

## 650V 75A Trench and Field Stop IGBT

### DESCRIPTION :

- High ruggedness performance
- Easy parallel switching capability
- Trench and field-stop technology.
- High efficiency for inverters
- RoHS compliant.



TO-263

### TYPICAL APPLICATIONS :

- Hair removal device
- Flash light

## IGBT

MAXIMUM RATINGS (Tvj=25°C unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Collector-Emitter Voltage		$V_{CES}$	650	V
Continuous collector current	Tc=25°C Tc=100°C	$I_{C\ nom}$	125 75	A
Pulsed collector current	t <sub>p</sub> limited by Tvjmax	$I_{CM}$	300	A
Gate emitter voltage		$V_{GE}$	±20	V
Power dissipation	Tc=25°C Tc=100°C	$P_{tot}$	535 267	W
Temperature under switching conditions		Tvj op	-40~+175	°C
Storage temperature		T <sub>STG</sub>	-55~+150	°C

## THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Max.	Unit
IGBT thermal resistance, junction - case		$R_{th(j-C)}$	0.28	K/W
Thermal resistance, junction - ambient		$R_{th(j-A)}$	40	K/W

## ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter breakdown voltage VGE=0V, IC=250uA	BV <sub>CES</sub>	650			V
Collector-emitter cut-off current VCE=650V, VGE=0V Tvj=25°C	IC <sub>CES</sub>			50	uA
Gate-emitter leakage current VCE=0V, VGE=20V Tvj=25°C	IG <sub>ES</sub>			100	nA
Gate-Emitter threshold voltage IC=1.0mA, VGE= VCE Tvj=25°C	V <sub>GE(th)</sub>	5.0	5.4	5.6	V
Collector-Emitter saturation voltage VGE=15V, IC=75A Tvj=25°C VGE=15V, IC=75A Tvj=175°C	V <sub>CE(SAT)</sub>		1.8 2.3		V
Input capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25°C	C <sub>ies</sub>		4250		pF
Output capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25°C	C <sub>oes</sub>		205		pF
Reverse transfer capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25°C	C <sub>res</sub>		31		pF
Gate charge IC = 75A, VGE = 15 V, VCC =520V Tvj=25°C	QG		130		nC
Turn-on delay time IC=75A, VCC=400 V Tvj=25°C VGE=0/15 V, RG=10Ω Tvj=175°C (inductive load)	td <sub>(ON)</sub>		53 53		ns
Rise time IC=75A, VCC=400 V Tvj=25°C VGE=0/15 V, RG=10Ω Tvj=175°C (inductive load)	tr		132 128		ns
Turn-off delay time IC=75A, VCC=400 V Tvj=25°C VGE=0/15 V, RG=10Ω Tvj=175°C (inductive load)	td <sub>(OFF)</sub>		162 181		ns
Fall time IC=75A, VCC=400 V Tvj=25°C VGE=0/15 V, RG=10Ω Tvj=175°C (inductive load)	tf		95 107		ns

Turn-on energy IC=75A, VCC=400 V      Tvj=25°C VGE=0/15 V, RG=10Ω    Tvj=175°C (inductive load)	E <sub>(ON)</sub>		3.3 4.8		mJ
Turn-off energy loss per pulse IC=75A, VCC=400 V      Tvj=25°C VGE=0/15 V, RG=10Ω    Tvj=175°C (inductive load)	E <sub>(OFF)</sub>		2.2 2.7		mJ

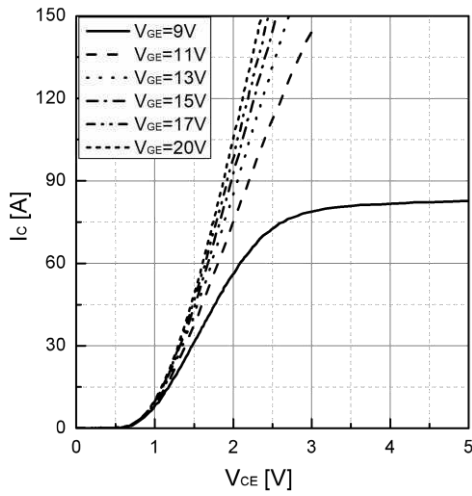


Figure 1. Typical output characteristics ( $T_{vj}=25^{\circ}\text{C}$ )

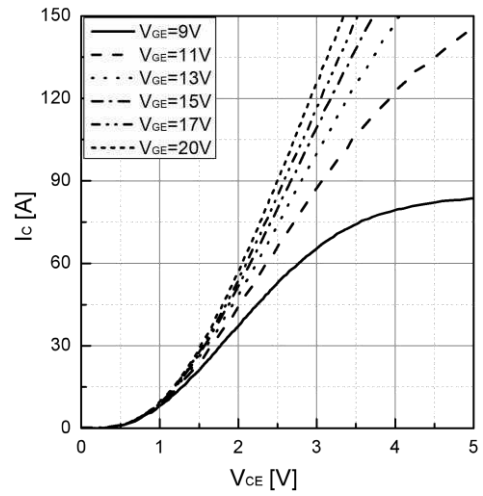


Figure 2. Typical output characteristics ( $T_{vj}=175^{\circ}\text{C}$ )

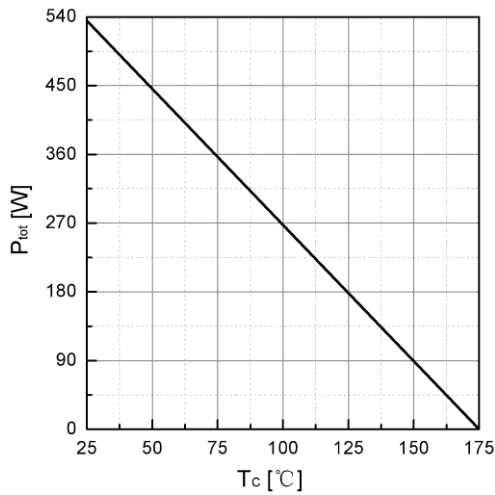


Figure 3. Power dissipation as a function of TC

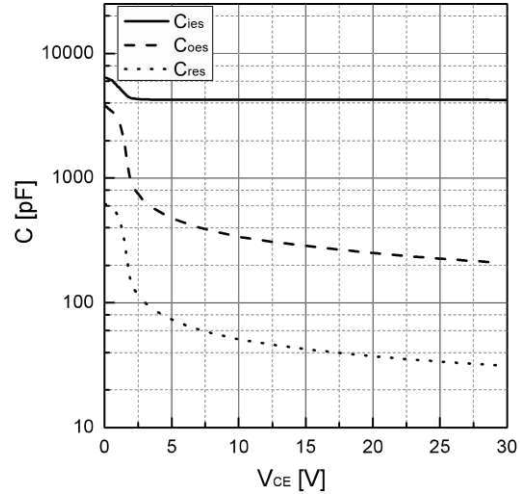


Figure 4. Typical capacitance as a function of  $V_{ce}$  ( $f=1\text{MHz}$ ,  $V_{ge}=0\text{V}$ )

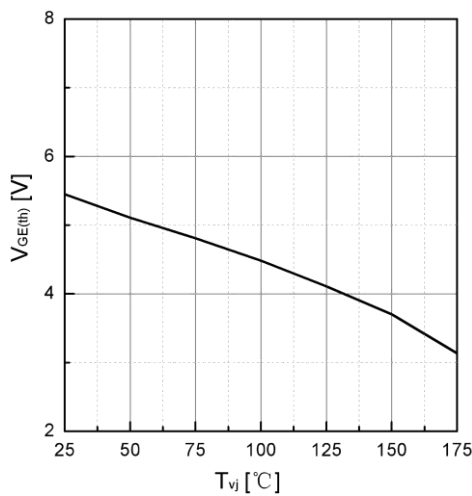


Figure 5. Typical  $V_{ge(th)}$  as a function of  $T_{vj}$  ( $I_c=1\text{mA}$ )

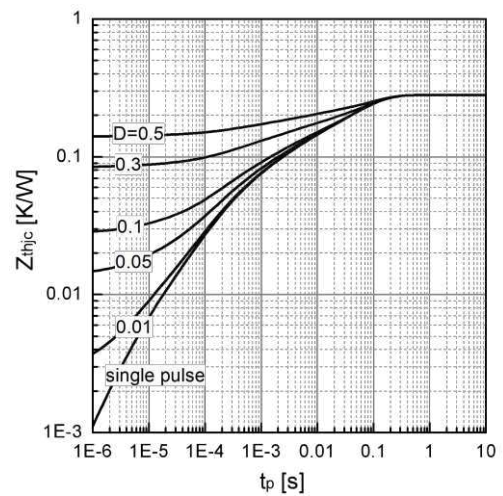


Figure 6. Transient thermal impedance of IGBT

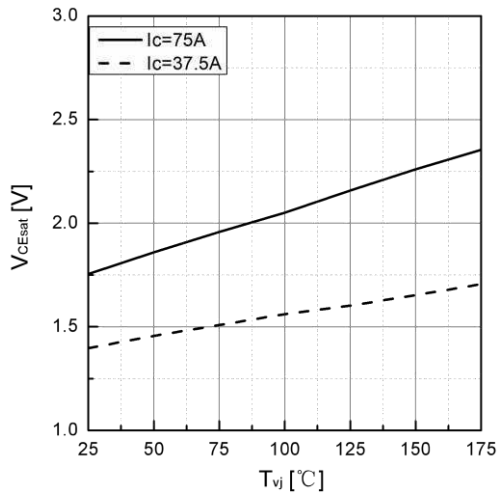


Figure 7. Typical VCEsat as a function of Tvj

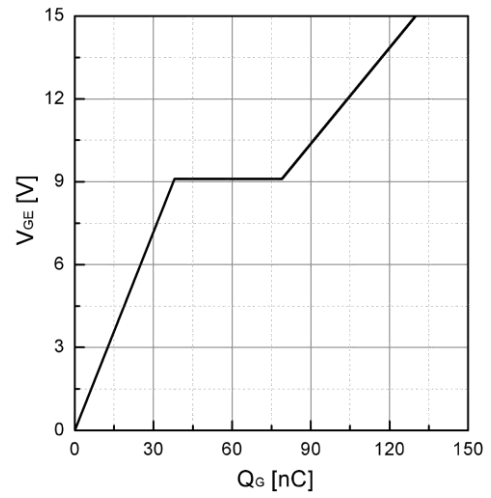


Figure 8. Typical Gate charge

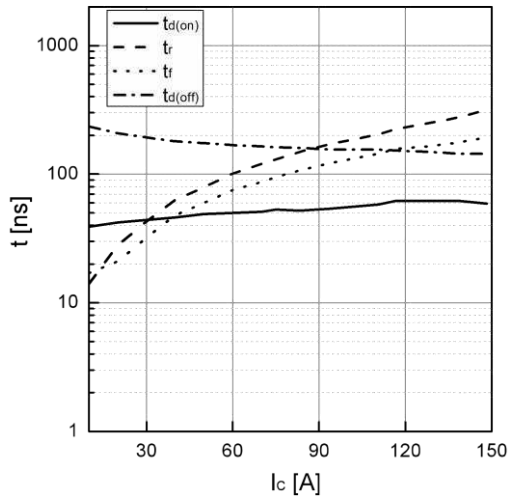


Figure 9. Typical switching times as a function of IC

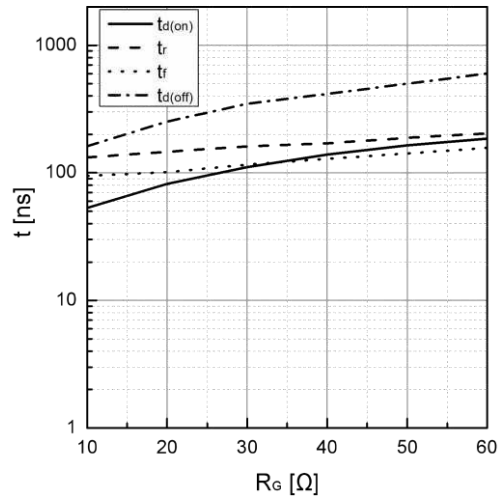


Figure 10. Typical switching times as a function of RG

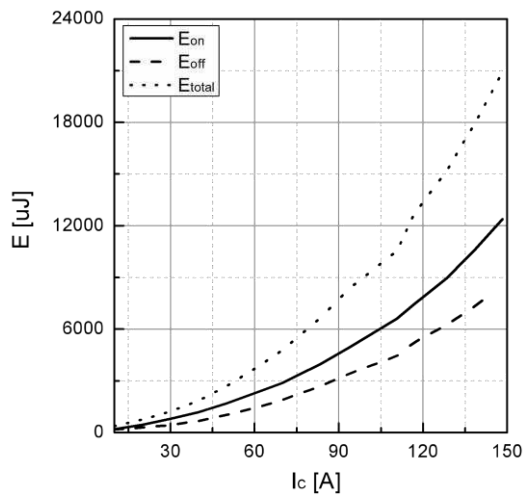


Figure 11. Typical switching energy losses as a function of IC

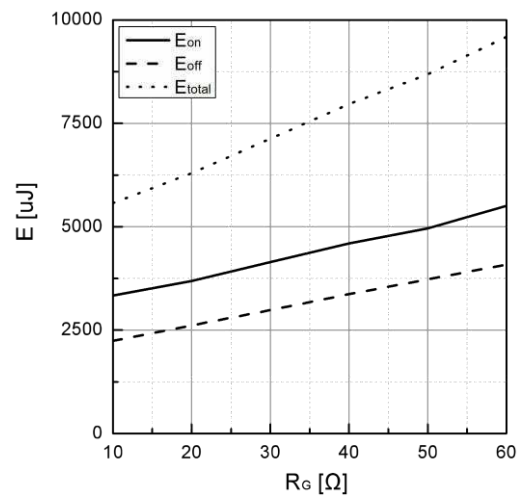
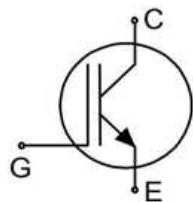
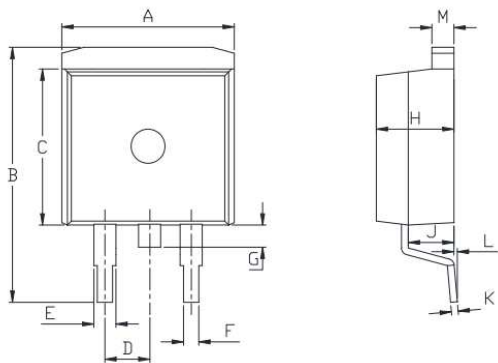


Figure 12. Typical switching energy losses as a function of RG

- Circuit diagram



- Package outlines : Dimensions in (mm)



DIM	MILLIMETERS	
	MIN	MAX
A	9.90	10.20
B	14.70	15.80
C	9.40	9.60
D	Typ. 2.54	
E	1.20	1.40
F	0.75	0.85
G	---	1.75
H	4.40	4.70
J	2.30	2.70
K	0.38	0.55
L	0.00	0.25
M	1.25	1.35

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