DIVERSIFIED
T.E.S.T.
TECHNOLOGIES, INC.
4675 Burr Drive ● Liverpool, NY 13088 ● 1-800-724-6452 ● FAX: 315-457-0428 ● 315-457-0245

November 11, 2014

Mr Paul Brown
GOJO Industries
1 GOJO Plaza-Suite 500
Akron, OH 44311

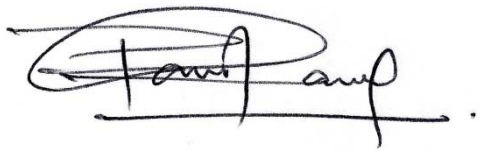
Dear Mr. Brown:

Enclosed is the test report for the GOJO Industries Limited Approval Wireless Transmitter Module 1960-501-WHT Rev. 004 and 1930-513-910 Rev. ABC in the host where the host is the Smartlink Ready LTX-12 19XX-##-YYY dispenser which was tested at our facility located at 4675 Burr Drive in Liverpool, NY. This facility is on file with the Federal Communications Commission (FCC) per 47 CFR 2.948. (Site File Registration Number: 306552) Please see attached annex for information on the Limited Approval Wireless Transmitter Module 1960-501-WHT Rev. 004 and 1930-513-910 Rev.ABC.

As narrated in the report, the product configuration meets the requirements of the FCC per CFR 47 Part 15.249 Class C for Intentional Radiators.

Thank you for selecting Diversified T.E.S.T. Technologies, Inc. for your testing needs. We look forward to working with you on future projects. Should you have any questions or concerns regarding this report, contact me at 315-457-0245. Please feel free to visit our website at www.dttlab.com.

Sincerely,



Prasanna Gautam
Technical Associate

Table of Contents

Emissions Testing

Documentation

Test Report

Laboratory
Diversified TEST Technologies, Inc.
4675 Burr Drive
Liverpool, NY 13088
315-457-0245

Manufacturer
GOJO Industries
1 GOJO Plaza, Suite 500
Akron, OH. 44311

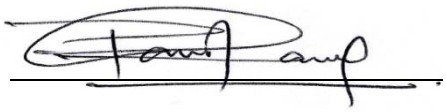
Report Issue Date: **October 21, 2014**
Project Number: **6491**
Report Number: **6491-070913 (Edition 2) FCCC LTX 12 with Limited Approval Wireless Transmitter Module**

Date Received: **August 8, 2014**
Date Tested: **August 8, 2014– August 16, 2014**
Model Numbers: Limited Approval Wireless Transmitter Module 1960-501-WHT and 1930-513-910 Rev. ABC in the host where the host is Smartlink Ready LTX-12 19XX-##-YYY Dispenser.

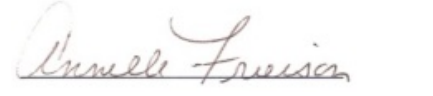
FCC ID: O76-T4SG0910A

Traceability: *Reference standards of measurement have been calibrated by a competent body using standards traceable to NIST.*

The testing performed by Diversified TEST Technologies, Inc. has shown that the product referenced above complies with the electromagnetic compatibility requirements according to the standard(s) specified on page 3 of the test report. The results in this test report apply only to the product denoted above. The manufacturer is responsible for ensuring that additional units are manufactured with identical mechanical and electrical characteristics.
The equipment listed above conforms to the specified requirements of the test standards listed on page 3 of this report.

Complied by:
Signature:  Date: November 11, 2014

Prasanna Gautam
Technical Associate

Reviewed by:
Signature:  Date: November 11, 2014

Annelle Frierson
Vice- President

Emissions Test Regulations

The emissions tests were performed according to the following regulations:

☐EN 50081-1:1992

☐EN 50081-2:1995

☐EN 55011:1998 / A1:1999 / A2:2001 ☐Group 1 ☐Group 2
☐Class A ☐Class B

☐EN 55013:1990 / A12:1994 / A13:1996 / A14:1999

☐EN 55014:1993 / A1: 1997 ☐Household appliances and similar
☐Portable tools
☐Semiconductor devices

☐EN 55022:1998 ☐Class A ☐Class B

☒**FCC Part 15.249** ☐Class A ☐Class B ☒**Class C**

☒**Certification**
☐Verification
☐Declaration of Conformity

Emissions Test Conditions: FCC PART 15.249 CLASS C

The Fundamental and harmonics measurements were tested in a horizontal and vertical polarization at the following test location:

☒ Diversified TEST Technologies, Inc. Open Area Test Site
☐ Diversified TEST Technologies, Inc. Lab

At a test distance of:

☒ 1 meter
☒ 3 meters
☐ 30 meters

Test equipment used:

Manufacturer	Model	Description	Serial #	Cal Date
Hewlett Packard	8596E	Spectrum Analyzer	3235A00144	05/16/15
Electro-Metrics	RGA60	Ridge Horn Antenna	2981	12/9/14
Hewlett Packard	7550A	Plotter	2407A00476	
Electro-Metrics	LPA-25	Log Periodic Antenna 200-1000 MHz	1242	07/08/15
	MFR-57500	Blue low-loss cable	337	
		Non-conductive wooden turntable		
		10-meter open field test range, grounded with ¼ ” x ¼ ” hardware cloth		
		Co-ax Cable, 100-foot RG 8/U, 20-foot RG 223/U		

NOTE: Calibration interval 1 year for the test equipment

Equipment under Test (EUT) Test Operation Mode – Emissions Tests:

The device under test was operated under the following conditions during emissions testing:

☐ Standby

☒ Normal Operating Mode

☐ Practice Operation

Description / Configuration of the device under test:

Limited Approval Wireless Transmitter Module 1960-501-WHT Rev. 004 and 1930-513-910 Rev. ABC in the host where the host is Smartlink Ready LTX-12 19XX-##-YYY dispenser. The unit was powered by a 6 VDC Battery during the collection of data.

Rationale for EUT setup / configuration:

ANSI C63.4-2009

After numerous trial runs with a full bottle and an empty bottle it was found an empty bottle was worst case so therefore the dispenser was tested with the empty bottle for the entire test.

Deviations from test method:

Testing performed at 1 meter test distance above 1 GHz to better represent harmonic emissions caused by the equipment under test.

Notes:

The Spurious Emissions test data is included in the Subpart B report including the Test data from the Active Loop Antenna.

Emissions Test Results:

FCC Part 15.249 Part C 910 MHz – 9100 MHz
The requirements are ☒ **MET** ☐ **NOT MET**

General Remarks:
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 less than 500 kHz.

Measurements were taken up to the tenth harmonic.

The EUT was evaluated in 1 orthogonal orientation and the worst case data is reflected in the test report.

The transmitter module transmits an OOK modulated data packet following a 10 second delay after an event trigger coming from the LTX dispenser. The use of the LTX dispenser to dispense soap to a customer constitutes an event and once an event occurs a trigger pulse is sent from the LTX dispenser to a microcontroller in the transmitter module. The microcontroller in the module uses the 10 second delay period to watch for additional events during that period of time. After the 10 second period has expired the total number of events that occurred during that 10 second period are sent in the transmitted data packet along with the transmitter module serial (ID) number and other information like the battery level. A drawing of the transmit packet is shown on last page of this report.

The transmitter packet starts with a 50% duty cycle Preamble for 38.76mSec followed by an off Space of 3.04mSec. After the Space, the payload is sent twice for redundancy. Each payload time is 63.84mSec in length and consists of an equal numbers of 1's and 0's. Where each of the 1's has a 25% duty cycle and each of the 0's has a 75% duty cycle. Together the payload has a combined 50% duty cycle. The total packet length is therefore the addition of the 38.76msec Preamble followed by the 3.04mSec Space followed by the two redundant payloads of 63.86mSec each for total packet length of 169.48mSec. The total packet duty cycle consists of 83.22mSec "on" bits and 86.26mSec "off" bits for a total percentage of "on" bits of 0.491%.

Therefore the duty cycle correction in terms of dB is: 20log(0.491) = -6dB.

Summary:
The requirements according to the technical regulations are
☒ Met.
☐ Not met.
The device under test does
☒ fulfill the general approval requirements mentioned on page 3.
☐ not fulfill the general approval requirements mentioned on page 3.

Testing Start Date: August 8, 2014
Testing End Date: August 16, 2014

Test Setup Photographs:

FCC PART 15.249 CLASS C – 910 MHZ

Photograph 1: FCC Part 15.249 Class C

Test Datasheets – 910 MHz- 9100 MHz

23 pages of data sheets to follow.

FCC Part 15.249 Transmitter Test												
GOJO 6491												
Measured Field Strength (Peak)	**Res. Bandwidth**	**DUT Frequency**	**Measured Frequency**	**Azimuth**	**Cable Factor**	**Antenna Gain**	**Measurement Distance**	**Duty Cycle Correction**	**FCC Limit at 3M**	**Corrected Field Strength to 3M**	**Delta Limit**	**Polarity**
(dBµV)	**(Khz)**	**(Mhz)**	**(Mhz)**	**Degrees**	**(dB)**	**(dB)**	**(Meters)**	**(dB)**	**(µV/M)**	**µV/M Peak**	**(dB)**	
52.33	120	910	910	70	16.98	19.6	3	-6	50000	13,979.77	-11.07	H
46.15	1000	910	1820	90	0.2	7.6	1	-6	500	82.85	-15.61	H
29.04	1000	910	2730	80	0.2	9.2	1	-6	500	13.97	-31.07	H
32.06	1000	910	3640	20	0.3	8.9	1	-6	500	19.40	-28.22	H
32.52	1000	910	4550	45	0.2	10	1	-6	500	22.93	-26.77	H
30.03	1000	910	5460	0	0.2	10	1	-6	500	17.15	-29.29	H
29.2	1000	910	6370	280	0.2	12	1	-6	500	19.54	-28.16	H
36.29	1000	910	7280	280	0.1	10.5	1	-6	500	37.06	-22.60	H
37.85	1000	910	8190	20	1.0	10.3	1	-6	500	47.74	-20.40	H
36.45	1000	910	9100	250	0.1	11.2	1	-6	500	40.60	-21.81	H
	*Antenna factors are pre-calculated into Measured Field Strength (dBµV)											
Unit Under Test:		**Gojo**	**LTX-12**	**13XX-##-YYY**			**8/21/2013**		**Empty Bottle**			

FCC Part 15.249 Transmitter Test

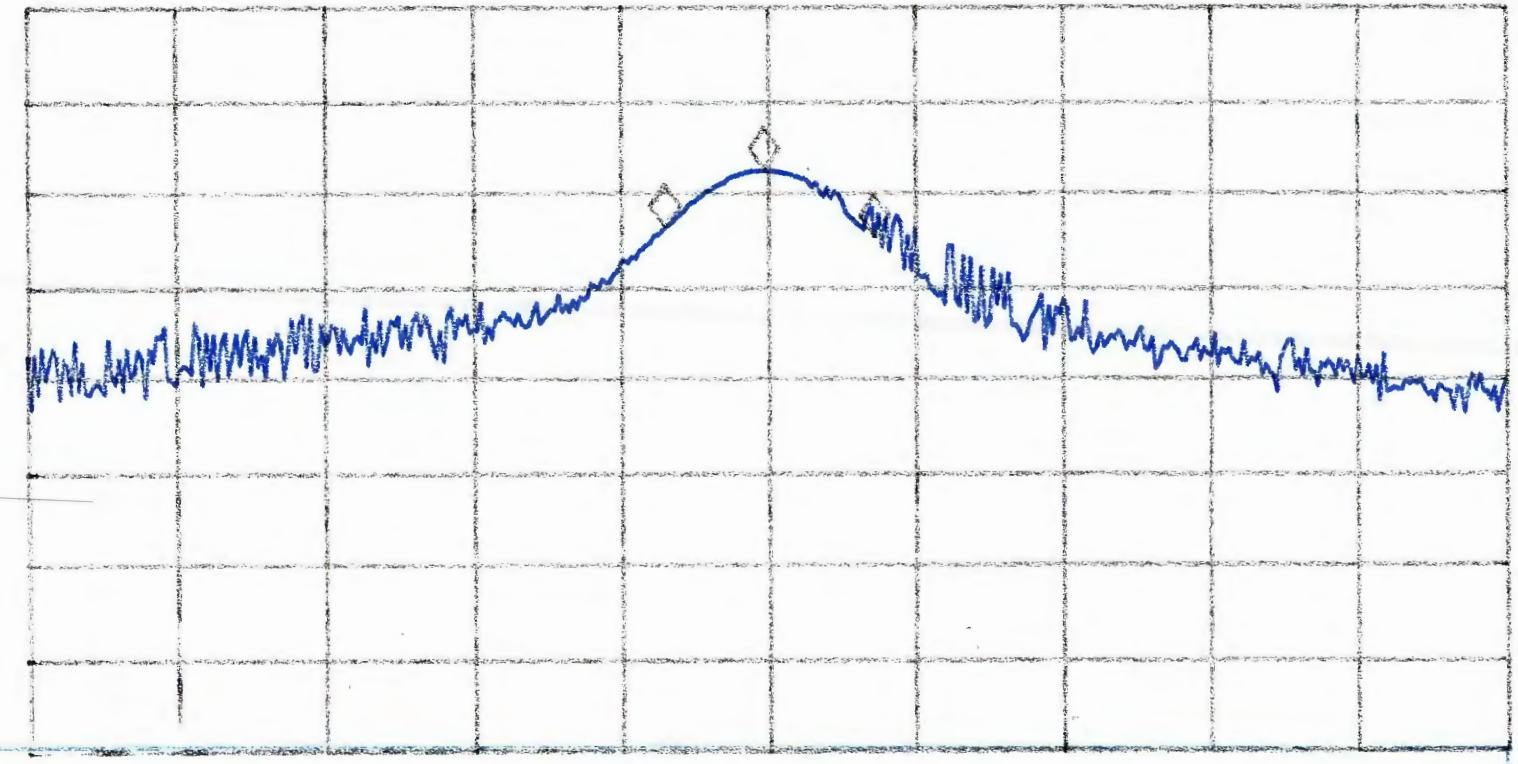
GOJO
6491

Measured Field Strength Peak	Res. Bandwidth	DUT Frequency	Measured Frequency	Azimuth	Cable Factor	Antenna Gain	Measurement Distance	Duty Cycle Correction	FCC Limit at 3M	Corrected Field Strength to 3M	Delta Limit	Polarity
(dBµV)	(Khz)	(Mhz)	(Mhz)	Degrees	(dB)	(dB)	(Meters)	(dB)	(µV/M)	µV/M Peak	(dB)	
54	120	910	910	70	16.98	19.6	3	-6	50000	16,943.38	-9.40	V
49.02	1000	910	1820	185	0.2	7.6	1	-6	500	115.29	-12.74	V
29.51	1000	910	2730	110	0.2	9.2	1	-6	500	14.75	-30.60	V
30.24	1000	910	3640	20	0.3	8.9	1	-6	500	15.74	-30.04	V
31.35	1000	910	4550	30	0.2	10	1	-6	500	20.04	-27.94	V
32.25	1000	910	5460	350	0.2	10	1	-6	500	22.15	-27.07	V
29	1000	910	6370	45	0.2	12	1	-6	500	19.09	-28.36	V
37.3	1000	910	7280	280	0.1	10.5	1	-6	500	41.63	-21.59	V
38.16	1000	910	8190	80	1.0	10.3	1	-6	500	49.47	-20.09	V
36.36	1000	910	9100	25	0.1	11.2	1	-6	500	40.18	-21.90	V
	*Antenna factors are pre-calculated into Measured Field Strength (dBµV)											
Unit Under Test:		**Gojo**	**LTX-12**	**13XX-##-YYY**			**8/21/2014**		**Empty Bottle**			

Azimuth 0°

23: Ø9: Ø7 AUG Ø8, 2Ø14
GOJO TALL EUT
F 7Ø.Ø dBµV #AT Ø dB
MKR 9Ø9.93Ø MHz
46.14 dBµV

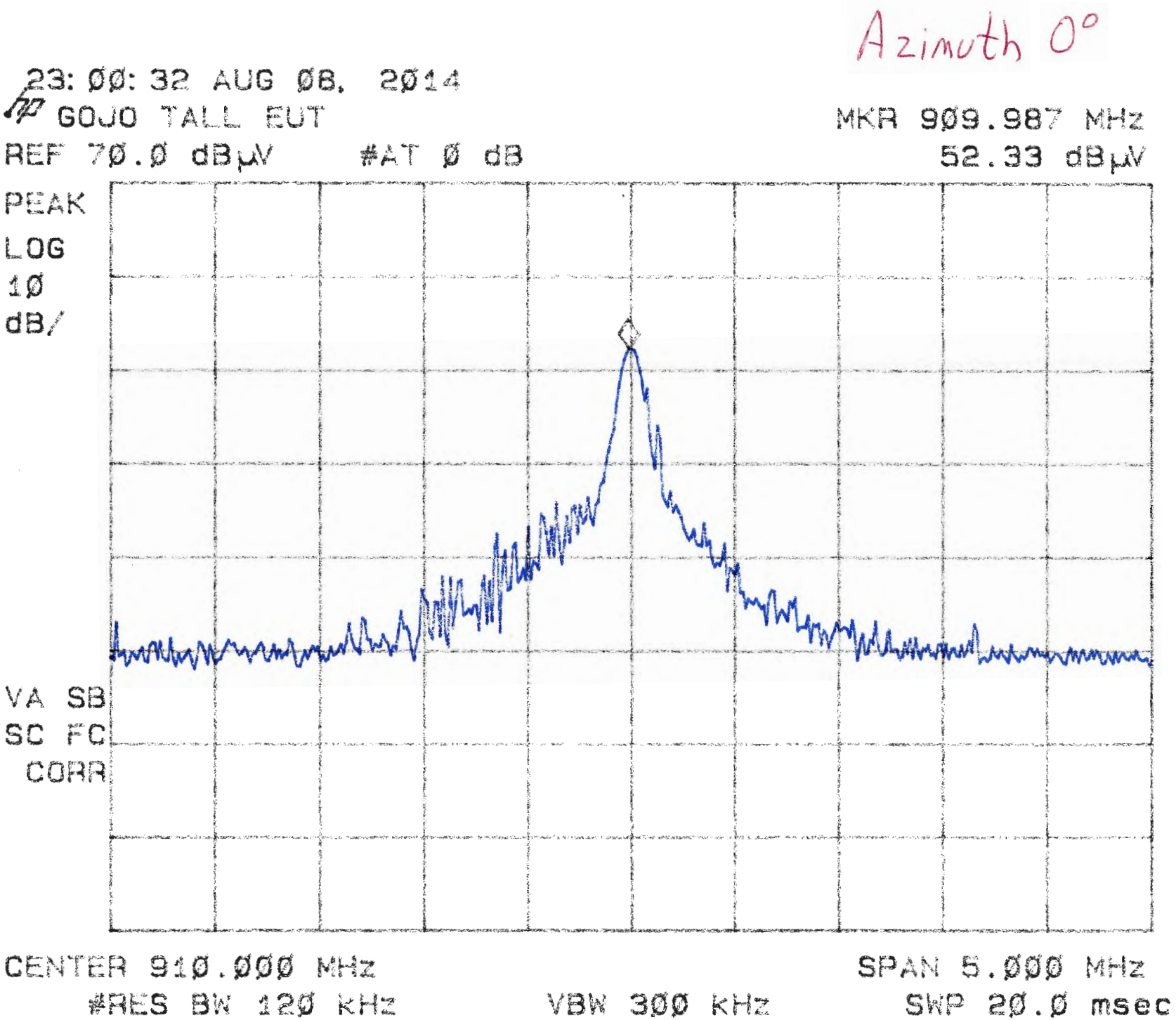
PEAK
:G



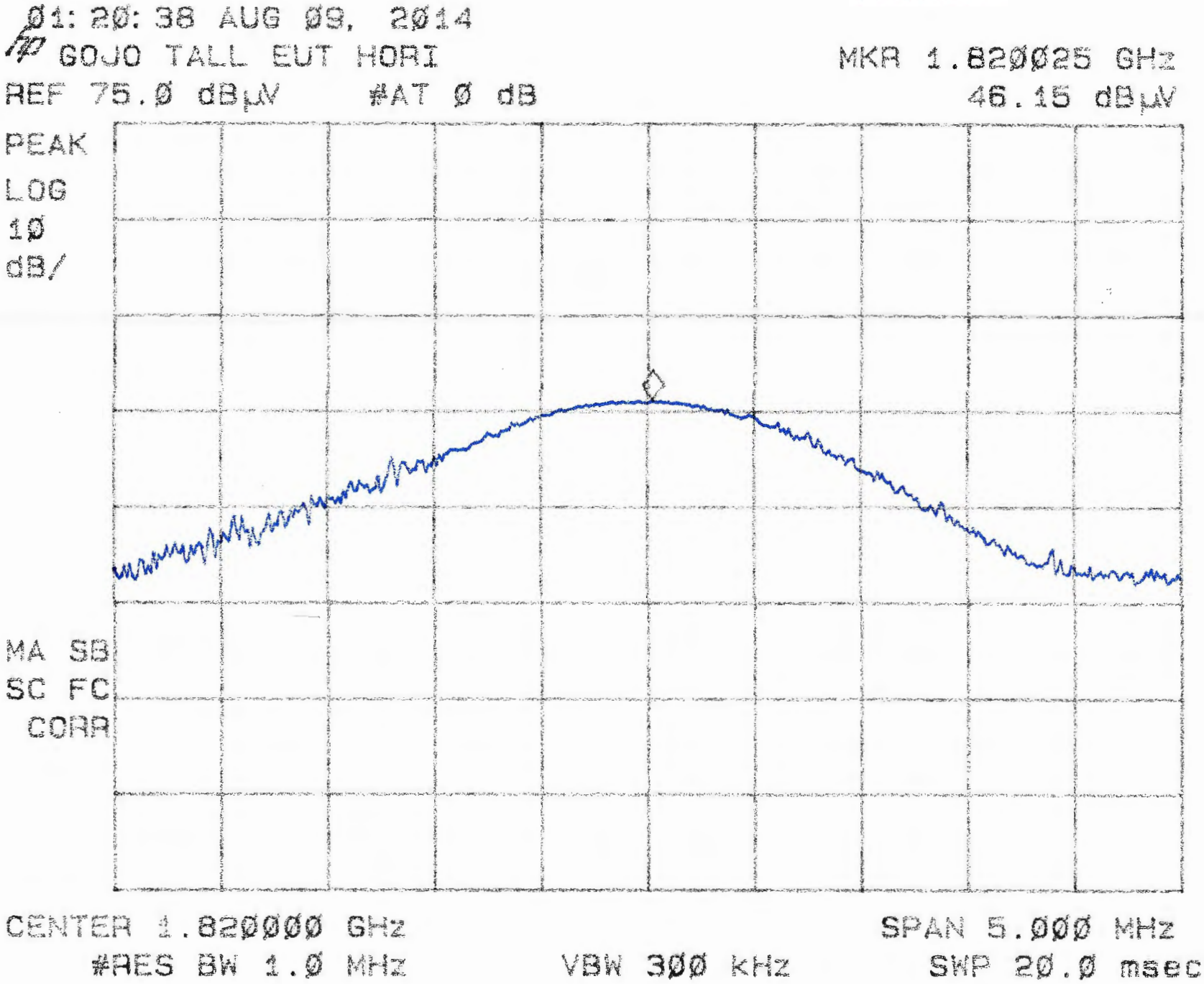
Marker	Trace	Type	Freq / Time	Amplitude
1:	(A)	Freq	9Ø9.998 MHz	52.28 dBuV
2:	(A)	Freq	9Ø9.93Ø MHz	46.14 dBuV
3:	(A)	Freq	91Ø.Ø73 MHz	45.Ø8 dBuV
4:	Inactive			

CENTER 91Ø.ØØØ MHz
#RES BW 12Ø kHz
VBW 3ØØ kHz
SPAN 1.ØØØ MHz
SWP 2Ø.Ø msec

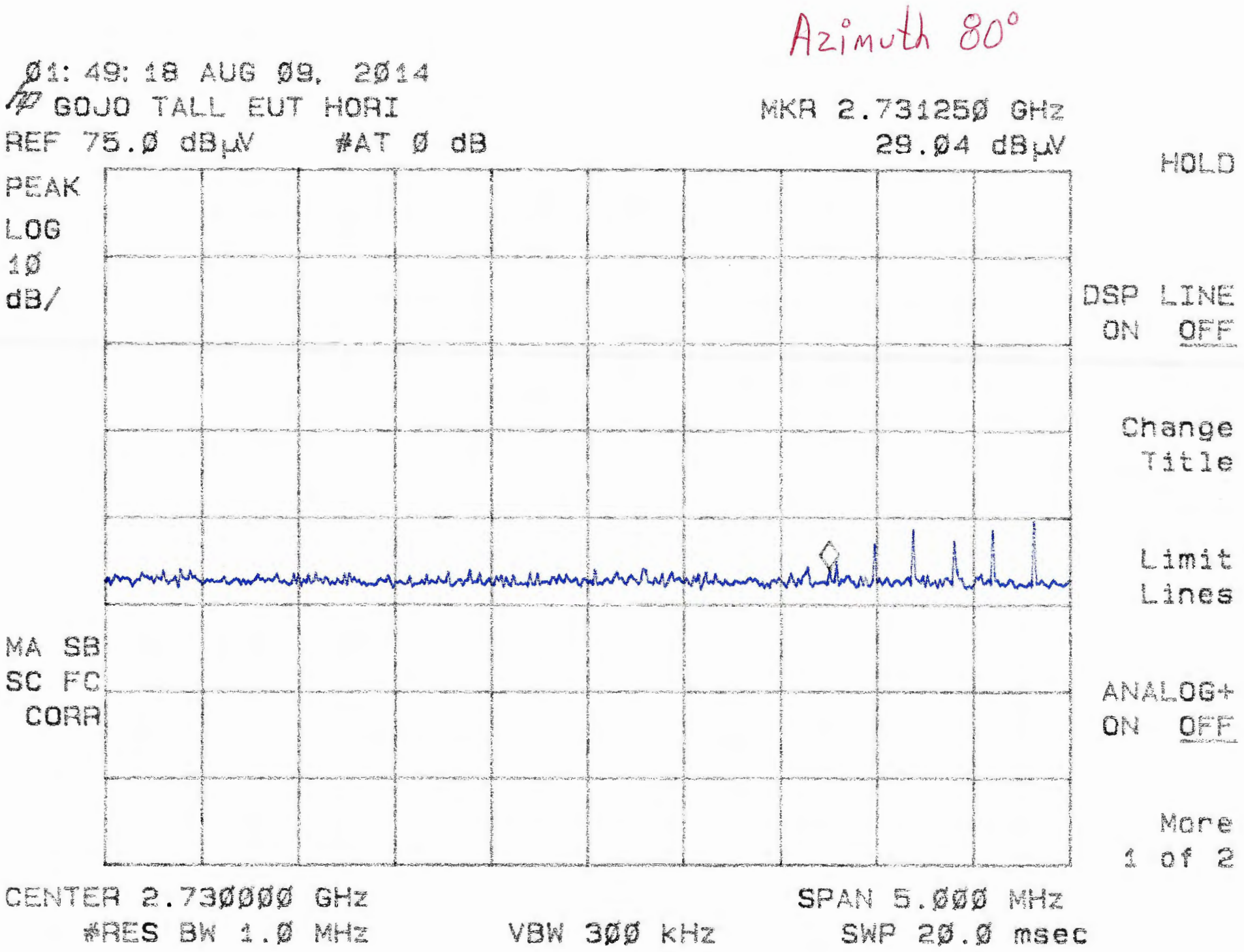
Azimuth 0°


23: ØØ: 32 AUG ØB, 2Ø14
GOJO TALL EUT
MKR 9Ø9.987 MHz
REF 7Ø.Ø dBµV
#AT Ø dB
52.33 dBµV
PEAK
LOG
1Ø
dB/
VA SB
SC FC
CORR
CENTER 91Ø.ØØØ MHz
SPAN 5.ØØØ MHz
#RES BW 12Ø kHz
VBW 3ØØ kHz
SWP 2Ø.Ø msec

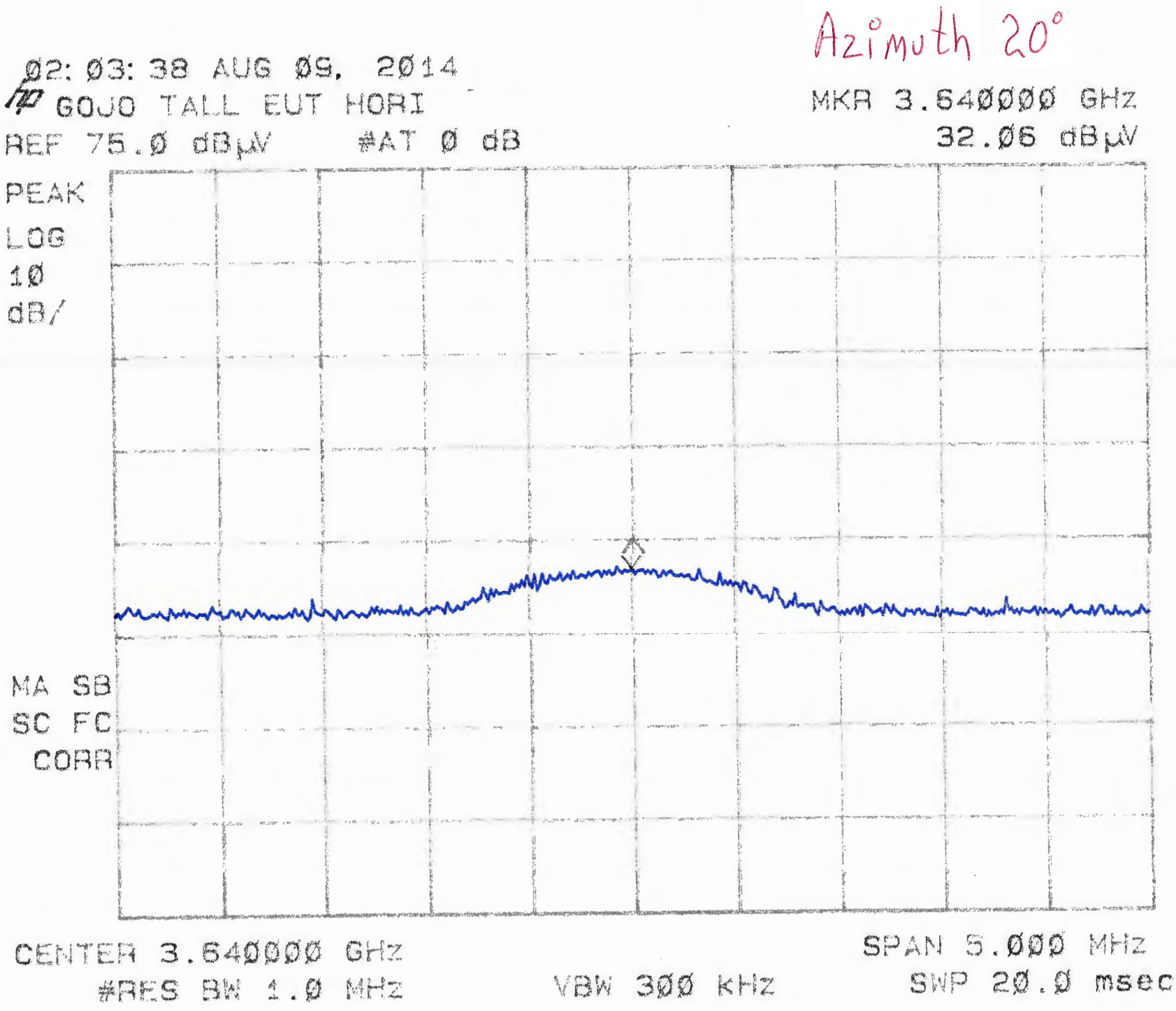
Azimuth 90°


01: 20: 38 AUG 09, 2014
GOJO TALL EUT HORI
MKR 1.820025 GHz
REF 75.0 dBµV
#AT 0 dB
46.15 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 1.820000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

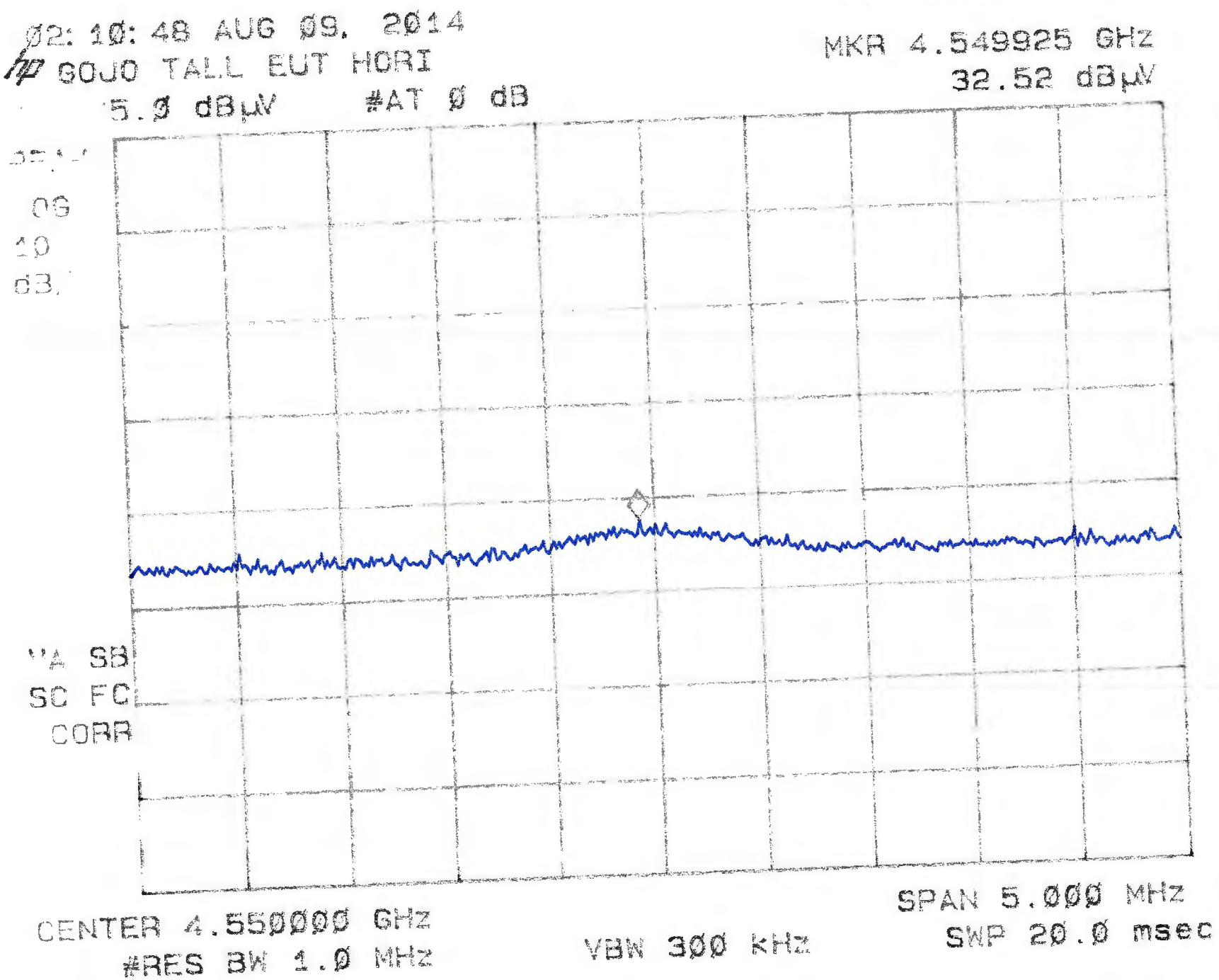
Azimuth 80°


01: 49: 18 AUG 09, 2014
GOJO TALL EUT HORI
MKR 2.731250 GHz
REF 75.0 dBµV
#AT 0 dB
29.04 dBµV
HOLD
PEAK
LOG
10
dB/
DSP LINE
ON OFF
Change
Title
Limit
Lines
MA SB
SC FC
CORR
ANALOG+
ON OFF
More
1 of 2
CENTER 2.730000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 20°


02: 03: 38 AUG 09, 2014
GOJO TALL EUT HORI
MKR 3.640000 GHz
REF 75.0 dBµV
#AT 0 dB
32.06 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 3.640000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 45°


02: 10: 48 AUG 09, 2014
GOJO TALL EUT HORI
5.0 dBµV #AT 0 dB
MKR 4.549925 GHz
32.52 dBµV
0G
10
dB
VA SB
SC FC
CORR
CENTER 4.550000 GHz
#RES BW 1.0 MHz
VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

Azimuth 0°

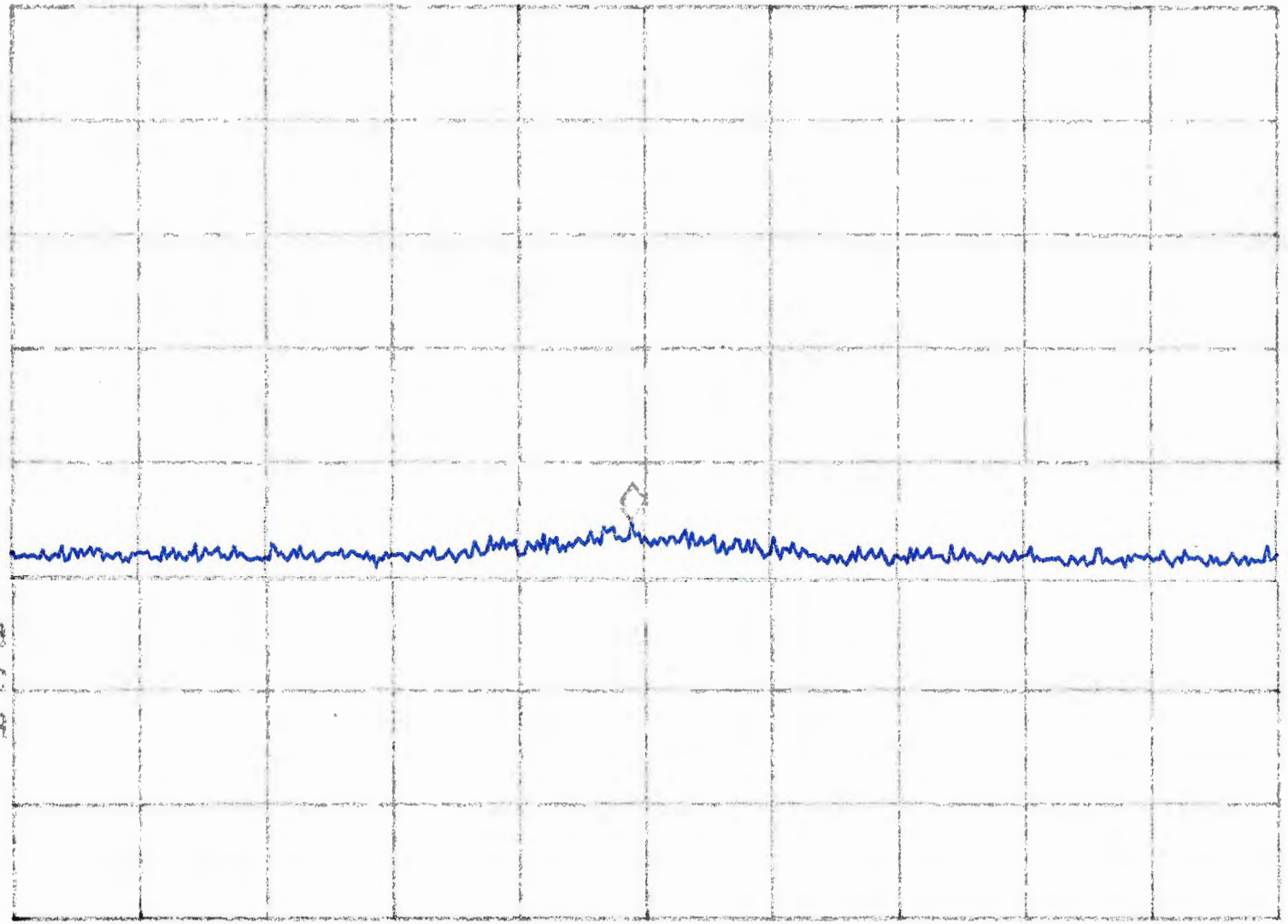
02: 18: 19 AUG 09, 2014

GOJO TALL EUT HORI

MKR 5.459950 GHz

REF 75.0 dBµV #AT 0 dB

30.03 dBµV



CENTER 5.460000 GHz

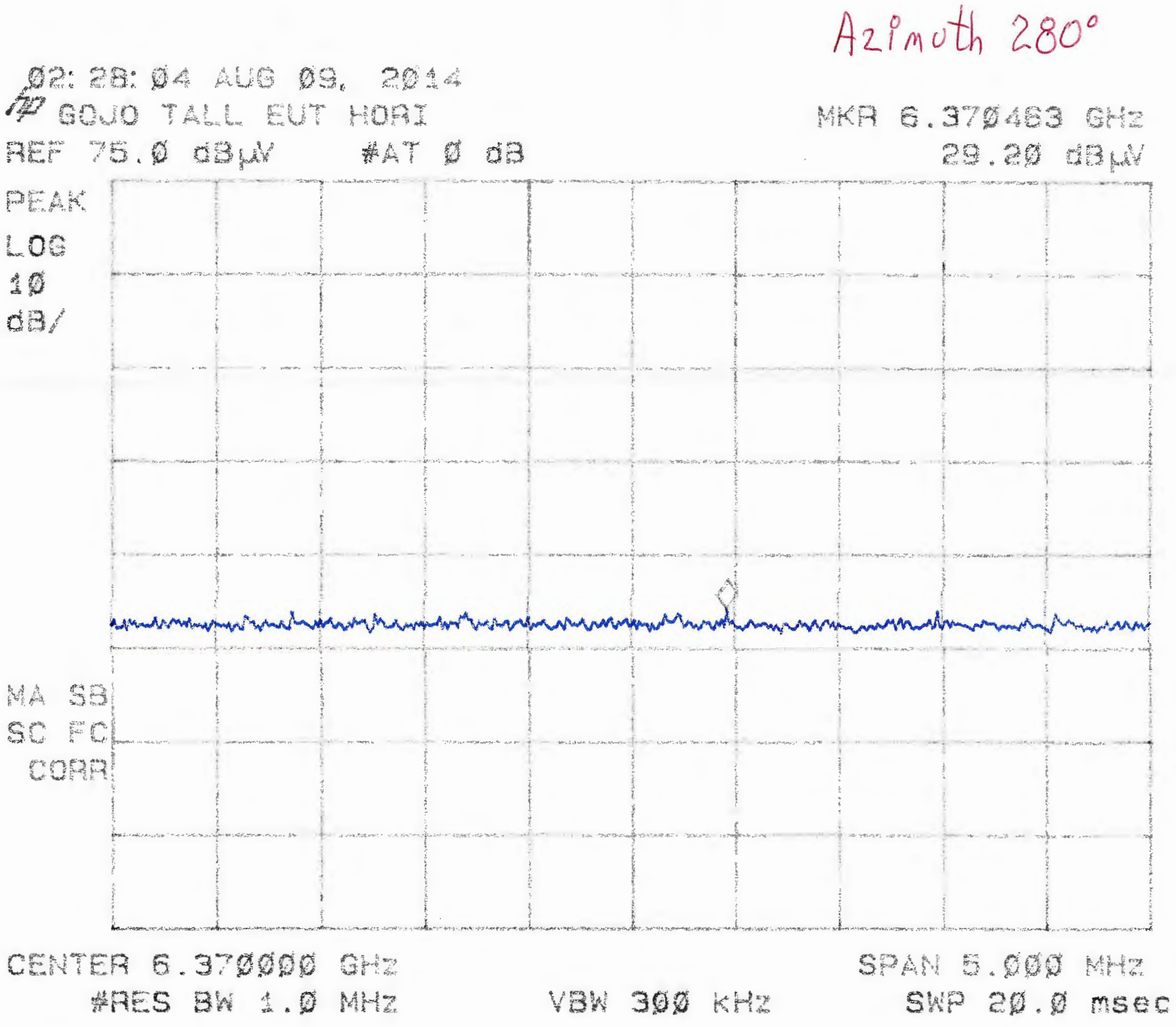
SPAN 5.000 MHz

#RES BW 1.0 MHz

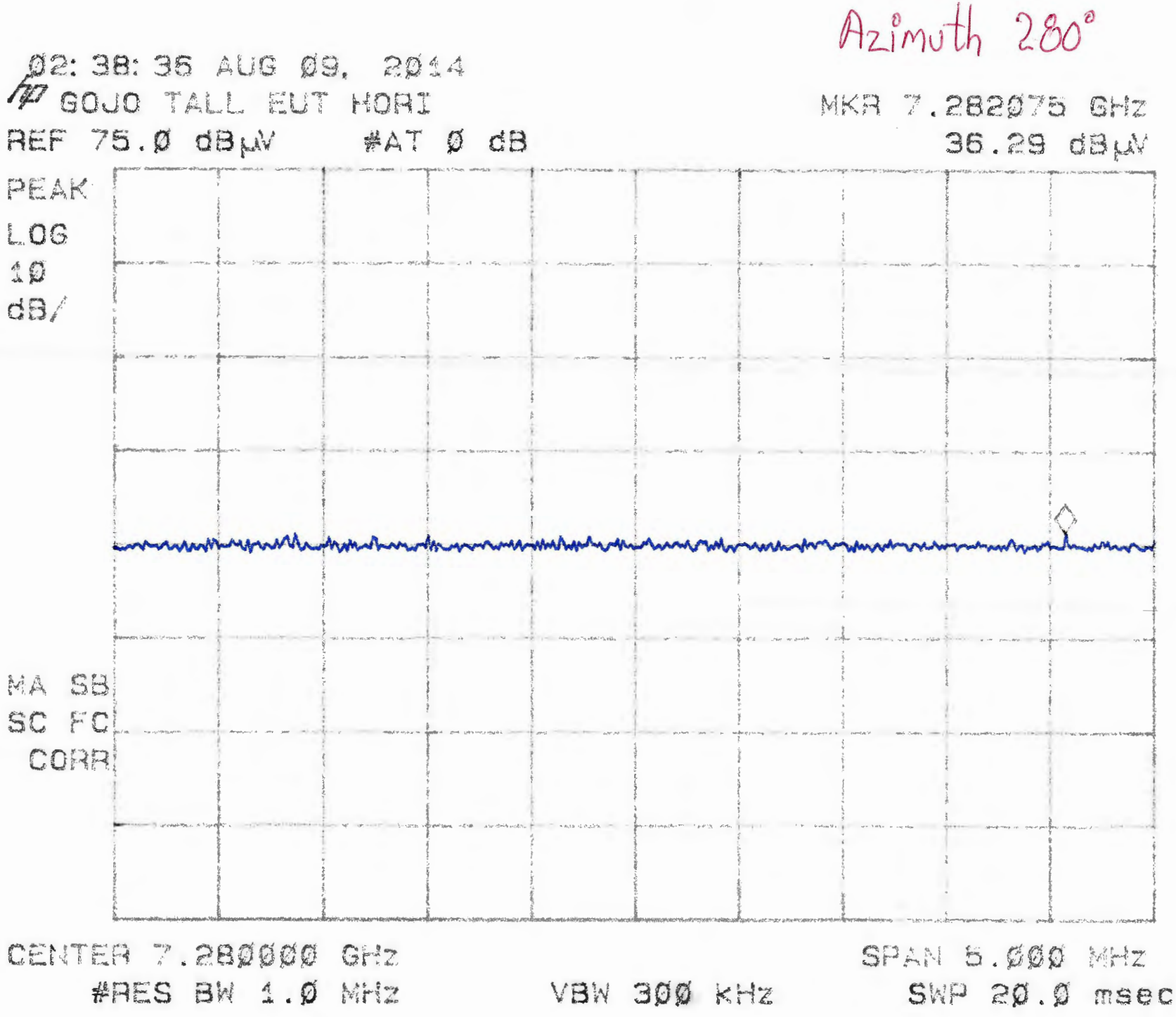
VBW 300 kHz

SWP 20.0 msec

Azimuth 280°

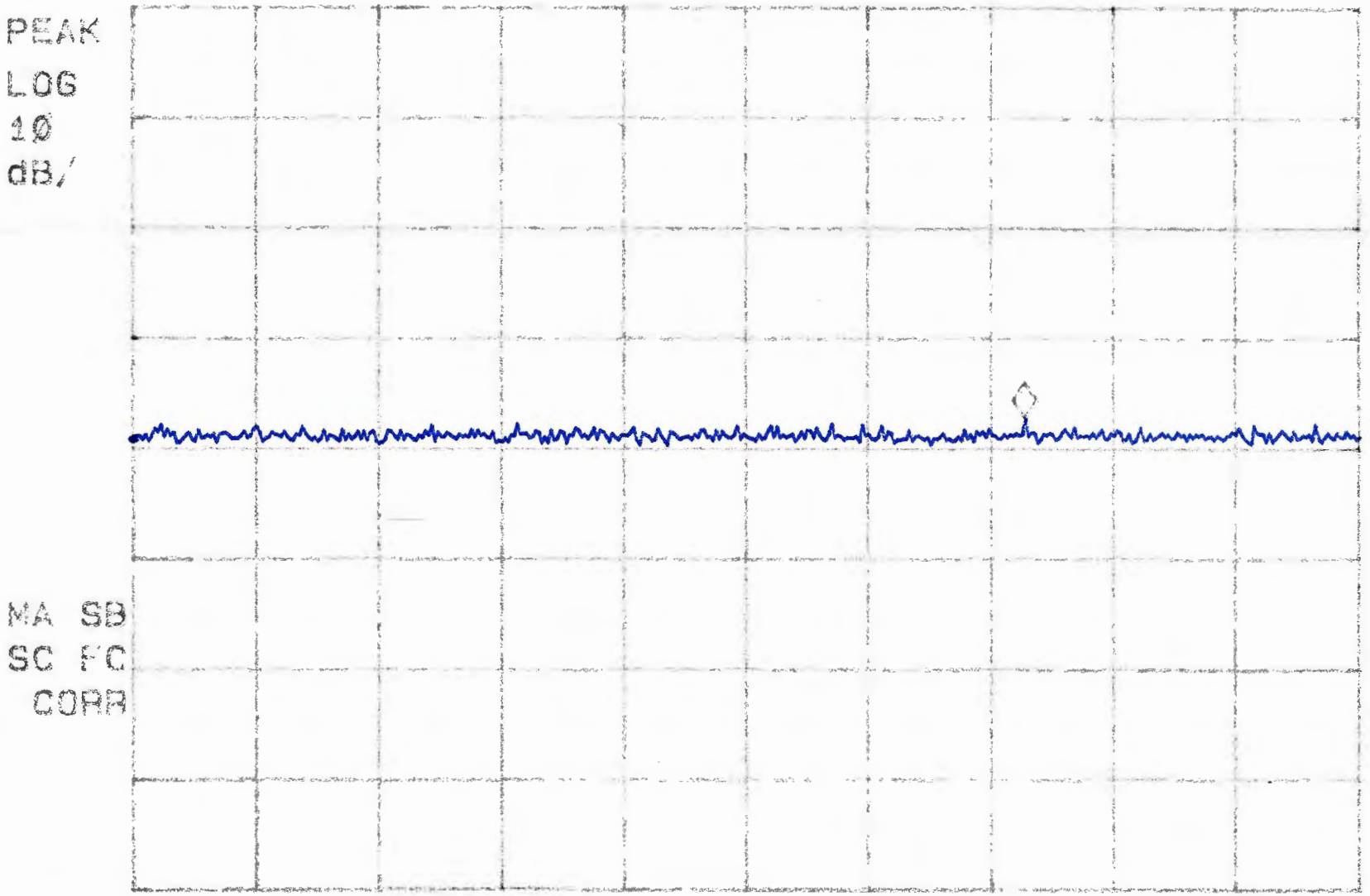

02: 28: 04 AUG 09, 2014
GOJO TALL EUT HORI
MKR 6.370463 GHz
REF 75.0 dBµV
#AT 0 dB
29.20 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 6.370000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 280°


02: 38: 36 AUG 09, 2014
GOJO TALL EUT HORI
MKR 7.282075 GHz
REF 75.0 dBµV
#AT 0 dB
36.29 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 7.280000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 20°

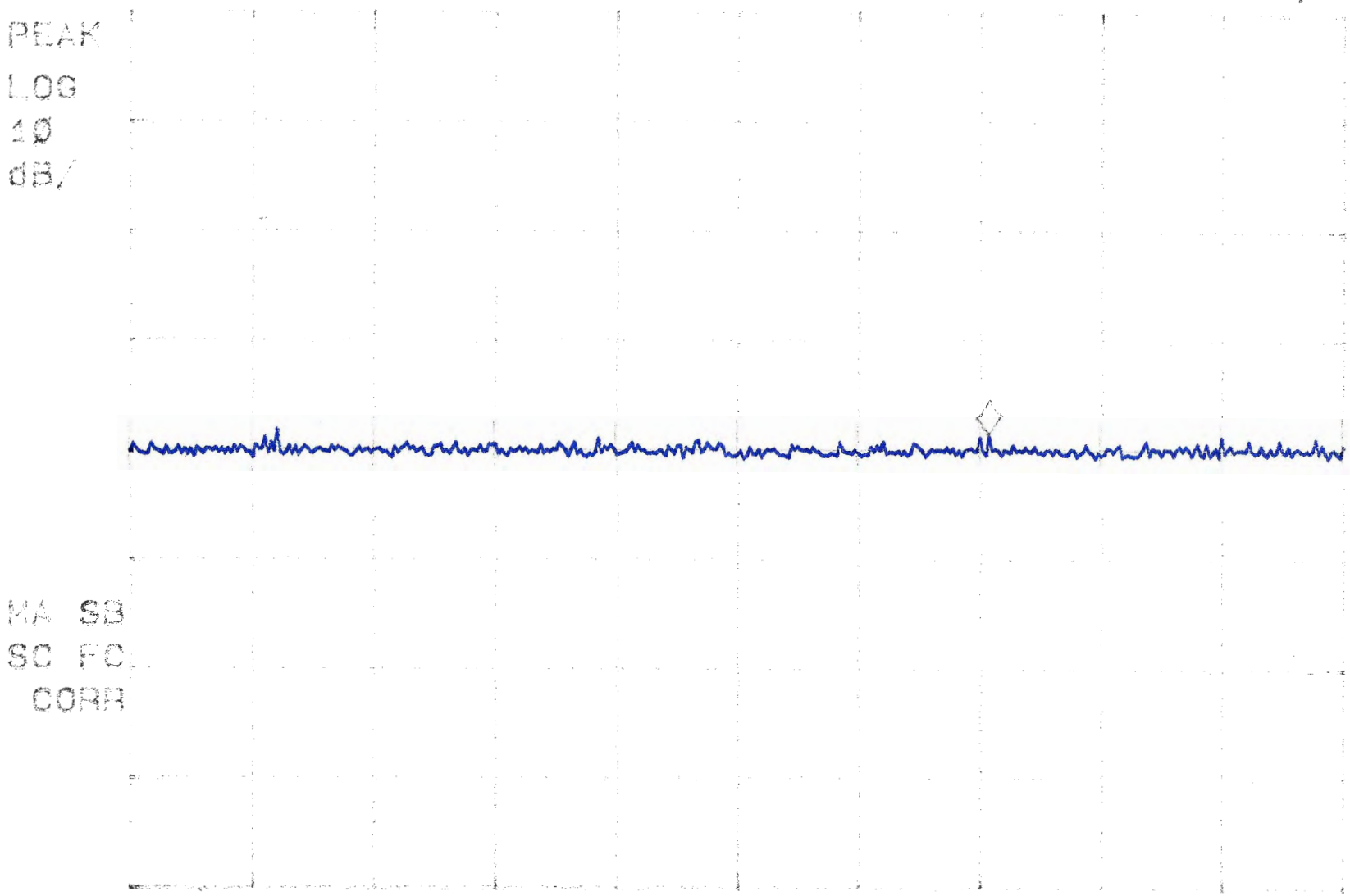
02: 49: 17 AUG 09, 2014
GOJO TALL EUT HORI
MKR 8.191137 GHz
REF 75.0 dBµV #AT 0 dB
37.85 dBµV



CENTER 8.190000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 250° 250°

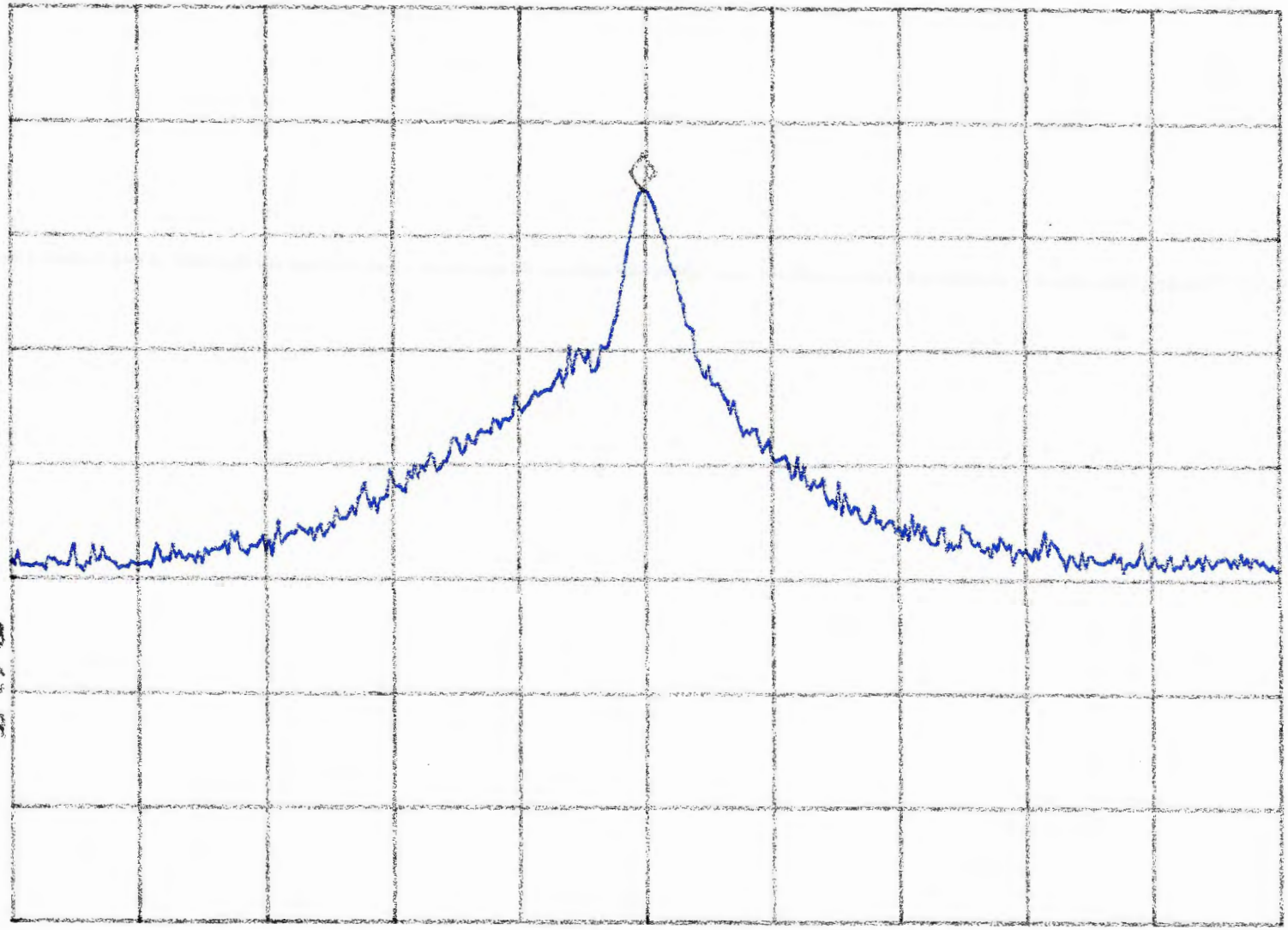
02:56:51 AUG 09, 2014
GOJO TALL EUT HORI
MKR 9.101037 GHz
REF 75.0 dBµV #AT 0 dB
36.45 dBµV



CENTER 9.100000 GHz
#RES BW 1.0 MHz
VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

Azimuth 300° vertical

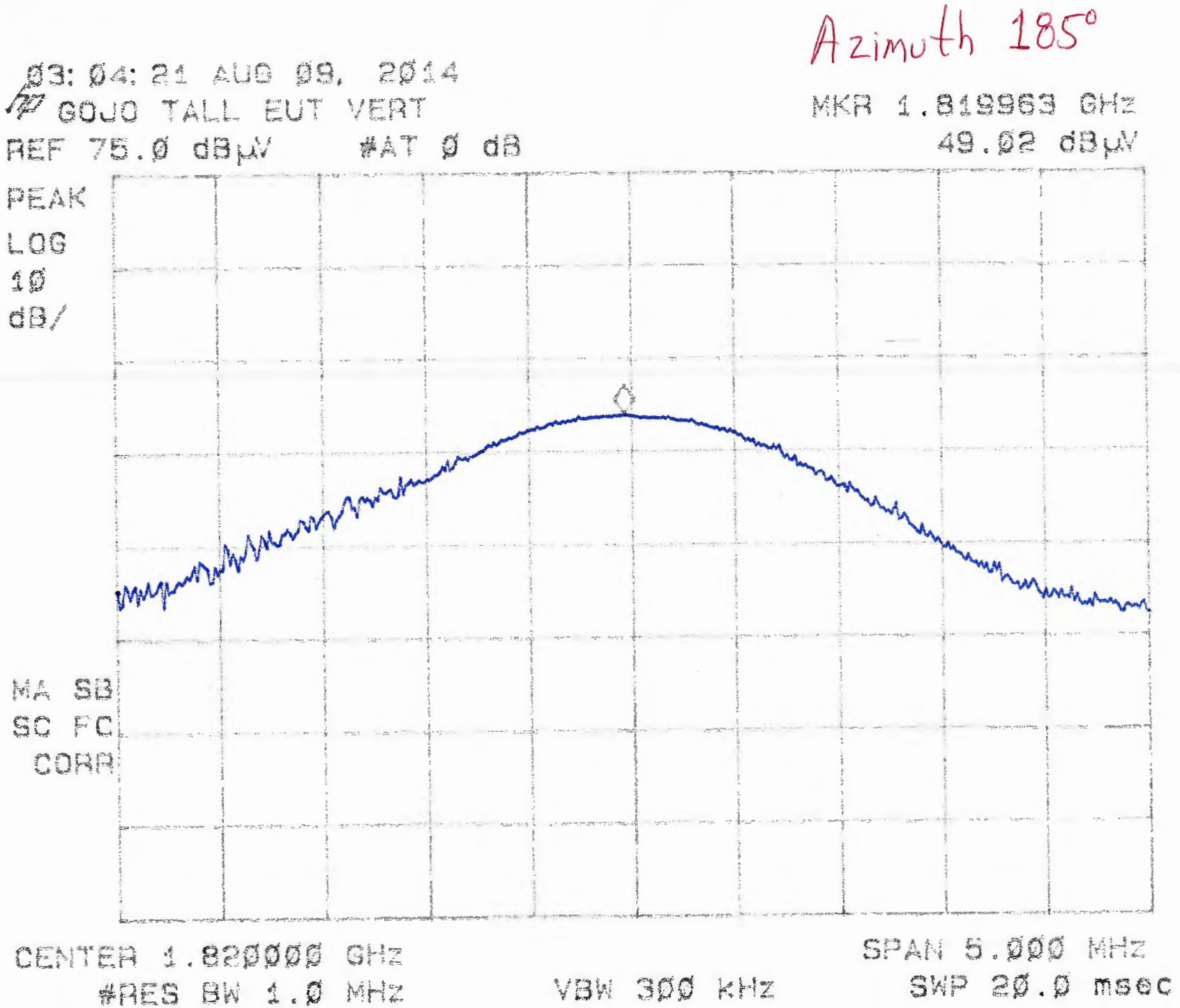
23: 34: 02 AUG 08, 2014
GOJO TALL EUT
MKR 909.987 MHz
REF 70.0 dBµV #AT 0 dB
54.07 dBµV



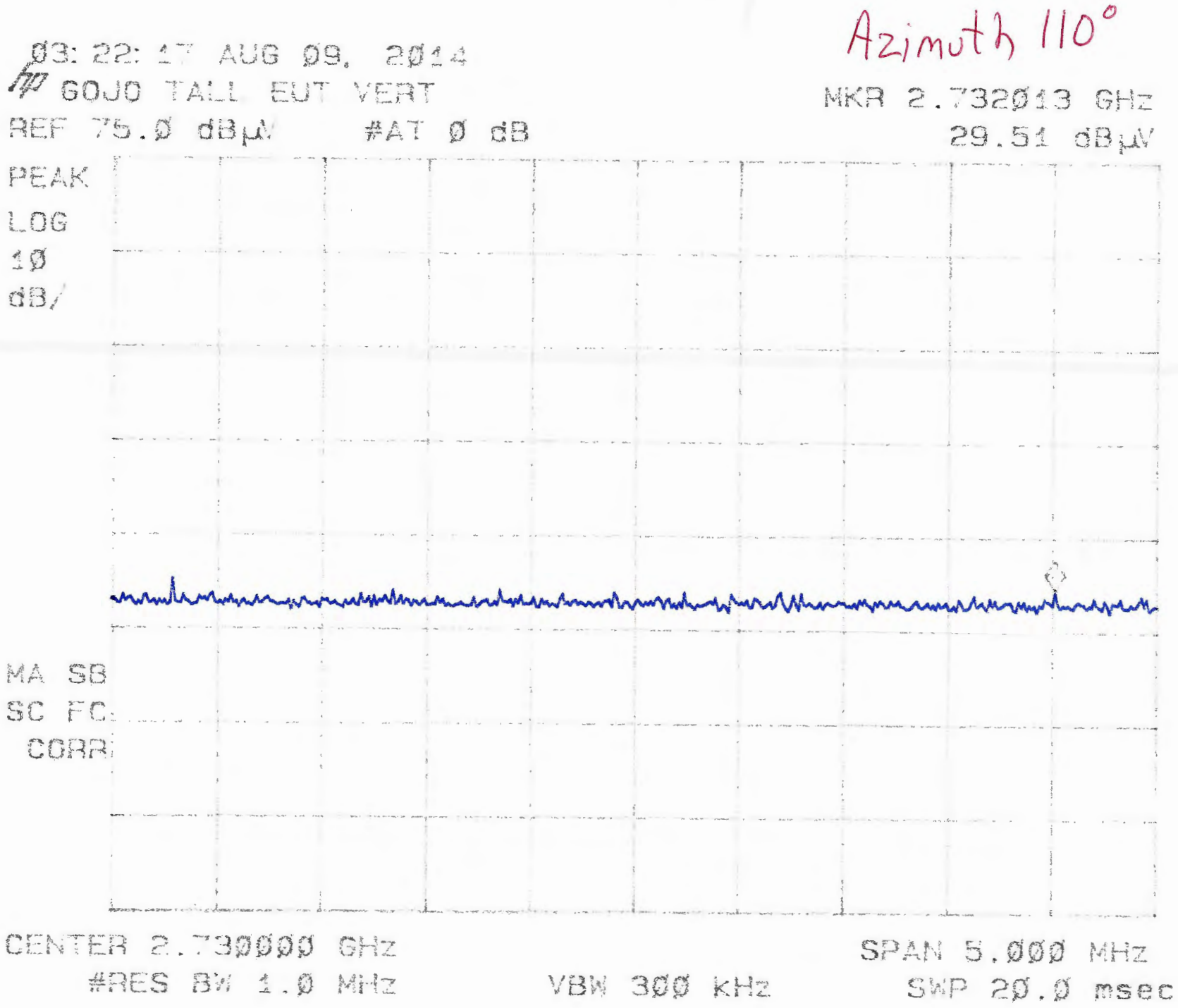
CENTER 910.000 MHz
SPAN 5.000 MHz
#RES BW 120 kHz
VBW 300 kHz
SWP 20.0 msec

Vertical 300°

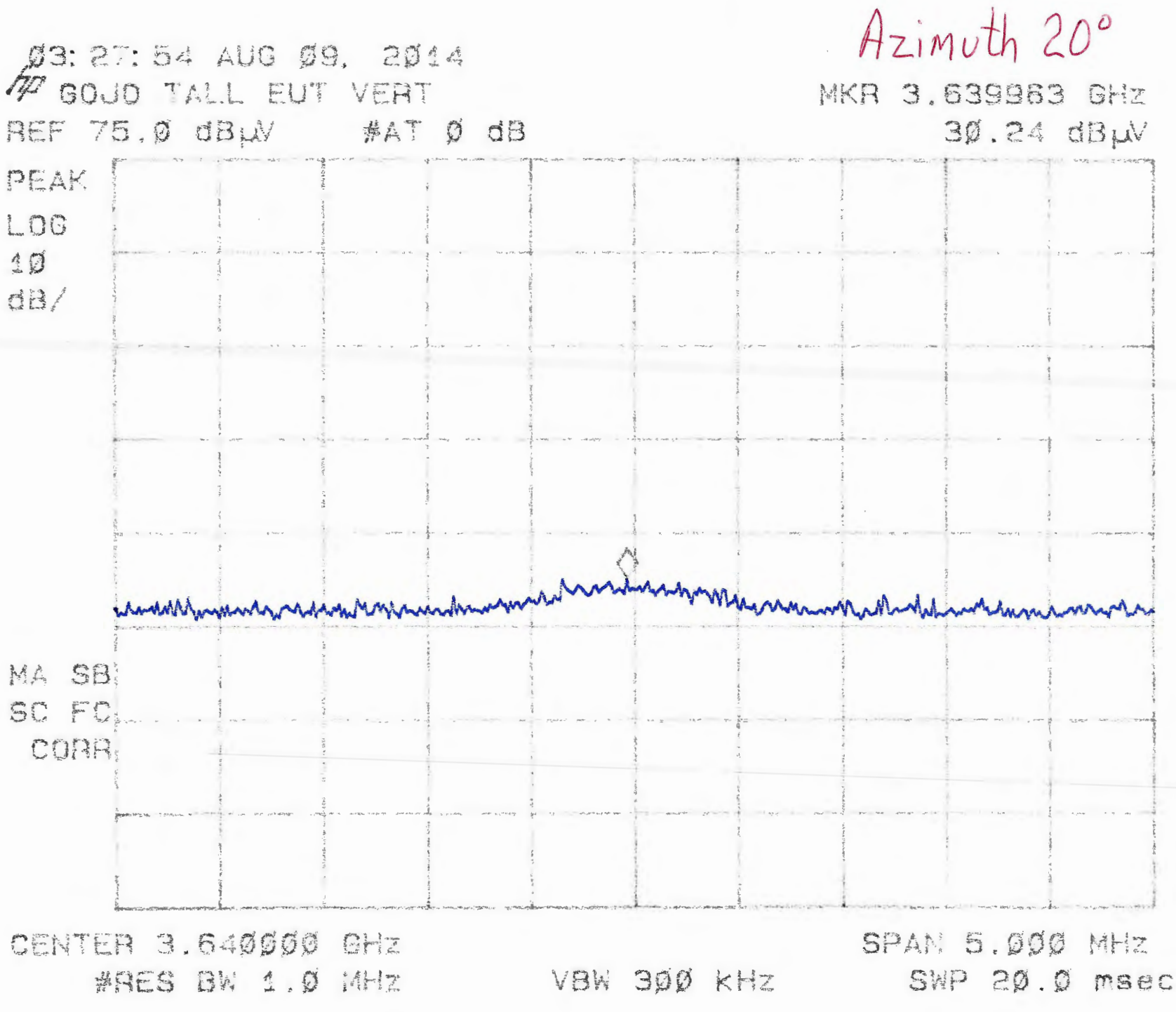
Azimuth 185°


03:04:21 AUG 09, 2014
GOJO TALL EUT VERT
REF 75.0 dBµV
#AT 0 dB
MKR 1.819963 GHz
49.02 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 1.820000 GHz
#RES BW 1.0 MHz
VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

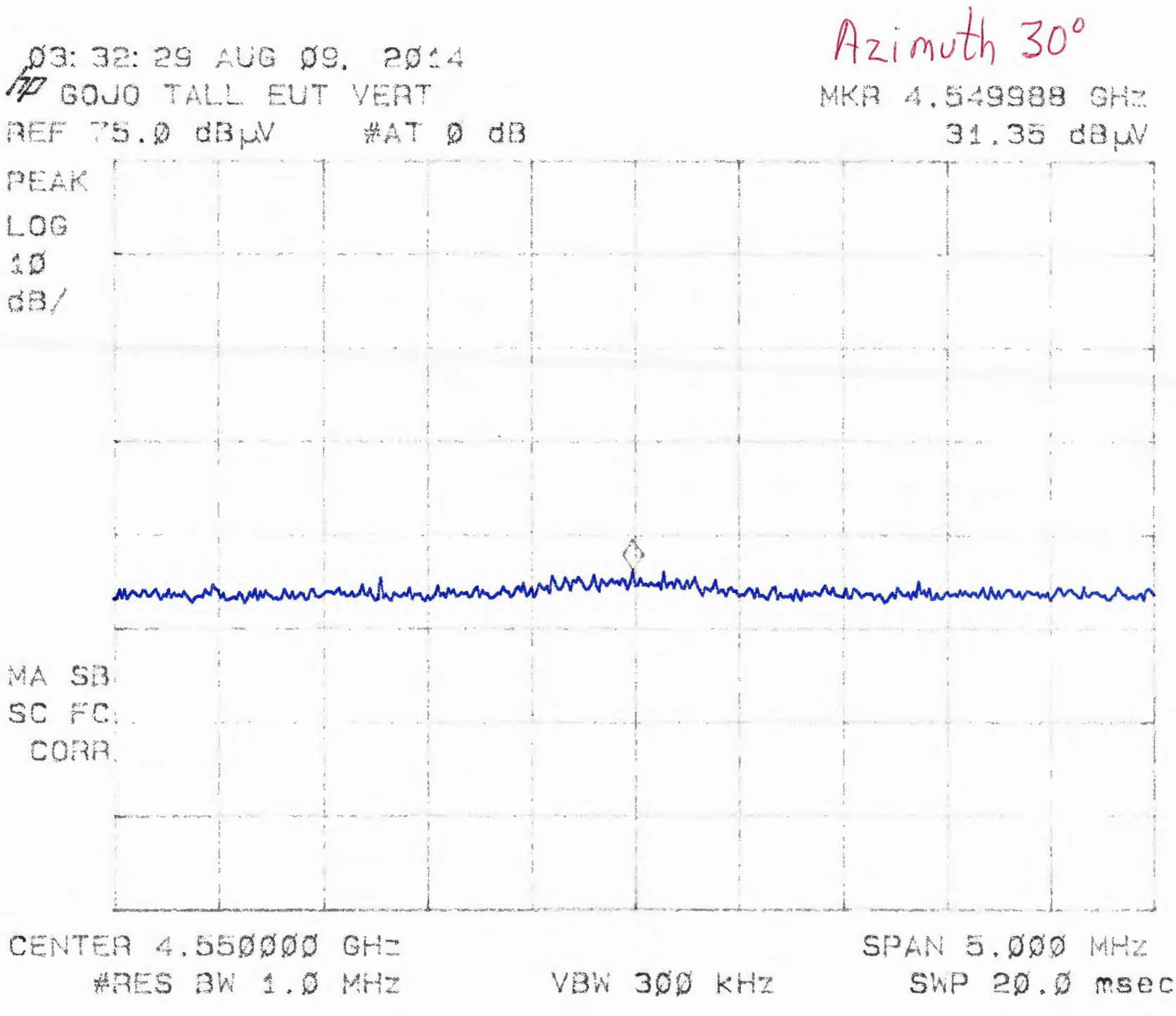
Azimuth 110°


03: 22: 17 AUG 09, 2014
GOJO TALL EUT VERT
REF 75.0 dBµV
#AT 0 dB
MKR 2.732013 GHz
29.51 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 2.730000 GHz
#RES BW 1.0 MHz
VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

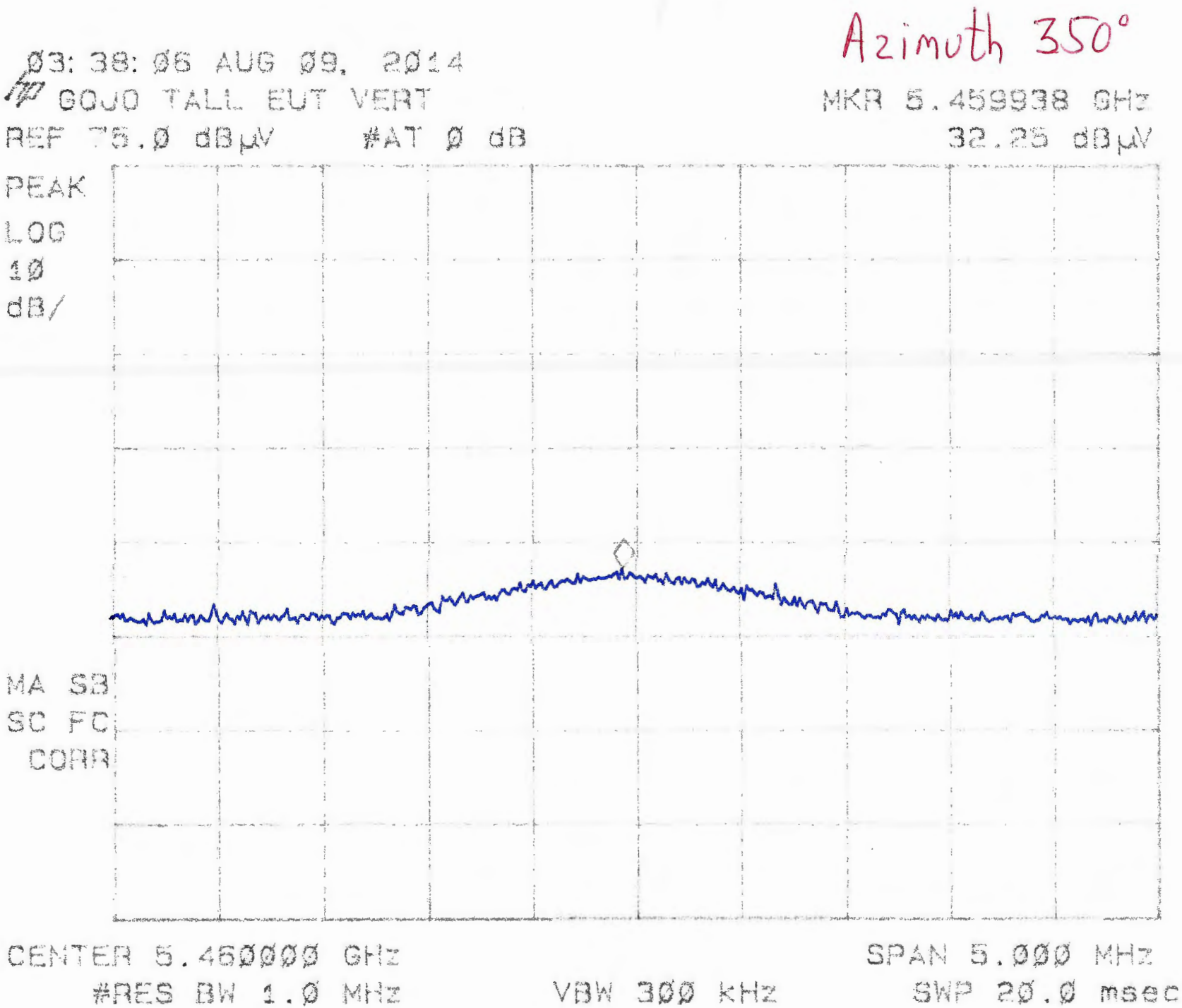
Azimuth 20°


03:27:54 AUG 09, 2014
GOJO TALL EUT VERT
MKR 3.639963 GHz
REF 75.0 dBµV
#AT 0 dB
30.24 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 3.640000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

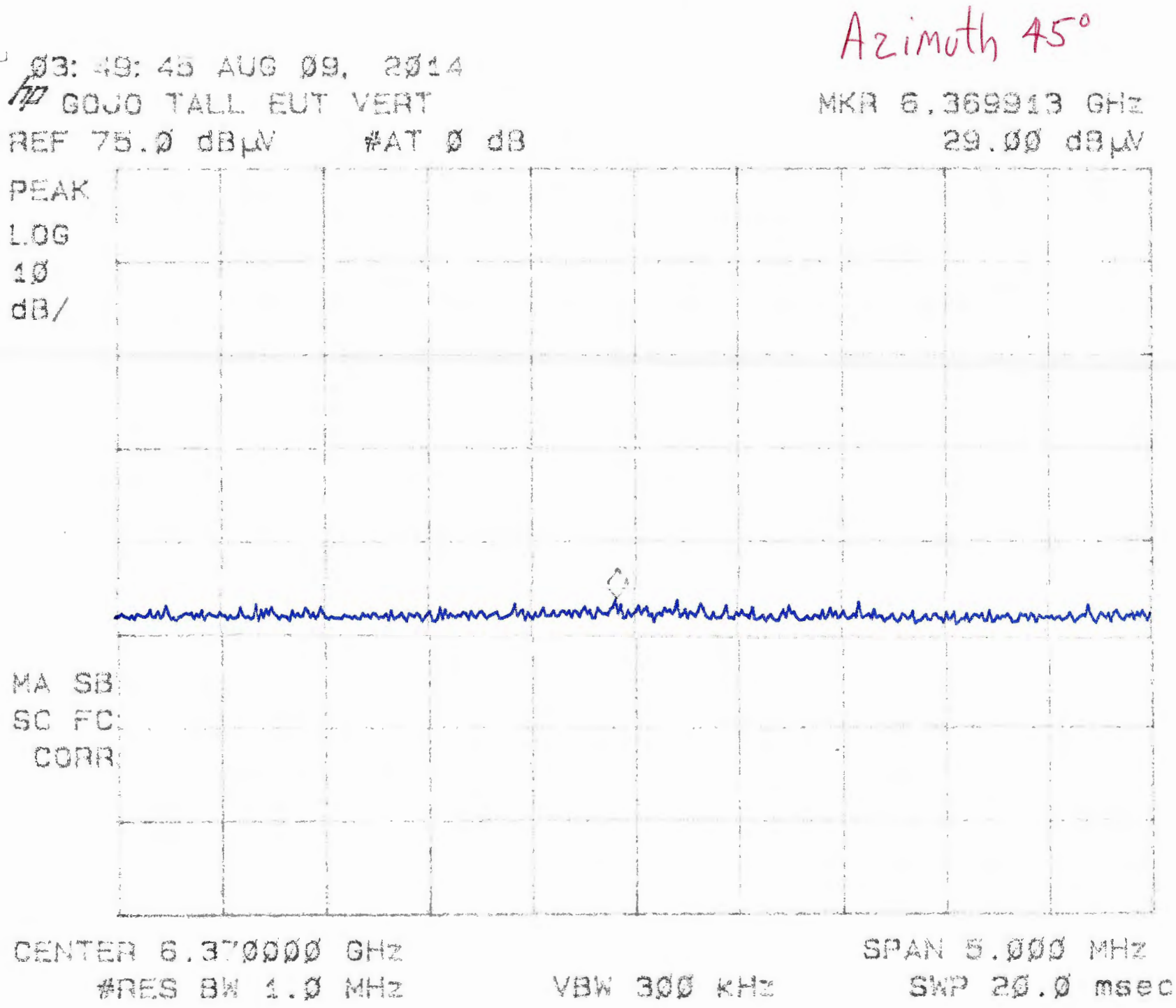
Azimuth 30°


03: 32: 29 AUG 09, 2014
GOJO TALL EUT VERT
MKR 4.549988 GHz
REF 75.0 dBµV
#AT 0 dB
31.35 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 4.550000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

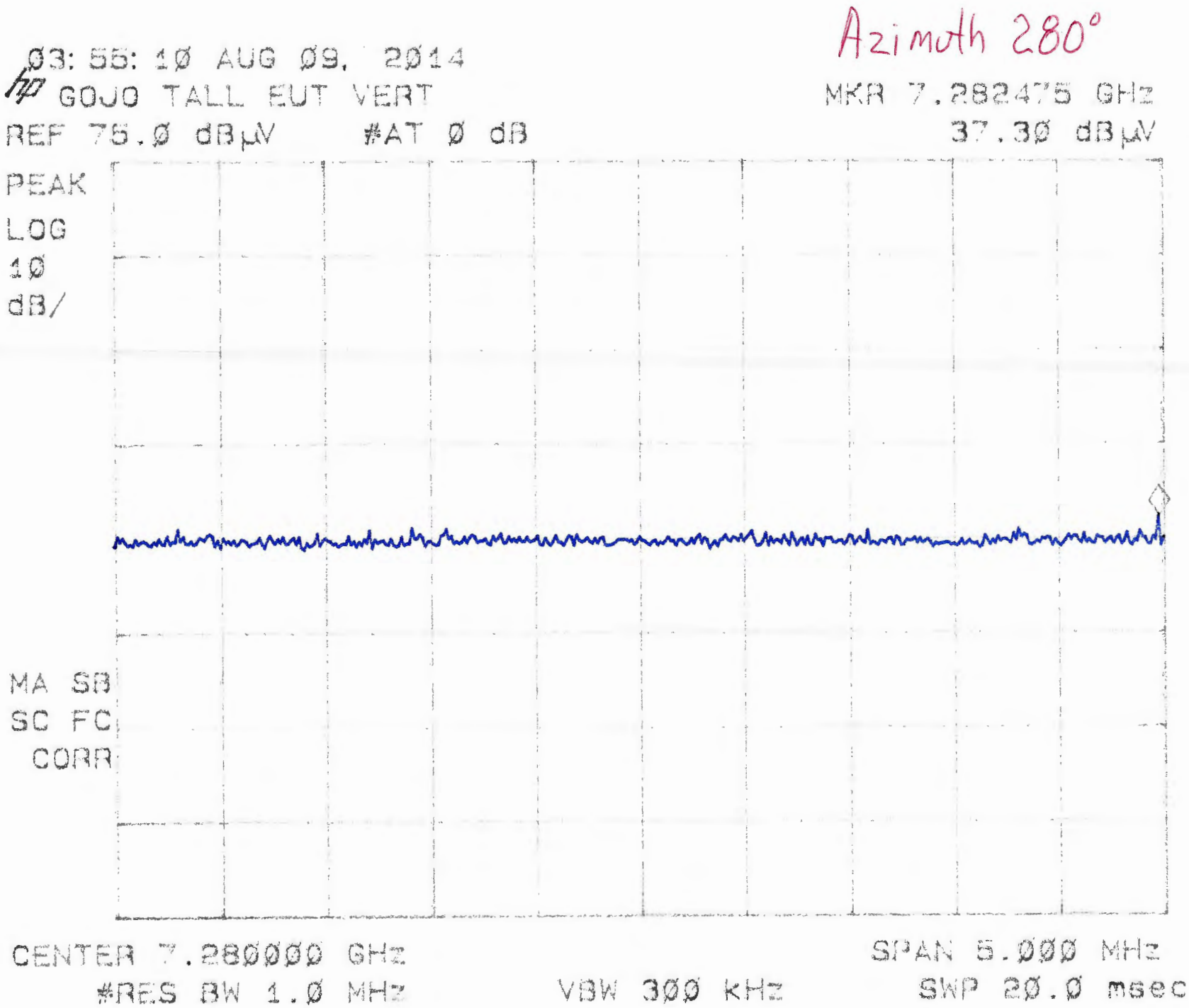
Azimuth 350°


03: 38: 06 AUG 09, 2014
GOJO TALL EUT VERT
MKR 5.459938 GHz
REF 75.0 dBµV #AT 0 dB
32.25 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 5.460000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

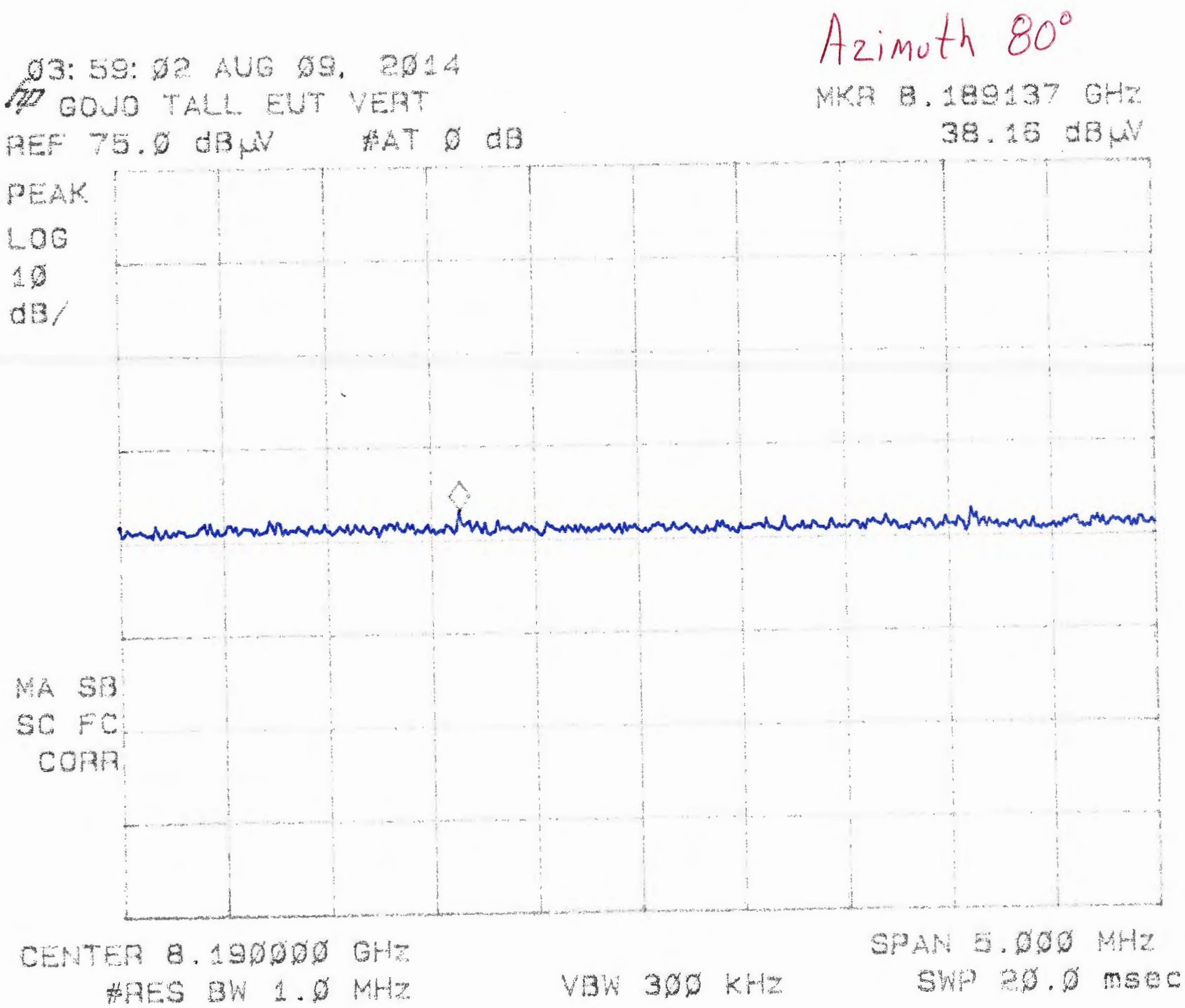
Azimuth 45°


03:49:45 AUG 09, 2014
GOJO TALL EUT VERT
MKR 6.369913 GHz
REF 75.0 dBµV
#AT 0 dB
29.00 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 6.37000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

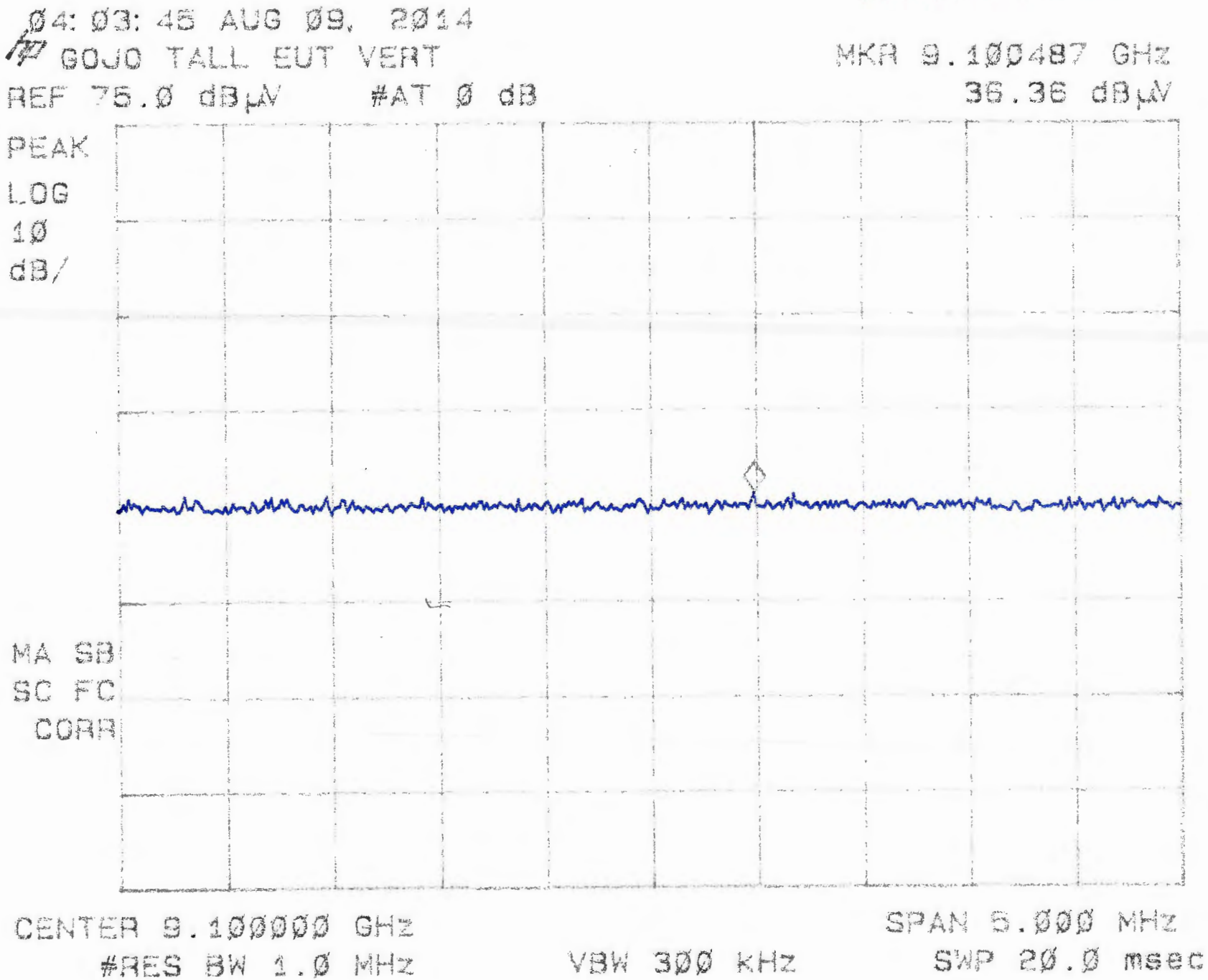
Azimuth 280°


03: 55: 10 AUG 09, 2014
GOJO TALL EUT VERT
MKR 7.282475 GHz
REF 75.0 dBµV
#AT 0 dB
37.30 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 7.280000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec

Azimuth 80°


03: 59: 02 AUG 09, 2014
GOJO TALL EUT VERT
REF 75.0 dBµV
#AT 0 dB
MKR 8.189137 GHz
38.16 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 8.190000 GHz
#RES BW 1.0 MHz
VBW 300 kHz
SPAN 5.000 MHz
SWP 20.0 msec

Azimuth 25°


04: 03: 45 AUG 09, 2014
GOJO TALL EUT VERT
MKR 9.100487 GHz
REF 75.0 dBµV
#AT 0 dB
36.36 dBµV
PEAK
LOG
10
dB/
MA SB
SC FC
CORR
CENTER 9.100000 GHz
SPAN 5.000 MHz
#RES BW 1.0 MHz
VBW 300 kHz
SWP 20.0 msec