DRIVER

# DR-DG-40-MO

## 40 Gbps NRZ Medium Output Voltage Driver

The DR-DG-40-MO is a driver module optimized for digital applications at 40 Gbps – 44 Gbps data rate. It exhibits an output voltage of 6.3 $V_{pp}$ and a broad bandwidth of 40 GHz.

The DR-DG-40-MO is housed in a compact package that integrates voltage regulators allowing for flexible biasing, while internal bias sequencing circuitry assures robust operation and single voltage power supply for maximum ease of use. It features two control inputs: one for gain control, the second one for crossing point adjustment. The RF connectors are V type, allowing easy and repeatable connections.

The DR-DG-40-MO combines high performance and user friendliness, it is the ideal device to drive 40 Gbps modulators and to obtain widely opened optical eye diagrams with short jitter and high SNR.




### Features

- Output voltage 6.3 $V_{pp}$
- Flat gain up to 40 GHz
- Single voltage power supply
- Gain and crossing point adjustment

### Applications

- $LiNbO_3$ & InP modulators
- 40 Gbps - 44 Gbps NRZ / RZ
- SONET OC-768 / SDH-256
- Research & Development

### Options

- Heat-sink
- Analog version
- Low output voltage version for EAM

### Related Equipments

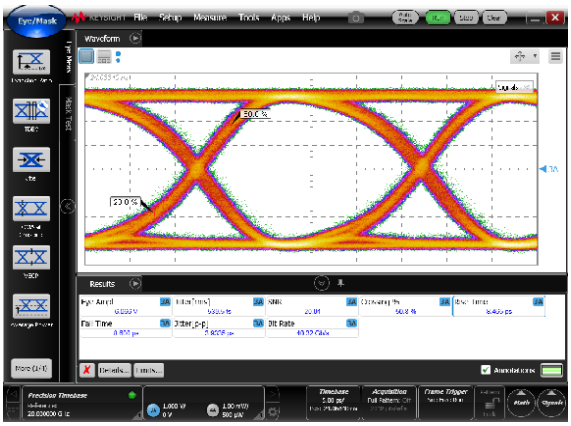
- MX-LN-40, MXAN-LN-40 modulators
- MBC-DG Automatic Bias Controllers

### Performance Highlights

| Parameter | Min | Typ | Max | Unit |
|---|---|---|---|---|
| Cut-off frequencies | 50 k | - | 40 G | Hz |
| Output voltage | - | 6.3 | - | $V_{pp}$ |
| Gain | - | 26 | - | dB |
| Saturated power | 20 | - | - | dBm |
| Added jitter | - | 0.75 | - | ps |
| Rise / Fall times | - | 9 | 12 | ps |

Measurements for $V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA

### 40 Gbps Output Response




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## 40 Gbps NRZ Medium Output Voltage Driver

### DC Electrical Characteristics

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Supply voltage (fixed) | $V_{bias}$ | 7 | 8 | 12 | V |
| Current consumption | $I_{bias}$ | - | 300 | 350 | mA |
| Gain control voltage | $V_{amp}$ | 0 | 1.5 | 2 | V |
| Cross Point control voltage | $V_{xp}$ | 0 | 2 | 2.5 | V |

### Electrical Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Lower frequency | $f_{3db}$, lower | -3 dB point | - | - | 50 | kHz |
| Upper frequency | $f_{3db}$, upper | -3 dB point | 36 | 40 | - | GHz |
| Gain | $S_{21}$ | Small signal | - | 26 | - | dB |
| Gain ripple | - | f < 40 GHz | - | ± 1.5 | - | dB |
| Input return loss | $S_{11}$ | 50 MHz < f < 30 GHz | - | -10 | - | dB |
| Output return loss | $S_{22}$ | 50 MHz < f < 30 GHz | - | -10 | - | dB |
| Saturated power | $P_{sat}$ | $V_{in}$ = 0.45 $V_{pp}$ | 20 | - | - | dBm |
| Output voltage | $V_{out}$ | $V_{in}$ = 0.45 $V_{pp}$ | - | 6.3 | 6.5 | $V_{pp}$ |
| Rise / Fall time | $t_r$ / $t_f$ | 20 % - 80 % | - | 9 | 12 | ps |
| Added Jitter | $J_{RMS}$ | $J_{RMS} = \sqrt{J^2_{RMS\text{-}total} - J^2_{RMS\text{-}source}}$ | - | 0.75 | - | ps |
| Power dissipation | P | $V_{out}$ = 6.3 $V_{pp}$ | - | 2.4 | - | W |

Conditions: $V_{in}$ = 0.5 $V_{pp}$, $T_{amb}$ = 25 °C, 50 W system

### Absolute Maximum Ratings

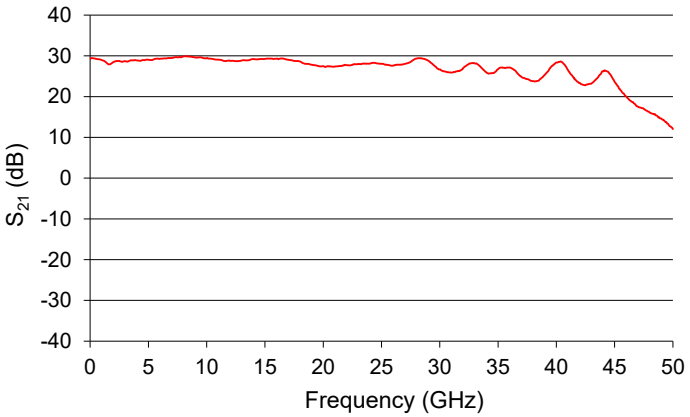
Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute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

| Parameter | Symbol | Min | Max | Unit |
|---|---|---|---|---|
| RF input voltage | $V_{in}$ | - | 1 | $V_{pp}$ |
| Supply voltage | $V_{bias}$ | 0 | 12 | V |
| DC current | $I_{bias}$ | 0 | 350 | mA |
| Gain control voltage | $V_{amp}$ | 0 | 2 | V |
| Cross Point control voltage | $V_{xp}$ | 0 | 2.5 | V |
| Power dissipation | $P_{diss}$ | - | 4.2 | W |
| Operating temperature | $T_{op}$ | 0 | 40 | °C |
| Storage temperature | $T_{st}$ | -20 | +70 | °C |

# DR-DG-40-MO

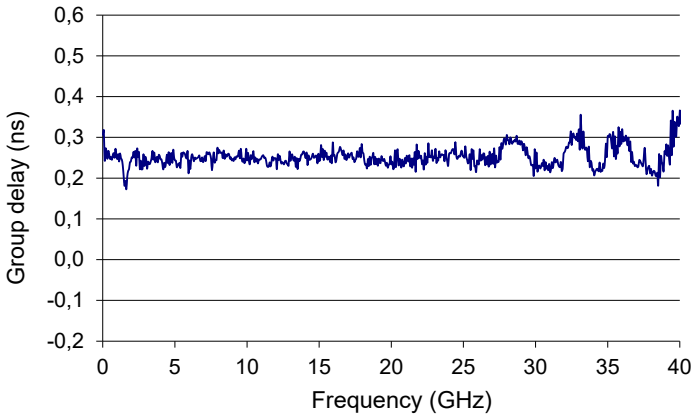
## $S_{21}$ Parameter Curve

Conditions: $V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



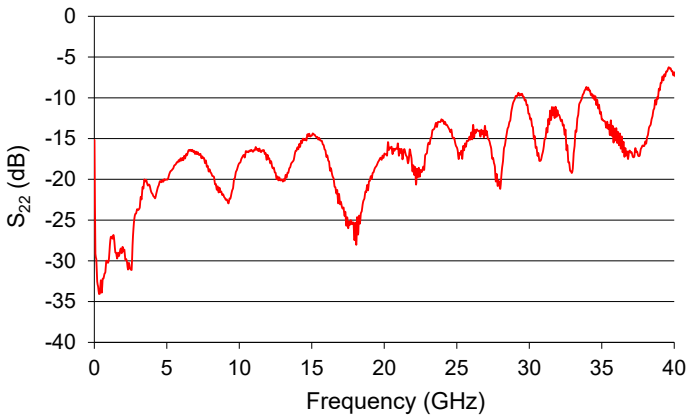

## Group Delay Parameter Curve

Conditions: $V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



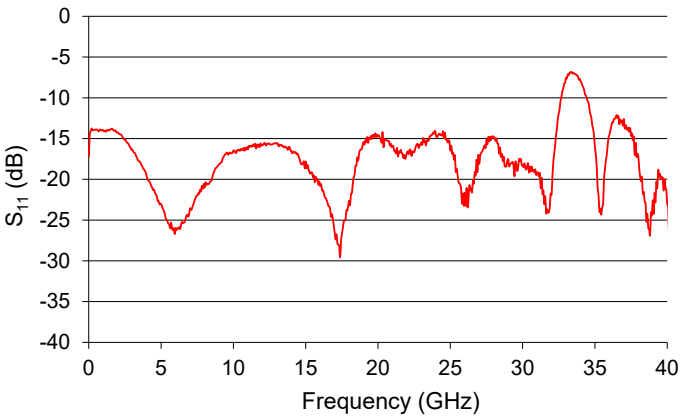

## $S_{22}$ Parameter Curve

Conditions: $V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



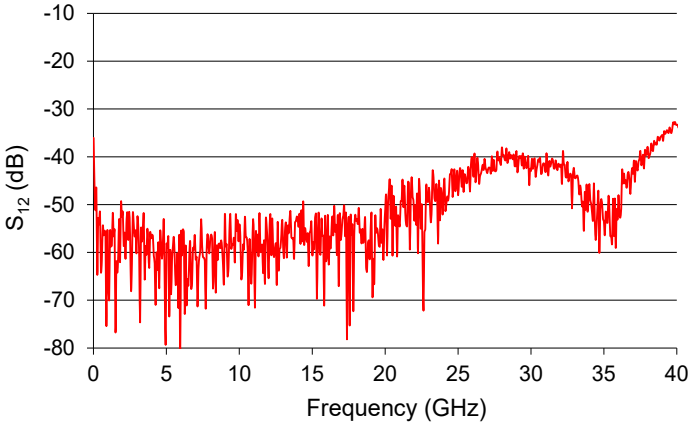

## $S_{11}$ Parameter Curve

Conditions: $V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



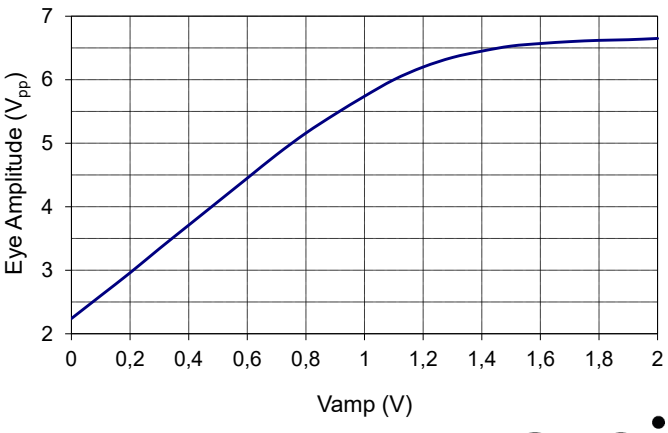

## $S_{12}$ Parameter Curve

Conditions: Vbias = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, Ibias = 300 mA




## Typical Output Voltage Amplitude VS Gain

Conditions: $V_{bias}$ = 8 V, $V_{xp}$ = 2 V



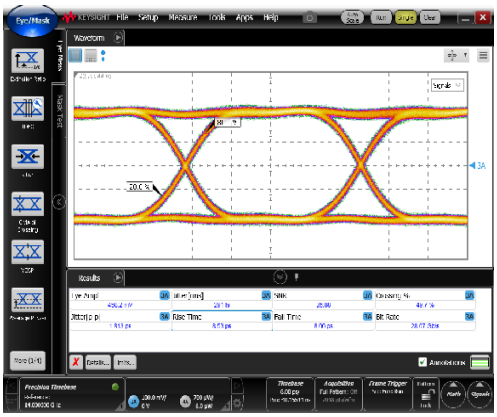
# DR-DG-40-MO

## Eye Diagrams

### 28 Gbps data rate

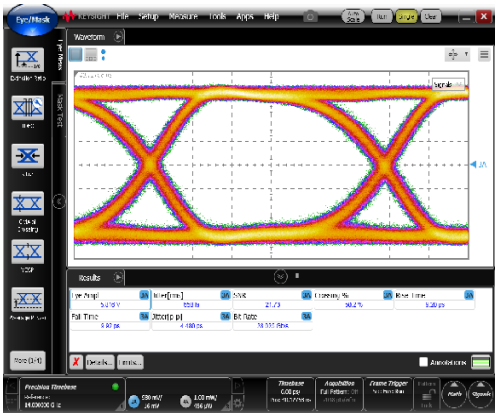
Conditions: Ratio 1/2, Pattern $2^{31}$–1

$V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



Input signal

Eye amplitude = 0.45 $V_{pp}$



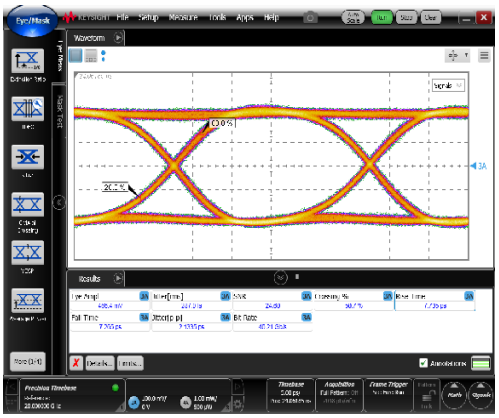
Output response

Eye amplitude = 5.8 $V_{pp}$

### 40 Gbps data rate

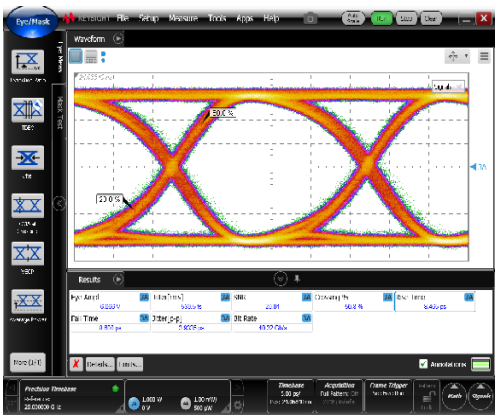
Conditions: Ratio 1/2, Pattern $2^{31}$–1

$V_{bias}$ = 8 V, $V_{amp}$ = 1.5 V, $V_{xp}$ = 2 V, $I_{bias}$ = 300 mA



Input signal

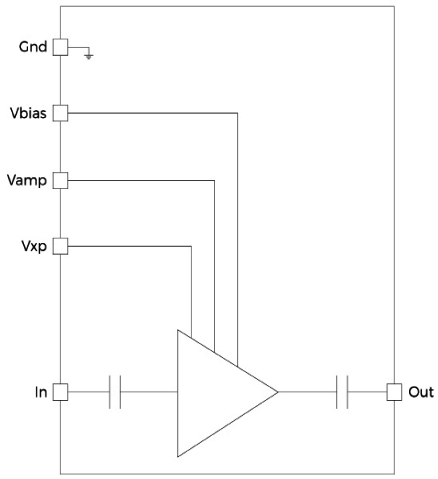
Eye amplitude = 0.45 $V_{pp}$



Output response

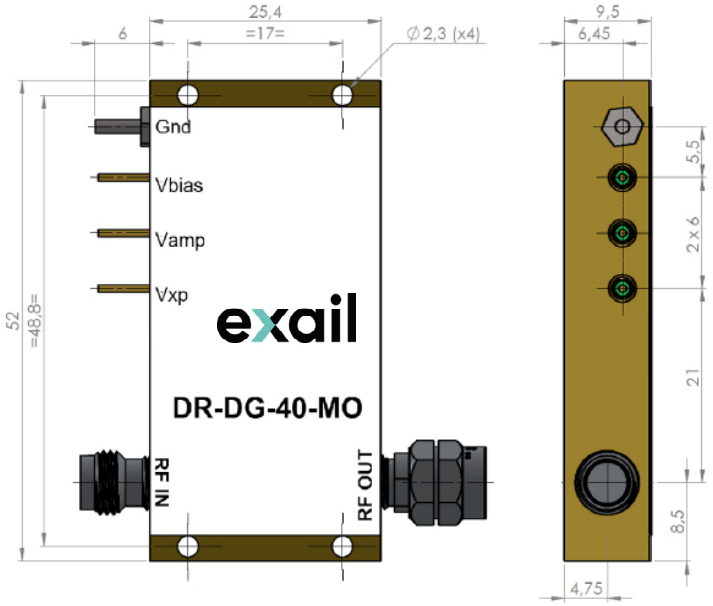
Eye amplitude = 6 $V_{pp}$

## Electrical Schematic Diagram




## Mechanical Diagram and Pinout

All measurements in mm

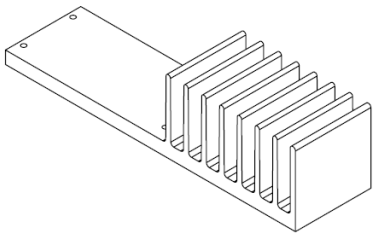


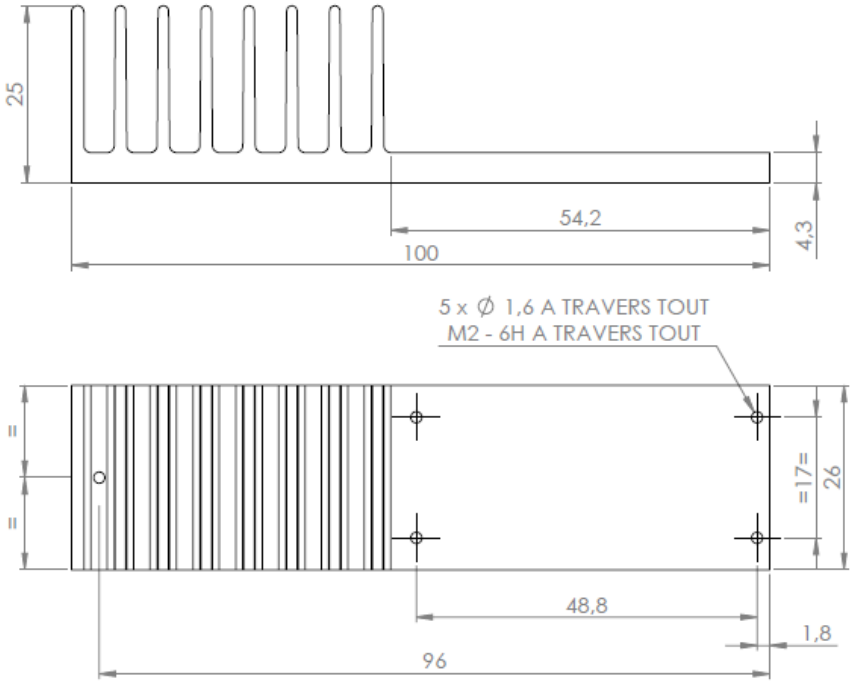

The heat-sinking of the module is necessary. It's user responsability to use an adequate heat-sink. Refer to page 6 for Exail recommended heat-sink.

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

## Mechanical Diagram and Pinout with HS-MO4 Heat-sink

All measurements in mm






## About us



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