

## DRIVER

# DR-AN-20-MO

## 20 GHz Analog Driver

The DR-AN-20-MO is a wideband RF amplifier module designed for analog applications at frequencies up to 20 GHz.

The DR-AN-20-MO is characterized by a low Noise Figure and a linear transfer function whose 1 dB compression point is above 20 dBm. It exhibits flat Group Delay and Gain curves with reduced ripple over the entire bandwidth.

The DR-AN-20-MO comes in a compact 52 mm x 25.6 mm housing with K type RF connectors (compatible SMA) and with an optional heat-sink. It operates from a single power supply for safety and ease of use, and offers gain control over 3 dB.

This amplifier module is ideally suited to drive optical modulators for analog applications.



### Features

- Output voltage up to 9 V<sub>pp</sub>
- Linear amplifier
- Flat gain up to 20 GHz
- Single voltage power supply
- Low group delay variation

### Applications

- LiNbO<sub>3</sub> modulators
- OFDM, RF over Fiber
- Linear amplification
- Research & Development

### Options

- Heat-sink

### Performance Highlights

| Parameter              | Min  | Typ  | Max | Unit            |
|------------------------|------|------|-----|-----------------|
| Cut-off frequencies    | 50 k | 20 G | -   | Hz              |
| Output voltage         | 0    | -    | 9   | V <sub>pp</sub> |
| Gain                   | 28   | 30   | -   | dB              |
| Saturated output power | 23   | -    | -   | dBm             |
| Output power 1 dB comp | 20   | 21   | -   | dB              |
| Harmonics              | -    | -    | -15 | dBc             |
| Noise figure           | 3    | -    | 7   | dB              |

Measurements for V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 305 mA



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**DR-AN-20-MO**

20 GHz Analog Driver

**DC Electrical Characteristics**

| Parameter              | Symbol            | Min | Typ | Max | Unit |
|------------------------|-------------------|-----|-----|-----|------|
| Supply voltage (fixed) | $V_{\text{bias}}$ | -   | 12  | -   | V    |
| Current consumption    | $I_{\text{bias}}$ | -   | 310 | -   | mA   |
| Gain control voltage   | $V_{\text{amp}}$  | -   | 1.2 | -   | V    |

**Electrical Characteristics**

| Parameter              | Symbol                  | Condition                                     | Min | Typ | Max       | Unit            |
|------------------------|-------------------------|---|-----|-----|-----------|-----------------|
| Lower frequency        | $f_{\text{3dB, lower}}$ | -3 dB point                                   | -   | -   | 50        | kHz             |
| Upper frequency        | $f_{\text{3dB, upper}}$ | -3 dB point                                   | 18  | 20  | -         | GHz             |
| Gain                   | $S_{21}$                | Small signal, $f < 15$ GHz                    | 28  | 30  | -         | dB              |
| Gain ripple            | -                       | $f < 15$ GHz                                  | -   | -   | $\pm 1.5$ | dB              |
| Input return loss      | $S_{11}$                | $f < 10$ GHz                                  | -   | -10 | -         | dB              |
| Output return loss     | $S_{22}$                | $f < 20$ GHz                                  | -   | -10 | -         | dB              |
| Isolation              | $S_{12}$                | $f < 20$ GHz                                  | -   | -60 | -         | dB              |
| Output power 1 dB      | $P_{1\text{dB}}$        | $2 \text{ GHz} < f < 16 \text{ GHz}$          | 20  | 21  | -         | dBm             |
| Saturated output power | $P_{\text{sat}}$        | $2 \text{ GHz} < f < 12 \text{ GHz}$          | 23  | -   | -         | dBm             |
| Output voltage         | $V_{\text{out}}$        | Linear  | 0   | -   | 7         | $V_{\text{pp}}$ |
|                        |                         | Maximum swing                                 | 0   | -   | 9         |                 |
| Noise figure           | NF                      | $f < 7 \text{ GHz} \ \& \ f > 18 \text{ GHz}$ | 5   | -   | 7         | dB              |
|                        |                         | $7 \text{ GHz} < f < 18 \text{ GHz}$          | 3   | -   | 5         |                 |
| Harmonics              | Harm                    | @ $P_{1\text{dB}}, f < 5 \text{ GHz}$         | -   | -   | -15       | dBc             |
| Power dissipation      | P                       | Small signal                                  | -   | 3.6 | 5.2       | W               |

Conditions: S parameters -30 dBm,  $T_{\text{amb}} = 25^\circ\text{C}$ , 50  $\Omega$  system**Absolute Maximum Ratings**

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter             | Symbol            | Min | Max | Unit             |
|-----------------------|-------------------|-----|-----|------------------|
| RF input voltage      | $V_{\text{in}}$   | -   | 0.6 | $V_{\text{pp}}$  |
| Supply voltage        | $V_{\text{bias}}$ | 0   | 13  | V                |
| DC current            | $I_{\text{bias}}$ | 0   | 400 | mA               |
| Gain control voltage  | $V_{\text{amp}}$  | 0   | 1.5 | V                |
| Power dissipation     | $P_{\text{diss}}$ | -   | 5.2 | W                |
| Operating temperature | $T_{\text{op}}$   | 0   | +40 | $^\circ\text{C}$ |
| Storage temperature   | $T_{\text{st}}$   | -20 | +70 | $^\circ\text{C}$ |

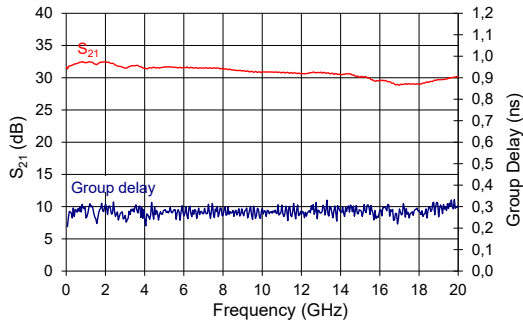


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## DR-AN-20-MO

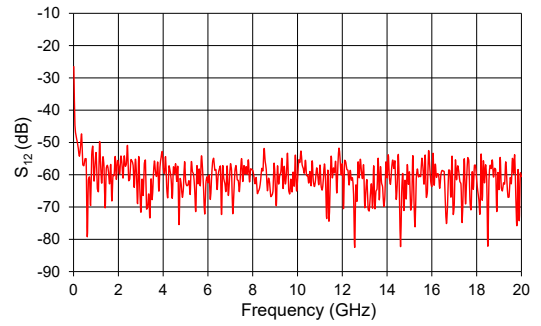
### S<sub>21</sub> and Group Delay Parameter Curves

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



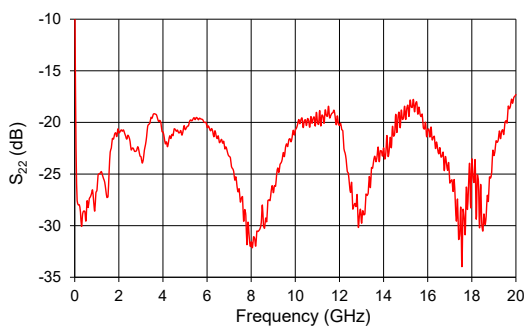
### S<sub>12</sub> Parameter Curve

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



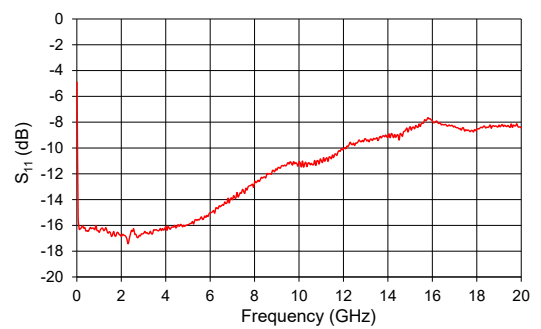
### S<sub>22</sub> Parameter Curve

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



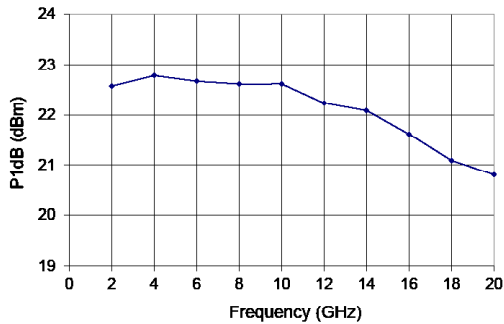
### S<sub>11</sub> Parameter Curve

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



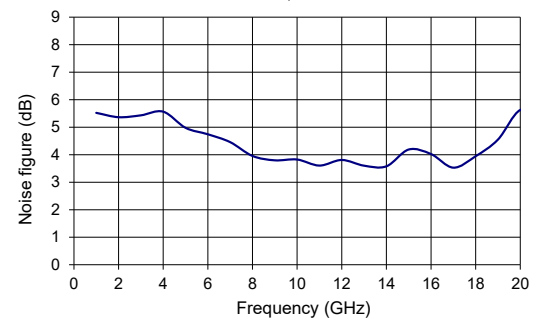
### Saturated Output Power Curve

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



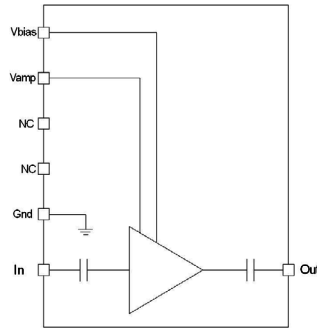
### Noise Figure Curve

Conditions: V<sub>bias</sub> = 12 V, V<sub>amp</sub> = 1.2 V, I<sub>bias</sub> = 300 mA



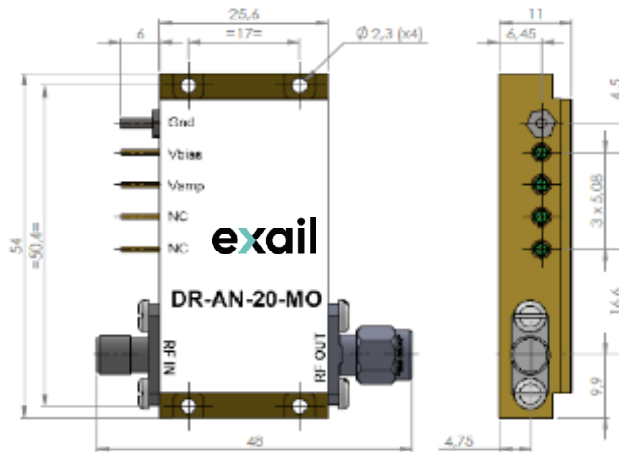
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**Electrical Schematic Diagram**



**Mechanical Diagram and Pinout**

All measurements in mm



The heat-sinking of the module is necessary. It's user responsibility to use an adequate heat-sink. Refer to page 5 for Exail recommended heat-sink.

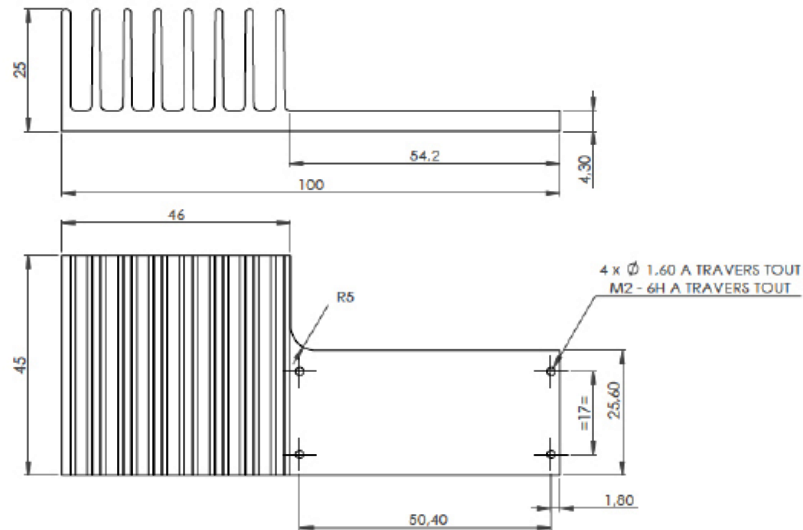
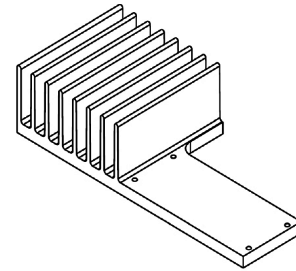
| Port       | Function                            | Unit                                  |
|------------|-------------------------------------|---------------------------------------|
| IN         | RF In                               | Female K connector                    |
| OUT        | RF Out                              | Male K connector                      |
| $V_{bias}$ | Power supply voltage                | Set a typical operating specification |
| $V_{amp}$  | Output voltage amplitude adjustment | Adjust for gain control tuning        |

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**Mechanical Diagram and Pinout with HS-MO2 Heat-sink**

All measurements in mm



**About us**

Exail Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate (LiNbO<sub>3</sub>) modulators and RF electronic modules.

Exail Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.

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