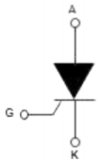
$I_{T(AV)}$	1 A
V_{DRM}/V_{RRM}	1000 V
I_{GT}	120 μA
T_J	-40°C to +110°C

LCRW10H
High surge voltage 1.8A SCR

Features

- On-state rms current, 1.8A
- Repetitive peak off-state voltage, 1000V
- Non-repetitive direct surge peak off-state voltage, 1500V
- Non-repetitive reverse surge peak off-state voltage, 1000V
- Triggering gate current, 100μA
- High off-state immunity: 200V/μs



Applications

- GFCI (Ground Fault Circuit Interrupter)
- AFCI (Arc Fault Circuit Interrupter)
- RCD (Residual Current Device)
- RCBO (Residual Current circuit Breaker with Overload protection)
- AFDD (Arc Fault Detection Device)

Description

Thanks to highly sensitive triggering levels, the LCRW10H series is suitable for circuit breaker applications where the available gate current is limited.

The 1500V direct surge voltage capability of the LCRW10H enables high robustness of the whole circuit breaker. The low leakage current of the LCRW10H reduces power consumption over the entire lifetime of the circuit breaker. The high off-state immunity (200V/μs) insures the non tripping of the breaker in case of electrical fast transient (EFT) on the mains.

The LCRW10H is available in through-hole TO-92 package with GAK and KGA pinout and in SMBflat-3L package.

Absolute ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state rms current (180° conduction angle)	TO-92	T_l = 53 °C	1.8	A
		SMBflat-3L	T_c = 109 °C		
$IT_{(AV)}$	Average on-state current (180° conduction angle)	TO-92	T_l = 53 °C	1	A
		SMBflat-3L	T_c = 109 °C		
I_{TSM}	Non repetitive surge peak on-state current	t_p = 8.3 ms	$T_{j\ initial}$ = 25 °C	22	A
		t_p = 10 ms		20	
	1st step: one surge every 5 seconds, 25 surges 2nd step: one surge every 5 seconds, 25 surges	t_p = 10 ms	T_{amb} = 90 °C	25 times 12 A 25 times 16 A	
I^2t	I^2t Value for fusing	t_p = 10 ms, 25 °C		2	A^2s
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, t_r ≤ 100 ns	F = 50 Hz, 125 °C		100	A/µs
	Non repetitive critical current rate of rise at break-over, see Figure 17, V_D > V_{DSm}			200	
V_{DRM}, V_{RRM}	Repetitive peak off-state AC voltage, R = 220 Ω		T = 125 °C	1000	V
V_{DSm}	Non-repetitive direct surge peak off-state voltage, R_{GK} = 220 Ω	t_p = 10 ms	T_j = 25 °C	1500	V
V_{RSM}	Non-repetitive reverse surge peak off-state voltage, R_{GK} = 220 Ω	t_p = 10 ms	T_j = 25 °C	1000	V
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	1.2	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	0.2	W
T_{stg}	Storage junction temperature range			- 40 to + 150	°C
T_j	Operating junction temperature range			- 40 to + 110	

Electrical characteristics

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 140Ω	T_j = 25 °C	Min.	1	µA
			Max.	120	
V_{GT}			Max.	0.8	V
V_{GD}	V_D = V_{DRM}, R_L = 33 kΩ, R_{GK} = 220 Ω	T_j = 125 °C	Min.	0.1	V
V_{RG}	I_{RG} = 2 mA	T_j = 25 °C	Min.	7.5	V
I_H	I_T = 50 mA, R_{GK} = 220 Ω	T_j = 25 °C	Max.	12	mA
I_L	I_G = 5 mA, R_{GK} = 220 Ω	T_j = 25 °C	Max.	12	mA
dV/dt	V_D = 67% V_{DRM}, R_{GK} = 220 Ω	T_j = 125 °C	Min.	200	V/µs

Static electrical characteristics

Symbol	Test conditions			Value	Unit
V_{TM}	I_{TM} = 2.5 A, t_p = 380 µs	T_j = 25 °C	Max.	1.35	V
V_{T0}	Threshold voltage	T_j = 125 °C	Max.	0.95	V
R_D	Dynamic resistance	T_j = 125 °C	Max.	220	mΩ
I_{DRM} I_{RRM}	$V_D = V_{DRM} / V_{RRM}$, R_{GK} = 220 Ω	T_j = 25 °C	Max.	1	µA
		T_j = 125 °C		100	µA

Thermal resistance

Symbol	Parameter			Value	Unit
$R_{th(j-l)}$	Junction to leads (DC)		TO-92	65	°C/W
$R_{th(j-a)}$			TO-92	160	
	Junction to ambient (DC)	S = 5 cm²	SMBflat-3L	75	
$R_{th(j-c)}$	Junction to case (DC)		SMBflat-3L	14	

Figure 1. Maximum average power dissipation versus average on-state current

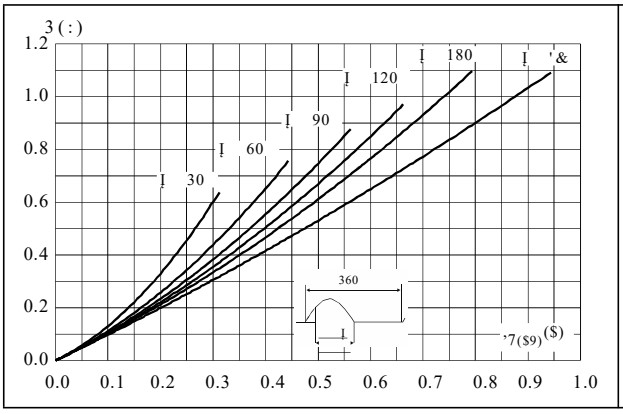


Figure 2. Average and DC on-state current versus lead temperature (TO-92)

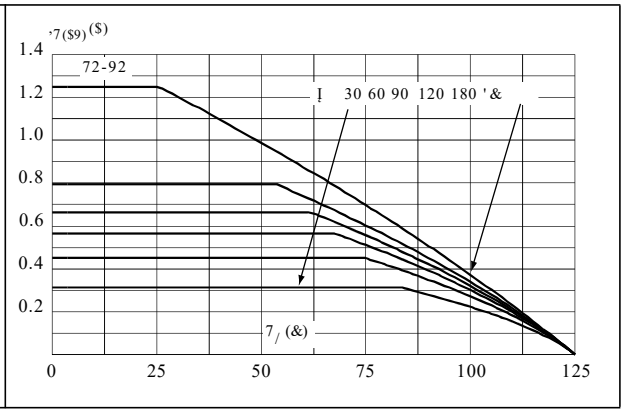


Figure 3. Average and DC on-state current versus case temperature (SMBflat-3L)

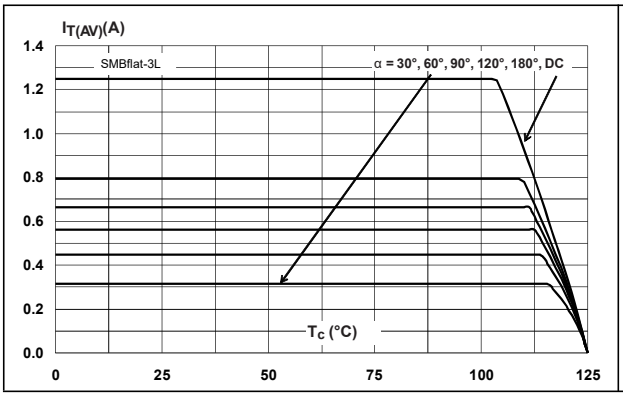


Figure 4. Average and DC on-state current versus ambient temperature

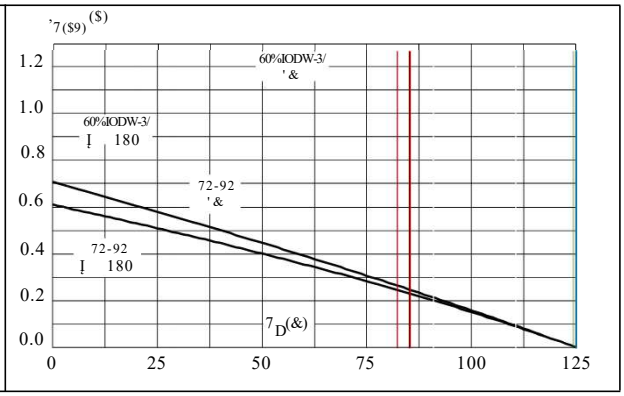


Figure 5. Relative variation of thermal impedance junction to ambient versus pulse duration

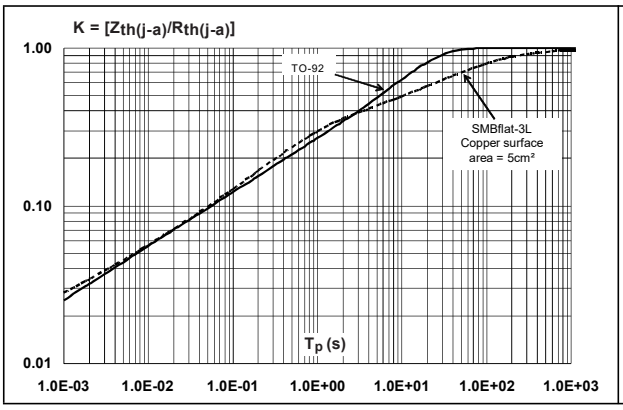


Figure 6. Typical thermal resistance junction to ambient versus copper surface under anode (epoxy FR4, Cu_{th} = 35 µm)

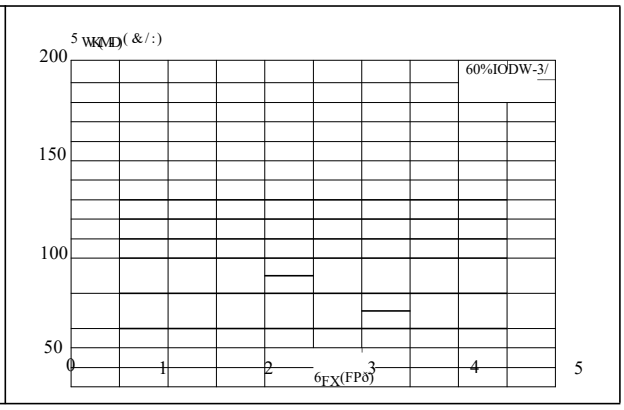


Figure 7. Relative variation of gate trigger current and trigger voltage versus junction temperature (typical values)

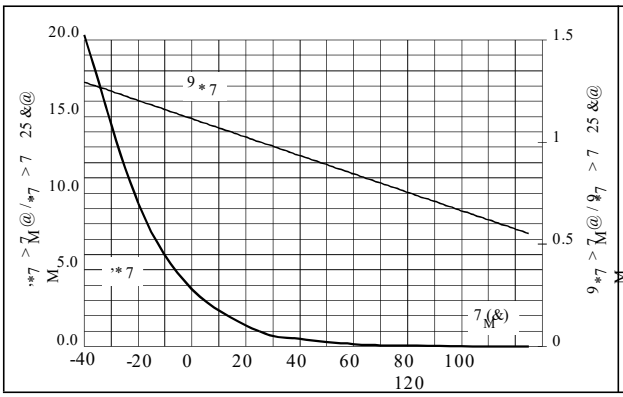


Figure 8. Relative variation of latching and holding current versus junction temperature (typical values)

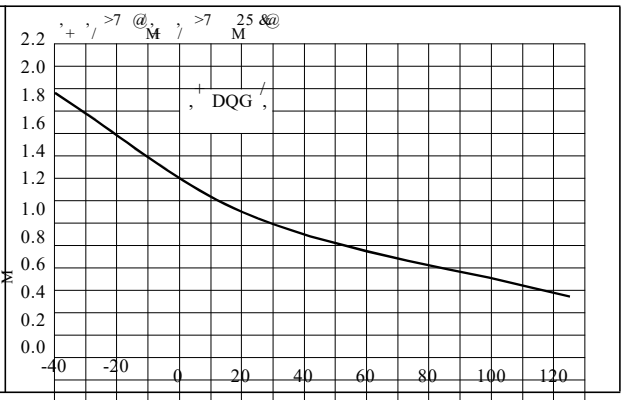


Figure 9. Relative variation of holding current versus gate-cathode resistance (typical values)

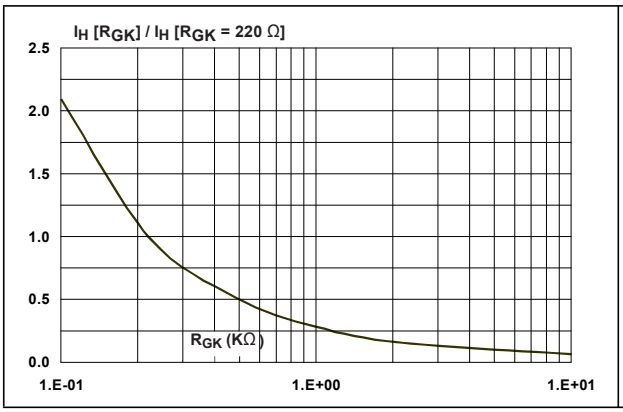


Figure 10. Relative variation of dV/dt immunity versus junction temperature (typical values)

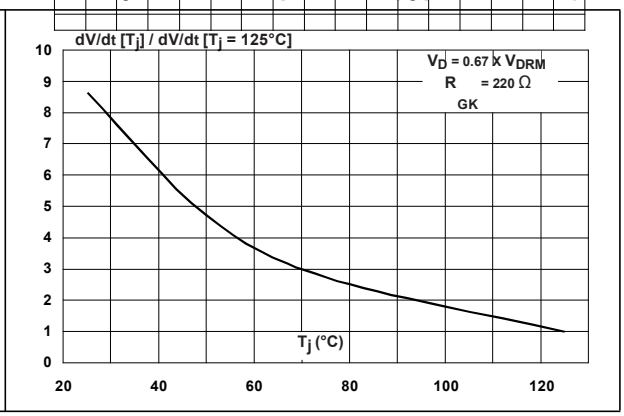


Figure 11. Relative variation of dV/dt immunity versus gate-cathode resistance (typical values)

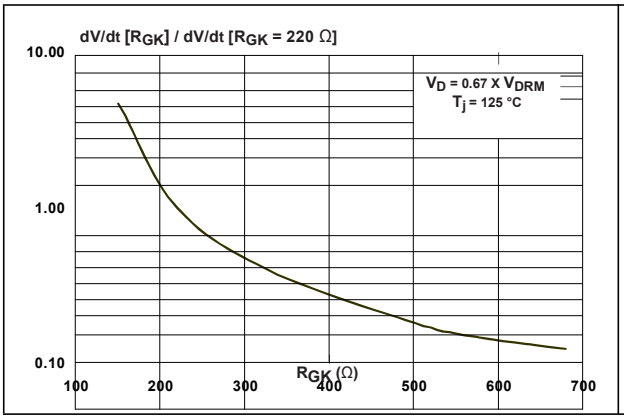


Figure 12. Relative variation of dV/dt immunity versus gate-cathode capacitor (typical values)

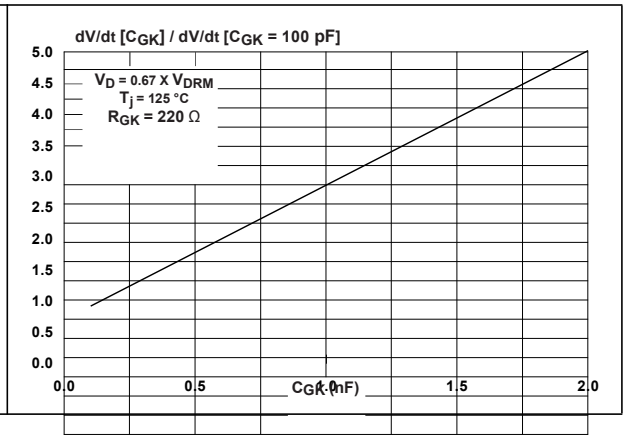


Figure 13. On-state characteristics (maximum values)

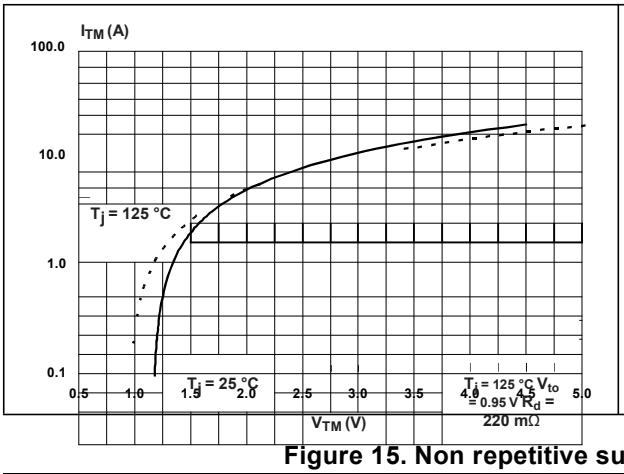


Figure 14. Surge peak on-state current versus number of cycles

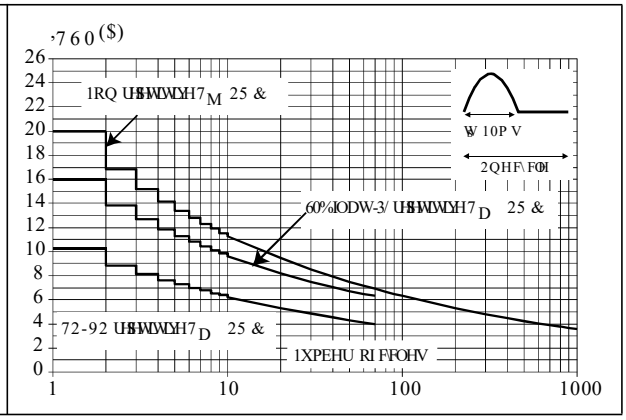


Figure 15. Non repetitive surge peak on-state current