



FCC CFR47 CERTIFICATION

PART 24E

TEST REPORT

FOR

TRIM TRAC

MODEL: 51200-00

FCC ID: JUPTRIMTRAC1

REPORT NUMBER: 03U2250-1

ISSUE DATE: JANUARY 6, 2004

Prepared for
Trimble Navigation Limited
749 NORTH MARY AVE.
SUNNYVAL, CA 94088-3642, USA

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: TRIMBLE NAVIGATION LIMITED
749 NORTH MARY AVE.
SUNNYVALE, CA 94086

EUT DESCRIPTION: TRIM TRAC

MODEL NUMBER: 51200-00

DATE TESTED: 12/16/2003 – 12/17/2003
12/29/2003 – 12/31/2003

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR, LICENSED TX MODULE IN MOBILE APPLICATION
MEASUREMENT PROCEDURE	ANSI C63.4 / 2001, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 24 Subpart E

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 24 Subpart E-Broadband PCS. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Tested By:



Released For CCS By:



WILLIM ZHUANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is a Tri-band GSM cellular transceiver with GPS receiver built-in. The device is a stand-alone unit design to be placed in a high-value asset such as a vehicle or cargo-container.

The device has built in Tri-Band GSM900, DCS1800, and PCS1900 cellular antenna embedded in the only PCS used in the product.

The EUT of GSM1900 has an output power of 30.3dBm / 1.071W (EIRP) which is designed for the bands transmitting of frequency range 1850.2MHz to 1909.9MHz.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

7. TEST SETUP, PROCEDURE AND RESULT

7.1. SECTION 2.1046: RF POWER OUTPUT

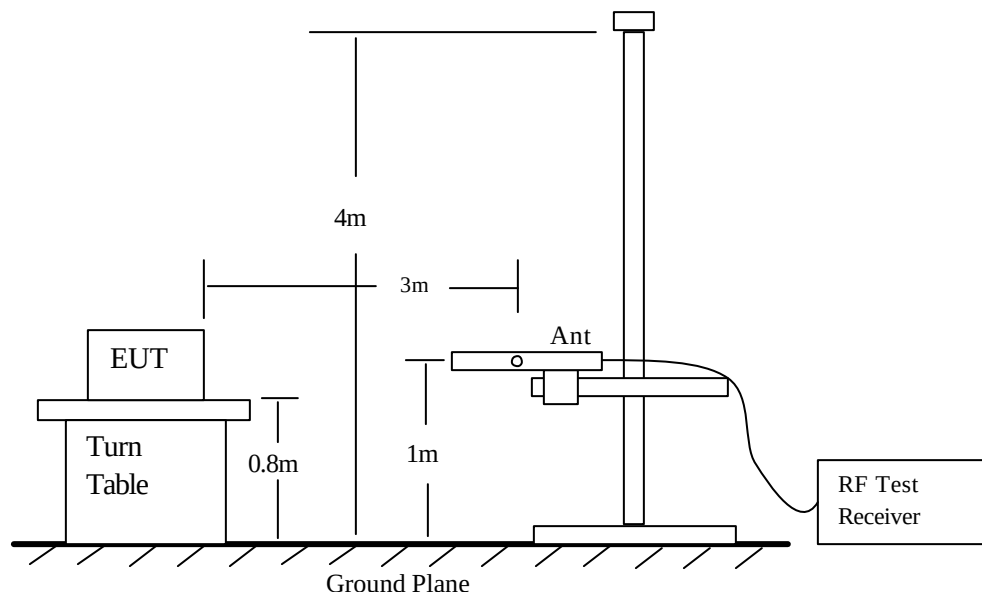
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
DC Power Supply	Kenwood	PA36-3A	7060074	N/A
Bilog Antenna	A.R.A.	LPB 2520/A	1185	3/6/04
Tune Dipole	ETS	DB-4	1629	5/14/04
Tx Horn Antenna	EMCO	3115	6739	2/4/2004
Rx Horn Antenna	EMCO	3115	6717	2/4/2004
Amplifier	MITEQ	NSP2600-SP	924342	4/25/2004
HPF	MICROLAB	FH-2400H	N/A	N/A

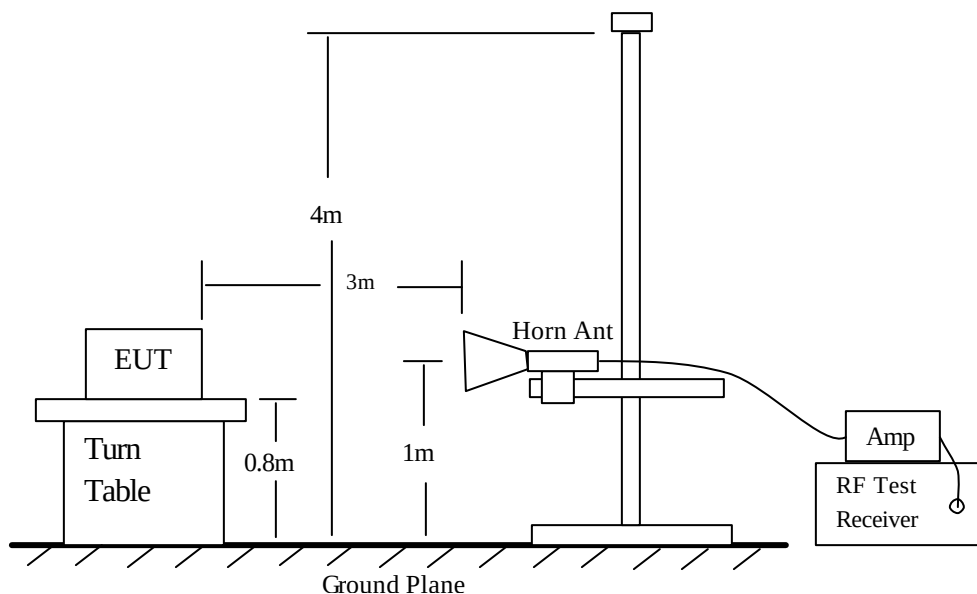
MEASUREMENT PROCEDURE

- 1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.
- 3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- 4). The transmitter shall be placed 0.80 meter above the ground plane, the X, Y, and Z positions shall be tested and the worst case reported. The transmitter shall be switched on with typical modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

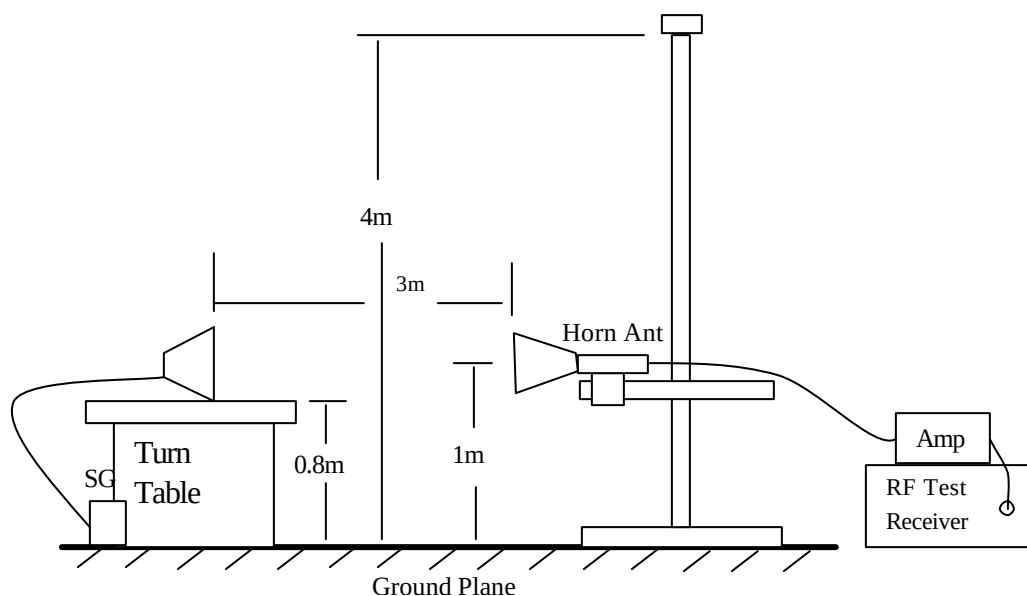
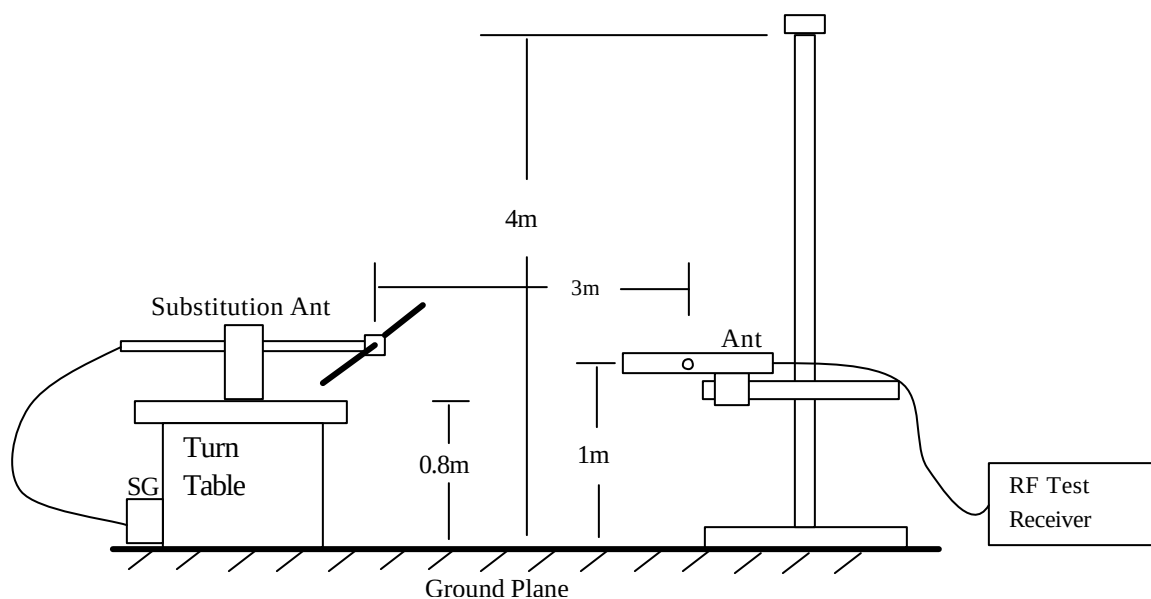
- 5). The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- 6). The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). The transmitter shall be replaced by a tuned dipole / horn (substitution antenna).
- 10). The substitution antenna shall be oriented for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- 11). The substitution antenna shall be connected to a calibrated signal generator.
- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.



Radiated Emission Measurement 30 to 1000 MHz



Radiated Emission Above 1000 MHz



Radiated Emission – Substitution Method Set-up

Radiated Emissions

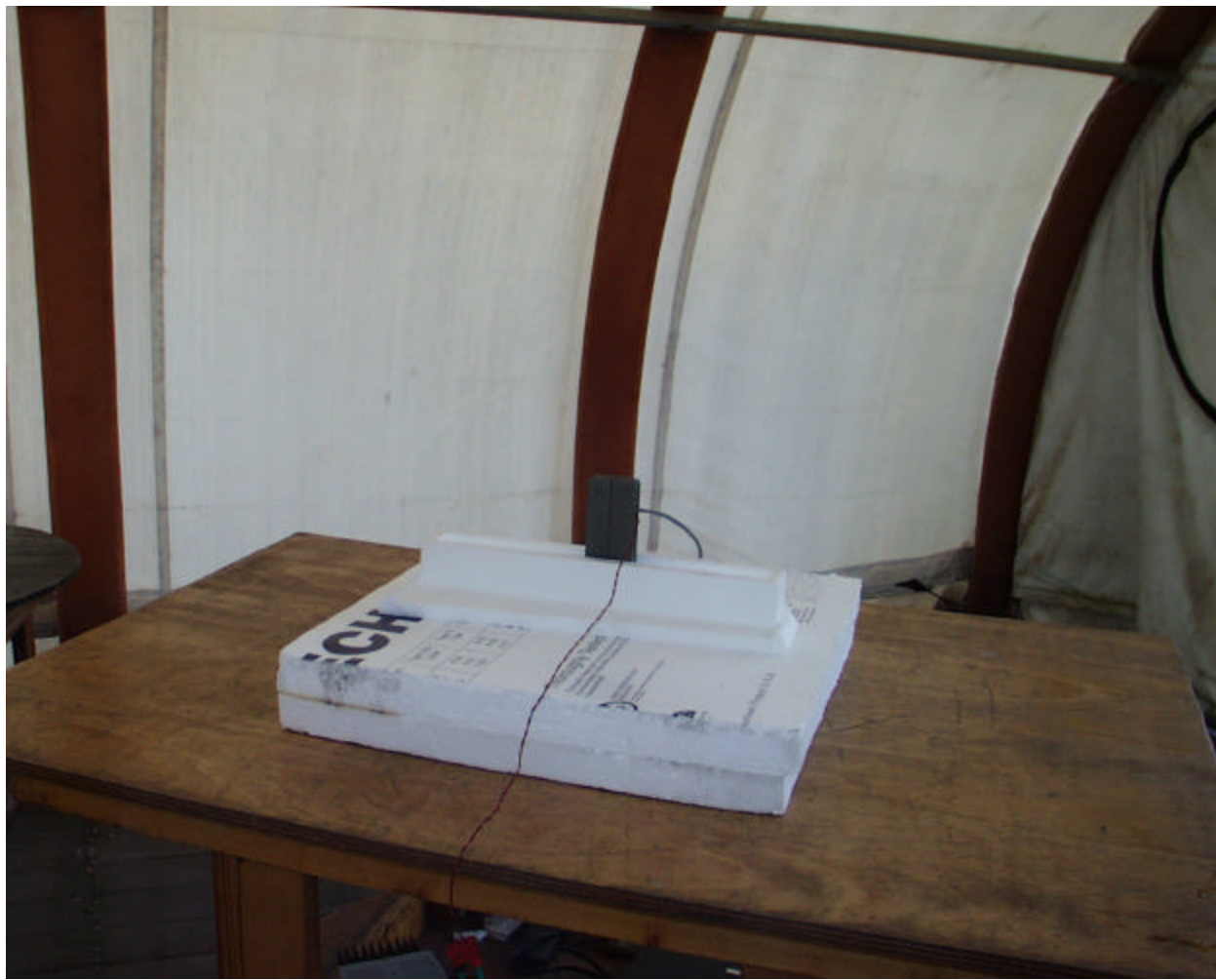
X –Orientation



Y –Orientation



Z-Orientation



MEASUREMENT RESULT:

Output Power (EIRP) at worst X-Position:

12/30/03 High Frequency Substitution Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: William Zhuang Project #: 03U2250 Company: Trimble Navigation Limited EUT Descrip.: Trimble Navigation Asset Tracker w/GPS & GSM EUT M/N: 51200-00 Test Target: FCC Part24 (1900MHz) Mode Oper: Transmit													
Test Equipment:													
EMCO Horn 1-18GHz		Pre-amplifier 1-26GHz		Spectrum Analyzer		Horn > 18GHz		Limit					
T73: S/N: 6717 @1n				Agilent E4446A Analyzer				FCC 24					
Hi Frequency Cables ☐ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☒ (12 ft)				Peak Measurements: Fundamental: RBW>99% or 26dB Emissions BW VBW=RBW						Bandedge: RBW=>1% Emissions BW VBW=> 3*RBW		Sourious RBW=1MHz VBW=1MHz	
f GHz	SA reading (dBm)	SG reading (dBm)	CL (dB)	Gain (dBi)	Gain (dBd)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Notes				
TX at worst position:													
1.850	96.8	20.1	2.2	7.4	5.3	25.3	33.0	-7.7	H, X position				
1.850	97.1	23.3	2.2	7.4	5.3	28.6	33.0	-4.4	V, X position				
1.880	99.8	22.7	2.2	7.4	5.3	27.9	33.0	-5.1	H, X position				
1.880	99.4	24.7	2.2	7.4	5.3	29.9	33.0	-3.1	V, X position				
1.910	98.1	21.3	2.2	7.5	5.3	26.6	33.0	-6.4	H, X position				
1.910	98.9	25.0	2.2	7.5	5.3	30.3	33.0	-2.7	V, X position				
RBW=VBW=3MHz													

7.2. SECTION 2.1047: MODULATION CHARACTERISTICS

Not applicable.

7.3. SECTION 2.1049: OCCUPIED BANDWIDTH

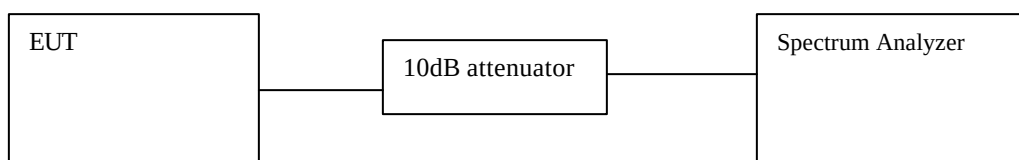
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
10dB Attenuator	Agilent	8493C	59028	N/A
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

TEST PROCEDURE

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RES BW was set to about 1% of emission BW, -26 dBc display line was placed on the screen, the occupied BW is the delta frequency between the two points where the display line intersects the signal trace. 26dB BW was measured for low, middle and high channels.

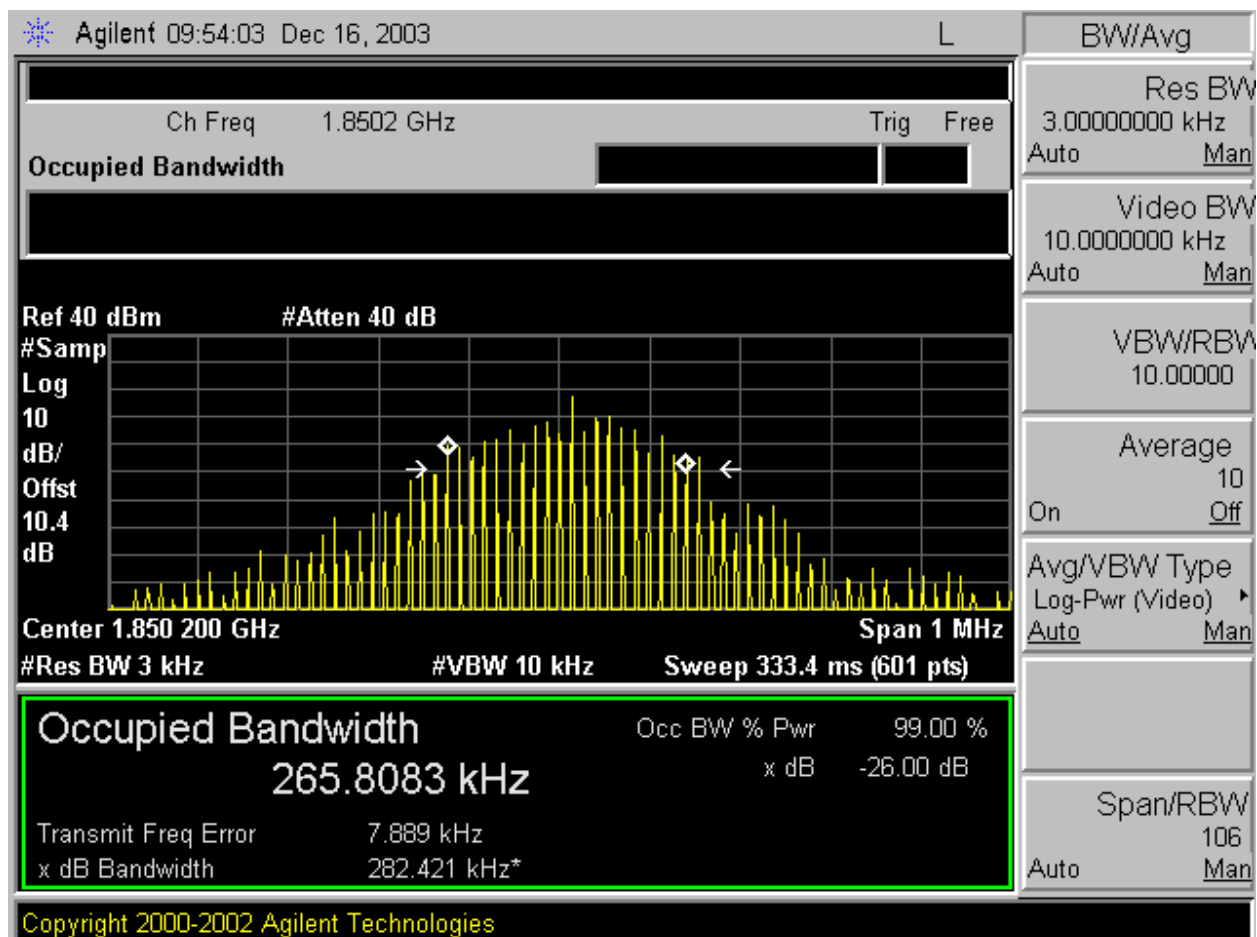
TEST SETUP



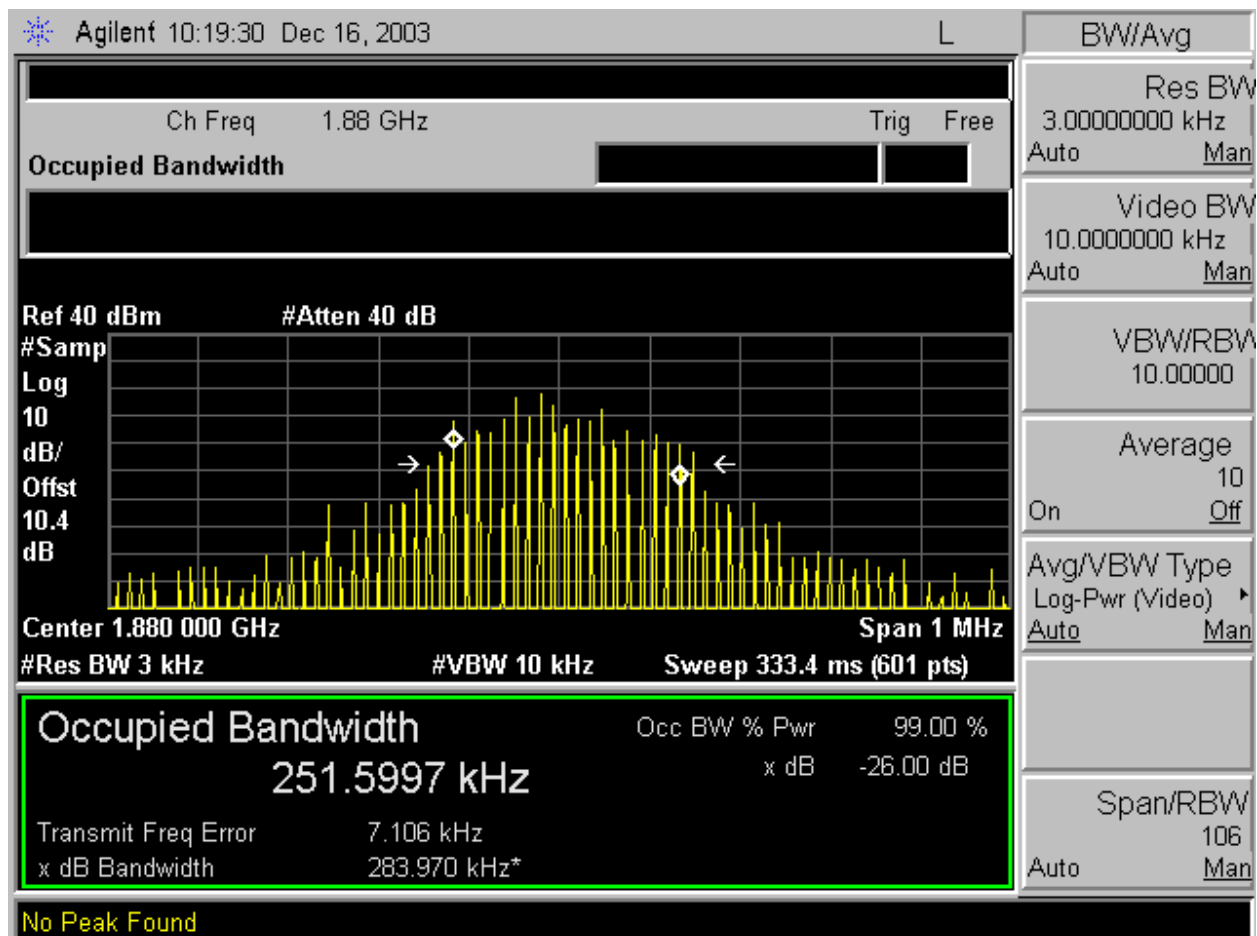
RESULT

Channel	Frequency (MHz)	-26dBc BW (KHz)
Low	1850.2	282.421
Middle	1880.0	283.970
High	1909.8	295.074

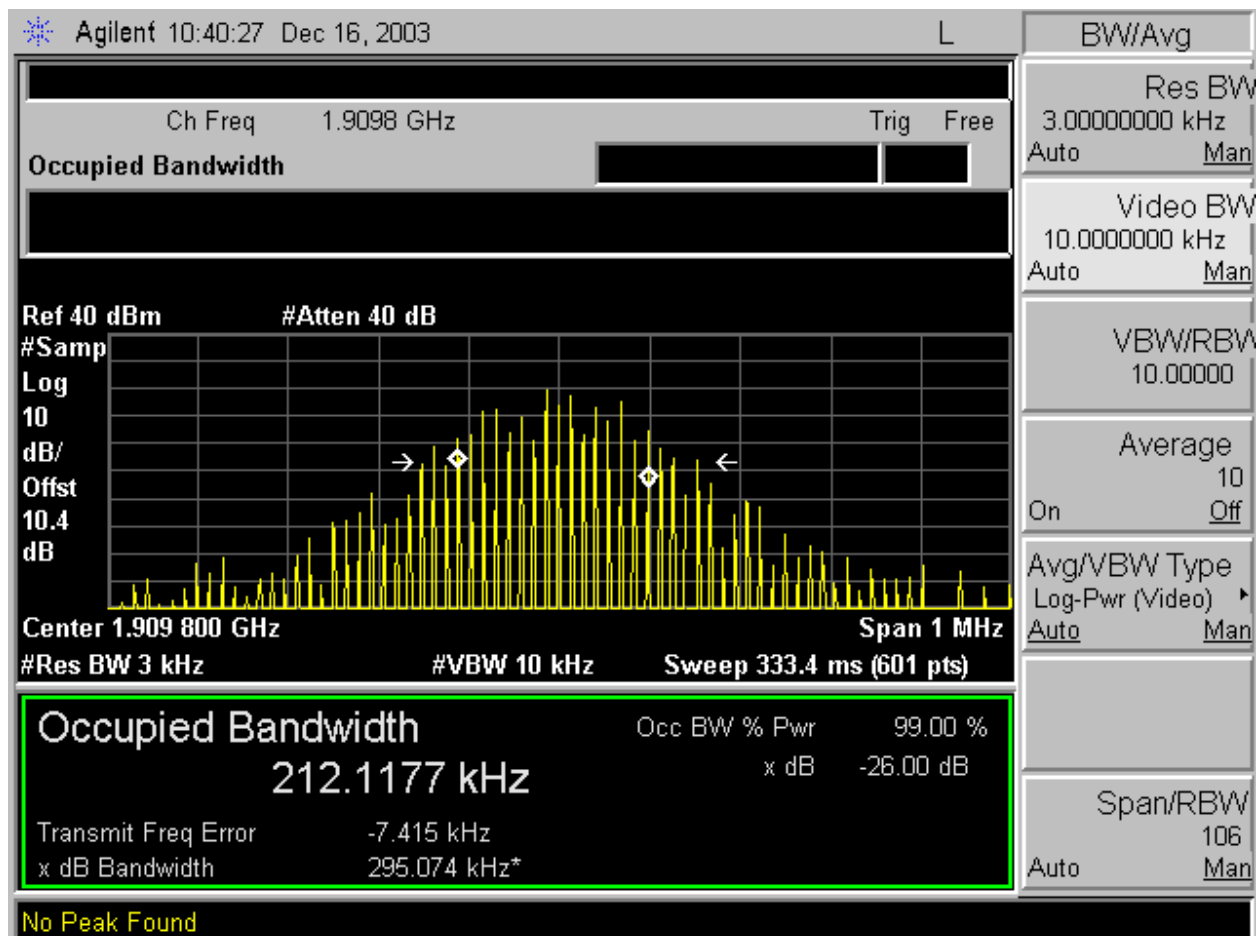
Low Channel



Mid Channel



High Channel

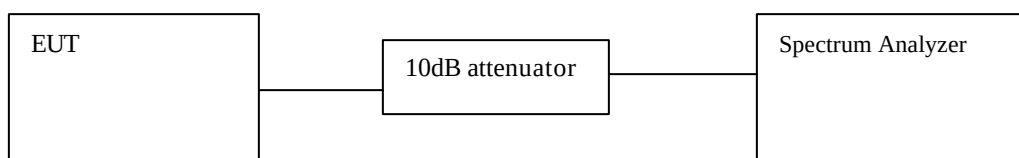


7.4. SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
10dB Attenuator	Agilent	8493C	59028	N/A
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

TEST SETUP



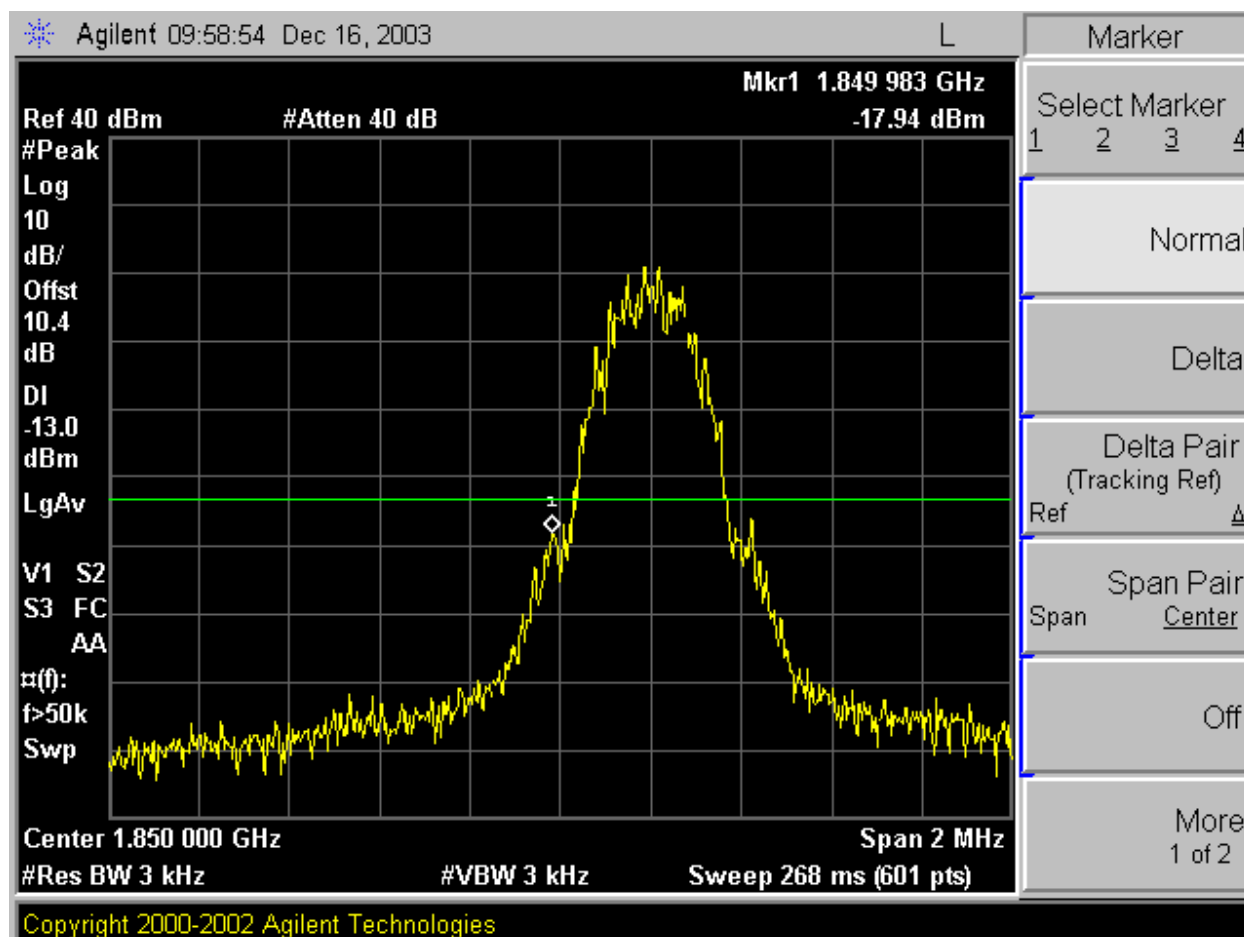
TEST PROCEDURE

- 1) EUT's RF output connector (made solely for the purpose of the test) is connected to the spectrum analyzer, and set as close as possible to the bottom of the block edge and one set as close as possible to the top of the block edge. Set the RES BW to 1% of the emission bandwidth to show compliance with the -13dBm limit, in the 1 MHz bands immediately outside and adjacent to the top and bottom edges of the frequency block.
- 2) For the Out-of-Band measurements a 1 MHz RES BW was used to scan from 15 MHz to $10 \times f_0$ of the fundamental carrier for all frequency block. A display line was placed at -13dBm to show compliance for spurious, and harmonics.

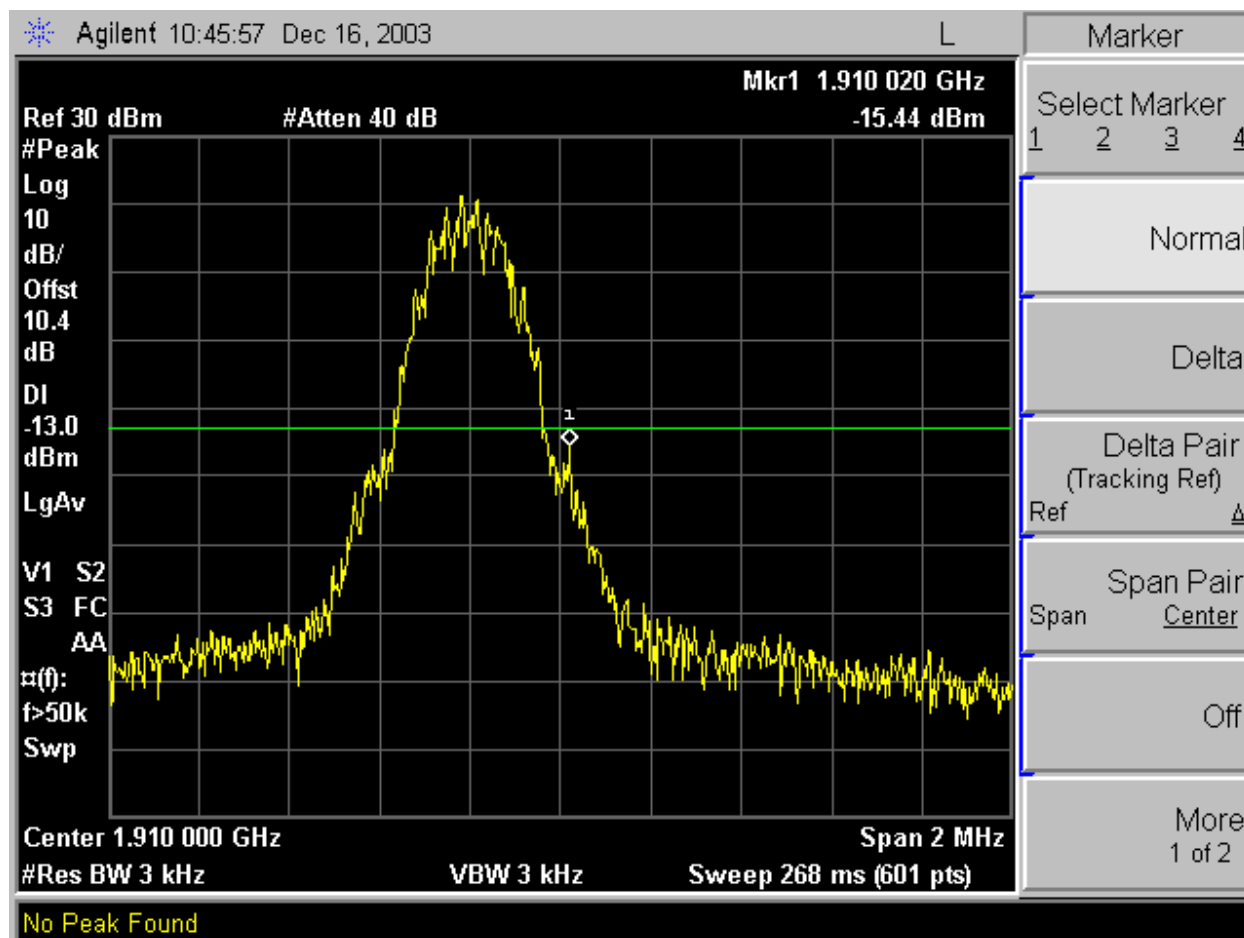
MEASUREMENT RESULT:

Low / High Band Edges, Low / Mid / High Out-Of-Band Emissions:

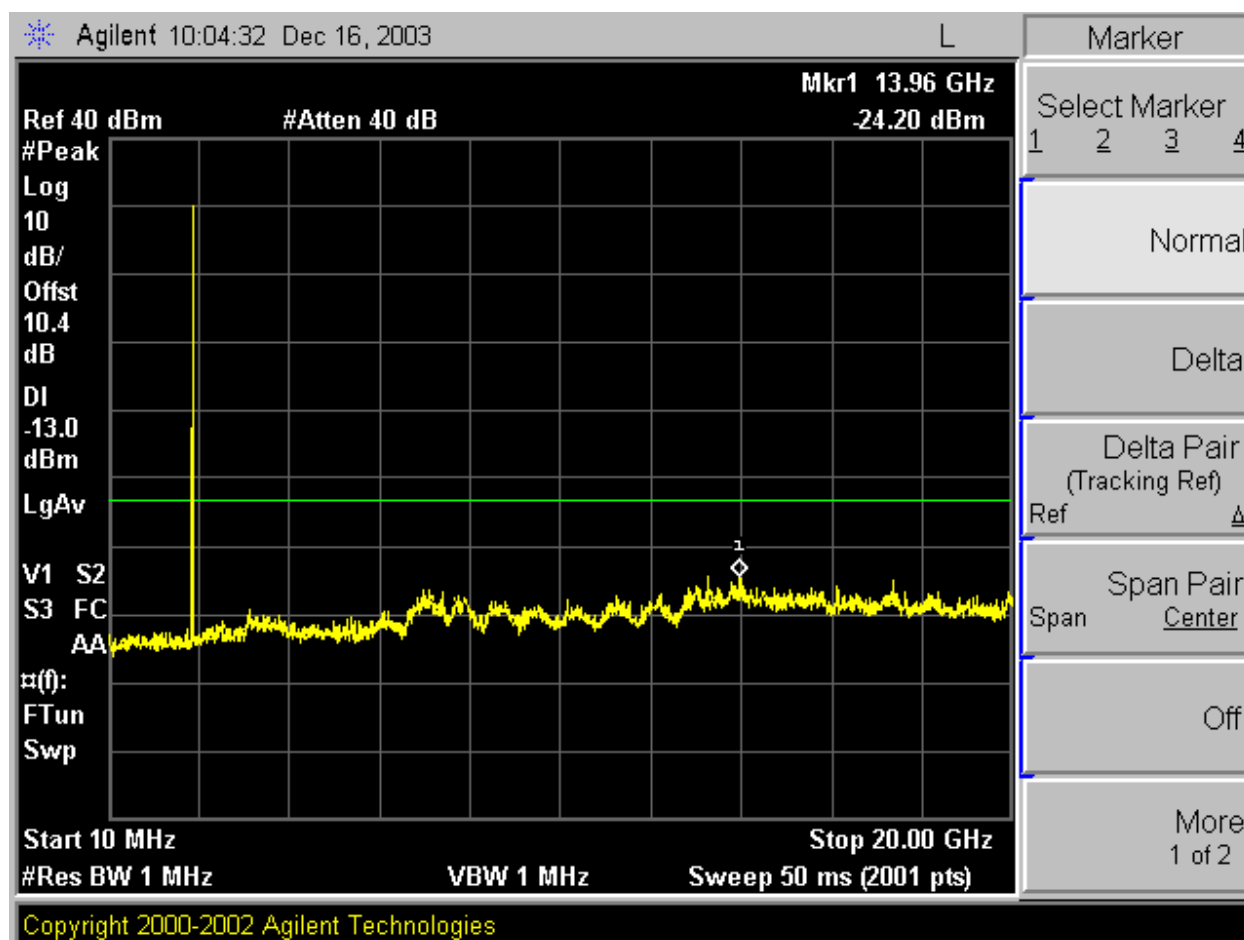
Low Band Edge- Ch 512 (Low Channel)



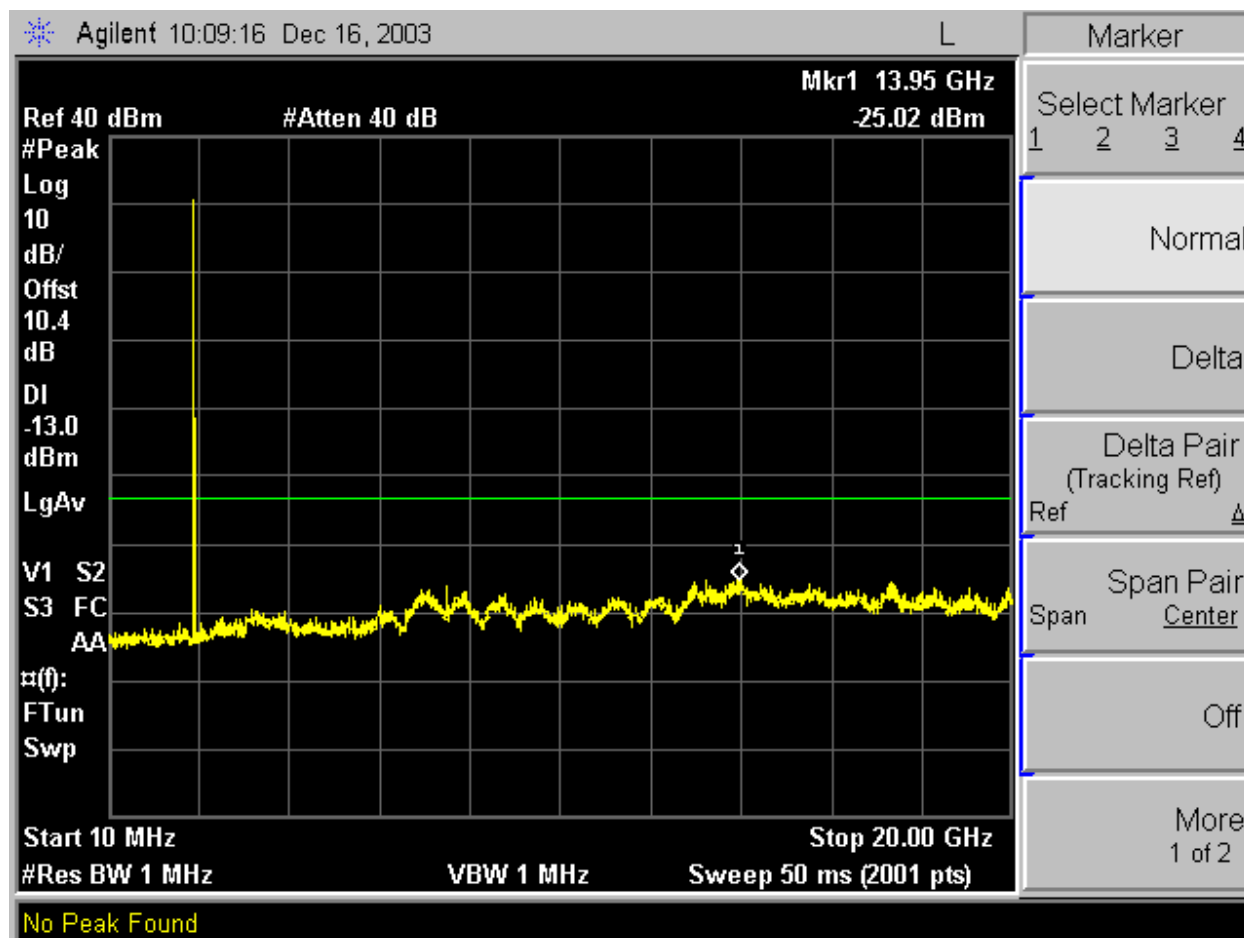
High Band Edge- Ch 810 (High Channel)



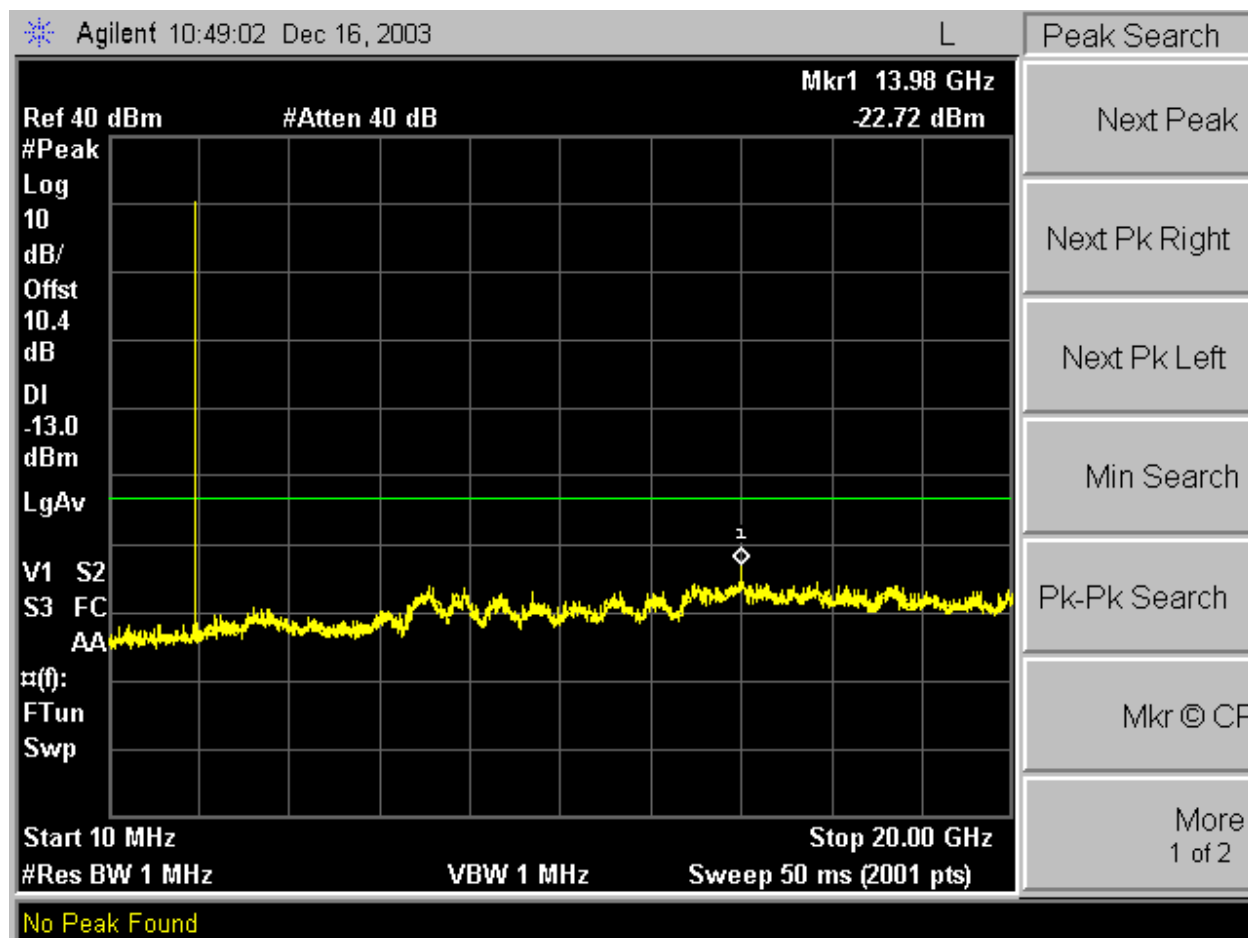
Out-Of-Band Emissions-Low Channel



Out-Of-Band Emissions-Mid Channel



Out-Of-Band Emissions-High Channel



7.5. SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

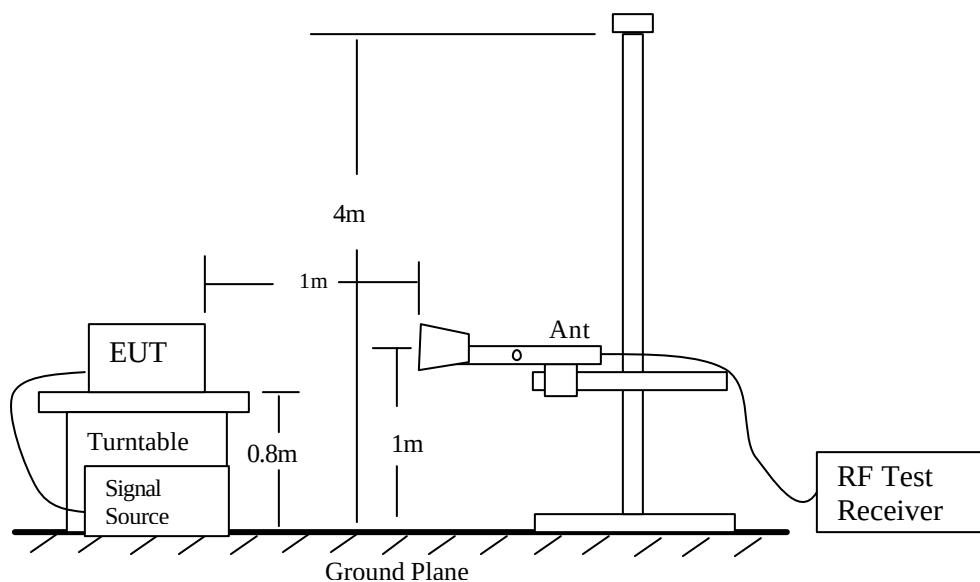
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
DC Power Supply	Kenwood	PA36-3A	7060074	N/A
Bilog Antenna	A.R.A.	LPB 2520/A	1185	3/6/04
Tune Dipole	ETS	DB-4	1629	5/14/04
Tx Horn Antenna	EMCO	3115	6739	2/4/2004
Rx Horn Antenna	EMCO	3115	6717	2/4/2004
Amplifier	MITEQ	NSP2600-SP	924342	4/25/2004
HPF	MICROLAB	FH-2400H	N/A	N/A

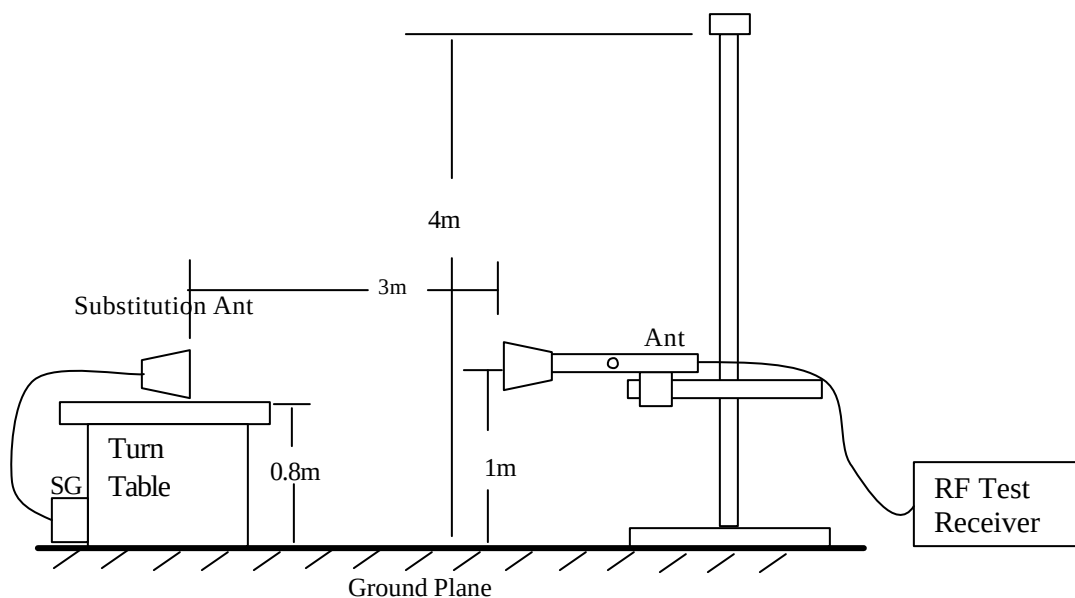
Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

TEST SETUP



Radiated Emission Measurement



Radiated Emission – Substitution Method set-up

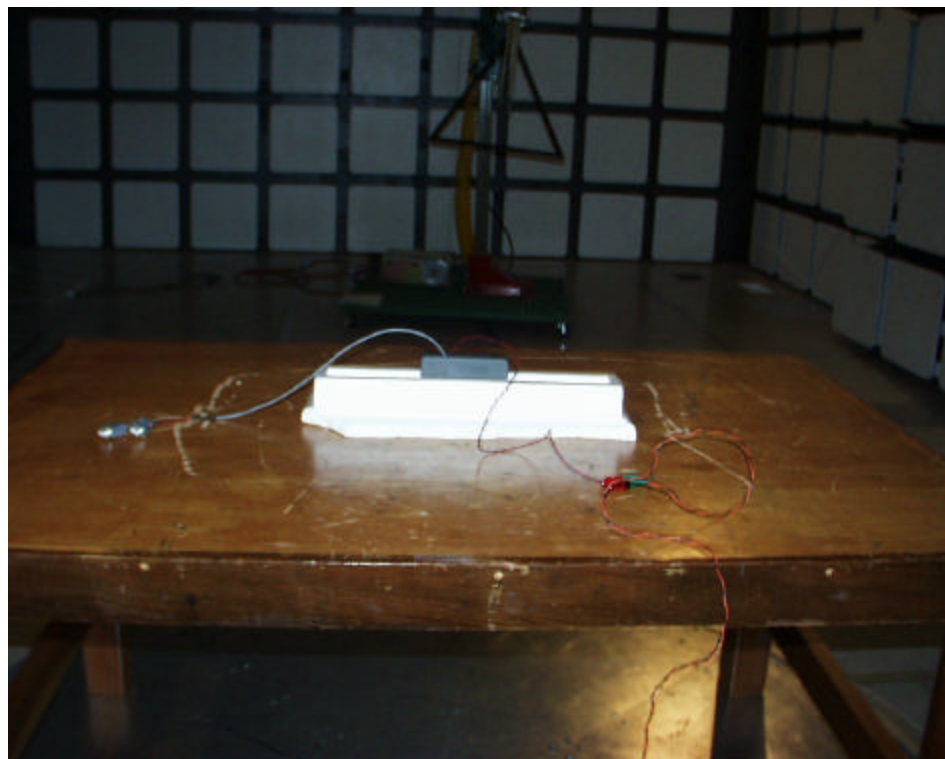
TEST PROCEDURE

- 1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- 2). The test antenna shall be oriented initially for vertical polarization located 1m from the EUT to correspond to the frequency of the transmitter.
- 3). The output of the test antenna shall be connected to the measuring receiver and either a peak or average detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- 4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- 5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6). The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). The transmitter shall be replaced by a substitution antenna.
- 10). The substitution antenna shall be oriented for vertical polarization.
- 11). The substitution antenna shall be connected to a calibrated signal generator.
- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

MEASUREMENT RESULT

No non-compliance noted, as shown below

Radiated Emission Setup Photos:



Harmonics & Spurious Emissions: Low, Mid, & High Channels:

1/5/2004	High Frequency Measurement					
Compliance Certification Services,Mogan Hill Open Field Site						
Test Engineer:		William Zhuang				
Project#:		03U2250				
Company:		Trimble Navigation Limited				
EUT Description:		Trimble Navigation Asset Tracker w/GPS & GSM				
EUT M/N:		51200-00				
Test Target:		FCC PART24 (1900MHZ)				
Mode Operate:		Transmit				
Test Equipment:						
EMCO Horn 1-18GHz		Pre-amplifier 1-26GHz			Spectrum Analyzer	
EMCO T73 S/N 6717		T87,NSP 2600-SP			E4446A	
EMCO T73 S/N 3245						
Signal Generator						
R&S SMP04						

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBd)	Emission level (dBm)	Limit (dBm)	Margin (dB)
Low Channel								
3700.40	76.78	H	-32.68	2.16	7.31	-27.52	-13.00	-14.52
5550.60	75.37	H	-33.13	2.83	9.14	-26.83	-13.00	-13.83
7400.80	67.47	H	-38.00	3.20	9.32	-31.87	-13.00	-18.87
9251.00	66.29	H	-34.81	3.67	9.20	-29.28	-13.00	-16.28
11101.20	47.79	H	-51.72	3.92	10.66	-44.97	-13.00	-31.97
Mid Channel								
3760.00	79.43	H	-29.84	2.19	7.35	-24.67	-13.00	-11.67
5640.00	72.67	H	-35.78	2.85	9.18	-29.45	-13.00	-16.45
7520.00	68.03	H	-37.09	3.25	9.29	-31.05	-13.00	-18.05
9400.00	62.00	H	-38.64	3.73	9.45	-32.92	-13.00	-19.92
11280.00	54.68	H	-45.26	3.89	10.62	-38.53	-13.00	-25.53
High Channel								
3819.60	79.37	H	-29.74	2.22	7.39	-24.57	-13.00	-11.57
5729.40	73.45	H	-34.95	2.86	9.22	-28.59	-13.00	-15.59
7639.20	74.97	H	-29.83	3.31	9.26	-23.88	-13.00	-10.88
9549.00	63.83	H	-36.38	3.78	9.68	-30.48	-13.00	-17.48
11458.80	62.48	H	-37.86	3.87	10.57	-31.16	-13.00	-18.16
13368.60	54.17	H	-46.56	4.06	9.91	-40.71	-13.00	-27.71

Frequency (MHz)	Reading level (dBuV)	Antenna Polarization	S.G. (dBm)	Cable loss (dB)	Ant.Gain (dBd)	Emission level (dBm)	Limit (dBm)	Margin (dB)
Low Channel								
3700.40	80.30	V	-29.01	2.16	7.31	-23.86	-13.00	-10.86
5550.60	79.60	V	-29.14	2.83	9.14	-22.84	-13.00	-9.84
7400.80	70.33	V	-35.96	3.20	9.32	-29.84	-13.00	-16.84
9251.00	63.68	V	-38.92	3.67	9.20	-33.39	-13.00	-20.39
11101.20	48.50	V	-50.80	3.92	10.66	-44.05	-13.00	-31.05
Mid Channel								
3760.00	80.74	V	-28.40	2.19	7.35	-23.24	-13.00	-10.24
5640.00	82.58	V	-26.15	2.85	9.18	-19.82	-13.00	-6.82
7520.00	68.90	V	-37.08	3.25	9.29	-31.05	-13.00	-18.05
9400.00	59.31	V	-42.77	3.73	9.45	-37.05	-13.00	-24.05
11280.00	51.64	V	-47.98	3.89	10.62	-41.25	-13.00	-28.25
High Channel								
3819.60	76.87	V	-32.13	2.22	7.39	-26.96	-13.00	-13.96
5729.40	80.32	V	-28.40	2.86	9.22	-22.04	-13.00	-9.04
7639.20	73.50	V	-32.20	3.31	9.26	-26.25	-13.00	-13.25
9549.00	65.56	V	-36.04	3.78	9.68	-30.14	-13.00	-17.14
11458.80	60.20	V	-39.72	3.87	10.57	-33.01	-13.00	-20.01
13368.60	57.32	V	-44.92	4.06	9.91	-39.07	-13.00	-26.07

7.6. RADIATED EMISSION - DIGITAL TEST

INSTRUMENTS LIST

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/20/2004
RF Filter Section	HP	85420E	3705A00256	11/20/2004
Antenna, Bicon/Log, 25 ~ 2000 MHz	ARA	LPB-2520/A	1185	3/6/2004

DETECTOR SETTING OF SPECTRUM ANALYZER

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak ☒ Quasi Peak	☒ 100 KHz ☒ 1 MHz	☒ 100 KHz ☒ 1 MHz

TEST PROCEDURE

1. The EUT was placed on the turn table 0.8 meter above ground inside 3 meter Anechoic Chamber.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures (3)~(6). If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.

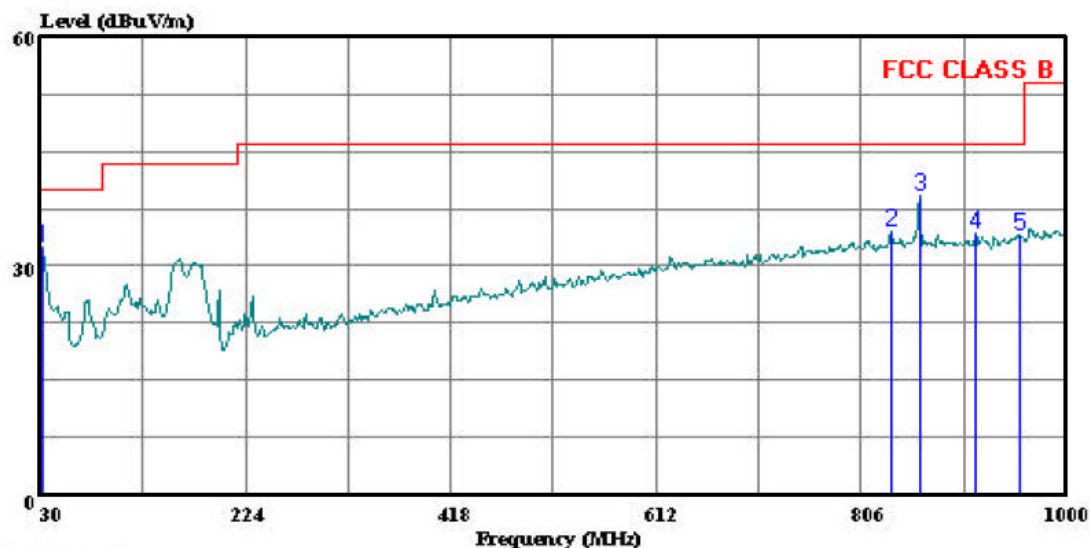
MEASUREMENT RESULT

No non-compliance noted, as shown below.



561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: emi.EMI Date: 12-31-2003 Time: 10:06:30



(Aidx ATC)

Trace: 3

Ref Trace:

Condition: FCC CLASS B CHAMBER 030306 1185 VERTICAL
Test Eng: : William Zhuang
Project #: : 03U2250
Company: : Trimble Navigation Ltd.
EUT: : Trimble Navigation Asset Tracker
: w/GPS & GMS
Model No: : 51200-00
Configuration: : EUT/Power Supply
Target of Test: : FCC-B
Mode of Operation: TX (WORST CASE)

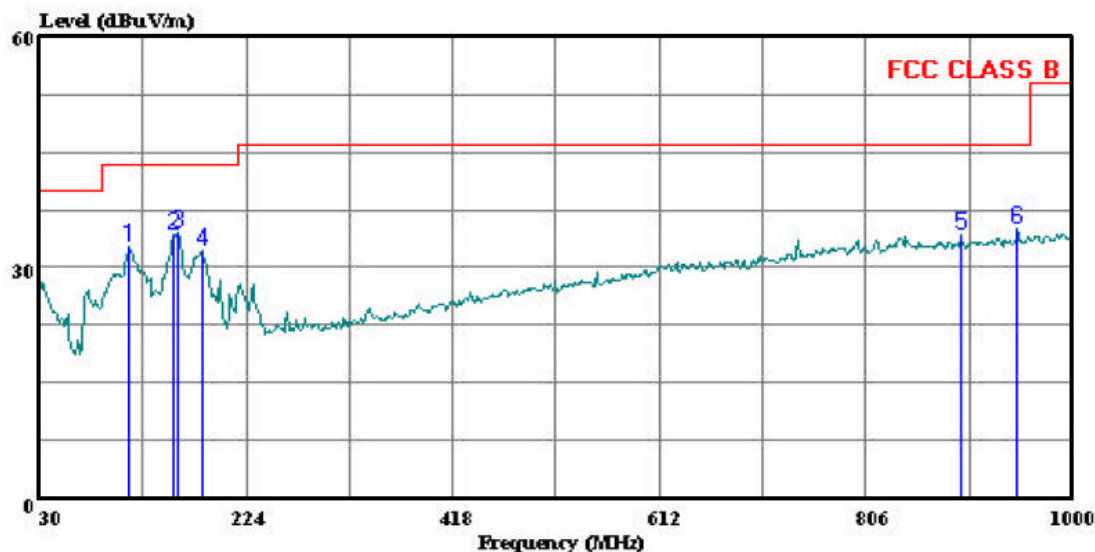
Page: 1

	Freq	Remark	Read Level	Factor	Limit Level	Over Line	Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	31.940	Peak	14.84	17.53	32.37	40.00	-7.63
2	834.130	Peak	11.34	23.16	34.50	46.00	-11.50
3	861.290	Peak	15.80	23.39	39.19	46.00	-6.81
4	914.640	Peak	10.41	23.94	34.35	46.00	-11.65
5	955.380	Peak	9.78	24.34	34.12	46.00	-11.88



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Data#: 2 File#: emi.EMI Date: 12-31-2003 Time: 09:55:50



(Auxiliary ATC)

Trace: 1

Ref Trace:

Condition: FCC CLASS B CHAMBER 030306 1185 HORIZONTAL
Test Eng: : William Zhuang
Project #: : 03U2250
Company: : Trimble Navigation Ltd.
EUT: : Trimble Navigation Asset Tracker
: w/GPS & GMS
Model No: : 51200-00
Configuration: : EUT/Power Supply
Target of Test: : FCC-B
Mode of Operation: TX (WORST CASE)

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	114.390	Peak	21.50	11.18	32.68	43.50	-10.83
2	155.130	Peak	24.76	9.63	34.39	43.50	-9.11
3	159.980	Peak	24.61	9.83	34.44	43.50	-9.06
4	182.290	Peak	22.05	10.10	32.15	43.50	-11.35
5	895.240	Peak	10.33	23.83	34.16	46.00	-11.84
6	948.590	Peak	10.68	24.28	34.96	46.00	-11.04

7.7. POWERLINE CONDUCTED EMISSION

Not applicable, EUT is operating only DC voltage.

7.8. SECTION 2.1055: FREQUENCY STABILITY

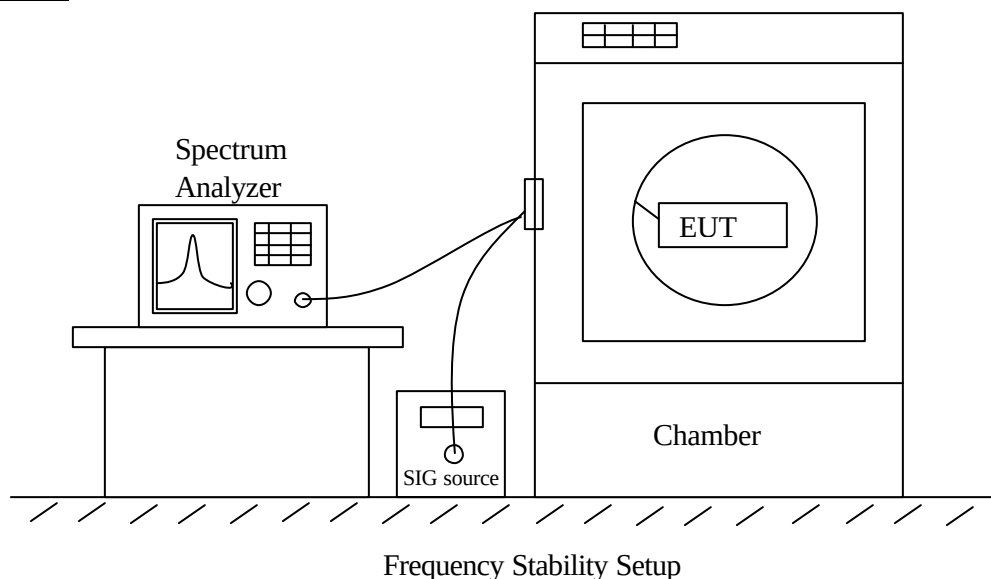
INSTRUMENTS LIST

EQUIPMENT	MANUFACTURE	MODEL NO.	SERIAL NO.	CAL. DUE DATE
PSA Analyzer	Agilent	E446A	US42070220	1/13/04
10dB Attenuator	Agilent	8493C	59028	N/A
Environmental Chamber	Thermotron	SE 600-10-10	2980	4/23/04
DC Power Supply	Kenwood	PA36-3A	7060074	N/A

DETECTOR SETTING OF TEST RECEIVER

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	Peak	300 Hz	300 Hz

TEST SETUP



TEST PROCEDURE

- **Frequency stability versus environmental temperature**

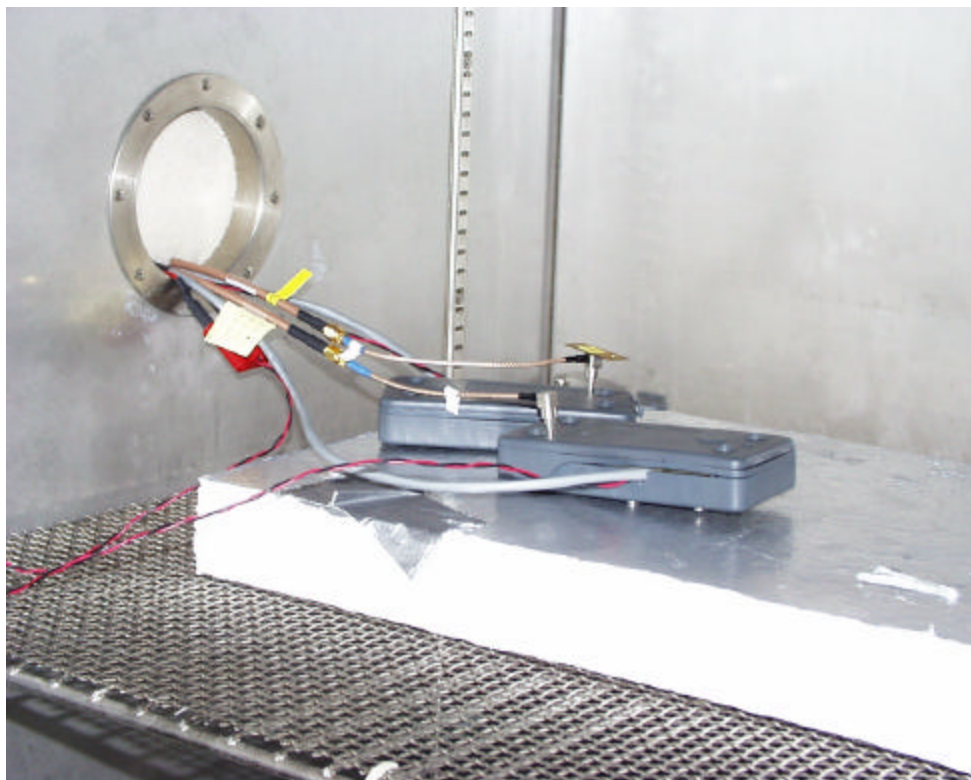
- 1). Setup the configuration per figure 6 for frequencies measurement inside the environmental chamber. Set the temperature of the chamber to 25°C. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
- 2). Turn EUT off and set Chamber temperature to -30°C.
- 3). Allow sufficient time (approximately 20 to 30 minus after chamber reach the assigned temperature) for EUT to stabilize. Turn on EUT and measure the EUT operating frequency. Turn off EUT after the measurement.
- 4). Repeat step 3 with a 10°C increased per stage until the highest temperature of +50°C reached, record all measured frequencies on each temperature step.

- **Frequency stability versus AC input voltage**

- 1). Setup the configuration per figure 6 and set chamber temperature to 25°C. Use a variable AC power supply to power the EUT and set AC output voltage to EUT nominal input AC voltage. Set SA Resolution Bandwidth low enough to obtain the desired frequency resolution and measure the EUT 25°C operating frequency as reference frequency.
- 2). Slowly reduce the EUT input voltage to specified extreme voltage variation ($\pm 15\%$) and record the maximum frequency change.

MEASUREMENT RESULT

No non-compliance noted, as shown below.



Reference Frequency: PCS Mid Channel 1880.00000MHz @ 25°C				
Limit: to stay ± 2.5 ppm = 4700.039 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
5.00	50	1880.01637	-0.418	± 2.5
5.00	40	1880.01596	-0.199	± 2.5
5.00	30	1880.01580	-0.116	± 2.5
5.00	25	1880.01558	0	± 2.5
5.00	20	1880.01558	0.003	± 2.5
5.00	10	1880.01555	0.018	± 2.5
5.00	0	1880.01530	0.152	± 2.5
5.00	-10	1880.01507	0.271	± 2.5
5.00	-20	1880.01492	0.354	± 2.5
5.00	-30	1880.01477	0.433	± 2.5
3.00 (end point)	25	1880.01538	0.110	± 2.5
4.25	25	1880.01605	-0.248	± 2.5
5.75	25	1880.01603	-0.240	± 2.5

8. APPENDICES

- 8.1. EXTERNAL & INTERNAL PHOTOS**
- 8.2. SCHEMATICS**
- 8.3. BLOCK DIAGRAM**
- 8.4. USER MANUAL**

END OF REPORT