

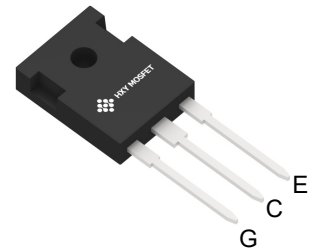


Features

- Easy paralleling capability due to positive temperature coefficient in $V_{CE_{SAT}}$
- Low EMI
- Low Gate Charge
- Low Saturation Voltage $V_{CE(SAT)}$
- Maximum junction temperature $T_{VJmax}=175^{\circ}C$

Applications

- UPS
- EV-Charger
- Solar String Inverter
- Energy Storage Inverter



TO-247

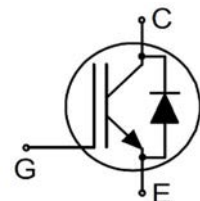


Table 1 Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CE(SAT)}$ ($T_{vj} = 25^{\circ}C$, $V_{GE} = 15V$, $I_C=30A$)	V_F ($T_{vj} = 25^{\circ}C$, $I_F=30A$)	Package	Packing
IGBT	1350 V	30 A	1.65 V	1.85 V	TO-247	30PCS

Table 2 Absolute Maximum Ratings

($T_{VJ} = 25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Conditions	Value	Unit
Collector emitter voltage	V_{CE}	$T_{vj} = 25\text{ }^{\circ}C$	1350	V
DC collector current	I_C	$T_C = 25\text{ }^{\circ}C$	60	A
		$T_C = 100\text{ }^{\circ}C$	30	A
Pulsed collector current	I_{CM}	$T_C = 25\text{ }^{\circ}C$	90	A
Maximum Diode forward current	I_F	$T_C = 25\text{ }^{\circ}C$	60	A
		$T_C = 100\text{ }^{\circ}C$	30	A
Diode pulsed current	I_{FM}	$T_C = 25\text{ }^{\circ}C$	90	A
Gate source voltage	V_{GE}	$T_{vj} = 25\text{ }^{\circ}C$	± 20	V
Transient Gate-Emitter Voltage ($t_p \leq 10\mu s$, $D < 0.010$)			± 30	V
Power dissipation	P_{tot}	$T_C = 25\text{ }^{\circ}C$	250	W
		$T_C = 100\text{ }^{\circ}C$	125	
Operating Junction Temperature Range	T_{vj}	-40 to +175		$^{\circ}C$
Storage Temperature Range	T_{stg}	-55 to +150		



Table 3 Thermal Resistance

Parameter	Symbol	Conditions	Max	Unit
IGBT Thermal resistance junction - case	R_{thJC}	IGBT	0.6	$^{\circ}\text{C} / \text{W}$
Thermal resistance junction - ambient	R_{thJA}		40	$^{\circ}\text{C} / \text{W}$

Table 4 Static Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector emitter voltage	$V_{(BR)CES}$	$T_{vj} = 25^{\circ}\text{C}$	1350	-	-	V
Collector emitter saturation voltage	V_{CEsat}	$V_{GE} = 15\text{ V}, I_C = 30\text{ A}$ $T_{vj} = 25^{\circ}\text{C}$		1.65	1.95	V
		$V_{GE} = 15\text{ V}, I_C = 30\text{ A}$ $T_{vj} = 175^{\circ}\text{C}$	-	1.95	2.25	
Diode forward voltage	VF	$V_{GE} = 0\text{ V}, I_C = 30\text{ A}$ $T_{vj} = 25^{\circ}\text{C}$		1.85	2.0	V
		$V_{GE} = 0\text{ V}, I_C = 30\text{ A}$ $T_{vj} = 175^{\circ}\text{C}$		1.95		
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C = 0.5\text{ mA}$ $T_{vj} = 25^{\circ}\text{C}$	5.5	6.18	6.9	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 1350\text{ V}, V_{GE} = 0\text{ V}$ $T_{vj} = 25^{\circ}\text{C}$	-	-	100	μA
Gate-emitter leakage current	I_{GES}	$V_{GE} = \pm 20\text{ V}, V_{CE} = 0\text{ V}$	-	-	± 200	nA
Transconductance	G_{FS}	$V_{GE} = 15\text{ V}, I_C = 20\text{ A}$		30		S

Table 5 Dynamic Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{ies}	$V_{GE} = 0\text{ V}$ $V_{CE} = 25\text{ V}$ $f = 1\text{ MHz}$	-	3800	-	pF
Output capacitance	C_{oes}		-	51	-	
Reverse transfer capacitance	C_{res}		-	18	-	
Gate charge	Q_g	$V_{GE} = 0\text{ V to } 15\text{ V}$ $I_C = 20\text{ A}$ $V_{CE} = 600\text{ V}$	-	120	-	nC
Gate to emitter charge	Q_{ge}		-	35	-	
Gate to collector charge	Q_{gc}			51		



Table 6 Switching Characteristic (TVJ = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$V_{CC} = 600\text{ V}, I_C = 30\text{ A}$ $V_{GE} = 15\text{ V}$ $R_{G(on)} = 10\Omega, R_{G(off)} = 10\Omega$	-	51	-	ns
Rise time	t_r		-	52	-	
Turn-off delay time	$t_{d(off)}$		-	190	-	
Fall time	t_f		-	152	-	
Turn-on energy	E_{on}		-	2.6	-	mJ
Turn-off energy	E_{off}		-	1.3	-	
Total switching energy	E_{ts}		-	3.9	-	

Table 7 Diode Recovery Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Reverse recovery time	T_{rr}	$V_R = 600\text{ V}, I_F = 30\text{ A}, di/dt = 600\text{ A}/\mu\text{S}$	-	330	-	ns
Reverse recovery charge	Q_{rr}		-	2.0	-	μC
Peak reverse recovery current	I_{rrm}		-	12	-	A



Typical Characteristics

Fig.1 Typical Output characteristics (25°C)

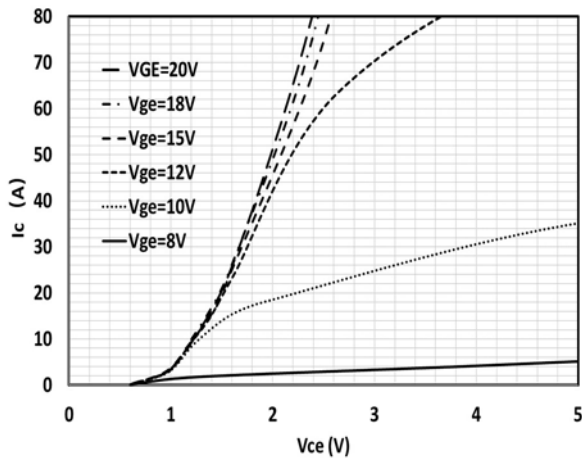


Fig.2 Typical Output characteristics (175°C)

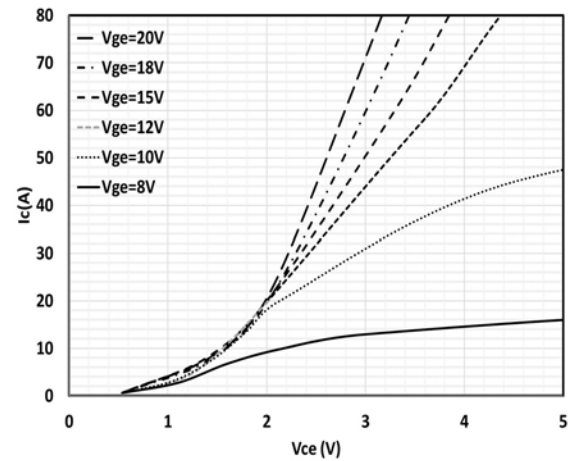


Fig.3 Forward Bias Safe Operating Area

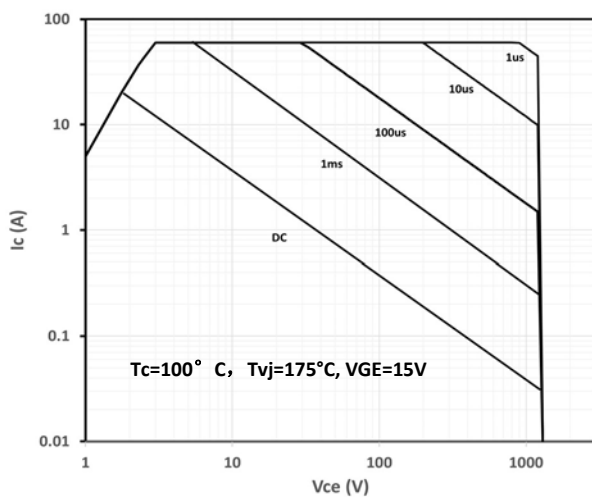


Fig.4 Transfer characteristics

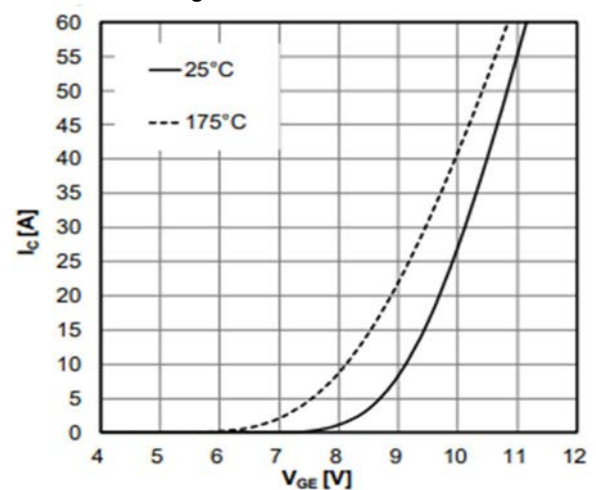


Fig.5 Gate charge

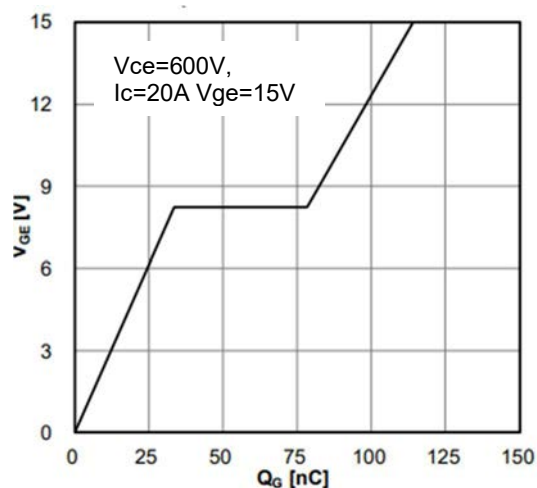


Fig.6 Typical capacitance

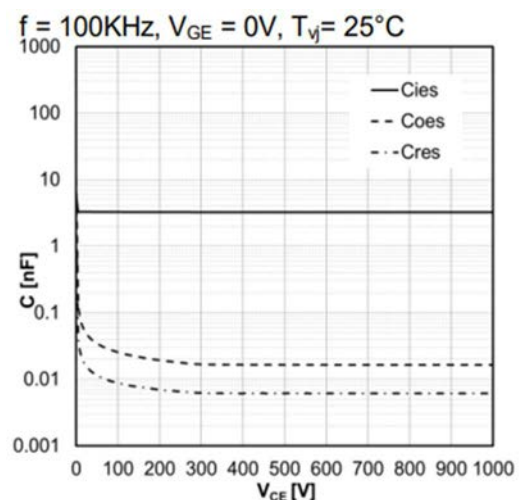




Fig.7 Vcesat vs. Junction Temperature

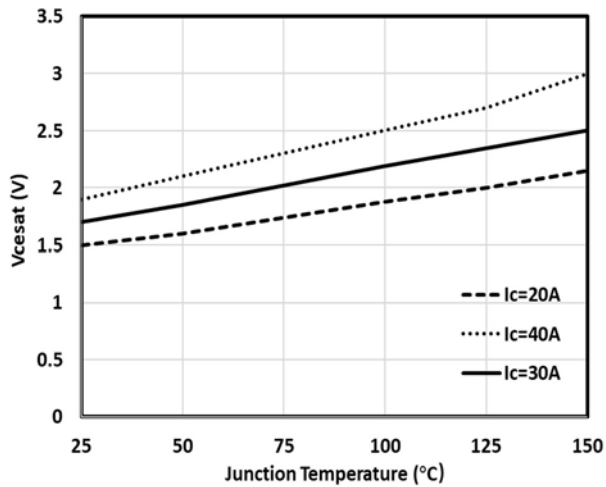


Fig.8 Typical diode VF vs. IF Characteristic

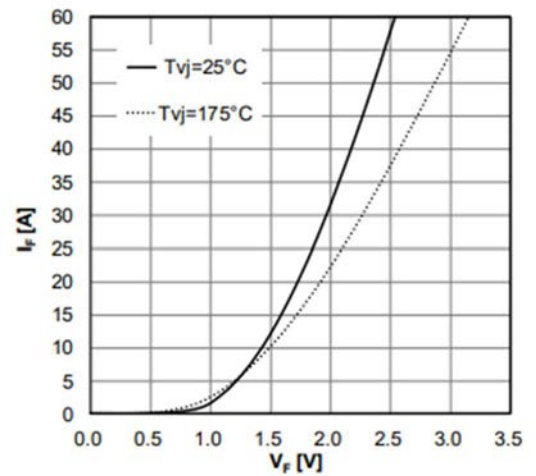


Fig.9 Threshold voltage vs. Junction temperature

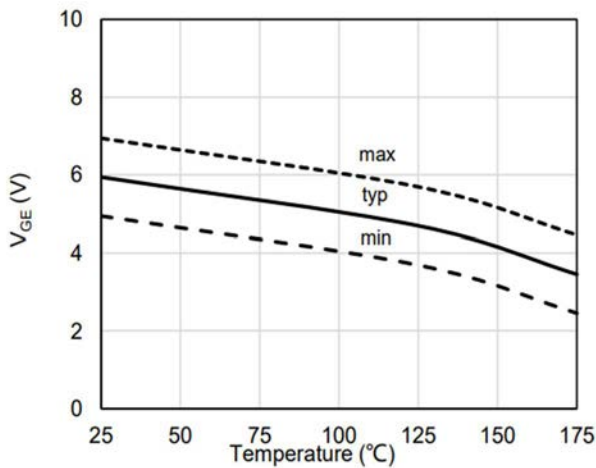


Fig.10 Switching Energy Loss vs. collector current

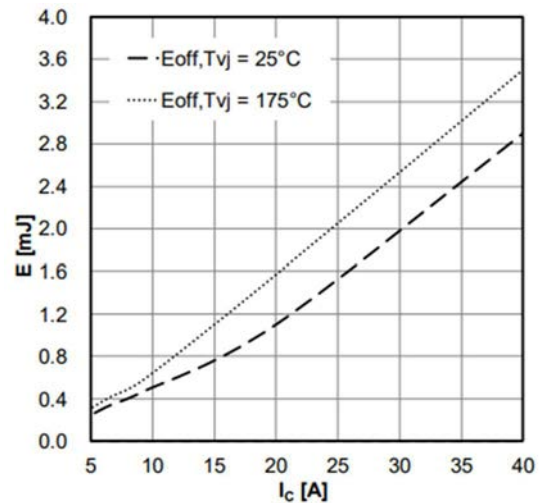


Fig.11 Switching Energy Loss vs. Rg

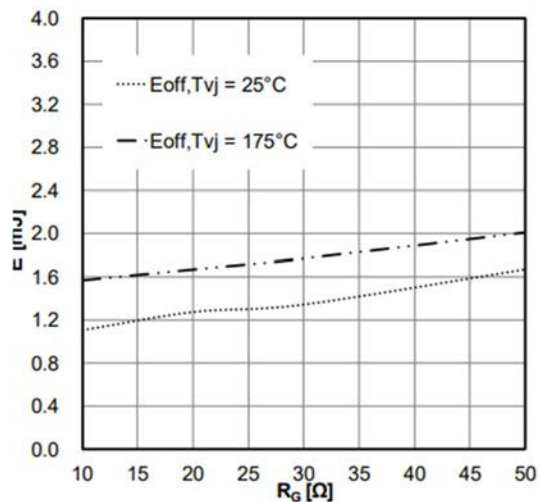
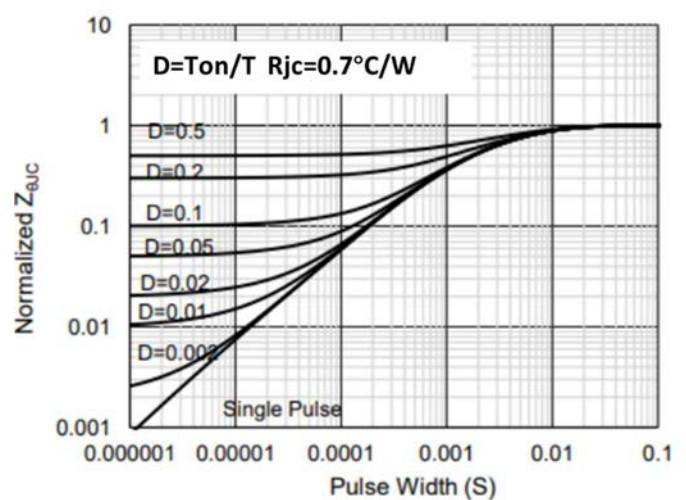
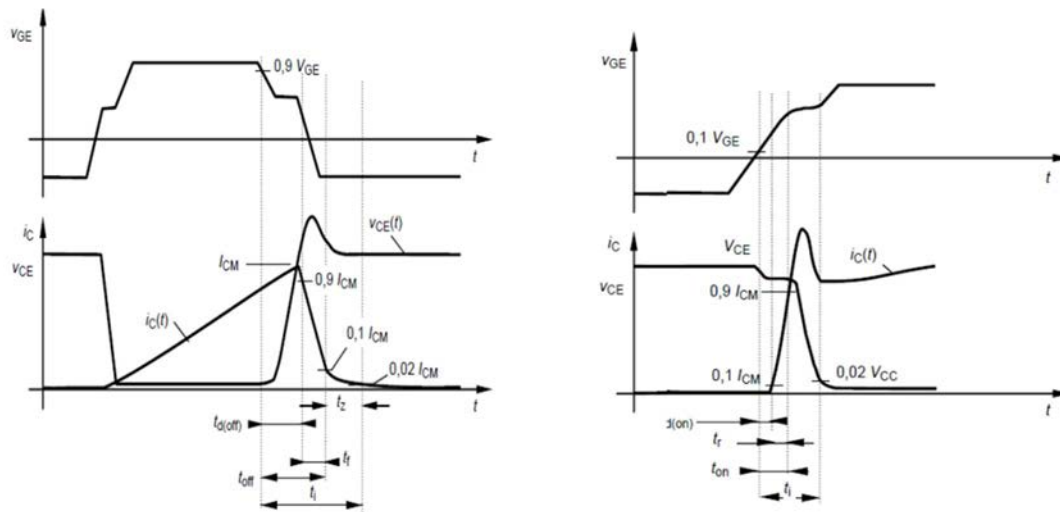


Fig.12 Transient Thermal Impedance IGBT

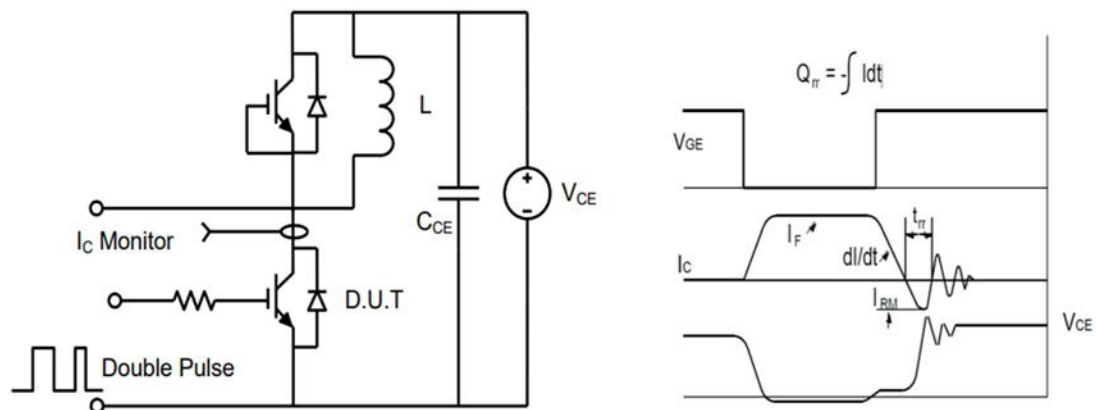




Switching Test Circuit & Waveforms

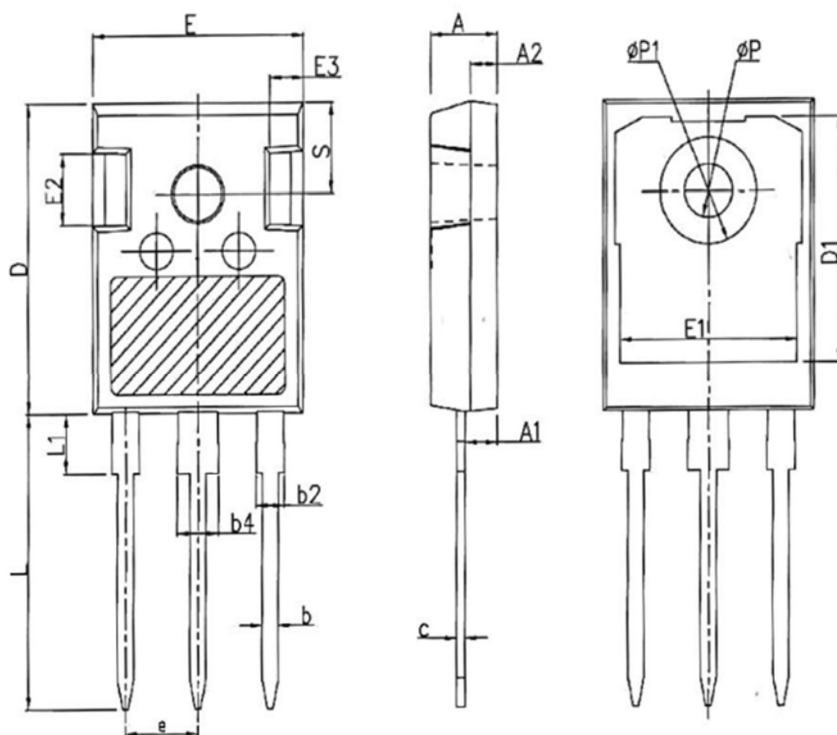


Diode Recovery Test Circuit & Waveforms





Package Outline



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		



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