FCC ID E9MHT40FLEXX:

TTI - P-G 089 / 94-11
DAT - P-011 / 91-02

EMI -- TEST REPORT

Test Report No. : T25873-00-02XF	April 21, 2005 Date of issue

Type / Model Name : HT40 FLEXX

Product Description : Wireless Microphone

Applicant : AKG Acoustics GmbH

Address : Lemböckgasse 21-25
A-1230 Vienna, Austria

Manufacturer : Vtech Communications Ltd.

Address : Vtech Science Park, Xia Ling Bei Management Zone,
Liabou, Dongguan Guangdong 523411

Licence holder : AKG Acoustics, U.S.

Address : 914 Airpark Center Dr., Nashville,
TN 37217, U.S.A

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

- Part 74	Experimental radio, auxiliary, special broadcast and other program distributional services
- Part 74 Subpart H; §74.861	Technical requirements for low power auxiliary stations

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2 SUMMARY

GENERAL REMARKS:

All spurious emissions not mentioned in this test report are
from 25-1000MHz: < 40 dBµV/m
above 1000MHz: < 30 dBµV/m

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records of MBPS

Testing commenced on : April 12, 2005

Testing concluded on : April 19, 2005

Checked by:

Harald Buchwald
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2005.06.17 11:58:17 +02'00'

Harald Buchwald
Dipl. Ing.(FH)

Tested by:

Xaver Fischer
Ich bin der Verfasser dieses Dokuments
2005.06.17 11:41:13 +02'00'

Xaver Fischer

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EuT

Wireless Microphone
T25873-00-02XF

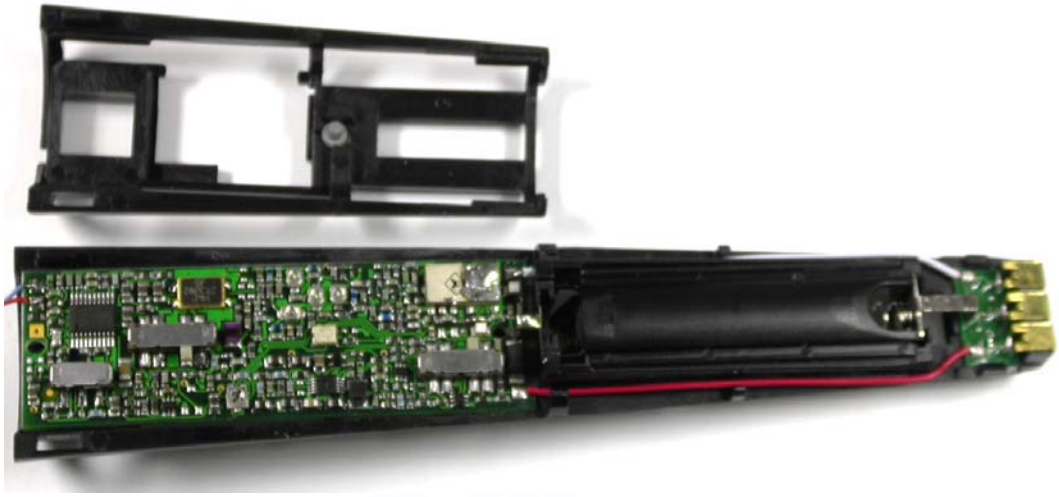
External photo
Front view

Wireless Microphone
T25873-00-02XF

External photo
Rear view with dismantled microphone head

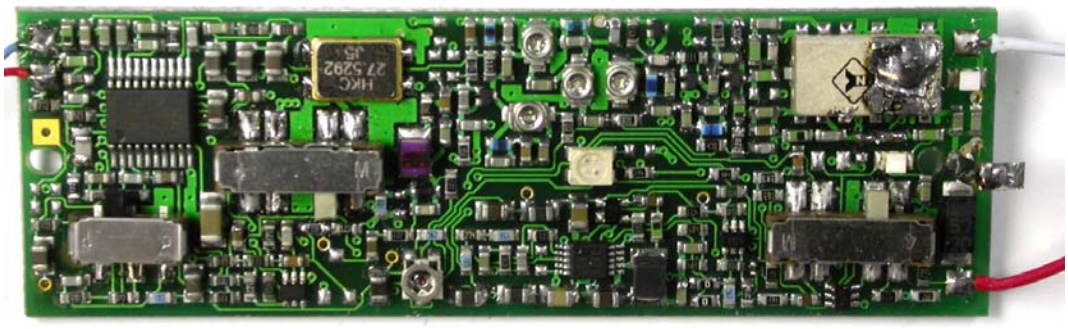
Wireless Microphone
T25873-00-02XF

Internal photo
Open view



Wireless Microphone
T25873-00-02XF

Internal photo
Front view of PCB



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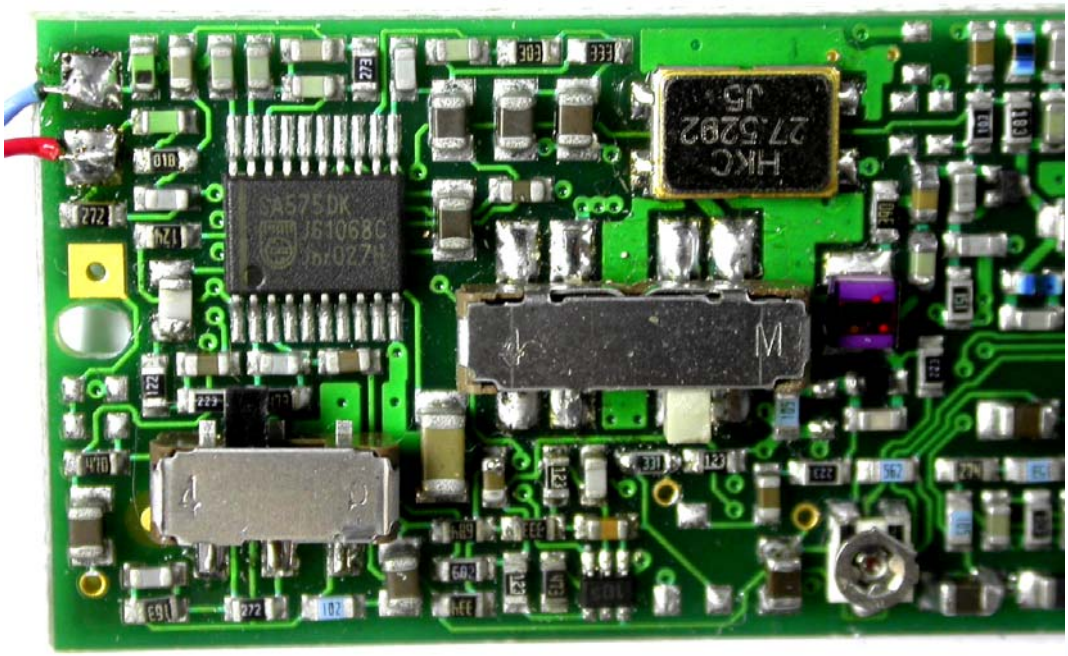
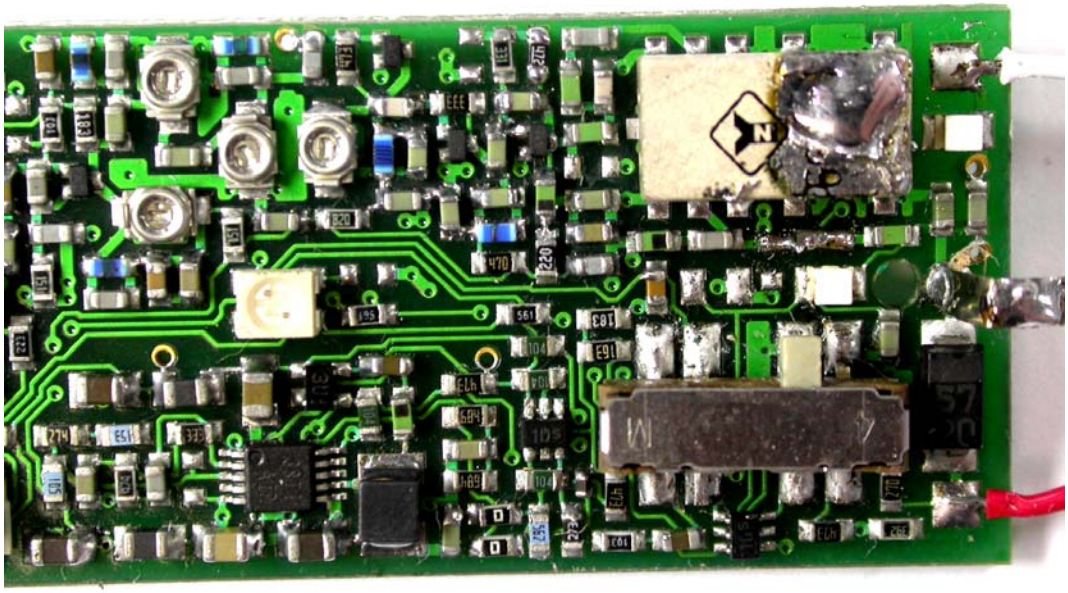
Wireless Microphone
T25873-00-02XF

Internal photo
Part front view of PCB



Wireless Microphone
T25873-00-02XF

Internal photo
Part front view of PCB



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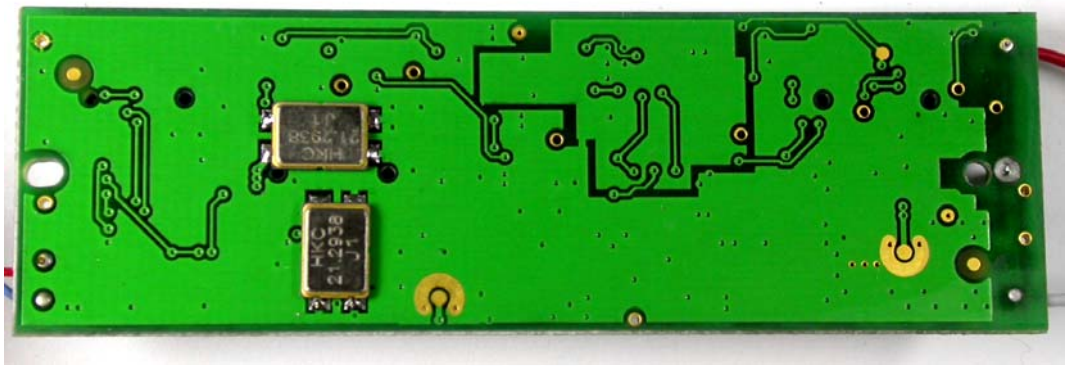
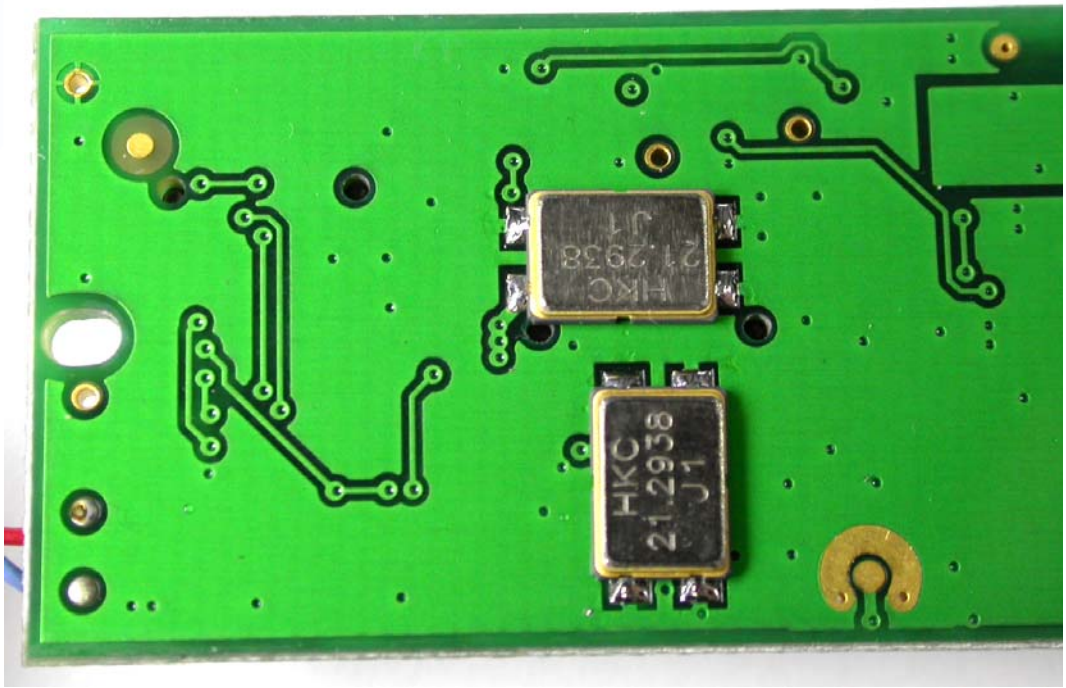
Wireless Microphone
T25873-00-02XF

Internal photo
Rear view of PCB



Wireless Microphone
T25873-00-02XF

Internal photo
Part rear view of PCB



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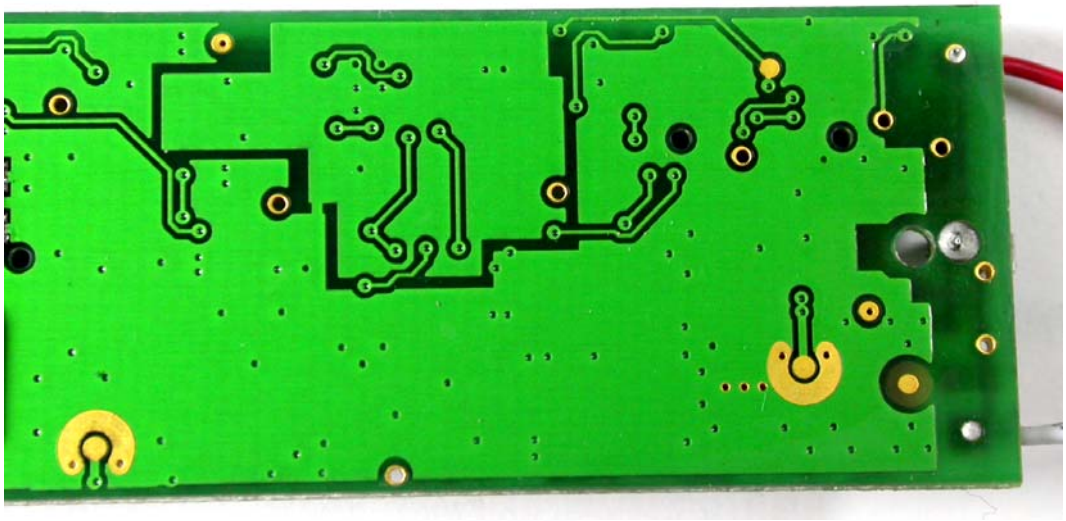
Wireless Microphone
T25873-00-02XF

Internal photo
Par reart view of PCB



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3.2 Power supply system utilised

Power supply voltage : 1.25 V / DC

3.3 Short description of the Equipment under Test (EuT)

The HT40 FLEXX is a transmitter working in the UHF band (frequencies between 660.700 MHz to 751.550 MHz) where the frequency is changeable in one of three frequencies via a slider switch. Transmission frequencies are generated by fundamental-mode-crystal-oscillator where a harmonic of the oscillator is used for following signal preparation.
The audio signal is fed through compressor and pre-emphasis stage before it gets to the varactor-diode of the oscillator.
The generated RF signal is amplified and multiplied by three stages and filtered before it is coupled to the antenna (formed by the battery and the PCB).

Number of tested samples: 3
Serial number: Prototype

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- Continuous transmitting mode without modulation
- Continuous transmitting mode with normal modulation

EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- Spectrum analyzer Model : ESIB 40
- Model :
- Model :
- Model :
- Model :
- Model :

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4 TEST ENVIRONMENT

4.1 Address of the test laboratory

MIKES BABT Product Service GmbH
Ohmstrasse 2-4
94342 Strasskirchen
Germany

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the MIKES BABT Product Service GmbH quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (1997), European Standard EN 55022 and Australian Standard AS 3548 (which are based on CISPR 22).

The Japanese standard, "Voluntary Control Council for Interference (VCCI) by Data Processing Equipment and Electronic Office Machines, Technical Requirements" is technically equivalent to CISPR 22 (1997). For official compliance, a conformance report must be sent to and accepted by the VCCI.

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Measurement Error

The data and results referenced in this document are true and accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. The measurement uncertainty was calculated for all measurements listed in this test report according to NIS 81/5.1994 “The treatment of uncertainty in EMC measurements” and is documented in the MIKES BABT Product Service GmbH quality system according to DIN EN ISO/IEC 17025. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the device.

4.4.1.3 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into it’s characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

4.4.2.1 General Standard Information

The test methods used comply with CISPR Publication 22 (1997), EN 55022 (2001) and AS 3548 (1992) - "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.4.2.2 Conducted disturbance

Conducted disturbance on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi peak detection, and a Line Impedance Stabilization Network (LISN), with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi peak and average detection and recorded on the data sheets.

4.4.2.3 Radiated disturbance

Radiated disturbance from the EUT are measured in the frequency range of 30 to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and average detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.

4.5 Discovery of worst case measurement conditions

The model HT40 FLEXX is a transmitter and consists of different versions between the frequency band 660.700 MHz to 751.550 MHz.

For the exact frequency range of this models please refer to the frequency plan in the technical documentation set.

All the versions are technically identical except the following items:

- PCB: The boards are similar with differences only in the output filter. On the PCB, the values of some resistors, coils and capacitors are different. For more detailed information, please see technical documentation set. Due to the different output filter, the PCB`s have different names.

To find out the worst case channel for the complete measurement the following tests have been performed:

The complete measurement was performed at three versions:

- US45A working at 660.700 MHz (lowest channel of the frequency band)
- US54 working at 710.400 MHz (middle channel of the frequency band)
- US60B working at 751.550 MHz (highest channel of the frequency band)

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5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location:

5.1.2 Photo documentation of the test set-up

5.1.3 Description of Measurement

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = Inverse log(dBμV/20)

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeter's above the floor and is positioned 40 centimeter's from the vertical ground plane (wall) of the screen room. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.4 Test result

Frequency range:

Min. limit margin

The requirements are

Remarks: The test is not applicable because the EuT is battery powered.

5.2 Effective radiated power (conducted)

For test instruments and accessories used see section 6 Part **CPC 2**.

5.2.1 Description of the test location

Test location: Area 4

5.2.2 Photo documentation of the test set-up

5.2.3 Description of Measurement

Transmitter power is the power at the transmitter output terminals and delivered to the antenna, antenna transmission line, or any other impedance-matched, radio frequency load.
No unusual transmitting antennas or antenna elevations shall be used as defined in §74.861(f) and the requirements in § 74.801 shall be fulfilled.

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5.2.4 Test result

EuT: HT40 FLEXX (Set US45A working at 660.700 MHz):

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
660.700	7.35	24	-16.65

EuT: HT40 FLEXX (Set US54 working at 710.400 MHz):

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
710.400	7.30	24	-16.70

EuT: HT40 FLEXX (Set US60B working at 751.550 MHz):

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
751.550	7.06	24	-16.94

Peak Power Limit according to FCC Subpart 74.861(e)(1)(ii):

Transmitting frequencies of the EuT [MHz]	Limit [mW]	Limit [dBm]
54 – 72	50	17
76 – 88		
174 – 216		
470 – 608	**250**	**24**
614 - 806		

The requirements are **FULFILLED.**

Remarks: No unusual transmitting antennas or antenna elevations have been used as defined in §74.861(f). Besides is the requirement according to § 74.801 fulfilled.

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5.3 Radiated emissions (electric field) 30 MHz – 9 GHz

For test instruments and accessories used see section 6 Part **SER 2, SER 3**.

5.3.1 Description of the test location

Test location: OATS1
Anechoic Chamber A2

Test distance: 3m

5.3.2 Photo documentation of the test set-up

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5.3.3 Test result

EuT: HT40 FLEXX (Set US45A working on 660.700MHz):

Frequency [MHz]	Reading Vert. [dBµV]	Reading Hor. [dBµV]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBµV/m]	Level Hor. [dBµV/m]	Limit [dBµV/m]	DLimit [dB]
330.36	36.4	30.6	18.0	18.0	54.4	48.6	84.4	-30.0
1325,00	74,7	60,7	-14,5	-14,5	60,3	46,3	84,4	-24,1
1655,00	61,3		-13,4		47,9		84,4	-36,5
1985,00	67,9		-12,1		55,8		84,4	-28,6
3310,00	56,3		-6,8		49,4		84,4	-35,0
3970,00	61,7		-4,9		56,8		84,4	-27,6
4300,00	55,4		-5,0		50,4		84,4	-34,0
4465,00	56,7		-5,0		51,6		84,4	-32,8
4630,00	69,0		-4,7		64,3		84,4	-20,1
4800,00	62,2		-3,8		58,4		84,4	-26,0
6277,00		59,1		-0,7		58,4	84,4	-26,0
6442,00		57,0		-0,9		56,1	84,4	-28,3
6609,00	68,2	70,8	-1,5	-1,5	66,8	69,3	84,4	-15,1
6777,00	58,1	57,9	-1,7	-1,7	56,5	56,2	84,4	-27,9
6942,00		56,0		-1,1		54,9	84,4	-29,5
7107,00	58,1	63,6	-1,3	-1,3	56,8	62,3	84,4	-22,1
7272,00	67,3	76,9	-1,4	-1,4	65,9	75,5	84,4	-8,9
7437,00		59,5		-0,9		58,5	84,4	-25,9
7932,00	56,5		-0,8		55,7		84,4	-28,7

EuT: HT40 FLEXX (Set US54 working on 710.400 MHz):

Frequency [MHz]	Reading Vert. [dBµV]	Reading Hor. [dBµV]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBµV/m]	Level Hor. [dBµV/m]	Limit [dBµV/m]	DLimit [dB]
355.20	30.3	21.1	18.5	18.5	48.8	39.6	84.4	-35.6
1130,00	56,6		-14,9		41,7		84,4	-42,7
1505,00	81,1	64,2	-13,8	-13,8	67,3	50,5	84,4	-17,1
2255,00	63,7	60,9	-11,3	-11,3	52,4	49,6	84,4	-32,0
3010,00	61,8	63,5	-7,5	-7,5	54,2	56,0	84,4	-28,4
3580,00	54,7		-5,9		48,8		84,4	-35,6
3765,00		54,9		-5,3		49,6	84,4	-34,8
4140,00	64,4	54,5	-4,9	-4,9	59,4	49,5	84,4	-25,0
4515,00	67,7	64,3	-4,9	-4,9	62,8	59,3	84,4	-21,6
4895,00	60,2	55,6	-3,0	-3,0	57,2	52,6	84,4	-27,2
5270,00	75,9	66,4	-1,9	-1,9	74,0	64,5	84,4	-10,4
6013,00	64,9	65,2	-0,2	-0,2	64,7	64,9	84,4	-19,5
6768,00	65,6	68,7	-1,6	-1,6	63,9	67,0	84,4	-17,4
7144,00		56,5		-1,4		55,0	84,4	-29,4
7518,00	63,1	68,9	-0,9	-0,9	62,2	68,0	84,4	-16,4
7894,00		57,6		-0,8		56,8	84,4	-27,6

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EuT: HT40 FLEXX (Set US60B working on 751.550 MHz)

Frequency [MHz]	Reading Vert. [dBµV]	Reading Hor. [dBµV]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBµV/m]	Level Hor. [dBµV/m]	Limit [dBµV/m]	DLimit [dB]
375.77	31.6	23.8	18.9	18.9	50.5	42.7	84.4	-33.9
1425,00	64,7	81,8	-14,1	-14,1	50,6	67,7	84,4	-16,7
2135,00	64,9	78,9	-11,6	-11,6	53,3	67,3	84,4	-17,1
2845,00	64,7	62,9	-8,5	-8,5	56,2	54,4	84,4	-28,2
4270,00	71,2	71,2	-5,0	-5,0	66,1	66,2	84,4	-18,2
4625,00	57,8	60,9	-4,7	-4,7	53,1	56,2	84,4	-28,2
4980,00	65,8	71,5	-2,8	-2,8	63,1	68,8	84,4	-15,6
5690,00	62,3	68,2	-0,1	-0,1	62,2	68,2	84,4	-16,2
6396,00	61,7	65,0	-0,7	-0,7	61,0	64,3	84,4	-20,1
7107,00	72,6	66,9	-1,3	-1,3	71,4	65,6	84,4	-13,0
7817,00	61,5	61,6	-0,9	-0,9	60,6	60,8	84,4	-23,6

Peak-Limit according to FCC Subpart 74.861(e)(6)(iii)

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:
On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}$(mean output power in watts) dB.

The requirements are **FULFILLED.**

Remarks: During the test, the Eut was set into transmitting mode without modulation.

The measurement was performed up to the 10th harmonic (9000 MHz).

The measurement has been performed in Peak mode. For critical results, the measurements were repeated in average mode.

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5.4 Modulation Limiting Data

For test instruments and accessories used see section 6 Part **MLD**.

5.4.1 Description of the test location

Test location: Area 4

5.4.2 Photo documentation of the test set-up

5.4.3 Description of Measurement

The modulation limiting data were measured at the antenna terminals for EuT`s with external connector.
Other EuT`s are tested via an adequate coupling device with antenna jack. The antenna jack was connected to the input of a communication test receiver. The internal batteries of the EuT have been removed also and an external DC power supply was used instead. The data have been taken by feeding the connectors used for connecting the microphone with different audio frequencies. These frequencies are generated in the communication test receiver. The level was varied in 10 dB steps from 20 dBµV to the maximum audio input level specified by the manufacturer. The frequency deviation at these levels has been recorded.
PFD: Positive frequency deviation
NFD: Negative frequency deviation

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5.4.4 Test result

EuT: HT40 FLEXX (Set US45A working on 660.700 MHz):

Input audio level [dBµV]	F_{mod}=50 Hz		F_{mod} =1 kHz		F_{mod} =20 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	1,6	0,9	1,6	0,8	1,9	1,0
30	1,6	1,0	1,6	0,9	2,4	1,5
40	1,8	1,0	1,7	1,0	4,1	3,2
50	1,7	1,2	1,7	1,3	7,1	6,4
60	2,0	1,7	2,1	1,8	12,0	11,3
70	2,9	2,8	3,0	2,9	20,2	19,0
80	4,9	4,8	5,1	5,0	34,5	32,0
90	8,4	8,3	8,8	8,8	48,2	44,2
100	15,0	14,8	15,8	15,6	49,0	44,9
110	25,4	24,8	26,6	25,4	48,7	44,5
120	29,9	29,1	35,8	35,5	48,7	44,5

EuT: HT40 FLEXX (Set US54 working on 710.400 MHz):

Input audio level [dBµV]	F_{mod}=50 Hz		F_{mod} =1 kHz		F_{mod} =20 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	1,1	0,9	1,2	1,0	1,4	1,2
30	1,1	0,9	1,2	1,0	2,2	2,0
40	1,0	0,8	1,3	1,1	4,3	4,1
50	1,3	1,2	1,4	1,2	7,2	7,2
60	1,9	1,8	2,0	1,9	12,5	12,1
70	3,0	3,0	3,2	3,2	21,6	21,0
80	5,2	5,2	5,5	5,5	37,3	36,3
90	9,1	9,0	9,6	9,6	51,5	50,0
100	16,3	15,2	17,3	16,8	52,4	51,0
110	27,7	26,3	28,1	27,2	51,0	50,3
120	32,7	30,8	39,1	38,4	51,8	50,3

EuT: HT40 FLEXX (Set US60B working on 751.550 MHz):

Input audio level [dBµV]	F_{mod}=50 Hz		F_{mod} =1 kHz		F_{mod} =20 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	1,9	1,0	2,0	1,0	2,2	1,3
30	2,0	1,1	2,1	1,1	3,0	2,2
40	2,0	1,2	2,1	1,2	5,5	4,6
50	2,0	1,4	2,1	1,6	9,6	9,2
60	2,3	2,0	2,5	2,2	16,5	15,8
70	3,5	3,4	37	3,6	27,7	26,7
80	5,9	5,9	6,3	6,2	46,8	45,2
90	10,3	10,6	11,2	11,0	63,2	60,6
100	18,2	18,3	19,2	19,2	64,2	61,3
110	30,2	30,6	31,0	31,9	63,6	61,0
120	35,6	35,6	43,4	45,2	63,5	61,0

Limit according to FCC Subpart 74.861(e)(3):

Any form of modulation may be used. A maximum deviation of +/- 75 kHz is permitted when frequency modulation is employed.

The requirements are **FULFILLED.**

Remarks: _____

_____

_____

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5.5 Occupied Bandwidth

For test instruments and accessories used see section 6 Part **BW**.

5.5.1 Description of the test location

Test location: Area 4

5.5.2 Photo documentation of the test set-up

5.5.3 Description of Measurement

For the occupied bandwidth protocol the value of 50 % of the maximum frequency deviation was calculated. The level on the audio input was increased until this 50 % frequency deviation was achieved. To this level 16 dB have been added and a plot was made as described in the next chapter under section occupied bandwidth

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5.5.4 Test result

EuT: HT40 FLEXX (Set US45A working on 660.700 MHz)

Max. measured frequency deviation: ±49.0 kHz
50% of the maximum deviation: ±24.5 kHz
Audio input level (ail) to get ±24.5 kHz: L= 74.8 dBµV
L + 16 dBµV = 90.8 dBµV => Level for testing the occupied bandwidth

Version of EuT	US45A							
Audio test level	L= 90.8 dBµV 1 kHz		L= 90.8 dBµV 7.5 kHz		L= 90.8 dBµV 15 kHz		L= 90.8 dBµV 20 kHz	
Shape of emission mask	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]
Min.limit margin [dB]	> 30	> 30	> 20	> 30	> 10	> 20	> 10	> 5

EuT: HT40 FLEXX (Set US54 working on 710.400 MHz)

Max. measured frequency deviation: ±52.4 kHz
50% of the maximum deviation: ±26.2 kHz
Audio input level (ail) to get ±26.2 kHz: L= 73.9 dBµV
L + 16 dBµV = 89.9 dBµV => Level for testing the occupied bandwidth

Version of EuT	US54							
Audio test level	L= 89.9 dBµV 1 kHz		L= 89.9 dBµV 7.5 kHz		L= 89.9 dBµV 15 kHz		L= 89.9 dBµV 20 kHz	
Shape of emission mask	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]
Min.limit margin [dB]	> 30	> 30	> 20	> 30	> 10	> 15	> 12	> 8

EuT: HT40 FLEXX (Set US60B working on 751.550 MHz)

Max. measured frequency deviation: ± 64.2 kHz
50% of the maximum deviation: ±32.1 kHz
Audio input level (ail) to get ±32.1 kHz: L= 73.4 dBµV
L + 16 dBµV = 89.4 dBµV => Level for testing the occupied bandwidth

Version of EuT	US60B							
Audio test level	L= 89.4 dBµV 1 kHz		L= 89.4 dBµV 7.5 kHz		L= 89.4 dBµV 15 kHz		L= 89.4 dBµV 20 kHz	
Shape of emission mask	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]	±50-100% [dB]	±100-250% [dB]
Min.limit margin [dB]	> 30	> 30	> 20	> 30	> 10	> 20	> 8	> 1

Limit according to FCC Subpart 15.247(e)(6)(i)(ii)(iii):

Attenuated below the mean output power ot the transmitter	±50-100% [dB]	±100-250% [dB]	> 250%
Limit	25	35	$43+10\log_{10}$ (mean output power in watt)

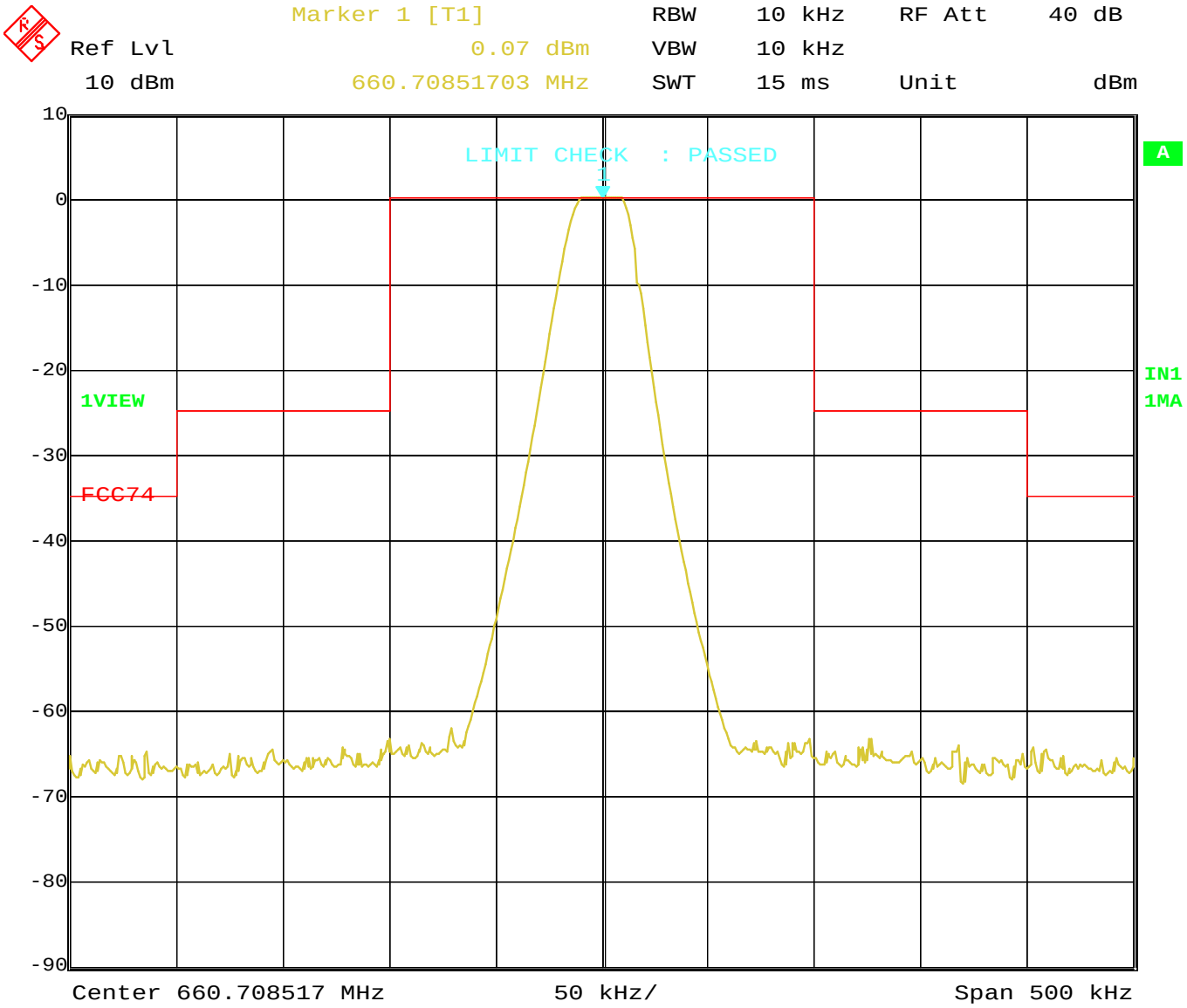
The requirements are **FULFILLED.**

Remarks: For detailed results, please see the protocol at following page(s).

5.5.5 Test protocol

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

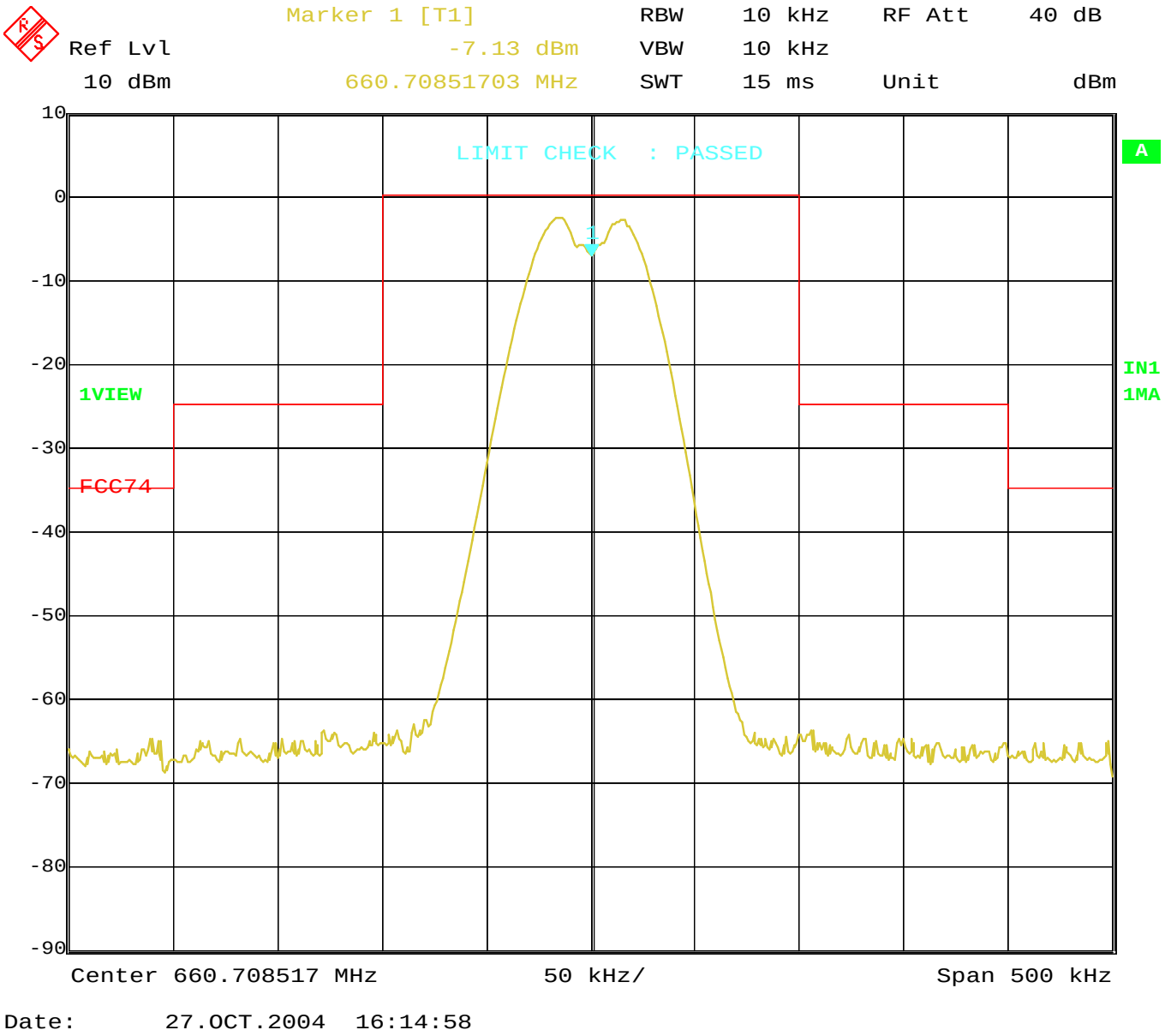
HT40 FLEXX US45A
AIL: 90.8 dBµV F_{mod}: 1 kHz



Date: 27.OCT.2004 16:12:55

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 90.8 dBµV F_{mod}: 7.5 kHz



Date: 27.OCT.2004 16:14:58

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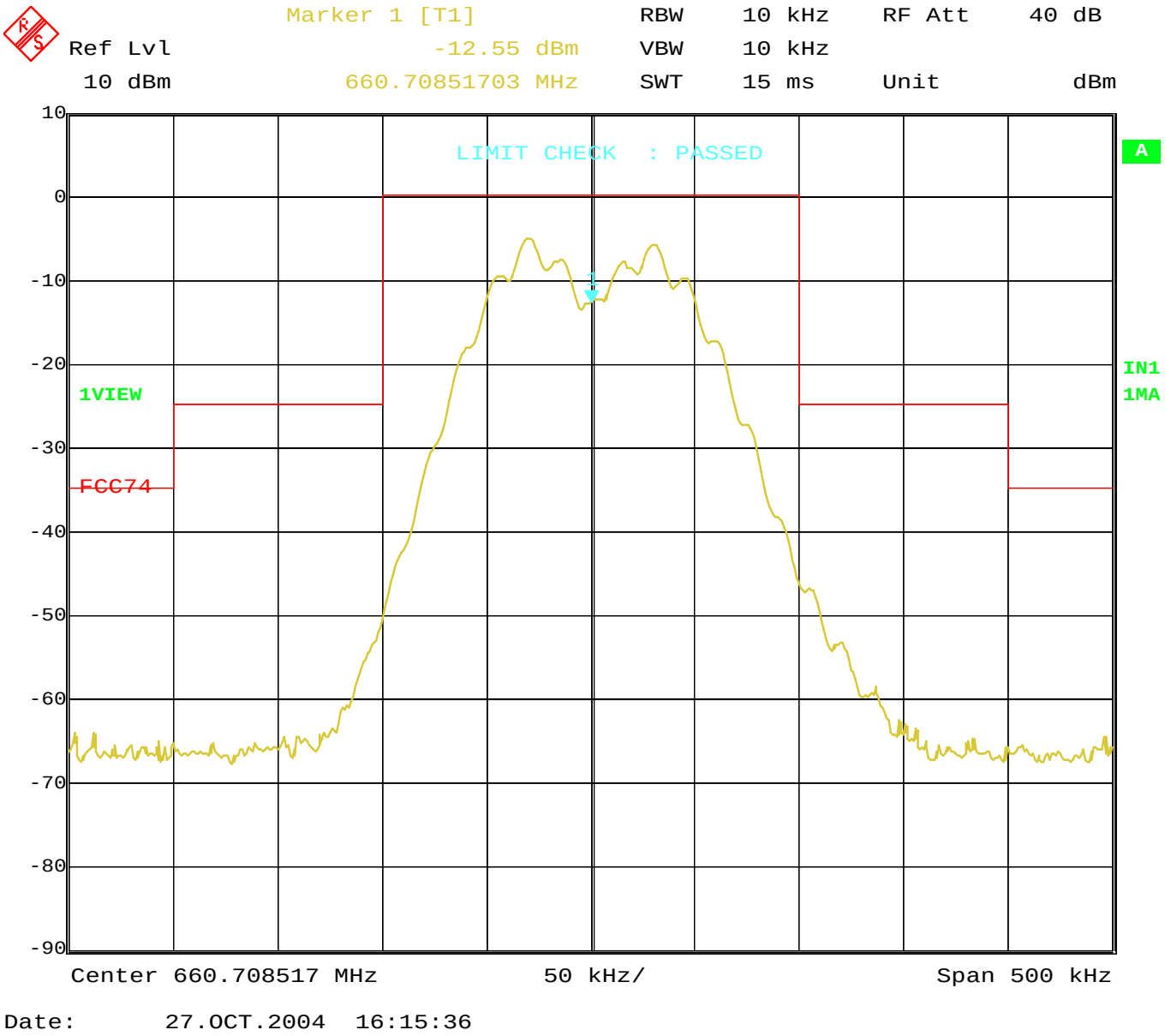
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 90.8 dBµV F_{mod}: 15 kHz



Date: 27.OCT.2004 16:15:36

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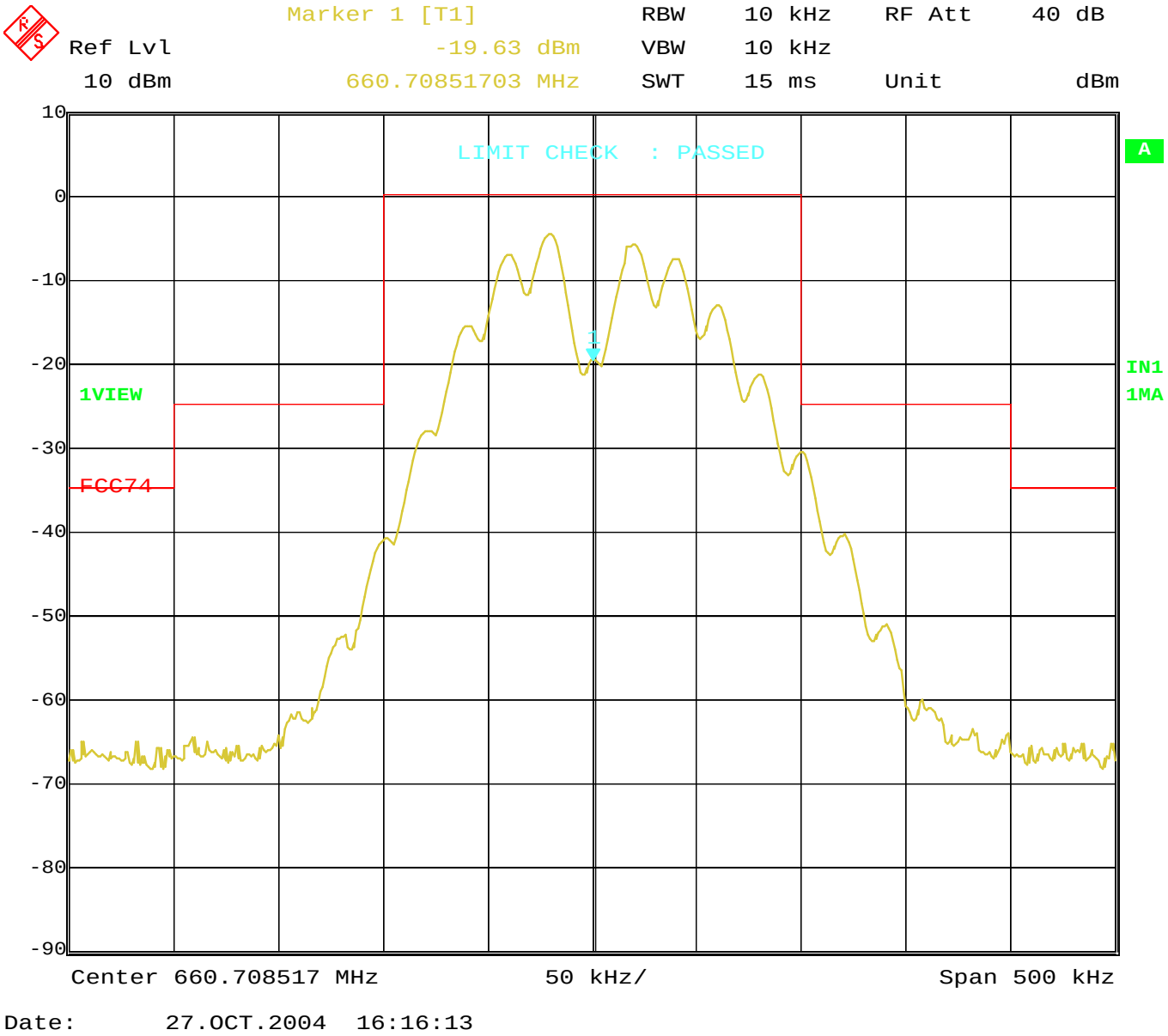
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

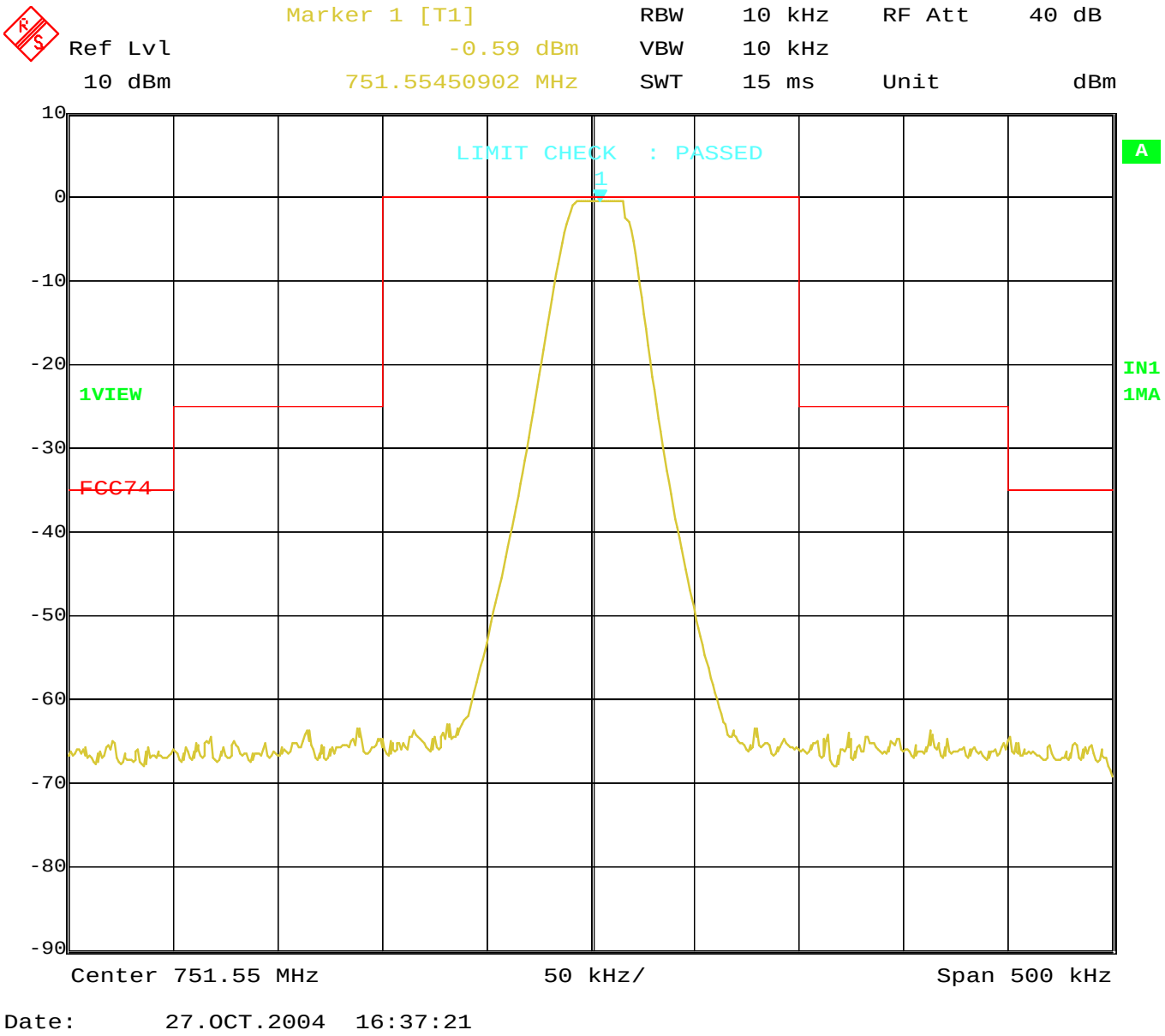
HT40 FLEXX US45A
AIL: 90.8 dBµV F_{mod}: 20 kHz



Date: 27.OCT.2004 16:16:13

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 89.4 dBµV F_{mod}: 1 kHz



Date: 27.OCT.2004 16:37:21

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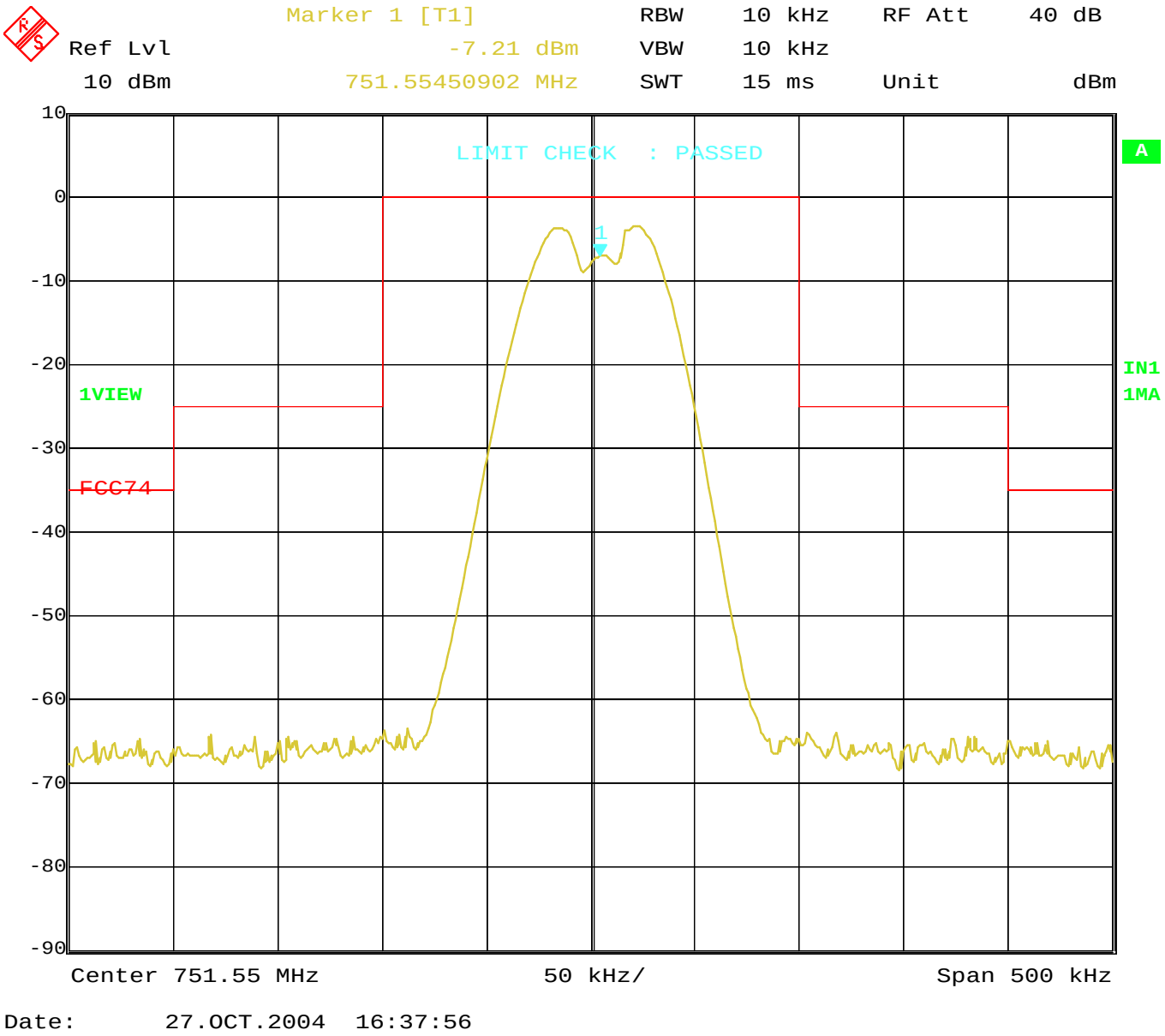
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 89.4 dBµV F_{mod}: 7.5 kHz



Date: 27.OCT.2004 16:37:56

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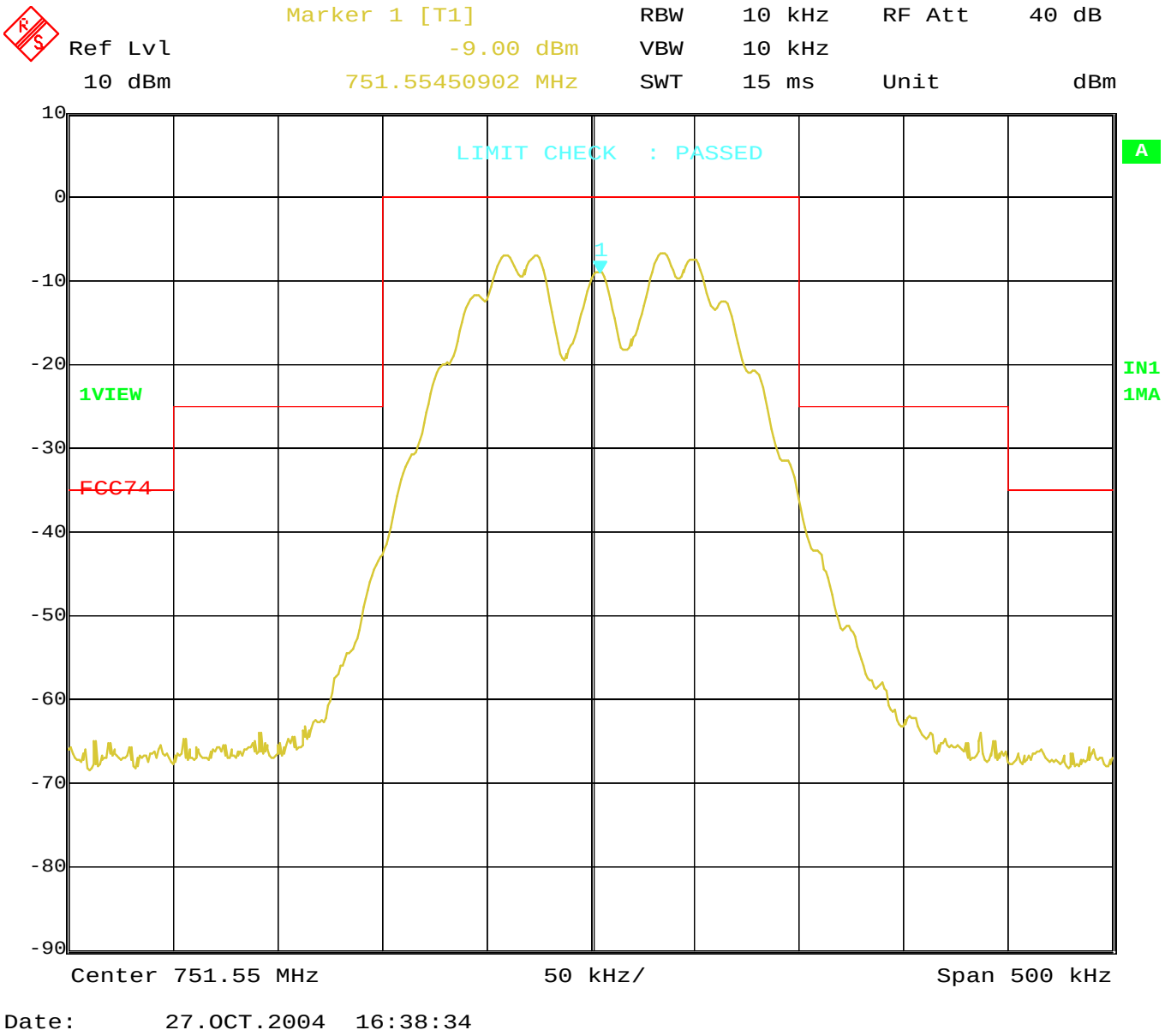
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 89.4 dBµV F_{mod}: 15 kHz



Date: 27.OCT.2004 16:38:34

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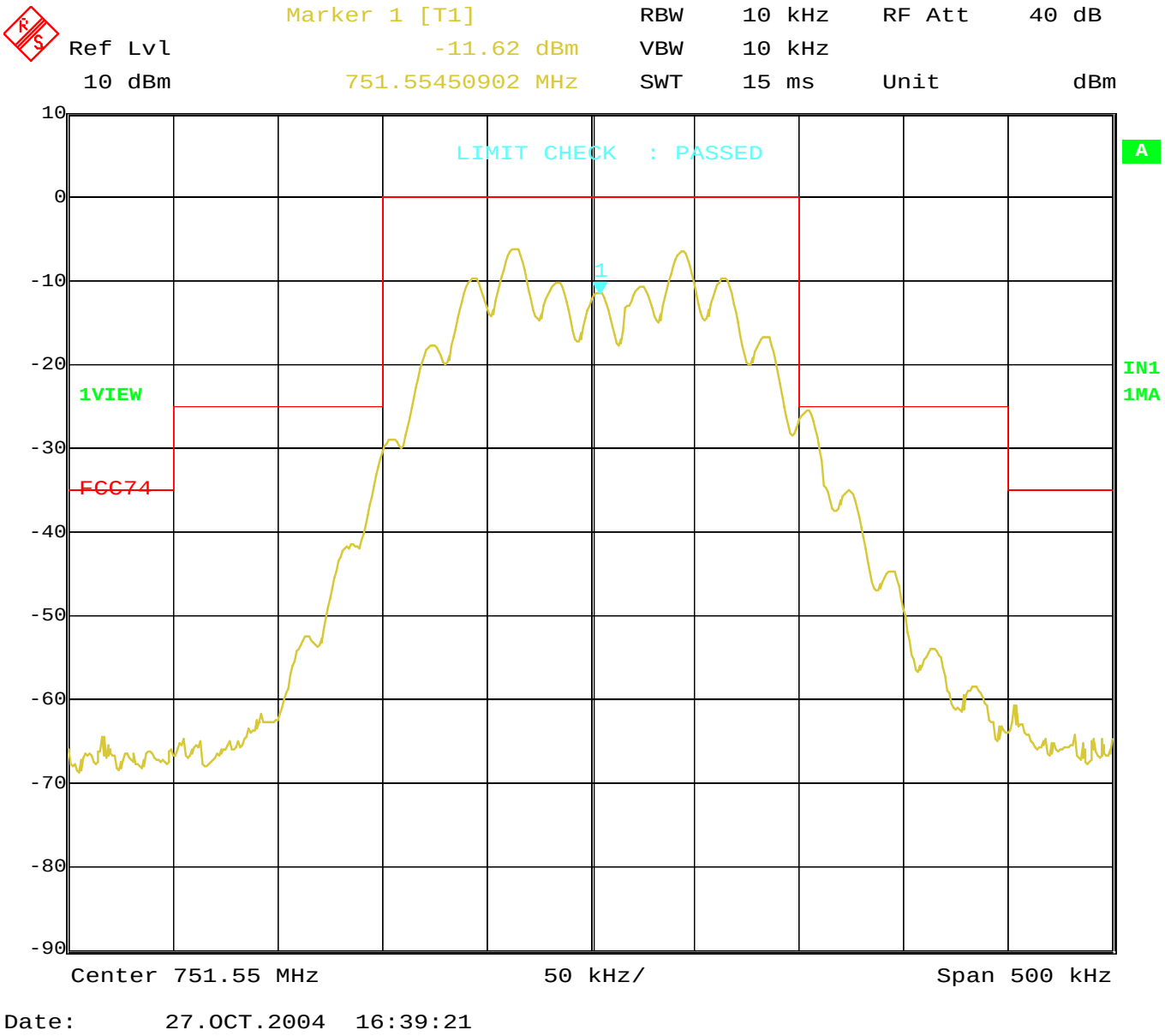
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 89.4 dBµV F_{mod}: 20 kHz



Date: 27.OCT.2004 16:39:21

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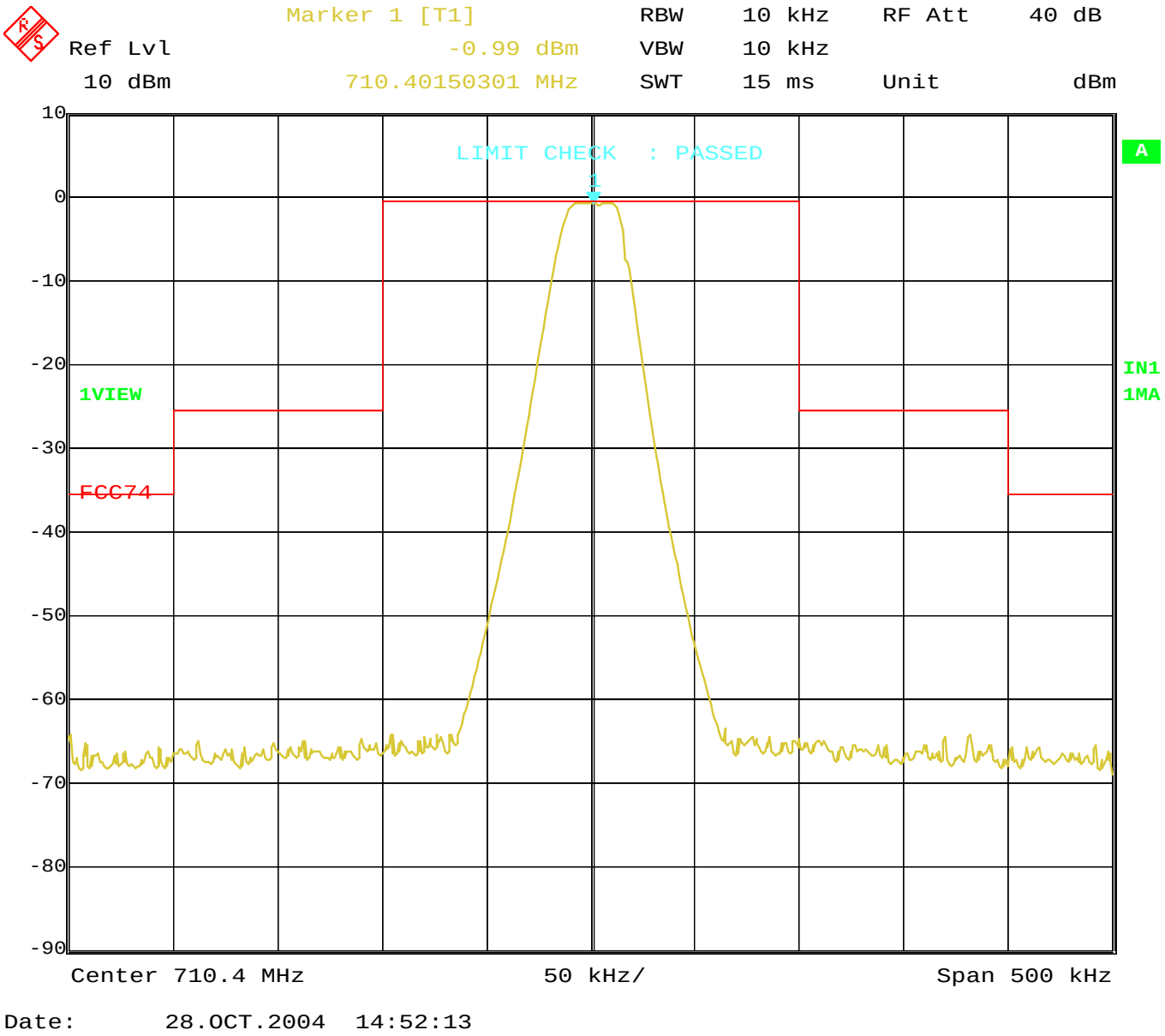
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

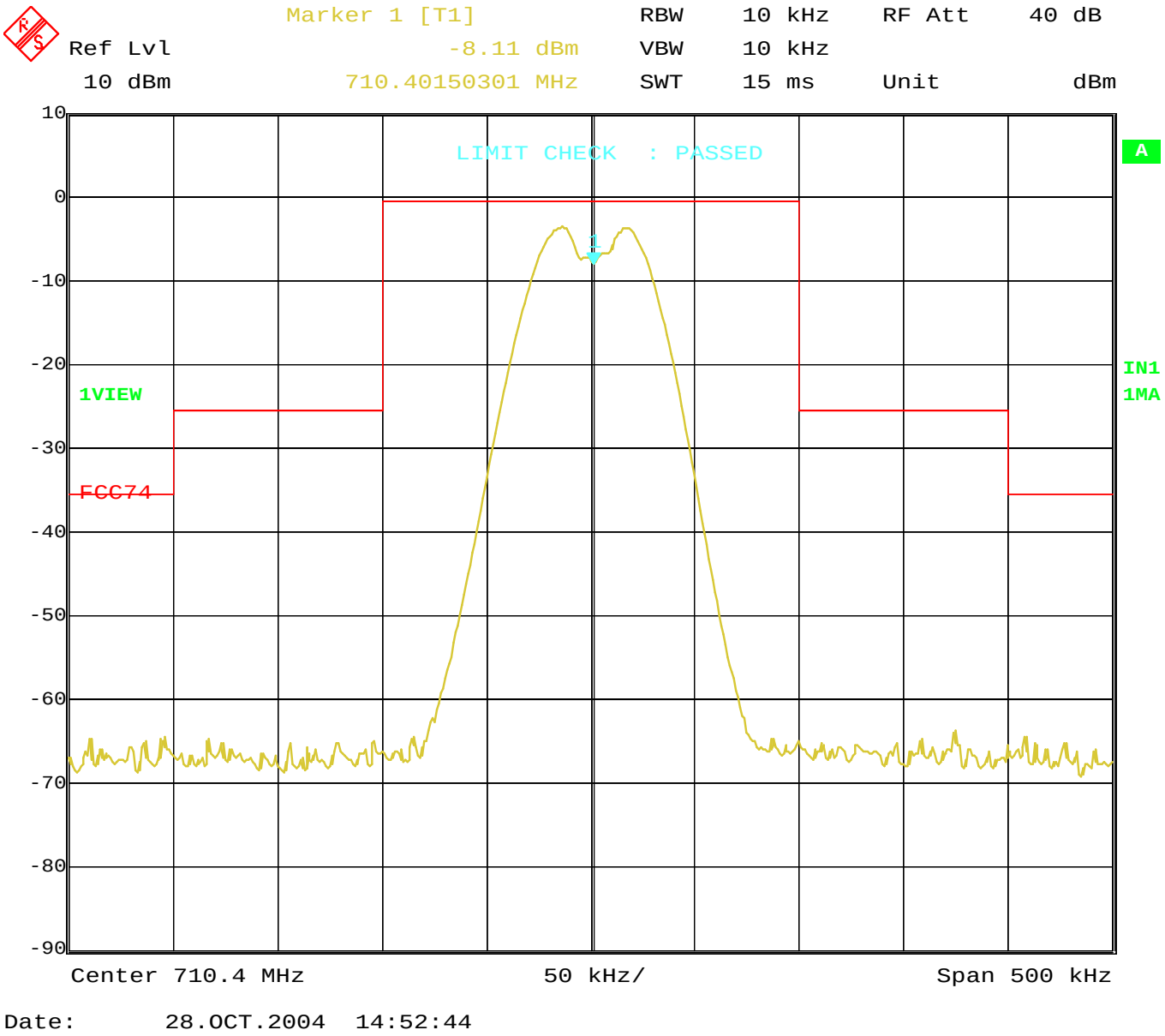
HT40 FLEXX US60B
AIL: 89.9 dBµV F_{mod}: 1 kHz



Date: 28.OCT.2004 14:52:13

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

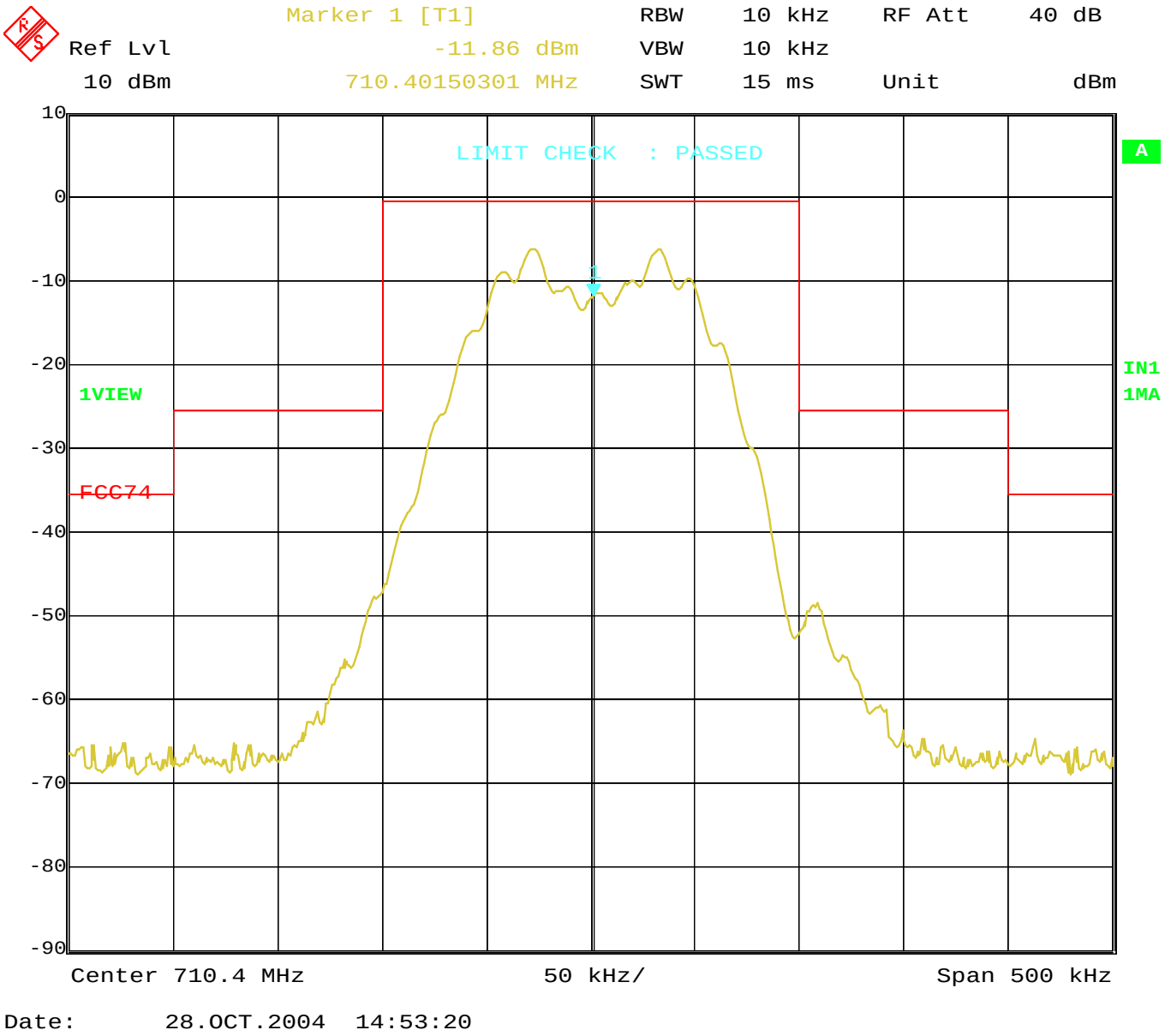
HT40 FLEXX US60B
AIL: 89.9 dBµV F_{mod}: 7.5 kHz



Date: 28.OCT.2004 14:52:44

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 89.9 dBµV F_{mod}: 15 kHz



Date: 28.OCT.2004 14:53:20

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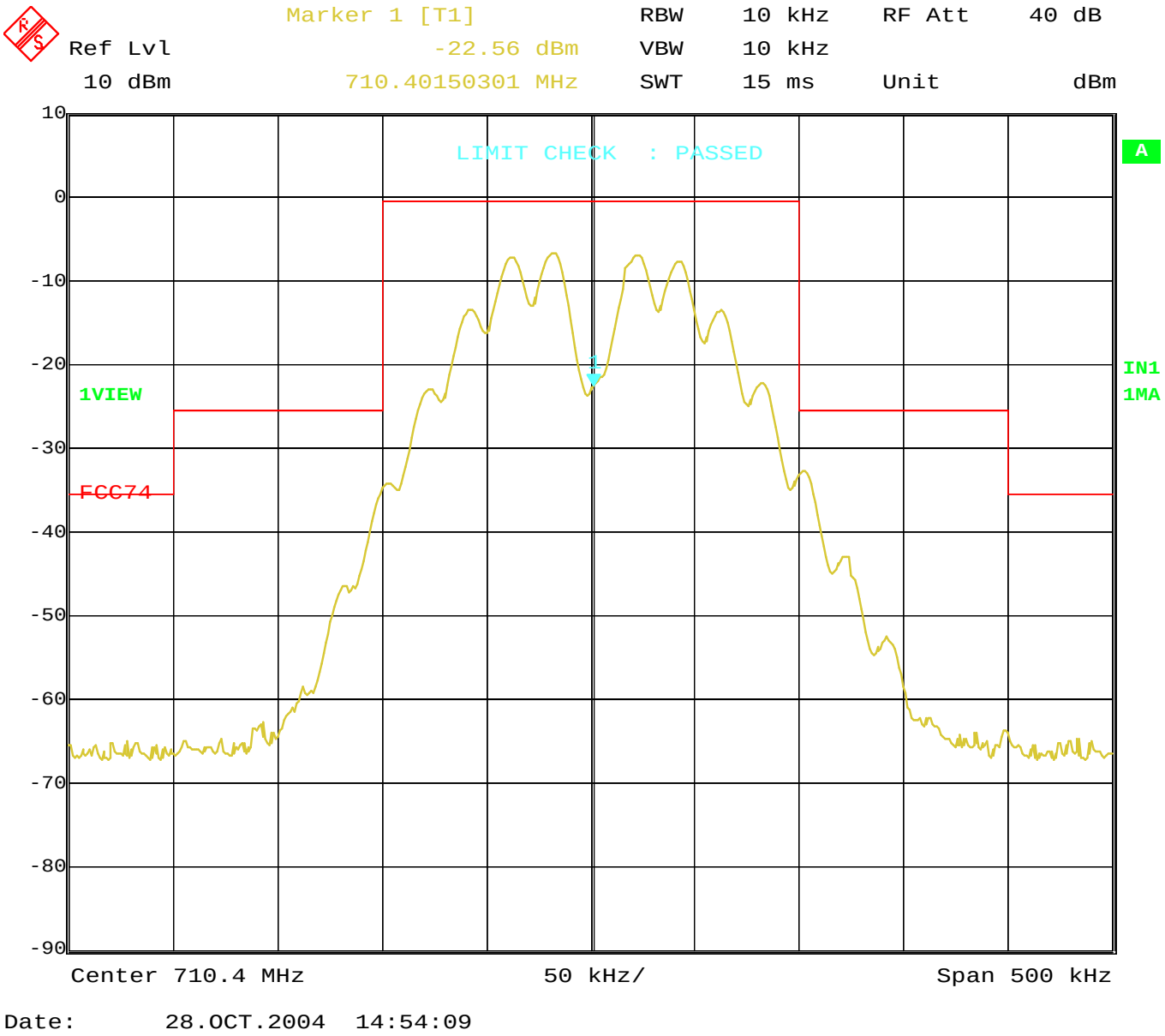
Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 89.9 dBµV F_{mod}: 20 kHz



Date: 28.OCT.2004 14:54:09

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5.6 Frequency error

For test instruments and accessories used see section 6 Part **FE**.

5.6.1 Description of the test location

Test location: Area 4

5.6.2 Photo documentation of the test set-up

5.6.3 Description of Measurement

The frequency error was measured at the antenna terminals for EuT`s with external connector. Other EuT`s are tested via an adequate coupling device with antenna jack in a climatic test chamber. The antenna jack was connected to the input of a communication test receiver. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with the EuT unmodulated. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead. The frequency error is defined as the deviation of the transmitting frequency from the nominal frequency.

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5.6.4 Test result

Version of Equipment with the fitting transmitting frequency		US45A 660.700 MHz	US54 710.400 MHz	US60B 751.550 MHz
Temperature [ºC]	DC supply voltage [V]	Frequency error [kHz]	Frequency error [kHz]	Frequency error [kHz]
-30	1.5	+4.71	+1.48	+4.77
	1.05	+4.48	+1.32	+4.70
-20	1.5	+7.52	+3.10	+7.88
	1.05	+7.34	+3.38	+7.85
-10	1.5	+6.75	+5.02	+4.40
	1.05	+8.30	+5.02	+8.00
0	1.5	+9.26	+4.53	+7.85
	1.05	+9.54	+4.67	+8.11
+10	1.5	+8.45	+2.85	+6.05
	1.05	+8.78	+3.15	+6.38
+20	1.5	+5.92	-0.83	+2.05
	1.05	+6.25	-0.55	+2.43
+30	1.5	+4.76	-2.47	+0.32
	1.05	+5.15	-2.12	+0.75
+40	1.5	+3.21	-4.12	-2.65
	1.05	+3.58	-3.77	-2.16
+50	1.5	+1.84	-6.22	-4.96
	1.05	+2.33	-5.72	-4.44
Maximum deviation from nominal frequency: [kHz]		+9.54 / -0.00	+5.02 / -6.22	+8.11 / -4.96

Limit according to FCC Subpart 74.861(e)(4):

The frequency tolerance of the transmitter shall be not greater than 0.005 percent of the nominal transmit frequency as declared by the manunfacturer.

Versions of Eut`s with the fitting nominal frequency [MHz]	0.005% of nominal frequency [kHz]	Limit [kHz]
US45A 660.700	33.035	±16.52
US54 710.400	35.520	±17.76
US60B 751.550	37.578	±18.79

The requirements are **FULFILLED.**

Remarks: _____

_____

5.7 Keeping the requirements of the emission mask

For test instruments and accessories used see section 6 Part **BW**

5.7.1 Description of the test location

Test location: Area 4

5.7.2 Photo documentation of the test set-up

5.7.3 Description of Measurement

The requirements of the emission mask were measured with different input signals at the antenna terminals for EuT`s with external connector. Other EuT`s are tested via an adequate coupling device with antenna jack. The antenna jack was connected to the input of a spectrum analyzer. The spectrum analyzer was set up as following:

- video and resolution bandwidth: 10 kHz
- attenuation: automatic, low noise
- center frequency: nominal transmit frequency
- frequency span: 500 kHz

The reference level was set to the maximum value of the unmodulated carrier. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with a modulation frequency and voltage according to the specification of the manufacturer. The audio frequency was provided by a communication test receiver. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead.

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5.7.4 Test result

The following table is showing the minimal margin to the required attenuations:

Version of Equipment with the fitting transmitting frequency		US45A 660.700 MHz	
Audio test level with modulation frequency	DC supply voltage [V]	±50-100% [dB]	±100-250% [dB]
1 kHz 74.8 dBµV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 74.8 dBµV	1.5	> 25	> 30
	1.05	> 25	> 30
20 kHz 74.8 dBµV	1.5	> 15	> 20
	1.05	> 15	> 20
1 kHz 100 mV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 100 mV	1.5	> 8	> 20
	1.05	> 8	> 20
20 kHz 100 mV	1.5	> 8	> 12
	1.05	> 8	> 12

Version of Equipment with the fitting transmitting frequency		US54 710.400	
Audio test level with modulation frequency	DC supply voltage [V]	±50-100% [dB]	±100-250% [dB]
1 kHz 73.9 dBµV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 73.9 dBµV	1.5	> 20	> 30
	1.05	> 20	> 30
20 kHz 73.9 dBµV	1.5	> 15	> 25
	1.05	> 15	> 25
1 kHz 100 mV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 100 mV	1.5	> 8	> 15
	1.05	> 8	> 15
20 kHz 100 mV	1.5	> 8	> 8
	1.05	> 8	> 8

Version of Equipment with the fitting transmitting frequency		US60B 751.550 MHz	
Audio test level with modulation frequency	DC supply voltage [V]	±50-100% [dB]	±100-250% [dB]
1 kHz 73.4 dBµV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 73.4 dBµV	1.5	> 20	> 30
	1.05	> 20	> 30
20 kHz 73.4 dBµV	1.5	> 12	> 20
	1.05	> 12	> 20
1 kHz 100 mV	1.5	> 30	> 30
	1.05	> 30	> 30
15 kHz 100 mV	1.5	>5	> 5
	1.05	>5	> 5
20 kHz 100 mV	1.5	>5	>=1
	1.05	>5	>=1

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Limit according to FCC Subpart 15.247(e)(6)(i)(ii)(iii):

Attenuated below the mean output power ot the transmitter	±50-100% [dB]	±100-250% [dB]	> 250%
Limit	25	35	$43+10\log_{10}$ (mean output power in watt)

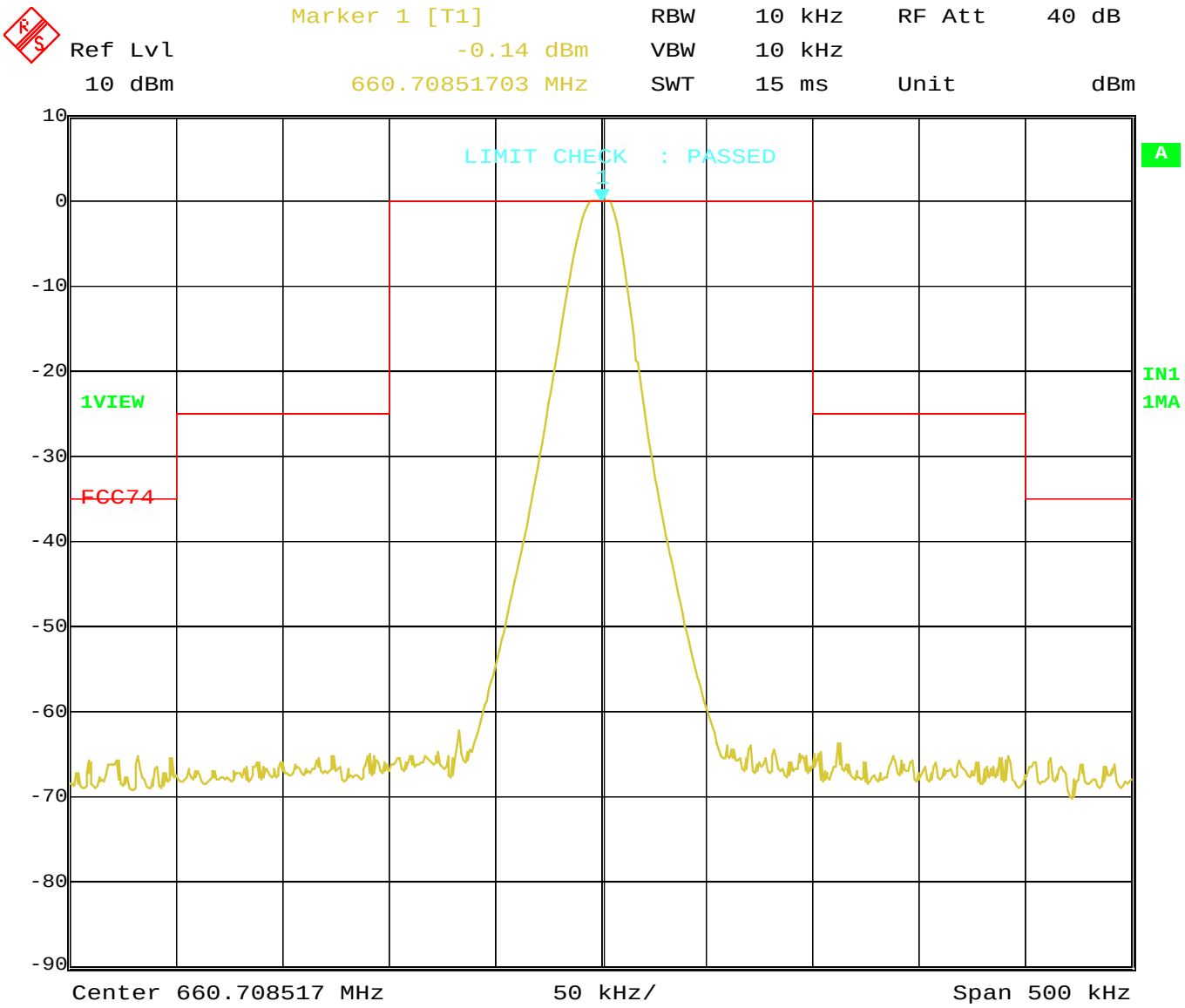
The requirements are **FULFILLED.**

Remarks: For detailed results, please see the protocol at following page(s).

5.7.5 Test protocol

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

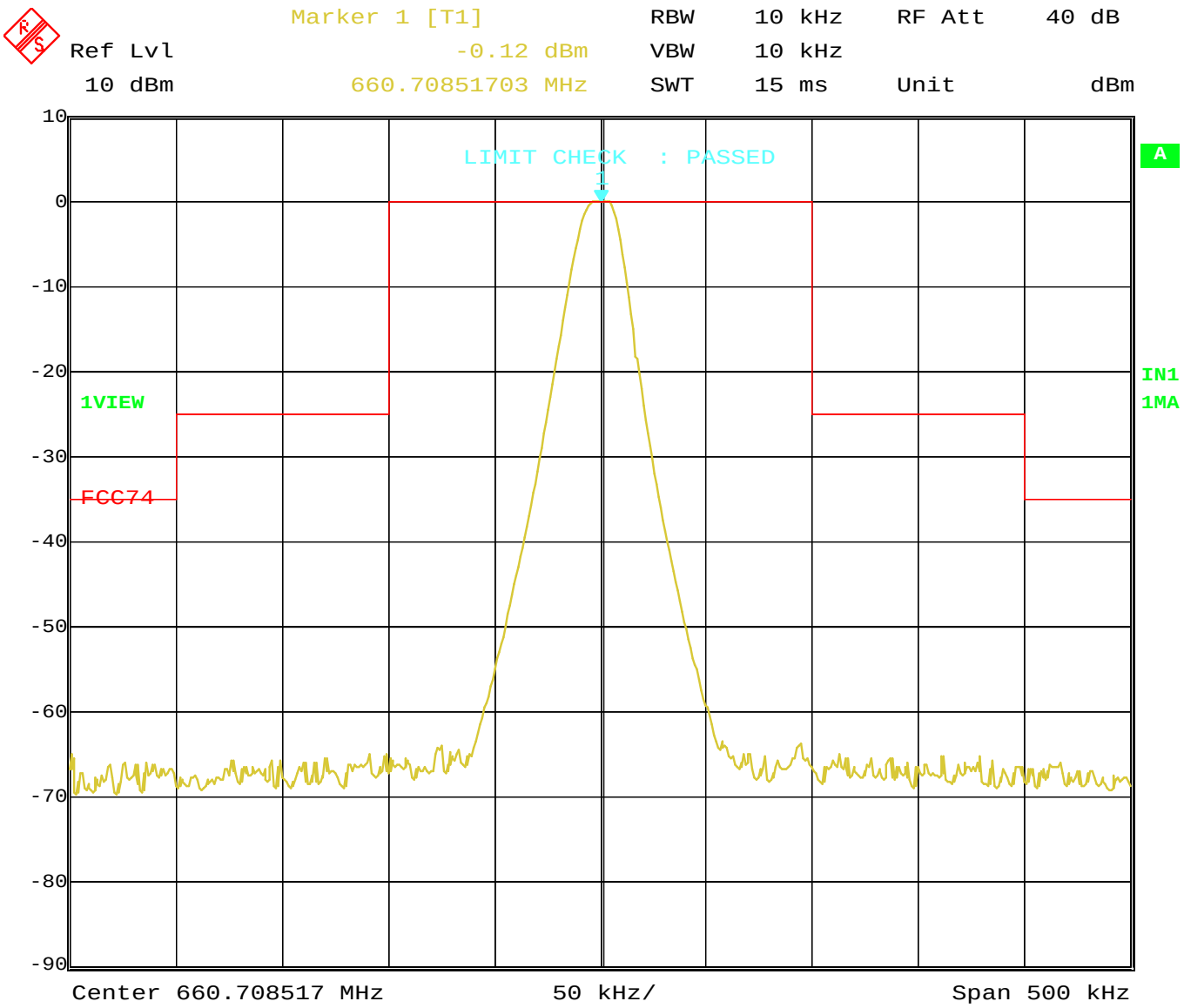
HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 16:07:04

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

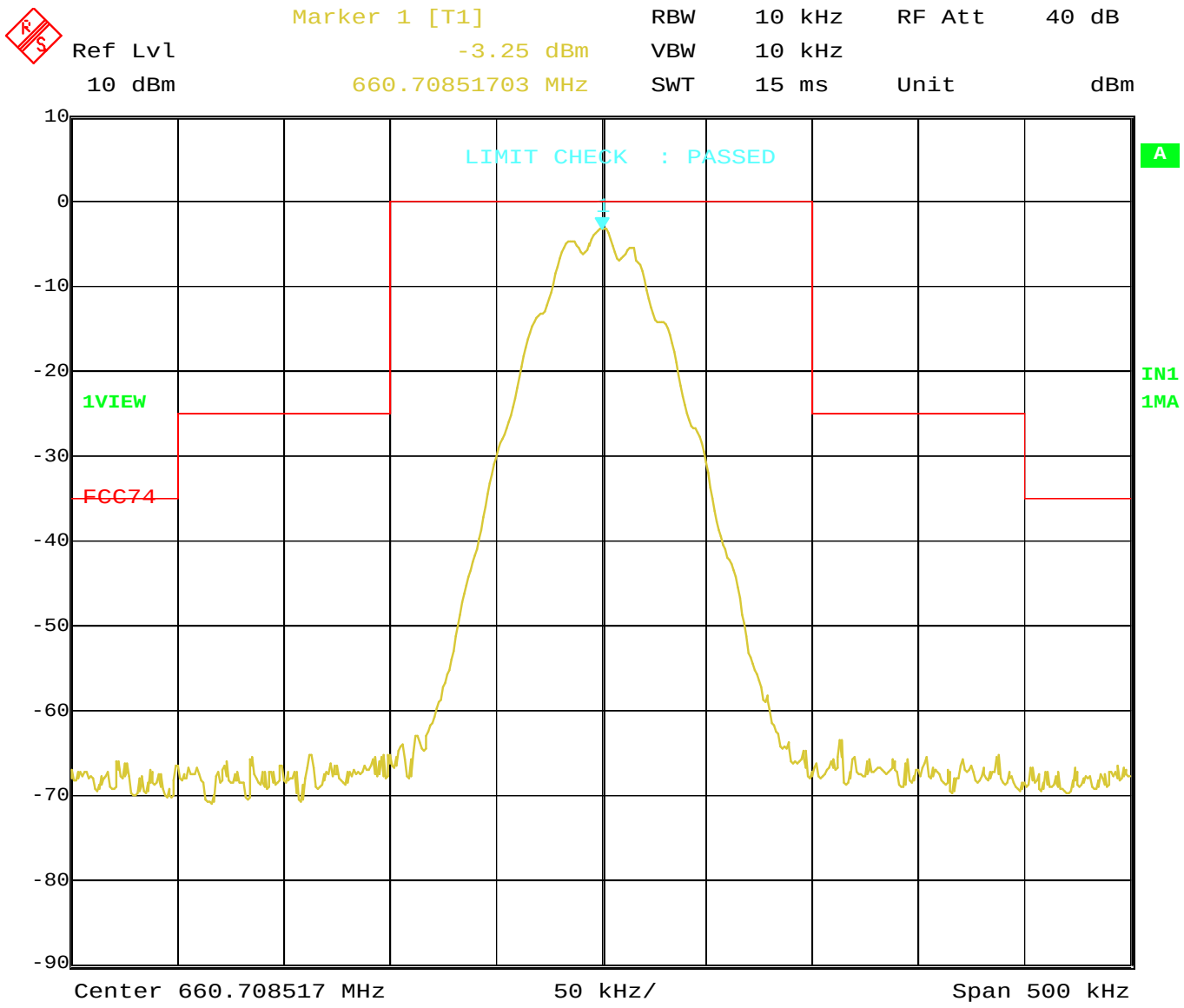
HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 16:06:38

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.5V



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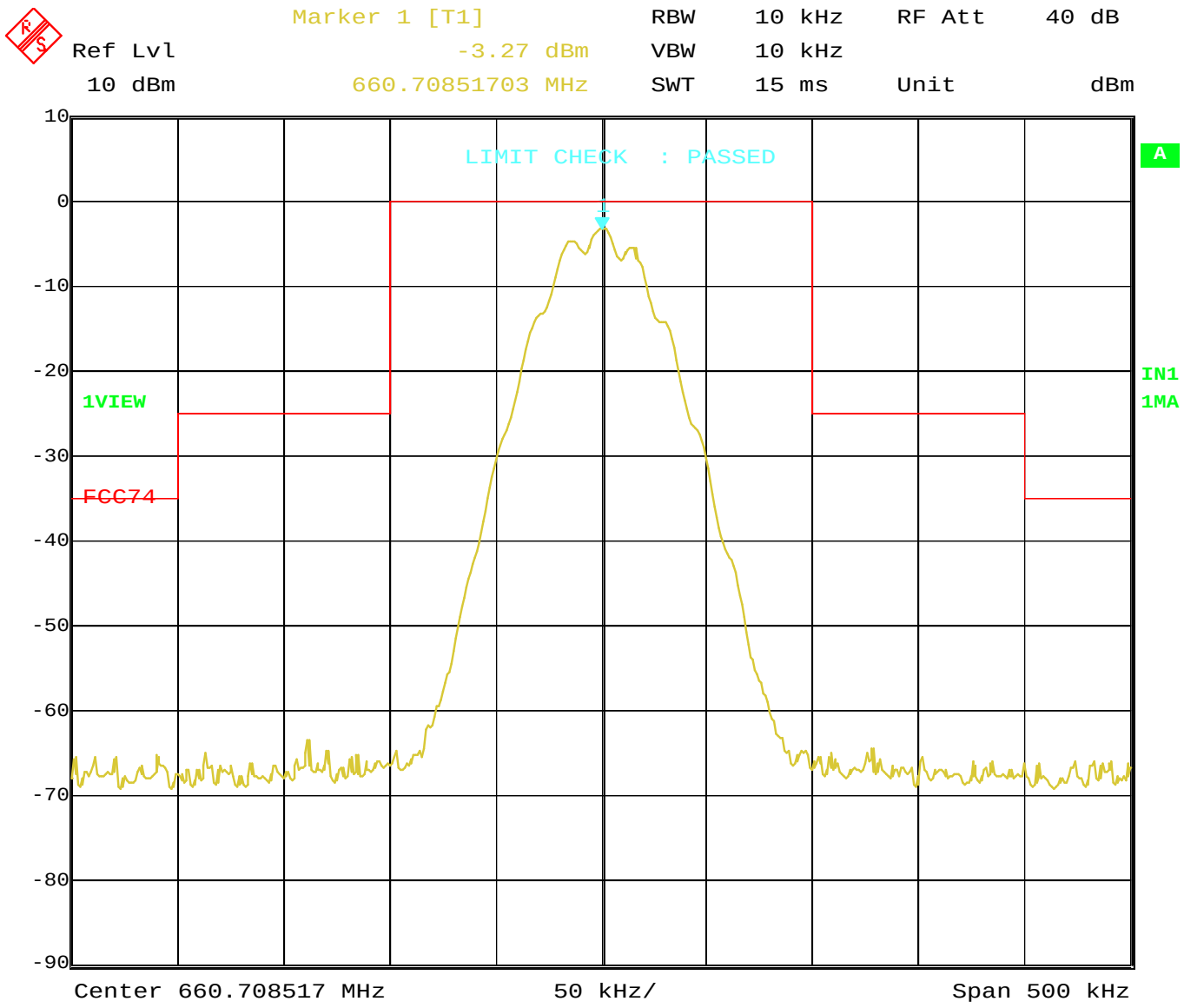
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 16:07:51

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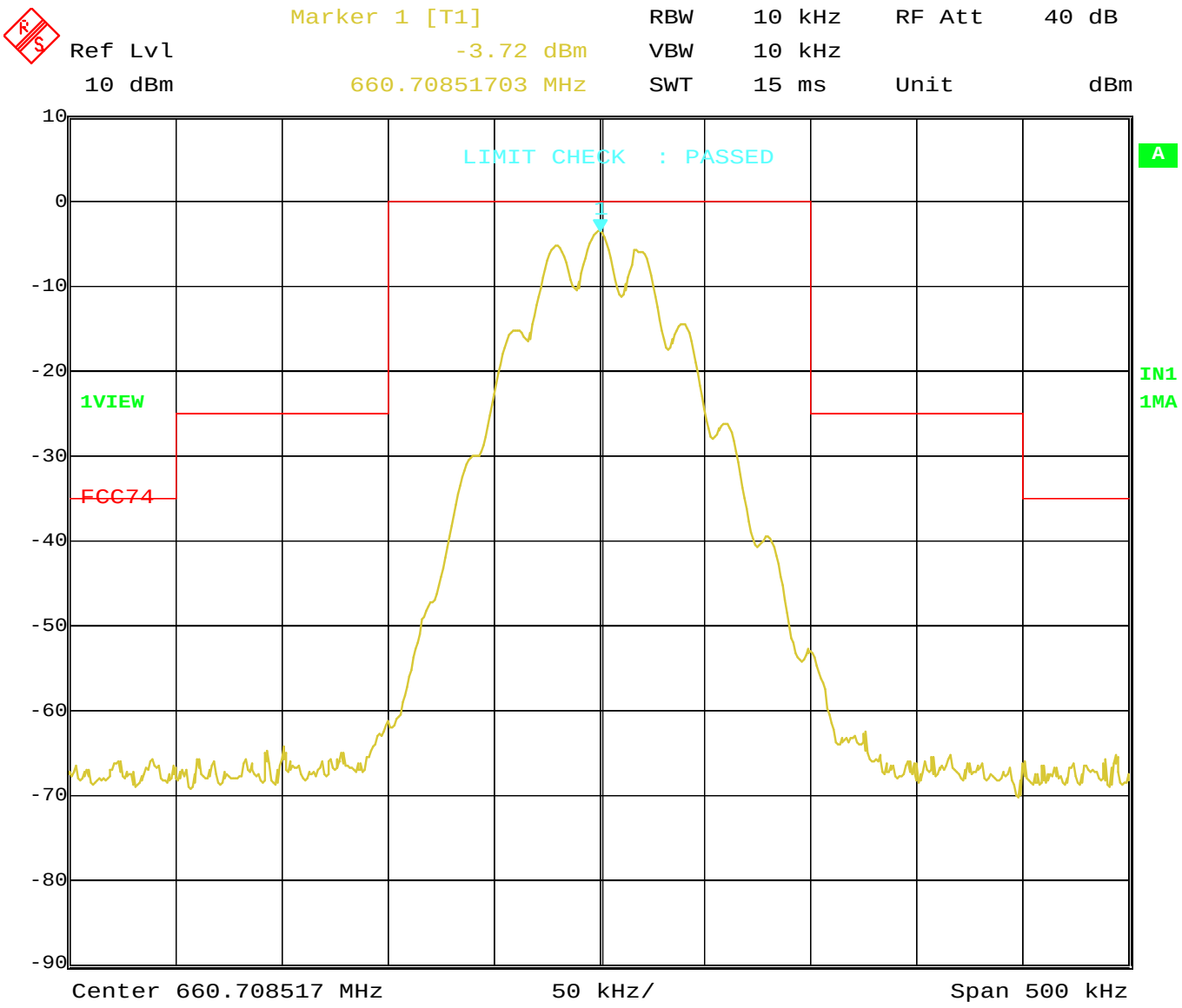
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

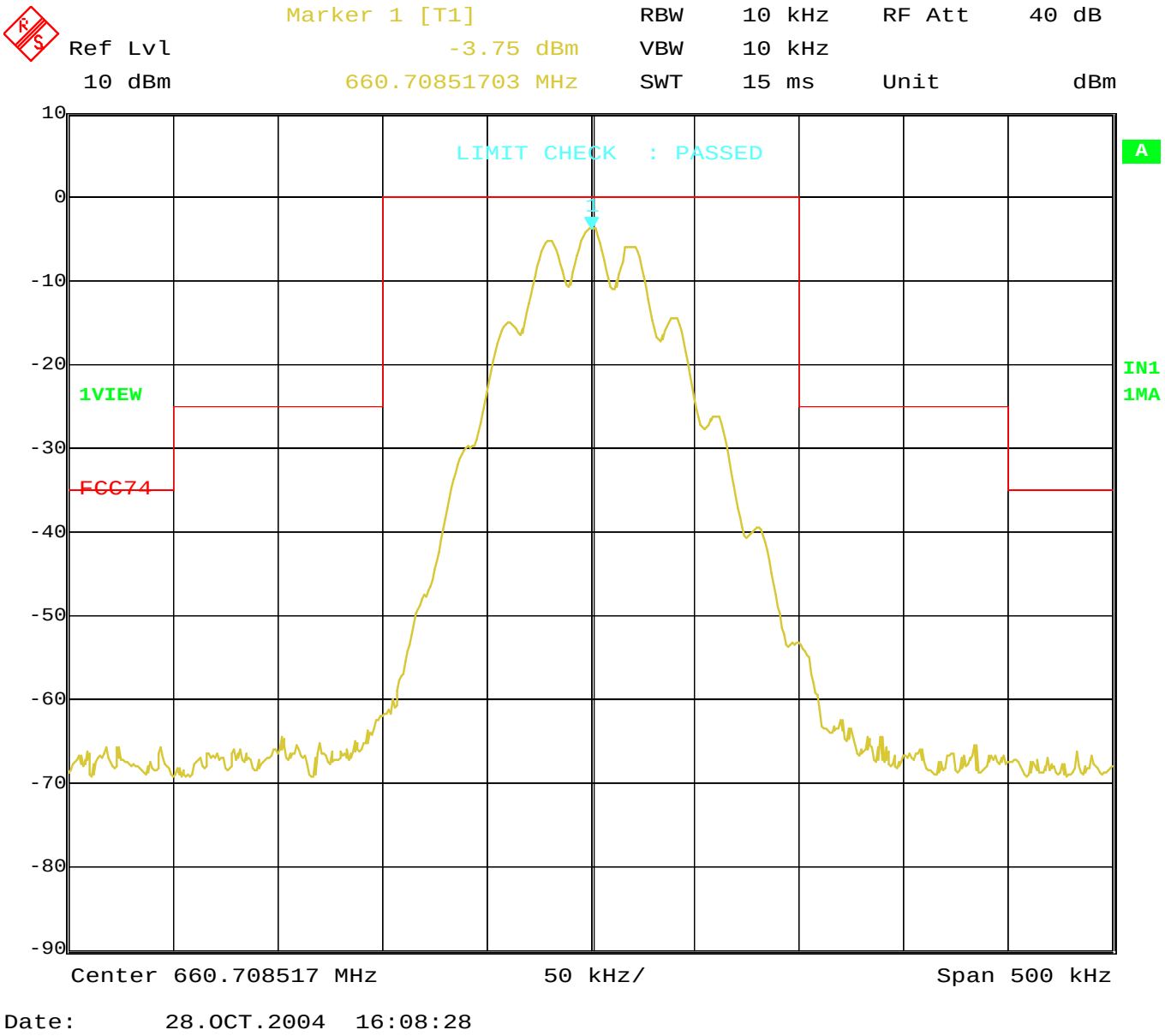
HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 16:09:08

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 74.8 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 16:08:28

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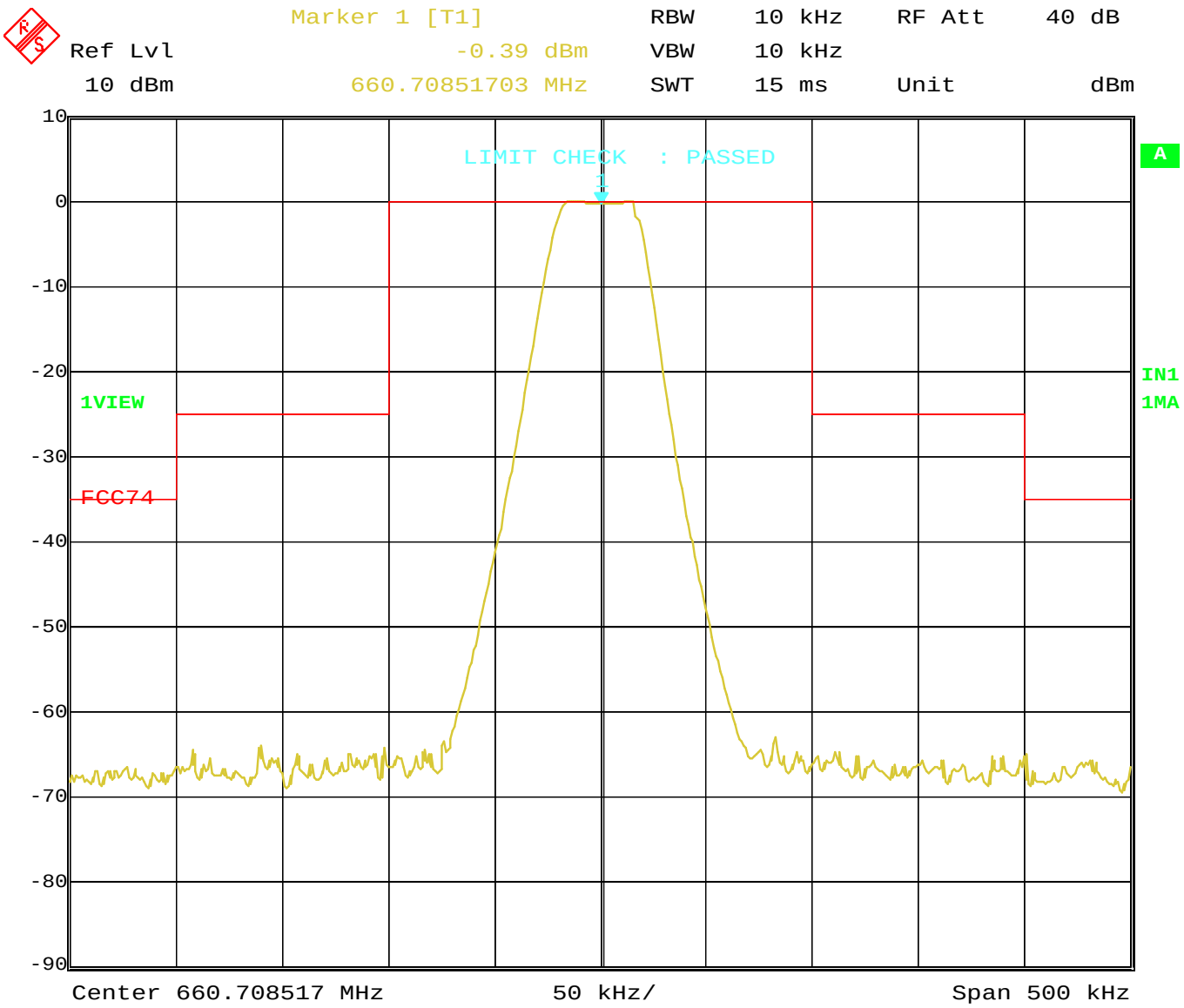
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.5V

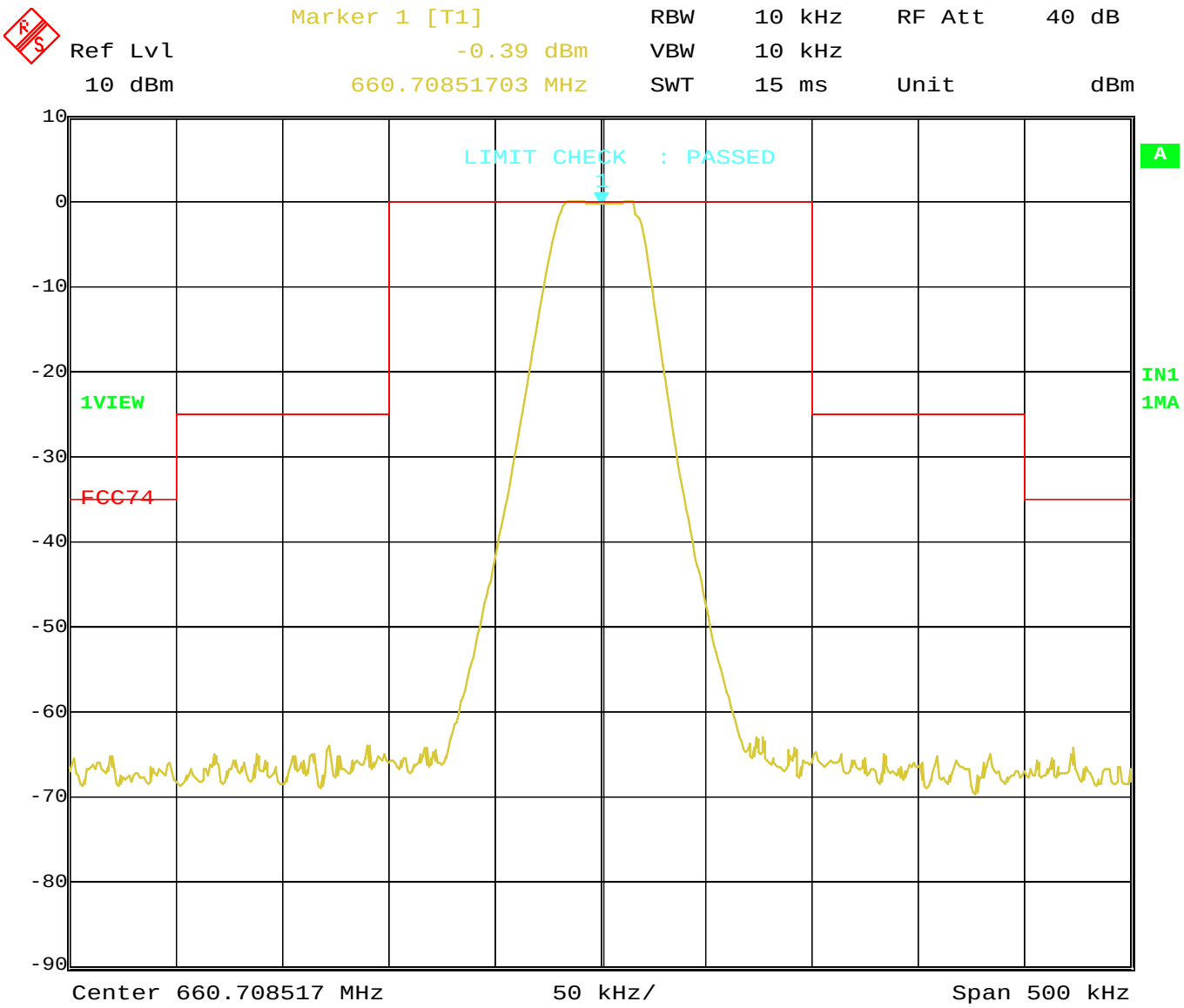


Date: 28.OCT.2004 16:00:18

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.05V

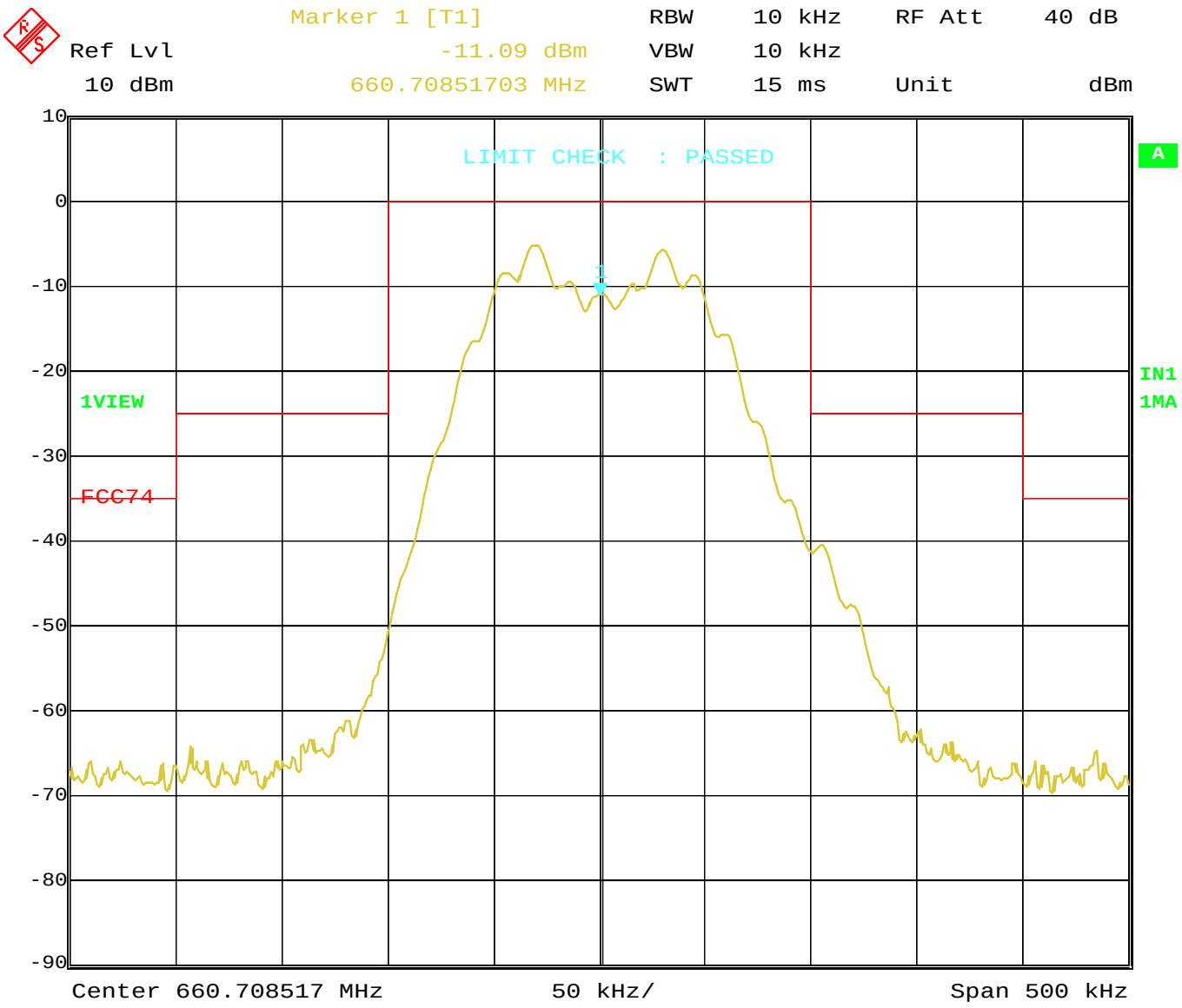


Date: 28.OCT.2004 16:04:13

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.5V

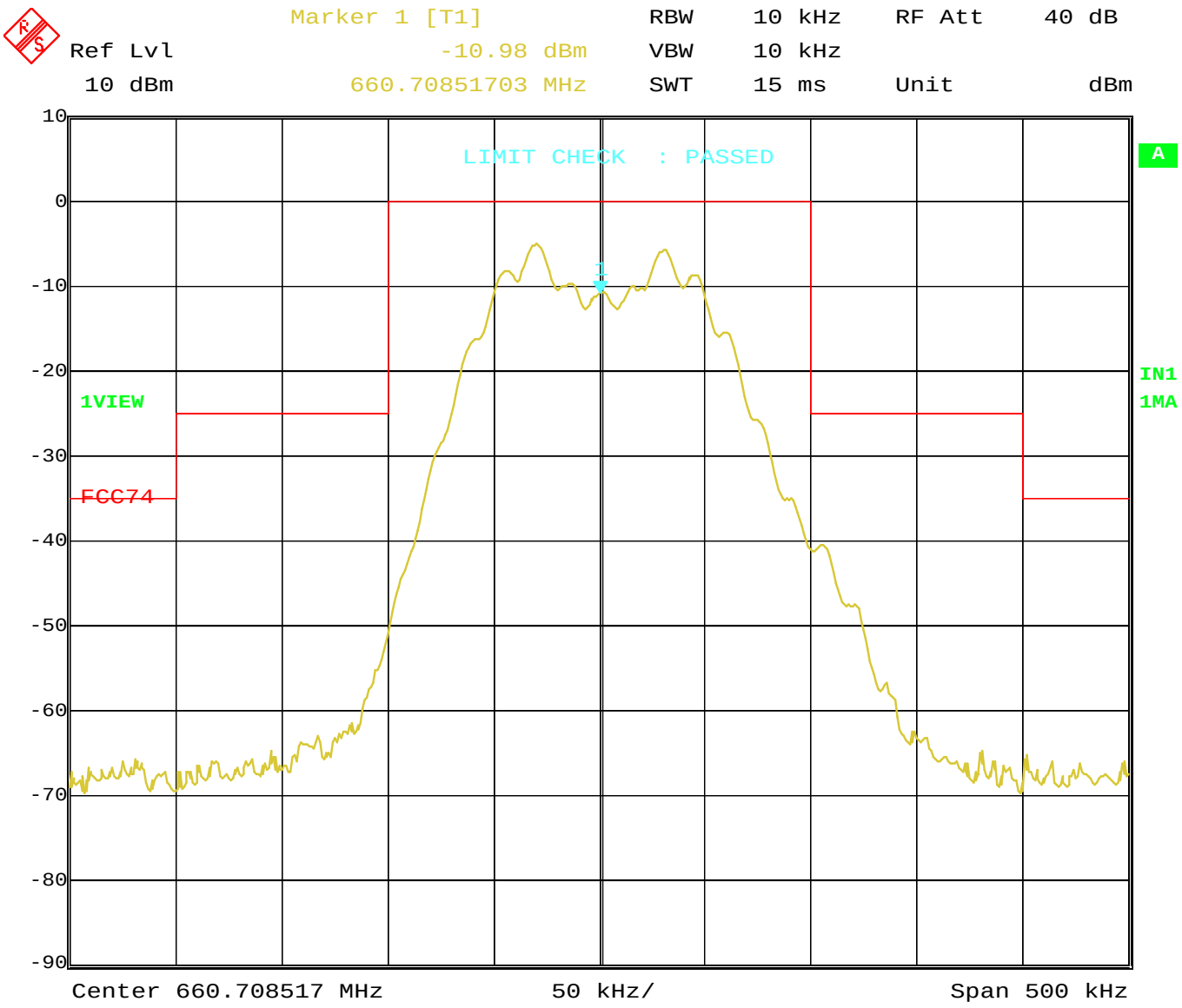


Date: 28.OCT.2004 16:04:58

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.05V

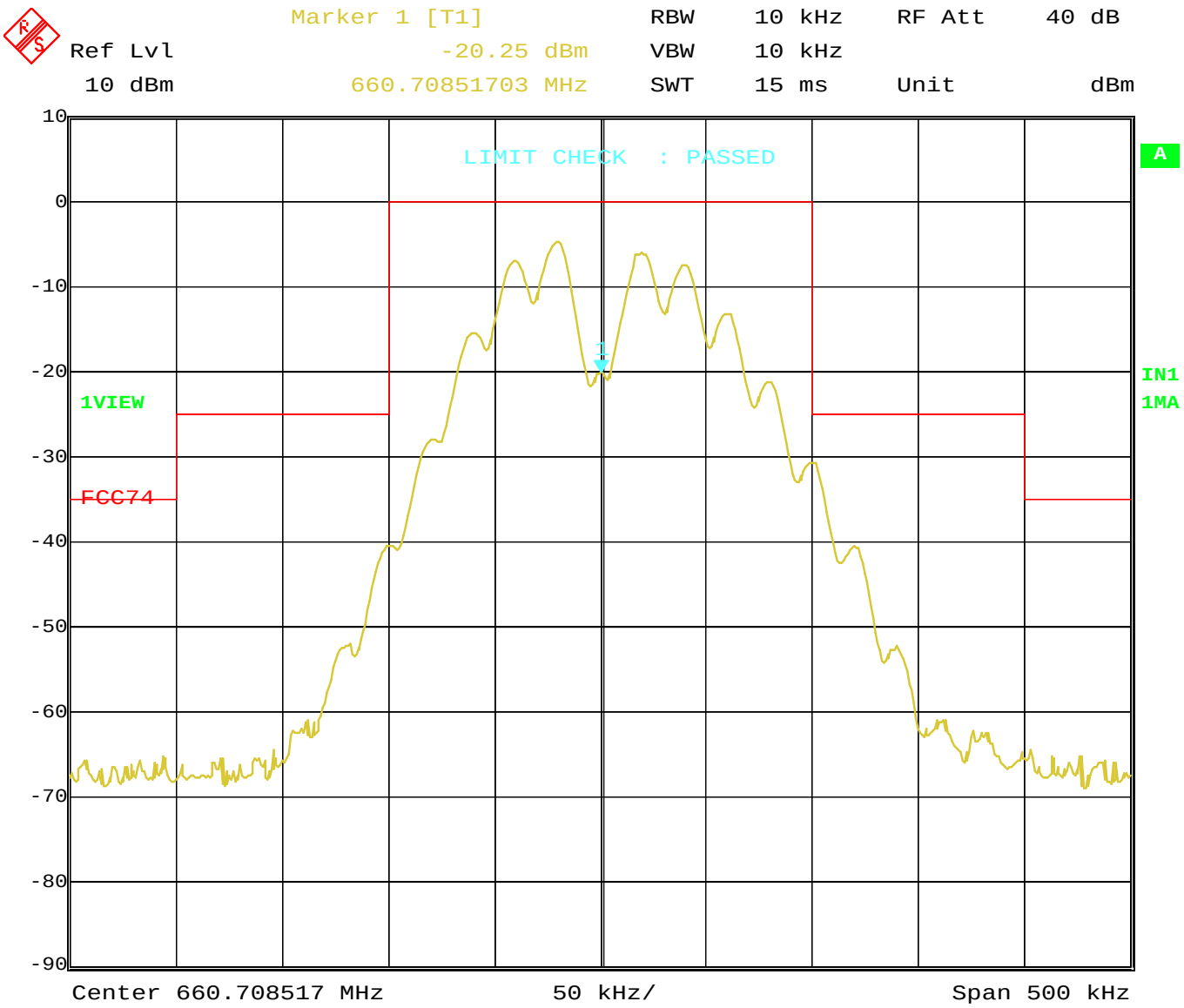


Date: 28.OCT.2004 16:04:35

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US45A
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.5V

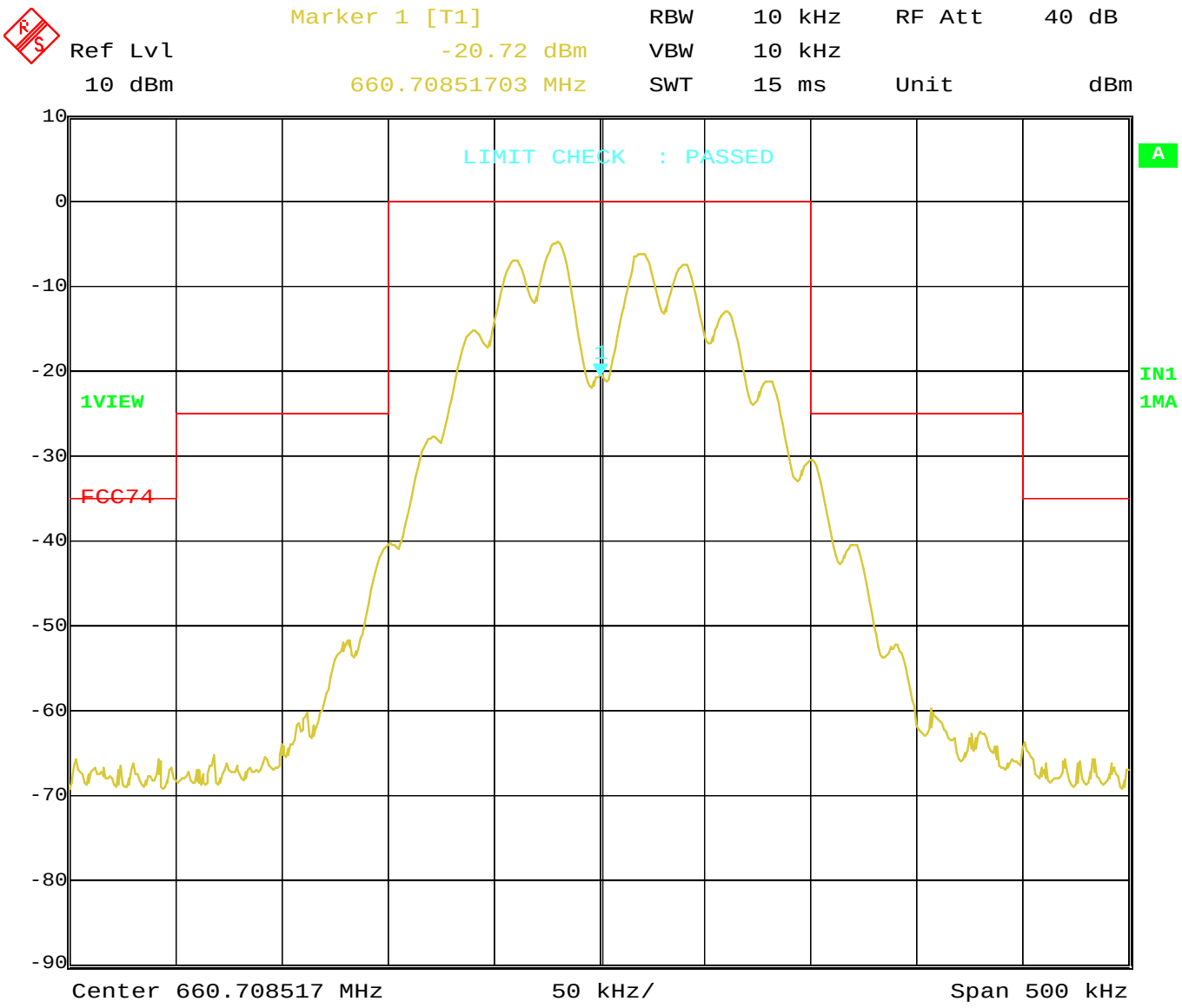


Date: 28.OCT.2004 16:05:26

MIKES BABT Product Service GmbH · Ohmstrasse 2-4 · D-94342 Strasskirchen · Tel.:+49 9424-9407-0 · Fax:+49 9424-9407-60

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

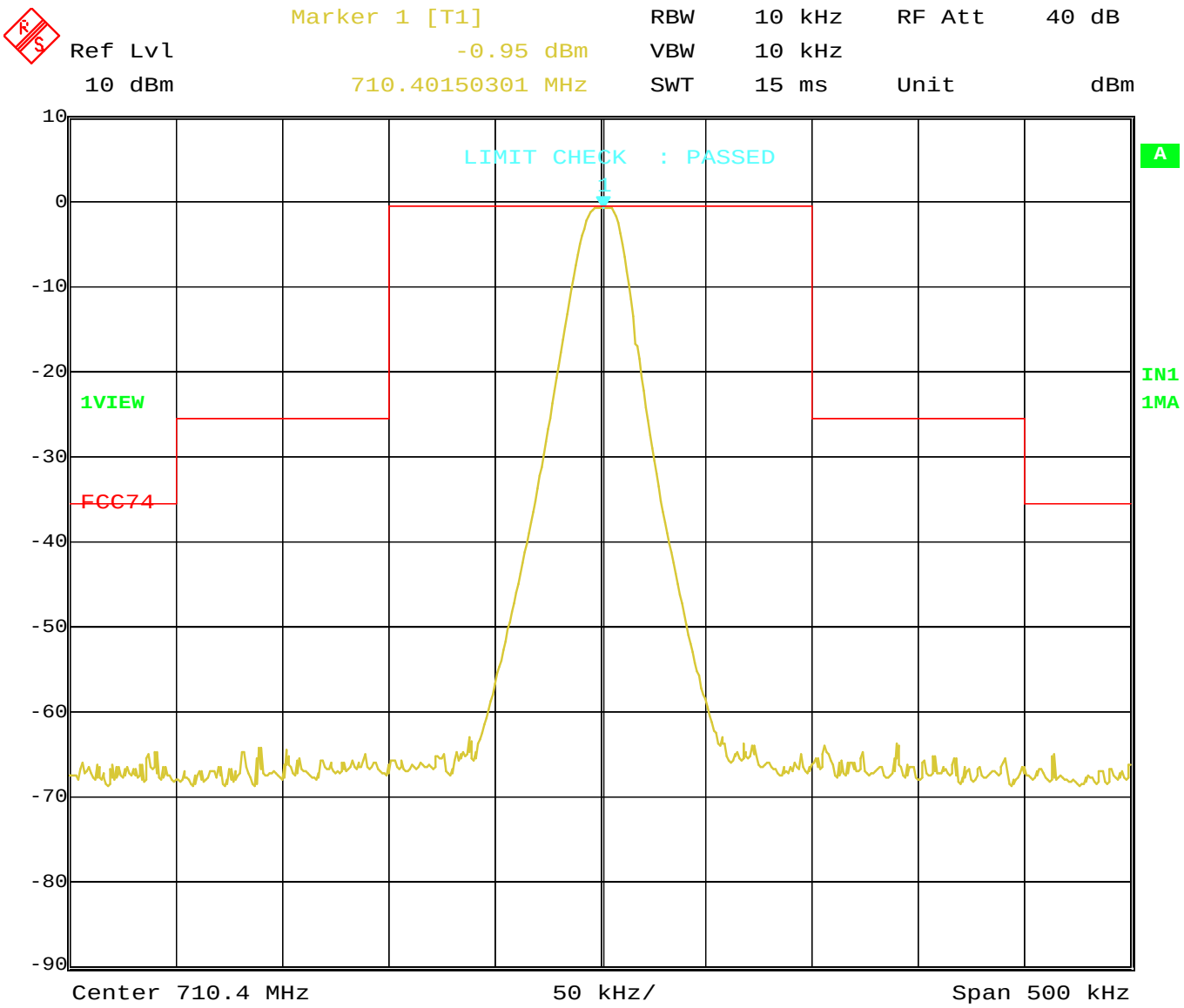
HT40 FLEXX US45A
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 16:05:50

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

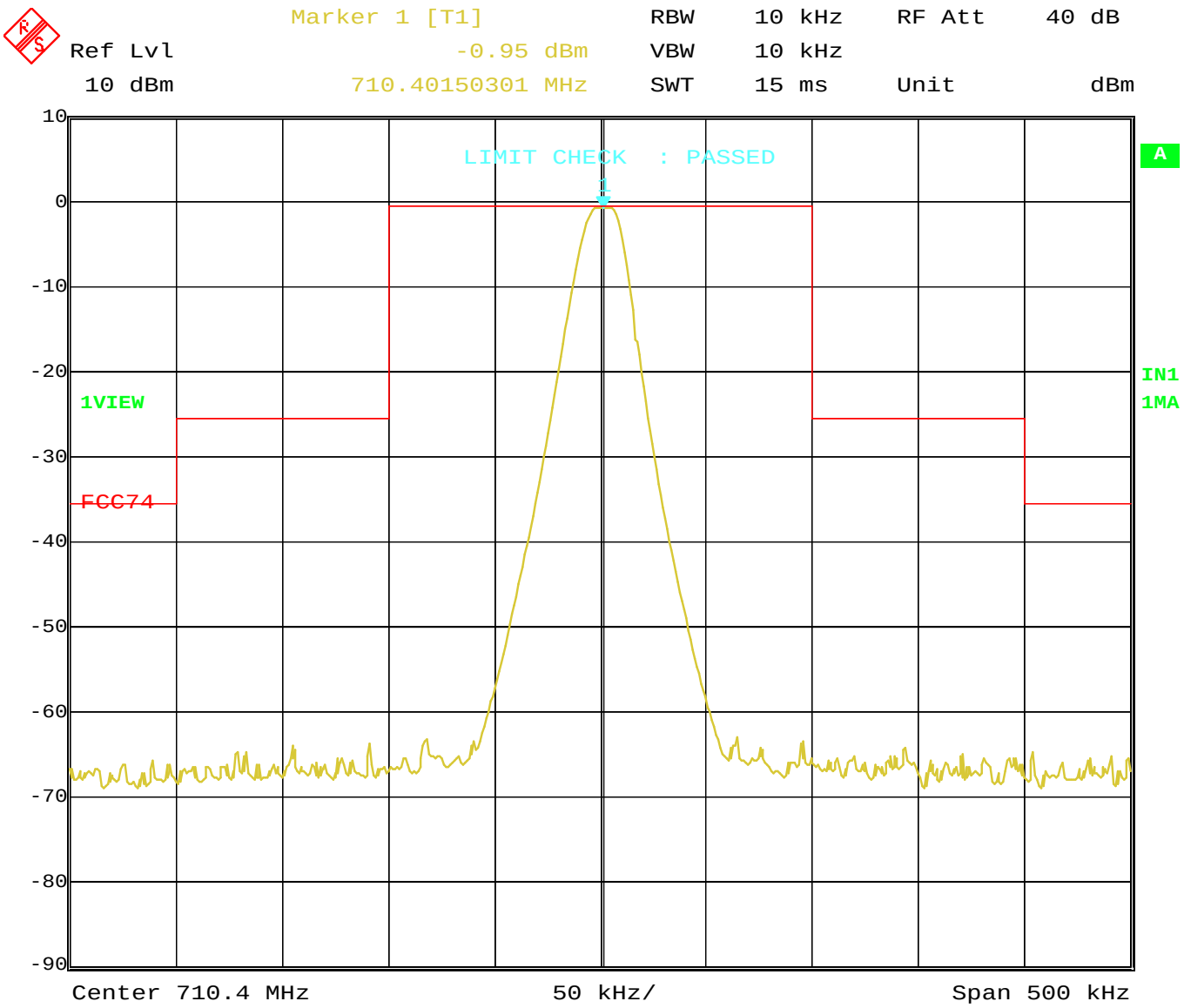
HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:30:34

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

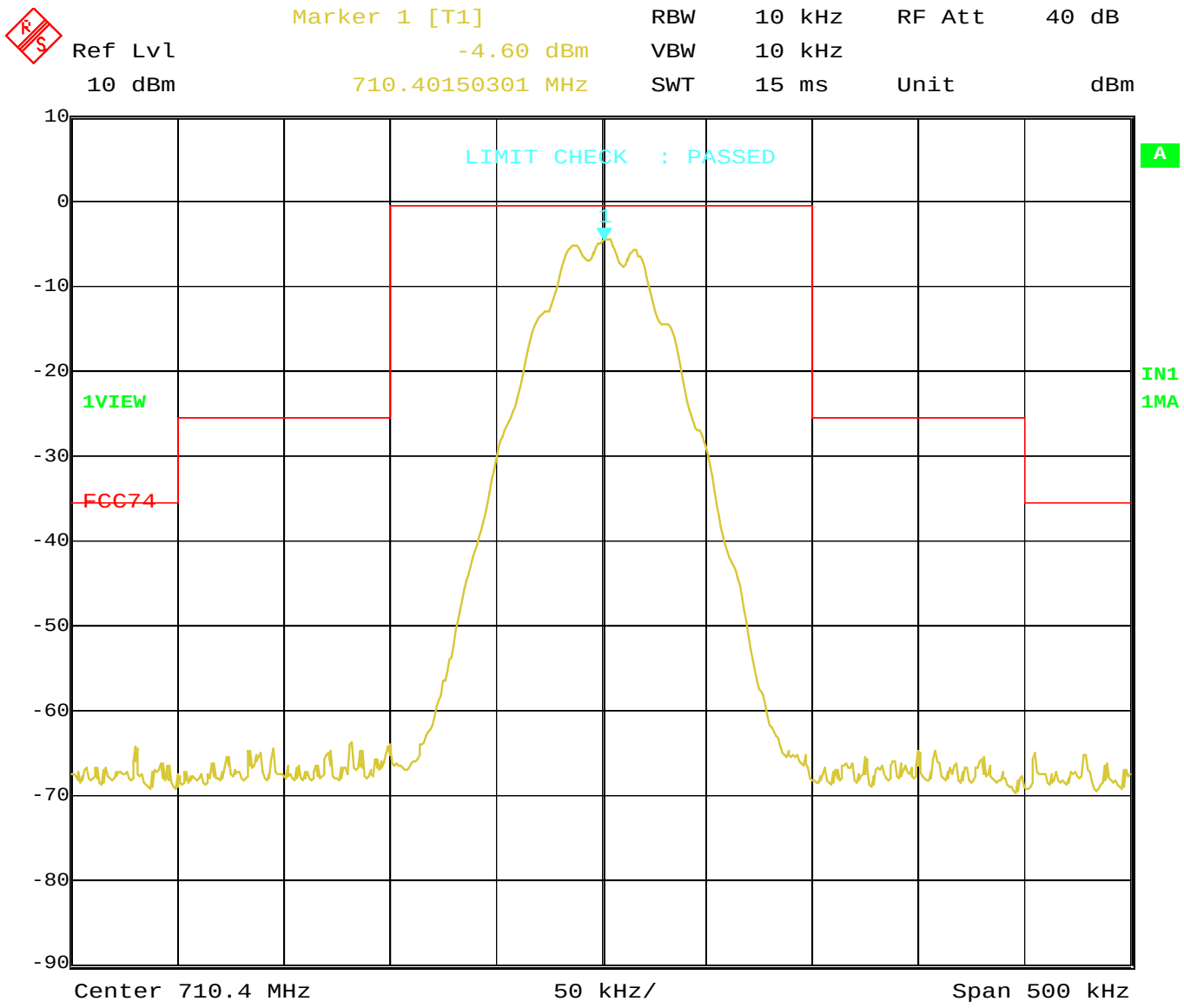
HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:31:16

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:32:12

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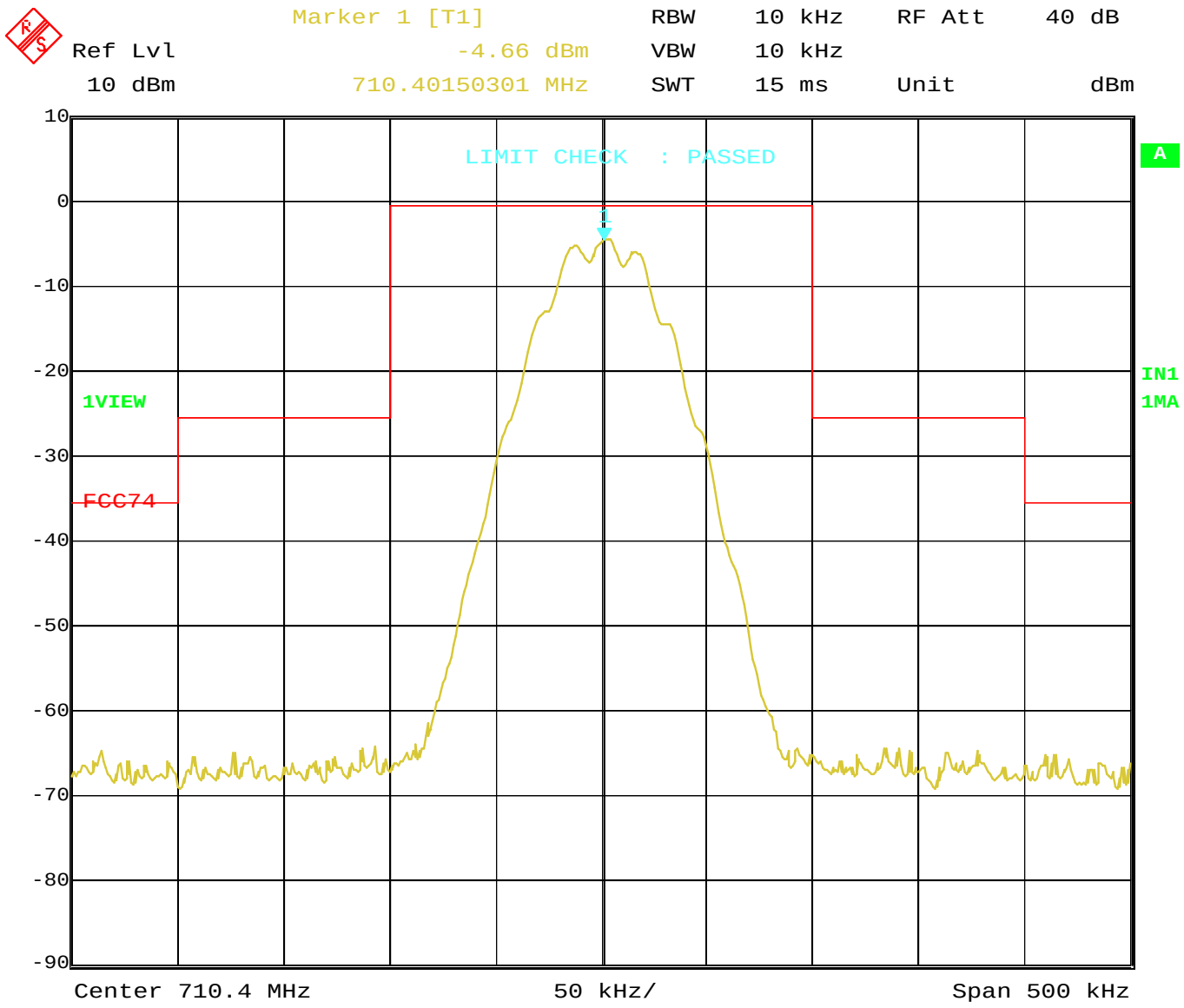
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

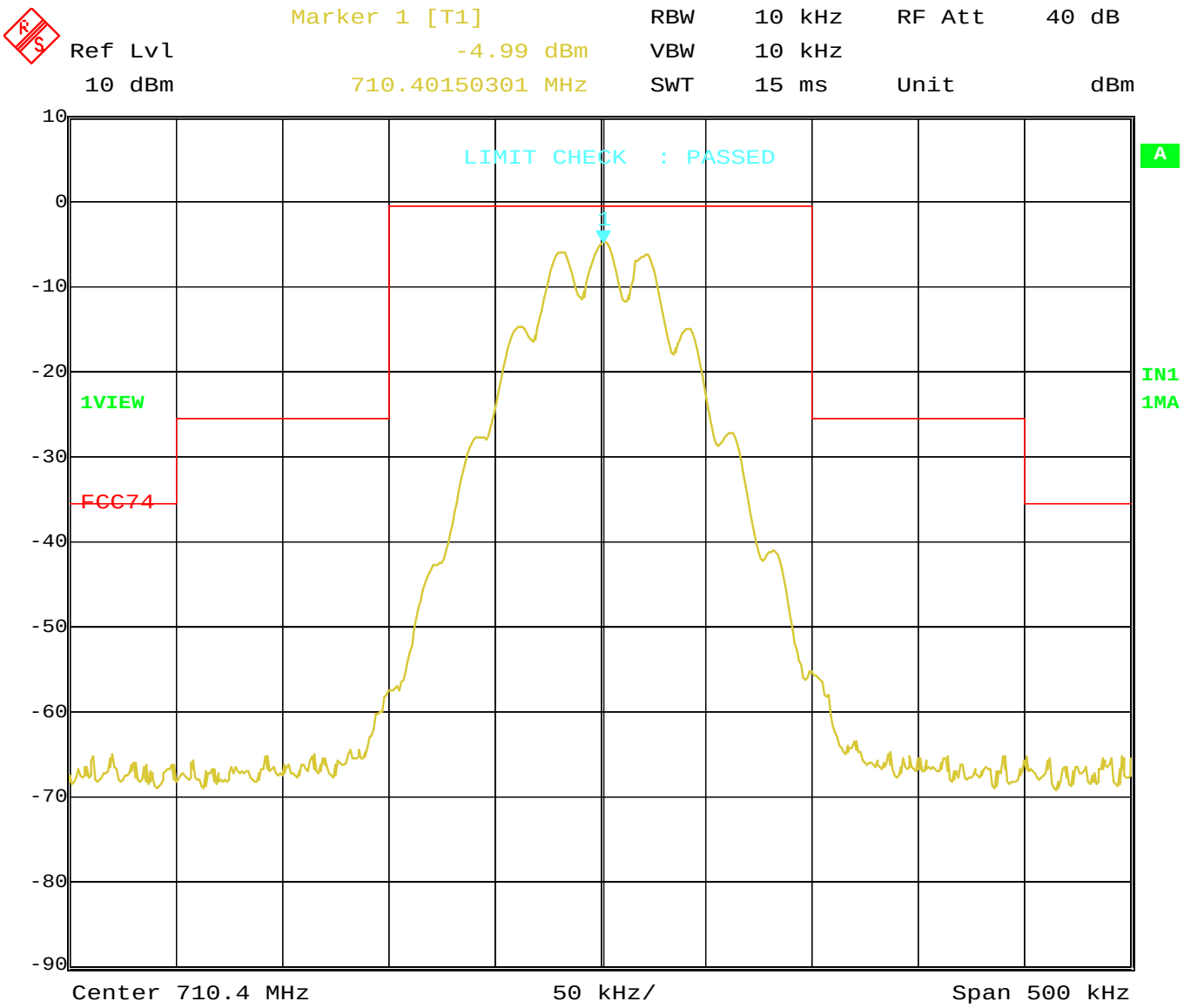
HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:31:42

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

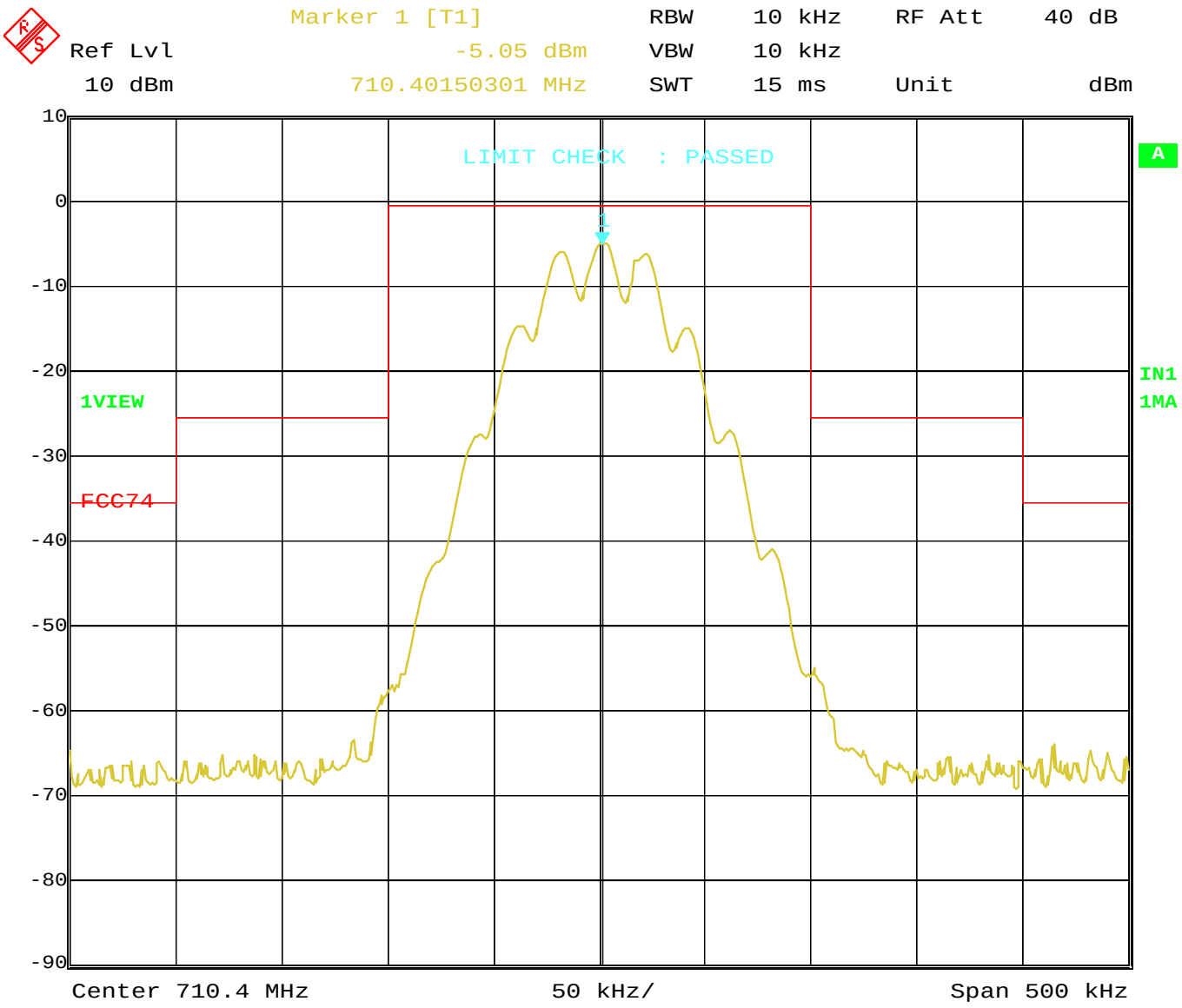
HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:32:54

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

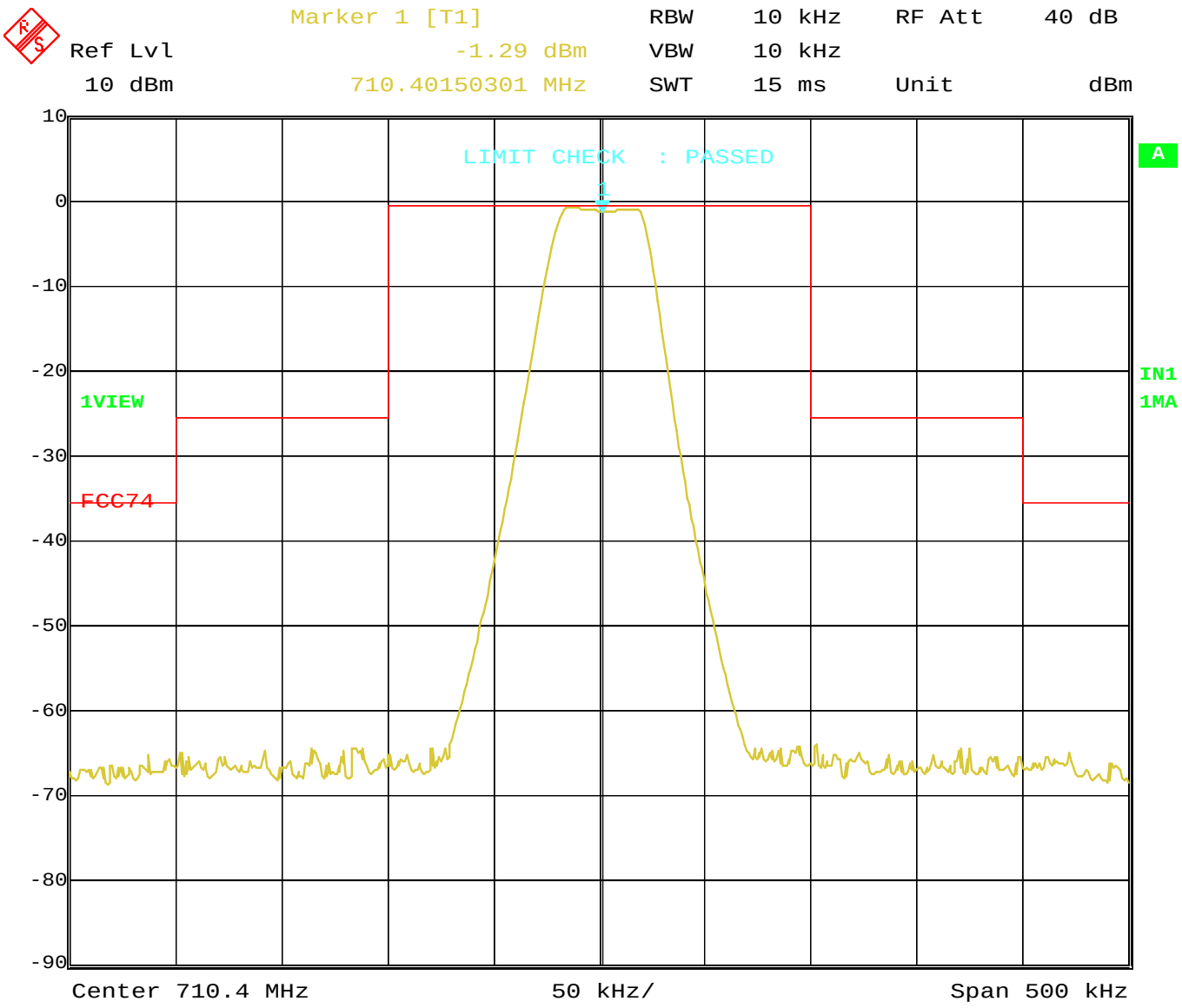
HT40 FLEXX US54
AIL: 73.9 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:33:20

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:23:53

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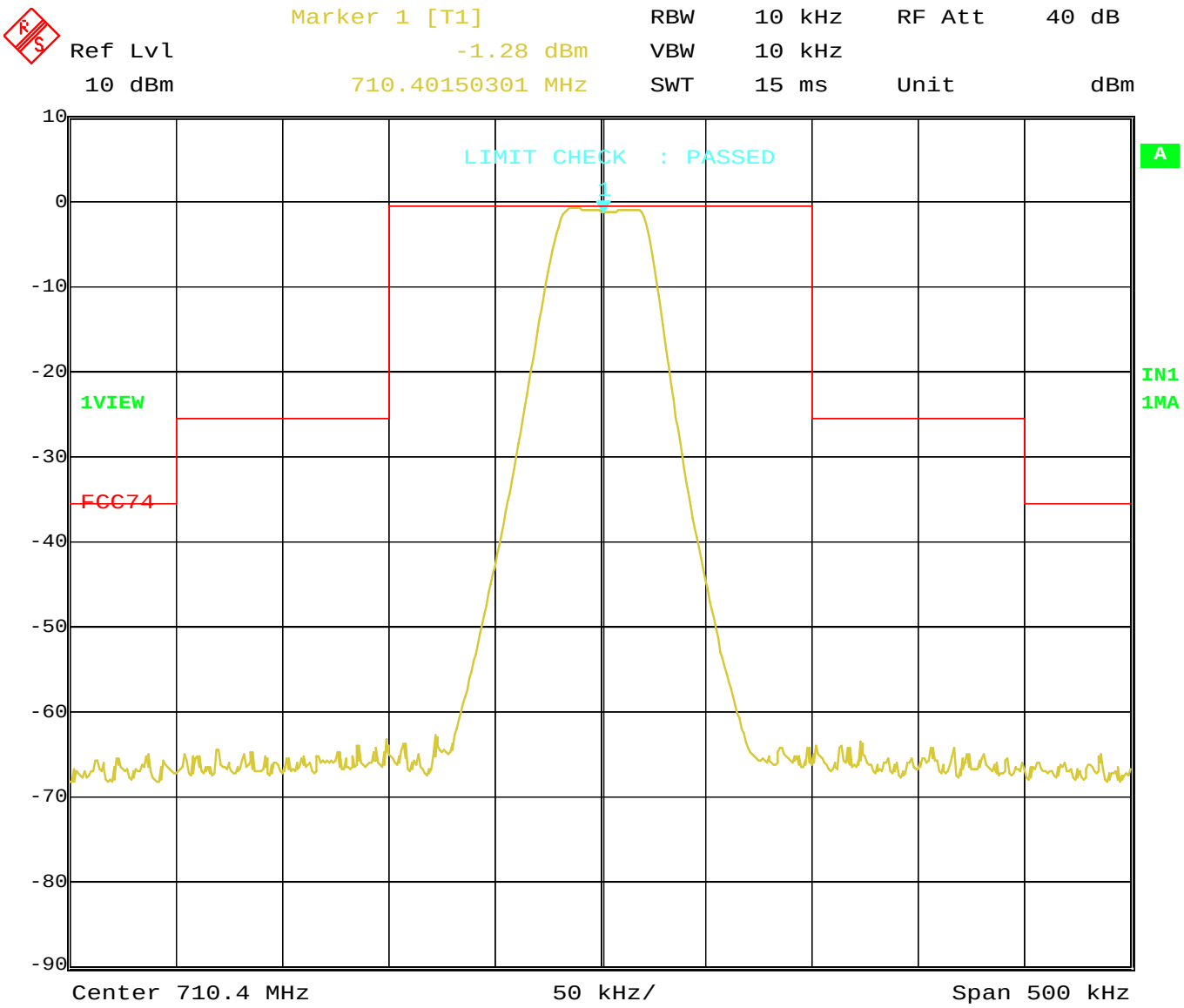
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

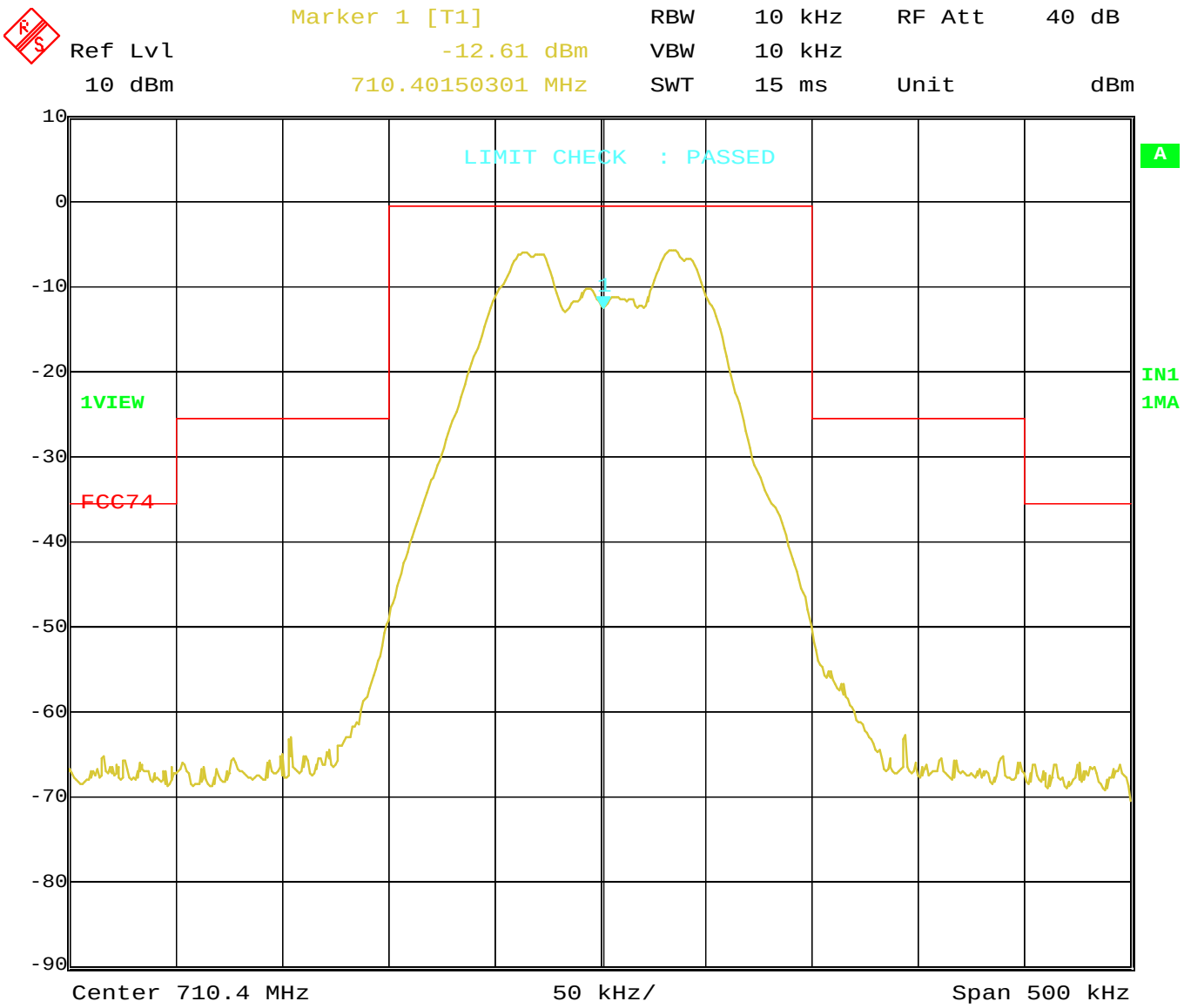
HT40 FLEXX US54
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:22:52

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

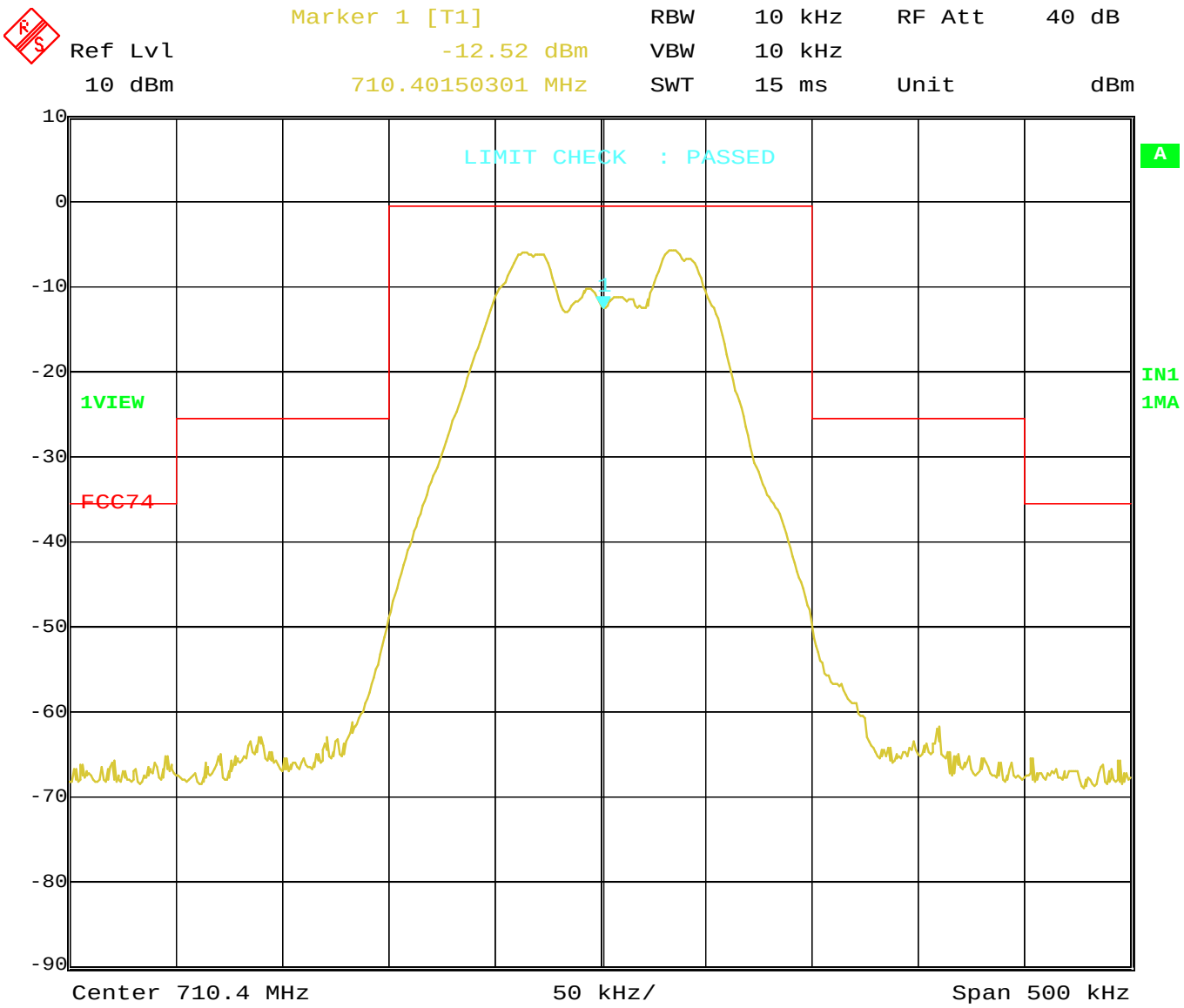
HT40 FLEXX US54
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:24:26

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

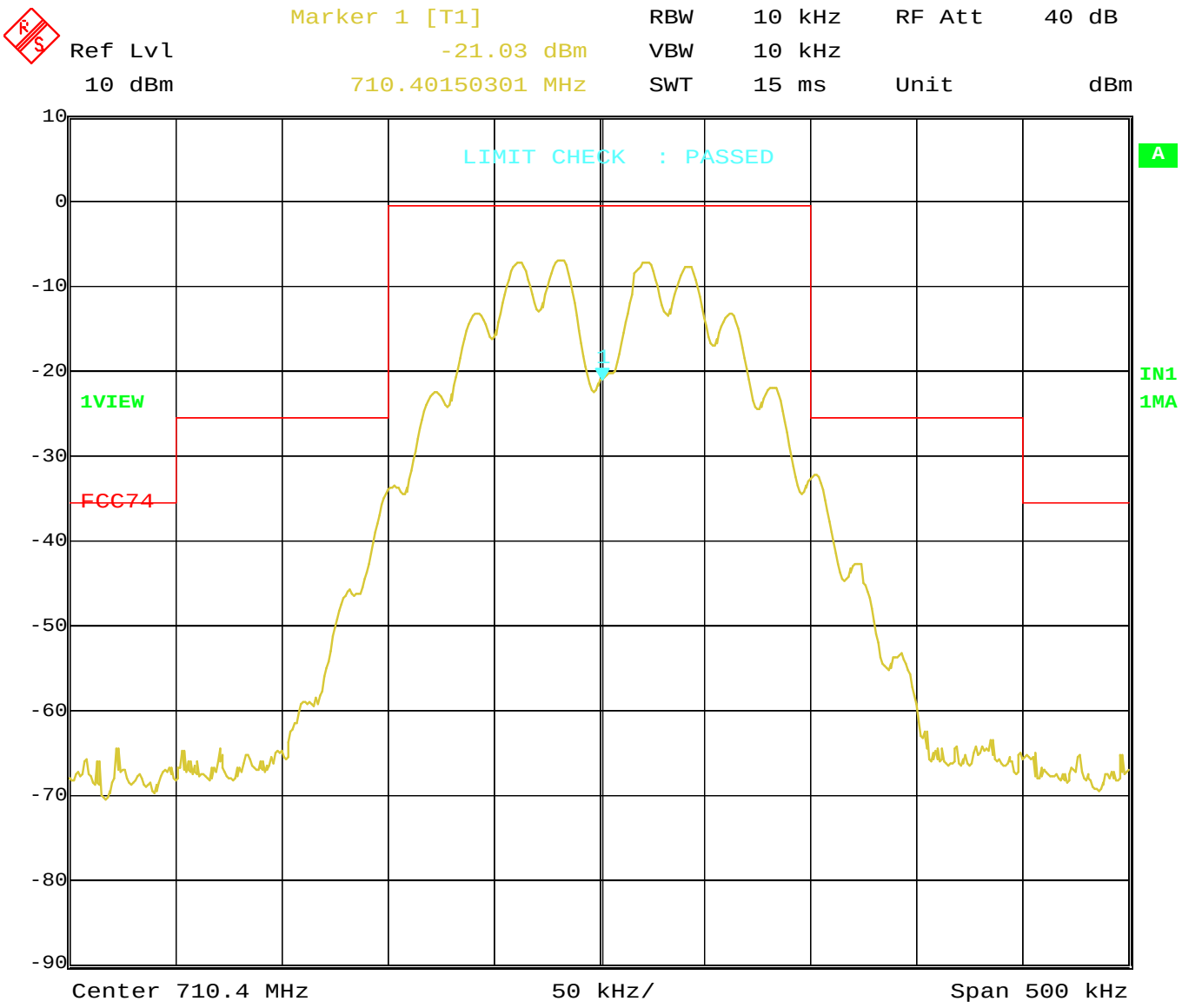
HT40 FLEXX US54
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:25:58

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

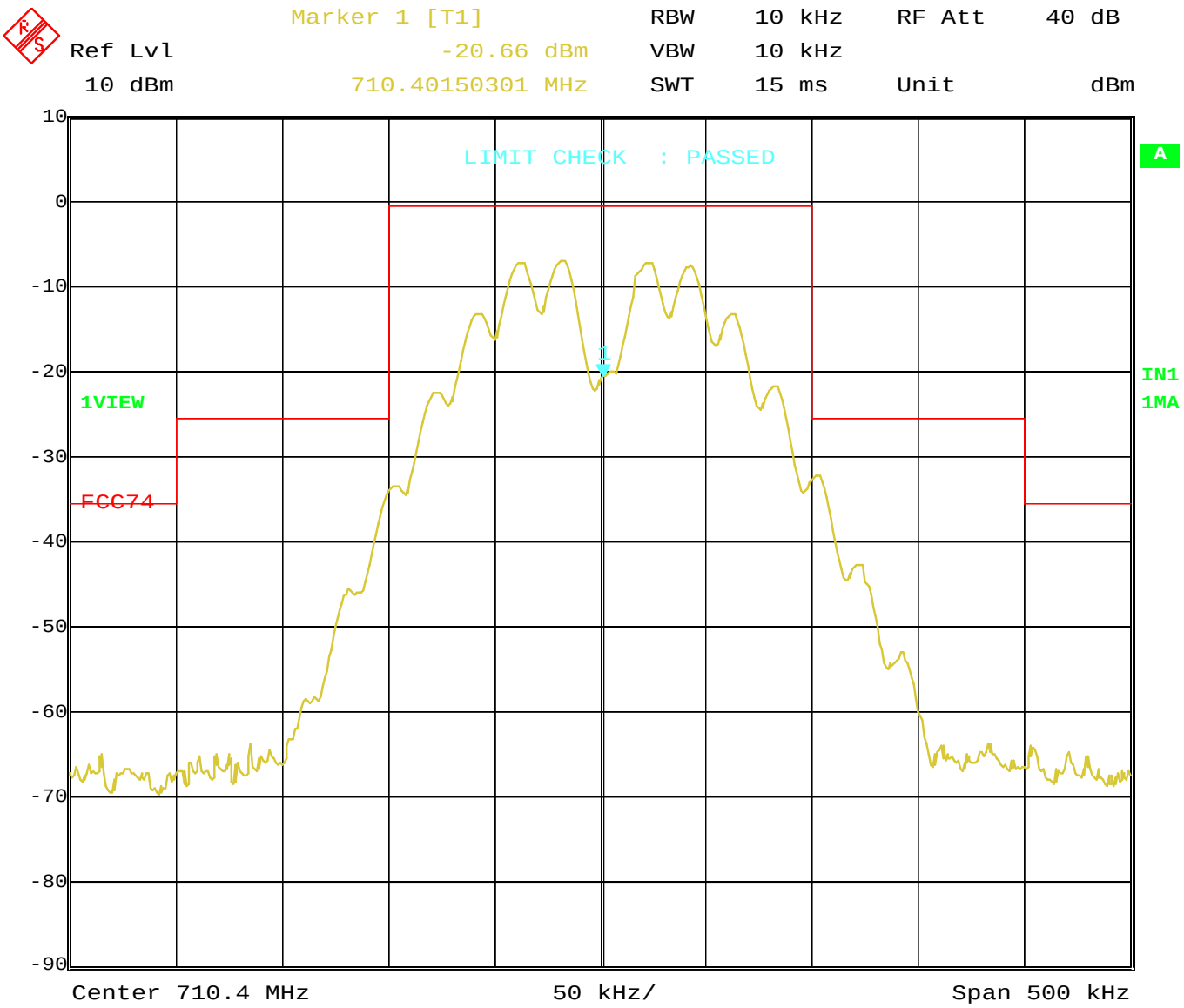
HT40 FLEXX US54
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:29:46

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US54
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:26:49

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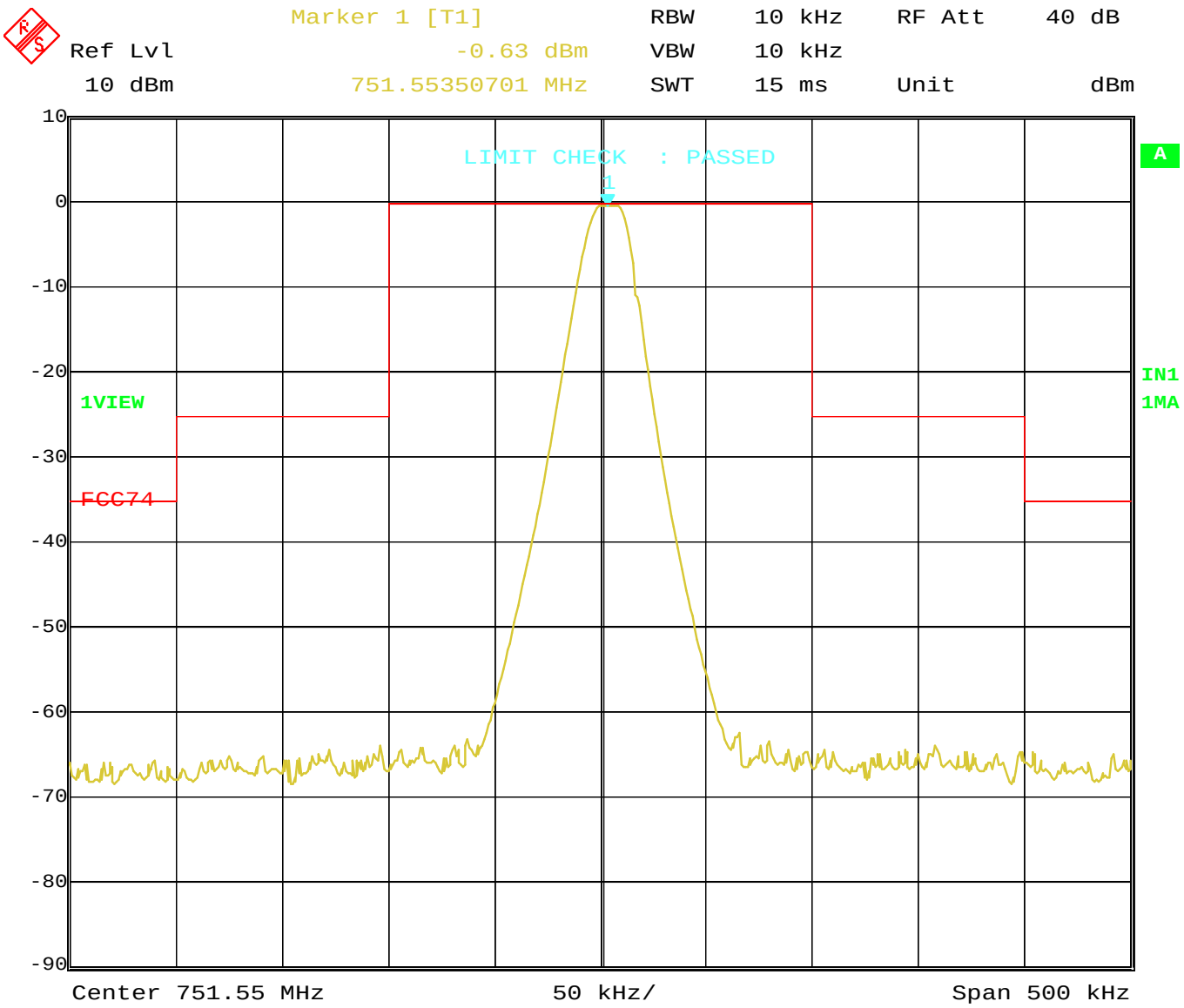
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:49:48

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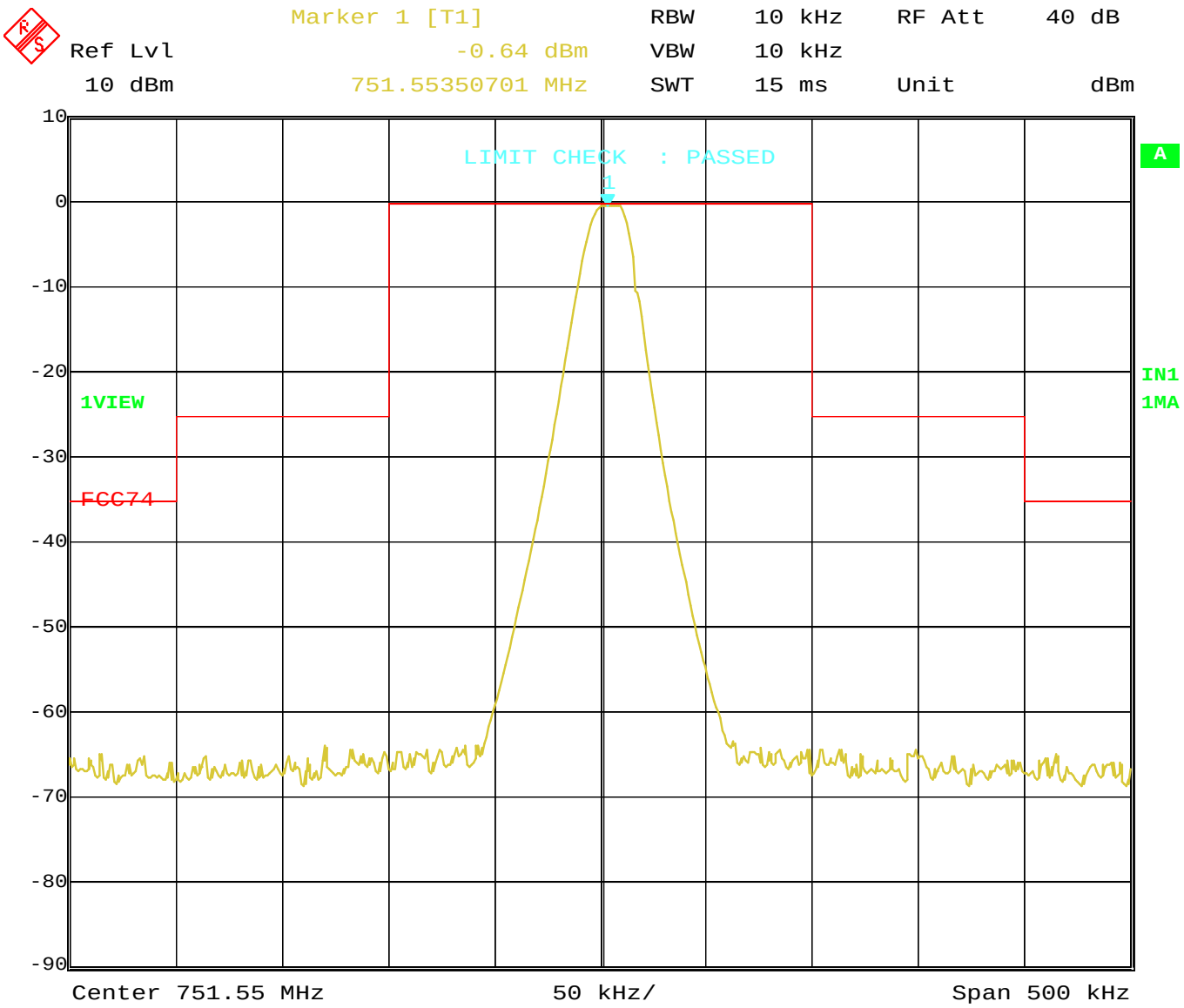
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 1 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:49:18

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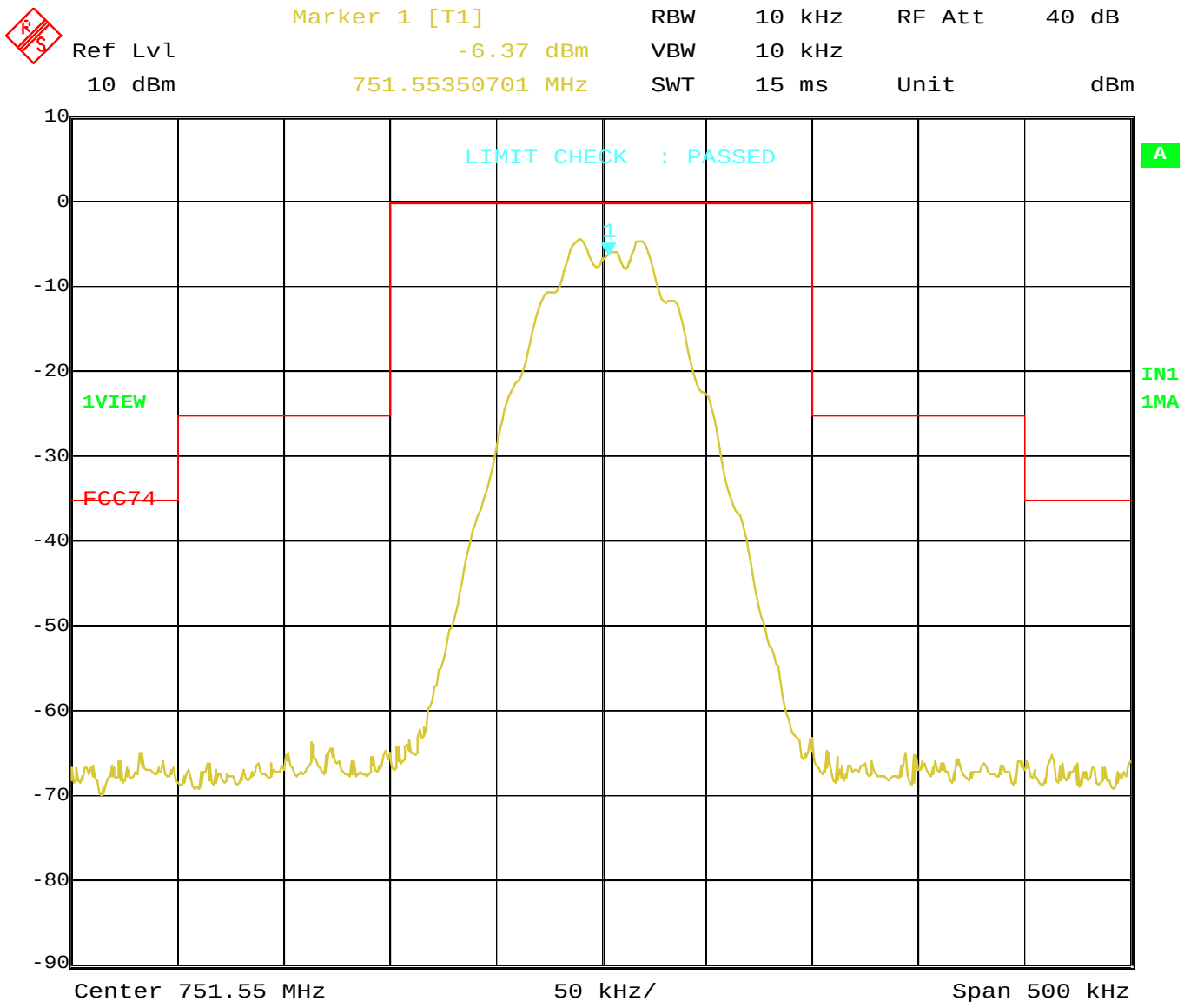
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

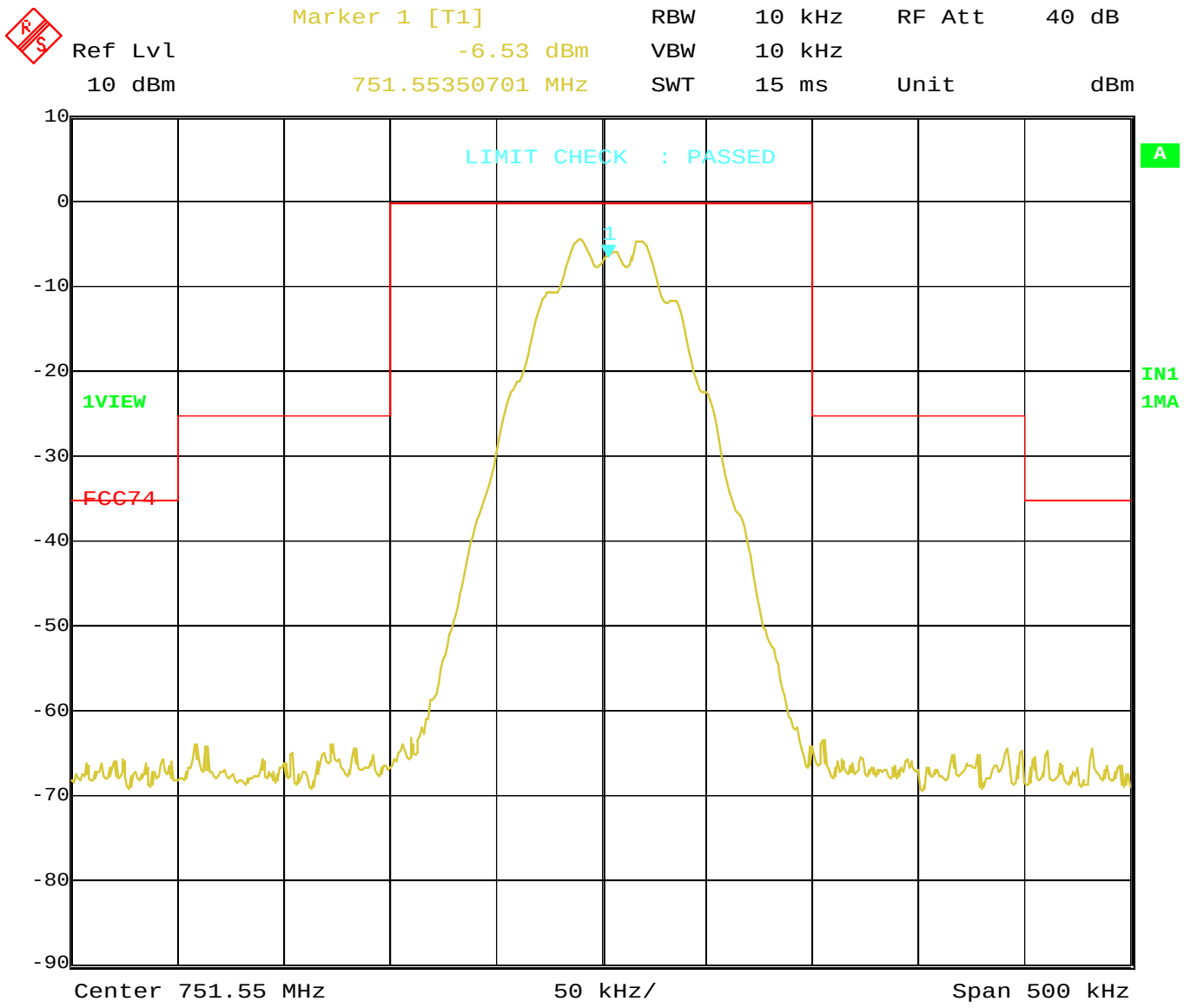
HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:50:16

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

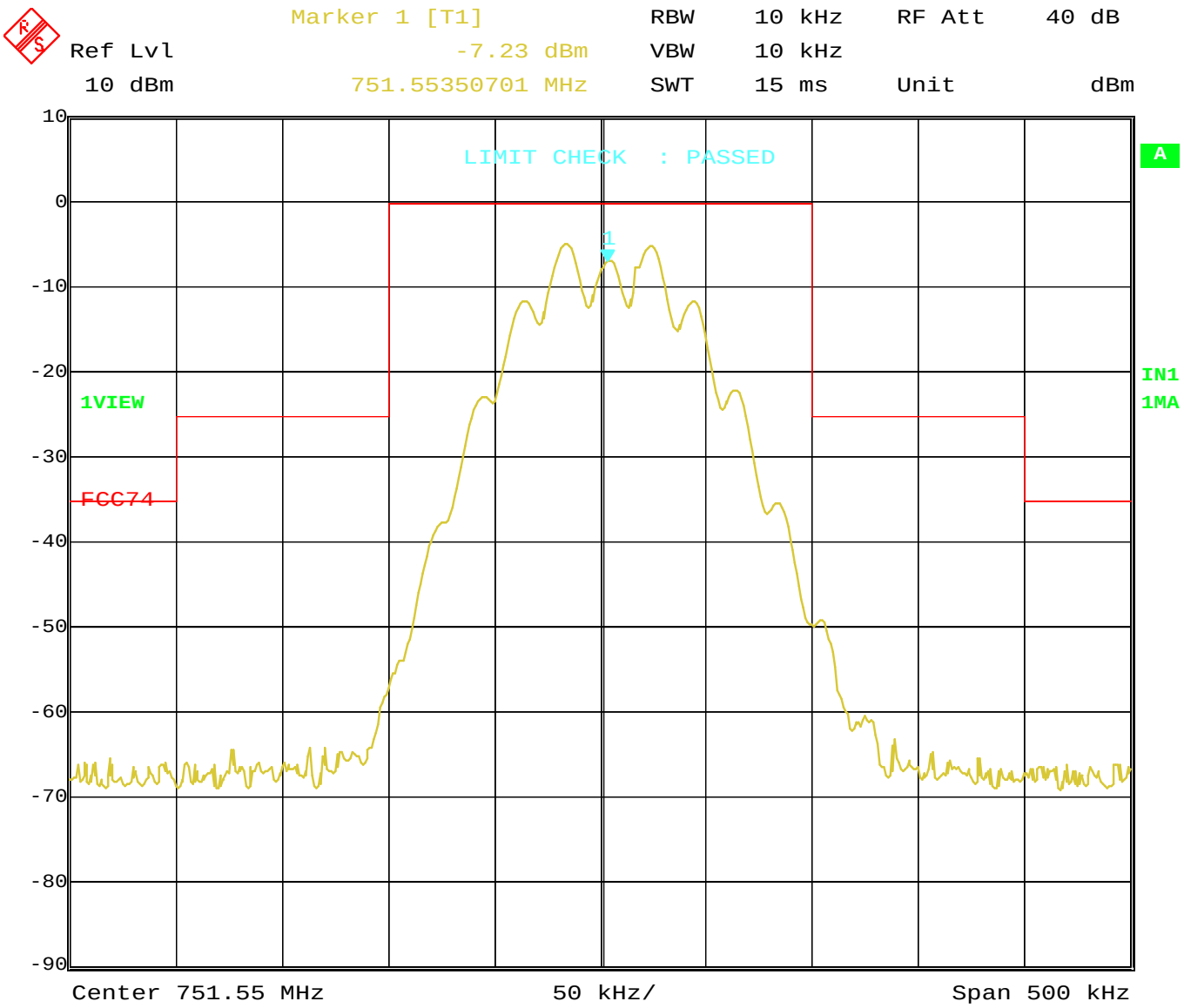
HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 15 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:50:41

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

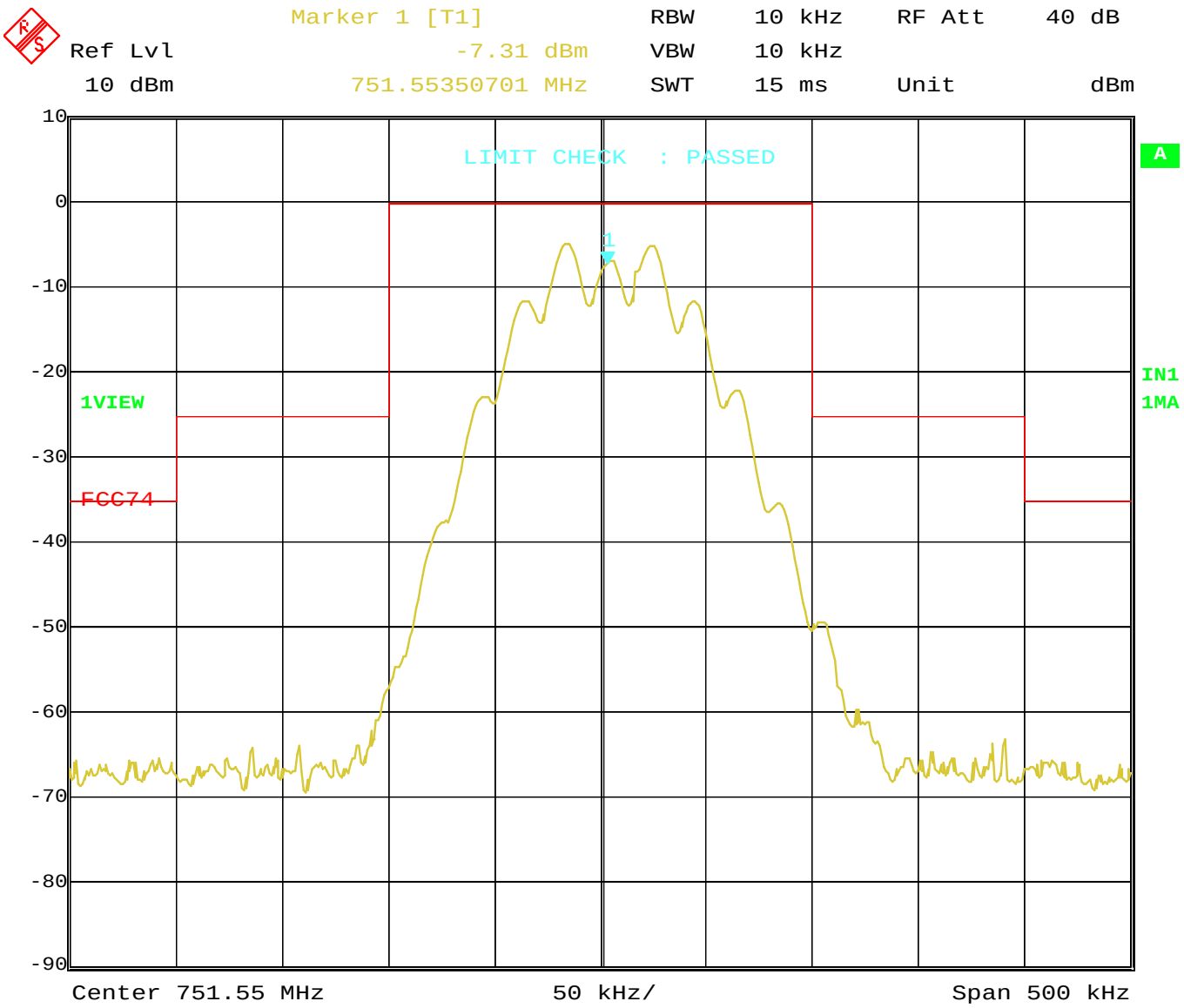
HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:51:31

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 73.4 dBµV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:51:08

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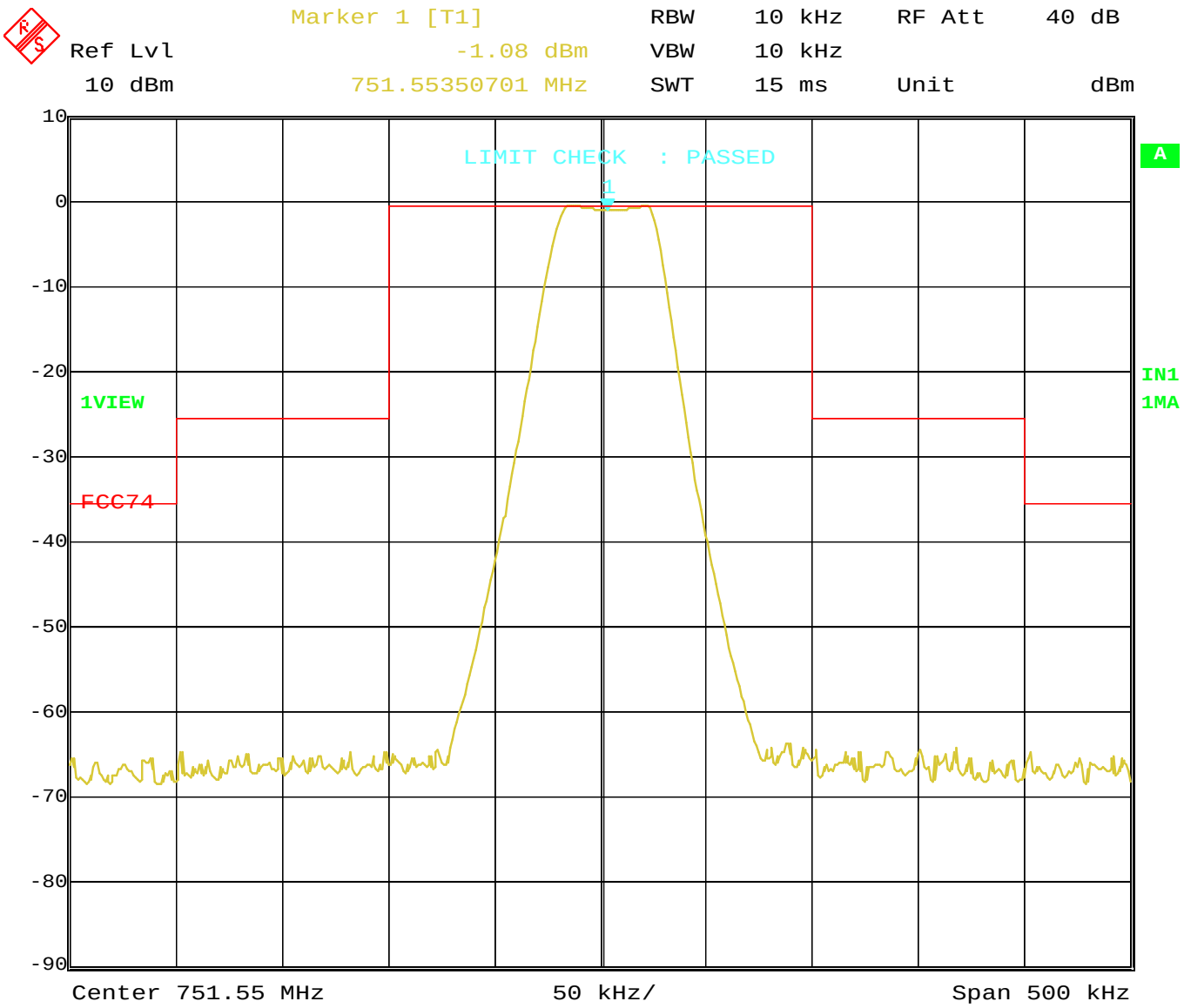
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:38:43

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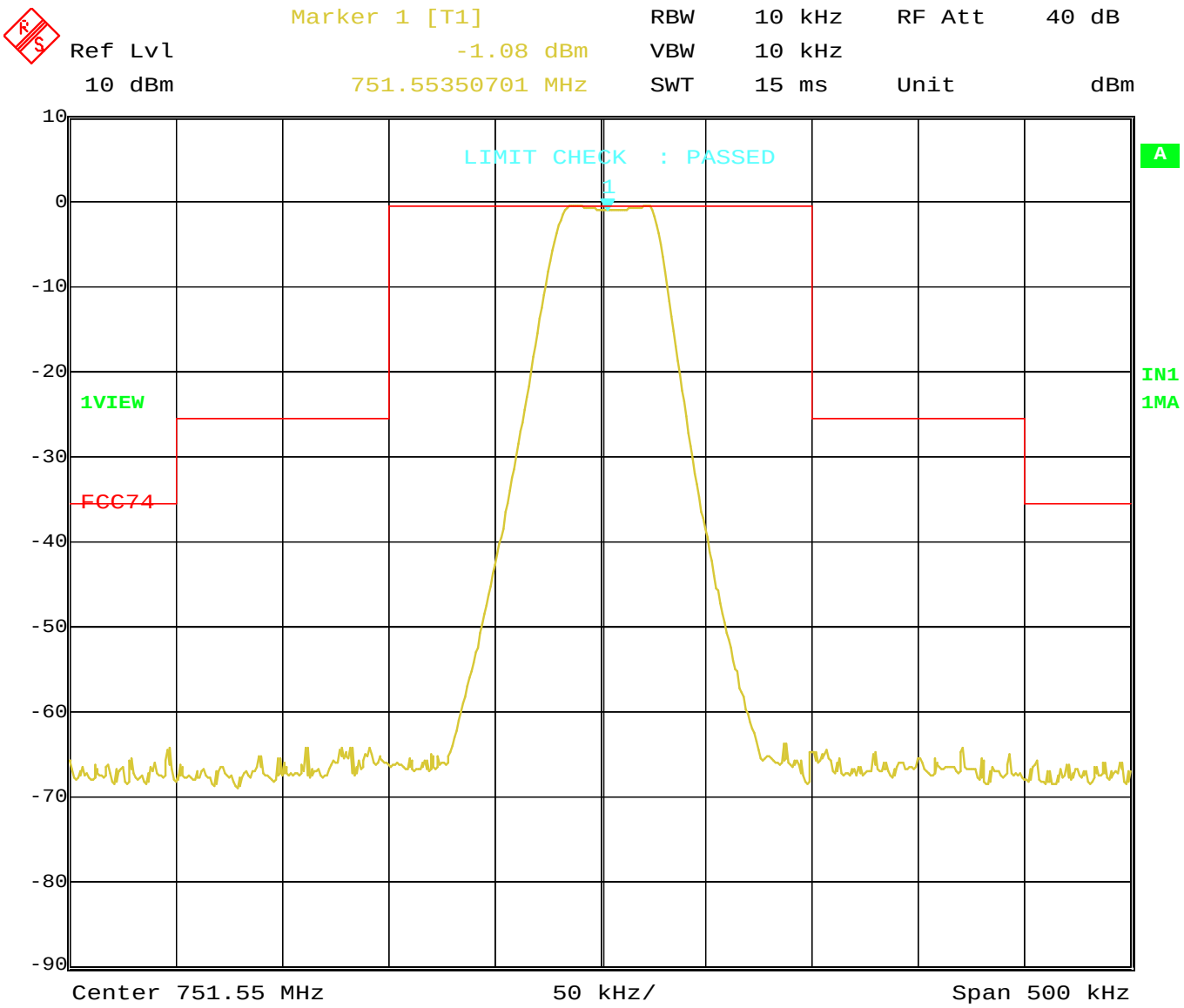
Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

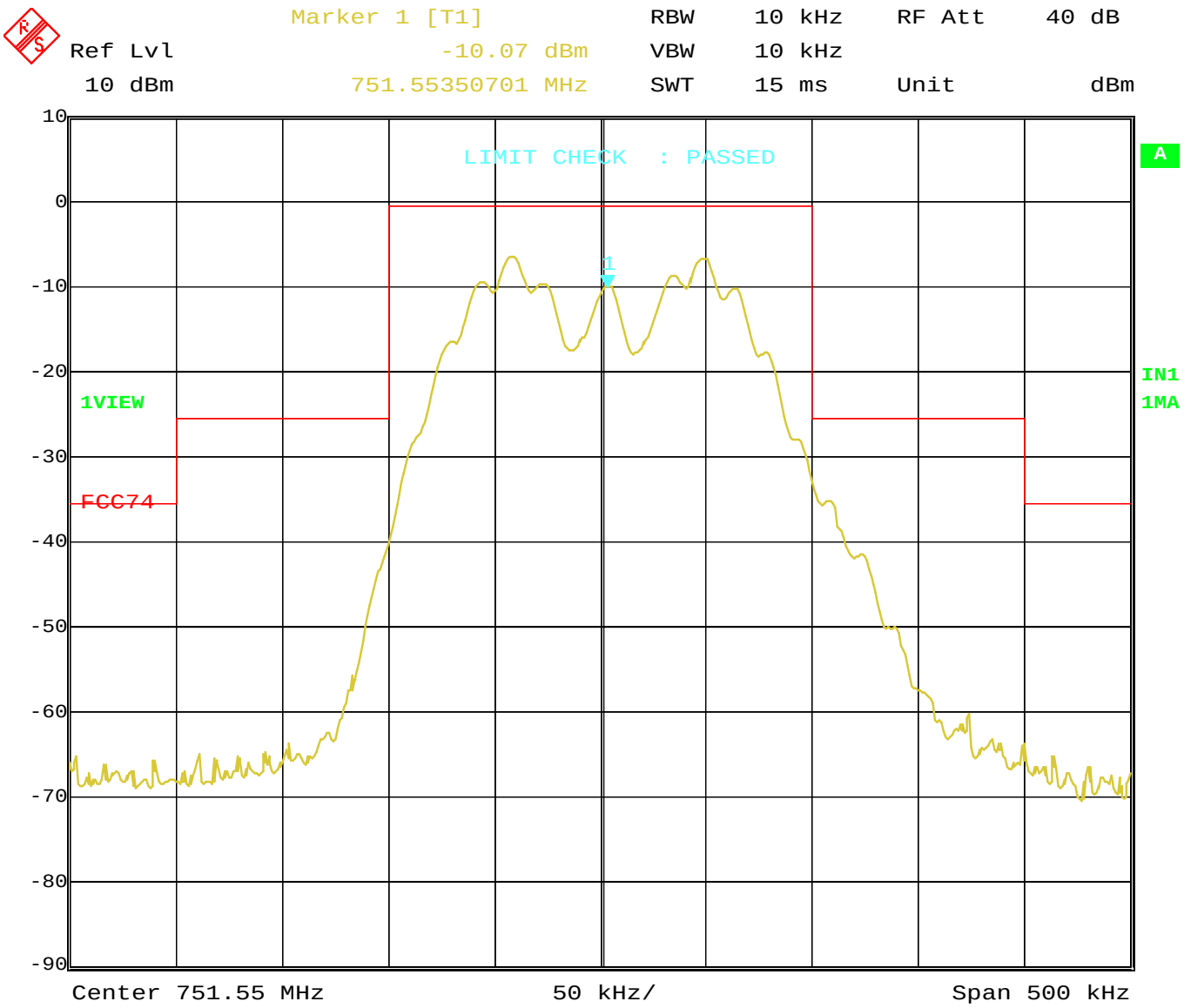
HT40 FLEXX US60B
AIL: 100mV F_{mod}: 1 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:39:45

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

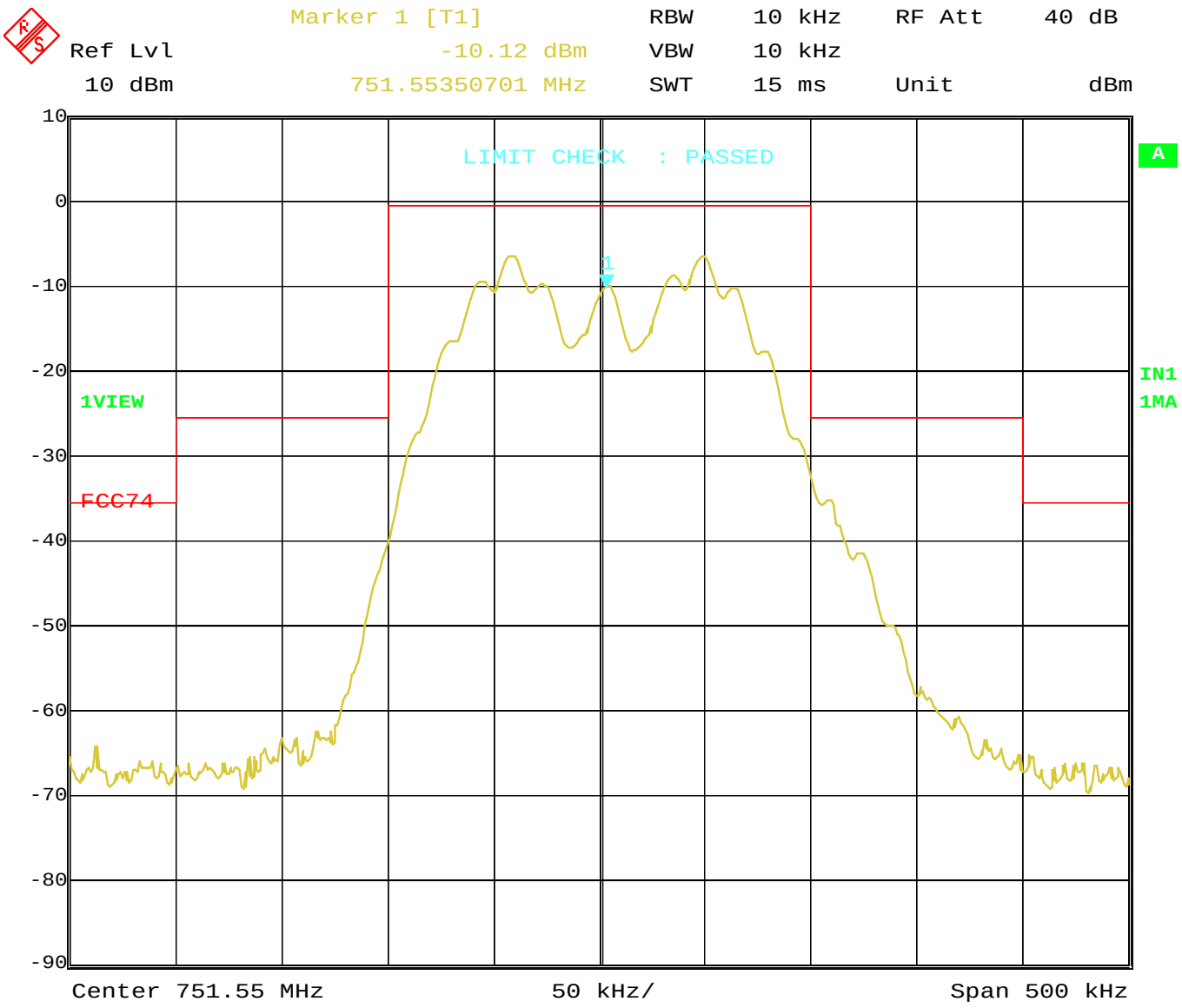
HT40 FLEXX US60B
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:46:01

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

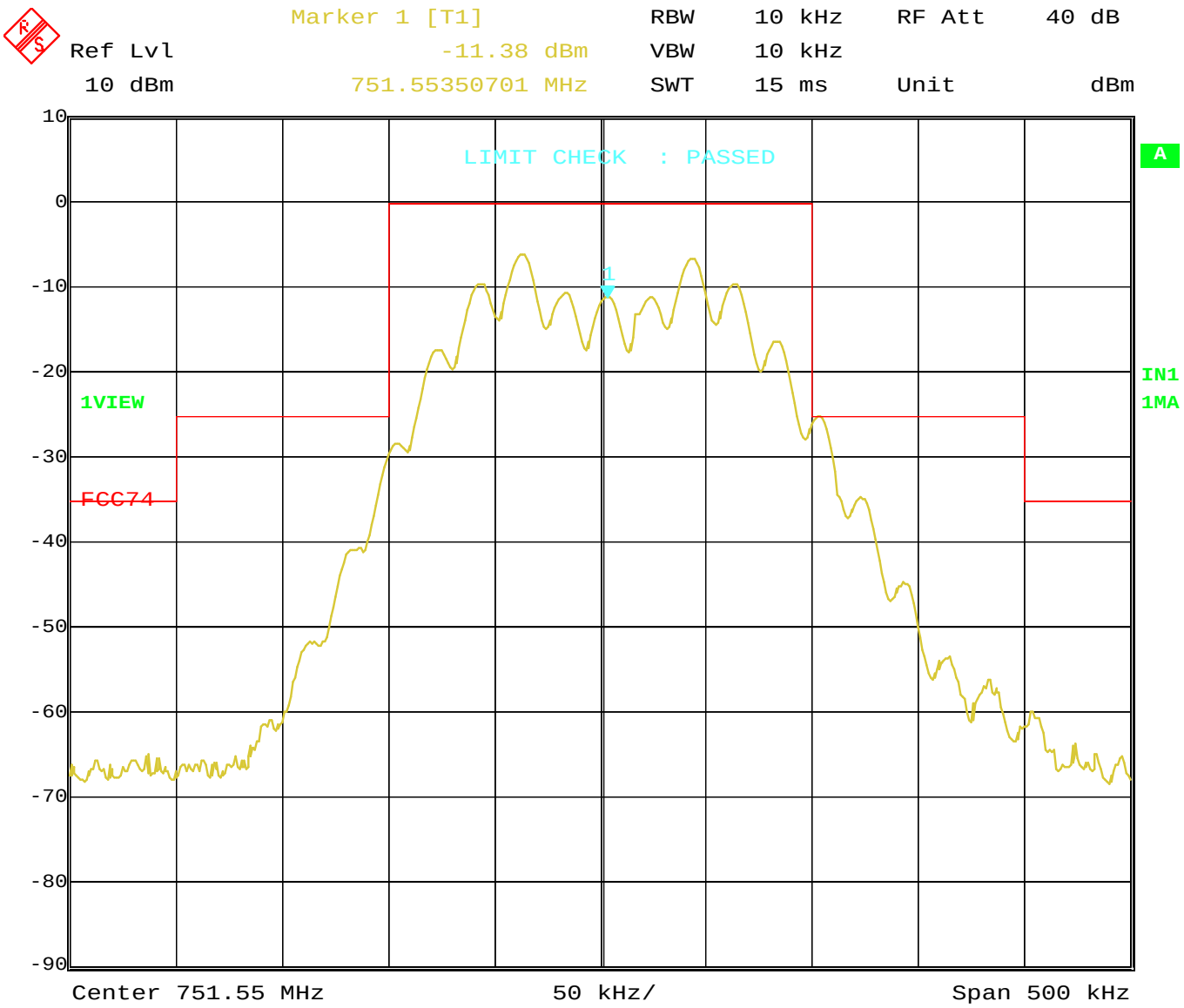
HT40 FLEXX US60B
AIL: 100mV F_{mod}: 15 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:45:35

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

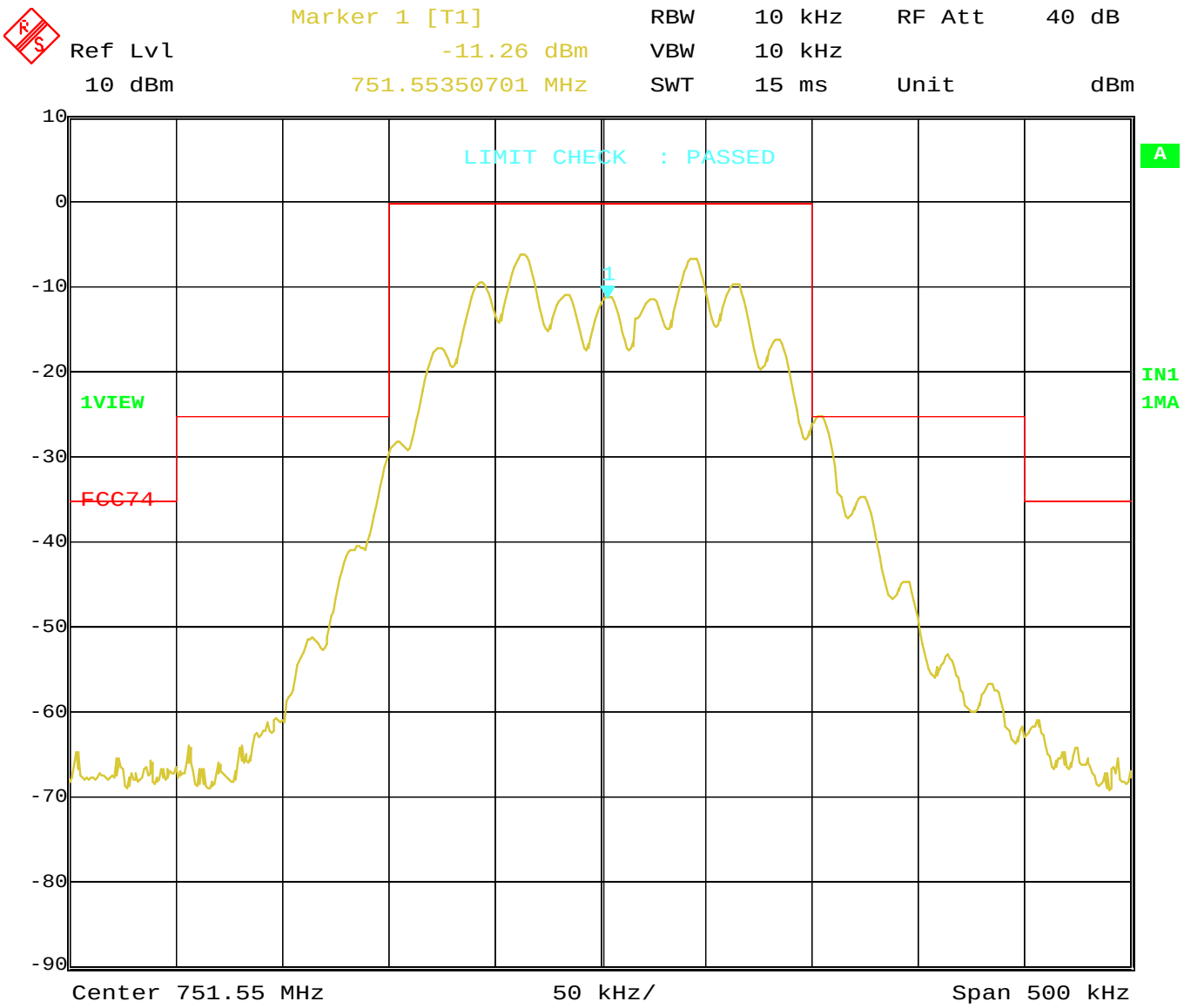
HT40 FLEXX US60B
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.5V



Date: 28.OCT.2004 15:47:39

Keeping the requirements of emission mask
FCC Part 15 Subpart 74.861(e)(6)

HT40 FLEXX US60B
AIL: 100mV F_{mod}: 20 kHz
DC supply voltage: 1.05V



Date: 28.OCT.2004 15:48:35

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
CPC2	Tektronix THS 730A	Handheld Scope	Tektronix GmbH	04-07/38-02-001
	HM-8142	Power Supply	Conrad Elektronic GmbH	04-07/49-99-002
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-96-062
	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
	VLK 04/300	Climatic Chamber	Heraeus -Vötsch GmbH	04-10/90-89-001
FE	Tektronix THS 730A	Handheld Scope	Tektronix GmbH	04-07/38-02-001
	HM-8142	Power Supply	Conrad Elektronic GmbH	04-07/49-99-002
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-96-062
	R 3162	Spectrum Analyzer	Advantest	04-07/74-00-001
	VLK 04/300	Climatic Chamber	Heraeus -Vötsch GmbH	04-10/90-89-001
MB	UPGR	Noise Meter	Rohde & Schwarz München	04-07/31-86-002
	Tektronix THS 730A	Handheld Scope	Tektronix GmbH	04-07/38-02-001
	HP-33120A	Function Generator	HP Hewelett-Packard	04-07/48-02-001
	HM-8142	Power Supply	Conrad Elektronic GmbH	04-07/49-99-002
	DR285/N	2-Way Power Divider	PARZICH GMBH	04-07/60-00-044
	8494B Attenuator / 0 - 11 dB	Attenuator	HP Hewelett-Packard	04-07/60-01-007
	8469B Attenuator / 0 - 110	Attenuator	HP Hewelett-Packard	04-07/60-01-008
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-94-052
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-96-062
MLD	UPGR	Noise Meter	Rohde & Schwarz München	04-07/31-86-002
	Tektronix THS 730A	Handheld Scope	Tektronix GmbH	04-07/38-02-001
	HM-8142	Power Supply	Conrad Elektronic GmbH	04-07/49-99-002
	DR285/N	2-Way Power Divider	PARZICH GMBH	04-07/60-00-044
	8494B Attenuator / 0 - 11 dB	Attenuator	HP Hewelett-Packard	04-07/60-01-007
	8469B Attenuator / 0 - 110	Attenuator	HP Hewelett-Packard	04-07/60-01-008
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-94-052
	CMS-54	Com. Receiver	Rohde & Schwarz München	04-07/63-96-062
SER2	Sucofeed 7/8	RF Cable	Huber+Suhner	04-07/60-04-089
	NW-2000-NB	RF Cable	MBPS GmbH	04-07/60-04-205
	EF393-21N-15m	RF Cable	Huber+Suhner	04-07/60-04-258
	VULB 9165	Super Broadband Antenn	Schwarzbeck Mess-Elektronik	04-07/62-00-001
	ESVS 30	Test Receiver	Rohde & Schwarz München	04-07/63-04-001
SER3	N-1600-N	Microwave Cable	Huber+Suhner	04-07/60-04-202
	N-1600-SMA	Microwave Cable	Huber+Suhner	04-07/60-04-203
	SM 01	Switchmatrix 1-18 GHz	MBPS GmbH	04-07/60-04-215
	Model 3115	Horn Antenna	EMCO Elektronik GmbH	04-07/62-03-003

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