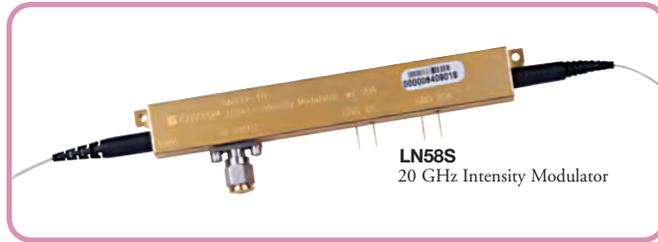


# 20 GHz Low $V_{\pi}$ Analog Intensity Modulator

The LN58S is a 20 GHz Analog Intensity Modulator from Covega, Thorlabs Quantum Electronics. This innovative Titanium-Indiffused Z-cut Lithium Niobate Optical Modulator is designed for ease of system integration to benefit customers developing high-speed analog modulation systems.

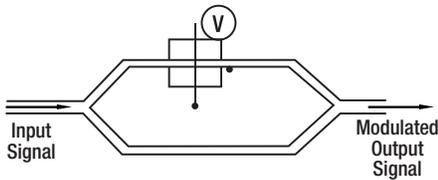
The LN58S Analog Modulator is a high-performance, low  $V_{\pi}$ , single-ended drive modulator capable of supporting analog signaling up to 20 GHz. The industry-leading, low RF drive and  $V_{\pi}$  voltages simplify any design based around the LN58S. The LN58S Analog Modulator has a Mach-Zehnder interferometric architecture that offers a large bandwidth, a low drive voltage ( $V_{\pi} < 3.9$  V @ 20 GHz), and supports 20 GHz operating frequencies, making it an ideal solution for microwave photonics and fiber optic antenna remote solutions.

The LN58S modulator is based on Z-cut Titanium-indiffused LiNbO<sub>3</sub> and packaged in a hermetic housing with a K-connector RF input signal port and PM and SM fiber pigtailed on the device input and output, respectively. The fiber pigtailed are connectorized with FC/PC and SC/PC connectors.

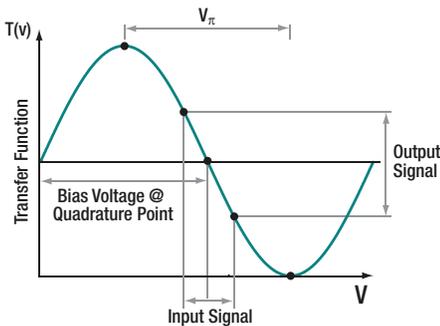


## Mach-Zehnder Modulator Operation

The voltage applied to an arm of the Mach-Zehnder modulator shifts the phase of the signal through that arm by an amount proportional to the voltage applied. If the phase shift equates to an integral number of wavelengths, the two beams will combine constructively and the intensity of the output power will be at its maximum. If the phase shift is a half-wavelength out of phase, the two beams will combine destructively, and the output power will be at its minimum.



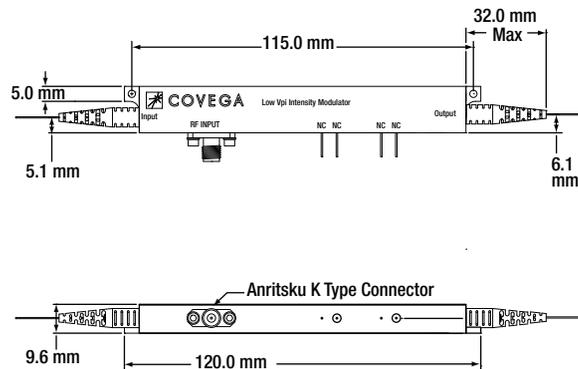
Schematic Diagram of a Mach-Zehnder Modulator



Transfer Function of a Mach-Zehnder Modulator

ITEM#		LN58S		
Parameter	Symbol	Min	Typ	Max
E/O Bandwidth (-3 dB)	$f_{c-3dB}$	20 GHz	25 GHz	-
Optical On/Off Extinction Ratio	E.R.	-	20 dB	-
Optical Insertion Loss (Connectorized)	I.L.	-	-	5.5 dB
Insertion Loss Variation (EOL)	$\Delta$ I.L.	-0.5 dB	-	-
Optical Return Loss		-	40 dB	-
Operating Wavelength	$\lambda$	1525 nm	-	1605 nm
S11 (DC to 10 GHz)		-	-12 dB	-10 dB
S11 (10 GHz to 20 GHz)		-	-10 dB	-8 dB
$V_{\pi}$ @ 20 GHz		-	3.5 V	3.9 V
$V_{\pi}$ @ DC		-	1.5 V	2.0 V
Operating Case Temperature		0 °C	-	70 °C
Storage Temperature		-40 °C	-	85 °C

## 20 GHz Modulator Package Drawing



Mechanical Drawings Available on the WEB

ITEM#	\$	£	€	RMB	DESCRIPTION
LN58S-FC	\$ 5,250.00	£ 3,640.00	€ 4,661.00	¥ 44,332.00	20 GHz Low $V_{\pi}$ Intensity Modulator, FC/PC Connectors
LN58S-SC	\$ 5,250.00	£ 3,640.00	€ 4,661.00	¥ 44,332.00	20 GHz Low $V_{\pi}$ Intensity Modulator, SC/PC Connectors