TEST RESULT FOR FCC CERTIFICATION

Purpose of test	: Certify JSS-296
Grantee's type or model No.	: JSS-296
Drawing, specification or exhibit	: FCC Part 2,15 and 80
Quantity of item tested	: One (1) of the above type
Abstract	: Refer to result sections
Date tested completed	: April 11, 2003
Test place	: Japan Radio Co., Ltd. Mitaka Plant 5-1-1, Shimorenjyaku Mitaka City, Tokyo 181-8510 Japan

Tested by: S. Furuta
S. Furuta

Checked by: T. Okude
T. Okude

Approved by: E. Kobayashi
E. Kobayashi

INDEX

1. General

1.1 Normal test conditions

Power source	: 220V AC single phase 50Hz, or 24V DC
Temperature range	: +15℃ to +30℃
Relative humidity	: 20% to 75%

1.2 Environmental test conditions

Power source

High voltage	: 253V AC (115%) 50Hz, 27.6V DC (115%)
Normal voltage	: 220V AC (100%) 50Hz, 24.0V DC (100%)
Low voltage	: 187V AC (85%) 50Hz, 20.4V DC (85%)

Temperature range

Low temperature	: -30℃
High temperature	: +50℃

1.3 Antenna impedance: 50 ohm

1.4 Modulation input impedance: 600 ohm

1.5 Equipment under test JSS-296 block set up: Fig. 1.5-1

1.6 List of measurement instruments: Table 1.6

1.5 Equipment under test JSS-296 block set up

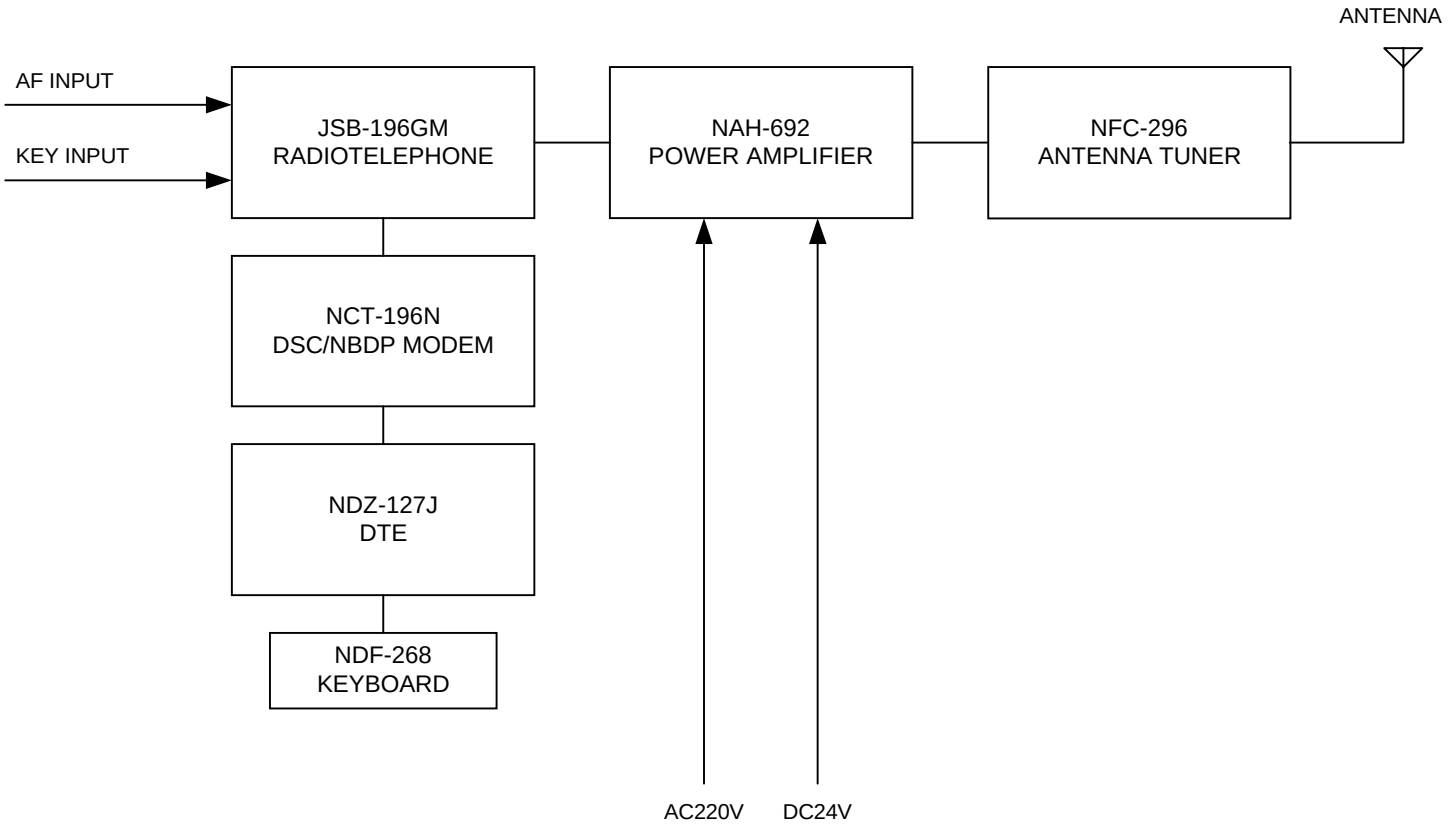


Fig. 1.5-1

1.6 List of measuring instruments

The measuring instruments used for these tests are maintained in good working condition and are calibrated on routine basis every six months.

Table 1.6

Article	Model	Serial No	Manufacturer
Regulated DC power supply	35-60L	1200011	Kikusui Electronics Corp.
Slide transformer	RTC-20	KZ5526	Tokyo-Rikosha Co., Ltd.
AC voltage meter	2013	-	Yokogawa Electric Works, Ltd.
DC voltage meter	2051	03953U	Yokogawa Electric Works, Ltd.
Two tone oscillator	TF2005R	351225/10	Marconi
AF Attenuator	STA-114	Z4463	Tokyo KO-ON Denpa Co., Ltd.
Frequency counter	TR5825	01950011	Advantest
Bi-Directional coupler	4266	-	Bird
Bi-Directional coupler	DIC-003-21	-	Fujisoku
Wattmeter	TLP-52X	15837	Fujisoku
Spectrum analyzer	8563A	-	HP
Spectrum analyzer	3582A	1809A03985	HP
Storage oscilloscope	9354TM	9354 2547	Lecroy
Selective level meter	3586C	1929A00296	HP
50 ohm dummy load	8860	2715	Bird
LISN	KNW-244C	8-647-5	Keyouritsu Electric Works, Ltd.
Interference test receiver	ESH-2	-	Rohde & Schwarz
Frequency controller	ESU2/ESM2	-	Rohde & Schwarz
Panorama adapter	EZP	-	Rohde & Schwarz
Loop antenna	HFH 2-Z2	-	Rohde & Schwarz
Log-Periodic antenna	TR17204	94880015	Advantest
Bi-Conical antenna	BBA9106	-	Schwarzbeck Mess-Elektronix

2. Test for requirement

2.1 RF power output and power amplifier operating parameters
[FCC §2.1046(a),(b), §80.215(d)]

2.1.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.1.1-1.

Output power: AC power supply --- 1.6 - 4MHz, 200W
4 - 27.5MHz, 250W
DC power supply --- 1.6 - 4MHz, 100W
4 - 27.5MHz, 150W

(1) In AC power supply conditions: AC220V and ± 15%
The equipment was tested on each of marine bands in the transmitter frequency range with J3E, A1A and F1B (DSC and NBDP) modes, on the 2MHz marine band at three frequencies with J3E, A1A and F1B modes.
(2) In DC power supply conditions: DC24V
The equipment was tested at three frequencies with J3E, A1A and F1B (DSC and NBDP) modes.

The modulation in J3E mode was signals of 400Hz and 1800Hz applied simultaneously to the microphone input. The levels of the tones were adjusted to produce equal output power. The level of the input signal increased until the transmitter rated output power, and then increased by 10dB as shown in Fig. 2.2.2.2-1 of the Modulation limiting characteristics test.

The transmit output in A1A mode was measured with the continuous key down.

F1B mode was modulated with a continuous dot pattern by the DSC unit. DSC unit audio lines connected the JSB-196GM line input terminal. The audio input signal pass over the modulation limiting circuits.

Current and voltage level into the final power amplifier were measured with the data display function of the NAH-692 POWER AMPLIFIER Ic/Vc menu. AC and DC source voltage was measured at the power supply terminal.

Readings were also taken with no audio input and carrier suppression was measured at this time with the spectrum analyzer.

Method of calculating the output power according to ITU-R Recommendation 326-2. We read the power of the wattmeter, then calculated the output power by the following formula.

$$\text{Output power (Watt)} = \text{mean power} \times \left[\frac{\text{Deflection of oscilloscope at two-signal}}{\text{Deflection of oscilloscope at one signal}} \right]^2$$

2.1.2 Test results

Test results are shown from Table 2.1.2-1 to Table 2.1.2-3.

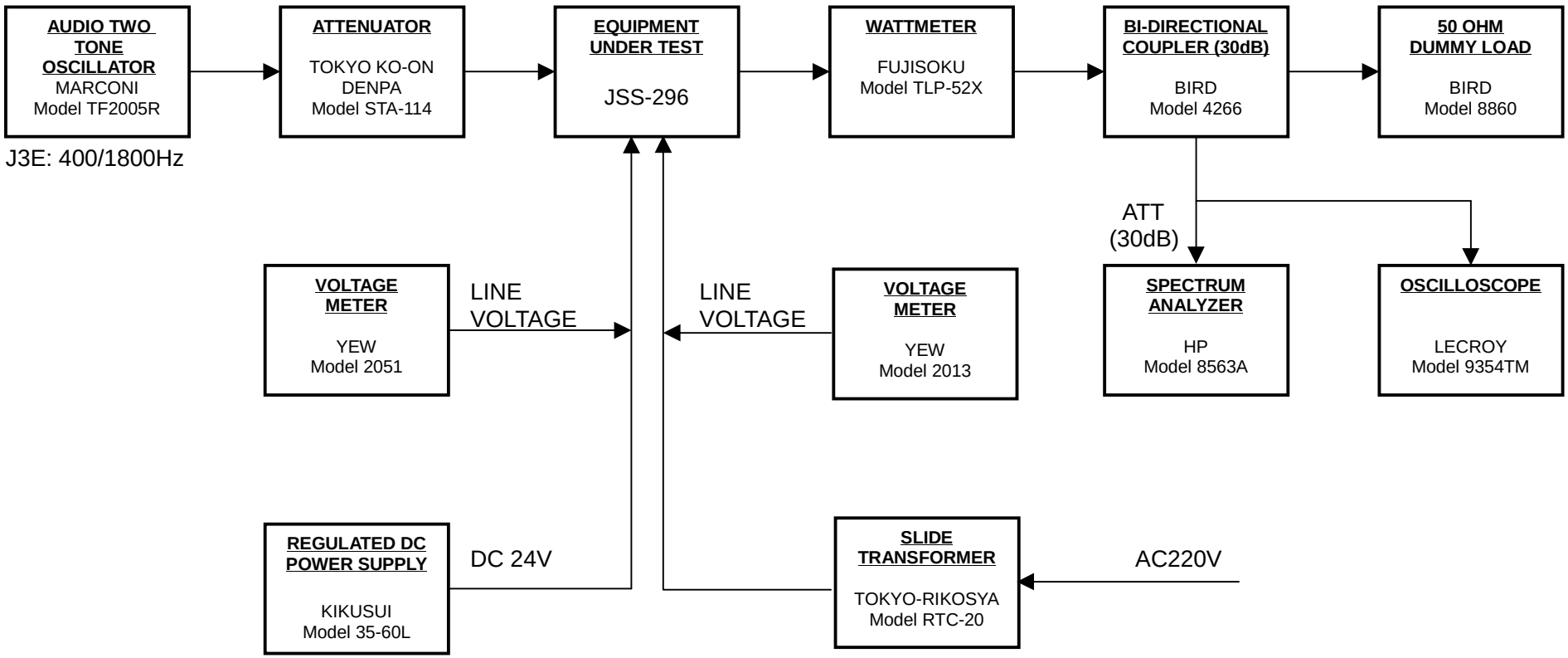


Fig. 2.1.1-1 Test set up for Power output and amplifier operating parameters

Table 2.1.2-1 Test results (AC220V)

RF power output and power amplifier operating parameters

(1/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier below pep (dB)
1619.0	J3E	200	76	6.9	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.2	----	----	----
	F1B	200	76	7.3	Dot signal	2.2	----
2182.0	J3E	200	76	6.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.0	----	----	----
	F1B	200	76	7.2	Dot signal	2.2	----
2187.5	J3E	200	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.5	----	----	----
	F1B	200	76	6.8	Dot signal	2.2	----
2830.0	J3E	200	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.6	----	----	----
	F1B	200	76	6.5	Dot signal	2.2	----
3258.0	J3E	200	76	5.7	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.1	----	----	----
	F1B	200	76	6.0	Dot signal	2.2	----
4112.0	J3E	250	76	7.0	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.5	----	----	----
	F1B	250	76	7.6	Dot signal	2.2	----
6212.0	J3E	250	76	6.6	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.3	----	----	----
	F1B	250	76	7.5	Dot signal	2.2	----
8238.0	J3E	250	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.0	----	----	----
	F1B	250	76	7.1	Dot signal	2.2	----
12339.0	J3E	250	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.7	----	----	----
	F1B	250	76	6.9	Dot signal	2.2	----
16525.0	J3E	250	76	7.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.4	----	----	----
	F1B	250	76	8.6	Dot signal	2.2	----

Table 2.1.2-1 Test results (AC220V)

RF power output and power amplifier operating parameters (cont'd)

(2/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier Below pep (dB)
22093.0	J3E	250	76	8.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.5	----	----	----
	F1B	250	76	8.6	Dot signal	2.2	----
26175.0	J3E	250	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.9	----	----	----
	F1B	250	76	6.8	Dot signal	2.2	----

Table 2.1.2-2 Test results (AC187V)

RF power output and power amplifier operating parameters

(1/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier below pep (dB)
1619.0	J3E	200	76	6.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.1	----	----	----
	F1B	200	76	7.3	Dot signal	2.2	----
2182.0	J3E	200	76	6.7	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.1	----	----	----
	F1B	200	76	7.2	Dot signal	2.2	----
2187.5	J3E	200	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.4	----	----	----
	F1B	200	76	6.8	Dot signal	2.2	----
2830.0	J3E	200	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.6	----	----	----
	F1B	200	76	6.6	Dot signal	2.2	----
3258.0	J3E	200	76	5.7	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.1	----	----	----
	F1B	200	76	6.0	Dot signal	2.2	----
4112.0	J3E	250	76	7.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.6	----	----	----
	F1B	250	76	7.7	Dot signal	2.2	----
6212.0	J3E	250	76	6.7	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.3	----	----	----
	F1B	250	76	7.5	Dot signal	2.2	----
8238.0	J3E	250	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.9	----	----	----
	F1B	250	76	7.1	Dot signal	2.2	----
12339.0	J3E	250	76	6.0	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.7	----	----	----
	F1B	250	76	6.9	Dot signal	2.2	----
16525.0	J3E	250	76	7.6	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.4	----	----	----
	F1B	250	76	8.5	Dot signal	2.2	----

Table 2.1.2-2 Test results (AC187V)

RF power output and power amplifier operating parameters (cont'd)

(2/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier Below pep (dB)
22093.0	J3E	250	76	8.0	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.6	----	----	----
	F1B	250	76	8.7	Dot signal	2.2	----
26175.0	J3E	250	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.0	----	----	----
	F1B	250	76	6.8	Dot signal	2.2	----

Table 2.1.2-3 Test results (AC253V)

RF power output and power amplifier operating parameters

(1/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier below pep (dB)
1619.0	J3E	200	76	6.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.1	----	----	----
	F1B	200	76	7.3	Dot signal	2.2	----
2182.0	J3E	200	76	6.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	7.2	----	----	----
	F1B	200	76	7.1	Dot signal	2.2	----
2187.5	J3E	200	76	6.0	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.5	----	----	----
	F1B	200	76	6.7	Dot signal	2.2	----
2830.0	J3E	200	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.6	----	----	----
	F1B	200	76	6.5	Dot signal	2.2	----
3258.0	J3E	200	76	5.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.2	----	----	----
	F1B	200	76	6.1	Dot signal	2.2	----
4112.0	J3E	250	76	7.0	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.5	----	----	----
	F1B	250	76	7.6	Dot signal	2.2	----
6212.0	J3E	250	76	6.5	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.3	----	----	----
	F1B	250	76	7.5	Dot signal	2.2	----
8238.0	J3E	250	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	7.1	----	----	----
	F1B	250	76	7.1	Dot signal	2.2	----
12339.0	J3E	250	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.7	----	----	----
	F1B	250	76	6.9	Dot signal	2.2	----
16525.0	J3E	250	76	7.8	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.3	----	----	----
	F1B	250	76	8.5	Dot signal	2.2	----

Table 2.1.2-3 Test results (AC253V)

RF power output and power amplifier operating parameters (cont'd)

(2/2)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier Below pep (dB)
22093.0	J3E	250	76	8.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	8.6	----	----	----
	F1B	250	76	8.7	Dot signal	2.2	----
26175.0	J3E	250	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	250	76	6.8	----	----	----
	F1B	250	76	6.7	Dot signal	2.2	----

Table 2.1.2-4 Test results (DC24V)

RF power output and power amplifier operating parameters

(1/1)

Frequency (kHz)	Emission	Output (W)	Final Voltage (V)	Final Current (A)	Modulation	Modulation Level (Vpep)	Carrier Below pep (dB)
2182.0	J3E	200	76	6.2	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.7	----	----	----
	F1B	200	76	6.8	Dot signal	2.2	----
2187.5	J3E	200	76	6.1	2-Tone	0.03	----
		0	78	0.8	None	----	-70
	A1A	200	76	6.6	----	----	----
	F1B	200	76	6.8	Dot signal	2.2	----

2.2 Modulation characteristics

2.2.1 Frequency response of audio modulating circuit [FCC § 2.1047(a)]

2.2.1.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.2.1.1-1.

An audio oscillator was used to drive the JSS-296 (JSB-196GM) handset input. The output signal of the MIC amplifier varied from 60Hz to 10kHz was measured with the audio spectrum analyzer.

2.2.1.2 Test results

Test results are shown in Table 2.2.1.2-1 and Fig. 2.2.1.2-1.

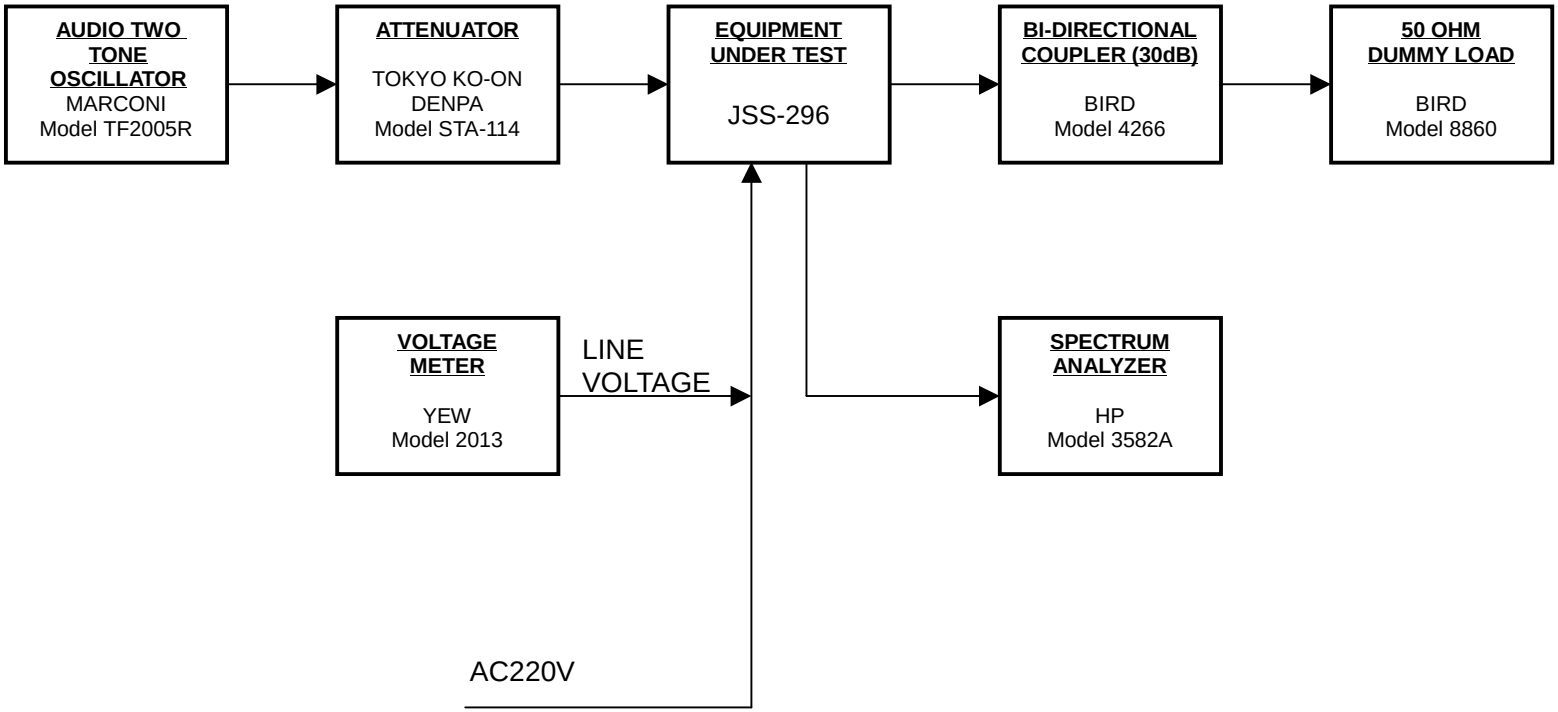
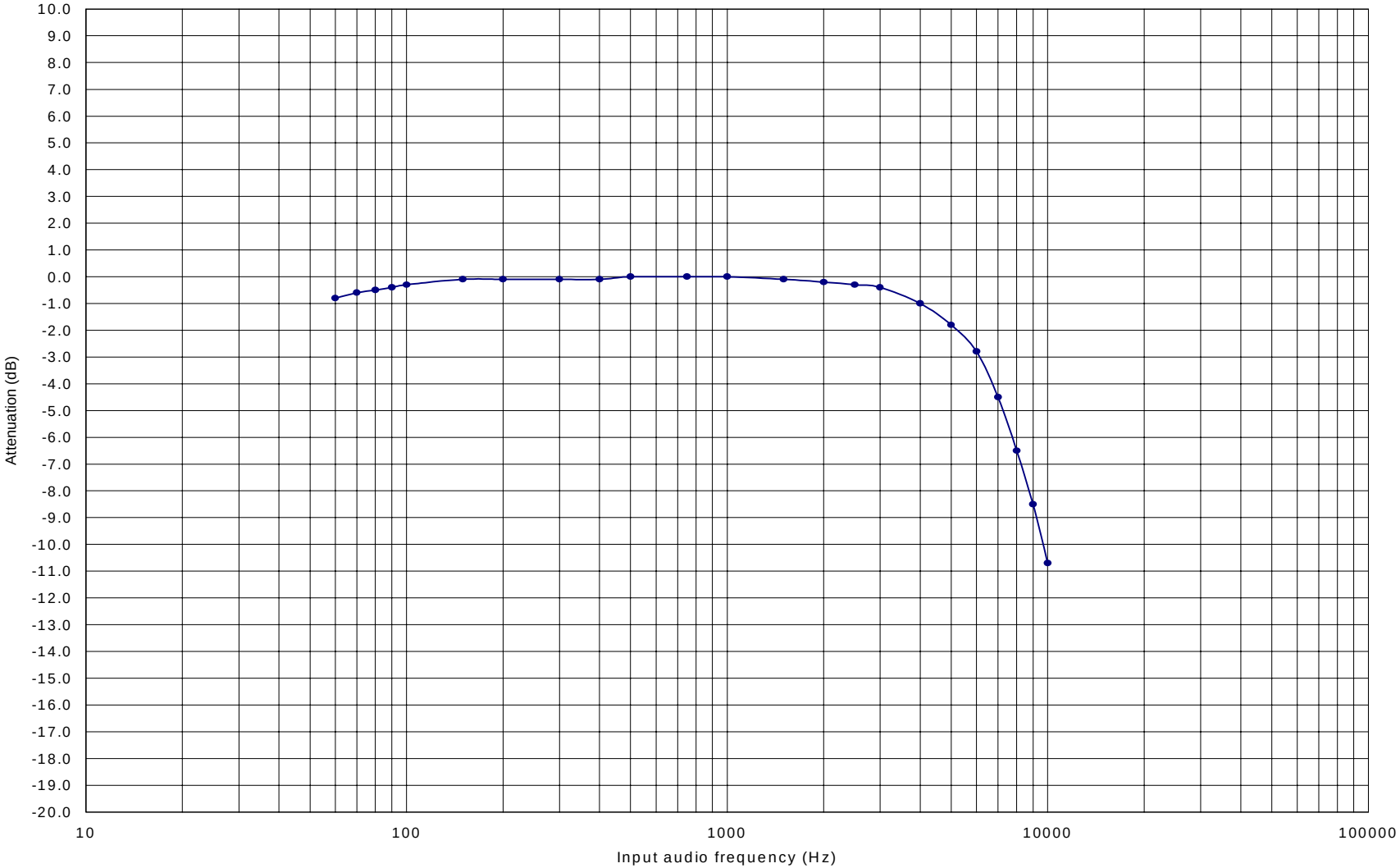


Fig. 2.2.1.1-1 Test set up for Frequency response of audio modulating circuit

Table 2.2.1.2-1 Frequency response of audio modulating circuit

Input Audio oscillator frequency (Hz)	Attenuation (dB)
60	-0.8
70	-0.6
80	-0.5
90	-0.4
100	-0.3
150	-0.1
200	-0.1
300	-0.1
400	-0.1
500	0.0
750	0.0
1000	0.0
1500	-0.1
2000	-0.2
2500	-0.3
3000	-0.4
4000	-1.0
5000	-1.8
6000	-2.8
7000	-4.5
8000	-6.5
9000	-8.5
10000	-10.7

Fig. 2.2.1.2-1 Frequency response of audio modulating circuit



2.2.2 Modulation limiting characteristics
[FCC §2.1047(b), §80.213(a)(3)]

2.2.2.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.2.2.1-1.

The modulation in J3E mode was signals of 400Hz and 1800Hz adjusted to produce equal output power.

The audio output voltage was measured with the oscilloscope, and the RF output power was measured with the oscilloscope.

2.2.2.2 Test results

Test results is shown in Table 2.2.2.2-1 and Fig. 2.2.2.2-1.

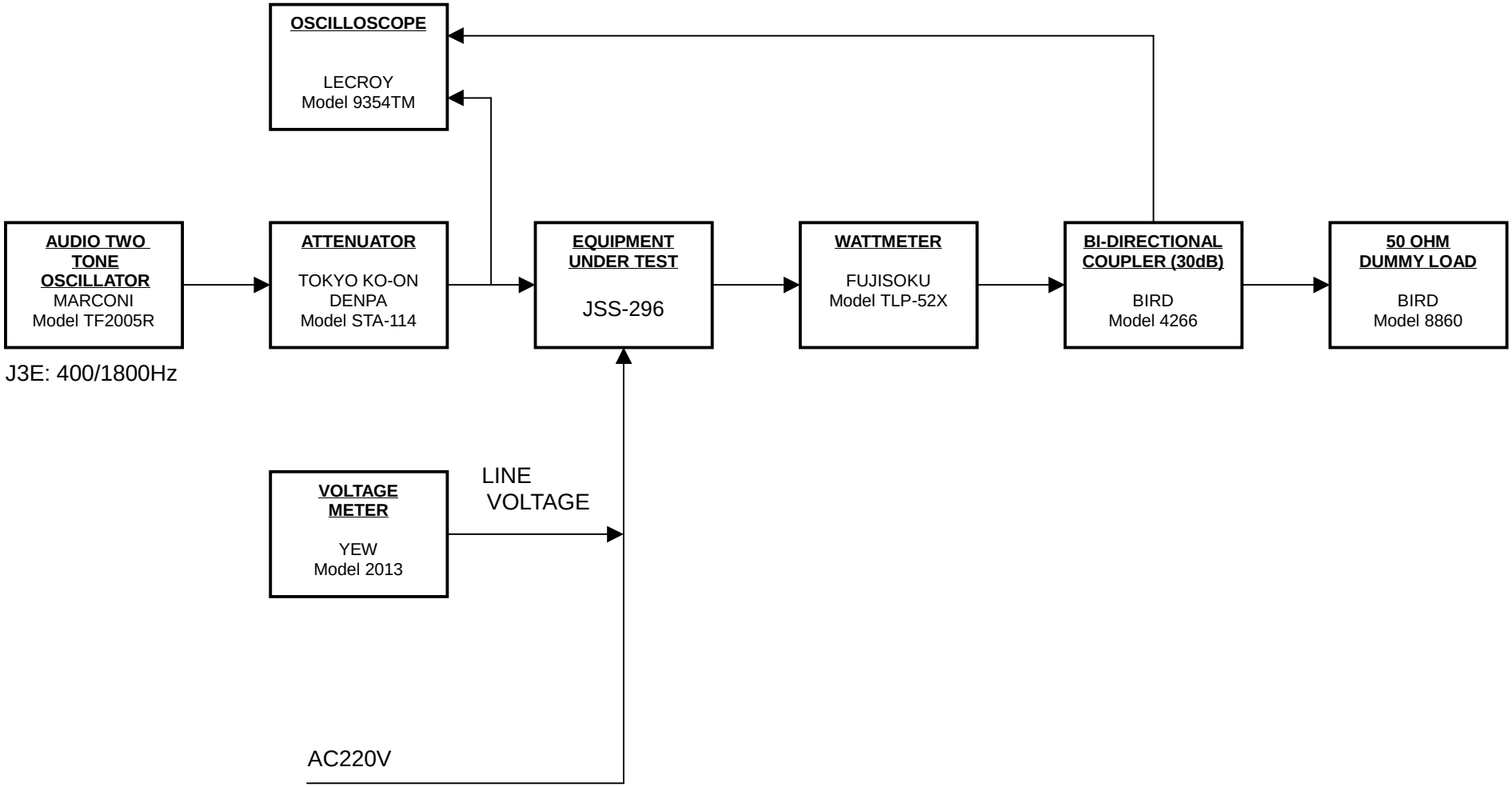


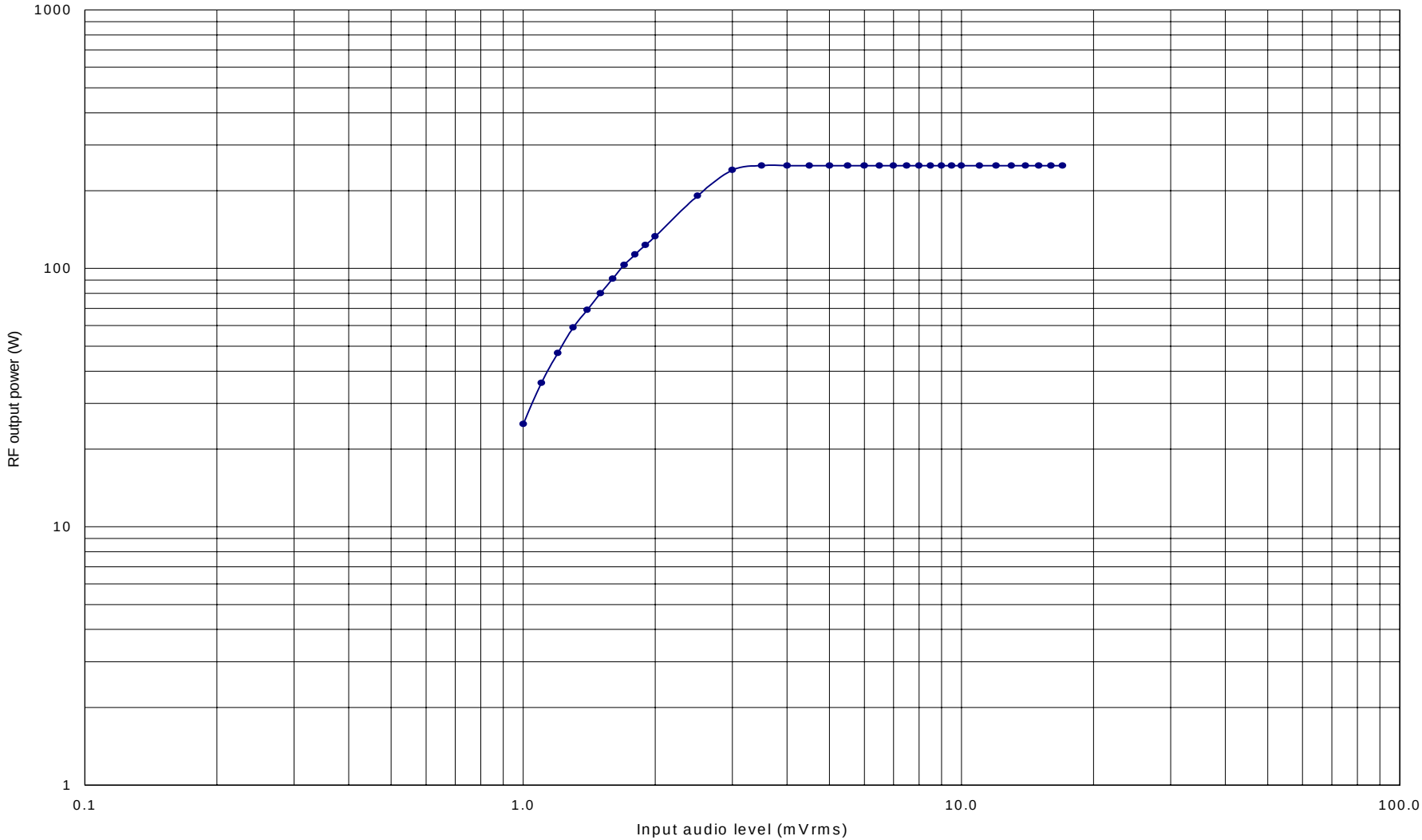
Fig. 2.2.2.1-1 Test set up for Modulation limiting characteristics

Table 2.2.2.2-1 Modulation limiting characteristics

Test frequency: 2182.0kHz
Mode: J3E
Line voltage: AC220V

Input level (mVrms)	RF output power (Wpep)
1.0	25
1.1	36
1.2	47
1.3	59
1.4	69
1.5	80
1.6	91
1.7	103
1.8	113
1.9	123
2.0	133
2.5	180
3.0	250
3.5	250
4.0	250
4.5	250
5.0	250
5.5	250
6.0	250
6.5	250
7.0	250
7.5	250
8.0	250
8.5	250
9.0	250
9.5	250
10.0	250
11.0	250
12.0	250
13.0	250
14.0	250
15.0	250
16.0	250
17.0	250

Fig. 2.2.2.2-1 Modulation limiting characteristics
Test frequency: 2182.0kHz
Mode: J3E



2.2.3 Overall transmitter audio frequency response [FCC § 2.1047(c), 80.211(a)]

2.2.3.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.2.3.1-1.

The overall transmitter audio response curve includes the audio response of the complete transmitter from handset input to power output. The level of test signal varied from 50Hz to 10kHz adjusted so that the output power at the peak response characteristic was 10dB below the rated output power. The peak response was measured with the spectrum analyzer.

2.2.3.2 Test results

Test results are shown in Table 2.2.3.2-1 and Fig. 2.2.3.2-1.

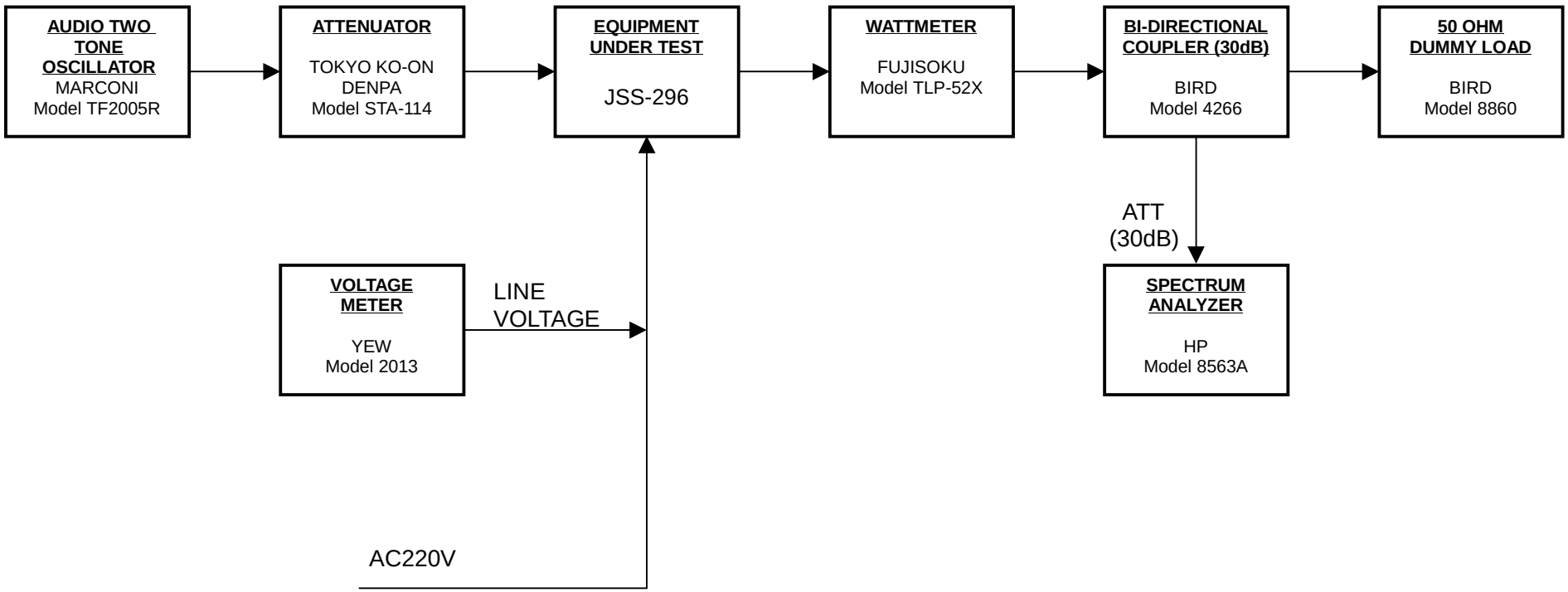
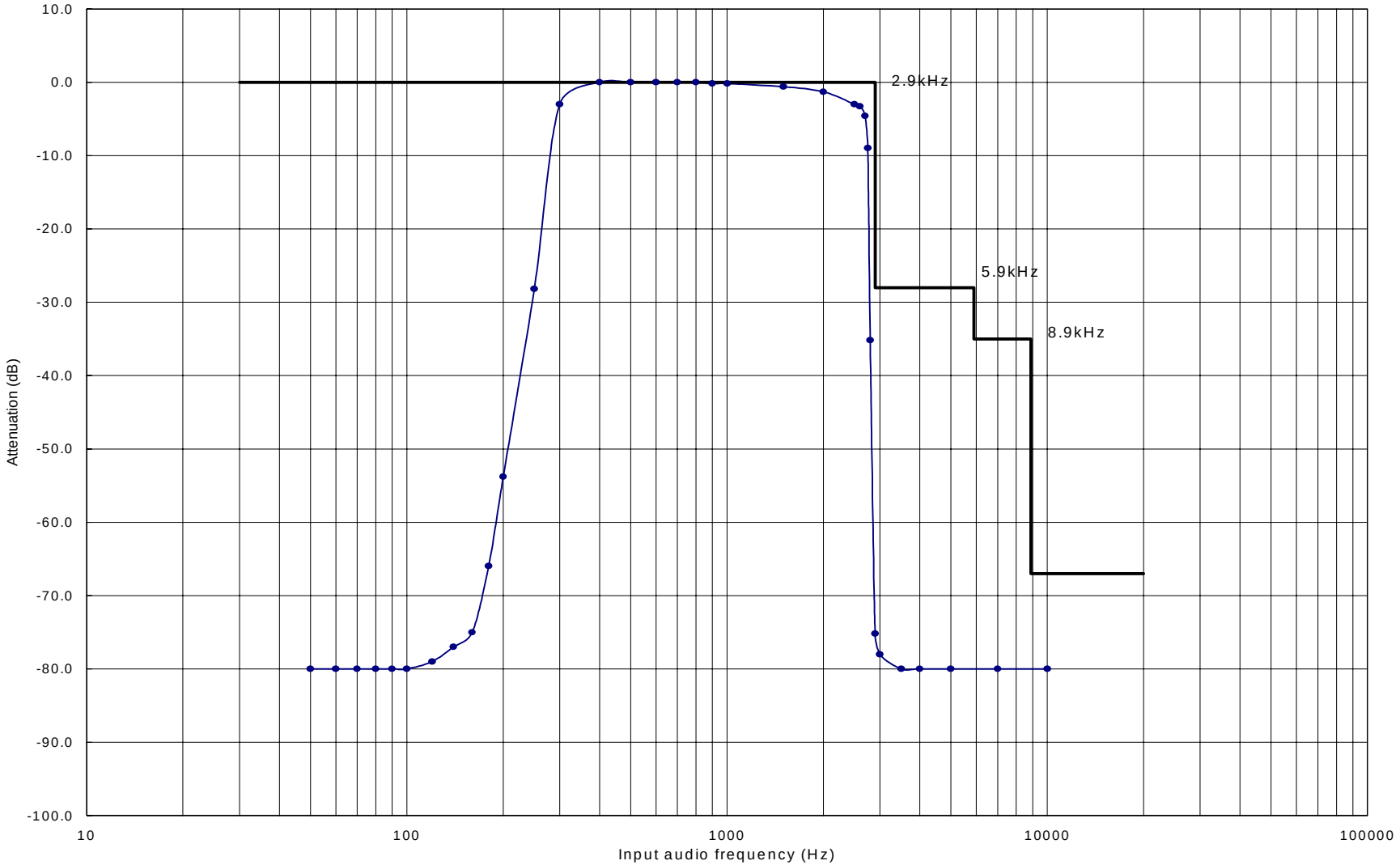


Fig. 2.2.3.1-1 Test set up for Overall transmitter audio frequency response

Table 2.2.3.2-1 Overall transmitter audio frequency response

Input Audio oscillator frequency (Hz)	Attenuation (dB)
50	-80.0
60	-80.0
70	-80.0
80	-80.0
90	-80.0
100	-80.0
120	-79.0
140	-77.0
160	-75.0
180	-66.0
200	-53.8
250	-28.2
300	-3.0
400	0.0
500	0.0
600	0.0
700	0.0
800	0.0
900	-0.2
1000	-0.2
1500	-0.6
2000	-1.3
2500	-3.0
2600	-3.3
2700	-4.6
2750	-9.0
2800	-35.2
2900	-75.2
3000	-78.0
3500	-80.0
4000	-80.0
5000	-80.0
7000	-80.0
10000	-80.0

Fig. 2.2.3.2-1 Overall transmitter audio frequency response



2.3 Occupied bandwidth

[FCC § 2.1049(a),(c)(2), § 80.205(a), § 80.211(a),(f)]

2.3.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.3.1-1.

The transmitter was modulated with signals of 400Hz and 1800Hz for J3E mode, with 16 dots per second for A1A mode, with continuous dot pattern for F1B mode.

The J3E modulation level was shown in Fig. 2.2.2.2-1 of the Modulation limiting characteristics. The J3E audio input level was constant at 10dB over the rated output power as per § 2.1047(c). The spectrum analyzer was adjusted so that mean power was at the 0dB reference.

The equipment was tested on each of marine bands in the transmitter frequency range with J3E, A1A and F1B modes, on the 2MHz marine band at two frequencies with J3E, A1A and F1B modes.

2.3.2 Test results

Test results are shown from Fig. 2.3.2-1 to Fig. 2.3.2-36.

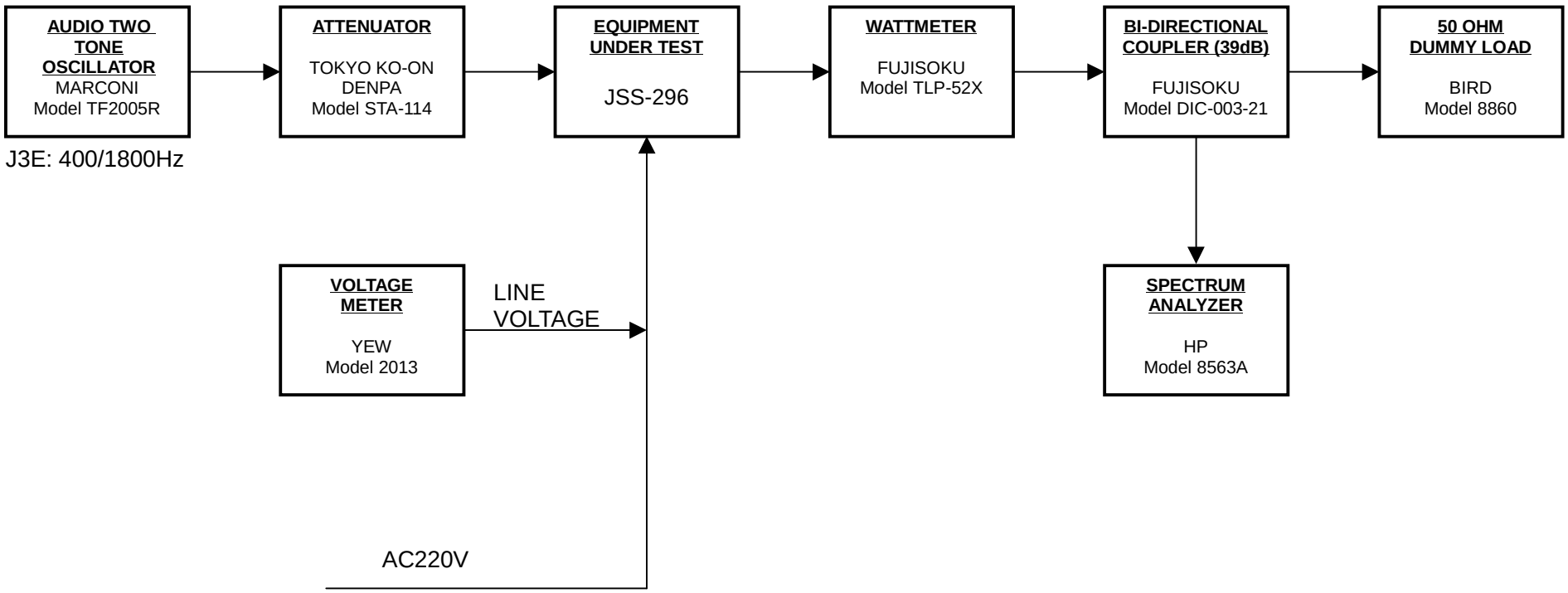


Fig. 2.3.1-1 Test set up for Occupied bandwidth

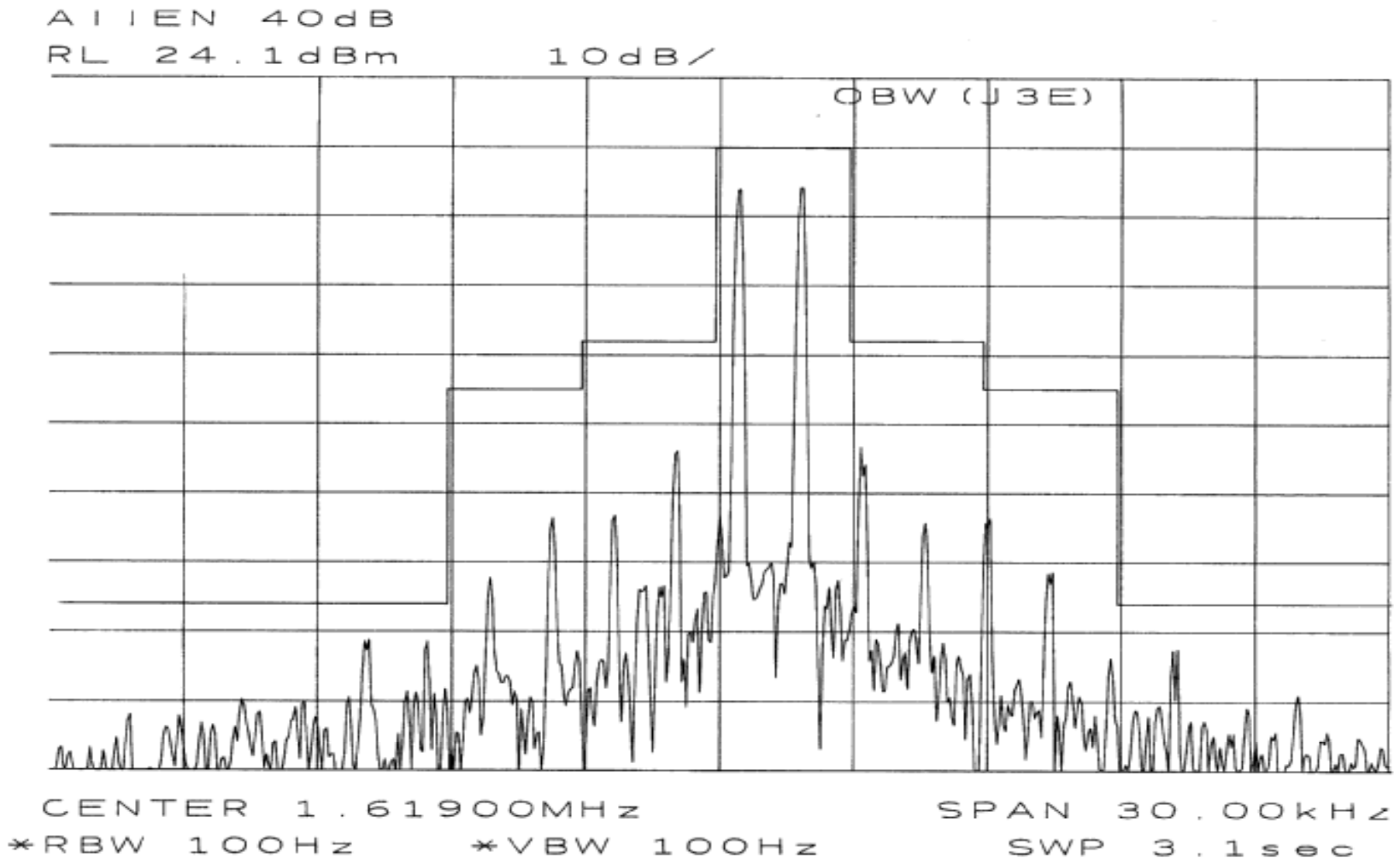


Fig. 2.3.2-1 Occupied bandwidth

Frequency: 1619.0kHz
Mode: J3E
Line Voltage: AC220V

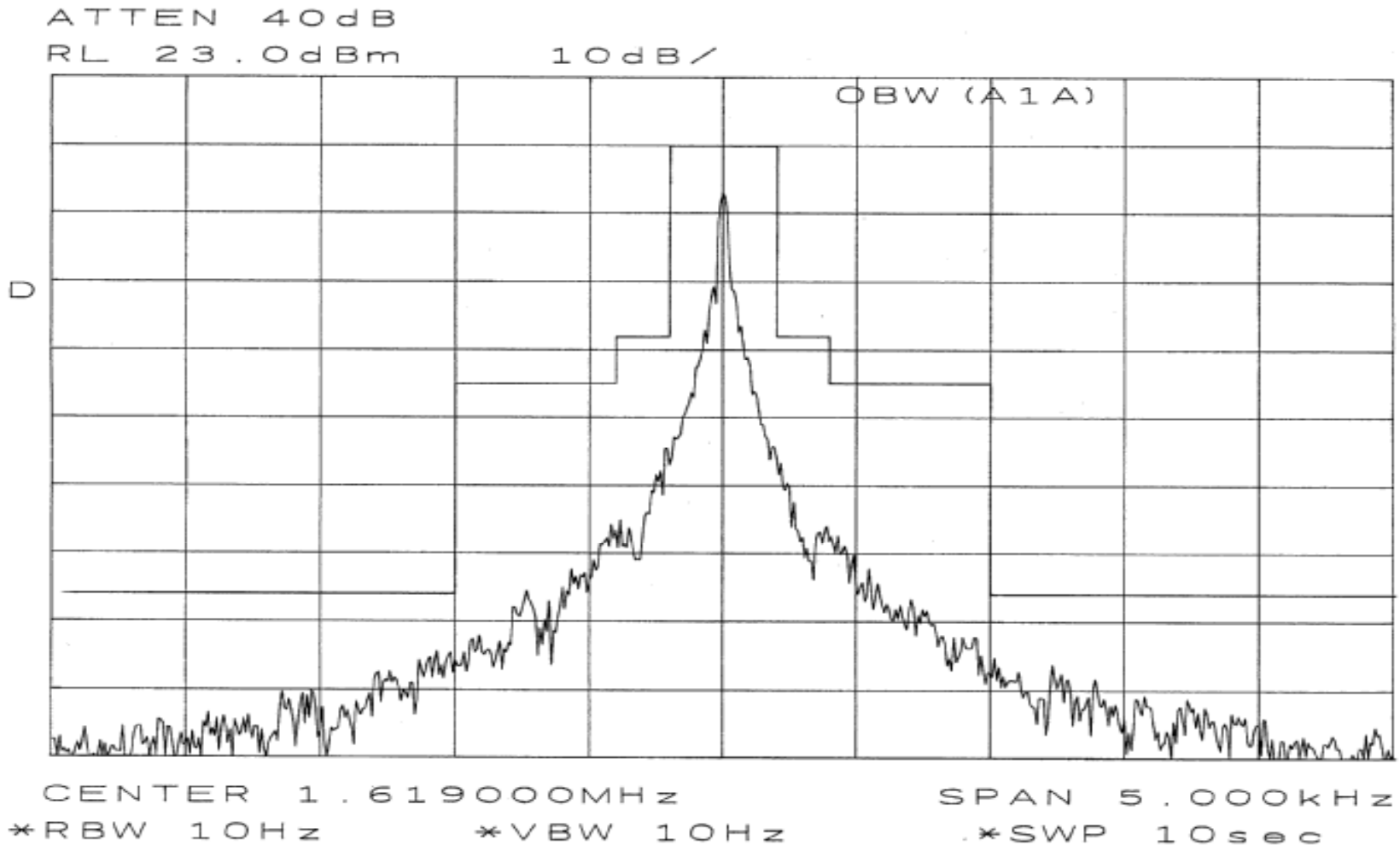


Fig. 2.3.2-2 Occupied bandwidth

Frequency: 1619.0kHz
Mode: A1A
Line Voltage: AC220V

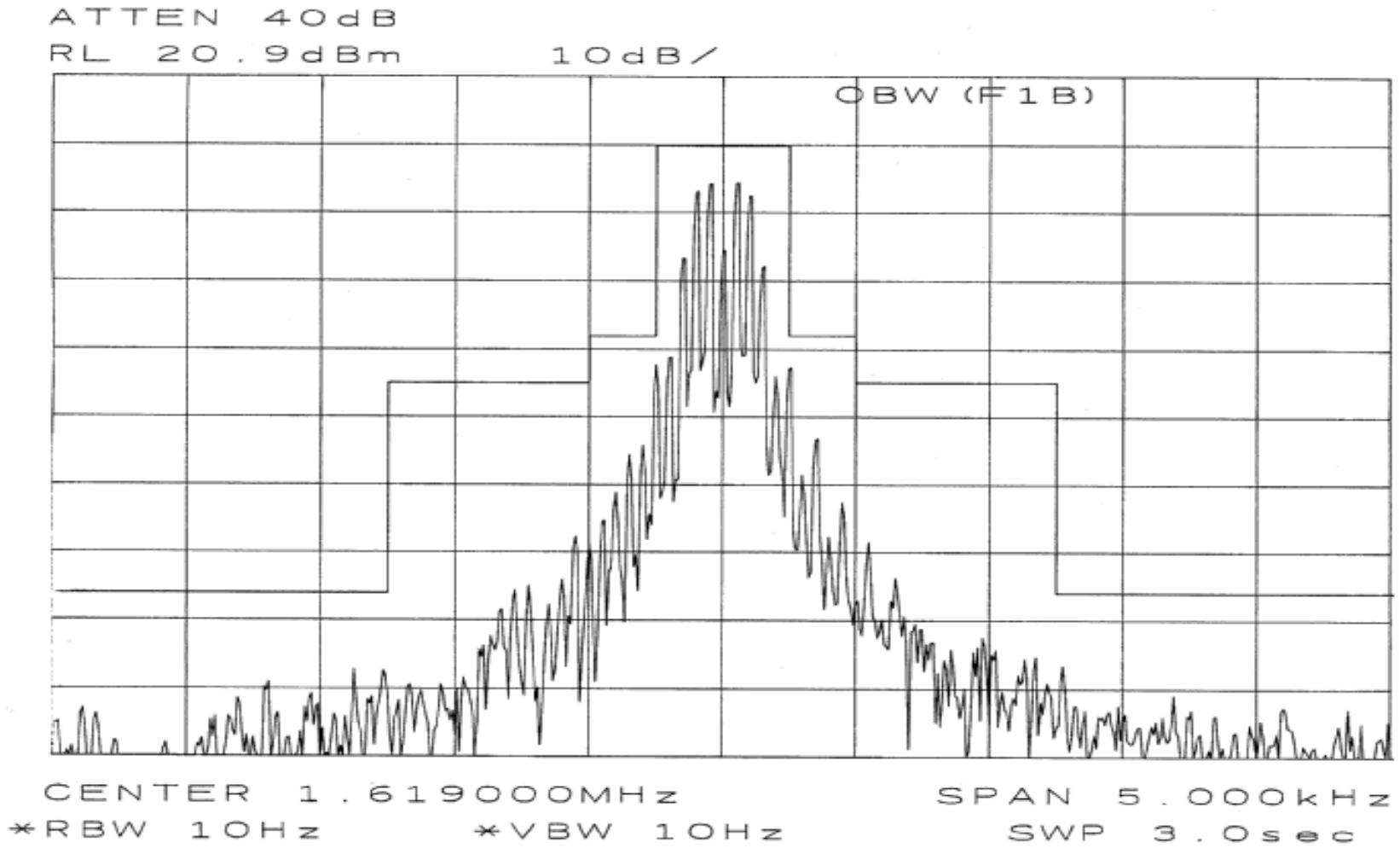


Fig. 2.3.2-3 Occupied bandwidth

Frequency: 1619.0kHz
Mode: F1B
Line Voltage: AC220V

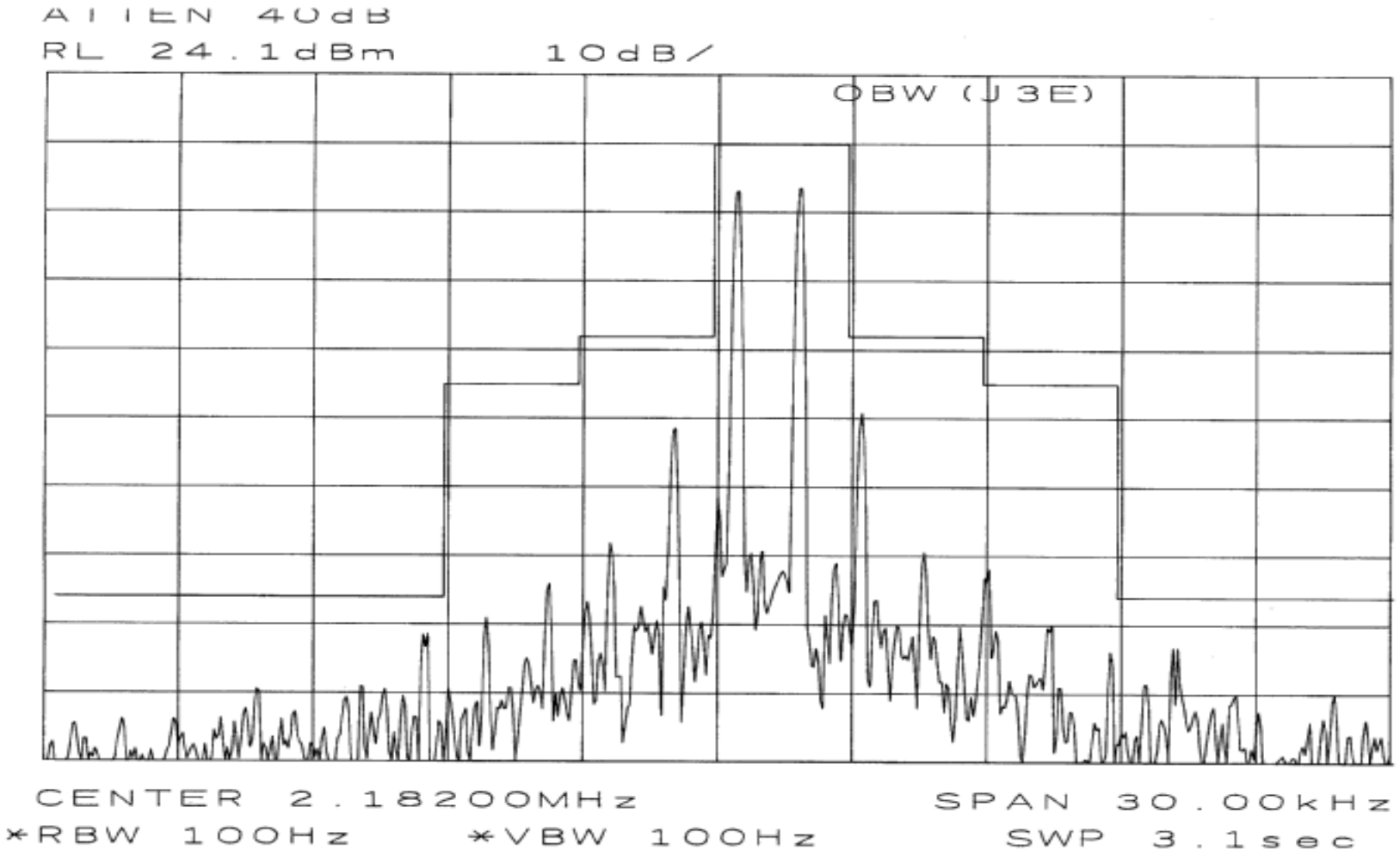


Fig. 2.3.2-4 Occupied bandwidth

Frequency: 2182.0kHz
Mode: J3E
Line Voltage: AC220V

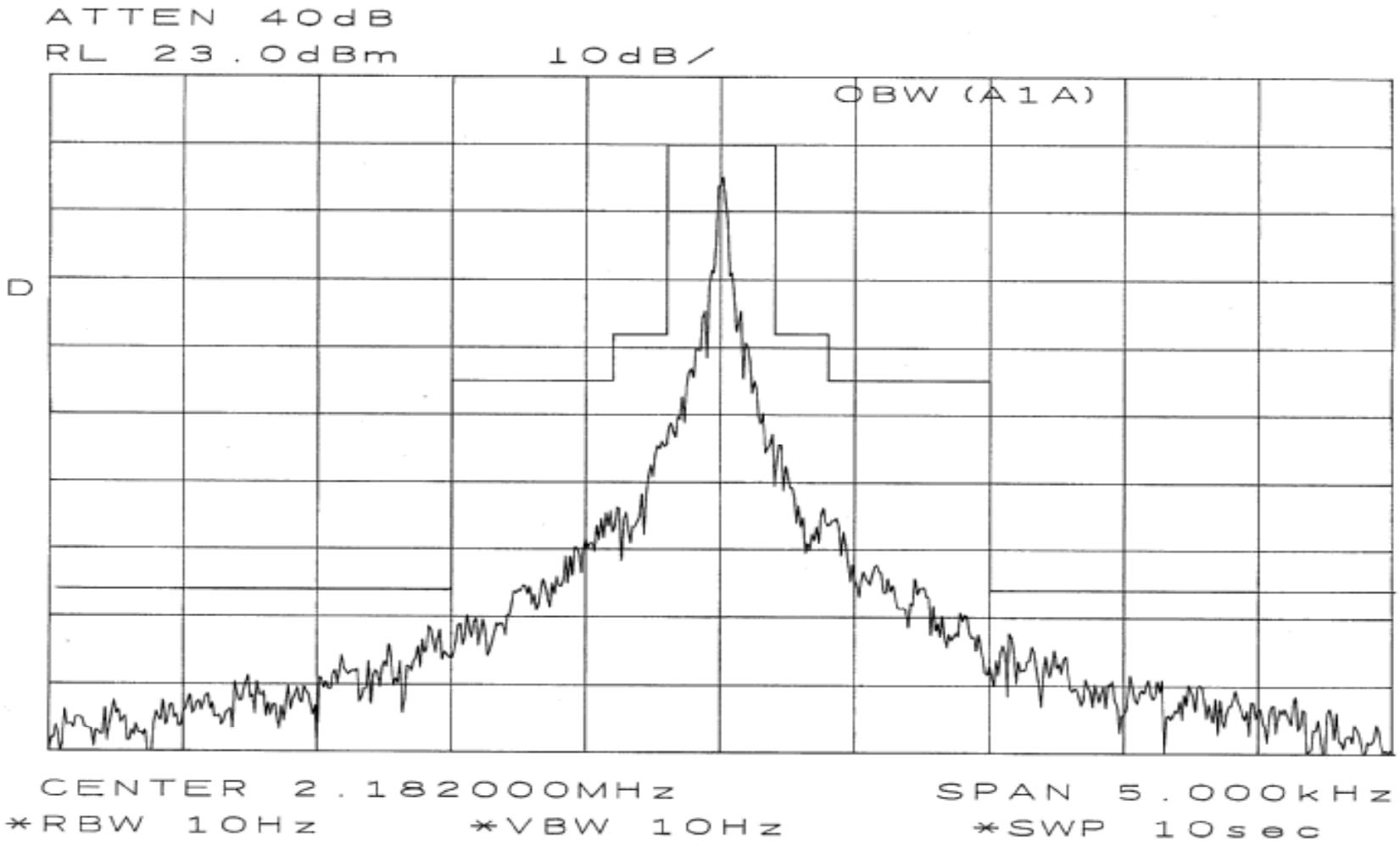


Fig. 2.3.2-5 Occupied bandwidth

Frequency: 2182.0kHz
Mode: A1A
Line Voltage: AC220V

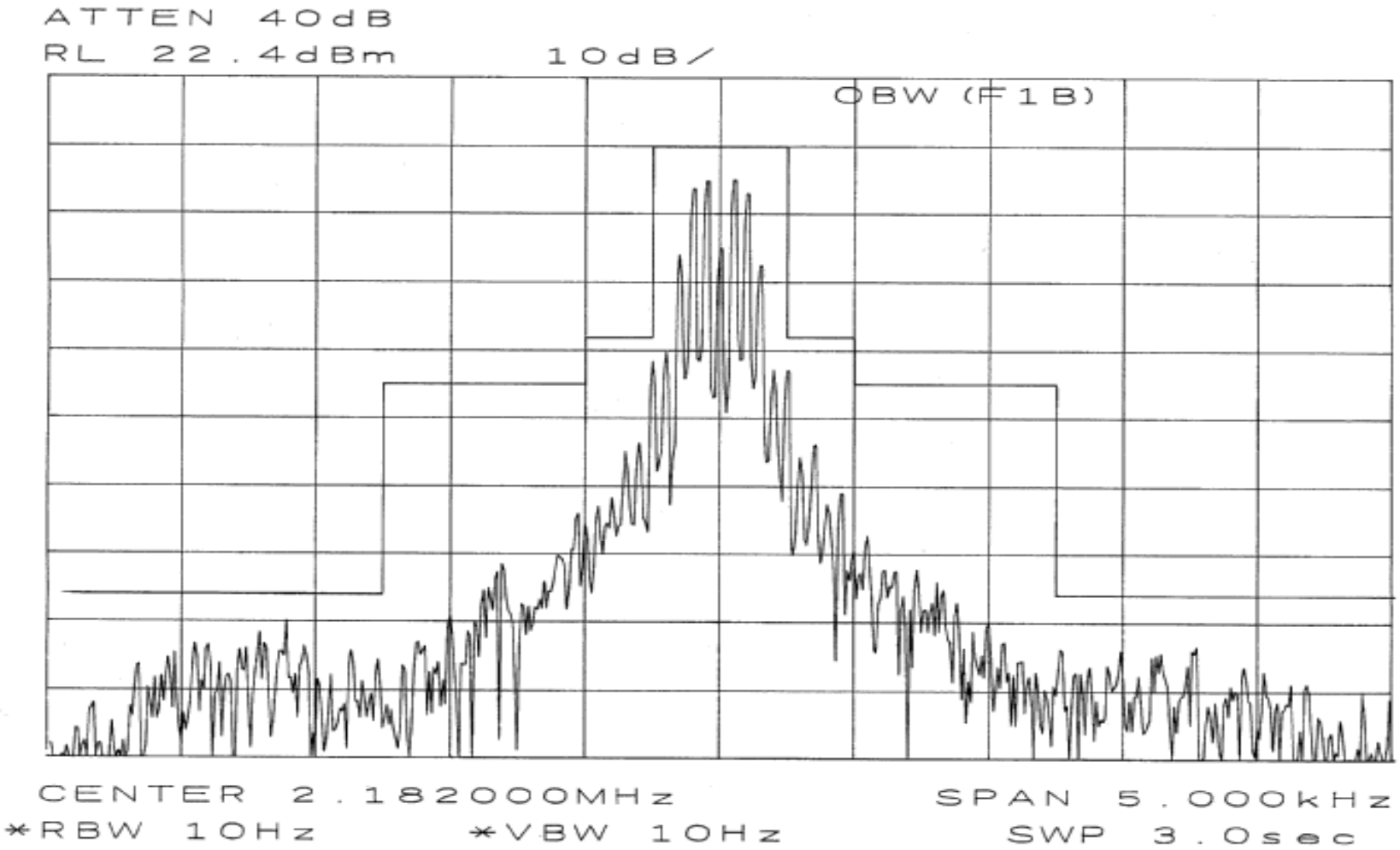


Fig. 2.3.2-6 Occupied bandwidth

Frequency: 2182.0kHz
Mode: F1B
Line Voltage: AC220V

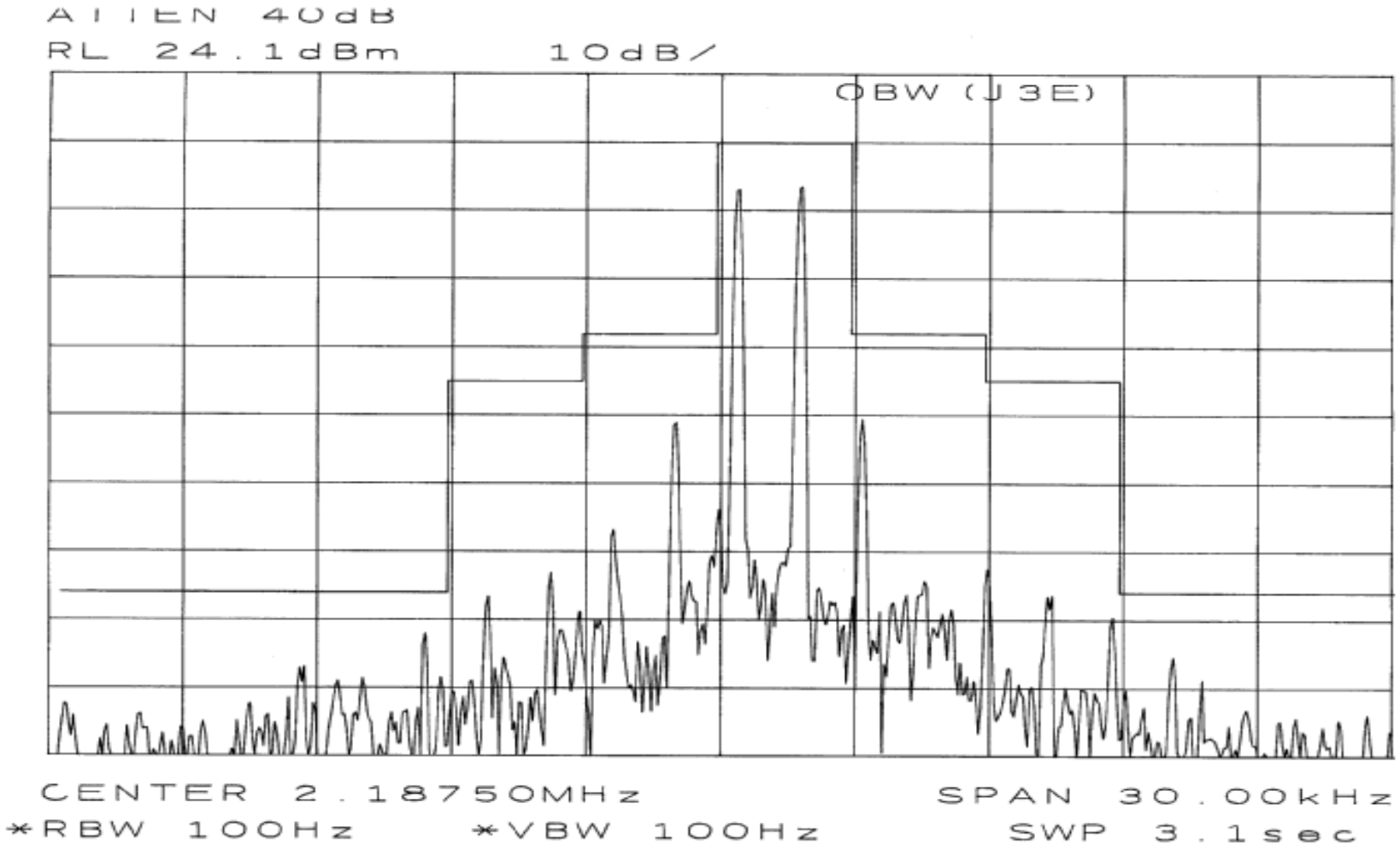


Fig. 2.3.2-7 Occupied bandwidth

Frequency: 2187.5kHz
Mode: J3E
Line Voltage: AC220V

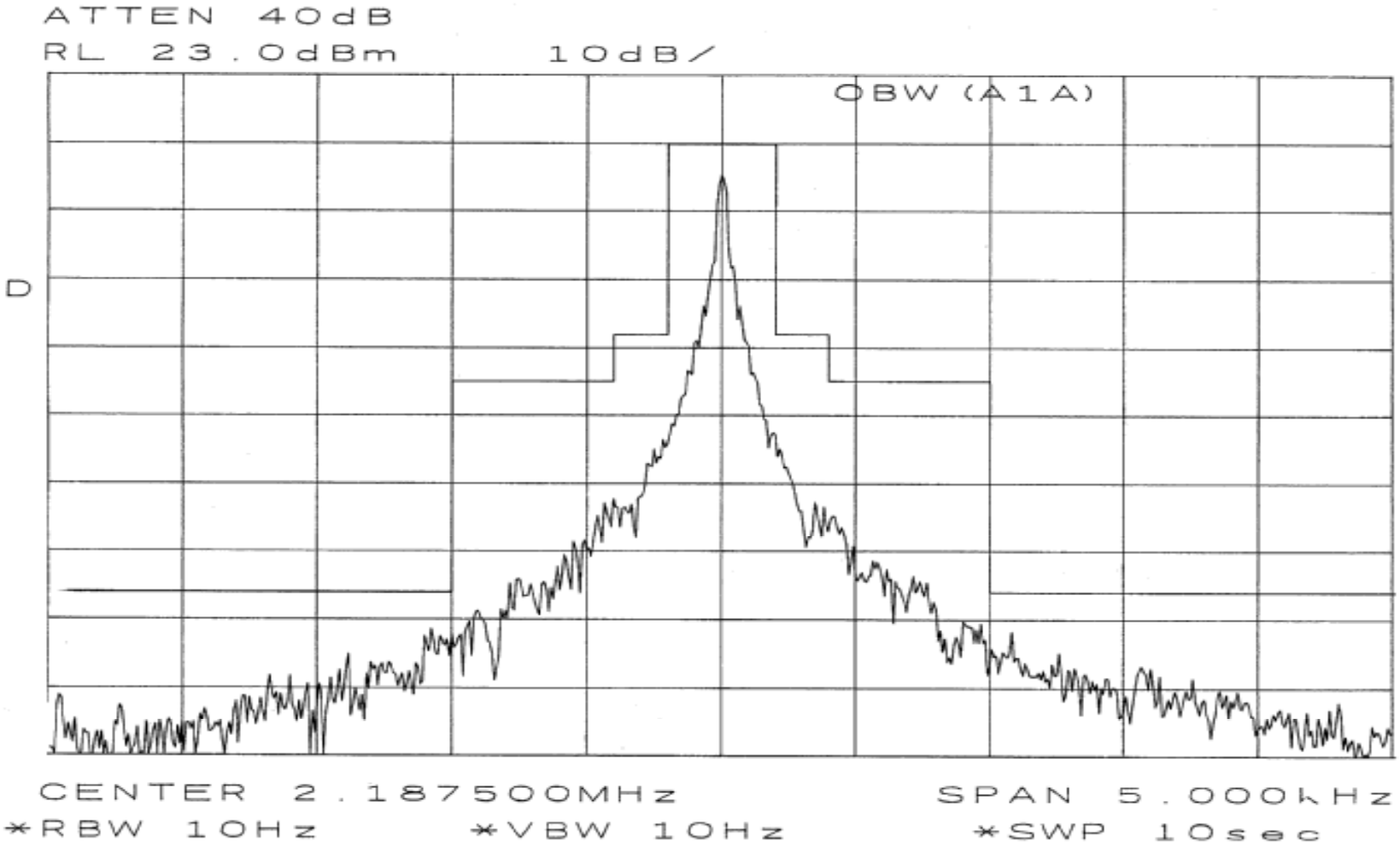


Fig. 2.3.2-8 Occupied bandwidth

Frequency: 2187.5kHz
Mode: A1A
Line Voltage: AC220V

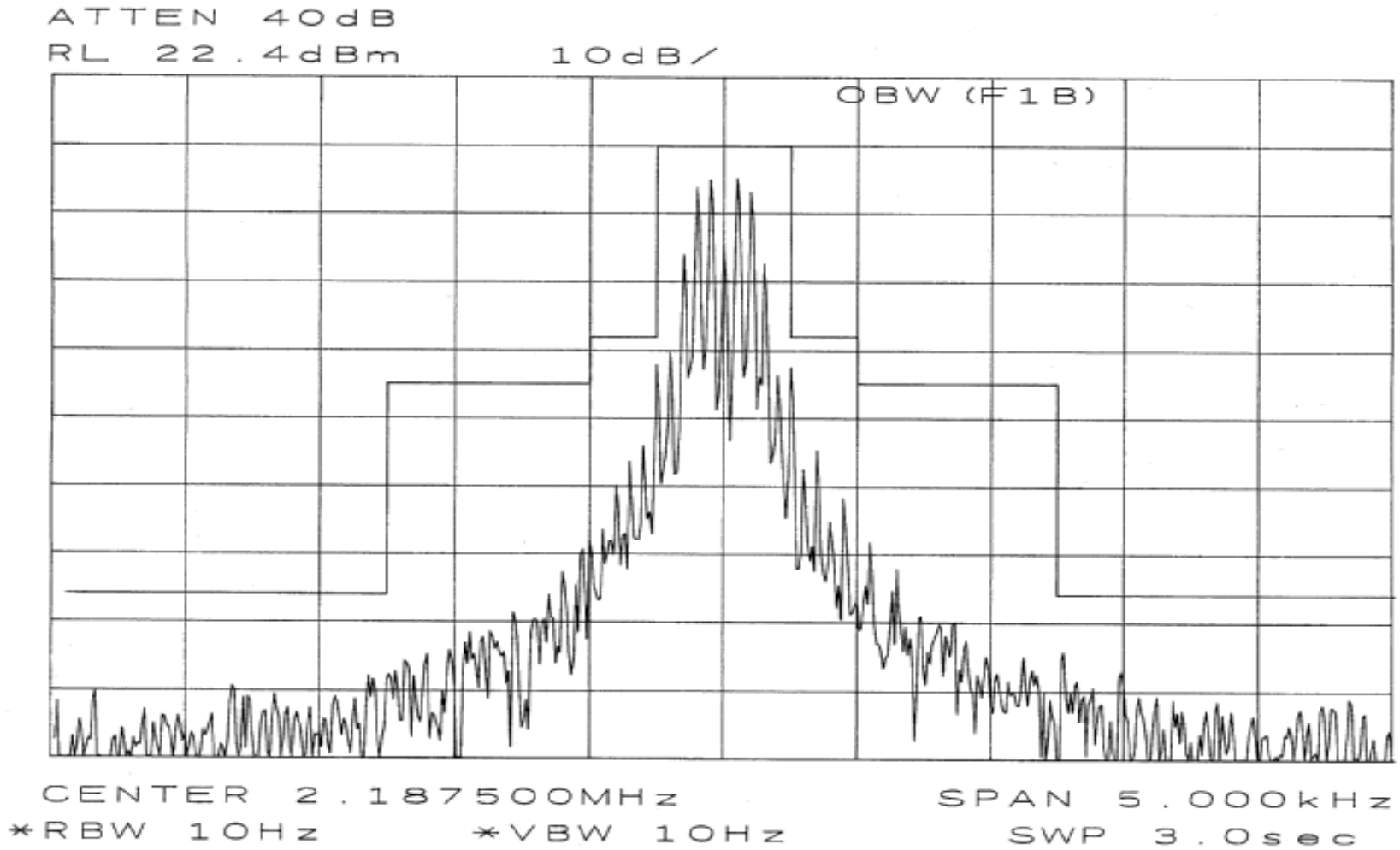


Fig. 2.3.2-9 Occupied bandwidth

Frequency: 2187.5kHz
Mode: F1B
Line Voltage: AC220V

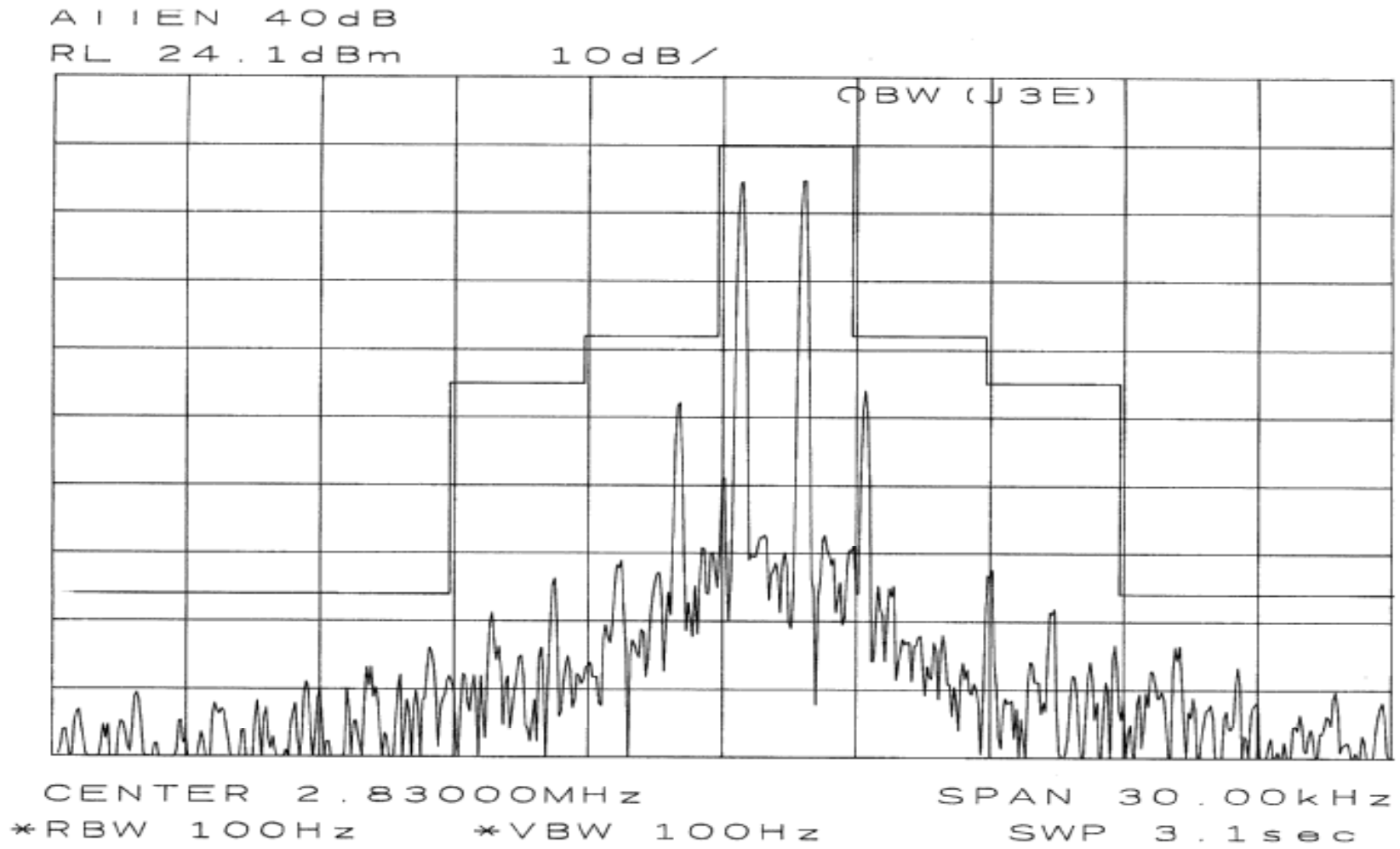


Fig. 2.3.2-10 Occupied bandwidth

Frequency: 2830.0kHz
Mode: J3E
Line Voltage: AC220V

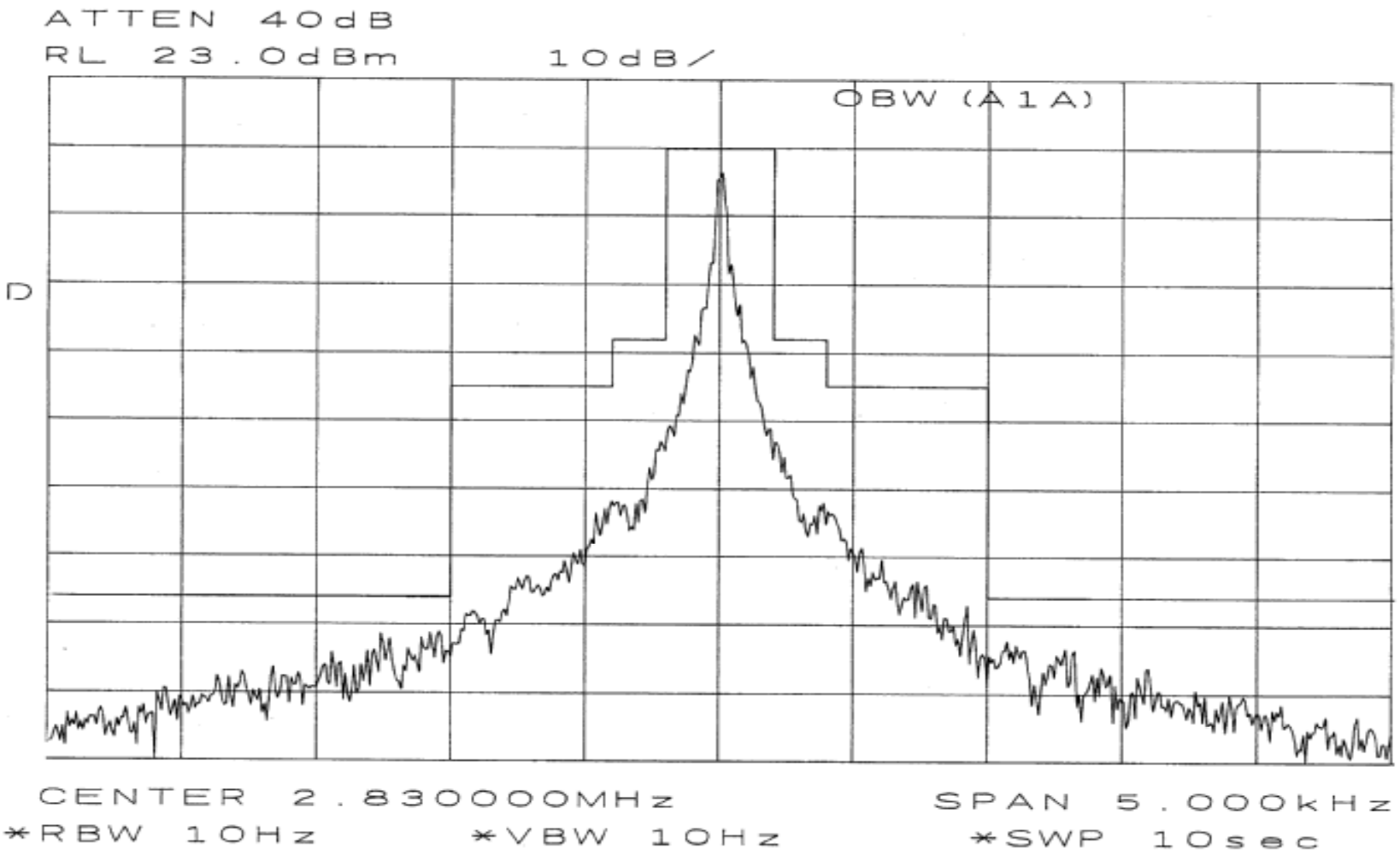


Fig. 2.3.2-11 Occupied bandwidth

Frequency: 2830.0kHz
Mode: A1A
Line Voltage: AC220V

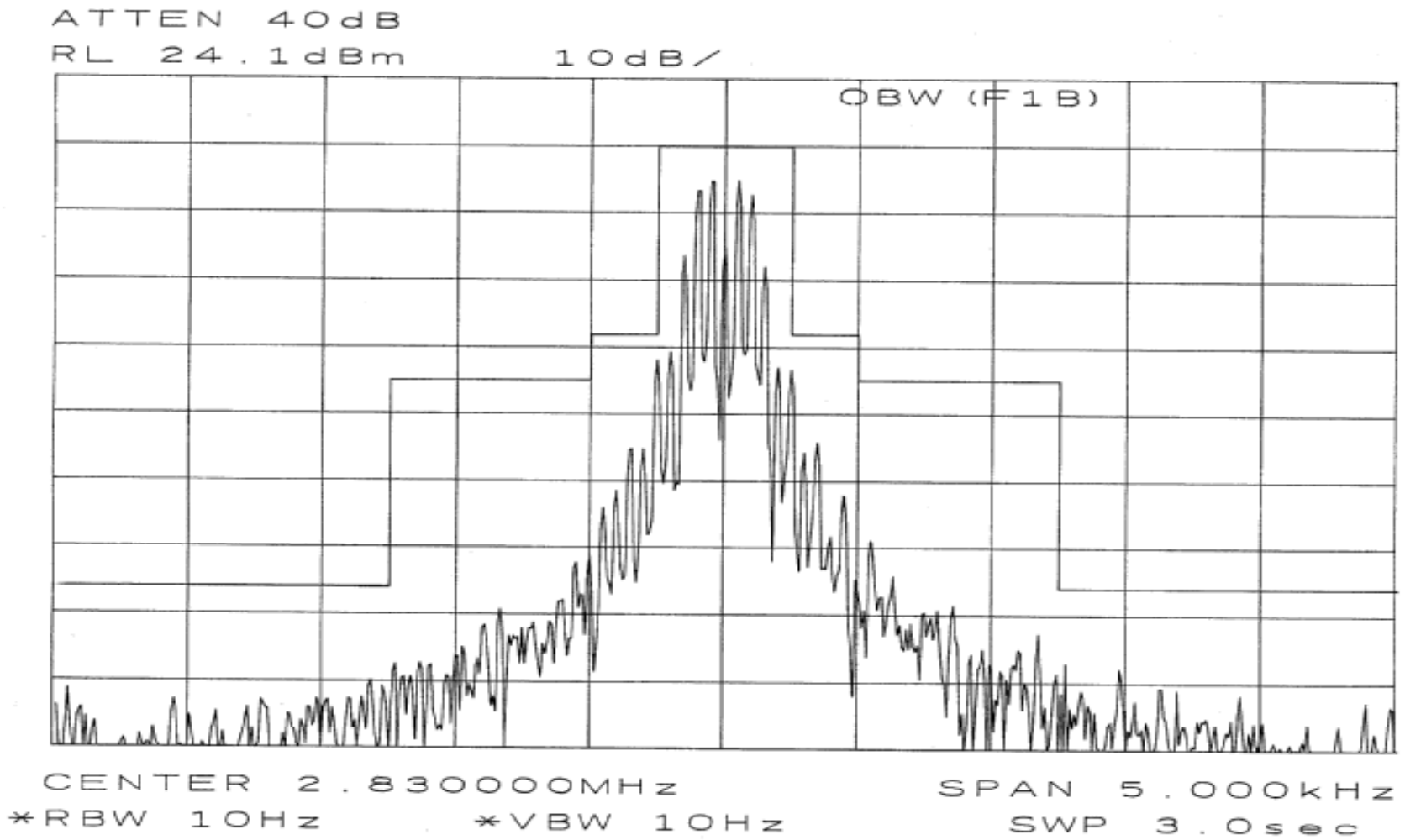


Fig. 2.3.2-12 Occupied bandwidth

Frequency: 2830.0kHz
Mode: F1B
Line Voltage: AC220V

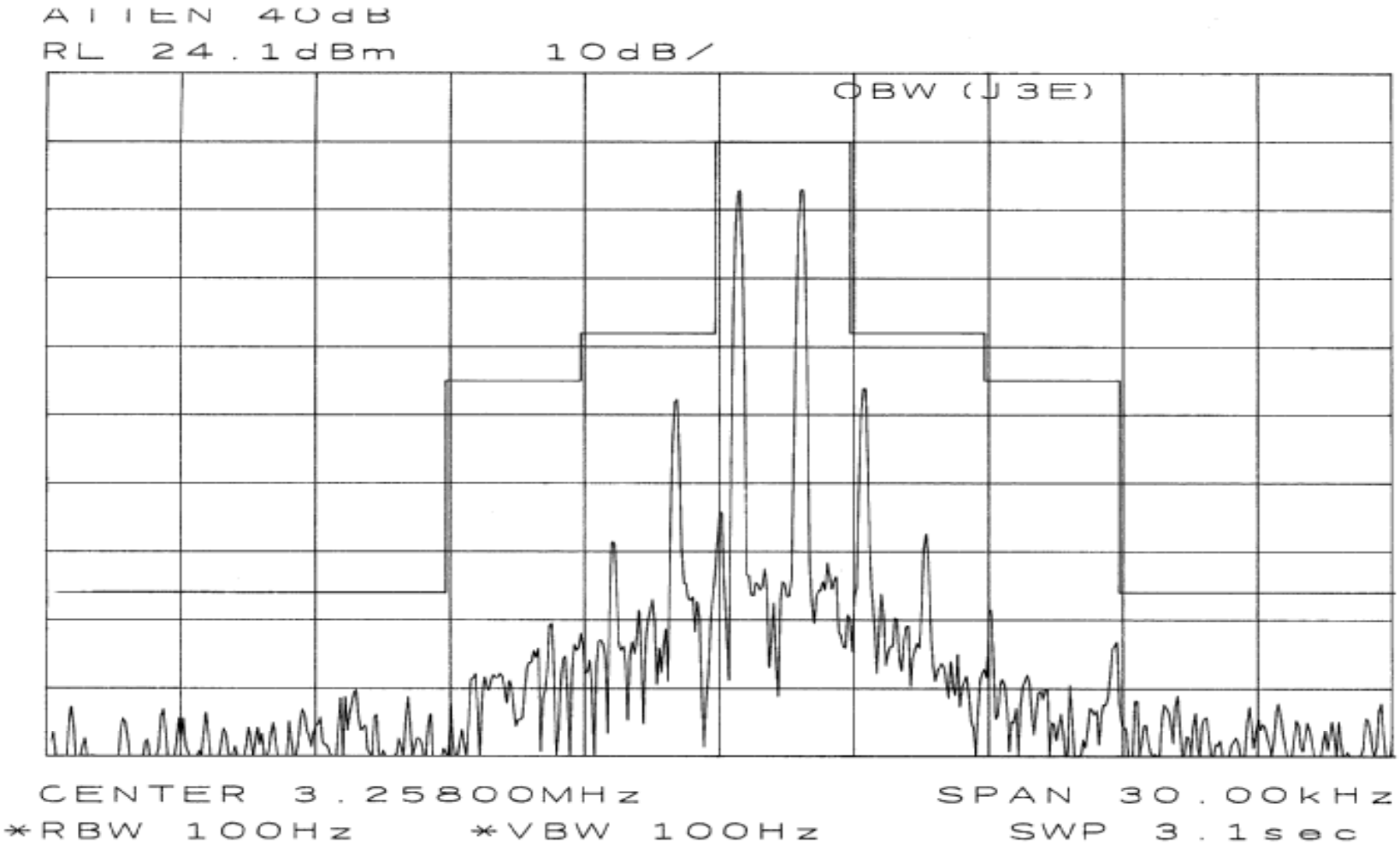


Fig. 2.3.2-13 Occupied bandwidth

Frequency: 3258.0kHz
Mode: J3E
Line Voltage: AC220V

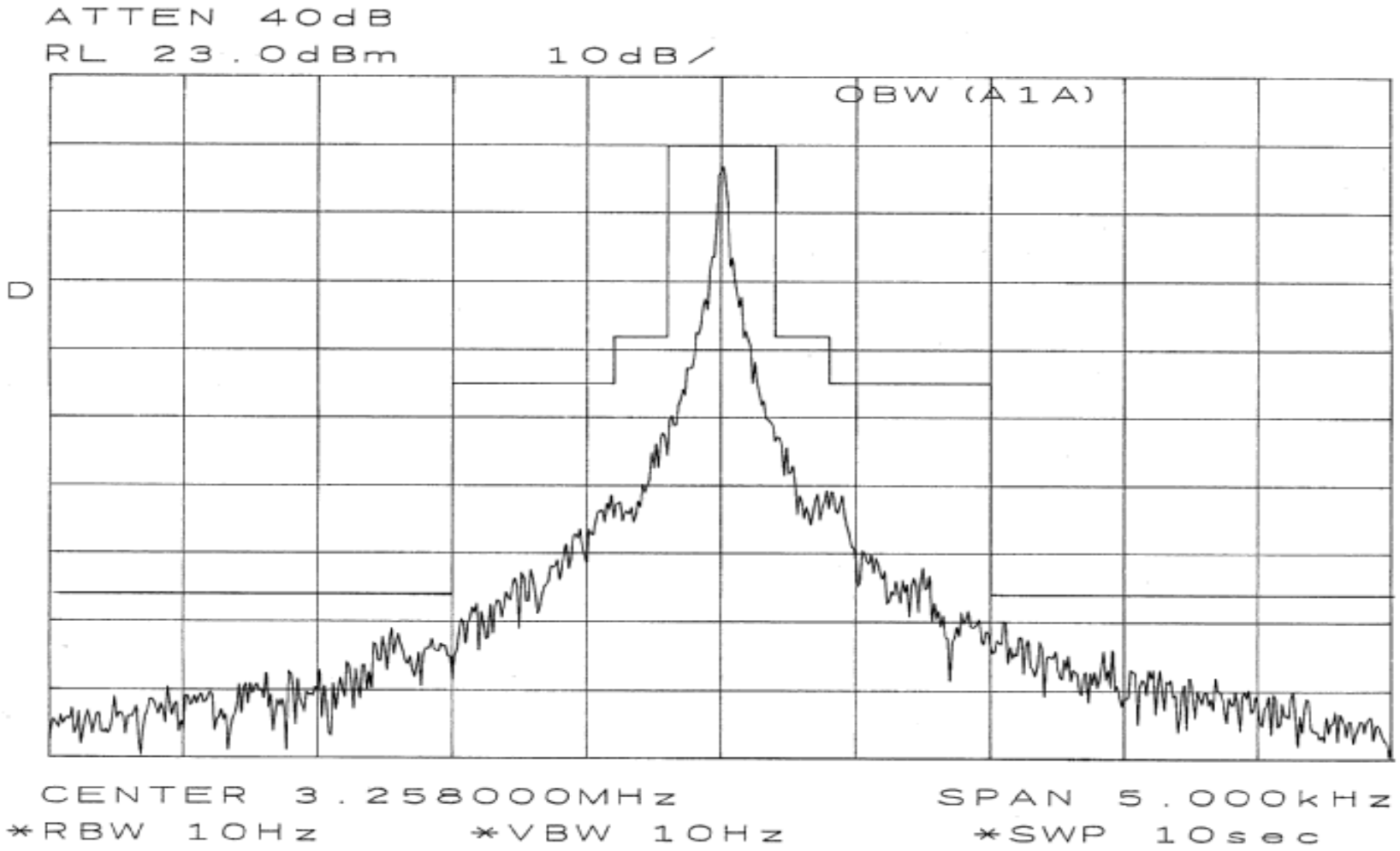


Fig. 2.3.2-14 Occupied bandwidth

Frequency: 3258.0kHz
Mode: A1A
Line Voltage: AC220V

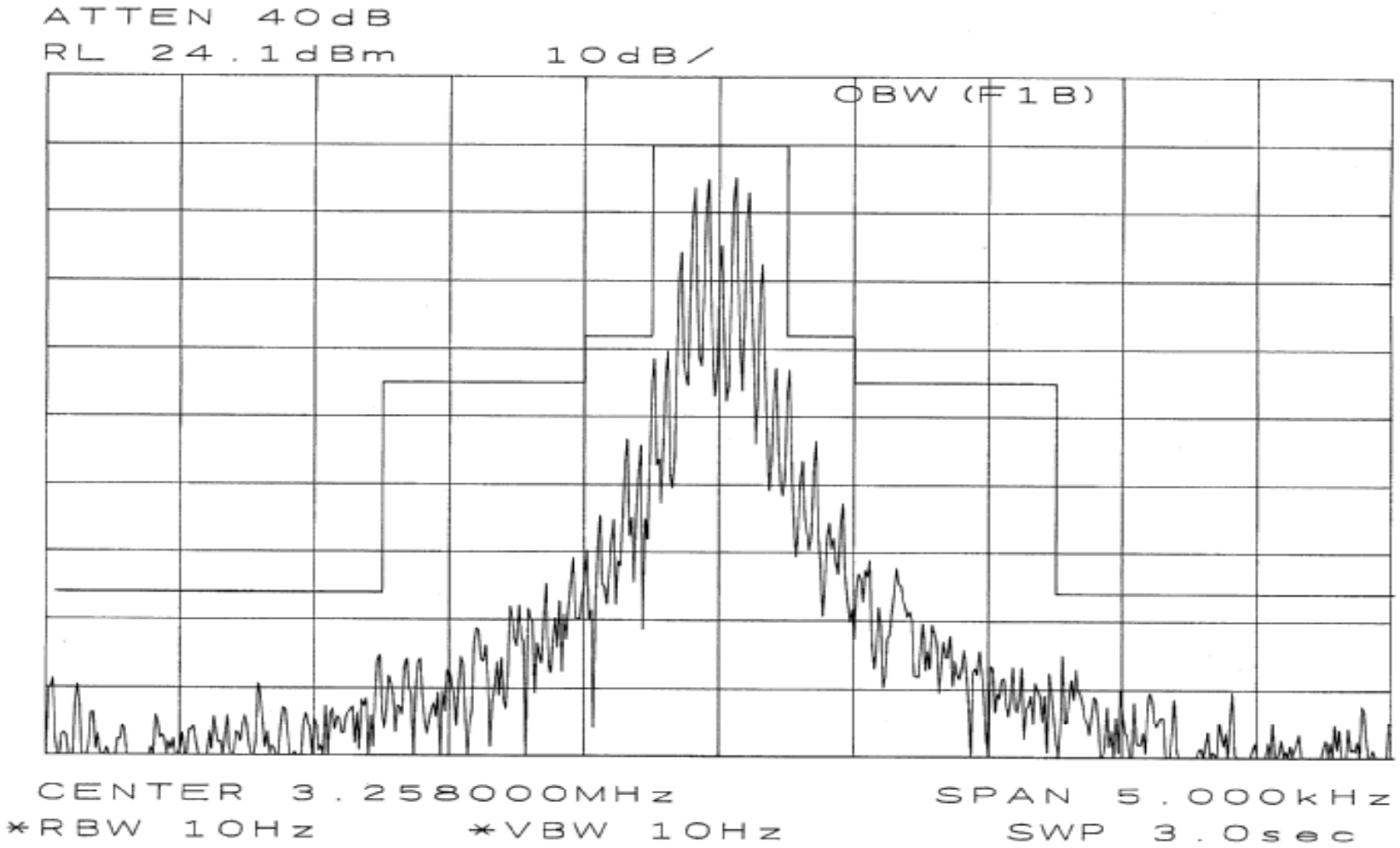


Fig. 2.3.2-15 Occupied bandwidth

Frequency: 3258.0kHz
Mode: F1B
Line Voltage: AC220V

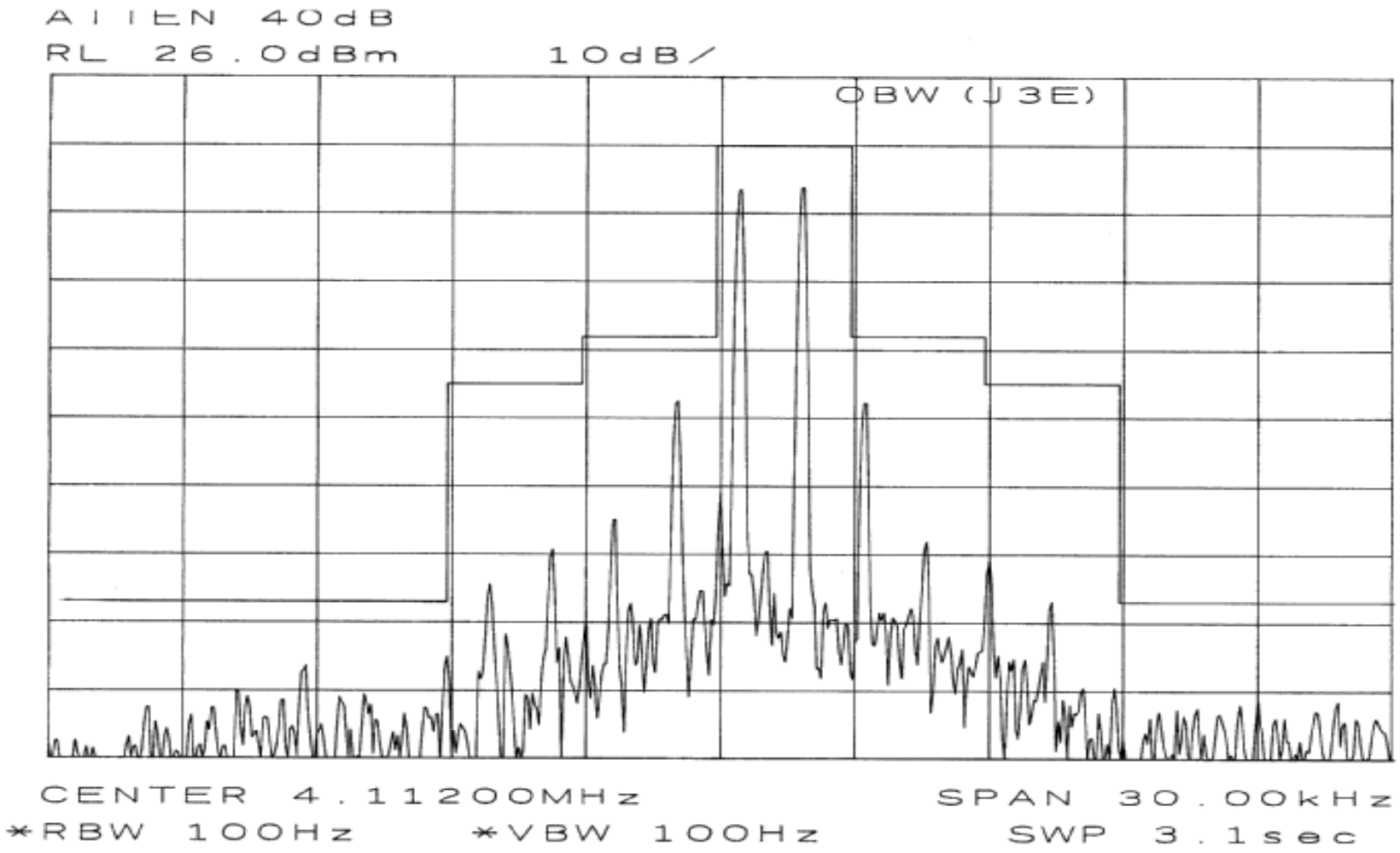


Fig. 2.3.2-16 Occupied bandwidth

Frequency: 4112.0kHz
Mode: J3E
Line Voltage: AC220V

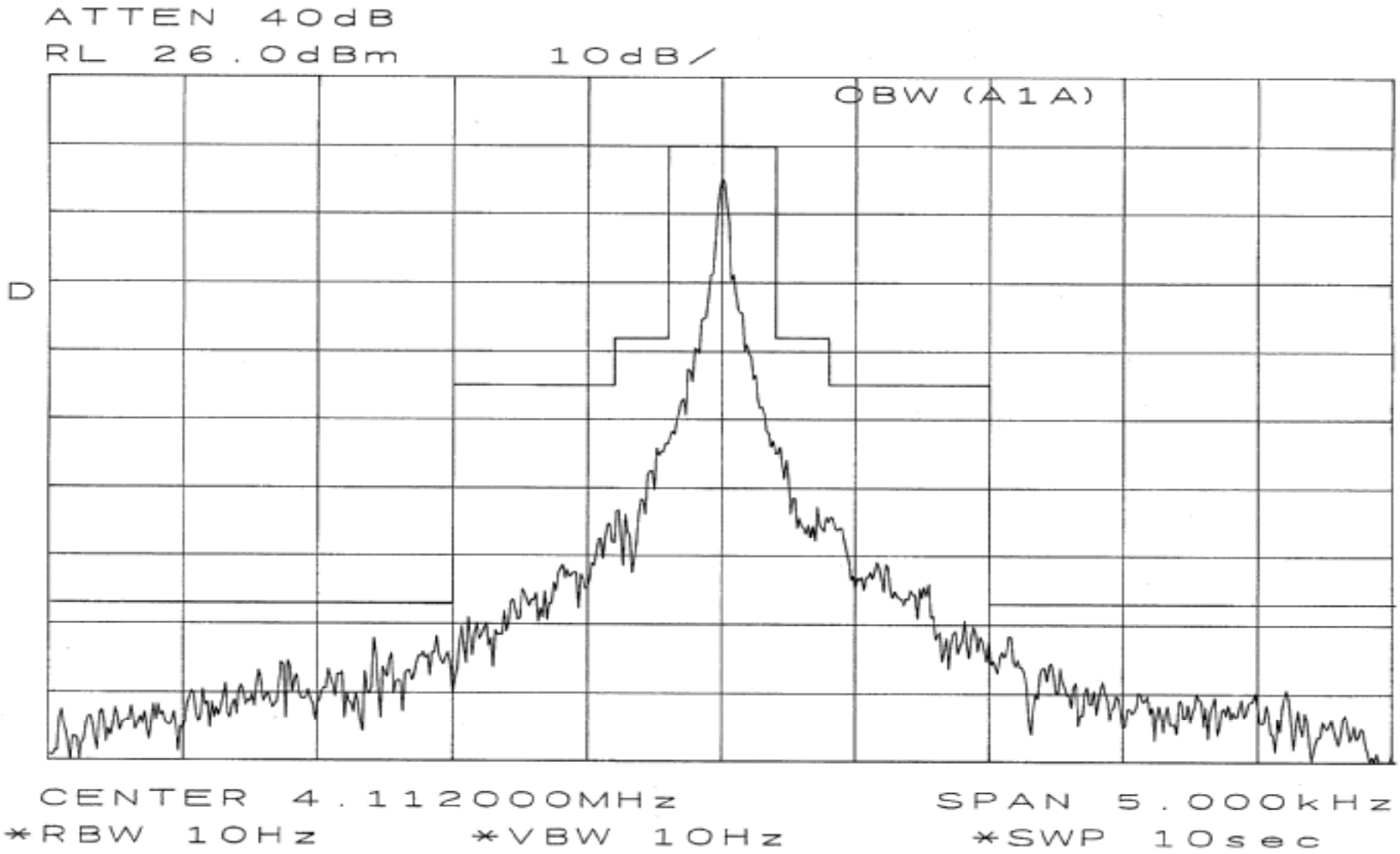


Fig. 2.3.2-17 Occupied bandwidth

Frequency: 4112.0kHz
Mode: A1A
Line Voltage: AC220V

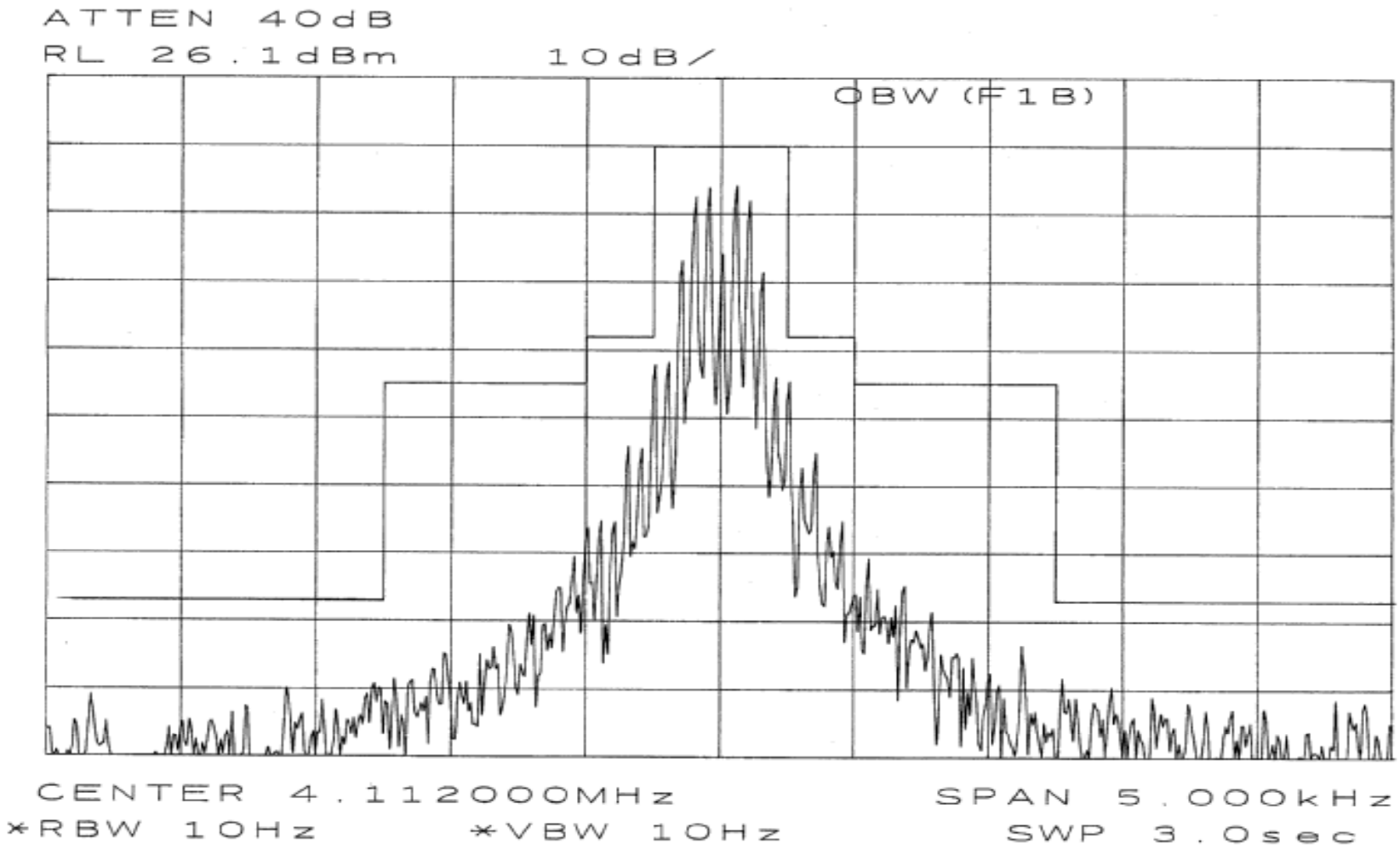


Fig. 2.3.2-18 Occupied bandwidth

Frequency: 4112.0kHz
Mode: F1B
Line Voltage: AC220V

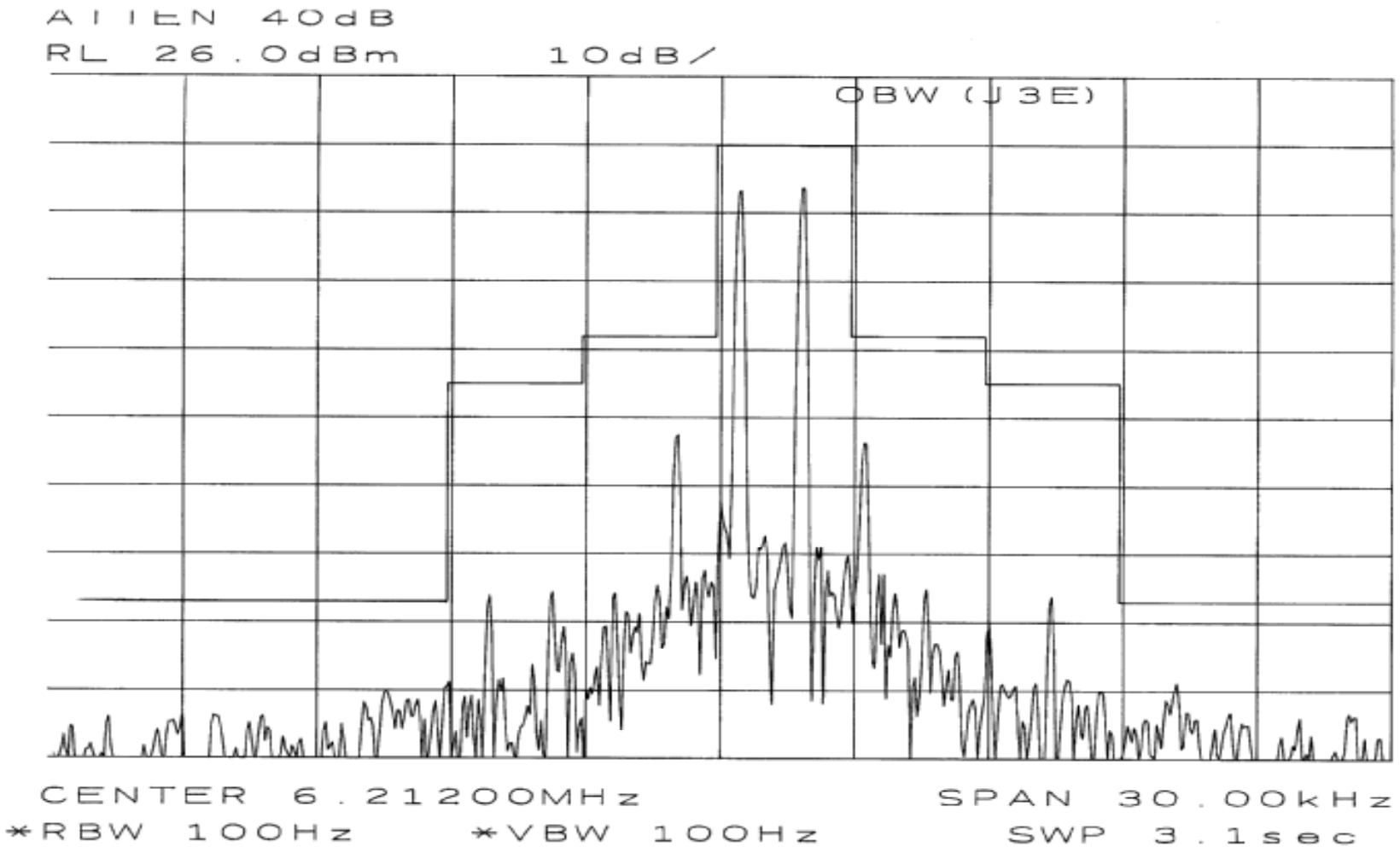


Fig. 2.3.2-19 Occupied bandwidth

Frequency: 6212.0kHz
Mode: J3E
Line Voltage: AC220V

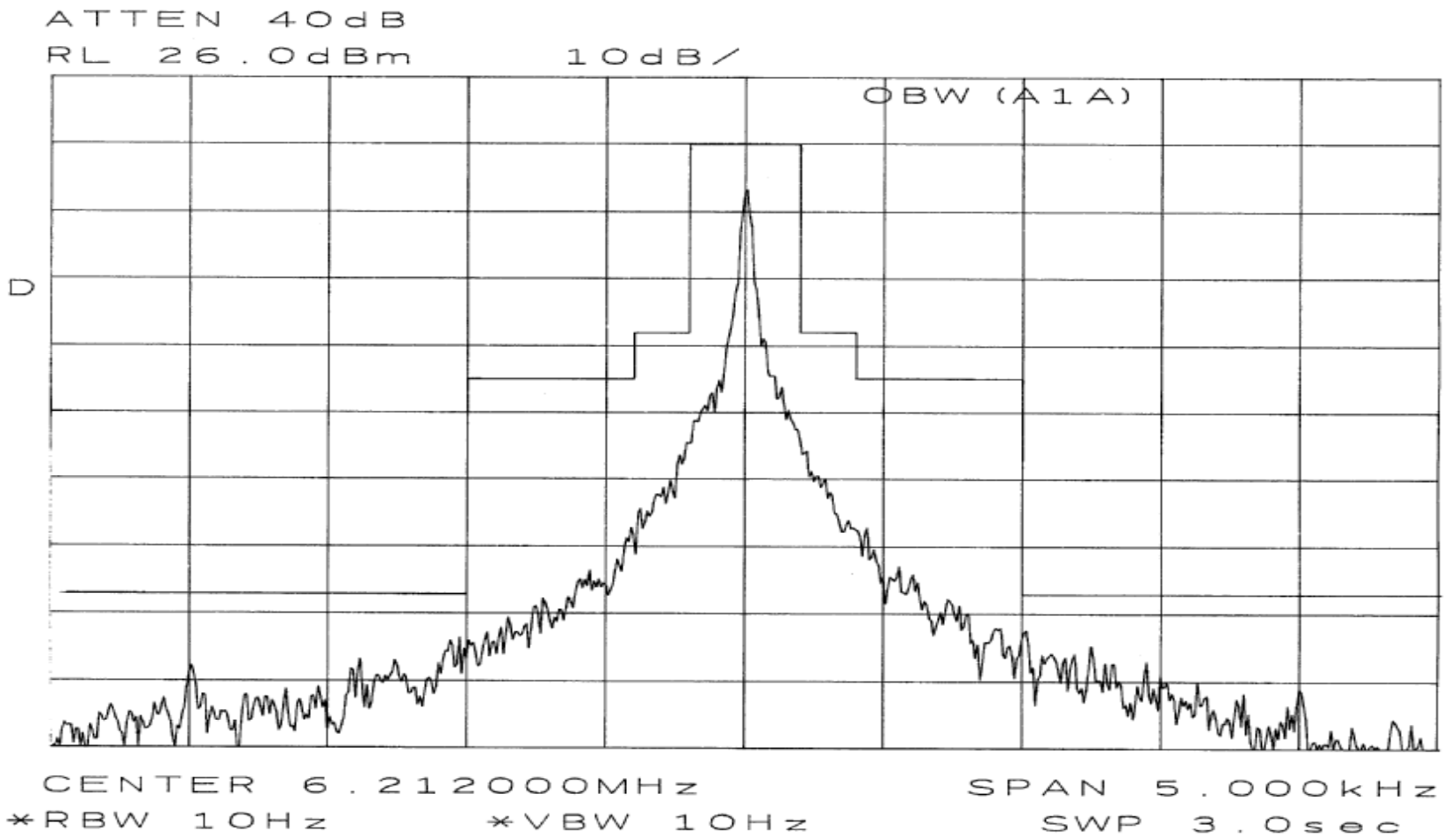


Fig. 2.3.2-20 Occupied bandwidth

Frequency: 6212.0kHz
Mode: A1A
Line Voltage: AC220V

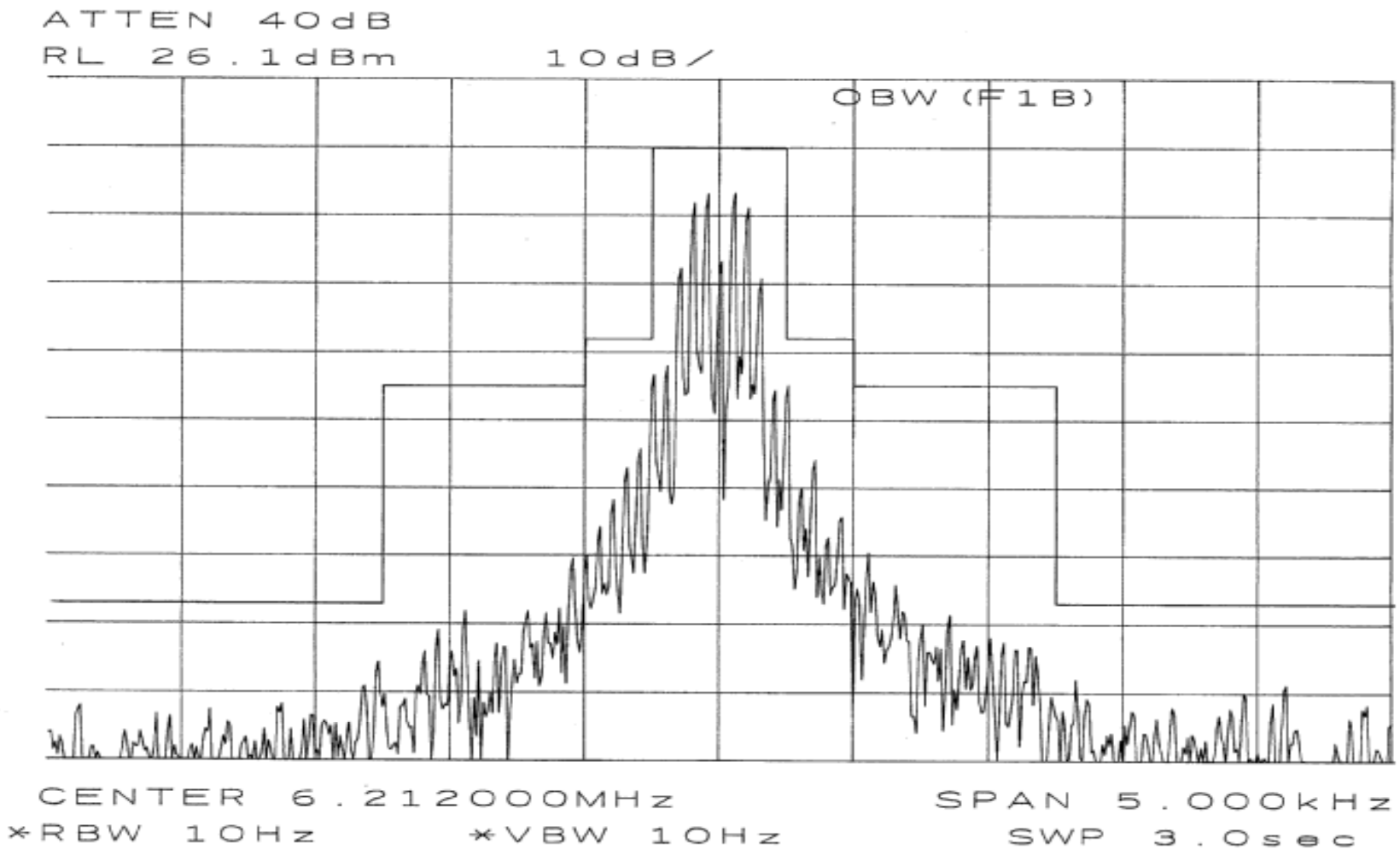


Fig. 2.3.2-21 Occupied bandwidth

Frequency: 6212.0kHz
Mode: F1B
Line Voltage: AC220V

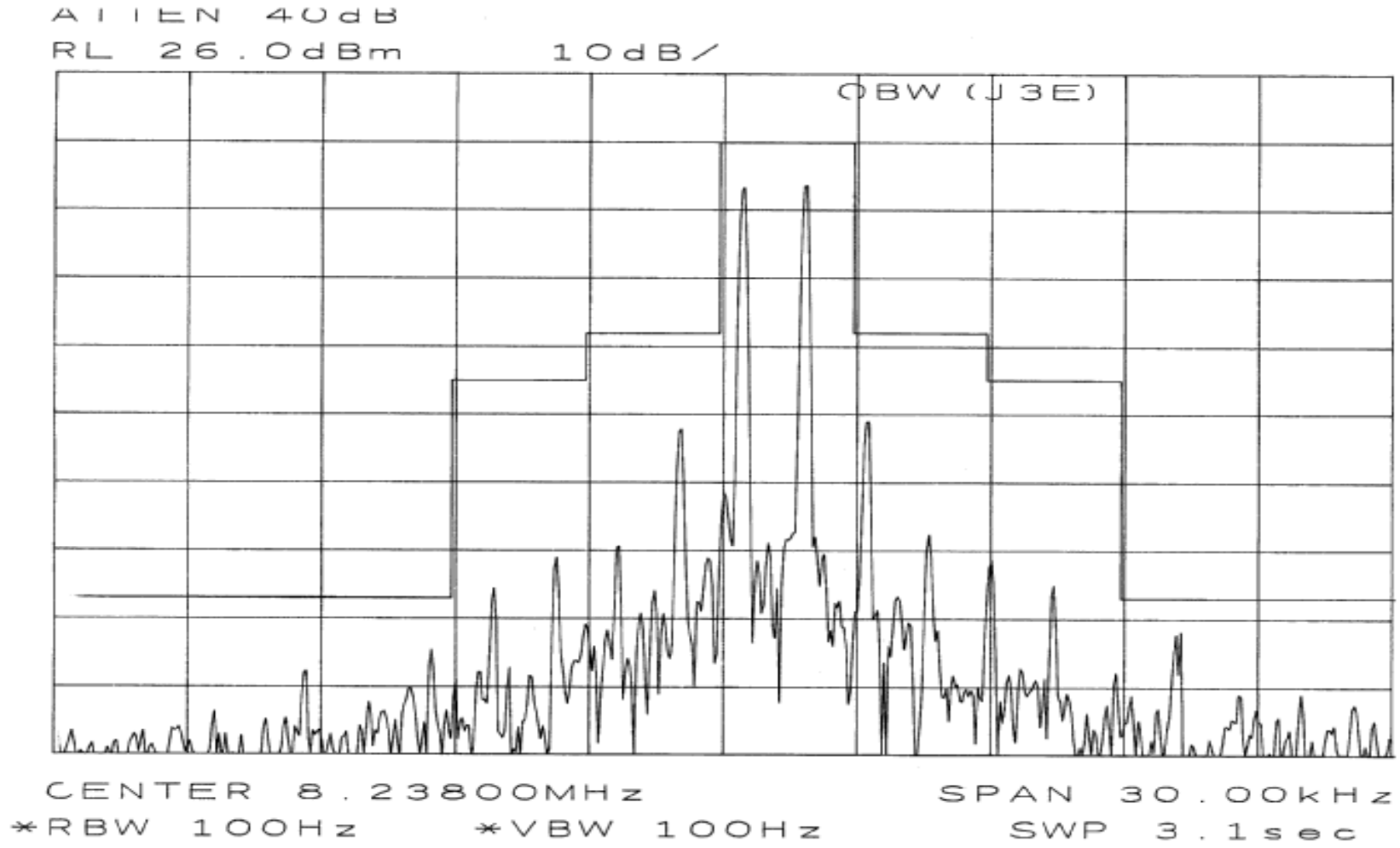


Fig. 2.3.2-22 Occupied bandwidth

Frequency: 8238.0kHz
Mode: J3E
Line Voltage: AC220V

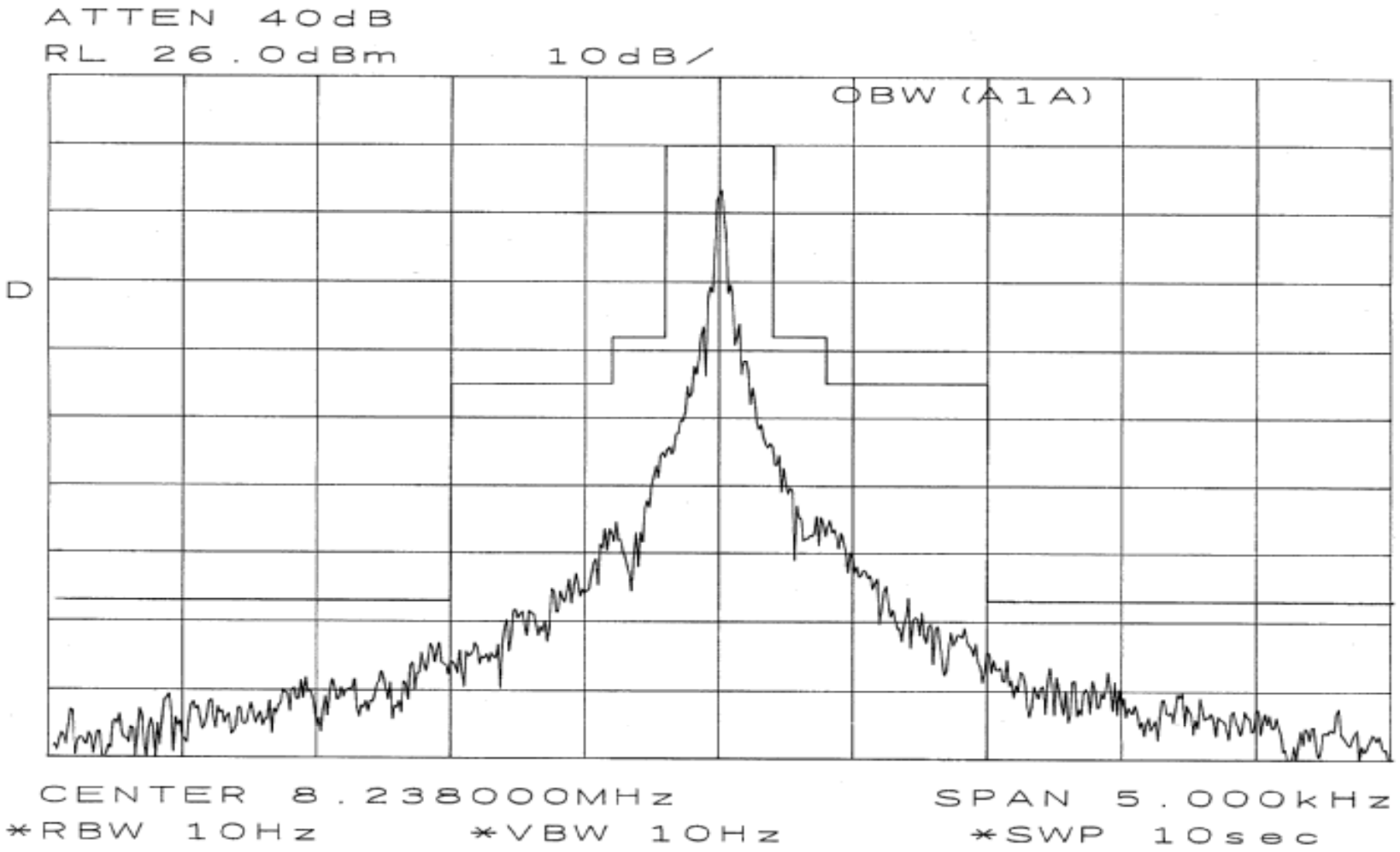


Fig. 2.3.2-23 Occupied bandwidth

Frequency: 8238.0kHz
Mode: A1A
Line Voltage: AC220V

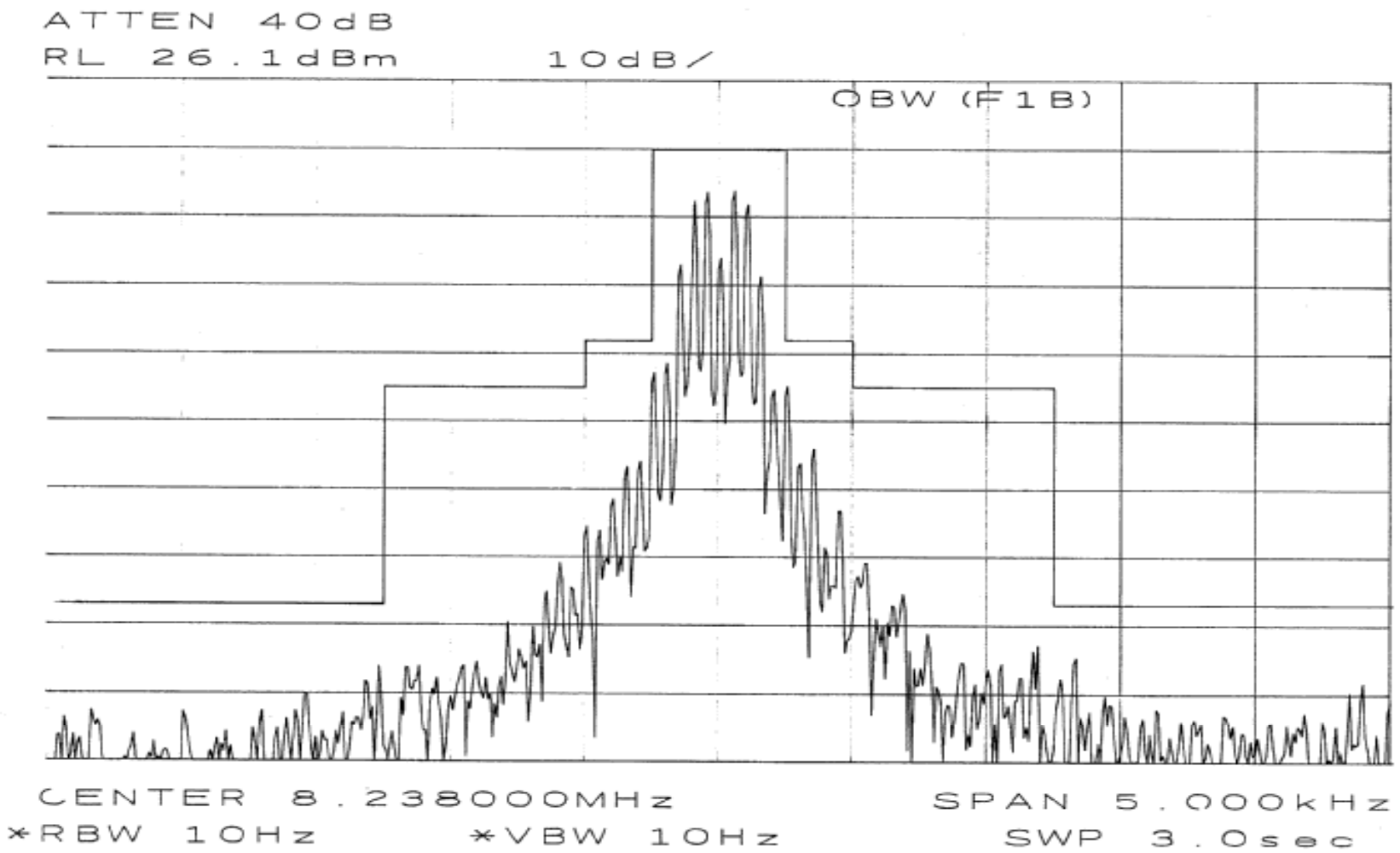


Fig. 2.3.2-24 Occupied bandwidth

Frequency: 8238.0kHz
Mode: F1B
Line Voltage: AC220V

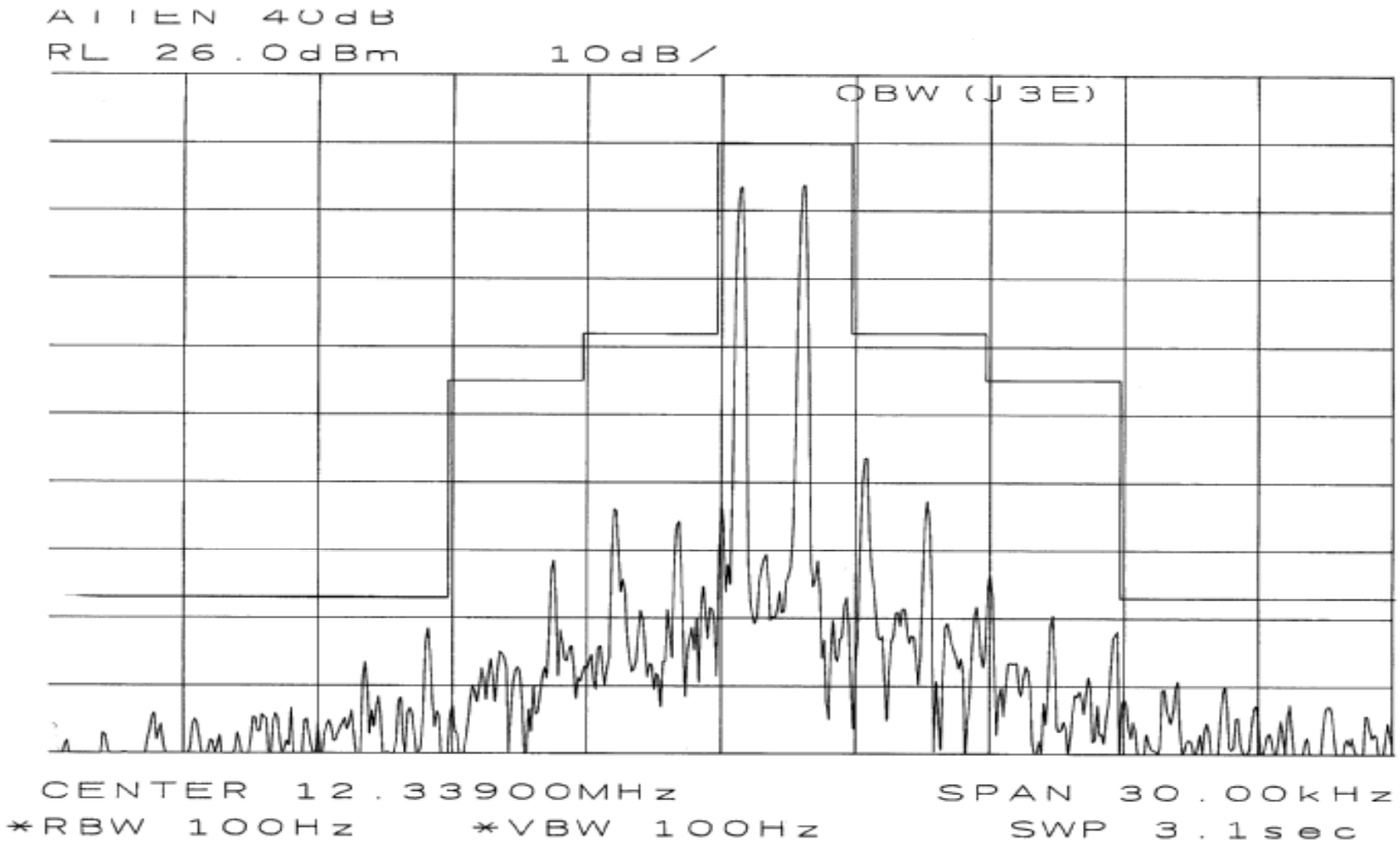


Fig. 2.3.2-25 Occupied bandwidth

Frequency: 12339.0kHz
Mode: J3E
Line Voltage: AC220V

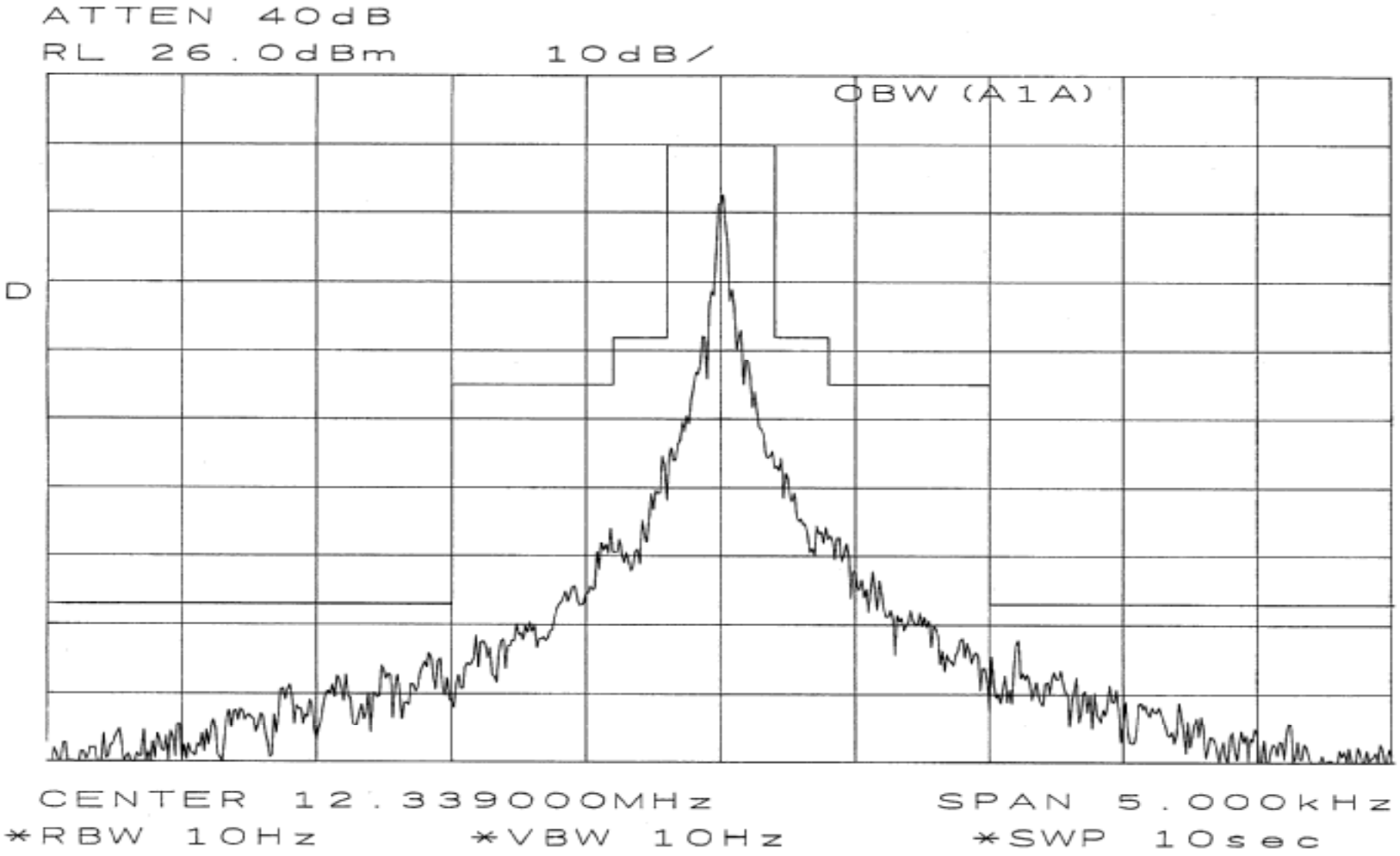


Fig. 2.3.2-26 Occupied bandwidth

Frequency: 12339.0kHz
Mode: A1A
Line Voltage: AC220V

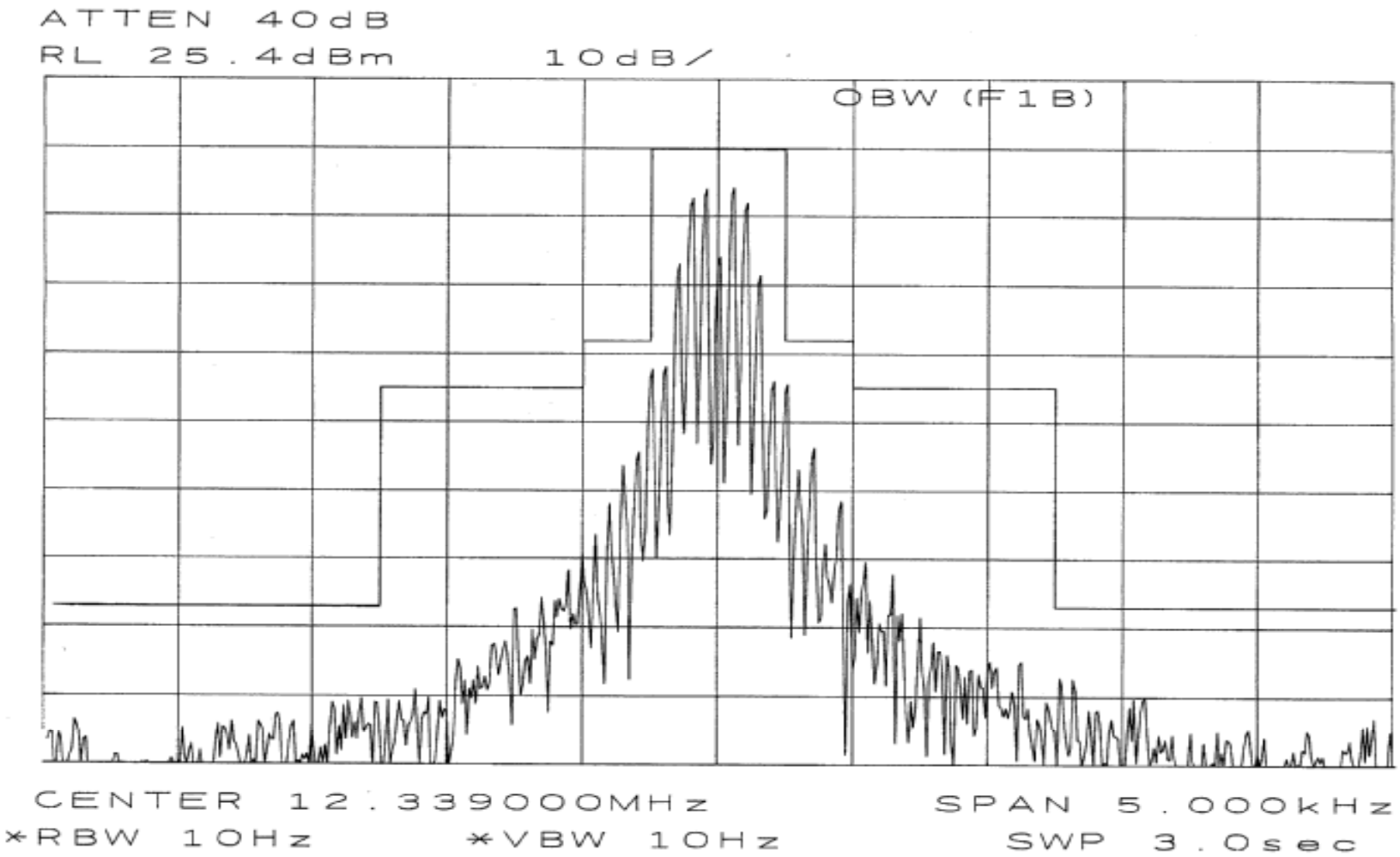


Fig. 2.3.2-27 Occupied bandwidth

Frequency: 12339.0kHz
Mode: F1B
Line Voltage: AC220V

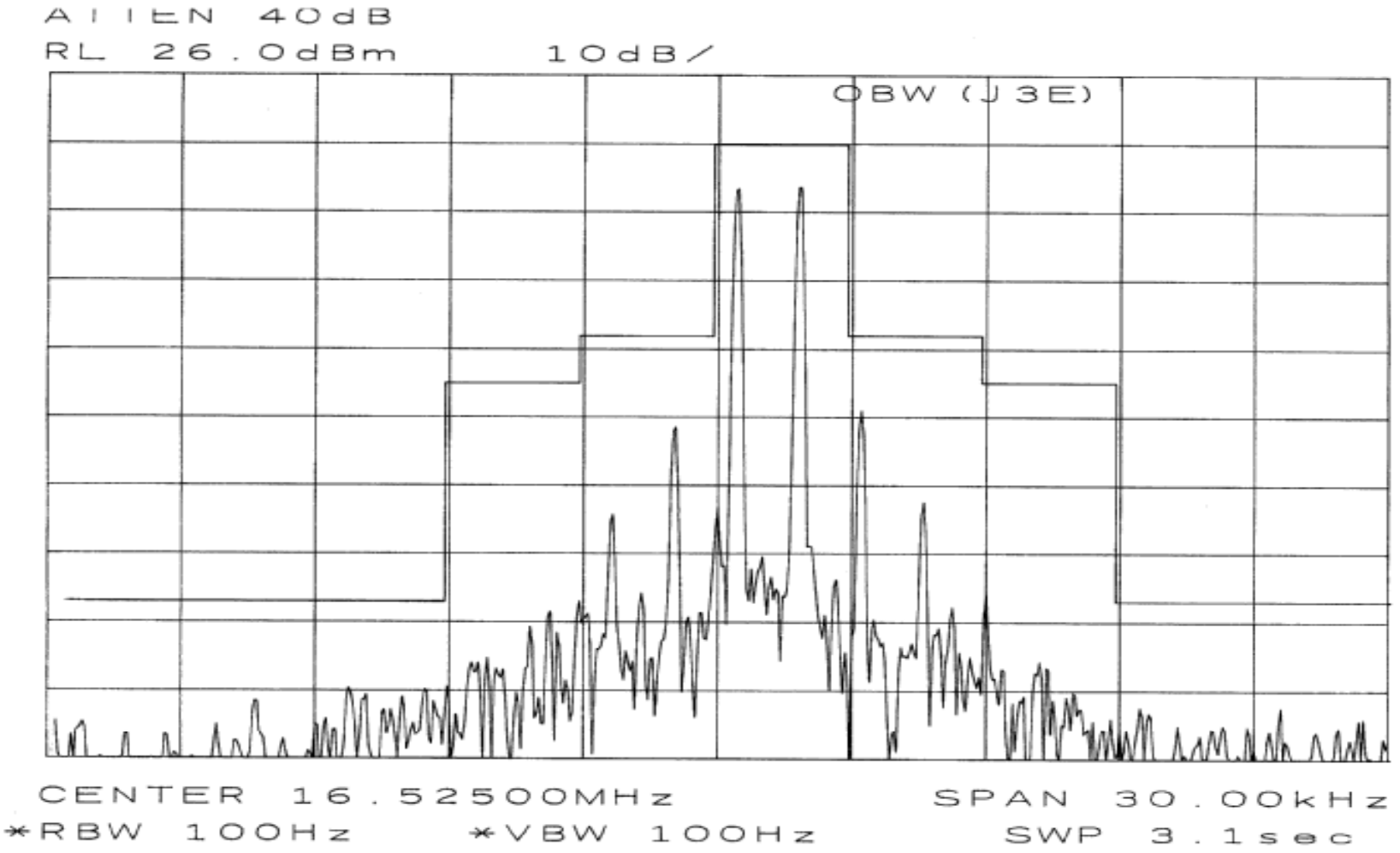


Fig. 2.3.2-28 Occupied bandwidth

Frequency: 16525.0kHz
Mode: J3E
Line Voltage: AC220V

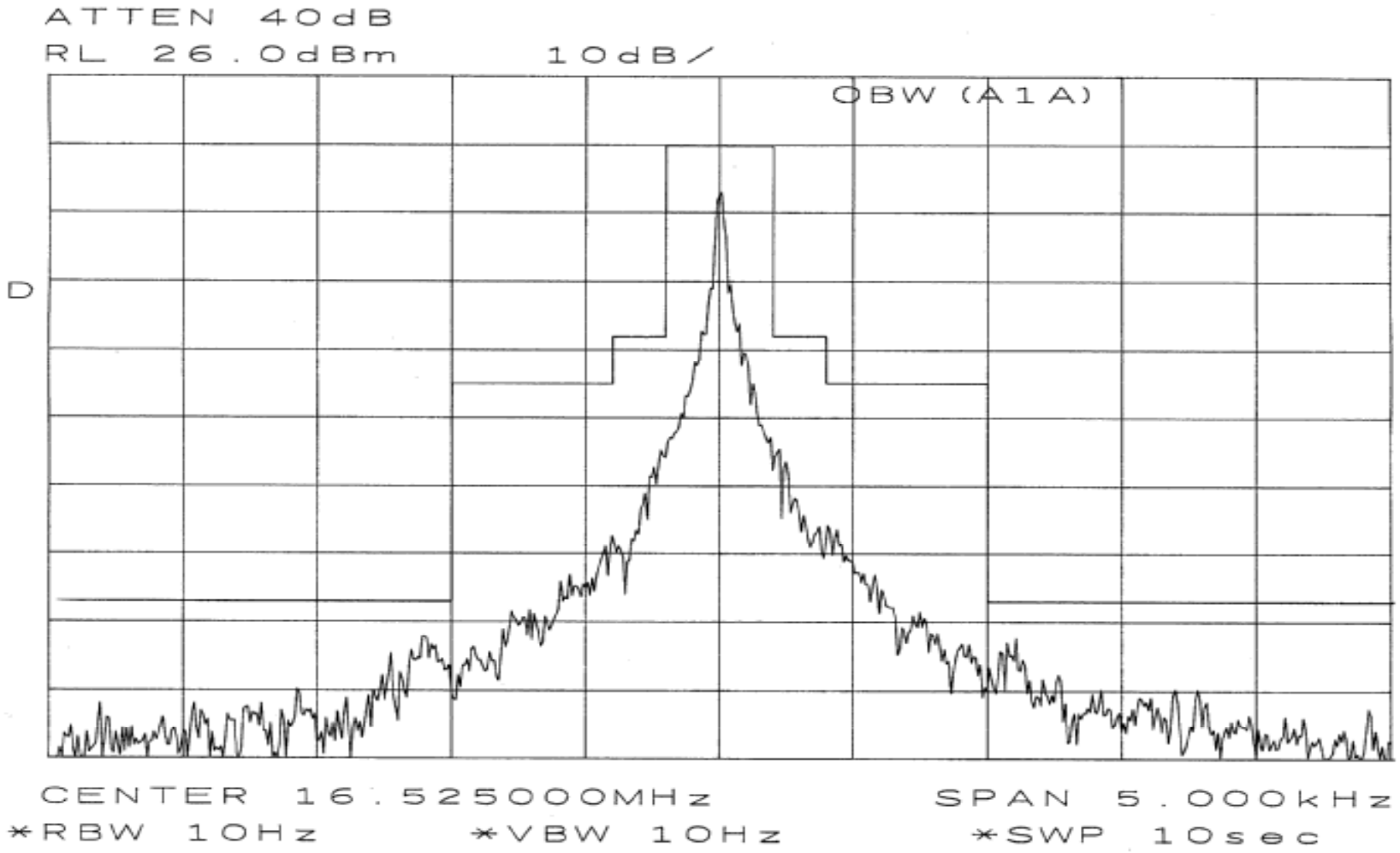


Fig. 2.3.2-29 Occupied bandwidth

Frequency: 16525.0kHz
Mode: A1A
Line Voltage: AC220V

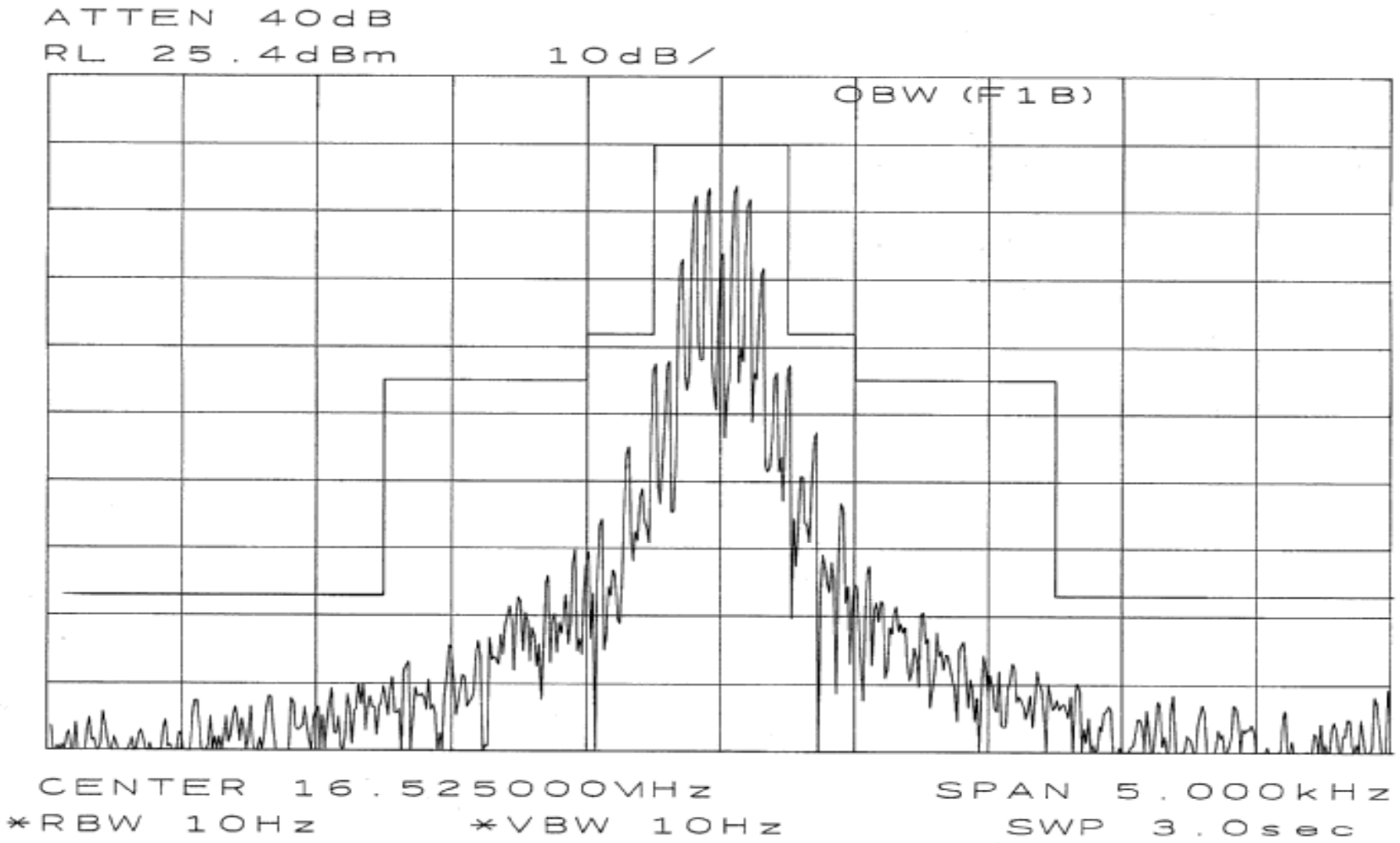


Fig. 2.3.2-30 Occupied bandwidth

Frequency: 16525.0kHz
Mode: F1B
Line Voltage: AC220V

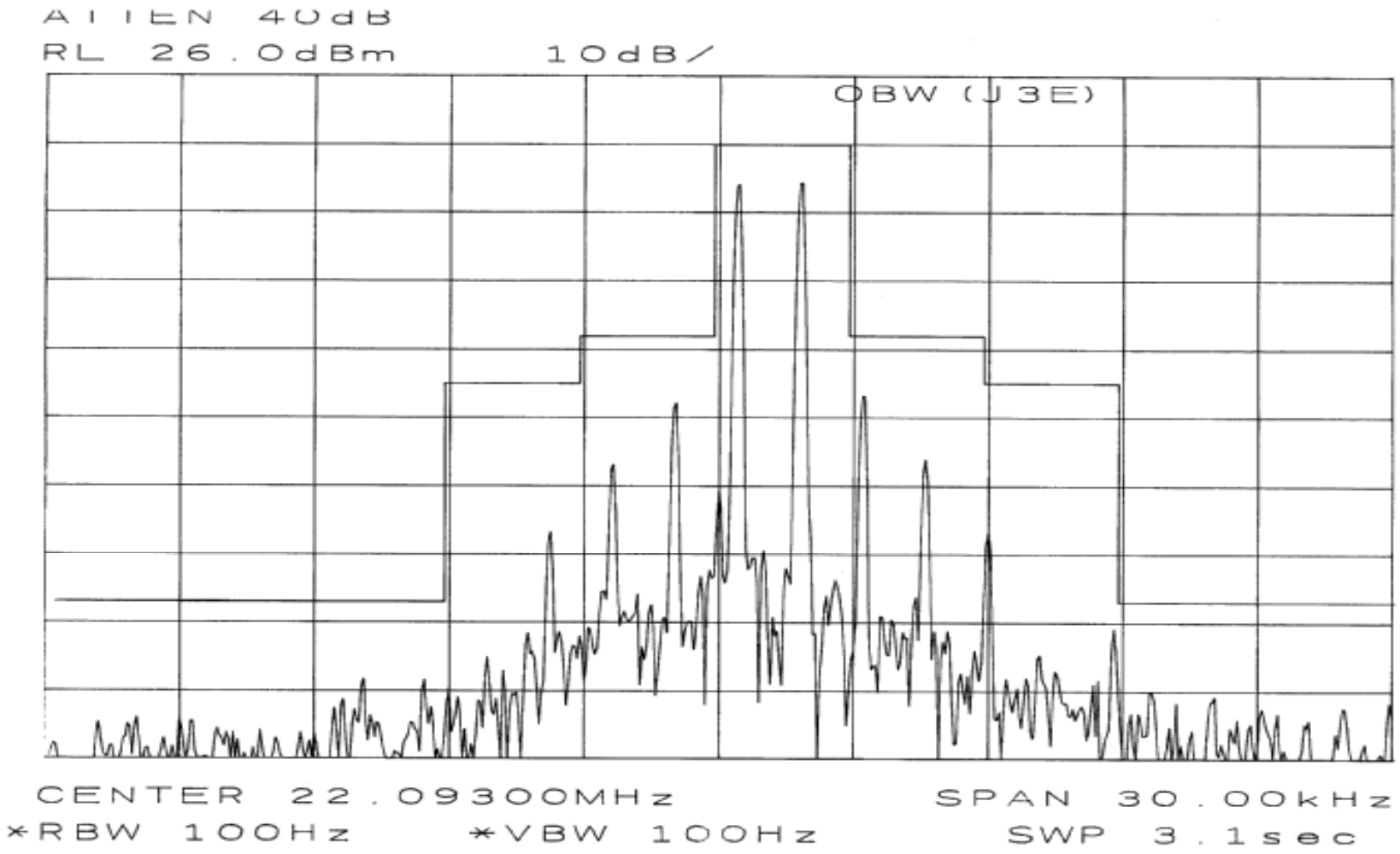


Fig. 2.3.2-31 Occupied bandwidth

Frequency: 22093.0kHz
Mode: J3E
Line Voltage: AC220V

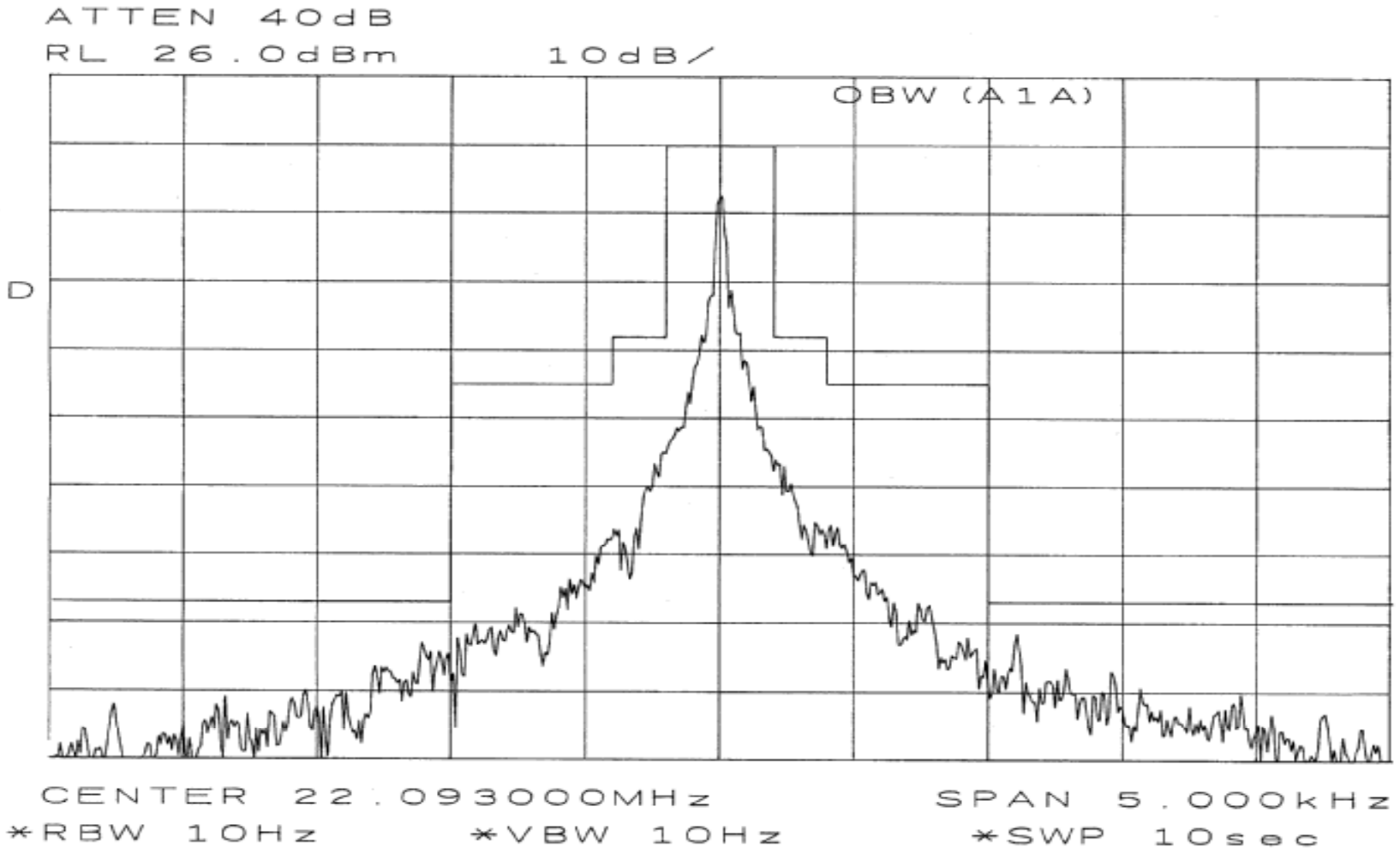


Fig. 2.3.2-32 Occupied bandwidth

Frequency: 22093.0kHz
Mode: A1A
Line Voltage: AC220V

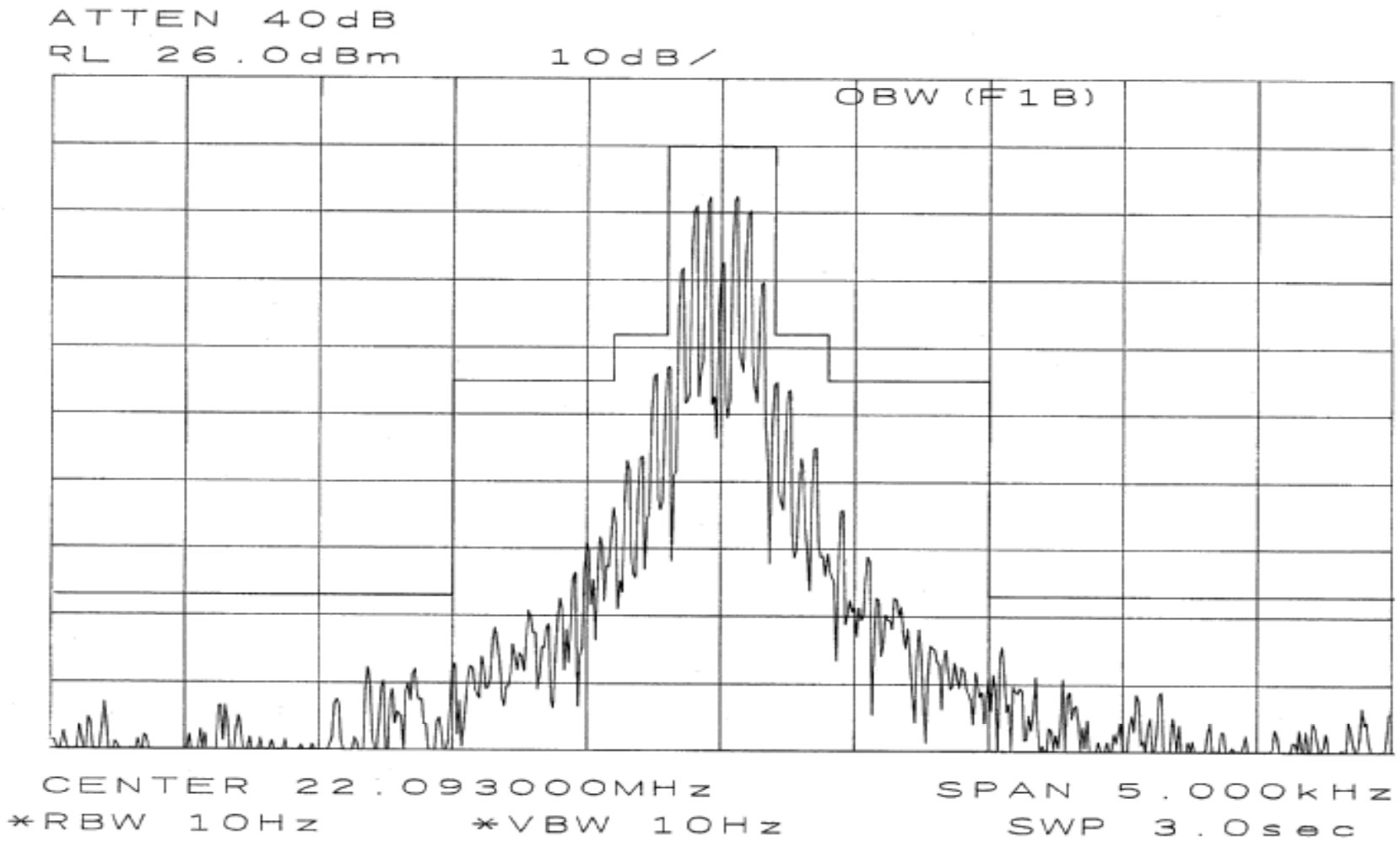


Fig. 2.3.2-33 Occupied bandwidth

Frequency: 22093.0kHz
Mode: F1B
Line Voltage: AC220V

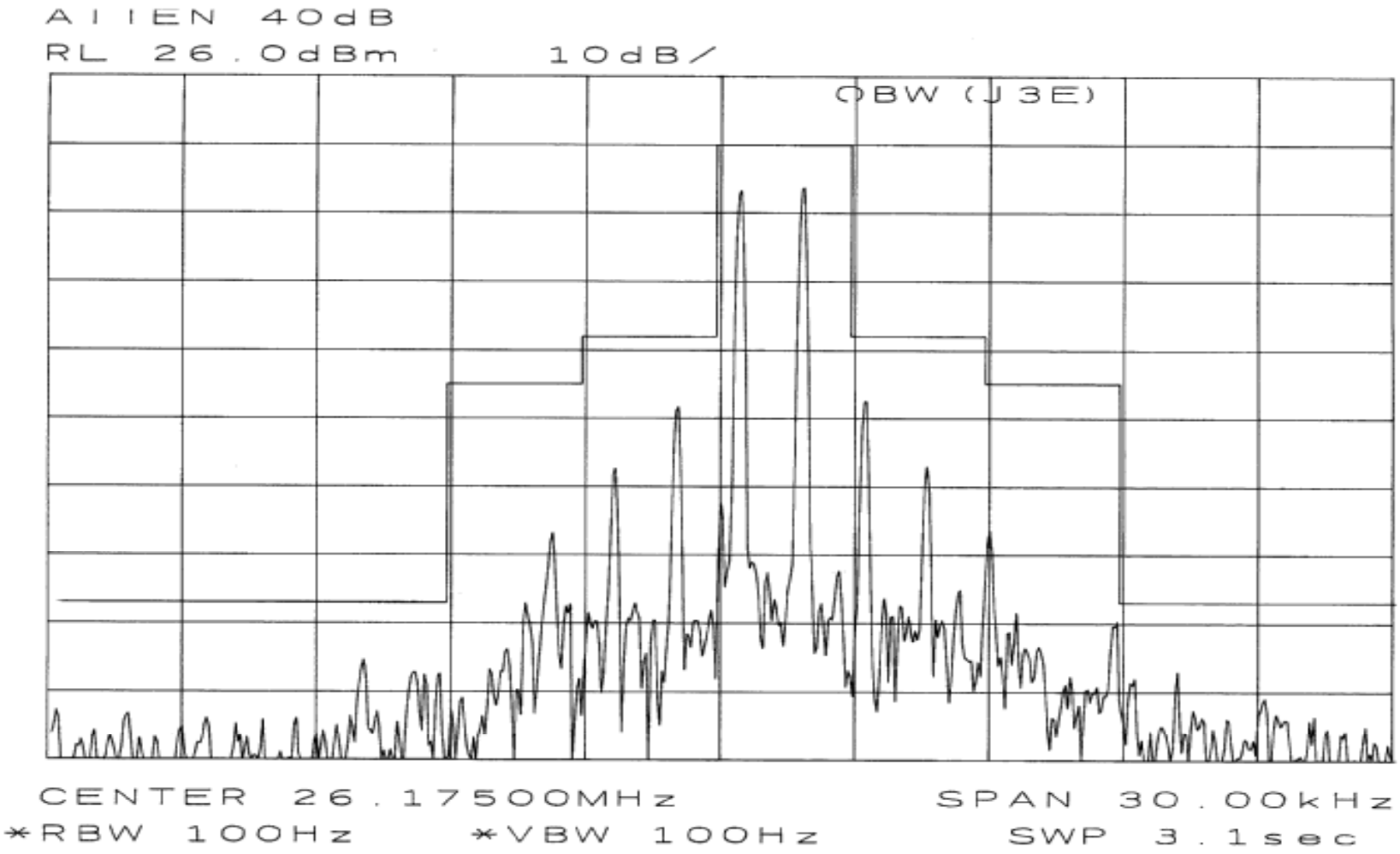


Fig. 2.3.2-34 Occupied bandwidth

Frequency: 26175.0kHz
Mode: J3E
Line Voltage: AC220V

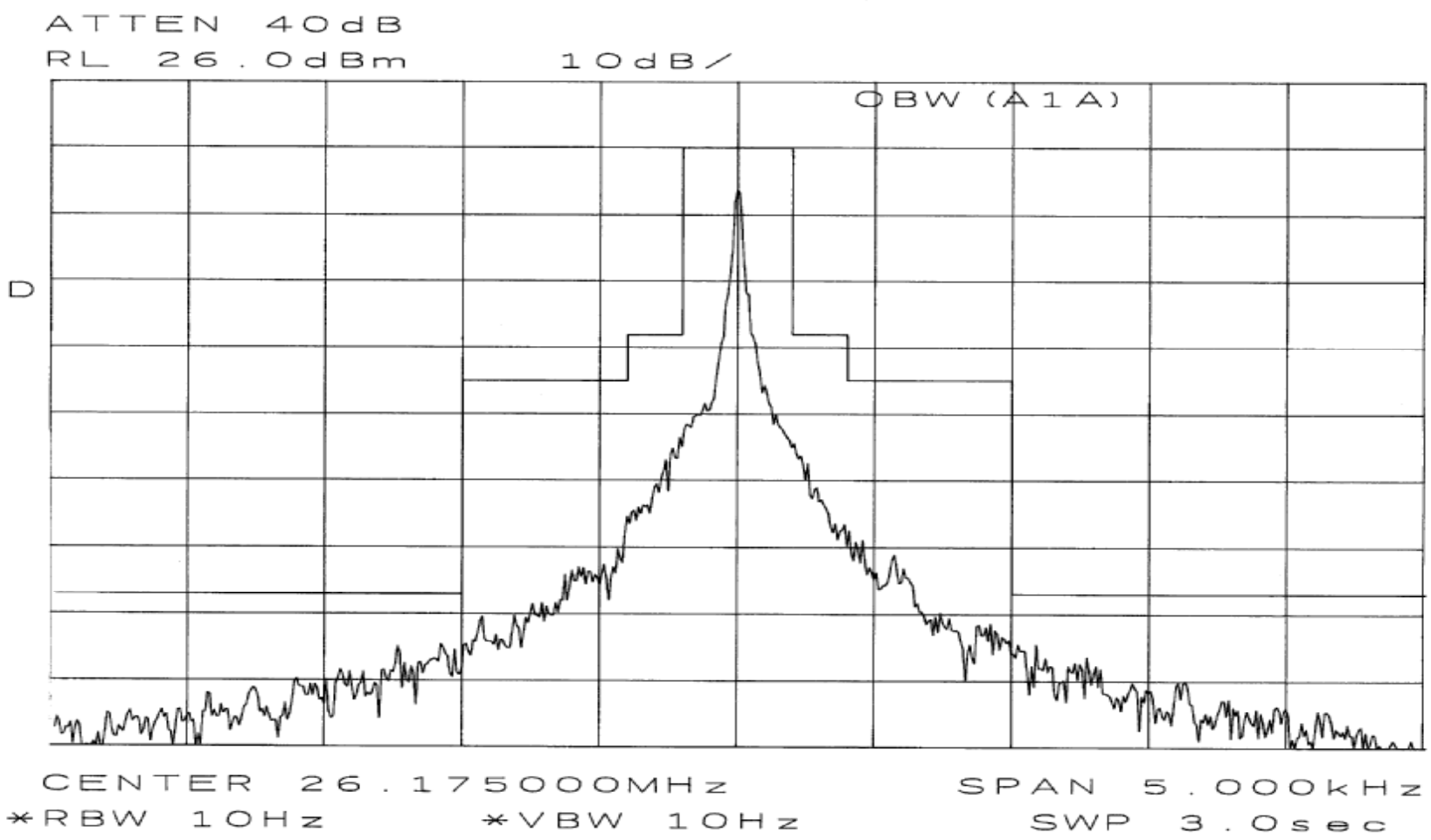


Fig. 2.3.2-35 Occupied bandwidth

Frequency: 26175.0kHz
Mode: A1A
Line Voltage: AC220V

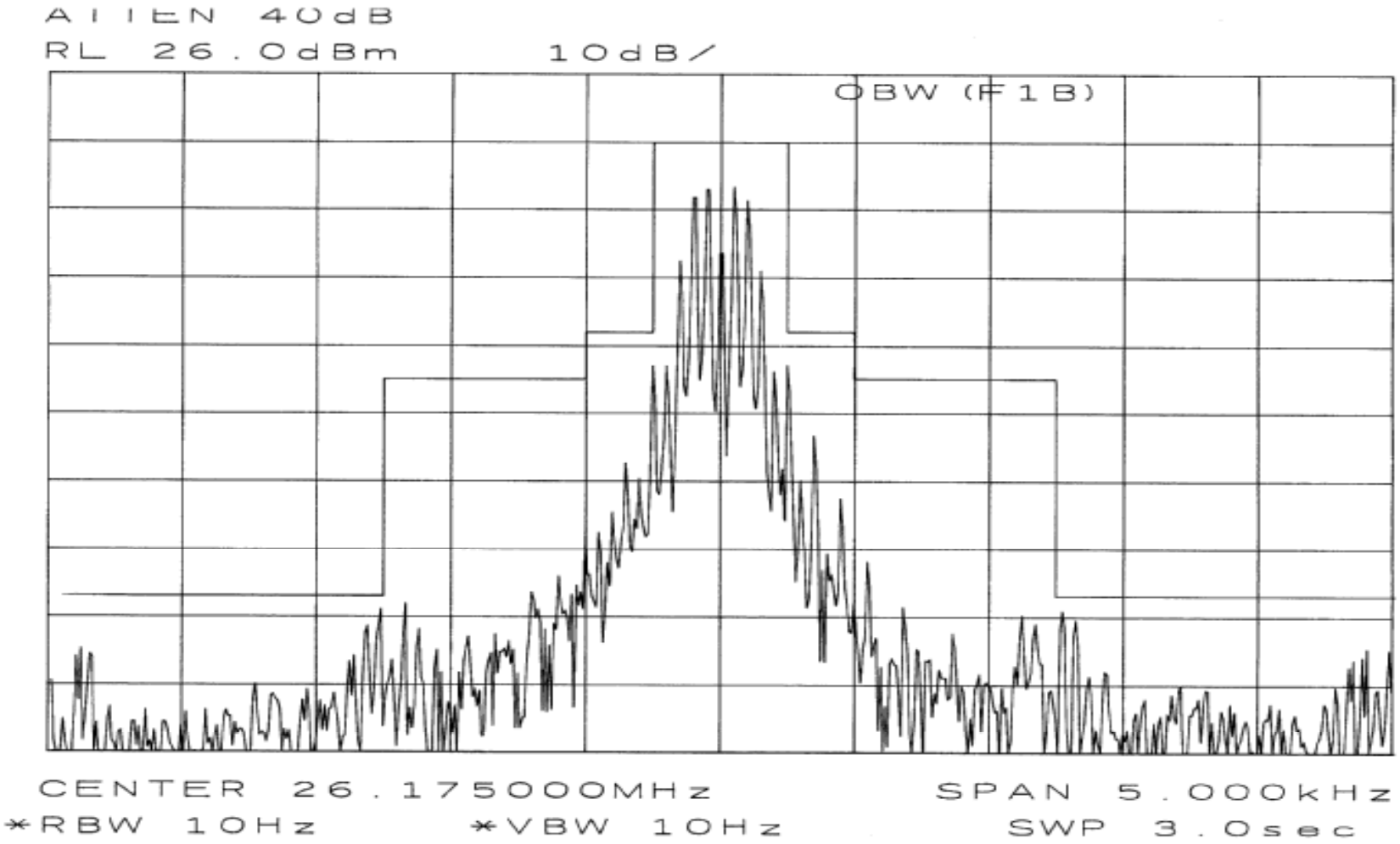


Fig. 2.3.2-36 Occupied bandwidth

Frequency: 26175.0kHz
Mode: F1B
Line Voltage: AC220V

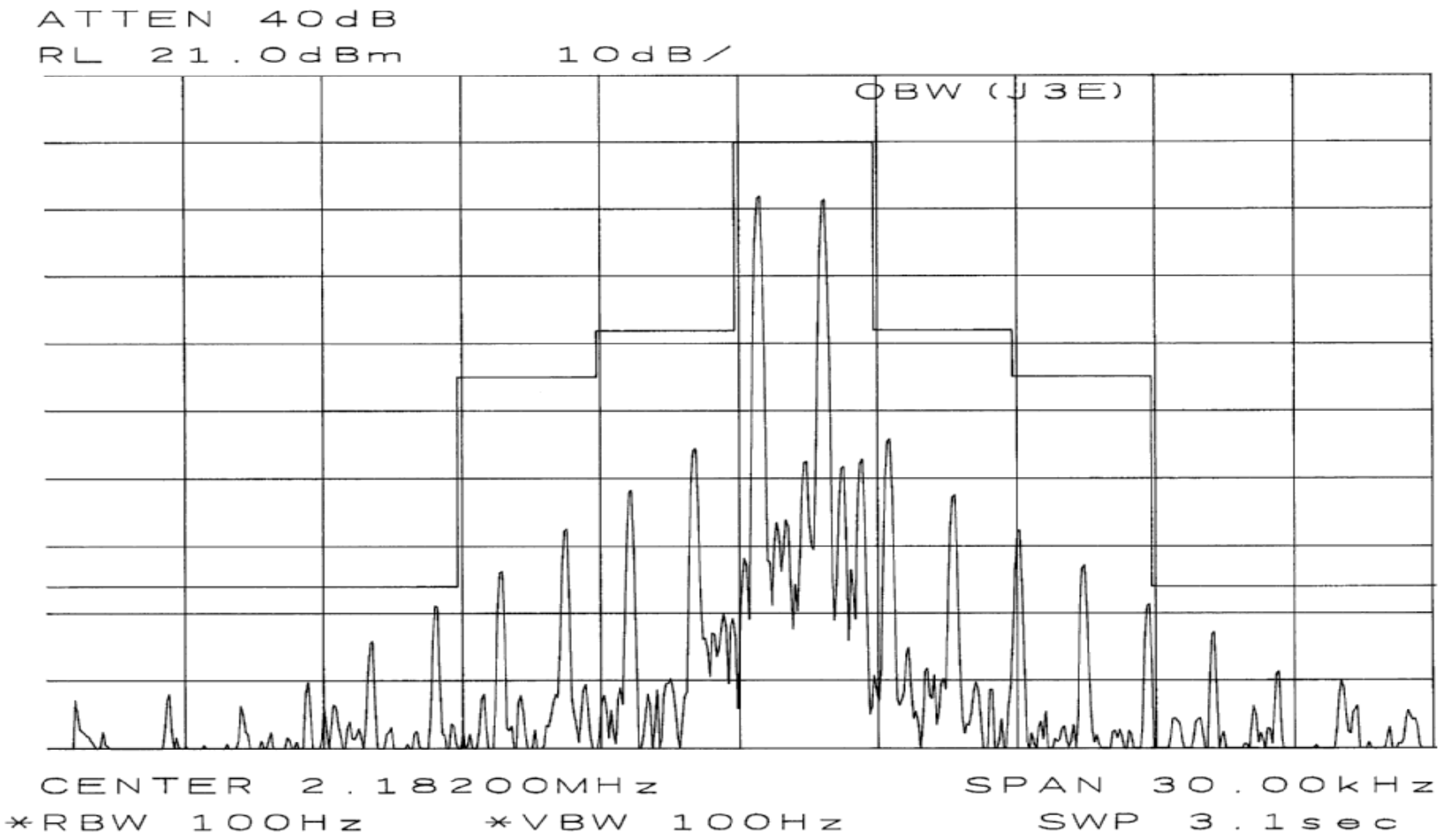


Fig. 2.3.2-37 Occupied bandwidth

Frequency: 2182.0kHz
Mode: J3E
Line Voltage: DC24V

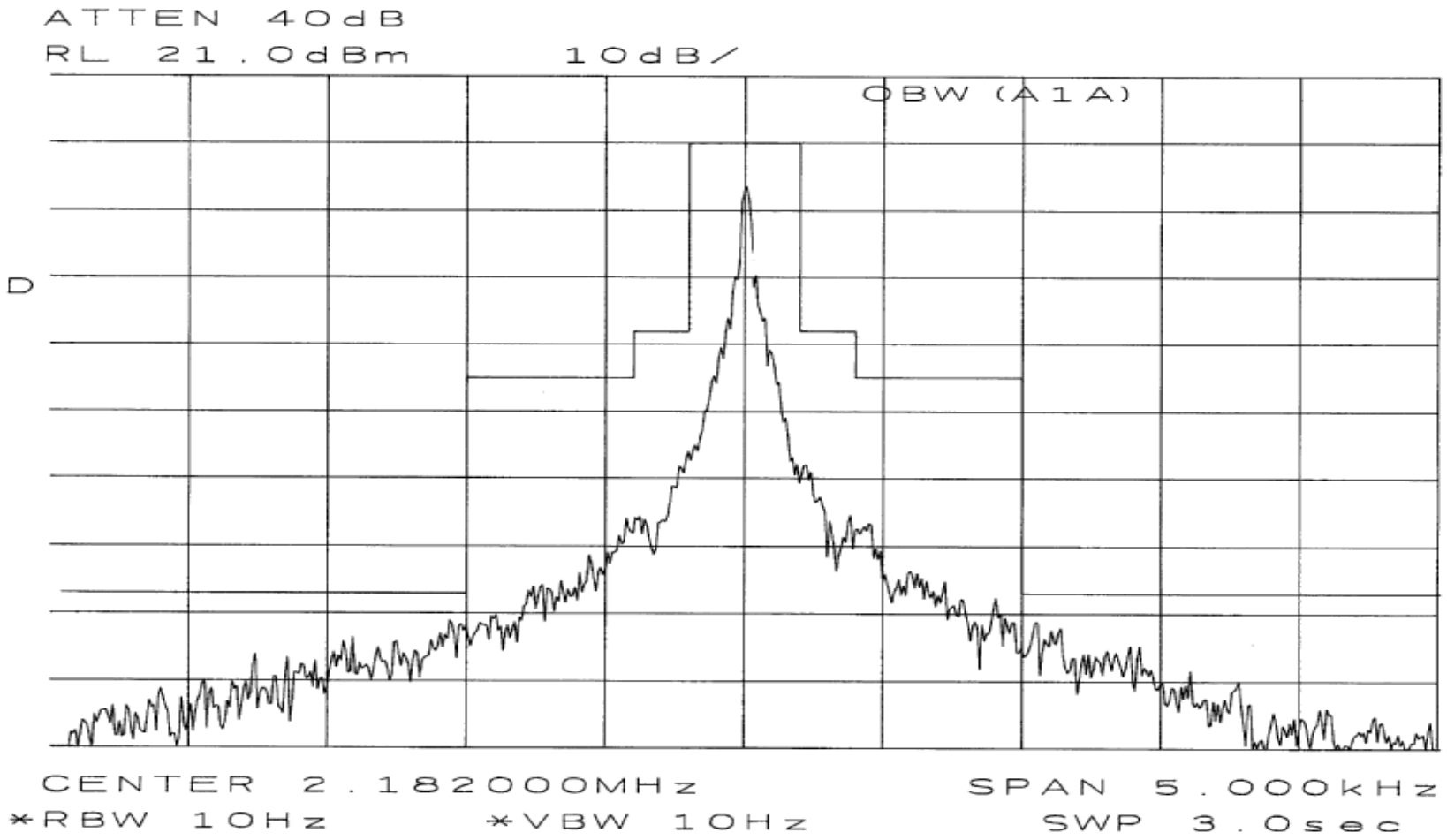


Fig. 2.3.2-38 Occupied bandwidth

Frequency: 2182.0kHz
Mode: A1A
Line Voltage: DC24V

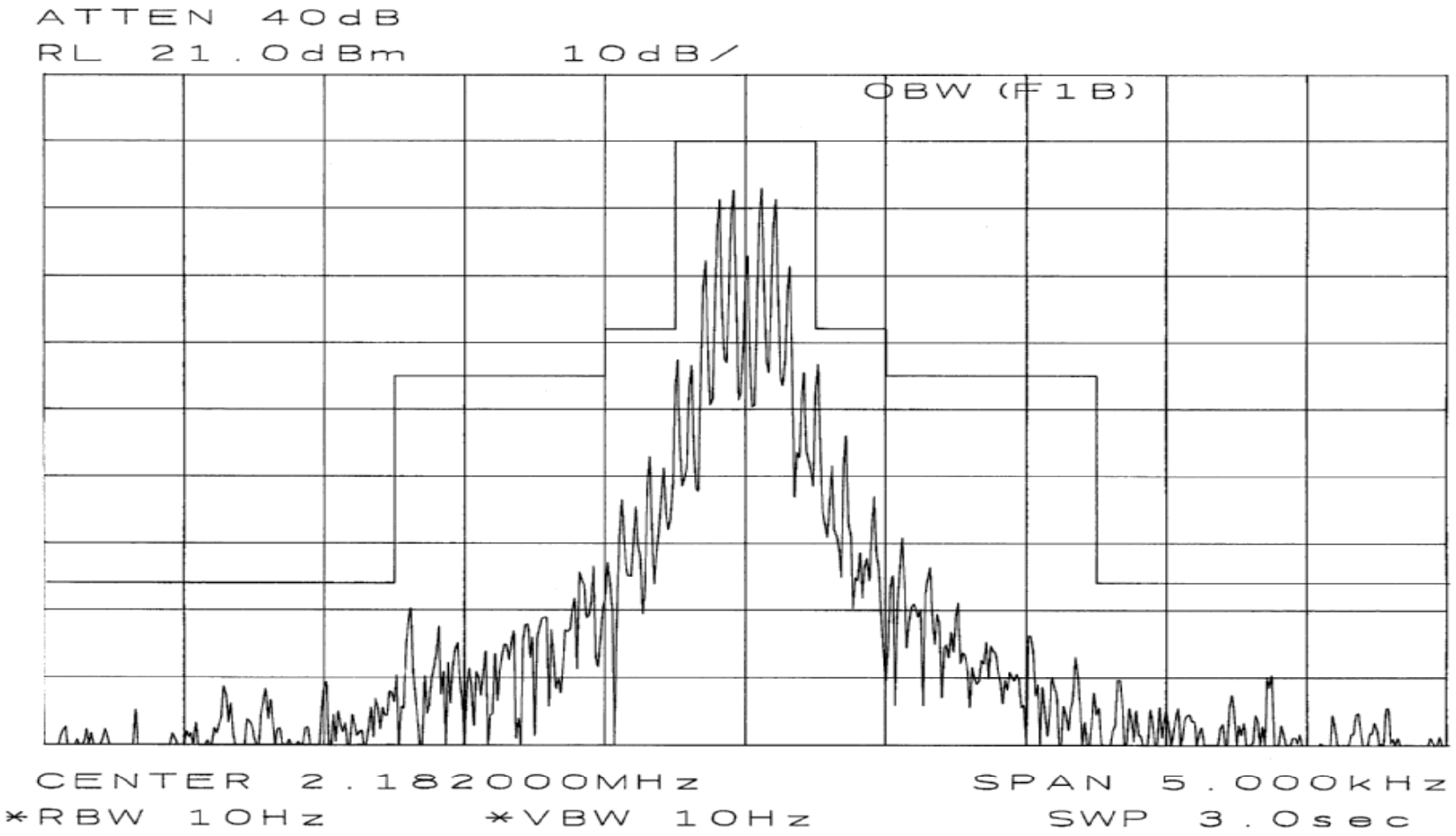


Fig. 2.3.2-39 Occupied bandwidth

Frequency: 2182.0kHz
Mode: F1B
Line Voltage: DC24V

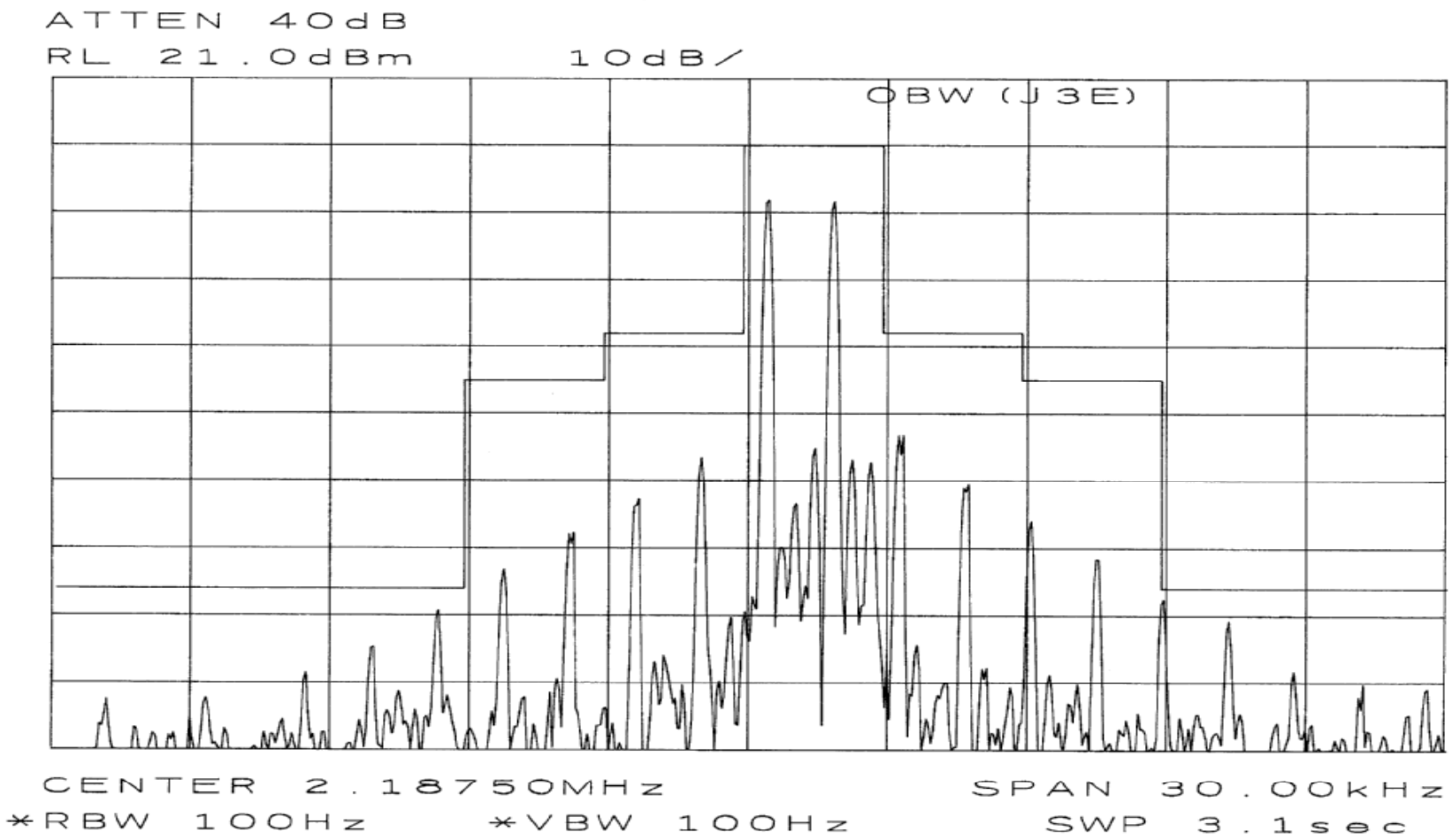


Fig. 2.3.2-40 Occupied bandwidth

Frequency: 2187.5kHz
Mode: J3E
Line Voltage: DC24V

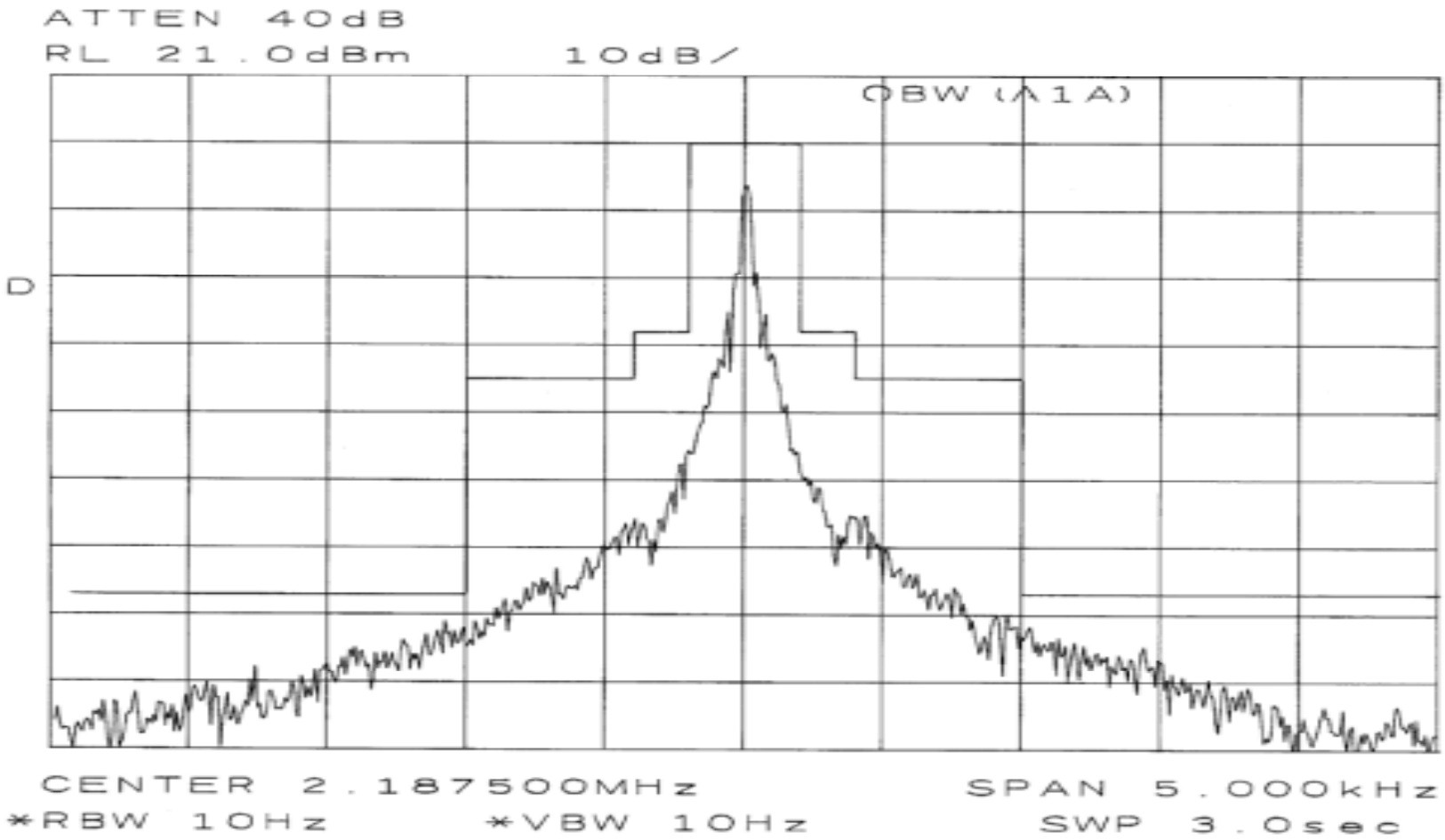


Fig. 2.3.2-41 Occupied bandwidth

Frequency: 2187.5kHz
Mode: A1A
Line Voltage: DC24V

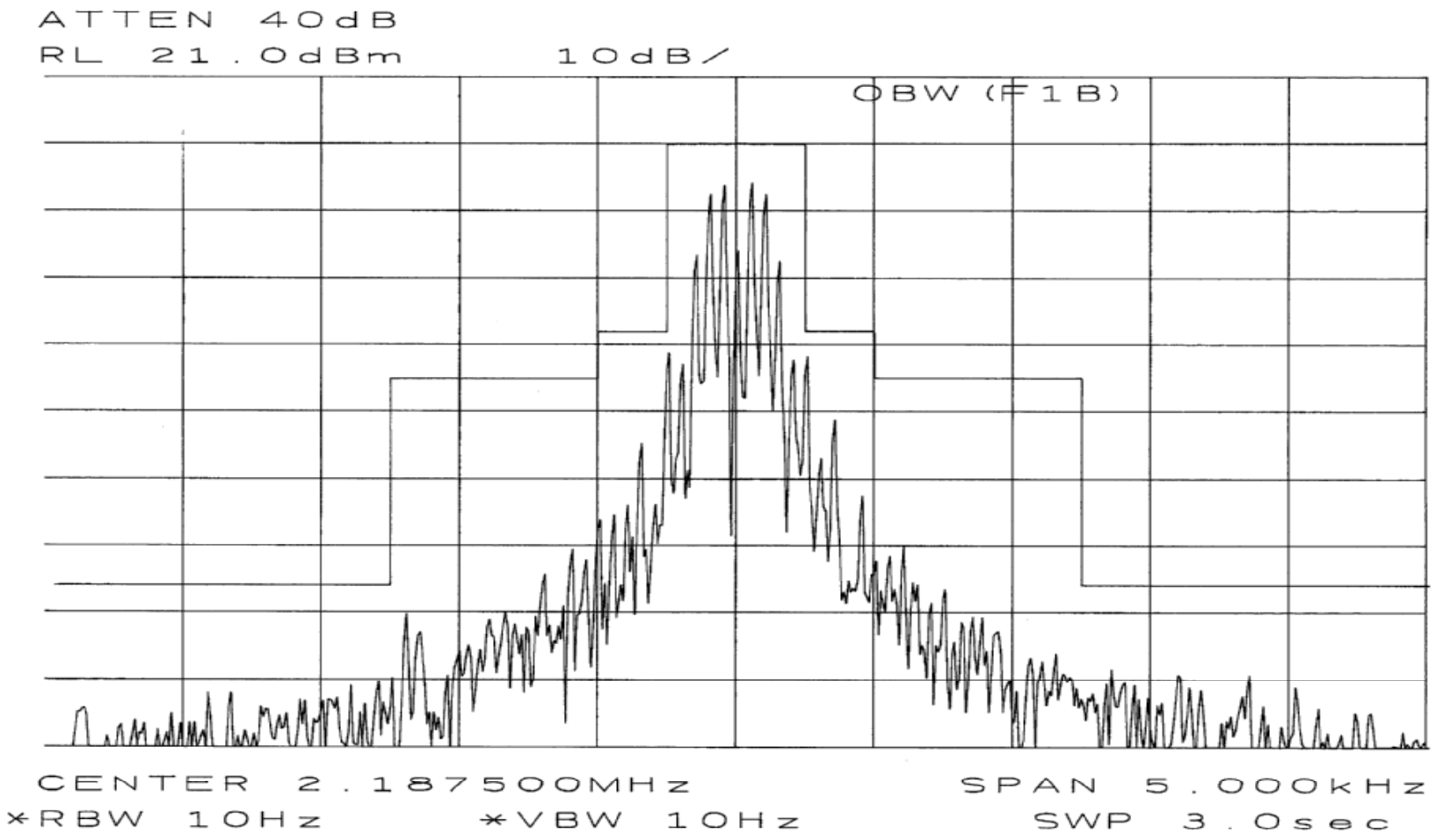


Fig. 2.3.2-42 Occupied bandwidth

Frequency: 2187.5kHz
Mode: F1B
Line Voltage: DC24V

2.4 Spurious emissions at antenna terminal
[FCC §2.1051, §80.211(a),(f)]

2.4.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig. 2.4.1-1.

The equipment under test was operated in J3E mode and in all cases. The J3E modulation level was shown in Fig. 2.2.2.2-1 of the Modulation limiting characteristics. The J3E audio input level was constant at 10dB over the rated output power as per §2.1047(c). The output spectrum was investigated for the worst case in the frequency range of the transmitter, and the output form was commensurable with that shown in section 2.1 and 2.2 of this test data.

The equipment was tested in J3E mode included in the transmitter frequency range.

2.4.2 Test results

The results are shown from Fig. 2.4.2-1 to Fig. 2.4.2-12.

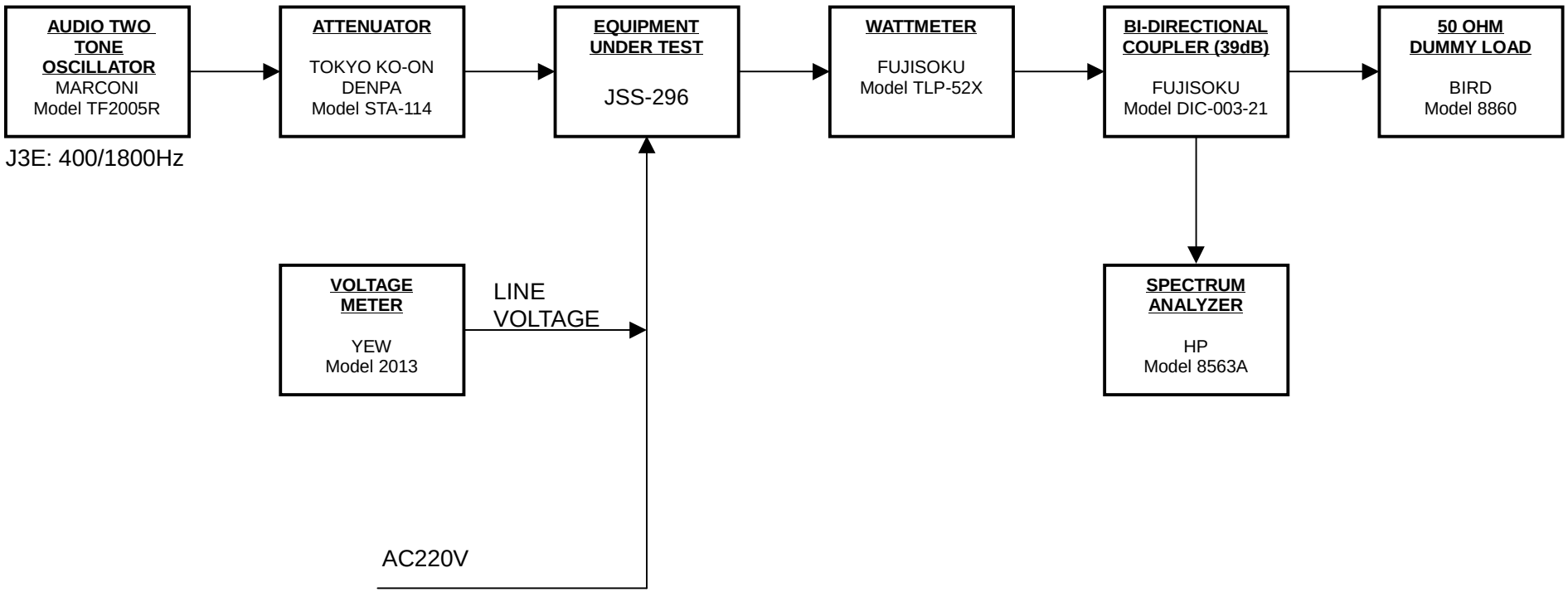


Fig. 2.4.1-1 Test set up for Spurious emissions at antenna terminal

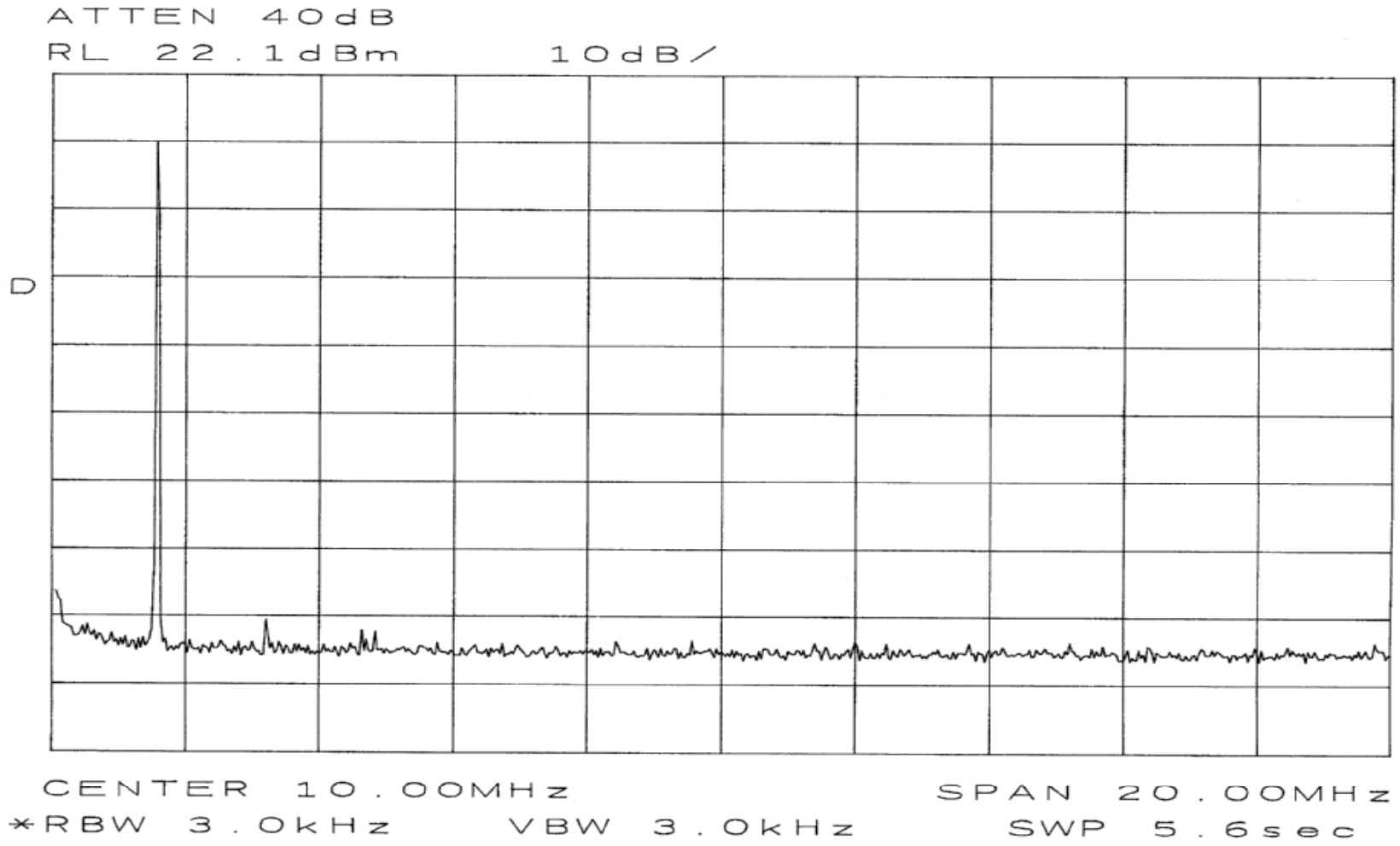


Fig. 2.4.2-1 Spurious emissions at antenna terminal

Frequency: 1619.0kHz
Mode: J3E
Line Voltage: AC220V

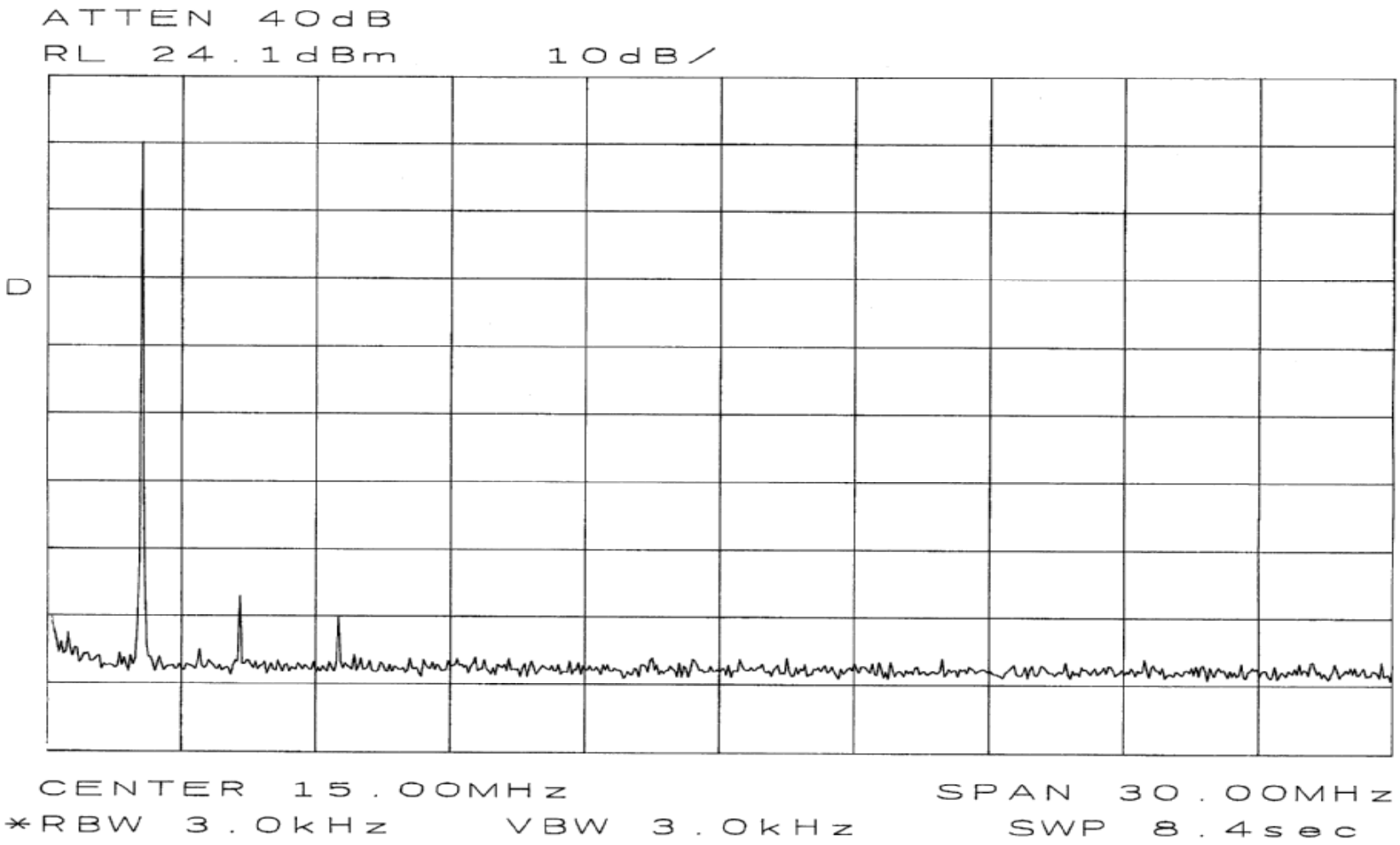


Fig. 2.4.2-2 Spurious emissions at antenna terminal

Frequency: 2182.0kHz
Mode: J3E
Line Voltage: AC220V

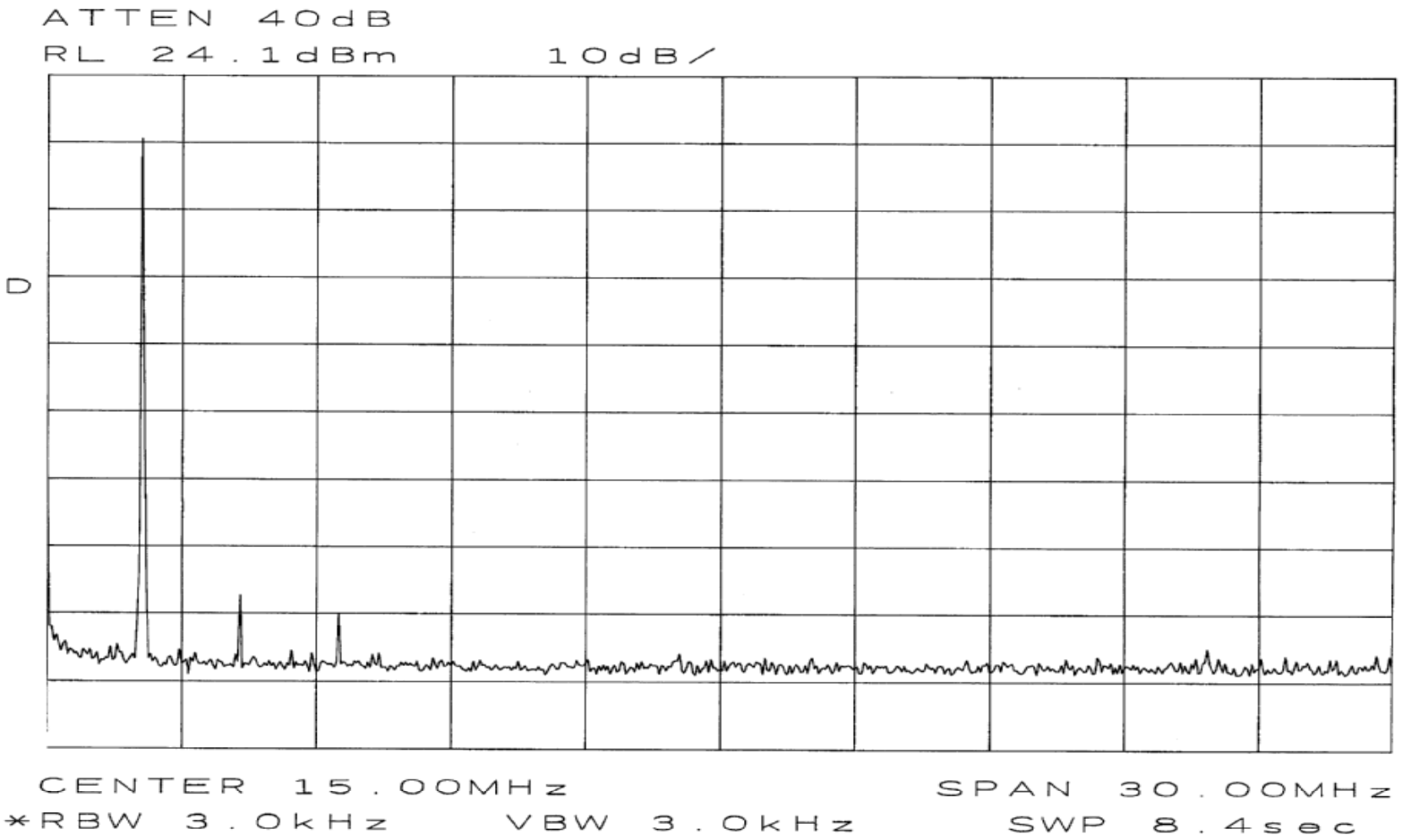


Fig. 2.4.2-3 Spurious emissions at antenna terminal

Frequency: 2187.5kHz
Mode: J3E
Line Voltage: AC220V

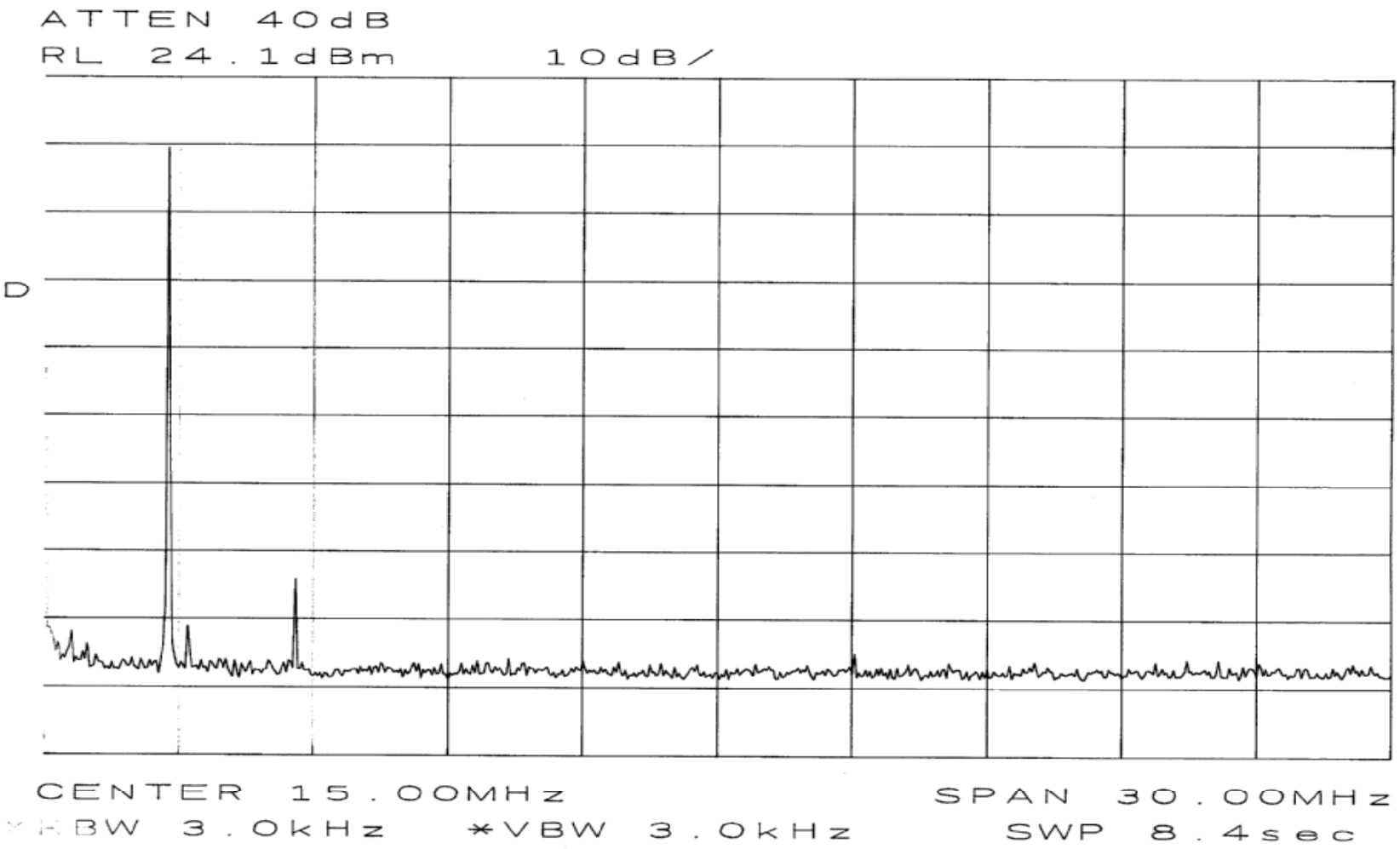


Fig. 2.4.2-4 Spurious emissions at antenna terminal

Frequency: 2830.0kHz
Mode: J3E
Line Voltage: AC220V

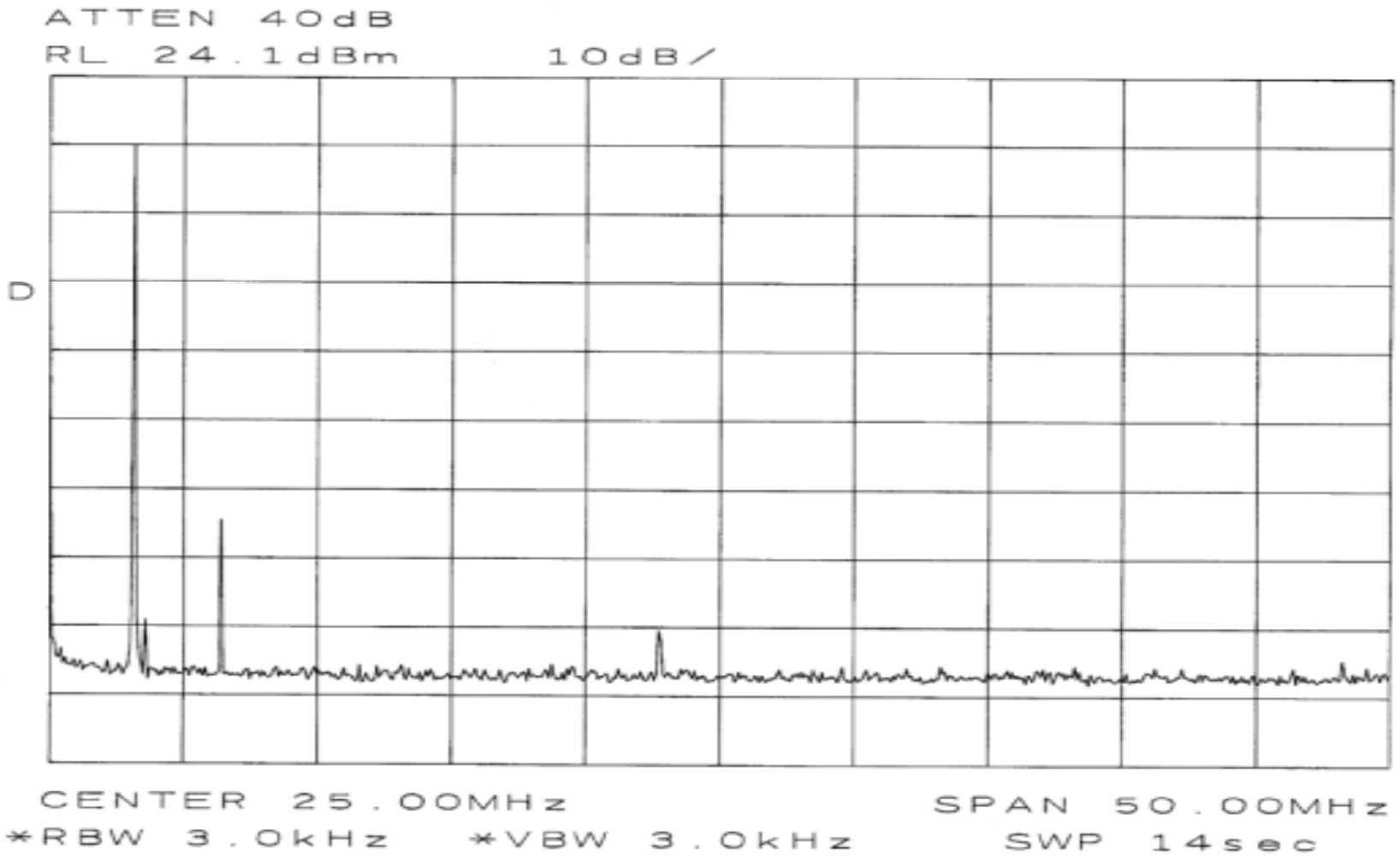


Fig. 2.4.2-5 Spurious emissions at antenna terminal

Frequency: 3258.0kHz
Mode: J3E
Line Voltage: AC220V

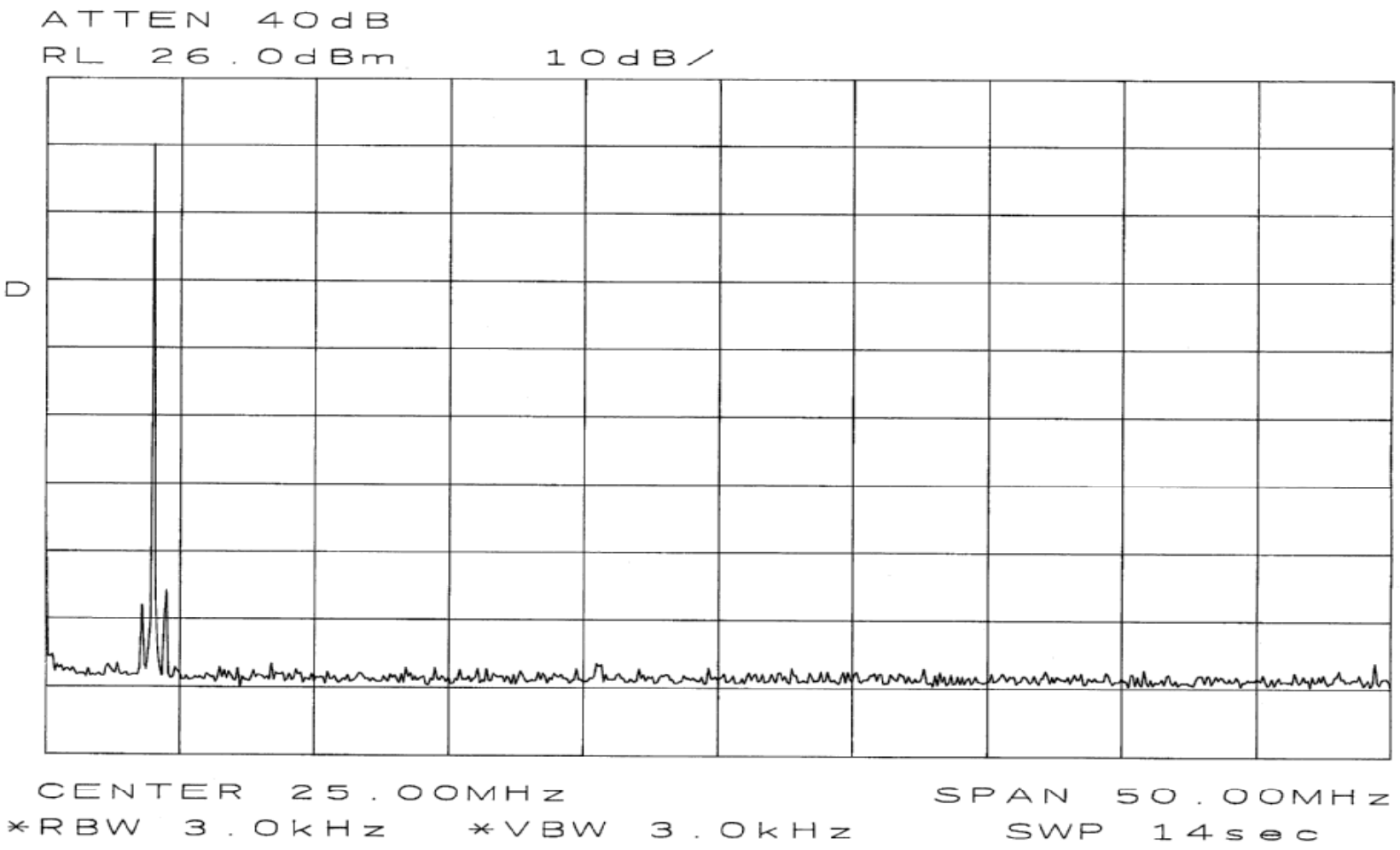


Fig. 2.4.2-6 Spurious emissions at antenna terminal

Frequency: 4112.0kHz
Mode: J3E
Line Voltage: AC220V

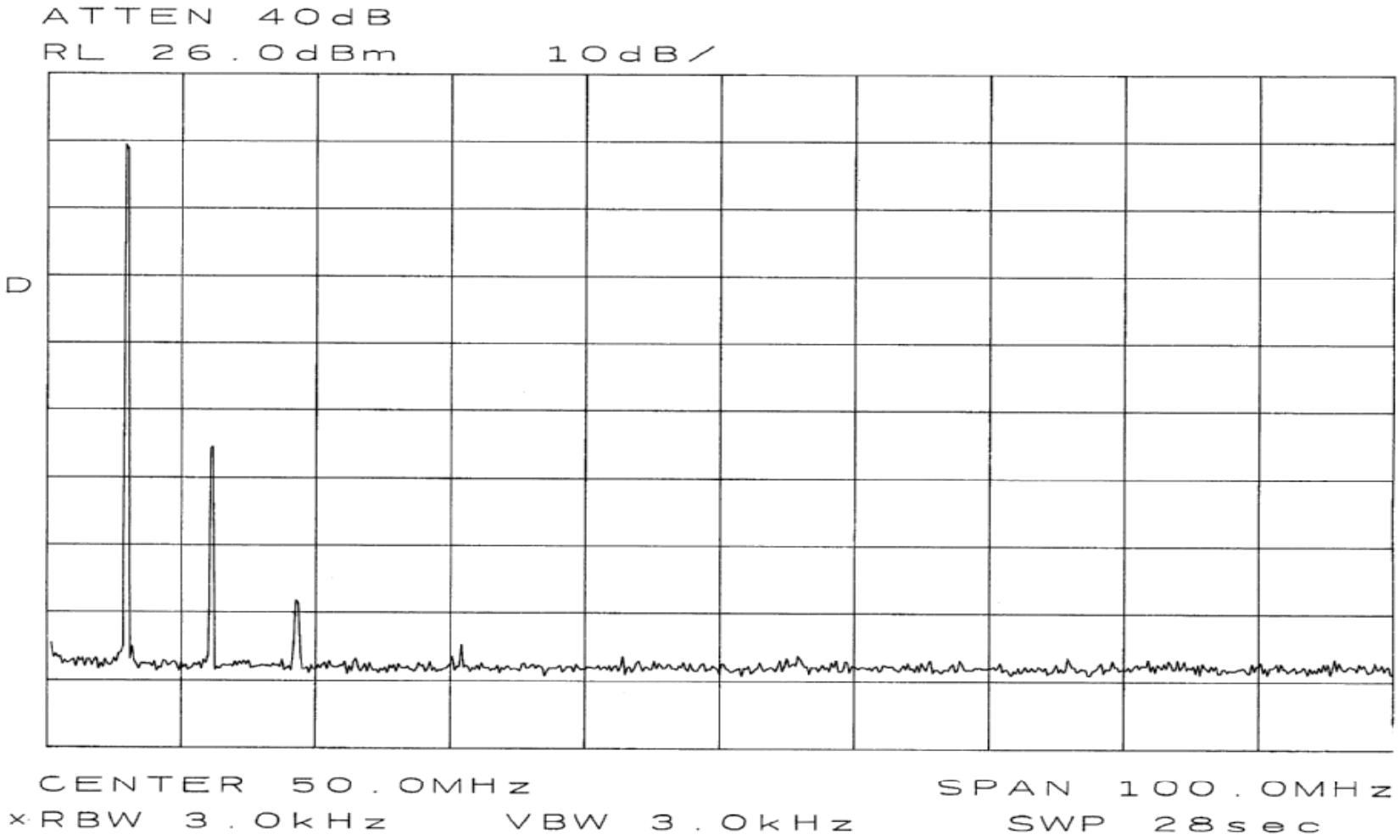


Fig. 2.4.2-7 Spurious emissions at antenna terminal

Frequency: 6212.0kHz
Mode: J3E
Line Voltage: AC220V

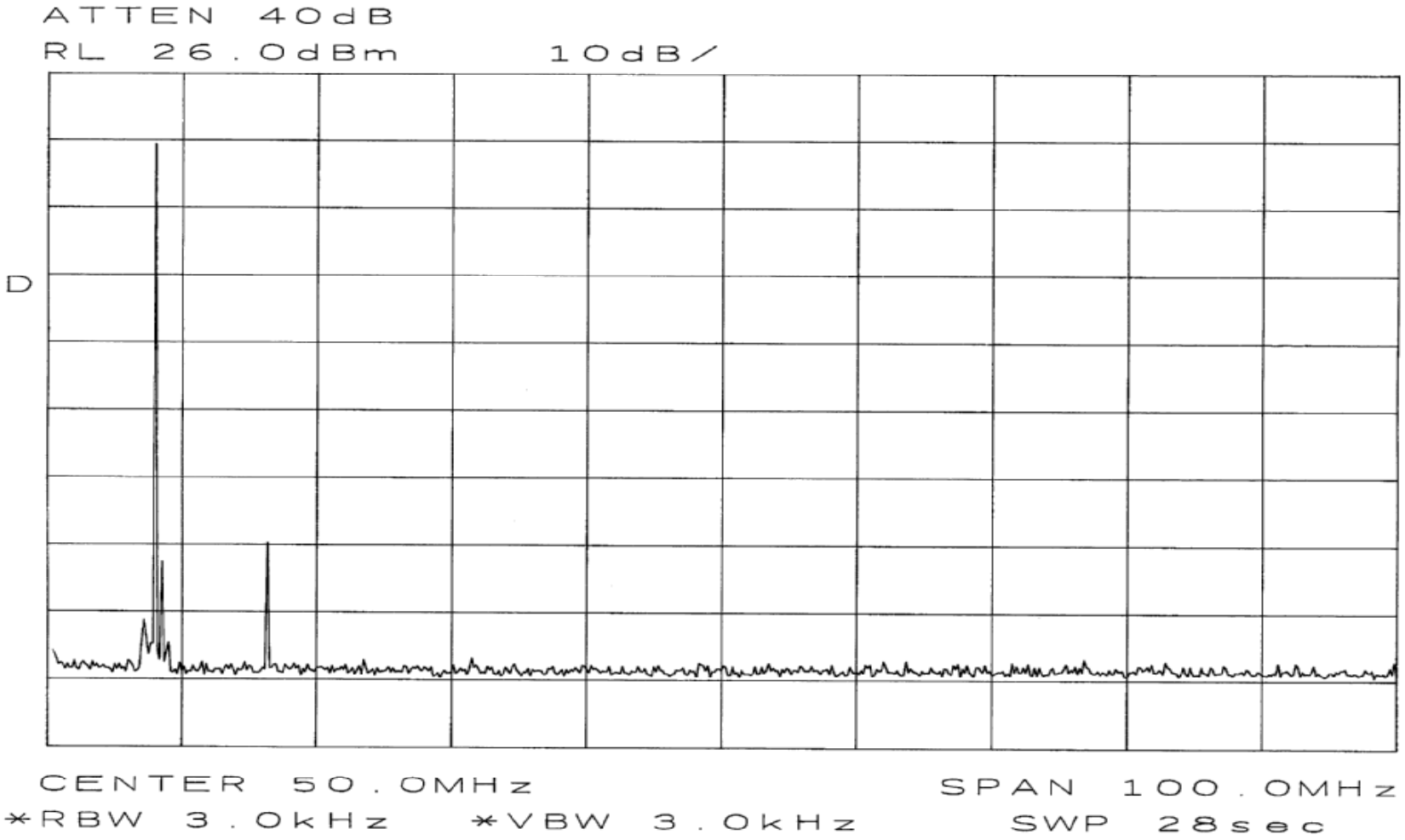


Fig. 2.4.2-8 Spurious emissions at antenna terminal

Frequency: 8238.0kHz
Mode: J3E
Line Voltage: AC220V

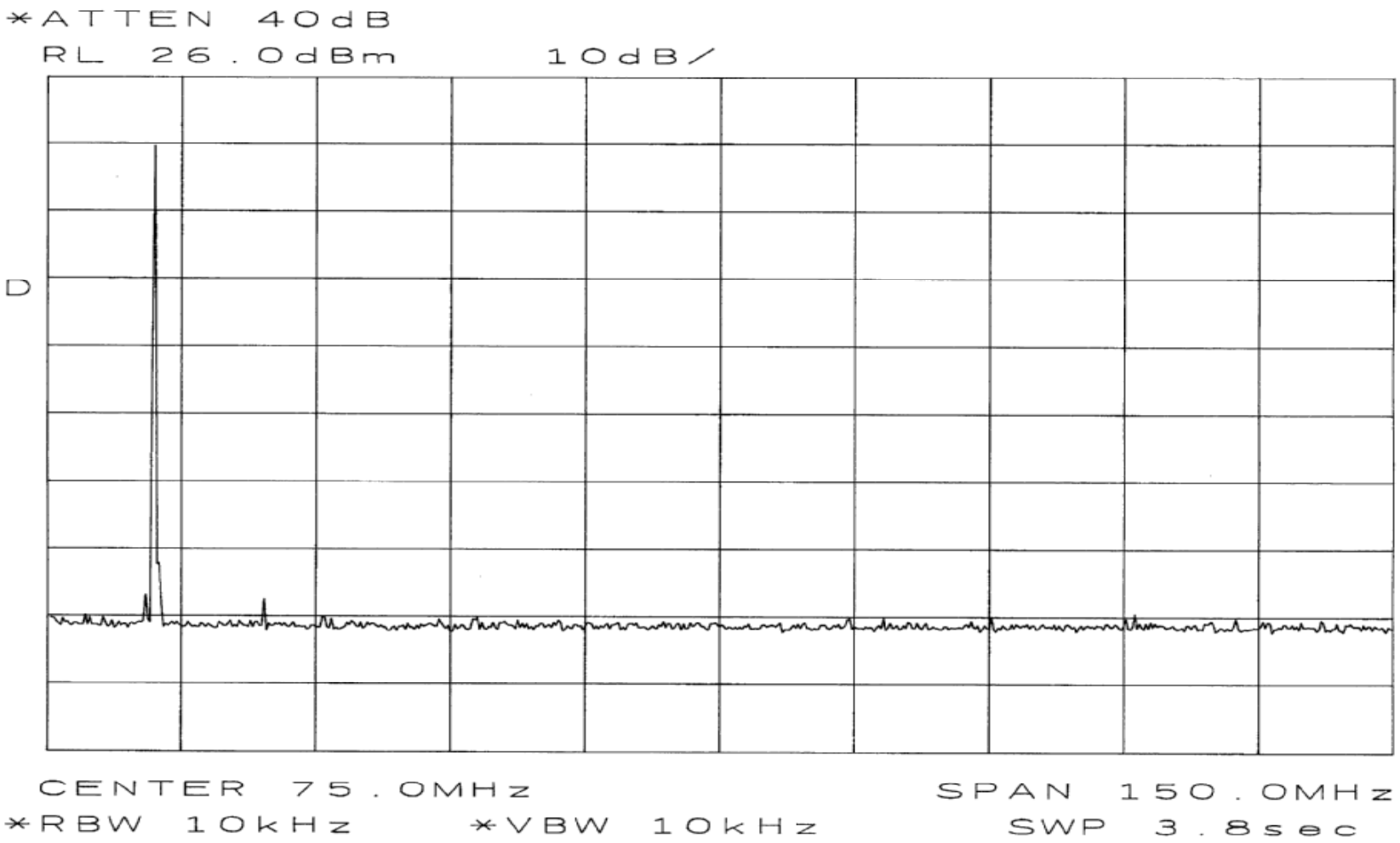


Fig. 2.4.2-9 Spurious emissions at antenna terminal

Frequency: 12339.0kHz
Mode: J3E
Line Voltage: AC220V

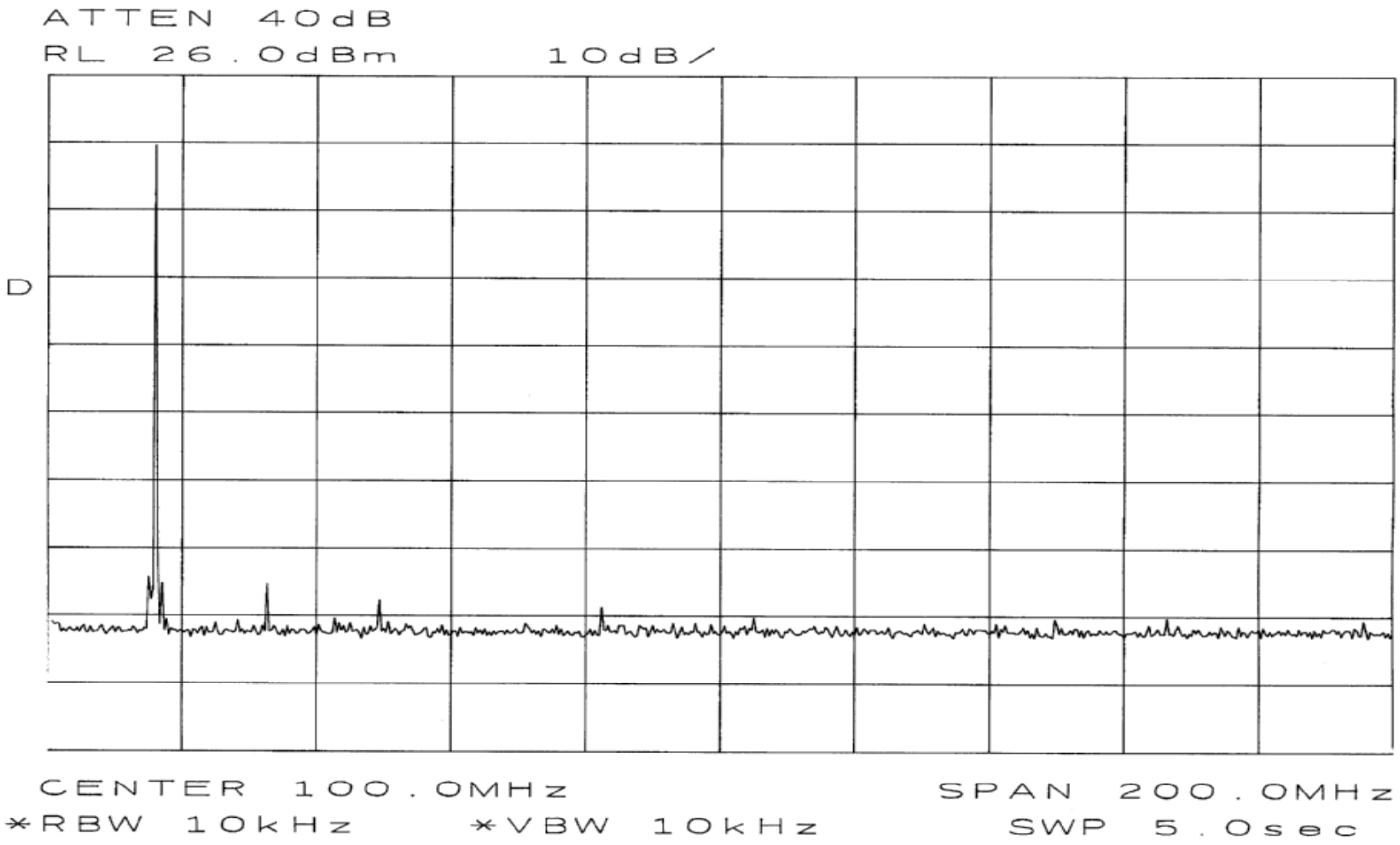


Fig. 2.4.2-10 Spurious emissions at antenna terminal

Frequency: 16525.0kHz
Mode: J3E
Line Voltage: AC220V

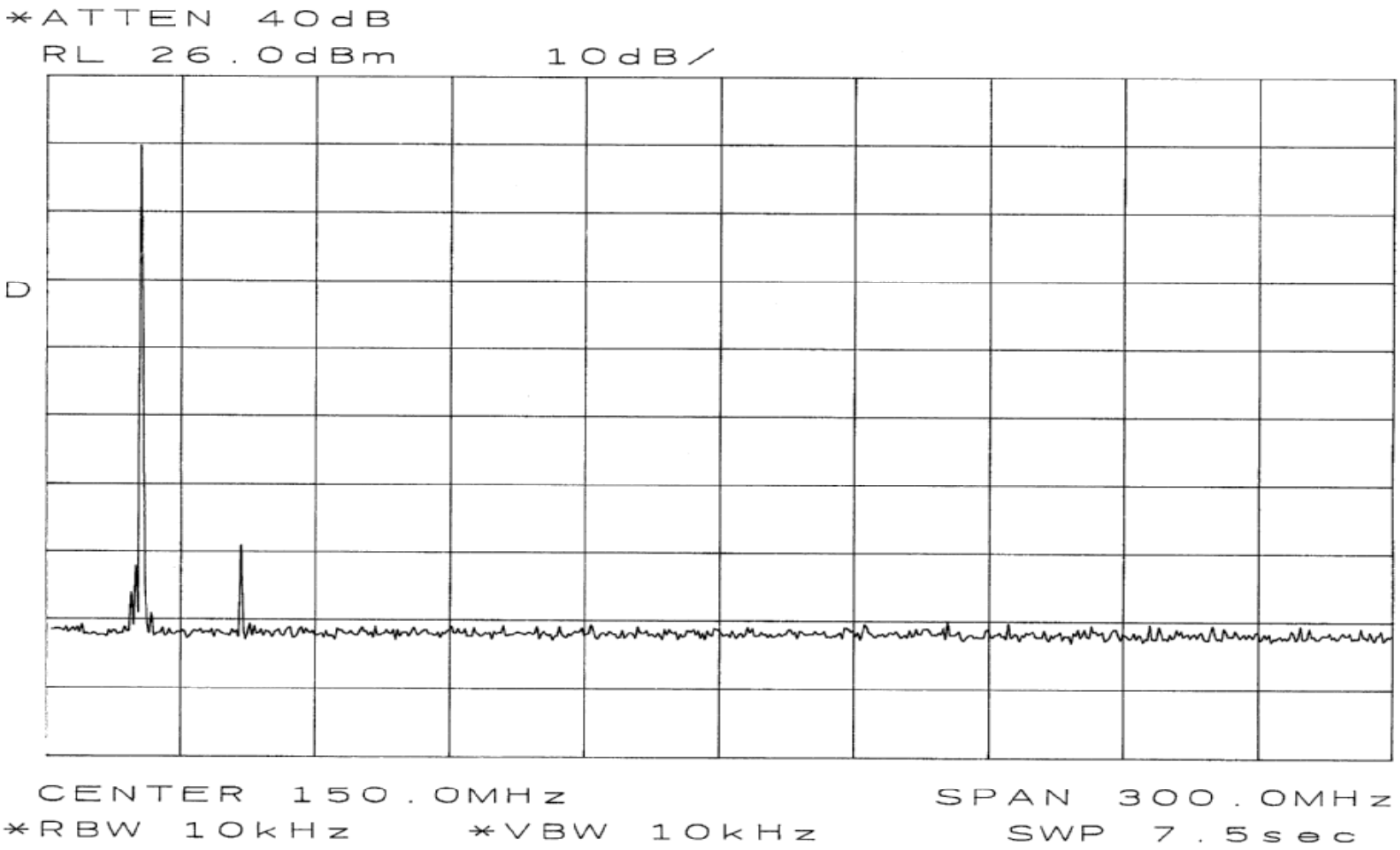


Fig. 2.4.2-11 Spurious emissions at antenna terminal

Frequency: 22093.0kHz
Mode: J3E
Line Voltage: AC220V

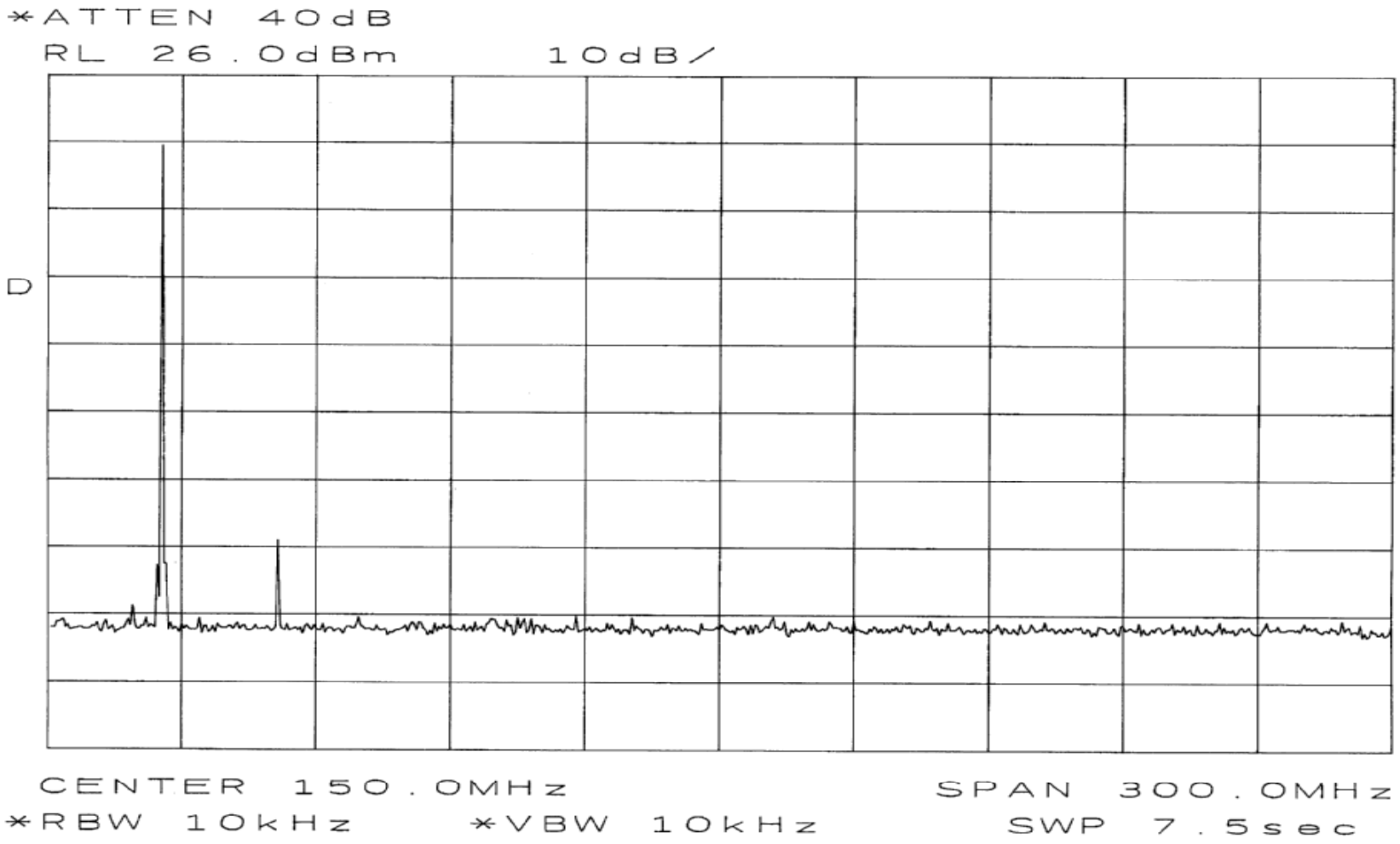


Fig. 2.4.2-12 Spurious emissions at antenna terminal

Frequency: 26175.0kHz
Mode: J3E
Line Voltage: AC220V

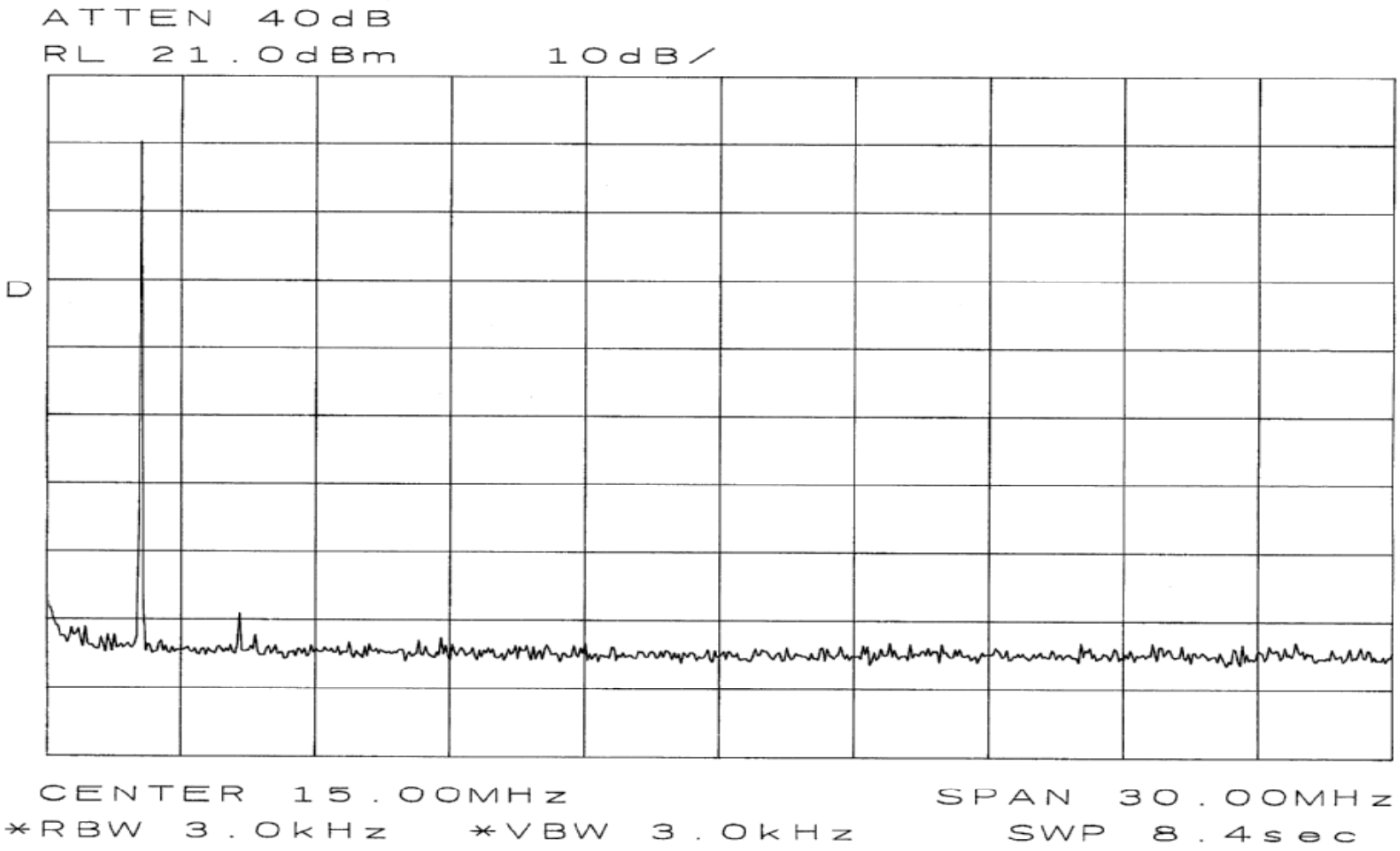


Fig. 2.4.2-13 Spurious emissions at antenna terminal

Frequency: 2182.0kHz
Mode: J3E
Line Voltage: DC24V

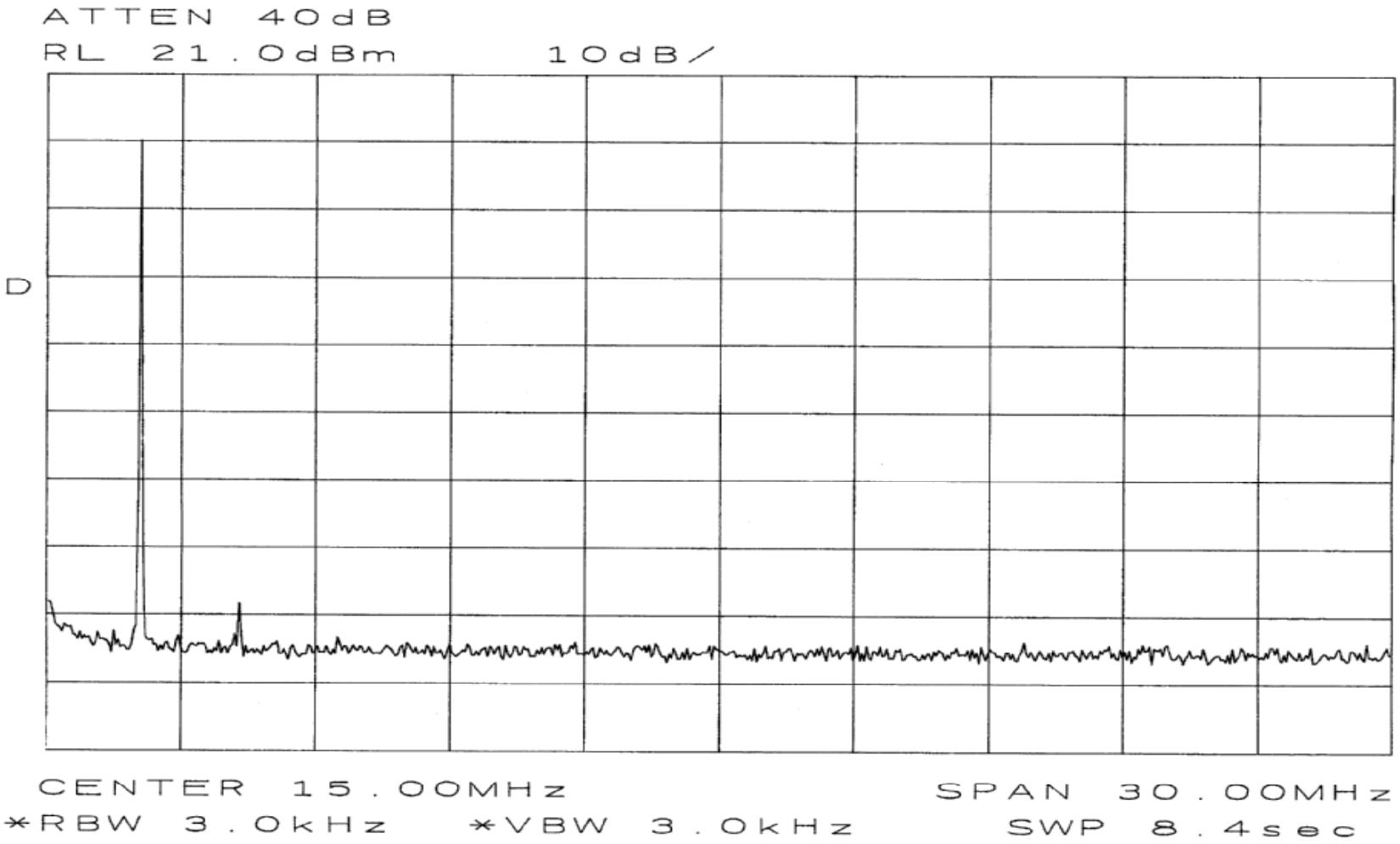


Fig. 2.4.2-14 Spurious emissions at antenna terminal

Frequency: 2187.5kHz
Mode: J3E
Line Voltage: DC24V

2.5 Field strength of spurious radiation [FCC §2.1053]

2.5.1 Test procedure

The transmitter was tested for radiated spurious emissions in J3E mode.

During this procedure, the transmitter was tuned to 26.175MHz and the input levels of two tones, 400Hz and 1800Hz, were so adjusted that the two principal frequency components of the radio frequency signal produced were equal in magnitude.

Initially, the radiating frequencies were identified and recorded within a shielded enclosure. The test set up was then re-located to an open field test site.

A nonconductive platform was used to support the transmitter and the dummy load. The power supply leads extended vertically downwards to a power supply located at the bottom of the nonconductive platform. The receiving antenna was located 3 meters from the transmitter during testing.

Two types of antenna were used whichever antenna corresponded to the portion of the spectrum being investigated. The actual magnitude of any unwanted signals was determined with a spectrum analyzer. The level of each spurious signal between 20MHz and 1000MHz was noted.
Field strength was ten calculated after adding the necessary cable losses and antenna correction factors. The reference field strength was calculated using the following equation.

$$E = ((49.2) \times (Pt))^{1/2} / D^*$$

Where : E = Field strength (V/Meter)
Pt = Transmitter power (Watts)
D = Distance from transmitter (Meters)

* “Reference Data for Radio Engineers”. Fifth Edition, Page 25-7.

2.5.2 Test results

Test results are shown in Table 2.5.2-1.
In all of the following tables, “c” refers to the fundamental carrier frequency of 26.175MHz. The spurious and harmonic radiated emissions are attenuated not less than 60.0dB.

Table 2.5.2-1 Field strength of spurious radiation

Test frequency: 26175.0kHz
Mode: J3E
Tone: 400/1800Hz
Line voltage: AC220V

Frequency	Field strength (uV/m)	Attenuation (dB)
1c	37.0×10^6	0
2c	1660	-87.0
3c	5451	-76.6
4c	1193	-89.8
5c	3265	-81.1
6c	841	-92.9
7c	2833	-82.3
8c	421	-98.9
9c	955	-91.8
10c	232	-104.1
11c	410	-99.1
12c	113	-110.3
13c	202	-105.3
14c	59	-115.9
15c	109	-110.6
16c	40	-119.3
17c	51	-117.2
18c	30	-121.8
19c	41	-119.1
20c	27	-122.7

2.6 Frequency stability
[FCC §2.1055(a)(1), §80.209(a)]

2.6.1 Frequency stability with temperature
[FCC §2.1055(a)(1),(b), §80.209(a)]

2.6.1.1 Test procedure

The Radio Equipment JSS-296 was placed in an environmental chamber with control and the equipment was connected as shown in Fig.2.6.1.1-1.

The power supply was set for AC220V and the voltage was monitored during the test. The RF output was fed to 50ohm dummy load and a sample was coupled to the frequency counter.

The equipment was set for the A1A mode. Two test were measured, one at 1619kHz and one at the highest frequency that the transmitter operates, 27499.9kHz.

The temperature chamber was lowed to –30℃ and the equipment was allowed to stabilize for one(1) hour. The transmitter was keyed and the frequency recorded. The temperature was raised in 10℃ steps to +50℃. The equipment was allowed to stabilize for 60 minutes. The frequency was recorded at each temperature after warm-up time.

2.6.1.2 Test results

Test results are shown in Table 2.6.1.2-1 and Fig. 2.6.1.2-1.

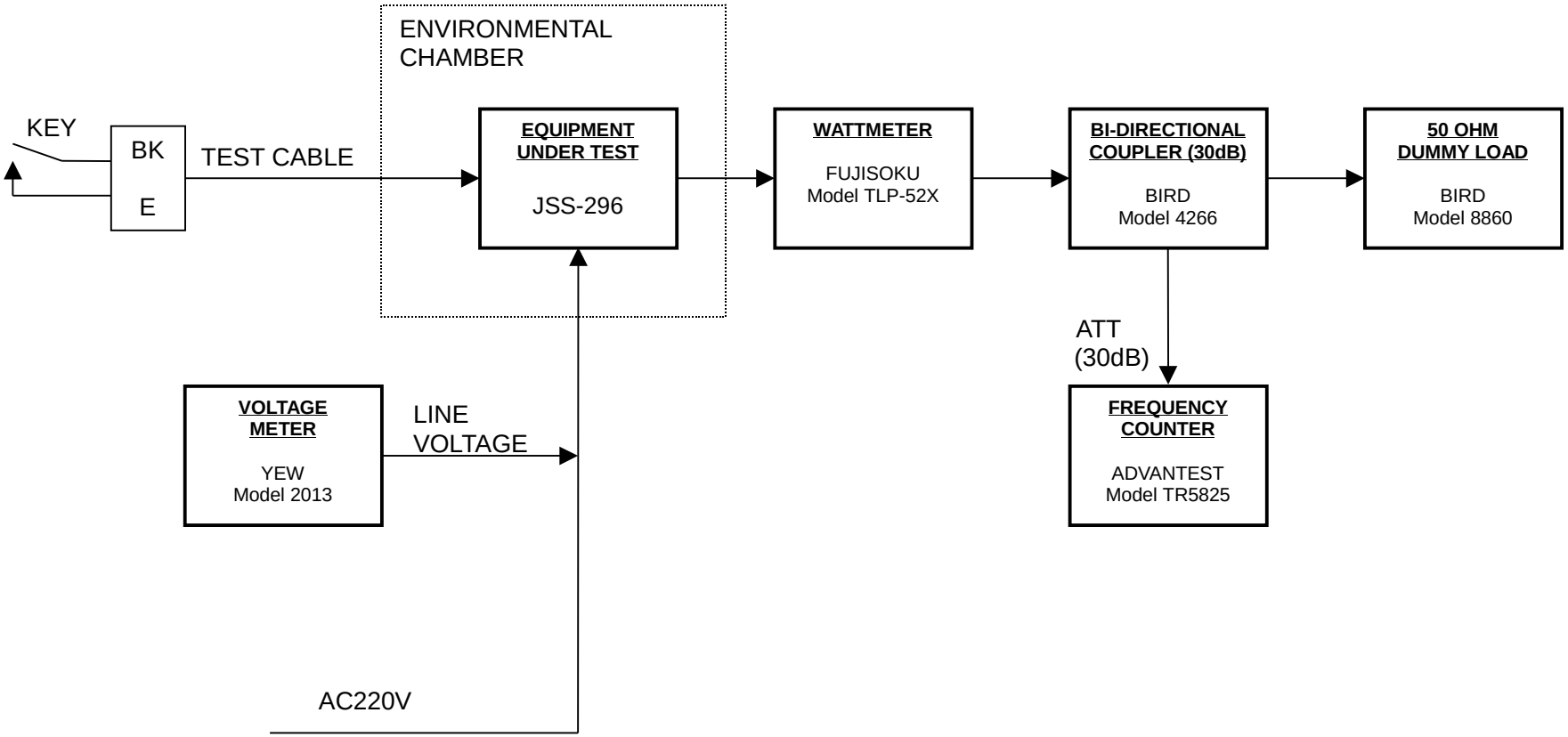


Fig. 2.6.1.1-1 Test set up for Frequency stability with temperature

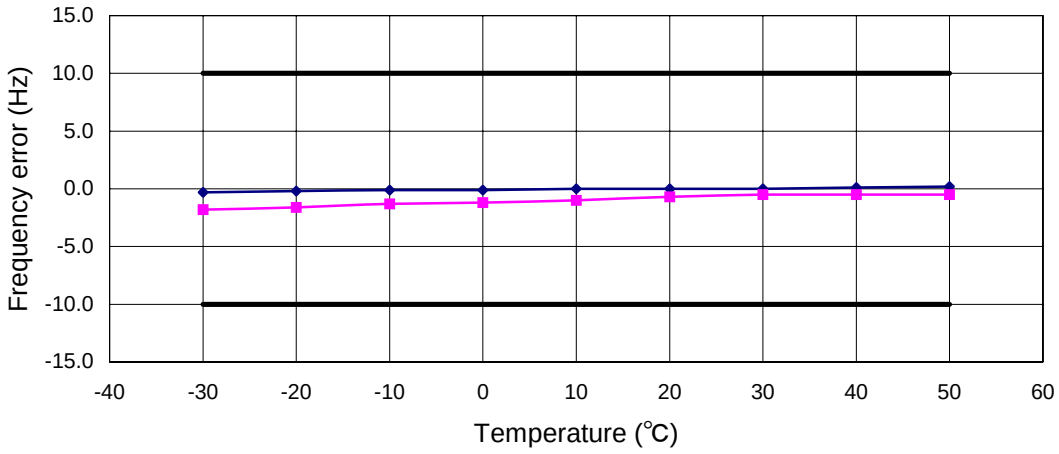
Table 2.6.1.2-1 Frequency stability with temperature

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Line voltage: AC220V

Temperature (℃)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
-30	-0.3	-1.8
-20	-0.2	-1.6
-10	-0.1	-1.3
0	-0.1	-1.2
10	0.0	-1.0
20	0.0	-0.7
30	0.0	-0.5
40	+0.1	-0.5
50	+0.2	-0.5

Fig. 2.6.1.2-1 Frequency stability with temperature

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Power source: AC220V



2.6.2 Frequency stability with primary supply voltage [FCC §2.1055(d)(1),(3), §80.209(a)]

2.6.2.1 Test procedure

The Radio Equipment JSS-296 was connected as shown in Fig.2.6.2.1-1.

The equipment was set for A1A. The frequency stability with varying line voltage was checked in power supply conditions of each AC operation and DC operation.

The AC voltage meter was used to measure the primary AC operation supply voltage. The DC voltage meter was used to measure the primary DC operation supply voltage.

(1) Measuring AC operation
The primary AC supply voltage was varied from 187 to 253 volts and the output frequency of the equipment under test in A1A mode was measured at both 1619.0kHz and 27499.9kHz

(2) Measuring DC operation
The primary DC supply voltage was varied from 20.4 to 27.6 volts and the output frequency of the equipment under test in A1A mode was measured at 2182.0kHz.

2.6.2.2 Test results

Test results are shown in table 2.6.2.2-1, table 2.6.2.2-2, Fig. 2.6.2.2-1, and Fig. 2.6.2.2-2.

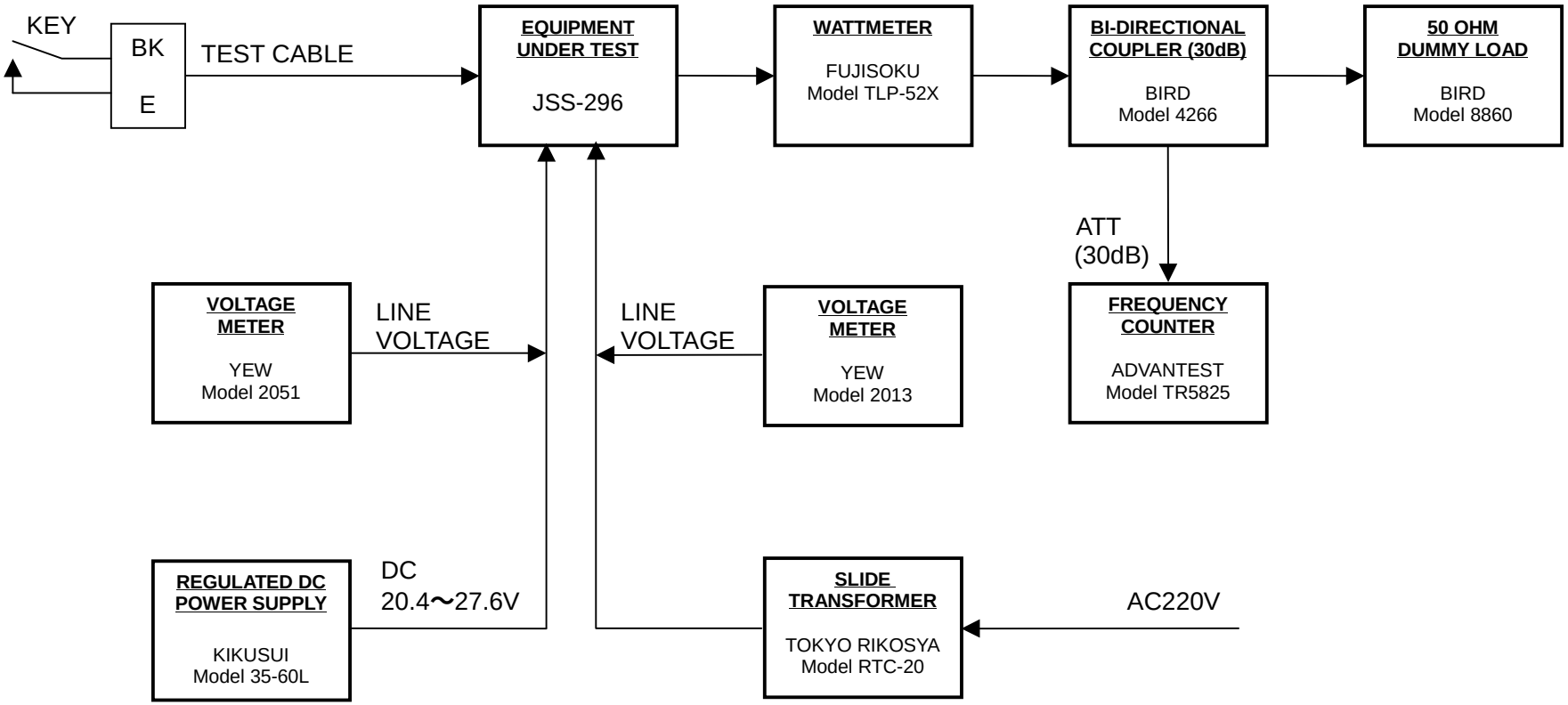


Fig. 2.6.2.1-1 Test set up for Frequency stability with primary supply voltage

Table 2.6.2.2-1 Frequency stability with primary supply voltage

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Line voltage: AC

Voltage variation (%)	Supply voltage (V)	Frequency error (Hz)	
		1619.0kHz	27499.9kHz
-15	187	0.0	-0.8
-10	198	0.0	-0.8
-5	209	0.0	-0.8
0	220	0.0	-0.8
5	231	0.0	-0.8
10	242	0.0	-0.8
15	253	0.0	-0.8

Fig. 2.6.2.2-1 Frequency stability with primary supply voltage

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Power source: AC

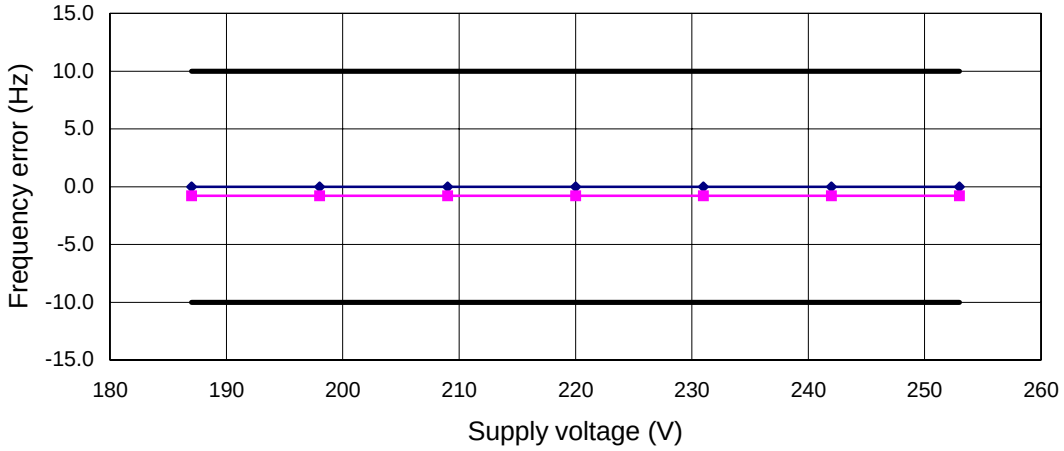


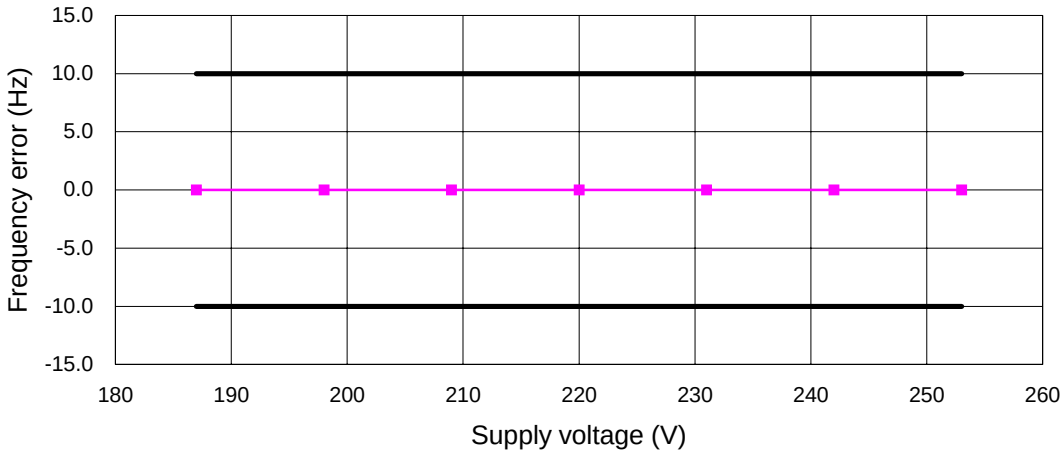
Table 2.6.2.2-2 Frequency stability with primary supply voltage

Test frequency: 2182.0kHz
Mode: A1A
Line voltage: DC24V

Voltage variation (%)	Supply voltage (V)	Frequency error (Hz)
-15	20.4	0.0
-10	21.6	0.0
-5	22.8	0.0
0	24.0	0.0
5	25.2	0.0
10	26.4	0.0
15	27.6	0.0

Fig. 2.6.2.2-2 Frequency stability with primary supply voltage

Test frequency: 2182.0kHz
Mode: A1A
Power source: DC24V



2.6.3 Frequency stability from cold start
[FCC §2.1055(c)(1),(2), §80.209(a)]

The Radio Equipment JSS-296 uses a DTCXO (non-crystal oven) as a reference generator from which the synthesizer derives all output frequencies. The reference generator is 0.3ppm over a temperature range from –30℃ to +55℃.

Note: DTCXO = Digitally Temperature Control Crystal Oscillator

2.6.2.1 Test procedure

The Radio Equipment JSS-296 was placed in an environmental chamber with control and the equipment was connected as shown in Fig.2.6.3.1-1.

The equipment was measured at –30℃ to +50℃ (10℃ step) and was set for A1A mode.

Two test were measured, one at 1619kHz and one at the highest frequency that the transmitter operates, 27499.9kHz.

The temperature chamber was lowed to –30℃ and the equipment was allowed to stabilize for one(1) hour with no primary power applied.

The primary power was then applied and the equipment was immediately keyed and the frequency was recorded. The equipment was keyed and frequency recorded at one-minute intervals up to 10 minutes, at two minutes intervals between 10 and 20 minutes, and then, the frequency was recorded every 5 minutes.

The primary power was then removed and the chamber temperature was raised in -20℃, and stabilized for 60 minutes after which the measurement was repeated.

2.6.2.2 Test results

Test results are shown from Table 2.6.3.2-1 to Table 2.6.3.2-9 and from Fig. 2.6.3.2-1 to Fig. 2.6.3.2-9.

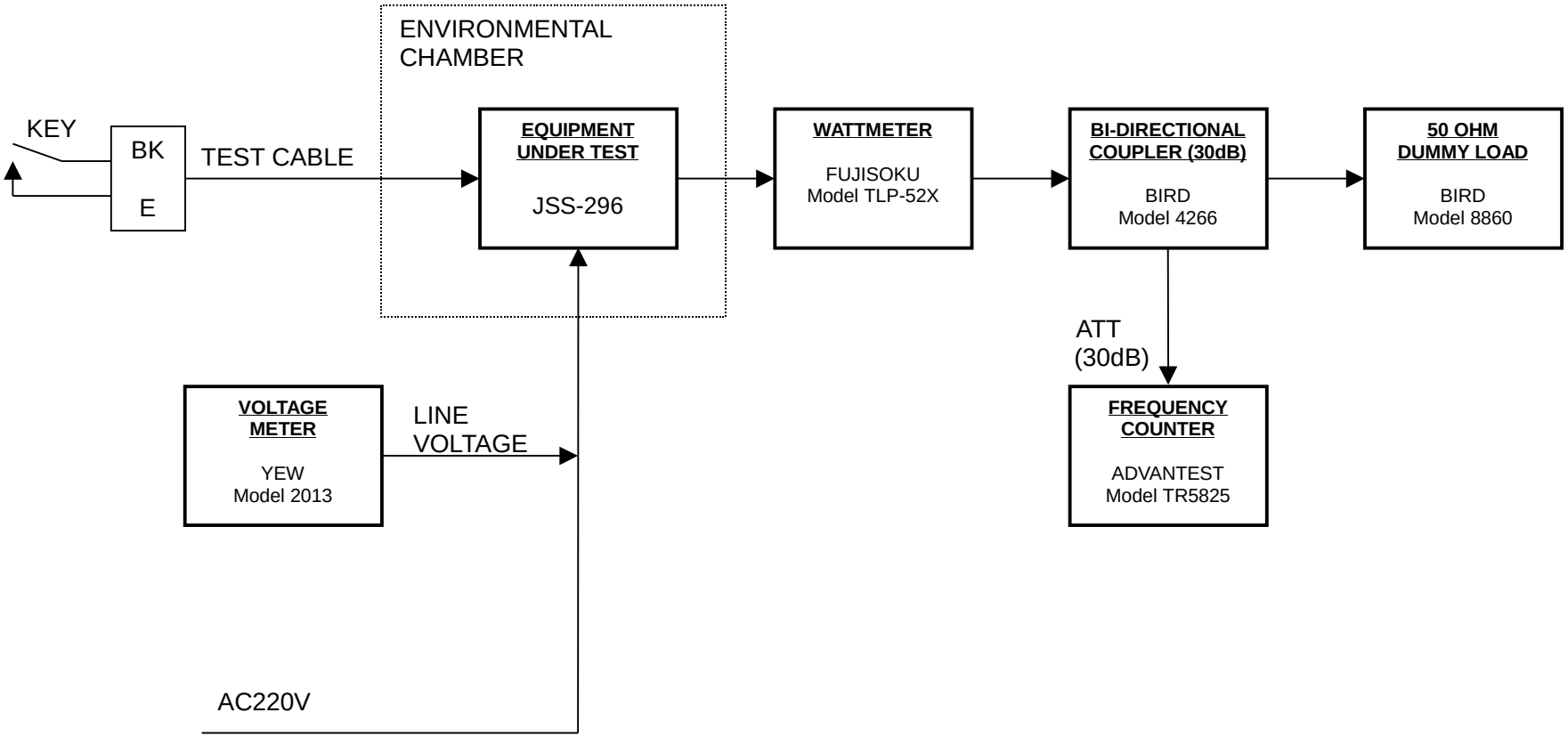


Fig. 2.6.3.1-1 Test set up for Frequency stability from cold start

Table 2.6.3.2-1 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -30℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	-0.1	-1.5
1	-0.1	-1.5
2	-0.2	-1.5
3	-0.1	-1.5
4	-0.1	-1.4
5	-0.1	-1.4
6	-0.1	-1.4
7	-0.2	-1.4
8	-0.2	-1.4
9	-0.1	-1.3
10	-0.1	-1.3
12	-0.2	-1.3
14	-0.2	-1.3
16	-0.1	-1.3
18	-0.1	-1.3
20	-0.1	-1.3
25	-0.1	-1.3
30	-0.2	-1.3
35	-0.1	-1.3
40	-0.1	-1.3
45	-0.1	-1.3
50	-0.1	-1.3
55	-0.1	-1.3
60	-0.1	-1.3

Fig. 2.6.3.2-1 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -30℃
Line voltage: AC220V

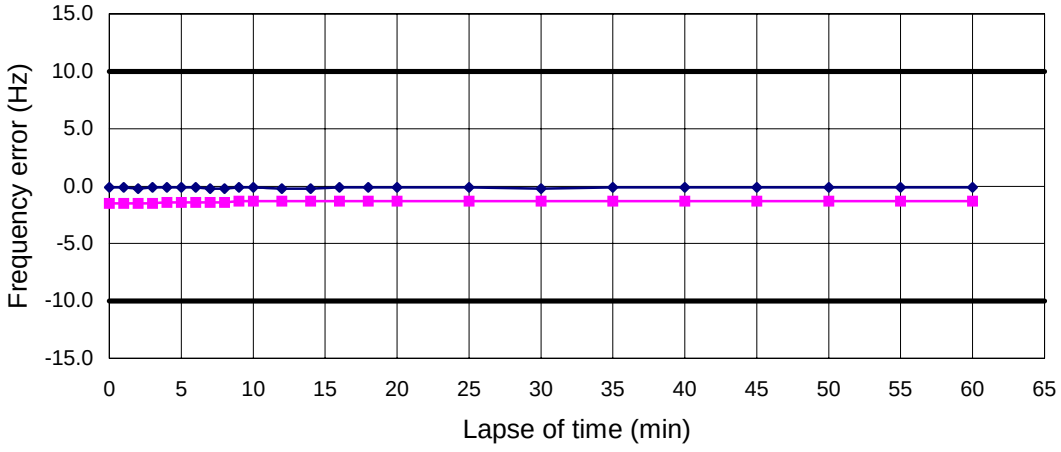


Table 2.6.3.2-2 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -20℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	-0.1	-1.3
1	-0.2	-1.3
2	-0.2	-1.3
3	-0.2	-1.3
4	-0.2	-1.4
5	-0.1	-1.4
6	-0.2	-1.4
7	-0.2	-1.3
8	-0.2	-1.3
9	-0.1	-1.4
10	-0.2	-1.3
12	-0.1	-1.3
14	-0.1	-1.3
16	-0.1	-1.3
18	-0.1	-1.3
20	-0.1	-1.3
25	-0.1	-1.2
30	-0.1	-1.2
35	-0.1	-1.2
40	-0.1	-1.2
45	-0.1	-1.2
50	-0.1	-1.3
55	-0.1	-1.2
60	-0.1	-1.2

Fig. 2.6.3.2-2 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -20℃
Line voltage: AC220V

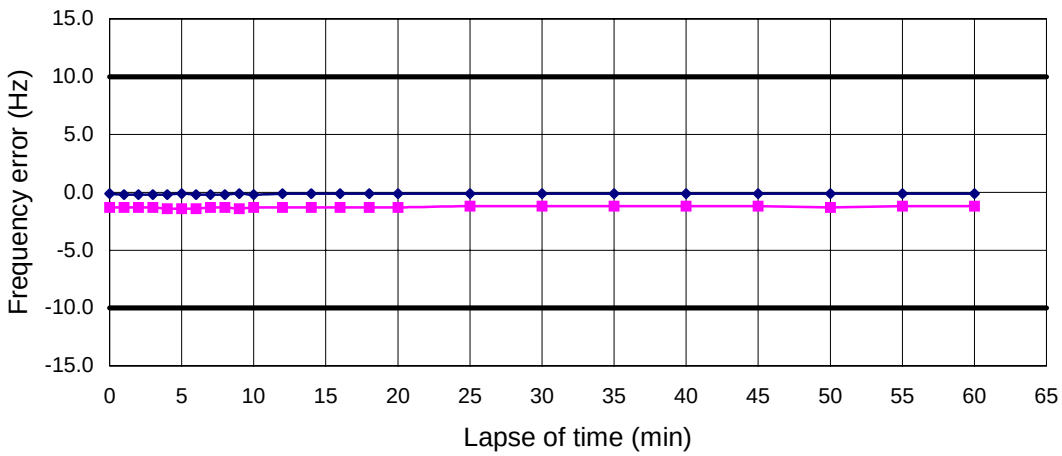


Table 2.6.3.2-3 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -10℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	-0.1	-1.3
1	0.0	-1.3
2	0.0	-1.3
3	-0.1	-1.3
4	-0.1	-1.3
5	-0.1	-1.3
6	-0.1	-1.3
7	-0.1	-1.3
8	0.0	-1.3
9	0.0	-1.3
10	0.0	-1.3
12	-0.1	-1.3
14	-0.1	-1.3
16	-0.1	-1.2
18	0.0	-1.3
20	0.0	-1.3
25	0.0	-1.2
30	0.0	-1.2
35	-0.1	-1.2
40	-0.1	-1.2
45	0.0	-1.2
50	-0.1	-1.2
55	-0.1	-1.2
60	-0.1	-1.2

Fig. 2.6.3.2-3 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: -10℃
Line voltage: AC220V

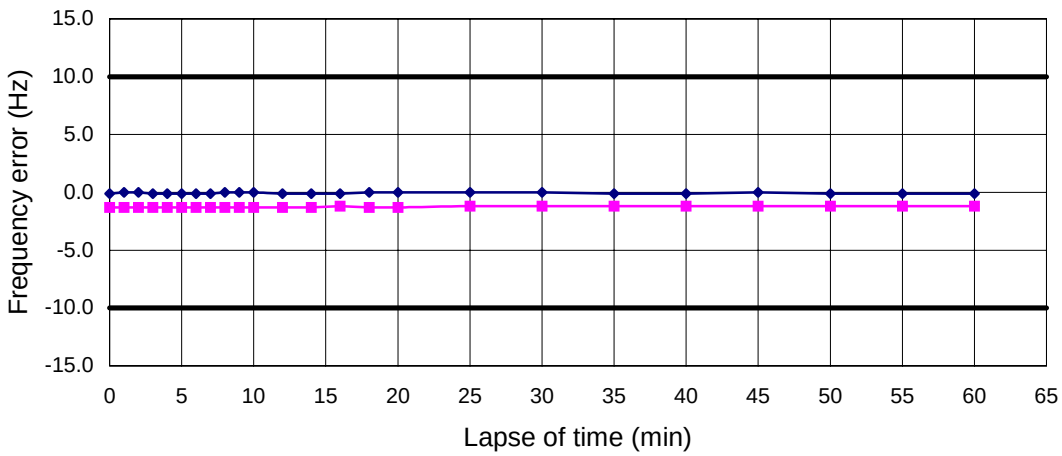


Table 2.6.3.2-4 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 0℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	-0.1	-1.2
1	-0.1	-1.2
2	-0.1	-1.2
3	-0.1	-1.2
4	-0.1	-1.2
5	-0.1	-1.2
6	-0.1	-1.1
7	-0.1	-1.1
8	-0.1	-1.1
9	-0.1	-1.1
10	-0.1	-1.1
12	-0.1	-1.1
14	-0.1	-1.1
16	-0.1	-1.1
18	-0.1	-1.1
20	-0.1	-1.1
25	-0.1	-1.1
30	-0.1	-1.1
35	-0.1	-1.1
40	-0.1	-1.1
45	-0.1	-1.1
50	-0.1	-1.1
55	-0.1	-1.1
60	-0.1	-1.1

Fig. 2.6.3.2-4 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 0℃
Line voltage: AC220V

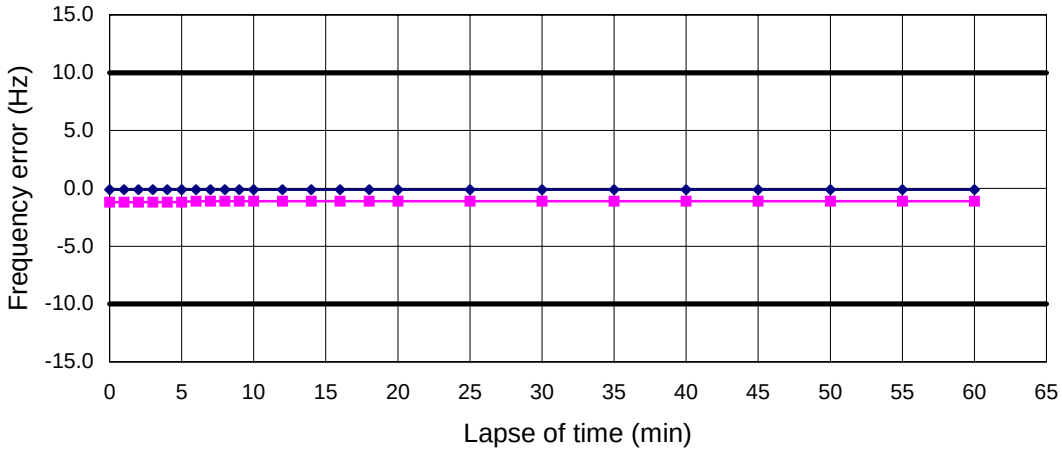


Table 2.6.3.2-5 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 10℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	-0.1	-0.9
1	-0.1	-0.9
2	-0.1	-0.9
3	-0.1	-0.8
4	-0.1	-0.8
5	-0.1	-0.8
6	-0.1	-0.9
7	-0.1	-0.8
8	-0.1	-0.8
9	-0.1	-0.9
10	-0.1	-0.9
12	-0.1	-0.8
14	0.0	-0.8
16	0.0	-0.8
18	0.0	-0.8
20	0.0	-0.8
25	0.0	-0.8
30	0.0	-0.8
35	0.0	-0.8
40	0.0	-0.8
45	0.0	-0.8
50	0.0	-0.8
55	0.0	-0.8
60	0.0	-0.8

Fig. 2.6.3.2-5 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 10℃
Line voltage: AC220V

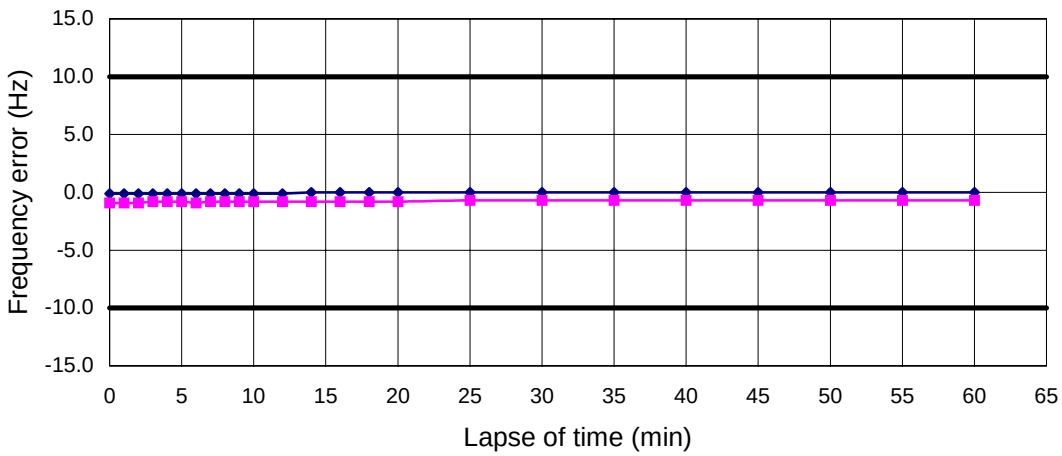


Table 2.6.3.2-6 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 20℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	+0.1	-0.9
1	+0.1	-0.9
2	0.0	-0.8
3	0.0	-0.8
4	0.0	-0.9
5	0.0	-0.9
6	0.0	-0.9
7	0.0	-0.8
8	0.0	-0.8
9	0.0	-0.8
10	0.0	-0.8
12	0.0	-0.8
14	0.0	-0.8
16	0.0	-0.8
18	0.0	-0.8
20	0.0	-0.8
25	0.0	-0.8
30	0.0	-0.8
35	0.0	-0.8
40	0.0	-0.8
45	0.0	-0.8
50	0.0	-0.8
55	0.0	-0.8
60	0.0	-0.8

Fig. 2.6.3.2-6 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 20℃
Line voltage: AC220V

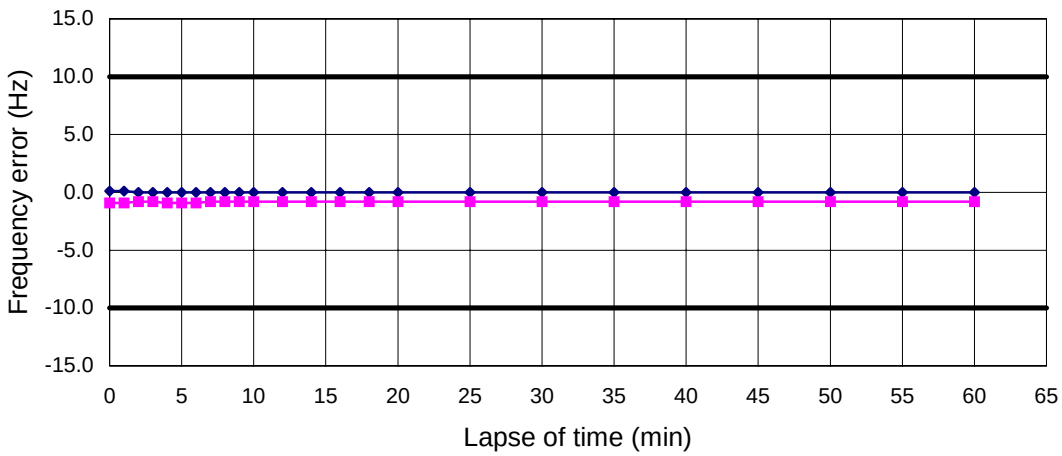


Table 2.6.3.2-7 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 30℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	0.0	-0.6
1	0.0	-0.6
2	0.0	-0.6
3	0.0	-0.7
4	0.0	-0.7
5	0.0	-0.7
6	0.0	-0.8
7	0.0	-0.8
8	0.0	-0.8
9	0.0	-0.8
10	0.0	-0.8
12	0.0	-0.8
14	0.0	-0.8
16	0.0	-0.8
18	0.0	-0.8
20	0.0	-0.8
25	0.0	-0.8
30	0.0	-0.8
35	0.0	-0.8
40	+0.1	-0.8
45	0.0	-0.8
50	0.0	-0.8
55	0.0	-0.8
60	0.0	-0.8

Fig. 2.6.3.2-7 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 30℃
Line voltage: AC220V

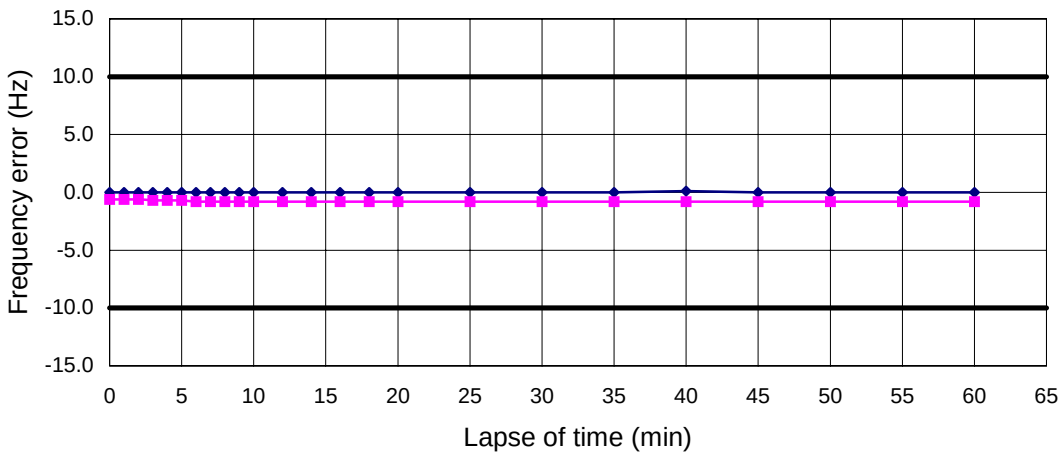


Table 2.6.3.2-8 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 40℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	+0.1	-0.7
1	+0.2	-0.7
2	+0.2	-0.7
3	+0.1	-0.7
4	+0.1	-0.7
5	+0.1	-0.7
6	+0.1	-0.6
7	+0.1	-0.6
8	+0.1	-0.6
9	+0.1	-0.6
10	+0.1	-0.6
12	+0.1	-0.7
14	+0.1	-0.7
16	+0.1	-0.7
18	+0.1	-0.7
20	+0.1	-0.6
25	+0.1	-0.6
30	+0.2	-0.6
35	+0.1	-0.6
40	+0.1	-0.6
45	+0.1	-0.6
50	+0.1	-0.6
55	+0.1	-0.6
60	+0.1	-0.6

Fig. 2.6.3.2-8 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 40℃
Line voltage: AC220V

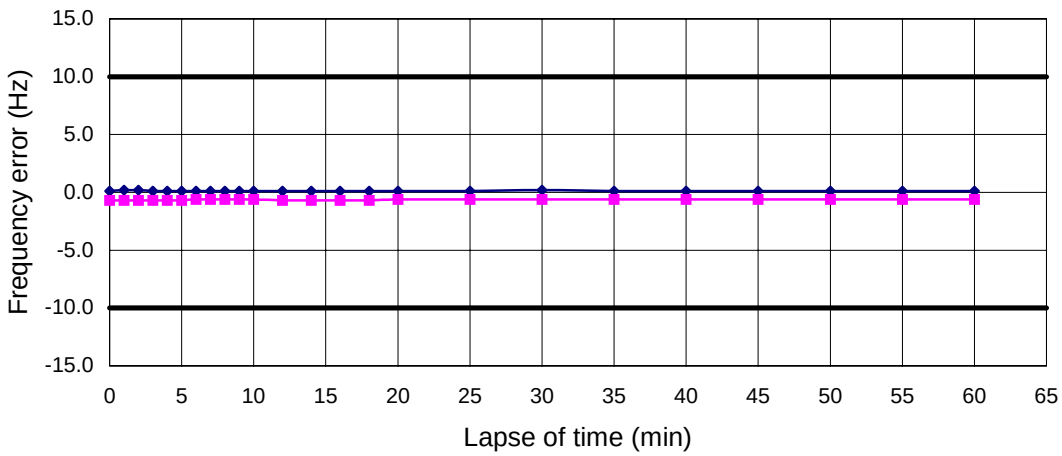


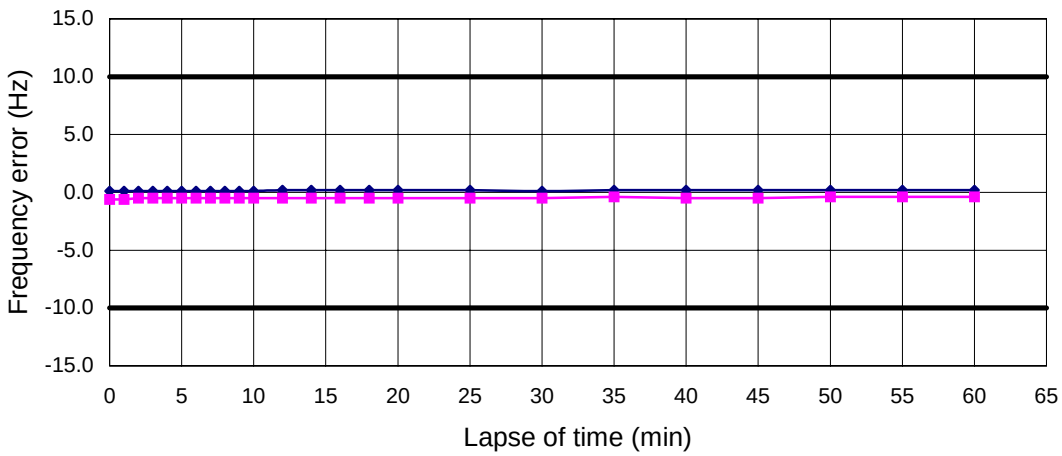
Table 2.6.3.2-9 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 50℃
Line voltage: AC220V

Lapse of time (min)	Frequency error (Hz)	
	1619.0kHz	27499.9kHz
0	+0.1	-0.6
1	+0.1	-0.6
2	+0.1	-0.5
3	+0.1	-0.5
4	+0.1	-0.5
5	+0.1	-0.5
6	+0.1	-0.5
7	+0.1	-0.5
8	+0.1	-0.5
9	+0.1	-0.5
10	+0.1	-0.5
12	+0.2	-0.5
14	+0.2	-0.5
16	+0.2	-0.5
18	+0.2	-0.5
20	+0.2	-0.5
25	+0.2	-0.5
30	+0.1	-0.5
35	+0.2	-0.4
40	+0.2	-0.5
45	+0.2	-0.5
50	+0.2	-0.4
55	+0.2	-0.4
60	+0.2	-0.4

Fig. 2.6.3.2-9 Frequency stability from cold start

Test frequency: 1619.0kHz and 27499.9kHz
Mode: A1A
Temperature: 50℃
Line voltage: AC220V

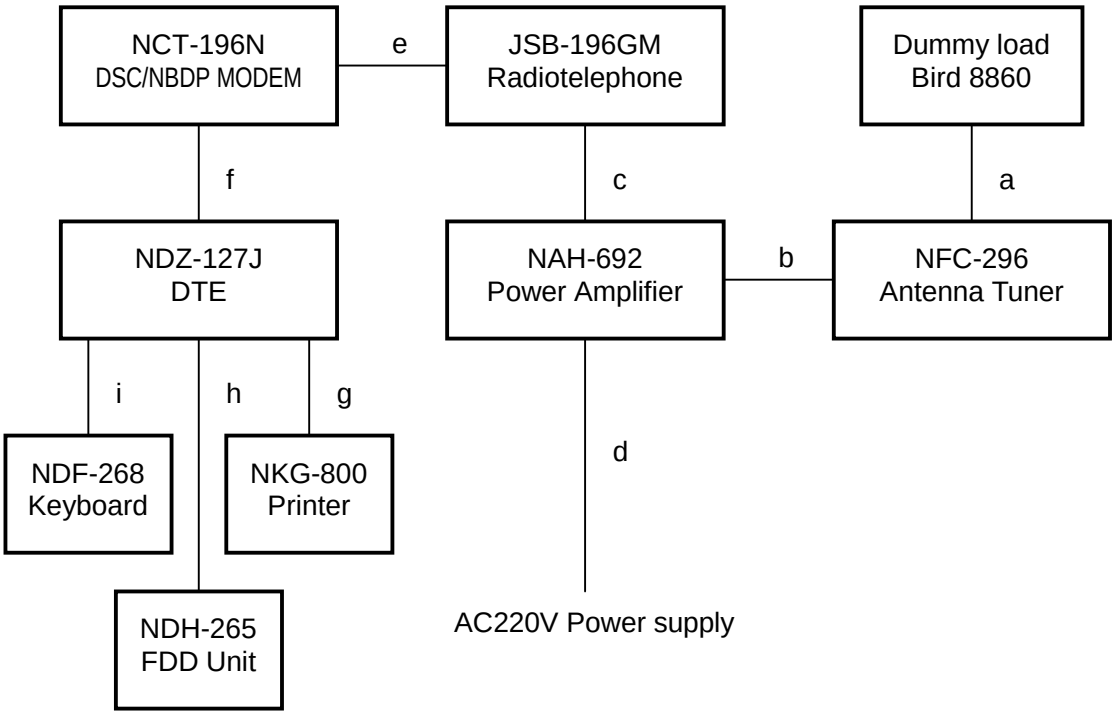


2.7 Interference
[FCC §15.207, §15.209]

2.7.1 Description of equipment

The equipment under test is JSS-296 which is consists of JSB-196GM Radiotelephone, NCT-196N DSC/NBDP MODEM, NAH-692 Power Amplifier, NFC-296 Antenna tuner, NDZ-127J DTE, NDF-268 Keyboard, NKG-800 Printer, and NDH-265 FDD unit.

2.7.2 Set up of testing



a. RF coaxial cable
b. RF coaxial cable and Control cable
c. Power supply cable and Control cable
d. Power supply cable
e. Power supply cable and Control cable
f. Power supply cable and Control cable
g. Power supply cable and Printer cable
h. FDD Control cable
i. Keyboard cable

2.7.3 Test procedure

The equipment was tested on the marine band at three frequencies, 2187.5kHz, 12577.0kHz and 26400.0kHz with J3E mode.

(1) Conducted interference

The line-impedance stabilization network (LISN) was connected between the equipment under test JSS-296 and primary power supply.
The actual magnitude of any unwanted signals was measured with the spectrum analyzer and the test receiver. The level of each unwanted signal between 450kHz and 30MHz was noted. Conducted interference was calculated after adding the necessary cable losses and LISN factors.

(2) Radiated interference

The equipment was placed on the nonconductive platform (turntable) of EMI shielded room. The receiving antenna was located 3 meters away from the transmitter during testing. In order to investigate the maximum magnitude of any spurious signals, the turntable was rotated in every direction, the receiving antenna was moved up and down and the direction was changed into horizontal and vertical plane. The level of each spurious signal was measured with the spectrum analyzer between 9kHz and 2GHz and was calculated after adding the necessary cable losses and antenna correction factors.

*Test Place
CHEMITOX EMC RESERCH, INC.
14979, Egusa, Sudama-cho,Kitakoma-gun, Yamanashi 408-01 JAPAN

UK Accreditation N0.2126. M10, EN45001 and ISO/IEC Guide 25.
NIST NVLAP Accredited Laboratory for FCC Part 15/ CISPR 22.

2.7.4 Test results

Test results are shown from Table 2.7.4-1 to Table 2.7.4-6 and from Fig. 2.7.4-1 to Fig. 2.7.4-6.

Table 2.7.4-1 Conducted interference

Test frequency: 2187.5kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading QP (dBuV)	LISN factor (dB)	Emission QP (dBuV)
1.402	26.9	0.2	27.1
2.384	35.8	0.3	26.1
14.335	25.8	0.6	26.4
15.220	36.7	0.6	37.3
15.945	15.5	0.6	16.1

Emission QP level = Reading QP level + LISN factor

Table 2.7.4-2 Conducted interference

Test frequency: 12577.0kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading QP (dBuV)	LISN factor (dB)	Emission QP (dBuV)
1.468	33.8	0.2	34.0
2.379	25.1	0.3	25.4
14.522	30.6	0.6	31.2
15.613	37.1	0.6	37.7
16.954	16.2	0.6	16.8

Emission QP level = Reading QP level + LISN factor

Table 2.7.4-3 Conducted interference

Test frequency: 26400.0kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading QP (dBuV)	LISN factor (dB)	Emission QP (dBuV)
1.533	35.5	0.2	35.7
2.429	36.7	0.3	37.0
14.359	26.5	0.6	32.1
15.633	13.7	0.6	24.3
16.975	27.8	0.6	28.4

Emission QP level = Reading QP level + LISN factor

Fig. 2.7.4-1 Conducted interference

Test frequency: 2187.5kHz
Mode: J3E

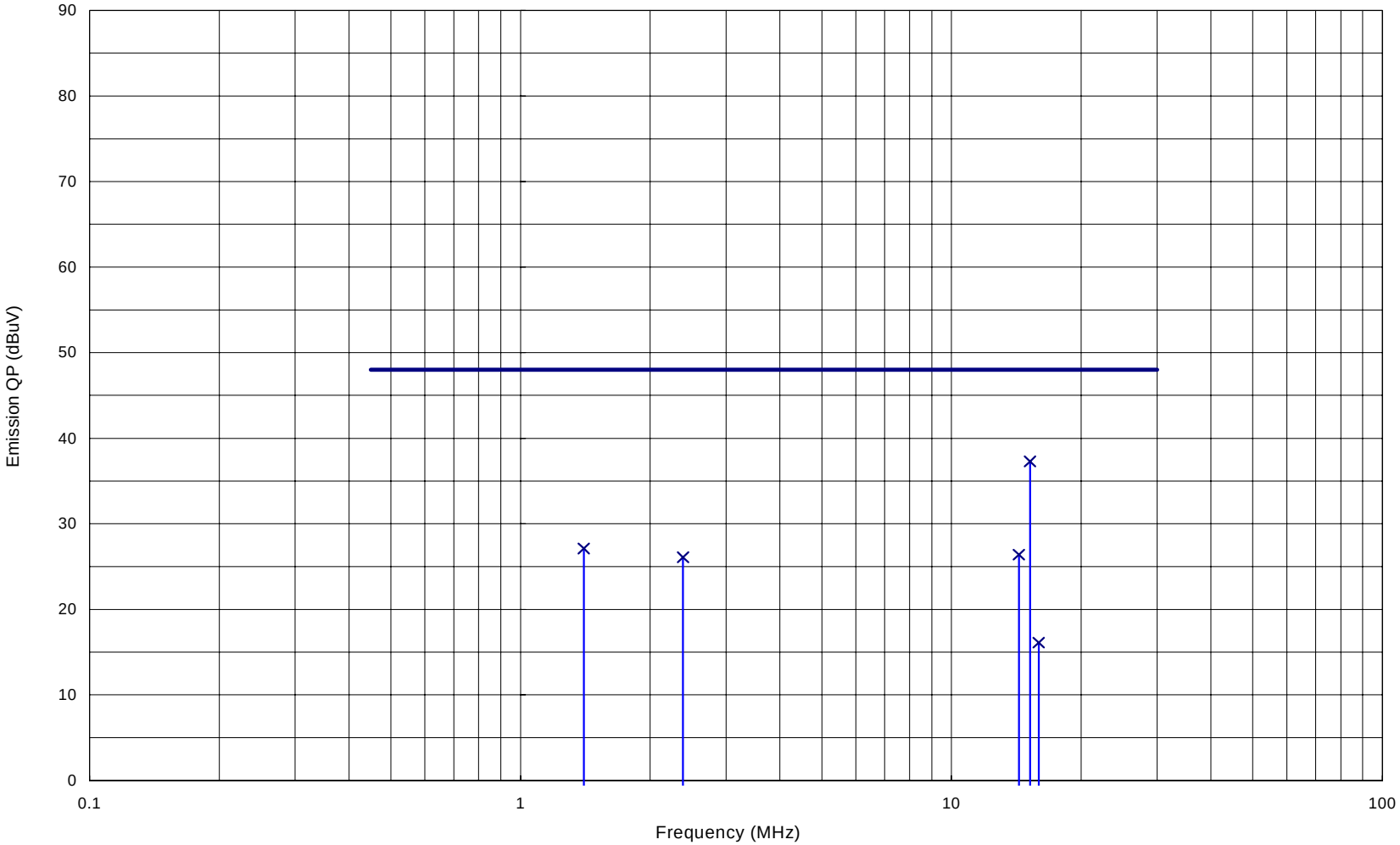


Fig. 2.7.4-2 Conducted interference

Test frequency: 12577.0kHz
Mode: J3E

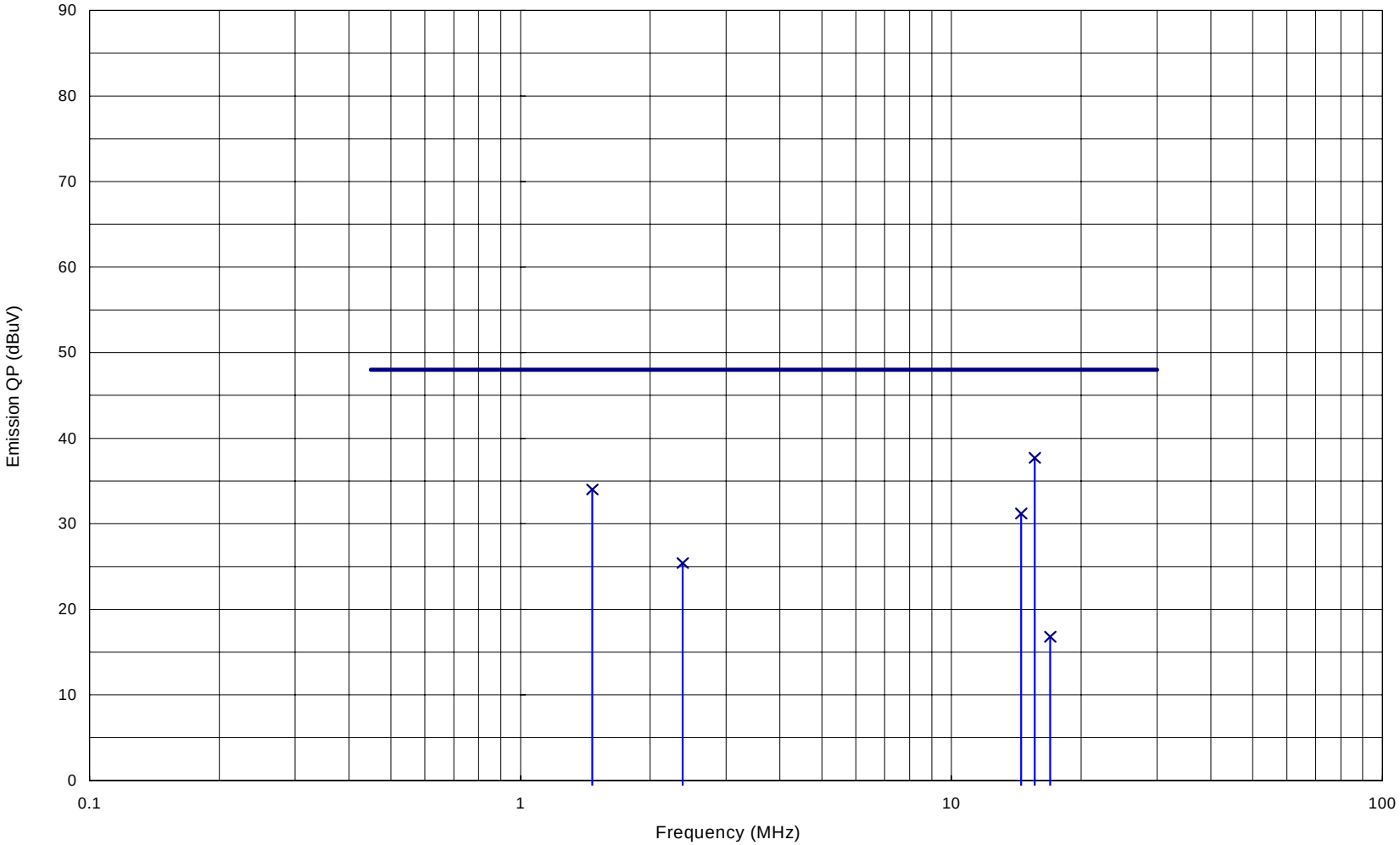


Fig. 2.7.4-3 Conducted interference

Test frequency: 26400.0kHz
Mode: J3E

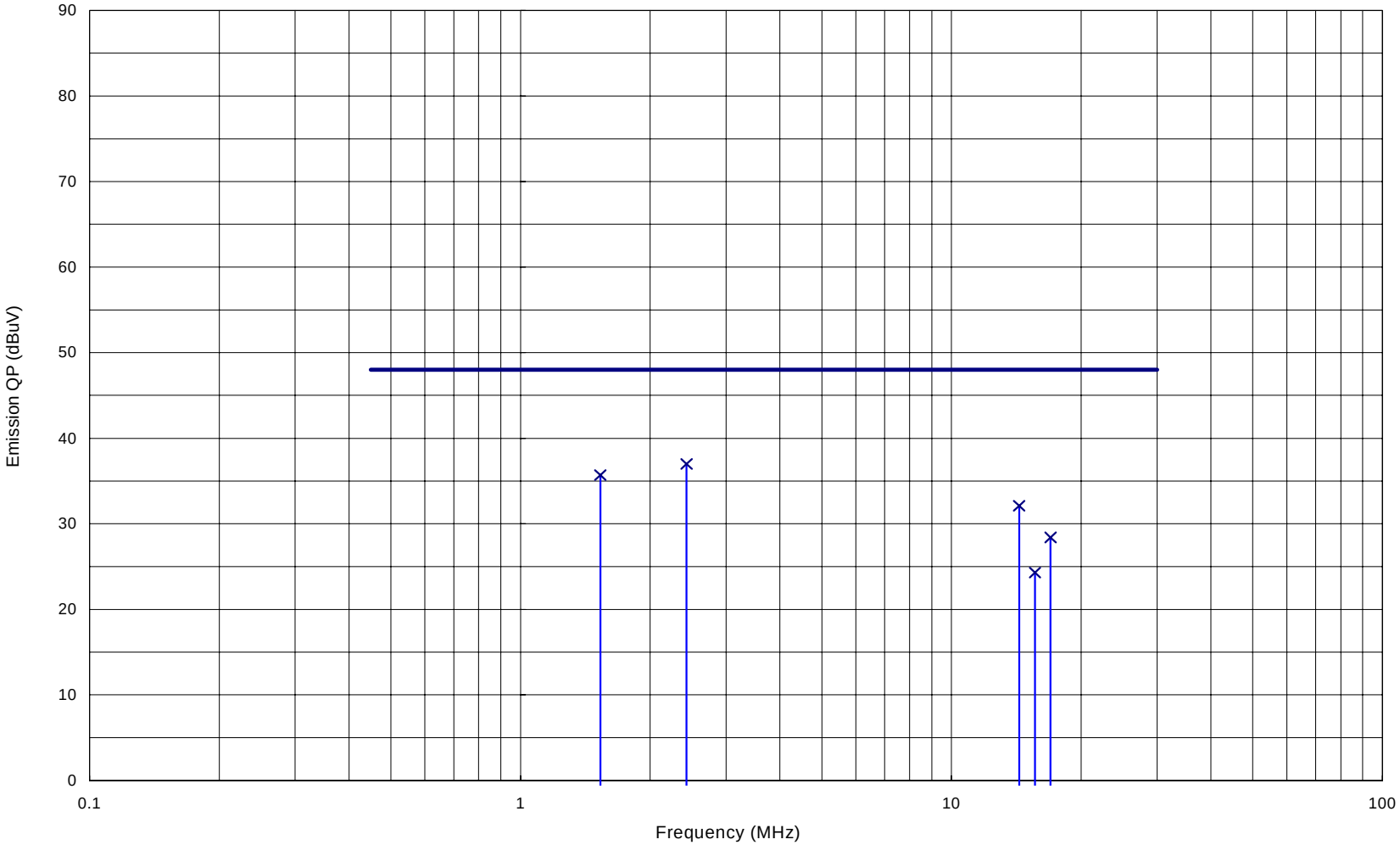


Table 2.7.4-4 Radiated interference

Test frequency: 2187.5kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading (dBuV)		Calibration Factor (dB)	Emission Level (dBuV/m)
	Horizontal Plane	Vertical Plane		
0.128	----	**20.9**	+20.8	41.7
0.196	----	**19.6**	+20.2	39.8
0.535	----	**29.6**	+18.6	48.2
0.829	----	**8.4**	+15.5	23.9
1.561	**15.2**	----	+19.3	34.5
3.776	**16.6**	----	+14.7	31.3
69.31	**31.8**	28.9	-11.5	20.3
128.67	**36.8**	32.6	-6.5	30.3
153.11	**43.2**	41.6	-6.3	36.9
154.82	**23.5**	22.7	-6.7	16.8
159.23	23.0	**24.1**	-6.2	17.9
161.50	**21.9**	20.8	-6.2	15.7
169.46	19.4	**20.7**	-6.5	14.2
210.03	----	**25.4**	-8.4	17.0
255.24	**28.0**	----	-8.9	19.1
322.39	**28.1**	----	-5.2	22.9
343.10	**38.8**	----	-4.4	34.4
515.82	36.1	**36.7**	-1.5	35.2
712.76	----	**33.9**	+3.8	37.7

Emission level = Reading level + Calibration factor
Calibration factor = Antenna factor + Cable loss – Amplifier gain

Fig. 2.7.4-4 Radiated interference

Test frequency: 2187.5kHz
Mode: J3E

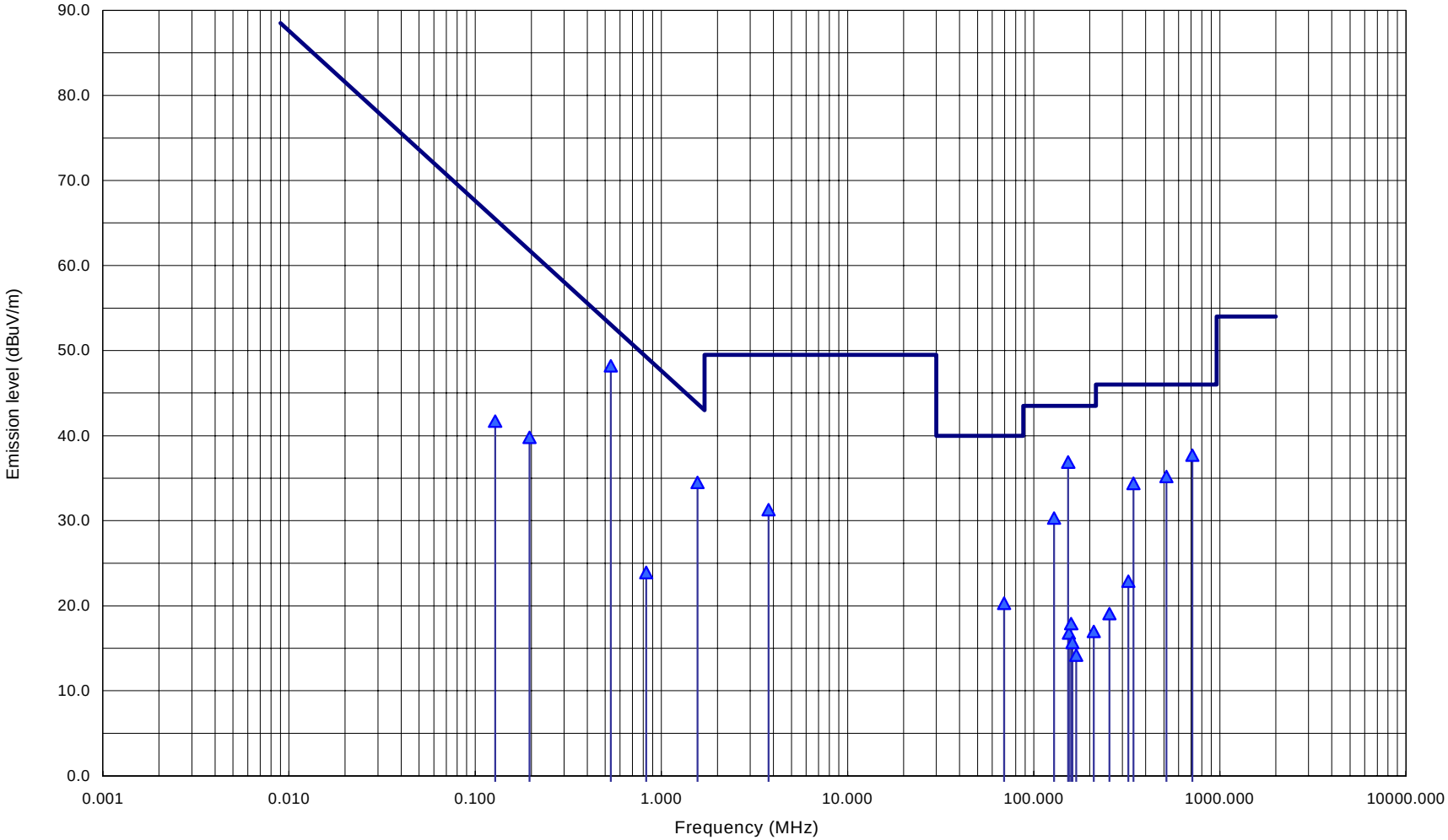


Table 2.7.4-5 Radiated interference

Test frequency: 12577.0kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading (dBuV)		Calibration Factor (dB)	Emission Level (dBuV/m)
	Horizontal Plane	Vertical Plane		
0.128	----	**20.2**	+20.6	40.8
0.201	----	**18.6**	+20.3	38.9
0.541	----	**28.4**	+18.6	47.0
0.830	----	**6.7**	+15.5	22.2
1.565	**15.8**	----	+19.3	35.1
3.782	**16.4**	----	+14.5	30.9
69.29	**32.2**	29.0	-11.4	20.8
128.53	**33.4**	32.5	-6.5	26.9
153.26	**42.7**	41.1	-6.3	36.4
154.82	**23.6**	22.5	-6.3	17.3
159.23	21.0	**23.6**	-6.2	17.4
161.31	**21.2**	20.8	-6.2	15.0
168.55	18.5	**20.1**	-6.1	14.0
212.30	16.4	**24.1**	-7.7	16.4
254.97	**28.1**	----	-8.4	19.7
321.57	**28.5**	----	-5.2	23.3
343.10	**34.3**	----	-4.5	29.8
468.91	36.6	**36.9**	-1.5	35.4
613.48	----	**34.6**	+3.9	38.5
704.55	**37.2**	35.3	+4.3	41.5

Emission level = Reading level + Calibration factor
Calibration factor = Antenna factor + Cable loss – Amplifier gain

Fig. 2.7.4-5 Radiated interference

Test frequency: 12577.0kHz
Mode: J3E

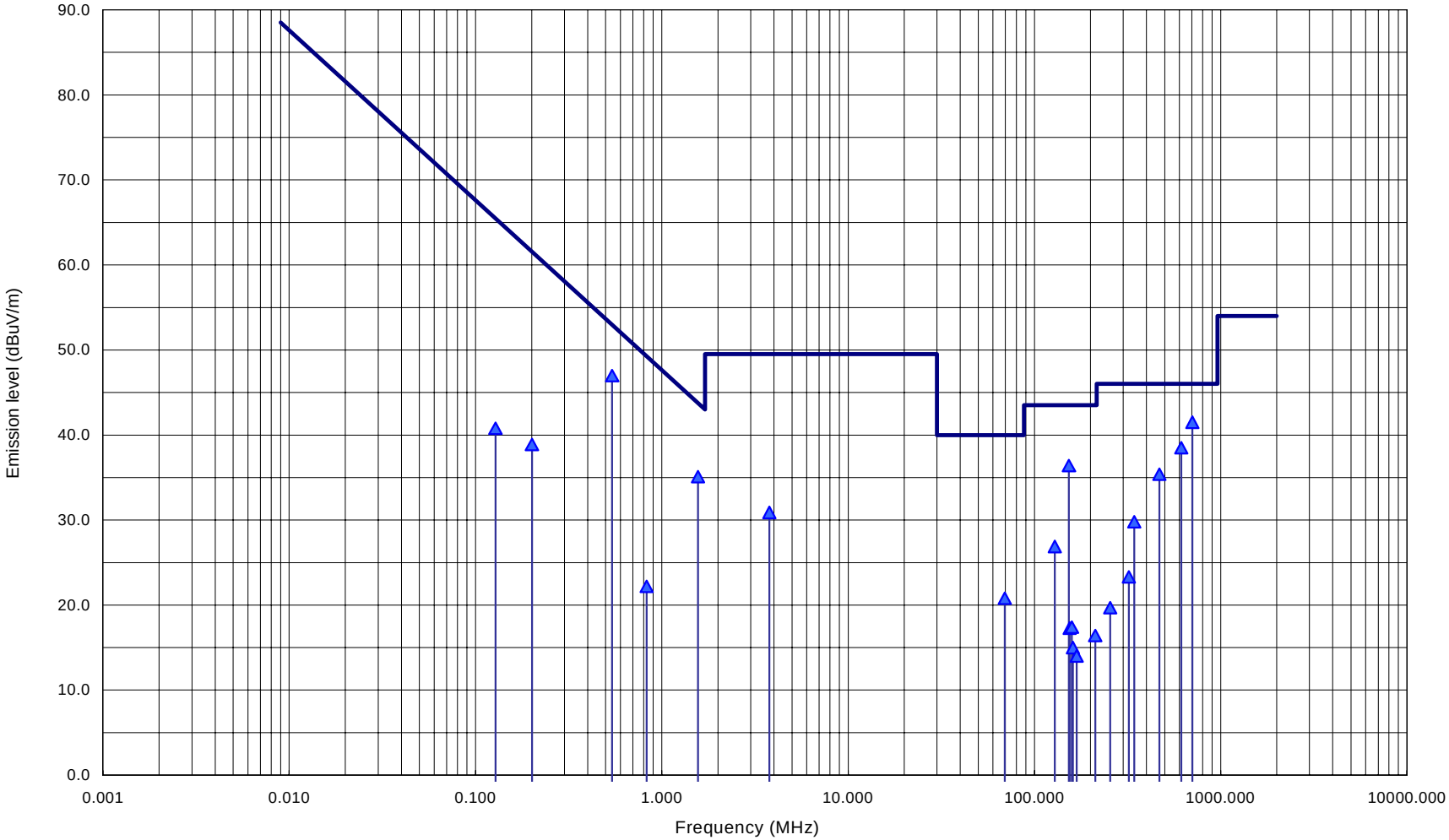


Table 2.7.4-6 Radiated interference

Test frequency: 26400.0kHz
Mode: J3E
Line voltage: AC220V

Frequency (MHz)	Reading (dBuV)		Calibration Factor (dB)	Emission Level (dBuV/m)
	Horizontal Plane	Vertical Plane		
0.127	----	**20.9**	+20.5	41.4
0.186	----	**18.6**	+20.1	38.7
0.535	----	**23.6**	+18.3	41.9
0.829	----	**8.4**	+15.1	23.5
1.562	**15.0**	----	+19.1	34.1
3.770	**16.4**	----	+13.7	30.1
69.31	**31.0**	28.9	-11.5	19.5
128.68	**36.3**	32.5	-6.5	29.8
153.11	**42.1**	40.7	-6.1	36.0
154.80	**23.3**	22.0	-6.7	16.6
159.24	22.8	**23.3**	-6.2	17.1
161.55	**21.7**	20.5	-6.2	15.5
169.46	----	**23.6**	-6.6	17.0
212.12	----	**25.9**	-8.4	17.5
255.32	**25.4**	----	-8.1	17.3
322.49	**27.7**	----	-5.2	22.5
343.27	**38.6**	----	-4.5	34.1
516.20	35.0	**36.5**	-1.5	35.0
711.93	17.6	**33.9**	+3.0	36.9
712.45	**32.5**	----	+4.2	36.7

Emission level = Reading level + Calibration factor
Calibration factor = Antenna factor + Cable loss – Amplifier gain

Fig. 2.7.4-6 Radiated interference

Test frequency: 26400.0kHz
Mode: J3E