Tektronix®

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

- 2,000 V 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 / ≤ 350 ps	500 MHz / ≤ 700 ps	200 MHz / ≤ 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 (÷1)	2X (÷2)
IVTIP5X, 5X Sensor tip cable	5X (÷5)	10X (÷10)
IVTIP10X, 10X Sensor tip cable	10X (÷10)	20X (÷20)
IVTIP25X, 25X Sensor tip cable	25X (÷25)	50X (÷50)
IVTIP50X, 50X Sensor tip cable	50X (÷50)	100X (÷100)

Common mode voltage   2 kVpk CAT I from DC - 1 GHz (1000 V, CAT II)

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	±1 V (DC + Peak AC)
IVTIP5X	±5 V (DC + Peak AC)
IVTIP10X	±10 V (DC + Peak AC)
IVTIP25X	±25 V (DC + Peak AC)
IVTIP50X	±50 V (DC + Peak AC)

Maximum non-destructive voltage (Typical)

IVTIP1X	4.3 Vpk, 3 V_{RMS}
IVTIP5X	21.5 Vpk, 12 V_{RMS}

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IVTIP10X	43 Vpk, 16 V_{RMS}
IVTIP25X	107.5 Vpk, 25 V_{RMS}
IVTIP50X	200 Vpk, 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.

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[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

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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.

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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