



TESTING LABORATORY
CERTIFICATE NUMBER: 3297.02



FCC PART 15 B

TEST AND MEASUREMENT REPORT

FOR

UTStarcom Inc.

1732 N, First Street, Suit 220, San Jose, CA

FCC ID: 2ACKN-MSG10000

Model Number: MSG10000

Report Type:	Original Report	Product Name:	Multi-Service Gateway
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Report Number:	R1406236		
Report Date:	2014-11-06		
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The **UTStarcom Inc.**, model number: **MSG10000 (FCC ID: 2ACKN-MSG10000)** or the "EUT" as referred to in this report was the **Multi-Service Gateway**, which has a metallic enclosure. The highest operating frequency was 1GHz.

Mechanical Description of EUT

The EUT was measured approximately 38 cm(L) x 48 cm(W) x 51 cm(H).

Rated input voltage: DC 48V

The data gathered are from a production sample provided by the manufacturer, serial number: 4062013102300008 assigned by the applicant.

Objective

The following Class B report was prepared on behalf of **UTStarcom Inc.** in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules.

The objective of the manufacturer was to demonstrate compliance with FCC Part 15B Class B limits.

Related Submittal(s)/Grant(s)

N/A

Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All tests were performed at Bay Area Compliance Laboratories Corp.

Test Facility

Bay area compliance Laboratories Corp. (BACL) is:

1- An independent Commercial Test Laboratory accredited to **ISO 17025:2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

Bay Area Compliance Laboratories Corp.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminaires and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:

- 1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2009, ANSI C63.4, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at
<http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

System Test Configuration

Justification

The EUT was configured in accordance to ANSI C63.4 Standards.

EUT Exercise Software

N/A

Equipment Modifications

No modifications were made to the equipment by BACL.

Special Equipment

No special equipment was used.

Local Support Equipment

Manufacturer	Description	Model Number	Serial Number
ELTEK VALERE	Power Supply	FLATPACK248/2000	310275
TP-LINK	Ethernet Switch	SF-1500	62751

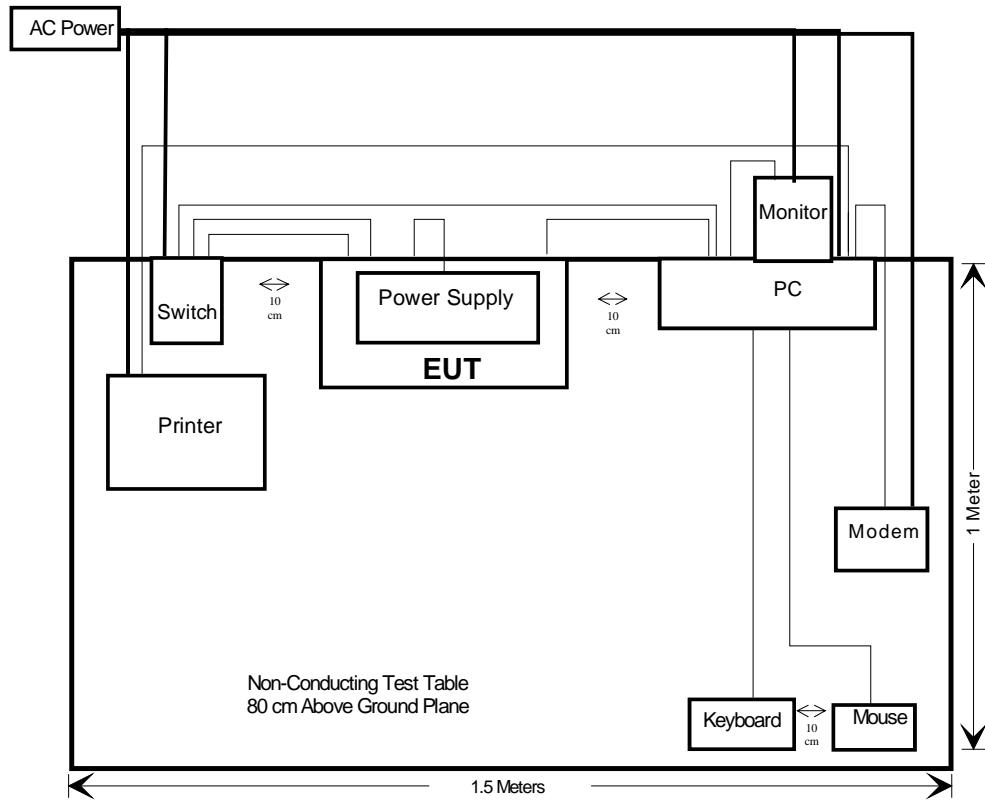
EUT Internal Configuration Details

UT Model Name	Product Name	Description
UT-CHAS-13U-14SL	Chassis 14-slots	13U/14 Slot ATCA Shelf, 300W per-slot power and cooling, 40G Dual Star Backplane, IPMI. 3 Hot Swap Fan Trays, replaceable air filter, Dual DC Power Entry Modules (PEMs), console cable. SAP, SAD and SHMM Boards are not included.
UT-PP-2	Line Card Dual CPU	Packet Processor PCBA, Dual 1GHz CPU, Multi-Core, Multi-threaded. 16GB DDR2 Memory, 8GB Flash; 10 x 1GbE SFP, 2 x 10GbE SFP+ optical ports. SFP & SFP+ fiber modules are not included. JOS2.0 SW license is included, with 1000 AP licenses.
UT-SB-1	Switch Card	Switch PCBA, 240Gbps Non-blocking switch, upto 16-Slot backplane, 8 x 10GbE SFP+ optical ports, SFP+ fiber modules are not included.
UT-SHM-6SL&14SL	Management Card	Pigeon PointShMM500, Shelf Manager For ATCA 6- & 14-Slot DC-powered Chassis.
UT-Alarm	Alarm Card	SAD(Shelf Alarm Display) Board & SAP(Shelf Alarm Panel) Board
UT-P-DC-25A	DC Power	Power Entry Modules (PEMs).Input voltage: -40.5 VDC to -72 VDC, Input current: 25 A per power feed (total 4 x Feed A and 4 x Feed B), Over current Protection: 30 A Fuses on PEM.
UT-FILTER-14SL	Air Filter	Air Filter for 14-slot chassis

External I/O Cabling List and Details

Cable Description	Length (m)	From	To
VGA Cable	1.5	PC/VGA Port	Monitor/VGA Port
USB Cable	1.5	PC / USB Port	Keyboard
USB Cable	1.5	PC/ USB Port	Mouse
RS232 Cable	1.5	PC/ RS232 Port	Modem/ RS232 Port
Parallel Cable	1.5	PC/ Parallel Port	Printer/ Parallel Port
RS232 Cable	3.75	PC	EUT
RJ45 Cable	1	PC/ RJ45 Port	Switch/ RJ45 Port
RJ45 Cable*2	1	EUT/ RJ45 Port	Switch/ RJ45 Port
Power Cable	1.5	EUT	Power Supply

Block Diagram of Test Setup



Bay Area Compliance Laboratories Corp.

SUMMARY OF TEST RESULTS

FCC Rules	Descriptions of Test	Result(s)
FCC §15.107	Conducted Emissions	N/A
FCC §15.109	Radiated Spurious Emissions	Compliant

Note: This product is DC powered.

FCC § 15.109 – Radiated Emissions

Measurement Uncertainty

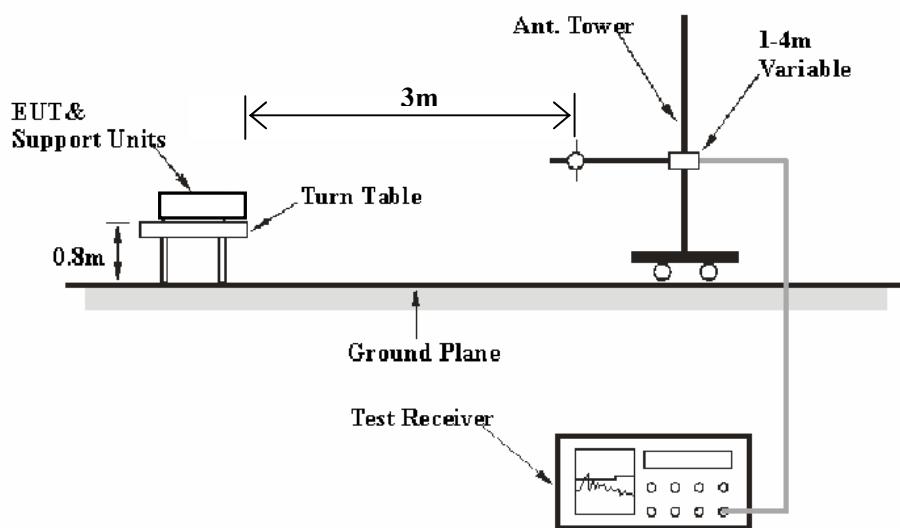
All measurements involve certain levels of uncertainties, especially in the field of EMI. The factors contributing to uncertainties are EMI Test Receiver, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2, the Treatment of Uncertainty in EMI Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is 30M~200MHz: ± 4.7 dB ; 200M~1GHz: ± 6.0 dB ; 1G-6GHz: ± 5.13 dB.

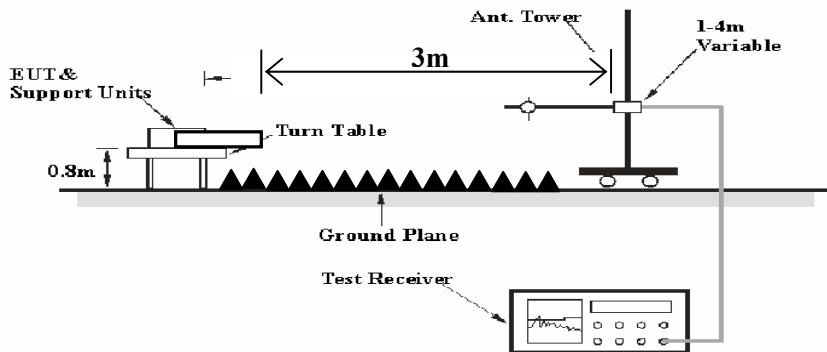
EUT Setup

The radiated emission test was performed in the 3 meter semi-anechoic chamber, using the setup in accordance with ANSI C63.4. The specification used was the FCC Part 15B CLASS B limits.

Below 1 GHz:



Above 1GHz:



The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

All units of equipment forming the system under test (includes the EUT as well as connected peripherals and associated equipment or devices) shall be arranged such that a nominal 0,1 m separation was achieved between the neighbouring units.

DC 48V power source was provided to EUT.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 5 GHz.

During the radiated emission test, the EMI test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	Quasi-peak
Above 1 GHz	1 MHz	3 MHz	/	Peak
	1 MHz	10 Hz	/	Average

Test Equipment List and Details

Description	Manufacturer	Model Number	Serial Number	Calibration Date	Calibration Due Date
Amplifier	Agilent	8447D	2944A10442	2014-06-23	2015-06-22
EMI Test Receiver	Rohde & Schwarz	ESCI	100028	2014-06-23	2015-06-22
Broadband Antenna	Sunol Sciences	JB3	A101808	2013-04-10	2015-04-09
Semi-Anechoic Chamber	EMCT	966	N/A	2013-03-13	2016-03-12
Spectrum Analyzer	Rohde & Schwarz	FSL18	100180	2014-06-23	2015-06-22
Horn Antenna	EM TEST	3115	003-6076	2013-04-09	2015-04-08
Amplifier	HP	8449B	3008A00277	2014-06-23	2015-06-22

* **Statement of Traceability:** BACL attested that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Software

Description	Manufacturer	Version
EMC32	R&S	V 8.52.0

Test Procedure

Maximizing procedure was respectively performed on the six (6) highest emissions to ensure EUT was compliant with all installation combinations.

All data were recorded in the quasi-peak detection mode from 30 MHz to 1 GHz. Peak and average detection mode above 1 GHz.

The EUT was in the normal (native) running mode during the final qualification test to represent the worst case results.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude was calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation was as follows:

$$\text{Corrected Amplitude} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission was 7 dB below the maximum limit for FCC Part 15B CLASS B. The equation for margin calculation was as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Summary of Test Results

According to the data in the following, the EUT complied with the FCC Part 15B CLASS B limits, and had the worst margin of:

9.0 dB at 624.973750 MHz in the Horizontal polarization

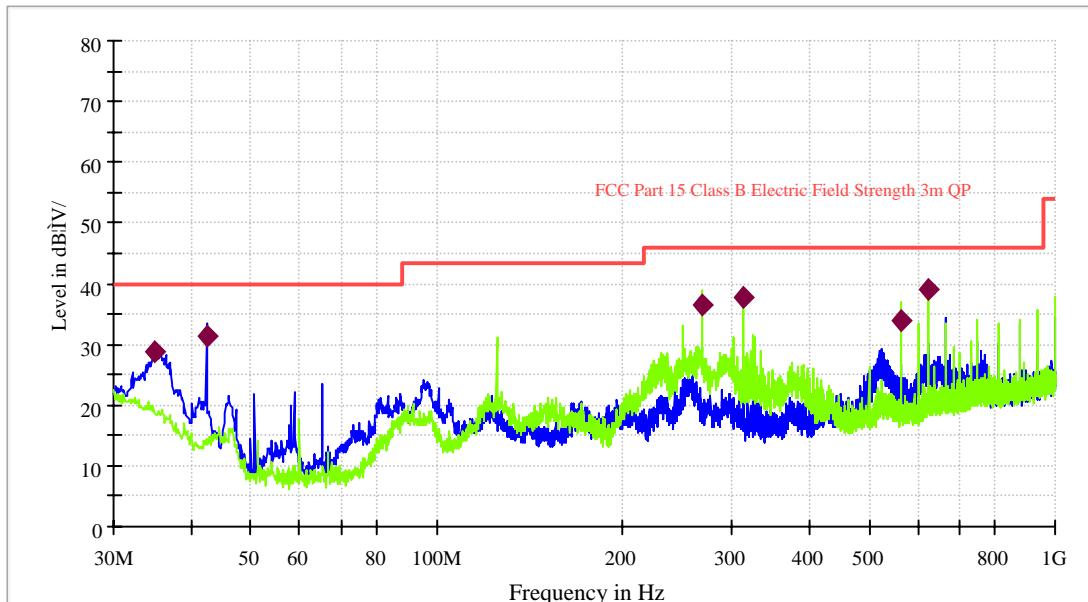
Test Data

Environmental Conditions

Temperature:	22 °C
Relative Humidity:	42 %
ATM Pressure:	101.9 kPa

The testing was performed by Kevin Tao on 2014-11-06.

Electric Field Strength with Scans

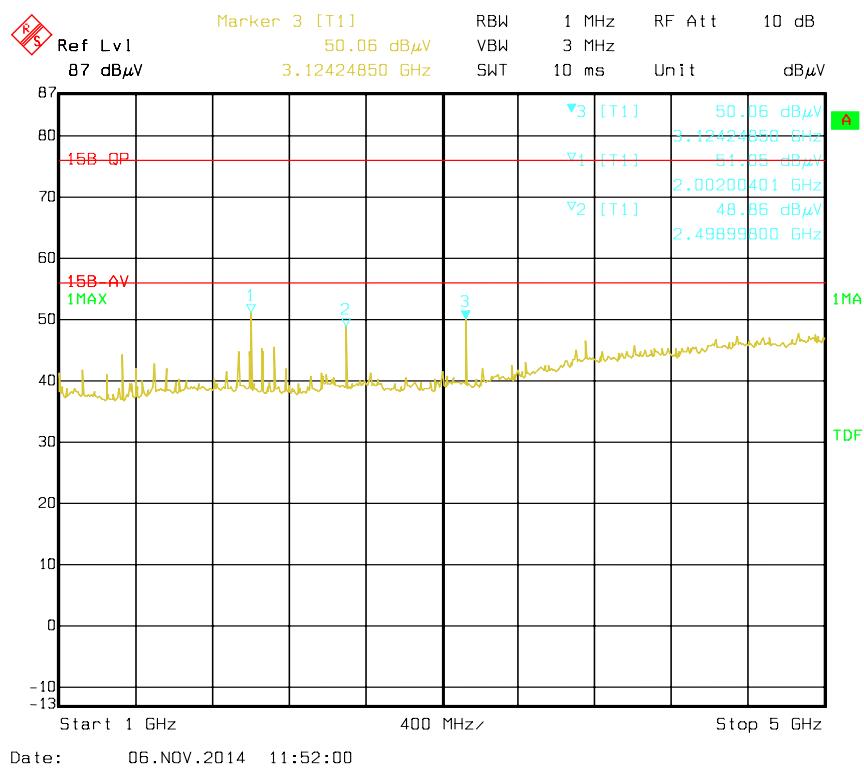


Frequency (MHz)	MaxPeak-MaxHold (dB μ V/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
34.850000	27.8	100.0	V	320.0	-7.9	12.2	40.0
42.488750	30.3	100.0	V	192.0	-14.2	9.7	40.0
269.105000	34.5	100.0	H	87.0	-12.4	11.5	46.0
312.512500	35.5	100.0	H	192.0	-11.4	10.5	46.0
562.530000	32.9	100.0	H	210.0	-8.2	13.1	46.0
624.973750	37.0	100.0	H	236.0	-6.8	9.0	46.0

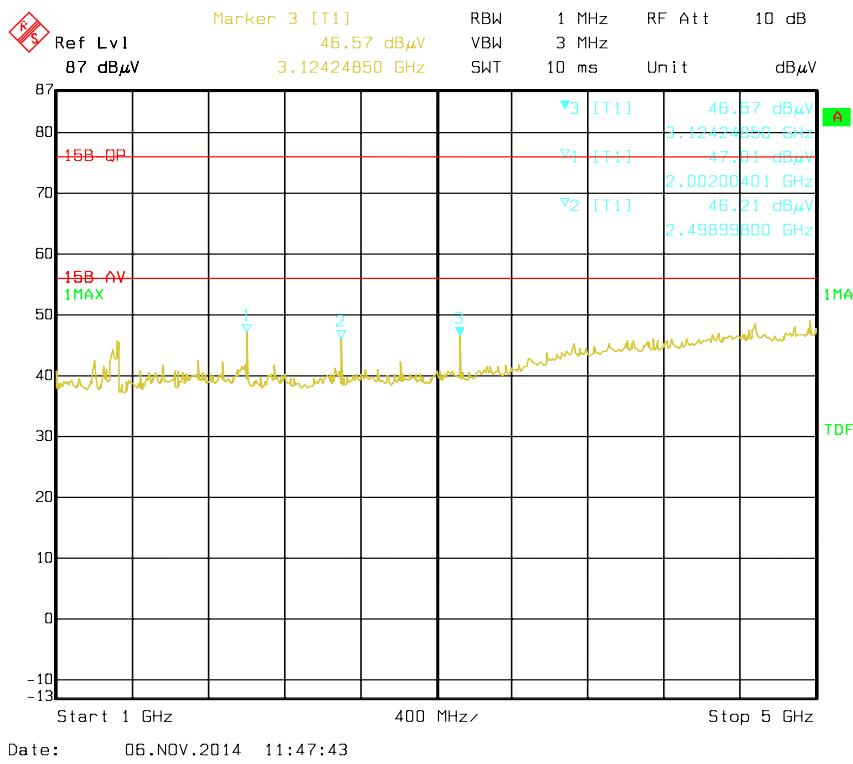
*Within measurement uncertainty!

Above 1 GHz:

Horizontal



Vertical



Frequency	Polarity	Detector	Result	Limit	Margin
MHz	V/H	QP/Ave.	(dB μ V/m)	(dB μ V/m)	(dB)
2002.004	V	PK	47.01	76	28.99
2002.004	V	AV	26.53	56	29.47
2498.998	V	PK	46.21	76	29.79
2498.998	V	AV	24.15	56	31.85
3124.428	V	PK	46.57	76	29.43
3124.428	V	AV	23.86	56	32.14
2002.004	H	PK	51.85	76	24.15
2002.004	H	AV	31.65	56	24.35
2498.998	H	PK	48.86	76	27.14
2498.998	H	AV	28.43	56	27.57
3124.428	H	PK	50.06	76	25.94
3124.428	H	AV	29.36	56	26.64

*****END OF REPORT*****