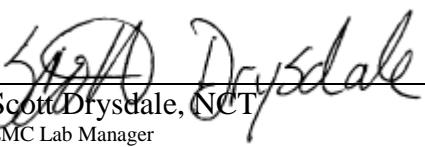


# Global EMC Inc. Labs

## EMC & RF Test Report

As per  
**GLOBAL EMC**  
RSS 210 Issue 8:2010  
&  
FCC Part 15 Subpart C:2011  
Unlicensed Intentional Radiators  
on the

**Armour Antenna Unit**  
**(SCAN~LINK SAFETY SYSTEM)**

  
\_\_\_\_\_  
Scott Drysdale, NCT  
EMC Lab Manager  
Global EMC Inc.  
180 Brodie Dr, Unit 2  
Richmond Hill, ON L4B 3K8  
Canada  
Ph: (905) 883-3919

Testing produced for



See Appendix A for full customer & EUT details.



LAB REGISTRATION #6844A-2



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



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Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Report Scope

This report addresses the EMC verification testing and test results of the Armour Antenna Unit, herein referred to as EUT (Equipment Under Test) performed at Global EMC Labs.

The EUT was tested for compliance against the following standards:

RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011

Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

The results contained in this report relate only to the item(s) tested.

This report does not imply product endorsement by A2LA or any other accreditation agency, any government, or Global EMC Inc.

Opinions/interpretations expressed in this report, if any, are outside the scope of Global EMC Inc accreditation. Any opinions expressed do not necessarily reflect the opinions of Global EMC Inc, unless otherwise stated.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Summary

The results contained in this report relate only to the item(s) tested.

EUT FCC Certification #, FCC ID:	YUU-SLAU270MR
EUT Industry Canada Certification #, IC:	9283A-SLAU270MR
EUT Passed all tests performed.	Yes (see test results summary)
Tests conducted by	Scott Drysdale

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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## **Test Results Summary**

Standard/Method	Description	Class/Limit	Result
FCC 15.203	Antenna Requirement	Unique	Pass See Justification
FCC 15.205 RSS 210 (Table 1)	Restricted Bands for intentional operation	QuasiPeak Average	Pass
FCC 15.207	Power line conducted emissions	QuasiPeak Average	Pass
FCC 15.209 RSS-210 (Table 2)	Spurious Radiated emissions	QuasiPeak Average	Pass
FCC 15.247(a)2 RSS-210 A8.2(a)	6 dB Bandwidth	> 500 kHz	Pass
FCC 15.247(b)2 RSS-210 A8.4(4)	Max output power	< 1 Watt	Pass
FCC 15.247(b)(4) RSS-210 A8.4(5)	Antenna Gain	< 6 dBi	Pass See Justifications
FCC 15.247(d) RSS-210 A8.5	Antenna conducted spurious	< 20 dBc	Pass
FCC 15.247(e) RSS-210 A8.2(b)	Spectral Density	< 8 dBm (3 kHz BW)	Pass
FCC 15.247(i) IC Safety code 6	Maximum Permissible Exposure	> 20 cm separation.	Pass See justification and calculations
<b>Overall Result</b>			<b>PASS</b>

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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All tests were performed by Scott Drysdale.

If the product as tested or otherwise complies with the specification, the EUT is deemed to comply with the requirement and is deemed a 'PASS' grade. If not 'FAIL' grade will be issued. Note that 'PASS' / 'FAIL' grade is independent of any measurement uncertainties. A 'PASS' / 'FAIL' grade within measurement uncertainty is marked with a '\*'.

### ***Justifications, Descriptions, or Deviations***

The following justifications for tests not performed or deviations from the above listed specifications apply:

For the Antenna requirement specified in FCC 15.203 (RSS 210 section 5.5), this device has internal antenna(s) and is permanently sealed with no end user serviceable operations.

For the Restricted Bands of operation, the EUT is designed to only operate between 2.4 GHz and 2.4835 GHz.

For the power line conducted emissions requirements, the EUT is DC powered, and this test does not apply.

For the scope of this testing the EUT was pre-scanned in three orthogonal axis to maximize emissions. Maximum emissions were found in the vertical EUT polarization. This setup was used for all testing in this report. Additionally, normally the EUT would be operated in this orientation.

For the Antenna gain, this device is designed to use an antenna with a rated gain of 6.15 dBi. The peak power limits are therefore adjusted by a factor 0.15 dB in accordance with 15.247 (b)(4).

For maximum permissible exposure, this device operates at less than 1 Watt at 2.4GHz to 2.4835 GHz MHz and is designed to operate greater than 20 cm from personnel during normal operation. No testing is required, however worst case calculated exposure compliance follows later in this report.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## ***Applicable Standards, Specifications and Methods***

ANSI C63.4:2003 - Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

ANSI C63.10:2009 - American national standard for testing unlicensed wireless devices

CFR 47 FCC 15 - Code of Federal Regulations – Radio Frequency Devices

CISPR 22:1997 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

FCC KDB 558074 - FCC KDB 558074 Digital Transmission Systems, measurements and procedures

ICES-003:2004 - Digital Apparatus - Spectrum Management and Telecommunications Policy Interference-Causing Equipment Standard

ISO 17025:2005 - General Requirements for the competence of testing and calibration laboratories

RSS 210:2010 - Issue 8: Spectrum Management and Telecommunications Policy. Radio Standards Specification Low Power Licence-Exempt Radiocommunication Devices

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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### ***Sample calculation(s)***

Margin = limit – (received signal + antenna factor + cable loss – pre-amp gain)

Margin = 50.5dBuV/m – (50dBuV + 10dB + 2.5dB – 20dB)

Margin = 8.5 dB

### ***Document Revision Status***

Revision 1 - May 17, 2013

Revision 2 - June 14, 2013

Added reference to system noise floor on page 48 as per TCB request.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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## Definitions and Acronyms

The following definitions and acronyms are applicable in this report.  
See also ANSI C63.14.

**AE** – Auxillary Equipment.

**BW** – Bandwidth. Unless otherwise stated, this is refers to the 6 dB bandwidth.

**EMC** – Electro-Magnetic Compatibility

**EMI** – Electro-Magnetic Immunity

**EUT** – Equipment Under Test

**ITE** – Information Technology Equipment with a primary function(s) of entry, storage, display, retrieval, transmission, processing, switching, or control, of data.

**LISN** – Line impedance stabilization network

**NCR** – No Calibration Required

**RF** – Radio Frequency

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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## Testing Facility

Testing for EMC on the EUT was carried out at Global EMC labs in Toronto, Ontario, Canada. The testing lab consists of a 3m semi-anechoic chamber calibrated to be able to allow measurements on an EUT with a maximum width or length of up to 2m and height up to 3m. The chamber is equipped with a turn table that is capable of testing devices up to 3300lb in weight. This facility is capable of testing products that are rated for 120 Vac and 240Vac single phase, or 208 Vac 3 phase input. DC capability is also available. The chamber is equipped with an antenna mast that controls polarization and height from the control room adjoining the shielded chamber. Radiated emissions measurements are performed using a Bilog, and Horn antenna where applicable. Conducted emissions, unless otherwise stated, are performed using a LISN.

## ***Calibrations and Accreditations***

The measurement site used is registered with Federal Communications Commission (FCC) and Industry Canada (IC). This site is calibrated for Normalized Site Attenuation (NSA) using test procedures outlined in ANSI C63.4 "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The semi-anechoic chamber is lined with ferrite tiles and absorption cones to minimize any undesired reflections. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

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### ***Testing Environmental Conditions and Dates***

Following were the environmental conditions in the facility during time of testing –

Date	Test	Init.	Temperature (°C)	Humidity (%)	Pressure (kPa)
Mar 13, 2013	Radiated	SD	22.5°C	30-45%	98 -103kPa
Mar 27, 2013	Antenna Conducted	SD	21°C	30-45%	98 -103kPa

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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## **Detailed Test Results Section**

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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## *Radiated Emissions*

### **Purpose**

The purpose of this test is to ensure that the RF energy unintentionally emitted from the EUT does not exceed the limits listed below as defined in the applicable test standard, as measured from a receiving antenna. This helps protect broadcast radio services such as television, FM radio, pagers, cellular telephones, emergency services, and so on, from unwanted interference.

### **Limit(s) and Method**

The method is as defined in ANSI C63.4:2003.

The limits are as defined in FCC Part 15, Section 15.209:

0.009 MHz – 0.490 MHz,  $2400/F(\text{kHz}) \text{ uV/m}$  at  $300 \text{ m}^1$

0.490 MHz – 1.705 MHz,  $24000/F(\text{kHz}) \text{ uV/m}$  at  $30 \text{ m}^1$

1.705 MHz – 30 MHz,  $30 \text{ uV/m}$  at  $30 \text{ m}^1$

30 MHz – 88 MHz,  $100 \text{ uV/m}$  ( $40.0 \text{ dBuV/m}^1$ ) at  $3 \text{ m}$

88 MHz – 216 MHz,  $150 \text{ uV/m}$  ( $43.5 \text{ dBuV/m}^1$ ) at  $3 \text{ m}$

216 MHz – 960 MHz,  $200 \text{ uV/m}$  ( $46.0 \text{ dBuV/m}^1$ ) at  $3 \text{ m}$

Above 960 MHz,  $500 \text{ uV/m}$  ( $54.0 \text{ dBuV/m}^1$ ) at  $3 \text{ m}$

Above 1000 MHz,  $500 \text{ uV/m}$  ( $54 \text{ dBuV/m}^2$ ) at  $3 \text{ m}$

Above 1000 MHz,  $500 \text{ uV/m}$  ( $74 \text{ dBuV/m}^3$ ) at  $3 \text{ m}$

<sup>1</sup>Limit is with Quasi Peak detector with bandwidths as defined in CISPR-16-1-1

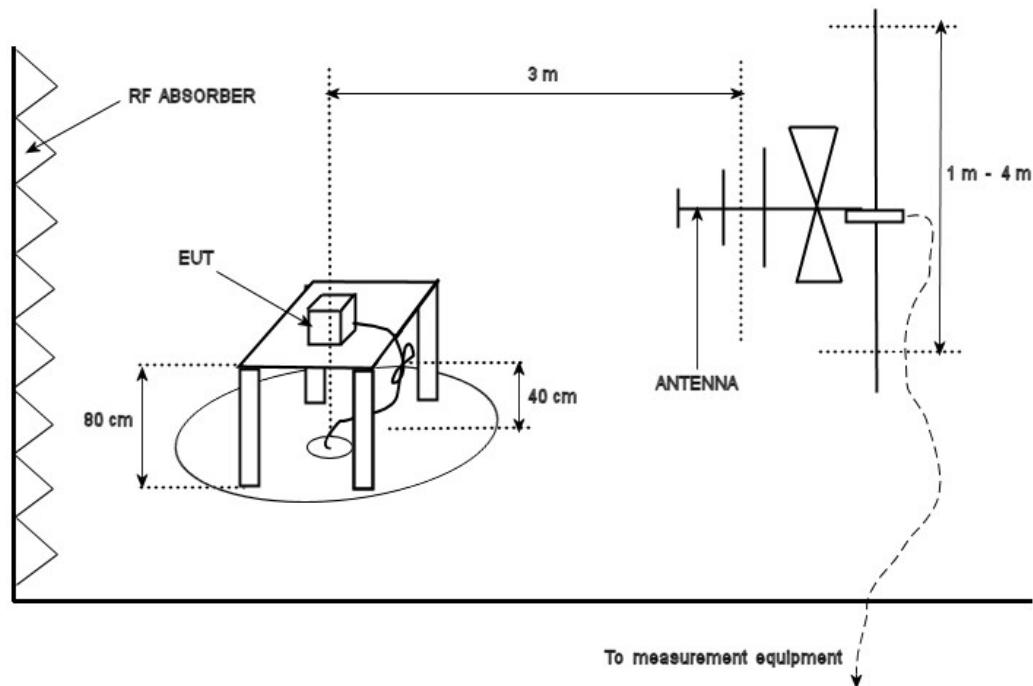
<sup>2</sup>Limit is with 1 MHz measurement bandwidth and using an Average detector

<sup>3</sup>Limit is with 1 MHz measurement bandwidth and using a Peak detector

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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### Typical Radiated Emissions Setup



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
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## Measurement Uncertainty

The expanded measurement uncertainty is calculated in accordance with CISPR 16-4-2 and is +/-4.4 dB with a 'k=2' coverage factor and a 95% confidence level.

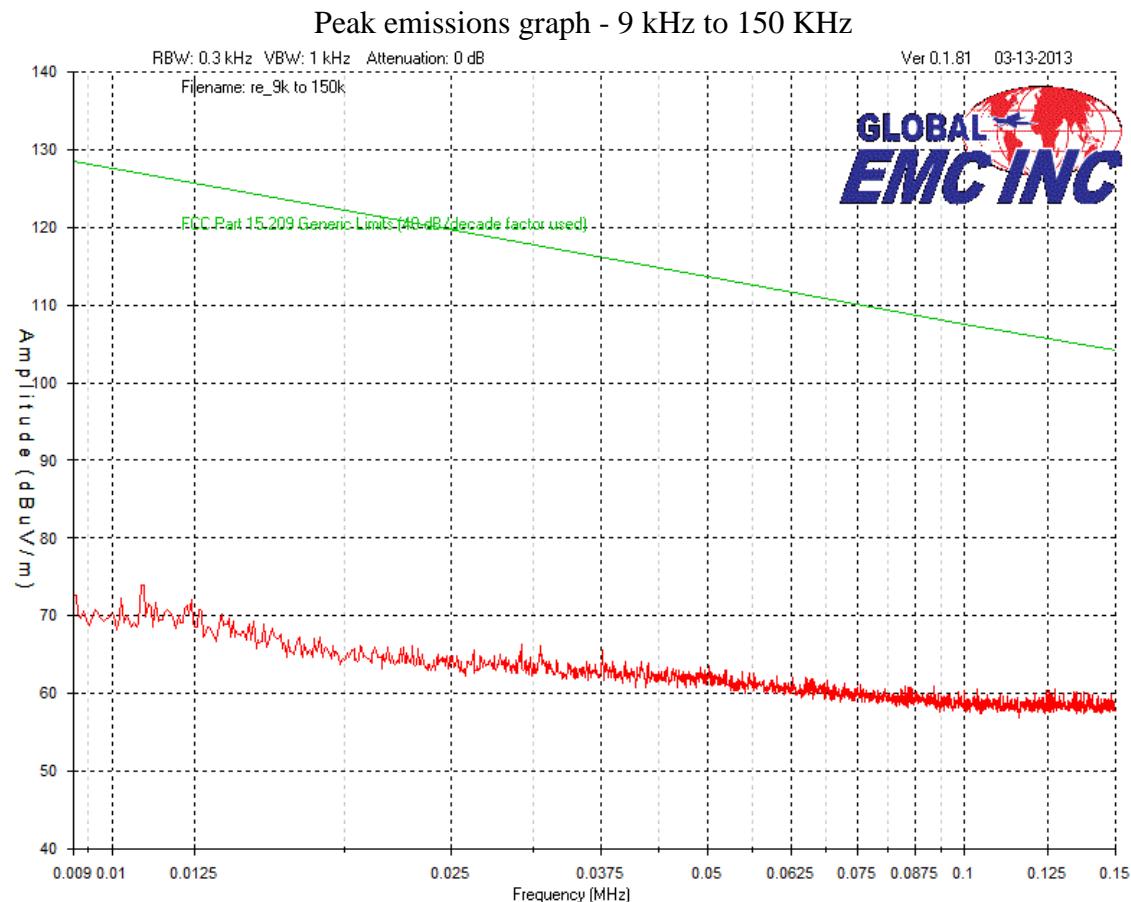
## Preliminary Graphs

Note the graphs shown below are for graphical illustration only. For final measurements with the appropriate detector, please refer to the final measurement table where applicable. The graph shown below is a maximized peak measurement graph, measured with a resolution bandwidth greater than the final required detector and over a full 0-360 rotation. This peaking process is done as a worst case measurement. This process enables the detection of frequencies of concern for final measurement, and provides considerable time savings.

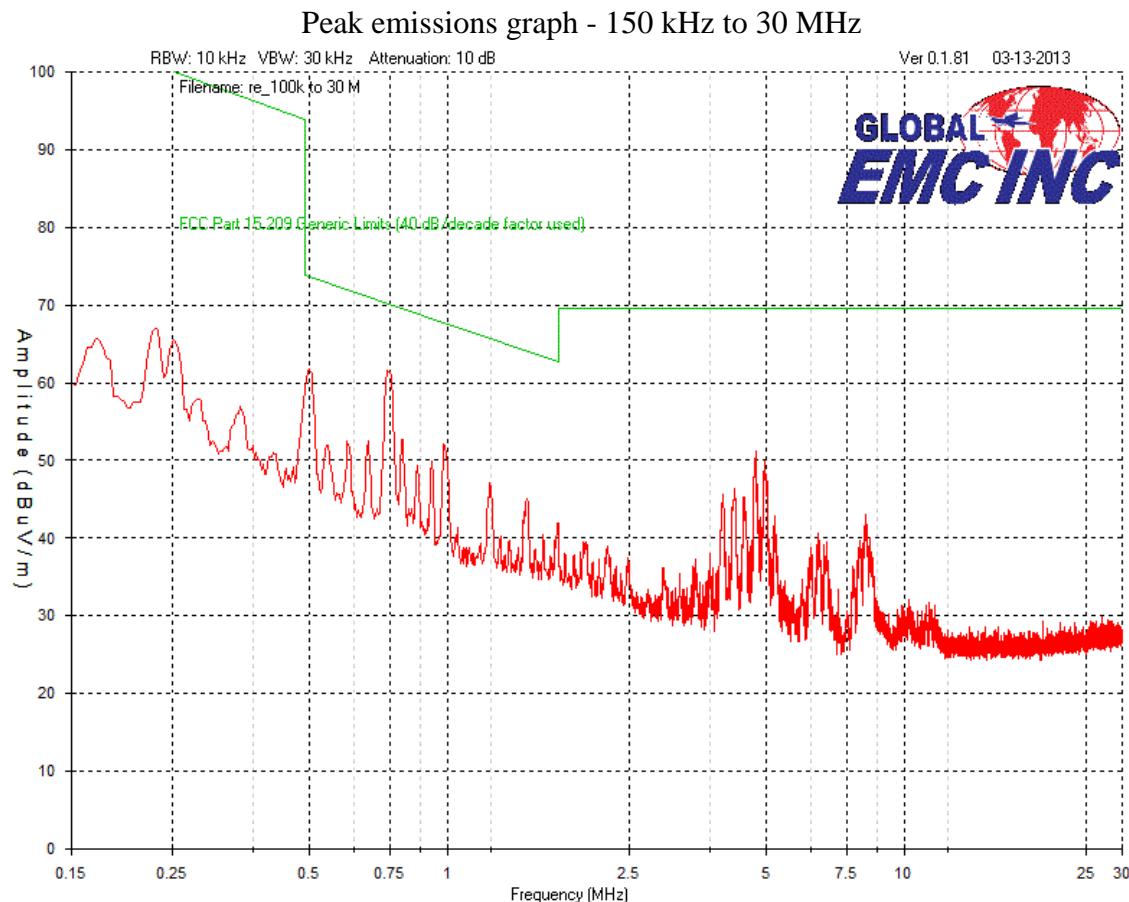
In accordance with FCC Part 15, Subpart A, Section 15.33, the device was scanned to the 10<sup>th</sup> harmonic ( a minimum of a 25 GHz).

Devices scanned may be scanned at alternate test distances, and in accordance with FCC Part 15, Subpart A, Section 15.31, an extrapolation factor of 20 dB/decade was used above 30 MHz and 40 dB/decade below 30 MHz. For example for 1 meter measurements, an extrapolation factor 9.5 dB from 20 Log (1m / 3m) is applied.

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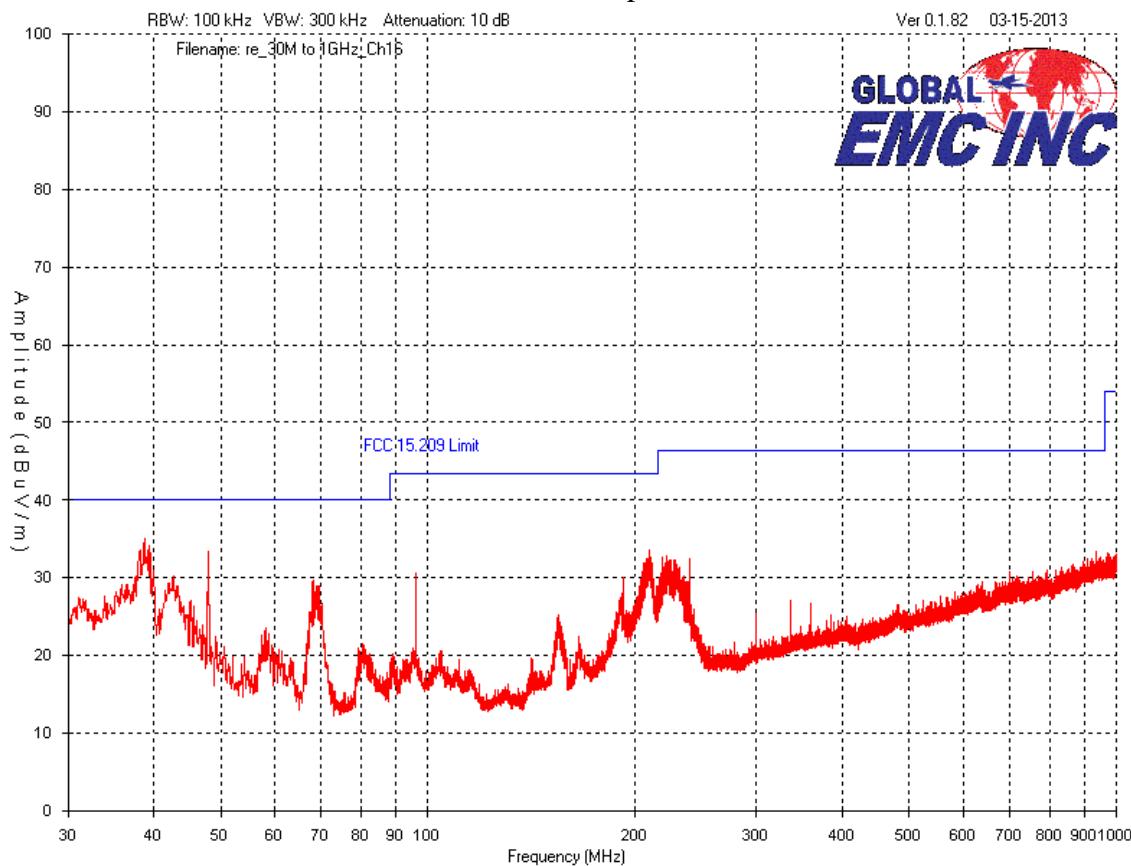
Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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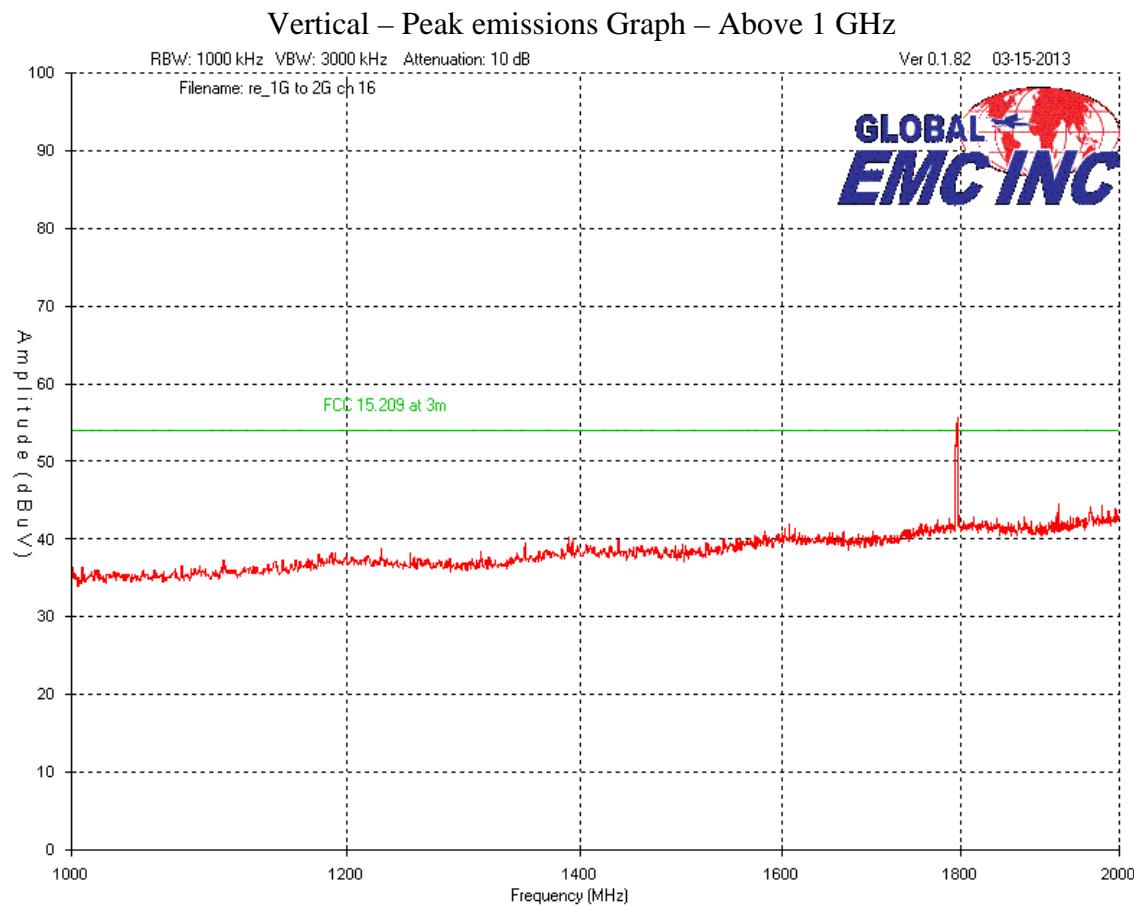


### Vertical – Peak Emissions Graph – 30 MHz to 1 GHz



Low, Mid and High scanned, worst case or representative shown above.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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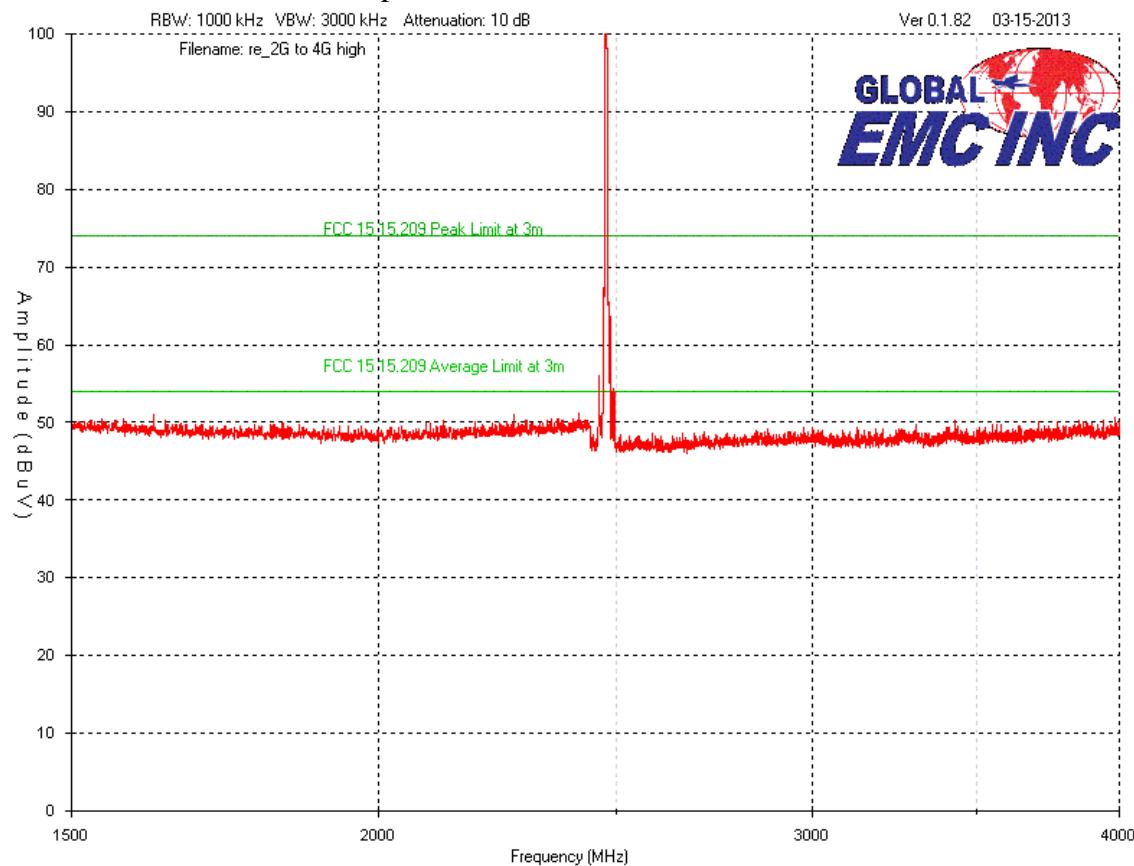


Note: The emission shown at 1795 MHz and is not within a restricted band. No emissions were detected within the restricted bands at low, mid and high settings.

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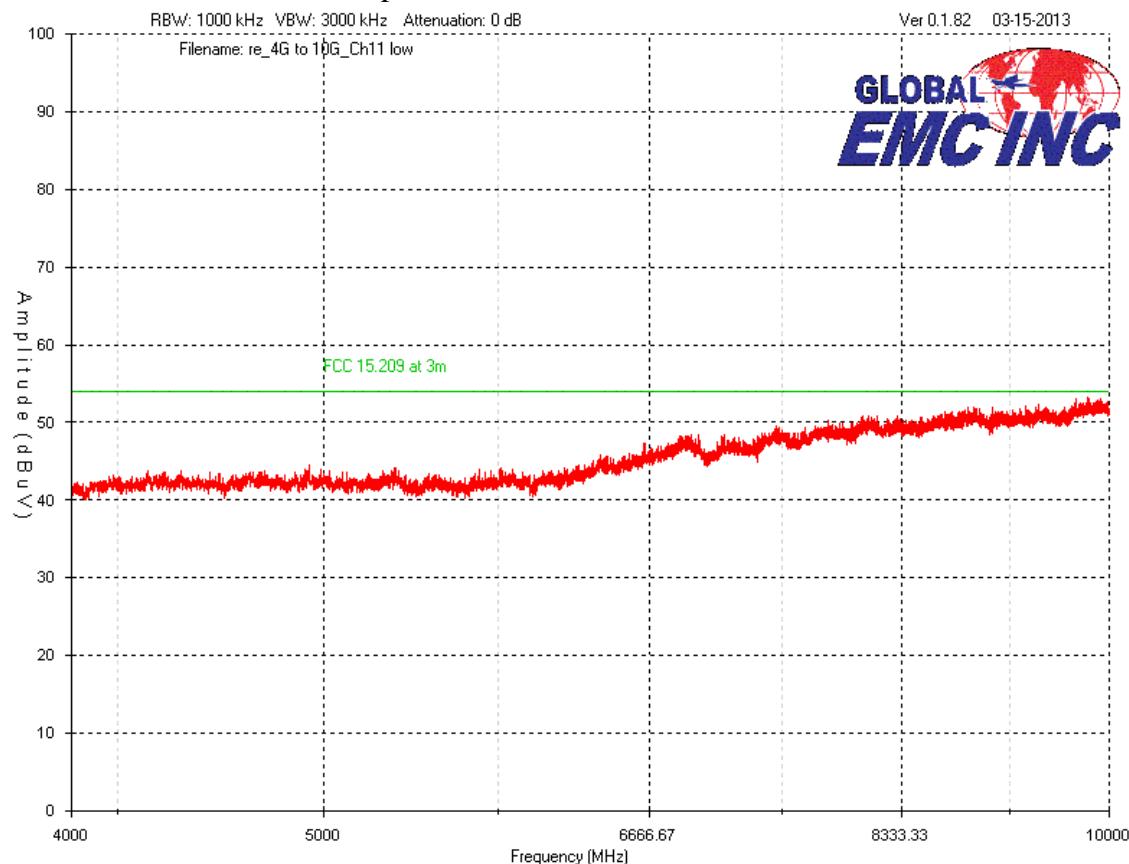
### Vertical – Peak emissions Graph – Above 1 GHz



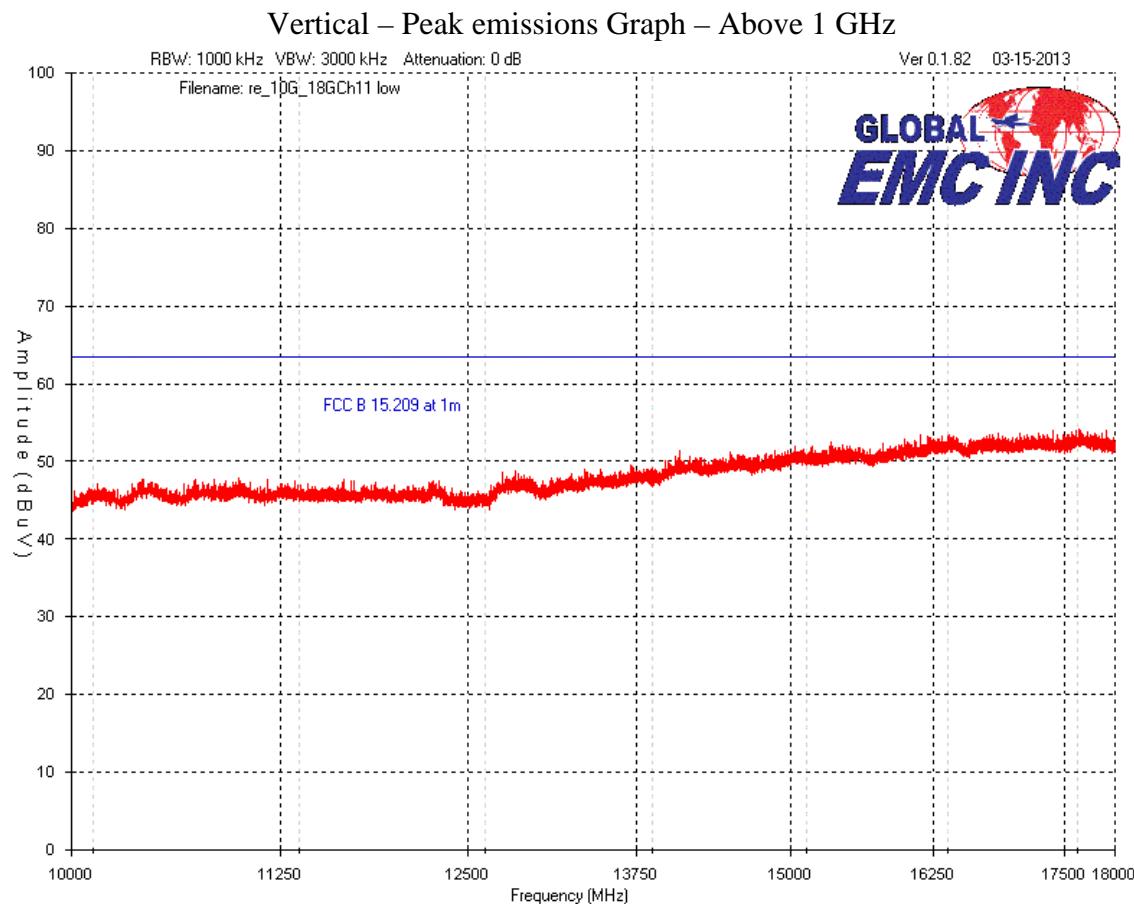
Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



### Vertical – Peak emissions Graph – Above 1 GHz



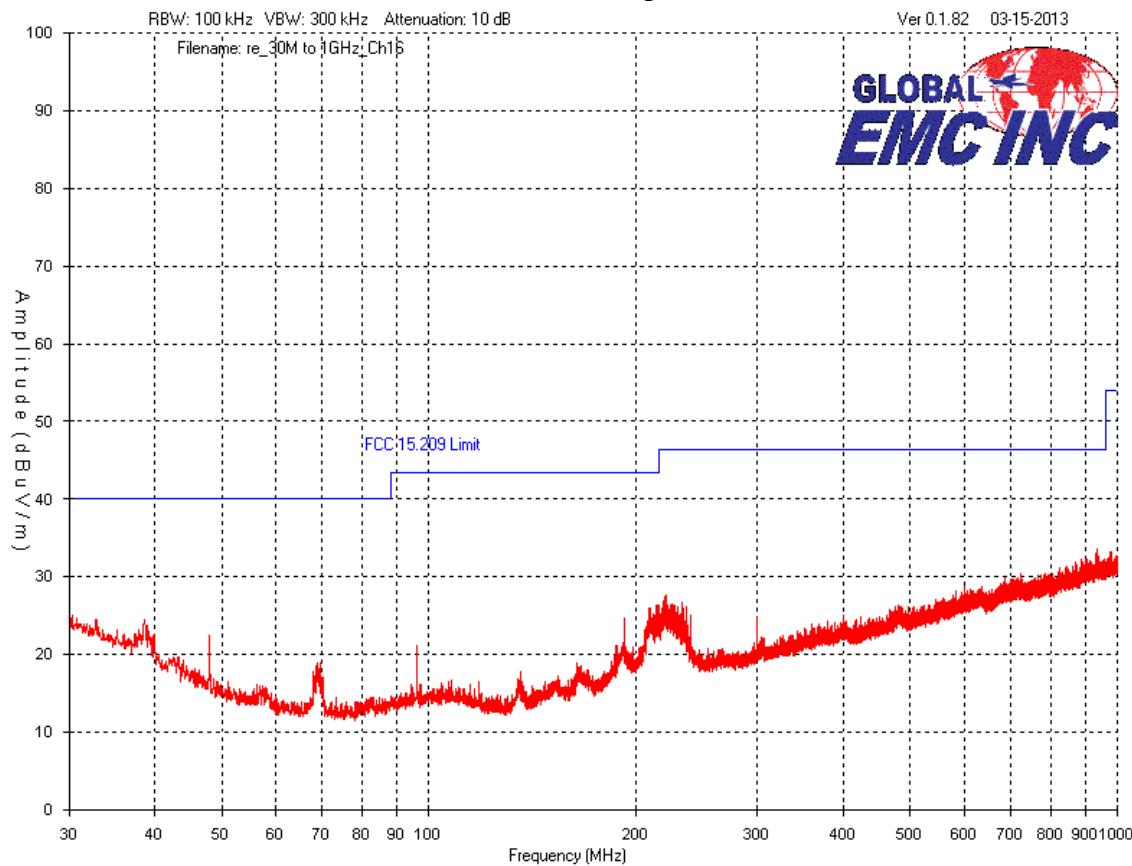
Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Note: Emissions were scanned to 26 GHz, and no emissions were detected above 18 GHz.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>	
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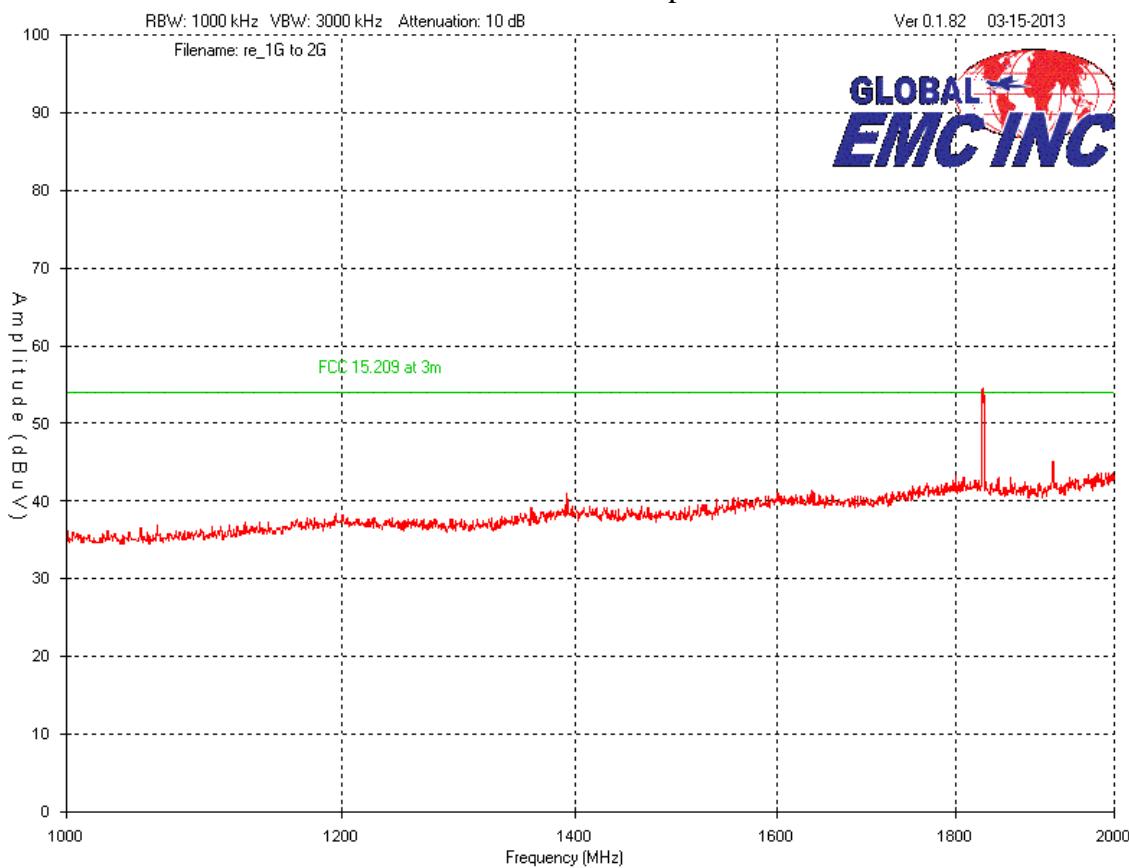
Horizontal – Peak Emissions Graph – 30 MHz to 1 GHz



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### Horizontal – Peak Emissions Graph – Above 1 GHz

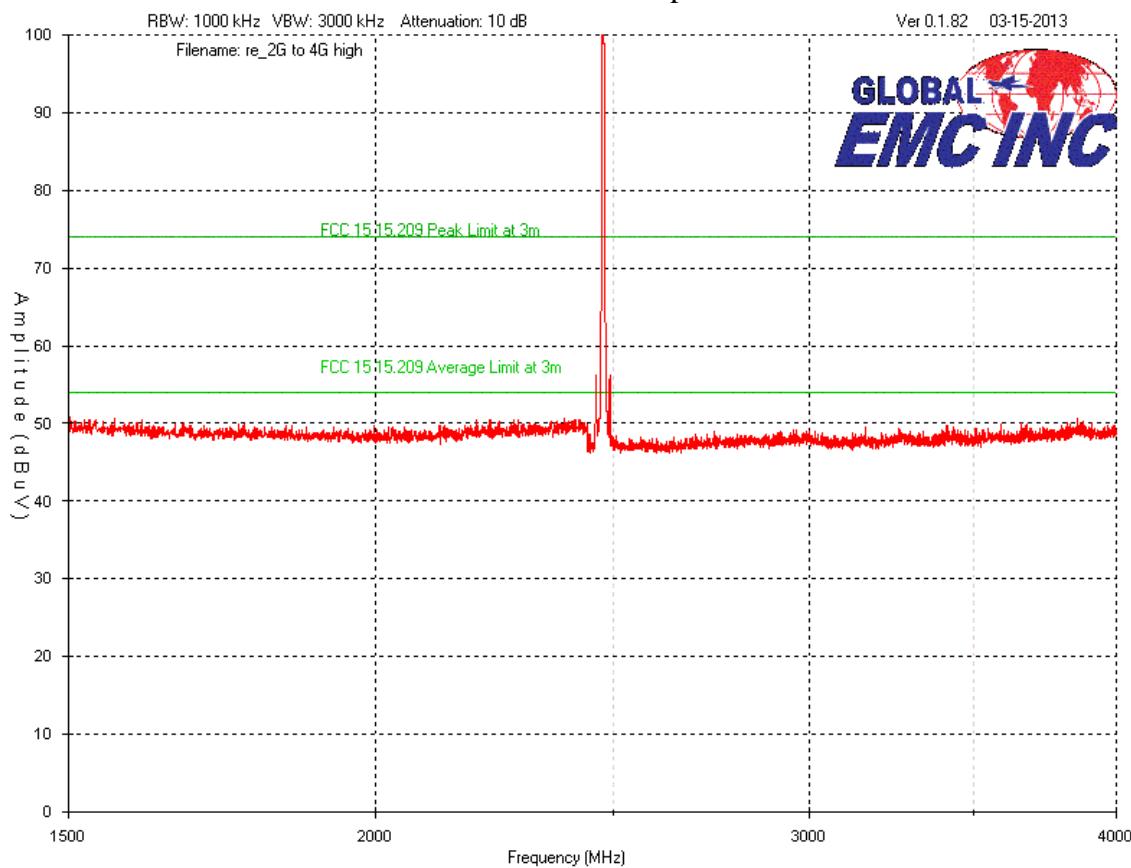


Note: The emission shown above occurred at 1832 MHz is not within a restricted band,  
 No emissions were detected within the restricted bands at low, mid and high settings.

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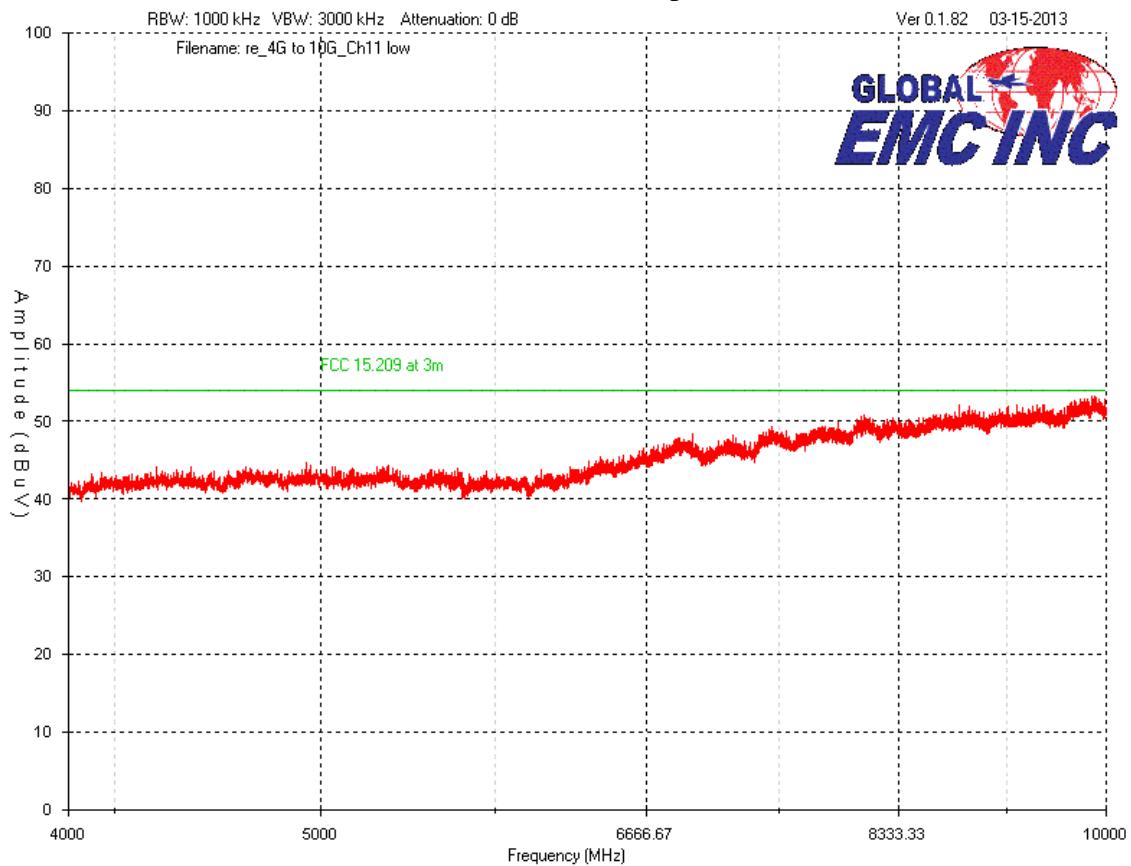
### Horizontal – Peak Emissions Graph – Above 1 GHz



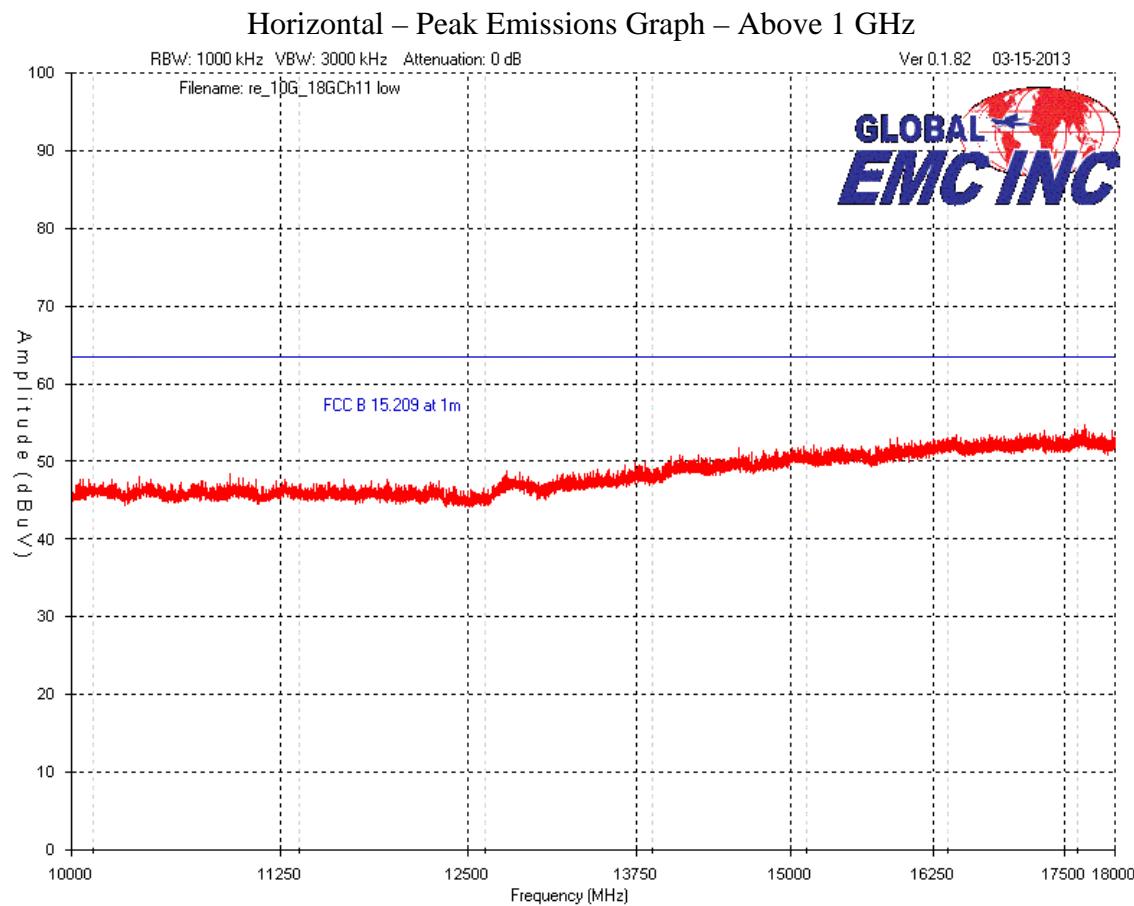
Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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### Horizontal – Peak Emissions Graph – Above 1 GHz



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Note: Emissions were scanned to 26 GHz, and no emissions were detected above 18 GHz.

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## Final Measurements

Note: In accordance with 15.247(d), only frequencies exceeding the 15.209 limit that occur within the bands listed in 15.205, need to be verified with a final detector.

No peak emissions were detected within the bands specified in 15.205.

For information purposes, the fundamental was measured to be 1 dBuV/m at 3 meters.

Test Frequency (MHz)	Detection mode (Q-Peak)	Antenna polarity (Horz/Vert)	Raw signal dB(µV)	Antenna factor dB	Cable loss dB + Preselecor	Attenuator dB	Pre-Amp Gain dB	Received signal dB(µV/m)	Emission limit dB(µV/m)	Margin dB(µV)	Result
Low Channel											
2405	Peak	Horz	102.6	30.6	2.2	10.0	36.2	109.2			PASS
2405	Avg	Horz	98.2	30.6	2.2	10.0	36.2	104.8			PASS
2405	Peak	Vert	102.3	30.6	2.2	10.0	36.2	108.9			PASS
2405	Avg	Vert	98.0	30.6	2.2	10.0	36.2	104.6			PASS
2400	Peak	Horz	54.4	30.6	2.2	10.0	36.2	61.0	74.0	13.0	PASS
2400	Avg	Horz	44.4	30.6	2.2	10.0	36.2	51.0	54.0	3.0	PASS
2400	Peak	Vert	53.9	30.6	2.2	10.0	36.2	60.5	74.0	13.5	PASS
2400	Avg	Vert	44.1	30.6	2.2	10.0	36.2	50.7	54.0	3.3	PASS
2388*	Peak	Horz	50.9	30.6	2.2	10.0	36.2	57.5	74.0	16.5	PASS
2388*	Avg	Horz	39.0	30.6	2.2	10.0	36.2	45.6	54.0	8.4	PASS
2388*	Peak	Vert	51.2	30.6	2.2	10.0	36.2	57.8	74.0	16.2	PASS
2388*	Avg	Vert	39.5	30.6	2.2	10.0	36.2	46.1	54.0	7.9	PASS
Mid channel											
2440	Peak	Horz	102.3	30.6	2.2	10.0	36.2	108.9			PASS
2440	Avg	Horz	98.0	30.6	2.2	10.0	36.2	104.6			PASS
2440	Peak	Vert	102.0	30.6	2.2	10.0	36.2	108.6			PASS
2440	Avg	Vert	97.8	30.6	2.2	10.0	36.2	104.4			PASS
High channel 25											
2475	Peak	Horz	102.7	30.6	2.2	10.0	36.2	109.3			PASS
2475	Avg	Horz	98.4	30.6	2.2	10.0	36.2	105.0			PASS
2475	Peak	Vert	102.4	30.6	2.2	10.0	36.2	109.0			PASS
2475	Avg	Vert	98.2	30.6	2.2	10.0	36.2	104.8			PASS
2483.5	Peak	Horz	54.9	30.6	2.2	10.0	36.2	61.5	74.0	12.5	PASS
2483.5	Avg	Horz	44.8	30.6	2.2	10.0	36.2	51.4	54.0	2.6	PASS

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2483.5	Peak	Vert	54.6	30.6	2.2	10.0	36.2	61.2	74.0	12.8	PASS
2483.5	Avg	Vert	44.3	30.6	2.2	10.0	36.2	50.9	54.0	3.1	PASS

No harmonic emissions were detected.

Note (\*): 2388 was the maximum or worst case emission between 2300 MHz and 2390 MHz. See 'Spurious Conducted' measurements for further details.

Client	SCAN~LINK TECHNOLOGIES INC.	
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## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
Loop Antenna	EM 6871	Electro-Metrics	Feb 5, 2013	Feb 5, 2015	GEMC 70
Loop Antenna	EM 6872	Electro-Metrics	Feb 5, 2013	Feb 5, 2015	GEMC 71
BiLog Antenna	3142-C	ETS	Feb 4, 2013	Feb 4, 2015	GEMC 137
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
Chase Preamp 9kHz - 2 GHz	CPA9231A	Chase	8/29/2012	8/29/2014	GEMC 6403
Q-Par 1.5-18 GHz Horn	6878/24	Q-par	8/23/2012	8/23/2014	GEMC 6365
Horn Antenna 18 GHz - 26.5 GHz	SAS-572	A.H. Systems	8/27/2012	8/27/2014	GEMC 6371
18.0-26.5 GHz Harmonic Mixer	11970K	HP	21-Dec-11	21-Dec-13	GEMC 158
1-26G pre-amp	HP 8449B	HP	8/22/2012	8/22/2014	GEMC 6351
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31

This report module is based on GEMC template "FCC - 15.209 - Radiated Emissions\_Rev1.doc"

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## *6dB Bandwidth of Digitally Modulated Systems*

### **Purpose**

The purpose of this test is to ensure that the bandwidth occupied exceeds a stated minimum. This helps ensure the utilization of the frequency allocation is sufficiently wide. This also helps prevent corruption of data by ensuring adequate data separation to distinguish the reception of the intended information.

### **Limits**

The Limit is as specified in FCC Part 15 and RSS 210.

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### **Results**

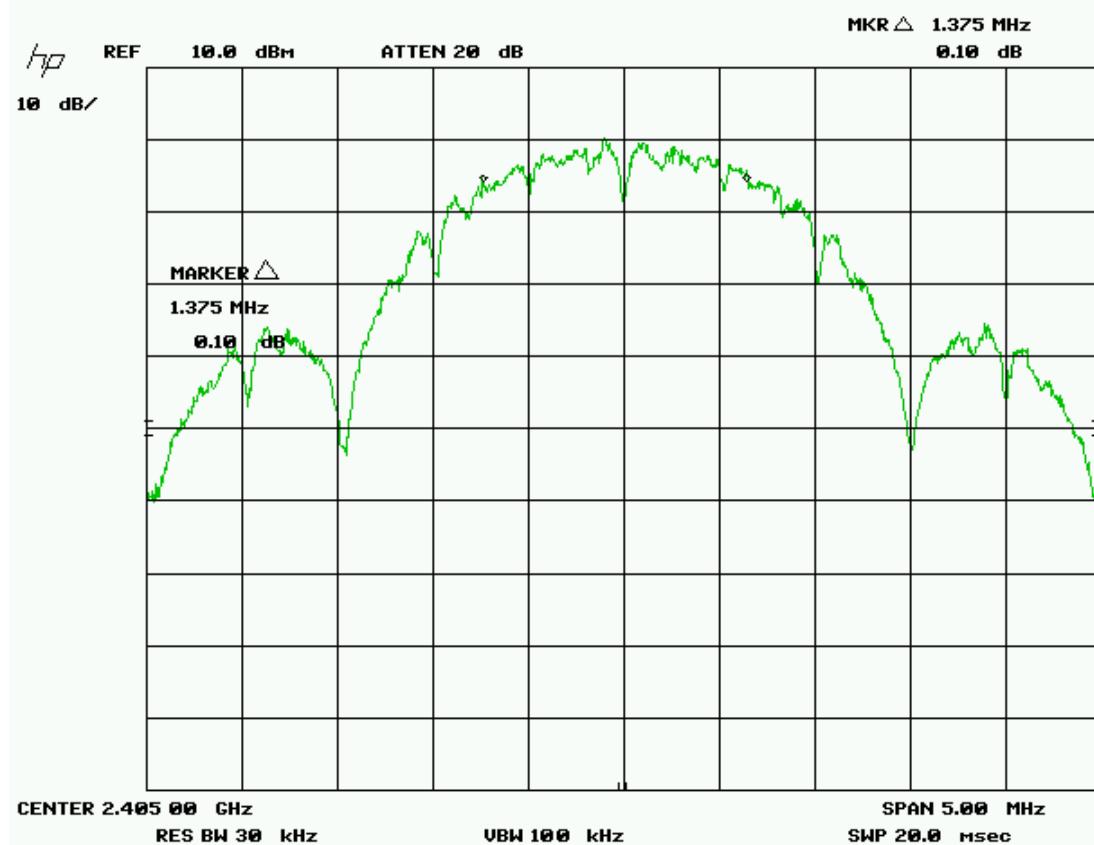
The EUT passed. The minimum 6 dB BW measured was 1.375 MHz

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Graph(s)

The graphs shown below shows the channel spacing during the operation of the device. This is measured by a max hold on the spectrum analyzer and the highest resolution bandwidth that is sufficiently low to exhibit the 6 dB bandwidth of a channel during operation of the EUT. This measurement is a peak measurement. Max hold is performed for a duration of not less then 1 minute.



6 dB BW = 1.375 MHz

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



20 dB BW = 2.56 MHz

Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Attenuator 20 dB	FP-50-20	Trilithic	NCR	NCR	GEMC 43
Spectrum Analyzer	8566B	HP	21-Dec-11	21-Dec-13	GEMC 141
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	NCR	NCR	GEMC 49

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B\_Rev1"

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## *Maximum Peak Envelope Conducted Power - DM*

### **Purpose**

The purpose of this test is to ensure that the maximum power conducted to the radiating element does not exceed the limits specified. This ensures that if the end-user replaces the antenna, that the maximum power does not exceed an amount which may create an excessive power level.

### **Limits**

The limits are defined in FCC Part 15.247(b) and RSS 210.

For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands, the peak limit is 1 watt.

### **Results**

The EUT passed. The peak power measured was 17.4 dBm (55 mW).

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011

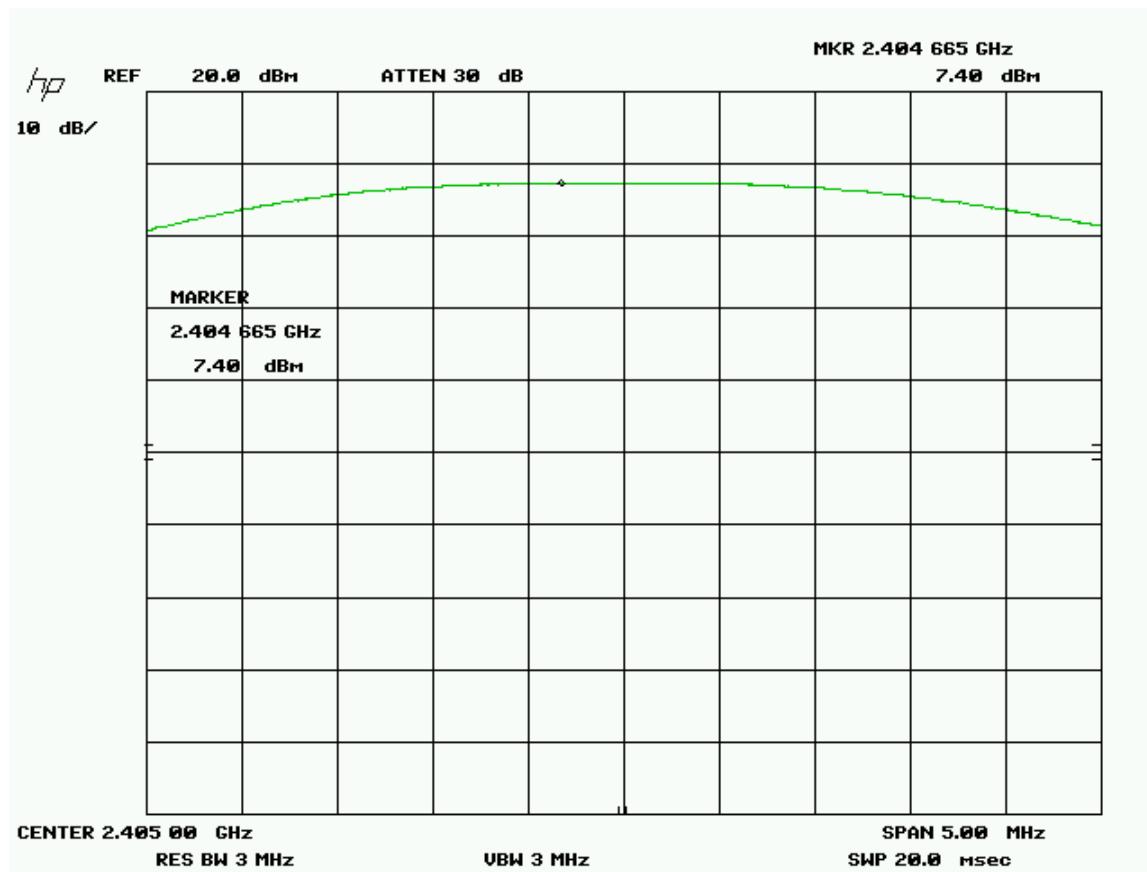


## Table(s)

The tables shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT.

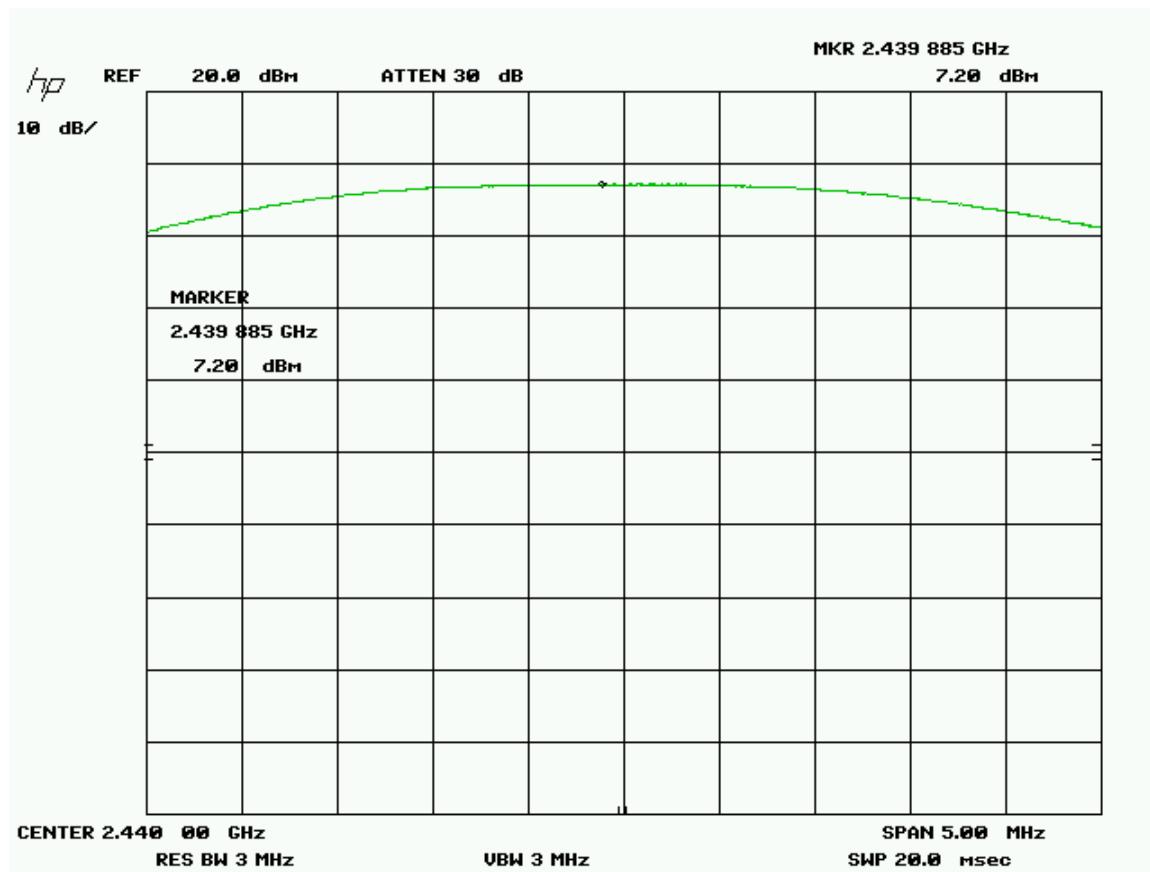
Band	Channel	Frequency (GHz)	Reading (dBm)
Low	11	2.405	17.4
Medium	18	2.440	17.2
High	25	2.475	17.3

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



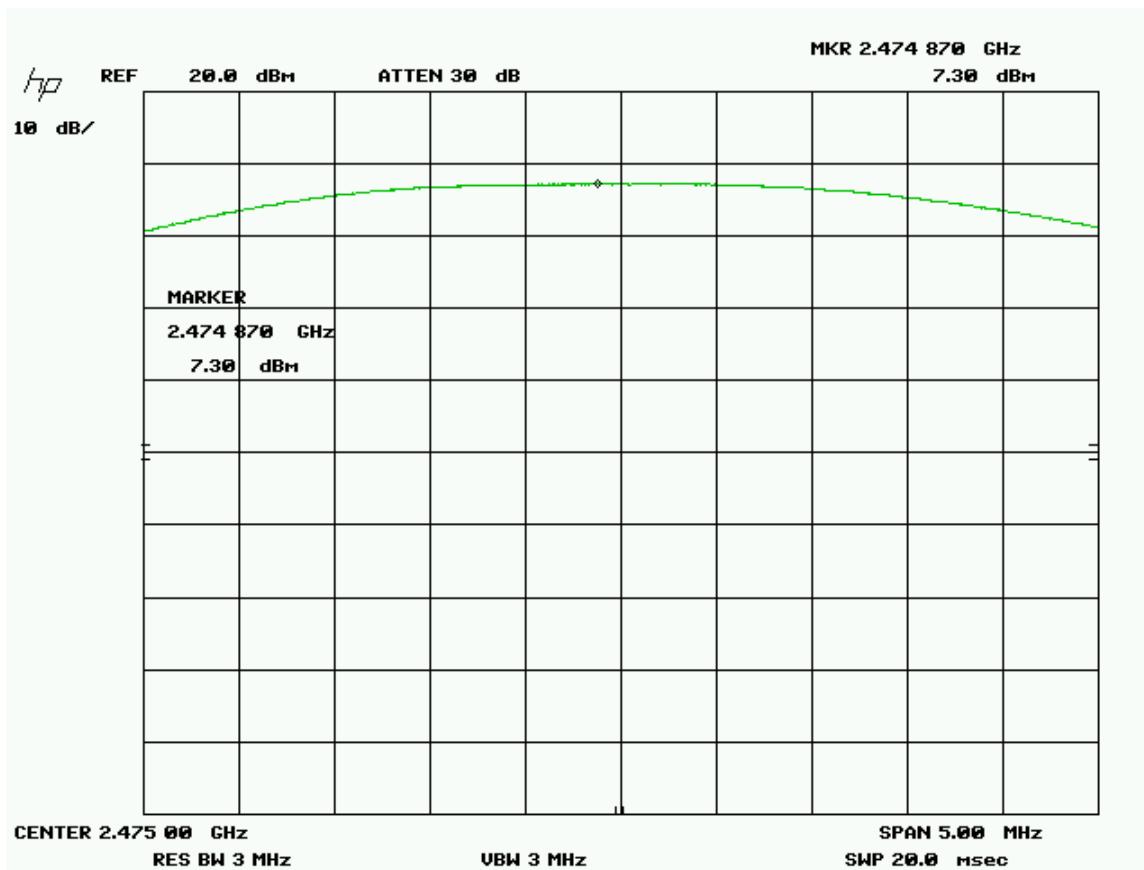
Low – Peak Power

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Mid – Peak Power

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



High – Peak Power.

Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	21-Dec-11	21-Dec-13	GEMC 141
RF Cable 10m	LMR-400-10M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31
Emission software	0.1.83	Global EMC	NCR	NCR	GEMC 58

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B\_Rev1"

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## *Spurious Conducted Emissions*

### **Purpose**

The purpose of this test is to ensure that the maximum power conducted to the radiating element at frequencies outside of the authorized spectrum does not exceed the limits specified. This ensures that only the intended signal is delivered to the radiating element.

### **Limits**

The limits are defined in 15.247(d). In any 100 kHz band, the peak spurious harmonics emissions must be at least 20 dB below the fundamental. Spurious Conducted emissions are to be evaluated up to the 10<sup>th</sup> harmonic. This -20 dBc requirement also applies at the 'band edge' or 2.4 GHz and 2.4835 GHz.

### **Results**

The EUT pass. Low, middle and high band was measured. The worst case for each mode is presented as a graph for the spectrum. The -20 dBc requirement is shown for the lower band edge at 2.4 GHz in the low band. The -20 dBc requirement is also shown for the higher band edge at 2.4835 GHz in the high band.

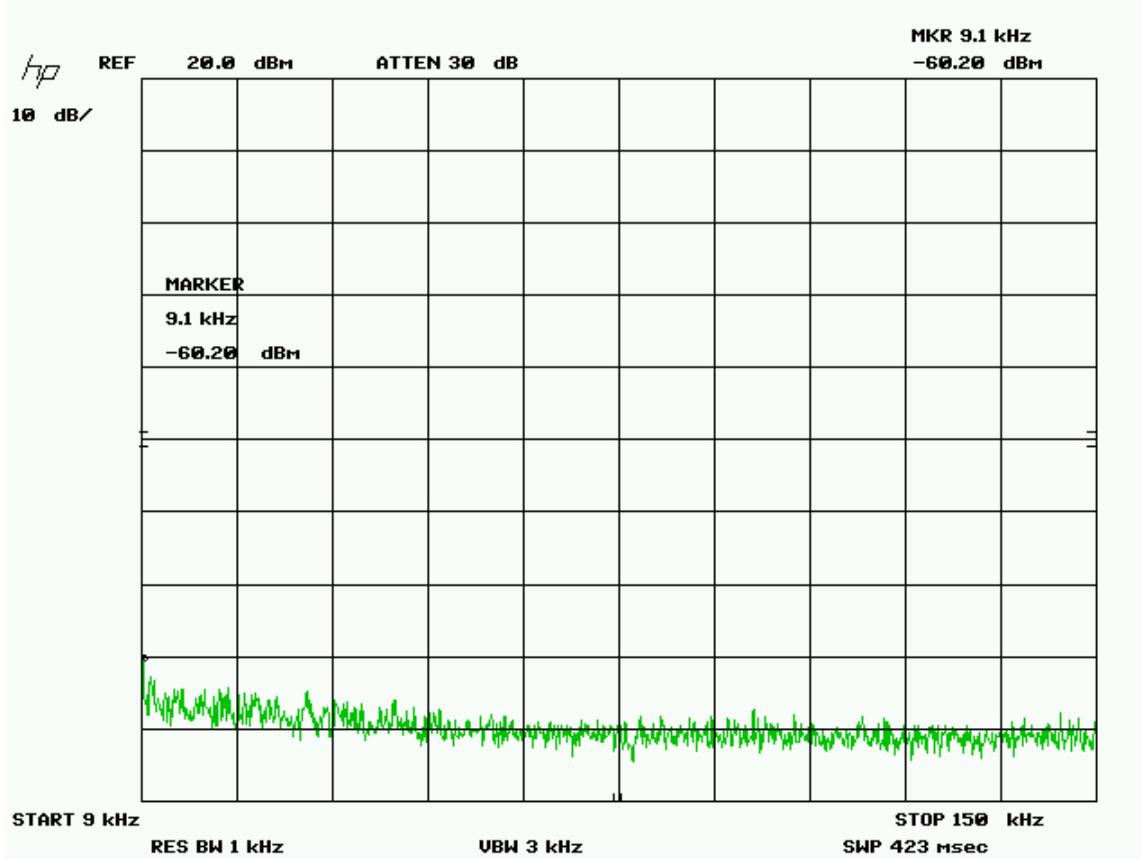
Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



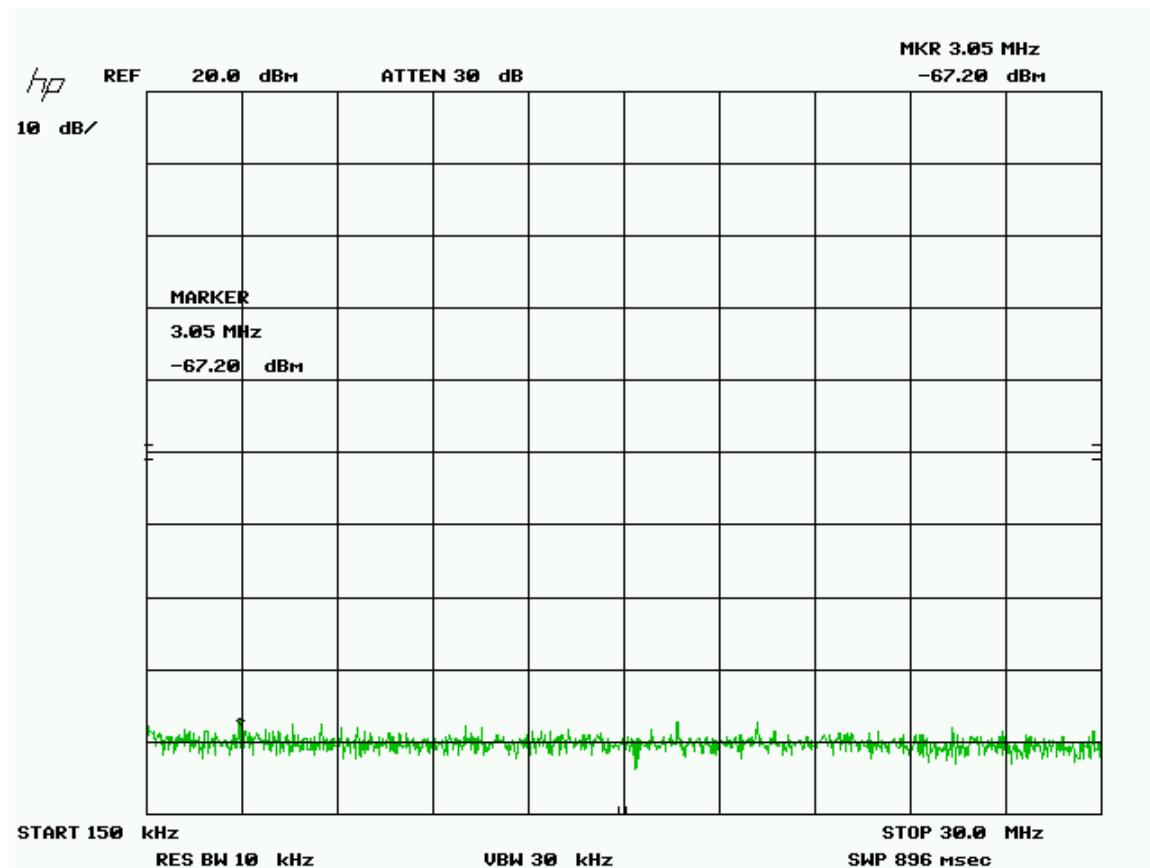
## Graph(s)

The graphs shown below shows the peak power output of the device during the antenna conducted measurement during transmit operation of the EUT. Note there was 20 dB of external attenuation taken during this measurement.

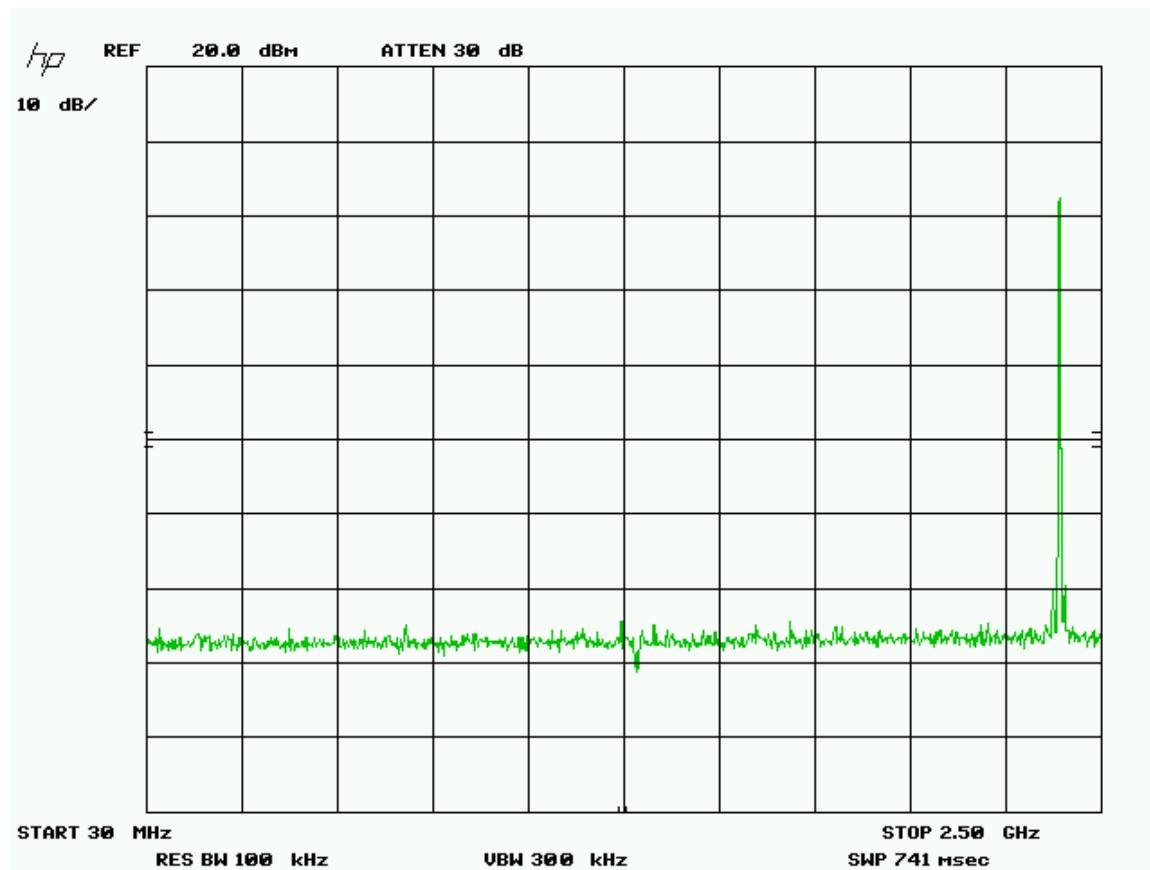
Frequencies below fundamental



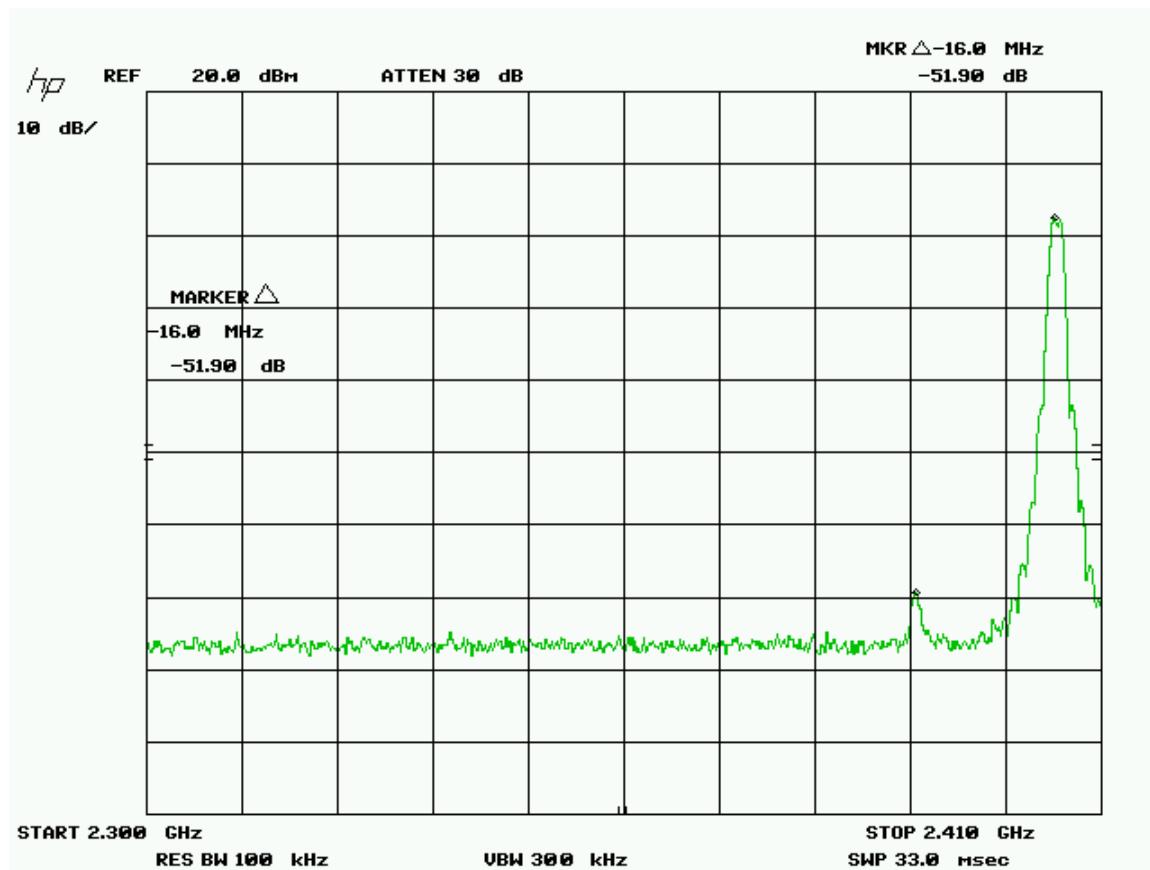
Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



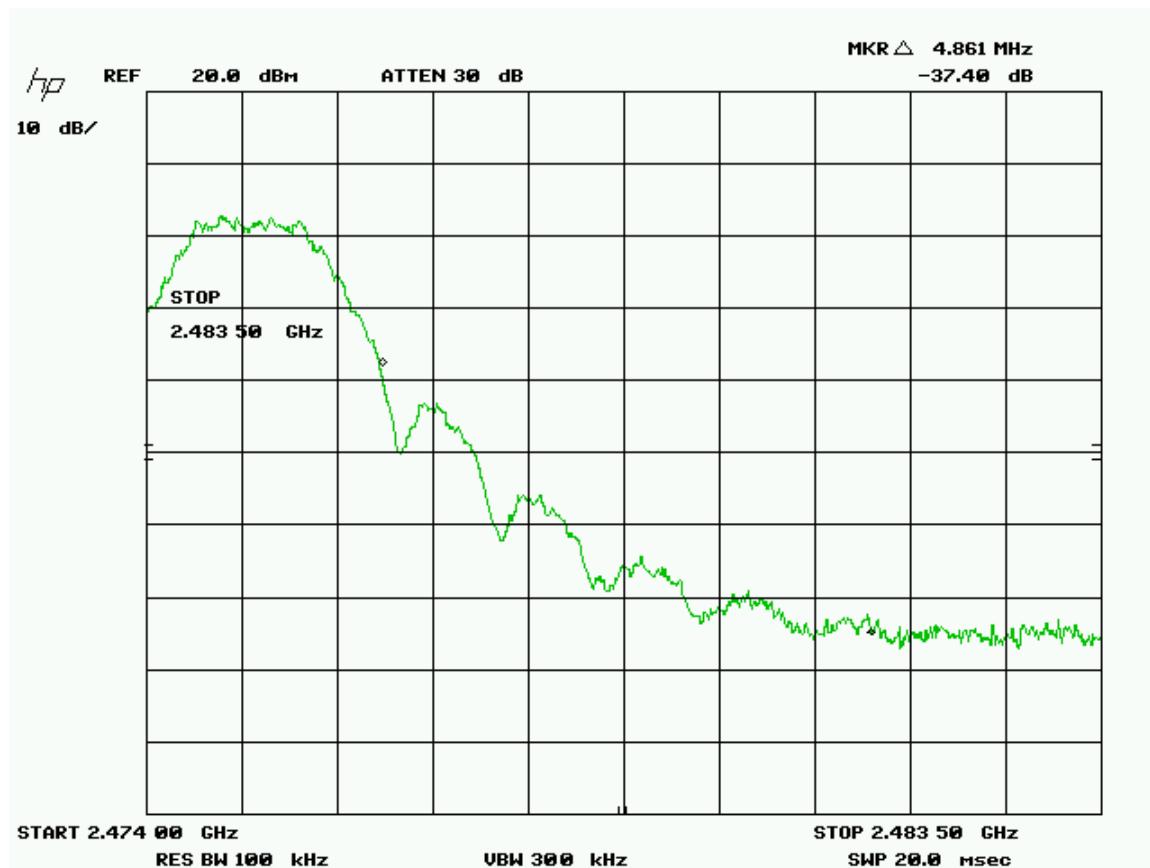
Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



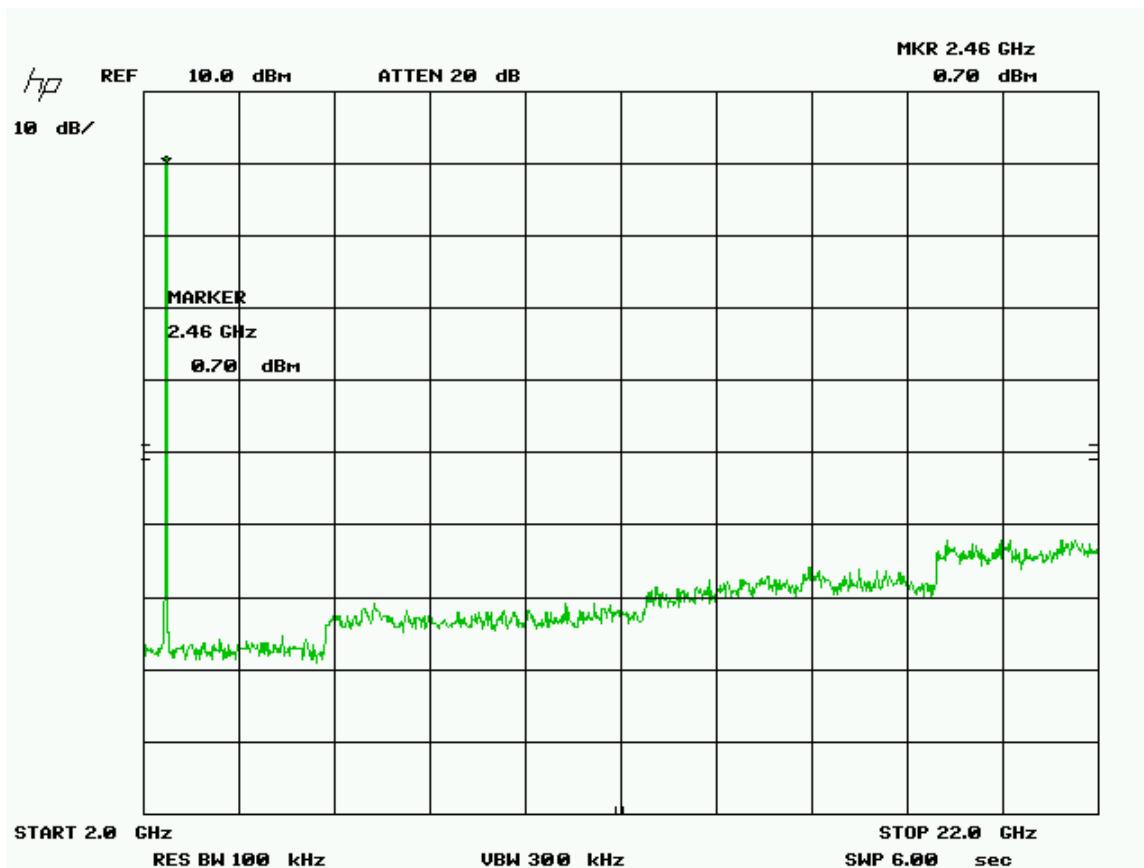
Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Note: This was additionally scanned to 26 GHz.  
 No emissions were detected above 22 GHz. No emissions were detected above 22 GHz and the system measurement noise floor was more than 20 dB below limit. The applicable limit would be -20 dBm in any 100 kHz band, and the noise floor was below -40 dBm in any 100 kHz band.

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
Spectrum Analyzer	ESL 6	Rohde & Schwarz	Oct-06, 2011	Oct-06, 2013	GEMC 160
Quasi Peak Adapter	85650A	HP	12/21/ 2011	12/21/2013	GEMC 7
Attenuator 3 dB	FP-50-3	Trilithic	NCR	NCR	GEMC 40
Chase Preamp 9kHz - 2 GHz	CPA9231A	Chase	8/29/2012	8/29/2014	GEMC 6403
18.0-26.5 GHz Harmonic Mixer	11970K	HP	21-Dec-11	21-Dec-13	GEMC 158
1-26G pre-amp	HP 8449B	HP	8/22/2012	8/22/2014	GEMC 6351
RF Cable 7m	LMR-400-7M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 28
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
RF Cable 0.5M	LMR-400-0.5M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 31

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B\_Rev1"

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## ***Power Spectral Density - DM***

### **Purpose**

The purpose of this test is to ensure that the maximum power spectral density to the radiating element does not exceed the limits specified. This ensures that the modulation is significantly wide enough, or low enough in power that it will allow for co-operation of other wireless devices operating within this frequency allocation.

### **Limits**

The limits are defined in 15.247(e).

For digitally modulated systems, the 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.

### **Results**

The EUT passed. Each mode was tested at low, medium, and high band. The worst case value is 3.2 dBm as measured with a 3 kHz resolution bandwidth (peak power).

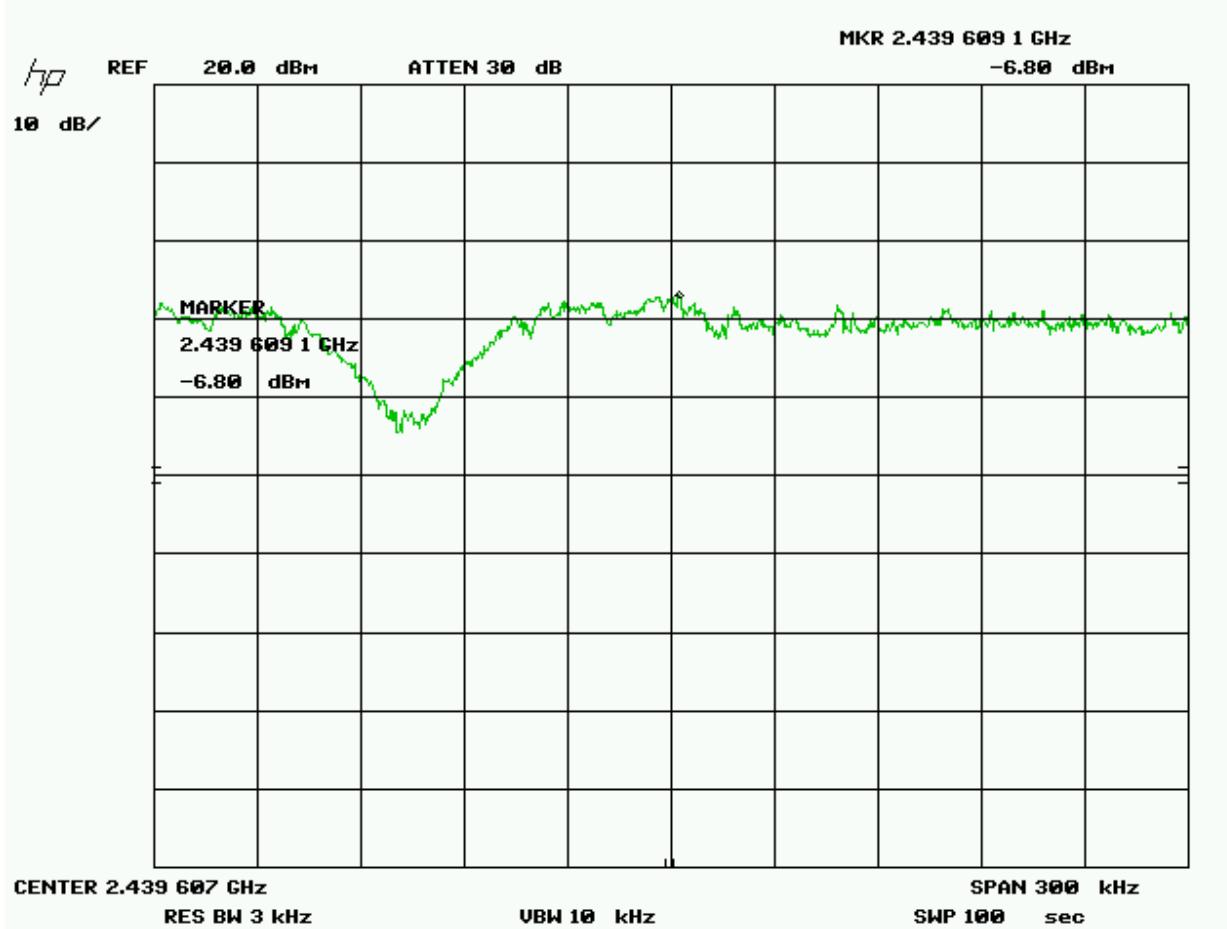
### **Graph(s)**

The graphs shown below show the power spectral density of the device during the conducted measurement operation of the EUT. Low, middle, and high channel was investigated in each mode, with the worst case being presented.

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Mid channel (10 dB ext)



Note: See 'Appendix B – EUT & Test Setup Photographs' for photos showing the test set-up.

Client	SCAN~LINK TECHNOLOGIES INC.
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Test Equipment List

Equipment	Model No.	Manufacturer	Last calibration date	Next calibration due date	Asset #
Spectrum Analyzer	8566B	HP	12/21/ 2011	12/21/2013	GEMC 141
RF Cable 1m	LMR-400-1M-50OHM-MN-MN	LexTec	NCR	NCR	GEMC 29
Power Attenuator 20 dB	25-A-FFN-20	Bird / Hutton	NCR	NCR	GEMC 49

This report module is based on GEMC template "FCC – Power Line Conducted Emissions Class B\_Rev1"

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Appendix A – EUT Summary

For further details for filing purposes, refer to filing package.

<b>Manufacturer</b>	MARLEX Engineering Inc. 1374 Sandhill Drive Ancaster, ON Canada L9G 4V5
<b>EUT Name</b>	Armour Antenna Unit
<b>Approximate Size (LxWxH)</b>	
<b>Equipment Category (Commercial / Residential / Medical)</b>	Industrial
<b>Peripherals required for test</b>	Non / Self contained
<b>Minimum Separation distance from operator</b>	20 cm
<b>Types and lengths of all I/O cables</b>	N/A
<b>Description</b>	Upon receiving a reverse input signal, the SCAN~LINK system will begin rapid rate transmission with the SkyeTek M10 RFID module to detect RFID tags. The reverse input signal can be received at the ARMOUR ANTENNA UNIT containing the RFID reader/antenna, or at the DISPLAY UNIT. In this reverse state, the SkyeTek M10 RFID module will transmit at pseudo random intervals. Each read (tag select) attempt is approximately 60ms in duration. These tag select events are spaced by a pseudo random dead time ranging between 60ms and 600ms. This cycle is repeated continuously until the vehicle has exited its reverse state. In the non-reverse state, the SCAN~LINK system will begin transmission with the SkyeTek M10 RFID module to detect tags at a slower rate of approximately one transmission per

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



	second
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Note the EUT is considered to have been received the date of the commencement of the first test, unless otherwise stated. For a close-up picture of the EUT, see 'Appendix B – EUT & Test Setup Photographs'.

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



## Appendix B – EUT and Test Setup Photographs

Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>	
Product	Armour Antenna Unit	
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011	

Note: These photos are for information purposes only. Also refer to PDF files that are separate from this test report.

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Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



### Radiated Emissions Below 30 MHz



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



Radiated Emissions 30 MHz to 1 GHz



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
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Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



### Radiated Emissions above 1 GHz



Client	<b>SCAN~LINK TECHNOLOGIES INC.</b>
Product	Armour Antenna Unit
Standard(s)	RSS 210 Issue 8:2010 / FCC Part 15 Subpart C 15:2011



### Antenna Conducted Measurements

