



Custom EMC Test Report

Covering Limited or Customer Requirements For

AIR-RM1252A-A-K9 5GHz 802.11a MIMO Radio Module

FCC ID: LDK102061

Against the following Specifications:

CFR47 Part 15.247(a)

CFR47 Part 15.247(a)(2)

CFR47 Part 15.247a3 (LP0002 3.10.6.2.2, RSS210)

CFR47 Part 15.407(a)6

CFR47 Part 15.407a (LP0002 4.7.2, RSS210)

Conducted Spurious Emissions

Cisco Systems

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San Jose, CA 95134

Author: James Nicholson

Approved By:

Title:

This report replaces any previously entered test report under EDCS - 571566



This test report has been electronically authorized and archived using the CISCO Engineering Document Control system.

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Section 1: Overview

1.1 Test Summary

samples were assessed against the tests detailed in section 3 under the requirements of the following specifications:

Emission	Immunity
CFR47 Part 15.247(a) CFR47 Part 15.247(a)(2) CFR47 Part 15.247a3 (LP0002 3.10.6.2.2, RSS210) CFR47 Part 15.407(a)6 CFR47 Part 15.407a (LP0002 4.7.2, RSS210) Conducted Spurious Emissions CFR47 Part 15: 2005 CFR47 Part 15: 2005 (CAN/CSA-CISPR 22-02)	N/A

The specifications listed above represent actual tests performed to demonstrate compliance against the specifications and basic standards listed on the front cover of this report. This list is not a one to one match to the front cover for one or more of the following reasons.

1. Basic standards call up many different test phenomena specifications such as the 61000-4-X series. The basic standards define which elements and levels shall be applied from these specifications and as such it is not appropriate to list the individual specifications on the front cover.
2. A Standard listed on the front cover may be required in a particular country but is not appropriate for the particular technologies included in the equipment under test. E.g. You cannot test a DC product to the mains Harmonics requirements in EN61000-3-2. See section 3.2.
3. Test results against a particular standard or specification may be included in a different test report. See section 3.2 for an EDCS reference of this data.
4. Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
5. Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.
6. Testing may have been performed to an equivalent test that satisfies the requirements of the standards and specifications listed on the front cover of the report. See section 3.2.
7. Where radiated emissions testing has been performed to EN55022/CISPR22 the additional requirements of VCCI: V- 3/2006.04, EN55022: 1994 +A1/2 and CAN/CSA- CISPR 22-02 have also been evaluated unless otherwise stated.
8. Testing to the requirements of CFR47 Part 15 was performed against the CISPR22 limits. The results are therefore deemed satisfactory evidence of compliance with Industry Canada Interference Causing Equipment Standard ICES-003.
9. Where assessment has been performed to CISPR24, all the applicable test requirements may have not been covered. Refer to the results section for the tests performed.

Notes:

- 1) Where a specification listed on the front cover of this report has deviations from the basic standards listed above, the additional technical requirements of the specification were also assessed.
- 2) Where appropriate, Cisco may have substituted a later revision of a basic standard to those referenced in the specification on the front sheet of this test report. This decision was based upon improved test methodology and repeatability and/or where the newer revision represented a more stringent test.
- 3) Where relevant, testing has been carried out to the requirements of both EN and IEC Specifications. This was possible because of the similarities of the test methods involved and the Cisco EMC test procedures.



Section 2: Assessment Information

2.1 General

This report contains an assessment of an apparatus against Electromagnetic Compatibility Standards based upon tests carried out on the samples submitted. The testing was performed by and for the use of Cisco systems Inc:

With regard to this assessment, the following points should be noted:

- a) The results contained in this report relate only to the items tested and were obtained in the period between the date of the initial assessment and the date of issue of the report. Manufactured products will not necessarily give identical results due to production and measurement tolerances.
- b) The apparatus was set up and exercised using the configuration and modes of operation defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report and the Test Assessment Plan (TAP).
- d) All testing was performed under the following environmental conditions:

Temperature	15°C to 35°C (54°F to 95°F)
Atmospheric Pressure	860mbar to 1060mbar (25.4" to 31.3")
Humidity	10% to 75*%

*[Where applicable] For ESD testing the humidity limits used were 30% to 60% and for EFT/B tests the humidity limits used were 25% to 75%.
- e) All AC testing was performed at one or more of the following supply voltages:

110V 60 Hz (+/-20%)
220V 50 Hz (+/-20%)

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2.2 Date of start of testing

11-Dec-2006

2.3 Report Issue Date

Cisco uses an electronic system to issue, store and control the revision of test reports. This system is called the Engineering Document Control System (EDCS). The actual report issue date is embedded into the original file on EDCS. Any copies of this report, either electronic or paper, that are not on EDCS must be considered uncontrolled

2.4 Testing facilities

This assessment was performed by:

Testing Laboratory

Cisco Systems, Inc.,	Cisco Systems, Inc.
4125 Highlander Parkway	170 West Tasman Drive
Richfield, OH 44286	San Jose, CA 95134
USA	USA

Test Engineers

James Nicholson

2.5 Equipment Assessed (EUT)

AIR-RM1252A-A-K9 5GHz 802.11a MIMO Radio Module.

2.6 EUT Description

The AIR-RM1252A-A-K9 5GHz 802.11a MIMO radio module operates in the AIR-AP1250 series access point, and may operate simultaneously with the AIR-RM1252G-A-K9 2.4GHz 802.11b/g MIMO radio module. The following modes of operation are supported. The modes are further defined in the radio Theory of Operation. The modes included in this report represent the worst case data for all modes.

Legacy OFDM, Single Antenna, 6 to 54 Mbps
Legacy OFDM, Dual Antennas, 6 to 54 Mbps
Legacy OFDM, Dual Antennas with Beam Forming, 6 to 54 Mbps
HT- 20 MHz, Dual Antennas, MCS0 to MCS15
Duplicate 2x20 MHz, Dual Antennas, 6 Mbps
HT- 40 MHz, Dual Antennas, MCS0 to MCS15

The following antennas are supported by this product. The antenna is bold was tested as a representative sample of all.

AIR-ANT5135D-R	3.5 dBi Black Articulating Dipole Antenna with RP-TNC Connectors
AIR-ANT5135DG-R	3.5 dBi Grey Non-Articulating Dipole Antenna with RP-TNC Connectors
AIR-ANT5140V-R	4 dBi Omni-Directional Antenna with RP-TNC Connectors
AIR-ANT5145V-R	4.5 dBi Diversity Omni-Directional Antenna with RP-TNC Connectors
AIR-ANT5160V-R	6 dBi Omni-Directional Antenna with RP-TNC Connectors



2.7 Scope of Assessment

Tests have been performed in accordance with the relevant Test and Assessment Plan (TAP), a copy of which is contained in Appendix E of this report, and the relevant Cisco EMC compliance test procedures (ENG-23438).

2.8 Units of Measurement

The units of measurements defined in the appendices are reported in specific terms, these are test dependent. Where radiated measurements are concerned these are defined at a particular distance. Basic voltage measurements are defined in dBuV and current in dBuA.

As an example, the basic calculation for all measurements is as follows:

$$\text{Emission level [dBuV]} = \text{Indicated voltage level [dBuV]} + \text{Cable Loss [dB]} + \text{Other correction factors [dB]}$$

The components of factors are dependent upon the exact test configurations [see test equipment lists for further details] and may include:-

Antenna Factors, Pre Amplifier Gain, LISN Loss, Pulse Limiter Loss, Current Probe Factors.

Note: to convert the results from dBuV/m to uV/m use the following formula:-

$$\text{Level in uV/m} = \text{Common Antilogarithm } [(X \text{ dBuV/m})/20] = Y \text{ uV/m}$$

2.9 Customer/Customer Report Template Revision No.

Revision: RFCR4.0

* Not intended to be used for WorldWide or GR1089 approvals.

Section 3: Results Summary

The following tables summarize the results and detail the assessment in terms of:

- The test type.
- The specification and class or level applied.
- The mode of operation of the sample assessed.

Refer to section 4.2 and 4.3 for Mode and System details. **Original test data is stored in ERAT Job# 4425.**

3.1 Test Result Summary

Conducted emissions

Test Number (Spec Id)	Basic Standard	Freq Range	Test Details / Comments	Mode	Systems Tested	Result
25260 (652)	Conducted Spurious Emissions Applied to: RF Ports Class: N/A	30MHz - xGHz	Also complies with RSS 210, LP0002	1	1	Pass
25234 (650)	CFR47 Part 15.247(a)(2) Applied to: RF Ports Class: N/A	2400 - 2483.5MHz	6dB Bandwidth, also complies with RSS 210, LP0002	1	1	Pass
25232 (651)	CFR47 Part 15.247(a) Applied to: RF Ports Class: N/A	2400 - 5850MHz	26dB Bandwidth also complies with RSS 210, LP0002.	1	1	Pass
25267 (649)	CFR47 Part 15.407(a)6 Applied to: RF Ports Class: N/A	5150 - 5725MHz	Peak Excursion also complies with LP0002, RSS 210	1	1	Pass
25253 (653)	CFR47 Part 15.247a3 (LP0002 3.10.6.2.2, RSS210) Applied to: RF Ports Class: N/A	2400 - 2483.5MHz	Power Spectral Density	1	1	Pass
25251 (474)	CFR47 Part 15.407a (LP0002 4.7.2, RSS210) Applied to: RF Ports Class: N/A	5150 - 5725MHz	Peak Power Spectral Density (LP0002 limit 4dBm from 5250-5350MHz)	1	1	Pass
24973 (648)	Restricted Bandedge Measurements Applied to: Enclosure Class: B	2.4 - 5.825GHz	CFR47 Part 15.205, CFR47 Part 15.209, LP0002, RSS210	1	1	Pass
25010 (647)	Radiated Spurious Emissions Applied to: Enclosure Class: B	30MHz-1.0GHz	CFR47 Part 15.109, CFR47 Part 15.247, CFR47 Part 15.407, RSS-210, LP0002	1	1	Pass
24621 (708)	CFR47 Part 15: 2005 (CAN/CSA-CISPR 22-02) Applied to: AC Power Line Class: B	0.15- 30MHz	Test procedure must follow ANSI C63.4 and U.S line voltages must be used (e.g 110V 60Hz).	1	1	Pass
24558 (714)	CFR47 Part 15: 2005 Applied to: Enclosure Class: B	1-5.334GHz	N/A	1	1	Pass
24538 (713)	CFR47 Part 15: 2005 Applied to: Enclosure Class: B	30MHz- 1GHz	N/A	1	1	Pass



Section 4: Sample Details

Note: Each sample was evaluated to ensure that its condition was suitable to be used as a test sample prior to the commencement of testing. Please also refer to the "Justification for worst Case test Configuration" section of this report for further details on the selection of EUT samples.

4.1 Sample Details (Photographs of the test samples, where appropriate can be found in appendix H)

Sample No.	Equipment Details	Part Number	Manufacturer	Hardware Rev.	Firmware Rev.	Software Rev.	Serial Number
S01	AIR-RM1252A-A-K9	73-10425-05	Cisco Systems	NA	NA	NA	RFD10410051
S02	AIR-AP1250	800-270630-05	Cisco Systems	NA	NA	NA	FOC10391YLB
S03	AIR-ANT5160V-R	NA	Cisco Systems	NA	NA	NA	NA
S04	AIR-PWR-SPLY1	341-0211-01	Cisco Systems	NA	NA	NA	DTH1030902Z

4.2 System Details

System #	Description	Samples
1	EUT	S01, S02, S03 and S04

4.3 Mode of Operation Details

Mode#	Description	Comments
1	Continuous Transmitting	Continuous Transmitting

Section 5: Modifications

5.1 Sample Modifications Performed During Assessment

No modifications were performed during assessment.

**Appendix A: Emission Test Results****Testing Laboratory:** Cisco Systems, Inc., 4125 Highlander Parkway, Richfield, OH, USA**Average Output Power**

5GHz Average Power with up to 6dBi Antennas

Frequency	Mode	Data Rate	Target Power Level			Actual Power Level
			Tx A	Tx B	Total	Total
5180	Dual	54	11	11	14	13.5
5180	Duplicate	6	11	11	14	13.0
5260	Dual	54	17	17	20	20.0
5260	Duplicate	6	17	17	20	19.4
5320	Dual	54	17	17	20	20.3
5320	Duplicate	6	11	11	14	16.6
5500	Dual	54	17	17	20	20.0
5500	Duplicate	6	14	14	17	16.1
5600	Dual	54	17	17	20	19.9
5600	Duplicate	6	17	17	20	20.4
5680	Duplicate	6	17	17	20	19.4
5700	Dual	54	17	17	20	19.4
5745	Dual BF	54	17	17	20	19.9
5745	Duplicate	6	17	17	20	19.5
5785	Dual BF	54	17	17	20	20.0
5785	Duplicate	6	17	17	20	19.6
5805	Duplicate	6	17	17	20	19.5
5825	Dual BF	54	17	17	20	20.1



6dB Bandwidth

15.247: Systems using digital modulation techniques may operate in the 5725-5850MHz band. The minimum 6 dB bandwidth shall be at least 500 kHz.

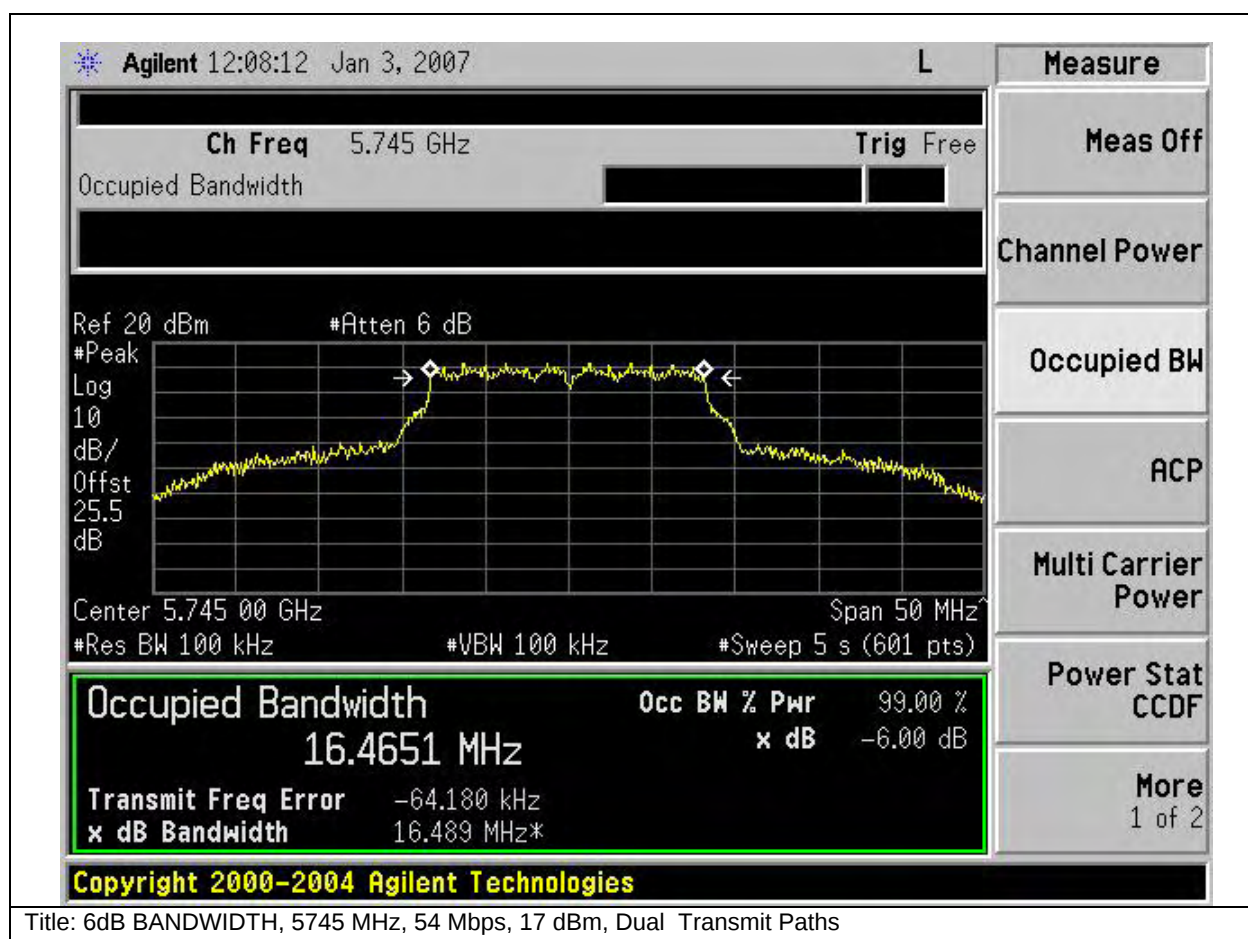
Conducted emissions

Test Number: 25234 Spec ID: 650				
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CFR47 Part 15.247(a)(2)	RF Ports	N/A	2400MHz - 2483.5MHz	6dB Bandwidth, aslo complies with RSS 210, LP0002
Operating Mode	Mode : 1, Continuous Transmitting			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

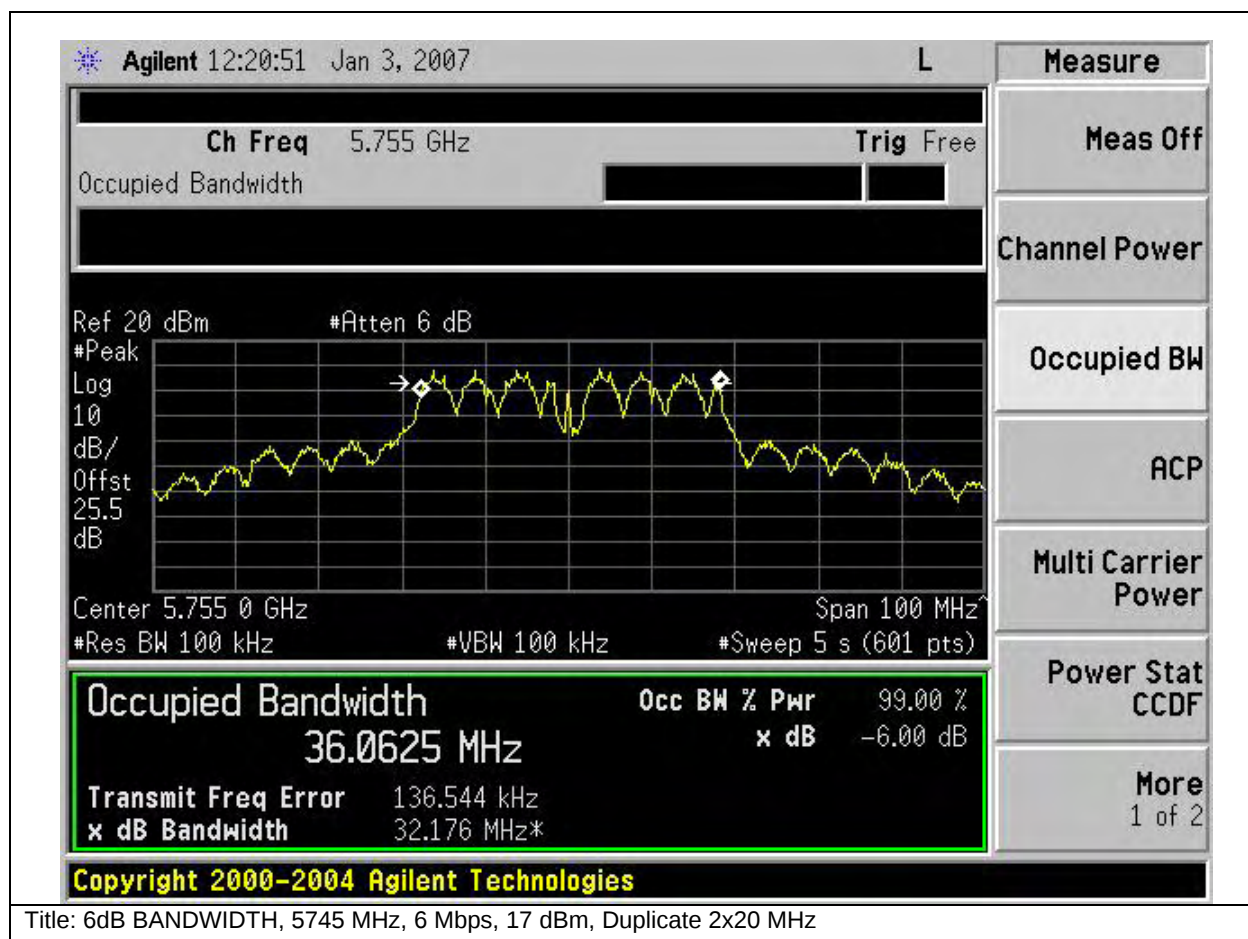
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03 and S04	☒	☐

Frequency (MHz)	Mode	Data Rate (Mbps)	6dB BW (MHz)	Limit (kHz)	Margin (kHz)
5745	Dual BF	54	16.5	>500	16000
5745	Duplicate	6	32.2	>500	31700
5785	Dual BF	54	16.5	>500	6000
5785	Duplicate	6	32.0	>500	31500
5805	Duplicate	6	32.2	>500	31800
5825	Dual BF	54	16.5	>500	16000

Subtest Number: 25234 - 2		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

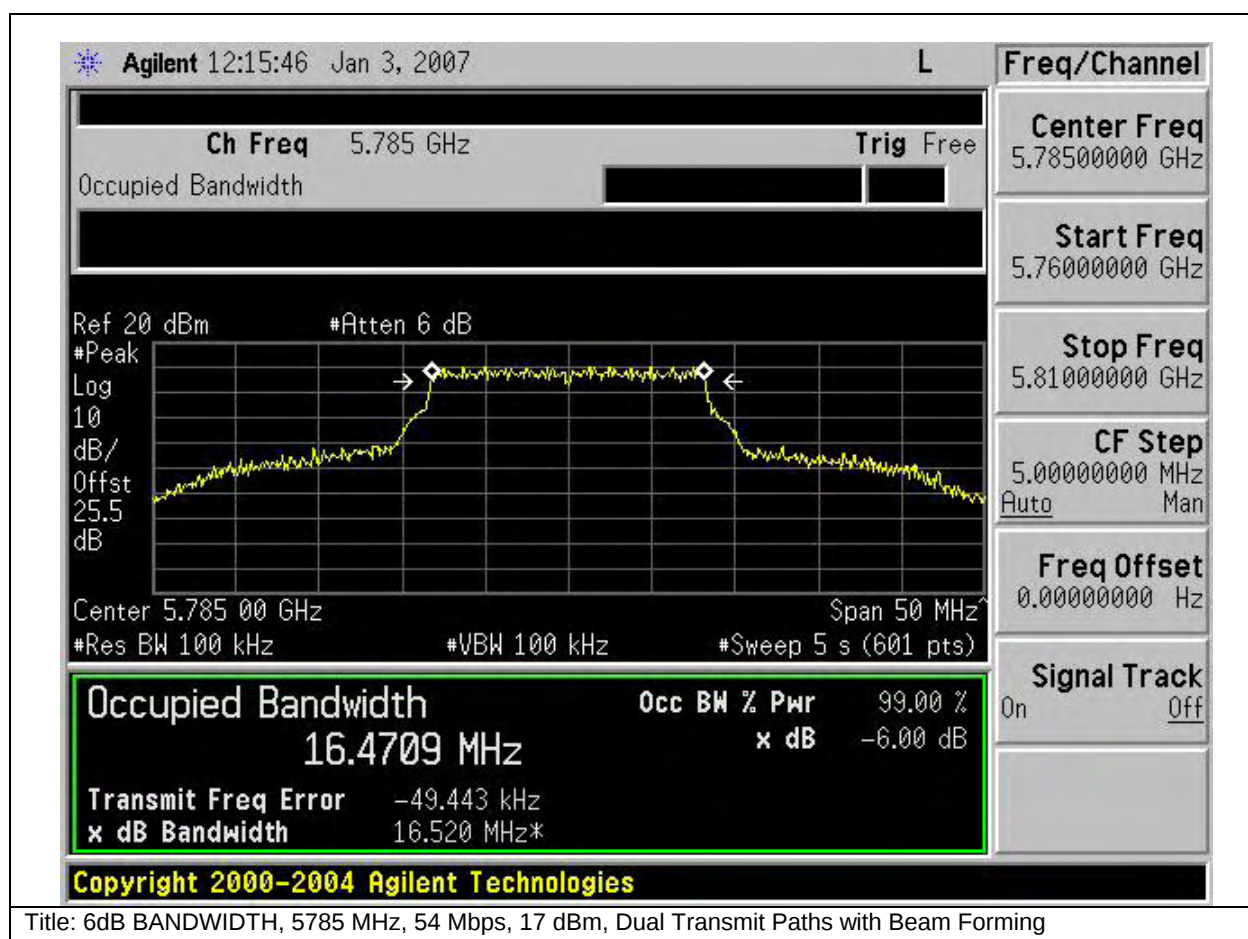


Subtest Number: 25234 - 1		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



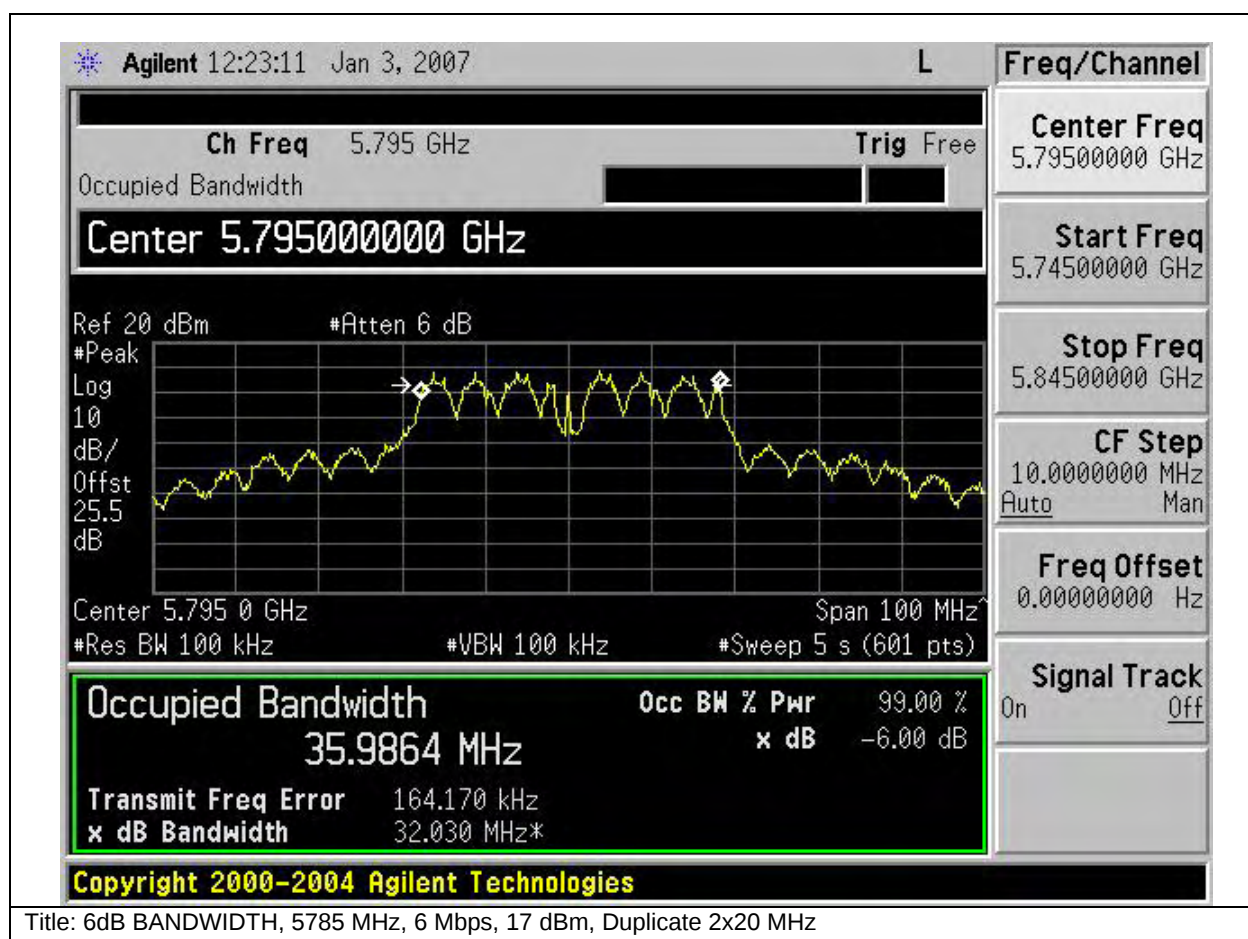


Subtest Number: 25234 - 9		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



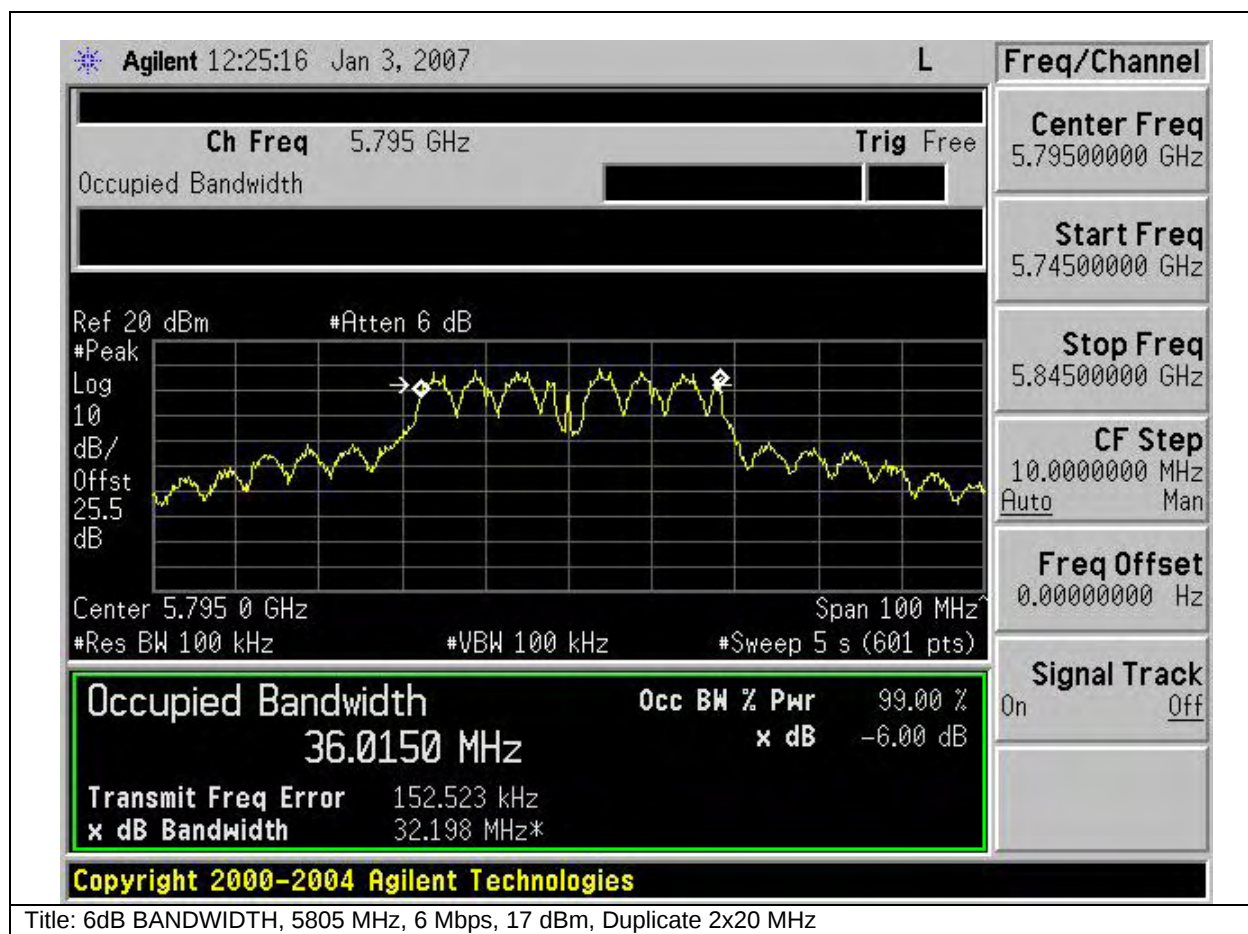


Subtest Number: 25234 - 7		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

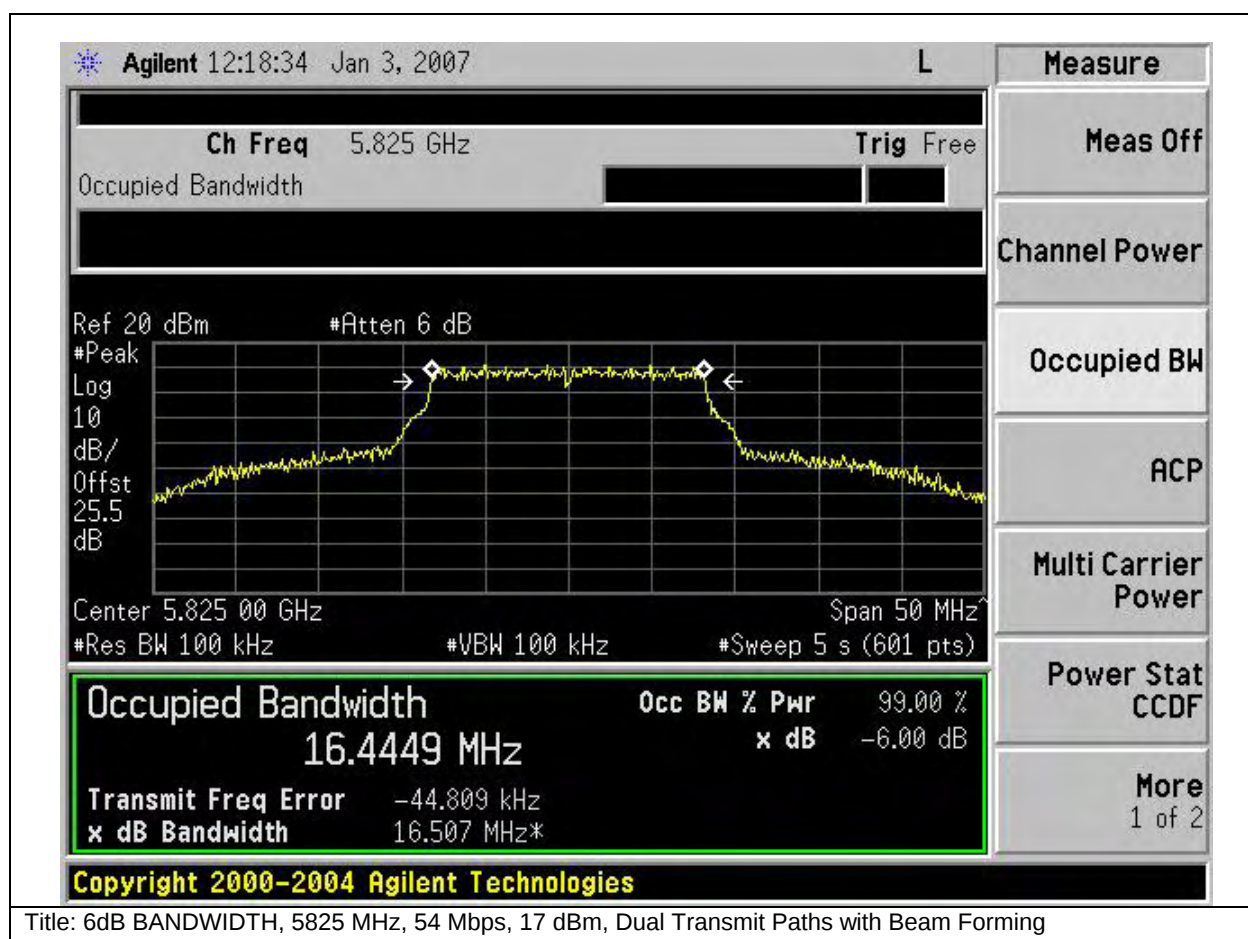




Subtest Number: 25234 - 13		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25234 - 16		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	





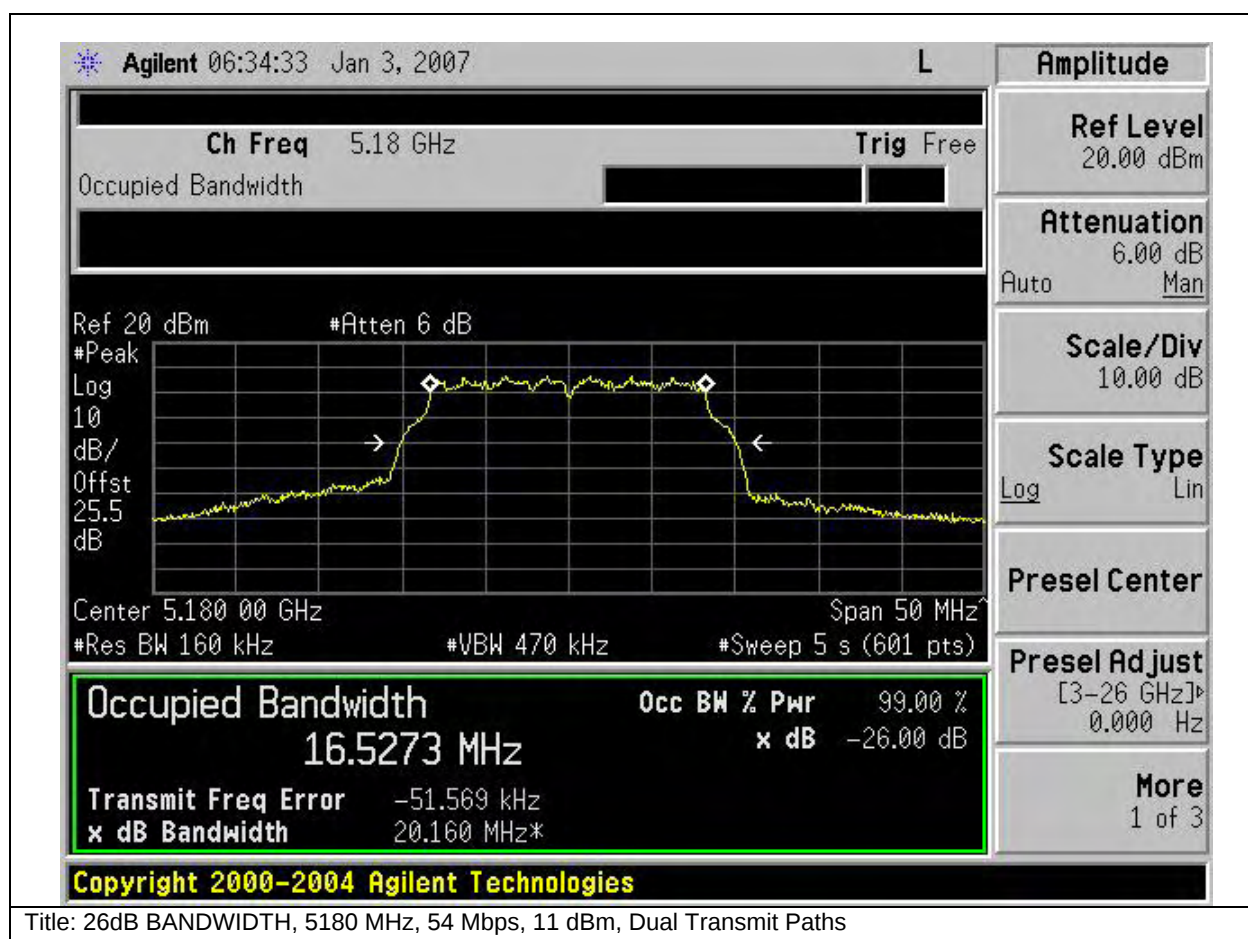
99% and 26dB Bandwidth

Test Number: 25232 Spec ID: 651				
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CFR47 Part 15.247(a)	RF Ports	N/A	2400MHz - 5850MHz	26dB Bandwidth also complies with RSS 210, LP0002.
Operating Mode	Mode : 1, Continuous Transmitting			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03 and S04	☒	☐

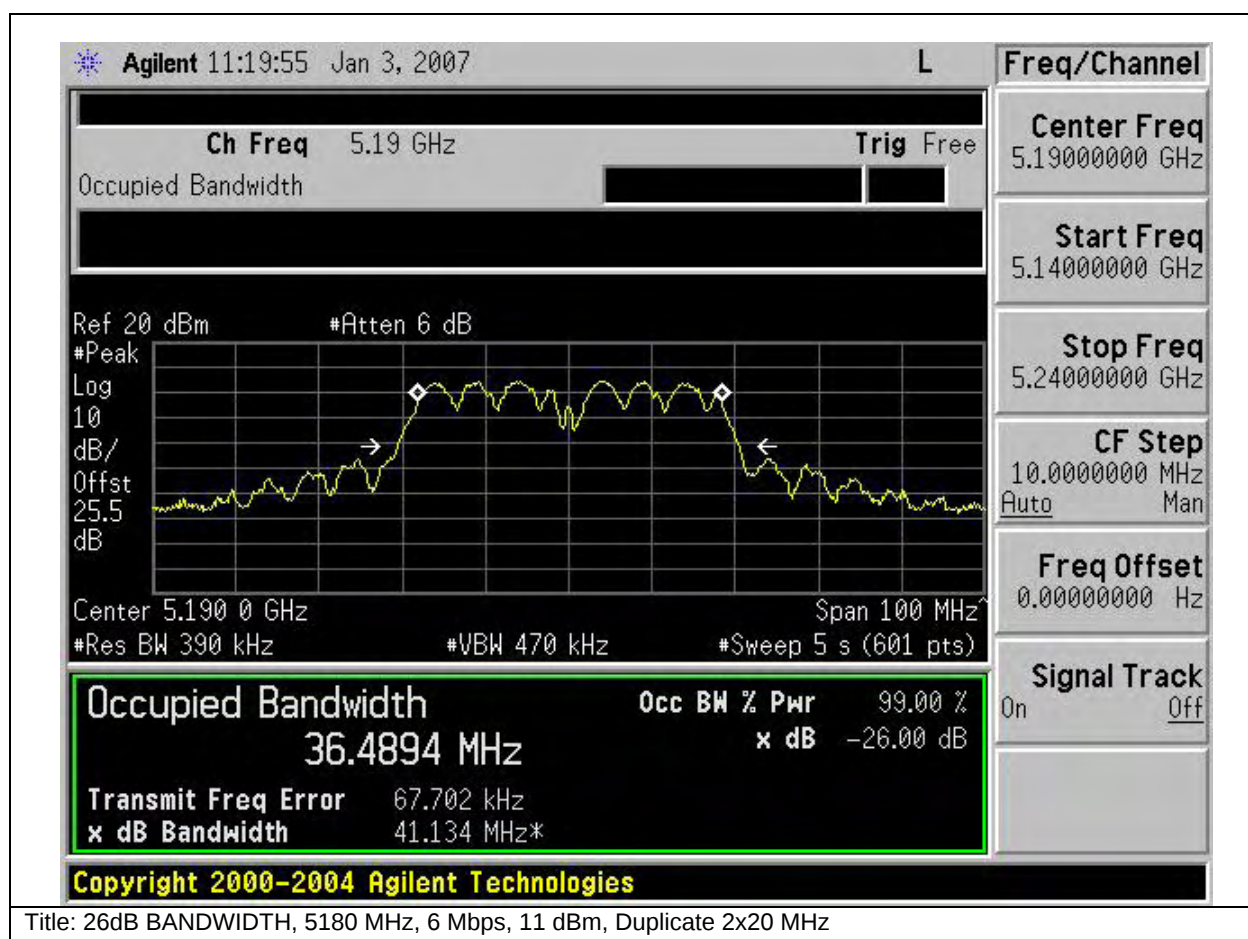
Frequency (MHz)	Mode	Data Rate (Mbps)	26dB BW (MHz)	99% BW (MHz)
5180	Dual	54	20.2	16.5
5180	Duplicate	6	41.1	36.5
5260	Dual	54	20.1	16.5
5260	Duplicate	6	51.6	36.8
5320	Dual	54	20.0	16.5
5320	Duplicate	6	41.1	36.5
5500	Dual	54	20.0	16.5
5500	Duplicate	6	41.0	36.6
5600	Dual	54	20.1	16.5
5600	Duplicate	6	64.4	37.1
5680	Duplicate	6	54.8	36.9
5700	Dual	54	20.0	16.5
5745	Dual BF	54	20.2	16.5
5745	Duplicate	6	56.6	37.0
5785	Dual BF	54	20.2	16.5
5785	Duplicate	6	56.1	36.9
5805	Duplicate	6	51.8	36.8
5825	Dual BF	54	20.1	16.5

Subtest Number: 25232 - 3		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

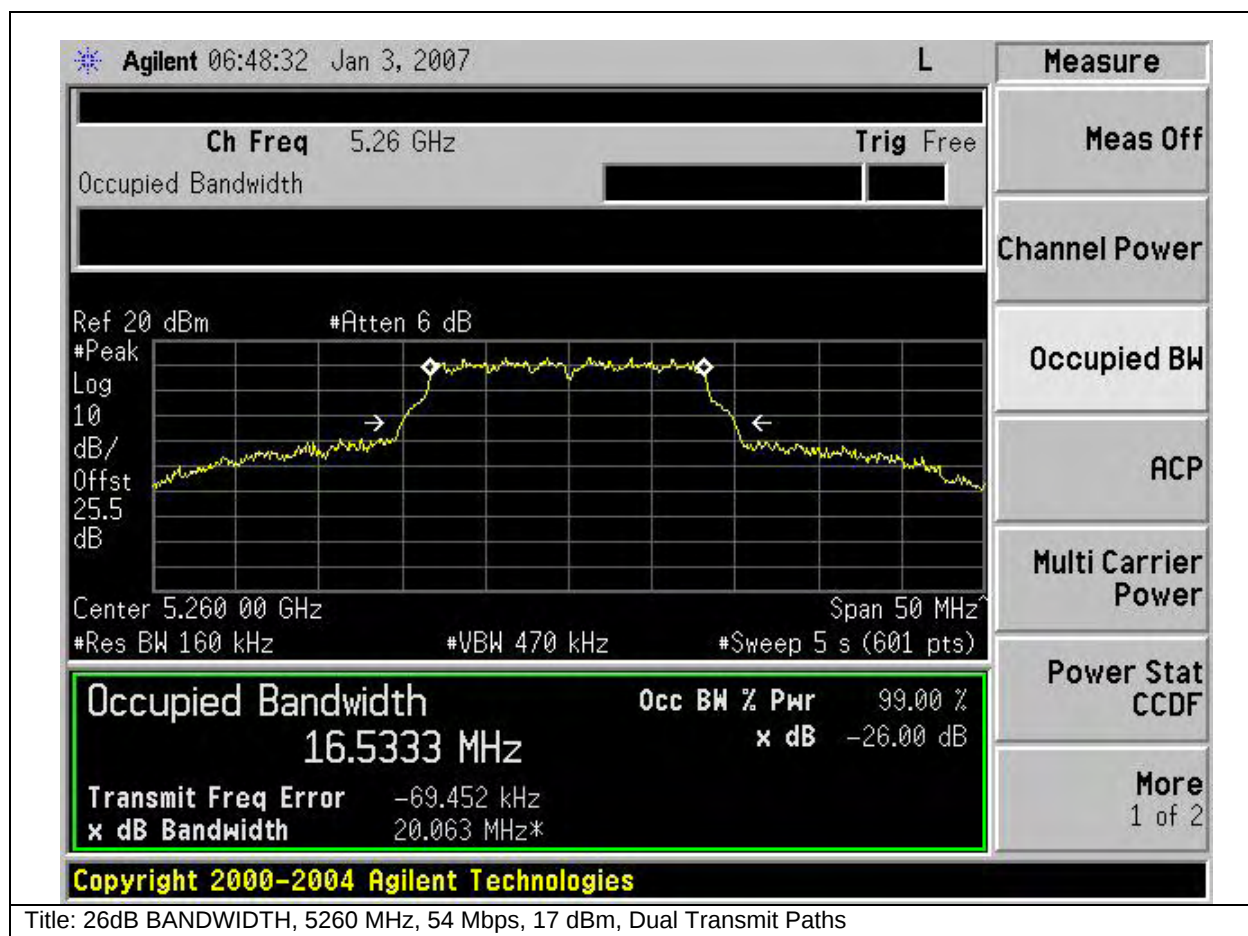




Subtest Number: 25232 - 1		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

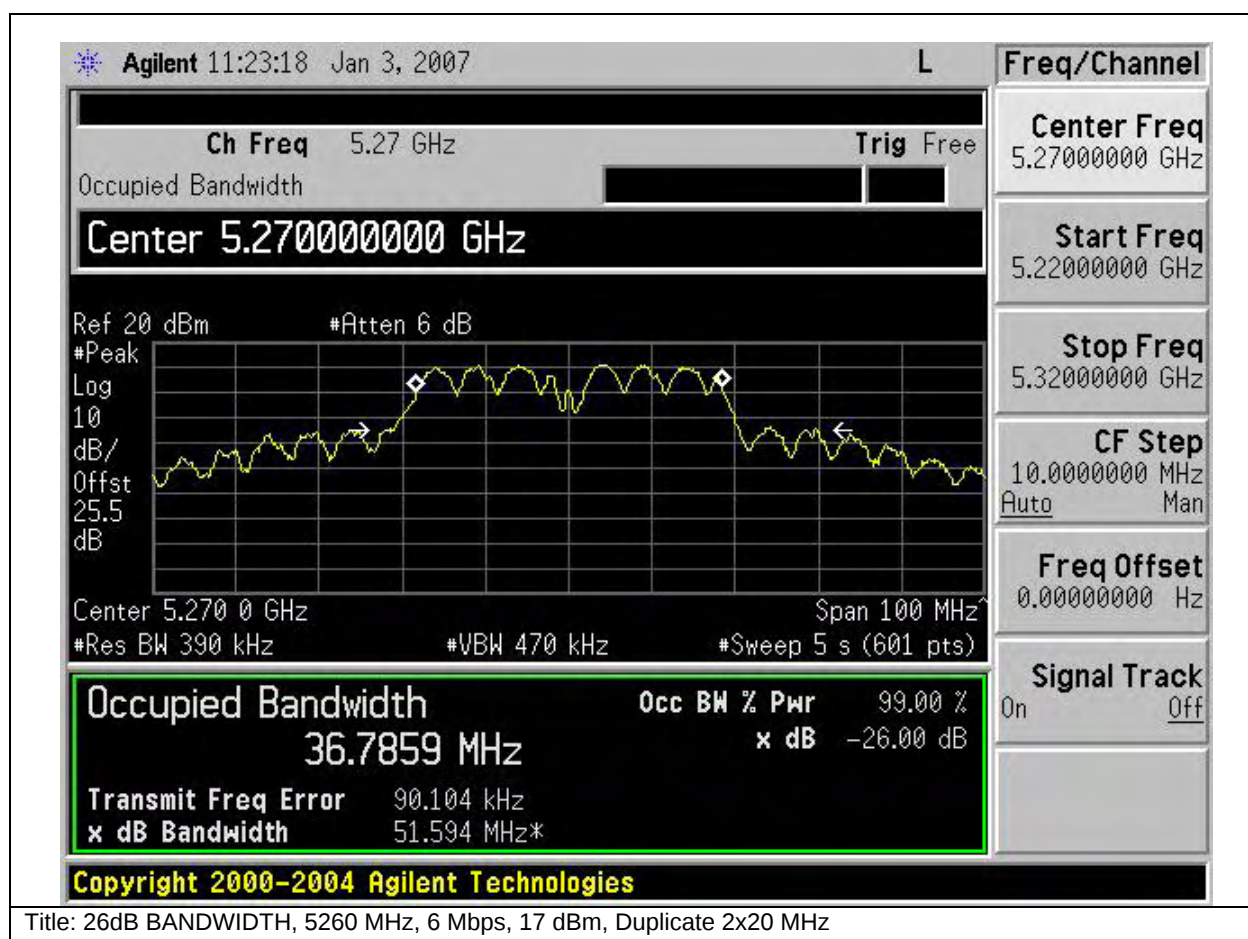


Subtest Number: 25232 - 12		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

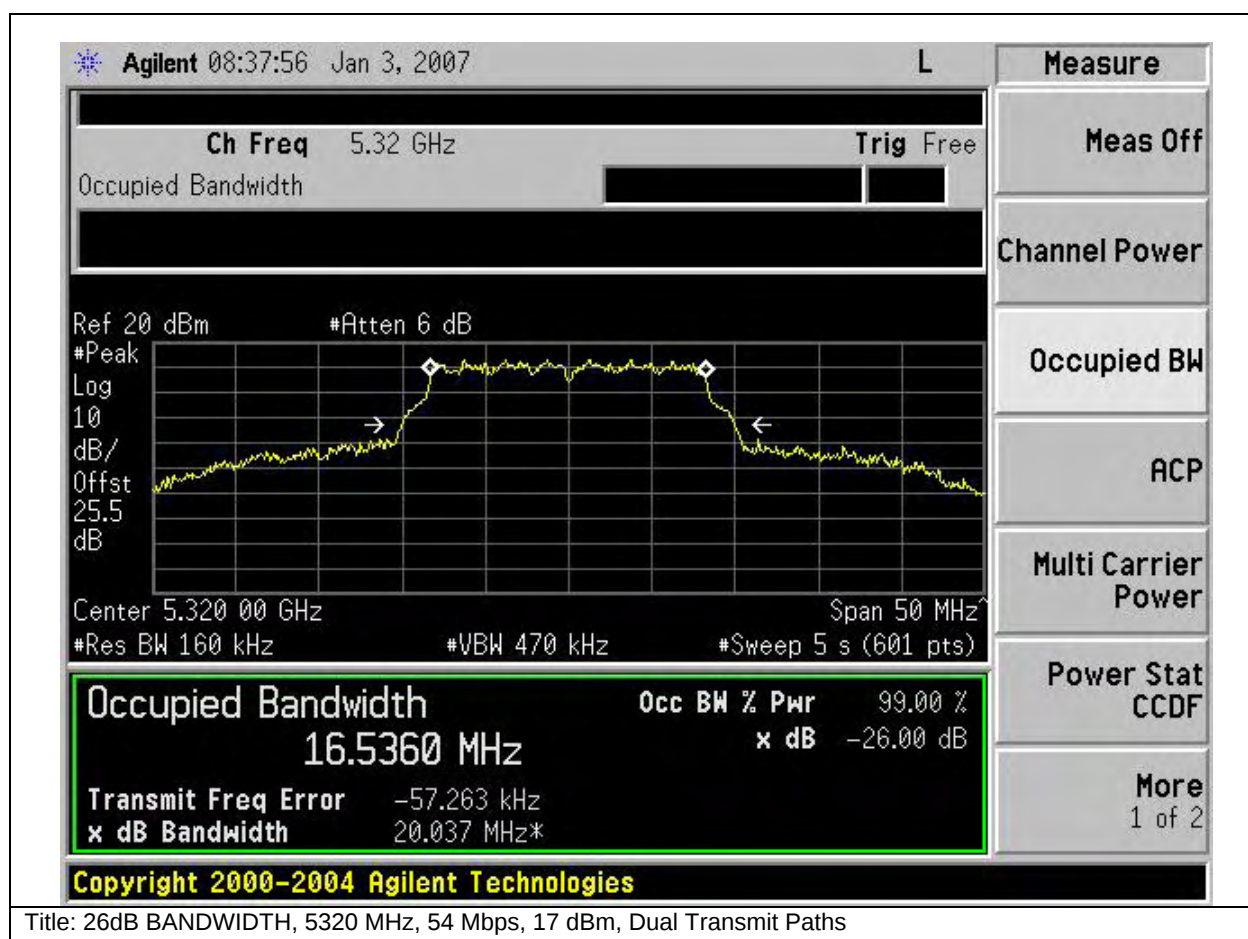




Subtest Number: 25232 - 8		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

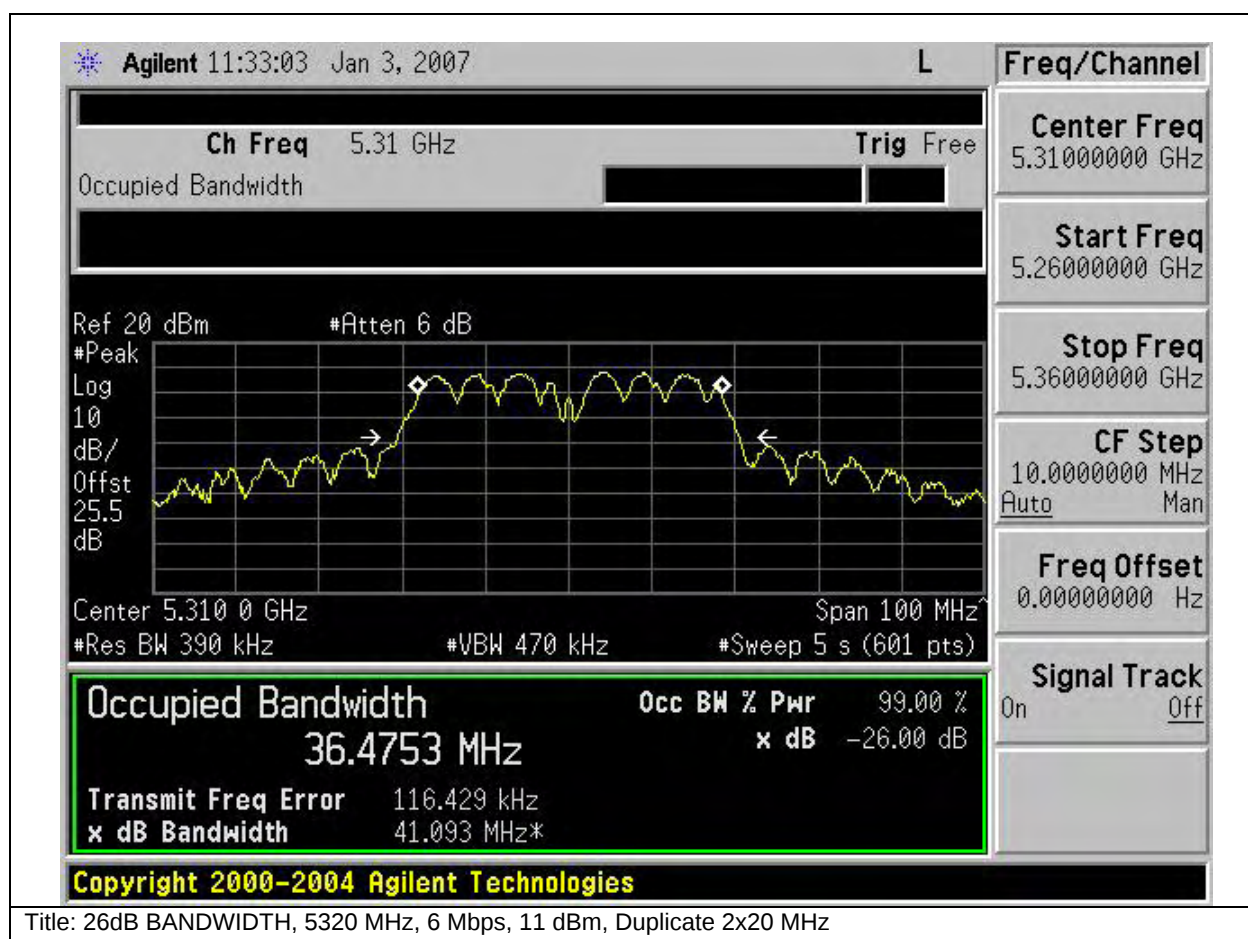


Subtest Number: 25232 - 28		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



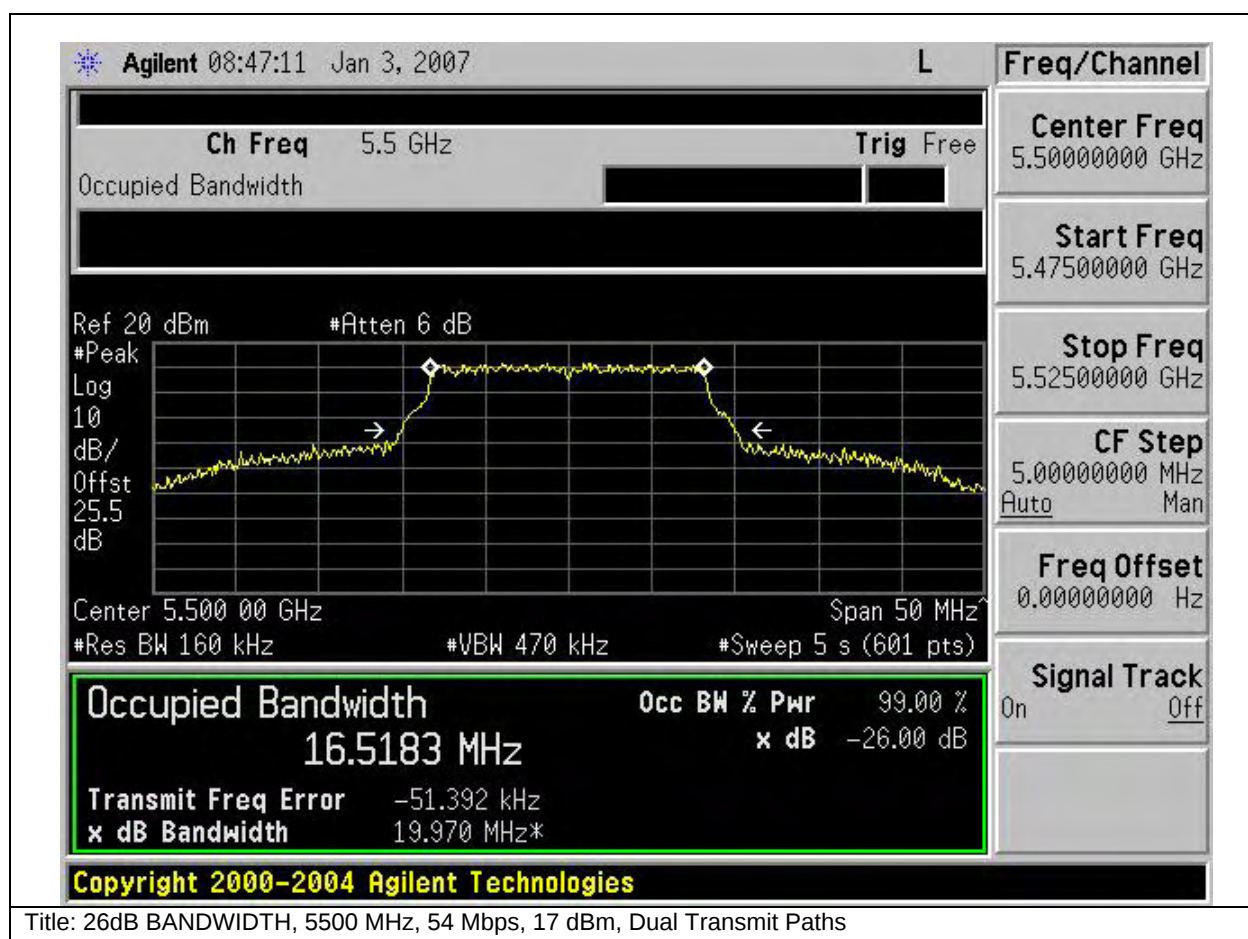


Subtest Number: 25232 - 24		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

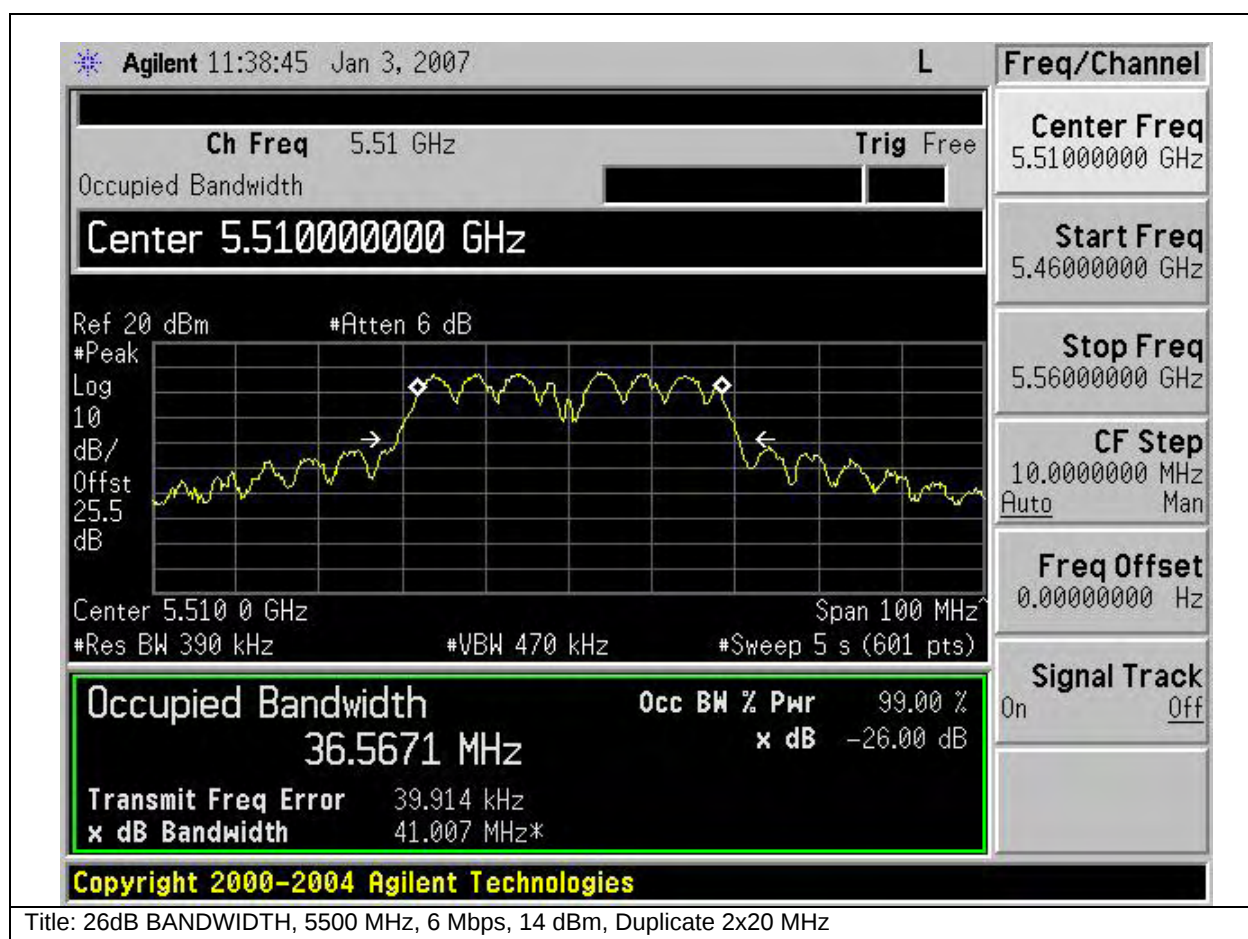




Subtest Number: 25232 - 35		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

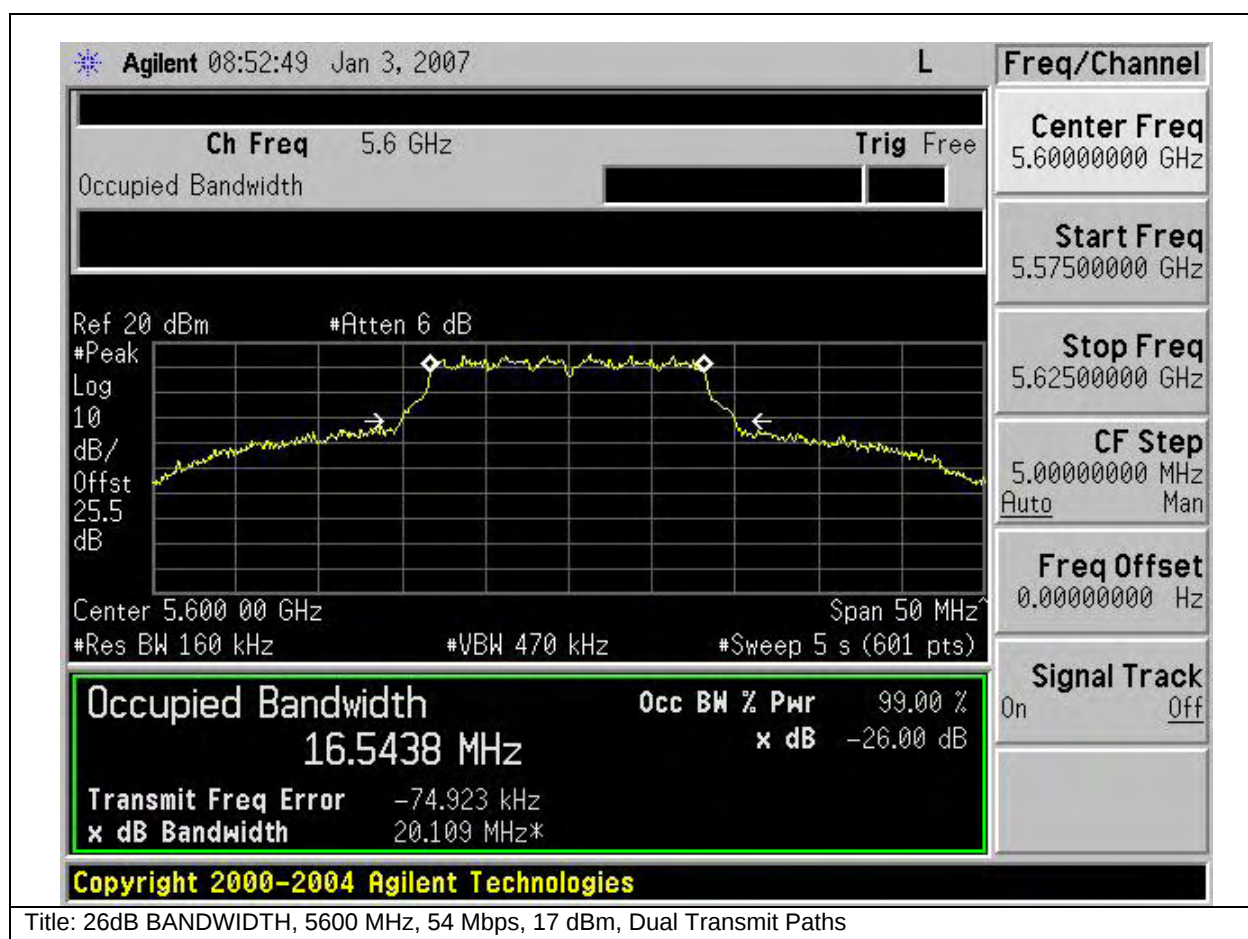


Subtest Number: 25232 - 33		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



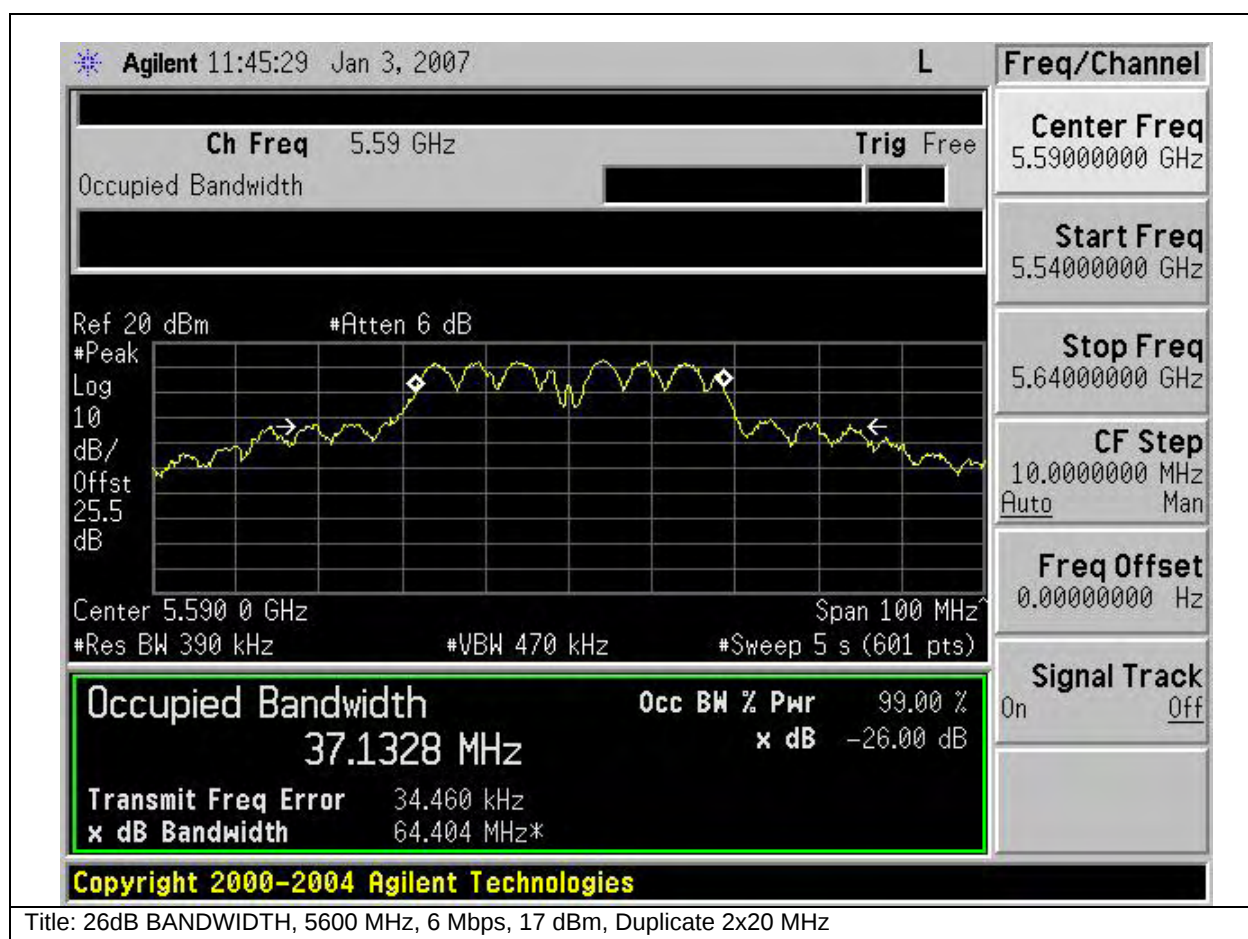


Subtest Number: 25232 - 41		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



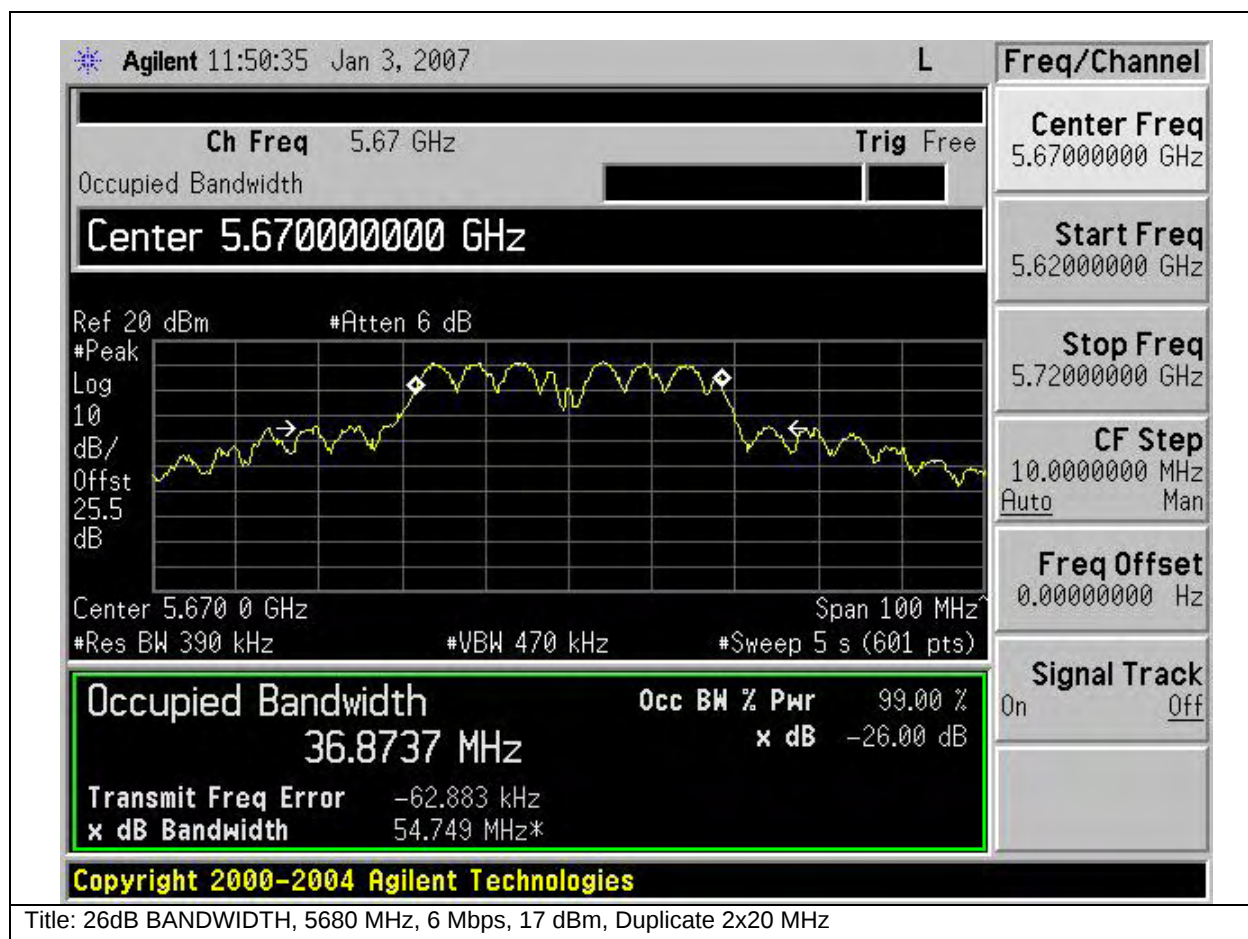


Subtest Number: 25232 - 39		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

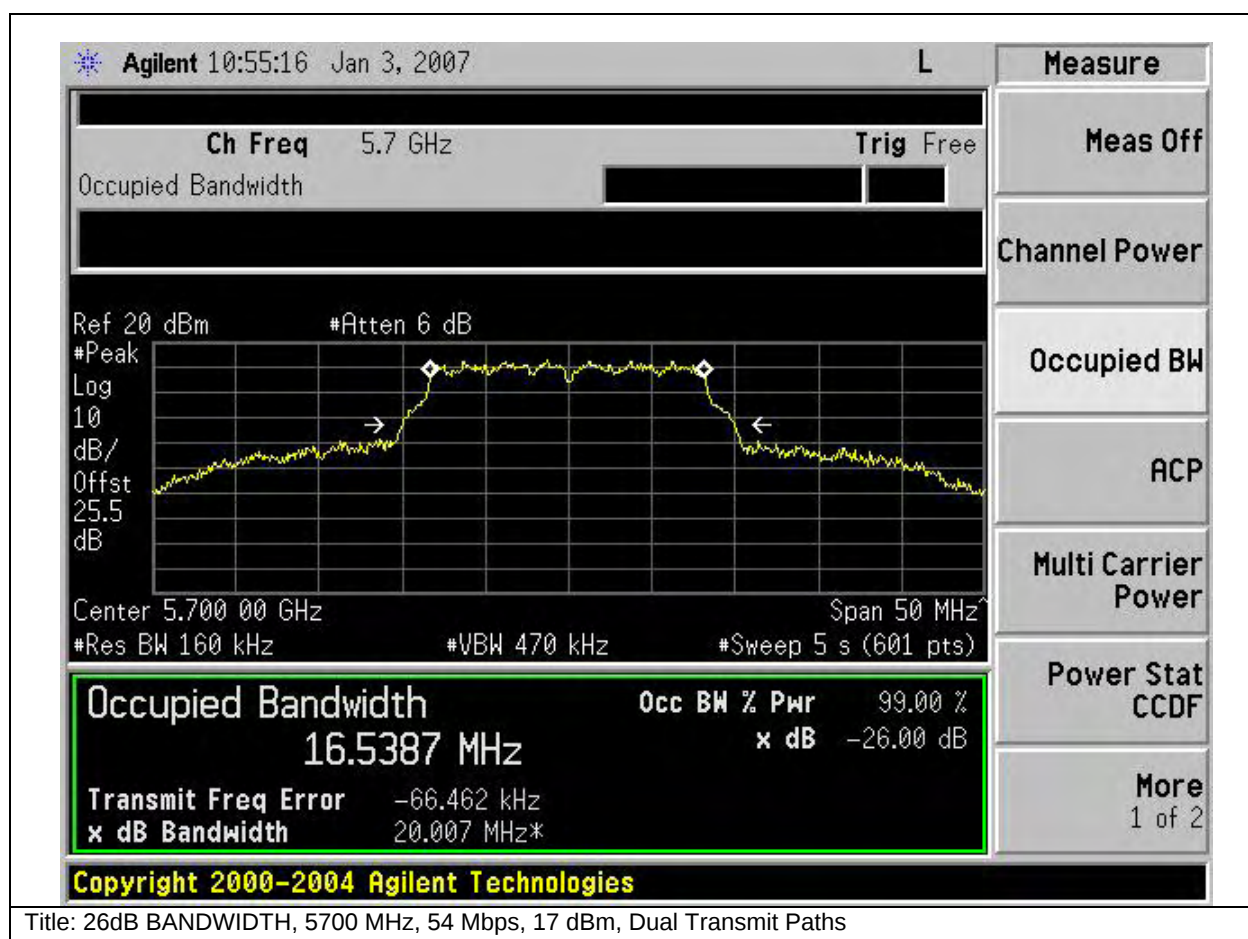




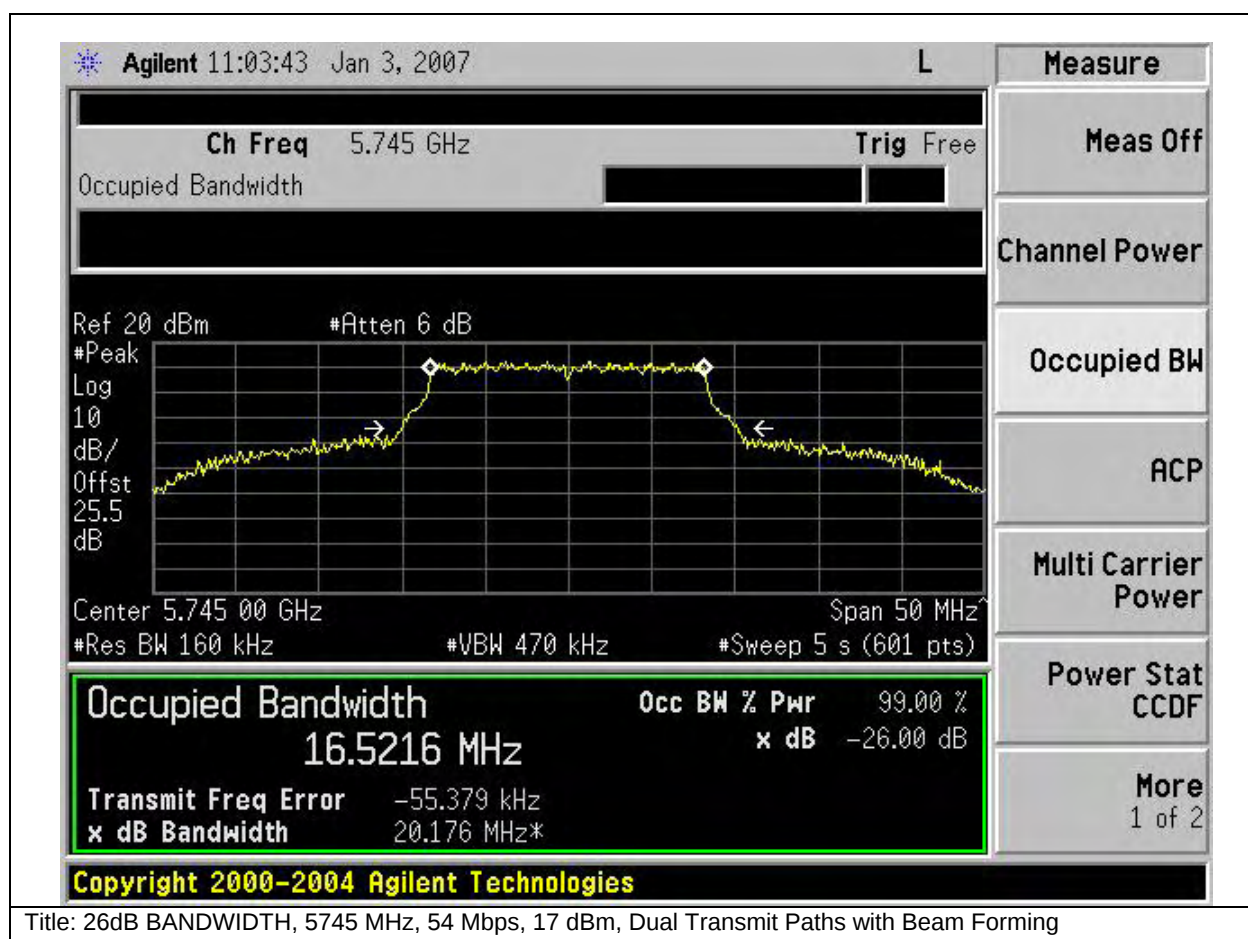
Subtest Number: 25232 - 45		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25232 - 48		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

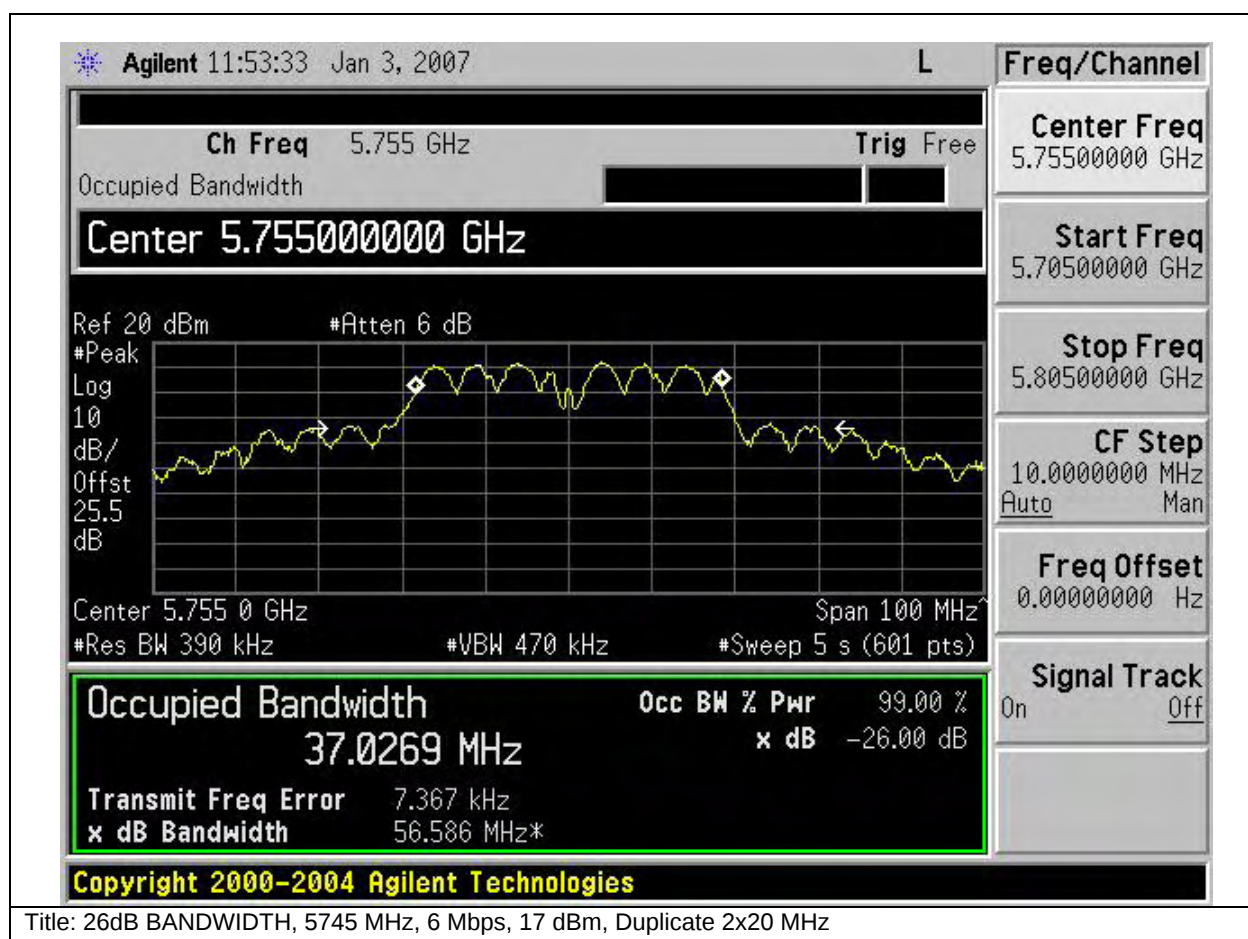


Subtest Number: 25232 - 53		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

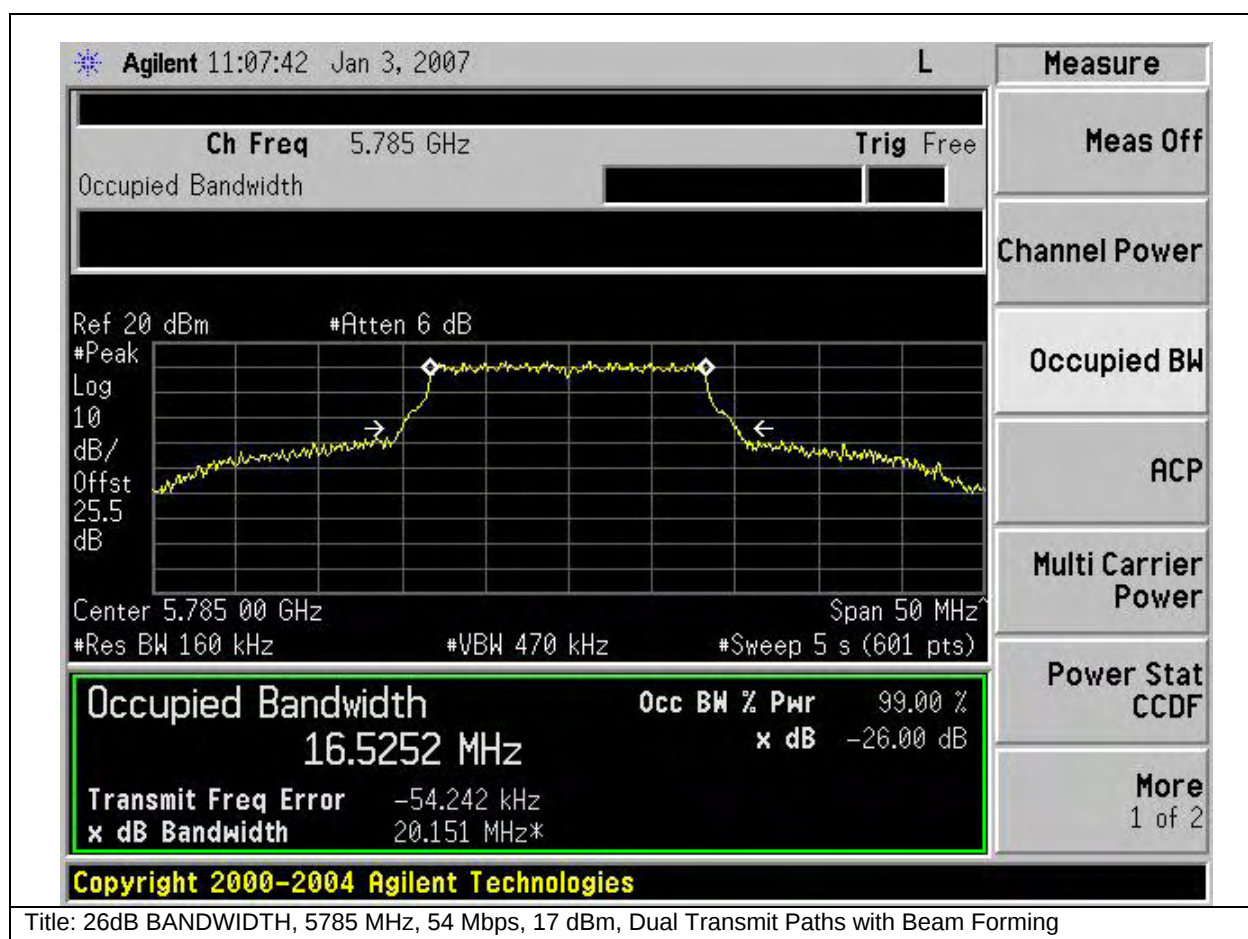




Subtest Number: 25232 - 51		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

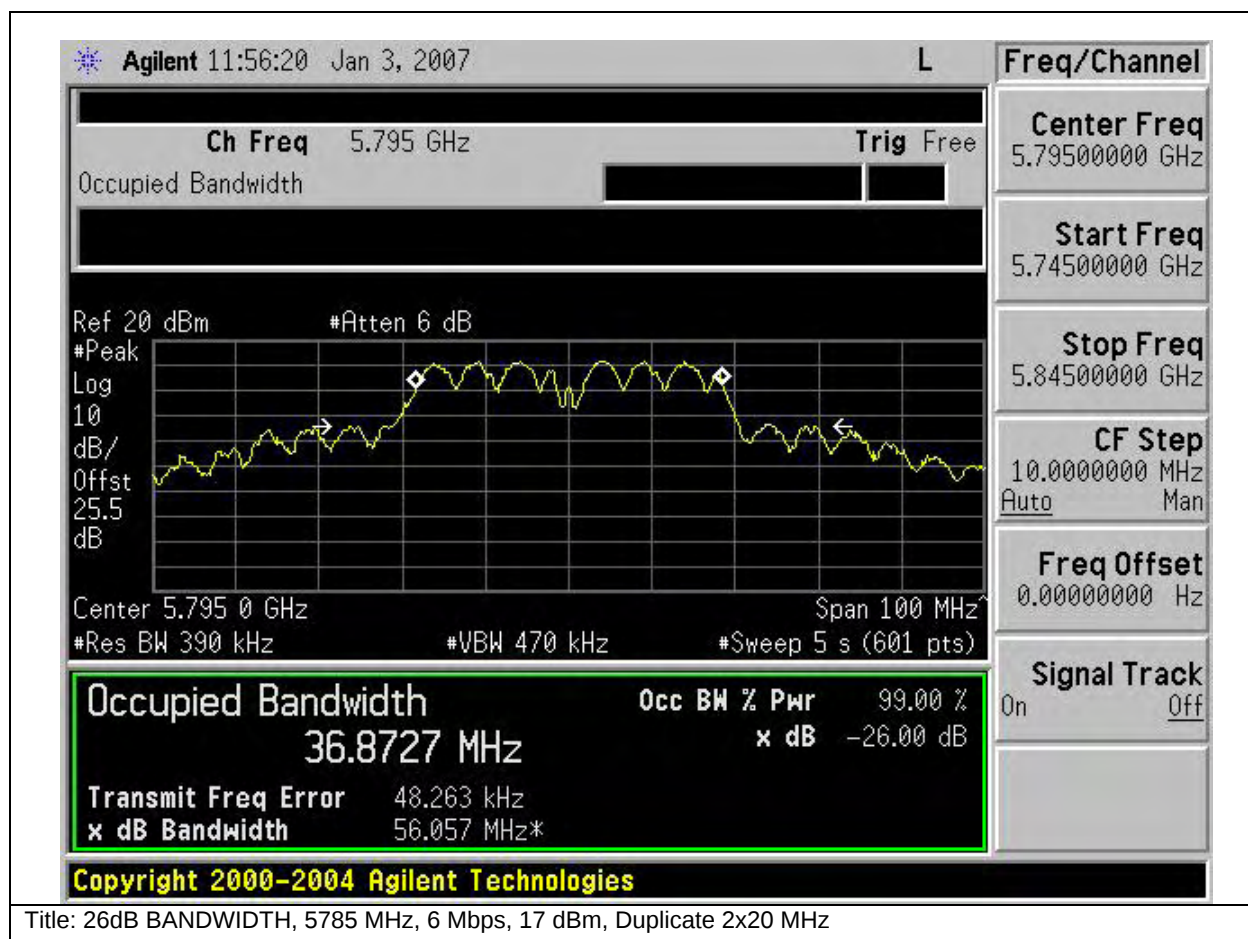


Subtest Number: 25232 - 59		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



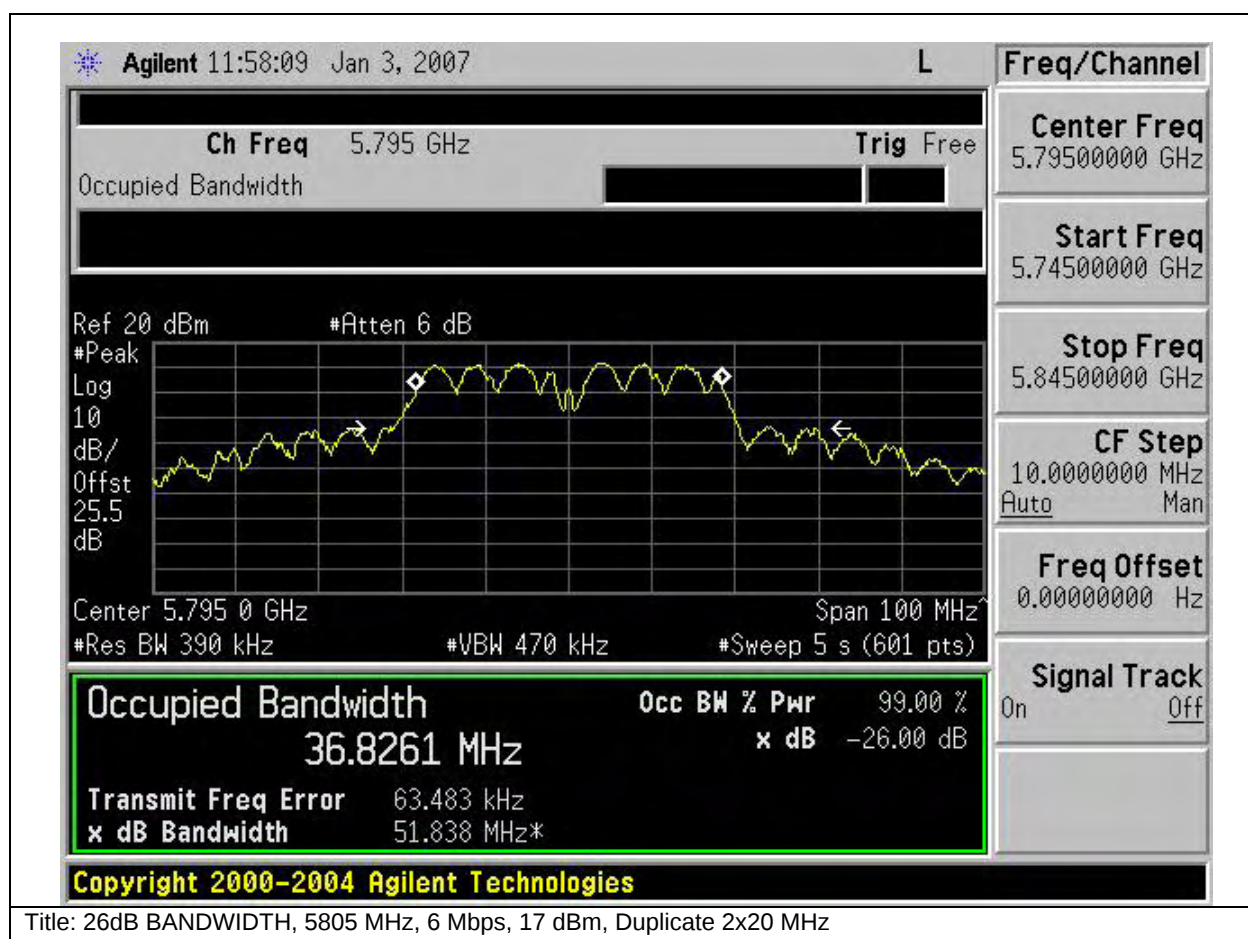


Subtest Number: 25232 - 57		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

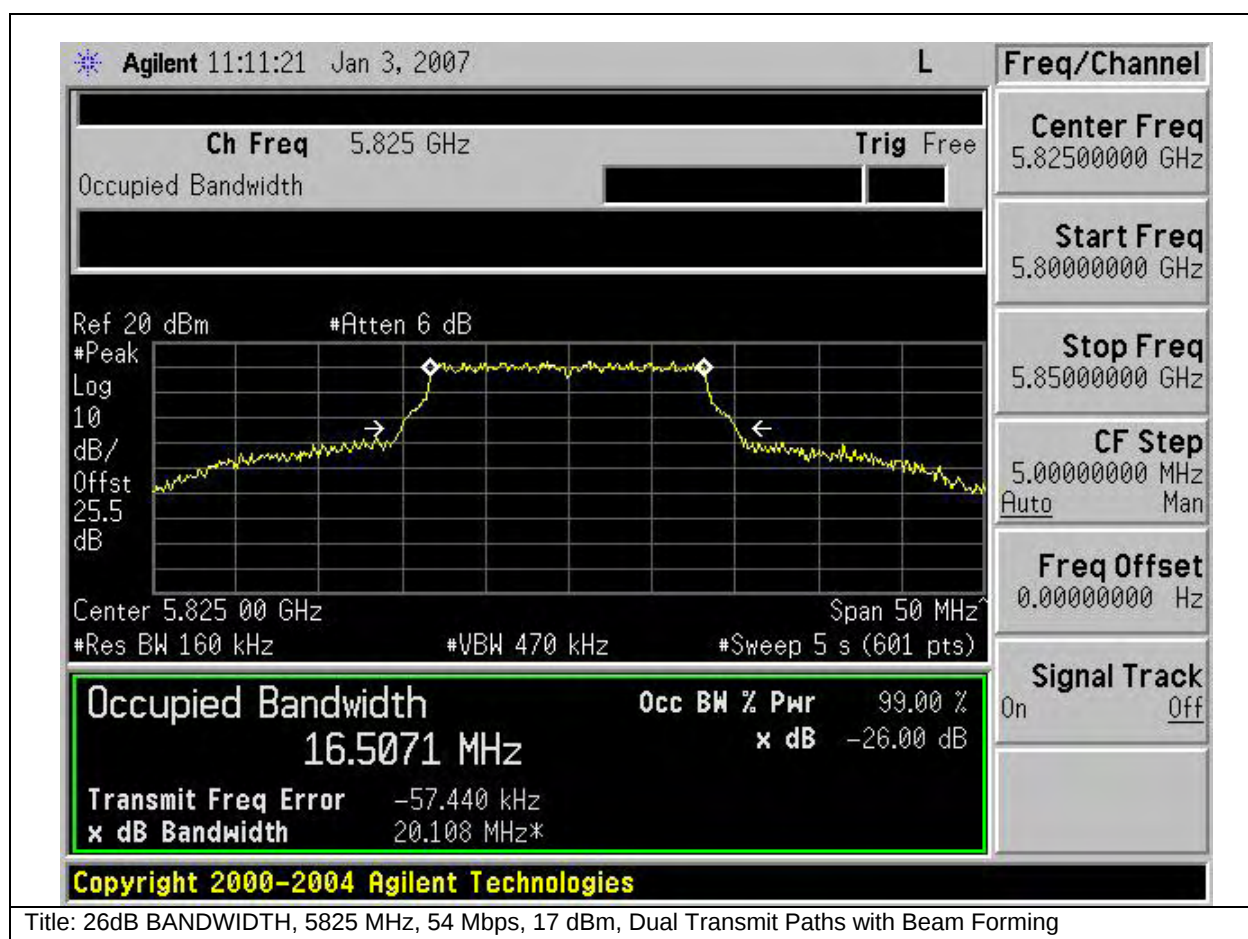




Subtest Number: 25232 - 63		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	DIRECT	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25232 - 66		Subtest Date: 23-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	





Peak Output Power

15.407: 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 $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The smallest 26dB bandwidth for all channels is 20 MHz. The maximum conducted output power is calculated as $4\text{dBm} + 10 \cdot \log(20\text{MHz}) = 17\text{dBm}$

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The smallest 26dB bandwidth for all channels is 19.9 MHz. The maximum conducted output power is calculated as $11\text{dBm} + 10 \cdot \log(19.9\text{MHz}) = 24\text{dBm}$

15.247: The maximum conducted output power of the intentional radiator for systems using digital modulation in the 5725-5850MHz band shall not exceed 1 Watt (30dBm). If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum supported antenna gain for all bands is 6dBi. In beamforming mode, the 6dBi behaves as $6\text{dBi} + 10\log(n)$ ($n=2$ radiating elements) = 9dBi. Therefore the maximum allowable output power for all bands in beamforming mode must be reduced by $9\text{dBi} - 6\text{dBi} = 3\text{dBi}$.

Power Spectral Density

15.407: For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum supported antenna gain in beamforming mode is 9dBi. Therefore the maximum allowable peak power spectral density must be reduced by $9\text{dBi} - 6\text{dBi} = 3\text{dBi}$ in all bands in beamforming mode.

15.247: For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

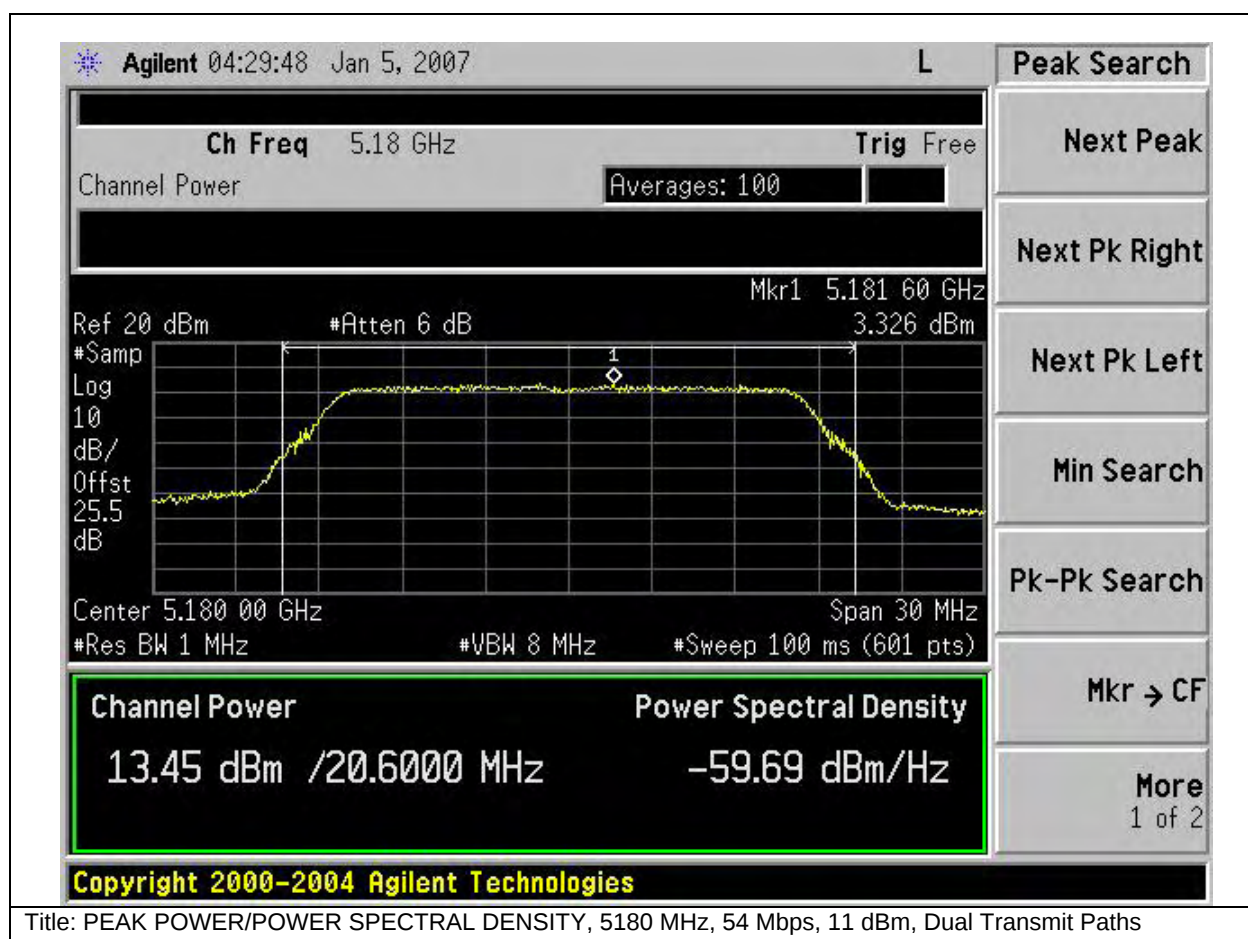


Test Number: 25251 Spec ID: 474				
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CFR47 Part 15.407a (LP0002 4.7.2, RSS210)	RF Ports	N/A	5150MHz - 5725MHz	Peak Power Spectral Density (LP0002 limit 4dBm from 5250-5350MHz)
Operating Mode	Mode : 1, Continuous Transmitting			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

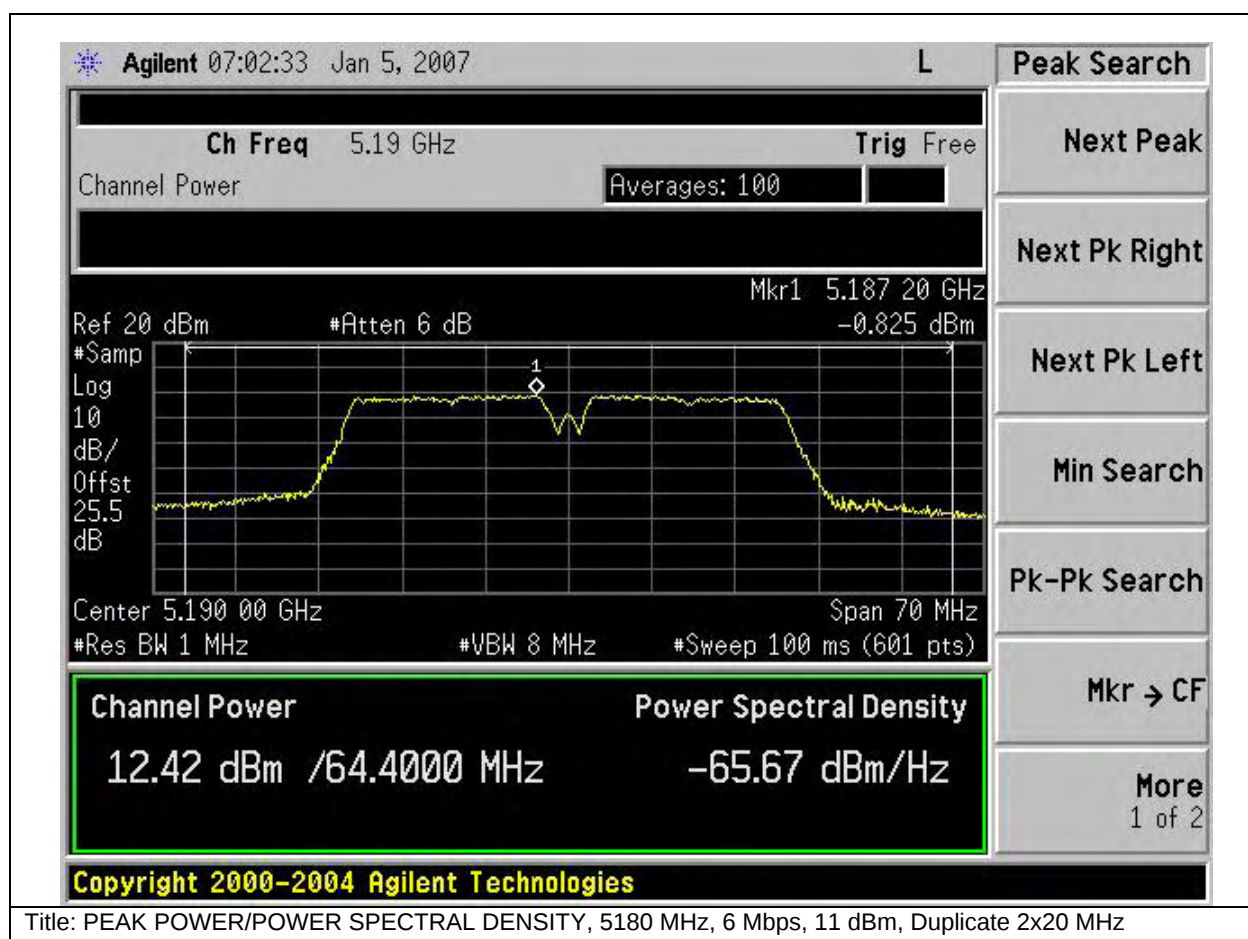
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03 and S04	☒	☐

Frequency (MHz)	Mode	Data Rate (Mbps)	Peak Power (dBm)	Limit (dBm)	Margin (dB)	PSD (dBm/MHz)	Limit (dBm/MHz)	Margin (dB)
5180	Dual	54	13.5	17	3.5	3.3	4	0.7
5180	Duplicate	6	12.4	17	4.6	-0.8	4	4.8
5260	Dual	54	19.7	24	4.3	9.0	11	2.0
5260	Duplicate	6	18.9	24	5.1	5.2	11	5.8
5320	Dual	54	20.0	24	4.0	10.0	11	1.0
5320	Duplicate	6	16.1	24	7.9	2.7	11	8.3
5500	Dual	54	20.1	24	3.9	9.7	11	1.3
5500	Duplicate	6	16.5	24	7.5	3.0	11	8.0
5600	Dual	54	20.4	24	3.6	9.9	11	1.1
5600	Duplicate	6	20.0	24	4.0	6.7	11	4.3
5680	Duplicate	6	19.7	24	4.3	6.6	11	4.4
5700	Dual	54	19.8	24	4.2	8.0	11	3.0
5745	Dual BF	54	20.1	30	9.9			
5745	Duplicate	6	19.6	30	10.4			
5785	Dual BF	54	20.0	27	7.0			
5785	Duplicate	6	19.5	30	10.5			
5805	Duplicate	6	19.4	30	10.6			
5825	Dual BF	54	19.9	27	7.1			

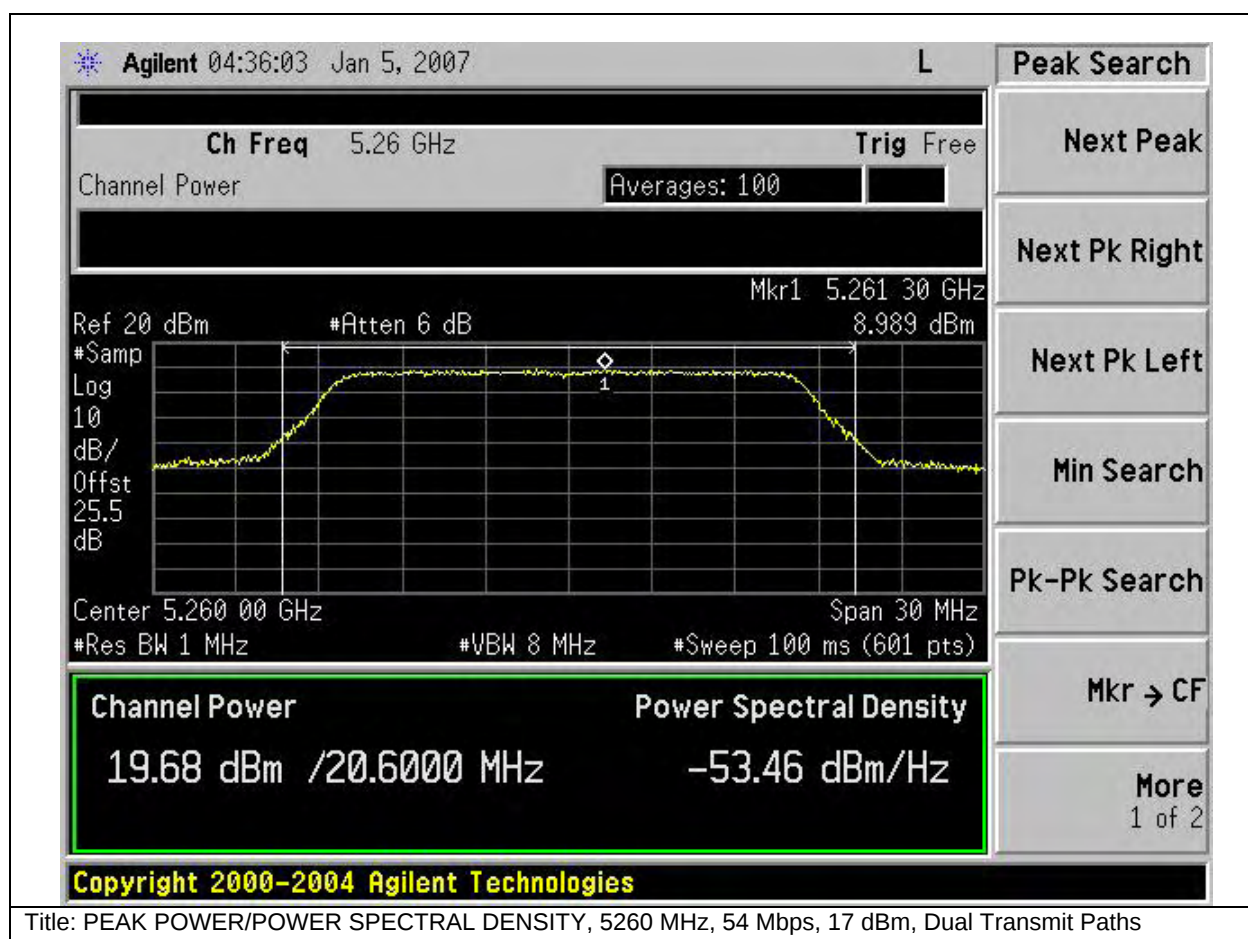
Subtest Number: 25251 - 3		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



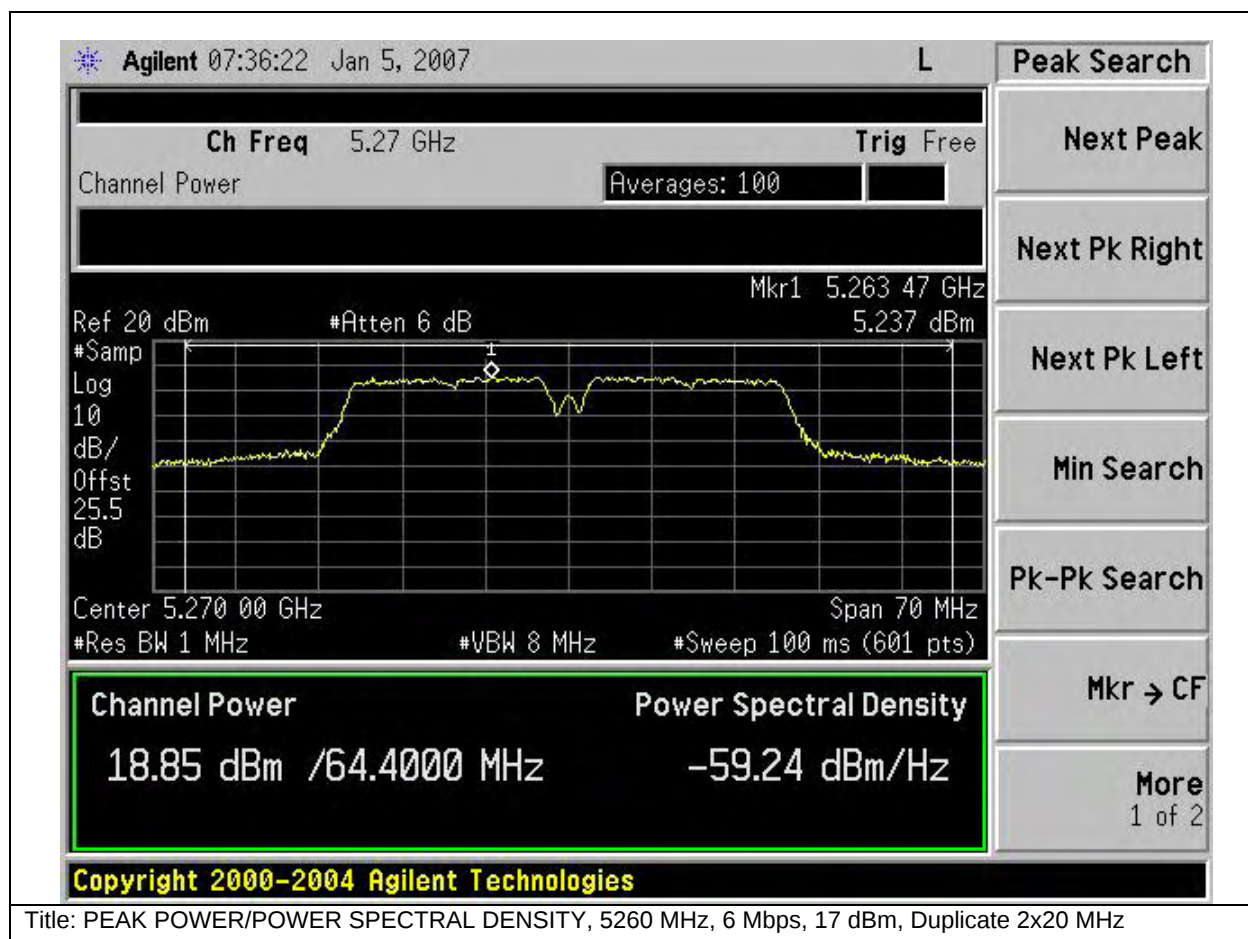
Subtest Number: 25251 - 1		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



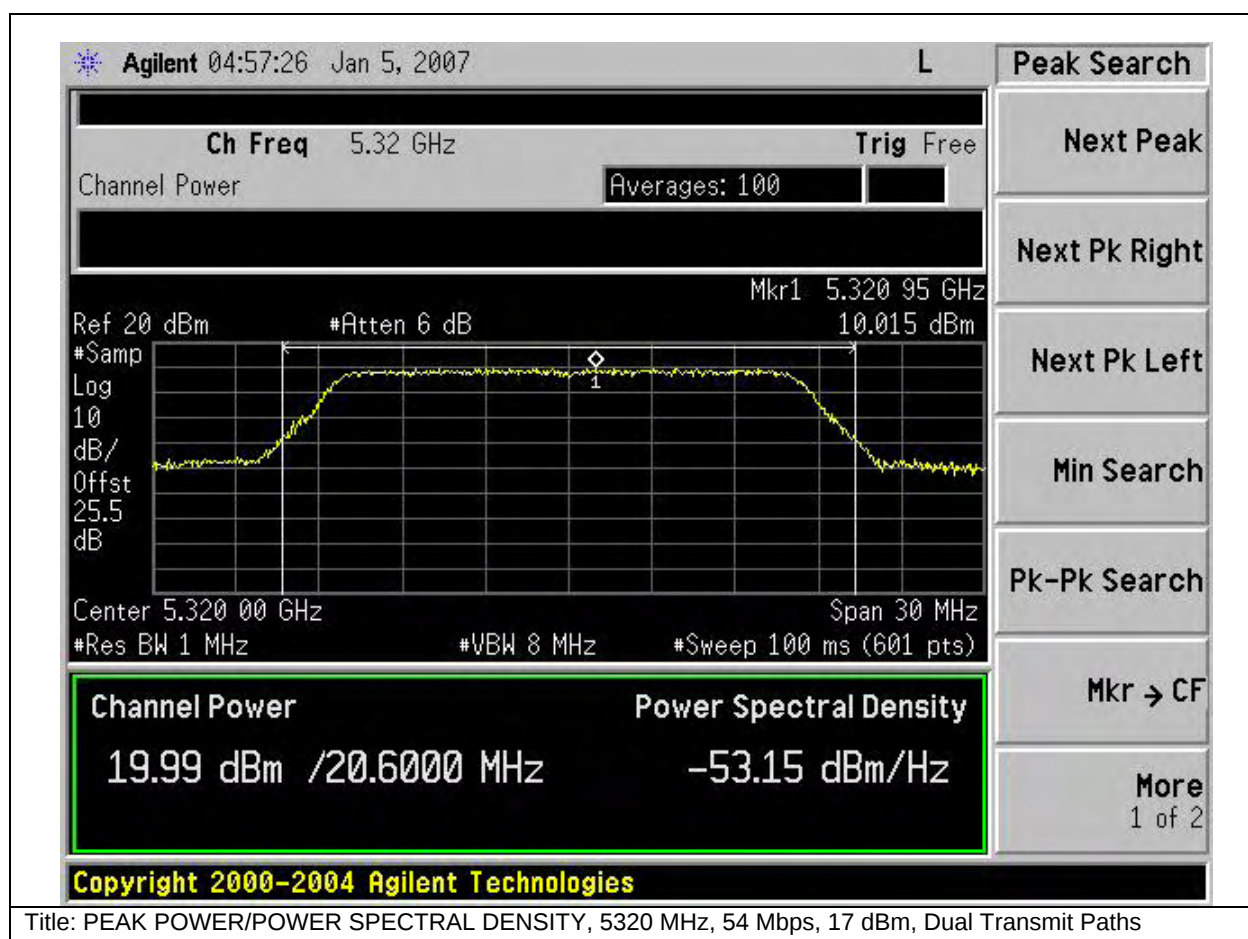
Subtest Number: 25251 - 12		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



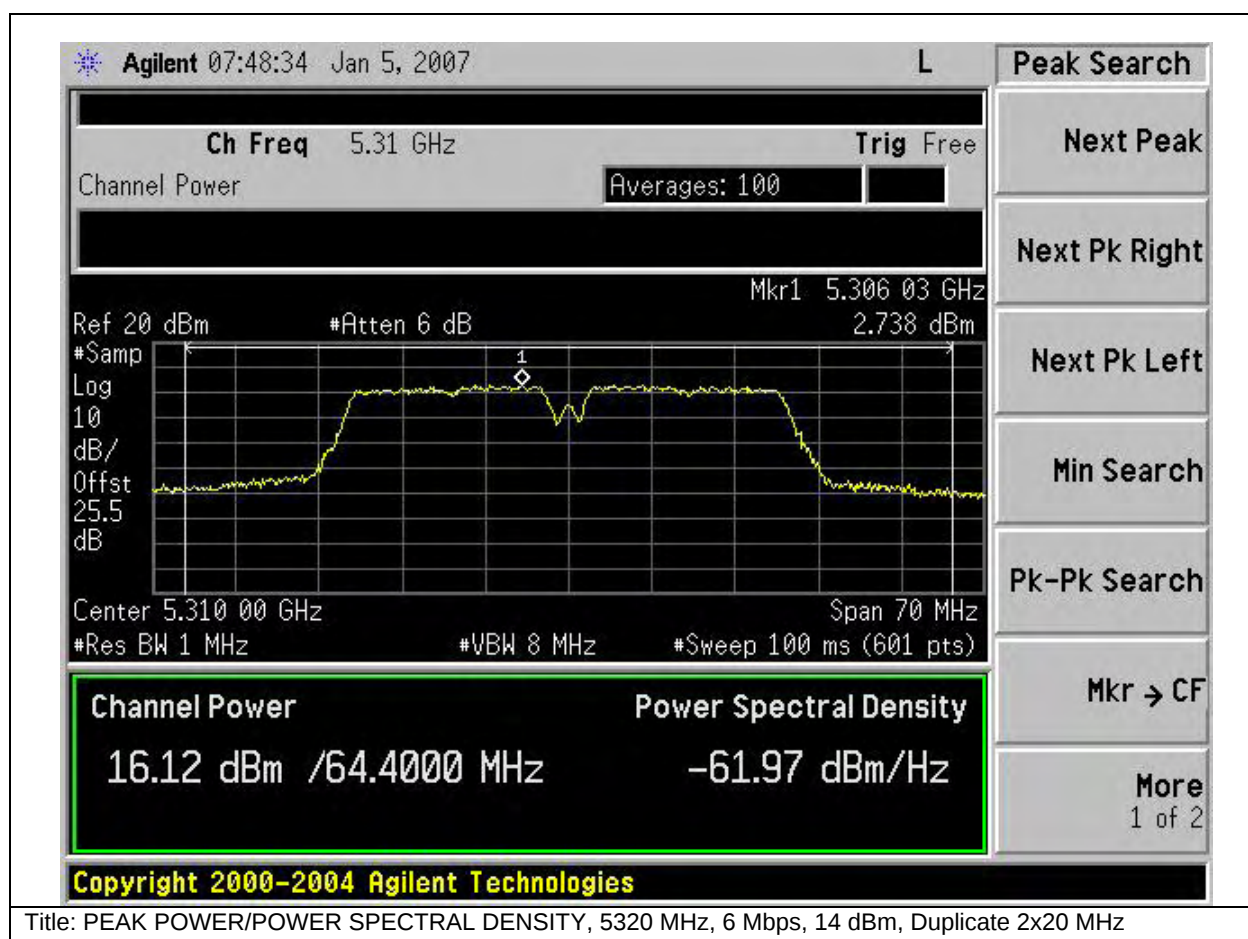
Subtest Number: 25251 - 8		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



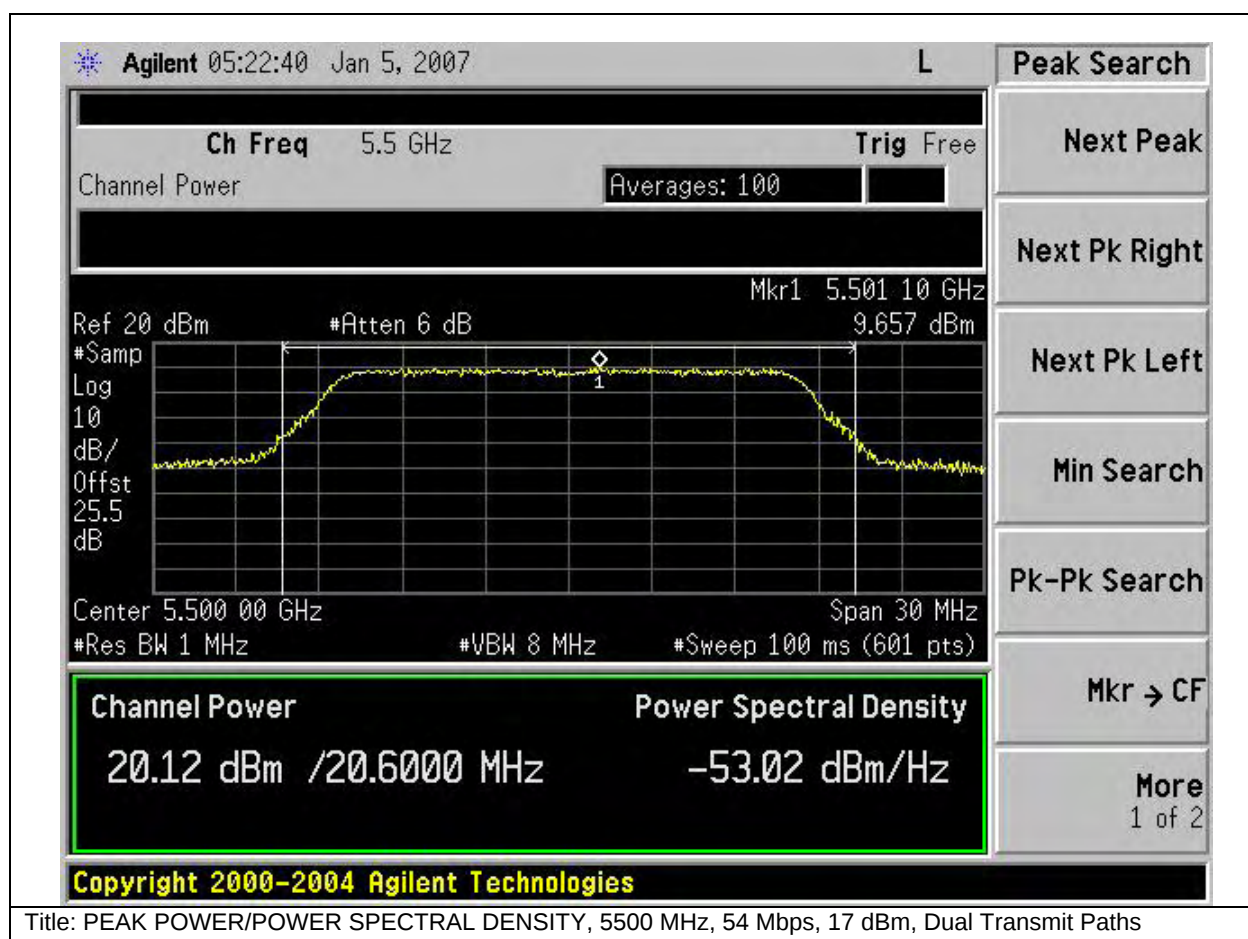
Subtest Number: 25251 - 28		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



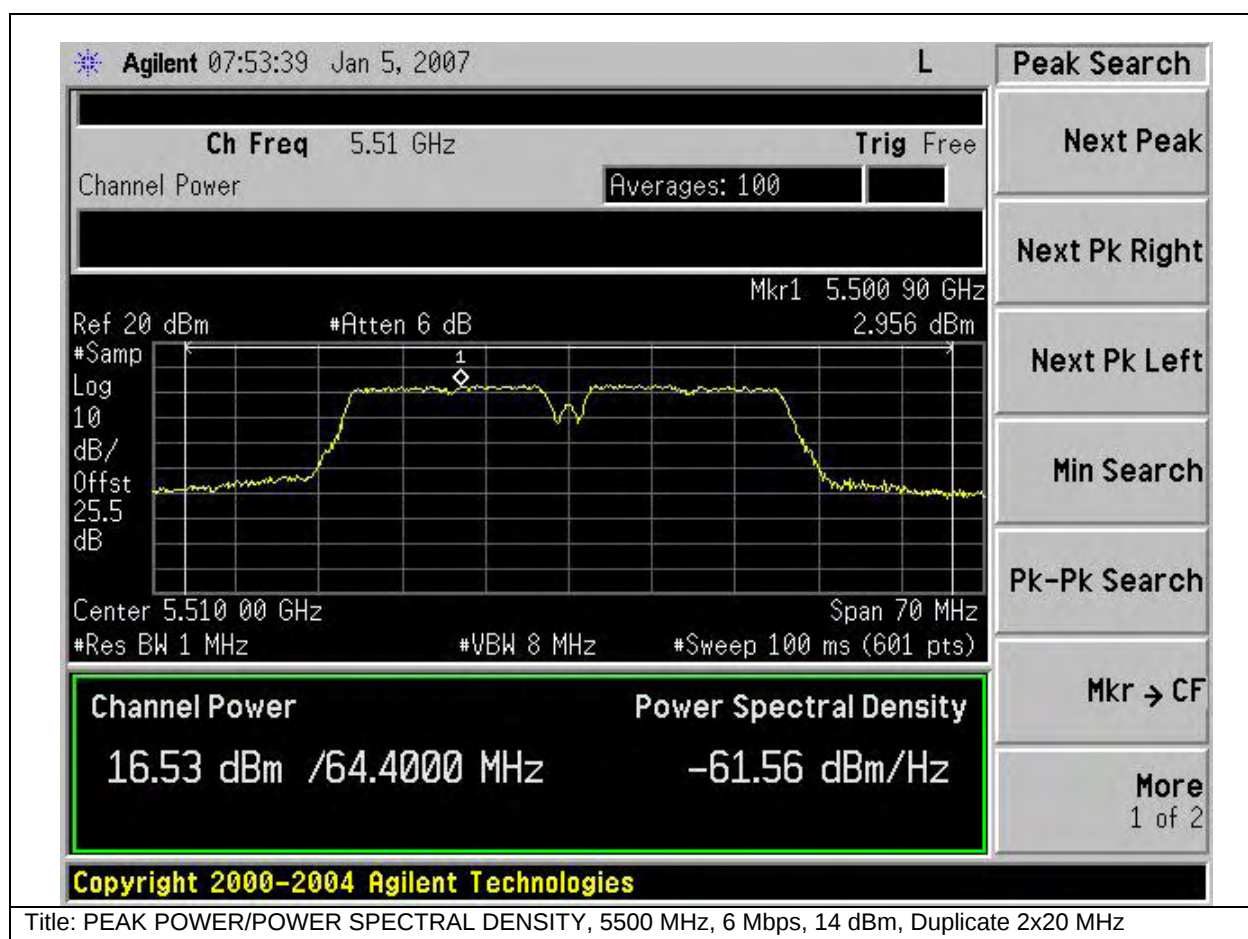
Subtest Number: 25251 - 24		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



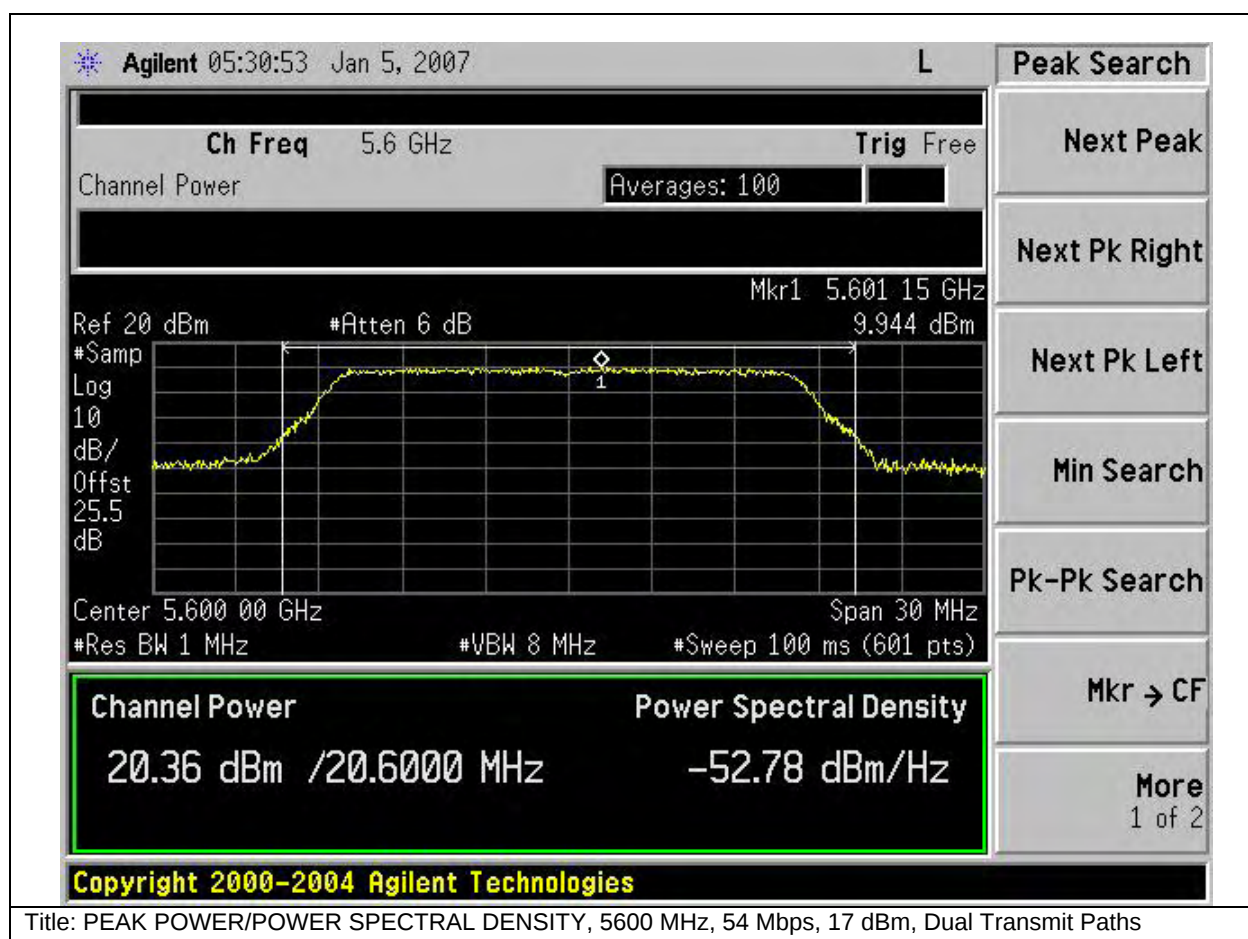
Subtest Number: 25251 - 35		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



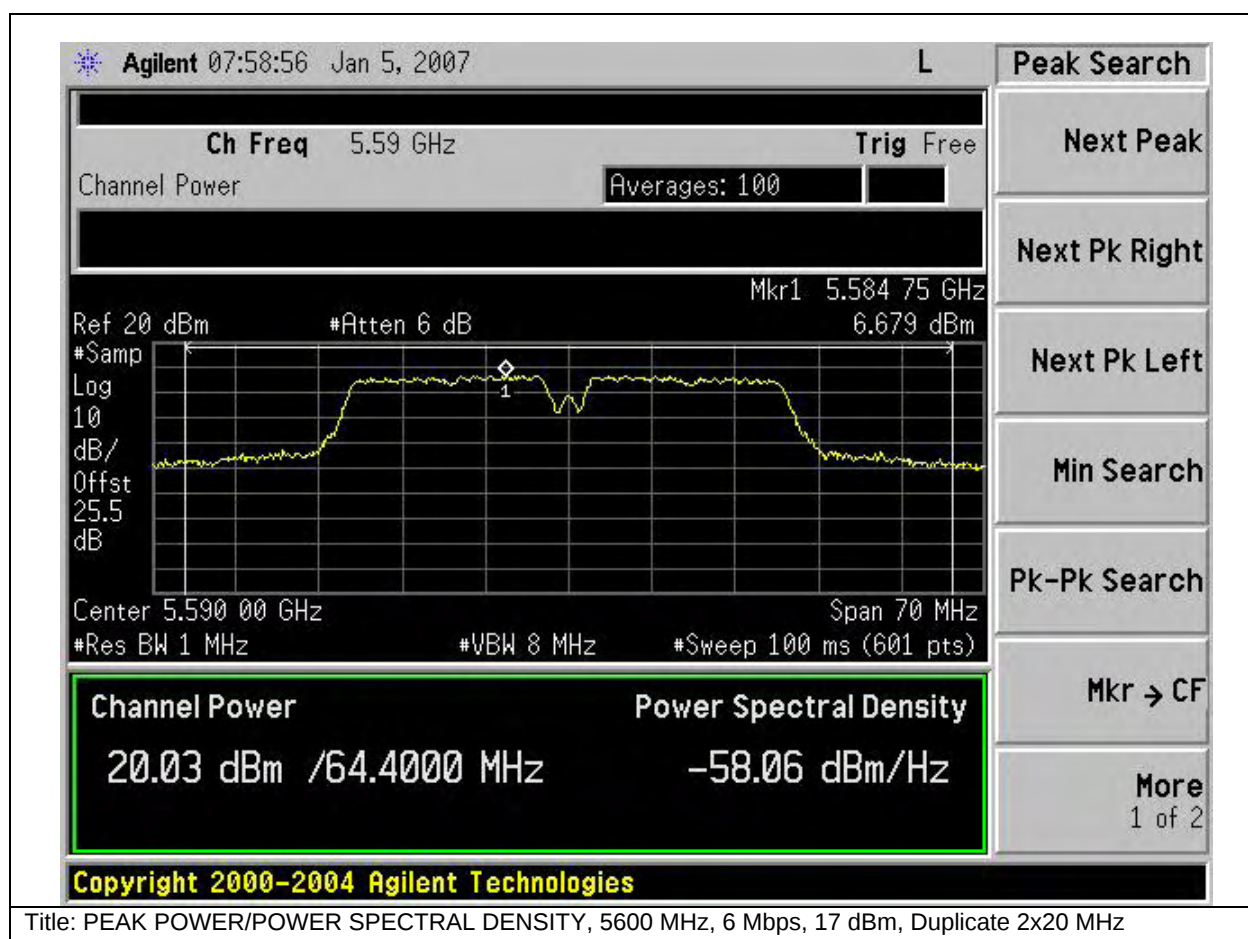
Subtest Number: 25251 - 33		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25251 - 41		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

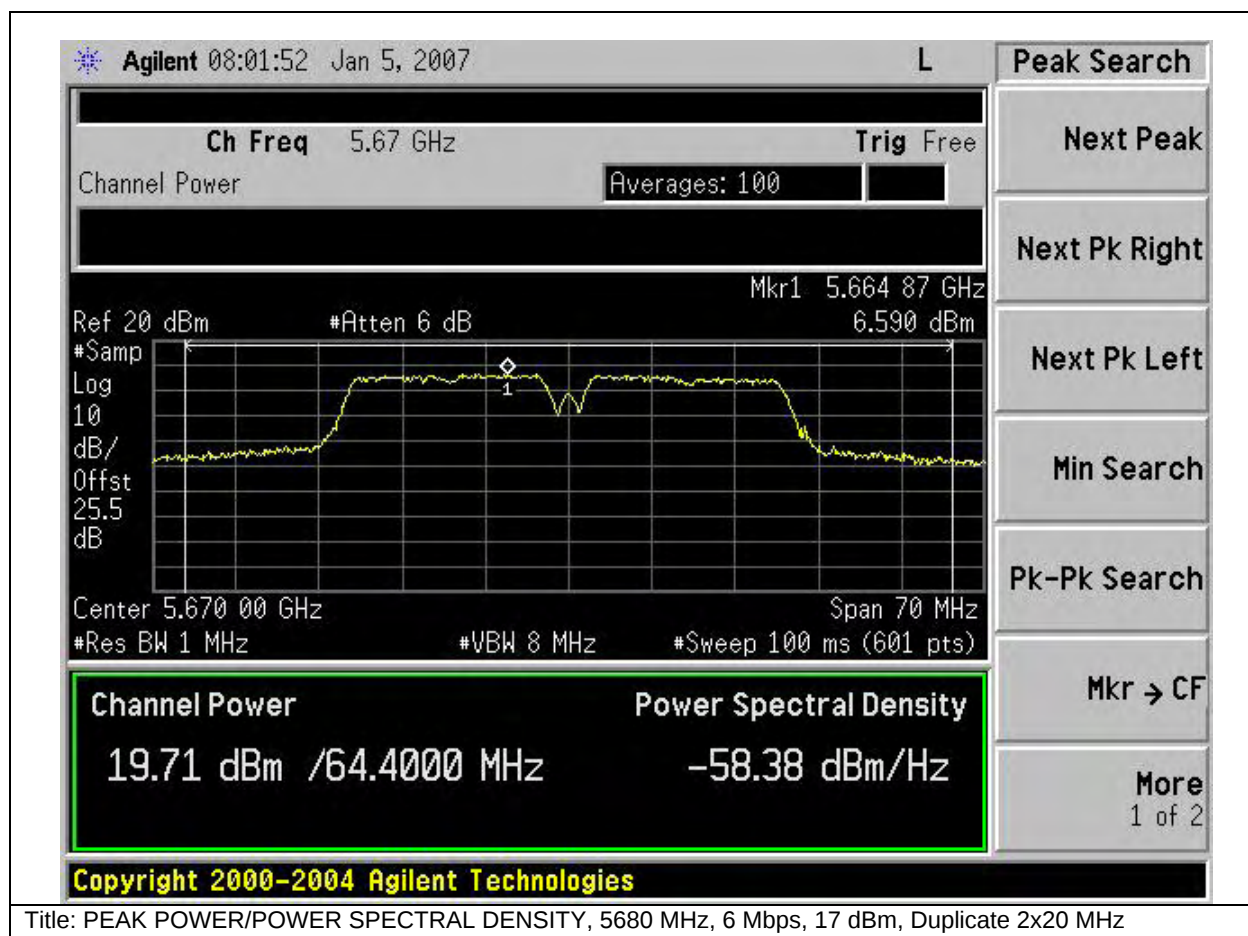


Subtest Number: 25251 - 39		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

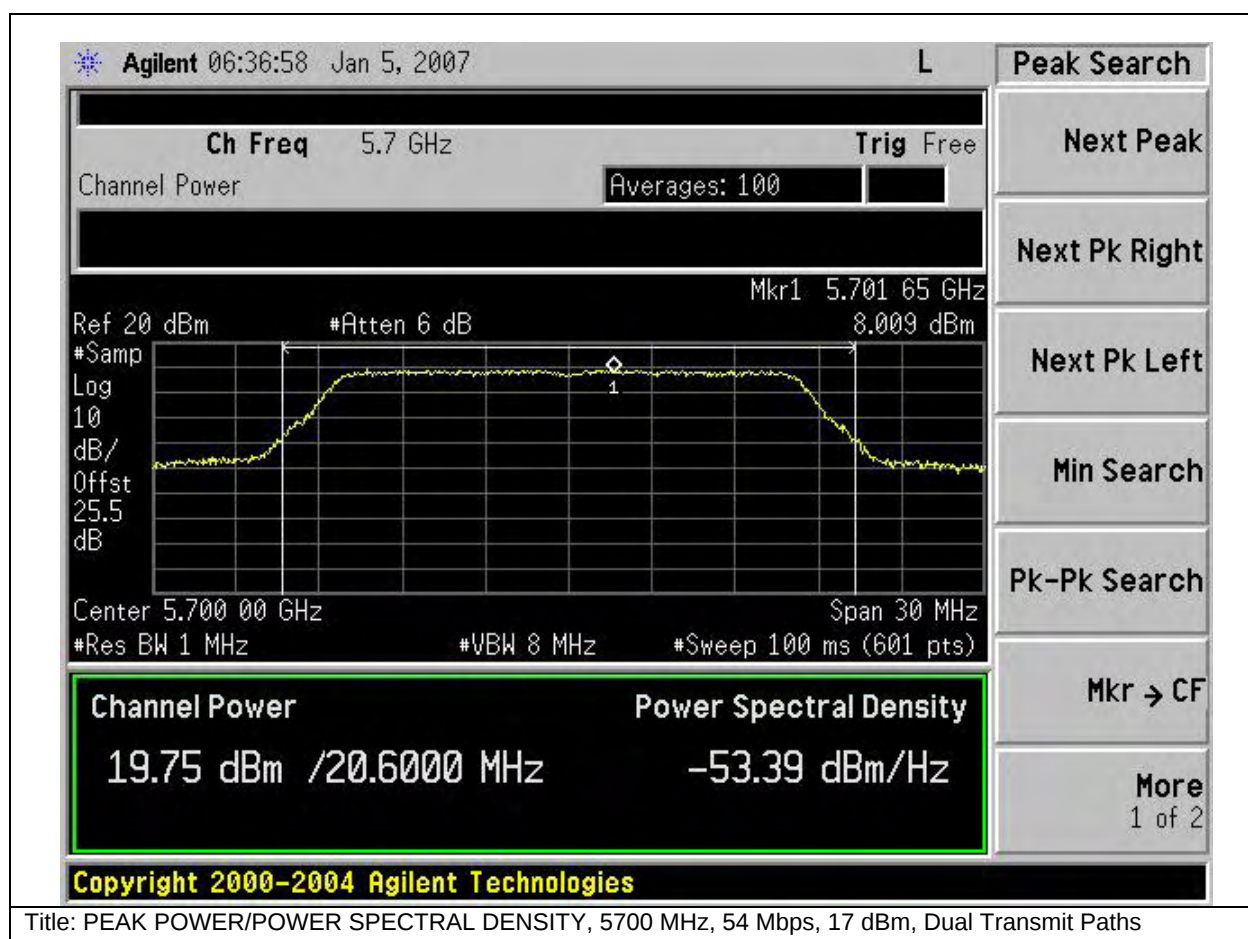




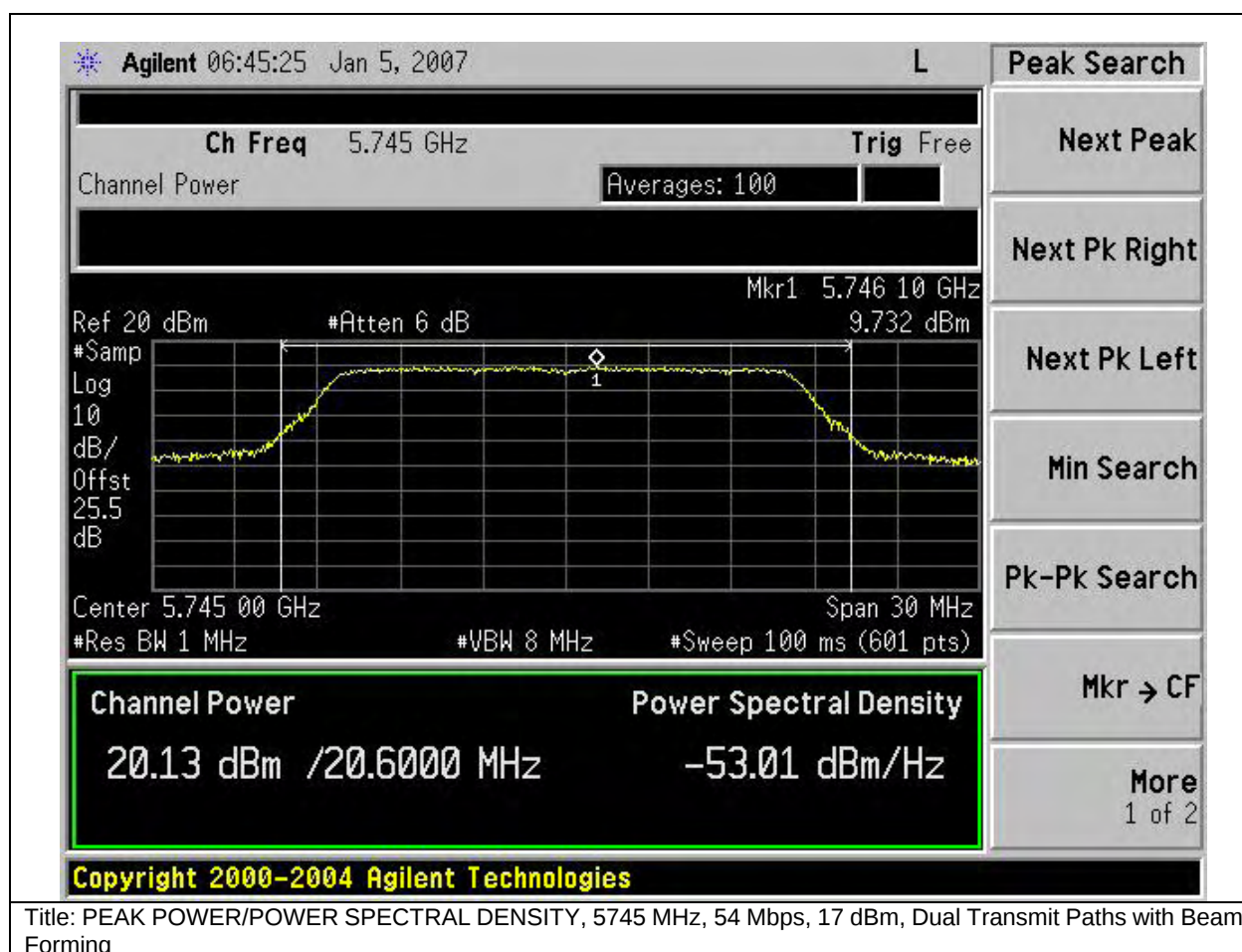
Subtest Number: 25251 - 45		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



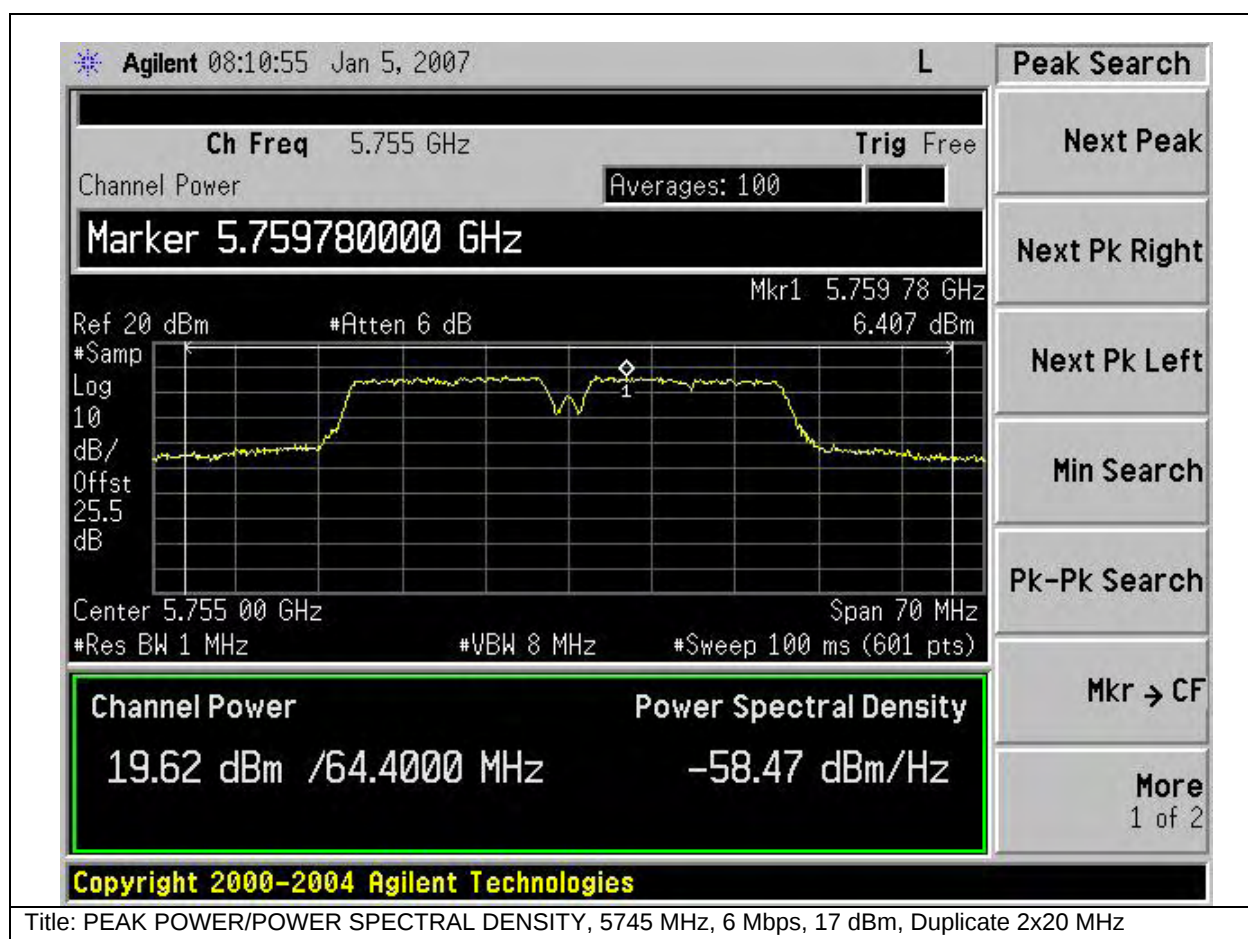
Subtest Number: 25251 - 48		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



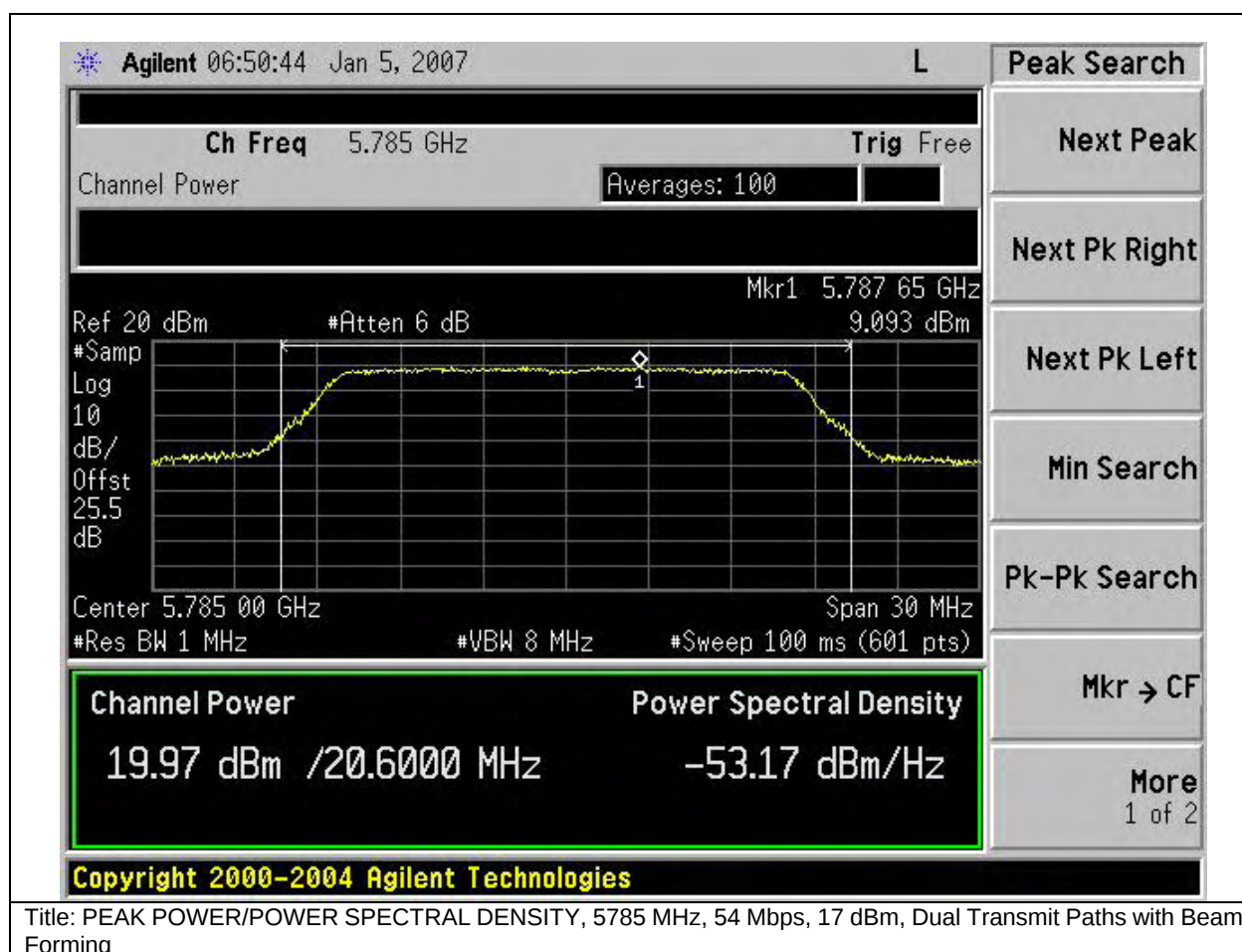
Subtest Number: 25251 - 53		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25251 - 51		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

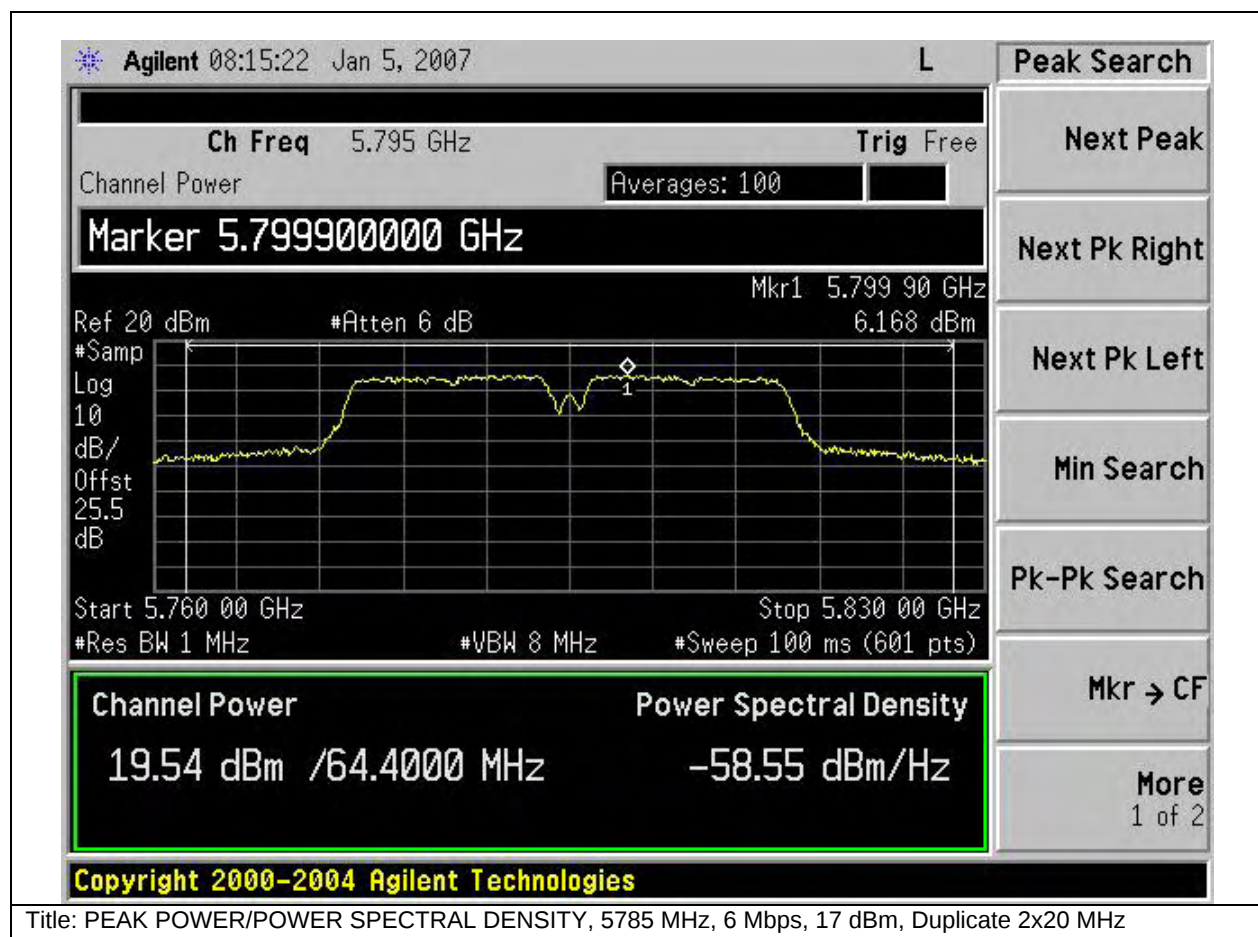


Subtest Number: 25251 - 59		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

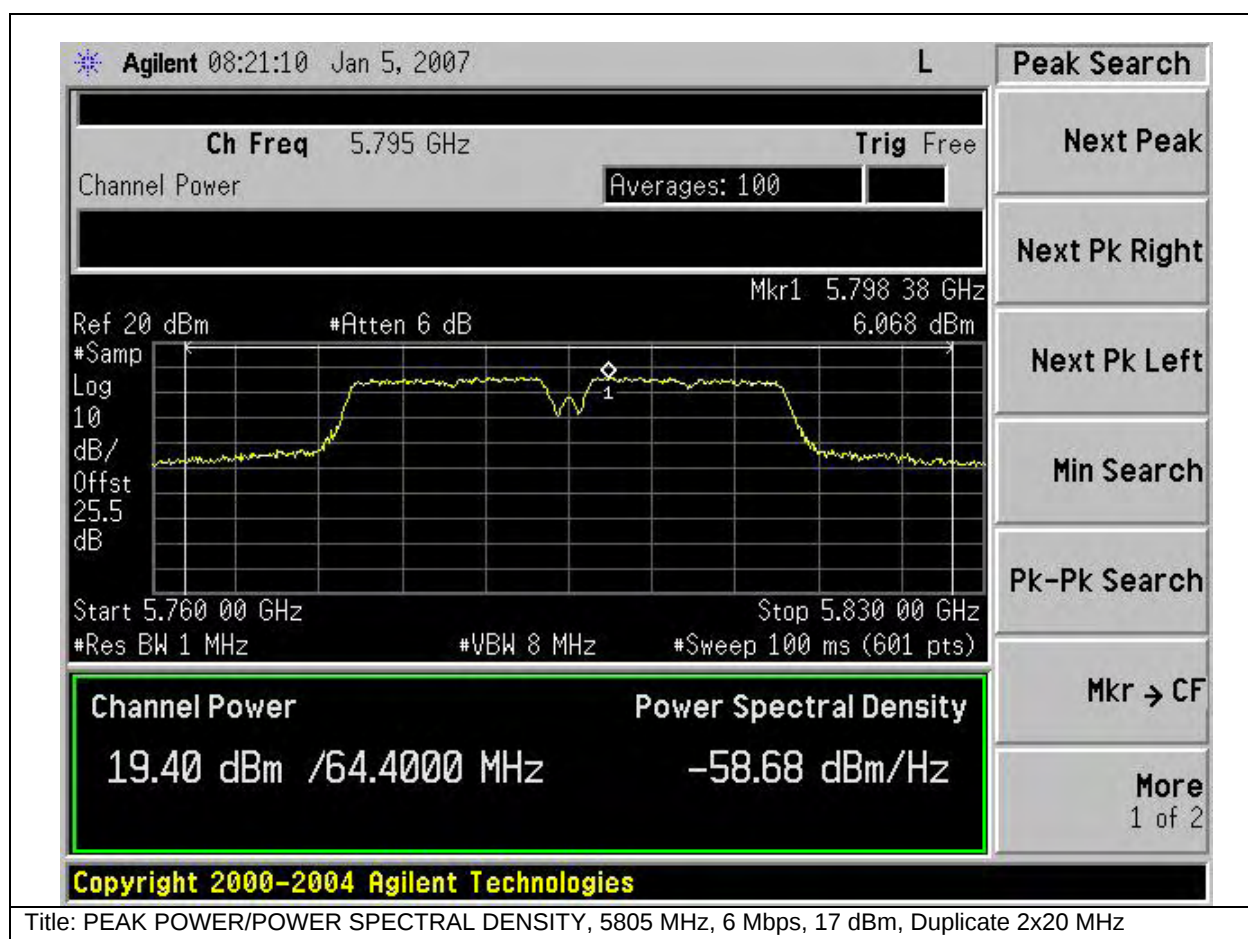




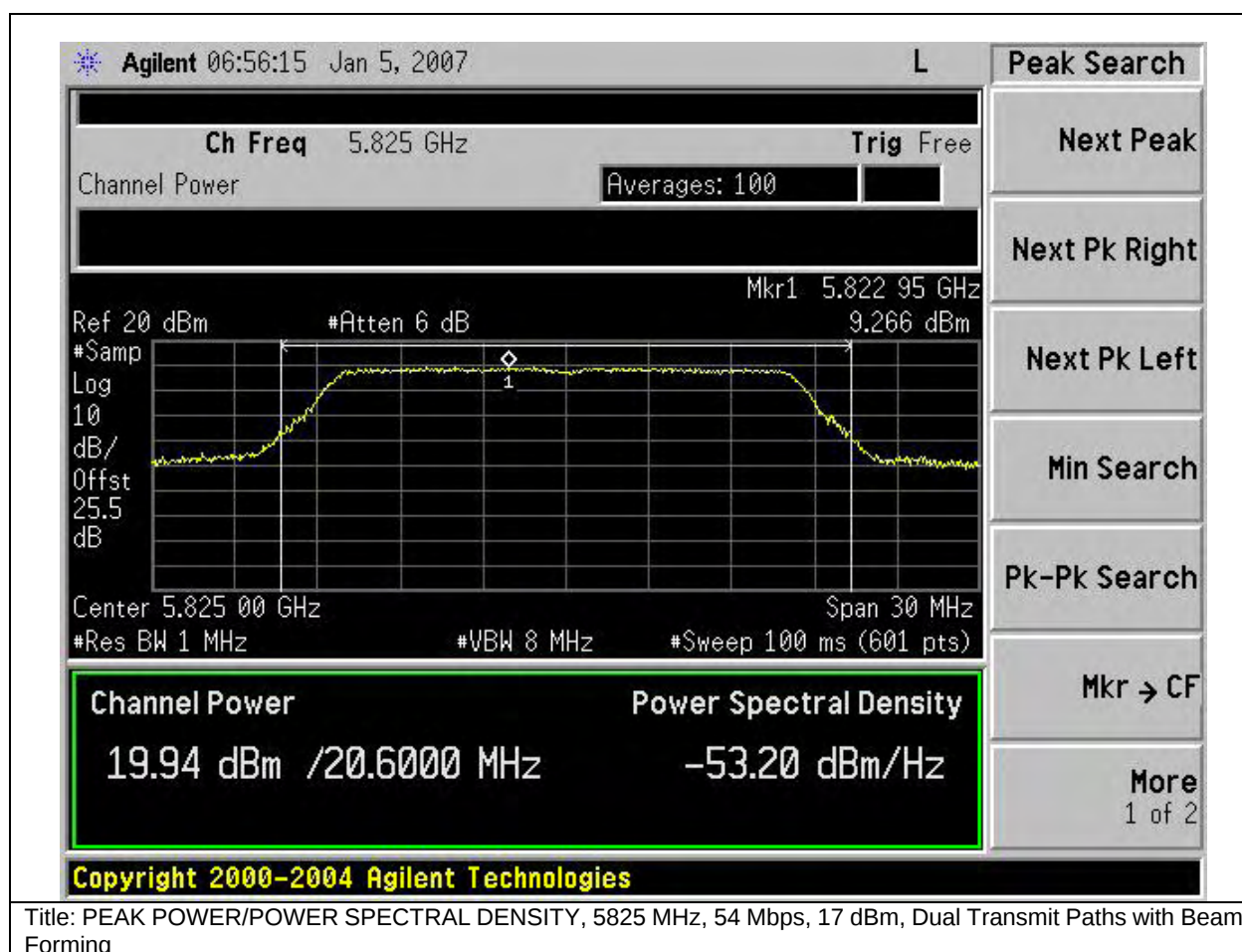
Subtest Number: 25251 - 57		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25251 - 63		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25251 - 66		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	





Power Spectral Density

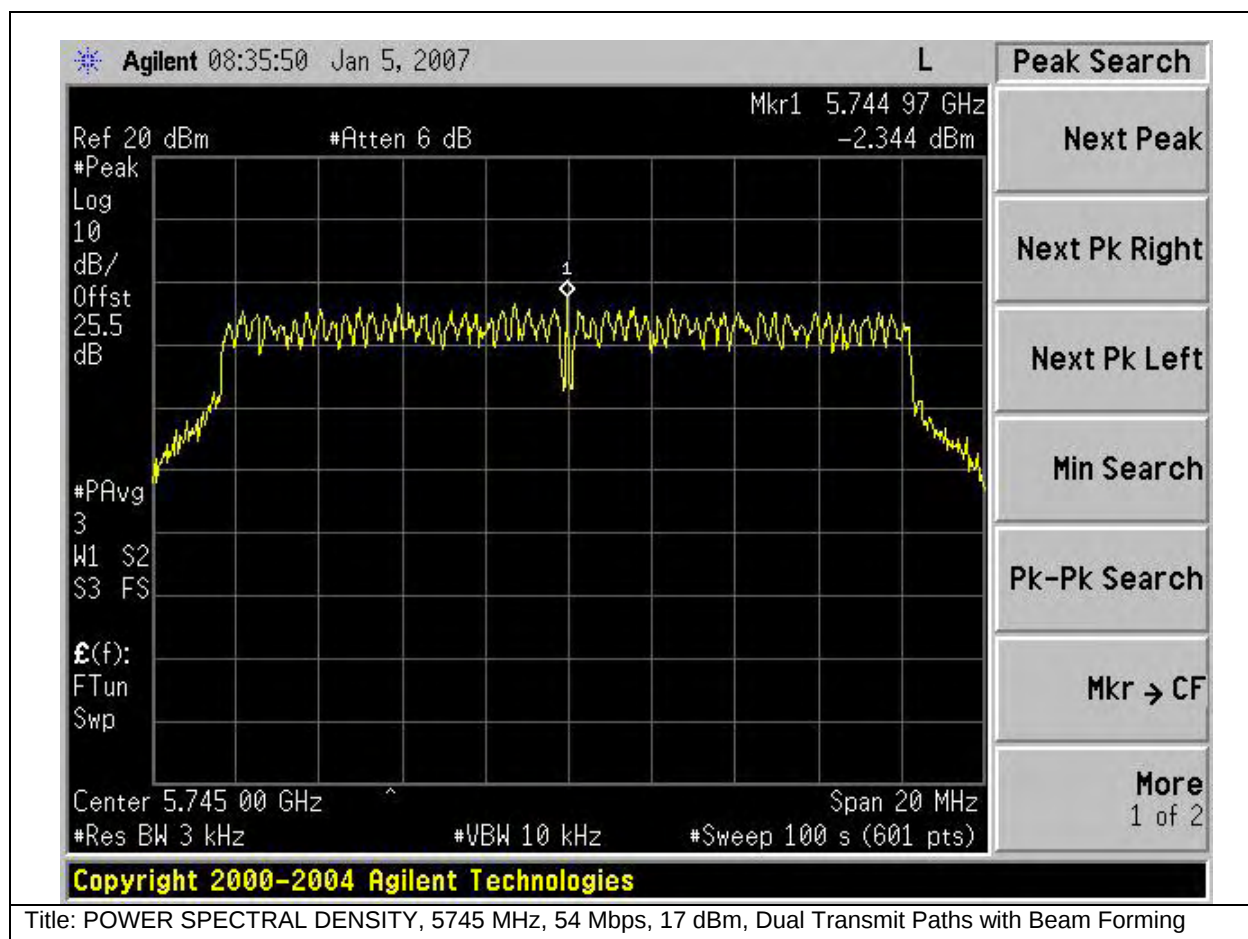
15.247: For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Number: 25253 Spec ID: 653				
Basic Standard	Applied to	Class	Freq Range	Test Details / Comments
CFR47 Part 15.247a3 (LP0002 3.10.6.2.2, RSS210)	RF Ports	N/A	2400MHz - 2483.5MHz	Power Spectral Density
Operating Mode	Mode : 1, Continuous Transmitting			
Power Input	110, 60Hz (+/-20%)			
Overall Result	Pass			
Comments	No further comments			
Deviation	There were no deviations from the specification			

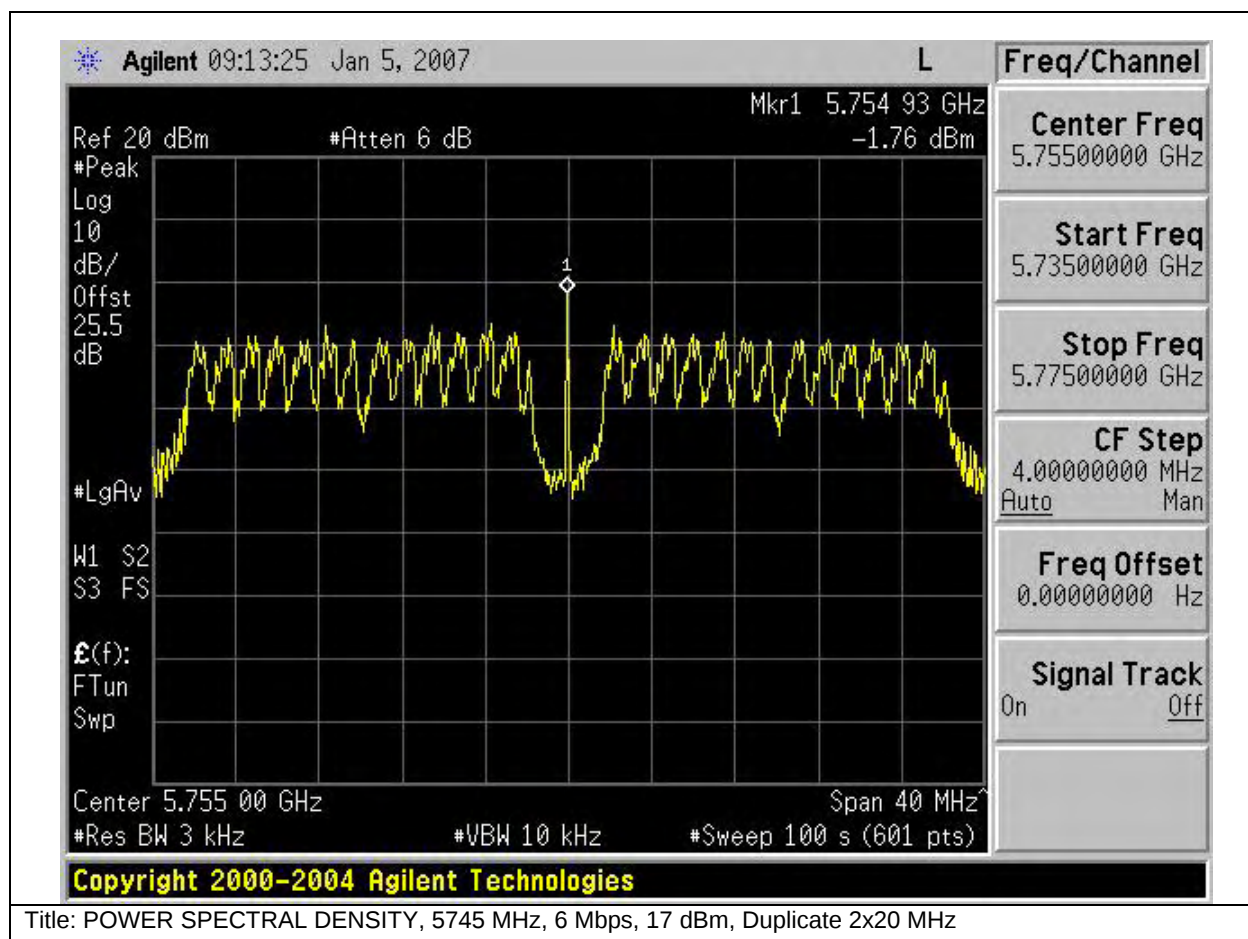
System Number	Description	Samples	System under test	Support equipment
1	EUT	S01, S02, S03 and S04	☒	☐

Frequency (MHz)	Mode	Data Rate (Mbps)	PSD (dBm/kHz)	Limit (dBm/kHz)	Margin (dB)
5745	Dual BF	54	-2.3	8	10.3
5745	Duplicate	6	-1.8	8	9.8
5785	Dual BF	54	-2.9	8	10.9
5785	Duplicate	6	-1.6	8	9.6
5805	Duplicate	6	-2.0	8	10
5825	Dual BF	54	-2.9	8	10.9

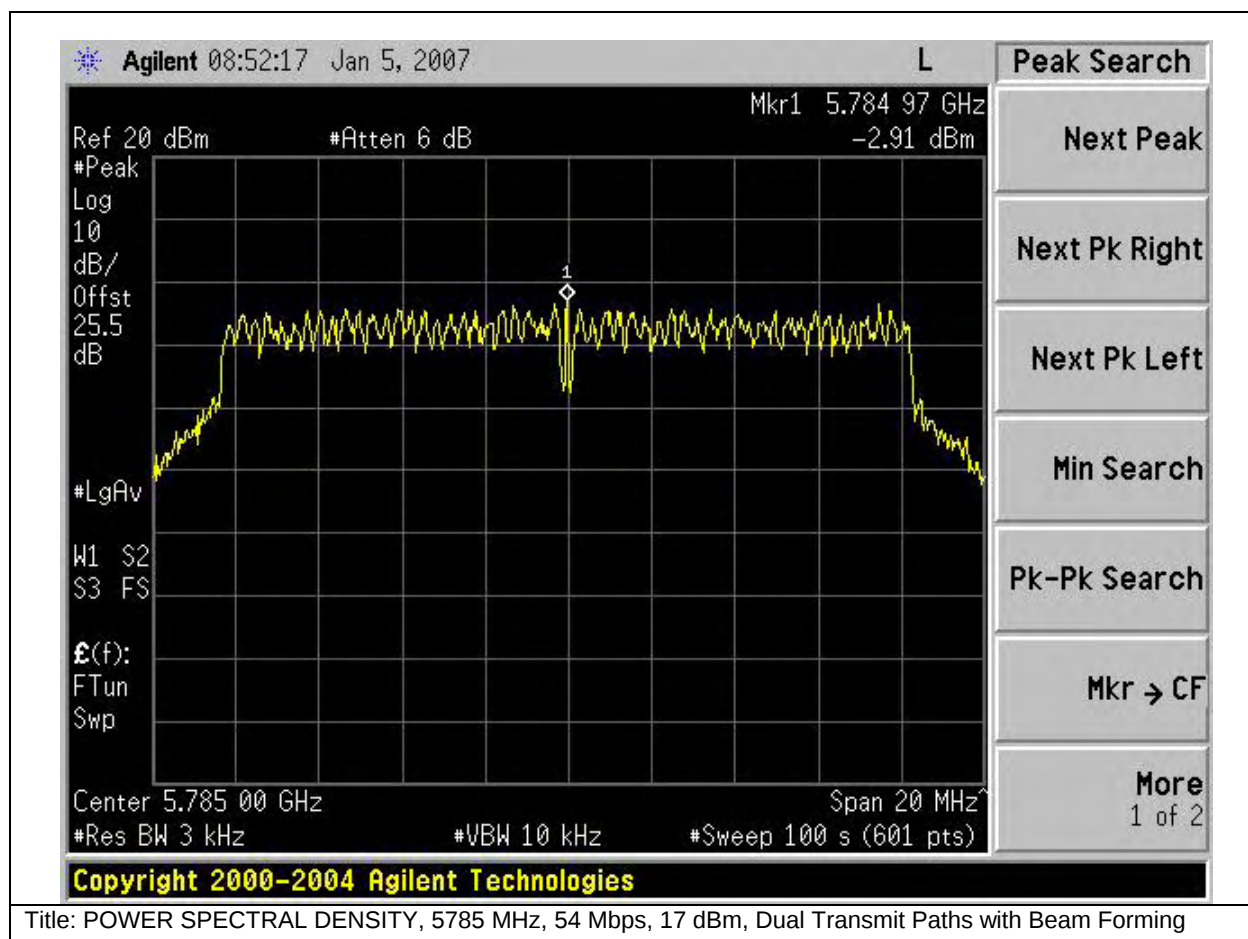
Subtest Number: 25253 - 3		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25253 - 1		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

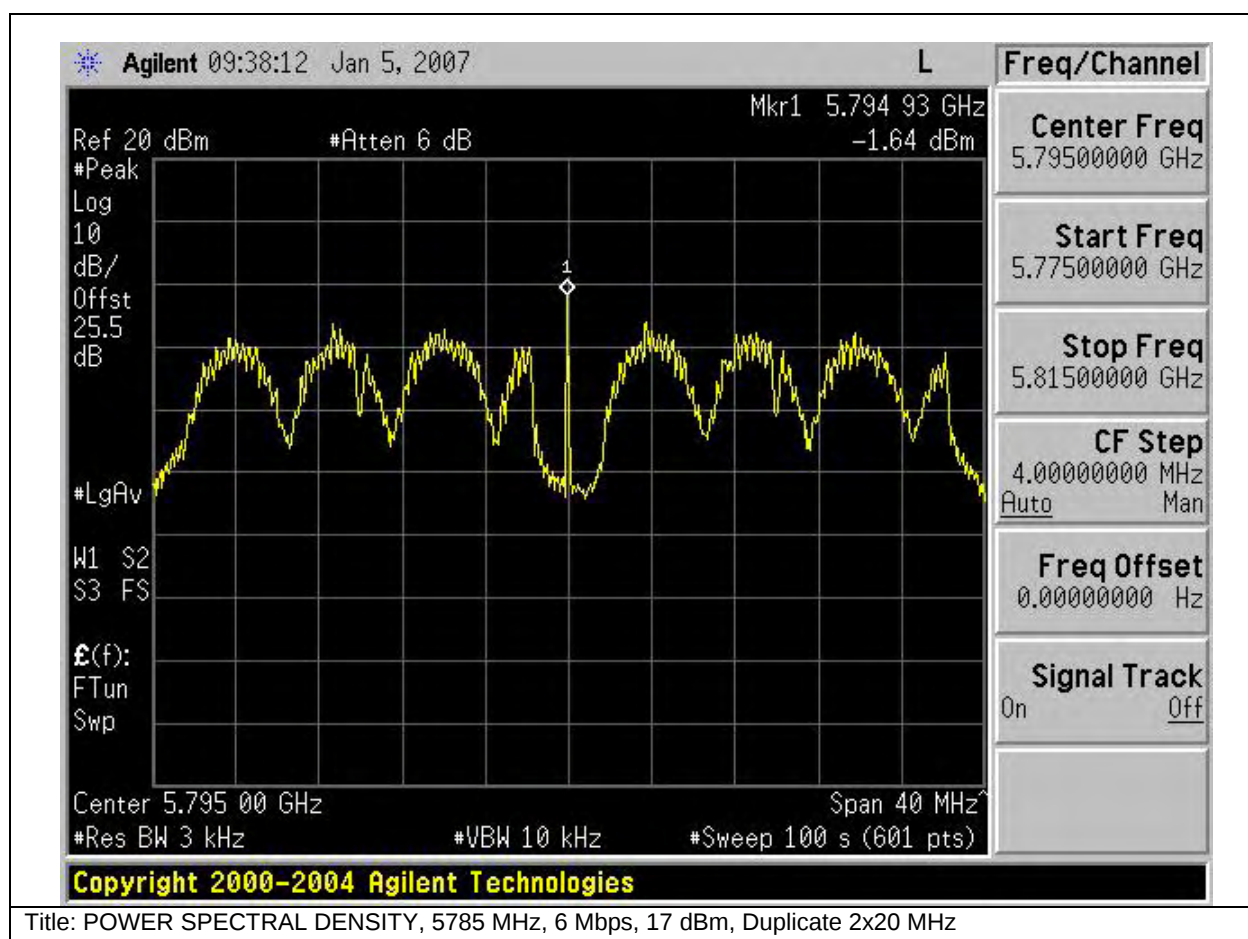


Subtest Number: 25253 - 9		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



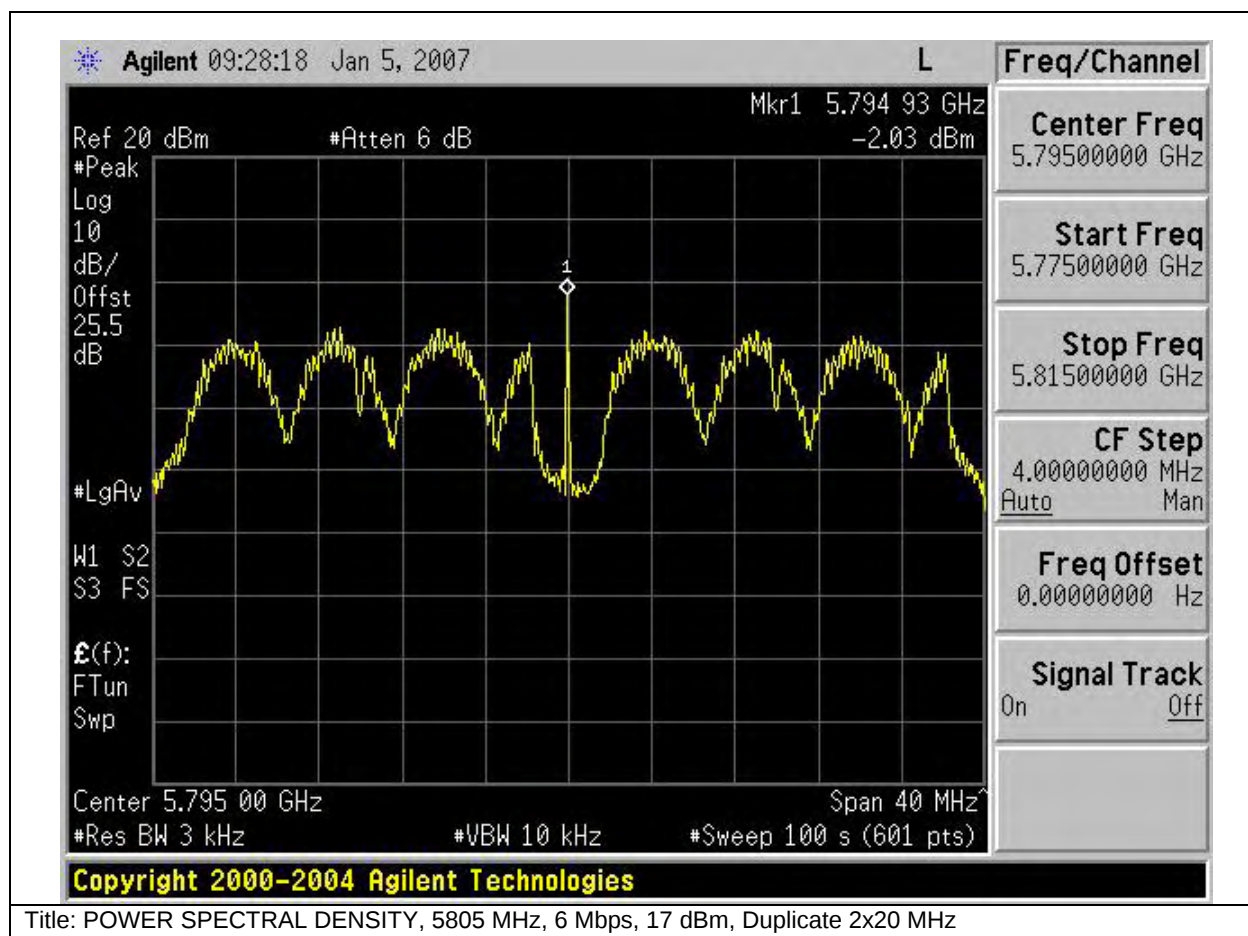


Subtest Number: 25253 - 7		Subtest Date: 24-Jan-2007	
Engineer	James Nicholson		
Lab Information	Richfield, EMC Labs		
Subtest Results			
Line Under Test	RF Port		
Transducer	Direct		
Subtest Result	Pass		
Highest Frequency	N/A		
Lowest Frequency	N/A		
Comments on the above Test Results	No further comments		





Subtest Number: 25253 - 13		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	



Subtest Number: 25253 - 16		Subtest Date: 24-Jan-2007
Engineer	James Nicholson	
Lab Information	Richfield, EMC Labs	
Subtest Results		
Line Under Test	RF Port	
Transducer	Direct	
Subtest Result	Pass	
Highest Frequency	N/A	
Lowest Frequency	N/A	
Comments on the above Test Results	No further comments	

