

Features

- AEC-Q101 Qualified
- Including Fast & Soft Recovery anti-Parallel FWD
- $V_{ce(sat)}$ with Positive Temperature Coefficient
- High Short Circuit Capability (10 μ s)
- Very Tight Parameter Distribution
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note 2)("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

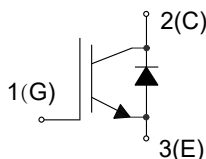
- Operating Junction Temperature Range : -40°C to +175°C
- Storage Temperature Range: -55°C to +150°C
- IGBT Thermal Resistance: 0.35°C/W Junction to Case
- Diode Thermal Resistance: 0.65°C/W Junction to Case
- Thermal Resistance: 40°C/W Junction to Ambient

Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	V_{CE}	1200	V
DC Collector Current ^(Note 3)	I_C	$T_C=25^\circ\text{C}$	80
		$T_C=100^\circ\text{C}$	40
Pulsed Collector Current ^(Note 4)	$I_{C,pulse}$	160	A
Diode Forward Current ^(Note 3)	I_F	$T_C=25^\circ\text{C}$	80
		$T_C=100^\circ\text{C}$	40
Diode Pulsed Current ^(Note 4)	$I_{F,pulse}$	160	A
Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ^(Note 5)		± 30	
Short Circuit Withstand Time, $V_{GE}=15\text{V}$, $V_{CC}=900\text{V}$, $V_{CEM}\leq 1200\text{V}$	t_{SC}	10	μs
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	428
		$T_C=100^\circ\text{C}$	214

Note:

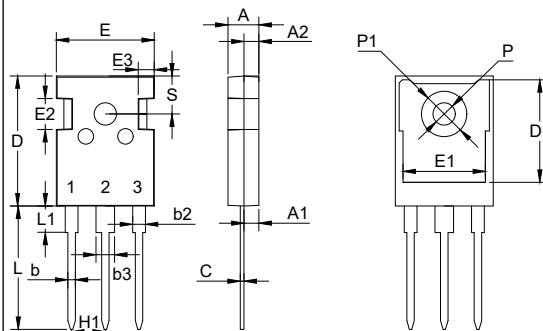
1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.
3. Limited by T_{Jmax} .
4. T_p limited by T_{Jmax} .
5. $T_p \leq 10\mu\text{s}$, Duty Cycle <1%

Internal Structure



Trench and Field Stop IGBT 1200V 40A

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 of the IGBT @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
IGBT Static Characteristics						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=250\mu A$	1200			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A, T_J=25^\circ C$		1.85	2.40	V
		$V_{GE}=15V, I_C=40A, T_J=125^\circ C$		2.20		
		$V_{GE}=15V, I_C=40A, T_J=150^\circ C$		2.30		
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=1.4mA, V_{CE}=V_{GE}$	4.8	5.6	6.5	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	
G-E Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 30V$			200	nA
Dynamic Characteristics						
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		2.5		nF
Reverse Transfer Capacitance	C_{res}			0.09		
Gate Charge	Q_g	$V_{CC}=960V, I_C=40A, V_{GE}=15V$		0.33		μC
Short Circuit Collector Current	I_{SC}	$V_{GE}=15V, t_{sc}\leq 10\mu s, V_{cc}=900V, T_J\leq 150^\circ C$		140		A
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=40A, V_{GE}=\pm 15V, R_G=12\Omega, T_J=25^\circ C$		45		ns
Rise Time	t_r			56		
Turn-Off Delay Time	$t_{d(off)}$			180		
Fall Time	t_f			80		mJ
Turn-On Energy	E_{on}			3.8		
Turn-Off Energy	E_{off}			1.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=40A, V_{GE}=\pm 15V, R_G=12\Omega, T_J=125^\circ C$		50		ns
Rise Time	t_r			58		
Turn-Off Delay Time	$t_{d(off)}$			240		
Fall Time	t_f			85		mJ
Turn-On Energy	E_{on}			5.4		
Turn-Off Energy	E_{off}			2.7		
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=40A, V_{GE}=\pm 15V, R_G=12\Omega, T_J=150^\circ C$		53		ns
Rise Time	t_r			60		
Turn-Off Delay Time	$t_{d(off)}$			260		
Fall Time	t_f			90		mJ
Turn-On Energy	E_{on}			5.8		
Turn-Off Energy	E_{off}			3.0		

Electrical Characteristics of the Diode @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Diode Characteristics						
Diode Forward Voltage	V_F	$V_{GE}=0V, I_F=40A, T_J=25^\circ C$	1.6	2.0	2.6	V
		$V_{GE}=0V, I_F=40A, T_J=125^\circ C$		1.8		
		$V_{GE}=0V, I_F=40A, T_J=150^\circ C$		1.7		
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=40A,$ $di_F/dt=-520A/\mu s, T_J=25^\circ C$		14		A
Diode Reverse Recovery Time	t_{rr}			439		ns
Reverse Recovery Charge	Q_{rr}			2.55		μC
Reverse Recovery Energy	E_{rec}			0.9		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=40A,$ $di_F/dt=-520A/\mu s, T_J=125^\circ C$		18		A
Diode Reverse Recovery Time	t_{rr}			628		ns
Reverse Recovery Charge	Q_{rr}			6.33		μC
Reverse Recovery Energy	E_{rec}			2.05		mJ
Reverse Recovery Current	I_{rr}	$V_R=600V, I_F=40A,$ $di_F/dt=-520A/\mu s, T_J=150^\circ C$		20		A
Diode Reverse Recovery Time	t_{rr}			773		ns
Reverse Recovery Charge	Q_{rr}			7.05		μC
Reverse Recovery Energy	E_{rec}			2.25		mJ

Curve Characteristics

Fig. 1 - Typical Output Characteristic($T_J=25^\circ\text{C}$)

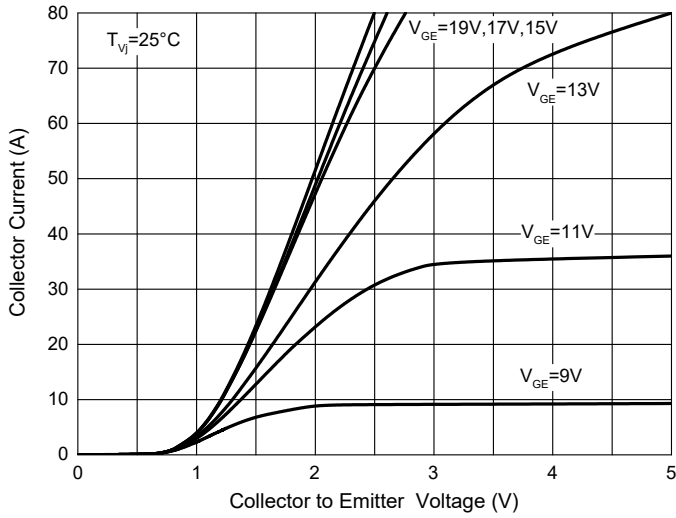


Fig. 2 - Typical Output Characteristic ($T_J=150^\circ\text{C}$)

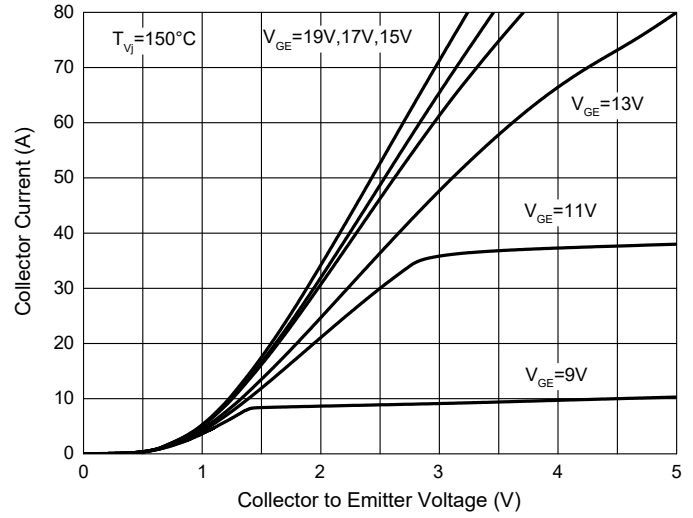


Fig. 3 - Typical Transfer Characteristic

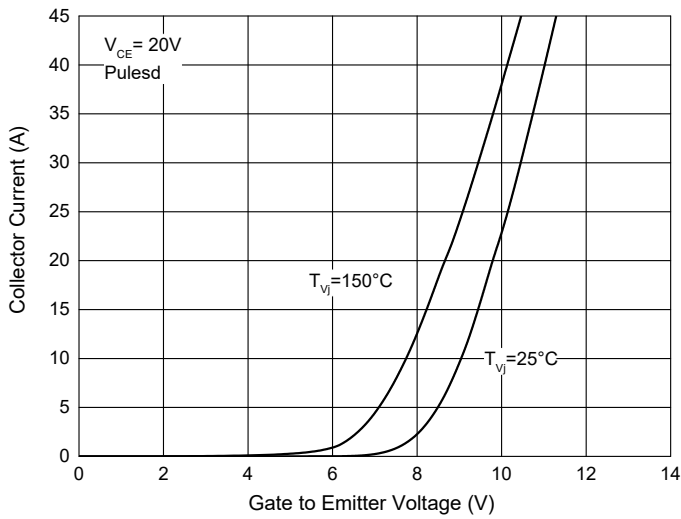


Fig. 4 - Diode Forward Current as a function of Forward Voltage

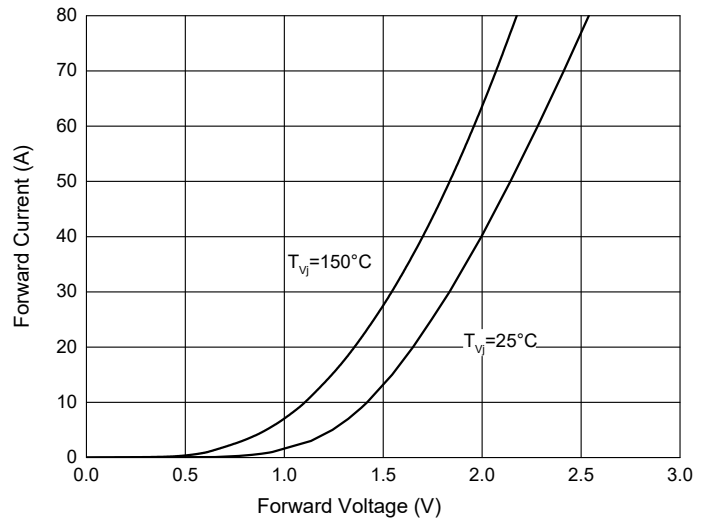


Fig. 5 - IGBT Transient Thermal Impedance

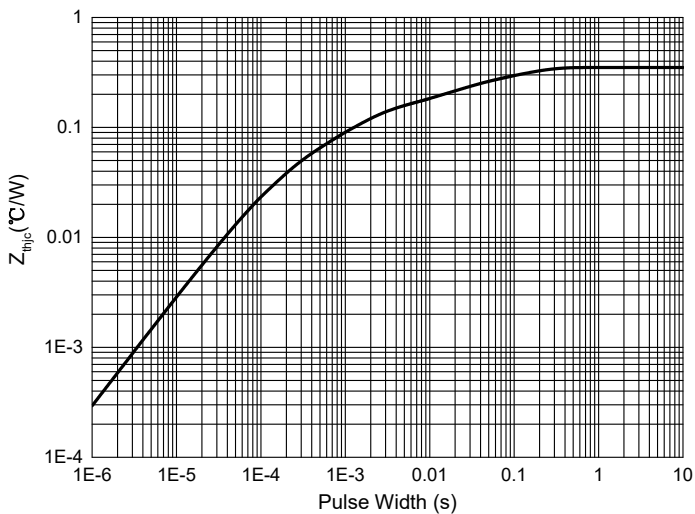
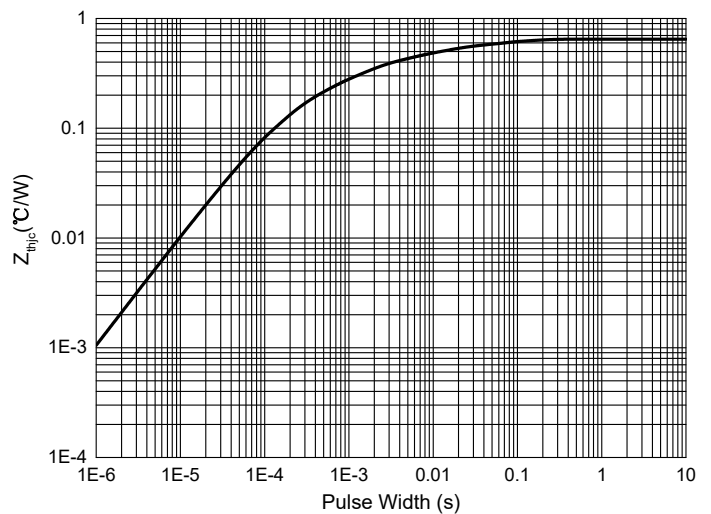


Fig. 6 - Diode Transient Thermal Impedance



Curve Characteristics

Fig. 7 - IGBT Switching Loss vs I_C

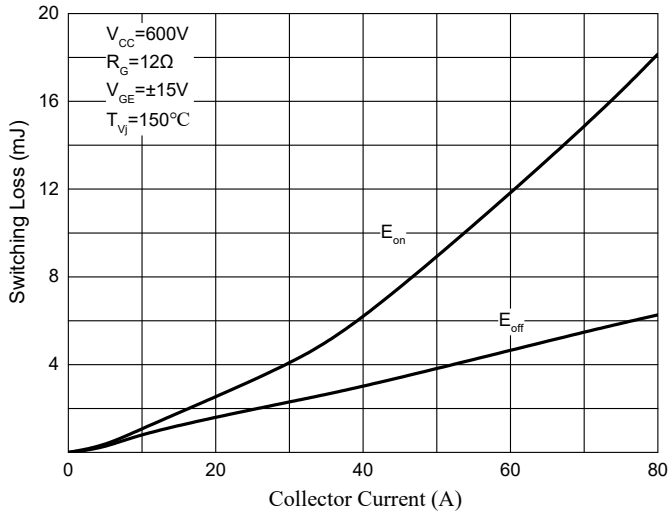


Fig. 8- IGBT Switching Loss vs R_G

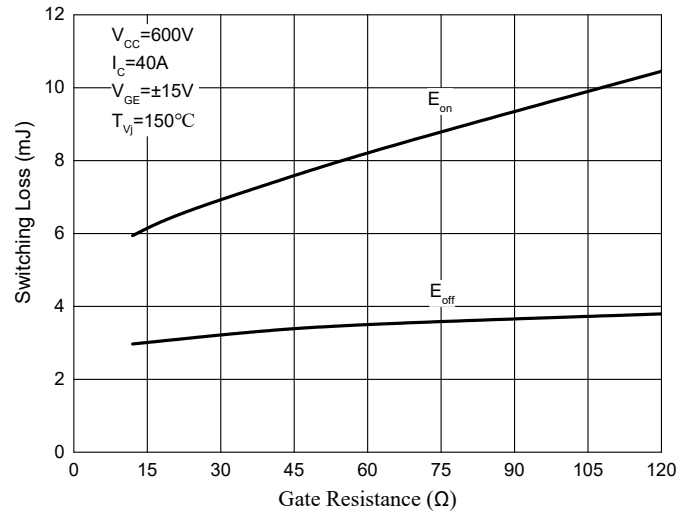


Fig. 9 - Diode Switching Loss (E_{rec}) vs I_F

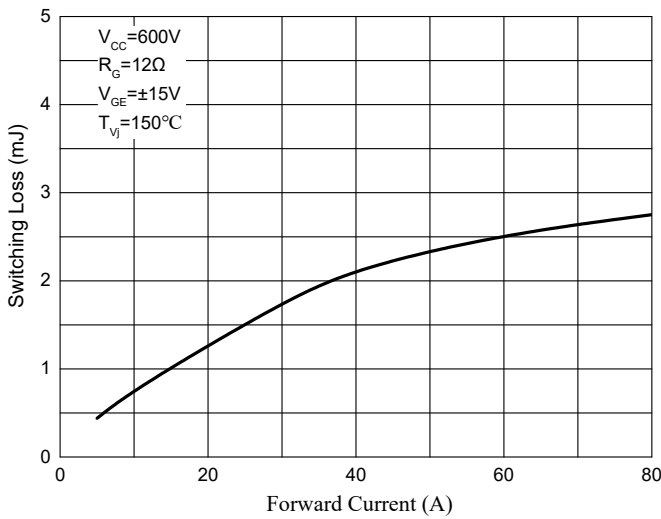


Fig. 10- Diode Switching Loss (E_{rec}) vs R_G

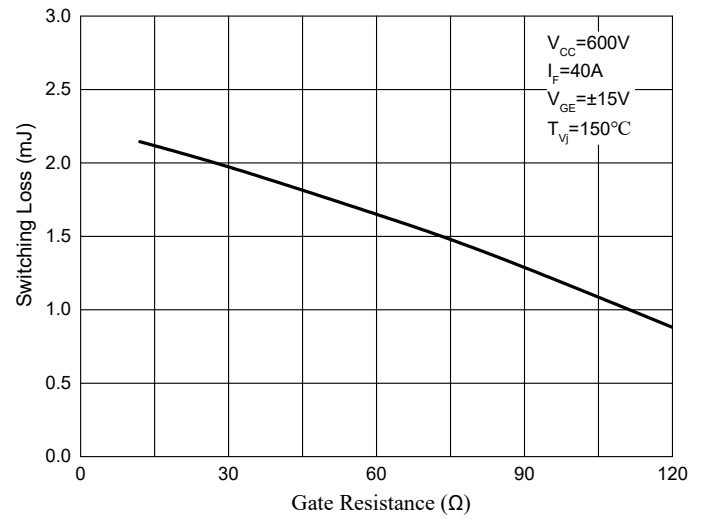


Fig. 11 - Power Dissipation as a function of Case Temperature

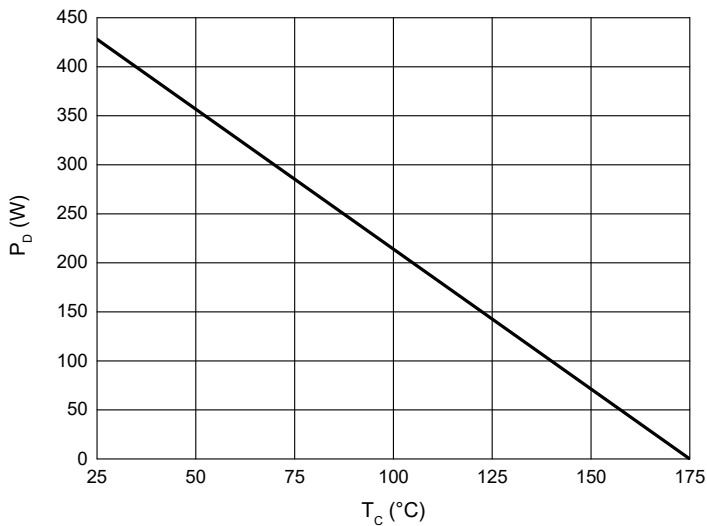
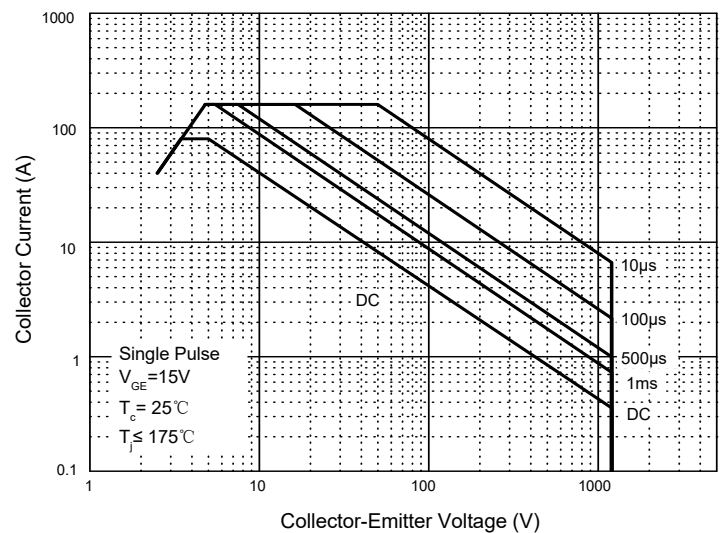


Fig. 12 -FBSOA



Ordering Information

Device	Packing
Part Number-BP	Tube: 30pcs/Tube, 360pcs/Box, 1800pcs/Ctn

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