

## Features

- Low VCE(sat) Trench-FS IGBT technology
- Positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- High short circuit capability(10us)
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

## Maximum Ratings

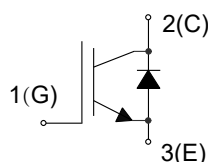
- Operating Junction Temperature Range : -40°C to +175°C
- Storage Temperature Range: -55°C to +150°C
- IGBT Thermal Resistance: 0.75°C/W Junction to Case
- Diode Thermal Resistance: 1.35°C/W Junction to Case
- Thermal Resistance: 40°C/W Junction to Ambient

Parameter	Symbol	Rating	Unit	
Collector-Emitter Voltage	$V_{CE}$	1200	V	
DC Collector Current <sup>(2)</sup>	$I_C$	$T_C=25^\circ\text{C}$	30	
		$T_C=100^\circ\text{C}$	15	
Pulsed Collector Current <sup>(3)</sup> VGE=15V	$I_{CM}$	60	A	
Diode Forward Current <sup>(2)</sup>	$I_F$	$T_C=25^\circ\text{C}$	30	
		$T_C=100^\circ\text{C}$	15	
Diode Pulsed Current <sup>(3)</sup>	$I_{F,puls}$	60	A	
Gate-Emitter Voltage	$V_{GE}$	$\pm 20$	V	
Transient Gate-Emitter Voltage		$\pm 30$		
Short Circuit Withstand Time	$t_{SC}$	10	$\mu\text{s}$	
$V_{GE}=15\text{V}, V_{CC}=900\text{V}, V_{CEM}\leq 1200\text{V}$				
Power Dissipation	$T_j=25^\circ\text{C}$	$P_D$	200	W

Note:

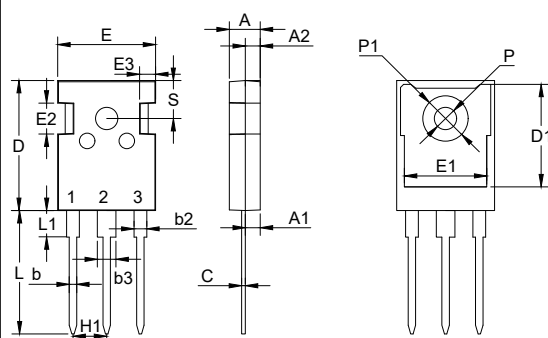
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Limited by  $T_{Jmax}$ .
3.  $T_p$  limited by  $T_{Jmax}$ .

## Internal Structure



# Trench and Field Stop IGBT 1200V 15A

## TO-247AB



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.087	0.103	2.21	2.61	
A2	0.073	0.085	1.85	2.15	
b	0.039	0.055	1.00	1.40	
b2	0.075	0.087	1.91	2.21	
C	0.020	0.028	0.50	0.70	
D	0.815	0.839	20.70	21.30	
D1	0.640	0.663	16.25	16.85	
E	0.610	0.634	15.50	16.10	
E1	0.512	0.535	13.00	13.60	
E2	0.189	0.205	4.80	5.20	
E3	0.091	0.106	2.30	2.70	
L	0.772	0.796	19.62	20.22	
L1	-	0.169	-	4.30	
P	0.134	0.150	3.40	3.80	$\Phi$
P1		0.287	-	7.30	$\Phi$
S		0.242		6.15	TYP
H1		0.214		5.44	TYP
b3	0.110	0.126	2.80	3.20	

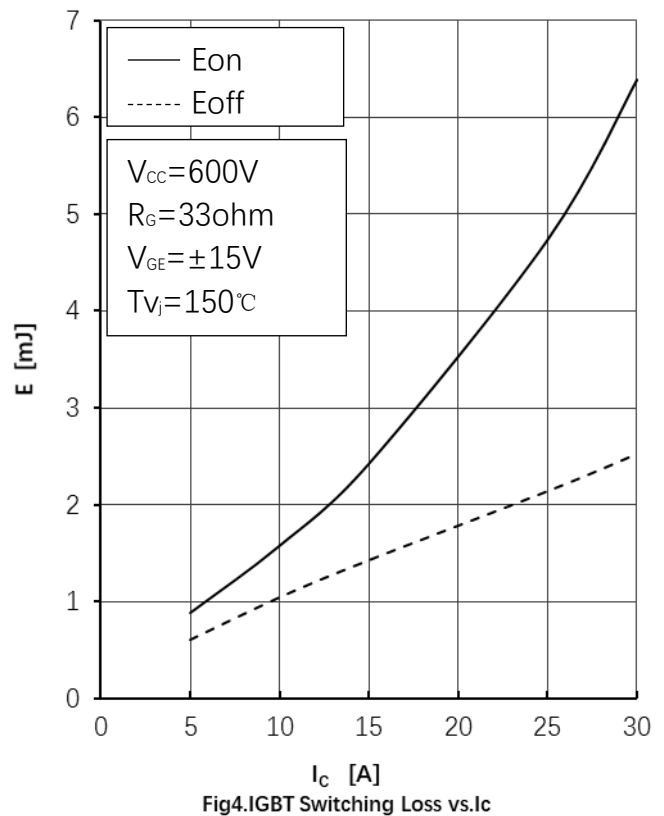
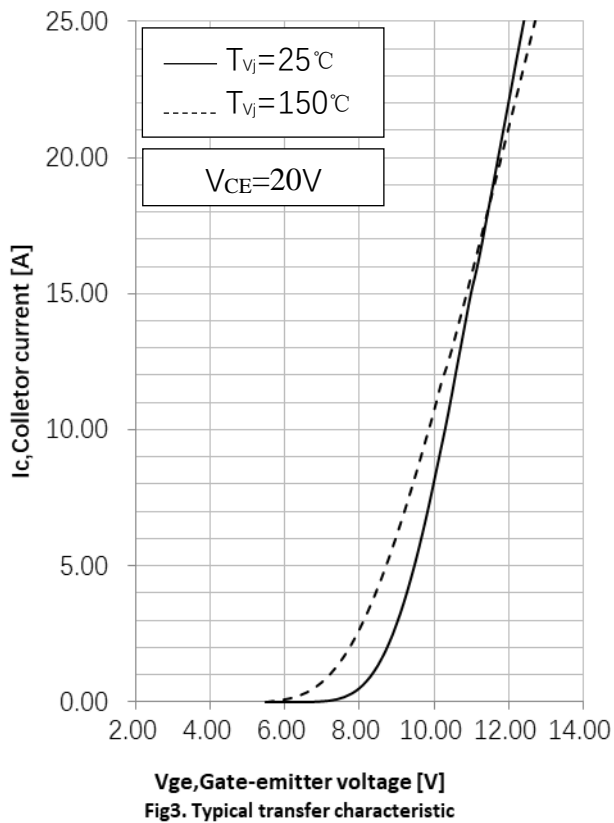
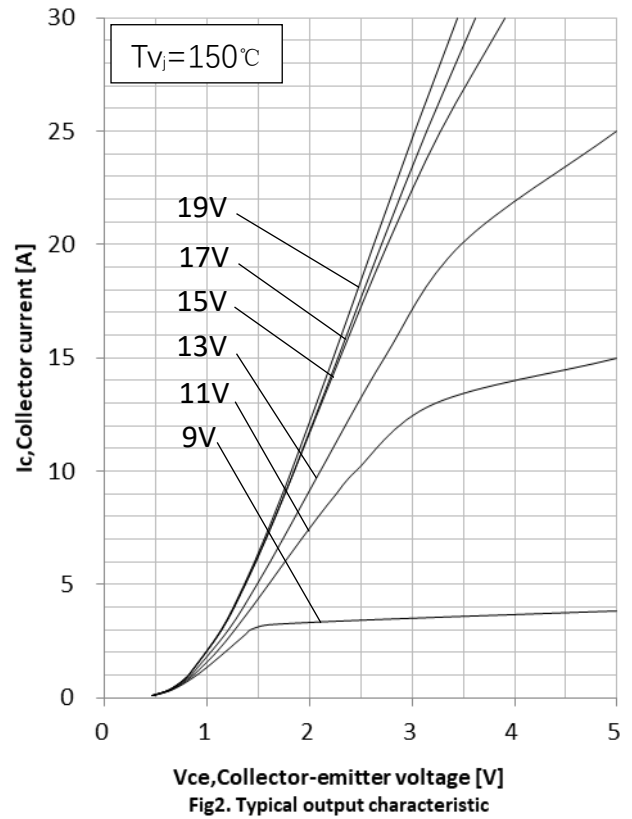
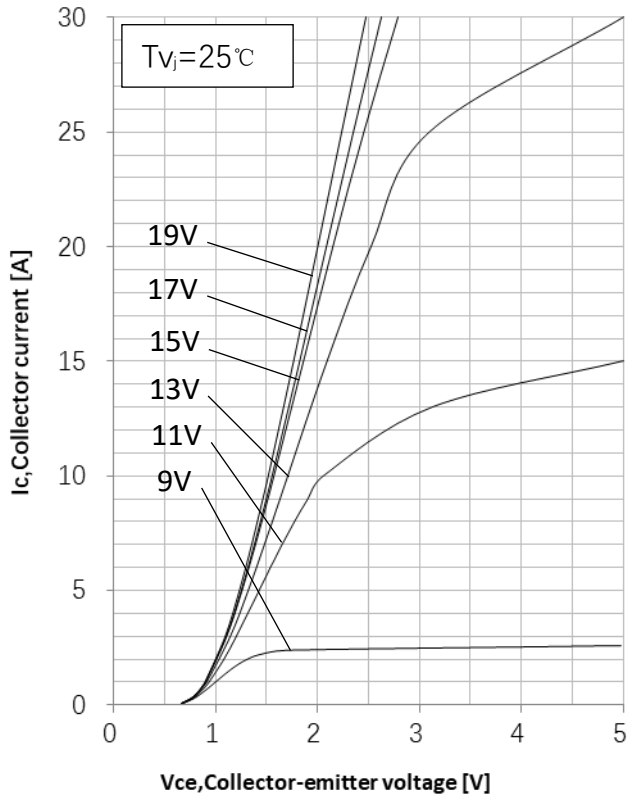
**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	1200			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A, T_J=25^\circ C$		1.85	2.35	V
		$V_{GE}=15V, I_C=15A, T_J=125^\circ C$		2.20		
		$V_{GE}=15V, I_C=15A, T_J=150^\circ C$		2.30		
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=500\mu A, V_{GE}=V_{CE}$	5.1	5.8	6.4	V
C-E Leakage Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V, T_J=25^\circ C$			0.25	mA
		$V_{CE}=1200V, V_{GE}=0V, T_J=150^\circ C$			5.00	
G-E Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$			100	nA
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		1.2		nF
Reverse Transfer Capacitance	$C_{res}$			0.04		
Gate Charge	$Q_g$	$V_{CC}=960V, I_C=15A, V_{GE}=15V$		0.14		$\mu C$
Short Circuit Collector Current	$I_{sc}$	$V_{GE}=15V, t_{sc}\leq 10\mu s, V_{CC}=900V, T_J\leq 150^\circ C$		60		A
<b>IGBT Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=15A, \dot{A}$ $V_{GE}=-15\sim 15V,$ $R_G=47\Omega$		45		ns
Rise Time	$t_r$			52		
Turn-Off Delay Time	$t_{d(off)}$			128		
Fall Time	$t_f$			186		
Turn-On Energy	$E_{on}$			1.5		mJ
Turn-Off Energy	$E_{off}$			0.9		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=15A, \dot{A}$ $V_{GE}=-15\sim 15V,$ $R_G=33\Omega \hat{E}$ $VRVF\acute{G}$		50		ns
Rise Time	$t_r$			55		
Turn-Off Delay Time	$t_{d(off)}$			160		
Fall Time	$t_f$			135		
Turn-On Energy	$E_{on}$			2.2		mJ
Turn-Off Energy	$E_{off}$			1.3		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=15A, \dot{A}$ $V_{GE}=-15\sim 15V,$ $R_G=33\Omega \hat{E}$ $VRVF\acute{I} 0$		52		ns
Rise Time	$t_r$			58		
Turn-Off Delay Time	$t_{d(off)}$			170		
Fall Time	$t_f$			138		
Turn-On Energy	$E_{on}$			2.4		mJ
Turn-Off Energy	$E_{off}$			1.45		

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Diode Static Characteristics</b>						
Diode Forward Voltage	$V_F$	$I_F=15A, T_J=25^\circ C$		2.00	2.40	V
		$I_F=15A, T_J=125^\circ C$		1.80		
		$I_F=15A, T_J=150^\circ C$		1.70		
<b>Diode Dynamic Characteristics</b>						
Diode Forward Voltage	$V_{FM}$	$I_F=15A$		1.90		V
Reverse Recovery Current	$I_{rr}$	$V_R=600V, I_F=15A,$ $di_F/dt=-240A/\mu s, T_J=25^\circ C$		7.5		A
Reverse Recovery Charge	$Q_{rr}$			1.8		$\mu C$
Reverse Recovery Energy	$E_{rec}$			0.60		mJ
Reverse Recovery Current	$I_{rr}$	$V_R=600V, I_F=15A,$ $di_F/dt=-240A/\mu s, T_J=125^\circ C$		9.0		A
Reverse Recovery Charge	$Q_{rr}$			2.4		$\mu C$
Reverse Recovery Energy	$E_{rec}$			0.9		mJ
Reverse Recovery Current	$I_{rr}$	$V_R=600V, I_F=15A,$ $di_F/dt=-240A/\mu s, T_J=150^\circ C$		9.5		A
Reverse Recovery Charge	$Q_{rr}$			2.6		$\mu C$
Reverse Recovery Energy	$E_{rec}$			1.0		mJ

**Curve Characteristics**



Curve Characteristics

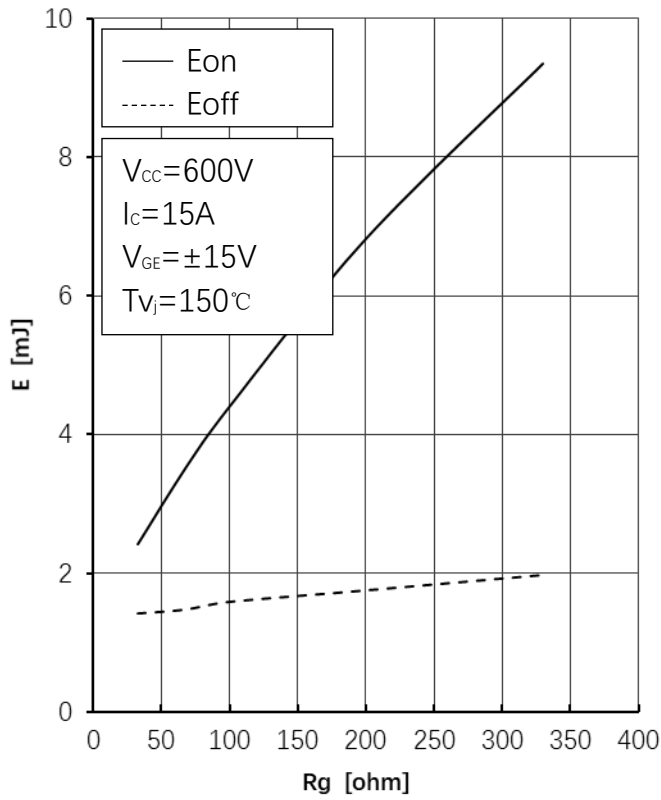


Fig5. IGBT Switching Loss vs. Rg

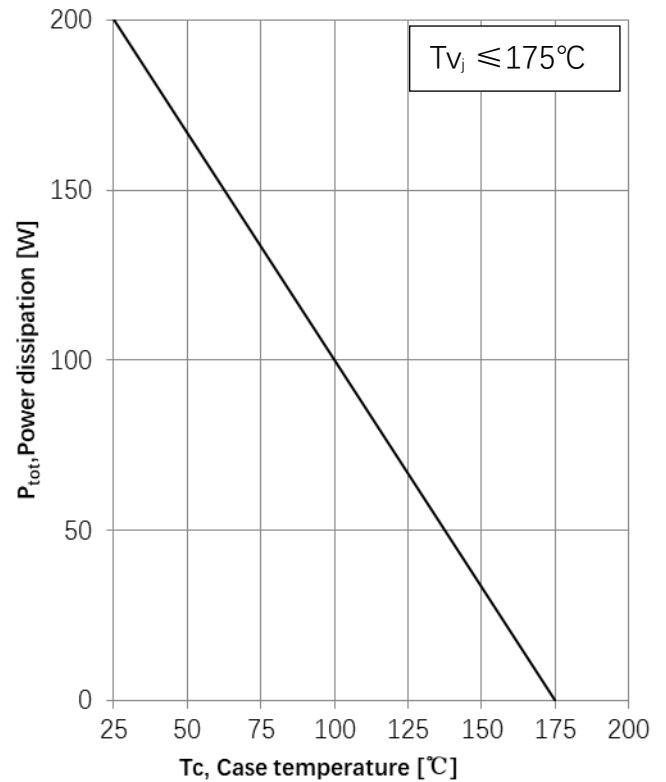


Fig6. Power dissipation as a function of case temperature

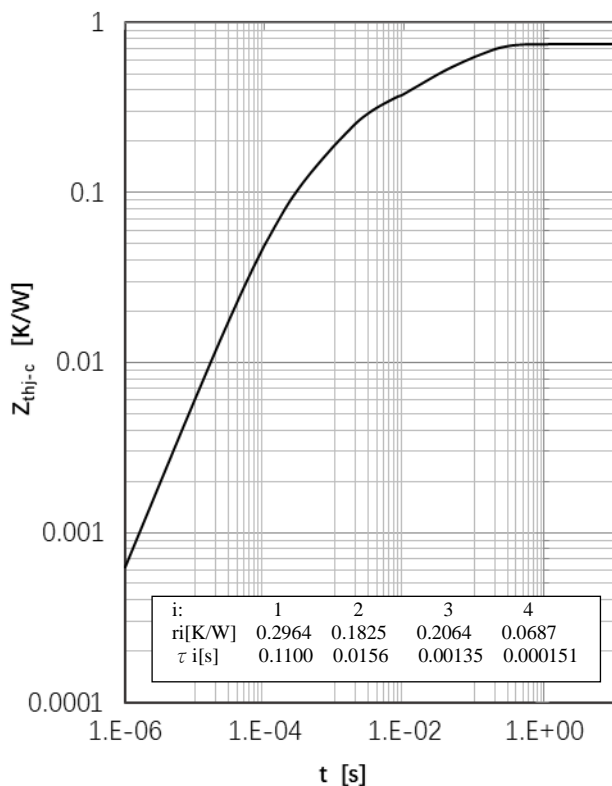


Fig 7. IGBT Transient Thermal Impedance

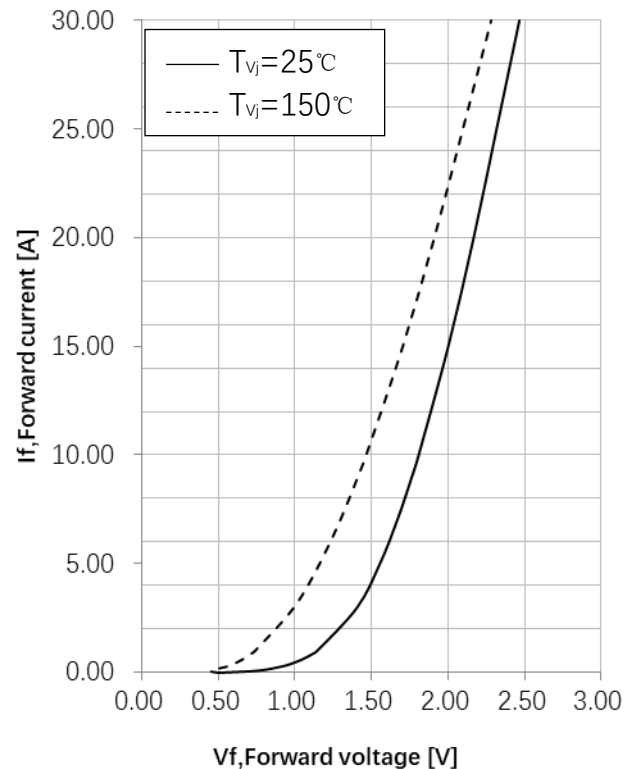


Fig8. diode forward current as a function of forward voltage

**Curve Characteristics**

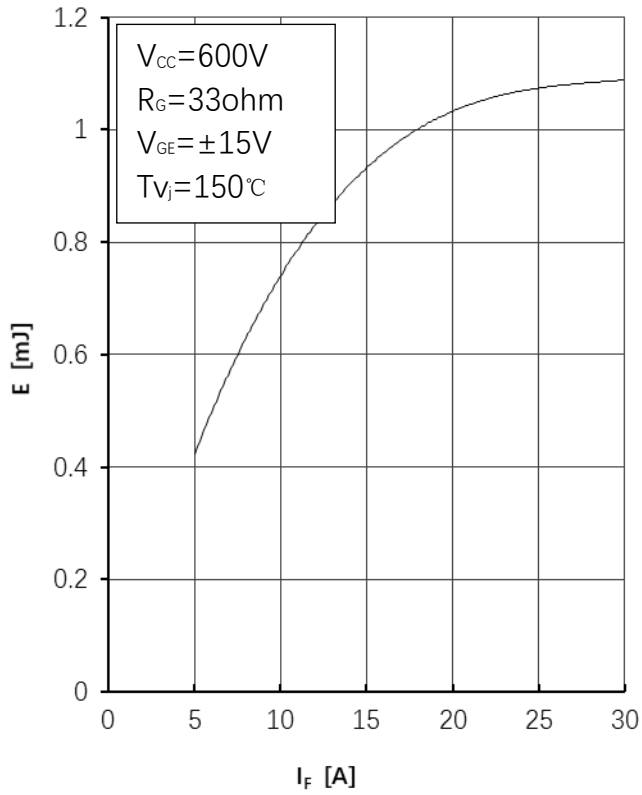


Fig9.Diode Switching Loss(Erec) vs.If

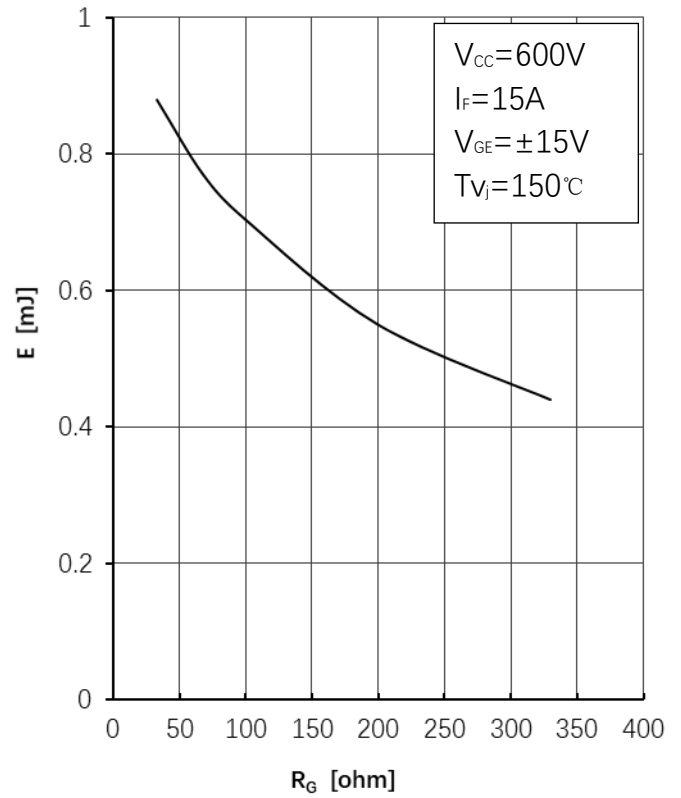


Fig10.Diode Switching Loss(Erec) vs.Rg

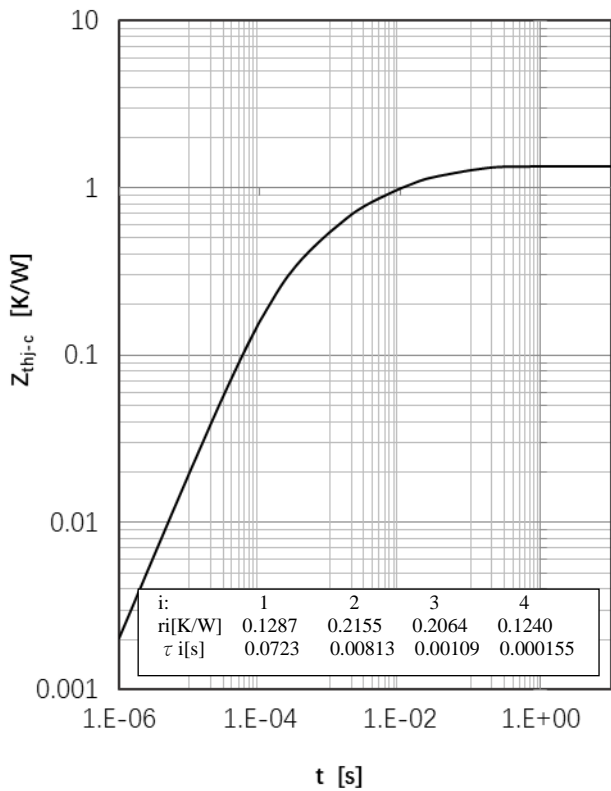


Fig11.Diode Transient Thermal Impedance

## Ordering Information

Device	Packing
Part Number-BP	Tube: 30pcs/Tube, 1800pcs/Ctn

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