Silicon Surge Voltage Suppressor

5SSA ..R Series

Doc. No. 5SYA 1030-01 Nov.95

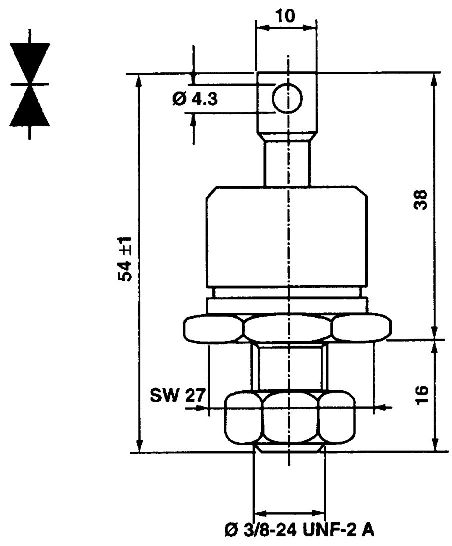
Features

The 5SSA silicon surge voltage suppressor consists of a diffused pnp-Si-wafer mounted with pressure contact in a hermetically sealed metal-ceramic-package.
5SSA silicon surge voltage suppressors are best suited to protect power thyristors against small and medium power surges (e.g. 200 kW over 10 μs). They allow the use of thyristors with lower voltage capability and much smaller snubber circuits.

Applications are e.g.:

Traction, HVDC transmission, generator excitation, transmitter power supply, high power motor controls.

Type and ordering number	V_R [V]
5SSA 50R0500	500 ± 60
5SSA 50R0600	600 ± 60
5SSA 38R0700	700 ± 60
5SSA 38R0800	800 ± 60
5SSA 30R0900	900 ± 60
5SSA 30R1000	1000 ± 60
5SSA 26R1100	1100 ± 60
5SSA 26R1200	1200 ± 60
5SSA 23R1300	1300 ± 60
5SSA 23R1400	1400 ± 60
5SSA 20R1500	1500 ± 60
5SSA 20R1600	1600 ± 60



Dimensions in mm Weight: 0.070 kg

Type and ordering number	V_R	Thyristor V_{DRM} V_{RRM}	I_{RM} [A]				P_{RAV}
	[V]	[V]	1 x 10µs	1 x 100µs	1 x 1ms	1 x 10ms	[W]
5SSA 50R0500 5SSA 50R0600	500 ± 60 600 ± 60	600 700	500	135	33	7.5	30
5SSA 38R0700 5SSA 38R0800	700 ± 60 800 ± 60	800 900	380	100	25	4.5	30
5SSA 30R0900 5SSA 30R1000	900 ± 60 1000 ± 60	1000 1100	300	80	21	4	30
5SSA 26R1100 5SSA 26R1200	1100 ± 60 1200 ± 60	1200 1300	260	67	18	3.6	30
5SSA 23R1300 5SSA 23R1400	1300 ± 60 1400 ± 60	1400 1500	230	58	15	3.4	30
5SSA 20R1500 5SSA 20R1600	1500 ± 60 1600 ± 60	1600 1700	200	50	13	3	30

V_R
Symmetrical avalanche voltage at sin $\hat{I}_A$ = 20 A, t_p = 10 µs, T_{vj} = 60 °C.

I_{RM}
Max. avalanche current for a single sine half wave pulse.

P_{RAV}
Admissible continuous losses at $R_{thCA} \leq$ 1 K/W, $T_A \leq$ 60 °C.
Single side cooling

T_{vj}

The initial virtual junction temperature is 60 °C.

Thermal resistance junction-heatsink: R_{thJS} = 0.6 K/W.

Temperature coefficent of the avalanche voltage V_R:+ 0.11 % per degree C:

$V_R (T) = V_{RO} [1 + 1.1 * 10^{-3} (T - 60 °C)]$.

V_R (60 °C) = V_{RO}; V_R (25 °C) = 0.93 * V_{RO}; V_R (125 °C) = 1.07 * V_{RO}.

The blocking current I_R is proportional to $e^{[T(°C)/20°C]}$.
I_R (0.8 * V_R; T_{vj} = 45 °C): 50 % - Value: < 4 µA; Arithm. meanvalue: < 8 µA.

Junction capacitance at zero voltage (T_{vj} = 60 °C): 1100 pF.

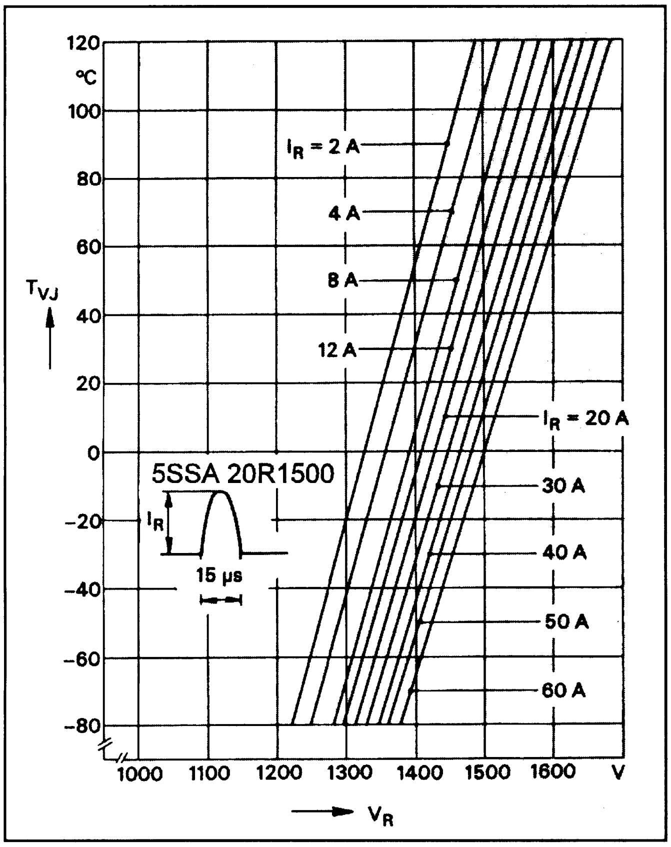
Storage temperature/max. junction temperature -40...125 °C/125 °C .

Admissible acceleration (vibration): 10 g

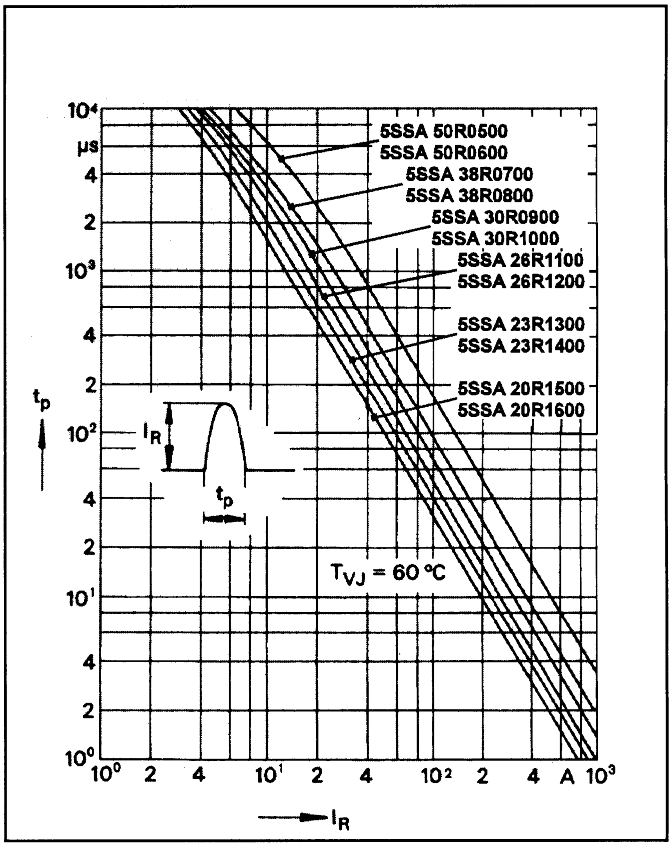
Mounting torque: 10 Nm ± 10 %.

Advantages of the 5SSA ..R Surge Voltage Suppressors:

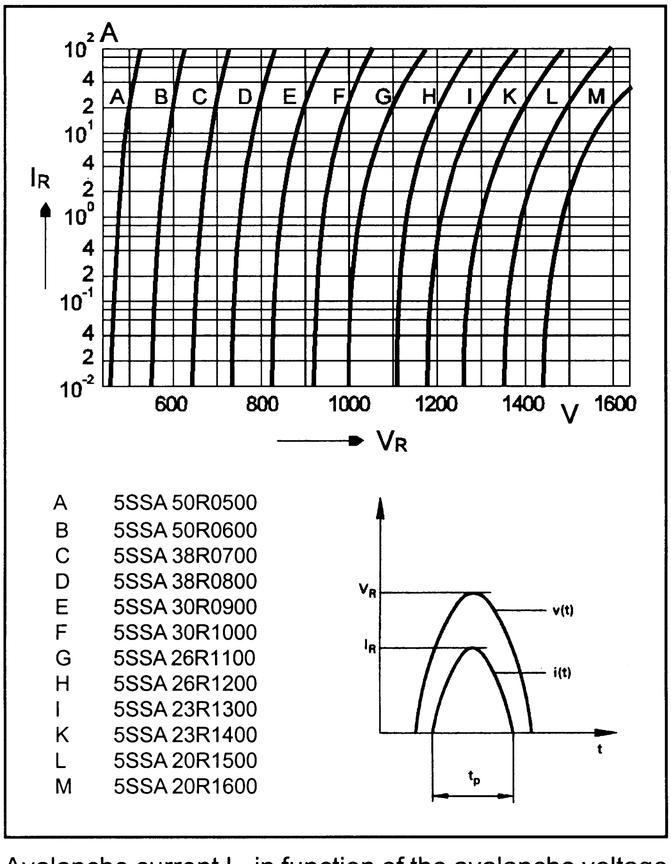
- Sharp avalanche-knee: small safety factor (≤ 1.2) for the protected thyristor required, very small leakage currents at 0.8 x V_R; that means higher operating voltages or cost reduction by using thyristors with lower blocking voltage.
- Immediate «turn-on», no dangerous overshoot as seen e.g. with varistors, thereby clear and safe protection against overvoltages. RC-snubber can be smaller (smaller losses, cheaper), approx. 50-100 nF/100 Ω, to damp RFI oscillations. By using 5SSA, a matching of power thyristors can in most cases be avoided.
- 5SSA can be heat sunk and is therefore ideal to protect against repetitive surges. There is no aging, e.g. as compared to varistors (limited number of surges, deterioration of electrical data). The temperature coefficient is the same for both 5SSA and protected thyristor.
- In case of a thermal overload, the 5SSA produces always a short circuit, thus still protecting the thyristor.



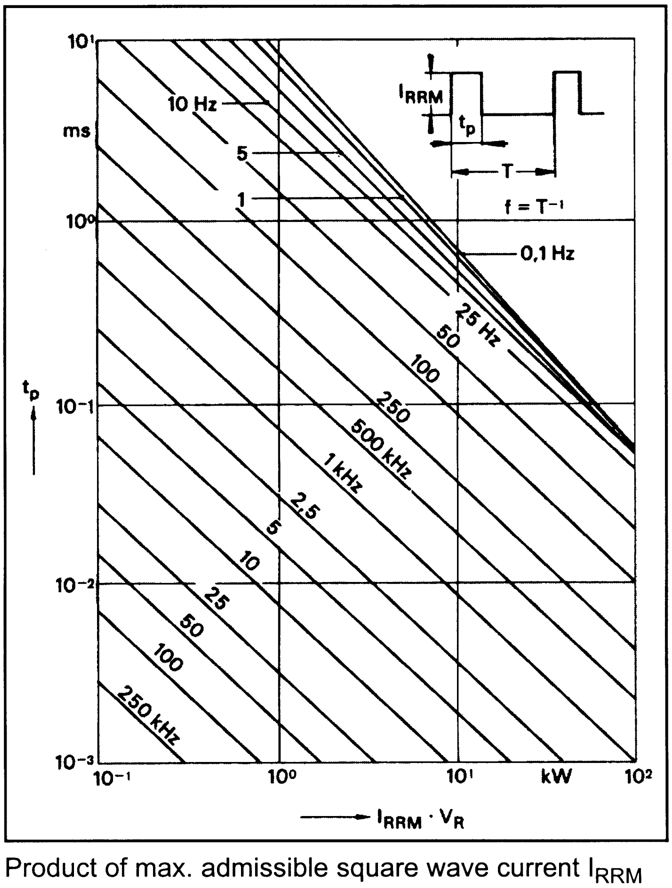
Avalanche voltage V_R vs. junction temperature T_{vj}.



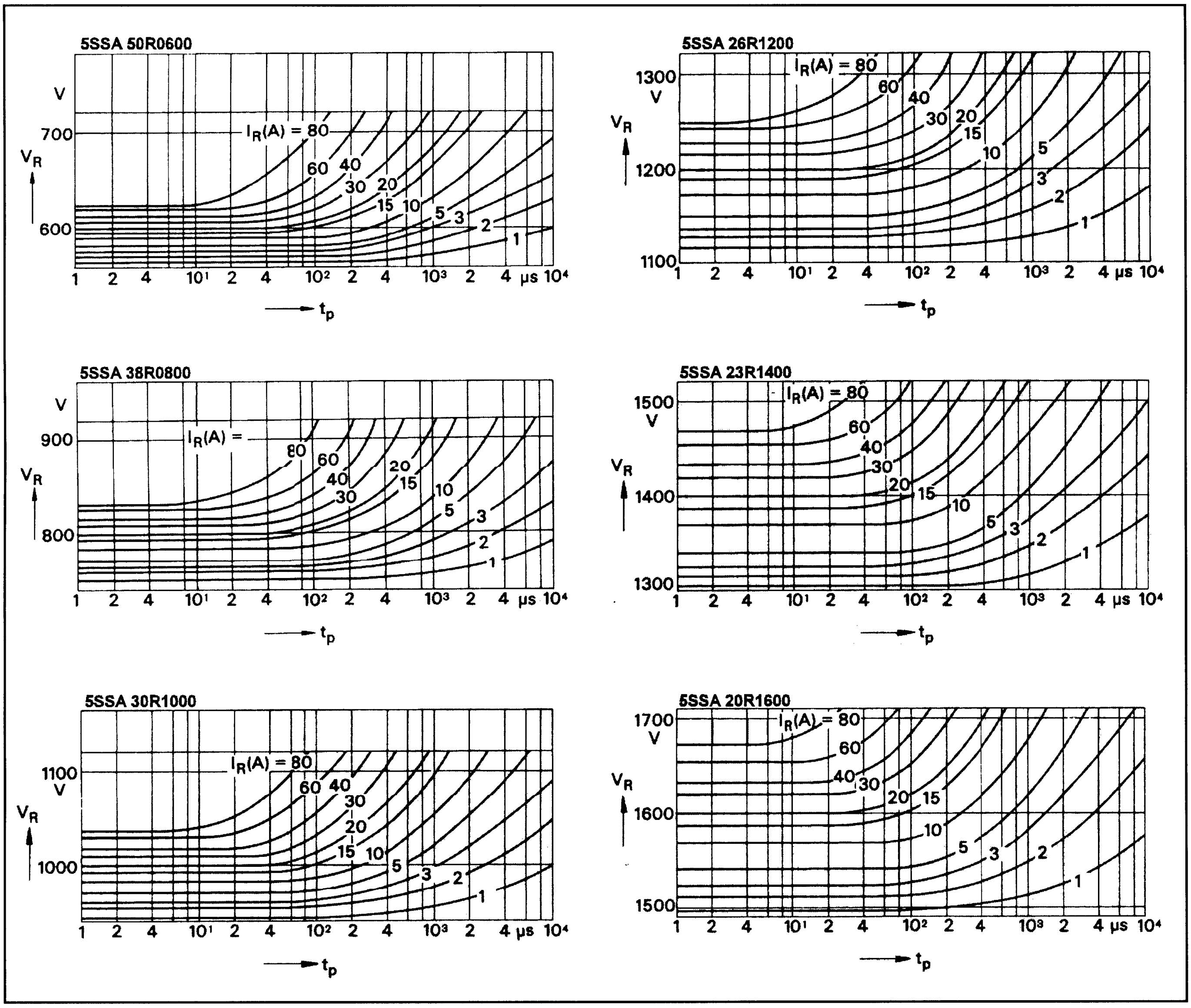
Max. admissible current peak I_R vs. base width t_p.



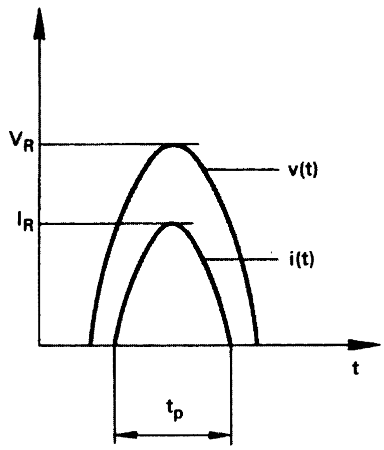
Avalanche current I_R in function of the avalanche voltage V_R for single sine wave pulses of base width tp ≤ 20 μs. T_{vj} = 60 °C.



Product of max. admissible square wave current I_{RRM} and avalanche voltage V_R in function of pulse width t_p; parameter is the repetition frequency. Case temperature T_c ≤ 60 °C.



Avalanche voltage V_R vs. base width t_p for a single sine half wave current with peak I_R as parameter. T_{vj} = 60 °C.



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