

Silicon Carbide Thyristor

V_{FBM}	=	6500 V
$I_{T(AVM)}$	=	40 A
Q_{rr}	=	1.8 μ C

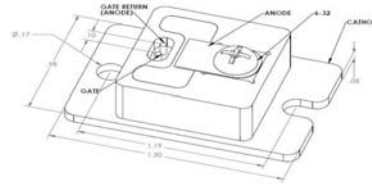
Features

- 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	$I_{T(AVM)}$	$T_c \leq 120\text{ }^\circ\text{C}$	40	A
RMS on-state current	$I_{T(RMS)}$	$T_c \leq 120\text{ }^\circ\text{C}$	69	A
Non-repetitive peak on-state current	$I_{T,max}$	$T_c = 25\text{ }^\circ\text{C}$, $t_p = 2\text{ }\mu\text{s}$, $D = 0.1$	tbid	A
Power dissipation	P_{tot}	$T_c = 25\text{ }^\circ\text{C}$	595	W
Operating and storage temperature	T_j, T_{stg}		-55 to 150	$^\circ\text{C}$

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Maximum peak on state voltage	$V_{KA(ON)}$	$I_K = -40\text{ A}$, $T_j = 25\text{ }^\circ\text{C}$ $I_K = -40\text{ A}$, $T_j = 150\text{ }^\circ\text{C}$		-4.30 -3.90		V
Anode-cathode threshold voltage	$V_{KA(TO)}$	$T_j = 25\text{ }^\circ\text{C}$ (150 °C)		-3.1(-2.8)		V
Anode-cathode slope resistance	R_{AK}	$T_j = 25\text{ }^\circ\text{C}$ (150 °C), $I_K = -40\text{ A}$		20(21)		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 30		μ A
Gate trigger current	I_{GT}	$T_j = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$		-30		mA
Holding current	I_H	$T_j = 25\text{ }^\circ\text{C}$		780		mA
Rise time	t_R	$I_G = -3\text{ A}$, $V_{KA} = -2500\text{ V}$		200		ns
Delay time	t_D	$I_K = -40\text{ A}$, $T_j = 25\text{ }^\circ\text{C}$		40		ns
Reverse recovery charge	Q_{rr}			1.8		μ C
Recovered charge, 50% chord	Q_{ra}	$di/dt = 270\text{ A}/\mu\text{s}$, $I_K = -40\text{ A}$, $V_{KA} = 20\text{ V}$		0.6		μ C
Reverse recovery current	I_{rm}	$dV/dt(\text{re-app}) = -500\text{ V}/\mu\text{s}$, $T_j = 25\text{ }^\circ\text{C}$		11		A
Circuit commutated turn-off time	t_q			4.7		μs

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	0.21	$^\circ\text{C}/\text{W}$
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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

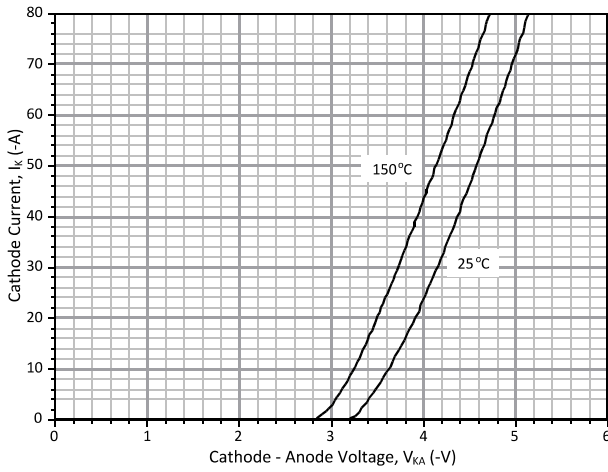


Figure 1: Typical On State Characteristics

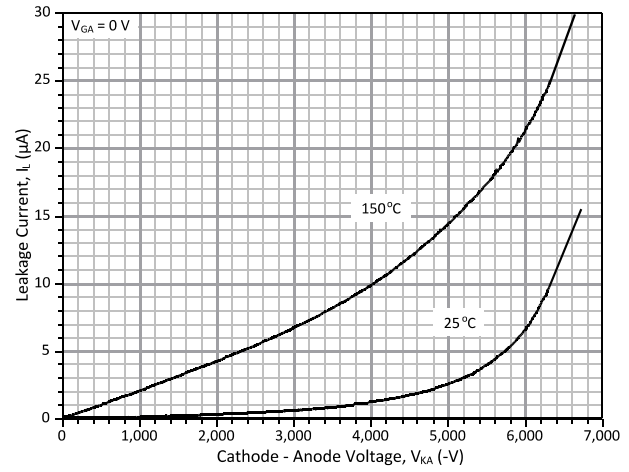


Figure 2: Typical Forward Blocking Characteristics

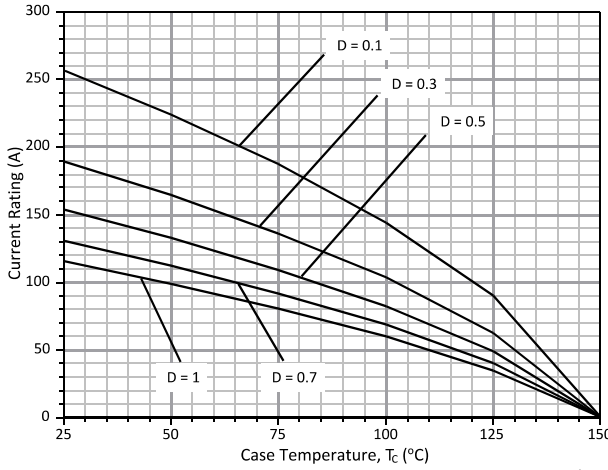


Figure 3: Typical Current Derating Curves ($D = t_p/T, t_p = 400 \mu s$)

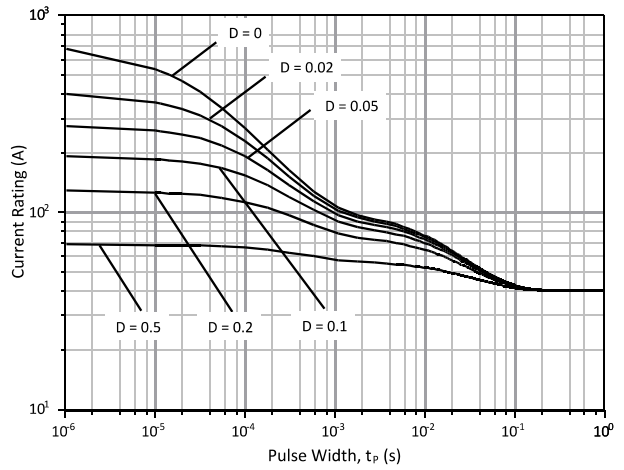


Figure 4: Typical Current Rating versus Pulse Duration Curves at $T_c = 120 \text{ }^\circ\text{C}$

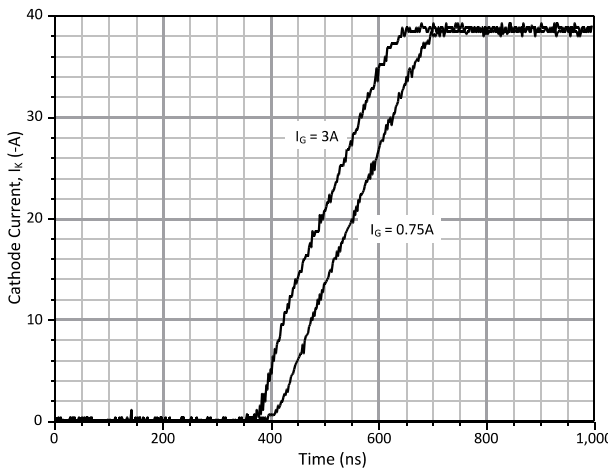


Figure 5: Typical Turn On Characteristics at 25 °C

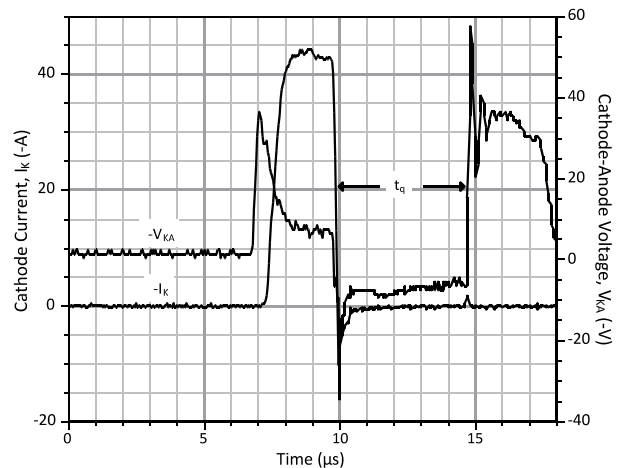


Figure 6: Typical Turn Off Characteristics at 25 °C

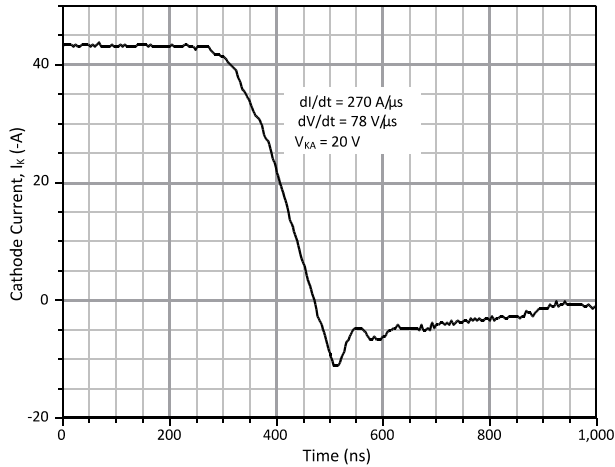


Figure 7: Typical Reverse Recovery Characteristics at 25 °C

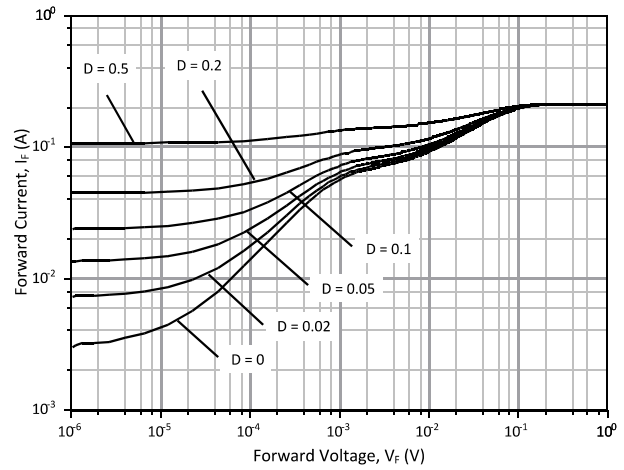


Figure 8: Typical Transient Thermal Impedance

Revision History

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

Published by
GeneSiC Semiconductor, Inc.
43670 Trade Center Place Suite 155
Dulles, VA 20166

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