

SPOTLIGHT

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Bourns Announces New Additions to Product Palette

TISP4500H3

Single bidirectional overvoltage protector developed for transformer coupled xDSL applications **Page 2**

TISP7015, TISP7038

Low Voltage Triple Element TISP® products designed to protect T1/E1/E3 systems. **Page 3**

TISP43xxMM

ADSL & POTS modem protectors, specified to comply with international modem standards. **Page 4**

TISP8250

Versatile telecom protector, designed for use in a variety of applications including telephone handset/base station and SLIC protection in access or telecommunication center equipment **Page 5**

TISP40xxL1

15 V, 30 V & 40 V TISP® products to protect high-frequency digital telecom lines – now available in a 25 % smaller footprint SMA package **Page 6**

4B04B-524-RC

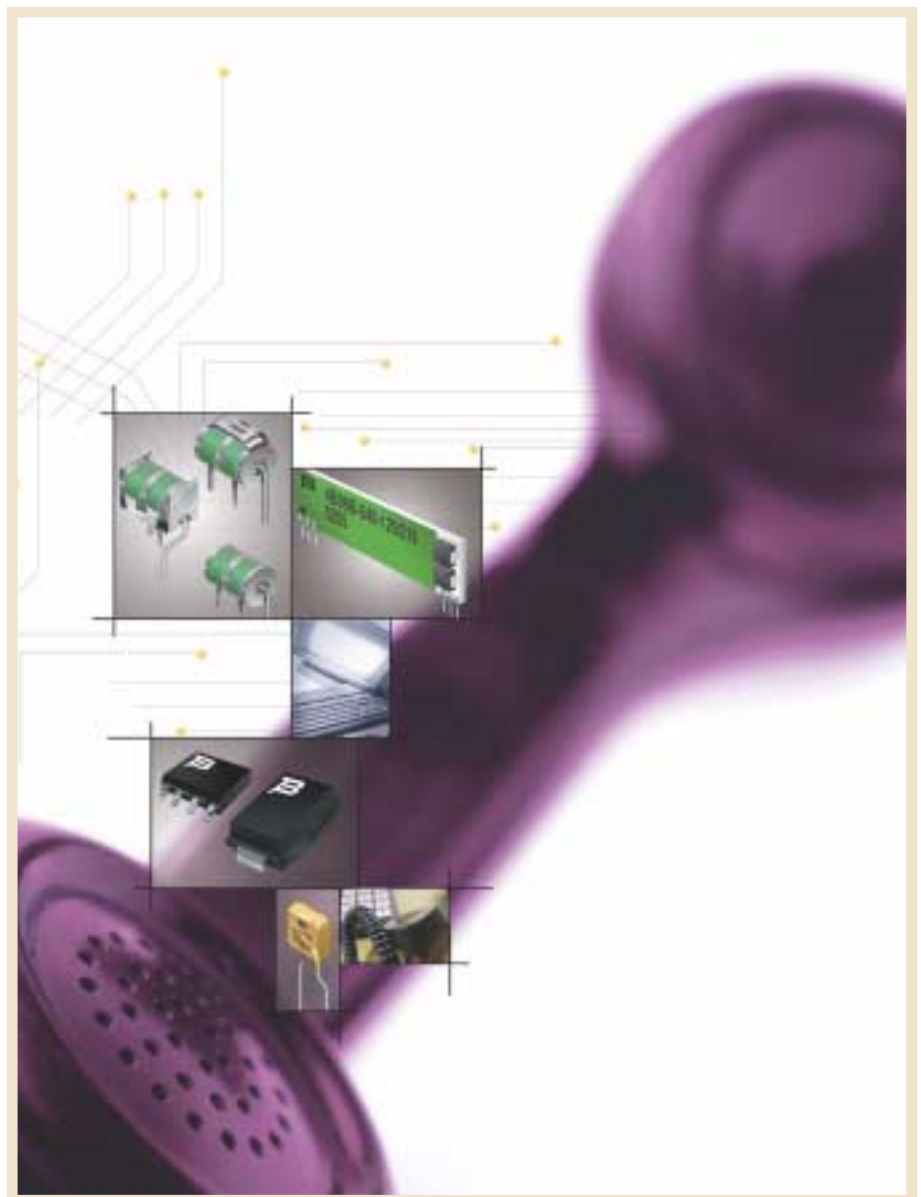
Line Protection Module offers Telcordia GR-1089-CORE compliant overcurrent protection for telecom line cards. **Page 6**

MF-R055/90, MF-R055/90U and MF-R075/90

90 V Multifuse® Positive Temperature Coefficient (PTC) Resettable Fuses, provide overcurrent protection in power passing taps and Network Interface Devices (NID) units. **Page 7**

MSP® Multi-Stage Protection Technology

Protects high-speed telecommunications circuits by combining the robustness of a heavy-duty Gas Discharge Tube (GDT), with the responsiveness of solid-state technology. **Page 8**





Single Bidirectional Overvoltage Protection For xDSL Applications

 **TISP®**
Thyristor Surge Protectors

Features

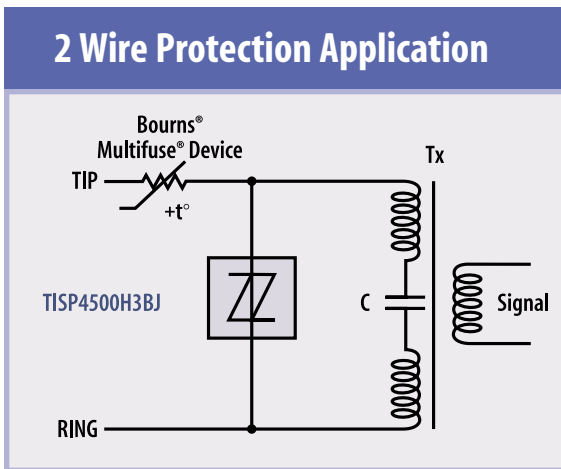
- 200 A 10/700 surge rating
- 350 V Working Voltage
- Enables ITU-T compliance
- Temperature range 0 to 70 °C

Our new *TISP4500H3BJ* is a single bidirectional overvoltage protector developed for transformer coupled xDSL applications. It can be used as a 2-wire (A-B) protector, or as one element in a 3-wire (A-B-C) protector scheme. The main advantage of the TISP4500H3BJ is non-conduction under ITU-T power contact tests[†] while still allowing the use of conventional capacitors for line-side interwinding coupling.

The 350 V 0 to 70 °C rated working voltage (V_{DRM}) means no conduction under the 230 V rms (325.2 Vpk) testing, and the 500 V protection voltage (V_{BO}) protects the interwinding capacitor C under lightning tests. Power induction tests will cause conduction of the TISP4500H3BJ. The current and duration of the ITU-T induction test conditions (600 V rms ~1 A/1 s and 450 V rms -1500 V rms up to ~7.5 A for up to 2 s) is sustainable by a TISP4500H3BJ, however, additional components may be required to fully comply with ITU-T recommendations.

The TISP4500H3BJ enables designers to develop protection schemes that fully comply with ITU-T enhanced level testing, while removing the need for unwanted signal attenuating components previously associated with current limiting under AC power contact testing. The protection scheme now only has to comprehend primary protector coordination (if used), and induction test current.

2 Wire Protection Application



The TISP4500H3BJ is rated for up to 200 A 10/700 and is able to provide protection under ITU-T recommendation K.21 enhanced test level (6 kV).

[†]ITU-T(2000) K.20/45/21 & K.44 (test circuits) Power Contact tests 2.3.1 & Power Induction tests 2.1.1/.2.

We invite you to request your free samples and datasheet with the prepaid card enclosed and visit Bourns at www.bourns.com.



Protecting T1/E1/E3 Systems with a Low Voltage Triple Element TISP® Protector

TISP®
Thyristor Surge Protectors

Features

- **Protection for signal, data and control lines**
 - xDSL, ISDN
 - T1/E1/E3
 - RS232 & RS485
- **Low capacitance**
 - TISP7015: 40 pF max
 - TISP7038: 30 pF max
- **Rated for International Surge Wave Shapes**

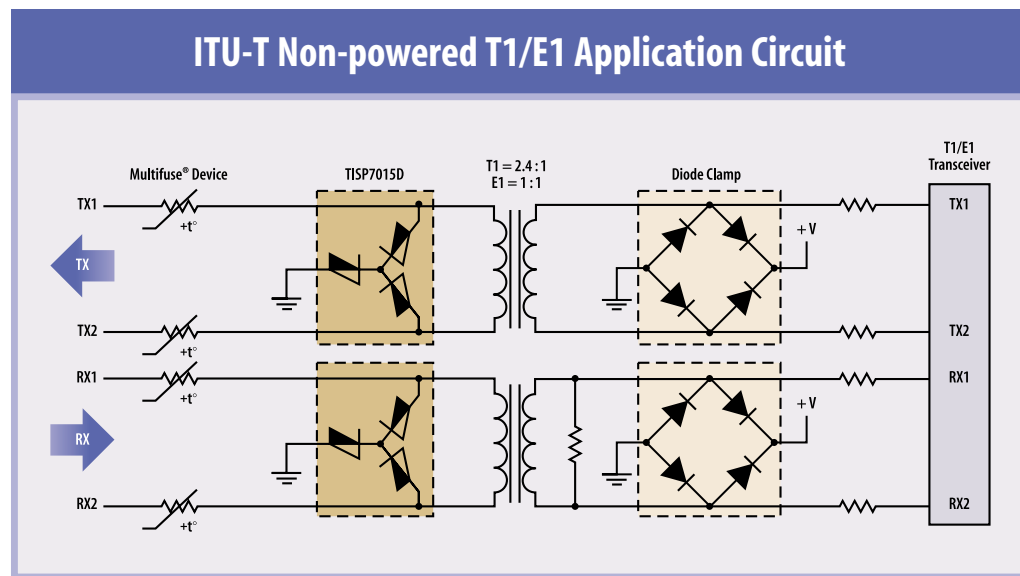
With high-speed data access systems gaining more importance in the modern world of telecommunications, we have developed two new triple element thyristor surge protectors ideal for T1/E1/E3, xDSL and high-speed data line protection. With working voltages of 8 V and 28 V and protection voltages of 15 V and 38 V respectively, these devices can protect against both transverse mode (Metallic) and common-mode (Longitudinal) surges. The TISP7015 and TISP7038 are guaranteed to withstand 40 A 10/700 surges applied to both Tip and Ring terminals simultaneously.

These devices also benefit from low off-state capacitance, making them ideal for use in low voltage high-speed transmission systems. This low capacitance reduces the overall equivalent capacitance on the data lines and the low protection voltage reduces the risk of transformer saturation. The TISP7015 guarantees 40 pF maximum at 0 V bias while the TISP7038 guarantees a maximum of 30 pF at 0 V bias.

Surge Ratings

Wave Shape	Standard	Rating
8/20	IEC 61000-4-5	150 A
10/700	ITU-T K.20/45/21	40 A
10/1000	GR-1089-CORE	30 A

ITU-T Non-powered T1/E1 Application Circuit



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Dedicated Protection For International Modem Design

TISP®
Thyristor Surge Protectors

Features

- **Specified to comply with international modem standards**

- ITU-T K.21 -10/700
- FCC Part 68 -Type A & B 10/560,9/720 and 10/160 surge requirements
- UL 1950/60950 & CSA 22.2 60950
- Telecordia GR-1089-CORE 2/10 and 10/1000 surge guarantees

- **Designed for use in POTS & ADSL Modems**

- **Available in SMB & 25 % smaller footprint SMA Packages**

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The design of modem protection has changed little in recent years, but with ever increasing pressure on manufacturers to reduce costs and equipment size (e.g. notebooks), it has become more difficult for modem protection to comply with international standards and safety requirements.

We have responded by introducing three brand-new devices, designed specifically to provide UL 1950/60950 and FCC Part 68 (now TIA/EIA-IS-968) compliance. Our new TISP43xxMMAJ/BJ are designed for all applicable modem standards and are available in both SMB and SMA packages.

Most modems are assembled using surface-mount technology, with protection components typically supplied in SMB packages. The TISP43xxMMAJ/BJ series is available in either the SMB or the 25% smaller footprint SMA packages, electrical specifications are identical for either package option.

This package choice allows for the migration of designs with updated PCBs to the smaller footprint alternative.

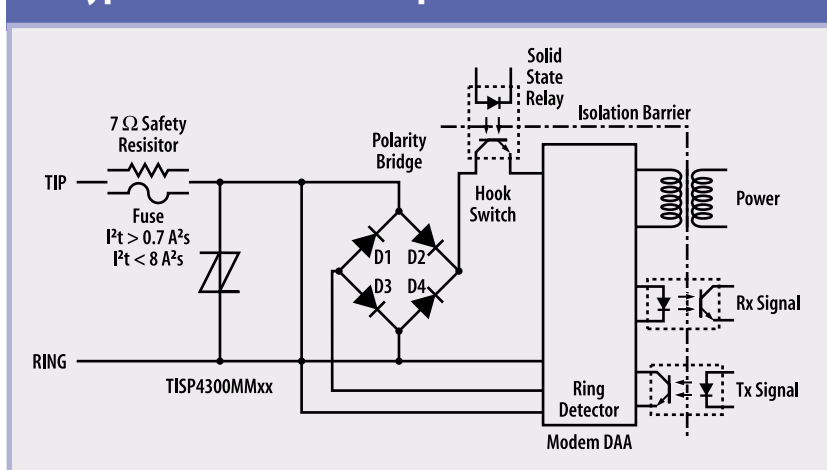
Device Number	Working Voltage	Protection Voltage	Application
	V_{DRM} V	$V_{(BO)}$ V	
TISP4300MMAJ/BJ	230	300	POTS Solid-State Relay Modems
TISP4350MMAJ/BJ	275	350	POTS Electro-mechanical Relay Modems
TISP4360MMAJ/BJ	290	360	ADSL Modems

To meet international standards for an international modem design, a 'superset' of standards tends to be used for approval. For example, the most stringent tests from the USA are FCC Part 68 lightning tests mixed with UL 60950 AC safety tests. Some modems are also supplied to Europe and therefore often incorporate ITU-T K.21.

A modem that floats with respect to ground (utilizing an isolation or safety barrier) will conduct no current during common mode FCC surge tests. So only the differential 800 V 10/560 test needs to be

considered. By utilizing a 7 Ω PTC thermistor or series resistance element compliant to UL 60950 AC requirements, any TISP43xxMMAJ/BJ will pass approval in a suitably designed system.

Typical FCC Part 68 Compliant Protection Circuit





TISP8250 - Gated Unidirectional Overvoltage & Overcurrent Protector

TISP®
Thyristor Surge Protectors

Features

- **Applications include**
 - Telephone handset/base station
 - SLIC protection
- **Programmable or fixed protection voltage**
- **Functional replacement for TPP25011**

Our new TISP8250 is a versatile telecommunications protector, designed for use in a variety of applications including: Telephone handset/base station and SLIC protection in Access or Telecommunication Center equipment.

This unidirectional protector is intended for use with diode bridge fed circuits, like those commonly employed in analog telephone handsets and DECT base stations, or in protection schemes where reverse biased conditions will not occur. The TISP8250 can be used as a fixed overvoltage protector having a "natural" maximum breakover voltage of 340 V - alternatively, when used with an external reference such as a zener diode, it can be made to operate as a gate triggered protector.

The TISP8250 can also be used as a current triggered protector. Such an application would use the TISP8250 as a conventional crowbar across the circuit to be protected. Triggering would be caused by a sense resistor in series with the circuit to be protected connected to the TISP8250 Gate and Cathode terminals. In this arrangement, the initial fault current flowing into the Circuit Under Protection (CUP) will cause sufficient voltage drop across the sense resistor to trigger the protector. The sense resistor value must allow for all normal CUP operating conditions, and yet cause the TISP8250 to trigger under fault conditions.

When triggered, the TISP8250 shunts the main fault current around the input circuit diverting the fault current away from the CUP which must be capable of handling the initial fault condition prior to protector triggering. Triggering resistor selection can be approximated as follows:

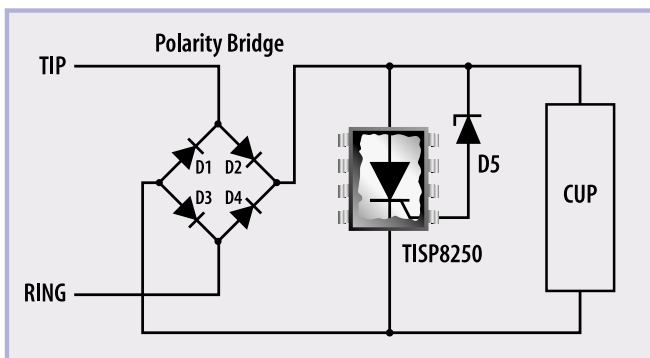
Triggering: $R_{(sense)} \approx V_{GK(MAX)} / (I_{cct(max)} - I_{GT(MAX)})$

Nominal operation: $R_{(sense)} \approx V_{GK(MIN)} / (I_{cct(nom)} - I_{GT(MAX)})$

For example: Maximum CUP current withstand 100 mA, TISP8250 $I_{GT(MAX)} = 40$ mA, $V_{GK(MAX)} = 1.2$ V. Therefore $R_{(sense)} \approx 1.2 / (0.1 - 0.04) \approx 20 \Omega$ and this corresponds approximately to a nominal operating current of $\approx V_{GT(MIN)} / R_{(sense)} \approx (0.6 / 20) \approx 0.03$ A (30 mA). For fixed voltage operation (no external trigger) the TISP8250 behaves like a conventional fixed-voltage protector. The breakover current ($I_{(BO)}$) 200 mA maximum @ 25 °C) and holding current (I_H) values make the TISP8250 suitable for the

protection of conventional POTS line equipment, when operated with associated fault current limiting devices such as Bourns® Multifuse® products and Bourns® Line Protection Modules.

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15 V, 30 V & 40 V TISP® Products To Protect High-Frequency Digital Telecom Lines

 **TISP®**
Thyristor Surge Protectors

Features

- **Low capacitance (18 pF)**
- **Applications include:**
 - T1/E1
 - U interface ISDN & Pairgain
 - S interface ISDN & HDSL
 - Home PNA
- **Space saving SMA package**
 - 25 % smaller footprint than existing SMB package
 - Supplied on reels of 5000 devices

We are proud to announce three low voltage TISP® telecom protectors, developed using our new low voltage Thyristor process, which allows us to produce devices with lower & more precisely controlled voltages than ever before. Each device provides 2-point protection and is typically used for the protection of transformer windings and low voltage electronics.

This new family of devices offers working voltages (V_{DRM}) as low as 8 V, together with a 15 V protection voltage ($V_{(BO)}$), making the TISP4015L1AJ/BJ ideally suited to T1/E1 applications. The family also offers higher working/protection voltage windows of 15/30 V and 25/40 V for higher voltage applications. They offer a 30 A 10/1000 lightning surge rating.



The SMA footprint is 25 % smaller than the standard SMB package.

Device	V_{DRM} V	$V_{(BO)}$ V	I_{TSP} 10/1000 A	C_{off} pF
TISP4015L1AJ/BJ	8	15	30	23
TISP4030L1AJ/BJ	15	30	30	22
TISP4040L1AJ/BJ	25	40	30	18

These devices feature ultra low capacitance that is guaranteed at all anticipated system levels, making them ideal for high data-rate digital applications. They also benefit from symmetrical capacitance between two quadrants of the thyristor structure, minimizing distortion for high data rates. We are currently the only manufacturer to specify both typical and maximum junction capacitance under bias and no-bias conditions making circuit design and system performance predictable.

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Bourns® Line Protection Modules

Bourns, Inc., a leading manufacturer of electronic components and integrated solutions, introduces a new part in its family of 4B series Line Protection Network products. Used in conjunction with Bourns' Thyristor Integrated Surge Protectors, TISPPBL3 and TISP61089B, the new product allows customers to use Bourns for both overvoltage and overcurrent protection for telecom line cards.

SLIC		Recommended Circuit Protection	
Manufacturer	Series	Overvoltage	Overcurrent
Ericsson	PBL 3 Series	TISPPBL3	Bourns 4B04B-524-400
Legerity™	ISLIC™ 79R241	TISP61089B	Bourns 4B04B-524-400
Infineon	PEB 4266		

Offering power line fault and lightning protection, the 4B04B-524-RC features an integral thermal fuse link with a matched pair of resistors designed to be TELCORDIA (formally BELLCORE) GR-1089-CORE compliant. With resistance values of 15 Ω - 60 Ω and a temperature range of -40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$, the products have an



90 V Multifuse® Positive Temperature Coefficient (PTC) Resettable Fuses in an HFC Network

Multifuse®
Resettable Fuses

Features

- Radial leaded device with V_{max} rating of 90 V
- Designed for overcurrent protection in power passing taps and NIDs
- Designed to aid compliance with article 830 in the 1999 National Electrical Code
- Models with hold currents of 550 mA and 750 mA at 23 °C
- Available coated / uncoated and kinked / straight leads

The Multifuse® product line is proud to introduce the new 90 V series that includes the MF-R055/90, MF-R055/90U and MF-R075/90, which have been specifically designed to provide overcurrent protection in broadband cable telephony equipment such as power passing taps and Network Interface Devices (NID) units.

The potential for power crosses or induced high voltages are very real so networks must provide adequate protection against such threats. Article 830 in the 1999 National Electrical Code, which deals with the network powered broadband equipment such as power passing taps, mentions that maximum power must be limited to 100 VA within 60 seconds because of the risk high currents can pose to the unknowing subscriber. The MF-R055/90 and the MF-R075/90 have been designed to act as such current limiters.

A resettable polymer PTC fuse has some very obvious benefits in the area of cable telephony that will help protect devices from fault conditions. The fact that a PTC automatically resets itself once the fault clears eliminates the costly and timely service calls of service technicians. The MF-R055/90 with its hold current of 550 mA at room temperature, 350 mA at 60 °C and maximum voltage rating of 90 V, suits power passing taps designed to supply single family homes. The MF-R075/90 with its hold current of 750 mA at room temperature, 480 mA at 60 °C and maximum voltage rating of 90 V suits power passing taps designed to supply multi-dwelling units.

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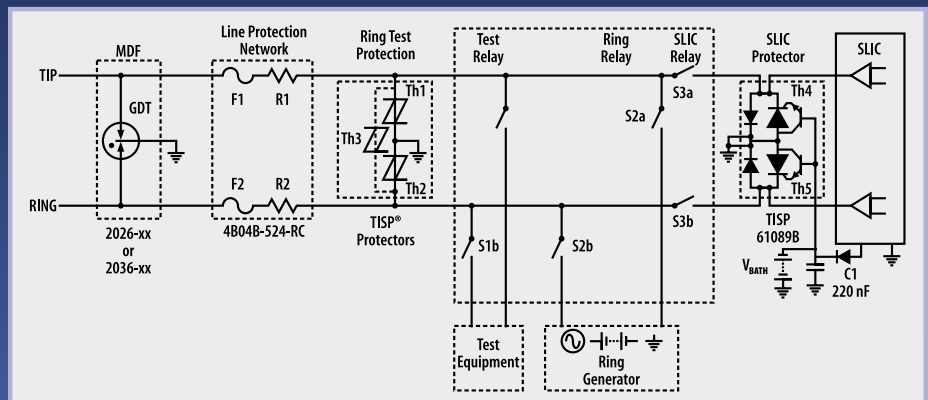
Model	V max V	I max A	Ihold	Itrip	Initial Resistance Values		One hour post trip resistance standard trip	Maximum time to trip		Tripped power dissipation
			A @ 23 °C	A @ 23 °C	Ω @ 23 °C	Ω @ 23 °C	A @ 23 °C	s @ 23 °C	W @ 23 °C	
			Hold	Trip	Min.	Max.	Min.	Max.		
MF-R055/90	90	10	0.55	1.1	0.45	0.9	2.0	1.6	60	2.0
MF-R055/90U	90	10	0.55	1.1	0.45	0.9	2.0	1.6	28	2.0
MF-R075/90	90	10	0.75	1.5	0.37	0.75	1.65	2.0	60	2.5

LPM
Line Protection Modules

Open Frame SIP body style conforming to UL 94V-0 standards, and can be used for secondary circuit protection in central office and remote equipment.

Availability: Sample quantities are available and are offered for evaluation.

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Bourns® Multi-Stage Protection Technology

 **GDT**
Gas Discharge Tubes

Features

- **6th Generation Gas Discharge Tube, GDT**
 - 2000 A 10/250 impulse capability
 - No failures during life tests
 - UL 497 listed for back-up gapless use
- **Metal Oxide Varistors**
 - Eliminates leading cause of premature GDT failure
 - Better impulse limiting than GDTs alone
- **Patented Switch-Grade Fail-Short**
 - Reduces risk of thermal runaway
 - Maximum fire safety protection

We invite you to request your free datasheet with the prepaid card enclosed and visit Bourns at www.bourns.com.

Bourns® MSP® Assembly is designed to meet the challenges of tomorrow's high-speed telecommunications circuits by combining the robustness of a heavy-duty Gas Discharge Tube, GDT, with the responsiveness of solid-state technology.

As wireline telecom networks become shorter in length, modern electronic equipment is more susceptible to higher energy surges over progressively smaller pair counts. MSP® (Multi-Stage Protection) devices use patented technology to provide the highest surge carrying levels available, while minimizing bandwidth limiting capacitance. Service life is extended by the elimination of air back up gaps, while precision matched Metal Oxide Varistors (MOVs) ensure optimum safety and consistently low clamping levels.

MSP® technology exceeds all industry standards for Impulse-Life and AC Life. Field deployments throughout the years have proven spectacularly reliable. Recent uses with VDSL (12 MHz bandwidth with 50 Mbps data rates) have demonstrated enhanced system performance and reach parameters attesting to the technology's "future-proofing" electronic performance.

High-speed data is virtually unimpeded due to its low insertion loss and behaves transparently to the information flow due to its high return loss. In a recent deployment of a fiber optic-copper/LAN system with VOD (Video-On Demand), streaming video at a rate of 108 Mbps was sent through the copper loop flawlessly to the customer premises without error.

MSP® products meet or exceed requirements put forth by agencies such as Underwriter's Laboratories, Telcordia (formerly Bellcore), CSA, and RUS.

MSP® technology is featured in the Bourns® circuit protection product line, and primary telephony products including 5-pin CO (Central Office) protectors and NID (Network Interface Devices) protectors.



Reliable Electronic Solutions

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