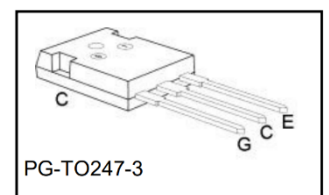
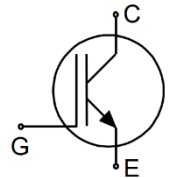


英飞凌低损耗 IGBT：采用 TRENCHSTOP™ 和 Fieldstop 技术的 IGBT



特性：

- 极低 $V_{CE(sat)}$ 1.5V (典型值)
- 最高结温 175°C
- 短路耐受时间 5 μ s
- 设计用于：
 - 变频器
 - 不间断电源
- 适用于 600V 应用的 TRENCHSTOP™ 和 Fieldstop 技术提供：
 - 参数分布紧密
 - 高稳健性、温度稳定性
 - 非常高的开关速度
- $V_{CE(sat)}$ 正温度系数
- 低电磁干扰
- 低栅极电荷
- 符合 JEDEC¹⁾ 目标应用要求
- 无铅引脚镀层；符合 RoHS 标准
- 完整的产品品类和 PSpice 模型：<http://www.infineon.com/igbt/>



Type	V_{CE}	I_C	$V_{CE(sat)}, T_j=25^\circ\text{C}$	$T_{j,max}$	Marking	Package
IGW75N60T	600V	75A	1.5V	175°C	G75T60	PG-TO247-3

最大额定值

Parameter	Symbol	Value	Unit
Collector-emitter voltage, $T_j \geq 25^\circ\text{C}$	V_{CE}	600	V
DC collector current, limited by $T_{j,max}$	I_C	118	A
$T_C = 25^\circ\text{C}$			
$T_C = 100^\circ\text{C}$		85	
Pulsed collector current, t_p limited by $T_{j,max}$		225	
Turn off safe operating area $V_{CE} = 600\text{V}$, $T_j = 175^\circ\text{C}$, $t_p = 1\mu\text{s}$	-	225	
Gate-emitter voltage	V_{GE}	± 20	V
Short circuit withstand time ²⁾	t_{SC}	5	μs
$V_{GE} = 15\text{V}$, $V_{CC} \leq 400\text{V}$, $T_j \leq 150^\circ\text{C}$			
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	428	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

¹⁾ J-STD-020 and JESD-022

²⁾ 允许短路次数：< 1000；短路间隔时间：> 1 s。

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热阻

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.35	K/W
Thermal resistance, junction – ambient	R_{thJA}		40	

电气特性，除非另有规定，否则均在 $T_j = 25^\circ\text{C}$ 的条件下测得

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0\text{ V}, I_C=0.2\text{ mA}$	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15\text{ V}, I_C=75\text{ A}$ $T_j=25\text{ }^{\circ}\text{C}$ $T_j=175\text{ }^{\circ}\text{C}$	- -	1.5 1.9	2.0 -	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=1.2\text{ mA}, V_{CE}=V_{GE}$	4.1	4.9	5.7	
Zero gate voltage collector current	I_{CES}	$V_{CE}=600\text{V},$ $V_{GE}=0\text{ V}$ $T_j=25\text{ }^{\circ}\text{C}$ $T_j=175\text{ }^{\circ}\text{C}$	- -	- -	40 5000	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0\text{ V}, V_{GE}=20\text{ V}$	-	-	100	
Transconductance	g_{fs}	$V_{CE}=20\text{ V}, I_C=75\text{ A}$	-	41	-	S
Integrated gate resistor	R_{Gint}		-			Ω

Dynamic Characteristic

Input capacitance	C_{iss}	$V_{CE} = 25\text{ V},$ $V_{GE} = 0\text{ V},$ $f = 1\text{ MHz}$	-	4620	-	pF
Output capacitance	C_{oss}		-	288	-	
Reverse transfer capacitance	C_{rss}		-	137	-	
Gate charge	Q_{Gate}	$V_{CC} = 480\text{ V}, I_C = 75\text{ A}$ $V_{GE} = 15\text{ V}$	-	470	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH
Short circuit collector current ¹⁾	$I_{C(SC)}$	$V_{GE} = 15\text{ V}, t_{SC} \leq 5\text{ }\mu\text{s}$ $V_{CC} = 400\text{ V},$ $T_j \leq 150^\circ\text{C}$	-	687.5	-	A

¹⁾ 允许短路次数 < 1000；短路间隔时间 > 1 S。

开关特性，电感负载，在 $T_j = 25^\circ\text{C}$ 的条件下测得

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=25\text{ }^{\circ}\text{C}$, $V_{CC}=400\text{ V}$, $I_C=75\text{ A}$, $V_{GE}=0/15\text{ V}$, $r_G=5\text{ }\Omega$, $L_{\sigma}=100\text{ n H}$, $C_{\sigma}=39\text{ pF}$	-	33	-	ns
Rise time	t_r		-	36	-	
Turn-off delay time	$t_{d(off)}$		-	330	-	
Fall time	t_f		-	35	-	
Turn-on energy ¹⁾	E_{on}	L_{σ}, C_{σ} from Fig. E Energy losses include “tail” and diode reverse recovery.	-	2.0	-	mJ
Turn-off energy	E_{off}		-	2.5	-	
Total switching energy	E_{ts}	Diode from IKW75N60T	-	4.5	-	

开关特性，电感负载，在 $T_j = 175^\circ\text{C}$ 的条件下测得

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j = 175\text{ }^{\circ}\text{C}$, $V_{CC} = 400\text{ V}$, $I_C = 75\text{ A}$, $V_{GE} = 0 / 15\text{ V}$, $r_G = 5\text{ }\Omega$, $L_{\sigma} = 100\text{ n H}$, $C_{\sigma} = 39\text{ pF}$	-	32	-	ns
Rise time	t_r		-	37	-	
Turn-off delay time	$t_{d(off)}$		-	363	-	
Fall time	t_f		-	38	-	
Turn-on energy ¹⁾	E_{on}	L_{σ} , C_{σ} from Fig. E Energy losses include “tail” and diode reverse recovery.	-	2.9	-	mJ
Turn-off energy	E_{off}		-	2.9	-	
Total switching energy	E_{ts}	Diode from IKW75N60T	-	5.8	-	

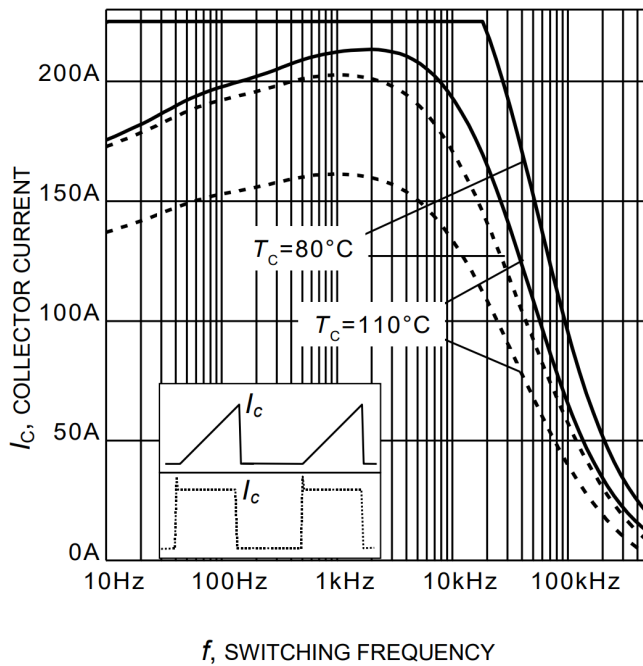


Figure 1. Collector current as a function of switching frequency
 $(T_j \leq 175^\circ\text{C}, D = 0.5, V_{CE} = 400\text{V}, V_{GE} = 0/15\text{V}, r_G = 5\Omega)$

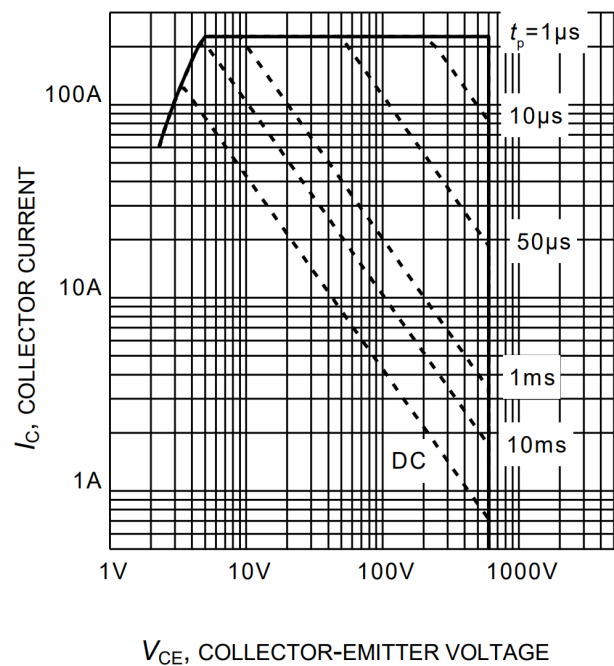


Figure 2. Safe operating area
 $(D = 0, T_C = 25^\circ\text{C}, T_j \leq 175^\circ\text{C}; V_{GE} = 0/15\text{V})$

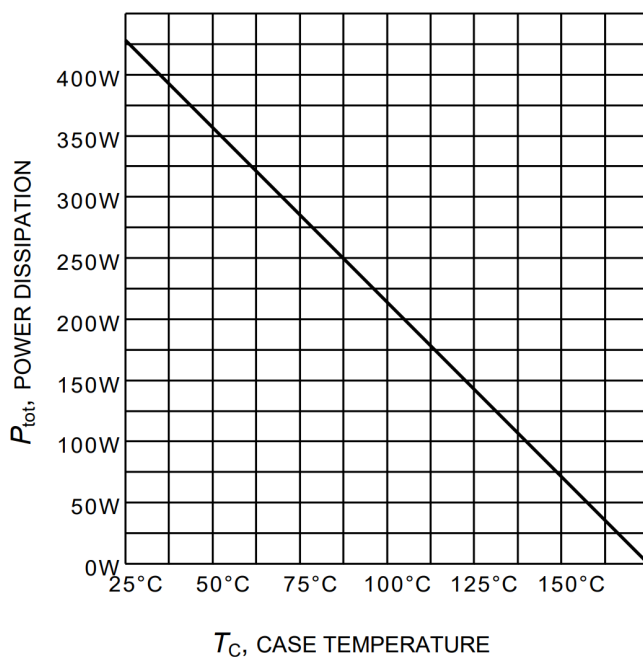


Figure 3. Power dissipation as a function of case temperature
 $(T_j \leq 175^\circ\text{C})$

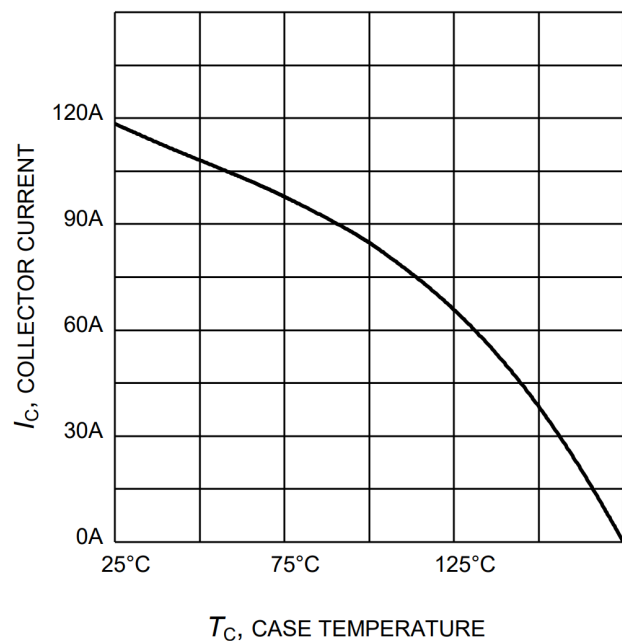


Figure 4. DC Collector current as a function of case temperature
 $(V_{GE} \geq 15\text{V}, T_j \leq 175^\circ\text{C})$

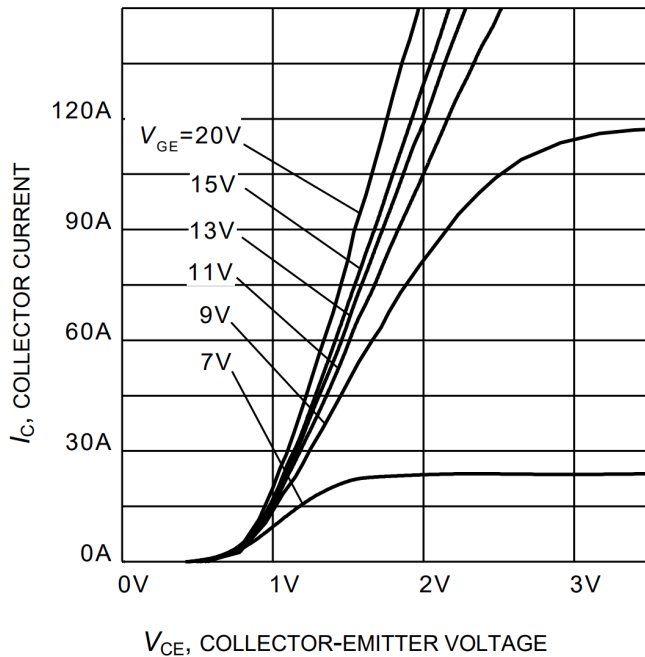


Figure 5. Typical output characteristic
($T_J=25^\circ\text{C}$)

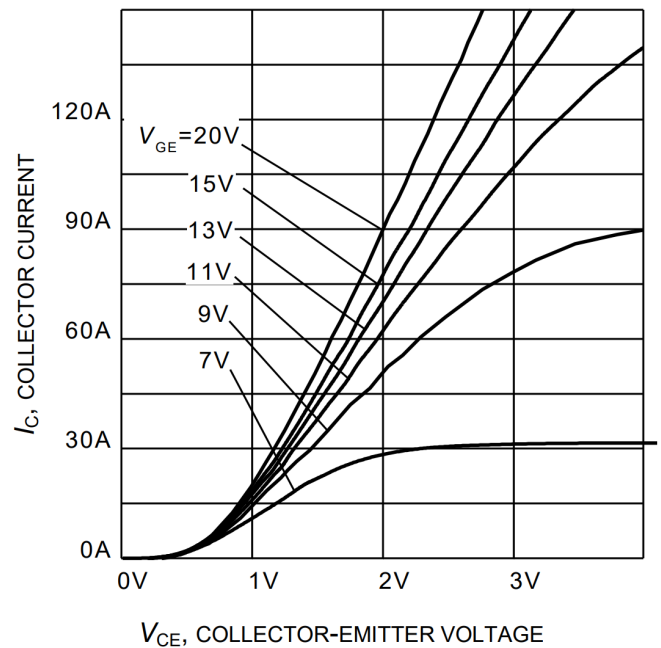


Figure 6. Typical output characteristic
($T_J=175^\circ\text{C}$)

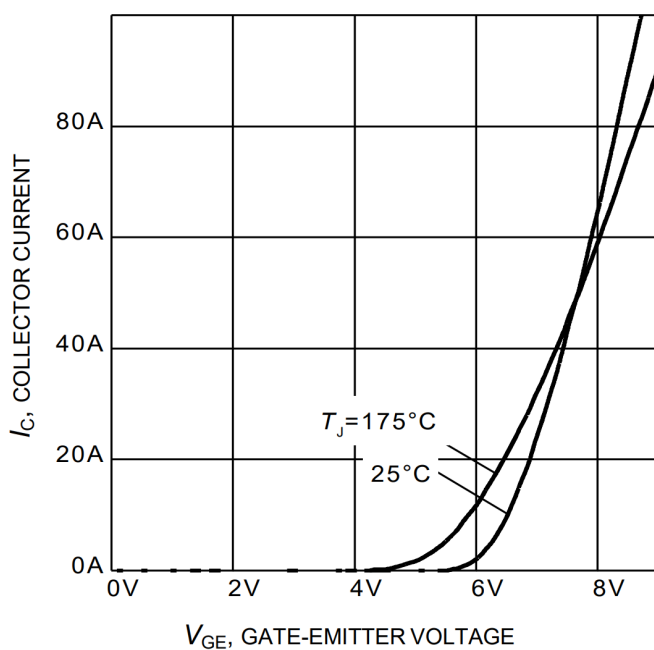


Figure 7 Typical transfer characteristic
($V_{CE}=20\text{V}$)

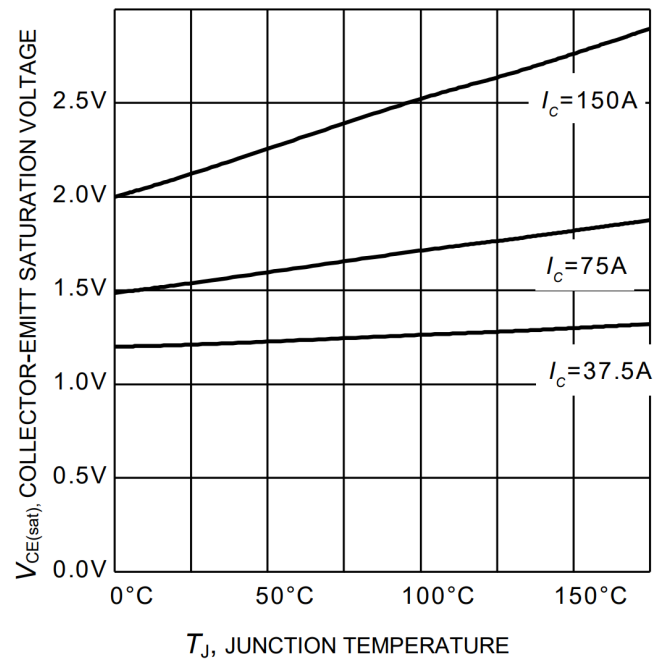


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
($V_{GE}=15\text{V}$)

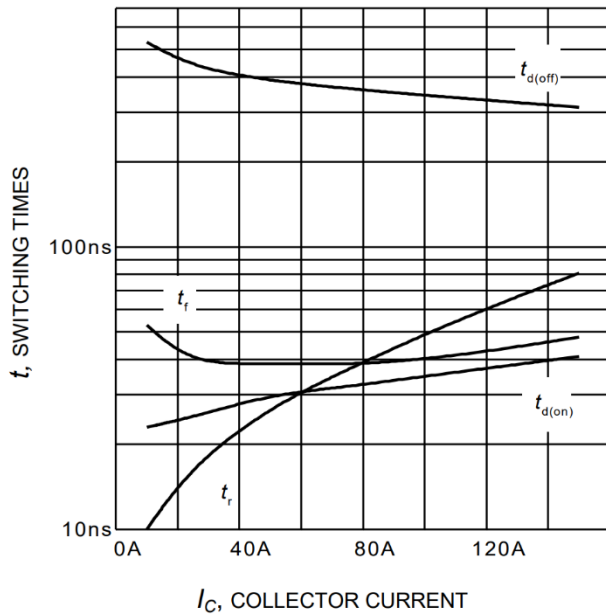


Figure 9. Typical switching times as a function of collector current
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $r_G = 5\Omega$,
Dynamic test circuit in Figure E)

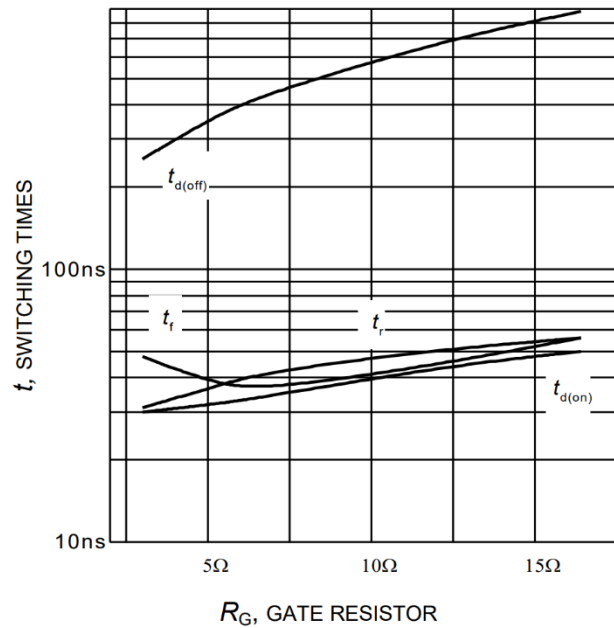


Figure 10. Typical switching times as a function of gate resistor
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$,
Dynamic test circuit in Figure E)

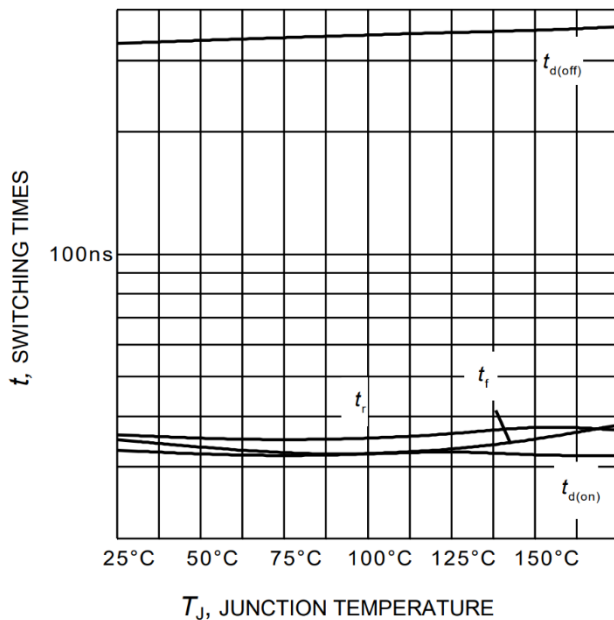


Figure 11. Typical switching times as a function of junction temperature
(inductive load, $V_{CE} = 400\text{V}$,
 $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$, $r_G = 5\Omega$,
Dynamic test circuit in Figure E)

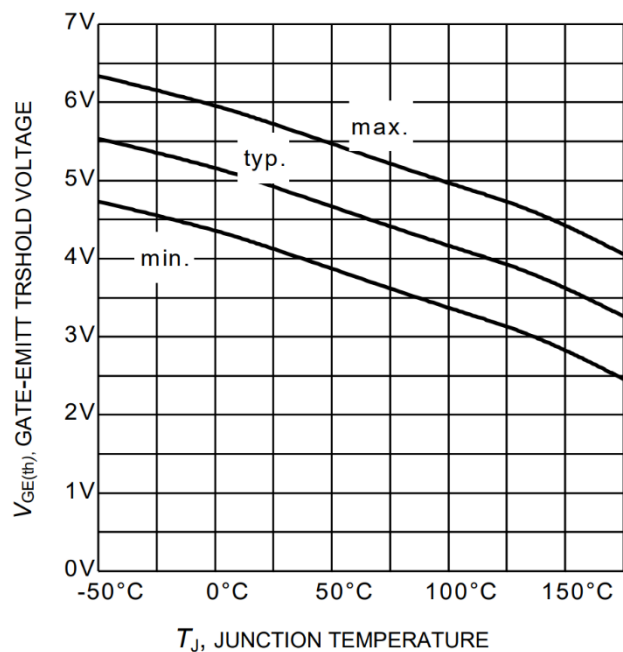


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
($I_C = 1.2\text{mA}$)

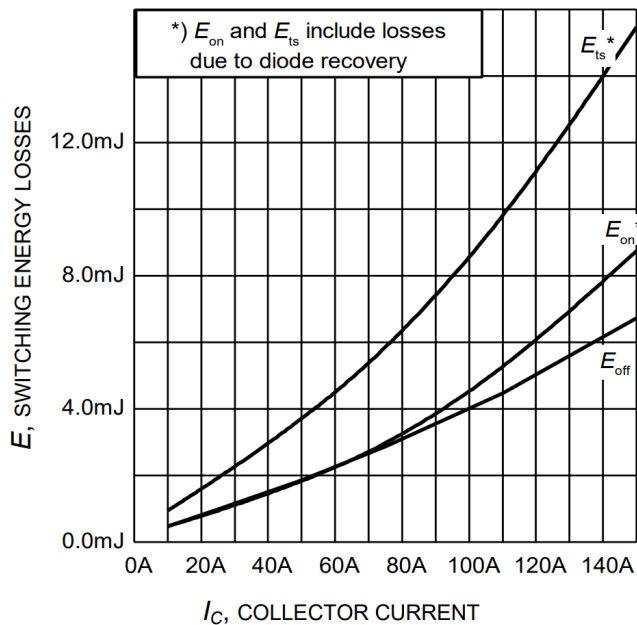


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $r_G = 5\Omega$,
Dynamic test circuit in Figure E)

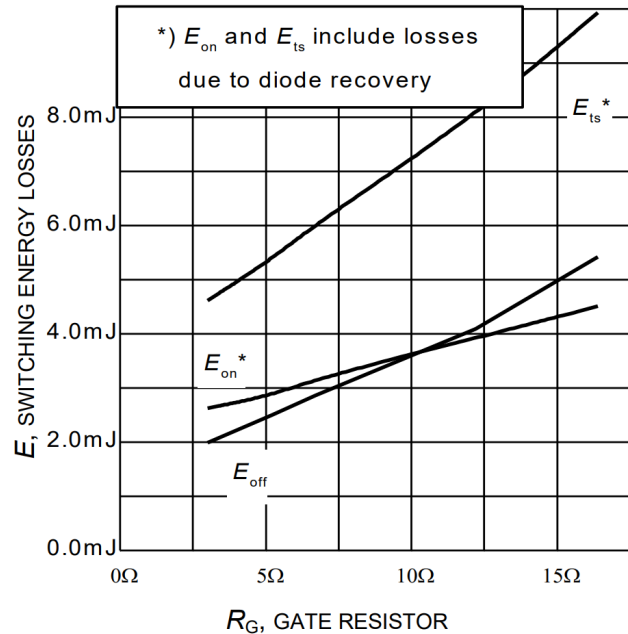


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$,
Dynamic test circuit in Figure E)

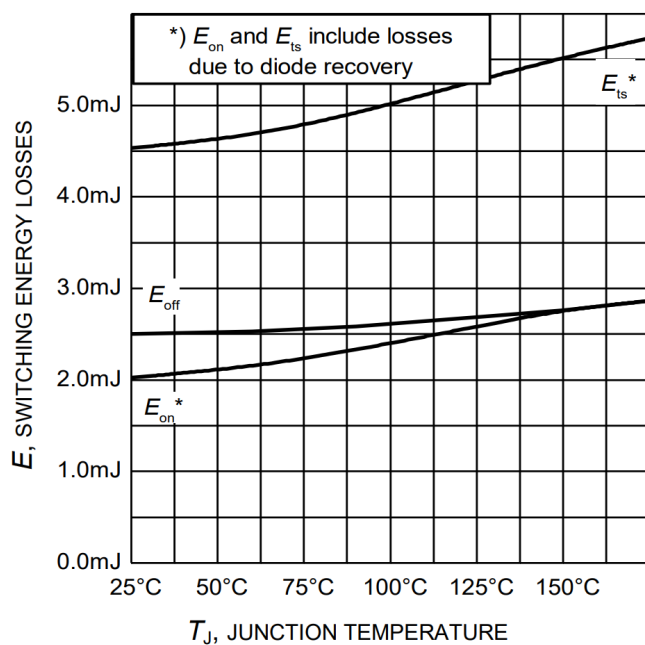


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$, $r_G = 5\Omega$,
Dynamic test circuit in Figure E)

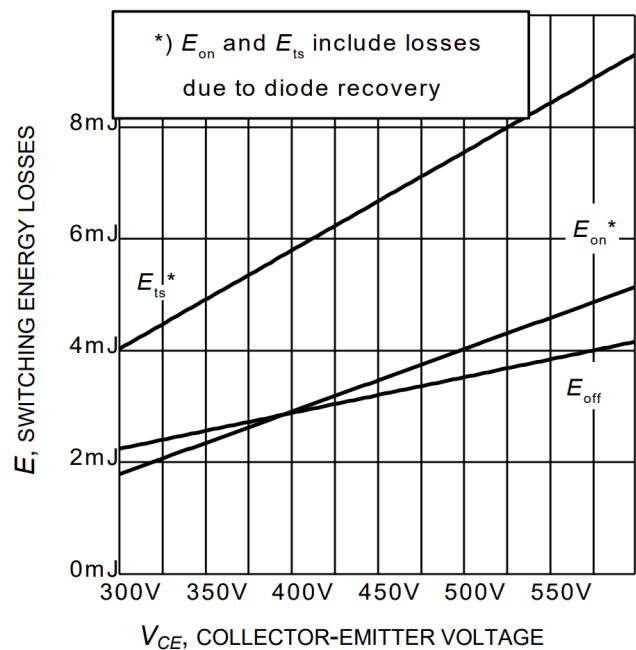


Figure 16. Typical switching energy losses as a function of collector emitter voltage
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$, $r_G = 5\Omega$,
Dynamic test circuit in Figure E)

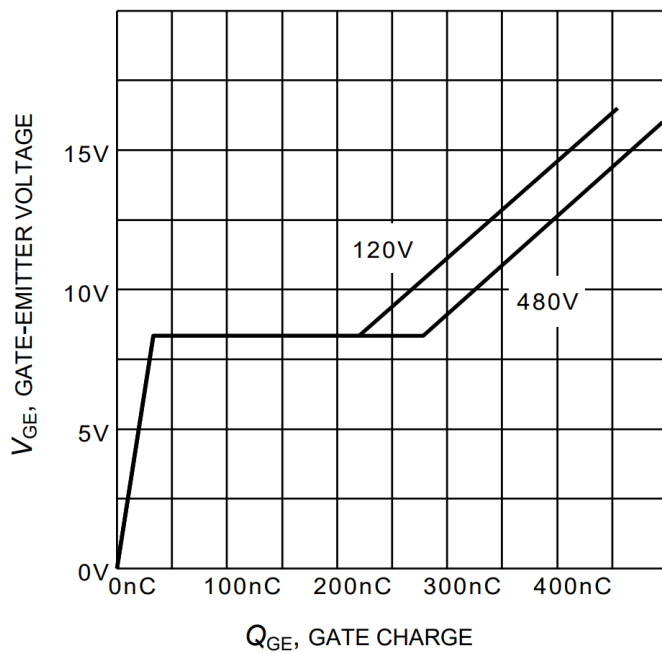


Figure 17. Typical gate charge
($I_C=75A$)

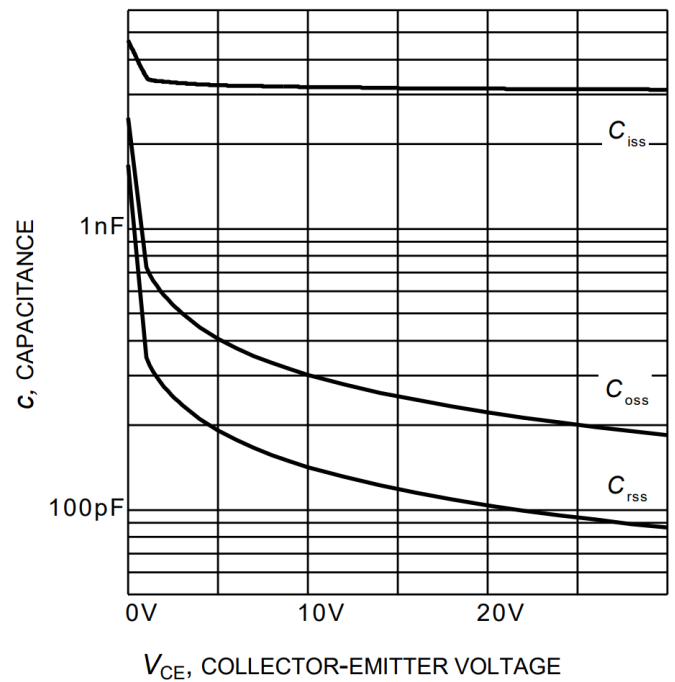


Figure 18. Typical capacitance as a function of collector-emitter voltage
($V_{GE}=0V$, $f=1\text{ MHz}$)

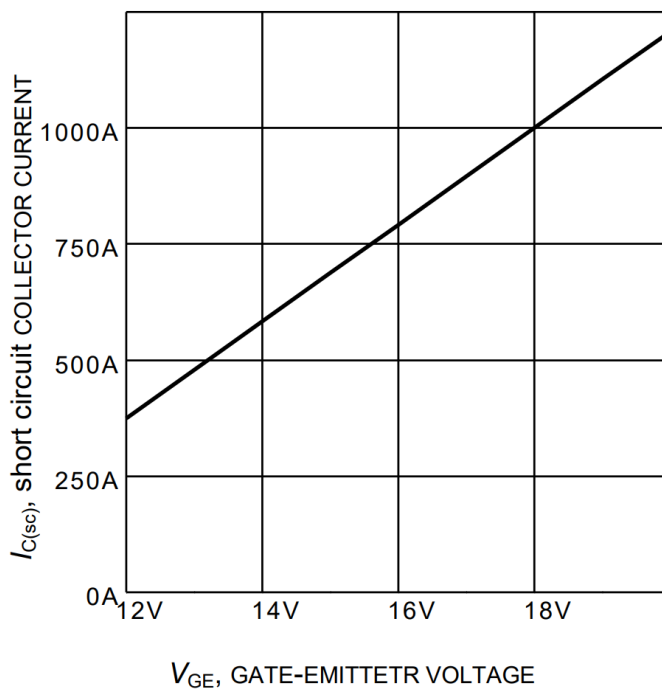


Figure 19. Typical short circuit collector current as a function of gate-emitter voltage
($V_{CE} \leq 400V$, $T_J \leq 150^\circ C$)

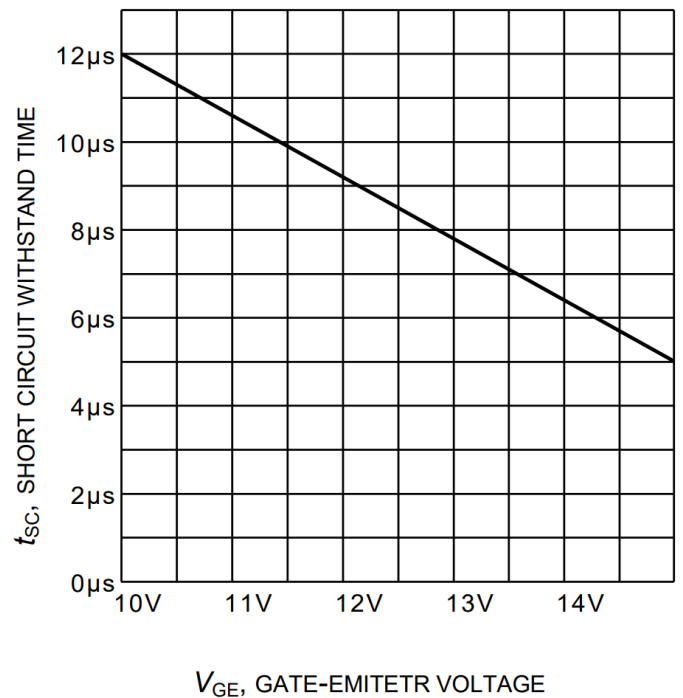


Figure 20. Short circuit withstand time as a function of gate-emitter voltage
($V_{CE}=400V$, start at $T_J=25^\circ C$, $T_{Jmax}<150^\circ C$)

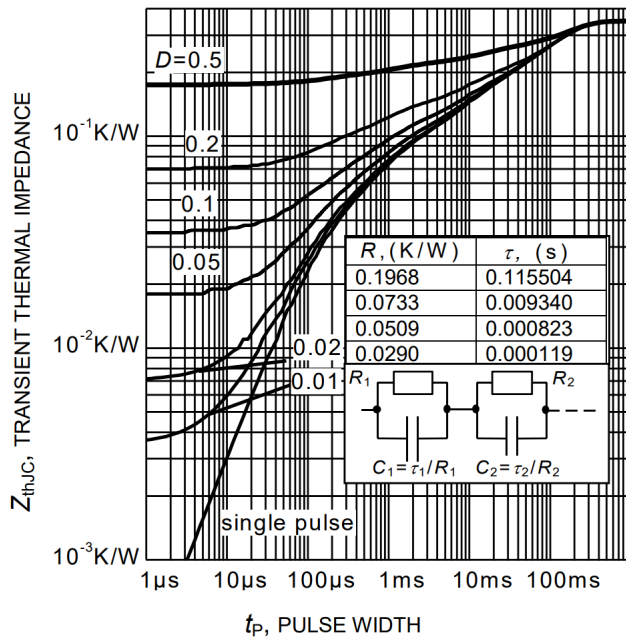
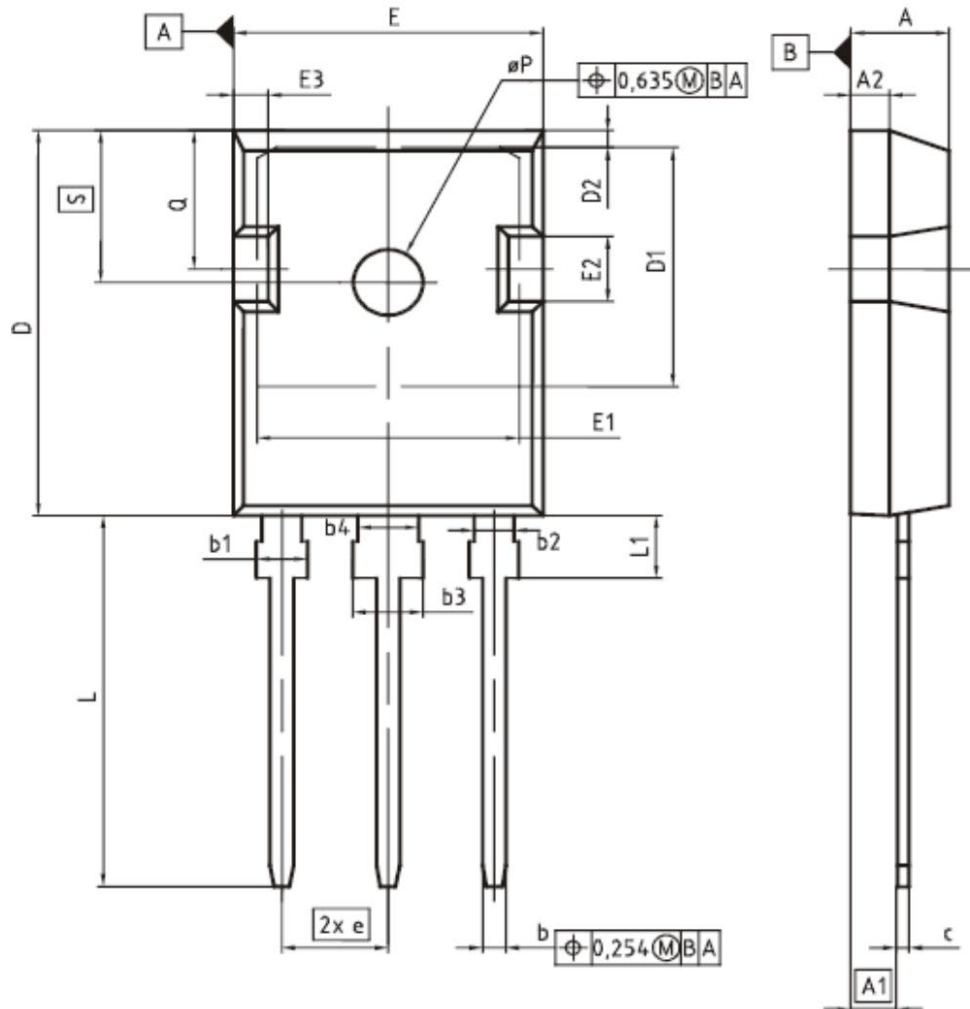


Figure 21. IGBT transient thermal impedance
($D \leq t_p / T$)

PG-TO247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4,83	5,21	0,190	0,205
A1	2,27	2,54	0,089	0,100
A2	1,85	2,16	0,073	0,085
b	1,07	1,33	0,042	0,052
b1	1,90	2,41	0,075	0,095
b2	1,90	2,16	0,075	0,085
b3	2,87	3,38	0,113	0,133
b4	2,87	3,13	0,113	0,123
c	0,55	0,68	0,022	0,027
D	20,80	21,10	0,819	0,831
D1	16,25	17,65	0,640	0,695
D2	0,95	1,35	0,037	0,053
E	15,70	16,13	0,618	0,635
E1	13,10	14,15	0,516	0,557
E2	3,68	5,10	0,145	0,201
E3	1,00	2,60	0,039	0,102
e	5,44 (BSC)		0,214 (BSC)	
N	3		3	
L	19,80	20,32	0,780	0,800
L1	4,10	4,47	0,161	0,176
eP	3,50	3,70	0,138	0,146
Q	5,49	6,00	0,216	0,236
S	6,04	6,30	0,238	0,248

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REVISION 05

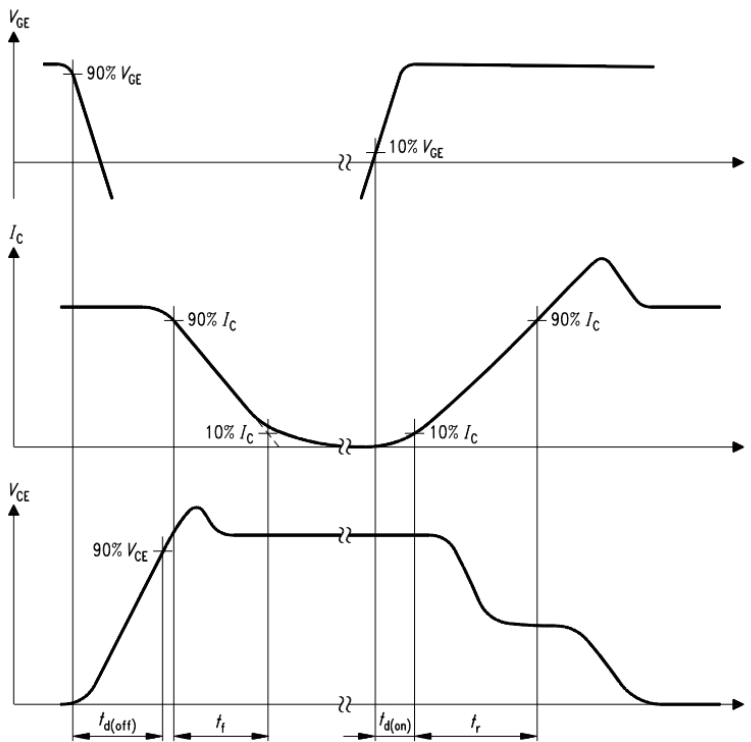


Figure A. Definition of switching times

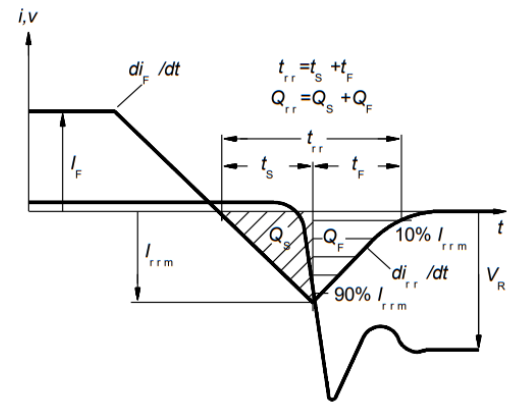


Figure C. Definition of diodes switching characteristics

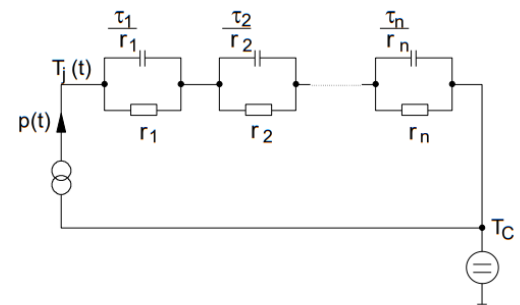


Figure D. Thermal equivalent circuit

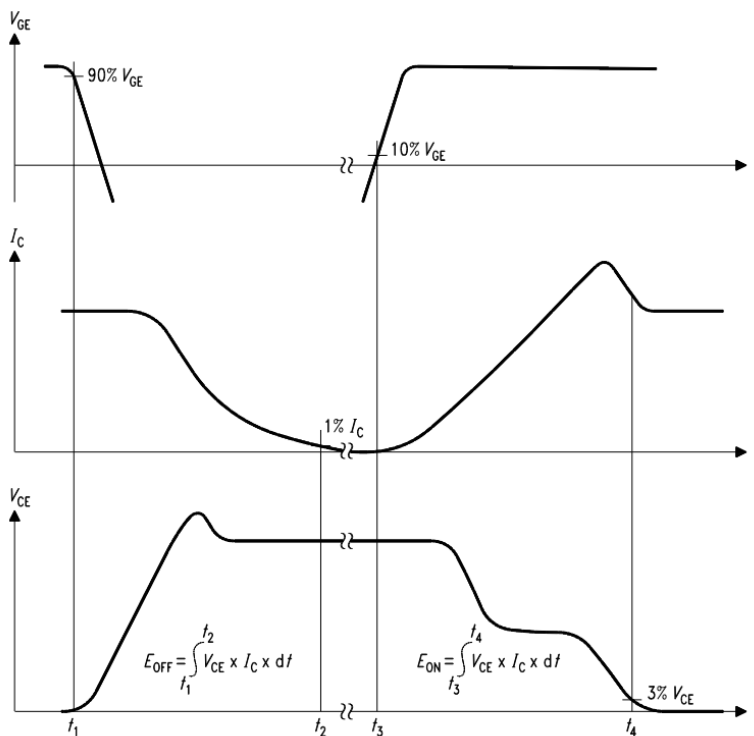


Figure B. Definition of switching losses

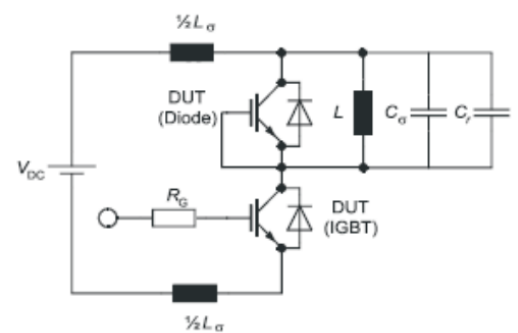


Figure E. Dynamic test circuit
Parasitic inductance L_σ ,
Parasitic capacitor C_σ ,
Relief capacitor C_r
(only for ZVT switching)

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