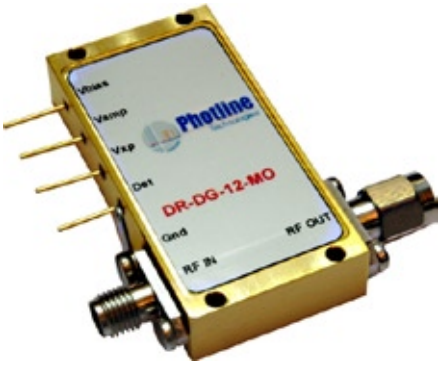
DR-DG-12-MO

12.5 Gbps NRZ/RZ High Performance Driver Module

Photline Technologies
Delivering Modulation Solutions

Digital Driver



Features

- Output voltage up to 9 V_{pp}
- Low Rise/Fall time
- Flat gain up to 12 GHz
- Single voltage power supply
- Low group delay variation

Applications

- $LiNbO_3$ modulators
- 12.5 Gbps NRZ and RZ
- OC-192 SONET / SDH
- Research & Development

Options

- Heat-sink
- Alternative RF connectors gender

The DR-DG-12-MO is a high performance versatile driver module designed for 2.5 Gbps up to 12.5 Gbps data transmission with NRZ or RZ format. It exhibits a 28 dB gain and can deliver an output signal up to 9 V_{pp}.

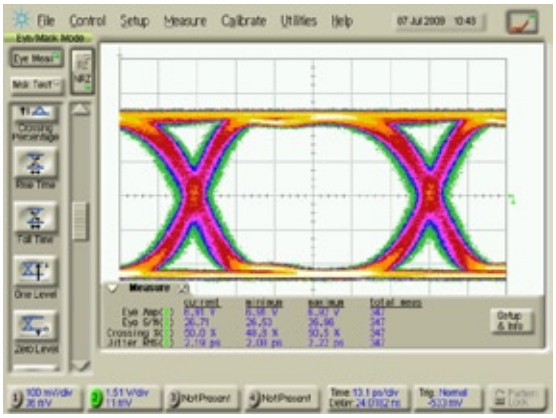
The DR-DG-12-MO is a key component to obtain high quality 2.5 Gbps up to 12.5 Gbps eye diagrams with low rise and fall time, low jitter and high SNR. It operates from a single power supply for safety and ease of use, and offers gain and cross point controls. It comes with K type RF connectors (female in, male out) and with an optional heat sink.

Performance Highlights

Parameter	Min	Typ	Max	Unit
Cut-off frequencies	50 k	-	12 G	Hz
Output voltage	5	-	9	V_{pp}
Gain	-	28	-	dB
Saturated output power	-	-	24	dBm
Added jitter	-	1.1	-	ps
Rise / Fall times	-	15	-	ps

Measurements for V_{bias} = 12 V, V_{amp} = 0.5 V, V_{xp} = 0.9 V, I_{bias} = 260 mA

12.5 Gbps Output Response



DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage (fixed)	V_{bias}	-	12	-	V
Current consumption	I_{bias}	-	260	-	A
Gain control voltage	V_{amp}	-	0.5	-	V
Cross Point control voltage	V_{xp}	-	0.9	-	V

Electrical Characteristics

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

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	12	15	-	GHz
Gain	S_{21}	Small signal	-	28	-	dB
Gain ripple	-	< 12 GHz	-	±1.5	-	dB
Input return loss	S_{11}	10 MHz < f < 10 GHz	-	-10	-	dB
Output return loss	S_{22}	10 MHz < f < 15 GHz	-	-10	-	dB
Saturated output power	P_{sat}	V_{in} = 0.5 V_{pp}	22	-	24	dBm
Output voltage	V_{out}	V_{in} = 0.5 V_{pp}	5	-	9	V_{pp}
Rise / Fall time	t_r / t_f	20 % - 80 %	-	15 / 20	-	ps
Added jitter	J_{RMS}	$J_{RMS}=\sqrt{J^2_{RMS\text{-}total} - J^2_{RMS\text{-}source}}$	-	1.1	-	ps
Noise Figure	NF	1 GHz < f < 20 GHz	3.5	-	6	dB
Power dissipation	P	V_{out} = 8 V_{pp}	-	3.2	-	W

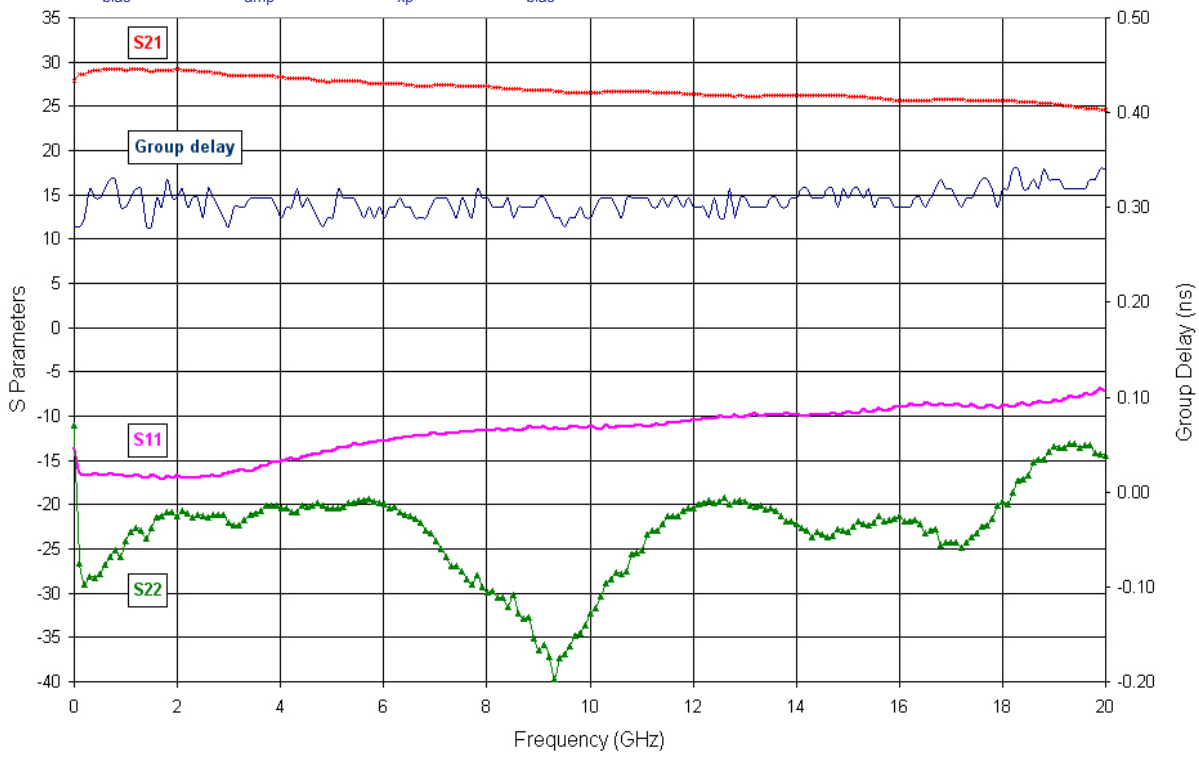
Absolute Maximum Ratings

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}	11	15	V
DC current	I_{bias}	0	0.4	A
Gain control voltage	V_{amp}	0	1.2	V
Cross Point control voltage	V_{xp}	0	1.1	V_{pp}
Power dissipation	P_{diss}	-	4.8	W
Temperature of operation	T_{op}	0	+50	W
Storage temperature	T_{st}	-20	+70	°C

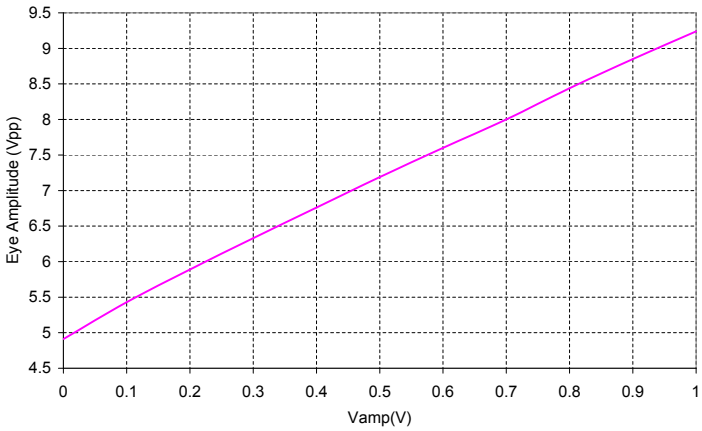
S Parameters Curves

Conditions: V_{bias} = 12 V, V_{amp} = 0.5 V, V_{xp} = 0.9 V, I_{bias} = 260 mA



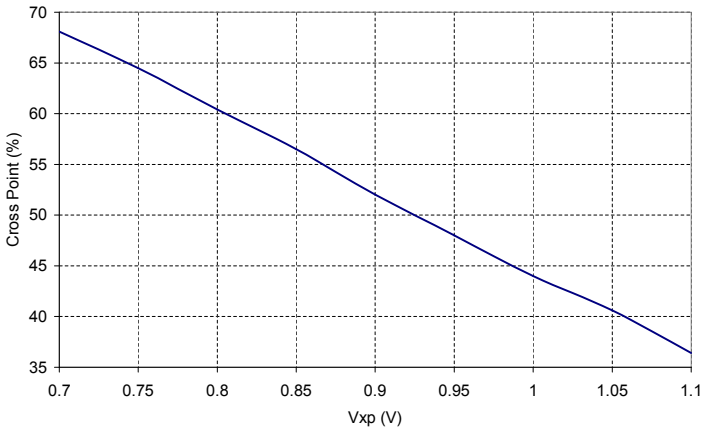
Typical Output Voltage Amplitude vs V_{amp}

Conditions: V_{bias} = 12 V, V_{in} = 0.5 V_{pp}



Typical Cross Point vs V_{xp}

Conditions: V_{bias} = 12 V, V_{in} = 0.5 V_{pp}

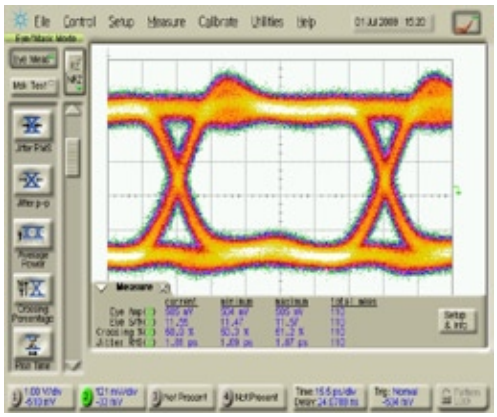


Eye Diagrams

10.709 Gbps data rate

Conditions: Ratio $\frac{1}{2}$, Pattern 2^{31}-1

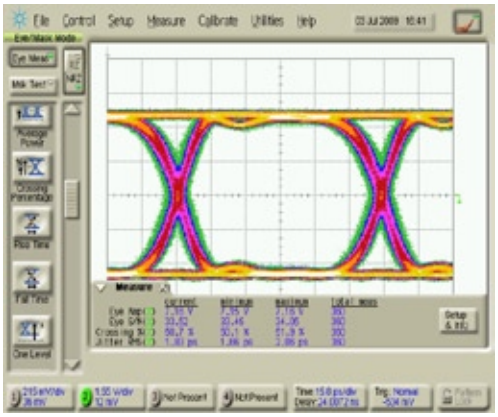
V_{bias} = 12 V, V_{amp} = 0.5 V, V_{xp} = 0.94 V, I_{bias} = 246 mA



Input signal

Genrated by Anritsu MP1758A

Eye amplitude = 0.51 V_{pp}, Rise time = 15.4 ps
Jitter RMS = 1.81 ps, SNR = 11.5



Output response

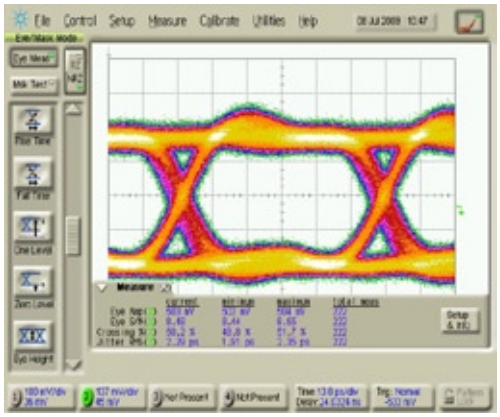
Measured using Agilent 86100B with two 50 GHz
8348A channels module, and without precision time-base module

Eye amplitude = 7.2 V_{pp}, Rise time = 14.0 ps
Jitter RMS = 1.83 ps, SNR = 33.5

12.5 Gbps data rate

Conditions: Ratio $\frac{1}{2}$, Pattern 2^{31}-1

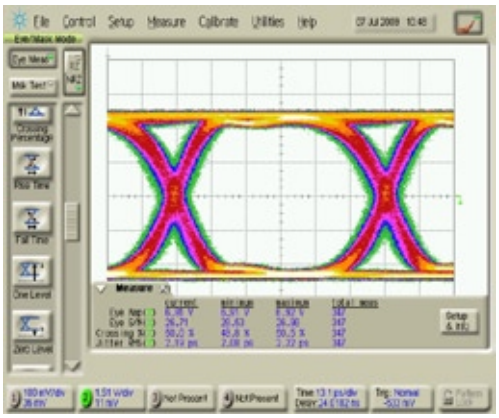
V_{bias} = 12 V, V_{amp} = 0.5 V, V_{xp} = 0.89 V, I_{bias} = 250 mA



Input signal

Generated with a NEL MOF15A 2:1 selector

Eye amplitude = 0.51 V_{pp}, Rise time = 15.0 ps
Jitter RMS = 2.25 ps, SNR = 8.43

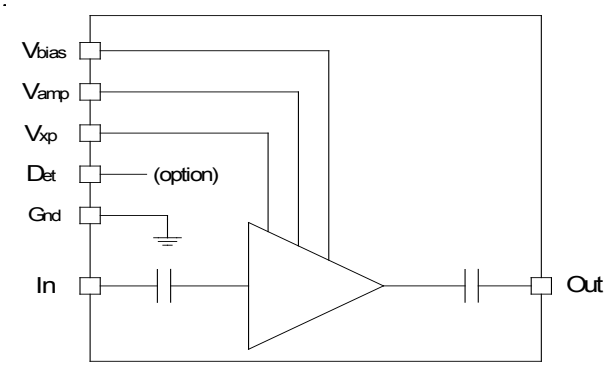


Output response

Measured using Agilent 86100B with two 50 GHz
8348A channels module, and without precision time-base module

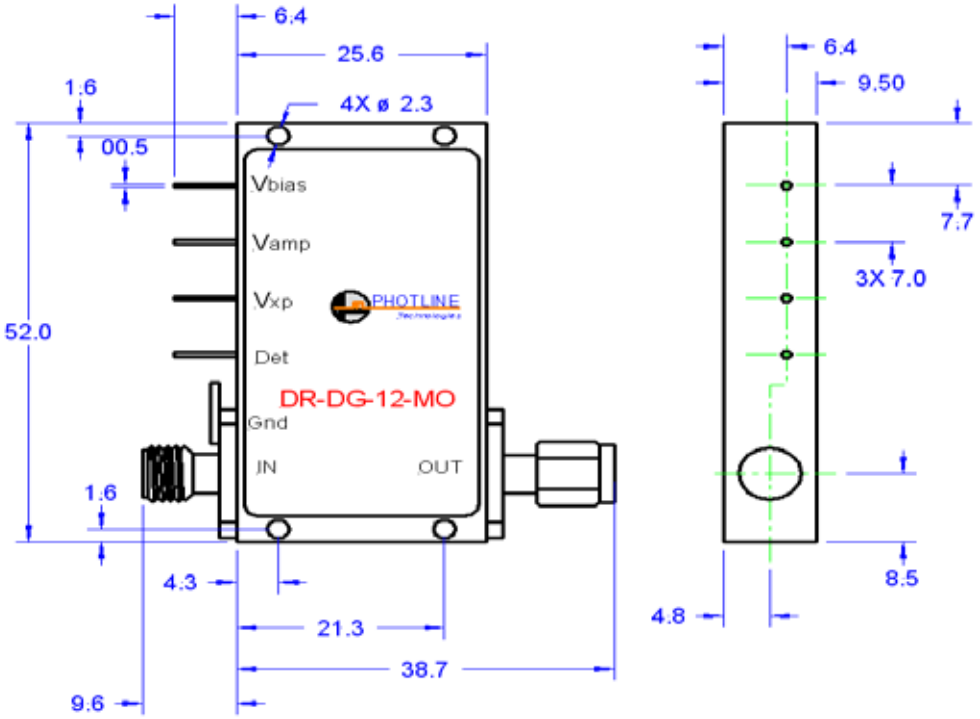
Eye amplitude = 6.91 V_{pp}, Rise time = 15.4 ps
Jitter RMS = 2.19 ps, SNR = 26.7

Electrical Schematic Diagram



Mechanical Diagram and Pinout

All measurements in mm

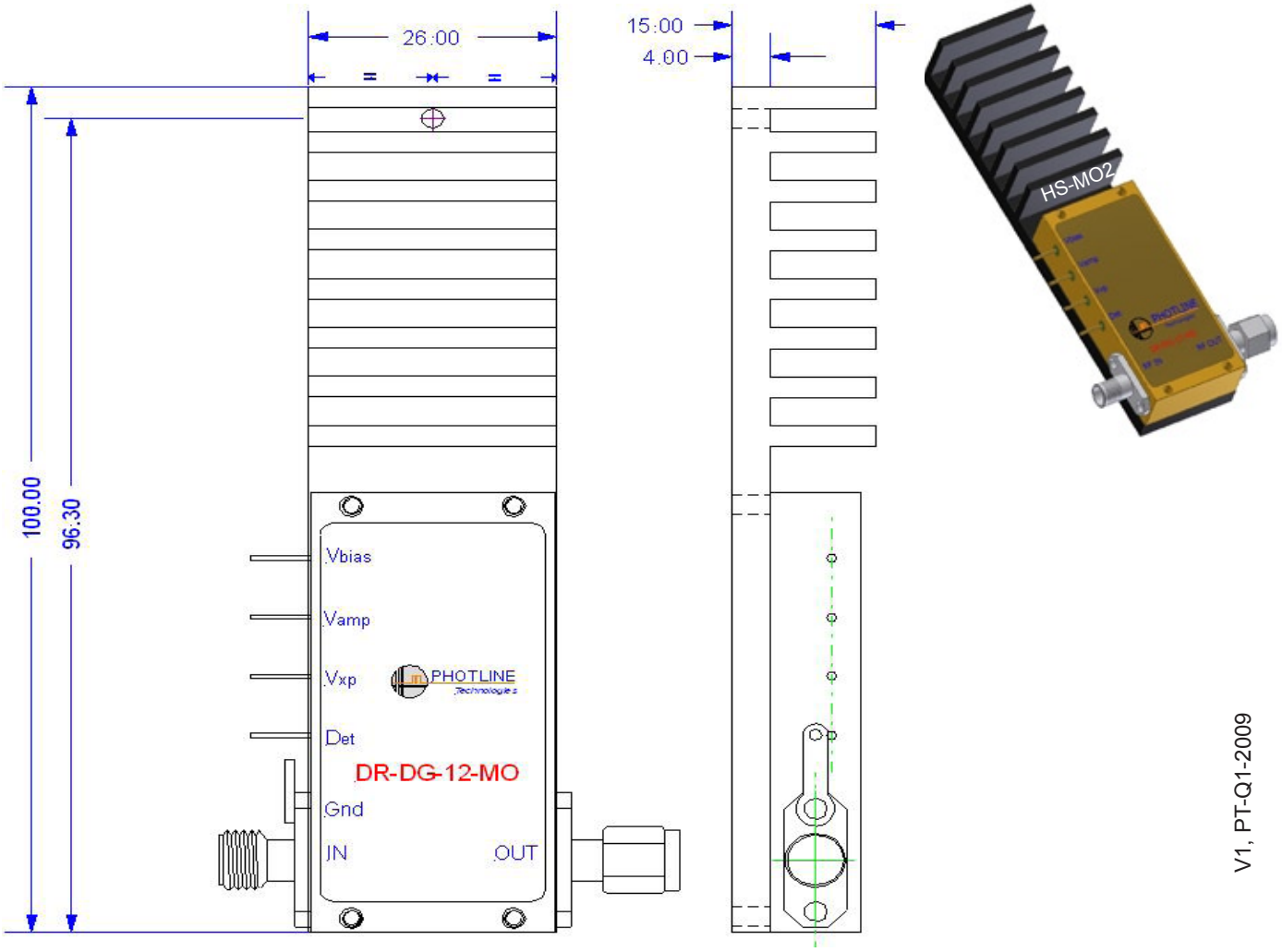


The heatsinking of the module is necessary. It's user responsability to use an adequate heatsink. Refer to page 6 for Photline Technologies recommended heatsink.

PIN	Function	Operational Notes
IN	RF In	K-connector female
OUT	RF Out	K-connector male
V_{bias}	Power supply voltage	Set at typical operating specification
V_{amp}	Output voltage amplitude adjustment	Adjust for gain control tuning
V_{xp}	Output voltage cross point adjustment	Adjust for cross point control tuning

Mechanical Diagram and Pinout with HS-MO2 Heatsink

All measurements in mm



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ABOUT US

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company LiNb03 modulators and high-speed electronics modules. Photline Technologies offers high speed and high data rate modulation solutions for the telecommunication industry and the defense, aerospace, instruments and sensors markets. The products offered by the company include : comprehensive range of intensity and phase modulators (800 nm, 1060 nm, 1300 nm, 1550 nm), RF drivers and modules, transmitters and modulation units.

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