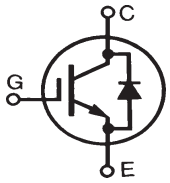
IXYS

GenX3™ 600V IGBT with Diode

IXGR72N60A3U1

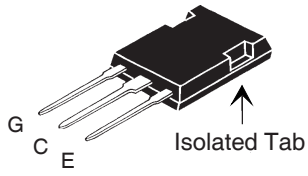
Ultra-low Vsat PT IGBTs for up to 5kHz switching

V_{CES} = 600V
I_{C110} = 52A
$V_{CE(sat)}$ ≤ 1.35V
$t_{fi(typ)}$ = 250ns



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	52	A
I_{CM}	T_C = 25°C, 1ms	400	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω Clamped inductive load @ V_{CE} ≤ 600V	I_{CM} = 150	A
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
F_C	Mounting Force	20..120/4.5..27	N/lb.
T_L	1.6mm (0.063 in.) from case for 10s	300	°C
T_{SOLD}	Plastic body for 10s	260	°C
V_{ISOL}	50/60 Hz, RMS	t = 1min 2500	V~
	I_{ISOL} ≤ 1mA	t = 1s 3000	V~
Weight		5	g

ISOPLUS247™ (IXGR)
E153432



G = Gate E = Emitter
C = Collector

Features

- Silicon chip on Direct-Copper Bond (DCB) substrate
- Isolated mounting surface
- Anti-parallel ultra fast diode
- 2500V electrical isolation

Advantages

- High power density
- Low gate drive requirement

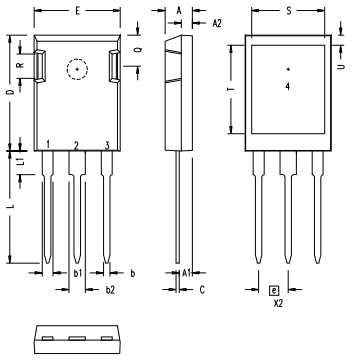
Applications

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

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} = 0.8 • V_{CES}			600	μA
	V_{GE} = 0V T_J = 125°C			18	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			± 100	nA
$V_{CE(sat)}$	I_C = 60A, V_{GE} = 15V, Note			1.35	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	48	75		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		6600		pF
C_{oes}			360		pF
C_{res}			80		pF
Q_g	I_C = 60A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		230		nC
Q_{ge}			40		nC
Q_{gc}			80		nC
$t_{d(on)}$	**Inductive Load** I_C = 50A, V_{GE} = 15V V_{CE} = 480A, R_G = 3Ω		31		ns
t_{ri}			34		ns
E_{on}			1.4		mJ
$t_{d(off)}$			320		ns
t_{fi}			250		ns
E_{off}			3.5		mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C** I_C = 50A, V_{GE} = 15V V_{CE} = 480A, R_G = 3Ω		29		ns
t_{ri}			32		ns
E_{on}			2.6		mJ
$t_{d(off)}$			510		nS
t_{fi}			375		ns
E_{off}			6.5		mJ
R_{thJC}				0.62	°C/W
R_{thCS}			0.15		°C/W

ISOPLUS247 (IXGR) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

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			2.0	V
	T_J = 150°C		1.5		V
R_{thJC}				0.75	°C/W

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

Fig. 1. Output Characteristics @ 25ºC

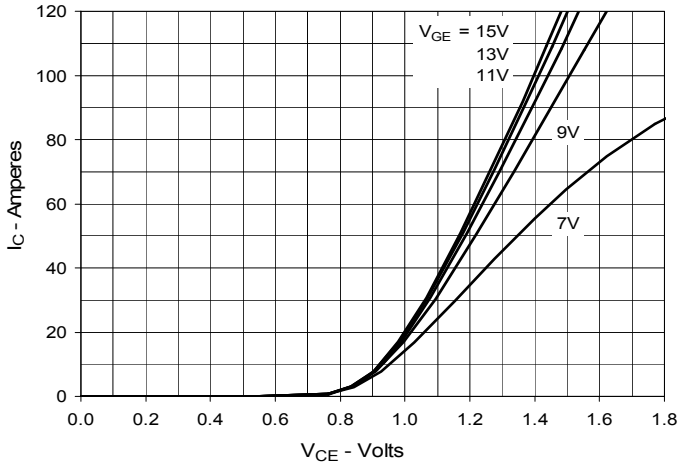


Fig. 2. Extended Output Characteristics @ 25ºC

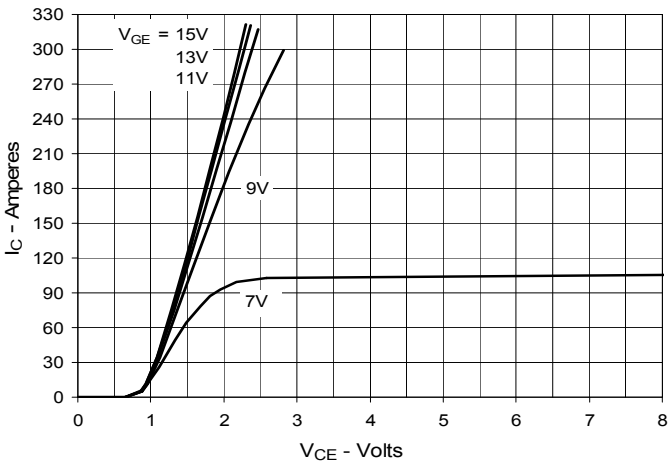


Fig. 3. Output Characteristics @ 125ºC

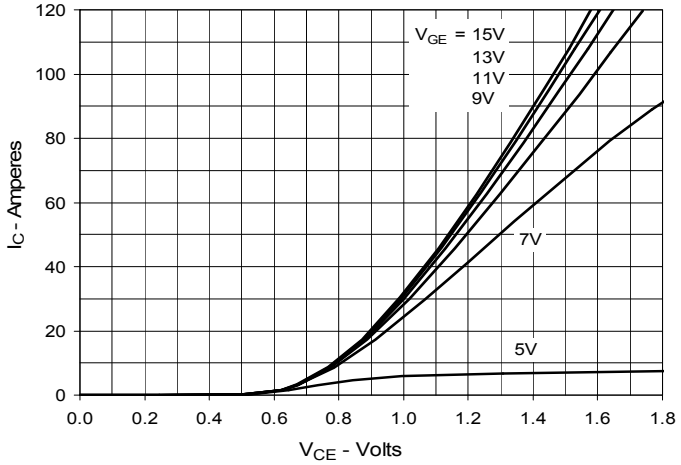


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

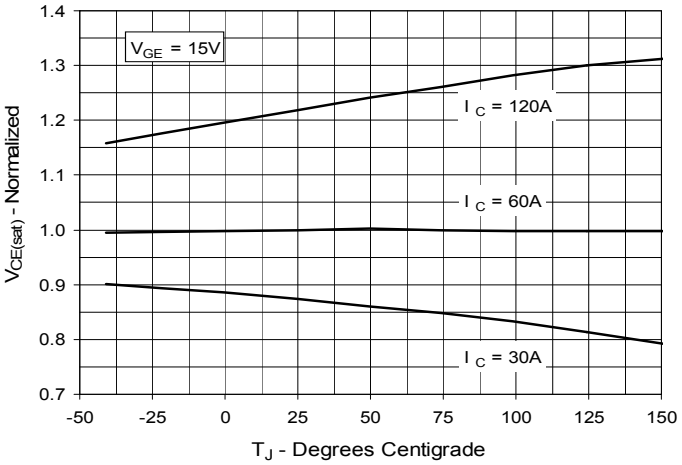


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

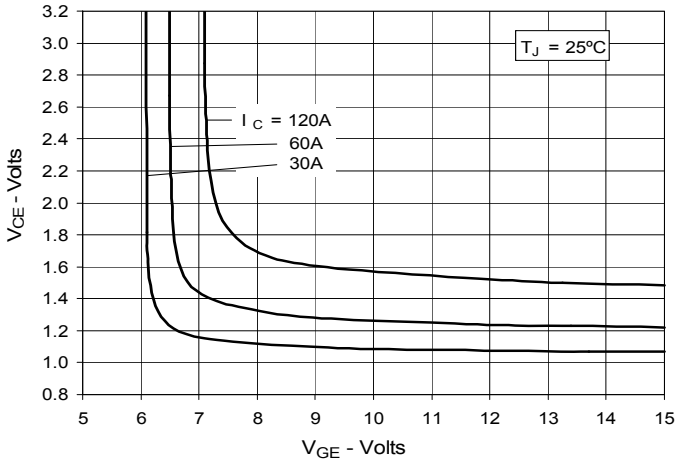


Fig. 6. Input Admittance

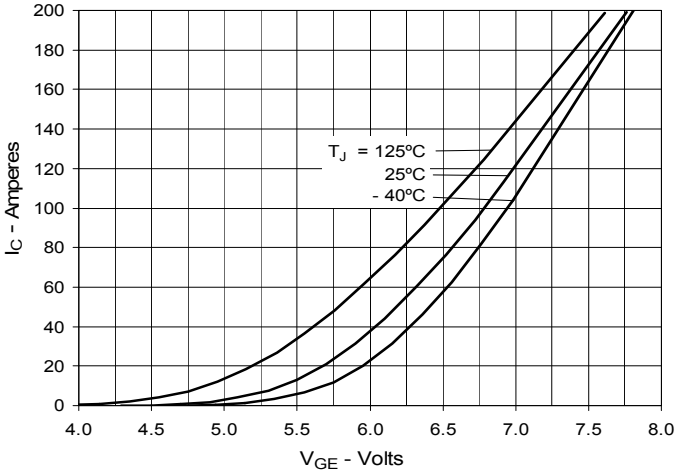


Fig. 7. Transconductance

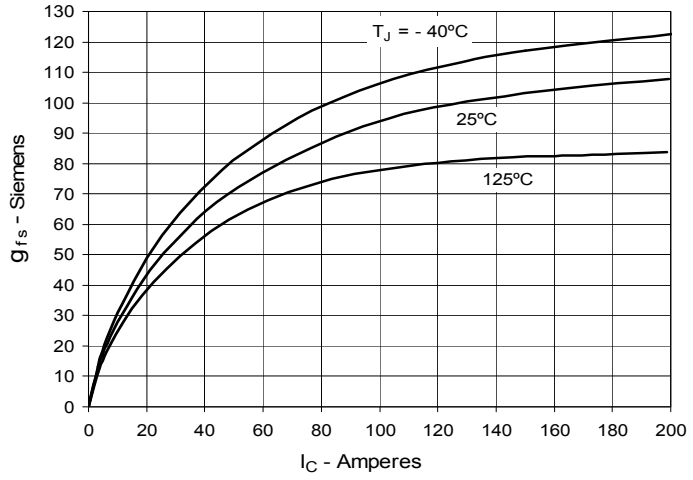


Fig. 8. Gate Charge

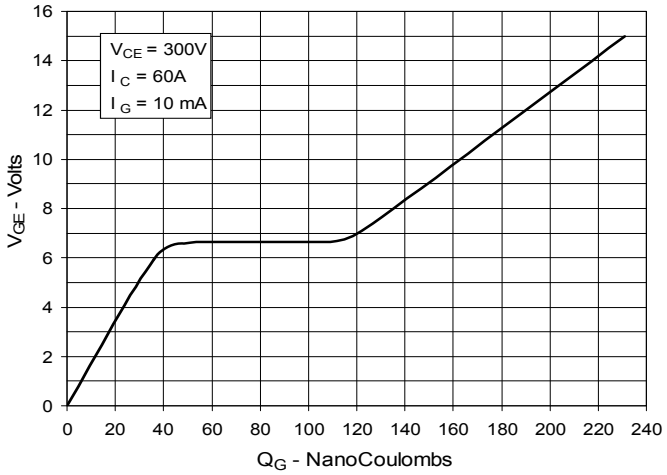


Fig. 9. Capacitance

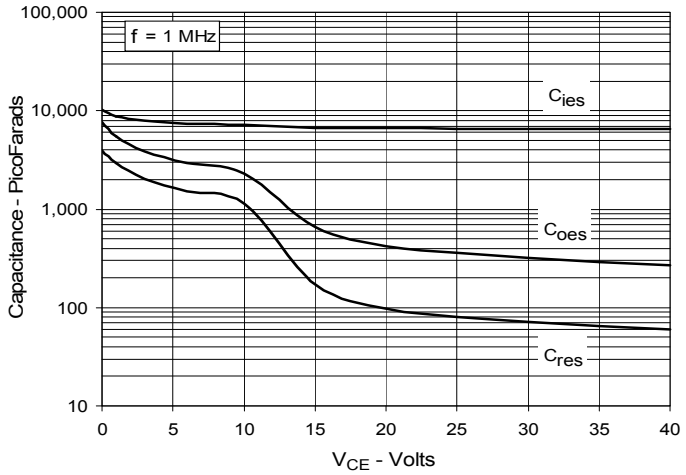


Fig. 10. Reverse-Bias Safe Operating Area

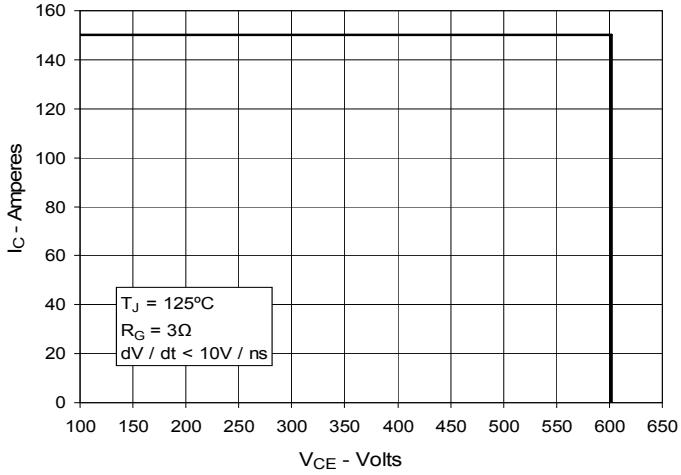


Fig. 11. Maximum Transient Thermal Impedance

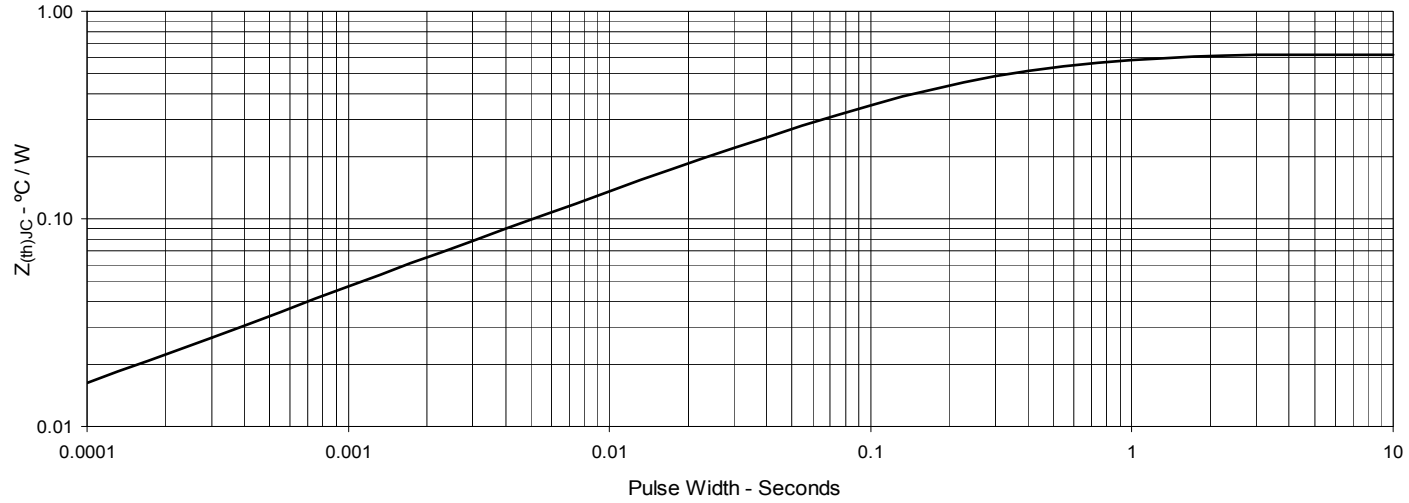


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

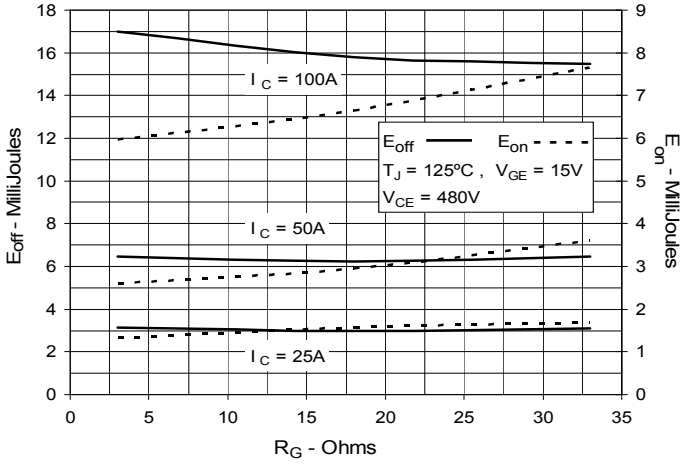


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

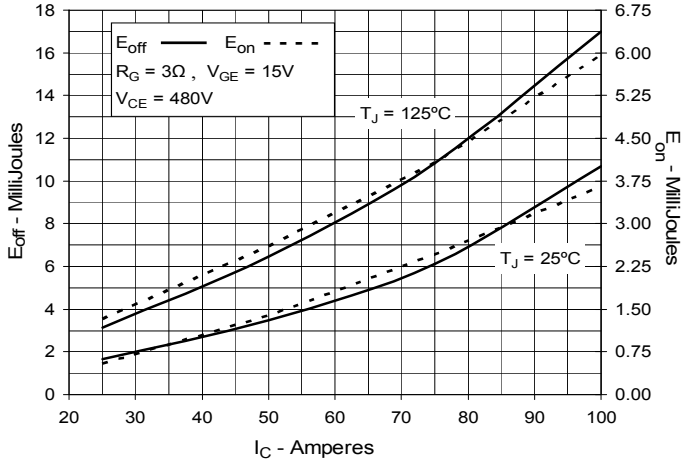


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

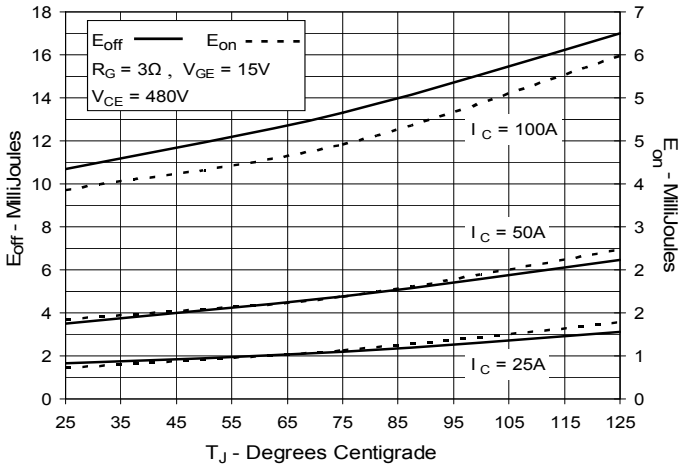


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

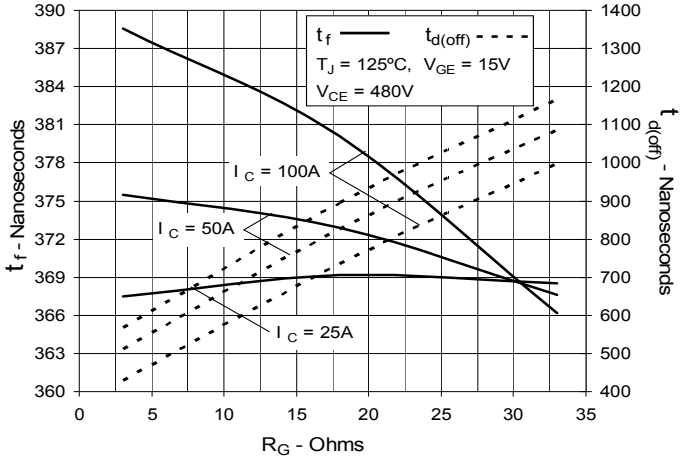


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

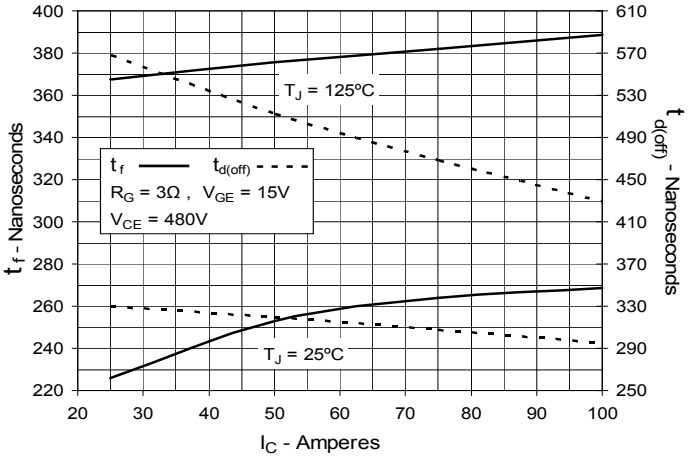


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

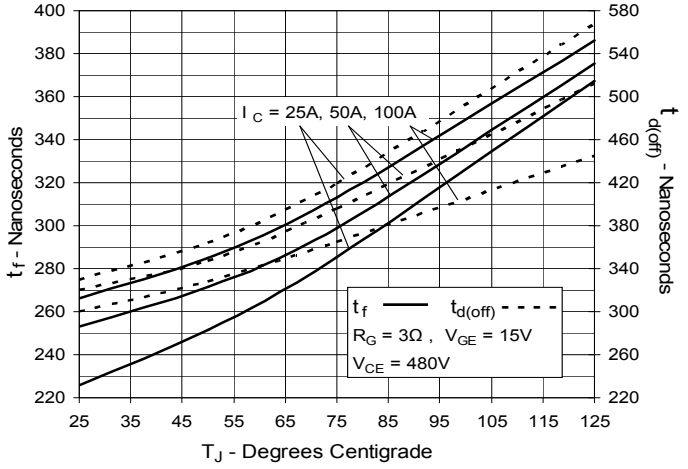


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

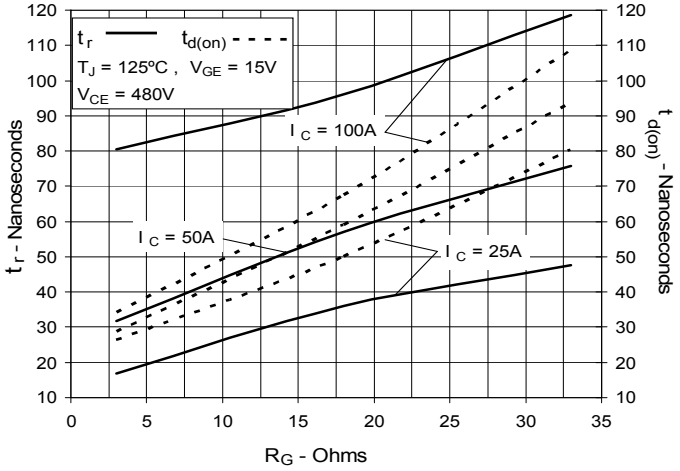


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

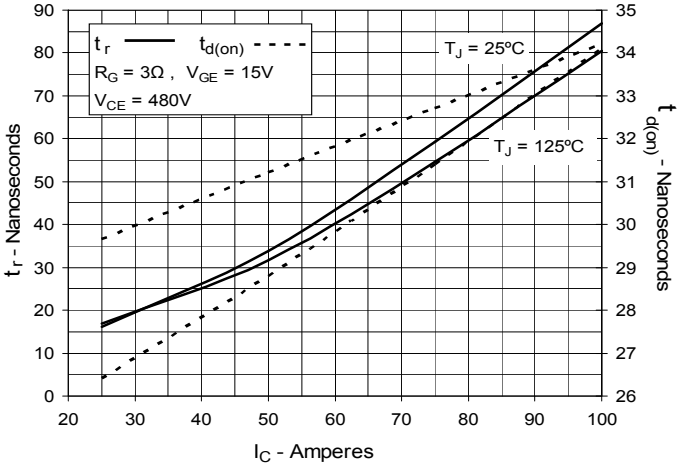
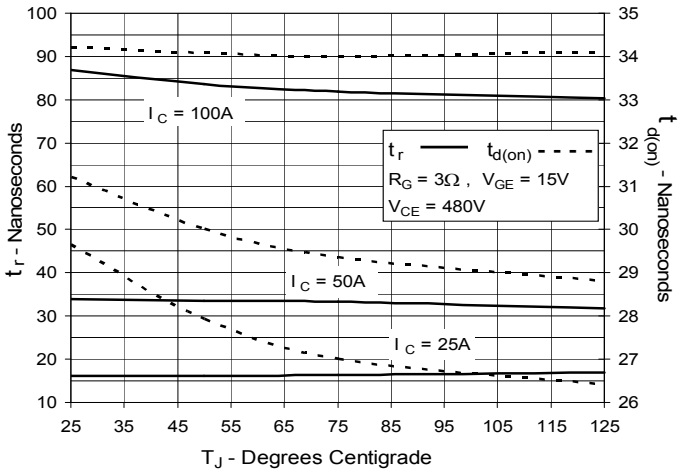


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



IXYS reserves the right to change limits, test conditions, and dimensions.

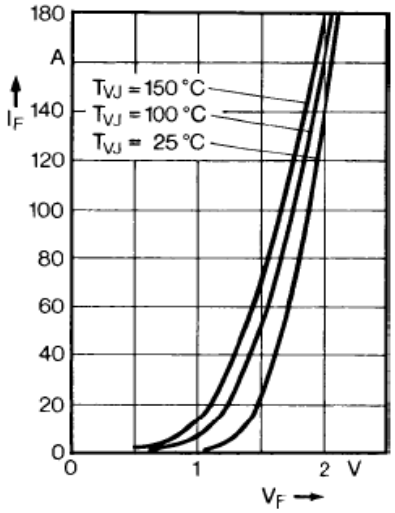


Fig. 21 Forward current versus voltage drop.

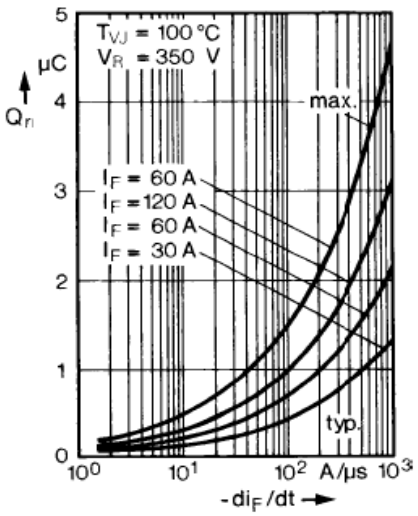


Fig. 22 Recovery charge versus $-di_F/dt$.

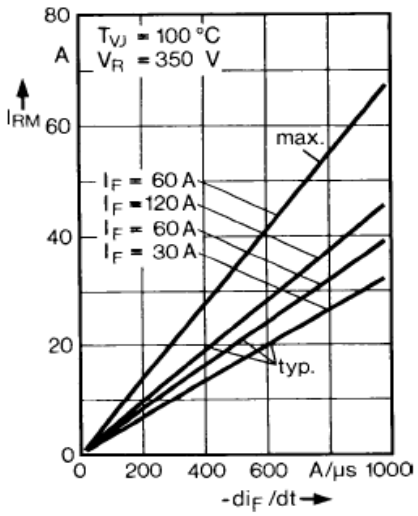


Fig. 23 Peak reverse current versus $-di_F/dt$.

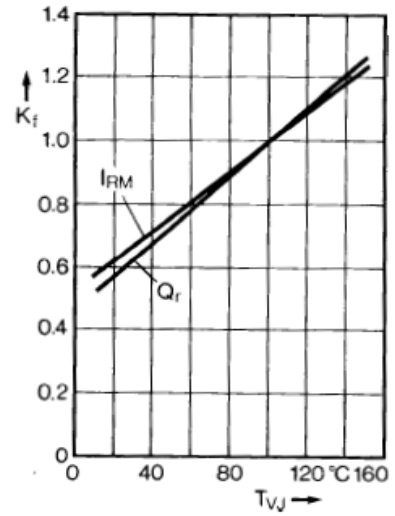


Fig. 24 Dynamic parameters versus junction temperature.

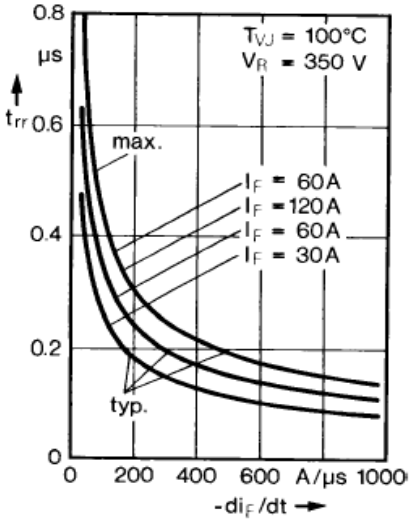


Fig. 25 Recovery time versus $-di_F/dt$.

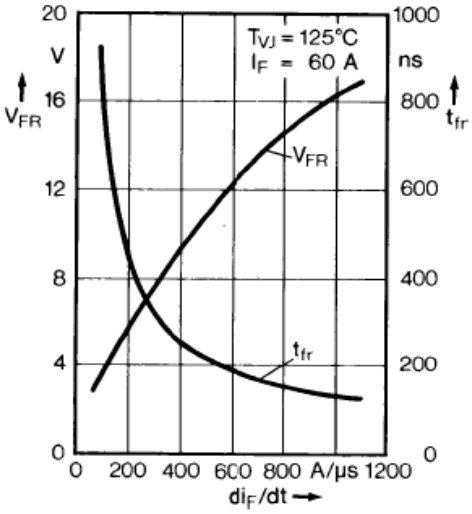


Fig. 26 Peak forward voltage vs. di_F/dt.

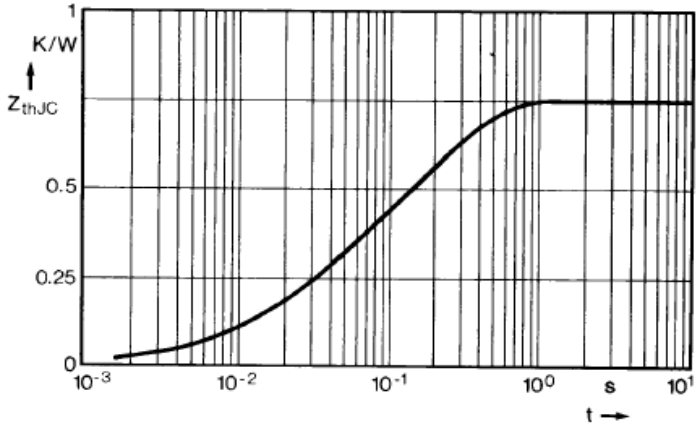


Fig. 27 Transient thermal impedance junction to case.