DR-DG-10-HO

10 Gbps High Output Voltage Driver Module

Photline Technologies
Delivering Modulation Solutions

Digital Driver

Features

- High output voltage 12 V_{pp}
- High gain 35 dB
- High SNR
- Single voltage power supply

Applications

- $LiNbO_3$ & InP modulators
- 10 Gbps DPSK
- 2×10 Gbps (D)QPSK
- Research & Development

Options

- Heat-sink
- Alternative RF connectors

The DR-DG-10-HO is a driver module optimized for digital applications requiring an upper operation voltage at 10 Gbps - 12.5 Gbps. It exhibits 12.5 V_{pp} output volatge and 35 dB gain up to 7 GHz.

The DR-DG-10-HO module is especially useful for driving $LiNb0_3$ modulators with 10 Gbps DPSK and 2 x 10 Gbps (D)QPSK modulation formats.

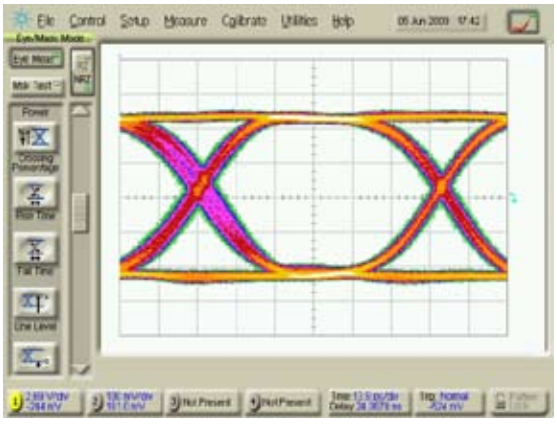
It is also a key device for multi-level modulation formats and for driving phase modulators. It is operated from a single power supply voltage for safety and ease of use and offers output voltage control. The DR-DG-10-HO comes with SMA type RF connectors (female in, male out) and with an optional heat sink. It is a non-inverting and single ended amplifier.

Performance Highlights

Parameter	Min	Typ	Max	Unit
Cut-off frequencies	80 k	-	7 G	Hz
Output Voltage	-	12.5	-	V
Gain	-	35	-	dB
Saturated Power	26	-	-	dBm
Added Jitter	-	1.75	-	ps
Rise / Fall Times	-	24.5	-	ps

Measurements for V_{bias} = 12 V, V_{amp} = 1.2 V, I_{bias} = 420 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}	-	0.420	-	A
Gain control voltage	V_{amp}	0	1.4	-	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	-	-	80	kHz
Upper frequency	f_{3dB}, upper	-3 dB point	-	7	-	GHz
Gain	S_{21}	Small signal	-	35	-	dB
Gain ripple	-	< 18 GHz	-	±1.5	-	dB
Input return loss	S_{11}	10 MHz < f < 10 GHz	-	-10	-	dB
Output return loss	S_{22}	10 MHz < f < 10 GHz	-	-10	-	dB
Output voltage	V_{out}	V_{in} = 0.5 V_{pp} @ 10.7 Gbps	-	12	-	V_{pp}
Rise time / Fall time	t_r / t_f	20 % - 80 %	-	24.5 / 24.5	-	ps
Added jitter	J_{RMS}	$J_{RMS} = \sqrt{J^2_{RMS\text{-}total} - J^2_{RMS\text{-}source}}$	-	1.9	-	ps
Power dissipation	P	V_{out} = 12 V_{pp}	-	5	-	W

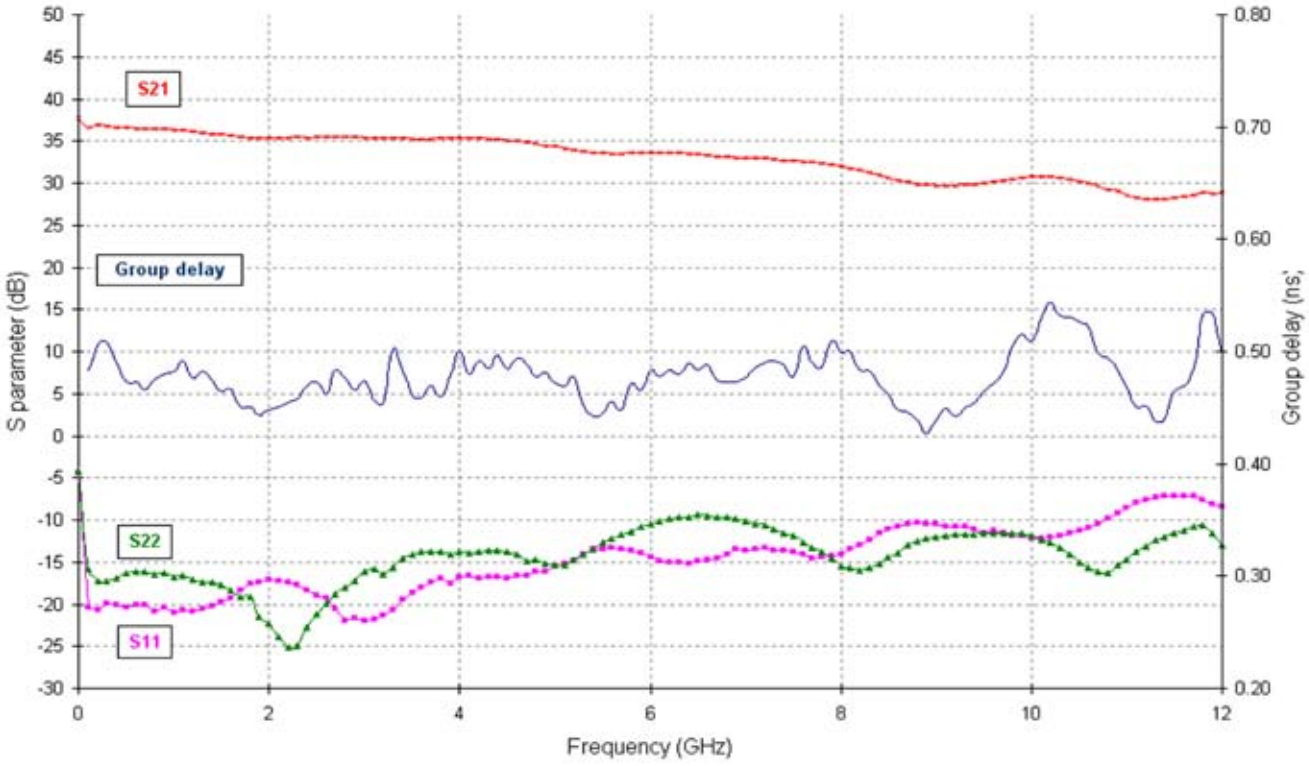
Absolute Maximum Ratings

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}	-	1.5	V_{pp}
Power supply voltage	V_{bias}	11.5	13	V
DC current	I_{bias}	-	0.45	A
Gain control voltage	V_{amp}	0	2	V
Power dissipation	P_{diss}	-	9.8	W
Temperature of operation	T_{op}	-5	+50	°C

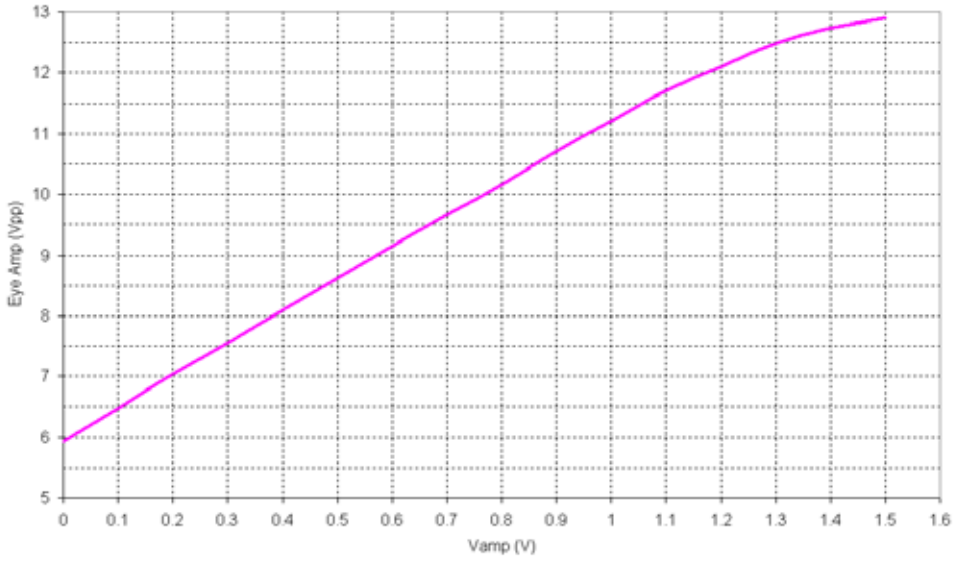
S parameters curves

Conditions: V_{bias} = 12 V, V_{amp} = 0.2 V, I_{bias} = 420 mA



Typical output voltage amplitude vs gain control V_{amp} tuning

Conditions: V_{bias} = 12 V

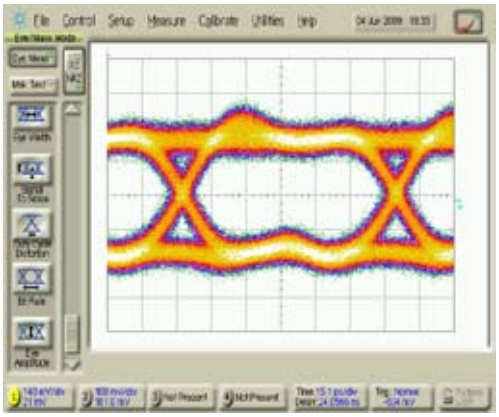


Eye Diagrams

10.709 Gbps data rate

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

V_{bias} = 12 V, V_{amp} = 1.2 V, I_{bias} = 420 mA

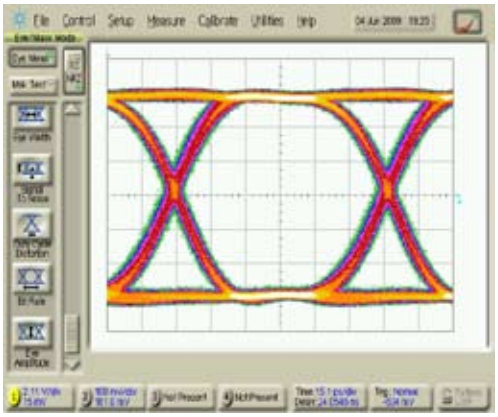


Input signal

Genrated by Anritsu MP1758A

Eye amplitude = 0.44 V, Rise time = 17.4 ps

Jitter RMS = 2.14 ps, SNR = 8.1



Output response

Measured using Agilent 86100B with two 50 GHz

8348A channels module, and without precision time-base module

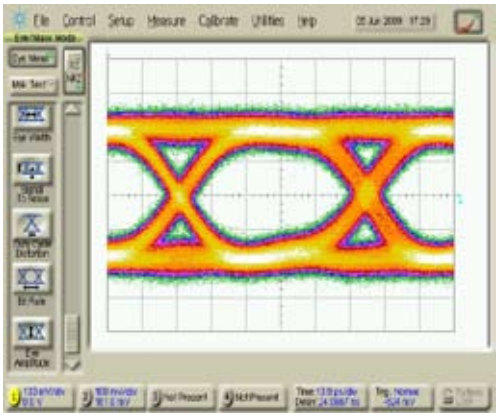
Eye amplitude = 12.1 V, Rise time = 24.8 ps

Jitter RMS = 1.67 ps, SNR = 43.5

12.5 Gbps data rate

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

V_{bias} = 12 V, V_{amp} = 1.2 V, I_{bias} = 420 mA

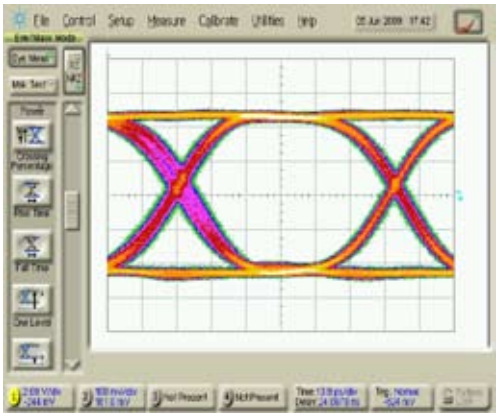


Input signal

Generated with a NEL MOF15A 2:1 selector

Eye amplitude = 0.49 V, Rise time = 23 ps

Jitter RMS = 2.24 ps, SNR = 8.8



Output response

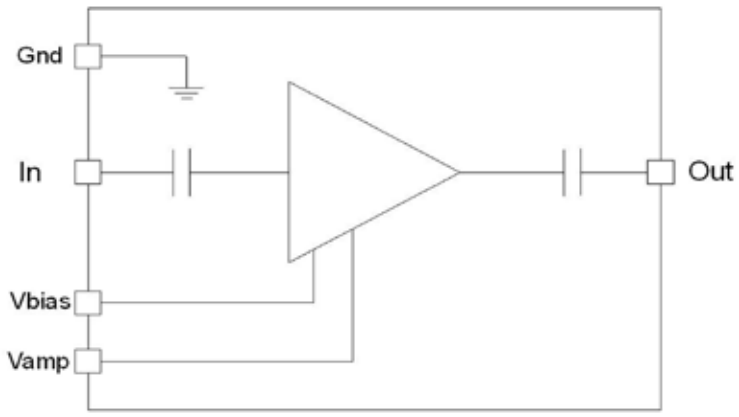
Measured using Agilent 86100B with two 50 GHz

8348A channels module, and without precision time-base module

Eye amplitude = 12.1 V, Rise time = 25.3 ps

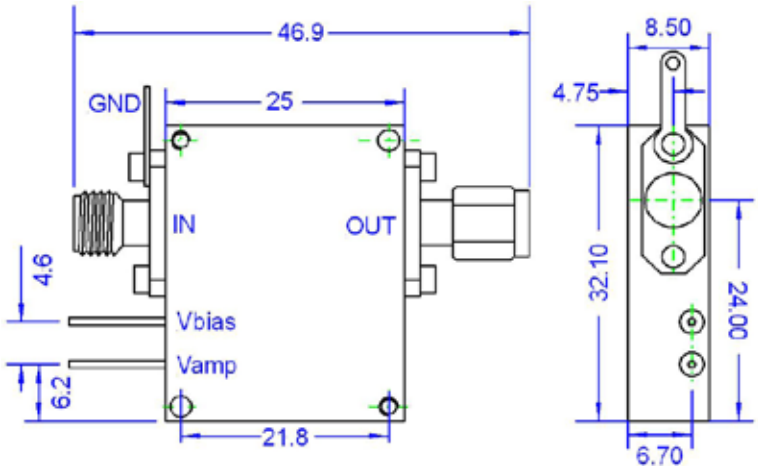
Jitter RMS = 2.5 ps, SNR = 32.77

Electrical Schematic Diagram



Mechanical diagram and pinout

All measurements in mm

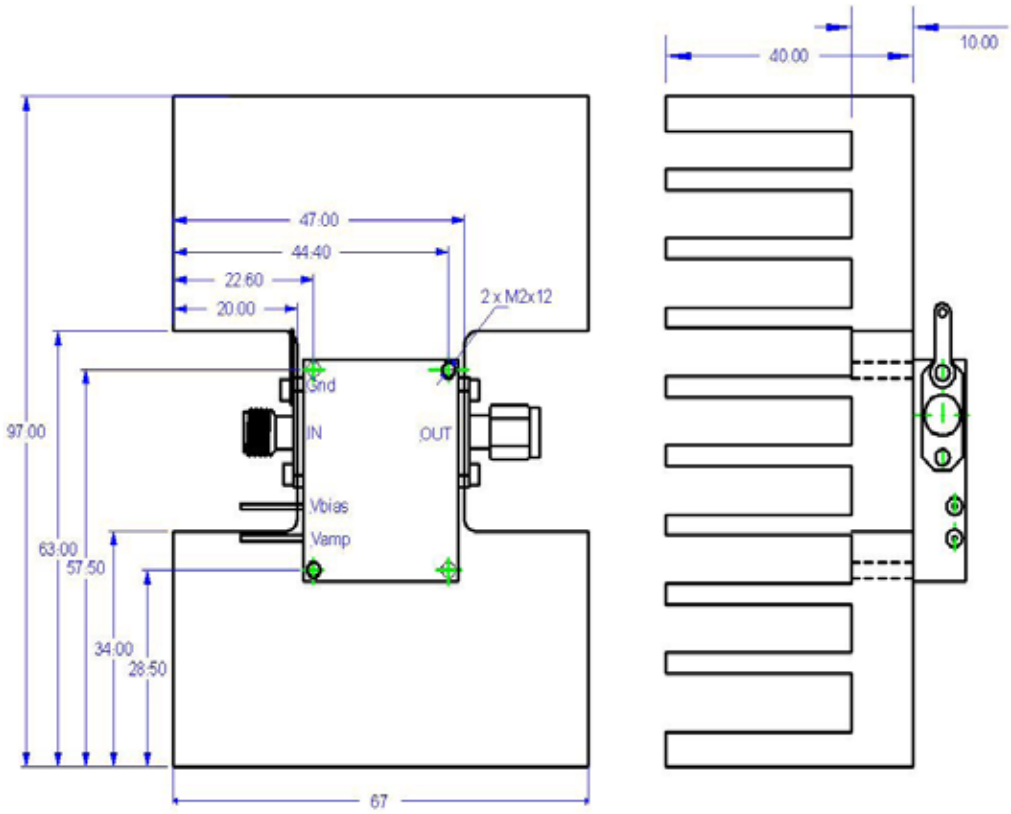


The heatsinking of the module is necessary. It's user responsability to use an adequate heatsink. Refer to page 6 for Photline Technologies recommended heatsink.

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

Mechanical diagram and pinout with HS-HO2 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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