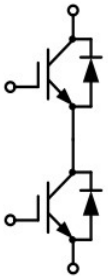
34mm Half Bridge IGBT Module

V_{CES}= 1700V, I_C= 150A, $V_{CE(sat)}$= 1.7V

Features

- High Speed Trench / Field Stop IGBT
- Low $V_{CE(sat)}$
- Low Switching Losses
- $V_{CE(Sat)}$ With Positive Temperature Coefficient



Applications

- Inverter
- Servo Drives
- Solar Applications
- UPS Systems

IGBT, Inverter

Maximum Ratings

Parameter	Symbol	Condition	Value	Unit
Collector-emitter voltage	V_{CES}	T_{vj}=25°C, V_{GE}=0V	1700	V
Continuous collector current	$I_{C\ nom}$	T_C=100° C, $T_{vj\ max}$=175℃	150	A
Repetitive peak collector current	I_{CRM}	t_P=1ms, T_{vj}=25℃	300	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V
Total power dissipation	P_{tot}	T_C=25℃, $T_{vj\ max}$=175℃	750	W

Characteristics Values

Parameter	Symbol	Conditions		Value			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C=150A, V_{GE}=15V	T_{vj}=25℃		1.7	2.1	V
			T_{vj}=125℃		2.0		V
			T_{vj}=150℃		2.1		V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=3.1mA, V_{CE}=V_{GE}	T_{vj}=25℃	6.0	6.5	7.1	V
Gate charge	Q_G	V_{GE}=-15V...+15V			1.4		μC
Integrated gate resistor	$R_{G\ int}$	T_{vj}=25℃			1.2		Ω
Input capacitance	C_{ies}	T_{vj}=25℃, f=100KHz, V_{CE}=25V, V_{GE}=0V			21.5		nF
Output capacitance	C_{oes}	T_{vj}=25℃, f=100KHz, V_{CE}=25V, V_{GE}=0V			0.65		nF

Reverse transfer capacitance	C_{res}	T_{vj}=25℃, f=100KHz, V_{CE}=25V, V_{GE}=0V			0.09		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=1700V, V_{GE}=0V	T_{vj}=25℃			1	mA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	T_{vj}=25℃			100	nA
Turn-on delay time	$t_{d\ on}$	I_C=150A, V_{CE}=900V, V_{GE}=-15V/+15V, R_G=5Ω, Inductive Load	T_{vj}=25℃		128		ns
			T_{vj}=125℃		136		ns
			T_{vj}=150℃		139		ns
Rise time	t_r		T_{vj}=25℃		57		ns
			T_{vj}=125℃		64		ns
			T_{vj}=150℃		69		ns
Turn-off delay time	$t_{d\ off}$		T_{vj}=25℃		360		ns
			T_{vj}=125℃		413		ns
			T_{vj}=150℃		436		ns
Fall time	t_f		T_{vj}=25℃		535		ns
			T_{vj}=125℃		744		ns
			T_{vj}=150℃		847		ns
Turn-on energy loss per pulse	E_{on}	I_C=150A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=5Ω, di/dt=1700A/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		36.27		mJ
			T_{vj}=125℃		44.89		mJ
			T_{vj}=150℃		50.21		mJ
Turn-off energy loss per pulse	E_{off}	I_C=150A, V_{CE}=900V, V_{GE}=-15V/+15V,R_G=5Ω, du/dt=4000V/μs (T_{vj}=150℃) Inductive Load	T_{vj}=25℃		34.48		mJ
			T_{vj}=125℃		44.15		mJ
			T_{vj}=150℃		48.06		mJ
SC data	I_{SC}	V_{GE}≤15V, V_{CE}=1000V V_{CEmax}=V_{CES}-L_{sCE}*di/dt, t_P≤8μs,	T_{vj}=25℃		640		A
		V_{GE}≤15V, V_{CE}=1000V V_{CEmax}=V_{CES}-L_{sCE}*di/dt, t_P≤6μs,	T_{vj}=150℃		630		A
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.195	K/W
Temperature under switching conditions	$T_{vj\ op}$			-40		175	℃

Diode, Inverter
Maximum Ratings

Parameter	Symbol	Conditions		Value	Unit
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃		1700	V
Continuous forward current	I_F	T_C=100℃, T_{vj} max=175℃		150	A
Repetitive peak forward current	I_{FRM}	t_P= 1ms		300	A
I^2t-value	I^2t	t_P=10ms, sin180°	T_{vj}=125℃	5400	A^2s

Characteristics Values

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F=150A, V_{GE}=0V	T_{vj}=25℃		1.7		V
			T_{vj}=125℃		1.9		V
			T_{vj}=150℃		1.95		V
Peak reverse recovery current	I_{rr}	I_F=150A, V_R=900V, V_{GE}=-15V, -diF/dt=2000A/μs (T_{vj}=150℃)	T_{vj}=25℃		123		A
			T_{vj}=125℃		136		A
			T_{vj}=150℃		141		A
Recovered charge	Q_{rr}		T_{vj}=25℃		38.6		μC
			T_{vj}=125℃		59.6		μC
			T_{vj}=150℃		72.5		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		21.36		mJ
			T_{vj}=125℃		35.71		mJ
			T_{vj}=150℃		44.47		mJ
Thermal resistance, junction to case	R_{thJC}	per FRD				0.257	K/W
Temperature under switching conditions	$T_{vj\ op}$			-40		175	℃

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_2O_3		-
Maximum junction temperature	$T_{vj\ max}$				175	℃
Temperature under switching conditions	$T_{vj\ op}$		-40		175	℃
Storage temperature	T_{stg}		-40		125	℃
Mounting torque for module mounting	M		3	-	6	N·m
Weight	G			149		g

Typical Characteristics

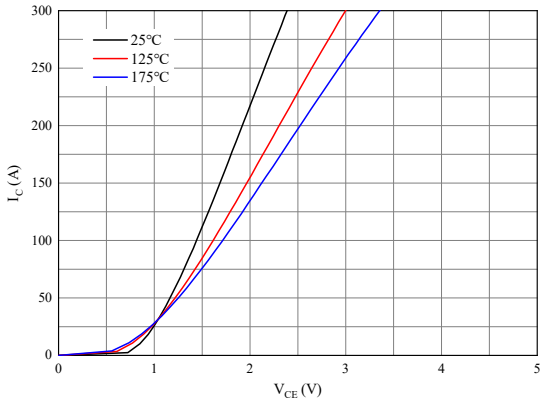


Fig 1. Typical output characteristics (V_{GE}=15V)

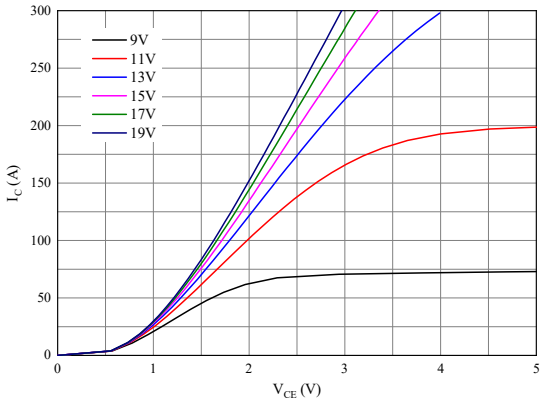


Fig 2. Typical output characteristics (T_{vj}=150℃)

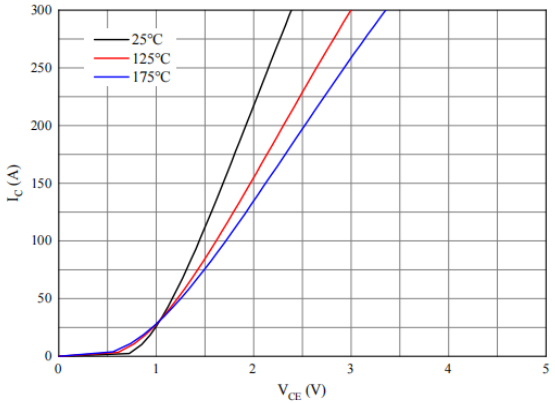


Fig 3. Typical transfer characteristics (V_{CE}=20V)

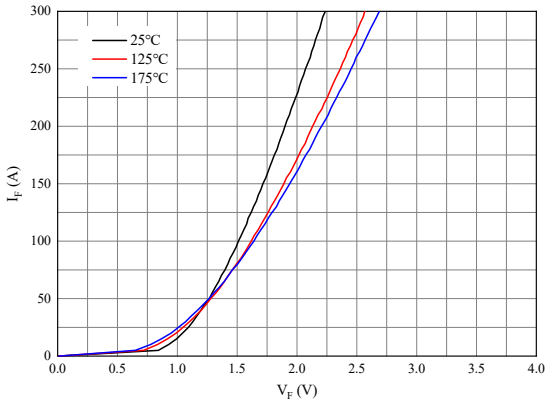


Fig 4. Forward characteristics of Diode

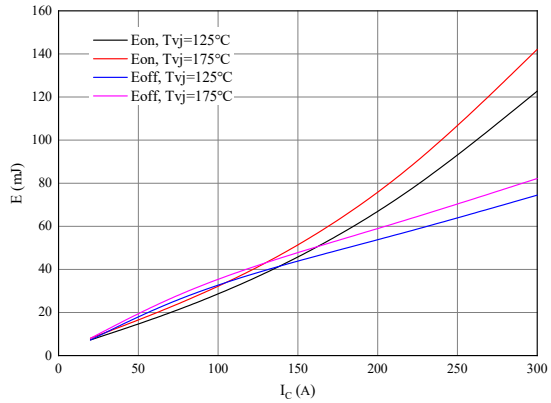


Fig 5. Switching losses of IGBT, Inverter
V_{GE}=±15V, R_{Gon}=R_{Goff}=5Ω, V_{CE}=900V

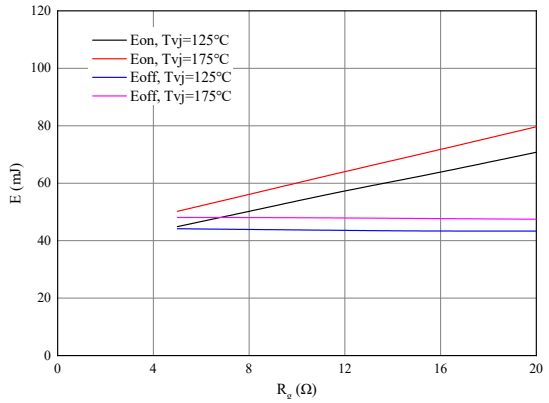


Fig 6. Switching losses of IGBT, Inverter
V_{GE}=±15V, I_C=75A, V_{CE}=900V

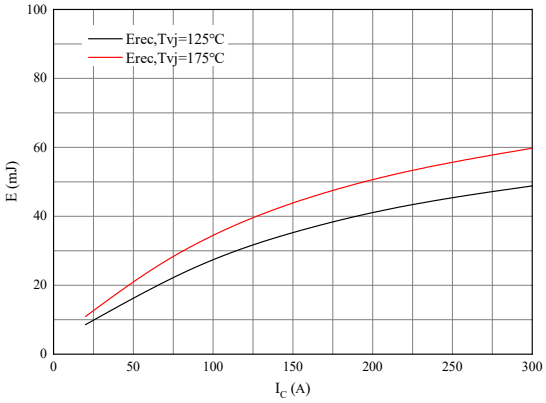


Fig 7. Switching losses of Diode
$R_{Gon}=R_{Goff}=5\Omega$, $V_{CE}=900V$

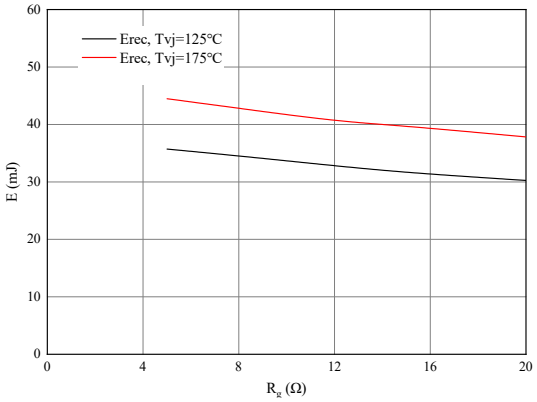


Fig 8. Switching losses of Diode
$I_F=75A$, $V_{CE}=900V$

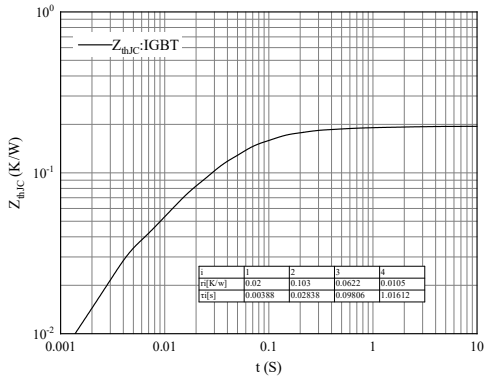


Fig 9. Transient thermal impedance IGBT, Inverter, $Z_{thJC}=f(t)$

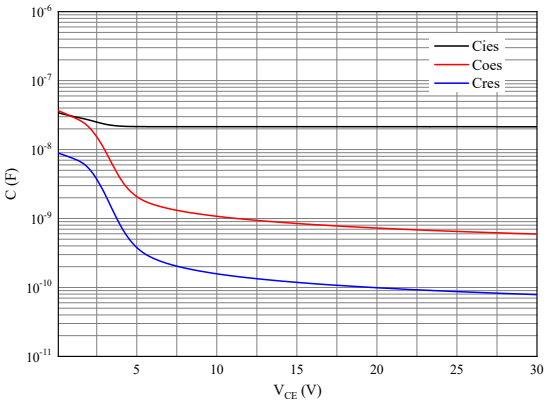


Fig 10. Capacitance characteristics

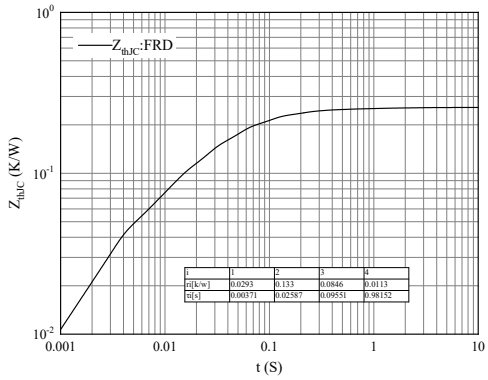
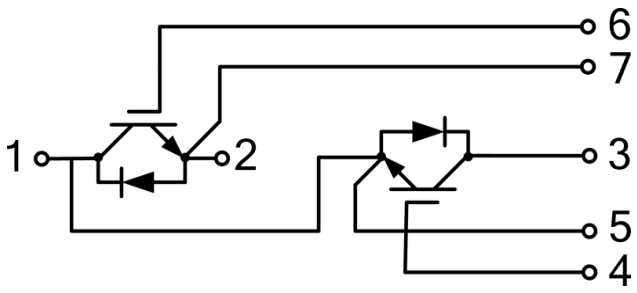
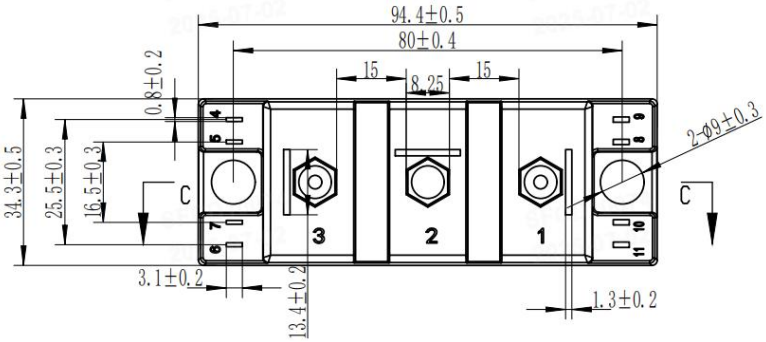


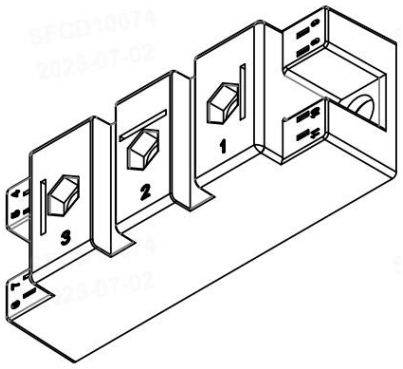
Fig 11. Transient thermal impedance FRD, Inverter, $Z_{thJC}=f(t)$

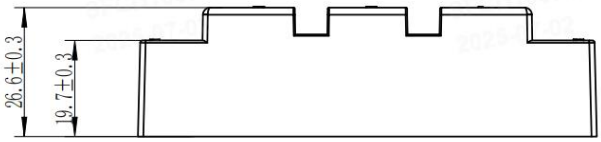
Circuit Diagram



Package Outlines (Unit:mm)







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