

Features

- High speed smooth switching device for hard & soft switching
- Maximum junction temperature 175°C
- Positive temperature coefficient
- High ruggedness, temperature stable

Application

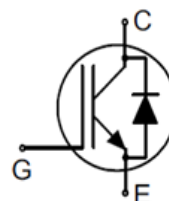
- Soft switching applications
- Air conditioning
- Motor drive inverter

Product Summary

V_{CE}	I_C	$V_{CE(sat)} I_C=40A$
1200V	40A	1.85V



G C E
TO-247 top view



Schematic diagram



Halogen-Free

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
Common Ratings (TC=25°C Unless Otherwise Noted)				
V _{CES}	Collector Emitter Voltage	T _j =25°C	1200	V
V _{GES}	Gate Emitter Voltage		±20	V
V _{GES}	Transient Gate-Emitter Voltage	tp≤10μs,D<0.010)	±30	V
I _C	DC Collector Current	Tc=25°C	80	A
		Tc=100°C	40	A
I _{CM}	Repetitive Peak Collector Current	V _{GE} =15V,tp limited by T _{jmax}	160	A
I _F	Diode Forward Current	Tc=25°C	80	A
		Tc=100°C	40	A
T _{SC}	Short Circuit Withstand Time	Tc=25°C,V _{GE} = 15V, V _{CC} =600V, V _{CEM} ≤1200V	10	us
I _{rpuls}	Diode Pulsed Current		160	A
T _j	Operating Junction Temperature		-40~+175	°C
T _s	Storage Temperature		-55~+150	°C
P _{tot}	Power Dissipation Per IGBT	Tc=25°C,T _{jmax} =175°C	428	W

IGBT

Electrical Characteristics (TC=25℃ unless otherwise noted)							
Symbol	Parameter	Condition		Min	Typ	Max	Unit
Static Electrical Characteristics @ TC= 25℃ (unless otherwise stated)							
BV _{CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _C =250μA		1200	--	--	V
V _{GE(th)}	Gate Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =1.4mA		4.8	5.6	6.5	V
V _{CE(sat)}	Collector - Emitter Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =25℃		--	1.85	2.4	V
		I _C =40A, V _{GE} =15V, T _J =125℃		--	2.2	--	V
		I _C =40A, V _{GE} =15V, T _J =150℃		--	2.3	--	V
I _{CES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25℃		--	--	0.25	mA
		V _{CE} =1200V, V _{GE} =0V, T _J =150℃		--	--	5.0	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V,V _{GE} =±30V, T _J =25℃		--	--	±200	nA
Q _g	Gate Charge	V _{CC} =960V, I _C =40A , V _{GE} =15V		--	0.33	--	μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		--	2.5	--	nF
C _{res}	Reverse Transfer Capacitance			--	0.09	--	nF
t _{d(on)}	Turn-on Delay Time	V _{CC} =600V,I _C =40A R _G =12Ω, V _{GE} =-15~15V, Inductive Load	T _J =25℃	--	45	--	ns
			T _J =125℃	--	50	--	ns
			T _J =150℃	--	53	--	ns
t _r	Turn-on Rise Time		T _J =25℃	--	56	--	ns
			T _J =125℃	--	58	--	ns
			T _J =150℃	--	60	--	ns
t _{d(off)}	Turn-Off Delay Time		T _J =25℃	--	180	--	ns
			T _J =125℃	--	240	--	ns
			T _J =150℃	--	260	--	ns
t _f	Turn-Off Fall Time		T _J =25℃	--	80	--	ns
			T _J =125℃	--	85	--	ns
			T _J =150℃	--	90	--	ns
E _{on}	Turn on Energy	T _J =25℃	--	3.8	--	mJ	
		T _J =125℃	--	5.4	--	mJ	
		T _J =150℃	--	5.8	--	mJ	
E _{off}	Turn off Energy	T _J =25℃	--	1.7	--	mJ	
		T _J =125℃	--	2.7	--	mJ	
		T _J =150℃	--	3.0	--	mJ	
I _{SC}	Short Circuit Current	tpsc≤10μs , V _{GE} =15V,T _J ≤150℃,V _{CC} =600V		--	150	--	A
R _{thJC}	Junction to Case Thermal Resistance (Per IGBT)			--	--	0.35	K/W

Diode

Absolute Maximum Ratings (TC=25℃ unless otherwise nc							
Symbol	Parameter			Min	Typ	Max	Unit
Common Ratings (TC=25℃ Unless Otherwise Noted)							
V _F	Forward Voltage	I _F =40A , V _{GE} =0V, T _J =25℃		1.6	2.0	2.6	V
		I _F =40A , V _{GE} =0V, T _J =125℃		--	1.8	--	
		I _F =40A , V _{GE} =0V, T _J =150℃		--	1.7	--	
t _{rr}	Reverse Recovery Time	I _F =40A , V _R =600V di/dt=-520A/μs	T _J =25℃	--	439	--	ns
			T _J =125℃	--	628	--	
			T _J =150℃	--	773	--	
I _{rr}	Reverse Recovery Current		T _J =25℃	--	14	--	A
			T _J =125℃	--	18	--	
			T _J =150℃	--	20	--	
Q _{rr}	Reverse Recovery Charge		T _J =25℃	--	2.55	--	μC
			T _J =125℃	--	6.33	--	
			T _J =150℃	--	7.05	--	
E _{rec}	Reverse Recovery Energy	T _J =25℃	--	0.92	--	mJ	
		T _J =125℃	--	2.05	--		
		T _J =150℃	--	2.25	--		
R _{thJCD}	Junction to Case Thermal Resistance （ Per Diode ）			--	--	0.65	K/W

Typical Operating Characteristics

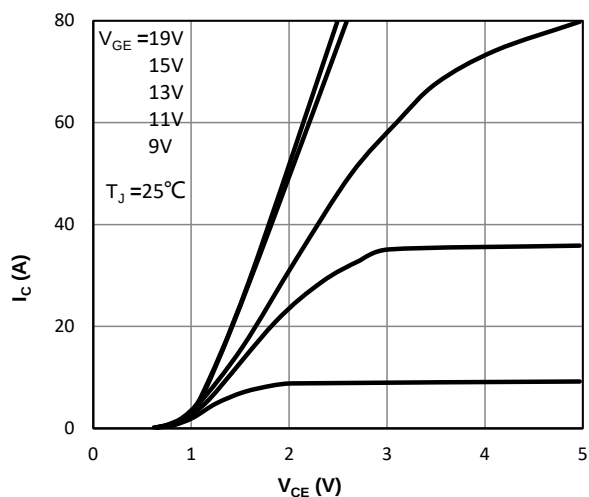


Figure 1. Typical Output Characteristics IGBT

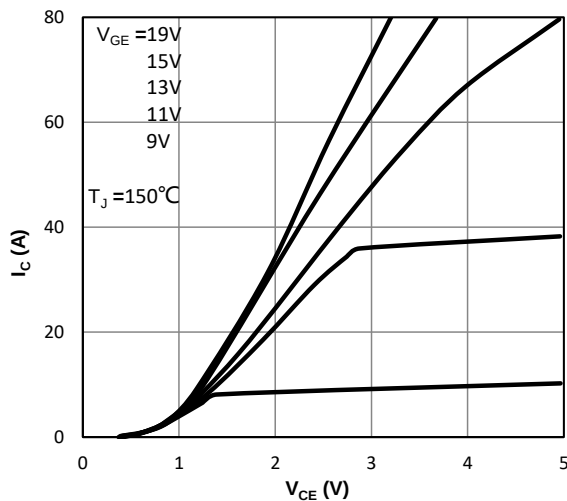


Figure 2. Typical Output Characteristics IGBT

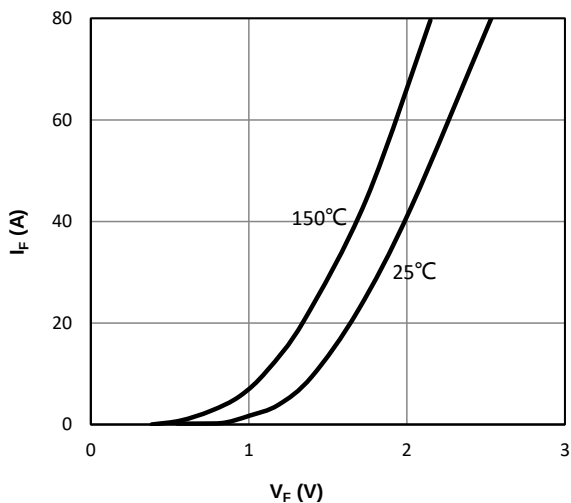


Figure 3. Diode Forward Characteristics Diode

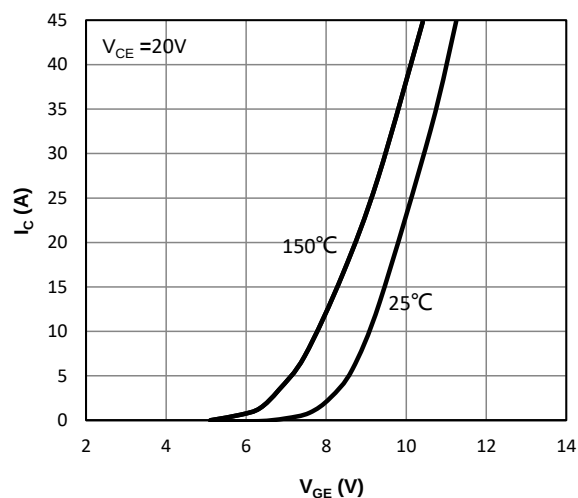


Figure 4. Typical Transfer Characteristics IGBT

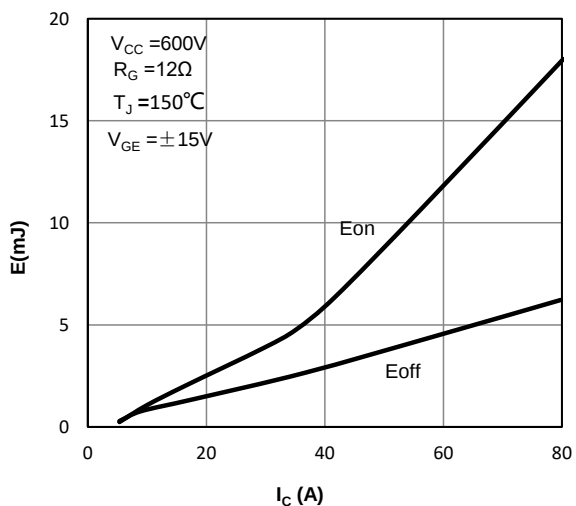


Figure 5. Switching Loss vs Ic IGBT

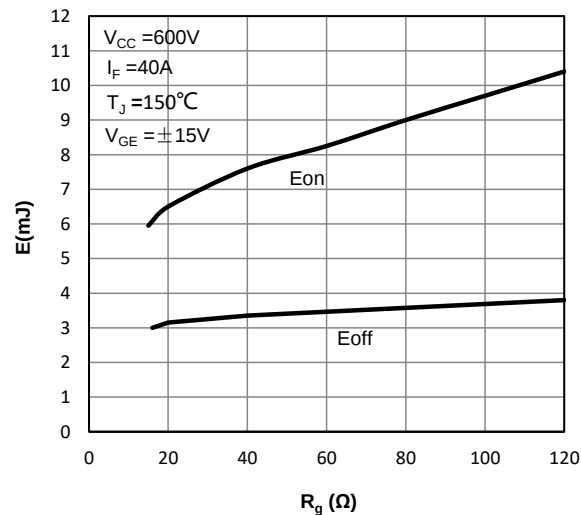


Figure 6. Switching Loss vs Rg IGBT

Typical Operating Characteristics

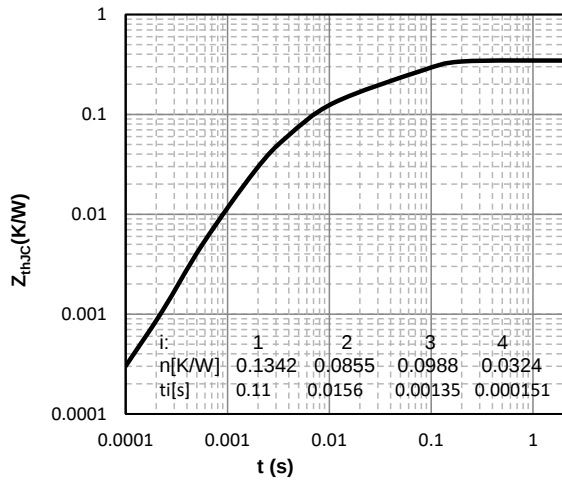
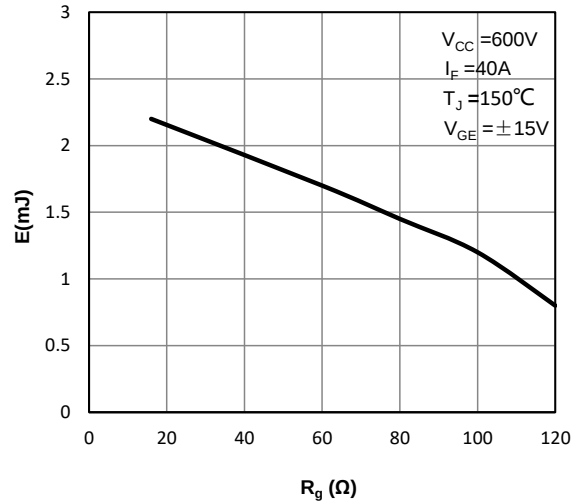
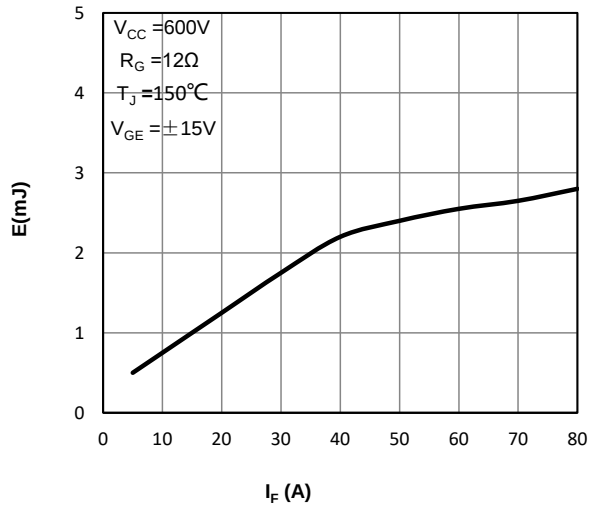


Figure 9. Transient Thermal Impedance IGBT

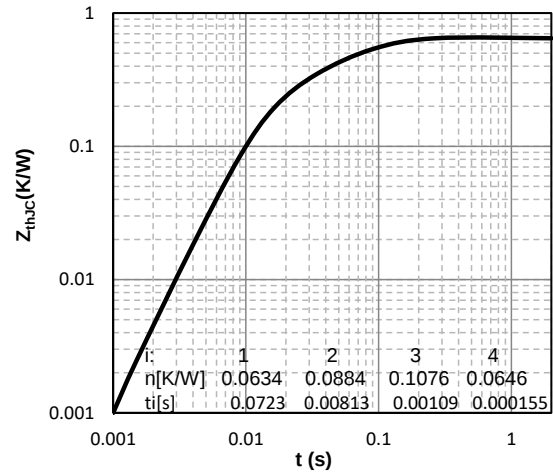
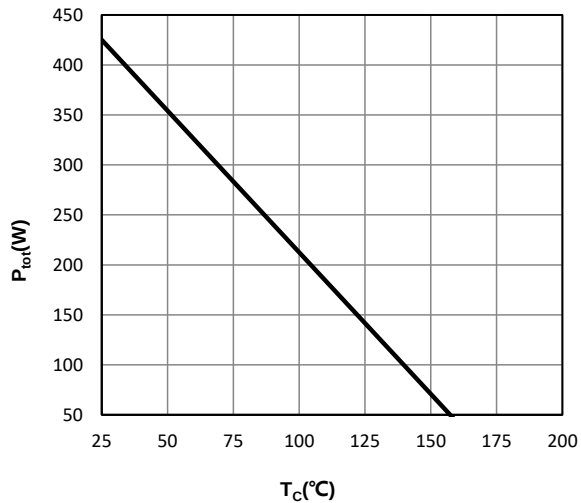
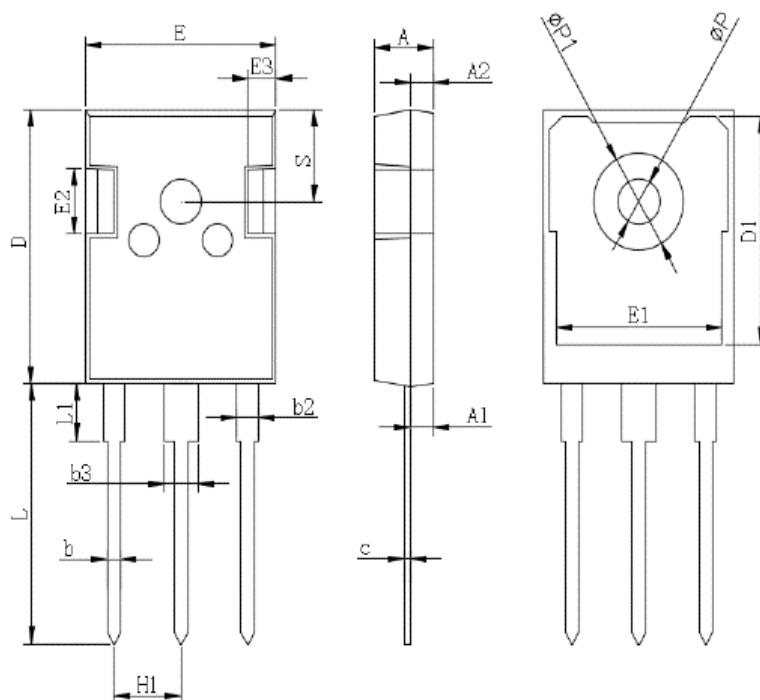


Figure 10. Transient Thermal Impedance Diode



TO-247 Package information


Symbol	Dimensions in Millimeters(mm)		Dimensions In Inches	
	Min	Max	Min	Max
A	4.800	5.200	0.188	0.204
A1	2.210	2.610	0.087	0.102
A2	1.850	2.150	0.072	0.084
b	1.000	1.400	0.039	0.055
b2	1.910	2.210	0.075	0.087
C	0.500	0.700	0.019	0.027
D	20.700	21.300	0.814	0.838
D1	16.250	16.850	0.639	0.663
E	15.500	16.100	0.610	0.633
E1	13.000	13.600	0.511	0.535
E2	4.800	5.200	0.188	0.204
E3	2.300	2.700	0.090	0.106
L	19.620	20.220	0.772	0.796
L1	-	4.300	-	0.169
ΦP	3.400	3.800	0.133	0.149
ΦP1	-	7.300	-	0.287
S	6.15TYP		0.242TYP	
H1	5.44TYP		0.214TYP	
b3	2.800	3.200	0.110	0.125