IXYS

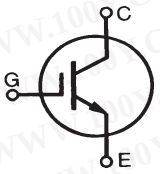
Advance Technical Information

XPT™ 650V IGBT GenX4™

IXXH80N65B4

V_{CES} = 650V
I_{C110} = 80A
$V_{CE(sat)}$ ≤ 2.0V
$t_{fi(typ)}$ = 63ns

Extreme Light Punch Through
IGBT for 5-30 kHz Switching



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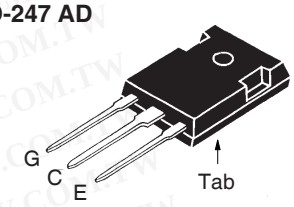


G = Gate C = Collector
E = Emitter Tab = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	160	A
I_{C110}	T_C = 110°C	80	A
I_{CM}	T_C = 25°C, 1ms	430	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 160 @$V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	10	μs
P_C	T_C = 25°C	625	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		6	g

Features

- Optimized for 5-30kHz Switching
- Square RBSOA
- Short Circuit Capability
- International Standard Package

Advantages

- High Power Density
- Extremely Rugged
- Low Gate Drive Requirement

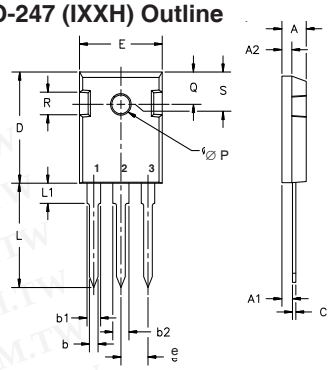
Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	650			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	4.0		6.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			10	μA
	T_J = 150°C			500	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 80A, V_{GE} = 15V, Note 1		1.65	2.00	V
	T_J = 150°C		2.00		V

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	19	31		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2686		pF
C_{oes}			176		pF
C_{res}			98		pF
$Q_{g(on)}$	I_C = 80A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		120		nC
Q_{ge}			22		nC
Q_{gc}			57		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		38		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		90		ns
E_{on}	V_{CE} = 400V, R_G = 3Ω		3.77		mJ
$t_{d(off)}$	Note 2		120		ns
t_{fi}			63		ns
E_{off}			1.20	1.80	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		30		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		127		ns
E_{on}	V_{CE} = 400V, R_G = 3Ω		4.80		mJ
$t_{d(off)}$	Note 2		86		ns
t_{fi}			65		ns
E_{off}			1.65		mJ
R_{thJC}				0.24	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXXH) Outline



Terminals: 1 - Gate 2 - Collector
3 - Emitted

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

Fig. 1. Output Characteristics @ T_J = 25ºC

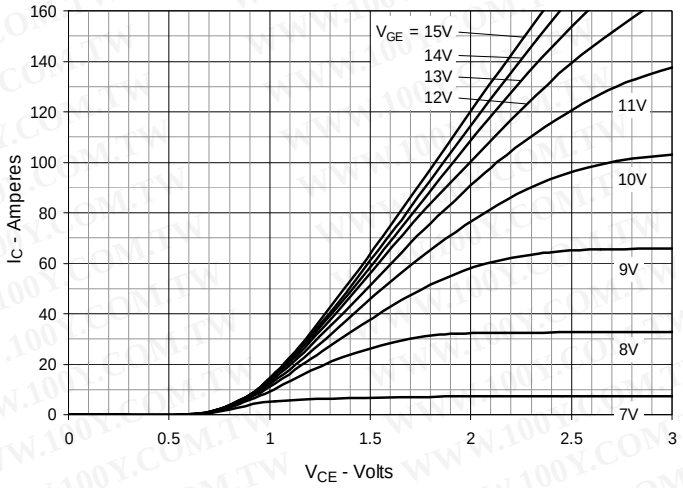


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

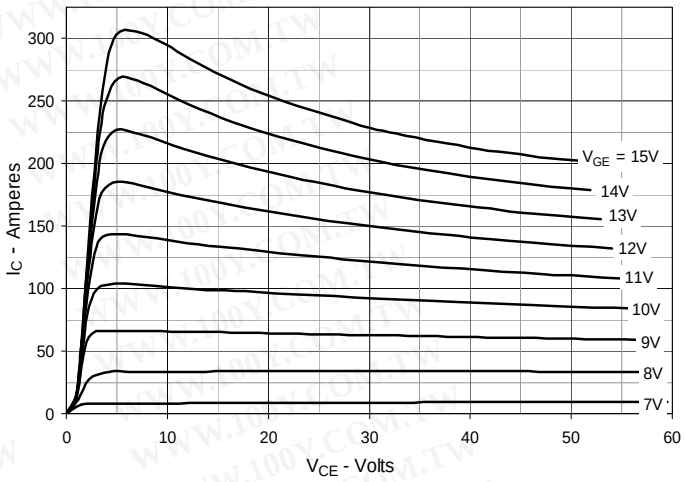


Fig. 3. Output Characteristics @ T_J = 150ºC

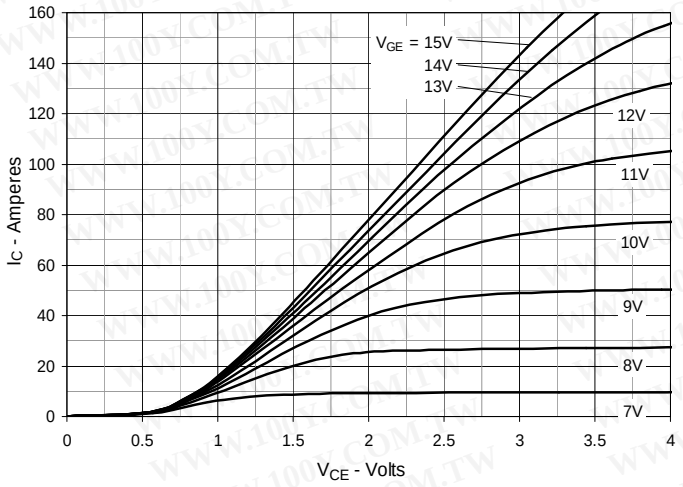


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

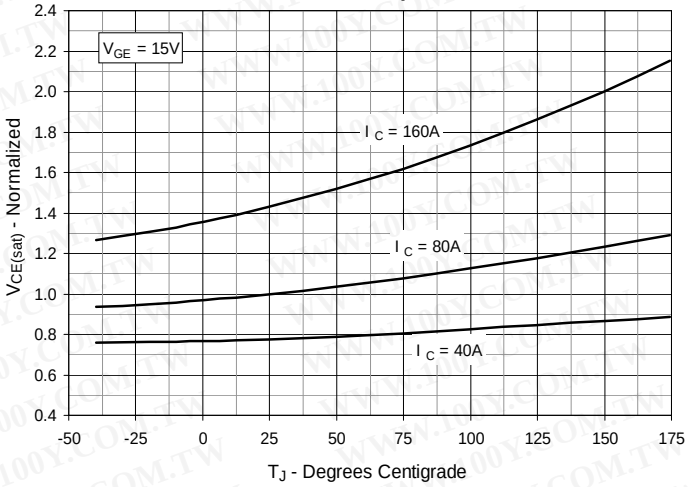


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

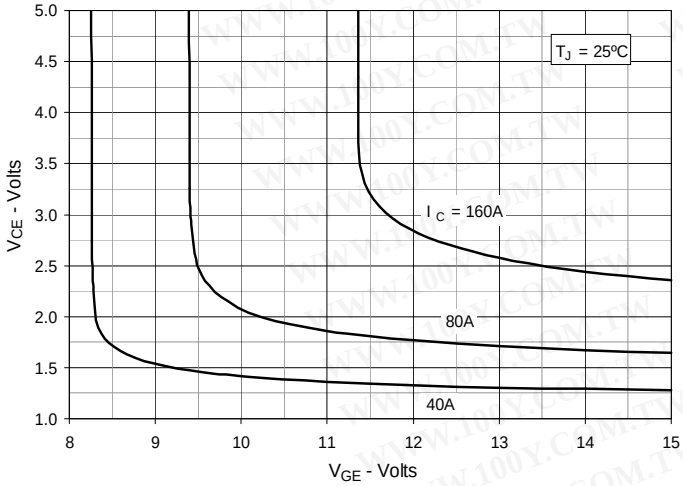


Fig. 6. Input Admittance

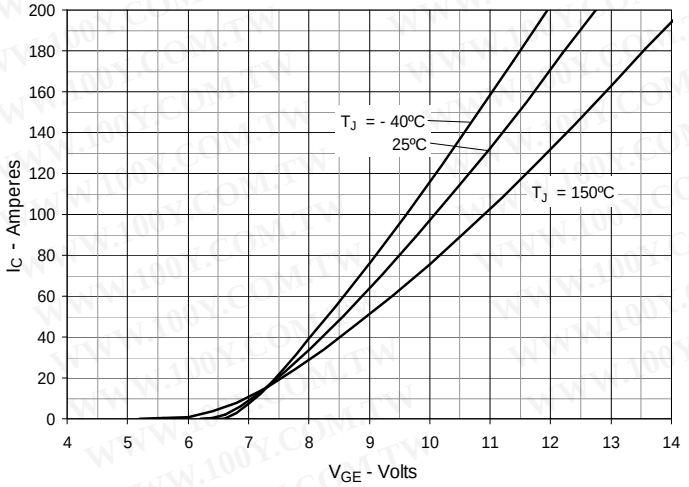


Fig. 7. Transconductance

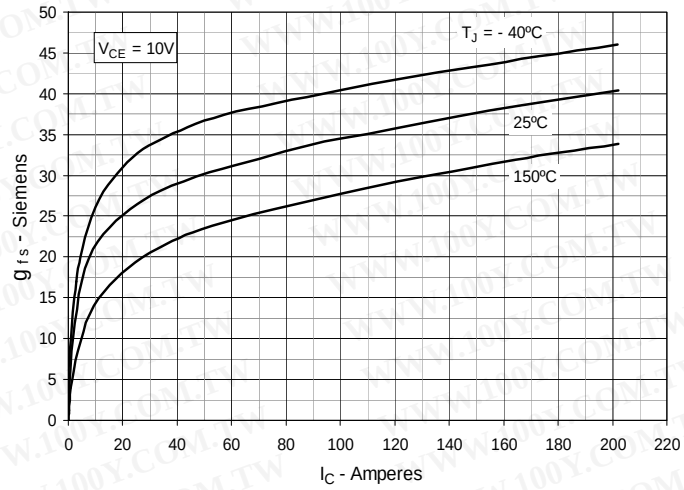


Fig. 8. Gate Charge

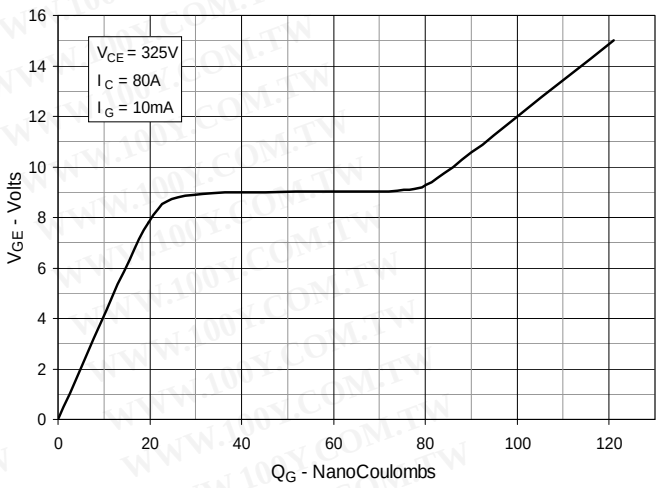


Fig. 9. Capacitance

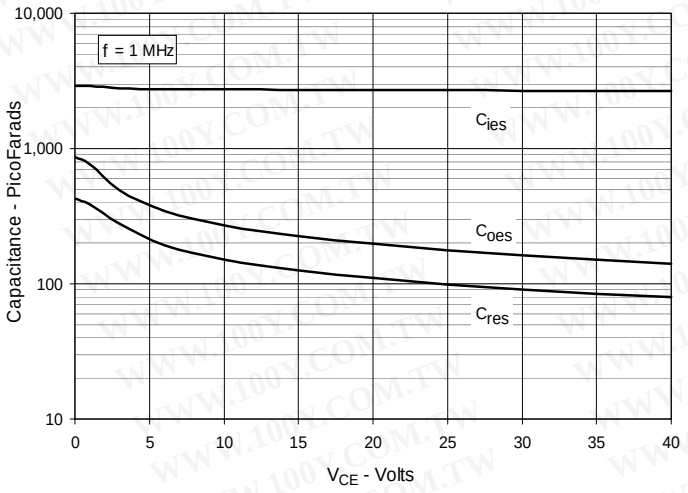


Fig. 10. Reverse-Bias Safe Operating Area

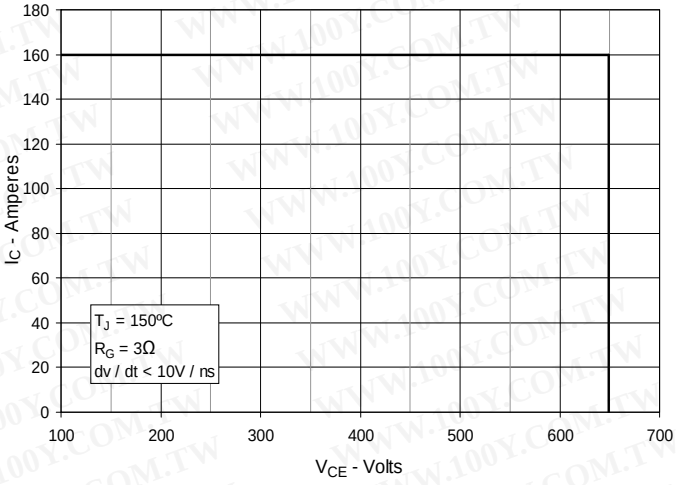


Fig. 11. Maximum Transient Thermal Impedance

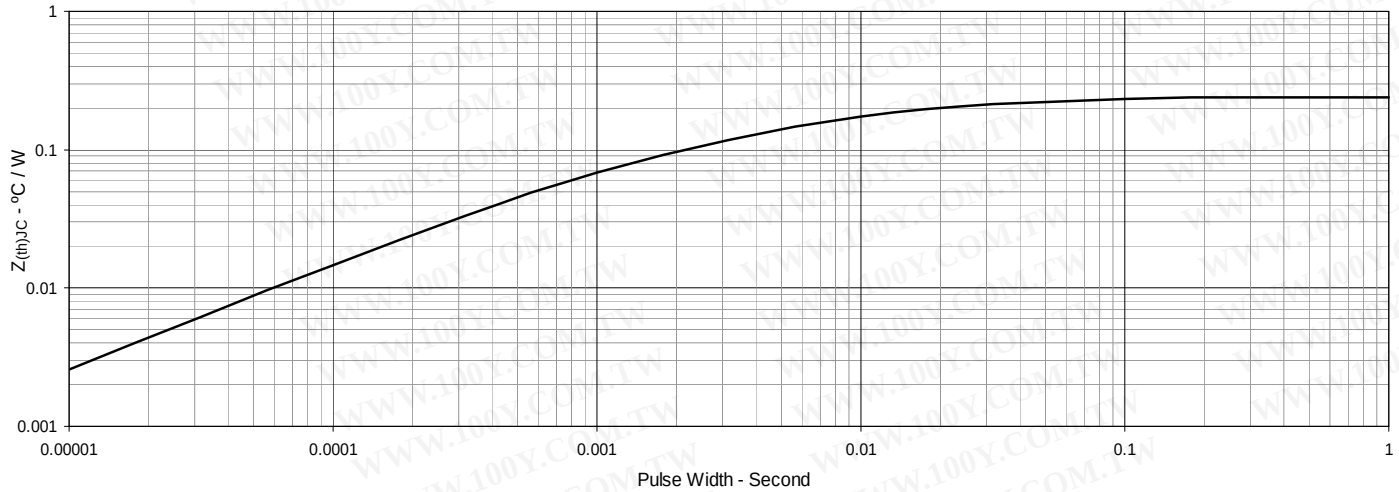


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

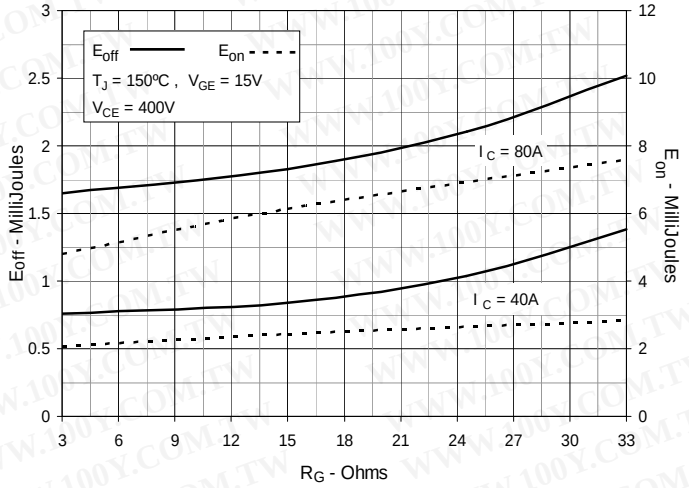


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

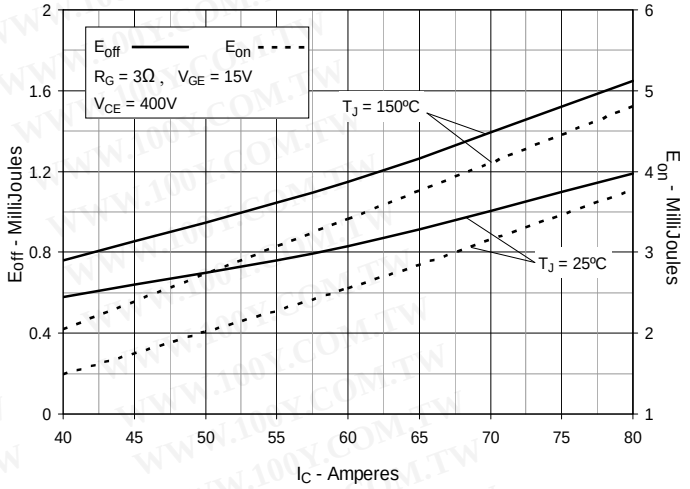


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

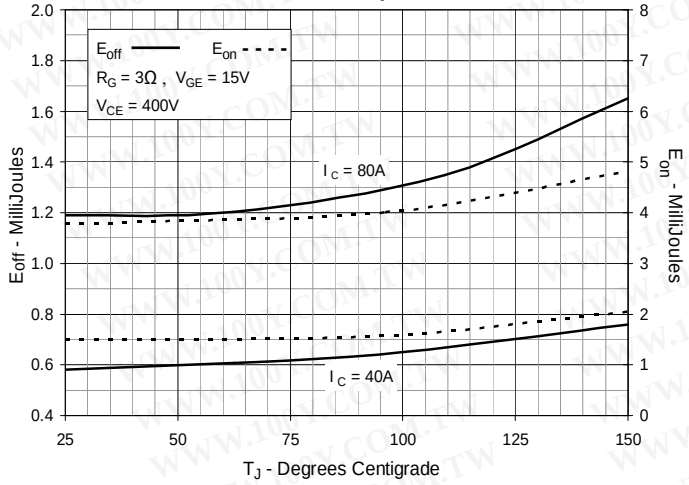


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

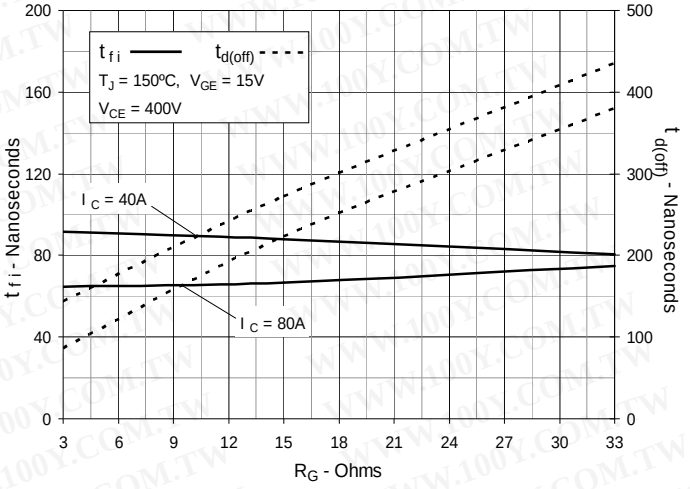


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

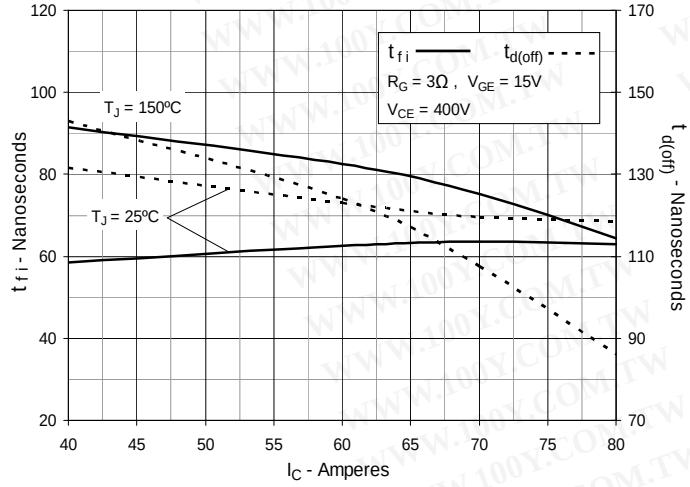


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

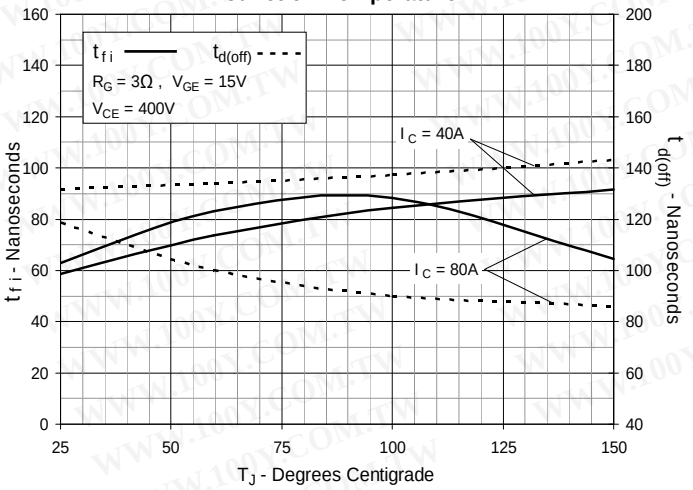


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

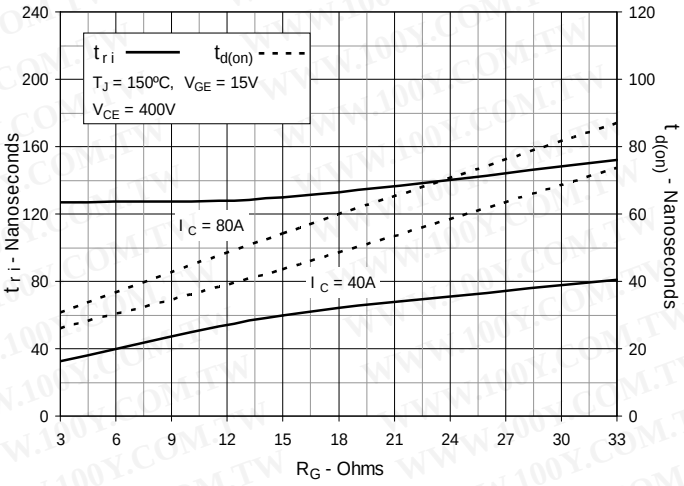


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

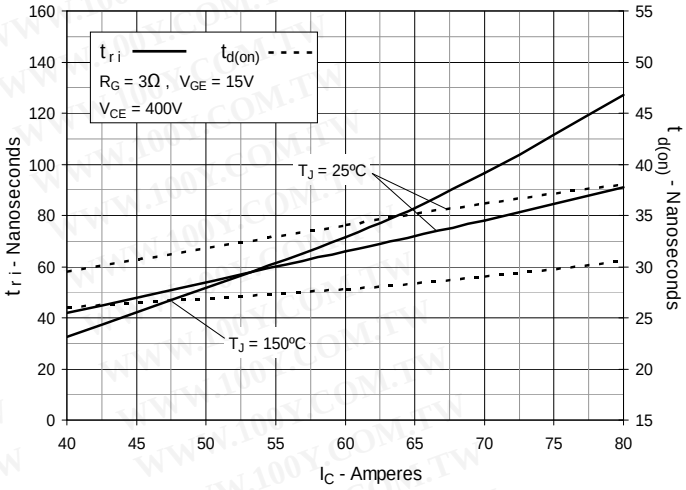


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature