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Test Report For The MSR 300 Movement and Surveying Radar

06 July 2010

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RF Design Engineer

1. Introduction

Test Scope

Tests for the RF output power (at TRX output) were performed.

Test Dates

Testing was performed on the following date(s): 06/07/2010

Test and Support Personnel

SunSpace and Information Systems (PTY) LTD Kgabo F. Mathapo

Client Representative (Reutech Radar Systems) Anton Joubert

Abbreviations

CW	Continuous Wave
EUT	Equipment Under Test
MSR	Movement and Surveying Radar
RF	Radio Frequency
TRX	Transceiver
TX	Transmit

2. Test Configuration

The MSR 300 Movement and Surveying Radar was configured as a self contained trailer mounted unit.

Under normal operation, the EUT sweeps a CW signal from 9.775GHz to 10.0GHz. The spectrum of the output signal of the MSR 300 under normal operation is shown in Figure 1.

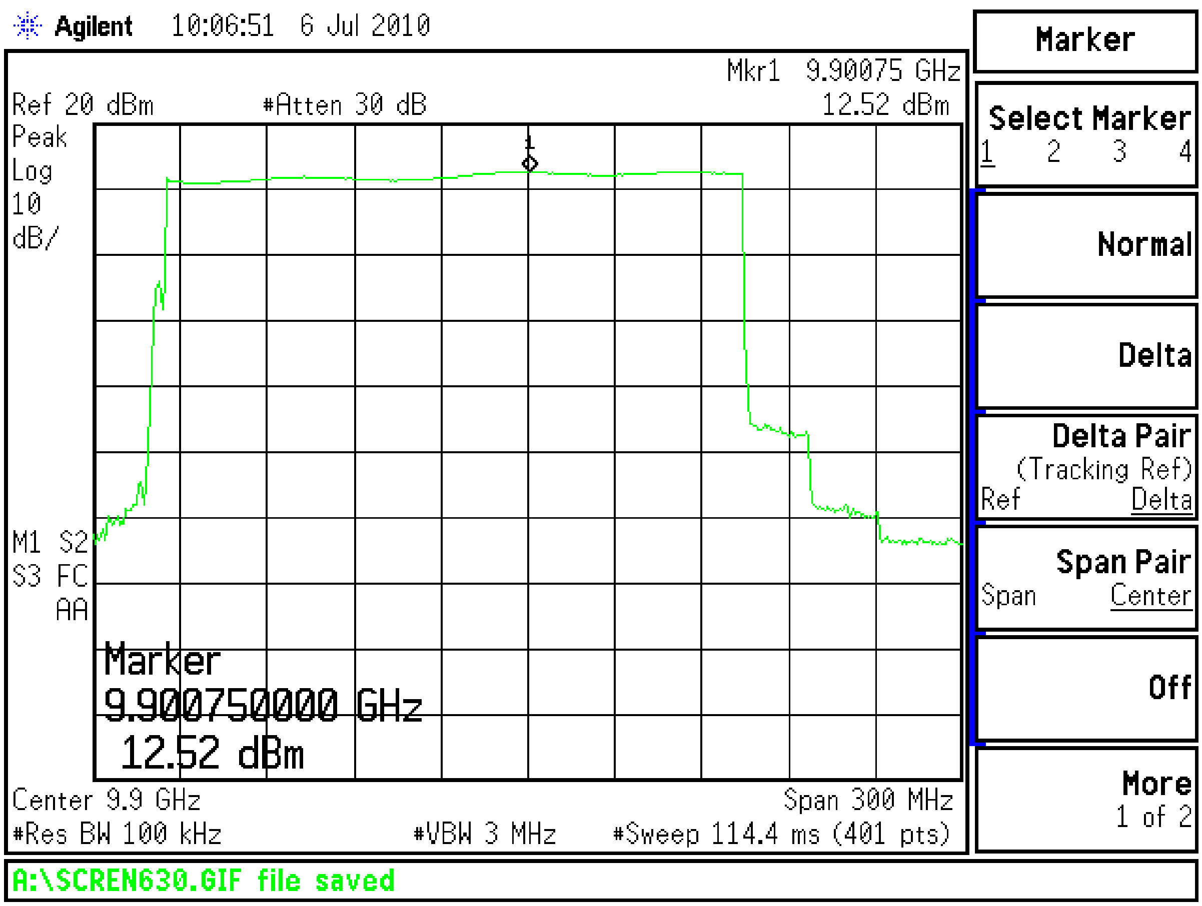

Figure 1: Normal Operation Output Signal Spectrum

Test Algorithm

The MSR 300 Movement and Surveying Radar was operated by selecting the operating mode, CW or sweep, by depressing the PB0 button on the control board. Each press of PB0 cycled the EUT mode from normal Sweep to CW-Start of Sweep Frequency to CW- 9.8GHz to CW- 9.9GHz to CW- 10GHz.

The RF Power measurements were taken at the TX port of the Transceiver module.

Test Equipments

Table 1 shows the list of the test equipments used for measurements and their calibration information.

Table 1: Calibrated test equipment used

No	Instrument description	Manufacturer and model number of instrument used	Serial number	Date of next calibration/Ref instrument
1	Spectrum Analyser(26.5GHz)	Agilent E4407B	MY41440621	22/02/2011
2	Peak Power meter	HP 438A	2649U00562	19/02/2011
3	Peak Power Sensor	HP 8481A	2702A70905	27/11/2010

3. Test Results

RF Output Power:

The transmitter's RF output power was measured using both the Spectrum Analyser and Peak Power meter. The output of the transmitter was connected to the RF Spectrum Analyser using an SMA coaxial cable and measurements were taken. The transmitter output power was measured at the TX port using the peak power meter (without the SMA cable). After that, the output of the transmitter was connected to the power meter using the same coaxial cable used in the spectrum analyser measurements and measurements were made.

The cable loss was determined by connecting the power meter to the output of the transmitter (without the cable) and measuring the output power, and then connecting the cable to the output of the transmitter and measuring with the power meter at the cable end. The cable loss was obtained by subtracting the power meter reading at the end of the cable from the power reading at the

transmitter output. The cable loss was found to be:
16.12 – 13.04 = 3.08 dB at 9.775GHz

16.85 – 14.21 = 2.64 dB at 9.9 GHz

17.34 – 14.06 = 3.28 dB (worst case cable loss at 10GHz).

The carrier was not modulated. The results are shown in Table 2.

Table 2: RF Output Power

Frequency	Spectrum Analyser: Output power with cable	Spectrum Analyser: output power with cable loss added	Cable loss	Power meter: Peak output power with cable	Power meter : peak output power at TRX output
Low Frequency 9.775GHz	10.81dBm	13.89dBm	3.08dB	13.04dBm	16.12dBm
Centre Frequency 9.9GHz	13.19dBm	15.83dBm	2.64dB	14.21dBm	16.85dBm
High Frequency 10GHz	12.72dBm	16.00dBm	3.28dB	14.06dBm	17.34dBm

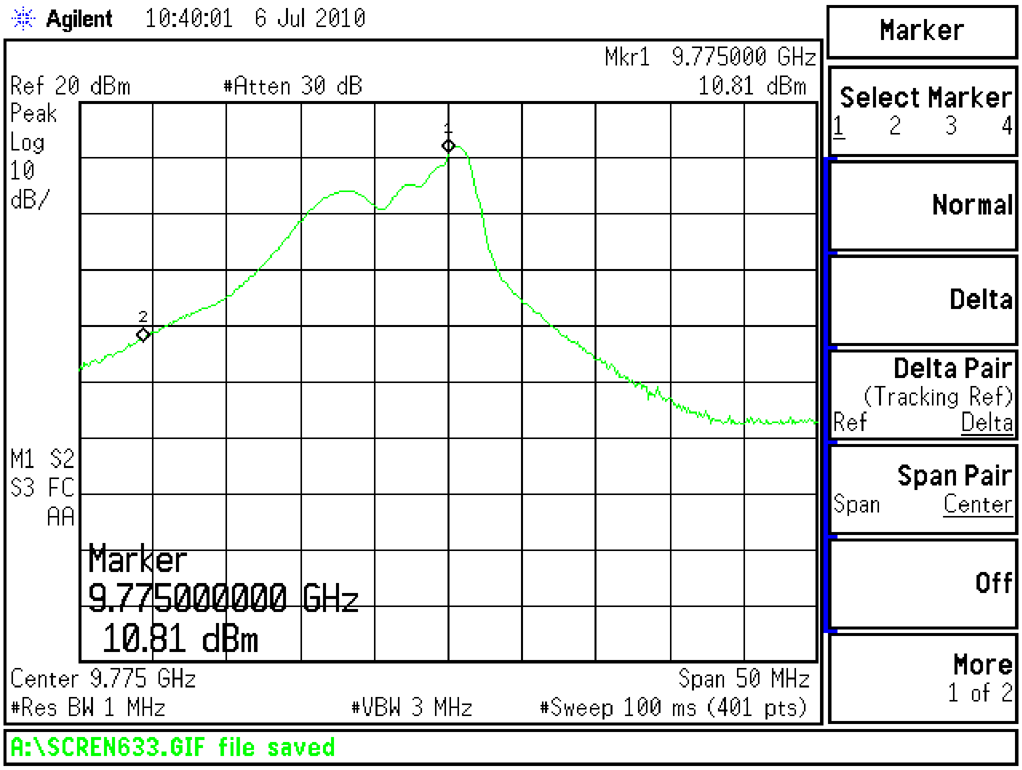

Figure 2: RF Peak power, Low Frequency.

Figure 3 : Power Meter Reading for RF Peak Power, Low Frequency (13.04 dBm using cable)

Figure 4: Power meter for RF Peak Power, Low Frequency at TX output (16.12 dBm without cable).

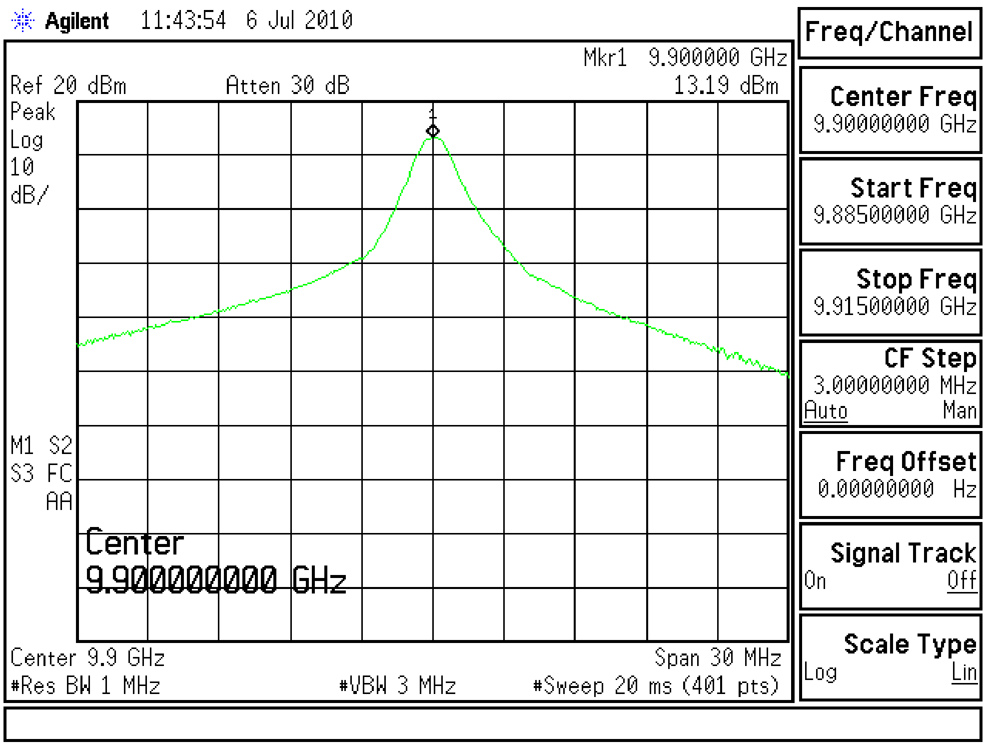

Figure 5: RF Peak Power, Centre Frequency

Figure 6: Power Meter Reading for RF Peak Power, Centre Frequency (14.21 dBm using cable)

Figure 7: Power Meter Reading for RF Peak Power at TRX output without cable, Centre Frequency (16.85 dBm)

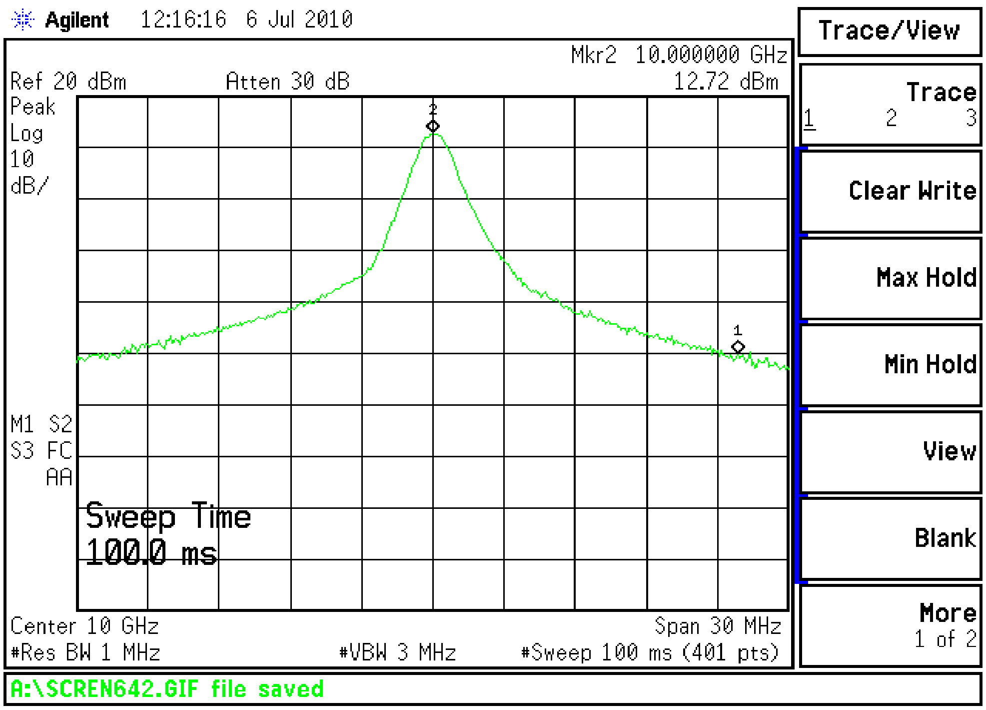

Figure 8: RF Peak Power, High Frequency.

Figure 9: Power Meter Reading for RF Peak Power, High frequency (14.06 dBm using cable).

Figure 10: Power Meter Reading for RF Peak Power, High Frequency at TX output (17.34 dBm without cable).

The DELTA measurements results are shown in Figure 11 to Figure 14.

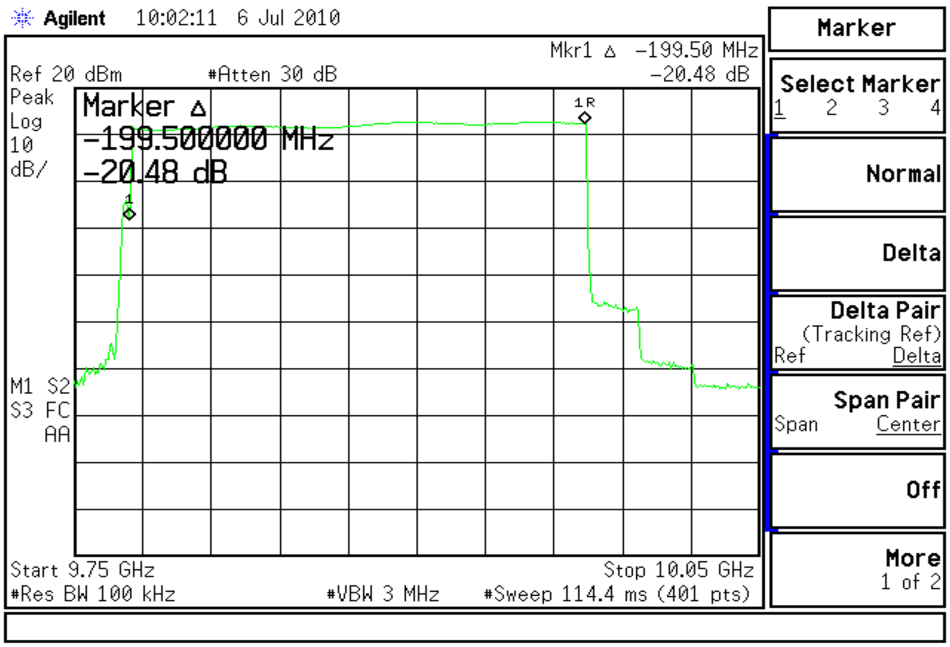

Figure 11: DELTA measurements for the normal operation.

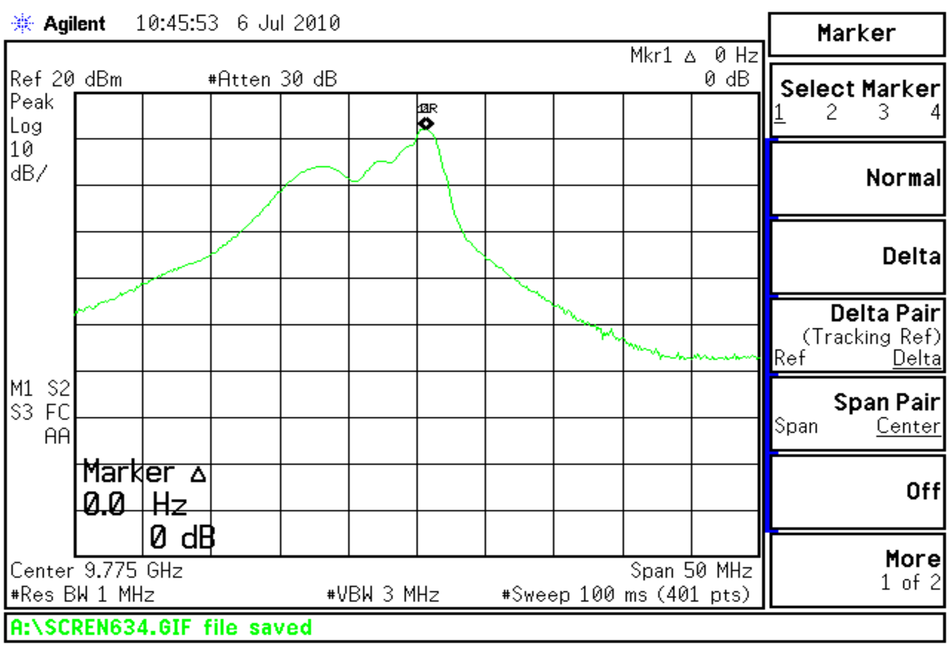

Figure 12: DELTA measurements for the low frequency

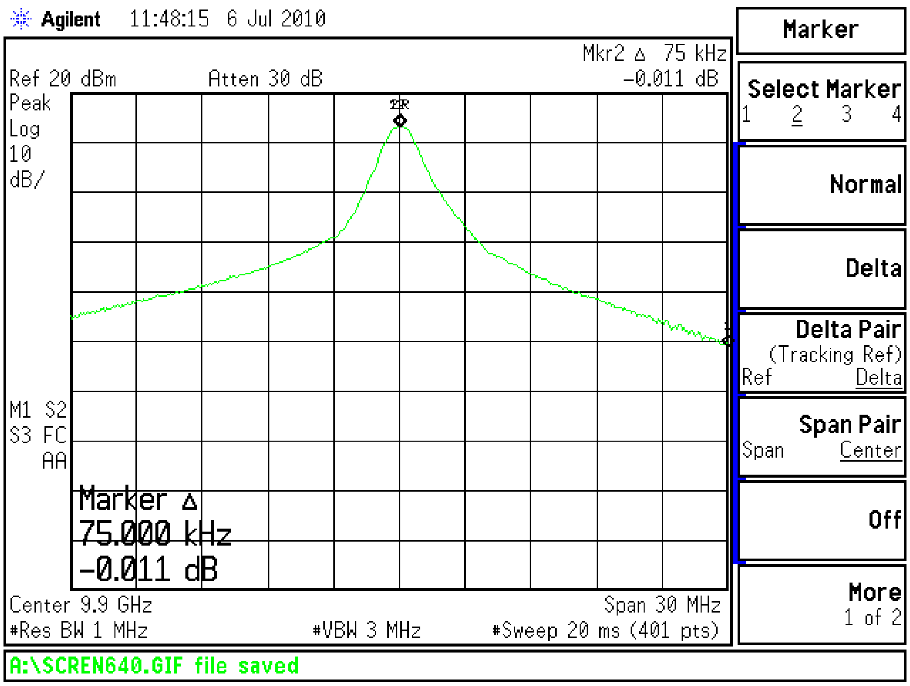

Figure 13: DELTA measurements for the centre frequency

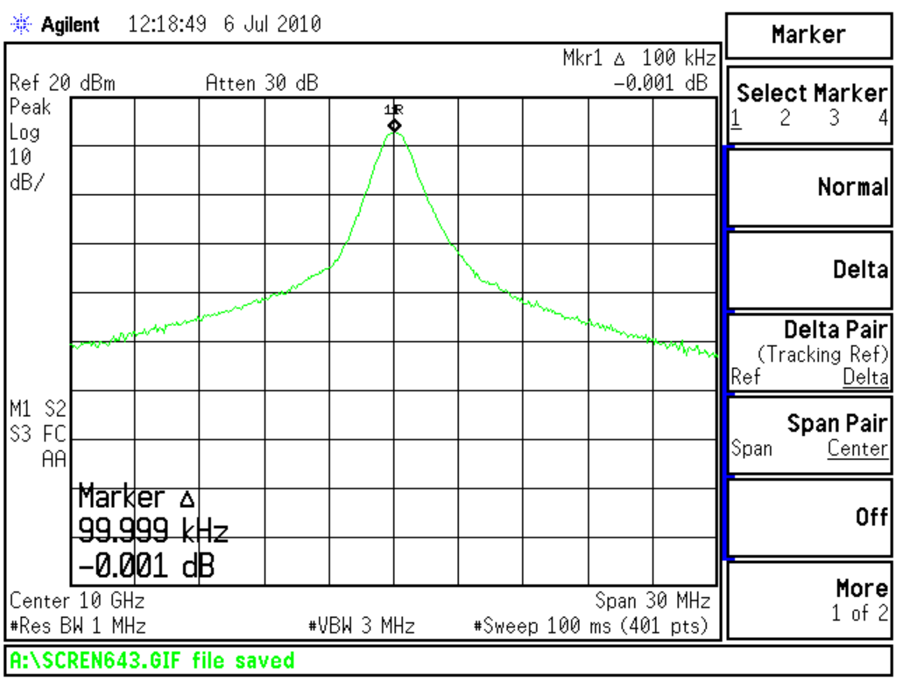

Figure 14: DELTA measurements for the high frequency

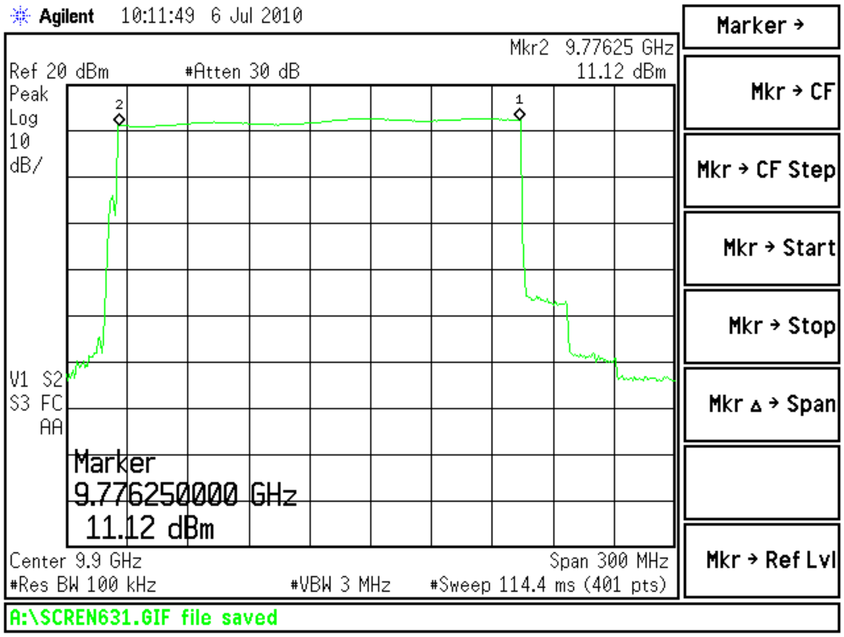

Figure 15: Normal operation measurements(marker 2 reading).

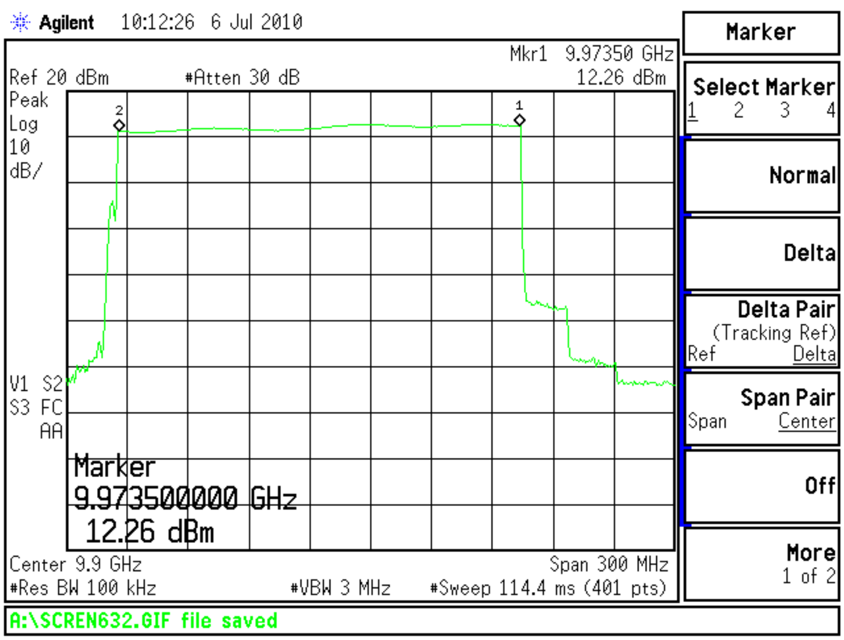

Figure 16: Normal operation measurements(marker 1 reading).