



## Features

- Completely modular
- Hot swappable elements
- Remote monitor and control capability via RS485 or Ethernet ports
- Input and output sample monitor ports
- Gain adjustment (local or remote)
- Fully weatherized
- Temperature gain compensation
- Automatic over-temperature shutdown
- Automatic high reflected power shutdown
- Option for Redundant Block Up-Converter
- CE Marking

## Overview

This Product Bulletin describes Advantech's SUMMIT OUTDOOR SSPA system. The OUTDOOR SUMMIT system is fully modular and can provide output power of up to 3500W in C-Band, 2800W in X-Band and 1600W in Ku-Band. The design of the SUMMIT line is based on Advantech's tradition of high power high linearity and high efficiency line of products.

The SUMMIT systems present distinct advantages over high power TWTA systems in terms of reliability, cost, maintainability and ease of operation.

## Application

The Advantech SUMMIT lines of SSPA are designed for satellite up-link applications in ground station terminals. The system is expandable from 4-modules to 8-modules.

Full remote monitor and control capability of the redundant system via serial or Ethernet interface.

## Description

The design of the SUMMIT SSPA system is based on Advantech's industry proven reliable solid state power amplifiers. The following is a description of the system elements and their salient features:

### RF Power Module

The RF Power Module contains the following:

- a) RF amplifier modules
- b) Field replaceable Power supply modules
- c) M&C system

### RF Amplifier Modules

The RF amplifier modules are packaged in a weatherproof enclosure. These RF modules are identical high gain fixed gain amplifier units with integral cooling system. In the Summit Modular system architecture, a failed RF module may be removed safely and without service interruption.

## Power Supply Modules

Each RF amplifier module contains a field replaceable power supply module. The power supply module could be replaced without dismounting the amplifier module. .

## M&C System

The M&C System provides access to monitor the operation of the RF and power supply modules. The M&C system is connected to the system M&C via RS485

## Redundant Pre-Amplifier

The pre-amplifier shelf operates in 1:1 redundancy mode and provides the following function:

- a) Adjustable gain; the gain may be adjusted over a range of 20 dB.
- b) Automatic gain compensation for (N-1) operation
- c) M&C system interface including RS485, Ethernet and Discrete.

Depending on the operating conditions of the system the impact of failure of a single module may be compensated by increasing the output from the Driver Amplifier.

## Waveguide Combining System

The waveguide passive combiner system is intended to combine the outputs of the chassis. The waveguide combiner system includes the following components:

- a) Waveguide combiners
- b) Interconnecting waveguide components
- c) Receive reject filter (where applicable)
- d) Output couplers for forward and reverse power monitoring

## Monitor & Control System

The M&C system operates on three levels:

- a) Amplifier module: The amplifier module M&C system is connected to the M&C system of the chassis via RS485. The following features are provided:
  - a) Parameters monitored
    - i) Fault
    - ii) Internal temperature
    - iii) Output power
  - b) Parameters controlled : amplifier inhibit
- b) Module M&C: The module M&C monitors and controls all the RF module via the RS485 bus. The RF module M&C is connected to the main system controller in located in the intermediate driver amplifiers. Power supply fault condition is provided.

- c) System M&C: The system M&C is located in the intermediate driver amplifiers. The complete system may be monitored and controlled via this interface. Also provided at this interface is output power and reflected power information. The following controls and status are provided

The Main Controller Board contains a microprocessor controller that performs all of the monitoring and control, input/output communication and the decision-making. The main controller board provides:

- Fault detection and indication from each module of the unit,
- Mute control and indication
- Forward RF power indication
- Reflected RF power indication
- Current consumption
- All interfaces

The Main Controller Board acts as a slave for the external system, and as a master to control all the internal agents: analog interface, serial interface, discrete interface, terminal interface.

The SNMP Agent Function combines distributed monitor and control functions and provides an Ethernet interface for SNMP management and Control, Monitor and Alarm functions.

Software architecture will be based around a kernel running on a single processor. Each unit offers full RS485 or SNMP features for remote monitoring and control.

## Modular operation

Failures of a single RF module would affect the output power of the system as follows:

4-module system (900W)	2.5 dB
8-modules system (1600W)	1.2 dB

The system may be expanded to include 16-modules; in this case failure of a single module would reduce the output power by only 0.6 dB

## TECHNICAL SPECIFICATIONS

### Electrical Characteristics

Frequency range	Ku-Band 14.0 - 14.5 GHz (Model SUMMIT-KS) Ku-Band (extended) 13.75 - 14.5 GHz (Model SUMMIT-KX) Low Ku-Band 12.75 - 13.25 GHz (Model SUMMIT-KL)		
Saturated output power nominal		4-module system	8-module system
	Ku-Band/Low Ku Ku-Band (ext'd)	900W 800W	1600W 1400W
Output Power (P1dB)	Ku-Band/Low Ku	58.5 dBm	61 dBm
	Ku-Band (ext'd)	58.0 dBm	60.5 dBm
Minimum Gain @ max. gain setting)	72 dB		
Gain flatness over each band	±1 dB max.		
Gain slope	0.6 dB/40 MHz max.		
Gain variation	±1.0 dB max. over operating temperature range		
Gain control range	20 dB min. in 0.1 dB steps		
Input VSWR	1.3:1 max.		
Output VSWR	1.25:1 max.		
Noise Power Density	13.75 - 14.5GHz -70 dBm/Hz      10.9 - 12.75 GHz -145 dBm/Hz		
Spurious at rated power	-65 dBc, max.		
Harmonics at rated power	-60 dBc		
AM/PM conversion at rated power	2.5°/dB max. at P1dB, 1°/dB max. at 3 dB back-off		
Two tone intermodulation (5 MHz apart)	-25 dBc max. at 3 dB total back-off from rated P1dB		
Group Delay	Linear:	0.02 nsec/MHz max.	
	Parabolic:	0.003 nsec/MHz <sup>2</sup> max.	
	Ripple	1 nsec p-p max.	
Residual AM (F* - frequency in kHz)	0-10 kHz	-45 dBc	
	10 kHz - 500 kHz	-20 (1.25+log F*) dBc	
	500 kHz - 1 MHz	-80 dBc	

### Power Requirements

Operating voltage	198 - 264 VAC 47 to 63 Hz		
Power consumption, nominal		900W system	1600W system
		7500W (at P1dB)	15000W (at P1dB)
		5500W (at 3dB back off)	11000W (at 3 dB back off)

### Mechanical Characteristics

4-module system (900W) will occupy a space of 81" x 30" (206 x 76 cm)  
 8-module system (1600W) will occupy a space of 81" x 63" (206 x 160 cm)  
 Height is 47" (120cm)

### Electrical Interfaces

RF input	Type-N female
Output sample port	Type-N female
RF output	WR75
Serial port	MS3112 type
Discrete port	MS3112 type
Ethernet	RJ45

### Environmental Conditions

Temperature	Operating	-30°C to +55°C
	Storage	-55°C to +85°C
Humidity	100%, condensing	
Altitude	10,000' AMSL, derated 2°C/1000' from AMSL	

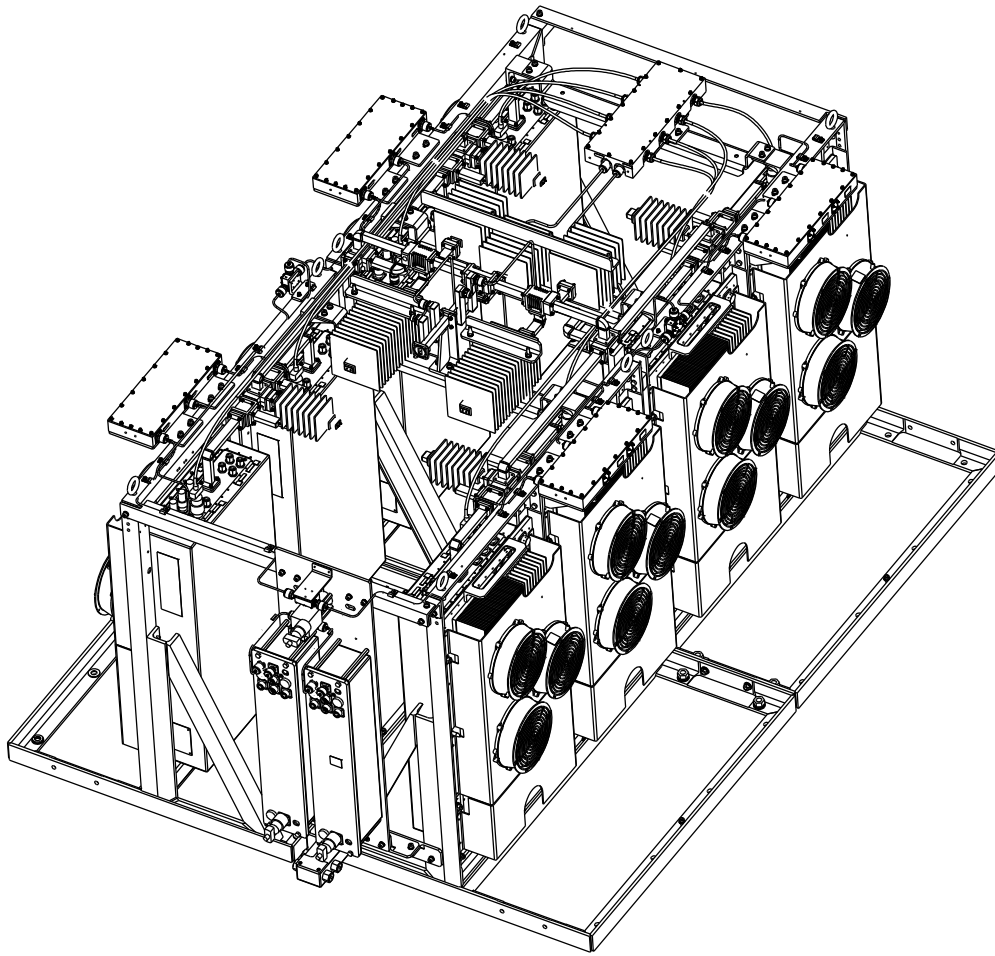


Figure 1: 3D View of SUMMIT 8-module Outdoor System

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