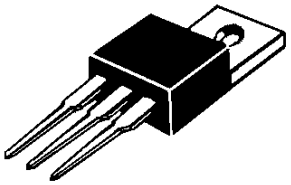
650V 30A Trench and Field Stop IGBT

DESCRIPTION：
- Excellent current sharing in parallel operation
- 10μs short circuit capability
- Positive $V_{CE(SAT)}$ temperature coefficient
- High efficiency for motor control
- High ruggedness performance.
- RoHS compliant.



TO-220AB

TYPICAL APPLICATIONS：
- Home appliances
- General inverters
- Motor drives

IGBT

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector-Emitter Voltage		V_{CES}	650	V
Continuous collector current	Tc=100℃	$I_{C\ nom}$	30	A
Pulsed collector current	t_P limited by Tvjmax	I_{CM}	120	A
Gate emitter voltage		V_{GE}	±20	V
Short circuit withstand time		t_{SC}	10	us
Power dissipation	Tc=25℃ Tc=100℃	P_{tot}	187 93	W
Temperature under switching conditions		Tvj op	-40~+175	℃
Storage temperature		T_{STG}	-55~+150	℃

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Max.	Unit
IGBT thermal resistance, junction - case		$R_{th(j-C)}$	0.80	K/W
Diode thermal resistance, junction - case		$R_{th(j-C)}$	1.80	K/W
Thermal resistance, junction - ambient		$R_{th(j-A)}$	40	K/W

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter cut-off current VCE=650V, VGE=0V Tvj=25℃	I_{CES}			50	uA
Gate-emitter leakage current VCE=0V, VGE=20V Tvj=25℃	I_{GES}			100	nA
Gate-Emitter threshold voltage IC=1.0mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	5.3	5.7	5.9	V
Collector-Emitter saturation voltage VGE=15V, IC=30A Tvj=25℃ VGE=15V, IC=30A Tvj=175℃	$V_{CE(SAT)}$		1.7 2.2		V
Input capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{ies}		1978		pF
Output capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{oes}		100		pF
Reverse transfer capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{res}		23		pF
Gate charge IC = 30A, VGE = 15 V,VCE =520V Tvj=25℃	Q_G		103		nC
Turn-on delay time IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$td_{(ON)}$		30 28		ns
Rise time IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	tr		39 40		ns
Turn-off delay time IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$td_{(OFF)}$		151 169		ns
Fall time IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	tf		29 71		ns
Turn-on energy IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$E_{(ON)}$		0.95 1.50		mJ

Turn-off energy loss per pulse IC=30A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$E_{(OFF)}$		0.60 0.80		mJ

Diode

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Repetitive peak reverse voltage	Tvj=25℃	V_{RRM}	650	V
Continuous forward current	Tc=100℃	I_F	30	A
Diode maximum current	t_P limited by Tvj max	I_{FM}	80	A

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=30A, VGE=0 V Tvj=25℃ IF=30A, VGE=0 V Tvj=175℃	V_F		1.4 1.2		V
Reverse Recovered Time IF=30 A, Tvj=25℃ -diF/dt =550A/μs Tvj=175℃ VR=400 V	T_{rr}		105 171		ns
Peak reverse recovery current IF=30 A, Tvj=25℃ -diF/dt =550A/μs Tvj=175℃ VR=400 V	I_{RRM}		16 26		A
Reverse Recovered charge IF=30 A, Tvj=25℃ -diF/dt =550A/μs Tvj=175℃ VR=400 V	Q_{rr}		876 2650		nC

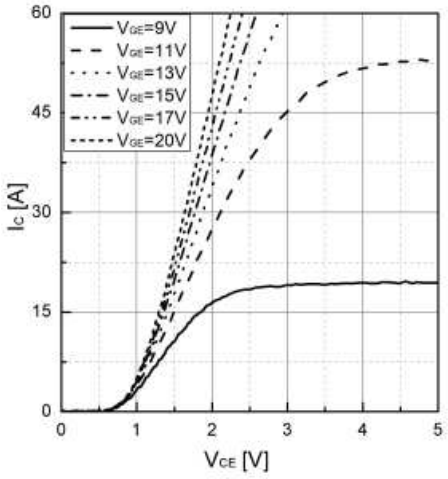


Figure 1. Typical output characteristics (Tvj=25℃)

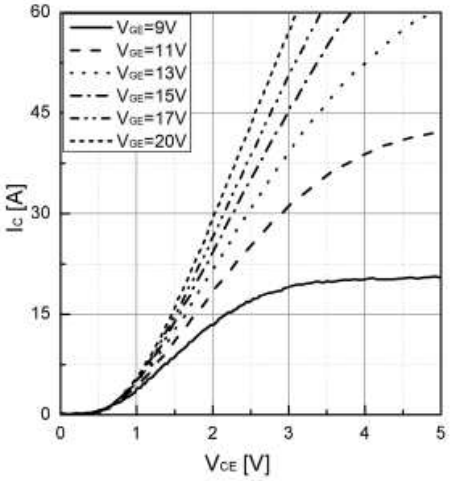


Figure 2. Typical output characteristics (Tvj=175℃)

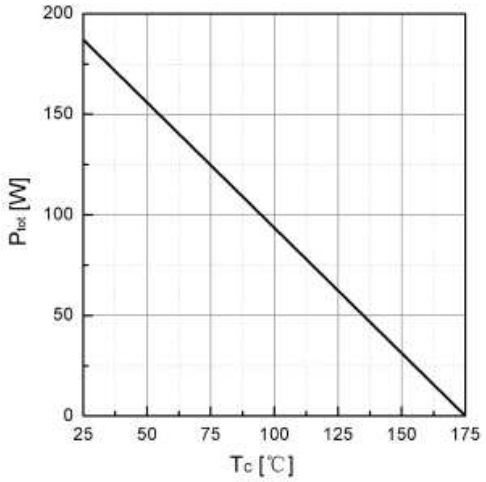


Figure 3. Power dissipation as a function of TC

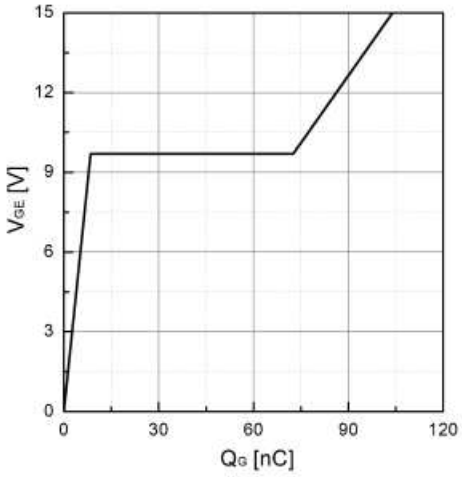


Figure 4. Typical Gate charge

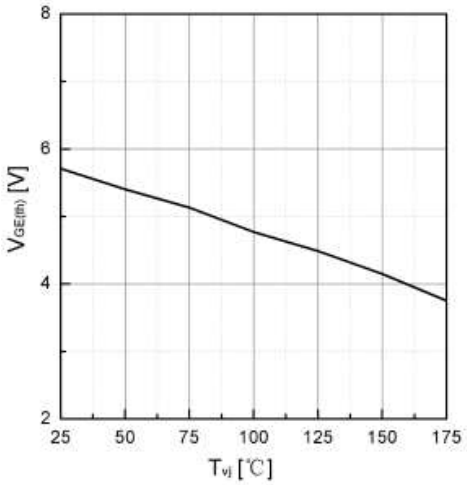


Figure 5. Typical VGE(th) as a function of Tvj (I_C=1mA)

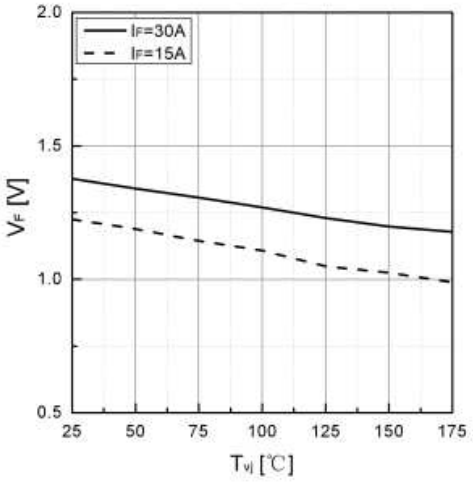


Figure 6. Typical VF as a function of Tvj

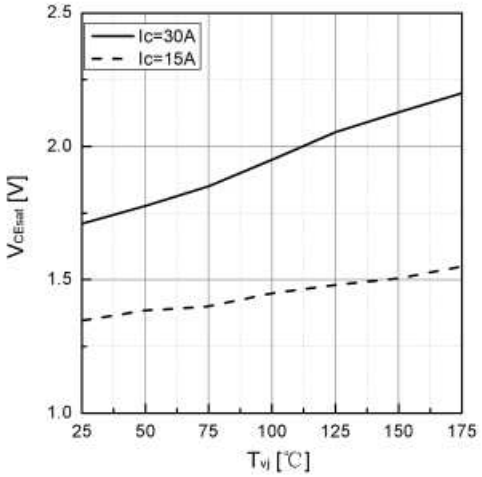


Figure 7. Typical VCEsat as a function of Tvj

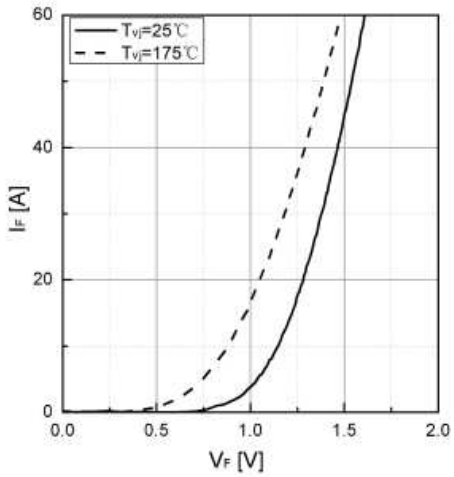


Figure 8. Typical IF as a function of VF

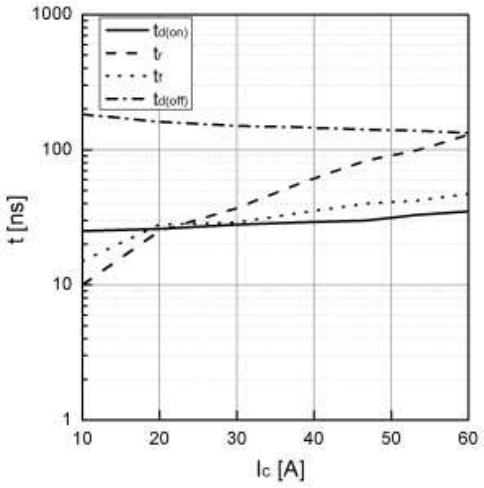


Figure 9. Typical switching times as a function of IC

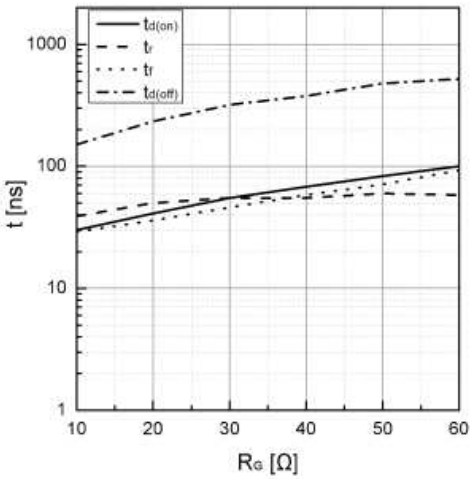


Figure 10. Typical switching times as a function of RG

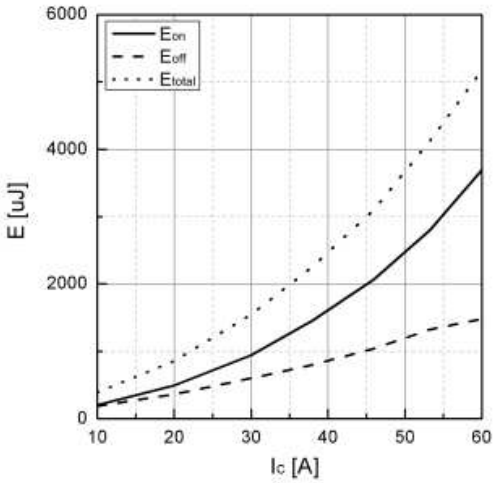


Figure 11. Typical switching energy losses as a function of IC

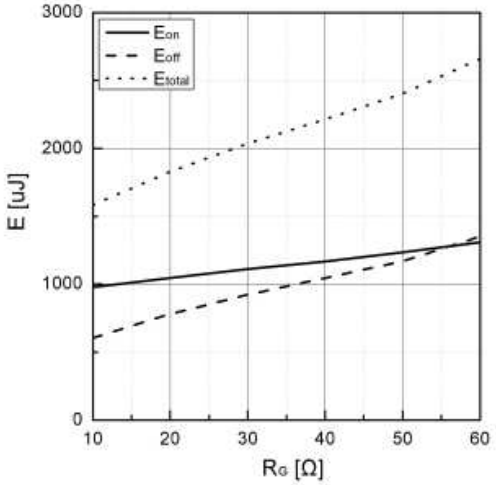


Figure 12. Typical switching energy losses as a function of RG

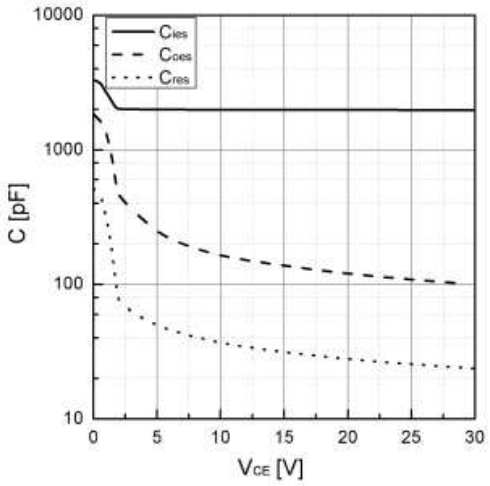
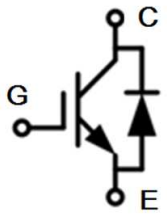
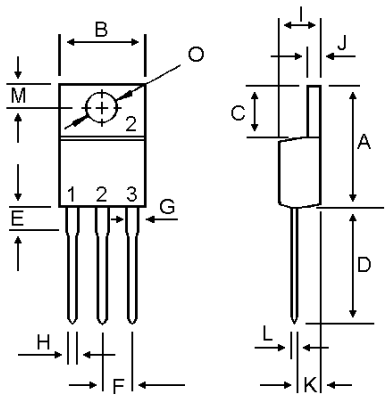


Figure 13. Typical capacitance as a function of VCE
(f=1Mhz, VGE=0V)

• Circuit diagram



• Package outlines : Dimensions in (mm)



DIM	MILLIMETERS	
	MIN	MAX
A	14.68	16.20
B	9.78	10.42
C	5.02	6.60
D	13.00	14.62
E	3.10	4.19
F	2.41	2.67
G	1.10	1.67
H	0.69	1.01
I	4.22	4.98
J	1.14	1.40
K	2.20	3.30
L	0.28	0.61
M	2.48	3.00
O	3.40	4.00

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