

Features:

Small Size Weight and Power

Wide Input Voltage Range

Operates over 29 to 31 GHz

Electronic Gain Control

Discrete/RS-422 Mute Enable

Hermetically Sealed

Other Products:

Low Noise Block Converters (Ku & X-Band)

Block Up Converters (Ku & X-Band)

Low Noise Amplifiers (Ku & K-Band)

Solid State Power Amplifiers
(X, Ku & Ka-Band)

Synthesizers (L, C or X-Band)

Description

This is a compact GaN based Hermetically Sealed SSPA which produces **12W minimum Linear Power¹ (16W typical)** over the entire **29-31GHz** bandwidth.

Included features are 20dB gain control, relative output power monitoring (done by monitoring the output of the driver stage), internal temperature monitoring, enable/disable control, and fault indication. Most of this is done through the RS-422 interface. The unit also includes a hard wire, TTL (+3.3V/0V) controlled pin for disabling the unit should the RS-422 communications link fail.

The total weight is 1.6 lbs max and the size is 5" L x 3.7" W x 1" H. See the outline drawing attached. The unit has a wide operating voltage of +20.5V to +32.5V.

¹ When a QPSK signal with a data rate of 10MSPS and a root raised cosine filter with a roll-off factor (α) of 0.2 is injected into the SSPA, the power level at which the spectral regrowth 1 symbol rate offset from the carrier (10MHz in this case) is 30dBc relative to the carrier is defined as the Linear Power.

Specifications:

Parameter	Value
Operating Freq Range	29 to 31 GHz
Operating Temp Range	-55°C to +85°C
Minimum Gain	33 dB (at 25°C)
Gain Control Range	20 dB typ (at 25°C)
Gain Flatness: 29 to 30 GHz	±1.0 dB max
Gain Flatness: 30 to 31 GHz	±1.0 dB max
Input VSWR	1.5:1 max
Output VSWR	2.0:1 max
Noise Power Density (29 to 31 GHz) in Band	-90dBm/Hz max
Linear Power (see def on pg 1)	40.8 dBm (12W) min
Max RF Input Power at Minimum Gain)	+13dBm
RF enable Time (Settling Time) ²	50 ms typ
Disable Time ²	1 ms typ
Gain Variation over Temperature (at nom Gain, 40dB)	±3dB Max

Parameter	Value
DC Power (RF disabled)	3W max
DC Power (RF enable, P _{out} =42dBm)	150W max
DC Voltage Range ²	+24.0V to +32.5V
DC Current (DC Voltage = +28V, P _{out} = 42dBm)	5.4A Max
RF Input Connector	2.92mm (female)
RF Output Interface	WR-28 Cover Flange with O-Ring Groove
DC Supply/Command/Monitor Interface	25 pin Micro-D Connector (MIL-DTL-83513/2)
Size	5"L x 3.7"W x 1"H
Weight	1.6 lbs Max
Altitude ³	Operational ≤60,000 ft
Shock ³	RTCA DO-160G 6g, 11ms Half Sine
Finish	Body Electroless Nickel
Relative Humidity	100%

² RF Enable Settling time is designated as time it takes for the signal to be within 1dB of the target power level.

³ Designed to comply with RTCA DO 160G, Section 7, Category B. Compliance by analysis of similarity to FATR-211042.

Micro D Connector Pinout Descriptions

The Micro D Connector on the SSPA consists of 25 pins with the pinouts as described by Table 2. Tie all +VDC pins together. Similarly tie all GND (ground) pins together. The RS-422 GND is internally connected to the GND pins but is provided as a separate output to connect with the source RS-422 connection. Please see Figure 2 on how to interface the SSPA RS-422 with the system or source RS-422.

Table 1: 25 Pin Micro D Connector Pinout Description

J1: 25 PIN MICRO D CONNECTOR PER MIL-DTL-83513/2		
PIN	FUNCTION	COLOR
J1-1	+VDC	BLACK
J1-2	+VDC	BROWN
J1-3	+VDC	RED
J1-4	+VDC	ORANGE
J1-5	GND	YELLOW
J1-6	GND	GREEN
J1-7	GND	BLUE
J1-8	-TX (RS-422)	VIOLET
J1-9	+RX (RS-422)	GREY
J1-10	RFTXEN (OPTIONAL, +3.3V=ON, OV=OFF)	WHITE
J1-11	GND (RS-422)	BLACK
J1-12	GND	BROWN
J1-13	GND	RED
J1-14	+VDC	ORANGE
J1-15	+VDC	YELLOW
J1-16	+VDC	GREEN
J1-17	GND	BLUE
J1-18	GND	VIOLET
J1-19	GND	GREY
J1-20	GND	WHITE
J1-21	+TX (RS-422)	BLACK
J1-22	-RX (RS-422)	BROWN
J1-23	SUMFLT (OPTIONAL, +3.3V=FAULT)	RED
J1-24	GND	ORANGE
J1-25	GND	YELLOW

- +VDC VOLTAGE RANGES FROM +20.5V TO +32.5V APPLY SAME VOLTAGE TO ALL +VDC PINS

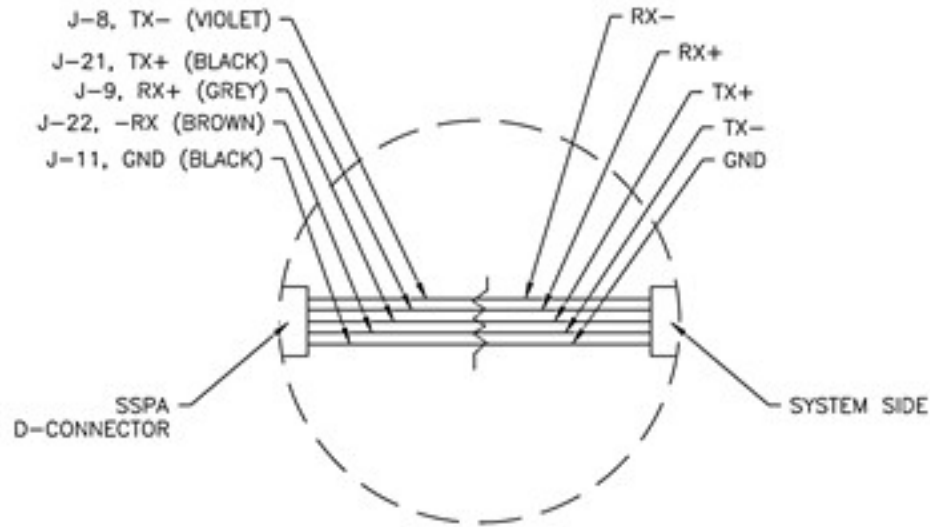


Figure 1: RS-422 Connection with System

Digital Protocols

Communication with the SSPA is done through RS-422. However, there are two discrete pins: RFTXEN and SUMFLT. RFTXEN is a hardwired TTL controlled pin for disabling RF power in case of emergency. This pin is high through an internal pull-up. To disable the unit, simply ground this pin. SUMFLT is a hardwired TTL level (+3.3V high) signal that indicates a fault when HIGH and no fault when LOW. The fault status can be read through the RS-422.

The serial format is shown in Table 3. A high-to-low transition indicates the start of the data. A newline (“\n”) following the command indicates the end of the command.

The SSPA default gain is set to 40 dB at startup and room temperature. In order to adjust this, use the gain control command from Table 4. If another default gain setting is desired, please contact Teledyne. See Example 5, for a sample command to set the gain control to 2050 (approximately +10 dB of gain control).

See command examples on the following page. The command part is bolded and the response is un-bolded.

Table 2: Serial Format

Baud Rate	115200 bps
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Table 3: RS-422 Command List

“VER”	Indicates Firmware Version
“SN”	Indicates Unit Serial Number
“ECHO 0”	Turns Command Echo OFF (command sent is not repeated back)
“ECHO 1”	Turns Command Echo ON (command send is repeated back)
“RF0”	Turns RF Power OFF
“RF1”	Turns RF Power ON
“STA”	Reports Fault Status
“POUT”	Reports Output Power (dBm)
“GAIN”	Reports Current Gain DAC value
“GC WORD HHHH”	Gain Control (0dB to ~20dB), 4 digit HEX value (HHHH) represents the gain control. DAC value 0 to 4095
“TEMP”	Reports PA Temperature (°C)
“SAVEGC”	Save Gain Control Value to Memory

Example 1: Turn on RF Power, Echo disabled

RF1\n
PA ON

Example 5: Set Gain control to 2050, Echo

disabled GC WORD 0802\n
DAC VALUE = 2050

Example 2: Turn on RF Power, Echo enabled

RF1\n
RF1
PA ON

Example 6: Read Power

POUT\n
POUT = 40.5

Example 3: Fault Status (No Fault), Echo disabled

STA\n
FAULT = 0

Example 7: Turn off RF Power, Echo disabled

RF0\n
PA OFF

Example 4: Temperature, Echo disabled

TEMP\n
TEMPERATURE = 25.1

Outline:

