

650V 75A Insulated Gate Bipolar Transistors

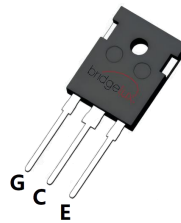
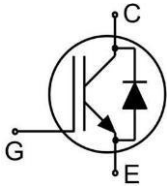
FEATURES

- $V_{CES}=650V, I_C=75A(T_C=100^\circ C)$
- Saturation pressure is reduced and the switching speed is fast
- Saturation pressure drops to a positive temperature coefficient
- High reliability and thermal stability, good parameter consistency

APPLICATIONS

- UPS
- Frequency transformer
- Industrial power supply
- Inverter welder

SYMBOL


TO-247

ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXE75T65HFHD	TO-247	Tube

ABSOLUTE MAXIMUM RATINGS ($T_J=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	650	V
V_{GES}	Gate- Emitter Voltage	± 20	V
I_C	Collector Current@ $T_C = 25^\circ C$	90	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 @ $T_C = 25^\circ C$	90	A
	Diode Continuous Forward Current @ $T_C = 100^\circ C$	75	A
I_{FM}	Diode Maximum Forward Current	300	A
P_D	Power Dissipation @ $T_C = 25^\circ C$	468	W
	Power Dissipation @ $T_C = 100^\circ C$	234	W
T_J	Operating Junction Temperature Range	-40 to +175	$^\circ C$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Temperature for Soldering	270	$^\circ C$

THERMAL CHARACTERISTICS

Parameter	Symbol	Max.	Units
Thermal Resistance, Junction to case for IGBT	$R_{\theta JC}$	0.32	$^\circ C/W$
Thermal Resistance, Junction to case for Diode	$R_{\theta JC}$	0.4	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	$^\circ C/W$

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

Symbol	Parameter	Test Conditions	Value			Units	
			Min.	Typ.	Max.		
Static Characteristics							
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_{CE}=250\mu A$	650	--	--	V	
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=650V$	--	--	1	mA	
$I_{GES(F)}$	Gate to Emitter Forward Leakage	$V_{GE}=+20V, V_{CE}=0V$	--	--	+250	nA	
$I_{GES(R)}$	Gate to Source Reverse Leakage	$V_{GE}=-20V, V_{CE}=0V$	--	--	-250	nA	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75A, V_{GE}=15V$	--	1.65	2.1	V	
$V_{GE(th)}$	Gate Threshold Voltage	$I_C=250\mu A, V_{CE}=V_{GE}$	3.5	--	6.5	V	
Dynamic Characteristics							
C_{ies}	Input Capacitance	$V_{CE}=30V, V_{GE}=0V,$ $f=1\text{MHz}$	--	7980	--	pF	
C_{oes}	Output Capacitance		--	412	--		
C_{res}	Reverse Transfer Capacitance		--	48	--		
Q_g	Total Gate Charge	$V_{CE}=520V, I_C=75A,$ $V_{GE}=15V$	--	169	--	nC	
Q_{ge}	Gate to Emitter Charge		--	38	--		
Q_{gc}	Gate to Collector Charge		--	57	--		
Switching Characteristics							
$t_{d(ON)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=75A,$ $V_{GE}=15V, R_g=10\Omega,$ Inductive Load, $T_J=25^{\circ}\text{C}$	--	120	--	ns	
t_r	Rise Time		--	105	--		
$t_{d(OFF)}$	Turn-Off Delay Time		--	380	--		
t_f	Fall Time		--	70	--		
E_{on}	Turn-On Switching Loss		--	4.95	--		mJ
E_{off}	Turn-Off Switching Loss		--	2.2	--		
E_{ts}	Total Switching Loss	--	7.12	--			
$t_{d(ON)}$	Turn-on Delay Time	$V_{CE}=400V, I_C=75A,$ $V_{GE}=15V, R_g=10\Omega,$ Inductive Load, $T_J=150^{\circ}\text{C}$	--	102	--	ns	
t_r	Rise Time		--	104	--		
$t_{d(OFF)}$	Turn-Off Delay Time		--	375	--		
t_f	Fall Time		--	68	--		
E_{on}	Turn-On Switching Loss		--	5.1	--		mJ
E_{off}	Turn-Off Switching Loss		--	2.35	--		
E_{ts}	Total Switching Loss	--	7.38	--			

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

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_F	Diode Forward Voltage	$I_F=75A$	--	1.65	2.3	V
T_{rr}	Reverse Recovery Time	$I_F=75A,$ $di/dt=200A/\mu s$	--	59	--	ns
I_{RRM}	Diode Peak Reverse Recovery Current		--	7.6	--	A
Q_{rr}	Reverse Recovery Charge		--	225	--	nC

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

TYPICAL PERFORMANCE CHARACTERISTICS

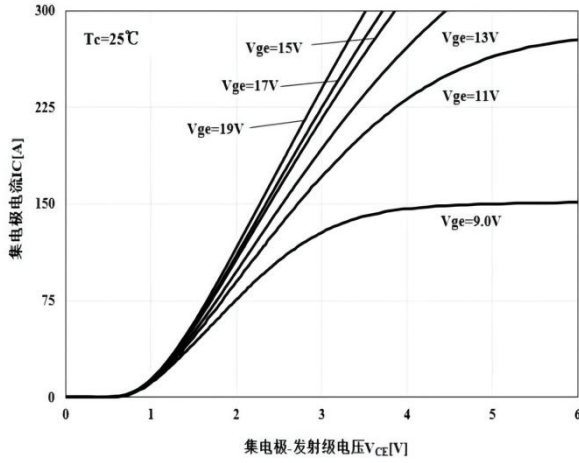


图1. 输出特性曲线

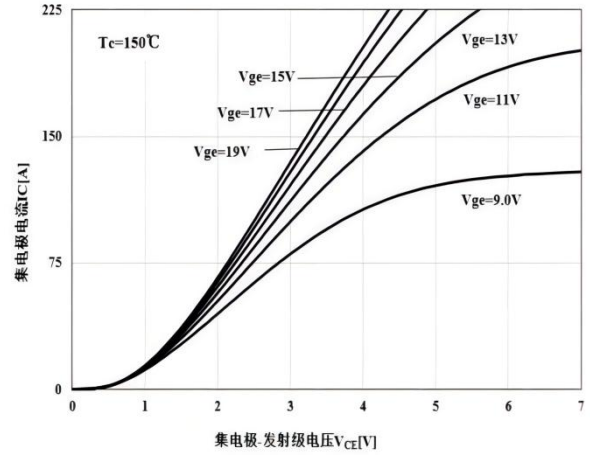


图2. 输出特性曲线

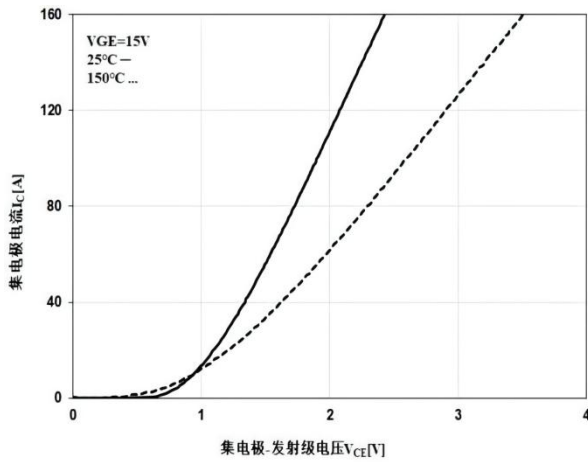


图3. 饱和和压降特性

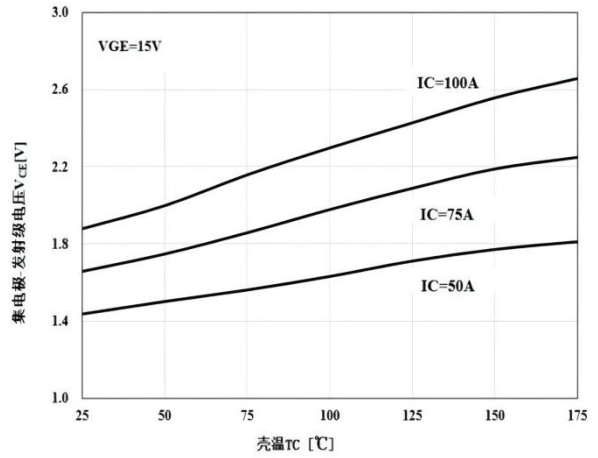


图4. 饱和和压降温度特性

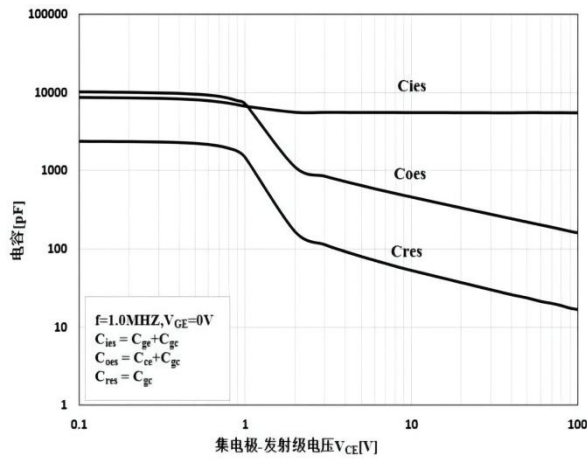


图5. 电容特性

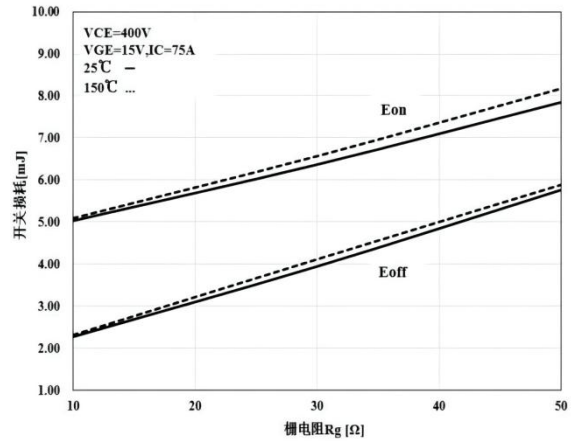


图6. 开关损耗-栅电阻特性曲线

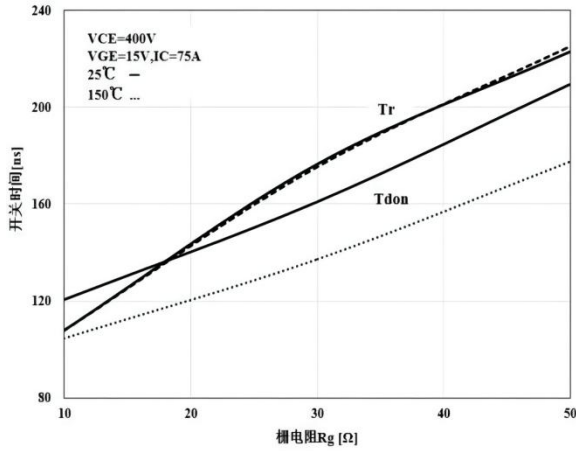


图7. 开通-栅电阻特性曲线

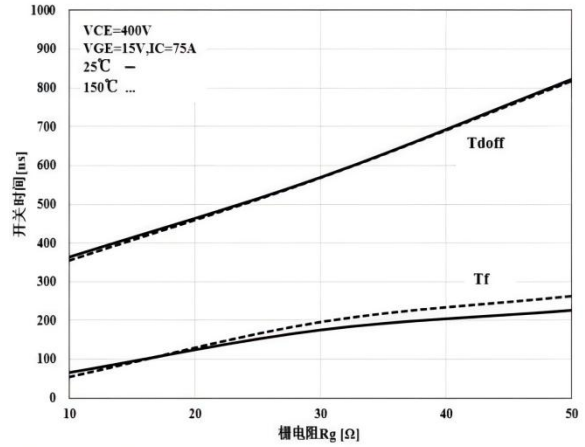


图8. 关断-栅电阻特性曲线

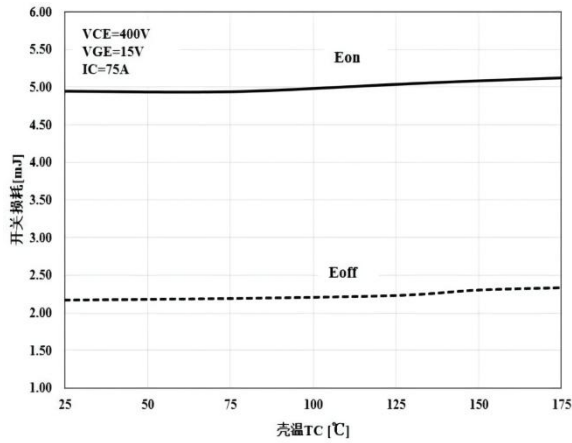


图9. 开关损耗温度特性

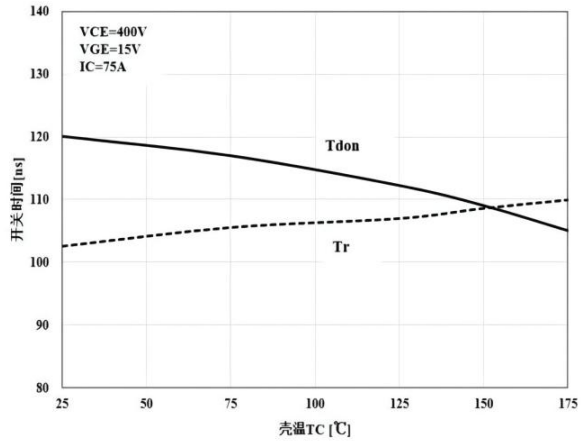


图10. 开通的温度特性

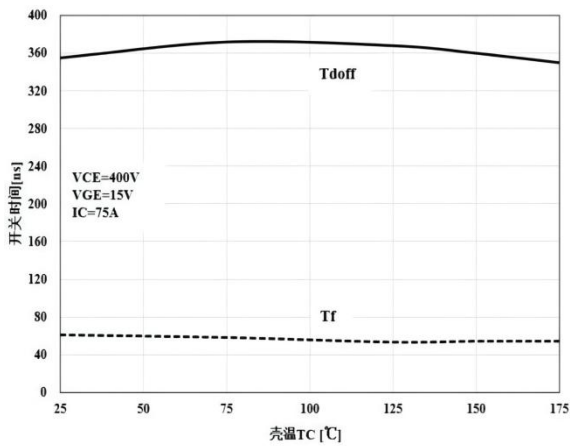


图11. 关断温度特性

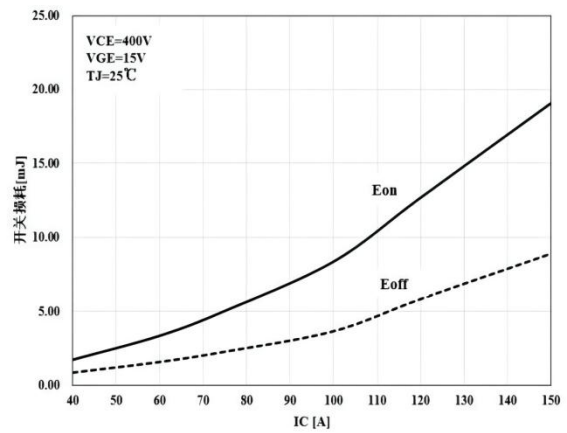


图12. 开关损耗的电流特性

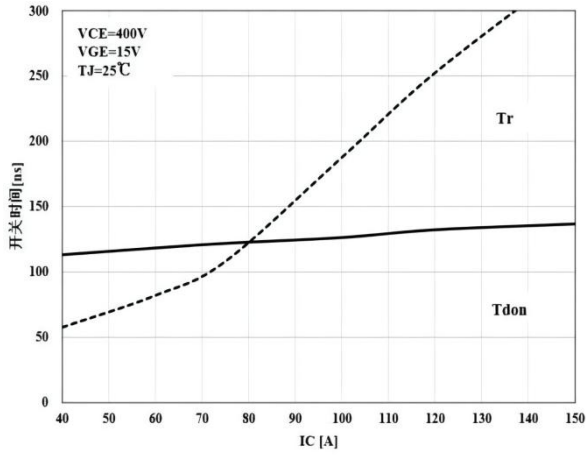


图13. 开通的电流特性

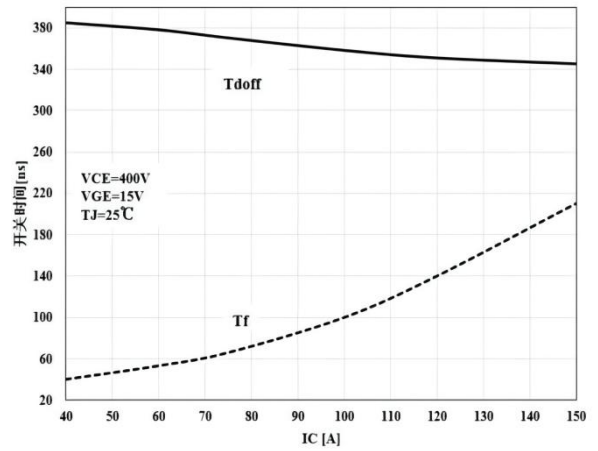


图14. 关断的电流特性

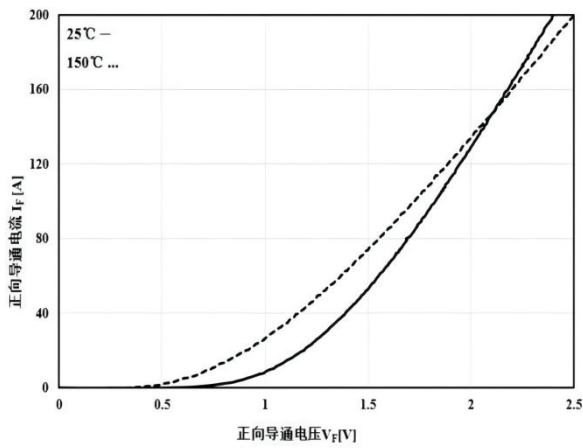


图15. 二极管正向特性

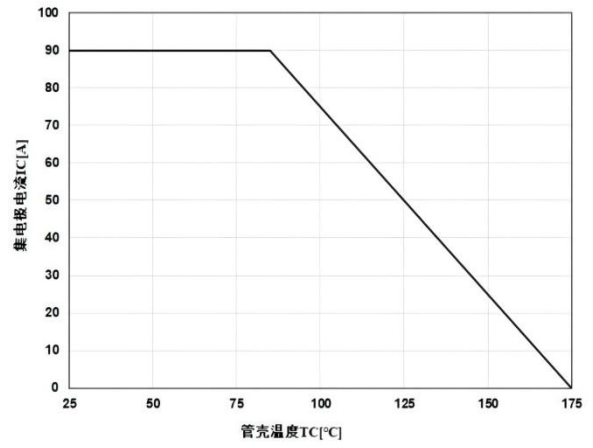


图16. 集电极电流温度特性

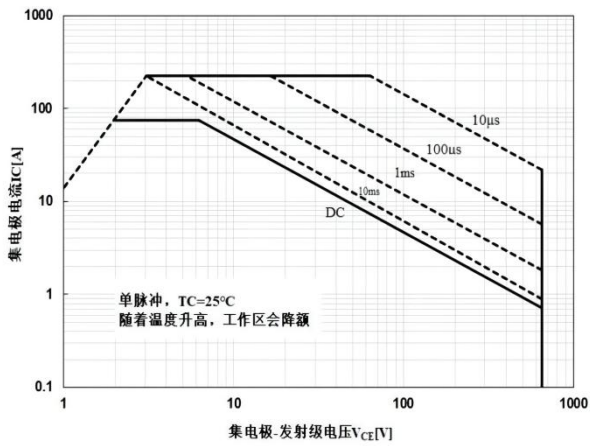


图17. 正向安全工作区

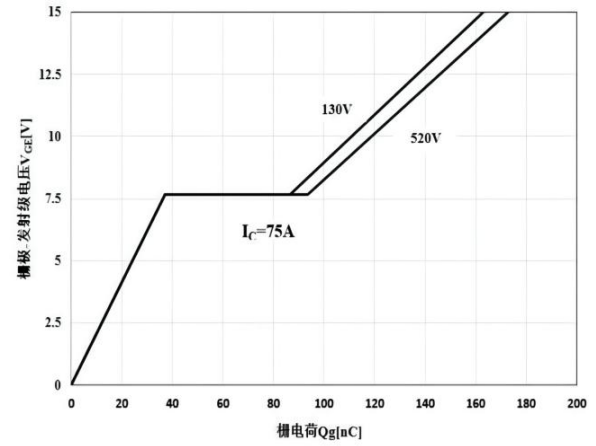
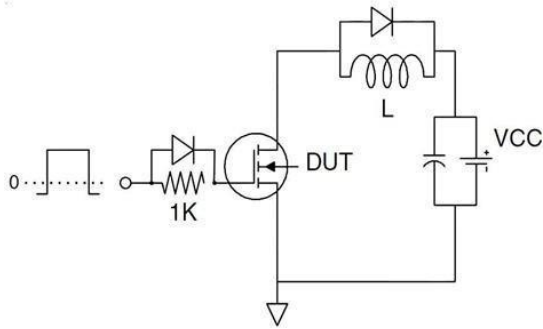
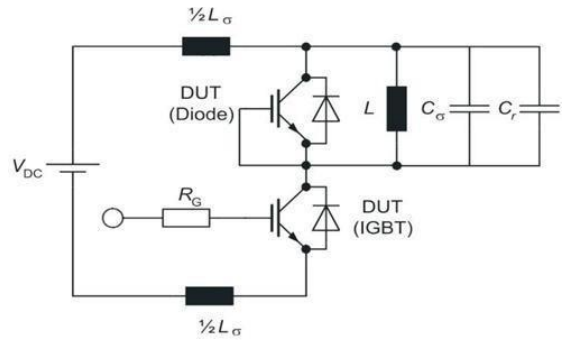


图18. 栅电荷特性

TEST CIRCUIT

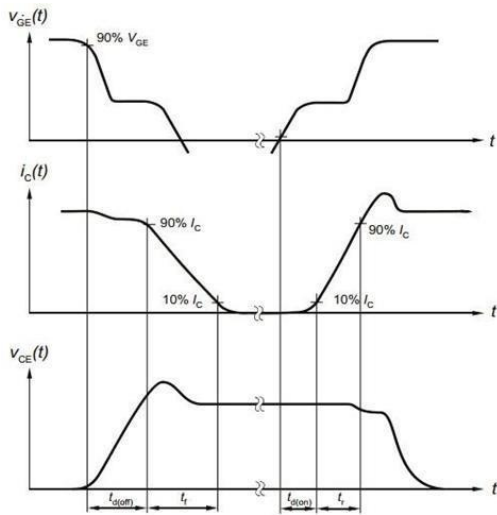


Gate Charge Test Circuit

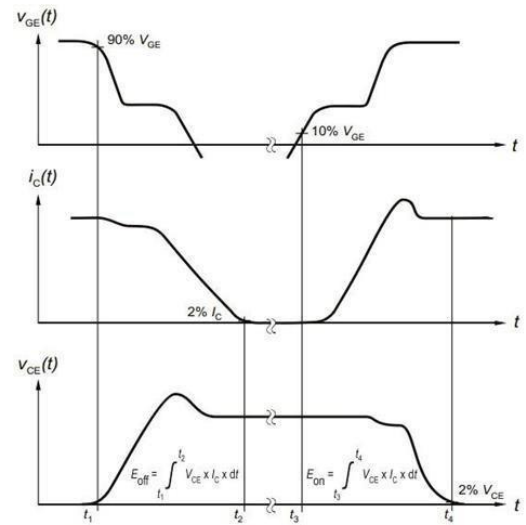


Switch Time Test Circuit

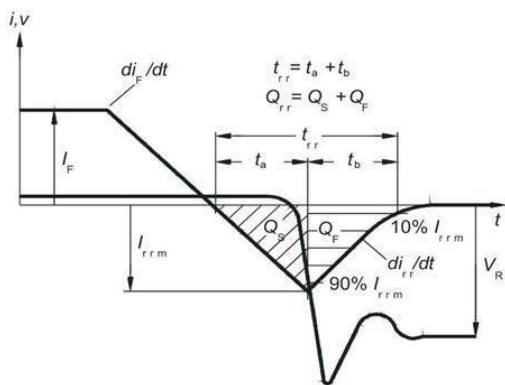
SWITCHING CHARACTERISTICS



Definition of switching times



Definition of switching losses



Definition of diode switching characteristics

Revision history

Document revision history

Date	Revision	Changes
10-Jan-2022	1.0	First release

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