

Silicon Carbide Thyristor

$$\begin{aligned} V_{\text{FBM}} &= 6500 \text{ V} \\ I_{\text{T(AVM)}} &= 80 \text{ A} \\ Q_{\text{rr}} &= 4.2 \text{ } \mu\text{C} \end{aligned}$$

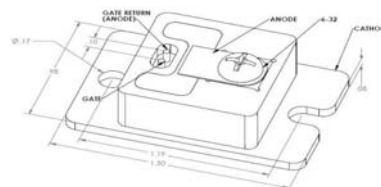
Features

- 6500 V Asymmetric SiC NPNP Thyristor
- 150 °C operating temperature
- Robust compact fully soldered package
- SOT-227 (ISOTOP) base plate form factor
- Fast turn on characteristics
- Lowest in class $Q_{rr}/I_{T(AVM)}$

Applications

- Grid Tied Solar Inverters
- Wind Power Inverters
- HVDC Power Conversion
- Utility Scale Power Conversion
- Trigger Circuits/Ignition Circuits

Package



Maximum Ratings

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak forward voltage	V_{FBM}	$T_J = 25\text{ }^{\circ}\text{C}$	6500	V
Repetitive peak reverse voltage	V_{RBM}	$T_J = 25\text{ }^{\circ}\text{C}$	50	V
Maximum average on-state current	$I_{T(AVM)}$	$T_C \leq 125\text{ }^{\circ}\text{C}$	80	A
RMS on-state current	$I_{T(RMS)}$	$T_C \leq 125\text{ }^{\circ}\text{C}$	139	A
Non-repetitive peak on-state current	$I_{T,max}$	$T_C = 25\text{ }^{\circ}\text{C}$, $t_p = 2\text{ us}$, $D = 0.1$	tbd	A
Power dissipation	P_{tot}	$T_C = 25\text{ }^{\circ}\text{C}$	1563	W
Operating and storage temperature	T_J, T_{sto}		-55 to 150	$^{\circ}\text{C}$

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Maximum peak on state voltage	$V_{KA(ON)}$	$I_K = -80\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$ $I_K = -80\text{ A}$, $T_J = 150\text{ }^{\circ}\text{C}$		-3.70 -3.45		V
Anode-cathode threshold voltage	$V_{KA(TO)}$	$T_J = 25\text{ }^{\circ}\text{C}$ (150 $^{\circ}\text{C}$)		-3.0(-2.7)		V
Anode-cathode slope resistance	R_{AK}	$T_J = 25\text{ }^{\circ}\text{C}$ (150 $^{\circ}\text{C}$), $I_K = -80\text{ A}$		6.0(6.3)		m Ω
Leakage current	I_L	$V_{KA} = -6500\text{ V}$, $V_{GA} = 0\text{ V}$, $T_J = 25\text{ }^{\circ}\text{C}$ $V_{KA} = -6500\text{ V}$, $V_{GA} = 0\text{ V}$, $T_J = 150\text{ }^{\circ}\text{C}$		15 50		μA
Gate trigger current	I_{GT}	$T_J = 25\text{ }^{\circ}\text{C}$, $t_p = 10\text{ }\mu\text{s}$		-100		mA
Holding current	I_H	$T_J = 25\text{ }^{\circ}\text{C}$		tbd		mA
Rise time	t_R	$I_G = -3\text{ A}$, $V_{KA} = -2200\text{ V}$		190		ns
Delay time	t_D	$I_K = -80\text{ A}$, $T_J = 25\text{ }^{\circ}\text{C}$		50		ns
Reverse recovery charge	Q_{rr}			4.2		μC
Recovered charge, 50% chord	Q_{ra}	$dI/dt = 430\text{ A/us}$, $I_K = -70\text{ A}$, $V_{KA} = 20\text{ V}$		2.3		μC
Reverse recovery current	I_{rm}	$dV/dt(\text{re-app}) = -460\text{ V/us}$, $T_J = 25\text{ }^{\circ}\text{C}$		20		A
Circuit commutated turn-off time	t_a			10.1		μs

Thermal Characteristics

Thermal resistance, junction - case	R_{thJG}	0.08	$^{\circ}\text{C/W}$
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Mechanical Properties

Mounting torque for base	M_b	Heat sink surface must be optically flat	1.5	Nm
Mounting torque for top	M_t		1.3	Nm
Weight	W_t		30	g

1. Considering worst case Z_{th} conditions

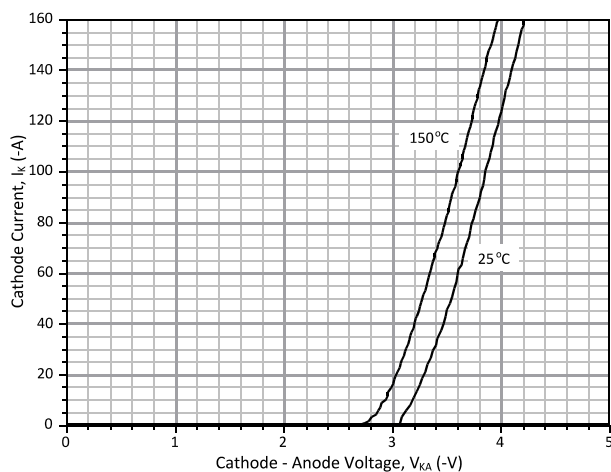


Figure 1: Typical On State Characteristics

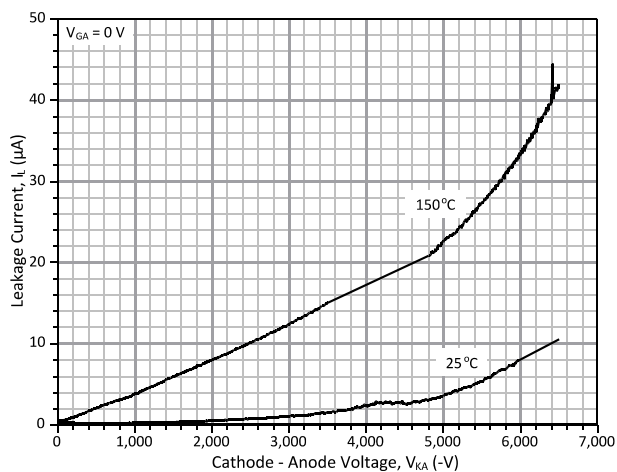


Figure 2: Typical Forward Blocking Characteristics

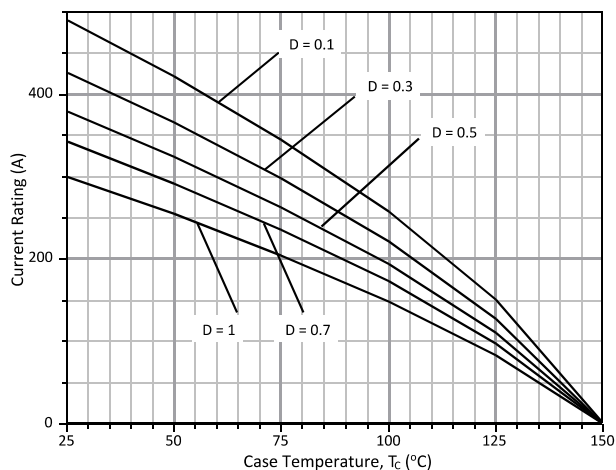


Figure 3: Typical Current Derating Curves ($D = t_p/T$, $t_p = 400 \mu s$)

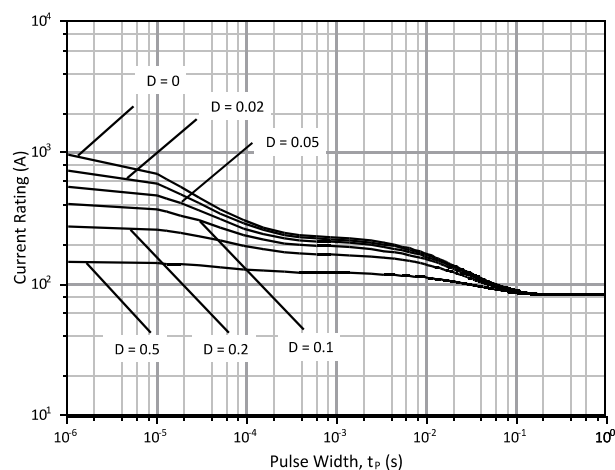


Figure 4: Typical Current Rating versus Pulse Duration Curves at $T_C = 120^\circ C$

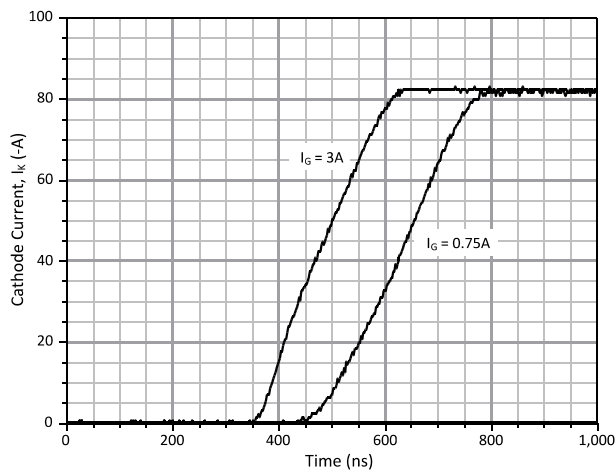


Figure 5: Typical Turn On Characteristics at $25^\circ C$

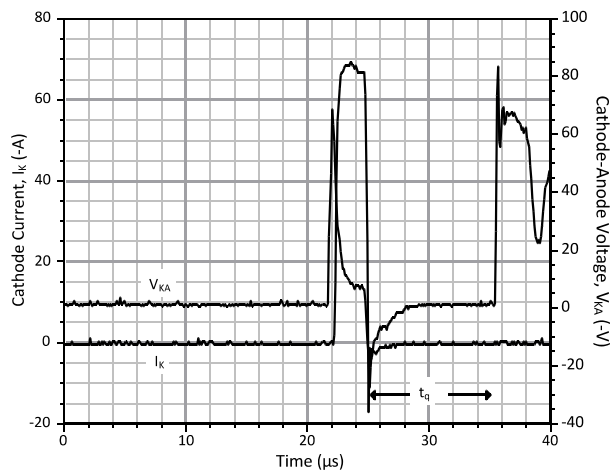


Figure 6: Typical Turn Off Characteristics at $25^\circ C$

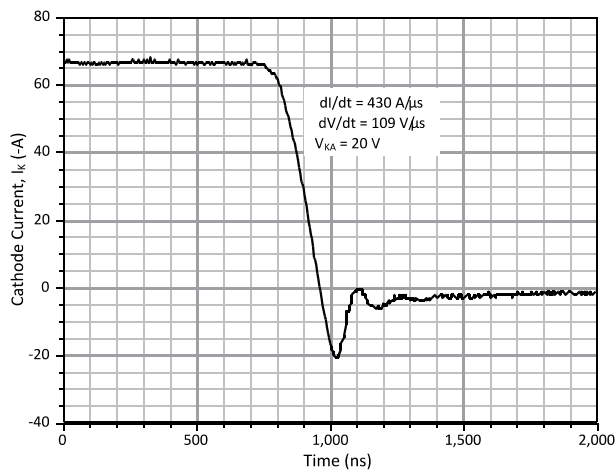


Figure 7: Typical Reverse Recovery Characteristics at 25 °C

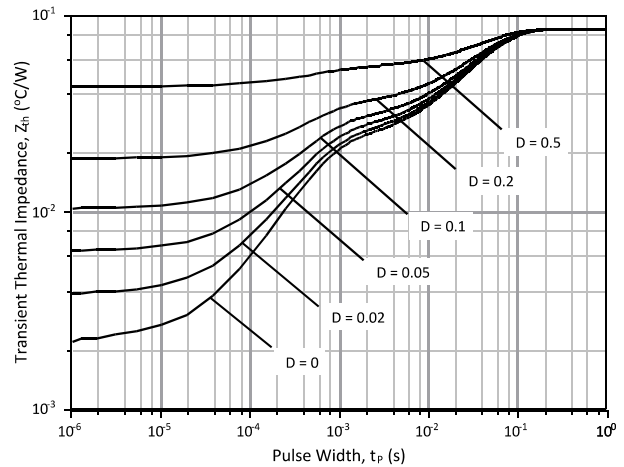


Figure 8: Typical Transient Thermal Impedance

Revision History			
Date	Revision	Comments	Supersedes
2010/11/13	1	First generation release	

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