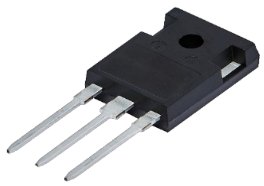
Silicon FS Trench IGBT



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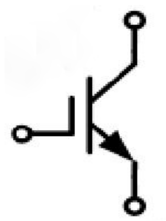


Features：

- 650V Trench /Field Stop type
- Low switching losses
- Vcesat has a positive temperature coefficient

Applications:

- Charging station
- On board charger
- Uninterruptible power supplies
- Inverters

IGBT

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-EmitterVoltage	T_{vj}=25°C	V_{CES}	650	V
Continuous DC collector current	T_C=25°C, $T_{vj\ max}$=175°C T_C=100°C, $T_{vj\ max}$=175°C	I_C	80 50	A

Pulsed collector current, tp limited by $T_{vj\,max}$		I_{Cpuls}	200	A
Total power dissipation	T_C =25°C, $T_{vj\,max}$ =175°C T_C =100°C, $T_{vj\,max}$ =175°C	P_{tot}	295 150	W
Gate emitterVoltage	t_p ≤10µs, D<0.010	V_{GE}	±20 30	V
Temperature under switching conditions		$T_{vj\,op}$	-40…+175	℃
Storage temperature		T_{stg}	-40…+150	℃

Thermal Characteristics

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Thermal resistance, junction-ambient		$R_{th(j-a)}$			40	K/W
IGBT thermal resistance, junction - case		$R_{th(j-C)}$		0.51		K/W

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Collector-emitter breakdown voltage	VGE=0V, IC=0.25mA		$V_{(BR)CES}$	650			V
Collector-Emitter saturationVoltage	V_{GE}=15V, I_C=50A V_{GE}=15V, I_C=50A V_{GE}=15V, I_C=50A	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_{CEsat}		1.58 1.87 1.95	2.10	V
Gate-Emitter thresholdVoltage	I_C=0.5mA,V_{GE}=V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	4.2	5.0	5.8	V
Transconductance	V_{CE}=20V， I_C=50A		G_{fs}		77		S
Input capacitance	f=100kHz,V_{CE}=25V,V_{GE}=0V	T_{vj}=25°C	C_{ies}		5.46		nF
Output capacitance			C_{oes}		0.20		nF
Reverse transfer capacitance			C_{res}		0.10		nF
Gate charge	I_C =50A,V_{GE} =15V, V_{CE} =520V	T_{vj}=25°C	Q_G		0.53		µC
Collector-emitter cut-off current	V_{CE}=650V ,V_{GE}=0V	T_{vj}=25°C T_{vj}=175°C	I_{CES}		 2000	50 	uA
Gate-emitter leakage current	V_{CE}=0V,V_{GE}=20V	T_{vj}=25°C	I_{GES}			100	nA

Turn-on delay time	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ on}$		33 21 19		ns
Rise time	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_r		75 67 65		
Turn-off delay time	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ off}$		21 32 38		
Fall time	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_f		41 62 62		
Turn-on energy loss per pulse	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		2.37 2.88 3.10		mJ
Turn-off energy loss per pulse	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		0.60 0.73 0.76		
Total switching energy	I_C=50A,V_{CE}=400V V_{GE}=±15V, R_G=8Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{ts}		2.97 3.61 3.86		

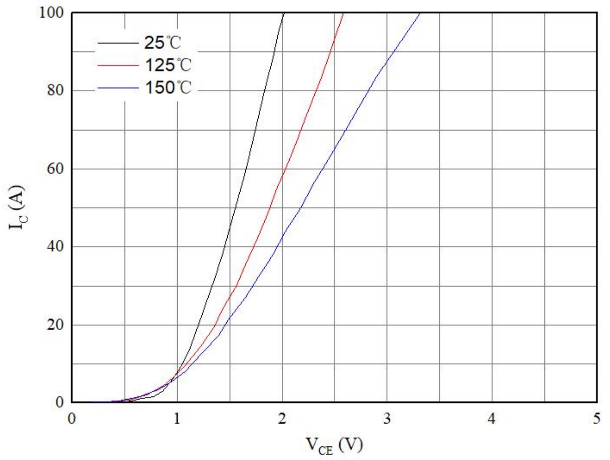


Fig 1. Typical output characteristics (V_{GE}=15V)

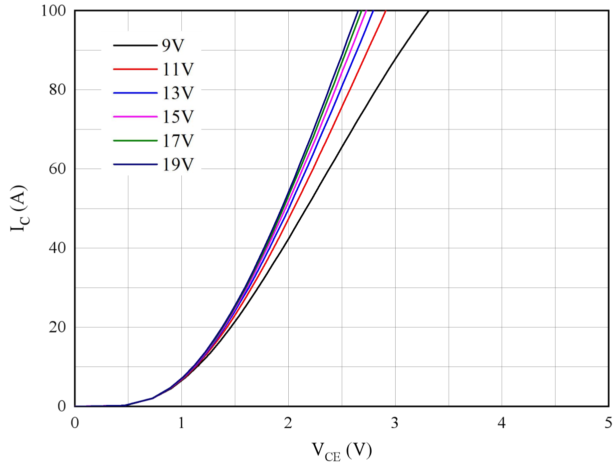


Fig 2. Typical output characteristics (T_{vj}=150℃)

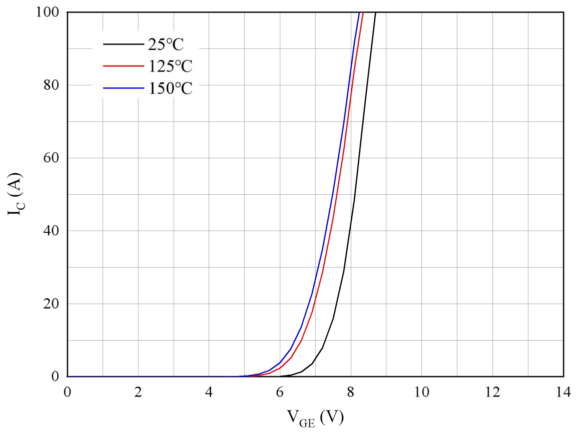


Fig 3. Typical transfer characteristic(V_{CE}=20V)

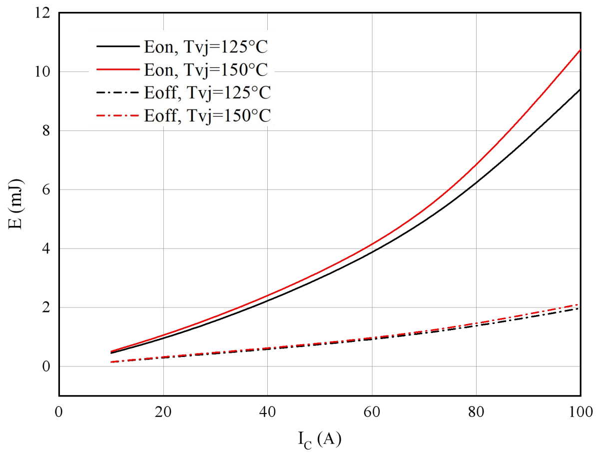


Fig 4. Switching losses of IGBT

VGE=±15V, RGon=8Ω, Rgoff=8Ω,VCE=400V

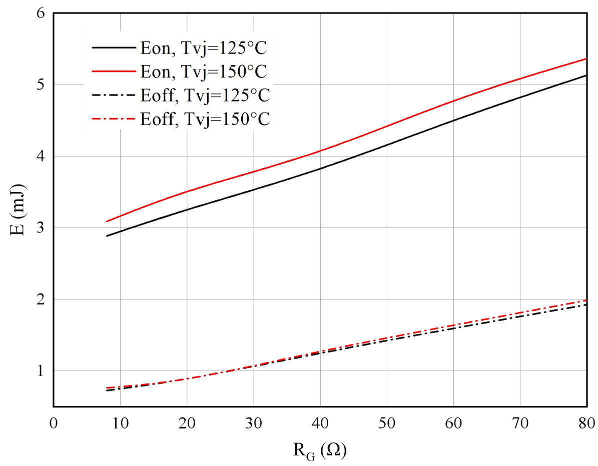


Fig 5. Switching losses of IGBT

VGE=±15V, IC=50A,VCE=400V

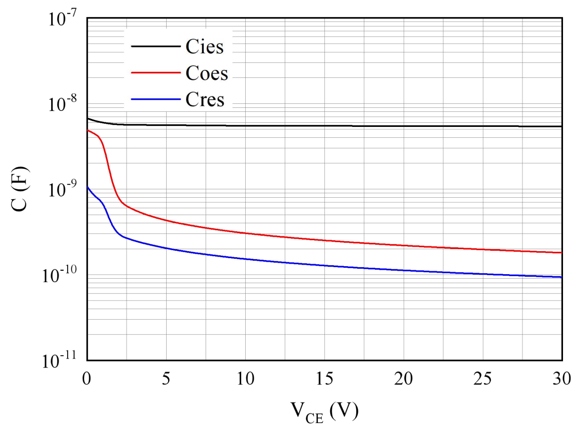


Fig 6. Capacitance characteristic

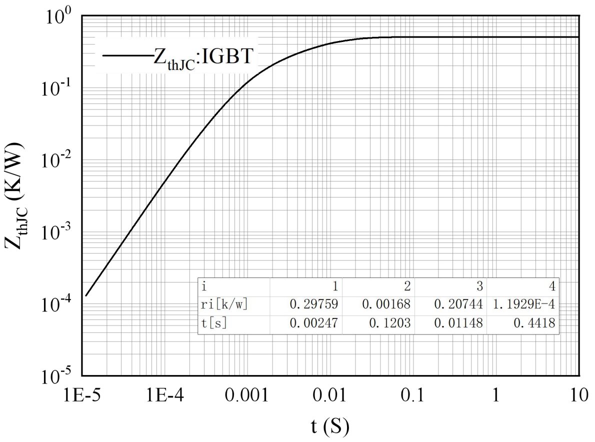
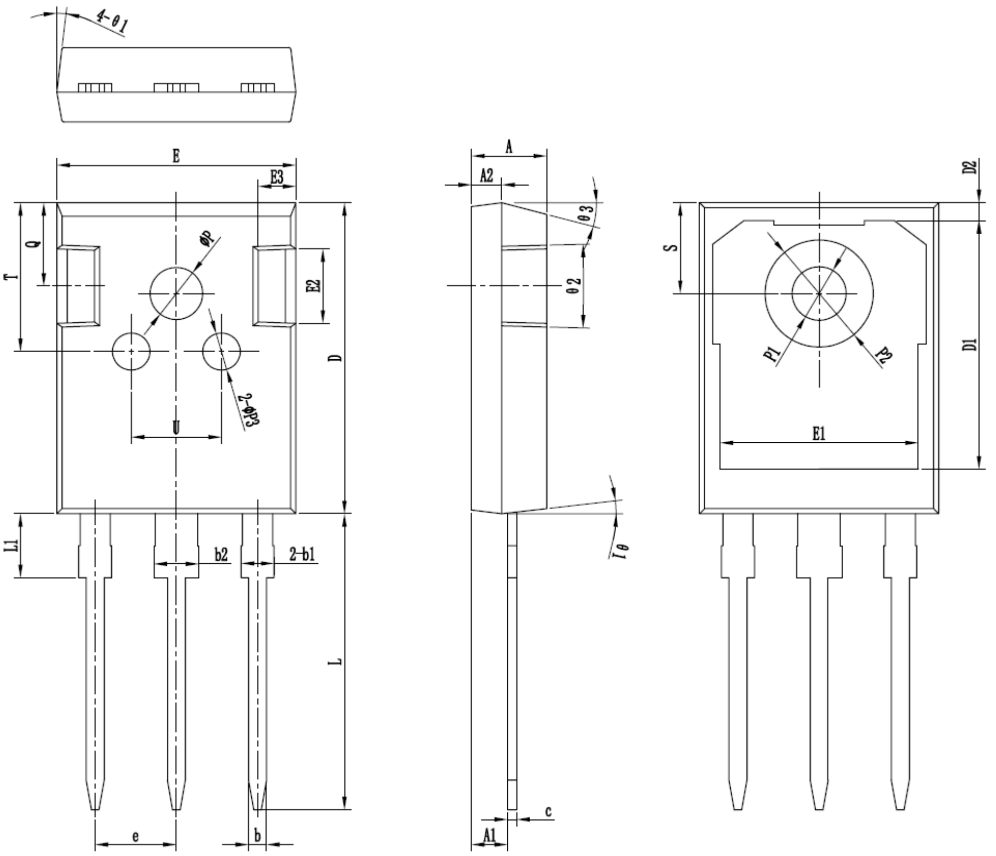


Fig 7. Transient thermal impedance IGBT, Z_{thJC}=f(t)

Circuit diagram

Package outlines



symbol	unit: mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
*E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.92	20.10
*L1	-	-	4.30
*ΦP	3.70	3.80	3.90
*ΦP1	3.50	3.60	3.70
ΦP2	7.00	7.20	7.40
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°