FCC Test Report

Report No.: AGC07628160701FE02

FCC ID	:	2AJR6TOUGHTRACKER
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	Tough Tracker
BRAND NAME	:	Tough Tracker
MODEL NAME	:	Tough Tracker
CLIENT	:	Concirrus Limited
DATE OF ISSUE	:	Sep. 22, 2016
STANDARD(S)	:	FCC Part 22H & 24E Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd.

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 22, 2016	Valid	Original Report

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1. VERIFICATION OF COMPLIANCE

Applicant	Concirrus Limited
Address	17 Leathermarket Street, London, SE1 3HN, UK
Manufacturer	Concirrus Limited
Address	17 Leathermarket Street, London, SE1 3HN, UK
Product Designation	Tough Tracker
Brand Name	Tough Tracker
Test Model	Tough Tracker
Date of test	Sep. 1, 2016~Sep. 21, 2016
Deviation	None
Condition of Test Sample	Normal

We hereby certify that:

The above equipment was tested by Dongguan Precise Testing Service Co., Ltd. The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI/TIA- 603-D-2010. The sample tested as described in this report is in compliance with the FCC Rules Part 22H and 24E.

The test results of this report relate only to the tested sample identified in this report.

Tested By	Dota Zhang	
	Dota Zhang(Zhang Jianfeng)	Sep. 22, 2016
Reviewed By	Bart Xie	
	Bart Xie(Xie Xiaobin)	Sep. 22, 2016
Approved By	Solger Zhang	
	Solger Zhang(Zhang Hongyi) Authorized Officer	Sep. 22, 2016

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	Tough Tracker
Hardware version:	1.5.1
Software version:	3.2
Frequency Bands:	☒GPRS 850 ☒GPRS 1900 (U.S. Bands) ☒GPRS 900 ☒GPRS 1800 (Non-U.S. Bands) ☒HSPA FDD Band II ☒HSPA FDD Band V (U.S. Bands) ☐HSPA FDD Band I ☐HSPA FDD Band VIII (Non-U.S. Bands)
Antenna:	PIFA Antenna
Type of Modulation	GPRS : GMSK HSPA : QPSK
Antenna gain(GSM):	GPRS 850/HSPA 850 -1.8dBi; GPRS 1900/HSPA 1900 -1.6dBi;
Power Supply:	DC 3.6V by battery
Battery parameter:	DC3.6V/13Ah
GPRS Class	12
Extreme Vol. Limits:	DC3.4 V to 4.2 V (Normal: DC3.7 V)
Extreme Temp. Tolerance	-10℃ to +50℃
*** Note: The High Voltage DC4.2V and Low Voltage DC3.4V were declared by manufacturer, The EUT couldn't be operating normally with higher or lower voltage.	

***** Note:** 1.The maximum power levels for GPRS are MCS-4: GMSK link, and RMC 12.2kbps mode for HSPA band II, HSPA band V, only these modes were used for all tests.

2. We found out the test mode with the highest power level after we analyze all the data rates. So we chose the worst case as a representative.

	Maximum ERP/EIRP (dBm)	Max. Conducted Power (dBm)	Max. Average Burst Power (dBm)
GPRS 850	30.42	31.29	30.44
GPRS 1900	27.82	28.51	27.53
HSPA II	21.22	22.28	20.83
HSPA V	21.57	22.81	20.86

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AJR6TOUGHTRACKER**, filing to comply with the FCC Part 22H&24E requirements.

2.3 TEST METHODOLOGY

The radiated emission testing was performed according to the procedures of ANSI/TIA-603-D-2010, and FCC CFR 47 Rules of 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057.
KDB 971168 D01 Power Meas License Digital Systems v02r02

2.4 TEST FACILITY

Site	Dongguan Precise Testing Service Co., Ltd.
Location	Building D,Baoding Technology Park,Guangming Road2,Dongcheng District, Dongguan, Guangdong, China,
FCC Registration No.	371540
Description	The test site is constructed and calibrated to meet the FCC requirements in documents of ANSI/TIA-603-D-2010.

2.5 MEASUREMENT INSTRUMENTS

Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI Test Receiver	Rohde & Schwarz	ESCI	101417	July 3, 2016	July 2, 2017
Trilog Broadband Antenna (25M-1GHz)	SCHWARZBECK	VULB9168	D69250	Mar 1, 2016	Feb 28, 2017
Trilog Broadband Antenna(substituted antenna) (25M-1GHz)	SCHWARZBECK	VULB9160	9160-3355	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 3, 2016	July 2, 2017
RF Cable	SCHWARZBECK	AK9515E	96221	July 3, 2016	July 2, 2017
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 5, 2016	June 4, 2017
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 5, 2016	June 4, 2017
Spectrum analyzer	Agilent	E4407B	MY46185649	June 5, 2016	June 4, 2017
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 10, 2016	July 9, 2017
Horn Antenna(substituted antenna) (1G-18GHz)	ETS LINDGREN	3117	00034609	Mar 1, 2016	Feb 28, 2017

Spectrum Analyzer	Agilent	E4411B	MY4511453	July 3, 2016	July 2, 2017
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 6, 2016	July 5, 2017
RF Cable	SCHWARZBECK	AK9515H	96220	July 7, 2016	July 6, 2017
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 5, 2016	June 4, 2017
Artificial Mains Network	Narda	L2-16B	000WX31025	July 7, 2016	July 6, 2017
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 7, 2016	July 6, 2017
RF Cable	SCHWARZBECK	AK9515E	96222	July 3, 2016	July 2, 2017
Shielded Room	CHENGYU	843	PTS-002	June 5, 2016	June 4, 2017
COMMUNICATION TESTER	AGILENT	8960	GB46490550	July 24, 2016	July 23, 2017
RF attenuator	N/A	RFA20db	68	N/A	N/A
Signal Generator	AGILENT	N5182A	MY50140530	Oct 16,2015	Oct 15,2016
Signal Generator(substituted equipment)	AGILENT	E8257D	MY45141029	Oct 16,2015	Oct 15,2016

2.6 SPECIAL ACCESSORIES

The battery supplied by the applicant were used as accessories and being tested with EUT intended for FCC grant together.

2.7 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. SYSTEM TEST CONFIGURATION

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The Transmitter was operated in the maximum output power mode through Communication Tester. The TX frequency was fixed which was for the purpose of the measurements.

3.3 GENERAL TECHNICAL REQUIREMENTS

Item Number	Item Description		FCC Rules
1	Output Power	Conducted output power	2.1046/22.913(a) (2) / 24.232 (c)
		Radiated output power	
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d)
3	Spurious Emission	Conducted spurious emission	2.1051 / 22.917 / 24.238
		Radiated spurious emission	
4	Frequency Stability		2.1055/22.355 /24.235
5	Occupied Bandwidth		2.1049 (h)(i)
6	Emission Bandwidth		22.917(a)/24.238(a)
7	Band Edge		22.917(a)/24.238(a)

3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	Tough Tracker	Tough Tracker	FCC ID: 2AJR6TOUGHTRACKER	EUT
2	Battery	ER34615M/w	DC3.6V/ 13Ah	Accessory

****Note: All the accessories have been used during the test. The following "EUT" in setup diagram means EUT system.*

4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	2.1046/22.913(a) (2) / 24.232 (c)	Pass
		Radiated Output Power		
2	Peak-to-Average Ratio	Peak-to-Average Ratio	24.232(d)	Pass
3	Spurious Emission	Conducted Spurious Emission	2.1051 / 22.917 / 24.238	Pass
		Radiated Spurious Emission		
4	Frequency Stability		2.1055/22.355 /24.235	Pass
5	Occupied Bandwidth		2.1049 (h)(i)	Pass
6	Emission Bandwidth		22.917(a)/24.238(a)	Pass
7	Band Edge		22.917(a)/24.238(a)	Pass

5. DESCRIPTION OF TEST MODES

During the testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication Tester (CMU 200) to ensure max power transmission and proper modulation. Three channels (The top channel, the middle channel and the bottom channel) were chosen for testing on both GSM and PCS frequency band.

*****Note:** 1.GSM/GPRS 850, GSM/GPRS 1900, WCDMA/HSPA band II, WCDMA/HSPA band V, mode have been tested during the test.

2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions

3. All antenna port conducted emissions testing was performed on a test bench with the antenna Port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

6. OUTPUT POWER

6.1 CONDUCTED OUTPUT POWER

6.1.1 MEASUREMENT METHOD

The transmitter output port was connected to base station.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Measure the maximum burst average power and average power for other modulation signal.

The EUT was setup for the max output power with pseudo random data modulation. Power was measured with Spectrum Analyzer. The measurements were performed on all modes (GSM/GPRS850, GSM/GPRS1900, WCDMA/HSPA band II, WCDMA/HSPA band V) at 3 typical channels (the Top Channel, the Middle Channel and the Bottom Channel) for each band.

6.1.2 MEASUREMENT RESULT

Conducted Output Power Limits for GSM850/GPRS band		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	33 dBm (2W)	- 2
Conducted Output Power Limits for PCS1900/GPRS band		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
GSM	30 dBm (1W)	- 2
Conducted Output Power Limits for UMTS band II		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24 dBm (0.25W)	- 2
Conducted Output Power Limits for UMTS band V		
Mode	**Nominal Peak Power**	**Tolerance(dB)**
WCDMA	24 dBm (0.25W)	- 2

GPRS 850:

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GPRS850 (1 Slot)	824.2	33	**31.29**	-1.71	**30.44**	-9	21.44
	836.6	33	31.11	-1.89	30.21	-9	21.21
	848.8	33	31.08	-1.92	30.15	-9	21.15
GPRS850 (2 Slot)	824.2	30	29.38	-0.62	28.58	-6	22.58
	836.6	30	29.29	-0.71	28.31	-6	22.31
	848.8	30	29.44	-0.56	28.26	-6	22.26
GPRS850 (3 Slot)	824.2	28.23	27.25	-0.98	26.33	-4.26	22.07
	836.6	28.23	27.27	-0.96	26.18	-4.26	21.92
	848.8	28.23	27.13	-1.1	26.22	-4.26	21.96
GPRS850 (4 Slot)	824.2	27	26.17	-0.83	25.19	-3	22.19
	836.6	27	26.22	-0.78	25.27	-3	22.27
	848.8	27	26.41	-0.59	25.14	-3	22.14

GPRS 1900:

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GPRS1900 (1 Slot)	1850.2	30	**28.51**	-1.49	**27.53**	-9	18.53
	1880	30	28.42	-1.58	27.27	-9	18.27
	1909.8	30	28.39	-1.61	27.16	-9	18.16
GPRS1900 (2 Slot)	1850.2	27	26.85	-0.15	25.33	-6	19.33
	1880	27	26.61	-0.39	25.17	-6	19.17
	1909.8	27	26.28	-0.72	25.28	-6	19.28
GPRS1900 (3 Slot)	1850.2	25.23	24.33	-0.9	23.33	-4.26	19.07
	1880	25.23	24.17	-1.06	23.23	-4.26	18.97
	1909.8	25.23	24.26	-0.97	23.19	-4.26	18.93
GPRS1900 (4 Slot)	1850.2	24	23.57	-0.43	22.32	-3	19.32
	1880	24	23.19	-0.81	22.18	-3	19.18
	1909.8	24	23.37	-0.63	22.31	-3	19.31

HSPA BAND II

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power
HSDPA Subtest 1	1852.6	24	**22.28**	-1.72	**20.83**
	1880	24	22.15	-1.85	20.61
	1907.4	24	22.17	-1.83	20.59
HSDPA Subtest 2	1852.6	24	22.02	-1.98	20.42
	1880	24	22.06	-1.94	20.37
	1907.4	24	22.14	-1.86	20.55
HSDPA Subtest 3	1852.6	24	22.09	-1.91	20.41
	1880	24	22.01	-1.99	20.33
	1907.4	24	21.83	-2.17	20.12
HSDPA Subtest 4	1852.6	24	21.92	-2.08	20.29
	1880	24	21.84	-2.16	20.14
	1907.4	24	21.77	-2.23	20.12
HSUPA Subtest 1	1852.6	24	21.79	-2.21	20.47
	1880	24	21.75	-2.25	20.16
	1907.4	24	21.72	-2.28	20.29
HSUPA Subtest 2	1852.6	24	21.65	-2.35	20.37
	1880	24	21.88	-2.12	20.15
	1907.4	24	21.6	-2.4	20.22
HSUPA Subtest 3	1852.6	24	21.52	-2.48	20.19
	1880	24	21.49	-2.51	20.35
	1907.4	24	21.83	-2.17	20.3
HSUPA Subtest 4	1852.6	24	21.62	-2.38	20.49
	1880	24	21.74	-2.26	20.42
	1907.4	24	21.69	-2.31	20.47
HSUPA Subtest 5	1852.6	24	21.58	-2.42	20.22
	1880	24	21.43	-2.57	20.06
	1907.4	24	21.46	-2.54	20.13

HSPA BAND V

Mode	Frequency (MHz)	Reference power	Peak Power	Tolerance	Avg.Burst Power
HSDPA Subtest 1	826.6	24	**22.81**	-1.19	**20.86**
	836.4	24	22.53	-1.47	20.54
	846.4	24	22.49	-1.51	20.63
HSDPA Subtest 2	826.6	24	22.57	-1.43	20.24
	836.4	24	22.29	-1.71	20.37
	846.4	24	22.36	-1.64	20.19
HSDPA Subtest 3	826.6	24	22.27	-1.73	20.25
	836.4	24	22.16	-1.84	20.24
	846.4	24	22.29	-1.71	20.26
HSDPA Subtest 4	826.6	24	22.17	-1.83	20.14
	836.4	24	22.22	-1.78	20.17
	846.4	24	22.57	-1.43	20.32
HSUPA Subtest 1	826.6	24	22.44	-1.56	20.16
	836.4	24	22.35	-1.65	20.31
	846.4	24	22.48	-1.52	20.17
HSUPA Subtest 2	826.6	24	22.17	-1.83	20.2
	836.4	24	22.24	-1.76	20.39
	846.4	24	22.18	-1.82	20.57
HSUPA Subtest 3	826.6	24	22.37	-1.63	20.14
	836.4	24	22.26	-1.74	20.27
	846.4	24	22.11	-1.89	20.21
HSUPA Subtest 4	826.6	24	22.32	-1.68	20.38
	836.4	24	22.17	-1.83	20.19
	846.4	24	22.26	-1.74	20.23
HSUPA Subtest 5	826.6	24	22.02	-1.98	20.64
	836.4	24	22.38	-1.62	20.49
	846.4	24	22.62	-1.38	20.37

According to 3GPP 25.101 sub-clause 6.2.2 , the maximum output power is allowed to be reduced by following the table.

Table 6.1aA: UE maximum output power with HS-DPCCH and E-DCH

UE Transmit Channel Configuration	CM(db)	MPR(db)
For all combinations of ,DPDCH,DPCCH HS-DPDCH,E-DPDCH and E-DPCCH	0≤ CM≤3.5	MAX(CM-1,0)
Note: CM=1 for β_c/β_d=12/15, β_{hs}/β_c=24/15.For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.		

The device supports MPR to solve linearity issues (ACLR or SEM) due to the higher peak-to average ratios (PAR) of the HSUPA signal. This prevents saturating the full range of the TX DAC inside of device and provides a reduced power output to the RF transceiver chip according to the Cubic Metric (a function of the combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH).

When E-DPDCH channels are present the beta gains on those channels are reduced firsts to try to get the power under the allowed limit. If the beta gains are lowered as far as possible, then a hard limiting is applied at the maximum allowed level.

The SW currently recalculates the cubic metric every time the beta gains on the E-DPDCH are reduced. The cubic metric will likely get lower each time this is done .However, there is no reported reduction of maximum output power in the HSUPA mode since the device also provides a compensate for the power back-off by increasing the gain of TX_AGC in the transceiver (PA) device.

The end effect is that the DUT output power is identical to the case where there is no MPR in the device.

6.2 RADIATED OUTPUT POWER

6.2.1 MEASUREMENT METHOD

The measurements procedures specified in ANSI/TIA-603-D-2010 were applied.

1. Effective Radiated Power (ERP) and Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI/TIA-603-D-2010 with the EUT transmitting into an integral antenna. Measurements on signal operating below 1GHz are performed using dipole antennas. Measurements on signals operating above 1GHz are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT operating at its maximum duty cycle, at maximum power, and at the approximate frequencies.
2. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power (Pin) is applied to the input of the dipole, and the power received (Pr) at the chamber's probe antenna is recorded.
3. The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established as ARpl=Pin + 2.15 - Pr. The ARpl is the attenuation of “reference path loss”, and including the gain of receive antenna, the cable loss and the air loss. The measurement results are obtained as described below: Power=PMea+ARpl
4. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
5. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
6. The EUT is then put into continuously transmitting mode at its maximum power level.
7. Power mode measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step1 is added to this result.
8. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power (Pin).
9. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi...

6.2.2 PROVISIONS APPLICABLE

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, “Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power” and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage.” Rule Part 22.913(a) specifies “Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.”

Mode	Nominal Peak Power
GPRS 850	<=38.45 dBm (7W)
GPRS 1900	<=33 dBm (2W)
HSPA BAND II	<=33 dBm (2W)
HSPA BAND V	<=38.45 dBm (7W)

6.2.3 MEASUREMENT RESULT

Radiated Power (ERP) for GPRS 850				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GPRS850	824.2	**30.42**	Horizontal	Pass
	836.6	30.26	Horizontal	Pass
	848.8	30.29	Horizontal	Pass
	824.2	29.43	Vertical	Pass
	836.6	28.11	Vertical	Pass
	848.8	28.45	Vertical	Pass

Radiated Power (E.I.R.P) for GPRS 1900				
Mode	Frequency	Result		Conclusion
		Max. Peak E.I.R.P.(dBm)	Polarization Of Max. E.I.R.P.	
GPRS1900	1850.2	27.67	Horizontal	Pass
	1880.0	**27.82**	Horizontal	Pass
	1909.8	27.46	Horizontal	Pass
	1850.2	26.55	Vertical	Pass
	1880.0	26.59	Vertical	Pass
	1909.8	25.88	Vertical	Pass

Radiated Power (E.I.R.P) for HSPA band II				
Mode	Frequency	Result		
		Max. Peak E.I.R.P (dBm)	Polarization Of Max. E.I.R.P	
RMC 12.2kbps	1852.6	**21.22**	Horizontal	Pass
	1880	21.06	Horizontal	Pass
	1907.4	21.14	Horizontal	Pass
	1852.6	21.09	Vertical	Pass
	1880	20.51	Vertical	Pass
	1907.4	20.77	Vertical	Pass

Radiated Power (ERP) for HSPA band V				
Mode	Frequency	Result		Conclusion
		Max. Peak ERP (dBm)	Polarization Of Max. E.I.R.P.	
RMC 12.2kbps	826.6	**21.57**	Horizontal	Pass
	836.4	20.86	Horizontal	Pass
	846.4	21.28	Horizontal	Pass
	826.6	20.53	Vertical	Pass
	836.4	20.61	Vertical	Pass
	846.4	21.26	Vertical	Pass

Note: Above is the worst mode data.

6.3. PEAK-TO-AVERAGE RATIO

6.3.1 MEASUREMENT METHOD

Use one of the procedures presented in 4.1 to measure the total peak power and record as PPk. Use one of the applicable procedures presented 4.2 to measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

PAPR (dB) = PPk (dBm) - PAvg (dBm).

6.3.2 PROVISIONS APPLICABLE

This is the test for the Peak-to-Average Ratio from the EUT.

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.3.3 MEASUREMENT RESULT

Modes	GPRS 850		
Channel	128	190	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.6	848.8
Peak-To-Average Ratio (dB)/GPRS	0.85	0.90	0.93

Modes	GPRS 1900		
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-To-Average Ratio (dB)/GPRS	0.98	1.15	1.23

Modes	HSPA BAND II		
Channel	9663	9800	9937
	(Low)	(Mid)	(High)
Frequency (MHz)	1852.6	1880	1907.4
Peak-To-Average Ratio (dB)	0.45	0.54	0.58

Modes	HSPA BAND V		
Channel	4358	4407	4457
	(Low)	(Mid)	(High)
Frequency (MHz)	826.6	836.6	846.4
Peak-To-Average Ratio (dB)	0.95	0.99	0.86

7. OCCUPIED BANDWIDTH

7.1 TEST OVERVIEW

1. The Occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper Frequency limits, the mean power radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

2. RBW=1~5% of the expected OBW, VBW>=3 x RBW, Detector=Peak, Trace mode=max hold, Sweep=auto couple, and the trace was allowed to stabilize.

7.2 PROVISIONS APPLICABLE

The emission bandwidth is defined as two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26dB below the transmitter power

7.3 MEASUREMENT RESULT

APPENDIX A:BANDWIDTH

Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GPRS 850	GPRS	LCH	246.58	316.39	PASS
		MCH	251.42	317.23	PASS
		HCH	245.49	319.32	PASS

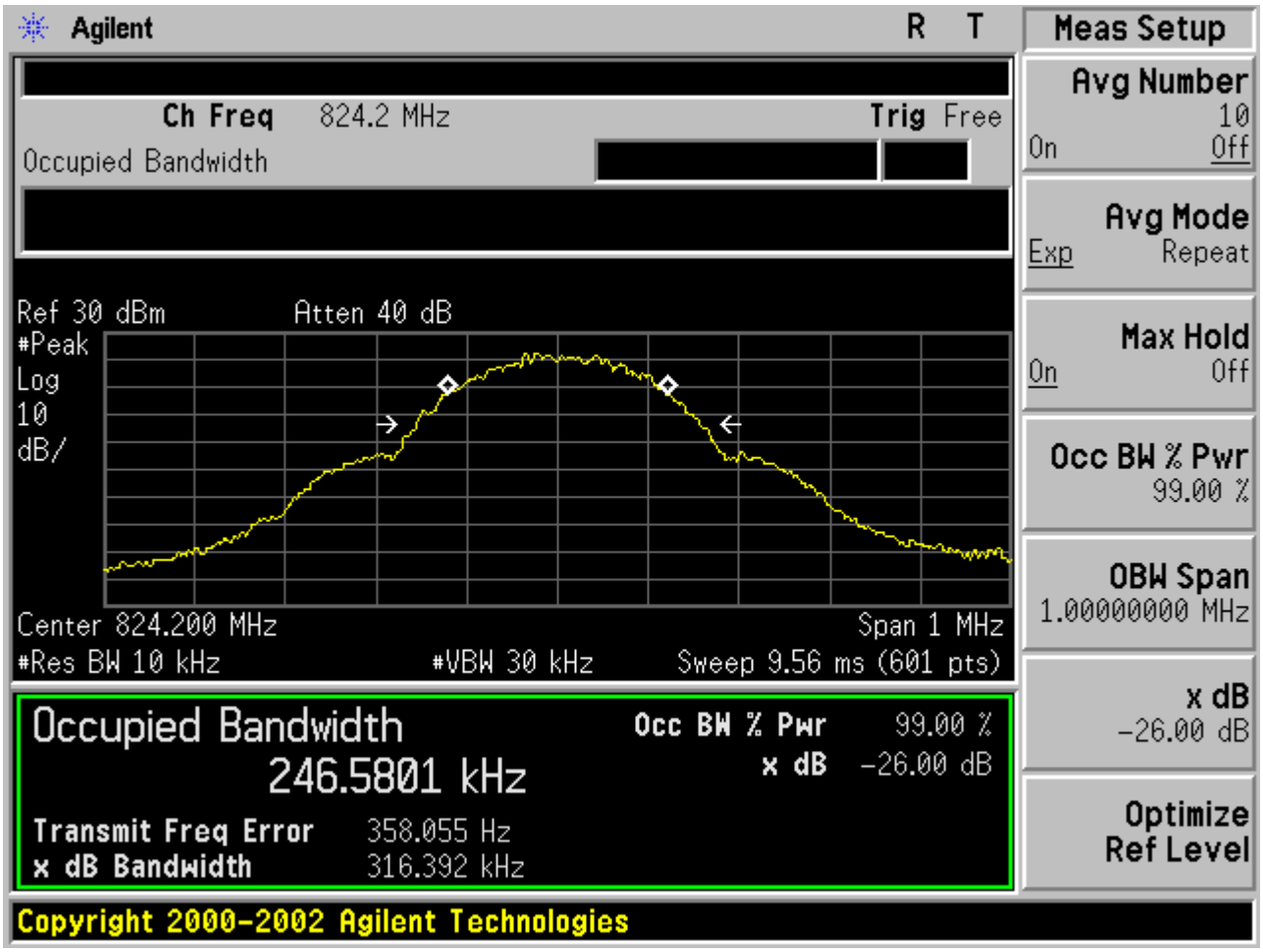
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GPRS1900	GPRS	LCH	244.97	313.16	PASS
		MCH	246.92	311.69	PASS
		HCH	252.21	320.62	PASS

For GPRS

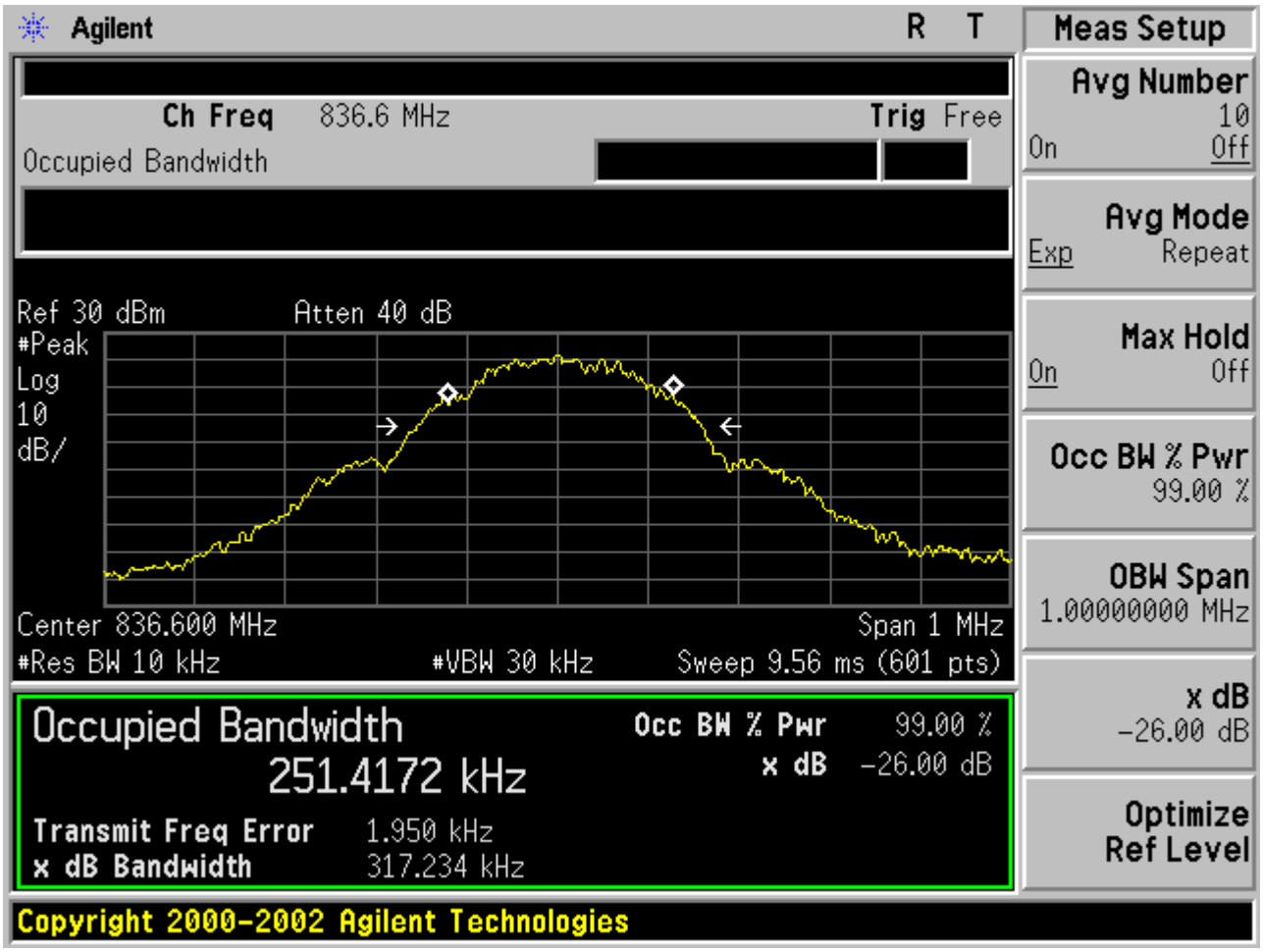
Test Band=GPRS 850

Test Mode=GPRS

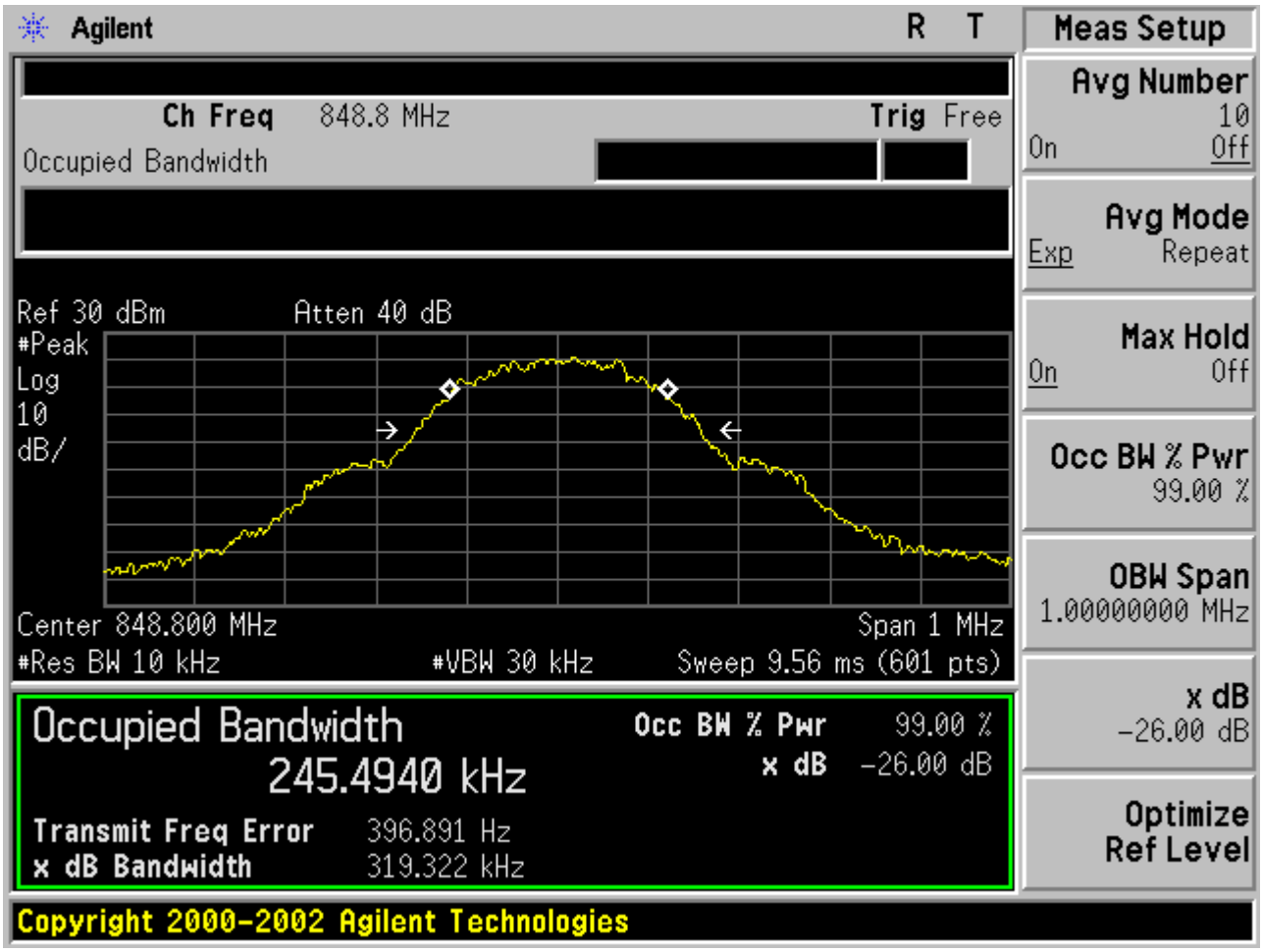
Test Channel=LCH



Test Channel=MCH



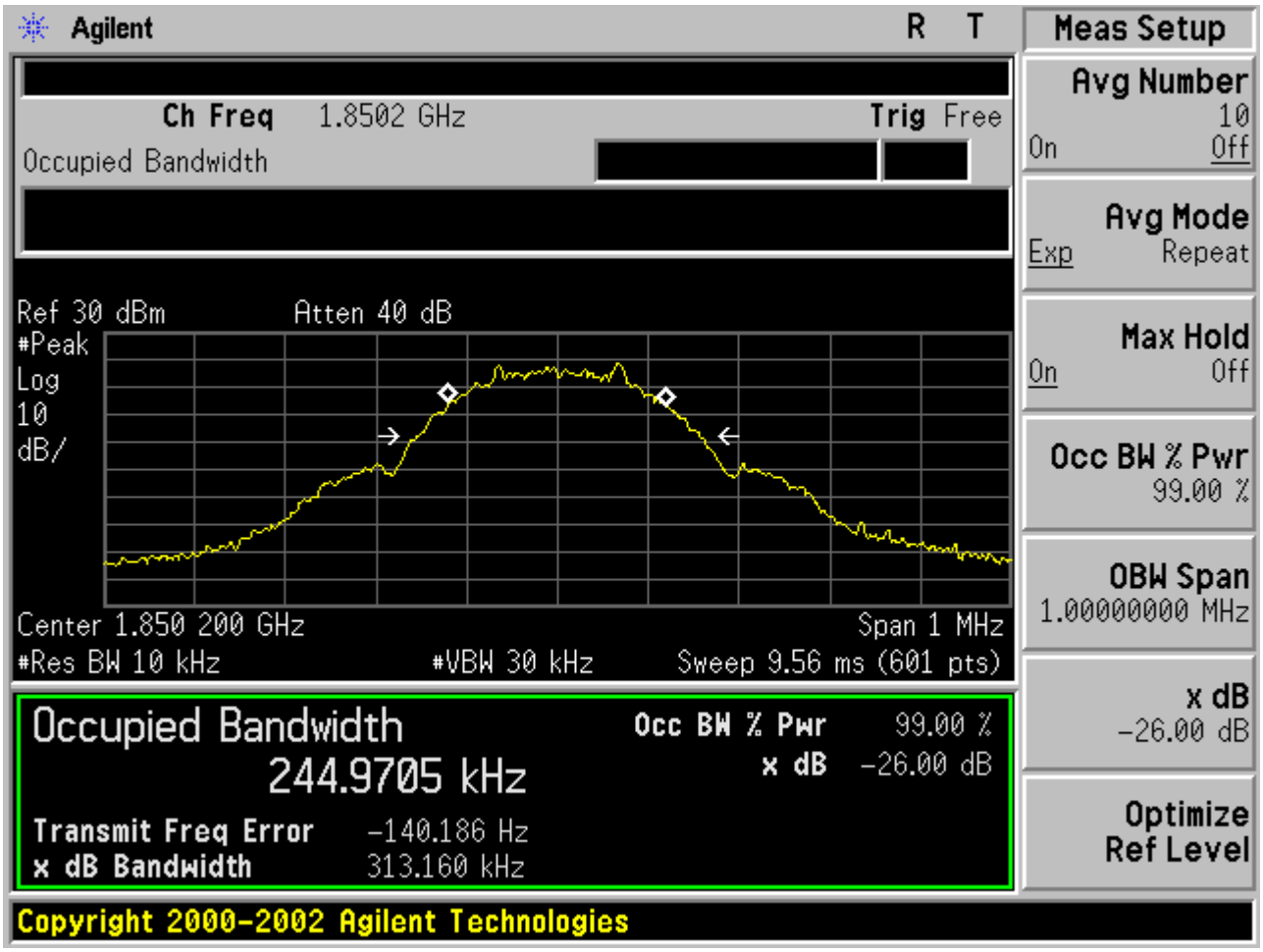
Test Channel=HCH



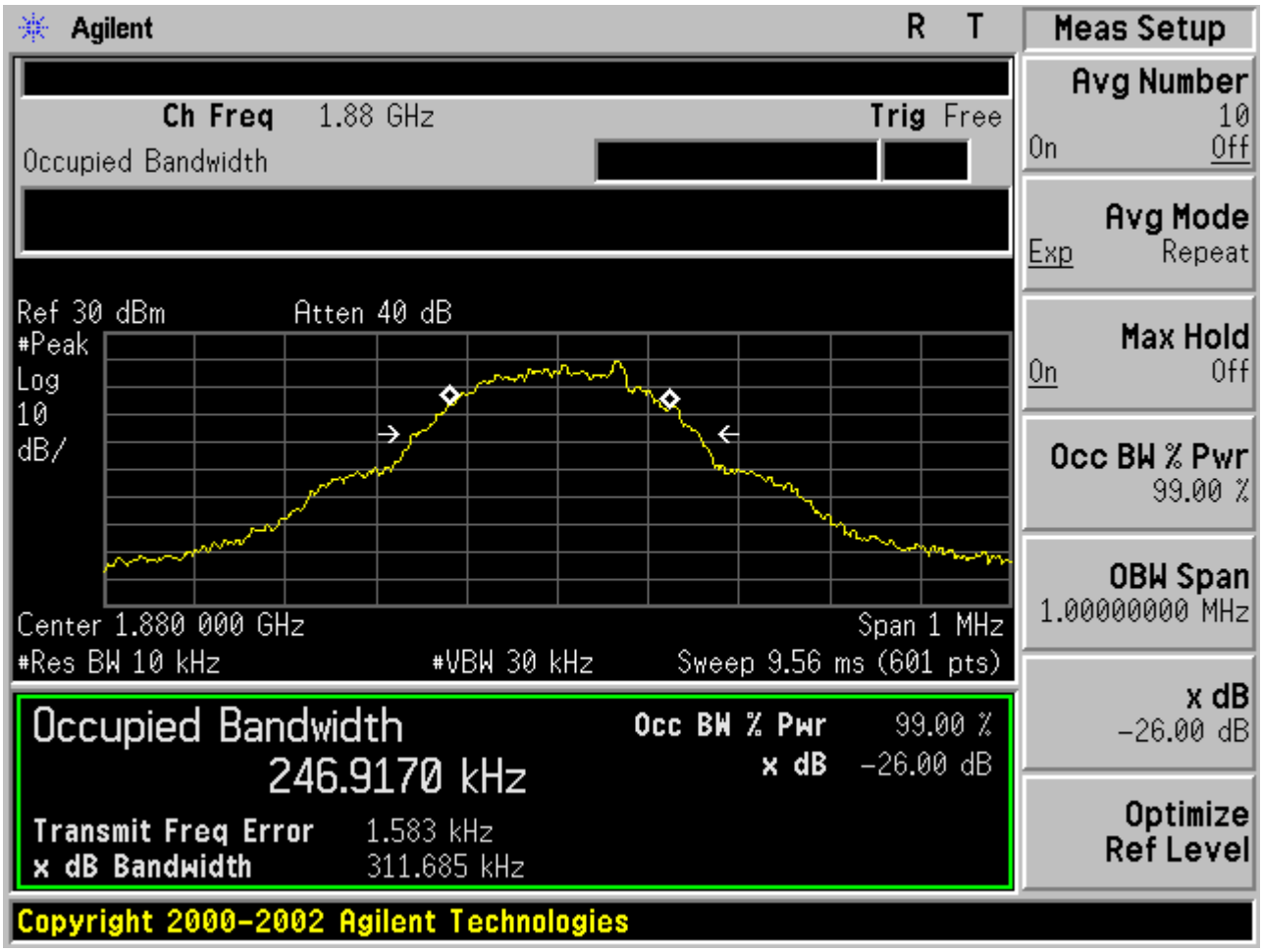
Test Band=GPRS 1900

Test Mode=GPRS

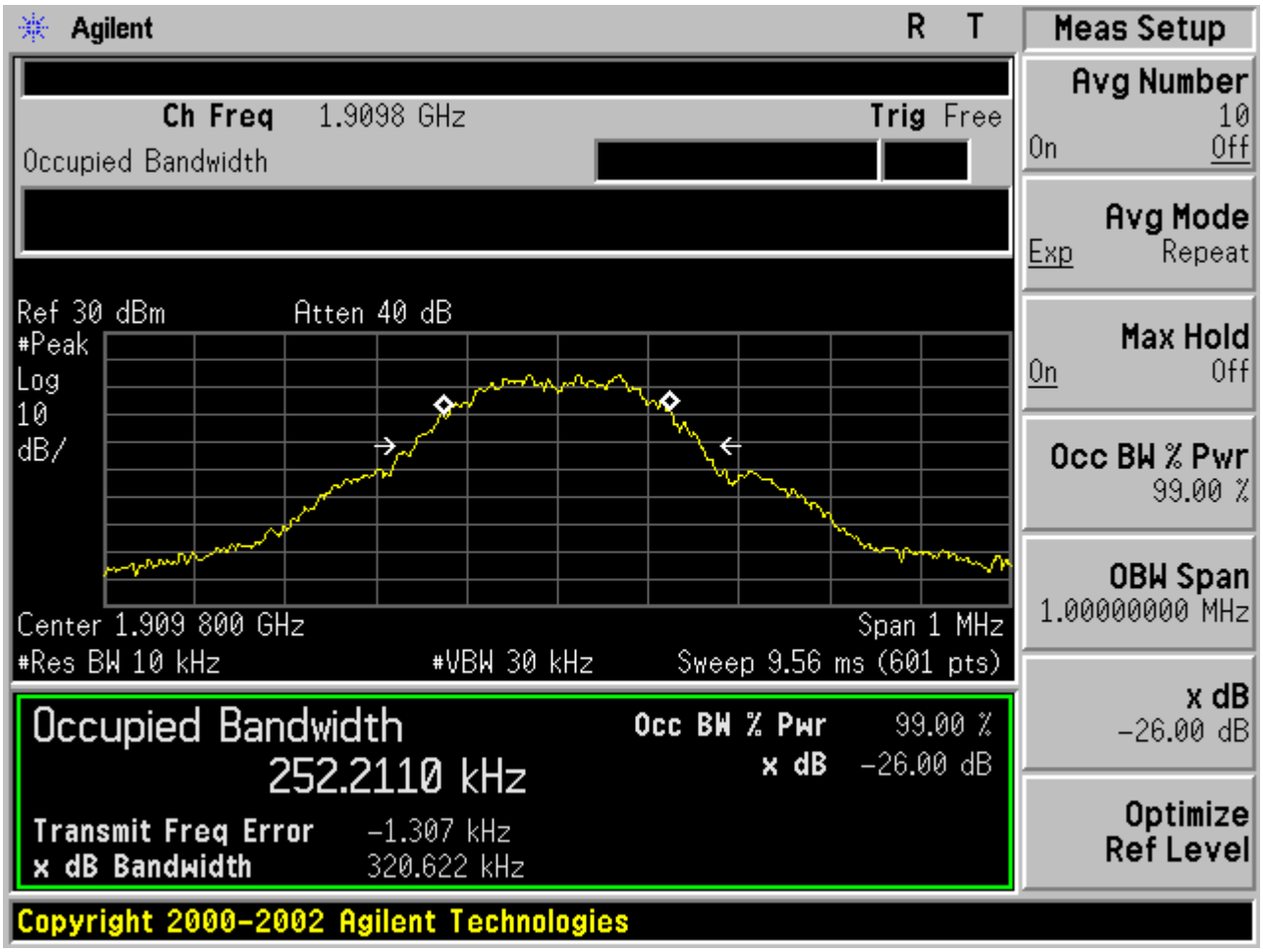
Test Channel=LCH



Test Channel=MCH



Test Channel=HCH



Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
HSPA850	HSPA	LCH	4.215	4.918	PASS
		MCH	4.212	4.874	PASS
		HCH	4.223	4.906	PASS

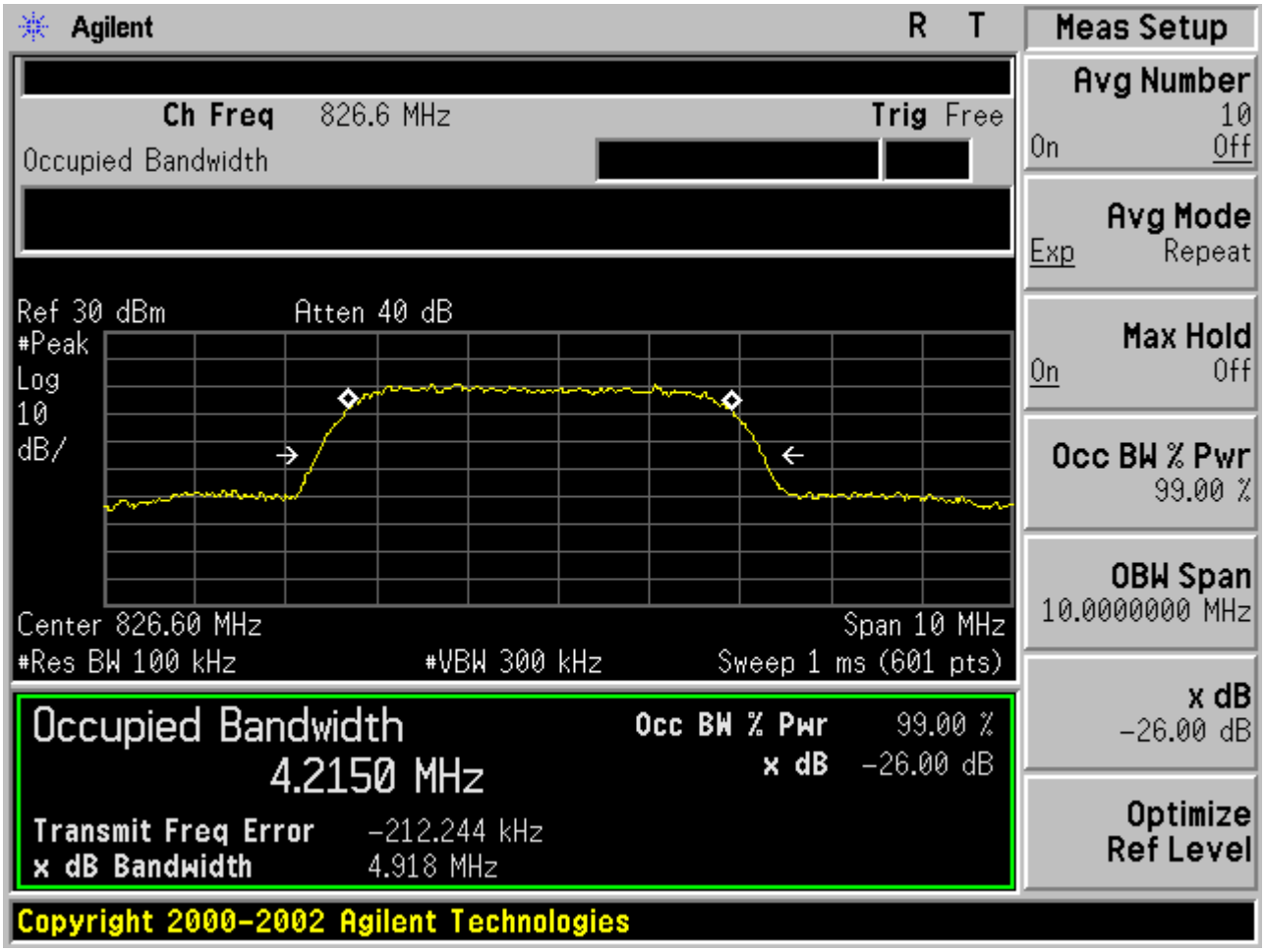
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
HSPA1900	HSPA	LCH	4.2078	4.885	PASS
		MCH	4.2468	4.914	PASS
		HCH	4.226	4.944	PASS

For WCDMA

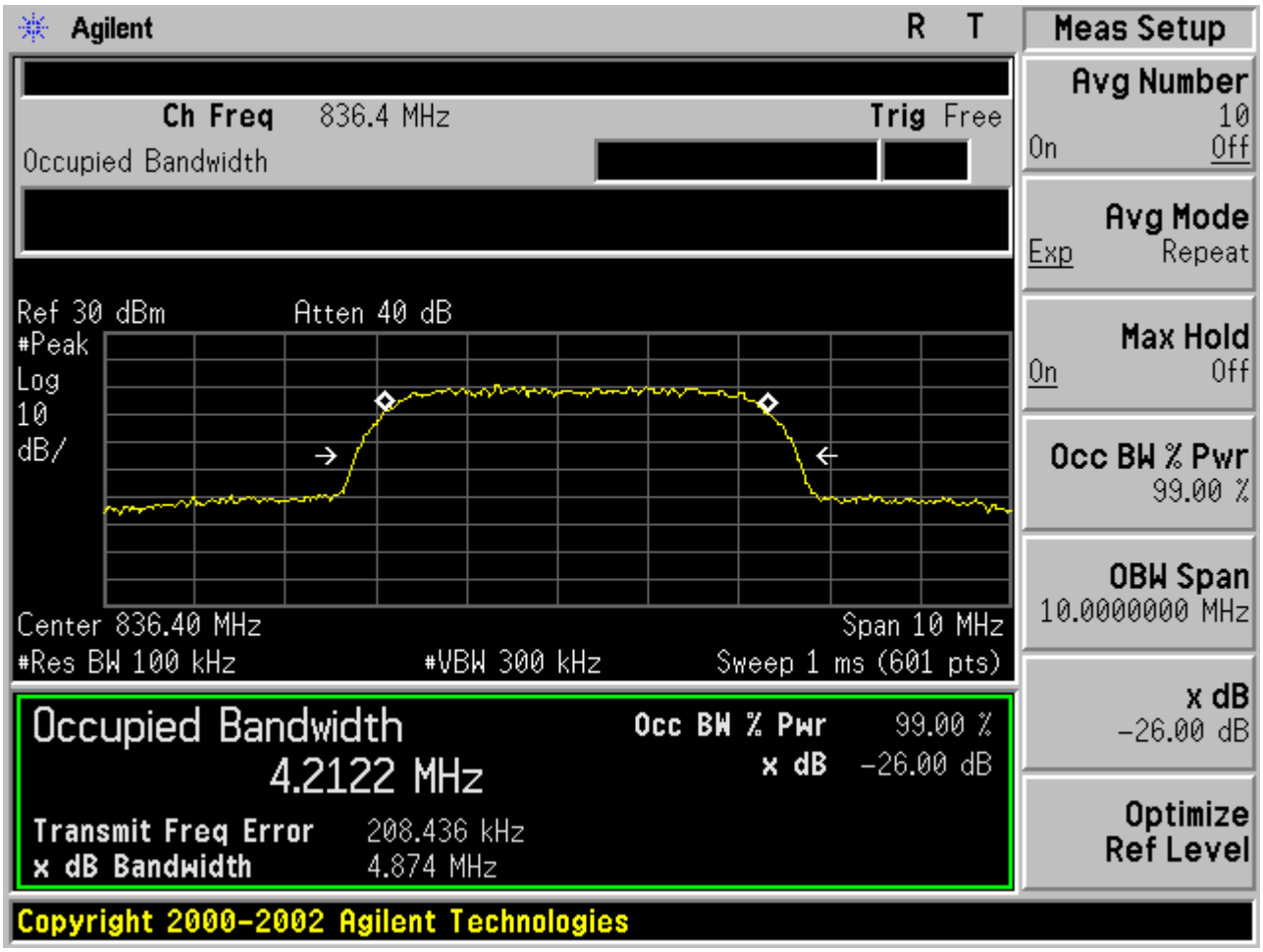
Test Band=HSPA 850

Test Mode=HSPA

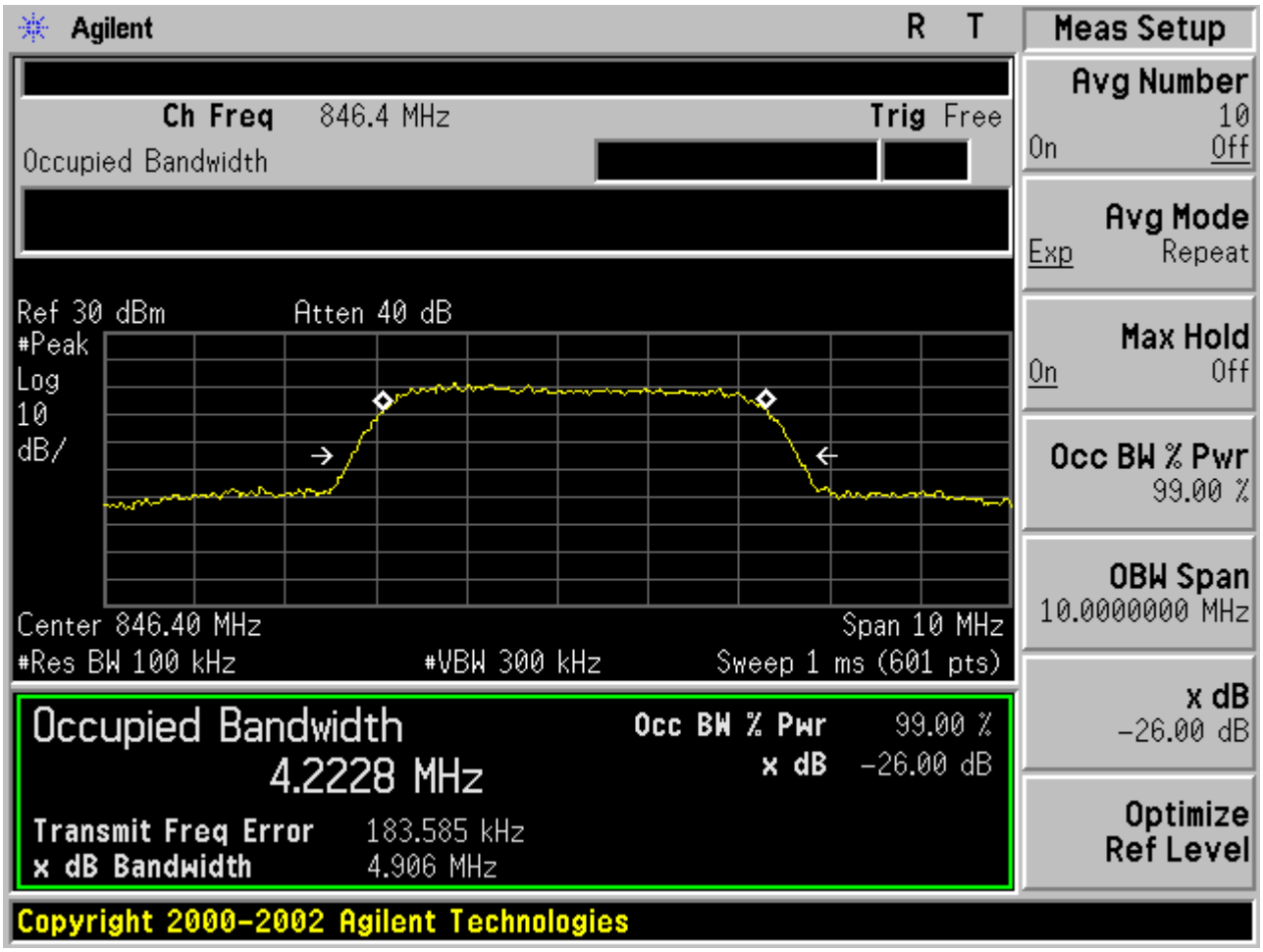
Test Channel=LCH



Test Channel=MCH



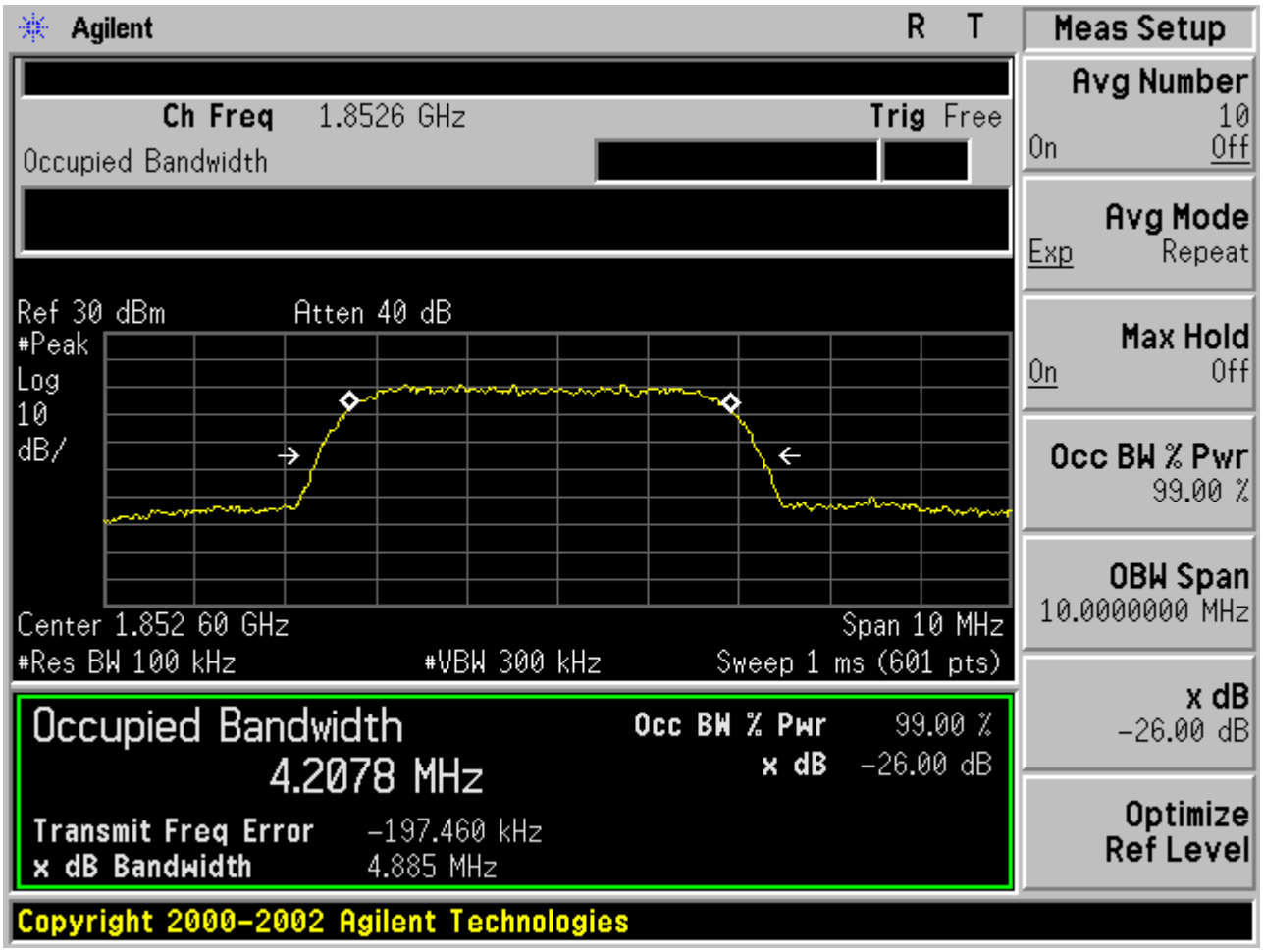
Test Channel=HCH



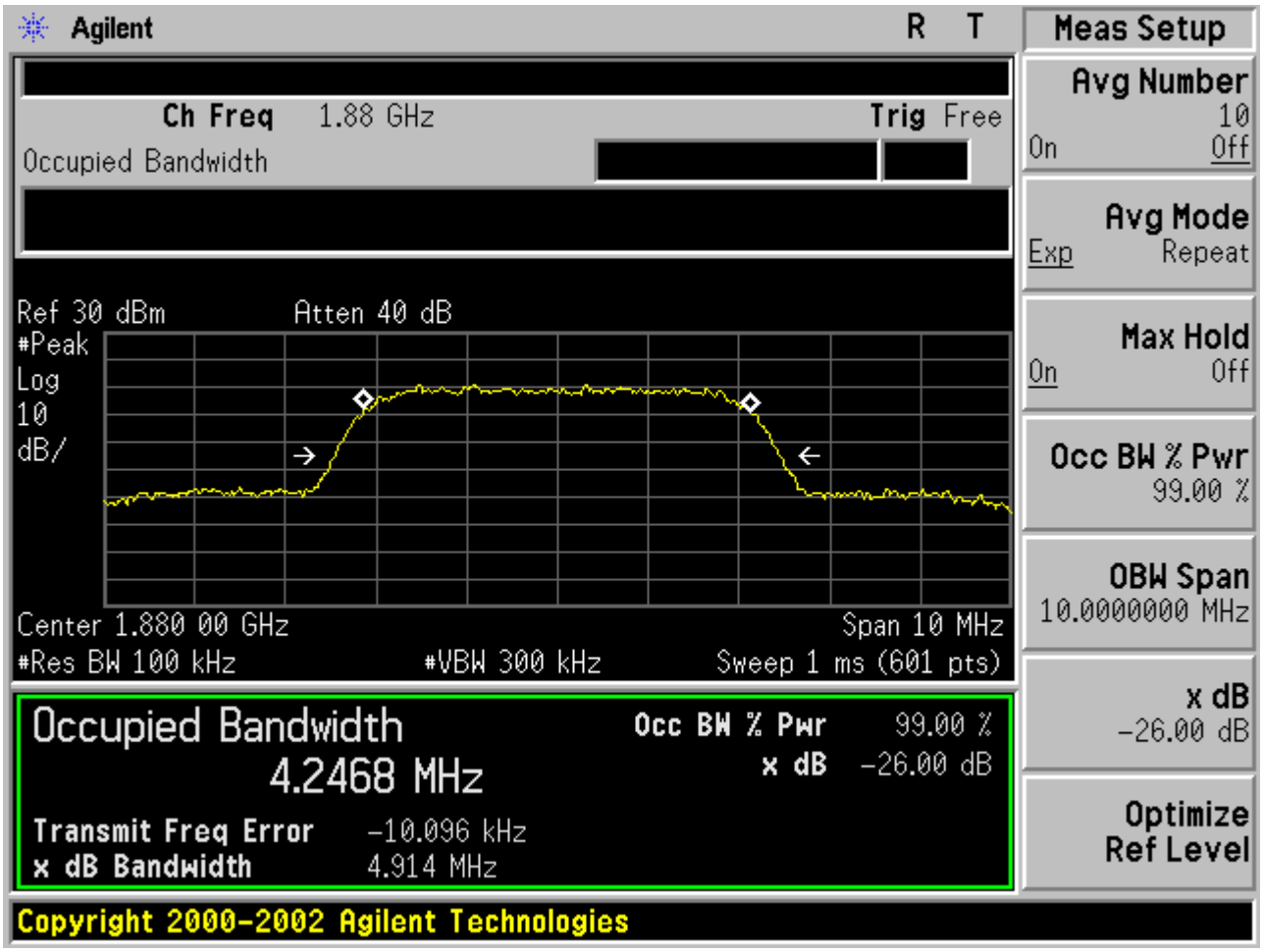
Test Band=HSPA 1900

Test Mode=HSPA

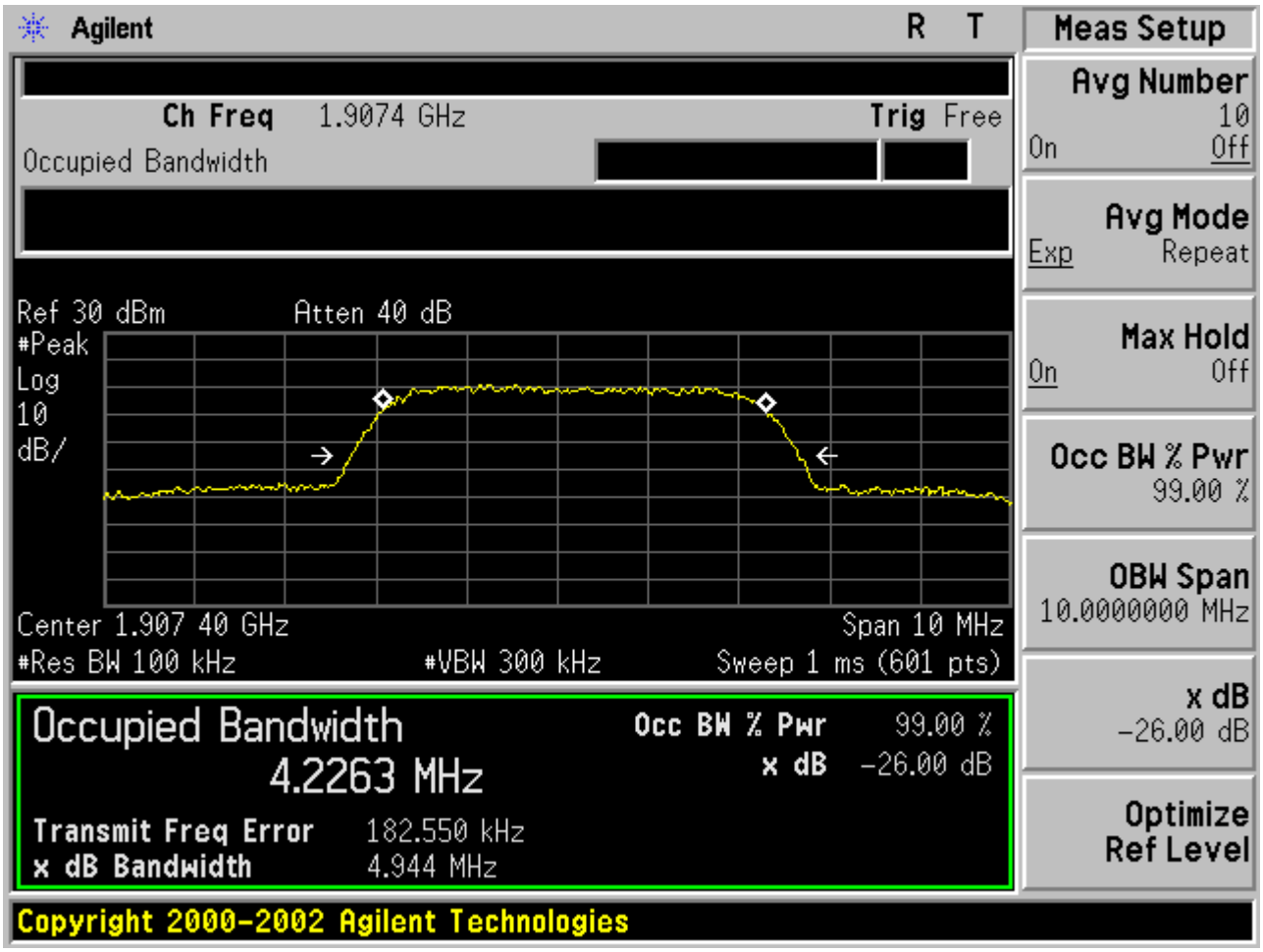
Test Channel=LCH



Test Channel=MCH



Test Channel=HCH



8. BAND EDGE

8.1 MEASUREMENT METHOD

1. All out of band emissions are measured with an analyzer spectrum connected to the antenna terminal of the EUT while the EUT at its maximum duty cycle, at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration
2. The test set up and general procedure is similar to conducted peak output power test. Only different for setting the measurement configuration of the measuring instrument of Spectrum Analyzer.
3. Start and stop frequency were set such that the band edge would be placed in the center of the plot.
4. Span was set large enough so as to capture all out of band emissions near the band edge.
5. RBW>1% of the emission bandwidth, VBW >=3 x RBW, Detector=RMS, Number of points>=2 x Span/RBW, Trace mode=max hold, Sweep time=auto couple, and the trace was allowed to stabilize

8.2 PROVISIONS APPLICABLE

As Specified in FCC rules of 22.917(a) and 24.238(a) and KDB 971168 V02r02

8.3 MEASUREMENT RESULT

APPENDIX B: BAND EDGES COMPLIANCE

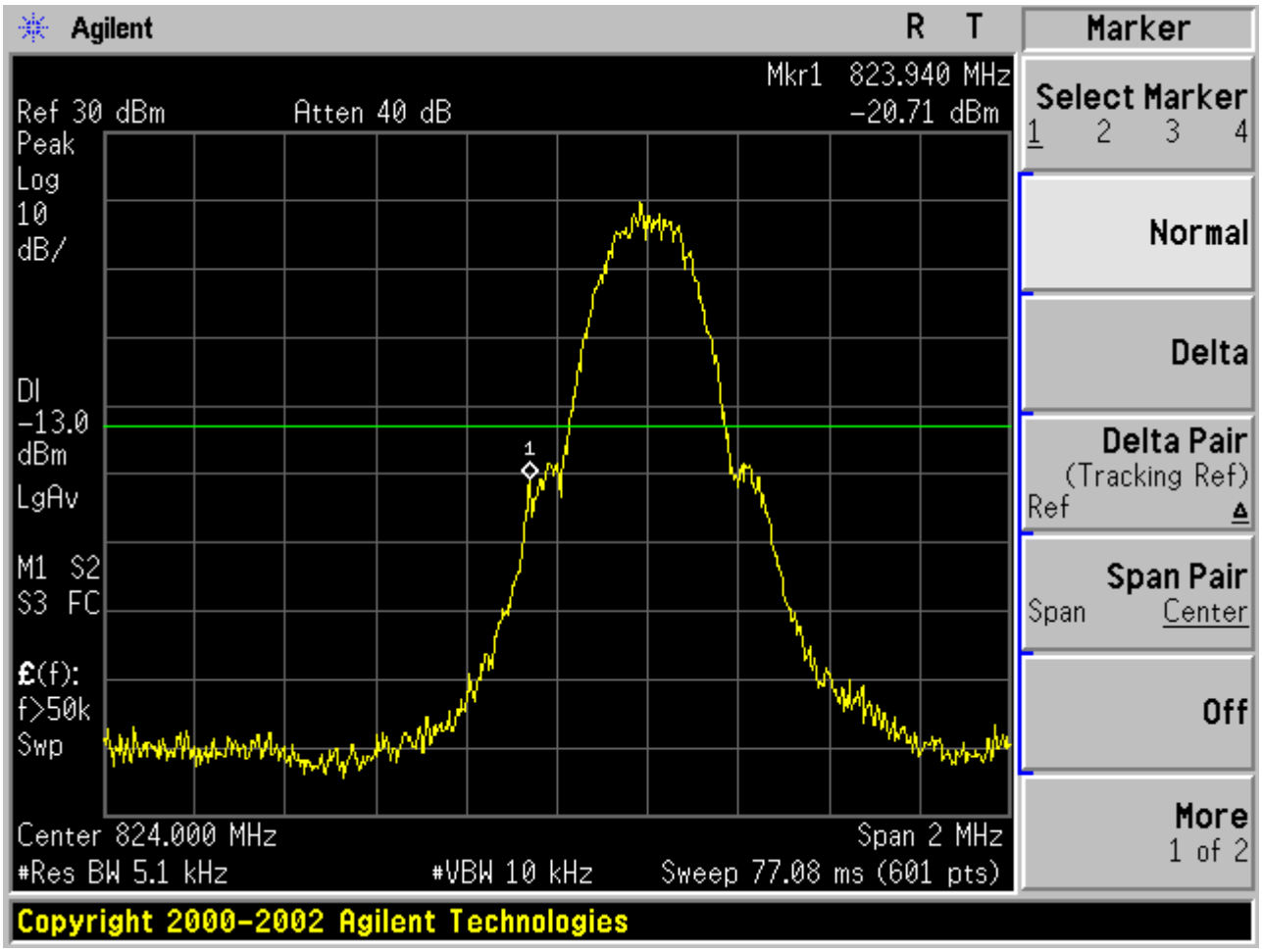
Test Results

For GPRS

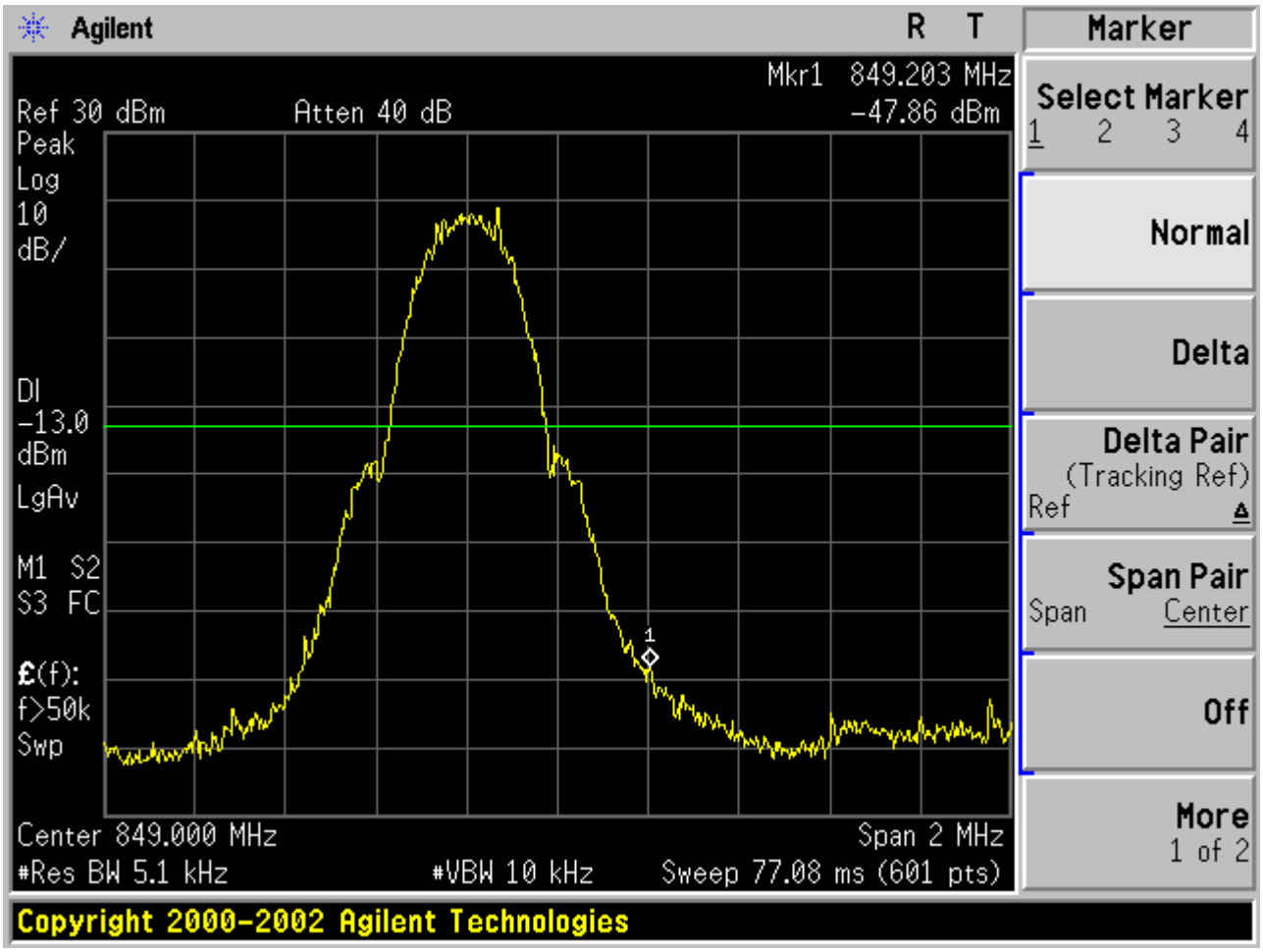
Test Band=GPRS 850

Test Mode=GPRS

Test Channel=LCH



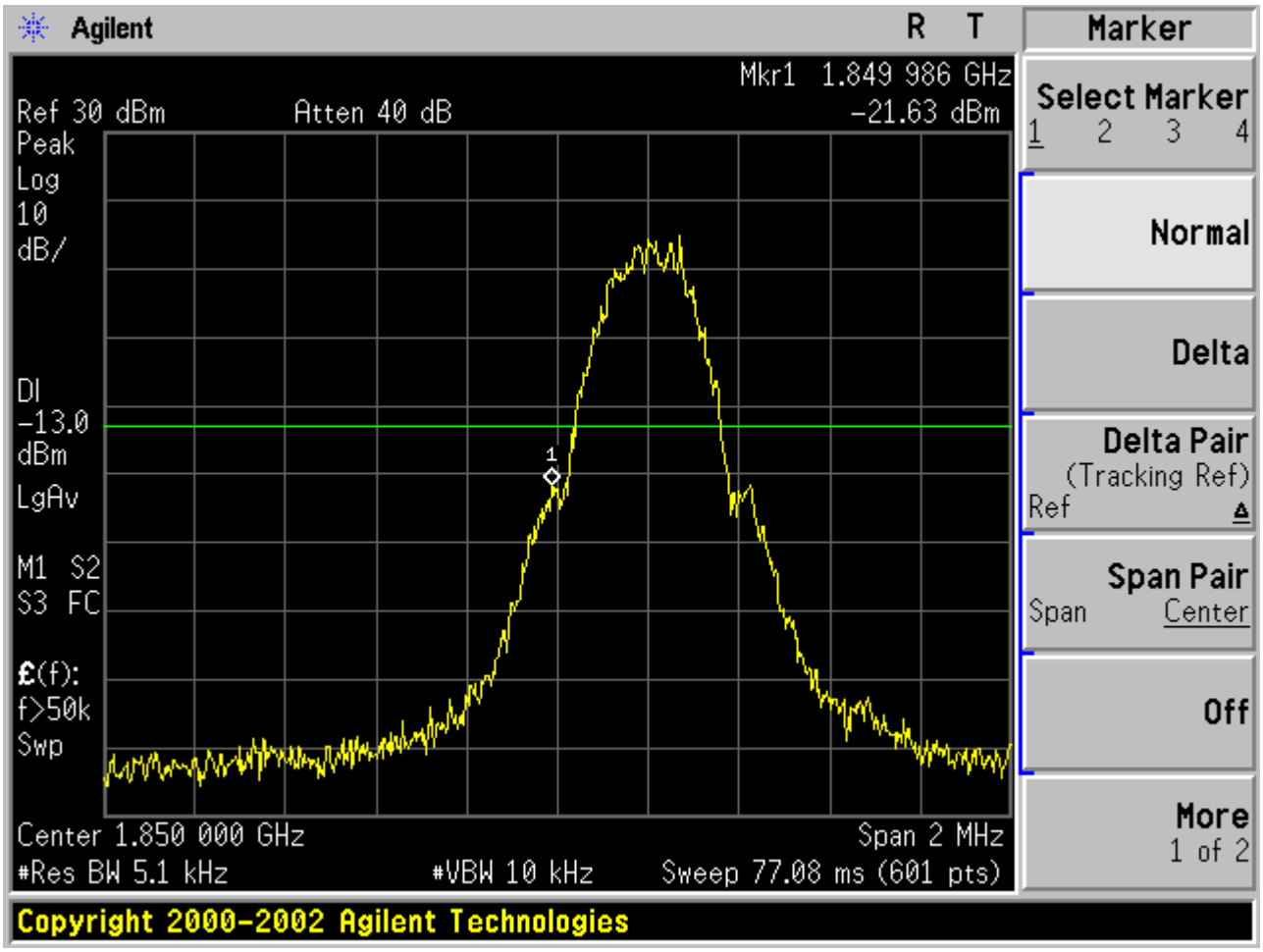
Test Channel=HCH



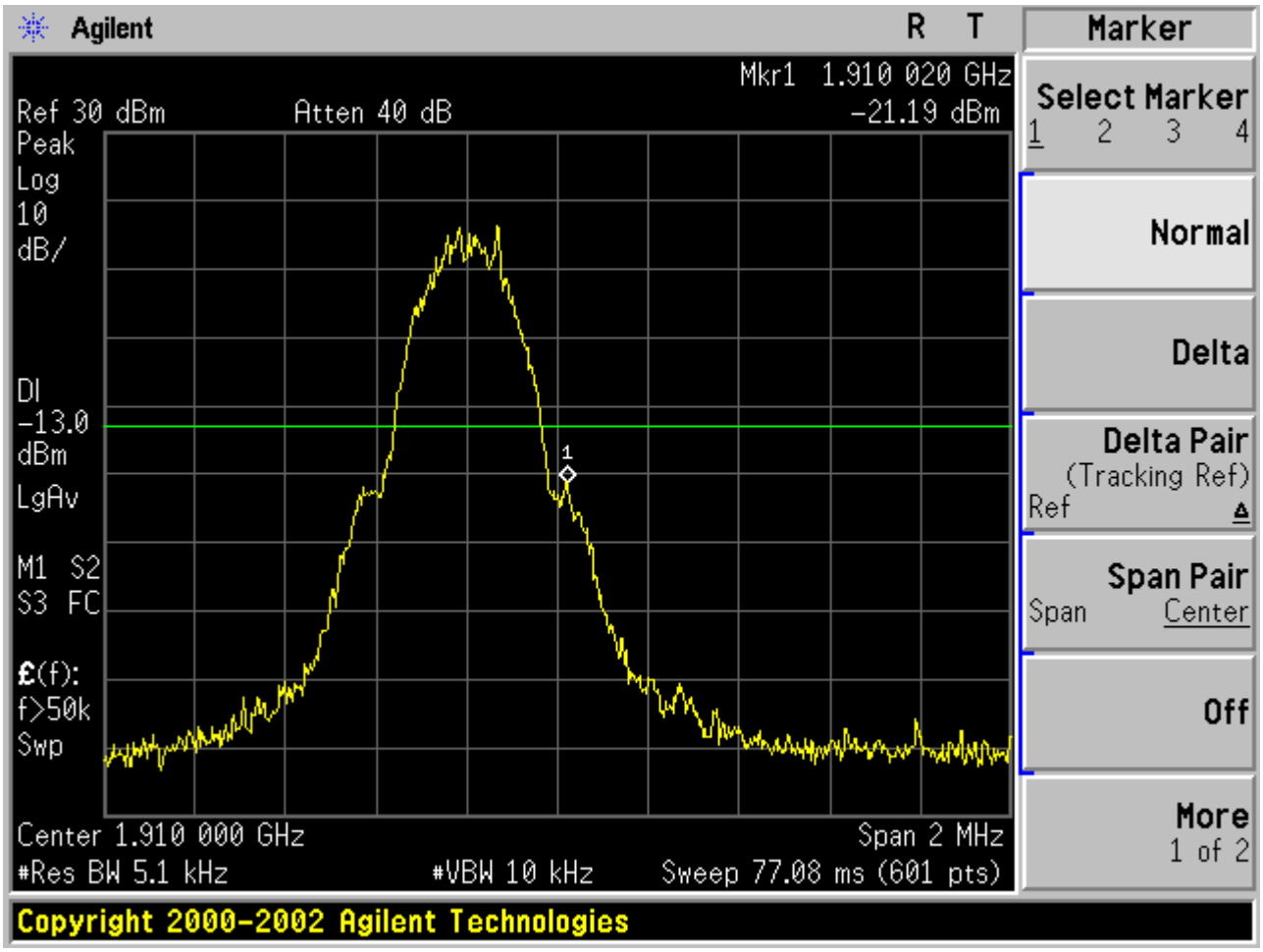
Test Band=GPRS1900

Test Mode=GPRS

Test Channel=LCH



Test Channel=HCH

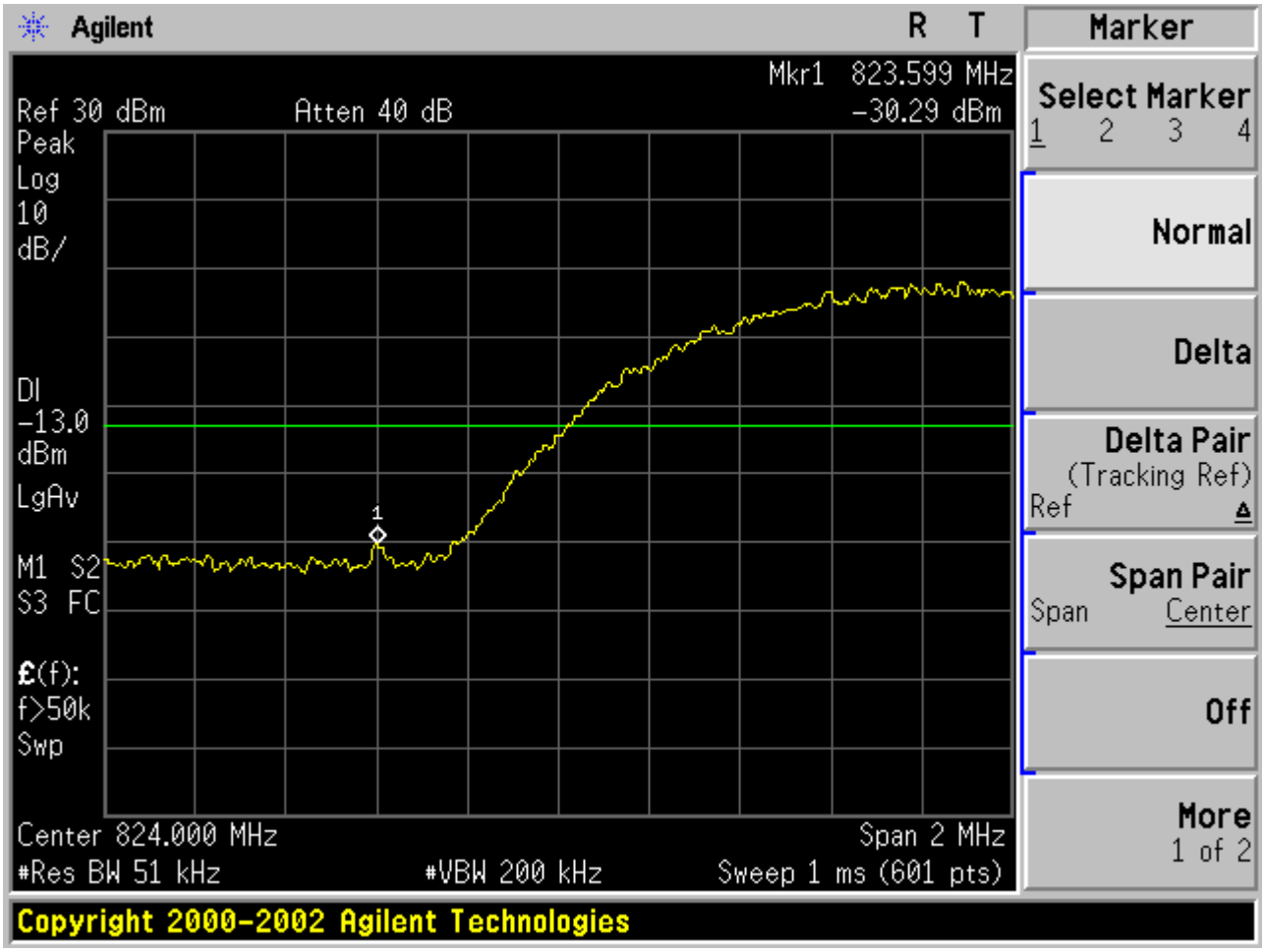


For HSPA

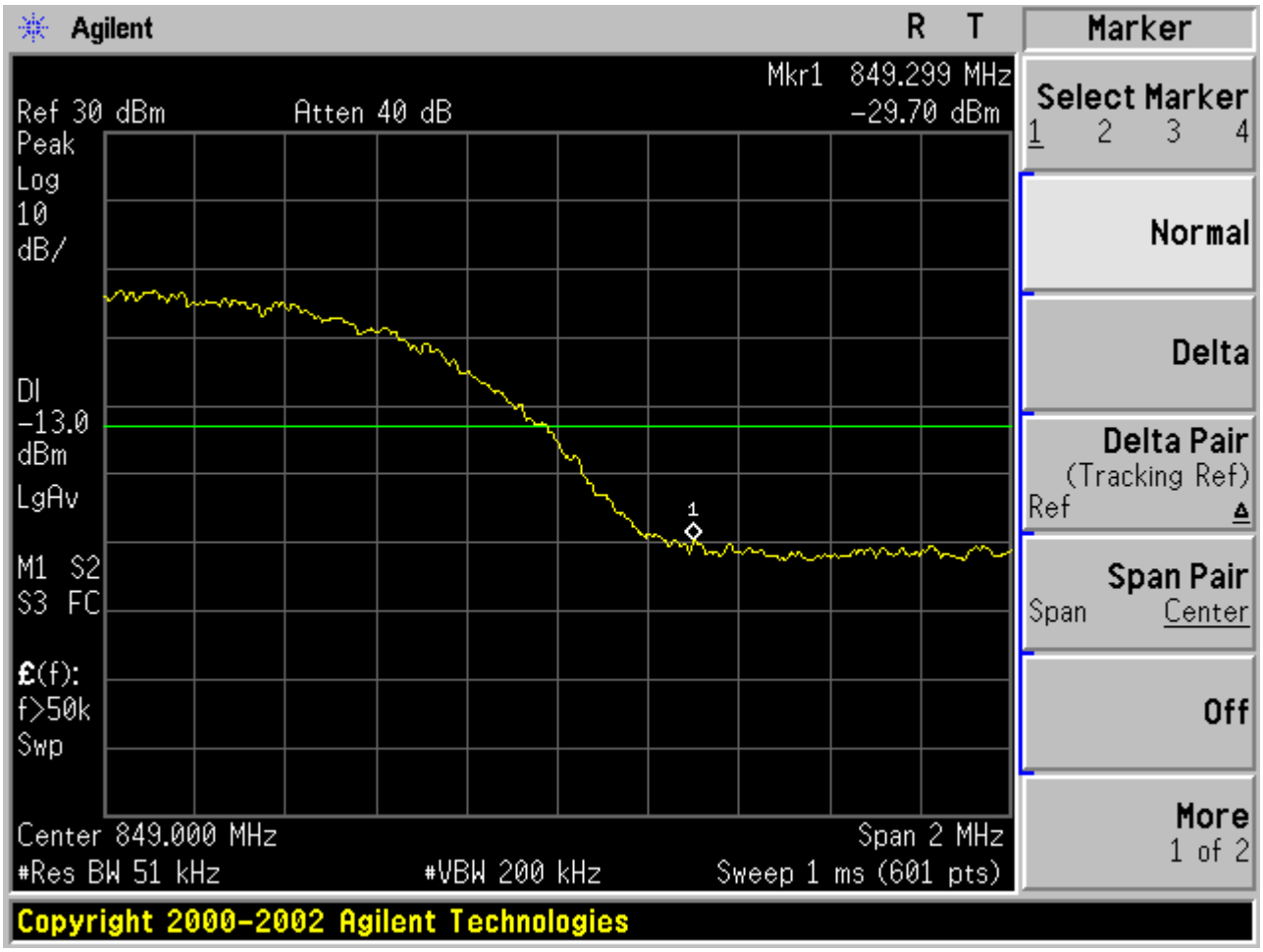
Test Band=HSPA 850

Test Mode=HSPA

Test Channel=LCH



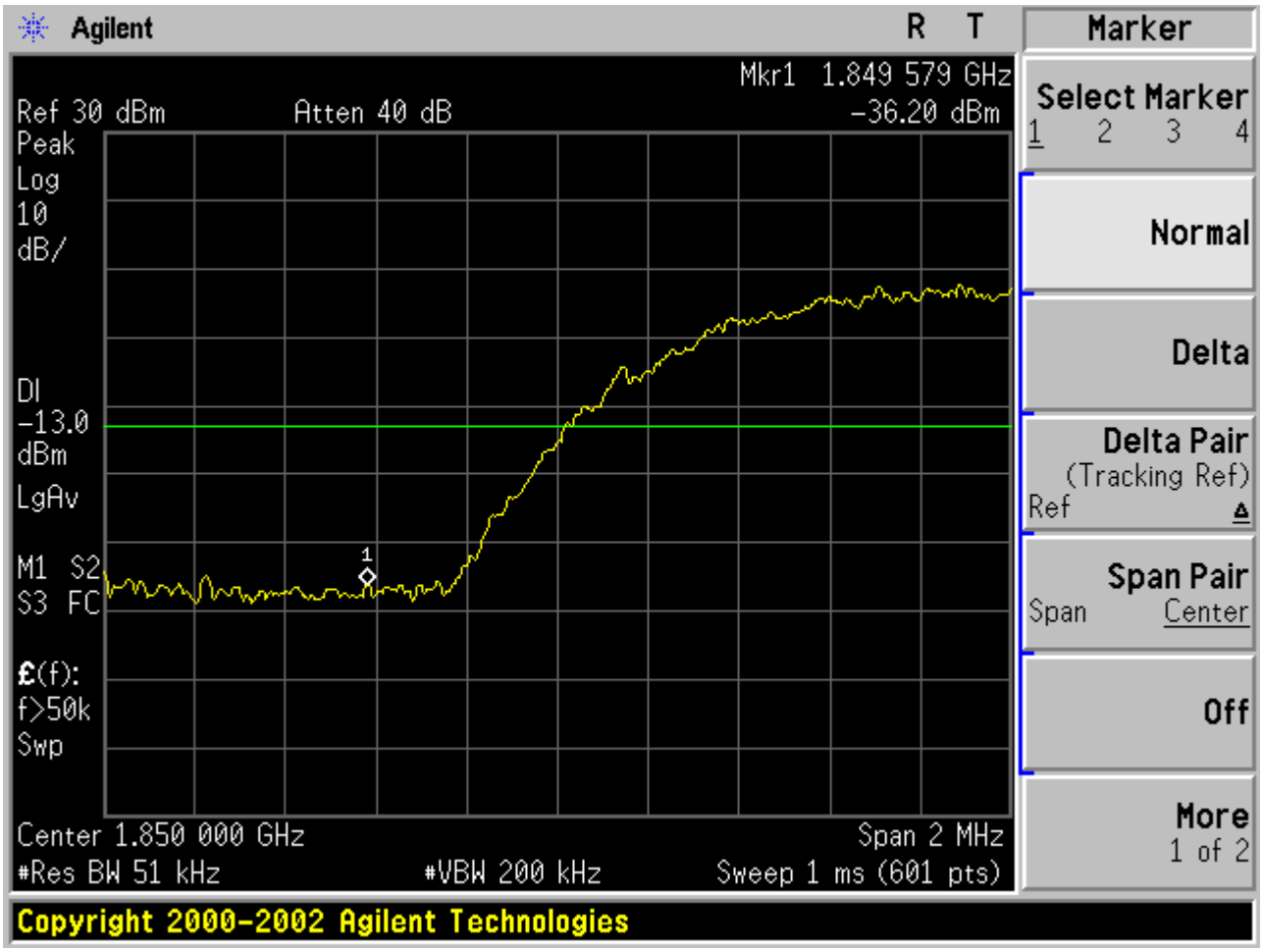
Test Channel=HCH



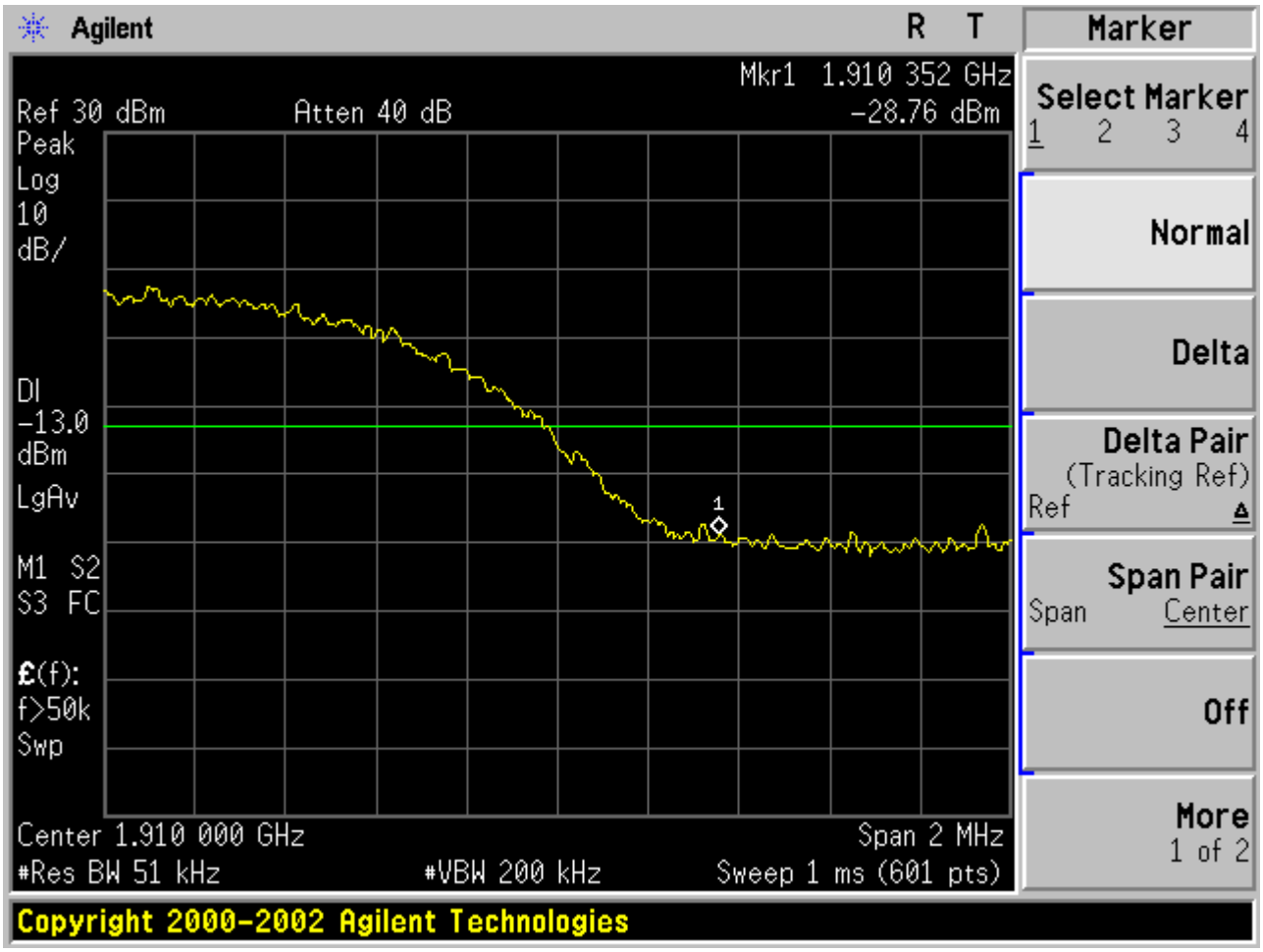
Test Band=HSPA1900

Test Mode=UMTS

Test Channel=LCH



Test Channel=HCH



9. SPURIOUS EMISSION

9.1 CONDUCTED SPURIOUS EMISSION

9.1.1 MEASUREMENT METHOD

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. The level of the carrier and the various conducted spurious and harmonic frequency is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10^{th} harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the approximate frequencies. All data rates were investigated to determine the worst case configuration.

2. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of GPRS 1900 band, this equates to a frequency range of 30 MHz to 20GHz, data taken from 30 MHz to 20 GHz. For GPRS 850, data taken from 30 MHz to 9 GHz.

3. Determine EUT transmit frequencies: the following typical channels were chosen to conducted emissions testing.

Typical Channels for testing of GPRS 850	
Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

Typical Channels for testing of GPRS 1900	
Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

Typical Channels for testing of UMTS band II	
Channel	Frequency (MHz)
9663	1852.6
9800	1880
9937	1907.4

Typical Channels for testing of UMTS band V	
Channel	Frequency (MHz)
4358	826.6
4407	836.4
4457	846.4

9.1.2 PROVISIONS APPLICABLE

On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

9.1.3 MEASUREMENT RESULT

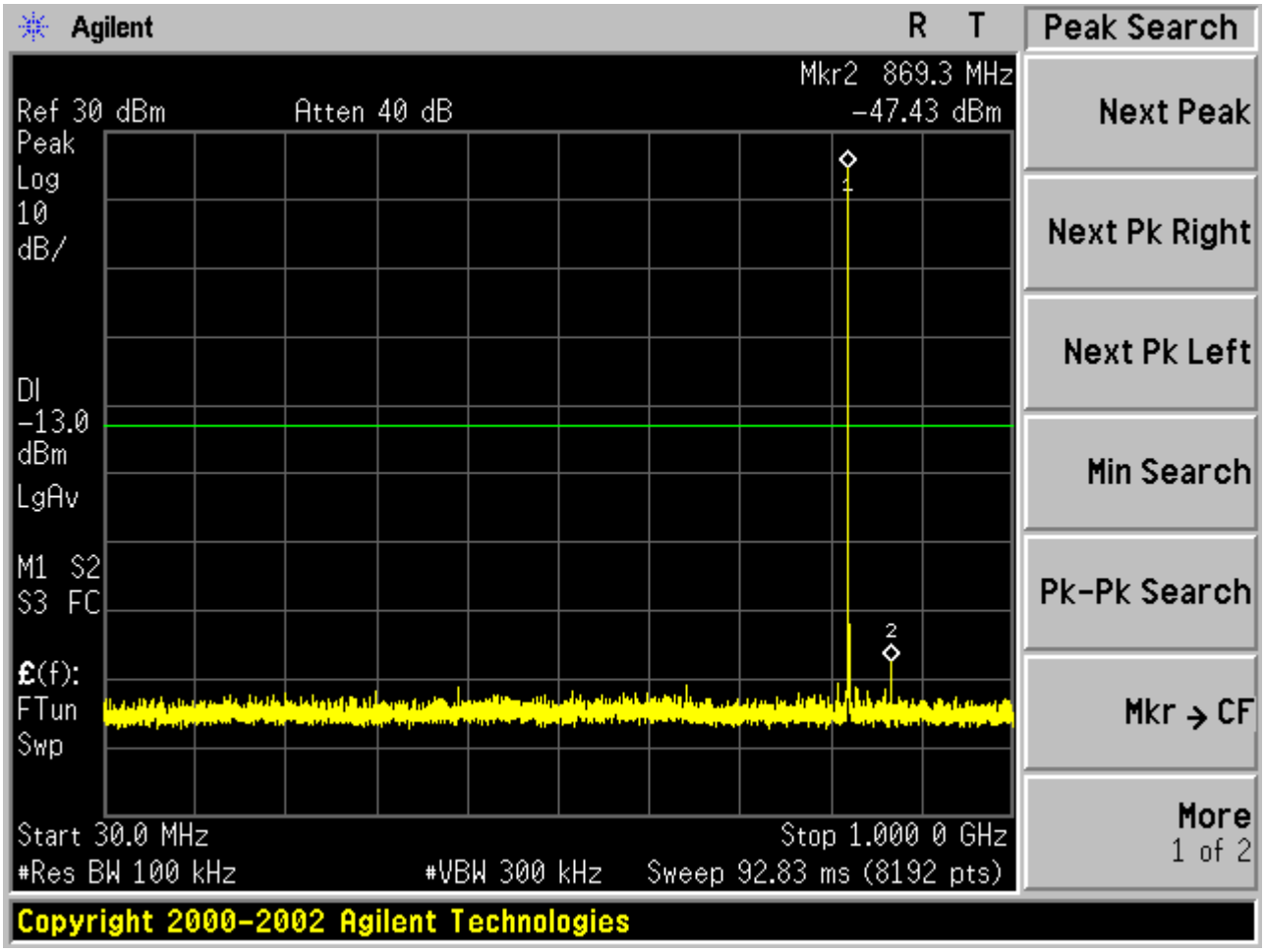
APPENDIX C: SPURIOUS EMISSION AT ANTENNA TERMINAL

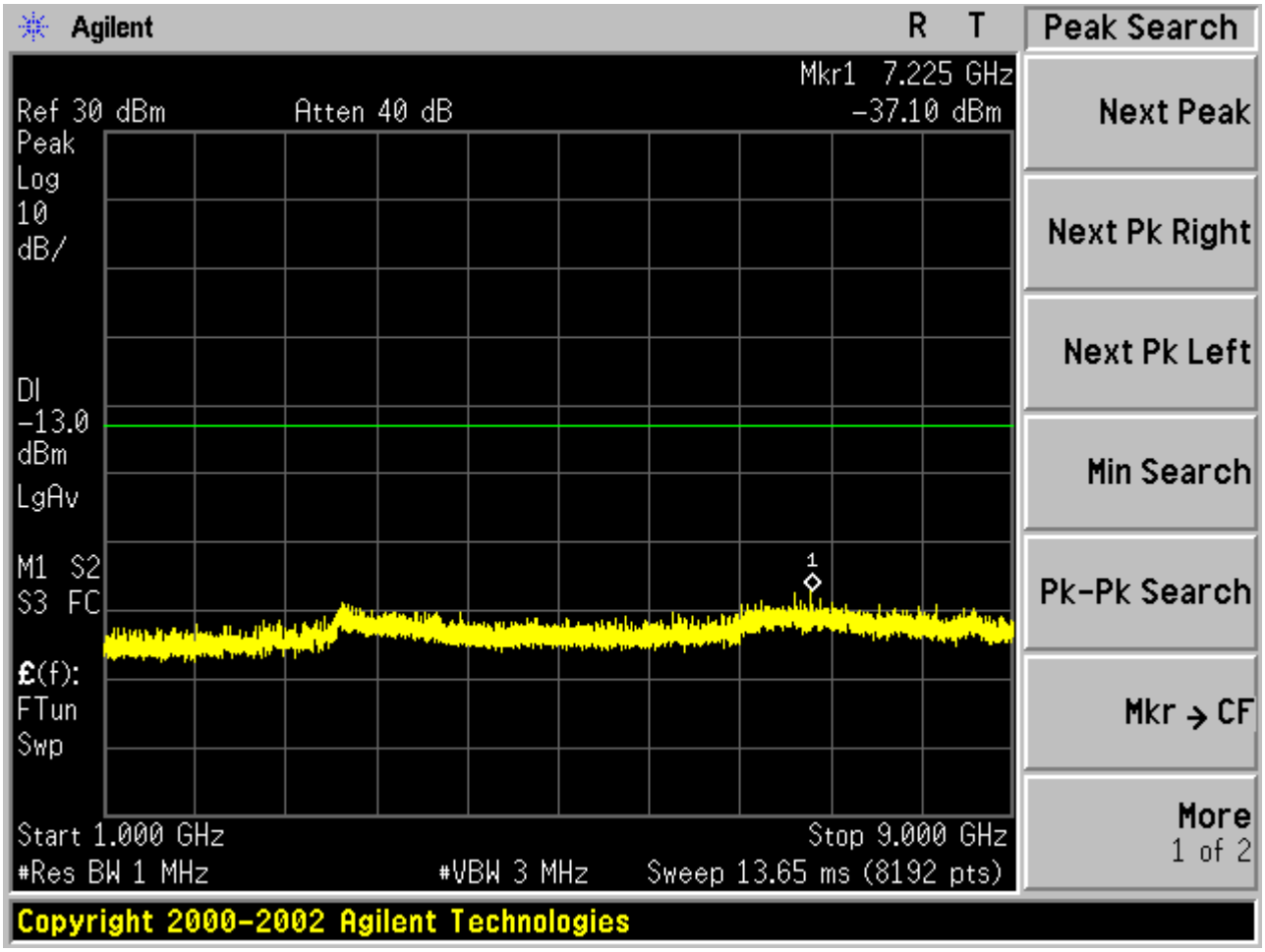
Test Results

Test Band=GPRS 850

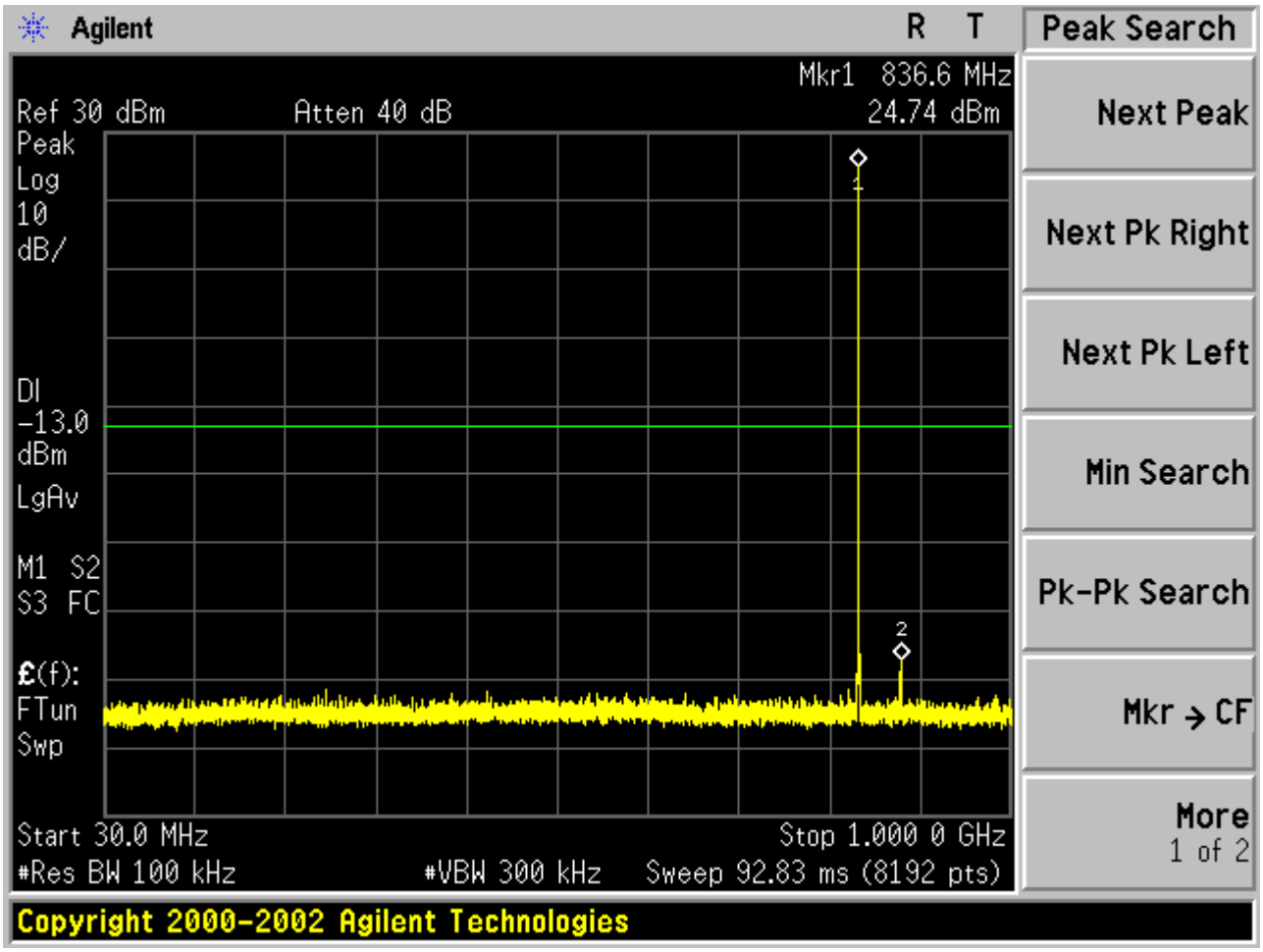
Test Mode=GPRS

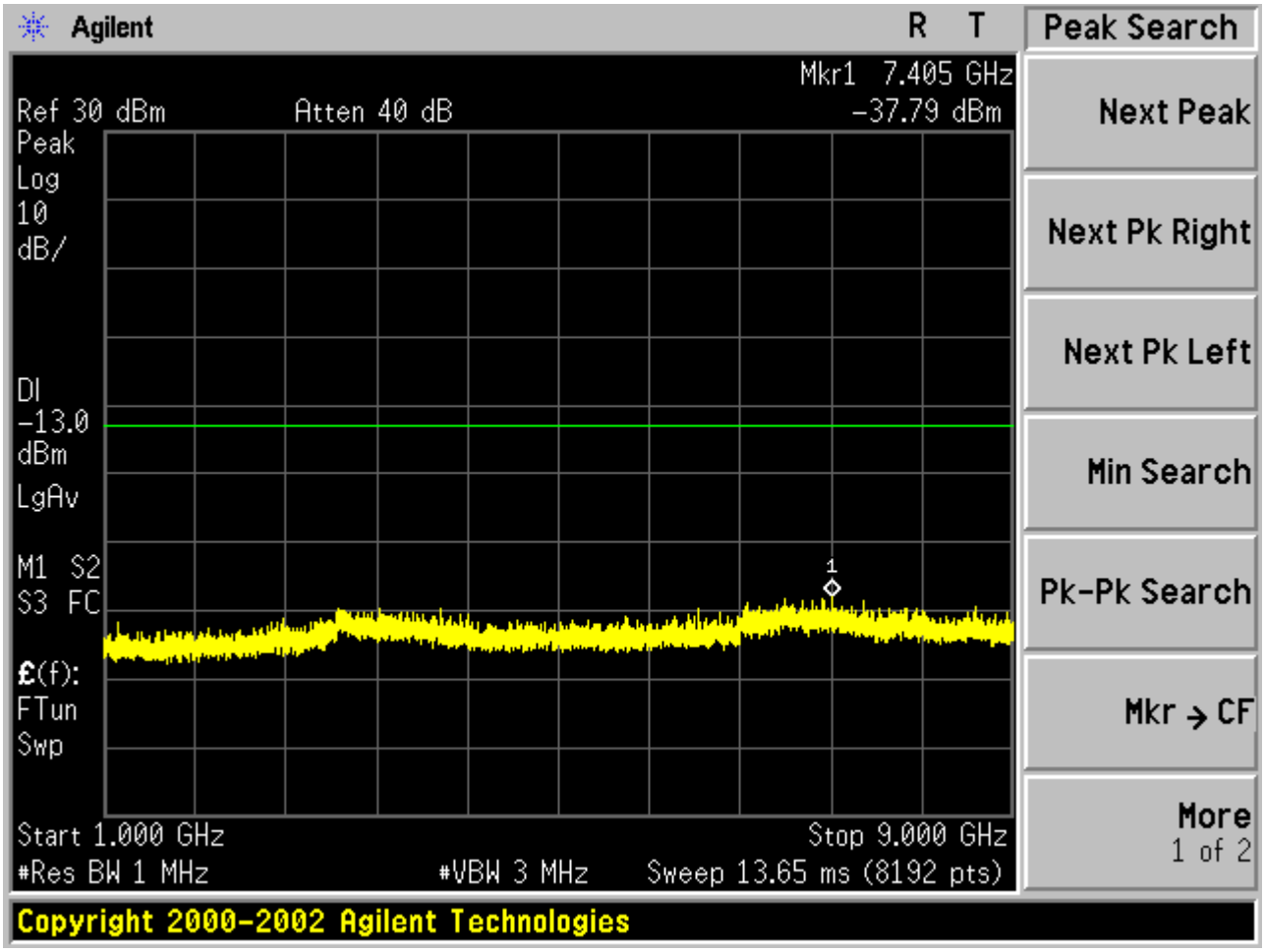
Test Channel=LCH


Agilent
R T
Peak Search
Mkr2 869.3 MHz
Ref 30 dBm
Atten 40 dB
-47.43 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 30.0 MHz
Stop 1.000 0 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 92.83 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

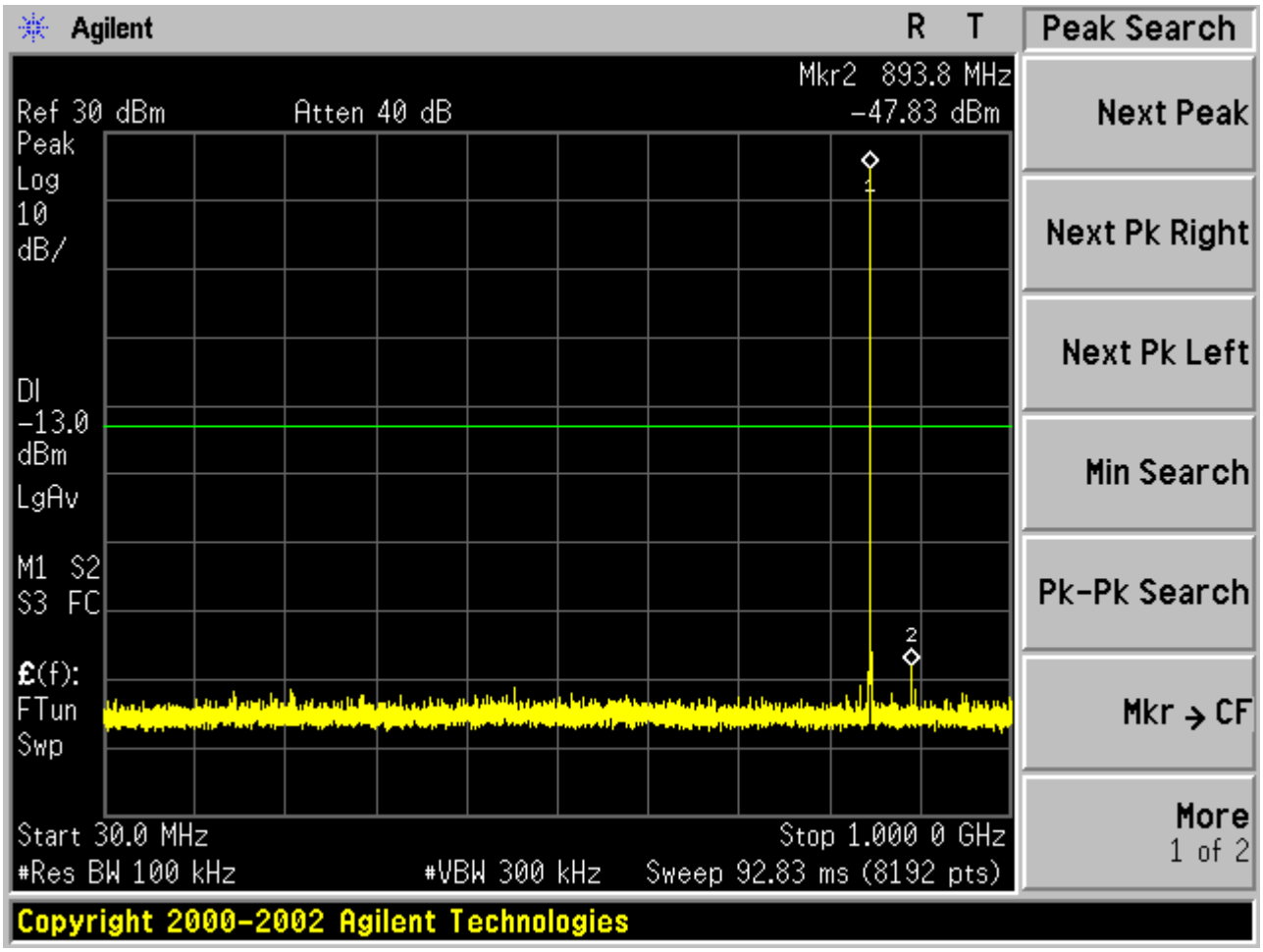

Agilent
R T
Peak Search
Mkr1 7.225 GHz
Ref 30 dBm
Atten 40 dB
-37.10 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
1
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

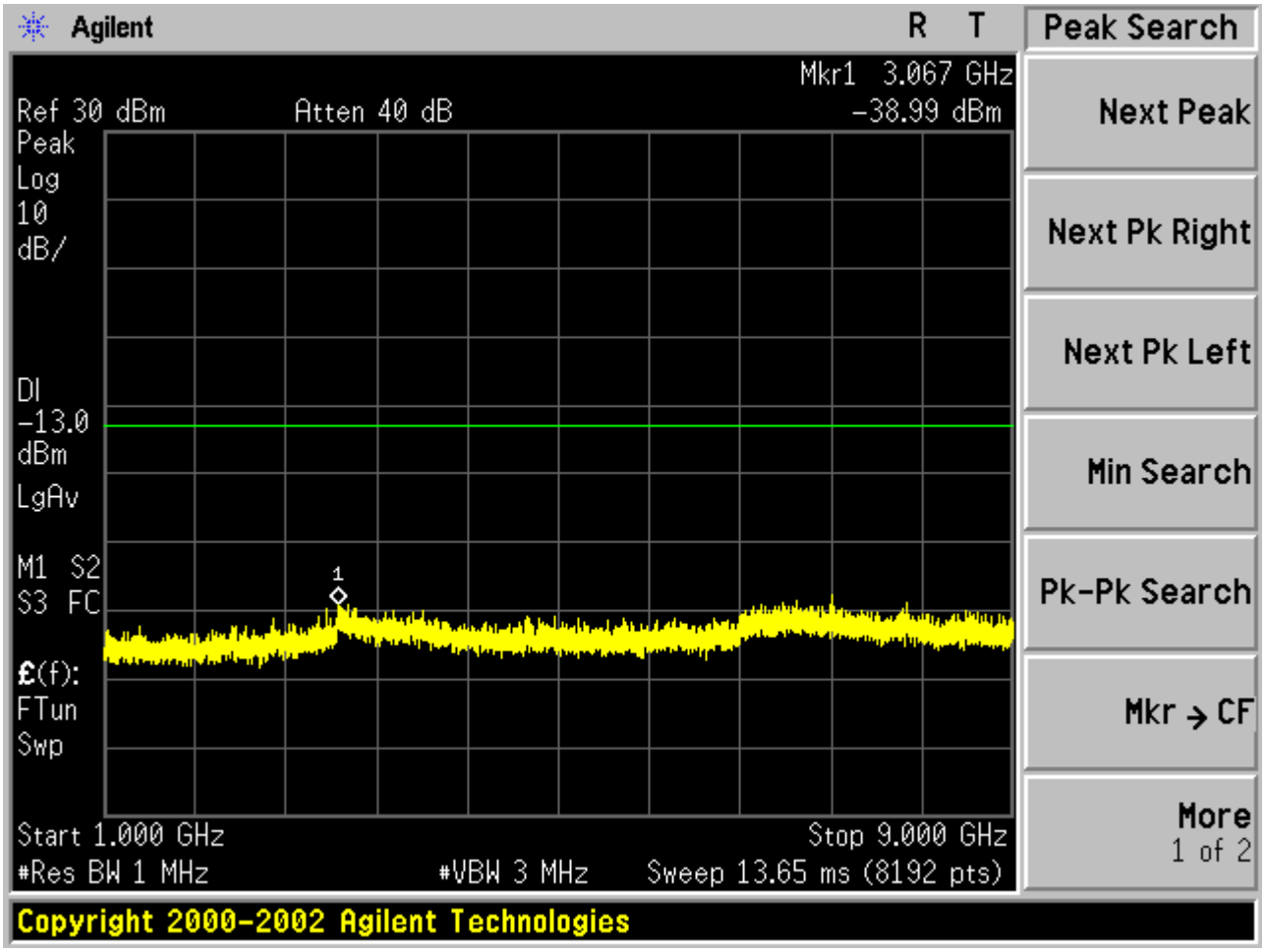
Test Channel=MCH




Agilent
R T
Peak Search
Mkr1 7.405 GHz
Ref 30 dBm
Atten 40 dB
-37.79 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
1
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=HCH

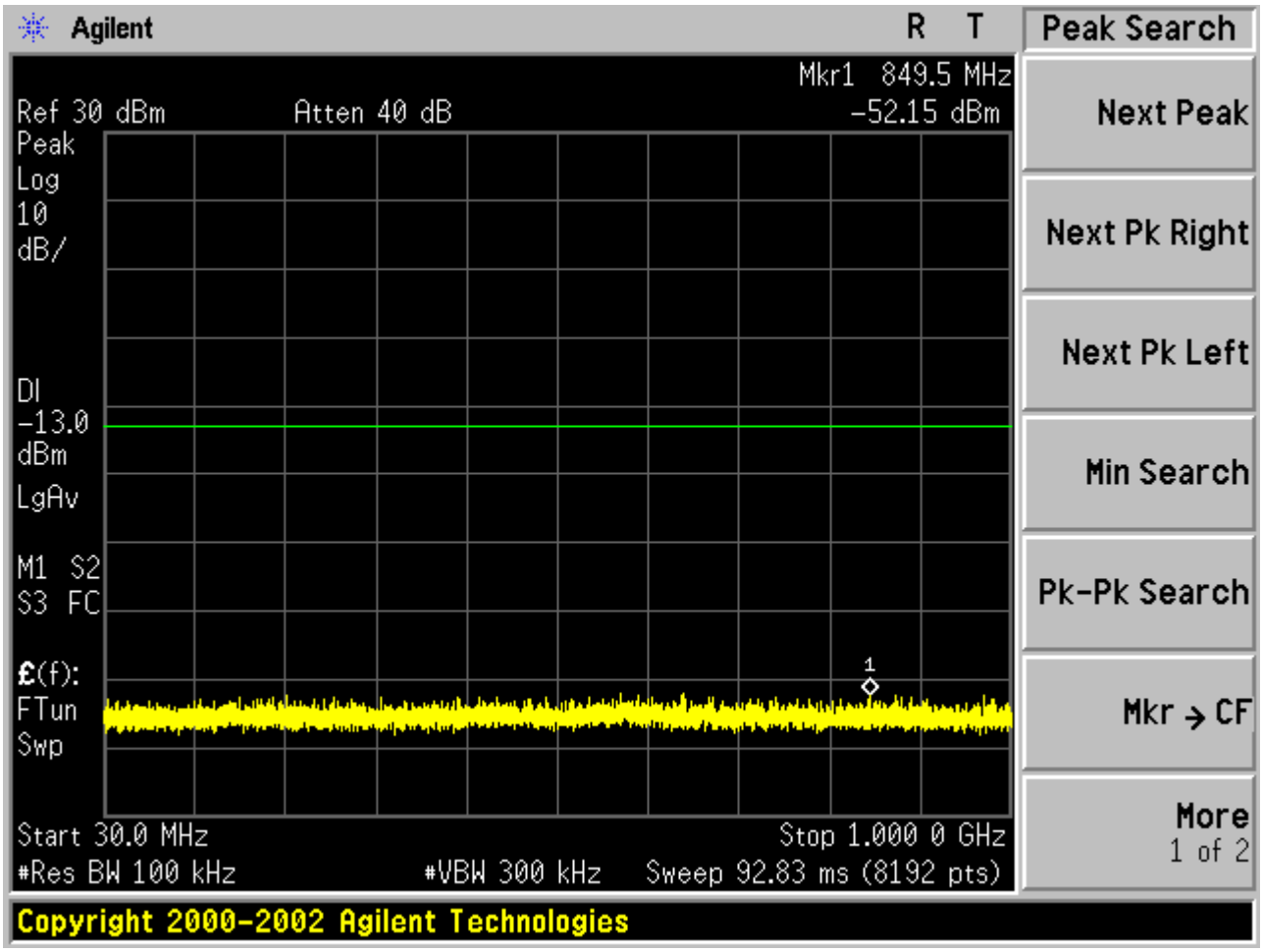


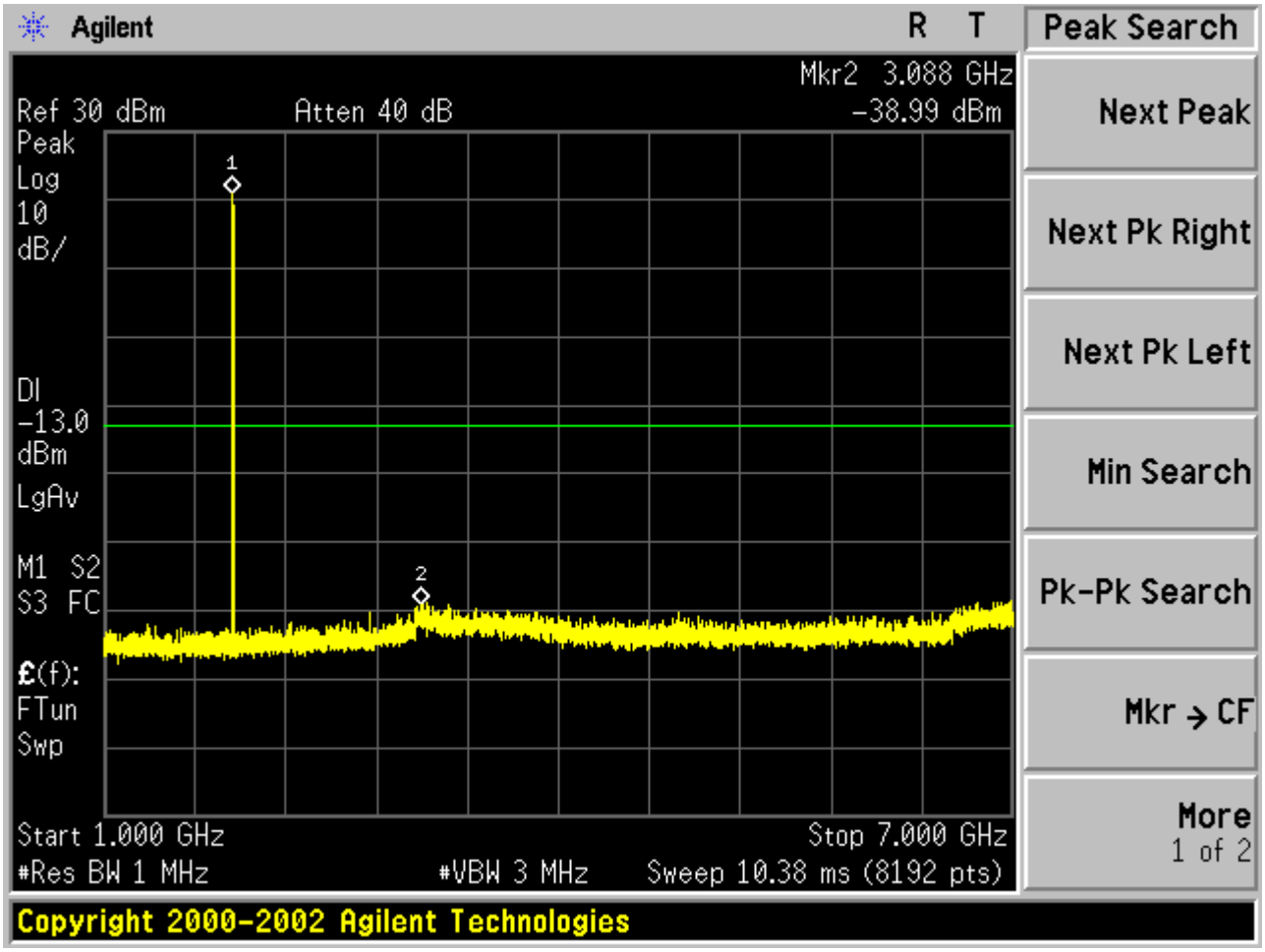

Agilent
R T
Peak Search
Mkr1 3.067 GHz
Ref 30 dBm
Atten 40 dB
-38.99 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

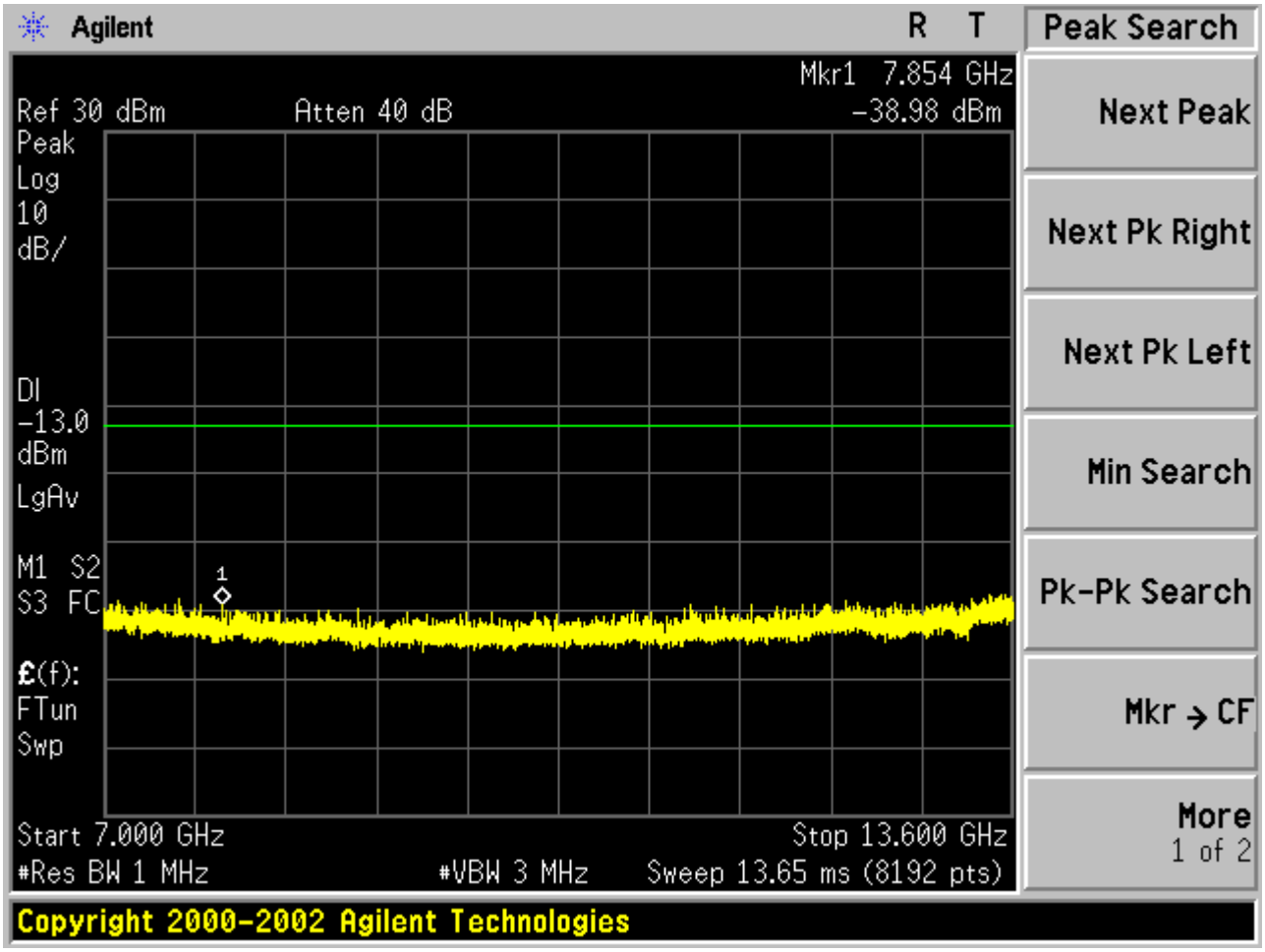
Test Band=GPRS 1900

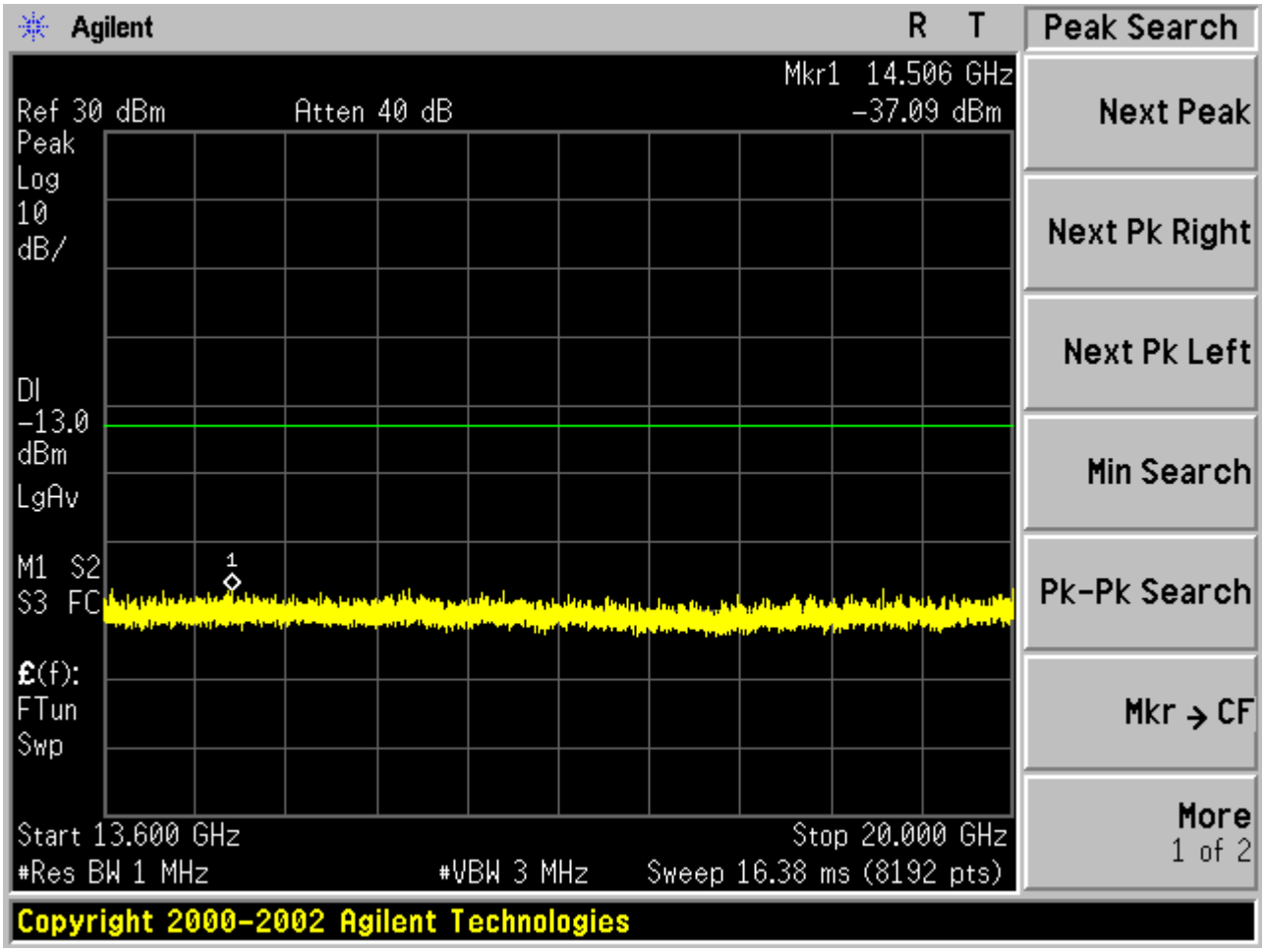
Test Mode=GPRS

Test Channel=LCH

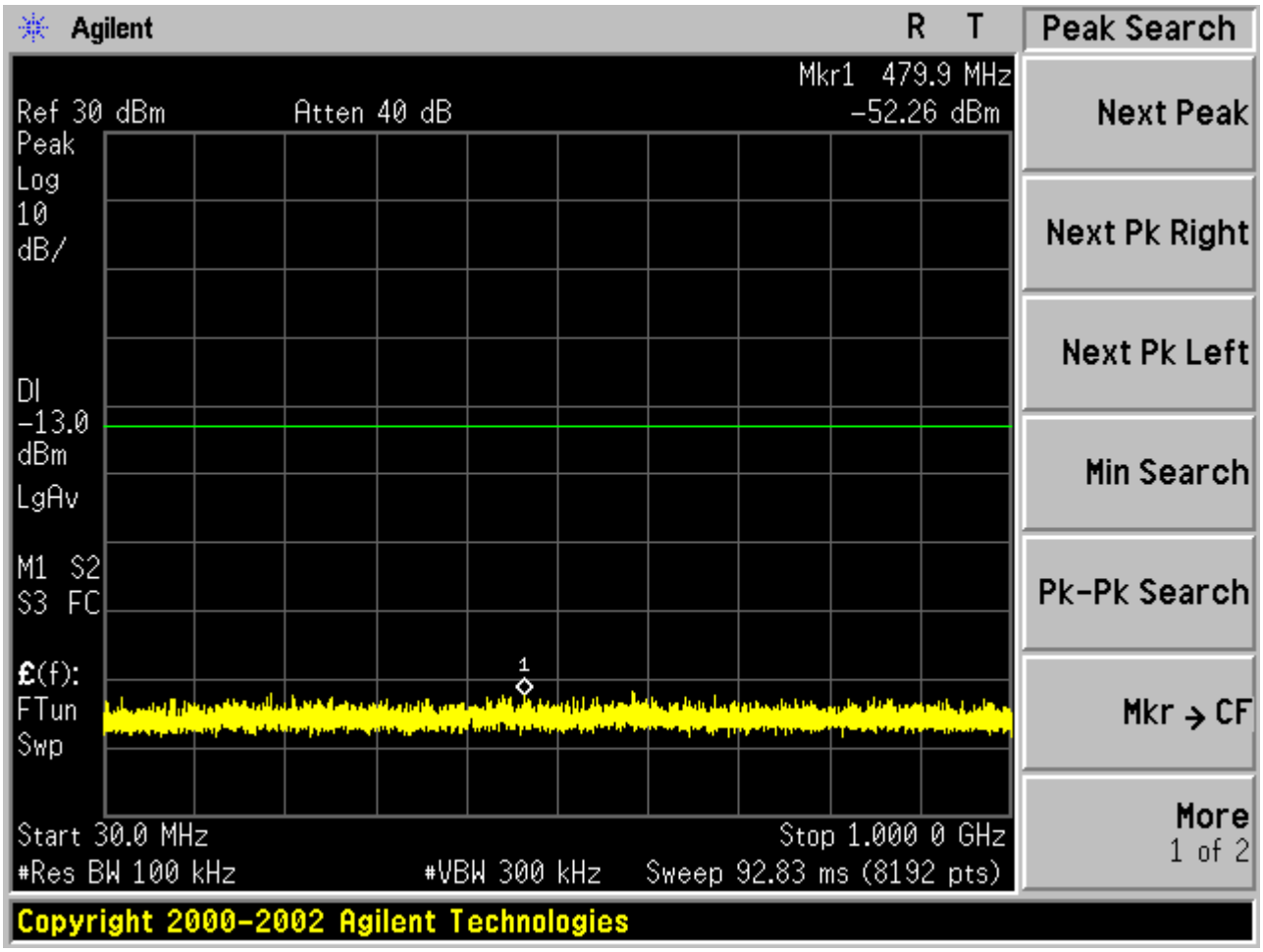


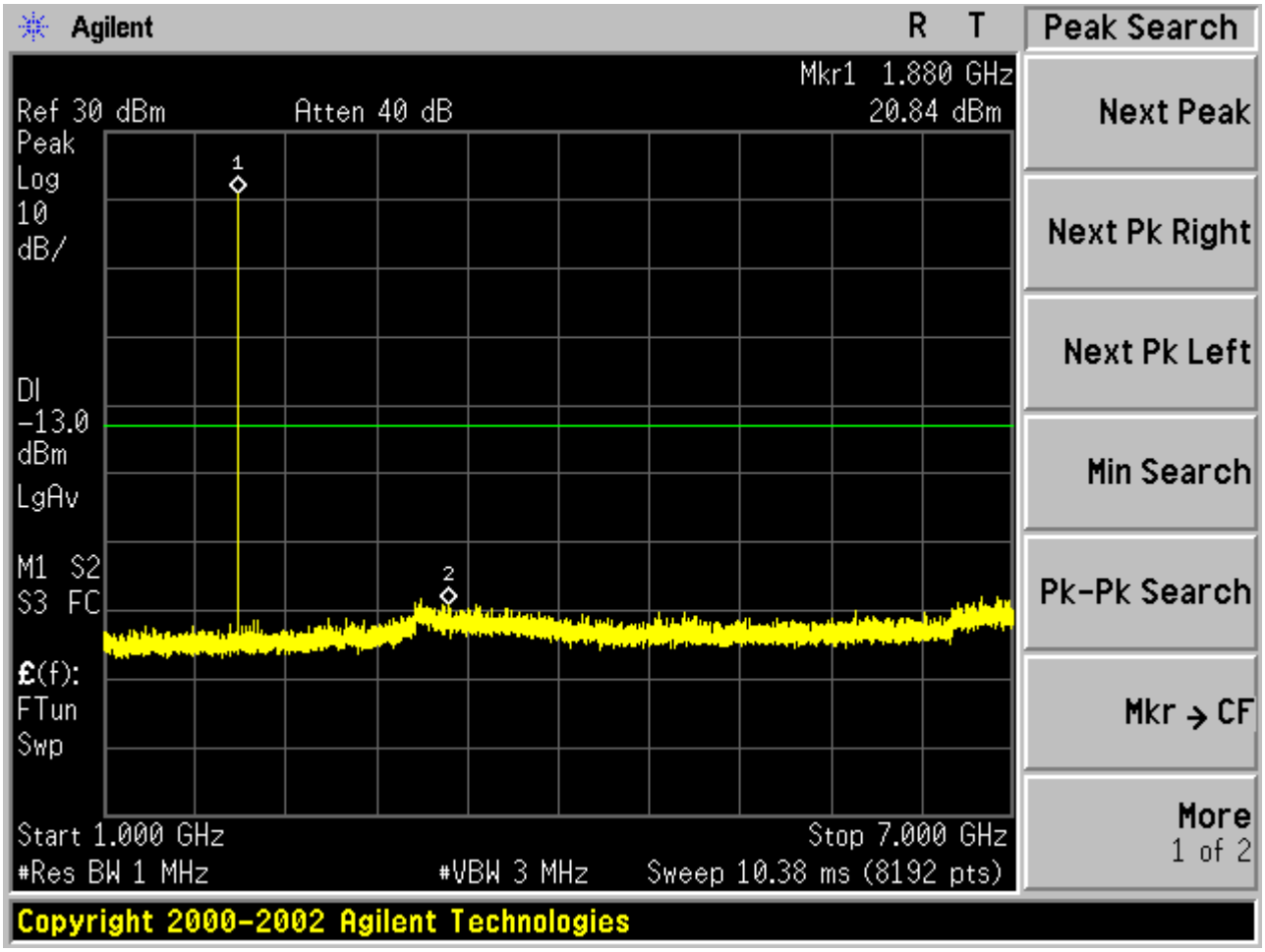

Agilent
R T
Peak Search
Mkr2 3.088 GHz
Ref 30 dBm
Atten 40 dB
-38.99 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

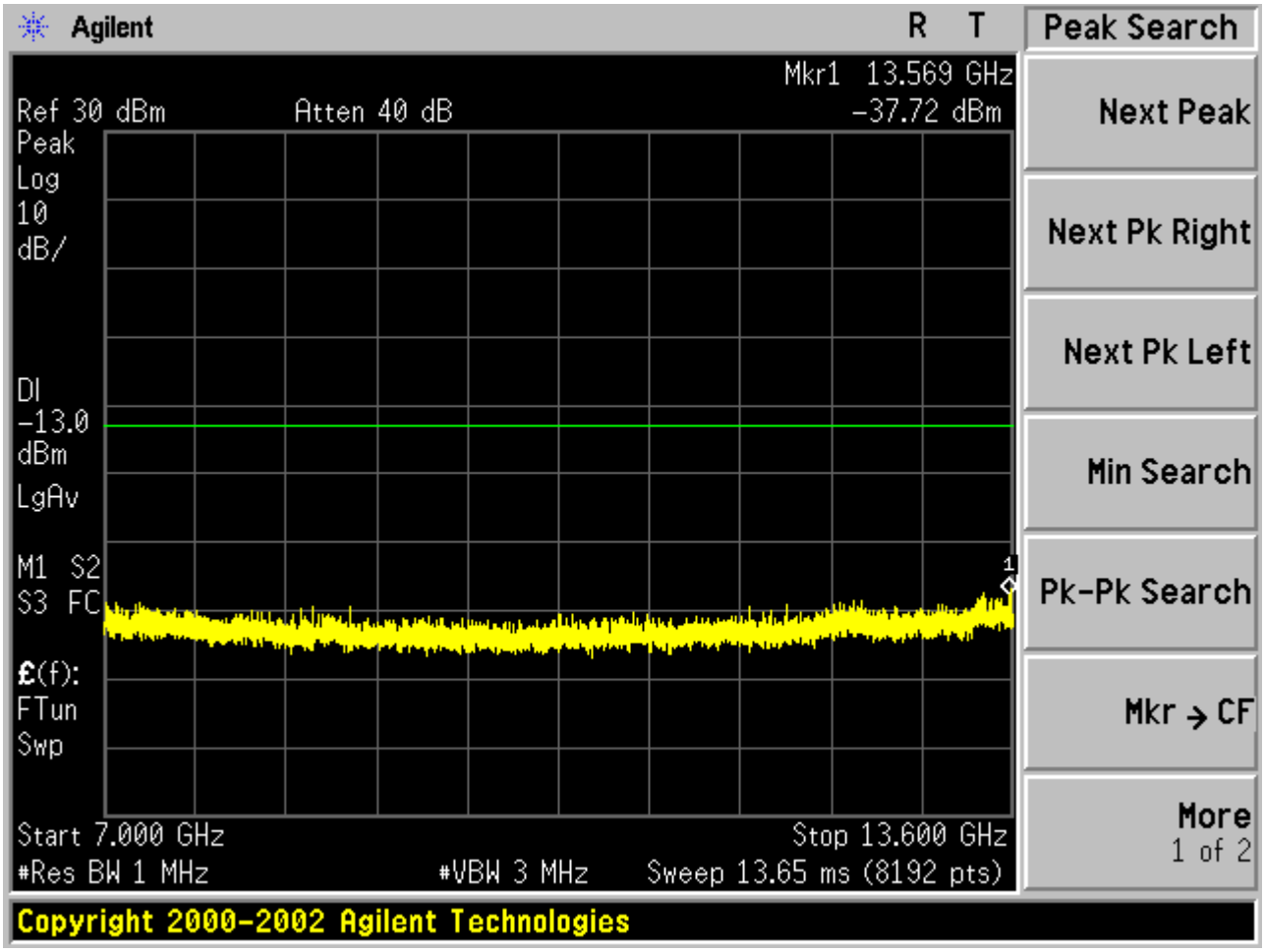

Agilent
R T
Peak Search
Mkr1 7.854 GHz
Ref 30 dBm
Atten 40 dB
-38.98 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

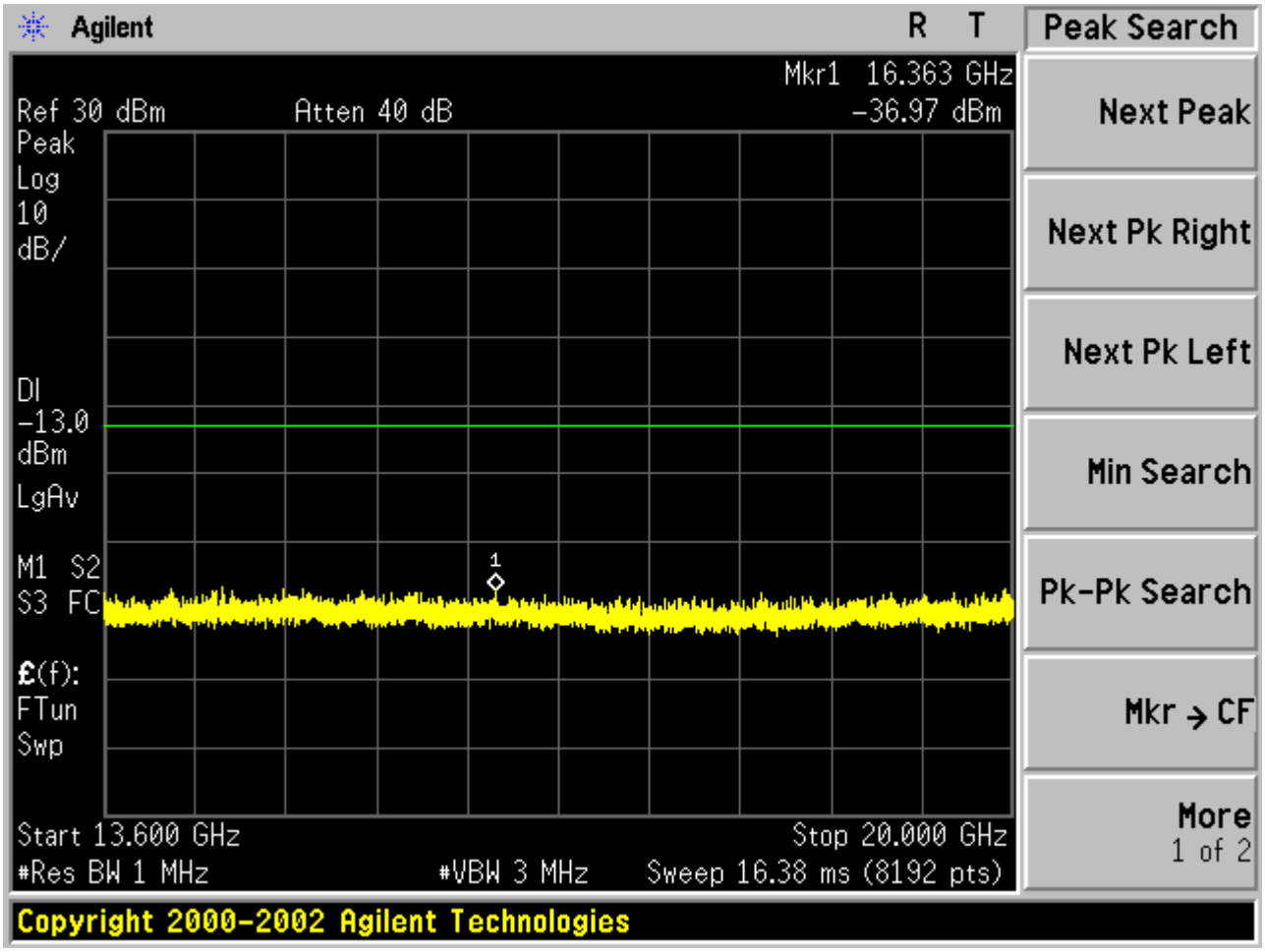

Agilent
R T
Peak Search
Mkr1 14.506 GHz
Ref 30 dBm
Atten 40 dB
-37.09 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 13.600 GHz
Stop 20.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=MCH

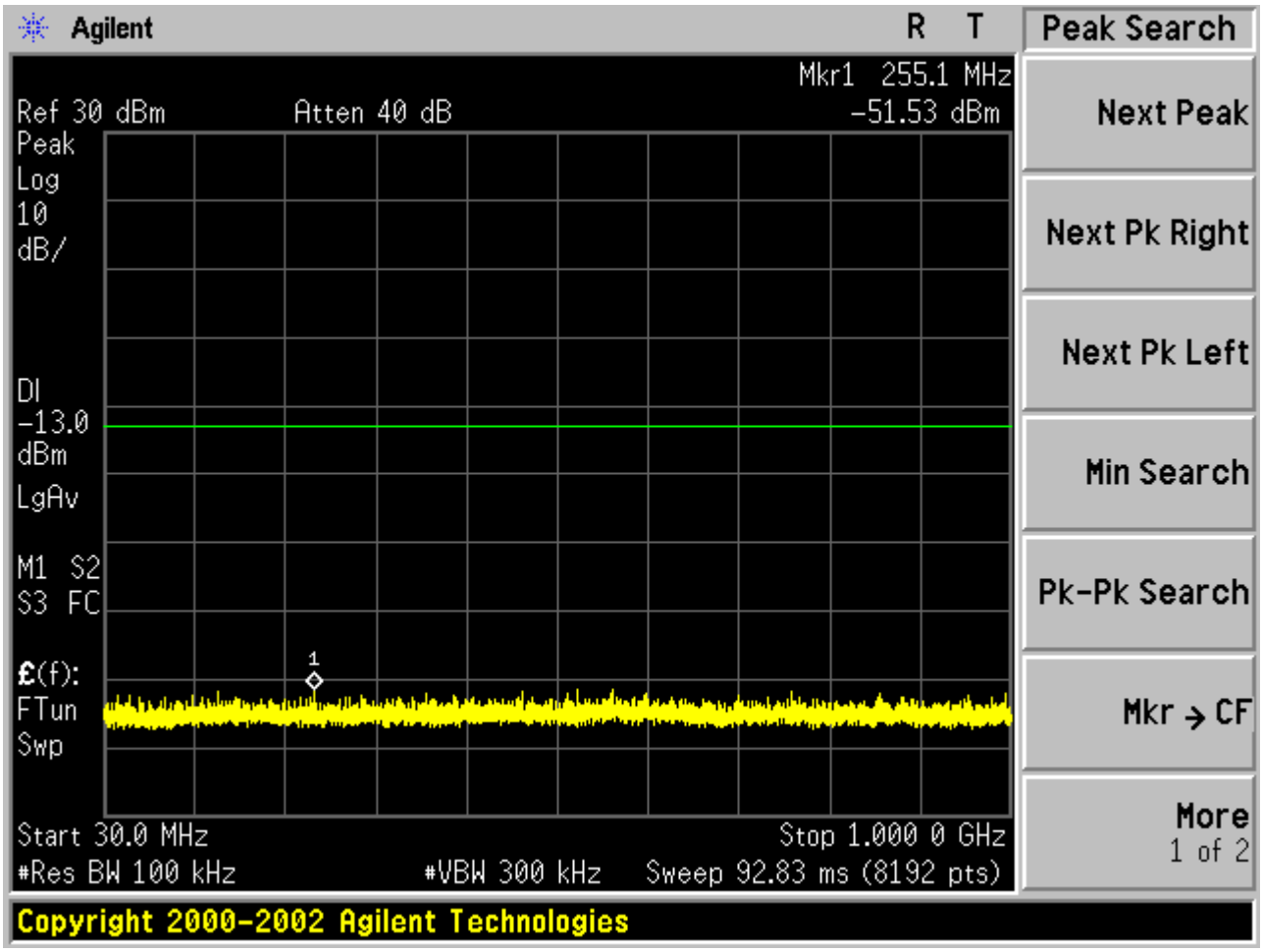


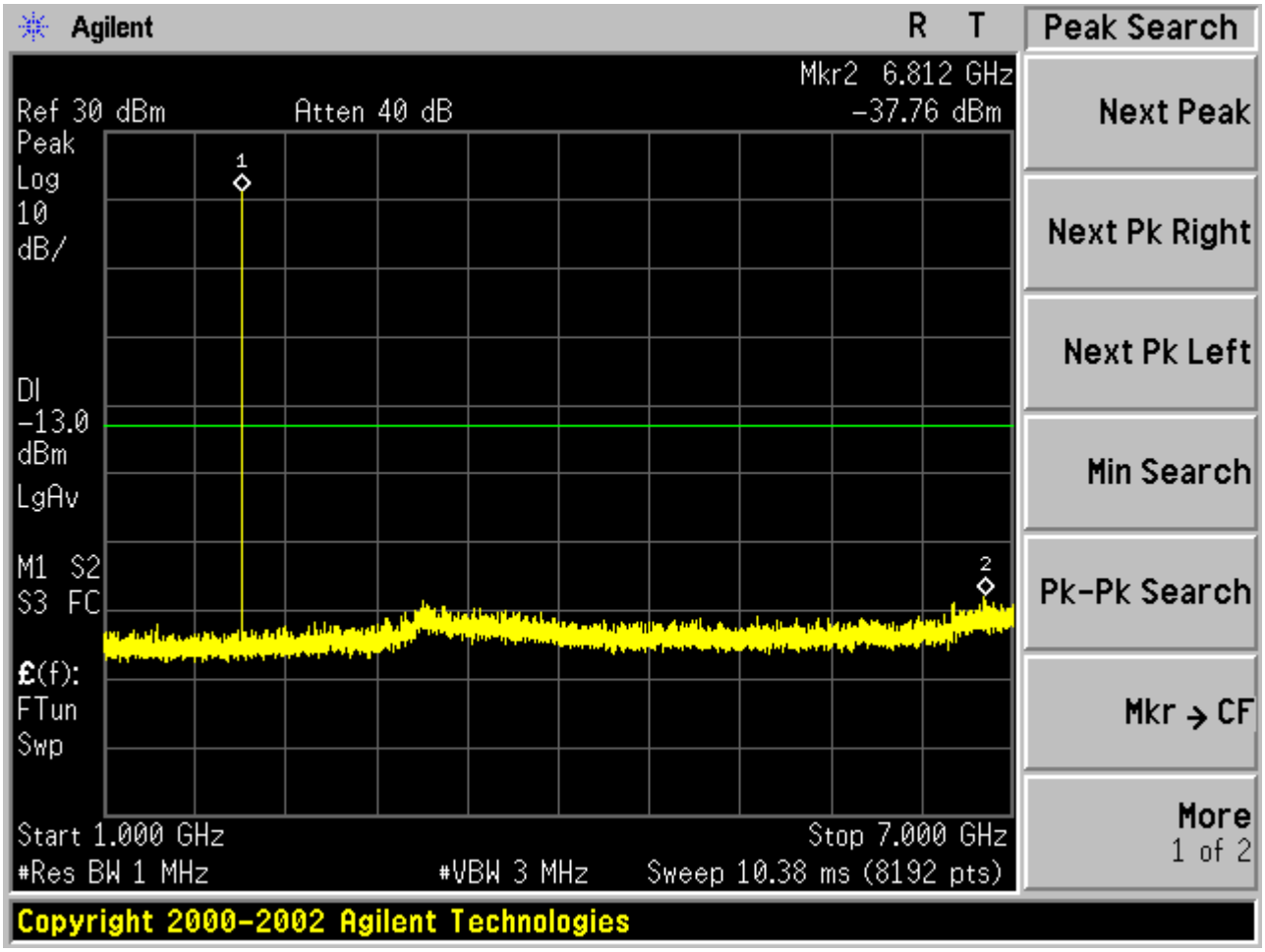

Agilent
R T
Peak Search
Mkr1 1.880 GHz
20.84 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

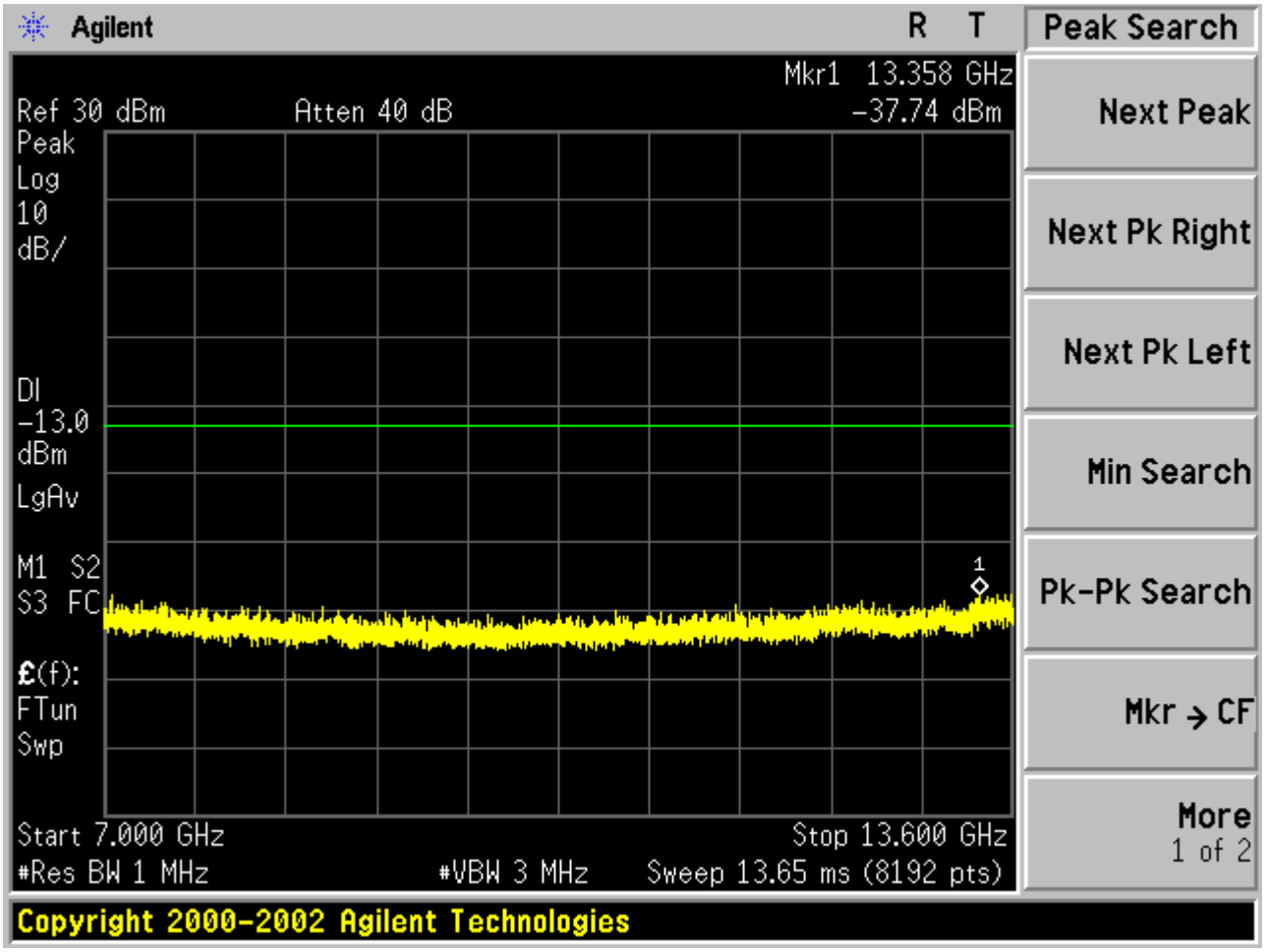

Agilent
R T
Peak Search
Mkr1 13.569 GHz
Ref 30 dBm
Atten 40 dB
-37.72 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

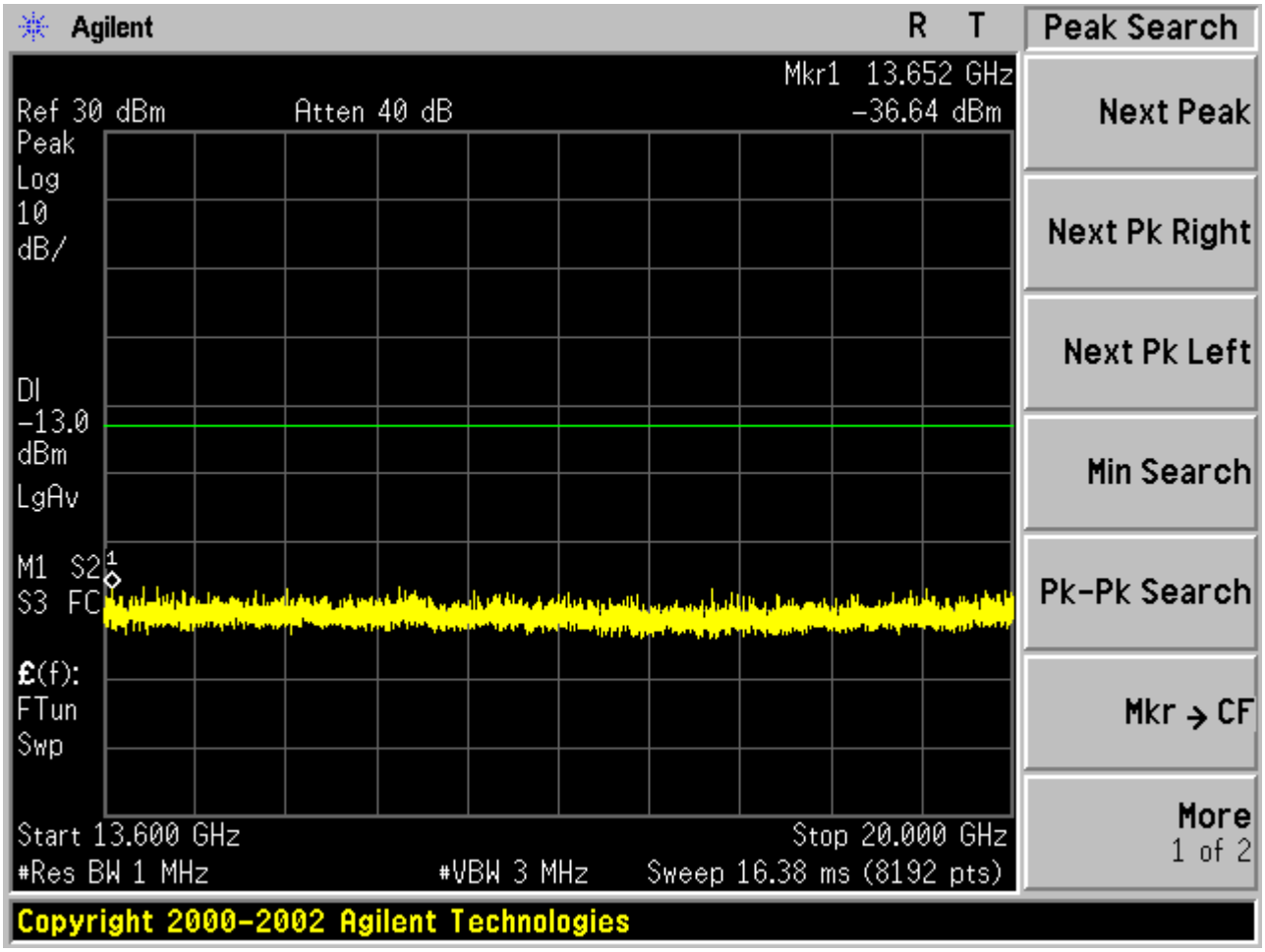

Agilent
R T
Peak Search
Mkr1 16.363 GHz
Ref 30 dBm
Atten 40 dB
-36.97 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
1
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 13.600 GHz
Stop 20.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=HCH




Agilent
R T
Peak Search
Mkr2 6.812 GHz
-37.76 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

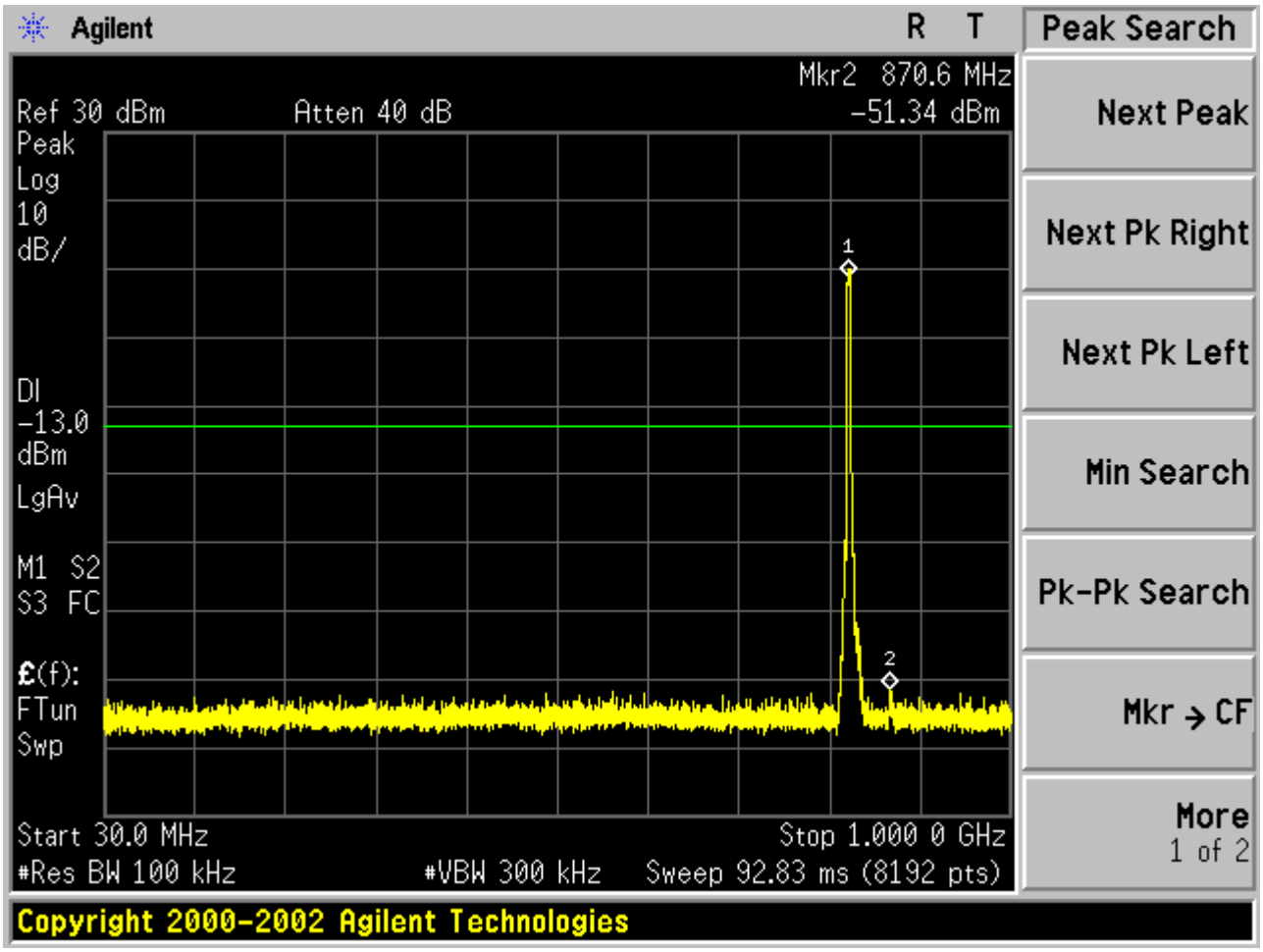

Agilent
R T
Peak Search
Mkr1 13.358 GHz
-37.74 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

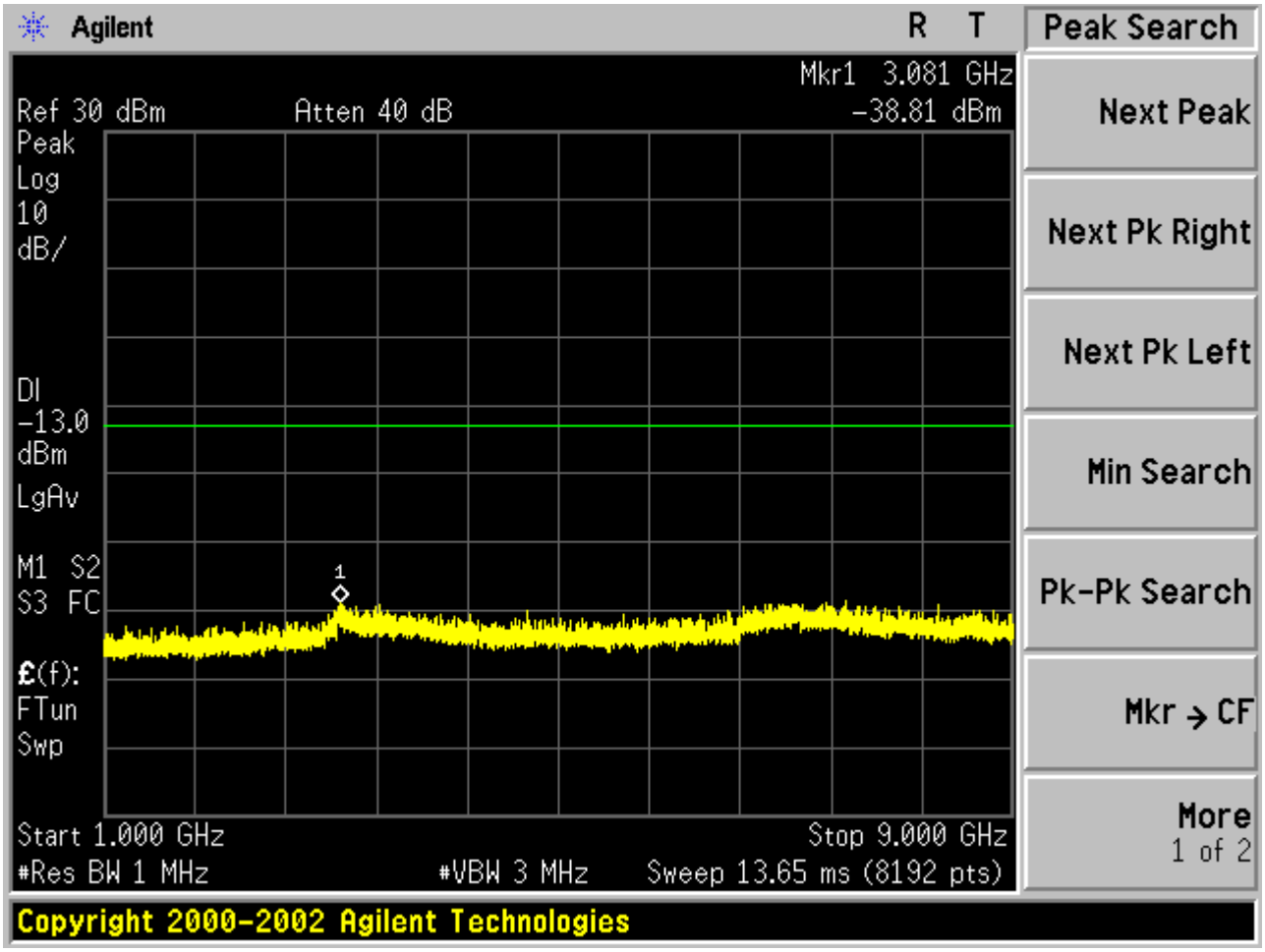

Agilent
R T
Peak Search
Mkr1 13.652 GHz
Ref 30 dBm
Atten 40 dB
-36.64 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 13.600 GHz
Stop 20.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Band= HSPA 850

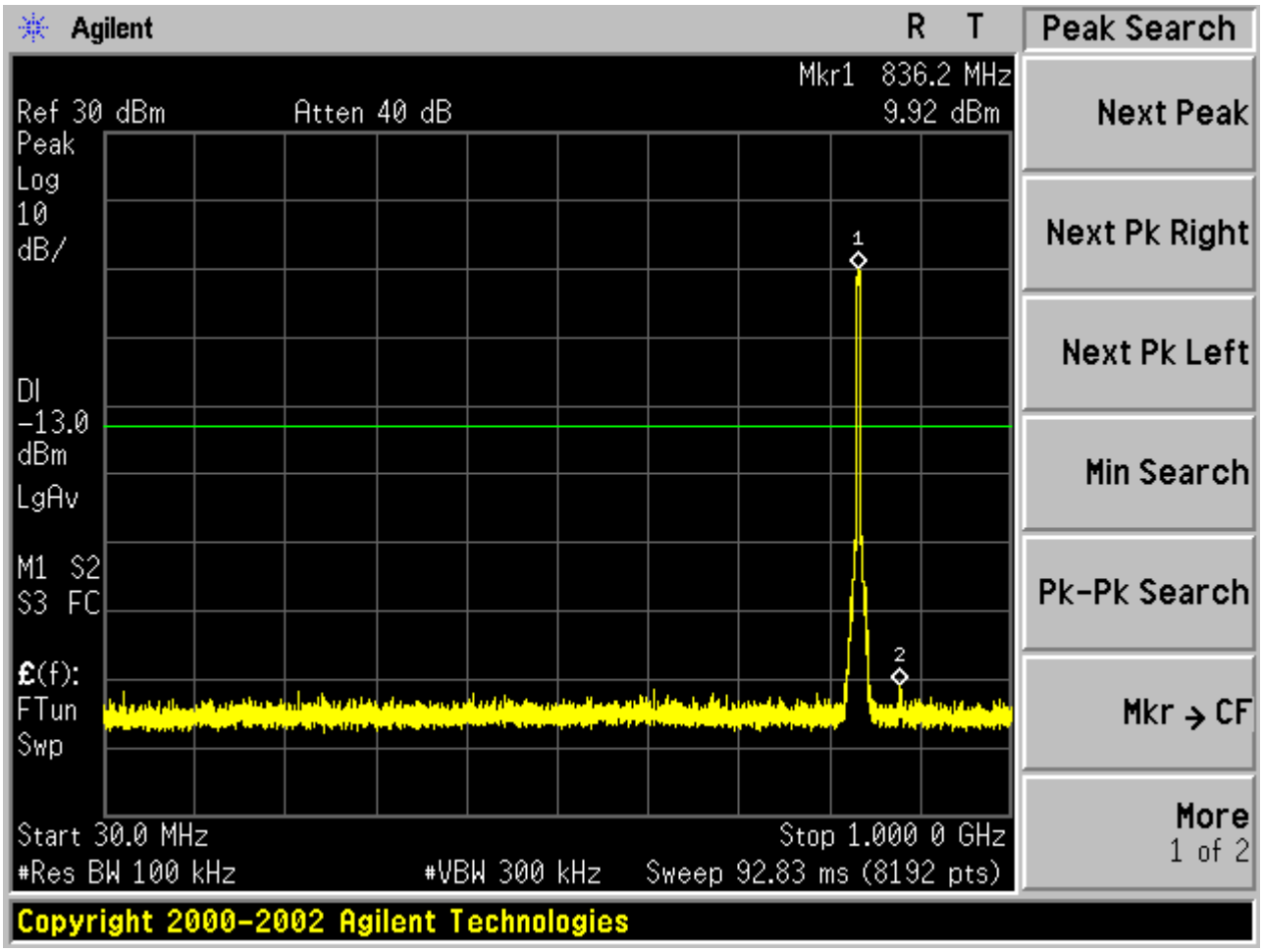
Test Mode=HSPA

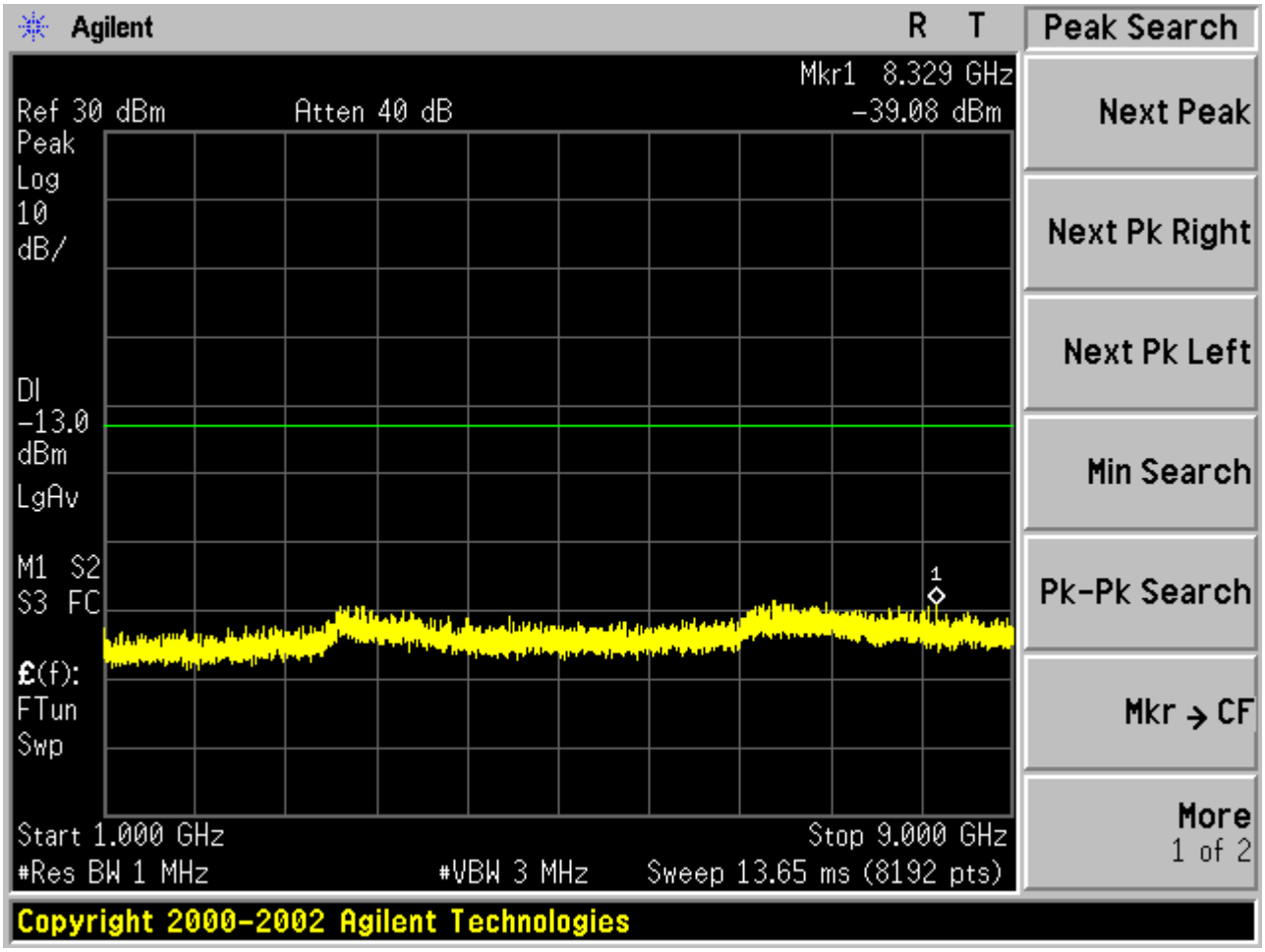
Test Channel=LCH



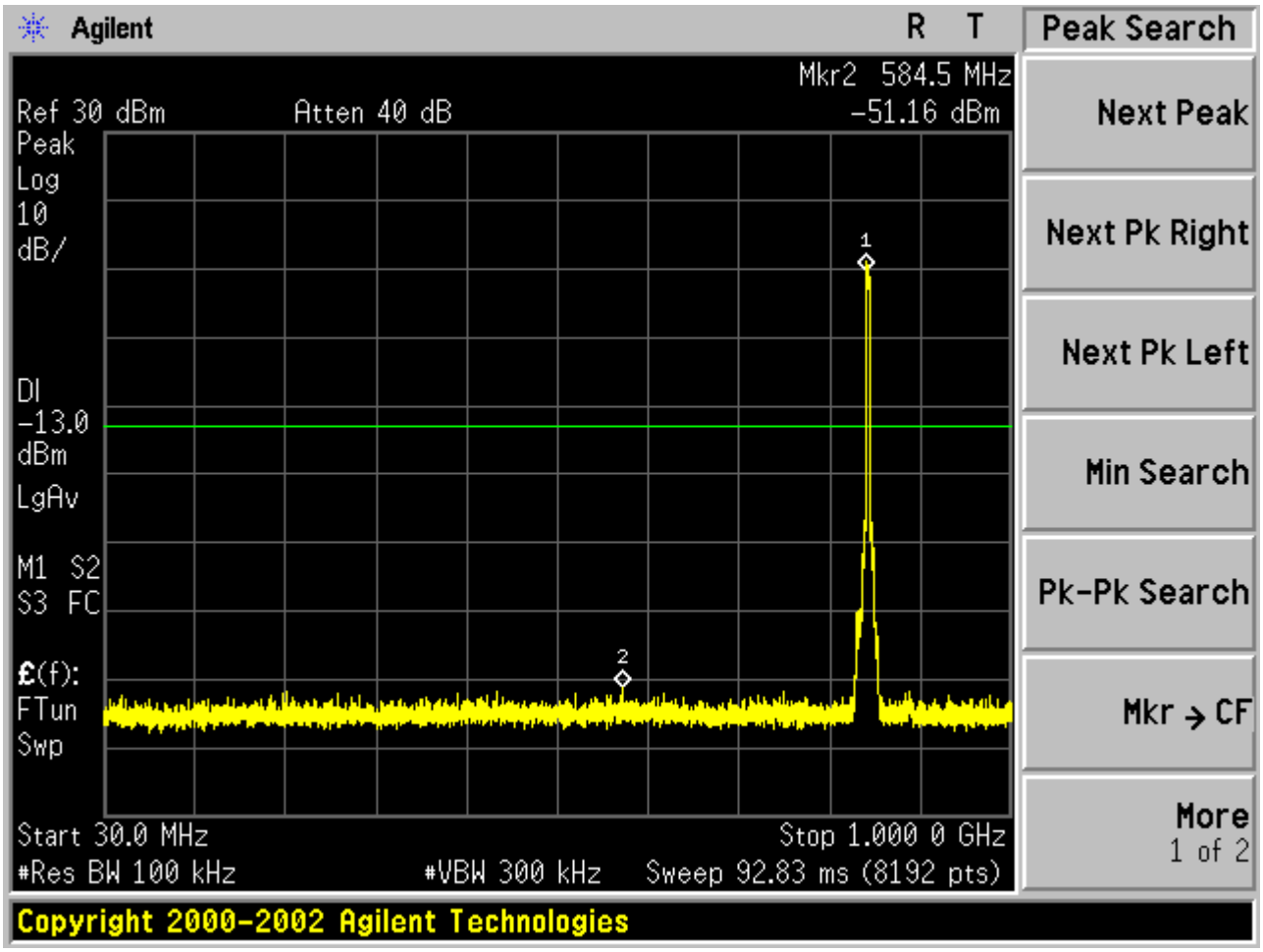

Agilent
R T
Peak Search
Mkr1 3.081 GHz
Ref 30 dBm
Atten 40 dB
-38.81 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

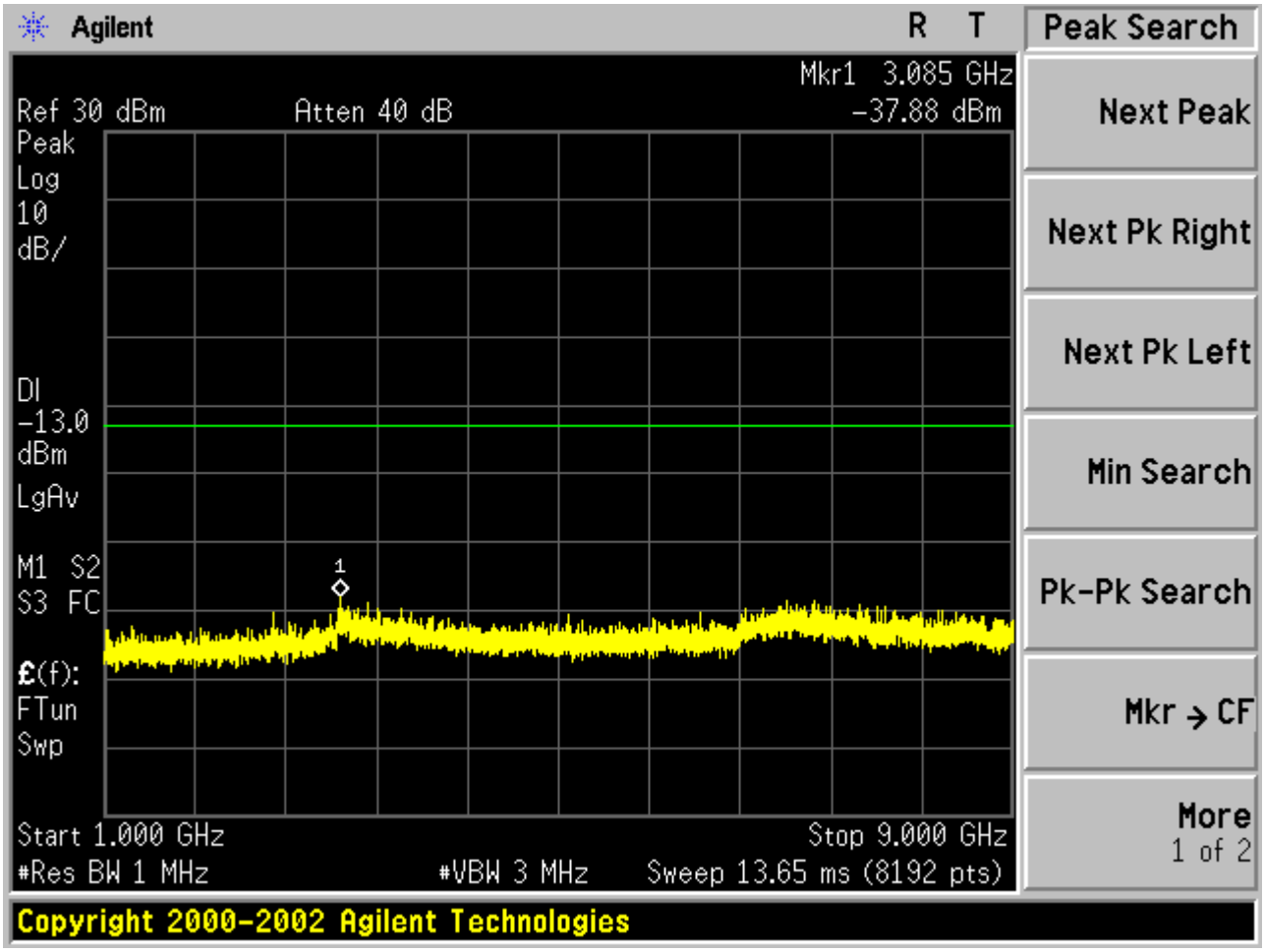
Test Channel=MCH




Agilent
R T
Peak Search
Mkr1 8.329 GHz
Ref 30 dBm
Atten 40 dB
-39.08 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=HCH

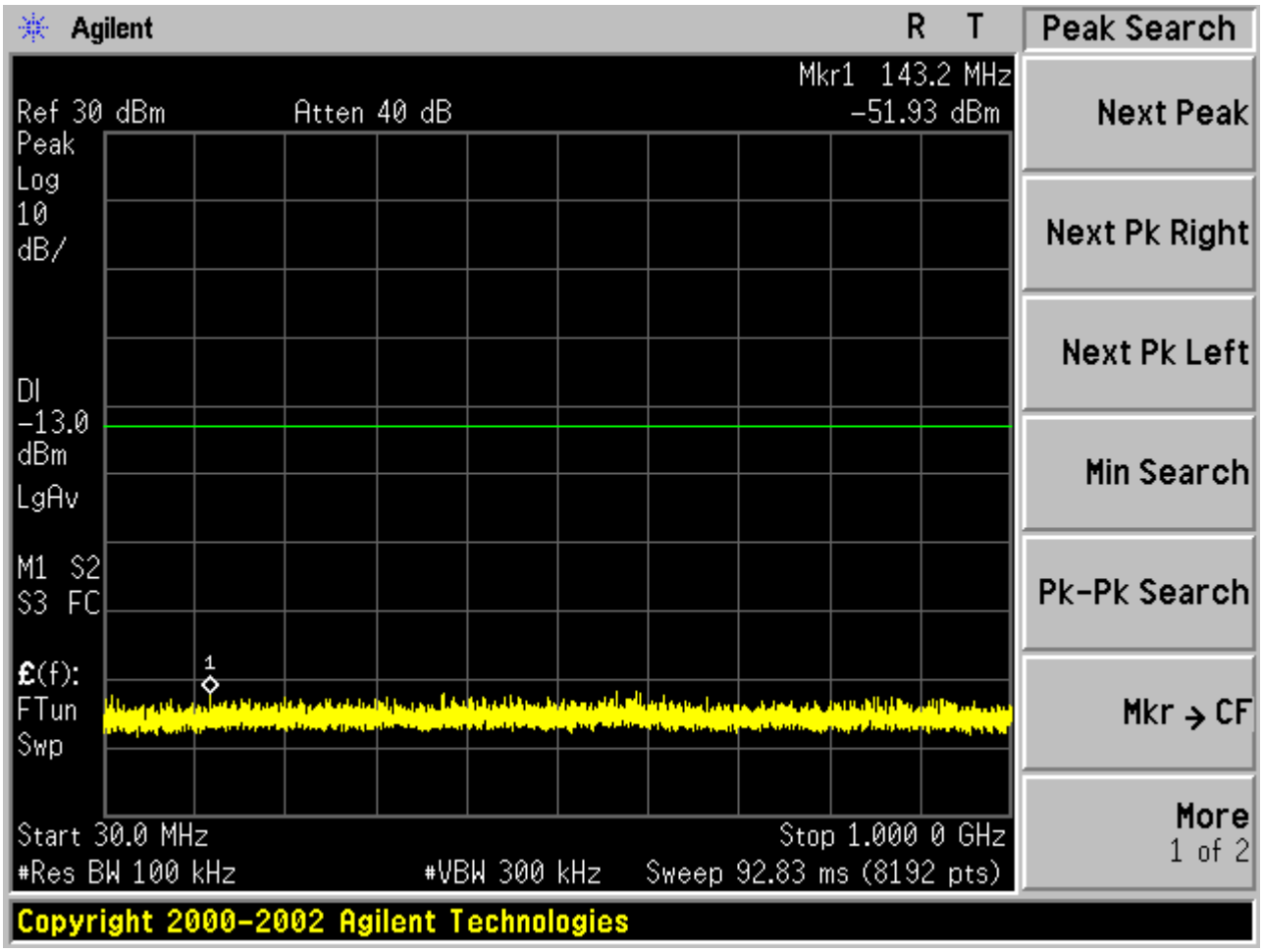


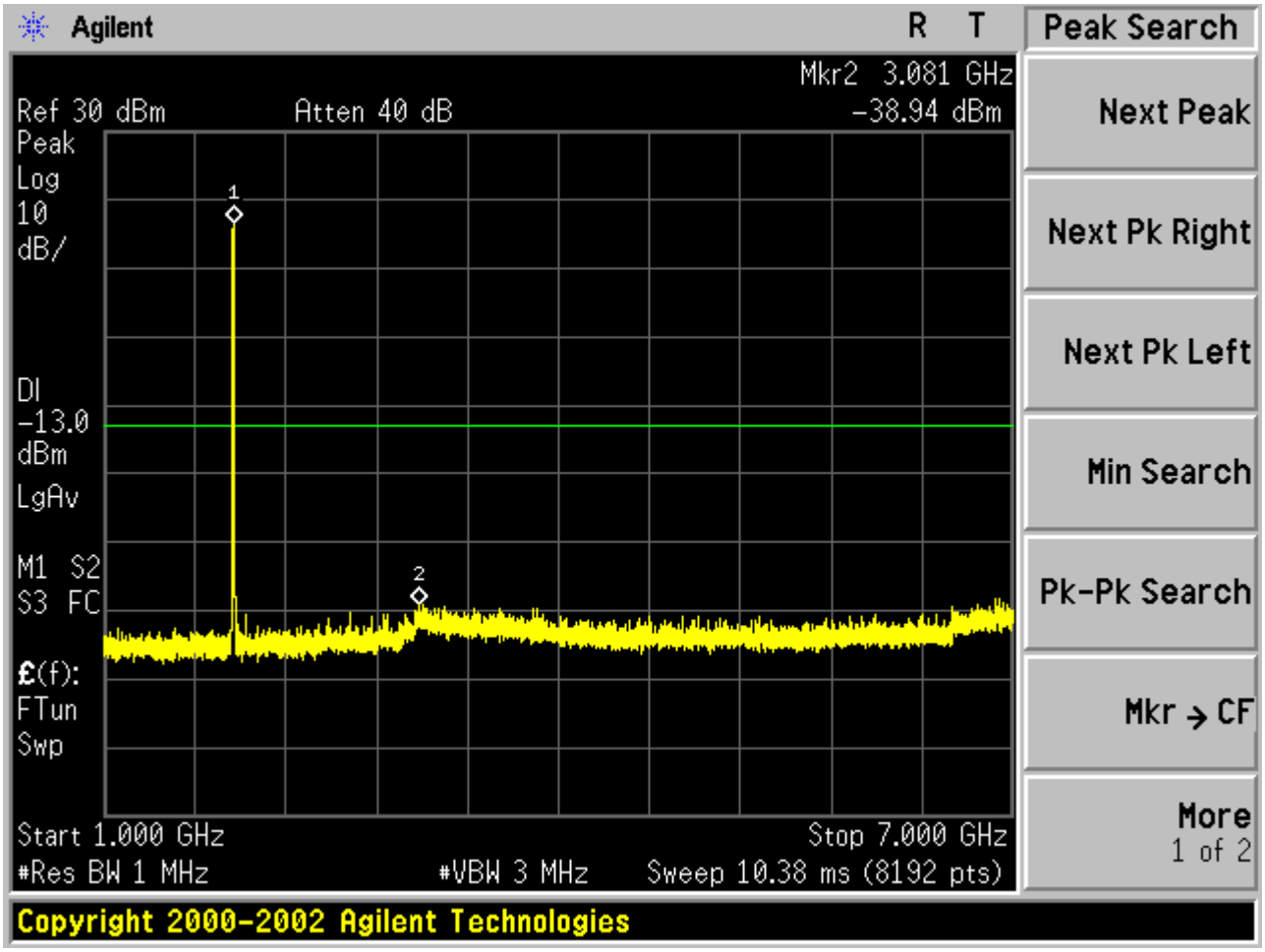

Agilent
R T
Peak Search
Mkr1 3.085 GHz
Ref 30 dBm
Atten 40 dB
-37.88 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
1
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 1.000 GHz
Stop 9.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

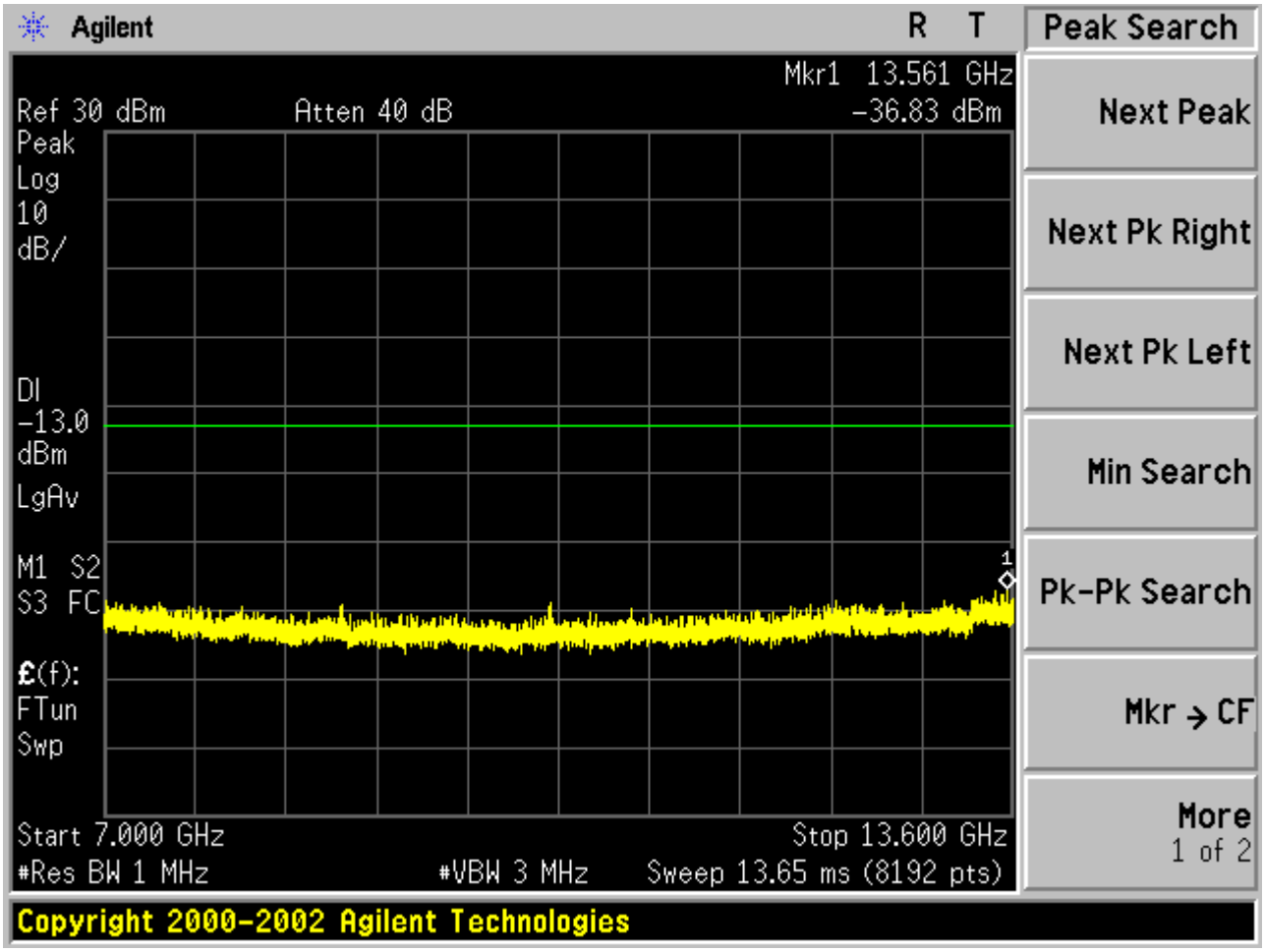
Test Band=HSPA 1900

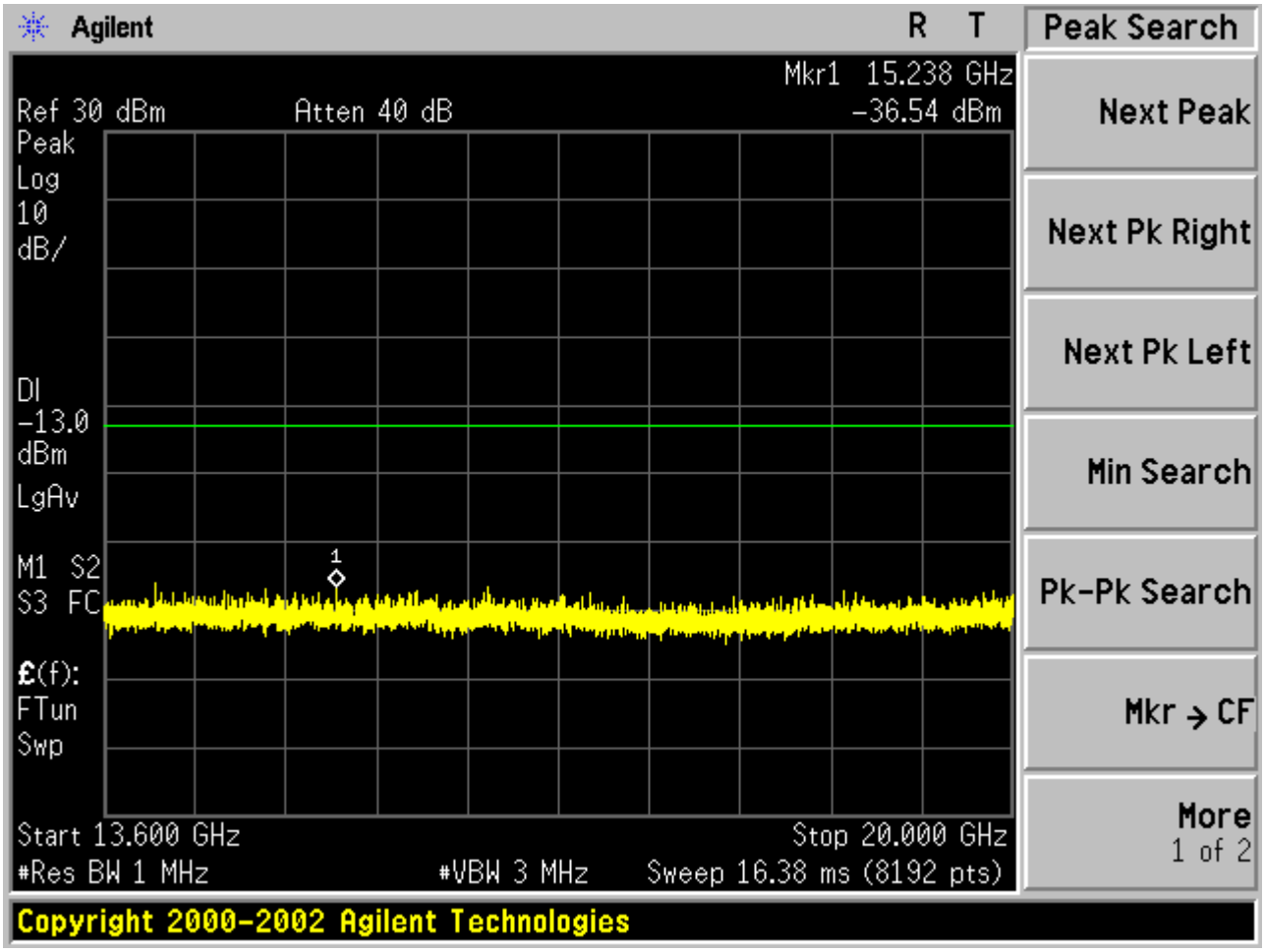
Test Mode=HSPA

Test Channel=LCH

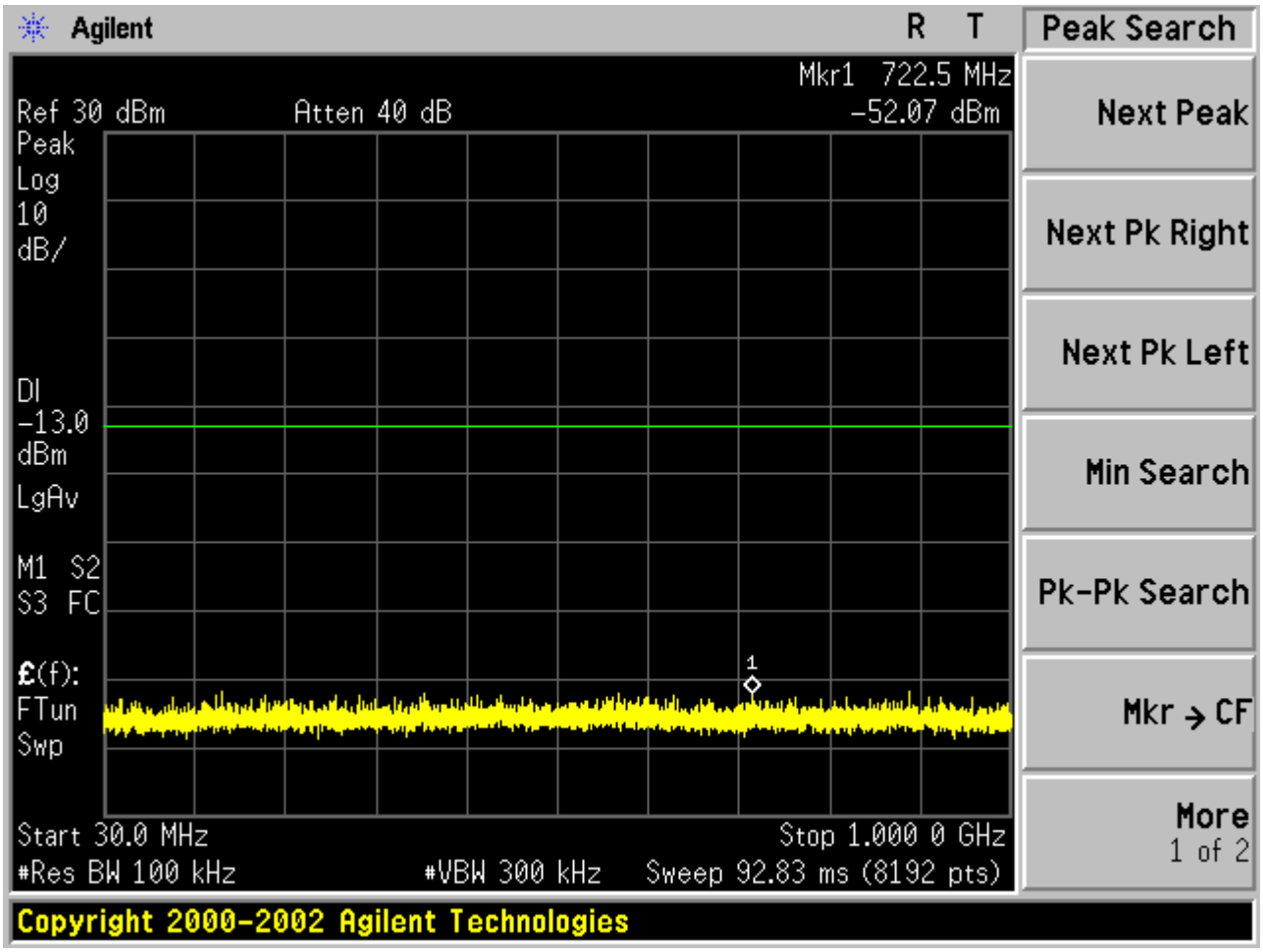


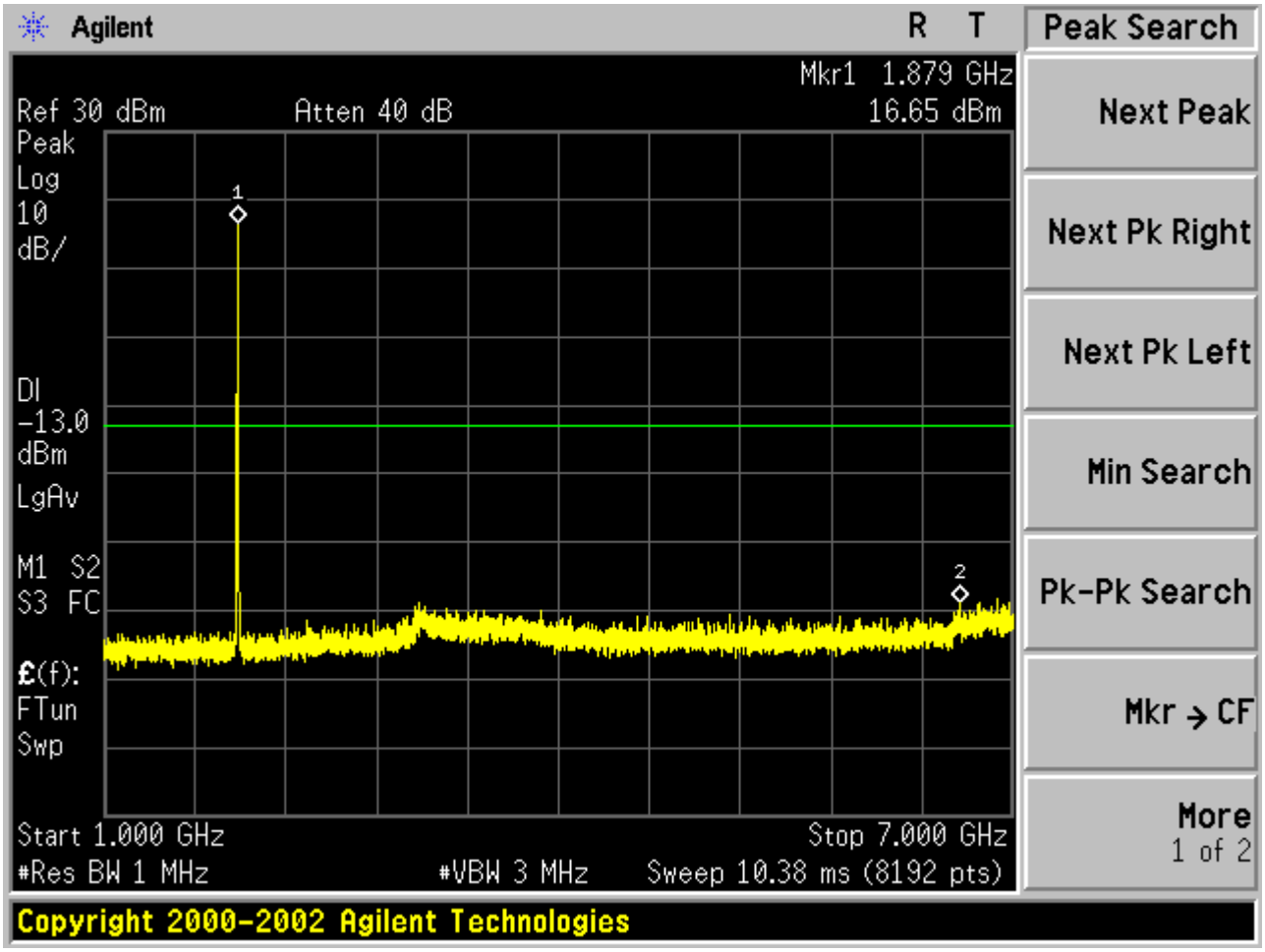

Agilent
R T
Peak Search
Mkr2 3.081 GHz
Ref 30 dBm
Atten 40 dB
-38.94 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

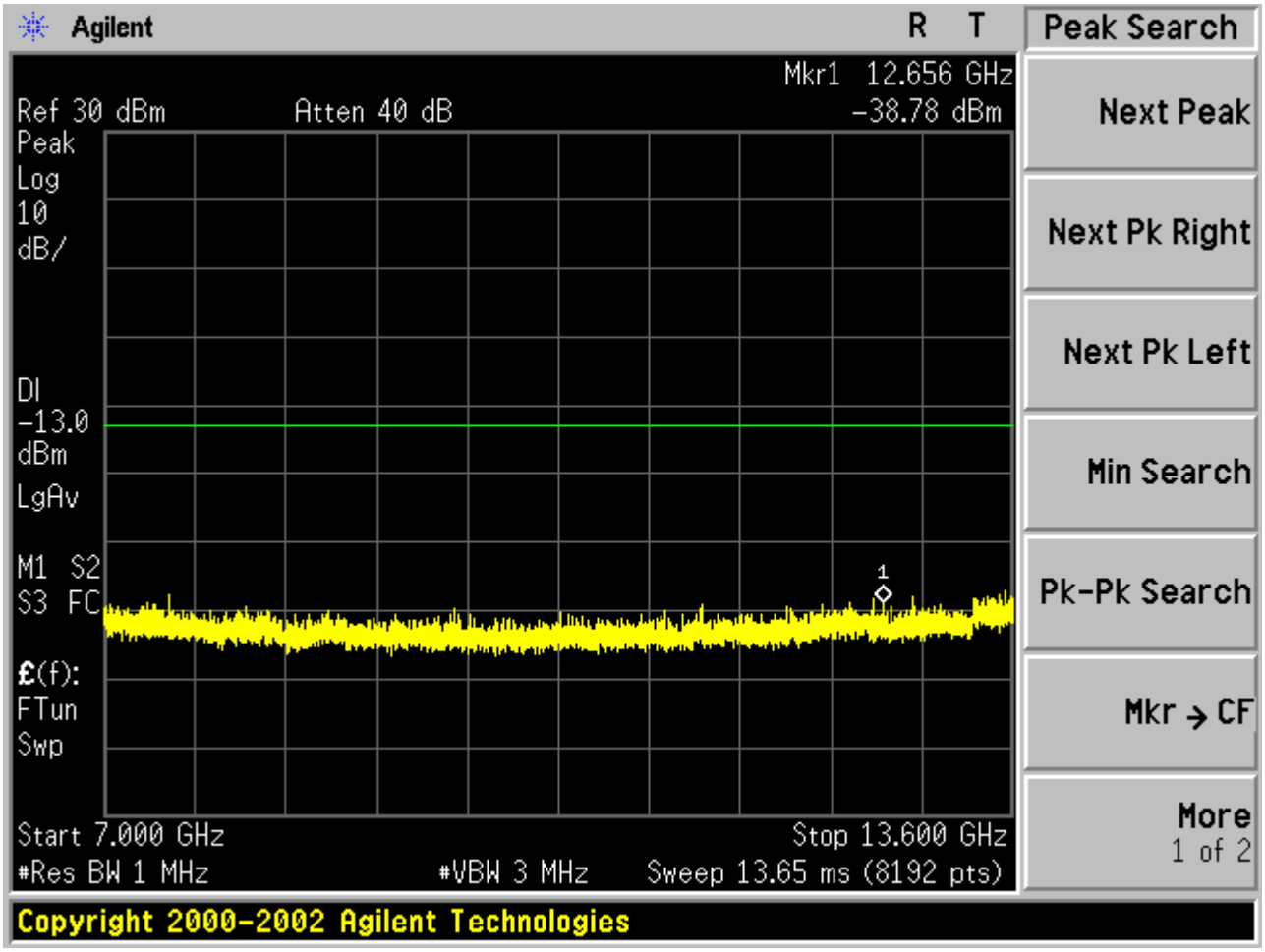

Agilent
R T
Peak Search
Mkr1 13.561 GHz
Ref 30 dBm
Atten 40 dB
-36.83 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

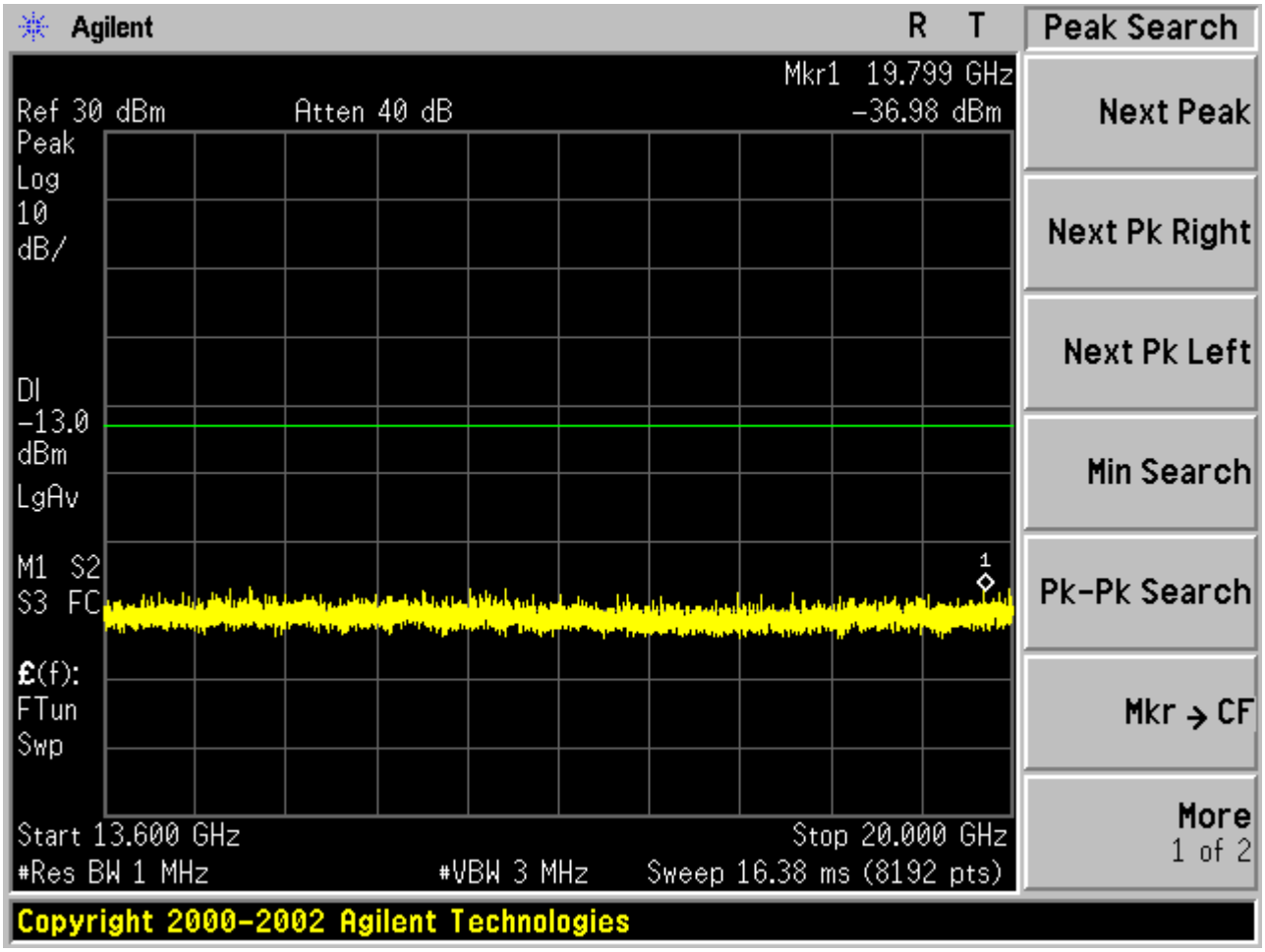

Agilent
R T
Peak Search
Mkr1 15.238 GHz
Ref 30 dBm
Atten 40 dB
-36.54 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 13.600 GHz
Stop 20.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=MCH

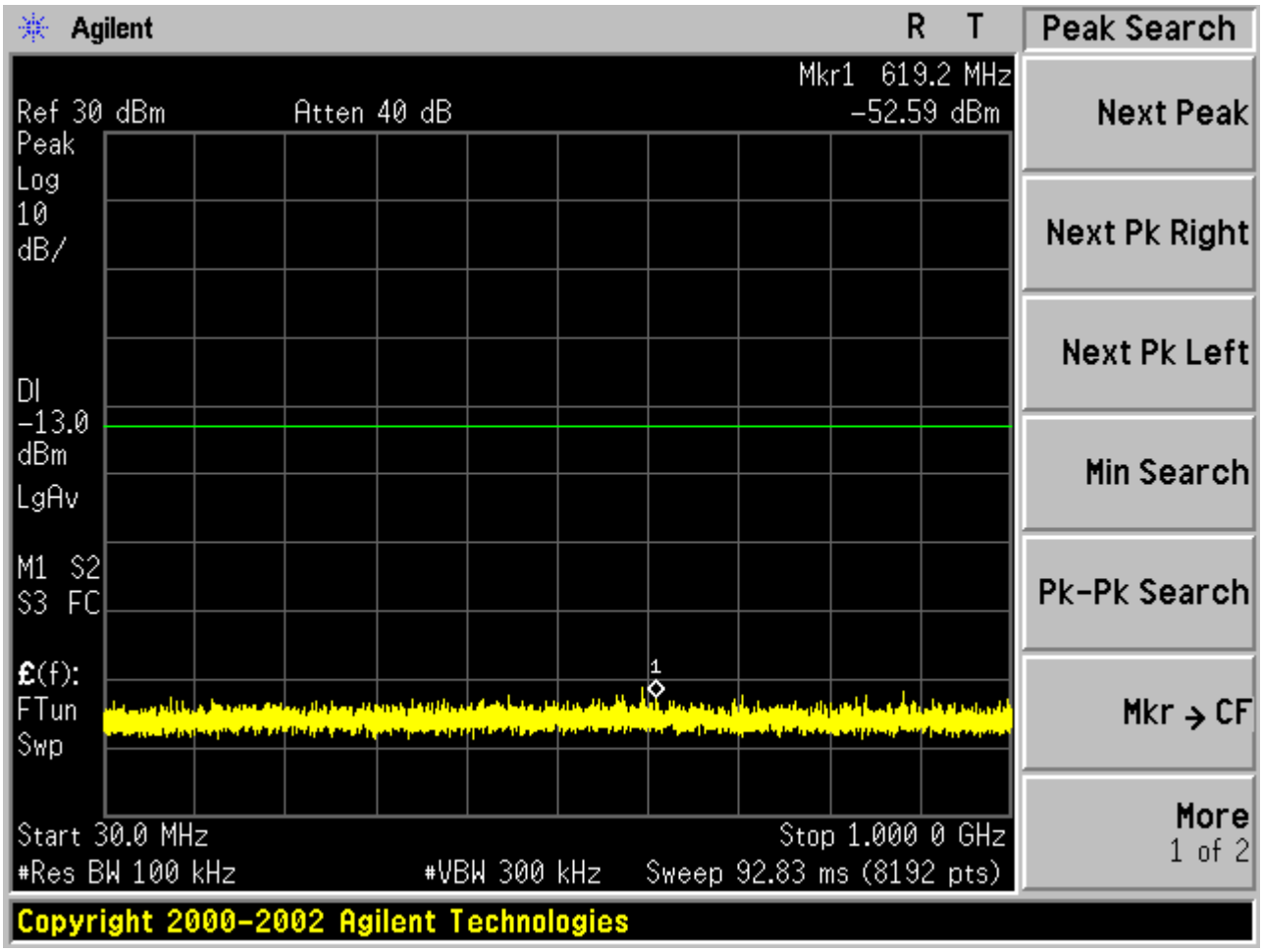


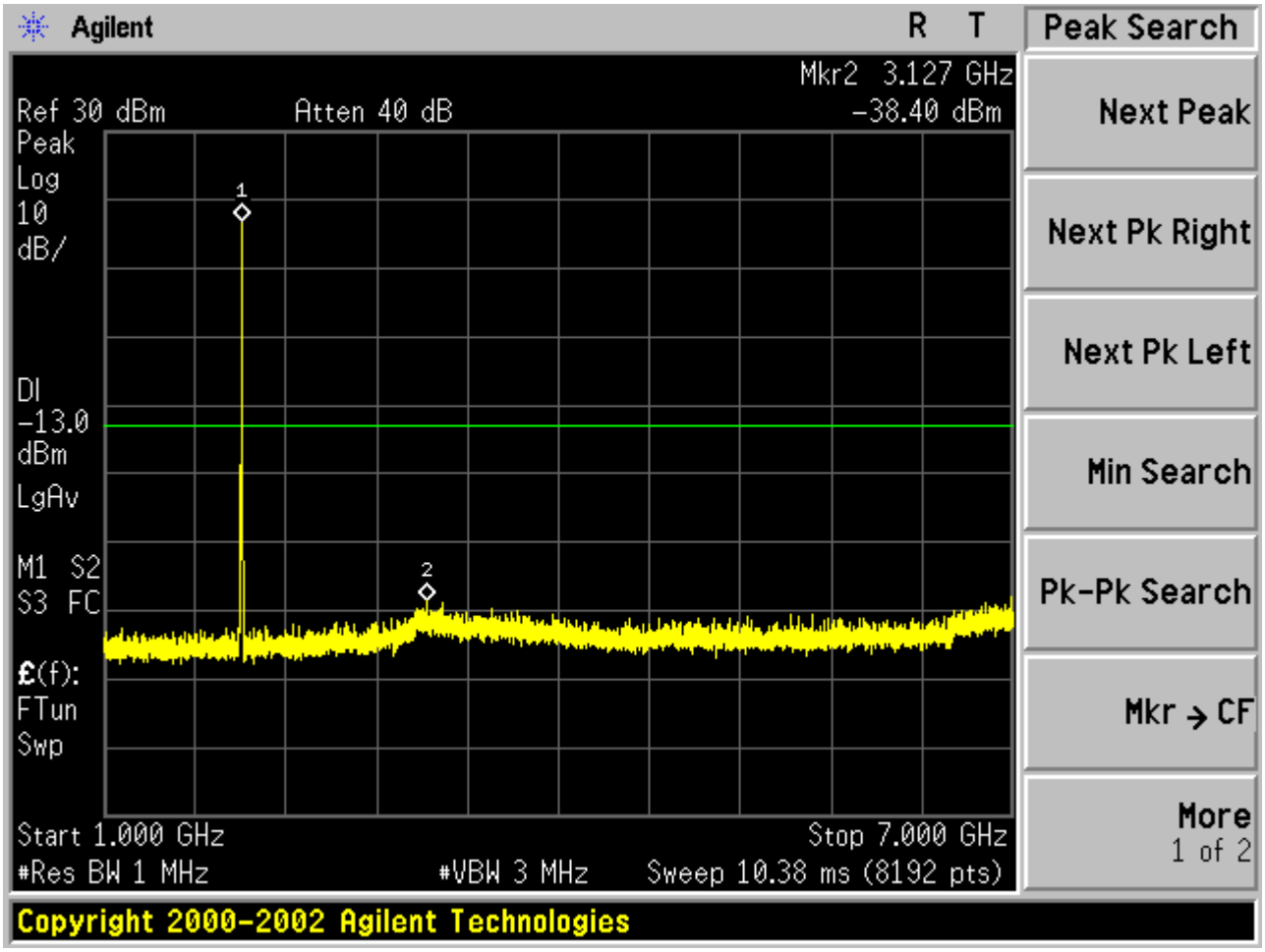

Agilent
R T
Peak Search
Mkr1 1.879 GHz
16.65 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

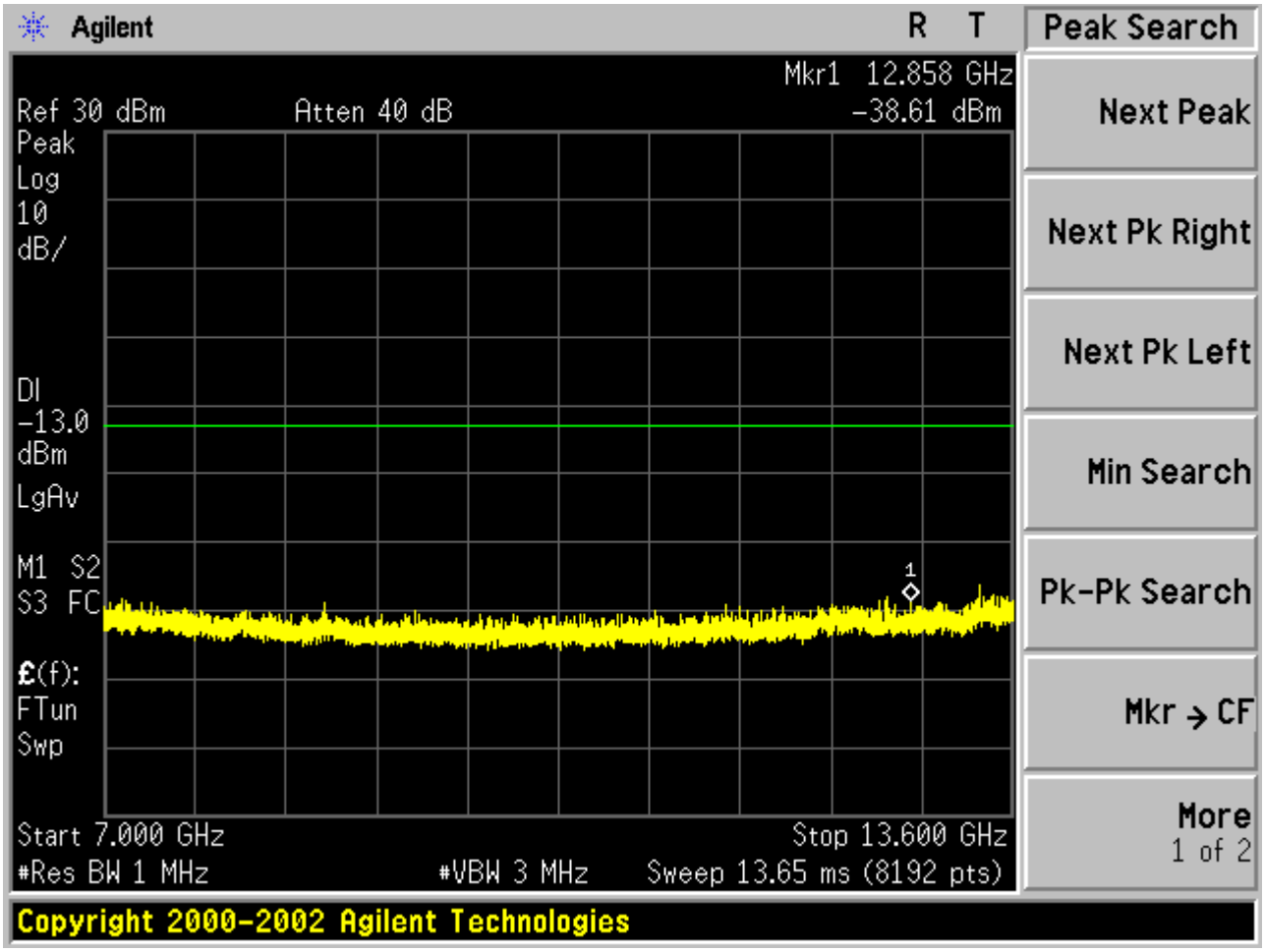

Agilent
R T
Peak Search
Mkr1 12.656 GHz
-38.78 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

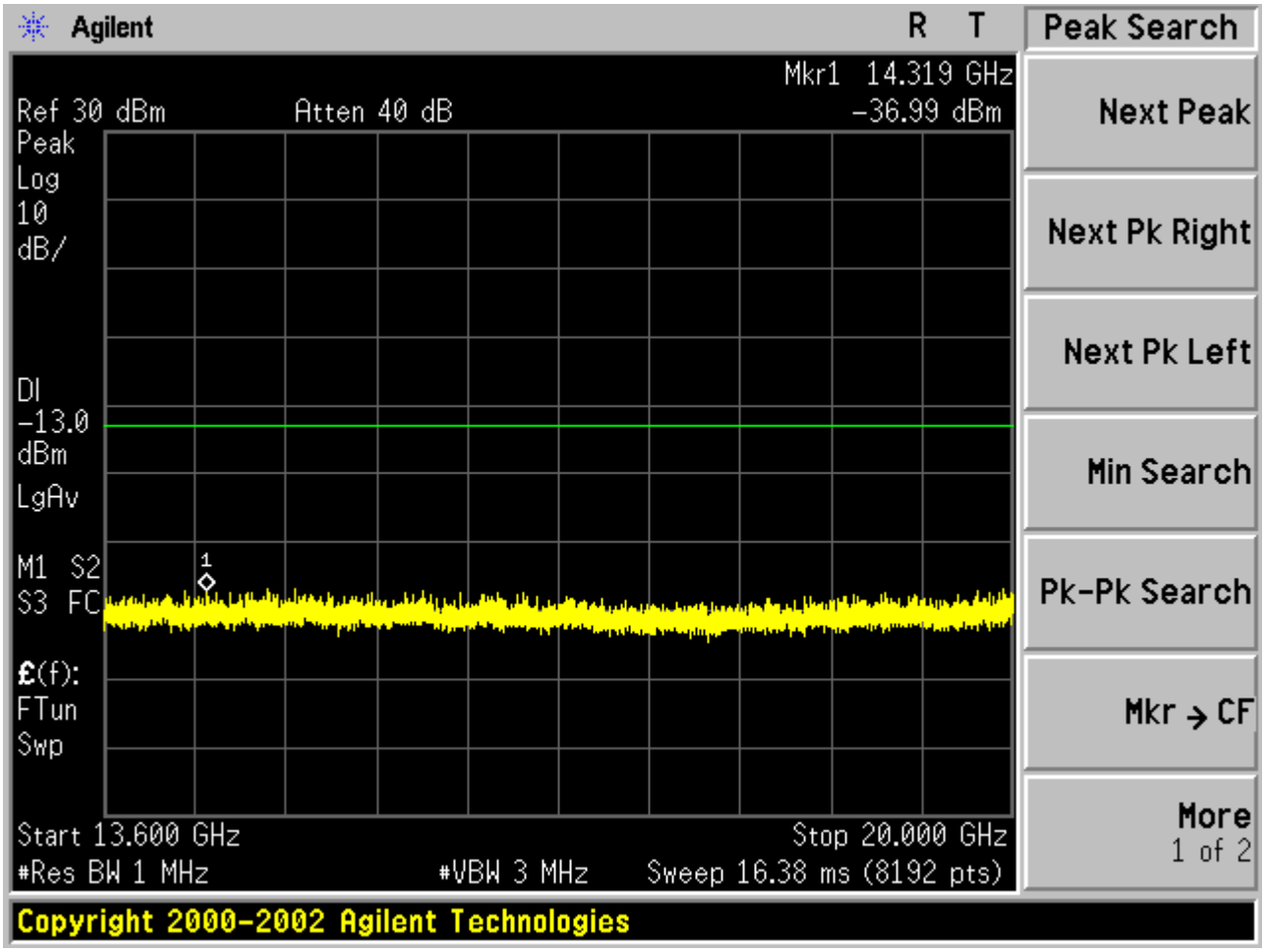

Agilent
R T
Peak Search
Mkr1 19.799 GHz
Ref 30 dBm
Atten 40 dB
-36.98 dBm
Next Peak
Peak
Log
10
dB/
Next Pk Right
Next Pk Left
Dl
-13.0
dBm
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 13.600 GHz
Stop 20.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 16.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies

Test Channel=HCH




Agilent
R T
Peak Search
Mkr2 3.127 GHz
Ref 30 dBm
Atten 40 dB
-38.40 dBm
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 1.000 GHz
Stop 7.000 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 10.38 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies


Agilent
R T
Peak Search
Mkr1 12.858 GHz
-38.61 dBm
Ref 30 dBm
Atten 40 dB
Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
Dl
-13.0
dBm
LgAv
M1 S2
S3 FC
£(f):
FTun
Swp
Start 7.000 GHz
Stop 13.600 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 13.65 ms (8192 pts)
Copyright 2000-2002 Agilent Technologies



Note: 1. Below 30MHZ no Spurious found and the GPRS modes is the worst condition.

2. As no emission found in standby or receive mode, no recording in this report.

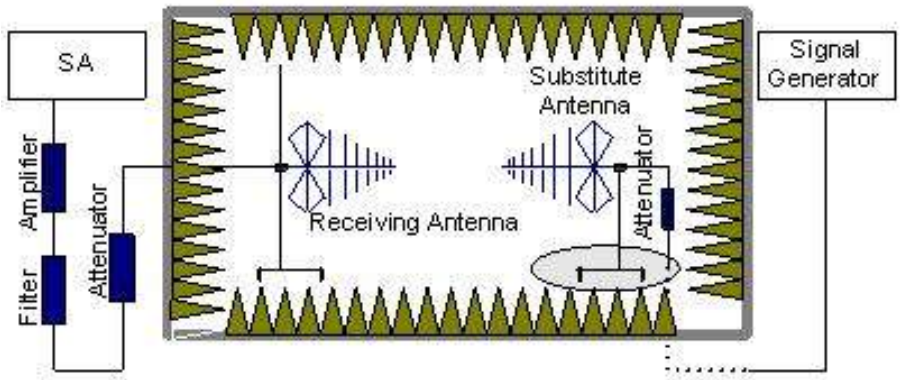
9.2 RADIATED SPURIOUS EMISSION

9.2.1 MEASUREMENT METHOD

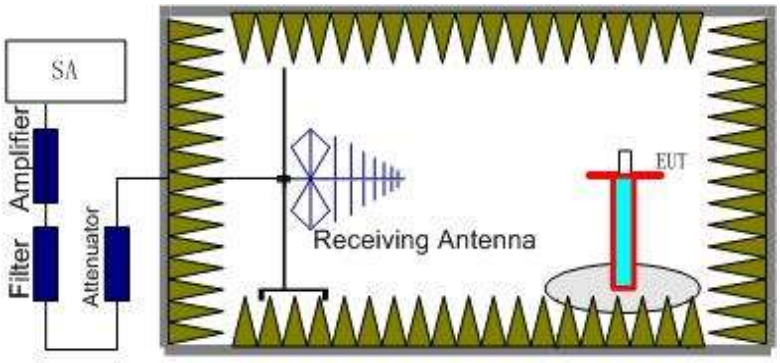
The measurements procedures specified in TIA-603-D-2010 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on all modes(GPRS 850, GPRS 1900, HSPA band II, HSPA band V) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for each band.

The procedure of radiated spurious emissions is as follows:

a) Pre-calibration With pre-calibration method, the Radiated Spurious Emissions(RSE) is calculated as, RSE=Rx（dBuV）+CL（dB）+SA（dB）+Gain（dBi）-107（dBuV to dBm）The SA is calibrated using following setup.



b) EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the test item for emission measurements. The height of receiving antenna is 0.8m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the test item and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector and 1MHz bandwidth.



Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the GPRS 1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) ,GPRS 850 band (824.2MHz, 836.6MHz, 848.8MHz), HSPA band II(1852.6MHz, 1880MHz, 1907.4MHz), HSPA band V(826.6MHz, 836.4MHz, 846.4MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of any band into any of the other blocks.

The substitution method is used. Substitution values at each frequency are measured before and saved to the test software. A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss and the air loss. The measurement results are obtained as described below: $Power=P_{Mea}+A_{Rpl}$

9.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a licensee’s frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Note: Only test the worst condition of each test mode:

9.2.3 MEASUREMENT RESULT

GPRS 850:

The Worst Test Results for Channel 251/848.8 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1685.23	-46.27	-5.01	-51.28	-13.00	Horizontal
2456.12	-44.11	-2.18	-46.29	-13.00	Vertical
3645.78	-42.48	3.46	-39.02	-13.00	Vertical
4536.58	-45.39	2.79	-42.60	-13.00	Horizontal

GPRS 1900:

The Worst Test Results for Channel 810/1909.8MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1429.36	-41.49	-3.22	-44.71	-13.00	Vertical
2563.47	-46.72	-0.24	-46.96	-13.00	Vertical
3645.26	-42.58	3.98	-38.60	-13.00	Horizontal
4563.56	-47.63	11.56	-36.07	-13.00	Vertical
5689.25	-41.25	17.89	-23.36	-13.00	Horizontal

HSPA band II:

The Worst Test Results for Channel 9938/1907.4MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
2000.00	-33.67	-2.25	-35.92	-13.00	Vertical
9548.50	-42.58	-3.03	-45.61	-13.00	Horizontal
13367.40	-45.37	-1.87	-47.24	-13.00	Horizontal
15277.80	-42.69	8.52	-34.17	-13.00	Vertical
17931.60	-45.26	18.7	-26.56	-13.00	Horizontal

HSPA band V:

The Worst Test Results for Channel 4458/846.4MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1598.26	-43.51	-2.26	-45.77	-13.00	Vertical
2365.78	-42.43	-3.12	-45.55	-13.00	Horizontal
4967.65	-41.29	-1.74	-43.03	-13.00	Horizontal
6457.86	-43.74	8.74	-35	-13.00	Vertical
7896.56	-44.23	17.89	-26.34	-13.00	Horizontal

Note: ARpl= Factor=Antenna Factor+ Cable loss-Amplifier gain.

The “Factor” value can be calculated automatically by software of measurement system.

Below 30MHZ no Spurious found and the GPRS modes is the worst condition.

10. FREQUENCY STABILITY

10.1 MEASUREMENT METHOD

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3.With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for GPRS 1900 band , channel 190 for GPRS 850 band, channel 9400 for HSPA band II and channel 4175 for HSPA band V measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4.Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10℃ increments from +50℃ to -30℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9.At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

11.2 PROVISIONS APPLICABLE

11.2.1 For Hand carried battery powered equipment

According to the ANSI/TIA-603-D-2010, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4V DC and 4.2V DC, with a nominal voltage of 4.2V DC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

11.2.2 For equipment powered by primary supply voltage

According to the ANSI/TIA-603-D-2010, the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment, the normal environment temperature is 20^{o}C.

11.3 MEASUREMENT RESULT

Appendix D:Frequency Stability

Test Results

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt.(V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GPRS850	GPRS	LCH	TN	3.4	19.21	0.02	±2.5	PASS
			TN	3.7	13.08	0.01	±2.5	PASS
			TN	4.2	12.55	0.02	±2.5	PASS
		MCH	TN	3.4	13.46	0.02	±2.5	PASS
			TN	3.7	16.17	0.02	±2.5	PASS
			TN	4.2	12.57	0.01	±2.5	PASS
		HCH	TN	3.4	13.32	0.02	±2.5	PASS
			TN	3.7	12.96	0.02	±2.5	PASS
			TN	4.2	11.17	0.02	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GPRS1900	GPRS	LCH	TN	3.4	13.22	0.01	±2.5	PASS
			TN	3.7	25.43	0.01	±2.5	PASS
			TN	4.2	26.19	0.02	±2.5	PASS
		MCH	TN	3.4	25.25	0.01	±2.5	PASS
			TN	3.7	16.47	0.01	±2.5	PASS
			TN	4.2	13.28	0.01	±2.5	PASS
		HCH	TN	3.4	26.44	0.02	±2.5	PASS
			TN	3.7	13.27	0.01	±2.5	PASS
			TN	4.2	15.87	0.01	±2.5	PASS

Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GPRS850	GPRS	LCH	VN	-30	13.11	0.01	±2.5	PASS
			VN	-20	18.42	0.02	±2.5	PASS
			VN	-10	13.69	0.01	±2.5	PASS
			VN	0	14.27	0.02	±2.5	PASS
			VN	10	11.17	0.02	±2.5	PASS
			VN	20	15.93	0.01	±2.5	PASS
			VN	30	12.22	0.02	±2.5	PASS
			VN	40	16.31	0.02	±2.5	PASS
			VN	50	24.47	0.03	±2.5	PASS
GPRS850	GPRS	MCH	VN	-30	16.12	0.01	±2.5	PASS
			VN	-20	10.46	0.02	±2.5	PASS
			VN	-10	16.53	0.02	±2.5	PASS
			VN	0	18.85	0.02	±2.5	PASS
			VN	10	13.06	0.02	±2.5	PASS
			VN	20	16.61	0.02	±2.5	PASS
			VN	30	15.28	0.02	±2.5	PASS
			VN	40	13.49	0.02	±2.5	PASS
			VN	50	13.13	0.02	±2.5	PASS
GPRS850	GPRS	HCH	VN	-30	21.19	0.02	±2.5	PASS
			VN	-20	15.24	0.02	±2.5	PASS
			VN	-10	25.29	0.02	±2.5	PASS
			VN	0	12.67	0.02	±2.5	PASS
			VN	10	16.19	0.02	±2.5	PASS
			VN	20	15.24	0.02	±2.5	PASS
			VN	30	16.31	0.02	±2.5	PASS
			VN	40	12.78	0.02	±2.5	PASS
			VN	50	13.11	0.02	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GPRS1900	GPRS	LCH	VN	-30	14.29	0.01	±2.5	PASS
			VN	-20	23.14	0.01	±2.5	PASS
			VN	-10	18.81	0.01	±2.5	PASS
			VN	0	20.43	0.01	±2.5	PASS
			VN	10	23.69	0.01	±2.5	PASS
			VN	20	14.63	0.01	±2.5	PASS
			VN	30	21.38	0.01	±2.5	PASS
			VN	40	22.64	0.01	±2.5	PASS
			VN	50	15.22	0.01	±2.5	PASS
GPRS1900	GPRS	MCH	VN	-30	22.63	0.01	±2.5	PASS
			VN	-20	20.49	0.01	±2.5	PASS
			VN	-10	29.33	0.01	±2.5	PASS
			VN	0	23.61	0.01	±2.5	PASS
			VN	10	14.19	0.01	±2.5	PASS
			VN	20	22.43	0.01	±2.5	PASS
			VN	30	19.83	0.01	±2.5	PASS
			VN	40	22.49	0.01	±2.5	PASS
			VN	50	18.27	0.01	±2.5	PASS
GPRS1900	GPRS	HCH	VN	-30	22.63	0.01	±2.5	PASS
			VN	-20	20.49	0.01	±2.5	PASS
			VN	-10	26.43	0.01	±2.5	PASS
			VN	0	23.18	0.01	±2.5	PASS
			VN	10	35.62	0.02	±2.5	PASS
			VN	20	24.37	0.01	±2.5	PASS
			VN	30	15.26	0.01	±2.5	PASS
			VN	40	24.33	0.01	±2.5	PASS
			VN	50	11.29	0.01	±2.5	PASS

Frequency Error vs. Voltage:

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
HSPA 850	HSPA	LCH	TN	3.4	-11.34	-0.02	±2.5	PASS
			TN	3.7	-16.47	-0.01	±2.5	PASS
			TN	4.2	-10.28	-0.02	±2.5	PASS
		MCH	TN	3.4	-13.24	-0.01	±2.5	PASS
			TN	3.7	-15.22	-0.01	±2.5	PASS
			TN	4.2	-9.51	-0.01	±2.5	PASS
		HCH	TN	3.4	-14.23	-0.02	±2.5	PASS
			TN	3.7	-10.29	-0.02	±2.5	PASS
			TN	4.2	-14.33	-0.02	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
HSPA 850	HSPA	LCH	TN	3.4	36.14	0.02	±2.5	PASS
			TN	3.7	33.27	0.02	±2.5	PASS
			TN	4.2	32.69	0.02	±2.5	PASS
		MCH	TN	3.4	45.36	0.02	±2.5	PASS
			TN	3.7	31.37	0.02	±2.5	PASS
			TN	4.2	32.48	0.02	±2.5	PASS
		HCH	TN	3.4	36.33	0.02	±2.5	PASS
			TN	3.7	32.59	0.02	±2.5	PASS
			TN	4.2	41.36	0.03	±2.5	PASS

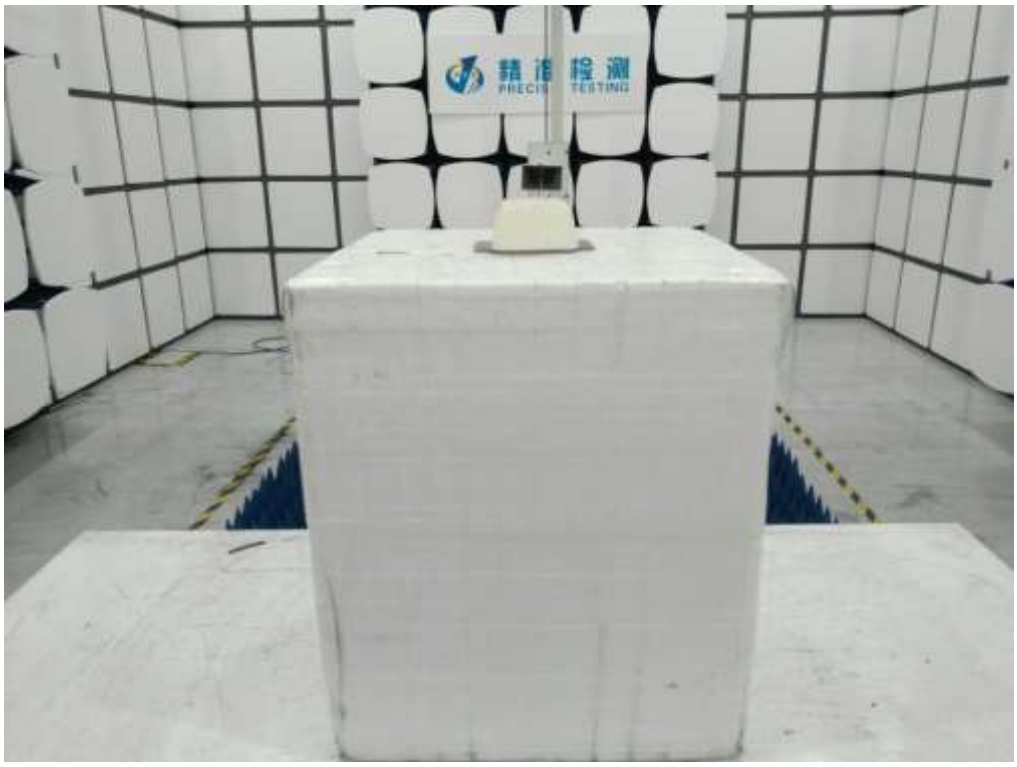
Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
HSPA 850	HSPA	LCH	VN	-30	-8.35	-0.01	±2.5	PASS
			VN	-20	-14.18	-0.02	±2.5	PASS
			VN	-10	-6.58	-0.01	±2.5	PASS
			VN	0	-16.13	-0.02	±2.5	PASS
			VN	10	-13.14	-0.02	±2.5	PASS
			VN	20	-16.39	-0.02	±2.5	PASS
			VN	30	-11.64	-0.01	±2.5	PASS
			VN	40	-13.24	-0.01	±2.5	PASS
			VN	50	-13.67	-0.01	±2.5	PASS
HSPA 850	HSPA	MCH	VN	-30	-6.51	-0.01	±2.5	PASS
			VN	-20	13.29	0.01	±2.5	PASS
			VN	-10	-8.41	-0.01	±2.5	PASS
			VN	0	11.64	0.01	±2.5	PASS
			VN	10	-4.19	-0.01	±2.5	PASS
			VN	20	-3.18	-0.01	±2.5	PASS
			VN	30	-6.72	-0.01	±2.5	PASS
			VN	40	-14.11	-0.01	±2.5	PASS
			VN	50	-9.37	-0.01	±2.5	PASS
HSPA 850	HSPA	HCH	VN	-30	-13.69	-0.02	±2.5	PASS
			VN	-20	-14.57	-0.01	±2.5	PASS
			VN	-10	-16.71	-0.02	±2.5	PASS
			VN	0	-12.05	-0.01	±2.5	PASS
			VN	10	-13.21	-0.02	±2.5	PASS
			VN	20	-16.37	-0.02	±2.5	PASS
			VN	30	-11.34	-0.02	±2.5	PASS
			VN	40	-12.96	-0.02	±2.5	PASS
			VN	50	-18.26	-0.02	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
HSPA1900	HSPA	LCH	VN	-30	33.24	0.02	±2.5	PASS
			VN	-20	38.21	0.02	±2.5	PASS
			VN	-10	36.11	0.02	±2.5	PASS
			VN	0	33.47	0.02	±2.5	PASS
			VN	10	42.16	0.02	±2.5	PASS
			VN	20	49.37	0.02	±2.5	PASS
			VN	30	41.06	0.02	±2.5	PASS
			VN	40	47.62	0.02	±2.5	PASS
			VN	50	35.64	0.02	±2.5	PASS
HSPA1900	HSPA	MCH	VN	-30	46.17	0.02	±2.5	PASS
			VN	-20	32.09	0.02	±2.5	PASS
			VN	-10	42.33	0.02	±2.5	PASS
			VN	0	36.29	0.02	±2.5	PASS
			VN	10	34.37	0.02	±2.5	PASS
			VN	20	42.22	0.02	±2.5	PASS
			VN	30	49.65	0.02	±2.5	PASS
			VN	40	38.37	0.02	±2.5	PASS
			VN	50	46.31	0.02	±2.5	PASS
HSPA1900	HSPA	HCH	VN	-30	56.32	0.03	±2.5	PASS
			VN	-20	30.47	0.02	±2.5	PASS
			VN	-10	51.19	0.03	±2.5	PASS
			VN	0	32.64	0.02	±2.5	PASS
			VN	10	32.34	0.02	±2.5	PASS
			VN	20	39.13	0.02	±2.5	PASS
			VN	30	42.69	0.02	±2.5	PASS
			VN	40	55.24	0.03	±2.5	PASS
			VN	50	46.33	0.03	±2.5	PASS

PHOTOGRAPHS OF TEST SETUP

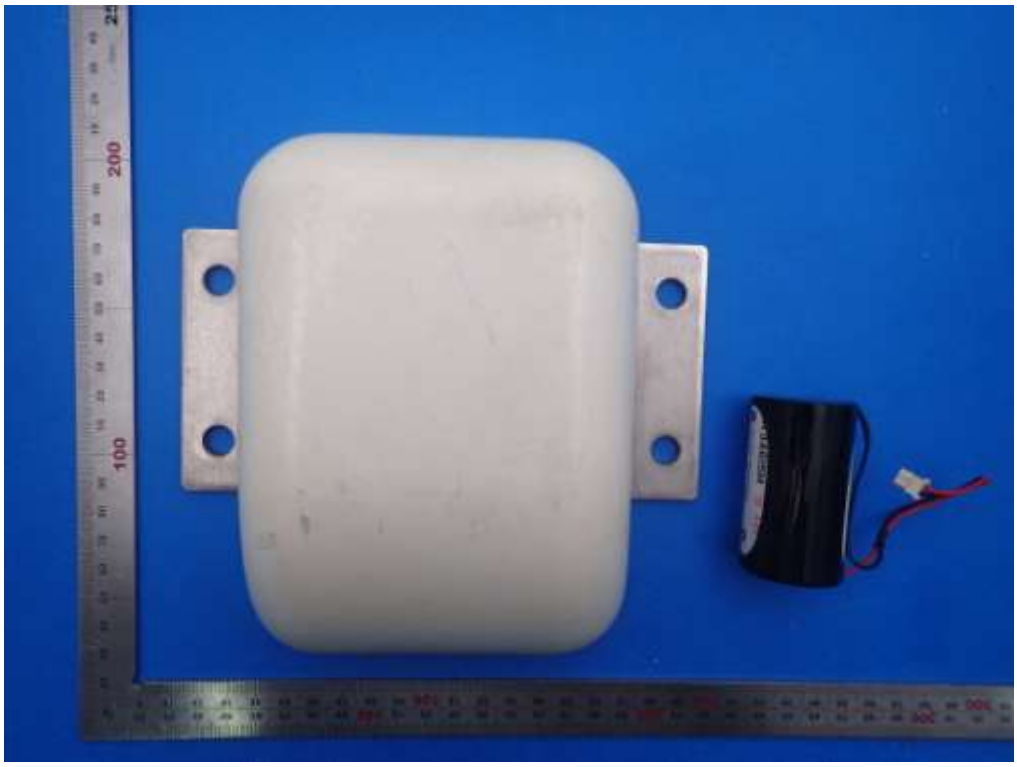
RADIATED SPURIOUS EMISSION



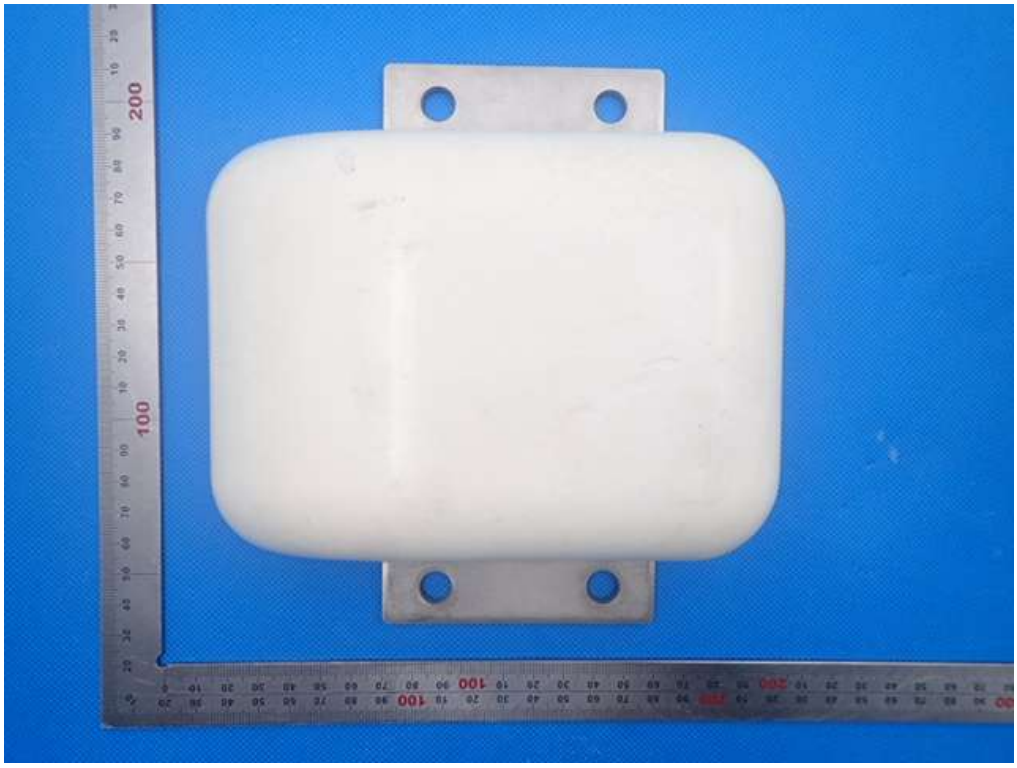
CONDUCTED MEASUREMENTS

PHOTOGRAPHS OF EUT

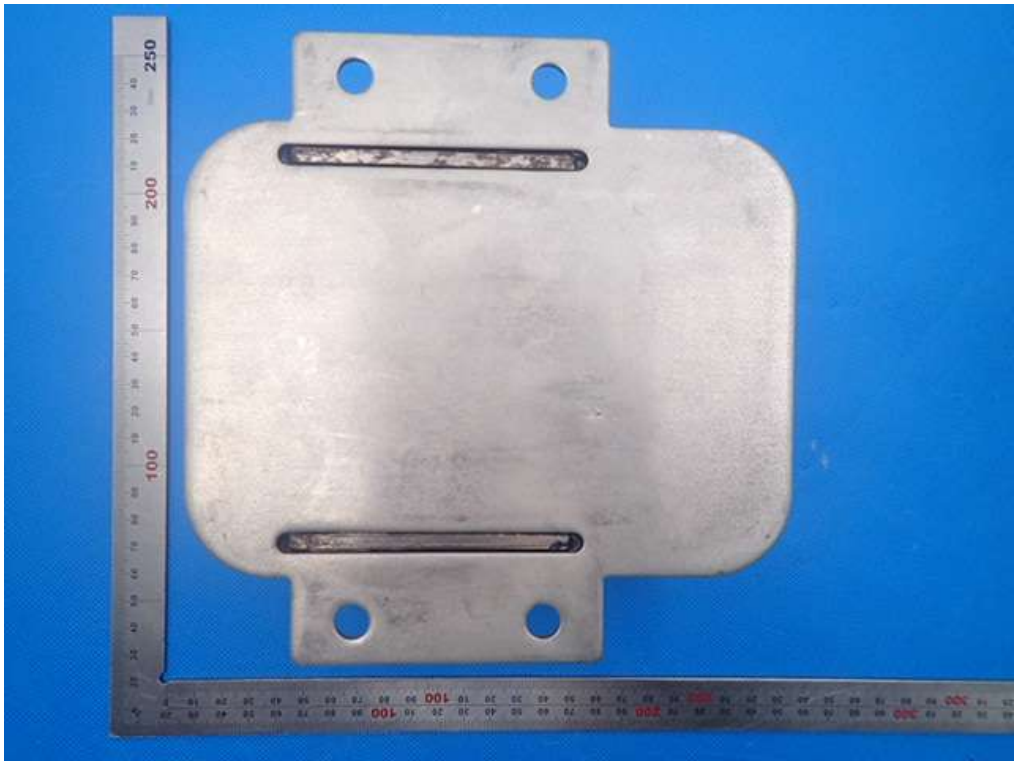
TOTAL VIEW OF EUT



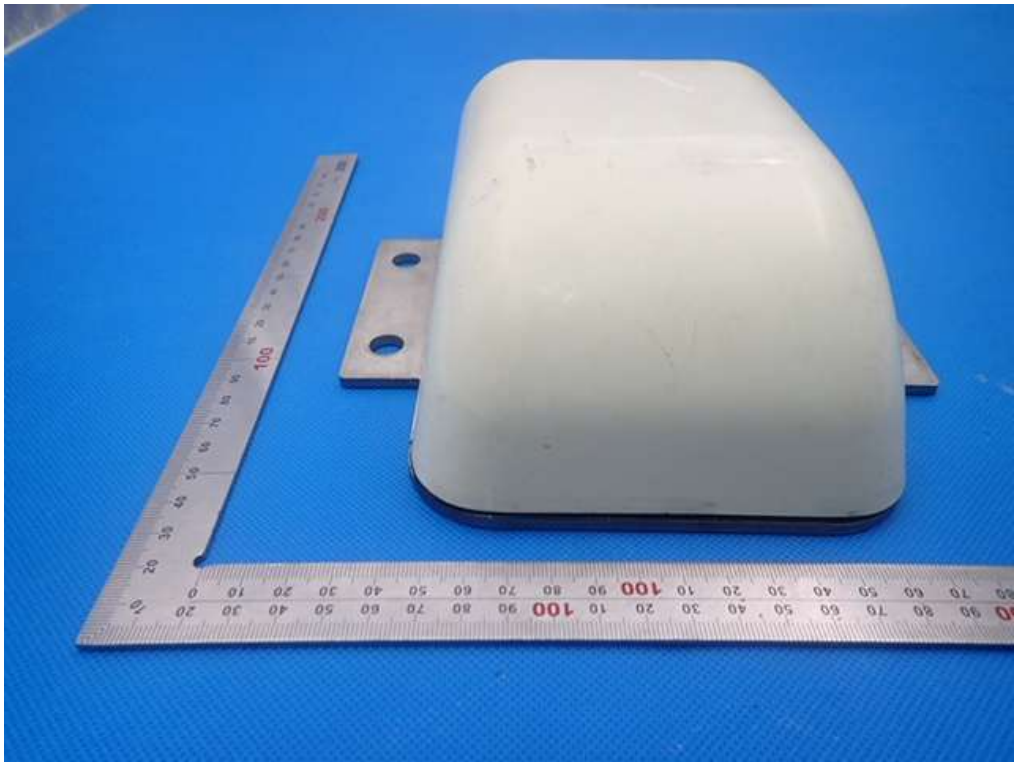
TOP VIEW OF EUT



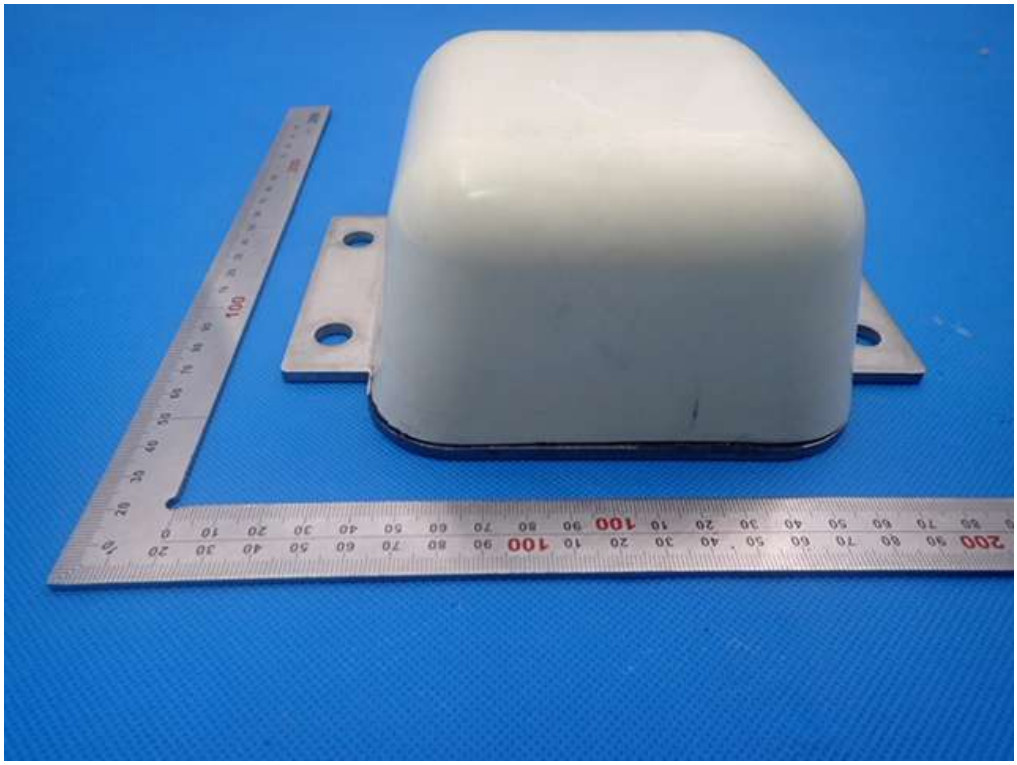
BOTTOM VIEW OF EUT



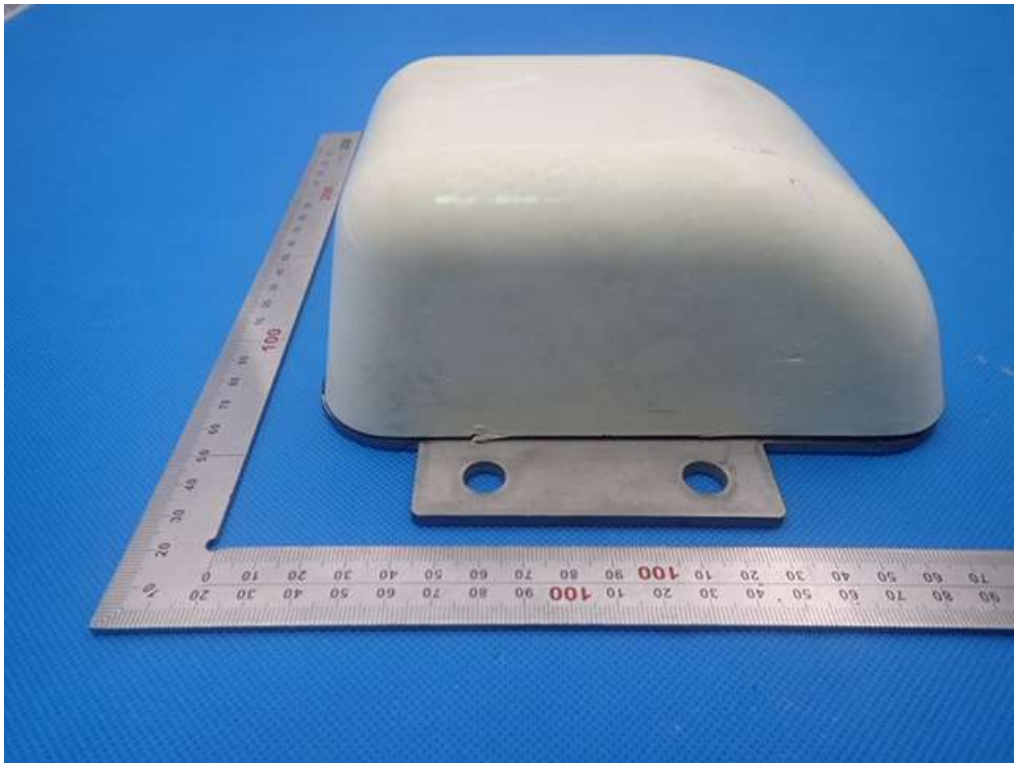
FRONT VIEW OF EUT



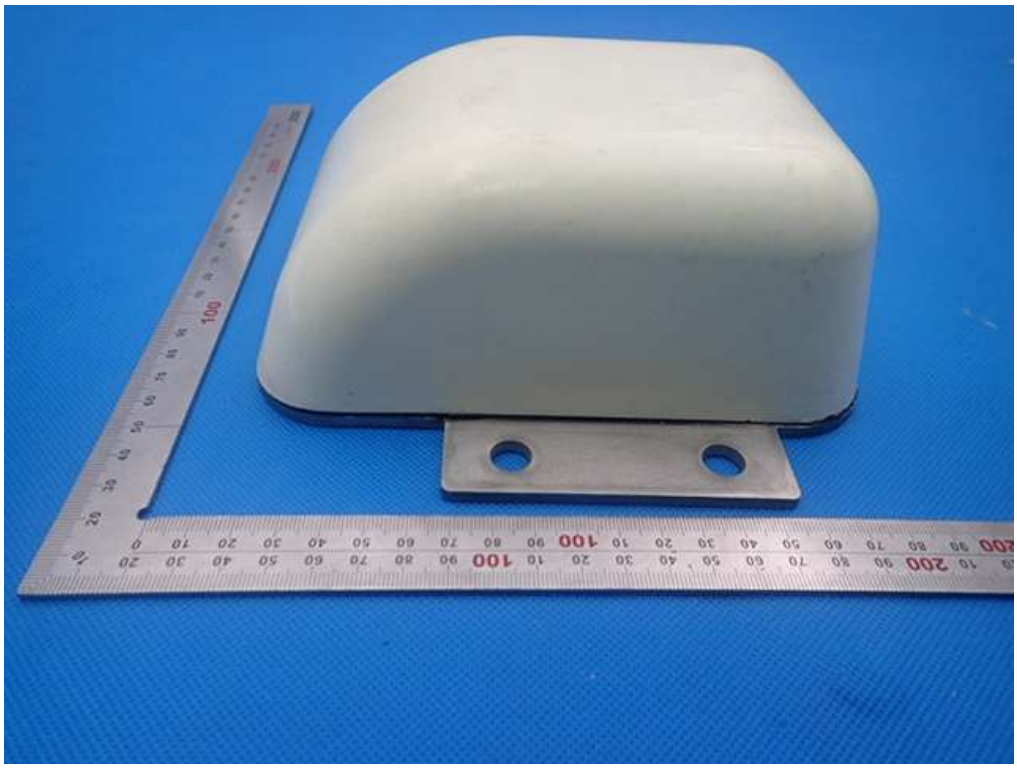
BACK VIEW OF EUT



LEFT VIEW OF EUT



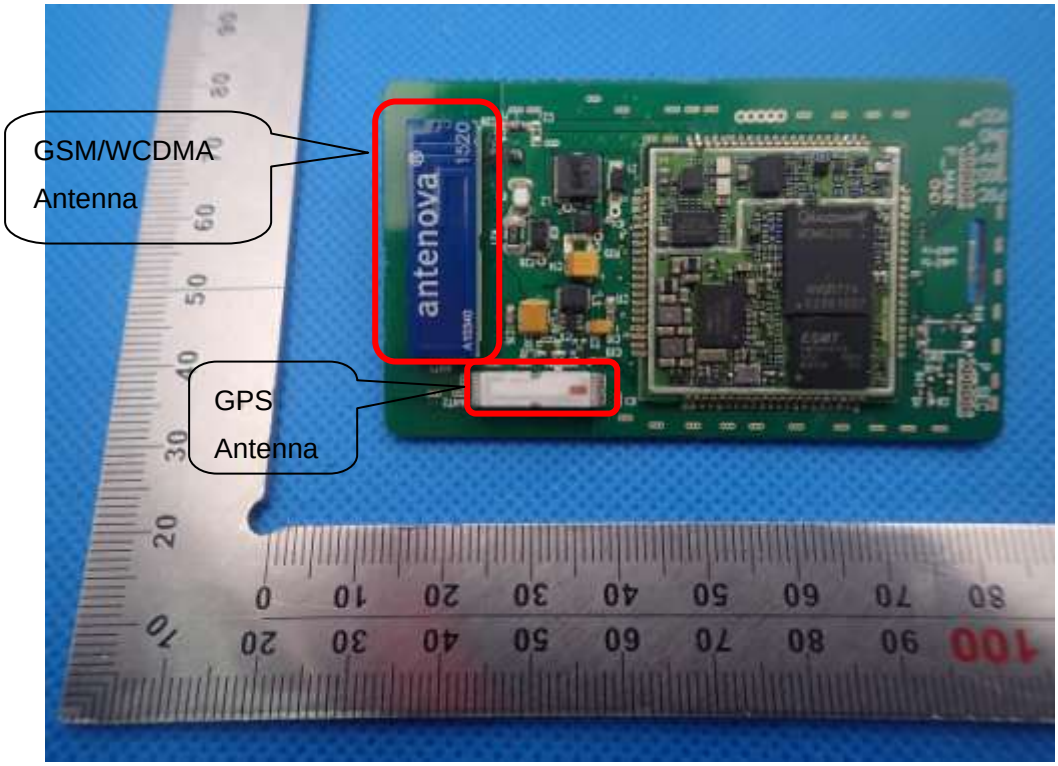
RIGHT VIEW OF EUT



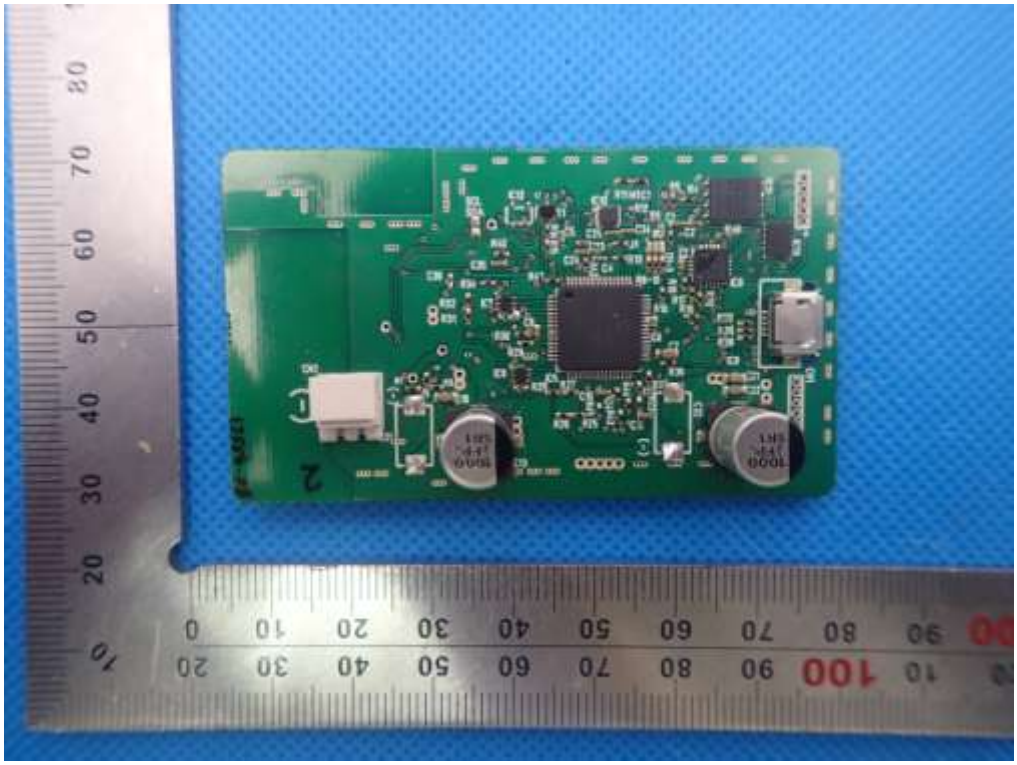
OPEN VIEW OF EUT-1

OPEN VIEW OF EUT-2

INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



----END OF REPORT----