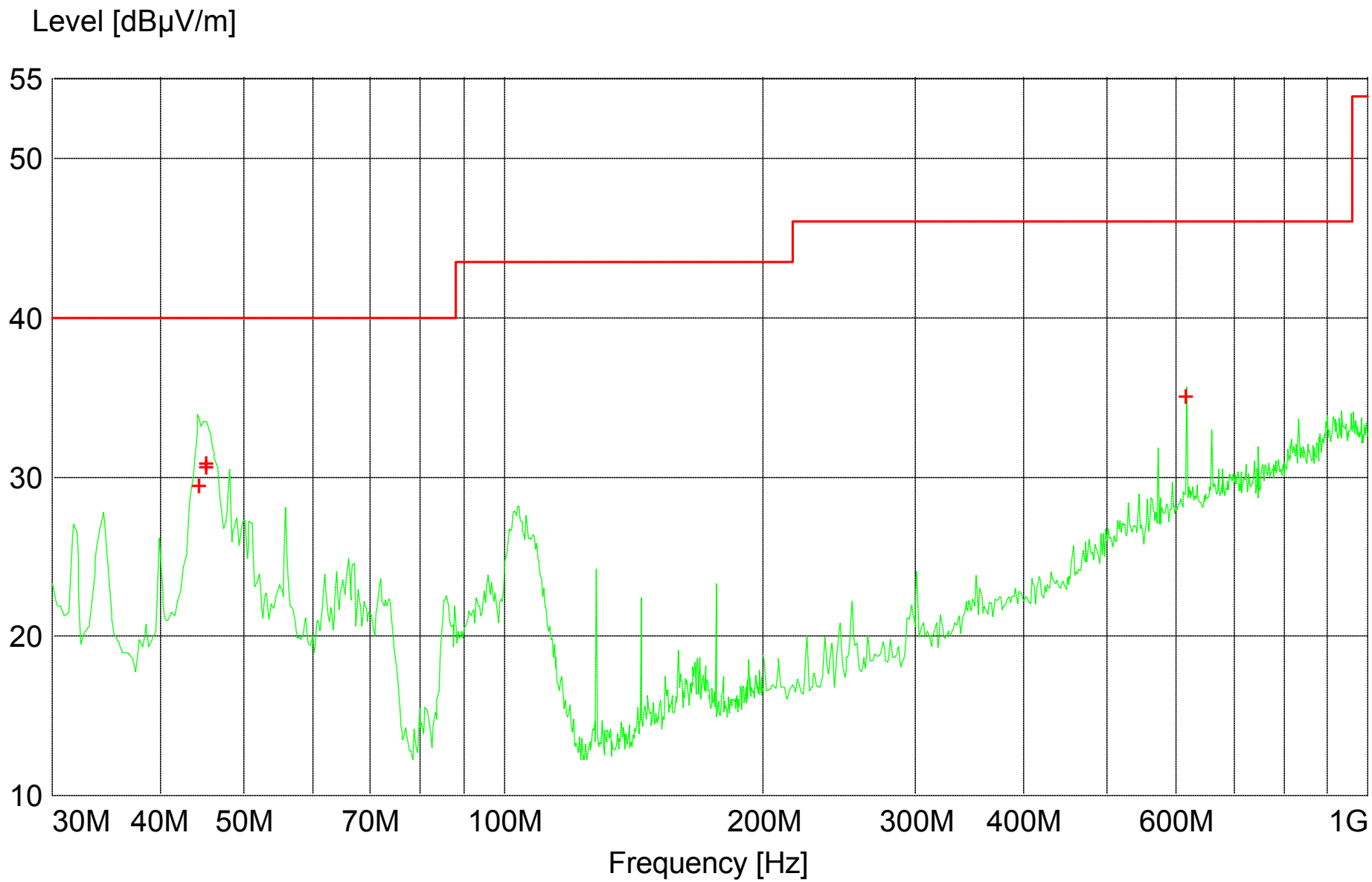


+ + + MES + glc032305b_fin QP
MES glc032305b_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

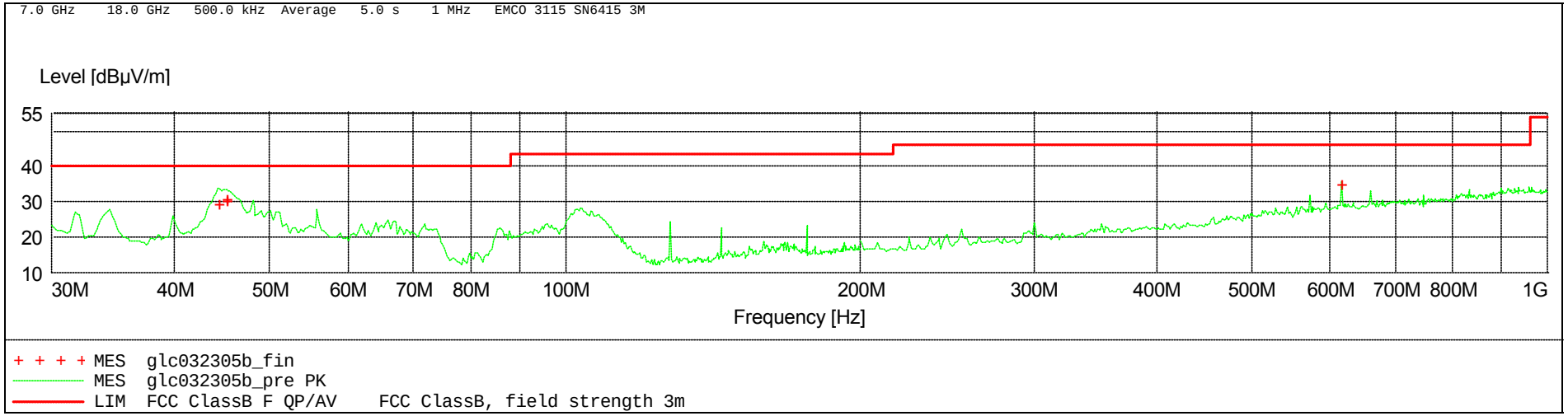
030905-05

Field strength

```
EUT:                  AS-20 with freezer controlers
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch1
Start of Test:        3/23/2005 / 3:25:28PM
```

SCAN TABLE: "FCC ClassB Field fin"

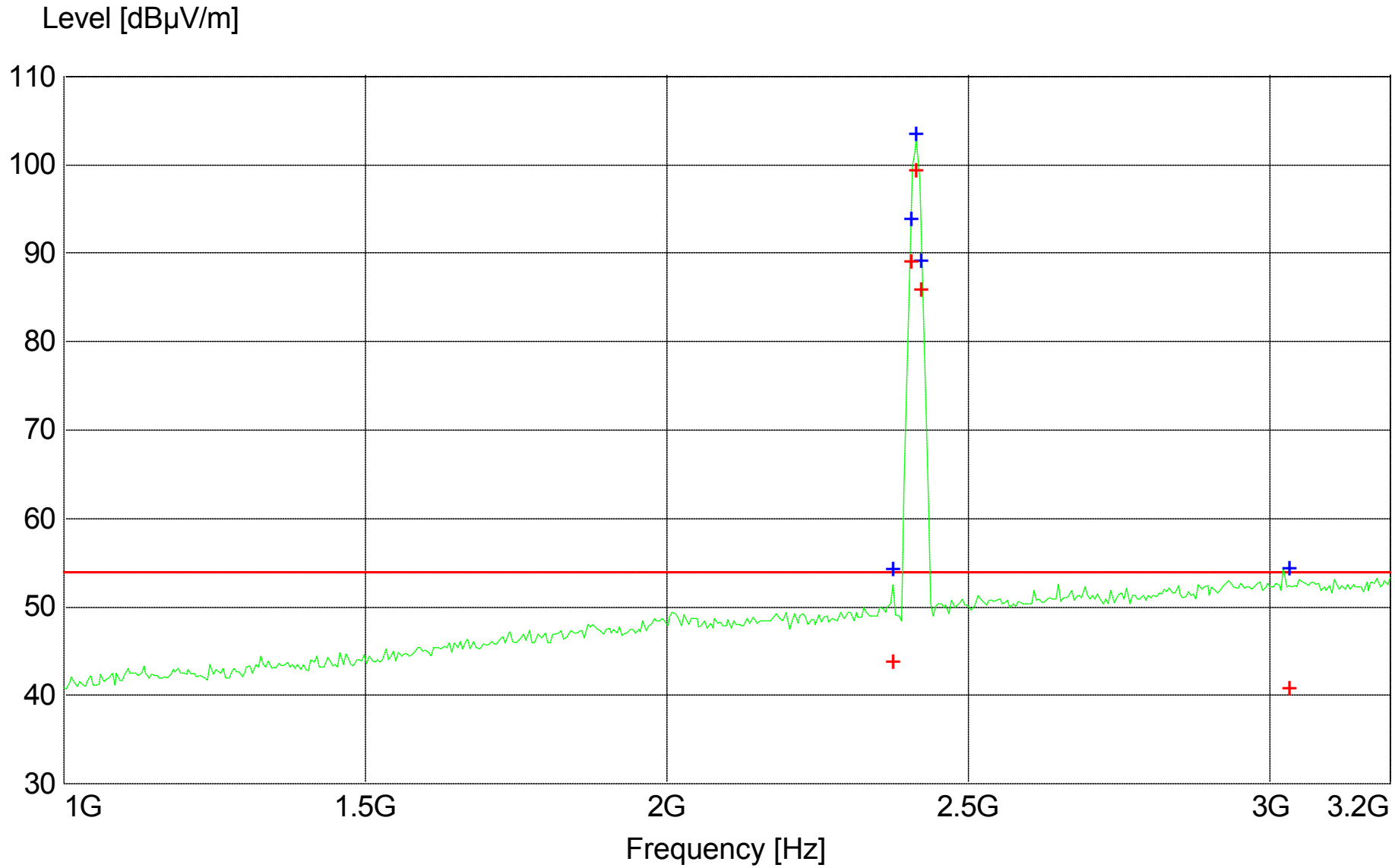
```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "glc032305b_fin QP"

3/23/2005 3:45PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
44.340000	29.42	17.41	11.2	-0.8	40.0	10.6	102.0	287	VERT
45.120000	30.65	18.87	11.0	-0.8	40.0	9.4	145.0	341	VERT
45.240000	30.88	19.13	10.9	-0.8	40.0	9.1	100.0	359	VERT
616.020000	35.02	11.06	20.8	-3.2	46.0	11.0	121.0	358	HORI



+ + + MES + gcs031405d_fin AV
+ + + MES + gcs031405d_fin Pk
MES gcs031405d_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

030905-05

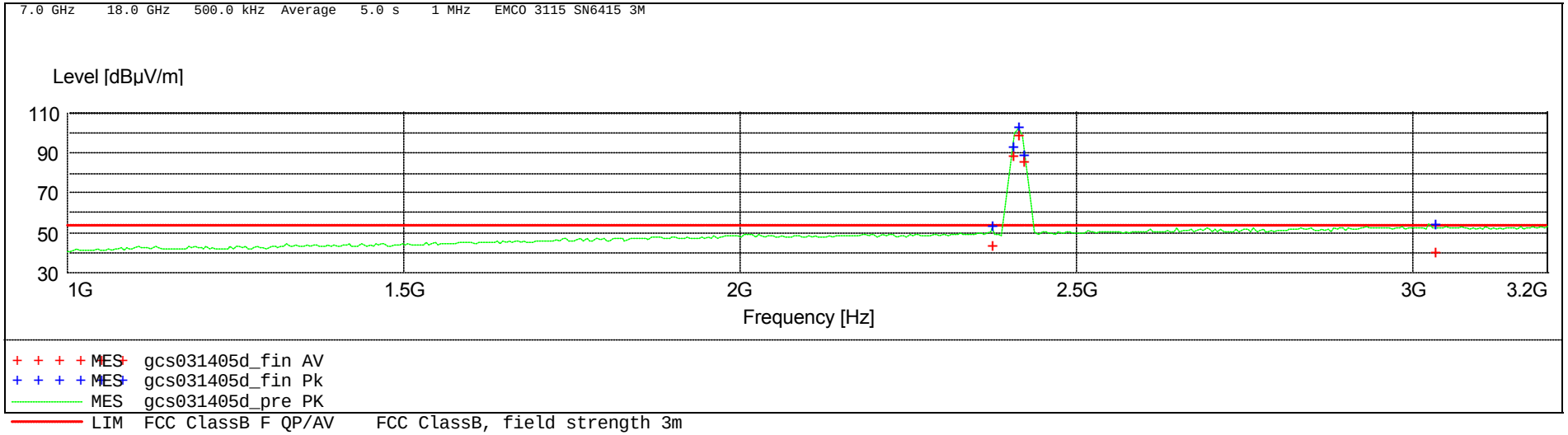
Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch1 2Mbps
Start of Test:        3/14/2005 / 5:24:47PM
```

SCAN TABLE: "FCC ClassB Field fin"

Short Description: FCC ClassB Field Strength fin

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	QuasiPeak	5.0 s	120 kHz	EMCO 3142 SN1654 3M
1.0 GHz	7.0 GHz	500.0 kHz	Average	5.0 s	1 MHz	EMCO 3115 SN6415 3M
			MaxPeak			
7.0 GHz	18.0 GHz	500.0 kHz	Average	5.0 s	1 MHz	EMCO 3115 SN6415 3M



MEASUREMENT RESULT: "gcs031405d_fin AV"

3/14/2005 5:49PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
2374.500000	43.75	9.13	28.2	-6.4	53.9	10.2	100.0	150	VERT
2406.000000	88.99	54.27	28.3	-6.4	53.9	-35.1	141.0	174	VERT
2413.000000	99.22	64.45	28.3	-6.5	53.9	-45.3	129.0	151	VERT
2420.000000	85.85	51.04	28.3	-6.5	53.9	-31.9	128.0	174	VERT
3032.000000	40.69	3.12	30.2	-7.4	53.9	13.2	105.0	288	HORI

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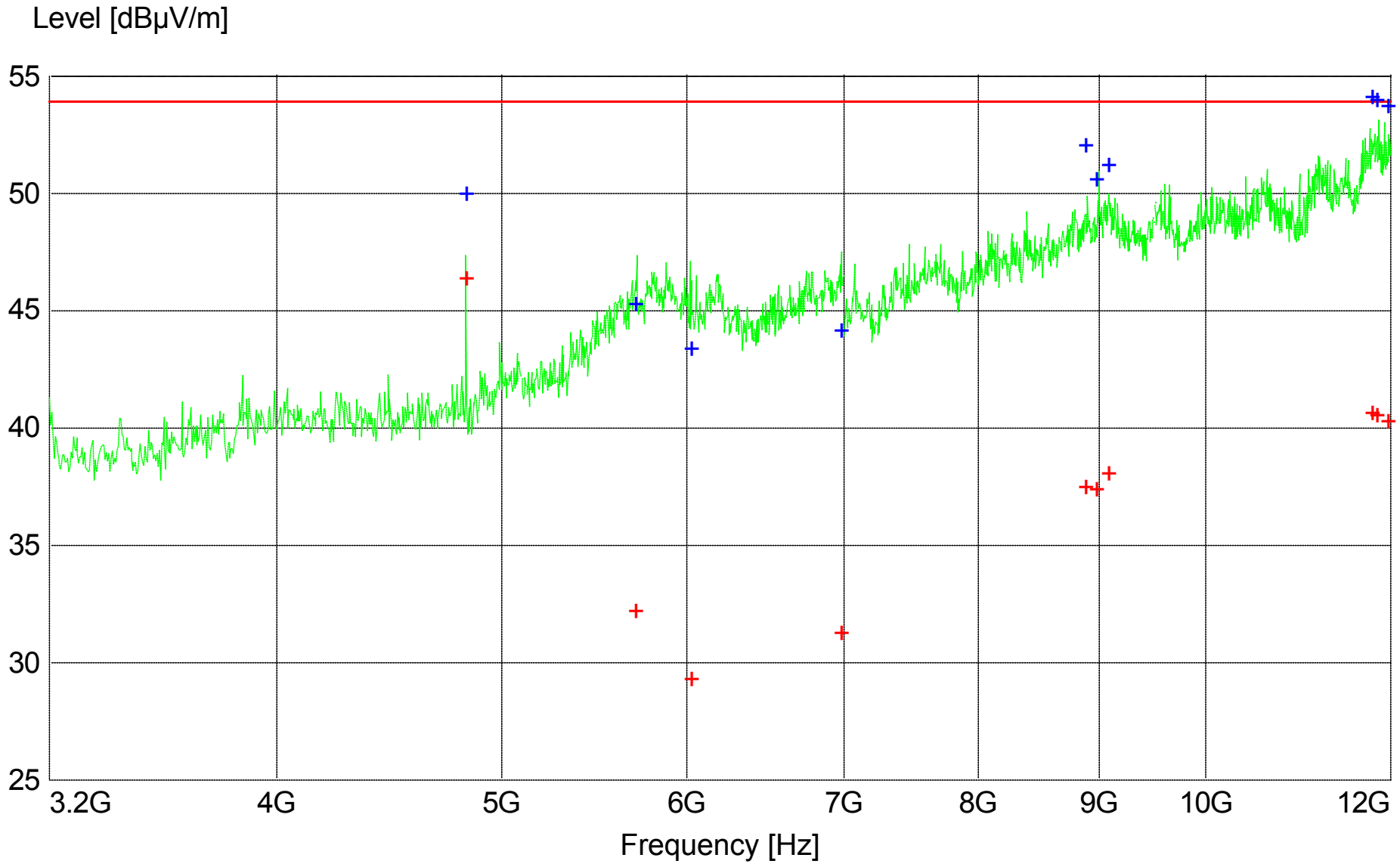


+ + + MES + gcs031105e_fin AV
+ + + MES + gcs031105e_fin Pk
MES gcs031105e_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

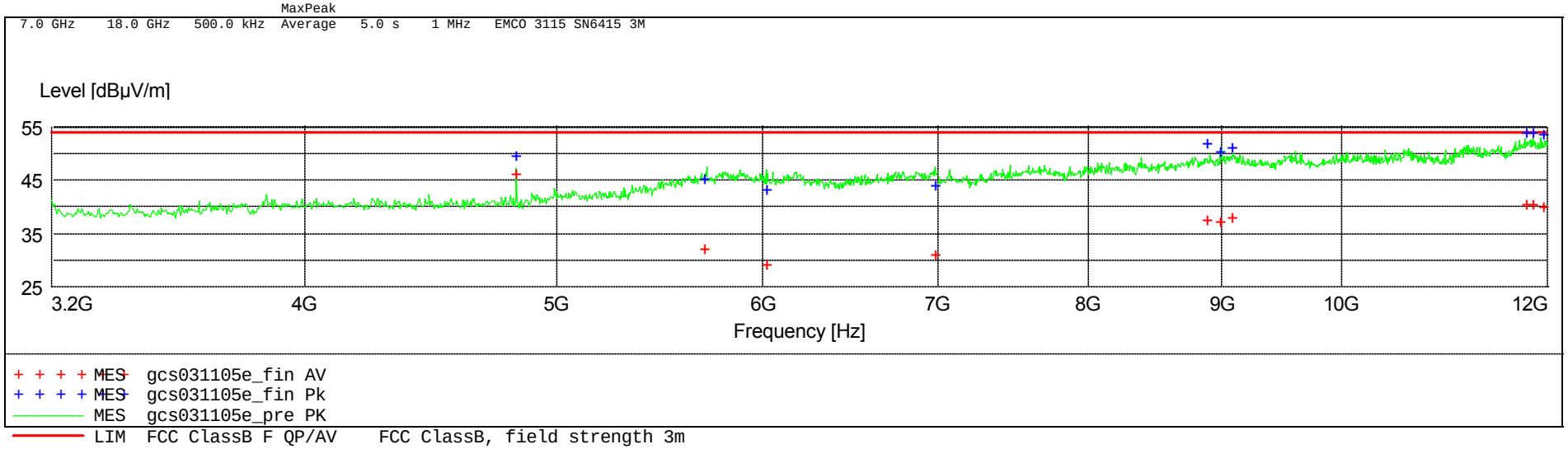
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch1
Start of Test:        3/11/2005 / 5:05:20PM
```

SCAN TABLE: "FCC ClassB Field fPA"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031105e_fin AV"

3/11/2005 5:51PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
4824.000000	46.35	34.82	33.0	21.5	53.9	7.6	99.0	261	VERT
5698.500000	32.16	15.34	34.2	17.4	53.9	21.7	100.0	151	HORI
6021.000000	29.27	12.32	34.4	17.4	53.9	24.6	201.0	358	HORI
6982.500000	31.25	14.42	35.3	18.4	53.9	22.6	250.0	209	HORI
8880.000000	37.49	16.25	37.8	16.6	53.9	16.4	149.0	277	HORI
8979.500000	37.37	15.58	37.9	16.1	53.9	16.5	299.0	110	HORI
9079.500000	38.00	16.24	37.9	16.2	53.9	15.9	249.0	248	VERT
11777.500000	40.61	16.48	39.1	14.9	53.9	13.3	149.0	70	VERT
11842.000000	40.49	16.48	39.1	15.1	53.9	13.4	100.0	44	HORI
11953.500000	40.21	16.06	39.2	15.0	53.9	13.7	250.0	134	HORI

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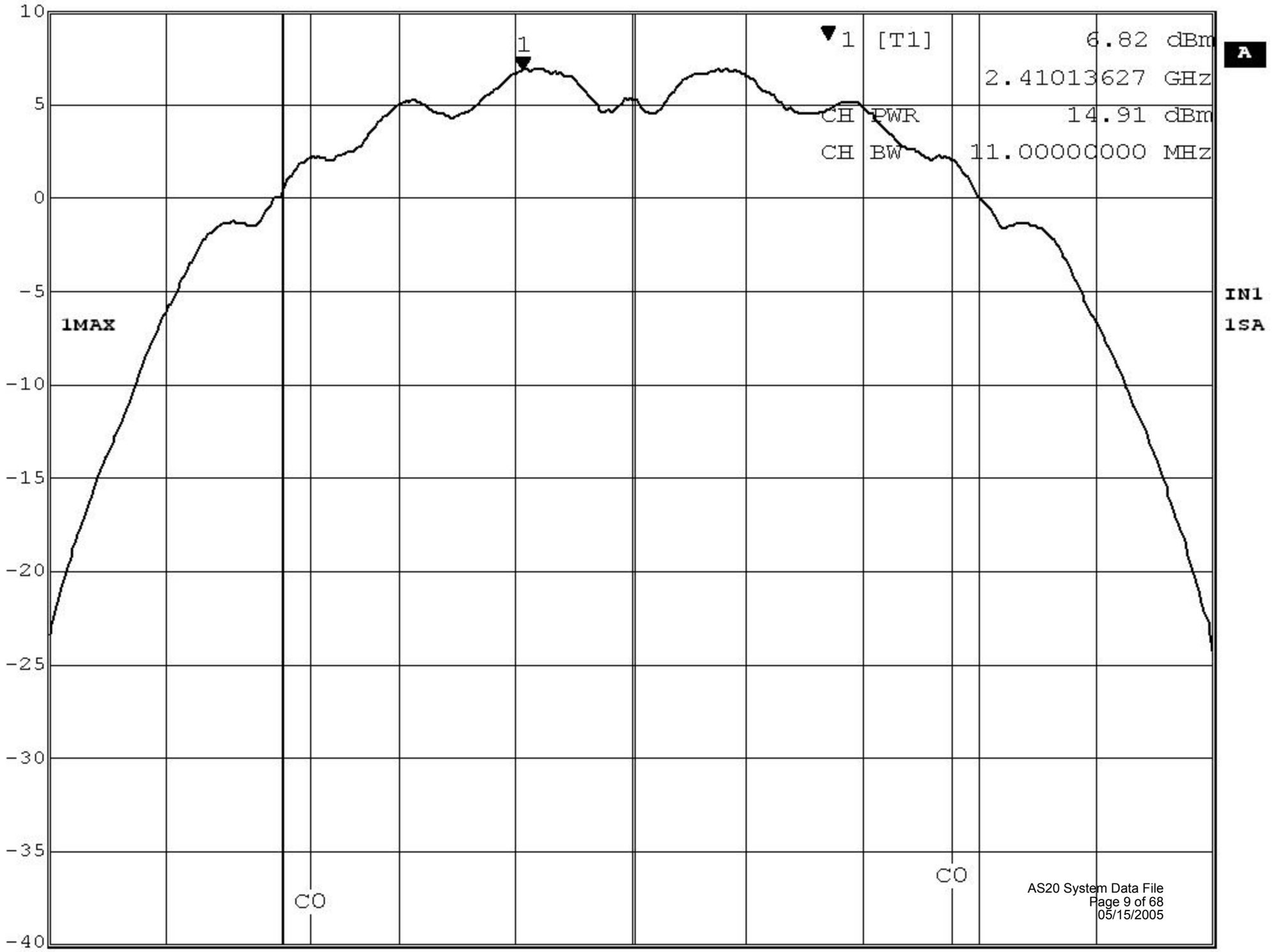
Marker 1 [T1] RBW 1 MHz RF Att 20 dB

Ref Lvl 6.82 dBm VBW 3 MHz

10 dBm 2.41013627 GHz SWT 5 ms Unit dBm



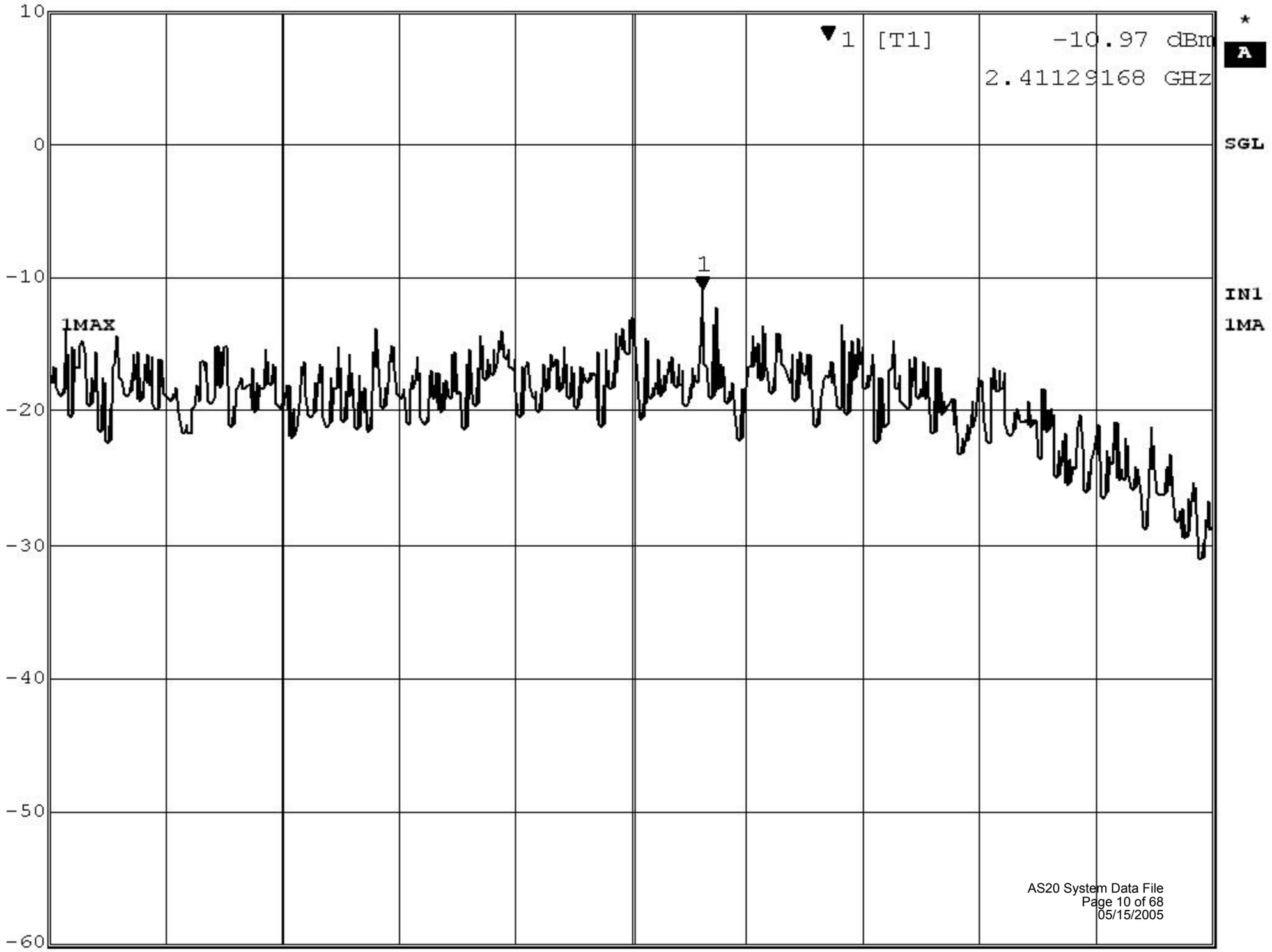
Center 2.412 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 15:05:44

Marker 1 [T1] RBW 3 kHz RF Att 20 dB

Ref Lvl -10.97 dBm VBW 30 kHz

10 dBm 2.41129168 GHz SWT 500 s Unit dBm



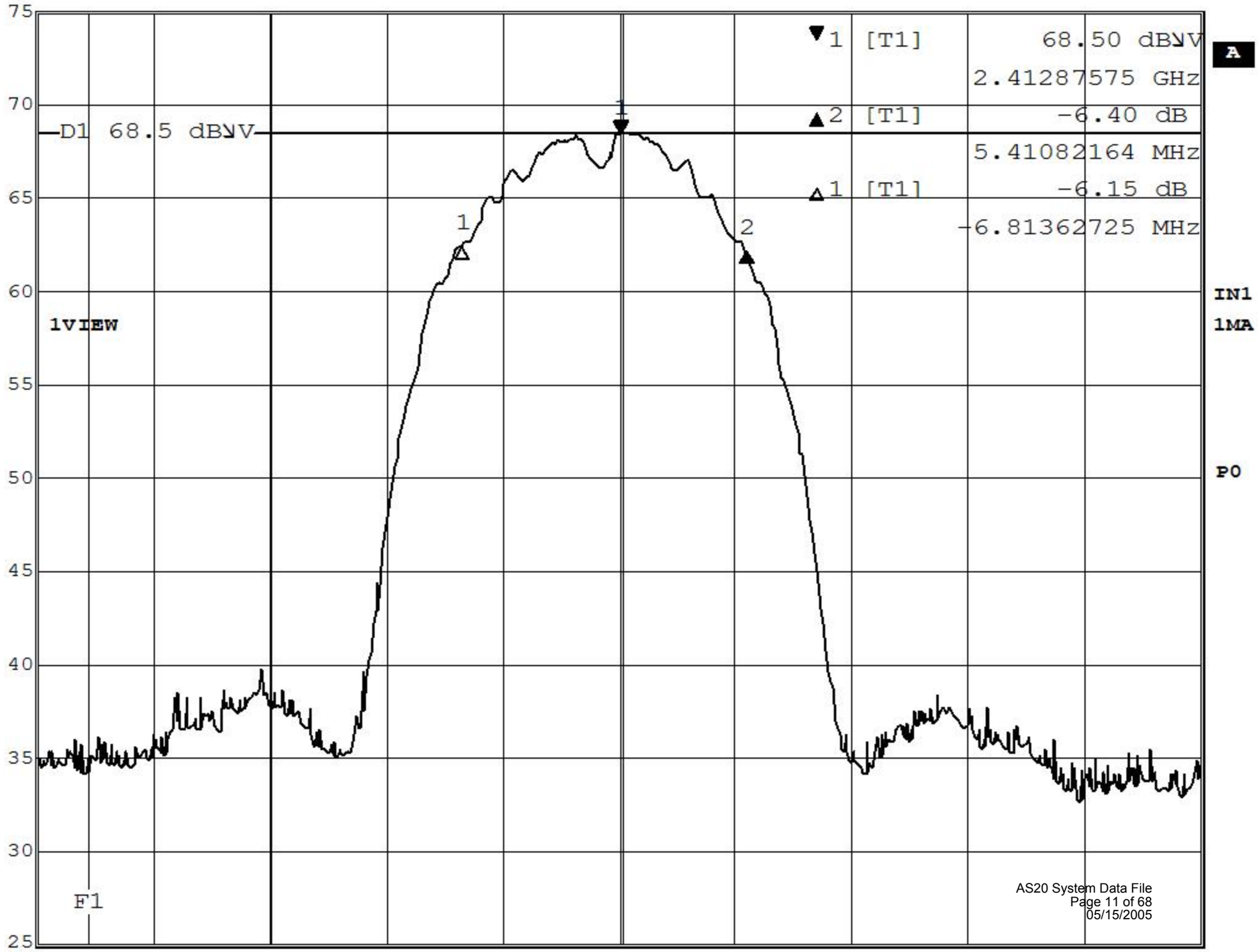
Center 2.4112 GHz 150 kHz/ Span 1.5 MHz

Date: 15.MAR.2005 16:52:49

Delta 2 [T1] RBW 1 MHz RF Att 10 dB

Ref Lvl -6.40 dB VBW 10 MHz

75 dBµV 5.41082164 MHz SWT 5 ms Unit dBµV



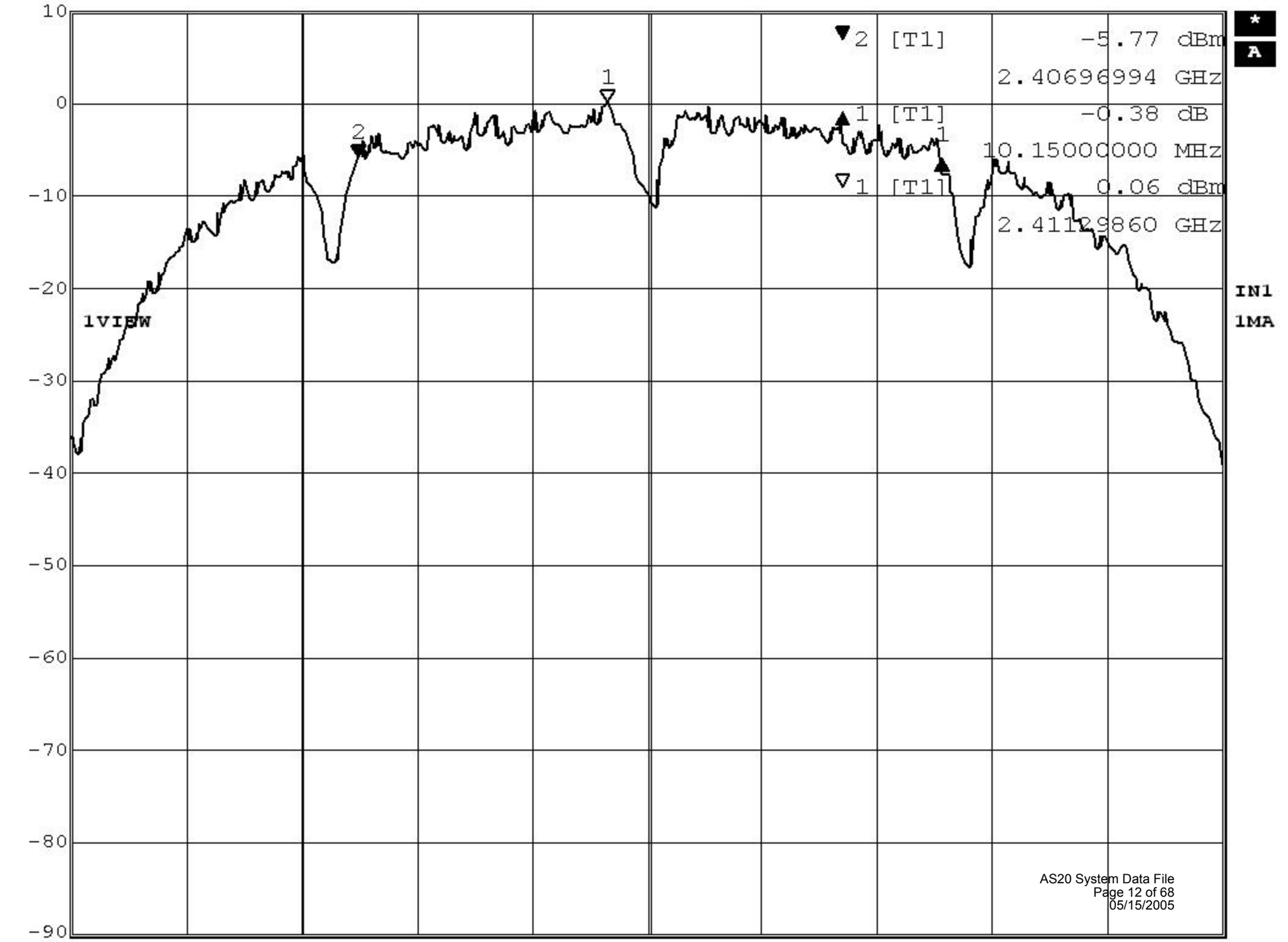
Center 2.412825651 GHz 5 MHz/ Span 50 MHz

Date: 14.MAR.2005 17:53:51

Delta 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -0.38 dB VBW 100 kHz

10 dBm 10.15000000 MHz SWT 5 ms Unit dBm



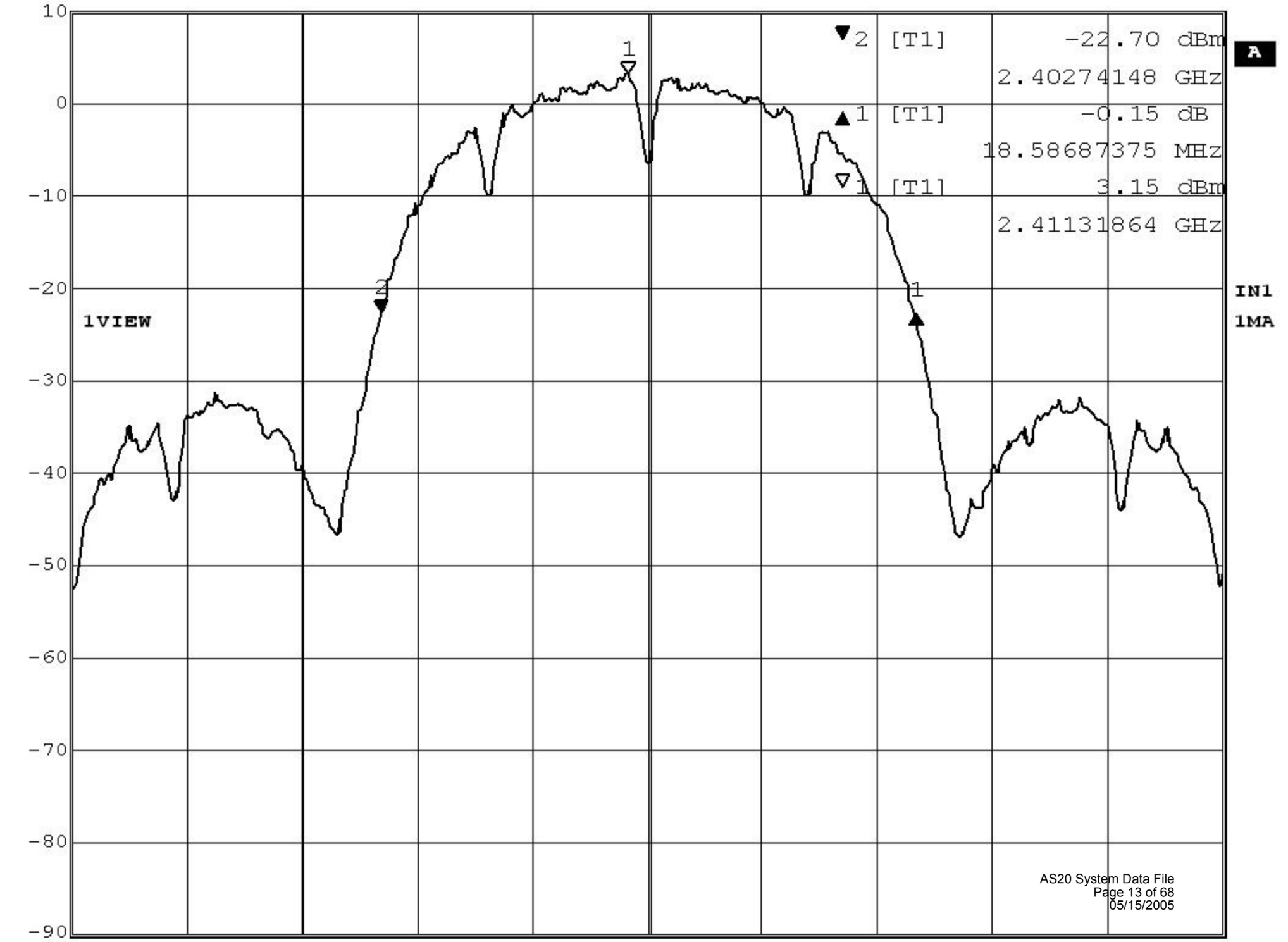
Center 2.412 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 14:46:39

Delta 1 [T1] RBW 300 kHz RF Att 20 dB

Ref Lvl -0.15 dB VBW 1 MHz

10 dBm 18.58687375 MHz SWT 5 ms Unit dBm



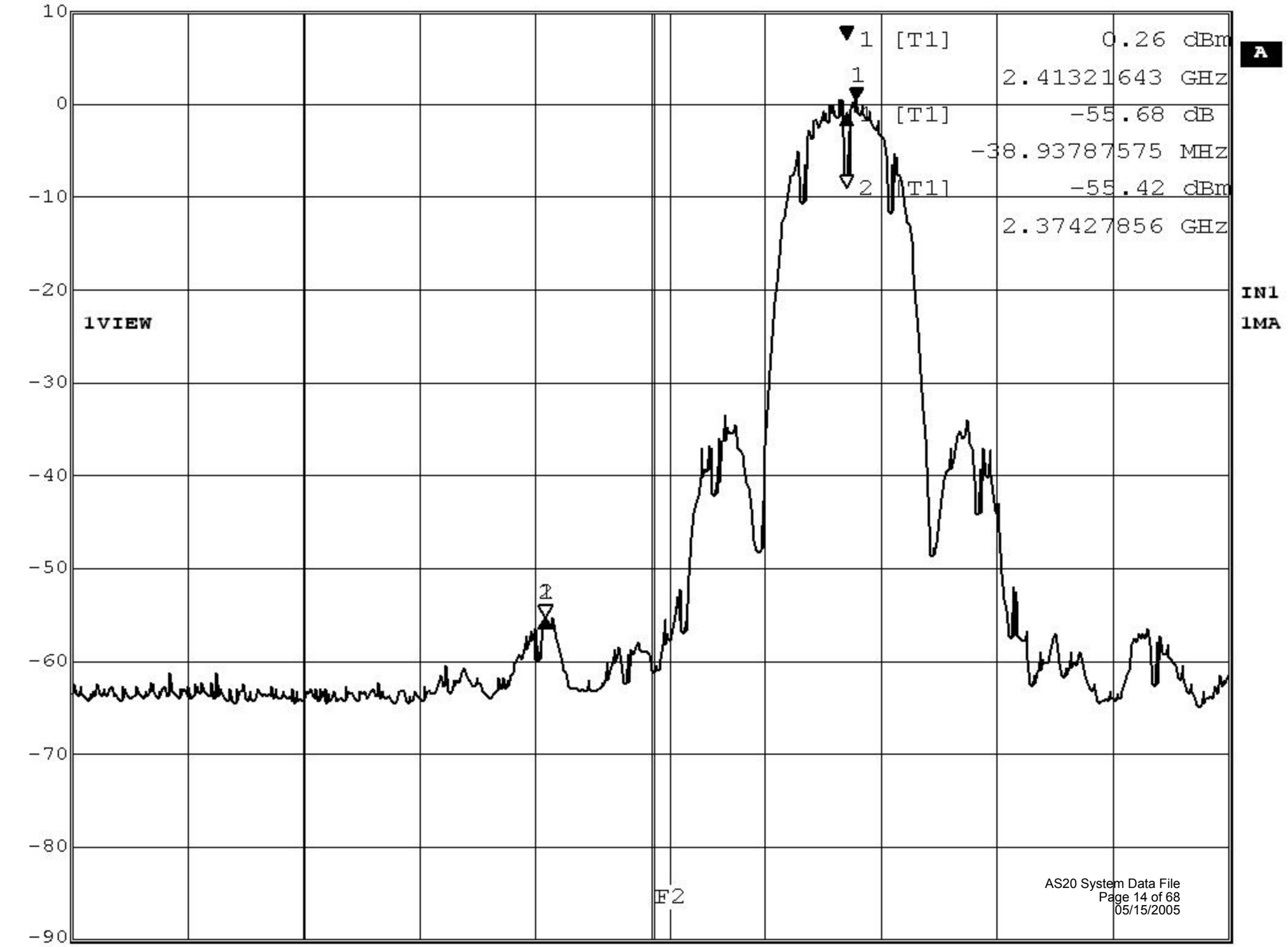
Center 2.412 GHz 4 MHz/ Span 40 MHz

Date: 15.MAR.2005 14:42:51

Delta 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -55.68 dB VBW 1 MHz

10 dBm -38.93787575 MHz SWT 37 ms Unit dBm



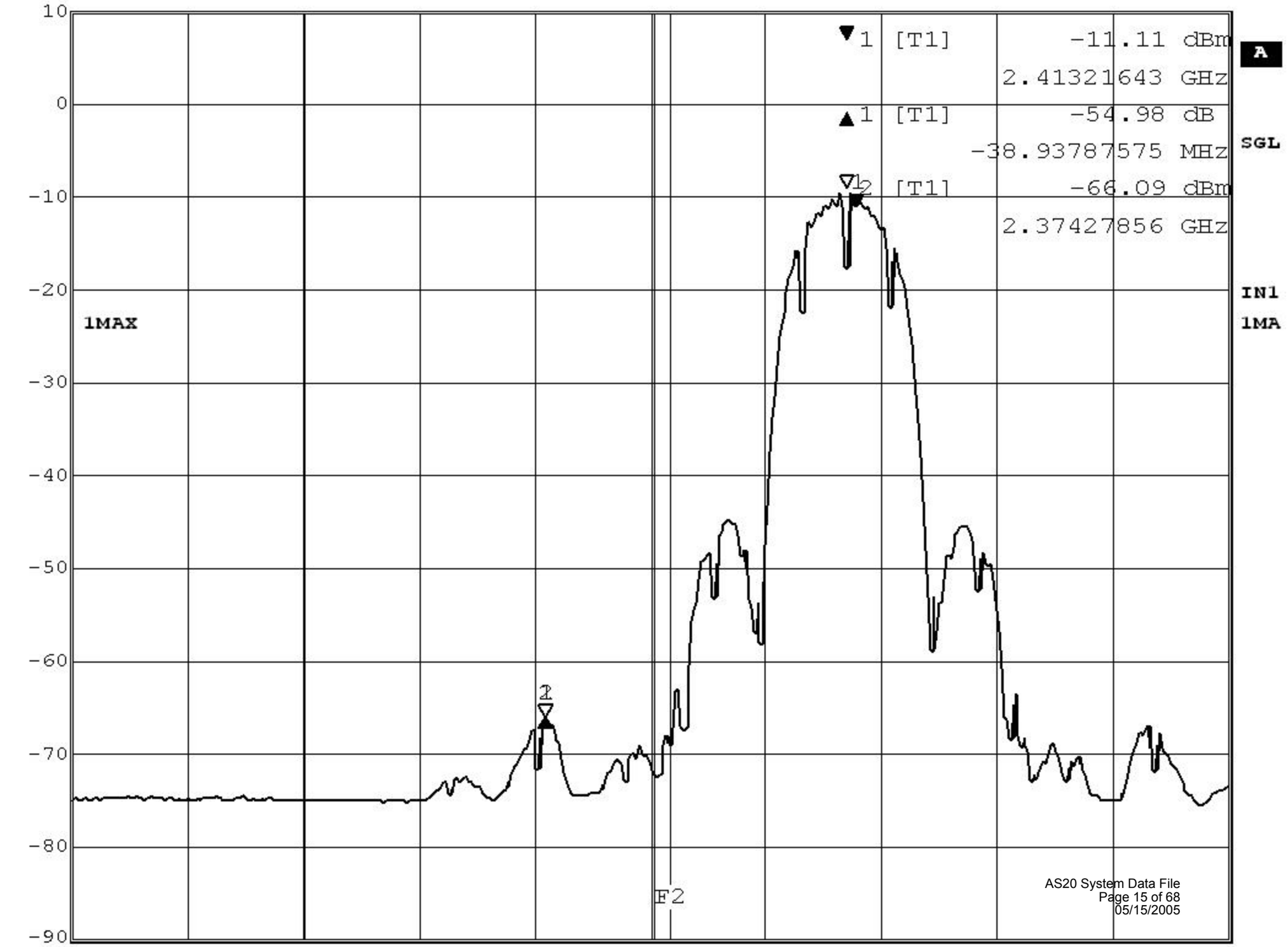
Center 2.3875 GHz 14.5 MHz/ Span 145 MHz

Date: 15.MAR.2005 14:27:15

Delta 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl -54.98 dB VBW 10 Hz

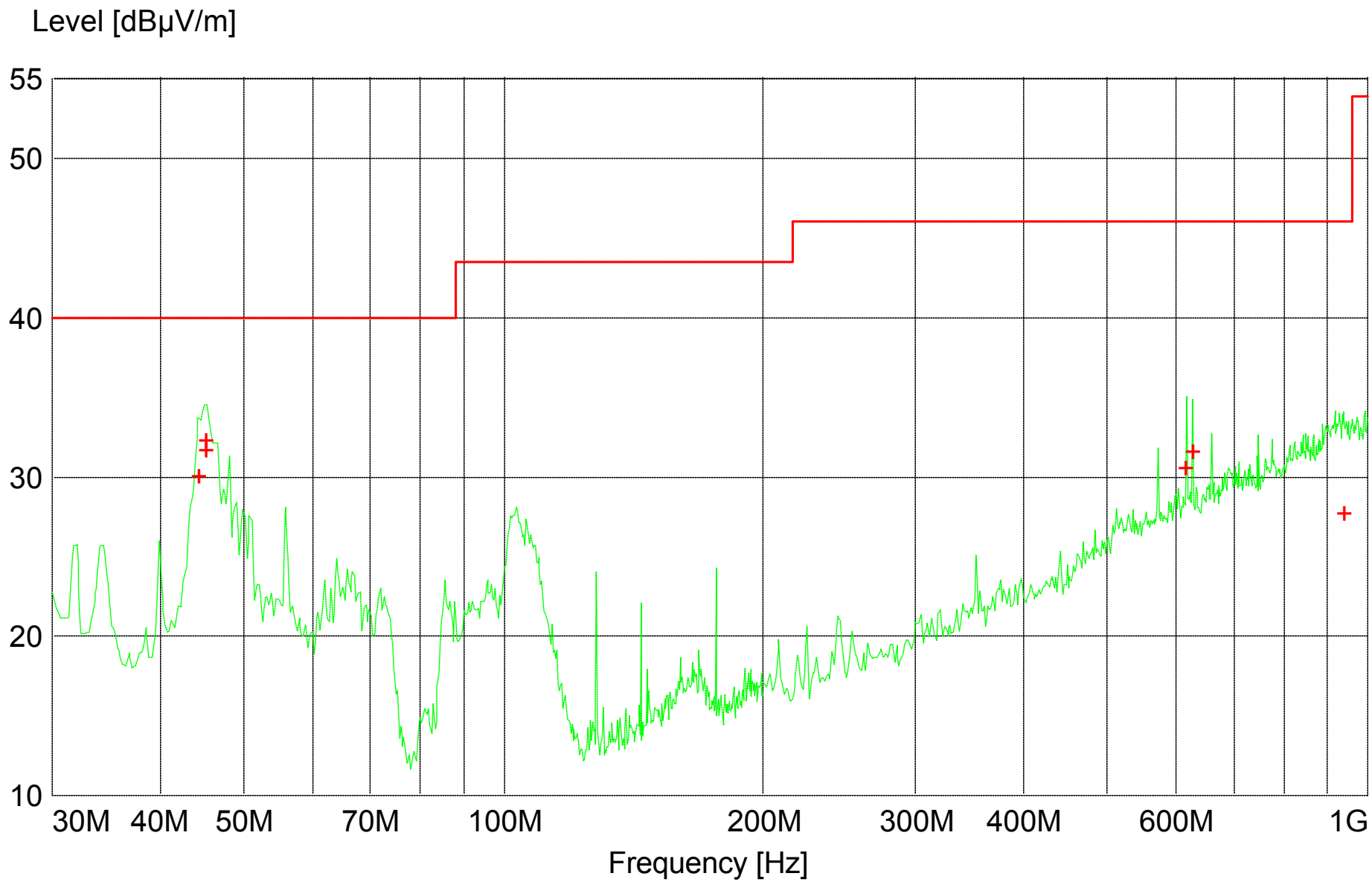
10 dBm -38.93787575 MHz SWT 370 s Unit dBm



AS20 System Data File
Page 15 of 68
05/15/2005

Center 2.3875 GHz 14.5 MHz/ Span 145 MHz

Date: 15.MAR.2005 14:35:57



+ + + MES + glc032305c_fin QP
MES glc032305c_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

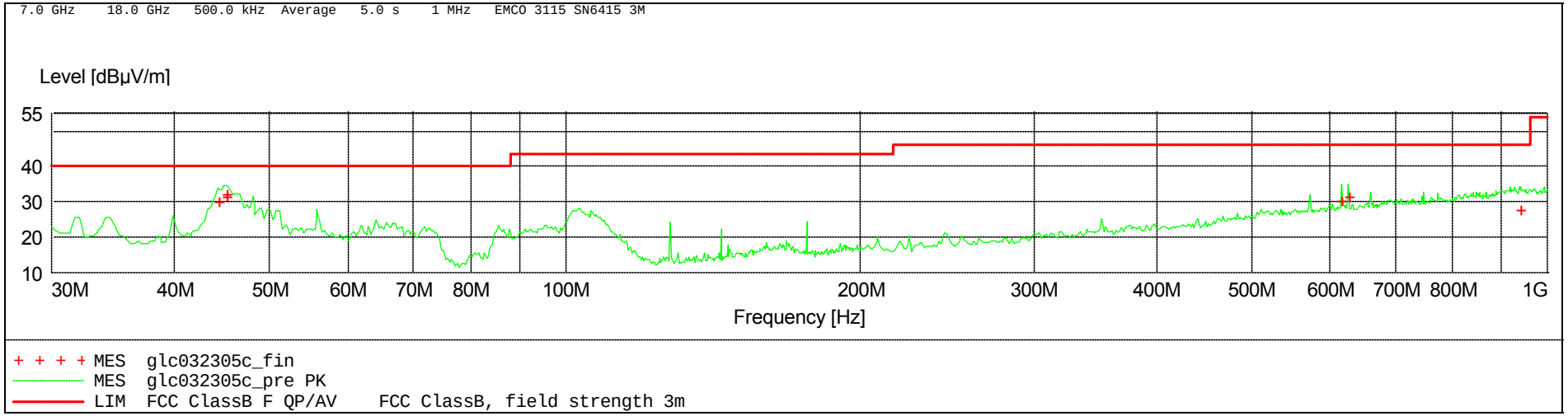
030905-05

Field strength

```
EUT:                  AS-20 with freezer controlers
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch5
Start of Test:        3/23/2005 / 3:49:04PM
```

SCAN TABLE: "FCC ClassB Field fin"

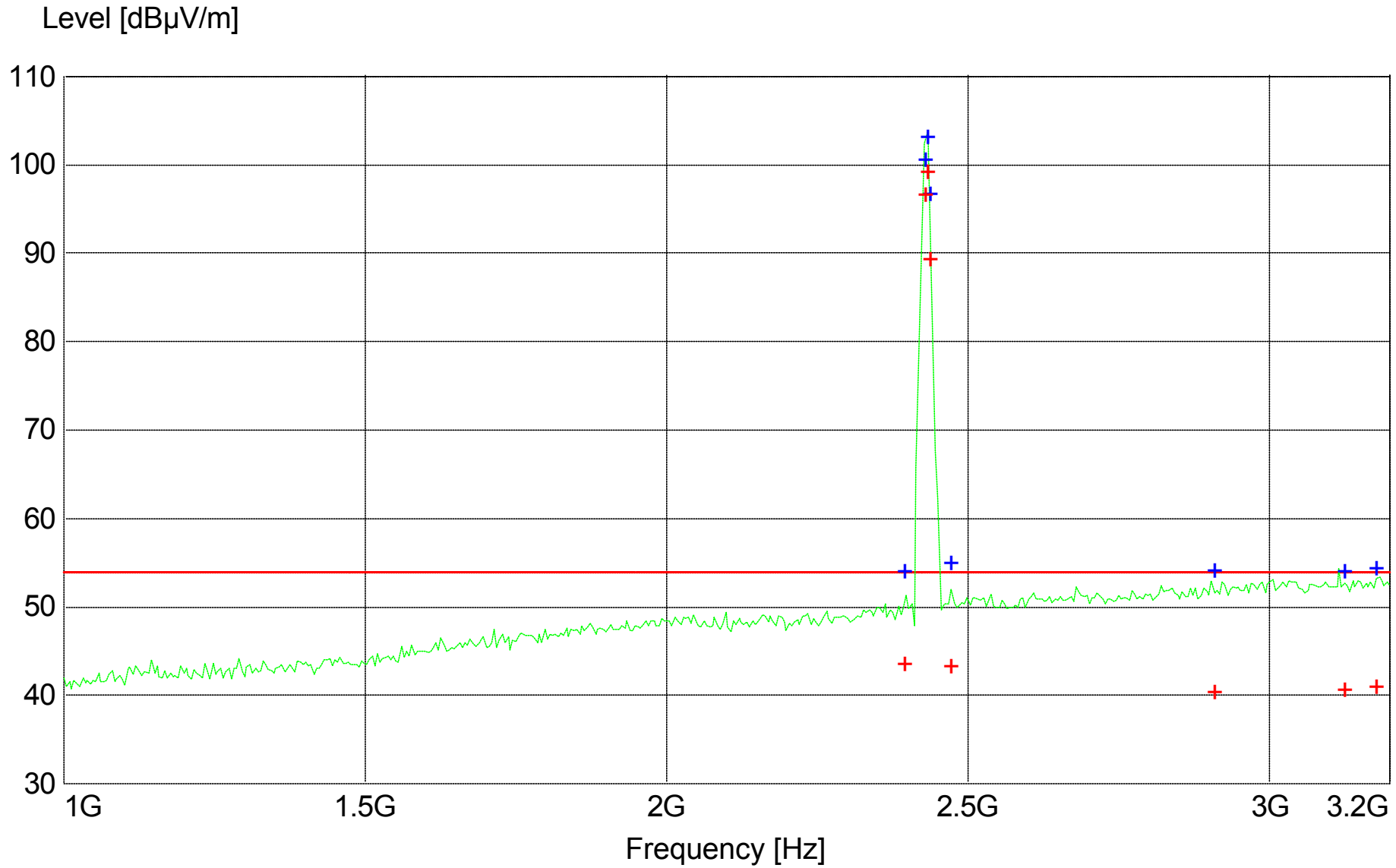
```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "glc032305c_fin QP"

3/23/2005 4:14PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
44.340000	30.07	18.05	11.2	-0.8	40.0	9.9	101.0	329	VERT
45.120000	31.66	19.89	11.0	-0.8	40.0	8.3	100.0	248	VERT
45.180000	32.25	20.49	11.0	-0.8	40.0	7.8	99.0	359	VERT
616.020000	30.55	6.58	20.8	-3.2	46.0	15.5	100.0	21	VERT
627.000000	31.58	7.38	21.0	-3.2	46.0	14.4	128.0	12	HORI
940.020000	27.73	-0.18	23.9	-4.0	46.0	18.3	105.0	356	HORI



+ + + MES + gcs031405e_fin AV
+ + + MES + gcs031405e_fin Pk
MES gcs031405e_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

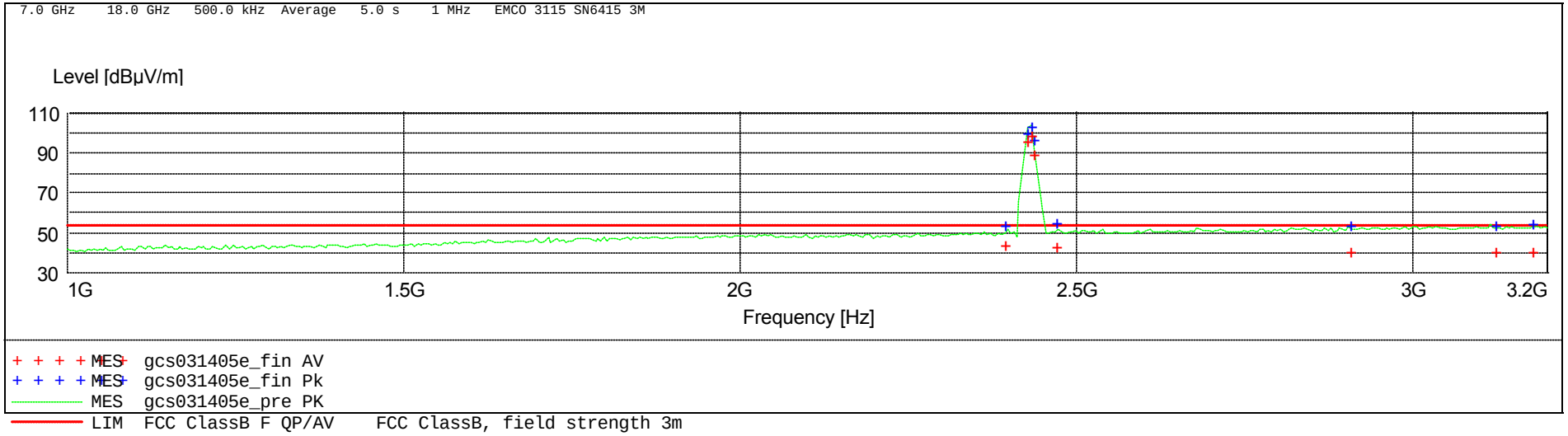
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch5 2Mbps
Start of Test:        3/14/2005 / 6:10:33PM
```

SCAN TABLE: "FCC ClassB Field fin"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031405e_fin AV"

3/14/2005 6:43PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
2394.500000	43.47	8.80	28.3	-6.4	53.9	10.4	129.0	147	VERT
2428.000000	96.46	61.60	28.3	-6.5	53.9	-42.6	128.0	174	VERT
2433.000000	99.03	64.14	28.4	-6.5	53.9	-45.1	128.0	174	VERT
2437.500000	89.24	54.33	28.4	-6.6	53.9	-35.3	165.0	105	VERT
2470.000000	43.19	8.20	28.4	-6.6	53.9	10.7	99.0	173	VERT
2908.000000	40.29	3.33	29.8	-7.1	53.9	13.6	294.0	329	VERT
3123.500000	40.47	2.68	30.4	-7.4	53.9	13.4	271.0	124	HORI
3178.500000	40.84	2.75	30.5	-7.6	53.9	13.1	150.0	326	VERT

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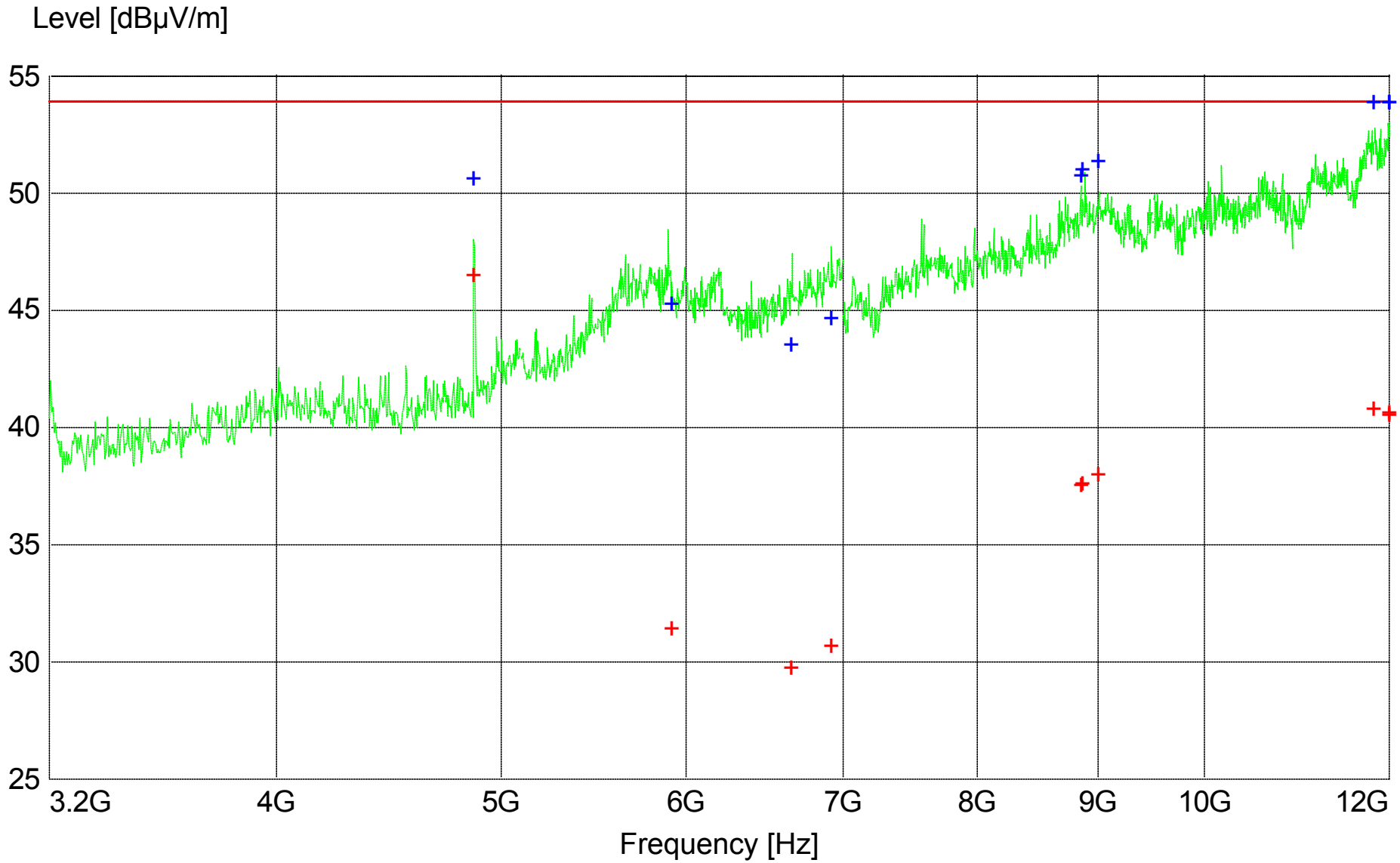


+ + + MES + gcs031405a_fin AV
+ + + MES + gcs031405a_fin Pk
MES gcs031405a_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

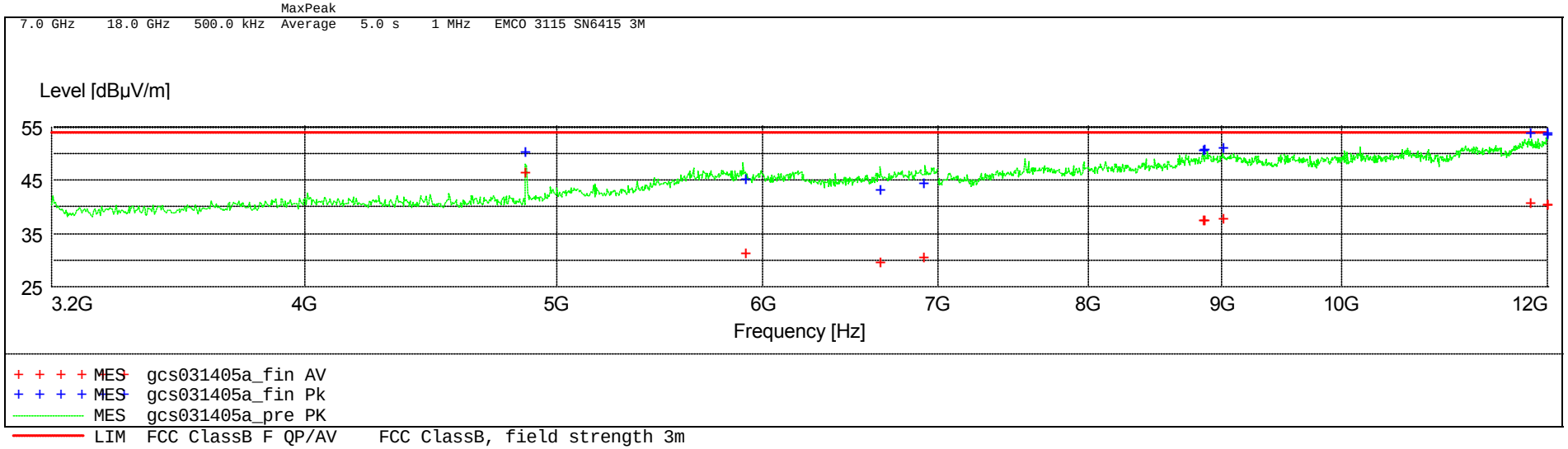
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch5
Start of Test:        3/14/2005 / 1:45:19PM
```

SCAN TABLE: "FCC ClassB Field fPA"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031405a_fin AV"

3/14/2005 2:53PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
4864.000000	46.51	34.88	33.1	21.5	53.9	7.4	191.0	65	VERT
5908.000000	31.36	14.04	34.3	17.0	53.9	22.5	250.0	255	VERT
6650.500000	29.71	13.63	34.7	18.6	53.9	24.2	300.0	324	HORI
6912.500000	30.66	14.08	35.1	18.6	53.9	23.2	249.0	345	VERT
8857.500000	37.51	16.35	37.8	16.6	53.9	16.4	100.0	208	VERT
8860.500000	37.58	16.41	37.8	16.6	53.9	16.3	249.0	156	VERT
9003.000000	37.98	16.08	37.9	16.0	53.9	15.9	214.0	213	HORI
11811.500000	40.73	16.52	39.1	14.9	53.9	13.2	258.0	0	VERT
11994.500000	40.58	16.03	39.2	14.6	53.9	13.3	168.0	46	HORI
11999.000000	40.49	15.90	39.2	14.6	53.9	13.4	156.0	199	VERT

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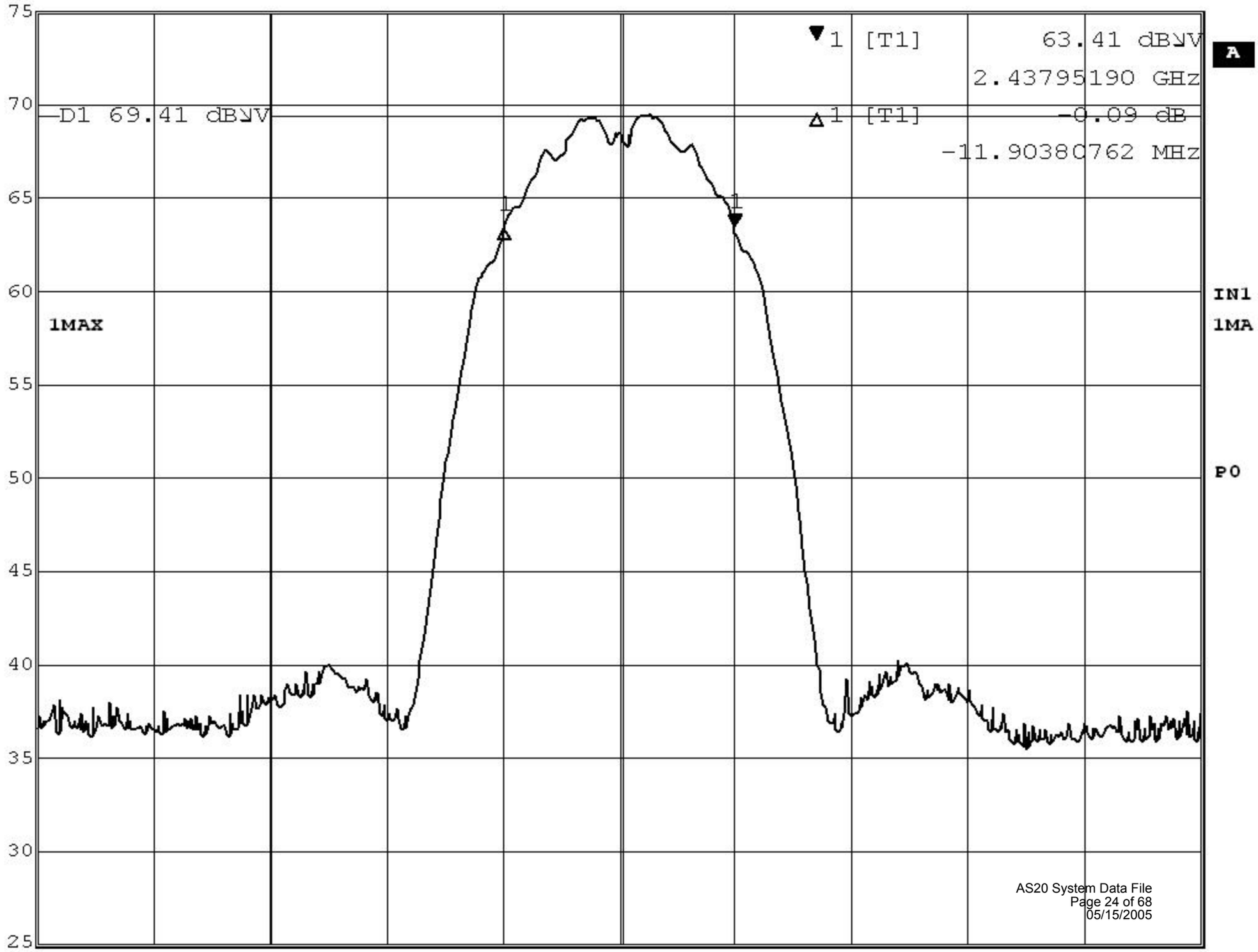
Marker 1 [T1] RBW 1 MHz RF Att 10 dB

Ref Lvl 63.41 dBµV VBW 1 MHz

75 dBµV 2.43795190 GHz SWT 5 ms Unit dBµV



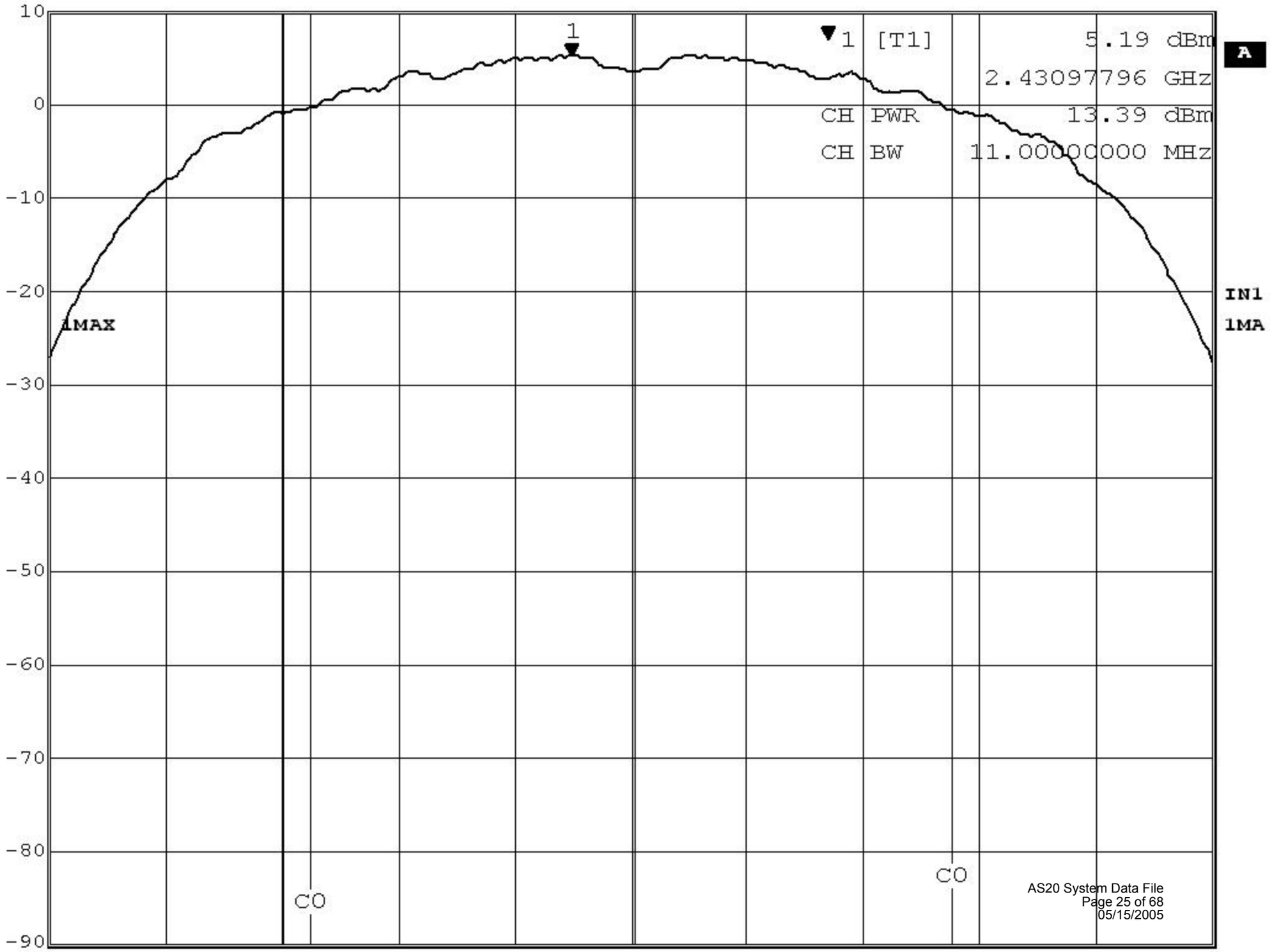
Center 2.432 GHz 6 MHz/ Span 60 MHz

Date: 14.MAR.2005 18:51:24

Marker 1 [T1] RBW 1 MHz RF Att 20 dB

Ref Lvl 5.19 dBm VBW 3 MHz

10 dBm 2.43097796 GHz SWT 5 ms Unit dBm



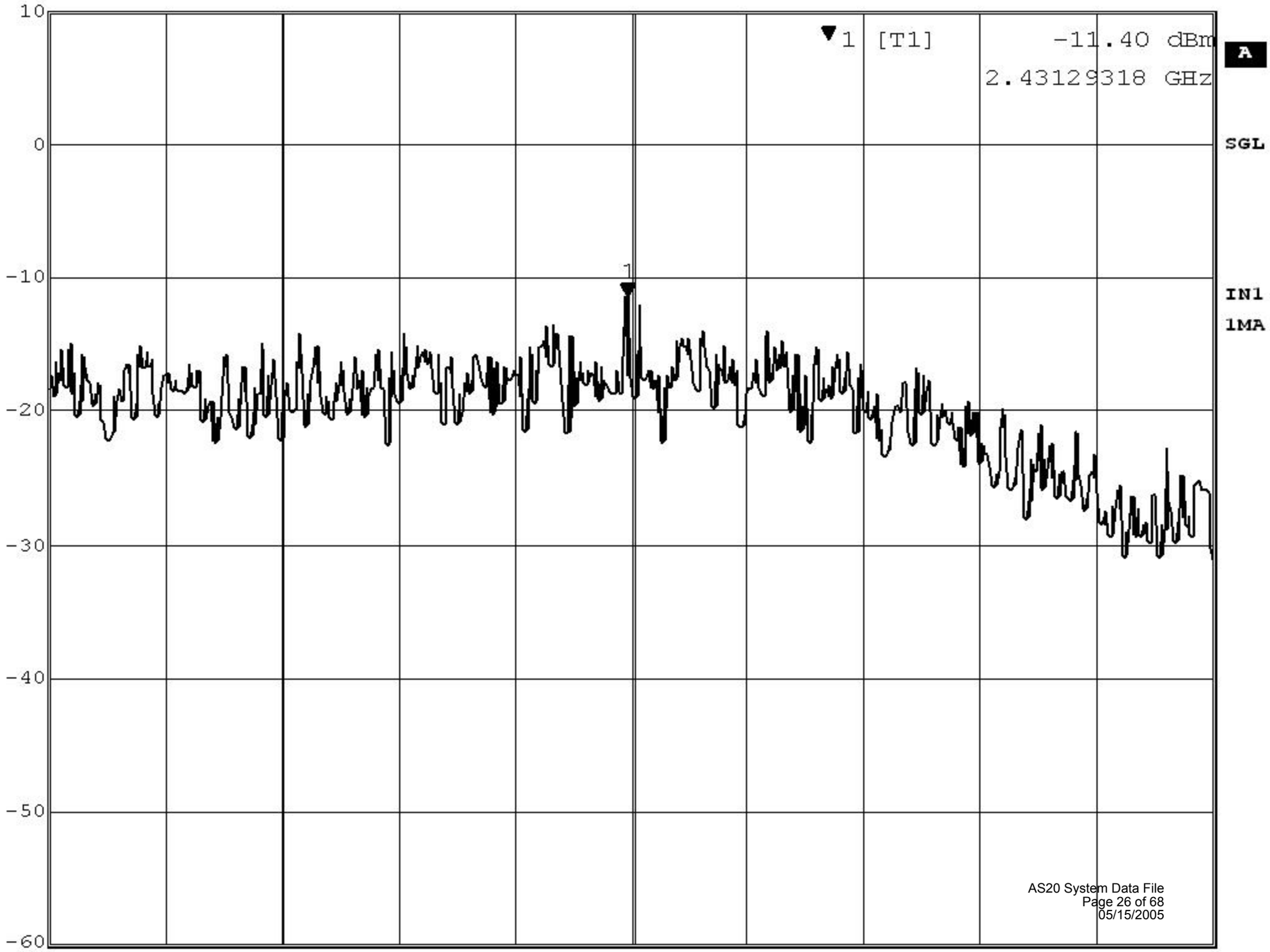
Center 2.432 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 15:51:41

Marker 1 [T1] RBW 3 kHz RF Att 20 dB

Ref Lvl -11.40 dBm VBW 30 kHz

10 dBm 2.43129318 GHz SWT 500 s Unit dBm



Center 2.431297685 GHz 150 kHz/ Span 1.5 MHz

Date: 15.MAR.2005 16:38:11

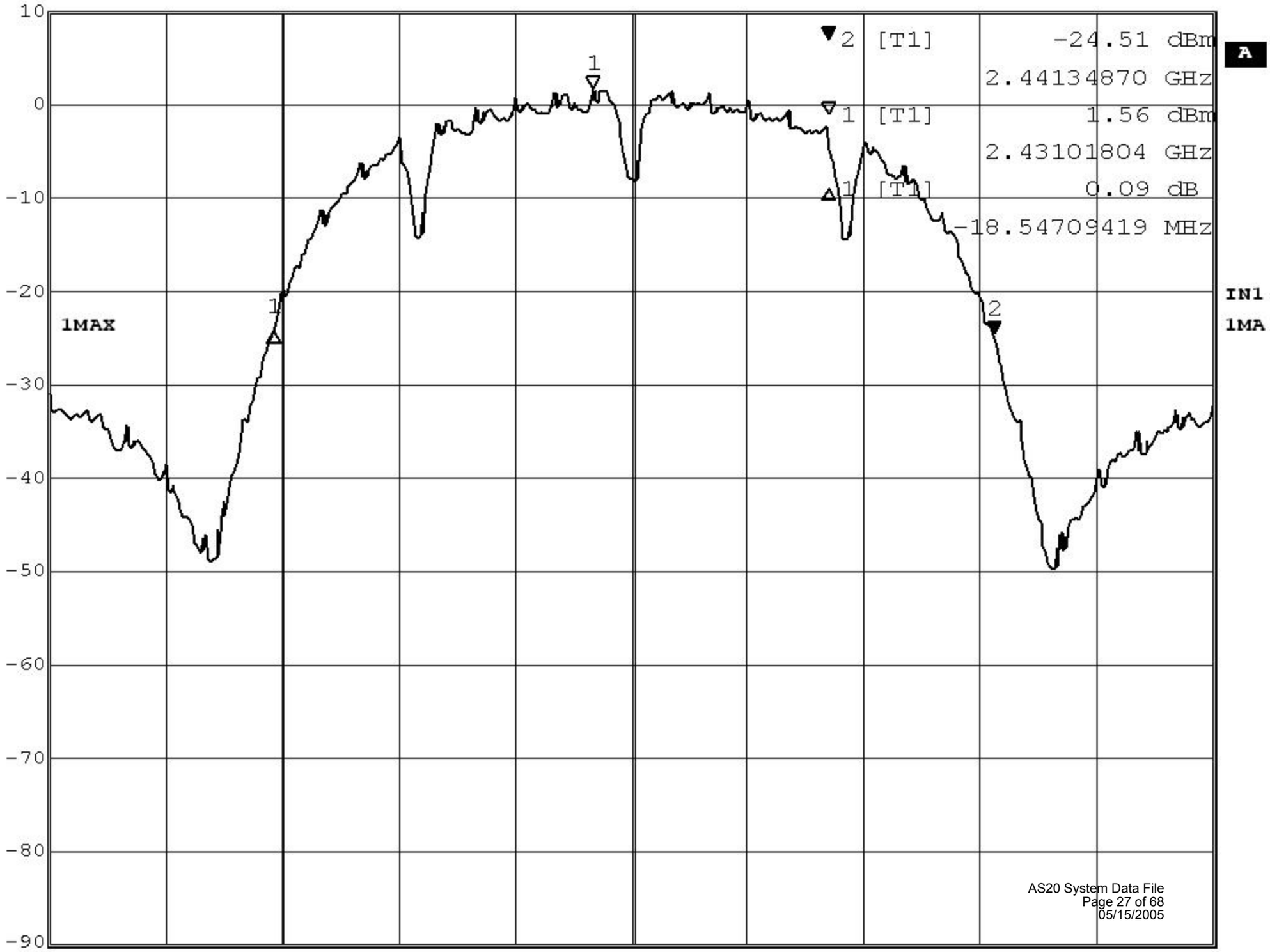
Marker 2 [T1]

Ref Lvl 10 dBm

-24.51 dBm
2.44134870 GHz

RBW 100 kHz
VBW 100 kHz
SWT 7.5 ms

RF Att 20 dB
Unit dBm



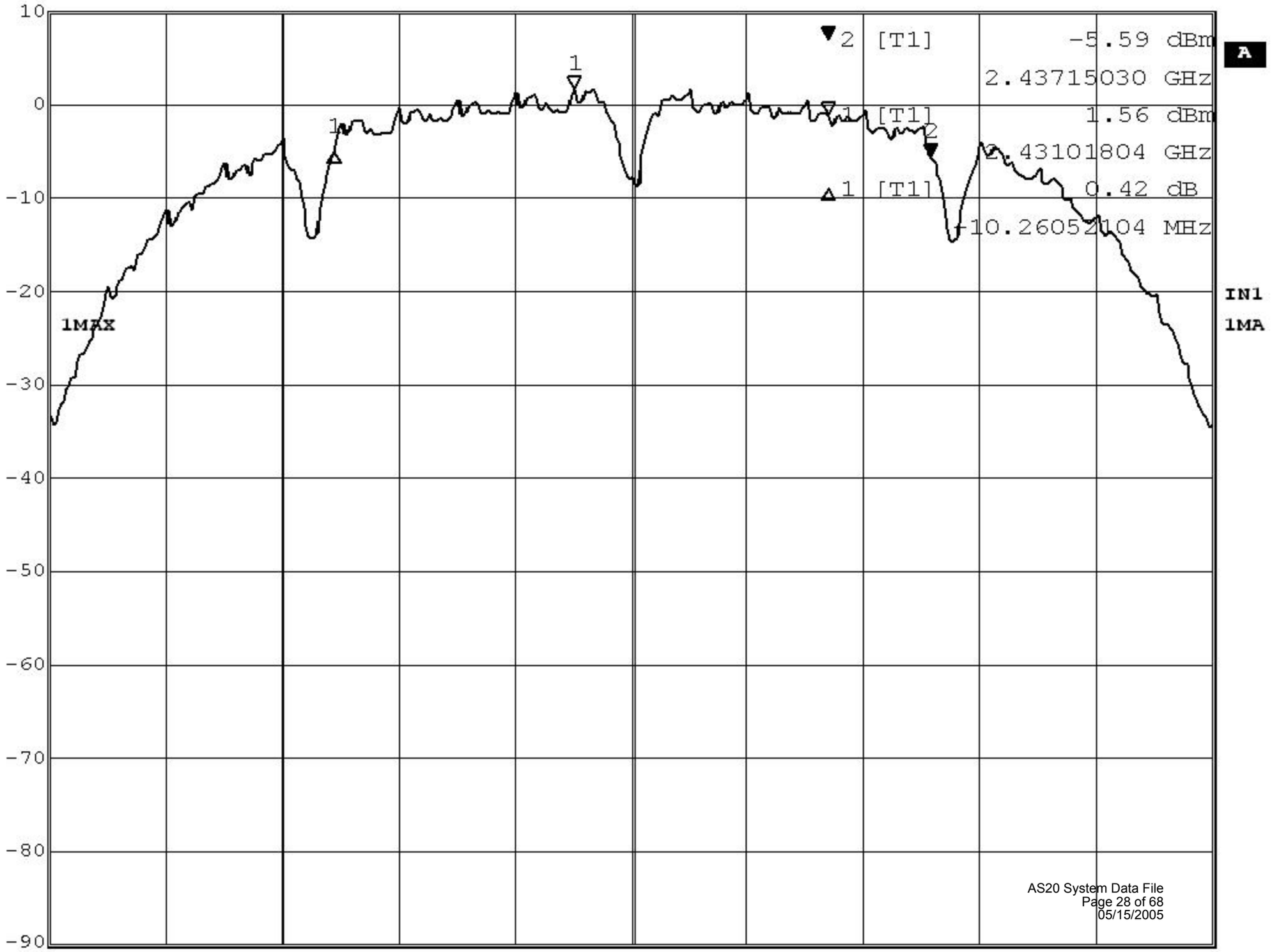
Center 2.432 GHz 3 MHz/ Span 30 MHz

Date: 15.MAR.2005 15:49:53

Marker 2 [T1] RBW 100 kHz RF Att 20 dB

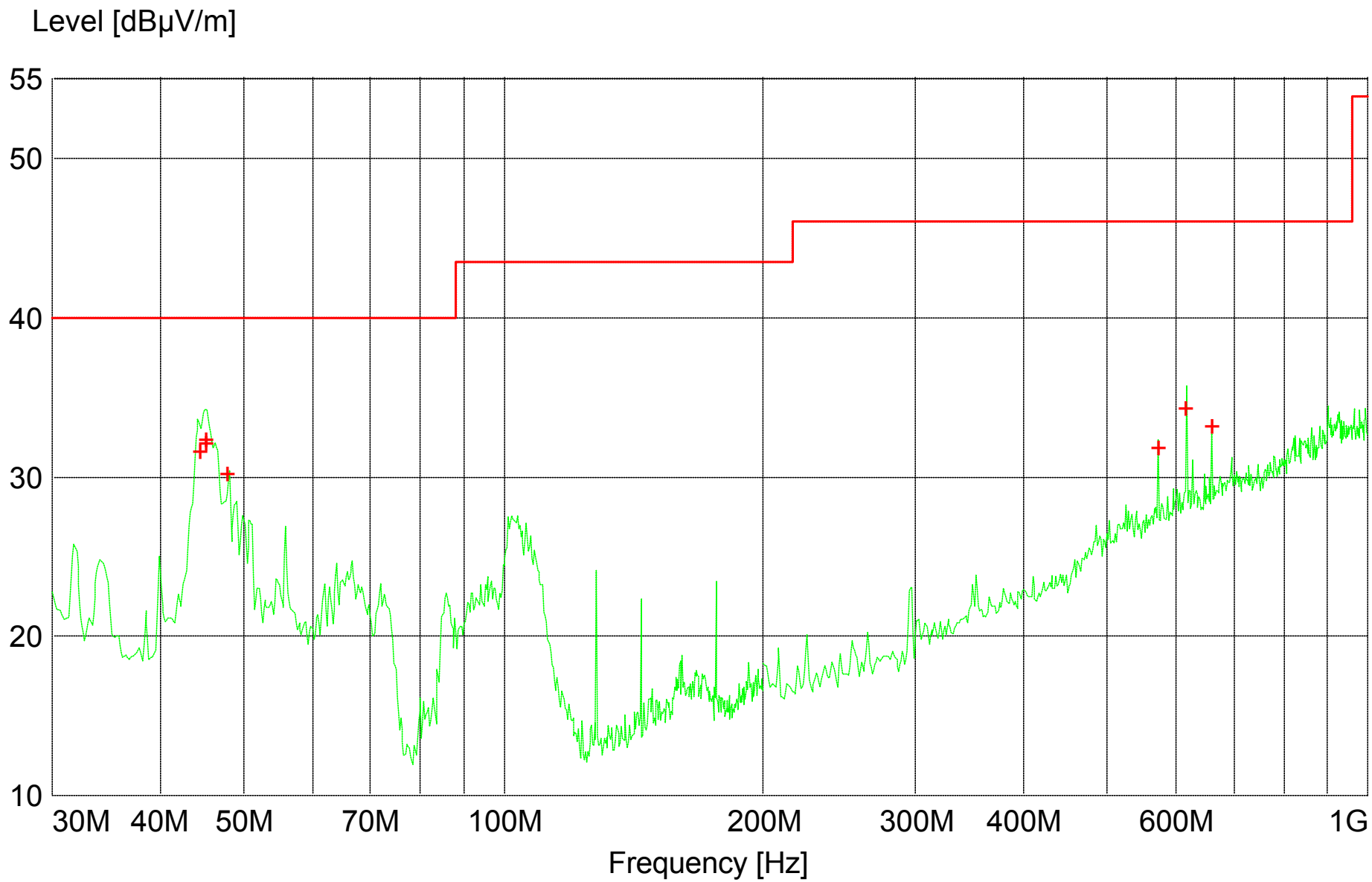
Ref Lvl -5.59 dBm VBW 100 kHz

10 dBm 2.43715030 GHz SWT 5 ms Unit dBm



Center 2.432 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 15:48:12



+ + + MES + glc032305d_fin QP
MES glc032305d_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

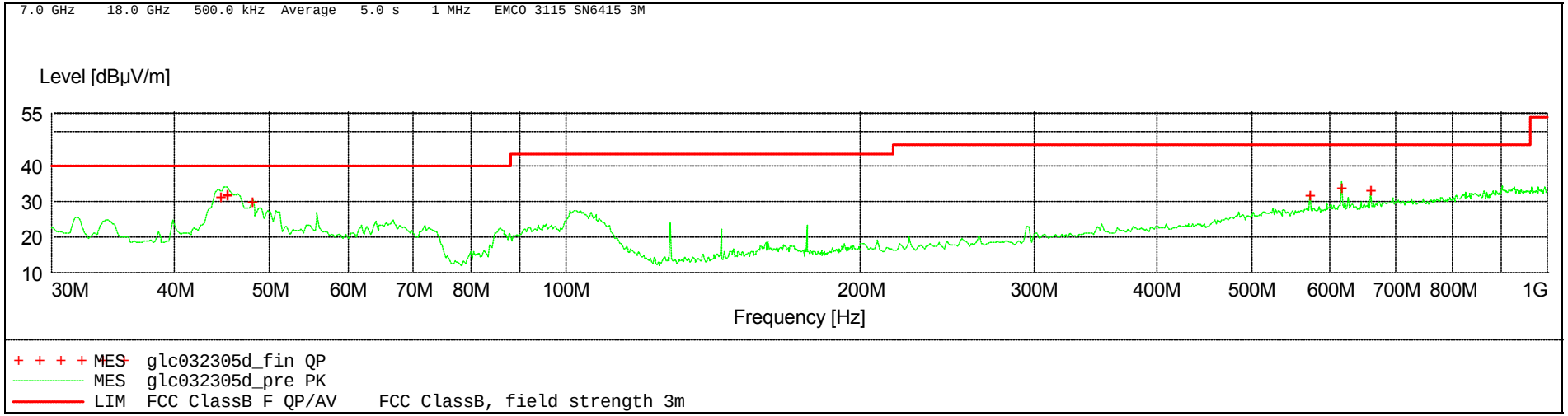
030905-05

Field strength

```
EUT:                  AS-20 with freezer controlers
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch11
Start of Test:        3/23/2005 / 4:16:52PM
```

SCAN TABLE: "FCC ClassB Field fin"

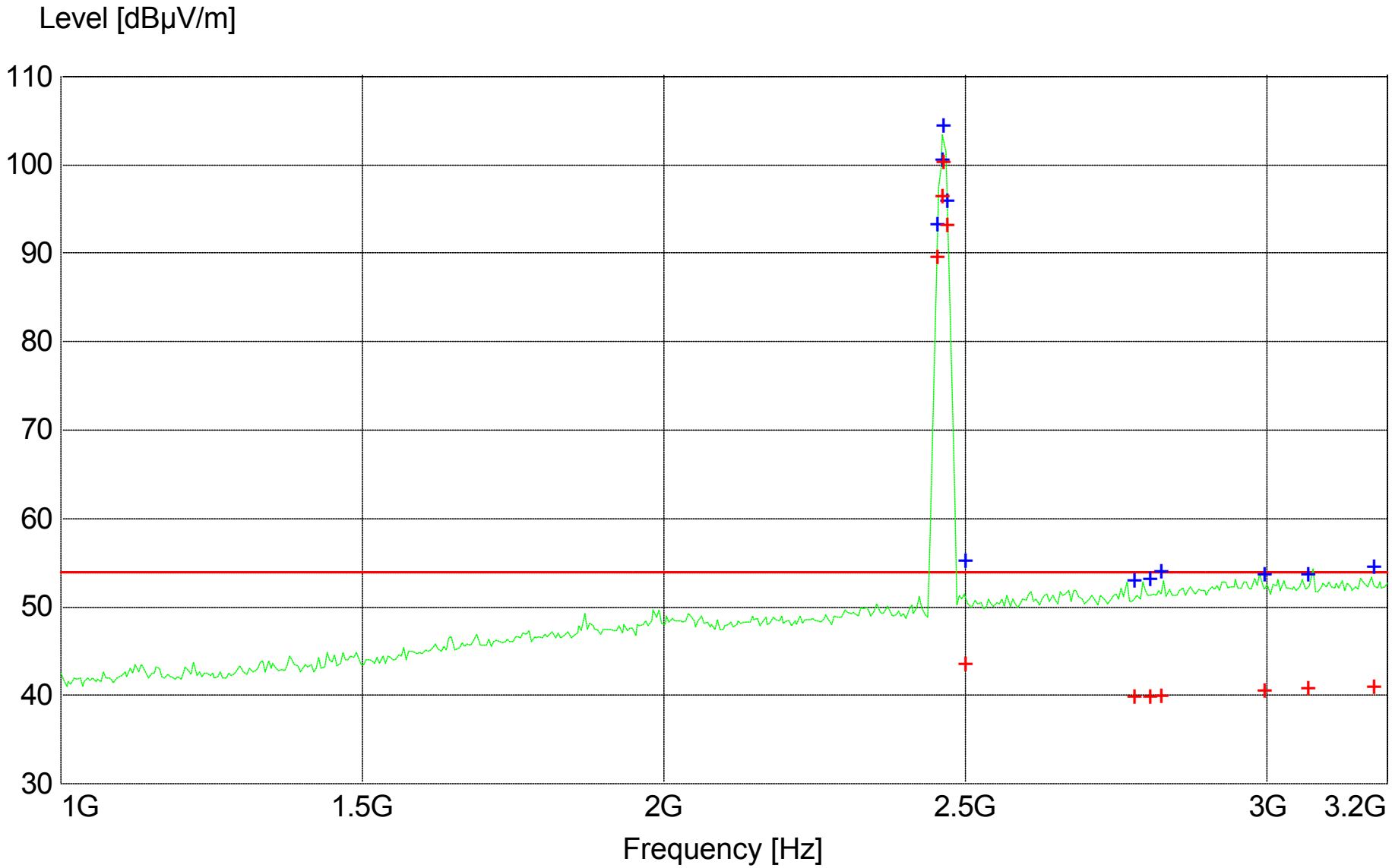
```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "glc032305d_fin QP"

3/23/2005 4:43PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
44.460000	31.59	19.61	11.2	-0.8	40.0	8.4	98.0	346	VERT
45.180000	32.39	20.63	11.0	-0.8	40.0	7.6	101.0	343	VERT
45.240000	32.06	20.32	10.9	-0.8	40.0	7.9	102.0	210	VERT
48.000000	30.18	19.05	10.3	-0.9	40.0	9.8	100.0	0	VERT
571.980000	31.83	8.89	19.8	-3.1	46.0	14.2	99.0	8	VERT
616.020000	34.30	10.34	20.8	-3.2	46.0	11.7	101.0	34	VERT
660.000000	33.22	8.72	21.2	-3.3	46.0	12.8	107.0	52	HORI



+ + + MES + gcs031405f_fin AV
+ + + MES + gcs031405f_fin Pk
MES gcs031405f_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

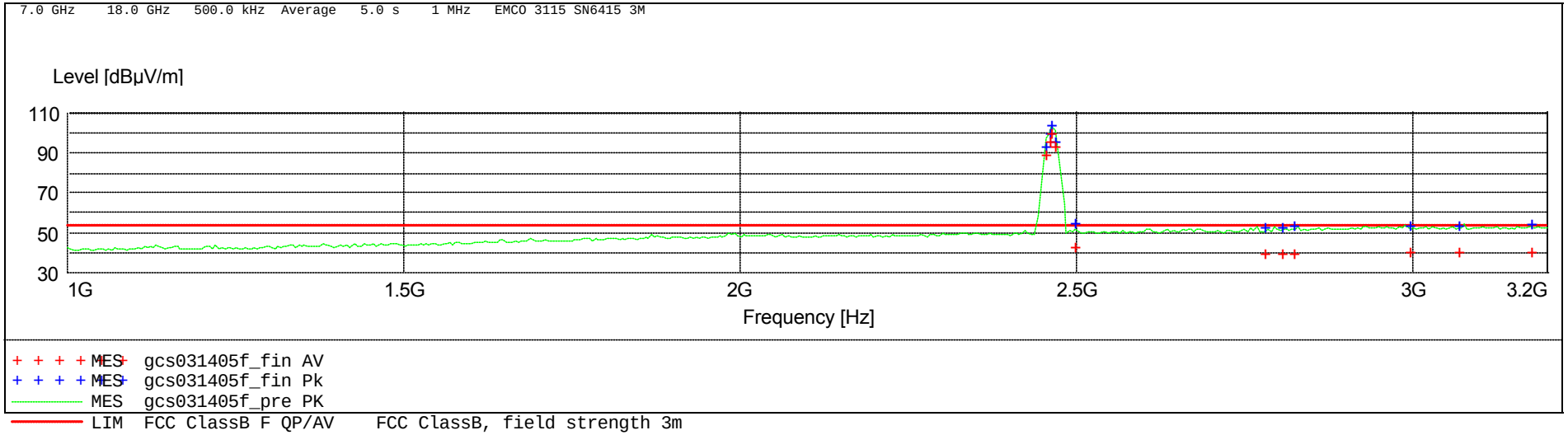
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch11 2Mbps
Start of Test:        3/14/2005 / 7:06:14PM
```

SCAN TABLE: "FCC ClassB Field fin"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031405f_fin AV"

3/14/2005 7:44PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
2454.500000	89.53	54.54	28.4	-6.6	53.9	-35.6	128.0	174	VERT
2461.000000	96.41	61.42	28.4	-6.6	53.9	-42.5	129.0	86	VERT
2463.000000	100.22	65.23	28.4	-6.6	53.9	-46.3	128.0	172	VERT
2468.500000	93.08	58.08	28.4	-6.6	53.9	-39.2	128.0	174	VERT
2499.000000	43.43	8.43	28.5	-6.5	53.9	10.5	100.0	170	VERT
2779.500000	39.62	3.15	29.4	-7.0	53.9	14.3	150.0	305	HORI
2805.500000	39.77	3.24	29.5	-7.0	53.9	14.1	178.0	95	HORI
2824.500000	39.90	3.28	29.6	-7.0	53.9	14.0	150.0	76	VERT
2995.500000	40.46	2.98	30.1	-7.4	53.9	13.4	299.0	0	HORI
3068.500000	40.63	2.97	30.3	-7.4	53.9	13.3	191.0	348	HORI
3176.500000	40.83	2.77	30.5	-7.6	53.9	13.1	178.0	339	VERT

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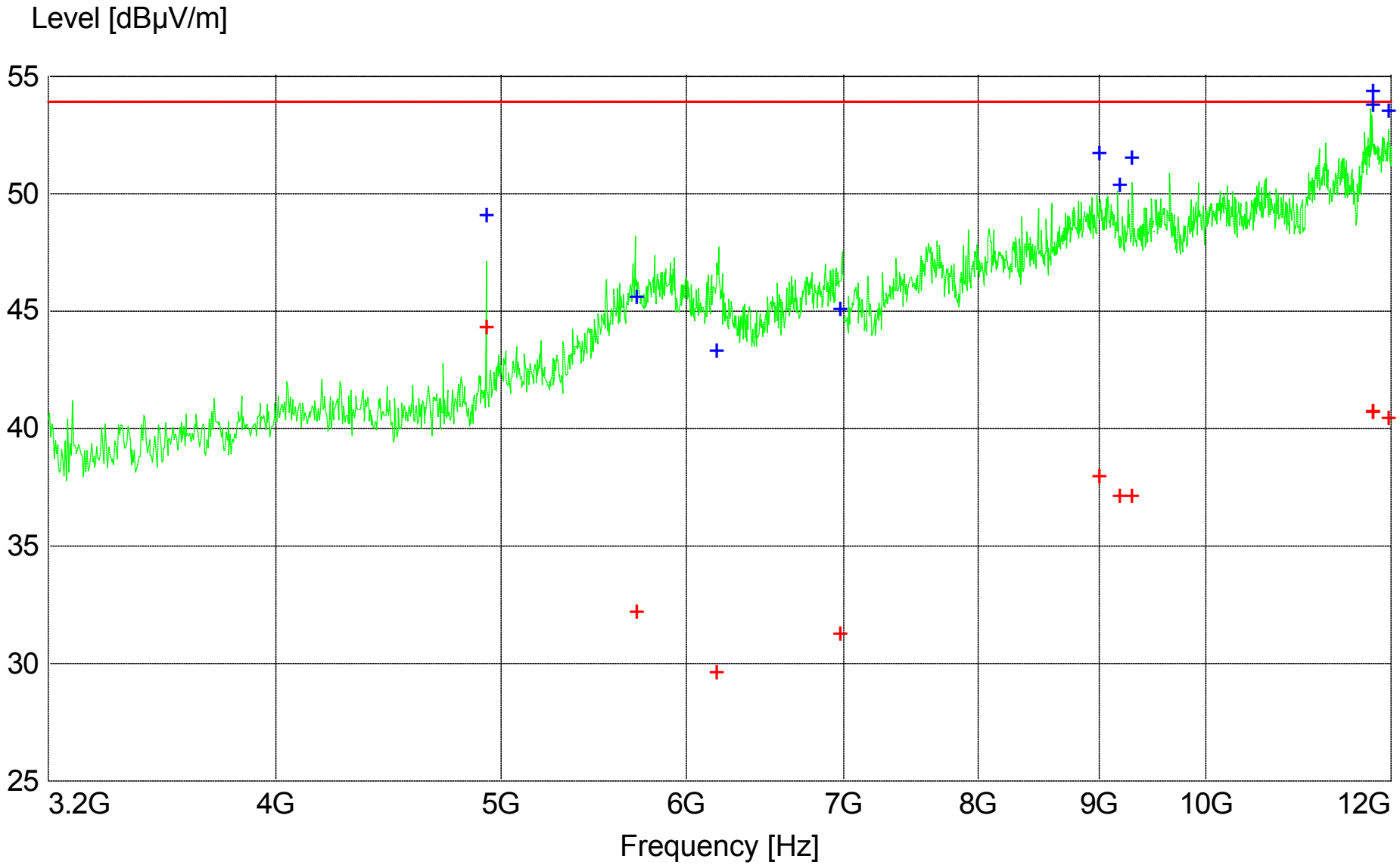


+ + + MES + gcs031405b_fin AV
+ + + MES + gcs031405b_fin Pk
MES gcs031405b_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

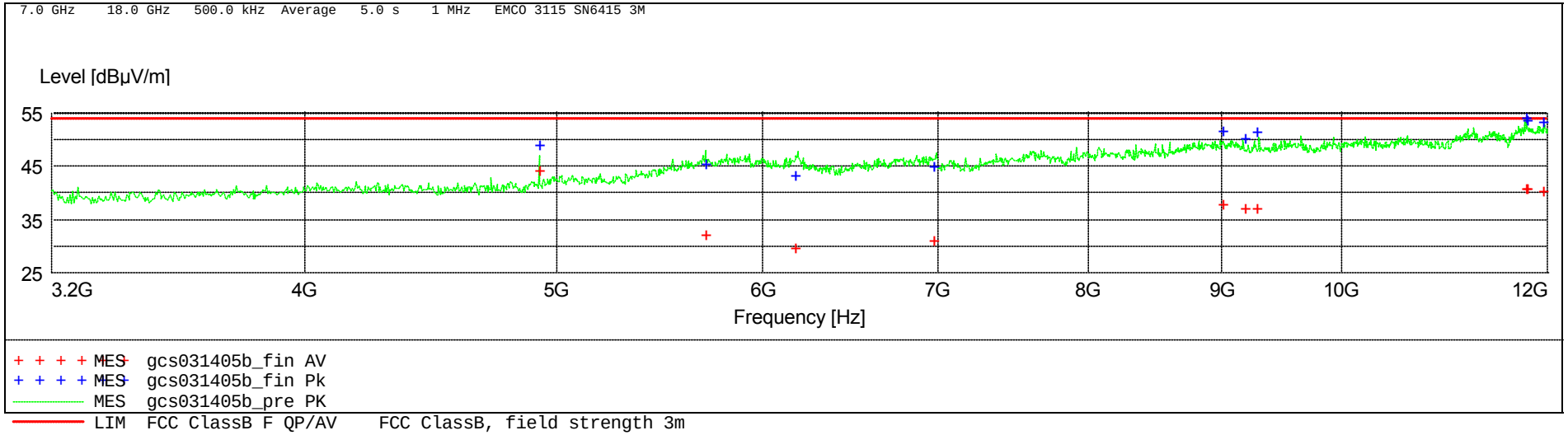
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Tx Ch11
Start of Test:        3/14/2005 / 3:00:01PM
```

SCAN TABLE: "FCC ClassB Field fPA"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031405b_fin AV"

3/14/2005 3:52PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
4924.000000	44.29	32.25	33.2	21.2	53.9	9.6	156.0	69	VERT
5707.000000	32.18	15.33	34.2	17.4	53.9	21.7	299.0	313	VERT
6176.000000	29.55	13.15	34.4	18.0	53.9	24.4	141.0	322	HORI
6978.500000	31.21	14.39	35.3	18.4	53.9	22.7	100.0	135	VERT
9003.500000	37.91	16.02	37.9	16.0	53.9	16.0	178.0	0	VERT
9185.000000	37.06	16.01	37.9	16.9	53.9	16.8	300.0	29	HORI
9284.500000	37.09	15.80	38.0	16.7	53.9	16.8	300.0	353	VERT
11777.000000	40.72	16.59	39.1	14.9	53.9	13.2	150.0	174	VERT
11786.000000	40.68	16.49	39.1	14.9	53.9	13.2	250.0	189	VERT
11954.500000	40.39	16.22	39.2	15.0	53.9	13.5	168.0	337	HORI

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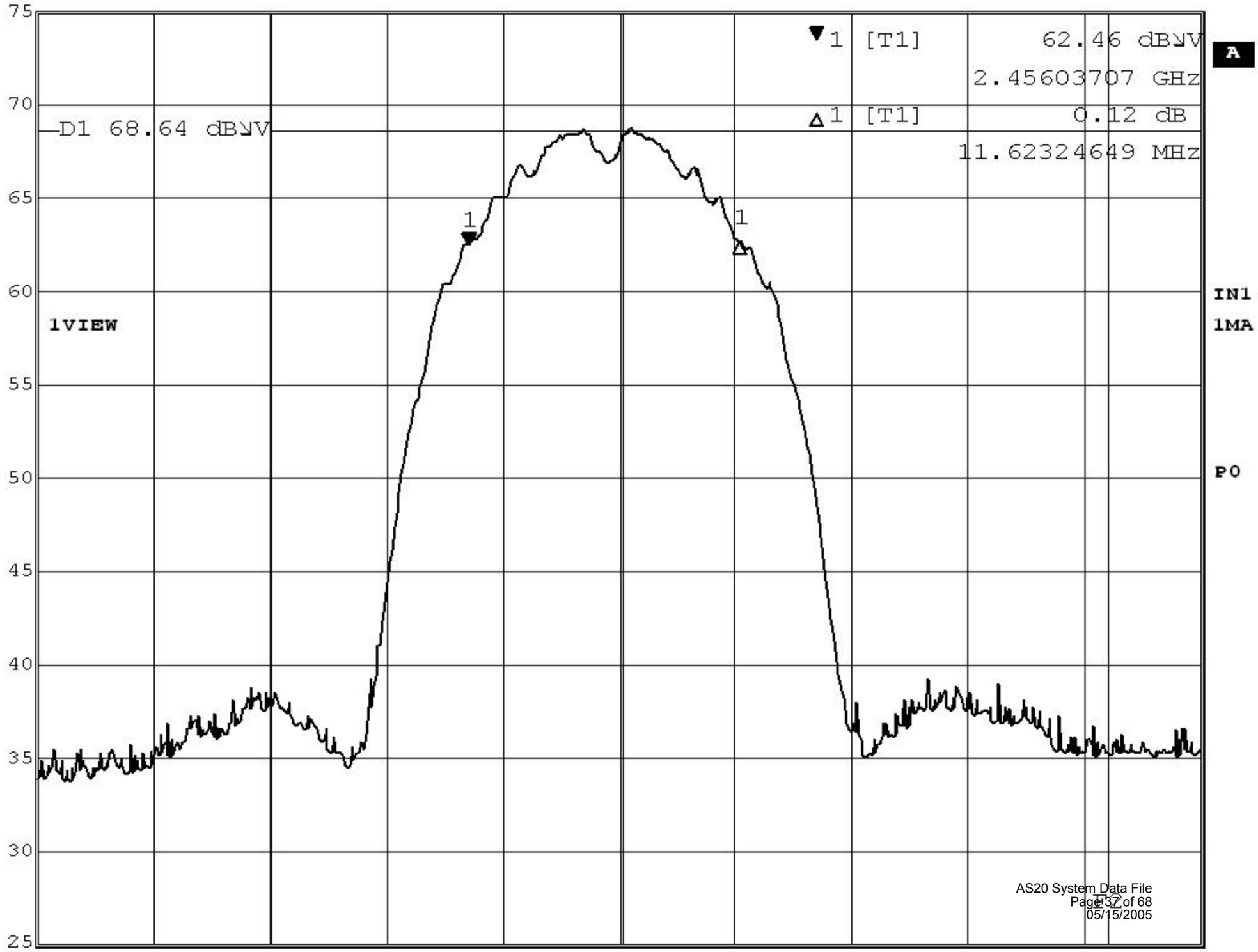
Marker 1 [T1] RBW 1 MHz RF Att 10 dB

Ref Lvl 62.46 dBµV VBW 10 MHz

75 dBµV 2.45603707 GHz SWT 5 ms Unit dBµV



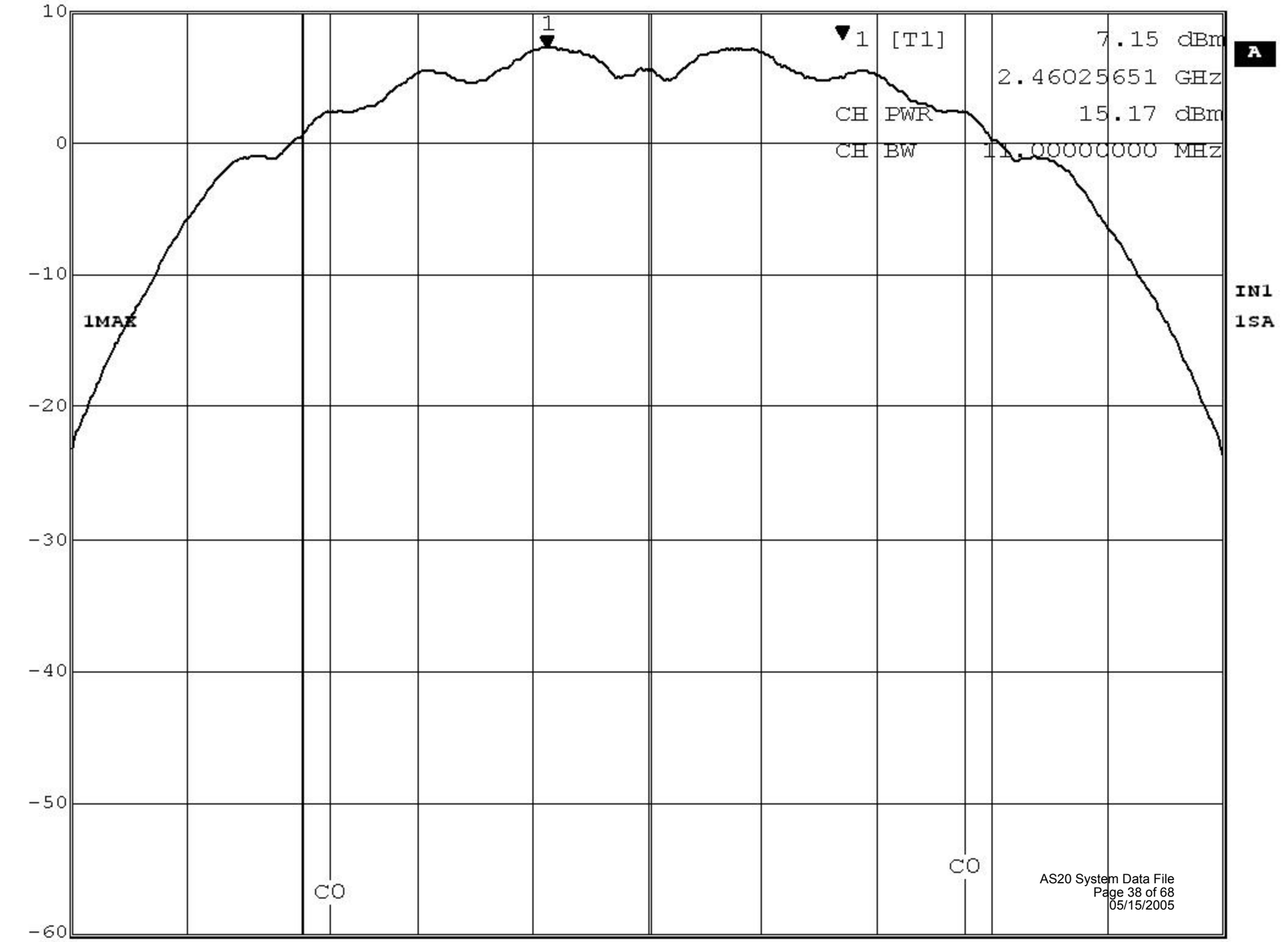
Center 2.4625 GHz 5 MHz/ Span 50 MHz

Date: 14.MAR.2005 19:38:42

Marker 1 [T1] RBW 1 MHz RF Att 20 dB

Ref Lvl 7.15 dBm VBW 3 MHz

10 dBm 2.46025651 GHz SWT 5 ms Unit dBm



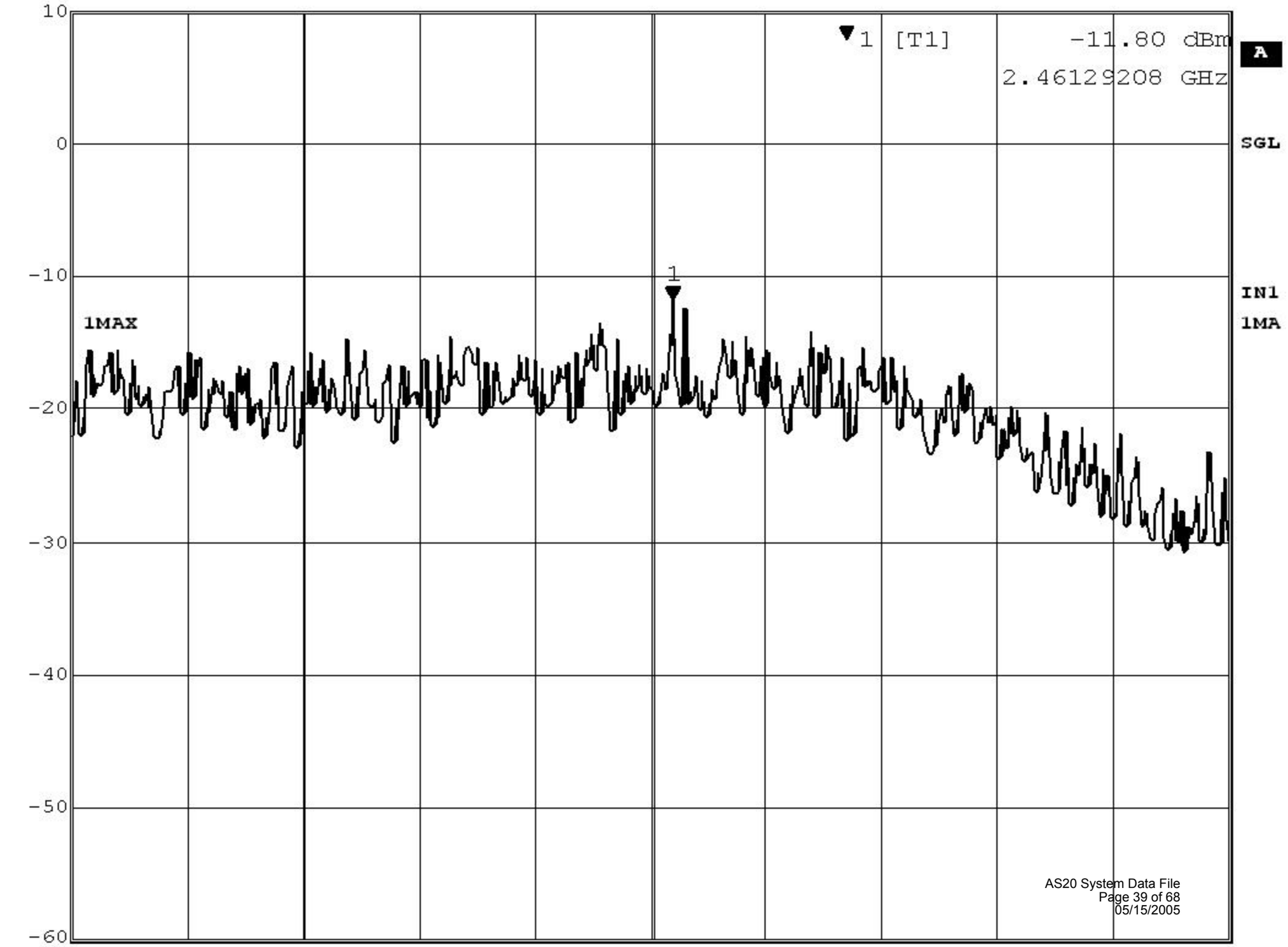
Center 2.462 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 17:31:02

Marker 1 [T1] RBW 3 kHz RF Att 20 dB

Ref Lvl -11.80 dBm VBW 30 kHz

10 dBm 2.46129208 GHz SWT 500 s Unit dBm



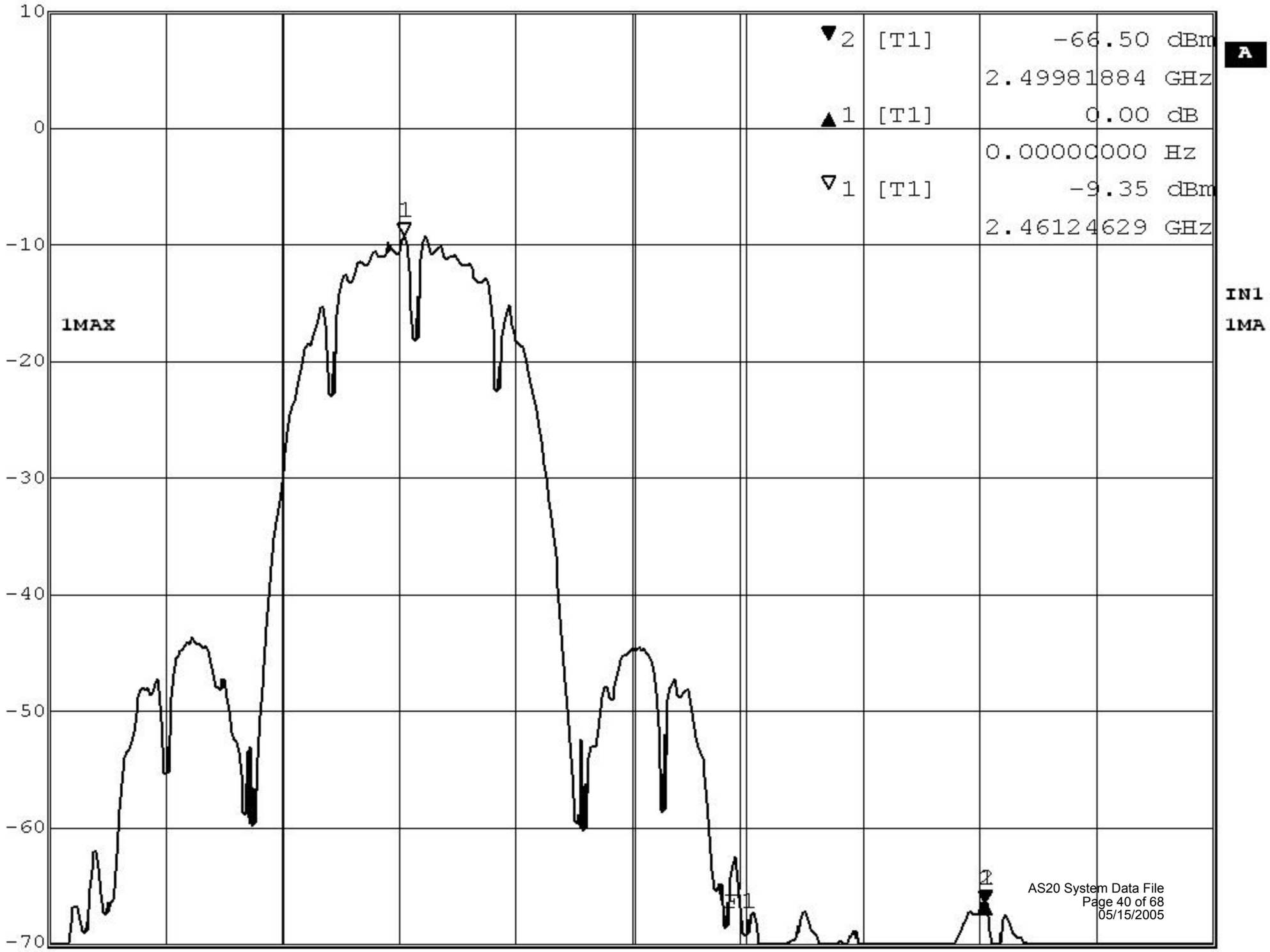
Center 2.461263527 GHz 150 kHz/ Span 1.5 MHz

Date: 15.MAR.2005 17:08:39

Delta 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl 0.00 dB VBW 10 Hz

10 dBm 0.00000000 Hz SWT 195 s Unit dBm



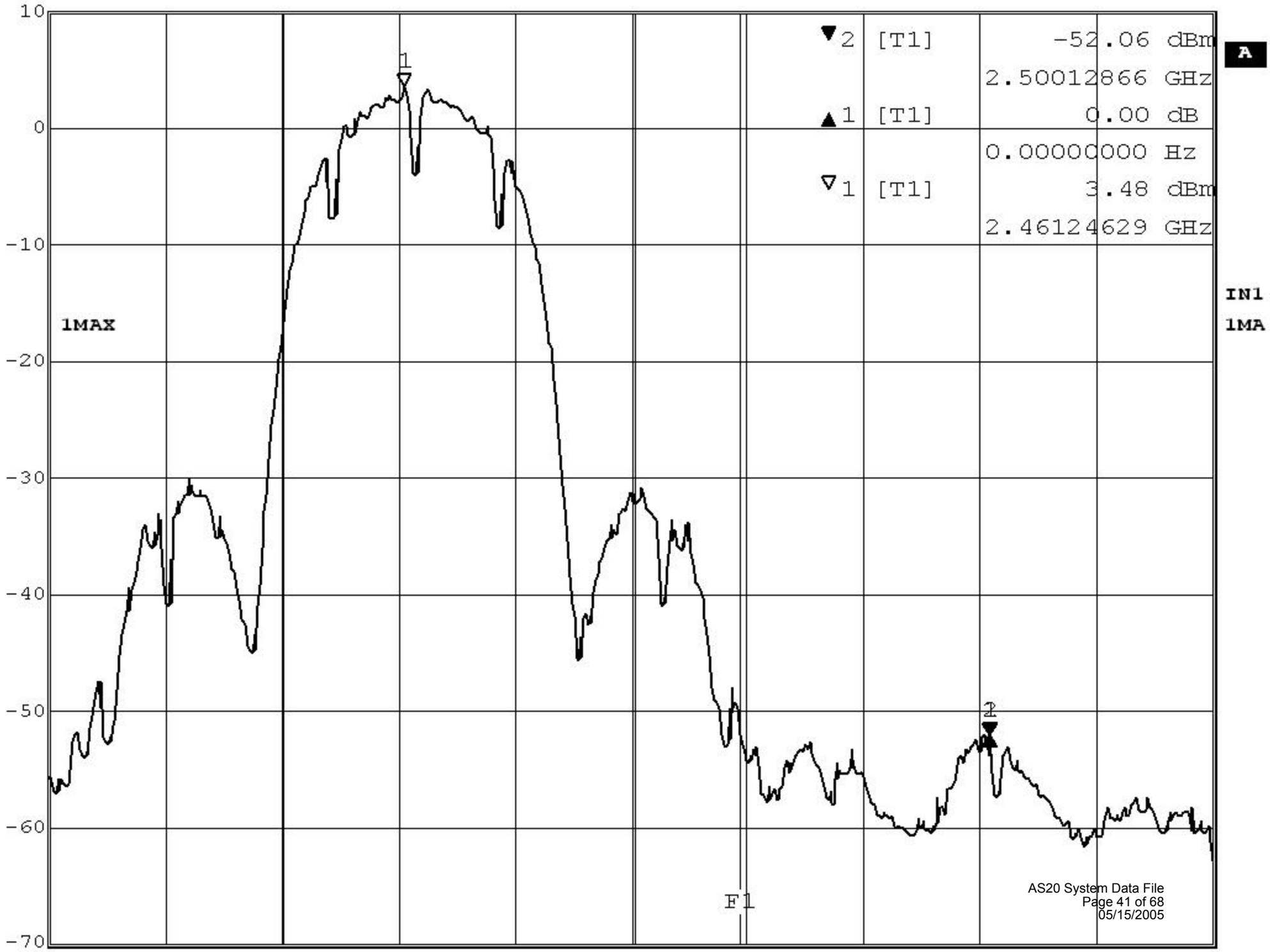
Start 2.4377 GHz 7.73 MHz/ Stop 2.515 GHz

Date: 15.MAR.2005 17:24:10

Delta 1 [T1] RBW 100 kHz RF Att 20 dB

Ref Lvl 0.00 dB VBW 1 MHz

10 dBm 0.00000000 Hz SWT 19.5 ms Unit dBm



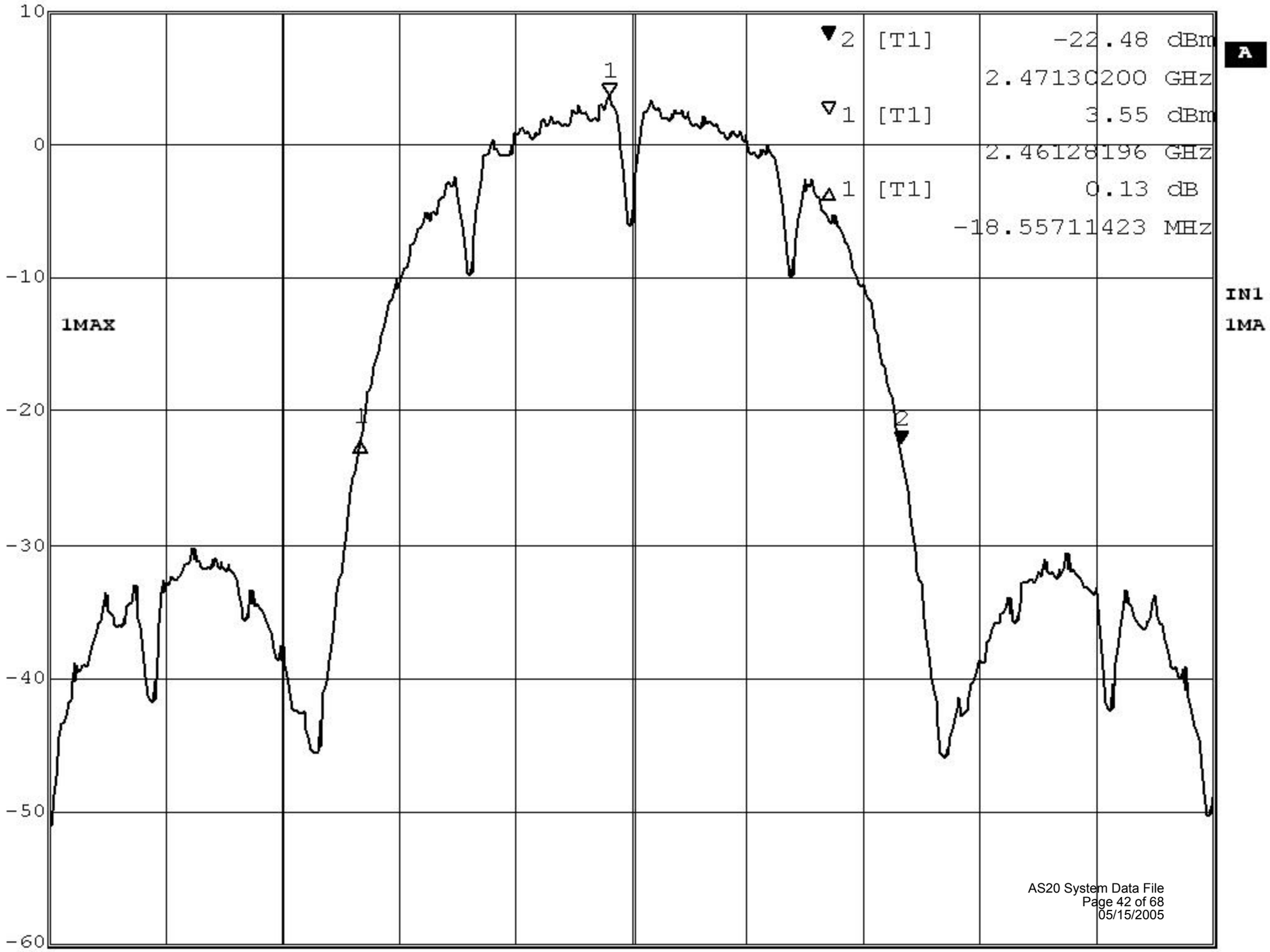
Start 2.4377 GHz 7.73 MHz/ Stop 2.515 GHz

Date: 15.MAR.2005 17:18:15

Marker 2 [T1] RBW 300 kHz RF Att 20 dB

Ref Lvl -22.48 dBm VBW 1 MHz

10 dBm 2.47130200 GHz SWT 5 ms Unit dBm



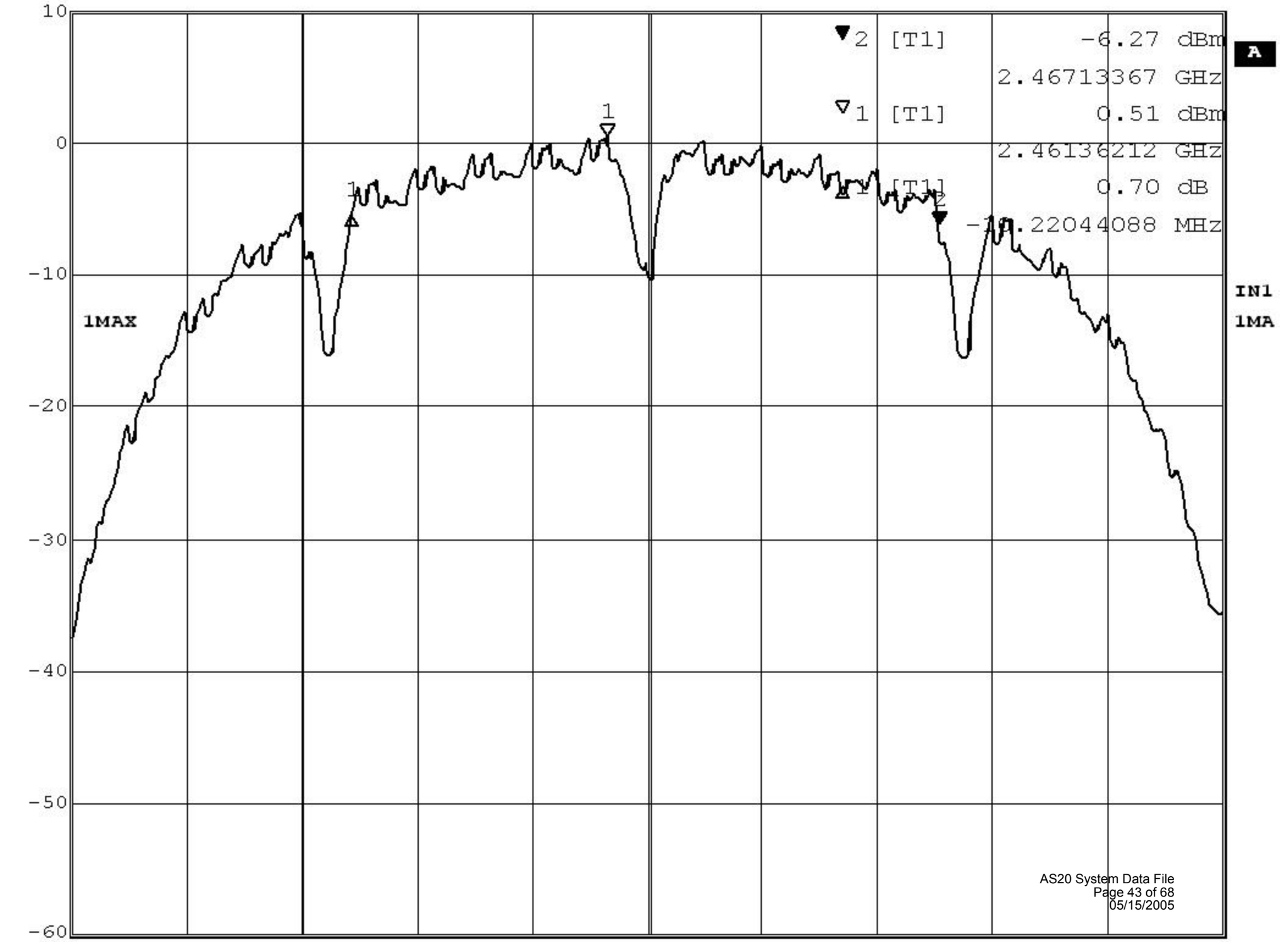
Center 2.462063527 GHz 4 MHz/ Span 40 MHz

Date: 15.MAR.2005 17:11:59

Marker 2 [T1] RBW 100 kHz RF Att 20 dB

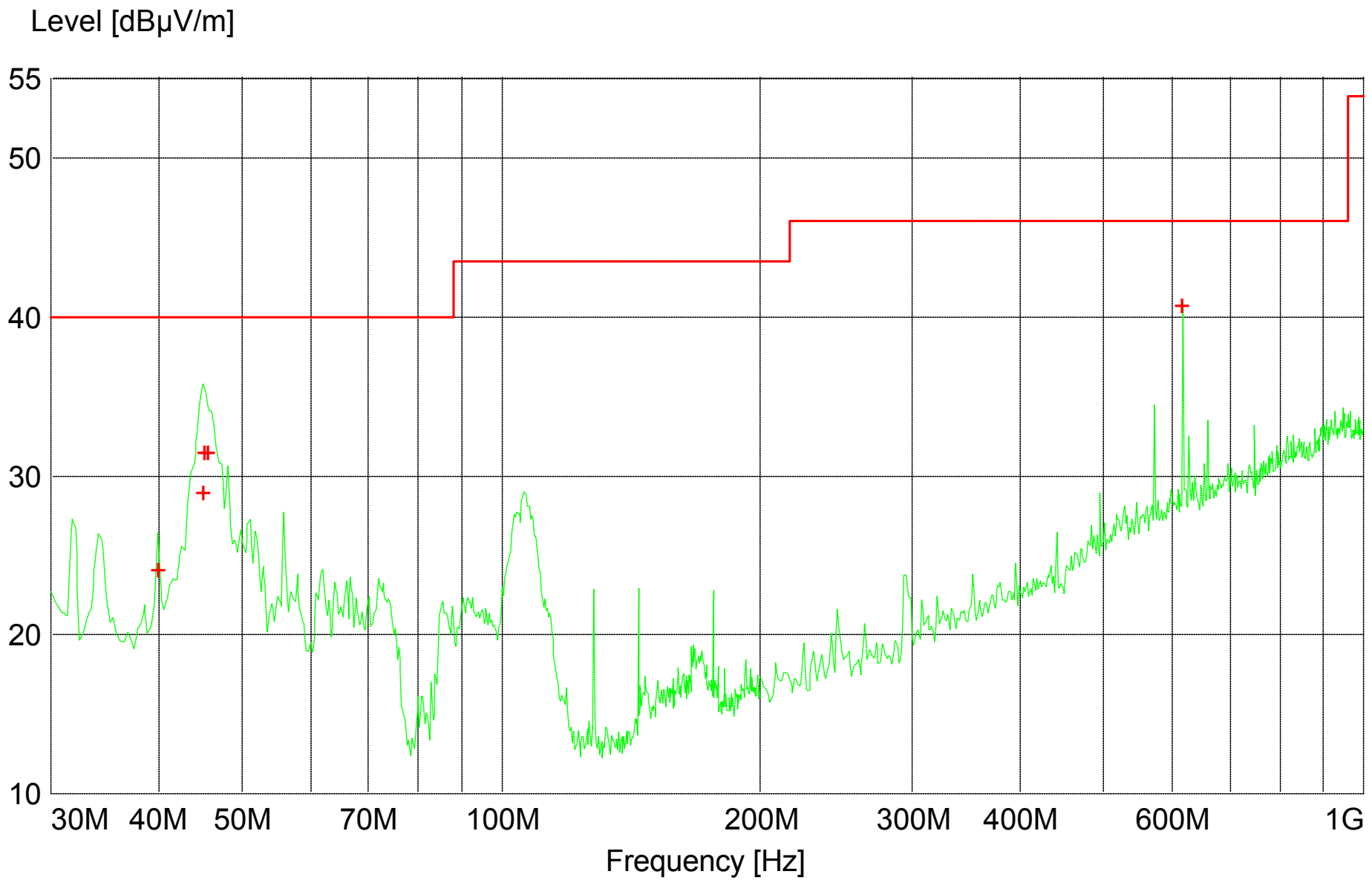
Ref Lvl -6.27 dBm VBW 100 kHz

10 dBm 2.46713367 GHz SWT 5 ms Unit dBm



Center 2.462063527 GHz 2 MHz/ Span 20 MHz

Date: 15.MAR.2005 17:10:47



+ + MES glc032305a_fin
MES glc032305a_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

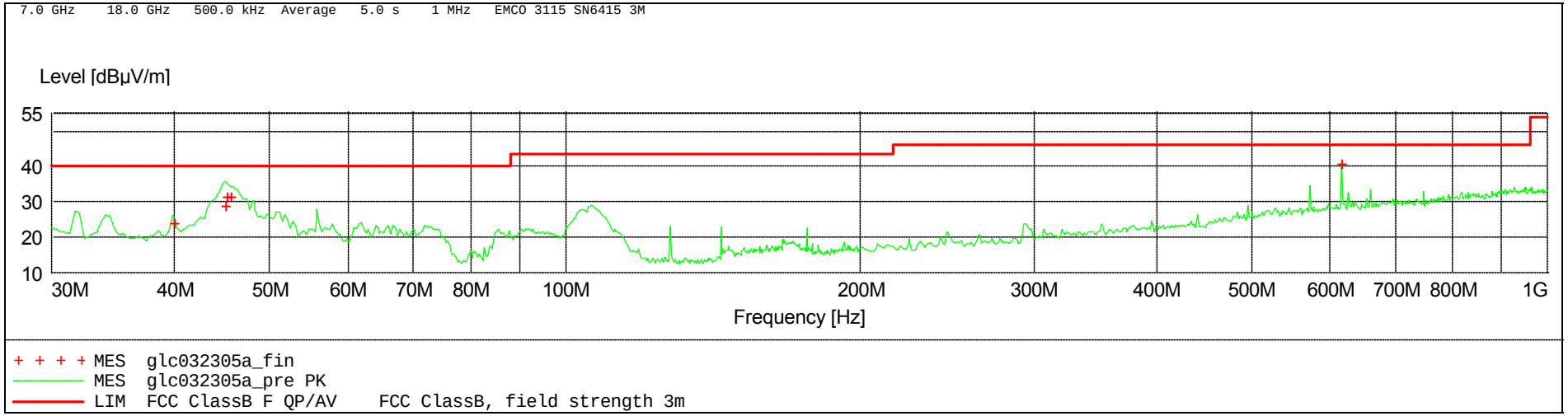
030905-05

Field strength

```
EUT:                  AS-20 with freezer controlers
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Rx
Start of Test:        3/23/2005 / 2:29:37PM
```

SCAN TABLE: "FCC ClassB Field fin"

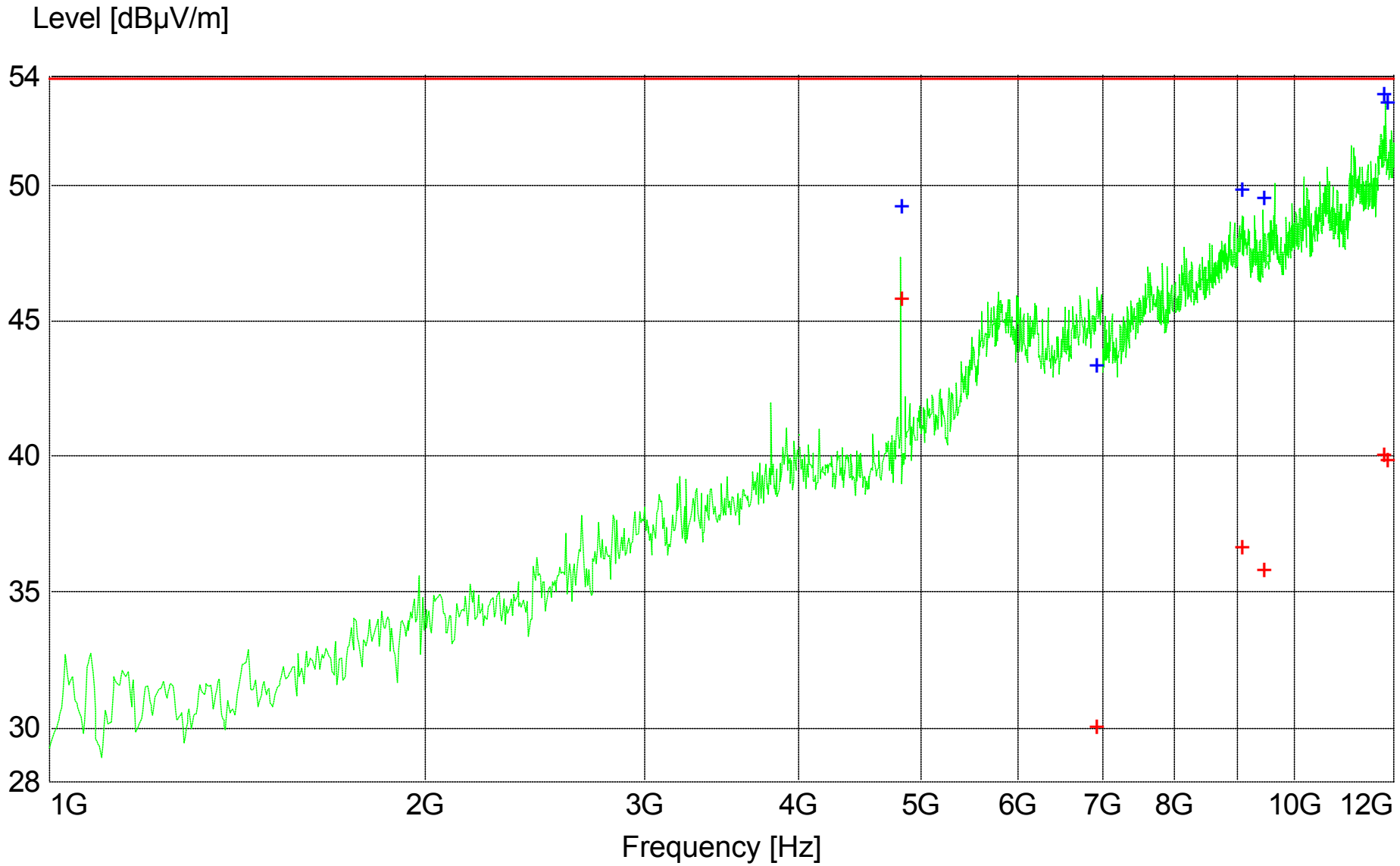
```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "glc032305a_fin"

3/23/2005 2:56PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
40.020000	24.11	10.61	12.8	-0.7	40.0	15.9	100.0	21	VERT
45.000000	28.89	17.09	11.0	-0.8	40.0	11.1	100.0	337	VERT
45.180000	31.47	19.71	11.0	-0.8	40.0	8.5	100.0	328	VERT
45.660000	31.43	19.78	10.8	-0.8	40.0	8.6	100.0	8	VERT
616.020000	40.72	16.76	20.8	-3.2	46.0	5.3	100.0	22	VERT



+ + MES gcs031105c_fin
+ + MES gcs031105c_fin Pk
MES gcs031105c_pre PK
LIM FCC ClassB F QP/AV FCC ClassB, field strength 3m

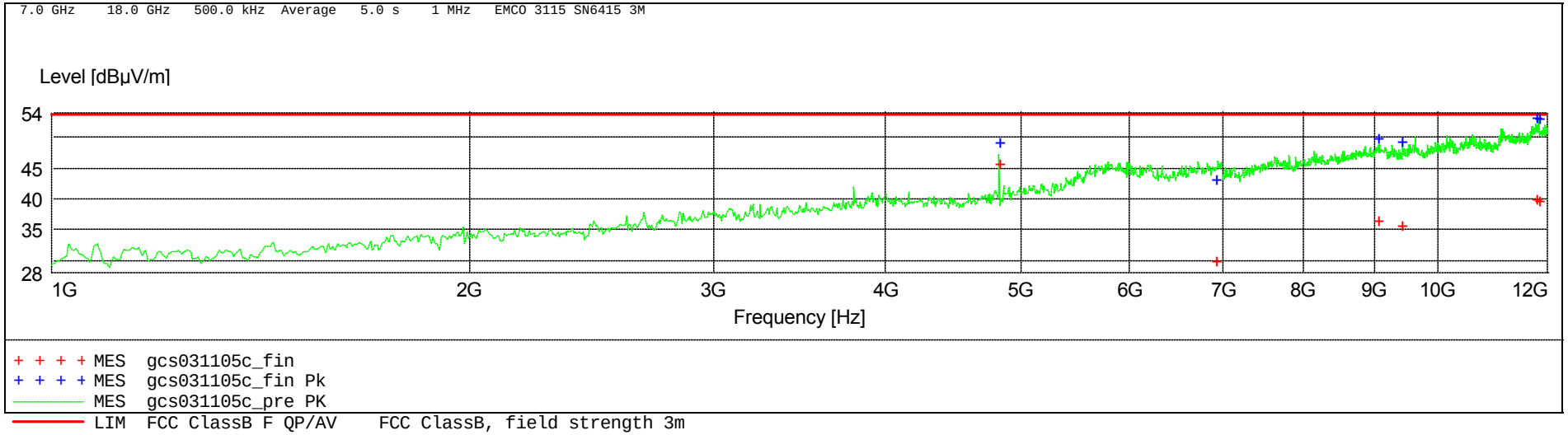
030905-05

Field strength

```
EUT:                  AS-20
Manufacturer:         Control Tec
Operating Condition:  120VAC/60Hz
Test Site:            tp3 NCEE
Operator:             dkramer
Test Specification:   FCC B
Comment:              Rx Ch1
Start of Test:        3/11/2005 / 3:28:51PM
```

SCAN TABLE: "FCC ClassB Field fPA"

```
  Short Description:            FCC ClassB Field Strength fin
  Start      Stop       Step       Detector  Meas.    IF      Transducer
  Frequency  Frequency  Width                Time     Bandw.
  30.0 MHz   1.0 GHz    60.0 kHz   QuasiPeak 5.0 s    120 kHz EMCO 3142 SN1654 3M
  1.0 GHz    7.0 GHz    500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
                                   MaxPeak
  7.0 GHz    18.0 GHz   500.0 kHz  Average   5.0 s    1 MHz   EMCO 3115 SN6415 3M
```



MEASUREMENT RESULT: "gcs031105c_fin"

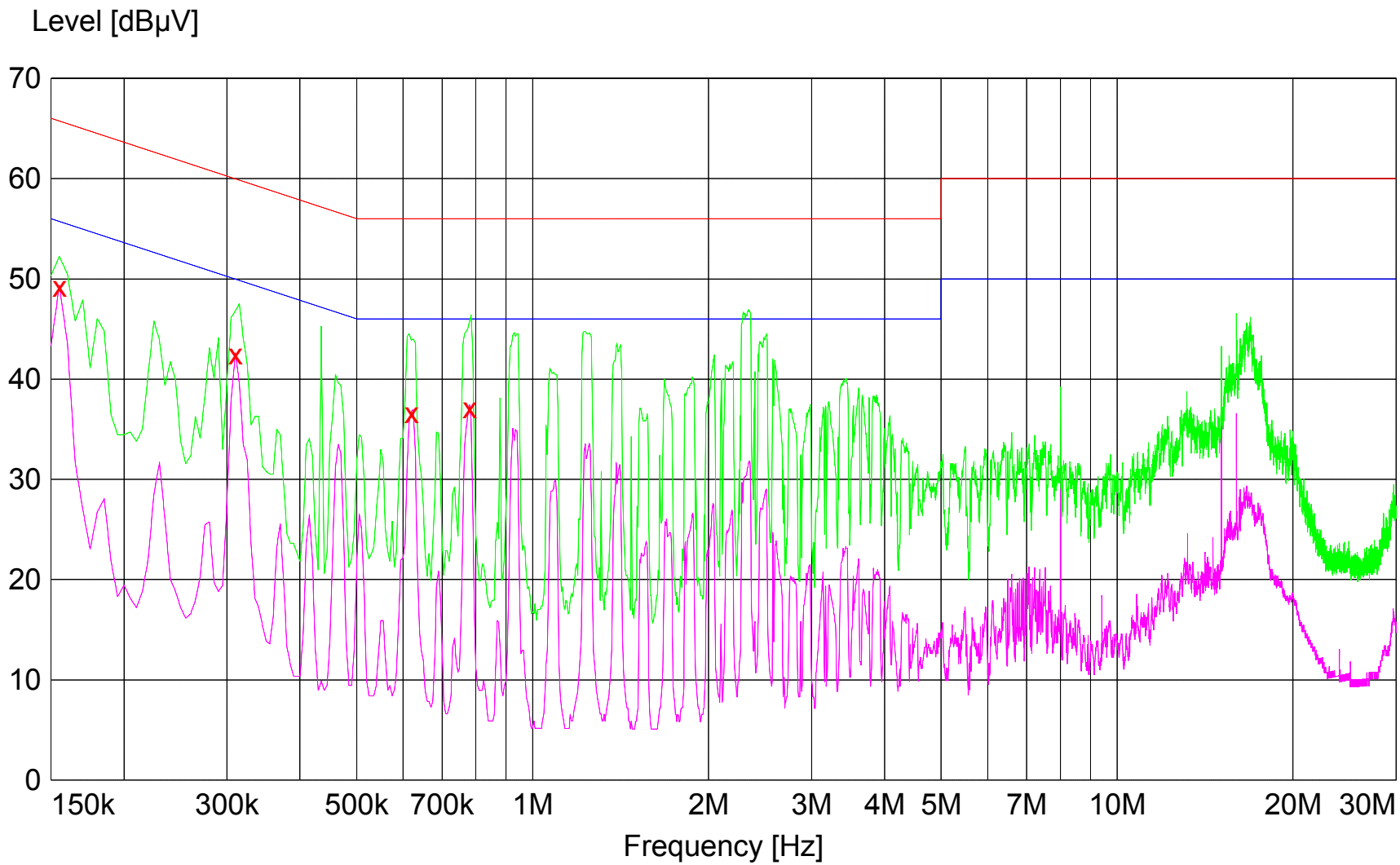
3/11/2005 4:08PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
4824.000000	45.76	34.73	33.0	22.0	53.9	8.1	118.0	167	VERT
6921.500000	30.00	14.33	35.2	19.5	53.9	23.9	128.0	24	HORI
9046.500000	36.63	16.02	37.9	17.3	53.9	17.3	101.0	210	HORI
9427.000000	35.77	15.56	38.0	17.8	53.9	18.1	300.0	101	HORI
11781.500000	40.01	16.51	39.1	15.6	53.9	13.9	150.0	141	HORI
11842.500000	39.83	16.48	39.1	15.8	53.9	14.1	150.0	122	HORI

MEASUREMENT RESULT: "gcs031105c_fin Pk"

3/11/2005 4:08PM

Frequency MHz	Level dBµV/m	Measured dBµV	Transd dB	Cables dB	Limit dBµV/m	Margin dB	Height cm	Angle deg	Pol.
4824.000000	49.19	38.16	33.0	22.0	53.9	4.7	118.0	167	VERT
6921.500000	43.33	27.67	35.2	19.5	53.9	10.6	128.0	24	HORI
9046.500000	49.78	29.17	37.9	17.3	53.9	4.1	101.0	210	HORI
9427.000000	49.50	29.30	38.0	17.8	53.9	4.4	300.0	101	HORI
11781.500000	53.31	29.81	39.1	15.6	53.9	0.6	150.0	141	HORI
11842.500000	53.03	29.68	39.1	15.8	53.9	0.9	150.0	122	HORI



x x x MES gbl032405Y_fin AV
MES gbl032405Y_pre PK
MES gbl032405Y_pre AV
LIM EN 55022 V QP Voltage QP Limit
LIM EN 55022 V AV Voltage AV Limit

030905-05

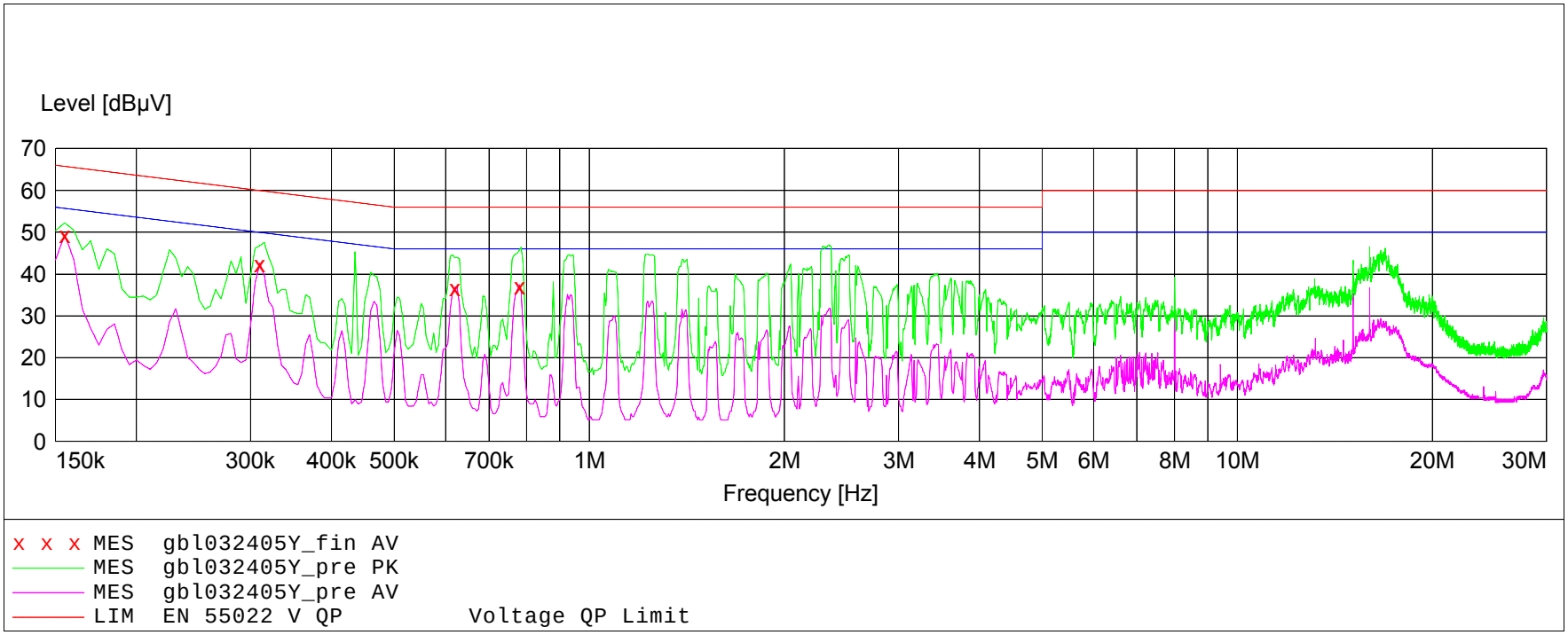
Conducted Emissions

EUT:	AS-20
Manufacturer:	Control Tec
Operating Condition:	120VAC/50Hz
Test Site:	NCEE, vert gnd
Operator:	dkramer
Test Specification:	FCC Class B
Comment:	Tx Ch 1, representative of all
Start of Test:	3/24/2005 / 5:33:37PM

SCAN TABLE: "EN 55011 Voltage Fin"

Short Description: EN 55011 Voltage

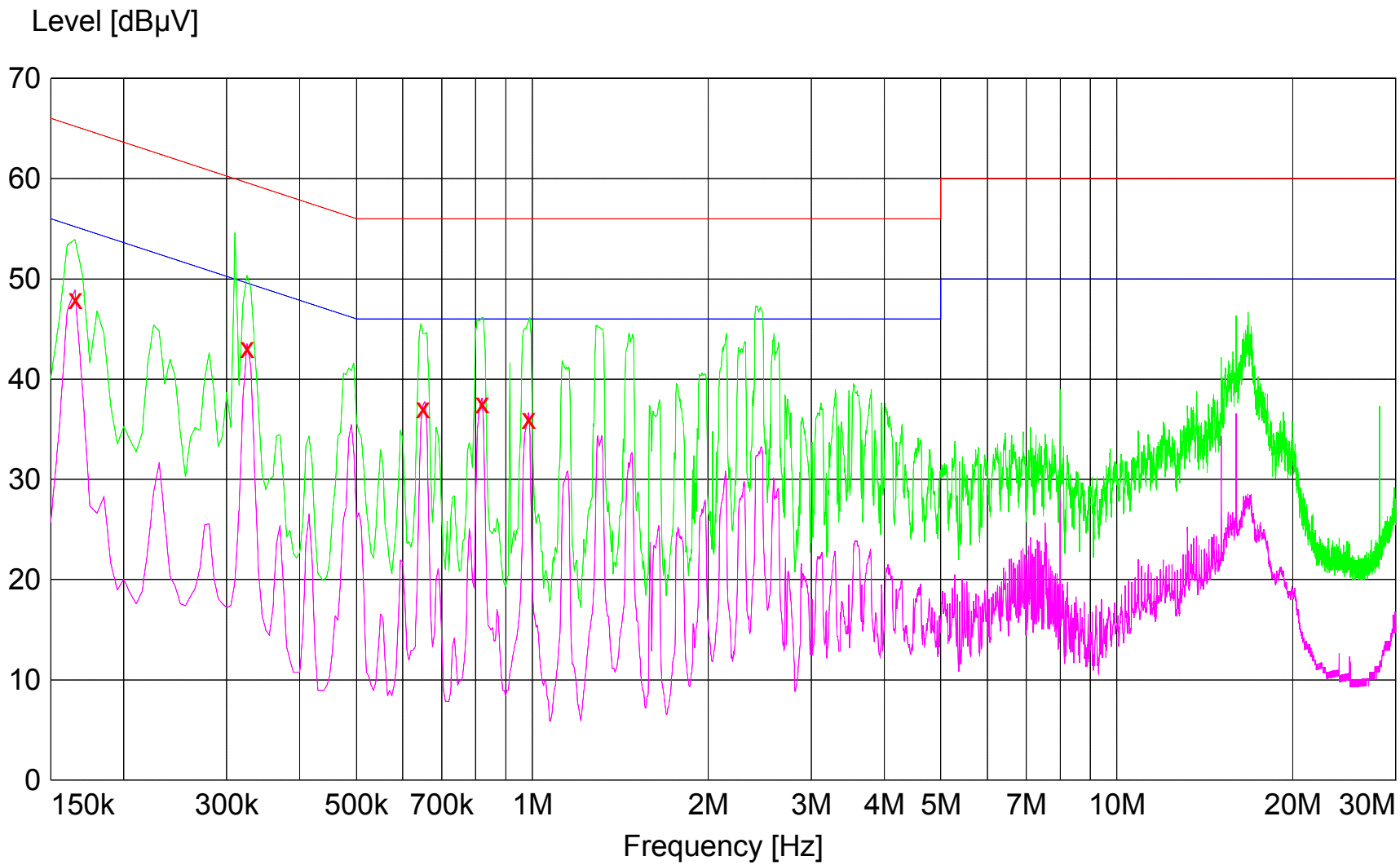
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	None



MEASUREMENT RESULT: "gbl032405Y_fin AV"

3/24/2005 6:01PM

Frequency MHz	Level dBµV	Measured dBµV	Transd dB	Cables dB	Limit dBµV	Margin dB	Line	PE
0.155000	49.20	39.32	0.0	9.9	56	6.5	L1	GND
0.310000	42.40	32.52	0.0	9.9	50	7.6	L1	GND
0.620000	36.60	26.73	0.0	9.9	46	9.4	L1	FLO
0.780000	37.10	27.19	0.0	9.9	46	8.9	N	GND



x x x MES gbl032405Z_fin AV
MES gbl032405Z_pre PK
MES gbl032405Z_pre AV
LIM EN 55022 V QP Voltage QP Limit
LIM EN 55022 V AV Voltage AV Limit

030905-05

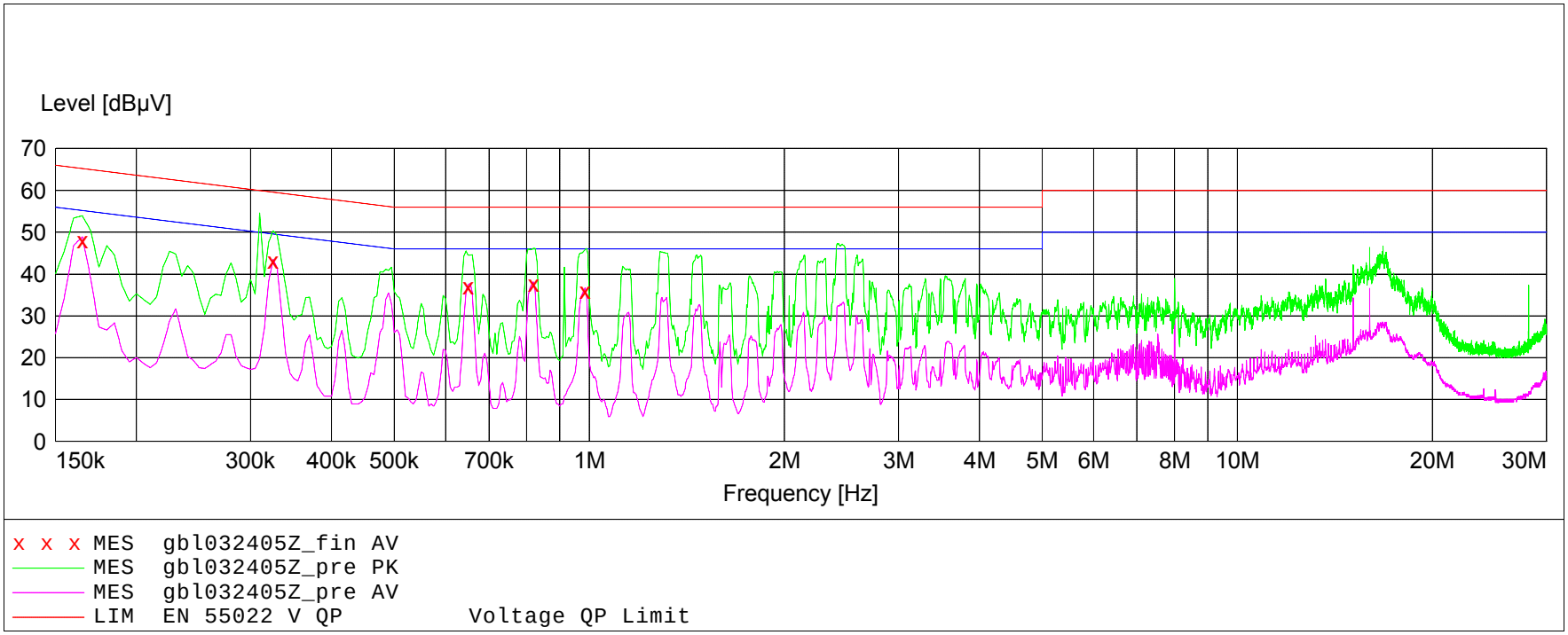
Conducted Emissions

EUT:	AS-20
Manufacturer:	Control Tec
Operating Condition:	120VAC/50Hz
Test Site:	NCEE, vert gnd
Operator:	dkramer
Test Specification:	FCC Class B
Comment:	RX
Start of Test:	3/24/2005 / 4:58:57PM

SCAN TABLE: "EN 55011 Voltage Fin"

Short Description: EN 55011 Voltage

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	QuasiPeak Average	1.0 s	9 kHz	None



MEASUREMENT RESULT: "gbl032405Z_fin AV"

3/24/2005 5:29PM

Frequency MHz	Level dBµV	Measured dBµV	Transd dB	Cables dB	Limit dBµV	Margin dB	Line	PE
0.165000	48.00	38.08	0.0	9.9	55	7.2	L1	GND
0.325000	43.10	33.20	0.0	9.9	50	6.5	L1	FLO
0.650000	37.10	27.20	0.0	9.9	46	8.9	L1	FLO
0.820000	37.60	27.72	0.0	9.9	46	8.4	N	GND
0.985000	36.00	26.07	0.0	9.9	46	10.0	N	GND

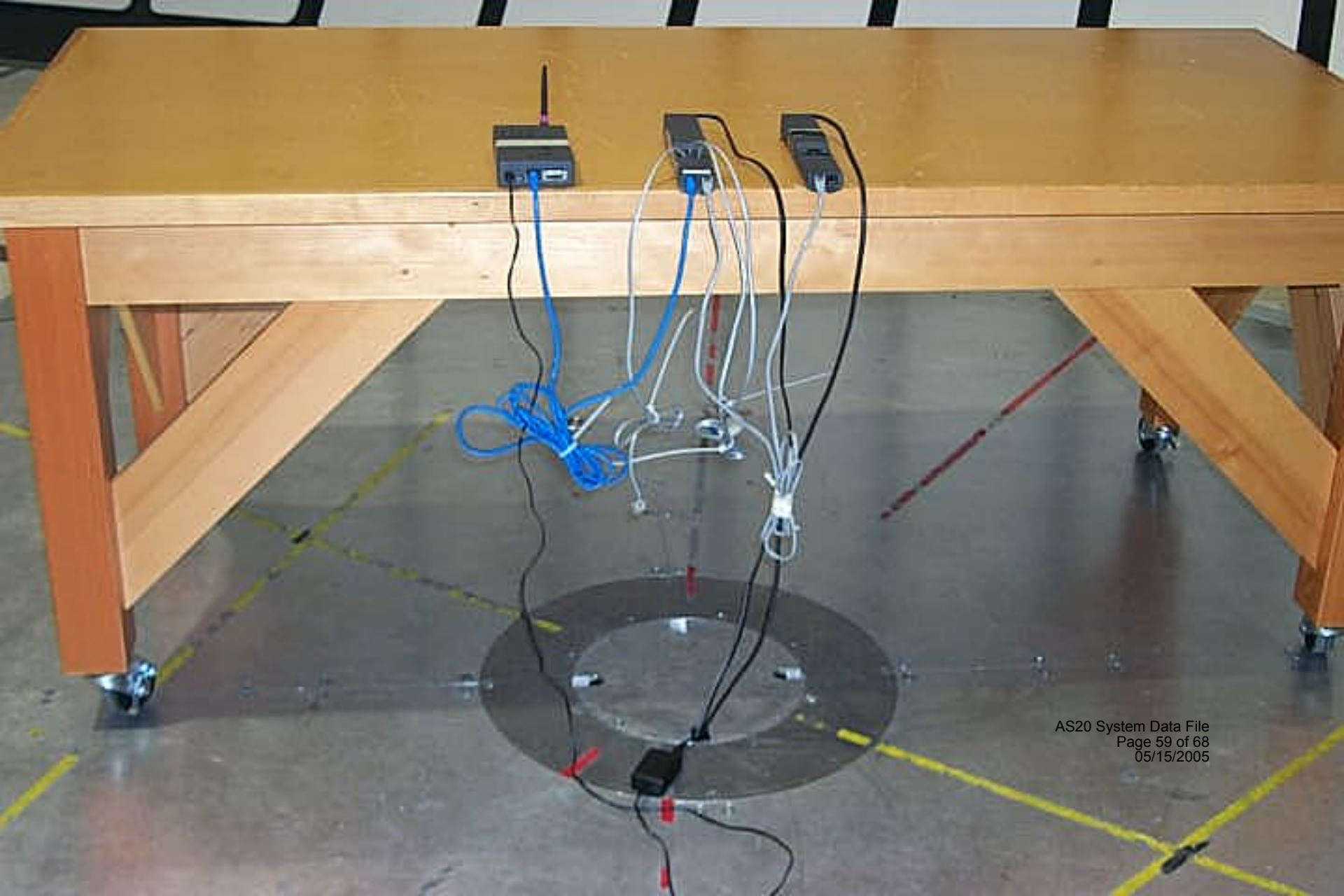
QF04d-NCEE RF Emissions Setup Sheet

MTO # _____
Customer: _____
Technician: _____
Per Test Plan # _____ **System Verification** _____
Start: Date _____ **Time** _____ **Ambient:** _____ **C** _____ **%RH**
Stop: Date _____ **Time** _____ **Ambient:** _____ **C** _____ **%RH**

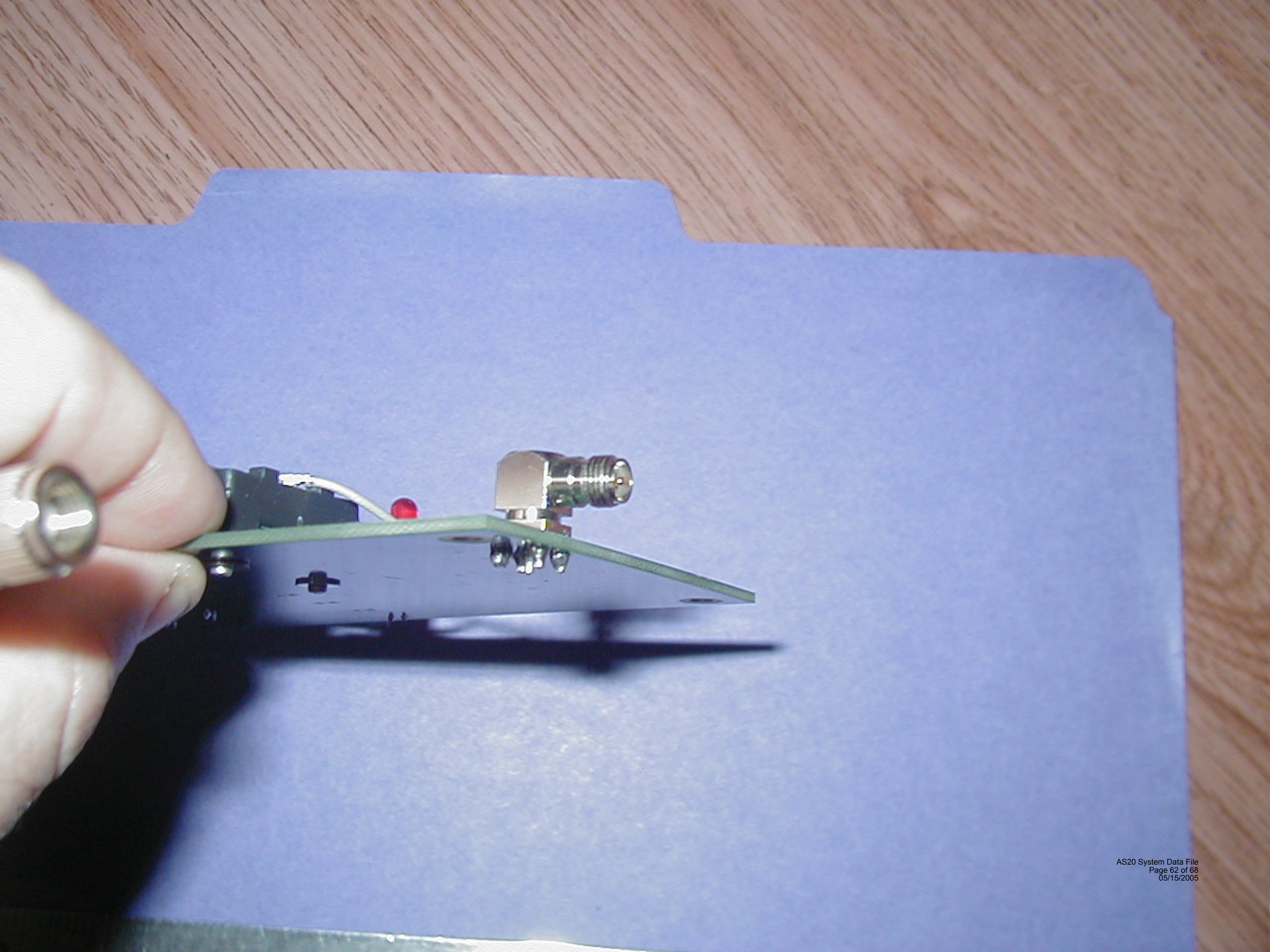
Last Cal	Serial #	Manufacturer	Model	Description	Used
3/4/2005	1084	A.H. Systems	SAS-510-2	Log Periodic Array 290M	
2/24/2005	781	A.H. Systems	SAS-542	Folding Biconical Antenn	
2/24/2005	780	A.H. Systems	SAS-542	Folding Biconical Antenn	
2/28/2005	50973	EMCO	.91550-2	Clamp-on current probe	
5/17/2004	50959	EMCO	.95236-1	Bulk Injection Probe	
5/17/2004	50987	EMCO	.95242-1	Bulk Injection Probe	
9/8/2004	6415	EMCO	3115	DRG Horn	X
9/17/2003	6416	EMCO	3115	DRG Horn	
5/17/2004	2576	EMCO	3116	DRG Horn	X
3/10/2005	1647	EMCO	3142B	Biconilog antenna	
5/20/2004	1654	EMCO	3142B	Biconilog antenna	X
2/23/2005	4411	EMCO	3301B	Active Rod antenna	
2/23/2005	3125	EMCO	3303	Rod antenna	
2/18/2004	1392	EMCO	4610	Source Refrad	
2/20/2004	1166	EMCO	4630B	Source Royce	
9/11/2003	24936	EMCO	6512	Standard loop, see cal. No	
11/4/2003	100021	Rohde & Schwarz	ESH2-Z5	Artificial mains 9kHz to 3	
5/17/2004	836679/010	Rohde & Schwarz	ESH3-Z5	Artificial mains 9kHz to 3	X
9/9/2004	100023	Rohde & Schwarz	ESH3-Z5	Artificial mains 9kHz to 3	
7/8/2004	100037	Rohde & Schwarz	ESI26	EMI Test Receiver	X
5/19/2004	100007	Rohde & Schwarz	ESI7	EMI Test Receiver	X
1/1/2003	2575	Rohde & Schwarz	ES-K1	Software v.1.60	X
2/28/2005	100006	Rohde & Schwarz	EZ-17	RF current probe	
11/5/2004	082001/003	Rohde & Schwarz	TS-PR18	Preamplifier	

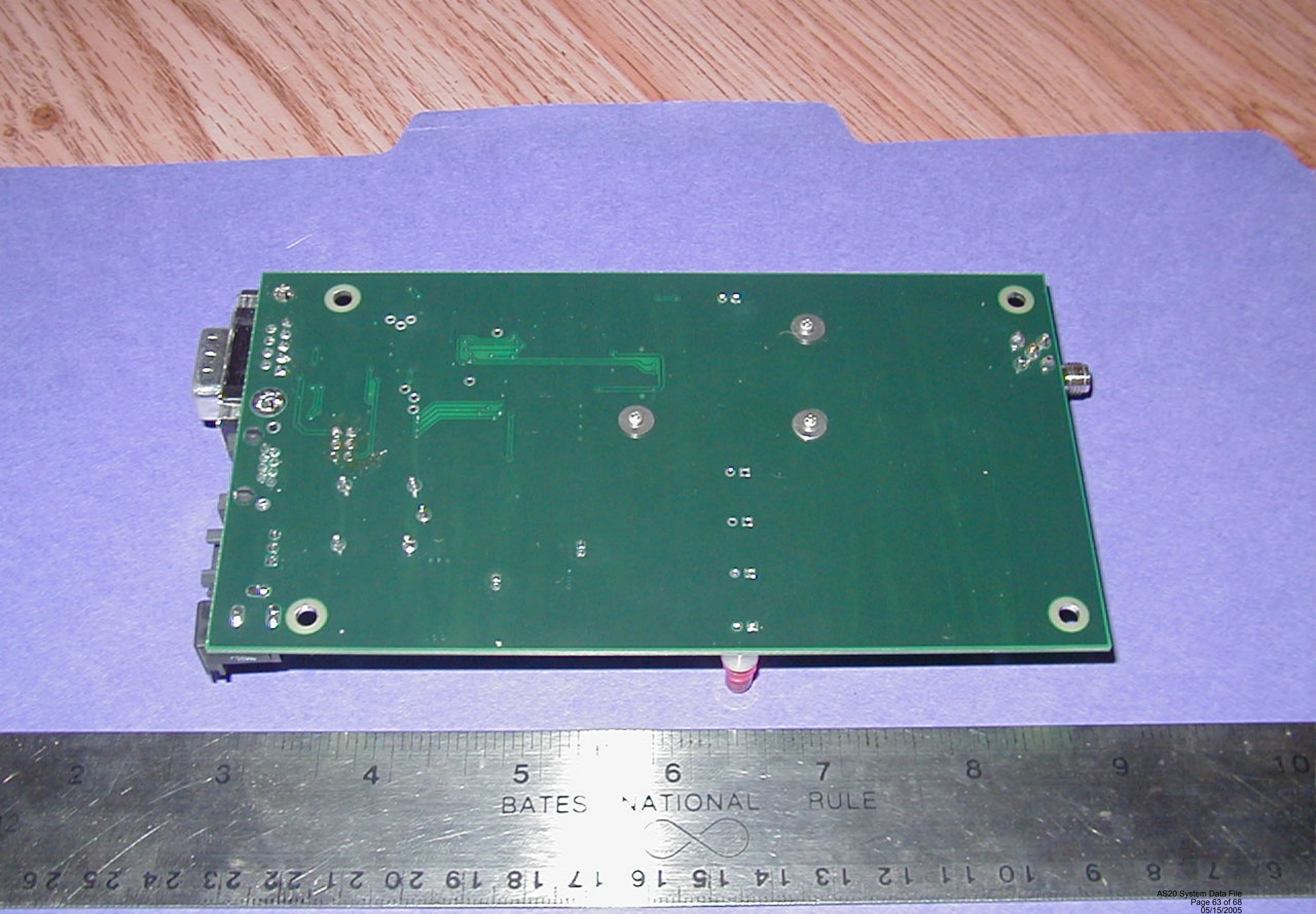
Photo Files: _____
Test Method: _____
Frequency Range: _____

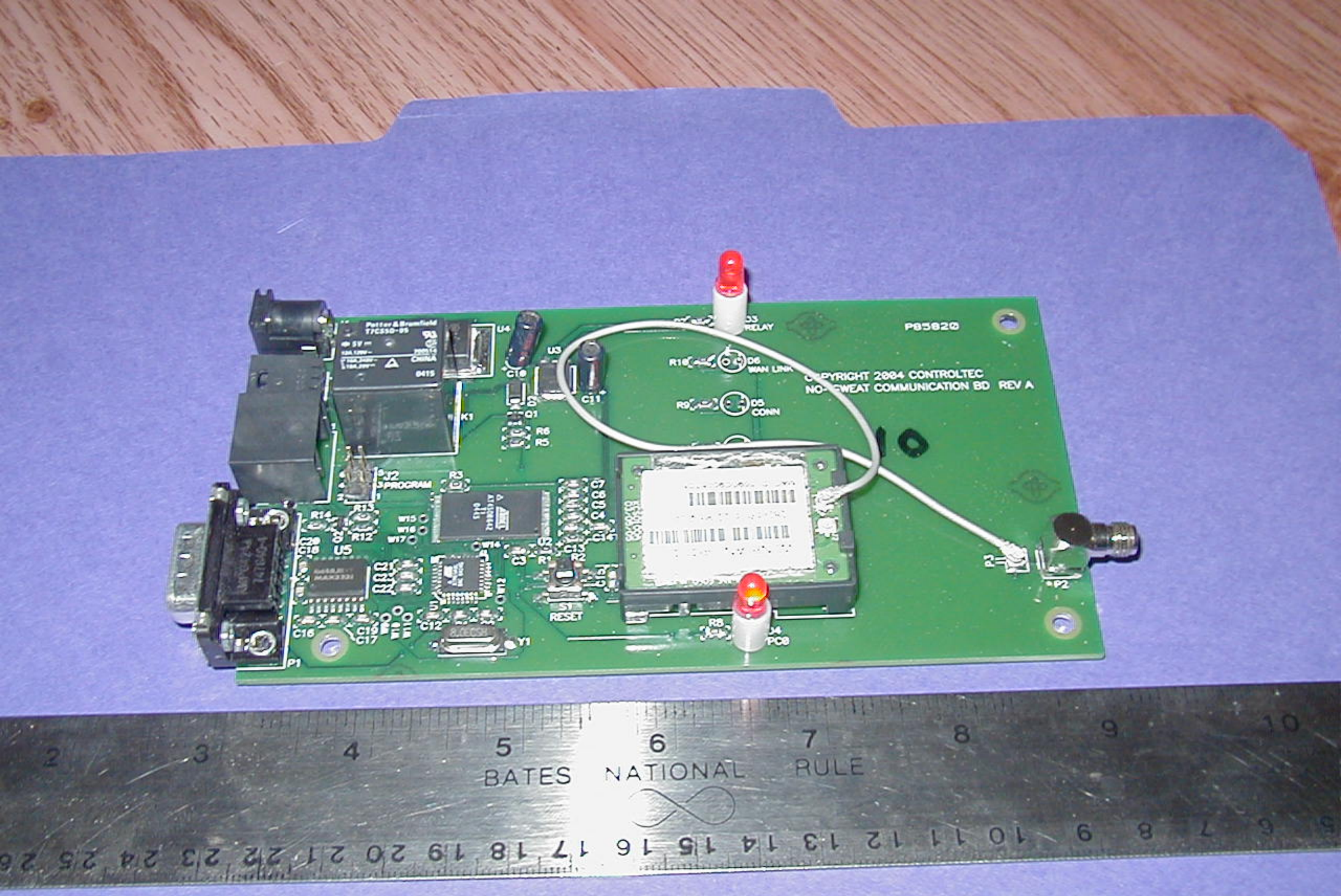
Notes (use back if Needed):



BATES NATIONAL
RULE




BATES NATIONAL RULE


P05820
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NO-SWEAT COMMUNICATION BD REV A
WAN LINK
CONN
RELAY
PROGRAM
RESET
BATES NATIONAL RULE

Calculations of ERP and EIRP									
	Direct Power Measurement			ERP for Typical Antenna Gain 2.7 dBi or 0.56 dBd			EIRP for Typical Antenn Gain of 2.7 dBi or 0.56 dBd		
Channel	(dBm)	(W)	(dBw)	dBm	dBw	mW	dBm	dBw	mW
1	6.82	0.0048	-23.18	0.5648	-29.4352	1.1	0.926272	-29.07373	1.2
5	5.19	0.0033	-24.81	0.5633	-29.4367	1.1	0.923812	-29.07619	1.2
11	7.15	0.0052	-22.85	0.5652	-29.4348	1.1	0.926928	-29.07307	1.2

Antenna Gain is 2.7 dBi
dBi = dBd + 2.14
dBd = dBi - 2.14
dBd = 2.7 - 2.14 = 0.56

ERP = P + dBd
EIRP = ERP * 1.64

Power Density Equation

S=(PG)/(4*3.1415*r*r)

Antenna Gain = 2.7 dBi or 1.862 numeric
Channel 1 Power = 31 mW
Channel 5 Power = 21.8 mW
Channel 11 Power = 33.7 mW

Power Density (mw/cm*cm)			
CH1	**Ch5**	**CH11**	**Distance (cm)**
0.045935	0.032303	0.049936	10
0.011484	0.008076	0.012484	20
0.005104	0.003589	0.005548	30
0.002871	0.002019	0.003121	40
0.001837	0.001292	0.001997	50
0.001276	0.000897	0.001387	60
0.000937	0.000659	0.001019	70
0.000718	0.000505	0.00078	80
0.000567	0.000399	0.000616	90
0.000459	0.000323	0.000499	100

antennas such as microwave and satellite dish antennas. The general equations given below can be used for predicting field strength and power density in the vicinity of most antennas, including those used for paging and in the commercial mobile radio service (CMRS). They can also be used for making conservative predictions of RF fields in the vicinity of antennas used for amateur radio transmissions, as discussed earlier.

Equations for Predicting RF Fields

Calculations can be made to predict RF field strength and power density levels around typical RF sources. For example, in the case of a single radiating antenna, a prediction for power density in the far-field of the antenna can be made by use of the general Equations (3) or (4) below [for conversion to electric or magnetic field strength see Equation (1) in Section 1]. These equations are generally accurate in the far-field of an antenna but will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction.

$$S = \frac{PG}{4\pi R^2} \qquad (3)$$

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

or:

$$S = \frac{EIRP}{4\pi R^2} \qquad (4)$$

where: EIRP = equivalent (or effective) isotropically radiated power

When using these and other equations care must be taken to use the ***correct units*** for all variables. For example, in Equation (3), if power density in units of mW/cm^2 is desired then power should be expressed in milliwatts and distance in cm. Other units may be used, but care must be taken to use correct conversion factors when necessary. Also, it is important to note that the power gain factor, ***G***, in Equation (3) is normally ***numeric*** gain. Therefore,

when power gain is expressed in logarithmic terms, i.e., dB, a conversion is required using the relation:

$$G = 10^{\frac{dB}{10}}$$

For example, a logarithmic power gain of 14 dB is equal to a numeric gain of 25.12.

In some cases operating power may be expressed in terms of "effective radiated power" or "ERP" instead of EIRP. ERP is power referenced to a half-wave dipole radiator instead of to an isotropic radiator. Therefore, if ERP is given it is necessary to convert ERP into EIRP in order to use the above equations. This is easily done by multiplying the ERP by the factor of 1.64, which is the gain of a half-wave dipole relative to an isotropic radiator. For example, if ERP is used in Equation (4) the relation becomes:

$$S = \frac{EIRP}{4\pi R^2} = \frac{1.64\ ERP}{4\pi R^2} = \frac{0.41\ ERP}{\pi R^2} \qquad (5)$$

For a truly worst-case prediction of power density at or near a surface, such as at ground-level or on a rooftop, 100% reflection of incoming radiation can be assumed, resulting in a potential doubling of predicted field strength and a four-fold increase in (far-field equivalent) power density. In that case Equations (3) and (4) can be modified to:

$$S = \frac{(2)^2 PG}{4\pi R^2} = \frac{PG}{\pi R^2} = \frac{EIRP}{\pi R^2} \qquad (6)$$

In the case of FM radio and television broadcast antennas, the U.S. Environmental Protection Agency (EPA) has developed models for predicting ground-level field strength and power density [Reference 11]. The EPA model recommends a more realistic approximation for ground reflection by assuming a maximum 1.6-fold increase in field strength leading to an