

## Features

- Low  $V_{ce(sat)}$ , Fast Switching
- $V_{ce(sat)}$  with Positive Temperature Coefficient
- High Ruggedness, Good Thermal Stability
- Very Tight Parameter Distribution
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

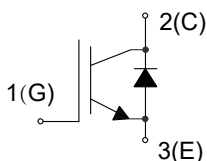
- Operating Junction Temperature Range :  $-55^{\circ}\text{C}$  to  $+175^{\circ}\text{C}^{(1)}$
- Storage Temperature Range:  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- IGBT Thermal Resistance:  $0.19^{\circ}\text{C/W}$  Junction to Case
- Diode Thermal Resistance:  $0.4^{\circ}\text{C/W}$  Junction to Case
- Thermal Resistance:  $40^{\circ}\text{C/W}$  Junction to Ambient

Parameter	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CE}$	1200	V
DC Collector Current <sup>(2)</sup>	$I_C$	$T_C=25^{\circ}\text{C}$	150
		$T_C=100^{\circ}\text{C}$	75
Pulsed Collector Current <sup>(3)</sup>	$I_{C,pluse}$	300	A
Diode Forward Current <sup>(2)</sup>	$I_F$	$T_C=25^{\circ}\text{C}$	150
		$T_C=100^{\circ}\text{C}$	75
Diode Pulsed Current <sup>(3)</sup>	$I_{F,pluse}$	300	A
Gate-Emitter Voltage	$V_{GE}$	$\pm 20$	V
Transient Gate-Emitter Voltage <sup>(4)</sup>		$\pm 30$	V
Short Circuit Withstand Time <sup>(5)</sup> $V_{GE}=15\text{V}, V_{CC}=600\text{V}, T_J \leq 175^{\circ}\text{C}$	$t_{SC}$	10	$\mu\text{s}$
Power Dissipation	$P_D$	$T_C=25^{\circ}\text{C}$	789
		$T_C=100^{\circ}\text{C}$	395

Note:

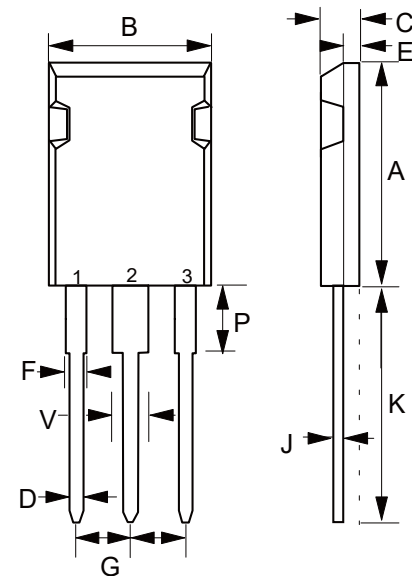
1. Device mounted on an infinite heat-sink.
2. Limited by  $T_{Jmax}$ .
3.  $T_p$  limited by  $T_{Jmax}$ .
4.  $T_p \leq 10\mu\text{s}$ , Duty Cycle  $< 1\%$
5. Allowed number of short circuits:  $< 1000$ ; time between short circuits:  $> 1\text{s}$ .

## Internal Structure



# Trench and Field Stop IGBT 1200V 75A

## TO-247P



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.787	0.866	20.00	22.00	
B	0.598	0.638	15.20	16.20	
C	0.185	0.208	4.70	5.30	
D	0.035	0.059	0.90	1.50	
E	0.059	0.094	1.50	2.40	
F	0.067	0.091	1.70	2.30	
G	0.197	0.224	5.00	5.70	
J	0.019	0.031	0.48	0.80	
K	0.748	0.833	19.00	21.15	
P	0.122	0.189	3.10	4.80	
V	0.106	0.134	2.70	3.40	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Collector-Emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=0.25mA$	1200			V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A$		1.9	2.3	V
		$V_{GE}=15V, I_C=75A, T_J=150^{\circ}C$		2.45		
		$V_{GE}=15V, I_C=75A, T_J=175^{\circ}C$		2.6		
Diode Forward Voltage	$V_F$	$V_{GE}=0V, I_F=75A$		2.2		V
		$V_{GE}=0V, I_F=75A, T_J=150^{\circ}C$		1.9		
		$V_{GE}=0V, I_F=75A, T_J=175^{\circ}C$		1.8		
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=2.4mA, V_{CE}=V_{GE}$	5	6	7	V
C-E Leakage Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$			0.1	mA
		$V_{CE}=1200V, V_{GE}=0V, T_J=175^{\circ}C$			4	
G-E Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=20V$			250	nA
Transconductance	$g_{FS}$	$V_{CE}=20V, I_C=75A$		30		S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz$		5235		pF
Output Capacitance	$C_{oes}$			400		
Reverse Transfer Capacitance	$C_{res}$			192		
Gate Charge	$Q_g$	$V_{CC}=600V, I_C=75A, V_{GE}=15V$		622		nC
Short circuit collector current	$I_{C(SC)}$	$V_{GE}=15V, V_{CC}=600V, T_{SC}=10\mu s, T_J=175^{\circ}C$		300		A
<b>IGBT Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=75A, V_{GE}=0/15V, R_G=10\Omega,$ Inductive load		112		ns
Rise Time	$t_r$			160		
Turn-Off Delay Time	$t_{d(off)}$			478		
Fall Time	$t_f$			78		mJ
Turn-On Energy	$E_{on}$			11.3		
Turn-Off Energy	$E_{off}$			4.7		
Total Switching Energy	$E_{ts}$		16.0			
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}=600V, I_C=75A, V_{GE}=0/15V, R_G=10\Omega,$ Inductive load, $T_J=175^{\circ}C$		96		ns
Rise Time	$t_r$			153		
Turn-Off Delay Time	$t_{d(off)}$			538		
Fall Time	$t_f$			140		mJ
Turn-On Energy	$E_{on}$			12.0		
Turn-Off Energy	$E_{off}$			6.1		
Total Switching Energy	$E_{ts}$		18.1			
<b>Diode Characteristics</b>						
Reverse Recovery Time	$t_{rr}$	$V_R=600V, I_F=75A,$ $di_F/dt=400A/\mu s$		293		ns
Reverse Recovery Charge	$Q_{rr}$			3		$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$			18		A
Reverse Recovery Time	$t_{rr}$	$V_R=600V, I_F=75A,$ $di_F/dt=400A/\mu s$ $T_J=175^{\circ}C$		492		ns
Reverse Recovery Charge	$Q_{rr}$			9.8		$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$			41		A

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

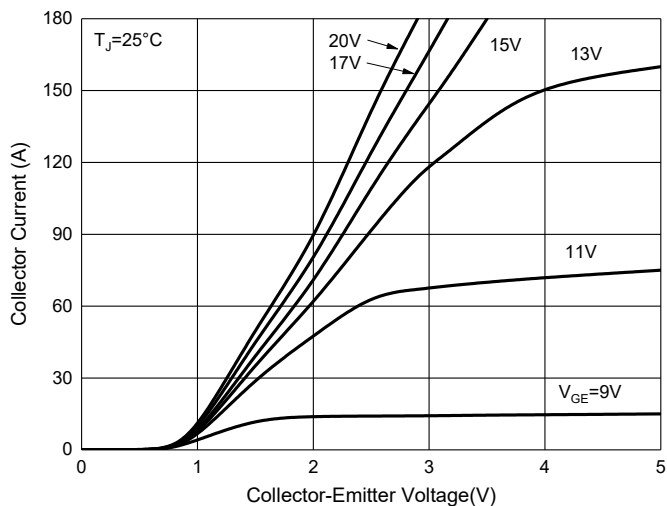


Fig. 2 - Typical Output Characteristics

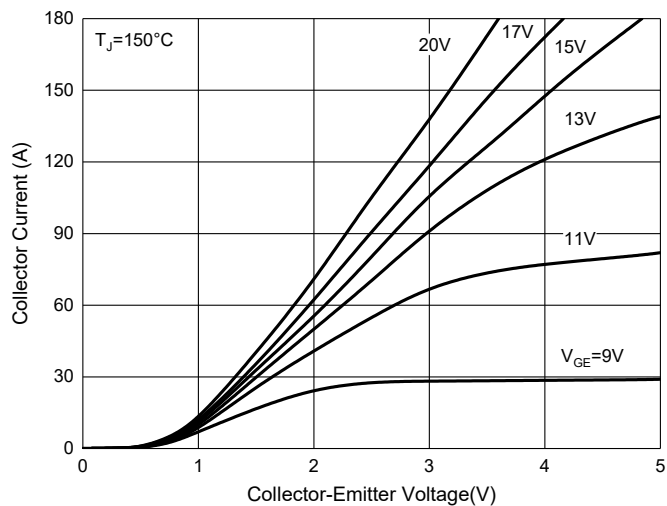


Fig. 3 -  $V_{CE(sat)} - I_C$

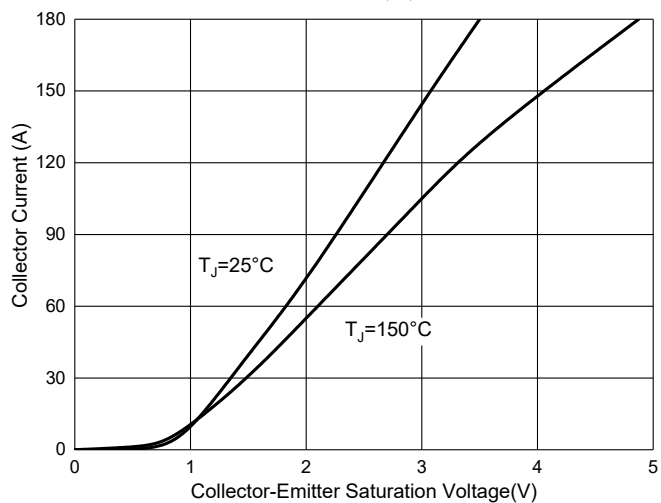


Fig. 4 -  $V_{CE(sat)} - T_J$

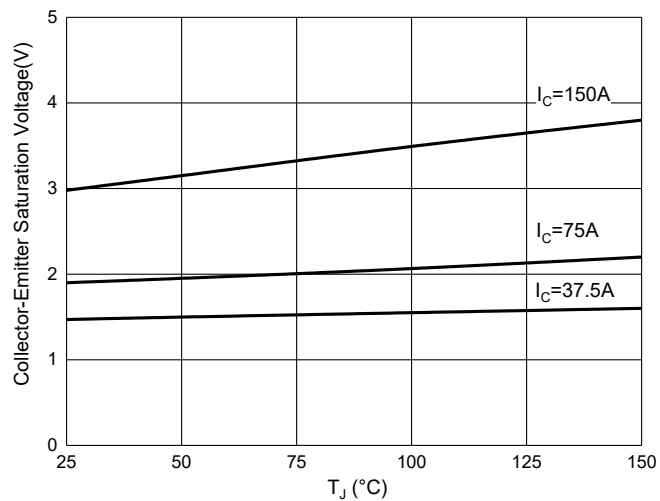


Fig. 5 - Capacitance Characteristics

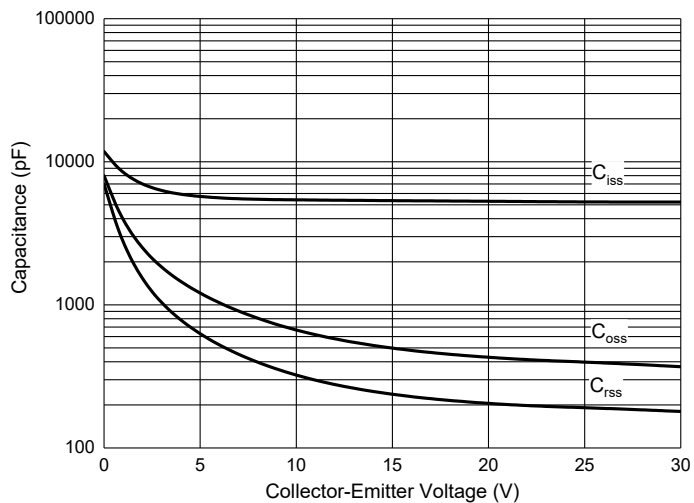
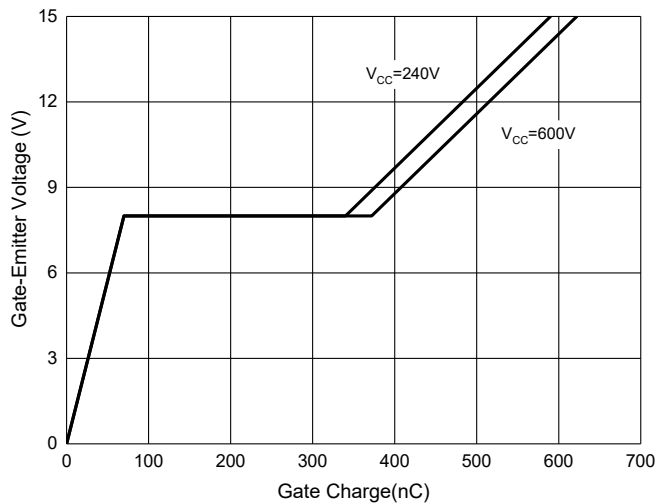


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Forward Voltage

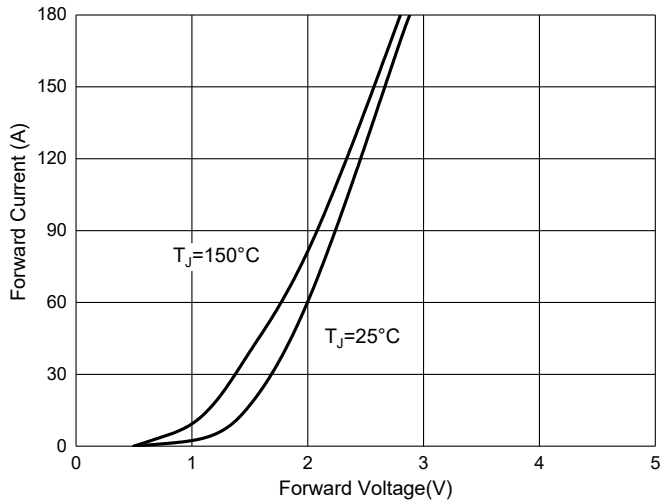


Fig. 8 -  $V_F - T_J$

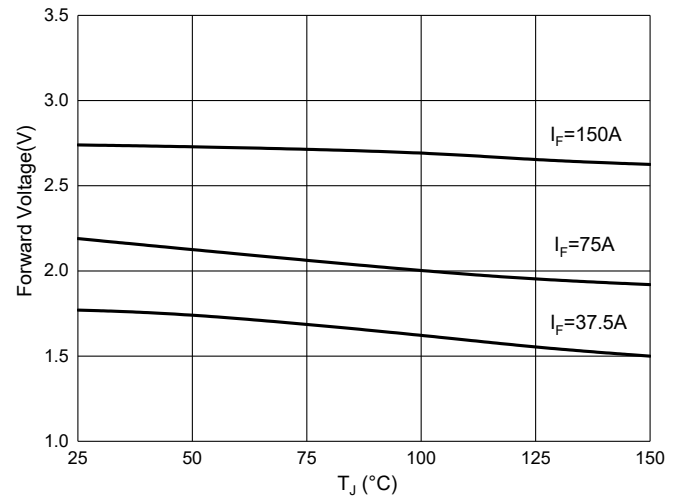


Fig. 9 - Switching Times —  $I_C$

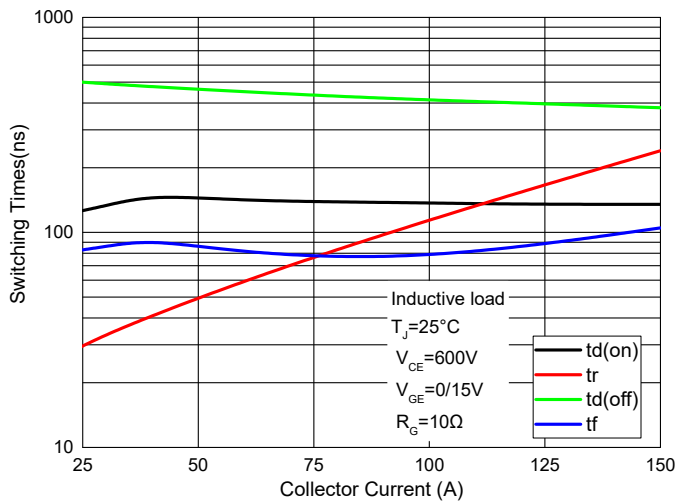


Fig. 10 - Switching Times —  $I_C$

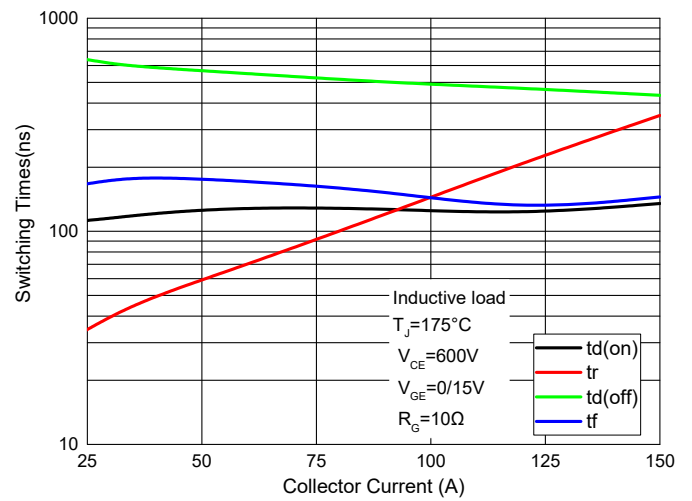


Fig. 11 - Switching Energy Losses —  $I_C$

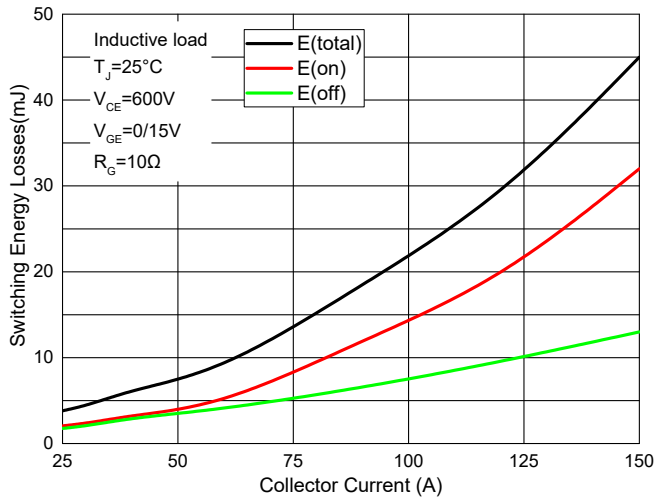
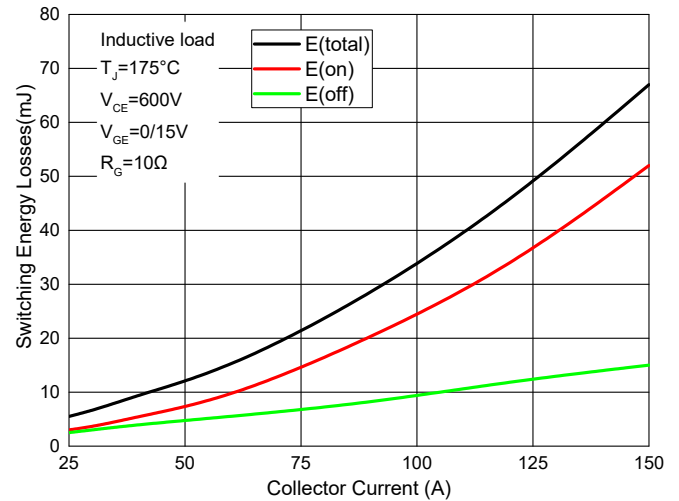


Fig. 12 - Switching Energy Losses —  $I_C$



## Ordering Information

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

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