

Resonant Switching Series

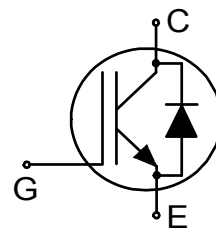
Reverse conducting IGBT with monolithic body diode

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}
 - easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Low EMI
- Qualified according to JEDEC for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models:
<http://www.infineon.com/igbt/>

Applications:

- Inductive cooking
- Inverterized microwave ovens
- Resonant converters
- Soft switching applications



Key Performance and Package Parameters

Type	V_{CE}	I_C	V_{CEsat} , $T_{vj}=25^{\circ}\text{C}$	T_{vjmax}	Marking	Package
IHW15N120R3	1200V	15A	1.48V	175°C	H15R1203	PG-TO247-3

Table of Contents

Description 1

Table of Contents 2

Maximum Ratings 3

Thermal Resistance 3

Electrical Characteristics 4

Electrical Characteristics Diagrams 6

Package Drawing12

Testing Conditions13

Revision History14

Disclaimer15

Resonant Switching Series

Maximum Ratings

For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1200	V
DC collector current, limited by T_{vjmax} $T_c = 25^\circ\text{C}$ $T_c = 100^\circ\text{C}$	I_C	30.0 15.0	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	45.0	A
Turn off safe operating area $V_{CE} \leq 1200\text{V}$, $T_{vj} \leq 175^\circ\text{C}$	-	45.0	A
Diode forward current, limited by T_{vjmax} $T_c = 25^\circ\text{C}$ $T_c = 100^\circ\text{C}$	I_F	30.0 15.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	45.0	A
Gate-emitter voltage Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$, $D < 0.010$)	V_{GE}	± 20 ± 25	V
Power dissipation $T_c = 25^\circ\text{C}$ Power dissipation $T_c = 100^\circ\text{C}$	P_{tot}	254.0 127.0	W
Operating junction temperature	T_{vj}	$-40 \dots +175$	$^\circ\text{C}$
Storage temperature	T_{stg}	$-55 \dots +175$	$^\circ\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	$^\circ\text{C}$
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistance

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
R _{th} Characteristics						
IGBT thermal resistance, junction - case	R _{th(j-c)}		-	-	0.59	K/W
Diode thermal resistance, junction - case	R _{th(j-c)}		-	-	0.59	K/W
Thermal resistance junction - ambient	R _{th(j-a)}		-	-	40	K/W

Resonant Switching Series

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	$V_{(BR)CES}$	$V_{GE} = 0V, I_C = 0.50mA$	1200	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	$V_{GE} = 15.0V, I_C = 15.0A$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 125^{\circ}C$ $T_{vj} = 175^{\circ}C$	- - -	1.48 1.70 1.80	1.70 - -	V
Diode forward voltage	V_F	$V_{GE} = 0V, I_F = 15.0A$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 125^{\circ}C$ $T_{vj} = 175^{\circ}C$	- - -	1.55 1.70 1.80	1.75 - -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C = 0.40mA, V_{CE} = V_{GE}$	5.1	5.8	6.4	V
Zero gate voltage collector current	I_{CES}	$V_{CE} = 1200V, V_{GE} = 0V$ $T_{vj} = 25^{\circ}C$ $T_{vj} = 175^{\circ}C$	- -	- -	100 2500	μA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0V, V_{GE} = 20V$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE} = 20V, I_C = 15.0A$	-	13.9	-	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	-	1165	-	pF
Output capacitance	C _{oes}		-	40	-	
Reverse transfer capacitance	C _{res}		-	32	-	
Gate charge	Q _G	V _{CC} = 960V, I _C = 15.0A, V _{GE} = 15V	-	165.0	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L _E		-	13.0	-	nH

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic, at $T_{vj} = 25^{\circ}\text{C}$						
Turn-off delay time	$t_{d(\text{off})}$	$T_{vj} = 25^{\circ}\text{C},$ $V_{CC} = 600\text{V}, I_C = 15.0\text{A},$ $V_{GE} = 0.0/15.0\text{V},$ $R_{G(\text{on})} = 14.6\Omega, R_{G(\text{off})} = 14.6\Omega,$ $L\sigma = 180\text{nH}, C\sigma = 39\text{pF}$ $L\sigma, C\sigma$ from Fig. E Energy losses include “tail” and diode reverse recovery.	-	300	-	ns
Fall time	t_f		-	46	-	ns
Turn-off energy	E_{off}		-	0.70	-	mJ

Resonant Switching Series

Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic, at $T_{vj} = 175^{\circ}\text{C}$						
Turn-off delay time	$t_{d(\text{off})}$	$T_{vj} = 175^{\circ}\text{C}$, $V_{CC} = 600\text{V}$, $I_C = 15.0\text{A}$, $V_{GE} = 0.0/15.0\text{V}$, $R_{G(\text{on})} = 14.6\Omega$, $R_{G(\text{off})} = 14.6\Omega$, $L\sigma = 180\text{nH}$, $C\sigma = 39\text{pF}$ $L\sigma$, $C\sigma$ from Fig. E Energy losses include “tail” and diode reverse recovery.	-	370	-	ns
Fall time	t_f		-	90	-	ns
Turn-off energy	E_{off}		-	1.25	-	mJ

Resonant Switching Series

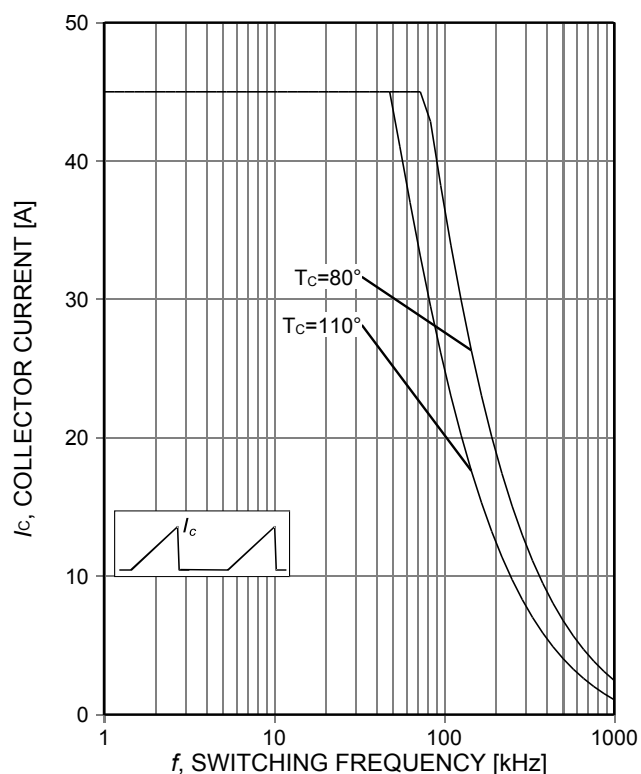


Figure 1. **Collector current as a function of switching frequency**
 $(T_J \leq 175^\circ\text{C}, D=0.5, V_{CE}=600\text{V}, V_{GE}=15/0\text{V}, R_G=14,6\Omega)$

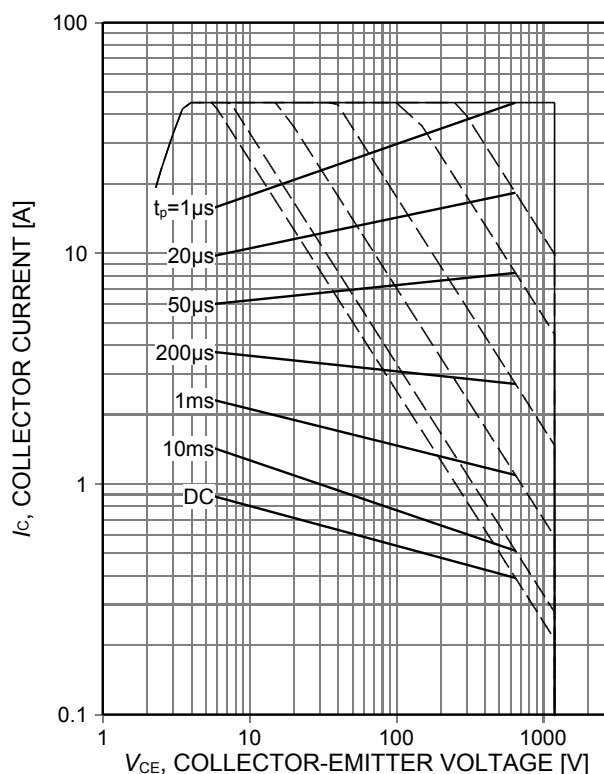


Figure 2. **Forward bias safe operating area**
 $(D=0, T_C=25^\circ\text{C}, T_J \leq 175^\circ\text{C}; V_{GE}=15\text{V})$

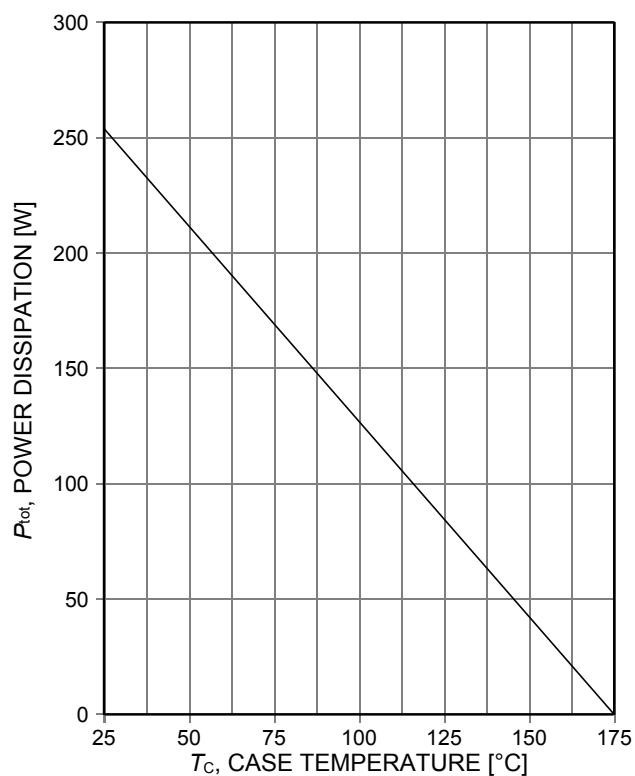


Figure 3. **Power dissipation as a function of case temperature**
 $(T_J \leq 175^\circ\text{C})$

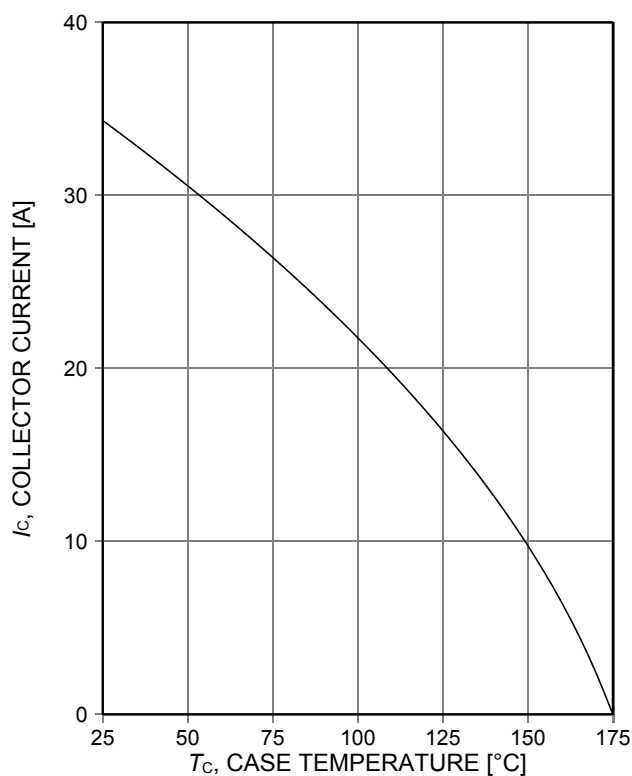


Figure 4. **Collector current as a function of case temperature**
 $(V_{GE} \geq 15\text{V}, T_J \leq 175^\circ\text{C})$

Resonant Switching Series

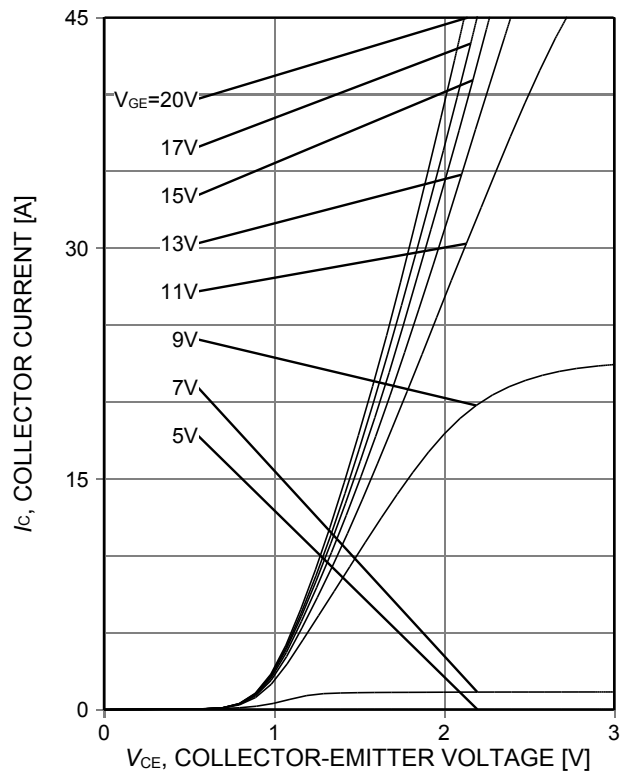


Figure 5. **Typical output characteristic**
($T_j = 25^\circ\text{C}$)

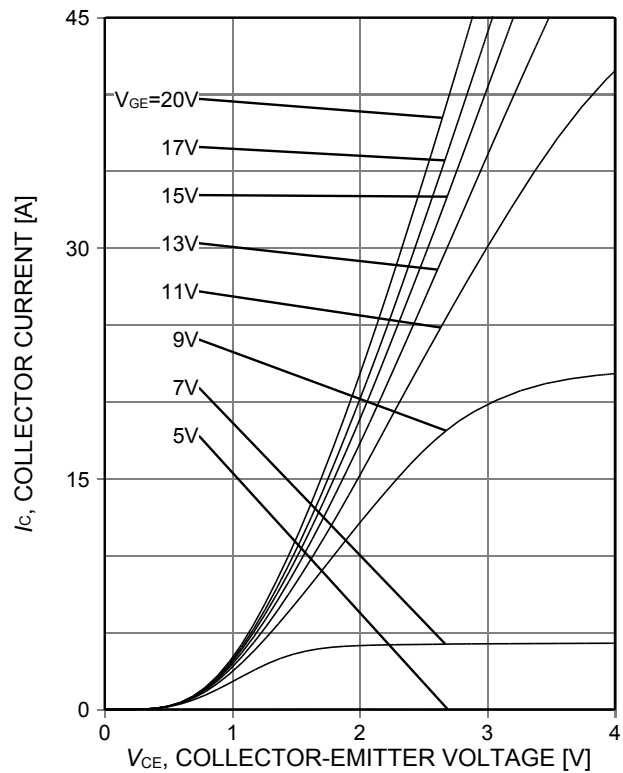


Figure 6. **Typical output characteristic**
($T_j = 175^\circ\text{C}$)

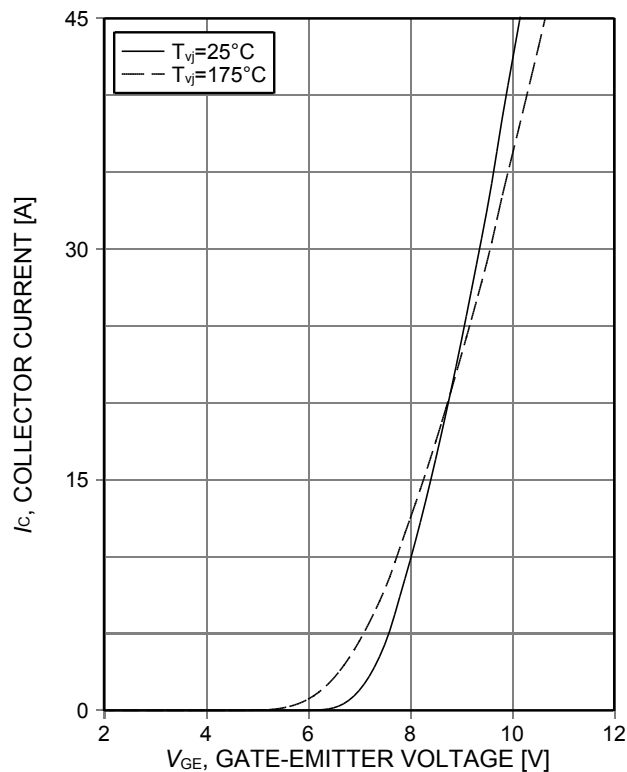


Figure 7. **Typical transfer characteristic**
($V_{CE} = 20\text{V}$)

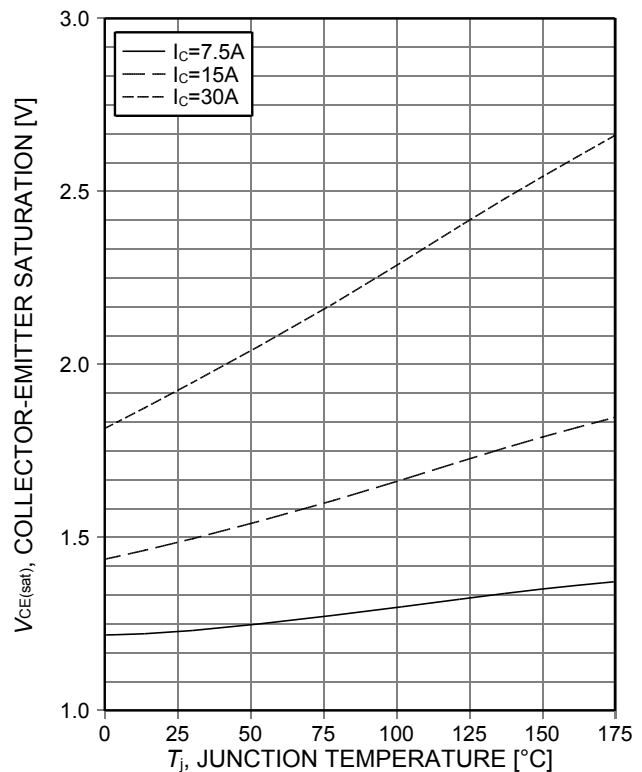


Figure 8. **Typical collector-emitter saturation voltage as a function of junction temperature**
($V_{GE} = 15\text{V}$)

Resonant Switching Series

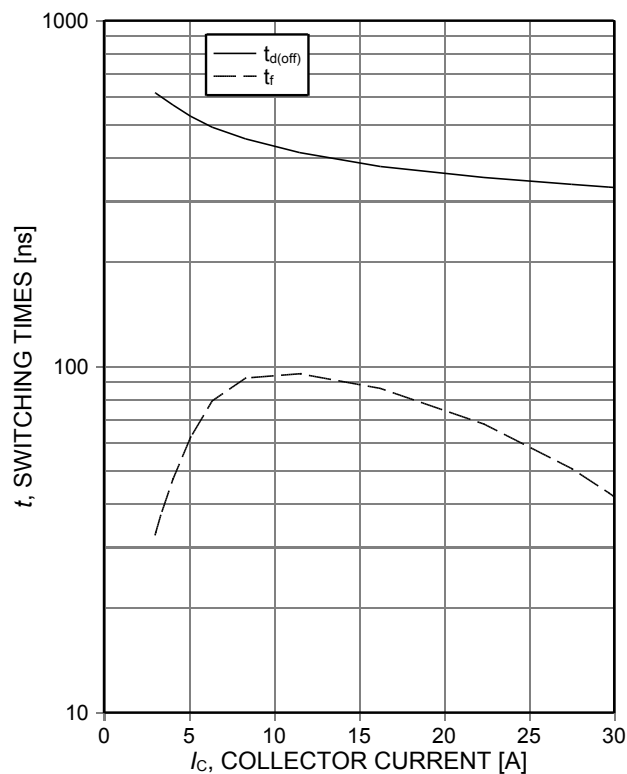


Figure 9. **Typical switching times as a function of collector current**
(ind. load, $T_J=175^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $R_{G(on)}=14,6\Omega$, $R_{G(off)}=14,6\Omega$, test circuit in Fig. E)

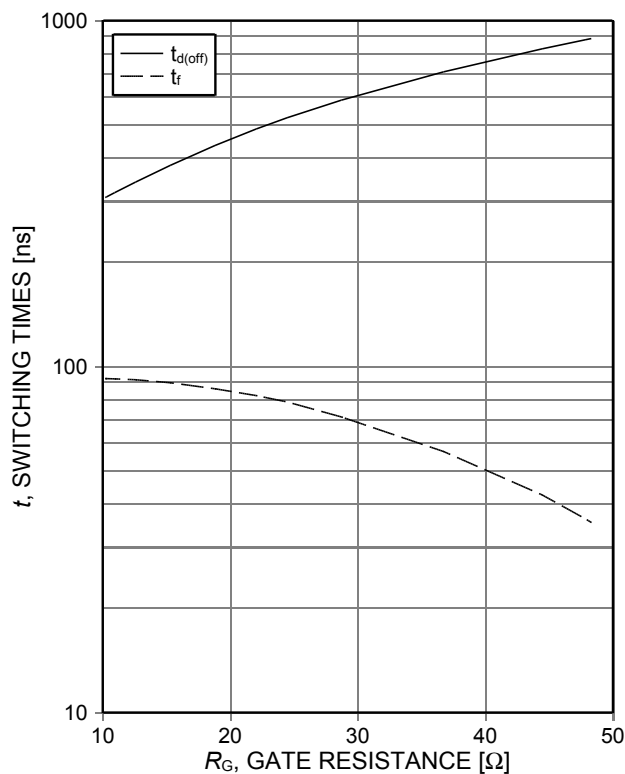


Figure 10. **Typical switching times as a function of gate resistance**
(ind. load, $T_J=175^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=15\text{A}$, test circuit in Fig. E)

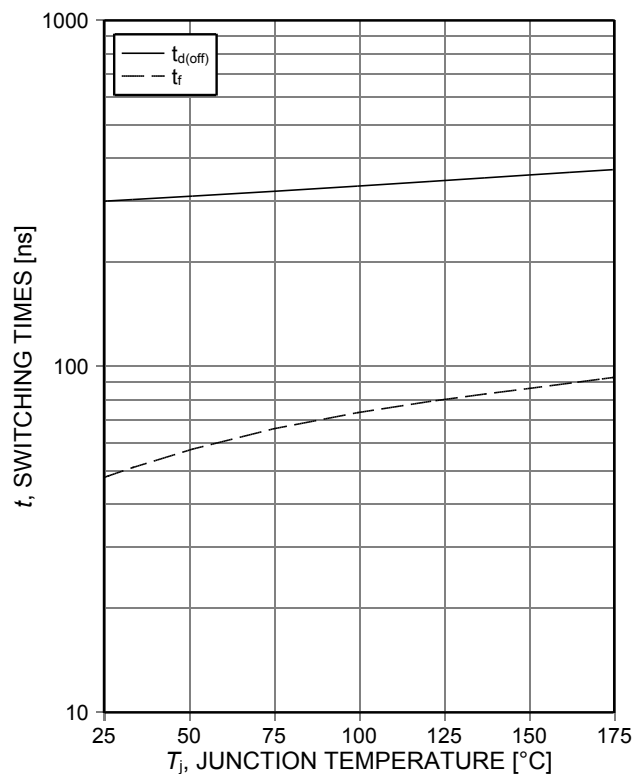


Figure 11. **Typical switching times as a function of junction temperature**
(ind. load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=15\text{A}$, $R_{G(on)}=14,6\Omega$, $R_{G(off)}=14,6\Omega$, test circuit in Fig. E)

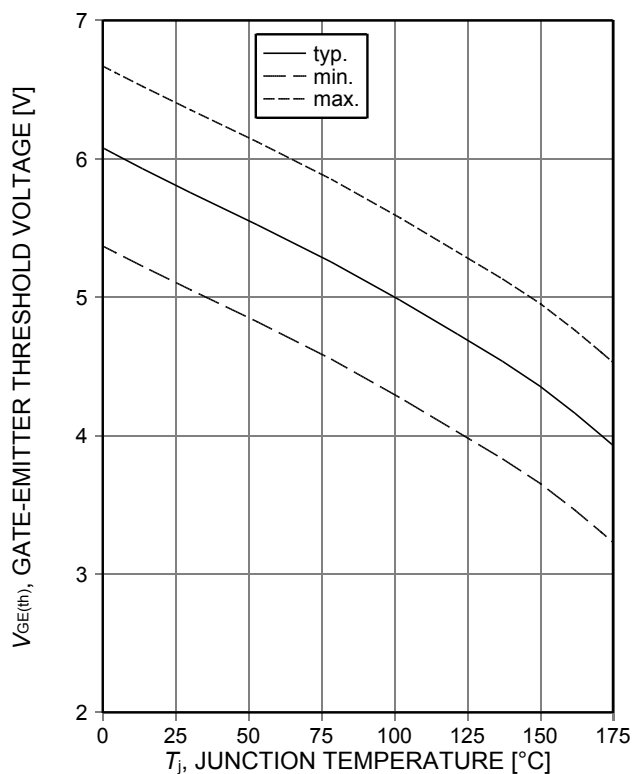


Figure 12. **Gate-emitter threshold voltage as a function of junction temperature**
($I_C=0.4\text{mA}$)

Resonant Switching Series

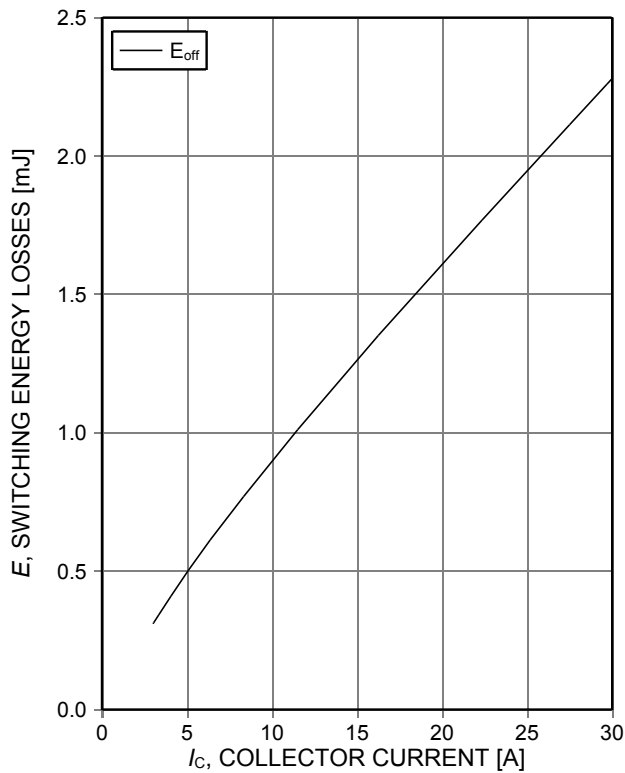


Figure 13. **Typical switching energy losses as a function of collector current**
(ind. load, $T_J=175^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $R_{G(on)}=14,6\Omega$, $R_{G(off)}=14,6\Omega$, test circuit in Fig. E)

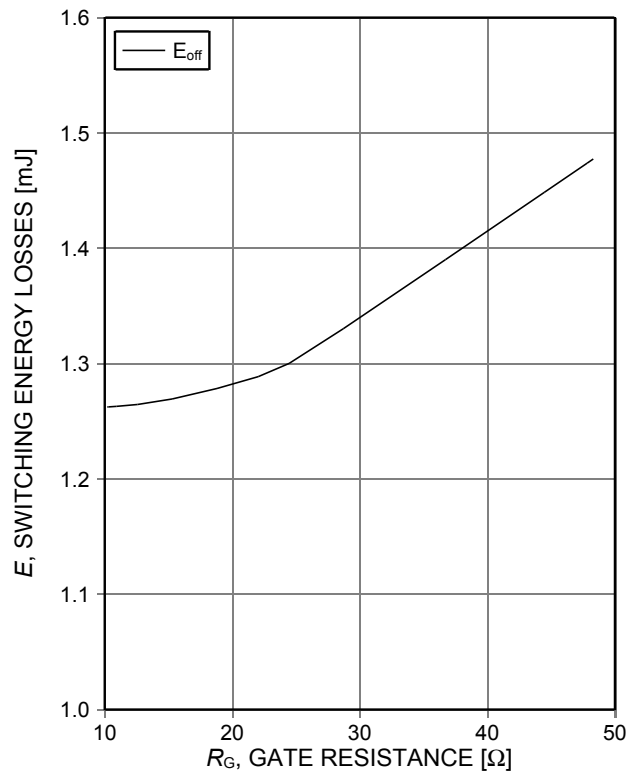


Figure 14. **Typical switching energy losses as a function of gate resistance**
(ind. load, $T_J=175^\circ\text{C}$, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=15\text{A}$, test circuit in Fig. E)

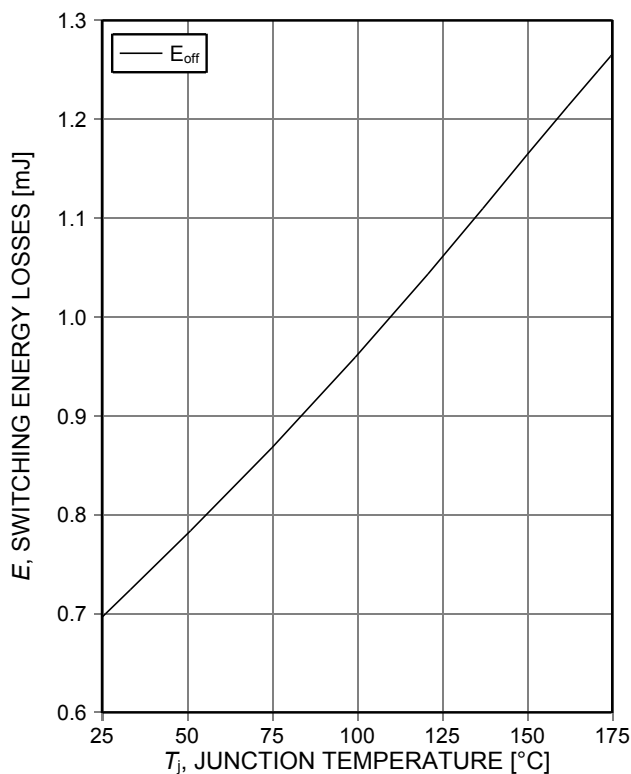


Figure 15. **Typical switching energy losses as a function of junction temperature**
(ind load, $V_{CE}=600\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=15\text{A}$, $R_{G(on)}=14,6\Omega$, $R_{G(off)}=14,6\Omega$, test circuit in Fig. E)

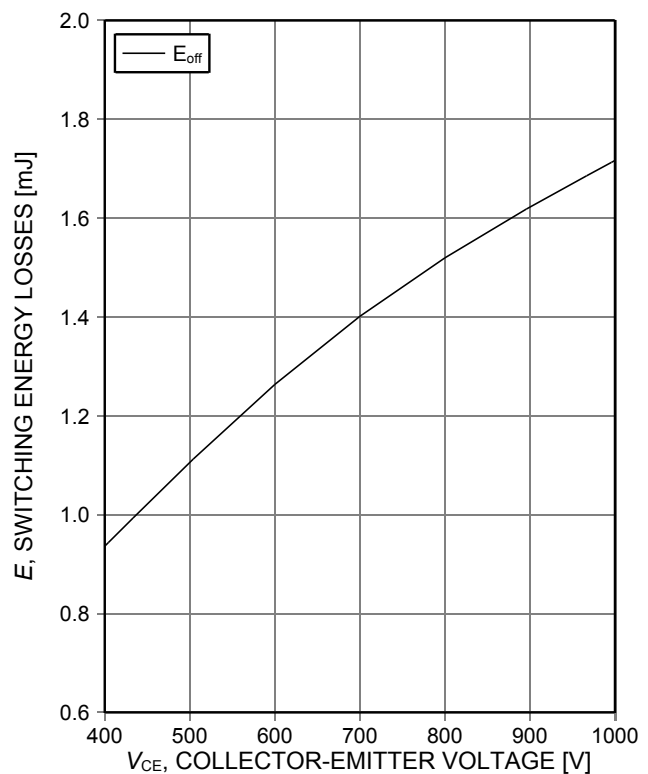


Figure 16. **Typical switching energy losses as a function of collector emitter voltage**
(ind. load, $T_J=175^\circ\text{C}$, $V_{GE}=0/15\text{V}$, $I_C=15\text{A}$, $R_{G(on)}=14,6\Omega$, $R_{G(off)}=14,6\Omega$, test circuit in Fig. E)

Resonant Switching Series

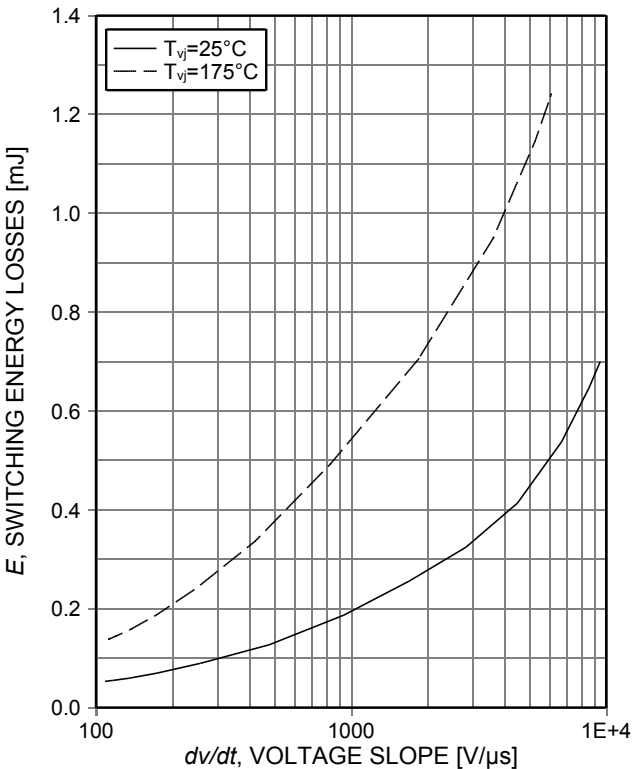


Figure 17. **Typical turn off switching energy loss for soft switching**
(ind load, $V_{CE}=600V$, $V_{GE}=15/0V$, $I_C=15A$, $R_G=14,6\Omega$, test circuit in Fig. E)

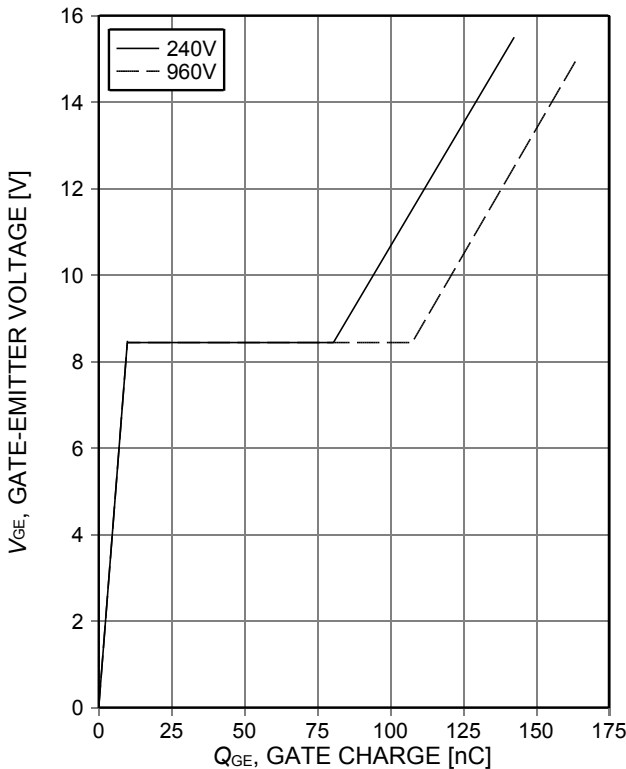


Figure 18. **Typical gate charge**
($I_C=15A$)

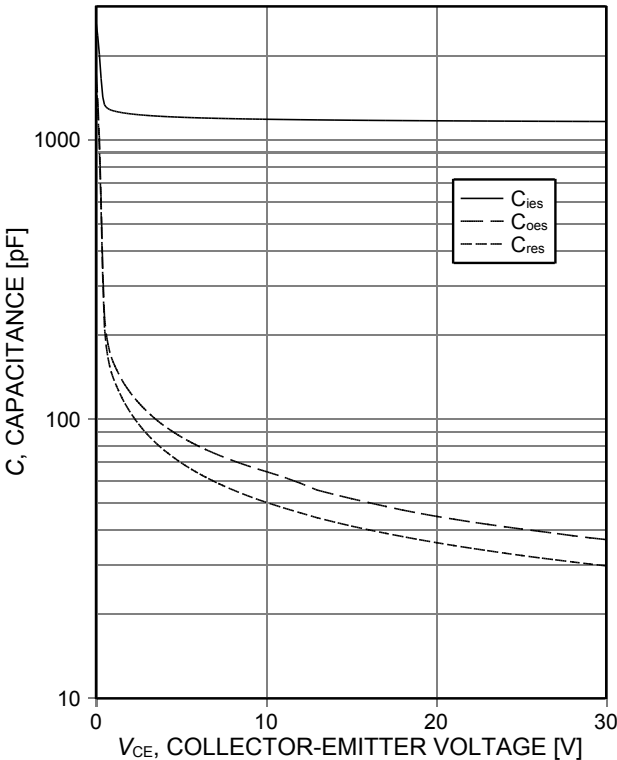


Figure 19. **Typical capacitance as a function of collector-emitter voltage**
($V_{GE}=0V$, $f=1MHz$)

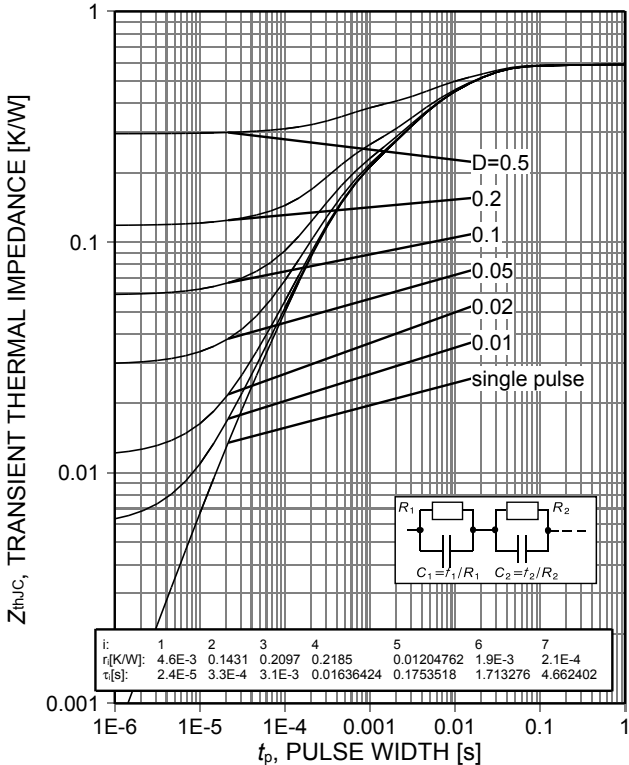


Figure 20. **IGBT transient thermal impedance**
($D=t_p/T$)

Resonant Switching Series

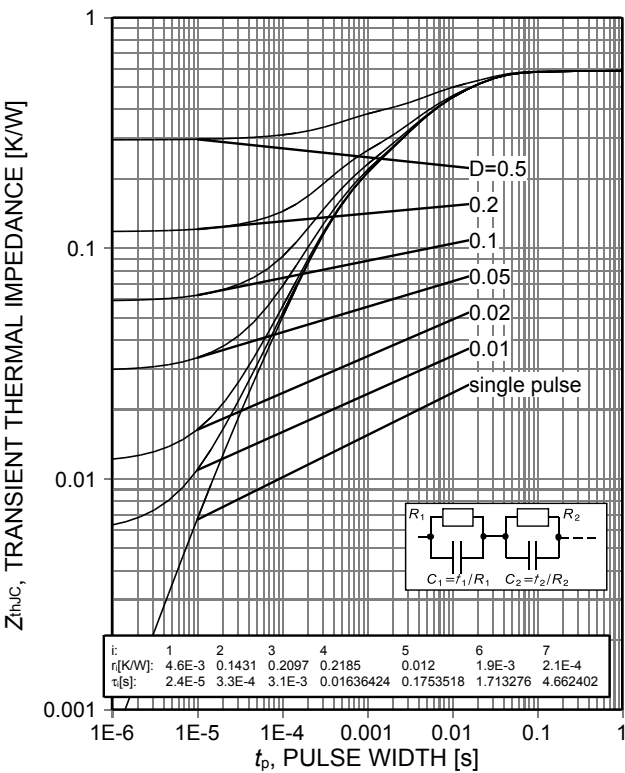


Figure 21. Diode transient thermal impedance as a function of pulse width ($D=t_p/T$)

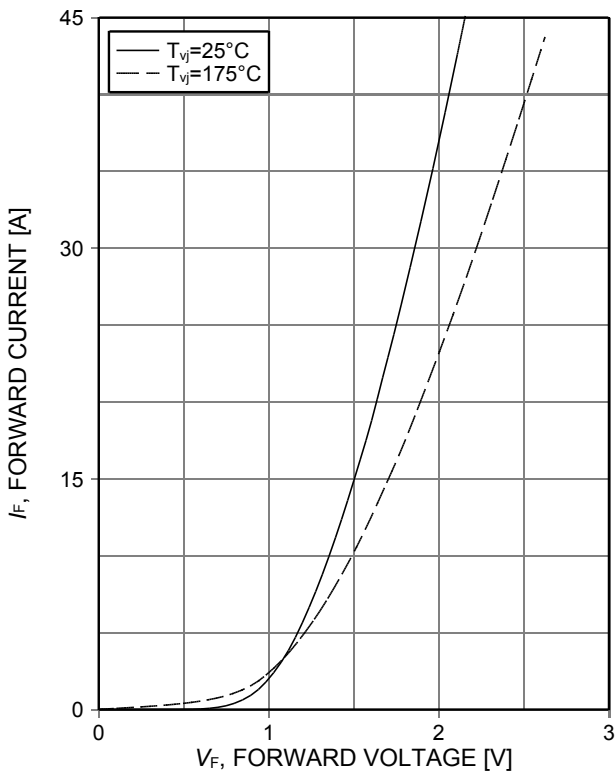


Figure 22. Typical diode forward current as a function of forward voltage

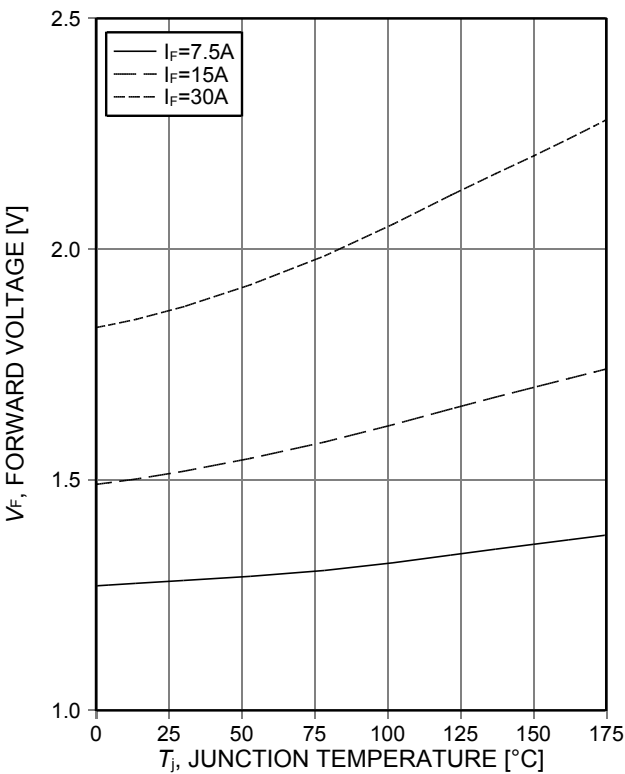
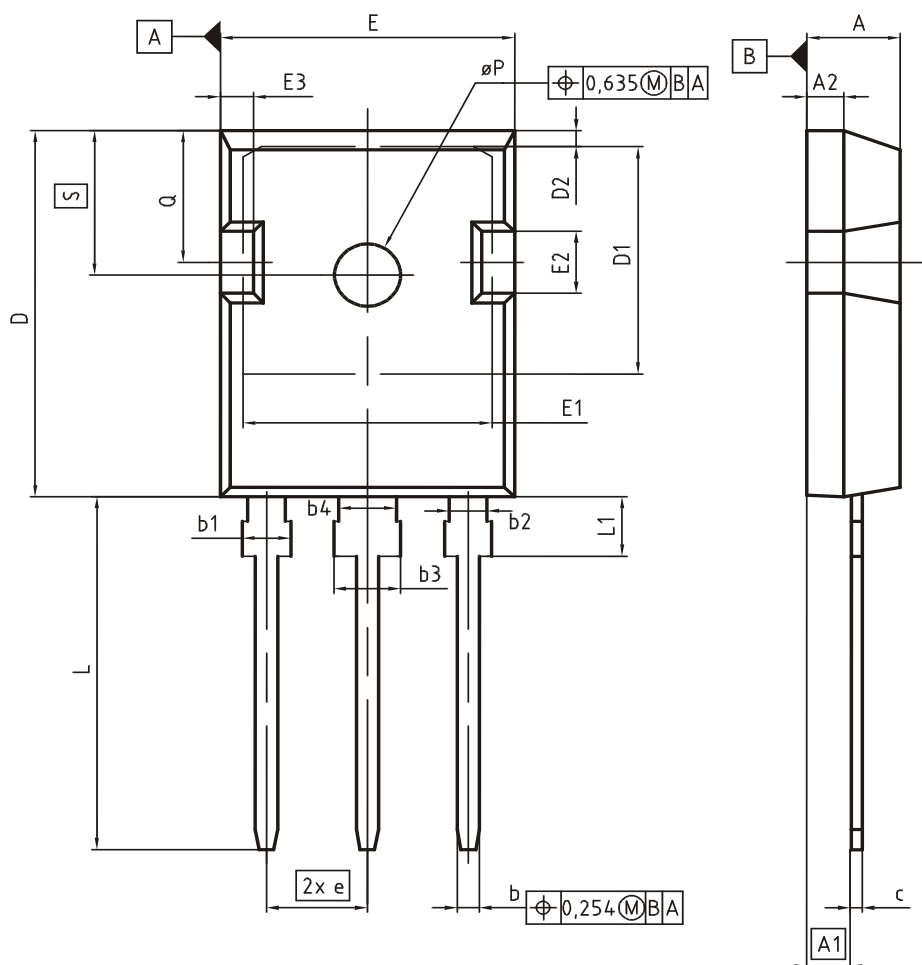


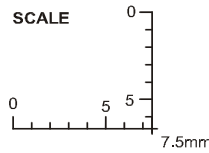
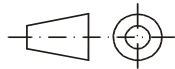
Figure 23. Typical diode forward voltage as a function of junction temperature

Resonant Switching Series

Package Drawing 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
ØP	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	
EUROPEAN PROJECTION	
	
ISSUE DATE 09-07-2010	
REVISION 05	

Resonant Switching Series

Testing Conditions

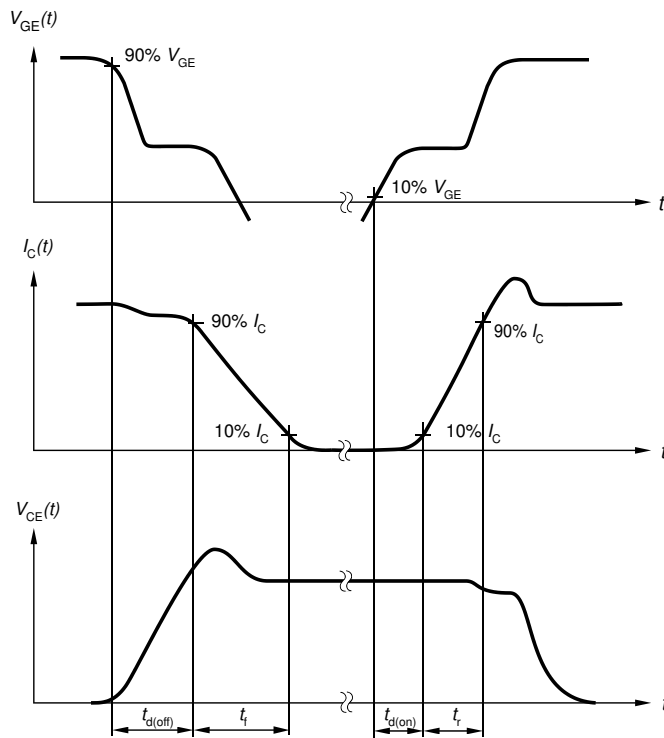


Figure A. Definition of switching times

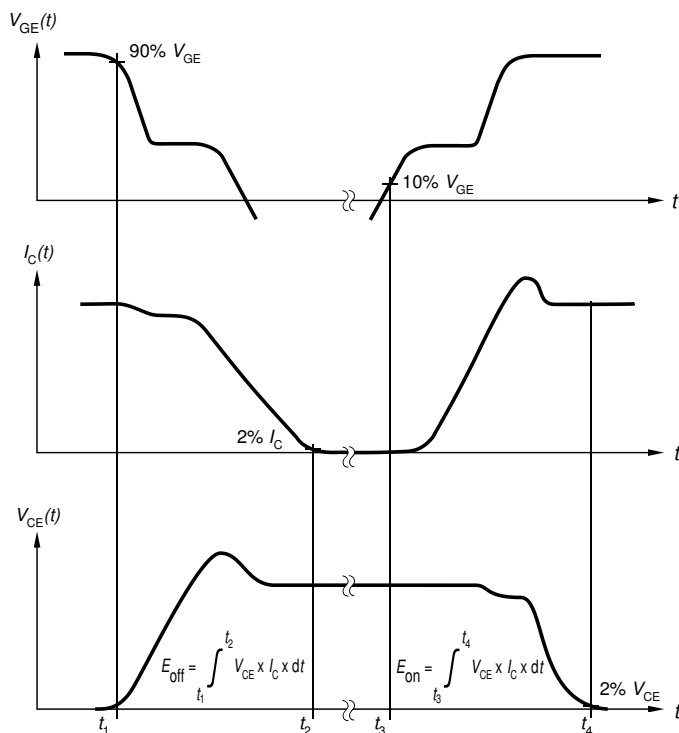


Figure B. Definition of switching losses

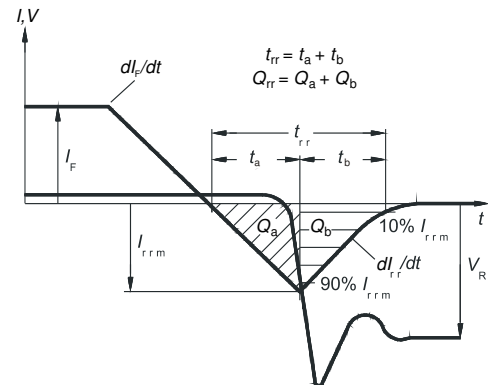


Figure C. Definition of diode switching characteristics

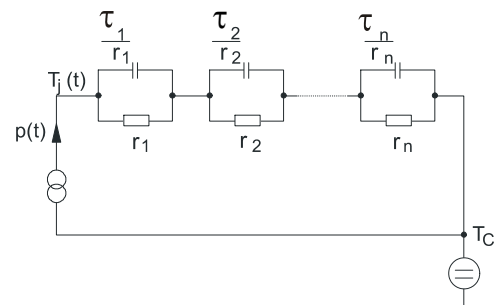


Figure D. Thermal equivalent circuit

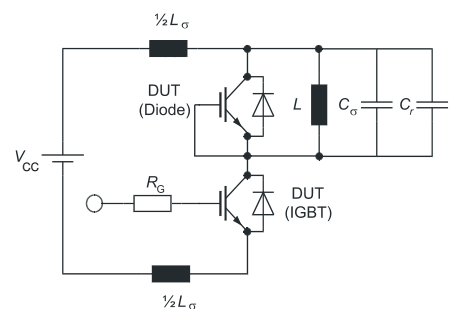


Figure E. **Dynamic test circuit**
 Parasitic inductance L_{σ} ,
 parasitic capacitor C_{σ} ,
 relief capacitor C_r ,
 (only for ZVT switching)

Resonant Switching Series**Revision History**

IHW15N120R3**Revision: 2018-03-29, Rev. 2.5**

Previous Revision

Revision	Date	Subjects (major changes since last revision)
1.1	2009-04-01	-
2.1	2009-05-27	-
2.2	2011-04-05	Pack. draw. rev. 05, marking update
2.3	2013-02-12	Layout change
2.4	2015-01-26	Minor changes
2.5	2018-03-29	Fig.12 and Fig.17 minor change of legend

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Published by
Infineon Technologies AG
81726 München, Germany
© Infineon Technologies AG 2018.
All Rights Reserved.

Important Notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, 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.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

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

Please note that this product is not qualified according to the AEC Q100 or AEC Q101 documents of the Automotive Electronics Council.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

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