SKT

SK TECH CO., LTD.

Certificate of Compliance

Test Report No.:	**SKTTRT-031127-006**		
NVLAP CODE:	**200220-0**		
Applicant:	**SICO SYSTEM INTEGRATION CO., LTD.**		
Applicant Address:	3F Hankook Electronic Hyunbdong B/D, 371-51, Gasan=Dong, Geumchon-Gu, Seoul, Korea 153-803		
Device Under Test:	**3D GYRO Pen Mouse**		
FCC ID:	**RNSZ3**	**Model No.:**	**Z3**
Receipt No.:	SKTEU03-0648	**Date of receipt:**	November 17, 2003
Date of Issue:	November 27, 2003		
Location of Testing:	**SK TECH CO., LTD.** 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
Test Procedure:	**ANSI C63.4 / 2001**		
Test Specification:	**FCC Title 47, Part 15 Subpart C / August 26, 2003**		
Equipment Class:	**Part 15 Spread Spectrum Transmitter**		
Test Result:	The above-mentioned device has been tested and passed.		

Tested & Reported by: *Jong-Soo, Yoon*	**Approved by**: *Jae-Kyung, Bae*
11/27/2003	*11/27/2003*
Signature *Date*	*Signature* *Date*

Other Aspects:	
Abbreviations:	**· OK, Pass = passed · Fail = failed · N/A = not applicable**

☞
- **This test report is not permitted to copy partly without our permission.**
- **This test result is dependent on only equipment to be used.**
- **This test result is based on a single evaluation of one sample of the above mentioned.**
- **This test report must not be used to claim product endorsement by NVLAP or any agency of the U.S Government.**
- **We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.**

NVLAP®

NVLAP Lab. Code: 200220-0

>> CONTENTS <<

1. GENERAL 4

2. TEST SITE 4
2.1 Location 4
2.2 List of Test and Measurement Instruments 5
2.3 Test Date 5
2.4 Test Environment 5

3. DESCRIPTION OF THE EQUIPMENT UNDER TEST 6
3.1 Rating and Physical Characteristics 6
3.2 Equipment Modifications 6
3.3 Submitted Documents 6

4. MEASUREMENT CONDITIONS 7
4.1 Description of test configuration 7
4.2 List of Peripherals 7
4.3 Type of used Cables 7
4.4 Uncertainty 7

5. TEST AND MEASUREMENTS 8

5.1 ANTENNA REQUIREMENT 8
5.1.1 Regulation 8
5.1.2 Result 8

5.2 MAXIMUM PEAK OUTPUT POWER 9
5.2.1 Regulation 9
5.2.2 Test Procedure 9
5.2.3 Test Results 10
Table 1: Measured values of the EIRP 10
Table 2: Measured values of the Maximum Peak Output Power (Conducted) 10
Figure 1: Plot of the Maximum Peak Output Power (Conducted) 10

5.3 CHANNEL BANDWIDTH 11
5.3.1 Regulation 11
5.3.2 Test Procedure 11
5.3.3 Test Results 11
Table 3: Measured values of the Channel Bandwidth (Conducted) 11
Figure 2: Plot of the Channel bandwidth (Conducted) 12

5.4 SPURIOUS EMISSION, BAND EDGE, AND RESTRICTED BANDS ... 13
5.4.1 Regulation 13
5.4.2 Test Procedure 13
5.4.3 Test Results 14
Table 4: Measured values of RF antenna port emission (Conducted) 14
Figure 3: Plot of the RF antenna port emission (Conducted): 30MHz ~ 3GHz 14

Figure 4: Plot of the RF antenna port emission (Conducted): 3GHz ~ 8GHz 15
Figure 5: Plot of the RF antenna port emission (Conducted): 8GHz ~ 25GHz 15
Figure 6: Plot of the Lower Band Edge (Conducted) 16
Figure 7: Plot of the Higher Band Edge (Conducted) 16
Table 5: Measured values of the field strength (Radiated)..... 17

5.5 PEAK POWER SPECTRAL DENSITY 18
5.5.1 Regulation 18
5.5.2 Test Procedure 18
5.5.3 Test Results 18
Table 6: Measured values of the Peak Power Spectral Density (Conducted) 18
Figure 8: Plot of the Peak Power Spectral Density (Conducted) 19

5.6 CONDUCTED EMISSIONS 20
5.6.1 Regulation 20
5.6.2 Test Procedure 20
5.6.3 Test Results 21
Table 7: Measured values of the Conducted Emissions..... 21
Figure 9: Plot of the Conducted Emissions: LINE – PE 22
Figure 10: Plot of the Conducted Emissions: NETURAL – PE..... 23

5.7 RF EXPOSURE 24
5.3.1 Regulation 24
5.3.3 RF Exposure Compliance Issue 24

1. GENERAL

These tests were performed using the test procedure outlined in ANSI C63.4, 2001 for intentional radiators, and in accordance with the limits set forth in FCC Part 15.247 for Spread Spectrum Transmitter. The EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards.

We attest to the accuracy of data. All measurements reported herein were performed by SK Tech Co., Ltd. and were made under Chief Engineer's supervision.
We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

2. TEST SITE

SK TECH Co., Ltd.

2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.
This laboratory is accredited by NVLAP for NVLAP Lab. Code: 200220-0 and DATech for DAR-Registration No.: TTI-P-G155/97-10

2.2 List of Test and Measurement Instruments

Equipment Type	Manufacturer	Model No.	Serial No.	Cal. Due Date
EMI Test Receiver	Rohde&Schwarz	ESHS 10	862970/019	10, 2004
EMI Test Receiver	Rohde&Schwarz	ESHS 10	835871/002	10, 2004
Artificial Mains Network	Rohde&Schwarz	ESH2-Z5	834549/011	10, 2004
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	836679/018	10, 2004
EMI Test Receiver	Rohde&Schwarz	ESVS 10	825120/013	10, 2004
EMI Test Receiver	Rohde&Schwarz	ESVS 10	834468/008	10, 2004
EMC Spectrum Analyzer	Agilent	E7405A	US40240203	12, 2003
Spectrum Analyzer	Agilent	E4405B	US40520856	07. 2004
Amplifier	H.P	8447F	3113A05153	10, 2004
Amplifier	H.P	8349B	2644A03250	08, 2004
Signal Generator	H.P	8673G	3128A00422	08, 2004
Vector Signal Generator	Agilent	E4438C	MY42080359	08, 2004
TRILOG broadband antenna	Schwarzbeck	VULB9160	3141	05, 2004
Log Periodic Antenna	Schwarzbeck	UHALP9107	1819	10, 2004
Biconical Antenna	Schwarzbeck	BBA9106	91031626	10, 2004
Horn Antenna	AH Systems	SAS-200/571	304	03, 2004
Horn Antenna	Electro Metrics	EM-6961	6298	08, 2004
Horn Antenna	Electro Metrics	EM-6961	6297	08, 2004
Antenna Mast	TOKIN	5907	N/A	N/A
Antenna & Turntable controller	TOKIN	5906	N/A	N/A
50Ω Switcher	Anritsu	MP59B	6100214538	N/A

2.3 Test Date

Date of Application : November 17, 2003

Date of Test : November 17, 2003 ~ November 26, 2003

2.4 Test Environment

See each test item's description.

3. DESCRIPTION OF THE EQUIPMENT UNDER TEST

The product specification described herein was obtained from the product data sheet or user's manual.

3.1 Rating and Physical Characteristics

Type (Model No.)	EUT (Transceiver)	Receiver*
	Z3	Z3RCV
Power source	DC 3.6V (AAA Ni-MH x 3)	DC 5.0V (Fed by PC)
Local Oscillator or X-Tal	X-Tal: 6 MHz, IF: 488 MHz, LO: 1952 MHz	X-Tal: 6 MHz, IF: 488 MHz, LO: 1952 MHz
Transmit Frequency	2440 MHz (fixed)	2440 MHz (fixed)
Antenna Type	PCB Printed antenna	PCB Printed antenna
Type of Modulation	DSSS (BPSK, OOK)	DSSS (BPSK, OOK)
RF Output power	< 2dBm	< 2dBm
External Ports	Charging Jack (AC adaptor: JE-0950U AC Input: 120V/60Hz DC output: 9V 500mA)	USB port

* The transmitter Z3RCV has the same RF module (RFW102) that Z3 has. The test report for compliance with FCC Part 15B&C as an intentional radiator should be issued with other test report number.

3.2 Equipment Modifications

None.

3.3 Submitted Documents

Block diagram

Schematic diagram

Antenna Specification

RF Module Specification

Part List

User manual

4. MEASUREMENT CONDITIONS

4.1 Description of test configuration

The EUT was configured for testing in a typical fashion (as a user would normally use it). Once the EUT has linked with the receiver Z3RCV connected to PC via USB port, the EUT transmits RF signals continuously as the location data of the mouse pointer despite the condition in the absence of the receiver Z3RCV. The measurements were taken in transmitting mode without the receiver Z3RCV.

4.2 List of Peripherals

Equipment Type	FCC ID	Manufacture	Model	Serial Number

The EUT was tested as a stand-alone device.

4.3 Type of Used Cables

Description	Length	Type of shield	Manufacturer	Remark

None

4.4 Uncertainty

Conducted RF power measurement

Uc (Combined standard Uncertainty) = ± 1.49 dB

Expanded uncertainty U = KUc = ±2.98dB (K = 2)

Radiated disturbance

Uc (Combined standard Uncertainty) = ± 2.37 dB

Expanded uncertainty U = KUc = ±4.74dB (K = 2)

Conducted disturbance

Uc (Combined standard Uncertainty) = ± 1.47 dB
Expanded uncertainty U = KUc = ±2.94dB (K = 2)

5. TEST AND MEASUREMENTS

Summary of Test Results

Requirement	CFR Section	Report Section	Test Result
Antenna Requirement	15.203	5.1	PASS
Maximum Peak Output Power	15.247(b)(3)&(4)	5.2	PASS
Channel Bandwidth	15.247(a)(2)	5.3	PASS
Spurious Emission, Band Edge, and Restricted bands	15.247(c), 15.209(a), 15.109(a)	5.4	PASS
Peak Power Spectral Density	15.247(d)	5.5	PASS
Conducted Emissions	15.207(a), 15.109(a)	5.6	PASS
RF Exposure	15.247(b)(5), 1.1307(b)(1)	5.7	PASS

5.1 ANTENNA REQUIREMENT

5.1.1 Regulation

FCC section 15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of Part 15C. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31 (d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

5.1.2 Result: PASS

The transmitter has a PCB printed square loop antenna and does meet the requirements of this section.

5.2 MAXIMUM PEAK OUTPUT POWER

5.2.1 Regulation

According to §15.247(b)(3)&(4), the maximum peak output power shall not exceed 1 watt (30dBm). If directional transmitting antennas with a gain of more than 6 dB are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB.

5.2.2 Test Procedure

Out power measurements were first taken as EIRP measurements using the Substitution Method. We adjusted the level as close a possible to the original values. After the testing was completed, the conducted power measurements were performed using a BALUN component, which converts the antenna's 200Ω differential impedance to unbalanced 50Ω impedance. The unbalanced port of the BALUN component was connected using a 50Ω transmission line to an SMA connector.

1. The EUT was placed at 1.5m height turnaround table and in a position for normal use.
2. The test antenna was oriented initially for vertical position with 3m away from EUT.
3. The output of the antenna was connected to the spectrum analyzer and the peak detector is used for the measurement with the 3MHz resolution bandwidth.
4. The transmitter was turned on and the spectrum analyzer was tuned to the frequency of EUT.
5. The test antenna was raised and lowered through specified ranged of height until the maximum signal level was detected by the spectrum analyzer.
6. The EUT was rotated through 360° in the horizontal plane until the signal level was detected.
7. The EUT was then replaced by a horn antenna that is a substitution antenna.
8. The substitution antenna was oriented for vertical polarization and then connected to a calibrated signal generator.
9. The test antenna was raised and lowered through specified ranged of height until the maximum signal level was detected.
10. The input signal to the substitution antenna was adjusted to the level to produce a level which was equal to the level noted while the transmitter radiated power was measured, corrected for the change of the input attenuator of the spectrum analyzer.
11. The input level to the substitution antenna was recorded as power level in dBm, corrected for any change of input attenuator of the spectrum analyzer.
12. The measurement was repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
13. The measure of the radiated output power is the larger one of the two level recorded, at the input to the substitution antenna, corrected for grain of the substitution antenna and cable loss.

5.2.3 Test Results: PASS

Table 1: Measured values of the EIRP

Frequency [MHz]	Resolution Bandwidth [MHz]	Pol. (V/H)	Output power of the signal generator [dBm]	Cable Loss [dB]	Substitution Antenna Gain [dBi]	Actual [dBm]	Limit [dBm]
2440	3	V	-9.1	1.4	9.37	-1.13	30.0

Actual = Output power of the signal generator – Cable Loss + Substitution Antenna Gain

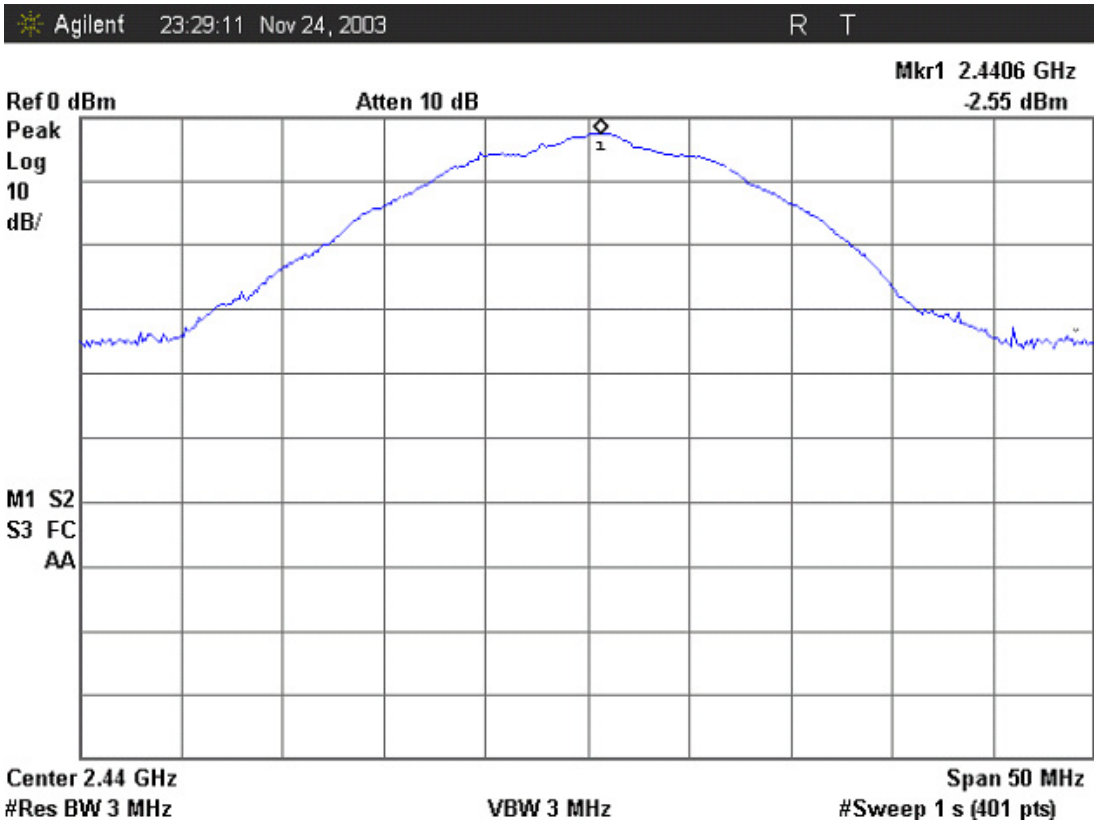
Table 2: Measured values of the Maximum Peak Output Power (Conducted)

Frequency [MHz]	Resolution Bandwidth [MHz]	Reading [dBm]	Cable Loss [dB]	Actual [dBm]	Limit [dBm]
2440	3	-2.55	1.4	-1.15	30.0

Actual = Reading + Cable Loss

Since the gain of the built-in antenna specified by manufacturer (G_{ant} = 0 dBi) does not exceed 6.0 dBi there was no need to reduce the output power.

Figure 1. Plot of the Maximum Peak Output Power (Conducted)



5.3 CHANNEL BANDWIDTH

5.3.1 Regulation

According to §15.247(a)(2), for direct sequence systems, the minimum 6dB bandwidth shall be at least 500 kHz.

5.3.2 Test Procedure

ANSI C63.4-2001 Section 13.1.7, Occupied Bandwidth Measurements. The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. Once the reference level is established, the equipment is conditioned with typical modulating signals to produce worst-case (widest) bandwidth.

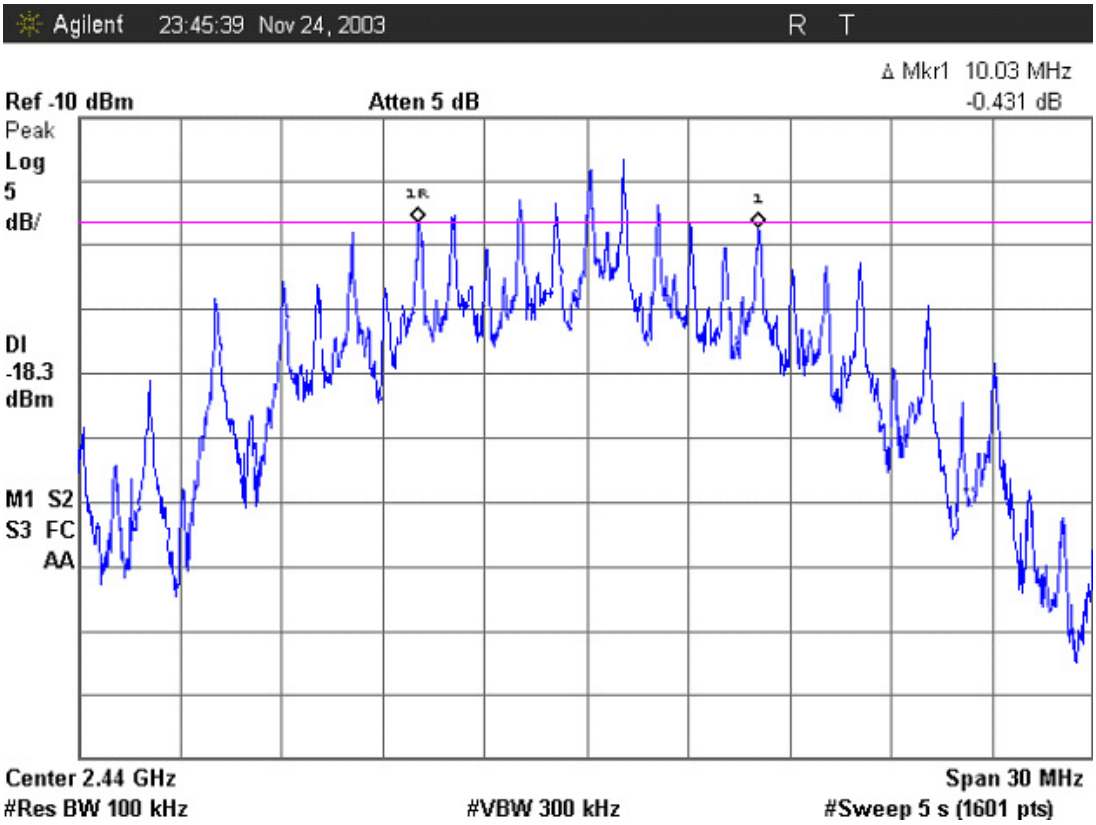
The measurements were performed at the operating frequency 2440 MHz. The spectrum trace data around fundamental frequency of the EUT was obtained with the spectrum analyzer in “Max Hold” mode. The bandwidth value was determined between the two points of 6dB down from the reference level.

5.3.3 Test Results: PASS

Table 3: Measured values of the Channel Bandwidth (Conducted)

Operating frequency	6 dB Bandwidth	Limit
2440 MHz	10.03 MHz	≥ *500 kHz*

Figure 2. Plot of the Channel Bandwidth (Conducted)



5.4 SPURIOUS EMISSIONS, BAND EDGE, AND RESTRICTED BANDS

5.4.1 Regulation

According to §15.247(c), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency (MHz)	Field strength (uV/m @ 3m)	Field strength (dBuV/m @ 3m)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

5.4.2 Test Procedure

1) RF Antenna Conducted Test: The EUT was configured to operate at maximum power and the antenna port was connected to the spectrum analyzer via an attenuator. Set the spectrum analyzer as following: RBW = 100 kHz, VBW = 100 kHz, scan up through 10th harmonic. Record harmonics/spurious.

2) Tests for Restricted Bands: The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters. The EUT was placed on the top of the 0.8 meter high, 1 x 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 30 to 1000 MHz using the TRILOG broadband antenna, and from 1000 MHz to 18000 MHz using the horn antenna. To obtain the final test data, the EUT was arranged on a turntable situated on a 4x4 meter at the Open Area Test Site. The EUT was tested at a 3-meter test distance. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT.

5.4.3 Test Results: PASS

Table 4: Measured values of the RF antenna port emission (Conducted)

Frequency (MHz)	Reading (dBm)	Cable Loss (dB)	Emissions (dBm)	Limit (dBm)	Margin (dB)
2440	-15.25	1.4	-13.85	-	-
976	-54.23	0.8	-53.64	- 33.85	19.6
1464	-55.64	1.0	-54.64	- 33.85	20.8
2179	-48.41	1.4	-47.01	- 33.85	13.2
2712	-53.22	1.5	-51.72	- 33.85	17.9
2928	-47.76	1.6	-46.16	- 33.85	12.3
3415	-54.57	1.9	-52.67	- 33.85	18.8
3905	-62.15	2.0	-60.15	- 33.85	26.3
4392	-58.29	2.2	-56.09	- 33.85	22.2
4880	-58.85	2.3	-56.55	- 33.85	22.7
5368	-65.04	2.5	-62.54	- 33.85	28.7
7321	-74.18	2.8	-71.38	- 33.85	37.5

All the Reading values were taken with Spectrum Analyzer RBW=100 kHz, VBW=100 kHz, and SPAN=100 MHz

Figure 3. Plot of the RF antenna port emission (Conducted): 30 MHz ~ 3GHz

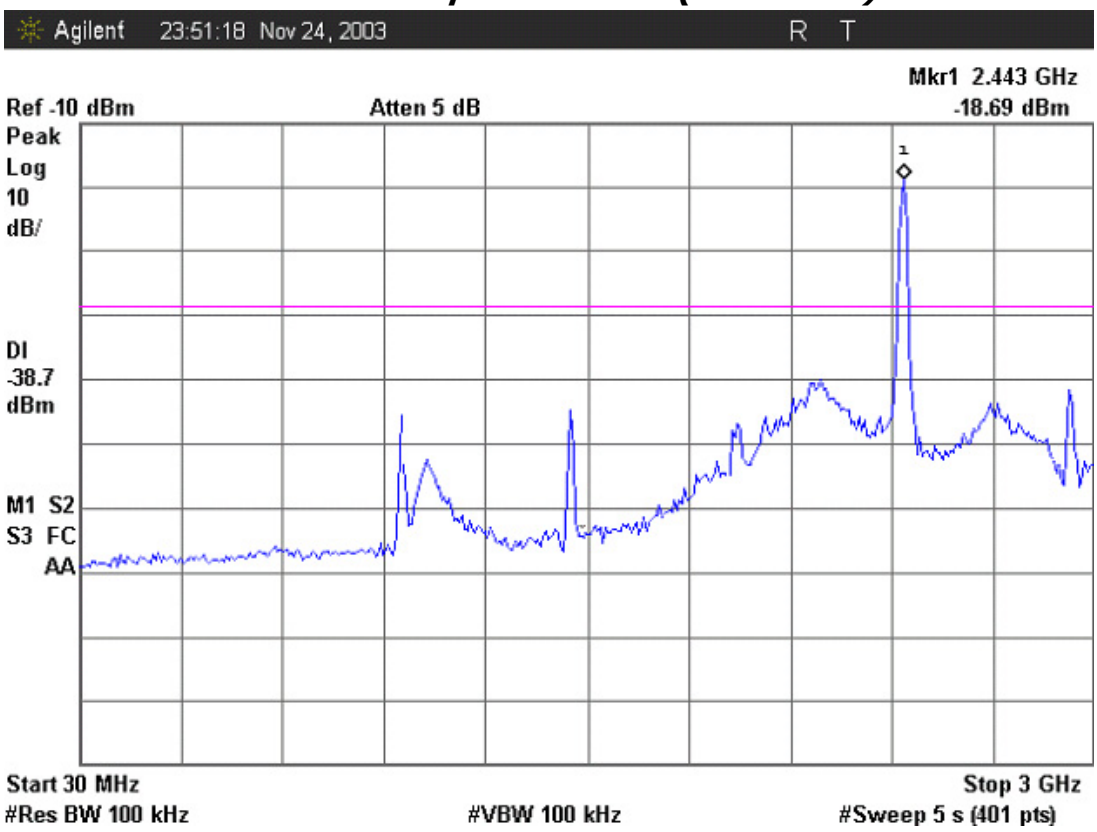


Figure 4. Plot of the RF antenna port emission (Conducted): 3 GHz ~ 8 GHz

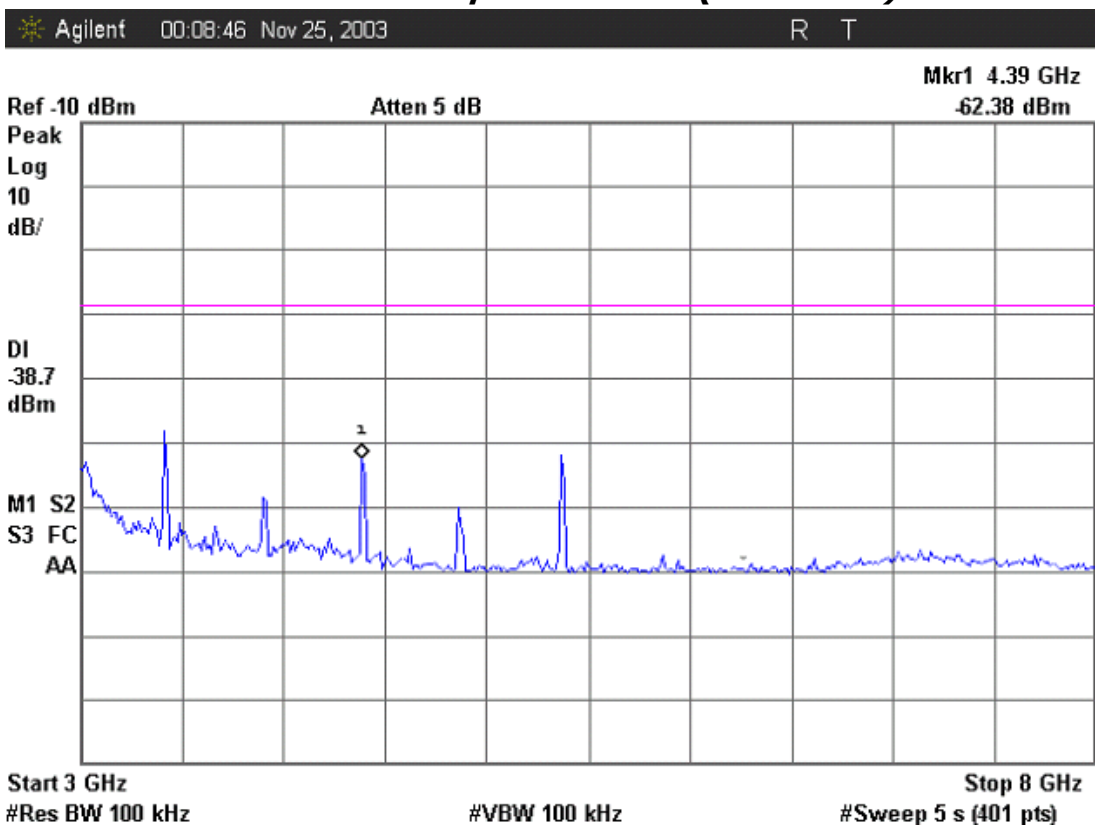


Figure 5. Plot of the RF antenna port emission (Conducted): 8 GHz ~ 25 GHz

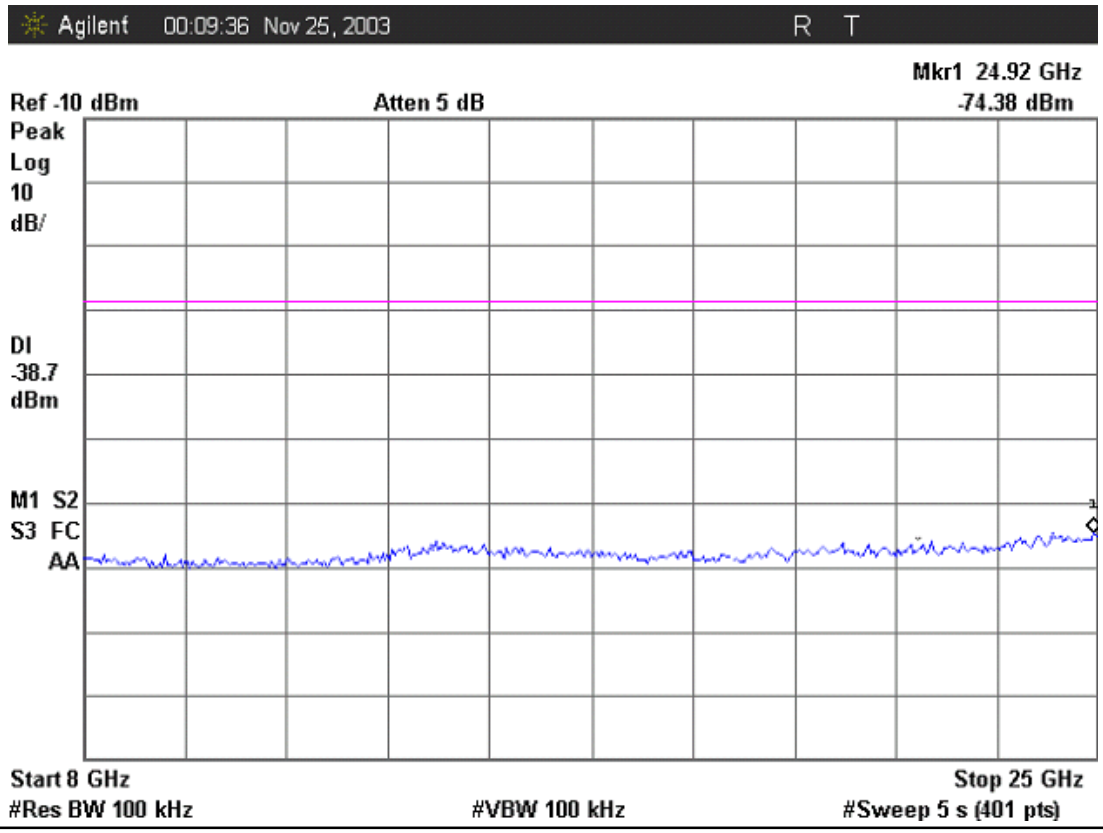


Figure 6. Plot of the Lower Band Edge (Conducted): 2310 ~ 2390 MHz

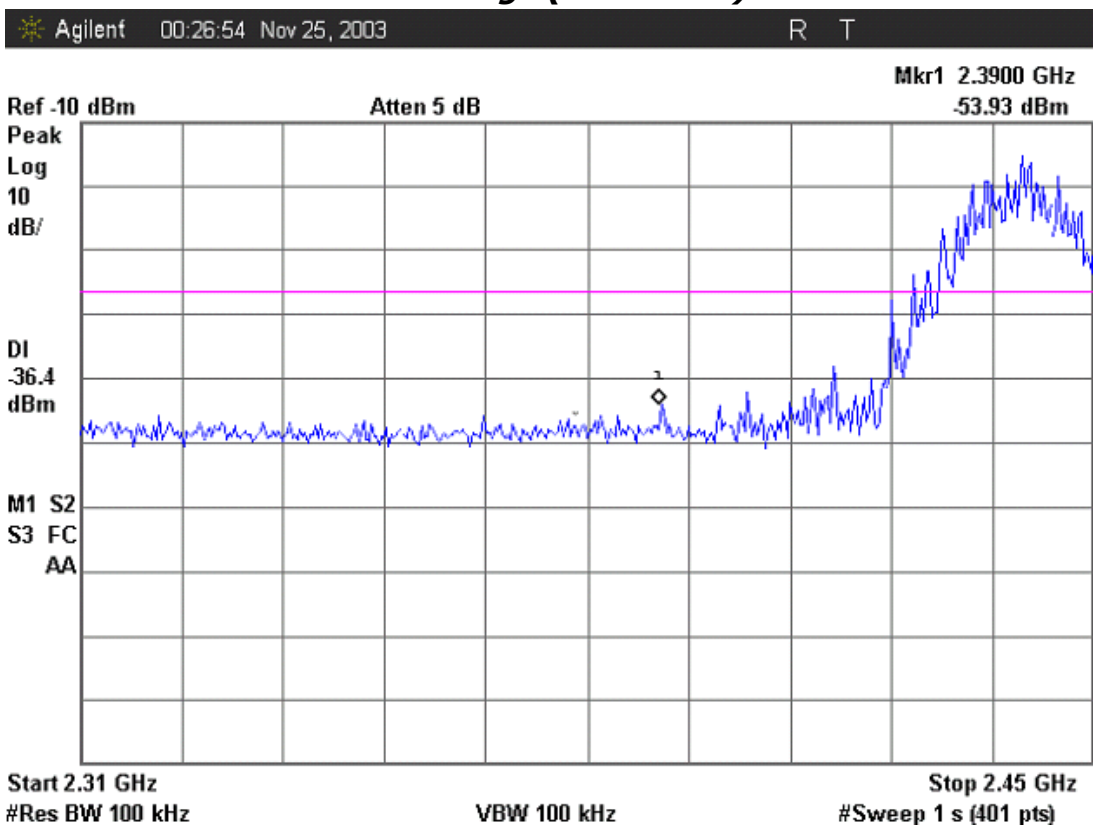


Figure 7. Plot of the Higher Band Edge (Conducted): 2483.5 ~ 2500MHz

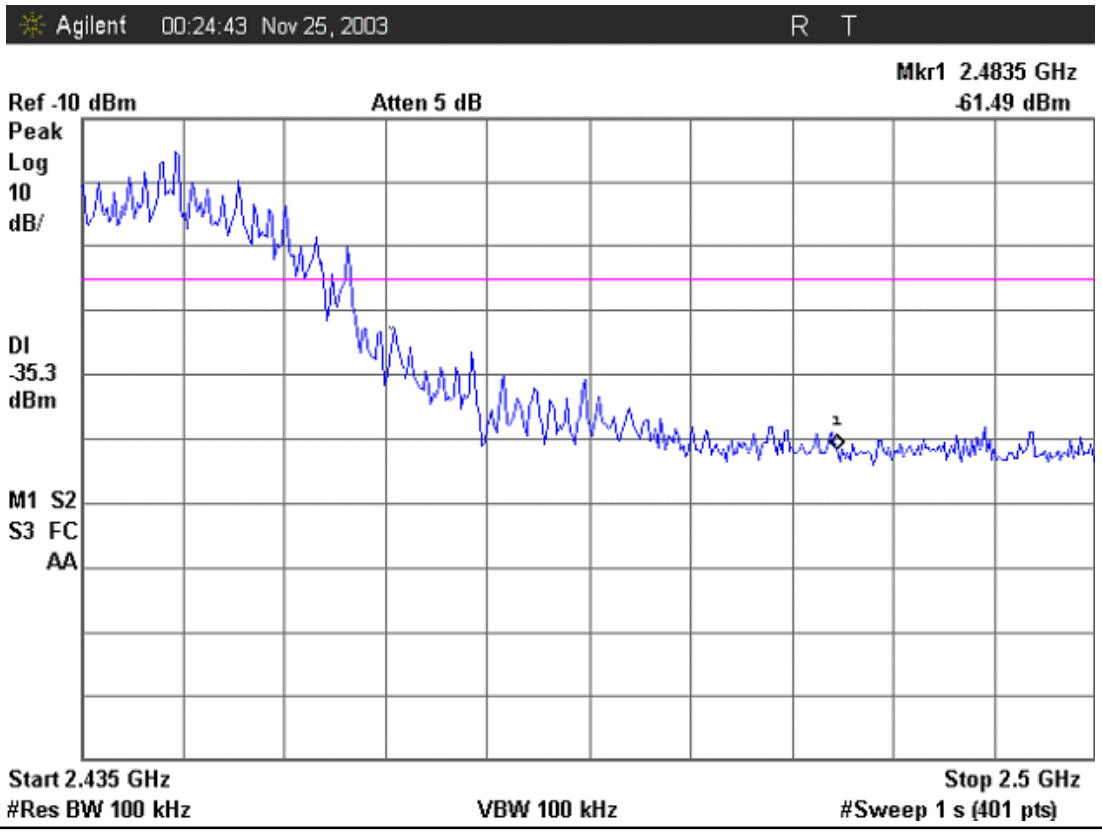


Table 5: Measured values of the Field strength in the Restricted bands (Radiated)

Frequency [MHz]	Receiver Bandwidth [kHz]	Pol. (V/H)	Antenna Height [m]	Table Angle [°]	Reading [dB(μV)]	Amp Gain [dB]	AF / CL [dB(1/m)]	Actual [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]
Quasi-peak data, emissions below 1000 MHz										
	120									
AVERAGE data, emissions above 1000 MHz										
	1000									
PEAK data, emissions above 1000 MHz										
	1000									

No emissions found

1. *H = Horizontal, V = Vertical Polarization*
2. *AF/CL = Antenna Factor and Cable Loss*
3. *The spectrum was scanned from 30 MHz to 18 GHz. All emissions not reported were more than 20 dB below the specified limit or in the noise floor.*

Margin (dB) = Limit – Actual

[Actual = Reading – Amp Gain + AF + CL]

5.5 PEAK POWER SPECTRAL DENSITY

5.5.1 Regulation

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

5.5.2 Test Procedure

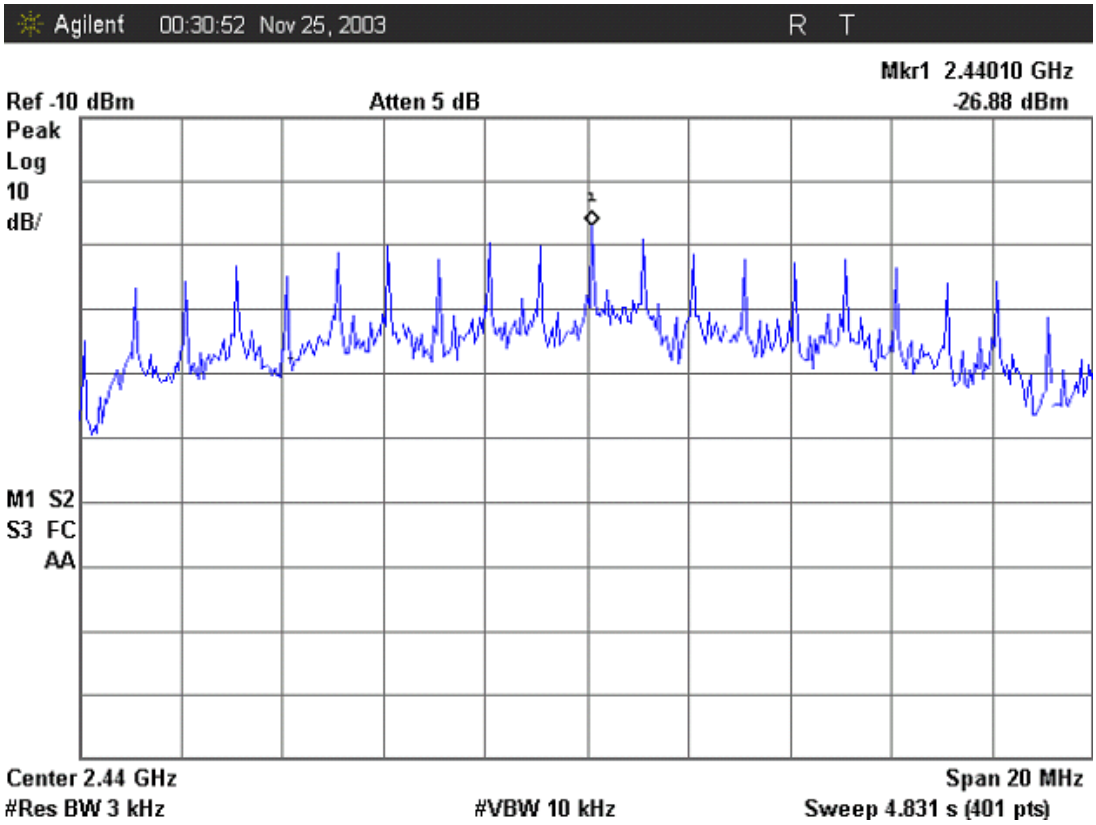
The Peak Power Spectral Density of the EUT was measured at the antenna port conducted from the transmitter using a spectrum analyzer. Set the spectrum analyzer as following: RBW = 3 kHz, VBW = 10 kHz, “Max Hold” mode.

5.5.3 Test Results: PASS

Table 6: Measured values of the Peak Power Spectral Density (Conducted)

Operating frequency (MHz)	Reading (dBm/3kHz)	Cable Loss (dB)	Power Density (dBm/3kHz)	Limit (dBm/3kHz)
2440	-26.88	1.4	-25.5	8.0

Figure 8. Plot of the Peak Power Spectral Density (Conducted)



5.6 CONDUCTED EMISSIONS

5.6.1 Regulation

According to §15.207(a), For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

5.6.2 Test Procedure

The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5 m away from the side wall of the shielded room. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50uH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

Exploratory measurements were used to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.

The measurements were made with the detector set to "peak" amplitude within a bandwidth of 10 kHz or to "quasi-peak and average" within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

5.6.3 Test Results: PASS

Table 7: Measured values of the Conducted emissions

Frequency (MHz)	Reading (dBμV)		CF/CL (dB)	Actual (dBμV)		Limit (dBμV)		Margin (dB)	
	Qp	Av		Qp	Av	Qp	Av	Qp	Av
LINE – PE									
0.15	19.94	–	0.09/0.0	20.03	–	66.00	56.00	45.97	–
2.56	13.28	–	0.13/0.3	13.71	–	56.00	46.00	42.29	–
2.60	13.31	–	0.13/0.3	13.74	–	56.00	46.00	42.26	–
2.62	13.37	–	0.13/0.3	13.80	–	56.00	46.00	42.20	–
2.64	13.19	–	0.13/0.3	13.62	–	56.00	46.00	42.38	–
2.68	12.60	–	0.13/0.3	13.03	–	56.00	46.00	42.97	–
2.75	12.10	–	0.13/0.3	12.53	–	56.00	46.00	43.47	–
6.00	21.40	–	0.25/0.4	22.05	–	60.00	50.00	37.95	–
NEUTRAL – PE									
2.50	11.94	–	0.17/0.3	12.41	–	56.00	46.00	43.95	–
2.56	13.06	–	0.17/0.3	13.53	–	56.00	46.00	42.47	–
2.61	13.54	–	0.17/0.3	14.01	–	56.00	46.00	41.99	–
2.64	13.90	–	0.17/0.3	14.37	–	56.00	46.00	41.63	–
2.68	13.30	–	0.17/0.3	13.77	–	56.00	46.00	42.23	–
2.70	12.98	–	0.17/0.3	13.45	–	56.00	46.00	42.55	–
3.84	11.31	–	0.21/0.4	11.92	–	56.00	46.00	44.08	–
6.00	19.68	–	0.28/0.4	20.36	–	60.00	50.00	39.64	–

1. *"–": Undetectable or the Qausi-peak value is lower than the limit of Average*
2. *Qp = Qausi-peak, Av = Average detector function*
3. *CF/CL = Correction Factor and Cable Loss*
4. *The frequency range was scanned from 150 kHz to 30 MHz. All emissions not reported were more than 20 dB below the specified limit.*

Margin (dB) = Limit – Actual

[Actual = Reading + CF + CL]

Figure 9. Plot of the Conducted Emissions: LINE – PE

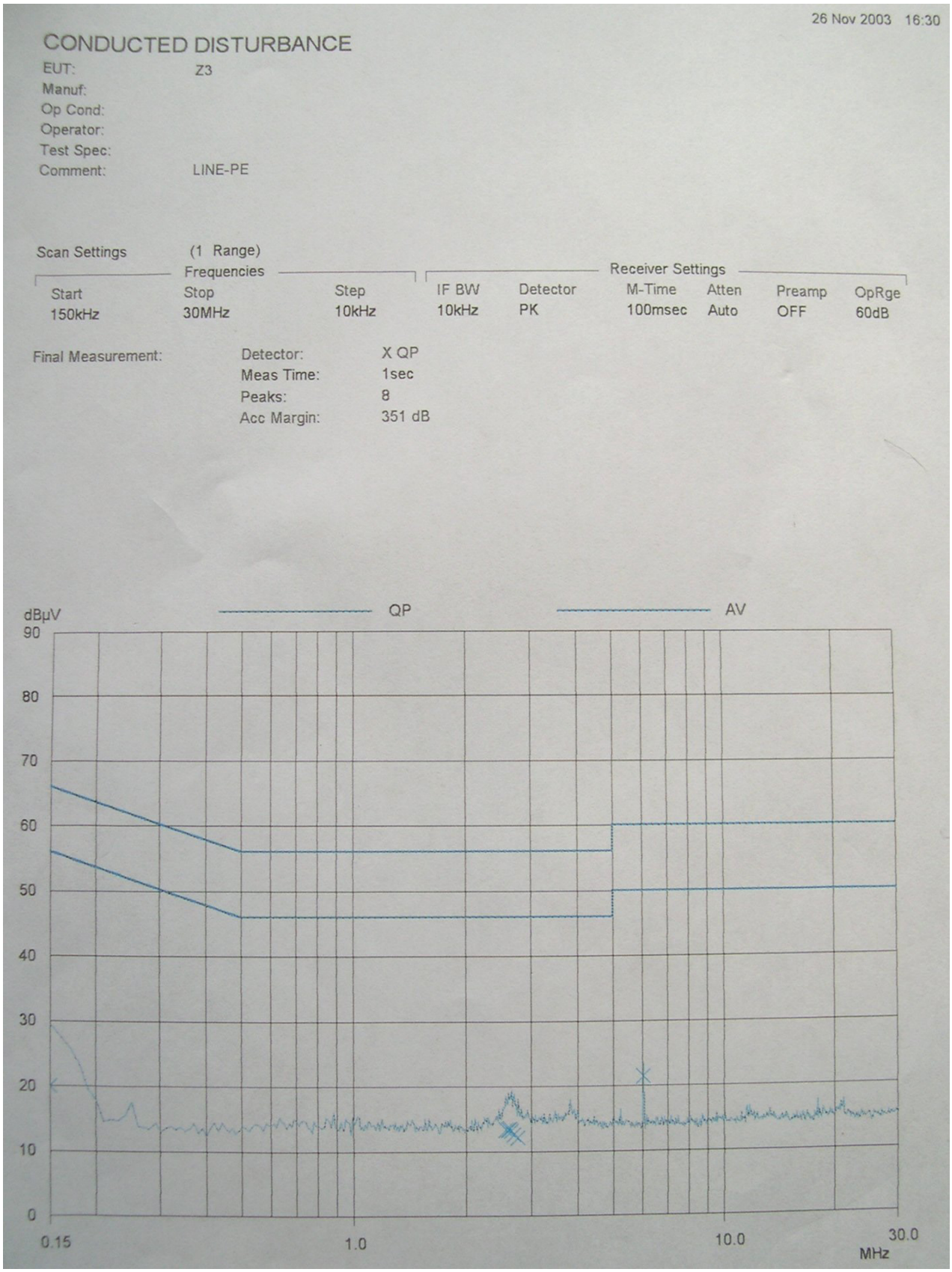


Figure 10. Plot of the Conducted Emissions: NETURAL – PE

26 Nov 2003 16:22

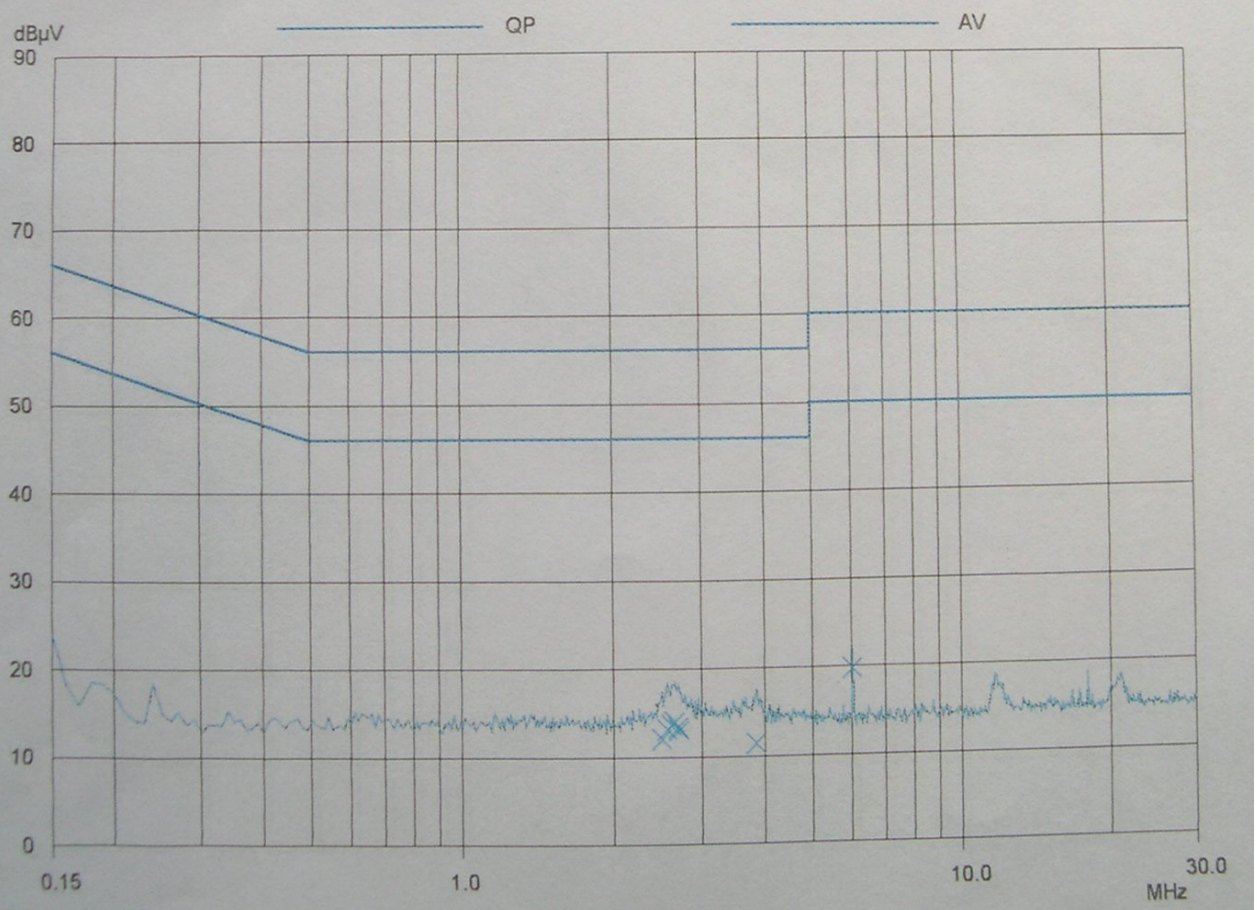
CONDUCTED DISTURBANCE

EUT: Z3
Manuf:
Op Cond:
Operator:
Test Spec:
Comment: NEUTRAL-PE

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	10kHz	10kHz	PK	100msec	Auto	OFF	60dB

Final Measurement:
Detector: X QP
Meas Time: 1sec
Peaks: 8
Acc Margin: 100 dB



5.7 RF Exposure

5.7.1 Regulation

According to §15.247(a) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093, RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3 ~ 1.34	614	1.63	*(100)	30
1.34 ~ 30	824/f	2.19/f	*($180/f^2$)	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1500	/	/	f/1500	30
1500 ~ 15000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

5.7.2 RF Exposure Compliance Issue

The EUT is categorically excluded from routine environmental because it operates at very low power level. The equipment is deemed to comply with the SAR or MPE limits without testing due to this very low power level. The maximum RF EIRP power output from the EUT is less than 1 mW. If the entire RF Power was absorbed by 1 gram of tissue (not possible considering typical RF circuits), the SAR limit of 1.6mW/g would still not be exceed. Therefore no warning labels, no RF exposure warnings in the manual or other protection measures are required for the EUT.