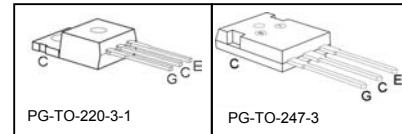
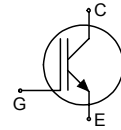


High Speed IGBT in NPT-technology

- 30% lower E_{off} compared to previous generation
- Short circuit withstand time – 10 μ s
- Designed for operation above 30 kHz
- NPT-Technology for 600V applications offers:
 - parallel switching capability
 - moderate E_{off} increase with temperature
 - very tight parameter distribution
- High ruggedness, temperature stable behaviour
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC¹ for target applications
- Complete product spectrum and PSpice Models : <http://www.infineon.com/igbt/>



Type	V_{CE}	I_C	E_{off}	T_j	Marking	Package
SGP20N60HS	600V	20	240 μ J	150°C	G20N60HS	PG-TO-220-3-1
SGW20N60HS	600V	20	240 μ J	150°C	G20N60HS	PG-TO-247-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	600	V
DC collector current	I_C		A
$T_C = 25^\circ\text{C}$		36	
$T_C = 100^\circ\text{C}$		20	
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	80	
Turn off safe operating area	-	80	
$V_{CE} \leq 600\text{V}$, $T_j \leq 150^\circ\text{C}$			
Avalanche energy single pulse	E_{AS}	115	mJ
$I_C = 20\text{A}$, $V_{CC} = 50\text{V}$, $R_{GE} = 25\Omega$ start $T_j = 25^\circ\text{C}$			
Gate-emitter voltage static	V_{GE}	± 20	V
transient ($t_p < 1\mu\text{s}$, $D < 0.05$)		± 30	
Short circuit withstand time ²⁾	t_{SC}	10	μs
$V_{GE} = 15\text{V}$, $V_{CC} \leq 600\text{V}$, $T_j \leq 150^\circ\text{C}$			
Power dissipation	P_{tot}	178	W
$T_C = 25^\circ\text{C}$			
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	$^\circ\text{C}$
Time limited operating junction temperature for $t < 150\text{h}$	$T_{j(tl)}$	175	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

¹ J-STD-020 and JESD-022

²⁾ Allowed number of short circuits: <1000; time between short circuits: >1s.

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.7	K/W
Thermal resistance, junction – ambient	R_{thJA}	PG-TO-220-3-1 PG-TO-247-3-21	62 40	

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

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=500\mu A$	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE} = 15V, I_C=20A$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$		2.8 3.5	3.15 4.00	
Gate-emitter threshold voltage	$V_{GE(th)}$	$I_C=500\mu A, V_{CE}=V_{GE}$	3	4	5	
Zero gate voltage collector current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	- -	- -	40 2500	μA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE}=20V, I_C=20A$	-	14		S

Dynamic Characteristic

Input capacitance	C_{iss}	$V_{CE}=25V,$	-	1100		pF
Output capacitance	C_{oss}	$V_{GE}=0V,$	-	105		
Reverse transfer capacitance	C_{rfs}	$f=1\text{MHz}$	-	64		
Gate charge	Q_{Gate}	$V_{CC}=480V, I_C=20A$ $V_{GE}=15V$	-	100		nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E	PG-TO-220-3-1 PG-TO-247-3-21	-	7 13		nH
Short circuit collector current ¹⁾	$I_{C(SC)}$	$V_{GE}=15V, t_{SC}\leq 10\mu s$ $V_{CC}\leq 600V,$ $T_j\leq 150^\circ\text{C}$	-	170		A

¹⁾ Allowed number of short circuits: <1000; time between short circuits: >1s.

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(\text{on})}$	$T_j=25^\circ\text{C}$, $V_{\text{CC}}=400\text{V}$, $I_{\text{C}}=20\text{A}$, $V_{\text{GE}}=0/15\text{V}$, $R_{\text{G}}=16\Omega$ $L_{\sigma}^{1)}=60\text{nH}$, $C_{\sigma}^{1)}=40\text{pF}$ Energy losses include "tail" and diode reverse recovery.	-	18		ns
Rise time	t_{r}		-	15		
Turn-off delay time	$t_{d(\text{off})}$		-	207		
Fall time	t_{f}		-	13		
Turn-on energy	E_{on}		-	0.39		mJ
Turn-off energy	E_{off}		-	0.30		
Total switching energy	E_{ts}		-	0.69		

Switching Characteristic, Inductive Load, at $T_j=150^\circ\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(\text{on})}$	$T_j=150^\circ\text{C}$ $V_{\text{CC}}=400\text{V}$, $I_{\text{C}}=20\text{A}$, $V_{\text{GE}}=0/15\text{V}$, $R_{\text{G}}=2.2\Omega$ $L_{\sigma}^{1)}=60\text{nH}$, $C_{\sigma}^{1)}=40\text{pF}$ Energy losses include "tail" and diode reverse recovery.	-	15		ns
Rise time	t_{r}		-	8.5		
Turn-off delay time	$t_{d(\text{off})}$		-	65		
Fall time	t_{f}		-	35		
Turn-on energy	E_{on}		-	0.46		mJ
Turn-off energy	E_{off}		-	0.24		
Total switching energy	E_{ts}		-	0.7		
Turn-on delay time	$t_{d(\text{on})}$	$T_j=150^\circ\text{C}$ $V_{\text{CC}}=400\text{V}$, $I_{\text{C}}=20\text{A}$, $V_{\text{GE}}=0/15\text{V}$, $R_{\text{G}}=16\Omega$ $L_{\sigma}^{1)}=60\text{nH}$, $C_{\sigma}^{1)}=40\text{pF}$ Energy losses include "tail" and diode reverse recovery.	-	17		ns
Rise time	t_{r}		-	13		
Turn-off delay time	$t_{d(\text{off})}$		-	222		
Fall time	t_{f}		-	13		
Turn-on energy	E_{on}		-	0.6		mJ
Turn-off energy	E_{off}		-	0.36		
Total switching energy	E_{ts}		-	0.96		

¹⁾ Leakage inductance L_{σ} and Stray capacity C_{σ} due to test circuit in Figure E.

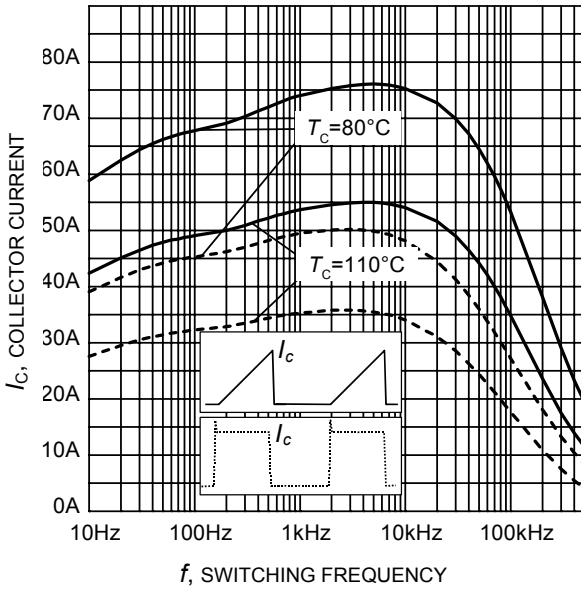


Figure 1. Collector current as a function of switching frequency
 ($T_j \leq 150^\circ\text{C}$, $D = 0.5$, $V_{CE} = 400\text{V}$,
 $V_{GE} = 0/+15\text{V}$, $R_G = 16\Omega$)

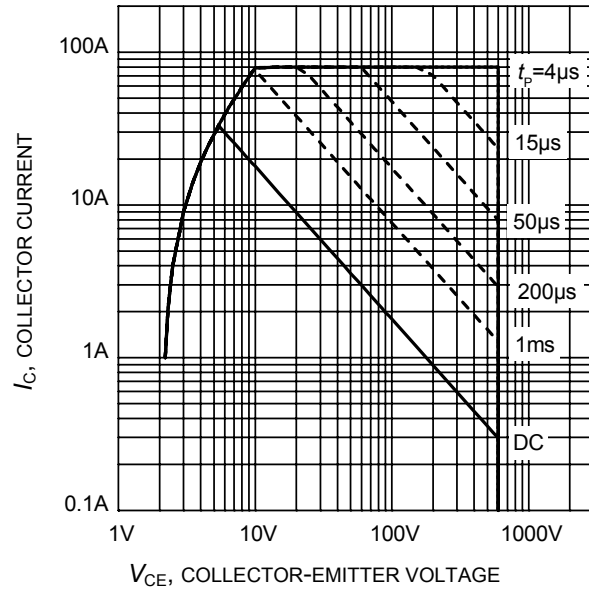


Figure 2. Safe operating area
 ($D = 0$, $T_C = 25^\circ\text{C}$,
 $T_j \leq 150^\circ\text{C}$; $V_{GE} = 15\text{V}$)

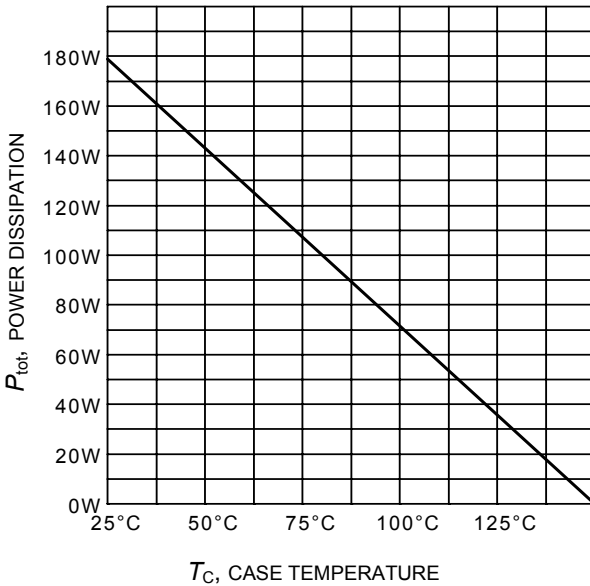


Figure 3. Power dissipation as a function of case temperature
 ($T_j \leq 150^\circ\text{C}$)

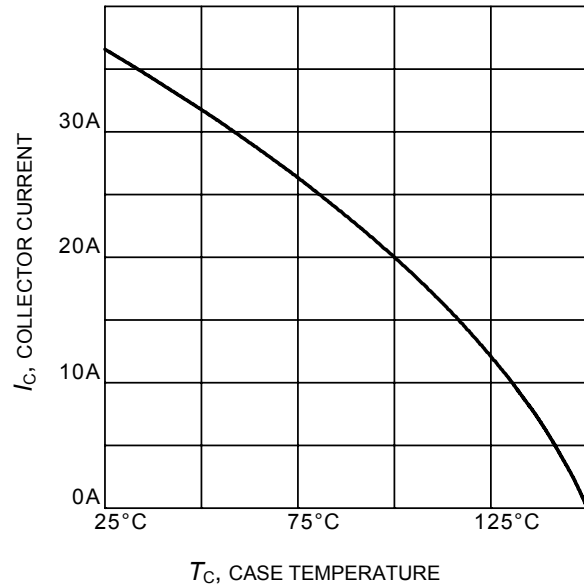


Figure 4. Collector current as a function of case temperature
 ($V_{GE} \leq 15\text{V}$, $T_j \leq 150^\circ\text{C}$)

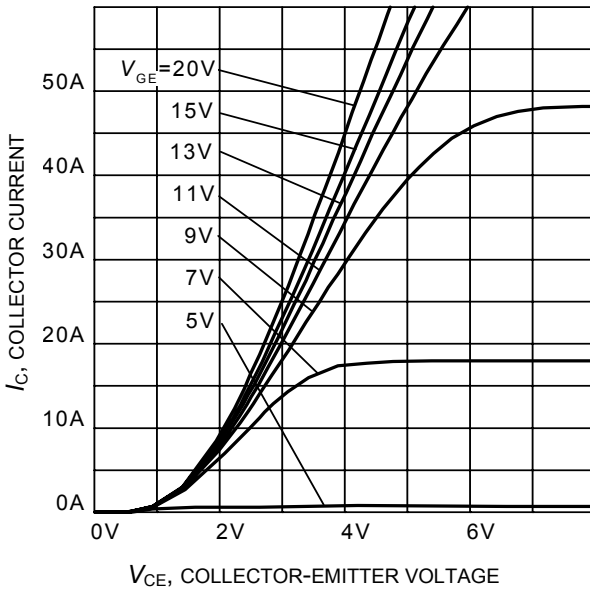


Figure 5. Typical output characteristic
($T_j = 25^\circ\text{C}$)

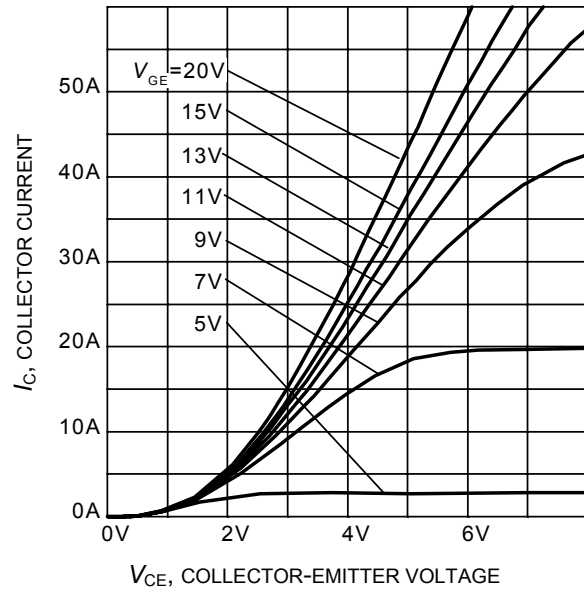


Figure 6. Typical output characteristic
($T_j = 150^\circ\text{C}$)

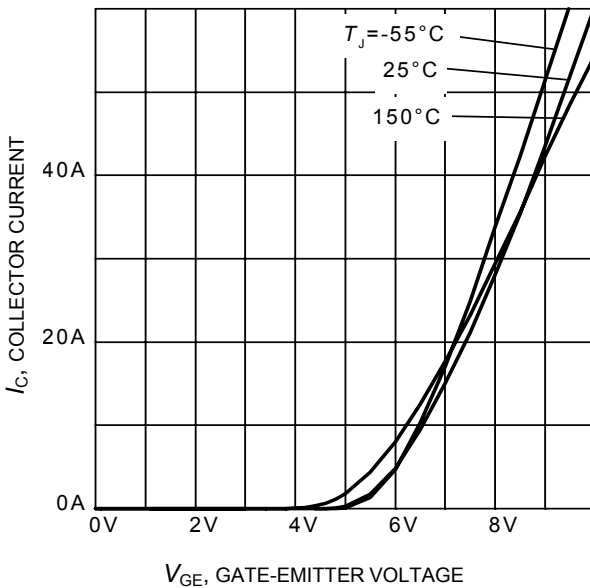


Figure 7. Typical transfer characteristic
($V_{CE} = 10\text{V}$)

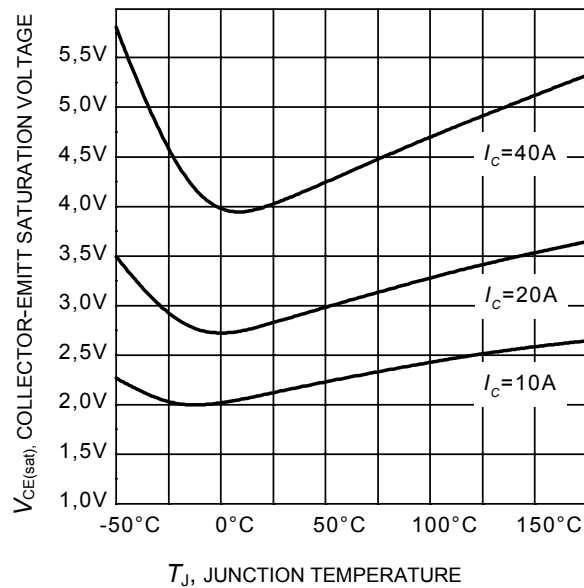


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
($V_{GE} = 15\text{V}$)

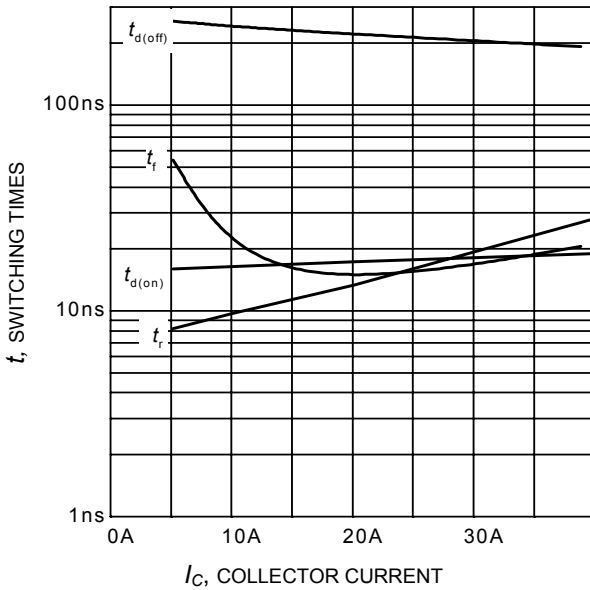


Figure 9. Typical switching times as a function of collector current
(inductive load, $T_J=150^\circ\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=16\Omega$,
Dynamic test circuit in Figure E)

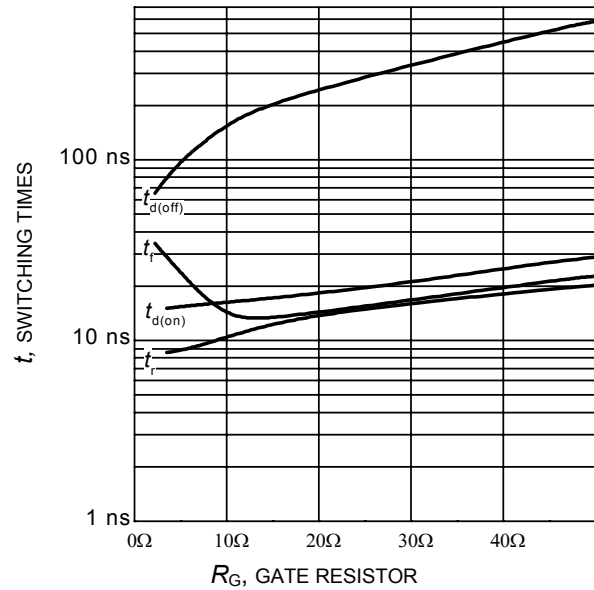


Figure 10. Typical switching times as a function of gate resistor
(inductive load, $T_J=150^\circ\text{C}$,
 $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=20\text{A}$,
Dynamic test circuit in Figure E)

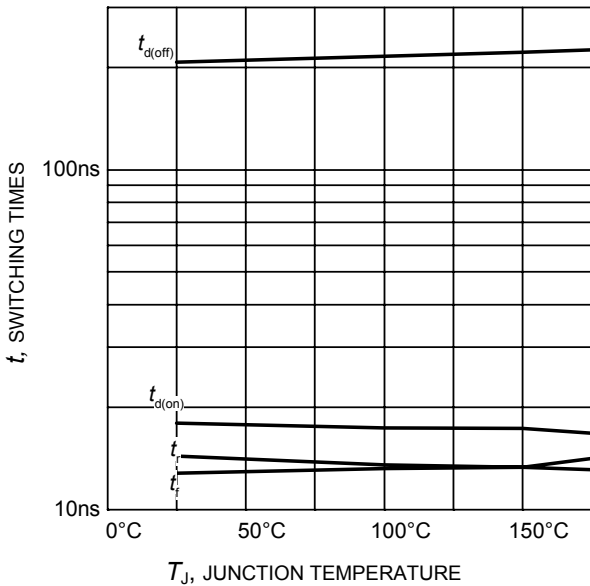


Figure 11. Typical switching times as a function of junction temperature
(inductive load, $V_{CE}=400\text{V}$,
 $V_{GE}=0/15\text{V}$, $I_C=20\text{A}$, $R_G=16\Omega$,
Dynamic test circuit in Figure E)

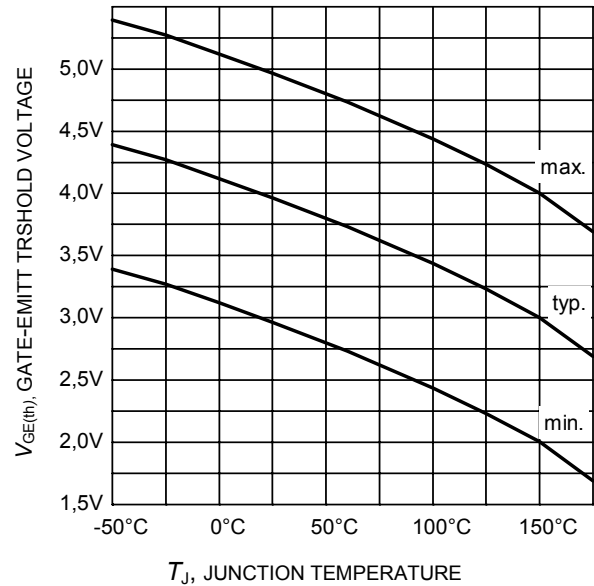


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
($I_C = 0.5\text{mA}$)

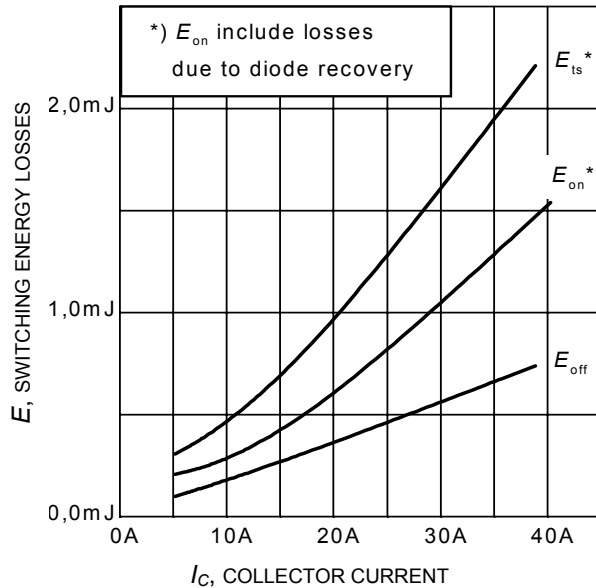


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, $T_J=150^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $R_G=16\Omega$, Dynamic test circuit in Figure E)

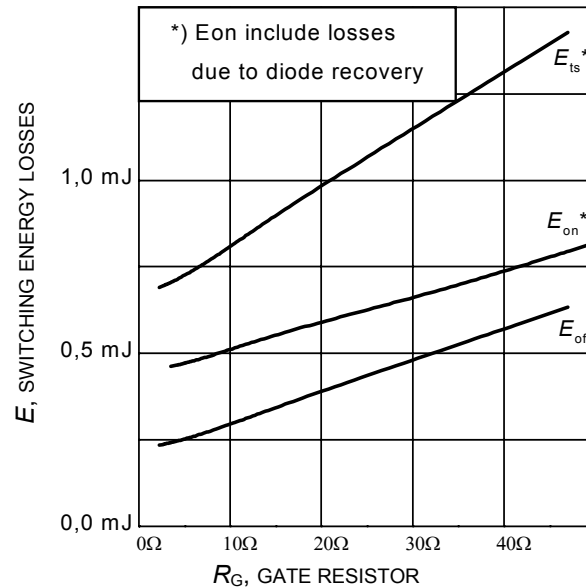


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, $T_J=150^\circ\text{C}$, $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=20\text{A}$, Dynamic test circuit in Figure E)

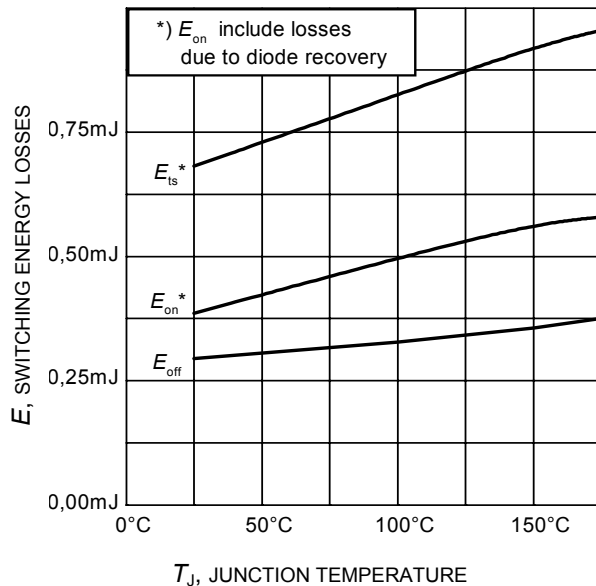


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, $V_{CE}=400\text{V}$, $V_{GE}=0/15\text{V}$, $I_C=20\text{A}$, $R_G=16\Omega$, Dynamic test circuit in Figure E)

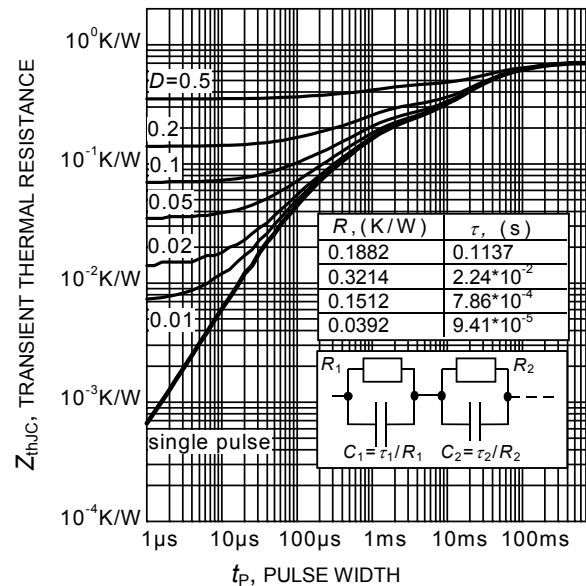


Figure 16. IGBT transient thermal resistance
($D = t_p / T$)

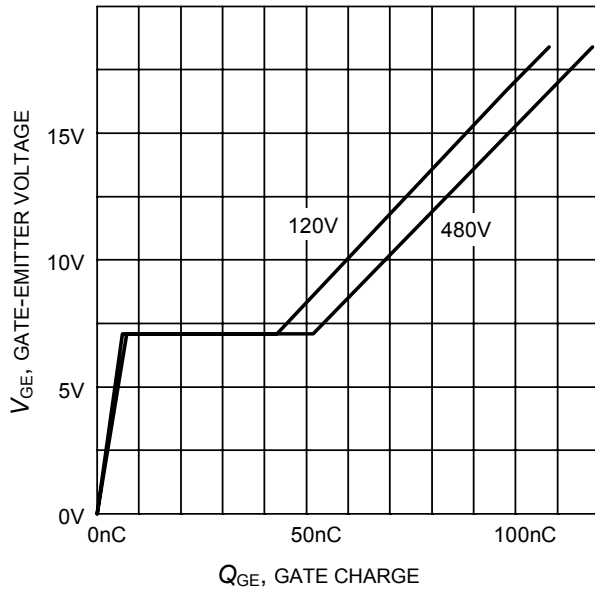


Figure 17. Typical gate charge
($I_C=20\text{ A}$)

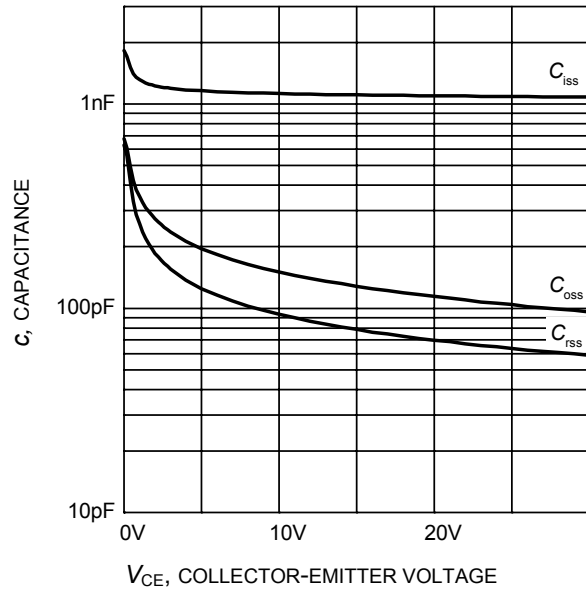


Figure 18. Typical capacitance as a function of collector-emitter voltage
($V_{GE}=0\text{V}$, $f=1\text{ MHz}$)

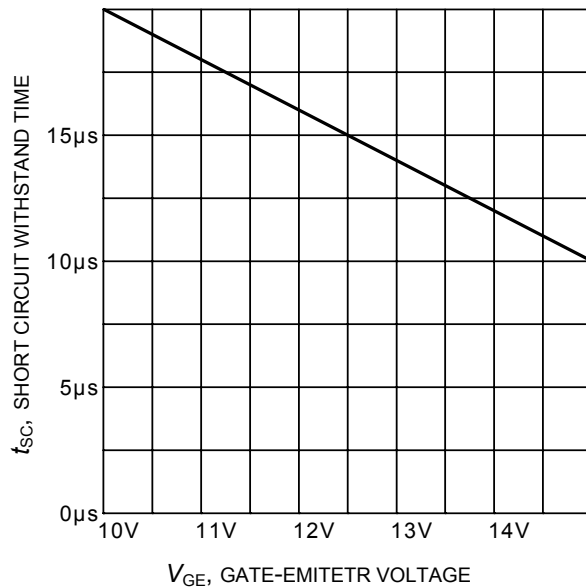


Figure 19. Short circuit withstand time as a function of gate-emitter voltage
($V_{CE}=600\text{V}$, start at $T_J=25^\circ\text{C}$)

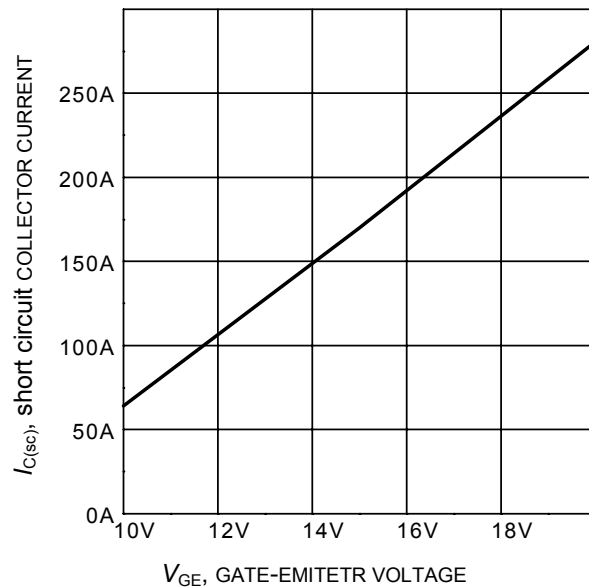
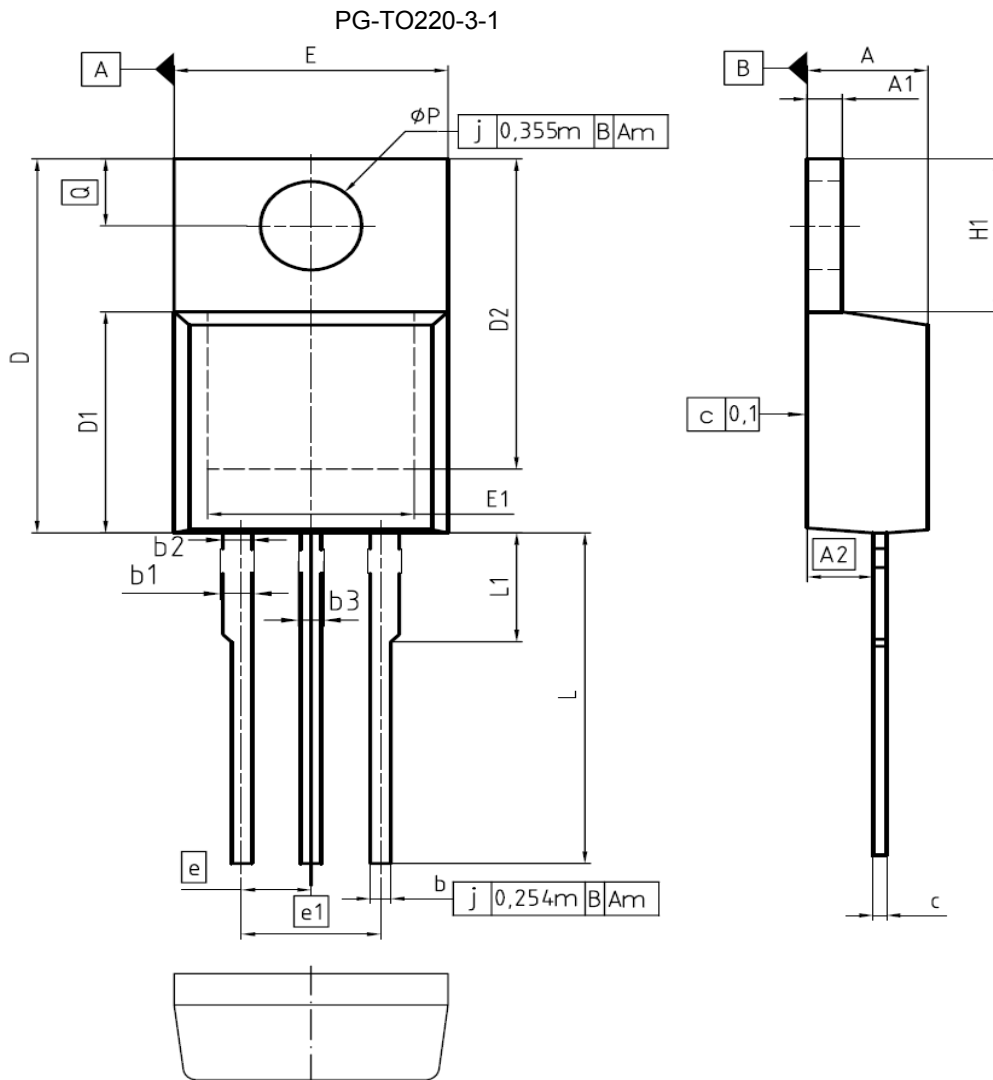


Figure 20. Typical short circuit collector current as a function of gate-emitter voltage
($V_{CE} \leq 600\text{V}$, $T_J \leq 150^\circ\text{C}$)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

DOCUMENT NO.
Z8B00003318

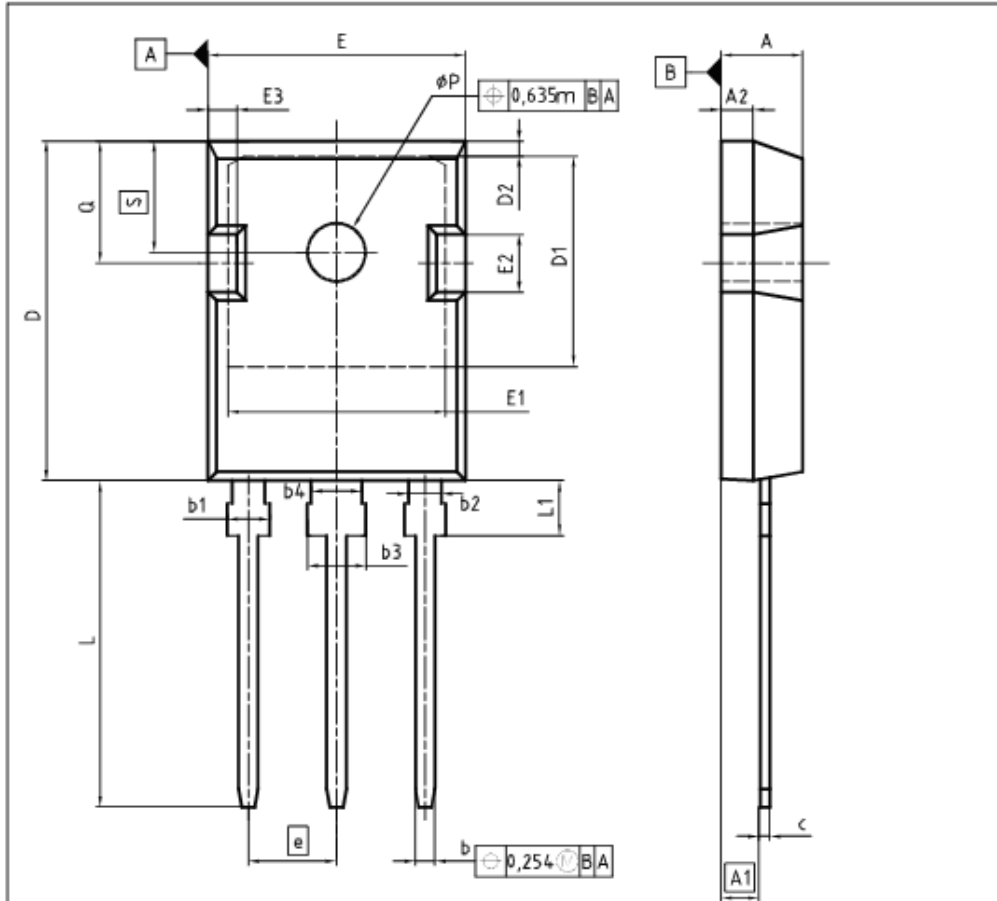
SCALE

EUROPEAN PROJECTION

ISSUE DATE
23-08-2007

REVISION
05

T0247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.180	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
ϕP	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.
Z8B0003327

SCALE

EUROPEAN PROJECTION

ISSUE DATE
01-10-2009

REVISION
04

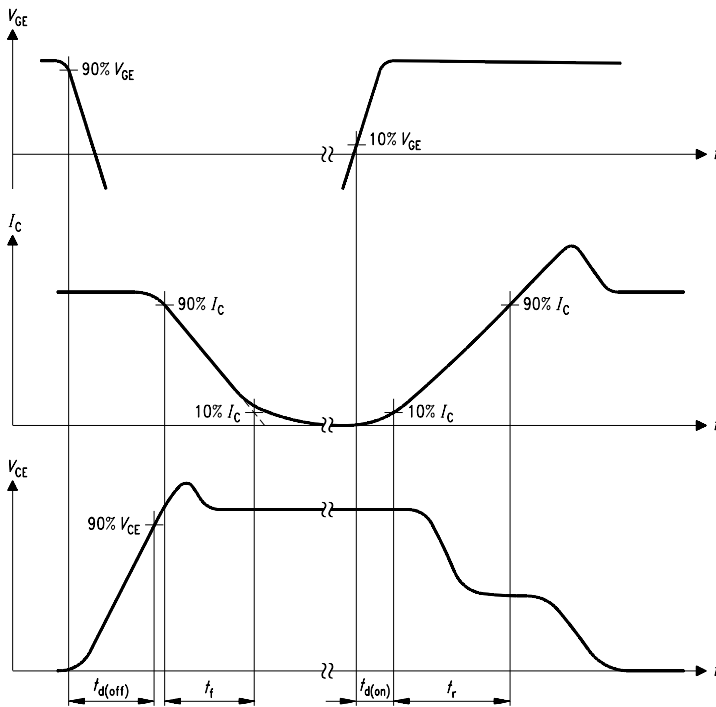


Figure A. Definition of switching times

SIS00053

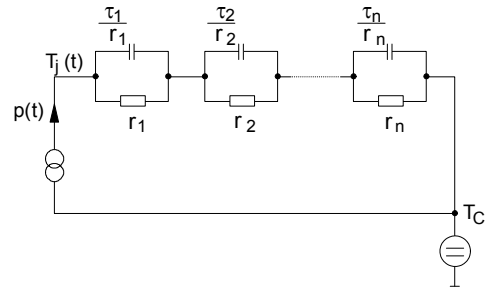


Figure D. Thermal equivalent circuit

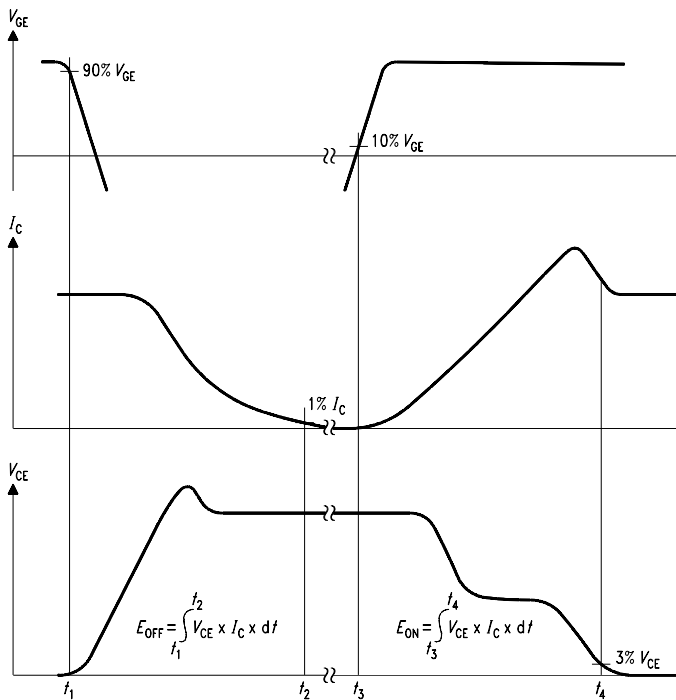


Figure B. Definition of switching losses

SIS

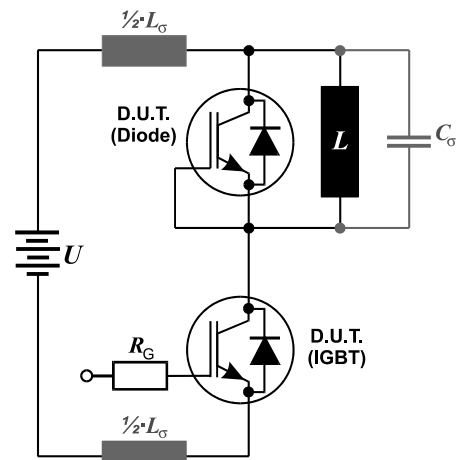


Figure E. Dynamic test circuit
Leakage inductance $L_{\sigma} = 60\text{nH}$
and Stray capacity $C_{\sigma} = 40\text{pF}$.

Published by
Infineon Technologies AG
81726 Munich, Germany
© 2008 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.



Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

Наши контакты:

Телефон: +7 812 627 14 35

Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург,
Промышленная ул, дом № 19, литера Н,
помещение 100-Н Офис 331