Infineon

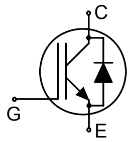
IHW30N100R

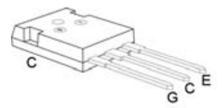
Soft Switching Series

Reverse Conducting IGBT with monolithic body diode

Features:

- 1.5V Forward voltage of monolithic body Diode
- Full Current Rating of monolithic body Diode
- Specified for T_{Jmax} = 175°C
- Trench and Fieldstop technology for 1000 V applications offers :
  - very tight parameter distribution
  - high ruggedness, temperature stable behavior
  - 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





PG-TO-247-3

Applications:

- Microwave Oven
- Soft Switching Applications

Type	V_{CE}	I_C	$V_{CE(sat),Tj=25°C}$	$T_{j,max}$	Marking	Package
IHW30N100R	1000V	30A	1.5V	175°C	H30R100	PG-TO-247-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	1000	V
DC collector current T_C = 25°C T_C = 100°C	I_C	 60 30	A
Pulsed collector current, t_p limited by T_{jmax}	I_{Cpuls}	90	
Turn off safe operating area $V_{CE} \leq$ 1000V, $T_j \leq$ 175°C	-	90	
Diode forward current T_C = 25°C T_C = 100°C	I_F	 60 30	
Diode pulsed current, t_p limited by T_{jmax}	I_{Fpuls}	90	
Gate-emitter voltage Transient Gate-emitter voltage (t_p < 5 ms)	V_{GE}	±20 ±25	V
Power dissipation, T_C = 25°C	P_{tot}	412	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+175	°C
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}		0.36	K/W
Diode thermal resistance, junction – case	R_{thJCD}		0.36	
Thermal resistance, junction – ambient	R_{thJA}		40	

Electrical Characteristic, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value min.	Value Typ.	Value max.	Unit
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE}=0V, I_C=500µA	1000	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE} = 15V, I_C=30A				
		T_j=25°C	-	1.5	1.7	
		T_j=150°C	-	1.7	-	
		T_j=175°C	-	1.75	-	
Diode forward voltage	V_F	V_{GE}=0V, I_F=30A				
		T_j=25°C	-	1.5	1.7	
		T_j=150°C	-	1.65	-	
		T_j=175°C	-	1.7	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	I_C=700µA, V_{CE}=V_{GE}	5.1	5.8	6.4	
Zero gate voltage collector current	I_{CES}	V_{CE}=1000V, V_{GE}=0V				µA
		T_j=25°C	-	-	5	
		T_j=175°C	-	-	2500	
Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V	-	-	600	nA
Transconductance	g_{fs}	V_{CE}=20V, I_C=30A	-	56	-	S

Dynamic Characteristic

Parameter	Symbol	Conditions	min.	Typ.	max.	Unit
Input capacitance	C_{iss}	V_{CE}=25V,	-	2791	-	pF
Output capacitance	C_{oss}	V_{GE}=0V,	-	82	-	
Reverse transfer capacitance	C_{rss}	f=1MHz	-	78	-	
Gate charge	Q_{Gate}	V_{CC}=800V, I_C=30A V_{GE}=15V	-	209	-	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,	-	846	-	
Fall time	t_f	V_{CC}=600V, I_C=30A,	-	33.3		
Turn-on energy	E_{on}	V_{GE}=0/15V,	-	-		mJ
Turn-off energy	E_{off}	R_G=26Ω,	-	2.1		
Total switching energy	E_{ts}		-	-	-	

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	-	948	-	
Fall time	t_f	V_{CC}=600V,	-	40.4	-	
Turn-on energy	E_{on}	I_C=30A,	-	-	-	mJ
Turn-off energy	E_{off}	V_{GE}=0/15V,	-	2.86	-	
Total switching energy	E_{ts}	R_G= 26Ω	-	-	-	

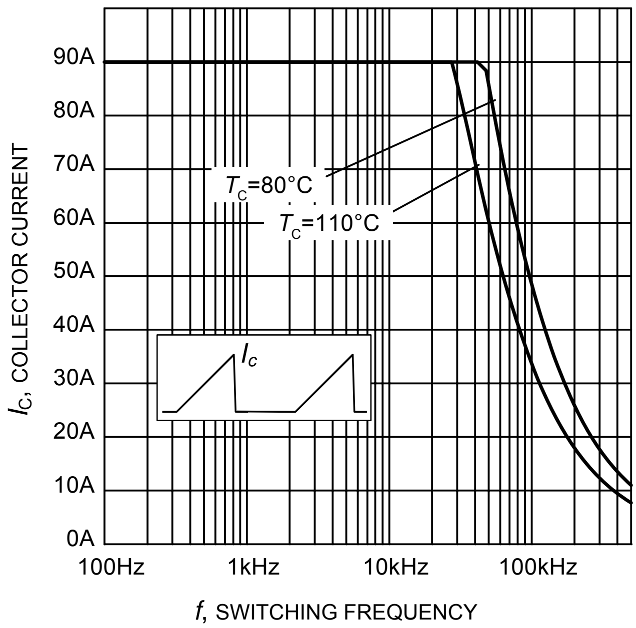


Figure 1. Collector current as a function of switching frequency for triangular current (E_{on} = 0, hard turn-off)
($T_j \leq$ 175°C, D = 0.5, V_{CE} = 400V, V_{GE} = 0/+15V, R_G = 26Ω)

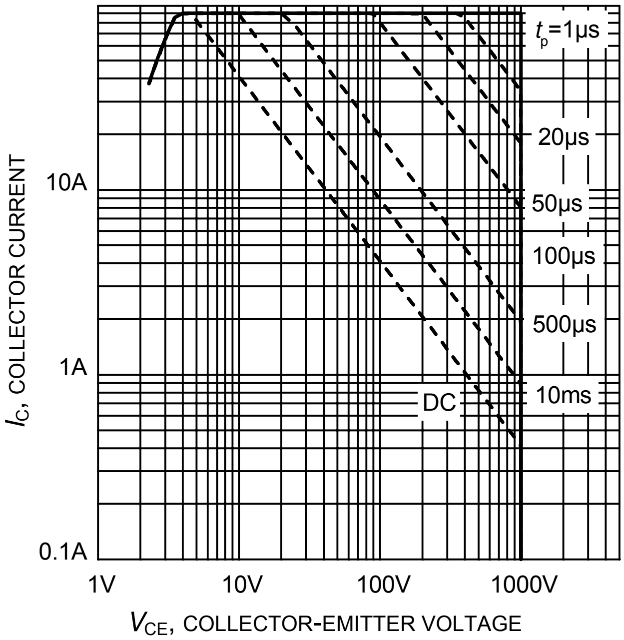


Figure 2. Safe operating area
(D = 0, T_C = 25°C, $T_j \leq$175°C; V_{GE}=15V)

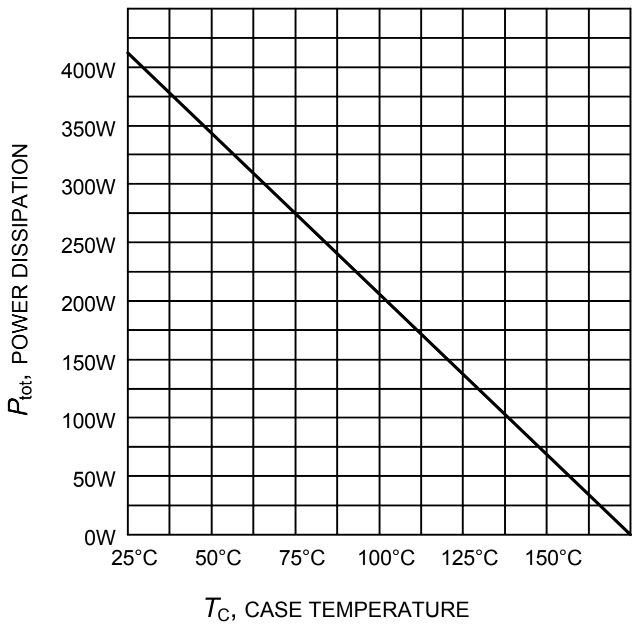


Figure 3. Power dissipation as a function of case temperature
($T_j \leq$ 175°C)

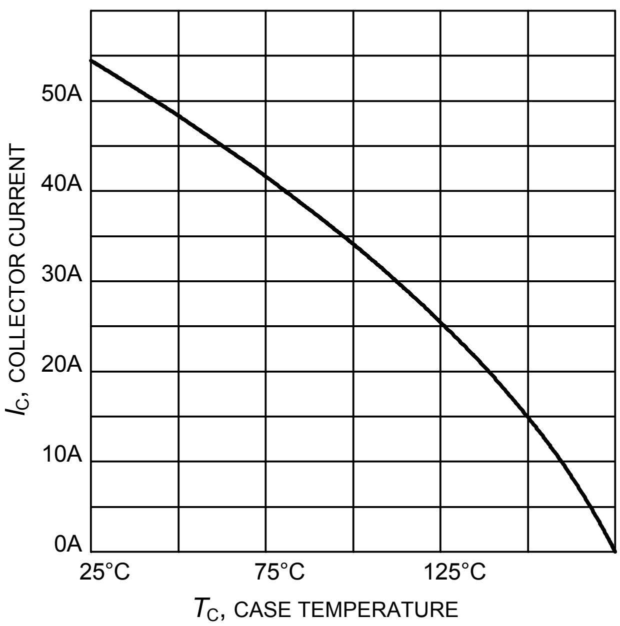


Figure 4. Collector current as a function of case temperature
($V_{GE} \geq$ 15V, $T_j \leq$ 175°C)

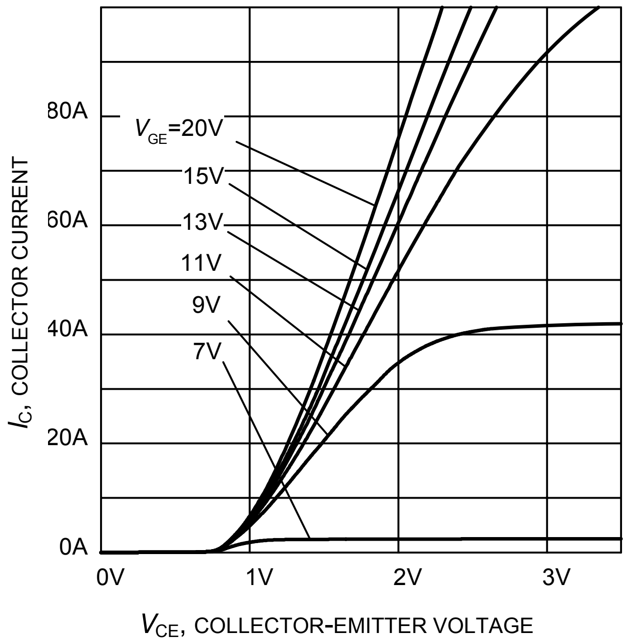


Figure 5. Typical output characteristic
(T_j = 25°C)

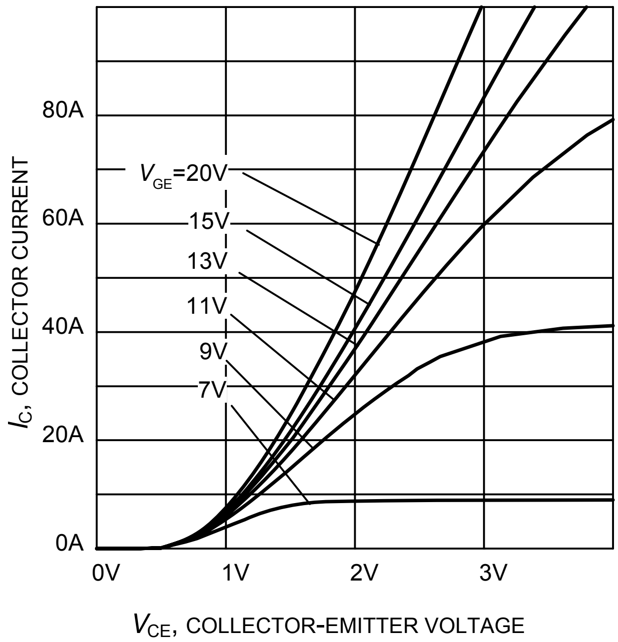


Figure 6. Typical output characteristic
(T_j = 175°C)

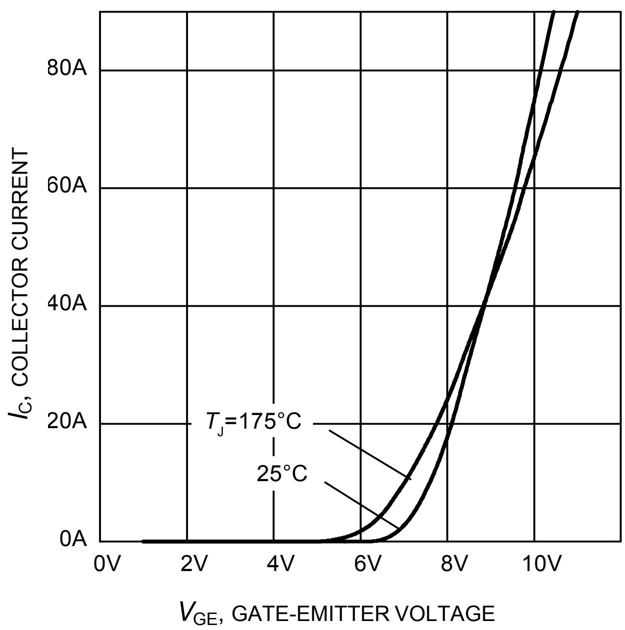


Figure 7. Typical transfer characteristic
(V_{CE}=20V)

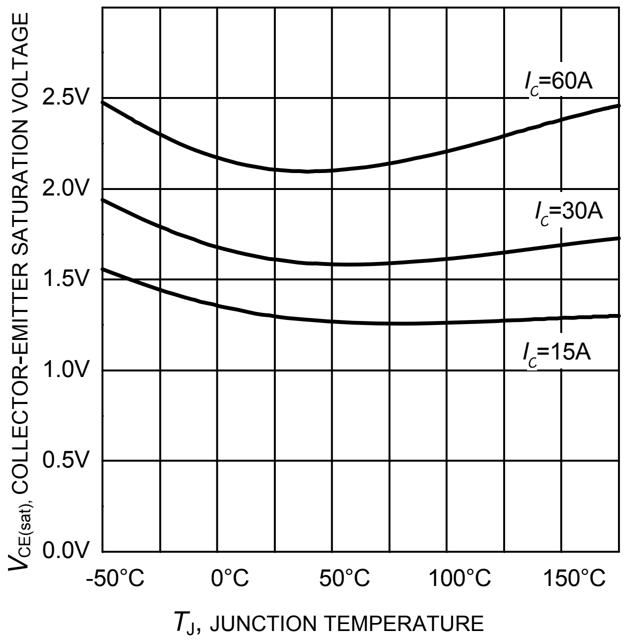


Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
(V_{GE} = 15V)

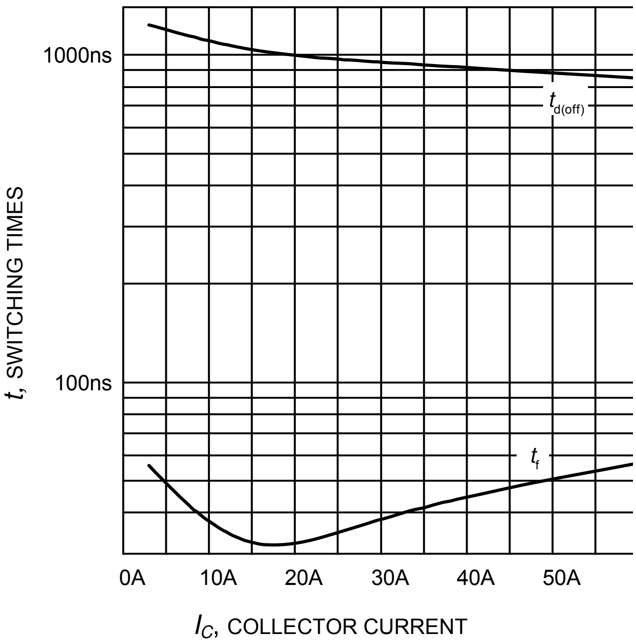


Figure 9. Typical switching times as a function of collector current
(inductive load, T_J=175°C,
V_{CE} = 600V, V_{GE} = 0/15V, R_G=26Ω,
Dynamic test circuit in Figure E)

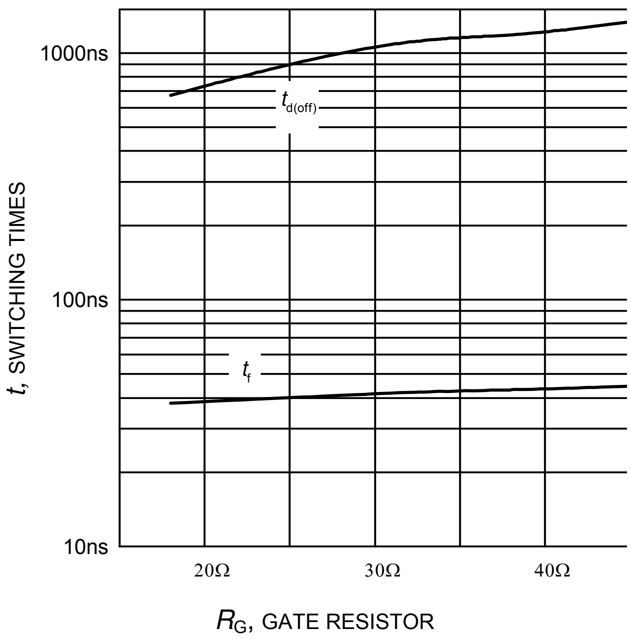


Figure 10. Typical switching times as a function of gate resistor
(inductive load, T_J = 175°C,
V_{CE}= 600V, V_{GE} = 0/15V, I_C = 30A,
Dynamic test circuit in Figure E)

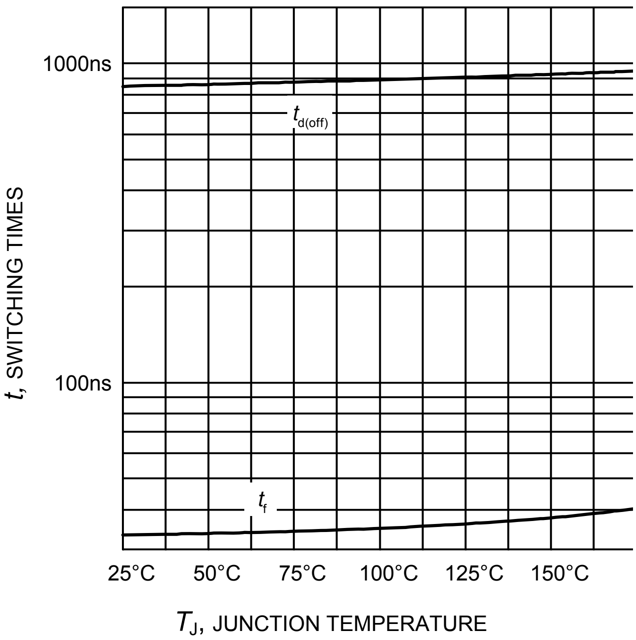


Figure 11. Typical switching times as a function of junction temperature
(inductive load, V_{CE} = 600V,
V_{GE} = 0/15V, I_C = 30A, R_G=26Ω,
Dynamic test circuit in Figure E)

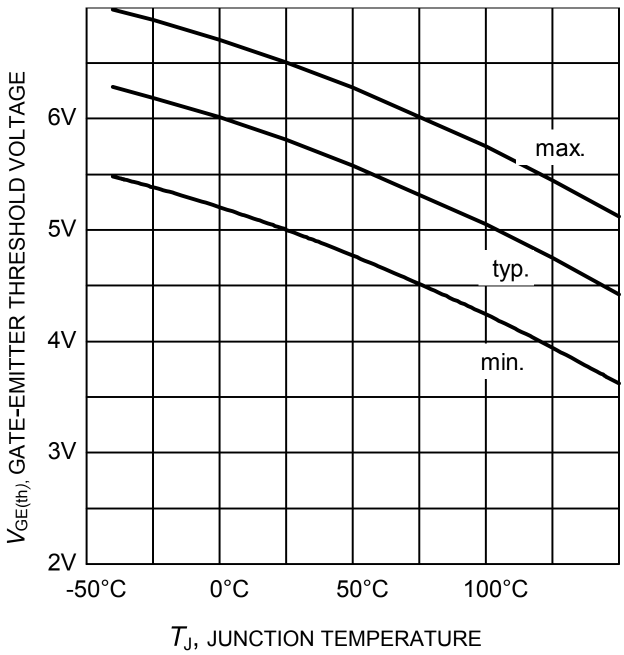


Figure 12. Gate-emitter threshold voltage as a function of junction temperature
(I_C = 0.7mA)

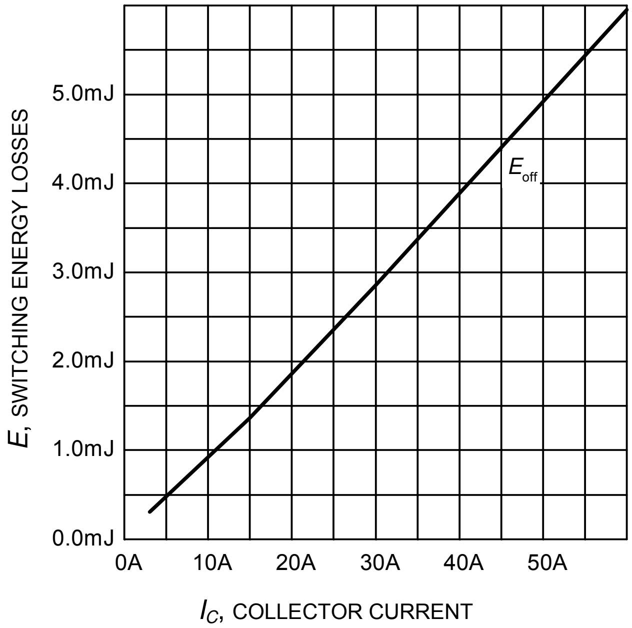


Figure 13. Typical switching energy losses as a function of collector current
(inductive load, T_J = 175°C, V_{CE} = 600V, V_{GE} = 0/15V, R_G=26Ω, Dynamic test circuit in Figure E)

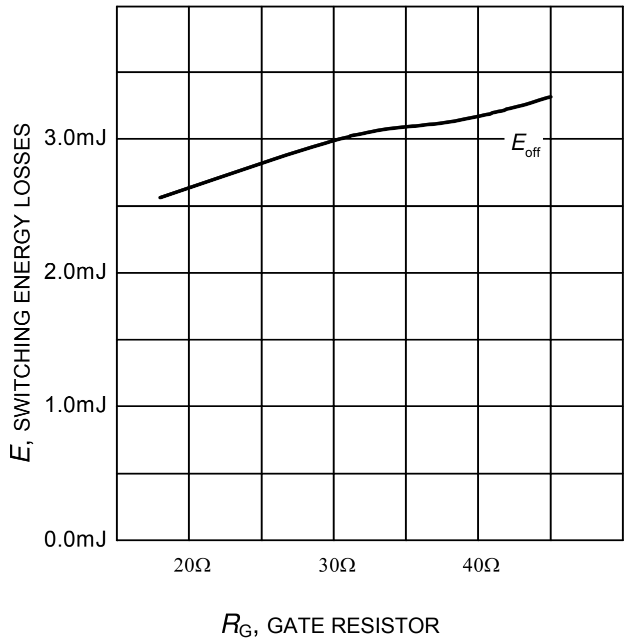


Figure 14. Typical switching energy losses as a function of gate resistor
(inductive load, T_J = 175°C, V_{CE} = 600V, V_{GE} = 0/15V, I_C = 30A, Dynamic test circuit in Figure E)

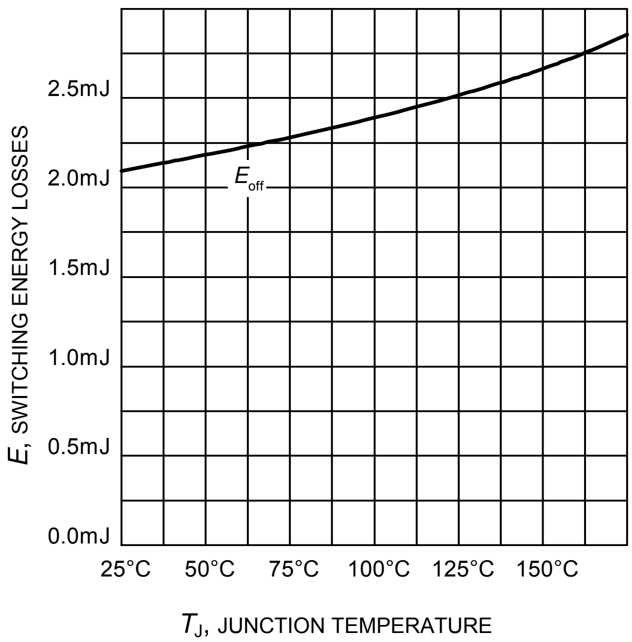


Figure 15. Typical switching energy losses as a function of junction temperature
(inductive load, V_{CE} = 600V, V_{GE} = 0/15V, I_C = 30A, R_G = 26Ω, Dynamic test circuit in Figure E)

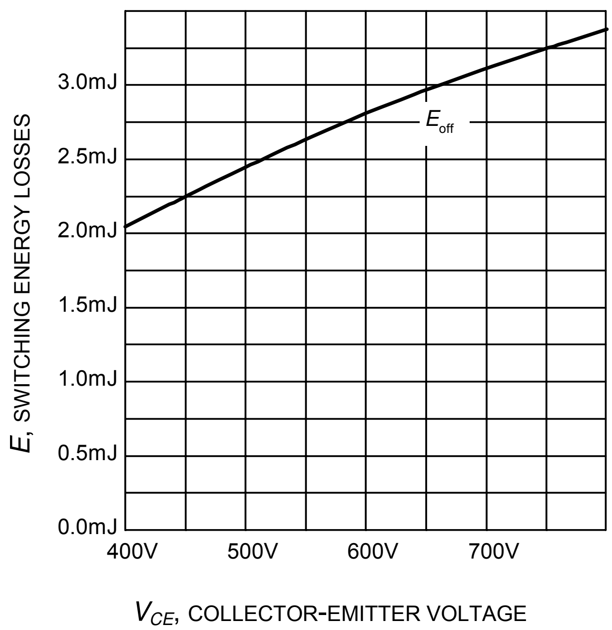


Figure 16. Typical switching energy losses as a function of collector emitter voltage
(inductive load, T_J = 175°C, V_{GE} = 0/15V, I_C = 30A, R_G = 26Ω, Dynamic test circuit in Figure E)

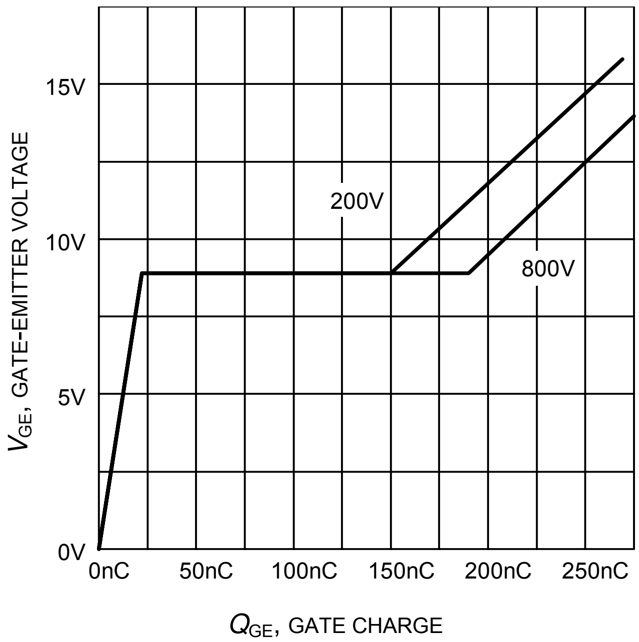


Figure 17. Typical gate charge
(I_C=30 A)

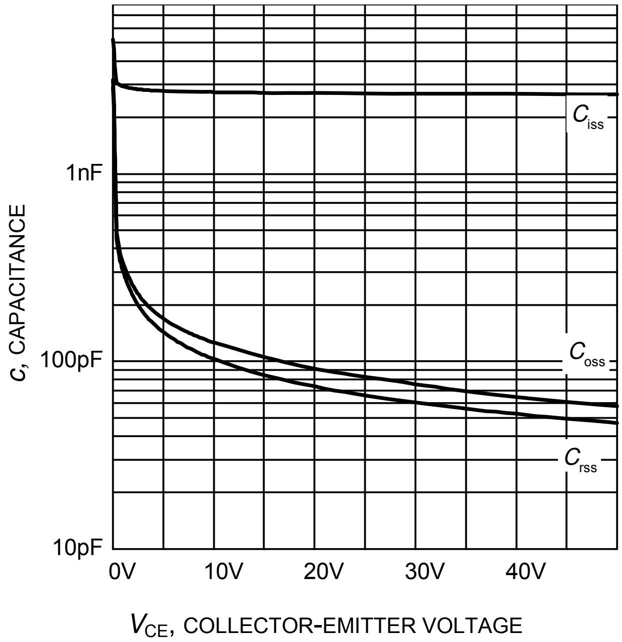


Figure 18. Typical capacitance as a function of collector-emitter voltage
(V_{GE}=0V, f = 1 MHz)

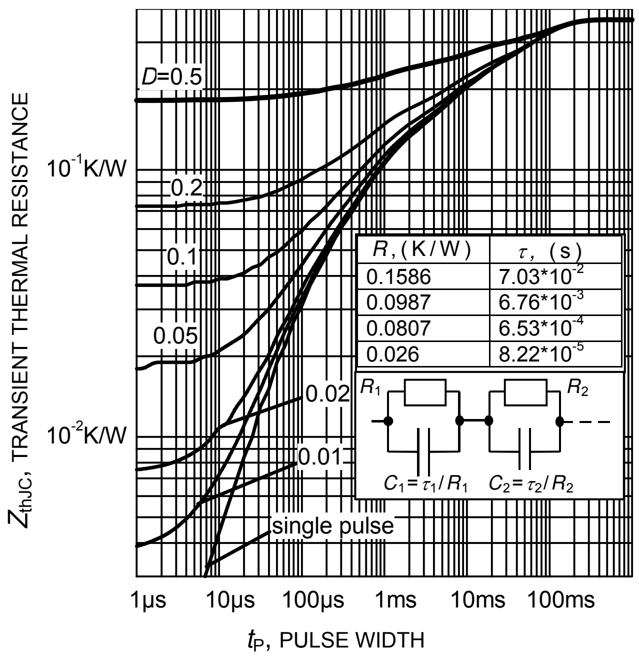


Figure 19. IGBT transient thermal resistance
($D = t_p / T$)

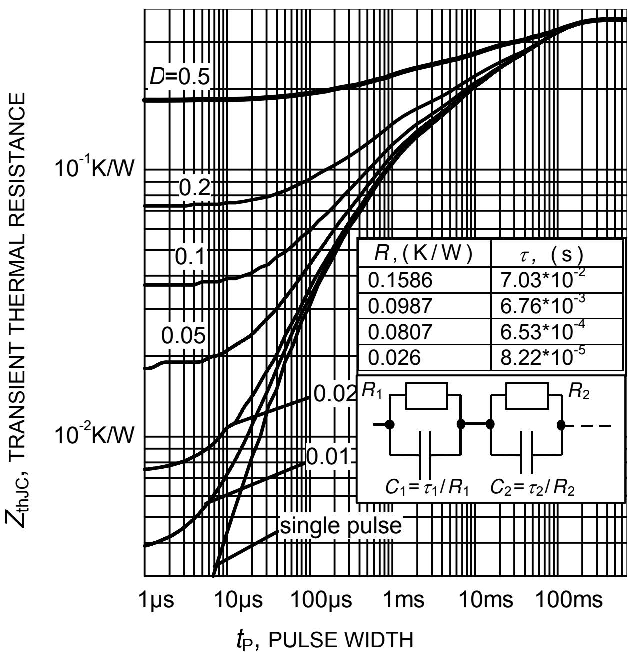


Figure 20. Diode transient thermal impedance as a function of pulse width
(D=t_P/T)

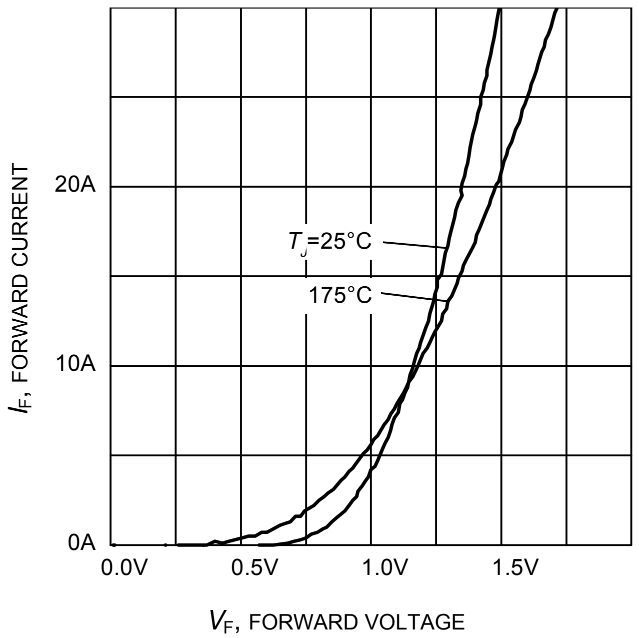


Figure 21. Typical diode forward current as a function of forward voltage

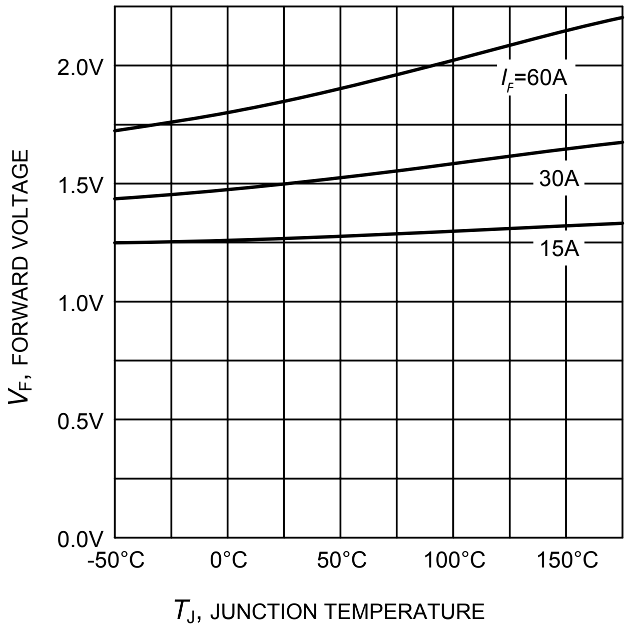


Figure 22. Typical diode forward voltage as a function of junction temperature

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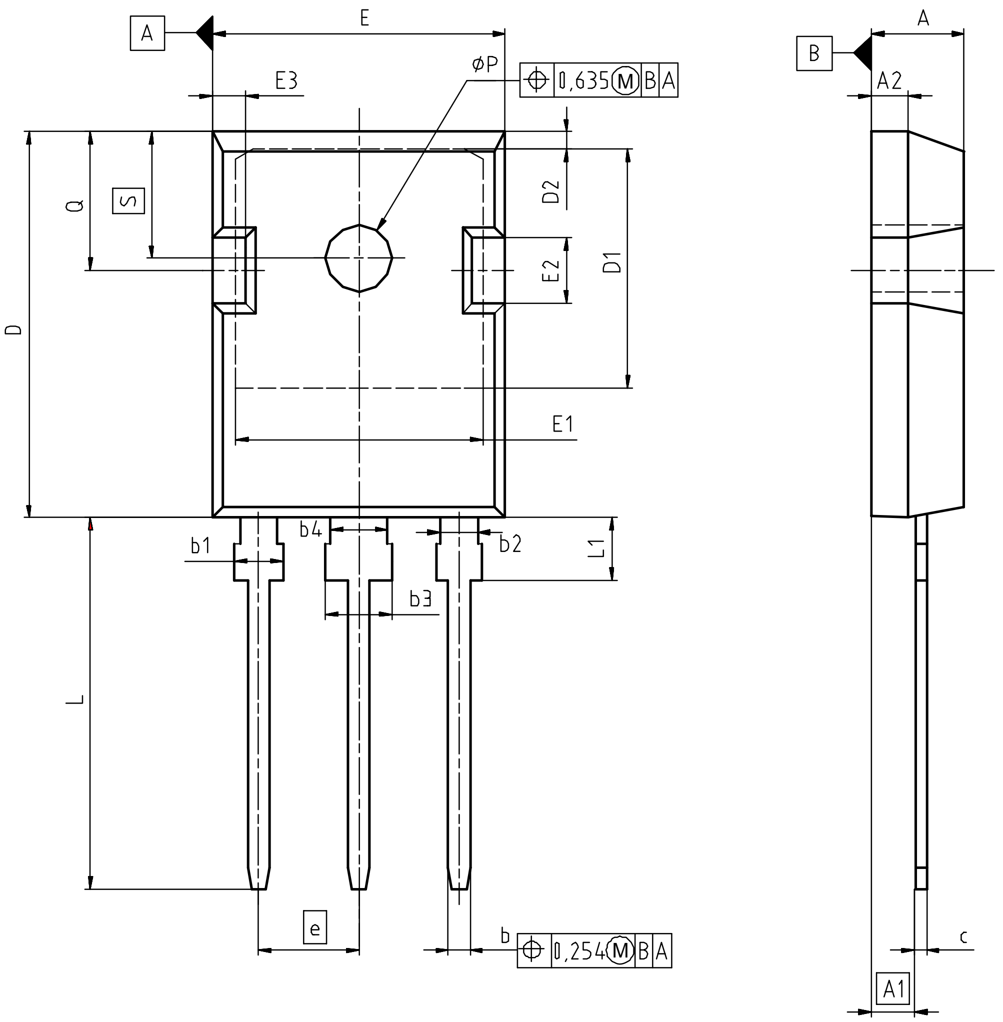
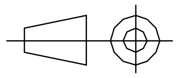


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.16	0.193	0.203
A1	2.27	2.53	0.089	0.099
A2	1.85	2.11	0.073	0.083
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.82	21.10	0.820	0.831
D1	16.25	17.65	0.640	0.695
D2	1.05	1.35	0.041	0.053
E	15.70	16.03	0.618	0.631
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.68	2.60	0.066	0.102
e	5.44		0.214	
N	3		3	
L	19.80	20.31	0.780	0.799
L1	4.17	4.47	0.164	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 0 5 7.5mm

EUROPEAN PROJECTION



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03

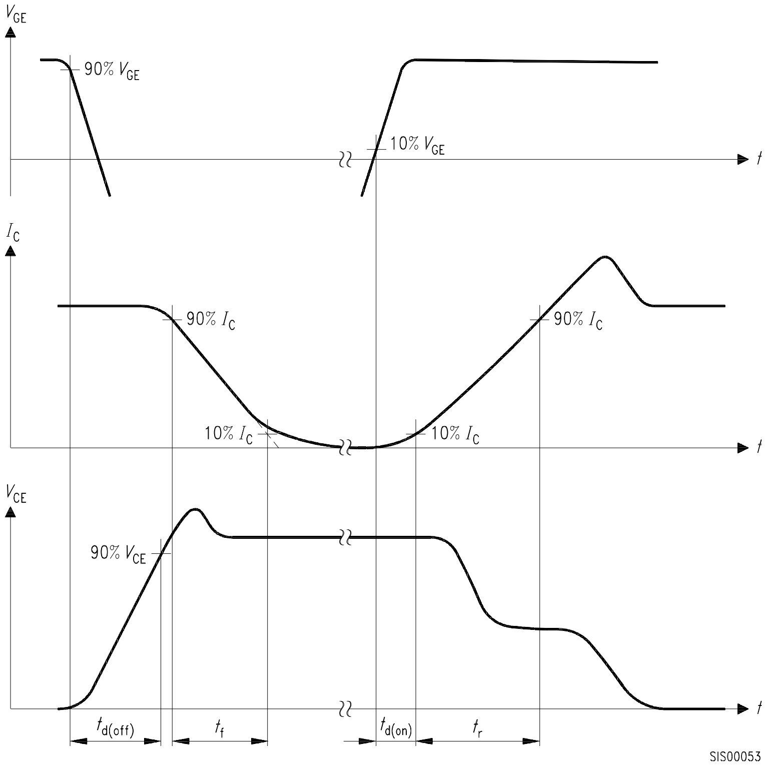

Figure A. Definition of switching times

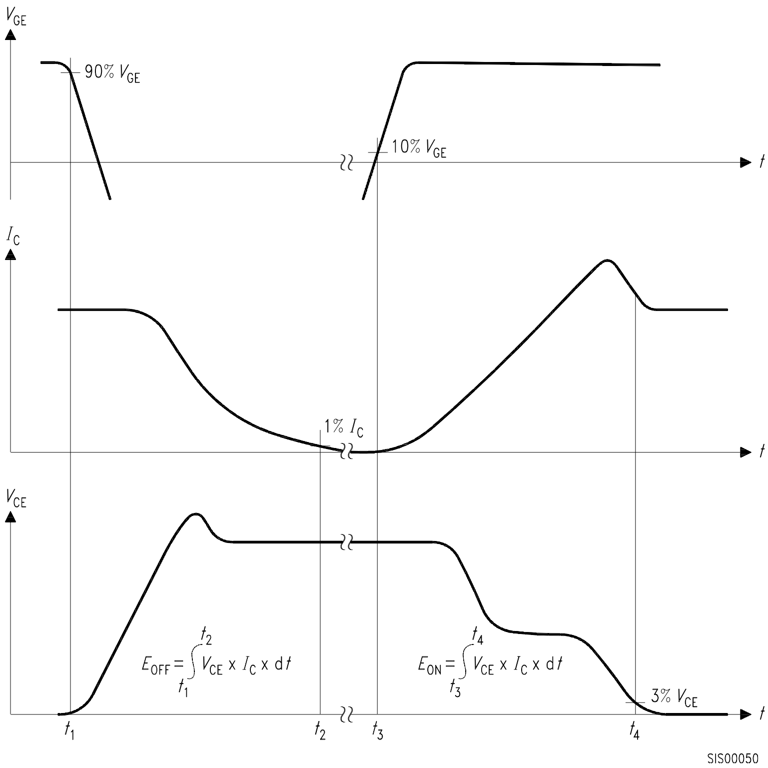

Figure B. Definition of switching losses

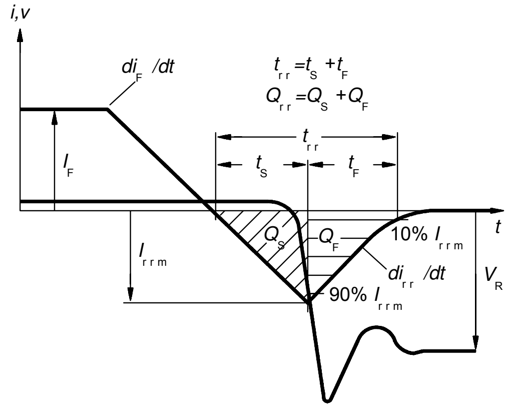

Figure C. Definition of diodes switching characteristics

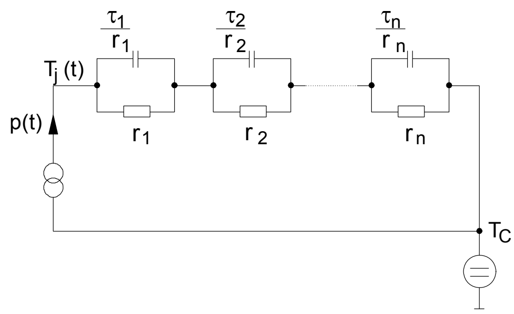

Figure D. Thermal equivalent circuit

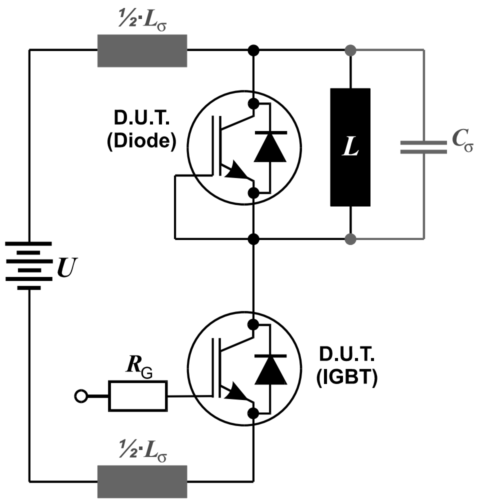

Figure E. Dynamic test circuit

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