

## FEATURES

- Specific design for pulse signals
- Accommodate a variety of pulse formats
- High pulse fidelity

## APPLICATIONS

- Pulse generation
- Pulse picking
- Spectroscopy
- Lidar

## OPTIONS

- Heat-sink

The DR-PL-20-MO RF drivers are amplifiers module designed to drive  $\text{LiNbO}_3$  optical modulators so as to generate undistorted optical pulses.

Electrical pulsed signals differ from classical telecom signals by long periods with no signal, when telecom signals are usually well balanced in 1 and 0. They also differ from analog signal by a wider frequency content. In order to generate clean optical pulses with sharp edges, sustained high and low levels and no overshoot, pulsed signals do require specific amplifiers.

The DR-PL-20-MO driver is optimized for low and high Pulse Repetition Frequency (PRF) signals from 10 Hz to 1 GHz. The bandwidth up to 20 GHz accommodates 50 ps narrow pulse width with short rise and fall time (down to 30 ps) and can withstand longer pulses up to 10 ns.

The DR-PL-20-MO drivers come in compact connectorized modules that match directly with Photline modulators, they use a single voltage power supply for ease and safety of use and feature an output voltage control for maximum flexibility. An optional heat sink is proposed as an accessory.

## Performance Highlights

Parameter	Min	Typ	Max	Unit
Cut-off frequencies	45 k	-	18 G	Hz
Output pulse amplitude	-	-	5.2	V <sub>pp</sub>
Gain	28	30	-	dB
Pulse repetition frequency	10	-	1 G	Hz
Pulse width	60 p	-	10 n	s
Rise / Fall time	-	20	35	ps

## DC Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage (fixed)	$V_{bias}$	-	12	-	V
Supply current	$I_{bias}$	-	320	400	mA
Output amplitude control voltage	$V_{amp}$	0	-	1.2	V
Output pulse adjustment voltage	$V_{xp}$	0	0.8	1.1	V

## Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Lower frequency	$f_{3dB}^{lower}$	-3 dB point	45	50	-	kHz
Upper frequency	$f_{3dB}^{upper}$	-3 dB point	18	20	-	GHz
Gain	$S_{21}$	Small signal, $P_{in} = -30$ dBm	28	30	-	dB
Gain ripple	-	< 17 GHz	-	$\pm 1.5$	-	dB
Input return loss	$S_{11}$	50 kHz < $f$ < 12 GHz	-	-	-10	dB
Output return loss	$S_{22}$	50 kHz < $f$ < 20 GHz	-	-	-10	dB
Output pulse amplitude	$V_{out}$	$V_{in} = 250$ mV <sub>pp</sub> , by $V_{amp}$ adjustment	1.5	4.5	5.2	V <sub>pp</sub>
Sat output pulse amplitude	$V_{out}$	$V_{in} = 500$ mV <sub>pp</sub>	-	-	5.4	V <sub>pp</sub>
Pulse repetition frequency	PRF	Duty-cycle < 0.1 %	10	-	1 G	Hz
Pulse width	PW	10 Hz < PRF < 1 GHz	60 p	-	10 n	s
Rise / Fall time	$t_R / t_F$	20 % - 80 %	-	20	35	ps
Power dissipation	P	-	-	3.8	5.2	W

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

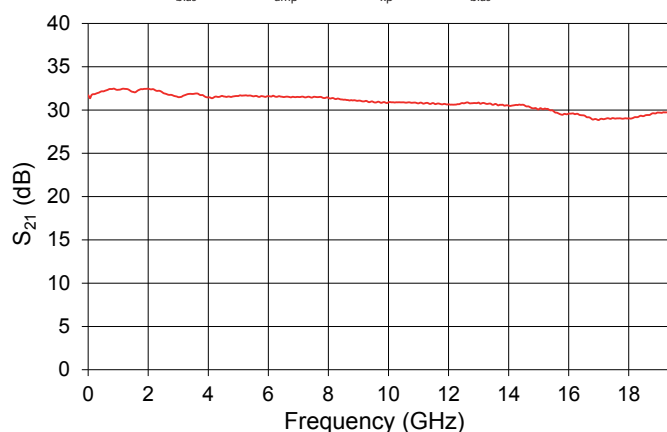
## Absolute Maximum Ratings

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	$V_{in}$	-	0.5	V <sub>pp</sub>
Supply Voltage	$V_{bias}$	-	13	V
DC current	$I_{bias}$	-	0.400	A
Pulse amplitude control	$V_{amp}$	0	1.2	V
Pulse adjustment control	$V_{xp}$	0	1.1	V
Power dissipation	$P_{diss}$	-	5.2	W
Temperature of operation	$T_{op}$	-5	+40	$^\circ\text{C}$
Storage temperature	$T_{st}$	-20	+70	$^\circ\text{C}$

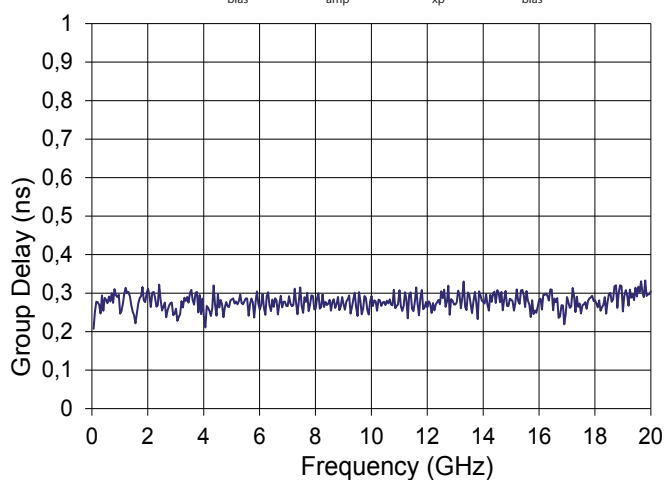
### $S_{21}$ and Group Delay Parameter Curves

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{amp} = 1.2\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $I_{bias} = 300\text{ mA}$



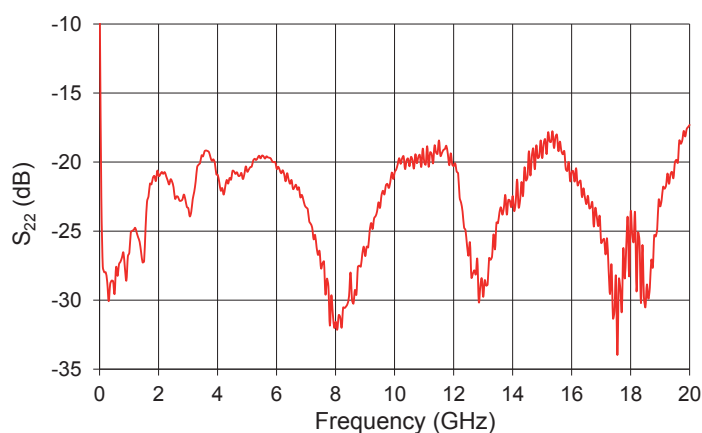
### Group Delay Parameter Curve

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{amp} = 1.2\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $I_{bias} = 300\text{ mA}$



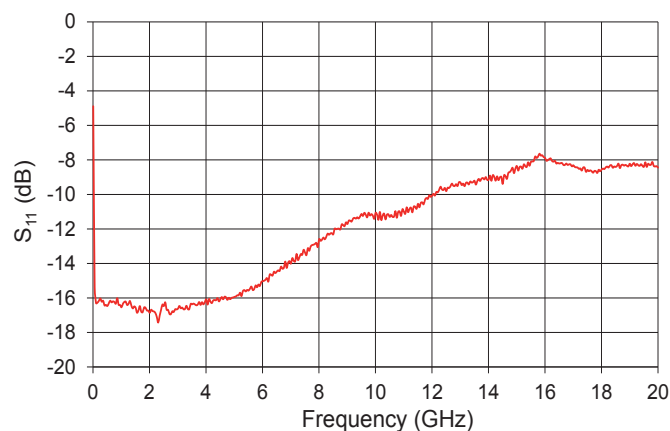
### $S_{22}$ Parameter Curve

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{amp} = 1.2\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $I_{bias} = 300\text{ mA}$



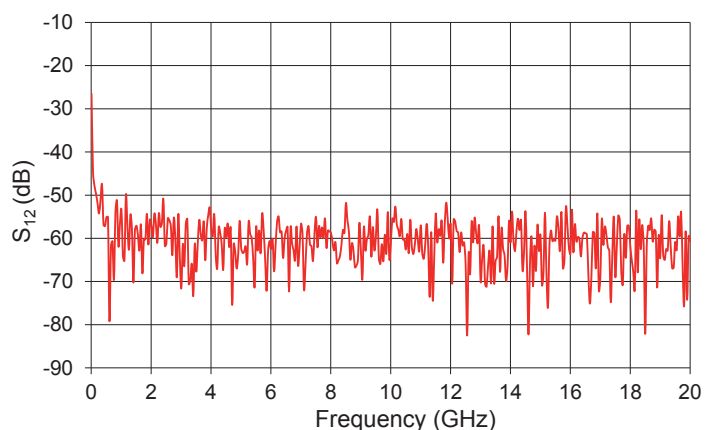
### $S_{11}$ Parameter Curve

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{amp} = 1.2\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $I_{bias} = 300\text{ mA}$



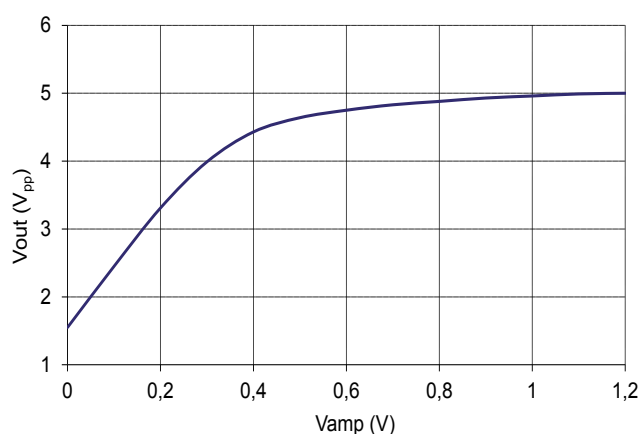
### $S_{12}$ Parameter Curve

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{amp} = 1.2\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $I_{bias} = 300\text{ mA}$



### Typical Output Voltage Amplitude vs $V_{amp}$

Conditions:  $V_{bias} = 12\text{ V}$ ,  $V_{xp} = 0.8\text{ V}$ ,  $V_{in} = 0.3\text{ V}_{pp}$

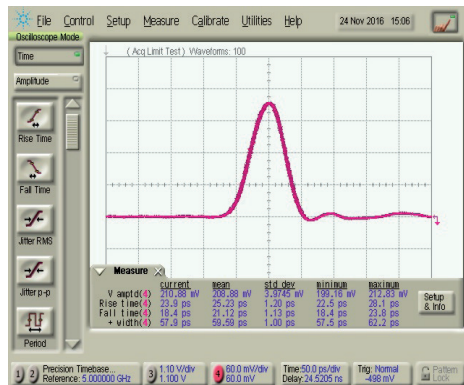


## Pulses Measurements

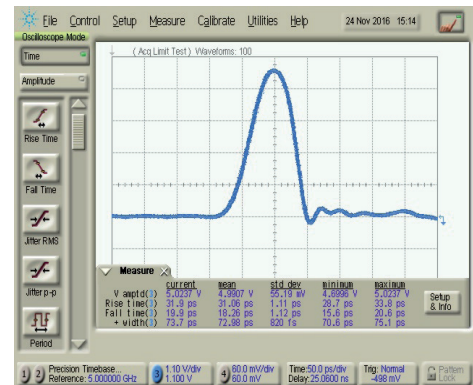
Conditions: Input signal

The input electrical signal is generated by Anritsu MP1800A. Measured using Agilent 86100B with two 50 GHz 8348A channels module.

### Low frequency repetition rate with a short pulse width of $PW = 60$ ps

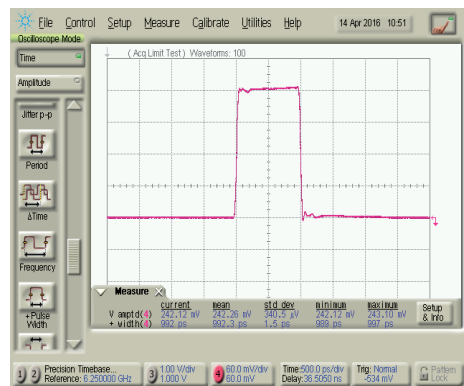


Input signal: Pulse amplitude =  $0.227 V_{pp}$ , Rise time = 24 ps

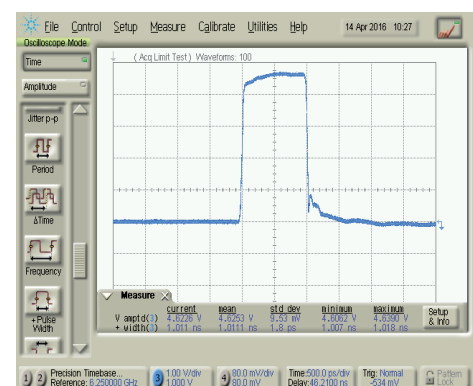


Output response: Pulse amplitude =  $5 V_{pp}$ , Rise time = 32 ps

### Low frequency repetition rate with a short pulse width of $PW = 1$ ns

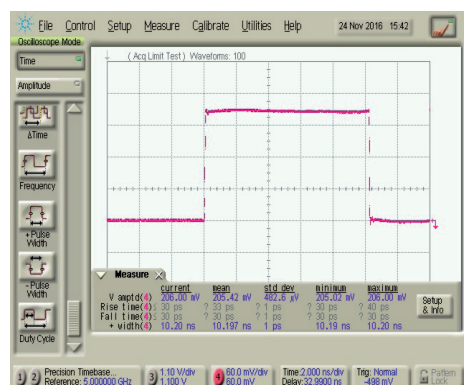


Input signal: Pulse amplitude =  $0.242 mV_{pp}$ , Rise time = 32 ps

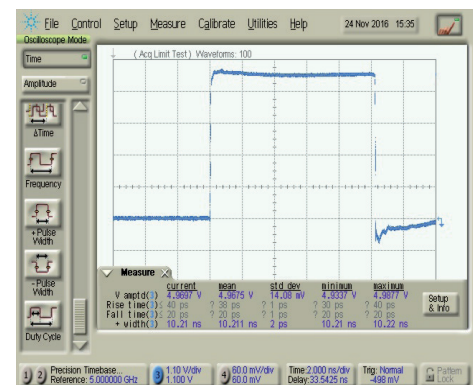


Output response: Pulse amplitude =  $4.6 V_{pp}$ , Rise time = 32 ps

### Low frequency repetition rate with a pulse width of $PW = 10$ ns

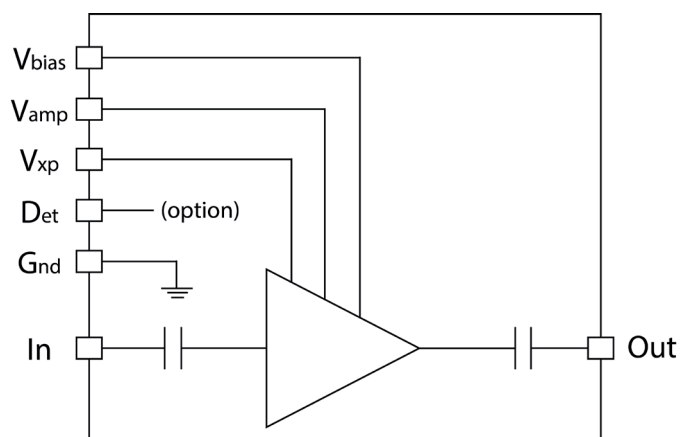


Input signal: Pulse amplitude =  $0.24 mV_{pp}$ , Rise time = 32 ps



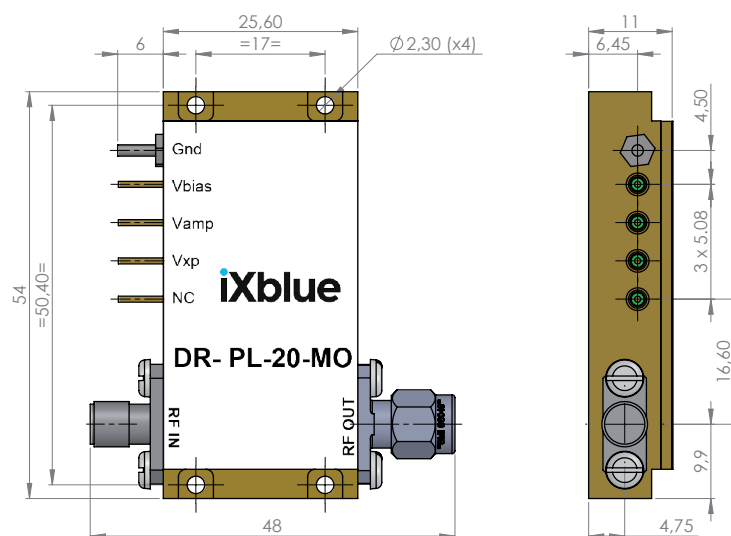
Output response: Pulse amplitude =  $4.96 V_{pp}$ , Rise time = 32 ps

## Electrical Schematic Diagram



## Mechanical Diagram and Pinout

All measurements in mm

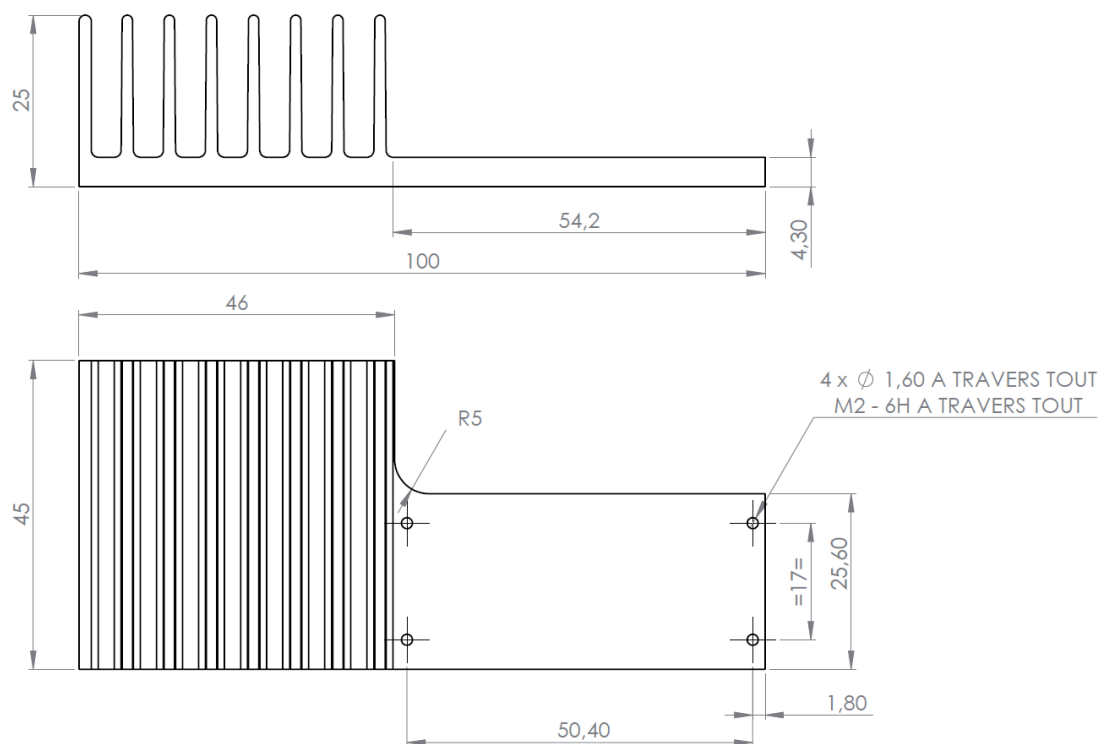
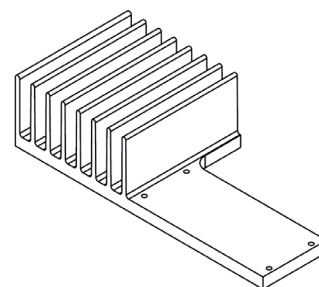


The heatsinking of the module is necessary. It's user responsibility to use an adequate heatsink. Refer to page 6 for ixBlue recommended heatsink.

PIN	Function	Unit
IN	RF In	K connector female
OUT	RF Out	K connector male
V <sub>bias</sub>	Power supply voltage	Set a typical operating specification
V <sub>amp</sub>	Output voltage amplitude adjustment	Adjust for gain control tuning
V <sub>xp</sub>	Output pulse adjustment	Adjust for pulse adjustment (amplitude and width) tuning
Det	RF power detector	Not available

## Mechanical Diagram And Pinout With HS-MO2 Heatsink

All measurements in mm



## About us

ixBlue 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.

ixBlue 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.