

### 34mm Half Bridge IGBT Module

$V_{CES} = 1700V$ ,  $I_C = 75A$ ,  $V_{CE(sat)} = 1.8V$

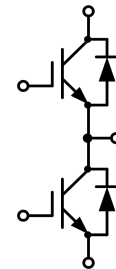
#### Features

- High Speed Trench / Field Stop IGBT
- Low  $V_{CE(sat)}$
- Low Switching Losses
- $V_{cesat}$  has a positive temperature coefficient



#### Applications

- Inverter
- Servo Drives
- Power Conversion System
- UPS Systems



### IGBT, Inverter Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	$V_{CES}$	$T_{vj}=25^{\circ}C$ , $V_{GE}=0V$	1700	V
Continuous collector current	$I_{C\ nom}$	$T_C=100^{\circ}C$ , $T_{vj\ max}=175^{\circ}C$	75	A
Repetitive peak collector current	$I_{CRM}$	$t_P=1ms$ , $T_{vj}=25^{\circ}C$	150	A
Gate-emitter peak voltage	$V_{GES}$	$T_{vj}=25^{\circ}C$	$\pm 20$	V
Total power dissipation	$P_{tot}$	$T_C=25^{\circ}C$ , $T_{vj\ max}=175^{\circ}C$	800	W

### Characteristics Values

Parameter	Symbol	Conditions	Value			Unit	
			Min.	Typ.	Max.		
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=75A$ , $V_{GE}=15V$	$T_{vj}=25^{\circ}C$	1.8	2.3	V	
			$T_{vj}=125^{\circ}C$	2.1		V	
			$T_{vj}=150^{\circ}C$	2.2		V	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=2.6mA$ , $V_{CE}=V_{GE}$	$T_{vj}=25^{\circ}C$	4.9	5.5	6.1	V
Gate charge	$Q_G$	$V_{GE}=-15V...+15V$		0.6			$\mu C$
Integrated gate resistor	$R_{G\ int}$	$T_{vj}=25^{\circ}C$		8.3			$\Omega$
Input capacitance	$C_{ies}$	$T_{vj}=25^{\circ}C$ , $f=1MHz$ , $V_{CE}=25V$ , $V_{GE}=0V$		8.32			nF
Reverse transfer capacitance	$C_{res}$	$T_{vj}=25^{\circ}C$ , $f=1MHz$ , $V_{GE}=0V$ , $V_{CE}=25V$		0.26			nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE}=1700V$ , $V_{GE}=0V$	$T_{vj}=25^{\circ}C$			1	mA
Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0V$ , $V_{GE}=20V$	$T_{vj}=25^{\circ}C$			100	nA

Turn-on delay time	$t_{d\ on}$	$I_C=75A,$ $V_{CE}=900V,$ $V_{GE}=-15V/+15V,$ $R_G=5\Omega,$ Inductive Load	$T_{vj}=25^\circ C$	208	ns
			$T_{vj}=125^\circ C$	222	ns
			$T_{vj}=150^\circ C$	225	ns
Rise time	$t_r$		$T_{vj}=25^\circ C$	36	ns
			$T_{vj}=125^\circ C$	40	ns
			$T_{vj}=150^\circ C$	42	ns
Turn-off delay time	$t_{d\ off}$		$T_{vj}=25^\circ C$	309	ns
			$T_{vj}=125^\circ C$	375	ns
			$T_{vj}=150^\circ C$	395	ns
Fall time	$t_f$	$T_{vj}=25^\circ C$	365	ns	
		$T_{vj}=125^\circ C$	487	ns	
		$T_{vj}=150^\circ C$	496	ns	
Turn-on energy loss per pulse	$E_{on}$	$T_{vj}=25^\circ C$	14.3	mJ	
		$T_{vj}=125^\circ C$	18.95	mJ	
		$T_{vj}=150^\circ C$	21.24	mJ	
Turn-off energy loss per pulse	$E_{off}$	$T_{vj}=25^\circ C$	10.43	mJ	
		$T_{vj}=125^\circ C$	13.80	mJ	
		$T_{vj}=150^\circ C$	14.18	mJ	
SC data	$I_{SC}$	$V_{GE}\leq 5V, V_{CE}=1000V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt,$ $t_p\leq 10\mu s,$	$T_{vj}=25^\circ C$	530	A
		$T_{vj}=150^\circ C$	450	A	
Thermal resistance, junction to case	$R_{thJC}$	per IGBT		0.182	K/W
Temperature under switching conditions	$T_{vj\ op}$		-40	150	$^\circ C$

## Diode, Inverter Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit	
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj}=25^\circ C$	1700	V	
Continuous forward current	$I_F$	$T_C=100^\circ C, T_{vj\ max}=175^\circ C$	75	A	
Repetitive peak forward current	$I_{FRM}$	$t_p=1ms$	150	A	
$I^2t$ -value	$I^2t$	$t_p=10ms, \sin 180^\circ$	$T_{vj}=150^\circ C$	2800	$A^2s$

## Characteristics Values

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F=75A, V_{GE}=0V$	$T_{vj}=25^\circ C$		1.8	V
			$T_{vj}=125^\circ C$		1.9	V
			$T_{vj}=150^\circ C$		1.87	V

Peak reverse recovery current	$I_{rr}$	$I_F=75A,$ $V_R=900V,$ $V_{GE}=-15V,$ $-diF/dt=1350A/\mu s$ ( $T_{vj}=150^\circ C$ )	$T_{vj}=25^\circ C$	59	A
			$T_{vj}=125^\circ C$	64	A
			$T_{vj}=150^\circ C$	68	A
Recovered charge	$Q_{rr}$		$T_{vj}=25^\circ C$	12.4	$\mu C$
			$T_{vj}=125^\circ C$	19.8	$\mu C$
			$T_{vj}=150^\circ C$	23.6	$\mu C$
Reverse recovery energy	$E_{rec}$		$T_{vj}=25^\circ C$	6.64	mJ
			$T_{vj}=125^\circ C$	12.2	mJ
			$T_{vj}=150^\circ C$	13.7	mJ
Thermal resistance, junction to case	$R_{thJC}$	per FRD		0.443	K/W
Temperature under switching conditions	$T_{vj op}$		-40	150	$^\circ C$

### Module Characteristics Values

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Isolation test voltage	$V_{ISOL}$	RMS, f=50Hz, t=1min		4		kV
Internal isolation	-		Al <sub>2</sub> O <sub>3</sub>			-
Maximum junction temperature	$T_{vj max}$				175	$^\circ C$
Temperature under switching conditions	$T_{vj op}$		-40		150	$^\circ C$
Storage temperature	$T_{stg}$		-40		125	$^\circ C$
Mounting torque for module mounting	M		3	-	6	N·m
Weight	G			149		g

### Typical Characteristics

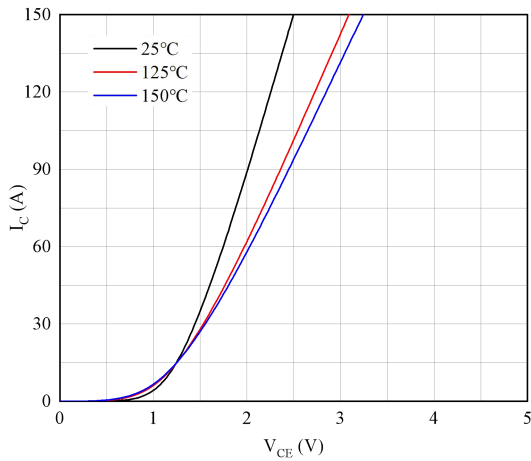


Fig 1. Typical output characteristics ( $V_{GE}=15V$ )

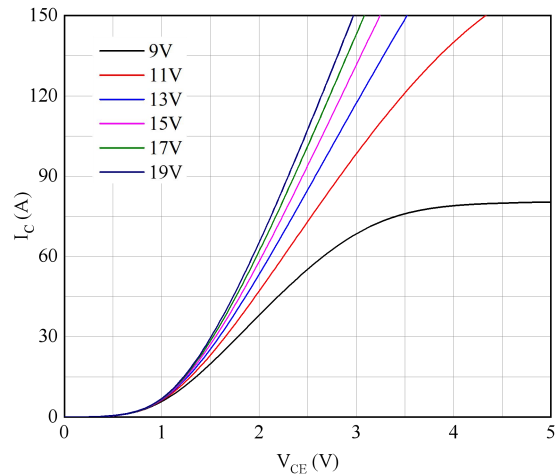


Fig 2. Typical output characteristics ( $T_{vj}=150^{\circ}C$ )

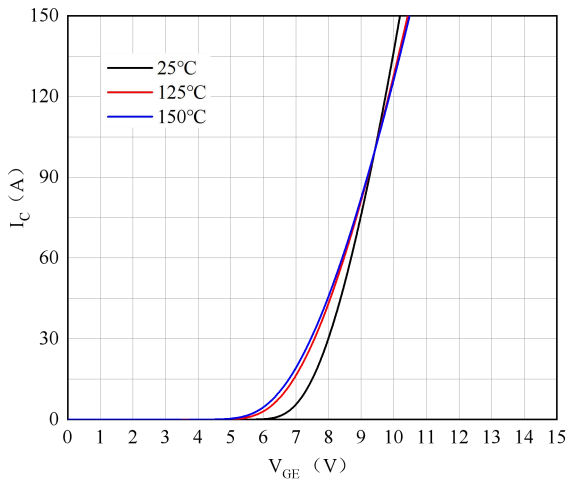


Fig 3. Typical transfer characteristics ( $V_{CE}=20V$ )

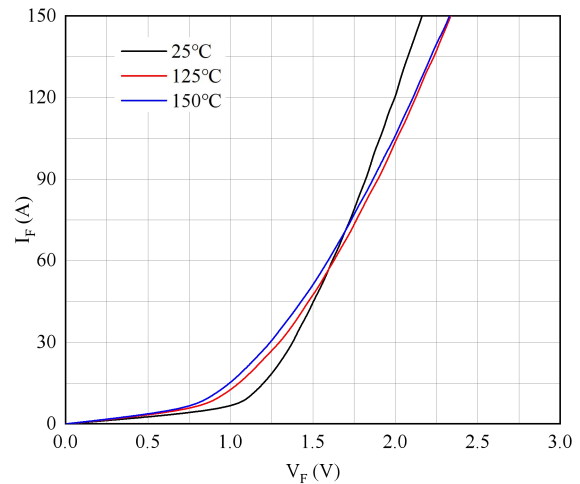


Fig 4. Forward characteristics of Diode

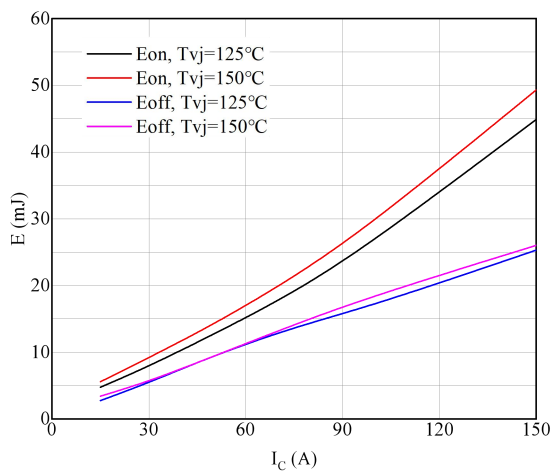


Fig 5. Switching losses of IGBT  
 $V_{GE}=\pm 15V$ ,  $R_{Gon}=5\Omega$ ,  $R_{Goff}=5\Omega$ ,  $V_{CE}=900V$

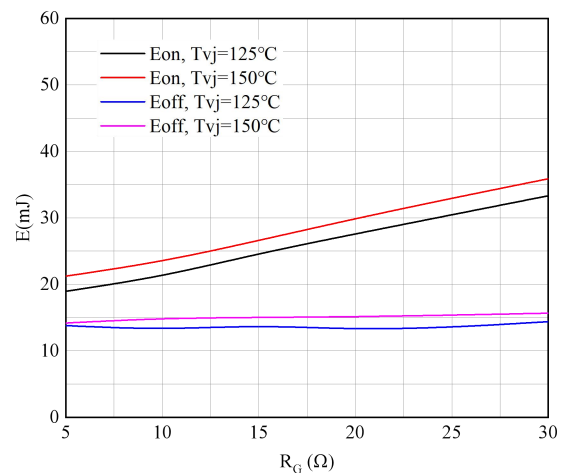


Fig 6. Switching losses of IGBT  
 $V_{GE}=\pm 15V$ ,  $I_C=75A$ ,  $V_{CE}=900V$

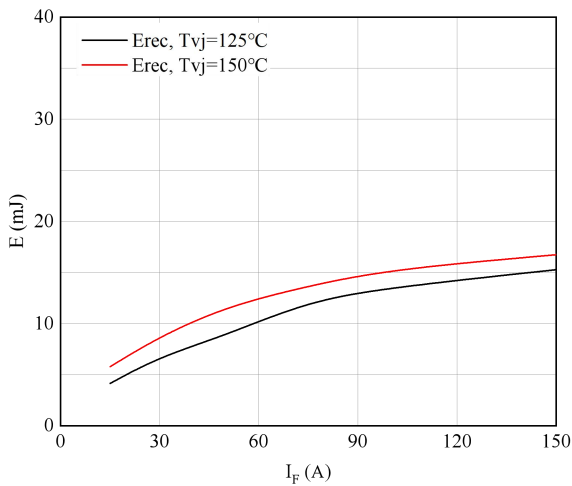


Fig 7. Switching losses of Diode  
 $R_{Gon}=5\Omega$ ,  $V_{CE}=900V$

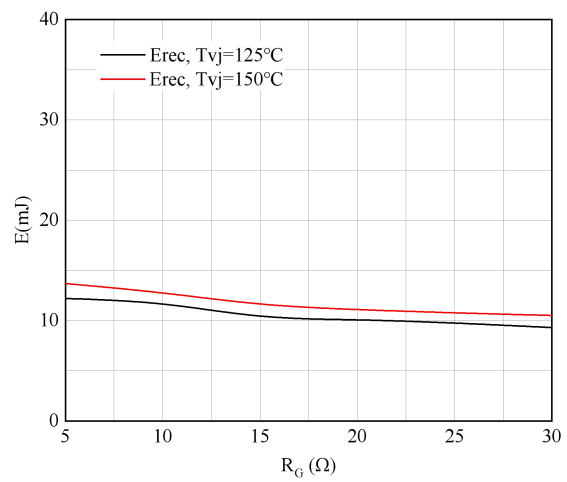


Fig 8. Switching losses of Diode  
 $I_C=75A$ ,  $V_{CE}=900V$

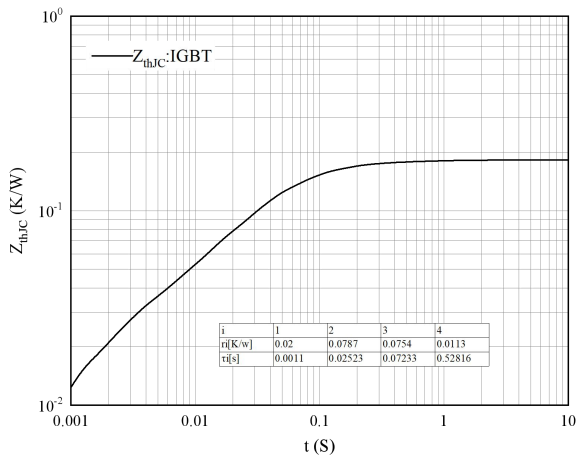


Fig 9. Transient thermal impedance IGBT,  
Inverter  $Z_{thJC}=f(t)$

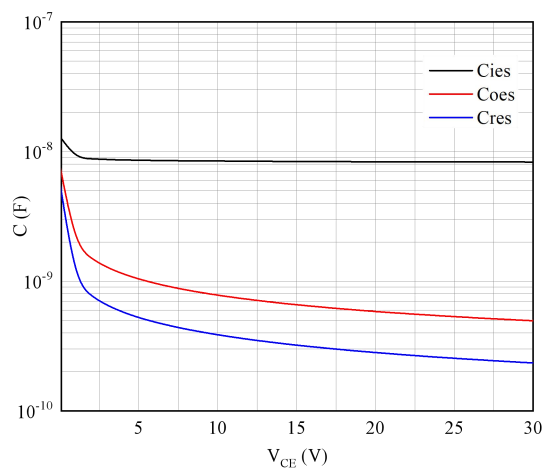


Fig 10. Capacitance characteristics

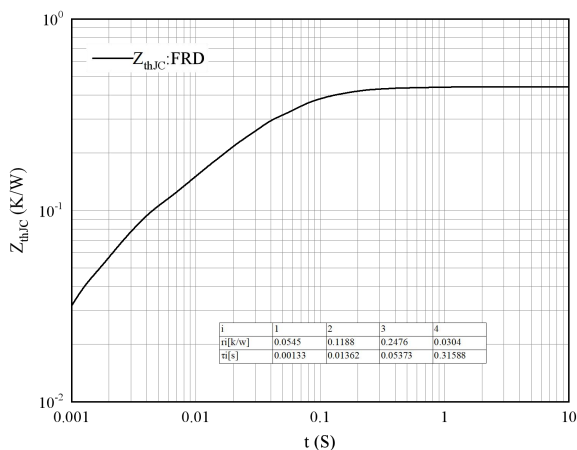
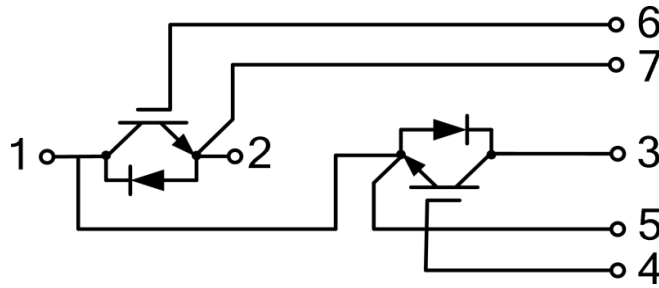
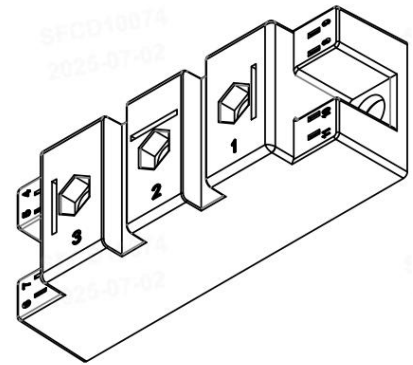
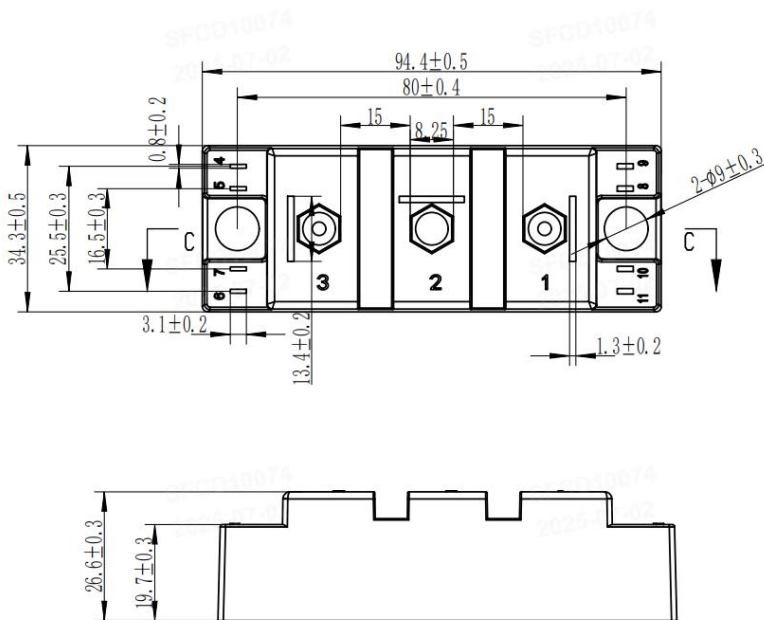


Fig 11. Transient thermal impedance FRD  
Inverter  $Z_{thJC}=f(t)$

### Circuit Diagram



### Package Outlines (Unit:mm)



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