

O/E Calibration Module

MN4765B

Introduction

The MN4765B is a characterized, unamplified photodiode module. It is used as an optical receiver with the Anritsu MS4640B Series VectorStar™ VNAs to perform highly accurate and stable optoelectronic measurements of both modulators (E/O) and photoreceivers (O/E). Model MN4765B is the base calibration module part number only. Customers are required to also order an option to configure the bandwidth and wavelength coverage. These options consist of an InGaAs photodiode that converts modulated optical signals to electrical signals, and includes additional circuitry for temperature and bias stability. Available configuration options are:

MN4765B-0070 (Option 70) Configured for 70 kHz to 70 GHz range, with 1550 nm wavelength coverage.

MN4765B-0071 (Option 71) Configured for 70 kHz to 70 GHz range, with 1310 nm wavelength coverage.

MN4765B-0072 (Option 72) Configured for 70 kHz to 70 GHz range, with 1310 and 1550 nm wavelength coverage.

MN4765B-0110 (Option 110) Configured for 70 kHz to 110 GHz range, with 1550 nm wavelength coverage.

Features

- **Fast and accurate optoelectronic measurements:** The MS4640B Series VectorStar series VNAs, when calibrated using the MN4765B module, enable error-corrected Transfer Function, Group Delay, and Return Loss measurements of E/O and O/E components and subsystems.
- **National Institute of Standards and Technology derived characterization:** Magnitude and phase characterization is obtained using a primary standard characterized by NIST or other National Metrology Institutes and held in the Anritsu Calibration Lab. The magnitude and phase data is provided on a USB drive with the module.
- **Temperature Stable:** The MN4765B is thermally stabilized to eliminate drift in photodiode performance over temperature.
- **Internal Biasing:** Accurate bias voltage to the photodiode is maintained internally. An external, multi-country, AC adapter is included for easy operation.
- **High Linearity:** Linear operating range to +6 dBm for transfer function measurement uncertainties of:
 - < 0.45 dB at 50 GHz and < 0.7 dB at 70 GHz (Typical specifications for MN4765B-0070 and MN4765B-0072 at 1550nm)
 - < 0.35 dB at 40 GHz and < 1 dB at 70 GHz (Typical specifications for MN4765B-0071 and MN4765B-0072 at 1310 nm)
 - < 0.5 dB at 70 GHz and < 0.75 dB at 110 GHz (Typical specifications for MN4765B-0110)
- **High Responsivity:**
 - > 0.7 A/W for MN4765B-0070 (Typical specification)
 - > 0.45 A/W for MN4765B-0071 (Typical specification)
 - > 0.45 A/W for MN4765B-0072 at 1310 nm (Typical specification)
 - > 0.65 A/W for MN4765B-0072 at 1550 nm (Typical specification)
 - > 0.5 A/W for MN4765B-0110 (Typical specification)



MN4765B O/E Calibration Module

Typical Specifications¹**MN4765B-0070**

Frequency Range	70 kHz to 70 GHz
Operating Wavelength Range	1480 nm to 1620 nm
Characterized Wavelength	1550 nm ± 20 nm
Linear Optical Input Power	< 6 dBm
Maximum Optical Input Power	10 dBm
Electrical Return Loss	< -8 dB at < 50 GHz < -5 dB from 50 GHz to 70 GHz
Optical Return Loss	< -24 dB
DC Responsivity	> 0.7 A/W (1550 nm ± 20 nm)
RF OUT Connector	V male (1.85 mm)

MN4765B-0071

Frequency Range	70 kHz to 70 GHz
Operating Wavelength Range	1300 nm to 1330 nm
Characterized Wavelength	1319 nm ± 10 nm
Linear Optical Input Power	< 6 dBm
Maximum Optical Input Power	10 dBm
Electrical Return Loss	< -8 dB at < 50 GHz < -5 dB from 50 GHz to 70 GHz
Optical Return Loss	< -24 dB
DC Responsivity	> 0.45 A/W (1319 nm ± 10 nm)
RF OUT Connector	V male (1.85 mm)

MN4765B-0072

Frequency Range	70 kHz to 70 GHz
Operating Wavelength Range	1300 nm to 1330 nm and 1530 to 1620 nm
Characterized Wavelength	1319 nm ± 10 nm and 1550 nm ± 20 nm
Linear Optical Input Power	< 6 dBm
Maximum Optical Input Power	10 dBm
Electrical Return Loss	< -8 dB at < 50 GHz < -5 dB from 50 GHz to 70 GHz
Optical Return Loss	< -24 dB
DC Responsivity	> 0.45 A/W (1319 nm ± 10 nm) and (1550 nm ± 20 nm)
RF OUT Connector	V male (1.85 mm)

MN4765B-0110

Frequency Range	70 kHz to 110 GHz
Operating Wavelength Range	1480 nm to 1620 nm
Characterized Wavelength	1550 nm ± 20 nm
Linear Optical Input Power	< 6 dBm
Maximum Optical Input Power	10 dBm
Electrical Return Loss	< -6 dB at < 50 GHz < -4 dB from 50 GHz to 110 GHz
Optical Return Loss	< -24 dB
DC Responsivity	> 0.5 A/W (1550 nm ± 20 nm)
RF OUT Connector	W male (1.0 mm)

General Specifications

Optical IN	FC/APC
AC Adapter	100 V to 240 V (50 Hz to 60 Hz) input, +12 VDC output
Power LED	On when the AC adapter is plugged in and the internal photodiode is properly biased
Operate LED	On when the module's internal temperature has stabilized at an optimum temperature for accurate calibrations and measurements
Dimensions	33 H x 51 W x 127 D mm (1.3 H x 2.0 W x 5.0 D in)

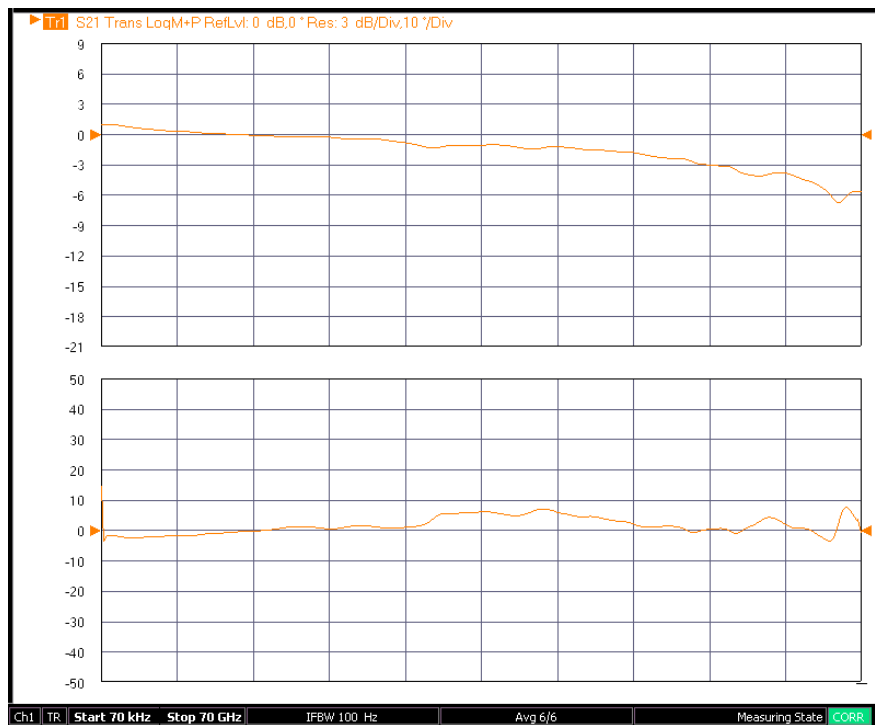
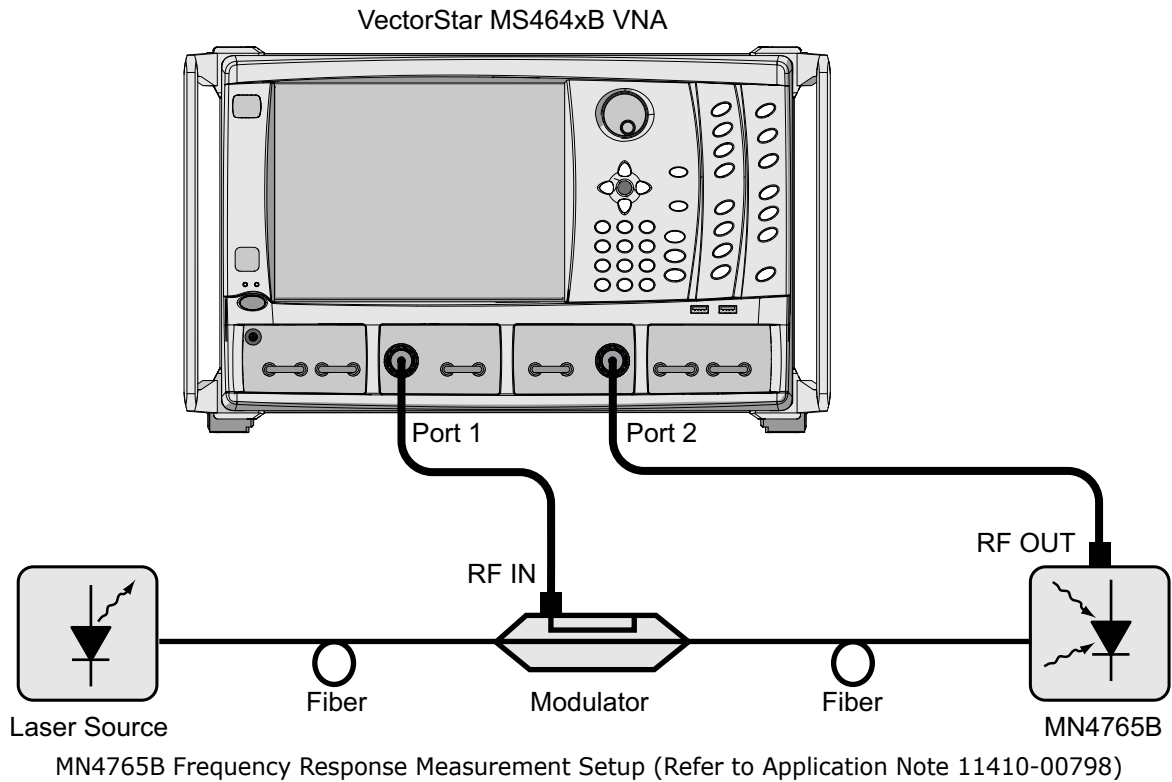
Environmental Specifications

Calibrated temperature	23 °C ± 3 °C
Operating Temperature	18 °C to 28 °C
Storage Temperature	-20 °C to 70 °C
Relative Humidity	5% to 95%
EMC	Conforms to the EMC Directive, 2004/108/EC per EN 61326-1:2013
Emissions	EN55011, Class A, Group 1
Immunity	EN61000-4-2/3/4/5/6/11

1. Typical specifications represent the measured performance of an average unit. They do not include guard-bands and are not covered by the product warranty.

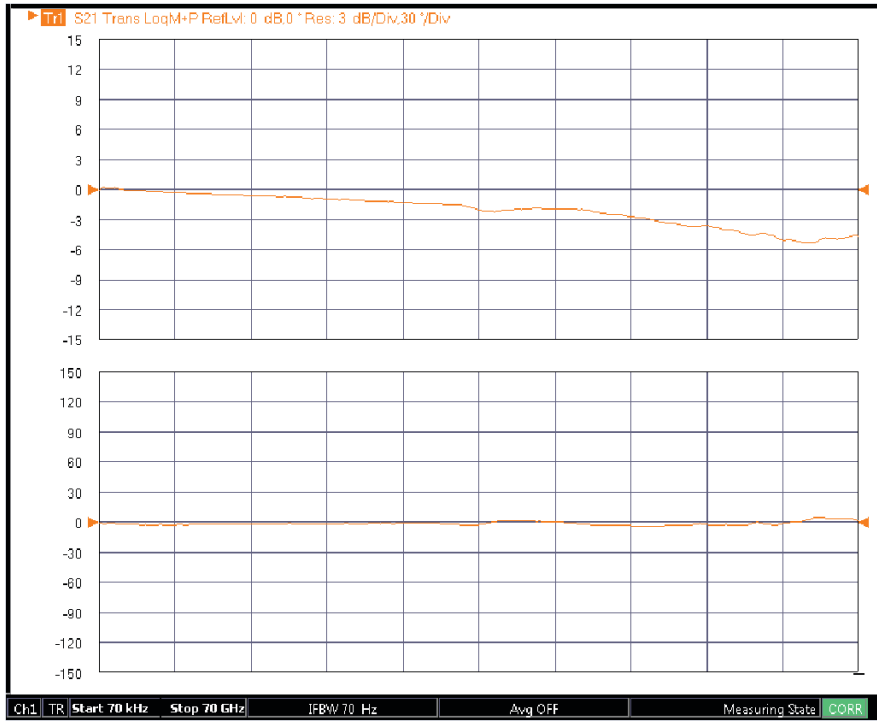
MN4765B Measurement Setup and Module Frequency Response

Full frequency use of the Option 70/71/72 module requires a MS4647B 70 GHz network analyzer although lower frequency VNAs can be used for their portion of the MN4765B-0070/-0071/-0072 frequency range. Full use of the frequency range of the Option 110 module requires a ME7838x broadband system. Below is the general E/O or O/E measurement setup and frequency response traces for the different options.

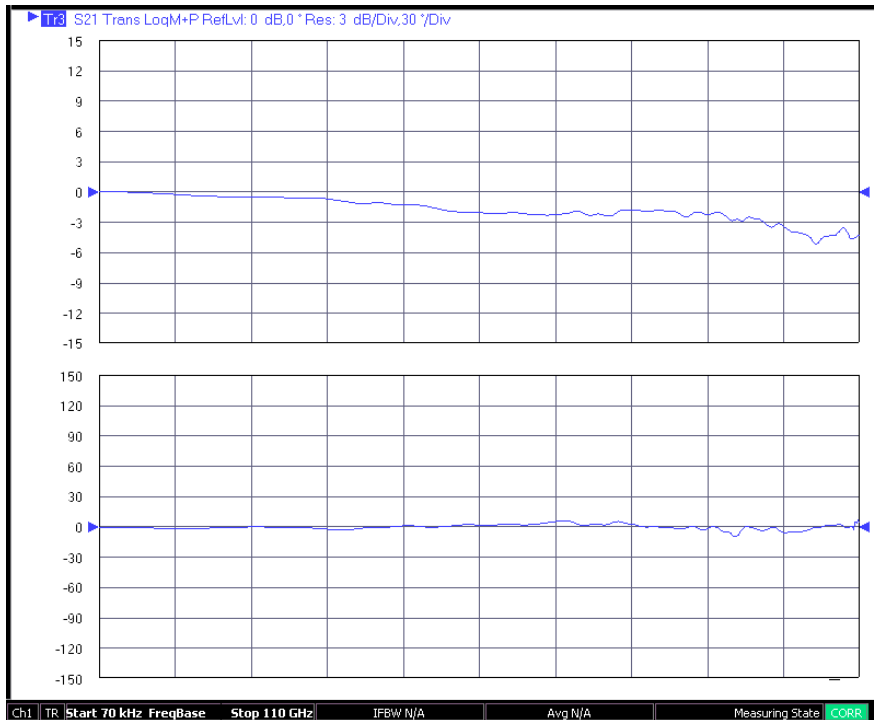


Frequency Response – Option 70 (MN4765B-0070)

Module Frequency Response (Continued)



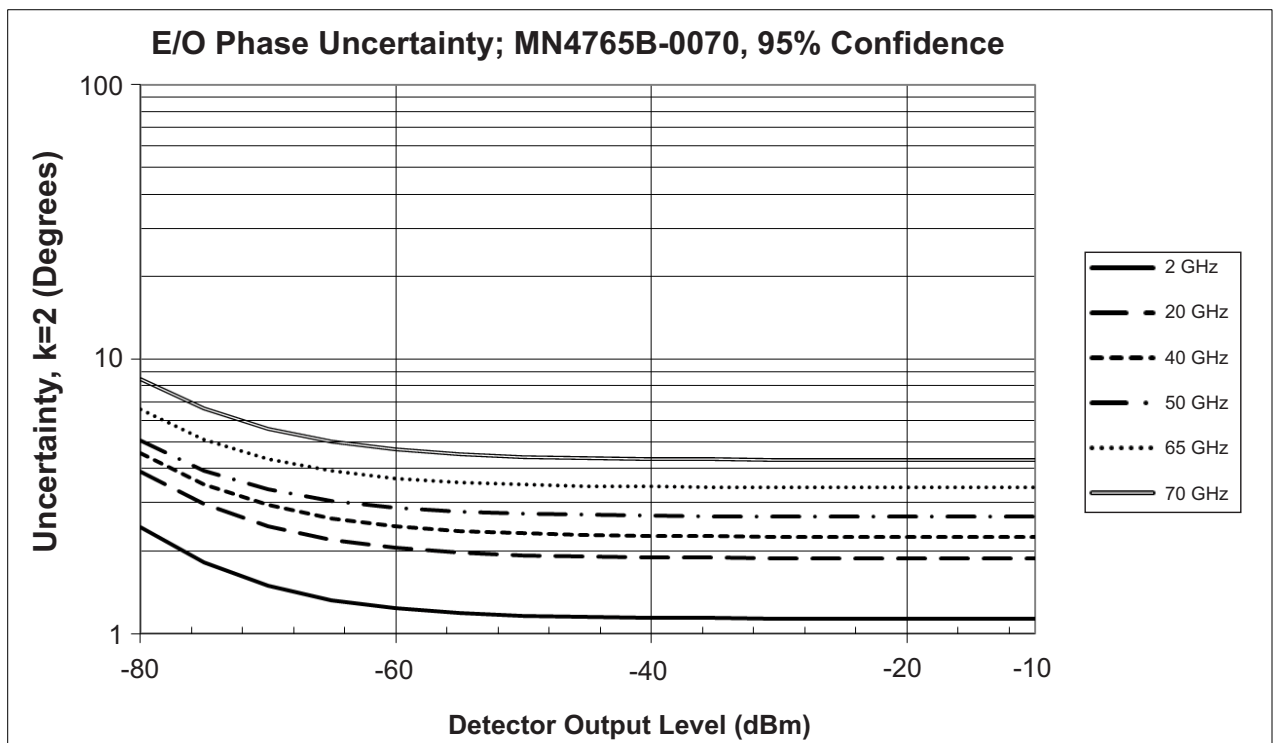
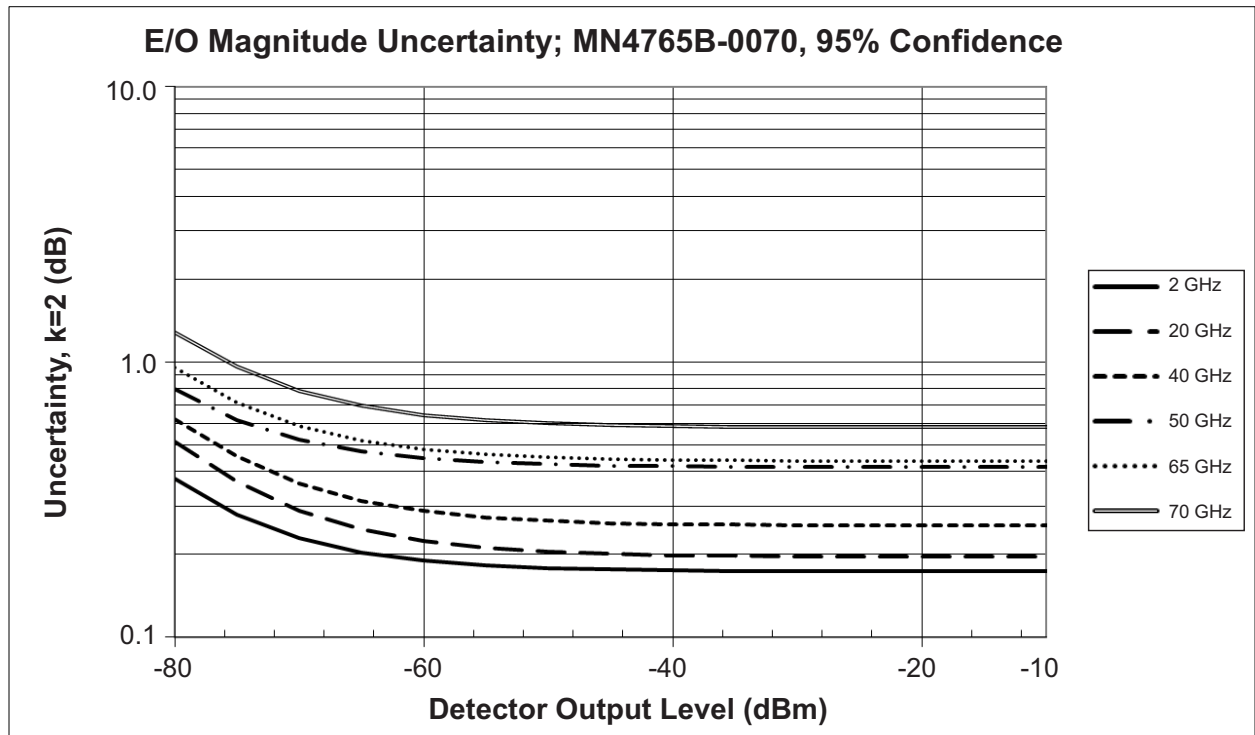
Frequency Response – Option 71 or Option 72 at 1310 nm (MN4765B-0071/0072)



Frequency Response – Option 110 (MN4765B-0110)

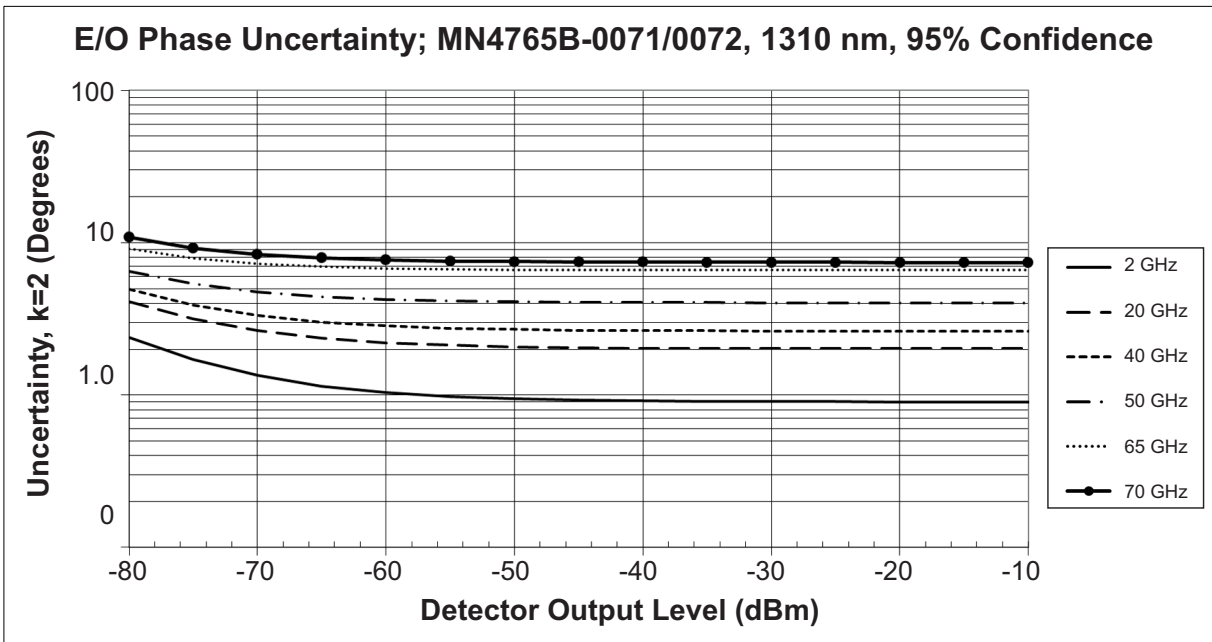
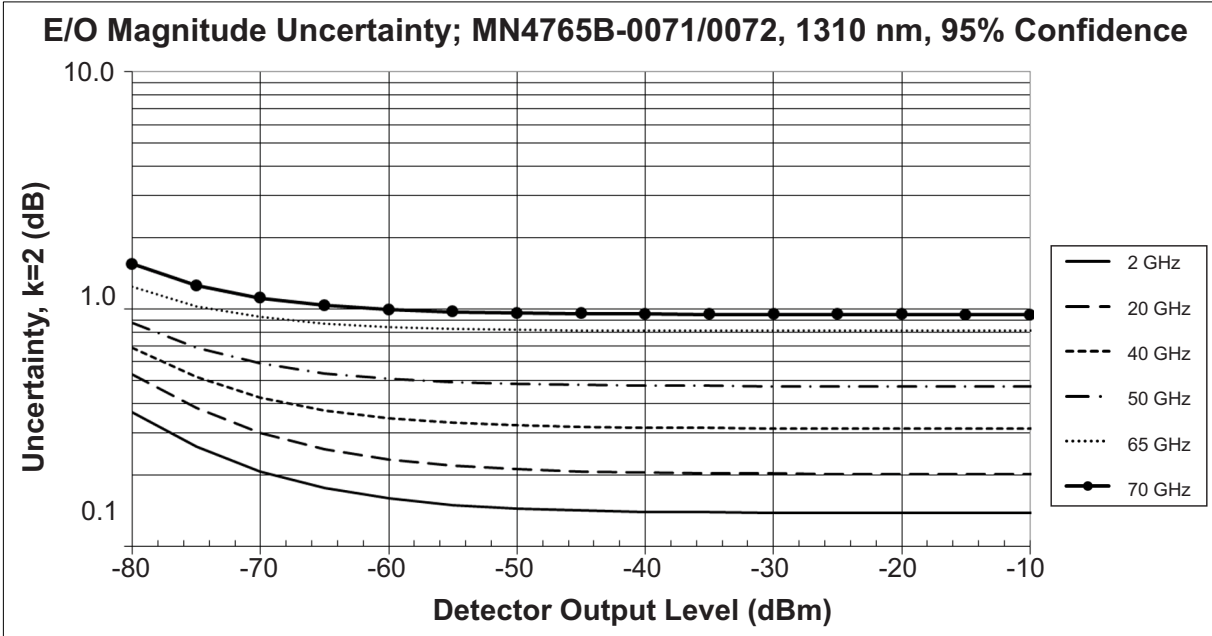
Measurement Uncertainties for Option 70 (or Option 72 at 1550 nm)

Uncertainty curves apply for temperatures of $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ (and measurements within 1 degree of calibration temperature) and are based on a coverage factor of 2 for a 95 % confidence interval.



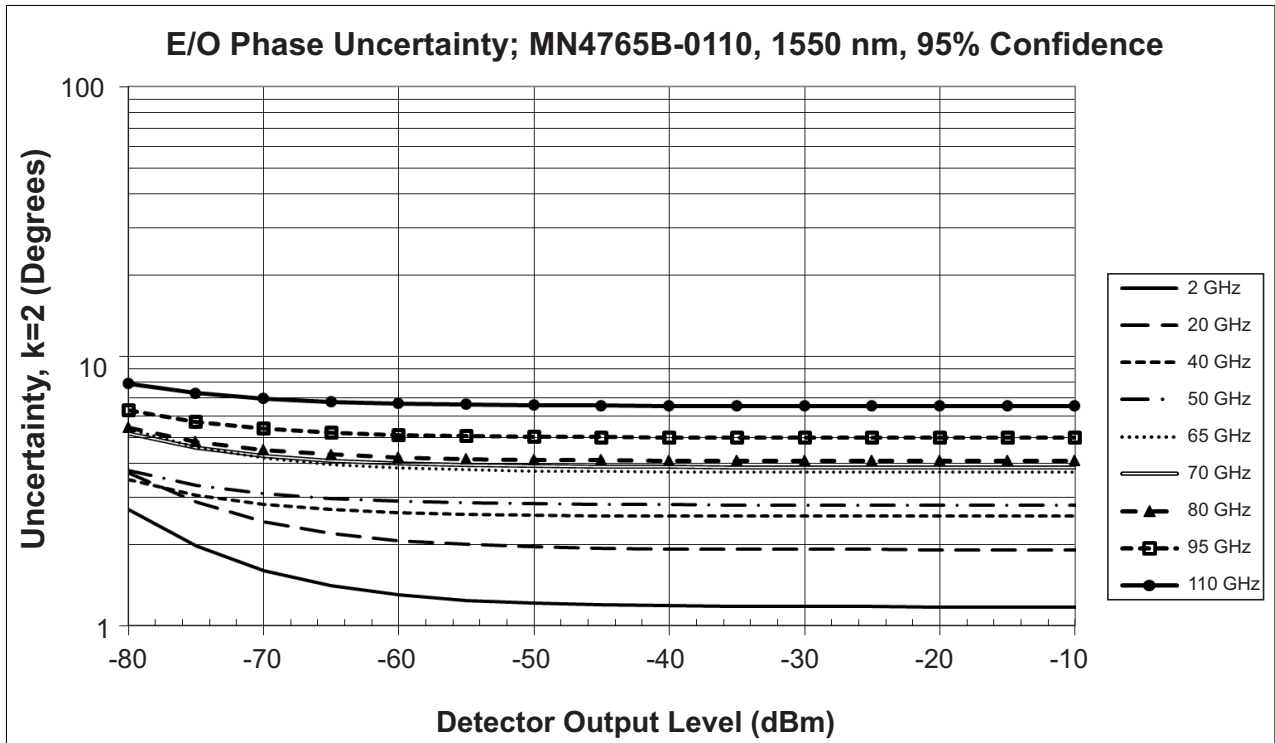
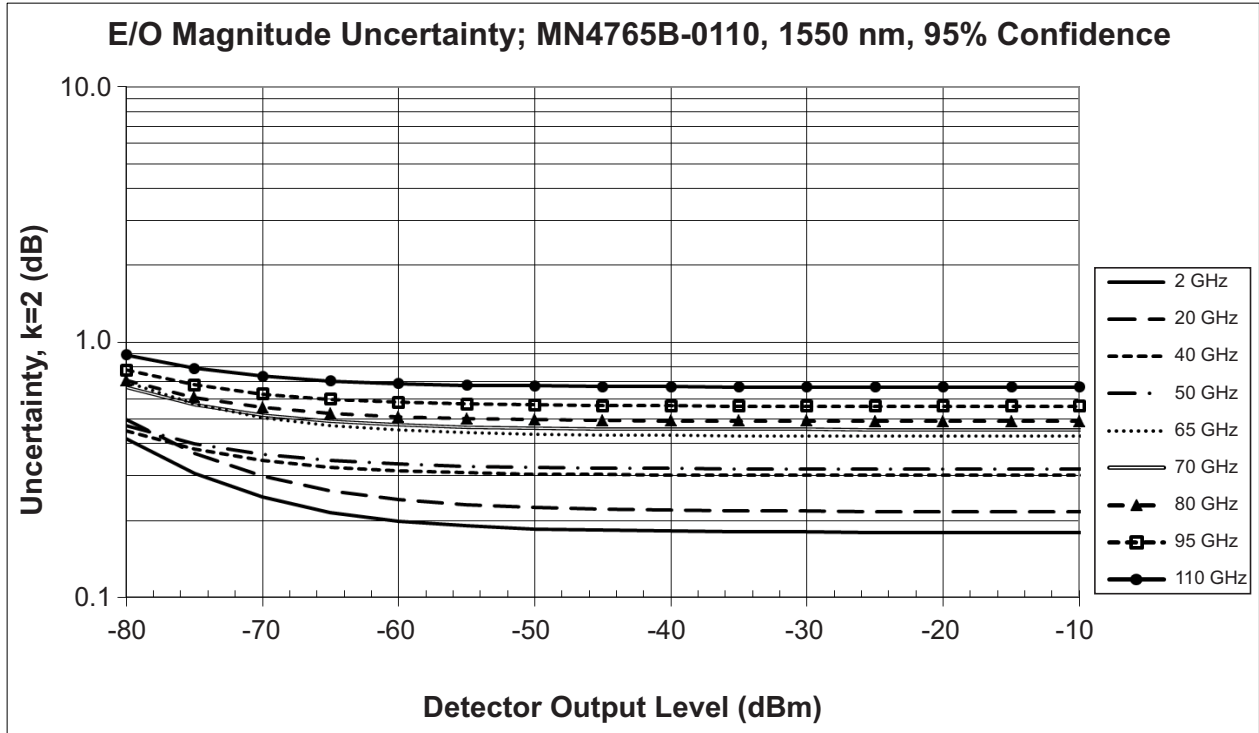
Measurement Uncertainties for Option 71 or Option 72 (at 1310 nm)

Uncertainty curves apply for temperatures of $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ (and measurements within 1 degree of calibration temperature) and are based on a coverage factor of 2 for a 95 % confidence interval. Magnitude uncertainty values above 40 GHz and phase uncertainty values are based on a 1550-1310 nm transfer model.



Measurement Uncertainties for Option 110 (at 1550 nm)

Uncertainty curves apply for temperatures of 23 °C ± 3 °C (and measurements within 1 degree of calibration temperature) and are based on a coverage factor of 2 for a 95 % confidence interval.





Find Drivers, Utilities, Software Updates, and other Helpful Tools at the VectorStar Users Site. Visit: www.anritsu.com/en-us/Products-Solutions/Solution/Welcome-to-the-VectorStar-Users-Site-.aspx

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