AI020K065TB

IGBT Discrete

Product Summary

$V_{(BR)CES}$	$V_{CE(SAT)TYP}$	$I_{C(100℃)}$
650V	1.60V@15V	20A

Feature

- Maximum junction temperature 175℃
- Positive temperature coefficient
- High ruggedness, temperature stable
- High speed smooth switching device for hard and soft switching

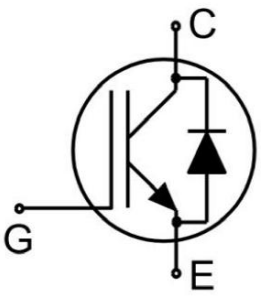
Application

- Soft switching applications
- Air conditioning
- Motor drive inverter

Package

TO-263AB

Circuit diagram



Marking

Absolute maximum ratings (T_C =25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	650	V
Continuous Gate- Emitter Voltage	V_{GE}	±20	V
Transient Gate-Emitter Voltage (tp ≤10us,D <0.01)	V_{GE}	±30	V
Collector Current, limited by T_{jmax}	I_C	40	A
Collector Current, limited by T_{jmax} (T_C =100°C)	I_C(100℃)	20	A
Pulsed Collector Current, tp limited by T_{jmax} (V_{GE} =15V)	I_{CM}	60	A
Diode Continuous Forward Current, limited by T_{jmax}	I_F	40	A
Diode Continuous Forward Current, limited by T_{jmax} (T_C =100°C)	I_F(100°C)	20	A
Diode Pulsed 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	μS
Power Dissipation (T_J =175°C)	P_D	120	W
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	1.5	°C/W
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	1.25	°C/W
Operating junction temperature range	T_J	-40 ~ +175	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Electrical characteristics of the IGBT (T_J=25℃ 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 =250μA	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
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE} =V_{CE}, I_C =1mA	5	5.8	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} =15V, I_C =20A		1.6	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		1.8		
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		μC
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 Loss	E_{on}			0.41		mJ
Turn-Off Switching Loss	E_{off}			0.22		

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Dynamic characteristics						
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 Loss	E_{on}			0.48		mJ
Turn-Off Switching Loss	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 Loss	E_{on}			0.52		mJ
Turn-Off Switching Loss	E_{off}			0.38		

Electrical characteristics of the Diode (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	I_F =20A		2	2.5	V
		I_F =20A, T_J =125°C		1.8		
		I_F =20A, T_J =150°C		1.7		
Reverse Recovery Current	I_{rrm}	V_R =300V, I_F =20A di/dt =-360A/μs		6		A
Reverse Recovery Charge	Q_{rr}			0.25		uC
Reverse Recovery Time	T_{rr}			200		nS
Reverse Recovery Energy	E_{rec}			0.07		mJ
Reverse Recovery Current	I_{rrm}	V_R =300V, I_F =20A di/dt =-360A/μs T_J =125°C		8		A
Reverse Recovery Charge	Q_{rr}			0.59		uC
Reverse Recovery Time	T_{rr}			218		nS
Reverse Recovery Energy	E_{rec}			0.13		mJ
Reverse Recovery Current	I_{rrm}	V_R =300V, I_F =20A di/dt =-360A/μs T_J =150°C		9		A
Reverse Recovery Charge	Q_{rr}			0.78		uC
Reverse Recovery Time	T_{rr}			227		nS
Reverse Recovery Energy	E_{rec}			0.16		mJ

Typical Characteristics

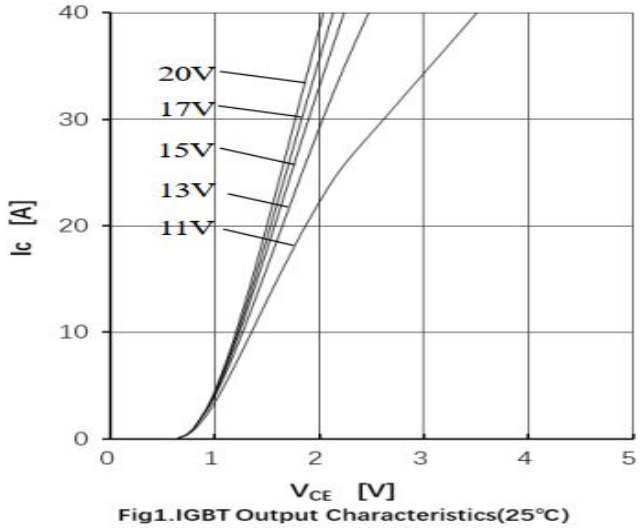


Fig1.IGBT Output Characteristics(25°C)

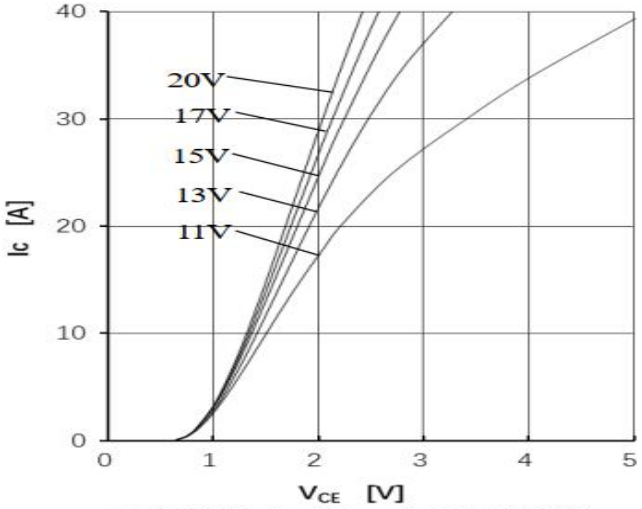


Fig2.IGBT Output Characteristics(150°C)

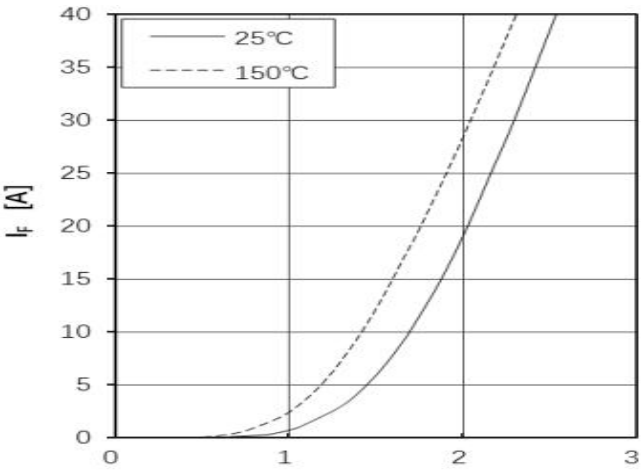


Fig3.Diode Foward Characteristics

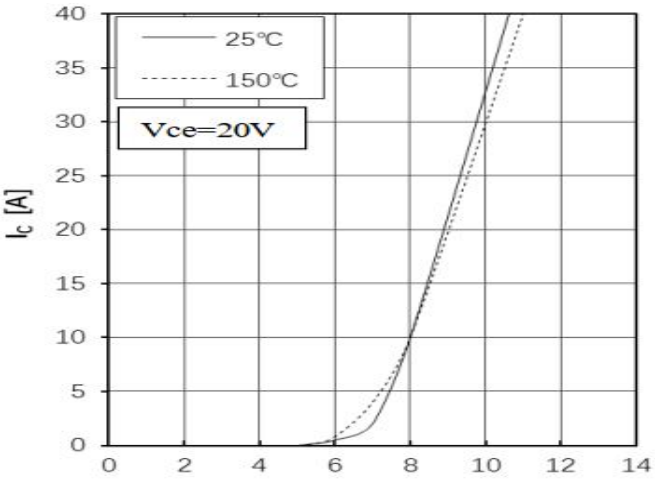


Fig4.IGBT Transfer Characteristics

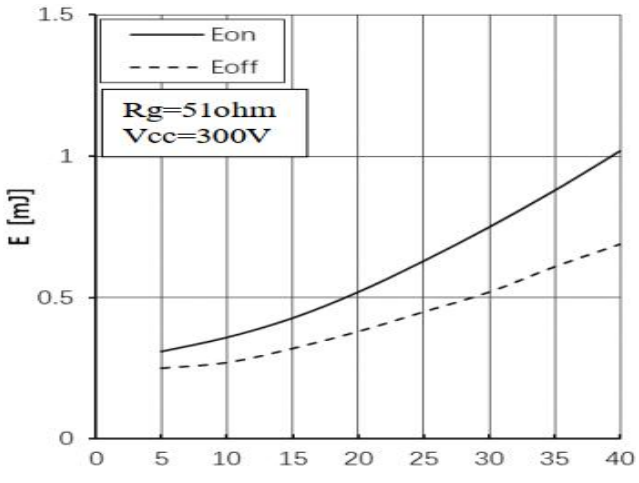


Fig5.IGBT Switching Loss vs.Ic(150°C)

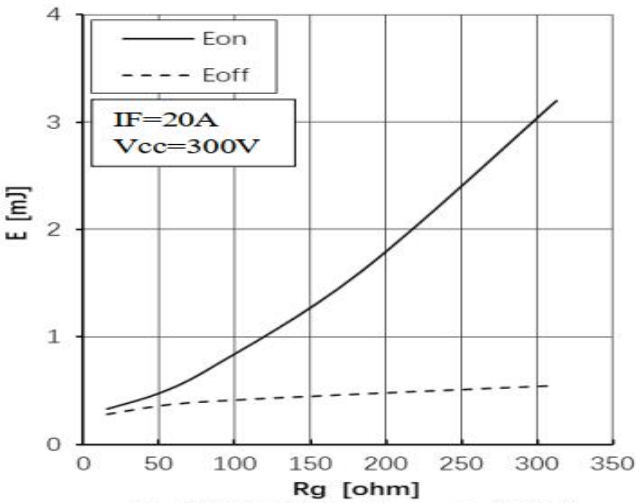


Fig6.IGBT Switching Loss vs.Rg(150°C)

Typical Characteristics

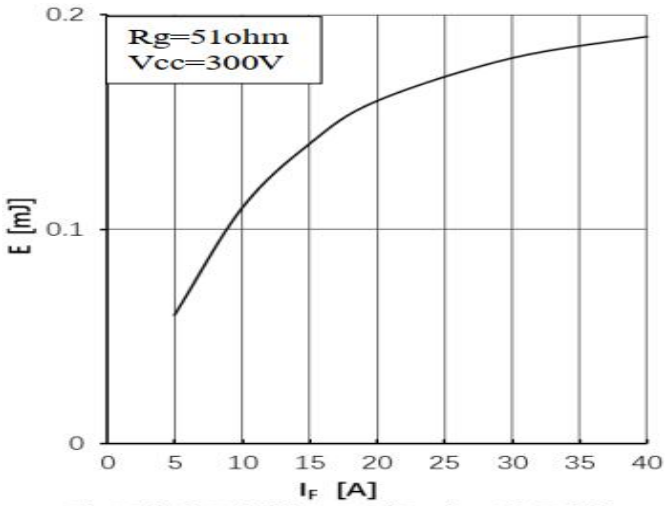


Fig7.Diode Switching Loss(Erec) vs.I_F(150°C)

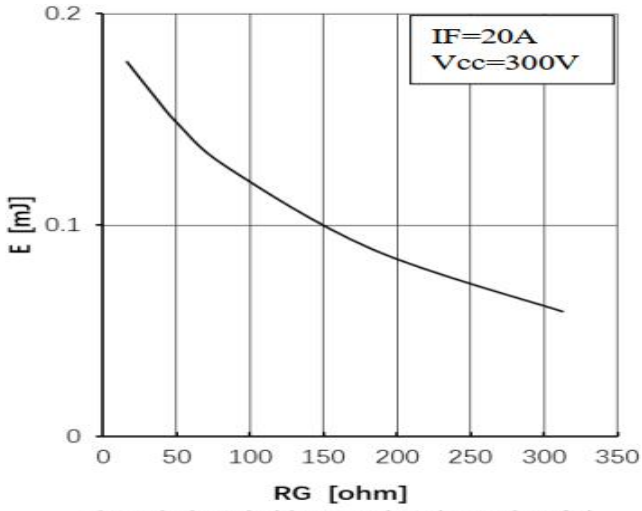


Fig8.Diode Switching Loss(Erec)vs.Rg(150°C)

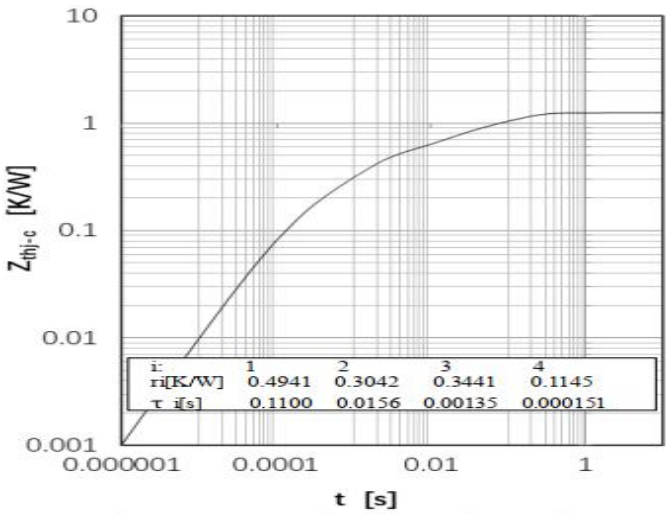


Fig 9. IGBT Transient Thermal Impedance

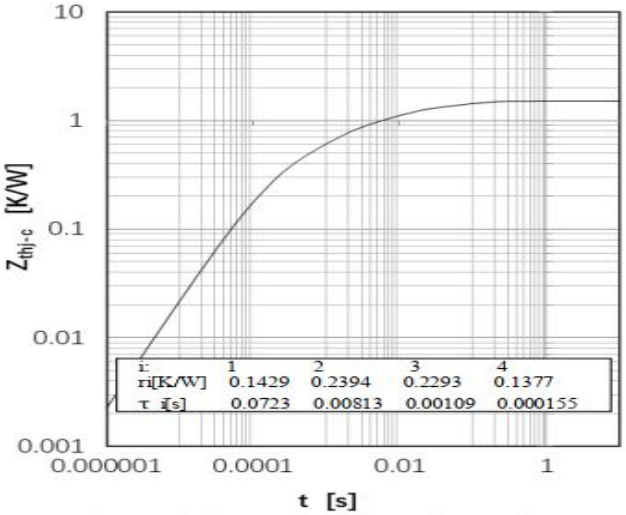
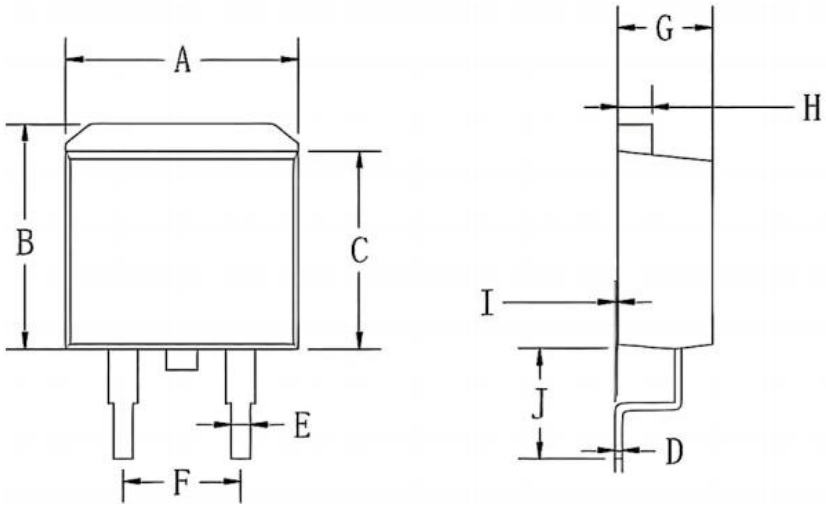


Fig10.Diode Transient Thermal Impedance

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