

650V 75A Insulated Gate Bipolar Transistors

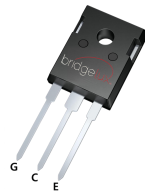
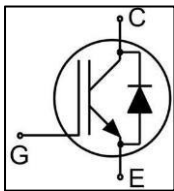
FEATURES

- $V_{CES}=650V, I_C=75A(T_C=100^{\circ}C)$
- Trench Gate and Field Stop Processes IGBT
- Low switching power loss
- Low switching surge and noise
- Low EMI

APPLICATIONS

- UPS
- Welding machine
- Solar converters
- Energy Storage
- Switching frequency converters

SYMBOL



TO-247

ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXPD-E75T65HD-0000	TO-247	Tube

ABSOLUTE MAXIMUM VALUES ($T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate-Emitter Voltage	± 20	V
	Transient Gate-Emitter Voltage ($t_p \leq 10\mu s, D < 0.01$)	± 30	V
I_C	Collector Current @ $T_C = 25^{\circ}C$	115	A
	Collector Current @ $T_C = 100^{\circ}C$	75	A
I_{Cplus}	Pulsed Collector Current, t_p limited by T_{jmax}	300	A
I_F	Diode Continuous Forward Current @ $T_C = 25^{\circ}C$	115	A
	Diode Continuous Forward Current @ $T_C = 100^{\circ}C$	75	A
I_{FM}	Diode Maximum Forward Current	300	A
P_D	IGBT Max. Power Dissipation	333	W
	FWD Max. Power Dissipation	250	W
T_J	Operating Junction Temperature	-40 to +175	$^{\circ}C$
T_{stg}	Storage Temperature Range	-55 to +175	$^{\circ}C$

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.	Units
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	0.45	$^{\circ}C/W$
Thermal Resistance, Junction to case for Diodes	$R_{\theta JC}$	0.6	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	39	$^{\circ}C/W$

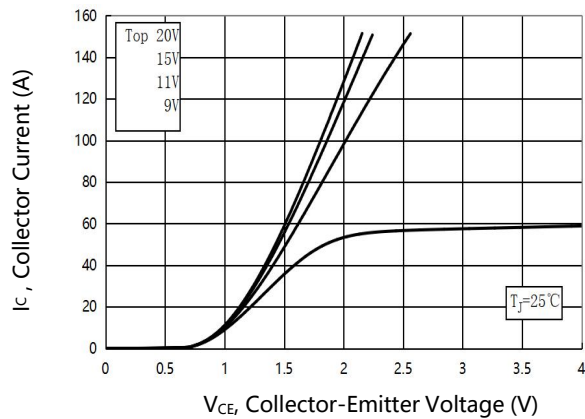
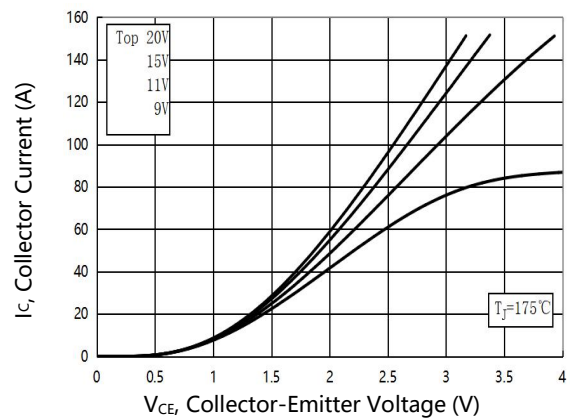
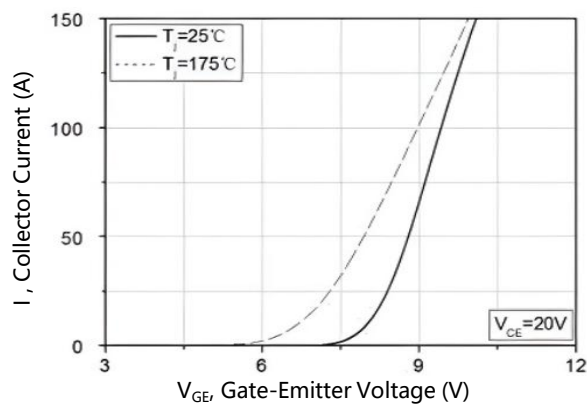
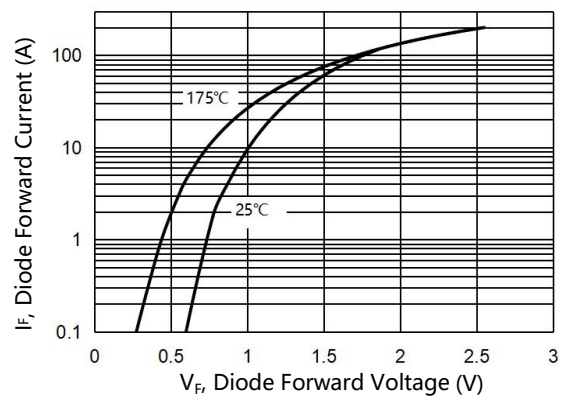
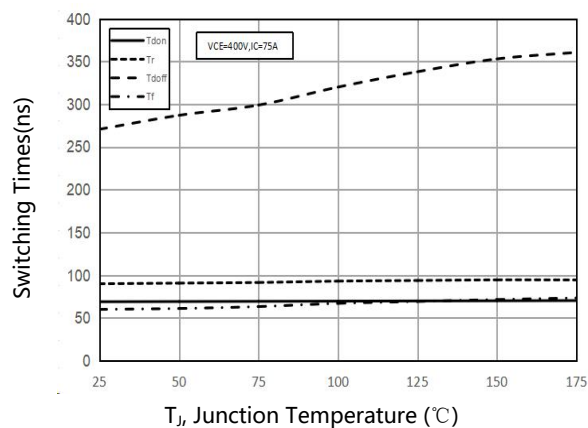
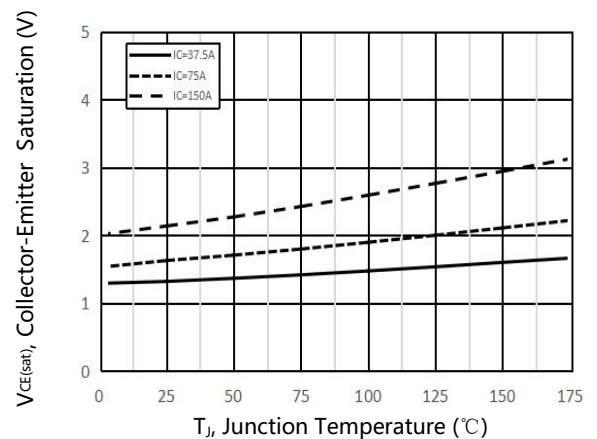
ELECTRICAL CHARACTERISTICS ($T_C=25^{\circ}\text{C}$, unless otherwise Noted)

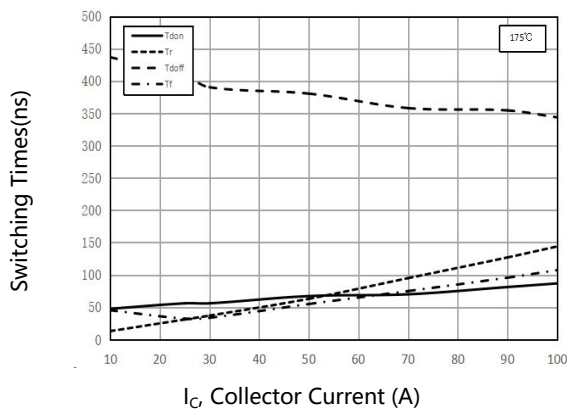
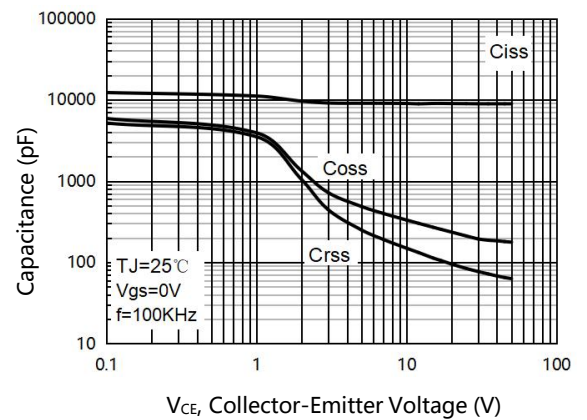
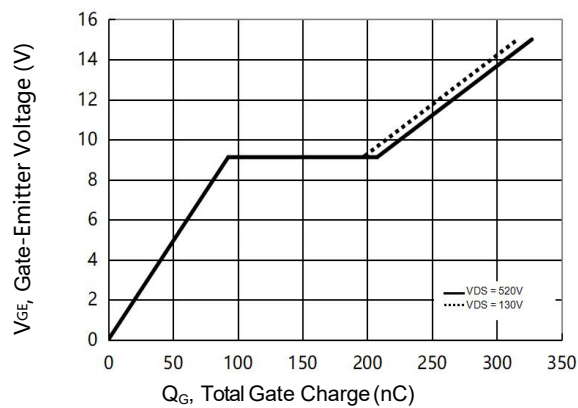
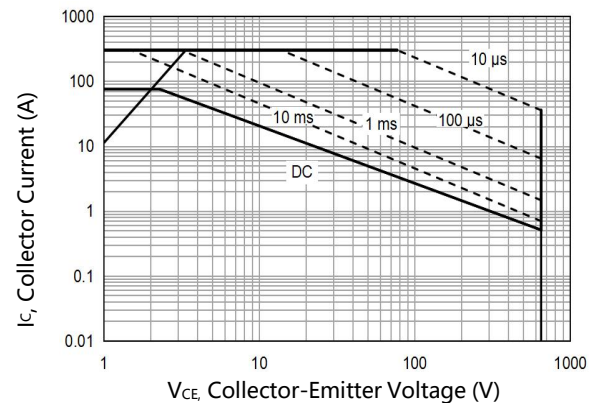
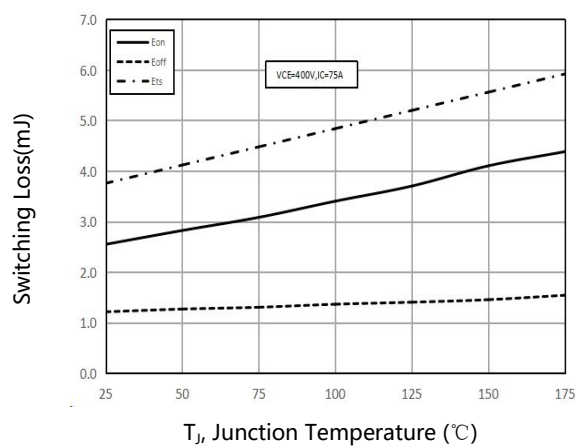
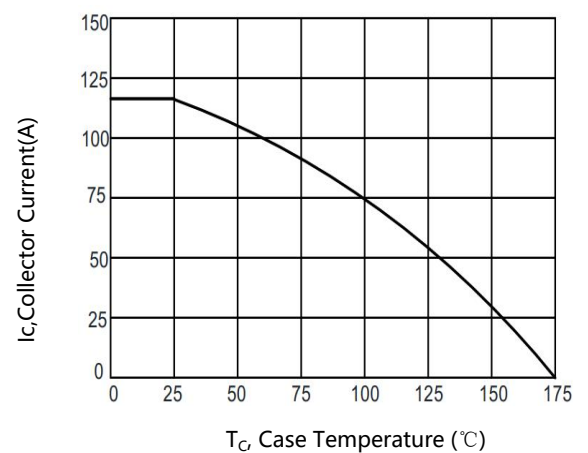
Symbol	Parameter	Test Conditions	Value			Units
			Min.	Typ.	Max.	
Static Characteristics						
V _{(BR)CES}	Collector-Emitter Breakdown Voltage	V _{GE} =0V, I _{CE} =0.5mA	650	--	--	V
I _{CES}	Collector-Emitter Leakage Current	V _{GE} =0V, V _{CE} =650V	--	--	200	μA
I _{GES(F)}	Gate to Emitter Forward Leakage	V _{GE} =+20V, V _{CE} =0V	--	--	+200	nA
I _{GES(R)}	Gate to Source Reverse Leakage	V _{GE} =-20V, V _{CE} =0V	--	--	-200	nA
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =75A, V _{GE} =20V	--	1.7	2.1	V
V _{GE(th)}	Gate Threshold Voltage	I _C =250uA, V _{CE} =V _{GE}	5	5.8	6.6	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f=1MHz	--	8917	--	pF
C _{oes}	Output Capacitance		--	194	--	
C _{res}	Reverse Transfer Capacitance		--	77	--	
Q _g	Total Gate Charge	V _{CE} =520V, I _C =75A, V _{GE} =15V	--	327	--	nC
Q _{ge}	Gate to Emitter Charge		--	92.6	--	
Q _{gc}	Gate to Collector Charge		--	115	--	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{CE} =400V, I _C =75A, V _{GE} =15V, R _g =10Ω, Inductive Load, Ta=25℃	--	69	--	ns
t _r	Rise Time		--	90	--	
t _{d(OFF)}	Turn-Off Delay Time		--	271	--	
t _f	Fall Time		--	60	--	
E _{on}	Turn-On Switching Loss		Ta=25℃	--	2.5	--
E _{off}	Turn-Off Switching Loss	--		1.2	--	
E _{is}	Total Switching Loss	--		3.7	--	
t _{d(ON)}	Turn-on Delay Time	V _{CE} =400V, I _C =75A, V _{GE} =15V, R _g =12Ω, Inductive Load, Ta=175℃	--	70	--	ns
t _r	Rise Time		--	94	--	
t _{d(OFF)}	Turn-Off Delay Time		--	361	--	
t _f	Fall Time		--	73	--	
E _{on}	Turn-On Switching Loss		Ta=175℃	--	4.4	--
E _{off}	Turn-Off Switching Loss	--		1.5	--	
E _{ts}	Total Switching Loss	--		5.9	--	

ELECTRICAL CHARACTERISTICS OF THE DIODE ($T_C=25^{\circ}\text{C}$, unless otherwise Noted)

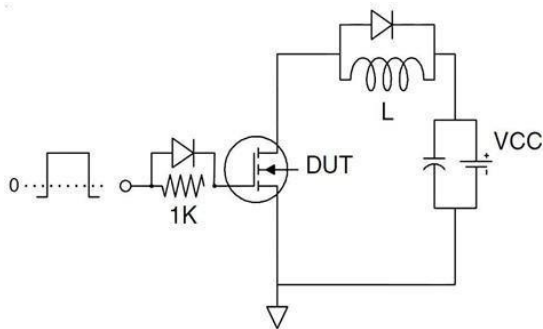
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_{FM}	Diode Forward Voltage	$I_F=75A$	--	1.5	3	V
T_{rr}	Reverse Recovery Time	$I_F=75A,$ $di/dt=500A/\mu s$	--	141	--	ns
I_{RRM}	Diode Peak Reverse Recovery Current		--	17	--	A
Q_{rr}	Reverse Recovery Charge		--	1.7	--	μC

Note: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

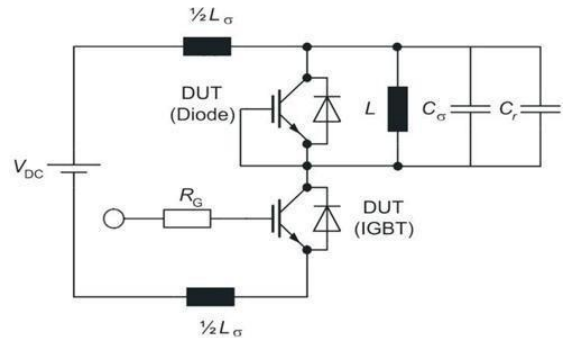
TYPICAL CHARACTERISTICS

Figure1. Output Characteristics

Figure2. Output Characteristics

Figure3. Typical Transfer Characteristics

Figure4. Typical V_F vs I_F Characteristics

Figure5. Typical Switching Times vs T_J Characteristics

Figure6. Typical $V_{CE(sat)}$ vs T_J Characteristics

TYPICAL CHARACTERISTICS(Cont.)

Figure7. Typical Switching Times vs collector current

Figure8. Capacitance Characteristics

Figure9. Gate Charge Wave Form

Figure10. Forward Bias Safe Operating Area

Figure11. Typical Switching Loss vs T_J Characteristics

Figure12. Collector current vs. case temperature

TEST CIRCUIT

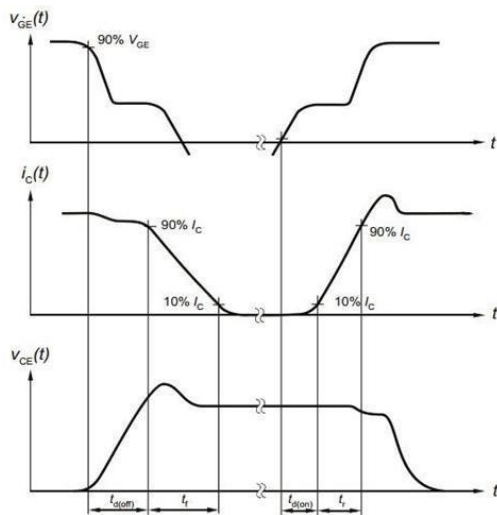


Gate Charge Test Circuit

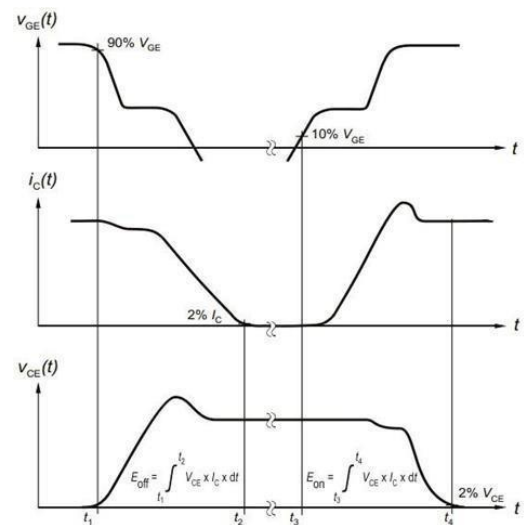


Switch Time Test Circuit

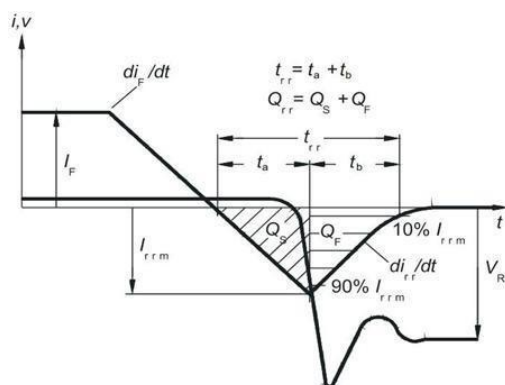
SWITCHING CHARACTERISTICS



Definition of switching times



Definition of switching losses



Definition of diode switching characteristics

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