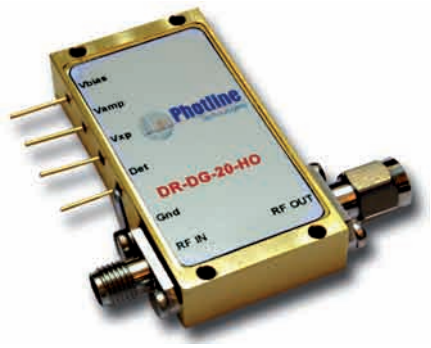
DR-DG-20-HO

22 Gbps High Output Voltage Driver Module

Photline Technologies
Delivering Modulation Solutions

Digital Driver



The DR-DG-20-HO is a driver module optimized for digital applications requiring an upper operation voltage. It exhibits 12.5 V_{pp} output volatge and 29 dB gain up to 23 GHz.

The DR-DG-20-HO module is especially useful for driving $LiNb0_3$ modulators with 22 Gbps DPSK and 2 x 22 Gbps (D) QPSK modulation formats. It is operated from a single power supply voltage for safety and ease of use and offers gain and cross-point control. The DR-DG-20-HO comes with K type RF connectors (female in, male out) and with an optional heat sink. It is a non-inverting and single ended amplifier.

Features

- High output voltage 12.5 V_{pp}
- High gain 29 dB
- Flat gain up to 20 GHz
- Single voltage power supply

Applications

- $LiNbO_3$ & InP modulators
- 22 Gbps DPSK
- 2×22 Gbps (D)QPSK
- Research & Development

Options

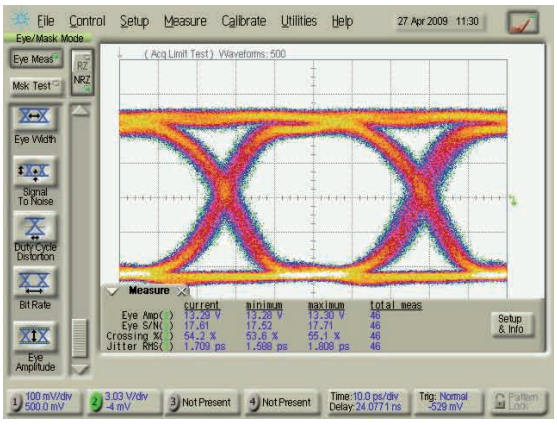
- 13.5 V_{pp} output voltage
- Heat-sink
- Alternative RF connectors
- Detector and Bias tee

Performance Highlights

Parameter	Min	Typ	Max	Unit
Cut-off frequencies	80 k	23 G	25 G	Hz
Output Voltage	-	12.5	13.5	V
Gain	-	29	-	dB
Saturated Power	26	-	-	dBm
Added Jitter	-	1.75	-	ps
Rise / Fall Times	-	12 / 16	-	ps

Measurements for V_{bias} = 12 V, V_{amp} = 1.2 V, V_{xp} = 0.7 V, I_{bias} = 650 mA

20 Gbps Output Response



DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage (fixed)	V_{bias}	-	12	15	V
Current consumption	I_{bias}	-	0.650	-	A
Gain control voltage	V_{amp}	0	1.2	2	V
Cross point control voltage	V_{xp}	0	0.7	1	V

Electrical Characteristics

Conditions: V_{in} = 0.65 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	20	23	-	GHz
Gain	S_{21}	Small signal	-	29	-	dB
Gain ripple	-	< 18 GHz	-	±1.5	-	dB
Input return loss	S_{11}	50 kHz < f < 18 GHz	-	-10	-	dB
Output return loss	S_{22}	50 kHz < f < 15 GHz	-	-10	-	dB
Output voltage	V_{out}	V_{in} = 0.65 V_{pp} @ 20 Gbps	-	12.5	13.5 (V_{in}=1V_{pp})	V_{pp}
Rise time / Fall time	t_r / t_f	20 % - 80 %	-	12 / 16	-	ps
Added jitter	J_{RMS}	$J_{RMS}=\sqrt{J^2_{RMS\text{-}total} - J^2_{RMS\text{-}source}}$	-	1.75	-	ps
Power dissipation	P	V_{out} = 12.5 V_{pp}	-	8.6	-	W

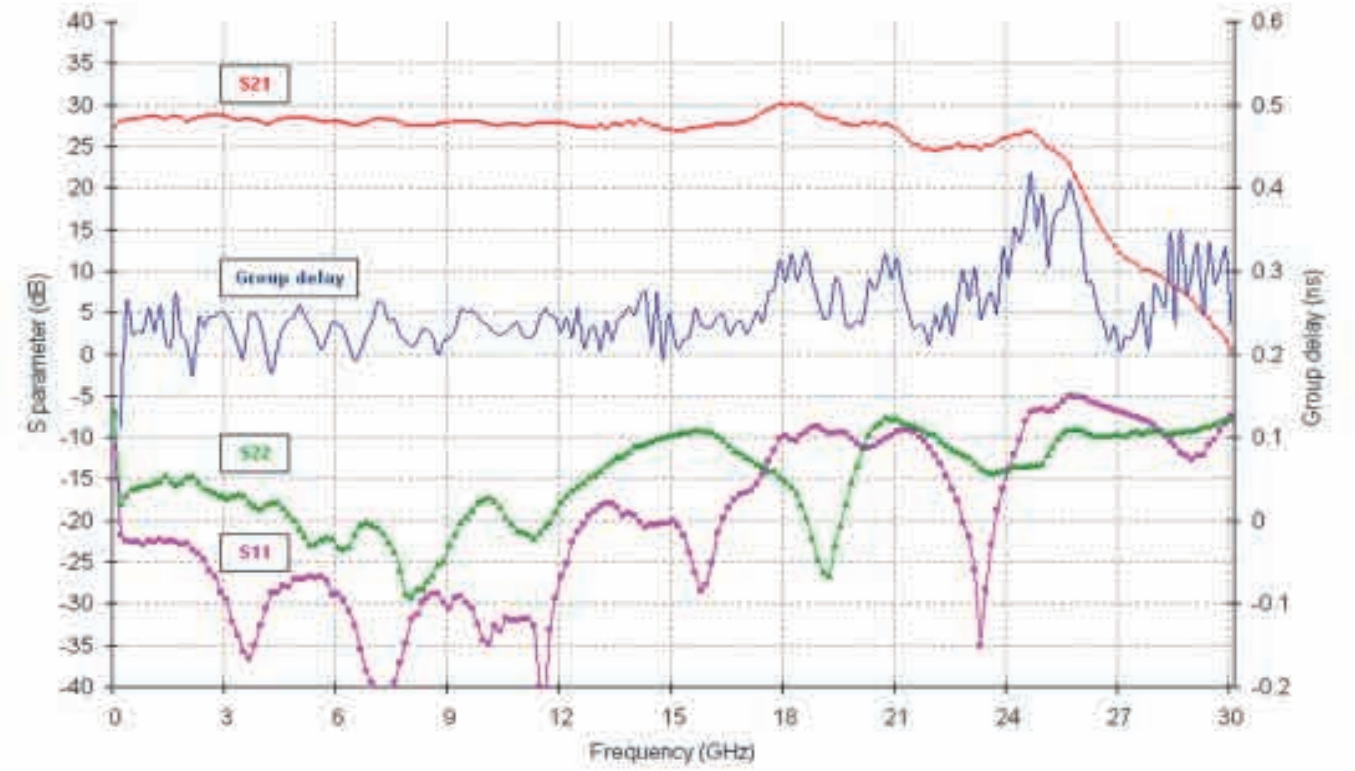
Absolute Maximum Ratings

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.

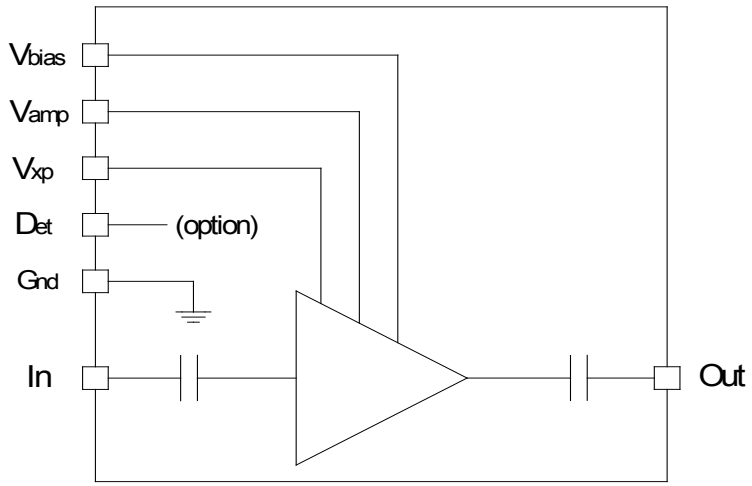
Parameter	Symbol	Min	Max	Unit
RF input voltage	V_{in}	-	1.5	V
Power supply voltage	V_{bias}	-	15	V
DC current	I_{bias}	-	0.7	A
Gain control voltage	V_{amp}	0	2	V
Cross point control	V_{xp}	0	1	V
Power dissipation	P_{diss}	-	9.8	W
Temperature of operation	T_{op}	-5	+50	°C

S parameters curves

Conditions: V_{bias} = 12 V, V_{amp} = 1.2 V, V_{xp} = 0.7 V, I_{bias} = 650 mA



Electrical Schematic Diagram

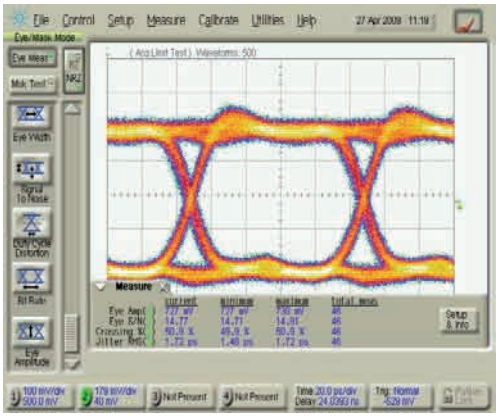


Eye Diagrams

10 Gbps data rate

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

V_{bias} = 12 V, V_{amp} = 1.2 V, V_{xp} = 0.7 V, I_{bias} = 650 mA

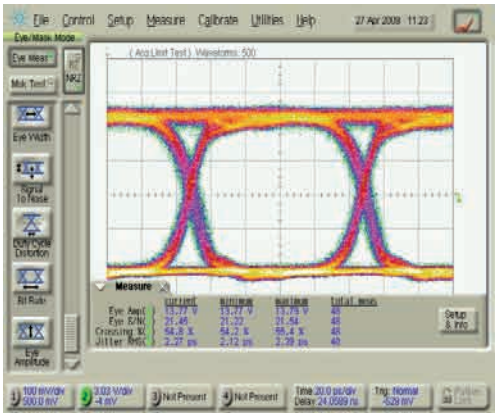


Input signal

Genrated by Anritsu MP1758A

Eye amplitude = 0.727 V, Rise time = 16 ps

Jitter RMS = 1.72 ps, SNR = 14.77



Output response

Measured using Agilent 86100B with two 50 GHz

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

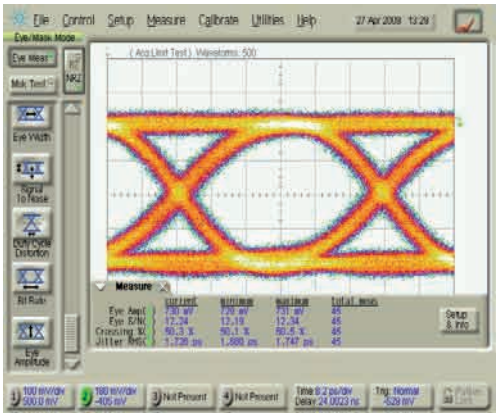
Eye amplitude = 13.77 V, Rise time = 14 ps

Jitter RMS = 2.27 ps, SNR = 21.45

20 Gbps data rate

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

V_{bias} = 12 V, V_{amp} = 1.2 V, V_{xp} = 0.7 V, I_{bias} = 650 mA

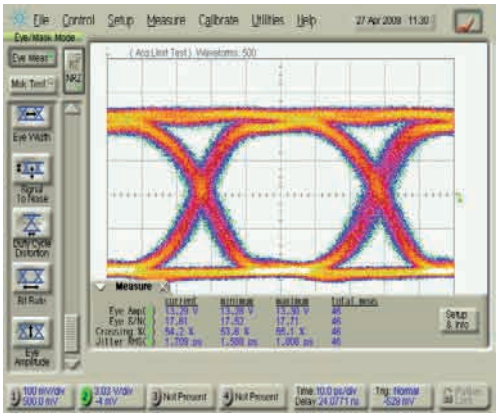


Input signal

Generated with a NEL MOF15A 2:1 selector

Eye amplitude = 0.73 mV, Rise time = 19 ps

Jitter RMS = 1.726 ps, SNR = 12.24



Output response

Measured using Agilent 86100B with two 50 GHz

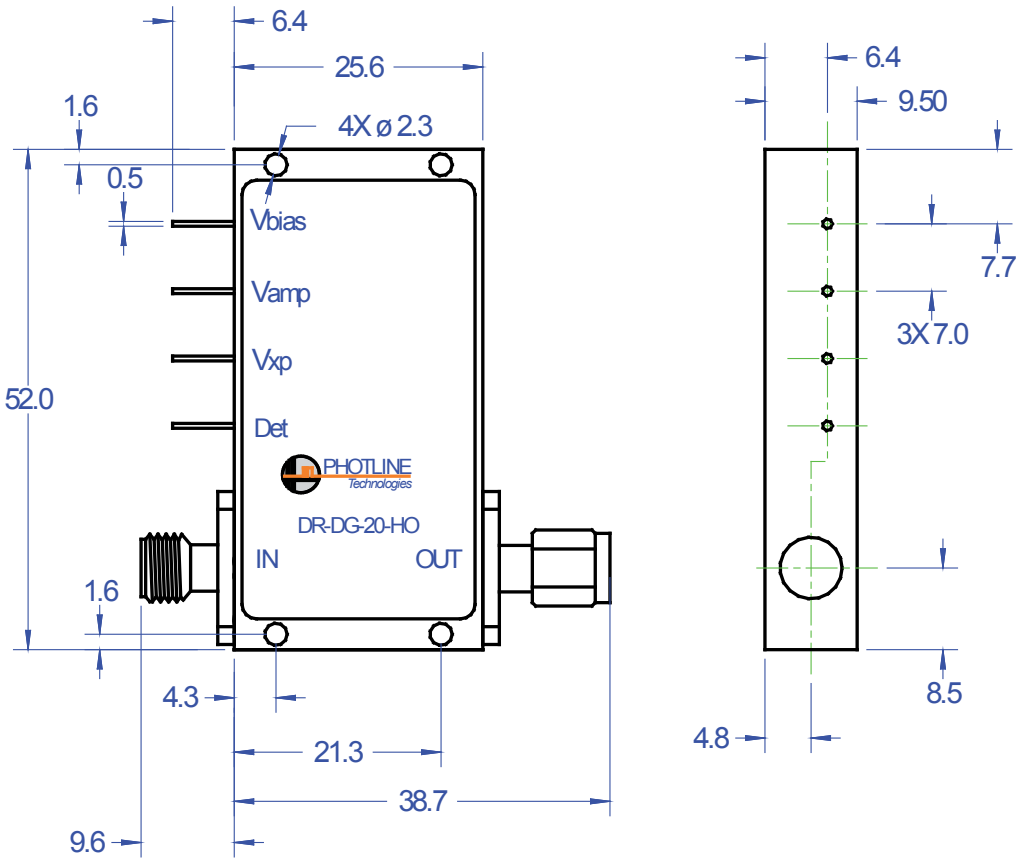
8348A channels module, and without precision time-base module

Eye amplitude = 13.29 V, Rise time = 13.33 ps

Jitter RMS = 1.709 ps, SNR = 17.61

Mechanical diagram and pinout

All measurements in mm

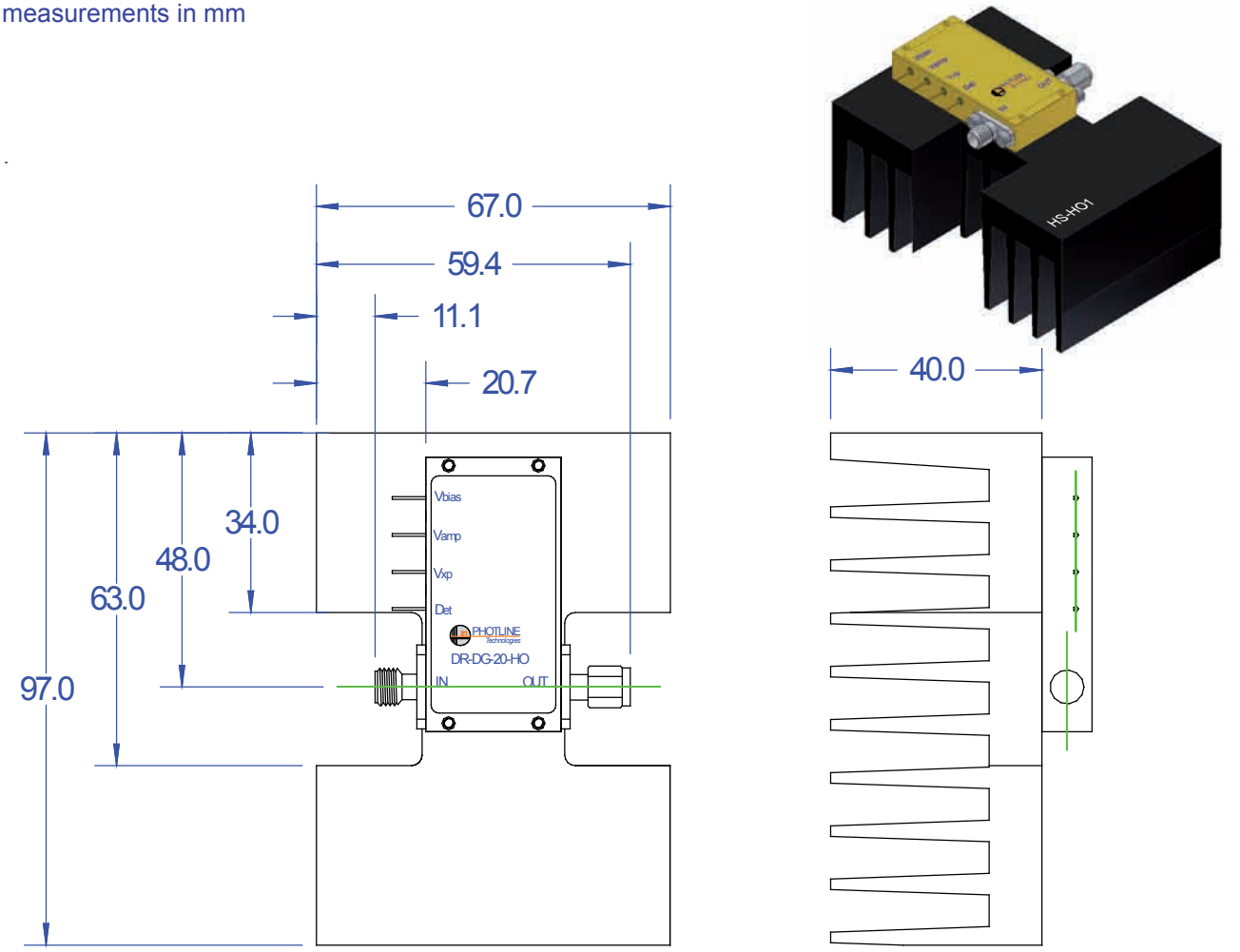


The heatsinking of the module is necessary. It's user responsability to use an adequate heatsink. Refer to page 6 for Photline Technologies recommended heatsink.

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}	Cross point adjustment	Adjust for gain control and eye diagram crossing point tuning
Det	RF power detector	Option

Mechanical diagram and pinout with HS-HO1 heatsink

All measurements in mm



V1, PT-Q1-2009

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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