Overvoltage Protection Components for AC Power Lines

BOURNS®

	MOV	EdgMOV™	Discrete GDT+MOV	GMOV™	IsoMOV™	PTVS
Surge Performance (using typical size up to 20 mm)	6.5 kA	12 kA	6.5 kA	10 kA	15 kA	20 kA
Technology	Varistor	Varistor	Varistor + GDT	Varistor + GDT	Varistor + GDT	Semiconductor
Behavior	Clamping voltage increases with current	Clamping voltage increases with current	Crowbar then clamp; increases with current	Crowbar then clamp; increases with current	Crowbar then clamp; increases with current	Low clamping voltage @ I_{PP}
Modes of Protection	L-L L-N	L-L L-N	L-L L-N L-G N-G	L-L L-N L-G N-G	L-L L-N L-G N-G	L-L L-N
Maximum Continuous Operating Voltage (MCOV)	1100 V_{RMS}	550 V_{RMS}	4500 V_{RMS} GDT (6 kV DC) + MOV (320 V_{RMS})	320 V_{RMS}	555 V_{RMS}	320 V_{RMS}
Pros	• Low cost and widespread availability	• Lower clamping voltage vs. MOV • Smaller diameter vs. comparable MOV	• Extended life due to minimal leakage current and zero voltage across the varistor • High TOV withstand	• Extended life due to minimal leakage current and zero voltage across the varistor • MOV drop-in replacement • Space-saving hybrid component design • Pre-match voltage for GDT and MOV • High TOV withstand	• Extended life due to minimal leakage current and zero voltage across the varistor • MOV drop-in replacement • Integrated EdgMOV™ technology provides lower clamping voltage vs. GMOV™ • High TOV withstand • Using EdgMOV™ technology	• Extremely low clamping voltage for enhanced protection • Very High Reliability; no degradation when surged below maximum rating
Cons	• Degradation caused by bias voltage, leakage current and temperature • Life-tested at 15 I_{NOM} operations	• Degrade over time due to bias voltage, leakage current and temperature • Life-tested at 15 I_{NOM} operations	• High initial voltage spike (V_{fp}) • Slightly lower cost than GMOV™ • Life-tested at 15 I_{NOM} operations • Larger PCB space requirements • Weakest link is the MOV	• High initial voltage spike (V_{fp}) • Slightly higher cost than MOV or IsoMOV™ • Life-tested at 15 I_{NOM} operations	• High initial voltage spike (V_{fp}) • Slightly higher cost than discrete MOV + GDT • Life-tested at 15 I_{NOM} operations	• Higher purchase cost • Larger PCB space requirements
Design Considerations	• Maximum Surge Current • Maximum Clamping Voltage	• Maximum Surge Current • Maximum Clamping Voltage	• V_{fp} tolerance • Maximum Surge Current • Maximum Clamping Voltage	• V_{fp} tolerance • Maximum Surge Current • Maximum Clamping Voltage	• V_{fp} tolerance • Maximum Surge Current • Maximum Clamping Voltage	• Maximum Surge Current • Maximum Clamping Voltage
Leakage Current	µA	µA	pA	< 1 µA	< 10 µA	< 10 µA
Let-through Voltage (During Surge)	⚡⚡⚡	⚡⚡	⚡⚡	⚡⚡	⚡⚡	⚡
Price	$	$	$$	$$	$$	$$$