

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)MAX}$	$I_C(100^\circ C)$
650V	1.95V@15V	20A

Feature

- High speed smooth switching device for hard and soft switching
- Positive temperature coefficient
- High ruggedness, temperature stable

Application

- Soft switching applications
- Air conditioning
- Motor drive inverter

Package

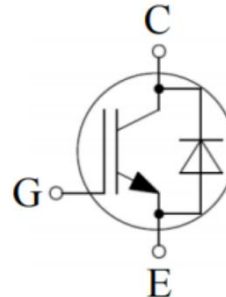


TO-263AB

Marking



Circuit diagram



Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V _{CEs}	650	V
Continuous Gate- Emitter Voltage	V _{GES}	±20	V
Collector Current	I _c	40	A
Collector Current(T _c =100°C)	I _c (100°C)	20	A
Pulsed Collector Current, tp limited by T _{jmax} ,V _{GE} =15V	I _{CM}	60	A
Diode Continuous Forward Current	I _F	40	A
Diode Continuous Forward Current(T _c =100°C)	I _F (100°C)	20	A
Diode Forward Current, tp limited by T _{jmax}	I _{Fpuls}	60	A
Turn off Safe Operating Area V _{CE} ≤ 600V,T _J ≤150°C	-	60	A
Short circuit withstand time V _{GE} =15V, V _{CE} ≤400V	T _{SC}	5	uS
Power Dissipation(T _J =175°C)	P _D	120	W
Thermal Resistance, Junction to case for Diode	R _{θJC}	1.5	°C/W
Thermal Resistance, Junction to case for IGBT	R _{θJC}	1.25	°C/W
Soldering Temperature,wave soldering 1.6mm(0.063in.) from case for 10s	T _L	260	°C
Junction Temperature	T _J	-40 ~ +175	°C
Storage Temperature Range	T _{STG}	-55 ~ +150	°C

Electrical characteristics of the IGBT (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Collector-Emitter Breakdown Voltage	V _{(BR)CES}	V _{GE} = 0V, I _c =250uA	650			V
Collector-Emitter Leakage Current	I _{CES}	V _{GE} = 0V, V _{CE} =650V			0.25	mA
		V _{GE} = 0V, V _{CE} =650V, T _J =150°C			1	
Gate to Emitter Leakage Current	I _{GES}	V _{GE} = ±20V, V _{CE} = 0V			200	nA
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} =15V, I _c =20A,		1.60	1.95	V
		V _{GE} =15V, I _c =20A, T _J =125°C		1.75		
		V _{GE} =15V, I _c =20A, T _J =150°C		1.80		
Gate Threshold Voltage	V _{GE(th)}	V _{CE} = V _{GE} , I _c =1mA	5.0	5.8	6.5	V
Dynamic characteristics						
Input Capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f = 1MHz		0.9		nF
Output Capacitance	C _{oes}			0.04		
Reverse Transfer Capacitance	C _{res}			0.01		
Total Gate Charge	Q _g	V _{CC} =300V, V _{GE} =15V, I _c =20A		0.085		uC
Short Circuit Collector Current	I _{C(SC)}	V _{CC} =400V, V _{GE} =15V, t _{SC} ≤5us, T _{J(start)} =25°C		115		A
Turn-on delay time	t _{d(on)}	V _{CC} =300V, V _{GE} =-5V~15V, I _c =20A, R _G =51Ω		12		nS
Turn-on rise time	t _r			33		
Turn-off delay time	t _{d(off)}			68		
Turn-off fall time	t _f			129		
Turn-on Switching Energy	E _{on}			0.41		
Turn-off Switching Energy	E _{off}		0.22			
Turn-on delay time	t _{d(on)}	V _{CC} =300V, V _{GE} =-5V~15V, I _c =20A, R _G =51Ω, T _J =125°C		16		nS
Turn-on rise time	t _r			41		
Turn-off delay time	t _{d(off)}			69		
Turn-off fall time	t _f			154		
Turn-on Switching Energy	E _{on}			0.48		
Turn-off Switching Energy	E _{off}		0.35			
Turn-on delay time	t _{d(on)}	V _{CC} =300V, V _{GE} =-5V~15V, I _c =20A, R _G =51Ω, T _J =150°C		18		nS
Turn-on rise time	t _r			49		
Turn-off delay time	t _{d(off)}			69		
Turn-off fall time	t _f			173		
Turn-on Switching Energy	E _{on}			0.52		
Turn-off Switching Energy	E _{off}		0.38			

Electrical characteristics of the Diode ($T_j=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	$I_F=20\text{A}$		2.0	2.5	V
		$I_F=20\text{A}, T_j=125^\circ\text{C}$		1.8		
		$I_F=20\text{A}, T_j=150^\circ\text{C}$		1.7		
Reverse Recovery Current	I_{rr}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=360\text{A/us}$		6		A
Reverse Recovery Charge	Q_{rr}			0.25		μC
Diode Reverse Recovery Time	t_{rr}			200		ns
Reverse Recovery Energy	E_{rec}			0.07		mJ
Reverse Recovery Current	I_{rr}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=360\text{A/us}, T_j=125^\circ\text{C}$		8		A
Reverse Recovery Charge	Q_{rr}			0.59		μC
Diode Reverse Recovery Time	t_{rr}			218		ns
Reverse Recovery Energy	E_{rec}			0.13		mJ
Reverse Recovery Current	I_{rr}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=360\text{A/us}, T_j=150^\circ\text{C}$		9		A
Reverse Recovery Charge	Q_{rr}			0.78		μC
Diode Reverse Recovery Time	t_{rr}			227		ns
Reverse Recovery Energy	E_{rec}			0.16		mJ

Typical Characteristics

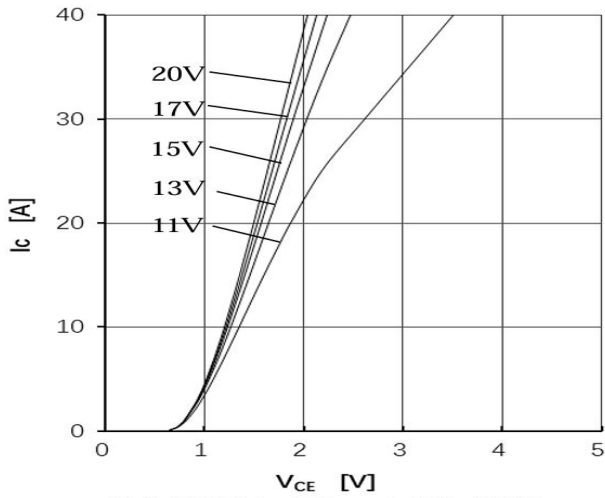


Fig1.IGBT Output Characteristics(25°C)

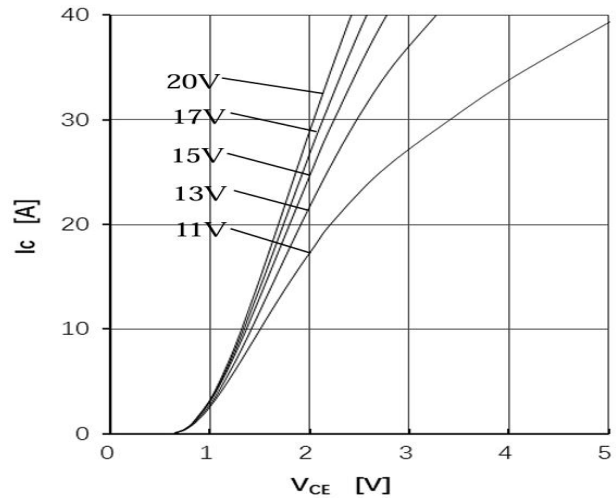


Fig2.IGBT Output Characteristics(150°C)

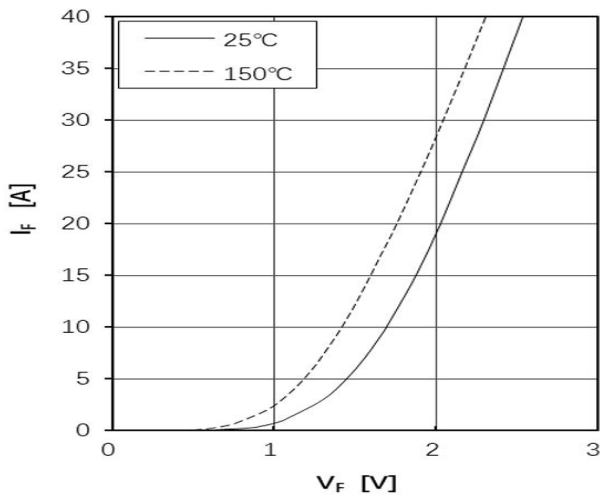


Fig3.Diode Foward Characteristics

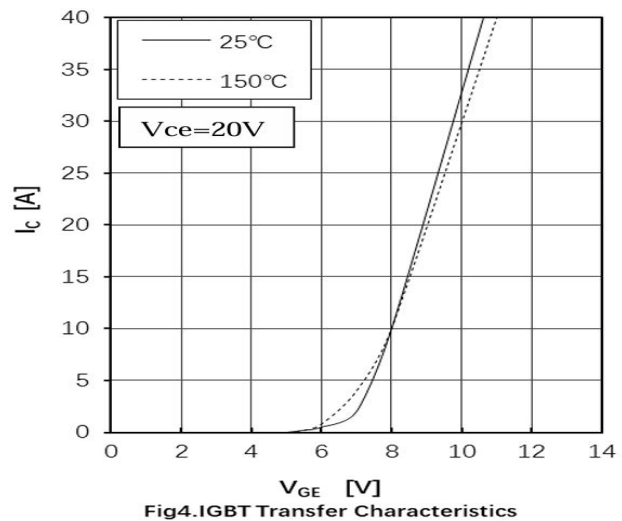


Fig4.IGBT Transfer Characteristics

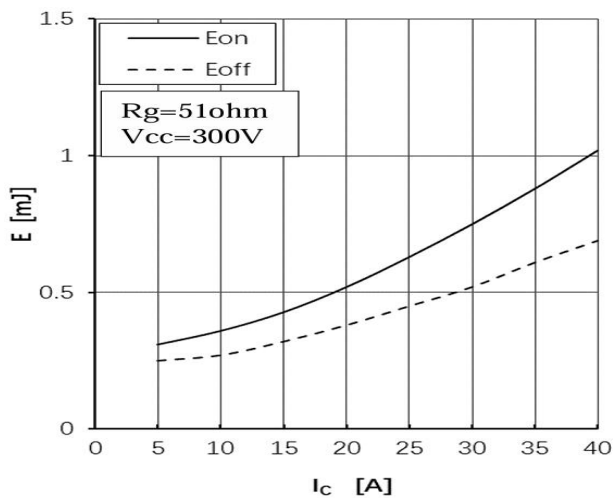


Fig5.IGBT Switching Loss vs.Ic(150°C)

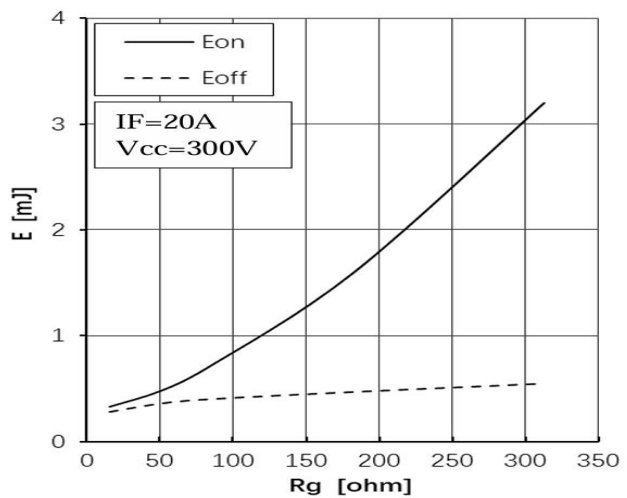


Fig6.IGBT Switching Loss vs.Rg(150°C)

Typical Characteristics

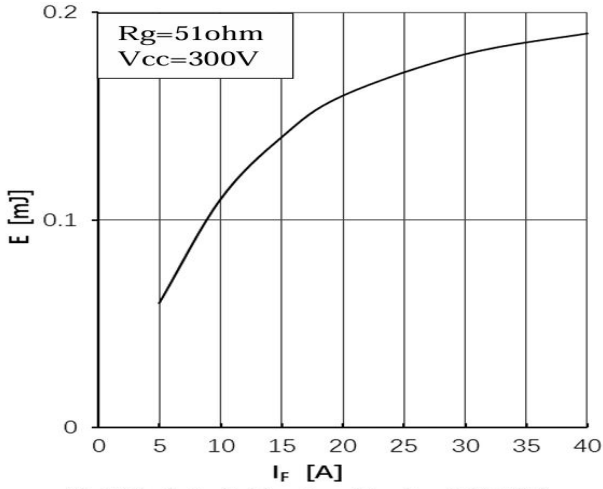


Fig7.Diode Switching Loss(Erec) vs.IF(150°C)

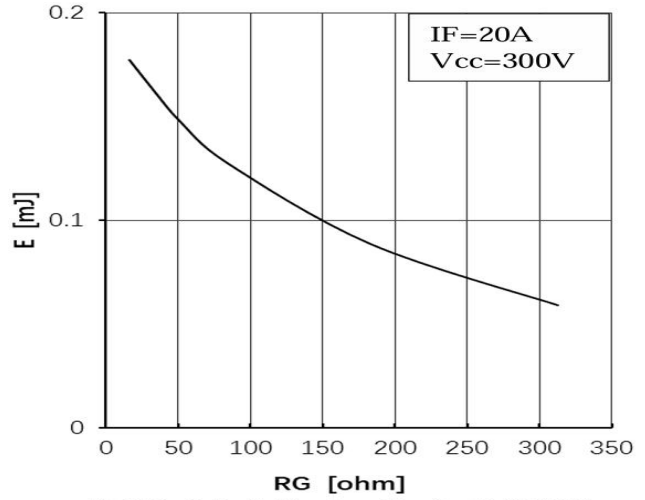


Fig8.Diode Switching Loss(Erec)vs.Rg(150°C)

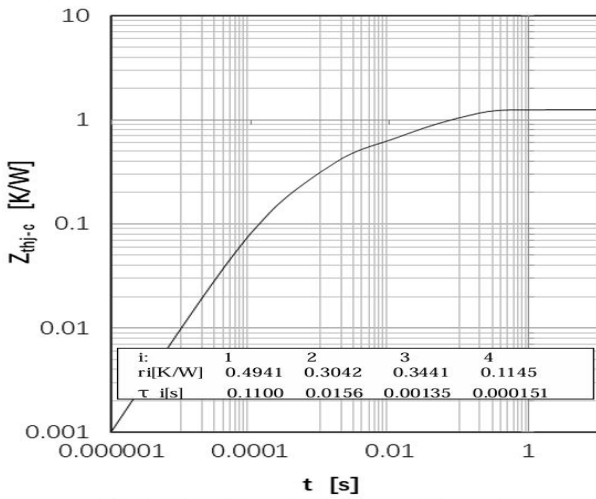


Fig 9. IGBT Transient Thermal Impedance

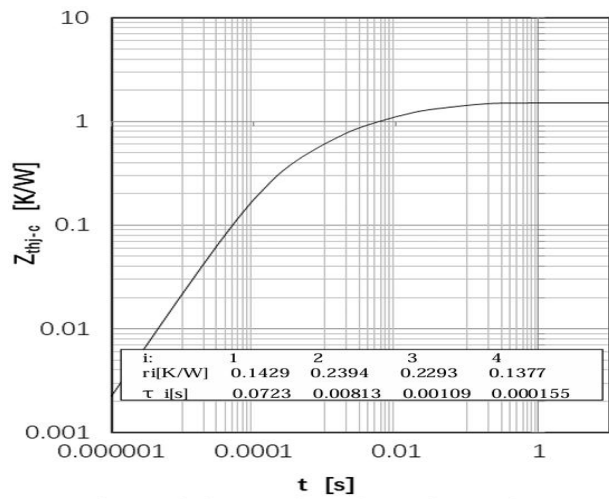
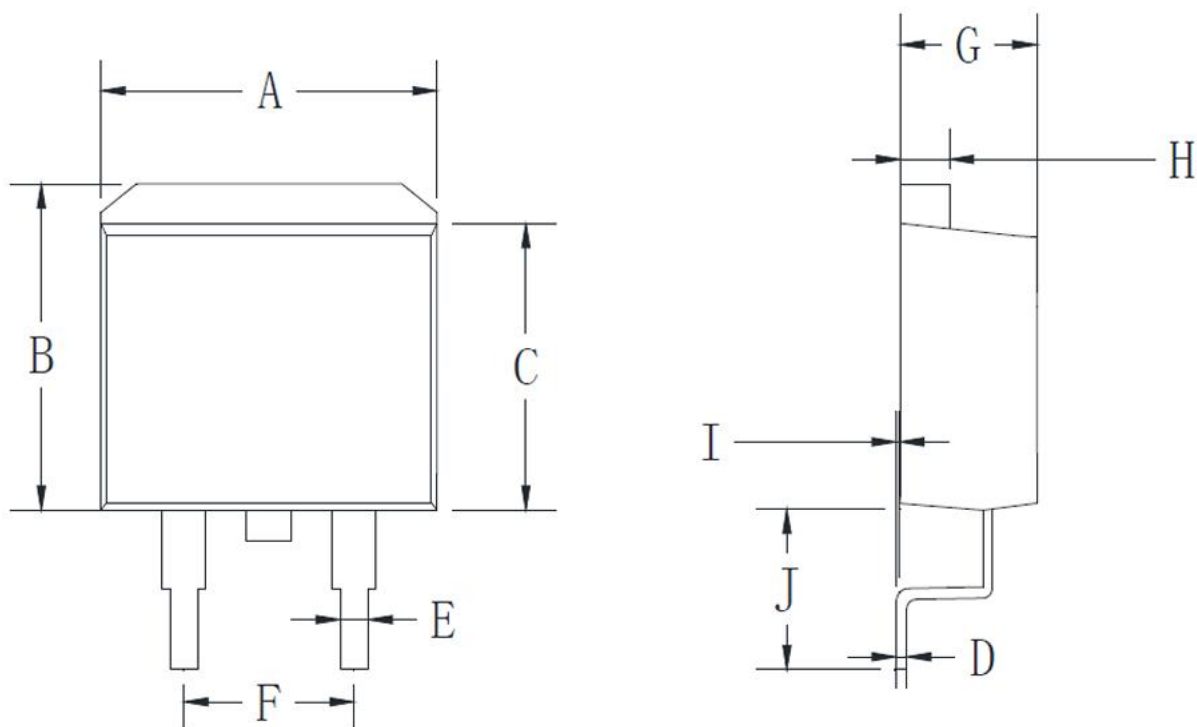


Fig10.Diode Transient Thermal Impedance

TO-263AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.500	11.500	0.374	0.453
B	9.700	10.500	0.382	0.413
C	8.400	9.000	0.331	0.354
D	0.280	0.640	0.011	0.025
E	0.680	0.940	0.027	0.037
F	4.550	5.600	0.179	0.220
G	4.040	5.100	0.159	0.201
H	1.140	1.400	0.045	0.055
I	0.000	0.200	0.000	0.008
J	4.900	6.050	0.193	0.238