

CERTIFICATION

TEST REPORT PREPARED ON BEHALF OF

SB TECHNOLOGY, INC.

FOR THE

FCC ID: OTVSBTFR530-2

Under Part 95, Family Radio Service

Prepared

By

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CERTIFICATION

TABLE OF CONTENTS

RF Power Output (2.1046)		1
Modulation Characteristics (2.1047)		2 - 5
Occupied Bandwidth (2.1049)		6
Plot Channel 7	462.71250 MHz	7
Plot Channel 8	467.56250 MHz	8
Spurious Emissions at Antenna Terminals (2.1051) N/A	Permanent Antenna Required	
Field Strength of Spurious Radiation (2.1053)		9 - 10
Frequency Stability (2.1055)		11 - 12
Block Diagram of OATS Test Set Up		13
Test Equipment List		14
Photos of EUT test set up at OATS	<i>uploaded separately</i>	15 -16
Photo worst case position on side with speaker mic	<i>uploaded separately</i>	17

TEST: RF POWER OUTPUT

FCC ID: OTVSBTFR530-2

Grantee: SB Technology, Inc.

Serial No.: none

Manufacture Rating: .3 Watt

Equipment Authorization
Procedure: Para. 2.985 (a)

Duty Cycle: PTT

Frequency Measured: 462.7125 and 467.5625 MHz
Mid Lower and Upper FRS Band

Freq. MHz	Horz. dBuV	Ant-F	Cable Loss	dBuV/m	V/m	mWatts
462.6375	96.33	22.3	1.17	119.8	.977237	.2864
467.6375	96.67	22.3	1.17	120.14	1.016248	.3098

We used the following formula to convert from field strength (FS) in volts/meter to transmitter output power (TP) in Watts, where D is the distance in meters between the two antennas and G is the numerical gain referenced to isotropic gain. Due to the integral whip antenna, G = 1.0 (unity gain) was assumed.

$$TP = \frac{(FS \times D)^2}{30 \times G}$$

Maximum Measured Transmitter Output Power: .3098 mWatt

Note: Due to the product design with surface mount components it was not practical to physically measure the collector current (IC) and collector voltage (VC) directly for the exciter input.

TEST: MODULATION CHARACTERISTICS

FCC ID: OTVSBTFR530-2

Grantee: SB Technology, Inc.

Serial No.: none

Minimum Standard Specified: Para. 95.633 & 95.635

Test Results: Equipment is Compliant with Standard

Equipment Authorization Procedure: Para. 2.1047

MEASUREMENT DATA

Audio Frequency Response see Pg. 3

Input: the audio was fed to a dummy microphone circuit
and into the FR530-2 external speaker/mic input jack.

Output: demodulated output of FM service monitor.

Audio Input vs Modulation Limiting Capability see Pg. 4

Input: external microphone input

Output: demodulated output of FM service monitor

Frequency Response of the Audio Low Pass Filter see Pg. 5

Input: external microphone input

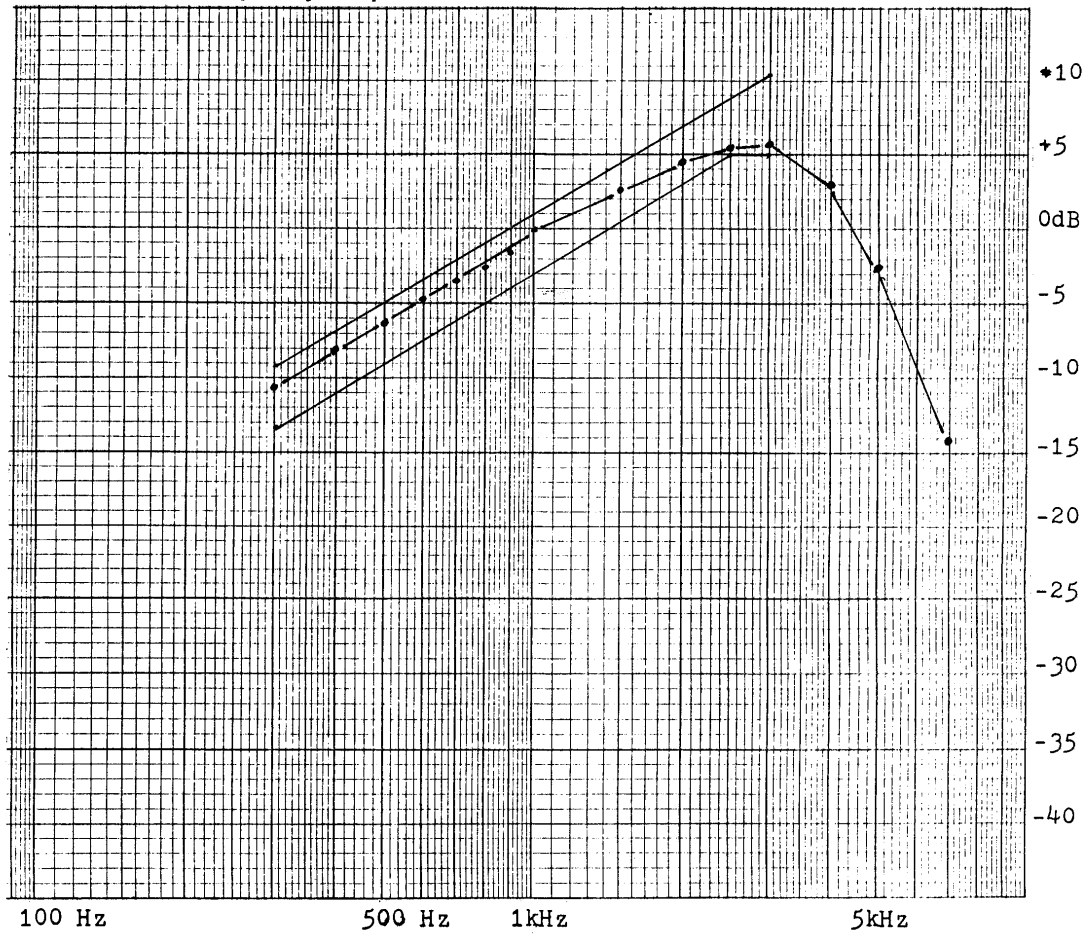
Output: LP filter output

TEST: MODULATION CHARACTERISTICS

FCC ID: OTVSBTFR530-2

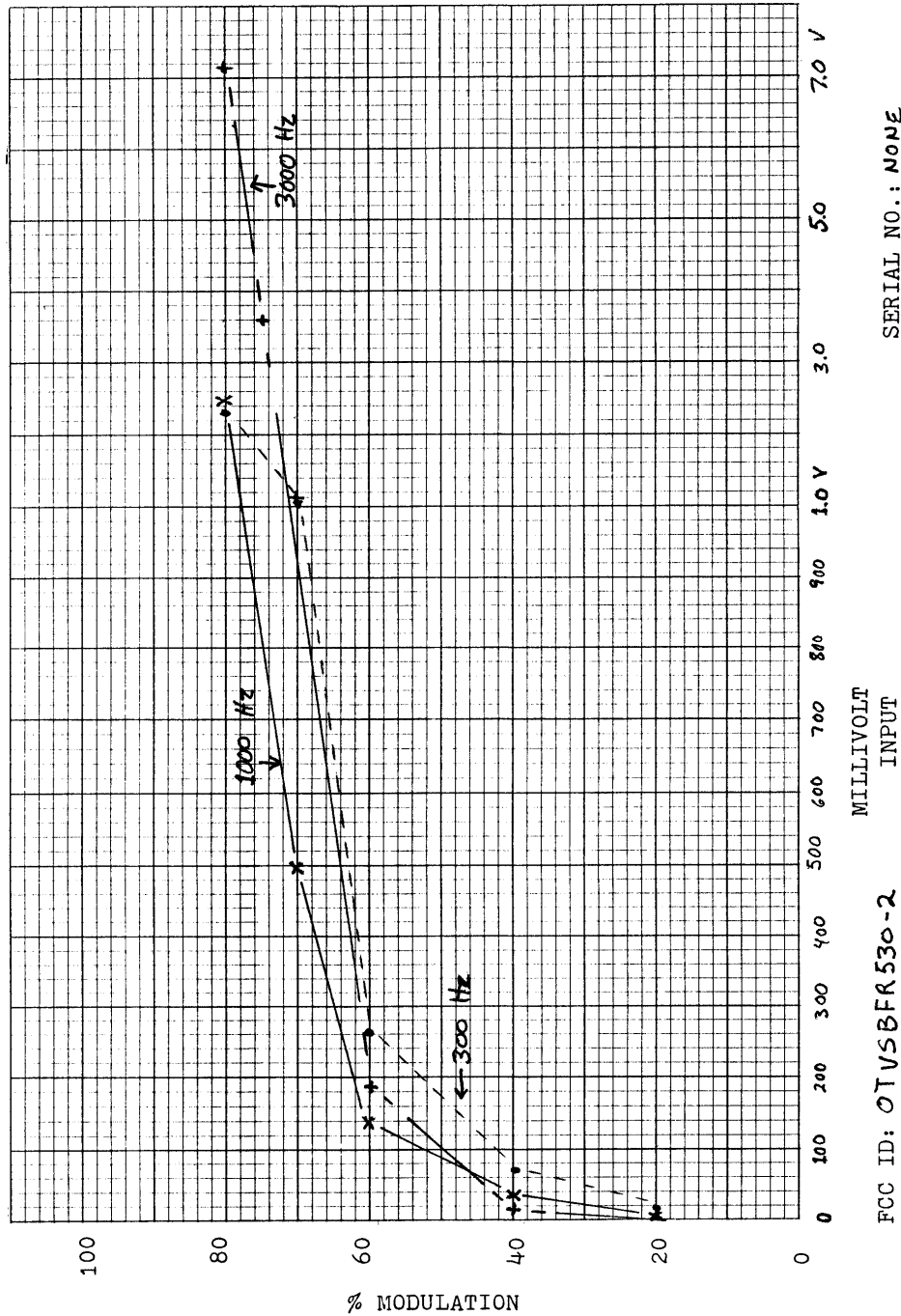
Grantee: SB Technology, Inc.

Audio Frequency Response



MODULATING FREQUENCY IN HERTZ

TEST: MODULATION LIMITING CAPABILITY



SERIAL NO.: NONE

PARA: 2.987 (b)

MILLIVOLT
INPUT

FCC ID: OTVSBFR530-2

GRANTEE: SB TECHNOLOGY INC

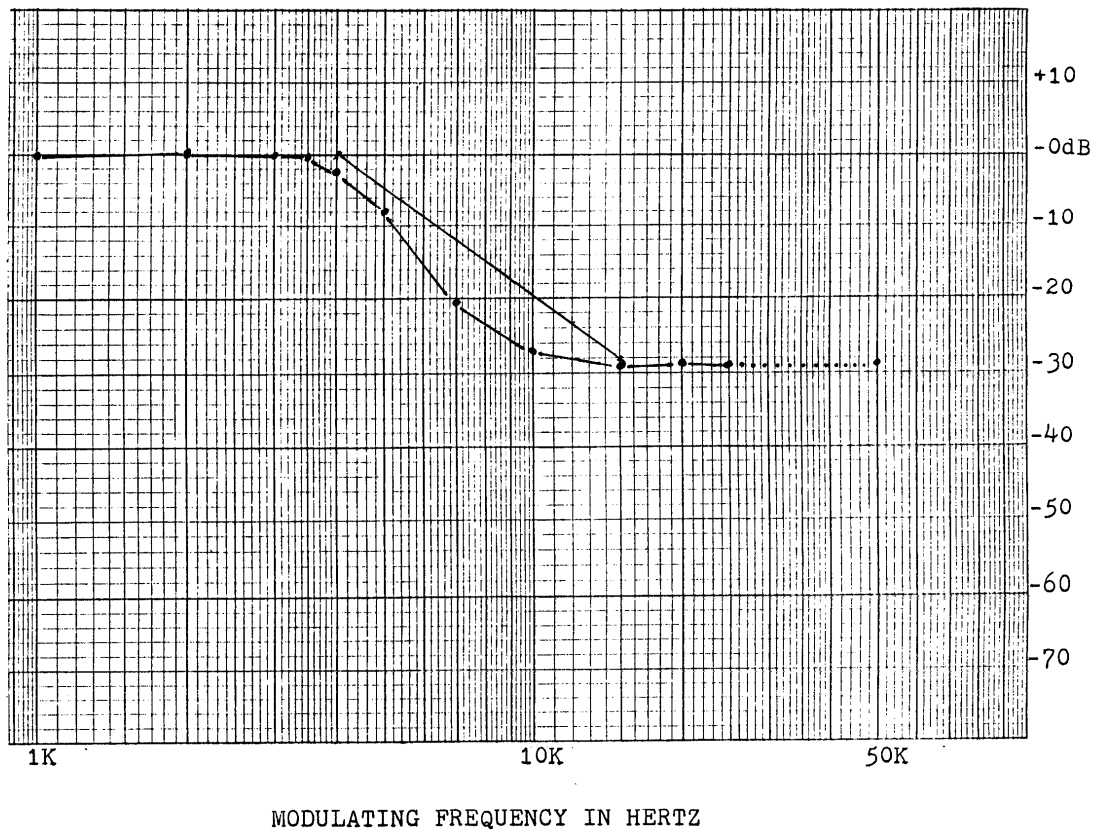
2/8/2000

TEST: MODULATION CHARACTERISTICS

FCC ID: OTVSBTFR530-2

Grantee: SB Technology, Inc.

Frequency Response of the Audio Low Pass Filter



TEST: OCCUPIED BANDWIDTH

FCC ID: OTVSBTFR530-2

Grantee: SB Technology, Inc.

Serial No.: none

Minimum Standard Specified: Para. 95.633

Test Results: Equipment is Compliant with Standard

Equipment Authorization
Procedure: Para. 2.1049

Test Equipment Set Up: Please refer to Block Diagram #1

MEASUREMENT DATA

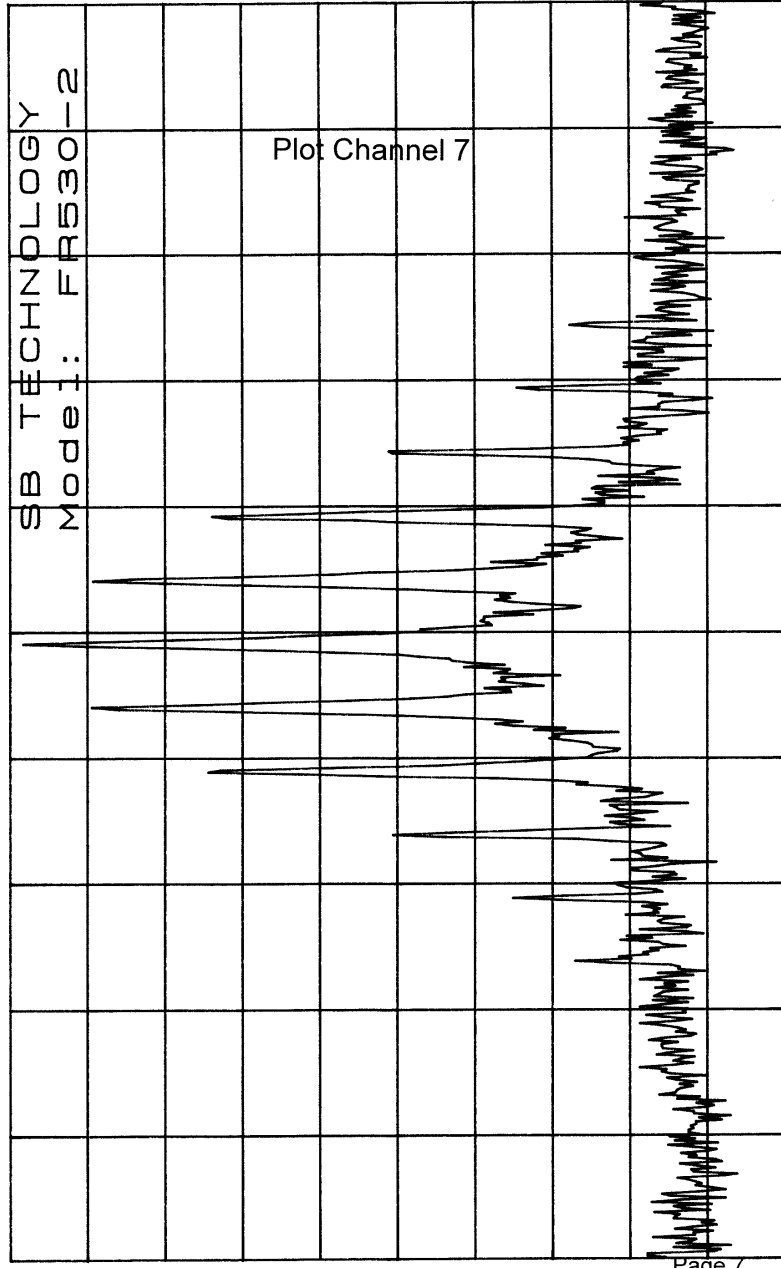
Spectrum Analyzer: Hewlett Packard 8562A

Test Plots Located on Page:	Pg. 7	Pg. 8	
Settings: Resolution Bandwidth:	100	100	kHz
Video Filter:	100	100	kHz
Sweep Time:	20	20	sec.
Scan Width:	50	50	kHz
Center Frequency:	462.1725	467.5625	MHz

The transmitter was modulated with a 2500 Hz tone fed in to the external microphone input. The transmitter deviation was measured at 2.2 kHz as set by the manufacturer. The measurements were made antenna to antenna. An unmodulated carrier was set to the reference line.

*ATTEN 10dB
RL 0dBm

10dB/



Plot Channel 7

SB TECHNOLOGY
Model: FR530-2

Page 7

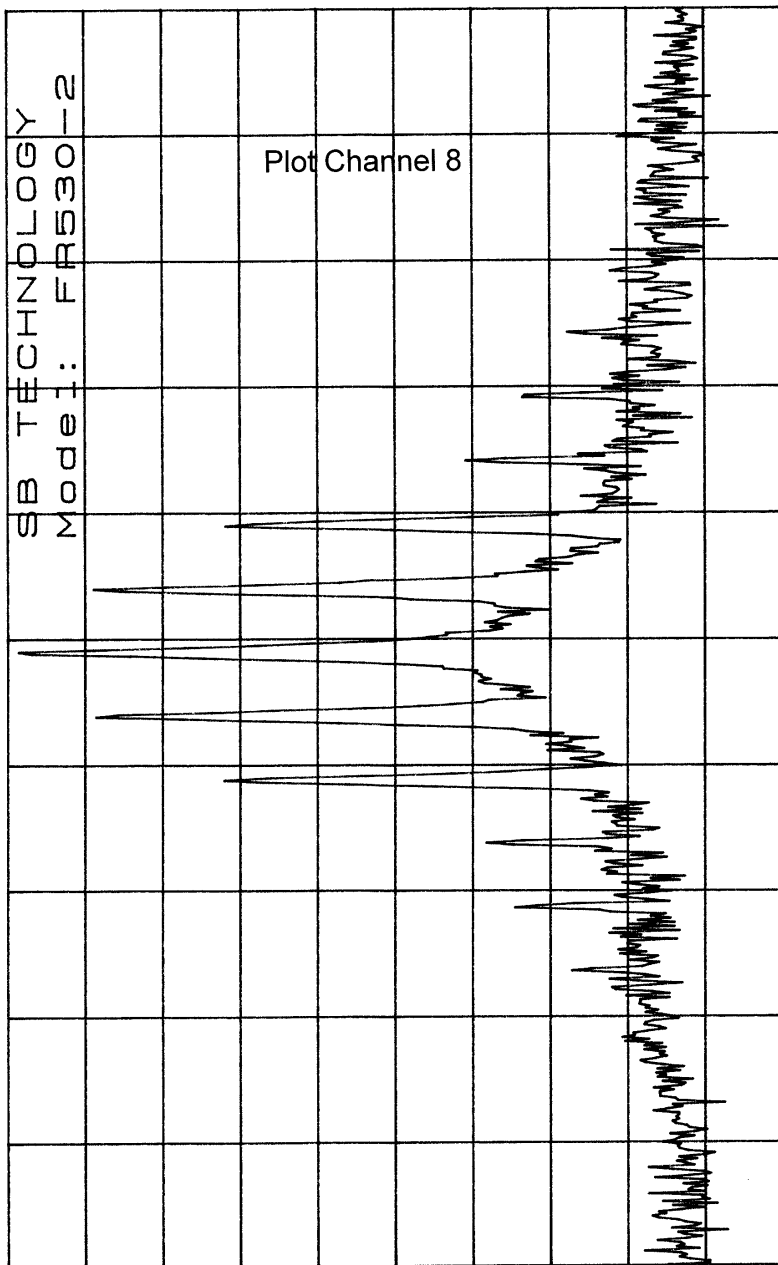
CENTER 462.71250MHZ SPAN 50.00KHZ
*RBW 100HZ VBW 100HZ SWP 20sec

3/6/00 10:00 AM

*ATTEN 10dB

RL 0dBm

10dB/



Page 8

CENTER 467.56250MHZ

*RBW 100HZ

VBW 100HZ

SPAN 50.00KHZ

SWP 20sec

36/100

TEST: FIELD STRENGTH OF SPURIOUS RADIATION

FCC ID: OTVSBTFR530-2

Manufacturer: SB Technology, Inc.

Serial No.: none

Minimum Standard Specified: Para. 95.

Test Results: Equipment complies with standard

Equipment Authorization Procedure: Para. 2.1053

Equipment Set Up: See Photo of EUT Setup

Frequency Range Observed: 0 to 4.67375 GHz, Para. 2.1057 10th harmonic of the highest fundamental frequency

Operating Frequency: 462.6375 MHz Chan. 4 mid-low group
467.6375 MHz Chan. 11 mid-high group

Power Output: .309 mWatt power (peak)

Spurious Limit = $43 \text{ dB} + 10\text{Log}_{10}(\text{PO}) = 43 + 10\text{Log}_{10}(.309) = 37.89 \text{ dB}$

Note: Measurements were made as required by Para. 95.635(a) with and without an optional speaker microphone attached. The worst case results reported were with the option attached.

100 kHz RBW and VBW was used below 1 GHz
1 MHz RBW and VBW was used above 1 GHz

The worst case peak, max-hold, field strength is reported for the two mid band channels observed on the following page.

TEST: FIELD STRENGTH OF SPURIOUS RADIATION

Mid-Low Group FRS Channel 4 462.6375 MHz

Test Date 3/14/00

Freq. MHz & GHz	Vert. Ant. dBuV	Horz. Ant. dBuV	Ant-F	Cable Loss	BPF Loss used >1 GHz	dBuV/m	Limit 37.89 dB Margin in dB
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462.6375	94.83	96.33	22.3	1.17	0	119.8	-0-
925.275	40.17	37.83	28.2	2.10	0	70.47	11.44
1.38790	45.33	44.17	23.21	1.05	.67	70.26	11.65
1.85054	48.17	43.5	27.15	1.22	.67	77.21	4.7
2.31317	44.50	41.5	28.37	1.38	.67	74.92	6.99
2.77580	40.83	39.71	31.01	1.67	.67	74.18	7.73
3.23846	35.0	35.17	32.45	1.8	.67	70.09	11.82
3.70111	35.0	34.5	Analyzer	Noise	Floor		
4.16373	33.0	34.17	"		"		
4.62637	33.67	35.83	"		"		

Mid-High Group FRS Channel 11 467.6375 MHz

467.6375	92.67	96.67	22.3	1.17	0	120.14	-0-
935.282	41.0	40.0	28.2	2.10	0	71.3	10.95
1.40298	45.5	47.0	23.21	1.05	.67	71.93	10.32
1.87055	46.0	48.67	27.15	1.22	.67	77.71	4.54
2.33819	40.67	44.33	28.37	1.38	.67	74.75	7.5
2.80583	41.5	46.33	31.01	1.67	.67	79.68	2.57 *
3.27346	38.33	35.0	32.45	1.8	.67	73.25	9.0
3.74111	35.33	35.33	Analyzer	Noise	Floor		
4.20874	35.17	34.83	"		"		
4.67638	34.0	34.33	"		"		

* Worst case

The highest level dBuV, either Vertical or Horizontal is calculated. The other reading is provided for information only. No other radiated emissions were measurable when measured at three meters EUT to antenna spacing and 1 MHz RBW and VBW.

TEST: FREQUENCY STABILITY

FCC ID: OTVSBTFR530-2

Grantee: SB Technology, Inc.

Serial No: none

Minimum Standard Specified:	Para. 95.627(b)	Limit +/- .00025%
Equipment Authorization Procedure:	Para. 2.1055	-30 to +50 degrees C
Test Frequency: Channel 1 FRS	462.5625 MHz	2.5 ppm = +/- 1156 Hz

The default power on channel is channel 1. So it was used for convenience to eliminate having to change channels which would require opening the chamber to physically push the program buttons on the front of the FR530-2, rather than just applying power and remotely keying with the external microphone.

The measurement data is graphically reported on the following page. The frequency was observed when the transmitter was keyed, immediately following power up. This value was recorded and is reported. Measurements at -30, 0 and +50 degrees C showed that the transmitter was within the 2.5 ppm limit at nominal voltage and at battery end point. The equipment power was off during changes in ambient temperature.

Two temperature probes connected to a Fluke 52, were used during the measurements. The first probe was placed in contact with one of the largest internal masses in the transmitter which in this case was part of a shield covering the LO. The other probe was outside of the transmitter within the chamber at a location with good air circulation to accurately measure the internal chamber temperature for comparison the internal transmitter temperature and insure that the equipment was properly stabilized at a given temperature.

The voltages used for measurements at -30, 0, & +50 degrees Celsius were supplied by a regulated power supply to allow variation in voltage as required:

+ 15 %	N/A	battery powered
Nominal	4.5	VDC
15 %	3.3	VDC manufacturer's battery end point

This device is normally battery powered with 3 AAA batteries.

TEST: FREQUENCY STABILITY

FCC ID: OTVSBTFR530-2

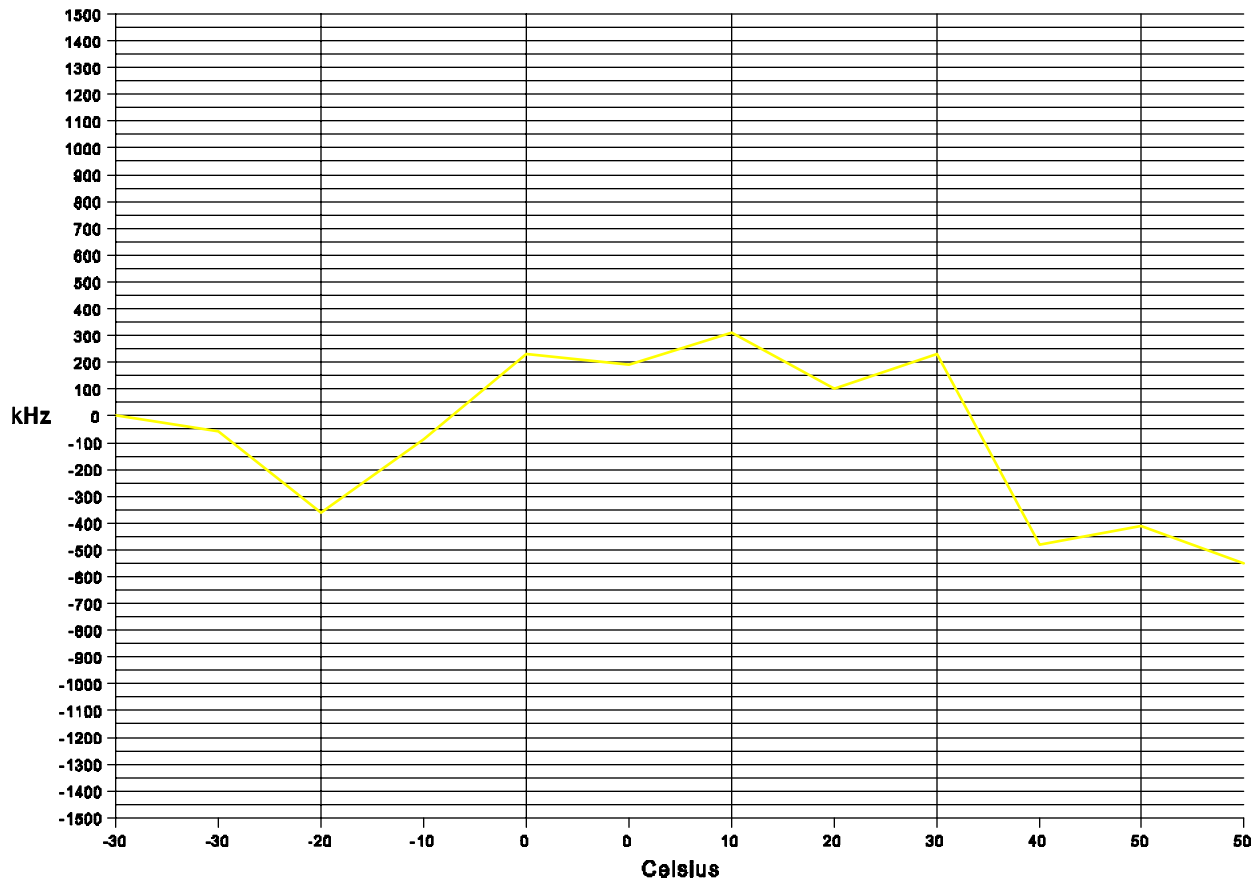
Grantee: SB Technology, Inc.

Model: FR530-2

Minimum Standard Specified: Para. 95.627(b) must be maintained within .00025%
Test Frequency: 462.5625 MHz 2.5 ppm = +/-1156 Hz
Ch. 1 of FRS Unit Channel Freq.'s listed in Para 95.627(a)

Equipment Authorization Procedure: Para. 2.1055

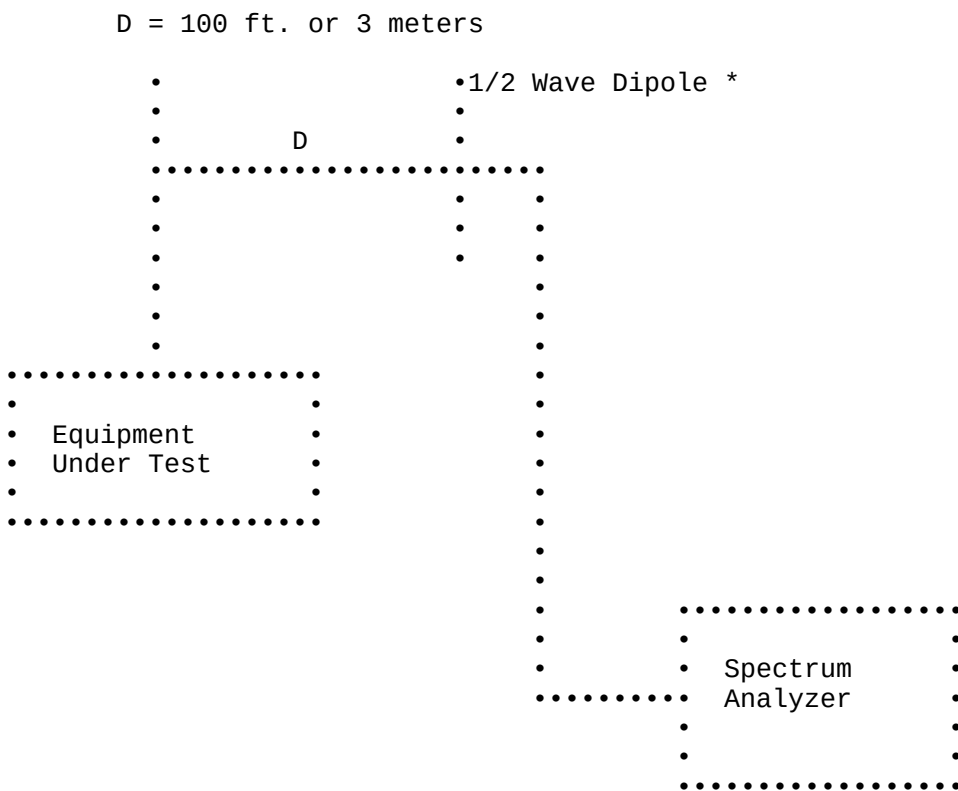
Graph Of Frequency Stability



Please Note: The variation in voltage is shown on the plot above for +50, 0 and -30 C. Two readings are shown at each of these three temperatures. The left-hand reading is the 3.3 VDC, battery end point and the right hand reading is Nominal 4.5 VDC. The other reported readings are all at the Nominal 4.5 VDC.

BLOCK DIAGRAM #1

Field Intensity Measurement Of
Spurious Radiation Test Set Up



See Equipment List
for Equipment Specifications

* 1/2 Wave Dipole 30-1000 MHz
Dual Ridged Guide Antenna or Broadband Log Periodic 1-10 GHz

TEST EQUIPMENT LIST A SPECTRUM TECHNOLOGY, INC.

<u>Equipment</u>	<u>Manufacturer</u>	<u>Serial Number</u>	<u>Cal Date/Due Date</u>	
Spectrum Analyzer	Hewlett-Packard 8562A	08562-60062	11/04/99	11/04/00
Amplifier 9 kHz-1300 MHz	Hewlett-Packard 8447F OPT H64	2727A02208	11/04/99	11/04/00
RF Signal Gen.	Fluke 6071A	2915016	5/14/99	4/14/00
Service Monitor	IFR FM/AM 500A	4103	---	
Oscilloscope	Kikusui C055060	6132295	---	
Power Supply	Astron VS35	8601266	---	
Voltmeter	Fluke 8020A	N2420658	---	
Multimeter	Fluke 25	3710310	---	
Wattmeter	Bird 43	56227	---	
RF Termination	Bird 8135	10004	---	
Dual Phase LISN 50 ohm/50 uH	STI per MP-4	02	1/8/99	1/9/00
Dual Phase LISN 50 ohm/50 uH	Compliance Design	8012-50R-24-BNC	1/8/99	1/9/00
Audio Generator	Hewlett-Packard 205-AG	8689	---	
Thermometer	Fluke 52	3965185	---	
Test Line	Simulator, Teltone TLS-2	none	---	
Turn Table, RC	EMCO 1060-2M	8912-1415	---	
Antenna Mast, RC	Compliance Design, Inc. M100		---	
Antennas:				
Dipole Set	EMCO Model: 3121C	1335	reference only	
Dipole Set	EMCO Model: 3121C	1336	reference only	
Bi-Conical	EMCO 3104	3763	reference only	
Bi-Conical	EMCO 3104C	9401-4635	01/24/99	1/24/00
Log-Periodic	EMCO 3146	1754	06/10/99	6/10/00
BiConiLog	EMCO 3141	1125	10/10/98	04/28/00
Active Loop	EMCO 6502	9107-2645	reference only	

