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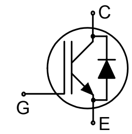
IHW25N120R2

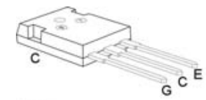
Soft Switching Series

Reverse Conducting IGBT with monolithic body diode

Features:

- Powerful monolithic Body Diode with very low forward voltage
- Body diode clamps negative voltages
- Trench and Fieldstop technology for 1200 V applications offers :
  - very tight parameter distribution
  - high ruggedness, temperature stable behavior
- NPT technology offers easy parallel switching capability due to positive temperature coefficient in $V_{CE(sat)}$
- Low EMI
- Qualified according to JEDEC[1] for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models : http://www.infineon.com/igbt/





PG-TO-247-3

Applications:

- Inductive Cooking
- Soft Switching Applications

Type	V_{CE}	I_C	$V_{CE(sat),Tj=25°C}$	$T_{j,max}$	Marking	Package
IHW25N120R2	1200V	25A	1.6V	175°C	H25R1202	PG-TO-247-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1200	V
DC collector current T_C = 25°C T_C = 100°C	I_C	 50 25	A
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	75	
Turn off safe operating area ($V_{CE} \leq$ 1200V, $T_j \leq$ 175°C)	-	75	
Diode forward current T_C = 25°C T_C = 100°C	I_F	 50 25	
Diode pulsed current, t_p limited by T_{jmax}	I_{Fpuls}	75	
Diode surge non repetitive current, t_p limited by T_{jmax} T_C = 25°C, t_p = 10ms, sine halfwave T_C = 25°C, $t_p \leq$ 2.5µs, sine halfwave T_C = 100°C, $t_p \leq$ 2.5µs, sine halfwave	I_{FSM}	 50 130 120	
Gate-emitter voltage Transient Gate-emitter voltage (t_p < 10 µs, D < 0.01)	V_{GE}	±20 ±25	V
Power dissipation T_C = 25°C	P_{tot}	365	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+175	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

[1] J-STD-020 and JESD-022

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.41	K/W
Diode thermal resistance, junction – case	R_{thJCD}		0.41	
Thermal resistance, junction – ambient	R_{thJA}		40	

Electrical Characteristic, at T_j = 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=500µA	1200	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C=25A				
		T_j=25°C	-	1.6	1.8	
		T_j=150°C	-	1.95	-	
		T_j=175°C	-	2.0	-	
Diode forward voltage	V_F	V_{GE}=0V, I_F=25A				
		T_j=25°C	-	1.5	1.75	
		T_j=150°C	-	1.75	-	
		T_j=175°C	-	1.8	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=0.58mA, V_{CE}=V_{GE}	5.1	5.8	6.4	
Zero gate voltage collector current	I_{CES}	V_{CE}=1200V, V_{GE}=0V				µA
		T_j=25°C	-	-	4	
		T_j=175°C	-	-	2500	
Gate-emitter leakage current	I_{GES}	V_{CE}=0V,V_{GE}=20V	-	-	100	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=25A	-	16.3	-	S
Integrated gate resistor	R_{Gint}			none		Ω

Dynamic Characteristic

Input capacitance	C_{iss}	V_{CE}=25V, V_{GE}=0V, f=1MHz	-	2342	-	pF
Output capacitance	C_{oss}		-	68.7	-	
Reverse transfer capacitance	C_{rss}		-	55.5	-	
Gate charge	Q_{Gate}	V_{CC}=960V, I_C=25A V_{GE}=15V	-	60.7	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH

Switching Characteristic, Inductive Load, at T_j=25 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	T_j=25°C, V_{CC}=600V, I_C=25A V_{GE}=0 /15V, R_G=10Ω,	-	324	-	ns
Fall time	t_f		-	55.8	-	
Turn-on energy	E_{on}		-	-	-	
Turn-off energy	E_{off}		-	1.59	-	
Total switching energy	E_{ts}		-	1.59	-	mJ

Switching Characteristic, Inductive Load, at T_j=175 °C

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
IGBT Characteristic						
Turn-off delay time	$t_{d(off)}$	T_j=175°C V_{CC}=600V, I_C=25A, V_{GE}= 0 /15V, R_G= 10Ω,	-	373	-	ns
Fall time	t_f		-	90.6	-	
Turn-on energy	E_{on}		-	-	-	
Turn-off energy	E_{off}		-	2.54	-	
Total switching energy	E_{ts}		-	2.54	-	mJ

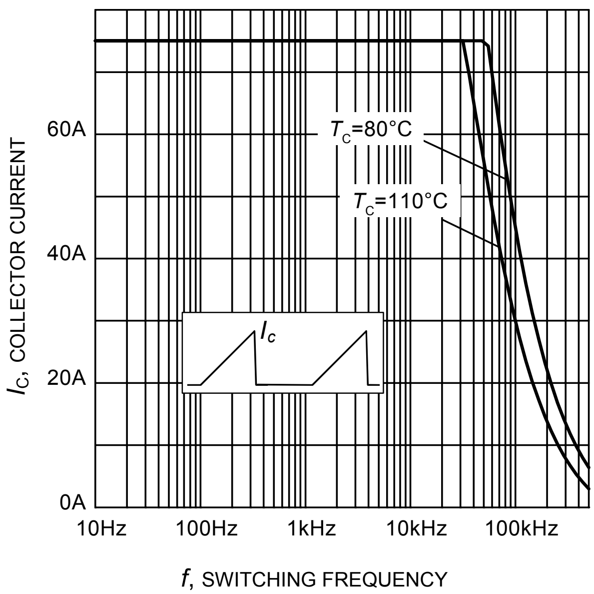


Figure 1. Collector current as a function of switching frequency for hard switching (turn-off)
($T_j \leq 175°C$, $D = 0.5$, $V_{CE} = 600V$, $V_{GE} = 0/+15V$, $R_G = 10\Omega$)

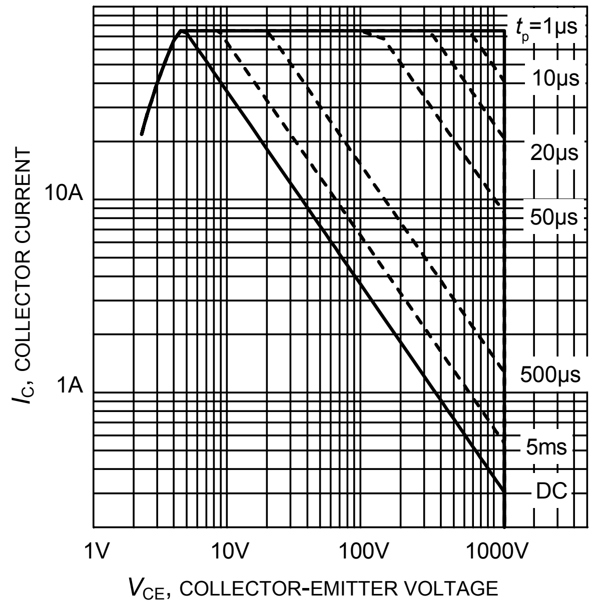


Figure 2. IGBT Safe operating area
($D = 0$, $T_C = 25°C$, $T_j \leq 175°C$; V_{GE}=15V)

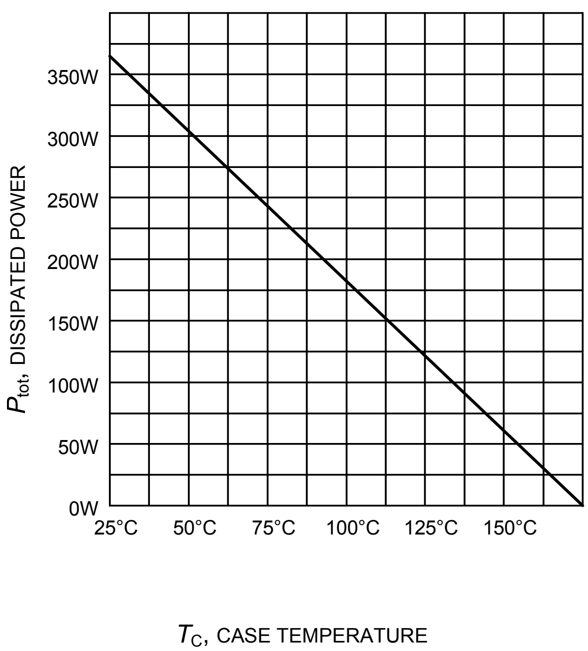


Figure 3. Power dissipation as a function of case temperature
($T_j \leq 175°C$)

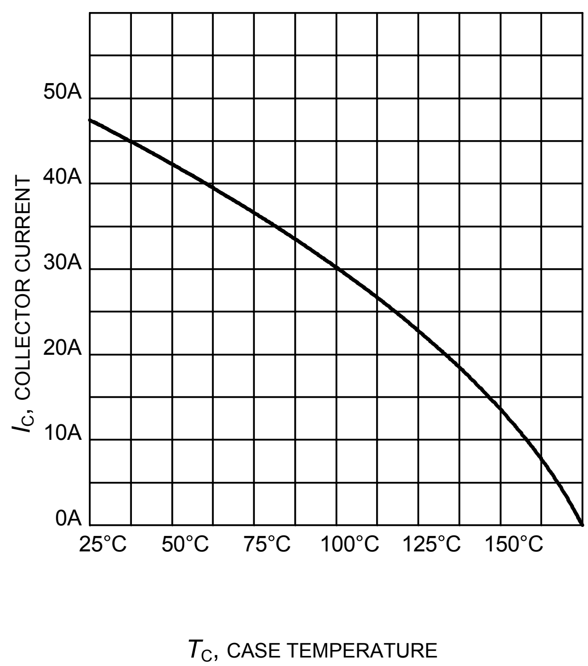


Figure 4. DC Collector current as a function of case temperature
($V_{GE} \geq 15V$, $T_j \leq 175°C$)

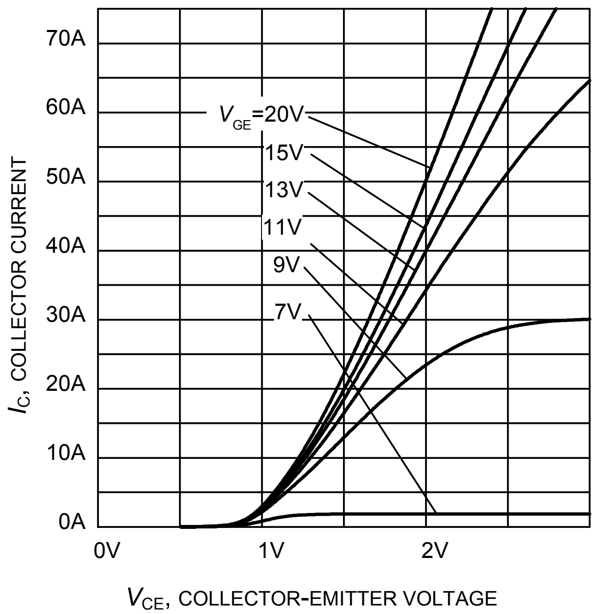


Figure 5. Typical output characteristic
(T_j = 25°C)

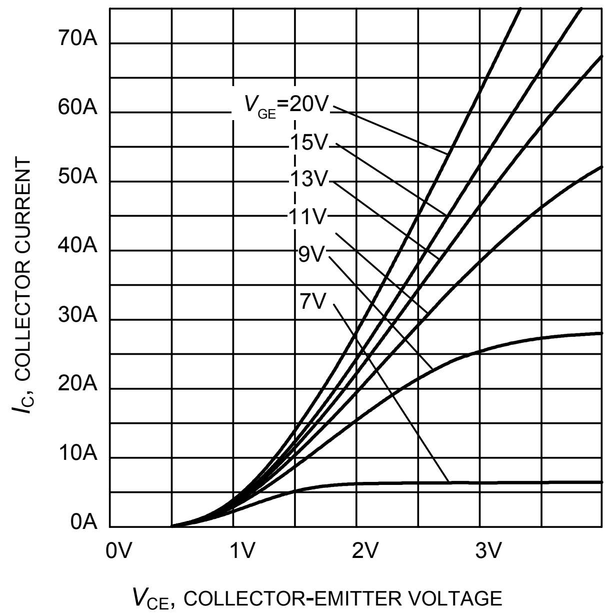


Figure 6. Typical output characteristic
(T_j = 175°C)

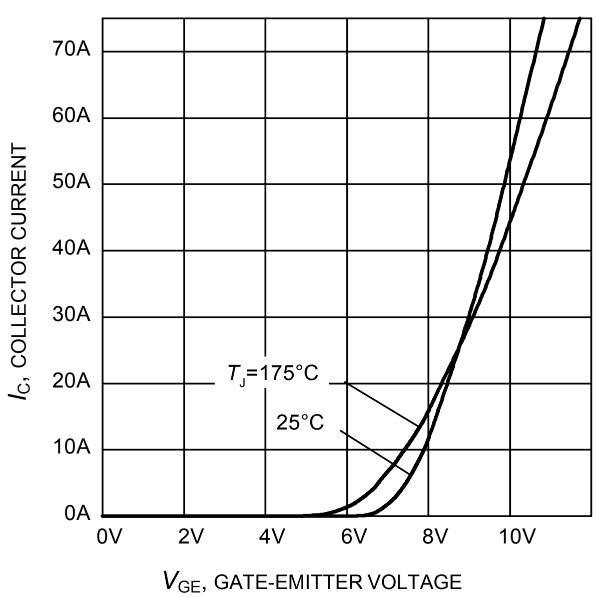


Figure 7. Typical transfer characteristic
(V_{CE}=20V)

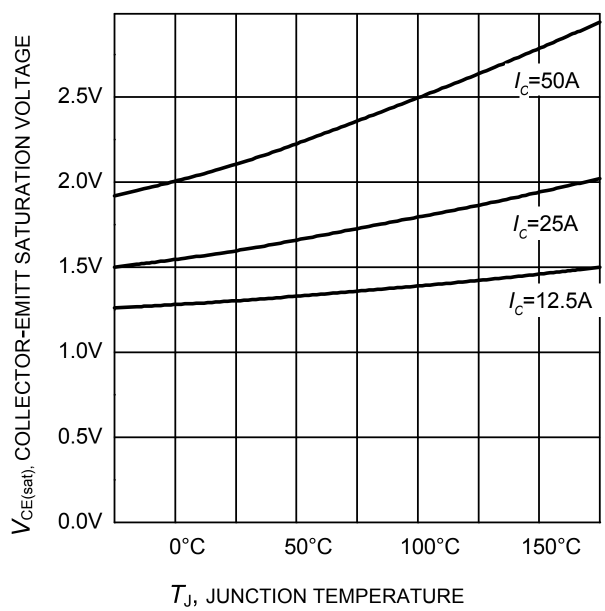


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE} =15V)

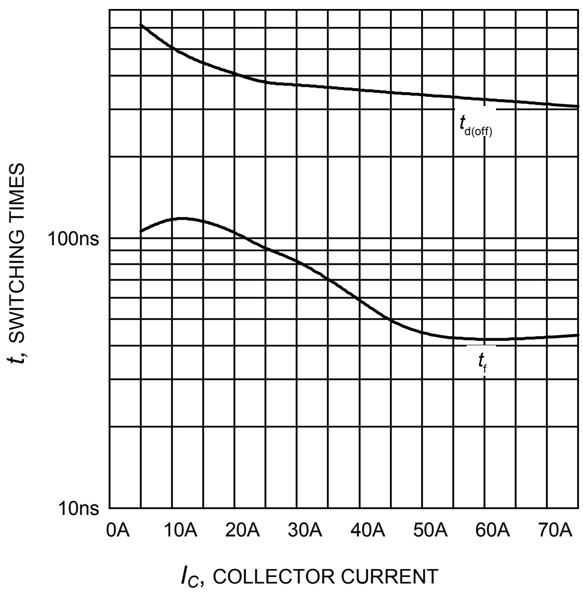


Figure 9. Typical switching times as a function of collector current
(inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, R_G=10Ω, Dynamic test circuit in Figure E)

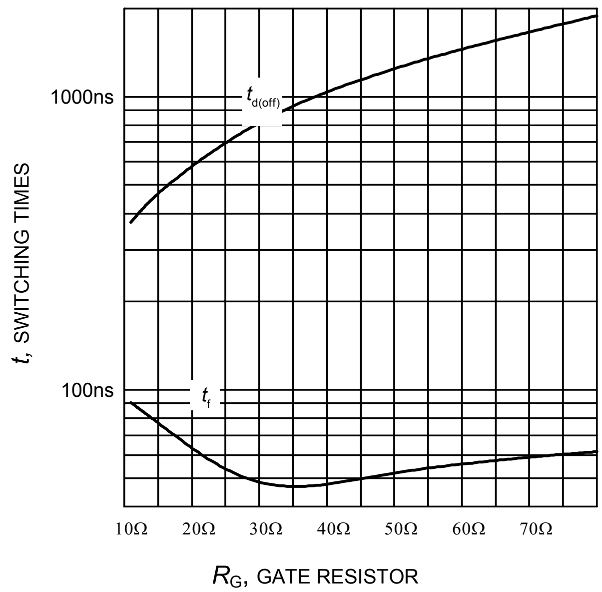


Figure 10. Typical switching times as a function of gate resistor
(inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, Dynamic test circuit in Figure E)

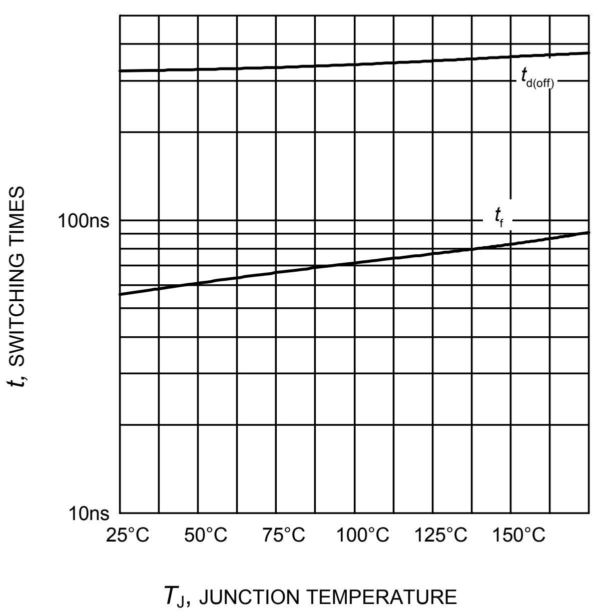


Figure 11. Typical switching times as a function of junction temperature
(inductive load, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, R_G=10Ω, Dynamic test circuit in Figure E)

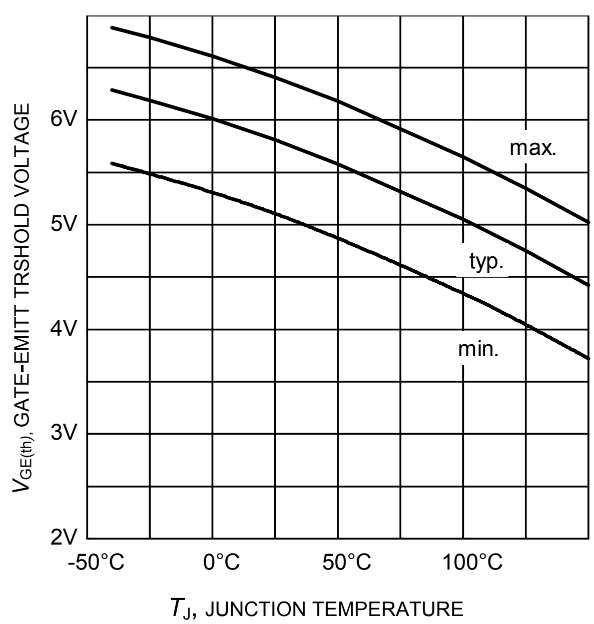


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
(I_C = 0.6mA)

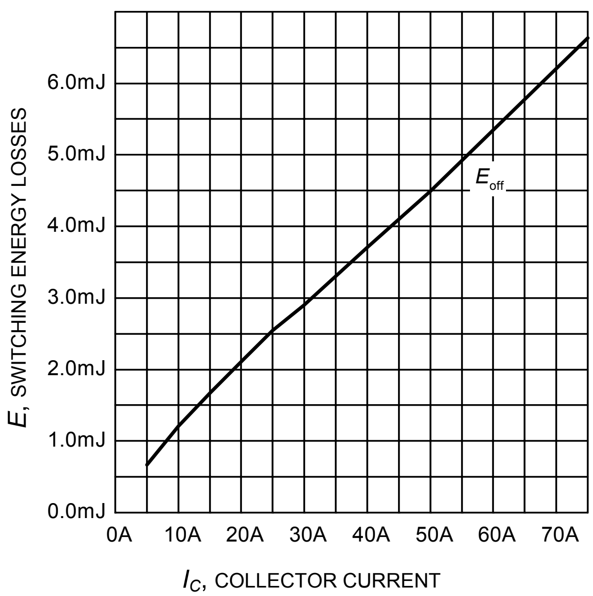


Figure 13. Typical turn-off energy as a function of collector current
(inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, R_G=10Ω, Dynamic test circuit in Figure E)

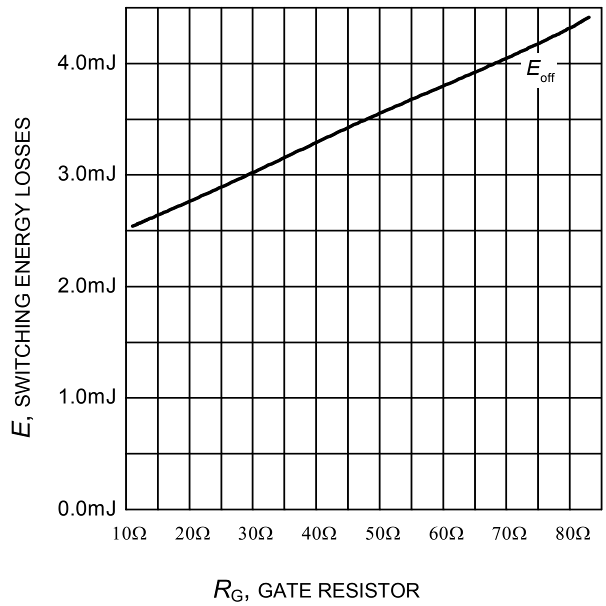


Figure 14. Typical turn-off energy as a function of gate resistor
(inductive load, T_J=175°C, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, Dynamic test circuit in Figure E)

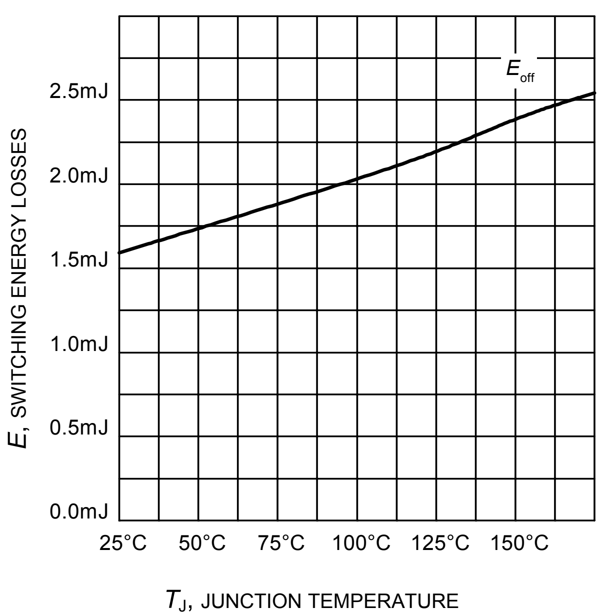


Figure 15. Typical turn-off energy as a function of junction temperature
(inductive load, V_{CE}=600V, V_{GE}=0/15V, I_C=25A, R_G=10Ω, Dynamic test circuit in Figure E)

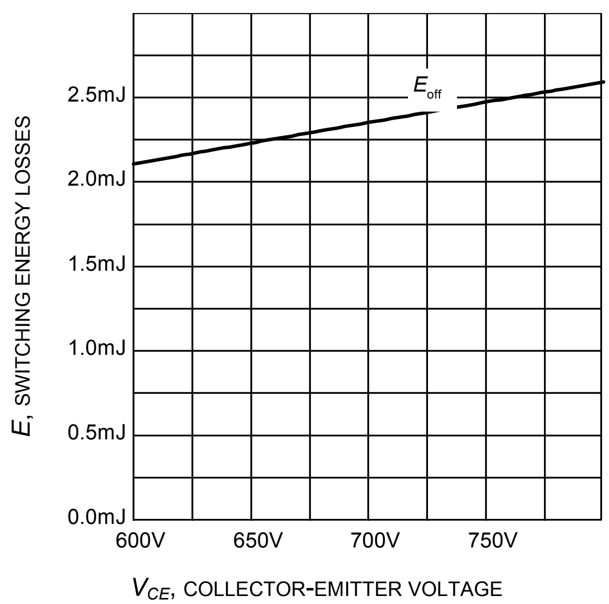


Figure 16. Typical turn-off energy as a function of collector emitter voltage
(inductive load, T_J=175°C, V_{GE}=0/15V, I_C=20A, R_G=10Ω, Dynamic test circuit in Figure E)

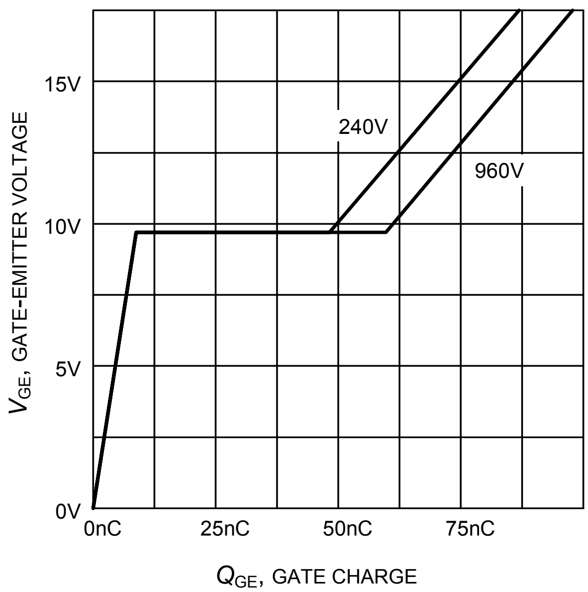


Figure 17. Typical gate charge
(I_C=25 A)

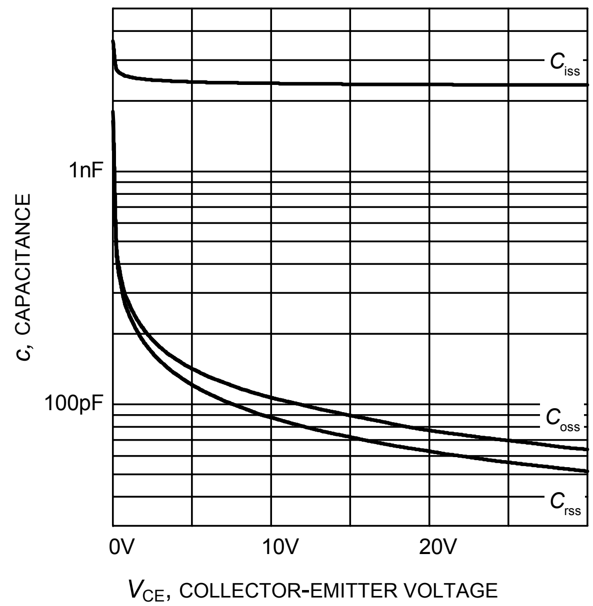


Figure 18. Typical capacitance as a function of collector-emitter voltage
(V_{GE}=0V, f = 1 MHz)

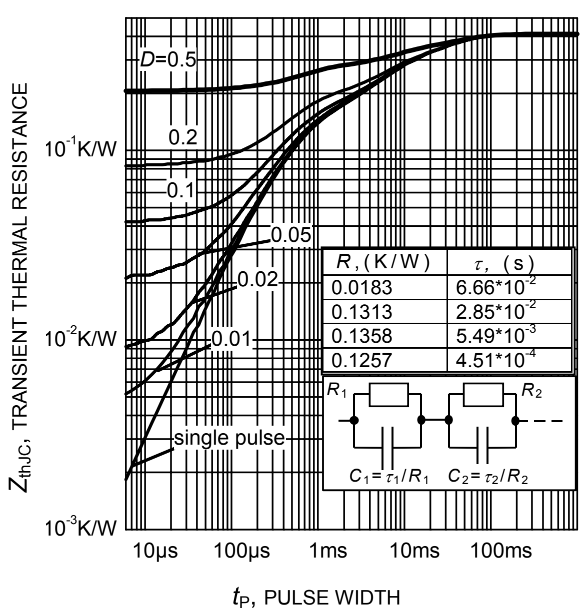


Figure 19. IGBT transient thermal resistance
($D = t_p / T$)

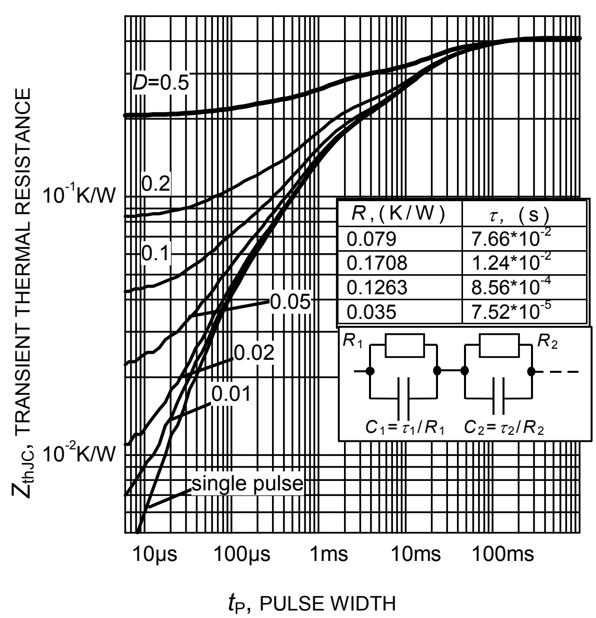


Figure 20. Diode transient thermal impedance as a function of pulse width
($D=t_P/T$)

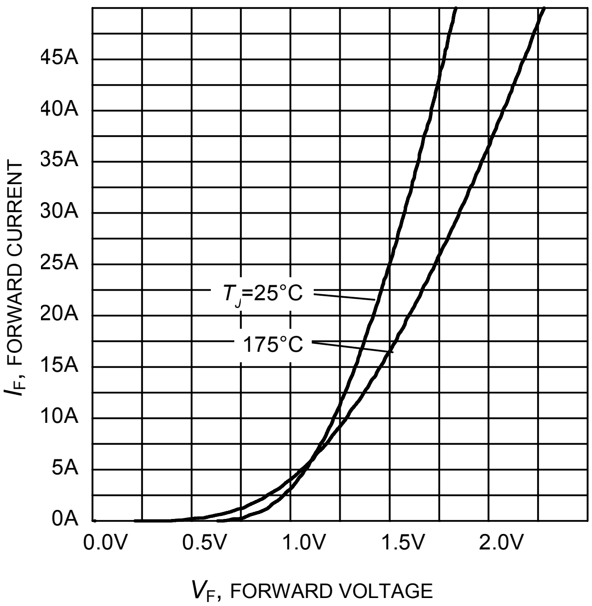


Figure 21. Typical diode forward current as a function of forward voltage

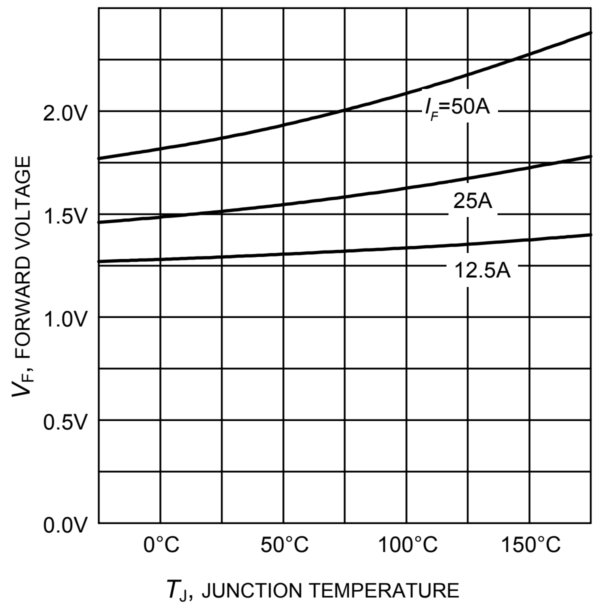


Figure 22. Typical diode forward voltage as a function of junction temperature

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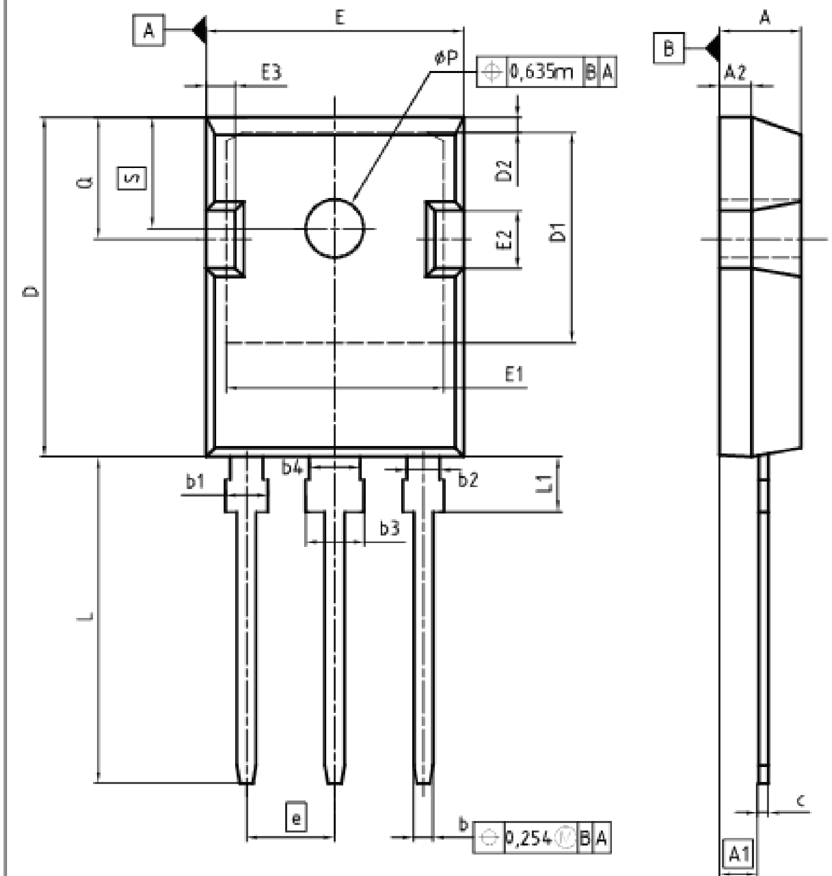

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	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		0.214	
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

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Z8B00003327

SCALE
0 5 7.5mm

EUROPEAN PROJECTION

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01-10-2009

REVISION
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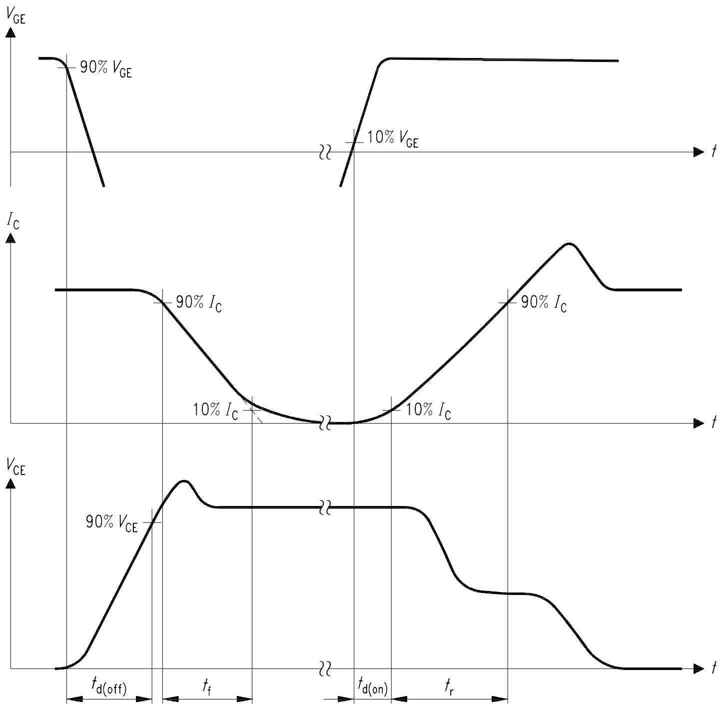

Figure A. Definition of switching times

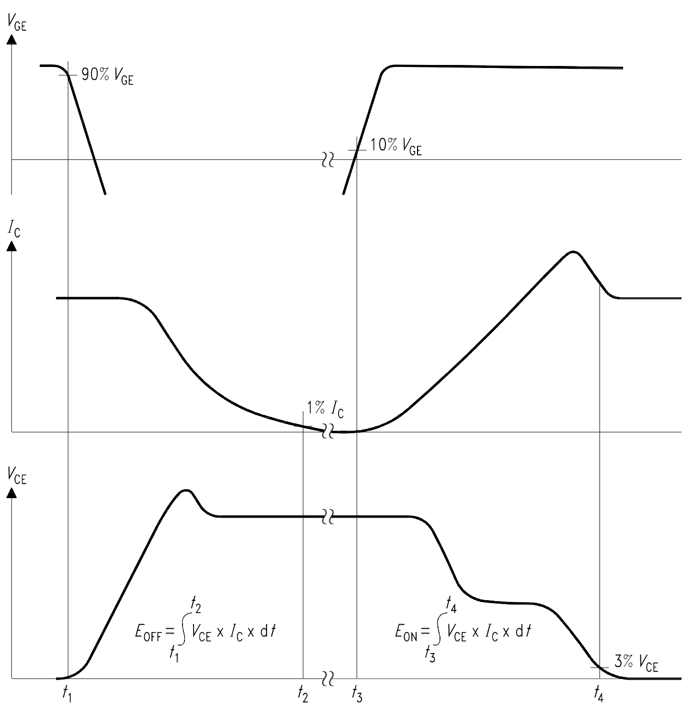

Figure B. Definition of switching losses

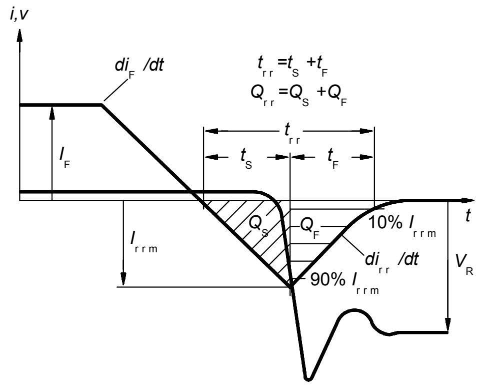

Figure C. Definition of diodes switching characteristics

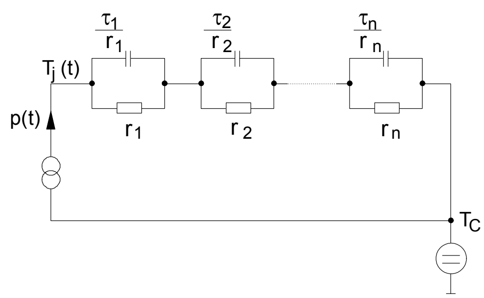

Figure D. Thermal equivalent circuit

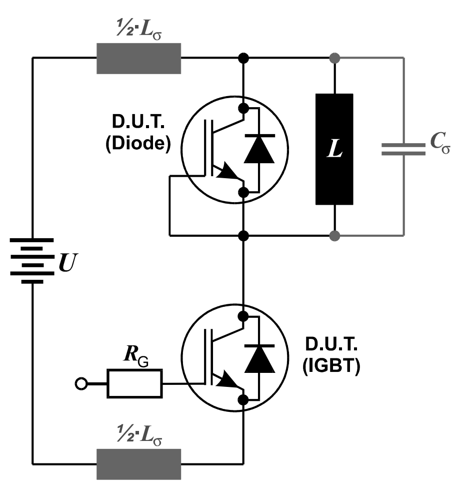

Figure E. Dynamic test circuit

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