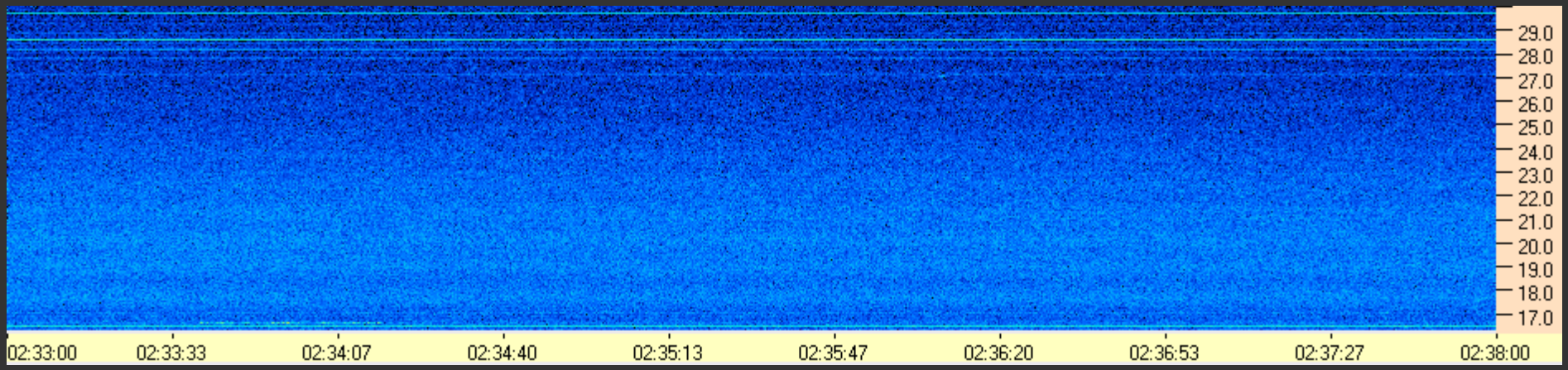
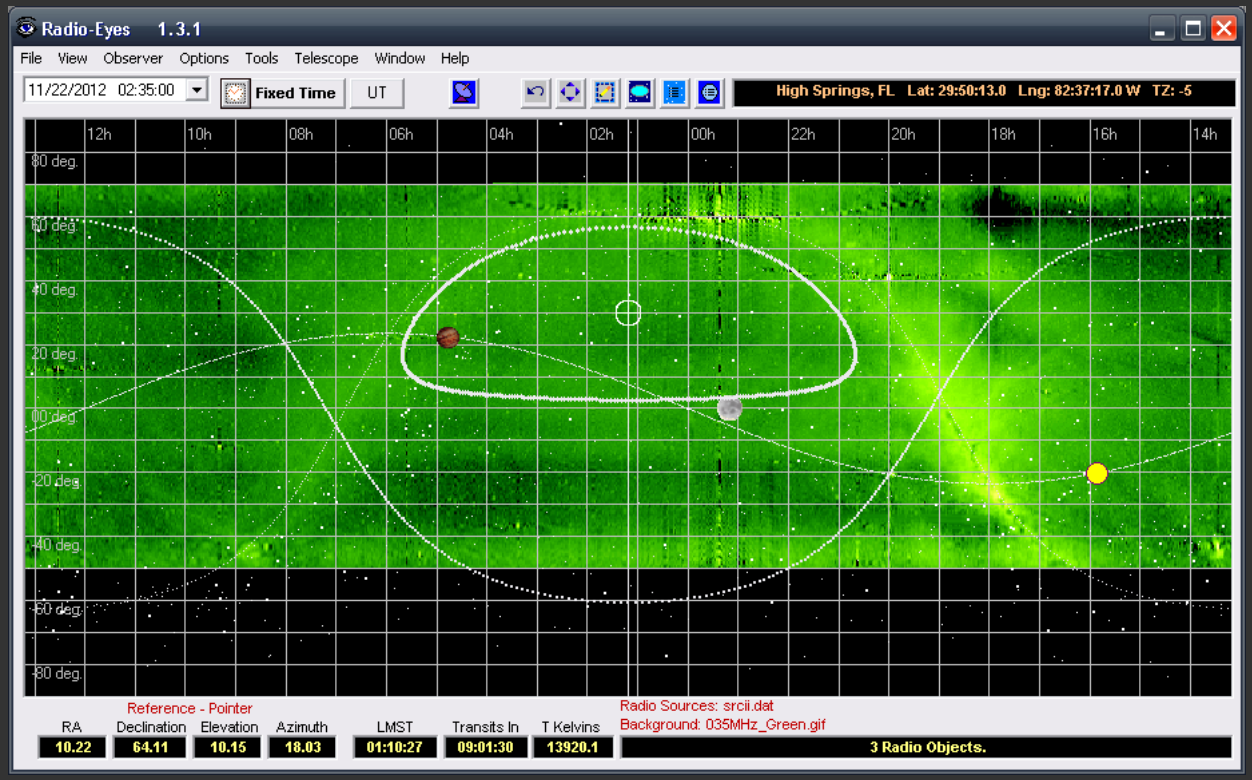
TFD #1 on FS-200 spectrograph, 22 Nov 2012 (UTC)

Is the temperature realistic?



Color Offset = 230
Color Gain = 1.2



TFD #1:
30' length, 8' spacing, 800 Ω term.
Top wire 9'2" height.
Element wires in N-S vertical plane.
Fed thru custom 16:1 dual balun.

Per EZNEC model:
N-S HPBW: 54°
E-W HPBW: 127°
Beam centerline at zenith.

AJ4CO OBSERVATORY

TFD Galactic Background Analysis

Date 21-Nov-2012

Technician Dave Typinski, AJ4CO

Test Equipment

Array Solutions VNA-2180 vector network analyzer, S/N 5249
Acer Aspire 5570Z laptop computer
VNA software version 530D

Device(s) Under Test

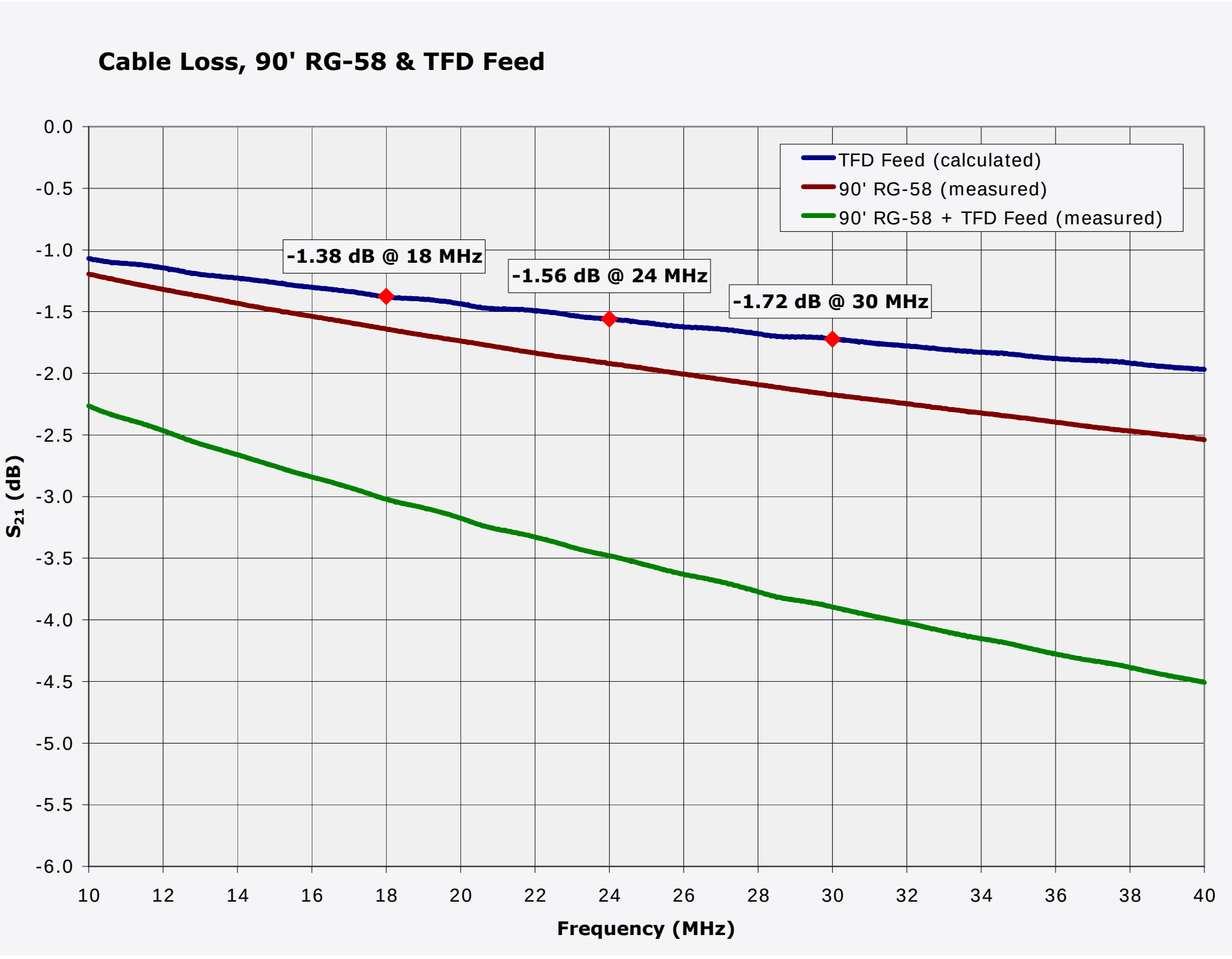
TFD #1, Dual balun, FS-200 Spectrograph

Test Results Directory

Test No.	Date	Calibration File		Data File	Calibration Plane	Notes
1	11/21/12	n/a	†	121122023214.csv; 5 min segment from 121122023214.sps	n/a	Galactic background
2	11/22/12	Cal 036.acal		01 - Cal 036 check_B.csv	VNA Ports A & B	Calibration sweep
3	"	"	†	02 - 90ft cable S21_B.csv	"	
4	"	"	†	03 - 90ft cable + TFD feed S21_B.csv	"	
5	11/3/12	Cal 32.bcal	†	S21, Balun 4, VNA Port A on balun Side A, VNA Port B on balun Side B_B.csv		Balun S21
6	"	Cal 33.acal	†	13 TFD Balun 4 Side A.csv	End of 90' RG-58	SWR as installed

† Indicates data plotted on following pages

Test 1:
Antenna temperature calibration plane is antenna end of coax (includes feed line loss); does *not* include balun insertion loss or loss due to feedpoint SWR.


Cable Loss, 90' RG-58 & TFD Feed
TFD Feed (calculated)
90' RG-58 (measured)
90' RG-58 + TFD Feed (measured)
-1.38 dB @ 18 MHz
-1.56 dB @ 24 MHz
-1.72 dB @ 30 MHz
S21 (dB)
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
-4.5
-5.0
-5.5
-6.0
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Frequency (MHz)

AJ4CO FS-200B + Radio-Sky Spectrograph Step Calibration

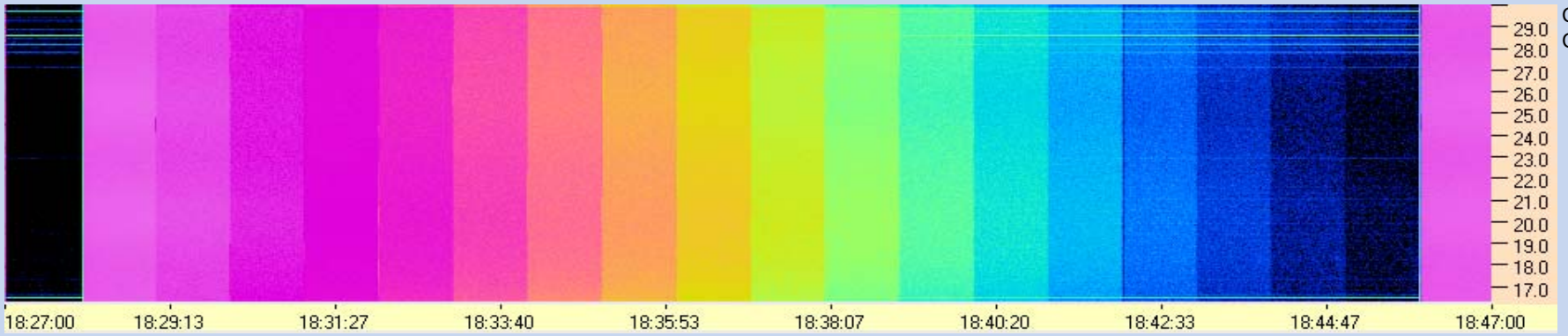
11/22/2012

HP461A noise source + Kay 431D step attenuator direct to spectrograph input

T0 (K)	**290**		**RSS Color Offset**	**210**	**250**	**230**	**180**
Noise source temperature (MK)	**68.2**		**RSS Color Gain**	**1.25**	**0.70**	**1.20**	**1.40**
Feed loss to antenna (dB)	**1.56**	**TFD FEED** @ 24 MHz		↓	↓	↓	↓

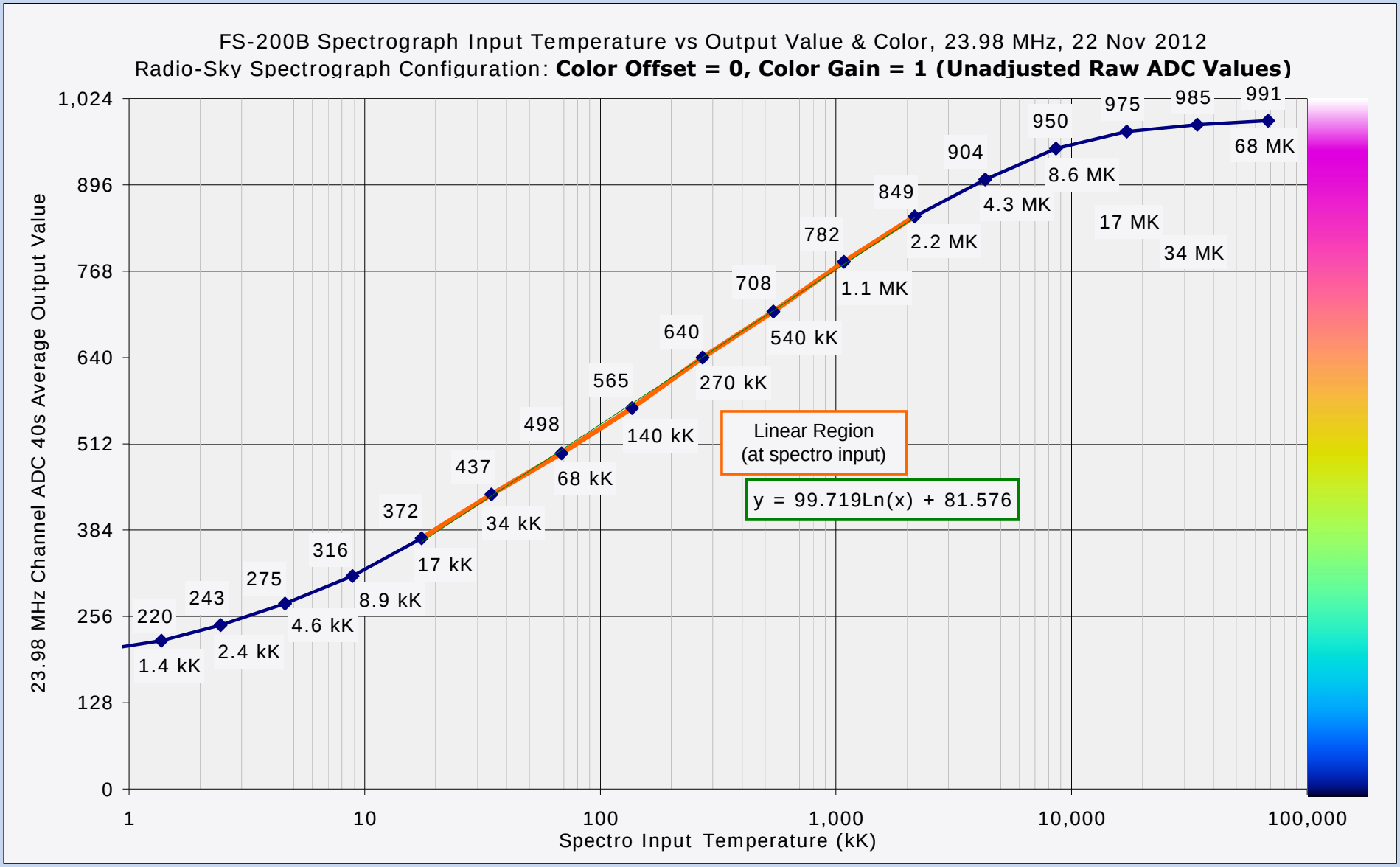
Att. dB	Source Temp (kK)	Equiv. Ant. Temp. (kK)	40 s Avg. @ 23.98 MHz	ADC Units/dB	Average Units/dB	Adjusted Value	Adjusted Value	Adjusted Value	Adjusted Value
0	68,200	97,680	991			976	519	913	1024
3	34,180	48,950	985	2		969	515	906	1024
6	17,130	24,530	975	3		956	508	894	1024
9	8,586	12,300	950	8		925	490	864	1024
12	4,303	6,163	904	15		868	458	809	1014
15	2,157	3,089	849	18		799	419	743	937
18	1,081	1,548	782	22	**Linear Region**	715	372	662	843
21	542.0	776.2	708	25		623	321	574	739
24	271.8	389.2	640	23		538	273	492	644
27	136.4	195.3	565	25		444	221	402	539
30	68.49	98.00	498	22		360	174	322	445
33	34.47	49.28	437	20		284	131	248	360
36	17.42	24.86	372	22	**22.7**	203	85	170	269
39	8.876	12.62	316	19		133	46	103	190
42	4.593	6.491	275	14		81	18	54	133
45	2.447	3.417	243	11		41	0	16	88
48	1.371	1.876	220	8		13	0	0	56
51	0.832	1.104	208	4		0	0	0	39
n/a	0.290	0.328	186			0	0	0	8
0	68,200	97,680	991			976	519	913	1024

Drift = 0.00 dB, 0.0%



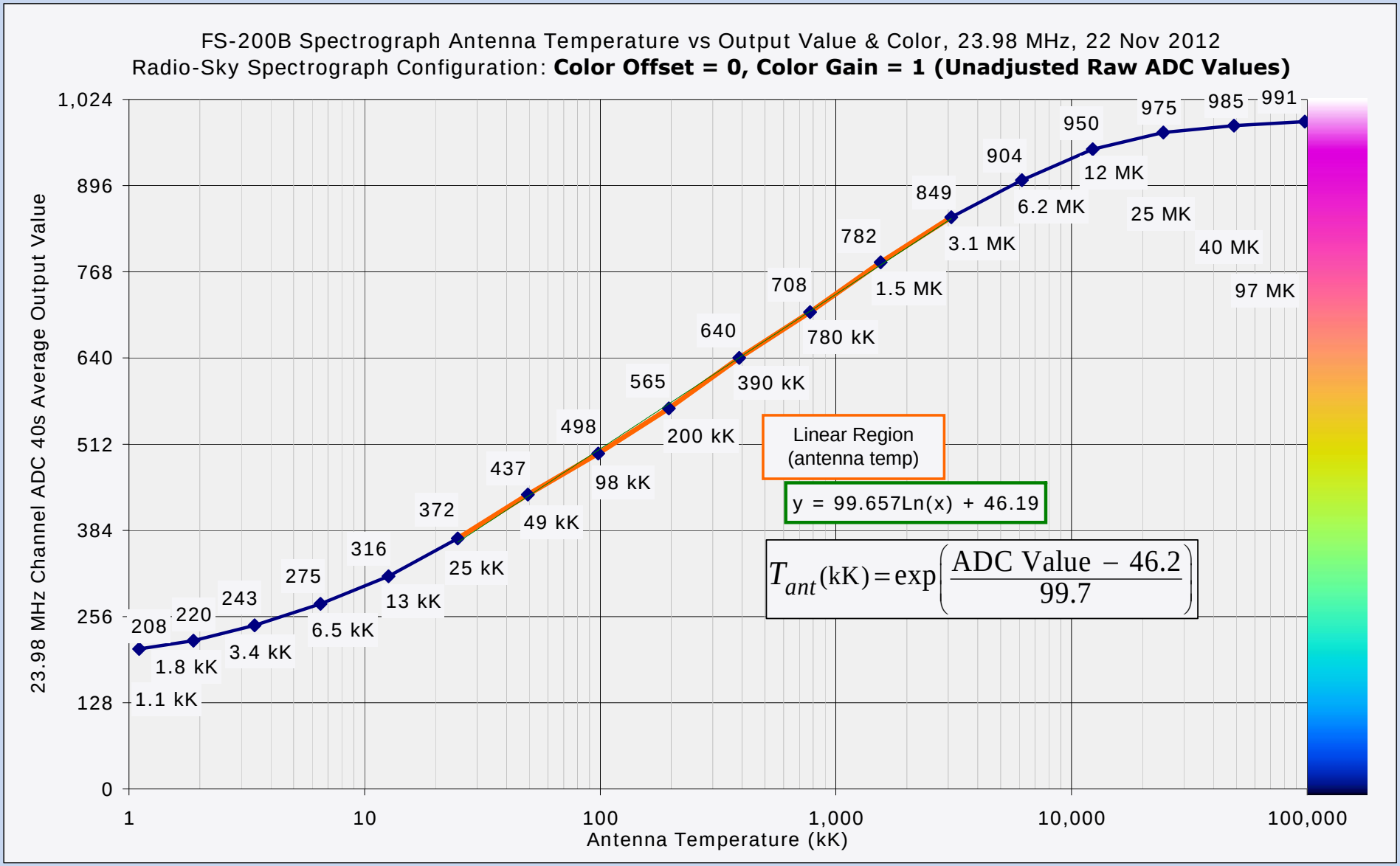
AJ4CO FS-200B + Radio-Sky Spectrograph Step Calibration

11/22/2012



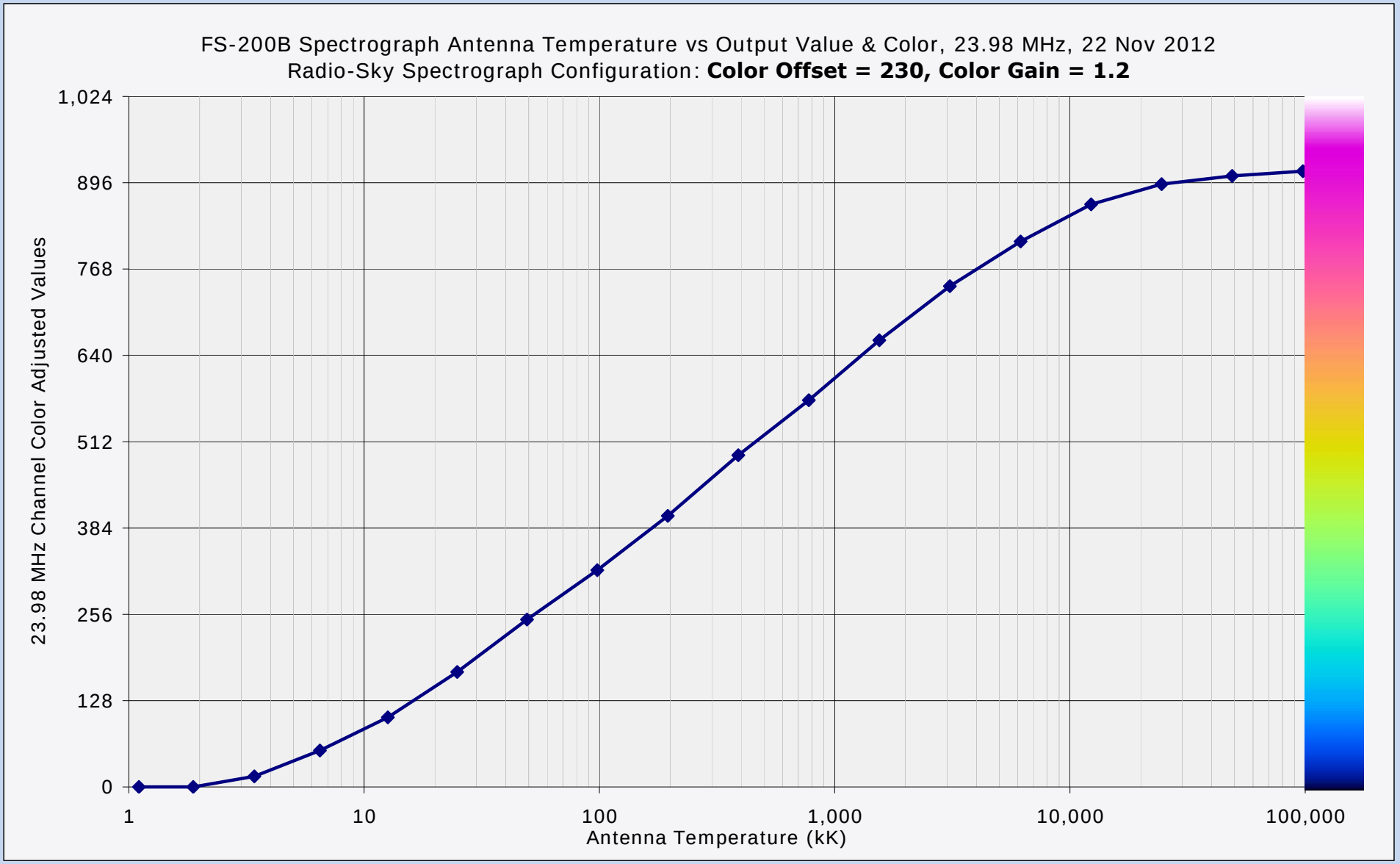
AJ4CO FS-200B + Radio-Sky Spectrograph Step Calibration

11/22/2012



AJ4CO FS-200B + Radio-Sky Spectrograph Step Calibration

11/22/2012

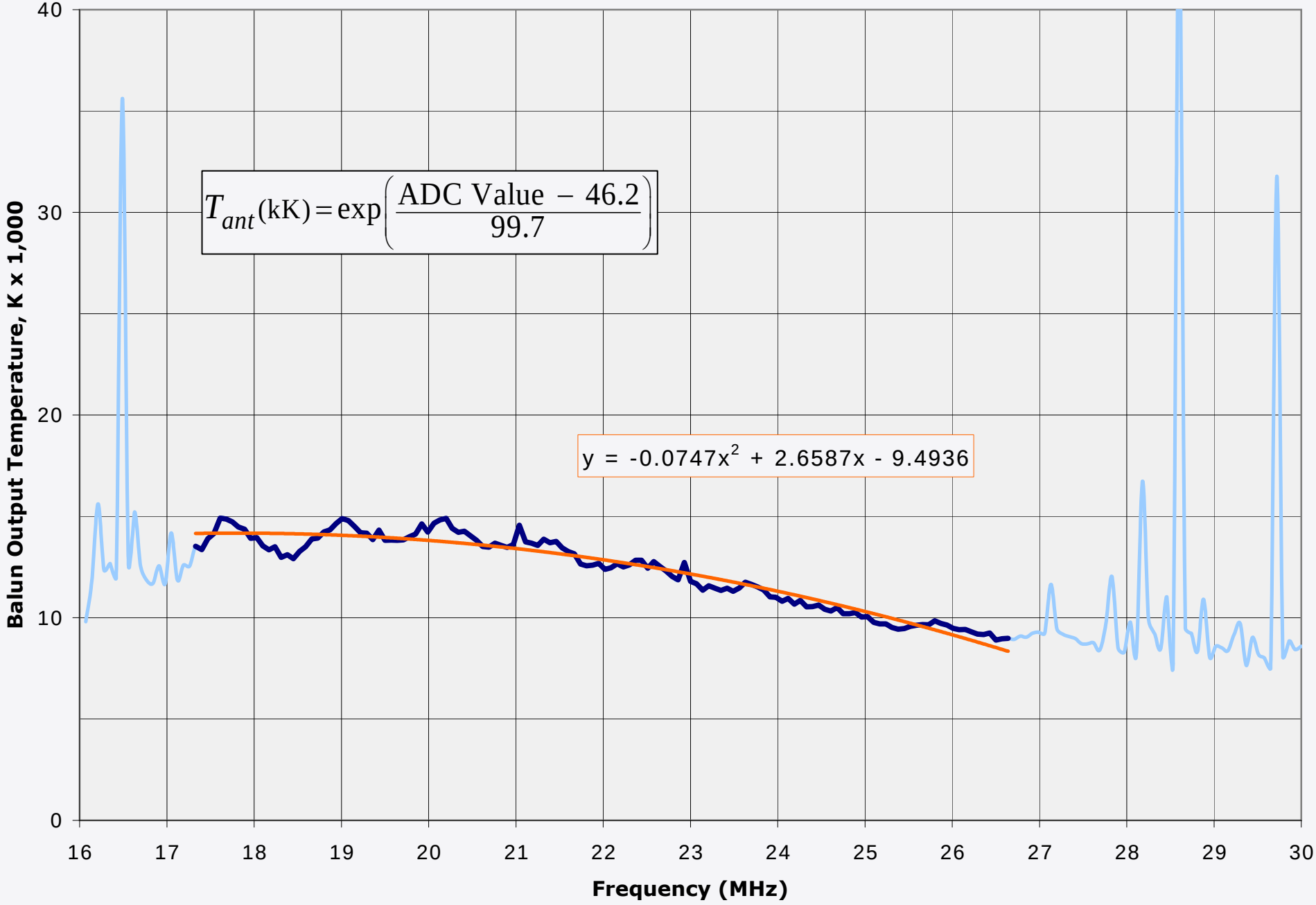


TFD #1 Galactic Background

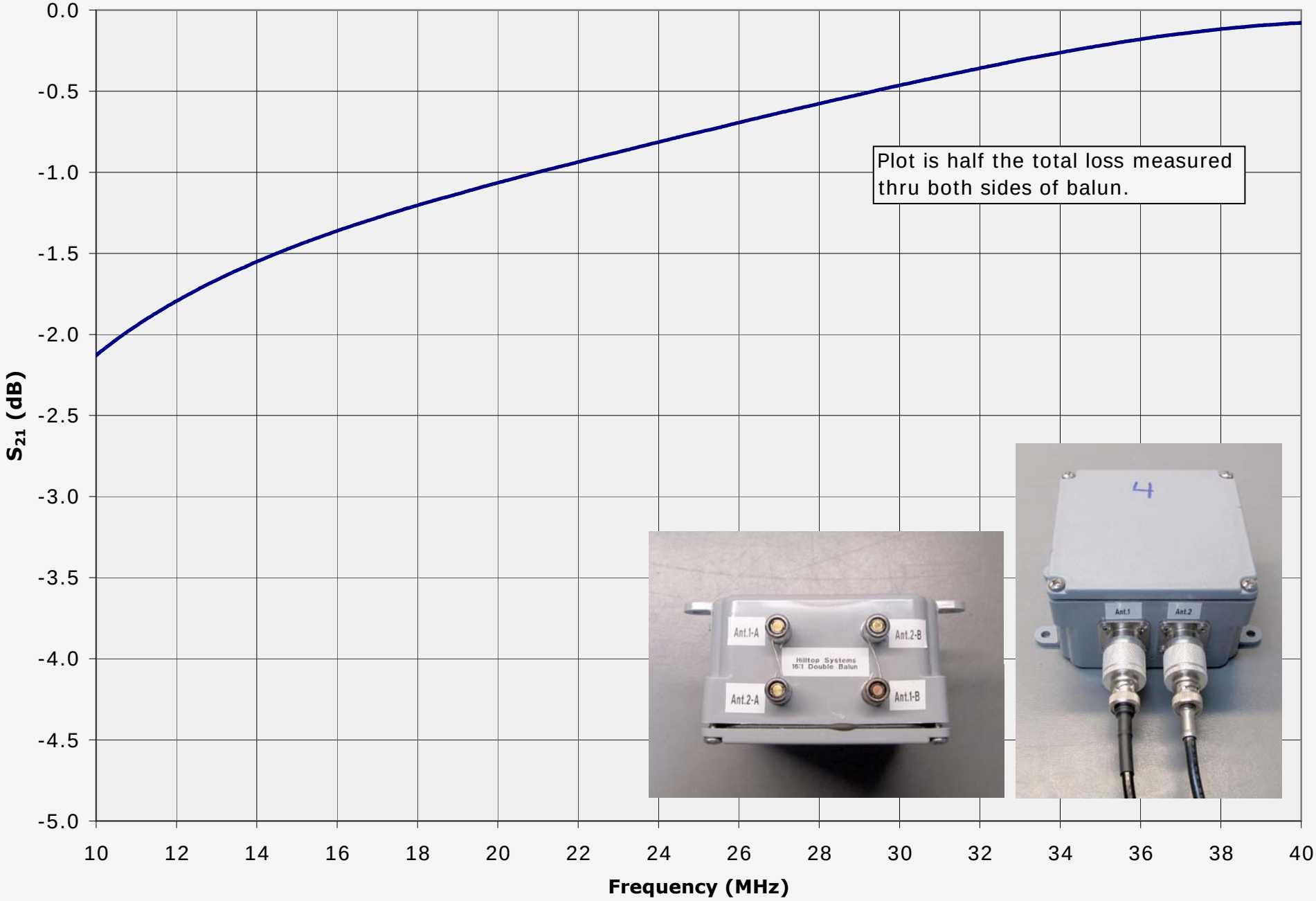
Referenced to Balun Output

0233 UTC 21 Nov 2012

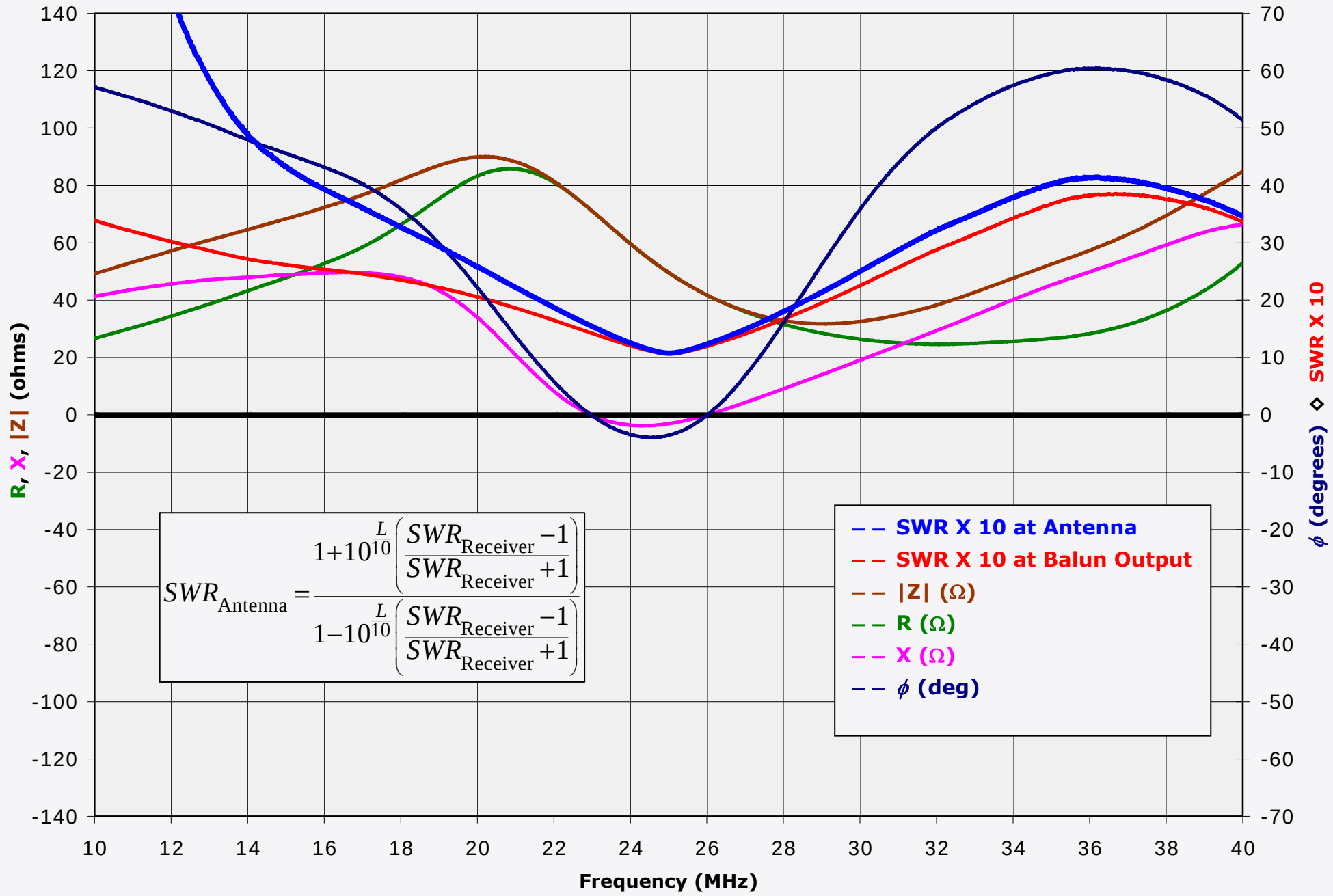
5 Minute Average (3,190 samples)



S_{21}, Balun 4, VNA Port A on balun Side A, VNA Port B on balun Side B

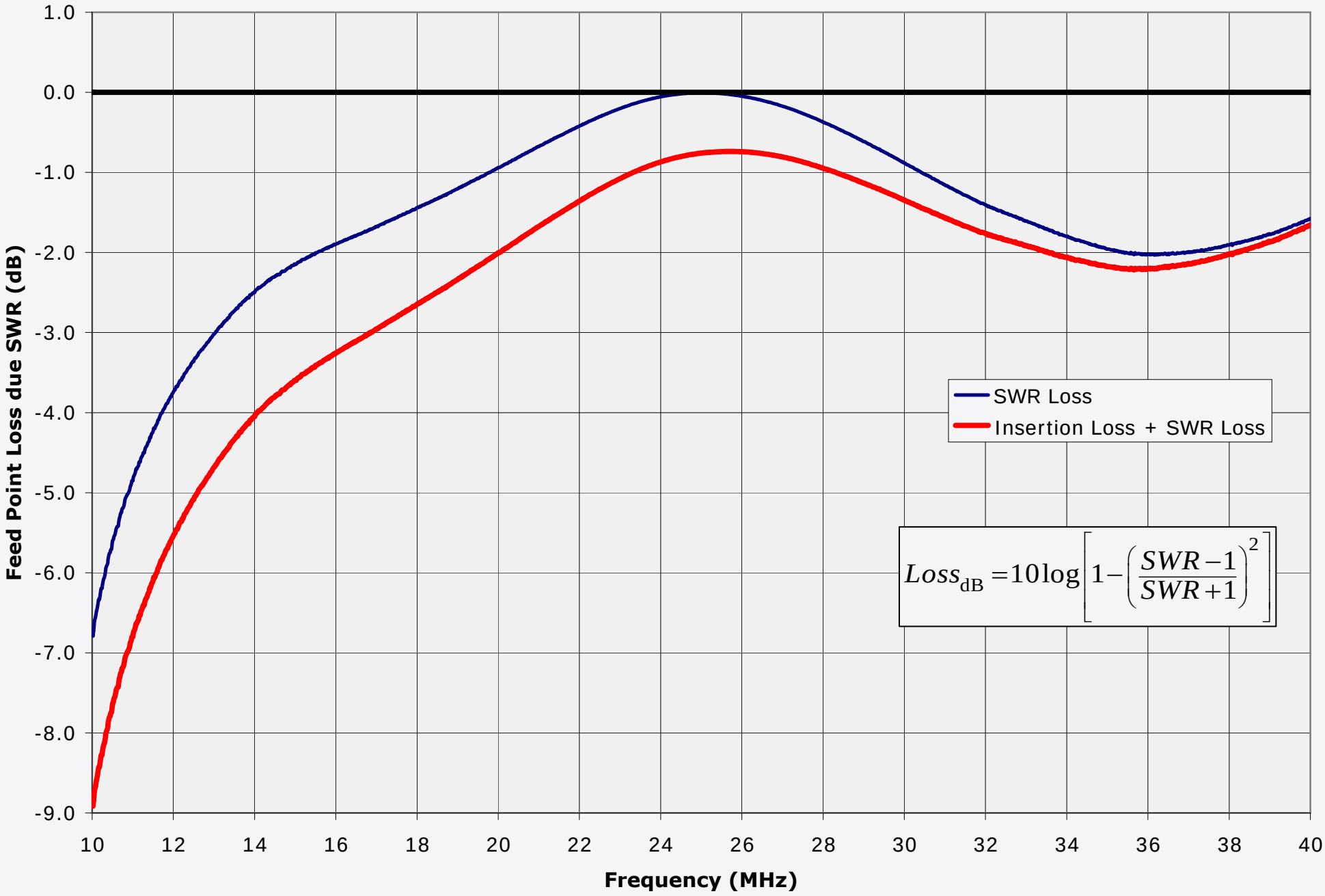


Looking into TFD balun, Side 1, as installed on antenna



Feed Point Losses

Balun Insertion Loss + Loss Due to Feed Point SWR



Galactic Background: Predicted and Observed