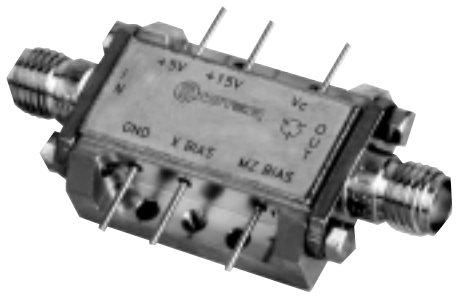
# MACH-ZEHNDER MODULATOR DRIVERS

## FEATURES

- **Specifically designed for fiber optic applications**
- **Standard models for 10, 10.7 and 12.5 Gb/s data rates**
- **Product line includes linear and limiting amplifiers**
- **Gain control available**
- **Compatible with telecordia requirements**
- **Small package size simplifies system integration**




**JSX125G3S7VPC**

***MITEQ tailors each design to maximize the customer's system performance. What does your system need?***

| MODEL NUMBER | CLOCK RATE (Gb/s) | CONTROL VOLTAGE |
|---|---|---|
| JSX100G3S7VPC | 10 | Positive |
| JSX107G3S7VPC | 10.7 | Positive |
| JSX125G3S7VPC | 12.5 | Positive |
| JSX100G3S7VNC | 10 | Negative |
| JSX107G3S7VNC | 10.7 | Negative |
| JSX125G3S7VNC | 12.5 | Negative |

NOTE: Add suffix "Z" to the model number for performance versions where the electrical "1" level corresponds to the optical "0" of the modulator.

## SPECIFICATIONS

| PARAMETERS | CONDITIONS | UNITS | MIN. | TYP. | MAX. |
|---|---|---|---|---|---|
| Lower frequency | 3 dB | kHz | | 20 | 30 |
| Return loss (small signal) | | | | | |
| Input | To 12 GHz | dB | 10 | | |
| Output | | dB | 10 | | |
| Gain flatness | 20 kHz to 8 GHz | dB, p-p | | | 1 |
| | To 12 GHz with a 800 mV input | dB, p-p | 0 | | -5 |
| Output variation over temperature | | Volts | | | 0.15 |
| Input voltage (maximum) | | Volts | | | 1.5 |
| +15 V* (+9 V also available) | | | | | |
| Power required | | Volts | | 15 | |
| Current required | | mA | | 200 | 320 |
| +8 V* (+5 V also available) | | | | | |
| Power required | | Volts | 4.8 | 5 | 5.2 |
| Current required | | mA | | 65 | 75 |
| Bias (zero crossing adjust) | | | | | |
| Power required | | Volts | -8 | -4 | 0 |
| Current required | | mA | | 10 | 30 |
| VPC models ($V_C$) | | | | | |
| Positive control voltage | | Volts | 0 | | 15 |
| Positive control current | | mA | 0 | | 3 |
| VNC models ($V_C$) | | | | | |
| Negative control voltage | | Volts | -15 | | 0 |
| Negative control current | | mA | 0 | | 3 |

* See "Customization" on page 36.

# MACH-ZEHNDER MODULATOR DRIVERS (CONT.)

## EYE MEASUREMENT

| PARAMETERS | CONDITIONS | UNITS | MIN. | MAX. |
|---|---|---|---|---|
| Voltage* | | | | |
| Input | | mV | 500 | 900 |
| Output | | V | 7 | |
| Q or S/N at 7 V output | | Ratio | 30 | |
| Jitter (corrected for instrument jitter) | | ps | | 10 |
| Rise time (corrected) | 10 to 90% | ps | | 30 |
| Fall time (corrected) | 10 to 90% | ps | | 30 |
| SNR of zero level | Z version | Ratio | 30 | |

* Optional 250 mV (non-inverting).

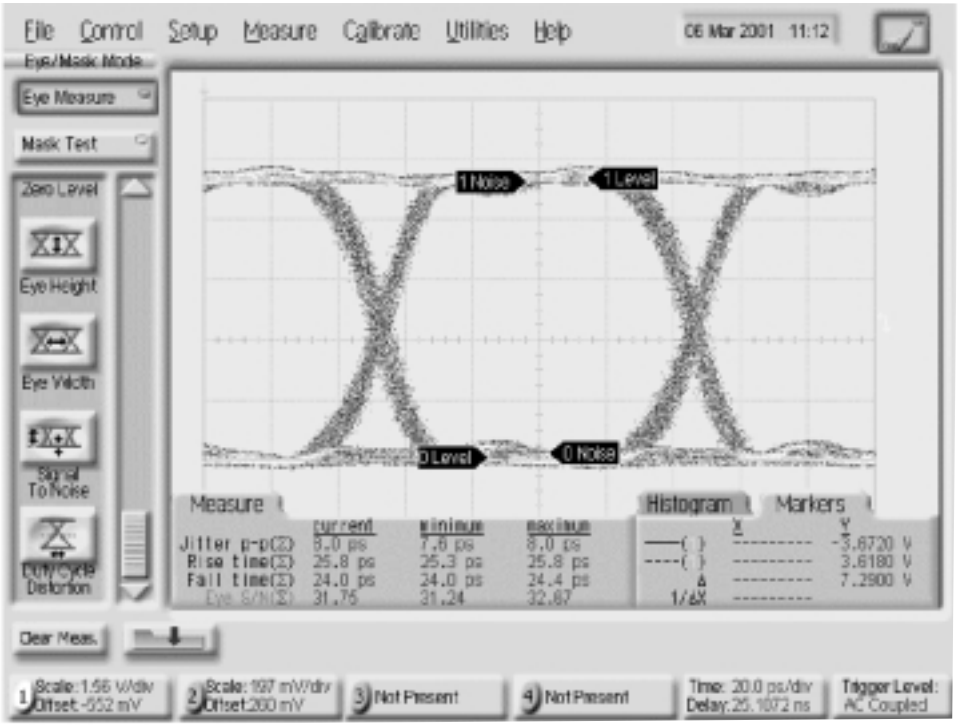
MITEQ's standard modulator driver amplifiers have been designed to meet the following environmental conditions:

### GENERAL SPECIFICATIONS

Operating temperature ..... -5 to +70°C
Storage temperature ..... -40 to +85°C
Humidity ..... 95% relative humidity, noncondensing
Vibration ..... 50 g's rms peak 20 Hz – 2 kHz in accordance with MIL-STD-883, Method 2007, Condition B

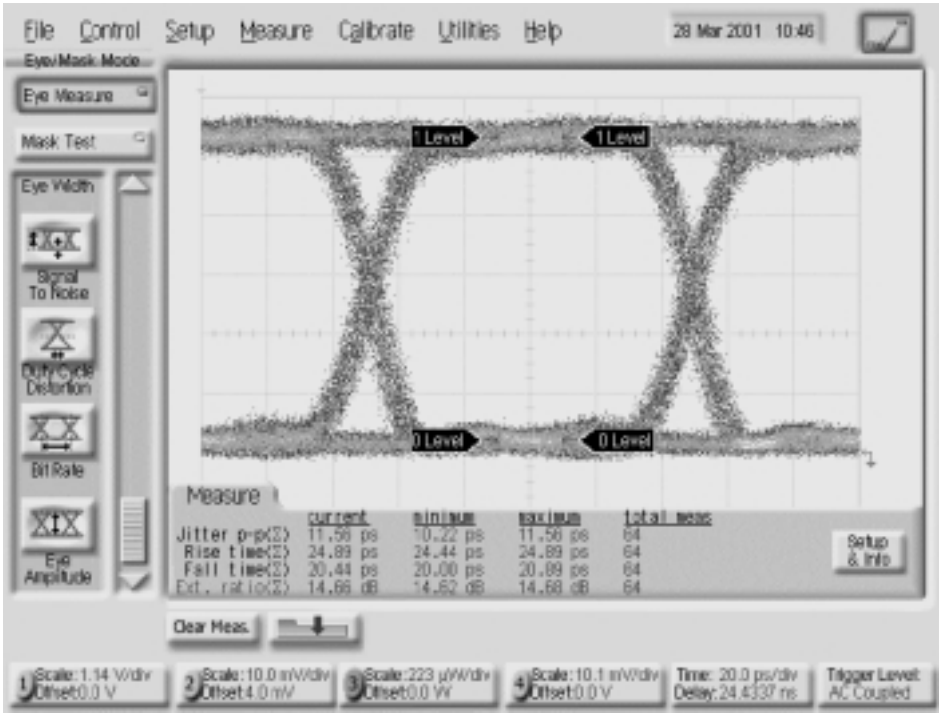
# MEASURED PERFORMANCE

## 10 Gb/s MODULATOR DRIVER



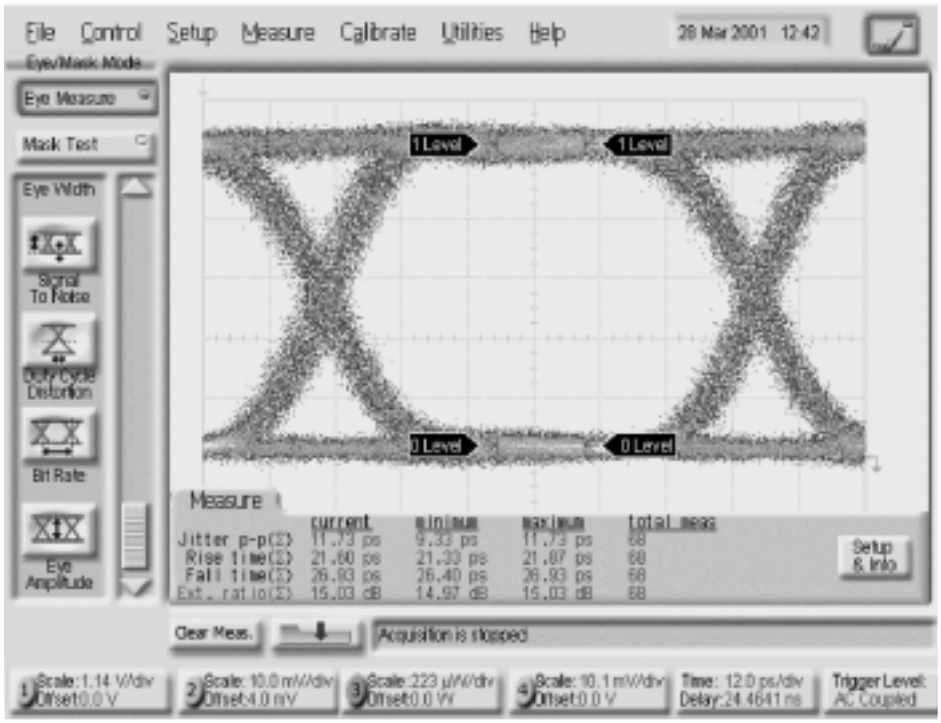

**ELECTRICAL EYE**

## 10.7 Gb/s MODULATOR DRIVER




**OPTICAL EYE**

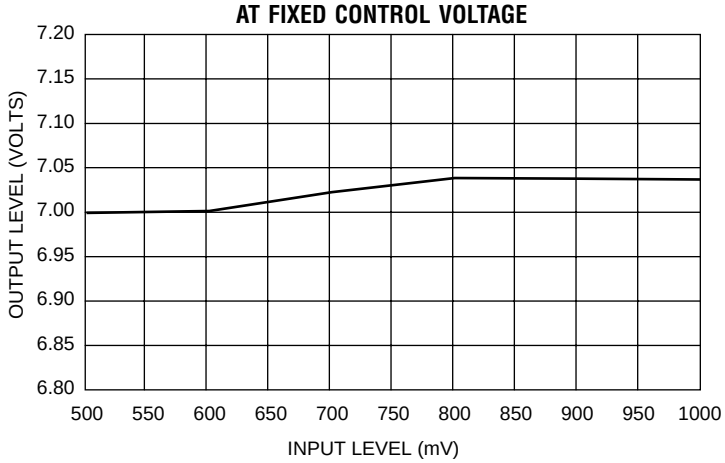
## 12.5 Gb/s MODULATOR DRIVER



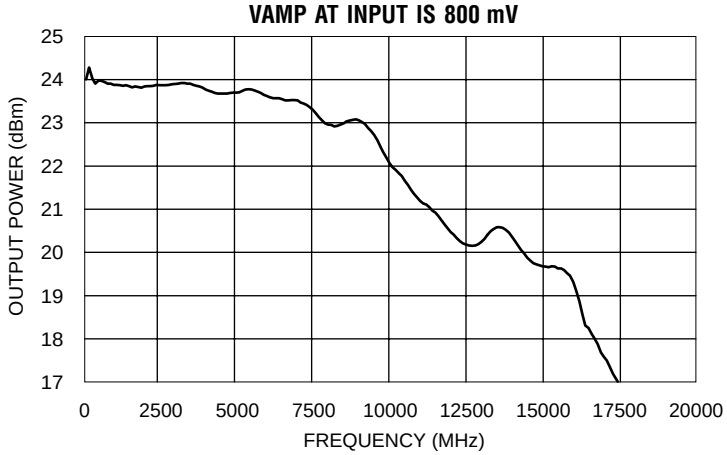

**OPTICAL EYE**

# MACH-ZEHNDER DRIVERS TYPICAL DATA

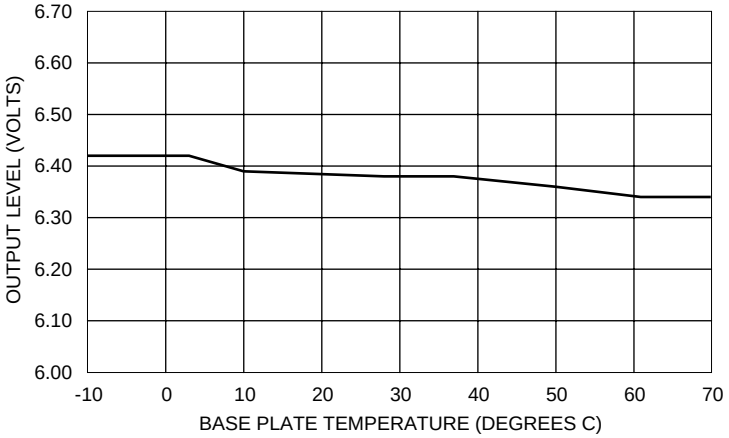
**DRIVER OUTPUT VOLTAGE vs. INPUT LEVEL AT FIXED CONTROL VOLTAGE**




**OUTPUT POWER vs. FREQUENCY OF 10.7 Gb/s VAMP AT INPUT IS 800 mV**




**DRIVER OUTPUT VOLTAGE vs. TEMPERATURE AT FIXED CONTROL VOLTAGE**




NOTE: TYPICAL FOR ALL MODELS.

# MACH-ZEHNDER DRIVERS CUSTOMIZATION

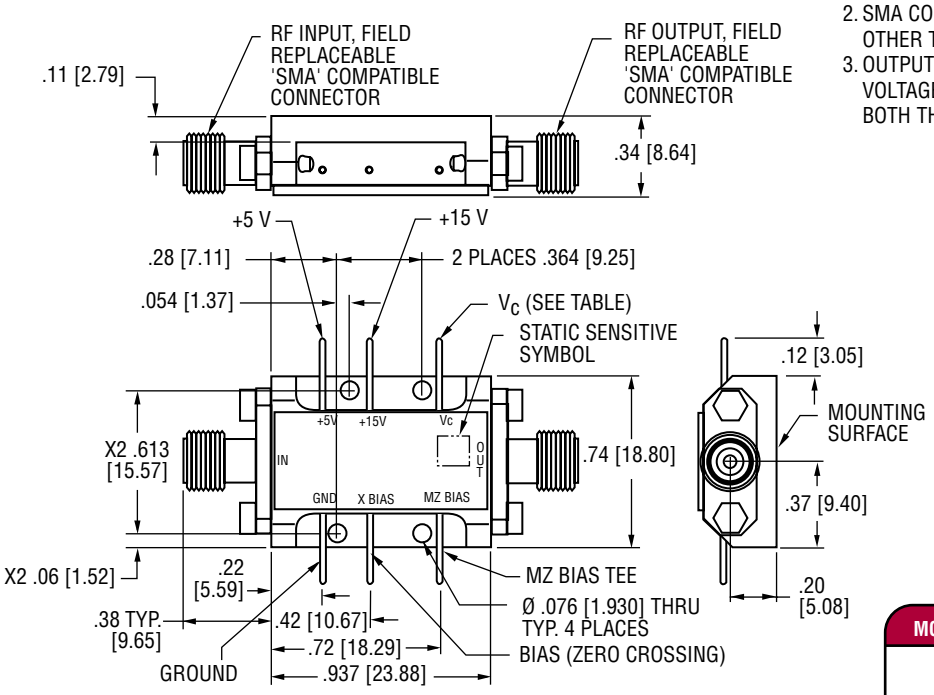
Customization of the electrical and mechanical configuration can be made available on request. Mounting provisions, PIN-out locations, supply voltages and connector type can be modified to facilitate system integration and maximize performance. Call us to discuss your specific needs.

MITEQ's telecommunication products have been designed to exceed industry standard lifetime expectations of twenty years when operated under the specified conditions. An advanced thermal design, supported by thermal analysis, endows this product with low internal temperature rise, ensuring long life. The thermally enhanced package design, utilizes hermetic glass to metal seals and is seam welded to protect the circuitry from the environment.

More than 10,000 MITEQ 10 Gb/s amplifiers have been fielded by major telecommunication system suppliers. This broad level of field service, combined with extensive qualification and life testing, clearly demonstrates the reliable performance of this product line. Qualification tests comply with standards endorsed by the telecommunications industry, as well as customer specified procedures. They include the full range of environments encountered by industry applications.

## OUTLINE DRAWING

NOTES:
1. SECONDARY DIMENSIONS ARE IN MILLIMETERS.
2. SMA CONNECTORS ARE STANDARD, OTHER TYPES ARE AVAILABLE.
3. OUTPUT LEVEL INCREASES WITH CONTROL VOLTAGE BECOMING MORE POSITIVE FOR BOTH THE VPC AND VNC MODELS.




| MODEL SUFFIX | $V_C$ OPTIONS |
|---|---|
| -PC | 0 V TO +15 V |
| -LC | 0 V TO +10 V |
| -NC | 0 V TO -10 V |
| -ZC | -5 V TO +5 V |

### HEATSINKING

The heat dissipation for these amplifiers can be as high as 4.5 W, therefore heatsinking is necessary. Ideally, the unit should be mounted to a metal base plate, which is connected to the overall housing of the system. For best long term reliability, this base plate should be kept below 80°C.