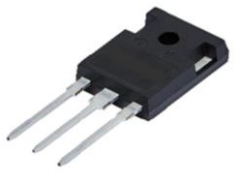
650V 60A Trench and Field Stop IGBT

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



TO-247

TYPICAL APPLICATIONS：
- PFC applications
- Solar inverters
- Uninterruptible power supplies (UPS)

IGBT

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector-Emitter Voltage	Tvj=25℃	V_{CES}	650	V
Continuous collector current	Tc=100℃	$I_{C\ nom}$	60	A
Pulsed collector current	t_P limited by Tvjmax	I_{CM}	240	A
Gate emitter voltage		V_{GE}	±20	V
Total power dissipation	Tc=25℃ Tc=100℃	P_{tot}	394 197	W
Temperature under switching conditions		Tvj op	-40~+175	℃
Storage temperature		T_{STG}	-40~+150	℃

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Max.	Unit
IGBT thermal resistance, junction - case		$R_{th(j-C)}$	0.38	K/W
Diode thermal resistance, junction - case		$R_{th(j-C)}$	0.50	K/W
Thermal resistance, junction - ambient		$R_{th(j-A)}$	40	K/W

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter saturation voltage VGE=15V, IC=60A Tvj=25℃ VGE=15V, IC=60A Tvj=175℃	$V_{CE(SAT)}$		1.9 2.5		V
Gate-Emitter threshold voltage IC=1.0mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	5.2	5.4	5.7	V
Input capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{ies}		3860		pF
Output capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{oes}		170		pF
Reverse transfer capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{res}		30		pF
Gate charge IC = 60A, VGE = 15 V,VCE =520V Tvj=25℃	Q_G		120		nC
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
Turn-on delay time IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$td_{(ON)}$		44 45		ns
Rise time IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	tr		100 105		ns
Turn-off delay time IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$td_{(OFF)}$		166 180		ns
Fall time IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	tf		75 76		ns
Turn-on energy IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$E_{(ON)}$		2.3 3.6		mJ

Turn-off energy loss per pulse IC=60A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=175℃ (inductive load)	$E_{(OFF)}$		1.3 1.6		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	60	A
Diode maximum current	t_P limited by Tvj max	I_{FM}	240	A

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=60A, VGE=0 V Tvj=25℃ IF=60A, VGE=0 V Tvj=175℃	V_F		1.7 1.4		V
Reverse Recovered Time IF=60 A, Tvj=25℃ -diF/dt =450A/μs Tvj=175℃ VR=400 V	T_{rr}		78 155		ns
Peak reverse recovery current IF=60 A, Tvj=25℃ -diF/dt =450A/μs Tvj=175℃ VR=400 V	I_{RM}		14 25		A
Reverse Recovered charge IF=60 A, Tvj=25℃ -diF/dt =450A/μs Tvj=175℃ VR=400 V	Q_{rr}		600 2300		nC

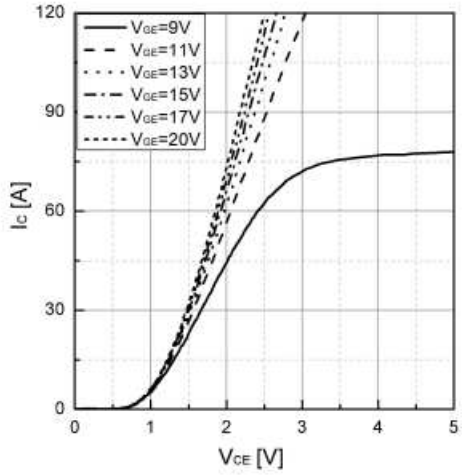


Figure 1. Typical output characteristics (Tvj=25℃)

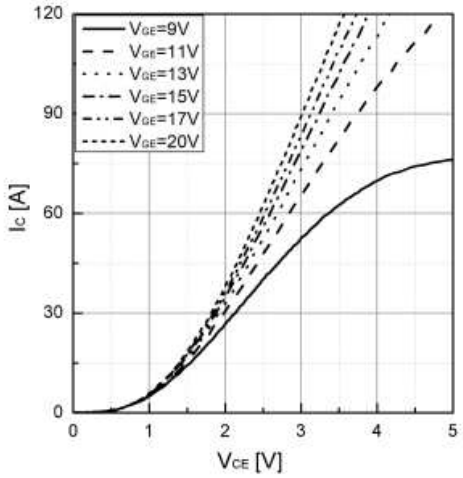


Figure 2. Typical output characteristics (Tvj=175℃)

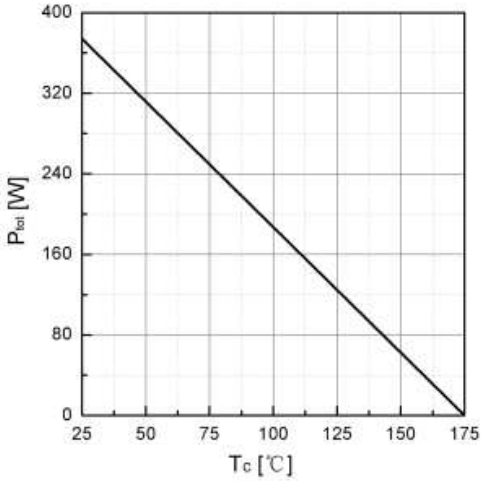


Figure 3. Power dissipation as a function of T_C

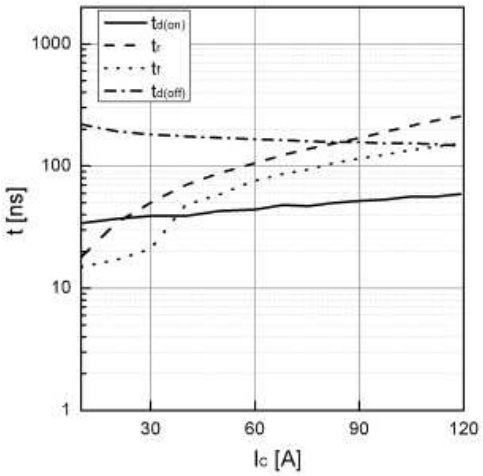


Figure 4. Typical switching time as a function of I_C

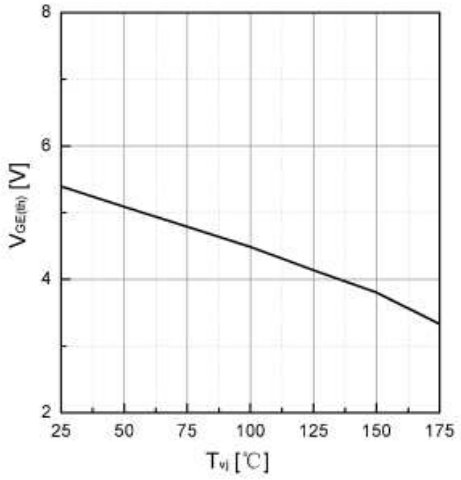


Figure 5. Typical VGE(th) as a function of Tvj (I_C=1mA)

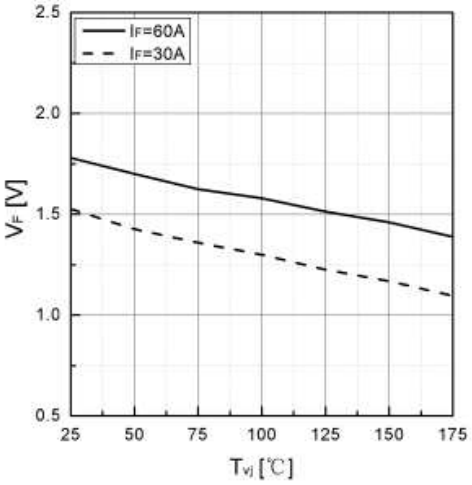


Figure 6. Typical VF as a function of Tvj

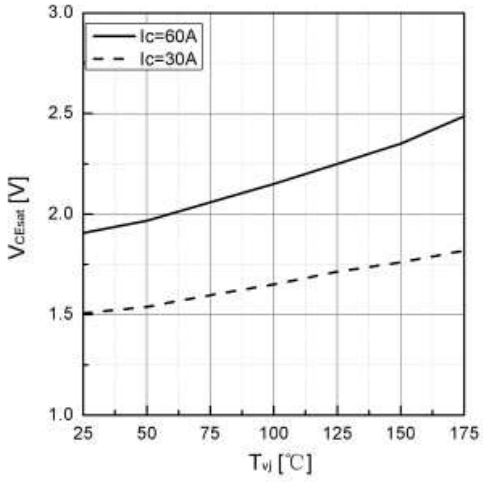


Figure 7. Typical VCEsat as a function of Tvj

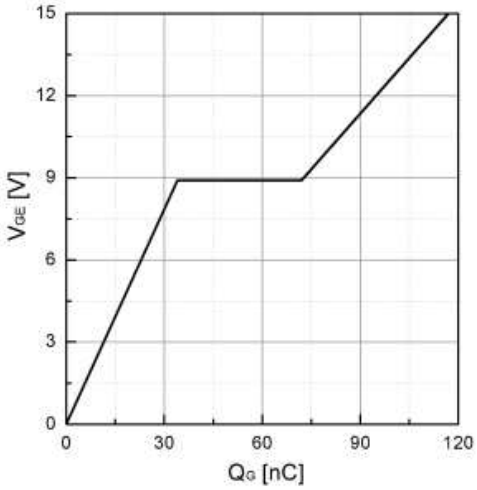


Figure 8. Typical Gate charge

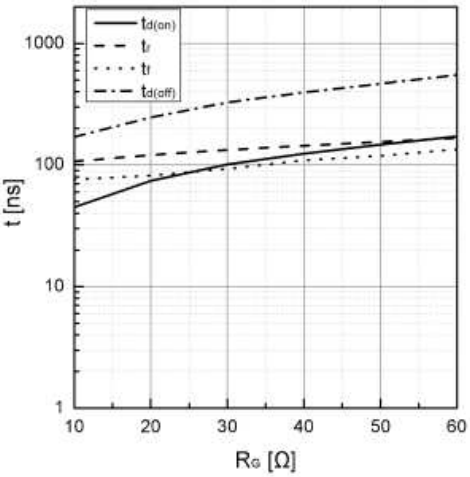


Figure 9. Typical switching times as a function of RG

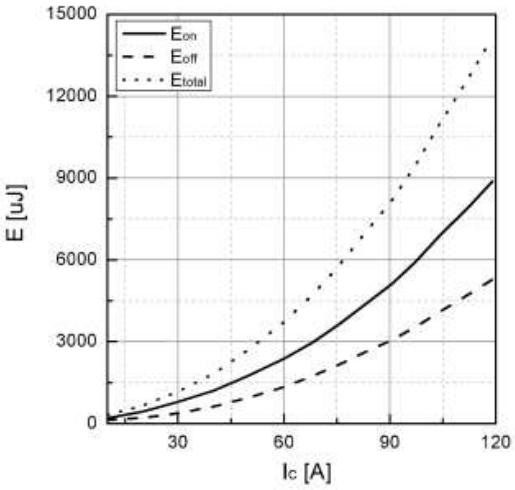


Figure 10. Typical switching energy losses as a function of IC

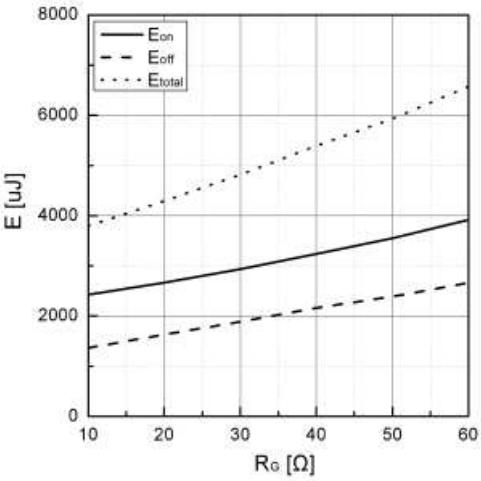


Figure 11. Typical switching energy losses as a function of RG

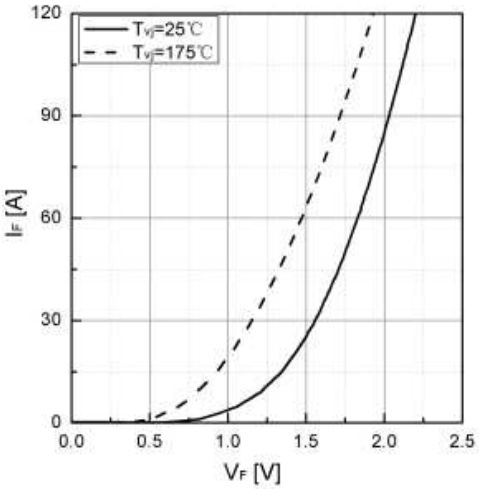


Figure 12. Typical IF as a function of VF

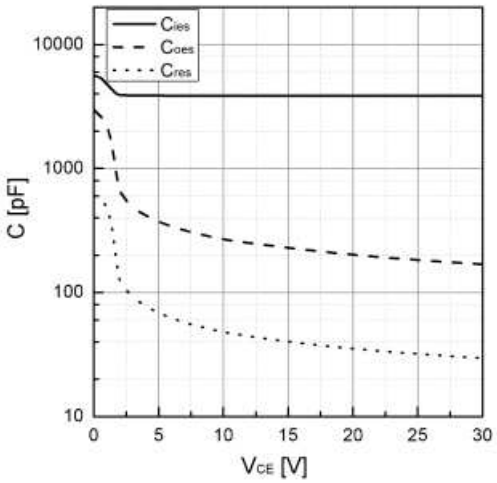


Figure 13. Typical capacitance as a function of VCE (f=1Mhz, VGE=0V)

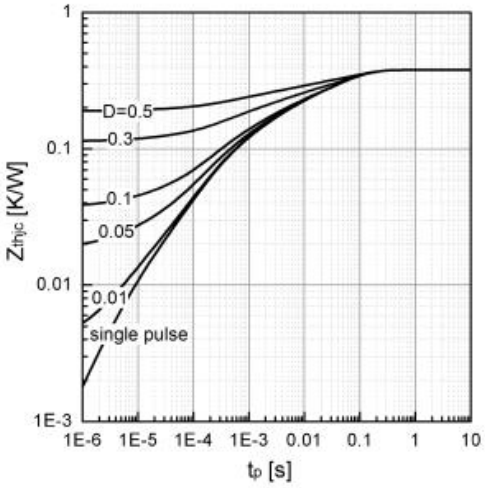
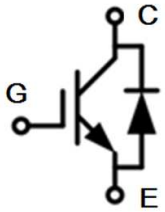
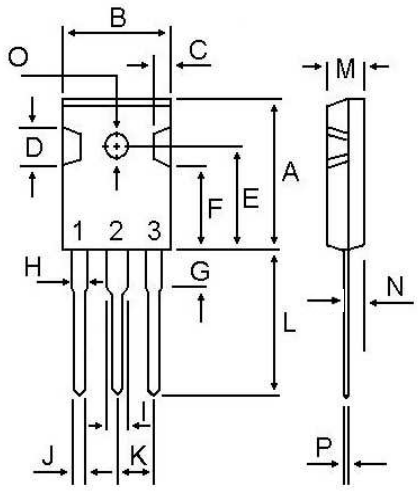


Figure 14. Transient thermal impedance of IGBT

• Circuit diagram



• Package outlines : Dimensions in (mm)



DIM	MILLIMETERS	
	MIN	MAX
A	20.80	21.80
B	15.38	16.20
C	1.90	2.70
D	5.10	6.10
E	14.50	15.50
F	11.20	13.20
G	3.75	4.35
H	1.90	2.30
I	2.90	3.30
J	1.00	1.40
K	5.26	5.66
L	19.50	20.50
M	4.68	5.36
N	2.30	2.60
O	3.45	3.85
P	0.48	0.72

Notice

MOSPEC reserves the rights to make changes of the content herein the document anytime without notification. MOSPEC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies. Please refer to MOSPEC website for the last document.

MOSPEC disclaims any and all liability arising out of the application or use of any product including damages incidentally and consequentially incurred.

Application shown on the herein document are examples of standard use and operation. Customers are responsible for comprehending suitable use in particular applications. MOSPEC makes no representation or warranty that such application will be suitable for the specified use without further testing or modification.

The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by MOSPEC for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of MOSPEC or others.

These MOSPEC products are intended for usage in general electronic equipment. Please make sure to consult with MOSPEC before you use these MOSPEC products in equipment which require specialized quality and/or reliability, and in equipment which could have major impact to the welfare of human life (atomic energy control, aeronautics , traffic control, combustion control, safety devices etc.)