

Isolated Measurement Systems

TIVM1, TIVM1L, TIVM05, TIVM05L, TIVM02, TIVM02L Datasheet



The Tektronix TIVM Series IsoVu™ Measurement System offers a galvanically isolated measurement solution for accurately resolving high bandwidth, differential signals up to ± 50 Vpk in the presence of large common mode voltages with the best in class common mode rejection performance across its bandwidth.

Features and benefits

- Bandwidths from DC to 1 GHz
- 1 Million to 1 (120 dB) Common Mode Rejection up to 100 MHz
- 10,000 to 1 (80 dB) Common Mode Rejection at 1 GHz
- 60 kV peak Common Mode Voltage
- Up to ± 50 V Differential (DC + pk AC)
- Output Clamping
- Safety Certified

Applications

- Half/Full Bridge designs using GaN, SiC, IGBTs
- Floating Measurements
- Power Converter Design
- Power Device Evaluation
- Switching Power Supply Design
- Inverter Design
- Motor Drive Design
- Electronic Ballast Design
- EMI
- ESD
- Current shunt measurements
- Remote probing capability

Product Description

The TIVM Series (IsoVu) products can be used on most Tektronix oscilloscopes with the TekVPI interface and on MSO/DPO70K series oscilloscopes with the TCA-VPI50 adapter. IsoVu utilizes an electro-optic sensor that converts the electrical signal from the sensor tip cables to an optical signal, which electrically isolates the device-under-test from the oscilloscope. IsoVu incorporates four separate lasers, an optical sensor, five optical fibers, and sophisticated feedback and control techniques. The sensor head, which connects to the test point, has complete electrical isolation and is powered over one of the optical fibers (No batteries required). IsoVu is an ideal solution for users making the following measurements:

- Differential measurements in the following conditions:
 - Complete galvanic isolation is required
 - High common mode voltage
 - High frequency common mode interference
 - High frequency measurements
- Measurements in high EMI environments
- EMI compliance testing
- ESD testing

Specifications

All specifications are guaranteed unless noted otherwise. All specifications apply to all models unless noted otherwise.

Overview

| Characteristic | TIVM1/TIVM1L | TIVM05/TIVM05L | TIVM02/TIVM02L |
|-------------------------------|---|---|---|
| Bandwidth/Rise time (Typical) | 1 GHz / \leq 350 ps | 500 MHz / \leq 700 ps | 200 MHz / \leq 1.8 ns |
| Fiber cable length | TIVM1: 3 m (9.8 ft) TIVM1L: 10 m (32.8 ft) | TIVM05: 3 m (9.8 ft) TIVM05L: 10 m (32.8 ft) | TIVM02: 3 m (9.8 ft) TIVM02L: 10 m (32.8 ft) |

Attenuation

Five sensor tip cables with the following attenuation options:

| Sensor tip cable | 1X Range on the controller | 2X Range on the controller |
|--------------------------------|----------------------------|----------------------------|
| IVTIP1X, 1X Sensor tip cable | 1X (\pm 1) | 2X (\pm 2) |
| IVTIP5X, 5X Sensor tip cable | 5X (\pm 5) | 10X (\pm 10) |
| IVTIP10X, 10X Sensor tip cable | 10X (\pm 10) | 20X (\pm 20) |
| IVTIP25X, 25X Sensor tip cable | 25X (\pm 25) | 50X (\pm 50) |
| IVTIP50X, 50X Sensor tip cable | 50X (\pm 50) | 100X (\pm 100) |

Common mode voltage

60 kV peak

Common mode rejection ratio (Typical)

| Sensor tip cable/ adapter | DC | 100 MHz | 200 MHz | 500 MHz | 1 GHz |
|--|----------|---------|---------|---------|-------|
| IVTIP1X, 1X Sensor tip cable | > 120 dB | 120 dB | 110 dB | 100 dB | 90 dB |
| IVTIP5X, 5X Sensor tip cable | > 120 dB | 120 dB | 110 dB | 100 dB | 90 dB |
| IVTIP10X, 10X Sensor tip cable | > 120 dB | 120 dB | 110 dB | 100 dB | 90 dB |
| IVTIP25X, 25X Sensor tip cable | > 120 dB | 110 dB | 100 dB | 100 dB | 90 dB |
| IVTIP50X, 50X Sensor tip cable | > 120 dB | 100 dB | 90 dB | 90 dB | 80 dB |
| MMCX-to 0.1 in (2.54 mm) square pin adapter with sensor tip cable. | > 120 dB | 70 dB | 60 dB | 40 dB | 30 dB |
| MMCX-to 0.062 in (1.57 mm) square pin adapter with sensor tip cable. | > 120 dB | 70 dB | 60 dB | 40 dB | 30 dB |

Differential input voltage (Typical)

| | |
|----------|---------------------------|
| IVTIP1X | \pm 1 V (DC + Peak AC) |
| IVTIP5X | \pm 5 V (DC + Peak AC) |
| IVTIP10X | \pm 10 V (DC + Peak AC) |
| IVTIP25X | \pm 25 V (DC + Peak AC) |
| IVTIP50X | \pm 50 V (DC + Peak AC) |

Maximum non-destructive voltage (Typical)

| | |
|---------|--|
| IVTIP1X | 4.3 V _{pk} , 3 V _{RMS} |
| IVTIP5X | 21.5 V _{pk} , 12 V _{RMS} |

| | |
|----------|---|
| IVTIP10X | 43 V _{pk} , 16 V _{RMS} |
| IVTIP25X | 107.5 V _{pk} , 25 V _{RMS} |
| IVTIP50X | 200 V _{pk} , 35 V _{RMS} |

Differential input impedance (Typical)

| Sensor tip cable | Resistance | Capacitance |
|------------------|------------|-------------|
| IVTIP1X | 50 Ω | N.A. |
| IVTIP5X | 250 Ω | < 1 pF |
| IVTIP10X | 500 Ω | < 1 pF |
| IVTIP25X | 1.25 kΩ | < 1 pF |
| IVTIP50X | 2.5 kΩ | < 1 pF |

Common mode input impedance (Typical)

| | |
|--------------------------------|--|
| Input resistance | Galvanically isolated through the fiber optic connection |
| Input capacitance ¹ | < 2 pF |

Input offset range (Typical)

| | |
|----------|--------|
| IVTIP1X | ±2 V |
| IVTIP5X | ±10 V |
| IVTIP10X | ±20 V |
| IVTIP25X | ±50 V |
| IVTIP50X | ±100 V |

DC Gain accuracy ±3%

Propagation delay

| | |
|----------------------|-------------|
| 3 meter fiber cable | 35 ns ±5 ns |
| 10 meter fiber cable | 68 ns ±7 ns |

Laser certification

CLASS I LASER PRODUCT

This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.

¹ The capacitance between the sensor head and a reference plane. The sensor head is placed six inches (15.25 cm) above the reference plane.

Ordering information

Models

| | |
|---------|--|
| TIVM1 | Tektronix IsoVu 1 GHz Medium Voltage with 3 m cable |
| TIVM1L | Tektronix IsoVu 1 GHz Medium Voltage with 10 m cable |
| TIVM05 | Tektronix IsoVu 500 MHz Medium Voltage with 3 m cable |
| TIVM05L | Tektronix IsoVu 500 MHz Medium Voltage with 10 m cable |
| TIVM02 | Tektronix IsoVu 200 MHz Medium Voltage with 3 m cable |
| TIVM02L | Tektronix IsoVu 200 MHz Medium Voltage with 10 m cable |

TIVM series

Standard accessories

| | |
|-------------|---|
| 016-2108-xx | IsoVu product carrying case, soft case |
| 016-2110-xx | IsoVu accessories carrying case, soft case |
| 003-1946-xx | Solder aid for 0.062-inch (1.57 mm) pitch square pins (0.016 - 0.018-inch (0.4 - 0.46 mm) square pin installation tool) |
| IVTIP5X | 5X Sensor tip cable |
| IVTIP25X | 25X Sensor tip cable |
| 003-1947-xx | 5/16-inch SMA wrench/driver tool |
| 131-9717-xx | Probe tip adapter (blue), MMCX to 0.1-inch (2.54 mm) square pin (0.025-inch (0.635 mm) square pins) |
| 131-9677-xx | Probe tip adapter (white), MMCX to 0.062-inch (1.57 mm) square pin (0.016 - 0.018-inch (0.4 - 0.46 mm) square pins) |
| 020-3169-xx | DUT Interface pin kit with (qty. 20) 0.018-inch (0.46 mm) round solder-in pins |
| 352-1171-xx | Flexible tripod with quick release |
| 344-0693-xx | Flexible tripod feet, 3 each |
| 352-1170-xx | Probe tip tripod support with living hinge, 2 each |
| 071-3495-xx | User manual (English) |
| — | Certificate of traceable calibration |

Translated manuals can be downloaded as pdf files on your local Tektronix Web site.

Recommended accessories

| | |
|----------|----------------------|
| IVTIP1X | 1X Sensor tip cable |
| IVTIP10X | 10X Sensor tip cable |
| IVTIP50X | 50X Sensor tip cable |

Supported oscilloscopes

The measurement system can be used with the following Tektronix oscilloscopes. For oscilloscopes not included in this list, contact your local Tektronix representative.

- MDO3000 series
- MSO/DPO4000B series
- MDO4000B/C series
- MSO/DPO5000B series
- DPO7000C series

In addition to the above oscilloscopes, the measurement system can also be used with the following oscilloscopes with a TCA-VPI50 adapter.

- MSO/DPO70000C series
- MSO/DPO70000DX series
- DPO70000SX series

Options

Service options

| | |
|----------------|--|
| Opt. C3 | Calibration Service 3 Years |
| Opt. C5 | Calibration Service 5 Years |
| Opt. D1 | Calibration Data Report |
| Opt. D3 | Calibration Data Report 3 Years (with Opt. C3) |
| Opt. D5 | Calibration Data Report 5 Years (with Opt. C5) |
| Opt. G3 | Complete Care 3 Years (includes loaner, scheduled calibration, and more) |
| Opt. R3 | Repair Service 3 Years (including warranty) |
| Opt. R5 | Repair Service 5 Years (including warranty) |

Probes and accessories are not covered by the oscilloscope warranty and Service Offerings. Refer to the datasheet of each probe and accessory model for its unique warranty and calibration terms.

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For Further Information. Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tek.com.

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