

Features

- High Speed Smooth Switching Device for Hard and Soft Switching
- $V_{ce(sat)}$ with Positive Temperature Coefficient
- High Ruggedness, Good Thermal Stability
- Very Tight Parameter Distribution
- 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)

Maximum Ratings

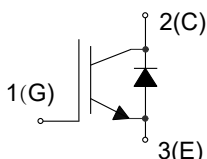
- Operating Junction Temperature Range : -40°C to $+175^{\circ}\text{C}$
- Storage Temperature Range: -55°C to $+150^{\circ}\text{C}$
- IGBT Thermal Resistance: 0.8°C/W Junction to Case
- Diode Thermal Resistance: 1.0°C/W Junction to Case
- Thermal Resistance: 40°C/W Junction to Ambient

Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CE}	650	V
DC Collector Current ⁽²⁾	I_C	$T_C=25^{\circ}\text{C}$	60
		$T_C=100^{\circ}\text{C}$	30
Pulsed Collector Current ⁽³⁾	$I_{C,pluse}$	120	A
Diode Forward Current ⁽²⁾	I_F	$T_C=25^{\circ}\text{C}$	60
		$T_C=100^{\circ}\text{C}$	30
Diode Pulsed Current ⁽³⁾	$I_{F,pluse}$	120	A
Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ⁽⁴⁾		± 30	
Short Circuit Withstand Time ⁽⁵⁾	t_{SC}	5	μs
$V_{GE}=15\text{V}, V_{CC}=400\text{V}, V_{CEM}\leq 650\text{V}$			
Power Dissipation	P_D	$T_C=25^{\circ}\text{C}$	187
		$T_C=100^{\circ}\text{C}$	93

Note:

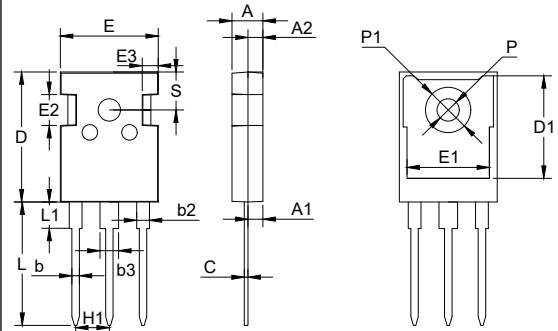
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. Limited by T_{Jmax} .
3. T_p limited by T_{Jmax} .
4. $T_p \leq 10\mu\text{s}$, Duty Cycle < 1%
5. Allowed number of short circuits: < 1000; time between short circuits: > 1s.

Internal Structure



Trench and Field Stop IGBT 650V 30A

TO-247AB



DIMENSIONS

DIM	INCHES		MM		NOTE
	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	Φ
P1		0.287	-	7.30	Φ
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	
Static Characteristics							
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	650			V	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=30A, T_J=25^\circ C$		1.80	2.10	V	
		$V_{GE}=15V, I_C=30A, T_J=125^\circ C$		2.10			
		$V_{GE}=15V, I_C=30A, T_J=150^\circ C$		2.20			
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	4.5	5.0	5.5	V	
C-E Leakage Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_J=25^\circ C$			1	mA	
G-E Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$			100	nA	
Dynamic Characteristics							
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		1.6		nF	
Reverse Transfer Capacitance	C_{res}			0.09			
Gate Charge	Q_g	$V_{CC}=300V, I_C=30A, V_{GE}=15V$		0.15		uC	
IGBT Switching Characteristics							
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=25^\circ C$		40		ns	
Rise Time	t_r			72			
Turn-Off Delay Time	$t_{d(off)}$			120			
Fall Time	t_f			30			
Turn-On Energy	E_{on}	$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=25^\circ C$		0.92		mJ	
Turn-Off Energy	E_{off}			0.45			
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=125^\circ C$		45		ns
Rise Time	t_r				75		
Turn-Off Delay Time	$t_{d(off)}$			180			
Fall Time	t_f			35			
Turn-On Energy	E_{on}	$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=125^\circ C$		1.35		mJ	
Turn-Off Energy	E_{off}			0.68			
Turn-On Delay Time	$t_{d(on)}$		$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=150^\circ C$		48		ns
Rise Time	t_r				78		
Turn-Off Delay Time	$t_{d(off)}$			195			
Fall Time	t_f			38			
Turn-On Energy	E_{on}	$V_{CC}=300V, I_C=30A, V_{GE}=-15/15V, R_G=33\Omega, L_S=60nH, T_J=150^\circ C$		1.5		mJ	
Turn-Off Energy	E_{off}			0.8			

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Characteristics						
Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=30A, T_J=25^\circ C$		1.9	2.4	V
		$V_{GE}=0V, I_F=30A, T_J=125^\circ C$		1.9		
		$V_{GE}=0V, I_F=30A, T_J=150^\circ C$		1.95		
Reverse Recovery Current	I_{rr}	$V_R=300V, I_F=30A,$ $di_F/dt=-300A/\mu s, T_J=25^\circ C$		6.0		A
Reverse Recovery Charge	Q_{rr}			0.1		μC
Reverse Recovery Energy	E_{rec}			0.06		mJ
Reverse Recovery Current	I_{rr}	$V_R=300V, I_F=30A,$ $di_F/dt=-300A/\mu s, T_J=125^\circ C$		10		A
Reverse Recovery Charge	Q_{rr}			0.22		μC
Reverse Recovery Energy	E_{rec}			0.13		mJ
Reverse Recovery Current	I_{rr}	$V_R=300V, I_F=30A,$ $di_F/dt=-300A/\mu s, T_J=150^\circ C$		12		A
Reverse Recovery Charge	Q_{rr}			0.26		μC
Reverse Recovery Energy	E_{rec}			0.17		mJ

Curve Characteristics

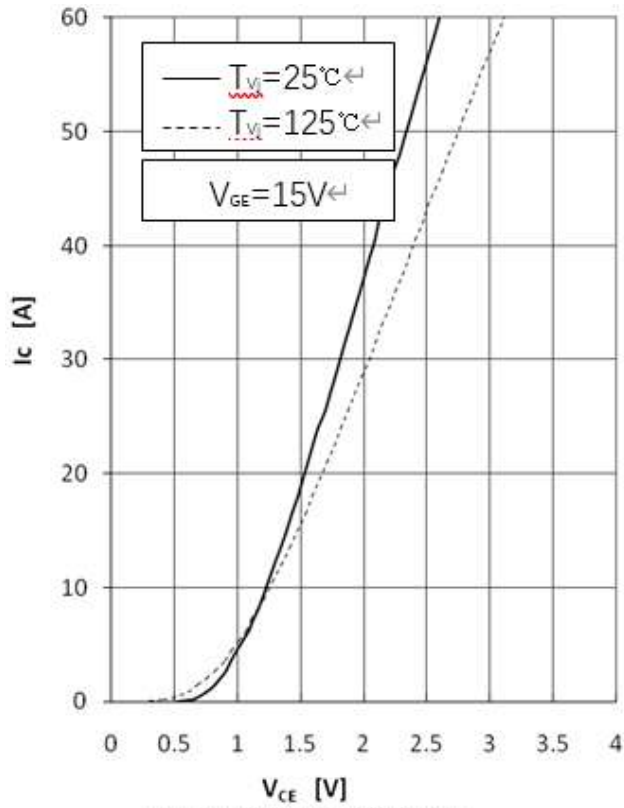


Fig1.IGBT Output Characteristics

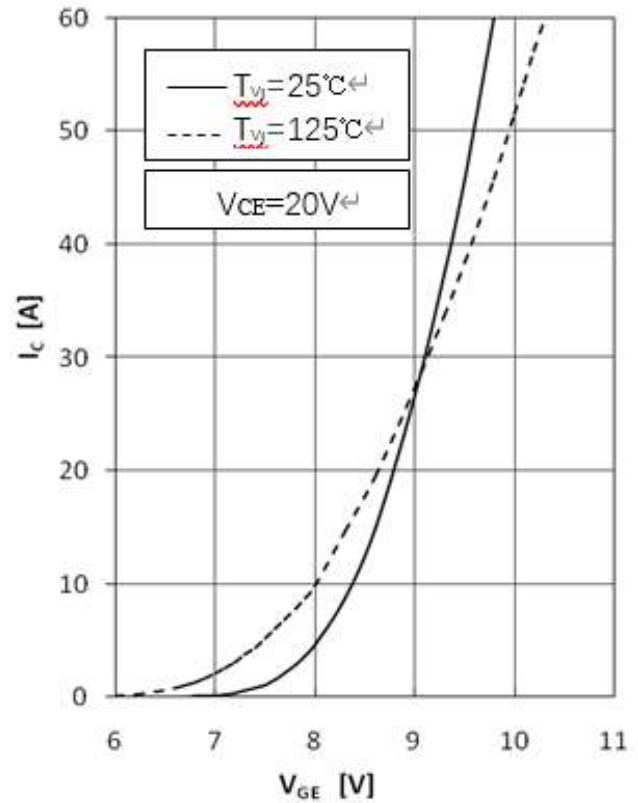


Fig2.IGBT Transfer Characteristics

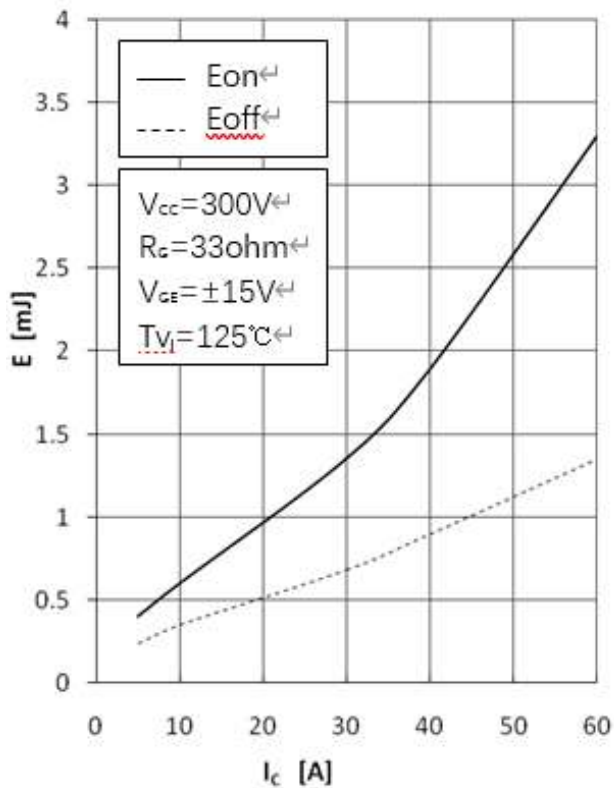


Fig3.IGBT Switching Loss vs. Ic

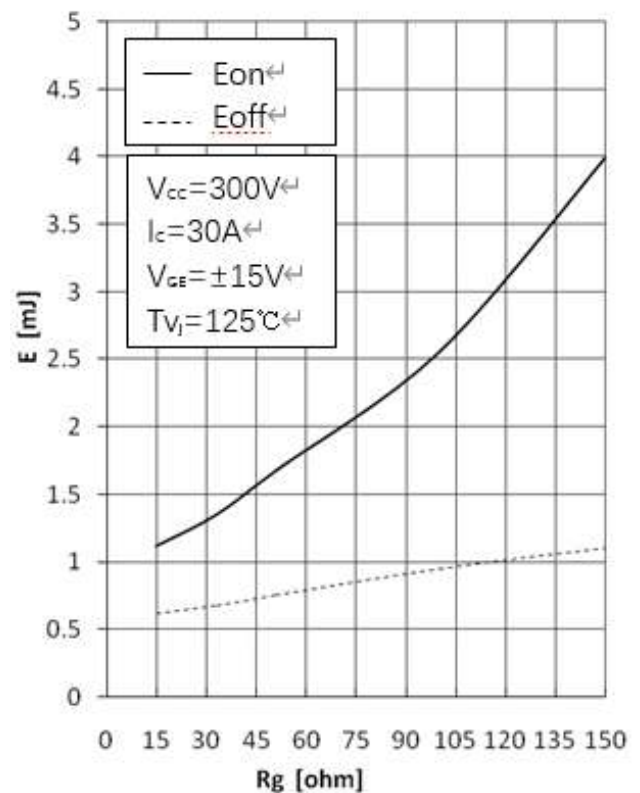
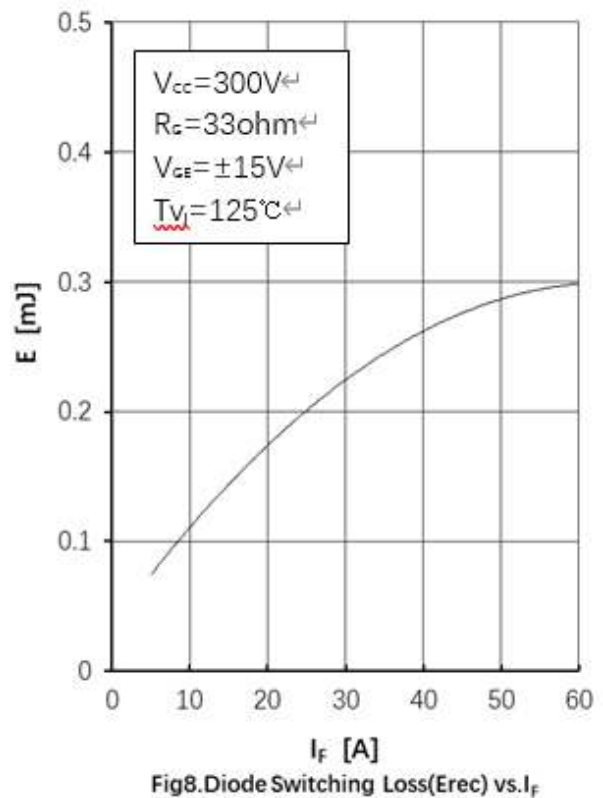
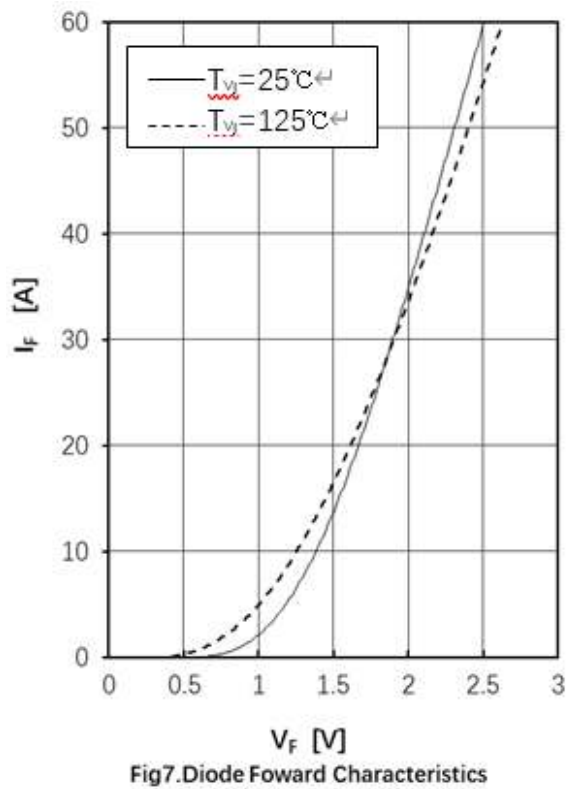
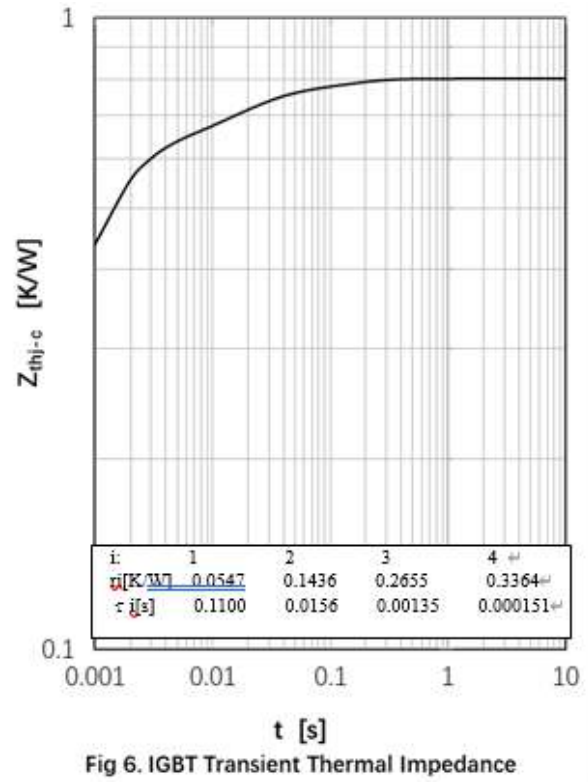
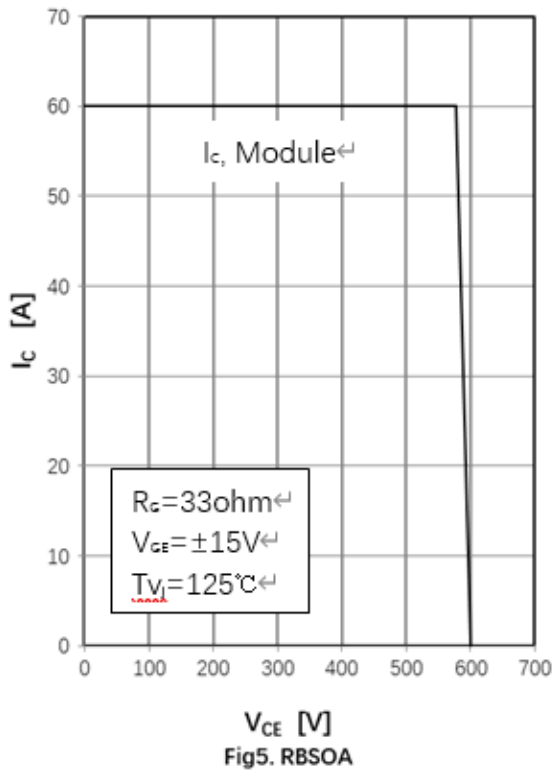


Fig4.IGBT Switching Loss vs. Rg

Curve Characteristics



Curve Characteristics

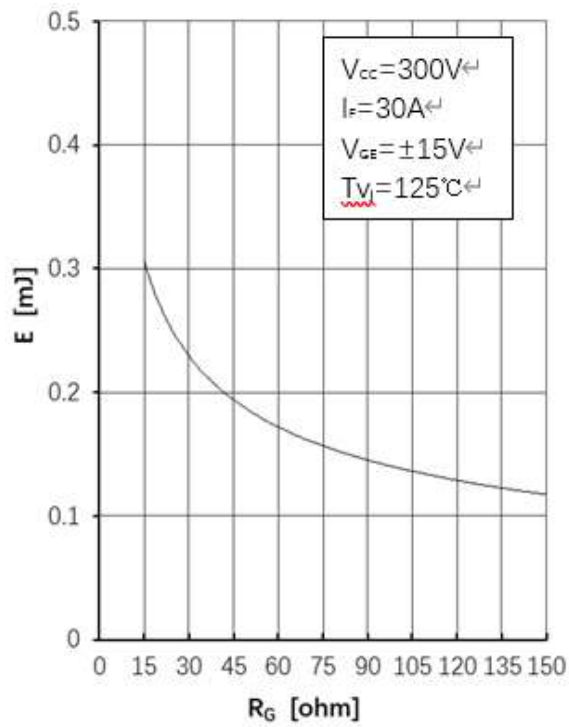


Fig9.Diode Switching Loss(Erec) vs.Rg

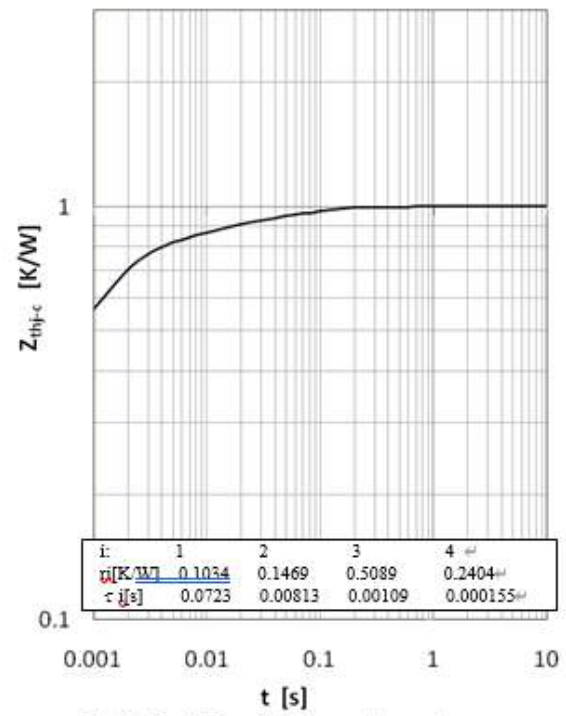


Fig 10. Diode Transient Thermal Impedance

Ordering Information

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

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