

Product Summary

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

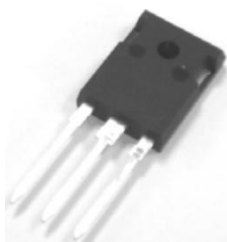
Feature

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

Application

- Soft switching applications
- Air conditioning
- Motor drive inverter

Package

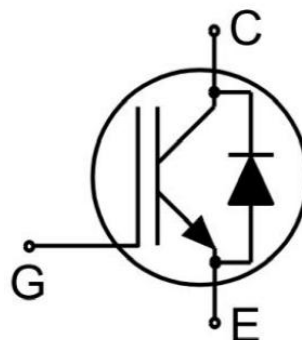


TO-247AB

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 Pulsed Current,tp limited by T _{Jmax}	I _{Fpuls}	60	A
Turn off Safe Operating Area V _{CE} ≤650V,T _J ≤150°C	-	60	A
Power Dissipation(T _J =175°C)	P _D	120	W
Thermal Resistance, Junction to case for Diode	R _{θJC}	1.50	°C/W
Thermal Resistance, Junction to case for IGBT	R _{θJC}	1.25	°C/W
Short circuit withstand time V _{GE} =15V, V _{CEM} ≤400V	t _{sc}	5	us
Maximum Temperature for Soldering,wave soldering 1.6mm (0.063in.) from case for 10s	T _L	260	°C
Junction Temperature Range	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 _{CE} =250uA	650			V	
Collector-Emitter Leakage Current	I _{CES}	V _{GE} = 0V,V _{CE} =600V			0.25	mA	
		V _{GE} = 0V,V _{CE} =600V, 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		0.90		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 _{GE} =15V,V _{CC} =400V, 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			mJ
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			mJ
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			mJ
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}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=500\text{A}/\mu\text{s}$		11		A
Reverse Recovery Charge	Q_{rr}			0.20		μC
Reverse recovery Energy	E_{rec}			0.07		mJ
Reverse Recovery Current	I_{rr}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=500\text{A}/\mu\text{s}, T_j=125^\circ\text{C}$		14		A
Reverse Recovery Charge	Q_{rr}			0.75		μC
Reverse recovery Energy	E_{rec}			0.2		mJ
Reverse Recovery Current	I_{rr}	$I_F=20\text{A}, V_R=300\text{V}, -di/dt=500\text{A}/\mu\text{s}, T_j=150^\circ\text{C}$		16		A
Reverse Recovery Charge	Q_{rr}			0.86		μC
Reverse recovery Energy	E_{rec}			0.25		mJ

Typical Characteristics

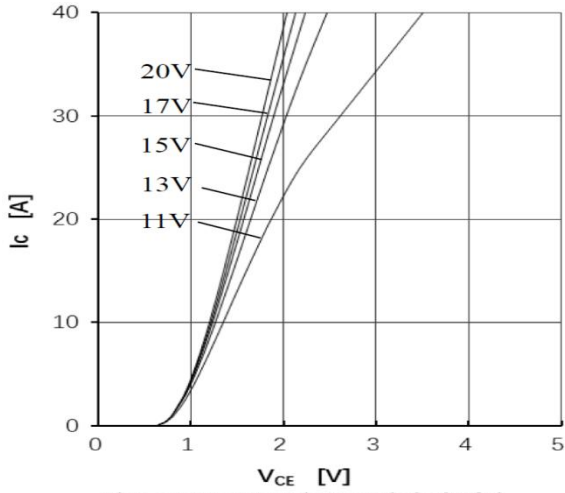


Fig1. IGBT Output Characteristics(25°C)

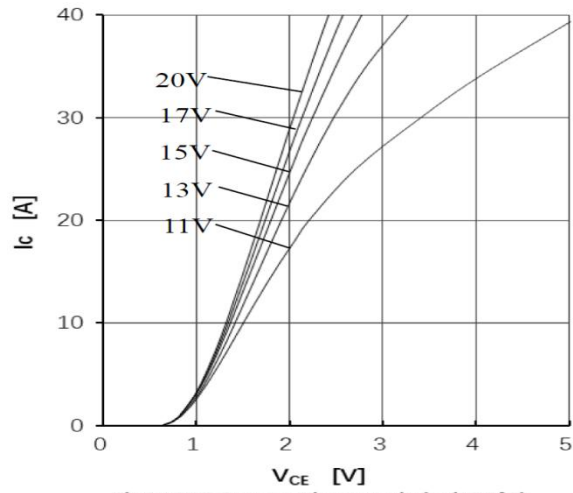


Fig2. IGBT Output Characteristics(150°C)

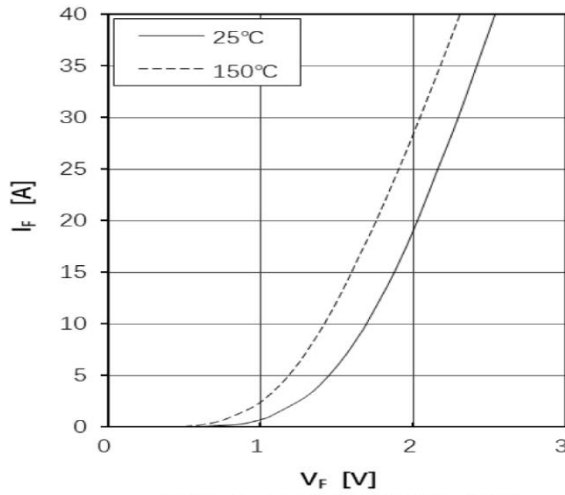


Fig3. Diode Forward Characteristics

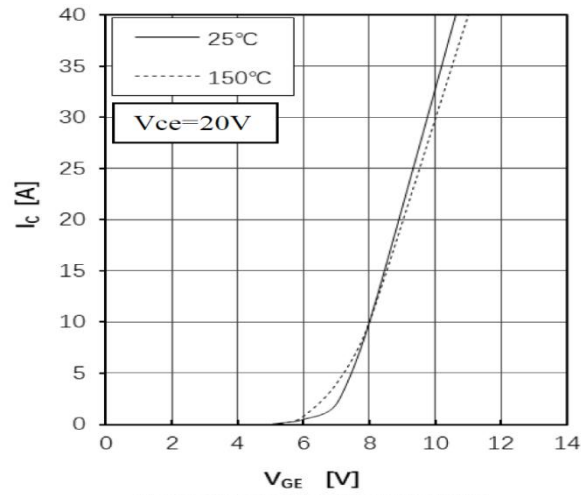


Fig4. IGBT Transfer Characteristics

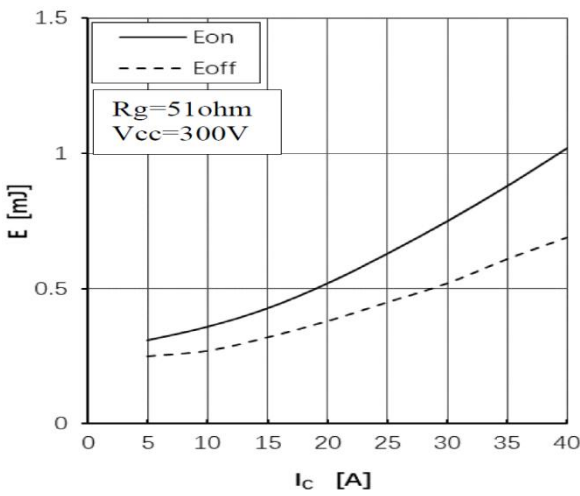


Fig5. IGBT Switching Loss vs. I_c (150°C)

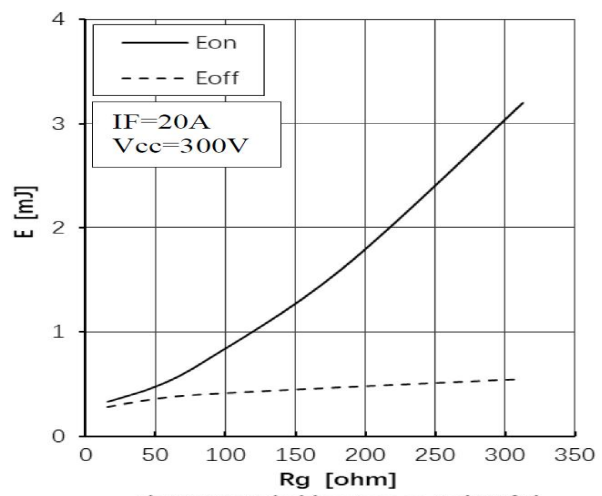
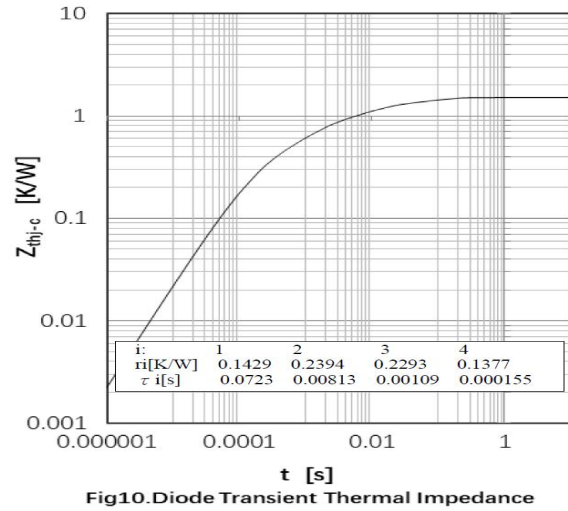
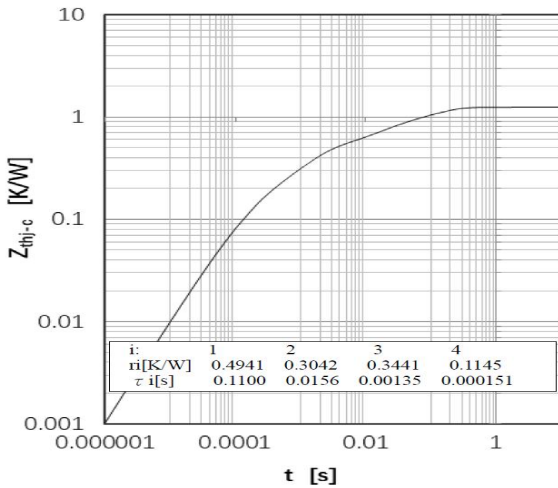
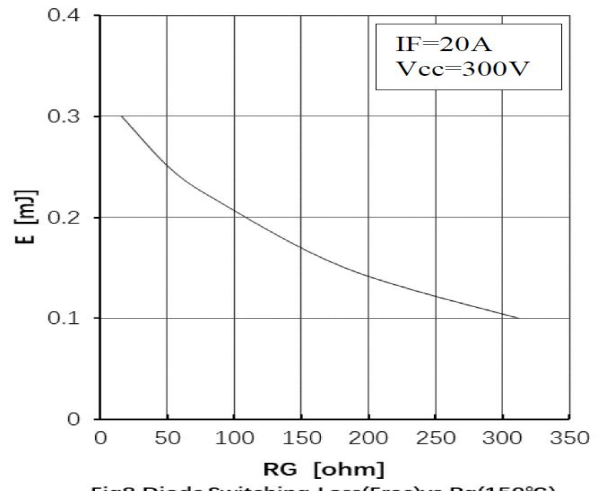
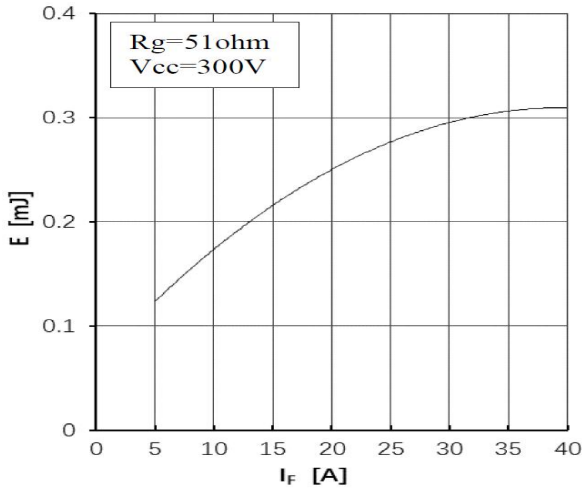
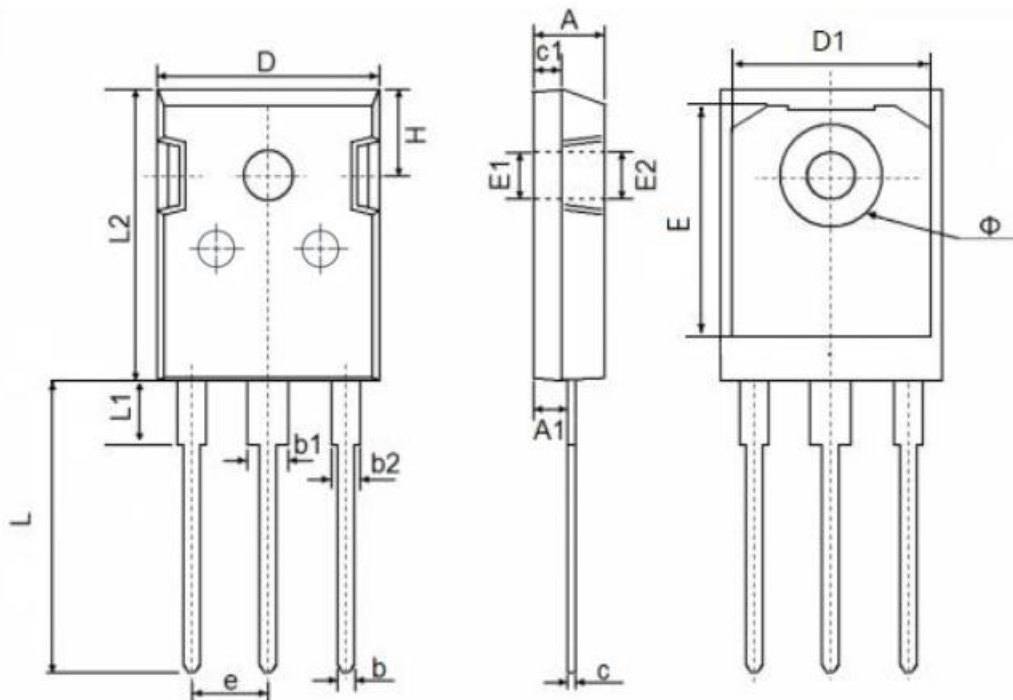


Fig6. IGBT Switching Loss vs. R_g (150°C)

Typical Characteristics



TO-247AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.250	0.189	0.207
A1	2.100	2.600	0.083	0.102
b	1.000	1.400	0.039	0.055
b1	2.800	3.400	0.110	0.134
b2	1.800	2.420	0.071	0.095
c	0.500	0.700	0.020	0.028
c1	1.500	2.500	0.059	0.098
D	15.500	16.200	0.610	0.638
D1	13.000	14.200	0.512	0.559
E	16.250	17.650	0.640	0.695
E1	3.650	5.500	0.144	0.220
E2	3.650	5.500	0.144	0.220
L	19.400	20.400	0.764	0.803
L1	3.900	4.500	0.154	0.177
L2	20.800	21.300	0.819	0.836
Φ	7.190 REF.		0.283 REF.	
e	5.440 BSC		0.214 BSC	
H	5.300	6.300	0.209	0.248