



## Description

The TTRM4410-D02 SISO Bi-Directional Amplifier is a class AB GaN module with an operating frequency range of 5000 to 5300 MHz. Designed for both military and commercial applications, this amplifier features an input voltage range of +12 to +30 VDC and a saturated RF output power of +45 dBm. With the capability of supporting any signal type and modulation format, all in a low-SWaP package, this unit is ideal for applications where high power-density, efficiency, and linearity are essential.

## TTRM4410-D02

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## Features

- Temperature Monitor Output
- Over-Temperature Protection
- Amplifier Status Output
- Manual Tx/Rx Switching

## Applications

- Unmanned Systems
- Military or Commercial Radio Systems
- Aircraft Systems

## CHARACTERISTICS & SPECIFICATIONS

Specifications subject to change without notice. Typical performance at 28VDC at 25°C in a 50Ω system.

### Tx Specifications (Per Channel)

| Parameter                                          | Min. | Typ. | Max  | Unit              |
|----------------------------------------------------|------|------|------|-------------------|
| Operating Frequency                                | 5000 | —    | 5300 | MHz               |
| 64QAM Power Output<br>20 MHz BW, -27 dB EVM Limit  | 40   | —    | —    | dBm               |
| BPSK Power Output<br>20 MHz BW, -7 dB EVM Limit    | 45   | —    | —    | dBm               |
| Saturated Power Output<br>CW Sweep at Design Limit | —    | 45   | —    | dBm               |
| Small Signal Gain                                  | 26.5 | 29.5 | —    | dB                |
| Small Signal Gain Flatness                         | —    | —    | 2    | dB (peak to peak) |
| Input Return Loss                                  | —    | —    | -15  | dB                |
| Tx / Rx Switching Time                             | —    | 1    | 2    | μS                |

### Rx Specifications (Per Channel)

| Parameter                  | Min. | Typ. | Max | Unit              |
|----------------------------|------|------|-----|-------------------|
| Small Signal Gain          | 10.5 | 13.5 | —   | dB                |
| Small Signal Gain Flatness | —    | —    | 2   | dB (Peak to Peak) |
| Noise Figure               | —    | 3    | 4   | dB                |
| Input Return Loss          | —    | —    | -9  | dB                |

### Power Supply Specifications

| Parameter                                          | Min. | Typ. | Max | Unit | Notes                                                          |
|----------------------------------------------------|------|------|-----|------|----------------------------------------------------------------|
| Supply Voltage Range                               | 12   | 28   | 30  | VDC  | —                                                              |
| RMS Operating Current Draw (Idle)                  | —    | 0.42 | —   | A    | 28VDC Supply Voltage,<br>Idle in Receive Mode                  |
| RMS Operating Current Draw<br>(64QAM Power Output) | —    | 1.3  | —   | A    | 28VDC Supply Voltage,<br>802.11 WLAN Signal,<br>50% Duty Cycle |
| RMS Operating Current Draw<br>(BPSK Power Output)  | —    | 3    | —   | A    | 28VDC Supply Voltage,<br>802.11 WLAN Signal,<br>50% Duty Cycle |

**CHARACTERISTICS & SPECIFICATIONS (CONT.)**

Specifications subject to change without notice.

**Mechanical Specifications**

| Parameter              | Value                                     | Unit    | Notes |
|------------------------|-------------------------------------------|---------|-------|
| Dimensions (L x W x H) | 5.3 x 3.25 x 0.6<br>(134.6 x 82.6 x 15.2) | in (mm) | —     |
| Cooling                | Baseplate Conduction                      | —       | —     |
| Weight                 | 13 (369)                                  | oz (g)  | —     |

**Interface Specifications**

| Parameter                      | Value             | Notes                                                           |
|--------------------------------|-------------------|-----------------------------------------------------------------|
| RF Connectors (Input / Output) | SMA-F / SMA-F     | —                                                               |
| Power / Signal Connector       | MDM-21SH016P-A174 | Connector appearing on unit<br>(Manufacturer P/N)               |
| Mating Connector               | M83513/03-C03C    | Mating connector required for interfacing<br>(Manufacturer P/N) |
| Test Integration Cable         | CBL58             | Triad P/N available for purchase separately                     |

**Environmental Specifications**

| Parameter                             | Min.                                                               | Max          | Unit     |
|---------------------------------------|--------------------------------------------------------------------|--------------|----------|
| Operating Temperature (Housing Temp.) | -20                                                                | 85           | °C       |
| Storage Temperature                   | -55                                                                | 85           | °C       |
| Altitude                              | 0 (0)                                                              | 30000 (9144) | ft. (m.) |
| Ingress Protection Rating             | IP55                                                               |              | —        |
| Shock / Vibration                     | Designed to comply with MIL-STD-810 Shock / Vibration Test Methods |              | —        |

**Protections & Maximum Ratings**

| Parameter                         | Value | Unit | Notes                                   |
|-----------------------------------|-------|------|-----------------------------------------|
| Maximum RF Input (Per Channel)    | 24    | dBm  | CW Power                                |
| Over Temp Protection Trip Level   | 85    | °C   | Internally Monitored System Temperature |
| RF Output Open Load Survivability | 45    | dBm  | CW with Open Circuit at Antenna Port    |

## DC / CONTROL CONNECTORS

## Input / Output Pins

| TTRM Connector Part Number |         |        | Mating Connector Part Number |                                                                                                                                                                                                                         |
|----------------------------|---------|--------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MDM-21SH016P-A174          |         |        | M83513/03-C03C               |                                                                                                                                                                                                                         |
| Pin                        | Label   | Type   | I/O                          | Notes                                                                                                                                                                                                                   |
| 1                          | Vin     | Power  | N/A                          | Supply Voltage                                                                                                                                                                                                          |
| 2                          | Vin     | Power  | N/A                          | Supply Voltage                                                                                                                                                                                                          |
| 3                          | Vin     | Power  | N/A                          | Supply Voltage                                                                                                                                                                                                          |
| 12                         | Vin     | Power  | N/A                          | Supply Voltage                                                                                                                                                                                                          |
| 13                         | Vin     | Power  | N/A                          | Supply Voltage                                                                                                                                                                                                          |
| 9                          | GND     | Power  | N/A                          | Power Supply Return                                                                                                                                                                                                     |
| 10                         | GND     | Power  | N/A                          | Power Supply Return                                                                                                                                                                                                     |
| 11                         | GND     | Power  | N/A                          | Power Supply Return                                                                                                                                                                                                     |
| 20                         | GND     | Power  | N/A                          | Power Supply Return                                                                                                                                                                                                     |
| 21                         | GND     | Power  | N/A                          | Power Supply Return                                                                                                                                                                                                     |
| 4                          | FWD DET | Signal | Output                       | TX AMP RMS Power Detector                                                                                                                                                                                               |
| 5                          | TEMP    | Signal | Output                       | Temp Monitor<br>Temp in DegC = (Vout - 0.5V) * 100                                                                                                                                                                      |
| 6                          | RAD DET | Signal | Output                       | Radio Input RMS Power Detector                                                                                                                                                                                          |
| 7                          | STATUS  | Signal | Output                       | Amplifier Status<br>TTL HIGH = Normal Operation<br>TTL LOW = Error Condition                                                                                                                                            |
| 8                          | I/O     | Signal | Input                        | TA:<br>TTL High or No Connection = Enable<br>TTL Low = Disable<br><br>Manual Switching TTRM:<br>TTL High = Tx Amp Enabled<br>TTL Low = Rx Amp Enabled<br><br>Automatic Switching TTRM:<br>Pin not required. Do not use. |
| 19                         | SIG GND | Signal | N/A                          | Signal Ground                                                                                                                                                                                                           |
| 14                         | N/C     | N/A    | N/A                          | NO CONNECTION                                                                                                                                                                                                           |
| 15                         | N/C     | N/A    | N/A                          | NO CONNECTION                                                                                                                                                                                                           |
| 16                         | N/C     | N/A    | N/A                          | NO CONNECTION                                                                                                                                                                                                           |
| 17                         | N/C     | N/A    | N/A                          | NO CONNECTION                                                                                                                                                                                                           |
| 18                         | N/C     | N/A    | N/A                          | NO CONNECTION                                                                                                                                                                                                           |

## MECHANICAL DRAWING









