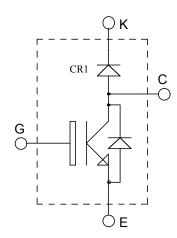


ISOTOP® Boost chopper High speed Trench + Field Stop IGBT4

 $V_{CES} = 1200V$ $I_{C} = 40A @ Tc = 80°C$





Application

- AC and DC motor control
- Switched Mode Power Supplies
- Power Factor Correction
- Brake switch

Features

- High speed Trench + Field Stop IGBT 4 Technology
 - Low voltage drop
 - Low leakage current
 - Low switching losses
 - RBSOA and SCSOA rated
- SiC Schottky Diode (CR1)
 - Zero reverse recovery
 - Zero forward recovery
 - Temperature Independent switching behavior
 - Positive temperature coefficient on VF
- ISOTOP® Package (SOT-227)
- Very low stray inductance
- High level of integration

Benefits

- Low conduction losses
- Stable temperature behavior
- Very rugged
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of V_{CEsat}
- RoHS Compliant

All ratings @ $T_j = 25$ °C unless otherwise specified

Absolute maximum ratings

Symbol	Parameter		Max ratings	Unit
V_{CES}	Collector - Emitter Breakdown Voltage		1200	V
Ţ	Continuous Collector Current	$T_C = 25$ °C	80	
I_{C}	Continuous Conector Current	$T_C = 80$ °C	40	Α
I_{CM}	Pulsed Collector Current	$T_C = 25^{\circ}C$	160	
V_{GE}	Gate – Emitter Voltage		±20	V
P_{D}	Maximum Power Dissipation	$T_C = 25^{\circ}C$	312	W
RBSOA	Reverse Bias Safe Operating Area	$T_j = 150^{\circ}C$	80A @ 1100V	

These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed. See application note APT0502 on www.microsemi.com



Electrical Characteristics

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{CES}	Zero Gate Voltage Collector Current	$V_{GE} = 0V, V_{CE} = 1200V$				25	μΑ
V	Callantan Fraittan actionstica Waltern	$V_{GE} = 15V$ $I_C = 40A$	$T_j = 25^{\circ}C$	1.7	2.05	2.4	V
$V_{CE(sat)}$	Collector Emitter saturation Voltage		$T_j = 150$ °C		2.6		V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE} = V_{CE}, I_C = 1 \text{mA}$		5.0	5.8	6.5	V
I_{GES}	Gate – Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V$				120	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions		Min	Тур	Max	Unit
C_{ies}	Input Capacitance	$V_{GE} = 0V$			2300		
Coes	Output Capacitance	$V_{CE} = 25V$			150		pF
C_{res}	Reverse Transfer Capacitance	f = 1MHz			130		
Q_{G}	Gate charge	$V_{GE} = 15V, I_{C} = 20$ $V_{CE} = 960V$	40A		185		nC
$T_{d(on)}$	Turn-on Delay Time	Resistive Switch	ing (25°C)		30		
T_{r}	Rise Time	$V_{GE} = \pm 15V$			57		
$T_{d(off)}$	Turn-off Delay Time	$V_{\text{Bus}} = 600V$ $I_{\text{C}} = 40A$			290		ns
$T_{\rm f}$	Fall Time	$R_G = 12\Omega$			16		
$T_{d(on)}$	Turn-on Delay Time	Inductive Switch	ing (150°C)		30		
T_{r}	Rise Time	$V_{GE} = \pm 15V$			49		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 600V$			366		ns
T_{f}	Fall Time	$I_{C} = 40A$ $R_{G} = 12\Omega$			48		
Eon	Turn-on Switching Energy	$V_{GE} = \pm 15V$	$T_i = 25^{\circ}C$		1.9		
	<u> </u>	$V_{\text{Bus}} = 600V$ $I_{\text{C}} = 40A$	$T_i = 150^{\circ}C$		2.25		mJ
E_{off}	Turn-off Switching Energy		$T_i = 25^{\circ}C$ $T_i = 150^{\circ}C$		1.2 2.25		
I_{sc}	Short Circuit data	$V_{GE} \le 15V ; V_{Bus}$ $t_p \le 10 \mu s ; T_j = 15$			150		A

Chopper SiC diode ratings and characteristics (CR1)

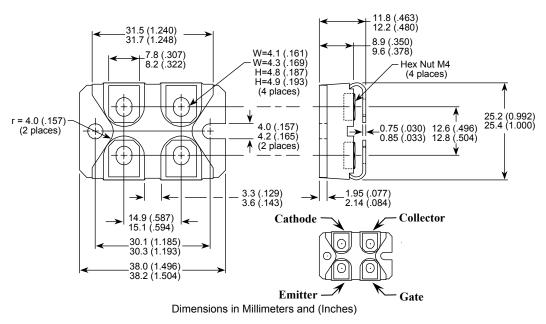
Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
V_{RRM}	Maximum Peak Repetitive Reverse Voltage			1200			V
т	Inv. Maximum Reverse Leakage Current Vp=1200V	V -1200V	$T_j = 25^{\circ}C$		64	400	4
\mathbf{I}_{RM}		$T_{j} = 175^{\circ}C$		112	2000	μΑ	
I_F	DC Forward Current		Tc = 100°C		20		Α
V_{F}	Diode Forward Voltage	$I_{\rm p} = 200\Delta$	$T_i = 25^{\circ}C$		1.6	1.8	V
			$T_i = 175$ °C		2.3	3	V
Qc	Total Capacitive Charge	$I_F = 20A, V_R = 600V$ di/dt = 1000A/ μ s			80		nC
С	Total Capacitance	$f = 1MHz, V_R =$	$f = 1 MHz, V_R = 200 V$		192		рF
	Total Capacitance	$f = 1MHz, V_R =$	400V		138		þι



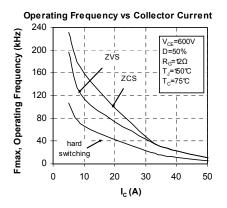
Thermal and package characteristics

Symbol	Characteristic		Min	Тур	Max	Unit
R_{thJC}	Junction to Case Thermal Resistance	IGBT			0.48	°C/W
		SiC Diode			0.8	
R_{thJA}	Junction to Ambient (IGBT & Diode)				20	
V_{ISOL}	RMS Isolation Voltage, any terminal to case t = 1 min, 50/60Hz		4000			V
T_{J}, T_{STG}	Storage Temperature Range		-55		150	°C
$T_{ m L}$	Max Lead Temp for Soldering:0.063" from case for 10 sec 300				300	C
Torque	Mounting torque (Mounting = 8-32 or 4mm Machine and terminals = 4m	nm Machine)			1.5	N.m
Wt	Package Weight			29.2		g

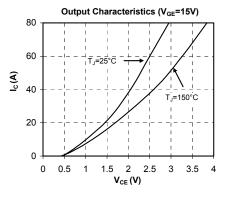
SOT-227 (ISOTOP®) Package Outline

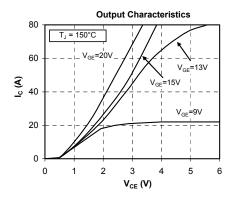


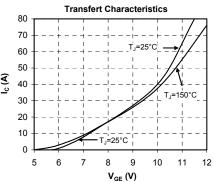
Typical IGBT Performance Curve

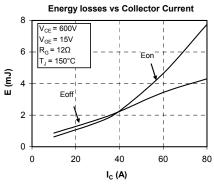


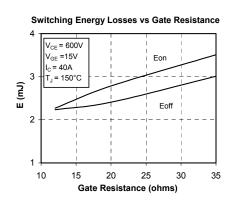


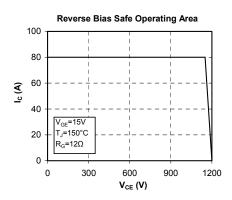


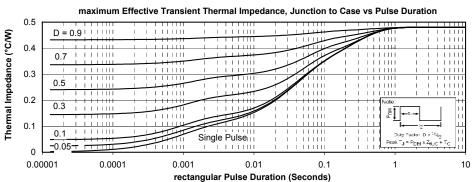






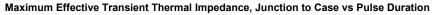


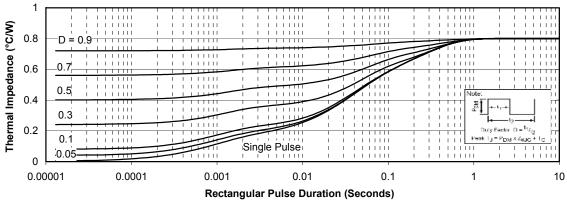


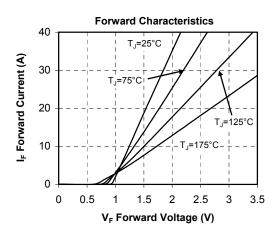


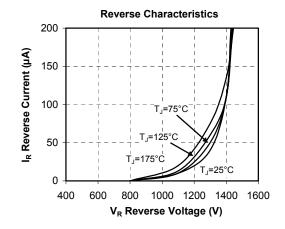


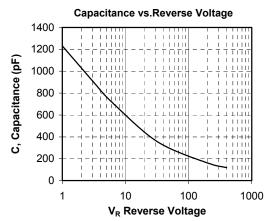
Typical chopper SiC diode Performance Curve











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