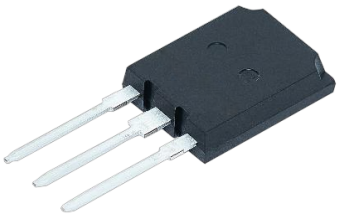
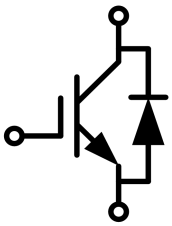
IGBT Discrete with Anti-Parallel Diode

Features：

- 1200V Trench /Field Stop type
- Low switching losses
- Vcesat has a positive temperature coefficient



TO-247 PLUS



Applications:

- Solar Inverter
- Welding Machine
- Uninterruptible power supplies

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	T_{vj}=25°C	V_{CE}	1200	V
Gate to Emitter Voltage		V_{GE}	±20	V
Transient Gate to Emitter Voltage	t_p ≤0.5μs, D<0.001		±30	V
collector current	Tc=25°C Tc=100°C	I_C	150 75	A
Pulsed Collector Current	Pulse width limited by max junction temperature	I_{pulse}	300	A

Diode Forward Current	Tc=25℃ Tc=100℃	I_F	150 75	
Power dissipation	T_C=25℃ T_C=100℃	P_{tot}	555 280	W
Operating Junction Temperature		T_J	-55 to +175	℃
Storage Temperature Range		T_{stg}	-55 to +150	℃
Thermal resistance junction - ambient		$R_{th(j-a)}$	40	K/W

IGBT Characteristic

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Static Characteristic						
Collector-emitter breakdown voltage	VGE = 0V, I_C = 0.25mA	$V_{(BR)CES}$	1200			V
Collector-Emitter saturation voltage	V_{GE}=15V, I_C=75A T_{vj}=25°C V_{GE}=15V, I_C=75A T_{vj}=175°C	V_{CEsat}		2.11 3.03	2.60	V
Gate-Emitter threshold voltage	I_C=2.6mA, V_{GE}= V_{CE} T_{vj}=25°C	$V_{GE(th)}$	5.0	5.6	6.5	V
Transconductance	V_{CE}=20V， I_C=75A	G_{fs}		98.8		S
Gate charge	I_C = 75A, V_{GE} = 15 V, V_{CE} =960 V T_{vj}=25°C	Q_G		0.77		μC
Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V T_{vj}=25°C	I_{CES}			450	μA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V T_{vj}=25°C	I_{GES}			100	nA
Dynamic Characteristic						
Input capacitance	f=1 MHz, V_{CE}=25 V, V_{GE}=0 V T_{vj}=25°C	Cies		7.72		nF
Output capacitance		Coes		0.28		
Reverse transfer capacitance		Cres		0.13		
Switching Characteristic						
Turn-on delay time	I_C=75A, V_{CE}=600 V V_{GE}=±15 V, R_G=10Ω T_{vj}=25°C (inductive load)	$t_{d\ on}$		51		ns
Rise time		t_r		193		

Turn-off delay time		$t_{d\ off}$		180		
Fall time		t_f		98		
Turn-on energy loss per pulse		E_{on}		9.5		mJ
Turn-off energy loss per pulse		E_{off}		2.7		
Total switching energy		E_{tot}		12.2		
Turn-on delay time	I_C=75A, V_{CE}=600 V V_{GE}=±15 V, R_G=10Ω (inductive load) T_{vj}=175°C	td_{on}		40		mJ
Rise time		t_r		171		
Turn-off delay time		td_{off}		202		
Fall time		t_f		119		
Turn-on energy loss per pulse		E_{on}		14.6		
Turn-off energy loss per pulse		Eoff		3.5		
Total switching energy		E_{tot}		18.1		
IGBT thermal resistance, junction - case		$R_{th(j-C)}$		0.27		K/W

Diode Characteristic

Parameter	**Conditions**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Static Characteristic						
Forward voltage	I_F=75A T_{vj}=25°C I_F=75A T_{vj}=175°C	V_F		1.93 1.67	2.40	V
Switching Characteristic						
Peak reverse recovery current	I_F=75A, -di_F/dt=320A/μs V_R=600V, V_{GE}=-15V T_{vj}=25°C	I_{RM}		18		A
Reverse Recovered charge		Q_{rr}		4.21		μC
Reverse Recovery Time		t_{rr}		444		ns

Reverse recovered energy		E_{rec}		1.7		mJ
Peak reverse recovery current	I_F=75A, -di$_F$/dt=320A/μs V_R=600V, V_{GE}=-15V T_{vj}=175°C	I_{RM}		43		A
Reverse Recovered charge		Q_{rr}		15.36		μC
Reverse Recovery Time		t_{rr}		767		ns
Reverse recovered energy		E_{rec}		6.2		mJ
Diode thermal resistance, junction - case		$R_{th(j-C)}$		0.28		K/W

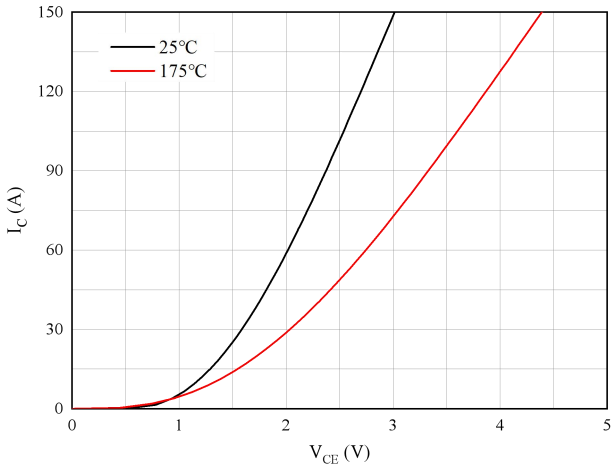


Fig 1. Typical output characteristics (V_{GE}=15V)

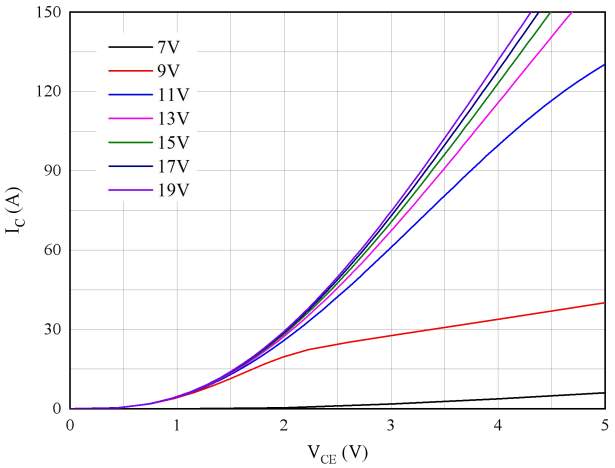


Fig 2. Typical output characteristics (T_{vj}=175℃)

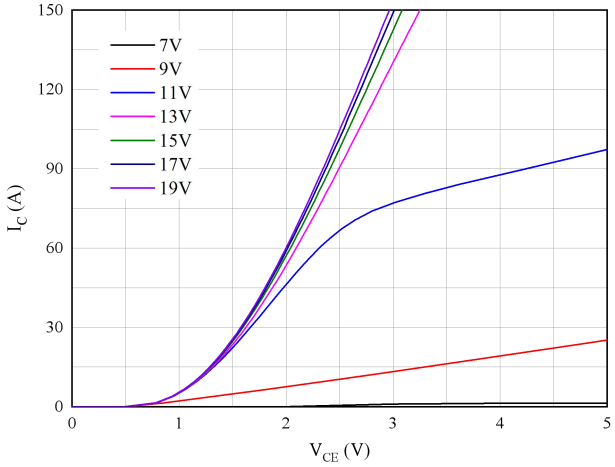


Fig 3. Typical output characteristics (T_{vj}=25℃)

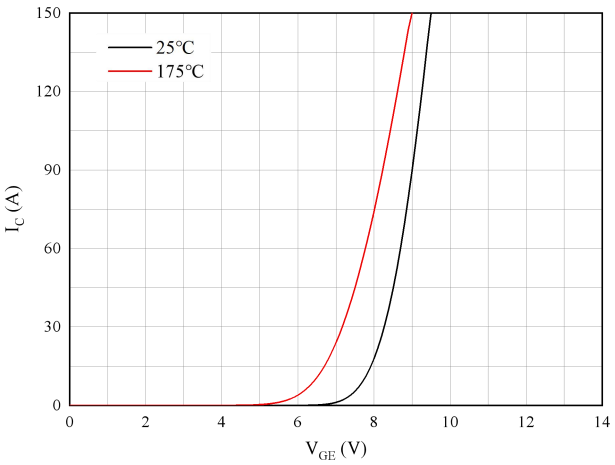


Fig 4. Typical transfer characteristic(V_{CE}=20V)

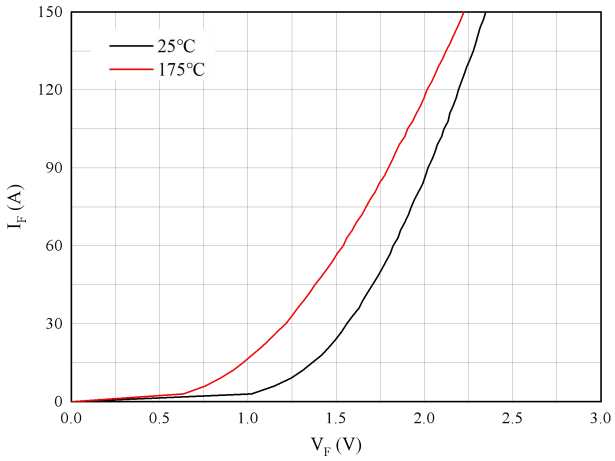


Fig 5. Forward characteristic of Diode

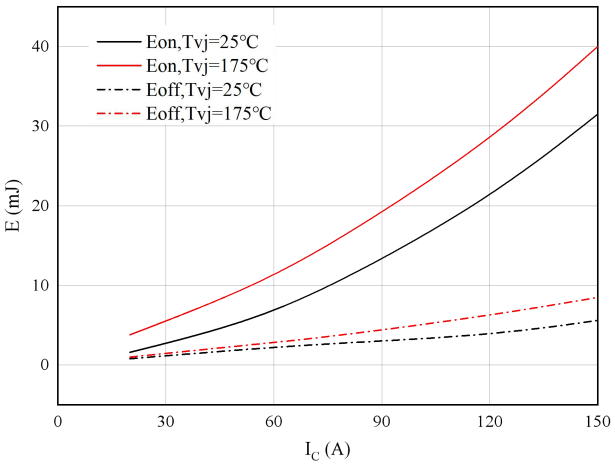


Fig 6. Switching losses of IGBT

VGE=±15V, RGon=10Ω, Rgoff=10Ω, VCE=600V

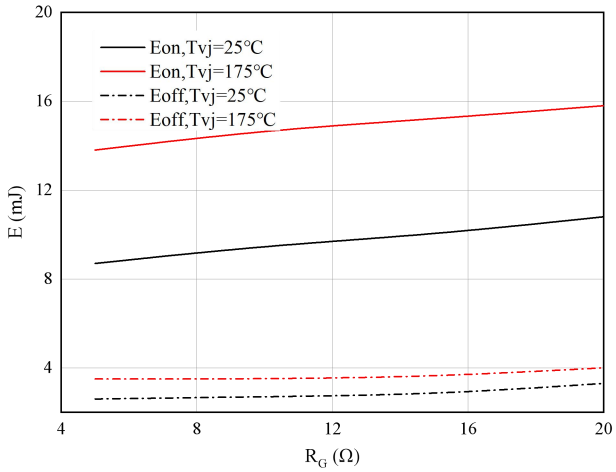


Fig 7. Switching losses of IGBT

VGE=±15V, IC=75A, VCE=600V

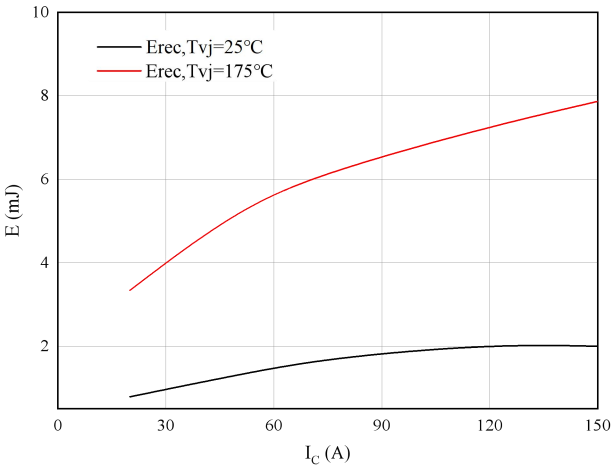


Fig 8. Switching losses of Diode

Rgon=10Ω, VCE=600V

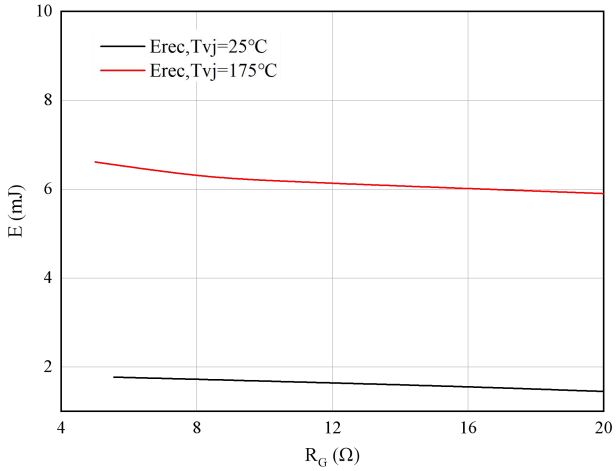


Fig 9. Switching losses of Diode

IF=75A, VCE=600V

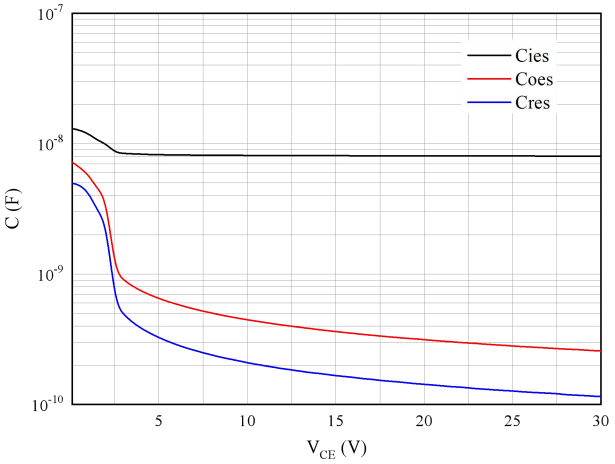


Fig 10. Capacitance characteristic

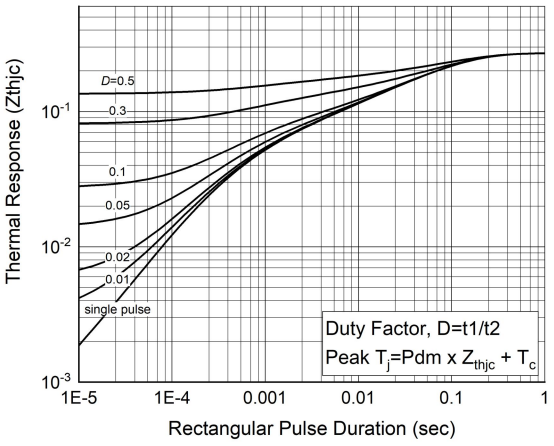


Fig 11. Transient thermal impedance IGBT, Z_{thJC}=f(t)

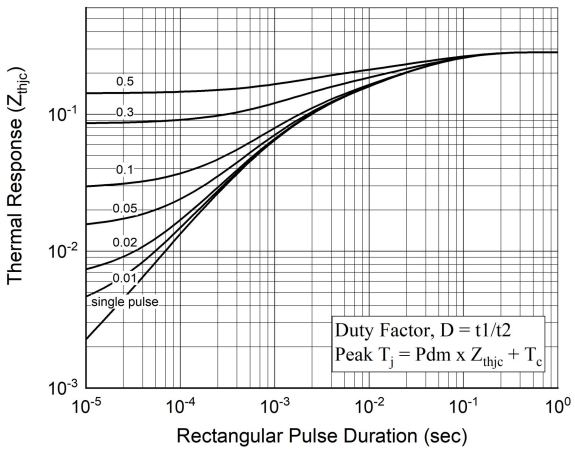
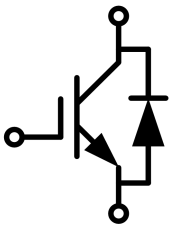
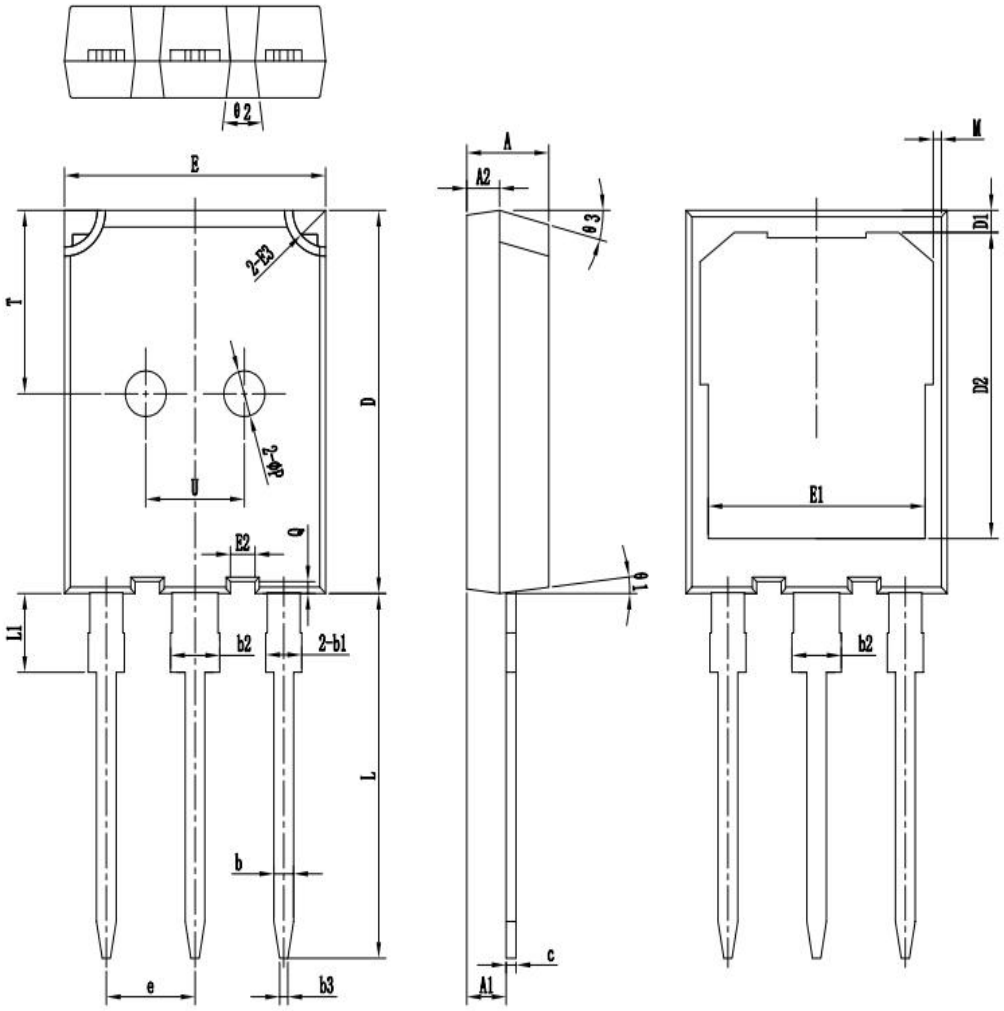


Fig 12. Transient thermal impedance FRD, Z_{thJC}=f(t)

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
b3	0.45	0.60	0.75
*c	0.55	0.60	0.68
*D	20.90	21.00	21.10
D1	1.00	1.20	1.40
D2	15.25	16.55	16.85
*E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	1.25	1.45	1.65
E3	1.80	2.00	2.20
*e	5.40	5.44	5.48
*L	19.80	19.92	20.10
*L1	-	-	4.30
ΦP	2.30	2.50	2.70
Q	0.50	0.68	0.80
T	9.80	10.00	10.20
U	5.80	6.00	6.20
θ1	5°	7°	9°
θ2	13°	16°	19°
θ3	13°	15°	17°