TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**10039979 001**	**Seite 1 von 105** *Page 1 of 105*
Auftraggeber: *Client:*	Lite-On Technology Corporation 90, Chien I Road, Chung Ho, Taipei Hsien 203, Taiwan, R.O.C. 光寶科技股份有限公司, 臺北市內湖區瑞光路 392 號 22 樓	
Gegenstand der Prüfung: Test item:	802.11 a/b/g/n, 2.4G/5G 1T1R Wireless+BT Module	
Bezeichnung: *Identification:*	WCBN603MH	**Serien-Nr.:** *Serial No.:* N/A
Wareneingangs-Nr.: *Receipt No.:*	TPE81101	**Eingangsdatum:** *Date of receipt:* 2012-12-20
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is ok for testing and not damaged	
Prüfort: *Testing location:*	**TÜV Rheinland Taiwan Ltd.** 11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105 Taiwan **FCC Registration No.: 365730**	
Prüfgrundlage: *Test specification:*	**FCC CFR47 Part 15 Subpart E: 2010** **ANSI C63.4:2003, FCC KDB-789033** **NCC LP0002: 2011-Jun**	
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*	
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Taiwan Ltd.** **11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.**	

geprüft/ *tested by:*

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*
2013-1-23	Arvin Ho/Department Manager	

kontrolliert/ *reviewed by:*

Datum *Date*	Name/Stellung *Name/Position*	Unterschrift *Signature*
2013-01-28	Rene Charton/Senior Project Manager	

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

TEST SUMMARY

5.1.1 802.11A/N BAND I

5.1.1.1 26 DB BANDWIDTH
RESULT: Passed

5.1.1.2 TRANSMIT OUTPUT POWER
RESULT: Passed

5.1.1.3 POWER EXCURSION
RESULT: Passed

5.1.1.4 POWER SPECTRAL DENSITY
RESULT: Passed

5.1.1.5 CONDUCTED SPURIOUS EMISSIONS
RESULT: Passed

5.1.1.6 SPURIOUS EMISSION AND FREQUENCY BAND EDGE
RESULT: Passed

5.1.2 802.11A/N BAND II

5.1.2.1 26 DB BANDWIDTH
RESULT: Passed

5.1.2.2 TRANSMIT OUTPUT POWER
RESULT: Passed

5.1.2.3 POWER EXCURSION
RESULT: Passed

5.1.2.4 POWER SPECTRAL DENSITY
RESULT: Passed

5.1.2.5 CONDUCTED SPURIOUS EMISSIONS
RESULT: Passed

5.1.2.6 SPURIOUS EMISSION AND FREQUENCY BAND EDGE
RESULT: Passed

5.1.3 802.11A/N BAND III

5.1.3.1 26 DB BANDWIDTH
RESULT: Passed

5.1.3.2 TRANSMIT OUTPUT POWER
RESULT: Passed

5.1.3.3 POWER EXCURSION
RESULT: Passed

5.1.3.4 POWER SPECTRAL DENSITY
RESULT: Passed

5.1.3.5 CONDUCTED SPURIOUS EMISSIONS
RESULT: Passed

5.1.3.6 SPURIOUS EMISSION AND FREQUENCY BAND EDGE
RESULT: Passed

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: Photo
(File:10039979APPENDIX1)
Appendix 2: Test Result of Radiated Emissions
(File:10039979APPENDIX2)

Test Specifications
The following standards were applied (in bold: product standards, otherwise: basic standards).

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15 Subpart E: 2010 ANSI C63.4:2003, FCC KDB-789033 NCC LP0002

2. Test Sites

2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC Registration No.: 365730
TAF Accredited NCC Test Lab. No.:0759
TAF ISO 17025 Certification effective periods: 2010-Jul-1st to 2013-Jun-30th

Testing Laboratory
0759

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	R&S	ESCI 7	1166.5950K07-100797-Pt	20-Dec-13
Bilog Antenna	TESEQ	CBL6111D	29802	29-Jun-13
Pre-Amplifier	HP	8447F	2805A03335	14-Sep-13
Spectrum Analyzer	R&S	FSV 40	100921	13-Dec-13
Horn Antenna (1GHz~18GHz)	COM-POWER	AHA118	701251	28-Sep-13
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	2-Nov-13
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	14-Sep-13
Preamplifier (18 GHz -40 GHz)	COMPOWER	PAM-840	461257	17-Sep-13
Power meter	R&S	NRVD	100439	27-Mar-13
Power sensor	R&S	NRV-Z1	100013	27-Mar-13
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	13-May-13
Signal Generator	R&S	SMU200	104260	13-Aug-13
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	28-Sep-13

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1 dB
Adjacent channel power	± 3 dB
Radiated emission of transmitter, valid up to 40 GHz	± 6 dB
Radiated emission of receiver, valid up to 40 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

"The tested sample is a Combo module, which is designed to work mount on other device. The module has two antenna ports, and it is has two work functions (Bluetooth and Wireless function)."
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Combo module
Brand Name	Lite-On Technology Corporation
FCC ID	PPQ-WCBN603MH
Type Designation	WCBN603MH
Operating Frequency	5150 MHz ~ 5700 MHz
Operation Voltage	3.3Vdc (Via Mini PCI-E port)
Modulation	OFDM,DSSS
Antenna gain	3.46 dBi
Antenna Type	Monopole (Chant Sincere: 341AWAE11111004)

Table 5: Frequency Channel information

Band	CH	Frequency (MHz)
802.11a Band I	36	5180.0
802.11a Band I	44	5220.0
802.11a Band I	48	5240.0
802.11a Band II	52	5260.0
802.11a Band II	56	5280.0
802.11a Band II	64	5320.0
802.11a Band III	100	5500.0
802.11a Band III	120	5600.0
802.11a Band III	140	5700.0
802.11n (HT20) Band I	36	5180.0
802.11n (HT20) Band I	44	5220.0
802.11n (HT20) Band I	48	5240.0
802.11n (HT20) Band II	52	5260.0
802.11n (HT20) Band II	56	5280.0
802.11n (HT20) Band II	64	5320.0
802.11n (HT20) Band III	100	5500.0
802.11n (HT20) Band III	120	5600.0
802.11n (HT20) Band III	140	5700.0
802.11n (HT40) Band I	38	5190.0
802.11n (HT40) Band I	46	5230.0
802.11n (HT40) Band II	54	5270.0
802.11n (HT40) Band II	62	5310.0
802.11n (HT40) Band III	102	5510.0
802.11n (HT40) Band III	118	5590.0
802.11n (HT40) Band III	134	5670.0

3.3 Independent Operation Modes

The basic operation modes are:

A. Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Receiving
C. Standby
D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- Circuit Diagram
- PCB Layout
- Instruction Manual
- Photo Document
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 4. All testing were performed according to the procedures in ANSI C63.10: 2009 and DA 00-705 of March 30, 2000.

Full test was applied on all test modes, but only worst case was shown.

Band	Date Rate or Sub-test	Worst
802.11a	6M	
802.11a	54M	V
802.11a20	MCS0	
802.11a20	MCS7	V
802.11a40	MCS0	
802.11a40	MCS7	V

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Kind of Equipment	Manufacturer	Model Name	S/N
Laptop	MSI	MSI4532 (CX420MX)	CX420 MX-233TWK 1008000096

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

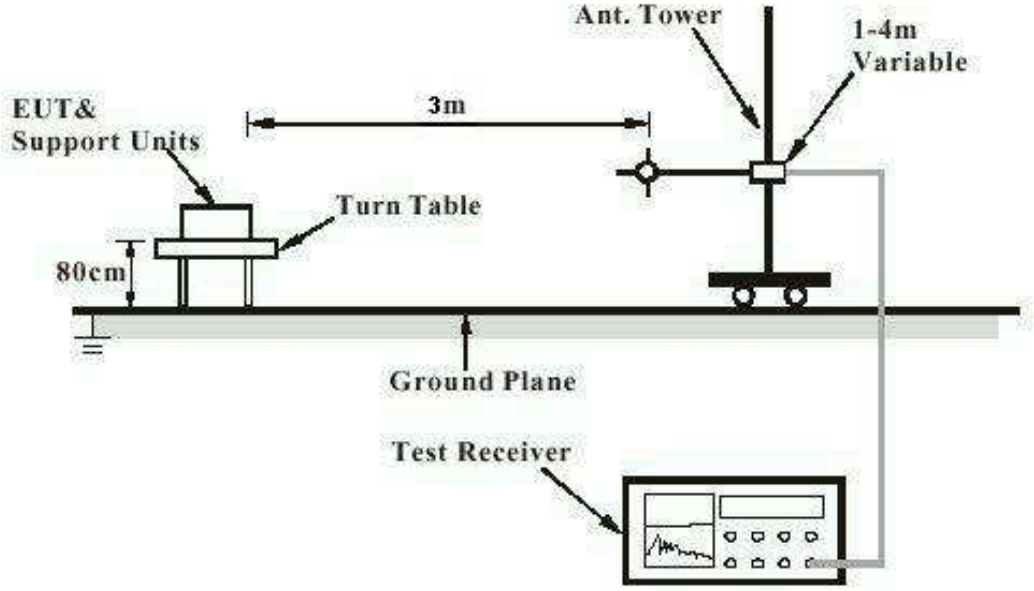


Diagram of Measurement Equipment Configuration for Mains Conduction Measurement

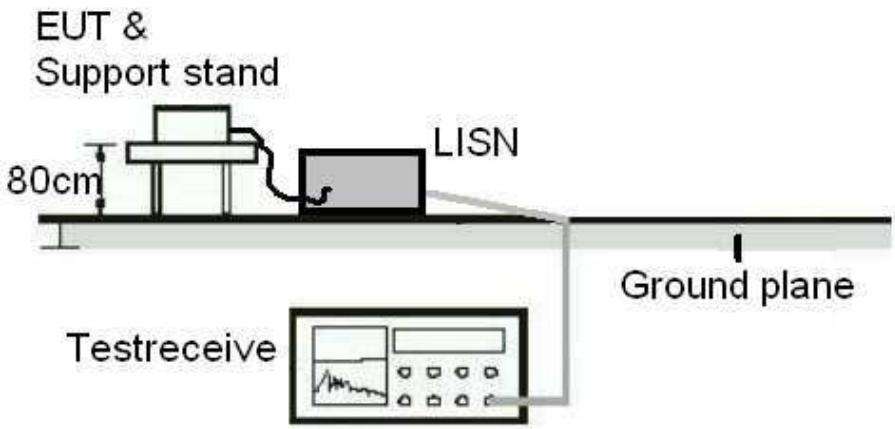
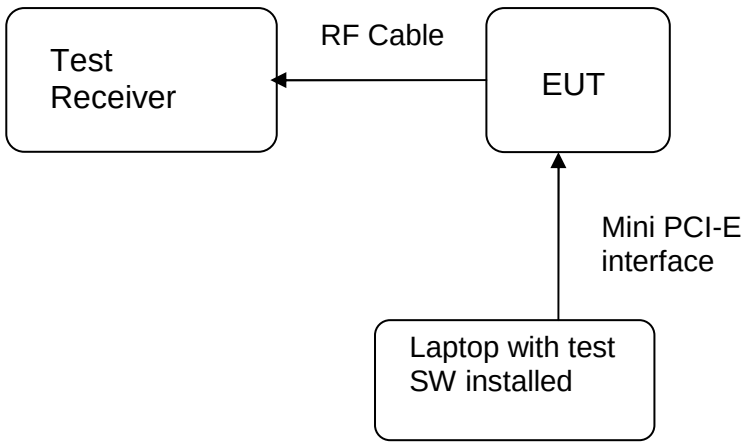


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 802.11a/n Band I

5.1.1.1 26 dB Bandwidth

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

Table 6: Test result of 26dB Bandwidth

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5180	19.537	/	Pass
Mid Channel	5220	19.537	/	Pass
High Channel	5240	19.508	/	Pass

Table 7: Test result of 26dB Bandwidth (HT20)

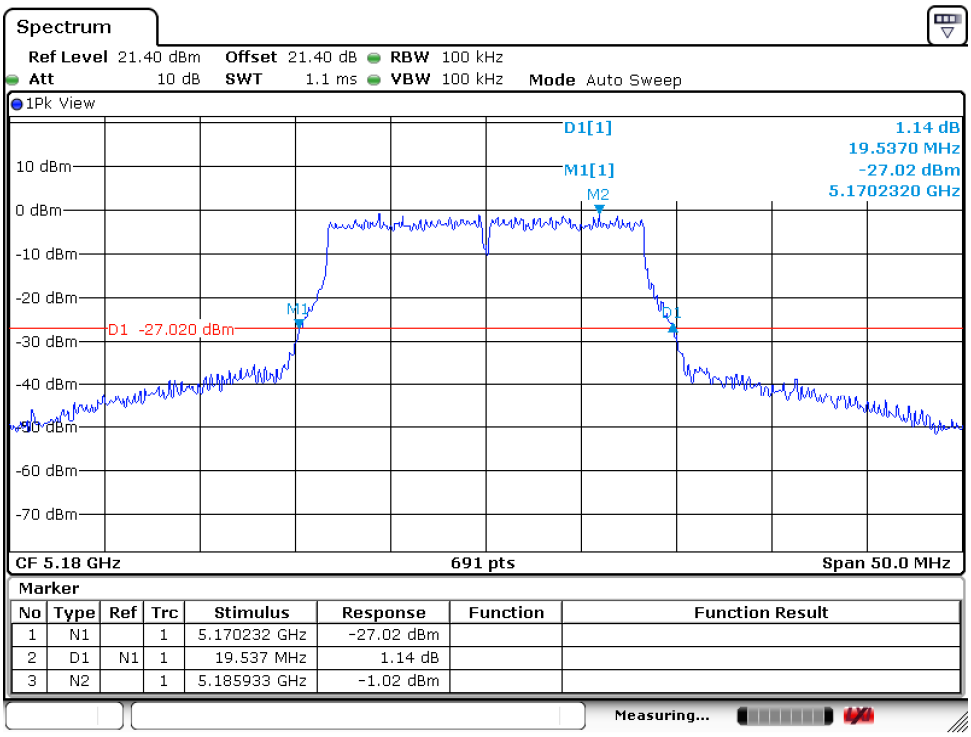
Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5180	19.971	/	Pass
Mid Channel	5220	19.971	/	Pass
High Channel	5240	20.087	/	Pass

Table 8: Test result of 26dB Bandwidth (HT40)

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5190	39.428	/	Pass
High Channel	5230	39.45	/	Pass

Test Plot of 26dB Bandwidth

Low Channel



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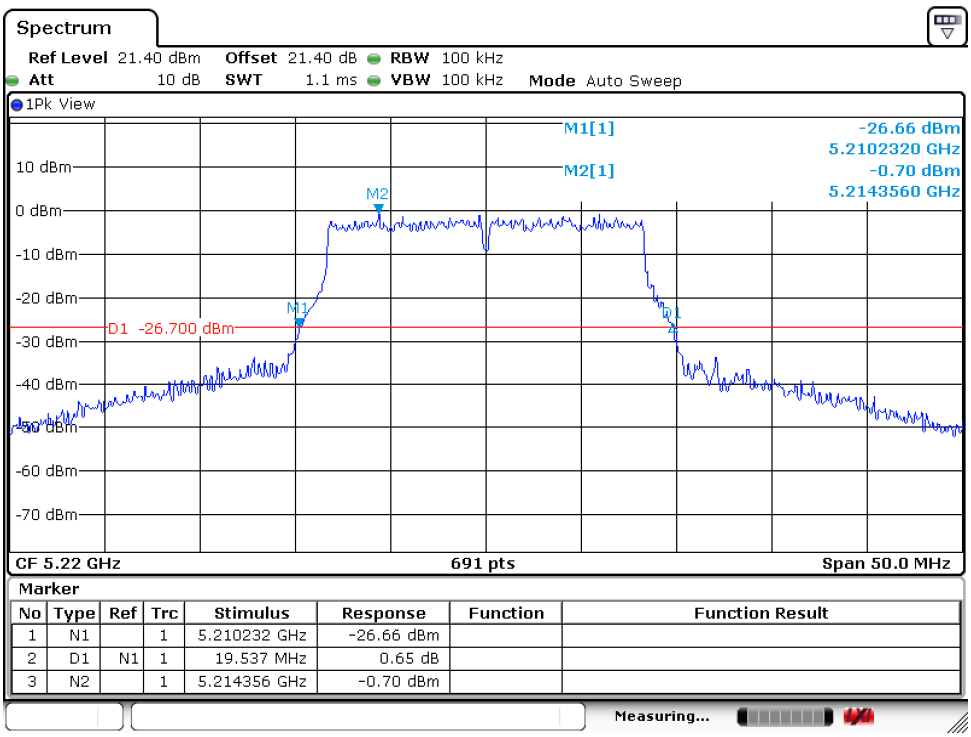
Middle Channel



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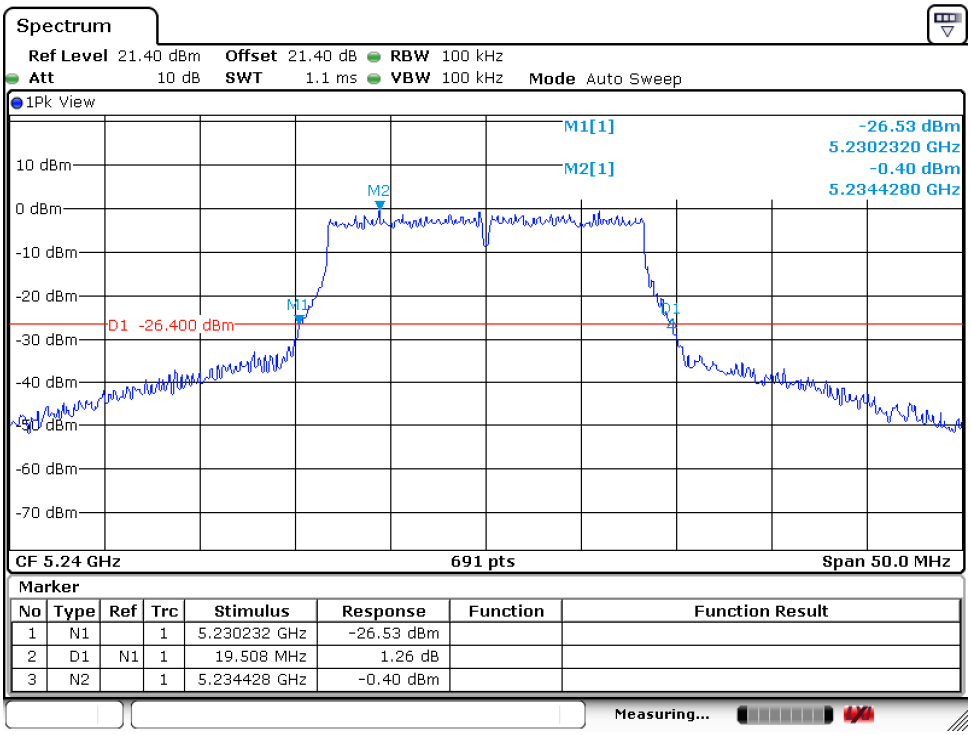
High Channel



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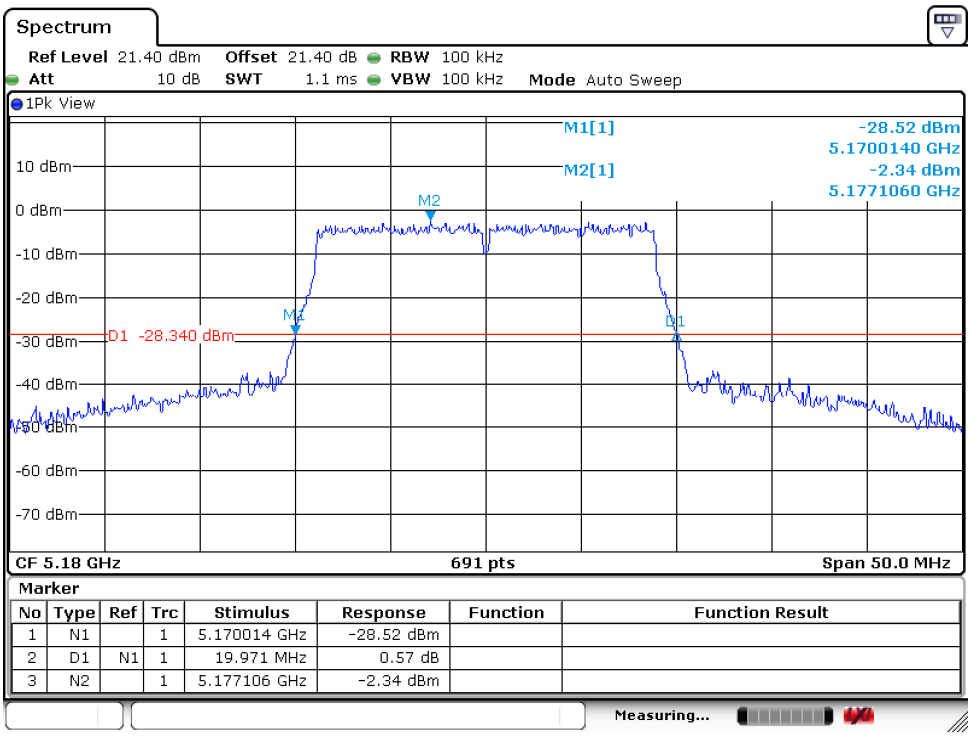
Test Plot of 26dB Bandwidth (HT20)

Low Channel



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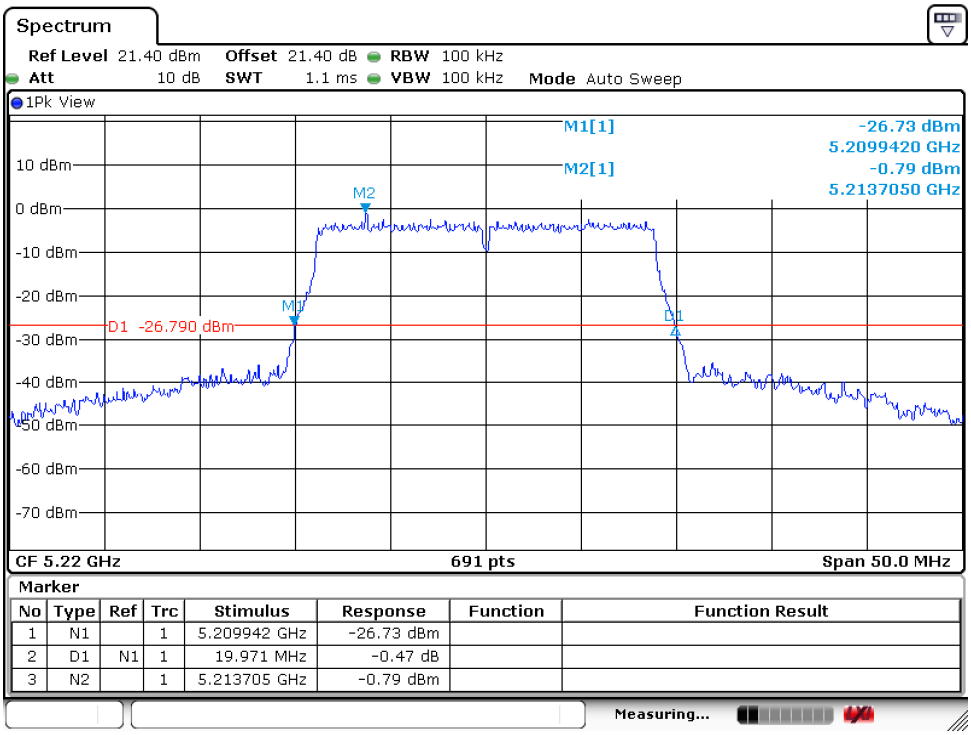
Middle Channel



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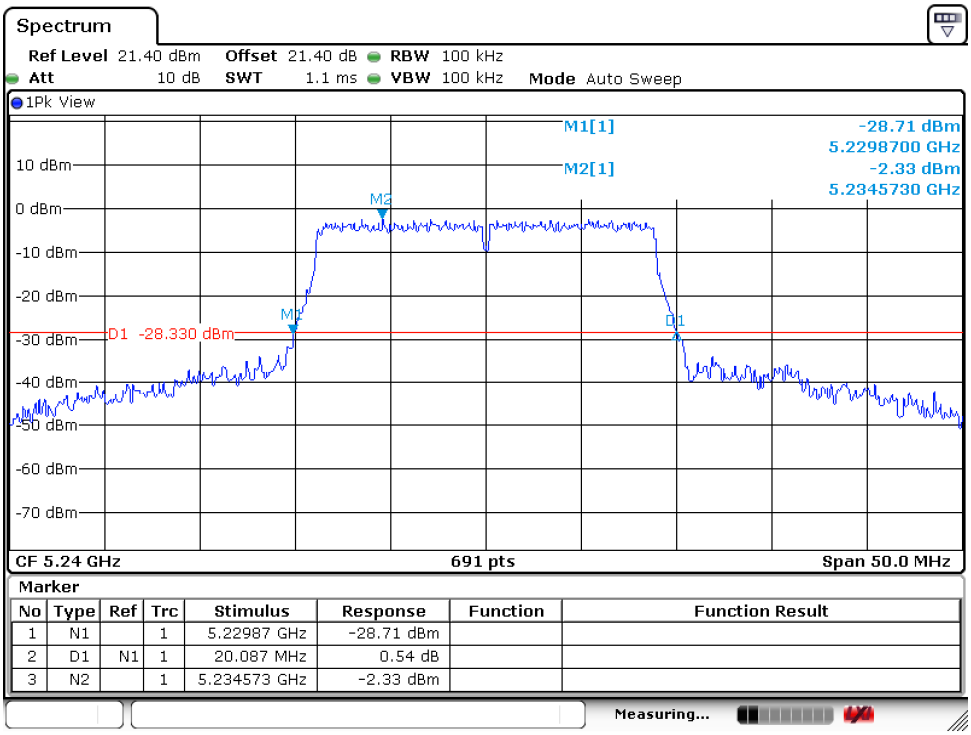
High Channel



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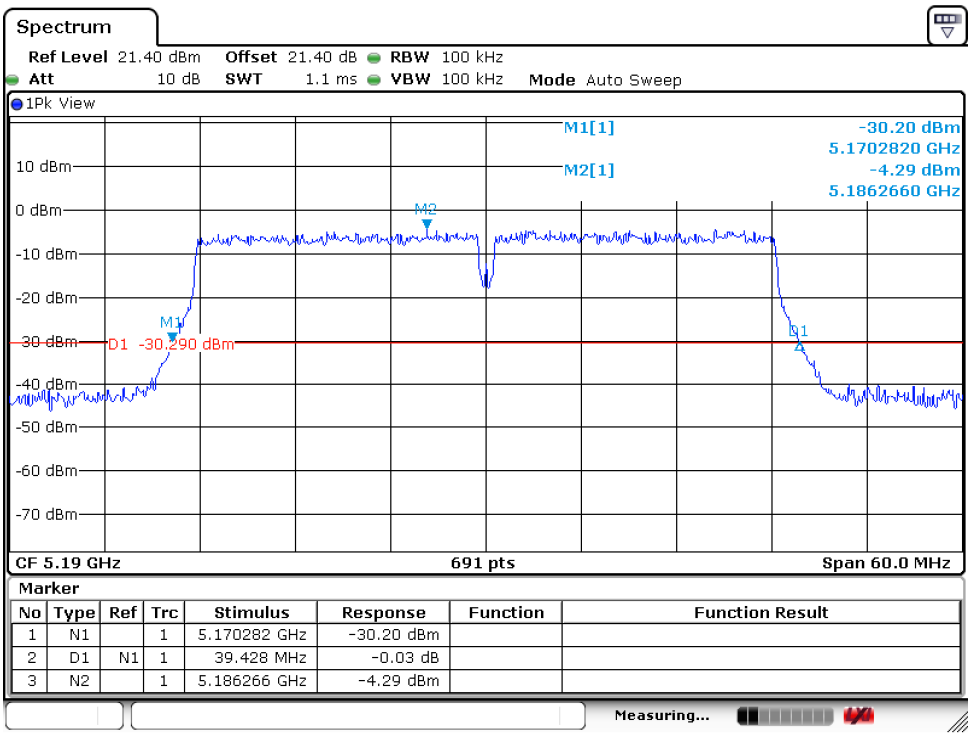
Test Plot of 26dB Bandwidth(HT40)

Low Channel



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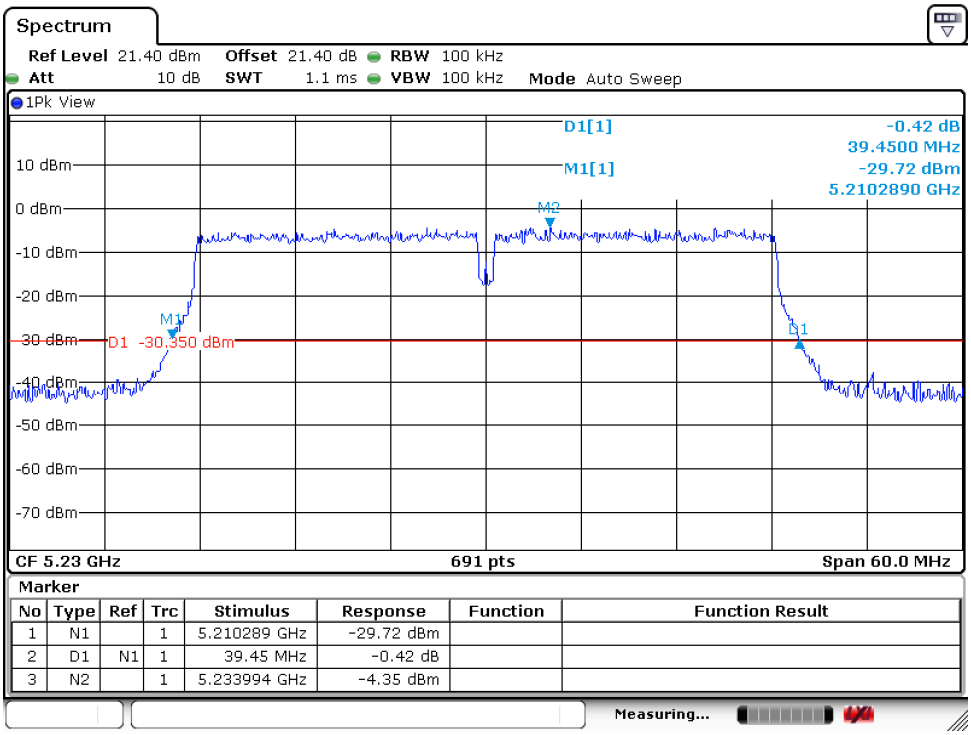
High Channel



Date: 2.JAN.2013 14:37:24

5.1.1.2 Transmit Output Power

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 5.15-5.25 GHz band, 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 26 dB emission bandwidth in MHz. If transmitting antenna sof directional gain greater than 6 dBi are used, both the peak transmit power anjd the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

Table 9: Test result of Transmit Power

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5180	12.76	19.537	16.909	Pass
Mid Channel	5220	13.03	19.537	16.909	Pass
High Channel	5240	12.68	19.508	16.902	Pass

Table 10: Test result of Transmit Power (HT20)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5180	12.99	19.971	17	Pass
Mid Channel	5220	13.04	19.971	17	Pass
High Channel	5240	13.29	20.087	17	Pass

Table 11: Test result of Transmit Power (HT40)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5190	13.05	39.428	17	Pass
High Channel	5230	13.06	39.45	17	Pass

5.1.1.3 Power Excursion

RESULT: **Passed**

Date of testing	:	2013-01-02
Test standard	:	FCC Part 15.407(a)(6), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 12: Test result of Power Excursion

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5180	8.08	13	Pass
Mid Channel	5220	8.15	13	Pass
High Channel	5240	8.25	13	Pass

Table 13: Test result of Power Excursion(HT20)

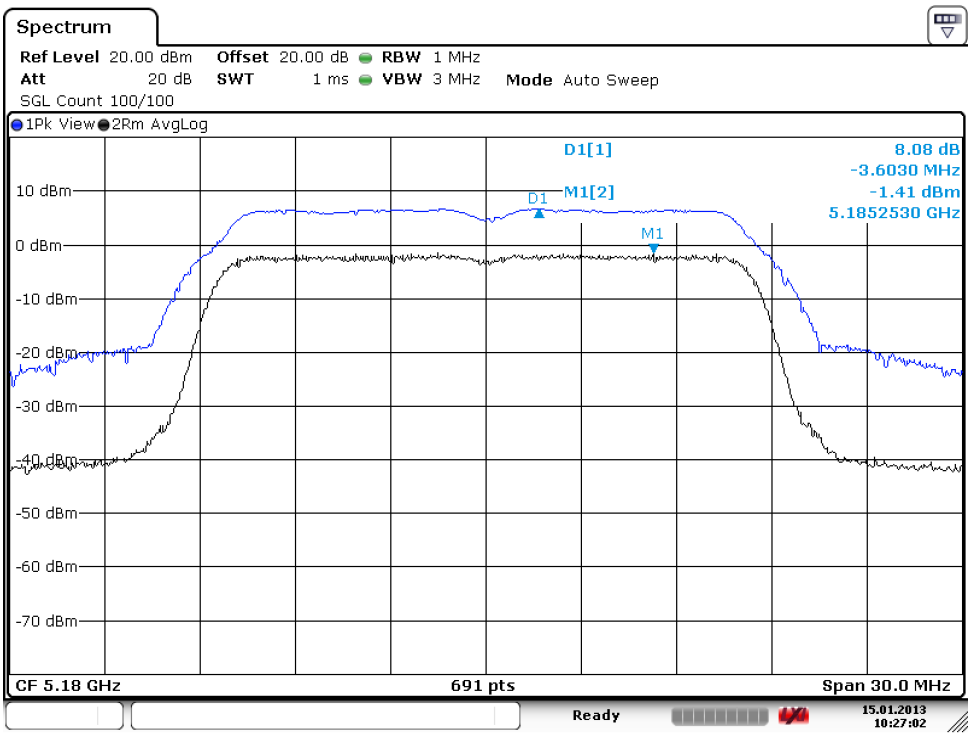
Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5180	8.53	13	Pass
Mid Channel	5220	8.47	13	Pass
High Channel	5240	8.48	13	Pass

Table 14: Test result of Power Excursion(HT40)

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5190	8.38	13	Pass
High Channel	5230	8.33	13	Pass

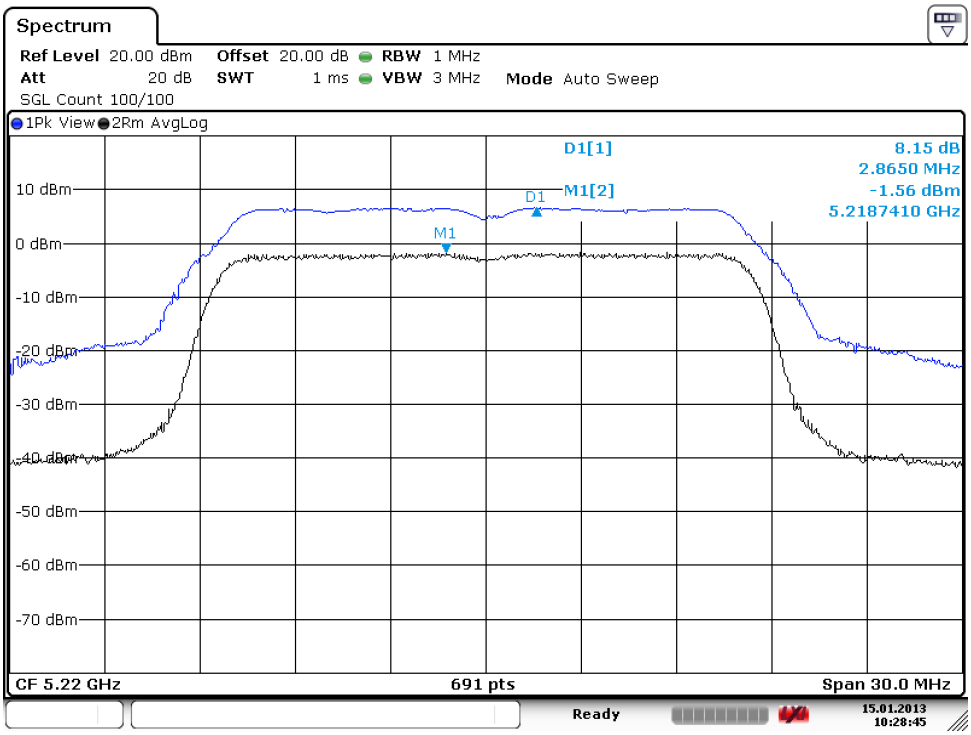
Test Plot of Power Excursion

Low Channel



Date: 15.JAN.2013 10:27:02

Middle Channel



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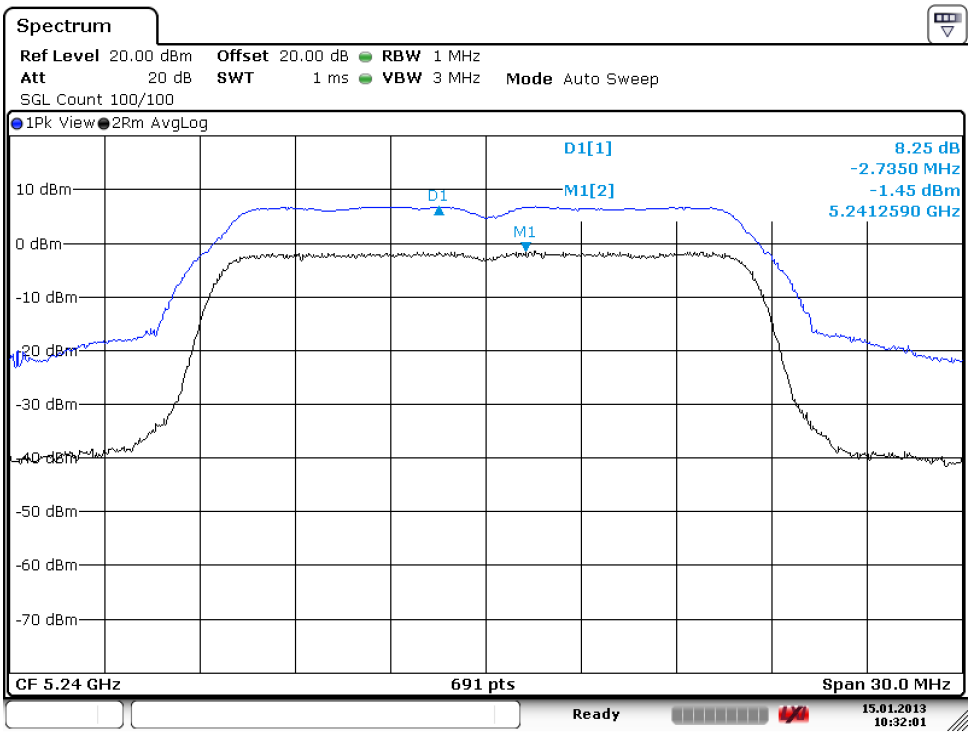
High Channel



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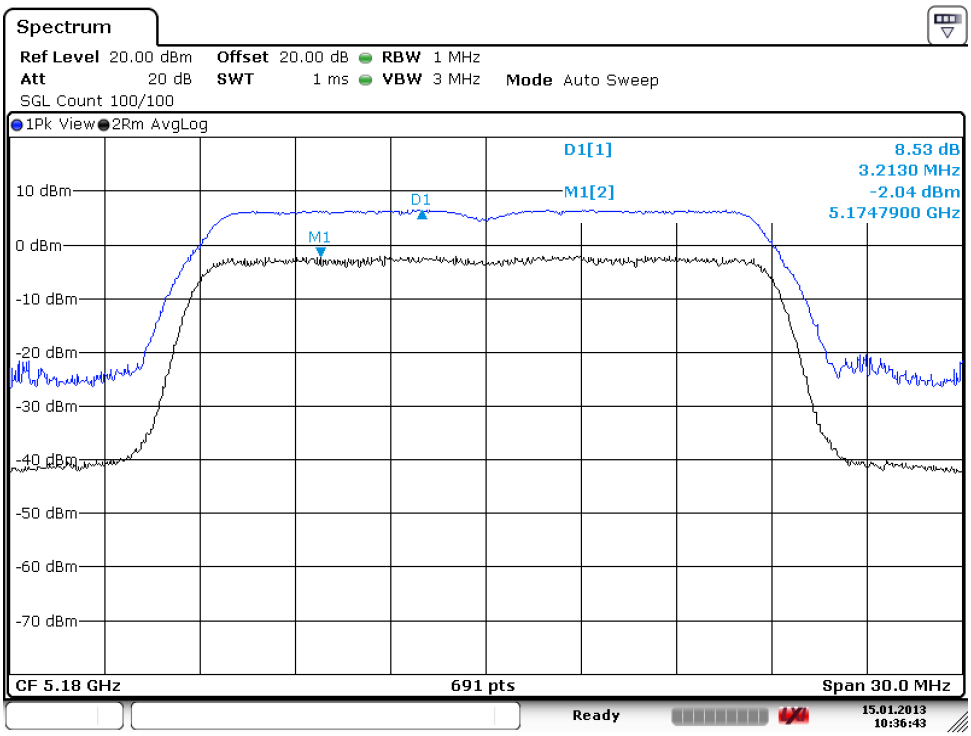
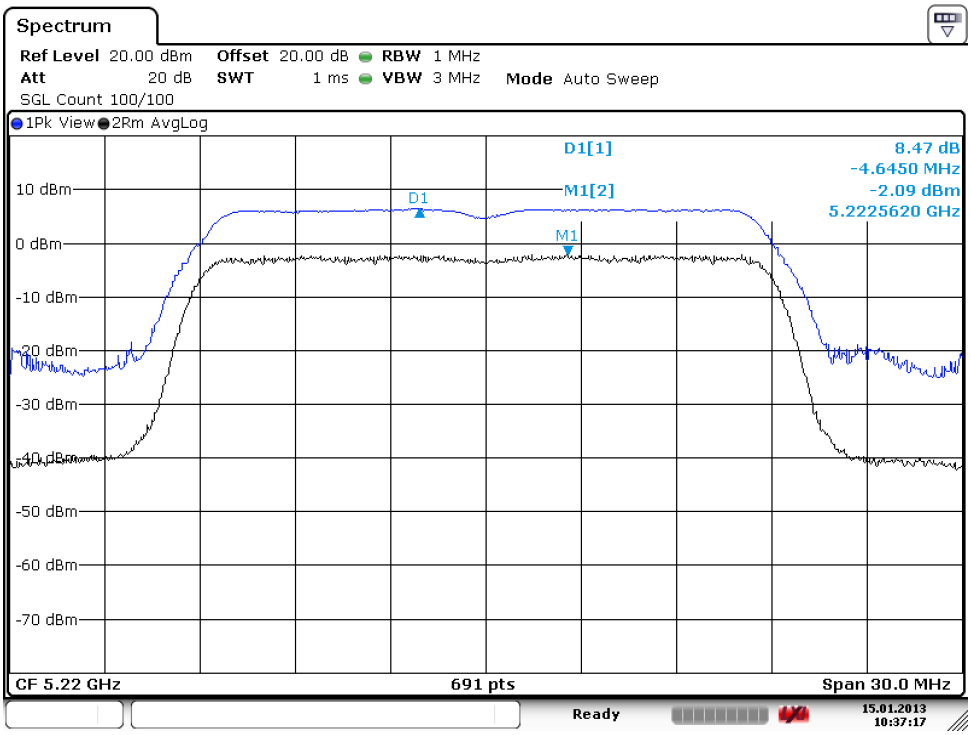
Test Plot of Power Excursion (HT20)

Low Channel



Date: 15.JAN.2013 10:36:43

Middle Channel



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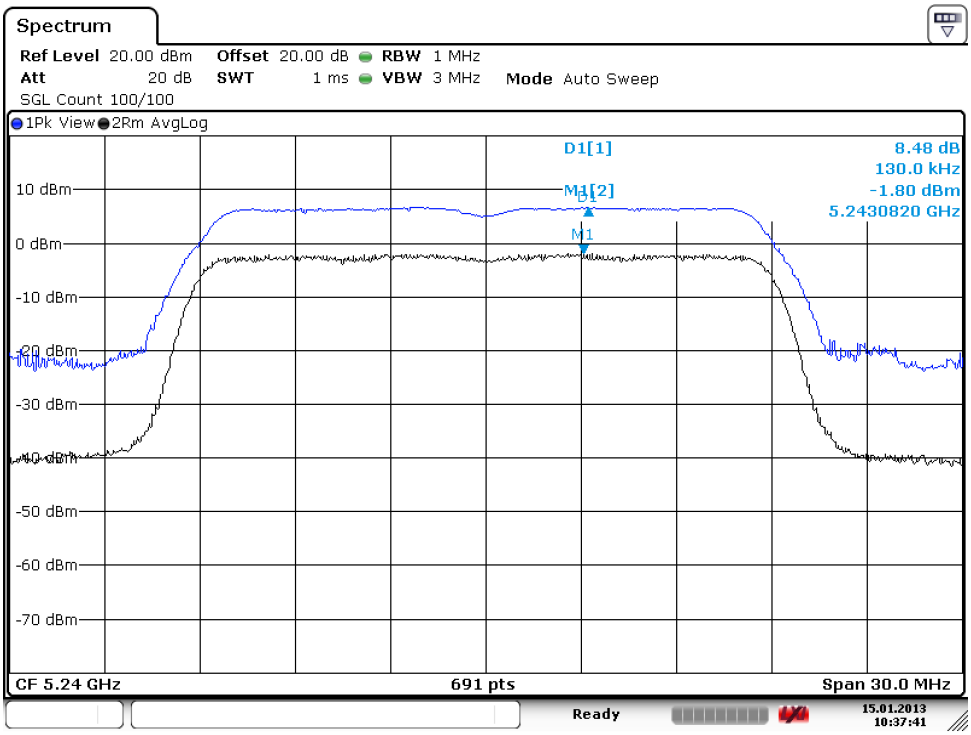
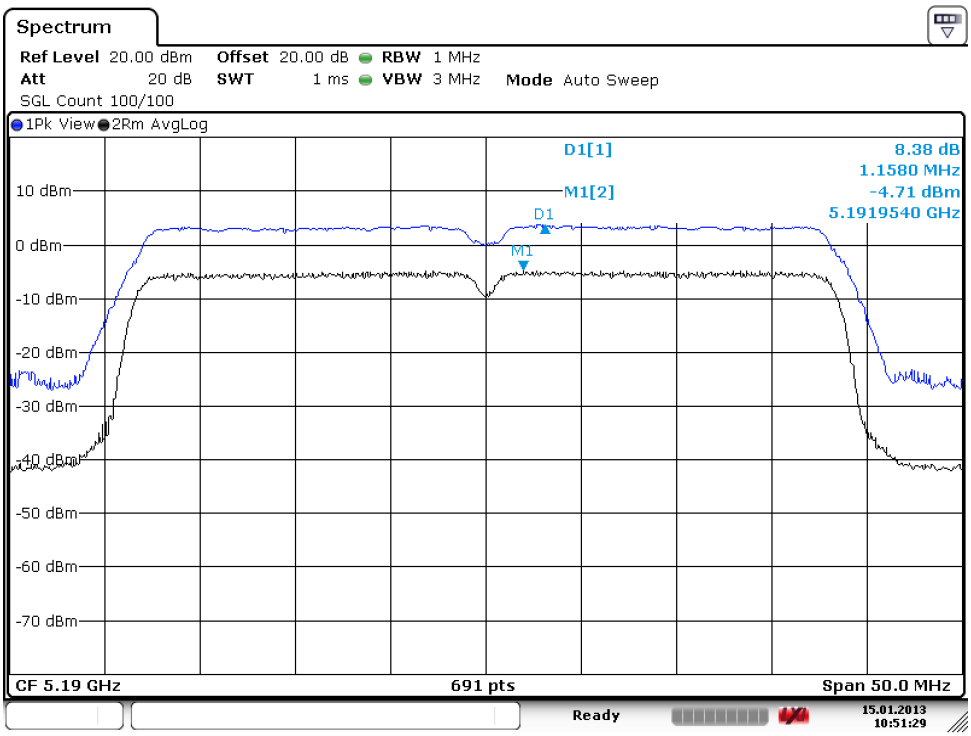
High Channel



Date: 15.JAN.2013 10:37:41

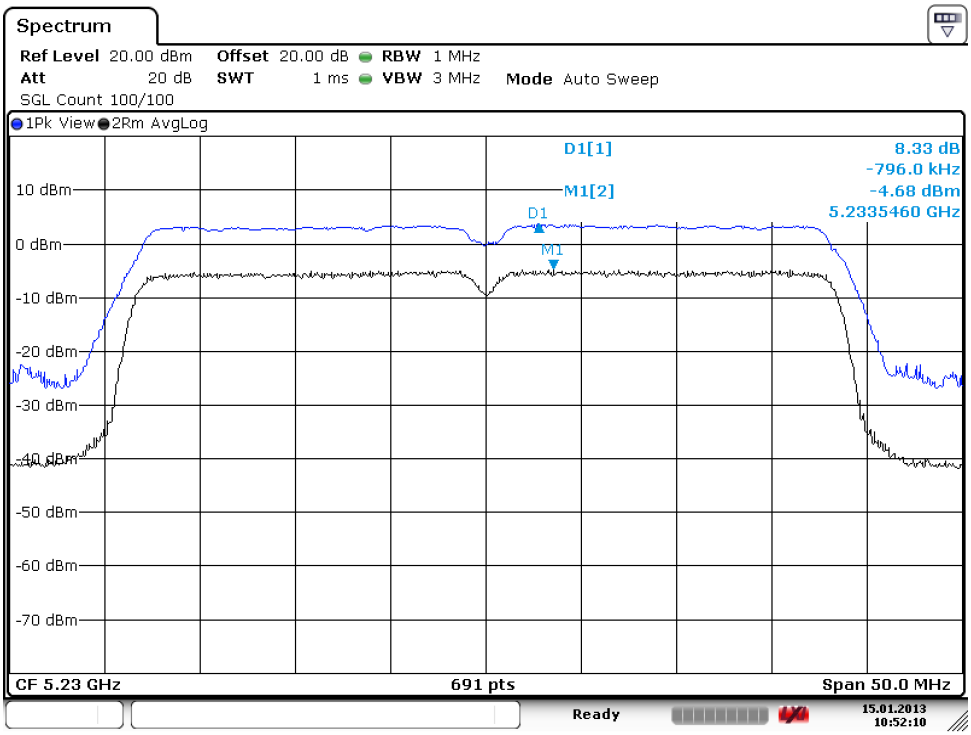
Test Plot of Power Excursion (HT40)

Low Channel



Date: 15.JAN.2013 10:51:29

High Channel



Date: 15.JAN.2013 10:52:10

5.1.1.4 Power Spectral Density

RESULT: **Passed**

Date of testing	:	2013-01-02
Test standard	:	FCC Part 15.407(a)(1),(5), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 15: Test result of Power Spectral Density

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5180	-14.99	4	Pass
Mid Channel	5220	-14.94	4	Pass
High Channel	5240	-14.89	4	Pass

Table 16: Test result of Power Spectral Density (HT20)

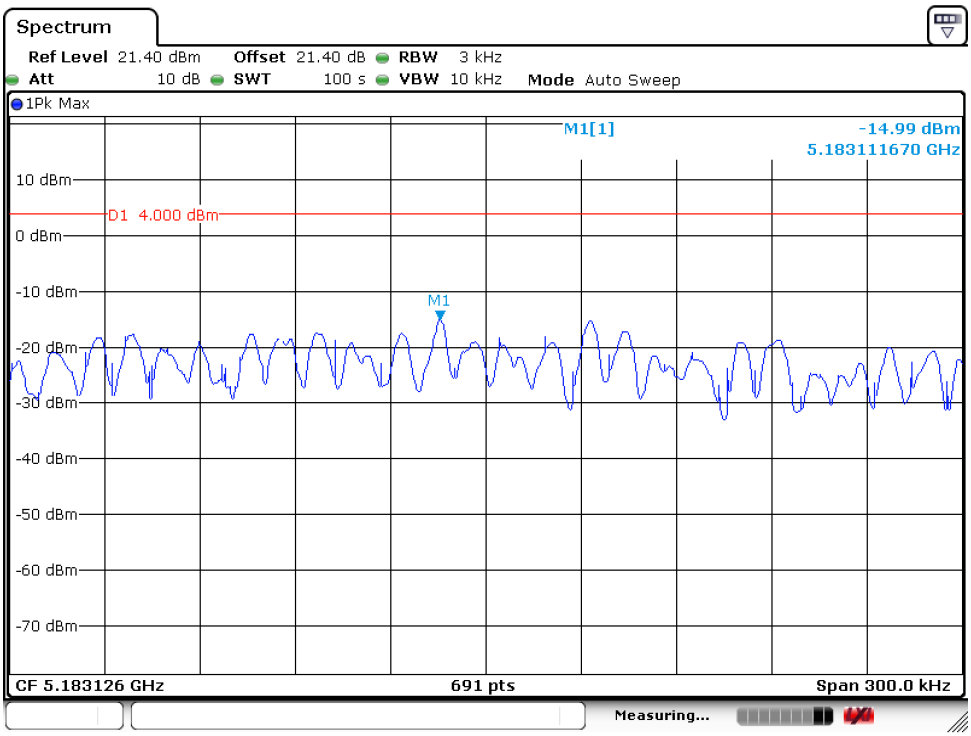
Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5180	-16.4	4	Pass
Mid Channel	5220	-16.41	4	Pass
High Channel	5240	-16.08	4	Pass

Table 17: Test result of Power Spectral Density (HT40)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5190	-18.6	4	Pass
High Channel	5230	-17.43	4	Pass

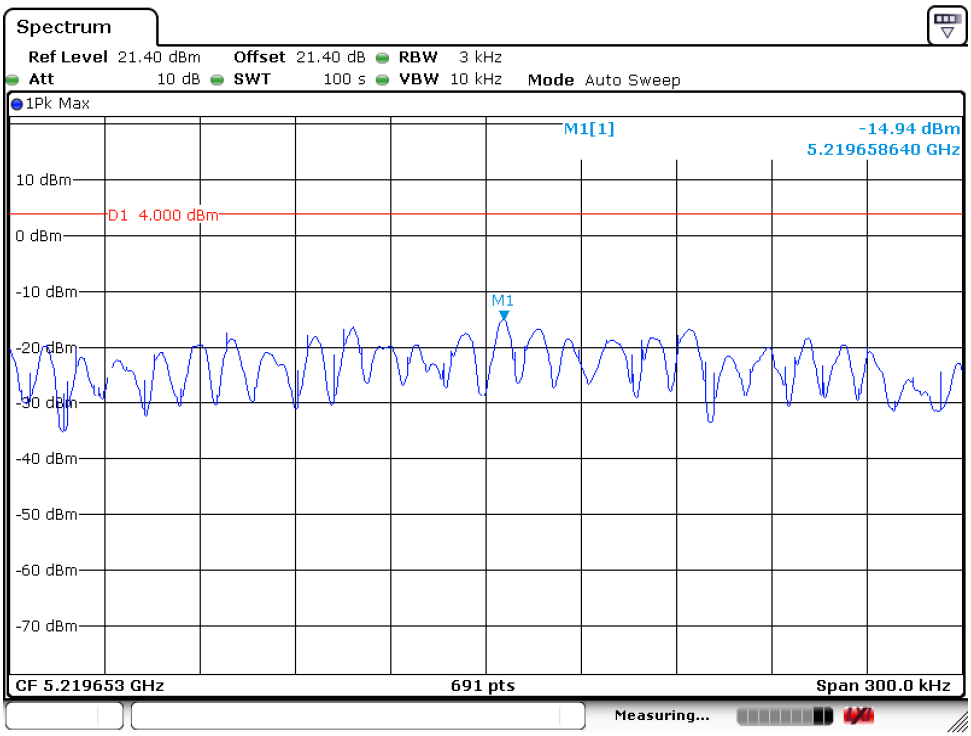
Test Plot of Power Density

Low Channel



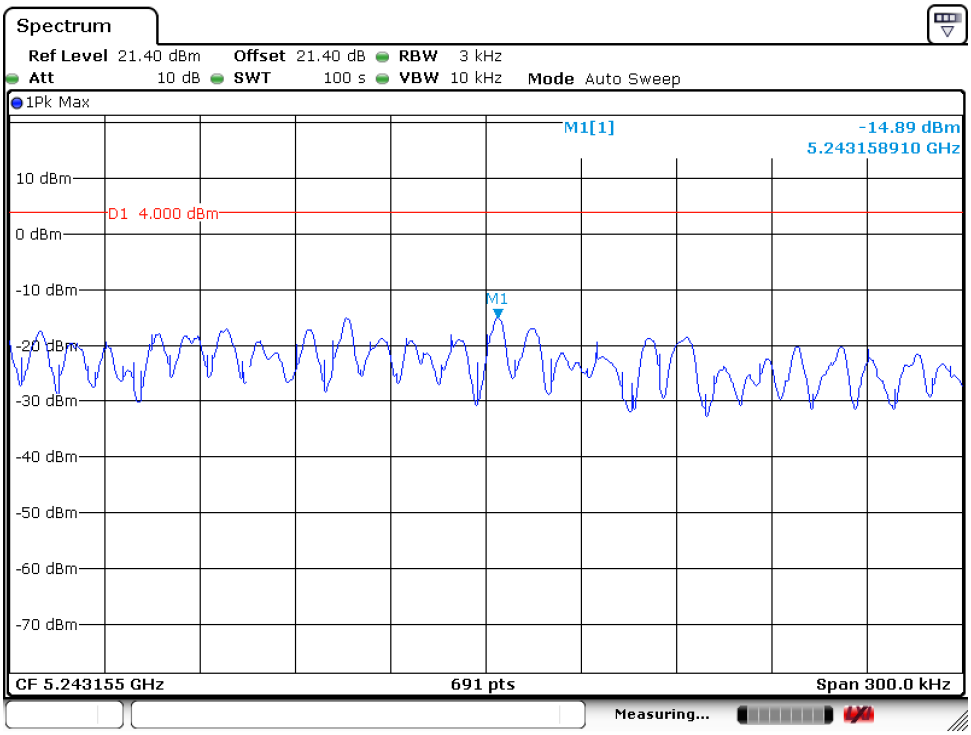
Date: 2.JAN.2013 15:36:33

Middle Channel



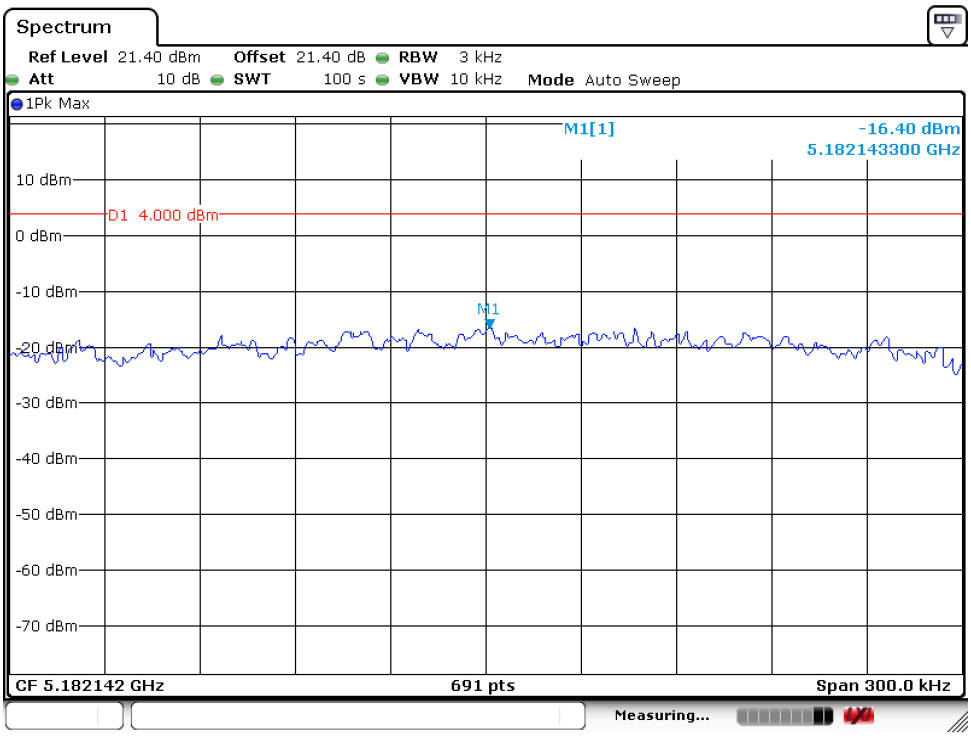
Date: 2.JAN.2013 15:38:54

High Channel



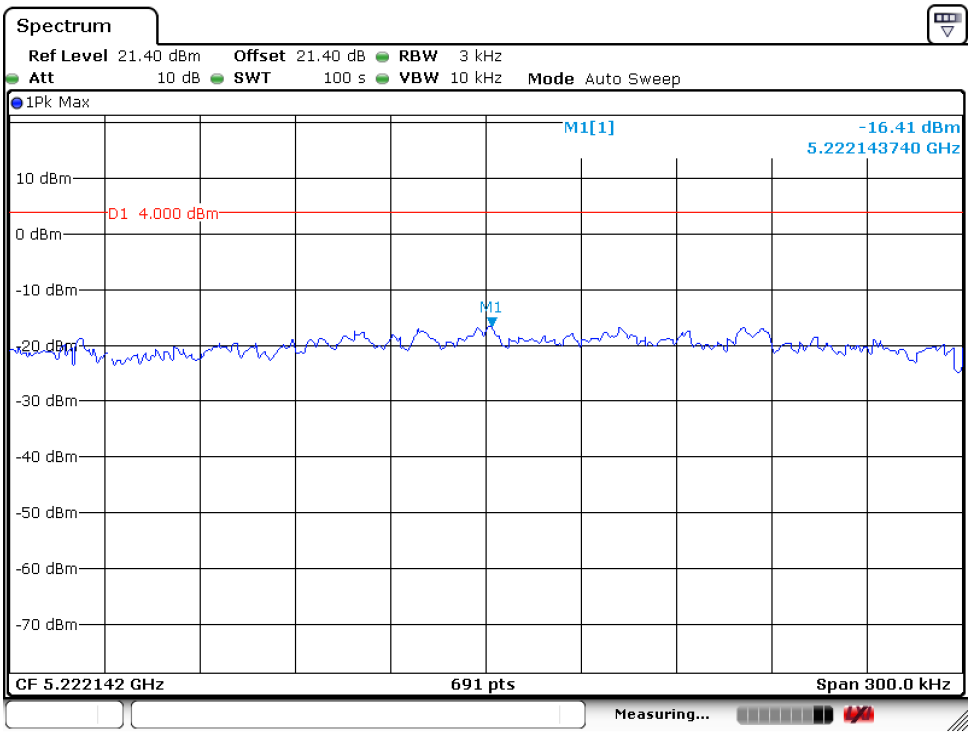
Test Plot of Power Density (HT20)

Low Channel



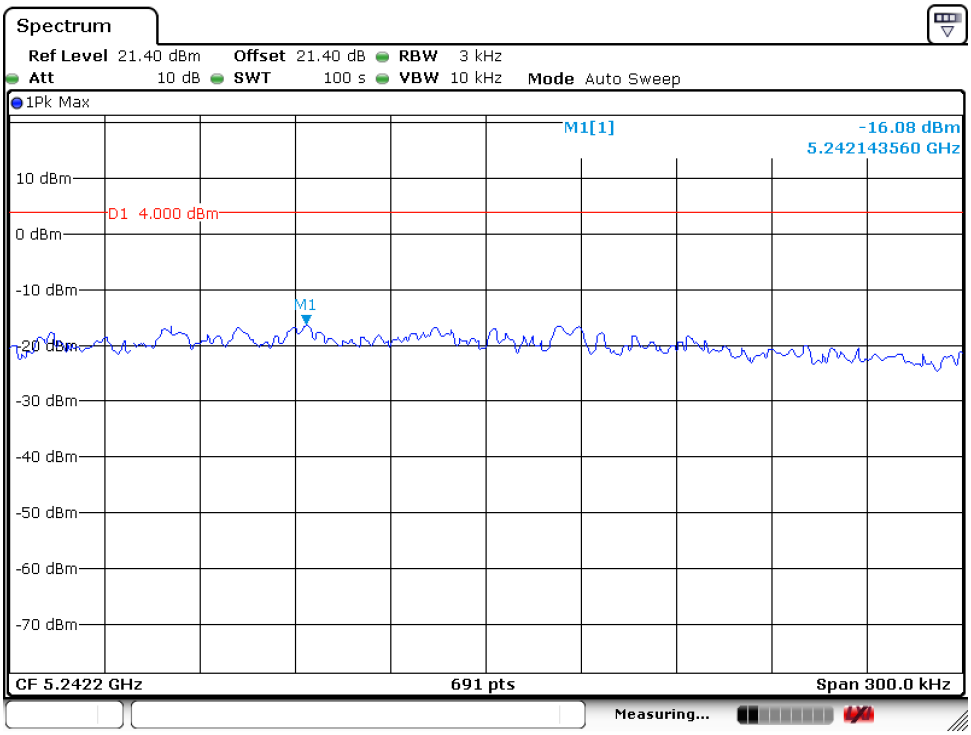
Date: 2.JAN.2013 15:44:43

Middle Channel



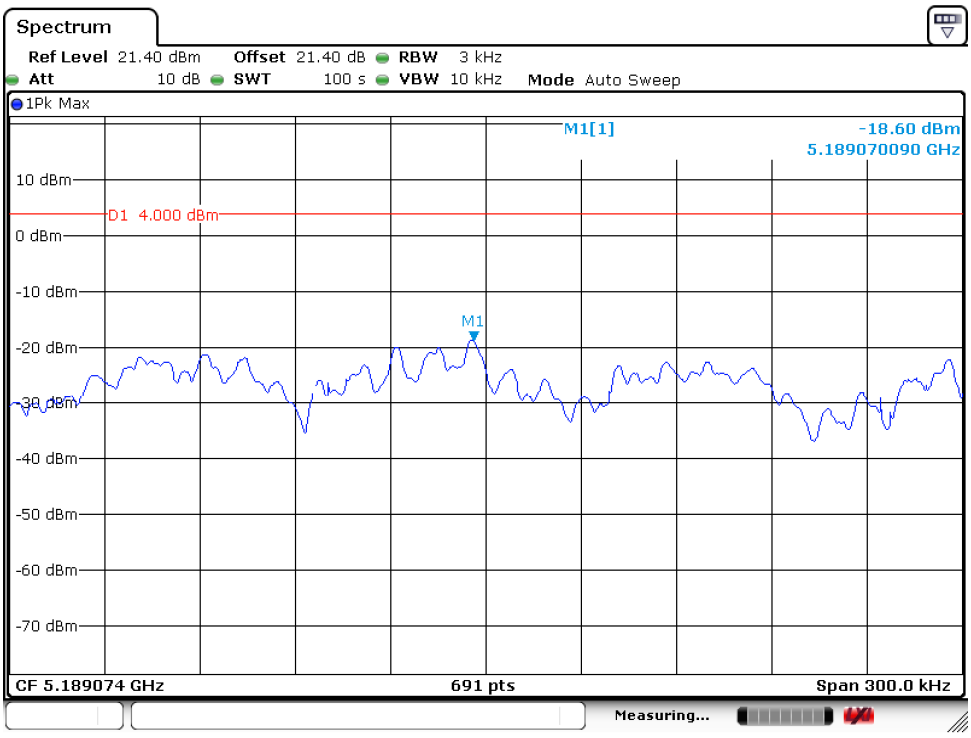
Date: 2.JAN.2013 15:47:04

High Channel



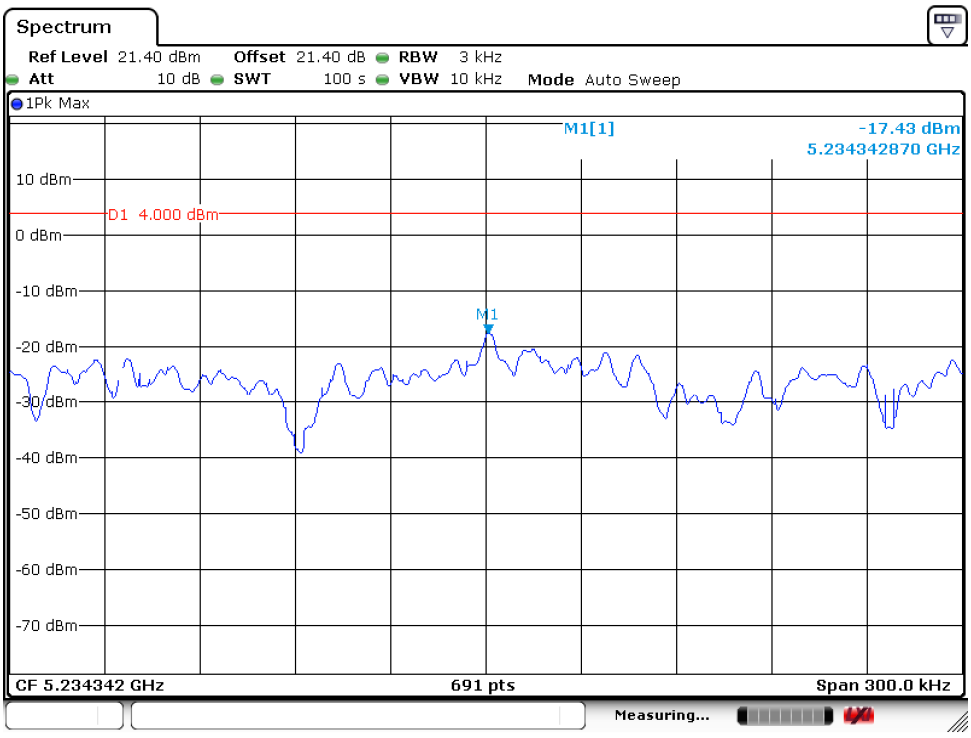
Test Plot of Power Density (HT40)

Low Channel



Date: 2.JAN.2013 15:52:11

High Channel



Date: 2.JAN.2013 15:54:38

5.1.1.5 Conducted spurious emissions

RESULT: **Passed**

Date of testing	:	2012-12-27
Test standard	:	FCC part 15.407(b)(1), LP0002 4.7.2
Limit	:	-27dB
Kind of test site	:	Shielded room

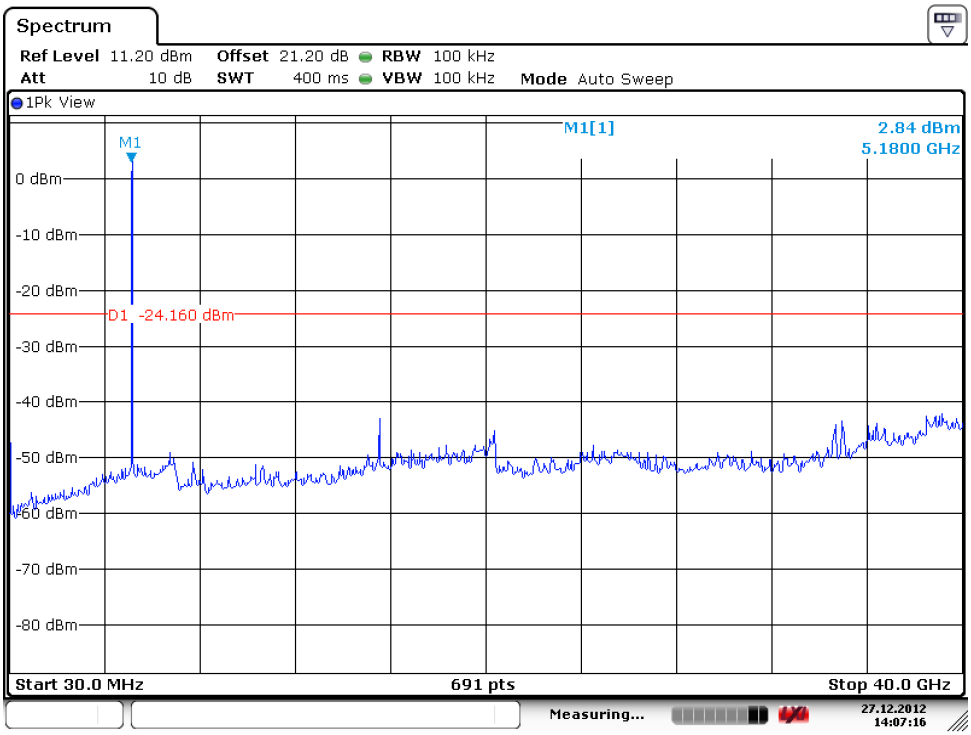
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 27dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

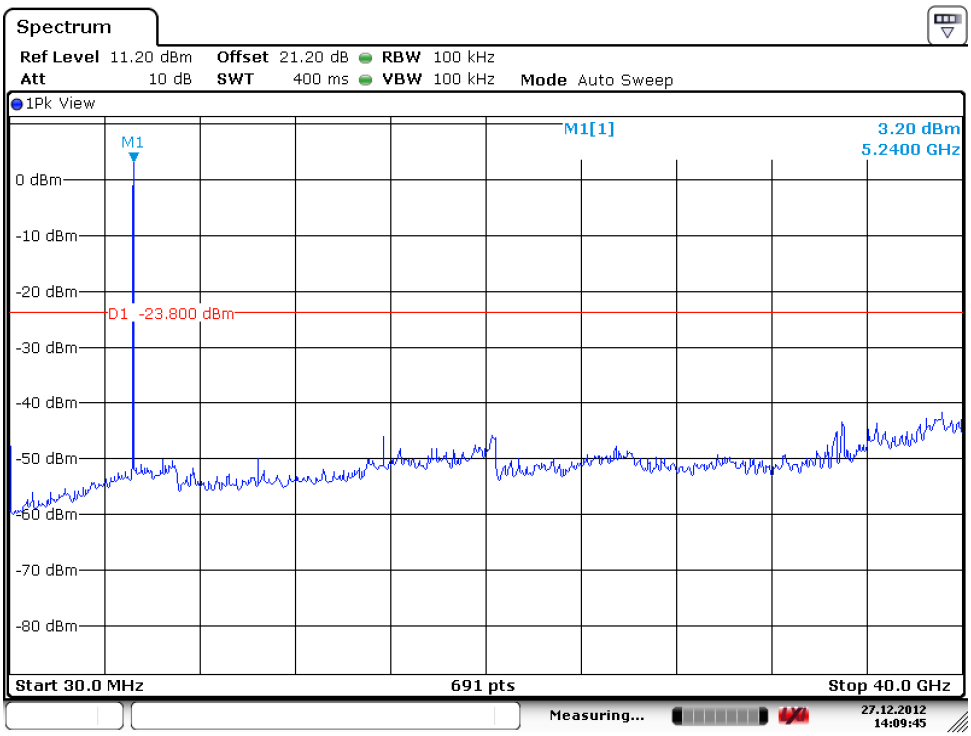
Test Plot of Conducted Emissions

Low Channel



Date: 27.DEC.2012 14:07:17

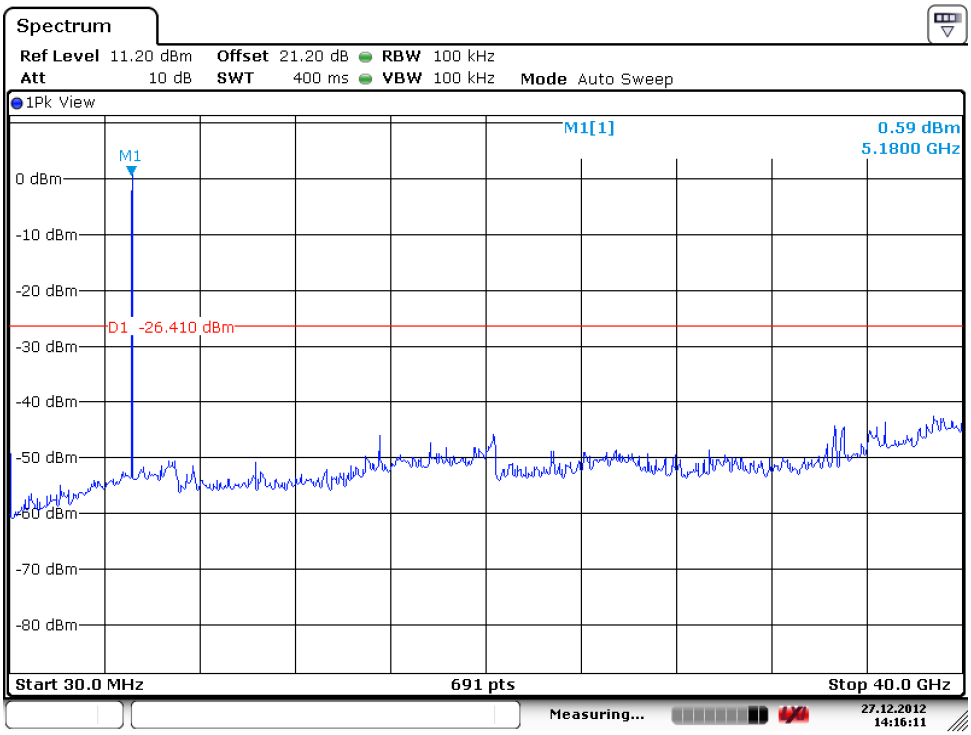
High Channel



Date: 27.DEC.2012 14:09:45

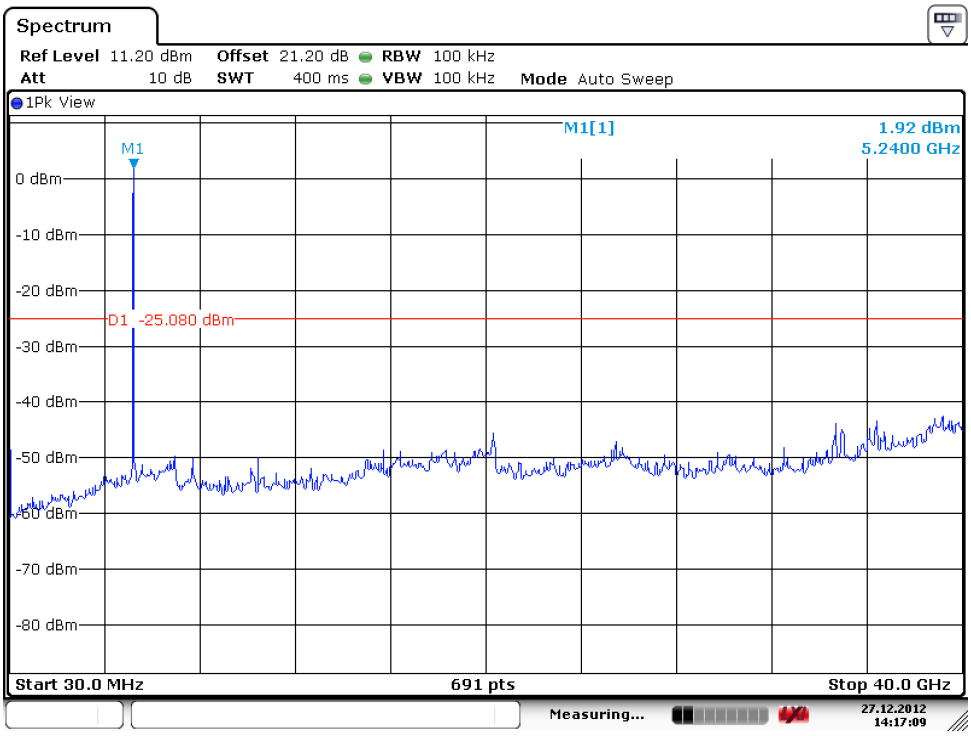
Test Plot of Conducted Emissions(HT20)

Low Channel



Date: 27.DEC.2012 14:16:11

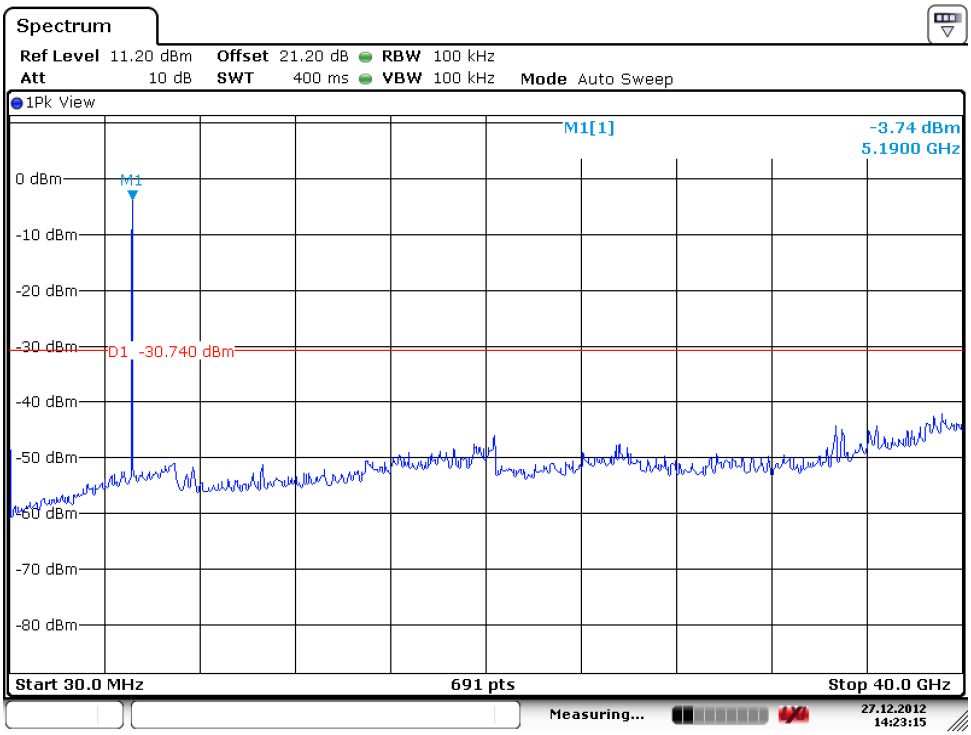
High Channel



Date: 27.DEC.2012 14:17:10

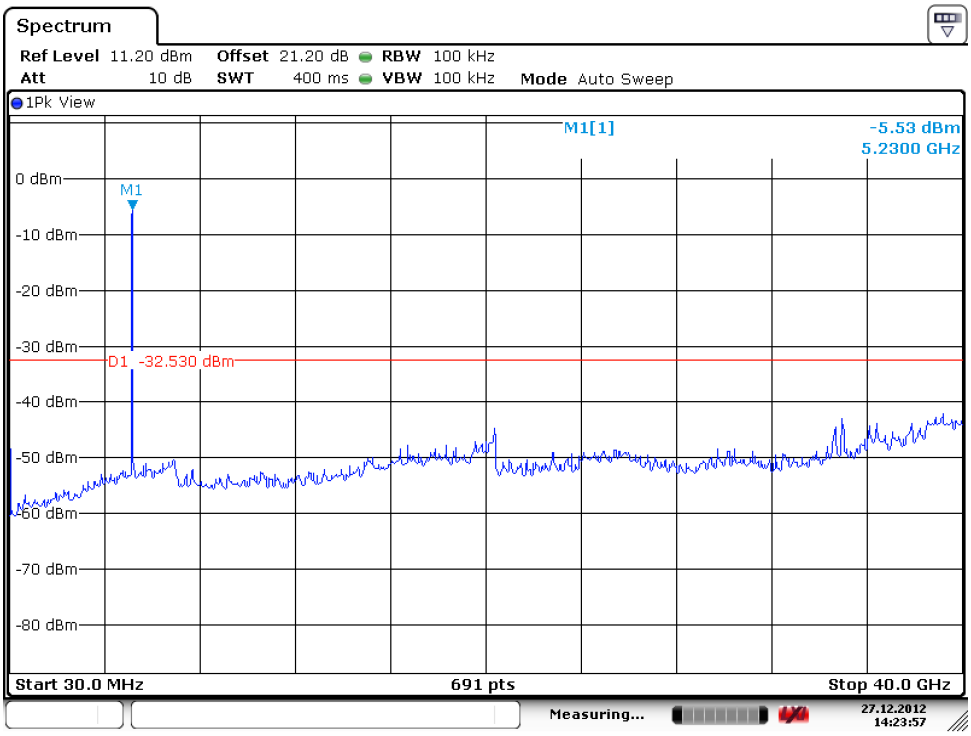
Test Plot of Conducted Emissions(HT40)

Low Channel



Date: 27.DEC.2012 14:23:15

High Channel



Date: 27.DEC.2012 14:23:57

5.1.1.6 Spurious Emission and Frequency Band Edge

RESULT: **Passed**

Date of testing	:	2012-12-31~2013-01-03
Test standard	:	FCC 15.205, FCC 15.209, LP0002 2.7, 2.8
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a)and LP0002 2.7 must comply with the radiated emission limits specified in FCC 15.209(a) and LP0002 2.8. Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a), LP0002 2.8 and FCC 15.249(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A, C
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The Z Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

5.1.2 802.11a/n Band II

5.1.2.1 26 dB Bandwidth

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

Table 18: Test result of 26dB Bandwidth

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5260	19.407	/	Pass
Mid Channel	5280	19.522	/	Pass
High Channel	5320	19.465	/	Pass

Table 19: Test result of 26dB Bandwidth (HT20)

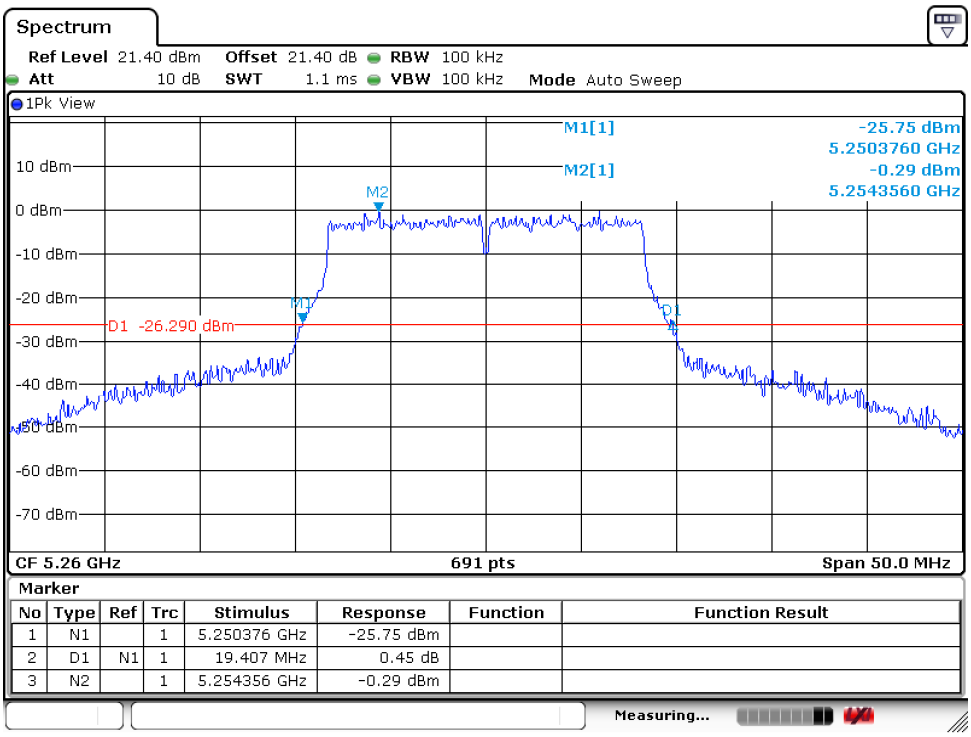
Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5260	20.13	/	Pass
Mid Channel	5280	20.029	/	Pass
High Channel	5320	20.043	/	Pass

Table 20: Test result of 26dB Bandwidth (HT40)

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5270	39.392	/	Pass
High Channel	5310	39.421	/	Pass

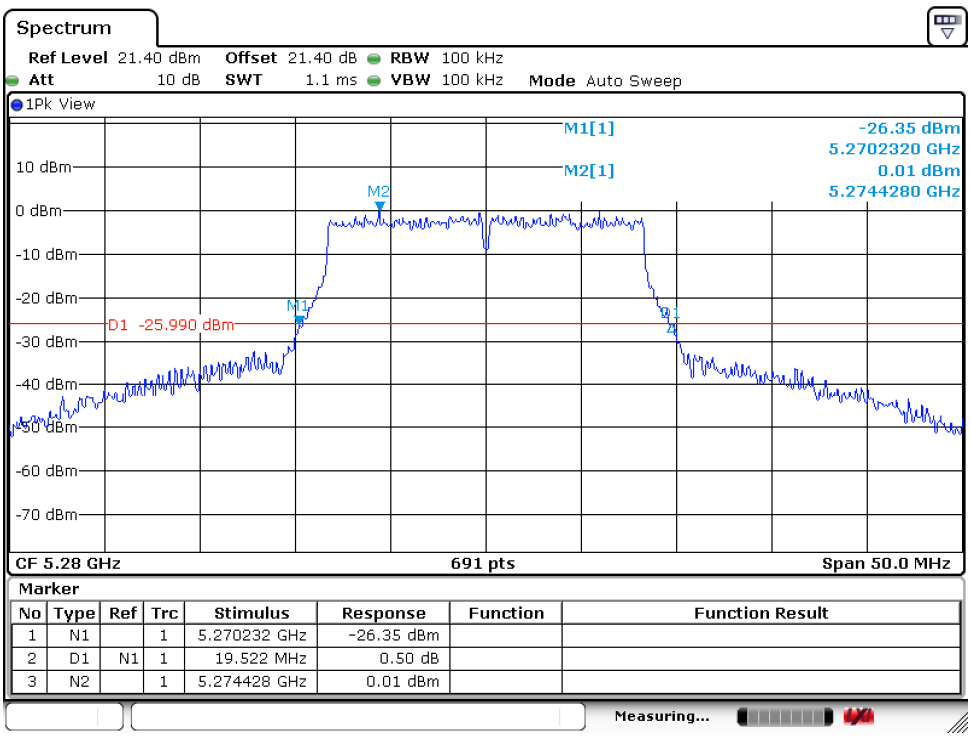
Test Plot of 26dB Bandwidth

Low Channel



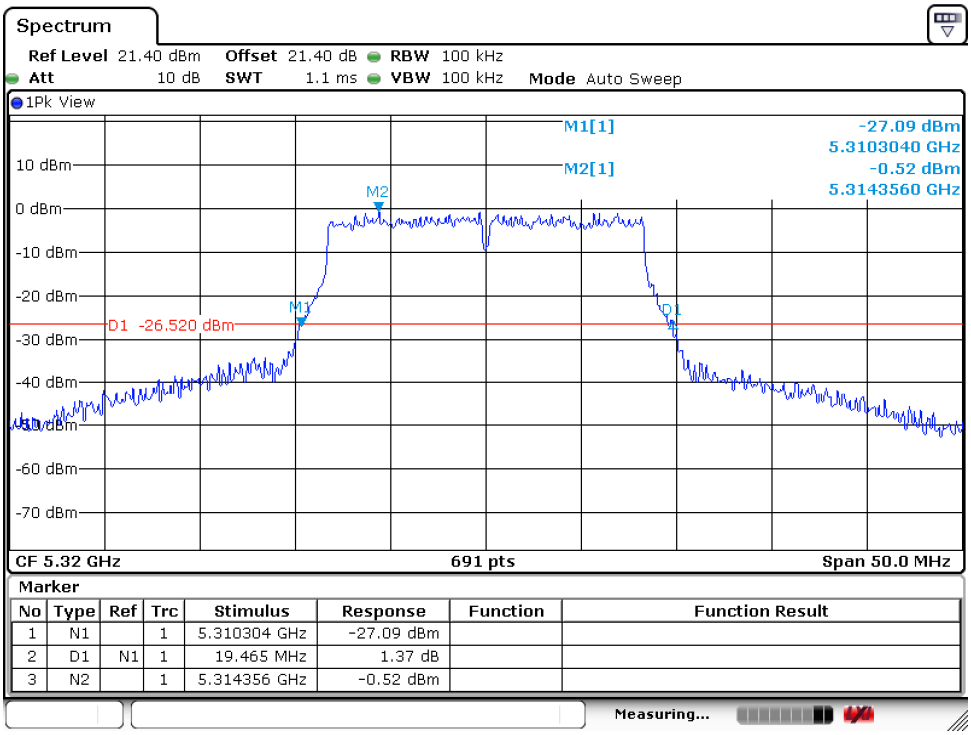
Date: 2.JAN.2013 14:10:23

Middle Channel



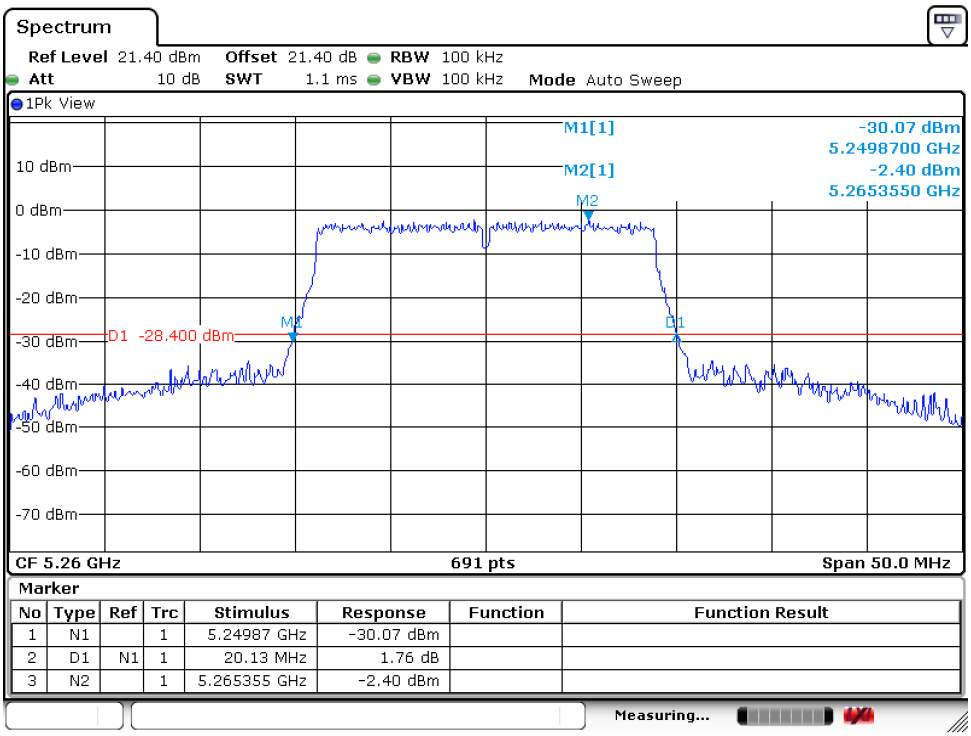
Date: 2.JAN.2013 14:11:33

High Channel



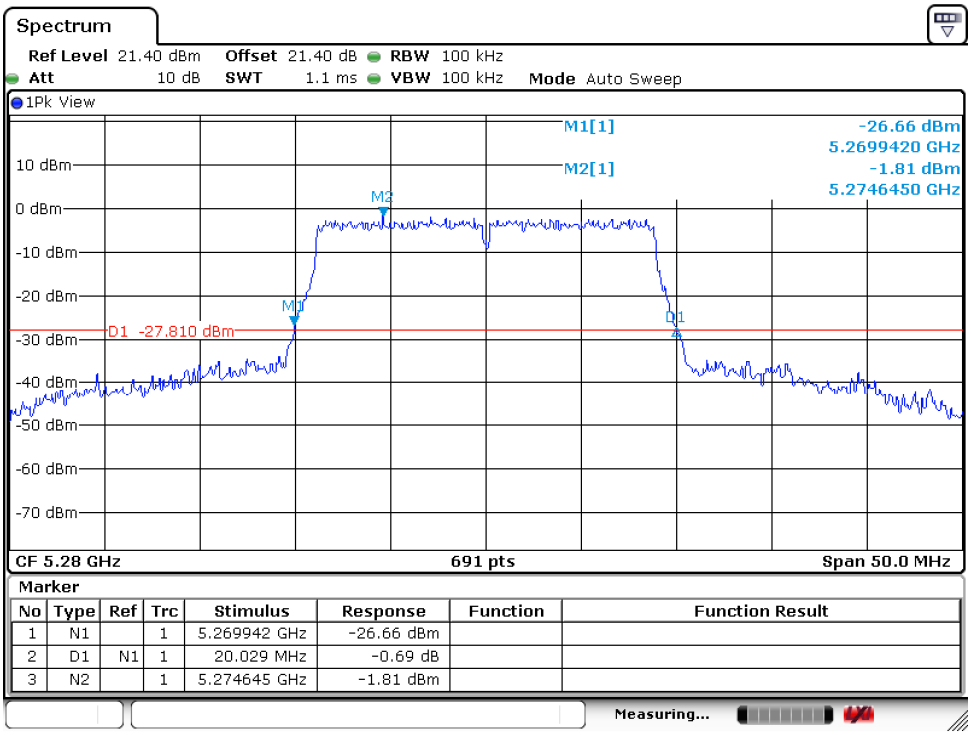
Test Plot of 26dB Bandwidth (HT20)

Low Channel



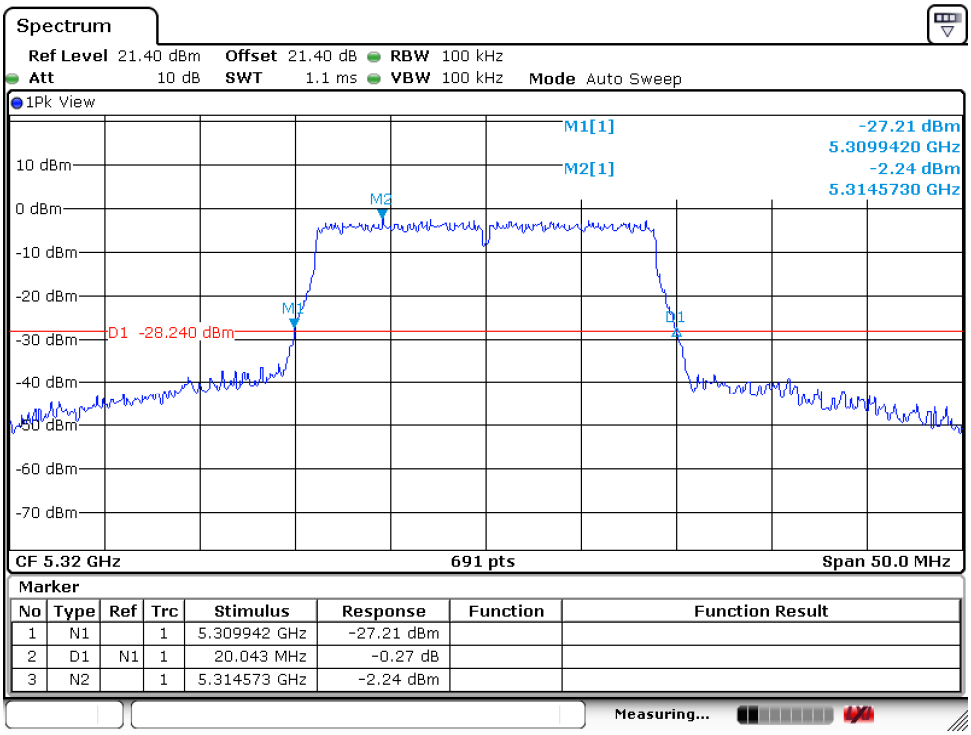
Date: 2.JAN.2013 14:29:14

Middle Channel



Date: 2.JAN.2013 14:29:52

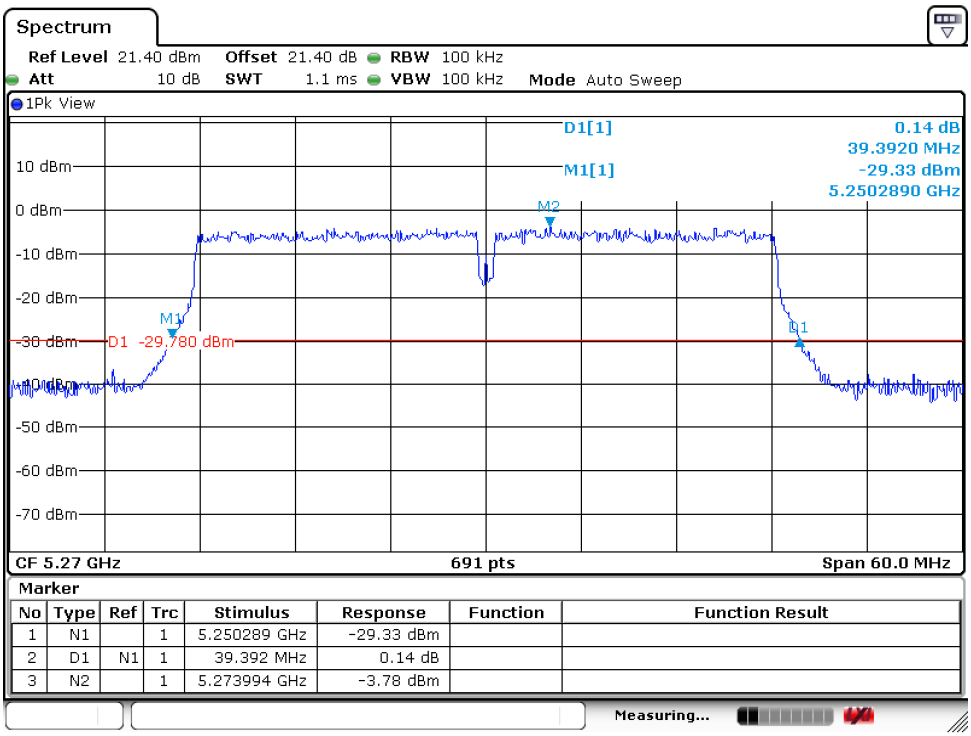
High Channel



Date: 2.JAN.2013 14:31:21

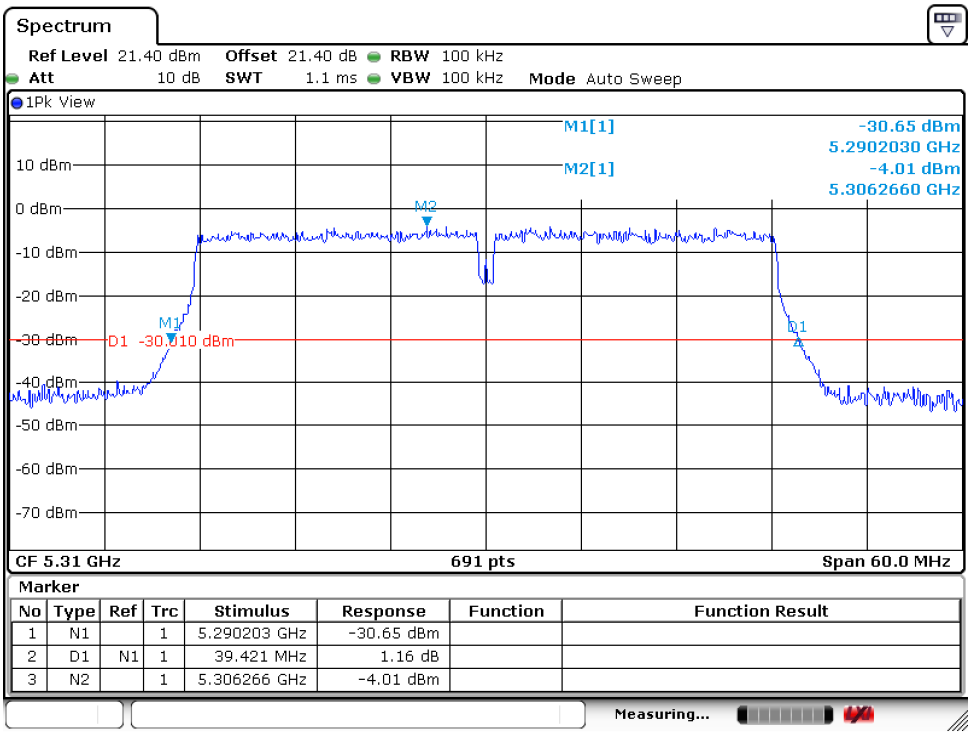
Test Plot of 26dB Bandwidth(HT40)

Low Channel



Date: 2.JAN.2013 14:38:22

High Channel



Date: 2.JAN.2013 14:39:11

5.1.2.2 Transmit Output Power

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 5.25-5.35 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If transmitting antenna sof directional gain greater than 6 dBi are used, both the peak transmit power anjd the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

Table 21: Test result of Transmit Power

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5260	13.33	19.407	23.880	Pass
Mid Channel	5280	13.08	19.522	23.905	Pass
High Channel	5320	12.63	19.465	23.893	Pass

Table 22: Test result of Transmit Power (HT20)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5260	13.43	20.13	24	Pass
Mid Channel	5280	13.63	20.029	24	Pass
High Channel	5320	13.23	20.043	24	Pass

Table 23: Test result of Transmit Power (HT40)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5270	13.54	39.392	24	Pass
High Channel	5310	13.19	39.421	24	Pass

5.1.2.3 Power Excursion

RESULT: **Passed**

Date of testing	:	2013-01-02
Test standard	:	FCC Part 15.407(a)(6), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 24: Test result of Power Excursion

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5260	8.17	13	Pass
Mid Channel	5280	8.26	13	Pass
High Channel	5320	8.29	13	Pass

Table 25: Test result of Power Excursion(HT20)

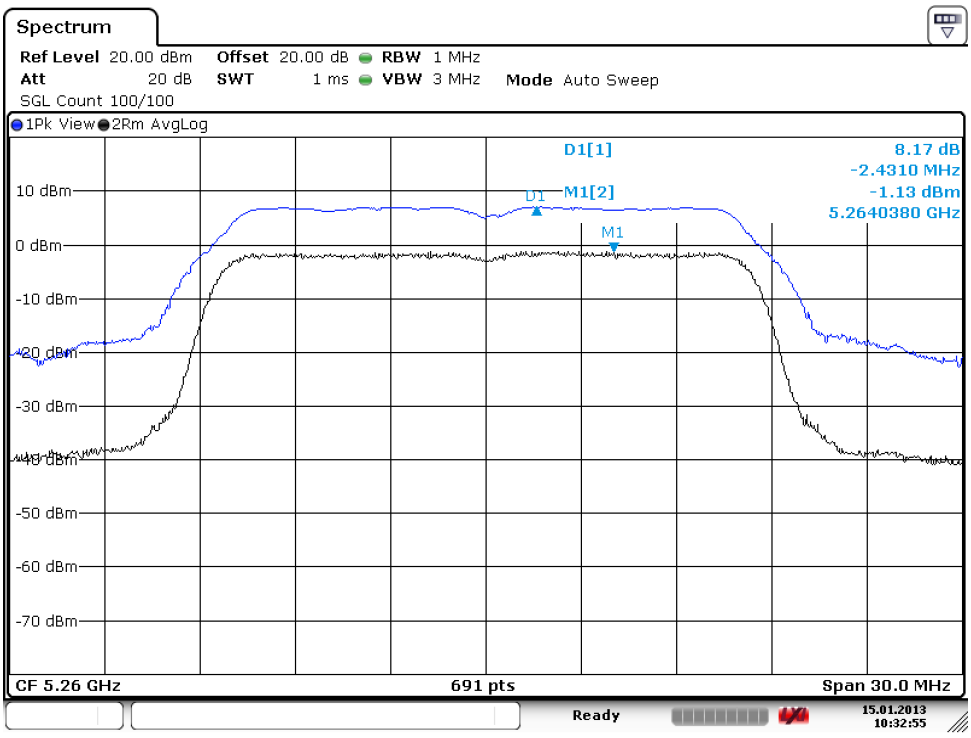
Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5260	8.38	13	Pass
Mid Channel	5280	8.52	13	Pass
High Channel	5320	8.45	13	Pass

Table 26: Test result of Power Excursion(HT40)

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5260	8.42	13	Pass
High Channel	5280	8.39	13	Pass

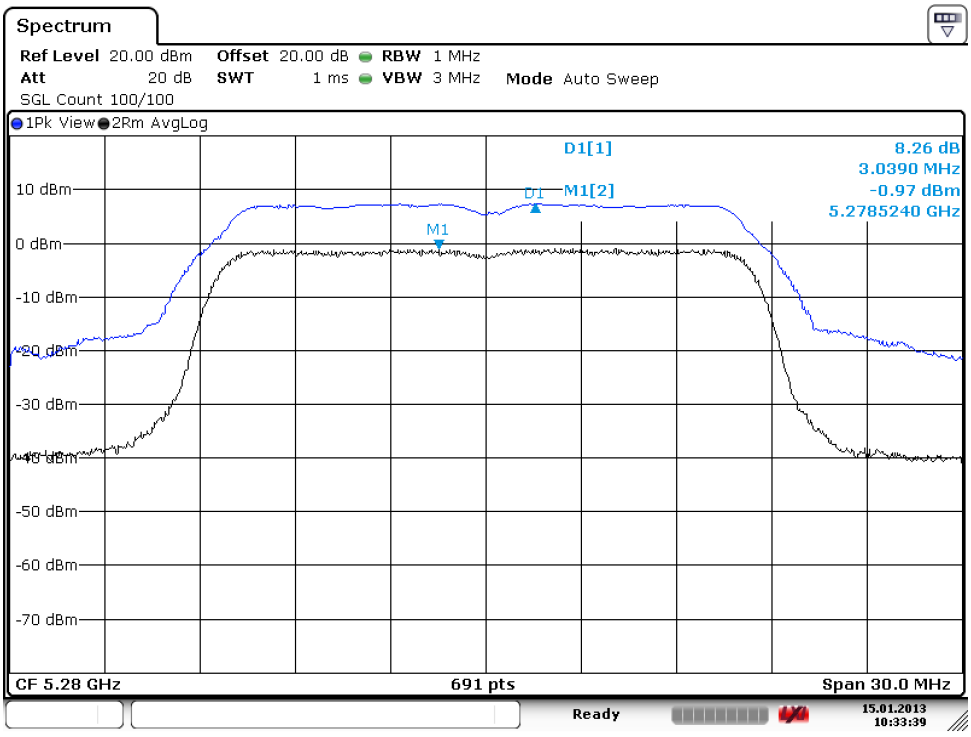
Test Plot of Power Excursion

Low Channel



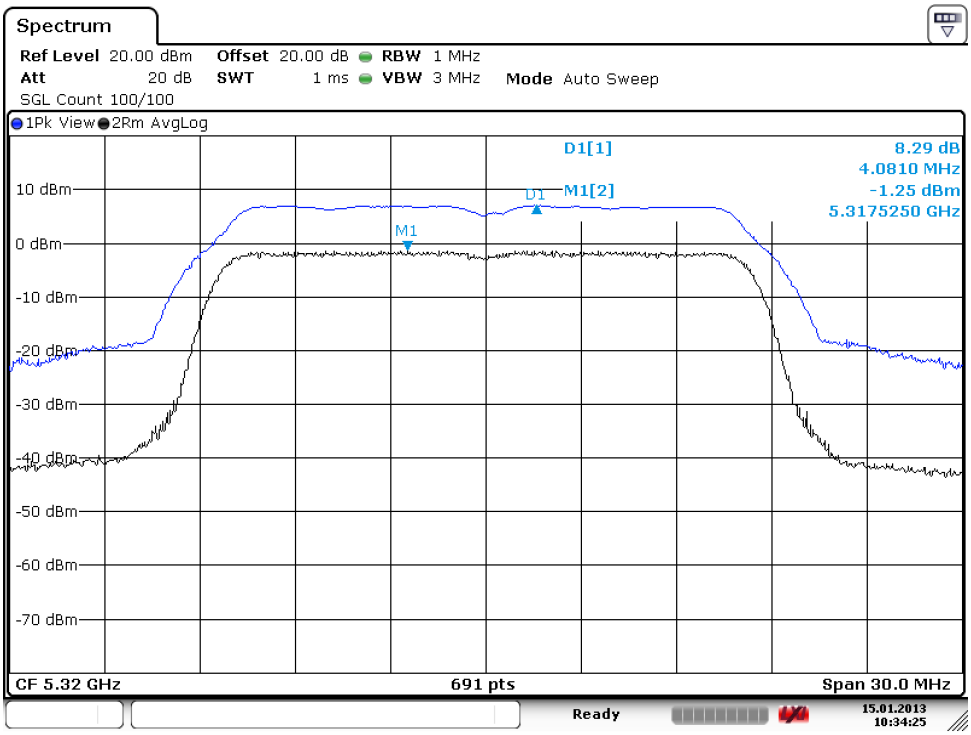
Date: 15.JAN.2013 10:32:55

Middle Channel



Date: 15.JAN.2013 10:33:39

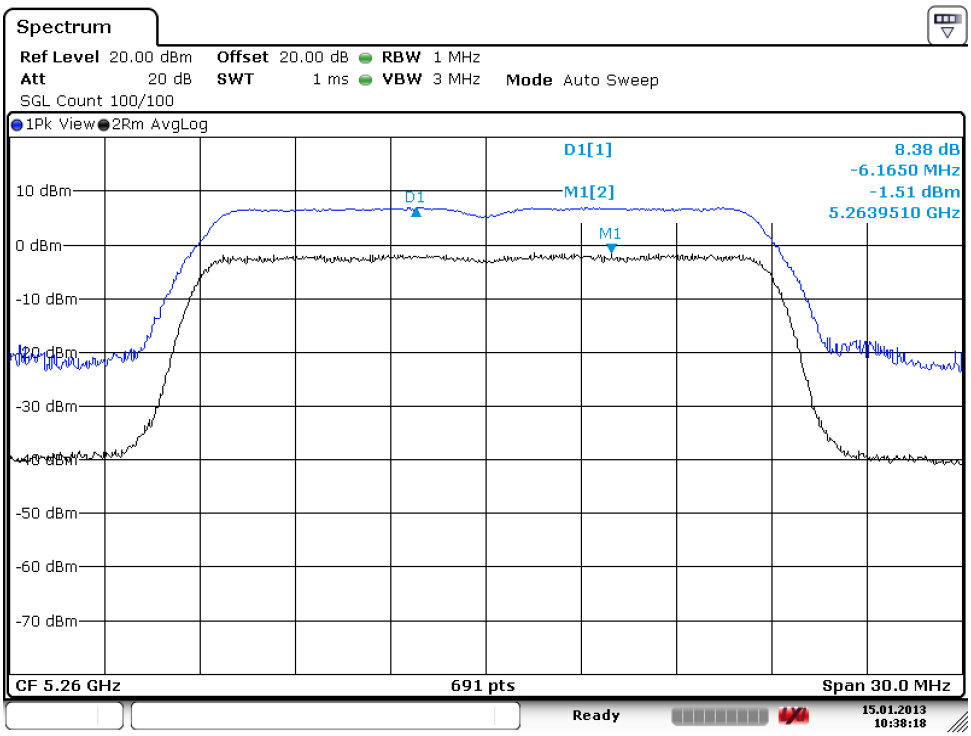
High Channel



Date: 15.JAN.2013 10:34:25

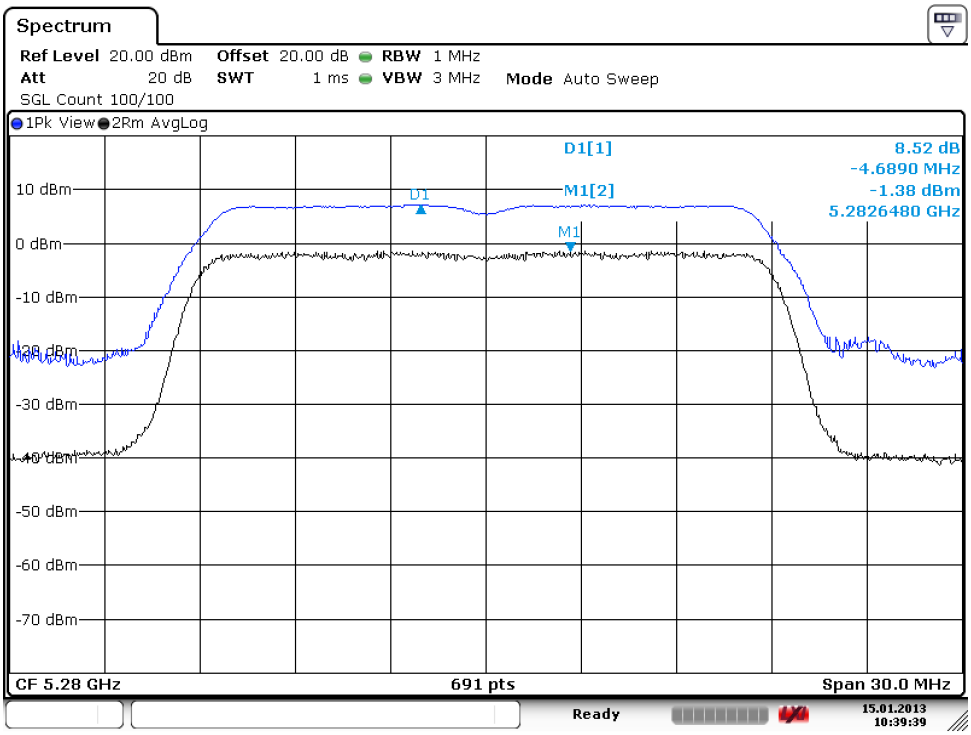
Test Plot of Power Excursion (HT20)

Low Channel



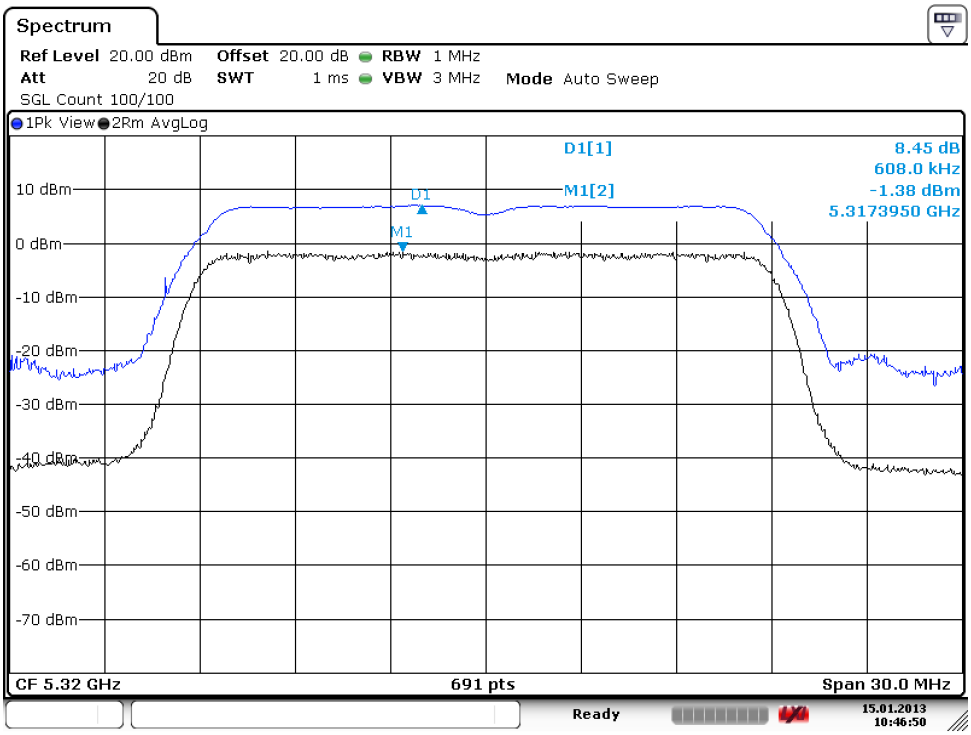
Date: 15.JAN.2013 10:38:18

Middle Channel



Date: 15.JAN.2013 10:39:39

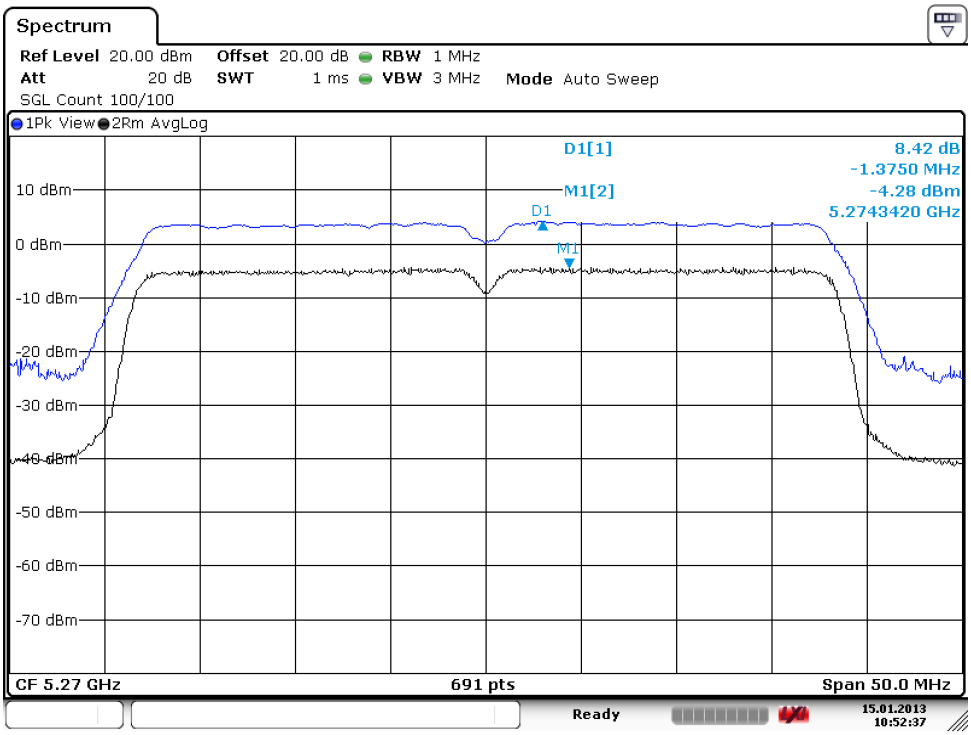
High Channel



Date: 15.JAN.2013 10:46:50

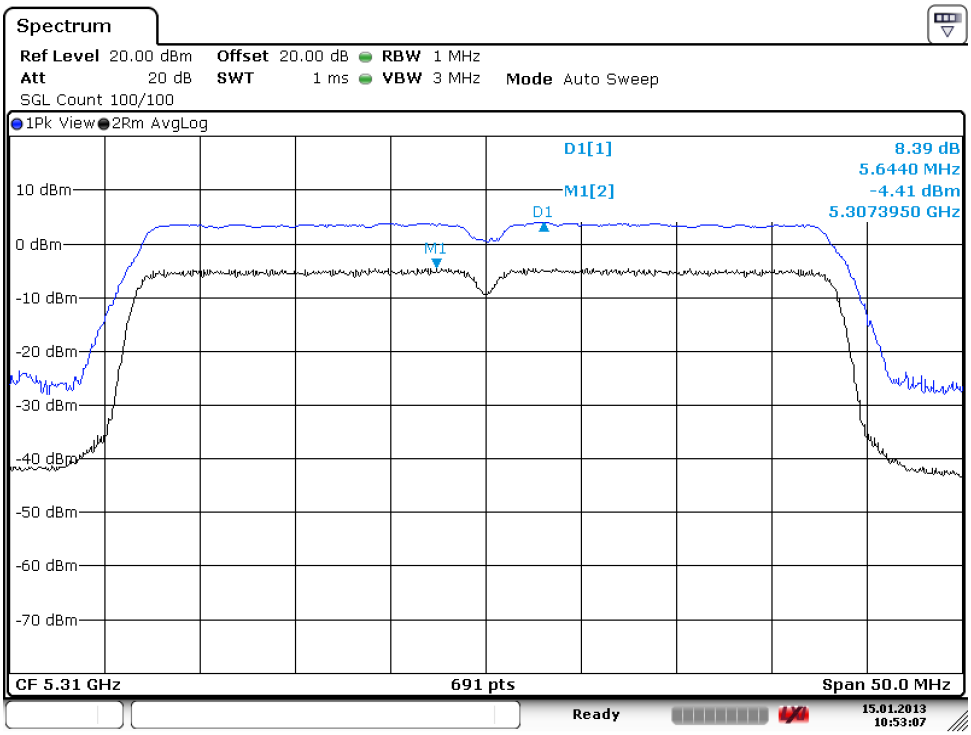
Test Plot of Power Excursion (HT40)

Low Channel



Date: 15.JAN.2013 10:52:37

High Channel



Date: 15.JAN.2013 10:53:07

5.1.2.4 Power Spectral Density

RESULT: **Passed**

Date of testing : 2013-01-02
Test standard : FCC Part 15.407(a)(1),(5), LP0002 4.7.2
Kind of test site : Shielded room

Test setup

Test Channel : Low/ Middle/ High
Operation Mode : A
Ambient temperature : 24℃
Relative humidity : 53%
Atmospheric pressure : 102 kPa

Table 27: Test result of Power Spectral Density

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5260	-14.66	11	Pass
Mid Channel	5280	-14.58	11	Pass
High Channel	5320	-14.9	11	Pass

Table 28: Test result of Power Spectral Density (HT20)

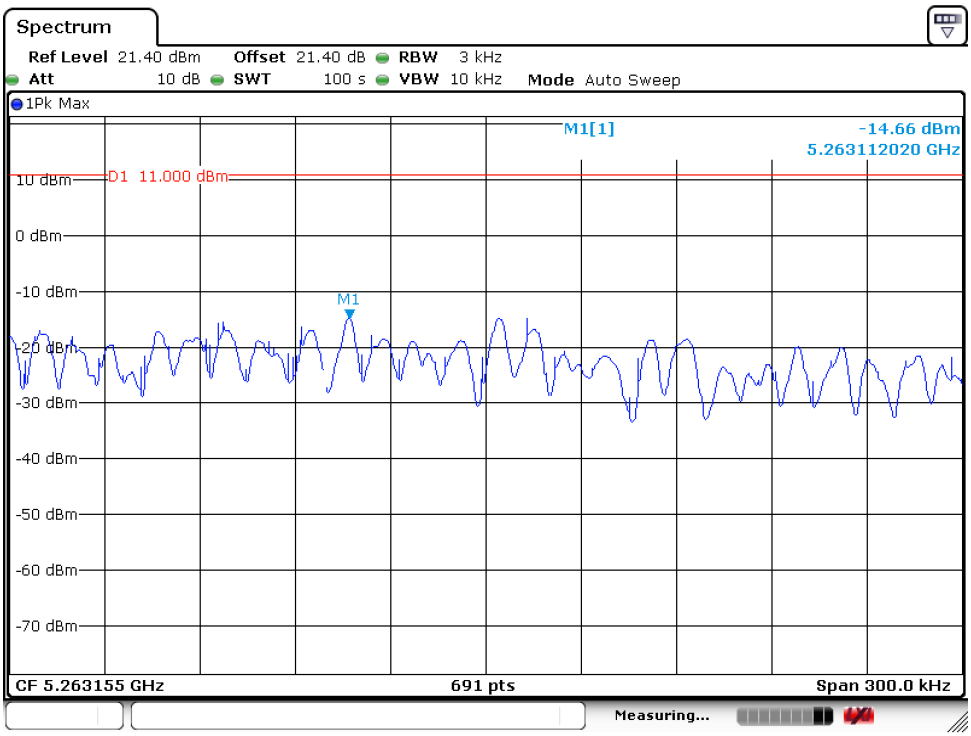
Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5260	-15.53	11	Pass
Mid Channel	5280	-15.39	11	Pass
High Channel	5320	-16.86	11	Pass

Table 29: Test result of Power Spectral Density (HT40)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5270	-16.87	11	Pass
High Channel	5310	-16.73	11	Pass

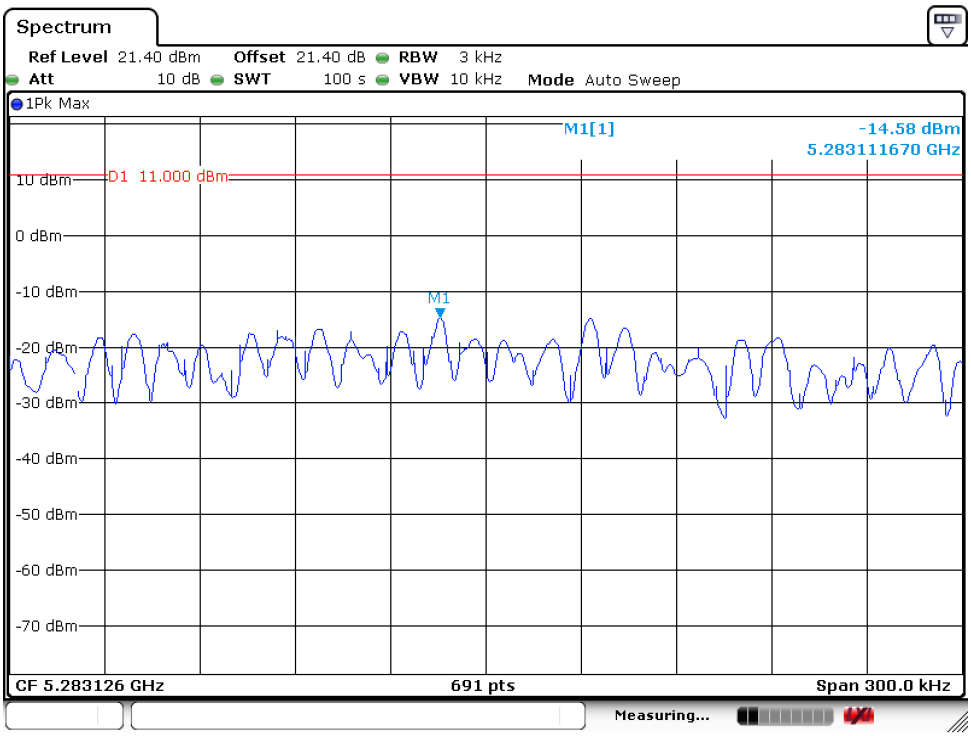
Test Plot of Power Density

Low Channel



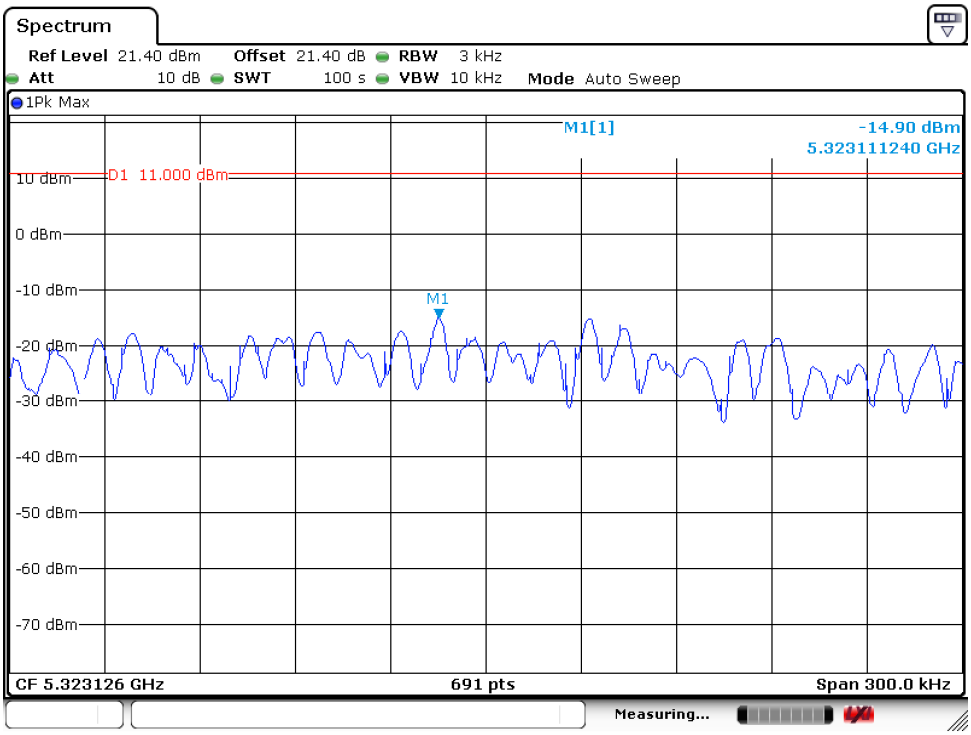
Date: 2.JAN.2013 16:04:43

Middle Channel



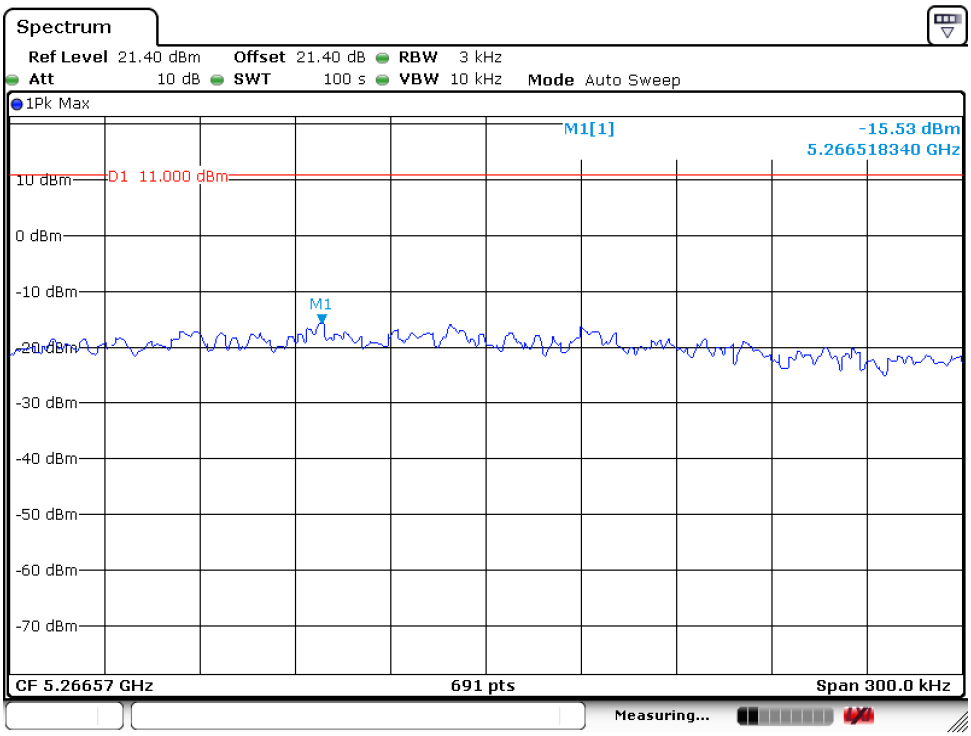
Date: 2.JAN.2013 16:07:06

High Channel



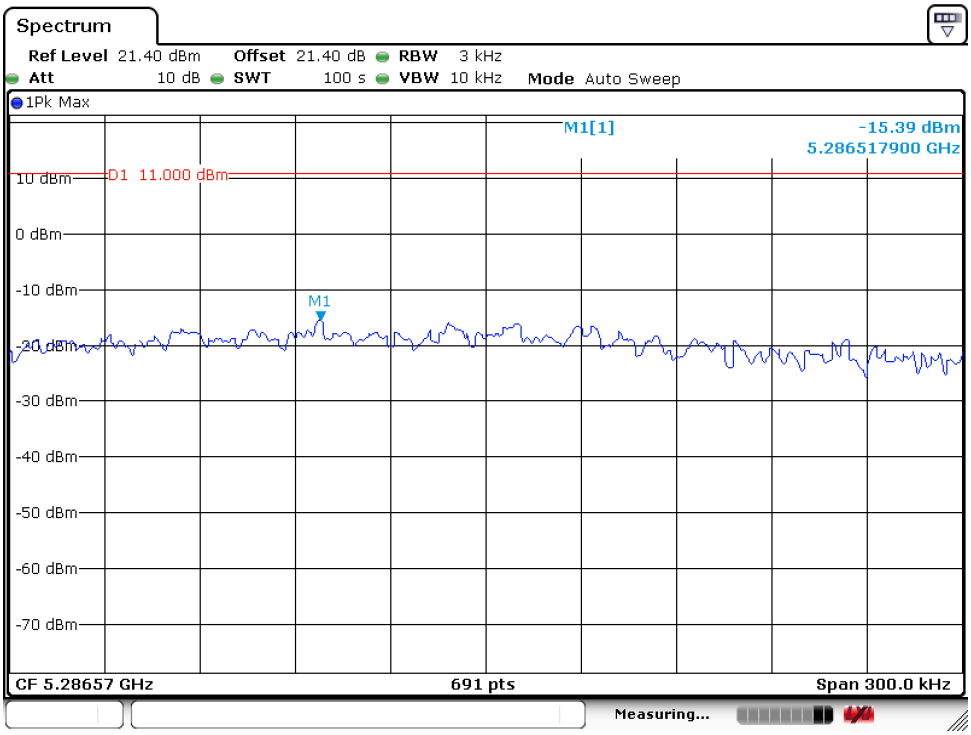
Test Plot of Power Density (HT20)

Low Channel



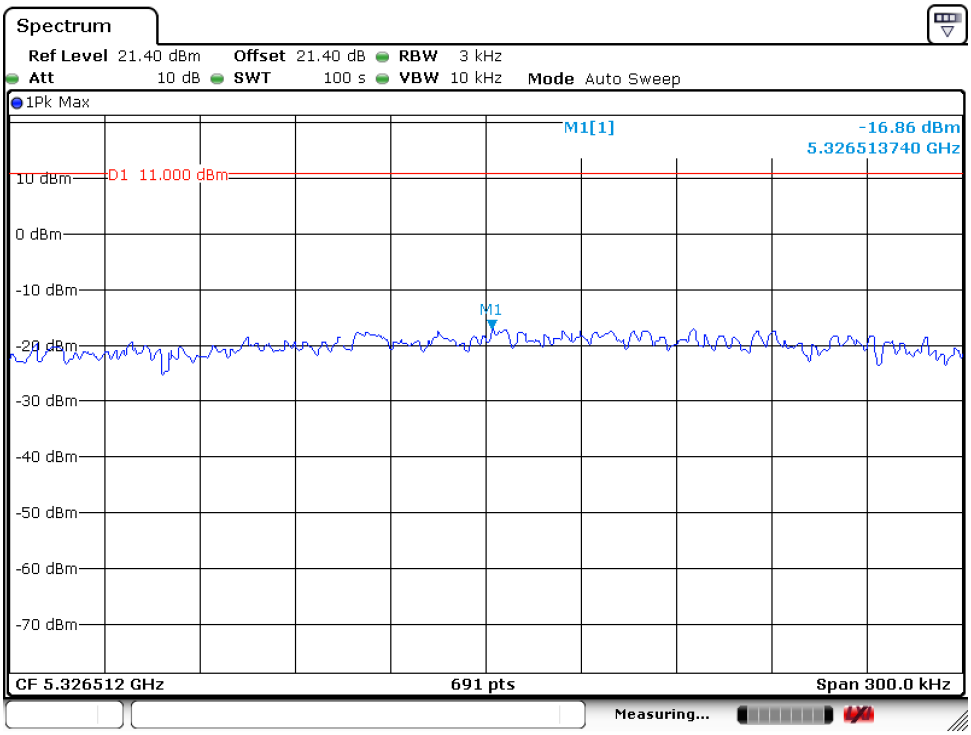
Date: 2.JAN.2013 16:11:47

Middle Channel



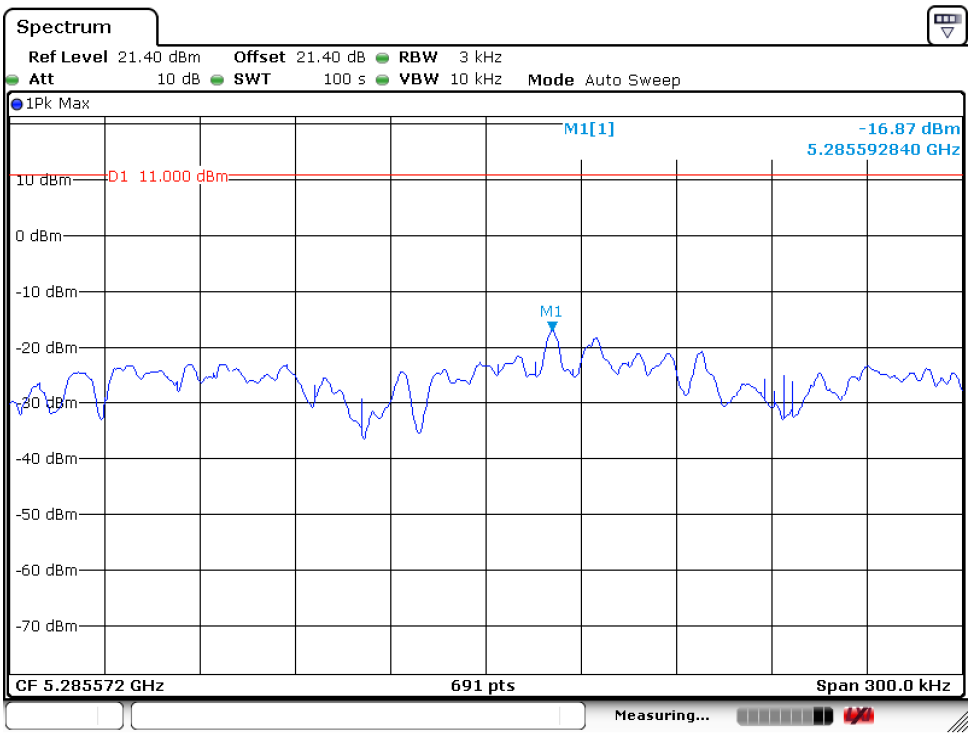
Date: 2.JAN.2013 16:14:16

High Channel



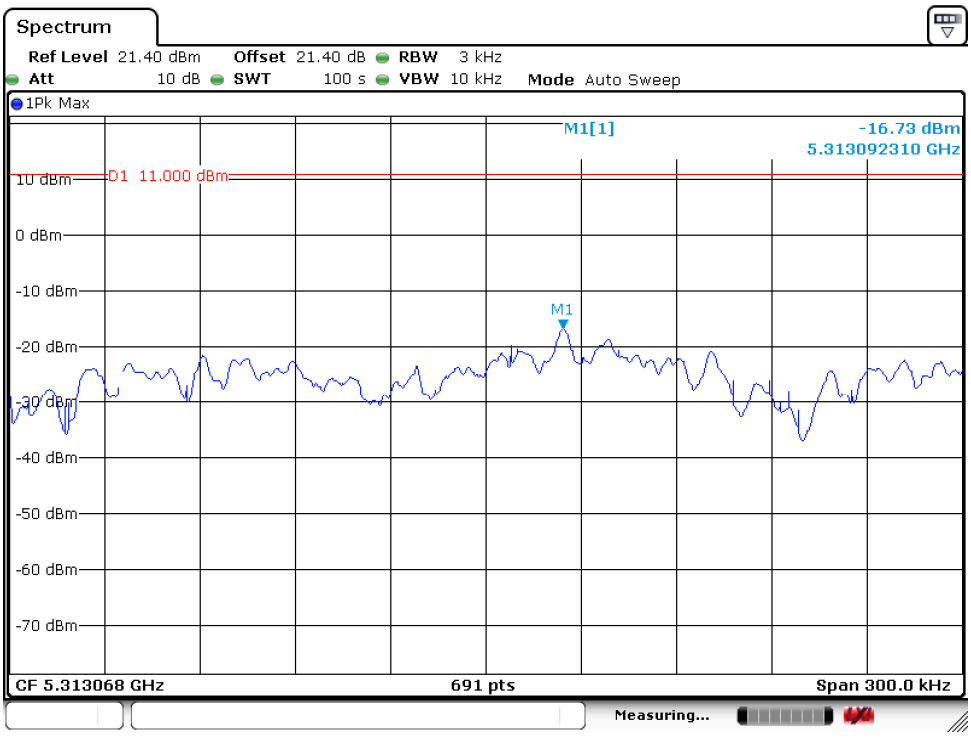
Test Plot of Power Density (HT40)

Low Channel



Date: 2.JAN.2013 15:57:23

High Channel



Date: 2.JAN.2013 16:01:32

5.1.2.5 Conducted spurious emissions

RESULT: **Passed**

Date of testing	:	2012-12-27
Test standard	:	FCC part 15.407(b)(1), LP0002 4.7.3
Limit	:	-27dB
Kind of test site	:	Shielded room

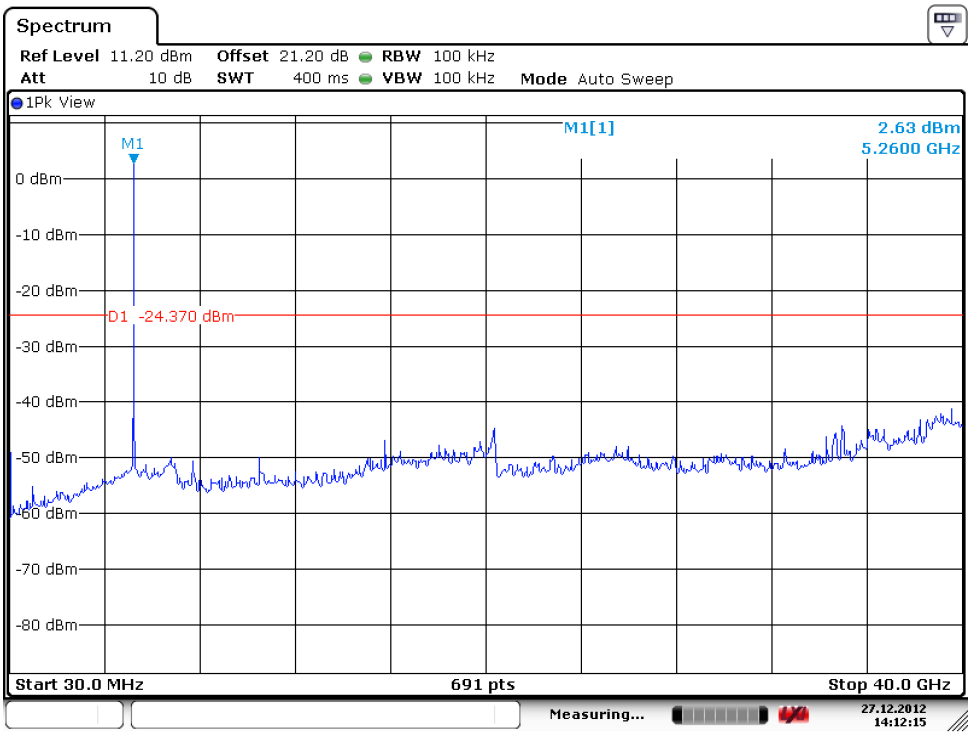
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 27dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

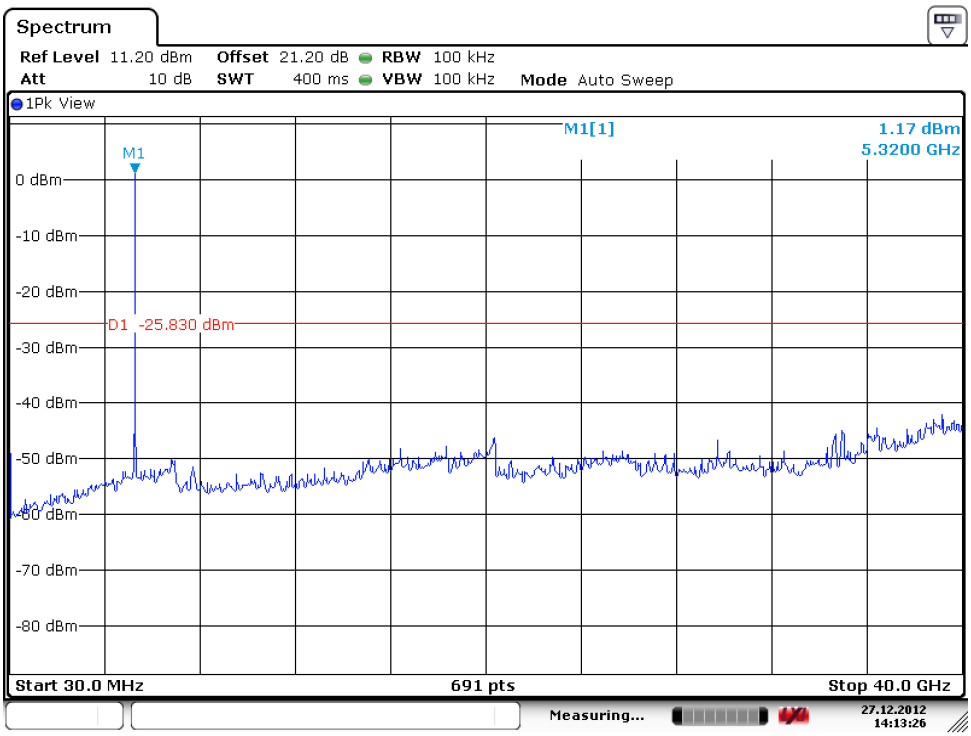
Test Plot of Conducted Emissions

Low Channel



Date: 27.DEC.2012 14:12:16

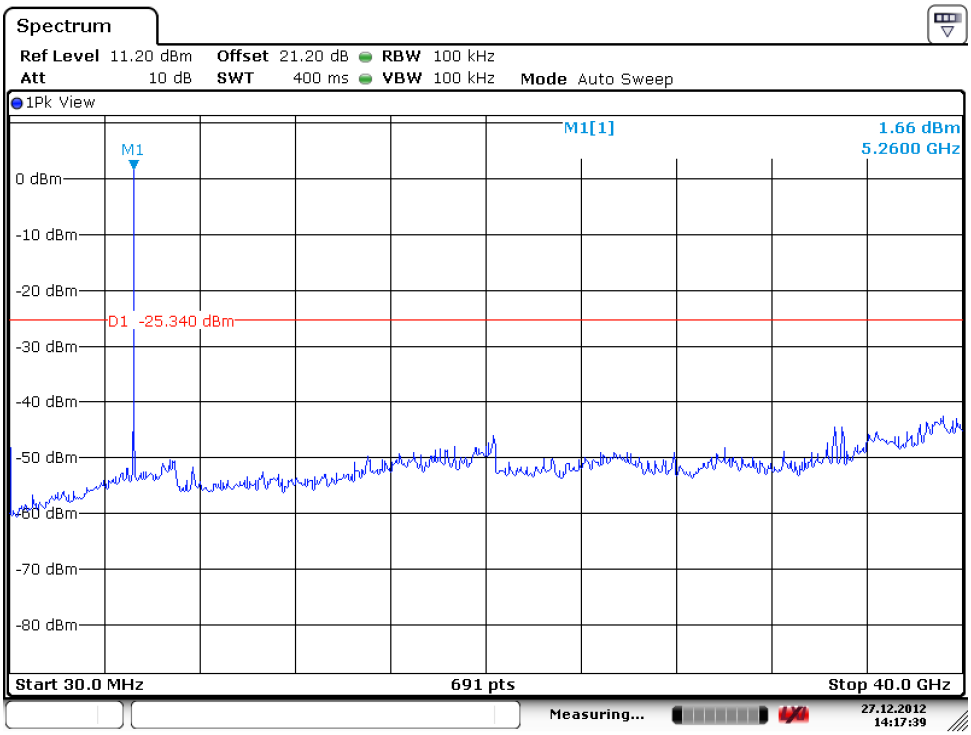
High Channel



Date: 27.DEC.2012 14:13:26

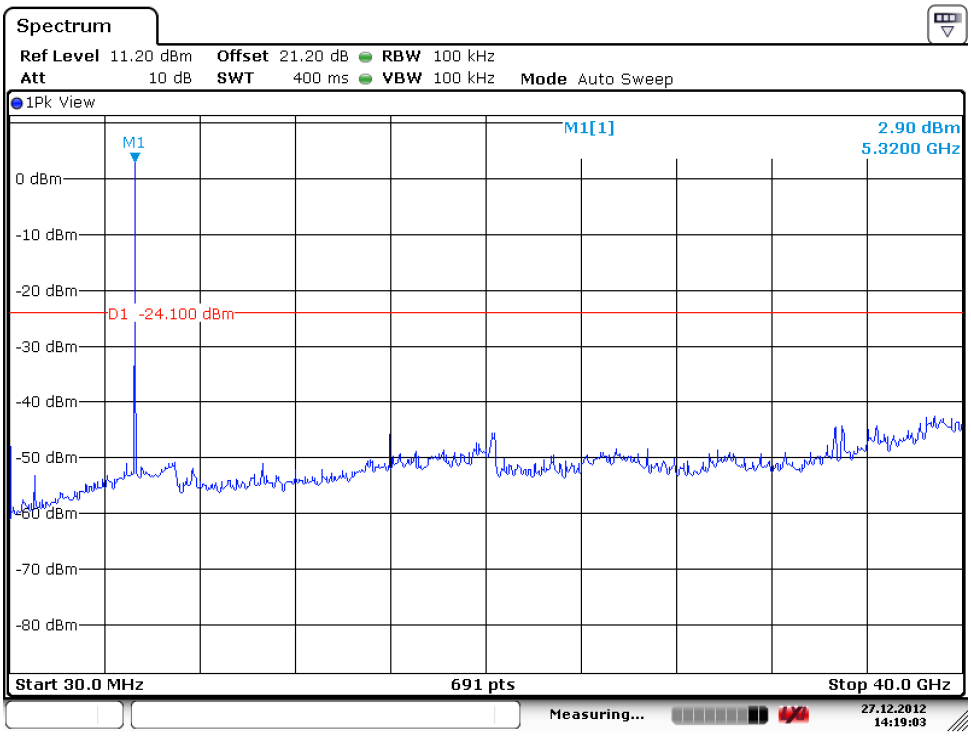
Test Plot of Conducted Emissions(HT20)

Low Channel



Date: 27.DEC.2012 14:17:40

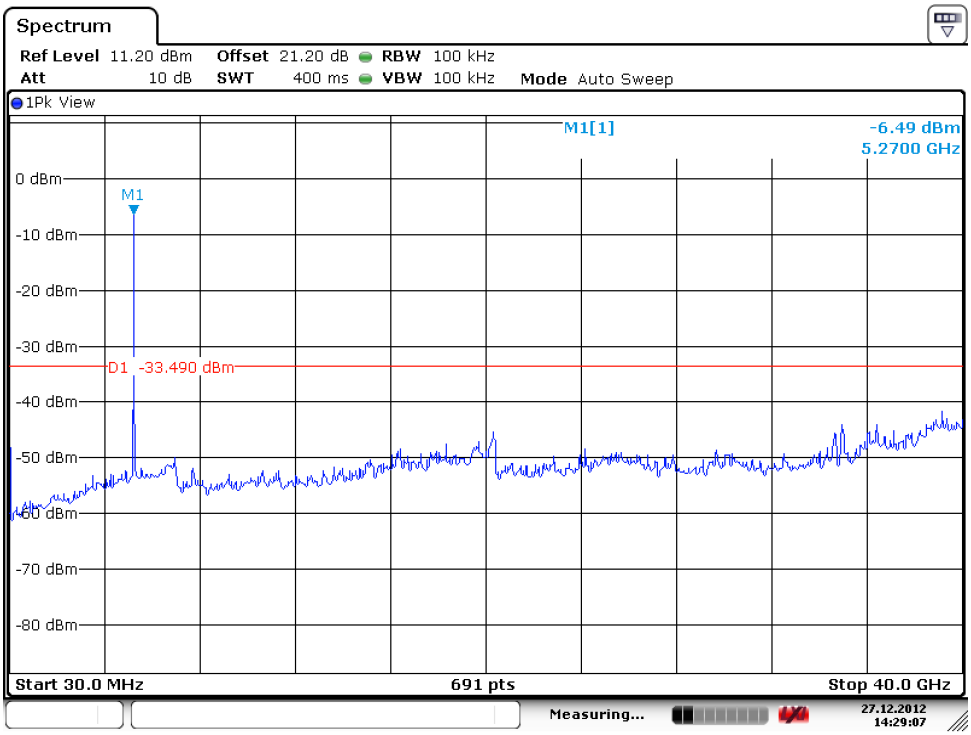
High Channel



Date: 27.DEC.2012 14:19:04

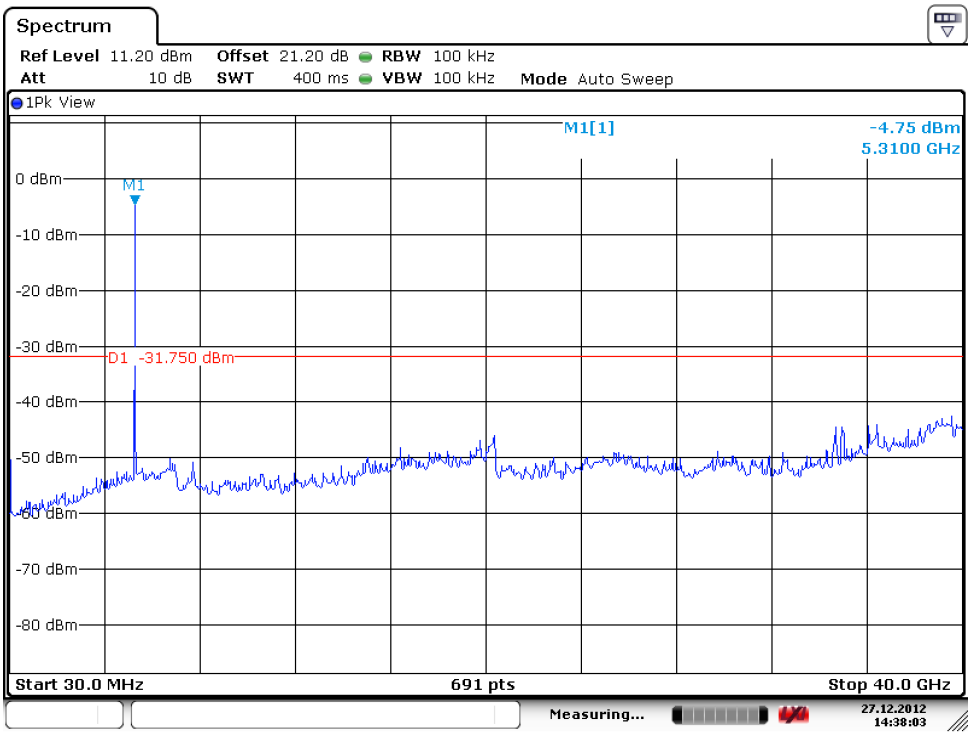
Test Plot of Conducted Emissions(HT40)

Low Channel



Date: 27.DEC.2012 14:29:08

High Channel



Date: 27.DEC.2012 14:38:04

5.1.2.6 Spurious Emission and Frequency Band Edge

RESULT: **Passed**

Date of testing	:	2012-12-31~2013-01-03
Test standard	:	FCC 15.205, FCC 15.209, LP0002 2.7, 2.8
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and LP0002 2.7, must comply with the radiated emission limits specified in FCC 15.209(a) and LP0002 2.8. Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a), LP0002 2.8 and FCC 15.249(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A, C
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The Z Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

5.1.3 802.11a/n Band III

5.1.3.1 26 dB Bandwidth

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

Table 30: Test result of 26dB Bandwidth

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5500	19.971	/	Pass
Mid Channel	5600	19.537	/	Pass
High Channel	5700	19.465	/	Pass

Table 31: Test result of 26dB Bandwidth (HT20)

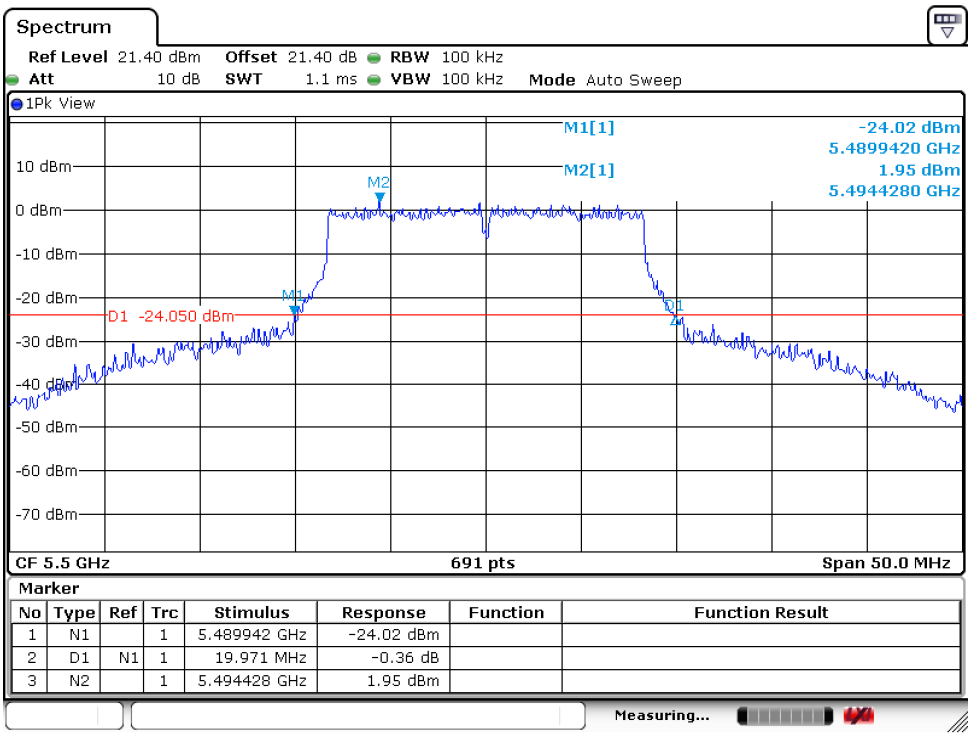
Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5500	20.405	/	Pass
Mid Channel	5600	20.116	/	Pass
High Channel	5700	20.043	/	Pass

Table 32: Test result of 26dB Bandwidth (HT40)

Channel	Channel Frequency (MHz)	26dB Bandwidth (MHz)	Limit (MHz)	Result
Low Channel	5510	39.768	/	Pass
Mid Channel	5590	39.421	/	Pass
High Channel	5690	39.508	/	Pass

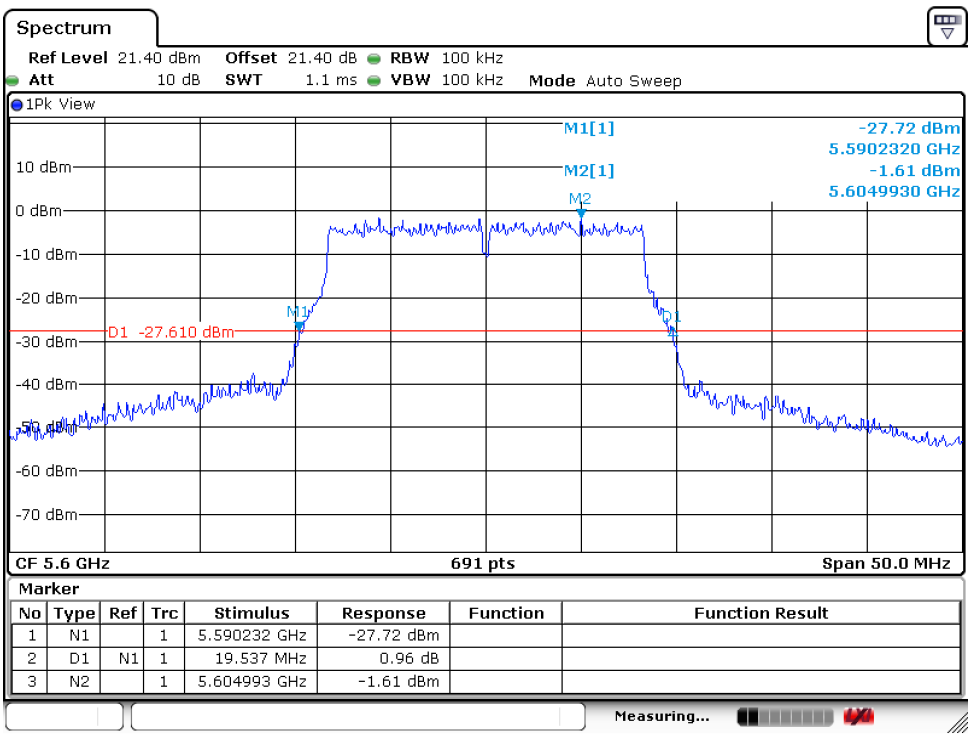
Test Plot of 26dB Bandwidth

Low Channel



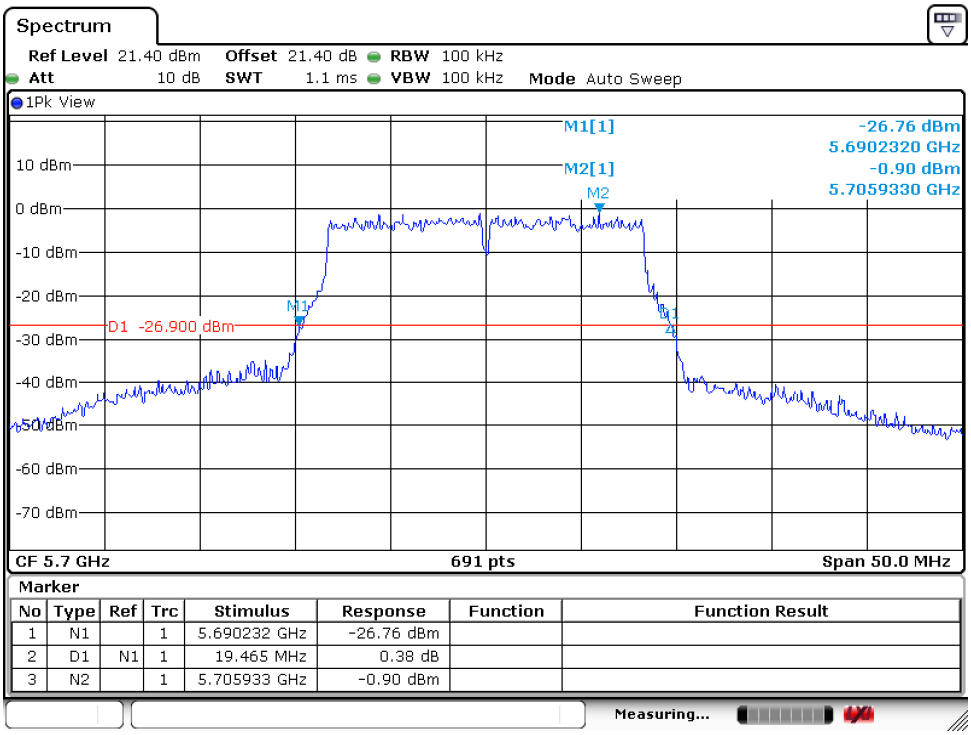
Date: 2.JAN.2013 14:25:02

Middle Channel



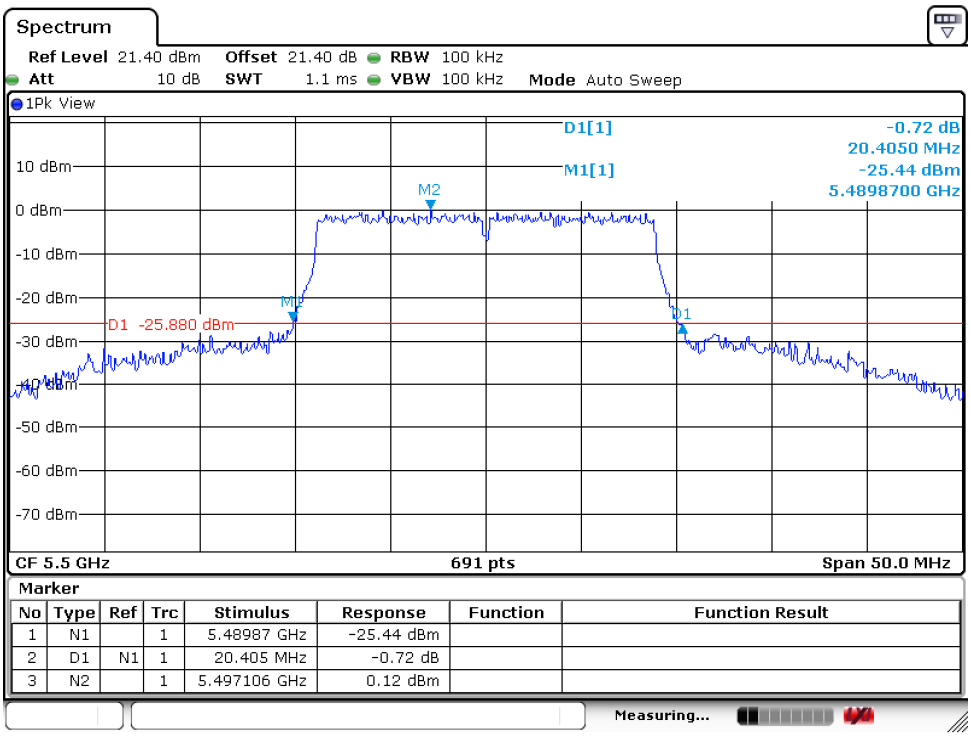
Date: 2.JAN.2013 14:25:51

High Channel



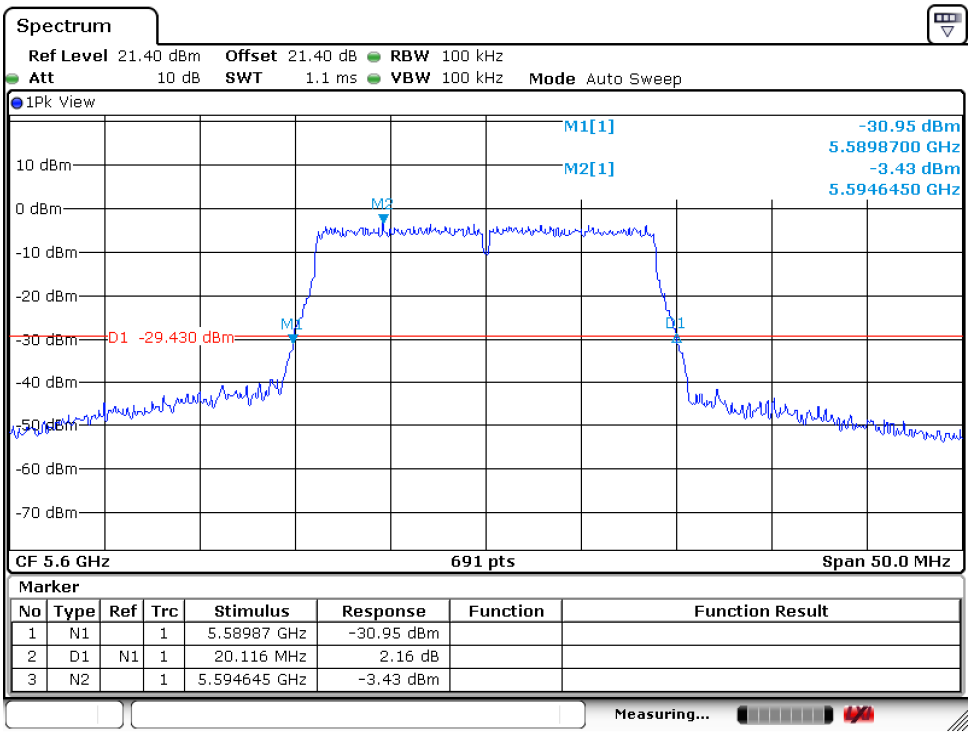
Test Plot of 26dB Bandwidth (HT20)

Low Channel



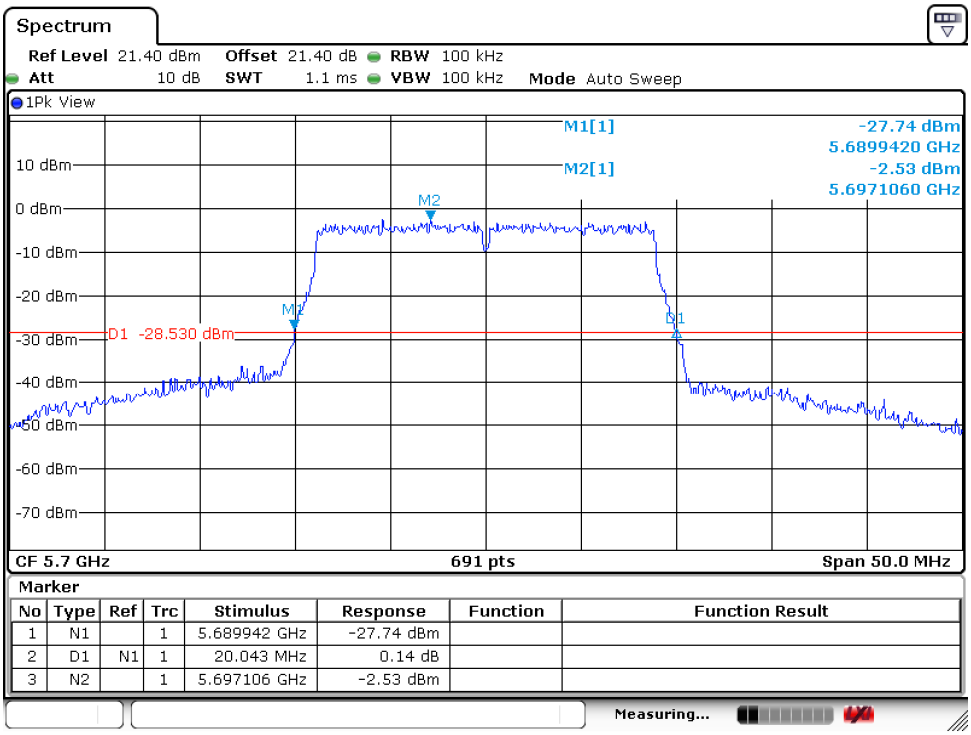
Date: 2.JAN.2013 14:33:33

Middle Channel



Date: 2.JAN.2013 14:34:16

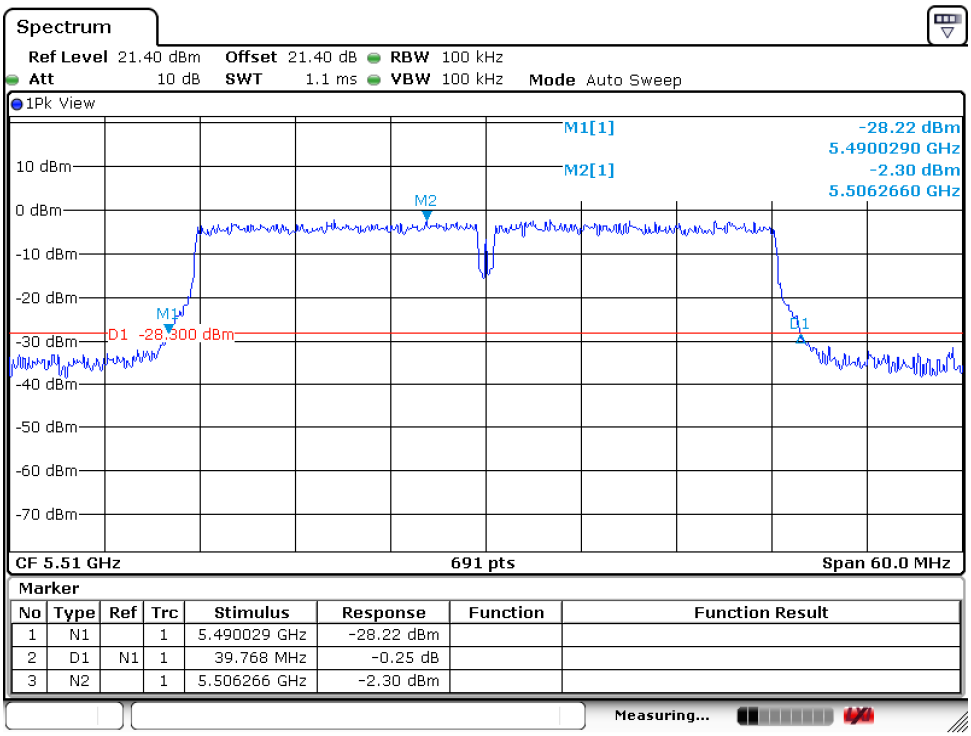
High Channel



Date: 2.JAN.2013 14:34:53

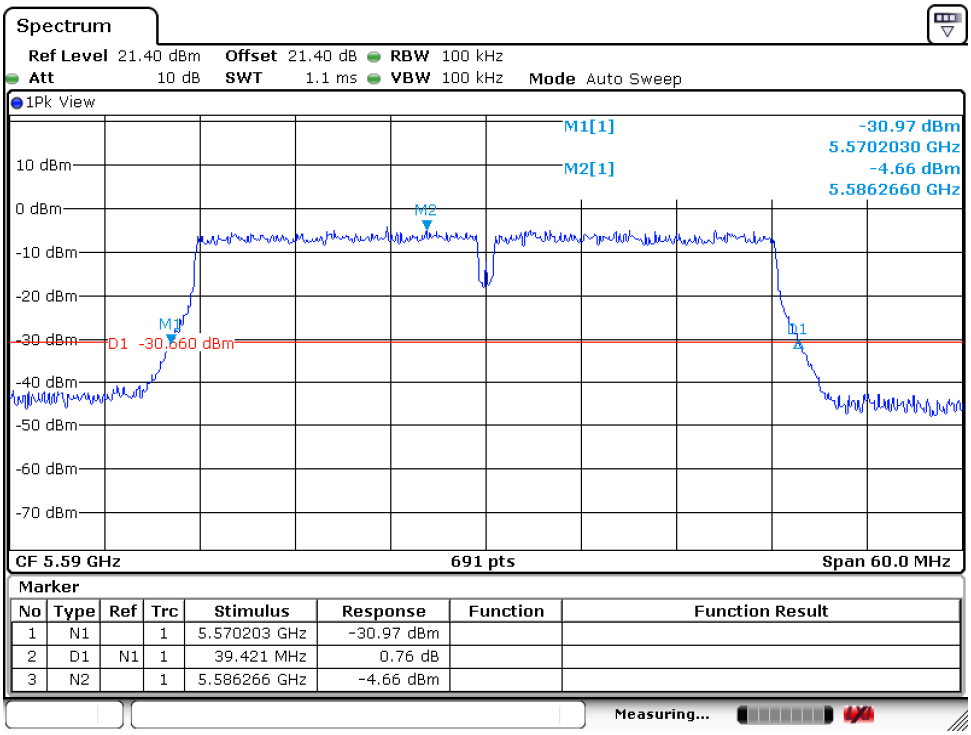
Test Plot of 26dB Bandwidth(HT40)

Low Channel



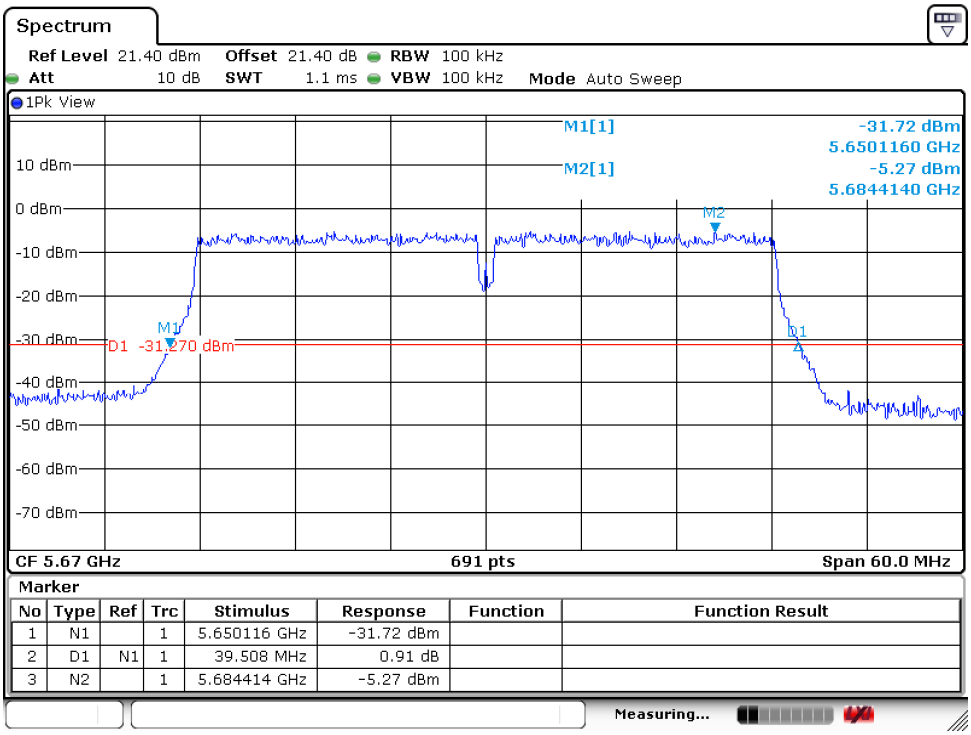
Date: 2.JAN.2013 14:40:05

Mid Channel



Date: 2.JAN.2013 14:40:55

High Channel



Date: 2.JAN.2013 14:41:54

5.1.3.2 Transmit Output Power

RESULT: **Passed**

Test date	:	2013-01-02
Test standard	:	FCC Part 15.407(a), LP0002 4.7.2
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

For the 5.47-5.725 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in MHz. If transmitting antenna sof directional gain greater than 6 dBi are used, both the peak transmit power anjd the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceed 6 dBi.

Table 33: Test result of Transmit Power

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5500	14.18	19.971	24	Pass
Mid Channel	5600	11.85	19.537	23.909	Pass
High Channel	5700	12.89	19.465	23.893	Pass

Table 34: Test result of Transmit Power (HT20)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5500	15.59	20.405	24	Pass
Mid Channel	5600	11.98	20.116	24	Pass
High Channel	5700	12.78	20.043	24	Pass

Table 35: Test result of Transmit Power (HT40)

Channel	Channel Frequency (MHz)	Power (dBm)	26dB Bandwidth (MHz)	Limit (dBm)	Result
Low Channel	5510	15.46	39.768	24	Pass
Mid Channel	5590	12.56	39.421	24	Pass
High Channel	5670	12.28	39.508	24	Pass

5.1.3.3 Power Excursion

RESULT: **Passed**

Date of testing	:	2013-01-02
Test standard	:	FCC Part 15.407(a)(6)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 36: Test result of Power Excursion

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5500	8.52	13	Pass
Mid Channel	5600	8.22	13	Pass
High Channel	5700	8.28	13	Pass

Table 37: Test result of Power Excursion(HT20)

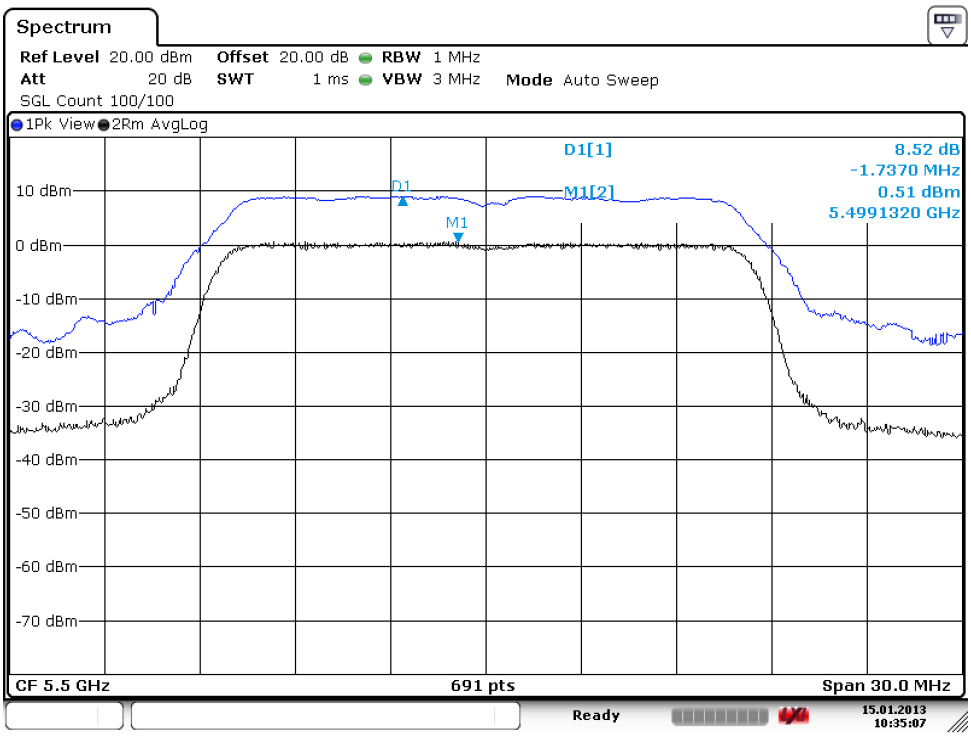
Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5500	8.46	13	Pass
Mid Channel	5600	8.54	13	Pass
High Channel	5700	8.66	13	Pass

Table 38: Test result of Power Excursion(HT40)

Channel	Channel Frequency (MHz)	Power Excursion (dB)	Limit (dB)	Result
Low Channel	5510	8.46	13	Pass
Mid Channel	5590	8.41	13	Pass
High Channel	5670	8.32	13	Pass

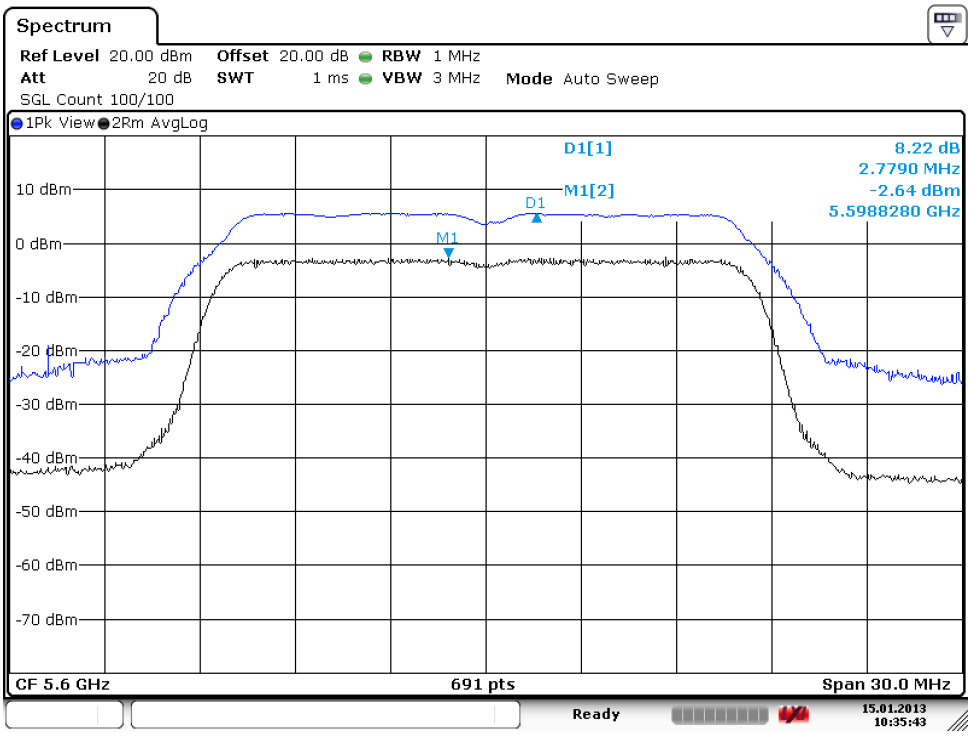
Test Plot of Power Excursion

Low Channel



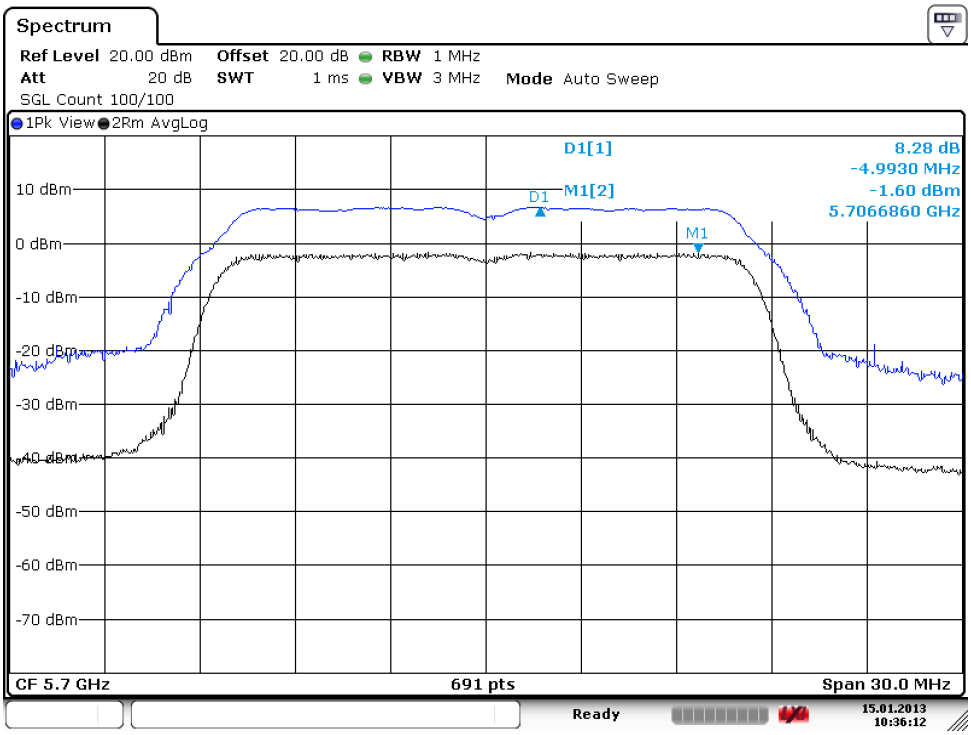
Date: 15.JAN.2013 10:35:07

Middle Channel



Date: 15.JAN.2013 10:35:43

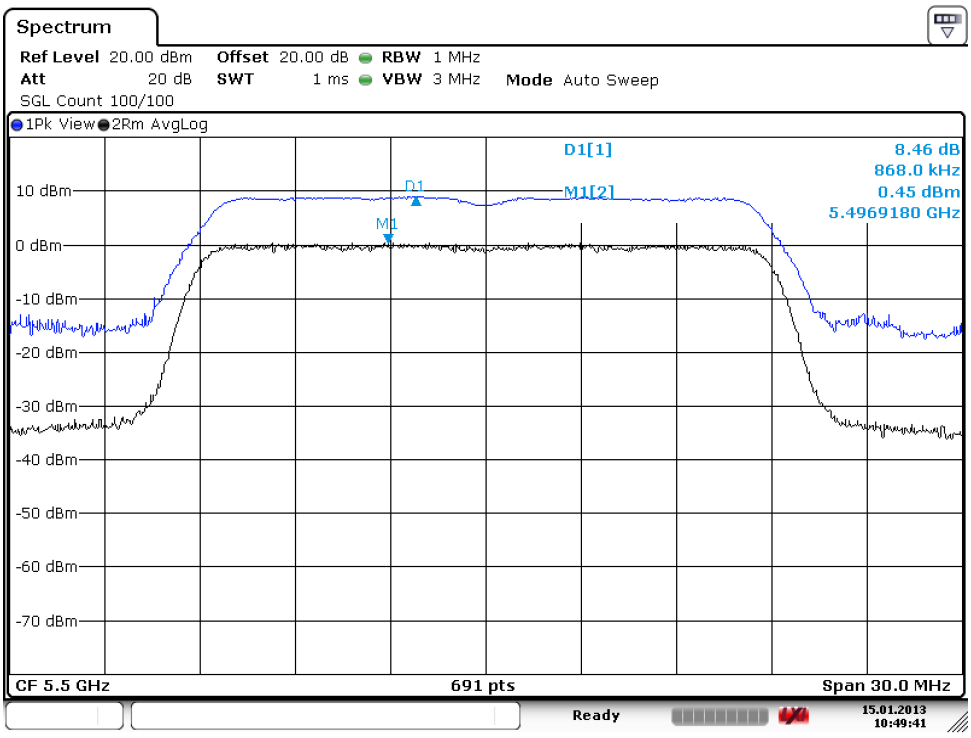
High Channel



Date: 15.JAN.2013 10:36:12

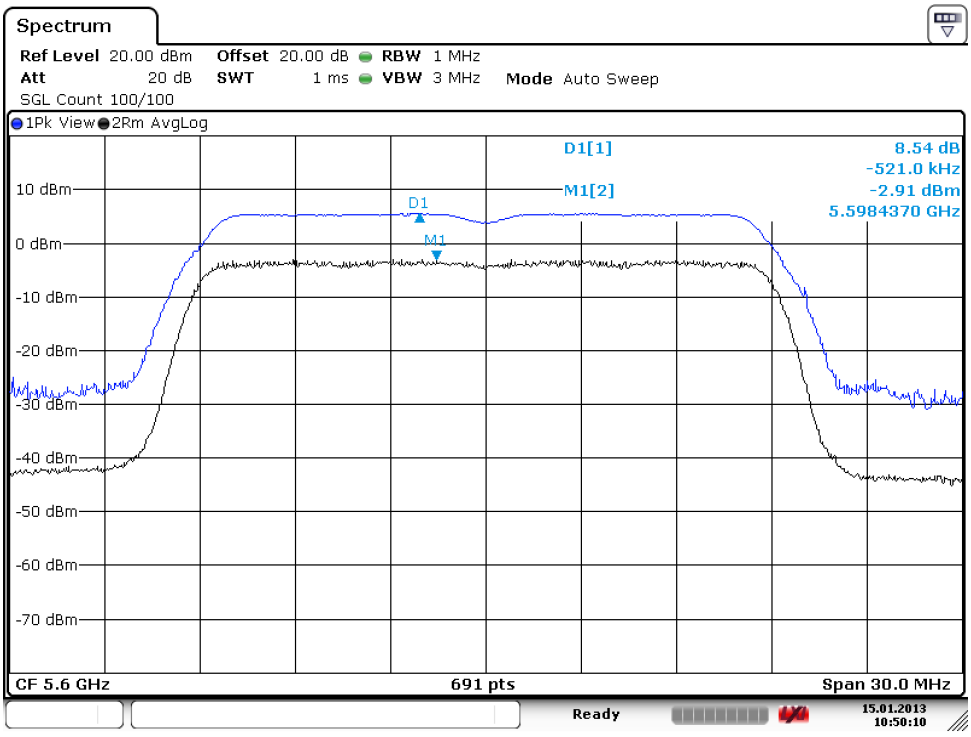
Test Plot of Power Excursion (HT20)

Low Channel



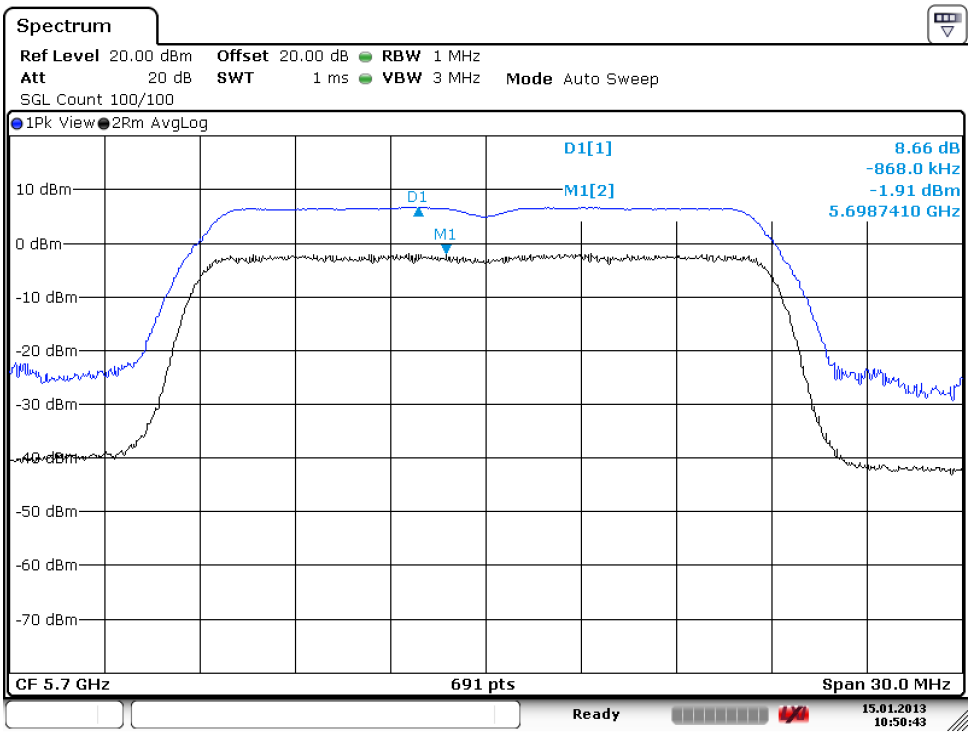
Date: 15.JAN.2013 10:49:41

Middle Channel



Date: 15.JAN.2013 10:50:09

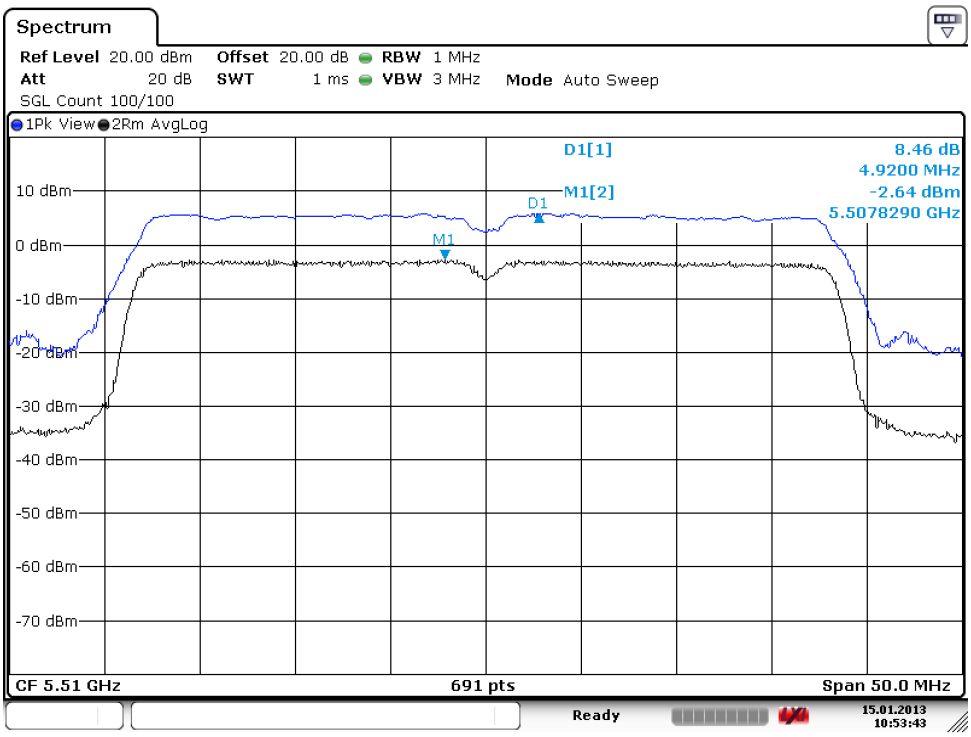
High Channel



Date: 15.JAN.2013 10:50:43

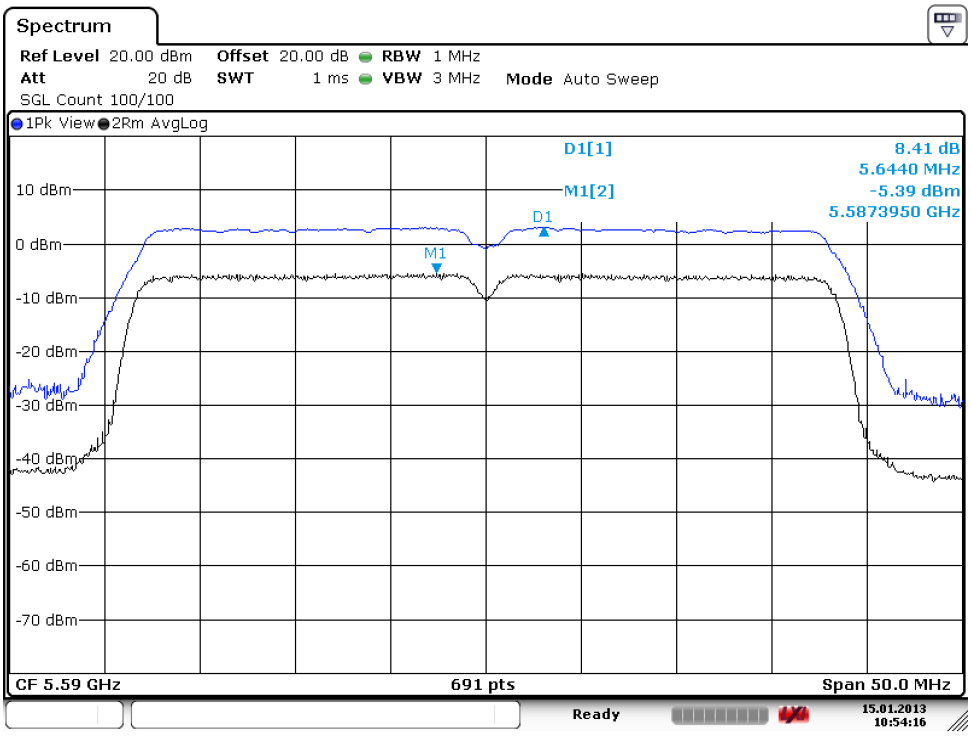
Test Plot of Power Excursion (HT40)

Low Channel



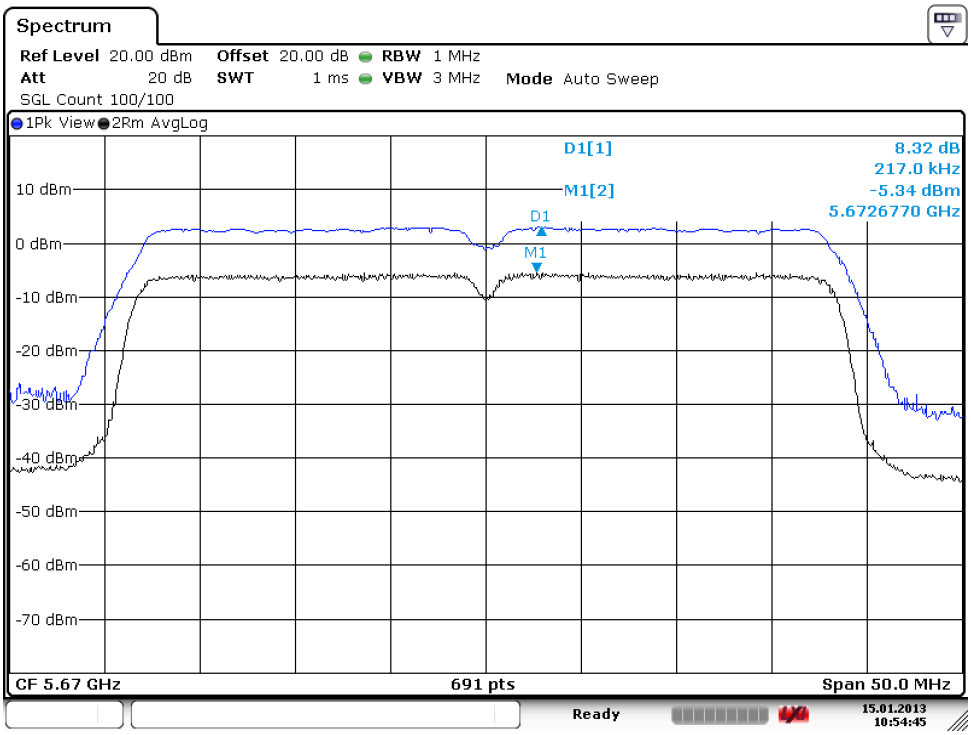
Date: 15.JAN.2013 10:53:43

Mid Channel



Date: 15.JAN.2013 10:54:16

High Channel



Date: 15.JAN.2013 10:54:45

5.1.3.4 Power Spectral Density

RESULT: **Passed**

Date of testing	:	2013-01-02
Test standard	:	FCC Part 15.407(a)(1),(5), LP0002 4.7.2
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 39: Test result of Power Spectral Density

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5500	-13.48	11	Pass
Mid Channel	5600	-16.2	11	Pass
High Channel	5700	-15.22	11	Pass

Table 40: Test result of Power Spectral Density (HT20)

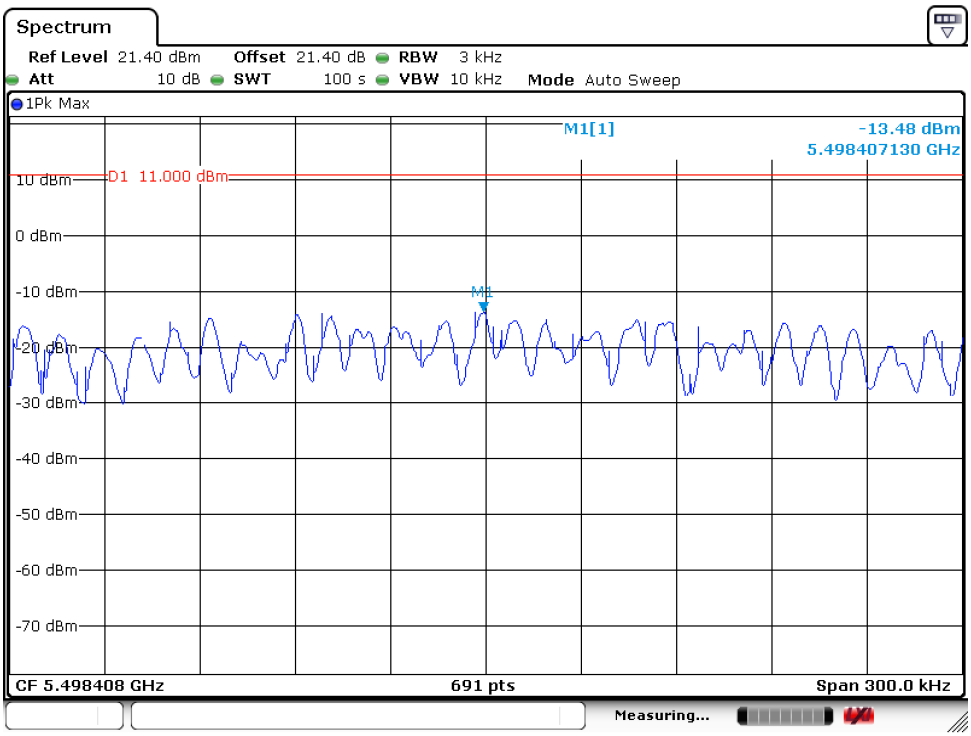
Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5500	-13.69	11	Pass
Mid Channel	5600	-16.56	11	Pass
High Channel	5700	-16.28	11	Pass

Table 41: Test result of Power Spectral Density (HT40)

Channel	Channel Frequency (MHz)	Peak Power Density (dBm)	Limit (dBm)	Result
Low Channel	5510	-14.75	11	Pass
Mid Channel	5590	-17.36	11	Pass
High Channel	5670	-17.49	11	Pass

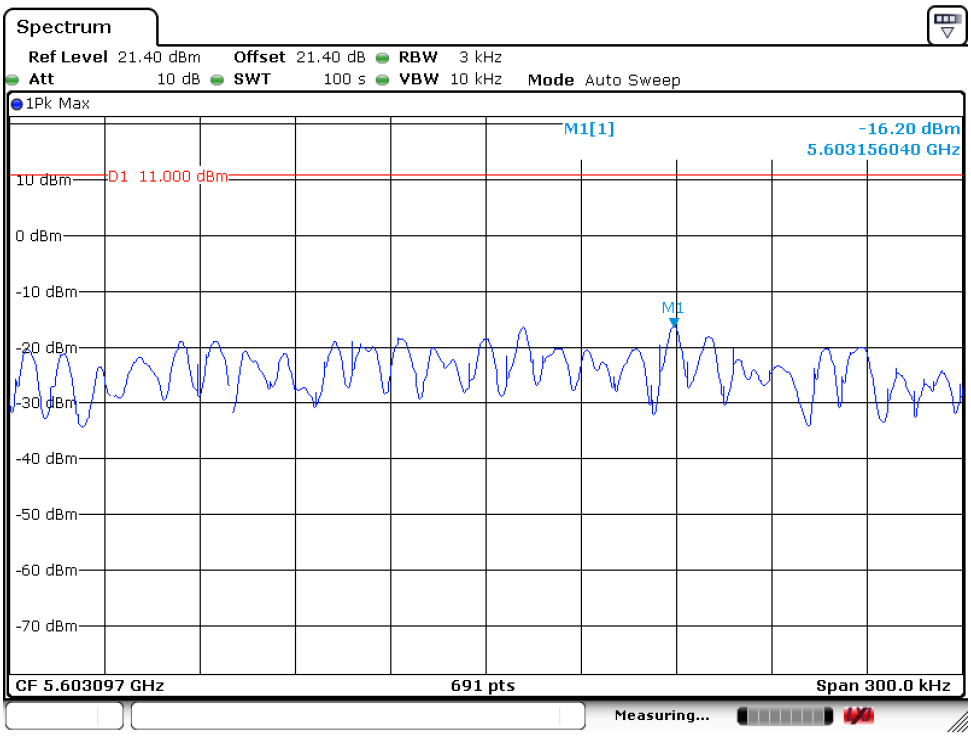
Test Plot of Power Density

Low Channel



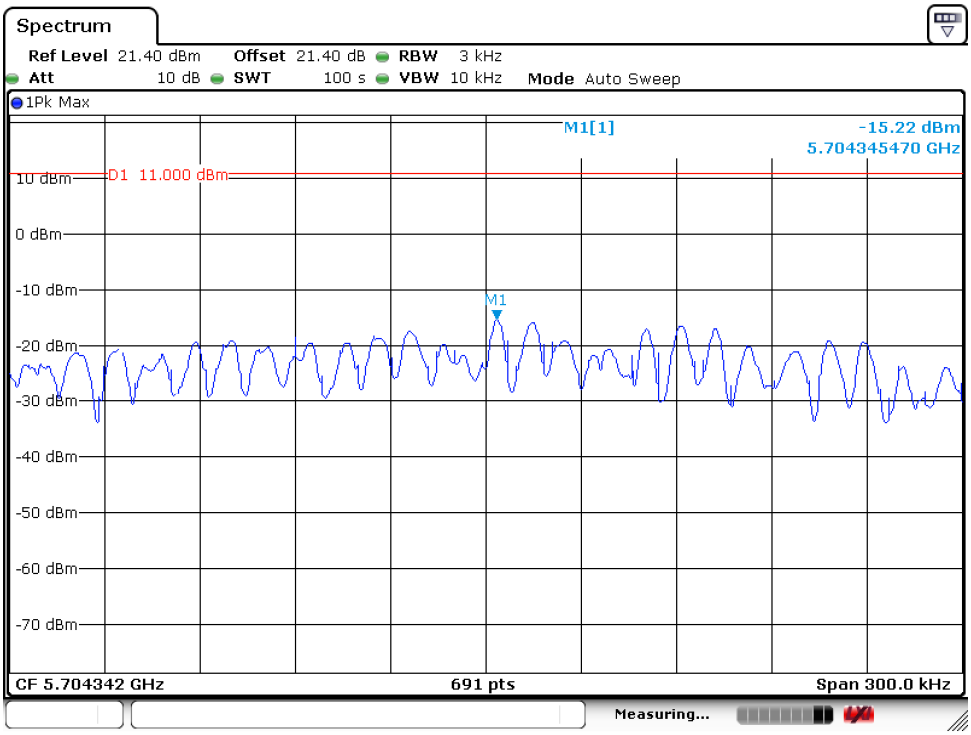
Date: 2.JAN.2013 16:19:39

Middle Channel



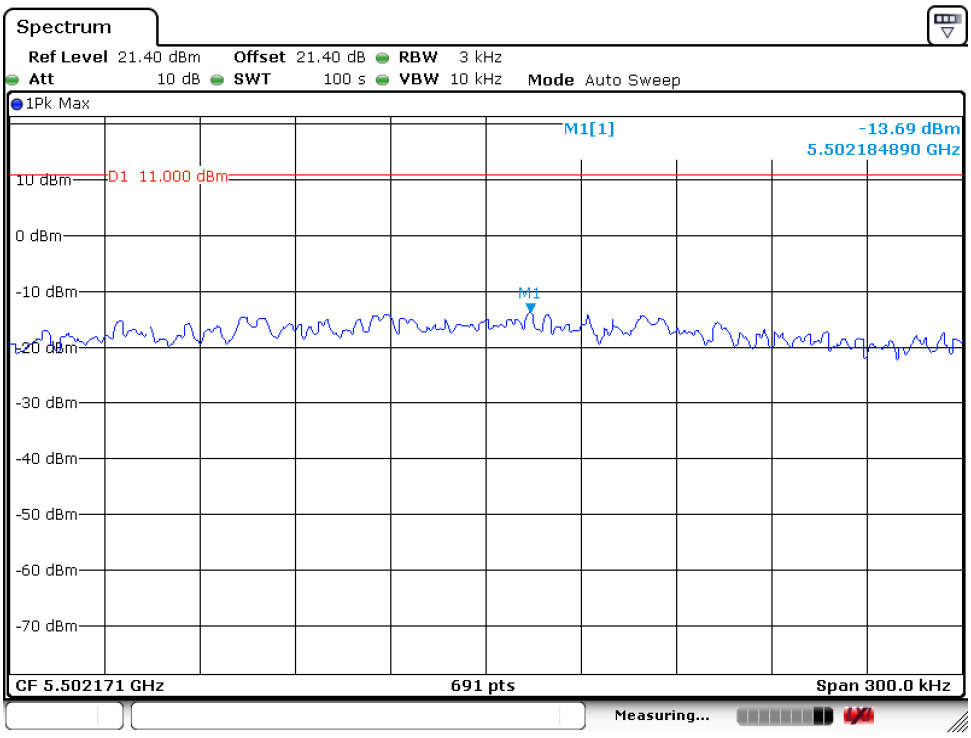
Date: 2.JAN.2013 16:22:14

High Channel



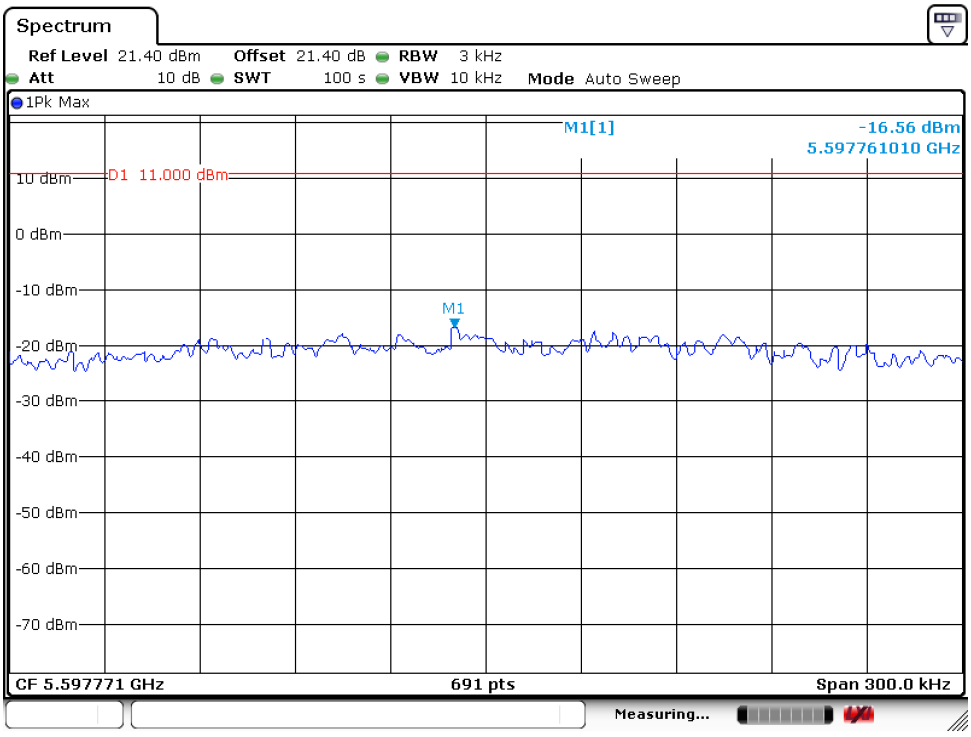
Test Plot of Power Density (HT20)

Low Channel



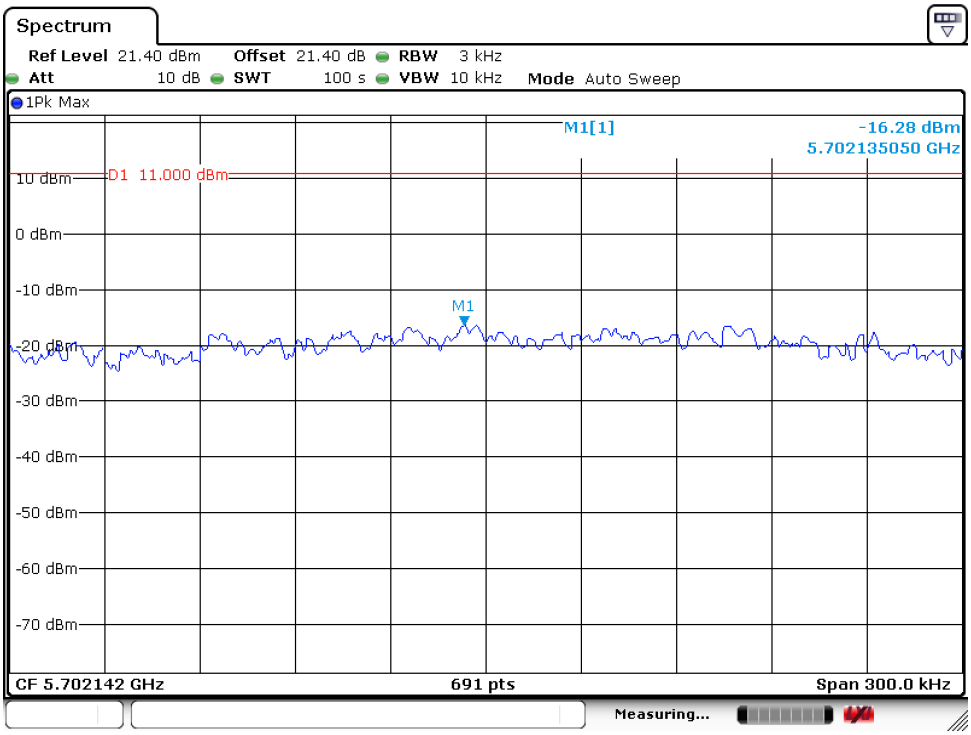
Date: 2.JAN.2013 16:27:08

Middle Channel



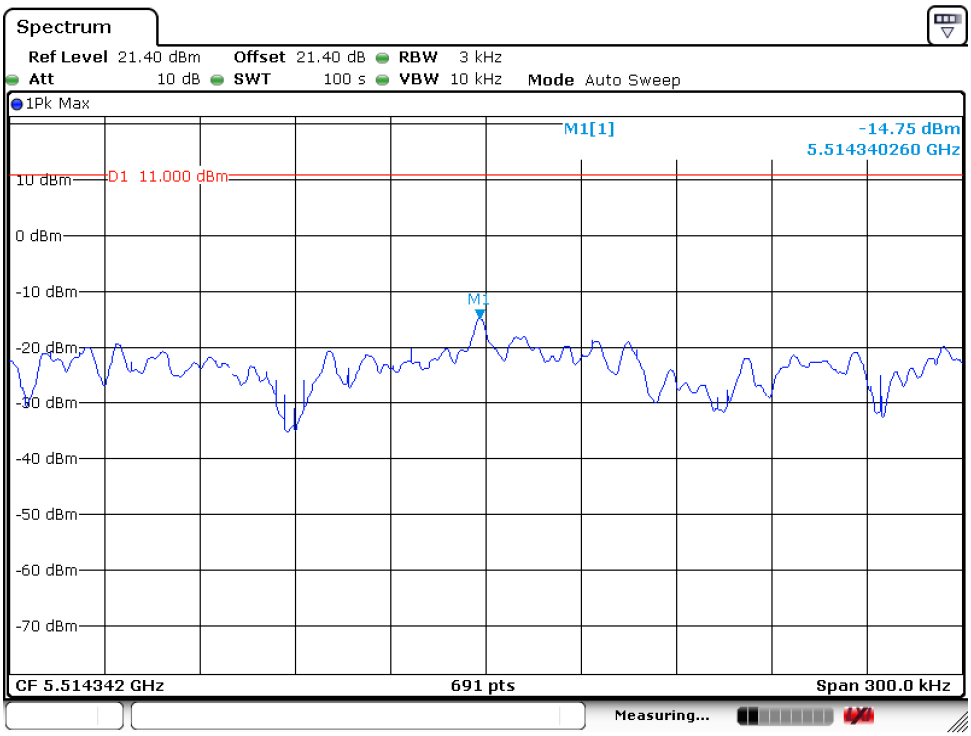
Date: 2.JAN.2013 16:29:41

High Channel



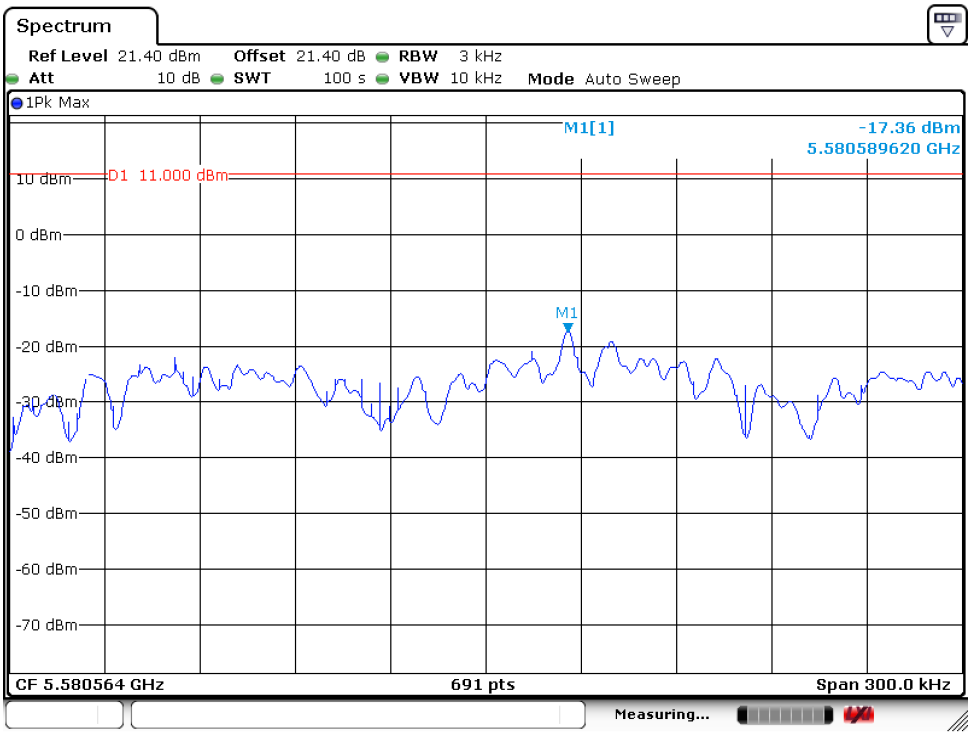
Test Plot of Power Density (HT40)

Low Channel



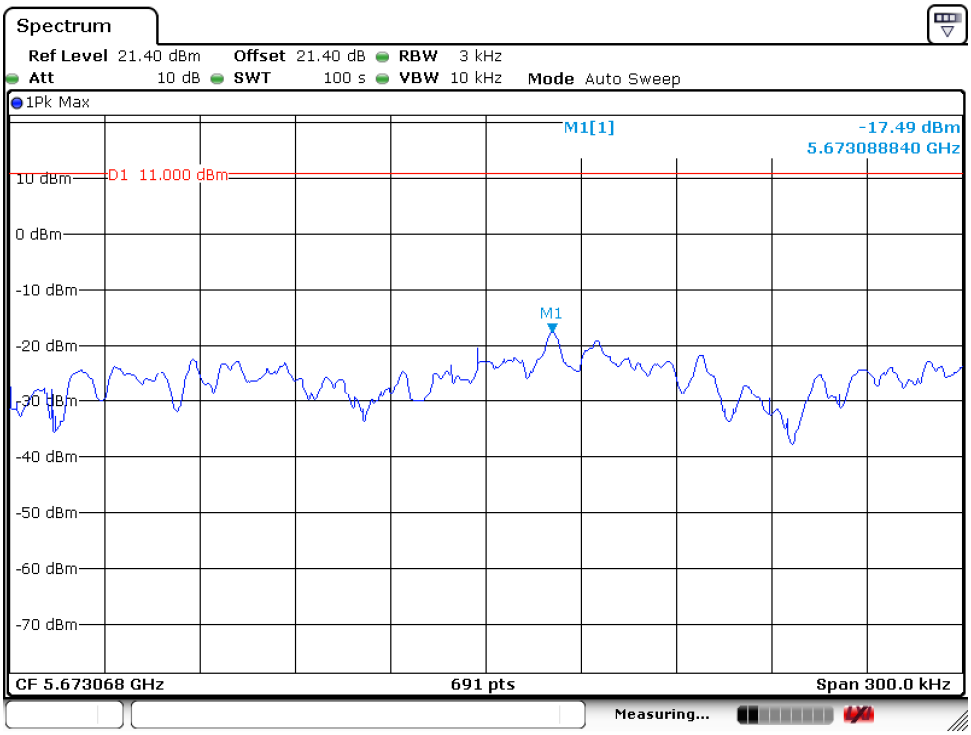
Date: 2.JAN.2013 16:34:45

Mid Channel



Date: 2.JAN.2013 16:37:10

High Channel



5.1.3.5 Conducted spurious emissions

RESULT: **Passed**

Date of testing	:	2012-12-27
Test standard	:	FCC part 15.407(b)(1), LP0002 4.7.3
Limit	:	-27dB
Kind of test site	:	Shielded room

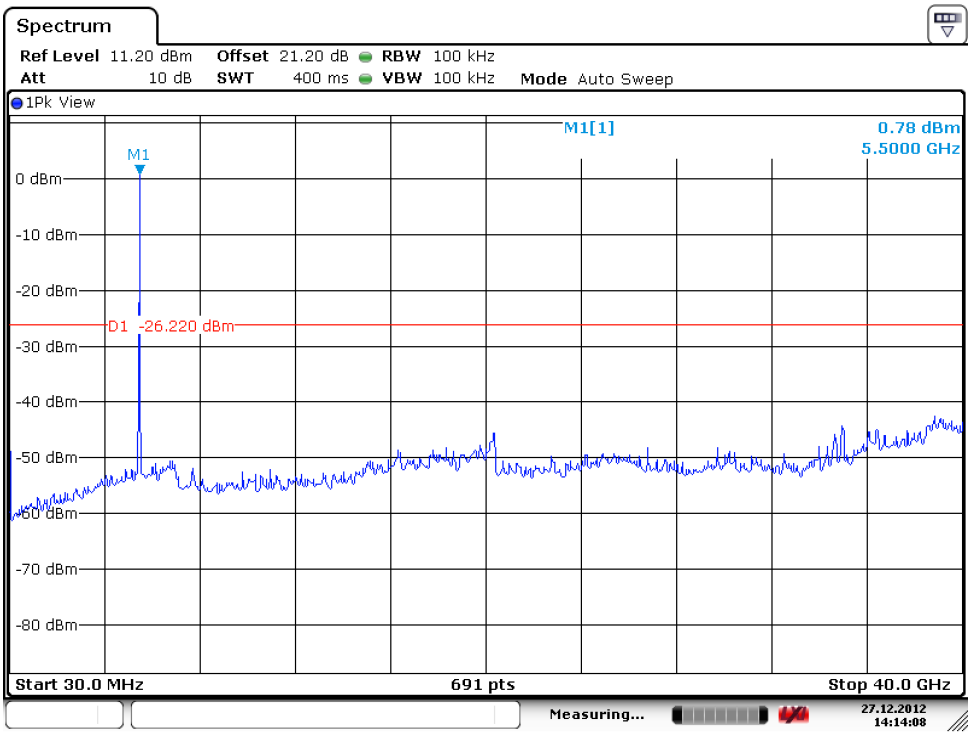
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 27dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

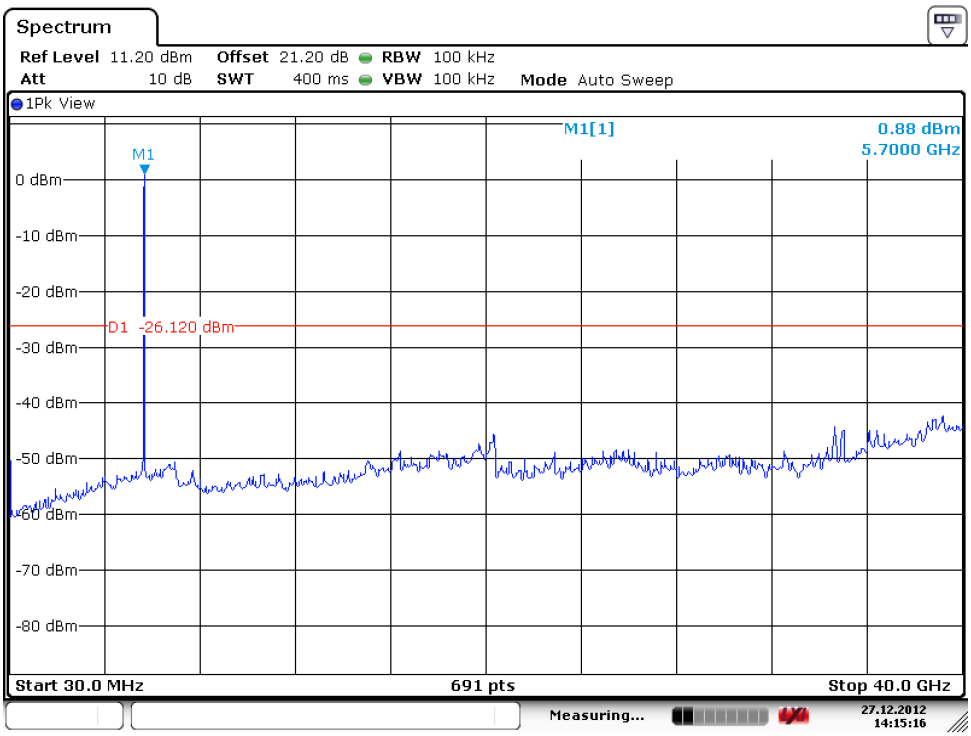
Test Plot of Conducted Emissions

Low Channel



Date: 27.DEC.2012 14:14:08

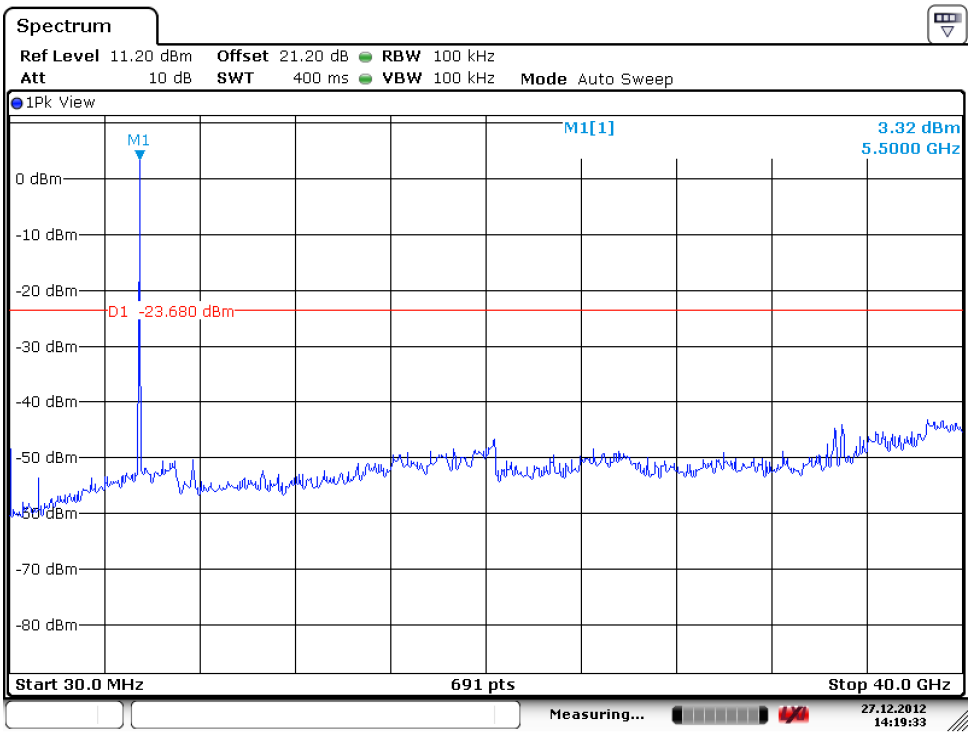
High Channel



Date: 27.DEC.2012 14:15:17

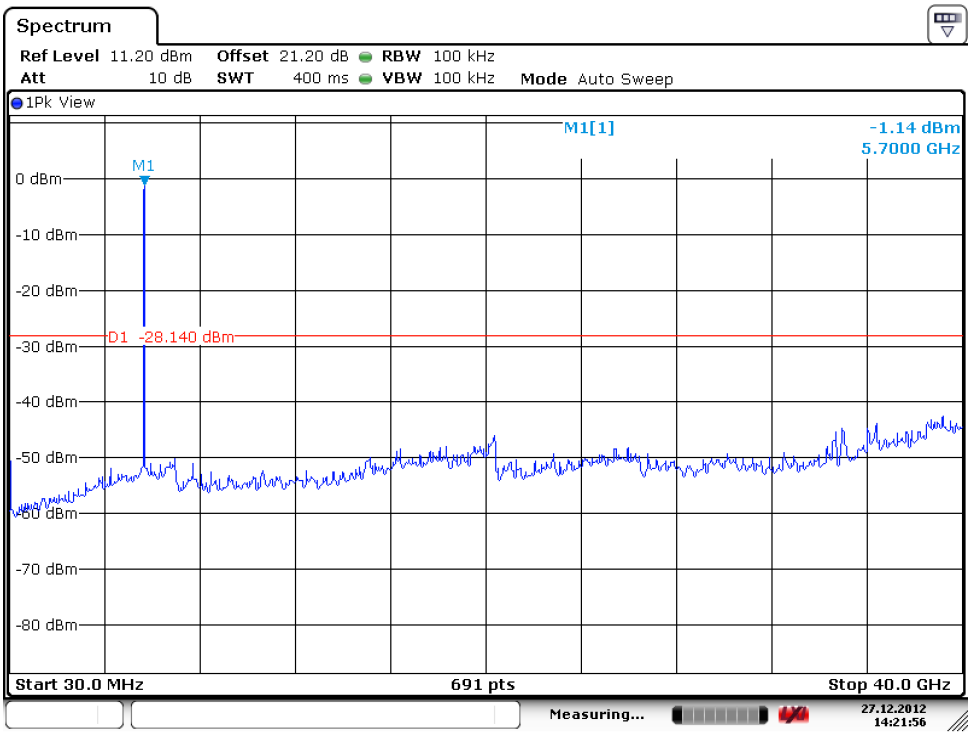
Test Plot of Conducted Emissions(HT20)

Low Channel



Date: 27.DEC.2012 14:19:33

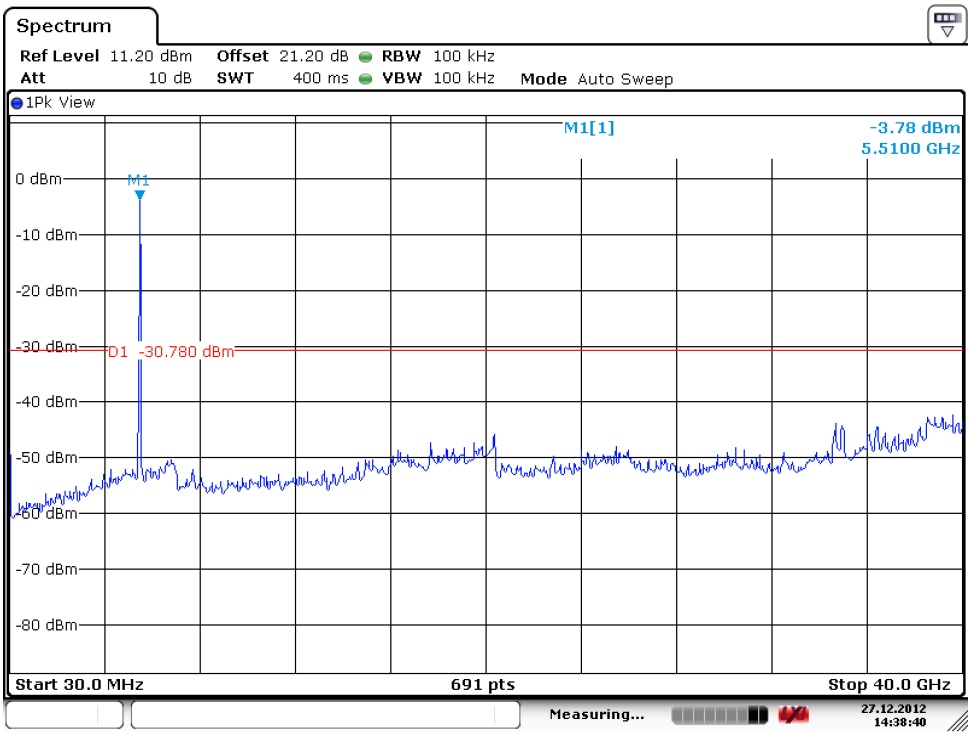
High Channel



Date: 27.DEC.2012 14:21:56

Test Plot of Conducted Emissions(HT40)

Low Channel



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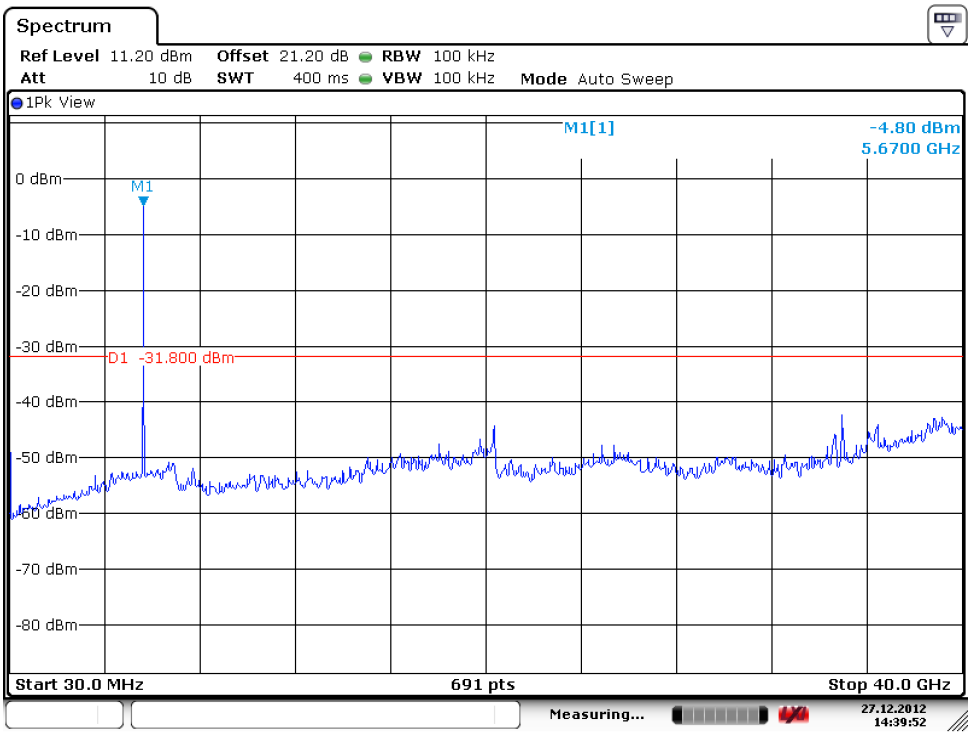
High Channel



Date: 27.DEC.2012 14:39:53

5.1.3.6 Spurious Emission and Frequency Band Edge

RESULT: **Passed**

Date of testing	:	2012-12-31~2013-01-03
Test standard	:	FCC 15.205, FCC 15.209, LP0002 2.7, 2.8
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and LP0002 2.7, must comply with the radiated emission limits specified in FCC 15.209(a) and LP0002 2.8. Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a), LP0002 2.8 and FCC 15.249(a).
Kind of test site	:	3m Semi-Anechoic Chamber

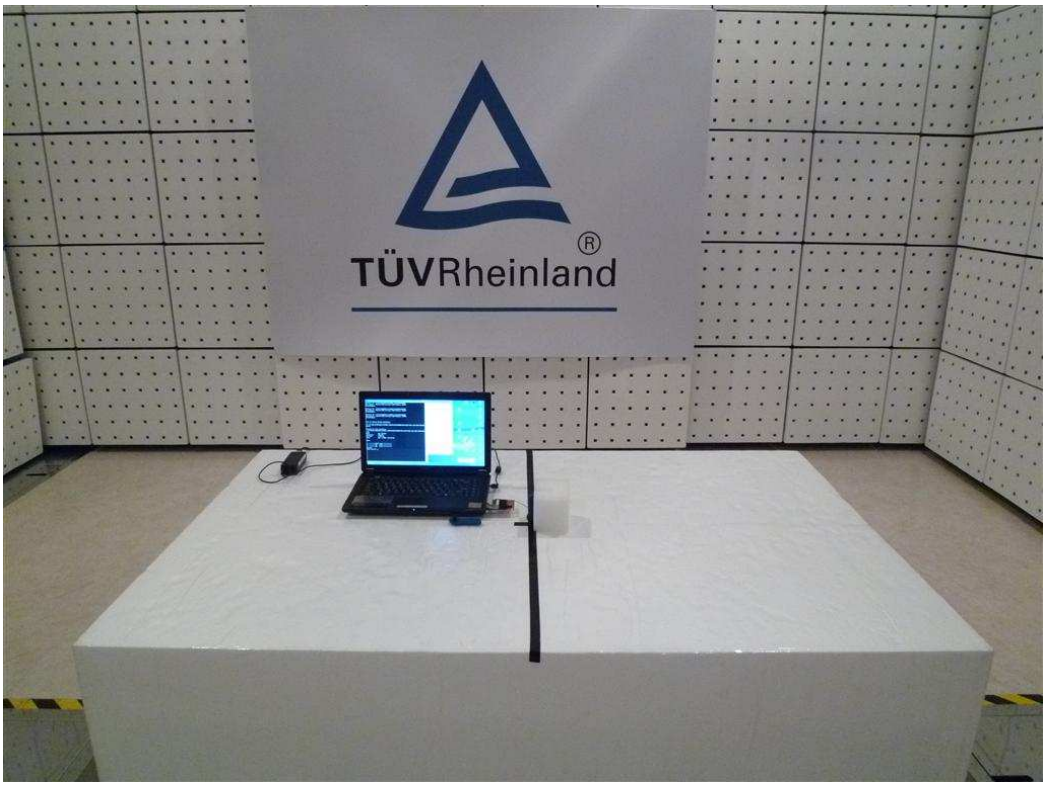
Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A, C
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

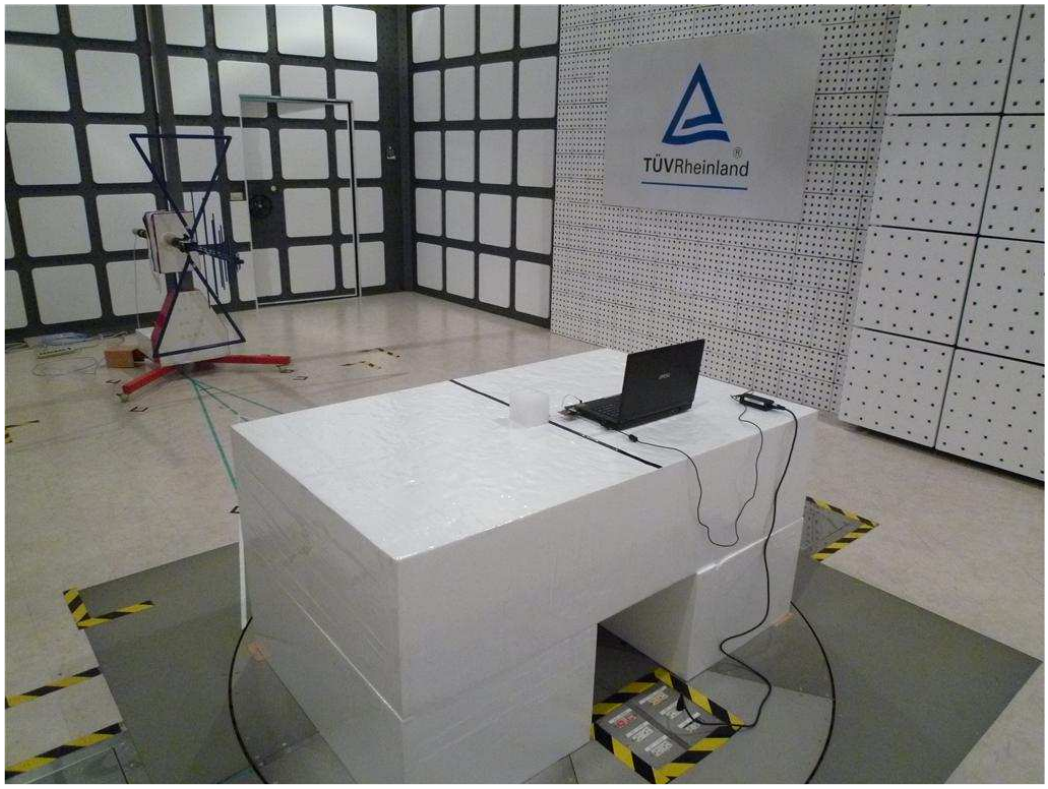
Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The Z Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

Photographs of the Test Set-Up

Photograph 1: Set-up for Spurious Emissions (Front View)

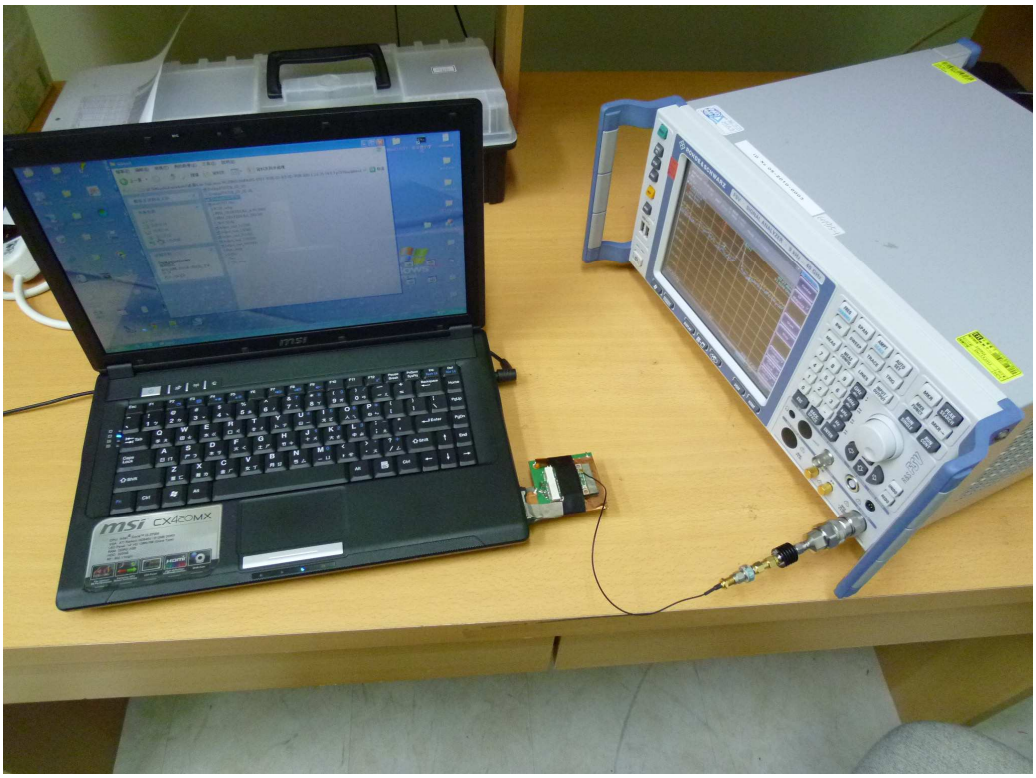


Photograph 2: Set-up for Spurious Emissions (Back View 1)



Photograph 3: Set-up for Spurious Emissions (Back View 2)

Photograph 4: Set-up for Conducted testing



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