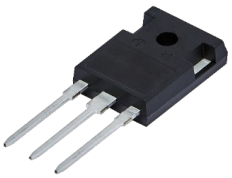
IGBT Discrete with Anti-Parallel Diode

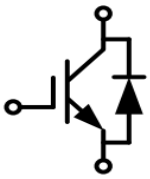
V_{CES}=1200V， $I_{C\ nom}$=40A/ I_{CRM} =80A

Features:

- 1200V Trench /Field Stop type
- Low switching losses
- Vcesat has A positive tempetrature coefficient



TO-247



Applications

- Charging station
- UPS
- Inverters

IGBT

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	T_{vj}=25°C	V_{CES}	1200	V
Continuous DC collector current	T_C=100°C, $T_{vj\ max}$=175°C	$I_{C\ nom}$	40	A
Repetitive peak collector current	t_P=1 ms	I_{CRM}	80	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	270	W
Gate emitter voltage		V_{GE}	±20	V

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Collector-Emitter saturation voltage	V_{GE}=15V, I_C=40A V_{GE}=15V, I_C=40A V_{GE}=15V, I_C=40A	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_{CEsat}		1.60 1.90 2.00	2.20	V
Gate-Emitter threshold voltage	I_C=0.5mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	4.8	5.5	6.2	
Transconductance	V_{CE}=20V， I_C=40A		G_{fs}		27		S
Input capacitance	f=1 MHz, V_{CE}=25 V, V_{GE}=0 V	T_{vj}=25°C	C_{ies}		2.56		nF
Output capacitance			C_{oes}		0.16		
Reverse transfer capacitance			C_{res}		0.12		
Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V	T_{vj}=25°C	I_{CES}			1	mA
Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			200	nA
Turn-on delay time	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=12Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ on}$		84 80 76		ns
Rise time	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=12Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_r		50 60 60		
Turn-off delay time	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=12Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ off}$		264 298 304		
Fall time	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=15Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_f		203 297 283		
Turn-on energy loss per pulse	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=12Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		2.50 4.15 4.50		mJ
Turn-off energy loss per pulse	I_C=40A, V_{CE}=600 V V_{GE}=±15 V, R_G=12Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		1.50 1.95 2.10		
IGBT thermal resistance, junction			R_{thJC}		0.38		K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

Diode

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25ºC	V_{RRM}	1200	V
Continuous DC forward current	T_C=100°C, $T_{vj\ max}$=175°C	I_F	8	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	16	A

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=8A, V_{GE}=0V	T_{vj}=25°C	V_F		1.73	2.8	V
	I_F=8A, V_{GE}=0V	T_{vj}=125°C			1.53		
	I_F=8A, V_{GE}=0V	T_{vj}=150°C			1.48		
Peak reverse recovery current	I_F=8A,	T_{vj}=25°C	I_{RM}		18		A
	-di$_F$/dt=356A/μs(T_{vj}=150°C)	T_{vj}=125°C			22		
	V_R=600V, V_{GE}=-15V	T_{vj}=150°C			25		
Reverse Recovered charge	I_F=8A,	T_{vj}=25°C	Q_{rr}		2.45		μC
	-di$_F$/dt=356A/μs(T_{vj}=150°C)	T_{vj}=125°C			3.38		
	V_R=600V, V_{GE}=-15V	T_{vj}=150°C			3.73		
Reverse Recovery Time	I_F=8A,	T_{vj}=25°C	t_{rr}		186		ns
	-di$_F$/dt=356A/μs(T_{vj}=150°C)	T_{vj}=125°C			207		
	V_R=600V, V_{GE}=-15V	T_{vj}=150°C			218		
Reverse recovered energy	I_F=8A,	T_{vj}=25°C	E_{rec}		0.65		mJ
	-di$_F$/dt=356A/μs(T_{vj}=150°C)	T_{vj}=125°C			0.88		
	V_R=600V, V_{GE}=-15V	T_{vj}=150°C			0.95		
Diode thermal resistance, junction			R_{thJC}		0.45		K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		175	°C

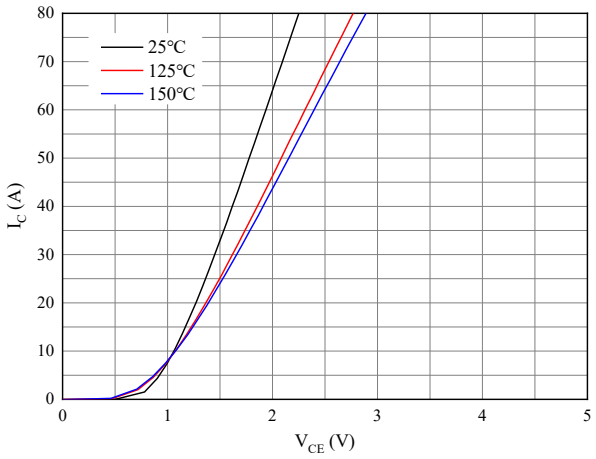


Fig 1. Typical output characteristics (V_{GE}=15V)

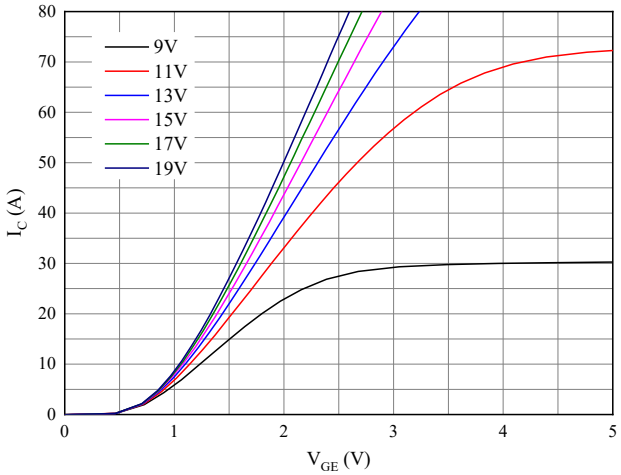


Fig 2. Typical output characteristics (T_{vj}=150℃)

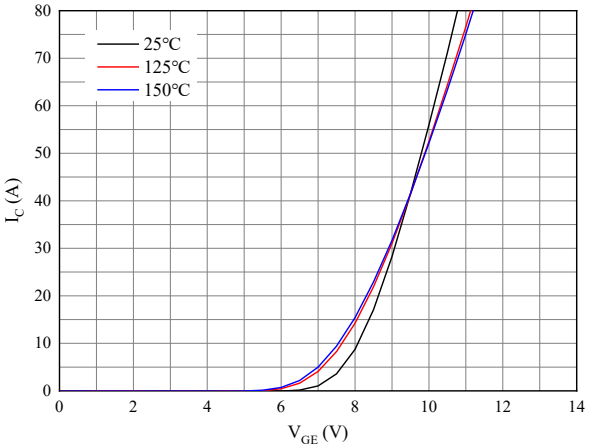


Fig 3. Typical transfer characteristic(V_{CE}=20V)

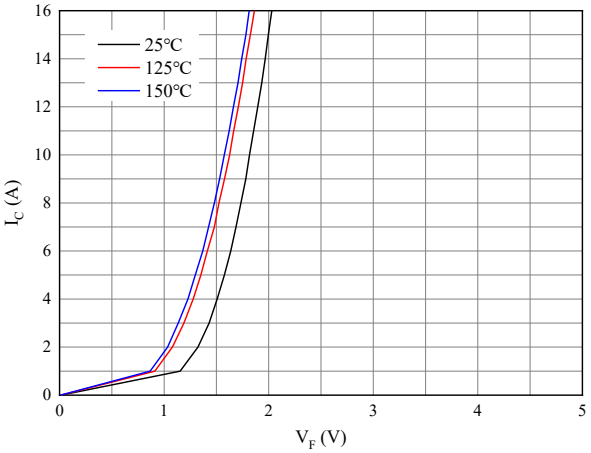


Fig 4. Forward characteristic of Diode

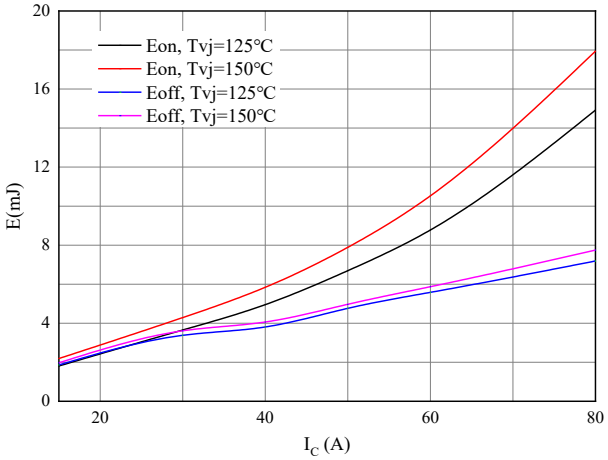


Fig 5. Switching losses of IGBT

VGE=±15V, RGon=12Ω, Rgoff=12Ω, VCE=600V

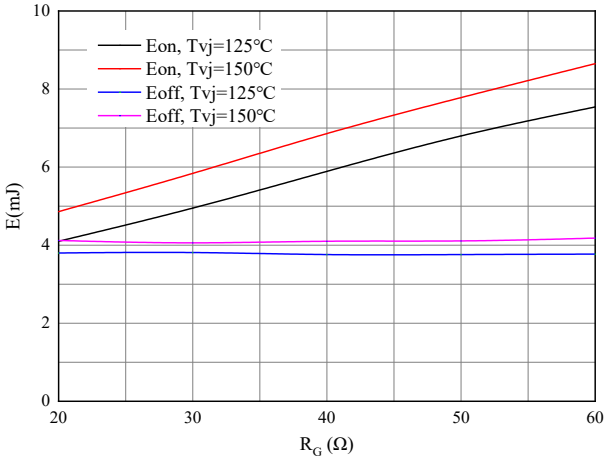


Fig 6. Switching losses of IGBT

VGE=±15V, IC=8A, VCE=600V

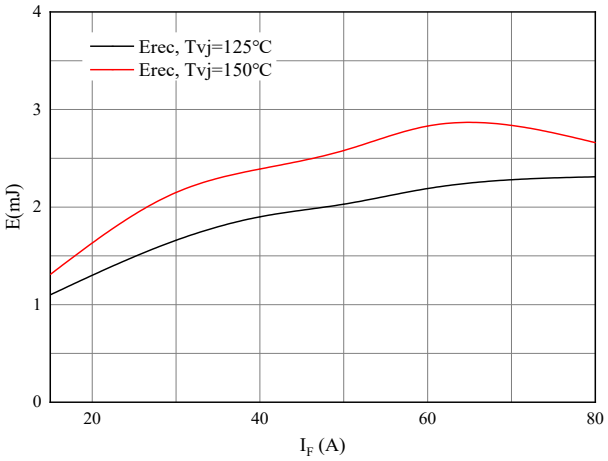


Fig 7. Switching losses of Diode

Rgon=12Ω, VCE=600V

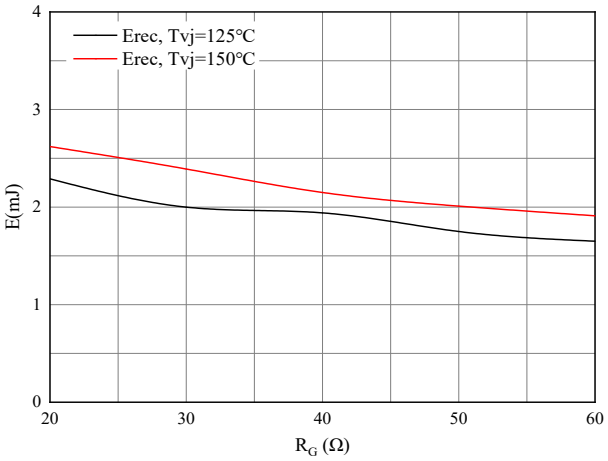


Fig 8. Switching losses of Diode

IF=8A, VCE=600V

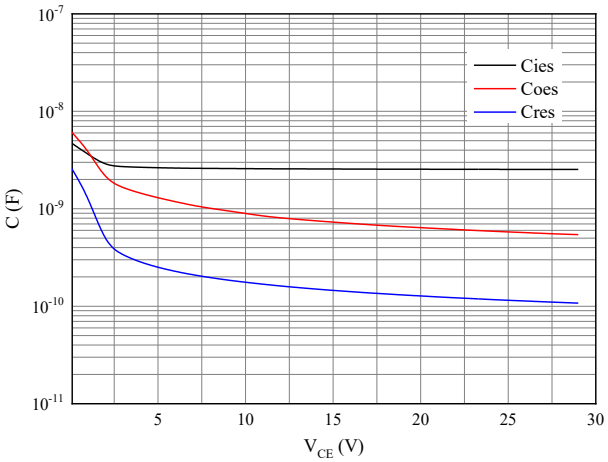
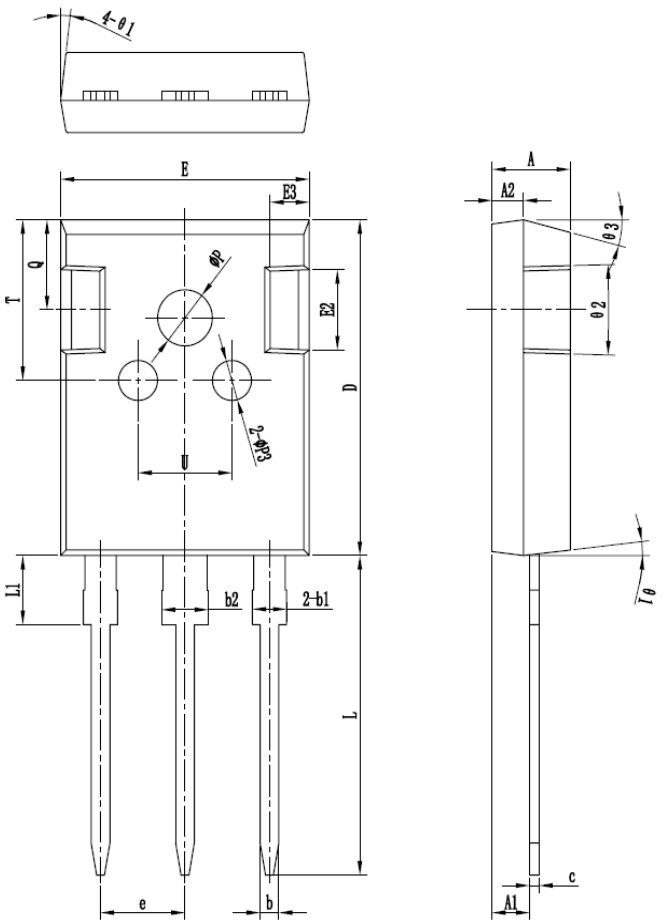


Fig 9. Capacitance characteristic

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°