

FCC RF Test Report

Product Name: Smart Phone

Product Model: HUAWEI D2-6114, D2-6114, HW-03E

Report Number: SYBH(Z-RF)014012013-2005

FCC ID: QISD2-6114

Reliability Laboratory of Huawei Technologies Co., Ltd.

Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District,
Shenzhen, 518129, P.R.C

Tel: +86 755 28780808 Fax: +86 755 89652518



Notice

1. The laboratory has Passed the accreditation by China National Accreditation Service for Conformity Assessment (CNAS). The accreditation number is L0310.
2. The laboratory has Passed the accreditation by The American Association for Laboratory Accreditation (A2LA). The accreditation number is 2174.01.
3. The laboratory has been listed by the US Federal Communications Commission to perform electromagnetic emission measurements. The site recognition number is 97456.
4. The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 6369A-2.
5. The laboratory has been listed by the VCCI to perform EMC measurements. The accreditation numbers of test site No.1 are R-2364, G-415, C-2583, and T-256, and the accreditation numbers of test site No.2 are R-3760, G-485, C-4210 and T-1237.
6. The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
7. The test report is invalid if there is any evidence of erasure and/or falsification.
8. The test report is only valid for the test samples.
9. Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.



Modification Record

No.	Last Report No.	Modification Description
1		First report.



CONTENT

1	General Information	6
1.1	Applied Standard	6
1.2	Test Location	6
1.3	Test Environment Condition	6
2	Test Summary	7
3	Description of the Equipment under Test (EUT)	8
3.1	General Description	8
3.2	EUT Identity	8
3.3	Technical Description	9
4	General Test Conditions / Configurations	10
4.1	EUT Configurations	10
4.2	Test Environments	11
4.3	Test Setups	12
4.4	Test Conditions	15
5	Main Test Instruments	17
6	Main Test Instruments	错误! 未定义书签。



1 General Information

1.1 Applied Standard

Applied Rules:	47 CFR FCC Part 2, Subpart J (2012-10-01 Edition) 47 CFR FCC Part 15, Subpart C (2012-10-01 Edition)
Test Method:	FCC KDB 558074 D01 DTS Meas Guidance v02 ANSI C63.4-2003/-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless Devices.

1.2 Test Location

Test Location 1:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

1.3 Test Environment Condition

Ambient Temperature:	19.5 to 25 °C
Ambient Relative Humidity:	45 to 55 %
Atmospheric Pressure:	Not applicable



2 Test Summary

Test Item	FCC Part No.	Requirements	Test Result	Verdict (NOTE)
6dB Emission Bandwidth (EBW)	15.247(a)(2)	> 500kHz	Appendix A	Pass
Maximum Peak Conducted Output Power	15.247(b)(3)	< 1 W	Appendix B	Pass
Maximum Power Spectral Density Level	15.247(e)	For directional gain: < 8 dBm/3 kHz – (G[dBi] – 6 [dB]), peak. Otherwise: < 8 dBm/3 kHz, peak.	Appendix C	Pass
Band edge spurious emission	15.247(d)	< -20 dBc/100 kHz if total peak power ≤ power limit.	Appendix D	Pass
Conducted RF Spurious Emission	15.247(d)	< -20 dBc/100 kHz if total peak power ≤ power limit.	Appendix E	Pass
Radiated Emissions in the Restricted Bands	15.247(d) 15.209	FCC Part 15.209 field strength limit;	Appendix F	Pass
AC Power Line Conducted Emissions	15.207	FCC Part 15.207 conducted limit;	Appendix G	Pass

3 Description of the Equipment under Test (EUT)

3.1 General Description

HUAWEI D2-6114, D2-6114, HW-03E is subscriber equipment in the LTE/UMTS/GSM system. The LTE frequency band is Band I, Band XIX and Band XXI, not included in this report. The HSUPA/HSDPA/UMTS frequency band is Band I, Band V, Band VI, and Band XIX. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, LTE/UMTS/GSM protocol processing, voice, video, MMS service, GPS, AGPS, Felica and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

NOTE: Only Bluetooth test data included in this report.

3.2 EUT Identity

NOTE: Unless otherwise noted in the report, the functional boards installed in the units shall be selected from the below list, but not means all the functional boards listed below shall be installed in one unit.

3.2.1 Board

Board		
Software	Hardware Version	Description
4.1..1301141	HL1U9701LM	Main board of Mobile Phone

3.2.2 Sub-Assembly

Sub-Assembly			
Sub-Assembly Name	Model	Manufacturer	Description
Rechargeable Li-ion	HB5R1HV	Huawei Technologies Co., Ltd.	Battery Model: HB5R1HV Rated capacity: 2150mAh Nominal Voltage:  +3.8V Charging Voltage:  +4.35V



3.3 Technical Description

Characteristics	Description	
TX/RX Operating Range	2400-2483.5 MHz band	$f_c = 2402 \text{ MHz} + N * 2 \text{ MHz}$, where: - f_c = "Operating Frequency" in MHz, - N = "Channel Number" with the range from 0 to 39.
Modulation Type	Digital	GFSK,
Emission Designator	GFSK for BT 4.0: 1M05GXD	
Bluetooth Power Class	Class 2,	

4 General Test Conditions / Configurations

4.1 EUT Configurations

4.1.1 General Configurations

Configuration	Description
Test Antenna Ports	Until otherwise specified, <ul style="list-style-type: none">- All TX tests are performed at all TX antenna ports of the EUT, and- All RX tests are performed at all RX antenna ports of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

4.1.2 Customized Configurations

# EUT Conf.	Signal Description	Operating Frequency
TM1_DH5_Ch0	GFSK for BT 4.0 modulation, package type DH5, hopping off.	Ch No. 0 / 2402 MHz
TM1_DH5_Ch19	GFSK for BT 4.0 modulation, package type DH5, hopping off.	Ch No. 19 / 2440 MHz
TM1_DH5_Ch39	GFSK for BT 4.0 modulation, package type DH5, hopping off.	Ch No. 39 / 2480 MHz



4.2 Test Environments

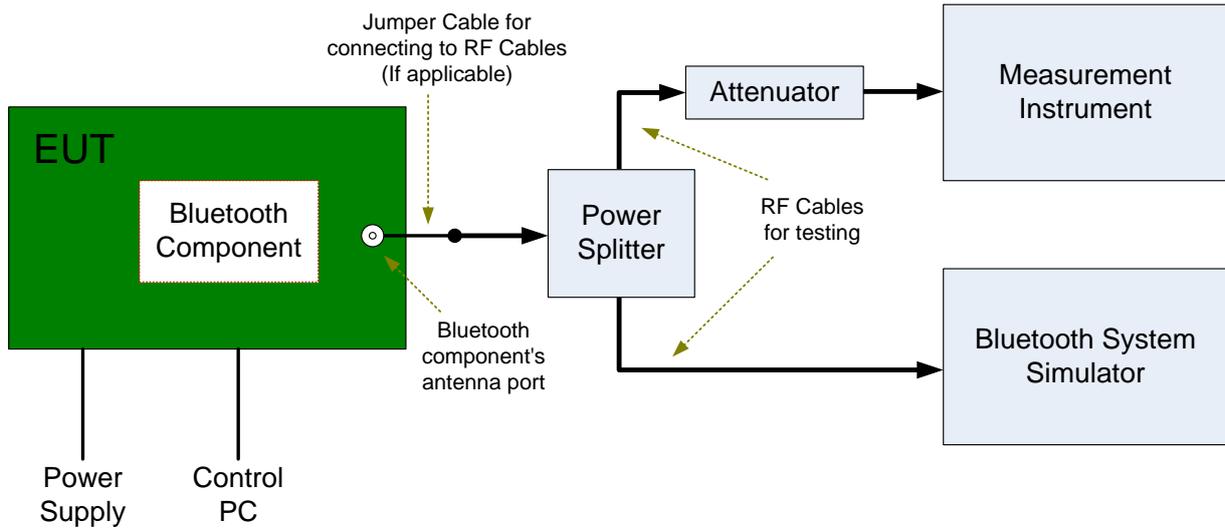
NOTE: The values used in the test report may be stringent than the declared.

Environment Parameter	Selected Values During Tests		
	Temperature	Voltage	Relative Humidity
NTNV	Ambient	3.8 VDC	Ambient

4.3 Test Setups

4.3.1 Test Setup 1

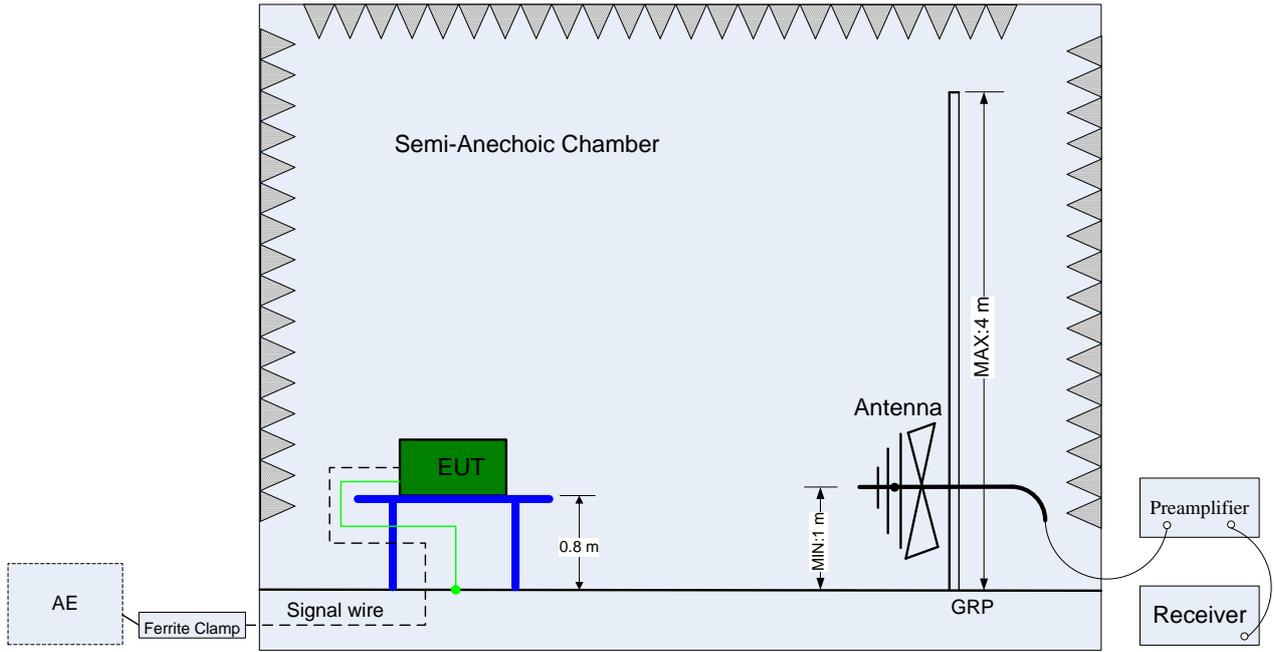
The Bluetooth component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by Bluetooth System Simulator and/or PC/software to emit the specified signals for the purpose of measurements.



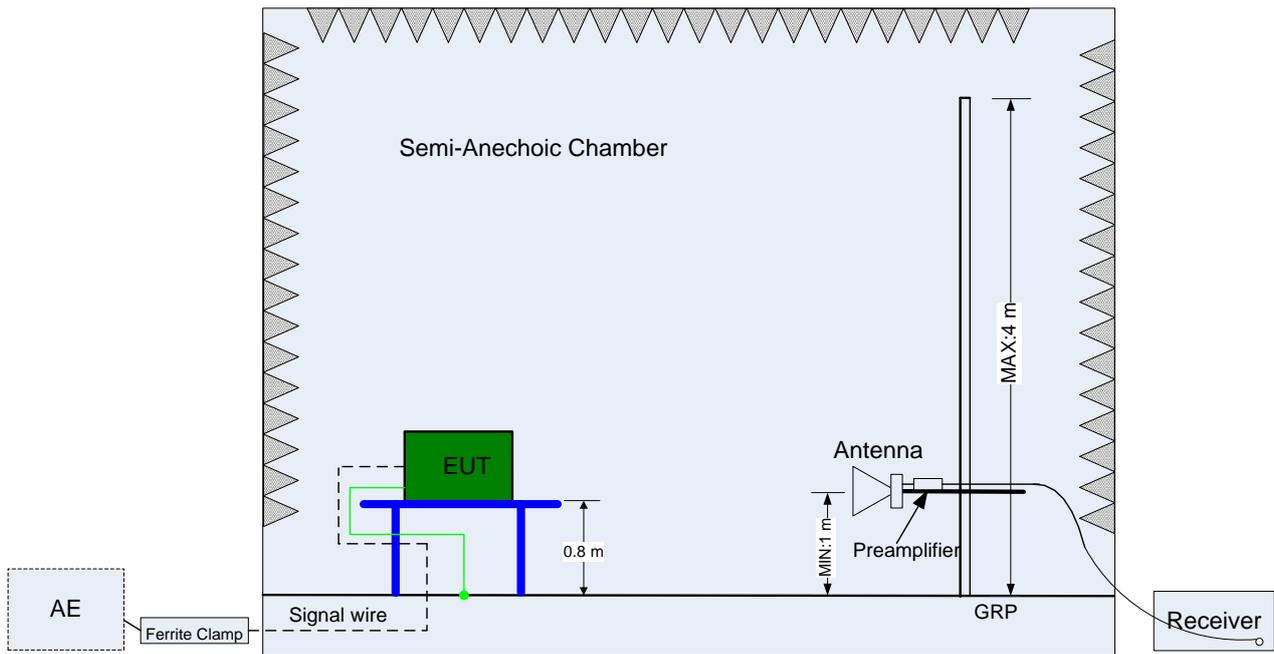
4.3.2 Test Setup 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.4. The test distance is 3m. The setup is according to ANSI C63.4 and CAN/CSA-CEI/IEC CISPR 22.

The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).



(Below 1 GHz)

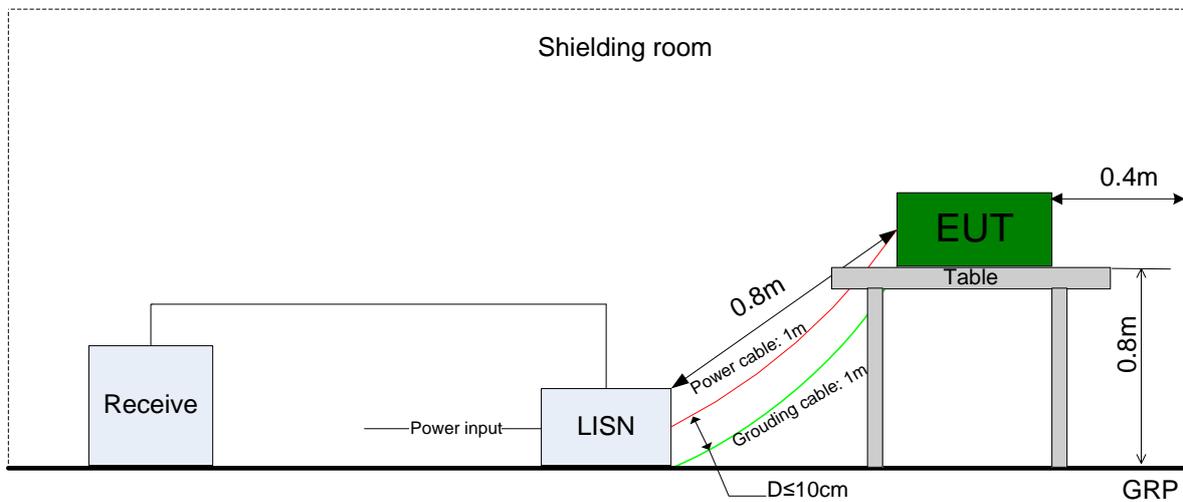


(Above 1 GHz)

4.3.3 Test Setup 3

The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8 m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.



4.4 Test Conditions

Test Case	Test Conditions		
	Configuration	Description	
6dB Emission Bandwidth (EBW)	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	TM1_DH5_Ch0, TM1_DH5_Ch19, TM1_DH5_Ch39.	
Maximum Peak Conducted Output Power	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	TM1_DH5_Ch0, TM1_DH5_Ch19, TM1_DH5_Ch39.	
Maximum Power Spectral Density Level	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	TM1_DH5_Ch0, TM1_DH5_Ch19, TM1_DH5_Ch39.	
Band edge spurious emission	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	TM1_DH5_Ch0, TM1_DH5_Ch39.	
Conducted RF Spurious Emission	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02	
	Test Env.	NTNV	
	Test Setup	Test Setup 1	
	EUT Conf.	TM1_DH5_Ch0, TM1_DH5_Ch19, TM1_DH5_Ch39.	
Radiated Emissions in the Restricted Bands	Meas. Method	FCC KDB 558074 D01 DTS Meas Guidance v02 , C63.4, C63.10. (1) 30 MHz to 1 GHz: Pre: RBW = 100 kHz; VBW = 300 kHz; Det. = Peak. Final: RBW = 120 kHz; Det. = CISPR Quasi-Peak. (2) 1 GHz to 26.5 GHz: Average: RBW = 1 MHz; VBW = 10 Hz; Det. = Peak; Sweep-time = Auto; Trace = Single. Peak: RBW = 1 MHz; VBW = 3 MHz; Det. = Peak; Sweep-time = Auto; Trace ≥ Max Hold * 100.	
	Test Env.	NTNV	
	Test Setup	Test Setup 2	
	EUT Conf.	30 MHz -1 GHz	TM1_DH5_Ch0 (Worst Conf.).
		1-3 GHz	TM1_DH5_Ch0, TM1_DH5_Ch19, TM1_DH5_Ch39.
		3-18 GHz	TM1_DH5_Ch19 (Worse Conf.),
		18-26.5 GHz	TM1_DH5_Ch0 (Worst Conf.).
AC Power Line Conducted	Meas. Method	AC mains conducted. Pre: RBW = 10 kHz; Det. = Peak.	



Test Case	Test Conditions	
	Configuration	Description
Emissions		Final: RBW = 9 kHz; Det. = CISPR Quasi-Peak & Average.
	Test Env.	NTNV
	Test Setup	Test Setup 3
	EUT Conf.	TM1_DH5_Ch39.



5 Main Test Instruments

NOTE: Unless otherwise specified, the calibration intervals for test instruments were Annual (per year). The other intervals, if applicable, are marked with (##y), which denotes ## years calibration interval.

Equipment Name	Manufacturer	Model	Serial Number	Cal Date	Cal. Due
Power supply	KEITHLEY	2303	1288003	2012-11-19	2014-11-18
Wireless Communication Test set	Agilent	N4010A	MY49081592	2012-11-09	2013-11-08
Spectrum Analyzer	Agilent	E4440A	MY48250119	2012-08-20	2013-08-19
Signal Analyzer	R&S	FSQ31	200021	2012-11-09	2013-11-08
Spectrum Analyzer	Agilent	N9030A	MY49431698	2012-11-09	2013-11-08
Temperature Chamber	WEISS	WKL64	56246002940010	2013-01-29	2014-01-28
Signal generator	Agilent	E8257D	MY49281095	2012-09-14	2013-09-13
Test receiver	R&S	ESU26	100150	2012-05-28	2013-05-27
Spectrum analyzer	R&S	FSU3	200474	2013-01-29	2014-01-28
Spectrum analyzer	R&S	FSU43	100144	2013-01-29	2014-01-28
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100304	2013-02-02	2014-02-01
Double-Ridged Waveguide Horn Antenna (1G~18GHz)	R&S	HF907	100391	2011-10-12	2013-10-11
Trilog Broadband Antenna (30M~3GHz)	SCHWARZBE CK	VULB 9163	9163-521	2011-12-09	2013-12-08
Pyramidal Horn Antenna(26GHz-40GH z)	ETS-Lindgren	3160-10	00123940	2011-02-28	2013-02-27
Pyramidal Horn Antenna(18GHz-26.5G Hz)	ETS-Lindgren	3160-09	00125912	2011-02-28	2013-02-27

END



Appendix A: 6dB Emission Bandwidth (EBW)



1 Result Table

EUT Conf.	EBW [KHz]	Verdict
TM1_DH5_Ch0	681.195	Pass
TM1_DH5_Ch19	675.848	Pass
TM1_DH5_Ch39	684.239	Pass



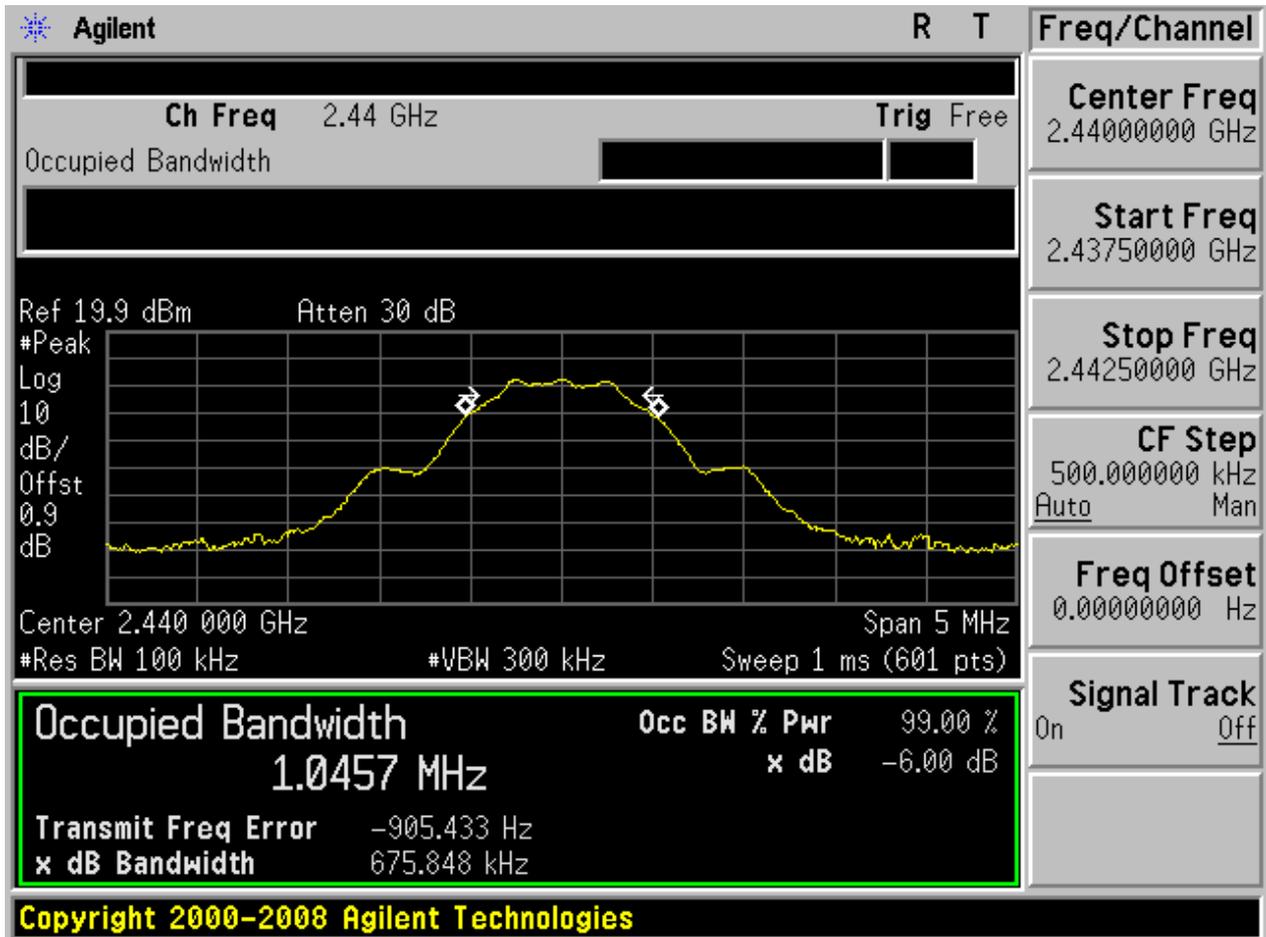
2 Test Plot

2.1 TM1_DH5_Ch0



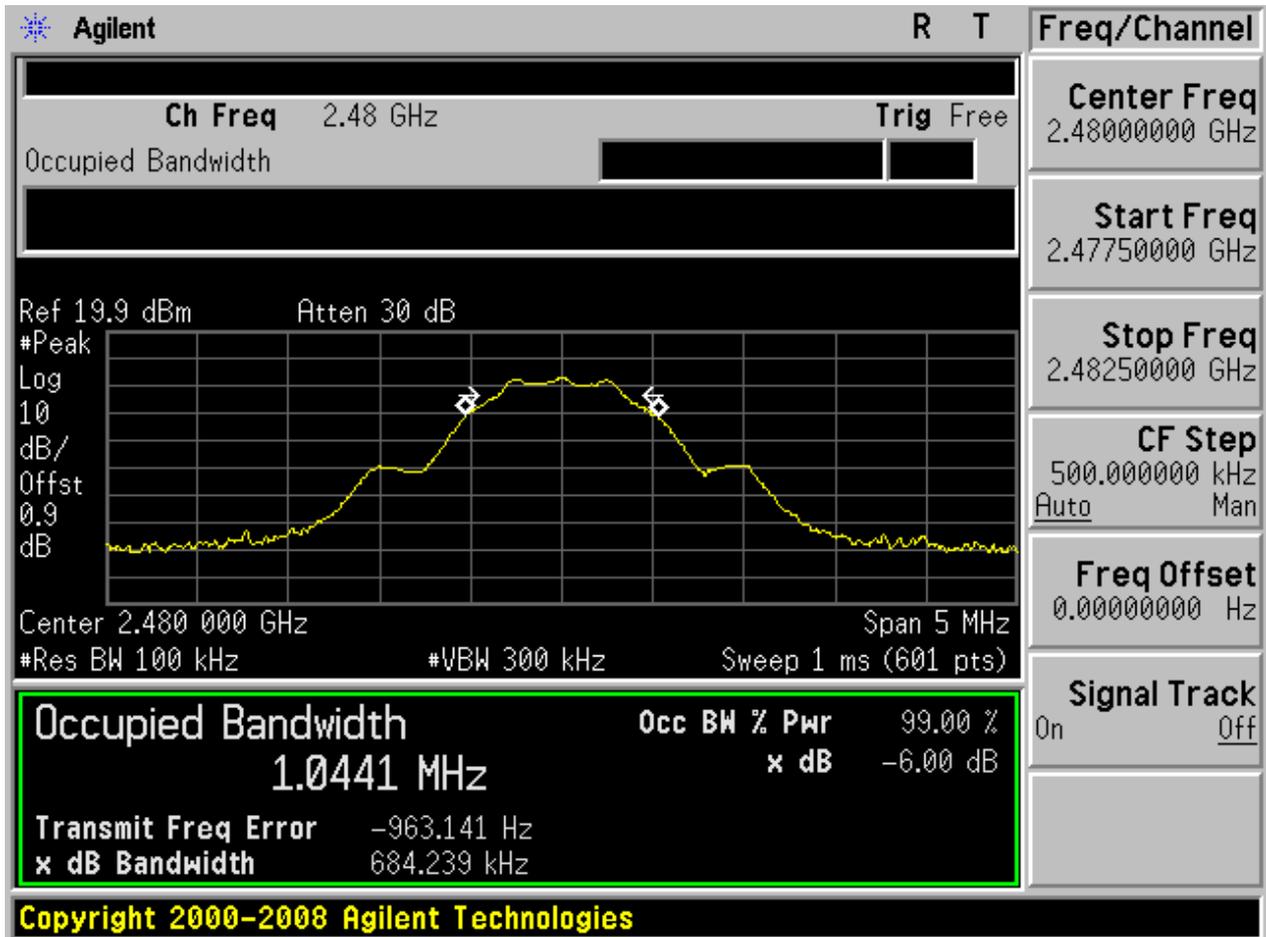


2.2 TM1_DH5_Ch19





2.3 TM1_DH5_Ch39





Appendix B: Maximum Peak Conducted Output Power

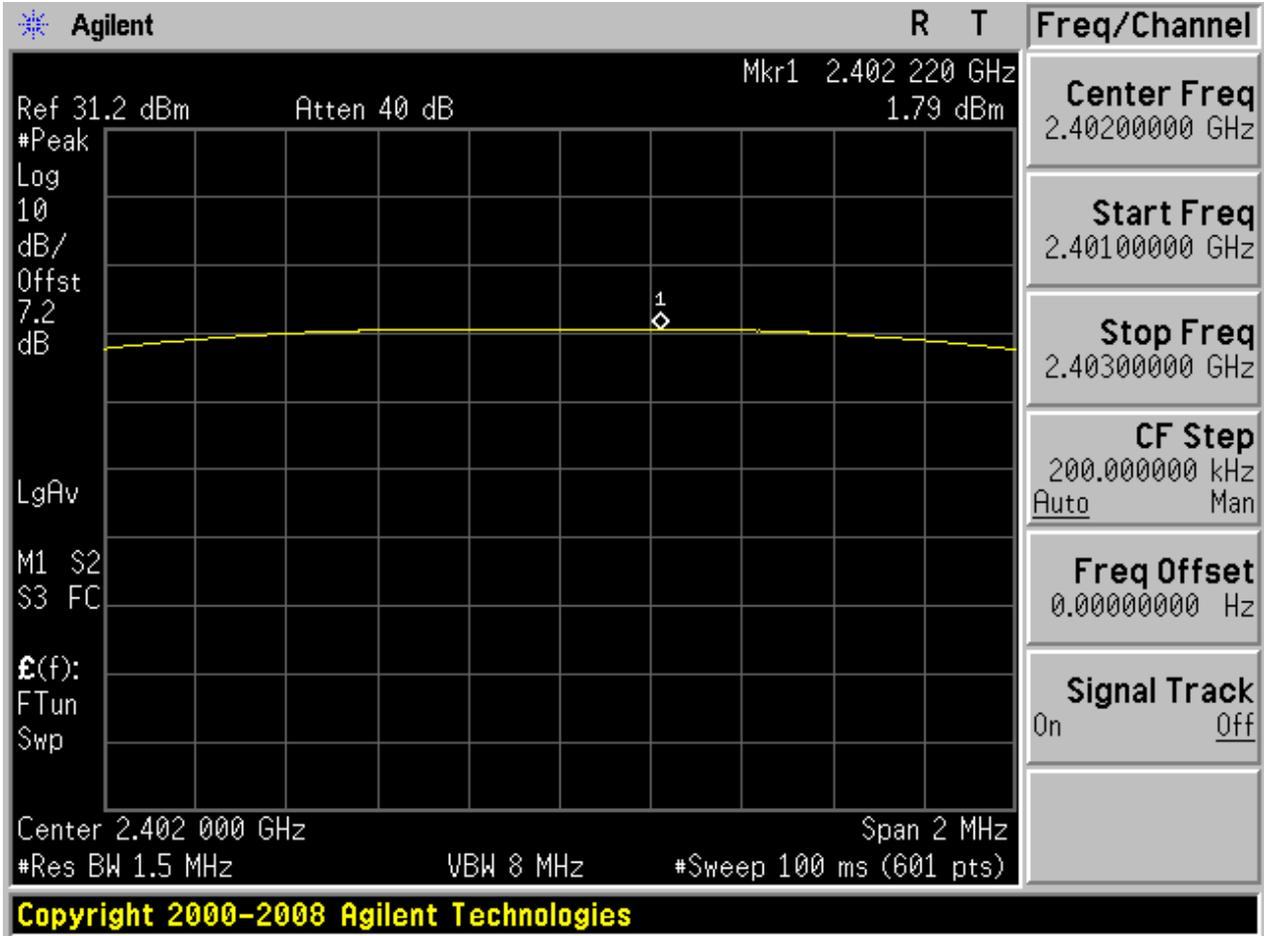


1 Result Table

EUT Conf.	Max. Peak Power [dBm]	Verdict
TM1_DH5_Ch0	1.79	Pass
TM1_DH5_Ch19	2.85	Pass
TM1_DH5_Ch39	2.62	Pass

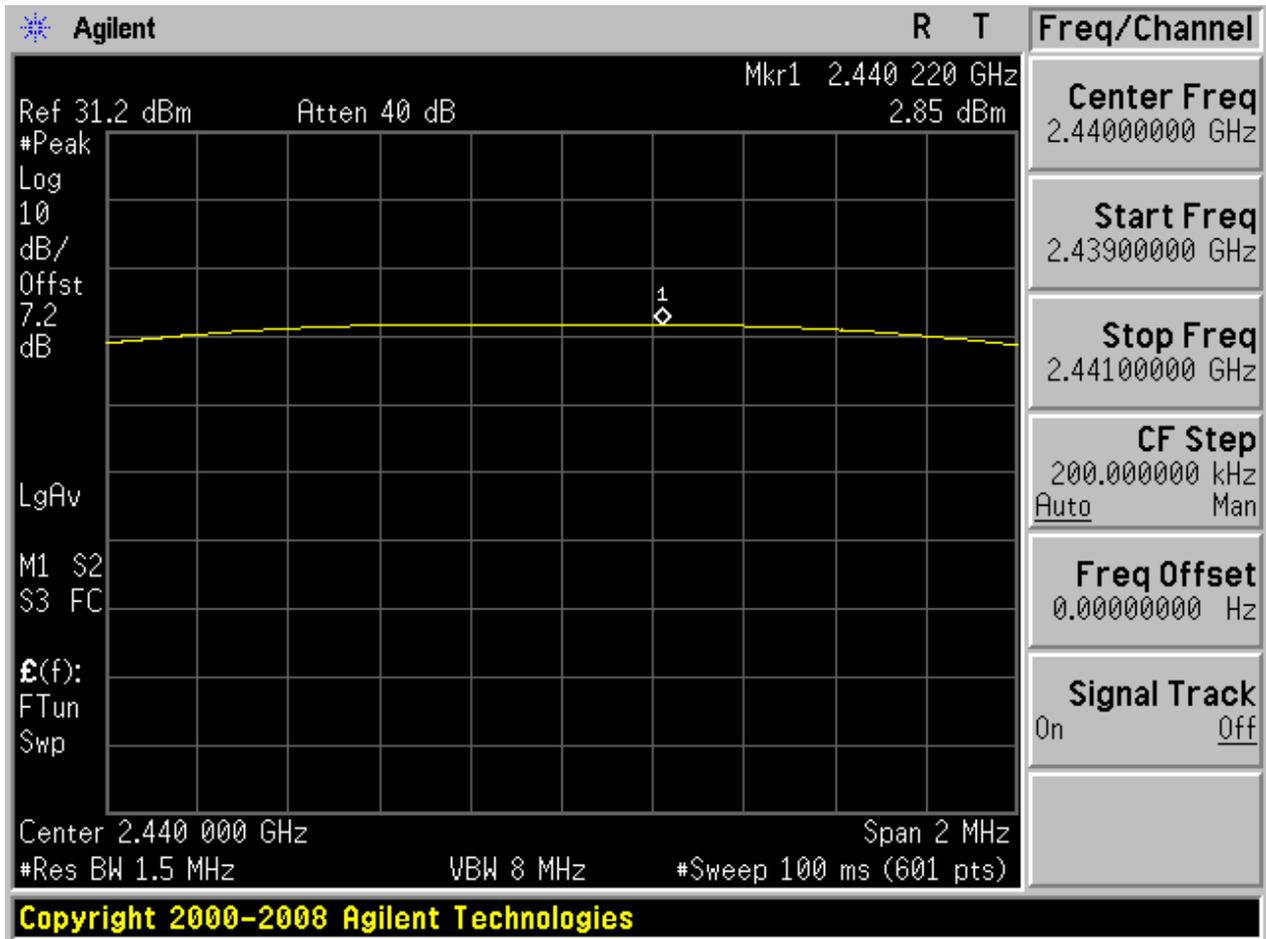


2 Test Plot
 2.1 TM1_DH5_Ch0



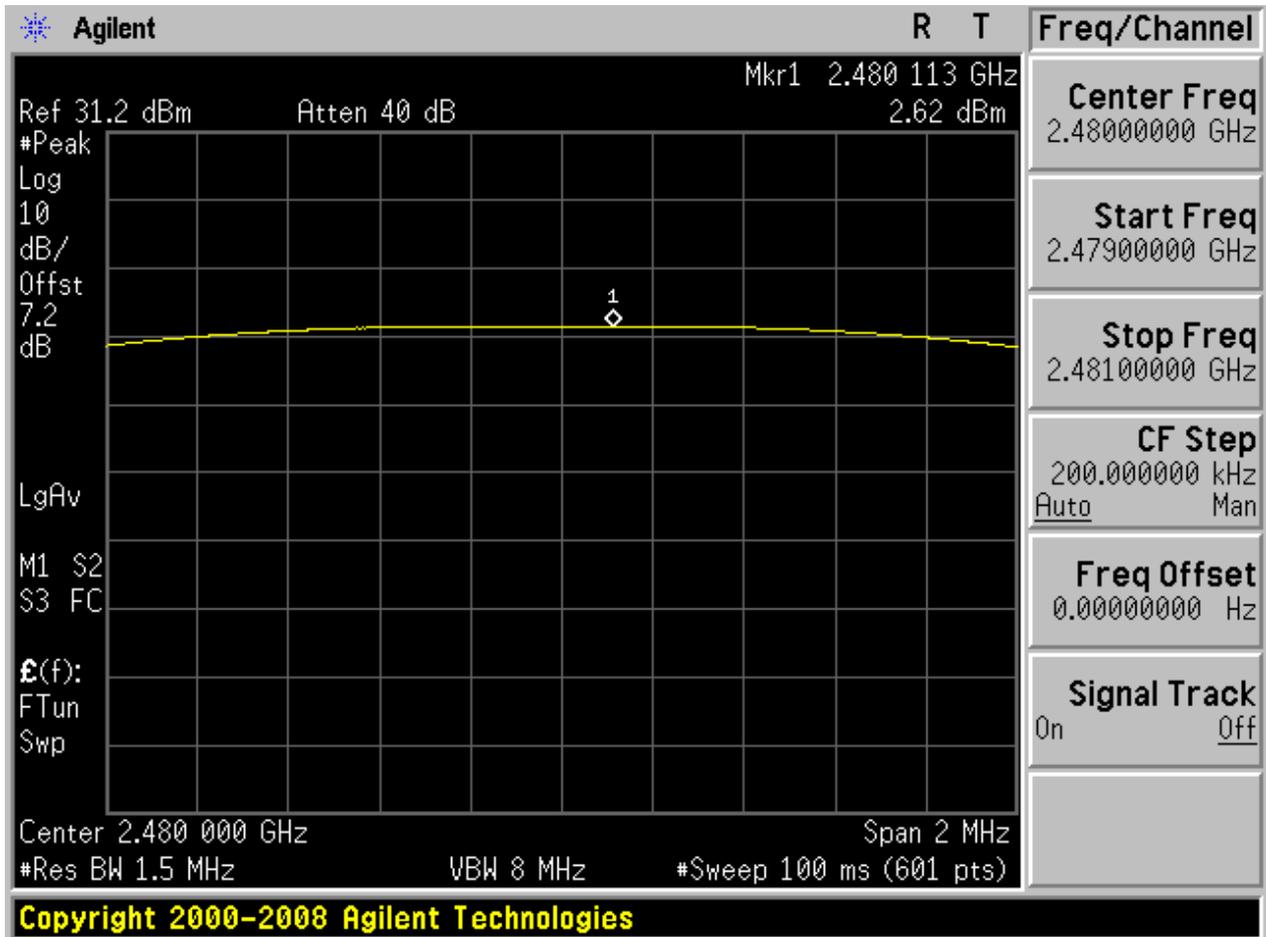


2.2 TM1_DH5_Ch19





2.3 TM1_DH5_Ch39





Appendix C: Maximum Power Spectral Density Level

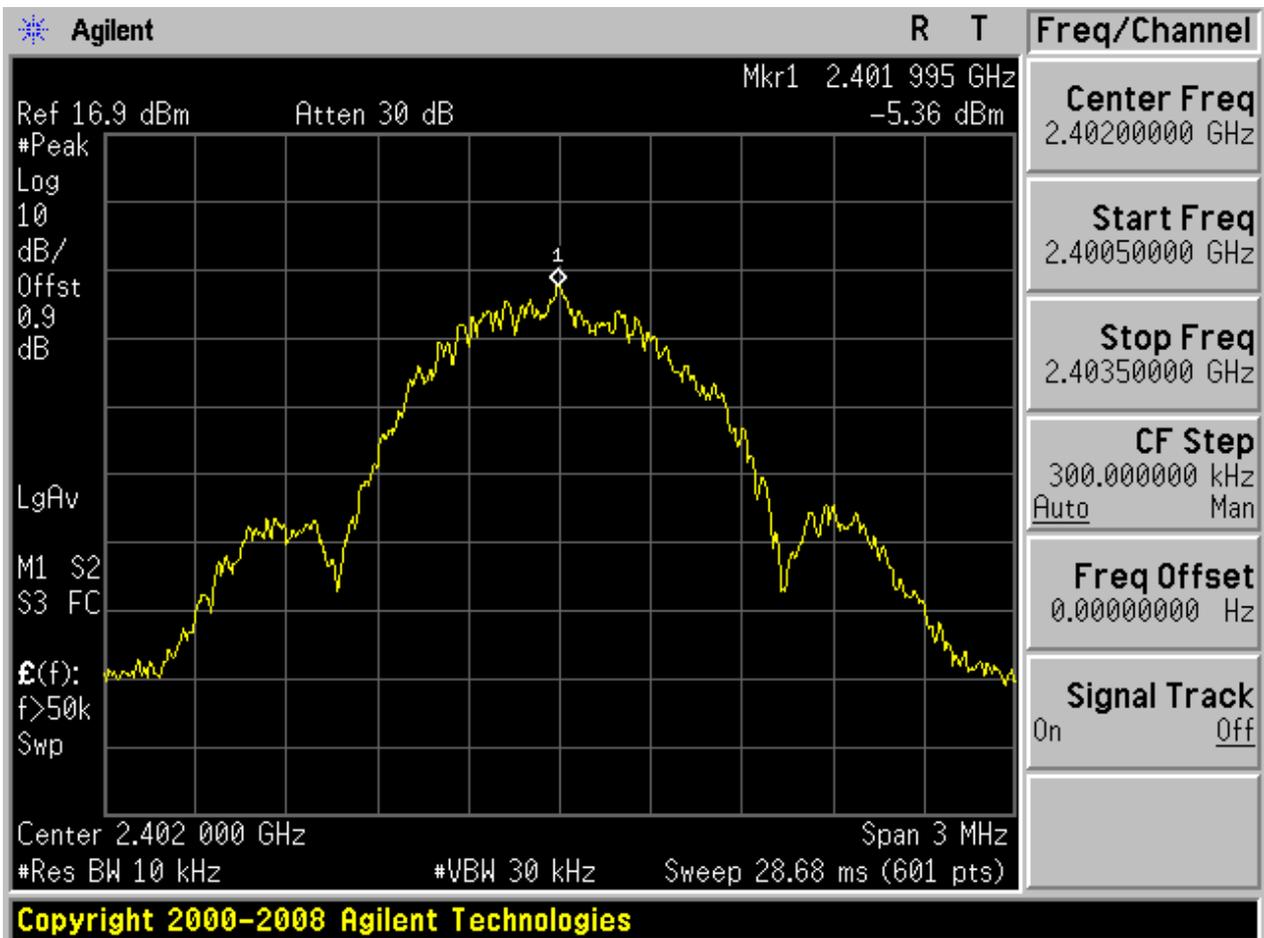


1 Result Table

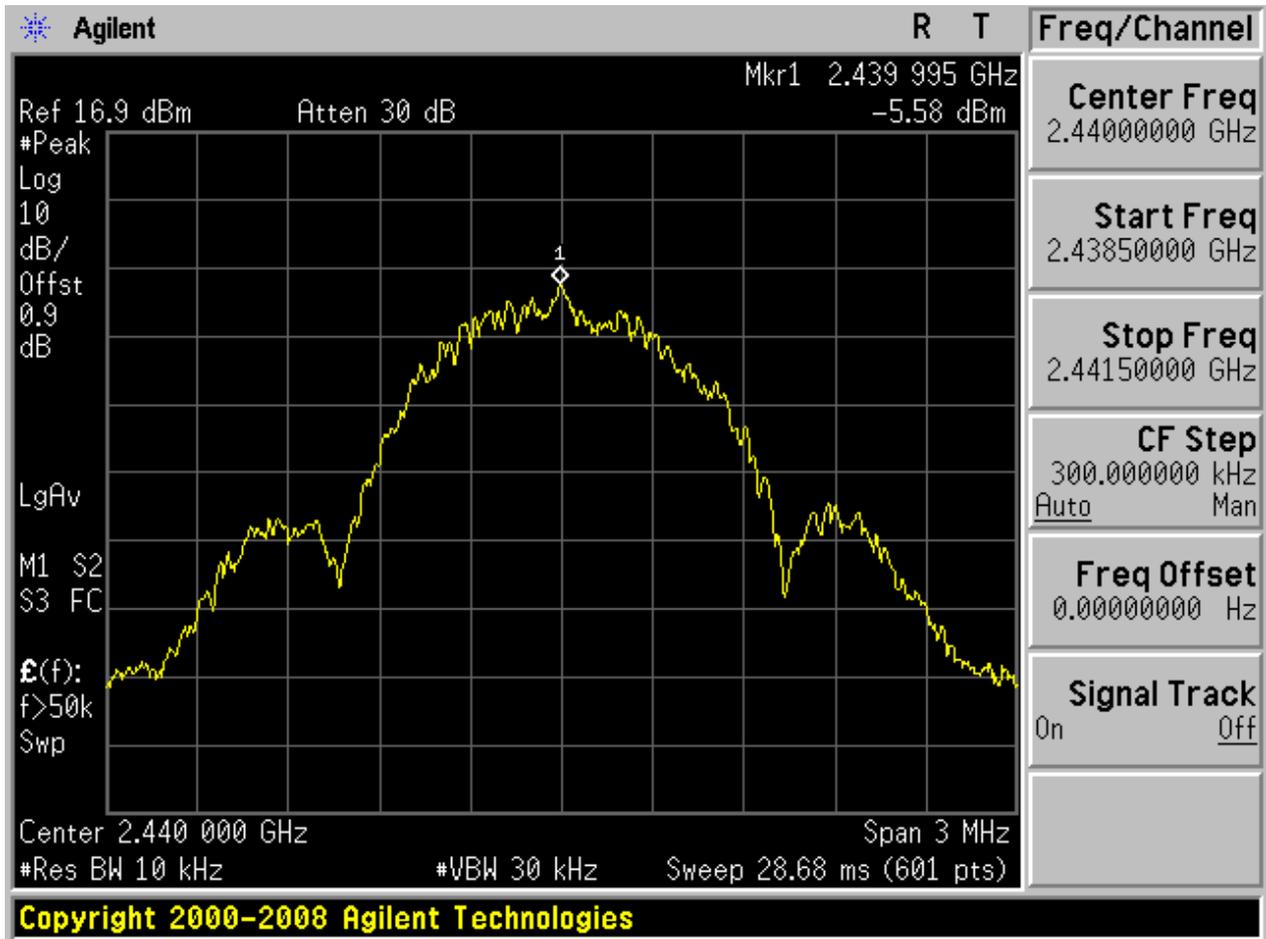
EUT Conf.	Max. Power Spectral Density Level [dBm]	Verdict
TM1_DH5_Ch0	-5.36	Pass
TM1_DH5_Ch19	-5.58	Pass
TM1_DH5_Ch39	-5.41	Pass

2 Test Plot

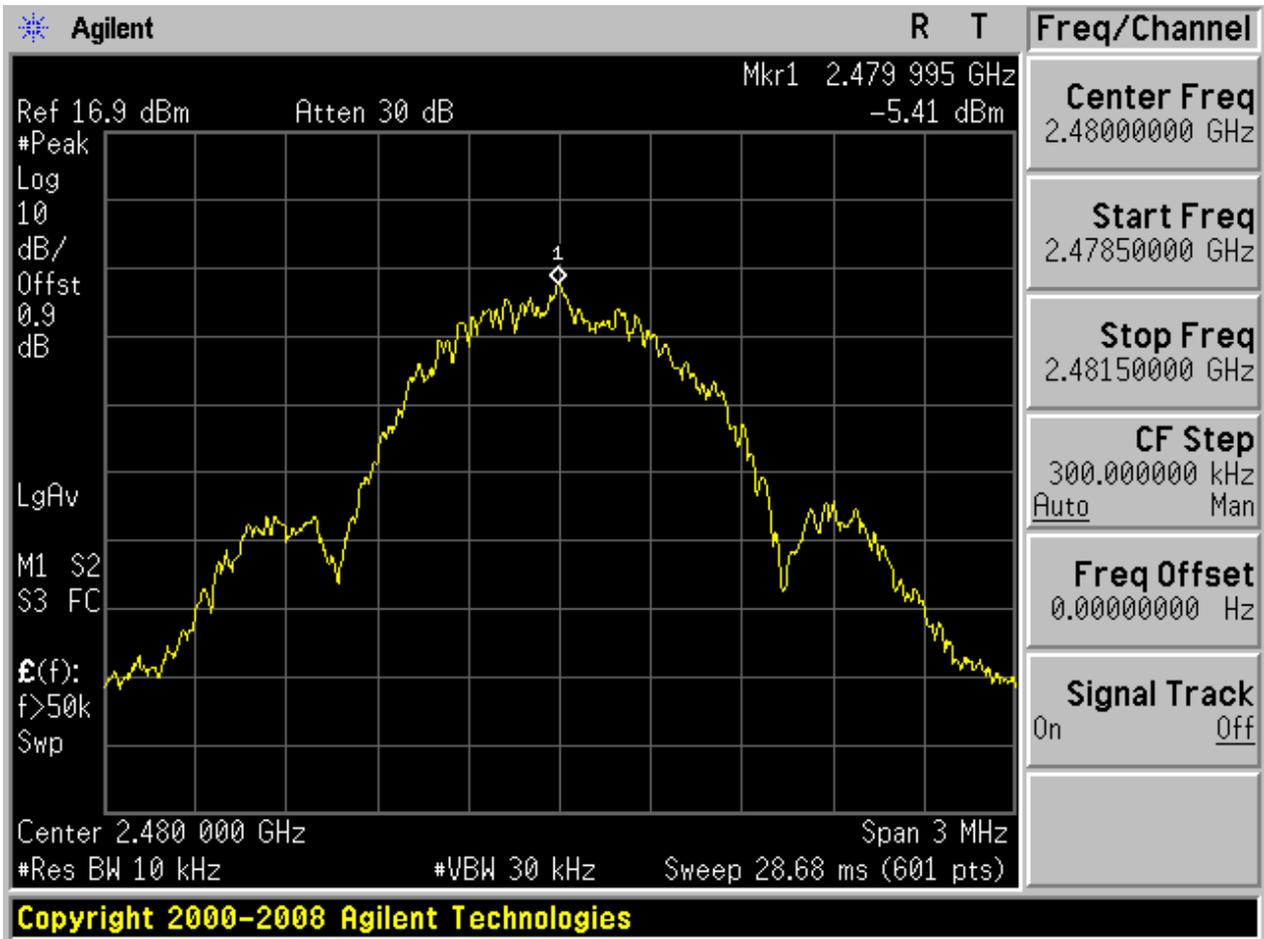
2.1 TM1_DH5_Ch0



2.2 TM1_DH5_Ch19



2.3 TM1_DH5_Ch39





Appendix D: Band edge spurious emission

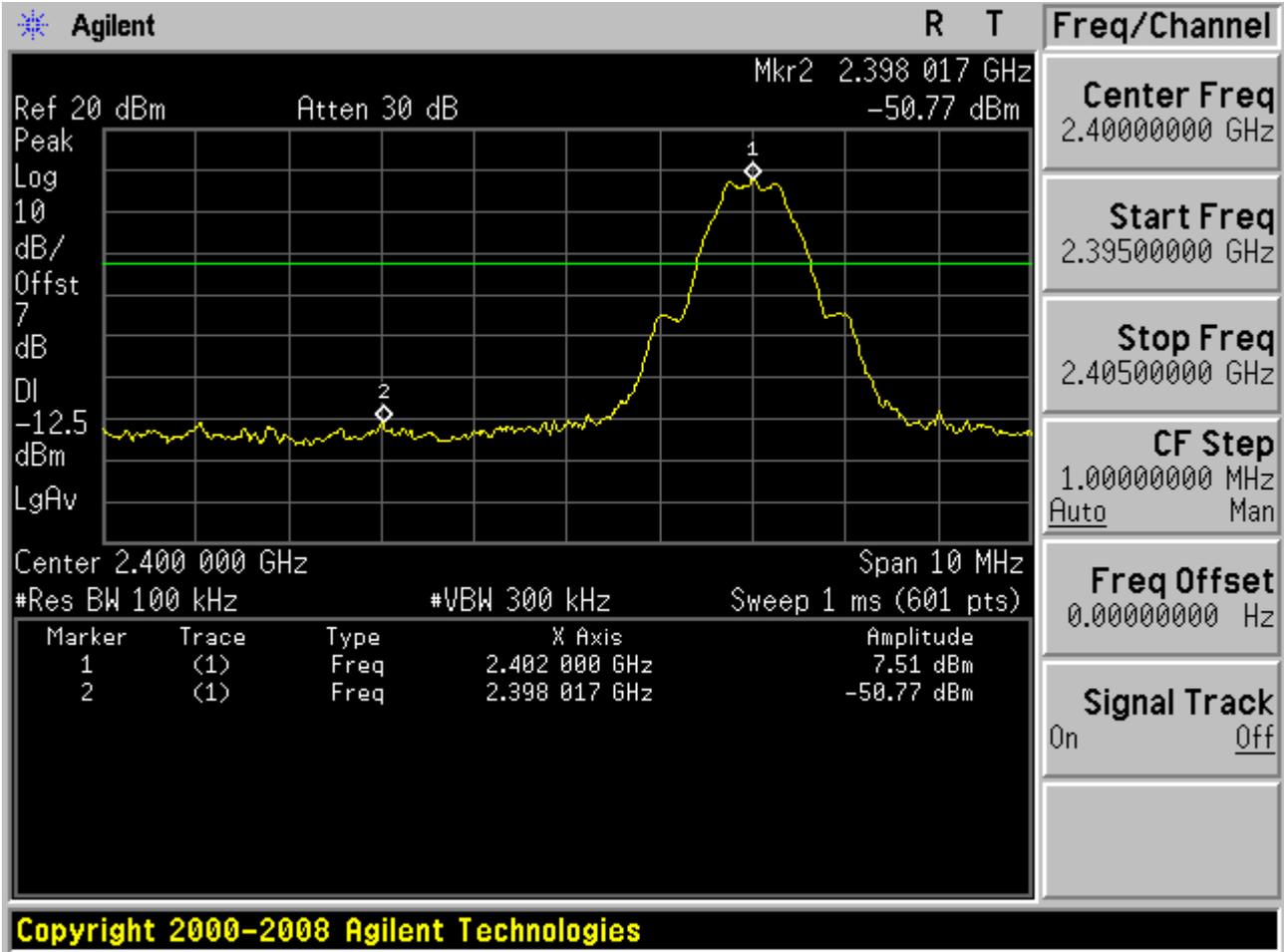


3 Result Table

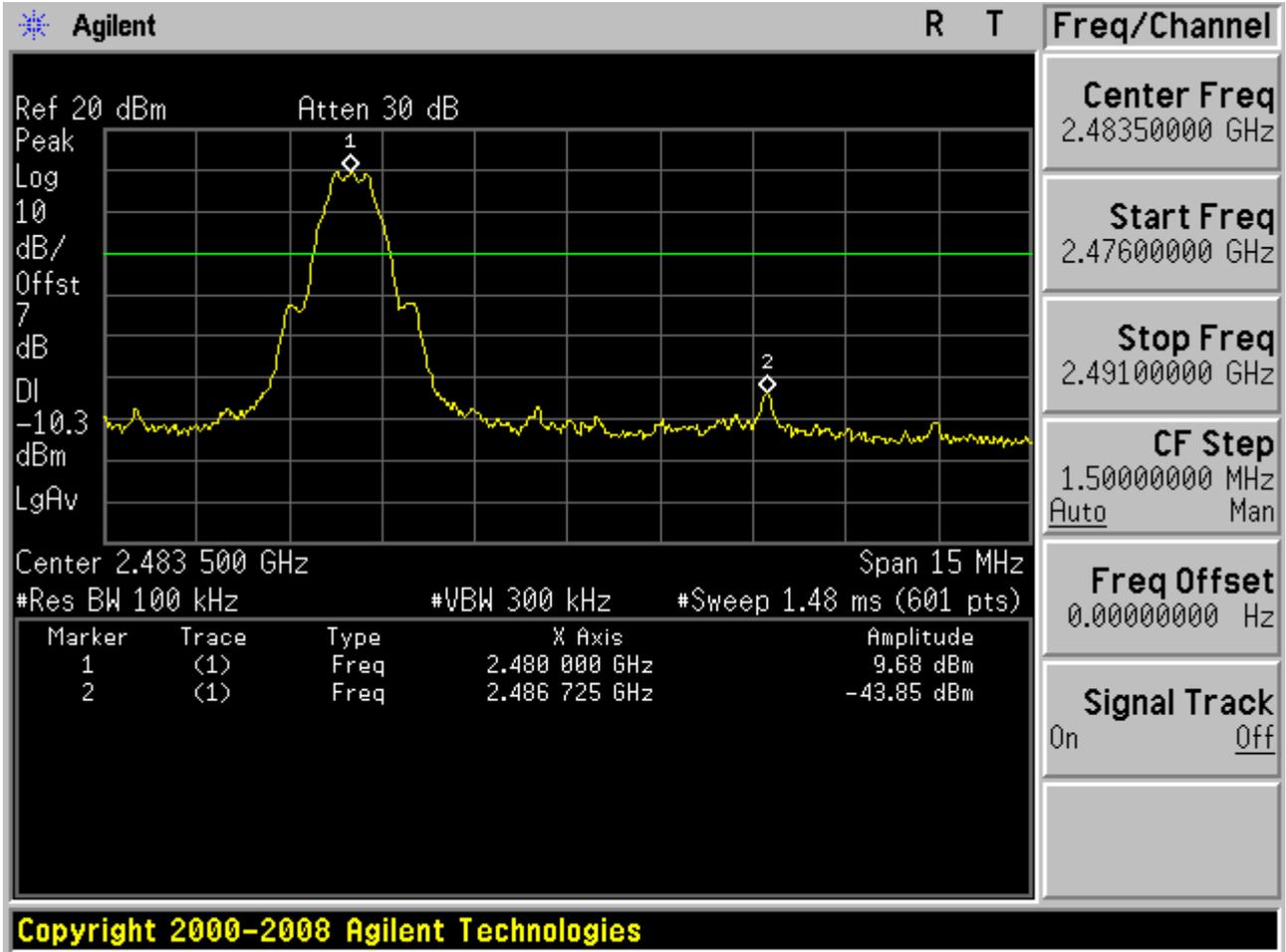
EUT Conf.	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
TM1_DH5_Ch0	0	2402	7.51	Off	-50.77	-12.49	Pass
TM1_DH5_Ch39	39	2480	9.68	Off	-43.85	-10.32	Pass

2 Test Plot

2.1 TM1_DH5_Ch0



2.2 TM1_DH5_Ch39





Appendix E: Conducted RF Spurious Emission

1 Result Table

In this Appendix, the “Pref” refers to the peak power level in any 100 kHz bandwidth within the fundamental emission which is used as the reference level, the “Puw” refers to the maximum emission power in 100 kHz band segments outside of the authorized frequency band.

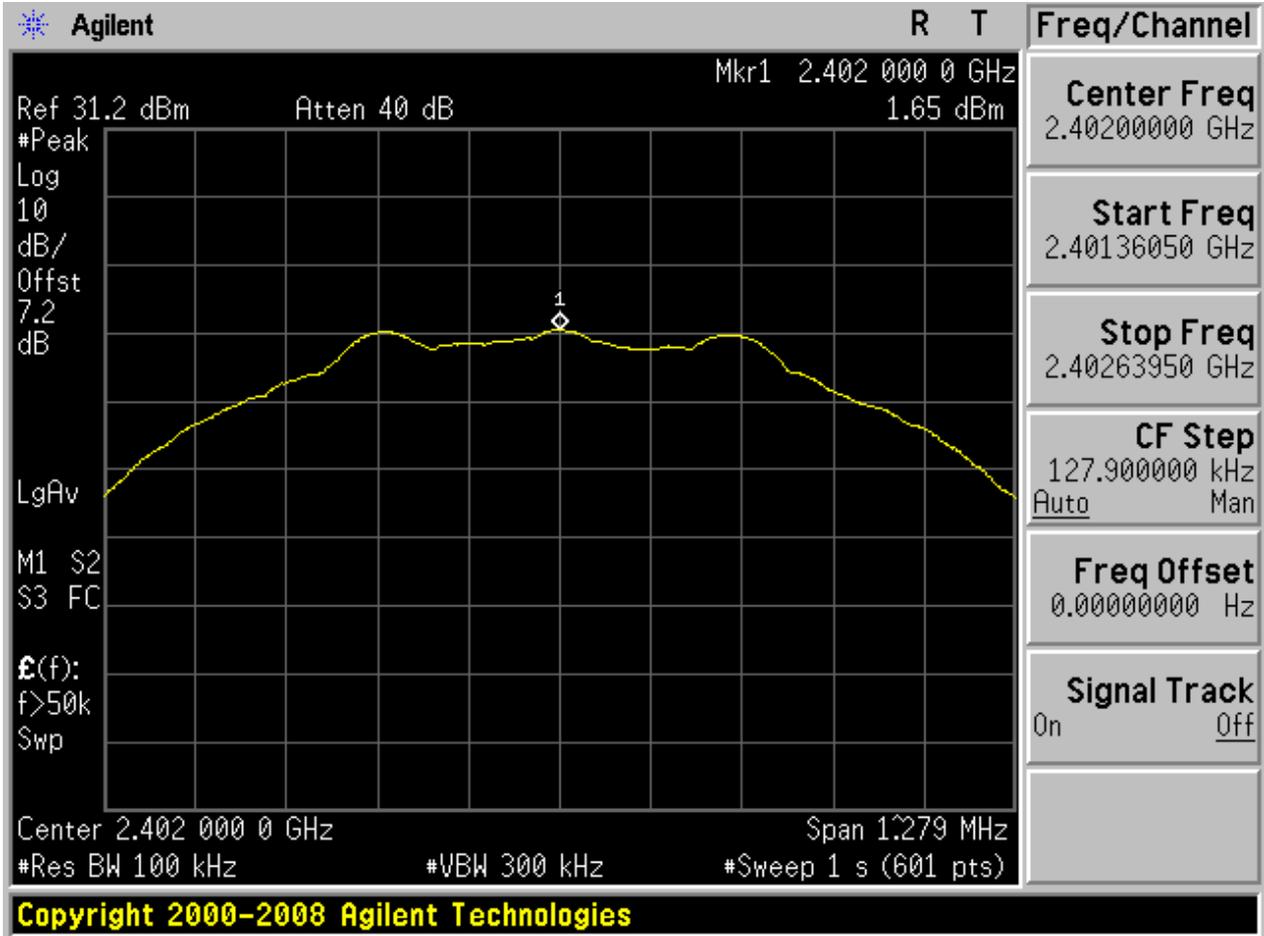
Considering that the higher ratio of RBW to the span for the frequency ranges below 30 MHz makes the results determination be complicated, a narrower RBW other than 100 kHz is used for these ranges. The measured value should add a RBW correction factor (RBWCF) where $RBWCF [dB] = 10 \times \lg(100 [kHz]/\text{narrower RBW [kHz]})$. As to this Appendix, the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

In the result table, the “< Limit” denotes that “The Puw [dBm] is less than Pref [dBm] - 20 [dB], see test plots for detailed”.

EUT Conf.	Pref [dBm/100 kHz]	Puw [dBm/100 kHz]	Verdict
TM1_DH5_Ch0	1.65	< Limit	Pass
TM1_DH5_Ch39	2.78	< Limit	Pass
TM1_DH5_Ch78	2.54	< Limit	Pass

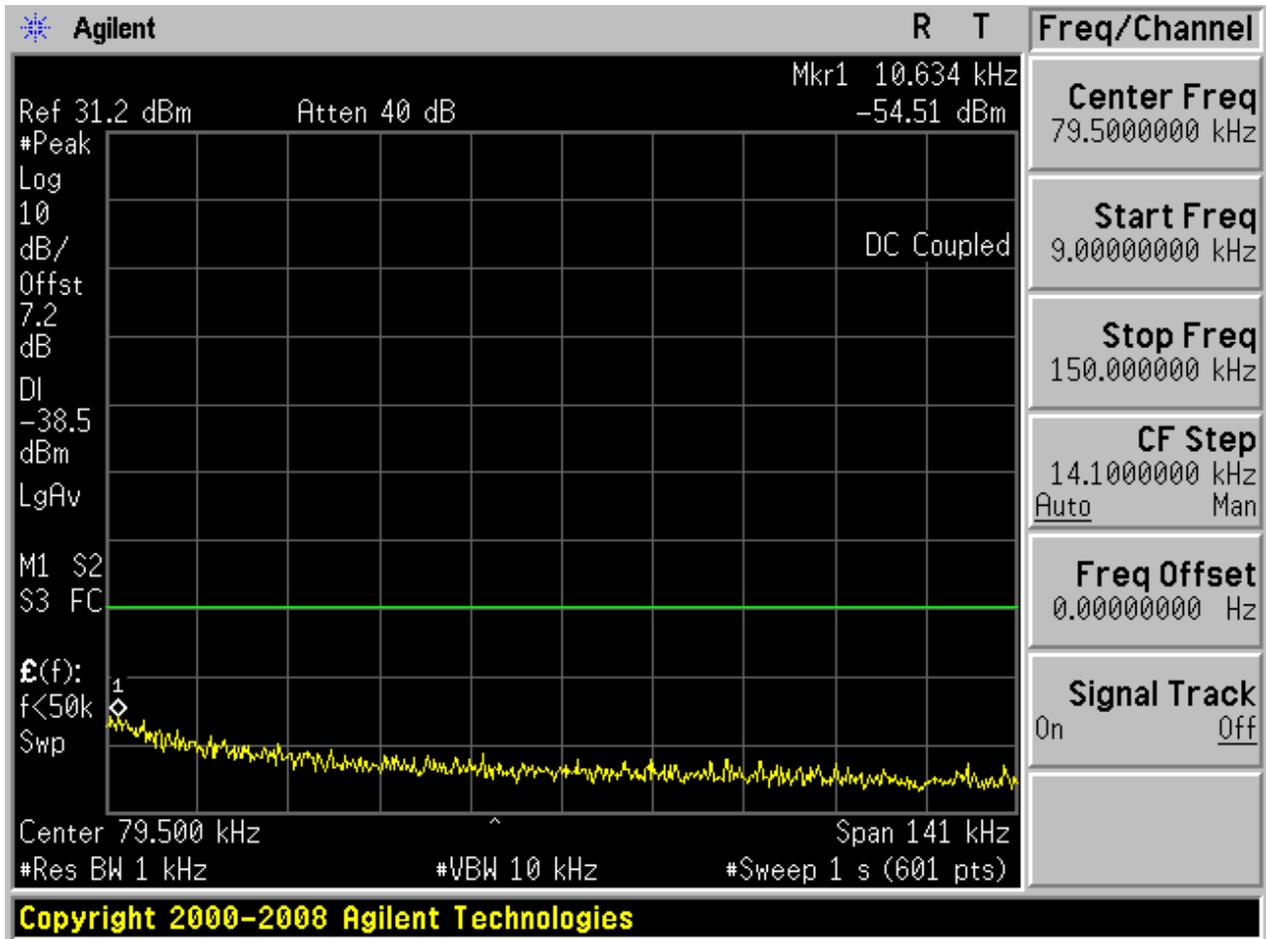


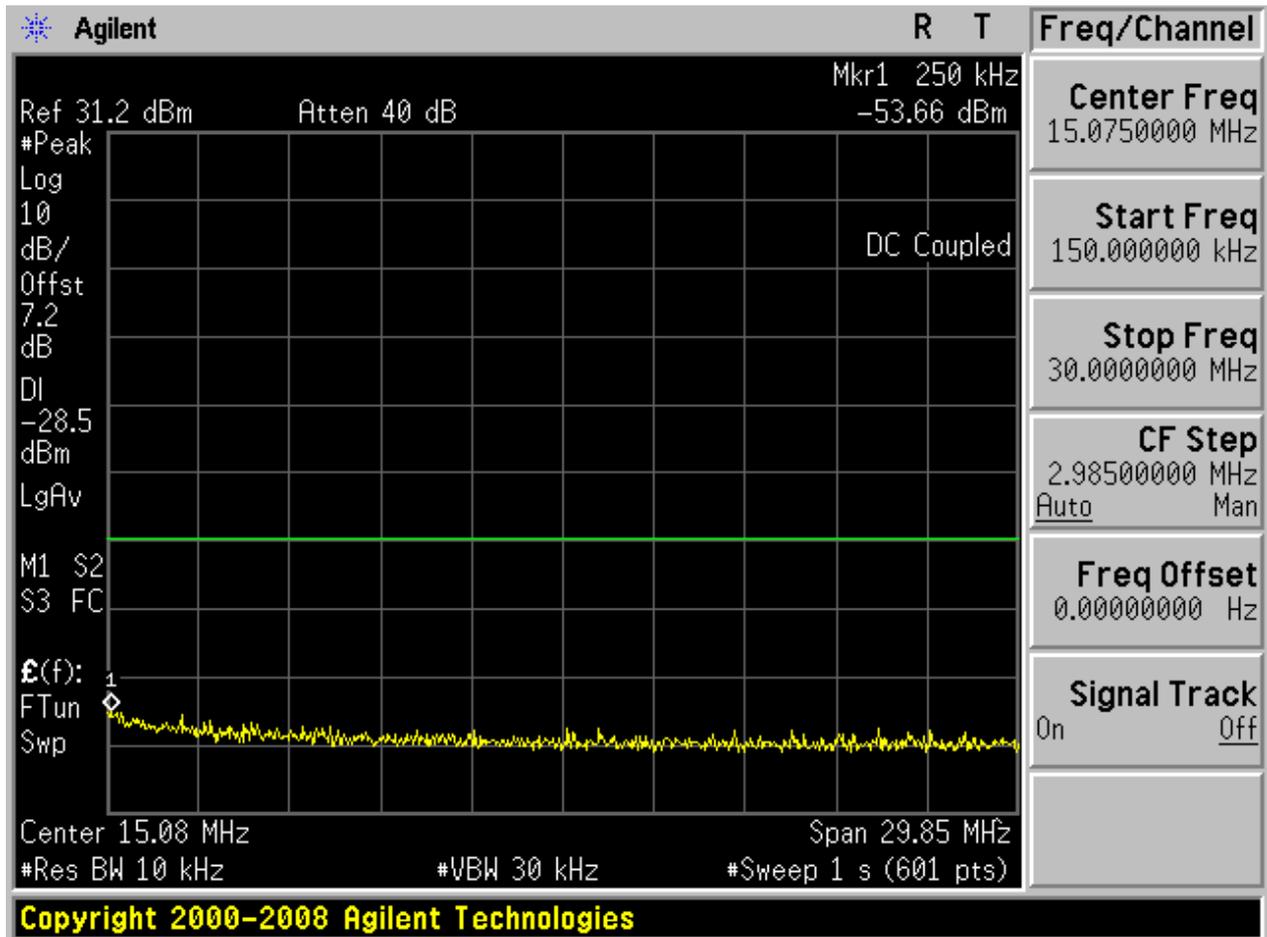
2 Test Plot
 2.1 TM1_DH5_Ch0
 2.1.1 Pref

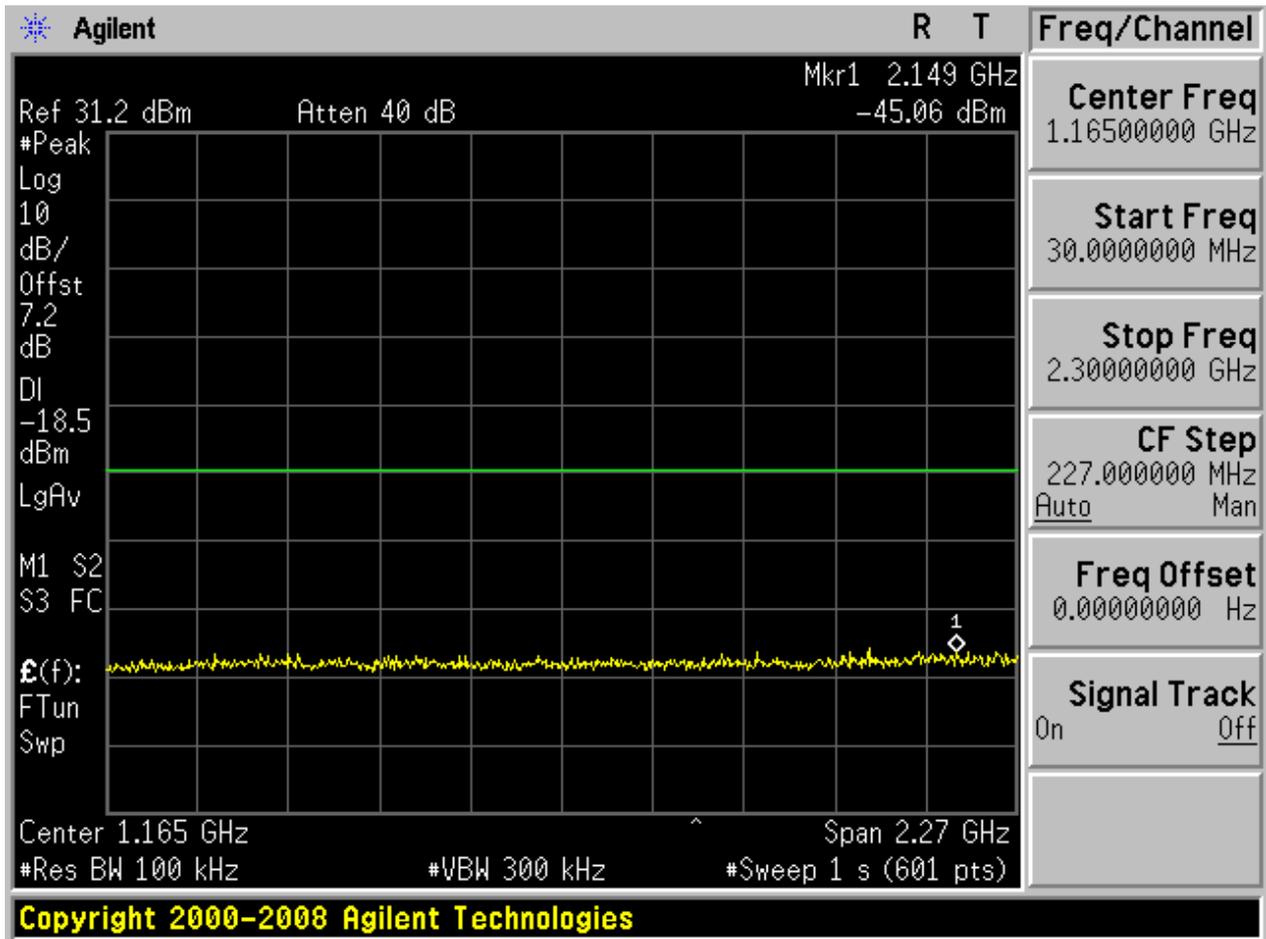


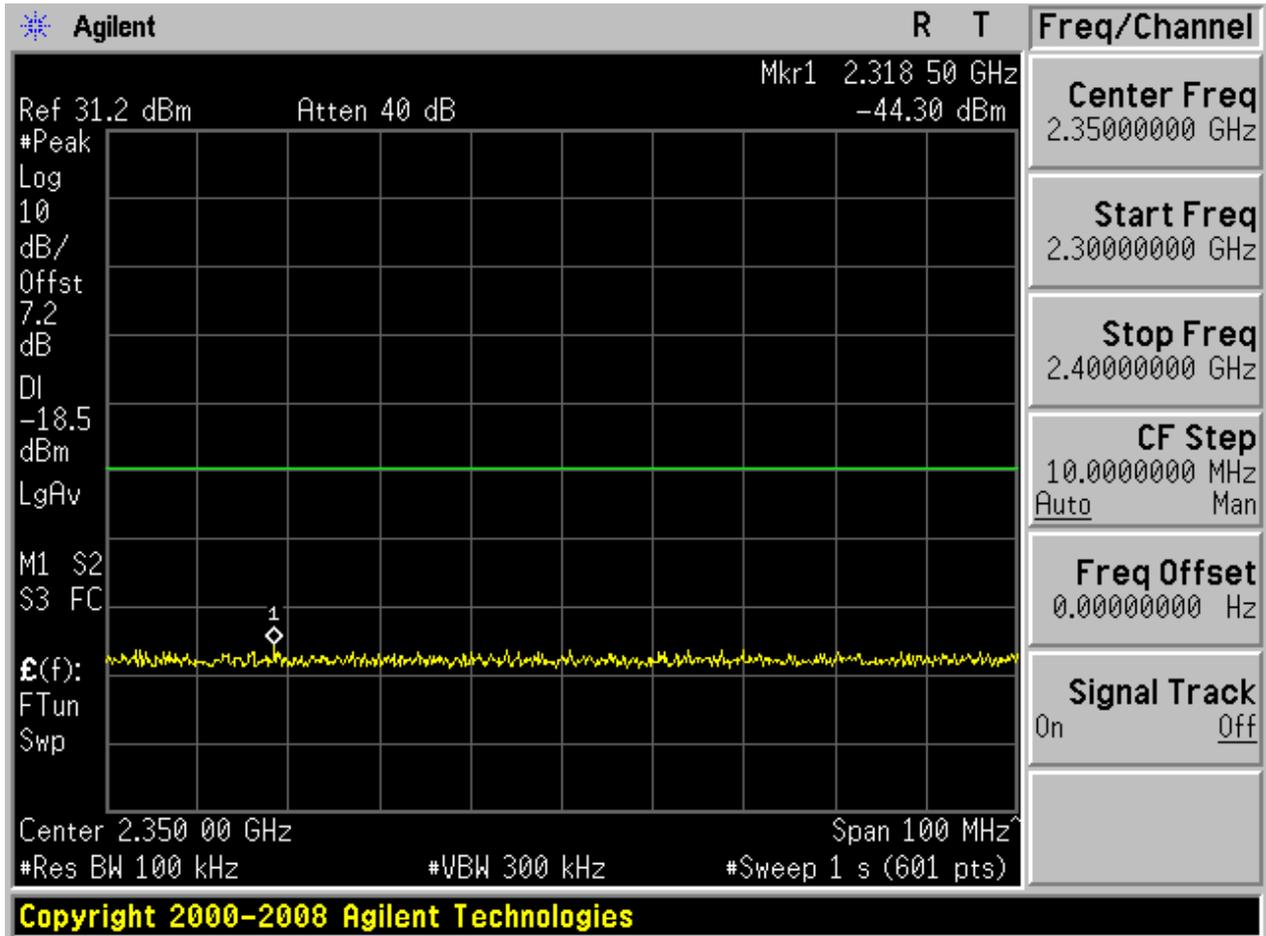


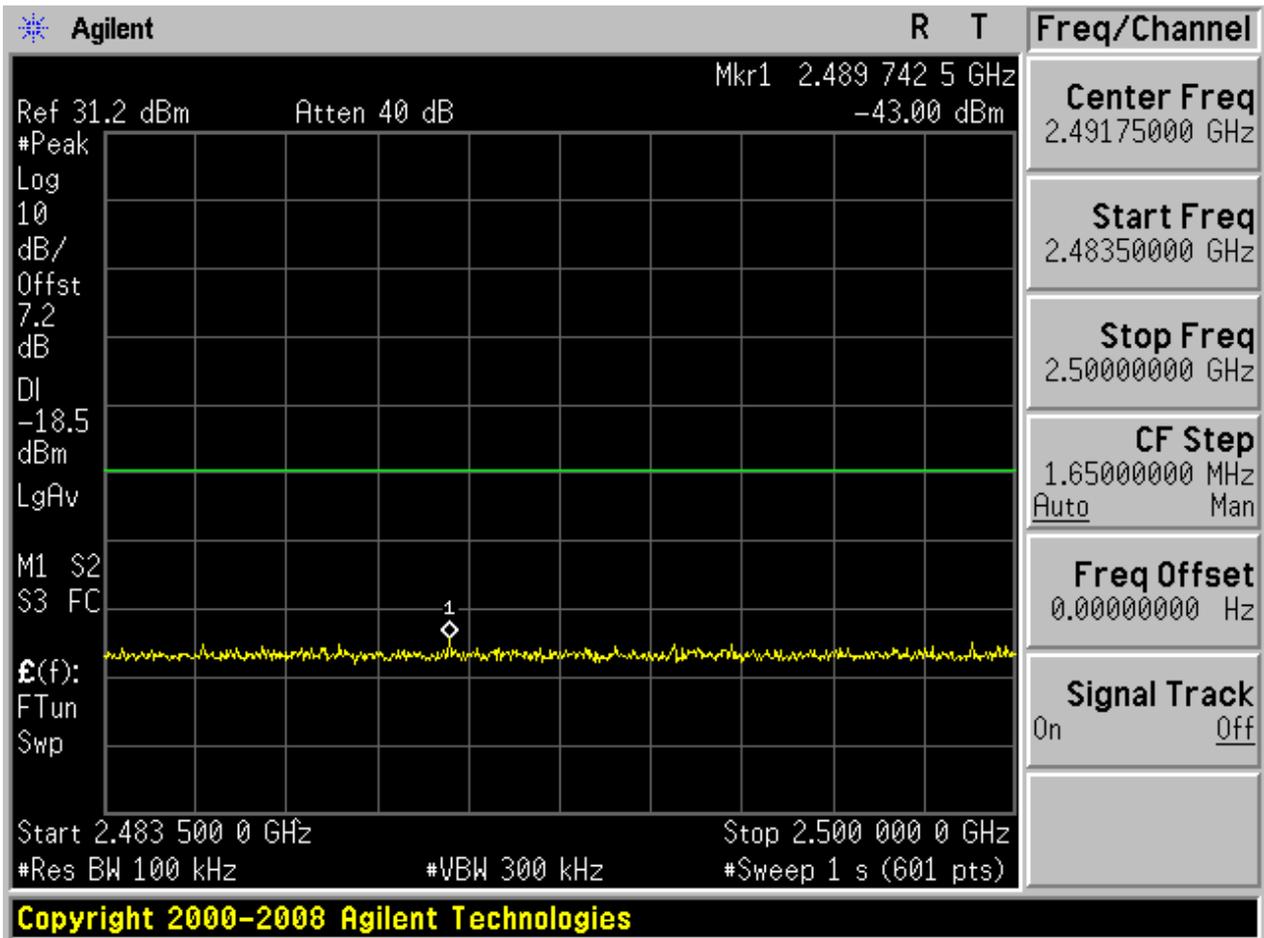
2.1.2 Puw

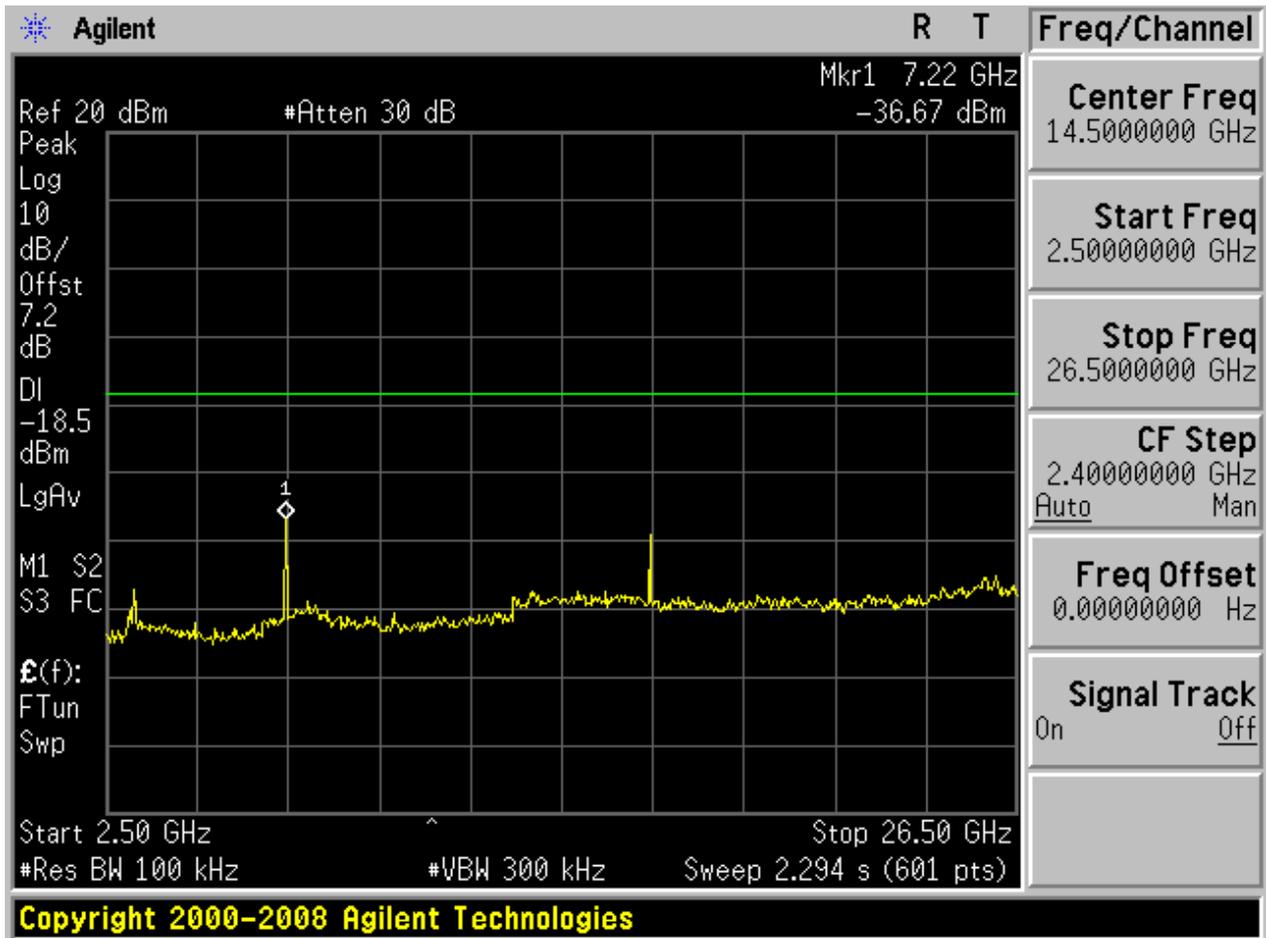






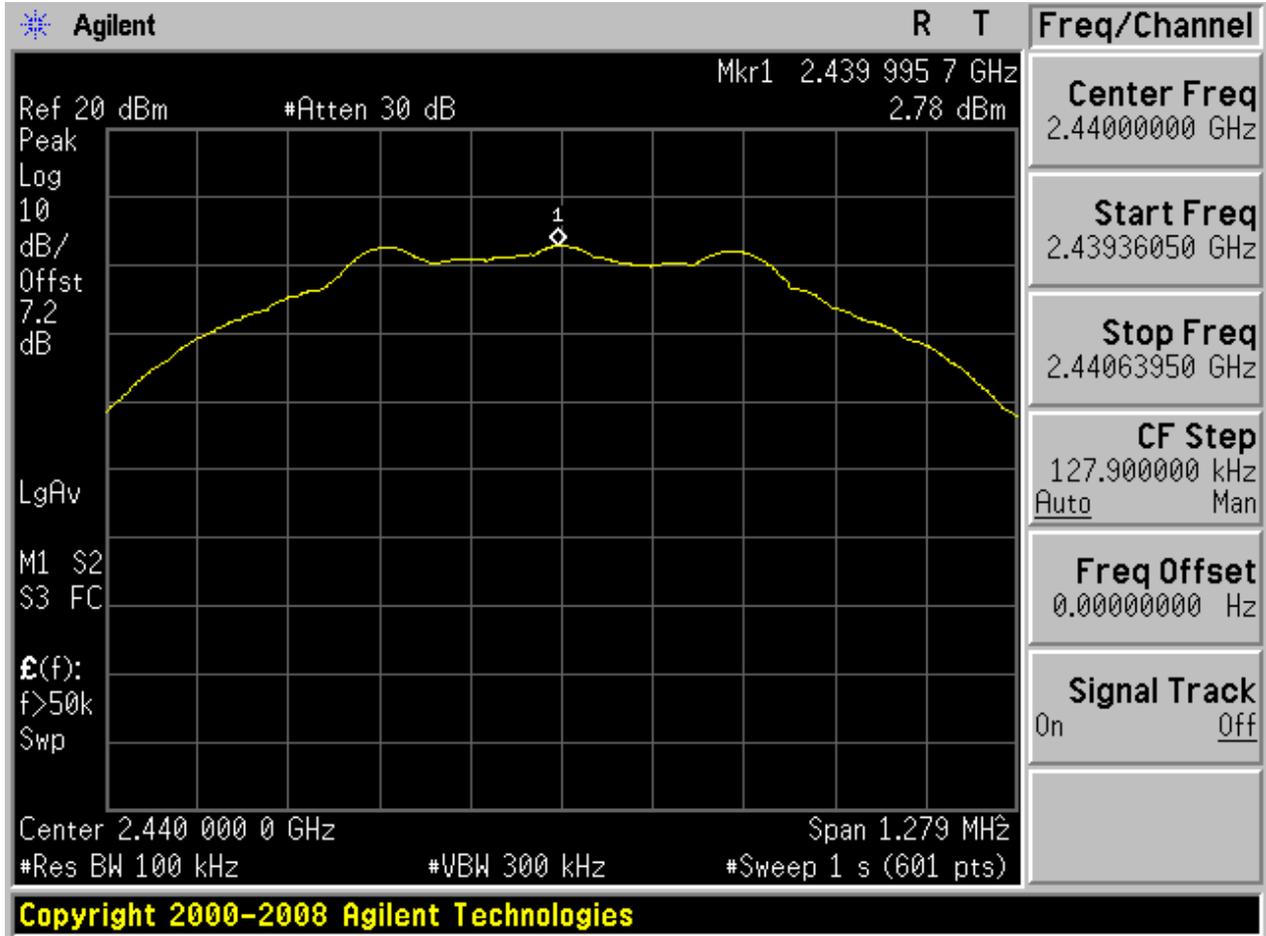






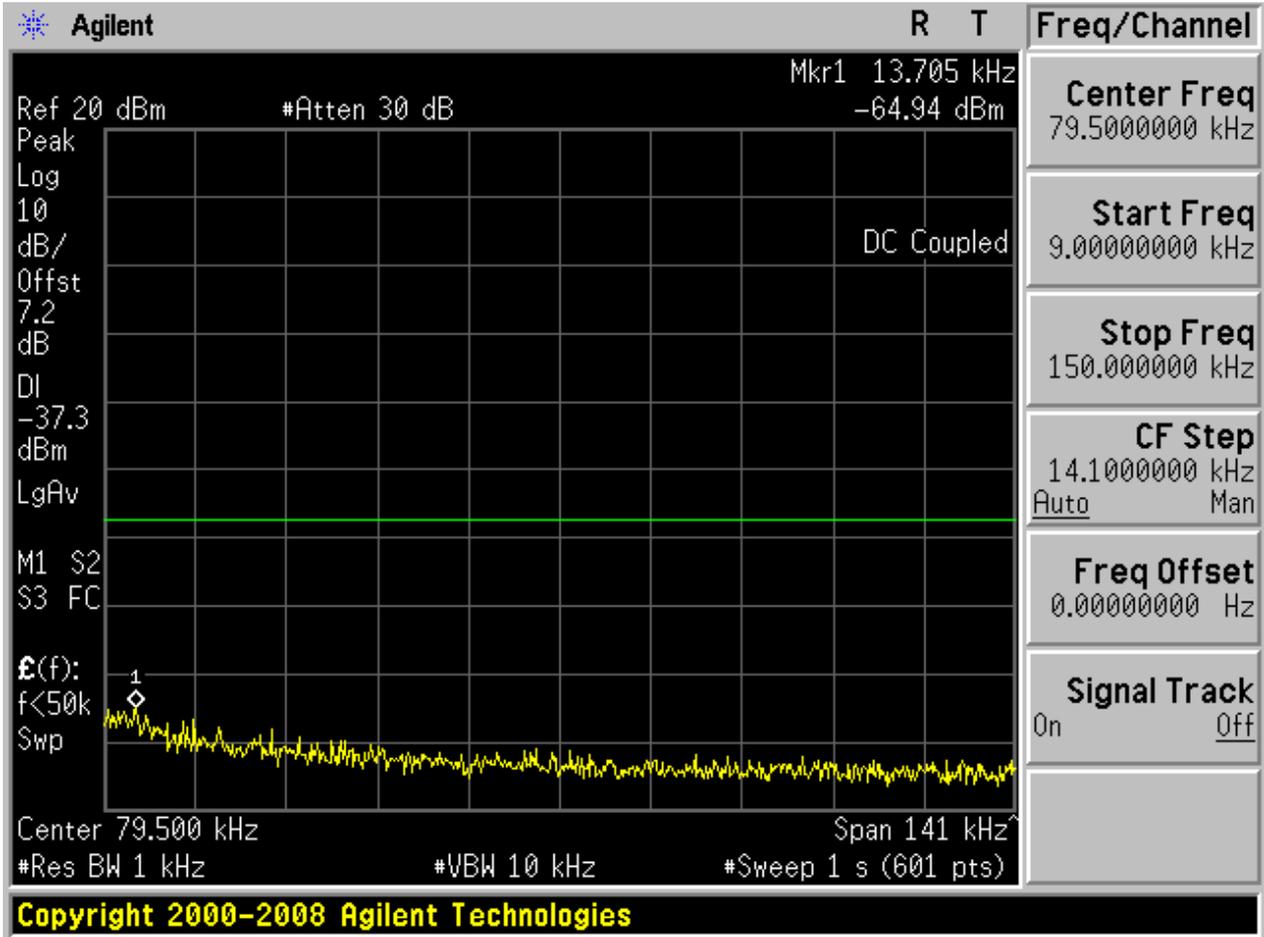
2.2 TM1_DH5_Ch19

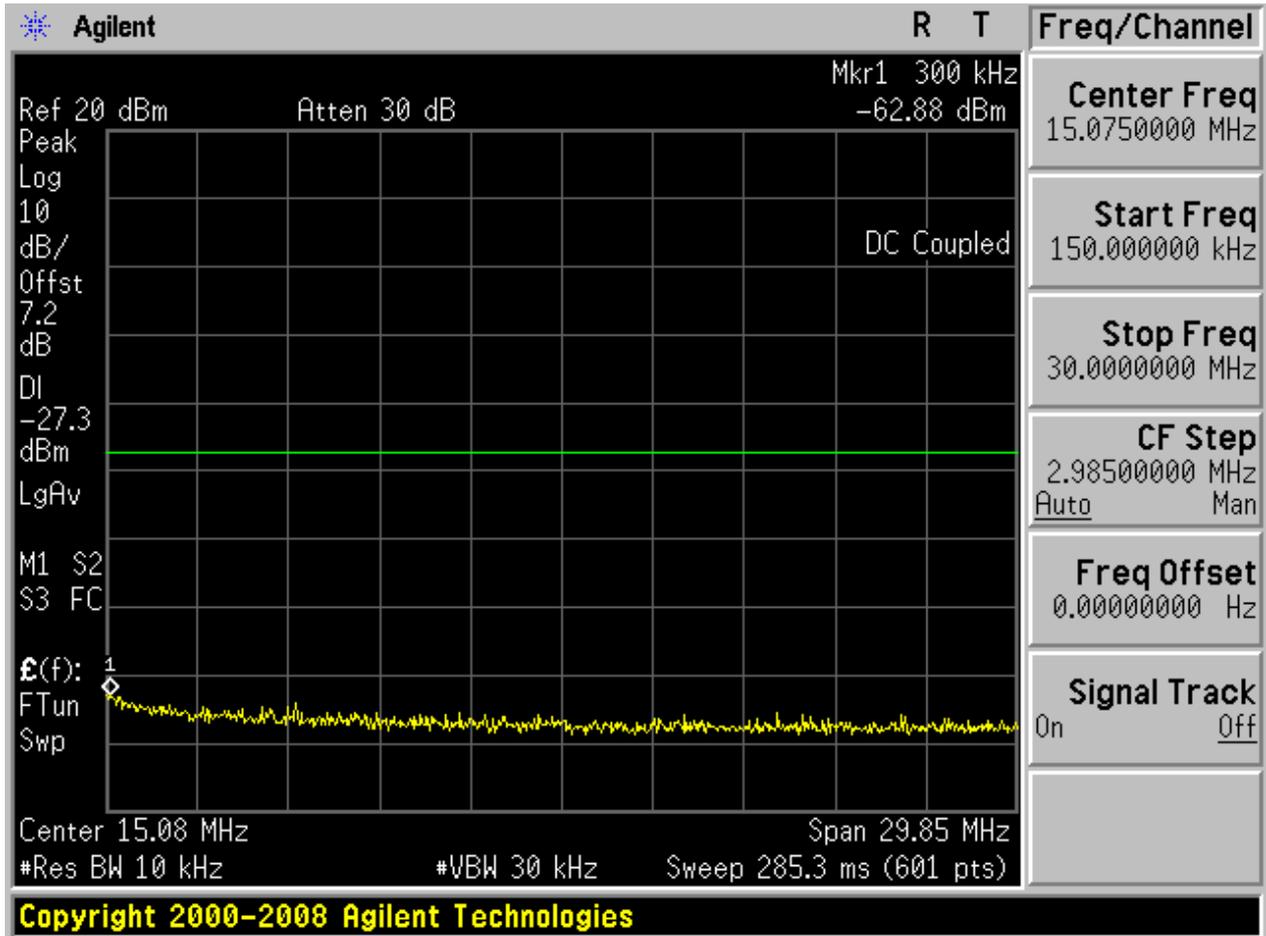
2.2.1 Pref

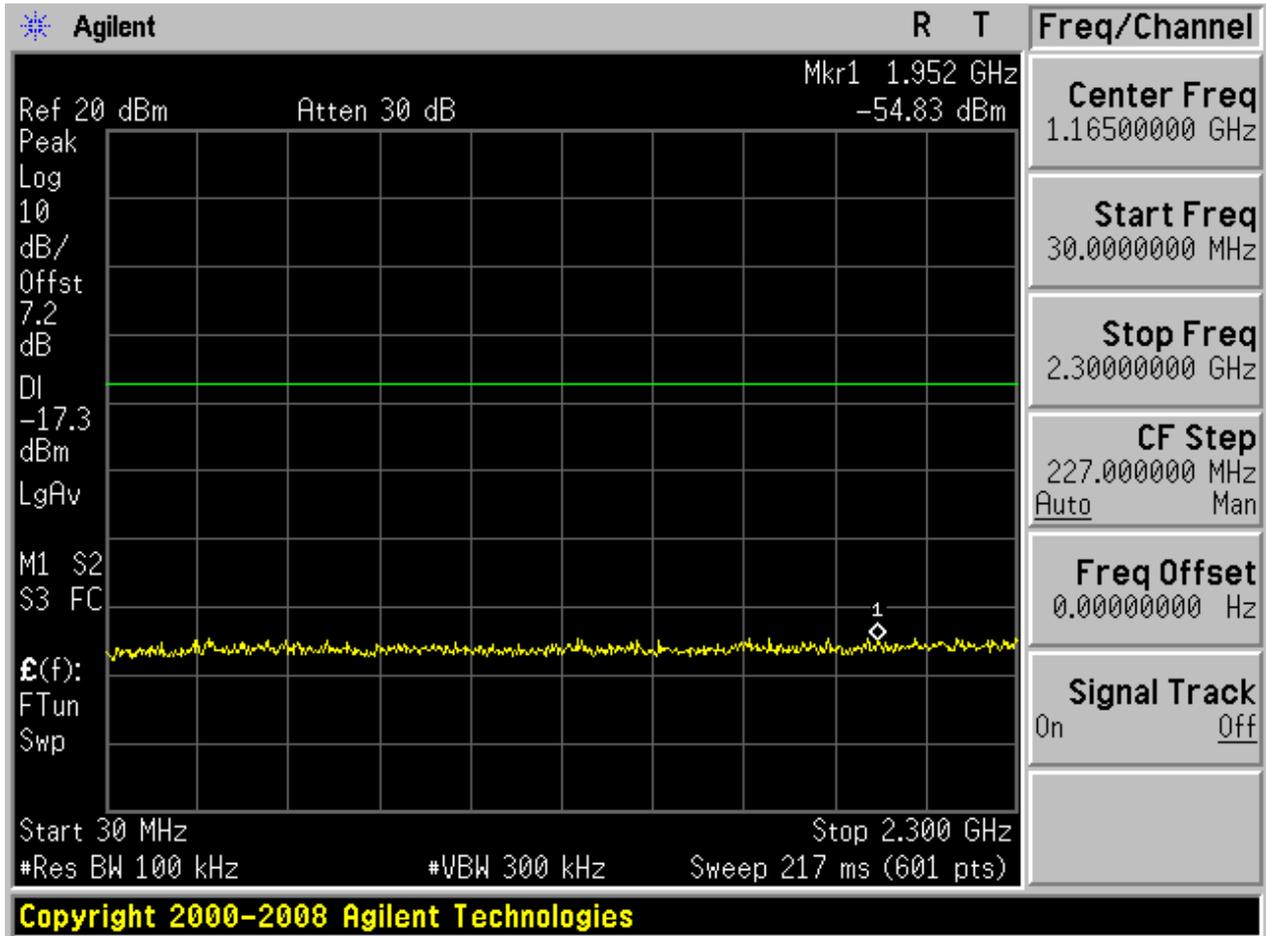


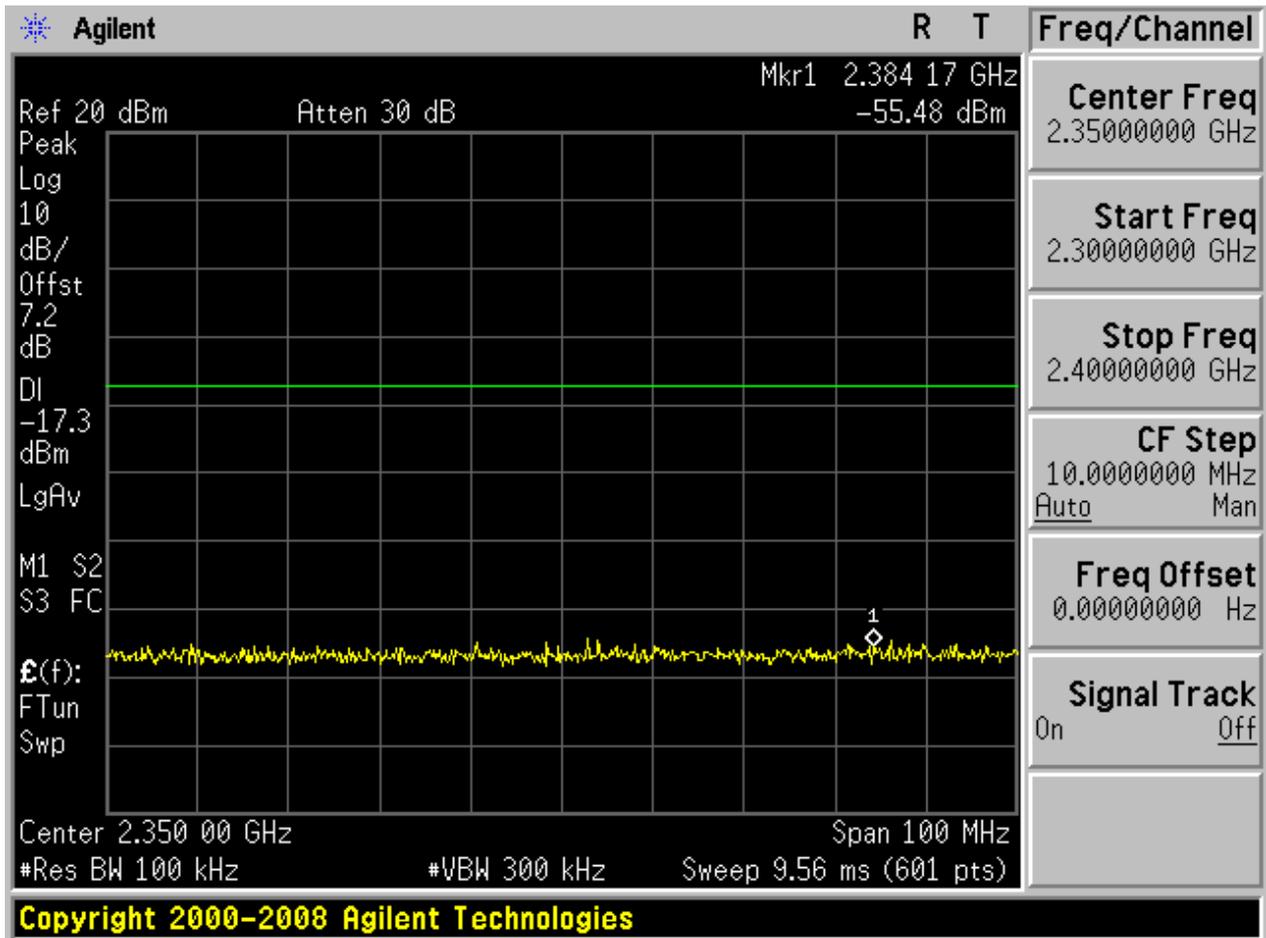


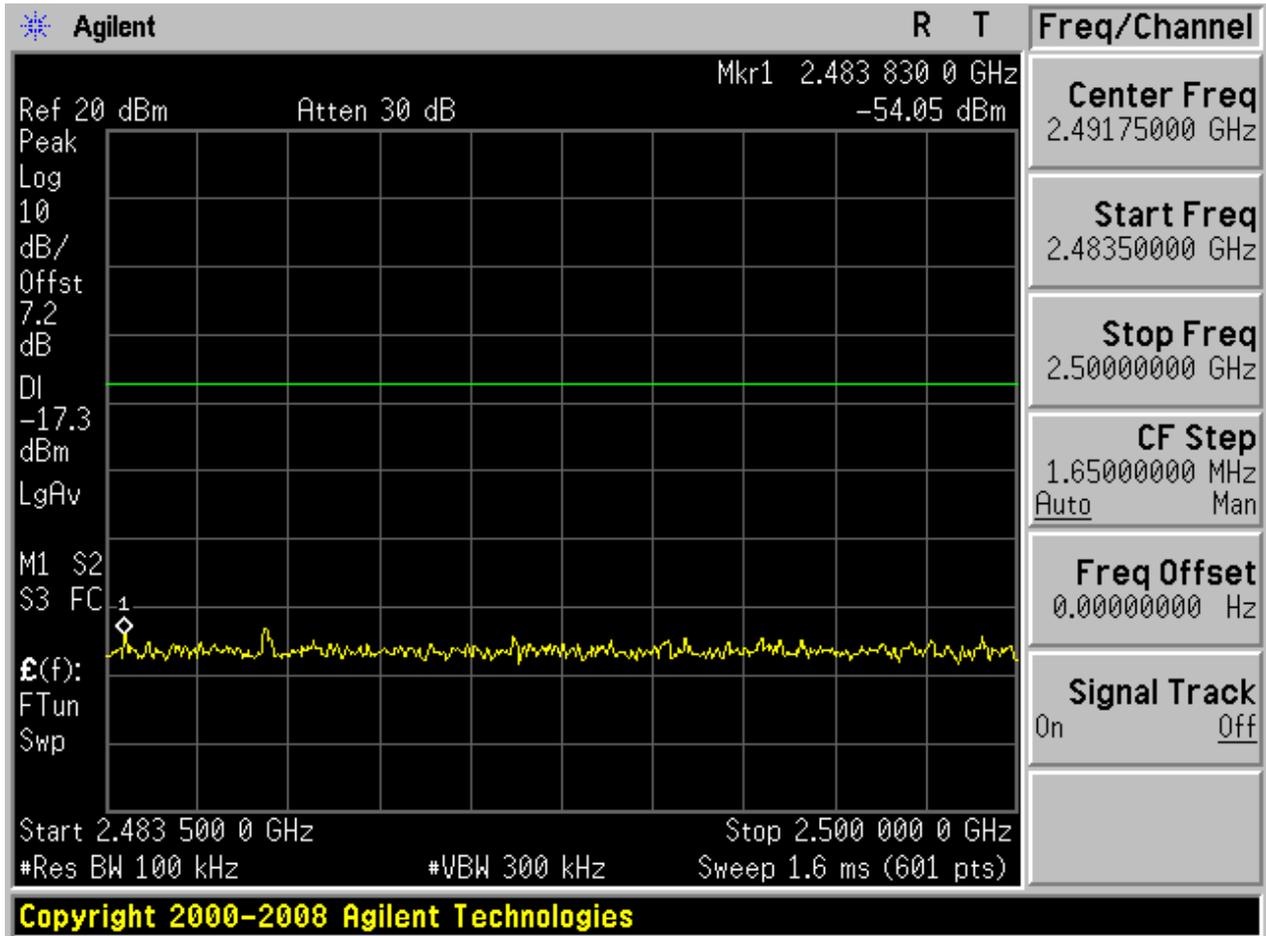
2.2.2 Puw

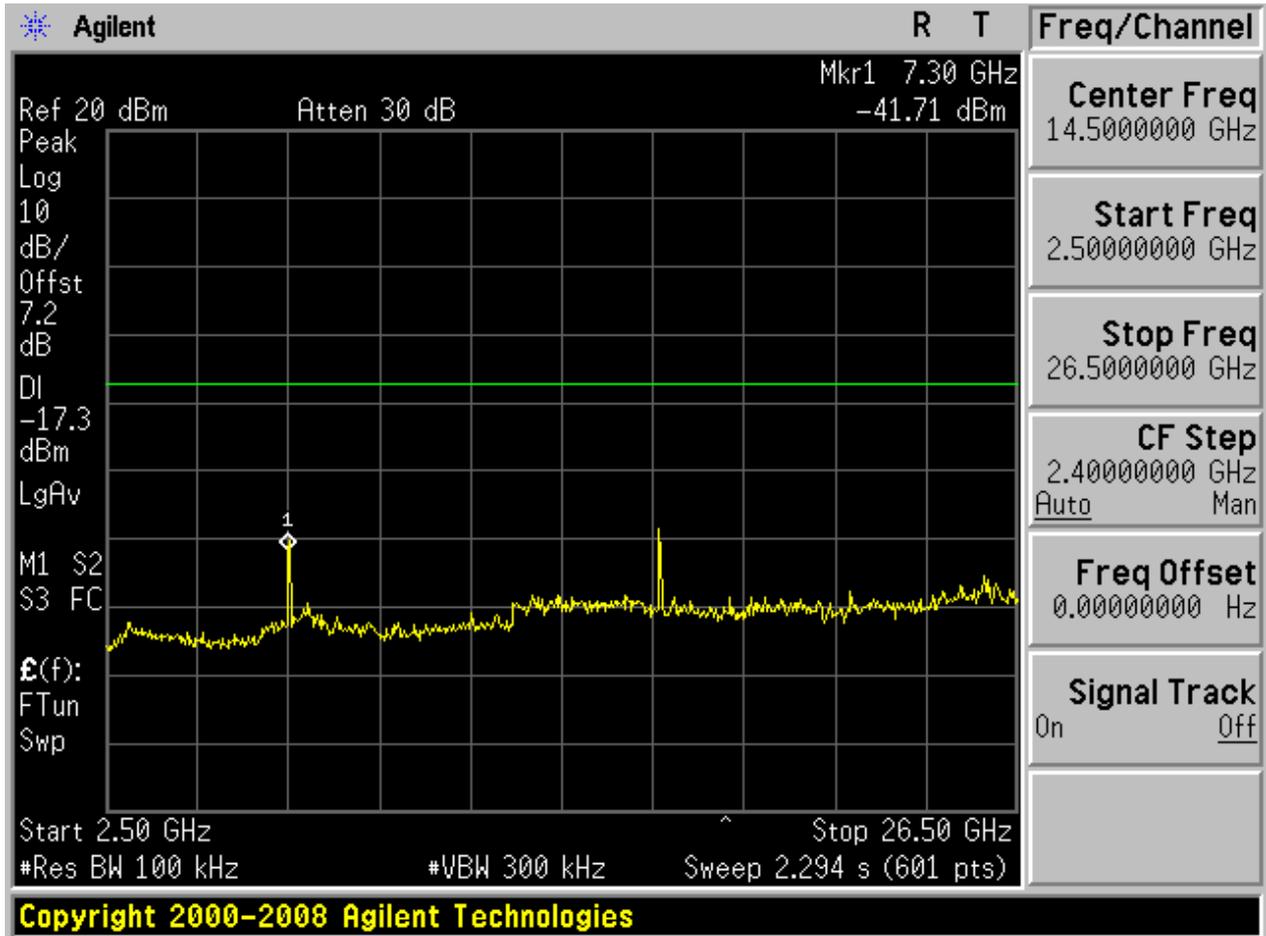






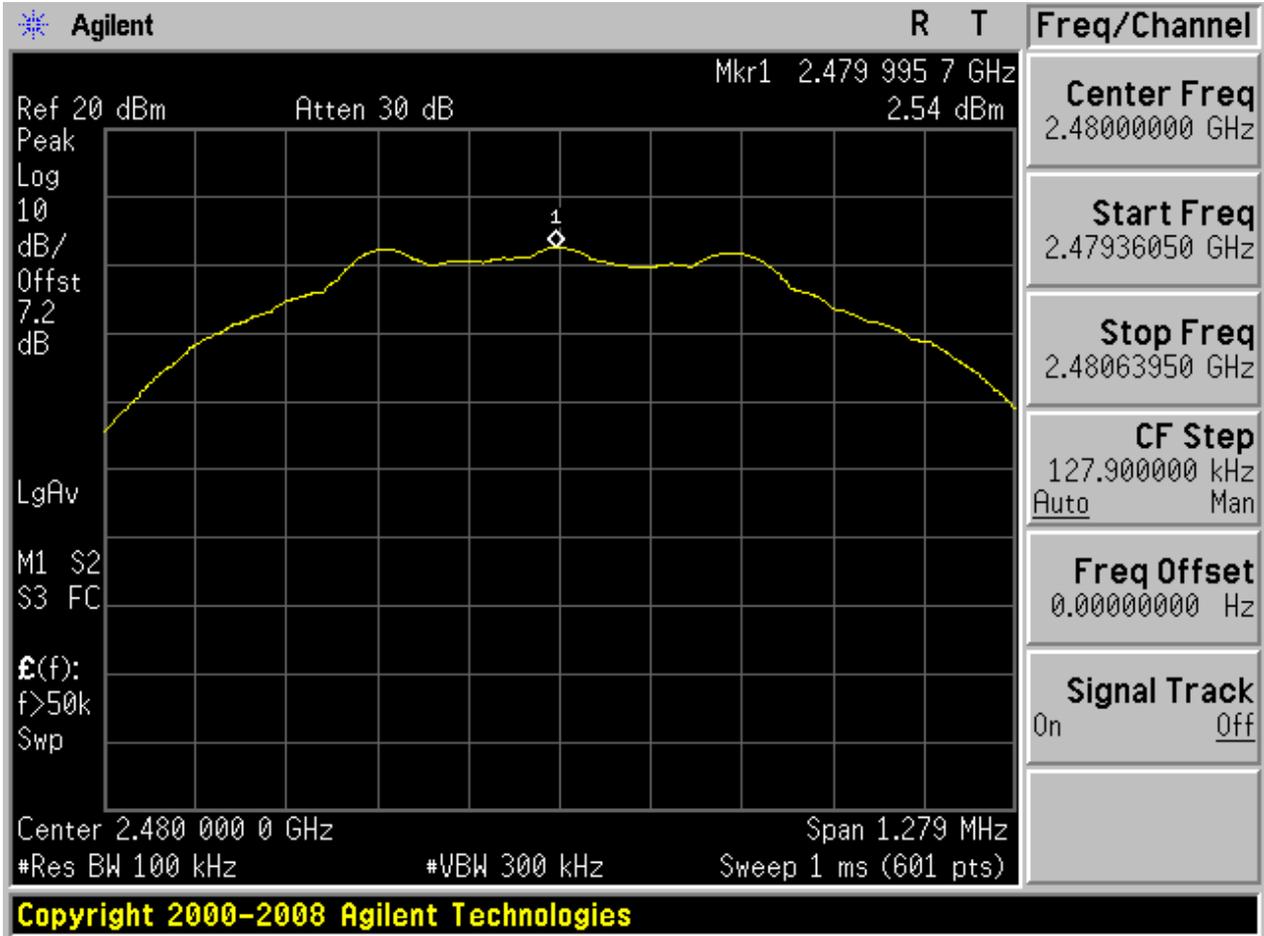






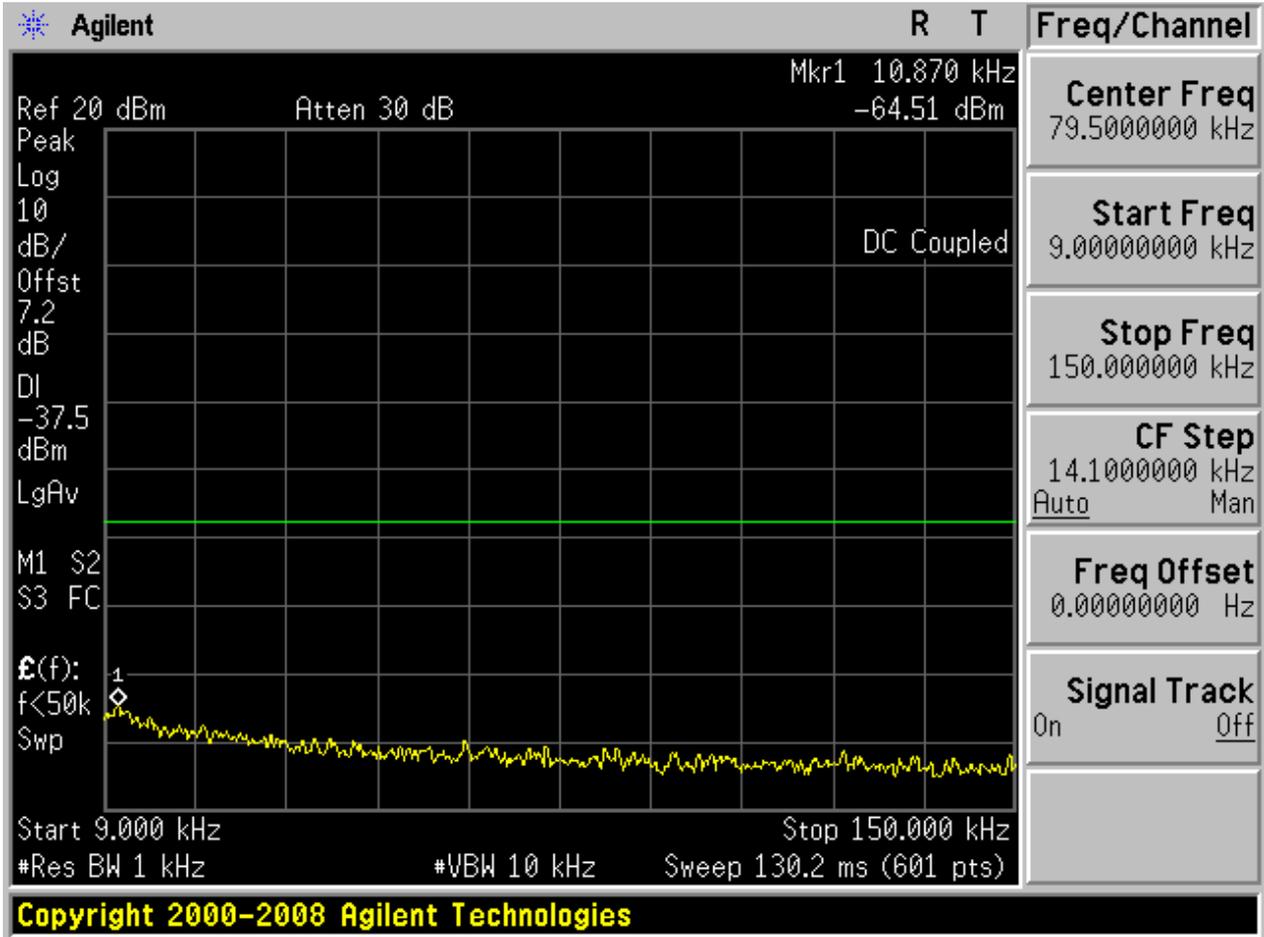
2.3 TM1_DH5_Ch39

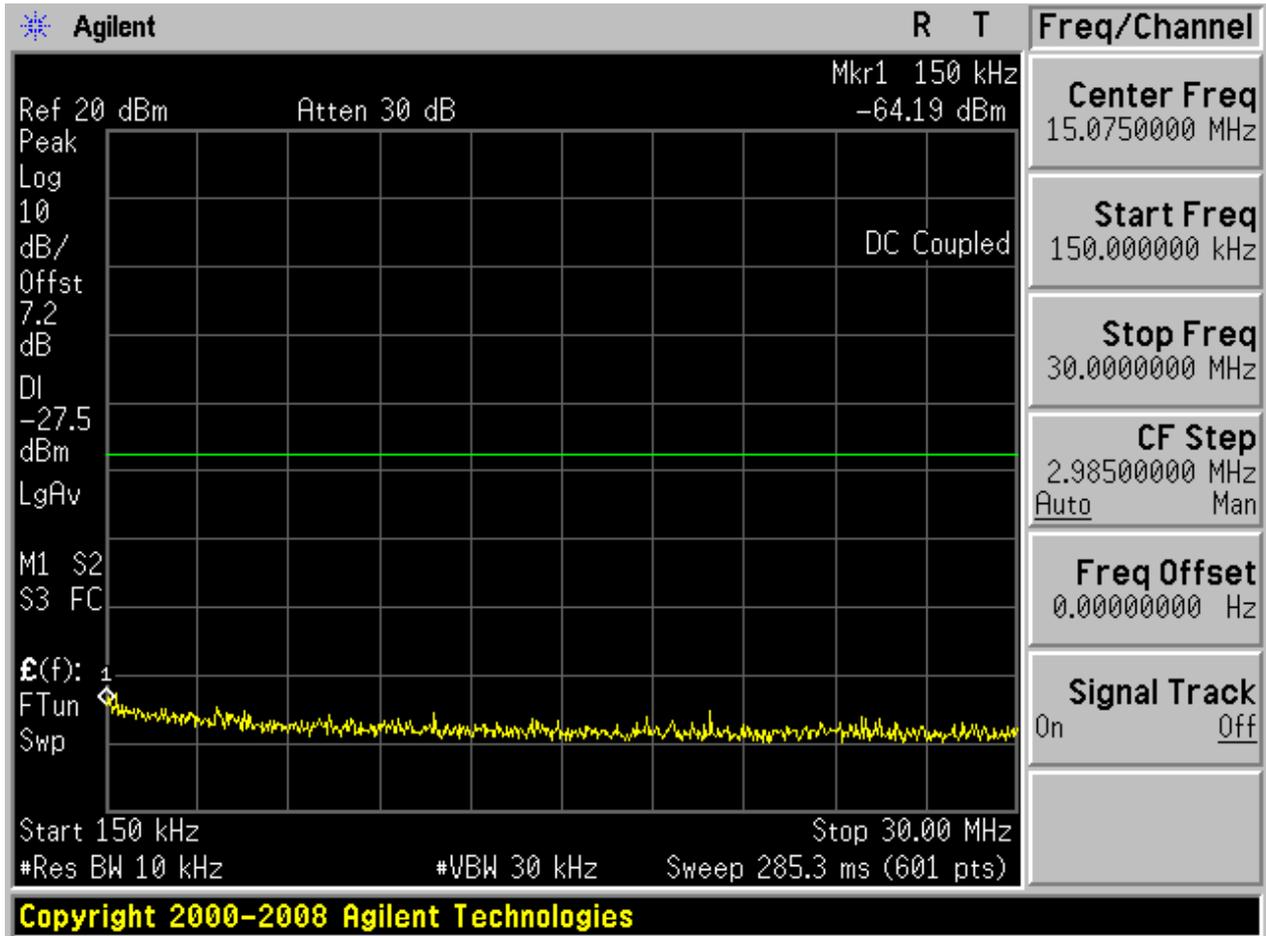
2.3.1 Pref

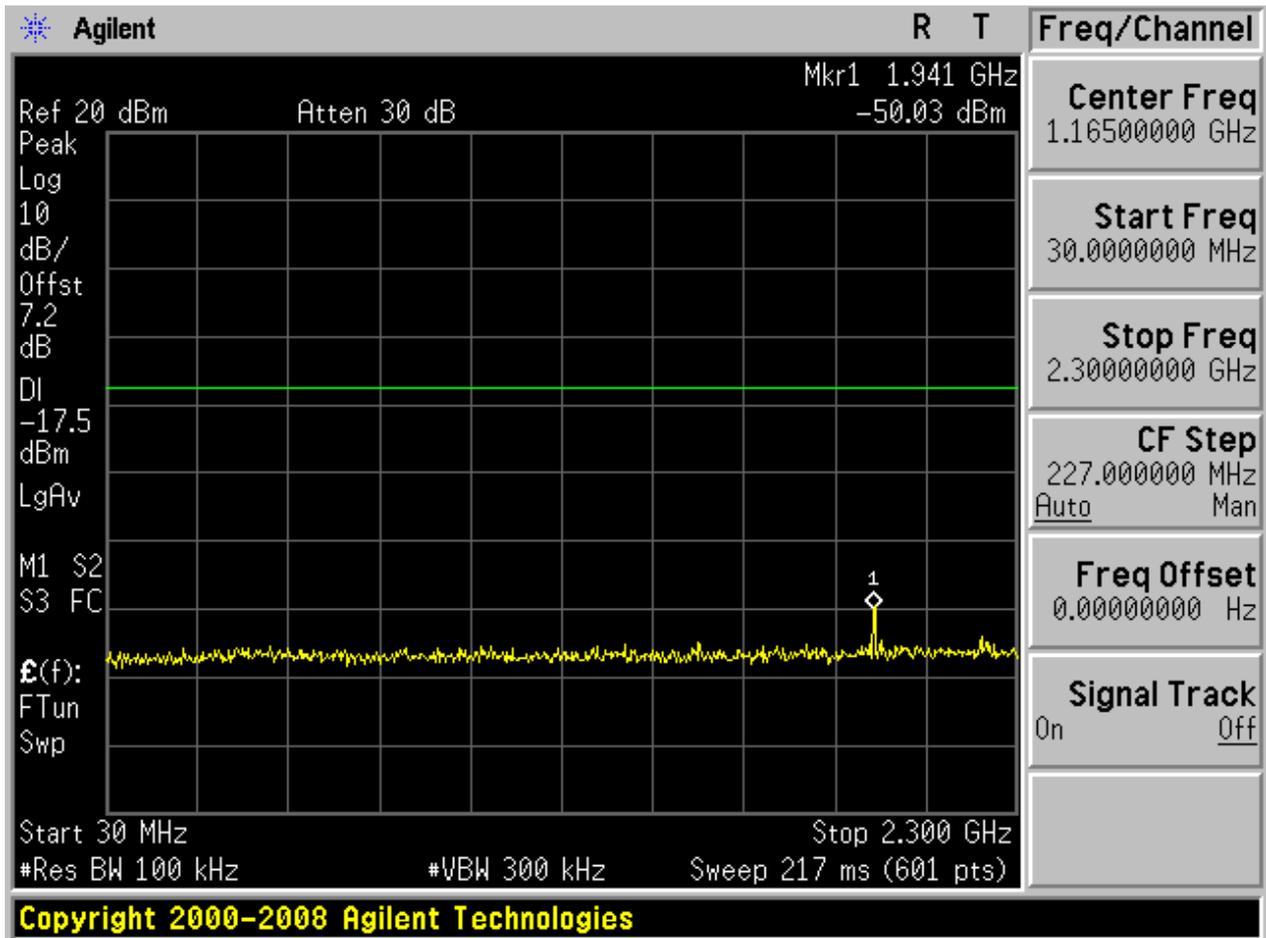


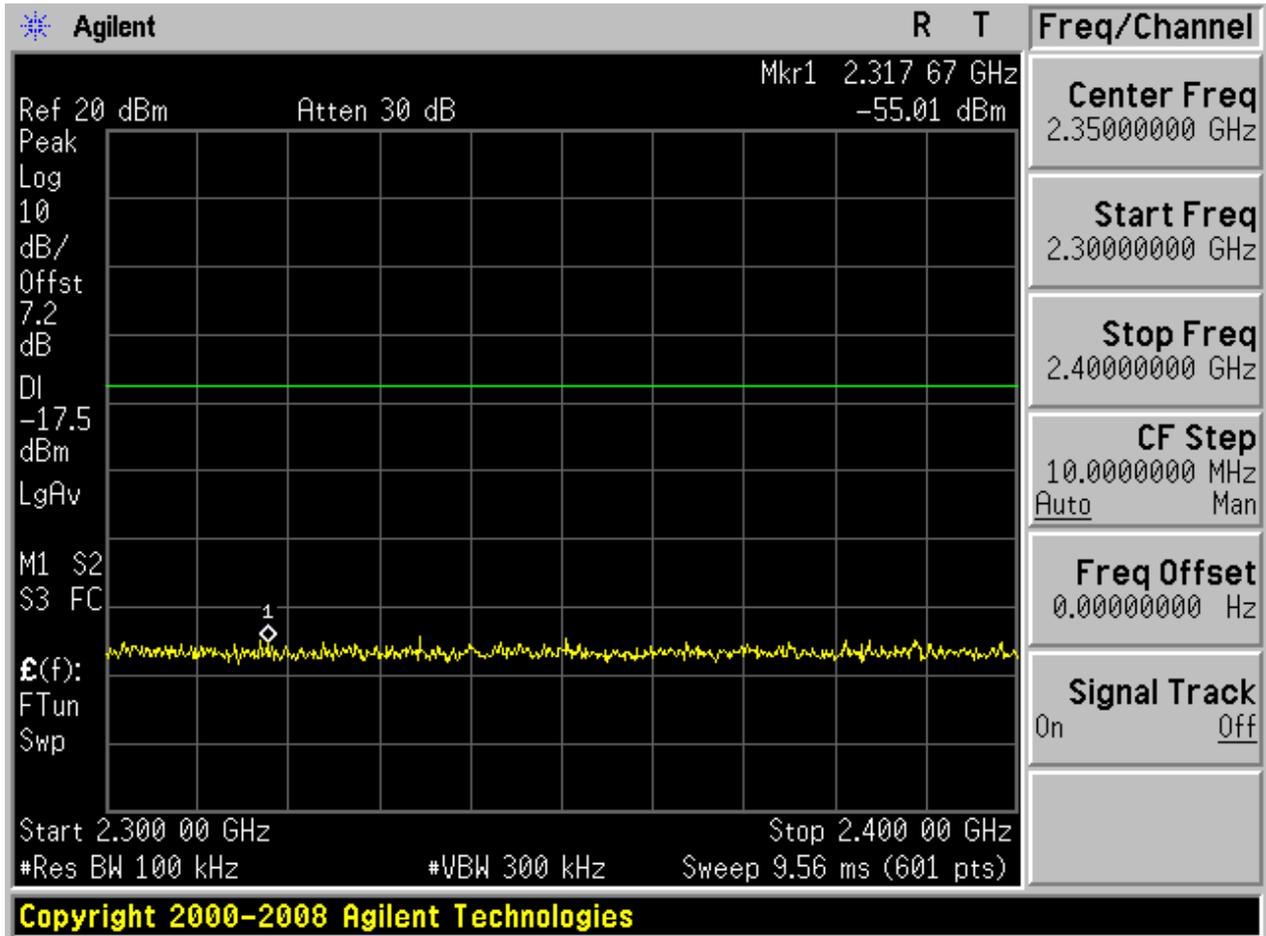


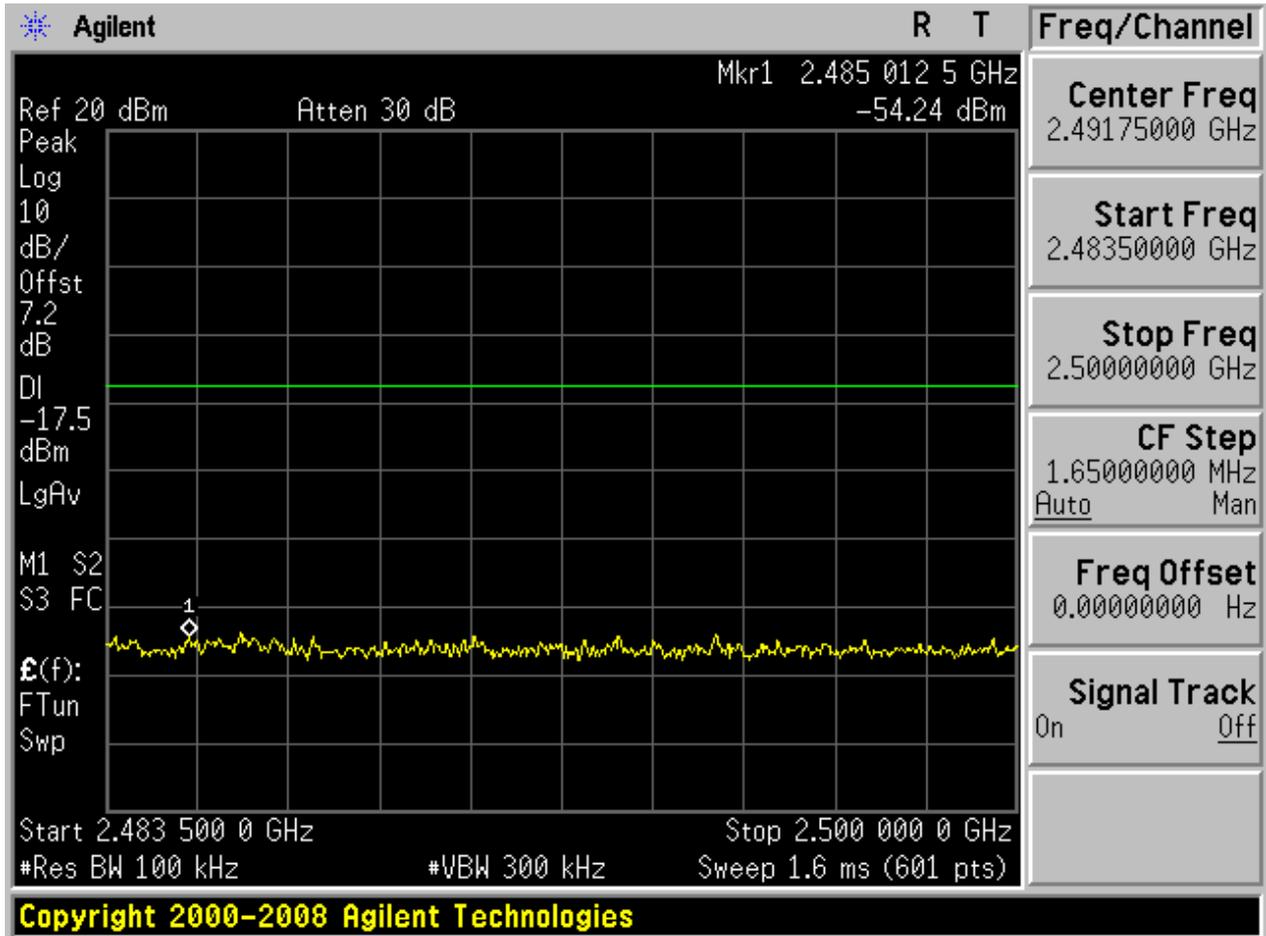
2.3.2 Puw

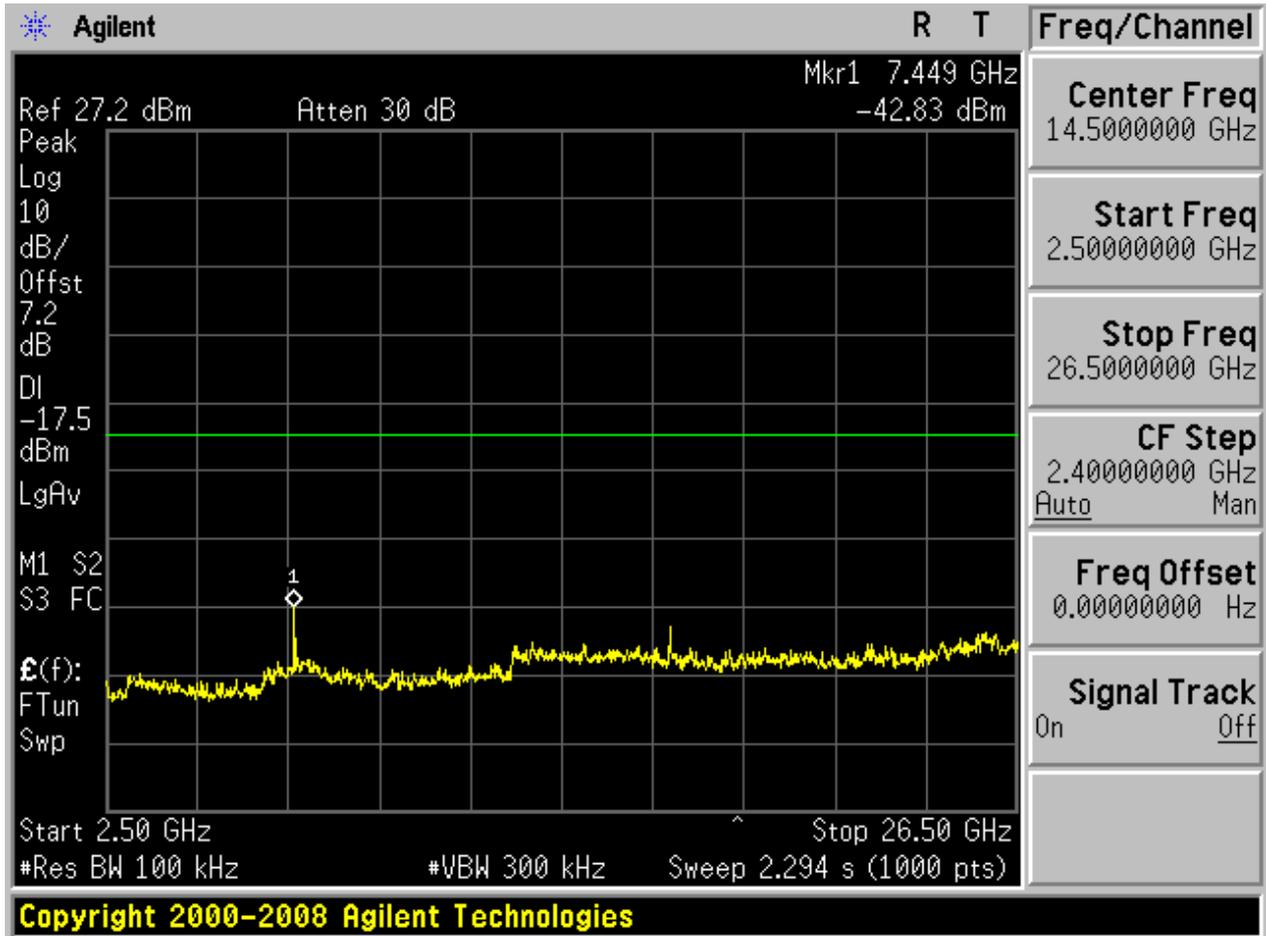












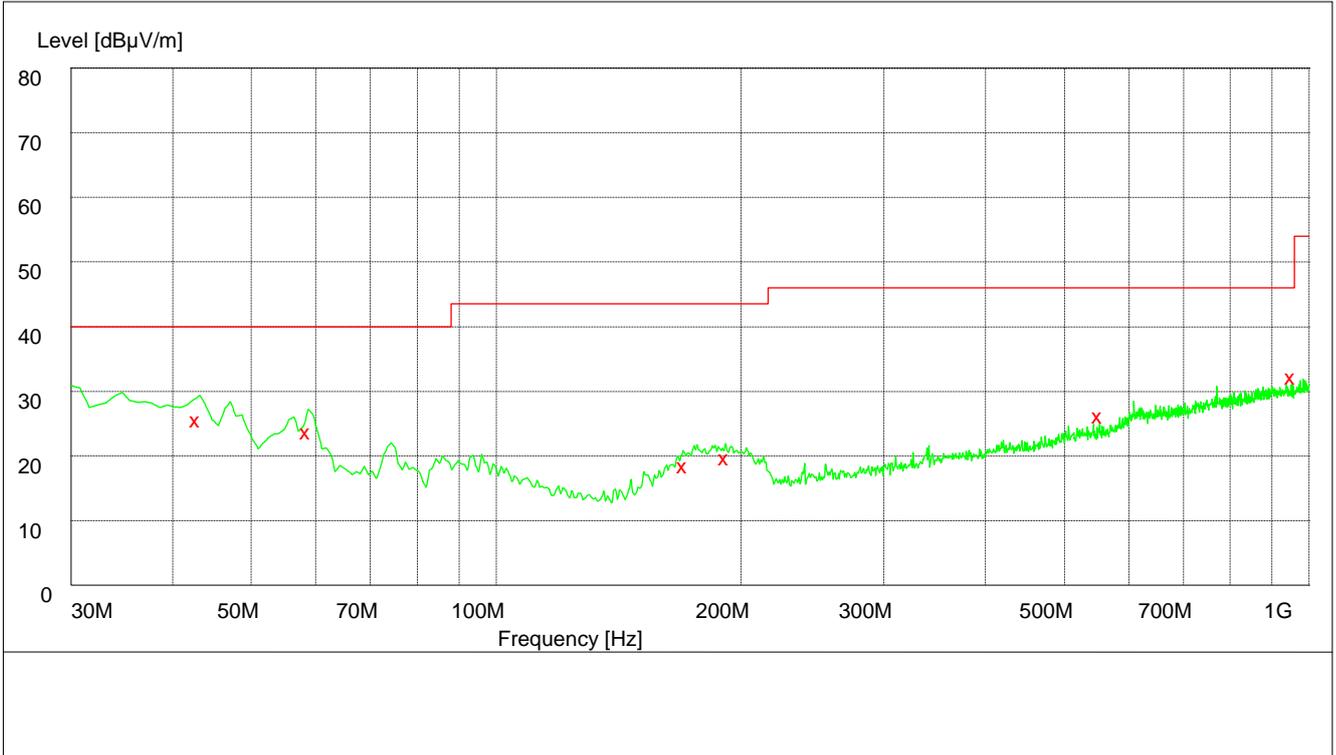


Appendix F: Radiated Emissions in the Restricted Bands

Part 1: Testing Range of “30 MHz to 1 GHz”

Note 1: The test results and plot for testing range of “30 MHz to 1 GHz” showed as below is **the WORST case for all Test Modes and Channels**. This range will not be presented for each Test Mode and each Channel.

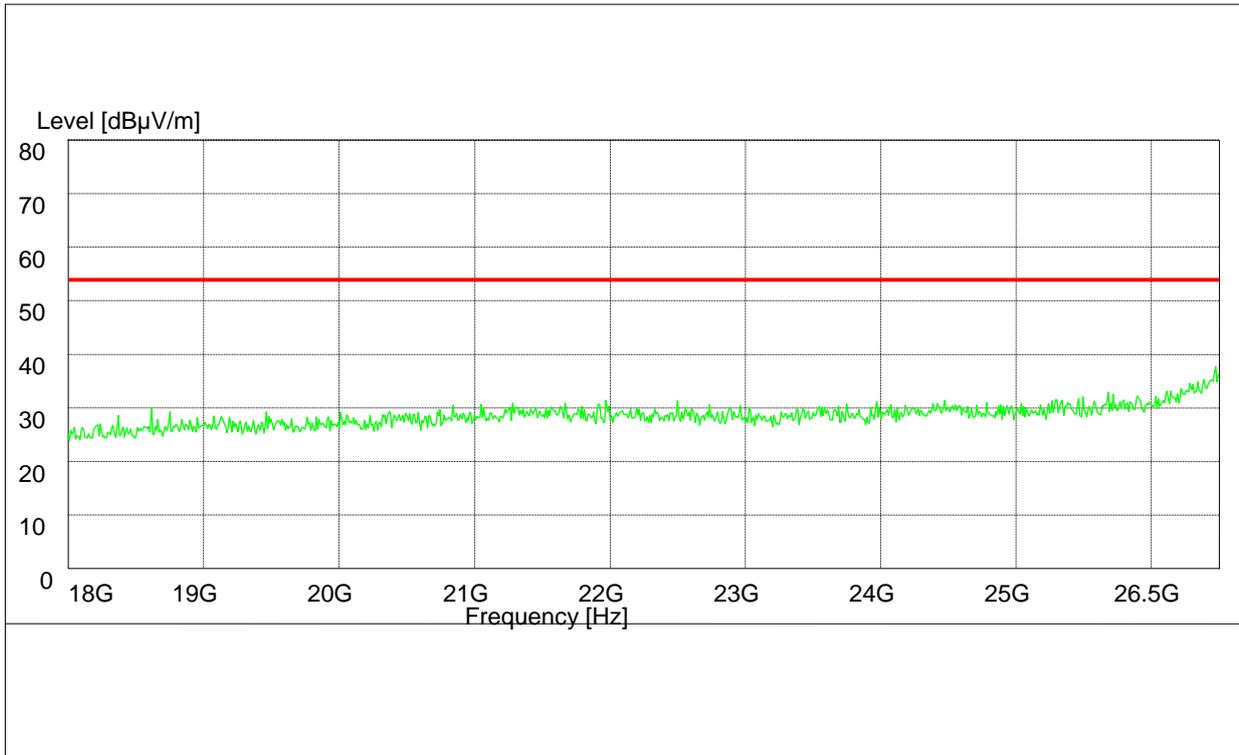
Note 2: **The emissions in this range are mainly from the Platform Device (Notepad PC and its ancillary components)**.



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
42.900000	27.10	15.1	40.0	12.9	103.0	338.00	VERTICAL
58.680000	25.20	13.6	40.0	14.8	103.0	291.00	VERTICAL
170.520000	20.00	10.7	43.5	23.5	179.0	124.00	HORIZONTAL
191.760000	21.10	12.2	43.5	22.4	100.0	270.00	HORIZONTAL
552.960000	27.60	20.0	46.0	18.4	131.0	297.00	HORIZONTAL
954.120000	33.70	25.3	46.0	12.3	151.0	338.00	VERTICAL

Part 2: Testing Range of “18 GHz to 26.5 GHz”



Note: No peak found in pre- test.

Part 3: Testing Range of “2.3GHz to 2.51GHz”

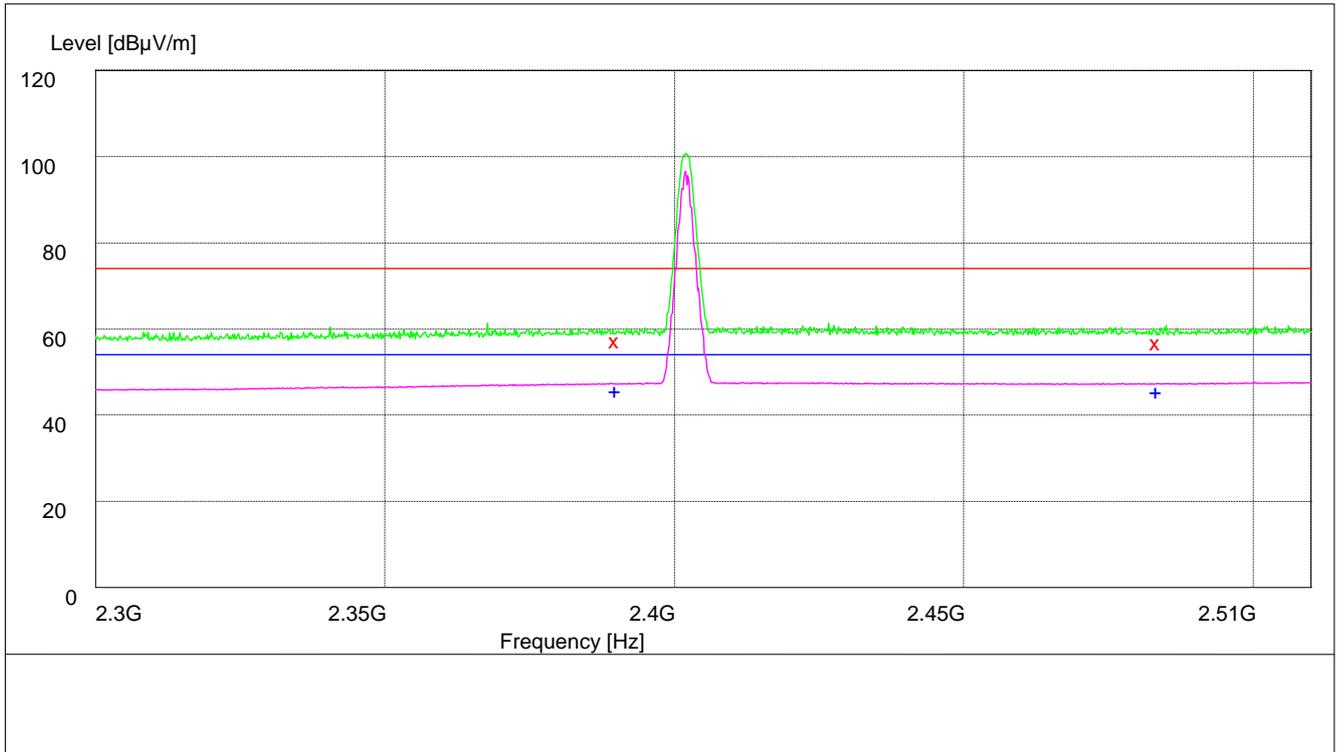
Note 1: The testing range of “2.3 GHz to 2.51 GHz” is for checking radiated emissions located in restricted bands near the EUT operating bands.

Note 2: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dB μ V/m) and Average Limit (54 dB μ V/m).

Note 3: The peak spike exceeds the limit line is EUT’s operating frequency.

3 Test Mode:

3.1 Channel 00



Note: The peak exceeds the limit line is carrier frequency.

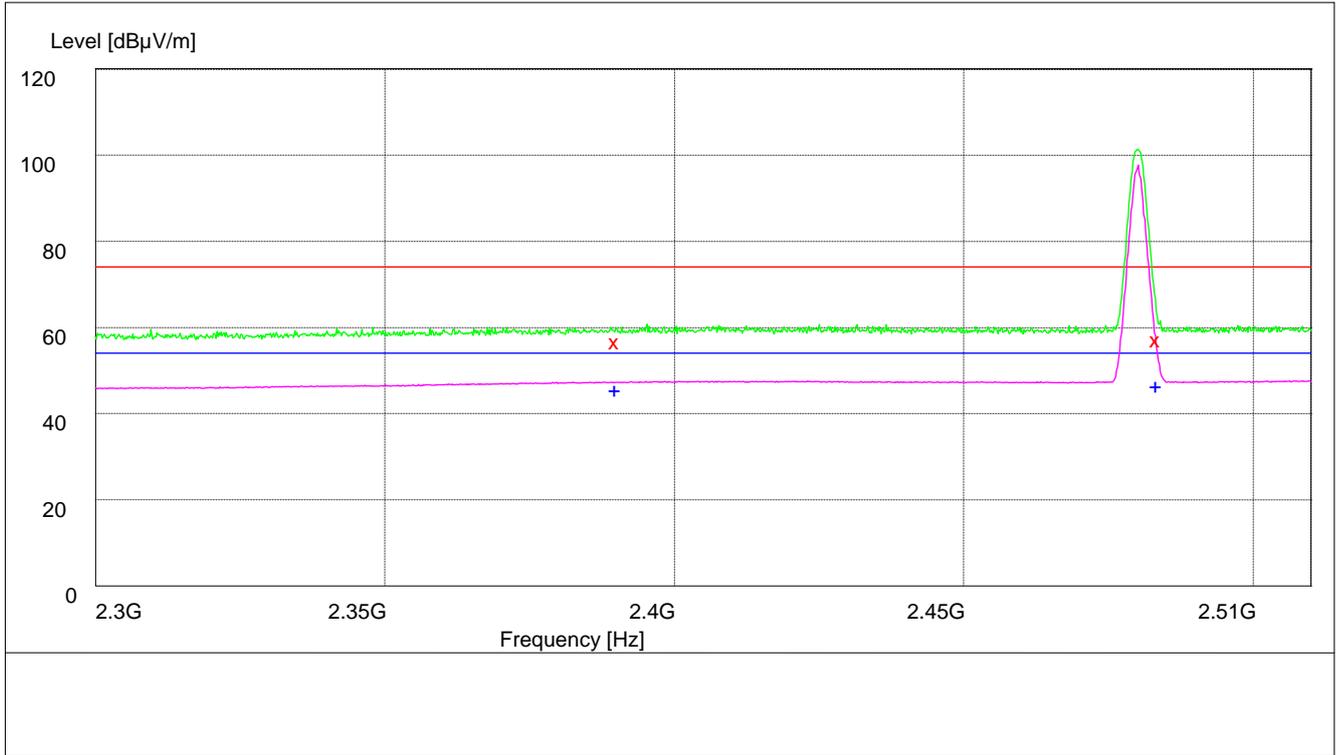
MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.40	33.5	74.0	14.6	103.0	189.00	HORIZONTAL
2483.500000	59.10	33.7	74.0	14.9	100.0	30.00	VERTICAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	47.90	33.5	54.0	6.1	140.0	121.00	HORIZONTAL
2483.500000	47.70	33.7	54.0	6.3	142.0	65.00	HORIZONTAL

3.2 Channel 39



Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

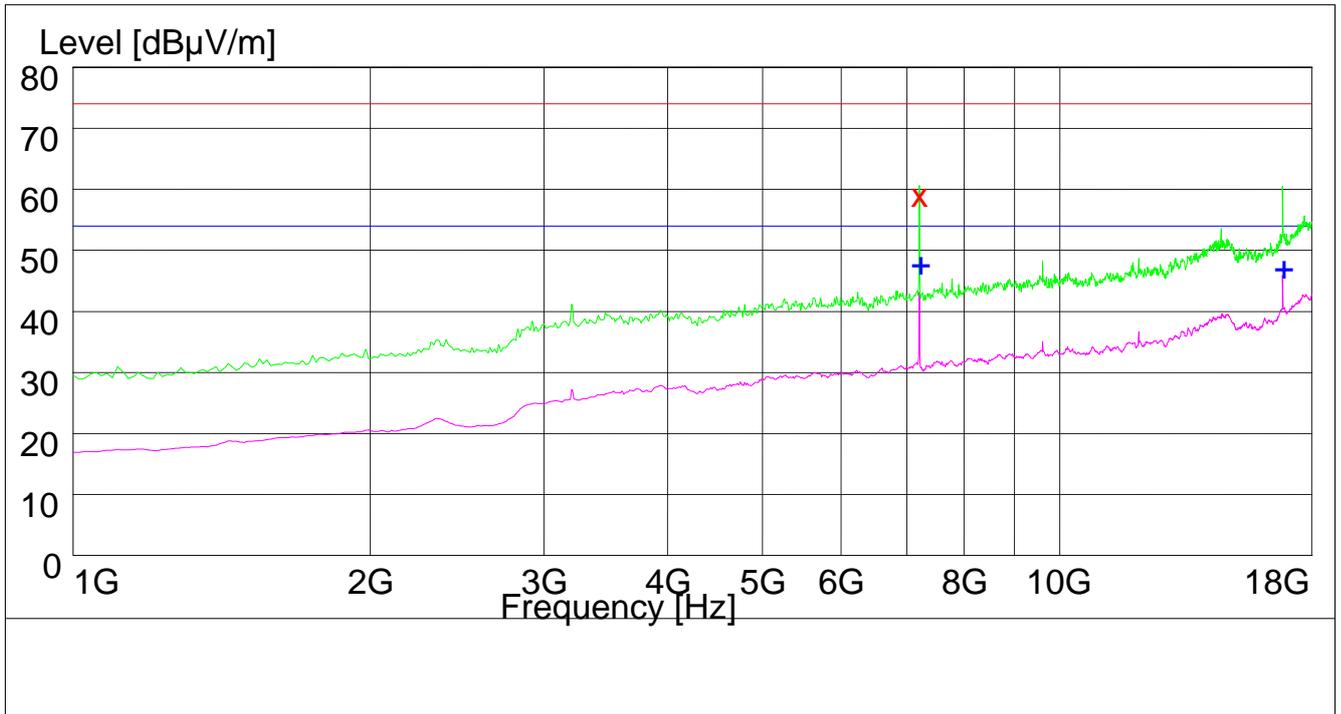
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	58.90	33.5	74.0	15.1	100.0	283.00	VERTICAL
2483.500000	59.30	33.7	74.0	14.7	112.0	33.00	VERTICAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	47.90	33.5	54.0	6.1	100.0	355.00	HORIZONTAL
2483.500000	48.80	33.7	54.0	5.2	150.0	309.00	VERTICAL

Part 4: Testing Range of “1 GHz to 18 GHz”

- Note 1: The test results and plot for testing range of “1 GHz to 18 GHz” showed as below is **the WORST case for all Test Modes and Channels**. This range will not be presented for each Test Mode and each Channel.
- Note 2: The testing range of “1 GHz to 18 GHz” is for checking radiated emissions located in restricted bands far away from the EUT operating bands.
- Note 3: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dB μ V/m) and Average Limit (54 dB μ V/m).



MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
7206.100000	60.80	2.4	74.0	13.2	100.0	40.00	HORIZONTAL

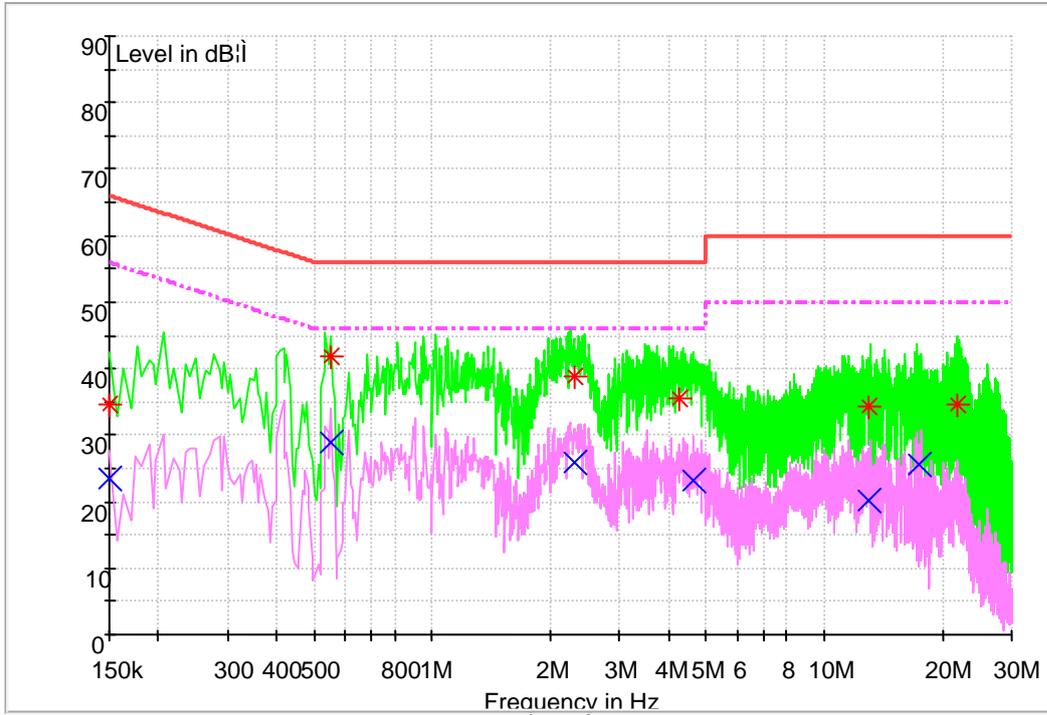
MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
7205.600000	50.70	2.4	54.0	4.3	101.0	37.00	HORIZONTAL
16812.300000	49.10	18.7	54.0	4.9	100.0	22.00	VERTICAL



Appendix G: AC Power Line Conducted Emissions

Channel 19



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	34.7	9.7	66.0	31.3	L1	FLO
0.552000	41.7	9.7	56.0	14.3	N	FLO
2.312000	38.7	9.7	56.0	17.3	N	FLO
4.284000	35.5	9.8	56.0	20.5	L1	FLO
12.980000	34.2	10.0	60.0	25.8	N	FLO
21.704000	34.6	10.1	60.0	25.4	L1	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	23.6	9.7	56.0	32.4	N	FLO
0.552000	29.0	9.7	46.0	17.0	N	FLO
2.304000	25.8	9.7	46.0	20.2	N	FLO
4.636000	23.3	9.8	46.0	22.7	N	FLO
12.984000	20.2	10.0	50.0	29.8	L1	FLO
17.464000	25.7	10.1	50.0	24.3	L1	FLO



Note:

Level= Reading level+ Transd (cable loss + correction factor)

The reading level is used to calculate by software which is not shown in the sheet.

END