FCC Test Report

Report No.: AGC00374160502FE02

FCC ID	:	2AIMLMODELNP1
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	NanoPhone
BRAND NAME	:	ELARI
MODEL NAME	:	Model NP1
CLIENT	:	R.B.R. Limited
DATE OF ISSUE	:	June 02, 2016
STANDARD(S) **TEST PROCEDURE(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	/	June 02, 2016	Valid	Original Report

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1. VERIFICATION OF COMPLIANCE

Applicant	R.B.R. Limited
Address	Unit 1901, Austin Plaza, 83 Austin Road, Kowloon, Hong Kong, China
Manufacturer	SHENZHEN NEWDELL SCIENCE & TECHNOLOGY CO., LTD
Address	4/F, 3# BLD., NO. 139, ZHONGXIN RD., BANTIAN, LONGGANG DISTRICT, SHENZHEN, P.R.CHINA
Product Designation	NanoPhone
Brand name	ELARI
Test Model	Model NP1
Date of Test	May 24, 2016 to May 26, 2016
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-2.5G/RF

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)	June 02, 2016
Reviewed By	Bart Xie	
	Bart Xie(Xie Xiaobin)	June 02, 2016
Approved By	Solger Zhang	
	Solger Zhang(Zhang Hongyi) Authorized Officer	June 02, 2016

2. GENERAL INFORMATION

2.1 PRODUCT DESCRIPTION

A major technical description of EUT is described as following:

Product Designation:	NanoPhone
Hardware Version:	LA07_MB_V02
Software Version:	LA07_C006
Frequency Bands:	☒GSM 850 ☒PCS 1900 (U.S. Bands) ☒GSM 900 ☒DCS 1800 (Non-U.S. Bands)
Antenna:	PIFA Antenna
Antenna gain:	1.0dBi
Battery parameter:	DC3.8V/260mAh
Adapter Input:	AC100-240V, 50-60Hz
Adapter Output:	DC5.0V, 500mA
Output Power:	30.81 dBm Maximum ERP measured for GSM 850 31.55 dBm Maximum Average Burst Power for GSM 850 28.11 dBm Maximum EIRP measured for PCS 1900 28.29 dBm Maximum Average Burst Power for PCS 1900
Single SIM Card:	The result for SIM is the worst case which was only recorded
Extreme Vol. Limits:	DC 3.4 V to DC4.35 V (Nominal DC 3.8 V)
Extreme Temp. Tolerance:	-10℃ to +50℃
** Note: 1.The High Voltage DC 4.35V and Low Voltage DC 3.4V were declared by manufacturer, The EUT could not operate normally with higher or lower voltage. 2. Other functions have been performed according to verification procedure except for MS function.	

2.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AIMLMODELNP1** filing to comply with the FCC Part 22H and 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 4, 2015	July 3, 2016
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 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9475	9745-0013	July 4, 2015	July 3, 2016
RF Cable	SCHWARZBECK	AK9515E	96221	July 4, 2015	July 3, 2016
3m Anechoic Chamber	CHENGYU	966	PTS-001	June 6, 2015	June 5, 2016
MULTI-DEVICE Positioning Controller	Max-Full	MF-7802	MF780208339	N/A	N/A
Active loop antenna (9K-30MHz)	Schwarzbeck	FMZB1519	1519-038	June 6, 2015	June 5, 2016
Spectrum analyzer	Agilent	E4407B	MY46185649	June 6, 2015	June 5, 2016
Horn Antenna (1G-18GHz)	SCHWARZBECK	BBHA9120D	9120D-1246	July 11, 2015	July 10, 2016
Horn Antenna(substituted antenna) (1G-18GHz)	ETS LINDGREN	3117	00034609	Mar 1, 2016	Feb 28, 2017
Spectrum Analyzer	Agilent	E4411B	MY4511453	July 4, 2015	July 3, 2016
Signal Amplifier	SCHWARZBECK	BBV 9718	9718-269	July 7, 2015	July 6, 2016
RF Cable	SCHWARZBECK	AK9515H	96220	July 8, 2015	July 7, 2016
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	9170-181	June 6, 2015	June 5, 2016
Artificial Mains Network	Narda	L2-16B	000WX31025	July 8, 2015	July 7, 2016
Artificial Mains Network (AUX)	Narda	L2-16B	000WX31026	July 8, 2015	July 7, 2016
RF Cable	SCHWARZBECK	AK9515E	96222	July 4, 2015	July 3, 2016
Shielded Room	CHENGYU	843	PTS-002	June 6,2015	June 5,2016
COMMUNICATION TESTER	AGILENT	8960	GB46490550	July 25, 2015	July 24, 2016
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 and the charger, earphone 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	22.913(a) / 24.232 (b)
		Radiated	
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	Mains Conducted Emission		15.107 / 15.207
5	Frequency Stability		2.1055 /24.235
6	Occupied Bandwidth		2.1049 (h)(i)
7	Emission Bandwidth		22.917(b) / 24.238 (b)
8	Band Edge		22.917(b) / 24.238 (b)

3.4 CONFIGURATION OF EUT SYSTEM

Fig. 2-1 Configuration of EUT System

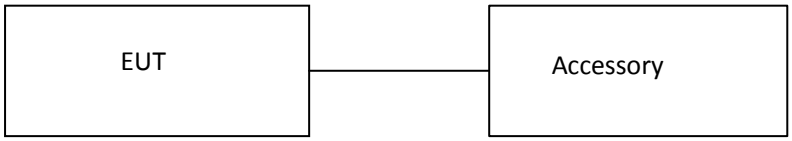


Table 2-1 Equipment Used in EUT System

Item	Equipment	Model No.	ID or Specification	Note
1	NanoPhone	Model NP1	FCC ID: 2AIMLMODELNP1	EUT
2	Adapter	N/A	DC5.0V / 500mA	Accessory
3	Battery	322730	DC3.8V/ 260 mAh	Accessory
4	Earphone	N/A	N/A	Accessory
5	USB Cable	N/A	N/A	Accessory

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

The adapter and earphone is provided by AGC-lab.

4. SUMMARY OF TEST RESULTS

Item Number	Item Description		FCC Rules	Result
1	Output Power	Conducted Output Power	22.913(a) / 24.232 (b)	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	Mains Conducted Emission		15.107 / 15.207	Pass
5	Frequency Stability		2.1055 /24.235	Pass
6	Occupied Bandwidth		2.1049 (h)(i)	Pass
7	Emission Bandwidth		22.917(b) / 24.238 (b)	Pass
8	Band Edge		22.917(b) / 24.238 (b)	Pass

5. DESCRIPTION OF TEST MODES

During the testing, the EUT (Quad-band GSM Mobile Phone) 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 modes have been tested during the test. The worst condition (GSM) was recorded in the test report if no other modes test data.

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) at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for both GSM band and PCS band.

6.1.2 PROVISIONS APPLICABLE

Conducted Output Power Limits for GSM 850 MHz			
Mode	**Power Step**	**Nominal Peak Power**	**Tolerance(dB)**
GSM	5	33 dBm (2W)	-2

Conducted Output Power Limits for PCS 1900 MHz			
Mode	**Power Step**	**Nominal Peak Power**	**Tolerance(dB)**
GSM	0	30 dBm (1W)	-2

6.1.3 MEASUREMENT RESULT

Test Result of Conducted Output Power for GSM 850 MHZ (SIM1)

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM(SIM)	824.2	33	**32.49**	-0.51	**31.55**	-9	22.55
	836.6	33	31.92	-1.08	31.42	-9	22.42
	848.8	33	31.63	-1.37	31.34	-9	22.34

Test Result of Conducted Output Power for PCS 1900 MHZ (SIM1)

Mode	Frequency (MHz)	Reference Power	Peak Power	Tolerance	Avg.Burst Power	Duty cycle Factor(dB)	Frame Power(dBm)
GSM(SIM)	1850.2	30	**29.47**	-0.53	**28.29**	-9	19.29
	1880	30	29.33	-0.67	28.16	-9	19.16
	1909.8	30	29.39	-0.61	28.18	-9	19.18

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.”

Radiated Power Limits for GSM 850 MHZ (ERP)		
Mode	**Power Step**	**Nominal Peak Power**
GSM	5	<=38.45 dBm (7W)

Radiated Power Limits for PCS 1900 MHZ (E.I.R.P.)		
Mode	**Power Step**	**Nominal Peak Power**
GSM	0	<=33 dBm (2W)

6.2.3 MEASUREMENT RESULT

Radiated Power (ERP) for GSM 850 MHZ					
Mode	Frequency	Power Step	Result		Conclusion
			Max. Peak ERP (dBm)	Polarization Of Max. ERP	
GSM	824.2	5	**30.81**	Horizontal	Pass
	836.6	5	30.65	Horizontal	Pass
	848.8	5	30.73	Horizontal	Pass

Radiated Power (E.I.R.P) for PCS 1900 MHZ					
Mode	**Frequency**	**Power Step**	**Result**		**Conclusion**
			Max. Peak E.I.R.P.(dBm)	**Polarization Of Max. E.I.R.P.**	
GSM	1850.2	0	**28.11**	Horizontal	Pass
	1880.0	0	28.02	Horizontal	Pass
	1909.8	0	28.04	Horizontal	Pass

7. PEAK-TO-AVERAGE RATIO

7.1 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).

7.2 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.

7.3 MEASUREMENT RESULT

Modes	GSM850(GSM)		
Channel	128	190	251
	(Low)	(Mid)	(High)
Frequency (MHz)	824.2	836.6	848.8
Peak-To-Average Ratio (dB)/GSM	0.94	0.50	0.29

Modes	PCS 1900 (GSM)		
Channel	512	661	810
	(Low)	(Mid)	(High)
Frequency (MHz)	1850.2	1880	1909.8
Peak-To-Average Ratio (dB)/GSM	1.18	1.17	1.21

8. OCCUPIED BANDWIDTH

8.1 MEASUREMENT METHOD

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.

8.2 PROVISIONS APPLICABLE

The occupied bandwidth (99%) shall not exceed 300 KHz.

8.3 MEASUREMENT RESULT

Appendix A: BandWidth

Test Results

Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM850	GSM	LCH	248.60	313.68	PASS
		MCH	245.33	319.22	PASS
		HCH	242.76	311.09	PASS

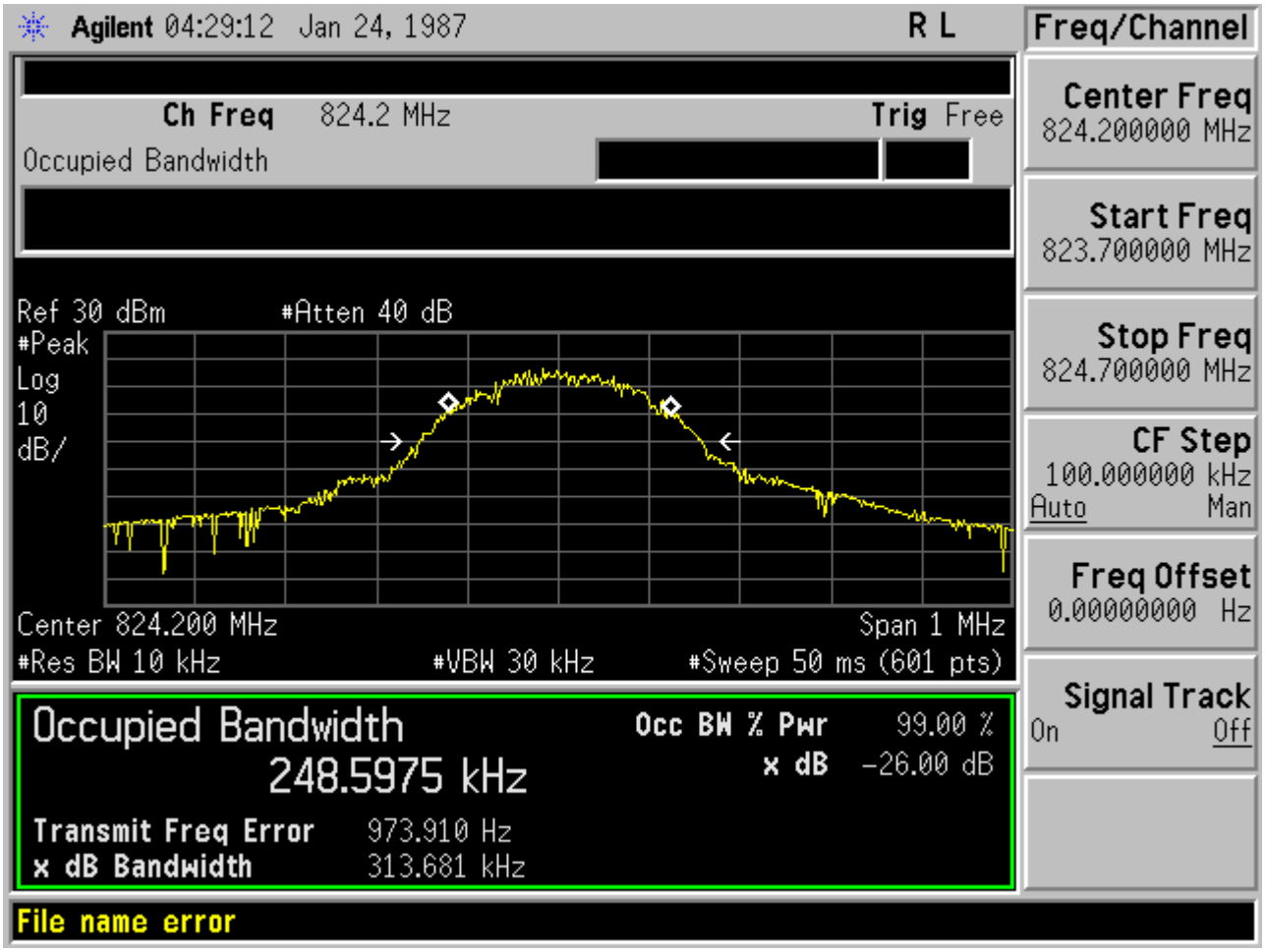
Test Band	Test Mode	Test Channel	Occupied Bandwidth (KHZ)	Emission Bandwidth (KHZ)	Verdict
GSM1900	GSM	LCH	245.17	313.75	PASS
		MCH	246.36	320.11	PASS
		HCH	243.80	316.08	PASS

For GSM

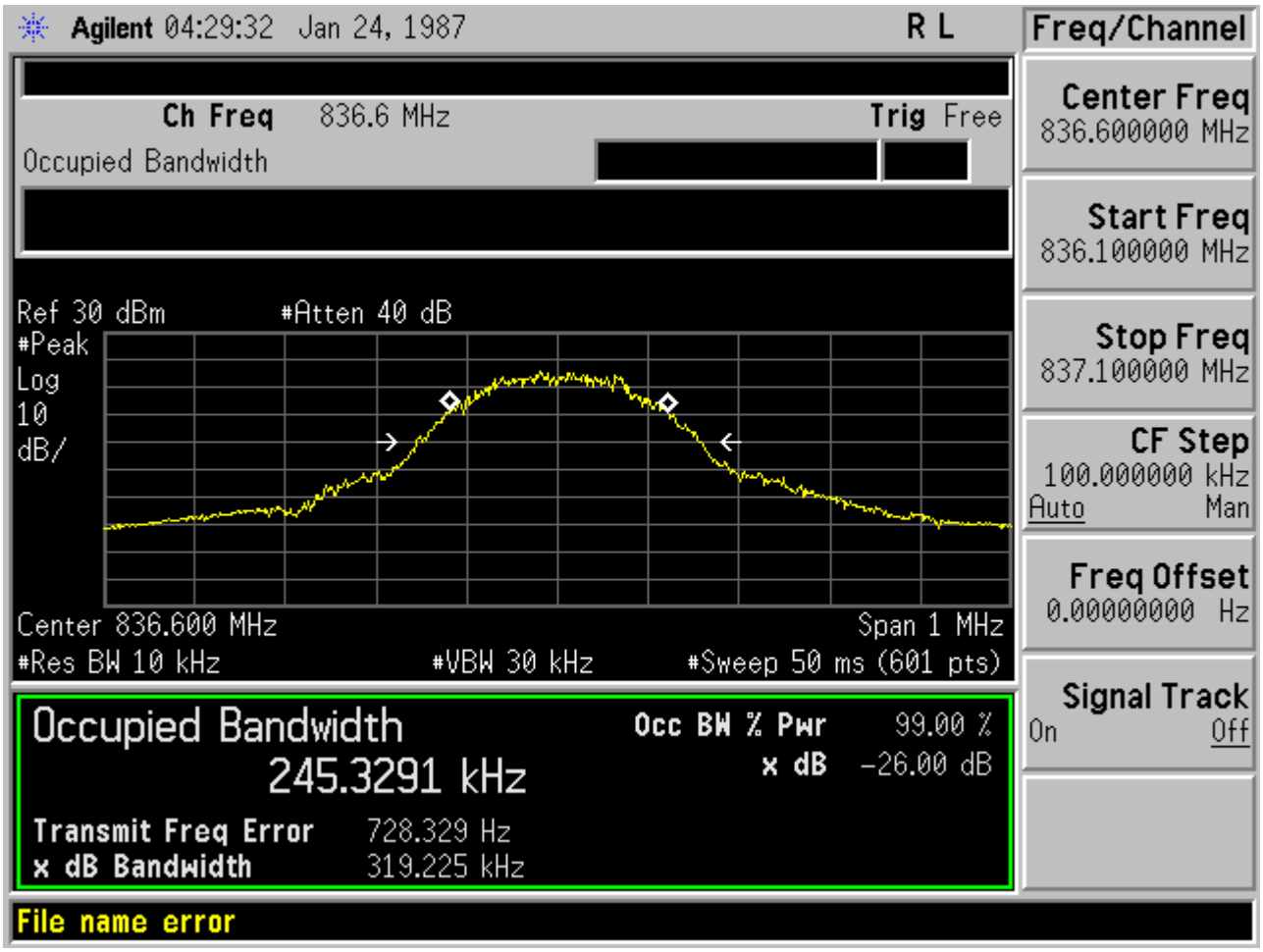
Test Band=GSM850

Test Mode=GSM

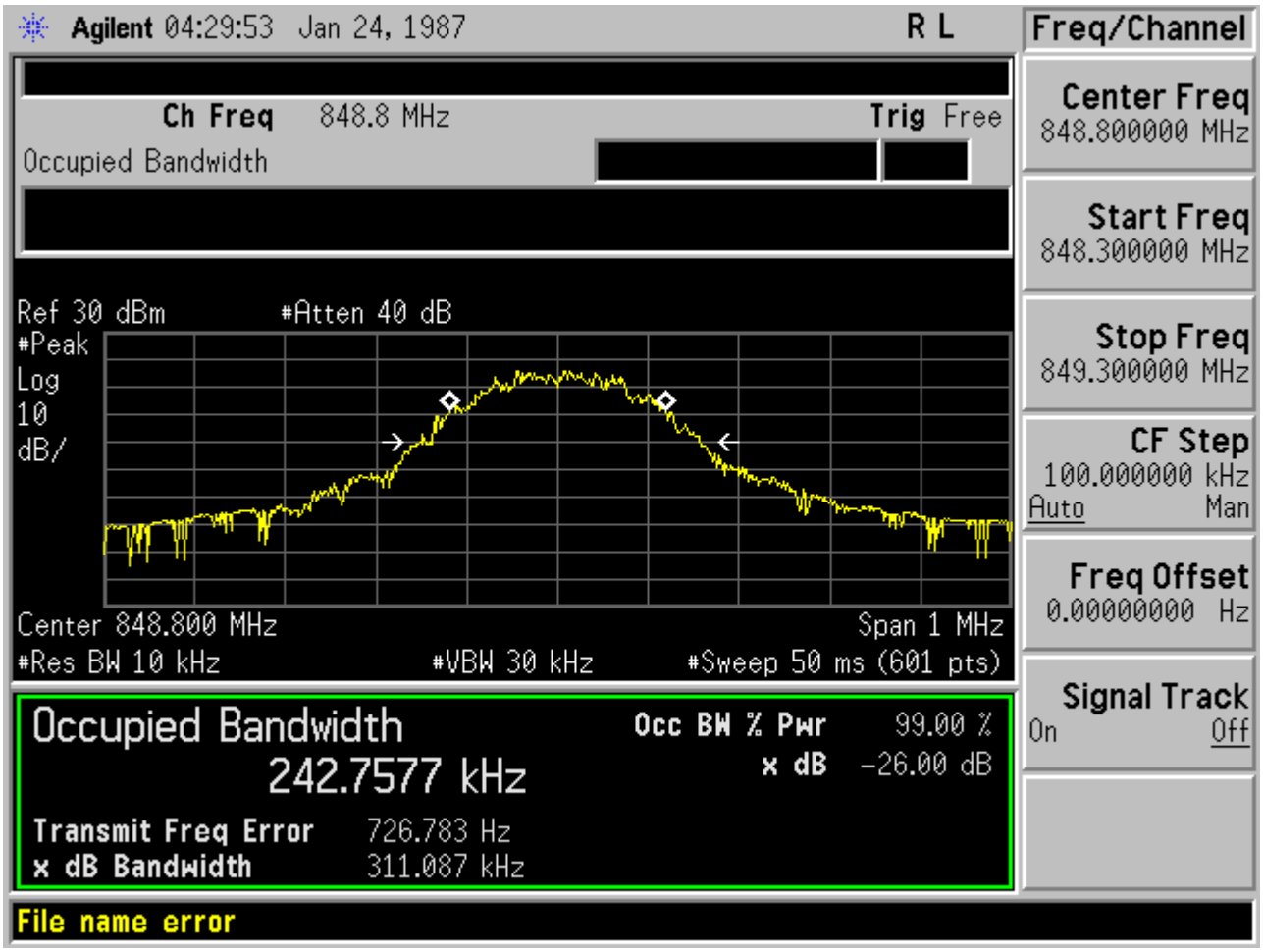
Test Channel=LCH



Test Channel=MCH



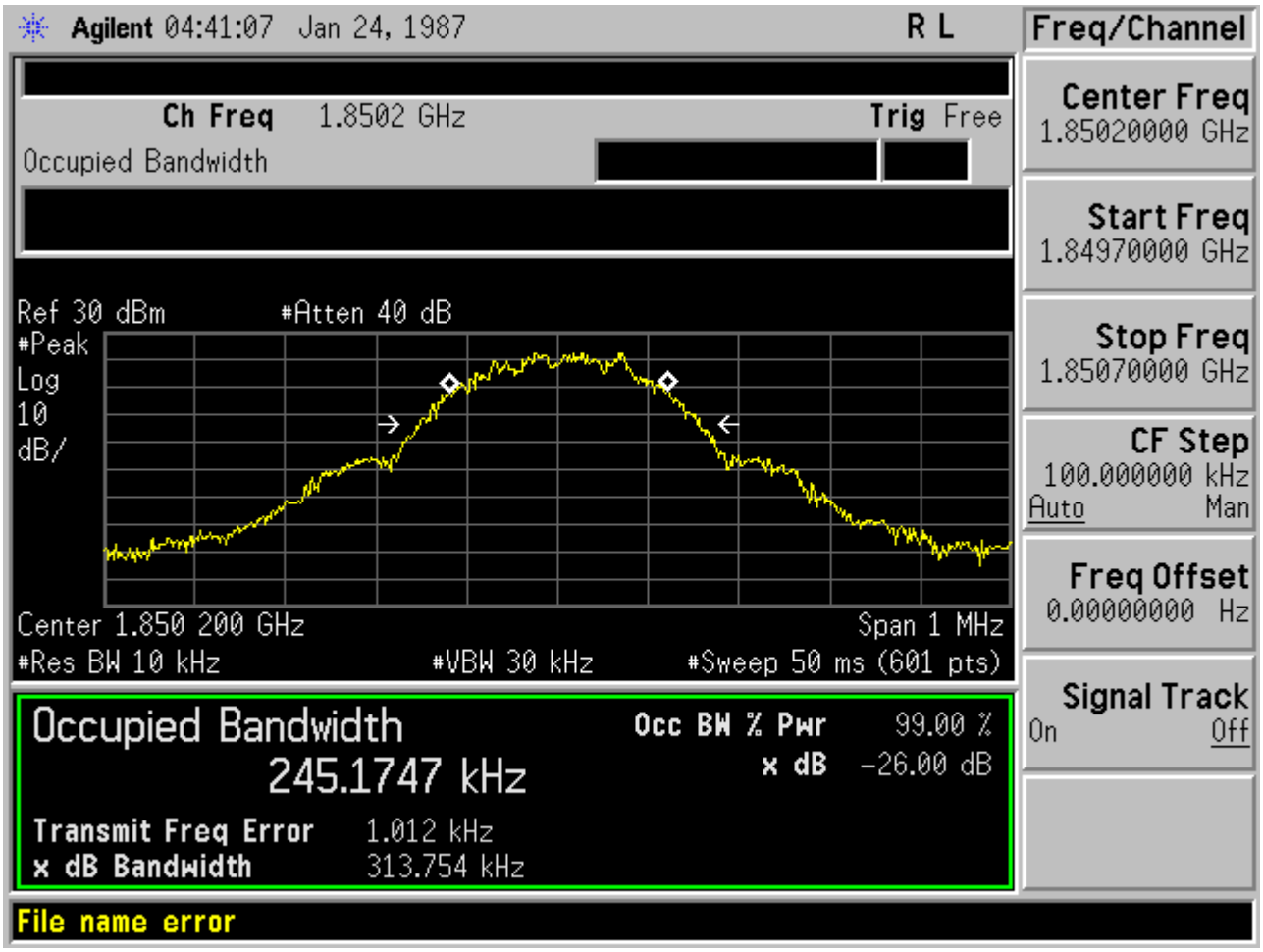
Test Channel=HCH



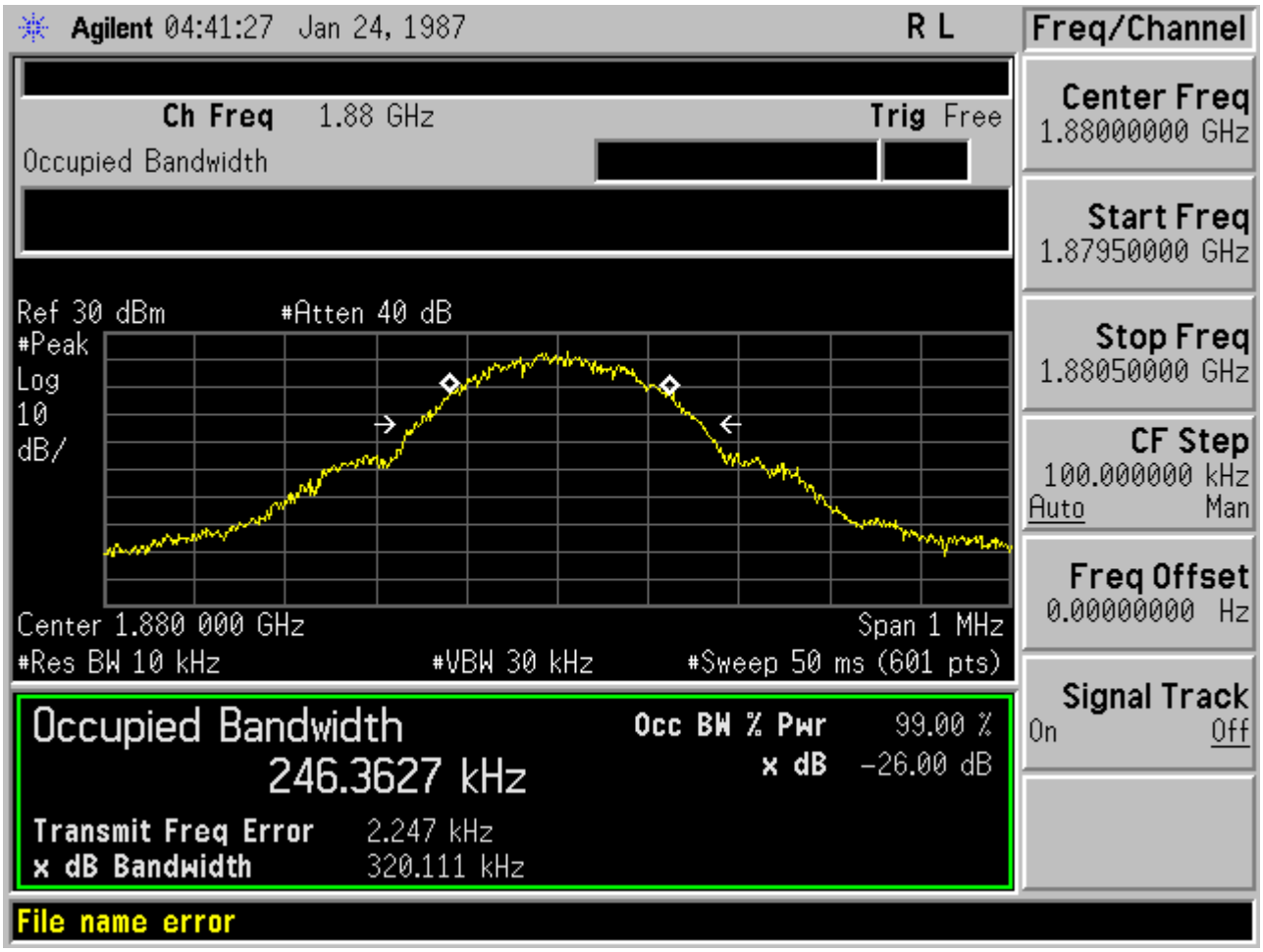
Test Band=GSM1900

Test Mode=GSM

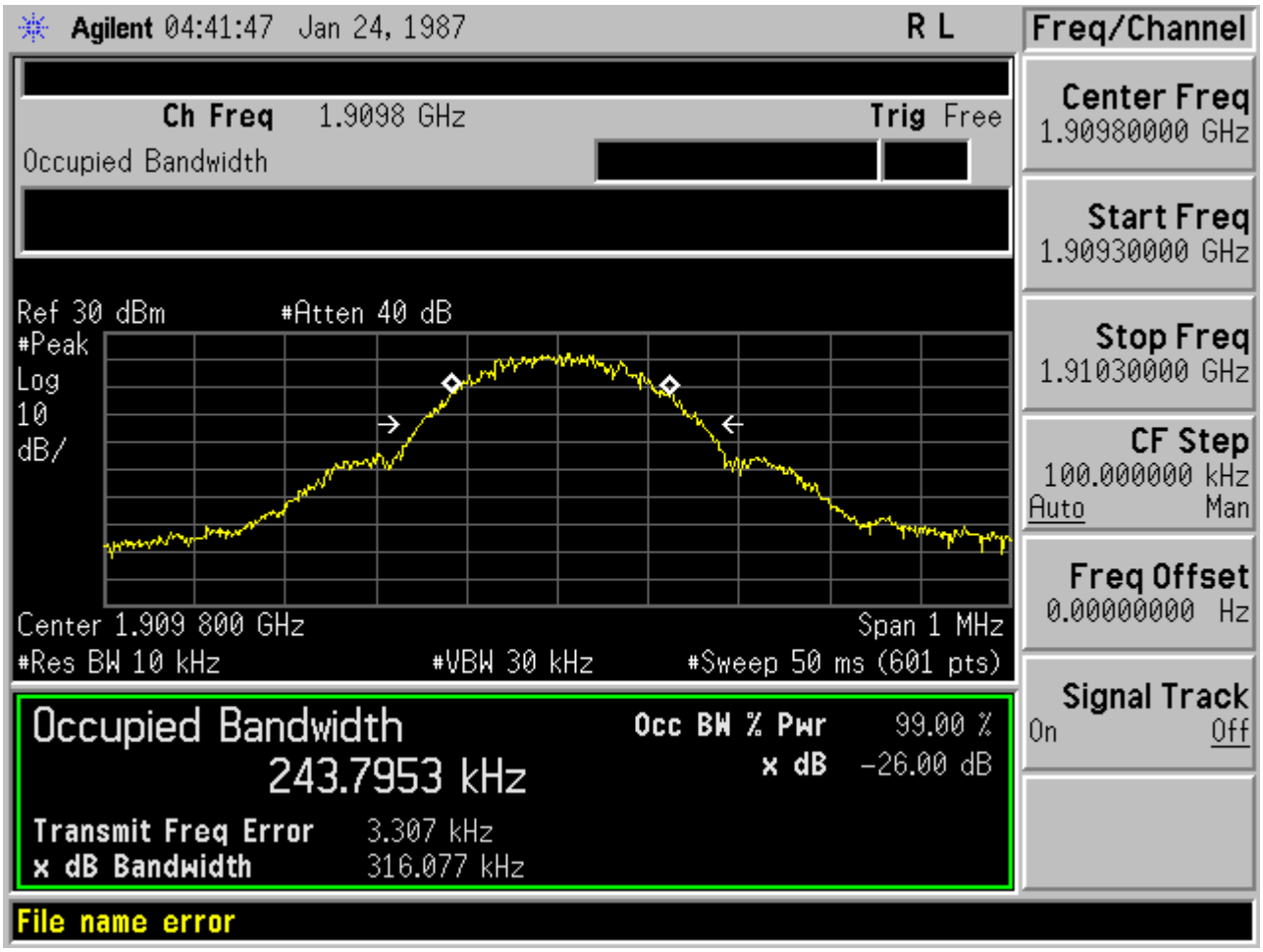
Test Channel=LCH



Test Channel=MCH



Test Channel=HCH



9. BAND EDGE

9.1 MEASUREMENT METHOD

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.

9.2 PROVISIONS APPLICABLE

as Specified in FCC rules of 22.917(b) and 24.238(b)

9.3 MEASUREMENT RESULT

APPENDIX B: BAND EDGES COMPLIANCE

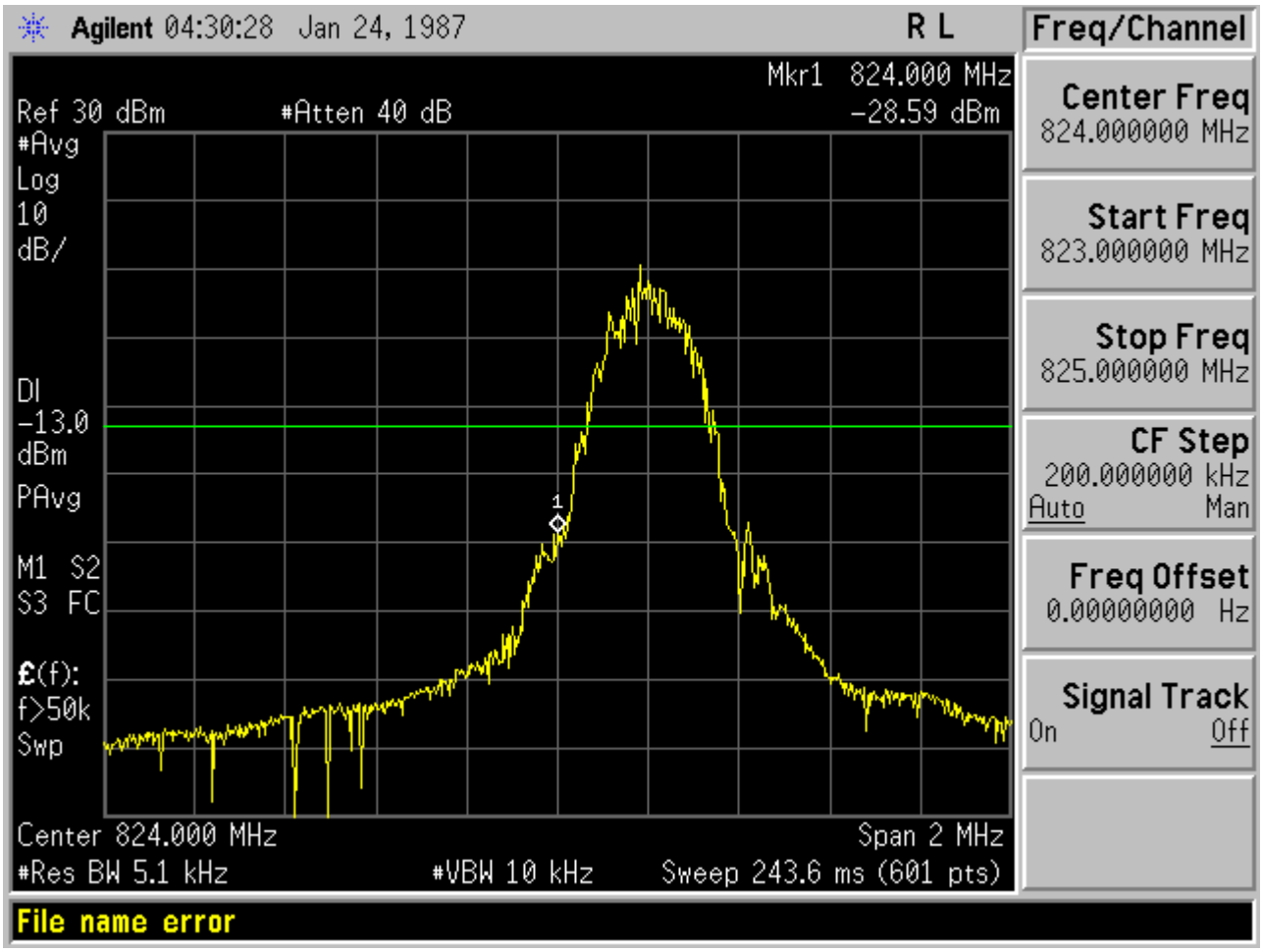
Test Results

For GSM

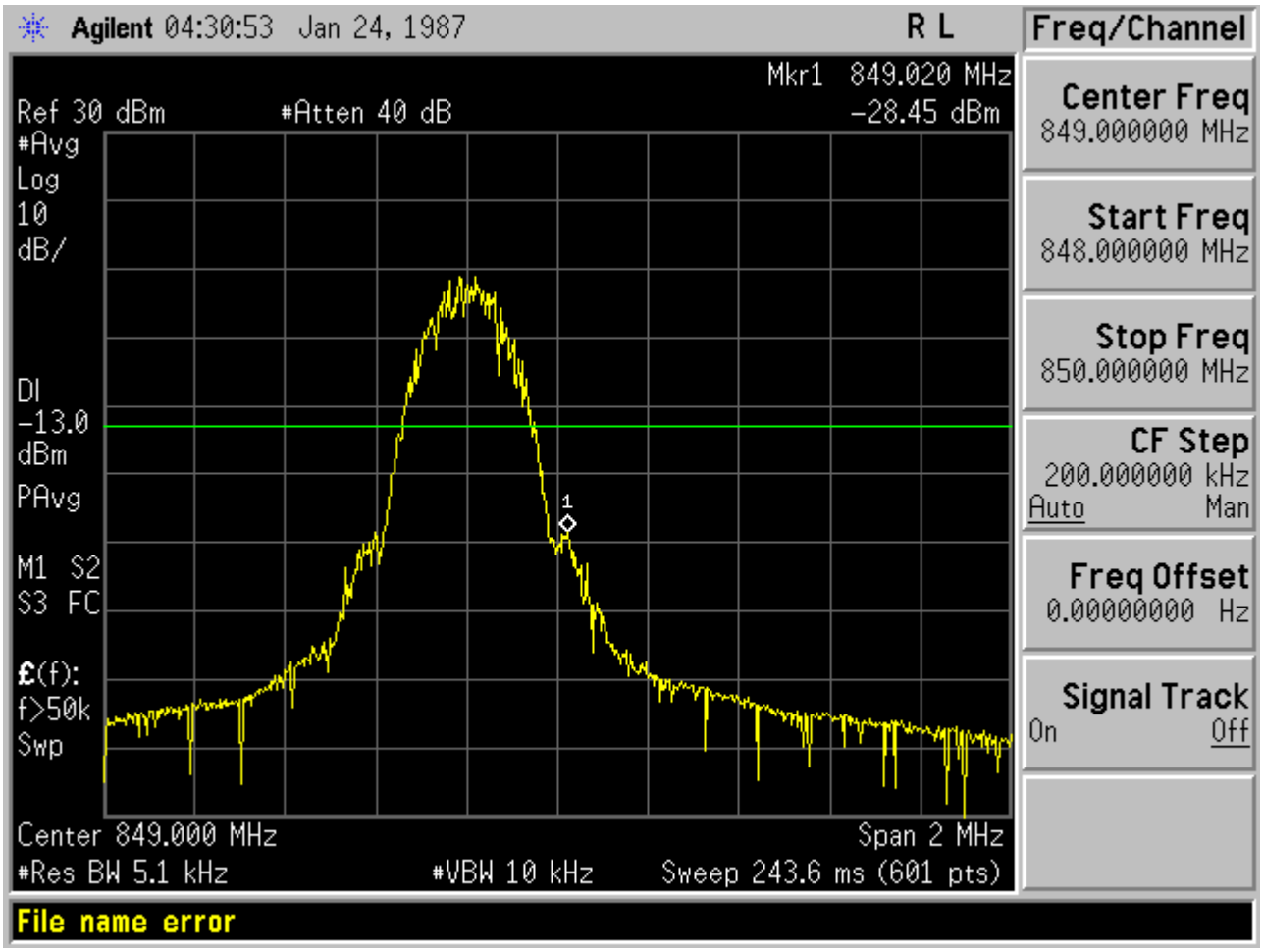
Test Band=GSM850

Test Mode=GSM

Test Channel=LCH



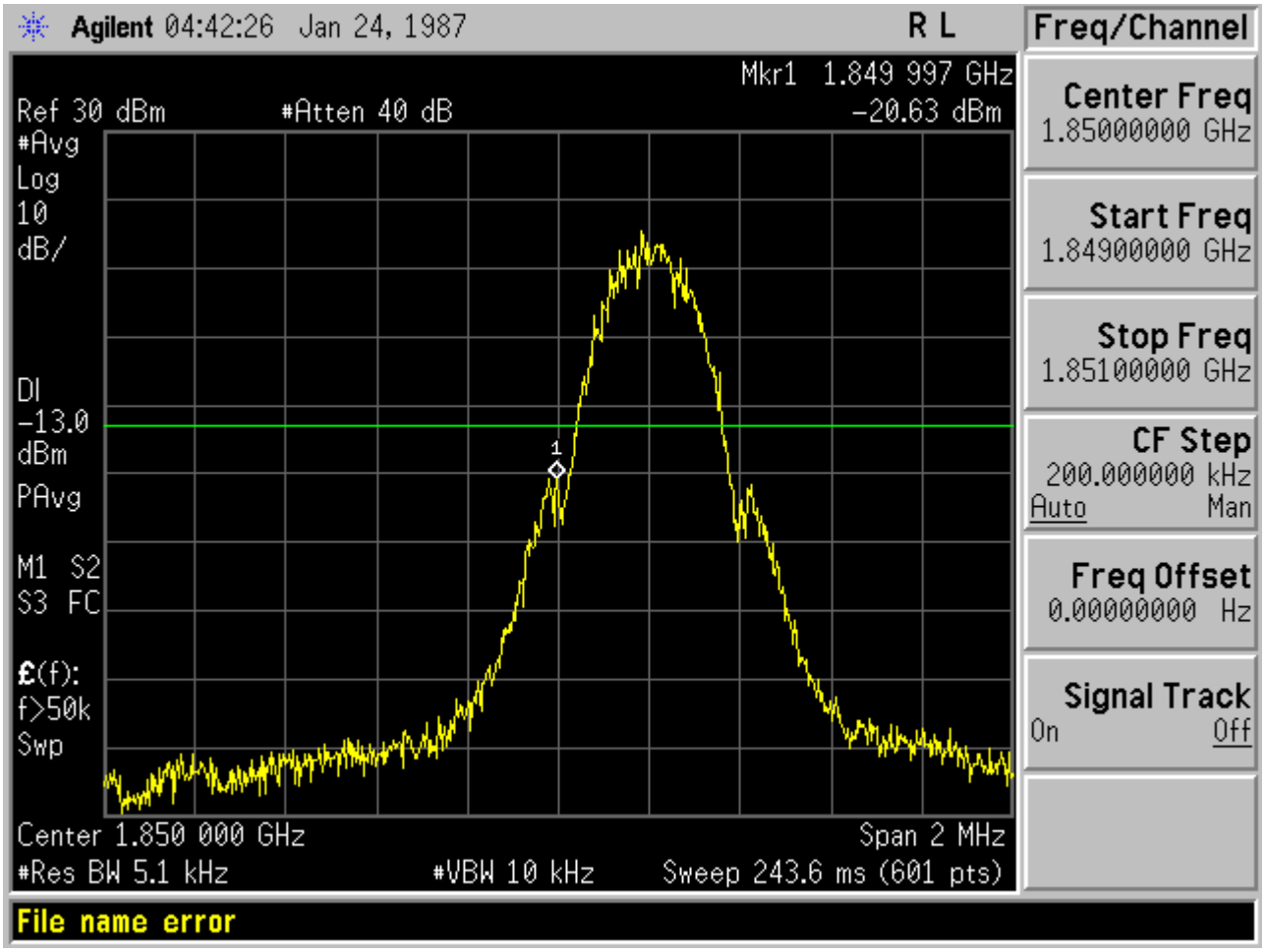
Test Channel=HCH



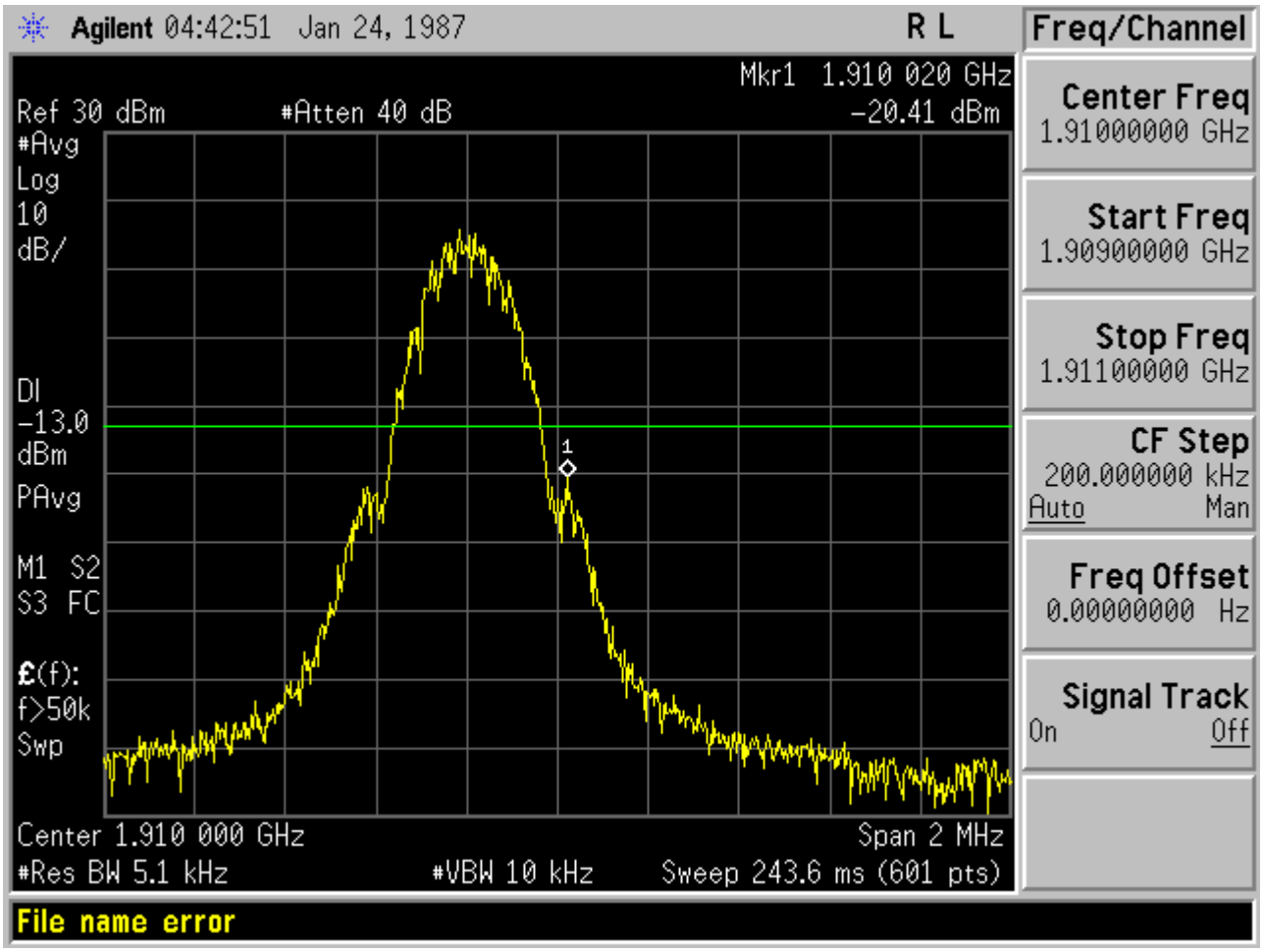
Test Band=GSM1900

Test Mode=GSM

Test Channel=LCH



Test Channel=HCH



10. SPURIOUS EMISSION

10.1 CONDUCTED SPURIOUS EMISSION

10.1.1 MEASUREMENT METHOD

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

1, 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 PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 9 GHz.

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

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

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

10.1.2 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.

10.1.3 MEASUREMENT RESULT

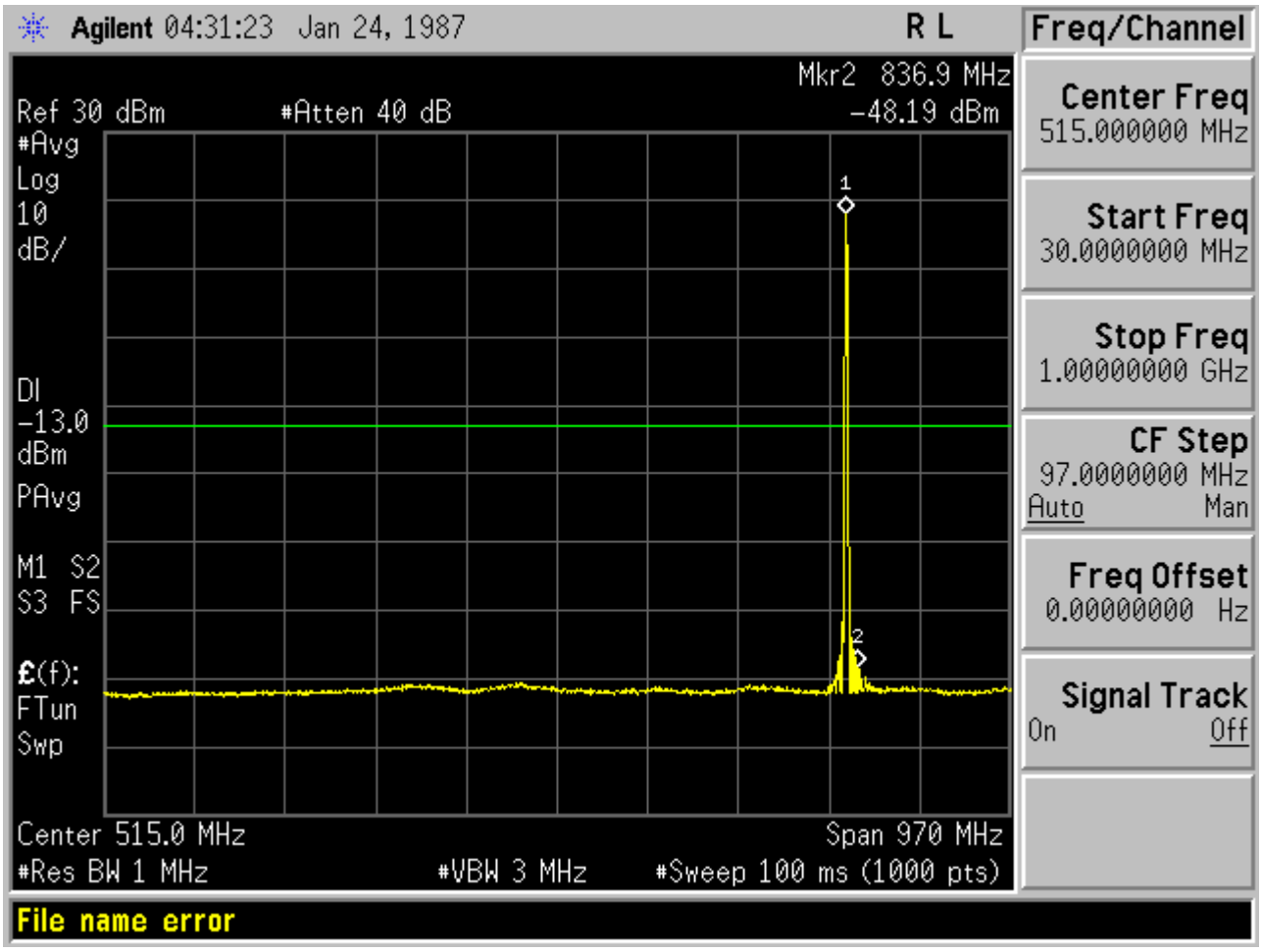
APPENDIX C: SPURIOUS EMISSION AT ANTENNA TERMINAL

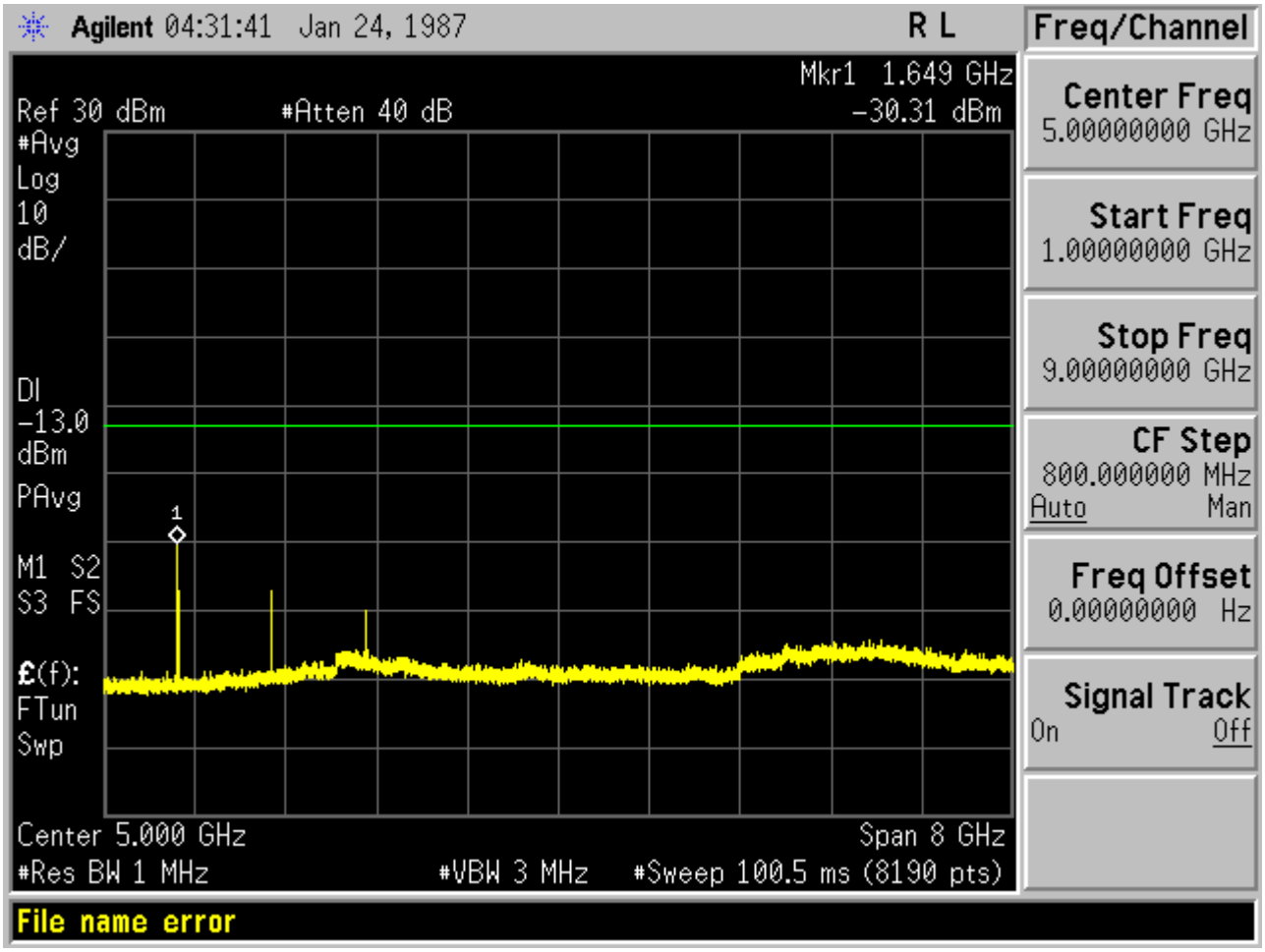
Test Results

Test Band=GSM850

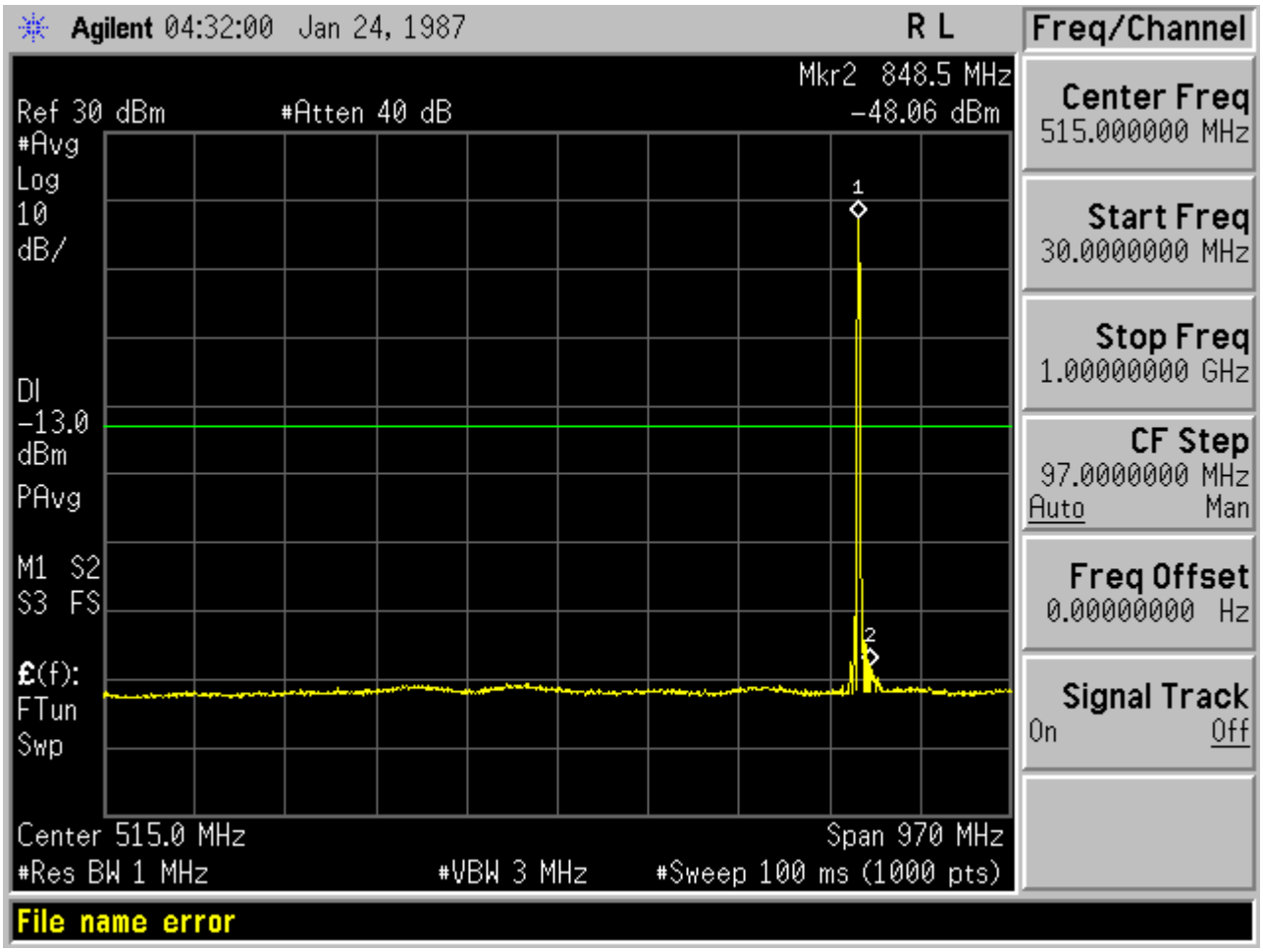
Test Mode=GSM

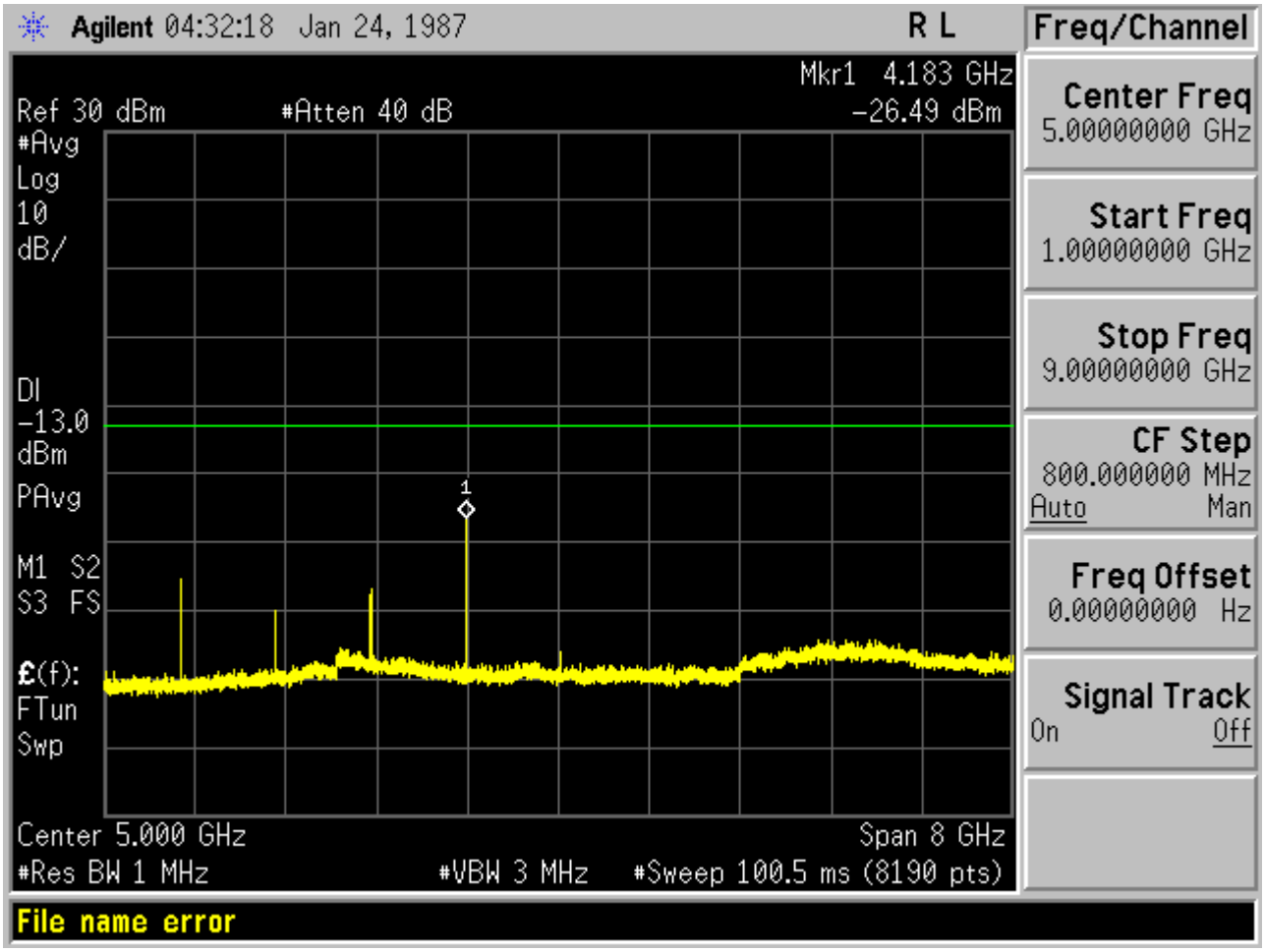
Test Channel=LCH



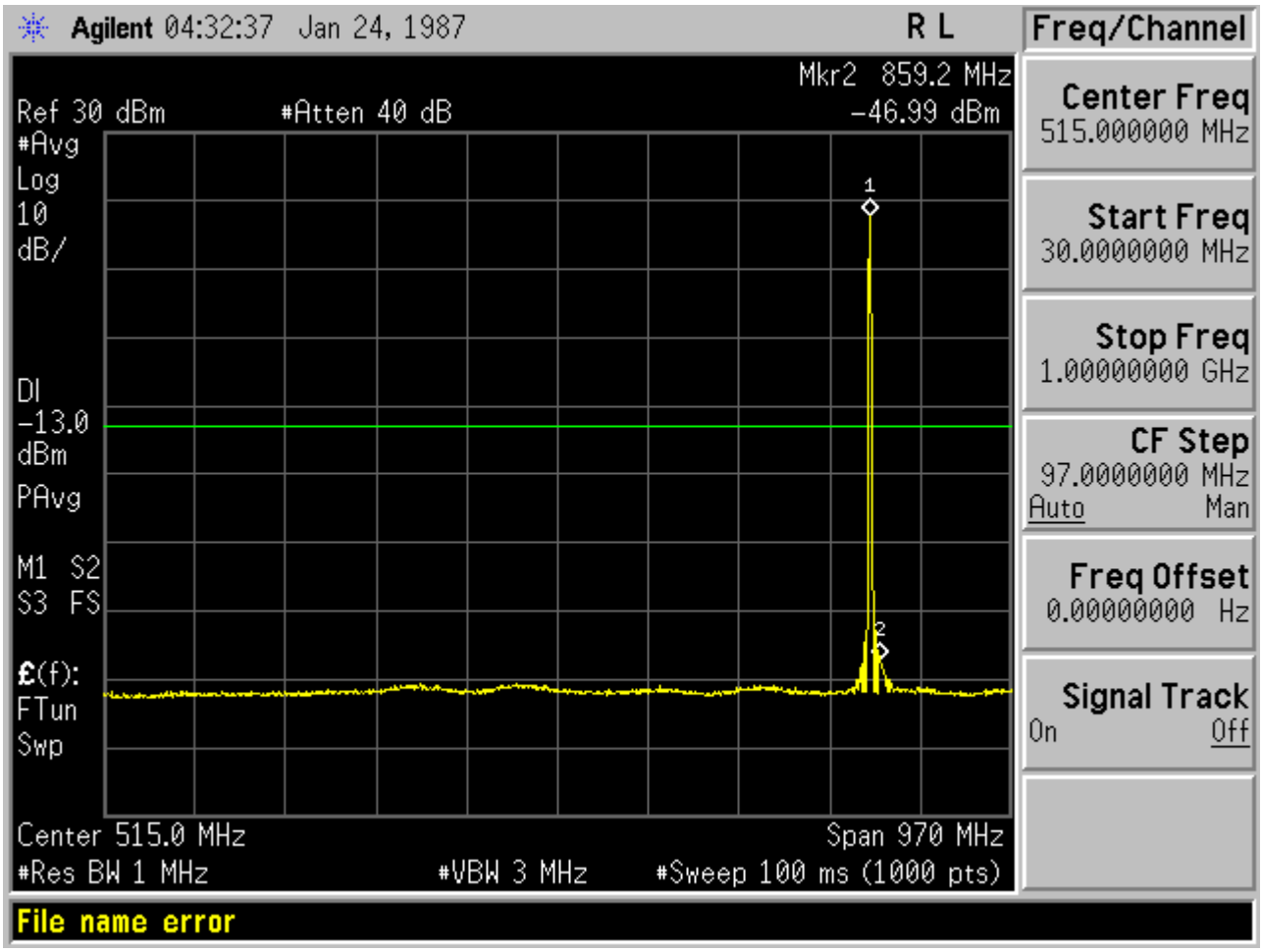

Agilent 04:31:41 Jan 24, 1987
R L
Freq/Channel
Mkr1 1.649 GHz
Ref 30 dBm
#Atten 40 dB
-30.31 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 5.000 GHz
Span 8 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.5 ms (8190 pts)
Center Freq
5.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
9.00000000 GHz
CF Step
800.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error

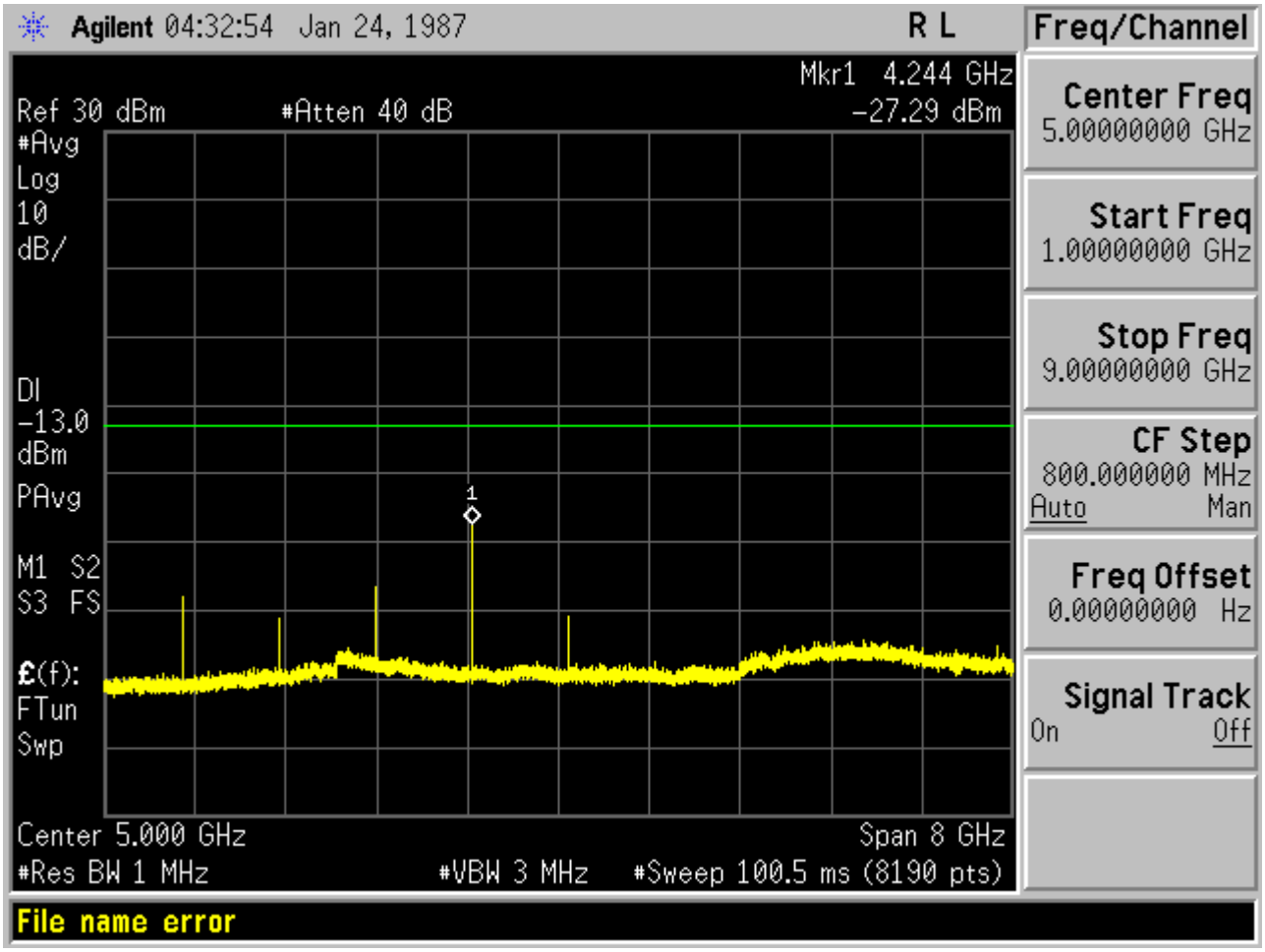
Test Channel=MCH




Agilent 04:32:18 Jan 24, 1987
R L
Freq/Channel
Mkr1 4.183 GHz
Ref 30 dBm
#Atten 40 dB
-26.49 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
1
Center Freq
5.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
9.00000000 GHz
CF Step
800.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 5.000 GHz
Span 8 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.5 ms (8190 pts)
File name error

Test Channel=HCH

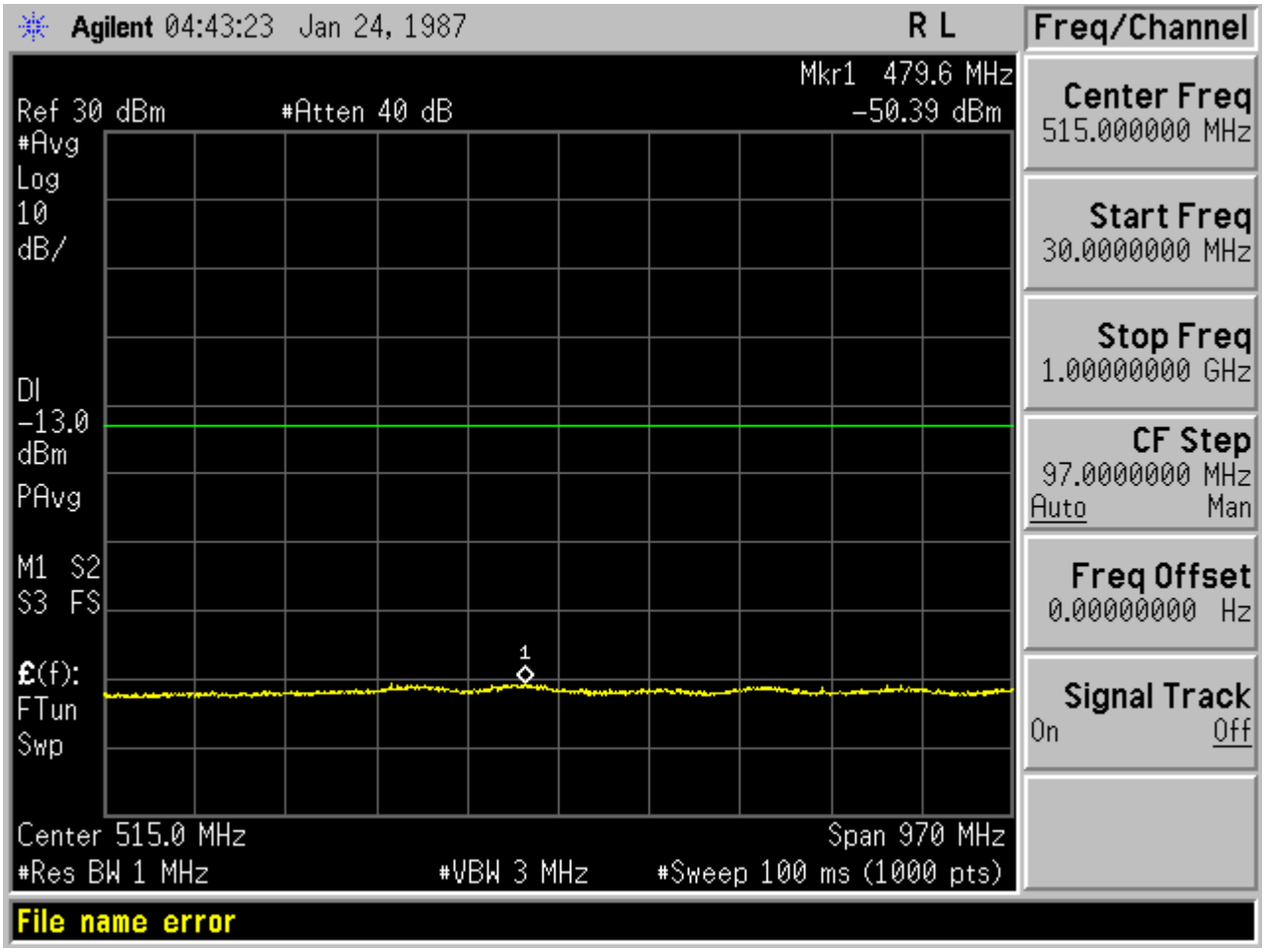


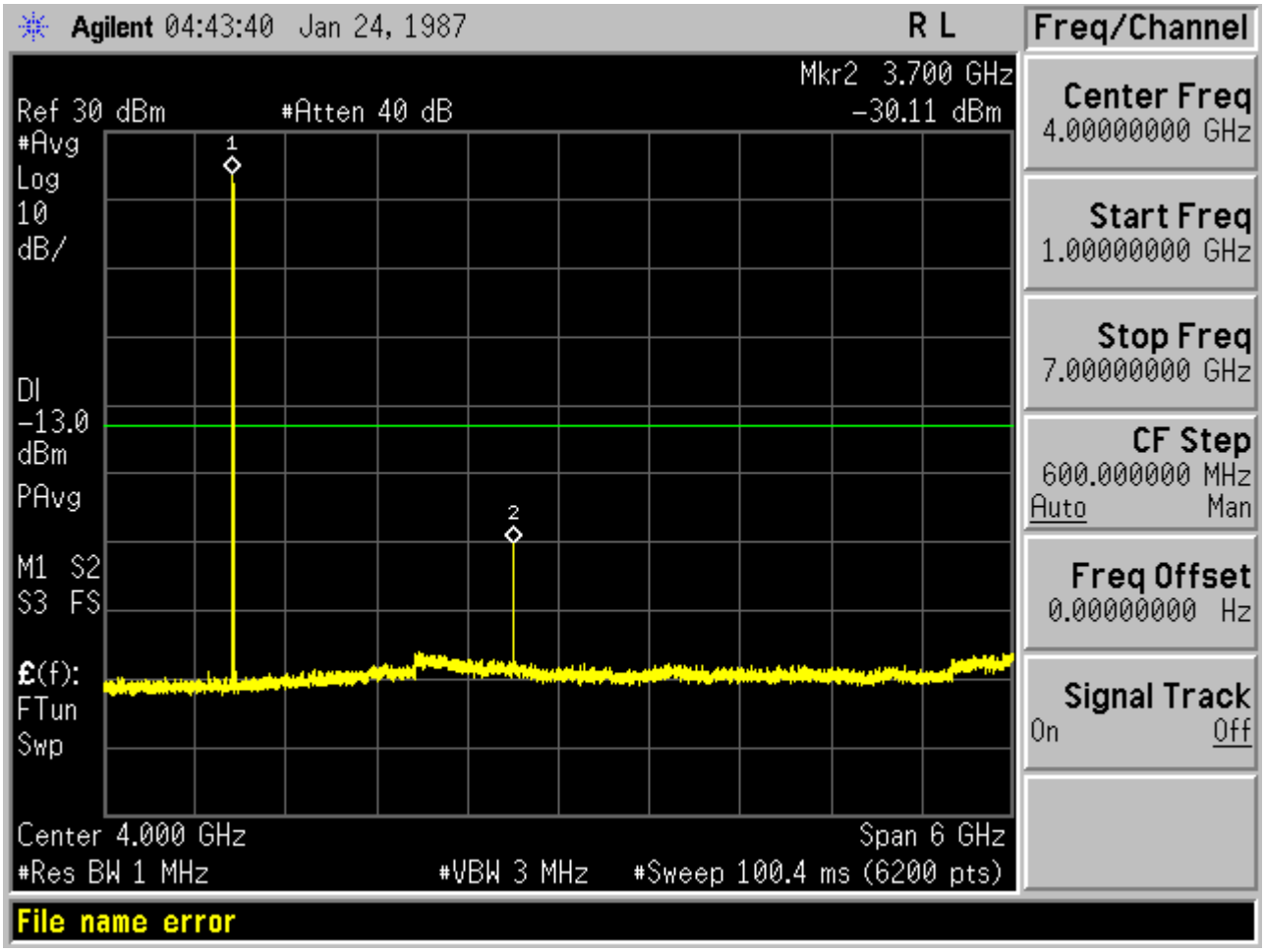

Agilent 04:32:54 Jan 24, 1987
R L
Freq/Channel
Mkr1 4.244 GHz
Ref 30 dBm
#Atten 40 dB
-27.29 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
1
Center Freq
5.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
9.00000000 GHz
CF Step
800.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 5.000 GHz
Span 8 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.5 ms (8190 pts)
File name error

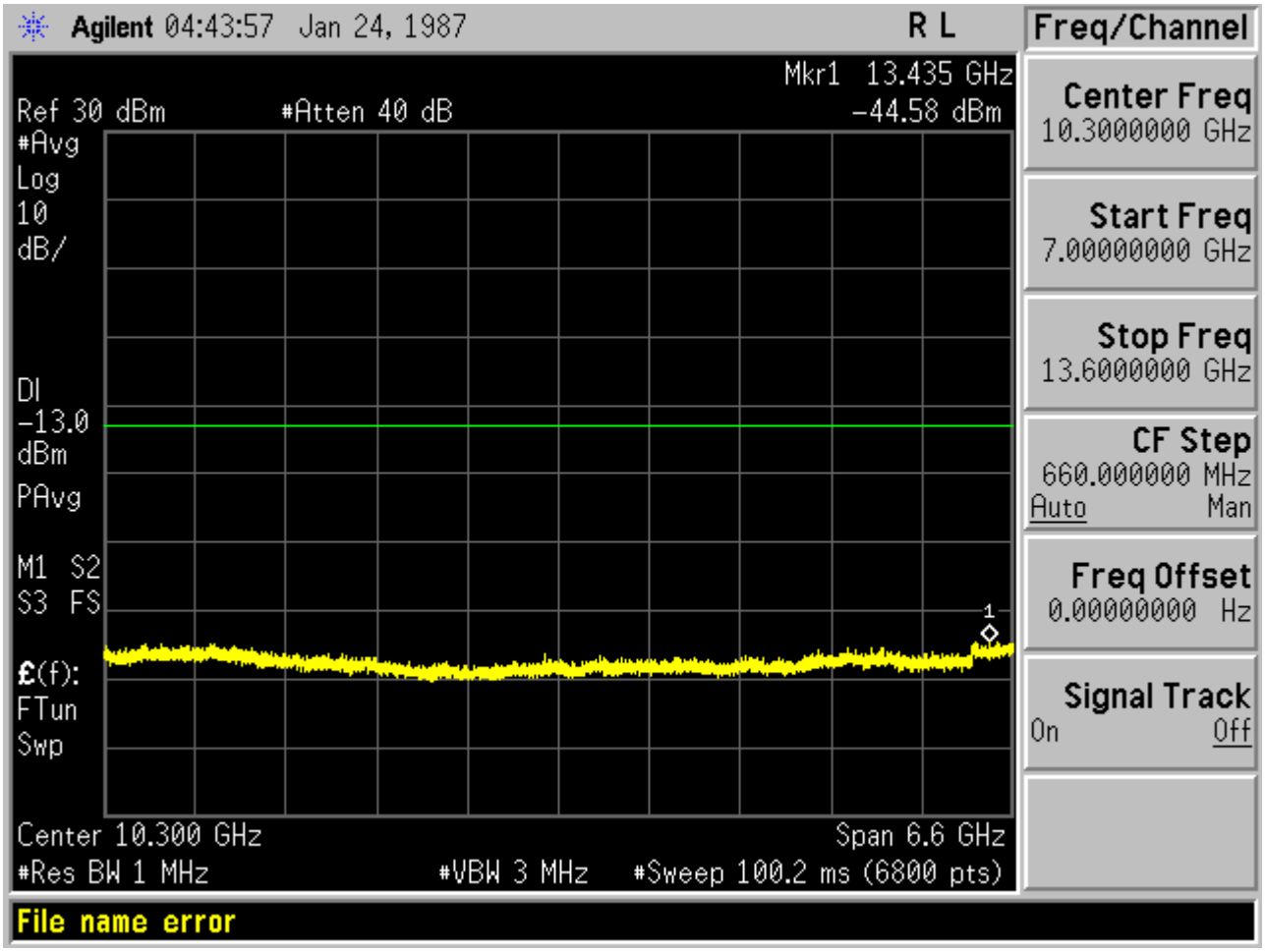
Test Band=GSM1900

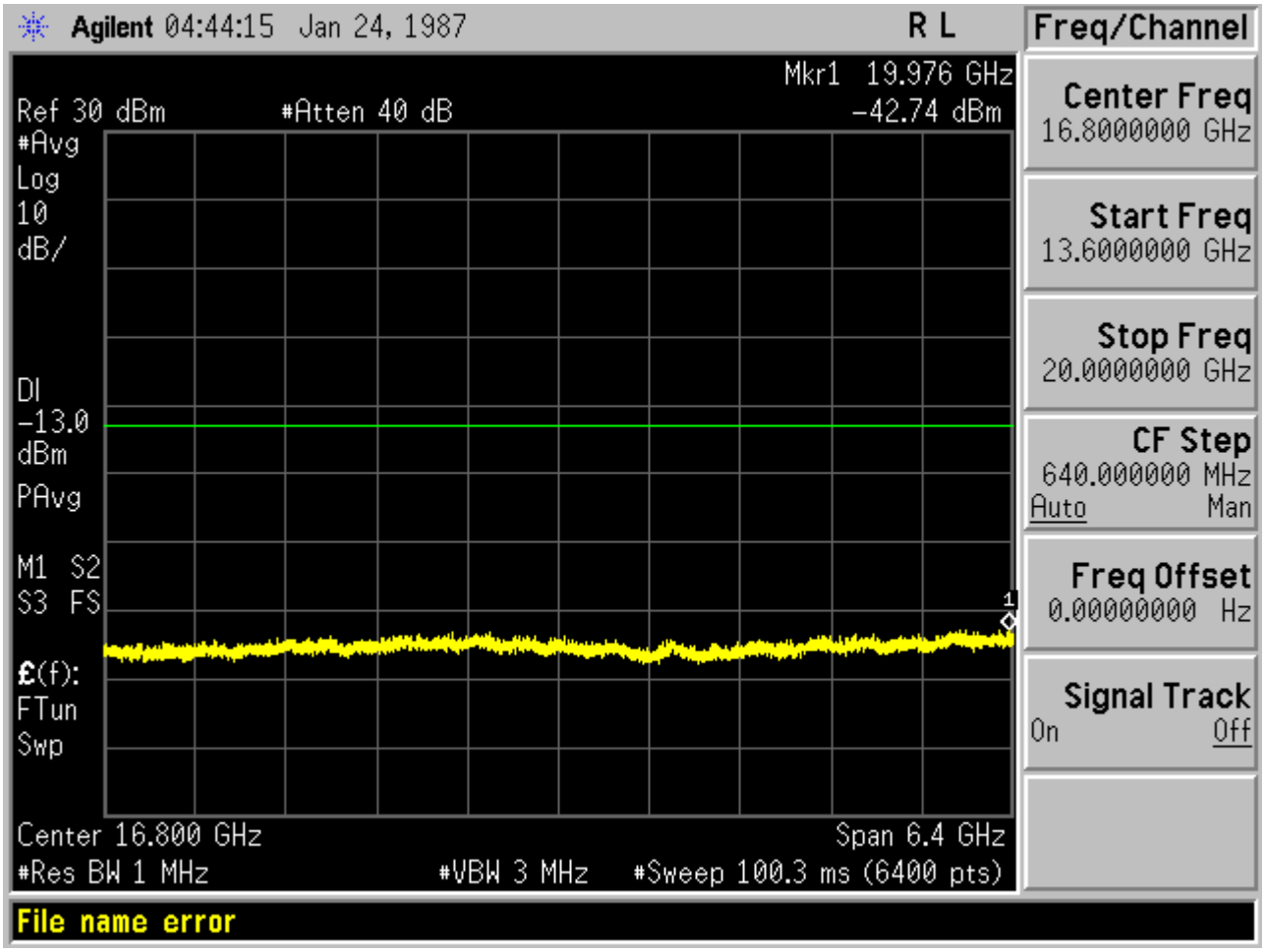
Test Mode=GSM

Test Channel=LCH

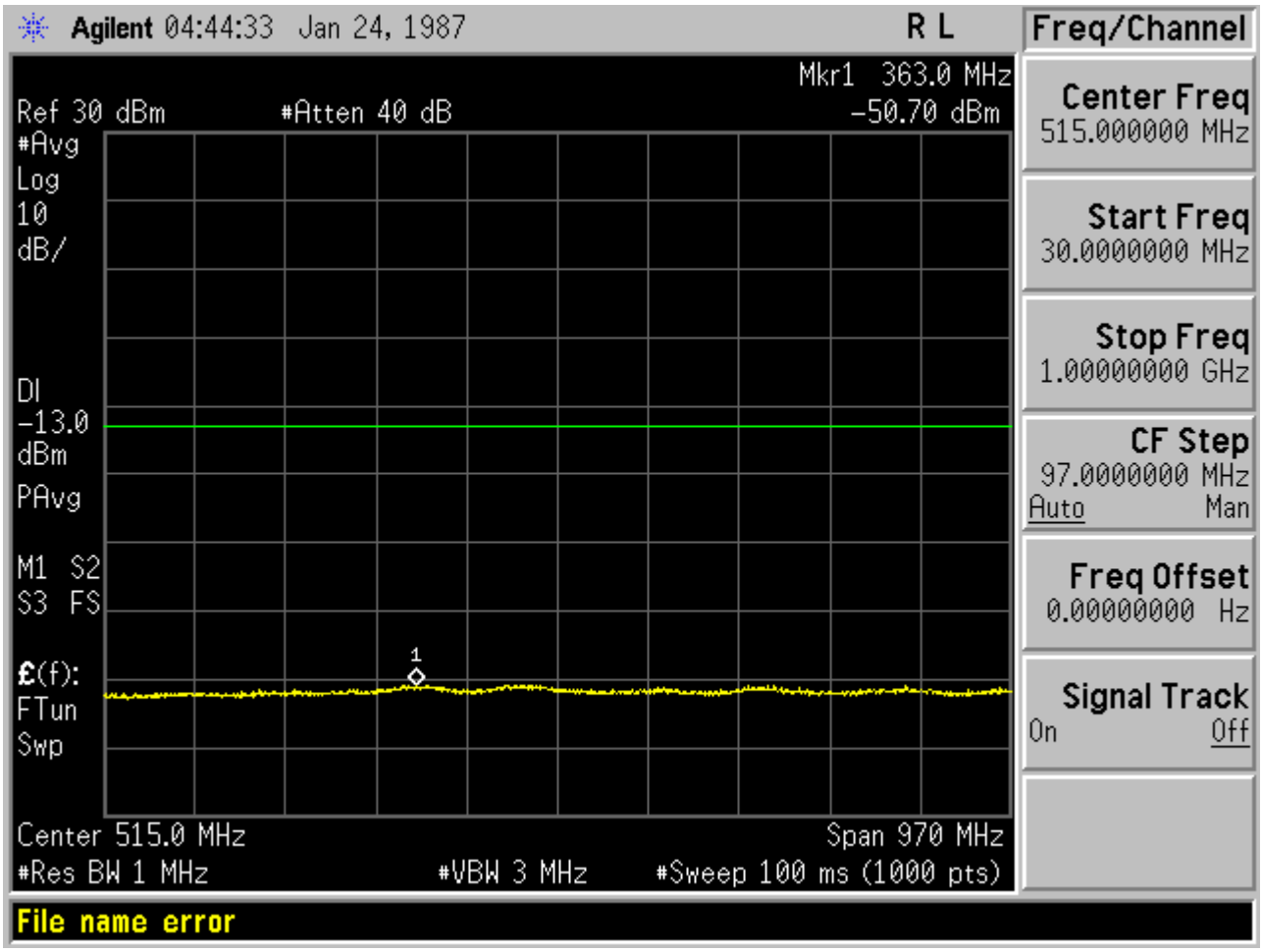


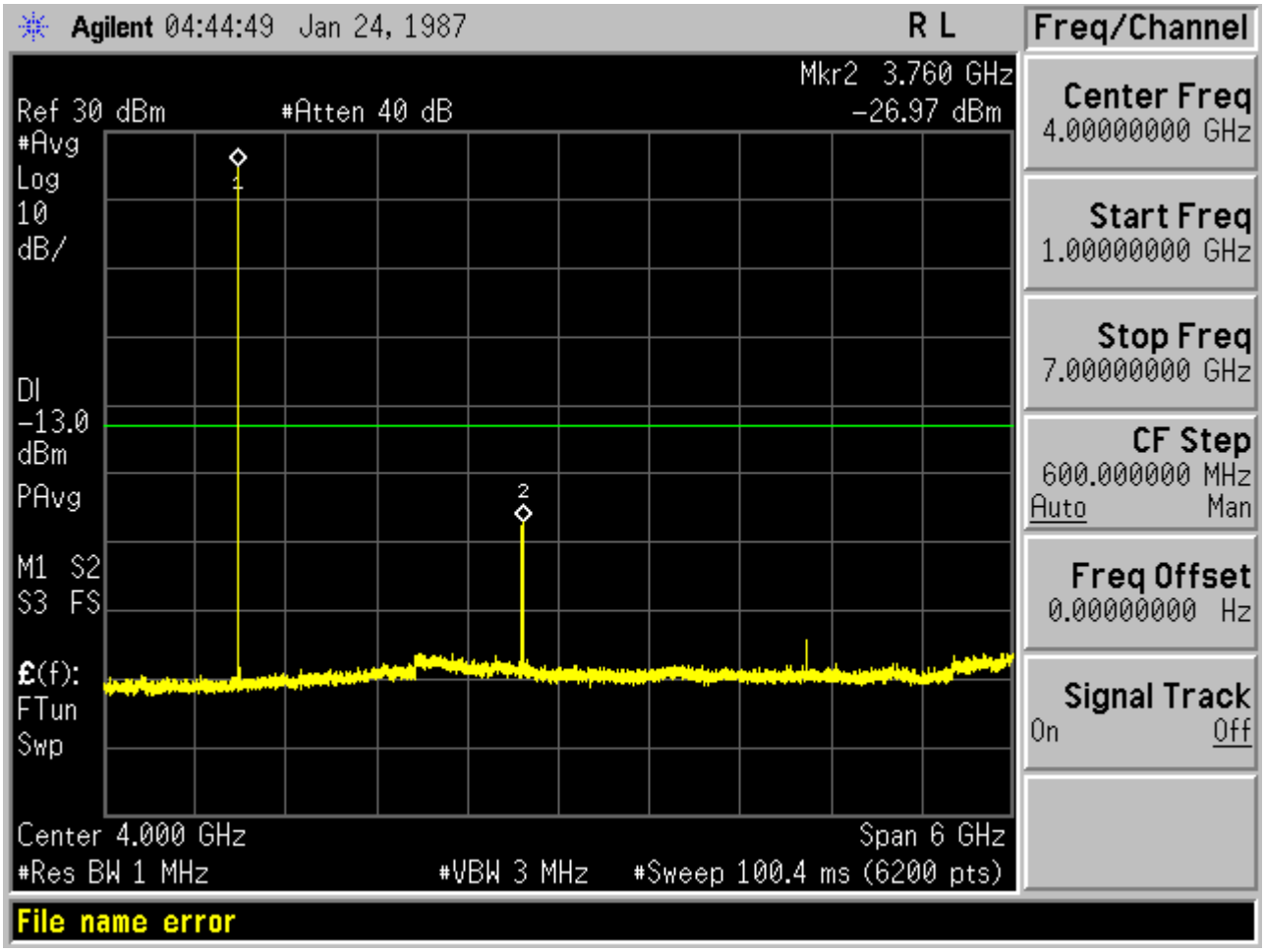

Agilent 04:43:40 Jan 24, 1987
R L
Freq/Channel
Mkr2 3.700 GHz
Ref 30 dBm
#Atten 40 dB
-30.11 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
1
2
Center Freq
4.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
7.00000000 GHz
CF Step
600.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 4.000 GHz
Span 6 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.4 ms (6200 pts)
File name error

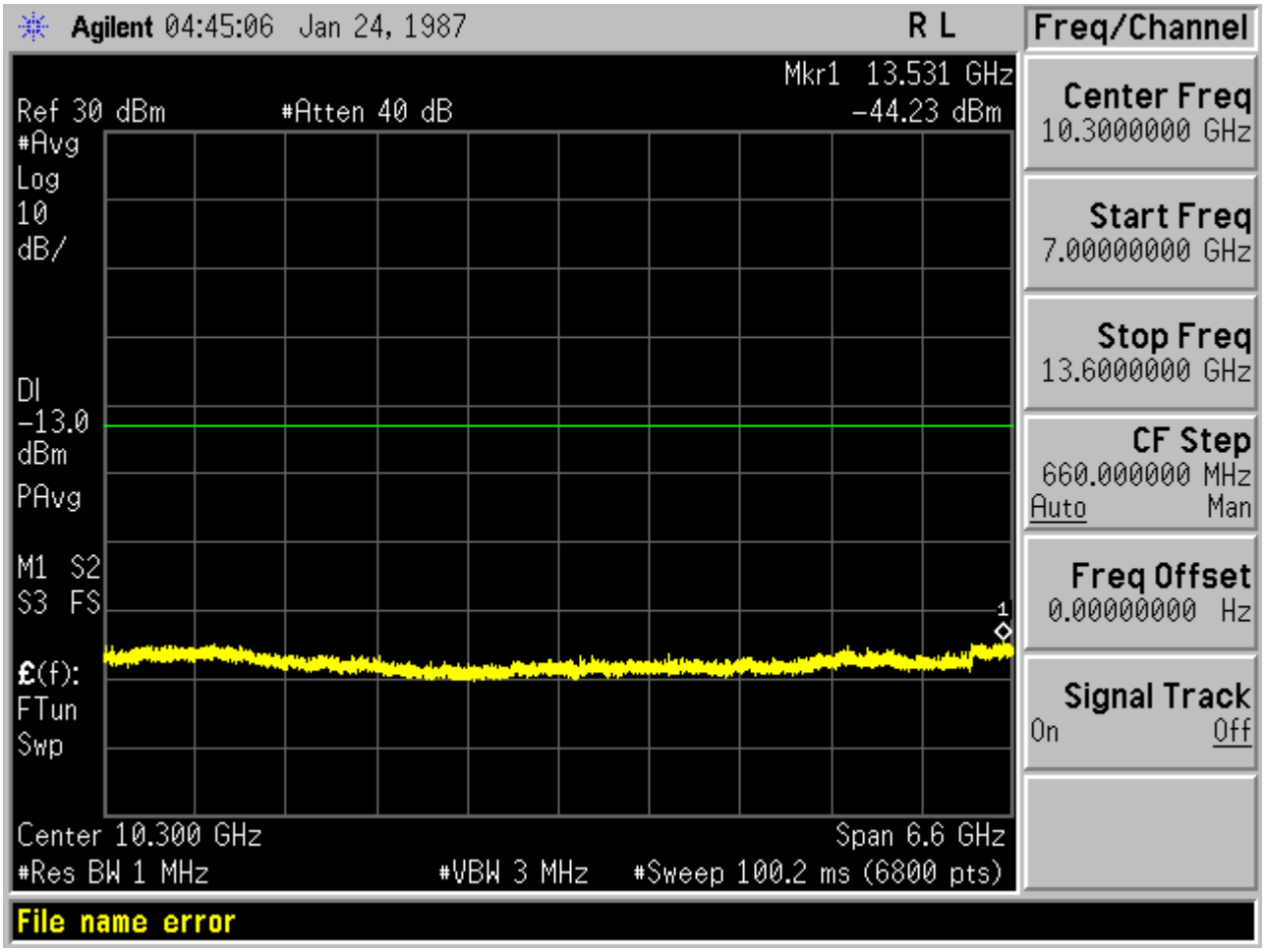

Agilent 04:43:57 Jan 24, 1987
R L
Freq/Channel
Mkr1 13.435 GHz
Ref 30 dBm
#Atten 40 dB
-44.58 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 10.300 GHz
Span 6.6 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.2 ms (6800 pts)
Center Freq
10.3000000 GHz
Start Freq
7.00000000 GHz
Stop Freq
13.6000000 GHz
CF Step
660.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error

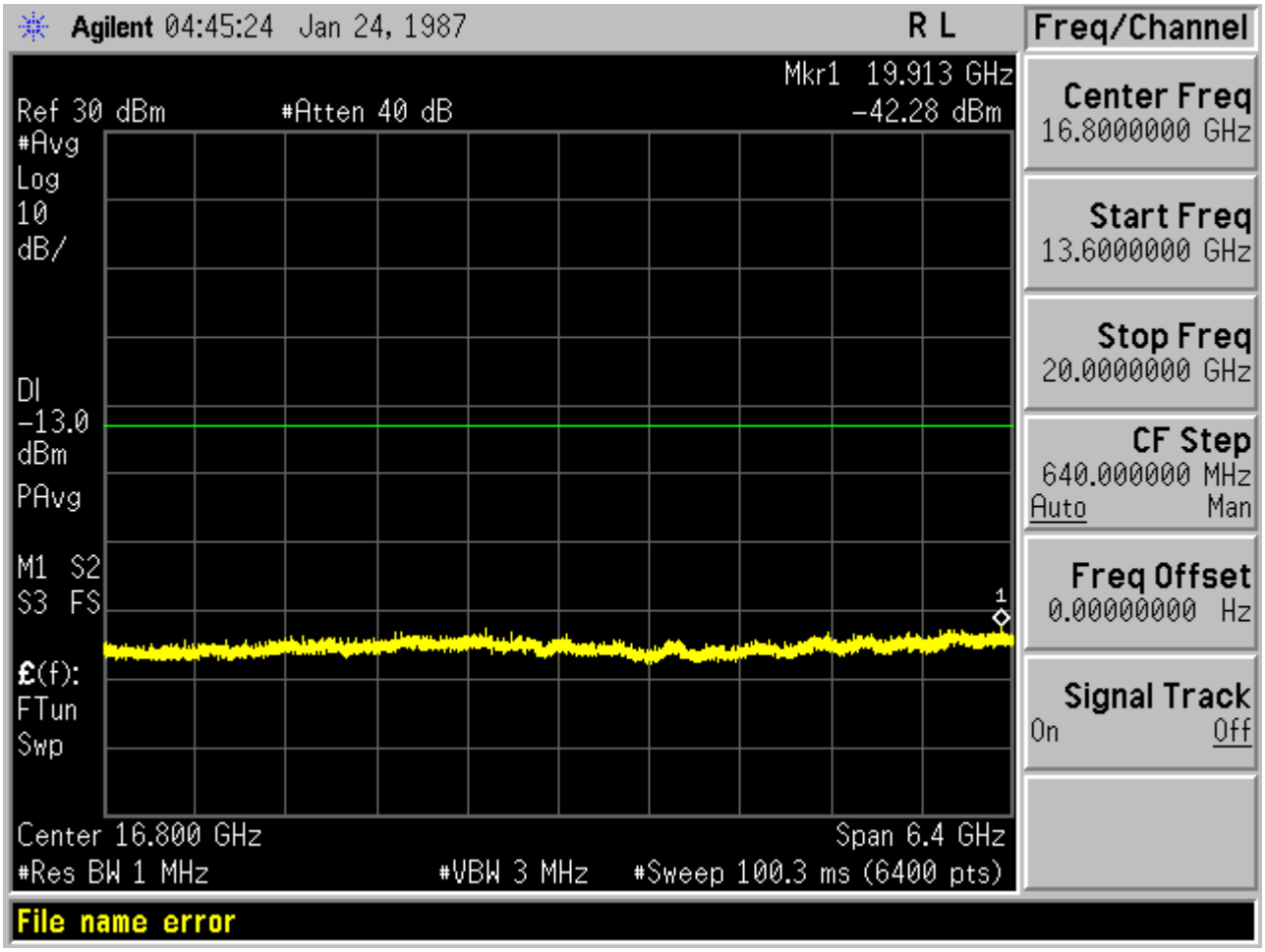

Agilent 04:44:15 Jan 24, 1987
R L
Freq/Channel
Mkr1 19.976 GHz
-42.74 dBm
Ref 30 dBm
#Atten 40 dB
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 16.800 GHz
Span 6.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.3 ms (6400 pts)
Center Freq
16.8000000 GHz
Start Freq
13.6000000 GHz
Stop Freq
20.0000000 GHz
CF Step
640.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error

Test Channel=MCH

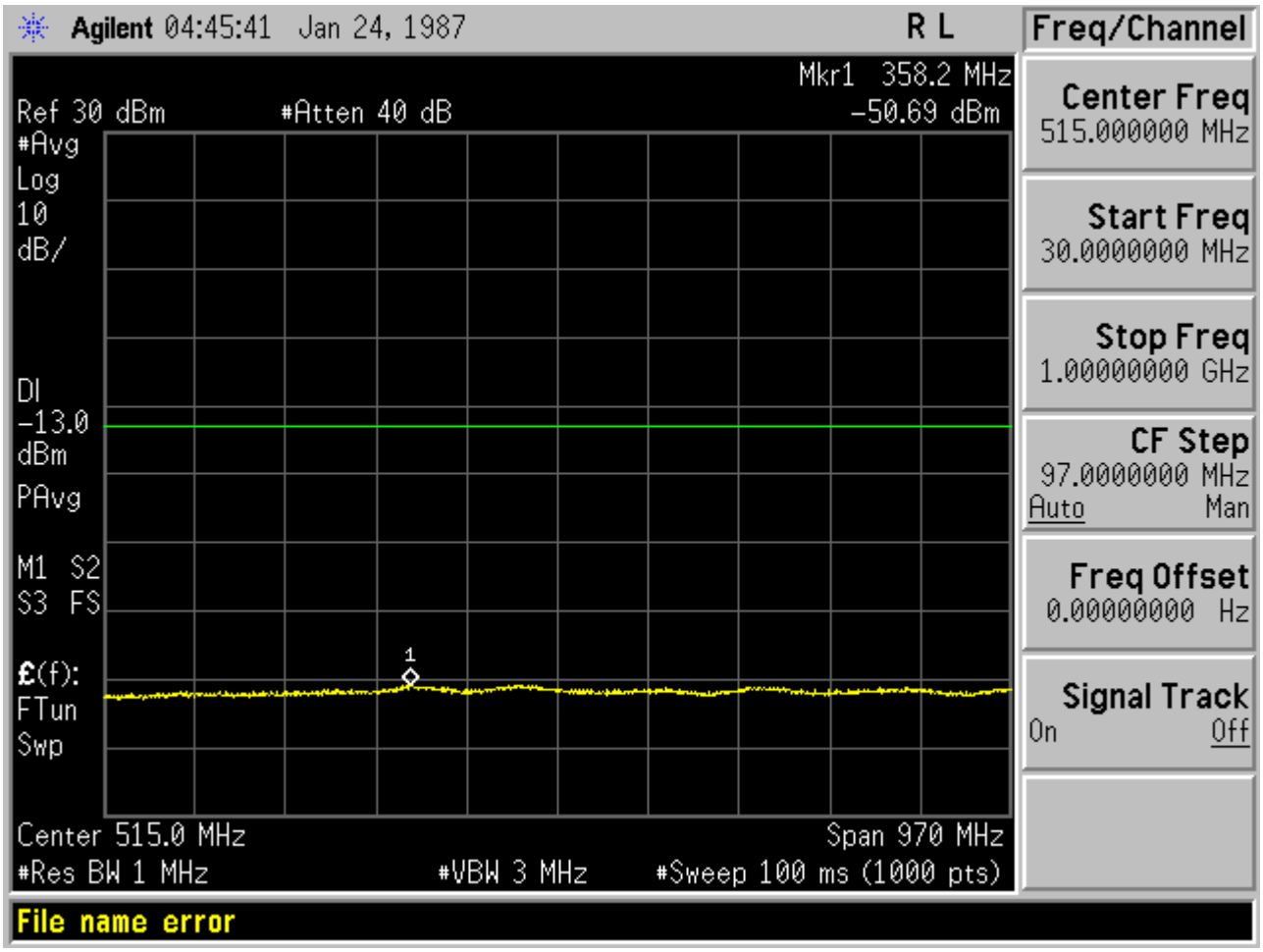


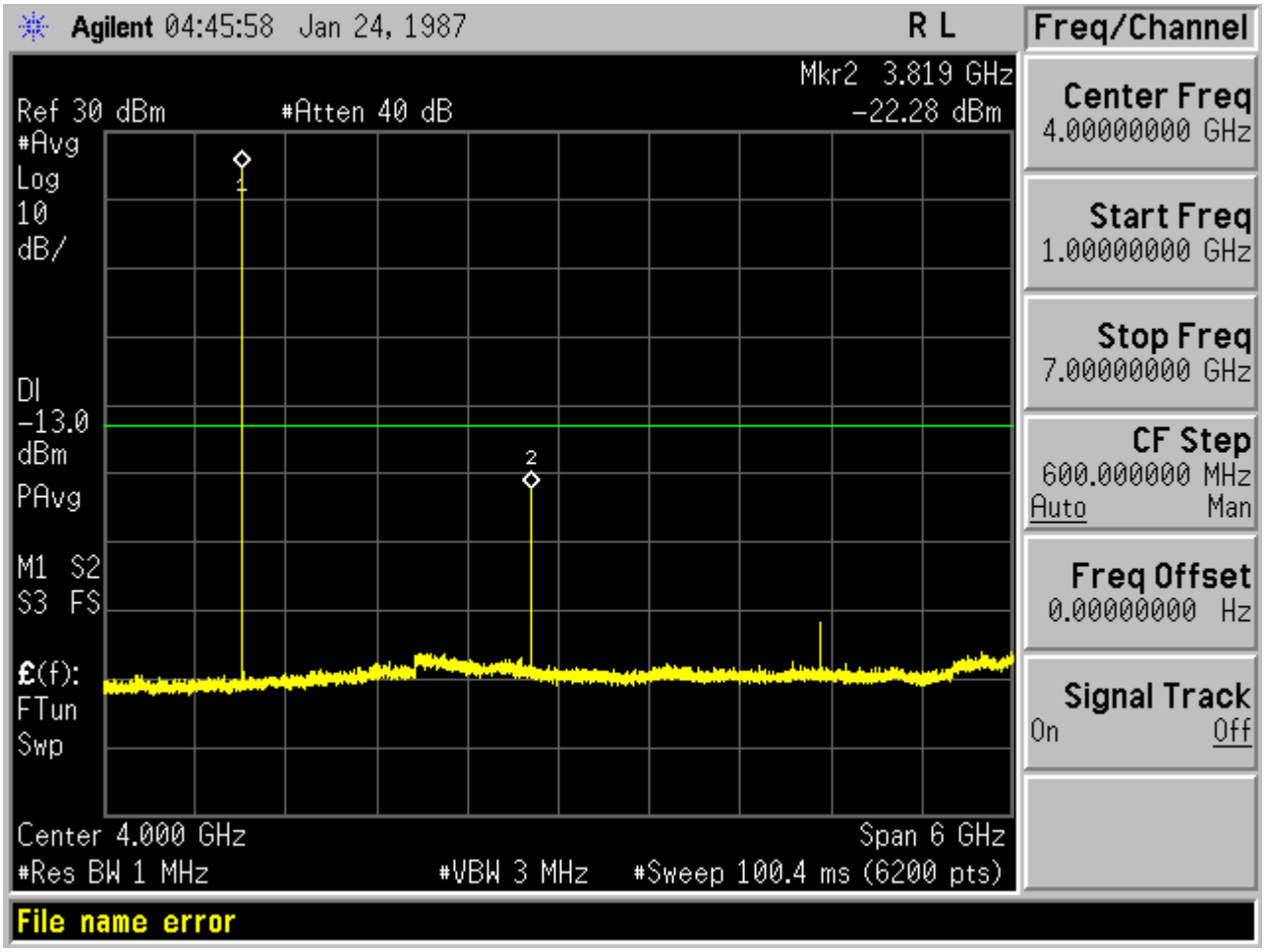

Agilent 04:44:49 Jan 24, 1987
R L
Freq/Channel
Mkr2 3.760 GHz
Ref 30 dBm
#Atten 40 dB
-26.97 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center Freq
4.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
7.00000000 GHz
CF Step
600.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 4.000 GHz
Span 6 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.4 ms (6200 pts)
File name error

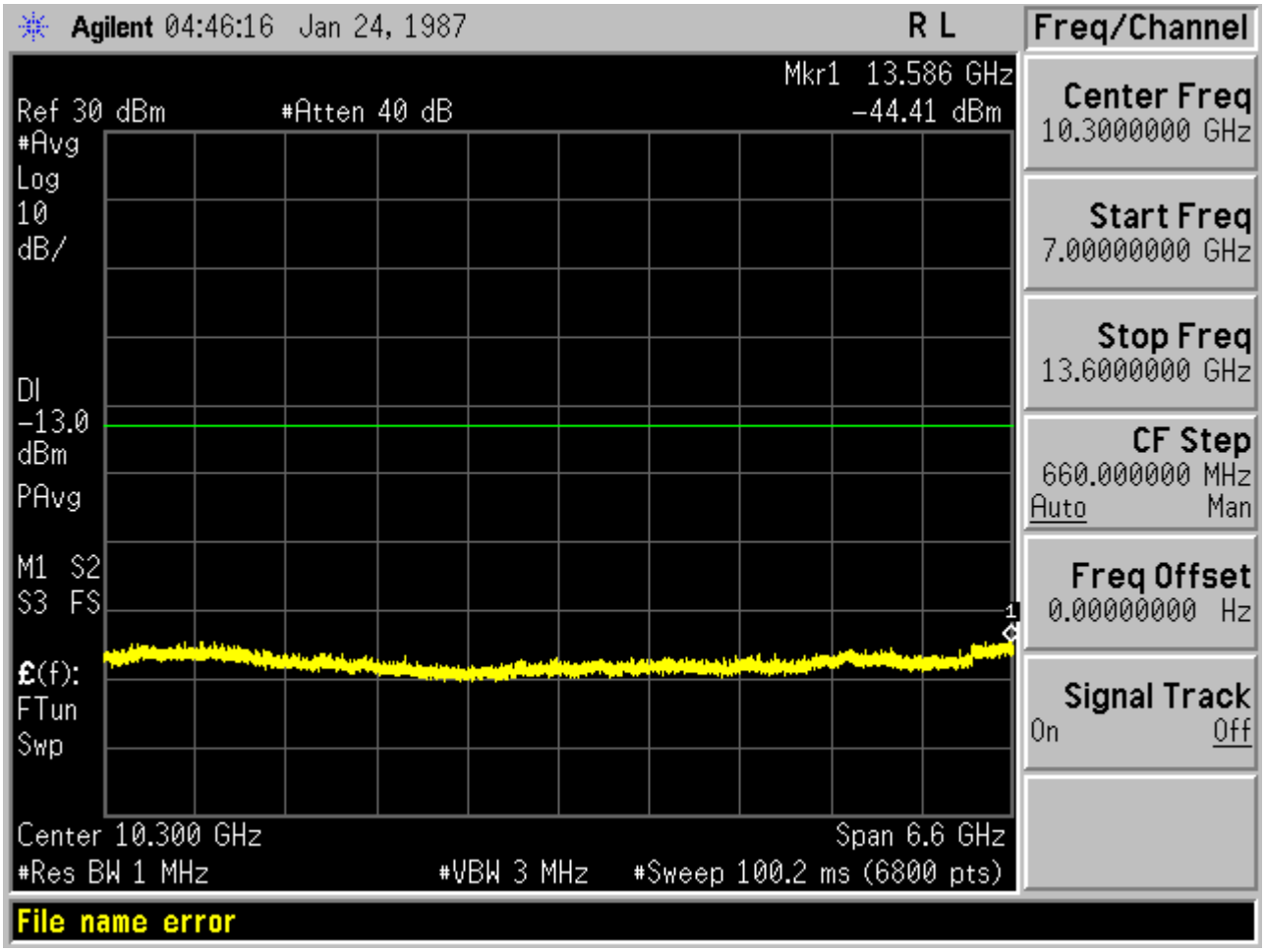

Agilent 04:45:06 Jan 24, 1987
R L
Freq/Channel
Mkr1 13.531 GHz
Ref 30 dBm
#Atten 40 dB
-44.23 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 10.300 GHz
Span 6.6 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.2 ms (6800 pts)
Center Freq
10.3000000 GHz
Start Freq
7.00000000 GHz
Stop Freq
13.6000000 GHz
CF Step
660.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error

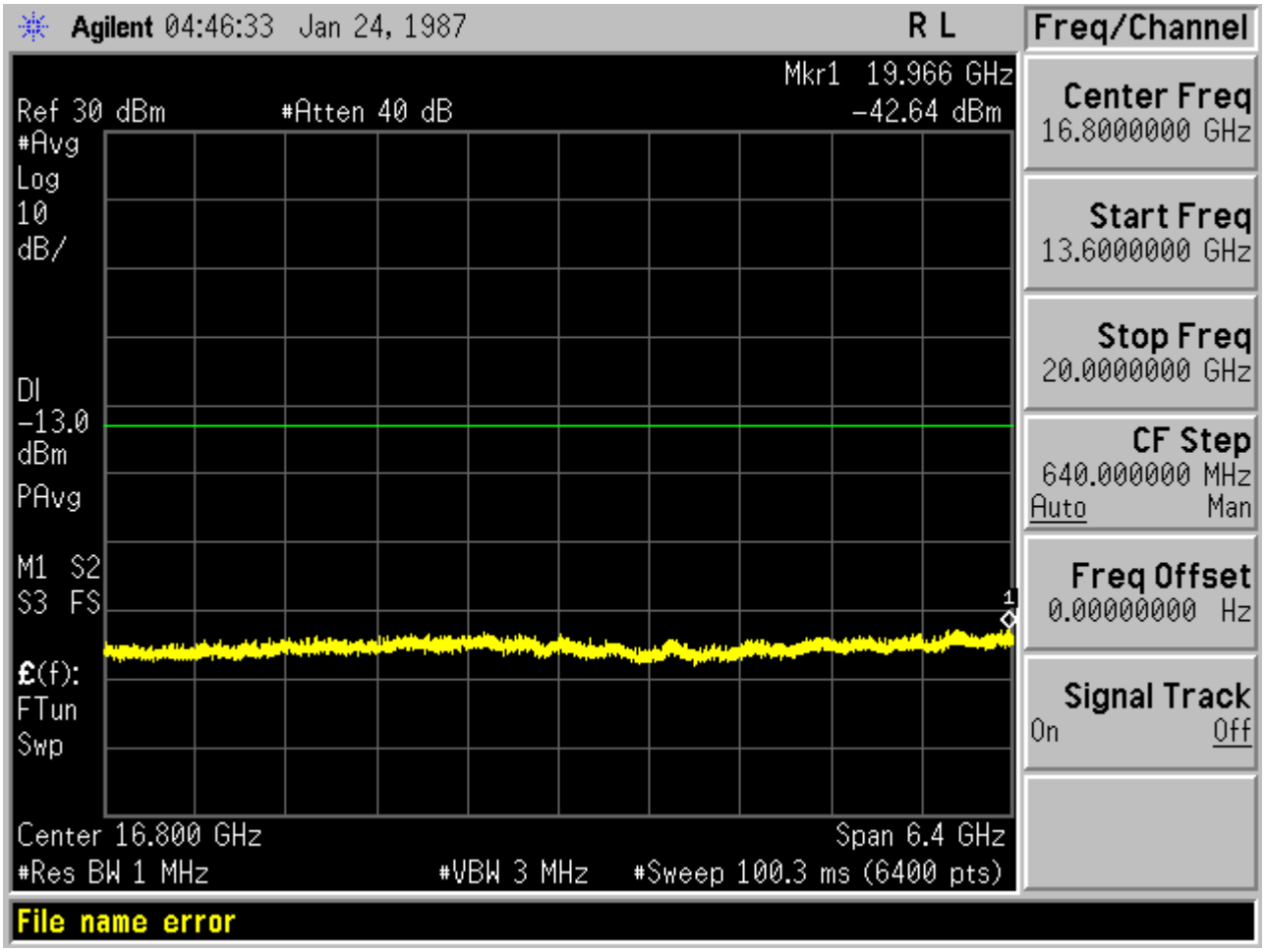

Agilent 04:45:24 Jan 24, 1987
R L
Freq/Channel
Mkr1 19.913 GHz
Ref 30 dBm
#Atten 40 dB
-42.28 dBm
#Avg
Log
10
dB/
Center Freq
16.8000000 GHz
Start Freq
13.6000000 GHz
Stop Freq
20.0000000 GHz
CF Step
640.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 16.800 GHz
Span 6.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.3 ms (6400 pts)
File name error

Test Channel=HCH




Agilent 04:45:58 Jan 24, 1987
R L
Freq/Channel
Mkr2 3.819 GHz
Ref 30 dBm
#Atten 40 dB
-22.28 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center Freq
4.00000000 GHz
Start Freq
1.00000000 GHz
Stop Freq
7.00000000 GHz
CF Step
600.000000 MHz
Auto Man
Freq Offset
0.00000000 Hz
Signal Track
On Off
Center 4.000 GHz
Span 6 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.4 ms (6200 pts)
File name error


Agilent 04:46:16 Jan 24, 1987
R L
Freq/Channel
Mkr1 13.586 GHz
-44.41 dBm
Ref 30 dBm
#Atten 40 dB
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 10.300 GHz
#Res BW 1 MHz
#VBW 3 MHz
Span 6.6 GHz
#Sweep 100.2 ms (6800 pts)
Center Freq
10.3000000 GHz
Start Freq
7.00000000 GHz
Stop Freq
13.6000000 GHz
CF Step
660.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error


Agilent 04:46:33 Jan 24, 1987
R L
Freq/Channel
Mkr1 19.966 GHz
Ref 30 dBm
#Atten 40 dB
-42.64 dBm
#Avg
Log
10
dB/
Dl
-13.0
dBm
PAvg
M1 S2
S3 FS
£(f):
FTun
Swp
Center 16.800 GHz
Span 6.4 GHz
#Res BW 1 MHz
#VBW 3 MHz
#Sweep 100.3 ms (6400 pts)
Center Freq
16.8000000 GHz
Start Freq
13.6000000 GHz
Stop Freq
20.0000000 GHz
CF Step
640.000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
File name error

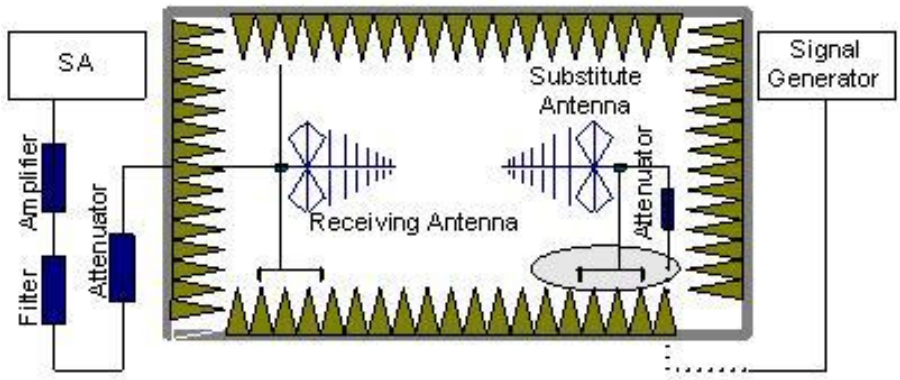
10.2 RADIATED SPURIOUS EMISSION

10.2.1 MEASUREMENT METHOD

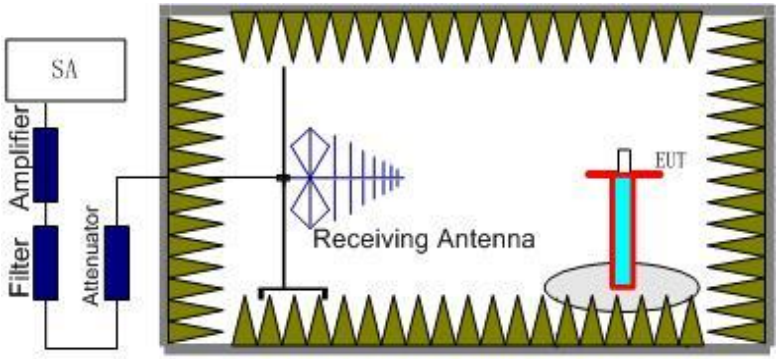
The measurements procedures specified in ANSI/TIA-603-D-2010 were used for testing. The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The measurements were performed on GSM modes at 3 typical channels(the Top Channel, the Middle Channel and the Bottom Channel) for both GSM band and PCS 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 PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz) ,GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . 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 the PCS1900 ,GSM850 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: $Power=P_{Mea}+A_{Rpl}$

10.2.2 PROVISIONS APPLICABLE

(a) On any frequency outside a lMOBOnsee’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.

10.2.3 MEASUREMENT RESULT

The Worst Test Results for Channel 128 / 824.2 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1648.00	-41.13	-5.01	-46.14	-13.00	Horizontal
1752.00	-42.29	-2.18	-44.47	-13.00	Vertical
2472.00	-42.57	3.46	-39.11	-13.00	Horizontal
9086.00	-42.33	2.79	-39.54	-13.00	Horizontal

The Worst Test Results for Channel 190/836.6 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1673.00	-43.18	-3.22	-46.40	-13.00	Horizontal
1903.00	-42.74	-0.24	-42.98	-13.00	Vertical
9089.00	-44.26	3.98	-40.28	-13.00	Vertical

The Worst Test Results for Channel 251/848.8 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1698.00	-46.46	-2.26	-48.72	-13.00	Horizontal
1888.50	-46.19	-3.12	-49.31	-13.00	Vertical
2131.00	-47.24	-1.74	-48.98	-13.00	Vertical
9089.00	-45.31	8.46	-36.85	-13.00	Horizontal

The Worst Test Results for Channel 512/1850.2 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
1999.00	-46.27	9.5	-36.77	-13.00	Horizontal
3700.00	-47.43	8.74	-38.69	-13.00	Horizontal
12950.40	-44.18	11.56	-32.62	-13.00	Vertical
17919.60	-44.52	17.89	-26.63	-13.00	Vertical

The Worst Test Results for Channel 661/1880.0 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
2000.50	-45.16	9.7	-35.46	-13.00	Vertical
9399.00	-44.52	11.6	-32.92	-13.00	Vertical
13160.40	-45.71	14.89	-30.82	-13.00	Horizontal
15039.60	-44.63	13.87	-30.76	-13.00	Vertical
17941.20	-47.73	19.76	-27.97	-13.00	Horizontal
The Worst Test Results for Channel 810/1909.8 MHz					
Frequency(MHz)	Power(dBm)	ARpl (dBm)	PMea(dBm)	Limit（dBm）	Polarity
2000.00	-44.19	10.02	-34.17	-13.00	Vertical
9548.50	-48.72	11.3	-37.42	-13.00	Horizontal
13367.40	-47.33	12.4	-34.93	-13.00	Horizontal
15277.80	-53.06	18.03	-35.03	-13.00	Vertical
17931.60	-46.04	19	-27.04	-13.00	Horizontal

Note: 1.ARpl= Factor=Antenna Factor+ Cable loss-Amplifier gain.

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

3. Below 30MHZ no Spurious found and The GSM modes is the worst condition.

11. MAINS CONDUCTED EMISSION

11.1 MEASUREMENT METHOD

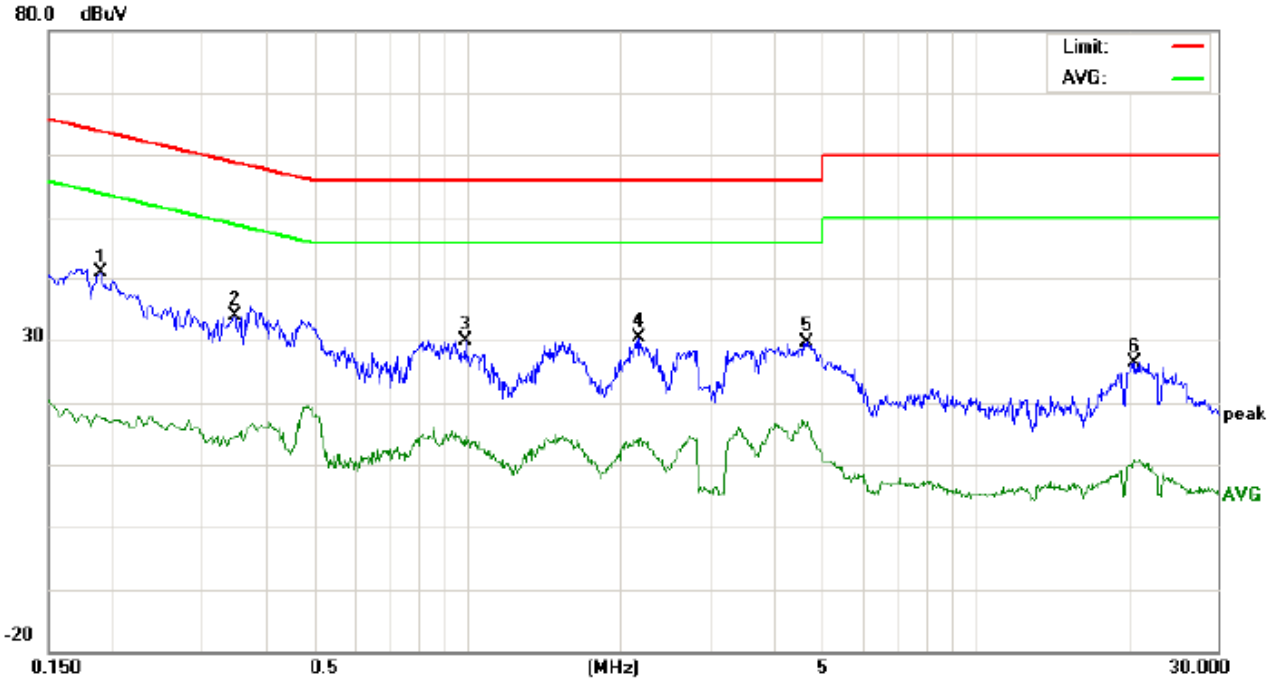
The measurement procedure specified in ANSI C63.4-2014 was used for testing. Conducted Emission was measured with travel charger.

11.2 PROVISIONS APPLICABLE

Frequency of Emission (MHz)	Conducted Limit(dBuV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50
*Decreases with the logarithm of the frequency. *The lower limit shall apply at the transition frequency.		

11.3 MEASUREMENT RESULT

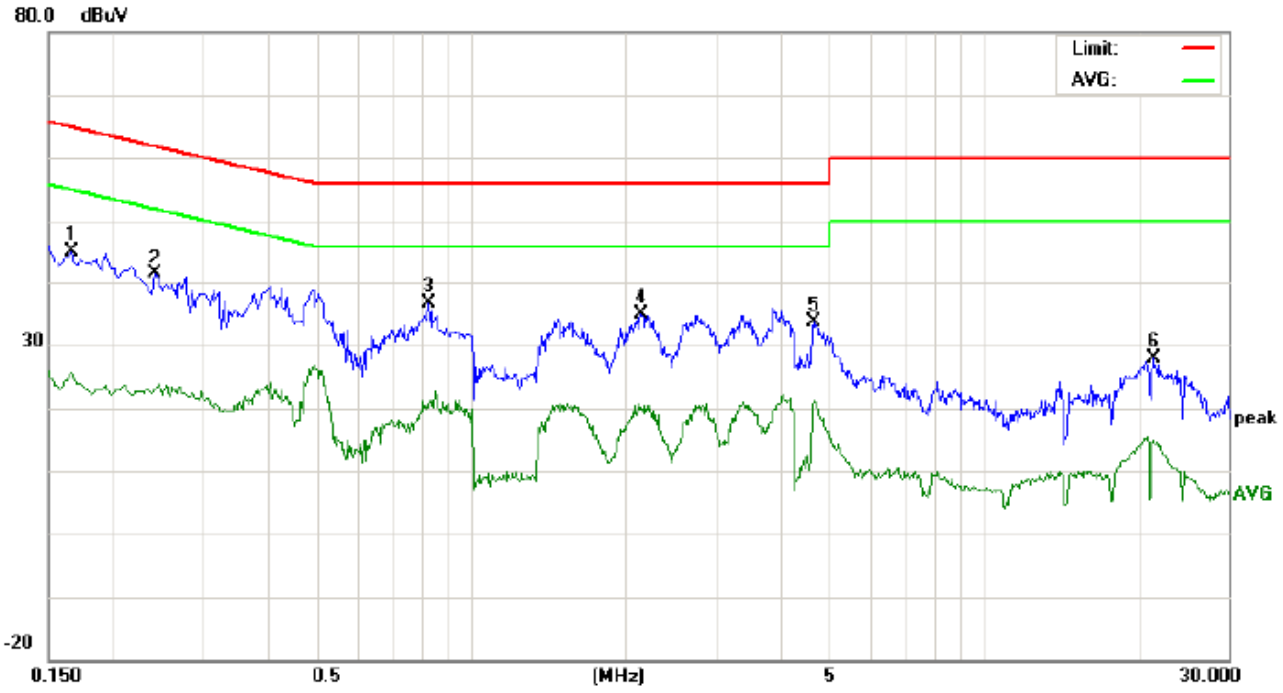
LINE CONDUCTED EMISSION – L1



Site: Conduction
Phase: *L1*
Temperature: 26
Limit: FCC Class B Conduction(QP)
Power: AC 120V/60Hz
Humidity: 60 %
EUT: NanoPhone
M/N: Model NP1
Mode:Call
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1900	30.60		7.21	10.20	40.80		17.41	64.03	54.03	-23.23	-36.62	P	
2	0.3499	23.64		4.28	10.31	33.95		14.59	58.96	48.96	-25.01	-34.37	P	
3	0.9939	19.62		4.23	10.37	29.99		14.60	56.00	46.00	-26.01	-31.40	P	
4	2.1859	19.99		3.72	10.30	30.29		14.02	56.00	46.00	-25.71	-31.98	P	
5	4.6658	19.31		6.24	10.22	29.53		16.46	56.00	46.00	-26.47	-29.54	P	
6	20.6419	16.21		0.46	10.12	26.33		10.58	60.00	50.00	-33.67	-39.42	P	

LINE CONDUCTED EMISSION - N



Site: Conduction
Phase: *N*
Temperature: 26
Limit: FCC Class B Conduction(QP)
Power: AC 120V/60Hz
Humidity: 60 %
EUT: NanoPhone
M/N: Model NP1
Mode:Call
Note:

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1660	34.85		15.48	10.18	45.03		25.66	65.15	55.15	-20.12	-29.49	P	
2	0.2420	31.06		12.91	10.26	41.32		23.17	62.02	52.02	-20.70	-28.85	P	
3	0.8300	26.23		9.80	10.32	36.55		20.12	56.00	46.00	-19.45	-25.88	P	
4	2.1500	24.51		9.65	10.28	34.79		19.93	56.00	46.00	-21.21	-26.07	P	
5	4.6579	23.49		10.80	10.22	33.71		21.02	56.00	46.00	-22.29	-24.98	P	
6	21.5140	17.72		4.56	10.12	27.84		14.68	60.00	50.00	-32.16	-35.32	P	

Note: The GSM850 mode is the worst condition.

12. FREQUENCY STABILITY

12.1 MEASUREMENT METHOD

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -10℃.
3.With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 661 for PCS 1900 band , channel 190 for GSM 850 band 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 -10℃ to +55℃. 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 +55℃.
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 +55℃ to -10℃. 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.

12.2 PROVISIONS APPLICABLE

12.2.1 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 3.4VDC and 4.2VDC, with a nominal voltage of 3.8VDC. 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.

12.2.2 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.

12.3 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
GSM 850	GSM	LCH	TN	3.4	-34.61	-0.04	±2.5	PASS
			TN	3.7	-39.71	-0.05	±2.5	PASS
			TN	4.2	-42.94	-0.05	±2.5	PASS
		MCH	TN	3.4	-40.03	-0.05	±2.5	PASS
			TN	3.7	-48.75	-0.06	±2.5	PASS
			TN	4.2	-42.55	-0.05	±2.5	PASS
		HCH	TN	3.4	-49.66	-0.06	±2.5	PASS
			TN	3.7	-45.26	-0.05	±2.5	PASS
			TN	4.2	-52.30	-0.06	±2.5	PASS

Test Band	Test Mode	Test Channel	Test Temp.	Test Volt. (V)	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM 1900	GSM	LCH	TN	3.4	-32.61	-0.02	±2.5	PASS
			TN	3.7	-28.73	-0.02	±2.5	PASS
			TN	4.2	-31.19	-0.02	±2.5	PASS
		MCH	TN	3.4	-37.97	-0.02	±2.5	PASS
			TN	3.7	-40.81	-0.02	±2.5	PASS
			TN	4.2	-31.77	-0.02	±2.5	PASS
		HCH	TN	3.4	-36.29	-0.02	±2.5	PASS
			TN	3.7	-36.22	-0.02	±2.5	PASS
			TN	4.2	-33.13	-0.02	±2.5	PASS

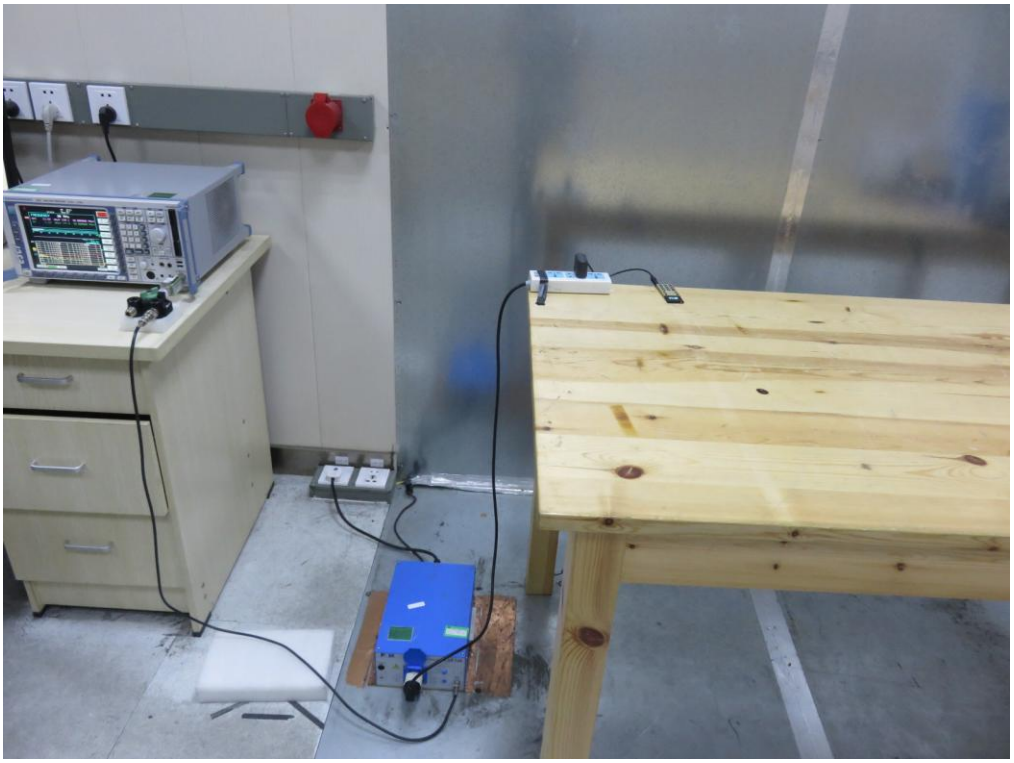
Frequency Error vs. Temperature:

Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM850	GSM	LCH	VN	-10	-47.91	-0.06	±2.5	PASS
			VN	0	-45.07	-0.05	±2.5	PASS
			VN	10	-37.00	-0.04	±2.5	PASS
			VN	20	-41.46	-0.05	±2.5	PASS
			VN	30	-41.33	-0.05	±2.5	PASS
			VN	40	-39.91	-0.05	±2.5	PASS
			VN	50	-41.39	-0.05	±2.5	PASS
GSM850	GSM	MCH	VN	-10	-41.26	-0.05	±2.5	PASS
			VN	0	-44.43	-0.05	±2.5	PASS
			VN	10	-50.43	-0.06	±2.5	PASS
			VN	20	-36.42	-0.04	±2.5	PASS
			VN	30	-45.65	-0.05	±2.5	PASS
			VN	40	-50.88	-0.06	±2.5	PASS
			VN	50	-48.36	-0.06	±2.5	PASS
GSM850	GSM	HCH	VN	-10	-34.87	-0.04	±2.5	PASS
			VN	0	-51.33	-0.06	±2.5	PASS
			VN	10	-35.51	-0.04	±2.5	PASS
			VN	20	-37.13	-0.04	±2.5	PASS
			VN	30	-50.04	-0.06	±2.5	PASS
			VN	40	-37.13	-0.04	±2.5	PASS
			VN	50	-43.20	-0.05	±2.5	PASS

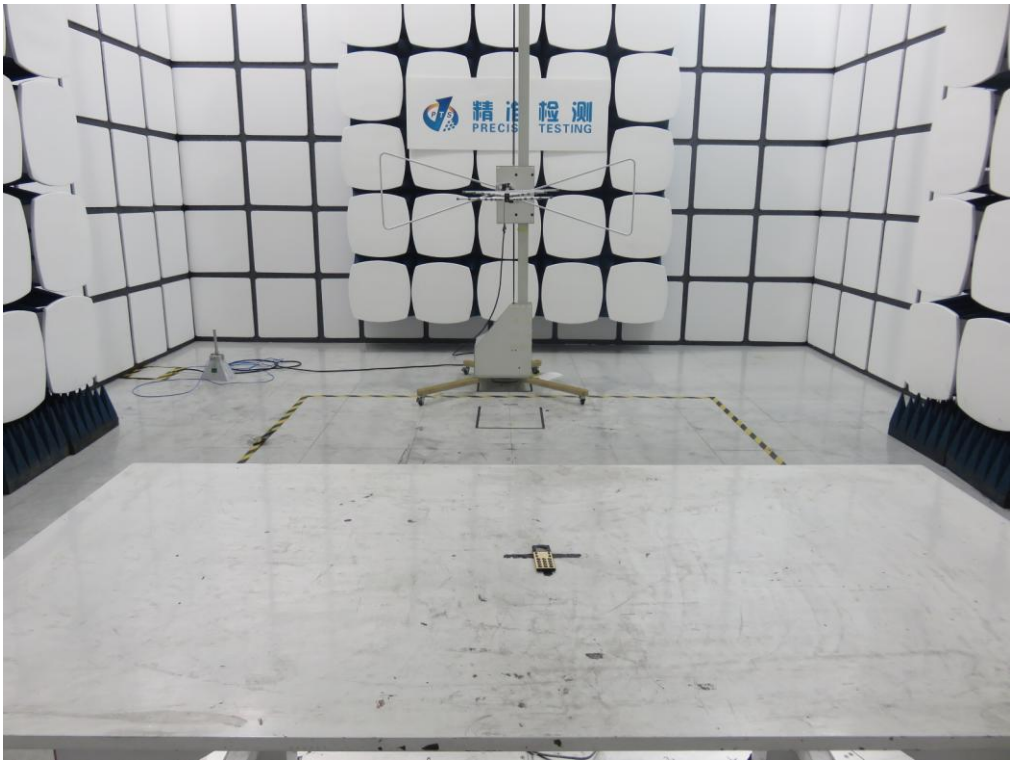
Test Band	Test Mode	Test Channel	Test Volt.	Test Temp.	Freq.Error (Hz)	Freq.vs.rated (ppm)	Limit (ppm)	Verdict
GSM 1900	GSM	LCH	VN	-10	-35.77	-0.02	±2.5	PASS
			VN	0	-31.70	-0.02	±2.5	PASS
			VN	10	-36.48	-0.02	±2.5	PASS
			VN	20	-33.96	-0.02	±2.5	PASS
			VN	30	-30.41	-0.02	±2.5	PASS
			VN	40	-35.19	-0.02	±2.5	PASS
			VN	50	-33.77	-0.02	±2.5	PASS
GSM 1900	GSM	MCH	VN	-10	-34.16	-0.02	±2.5	PASS
			VN	0	-40.94	-0.02	±2.5	PASS
			VN	10	-38.16	-0.02	±2.5	PASS
			VN	20	-35.77	-0.02	±2.5	PASS
			VN	30	-37.00	-0.02	±2.5	PASS
			VN	40	-44.04	-0.02	±2.5	PASS
			VN	50	-32.35	-0.02	±2.5	PASS
GSM 1900	GSM	HCH	VN	-10	-37.19	-0.02	±2.5	PASS
			VN	0	-35.71	-0.02	±2.5	PASS
			VN	10	-34.35	-0.02	±2.5	PASS
			VN	20	-42.49	-0.02	±2.5	PASS
			VN	30	-28.99	-0.02	±2.5	PASS
			VN	40	-35.58	-0.02	±2.5	PASS
			VN	50	-31.77	-0.02	±2.5	PASS

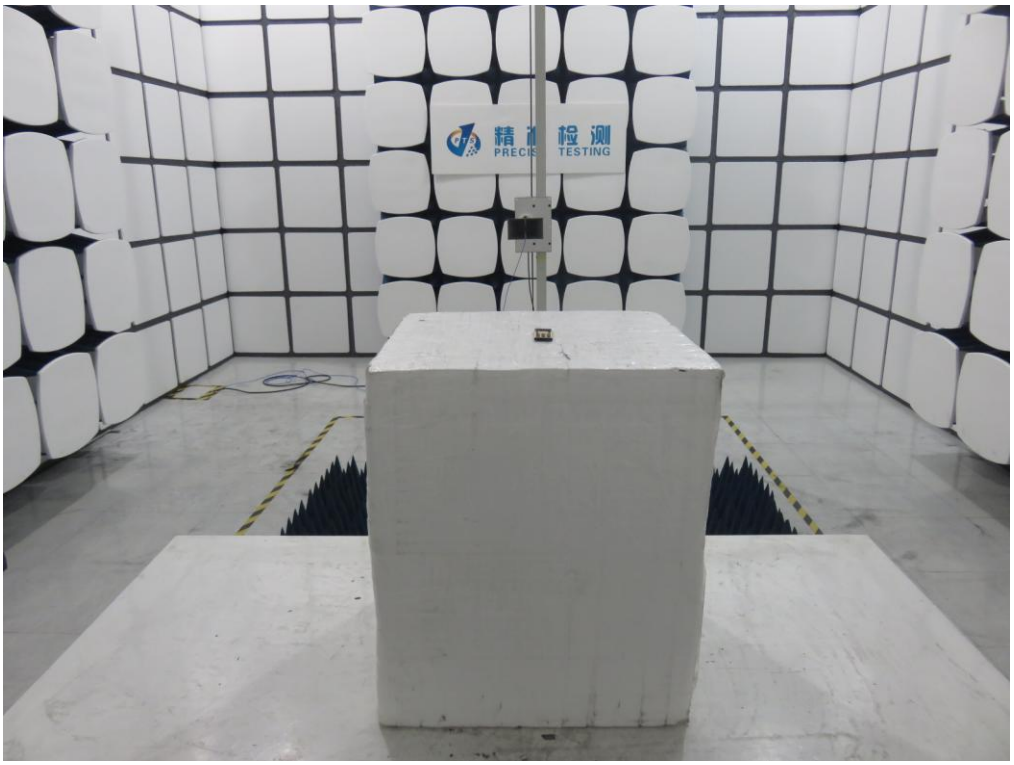
PHOTOGRAPHS OF TEST SETUP

CONDUCTED EMISSION



RADIATED SPURIOUS EMISSION





CONDUCTED MEASUREMENTS

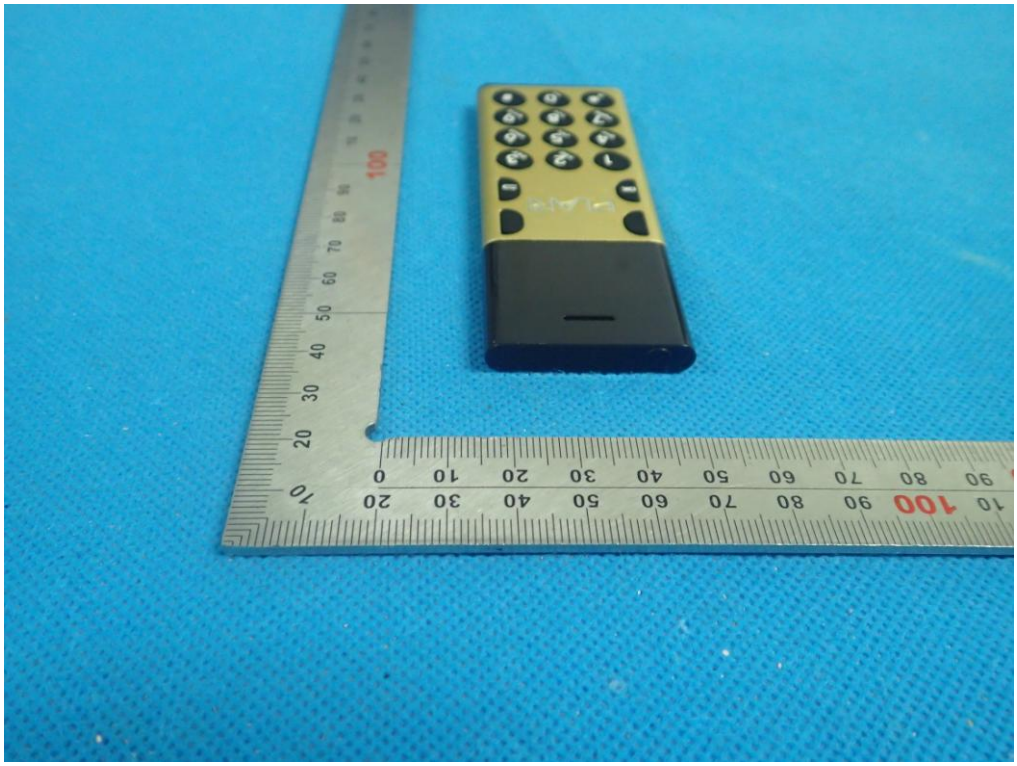
PHOTOGRAPHS OF EUT

TOTAL VIEW OF EUT

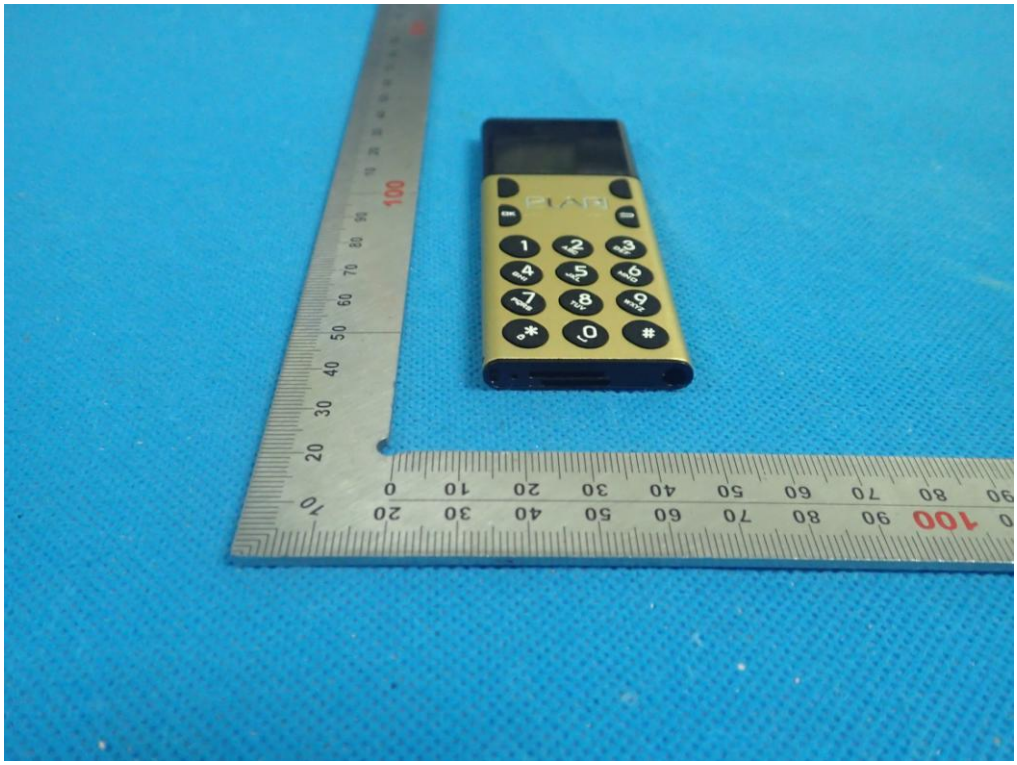
THE LABEL OF ADAPTER

THE LABEL OF BATTERY

TOP VIEW OF EUT

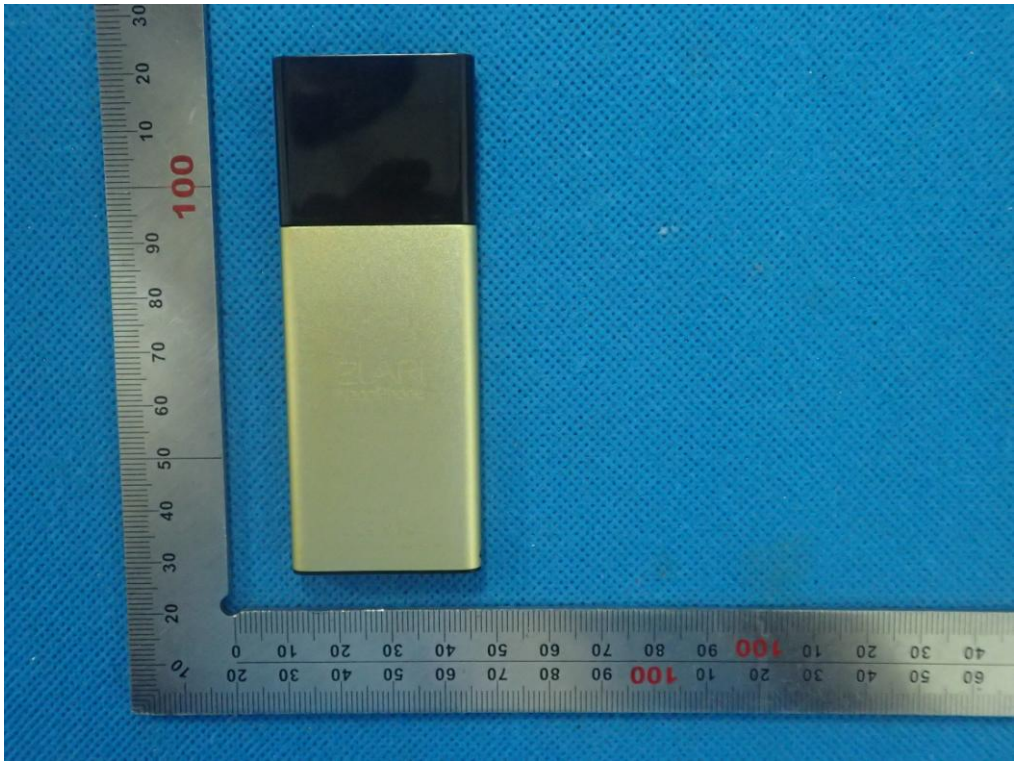


BOTTOM VIEW OF EUT

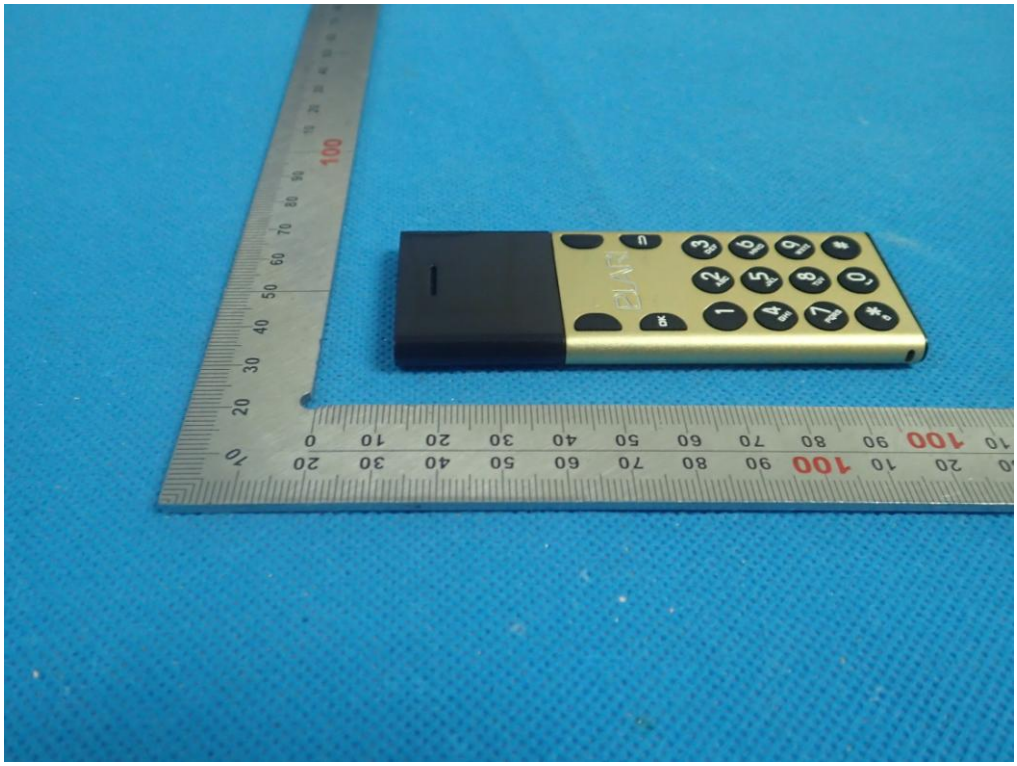


FRONT VIEW OF EUT

BACK VIEW OF EUT

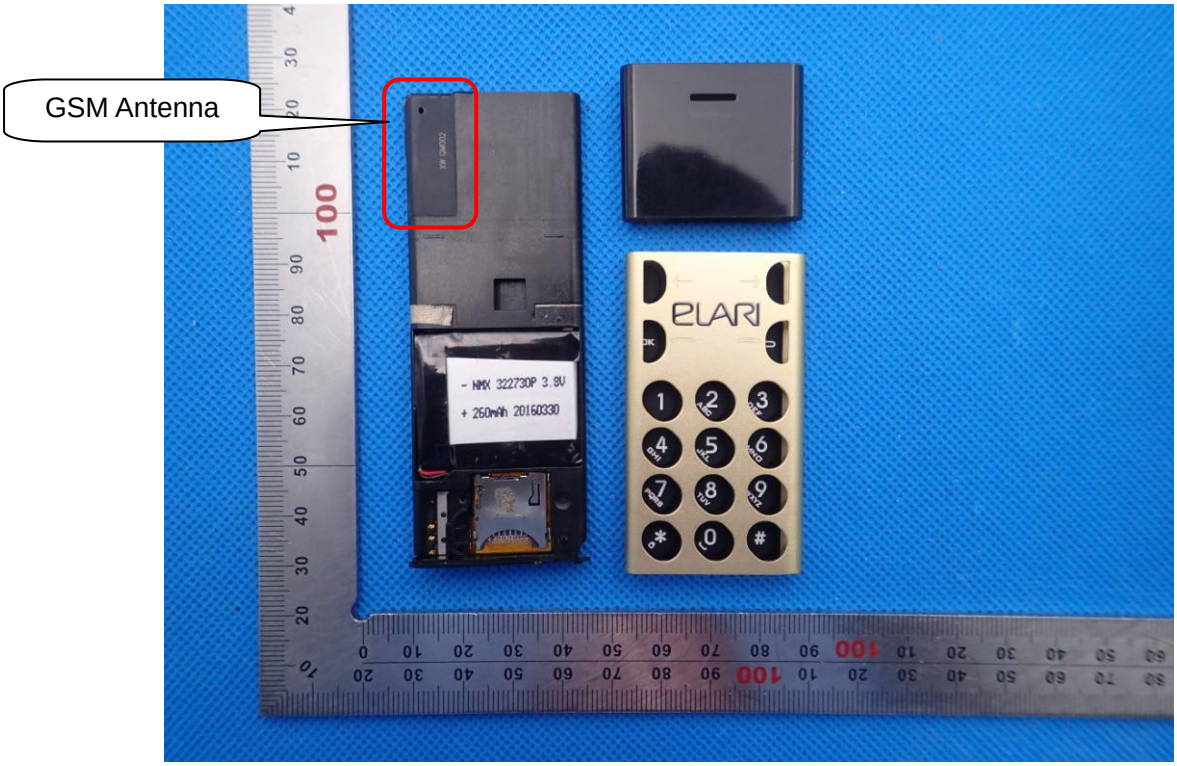


LEFT VIEW OF EUT

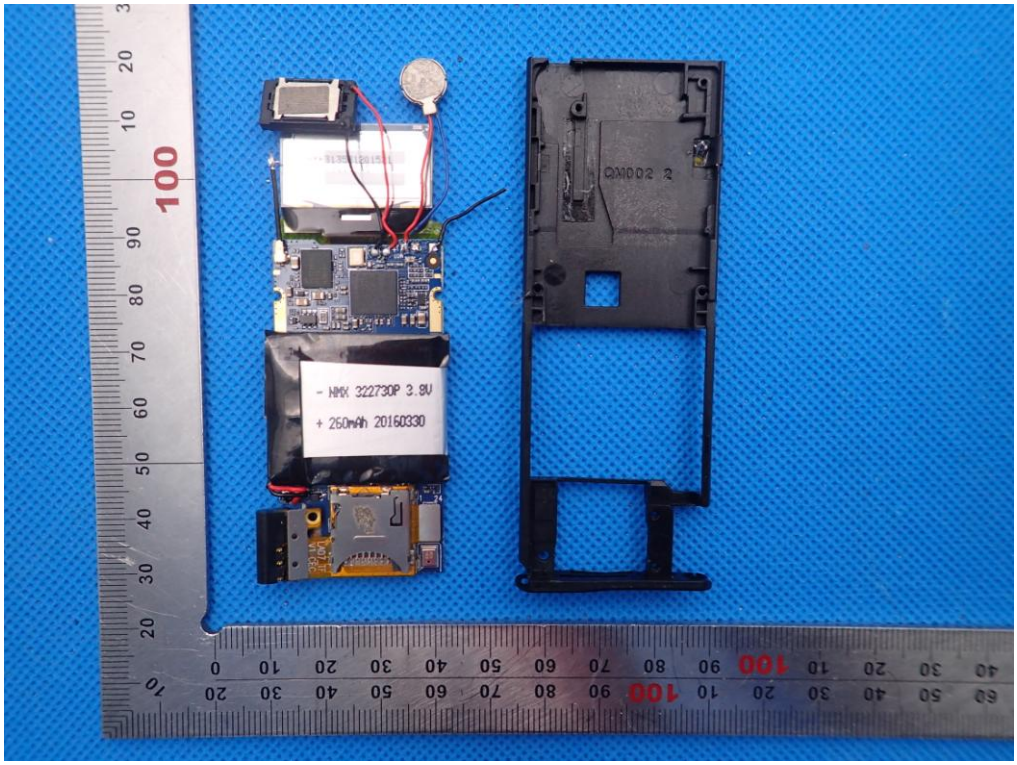


RIGHT VIEW OF EUT

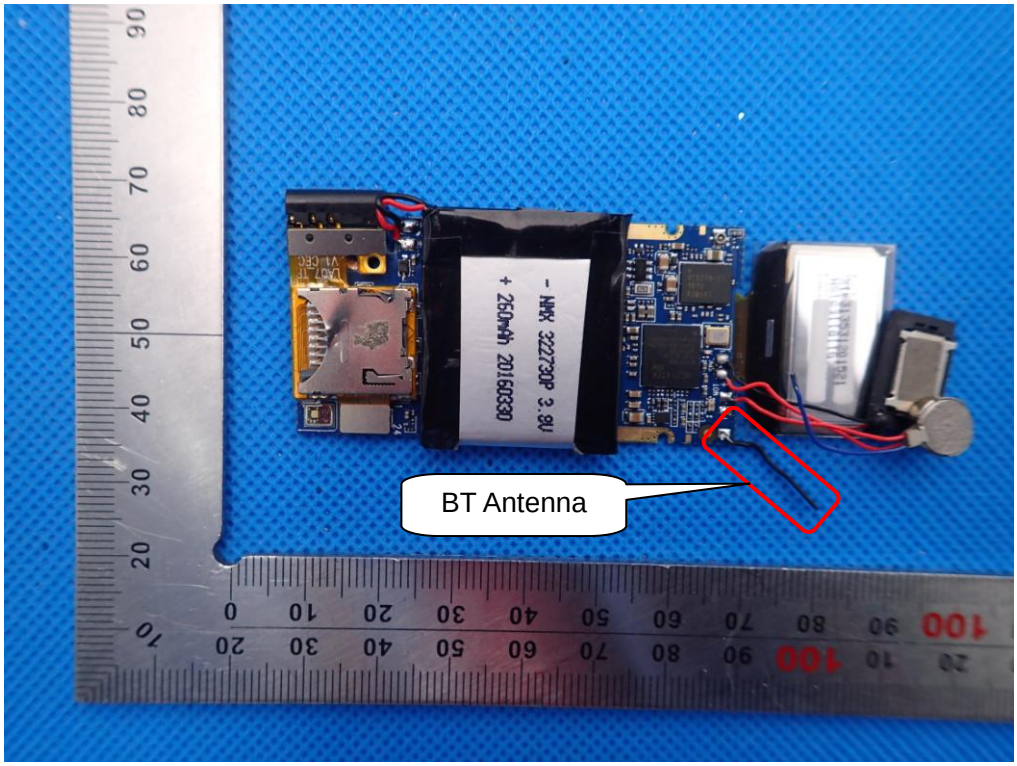
OPEN VIEW OF EUT-1



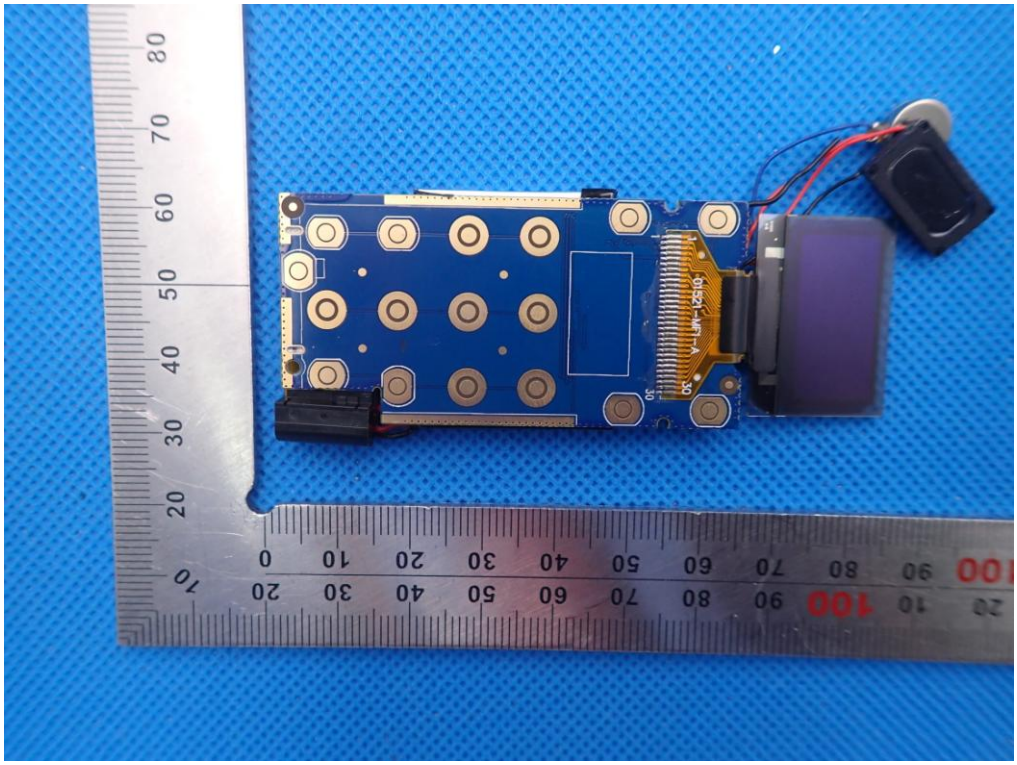
OPEN VIEW OF EUT-2



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



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