Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

IH-series

Reverse conducting IGBT with monolithic body diode

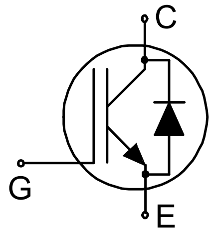
IHW20N135R3

Datasheet

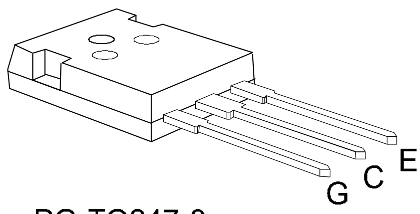
Industrial & Multimarket

Reverse conducting IGBT with monolithic body diode

Features:



- Offers new higher breakdown voltage to 1350V for improved reliability
- Powerful monolithic body diode with low forward voltage designed for soft commutation only
- TrenchStop™ technology offering:
  - 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 JESD-022 for target applications
- Pb-free lead plating; RoHS compliant
- Halogen free (according to IEC 61249-2-21)
- Complete product spectrum and PSpice Models: http://www.infineon.com/igbt/



PG-TO247-3

Applications:

- Inductive cooking

Key Performance and Package Parameters

Type	V_{CE}	I_C	V_{CEsat}, T_{vj}=25°C	T_{vjmax}	Marking	Package
IHW20N135R3	1350V	20A	1.6V	175°C	H20R1353	PG-TO247-3

Table of Contents

Maximum ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1350	V
DC collector current, limited by T_{vjmax} T_C = 25°C T_C = 100°C	I_C	40.0 20.0	A
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpuls}	60.0	A
Turn off safe operating area V_{CE} ≤ 1350V, T_{vj} ≤ 175°C	-	60.0	A
Diode forward current, limited by T_{vjmax} T_C = 25°C T_C = 100°C	I_F	40.0 20.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	60.0	A
Gate-emitter voltage Transient Gate-emitter voltage (t_p = 10µs, D < 0.010)	V_{GE}	±20 ±25	V
Power dissipation T_C = 25°C Power dissipation T_C = 100°C	P_{tot}	310.0 155.0	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+175	°C
Soldering temperature, wave soldering 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	$R_{th(j-c)}$		0.48	K/W
Diode thermal resistance, junction - case	$R_{th(j-c)}$		0.48	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		40	K/W

Electrical Characteristic, at T_{vj} = 25°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	1350	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE} = 15.0V, I_C = 20.0A T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	- - -	1.60 1.80 1.90	1.80 - -	V
Diode forward voltage	V_F	V_{GE} = 0V, I_F = 20.0A T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	- - -	1.60 1.73 1.80	1.80 -	V
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C = 0.50mA, V_{CE} = V_{GE}	5.1	5.8	6.4	V
Zero gate voltage collector current	I_{CES}	V_{CE} = 1350V, V_{GE} = 0V T_{vj} = 25°C T_{vj} = 175°C	- -	- -	100.0 2500.0	µA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = 20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE} = 20V, I_C = 20.0A	-	14.8	-	S
Integrated gate resistor	r_G			none		Ω

Electrical Characteristic, at T_{vj} = 25°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	-	1500	-	pF
Output capacitance	C_{oes}		-	55	-	
Reverse transfer capacitance	C_{res}		-	45	-	
Gate charge	Q_G	V_{CC} = 1080V, I_C = 20.0A, V_{GE} = 15V	-	195.0	-	nC

Switching Characteristic, Inductive Load, at T_{vj} = 25°C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	T_{vj} = 25°C, V_{CC} = 600V, I_C = 20.0A, V_{GE} = 0.0/15.0V, r_G = 15.0Ω, L_σ = 175nH, C_σ = 40pF L_σ, C_σ from Fig. E Energy losses include “tail” and diode reverse recovery.	-	335	-	ns
Fall time	t_f		-	50	-	ns
Turn-off energy	E_{off}		-	1.30	-	mJ

Switching Characteristic, Inductive Load, at T_{vj} = 175°C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	T_{vj} = 175°C, V_{CC} = 600V, I_C = 20.0A, V_{GE} = 0.0/15.0V, r_G = 15.0Ω, L_σ = 175nH, C_σ = 40pF L_σ, C_σ from Fig. E Energy losses include "tail" and diode reverse recovery.	-	405	-	ns
Fall time	t_f		-	100	-	ns
Turn-off energy	E_{off}		-	2.25	-	mJ

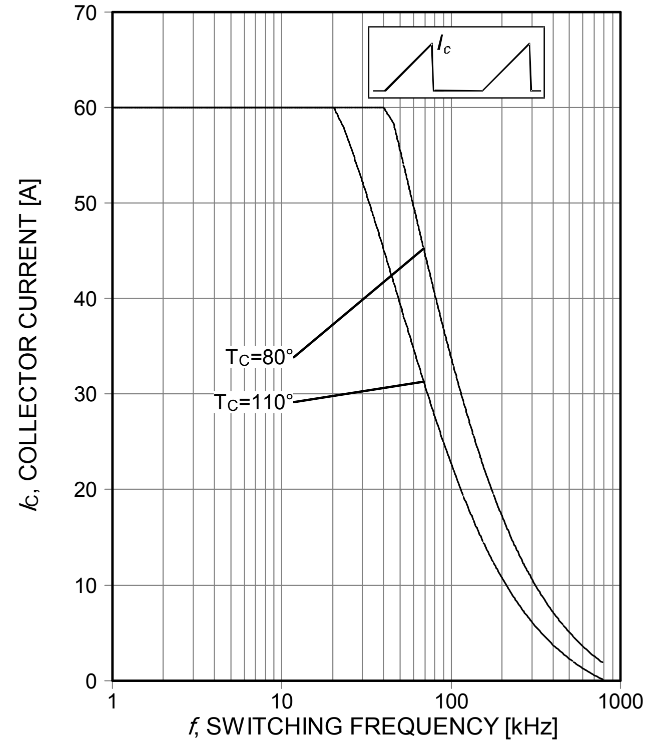


Figure 1. Collector current as a function of switching frequency
(T_{vj}≤175°C, D=0.5, V_{CE}=600V, V_{GE}=15/0V, r_G=15Ω)

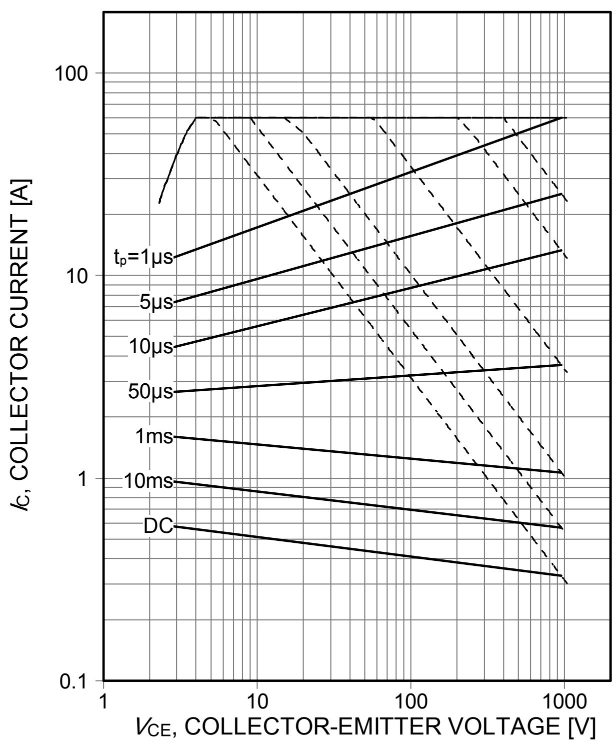


Figure 2. Forward bias safe operating area
(D=0, T_C=25°C, T_{vj}≤175°C; V_{GE}=15V)

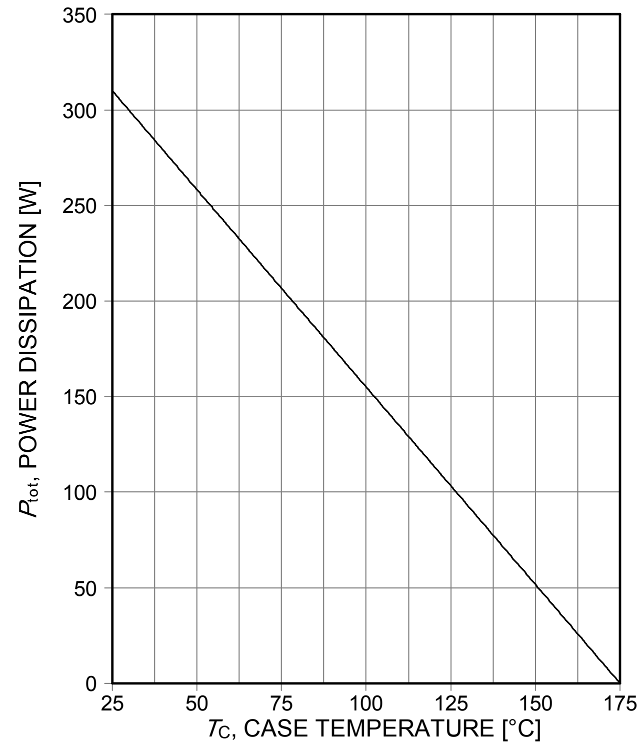


Figure 3. Power dissipation as a function of case temperature
(T_{vj}≤175°C)

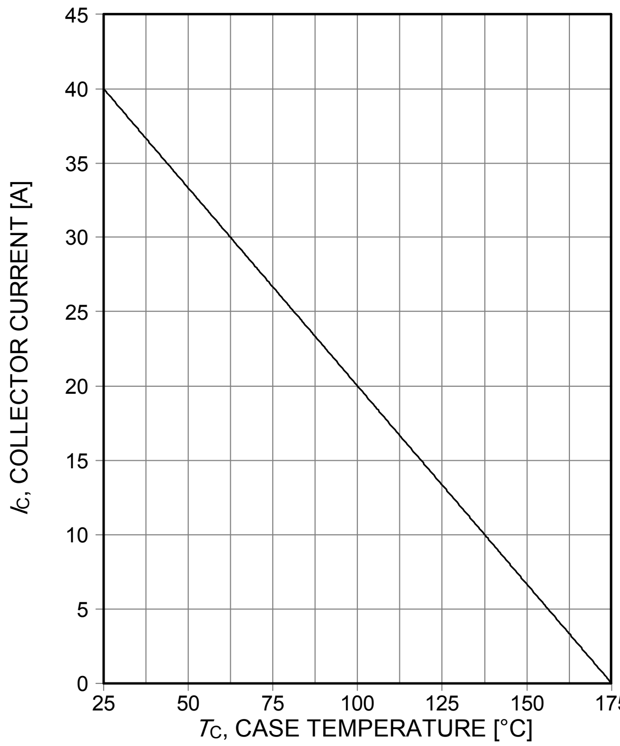


Figure 4. Collector current as a function of case temperature
(V_{GE}≥15V, T_{vj}≤175°C)

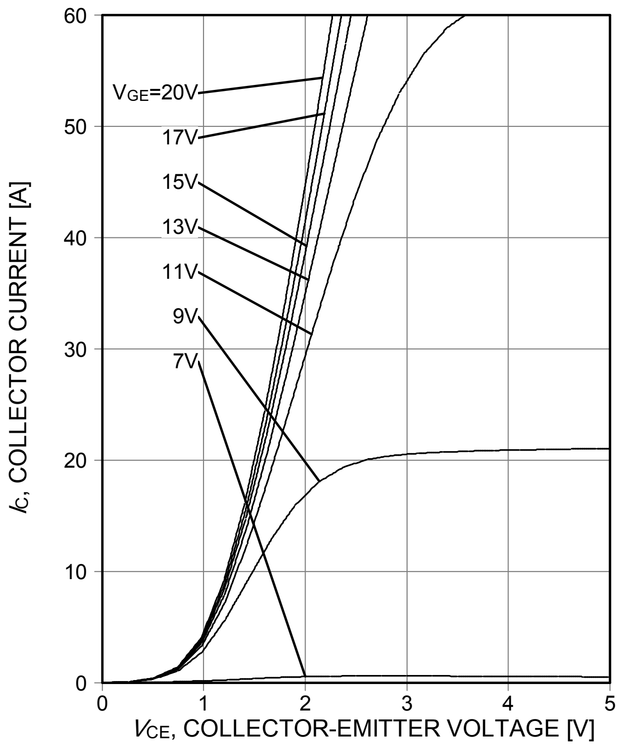


Figure 5. Typical output characteristic
(T_{vj}=25°C)

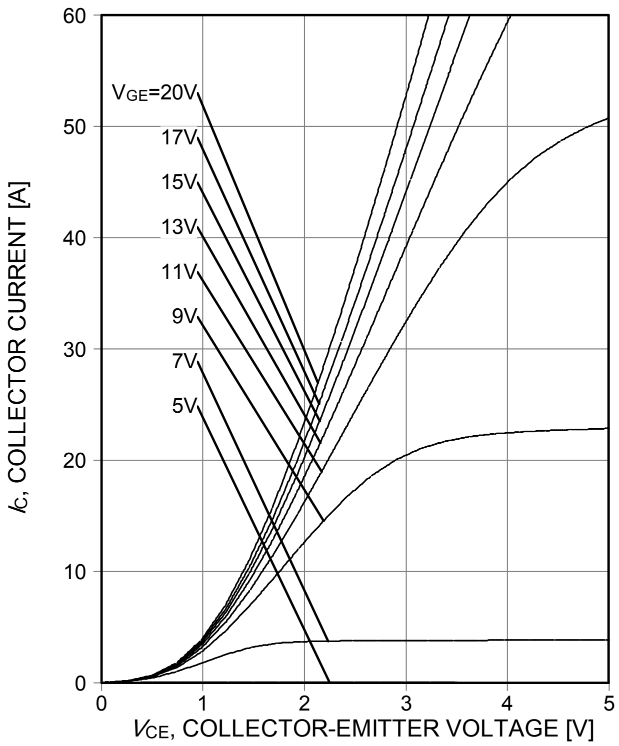


Figure 6. Typical output characteristic
(T_{vj}=175°C)

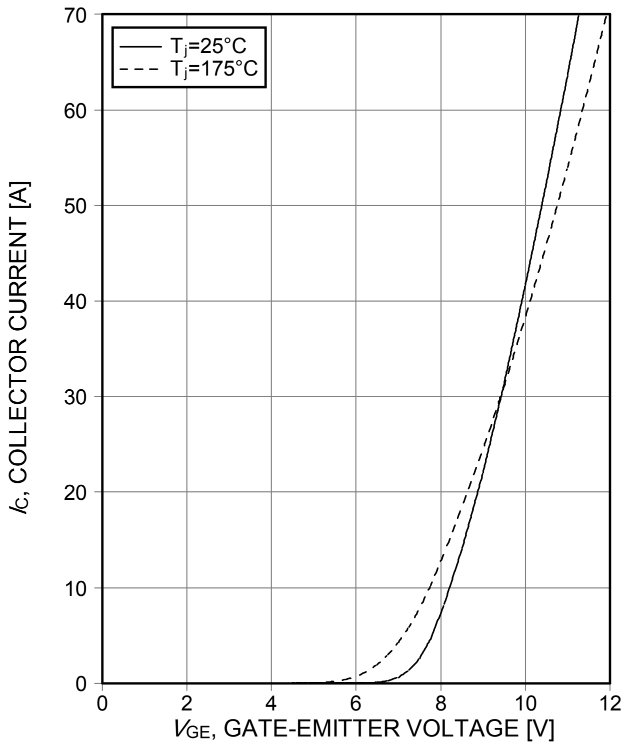


Figure 7. Typical transfer characteristic
(V_{CE}=20V)

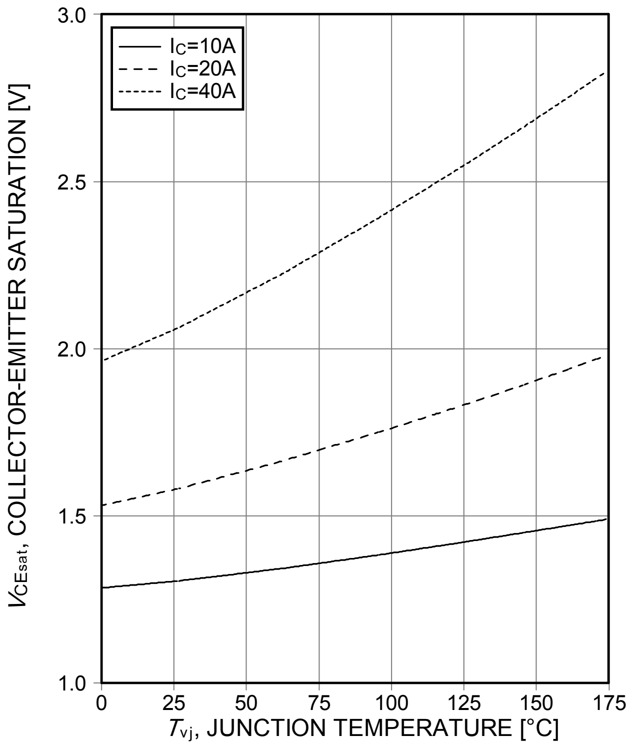


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE}=15V)

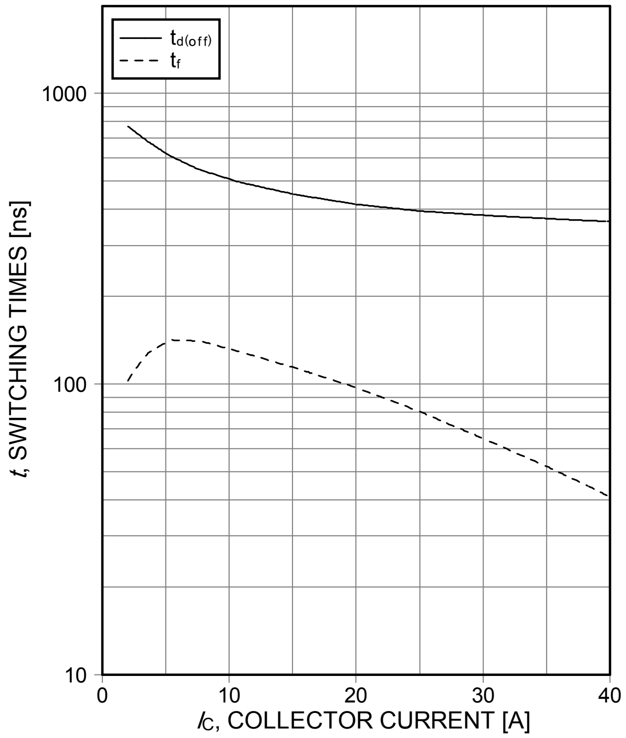


Figure 9. Typical switching times as a function of collector current
(inductive load, T_{vj}=175°C, V_{CE}=600V, V_{GE}=15/0V, r_G=15Ω, Dynamic test circuit in Figure E)

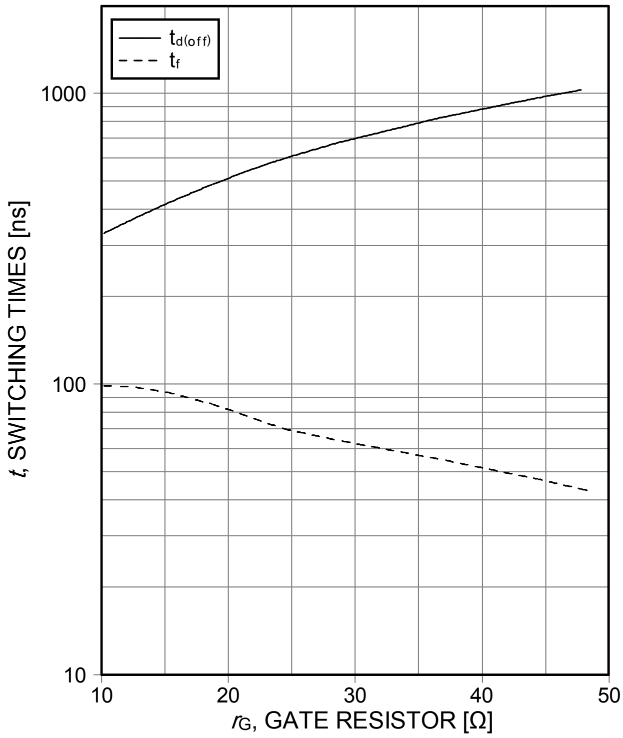


Figure 10. Typical switching times as a function of gate resistor
(inductive load, T_{vj}=175°C, V_{CE}=600V, V_{GE}=15/0V, I_C=20A,Dynamic test circuit in Figure E)

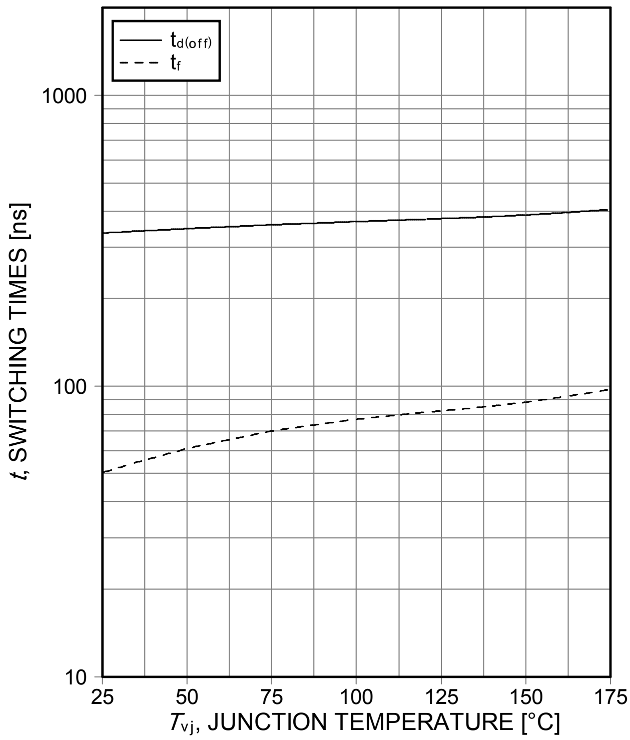


Figure 11. Typical switching times as a function of junction temperature
(inductive load, V_{CE}=600V, V_{GE}=15/0V, I_C=20A, r_G=15Ω,Dynamic test circuit in Figure E)

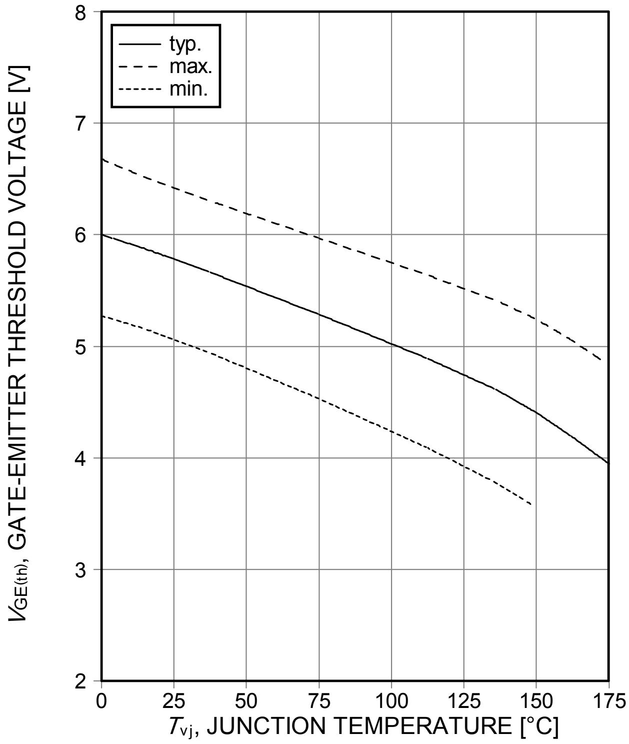


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
(I_C=0.5mA)

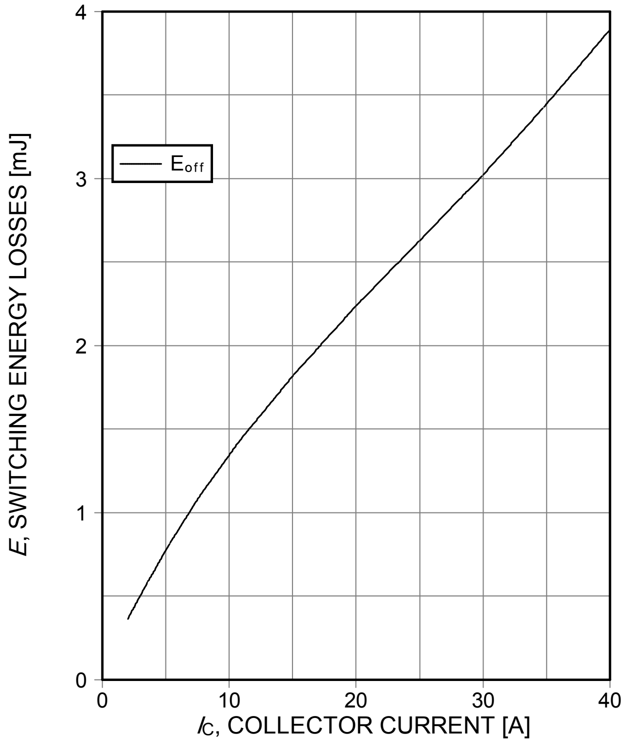


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, T_{vj}=175°C, V_{CE}=600V, V_{GE}=15/0V, r_G=15Ω,Dynamic test circuit in Figure E)

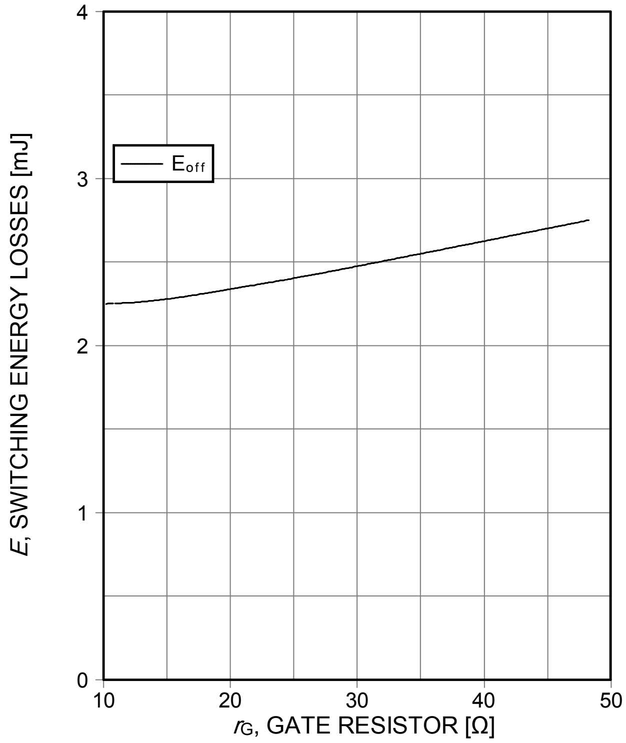


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, T_{vj}=175°C, V_{CE}=600V, V_{GE}=15/0V, I_C=20A, Dynamic test circuit in Figure E)

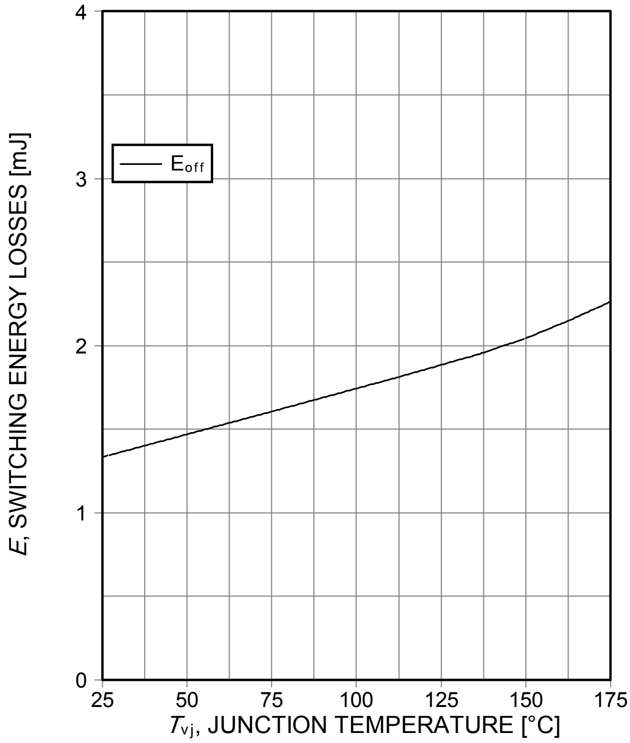


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, V_{CE}=600V, V_{GE}=15/0V, I_C=20A, r_G=15Ω,Dynamic test circuit in Figure E)

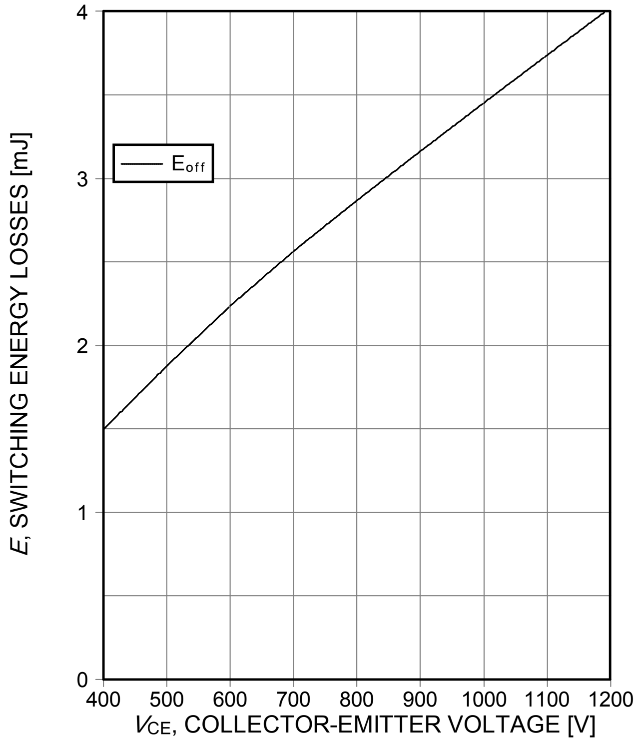


Figure 16. Typical switching energy losses as a function of collector emitter voltage
(inductive load, T_{vj}=175°C, V_{GE}=15/0V, I_C=20A, r_G=15Ω,Dynamic test circuit in Figure E)

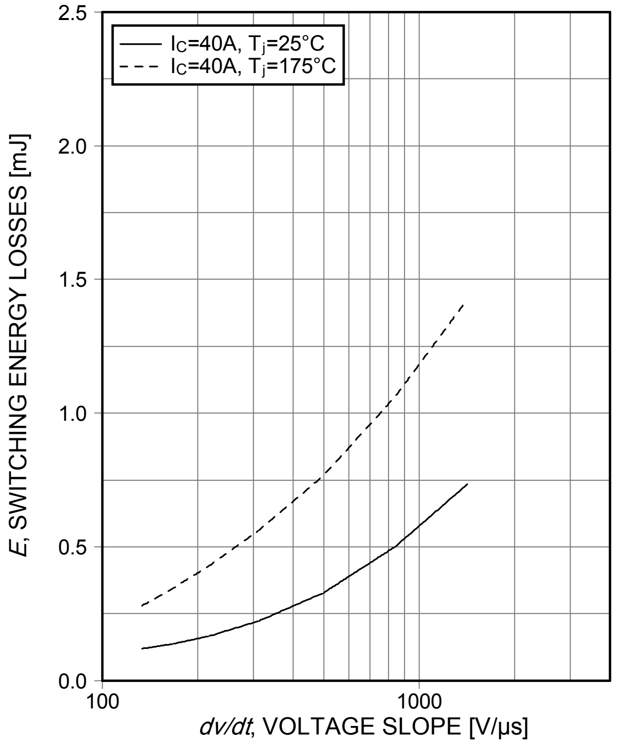


Figure 17. Typical turn off switching energy loss for soft switching
(inductive load, T_{vj}=175°C, V_{GE}=15/0V, I_C=20A, r_G=15Ω,Dynamic test circuit in Figure E)

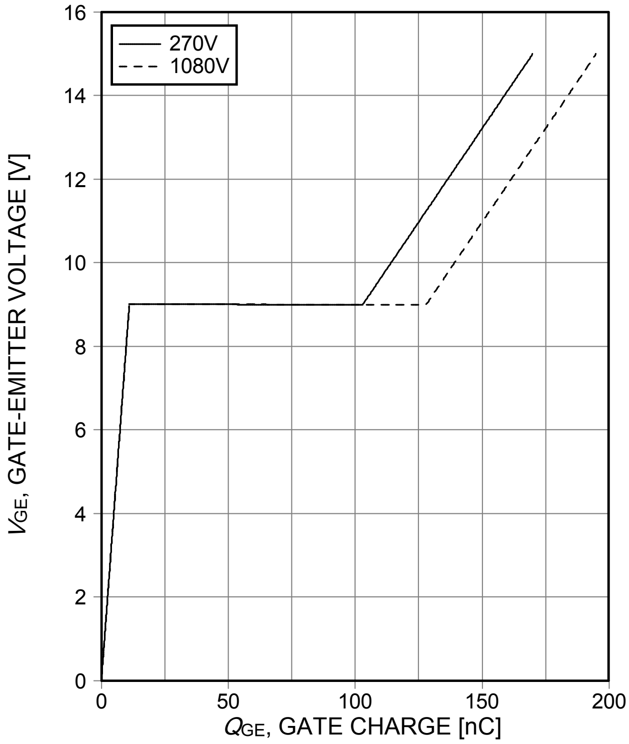


Figure 18. Typical gate charge
(I_C=20A)

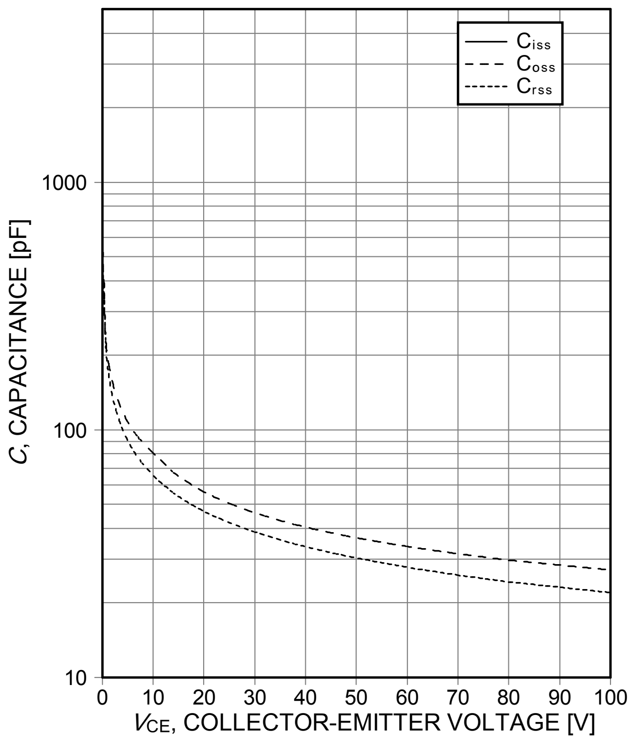


Figure 19. Typical capacitance as a function of collector-emitter voltage
(V_{GE}=0V, f=1MHz)

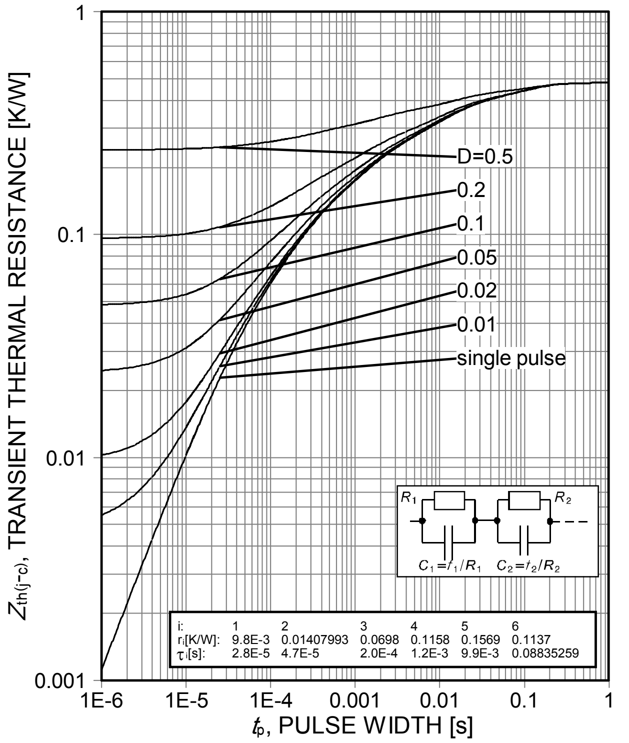


Figure 20. IGBT transient thermal resistance
(D=t_p/T)

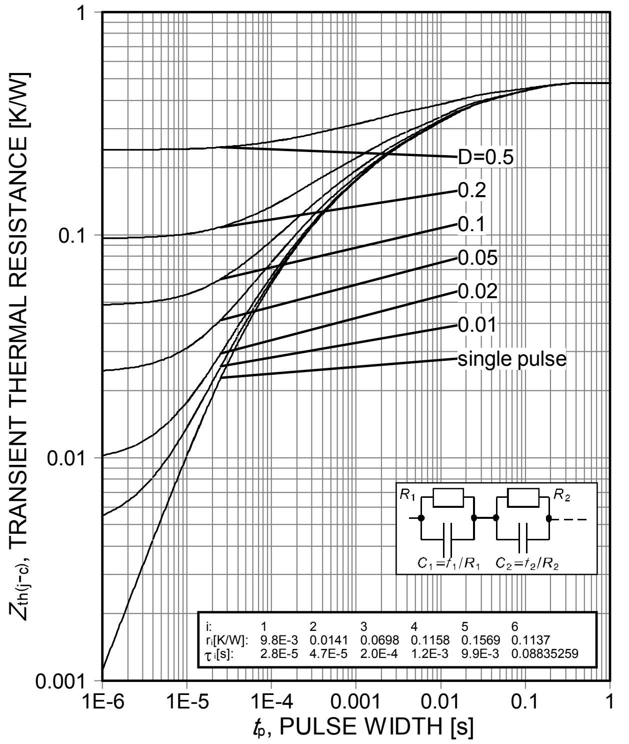


Figure 21. Diode transient thermal impedance as a function of pulse width (D=t_p/T)

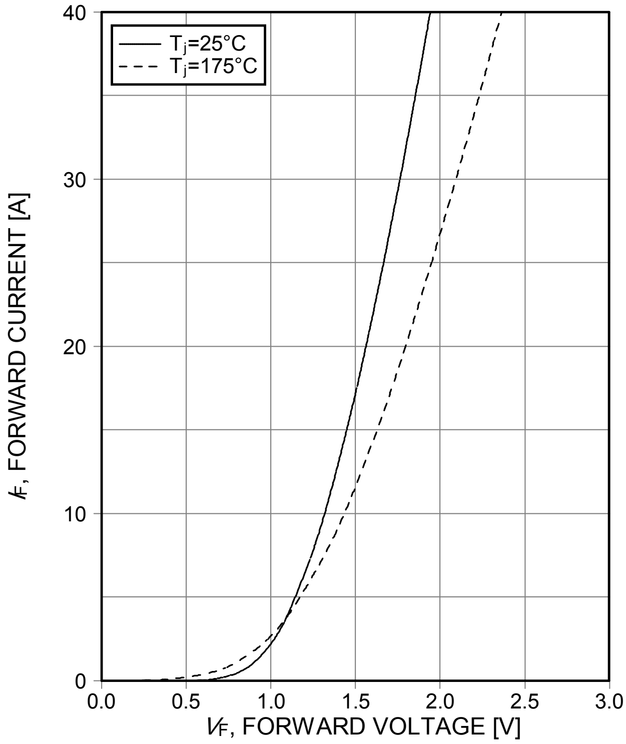


Figure 22. Typical diode forward current as a function of forward voltage

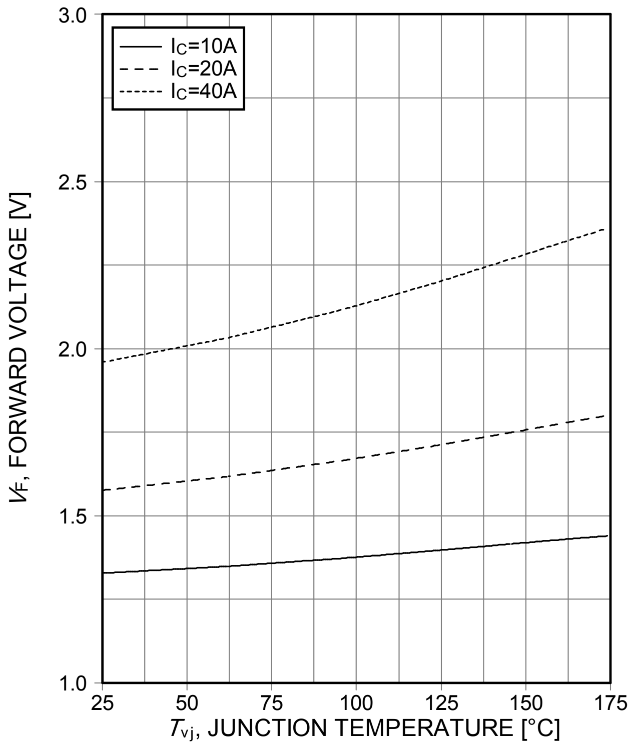
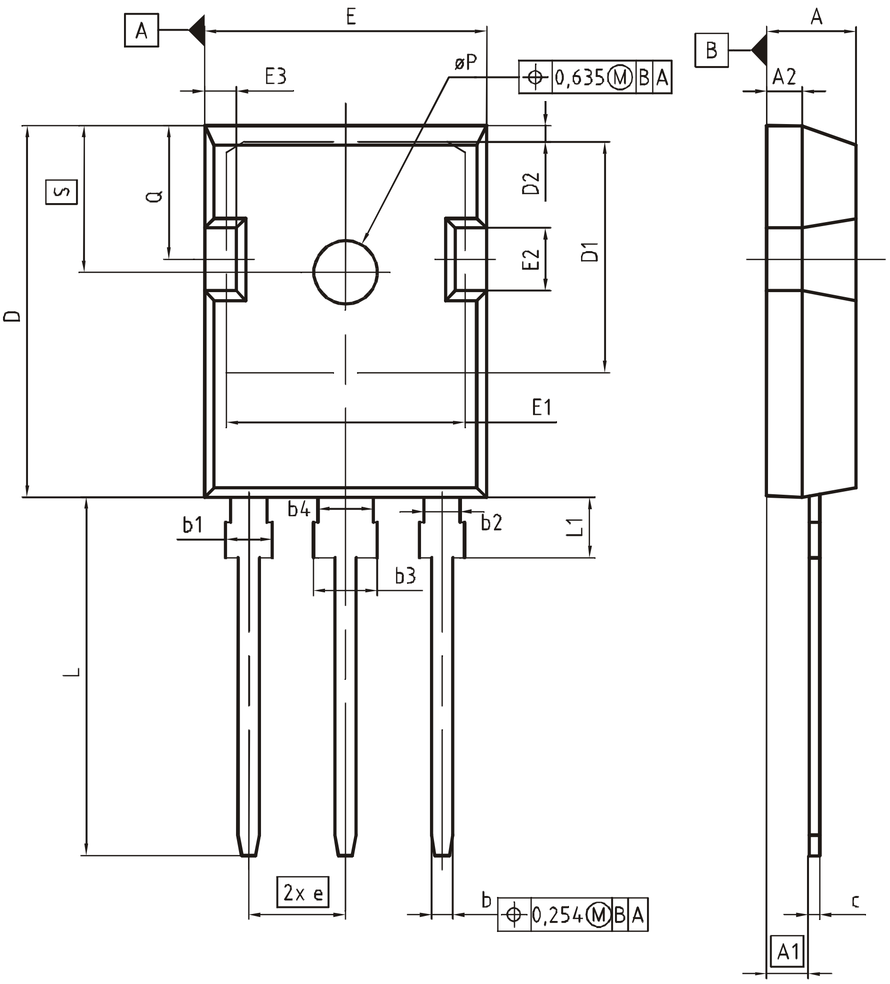


Figure 23. Typical diode forward voltage as a function of junction temperature

PG-TO247-3



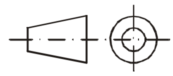
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	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

0 5 7.5mm

EUROPEAN PROJECTION



ISSUE DATE
09-07-2010

REVISION
05

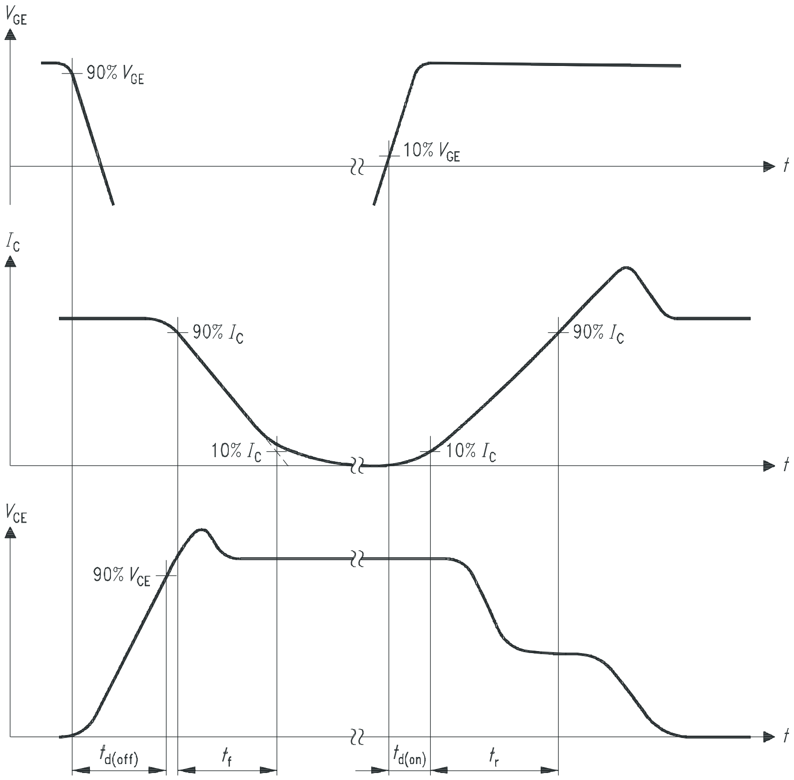
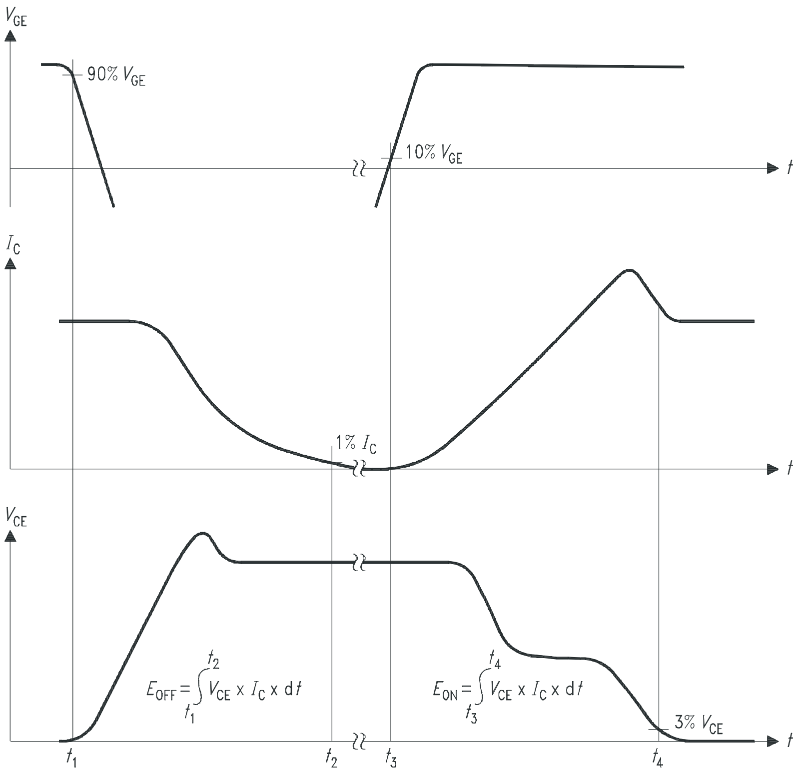


Figure A. Definition of switching times



$E_{OFF} = \int_{t_1}^{t_2} V_{CE} \times I_C \times dt$

$E_{ON} = \int_{t_3}^{t_4} V_{CE} \times I_C \times dt$

Figure B. Definition of switching losses

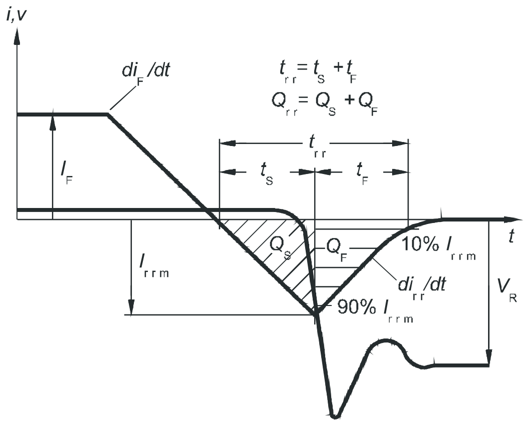


Figure C. Definition of diodes switching characteristics

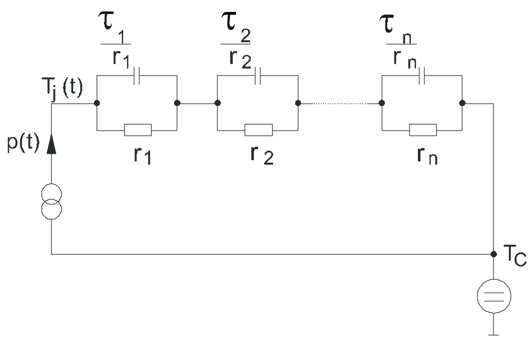


Figure D. Thermal equivalent circuit

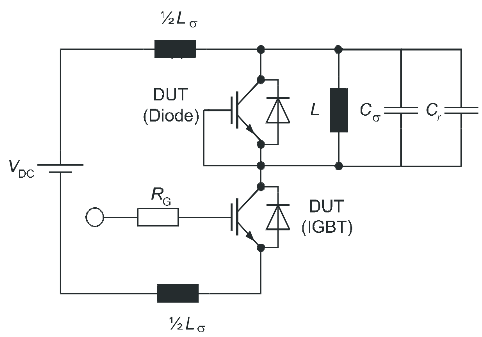


Figure E. Dynamic test circuit

Parasitic inductance L_σ,

Parasitic capacitor C_σ,

Relief capacitor C_r

(only for ZVT switching)

Revision History

IHW20N135R3

Revision: 2011-05-03, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.1	-	Final data sheet

We Listen to Your Comments
Any information within this document that you feel is wrong, unclear or missing at all ?
Your feedback will help us to continuously improve the quality of this document.
Please send your proposal (including a reference to this document) to: erratum@infineon.com

Published by
Infineon Technologies AG
81726 Munich, Germany
81726 München, Germany

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.
The Infineon Technologies component described in this Data Sheet may be used in life-support devices or systems and/or automotive, aviation and aerospace applications 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, automotive, aviation and aerospace 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.