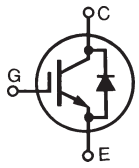
IXYS

GenX3™ 600V IGBT with Diode

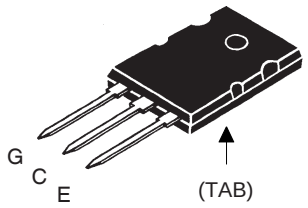
IXGK64N60B3D1
IXGX64N60B3D1

V_{CES} = 600V
I_{C110} = 64A
$V_{CE(sat)}$ ≤ 1.8V
$t_{fi(typ)}$ = 88ns

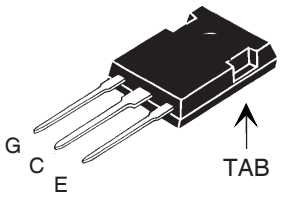
Medium speed low Vsat PT
IGBTs 5-40 kHz switching



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_{C110}	T_C = 110°C	64	A
I_{CM}	T_C = 25°C, 1ms	400	A
SSOA	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω	I_{CM} = 200	A
(RBSOA)	Clamped inductive load @ V_{CE} ≤ 600V		
P_C	T_C = 25°C	460	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 (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}			700	μA
	V_{GE} = 0V T_J = 125°C			2.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V, Note 1		1.59	1.80	V

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

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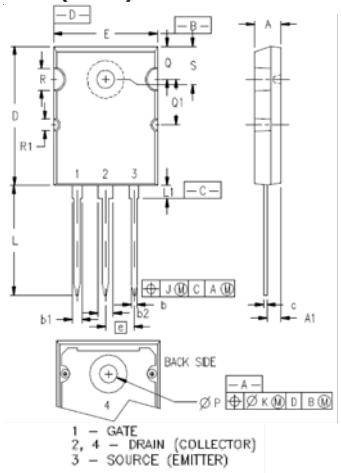
Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 50A, V_{CE} = 10V, Note 1	38	64		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4750		pF
C_{oes}			260		pF
C_{res}			65		pF
Q_g	I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		168		nC
Q_{ge}			28		nC
Q_{gc}			61		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C** I_C = 50A, V_{GE} = 15V V_{CE} = 480V, R_G = 3Ω		25		ns
t_{ri}			41		ns
E_{on}			1.5		mJ
$t_{d(off)}$			138		ns
t_{fi}			88	150	ns
E_{off}			1.0	1.9	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C** I_C = 50A, V_{GE} = 15V V_{CE} = 480V, R_G = 3Ω		24		ns
t_{ri}			40		ns
E_{on}			2.70		mJ
$t_{d(off)}$			195		ns
t_{fi}			131		ns
E_{off}			1.95		mJ
R_{thJC}				0.27	°C/W
R_{thCS}			0.15		°C/W

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 60A, V_{GE} = 0V, Note 1			2.1	V
	T_J = 150°C		1.4		V
I_{RM}	I_F = 60A, V_{GE} = 0V, T_J = 100°C $-di_F/dt$ = 100A/μs, V_R = 100V		8.3		A
t_{rr}	I_F = 1A, -di/dt = 200A/μs, V_R = 30V		35		ns
R_{thJC}				1.35	°C/W

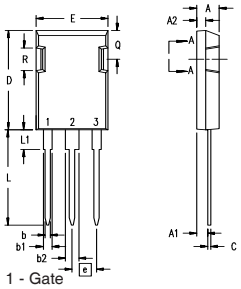
Note 1: Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

TO-264 (IXGK) Outline



DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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.	Millimeter Max.	Inches Min.	Inches 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 reserves the right to change limits, test conditions, and dimensions.

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

Fig. 1. Output Characteristics @ 25ºC

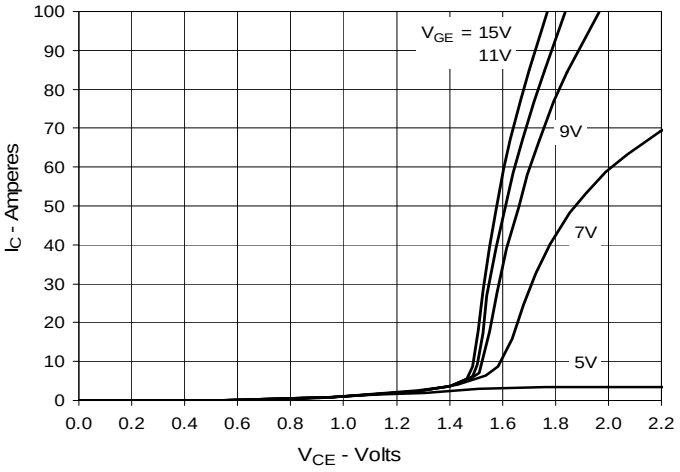


Fig. 2. Extended Output Characteristics @ 25ºC

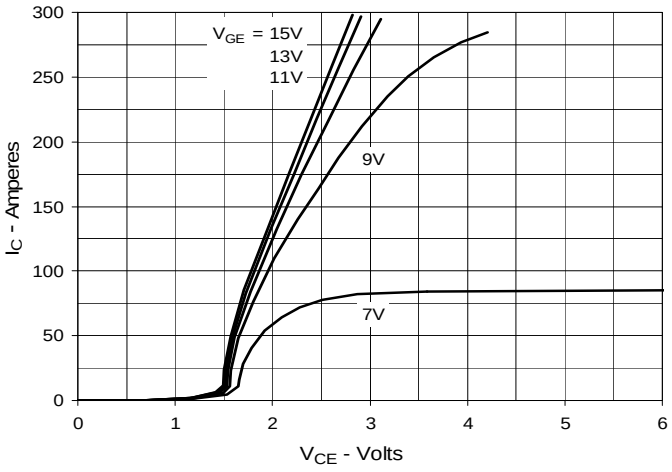


Fig. 3. Output Characteristics @ 125ºC

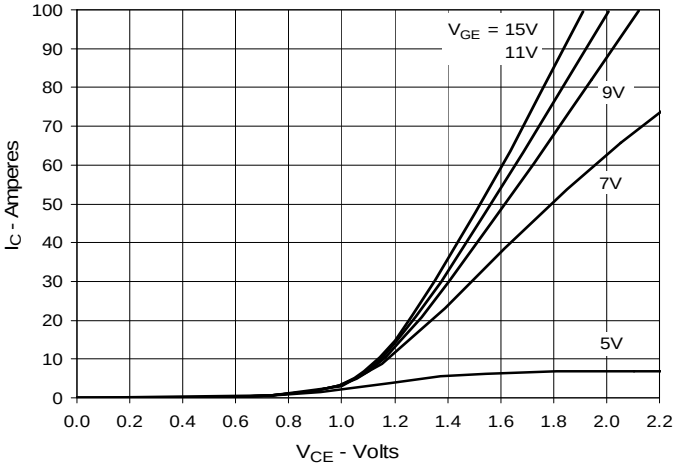


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

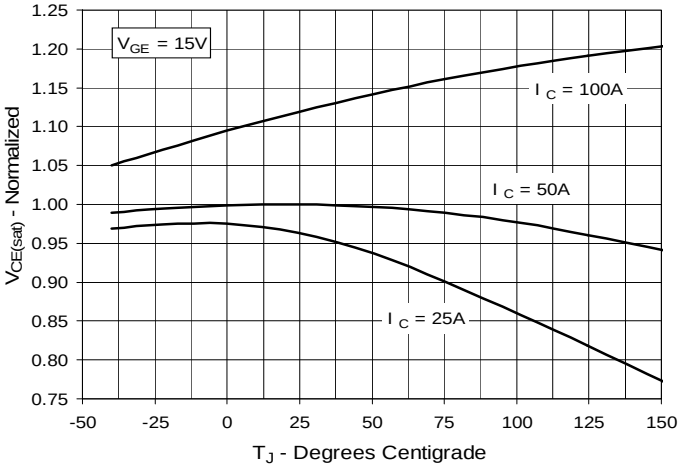


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

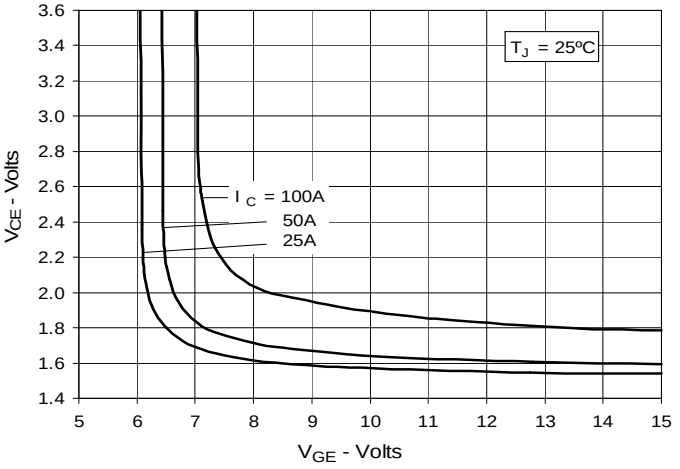
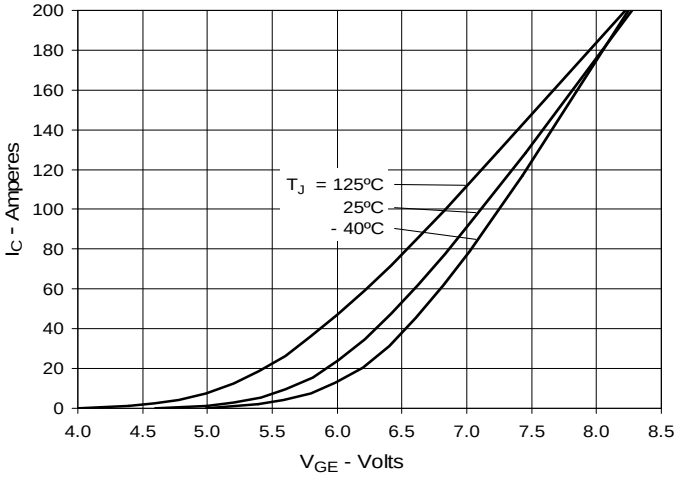


Fig. 6. Input Admittance



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Fig. 7. Transconductance

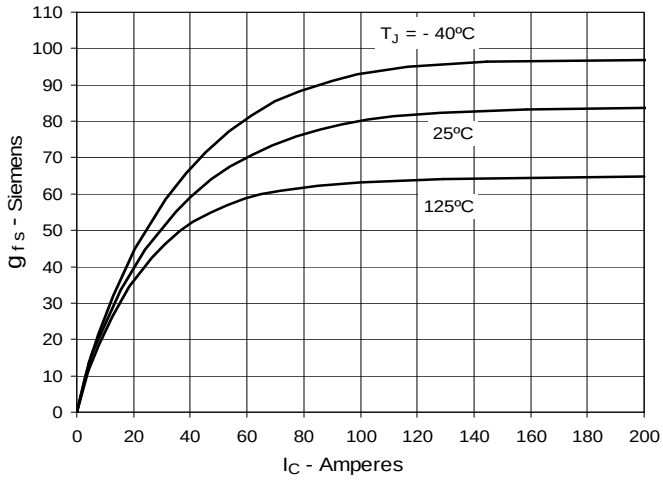


Fig. 8. Gate Charge

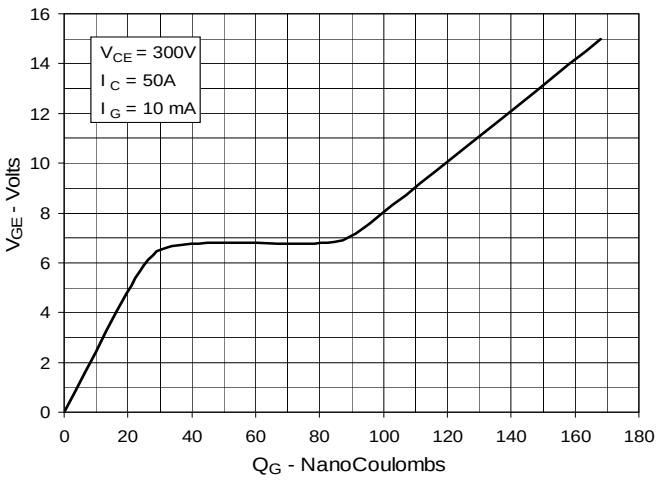


Fig. 9. Reverse-Bias Safe Operating Area

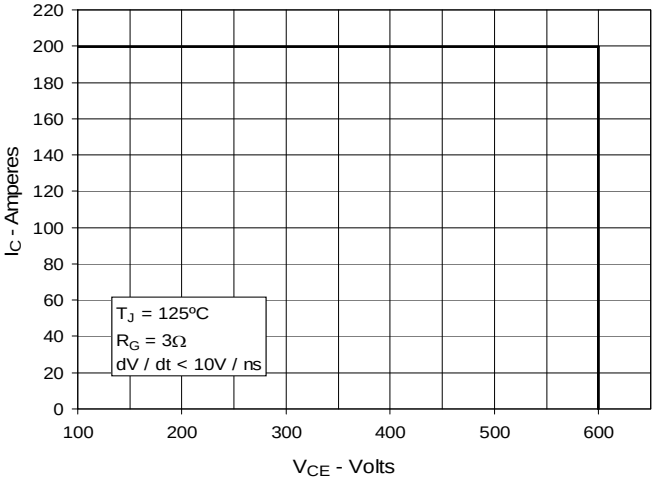


Fig. 10. Capacitance

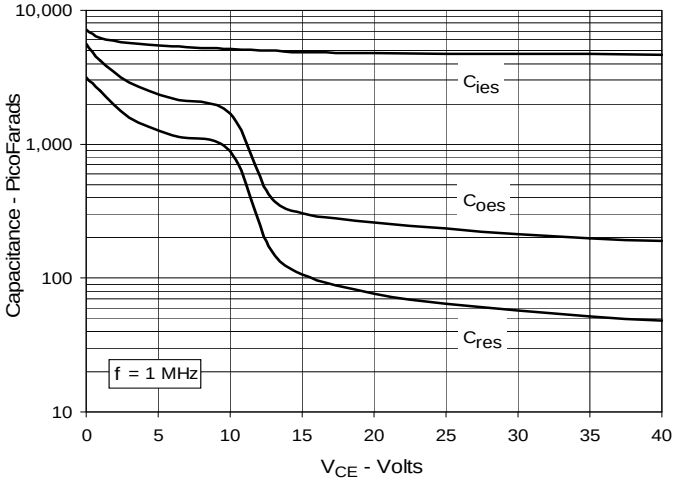
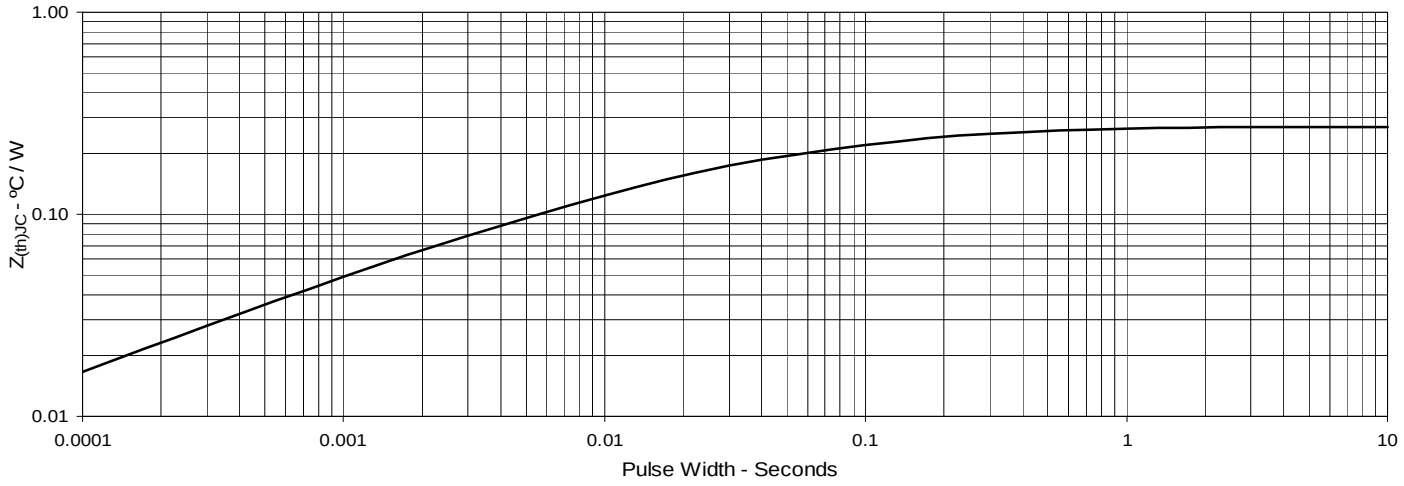


Fig. 11. Maximum Transient Thermal Impedance



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

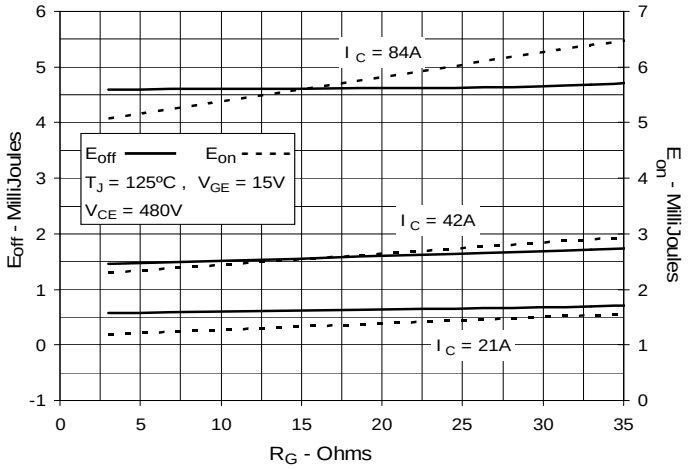


Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature

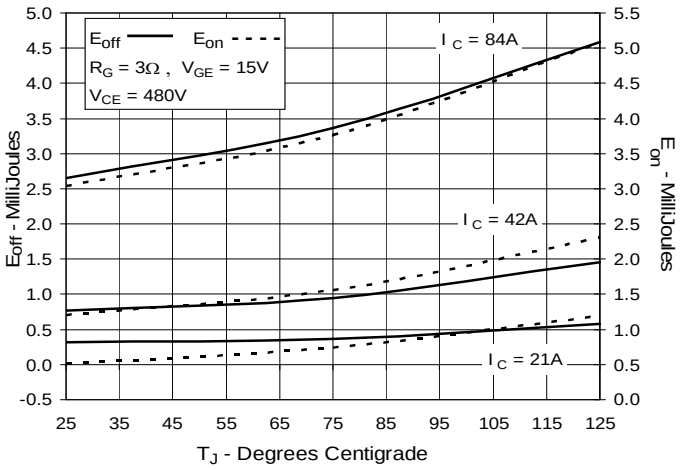


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

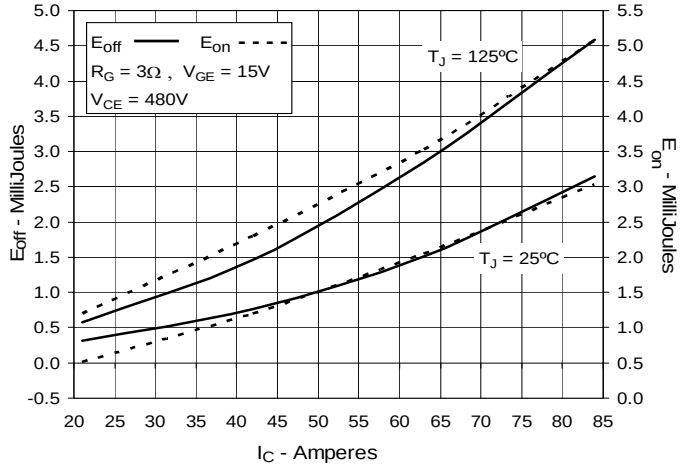


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

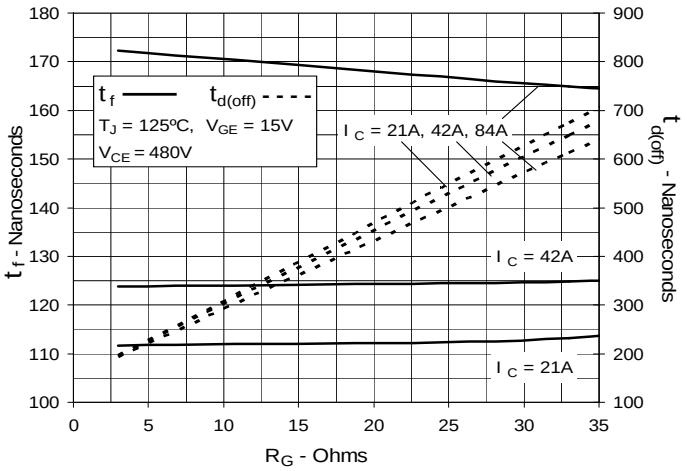


Fig. 16. Inductive Turn-off Switching Times vs. Junction Temperature

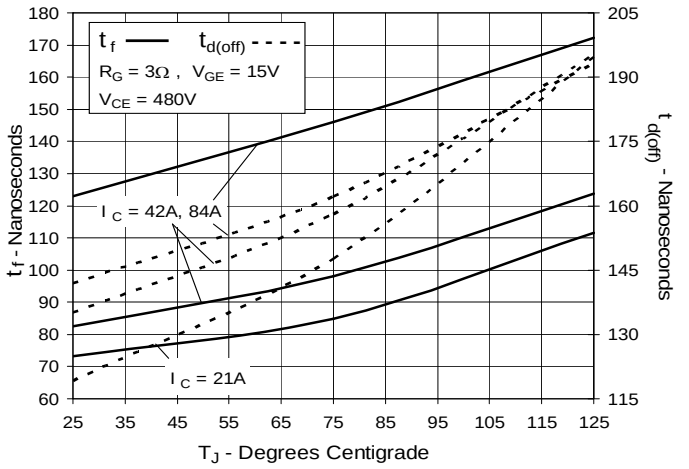
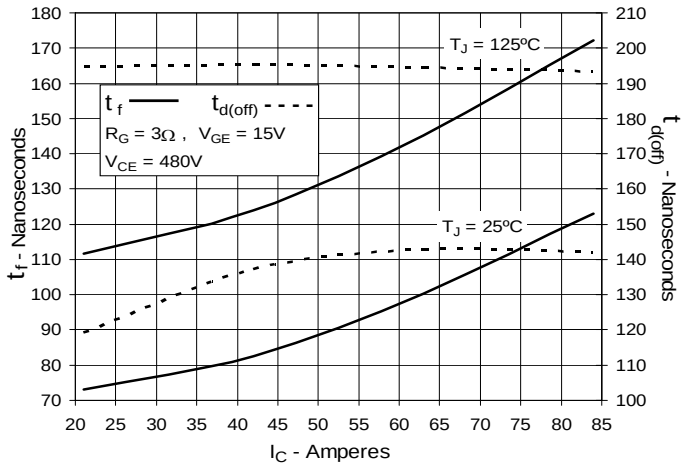


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current



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

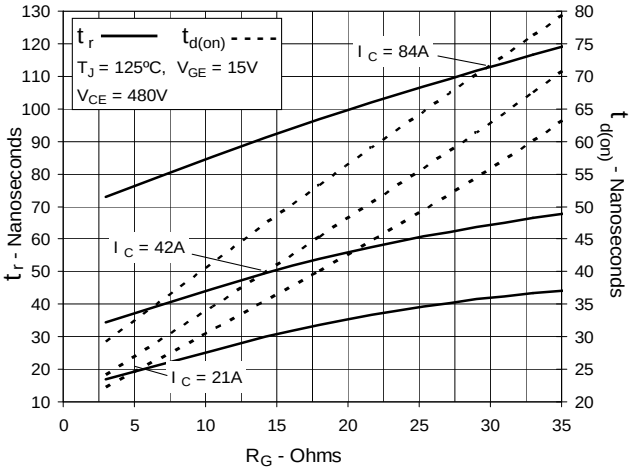


Fig. 19. Inductive Turn-on Switching Times vs. Junction Temperature

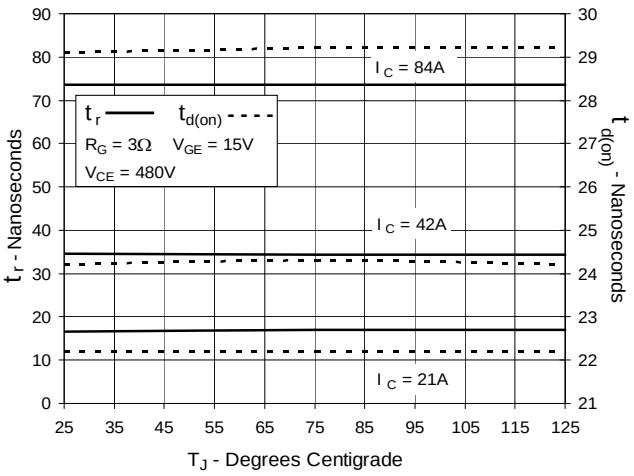
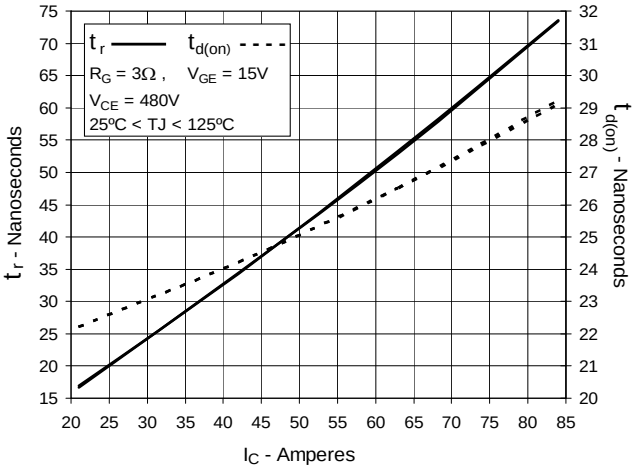


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current



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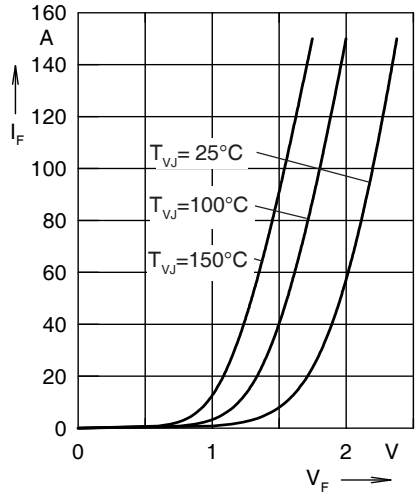


Fig. 21. Forward current I_F versus V_F

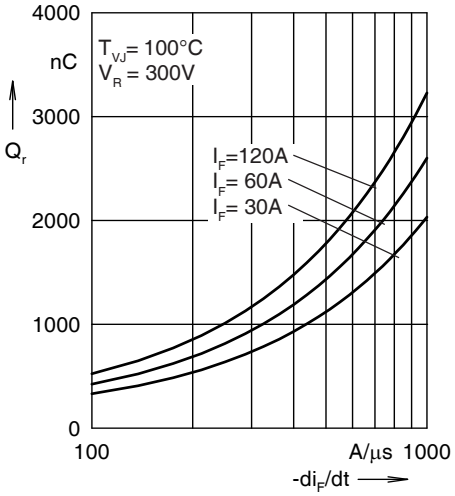


Fig. 22. Reverse recovery charge Q_r versus -di$_F$/dt

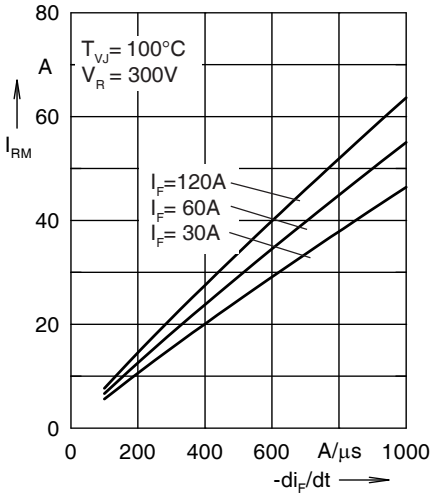


Fig. 23. Peak reverse current I_{RM} versus -di$_F$/dt

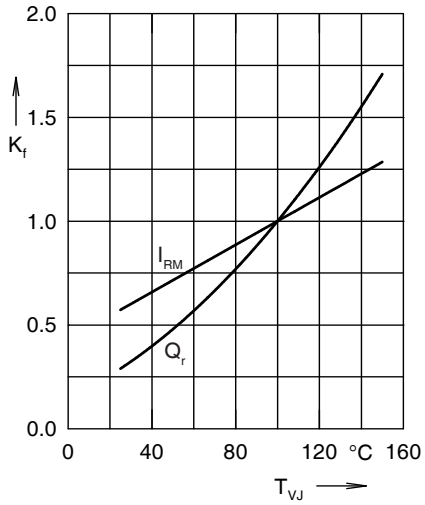


Fig. 24. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

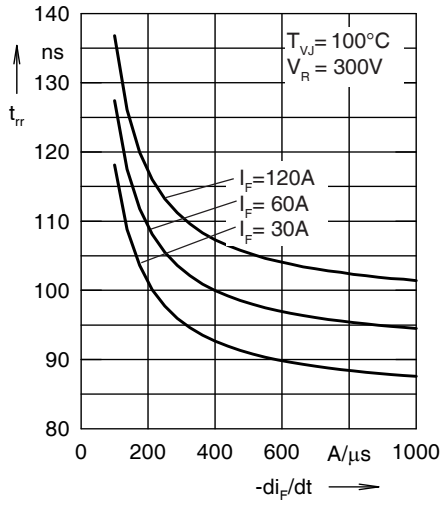


Fig. 25. Recovery time t_{rr} versus -di$_F$/dt

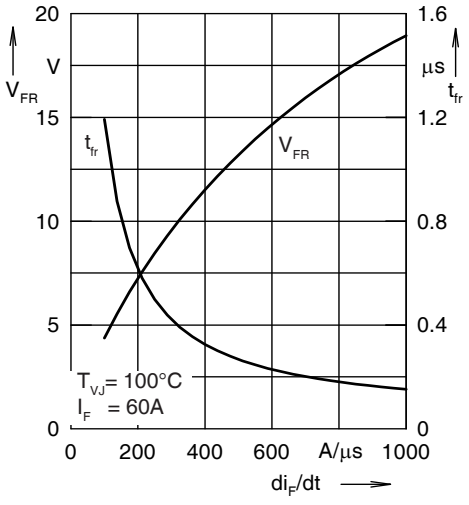


Fig. 26. Peak forward voltage V_{FR} and t_{fr} versus di$_F$/dt

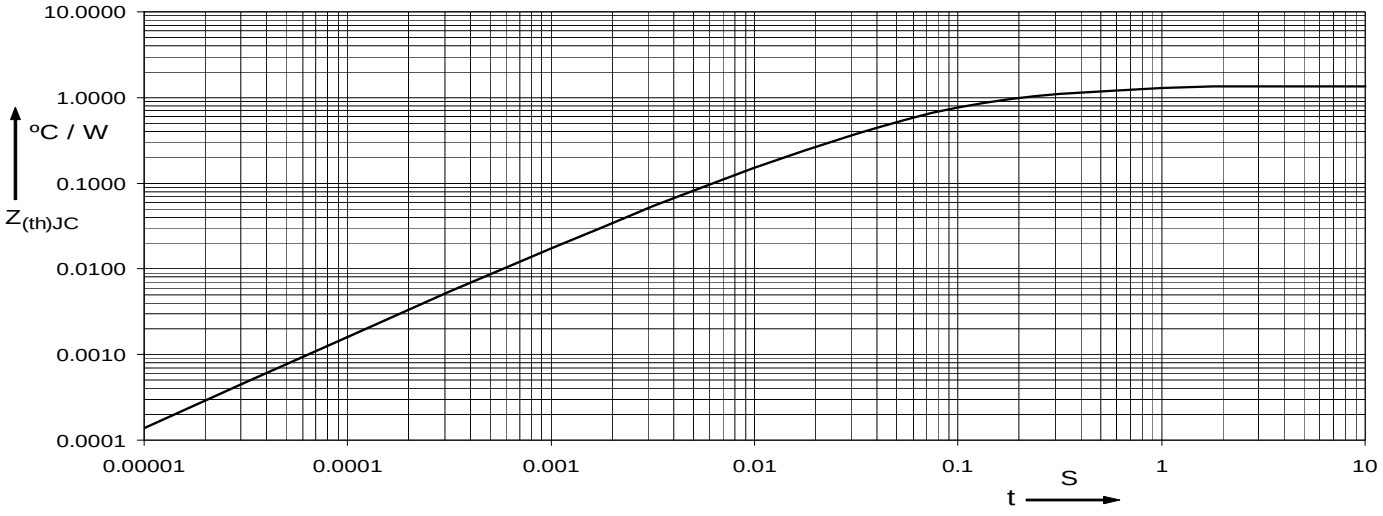


Fig. 27. Maximum transient thermal impedance junction to case (for diode)

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