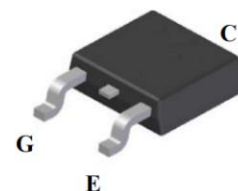


$$V_{CES} = 650V, I_C = 6A, V_{CE(sat)} = 1.7V$$

Features:

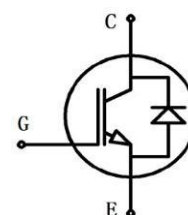
- High ruggedness performance
- Very tight parameter distribution
- Positive $V_{CE(sat)}$ temperature coefficient
- High efficiency for motor control
- Excellent current sharing in parallel operation
- RoHS compliant



TO-252

Applications:

- Home appliances
- Motor drives
- Fan, Pumps, Vacuum cleaner


Absolute Maximum Ratings of IGBT ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Value	Unit
V_{CES}	Collector to Emitter Voltage		650	V
V_{GES}	Continuous Gate to Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C = 100^\circ\text{C}$	6	A
		$T_C = 25^\circ\text{C}$	12	A
I_{CM}	Pulse Collector Current	$t_p = 1\text{ms}$	24	A
P_D	Maximum Power Dissipation (IGBT)	$T_C = 25^\circ\text{C}, T_J = 175^\circ\text{C}$	136	W
t_{sc}	Short Circuit Withstand Time	$V_{CC} = 400V, V_{GE} \leq 15V$	10	μs

Absolute Maximum Ratings of Diode ($T_J = 25^\circ\text{C}$ unless otherwise noted)

V_{RRM}	Repetitive peak reverse voltage	$T_C = 25^\circ\text{C}$	650	V
I_F	Diode Continuous Forward Current	$T_C = 100^\circ\text{C}$	6	A
I_{FM}	Peak FWD Current Repetitive	$t_p = 1\text{ms}$	24	A

Electrical Characteristics of IGBT ($T_J = 25^\circ\text{C}$ unless otherwise noted)
Static characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 1\text{mA}, V_{CE} = V_{GE}, T_J = 25^\circ\text{C}$	5.2	6.2	7.2	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 6A, V_{GE} = 15V, T_J = 25^\circ\text{C}$	-	1.7	-	V
		$T_J = 175^\circ\text{C}$	-	2.2	-	
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0V, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$	-	-	0.1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = \pm 20V, V_{CE} = 0V, T_J = 25^\circ\text{C}$	-100	-	100	nA

C_{iss}	Input capacitance	$V_{CE}=30V,$ $V_{GE}=0V,$ $f=1MHz$	-	480	-	pF
C_{oss}	Output capacitance		-	22	-	
C_{rss}	Reverse transfer capacitance		-	8	-	
Q_g	Total gate charge	$V_{CC}=520V$ $V_{GE}=15V$ $I_C=6A$	-	19	-	nC

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V,$ $I_C=6A,$ $V_{GE}=\pm 15V,$ $L=525\mu H,$ $R_G=10\Omega$	$T_J = 25^{\circ}C$		10		ns
			$T_J = 175^{\circ}C$		11		
t_r	Rise Time		$T_J = 25^{\circ}C$		8		ns
			$T_J = 175^{\circ}C$		10		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^{\circ}C$		79		ns
			$T_J = 175^{\circ}C$		108		
t_f	Fall Time		$T_J = 25^{\circ}C$		56		ns
			$T_J = 175^{\circ}C$		89		
E_{on}	Turn-on Switching Loss		$T_J = 25^{\circ}C$		0.11		mJ
			$T_J = 175^{\circ}C$		0.16		
E_{off}	Turn-off Switching Loss		$T_J = 25^{\circ}C$		0.1		mJ
			$T_J = 175^{\circ}C$		0.16		
$R_{\theta JC}$	Junction-To-Case (IGBT)					1.1	K/W

Electrical Characteristics of Diode ($T_J = 25^\circ C$ unless otherwise noted)
Static characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{FM}	Forward Voltage	$I_F=6A, V_{GE}=0V$	$T_J = 25^\circ C$		1.6	V
			$T_J = 150^\circ C$		1.4	

Switching Characteristics

IRM	Peak Reverse Recovery Current	I _F =6A, V _{CC} =400V, V _{GE} =-15V, L=525uH, R _G =10Ω	T _J = 25°C		10		A
			T _J = 175°C		12		
Q _{rr}	Reverse Recovery Charge		T _J = 25°C		306		nC
			T _J = 175°C		529		
t _{rr}	Reverse Recovery Energy		T _J = 25°C		55		ns
			T _J = 175°C		98		
R _{θJC}	Junction-To-Case (Diode)					3.8	K/W

Module Characteristics

T_J	Maximum Junction Temperature			175	$^\circ C$
T_{JOP}	Maximum Operating Junction Temperature Range	-40		+175	$^\circ C$
T_{stg}	Storage Temperature	-55		+150	$^\circ C$

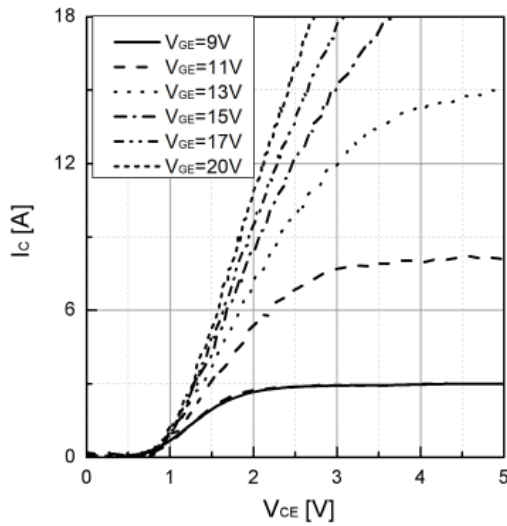


Fig 1. Typical output characteristic ($T_{vj}=25^{\circ}\text{C}$)

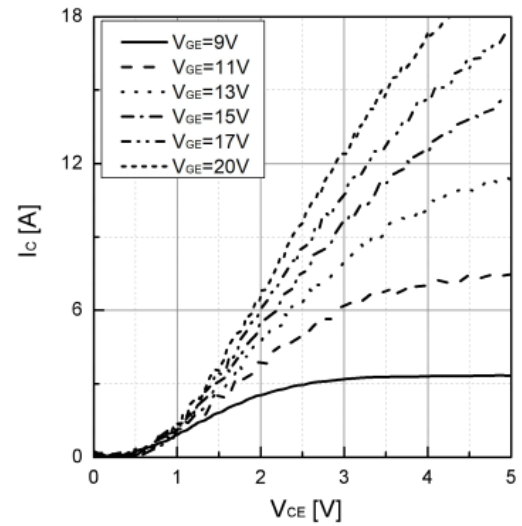


Fig 2. Typical output characteristic ($T_{vj}=175^{\circ}\text{C}$)

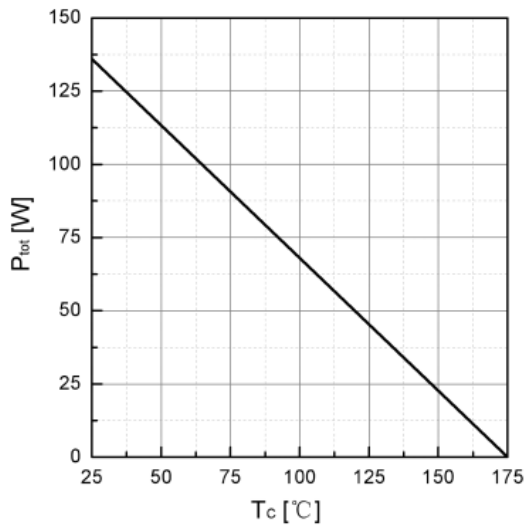


Fig 3. Power dissipation as a function of T_c

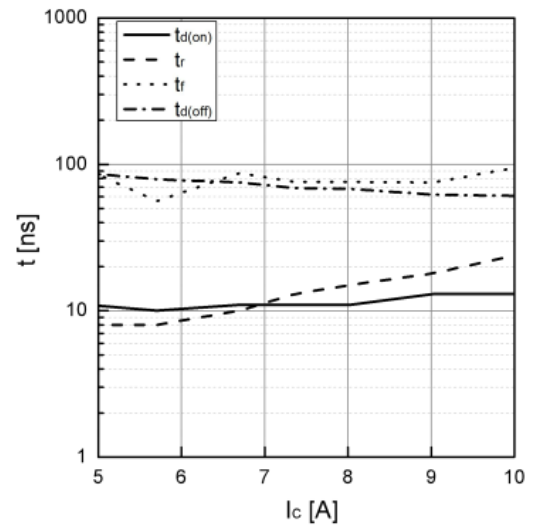


Fig 4. Typical switching time as a function of I_c

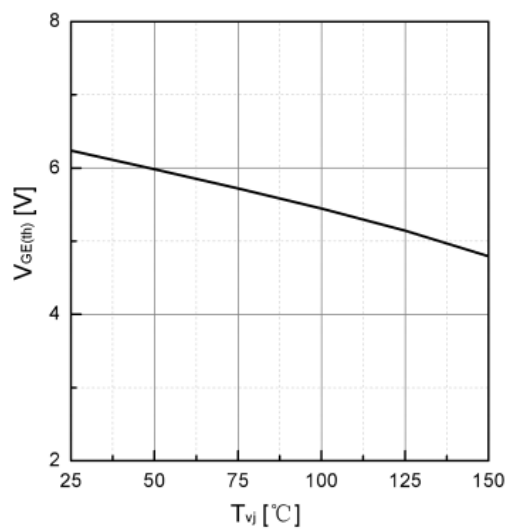


Fig 5. Typical $V_{GE(th)}$ as a function of T_{vj}
($I_c=1\text{mA}$)

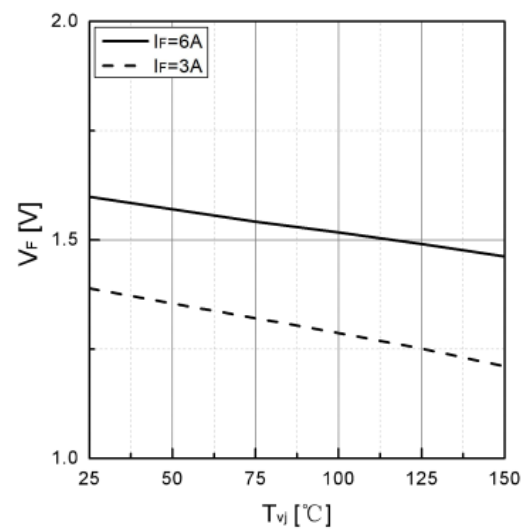


Fig 6. Typical V_F as a function of T_{vj}

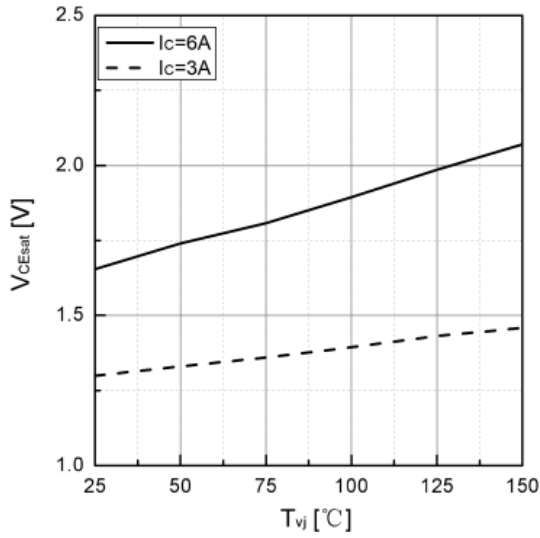


Fig 7. Typical V_{CEsat} as a function of T_{vj}

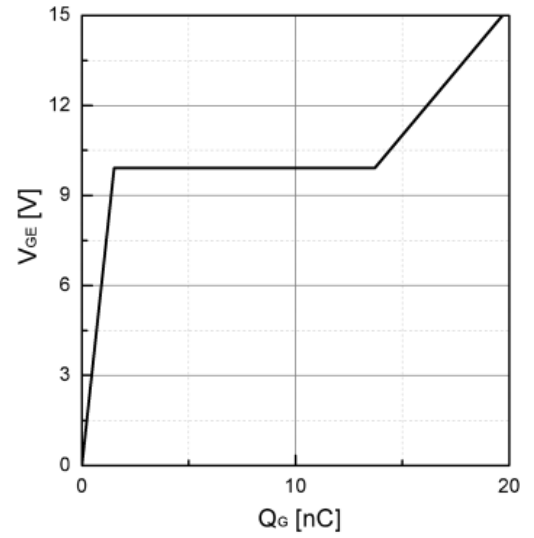


Fig 8. Typical Gate charge

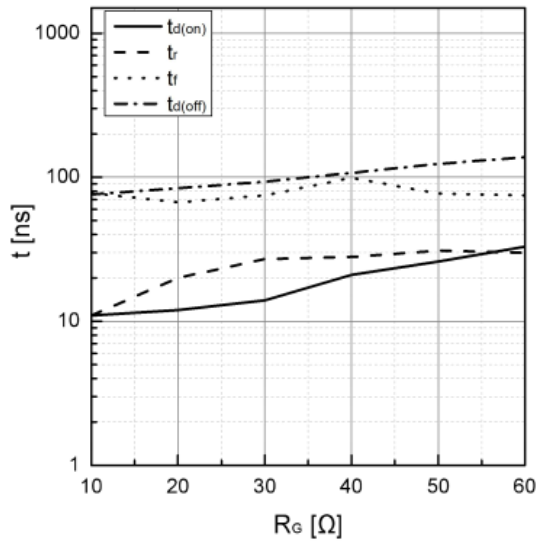


Fig 9. Typical switching times as a function of R_G

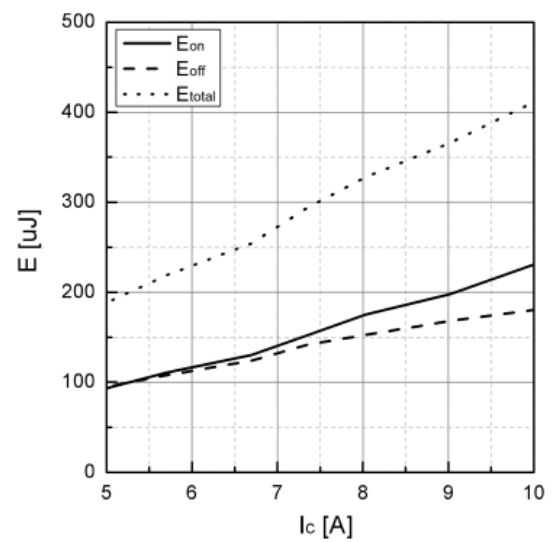


Fig 10. Typical switching energy losses as a function of I_c

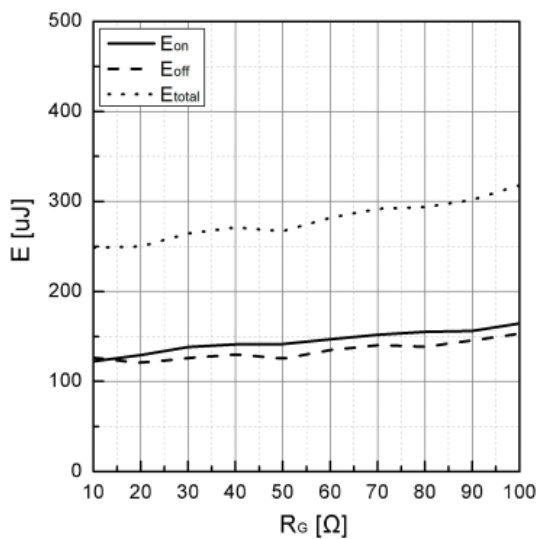


Fig 11. Typical switching energy losses as a function of R_G

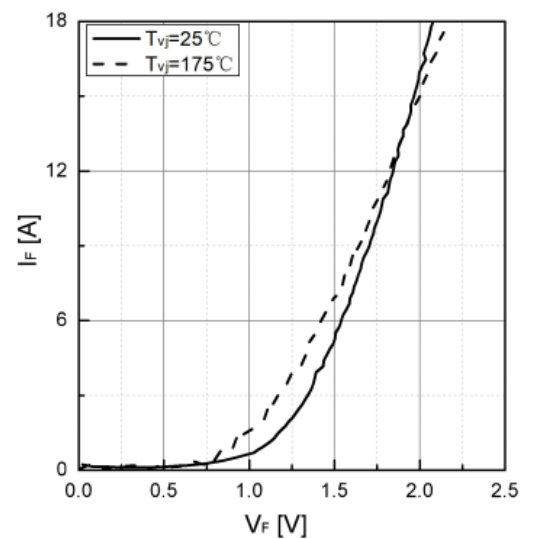


Fig 12. Typical I_F as a function of V_F

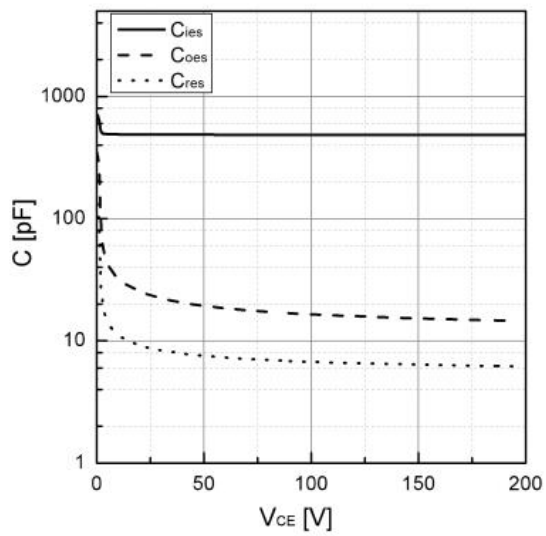


Fig 13. Typical capacitance as a function of V_{CE}
 ($f=1\text{MHz}$, $V_{GE}=0\text{V}$)

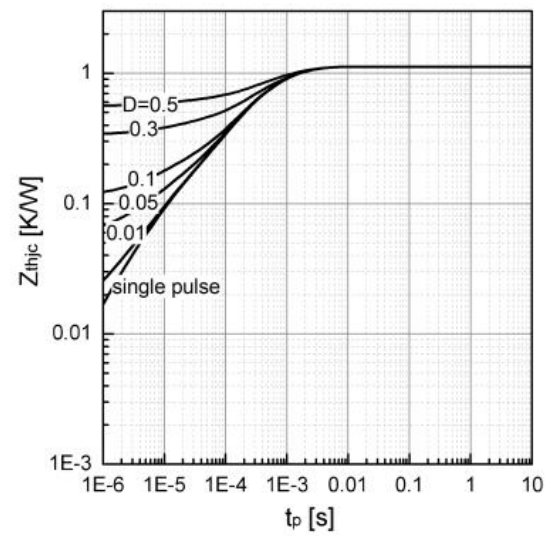
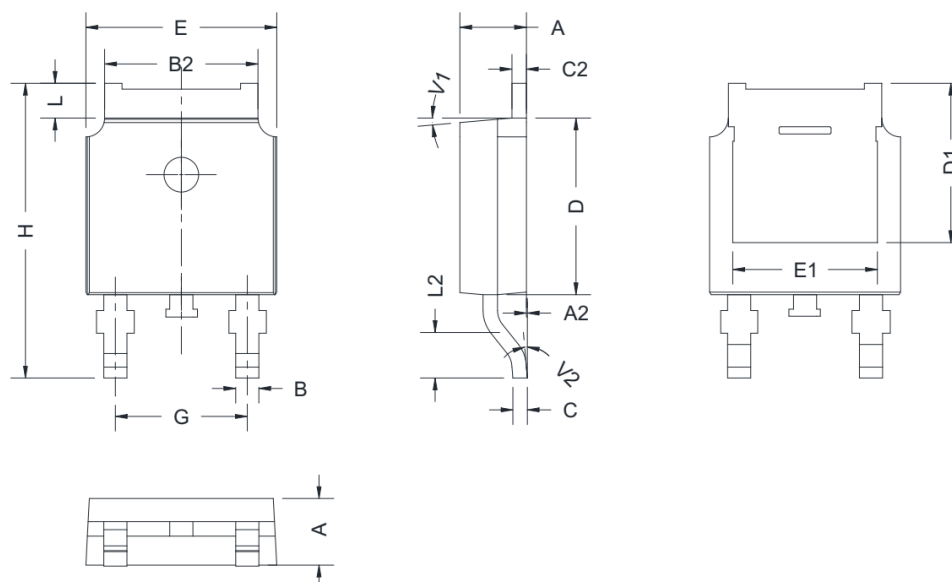


Fig 14. Transient thermal impedance of IGBT

Package Outline (TO-252):


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10	-	2.50	0.083	-	0.098
A2	0	-	0.10	0	-	0.004
B	0.66	-	0.86	0.026	-	0.034
B2	5.18	-	5.48	0.202	-	0.216
C	0.40	-	0.60	0.016	-	0.024
C2	0.44	-	0.58	0.017	-	0.023
D	5.90	-	6.30	0.232	-	0.248
D1	5.30 REF			0.209 REF		
E	6.40	-	6.80	0.252	-	0.268
E1	4.63	-	-	0.182	-	-
G	4.47	-	4.67	0.176	-	0.184
H	9.50	-	10.70	0.374	-	0.421
L	1.09	-	1.21	0.043	-	0.048
L2	1.35	-	1.65	0.053	-	0.065
V1	-	7°	-	-	7°	-
V2	0°	-	6°	0°	-	6°

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