



**DATE: 19 March 2012**

**I.T.L. (PRODUCT TESTING) LTD.**  
**FCC Radio Test Report**  
**for**  
**Corning MobileAccess**

**Equipment under test:**

**MA2000 IDEN-SMR RHU in TSX Case**

**2000-S80-S90-A-TC AC**  
**2000-S80-S90-A-TC DC\***

\* See additional information in Section 2.1 of this report.

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Approved by:

I. Raz, EMC Laboratory Manager

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This report relates only to items tested.



## Measurement/Technical Report for Corning MobileAccess

### MA2000 IDEN-SMR RHU in TSX Case

**FCC ID: OJF2KIDENSMRTBC**

This report concerns:	Original Grant: X
	Class II change:
	Class I change:
Equipment type:	Licensed Non-Broadcast Station Transmitter
Limits used:	
47CFR Part 90, Subparts I; S	
Measurement procedure used is ANSI C63.4-2003.	
Substitution Method used as in ANSI/TIA-603-C: 2004	
Application for Certification prepared by:	Applicant for this device: (different from "prepared by")
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D.N. Shimshon 99780	Vienna, VA. 22182
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## 1. General Information

### 1.1 Administrative Information

Manufacturer: Corning MobileAccess

Manufacturer's Address: 8391 Old Courthouse Rd.  
Suite #300  
Vienna, VA 22182  
U.S.A.  
Tel: +1-541-758-2880  
Fax: +1-703-848-0260

Manufacturer's Representative: Steve Blum

Equipment Under Test (E.U.T): MA2000 IDEN-SMR RHU in TSX Case

Equipment Model No.: 2000-S80-S90-A-TC AC

Equipment Serial No.: Not Designated

Date of Receipt of E.U.T: 01.02.2012

Start of Test: 01.02.2012

End of Test: 8.2.2012

Test Laboratory Location: I.T.L (Product Testing) Ltd.  
Kfar Bin Nun,  
ISRAEL 99780

Test Specifications: FCC Part 90 Sub-part I, S



## 1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), Registration No. 90715.
3. The Israel Ministry of the Environment (Israel), Registration No. 1104/01.
4. The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) (Japan), Registration Numbers: C-1350, R-1285.
5. Industry Canada (Canada), IC File No.: 46405-4025; Site No. IC 4025B-1.
6. TUV Product Services, England, ASLLAS No. 97201.

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.



### **1.3 Product Description**

The EUT is MobileAccess 2000 IDEN-SMR RHU installed inside Tri-Service package.

Since the EUT has only one RHU (without Add-On), there are no additional splitters and/or filters in the case. As a result, higher output power at antenna port is achieved.

MA2000 TSX is compact, easily installable remote-end enclosure that provides carrier-grade indoor coverage for a number of services over a single, broadband architecture. TSX units that are already installed in the field can be upgraded to support another service. A wide range of services are supported, including 2G, 3G, and 4G mobile voice and data services, where the combination of services supported by each unit is model dependent.

### **1.4 Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at an antenna to EUT distance of 3 meters.

### **1.5 Test Facility**

Both conducted and radiated emissions tests were performed at I.T.L.'s testing facility at Kfar Bin-Nun, Israel. This site is a FCC listed test laboratory (FCC Registration No. 90715, date of listing September 3, 2009).

I.T.L.'s EMC Laboratory is also accredited by A2LA, certificate No. 1152.01.

### **1.6 Measurement Uncertainty**

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)  
0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):  
± 3.44 dB

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)  
for open site 30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):  
± 4.96 dB



## 2. System Test Configuration

### 2.1 Justification

The test setup was configured to closely resemble the standard installation.

The EUT consists of the RHU device in Tri Band enclosure without SCU-4 splitter.

The IDEN and the SMR source signals are represented in the setup by appropriate signal generators.

An “Exercise” SW on the computer was used to enable / disable transmission of the RHU, while the EUT output was connected to the spectrum analyzer.

The E.U.T. is available powered from AC or DC

To select the worst case host to be fully tested, an exploratory radiated emission test was performed inside the shielded room.

The units were placed on a 0.8 meter high wooden table, 1meter from the tests antenna, which was 1 m high.

The results of the exploratory radiated emission tests are shown in the table below.

Frequency (MHz)	AC Configuration (dB $\mu$ V/m)	DC Configuration (dB $\mu$ V/m)
1870.0	55.0	54.6
1720.0	50.0	49.8

Based on the above exploratory radiated emission test, the AC powered configuration was selected as the “worst case” host.

### 2.2 EUT Exercise Software

Embedded SW ver. 2.0 build 07 was used

### 2.3 Special Accessories

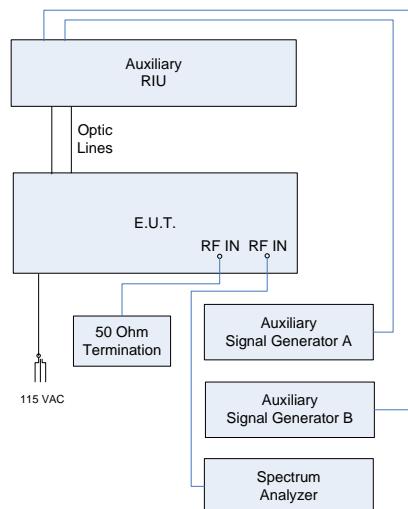
No special accessories were needed in order to achieve compliance.

### 2.4 Equipment Modifications

No modifications were needed in order to achieve compliance.



## 2.5 Configuration of Tested System



**Figure 1. Tests Set-up**

### 3. Conducted and Radiated Measurement Test Set-ups Photo

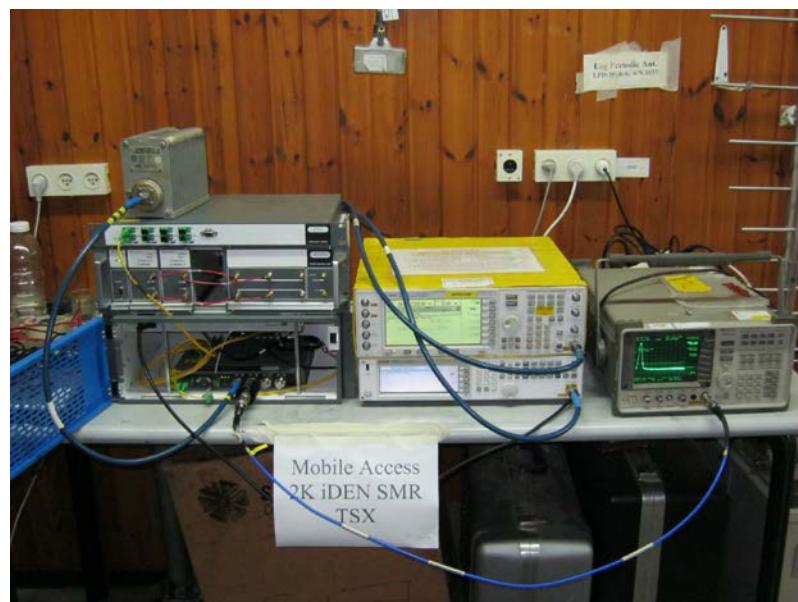


Figure 2. Conducted Emission From Antenna Ports Tests



Figure 3. Radiated Emission Test



## 4. Peak Output Power (iDEN)

### 4.1 ***Test Specification***

FCC Part 90 Section 90.219

### 4.2 ***Test Procedure***

Peak Output Power must not exceed 27 dBm (ERP – Antenna Gain = 37 – 10 = 27 dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through a 40 dB external attenuator and an appropriate coaxial cable (Cable Loss = 1 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz resolution BW. The output power level was measured at 851.0125, 860.00, and 868.9875 MHz.

Type of modulation is 16QAM, Symbol rate is 7.5 ksps.

### 4.3 ***Test Results***

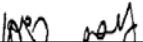
Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
851.0125	25.45	27.0	-1.55
860.0000	24.31	27.0	-2.69
868.9875	23.73	27.0	-3.27

**Figure 4 Peak Output Power Test Results Table**

See additional information in Figure 5 to Figure 7.

JUDGEMENT: Passed by 1.55 dB

TEST PERSONNEL:

Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni

## Peak Output Power (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

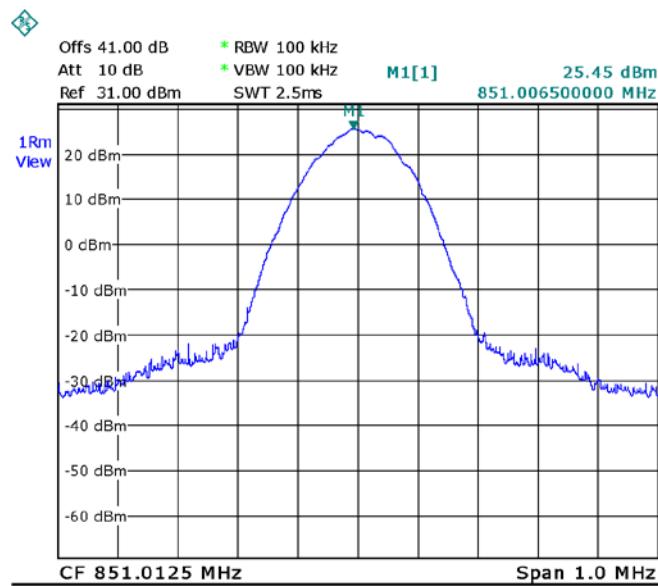


Figure 5.— 851.0125 MHz

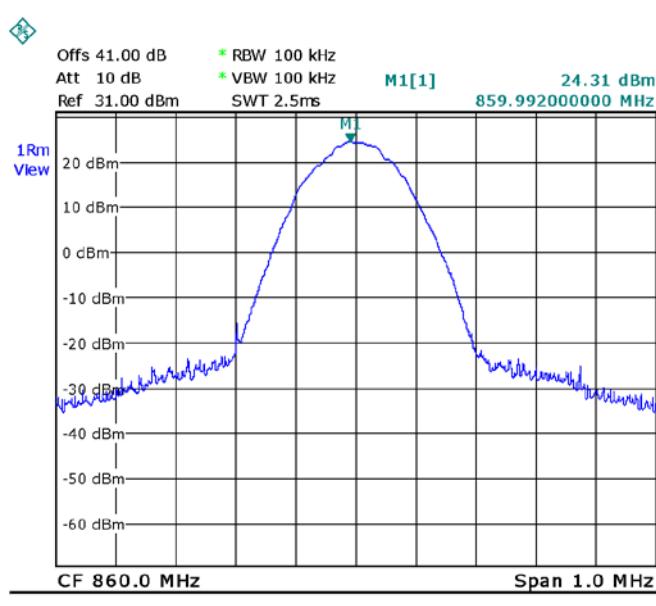


Figure 6.— 860.00 MHz



## Peak Output Power (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

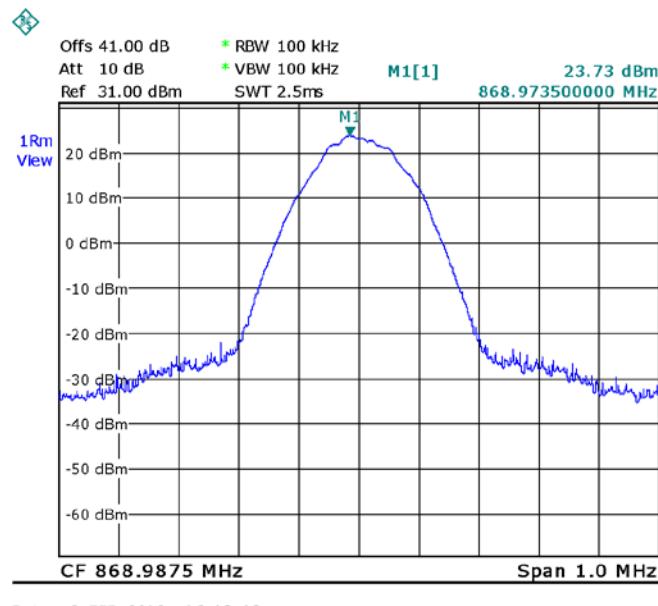


Figure 7.— 868.9875 MHz



## Peak Output Power (iDEN)

### 4.1 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 8 Test Equipment Used Peak Output Power (iDEN)**



## 5. Occupied Bandwidth (iDEN)

### 5.1 ***Test Specification***

FCC Parts 2.1049; 90.2.09

### 5.2 ***Test Procedure***

The E.U.T. was set to the applicable test frequency with 16QAM modulation. The E.U.T. antenna terminal was connected to the spectrum analyzer through a 40 dB external attenuator and appropriate coaxial cable (Cable Loss 1 dB). The spectrum analyzer was set to 300 Hz resolution B.W.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

The occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.

Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

### 5.3 ***Test Results***

	Operating Frequency	Reading (kHz)
Input	851.0125	9.681
Output	851.0125	9.681
Input	860.00	9.681
Output	860.00	9.681
Input	868.9875	9.830
Output	868.9875	9.780

**Figure 9 Occupied Bandwidth Test Results Table**

See additional information in Figure 10 to Figure 15.

#### TEST PERSONNEL:

Tester Signature: ITL Date: 19.03.12

Typed/Printed Name: I. Siboni

## Occupied Bandwidth (iDEN)

E.U.T Description MA2000 iDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

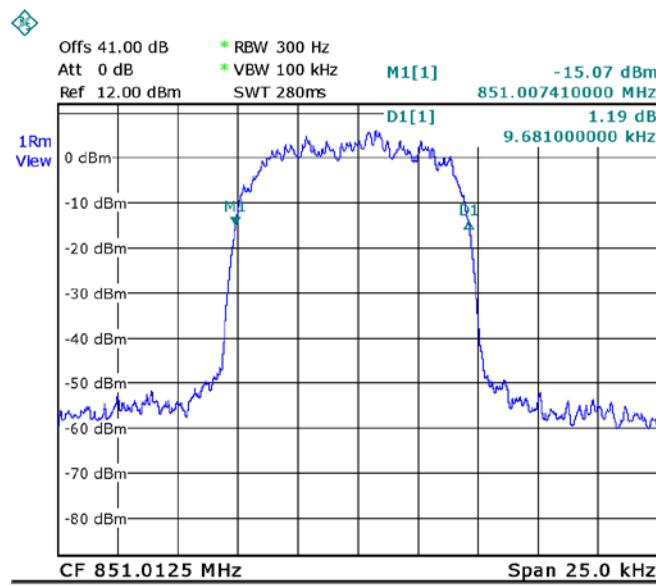


Figure 10.— 851.0125 Input

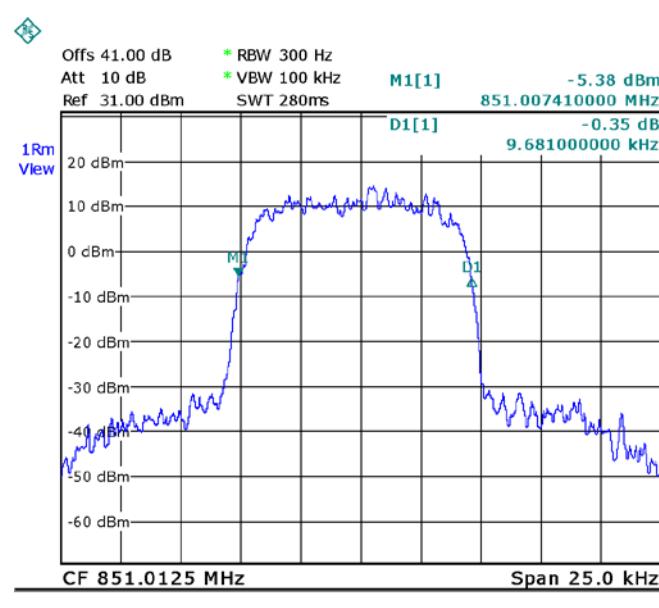


Figure 11.— 851.0125 Output

## Occupied Bandwidth (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

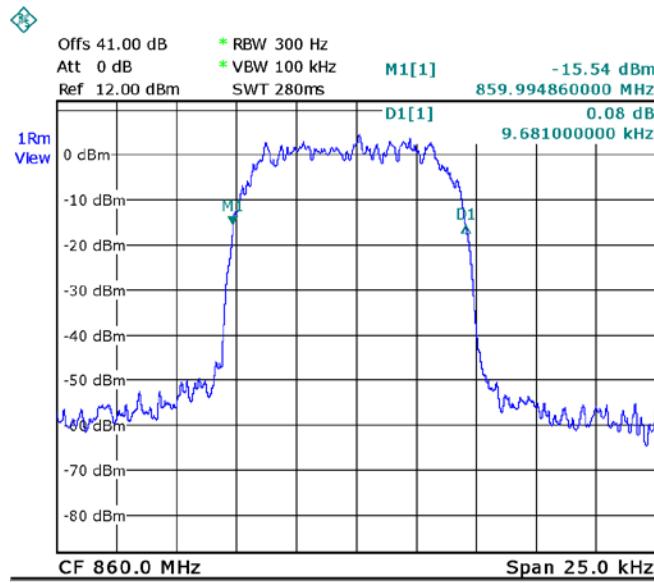


Figure 12.— 860.00 Input

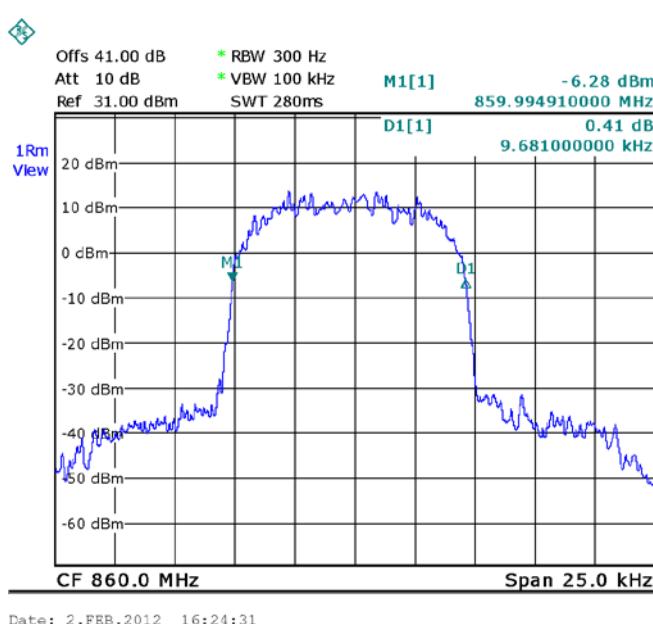


Figure 13.— 860.00 Output

## Occupied Bandwidth (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
 Type 2000-S80-S90-A-TC AC  
 Serial Number: Not Designated

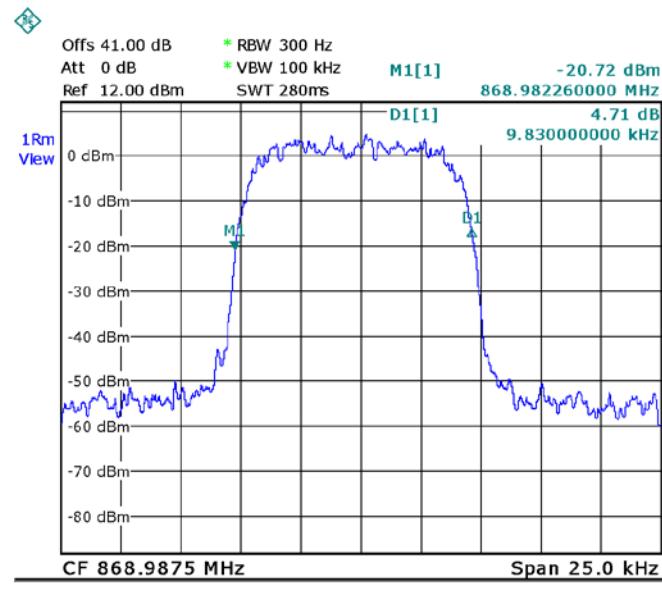


Figure 14.— 868.9875 Input

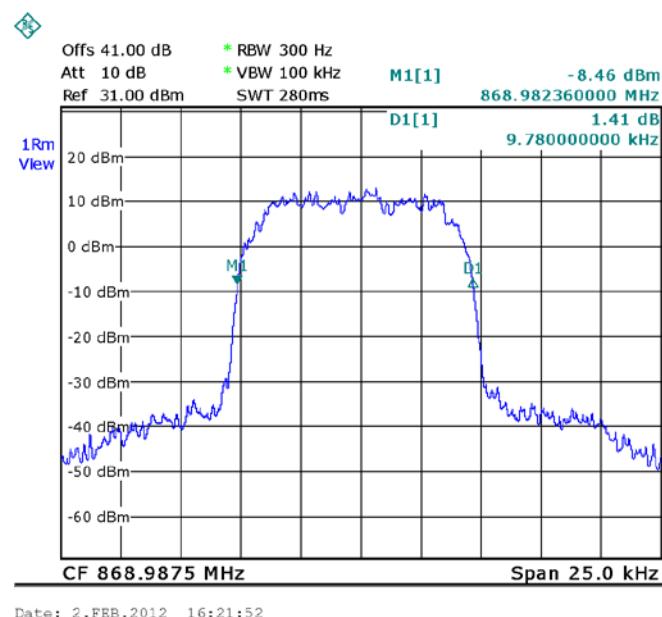


Figure 15.— 868.9875 Output



## Occupied Bandwidth (iDEN)

### 5.4 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 16 Test Equipment Used Occupied Bandwidth (iDEN)**



## 6. Emission Mask (iDEN)

### 6.1 ***Test Specification***

FCC Part 90 Sub-part I Section 90.210; Part 90 Section 90.691

According to the table in Section 90.210, the following masks shall be used:

For the frequency band 851-854 MHz Mask H

For the frequency band 854-869 MHz Mask G

Also at all frequencies, the E.U.T. must comply with the emission mask in Section 90.691.

### 6.2 ***Test Procedure***

The E.U.T. was set to the applicable test frequency with 16QAM modulation, Symbol rate of 7.5ksps.

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 40 dB external attenuator and appropriate coaxial cable (1 dB cable loss).

### 6.3 ***Test Results***

JUDGEMENT: Passed

See additional information in Figure 17 to Figure 22.

TEST PERSONNEL:

Tester Signature: I. Siboni Date: 19.03.12

Typed/Printed Name: I. Siboni



## Emission Mask (iDEN)

E.U.T Description MA2000 iDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

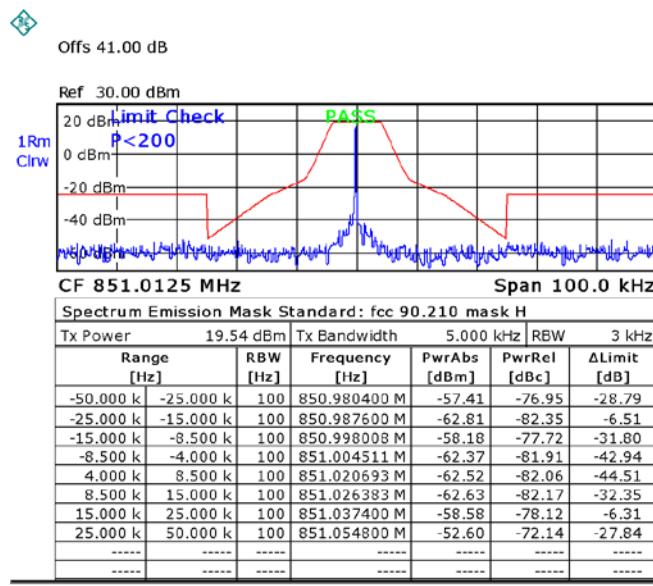


Figure 17.— 851.0125

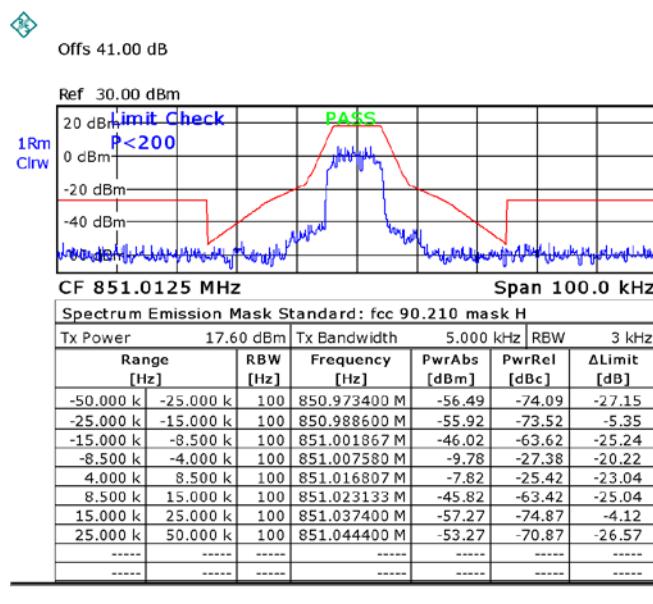


Figure 18.— 851.0125



## Emission Mask (iDEN)

E.U.T Description MA2000 iDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

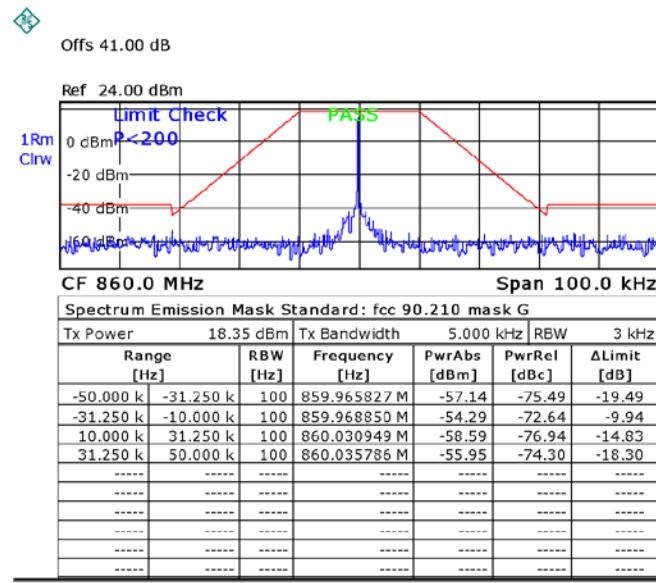


Figure 19.— 860.00

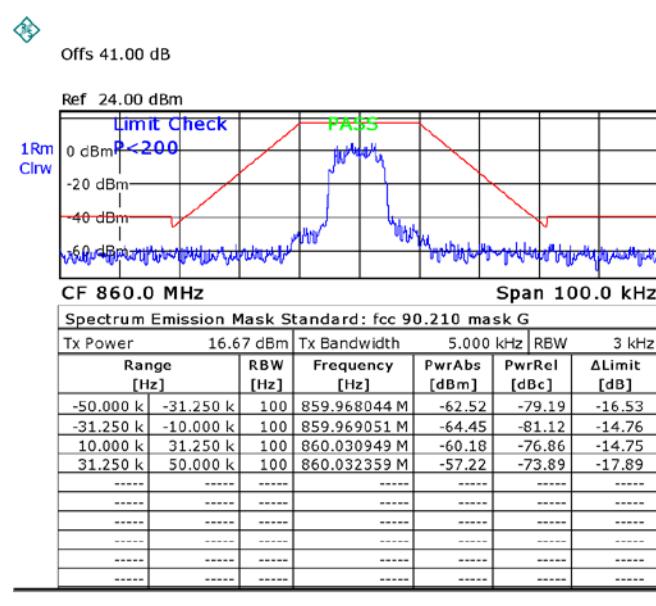


Figure 20.— 860.00

## Emission Mask (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
 Type 2000-S80-S90-A-TC AC  
 Serial Number: Not Designated

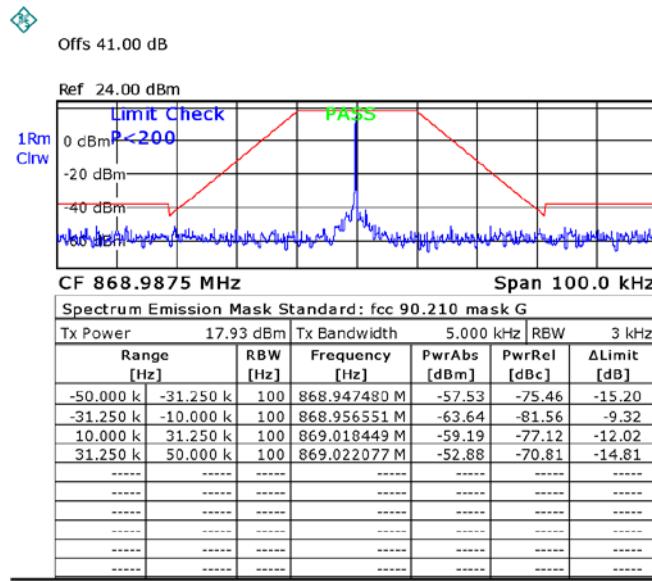


Figure 21.— 868.9875

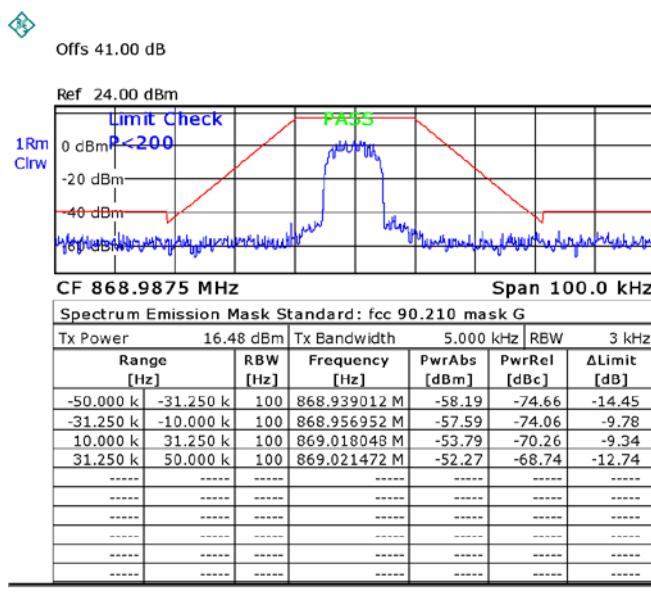


Figure 22.— 868.9875



## Emission Mask (iDEN)

### 6.1 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 23 Test Equipment Used Emission Mask (iDEN)**



## 7. Out of Band Emissions at Antenna Terminals (iDEN)

### 7.1 Test Specification

FCC Part 90, Section 90.210

### 7.2 Test Procedure

The power of any emission outside of the authorized bandwidth must be attenuated below the transmitting power (P) by a factor of at least  $43 + \log(P)$  dB, yielding  $-13$  dBm. The resolution bandwidth was set to 1.0 kHz for the frequency range 9 kHz – 1 MHz, 100 kHz for the frequency range 1 MHz to 1 GHz, and 1 MHz in the frequency range 1 – 9 GHz. In the band edges, measurement was performed using resolution bandwidth of 10 kHz. Therefore the limit in these ranges =  $-13 + 20 \log 10/100 = -33$  dBm.

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 40 dB external attenuator and an appropriate coaxial cable (Cable Loss= 1 dB).

### 7.3 Test Results

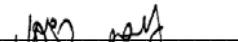
Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
851.0125	-21.07	-13.0	-8.07
860.00	-20.80	-13.0	-7.8
868.9875	-21.80	-13.0	-8.8

Figure 24 Out of Band Emission at Antenna Terminals (iDEN) Test Results Table

See additional information in Figure 25 to Figure 52.

JUDGEMENT: Passed by 7.8 dB

TEST PERSONNEL:

Tester Signature:  Date: 19.03.12

Typed/Printed Name: I. Siboni



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

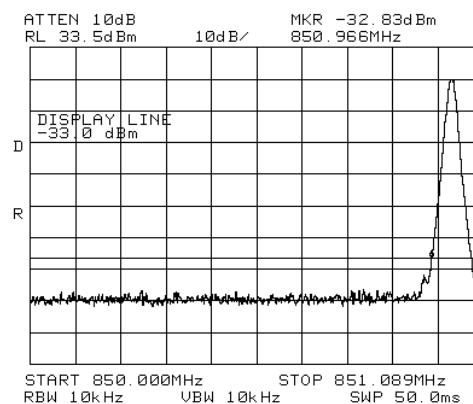


Figure 25.— 851.0125 MHz

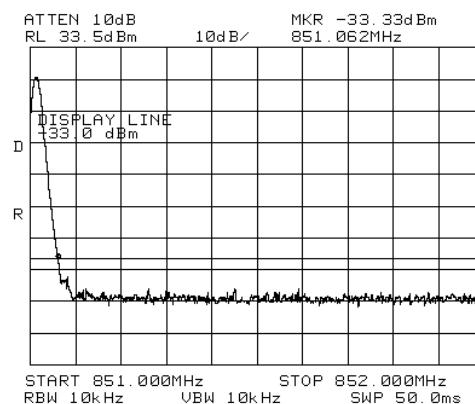


Figure 26.— 851.0125 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

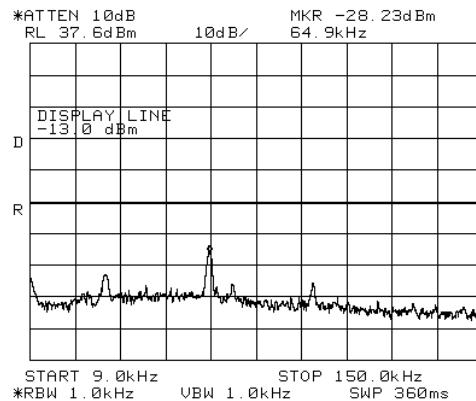


Figure 27.— 851.0125 MHz

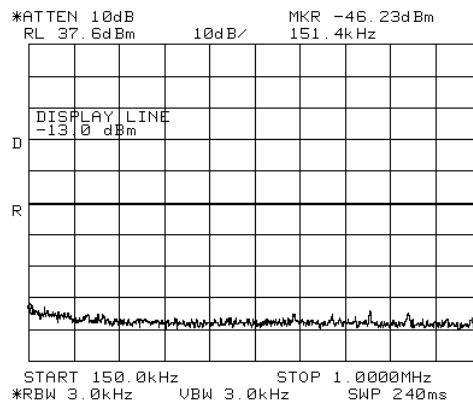


Figure 28.— 851.0125 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

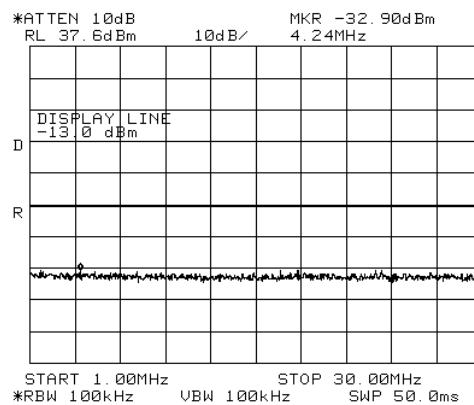


Figure 29.— 851.0125 MHz

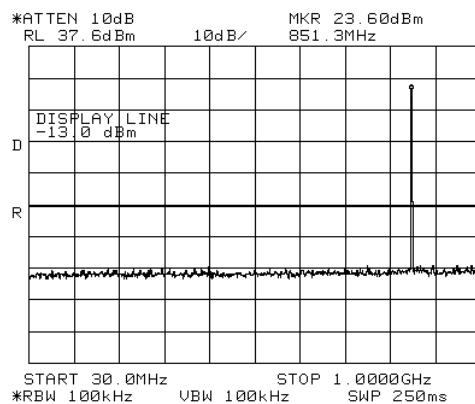


Figure 30.— 851.0125 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

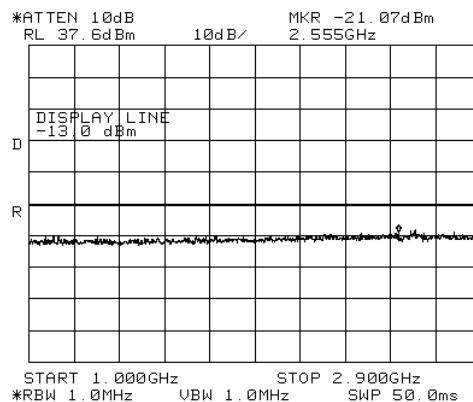


Figure 31.— 851.0125 MHz

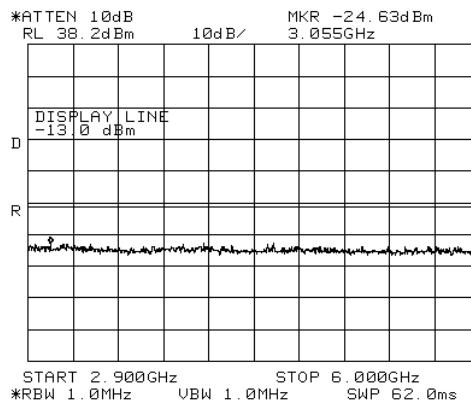


Figure 32.— 851.0125 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

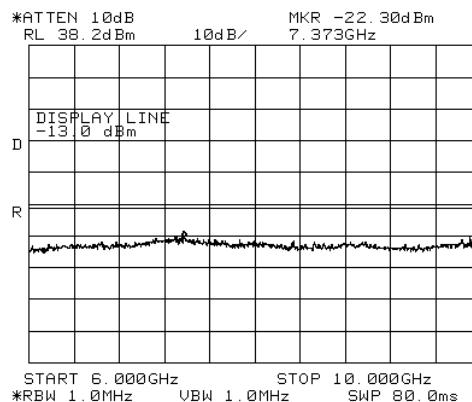


Figure 33.— 851.0125 MHz

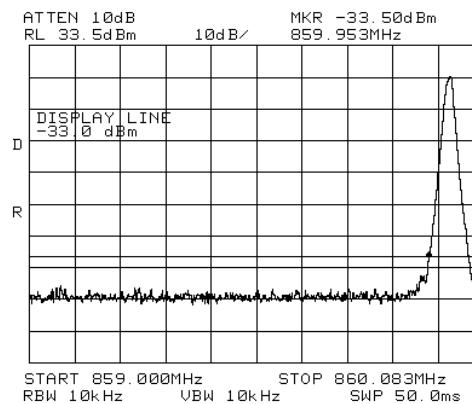


Figure 34.— 860.00 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

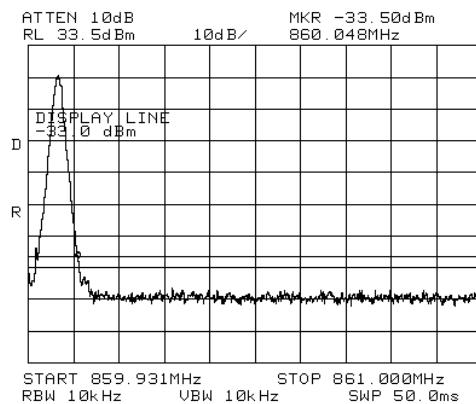


Figure 35.— 860.00 MHz

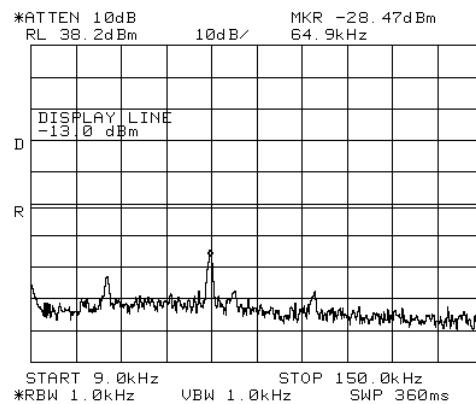


Figure 36.— 860.00 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

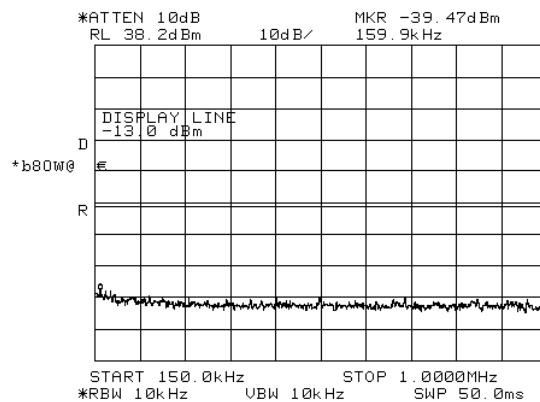


Figure 37.— 860.00 MHz

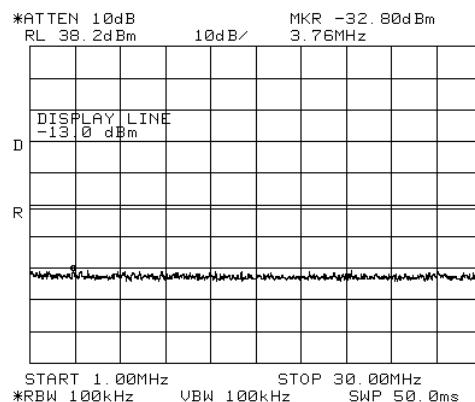


Figure 38.— 860.00 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

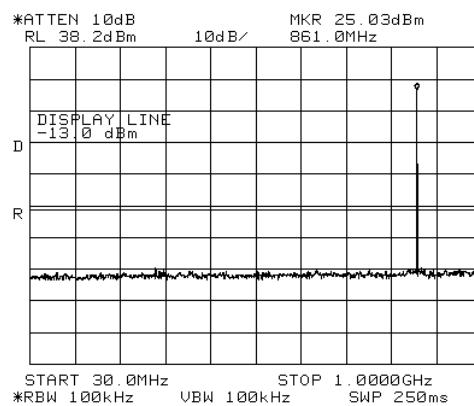


Figure 39.— 860.00 MHz

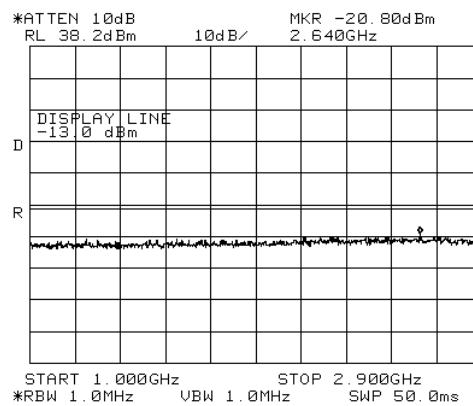


Figure 40.— 860.00 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

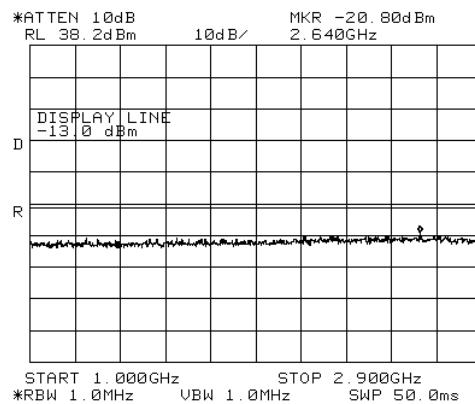


Figure 41.— 860.00 MHz

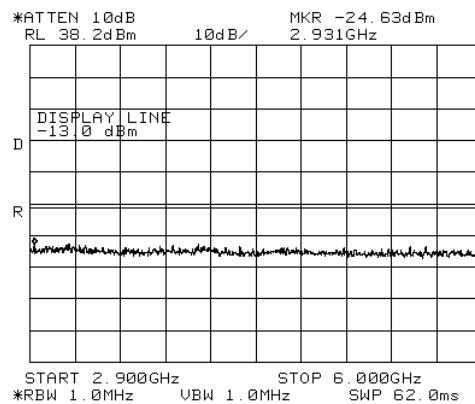


Figure 42.— 860.00 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

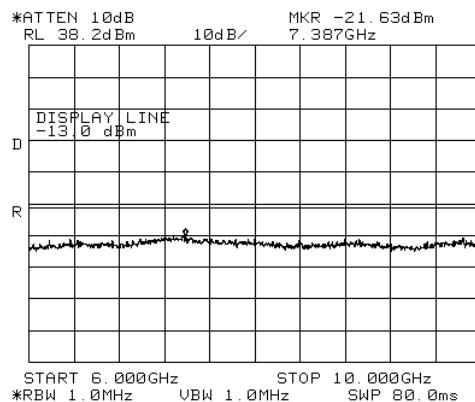


Figure 43.— 860.00 MHz

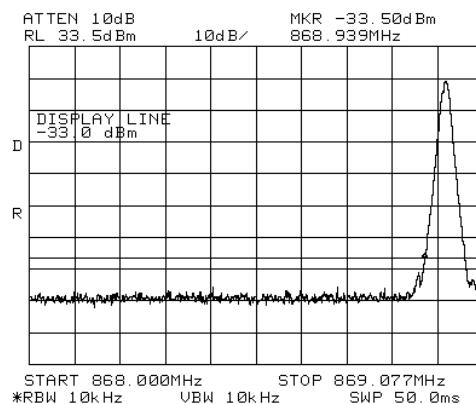


Figure 44.— 868.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

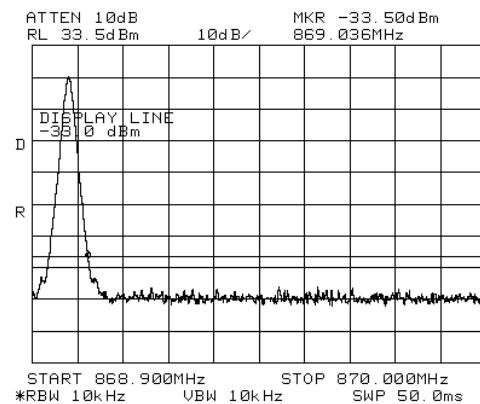


Figure 45.— 868.9875 MHz

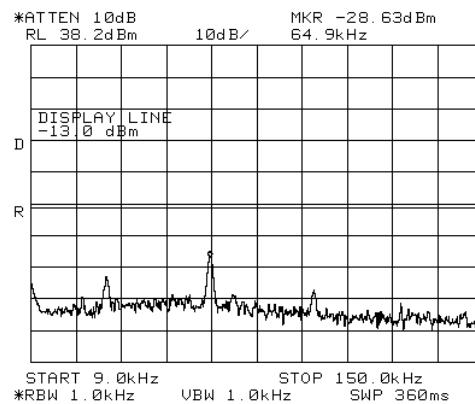


Figure 46.— 868.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 iDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

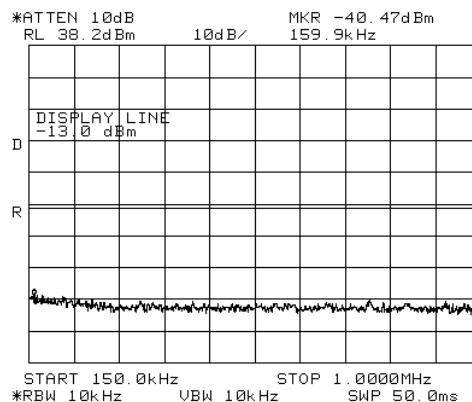


Figure 47.— 868.9875 MHz

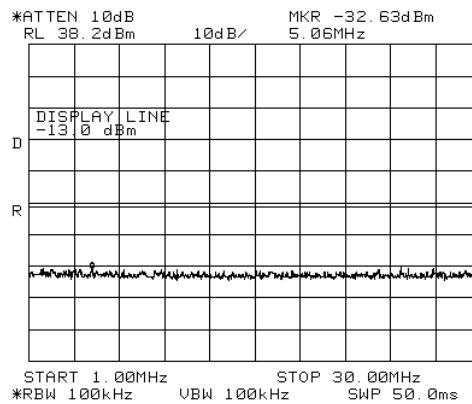


Figure 48.— 868.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

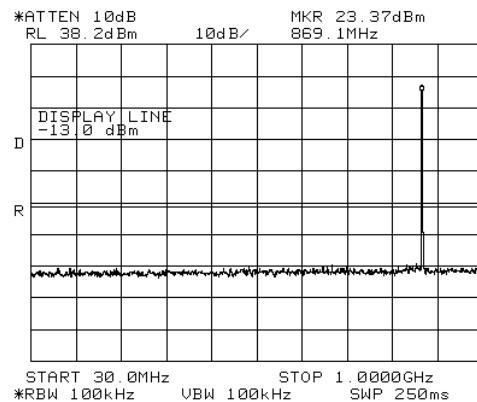


Figure 49.— 868.9875 MHz

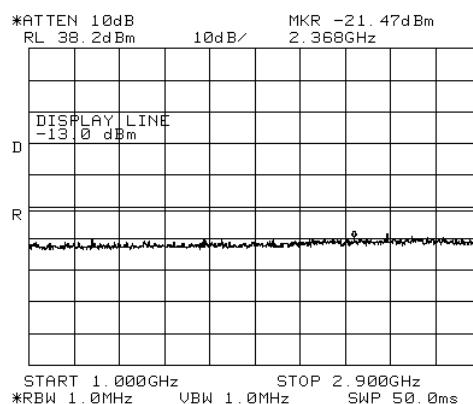


Figure 50.— 868.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

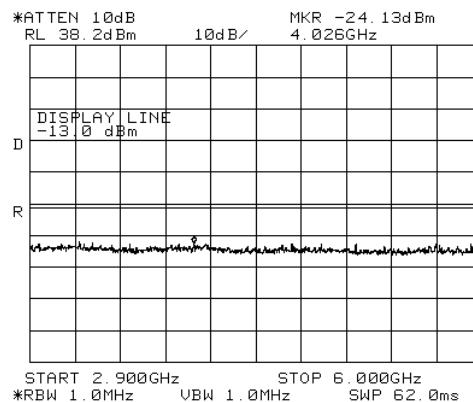


Figure 51.— 868.9875 MHz

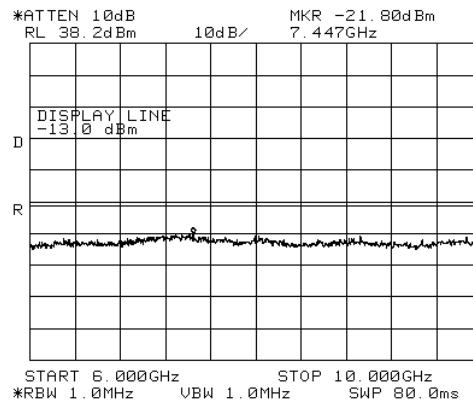


Figure 52.— 868.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

### 7.4 ***Test Equipment Used.***

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 19, 2012	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 53 Test Equipment Used Out of Band Emissions at Antenna Terminals (iDEN)**



## 8. Out of Band Emissions (Radiated) (iDEN)

### 8.1 ***Test Specification***

FCC, Part 90, Section 90.210

### 8.2 ***Test Procedure***

The power of any emission outside of the authorized bandwidth must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB, yielding  $-13$  dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The configuration tested is shown in Figure 3.5.

The frequency range 30 MHz-10 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:

$$P \text{ (dBm)} = P_g \text{ (dBm)} - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dBi)}$$

P = Equivalent Isotropic Radiated Power.

P<sub>g</sub> = Signal Generator Output Level.



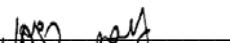
## Out of Band Emissions (Radiated) (iDEN)

### 8.3 Test Results

JUDGEMENT: Passed by 30.8 dB

The E.U.T met the requirements of the FCC, Part 90, Section 90.210 specifications.

#### TEST PERSONNEL:

Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni

Downlink mode at 4 different channels at each band of operation. Transmitting.

RBW 1MHz

VBW 1MHz

Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dB $\mu$ V/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
851.0125	1702.025	V	54.31	-46.51	5.45	7.64	-44.32	-13.0	-31.32
851.0125	1702.025	H	53.5	-47.14	5.45	7.64	-44.95	-13.0	-31.95
860.00	1720.00	V	50.0	-50.81	5.45	7.64	-48.62	-13.0	-35.62
860.00	1720.00	H	53.21	-47.44	5.45	7.64	-45.25	-13.0	-32.35
868.9875	1737.975	V	54.78	-46.01	5.45	7.64	-43.82	-13.0	-30.82
868.9875	1737.975	H	53.57	-47.04	5.45	7.64	-44.85	-13.0	-31.85

Figure 54 Out of Band (Radiated) (iDEN) Test Results Table



## Out of Band Emissions (Radiated) (iDEN)

### 8.1 *Test Equipment Used*

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year

Figure 55 Test Equipment Used Out of Band Emissions (Radiated) (iDEN)



## 9. Peak Output Power (SMR)

### 9.1 ***Test Specification***

FCC Part 90, Section 90.219

### 9.2 ***Test Procedure***

Peak Power Output must not exceed 27 dBm (EIRP – Antenna gain = 37 – 10 = -27 dBm).

The E.U.T. antenna terminal was connected to the Spectrum Analyzer through a 40db external attenuator and an appropriate coaxial cable (cable Loss = 0.5 dB). Special attention was taken to prevent Spectrum Analyzer RF input overload. The Spectrum Analyzer was set to 100 kHz resolution BW. The output power level was measured at 929.0125, 935.00, and 940.9875 MHz.

The type of modulation used is FM and the rate of modulation was 1 kHz.

The deviation is:

- a. For the frequency ranges 929-935 MHz, and 940-941 MHz, 5 kHz.
- b. For the frequency range 935-940 MHz, 2.5 kHz.

### 9.3 ***Test Results***

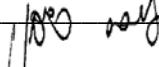
Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
929.0125	22.54	27.0	-4.46
935.00	23.84	27.0	-3.16
940.9875	23.26	27.0	-3.74

**Figure 56 Peak Output Power Test results Table**

See additional information in Figure 57 to Figure 59.

JUDGEMENT: Passed by 3.16 dB

TEST PERSONNEL:

Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni



## Peak Output Power (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

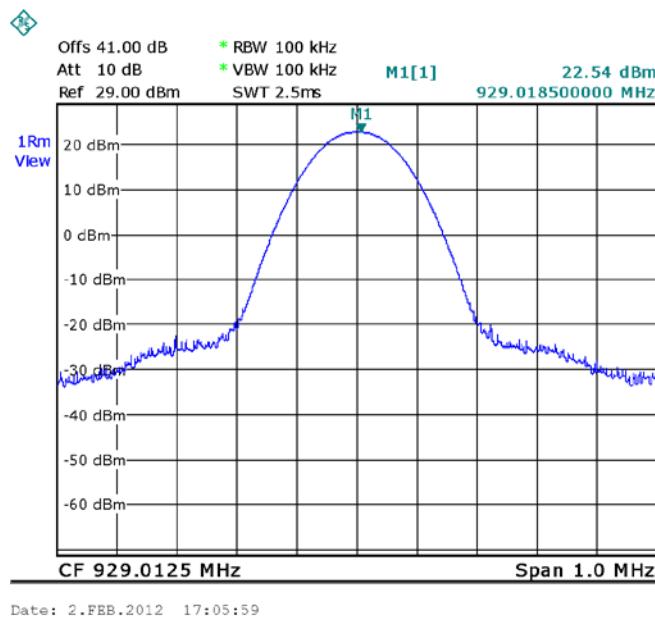


Figure 57.— 929.0125 MHz

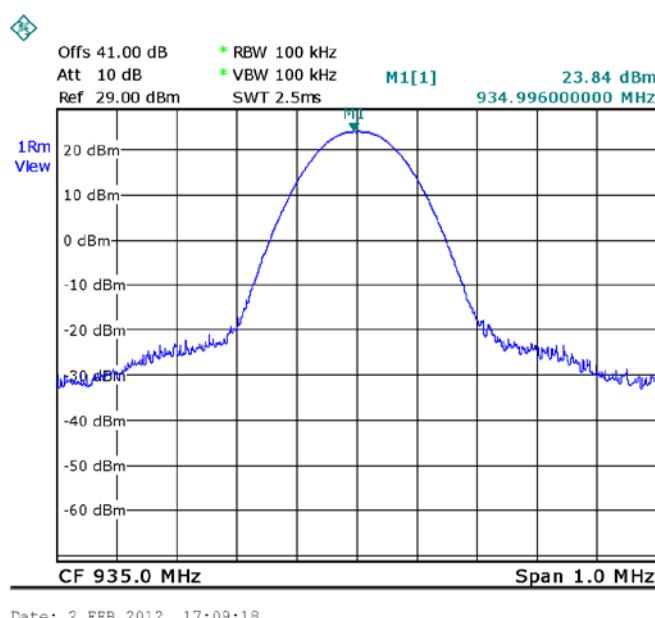
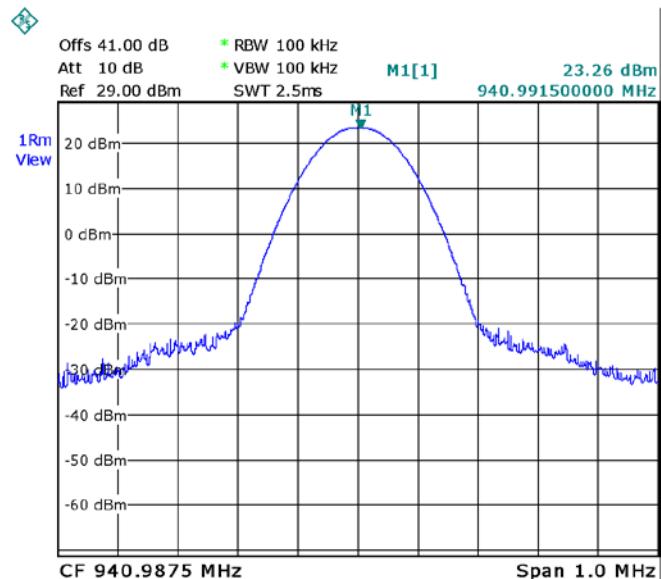


Figure 58.— 935.00 MHz



## Peak Output Power (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated



Date: 2.FEB.2012 17:10:45

Figure 59.— 940.9875 MHz



## Peak Output Power (SMR)

### 9.4 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 60 Test Equipment Used Peak Output Power (SMR)**



## 10. Occupied Bandwidth (SMR)

### 10.1 Test Specification

FCC Part 2, Section 2.202, FCC Part90 Section 90.209

### 10.2 Test Procedure

The E.U.T. was set to the applicable test frequency. The E.U.T. antenna terminal was connected to the spectrum analyzer through a 41db external attenuator (at the output test) and an appropriate coaxial cable (Cable Loss = 1 dB). The spectrum analyzer was set to 300 Hz resolution B.W.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limit, the mean powers radiated are each equal to 0.5% of the total mean power radiated by a given emission.

The occupied bandwidth of the E.U.T. at the points of 20 dB below maximum peak power was measured and recorded.

Occupied bandwidth measured was repeated in the input terminal of the E.U.T.

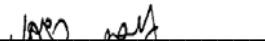
### 10.3 Test Results

	Operating Frequency (MHz)	Reading (Hz)
Input	929.0125	28.54
Output	929.0125	28.44
Input	935.00	28.34
Output	935.00	28.64
Input	940.9875	12.48
Output	940.9875	12.48

Figure 61 Occupied Bandwidth Test Results Table

See additional information in Figure 62 to Figure 67.

TEST PERSONNEL:

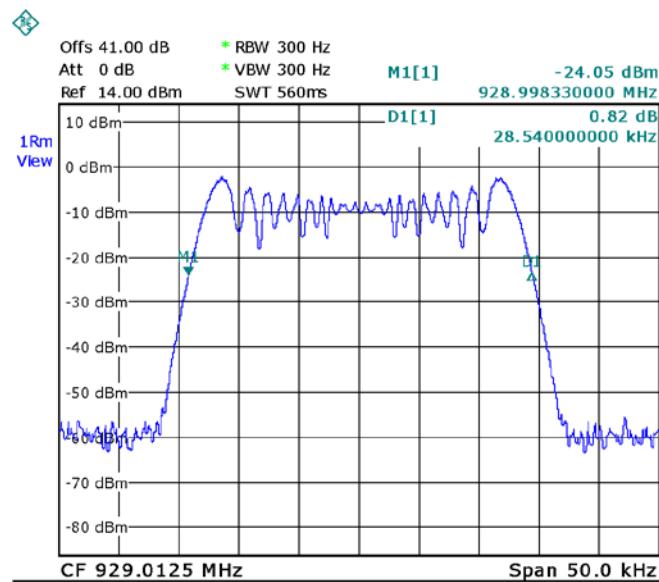
Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni

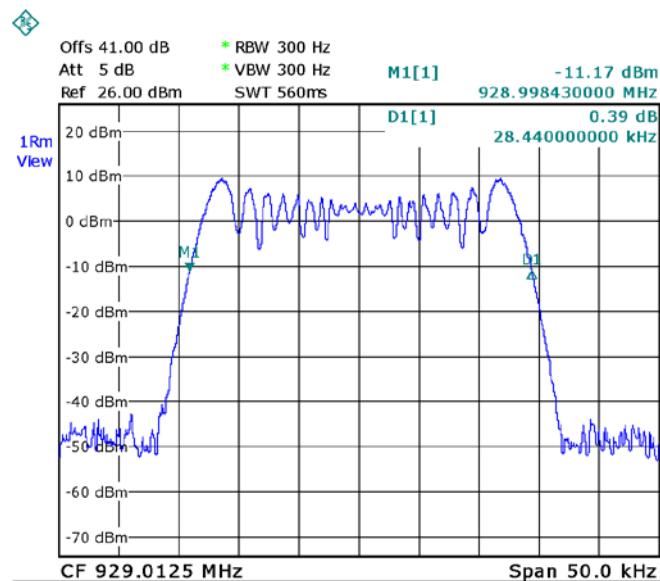
## Occupied Bandwidth (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated



Date: 6.FEB.2012 12:06:32

Figure 62.— Input 929.0125 MHz



Date: 6.FEB.2012 11:57:00

Figure 63.— Output 929.0125 MHz

## Occupied Bandwidth (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
 Type 2000-S80-S90-A-TC AC  
 Serial Number: Not Designated

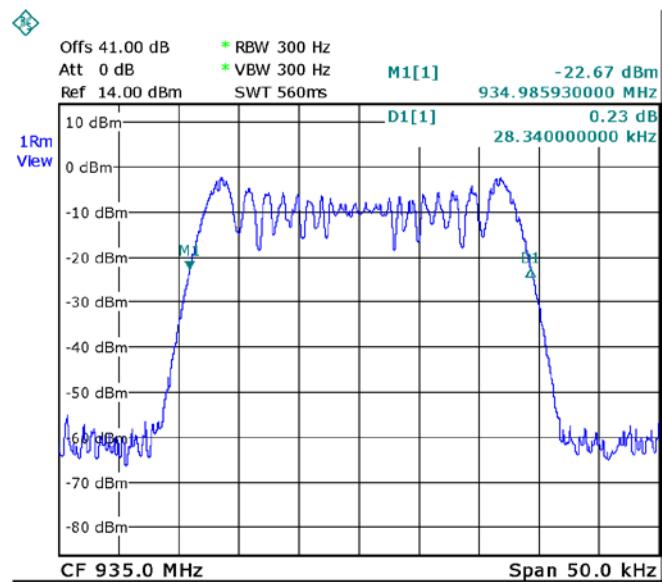


Figure 64.— Input 935.00 MHz

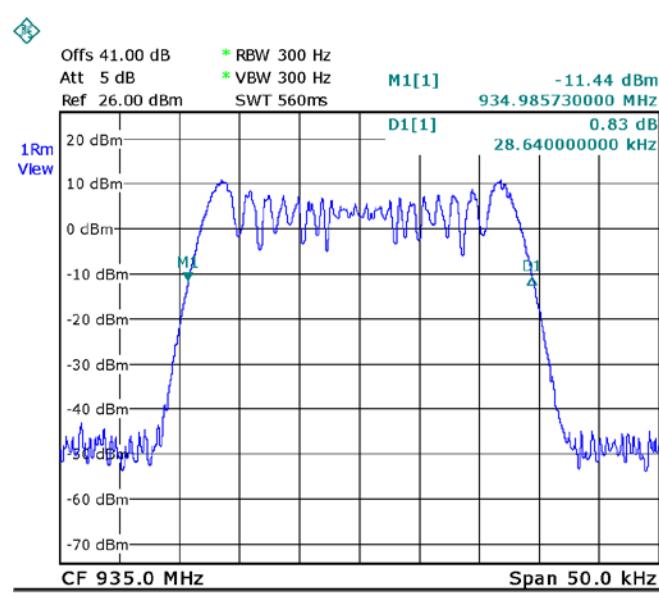


Figure 65.— Output 935.00 MHz



## Occupied Bandwidth (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

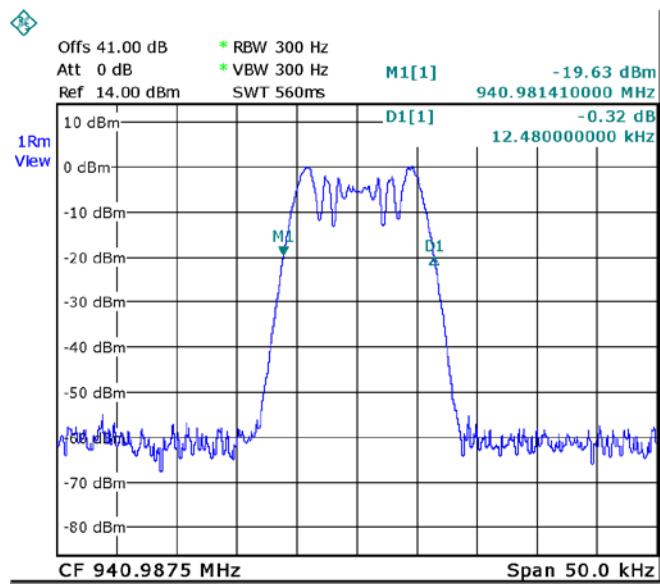


Figure 66.— Input 940.9875 MHz

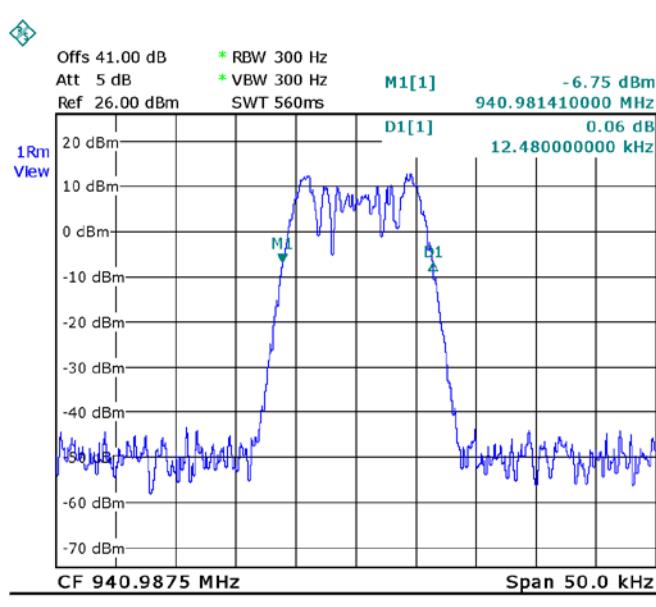


Figure 67.— Output 940.9875 MHz



## Occupied Bandwidth (SMR)

### 10.4 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 68 Test Equipment Used Occupied Bandwidth (SMR)**



## 11. Emission Mask (SMR)

### 11.1 Test Specification

FCC Part 90, Subpart I Section 90.210; Part 90 Section 90.691

According to the table in this section, the following masks shall be used:

For the frequency bands 929-930 MHz	Mask G
For the frequency bands 930-935 MHz	Mask C
For the frequency bands 935-940 MHz	Mask J
For the frequency bands 940-941 MHz	Mask C

Also, at all frequencies, the E.U.T. must comply with the emission mask in Section 90.691.

### 11.2 Test Procedure

The E.U.T. was set to the applicable test frequency with frequency modulation, rate of modulation 1 kHz.

The deviation at the frequency ranges 929-935 MHz and 940-941 MHz is 5 kHz.

The deviation at the frequency range 935-40 MHz is 2.5 kHz.

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 40db external attenuator and appropriate coaxial cable

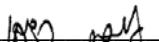
(1 dB cable loss). The spectrum analyzer was set to 300 Hz resolution B.W.

### 11.3 Test Results

JUDGEMENT: Passed

See additional information in Figure 69 to Figure 74.

TEST PERSONNEL:

Tester Signature:  \_\_\_\_\_

Date: 19.03.12

Typed/Printed Name: I. Siboni

## Emission Mask (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
 Type 2000-S80-S90-A-TC AC  
 Serial Number: Not Designated

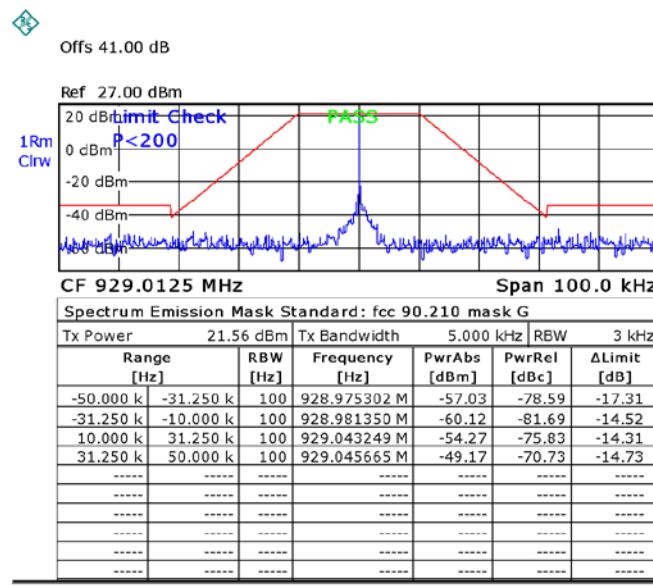


Figure 69.— 929.0125

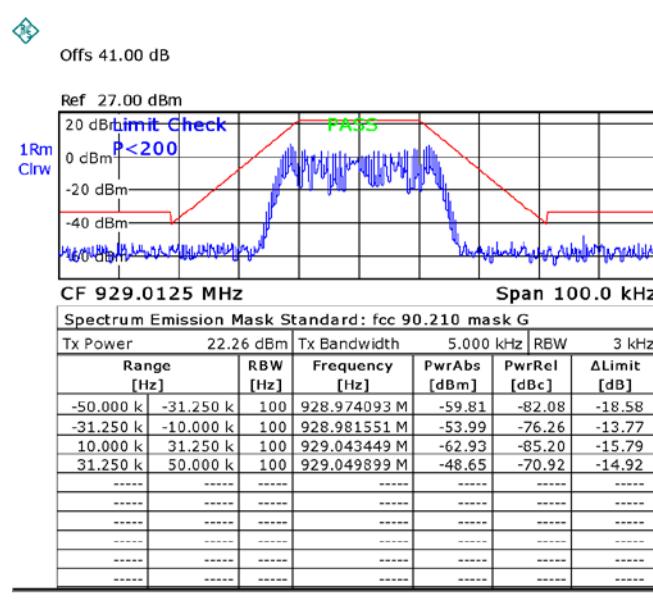


Figure 70.— 929.0125



## Emission Mask (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

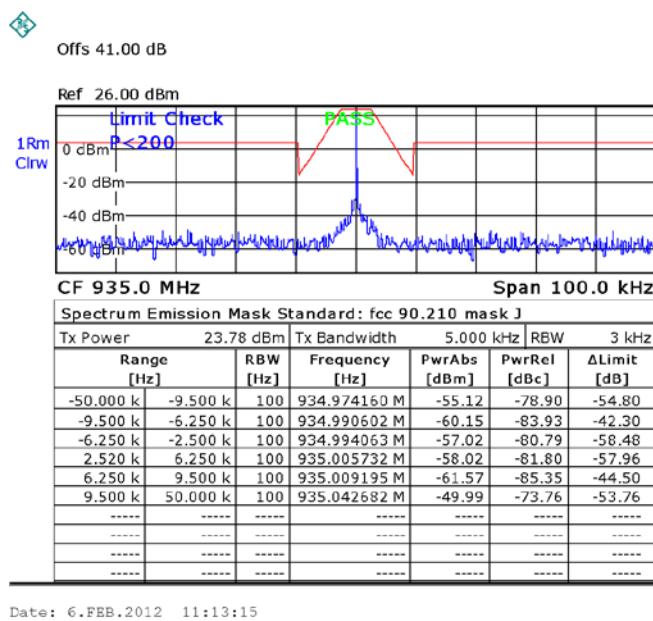


Figure 71.— 935.00

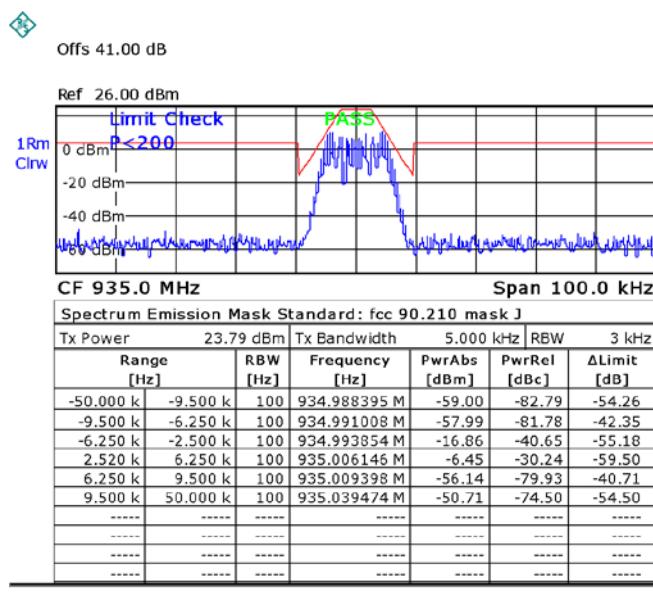
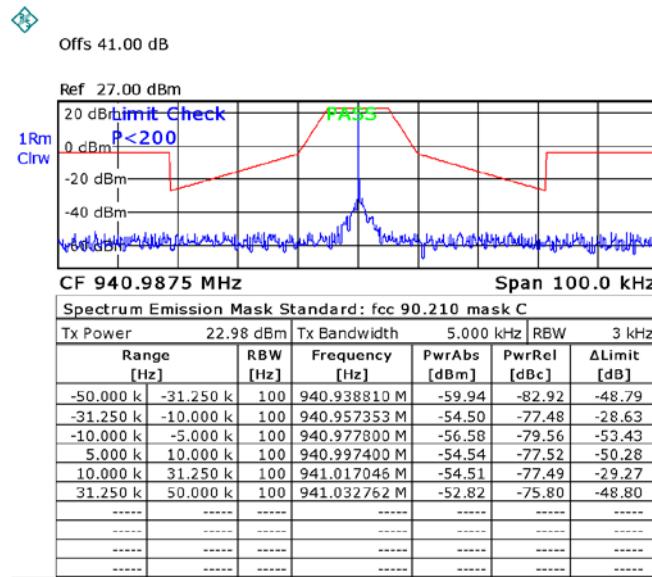


Figure 72.— 935.00

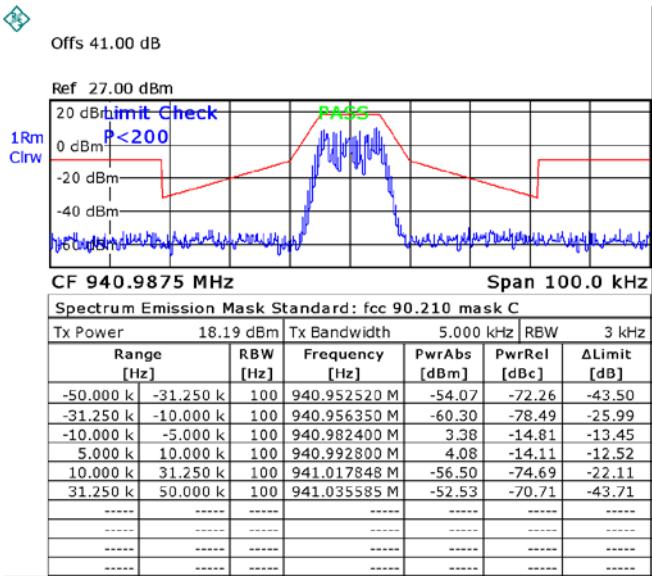
## Emission Mask (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
 Type 2000-S80-S90-A-TC AC  
 Serial Number: Not Designated



Date: 6.FEB.2012 11:10:24

Figure 73.— 940.9875



Date: 6.FEB.2012 11:10:53

Figure 74.— 940.9875



## Emission Mask (SMR)

### 11.4 **Test Equipment Used.**

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	Rohde & Swartz	FSL	10-300191865	October 30, 2011	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

**Figure 75 Test Equipment Used Emission Mask (SMR)**



## 12. Out of Band Emissions at Antenna Terminals (SMR)

### 12.1 ***Test Specification***

FCC Part 90, Section 210

### 12.2 ***Test procedure***

The power of any emission outside of the authorized bandwidth must be attenuated below the transmitting power (P) by a factor of at least  $43 + \log (P)$  dB, yielding  $-13\text{dBm}$  for the frequency ranges 929-935 and 940-941 MHz and at least  $50 + 10 \log (P)$ , yielding  $-20\text{ dBm}$  for the frequency range 935-940 MHz.

The E.U.T. antenna terminal was connected to the spectrum analyzer through a 41db external attenuator and an appropriate coaxial cable (Cable Loss = 1dB).

The operating frequencies of 929.0125, 935.00, and 940.0875 MHz were tested.

### 12.3 ***Test Results***

Operation Frequency (MHz)	Reading (dBm)	Specification (dBm)	Margin (dB)
929.0125	-20.80	-33.0	-12.2
935.00	-28.63	-40.0	-11.37
940.9875	-21.33	-33.0	-11.67

**Figure 76 Out of Band Emission at Antenna Terminals (SMR) Test Results Table**

See additional information in Figure 77 to Figure 102.

JUDGEMENT: Passed by 11.37 dB

TEST PERSONNEL:

Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

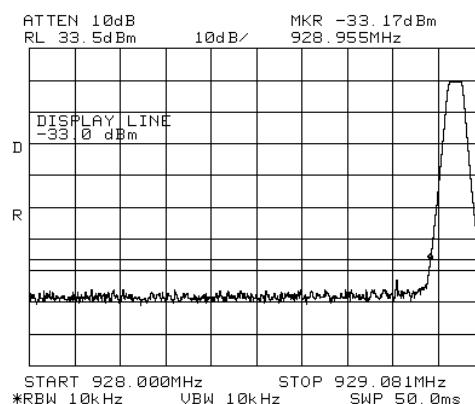


Figure 77.— 929.0125 MHz

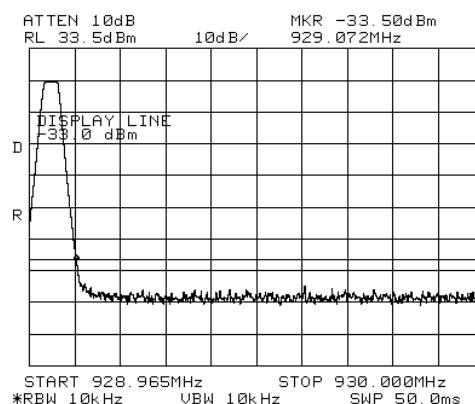


Figure 78.— 929.0125 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

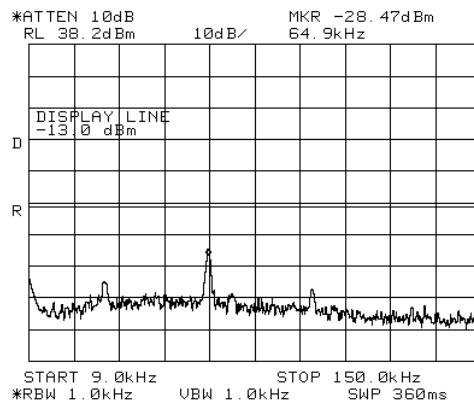


Figure 79.— 929.0125 MHz

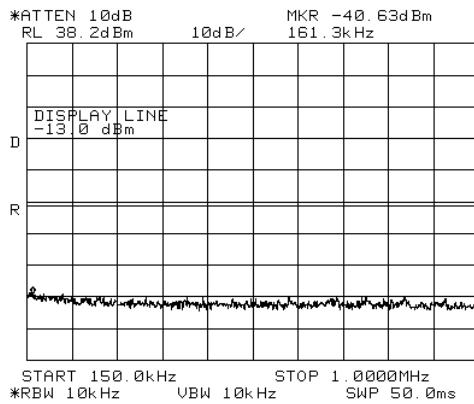


Figure 80.— 929.0125 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

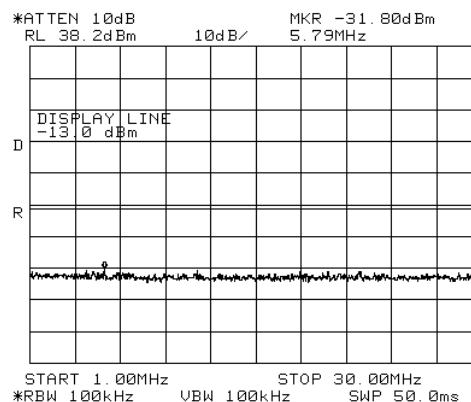


Figure 81.— 929.0125 MHz

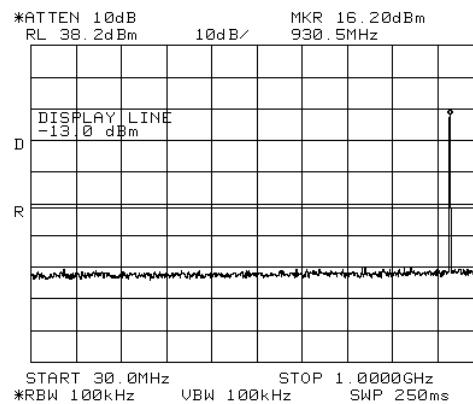


Figure 82.— 929.0125 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

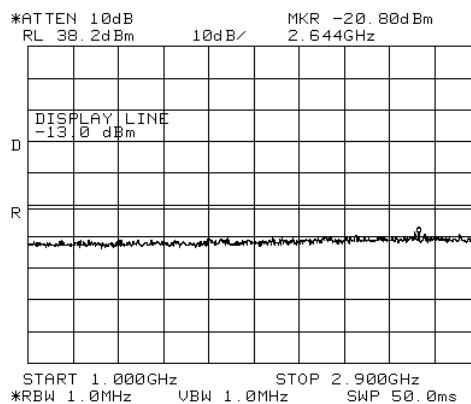


Figure 83.— 929.0125 MHz

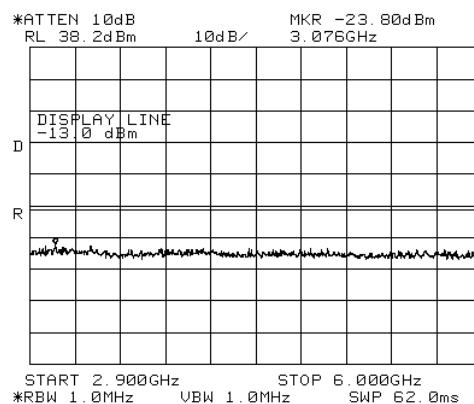


Figure 84.— 929.0125 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

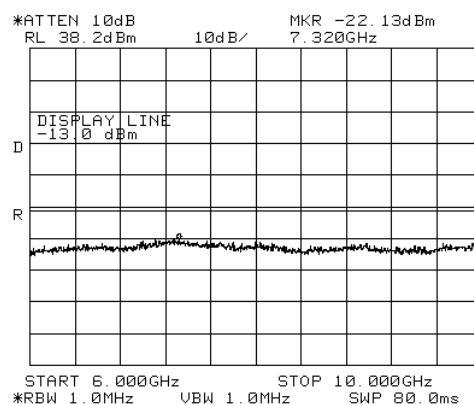


Figure 85.— 929.0125 MHz

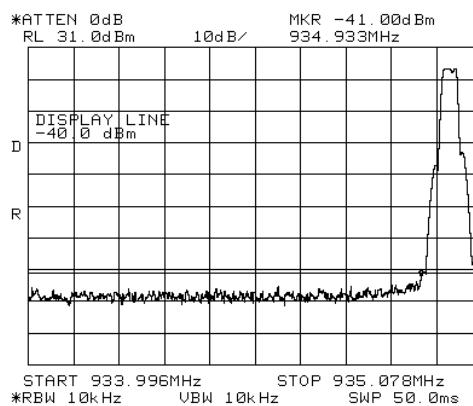


Figure 86.— 935.00 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

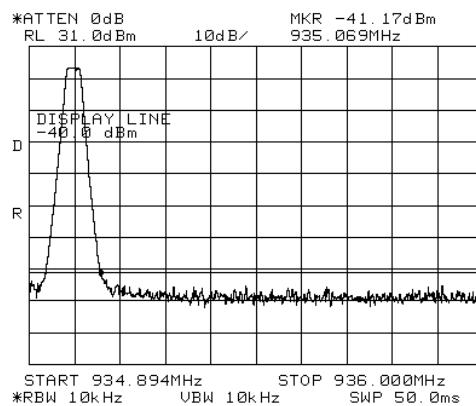


Figure 87.— 935.00 MHz

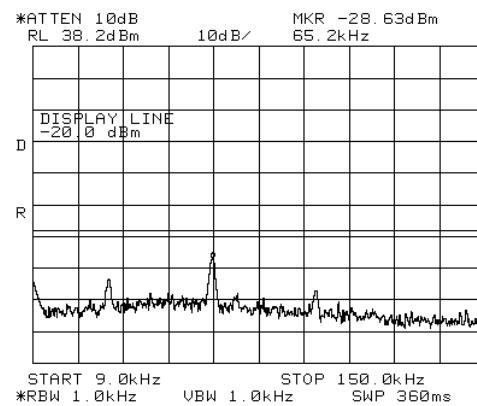


Figure 88.— 935.00 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

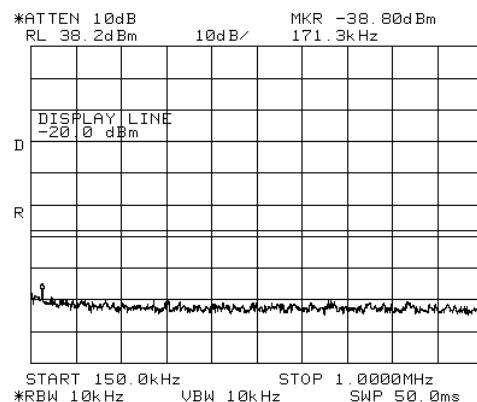


Figure 89.— 935.00 MHz

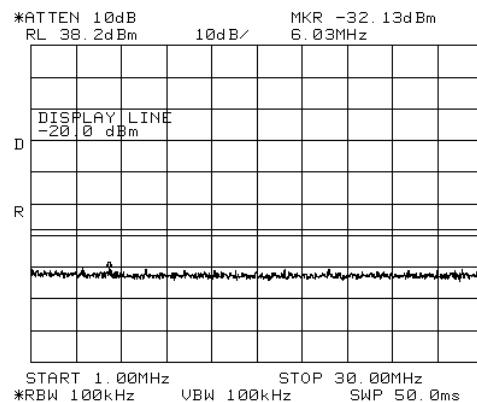


Figure 90.— 935.00 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

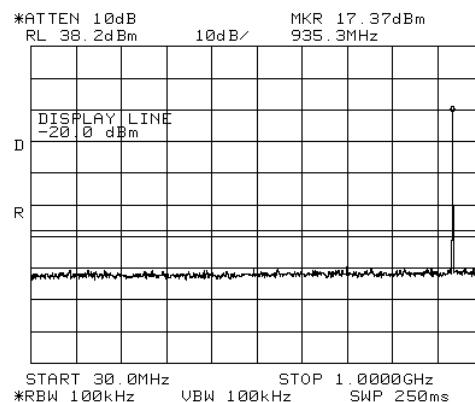


Figure 91.— 935.00 MHz

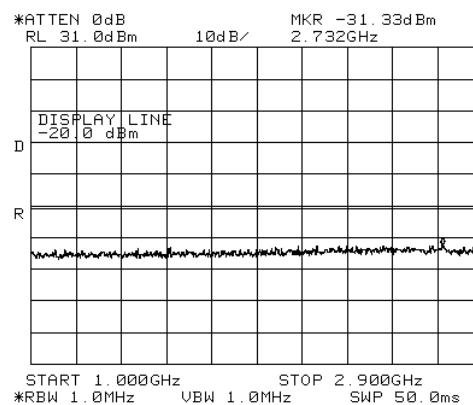


Figure 92.— 935.00 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

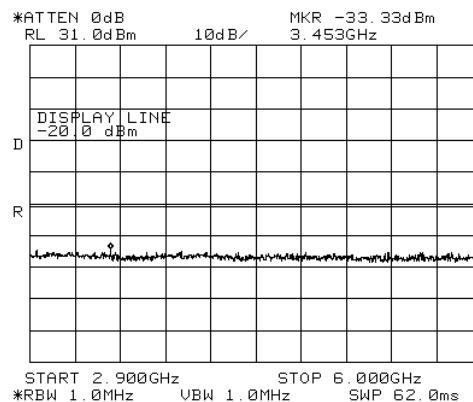


Figure 93.— 935.00 MHz

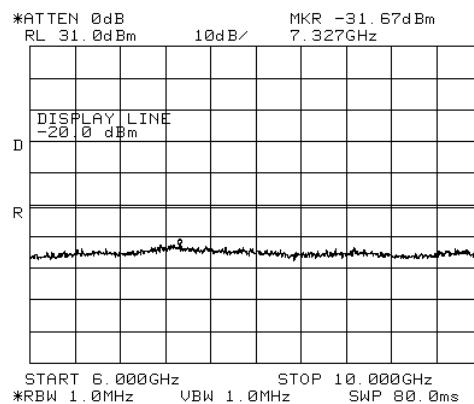


Figure 94.— 935.00 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

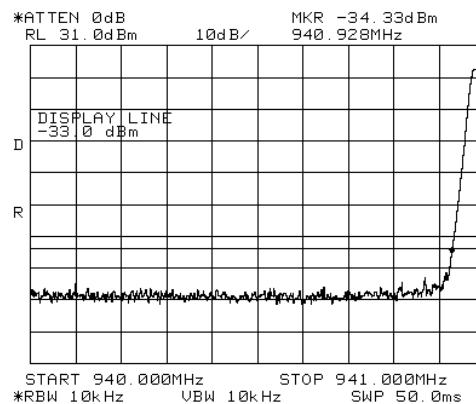


Figure 95.— 940.9875 MHz

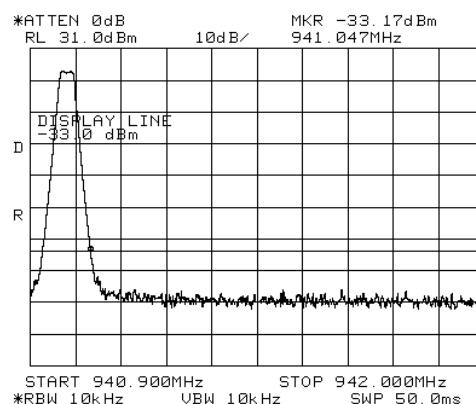


Figure 96.— 940.9875 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

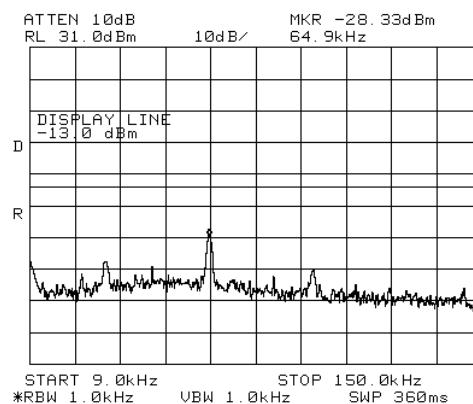


Figure 97.— 940.9875 MHz

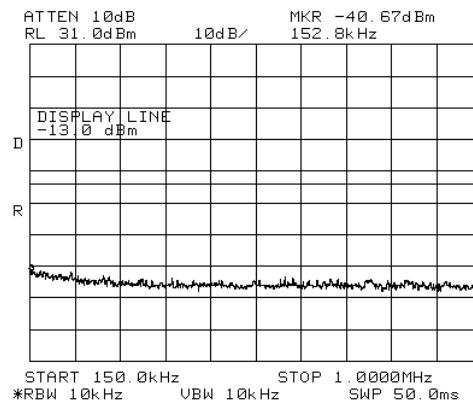


Figure 98.— 940.9875 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

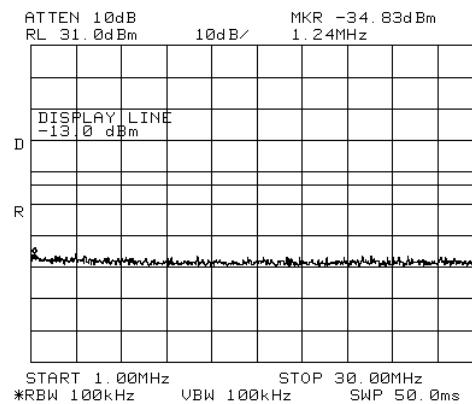
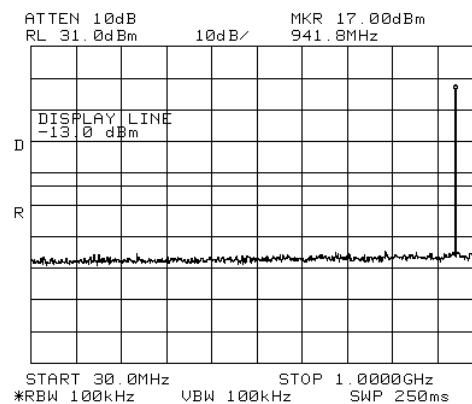


Figure 99.— 940.9875 MHz





## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

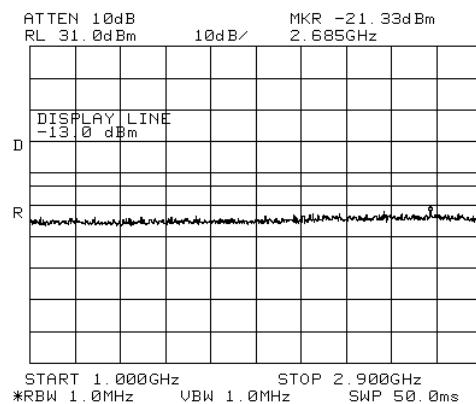


Figure 100.— 940.9875 MHz

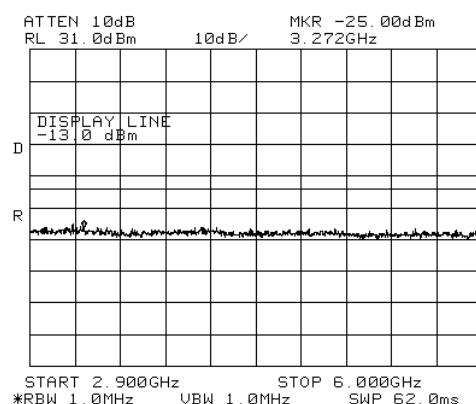


Figure 101.— 940.9875 MHz



## Out of Band Emissions at Antenna Terminals (SMR)

E.U.T Description MA2000 IDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

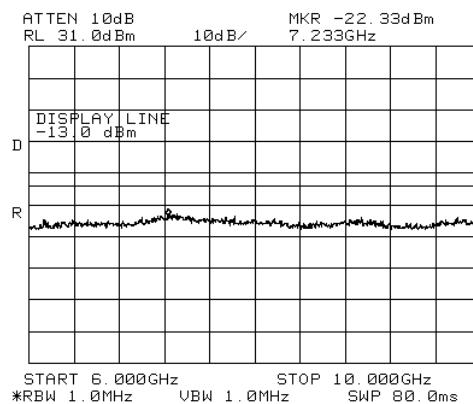


Figure 102.— 940.9875 MHz



## Out of Band Emissions at Antenna Terminals (iDEN)

E.U.T Description MA2000 iDEN-SMR RHU in TSX Case  
Type 2000-S80-S90-A-TC AC  
Serial Number: Not Designated

### 12.4 *Test Equipment Used.*

Instrument	Manufacturer	Model	Serial Number	Calibration	
				Last Calibration	Period
Spectrum Analyzer	HP	8564E	3442A00275	January 19, 2012	1 year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year
Attenuator	Narda	MOD 766-10	9409	August 28, 2011	1 year
Attenuator	Mini-Circuits	BW-S30W5	0533	August 28, 2011	1 year
Cable	Mini-Circuits	30091		February 10, 2011	1 year

Figure 103 Test Equipment Used Out of Band Emissions at Antenna Terminals (SMR)



## 13. Out of Band Emissions (Radiated) (SMR)

### 13.1 ***Test Specification***

FCC, Part 90, Section 90.210

### 13.2 ***Test Procedure***

The power of any emission outside of the authorized bandwidth must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB, yielding  $-13$  dBm.

- (a) The E.U.T. operation mode and test set-up are as described in Section 3. A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The configuration tested is shown in Figure 3.5.

The frequency range 30 MHz-10 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

- (c) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:

$$P(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dBi)}$$

P = Equivalent Isotropic Radiated Power.

P<sub>g</sub> = Signal Generator Output Level.



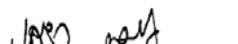
## Out of Band Emissions (Radiated) (SMR)

### 13.3 Test Results

JUDGEMENT: Passed by 25.06 dB

The E.U.T met the requirements of the FCC, Part 90, Section 90.210 specifications.

#### TEST PERSONNEL:

Tester Signature: 

Date: 19.03.12

Typed/Printed Name: I. Siboni

Carrier Channel (MHz)	Freq. (MHz)	Antenna Pol.	Maximum Peak Level	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
929.0125	1858.025	V	56.7	-41.54	5.7	7.68	-39.56	-13.0	-25.56
929.0125	1858.025	H	57.5	-41.16	5.7	7.68	-39.18	-13.0	-26.18
935.00	1870.000	V	55.0	-43.24	5.7	7.68	-41.26	-13.0	-28.26
935.00	1870.000	H	56.9	-41.34	5.7	7.68	-39.36	-13.0	-26.36
940.9875	1881.975	V	58.23	-40.04	5.7	7.68	-38.06	-13.0	-25.06
940.9875	1881.975	H	56.7	-41.96	5.7	7.68	-39.98	-13.0	-29.98

Figure 104 Out of Band (Radiated) (SMR) Test Results Table



## Out of Band Emissions (Radiated) (SMR)

### 13.4 *Test Equipment Used*

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year

Figure 105 Test Equipment Used Out of Band Emissions (Radiated) (SMR)



## 14. Intermodulation

### 14.1 Test procedure

The test method was based on ANSI/TIA-603-C: 2004, Section 2.2.12

Unwanted Emissions: Radiated Spurious.

The power of any emission outside of the authorized operating frequency ranges (851-869; 929-941 MHz) must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB, yielding  $-13$  dBm.

(a) The E.U.T. operation mode and test set-up are as described in Section 2.

A preliminary measurement to characterize the E.U.T was performed inside the shielded room at a distance of 3 meters, using peak detection mode and broadband antennas. The preliminary measurements produced a list of the highest emissions. The E.U.T was then transferred to the open site, and placed on a remote-controlled turntable. The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The configuration tested is shown in Figure 1.

The E.U.T. was operated in Downlink mode at 4 different channels at center frequency of each band at the same time, transmitting at CW signal.

(b) The frequency range 9 kHz-25 GHz was scanned, and the list of the highest emissions was verified and updated accordingly.

The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

(b) The E.U.T. was replaced by a substitution antenna (dipole 30MHz-1GHz, Horn Antenna above 1GHz) driven by a signal generator. The height was readjusted for maximum reading. The signal generator level was adjusted to obtain the same reading on the EMI receiver as in step (a).

The signals observed in step (a) were converted to radiated power using:  
 $P_d(\text{dBm}) = P_g(\text{dBm}) - \text{Cable Loss (dB)} + \text{Substitution Antenna Gain (dB)}$

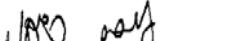
$P_d$  = Dipole equivalent power (result).

$P_g$  = Signal generator output level.

### 14.2 Test Results

JUDGEMENT: Passed

TEST PERSONNEL:

Tester Signature: 

Date: 19.13.12

Typed/Printed Name: I. Siboni



## Intermodulation

Signal Applied: 860MHz and 935MHz

Freq. (MHz)	Antenna Pol.	Maximum Peak Level (dB $\mu$ V/m)	Signal Generator RF Output (dBm)	Cable Loss (dB)	Antenna Gain (dBi)	Effective Radiated Power Level (dBm)	Spec. (dBm)	Margin (dB)
85.0	H	22.6	-75.59	1.1	1.27	-75.42	-13.0	-62.42
785.0	V	39.5	-53.85	3.6	0.97	-56.48	-13.0	-43.48
850.0	V	39.0	-54.35	3.6	0.97	-56.98	-13.0	-43.98
1020.0	V	45.0	-56.79	4.2	5.4	-55.59	-13.0	-42.59
1645.0	V	53.4	-47.6	5.3	7.62	-45.28	-13.0	-32.28



#### 14.1 Test Instrumentation Used

Instrument	Manufacturer	Model	Serial Number	Calibration	Period
EMI Receiver	HP	85422E	3906A00276	December 12, 2011	1 year
RF Section	HP	85420E	3705A00248	December 12, 2011	1 year
Active Loop Antenna	Emco	6502	2950	October 19, 2011	1 year
Antenna Bioconical	ARA	BCD 235/B	1041	November 13, 2011	1 year
Antenna Log Periodic	ARA	LPD-2010/A	1038	March 23, 2011	1 year
Antenna Log Periodic	A.H. Systems	SAS-200/511	253	January 27, 2011	2 year
Antenna Mast	ARA	AAM-4A	1001	N/A	N/A
Turntable	ARA	ART-1001/4	1001	N/A	N/A
Mast & Table Controller	ARA	ACU-2/5	1001	N/A	N/A
Printer	HP	ThinkJet 2225	2738508357.0	N/A	N/A
Spectrum Analyzer	HP	8592L	3826A01204	February 21, 2011	1 year
Low Noise Amplifier	DBS MICROWAVE	LNA-DBS-0411N313	013	November 5, 2011	1 Year
Signal Generator	HP	E4432B	GB40051392	May 4, 2011	2 years
Signal Generator	HP	N5181A	MY49061212	July 17, 2011	1 year

Figure 106 Test Equipment Used Intermodulation



## 15. APPENDIX A - CORRECTION FACTORS

### 15.1 Correction factors for

### CABLE

**from EMI receiver  
to test antenna  
at 3 meter range.**

FREQUENCY (MHz)	CORRECTION FACTOR (dB)	FREQUENCY (MHz)	CORRECTION FACTOR (dB)
10.0	0.3	1200.0	7.3
20.0	0.6	1400.0	7.8
30.0	0.8	1600.0	8.4
40.0	0.9	1800.0	9.1
50.0	1.1	2000.0	9.9
60.0	1.2	2300.0	11.2
70.0	1.3	2600.0	12.2
80.0	1.4	2900.0	13.0
90.0	1.6		
100.0	1.7		
150.0	2.0		
200.0	2.3		
250.0	2.7		
300.0	3.1		
350.0	3.4		
400.0	3.7		
450.0	4.0		
500.0	4.3		
600.0	4.7		
700.0	5.3		
800.0	5.9		
900.0	6.3		
1000.0	6.7		

#### NOTES:

1. The cable type is RG-214.
2. The overall length of the cable is 27 meters.
3. The above data is located in file 27MO3MO.CBL on the disk marked "Radiated Emission Tests EMI Receiver".



**15.2 Correction factors for**

**CABLE**

**from EMI receiver  
to test antenna  
at 3 meter range.**

<b>FREQUENCY</b>	<b>CORRECTION</b>
<b>(GHz)</b>	<b>FACTOR</b>
1.0	1.2
2.0	1.6
3.0	2.0
4.0	2.4
5.0	3.0
6.0	3.4
7.0	3.8
8.0	4.2
9.0	4.6
10.0	5.0
12.0	5.8

**NOTES:**

1. The cable type is RG-8.
2. The overall length of the cable is 10 meters.



### 15.3 Correction factors for

### CABLE from spectrum analyzer to test antenna above 2.9 GHz

FREQUENCY (GHz)	CORRECTION FACTOR (dB)	FREQUENCY (GHz)	CORRECTION FACTOR (dB)
1.0	1.9	14.0	9.1
2.0	2.7	15.0	9.5
3.0	3.5	16.0	9.9
4.0	4.2	17.0	10.2
5.0	4.9	18.0	10.4
6.0	5.5	19.0	10.7
7.0	6.0	20.0	10.9
8.0	6.5	21.0	11.2
9.0	7.0	22.0	11.6
10.0	7.5	23.0	11.9
11.0	7.9	24.0	12.3
12.0	8.3	25.0	12.6
13.0	8.7	26.0	13.0

#### NOTES:

1. The cable type is SUCOFLEX 104 E manufactured by SUHNER.
2. The cable is used for measurements above 2.9 GHz.
3. The overall length of the cable is 10 meters.



**15.4 Correction factors for LOG PERIODIC ANTENNA**  
**Type LPD 2010/A**  
**at 3 and 10 meter ranges.**

**Distance of 3 meters**

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.1
250.0	10.2
300.0	12.5
400.0	15.4
500.0	16.1
600.0	19.2
700.0	19.4
800.0	19.9
900.0	21.2
1000.0	23.5

**Distance of 10 meters**

FREQUENCY (MHz)	AFE (dB/m)
200.0	9.0
250.0	10.1
300.0	11.8
400.0	15.3
500.0	15.6
600.0	18.7
700.0	19.1
800.0	20.2
900.0	21.1
1000.0	23.2

**NOTES:**

1. Antenna serial number is 1038.
2. The above lists are located in file number 38M30.ANT for a 3 meter range, and file number 38M100.ANT for a 10 meter range.
3. The files mentioned above are located on the disk marked "Radiated Emission Test EMI Receiver".



### 15.5 Correction factors for LOG PERIODIC ANTENNA

Type SAS-200/511  
at 3 meter range.

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
1.0	24.9
1.5	27.8
2.0	29.9
2.5	31.2
3.0	32.8
3.5	33.6
4.0	34.3
4.5	35.2
5.0	36.2
5.5	36.7
6.0	37.2
6.5	38.1

FREQUENCY (GHz)	ANTENNA FACTOR (dB)
7.0	38.6
7.5	39.2
8.0	39.9
8.5	40.4
9.0	40.8
9.5	41.1
10.0	41.7
10.5	42.4
11.0	42.5
11.5	43.1
12.0	43.4
12.5	44.4
13.0	44.6

#### NOTES:

1. Antenna serial number is 253.
2. The above lists are located in file number SAS3M0.ANT for a 3 meter range.
3. The files mentioned above are located on the disk marked "Antenna Factors".



**15.6 Correction factors for**

**BICONICAL ANTENNA  
Type BCD-235/B,  
at 3 meter range**

FREQUENCY (MHz)	AFE (dB/m)
20.0	19.4
30.0	14.8
40.0	11.9
50.0	10.2
60.0	9.1
70.0	8.5
80.0	8.9
90.0	9.6
100.0	10.3
110.0	11.0
120.0	11.5
130.0	11.7
140.0	12.1
150.0	12.6
160.0	12.8
170.0	13.0
180.0	13.5
190.0	14.0
200.0	14.8
210.0	15.3
220.0	15.8
230.0	16.2
240.0	16.6
250.0	17.6
260.0	18.2
270.0	18.4
280.0	18.7
290.0	19.2
300.0	19.9
310	20.7
320	21.9
330	23.4
340	25.1
350	27.0

*NOTES:*

1. Antenna serial number is 1041.
2. The above list is located in file 19BC10M1.ANT on the disk marked "Radiated Emissions Tests EMI Receiver".



**15.7 Correction factors for ACTIVE LOOP ANTENNA**

**Model 6502**  
**S/N 9506-2950**

FREQUENCY (MHz)	Magnetic Antenna Factor (dB)	Electric Antenna Factor (dB)
.009	-35.1	16.4
.010	-35.7	15.8
.020	-38.5	13.0
.050	-39.6	11.9
.075	-39.8	11.8
.100	-40.0	11.6
.150	-40.0	11.5
.250	-40.0	11.6
.500	-40.0	11.5
.750	-40.1	11.5
1.000	-39.9	11.7
2.000	-39.5	12.0
3.000	-39.4	12.1
4.000	-39.7	11.9
5.000	-39.7	11.8
10.000	40.2	11.3
15.000	-40.7	10.8
20.000	-40.5	11.0
25.000	-41.3	10.2
30.000	42.3	9.2