

# 40 Gb/s 3.3V Polarization Modulator

Electro-Optic Mode Converter

PN: PM-XX-X-X-X SN: 000R00

RF

The Versawave 40 Gb/s Electro-Optic Polarization Modulator is capable of changing the state of polarization (SOP) of light at ultra-high speeds. Functioning as a high speed electrically variable wave plate, the modulator is able to change the SOP of linearly polarized laser light to an orthogonal linear polarization, passing through either circular polarization states. The range and degree of the change in the SOP can

GND

Bias

be varied by adjusting the magnitude of the DC

OUT

bias and RF drive voltage.

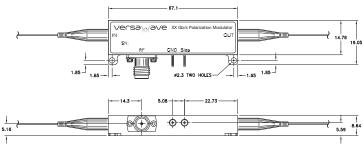
### **Applications**

- · Analogue and digital
- · Polarization shift keying
- Polarization multiplexing and de-multiplexing
- · High-speed polarization sweeping
- High-speed test equipment
- Optical quantum encryption

### **Features**

- High modulation bandwidth
- · Low drive voltage
- Low residual amplitude modulation
- · Low differential group delay
- Covers C and L bands
- GaAs technology
- Low insertion loss
- Low chirp

Unlike designs based on lithium niobate, the Versawave Polarization Modulator has very low birefringence and subsequently, low differential group delay - giving system designers flexibility to use polarization modulation or multiplexing in transmission systems. In addition, the polarization modulator has the same class-leading performance benefits of Versawave's Amplitude Modulator including low drive voltage, ultra-wide bandwidth, and small footprint.



All above dimensions are in mm

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## **Specifications**

Optical     MIN     Typical     MAX       S21 Electro-Optic Bandwidth     -     40 GHz     -       Polarization Extinction Ratio     20 dB     -     -       Residual Amplitude Modulation     -     -18 dB     -       Differential Group Delay     -     -     100 fs       Chirp Parameter     -0.1     -     40.1       Wavelength Range     1530 nm     -     1610 nm       Optical Return Loss     30 dB     -     -       Insertion Loss (no connectorization)     -     3.0 dB     -       Electrical     MIN     Typical     MAX       PRBS Drive Voltage     -     3.3 V     -       Impedance     -     50 Ω     -       Impedance     -     50 Ω     -       Bias Voltage (required to operate at quadrature)     -12 V     -     +12 V       Environmental     MN     MAX     -     -       Operating Temperature     -0°C (32F)     70°C (158F)     -       Storage Temperature     -40°C (40°F)				
Polarization Ratio20 dB-Residual Amplitude Modulation18 dB-Differential Group Delay100 fsChirp Parameter-0.1-+0.1Wavelength Range1530 nm-1610 nmOptical Return Loss30 dBInsertion Loss (no connectorization)-3.0 dB-ElectricalMINTypicalMAXPRBS Drive Voltage-3.3 V-Return Loss (40 MHz - 40 GHz)-10 dB-Impedance-50 Ω-Bias Voltage (required to operate at quadrature)-12 V-+12 VEnvironmentalMNMAXOperating Temperature0°C (32°F)70°C (158°F)Storage Temperature-40°C (40°F)85°C (185°F)ROHSEnvironmentalEnvironmentalOutput Fiber TypePMF-Storage Temperature1.85 nmBias Connection1.85 nmBias Connector1.85 nmBias ConnectorFC/APC or FC/UPCInput J Output ConnectorFC/APC or FC/UPCInput J Output Fiber Lengthnext context	Optical	MIN	Typical	MAX
Residual Amplitude Modulation     -     -18 dB     -       Differential Group Delay     -     100 fs       Chirp Parameter     -0.1     -     40.1       Wavelength Range     1530 nm     -     1610 nm       Optical Return Loss     30 dB     -     -       Insertion Loss (no connectorization)     -     3.0 dB     -       Felectrical     MIN     Typical     MAX       PRBS Drive Voltage     -     3.3 V     -       Return Loss (40 MHz - 40 GHz)     10 dB     -     -       Impedance     50 Ω     -     +12 V     -       Environmental     MAX     -     +12 V     -     +12 V       Environmental     OPC (32°F)     70°C (158°F)     -     -       ROHS     -     -     40°C (40°F)     85°C (185°F)     -       ROHS     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -     -	S21 Electro-Optic Bandwidth	-	40 GHz	-
Differential Group Delay-100 fsChirp Parameter-0.1+0.1Wavelength Range1530 nm1610 nmOptical Return Loss30 dB-Insertion Loss (no connectorization)-3.0 dBElectricalMINTypicalMAXPRBS Drive Voltage-3.3 V-Return Loss (40 MHz - 40 GHz)-10 dB-Impedance-50 Ω-Bias Voltage (required to operate at quadrature)-12 V-+12 VEnvironmentalMINMAXOperating Temperature-0°C (32°F)70°C (158°F)Storage Temperature-40°C (40°F)85°C (185°F)ROHS10 dB-Diput Fiber TypePMFConnectors and Fiber OptionsRF Connection1.85 mmBias ConnectorFC/APC or FC/UPCInput / Output ConnectorFC/APC or FC/UPC-Input / Output ConnectorFC/APC or FC/UPC-Input / Output Fiber LengthInput / Output Fiber Length <th>Polarization Extinction Ratio</th> <th>20 dB</th> <th>-</th> <th>-</th>	Polarization Extinction Ratio	20 dB	-	-
Chirp Parameter-0.1-+0.1Wavelength Range1530 nm-1610 nmOptical Return Loss30 dBInsertion Loss (no connectorization)-3.0 dB-ElectricalMINTypicalMAXPRBS Drive Voltage-3.3 V-Return Loss (40 MHz - 40 GHz)-10 dB-Impedance-50 Ω-Bias Voltage (required to operate at quadrature)-12 V-+12 VEnvironmentalMINMAXOperating Temperature0°C (32°F)70°C (158°F)Storage Temperature-40°C (-40°F)85°C (185°F)ROHS6/6 Compliant-Input Fiber TypeSMF-28 or PMF-RF Connection1.85 mm-Bias Connector-1.85 mmBias ConnectorFC/APC or FC/UPC-Input J Output ConnectorFC/APC or FC/UPCInput J Output Fiber Length1 m	Residual Amplitude Modulation	-	-18 dB	-
Mavelength Range     1530 nm     -     1610 nm       Optical Return Loss     30 dB     -     -       Insertion Loss (no connectorization)     -     3.0 dB     -       Electrical     MIN     Typical     MAX       PRBS Drive Voltage     -     3.3 V     -       Return Loss (40 MHz - 40 GHz)     -     10 dB     -       Impedance     -     50 Ω     -     +12 V       Bias Voltage (required to operate at quadrature)     -12 V     -     +12 V       Environmental     MAX     -     -     -     -       Operating Temperature     -0°C (32°F)     70°C (158°F)     -     -       Storage Temperature     -40°C (-40°F)     85°C (185°F)     -       ROHS     -     -     -     -     -       Operating Temperature     90°C (32°F)     70°C (158°F)     -     -     -       ROHS     6/6 Compliant     -     -     -     -     -     -     -     -     -     -     -     -<	Differential Group Delay	-	-	100 fs
Optical Peturn Loss30 dB.Insertion Loss (no connectorization).3.0 dB.ElectricalMINTypicalMAXPRBS Drive Voltage3.3 V.Return Loss (40 MHz - 40 GHz).10 dB.Impedance50 Ω.Bias Voltage (required to operate at quadrature)-12 V.+12 VEnvironmentalO°C (32°F).70°C (158°F)Storage Temperature.40°C (40°F)85°C (185°F)Storage Temperature.40°C (40°F)85°C (185°F)ROHSInput Fiber TypePMF.Quitput Fiber TypeSMF-28 or PMF.RF Connection1.85 mm.Bias ConnectionInput / Output ConnectorPrisInput Joutput LoonnectorInsInput Joutput Fiber LengthIm	Chirp Parameter	-0.1	-	+0.1
Insertion Loss (no connectorization).3.0 dB.ElectricalMINTypicalMAXPRBS Drive Voltage.3.3 V.Return Loss (40 MHz - 40 GHz).10 dB.Impedance.50 Ω.Bias Voltage (required to operate at quadrature)-12 V.+12 VEnvironmentalMINMAXOperating Temperature0°C (32°F)70°C (158°F)Storage Temperature.40°C (40°F)85°C (185°F)ROHSInput Fiber OptionsInput Fiber TypePMFQutput Fiber TypeSMF-28 or PMFRF Connection1.85 mmBias ConnectionPinsInput / Output ConnectorFC/APC or FC/UPC.Input / Output Fiber Length1 m.	Wavelength Range	1530 nm	-	1610 nm
Flectrical   MIN   Typical   MAX     PRBS Drive Voltage   -   3.3 V   -     Return Loss (40 MHz - 40 GHz)   -   10 dB   -     Impedance   -   50 Ω   -     Bias Voltage (required to operate at quadrature)   -12 V   -   +12 V     Environmental   MIN   MAX     Operating Temperature   0°C (32°F)   70°C (158°F)     Storage Temperature   -40°C (-40°F)   85°C (185°F)     ROHS   6/6 Compliant   -     Connectors and Fiber Options   -   -     Input Fiber Type   PMF   -   -     Output Fiber Type   SMF-28 or PMF   -   -     RF Connection   1.85 mm   -   -     Bias Connection   Pins   -   -     Bias Connector   FC/APC or FC/UPC   -   -     Input / Output Fiber Length   1 m   -   -	Optical Return Loss	30 dB	-	-
PRBS Drive Voltage     -     3.3 V     -       Return Loss (40 MHz - 40 GHz)     -     10 dB     -       Impedance     -     50 Ω     -       Bias Voltage (required to operate at quadrature)     -12 V     -     +12 V       Environmental     MAX     -     +12 V       Operating Temperature     -0°C (32°F)     70°C (158°F)       Storage Temperature     -40°C (-40°F)     85°C (185°F)       ROHS     6/6 Compliant     6/6 Compliant       Doperating Tippe Options     85°C (185°F)     10.0000       RF Connection     1.85 mm     5000       Bias Connection     1.85 mm     5000       Bias Connector     FC/APC or FC/UPC     5000       Input / Output Connector     FC/APC or FC/UPC     50000       Input / Output Fiber Length     1 m     500000	Insertion Loss (no connectorization)	-	3.0 dB	-
Return Loss (40 MHz - 40 GHz)   -   10 dB   -     Impedance   -   50 Ω     Bias Voltage (required to operate at quadrature)   -12 V   -   +12 V     Environmental   MIN   MAX     Operating Temperature   0°C (32°F)   70°C (158°F)     Storage Temperature   -40°C (-40°F)   85°C (185°F)     ROHS   6/6 Compliant     Input Fiber Type   PMF     Output Fiber Type   SMF-28 or PMF     RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	Electrical	MIN	Typical	MAX
Impedance-50 ΩBias Voltage (required to operate at quadrature)-12 V-+12 VEnvironmentalMINMAXOperating Temperature0°C (32°F)70°C (158°F)Storage Temperature-40°C (-40°F)85°C (185°F)ROHS6/6 Compliant6/6 CompliantConnectors and Fiber OptionsInput Fiber TypePMFOutput Fiber TypeSMF-28 or PMFRF Connection1.85 mmBias ConnectionPinsInput / Output ConnectorFC/APC or FC/UPCInput / Output Fiber Length1 m	PRBS Drive Voltage	-	3.3 V	-
Bias Voltage (required to operate at quadrature)   -12 V   -   +12 V     Environmental   MIN   MAX     Operating Temperature   0°C (32°F)   70°C (158°F)     Storage Temperature   -40°C (-40°F)   85°C (185°F)     ROHS   6/6 Compliant   6/6 Compliant     Connectors and Fiber Options   PMF   Storage or PMF     Input Fiber Type   SMF-28 or PMF   SMF-28 or PMF     Bias Connection   1.85 mm   1.85 mm     Bias Connector   FC/APC or FC/UPC   Input / Output Fiber Length	Return Loss (40 MHz - 40 GHz)	-	10 dB	-
Environmental   MIN   MAX     Operating Temperature   0°C (32°F)   70°C (158°F)     Storage Temperature   -40°C (-40°F)   85°C (185°F)     ROHS   6/6 Compliant     Connectors and Fiber Options   6/6 Compliant     Input Fiber Type   PMF     Output Fiber Type   SMF-28 or PMF     RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	Impedance	-	50 Ω	
Operating Temperature0°C (32°F)70°C (158°F)Storage Temperature-40°C (-40°F)85°C (185°F)ROHS6/6 CompliantConnectors and Fiber OptionsInput Fiber TypePMFOutput Fiber TypeSMF-28 or PMFRF Connection1.85 mmBias ConnectionPinsInput / Output ConnectorFC/APC or FC/UPCInput / Output Fiber Length1 m	Bias Voltage (required to operate at quadrature)	-12 V	-	+12 V
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ROHS   6/6 Compliant     Connectors and Fiber Options   PMF     Input Fiber Type   PMF     Output Fiber Type   SMF-28 or PMF     RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	Operating Temperature	0°C (32°F)		70°C (158°F)
Connectors and Fiber Options     Input Fiber Type   PMF     Output Fiber Type   SMF-28 or PMF     RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	Storage Temperature	-40°C (-40°F)		85°C (185°F)
Input Fiber Type   PMF     Output Fiber Type   SMF-28 or PMF     RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	ROHS		6/6 Compliant	
Output Fiber Type SMF-28 or PMF   RF Connection 1.85 mm   Bias Connection Pins   Input / Output Connector FC/APC or FC/UPC   Input / Output Fiber Length 1 m	Connectors and Fiber Options			
RF Connection   1.85 mm     Bias Connection   Pins     Input / Output Connector   FC/APC or FC/UPC     Input / Output Fiber Length   1 m	Input Fiber Type	PMF		
Bias Connection Pins   Input / Output Connector FC/APC or FC/UPC   Input / Output Fiber Length 1 m	Output Fiber Type	SMF-28 or PMF		
Input / Output Connector FC/APC or FC/UPC   Input / Output Fiber Length 1 m	RF Connection	1.85 mm		
Input / Output Fiber Length 1 m	Bias Connection	Pins		
	Input / Output Connector	FC/APC or FC/UPC		
Package	Input / Output Fiber Length	1 m		
	Package			

Epoxy sealed, hermetic package available upon request. Low outgassing assembly available upon request.

Ordering Information	AB C D E PM -43 - X - X - X	
C Input Optical Connector	FC/APC = A	FC/UPC = U
D Output Optical Connector	FC/APC = A	FC/UPC = U
E Output Fiber	SMF-28 = S	PMF = P

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