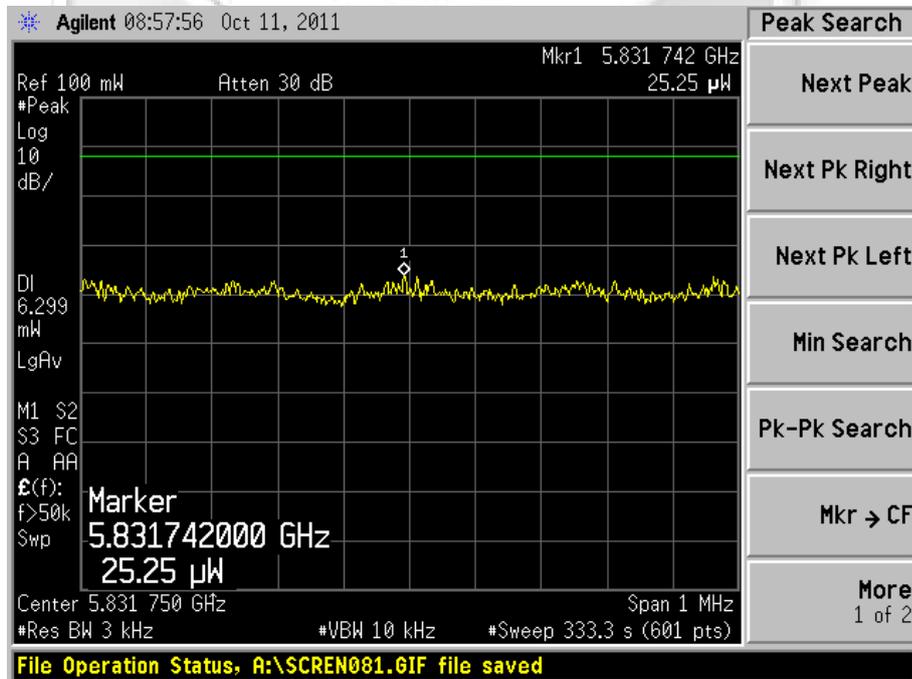


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots



Plot 101 – Channel 8 (Antenna 0)



Plot 102 – Channel 8 (Antenna 1)



MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST

47 CFR FCC Part 1.1310 Maximum Permissible Exposure (MPE) Limits

The EUT shows compliance to the requirements of this section, which states the MPE limits for general population / uncontrolled exposure are as shown below:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (min)
0.3 - 1.34	614	1.63	100 ^{Note 2}	30
1.34 - 30	824 / f	2.19 / f	180 / f ² ^{Note 2}	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f / 1500	30
1500 - 100000	-	-	1.0	30
Notes				
1. f = frequency in MHz				
2. Plane wave equivalent power density				

47 CFR FCC Part 1.1310 Maximum Permissible Exposure Computation

The power density at 20cm distance was computed from the following formula:

$$S = (30GP) / (377d^2)$$

where

- S = Power density in W/m²
- P = 0.03123 W
- d = Test distance at 0.2m
- G = Numerical isotropic gain, 1.59 (2.0dBi)

Substituting the relevant parameters into the formula:

$$S = [(30GP) / 377d^2]$$

$$= 0.0988 \text{ W/m}^2$$

$$= 0.0099 \text{ mW/cm}^2$$

∴ The power density of the EUT at 20cm distance is 0.0099 mW/cm² based on the above computation and found to be lower than the power density limit of 1.0mW/cm².



Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.
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5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011





FCC LABEL & POSITION

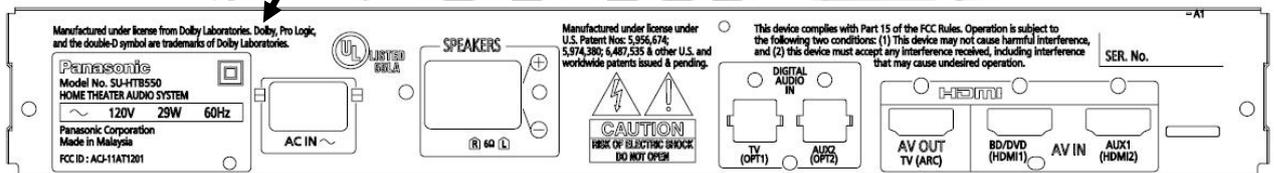
ANNEX B

Labelling requirements per Section 2.925 & 15.19

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



Sample Label



Physical Location of FCC Label on EUT



**USER MANUAL TECHNICAL DESCRIPTION BLOCK
& CIRCUIT DIAGRAM**

ANNEX C

