Advanced Microwave Technologies, Inc.
ADVANTECH

KU-BAND BOOSTER AMPLIFIER

Output Power 16 W to 50 W

AWSB-K16; AWSB-K20; AWSB-K25;
AWSB-K32; AWSB-K40; AWSB-K50

INTRODUCTION

The AWSB-K series described in this section are Advantech's line of medium gain solid state booster amplifiers (SSBs) with basic control and output power ranging from 16 watts to 50 watts. These SSBs are protected against damage in the event that input level rises to an overdrive condition. Other Ku-Band hubmount SSBs are available for output power up to 125 watts.

Advantech's hubmount SSBs are sealed self-contained units designed for outdoor operation in harsh environmental conditions and are particularly suited to applications where efficiency and size considerations are critical. Advantech's hubmount SSBs set the industry standard for operating efficiency and feature compact and lightweight construction.

STANDARD FEATURES

- Medium gain, high linearity and efficiency
- High input level overdrive protected
- Remote RF mute capability
- Temperature gain compensation
- Automatic over-temperature shutdown
- Automatic high reflected power shutdown
- Output sample monitor port
- Form-C contacts for fault/alarm conditions
- Infinite VSWR protection
- CE Marking

40 Watt Ku-Band Booster

Option: High ambient temperature operation (up to 60° C)

APPLICATION

The AWSB-K series hubmount SSBs are designed as an economical way to boost the transmit gain and power output of transceivers used in satellite uplink ground stations. These boosters provide from 26 to 31 dB gain and have power output (P1dB) between 16 and 50 watts. The gain of these units may be reduced as required using fixed attenuators. Other Advantech boosters are available with gain up to 35 dB and output power (P1dB) up to 125 watts.

DESCRIPTION

ADVANTECH's hub-mount SSBs are constructed in a compact, air-cooled housing for outdoor operation. These Boosters are weatherproof, thus a special equipment shelter is not required. They are the smallest fully integrated units on the market today.

The design of these amplifiers is based on ADVANTECH's industry proven reliable solid state high power amplifiers. Built-in design features and assembly methods, incorporated with effective combining techniques result in an amplifier with exceptional linearity and operating efficiency. The use of high efficiency power supply and conservative thermal designs contributes to the trouble free operation of the booster. Additional standard features comprise the automatic over-temperature shutdown, high input overdrive protection and soft failure features that contribute to smooth operation and greatly improve the life of the product.

The AWSB-K series Boosters contain the following subsystems:

- Booster amplifier module
- Waveguide arm assembly
- Power supply system
- Alarm interface module

Booster Amplifier Module

The Booster Amplifier Module has a RF gain of 26 $\pm$ 3 dB to 31 $\pm$ 3 dB (depending on model, see TECHNICAL SPECIFICATIONS table) and an output power at 1 dB gain compression (P1dB), depending also on model, between 16 and 50W (see also the TECHNICAL SPECIFICATIONS table). A DC board containing the biasing and the control and protection circuitry is included in this module. Other functional capabilities are gain temperature compensation, high temperature shutdown, reflected power shutdown and overload shutdown.

Waveguide Arm Assembly

The Waveguide Arm Assembly includes a harmonic filter, an isolator and related power detectors.

- The harmonic filter provides a minimum of 50dB attenuation of all harmonic products other than the fundamental signal.

- The isolator provides one reflected power port coupled via a detector to the Alarm/ Indicate board for reverse power protection. The output port of the waveguide arm assembly has a minimum 18 dB output return loss and the output flange is WR-75G.

- One extra sample port, the RF Output Monitor Port, calibrated in coupling ratio versus frequency, permits the independent monitoring of SSB output power levels, using an external spectrum analyzer or power meter, via a 'N'-type connector.

- The RF Input Isolation Circuit provides an Input Return Loss of minimum 18 dB, over full frequency band, at the N-type RF input connector of the SSB.

Power supply system

The power supply sub-assembly of the SSB provides all of the internal voltages necessary to operate the RF section and the Alarm/Indicate board. The power supply is configured for 90-132 or 180-265 VAC input AC line (auto-ranging).

Alarm interface module

The Alarm/Indicate Board provides:

- Status indicator via Form-C relay contacts: FAULT
- High Reflected Power shutdown (resulting in FAULT condition)
- Overdrive shutdown (an overdrive shutdown will typically occur when gain dropped between 1 and 5 dB relative to the linear gain) resulting also in a FAULT condition

The Alarm/Indicate board is connected between the microwave booster amplifier and the customer interface.

SAFETY FEATURES

Input Overdrive Protection

The amplifier is equipped with circuitry that prevents damage caused by input overdrive situations. These SSBs are capable of tolerating an input signal of 35 dBm without damage to any internal components.

Thermal Alarms and Faults

A thermal shutdown feature is incorporated into the system in order to protect the amplifier from permanent damage. The thermal shutdown feature operates at a baseplate temperature of 85° C and is self-healing. When the baseplate temperature drops to below 65° C, the amplifier re-starts automatically. A thermal shutdown is always preceded by a thermal alarm, which is activated at a baseplate temperature of approximately 75° C.

High Reflected Power

The output isolator in the output arm of the AWSB-K SSB series is designed to withstand high reflected RF power. The amplifier is shutdown when the reflected power is more than 25% of the rated output power. An amplifier that has been shutdown due to high load VSWR must be restarted manually.

ORDERING INFORMATION

A complete model number for ordering consists of a basic number followed by an option code, as follows:

Basic number – [Option Code]

Basic numbers

AWSB-K16-CH	16 W (saturated power) SSB	AWSB-K32-CH	32 W (saturated power) SSB
AWSB-K20-CH	20 W (saturated power) SSB	AWSB-K40-CH	40 W (saturated power) SSB
AWSB-K25-CH	25 W (saturated power) SSB	AWSB-K50-CH	50 W (saturated power) SSB

[Option Codes]

E - -30^{O}C to +55^{O}C
F - -40^{O}C to +55^{O}C
G - -50^{O}C to +50^{O}C

Example

To order a 20 W Ku-Band hubmount SSB with temperature option -40^{O}C to +55^{O}C please specify: AWSB-K20-CHF.

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TECHNICAL SPECIFICATIONS		16 W	20 W	25 W	32W	40W	50W
Electrical Characteristics							
Frequency ranges		14.000 – 14.500 GHz (KS series); 13.750 – 14.500 GHz (KX series)					
Saturated output power nominal		+43 dBm	+44 dBm	+45 dBm	+46 dBm	+47 dBm	+48 dBm
Output power (P1dB)		+42 dBm	+43 dBm	+44 dBm	+45 dBm	+46 dBm	+47 dBm
Gain minimum (G_{max} = G_{min} + 6 dB)		23 dB	24 dB	25 dB	26 dB	27 dB	28 dB
Gain flatness over 500 MHz		±1 dB max.					
Gain slope		0.6 dB/40 MHz max.					
Gain variation with Temperature		±1.5 dB over operating temperature range					
Input VSWR		1.3:1 max.					
Output VSWR		1.25:1 max.					
Spurious at rated power		-65 dBc, max.					
Harmonics at rated power		-60 dBc, max					
AM/PM conversion at rated power		2.5^{O}/dB max. at P1dB, 1^{O}/dB max. at 3 dB back-off					
Two tone intermodulation (5 MHz apart)		-26 dBc max. at 3 dB total back-off from rated P1dB					
Group Delay		Linear: 0.02 nsec/MHz max. Parabolic: 0.003 nsec/MHz^2 max. Ripple 1 nsec p-p max.					
Phase Noise		Exceeds IESS-308/309 by – 6 dB					
Residual AM (F* - frequency in kHz)		0-10 kHz 10 kHz - 500 kHz 500 kHz - 1 MHz	-45 dBc -20 (1.125+log F*) dBc -80 dBc				
Power Requirements							
Operating voltage (Autoranging)		90-132 and 198-265 VAC (47 - 63 Hz)					
Power consumption, nominal		390 W	450 W	450 W	580 W	775 W	870 W
Mechanical Characteristics							
Dimensions (W x H x L)		9.8” x 9.2” x 16.4”					
Weight		14 kg (31 lbs.)					
Interfaces	RF input	Type-N female					
	Output sample port	Type-N female					
	RF output	WR-75 cover					
	Discrete port	MS3112E16-26P					
	Power	MS3102R16-10P					
Environmental Conditions							
Temperature	Operating	Option E: -30^{O}C to +55^{O}C Option F: -40^{O}C to +55^{O}C; Option G: -50^{O}C to +50^{O}C					
	Storage	-55^{O}C to +85^{O}C					
Humidity		100% condensing, up to 2”/hour rain					
Altitude		10,000' AMSL, derated by 2^{O}C/1000' from AMSL					

ADVANTECH reserves the right to change the above specifications without prior notice

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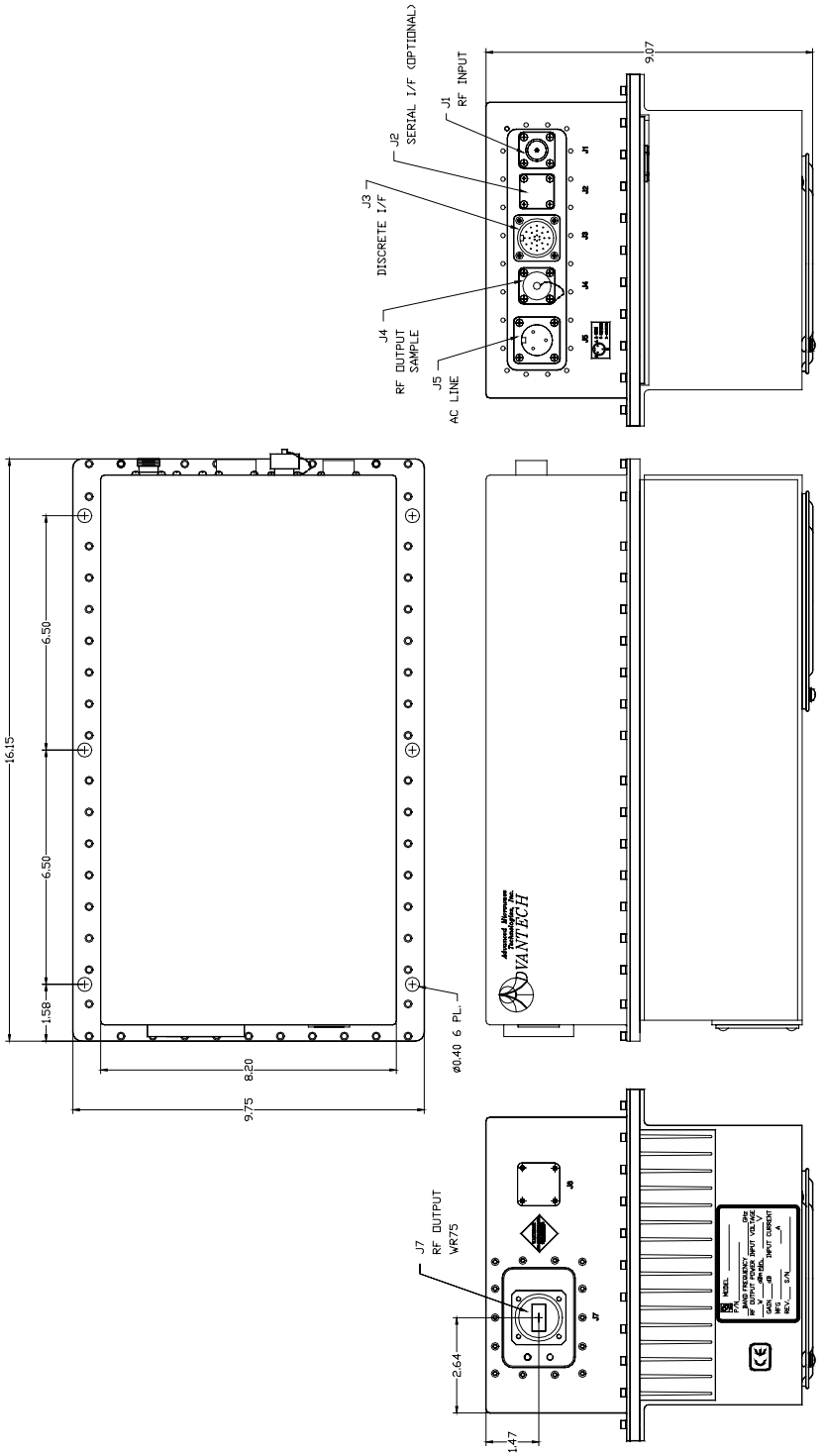
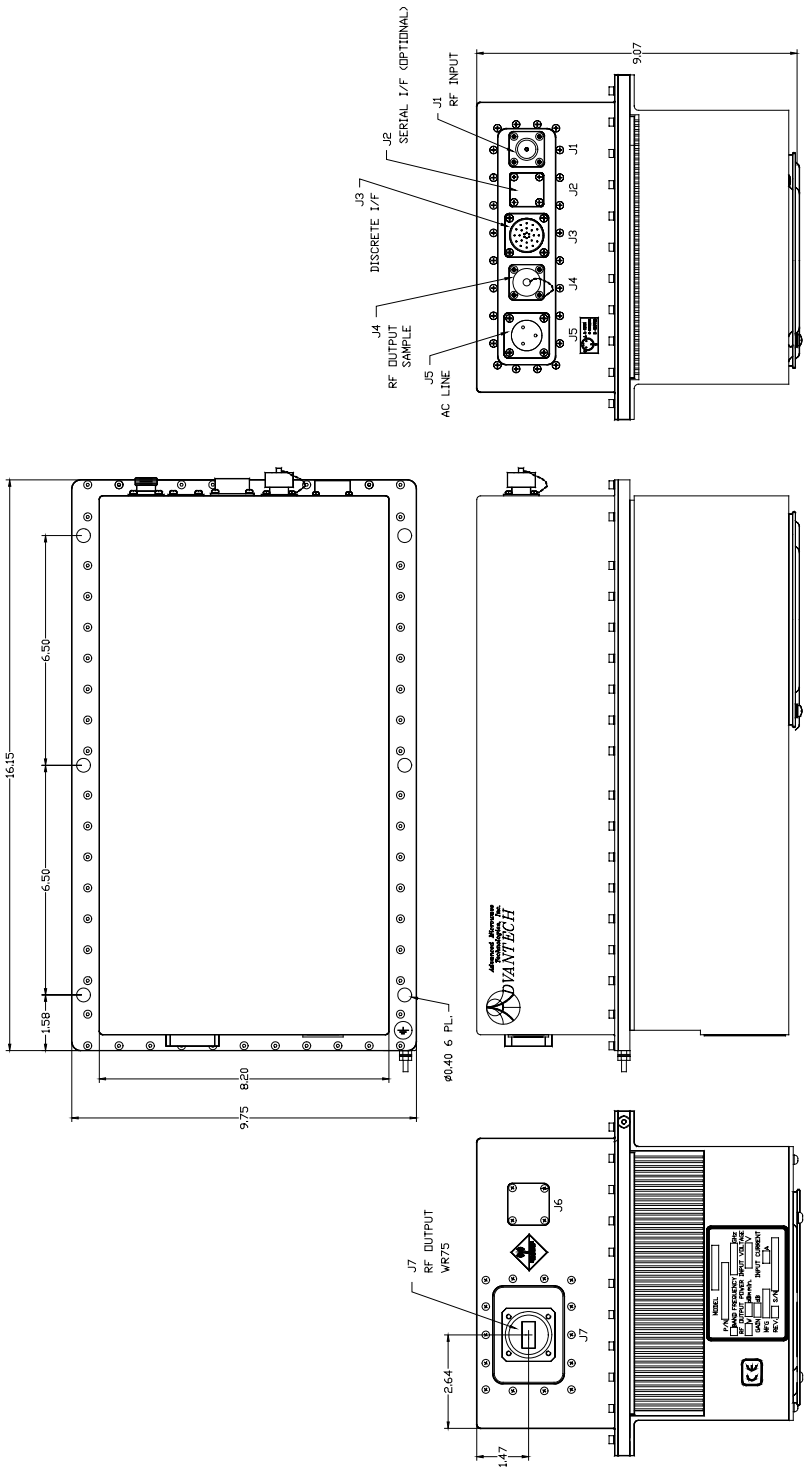


Product Outline – 16W & 20W Ku-Band SSB



Product Outline – 25W - 50W Ku-Band SSB