



## 20-40 GHz Intensity Modulators for Analog Applications AM20, AM40

### ● Description

GKER high bandwidth Zero-Chirp modulators are based on the Mach-Zehnder Interferometer (MZI) architecture. The AM20 & AM40 broadband analog intensity modulators combine high linearity with low driving voltage and small footprint, covering all the frequency range from 20 GHz to beyond 40 GHz (AM20: 20-30 GHz; AM40: > 30 GHz). The increasing demand to shift the transmission frequency in analog fiber optic links towards higher frequency finds in GKER analog modulators the most advanced and suitable answer. The experience and know-how of GKER engineers is available to customize our products to the customer's specific requirements.

### ● Key Features

- Titanium Indiffused Waveguides
- X-Cut LiNbO3
- C+L-Band Operation
- Operating up to 60 GHz
- Zero-Chirped Modulator
- Low Drive Voltage
- Low Optical Insertion Loss
- Integrated Monitor Photodiode
- Integrated Polarizer
- RoHS Compliant

### ● Applications

Digital Transmission

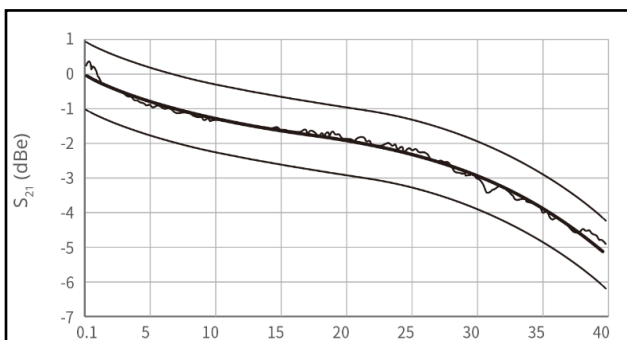
Analog Transmission

Instrumentation

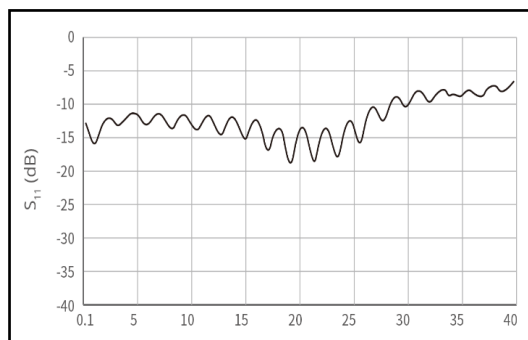
High Frequency Fiber Optic Links

Delay Lines Telemetry Systems

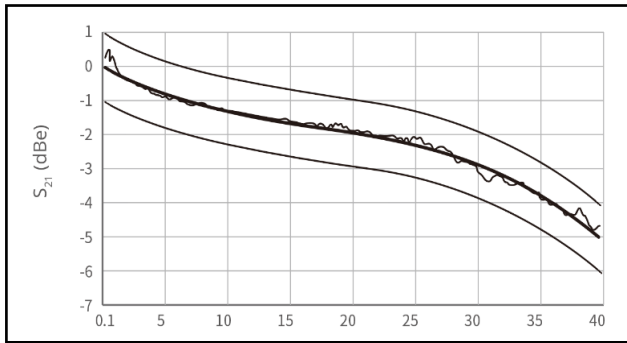
### ● Performance Characteristics F10



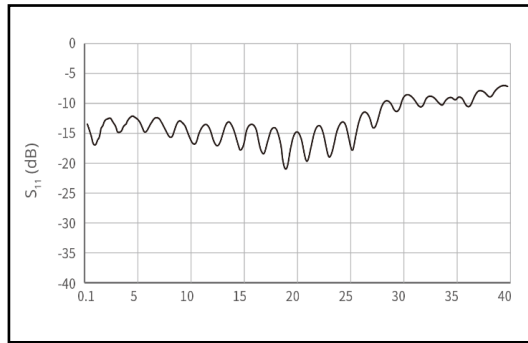
Electrical optical response (20 GHz example)



Electrical return loss (20 GHz example)



Electrical optical response (40 GHz example)



Electrical return loss (40 GHz example)

### ● Absolute Maximum Ratings

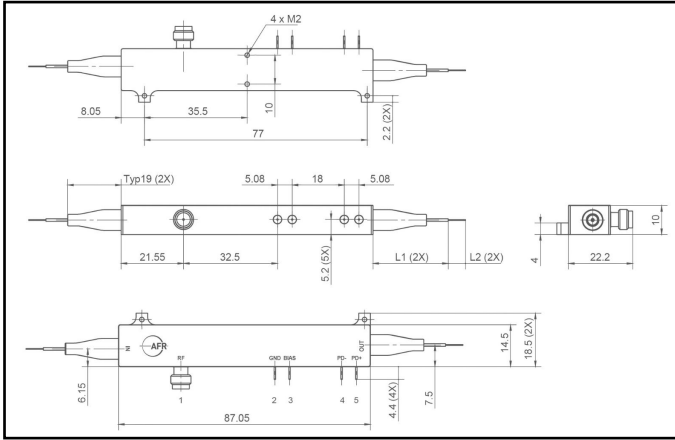
Parameter	Operating Conditions (1)	Min	Max.	Unit
Maximum RF Input Power	AC coupled	-	25	dBm
Maximum Optical Input Power	CW	-	100	mW
Operating Case Temperature	-	0	+75	°C
Storage Temperature	-	40	+85	°C
Maximum Operating Temperature Variation Rate	-	-	1	°C/min
Operating Humidity	-	5	85	%
Leads Soldering Temperature	-	-	250	°C
Leads Soldering Time	-	-	10	s

### ● Pin-Out and Fiber Specifications

RF Connector	V-Connector <sup>1</sup>
Bias and PD connector	LEAD pins
Input Fiber	Corning/Fujikura SM15P UV/UV250 (Panda fiber), L1 (900 μm loose tube fiber without connector) > 1.3 m & L2 (bare fiber) ≥ 5 cm, or >1.2 m 900 μm loose tube fiber with connectors
Output Fiber	Corning/Fujikura SM15P UV/UV250 (Panda fiber), L1 (900 μm loose tube fiber without connector) > 1.3 m & L2 (bare fiber) ≥ 5 cm, or >1.2 m 900 μm loose tube fiber with connectors
Minimum Bending Radius	15 mm

<sup>1</sup>V-Connector is a registered trademark of the Anritsu Corporation.

## ● Mechanical Outline



All dimension measured in mm. L1 is fiber length with 900  $\mu$ m loose tube. L2 is length of bare fiber.

## ● Optical and Electrical Specifications

Characterisitcs	Conditions <sup>1</sup>	Value (AM20)	Value (AM40)	Unit
<b>Optical</b>				
Operating Wavelength Range	-	1525-1615	1525 - 1615	nm
Insertion Loss	No connectors	< 4.5 (3.5 typ)	< 5.0 (4.0 typ)	dB
	With connectors	< 5.0 (4.0 typ)	< 5.5 (4.5 typ)	
Optical Return Loss	No connectors	> 45	> 45	dB
Polarization Extinction ratio	-	> 20 (23 typ)	> 20 (23 typ)	dB
<b>Electrical – RF Port</b>				
S <sub>21</sub> Electro-Optic Bandwidth	- 3 dBe	> 20 (23 typ)	> 30 (31 typ)	GHz
S <sub>11</sub> Electrical Return Loss	40 MHz - 20 GHz	< - 10 (- 12 typ)	< - 10 (- 12 typ)	dB
	20 GHz - 35 GHz	-	< - 8 (- 10 typ)	
RF V $\pi$ Voltage	@ 1 kHz	< 5.0 (4.5 typ)	< 5.2 (4.7 typ)	V
	@ 20 GHz	6.0	6.0	V
<b>Electrical – Bias Port</b>				
Bias V $\pi$ Voltage	@ 1 kHz	< 5.5 (5.0 typ)	< 5.5 (5.0 typ)	V
Bias Port Impedance	@ DC	1	-	M $\Omega$
<b>Photodiode Characteristic</b>				
Monitor PD Reverse Current	-	10	2	mA
Monitor PD Forward Current	-	-	10	mA
Monitor PD Reverse Voltage	-	-	15	V
Photodiode Responsivity	-	> 1 x 10 <sup>-3</sup>	> 1 x 10 <sup>-3</sup>	mA/W
Linearity	-	$\pm$ 10	$\pm$ 10	%

All requirements at Top = 25 °C , wavelength 1550 nm and BOL unless otherwise specified.

## ● Pin-Out Information

Pin	Name/Description	Description
1	RF	RF input, V-connector
2	GND	Ground
3	Bias	Bias Voltage
4	PD-C	Photodiode cathode (-)
5	PD-A	Photodiode anode (+)

## ● Electrostatic Discharge (ESD)

Caution: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



## ● RoHS Compliance

This series of modulators are RoHS compliant.

## ● Reliability Requirements

This series of modulators are designed to meet Telcordia GR-468-Core requirements.

## ● Ordering Information:

For more information on this product and its availability, please contact your local GKER account manager or GKER directly at [sales@GKERPhotonics.com](mailto:sales@GKERPhotonics.com)

Product Description	Part Number
AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.3 m 900 $\mu$ m loose tube fiber + > 5 cm bare fiber, no connectors)	7910511-A
AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 $\mu$ m loose tube fiber with connector, FC/PC connectors)	792000980
AM20, C-Band 20 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 $\mu$ m loose tube fiber with connector, FC/APC connectors)	7910508-A
AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.3 m 900 $\mu$ m loose tube fiber + > 5 cm bare fiber, no connectors)	7910512-A
AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 $\mu$ m loose tube fiber with connector, FC/PC connectors)	792000990
AM40, C-band 40 GHz Intensity modulator for analog applications (PMF-PMF, > 1.2 m 900 $\mu$ m loose tube fiber with connector, FC/APC connectors)	7910507-A