

# TISP9110LDM Overtoltage Protector

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## Absolute Maximum Ratings, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Rating	Symbol	Value	Unit
Repetitive peak off-state voltage $V_{G1(\text{Line})} = 0, V_{G2} \geq +5\text{ V}$ $V_{G2(\text{Line})} = 0, V_{G1} \geq -5\text{ V}$	$V_{\text{DRM}}$	-120 +120	V
Non-repetitive peak impulse current (see Notes 1, 2, 3 and 4) 2/10 $\mu\text{s}$ (Telcordia GR-1089-CORE) 5/310 $\mu\text{s}$ (ITU-T K.20, K.21 & K.45, K.44 open-circuit voltage wave shape 10/700 $\mu\text{s}$ ) 10/1000 $\mu\text{s}$ (Telcordia GR-1089-CORE)	$I_{\text{PPSM}}$	$\pm 100$ $\pm 45$ $\pm 30$	A
Non-repetitive peak on-state current, 50 Hz / 60 Hz (see Notes 1, 2, 3 and 5) 0.2 s 1 s 900 s	$I_{\text{TSM}}$	9.0 5.0 1.7	A
Maximum negative battery supply voltage	$V_{G1M}$	-110	V
Maximum positive battery supply voltage	$V_{G2M}$	+110	V
Maximum differential battery supply voltage	$\Delta V_{(\text{BAT})M}$	220	V
Junction temperature	$T_J$	-40 to +150	$^\circ\text{C}$
Storage temperature range	$T_{\text{stg}}$	-65 to +150	$^\circ\text{C}$

- NOTES: 1. Initially the device must be in thermal equilibrium with  $T_J = 25\text{ }^\circ\text{C}$ . The surge may be repeated after the device returns to its initial conditions.
2. The rated current values may be applied to either of the Line to Ground terminal pairs. Additionally, both terminal pairs may have their rated current values applied simultaneously (in this case the Ground terminal current will be twice the rated current value of a single terminal pair).
3. Rated currents only apply if pins 6 & 7 (Ground) are connected together.
4. Applies for the following bias conditions:  $V_{G1} = -20\text{ V}$  to  $-110\text{ V}$ ,  $V_{G2} = 0\text{ V}$  to  $+110\text{ V}$ .
5. EIA/JESD51-2 environment and EIA/JESD51-7 high effective thermal conductivity test board (multi-layer) connected with 0.6 mm printed wiring track widths.

## Electrical Characteristics for any Section, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
$I_D$ Off-state current	$V_D = V_{\text{DRM}}, V_{G1(\text{Line})} = 0, V_{G2} \geq +5\text{ V}$ $V_D = V_{\text{DRM}}, V_{G2(\text{Line})} = 0, V_{G1} \geq -5\text{ V}$			-5 -50 +5 +50	$\mu\text{A}$
$I_{G1(\text{Line})}$ Negative-gate leakage current	$V_{G1(\text{Line})} = -220\text{ V}$			-5	$\mu\text{A}$
$I_{G2(\text{Line})}$ Positive-gate leakage current	$V_{G2(\text{Line})} = +220\text{ V}$			+5	$\mu\text{A}$
$V_{G1L(\text{BO})}$ Gate - Line impulse breakover voltage	$V_{G1} = -100\text{ V}, I_T = -100\text{ A}$ (see Note 6) $V_{G1} = -100\text{ V}, I_T = -30\text{ A}$			-15 -11	V
$V_{G2L(\text{BO})}$ Gate - Line impulse breakover voltage	$V_{G2} = +100\text{ V}, I_T = +100\text{ A}$ (see Note 6) $V_{G2} = +100\text{ V}, I_T = +30\text{ A}$			+15 +11	V
$I_{H^-}$ Negative holding current	$V_{G1} = -60\text{ V}, I_T = -1\text{ A}, di/dt = 1\text{ A/ms}$	-150			mA
$I_{G1T}$ Negative-gate trigger current	$I_T = -5\text{ A}, t_{p(g)} \geq 20\text{ } \mu\text{s}, V_{G1} = -60\text{ V}$			+5	mA
$I_{G2T}$ Positive-gate trigger current	$I_T = 5\text{ A}, t_{p(g)} \geq 20\text{ } \mu\text{s}, V_{G2} = 60\text{ V}$			-5	mA
$C_O$ Line - Ground off-state capacitance	$f = 1\text{ MHz}, V_D = -3\text{ V}, G1 \text{ \& } G2$ open circuit		32		pF

NOTE: 6. Voltage measurements should be made with an oscilloscope with limited bandwidth (20 MHz) to avoid high frequency noise.

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# TISP9110LDM Overvoltage Protector

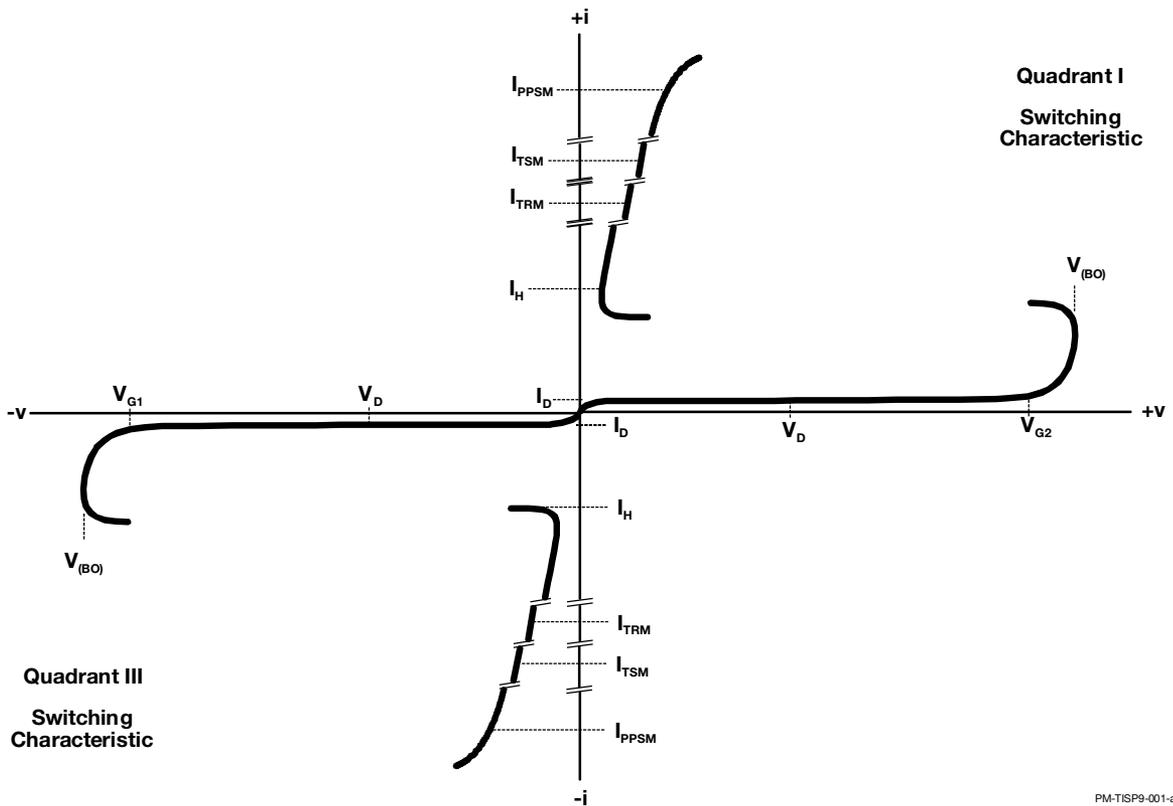
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## Thermal Characteristics, $T_A = 25\text{ }^\circ\text{C}$ (Unless Otherwise Noted)

Parameter	Test Conditions	Min	Typ	Max	Unit
$R_{\theta JA}$ Junction to ambient thermal resistance	EIA/JESD51-7 PCB, EIA/JESD51-2 Environment, $P_{TOT} = 4\text{ W}$ (See Note 7)		55		$^\circ\text{C/W}$

NOTE 7. EIA/JESD51-7 high effective thermal conductivity test board (multi-layer) connected with 0.6 mm printed wiring track widths.

## Parameter Measurement Information



**Figure 1. Voltage-Current Characteristic**  
Unless Otherwise Noted, All Voltages are Referenced to the Ground Terminal

PM-TISP9-001-a

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## Typical Characteristics

### OFF-STATE CAPACITANCE vs OFF-STATE VOLTAGE

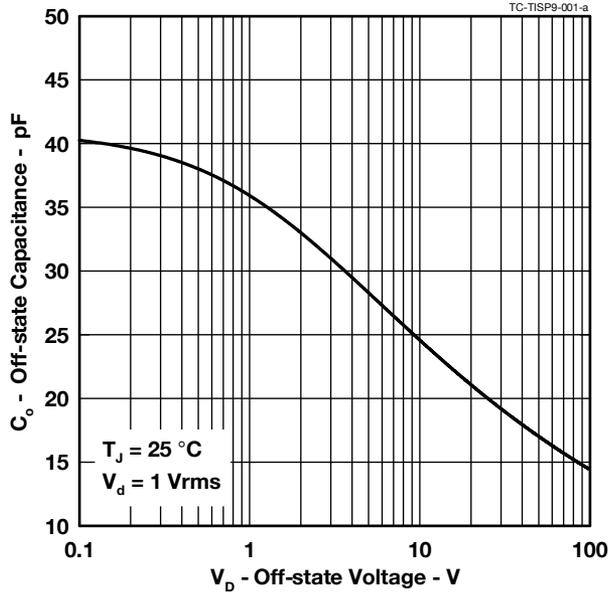


Figure 2.

## Thermal Information

### NON-REPETITIVE PEAK ON-STATE CURRENT vs CURRENT DURATION

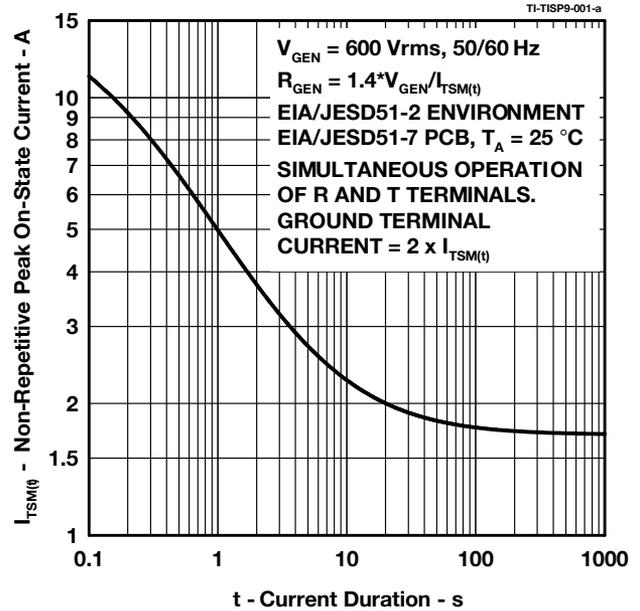


Figure 3.

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## APPLICATIONS INFORMATION

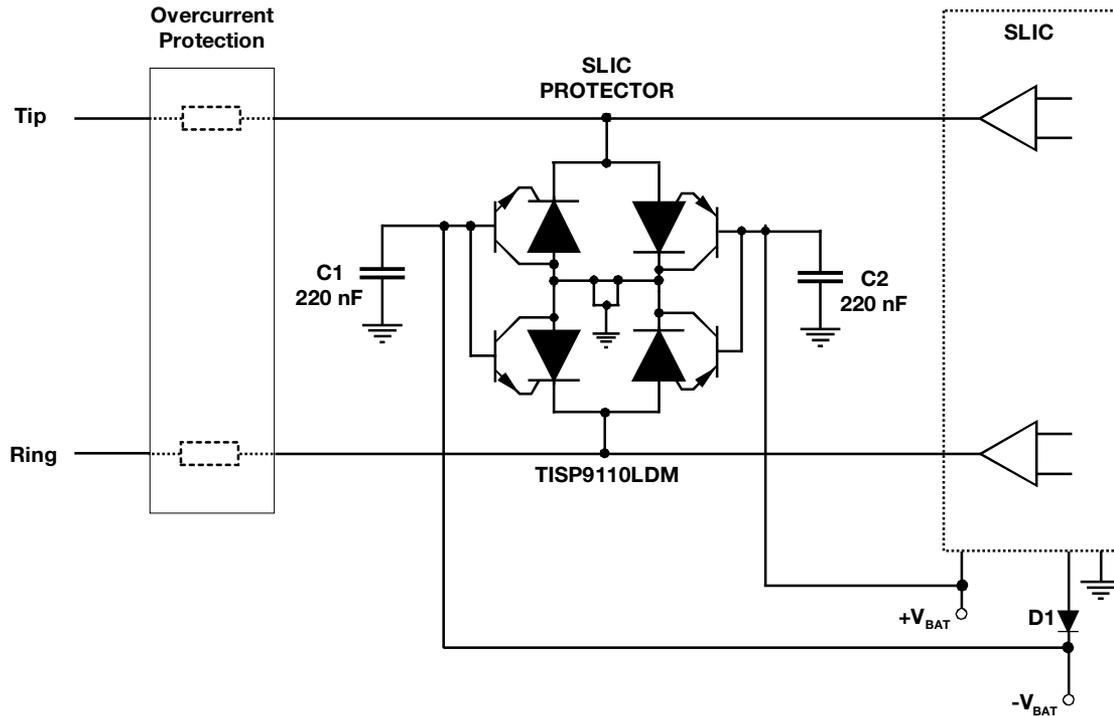


Figure 4. Typical Application Diagram

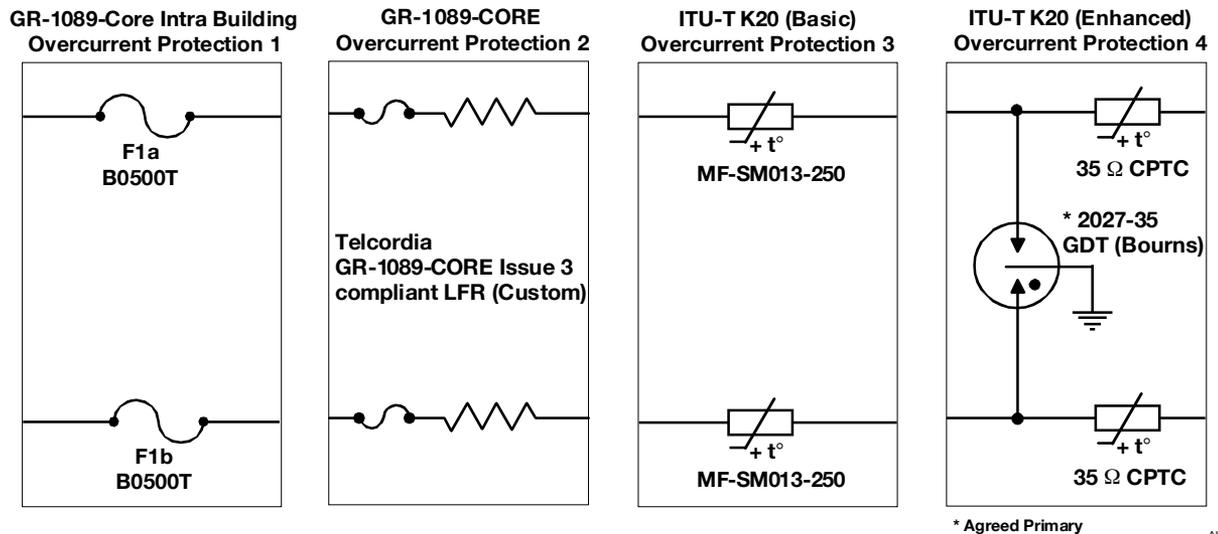


Figure 5. Typical Overcurrent Protection

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