

# TSA-213245

## High Power GaN Amplifier

## Technical Specifications

**2,000 to 6,000 MHz,  
40 Watts**



EXPORT RESTRICTIONS MAY APPLY

### Description

The TSA-213245 amplifier provides nominal output power of 28-42 Watts. The amplifier uses control circuitry to ensure safe startup and automatic thermal shutdown and recovery. The amplifiers have an external pin for TTL on/off control. On/Off Low or High can be specified; standard is Off/Low.

Heat sinking is required to keep the case temperatures within a safe operating range. A thin layer of thermal grease or HiTherm (for example the HT-2500 series) helps provide a low resistance thermal path between the case and the mounting surface. The mounting surface should be metal with heat conduction of aluminum or better. Heat sink size depends on whether fan-driven air cooling is used, or if only convection is used.

Maximum  $T_j$  of amplifier is 225°C.

### Heat Sink Warning:

This amplifier requires an adequate heat sink to prevent damage. Maximum case temperature must not be exceeded. The package is designed to provide adequate heat transfer to proper aluminum heat sink

### Typical Vaules

- Broadband: 2,000-6,000 MHz
- High Saturated Power,  $P_{sat}$ : 28-42 W, (+46.3 dBm)
- Small hermetic package
- Dimensions: 2.5"L x 2.0"W x 0.42"H

## Specifications

Parameter	Guarenteed -55 to +85°C
Frequency (Min.)	2,000 - 6,000 MHz
Small Signal Gain (Min.)	50 dB
Gain Flatness (Max.)	±1.0 dB
Noise Figure (Max.)	4.0 dB
SWR (Max.) Input/Output	2.0:1/2.0:1
Power Output (Min.) @ 5 dB comp	+45 dBm
DC Current (Max.)	4.5A (28V), 0.45A (8V) Typ.
Switching Speed (Max.) 50% TTL to 90% Rise Time or 10% Fall Time	100 ns Typ.

\*Measured in a 50-ohm system at +32V

^ Faster switching speed option available upon request

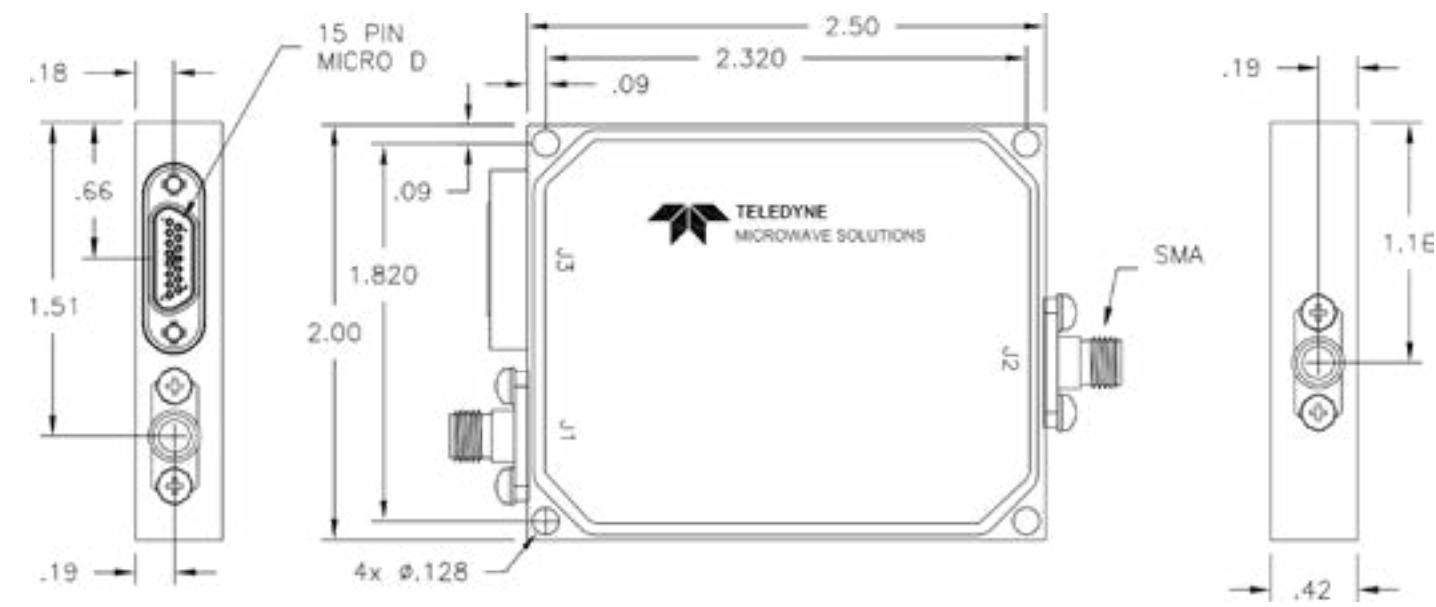
## Intermodulation Performance

Parameter	Guarenteed -55 to +85°C
Second Order Harmonic Intercept Point	+82 dBm
Second Order Two Tone Intercept Point	+76 dBm

## Absolute Maximum Ratings

Parameter	Value
Storage Temperature	-62 to +125°C
Maximum Case Temperature, +32V	+85°C
Maximum DC Voltage	+33 Volts
Maximum RF Input Power	+10 dBm
Burn-in Temperature, +29V	+85°C
Thermal Resistance <sup>1</sup> (0jc)	+3°C/Watt
Junction Temperature Rise Above Case (Tjc), +32V	+120°C

Outline Drawing



Logic Table

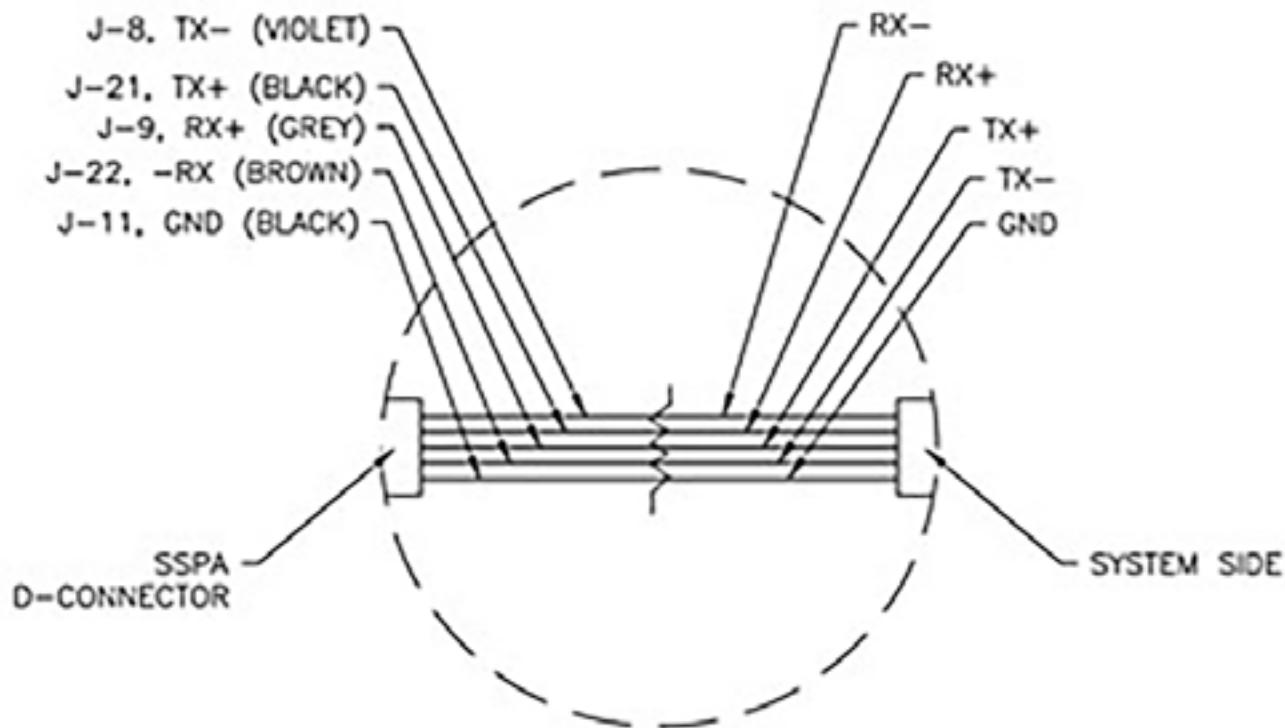
TTL	State
HIGH	ON
LOW	OFF

Notes: (Unless otherwise specified)

1. Dimensions are in inches
2. Tolerances: X.XXX± 0.005  
X.XX±0.01
3. Marking as shown shall be permanent and legible per MIL-STD-130 using black epoxy base ink
4. Case material: Aluminum
5. Finish: All surfaces except mounting surface, connectors and pins, alignment slots and Micro-D connector, are painted with epoxy paint per MIL-C-22750 over epoxy primer per MIL-P-23377, Type I. Color is Teledyne standard color chip 26231 per FED-STD-595 mounting surface is Chem Film per MIL-DTL-5541, Class 3, Type I.
6. Weight not to exceed 0.40 pounds

**Table 1: 25 Pin Micro-D Connector Pinout Description**

J1: 15 PIN MICRO-D CONNECTOR PER MIL_DTL-83513/2		
PIN NO.	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	RESERVED (DO NOT CONNECT)	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	RESERVED (DO NOT CONNECT)	YELLOW



## 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.

In terms of defaults, at power the gain is set to the minimum gain of 35dB. In order to adjust this, use the gain control command from Table 4. See Example 5, for a sample command to set the gain control.

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

**Table 2: Serial Format**

Baud Rate	115,200 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 (0 dB to -20 dB), 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 2:** Turn on RF Power, Echo disabled **RF1\n** RF1 PA ON

**Example 3:** Fault Status (No Fault), Echo disabled **STA\n** FAULT = 0

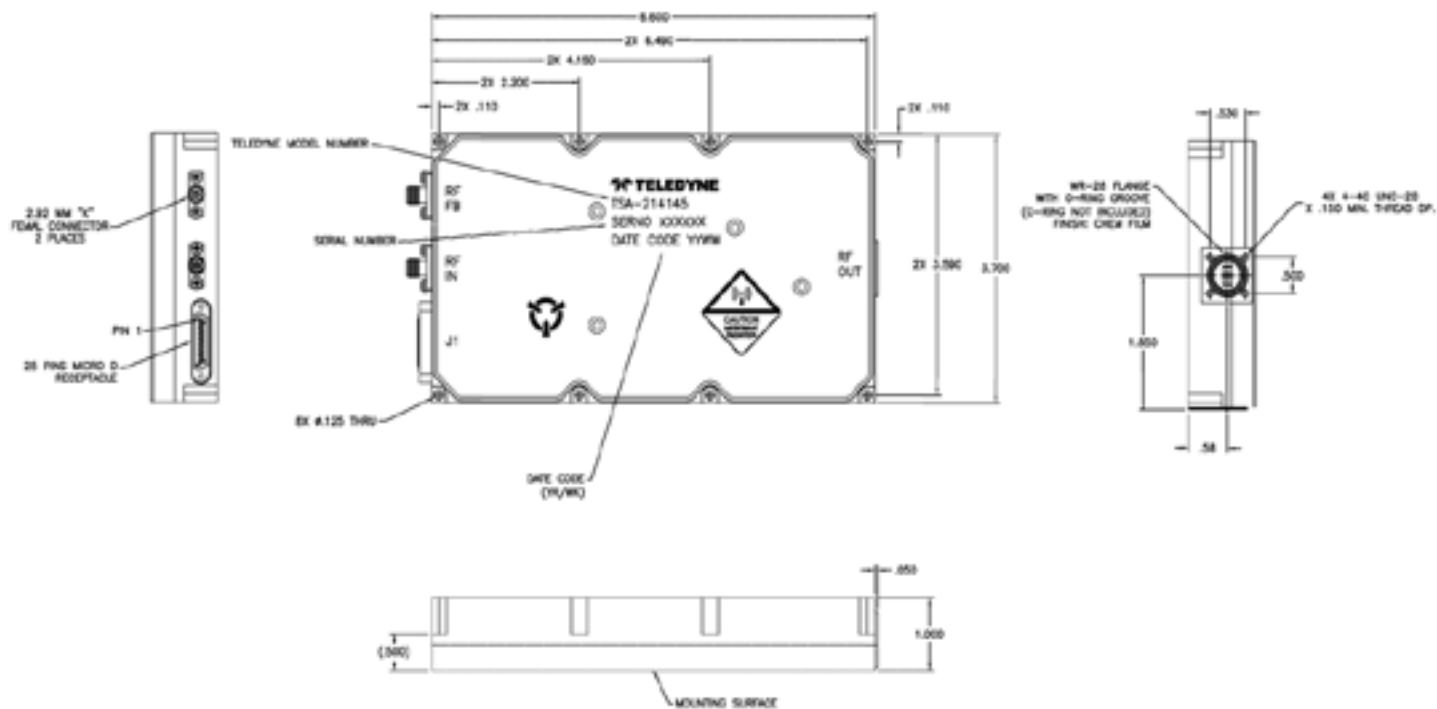
**Example 4:** Temperature, Echo disabled **TEMP\n** TEMPERATURE = 25.1

**Example 5:** Set Gain Control to 2050, Echo disabled **GC WORD 0802\n** DAC VALUE = 2050

**Example 6:** Read Power **POUTF\n** POUT = 40.5

**Example 7:** Turn off RF Power, Echo disabled **RF0\n** PA OFF

## Outline Drawing



**Notes (unless otherwise specified):**

1. Marking as shown shall be permanent and legible per MIL-STD-130 using black epoxy based ink. Marking to be on top of SSPA and on top cover.
1. Case material: Aluminum.
2. Finish: Electroless nickel per MIL-C-26074, Type I, Class 4, Grade B, 200-400 microinches except for welded cover, mounting surface and waveguide flange. Welded cover, mounting surface and waveguide finish is chemical film per MIL-DTL-541, latest revision, Type 1, Class 3, Yellow.