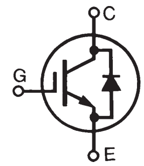
GenX3™ 600V IGBT with Diode

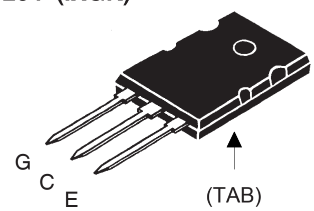
IXGK72N60B3H1
IXGX72N60B3H1

V_{CES}	=	600V
I_{C110}	=	72A
$V_{CE(sat)}$	≤	1.8V
$t_{fi(typ)}$	=	92ns

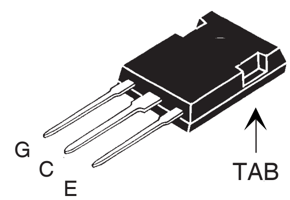
Medium speed low Vsat PT
IGBTs 5-40 kHz switching



TO-264 (IXGK)



PLUS247 (IXGX)



G = Gate C = Collector
E = Emitter TAB = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (limited by leads)	75	A
I_{C110}	T_C = 110°C	72	A
I_{CM}	T_C = 25°C, 1ms	450	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω Clamped inductive load @ V_{CE} ≤ 600V	I_{CM} = 240	A
P_C	T_C = 25°C	540	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_d	Mounting torque (TO-264)	1.13 / 10	Nm/lb.in.
F_C	Mounting force (PLUS247)	20..120 / 4.5..27	N/lb.
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	1.6mm (0.062 in.) from case for 10s	260	°C
Weight	TO-264	10	g
	PLUS247	6	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}		3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}				300	μA
	V_{GE} = 0V	T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V				±100	nA
$V_{CE(sat)}$	I_C = 60A, V_{GE} = 15V, Note 1			1.50	1.80	V
	I_C = 120A			1.75		

Features

- Optimized for low conduction and switching losses
- Square RBSOA
- Anti-parallel ultra fast diode
- International standard packages

Advantages

- High power density
- 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.	
g_{fs}	I_C = 50A, V_{CE} = 10V, Note 1	45	76		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		6800		pF
C_{oes}			575		pF
C_{res}			80		pF
Q_g	I_C = 60A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		225		nC
Q_{ge}			40		nC
Q_{gc}			82		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		31		ns
t_{ri}	I_C = 50A, V_{GE} = 15V		33		ns
E_{on}	V_{CE} = 480V, R_G = 3Ω		1.4		mJ
$t_{d(off)}$			152	240	ns
t_{fi}			92	150	ns
E_{off}			1.0	2.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		29		ns
t_{ri}	I_C = 50A,V_{GE} = 15V		34		ns
E_{on}	V_{CE} = 480V,R_G = 3Ω		2.7		mJ
$t_{d(off)}$			228		ns
t_{fi}			142		ns
E_{off}			2.2		mJ
R_{thJC}				0.23	°C/W
R_{thCS}			0.15		°C/W

Reverse Diode (FRED)

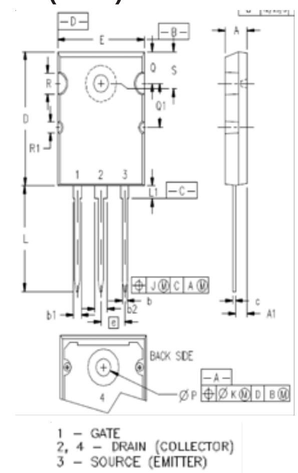
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
V_F	I_F = 60A, V_{GE} = 0V, Note 1		1.6	2.0	V
	T_J = 150°C		1.4	1.8	V
I_{RM}	I_F = 60A, V_{GE} = 0V, T_J = 100°C		8.3		A
t_{rr}	$-di_F/dt$ = 200A/μs, V_R = 300V		140		ns
R_{thJC}				0.3	°C/W

Note 1: Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

PRELIMINARY TECHNICAL INFORMATION

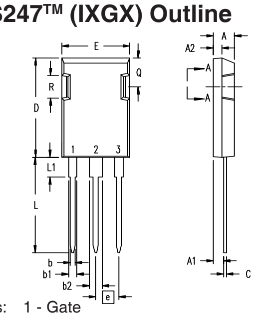
The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

TO-264 (IXGK) Outline



DIM	INCHES MIN	MAX	MILLIMETERS MIN	MAX
A	0.185	0.209	4.70	5.31
A1	0.102	0.118	2.59	3.00
b	0.037	0.055	0.94	1.40
b1	0.087	0.102	2.21	2.59
b2	0.110	0.126	2.79	3.20
c	0.017	0.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	0.760	0.799	19.30	20.29
e	.215 BSC		5.46 BSC	
J	0.000	0.010	0.00	0.25
K	0.000	0.010	0.00	0.25
L	0.779	0.842	19.79	21.39
L1	0.087	0.102	2.21	2.59
ØP	0.122	0.138	3.10	3.51
Q	0.240	0.256	6.10	6.50
Q1	0.330	0.346	8.38	8.79
ØR	0.155	0.187	3.94	4.75
ØR1	0.085	0.093	2.16	2.36
S	0.243	0.253	6.17	6.43

PLUS247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)
4 - Drain (Collector)

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

IXYS MOSFETs and IGBTs are covered by one or moreof the following U.S. patents: 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

Fig. 1. Output Characteristics @ 25ºC

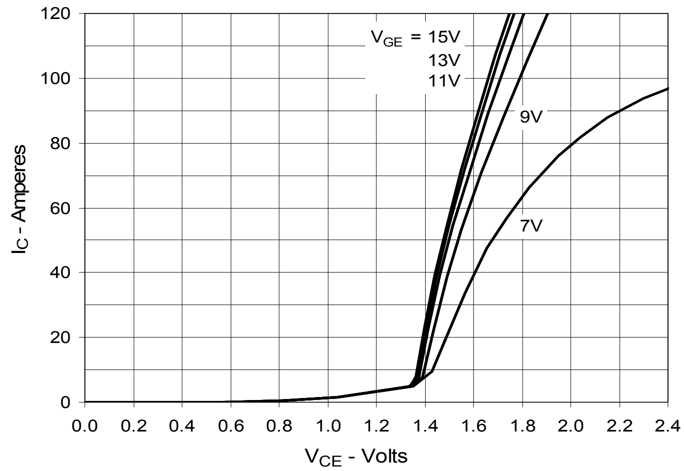


Fig. 2. Extended Output Characteristics @ 25ºC

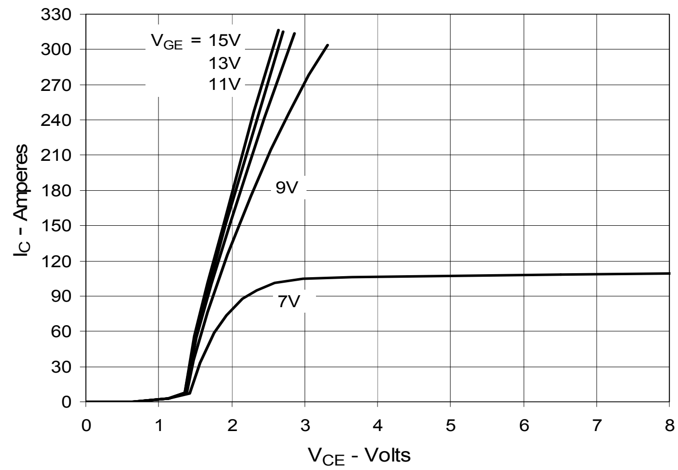


Fig. 3. Output Characteristics @ 125ºC

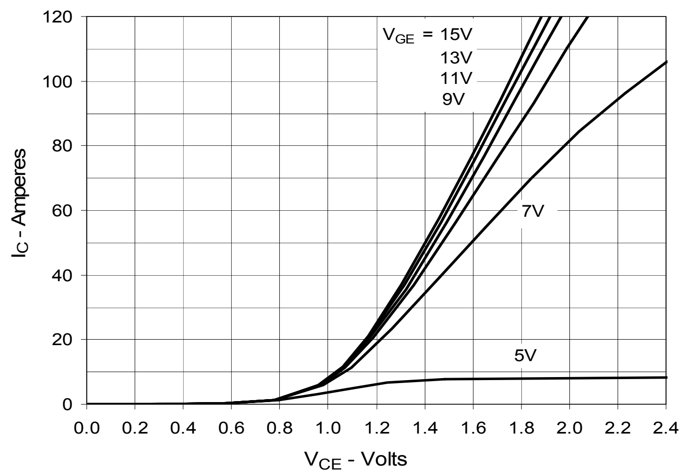


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

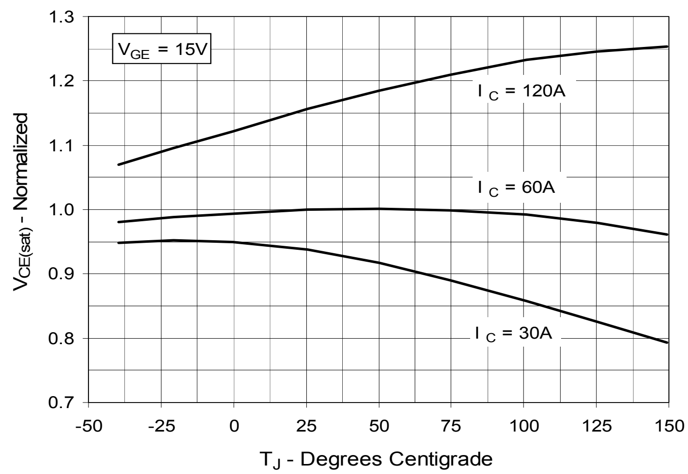


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

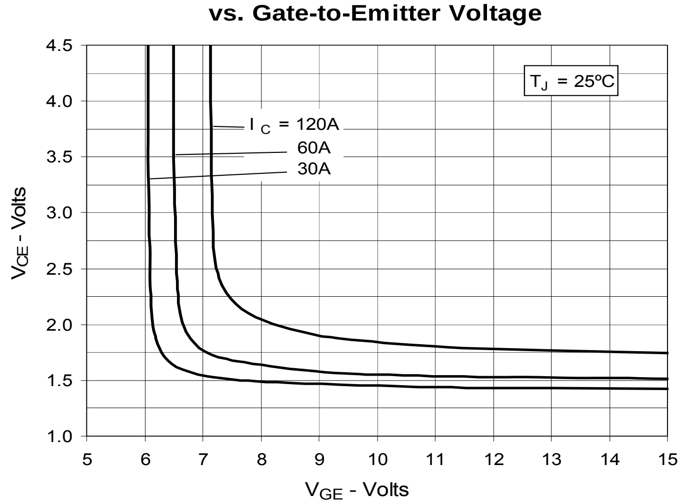
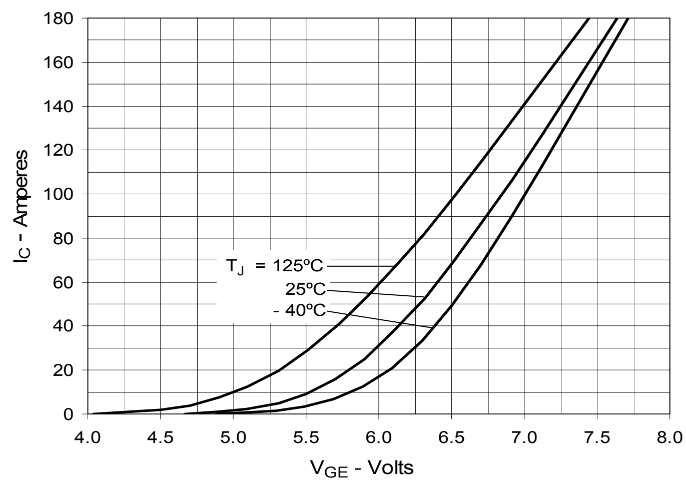


Fig. 6. Input Admittance



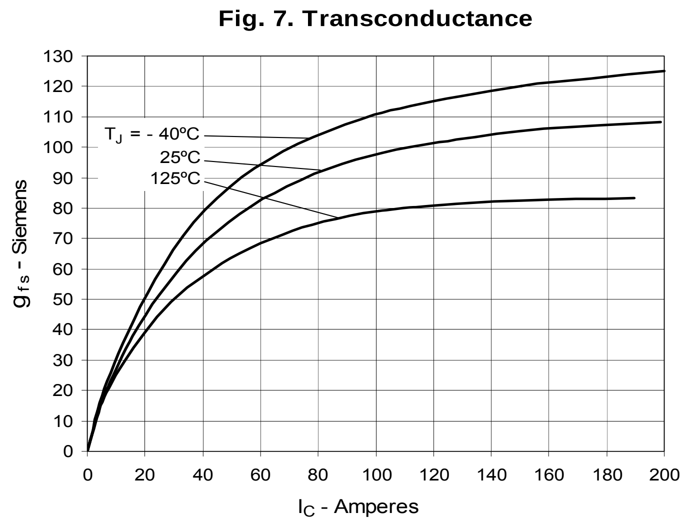


Fig. 7. Transconductance
T_J = - 40ºC
25ºC
125ºC
g_{fs} - Siemens
I_C - Amperes
0
10
20
30
40
50
60
70
80
90
100
110
120
130
0
20
40
60
80
100
120
140
160
180
200

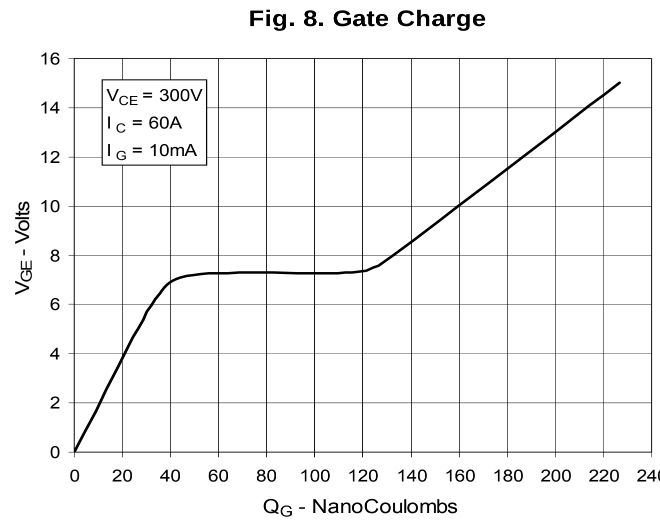


Fig. 8. Gate Charge
V_{CE} = 300V
I_C = 60A
I_G = 10mA
V_{GE} - Volts
Q_G - NanoCoulombs
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120
140
160
180
200
220
240

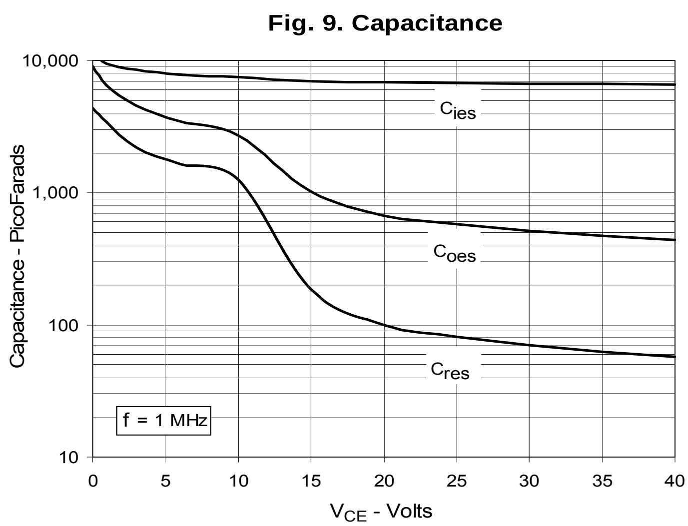


Fig. 9. Capacitance
C_{ies}
C_{oes}
C_{res}
f = 1 MHz
Capacitance - PicoFarads
V_{CE} - Volts
10
100
1,000
10,000
0
5
10
15
20
25
30
35
40

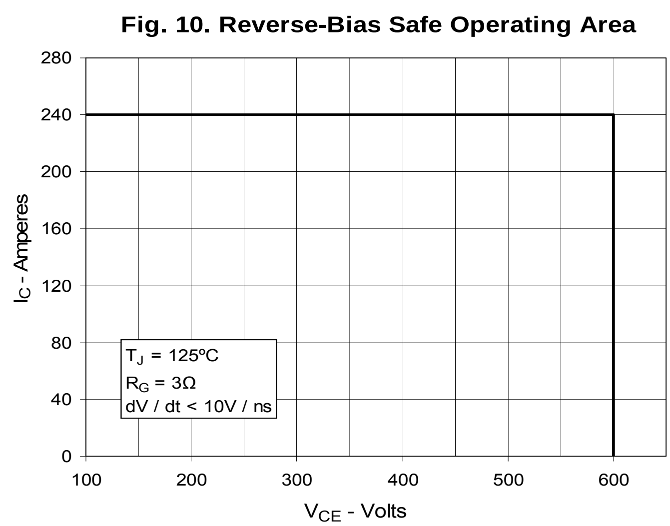


Fig. 10. Reverse-Bias Safe Operating Area
T_J = 125ºC
R_G = 3Ω
dV / dt < 10V / ns
I_C - Amperes
V_{CE} - Volts
0
40
80
120
160
200
240
280
100
200
300
400
500
600

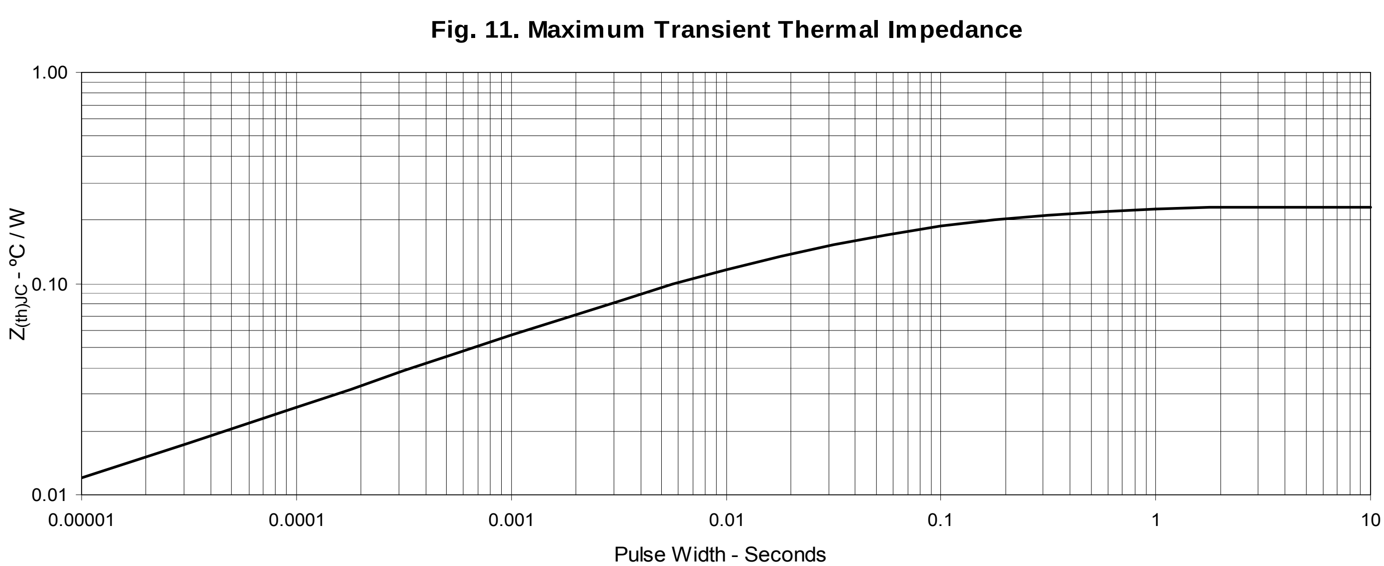


Fig. 11. Maximum Transient Thermal Impedance
$Z_{(th)JC}$ - ºC / W
Pulse Width - Seconds
0.01
0.10
1.00
0.00001
0.0001
0.001
0.01
0.1
1
10

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

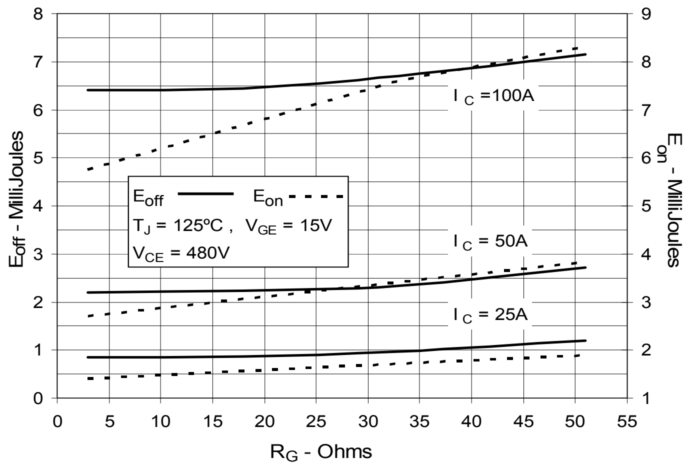


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

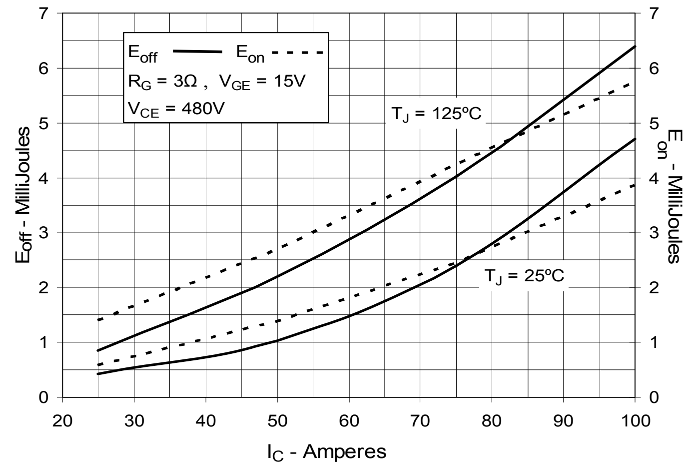


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

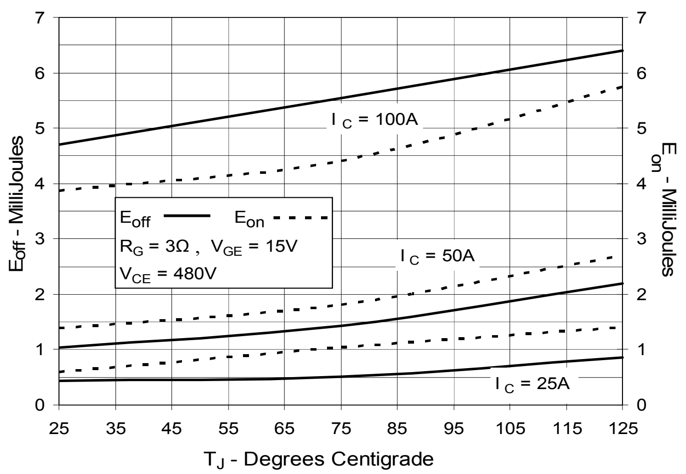


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

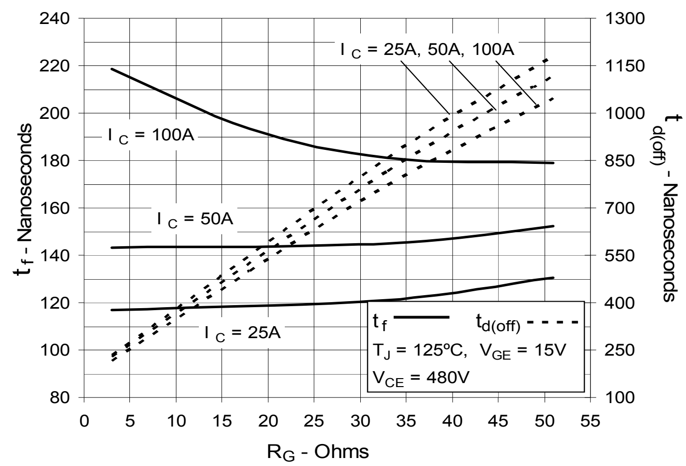


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

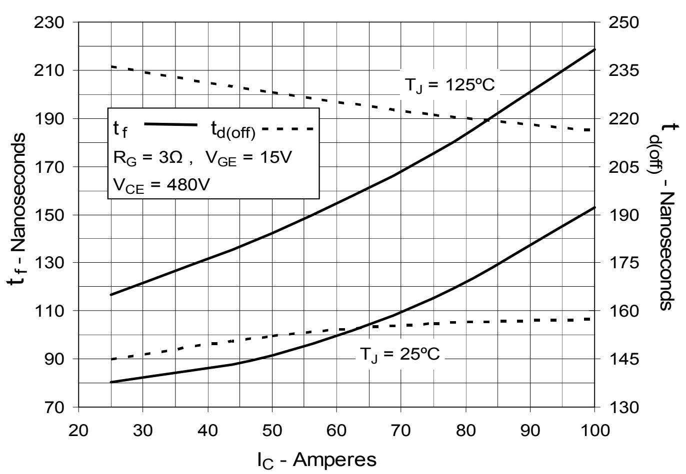


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

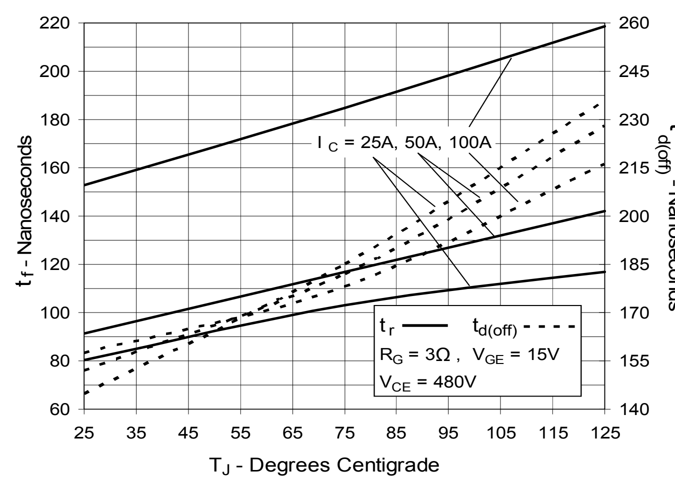


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

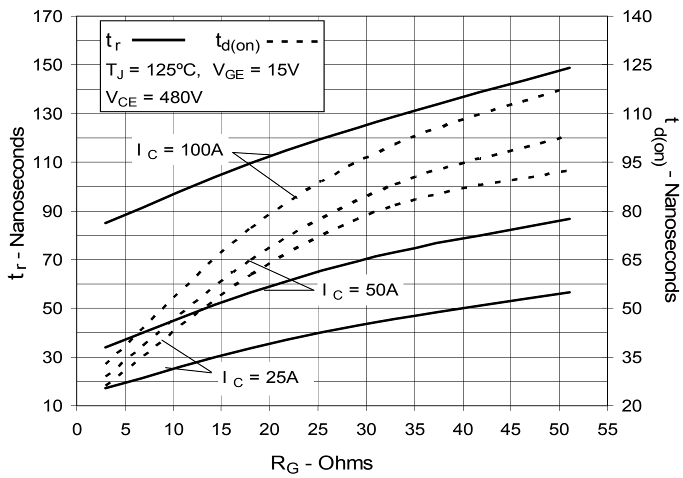


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

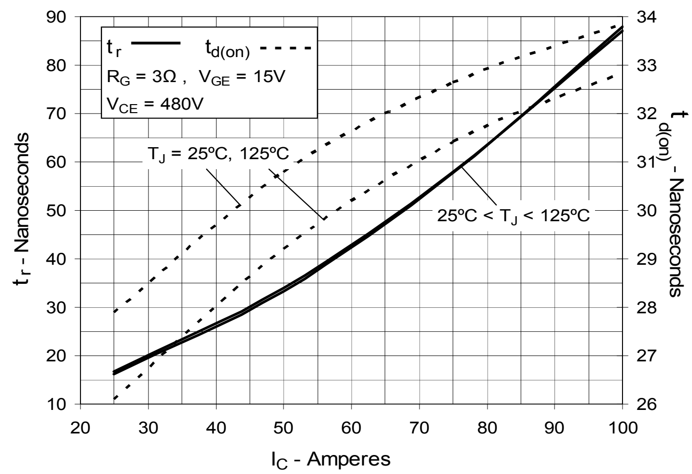
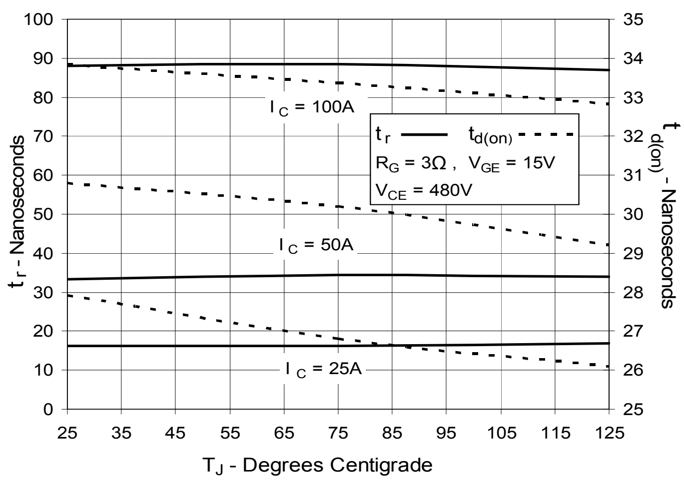


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



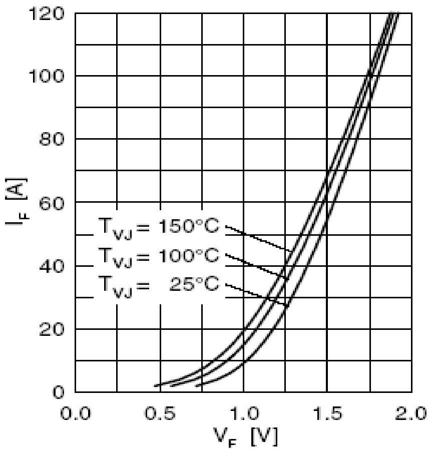


Fig. 21 Forward current I_F vs. V_F

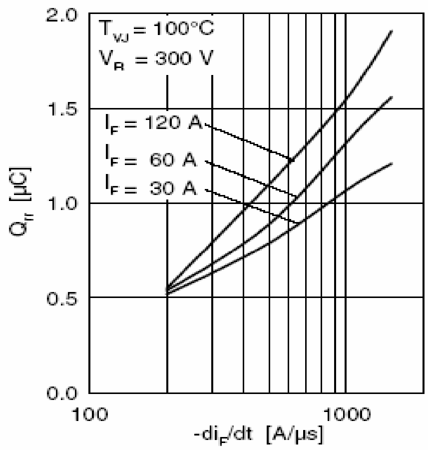


Fig. 22 Typ. reverse recovery charge Q_{rr}

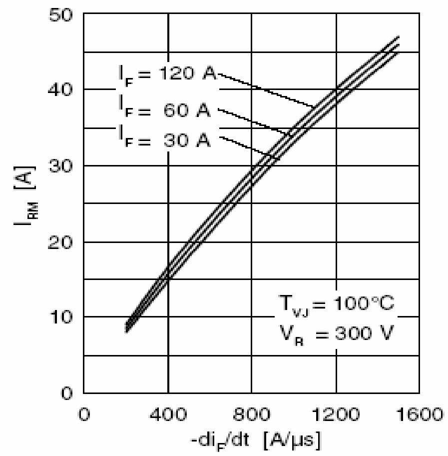


Fig. 23 Typ. peak reverse current I_{RM}

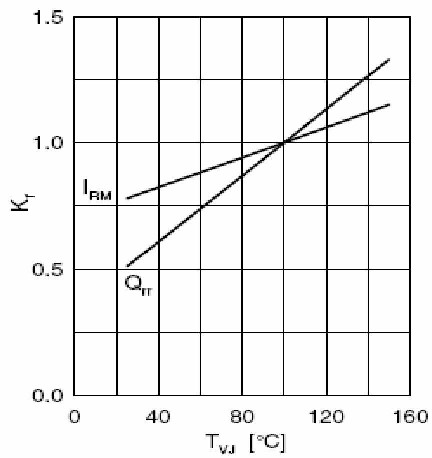


Fig. 24 Typ. dynamic parameters Q_{rr}, I_{RM}

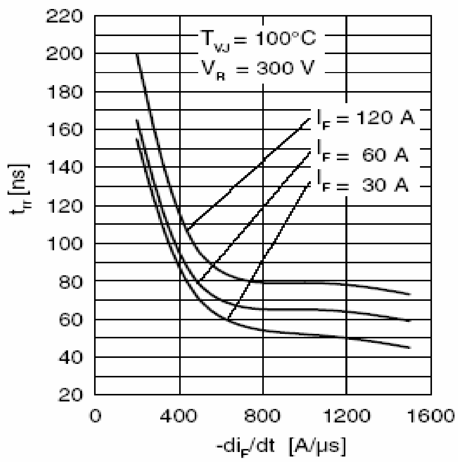


Fig. 25 Typ. recovery time t_{rr}

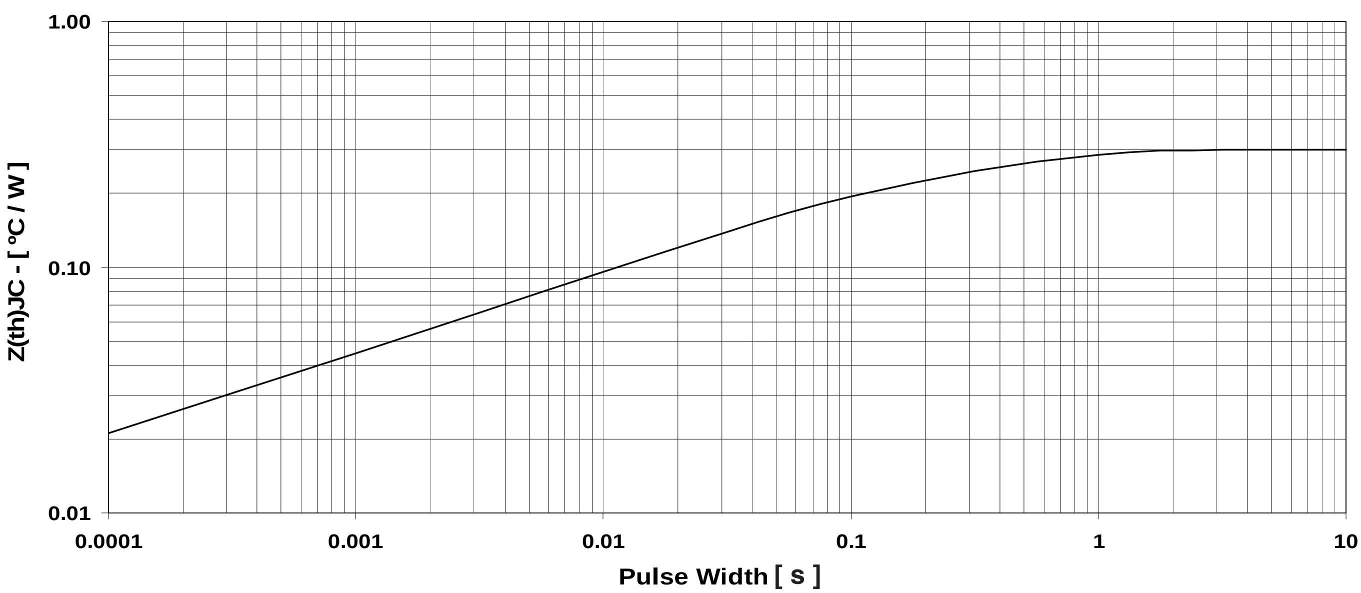


Fig. 26 Maximum transient thermal impedance junction to case (for diode)

Стандарт Электрон Связь

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