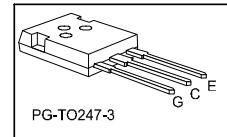
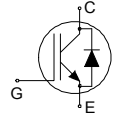


Reverse conducting IGBT

Features:

- Powerful monolithic body diode with low forward voltage designed for soft commutation only
- TrenchStop® technology applications offers:
 - very tight parameter distribution
 - high ruggedness, temperature stable behavior
 - low V_{CEsat}
- Low EMI
- Qualified according to JEDEC J-STD-020 and JESD-022 for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models: <http://www.infineon.com/igbt/>



Applications:

- Inductive cooking
- Soft switching applications

Type	V_{CE}	I_C	$V_{CEsat}, T_{vj}=25^\circ\text{C}$	T_{vjmax}	Marking	Package
IHW40N60RF	600V	40A	1.85V	175°C	H40RF60	PG-TO247-3

Maximum ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	600	V
DC collector current, limited by T_{vjmax} $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_C	80.0 40.0	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	120.0	A
Turn off safe operating area $V_{CE} \leq 600\text{V}, T_{vj} \leq 175^\circ\text{C}$	-	120.0	A
Diode forward current, limited by T_{vjmax} $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_F	80.0 40.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	120.0	A
Gate-emitter voltage	V_{GE}	± 20	V
Power dissipation $T_C = 25^\circ\text{C}$ Power dissipation $T_C = 100^\circ\text{C}$	P_{tot}	305.0 152.5	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+175	°C
Soldering temperature, wavesoldering 1.6 mm (0.063 in.) from case for 10s		260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction - case	$R_{th(j-c)}$		0.49	K/W
Diode thermal resistance, junction - case	$R_{th(j-c)}$		0.49	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		40	K/W

Electrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE} = 0V, I_C = 0.50mA$	600	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	$V_{GE} = 15.0V, I_C = 40.0A$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 175^{\circ}C$	- -	1.85 2.30	2.40 -	V
Diode forward voltage	V_F	$V_{GE} = 0V, I_F = 40.0A$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 175^{\circ}C$	- -	1.75 2.00	2.20	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 0.58mA, V_{CE} = V_{GE}$	4.1	4.9	5.7	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 600V, V_{GE} = 0V$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 175^{\circ}C$	- -	- -	40.0 1000.0	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = 20V$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE} = 20V, I_C = 40.0A$	-	24.0	-	S
Integrated gate resistor	r_G			none		Ω

Electrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Input capacitance	C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	-	2400	-	pF
Output capacitance	C_{oes}		-	88	-	
Reverse transfer capacitance	C_{res}		-	68	-	
Gate charge	Q_G	$V_{CC} = 480V, I_C = 40.0A, V_{GE} = 15V$	-	220.0	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13.0	-	nH
Short circuit collector current Max. 1000 short circuits Time between short circuits: $\geq 1.0s$	$I_{C(SC)}$	$V_{GE} = 15.0V, V_{CC} \leq 400V$	-		-	A

Switching Characteristic, Inductive Load, at $T_{vj} = 25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	$T_{vj} = 25^{\circ}\text{C}$, $V_{CC} = 400\text{V}$, $I_C = 40.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $r_G = 5.6\Omega$, $L_{\sigma} = 90\text{nH}$, $C_{\sigma} = 67\text{pF}$ L_{σ} , C_{σ} from Fig. E Energy losses include “tail” and diode reverse recovery.	-	175	-	ns
Fall time	t_f		-	14	-	ns
Turn-off energy	E_{off}		-	0.56	-	mJ

Switching Characteristic, Inductive Load, at $T_{vj} = 125^{\circ}\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	$T_{vj} = 125^{\circ}\text{C}$, $V_{CC} = 400\text{V}$, $I_C = 40.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $r_G = 5.6\Omega$, $L_{\sigma} = 90\text{nH}$, $C_{\sigma} = 67\text{pF}$ L_{σ} , C_{σ} from Fig. E Energy losses include “tail” and diode reverse recovery.	-	205	-	ns
Fall time	t_f		-	23	-	ns
Turn-off energy	E_{Off}		-	0.79	-	mJ

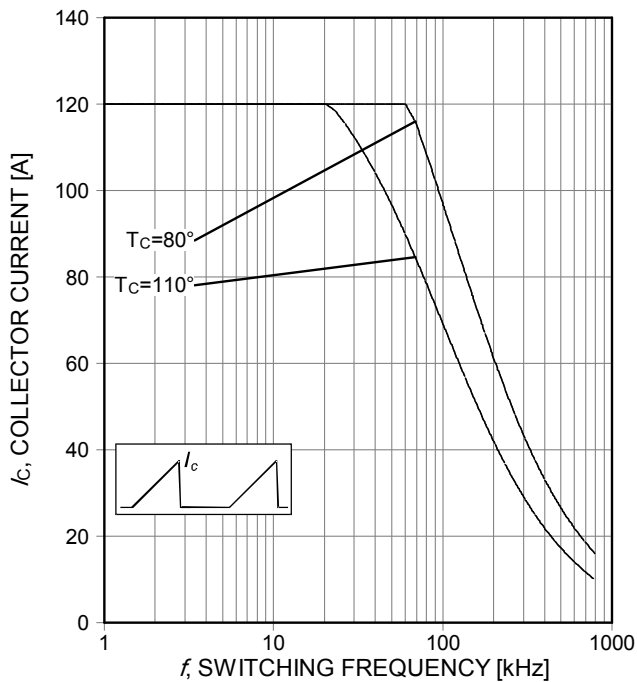


Figure 1. Collector current as a function of switching frequency
 $(T_{vj} \leq 175^\circ\text{C}, D=0.5, V_{CE}=400\text{V}, V_{GE}=15.0\text{V}, r_G=5.6\Omega)$

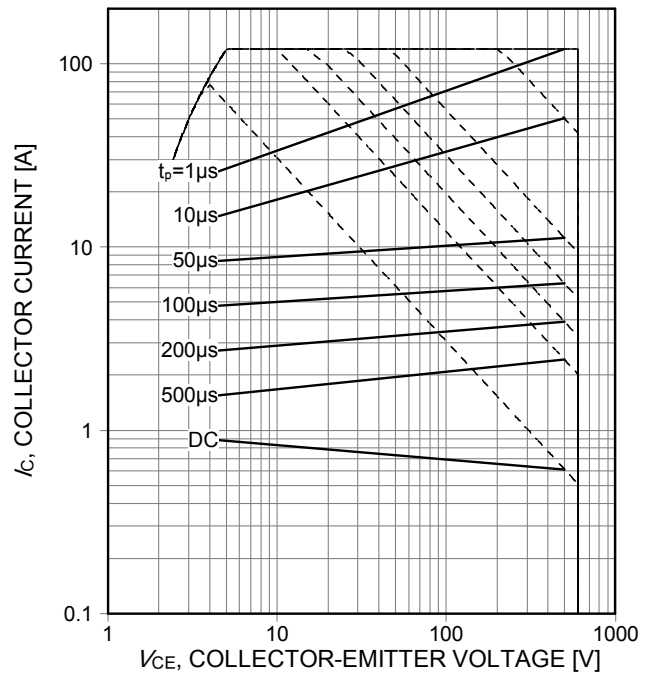


Figure 2. Forward bias safe operating area
 $(D=0, T_C=25^\circ\text{C}, T_{vj} \leq 175^\circ\text{C}; V_{GE}=15\text{V})$

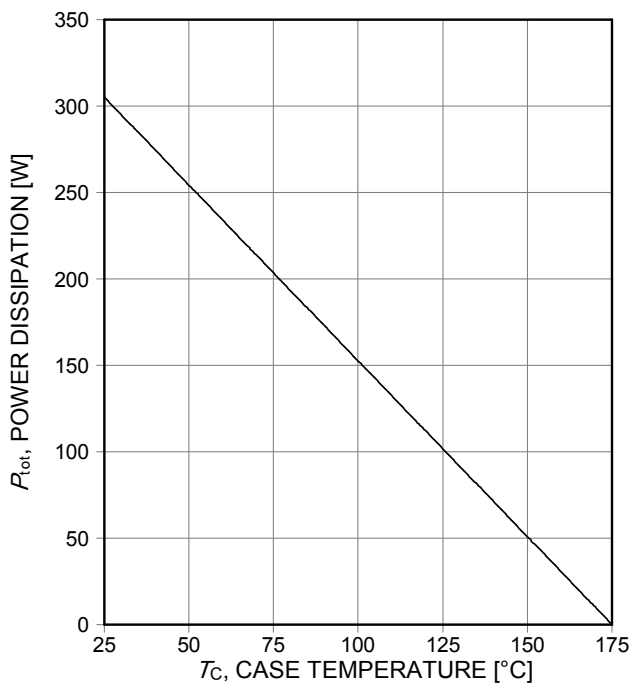


Figure 3. Power dissipation as a function of case temperature
 $(T_{vj} \leq 175^\circ\text{C})$

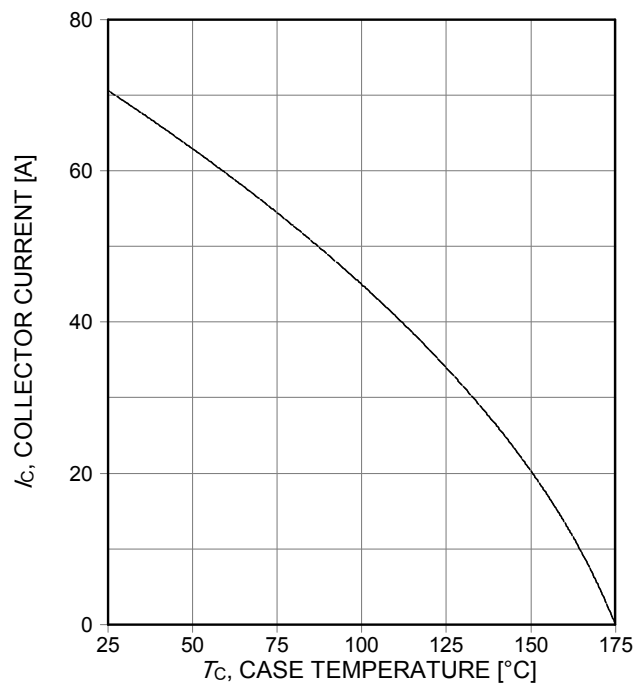


Figure 4. Collector current as a function of case temperature
 $(V_{GE} \geq 15\text{V}, T_{vj} \leq 175^\circ\text{C})$

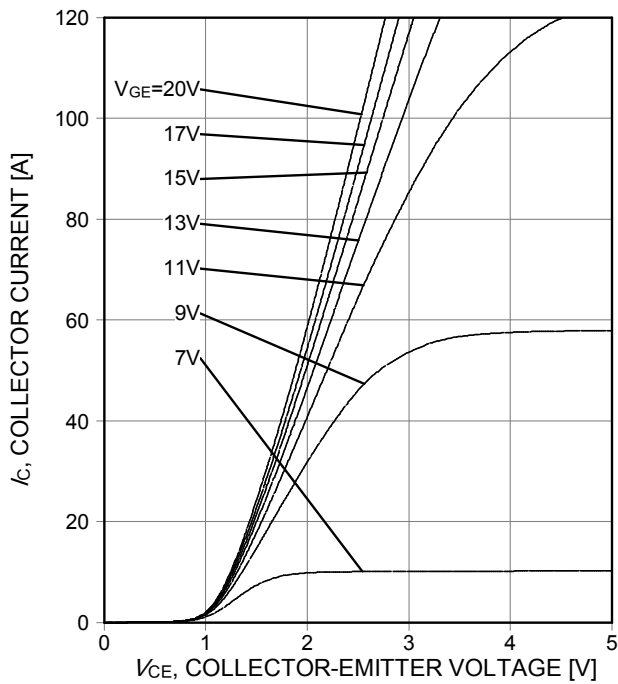


Figure 5. Typical output characteristic
($T_{vj}=25^{\circ}\text{C}$)

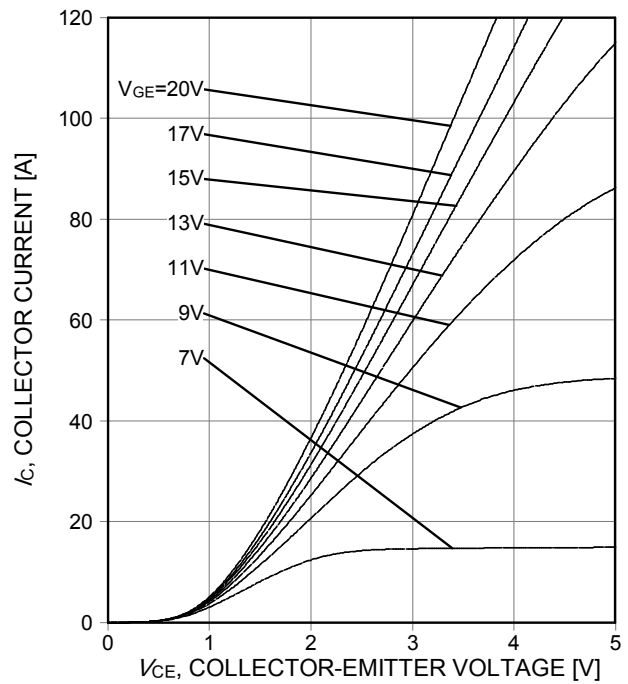


Figure 6. Typical output characteristic
($T_{vj}=175^{\circ}\text{C}$)

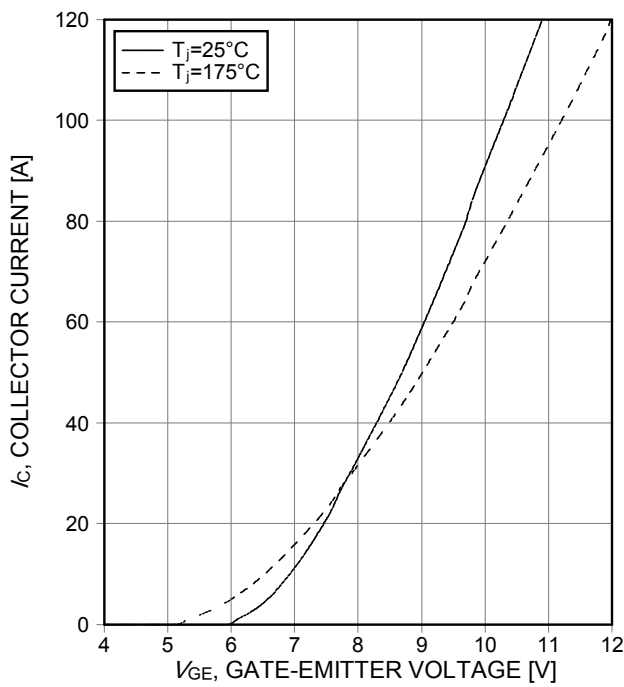


Figure 7. Typical transfer characteristic
($V_{ce}=20\text{V}$)

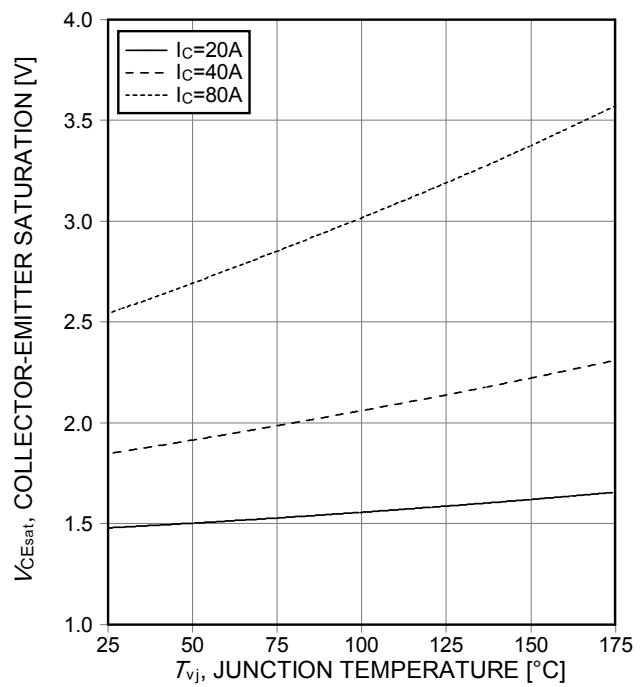


Figure 8. Typical collector-emitter saturation voltage
as a function of junction temperature
($V_{ge}=15\text{V}$)

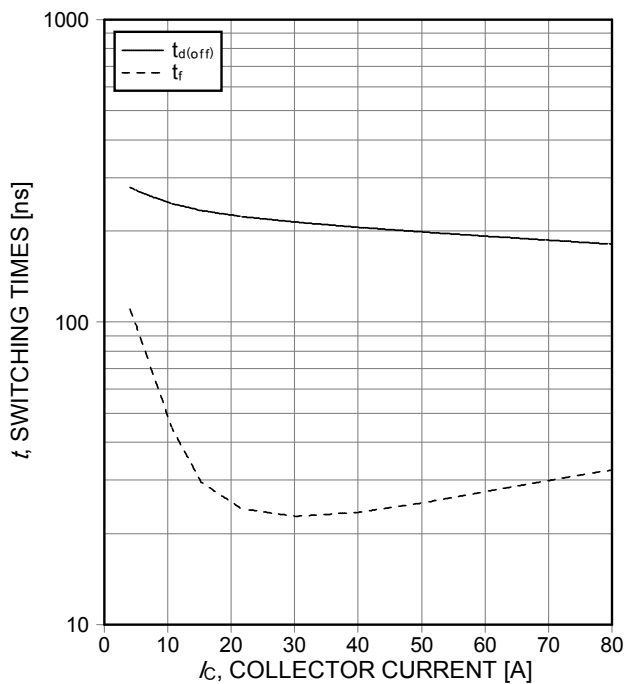


Figure 9. Typical switching times as a function of collector current
(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $r_G=5.6\Omega$, Dynamic test circuit in Figure E)

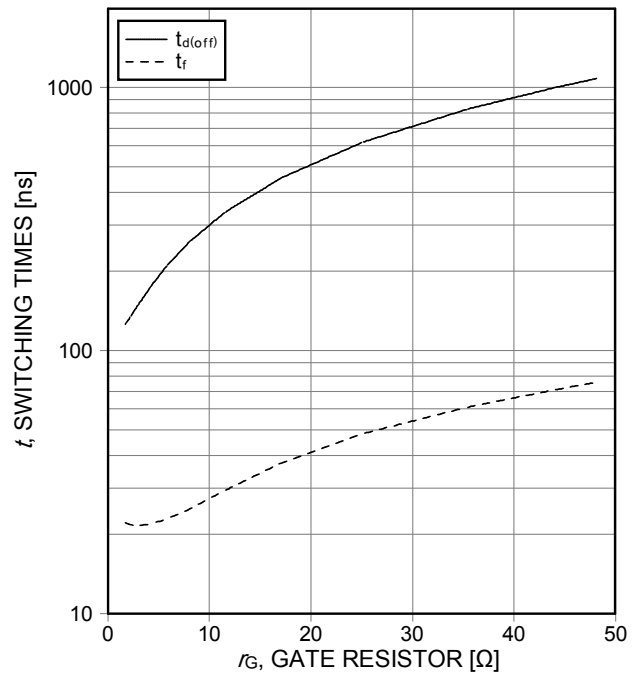


Figure 10. Typical switching times as a function of gate resistor
(inductive load, $T_{vj}=175^{\circ}\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=40\text{A}$, Dynamic test circuit in Figure E)

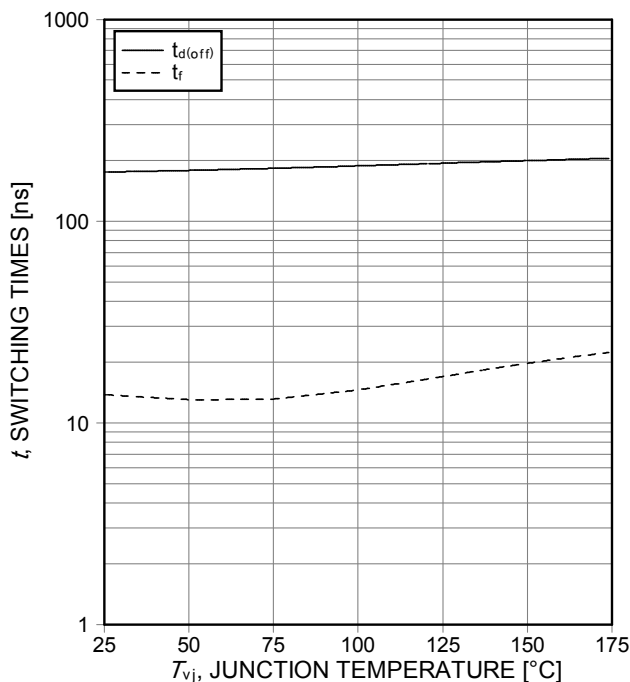


Figure 11. Typical switching times as a function of junction temperature
(inductive load, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=40\text{A}$, $r_G=5.6\Omega$, Dynamic test circuit in Figure E)

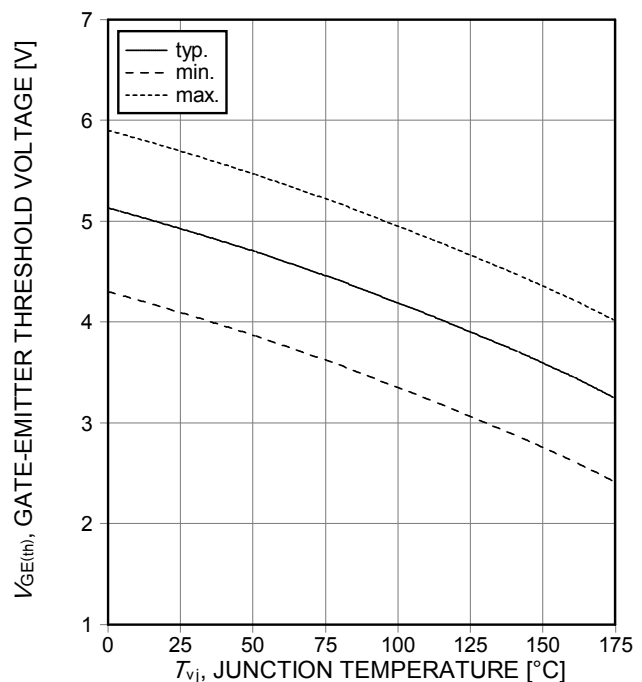


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
($I_C=0.58\text{mA}$)

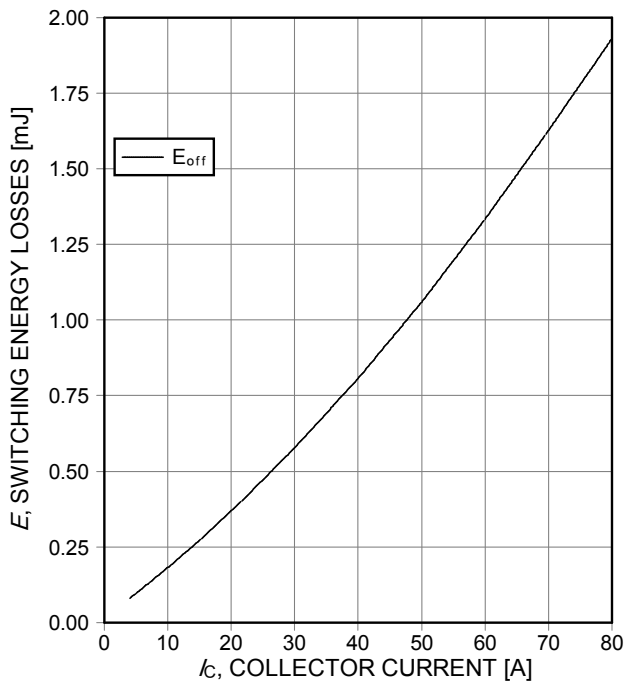


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, $T_{vj}=175^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $r_G=5.6\Omega$, Dynamic test circuit in Figure E)

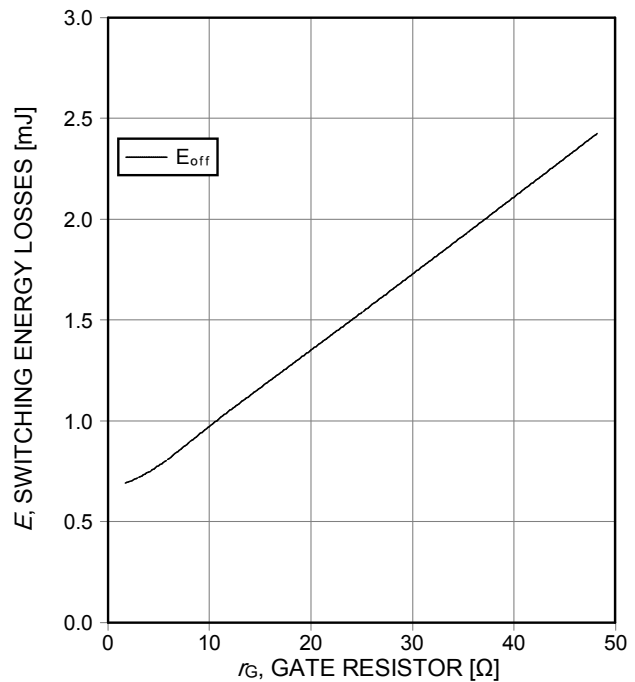


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, $T_{vj}=175^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=40\text{A}$, Dynamic test circuit in Figure E)

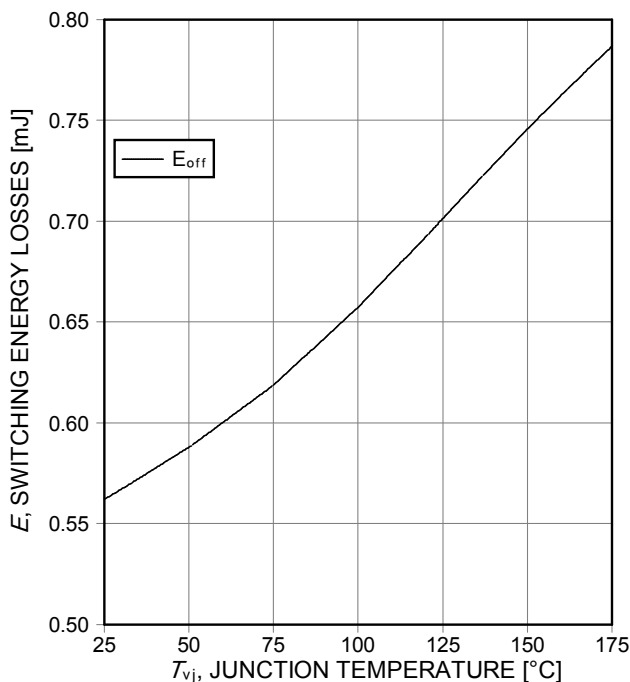


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, $V_{CE}=400\text{V}$, $V_{GE}=15/0\text{V}$, $I_C=40\text{A}$, $r_G=5.6\Omega$, Dynamic test circuit in Figure E)

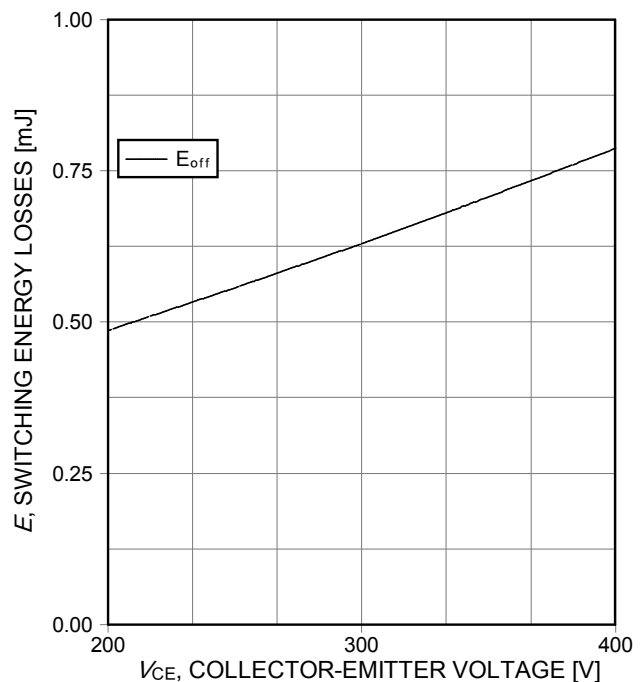


Figure 16. Typical switching energy losses as a function of collector emitter voltage
(inductive load, $T_{vj}=175^\circ\text{C}$, $V_{GE}=15/0\text{V}$, $I_C=40\text{A}$, $r_G=5.6\Omega$, Dynamic test circuit in Figure E)

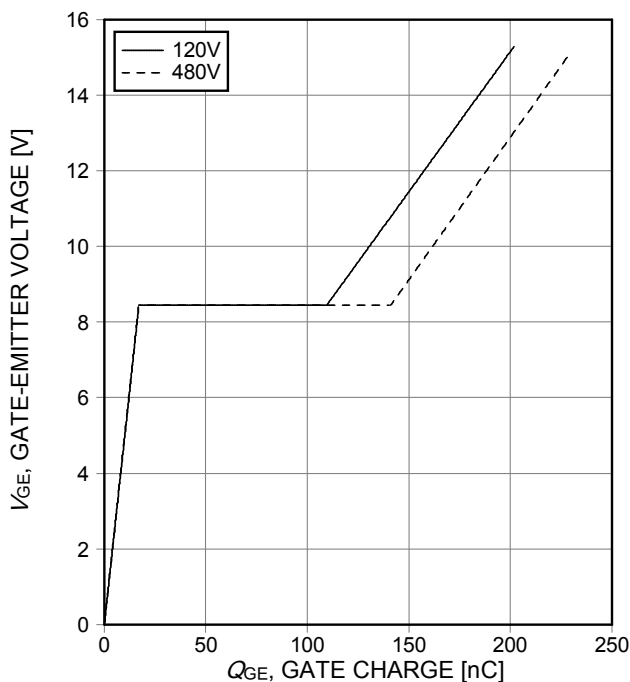


Figure 17. Typical gate charge
($I_C=40A$)

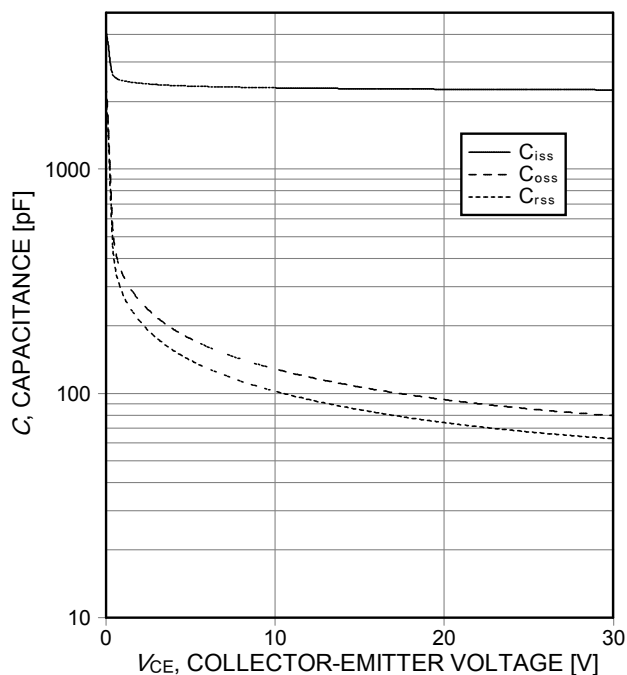


Figure 18. Typical capacitance as a function of
collector-emitter voltage
($V_{GE}=0V$, $f=1MHz$)

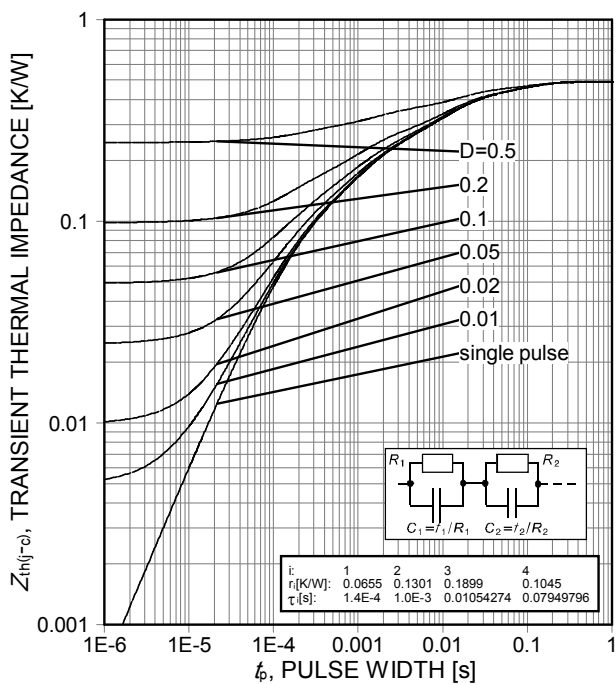


Figure 19. IGBT transient thermal impedance
($D=t_p/T$)

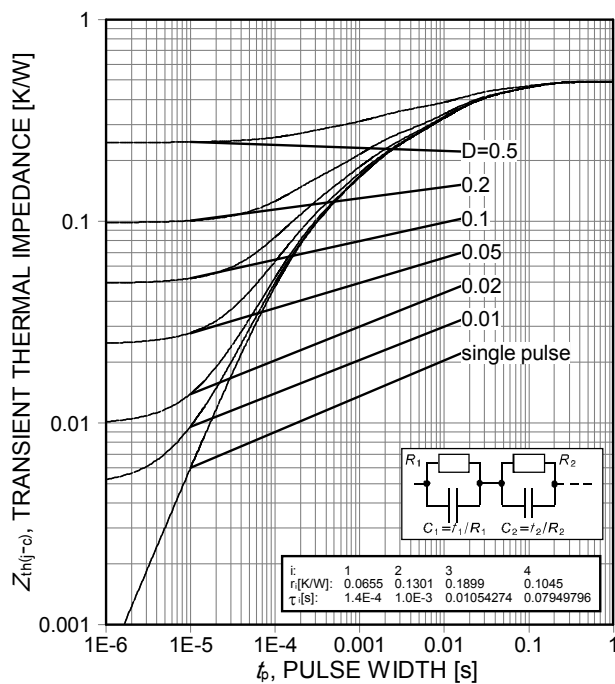


Figure 20. Diode transient thermal impedance as a
function of pulse width
($D=t_p/T$)

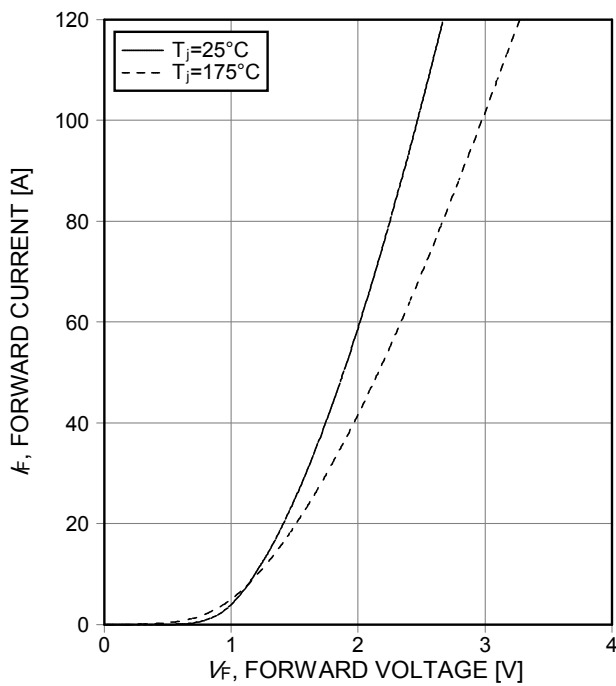


Figure 21. Typical diode forward current as a function of forward voltage

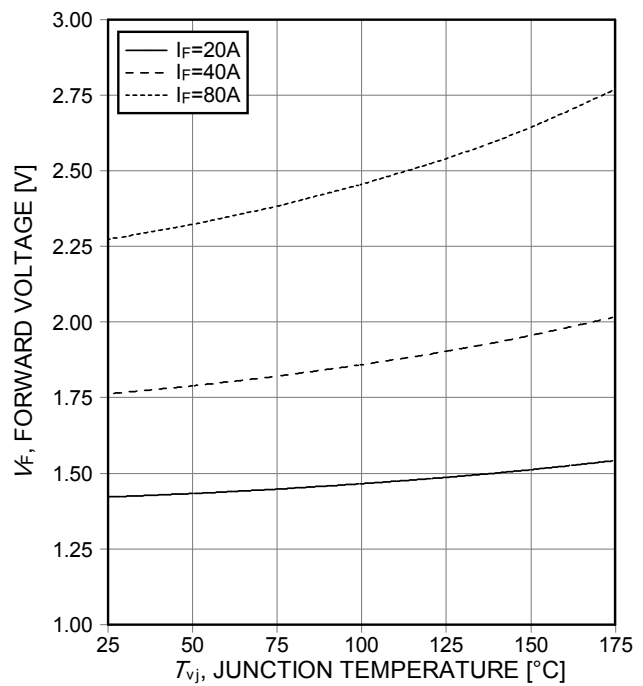
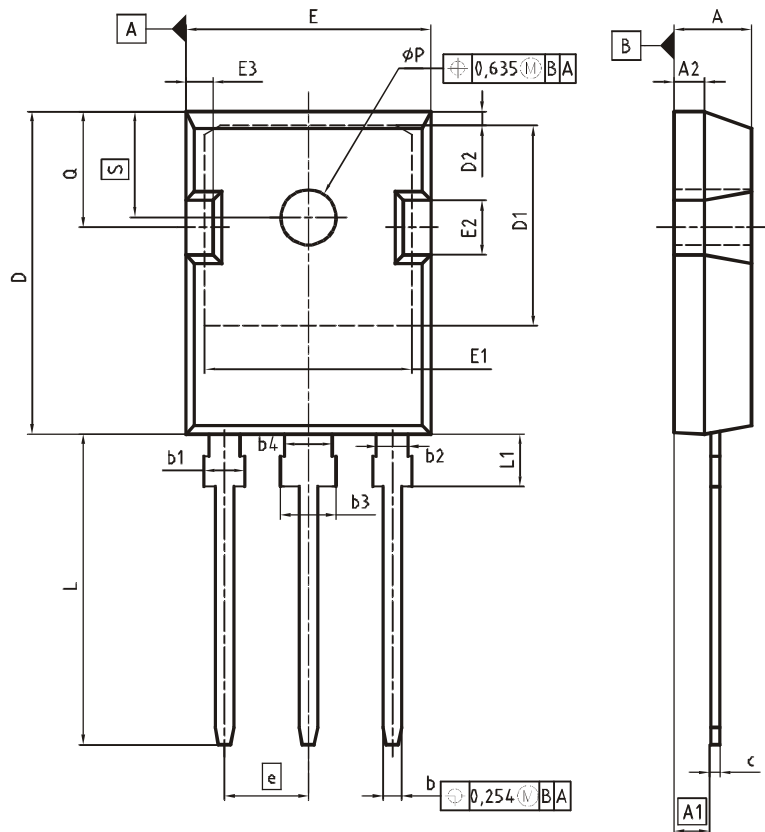
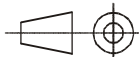


Figure 22. Typical diode forward voltage as a function of junction temperature

PG-TO247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.63	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		0.214	
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

DOCUMENT NO. Z8B00003327
SCALE 0 5 5 7.5mm
EUROPEAN PROJECTION 
ISSUE DATE 01-10-2009
REVISION 04

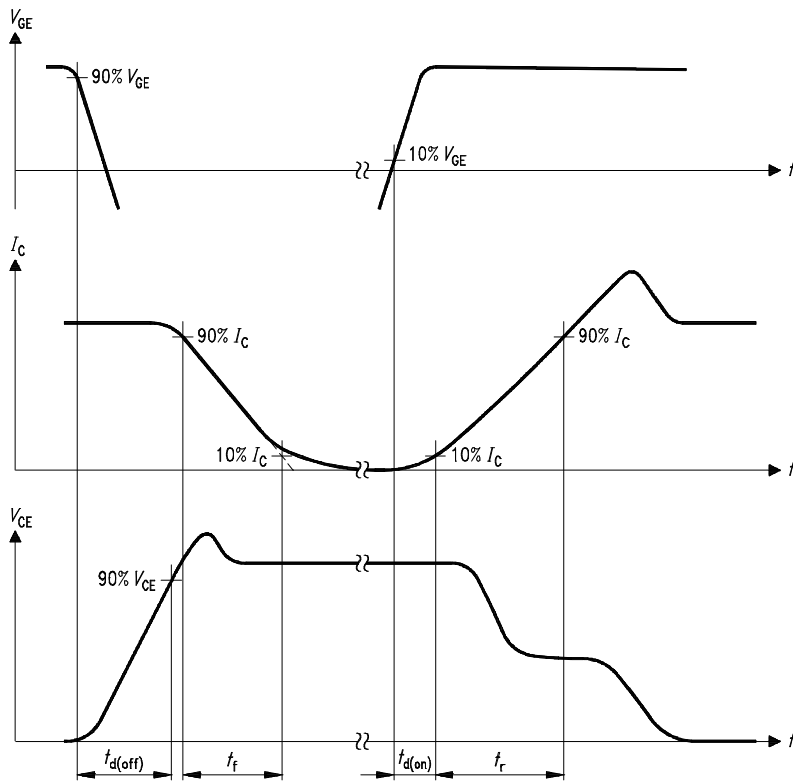


Figure A. Definition of switching times

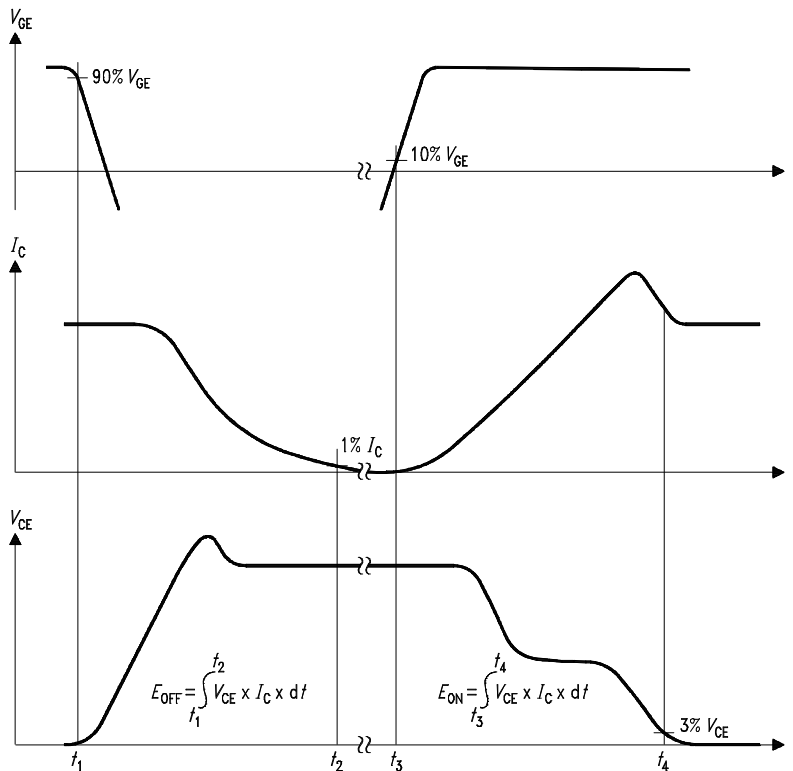


Figure B. Definition of switching losses

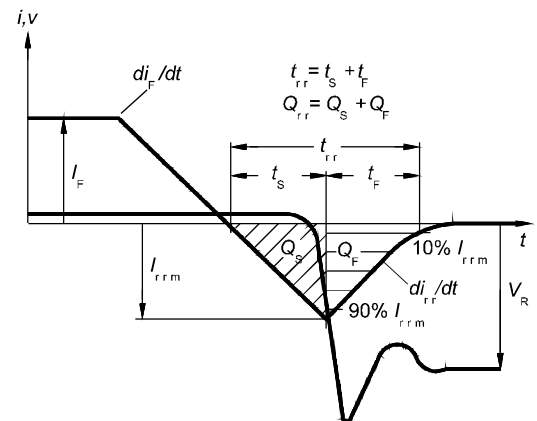


Figure C. Definition of diodes switching characteristics

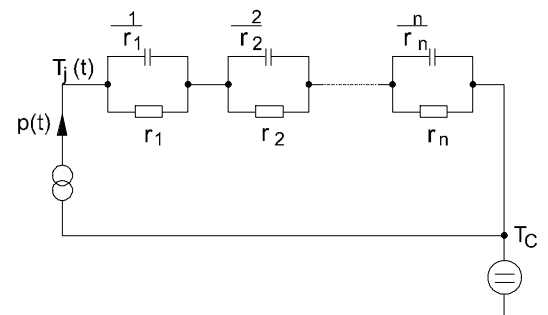


Figure D. Thermal equivalent circuit

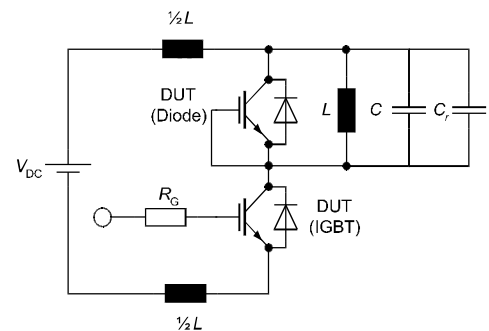


Figure E. Dynamic test circuit
Leakage inductance $L = 180\text{nH}$,
Stray capacitor $C_s = 40\text{pF}$,
Relief capacitor $C_r = 1\text{nF}$
(only for ZVT switching)

Published by
Infineon Technologies AG
81726 Munich, Germany
81726 München, Germany
© 2010 Infineon Technologies AG
All Rights Reserved.

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office. Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.

Компания «Океан Электроники» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А