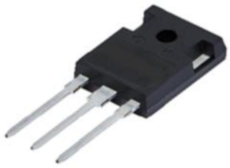
MOSPEC

MD40D65JB2H

650V 40A Trench and Field Stop IGBT

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

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



TO-247

IGBT

MAXIMUM RATINGS

Characteristic	Condition	Symbol	Value	Unit
Collector-Emitter Voltage	Tvj=25℃	V_{CES}	650	V
Continuous collector current	Tc=100℃	$I_{C\ nom}$	40	A
Pulsed collector current	t_P limited by Tvjmax	I_{CM}	160	A
Gate emitter voltage		V_{GE}	±20	V
Total power dissipation	Tc=25℃ Tc=100℃	P_{tot}	300 150	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		$R_{th(j-C)}$	0.50	K/W
Diode thermal resistance, junction - case		$R_{th(j-C)}$	0.90	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=40A Tvj=25℃ VGE=15V, IC=40A Tvj=150℃	$V_{CE(SAT)}$		1.7 2.2		V
Gate-Emitter threshold voltage IC=1.0mA, VGE= VCE Tvj=25℃	$V_{GE(th)}$	4.0	5.0	6.0	V
Input capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{ies}		2480		pF
Output capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{oes}		95		pF
Reverse transfer capacitance f=1MHz, VCE=30 V, VGE=0 V Tvj=25℃	C_{res}		21		pF
Gate charge IC = 40A, VGE = 15 V,VCE =520V Tvj=25℃	Q_G		78		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=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	$td_{(ON)}$		32 28		ns
Rise time IC=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	tr		59 52		ns
Turn-off delay time IC=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	$td_{(OFF)}$		110 128		ns
Fall time IC=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	tf		52 75		ns
Turn-on energy IC=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	$E_{(ON)}$		1.2 1.6		mJ

Turn-off energy loss per pulse IC=40A, VCE=400 V Tvj=25℃ VGE=0/15 V, RG=10Ω Tvj=150℃ (inductive load)	$E_{(OFF)}$		0.60 0.90		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	40	A
Diode maximum current	t_P limited by Tvj max	I_{FM}	160	A

ELECTRICAL CHARATERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Forward voltage IF=40A, VGE=0 V Tvj=25℃ IF=40A, VGE=0 V Tvj=150℃	V_F		1.5 1.3		V
Reverse Recovered Time IF=40 A, Tvj=25℃ -diF/dt =1200A/μs Tvj=150℃ VR=400 V	T_{rr}		82 130		ns
Peak reverse recovery current IF=40 A, Tvj=25℃ -diF/dt =1200A/μs Tvj=150℃ VR=400 V	I_{RM}		15 42		A
Reverse Recovered charge IF=40 A, Tvj=25℃ -diF/dt =1200A/μs Tvj=150℃ VR=400 V	Q_{rr}		1620 3520		nC

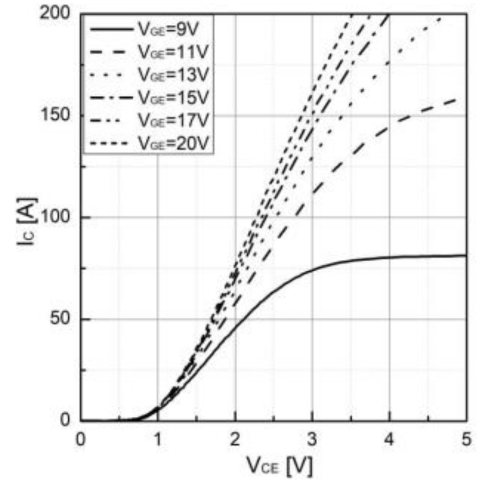


Figure 1. Typical output characteristics (Tvj=25℃)

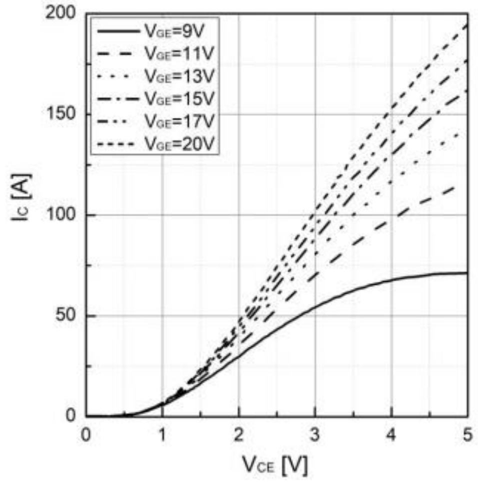


Figure 2. Typical output characteristics (Tvj=150℃)

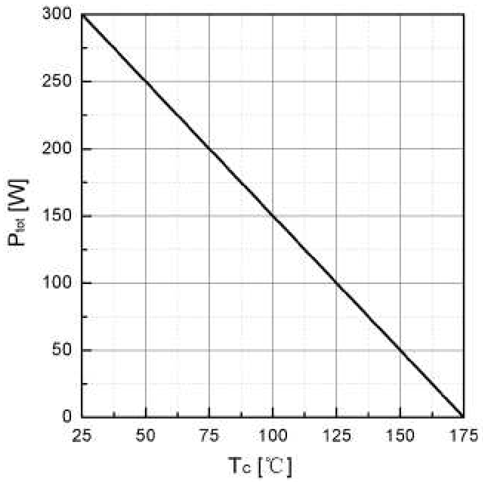


Figure 3. Power dissipation as a function of T_C

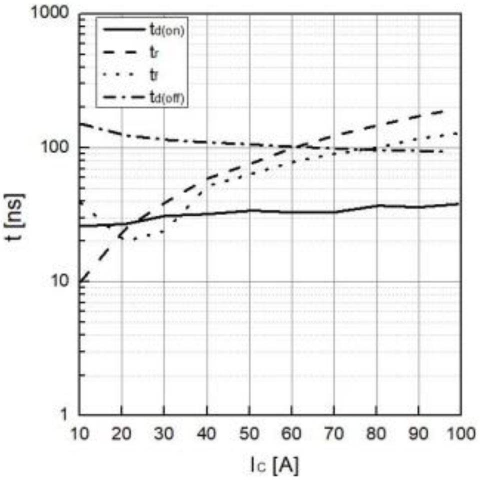


Figure 4. Typical switching time as a function of I_C

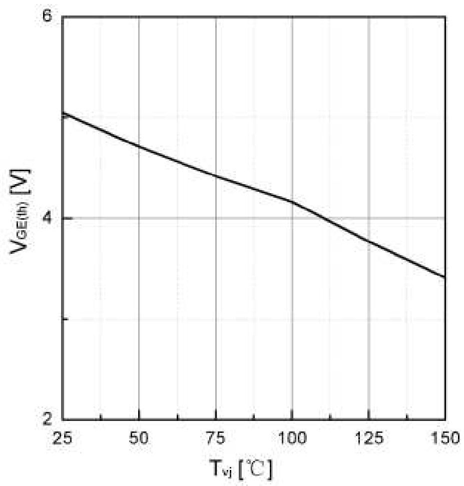


Figure 5. Typical VGE(th) as a function of Tvj (I_C=1mA)

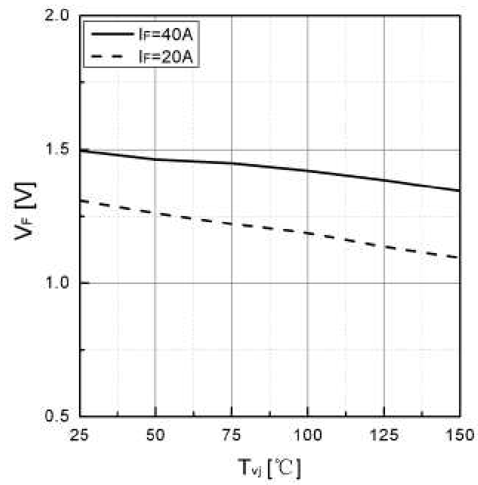


Figure 6. Typical VF as a function of Tvj

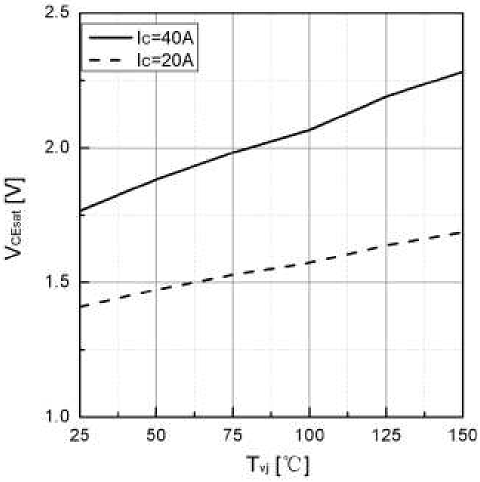


Figure 7. Typical VCEsat as a function of Tvj

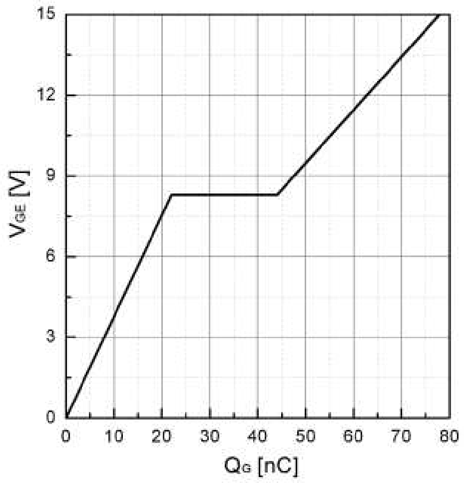


Figure 8. Typical Gate charge

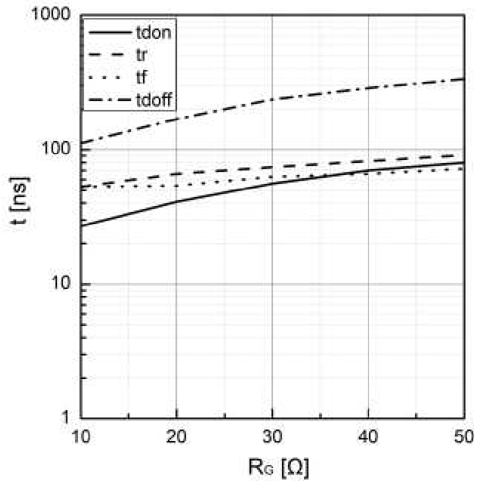


Figure 9. Typical switching times as a function of RG

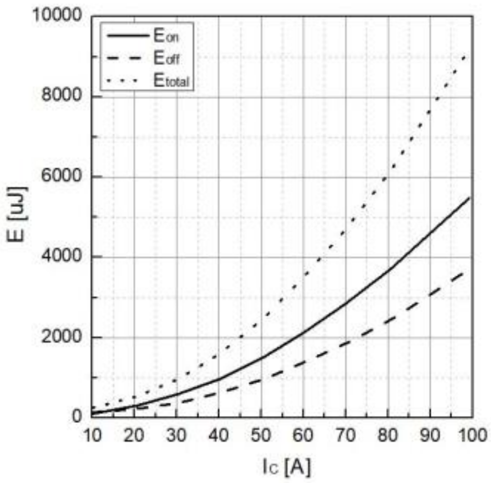


Figure 10. Typical switching energy losses as a function of IC

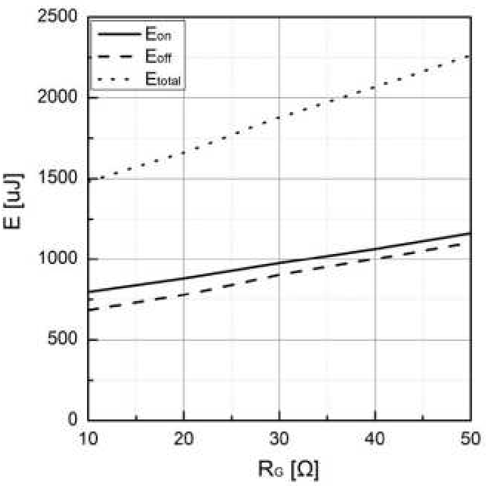


Figure 11. Typical switching energy losses as a function of RG

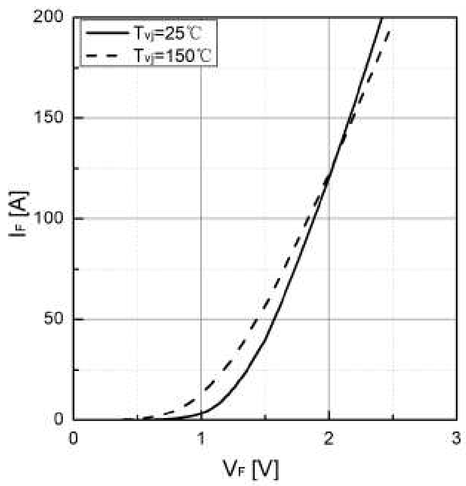


Figure 12. Typical IF as a function of VF

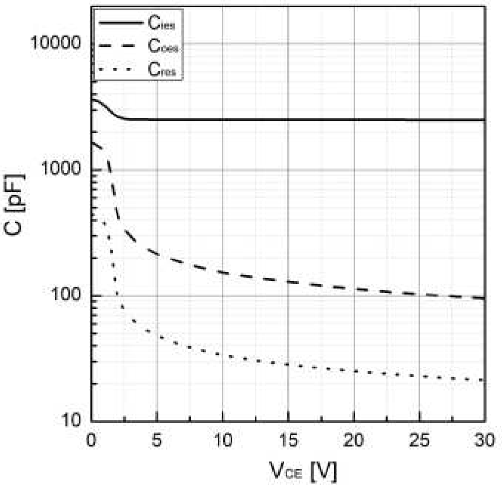


Figure 13. Typical capacitance as a function of VCE (f=1Mhz, VGE=0V)

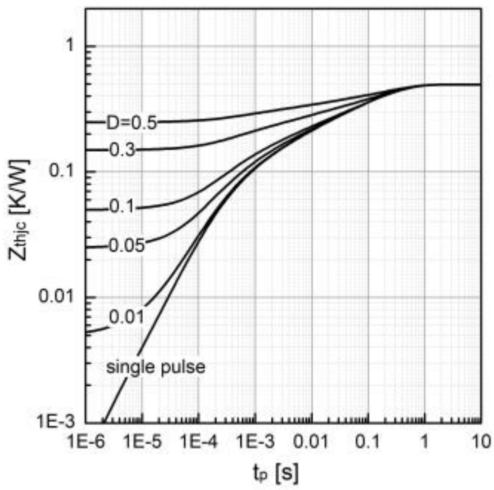
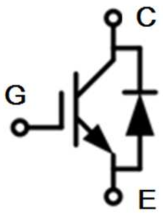
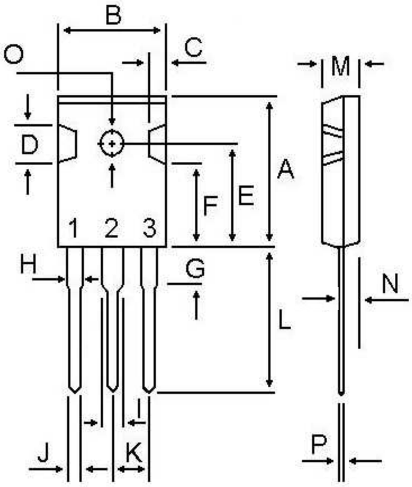


Figure 14. Transient thermal impedance of IGBT

・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

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