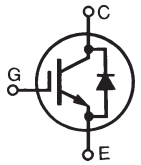
GenX3™ 600V IGBT with Diode

IXGX72N60C3H1*

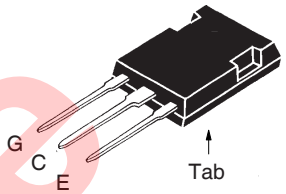
*Obsolete Part Number

High-Speed PT IGBT for 40-100kHz Switching



V_{CES} = 600V
I_{C110} = 72A
$V_{CE(sat)}$ ≤ 2.5V
$t_{fi(typ)}$ = 55ns

PLUS247



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 (Chip Capability)	72	A
I_{CM}	T_C = 25°C, 1ms	360	A
I_A	T_C = 25°C	50	A
E_{AS}	T_C = 25°C	500	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 150 $V_{CE} \leq V_{CES}$	A
P_C	T_C = 25°C	540	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
M_F	Mounting Force	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	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		5.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			250	μA
	T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 50A, V_{GE} = 15V, Note 1		2.10	2.50	V
	T_J = 125°C		1.65		

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Avalanche Rated
- Anti-Parallel Ultra Fast Diode
- International Standard Package

Advantages

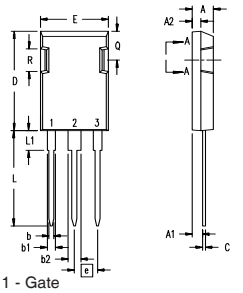
- High Power Density
- Low Gate Drive Requirement

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	33	55		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4780		pF
C_{oes}			330		pF
C_{res}			117		pF
Q_g	I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		174		nC
Q_{ge}			33		nC
Q_{gc}			72		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		27		ns
t_{ri}			37		ns
E_{on}	I_C = 50A, V_{GE} = 15V		1.03		mJ
$t_{d(off)}$	V_{CE} = 480V, R_G = 2Ω, Note 2		77	130	ns
t_{fi}			55	110	ns
E_{off}			0.48	0.95	mJ
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		26		ns
t_{ri}			36		ns
E_{on}	I_C = 50A, V_{GE} = 15V		1.48		mJ
$t_{d(off)}$	V_{CE} = 480V, R_G = 2Ω, Note 2		120		ns
t_{fi}			124		ns
E_{off}			0.93		mJ
R_{thJC}				0.23	°C/W
R_{thCS}			0.15		°C/W

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

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		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

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.

Fig. 1. Output Characteristics @ T_J = 25ºC

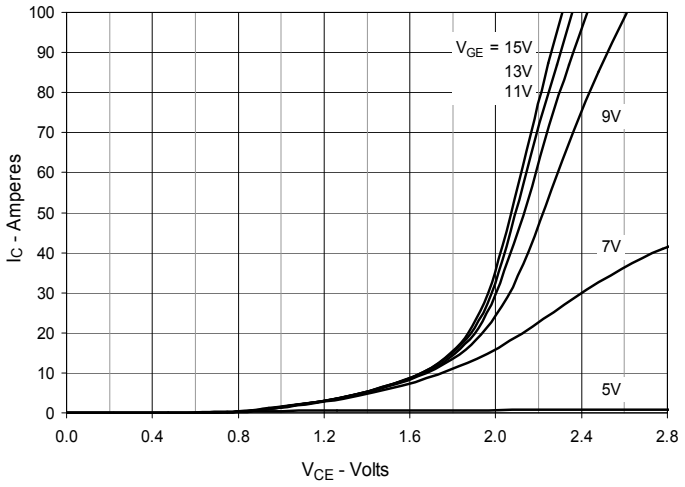


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

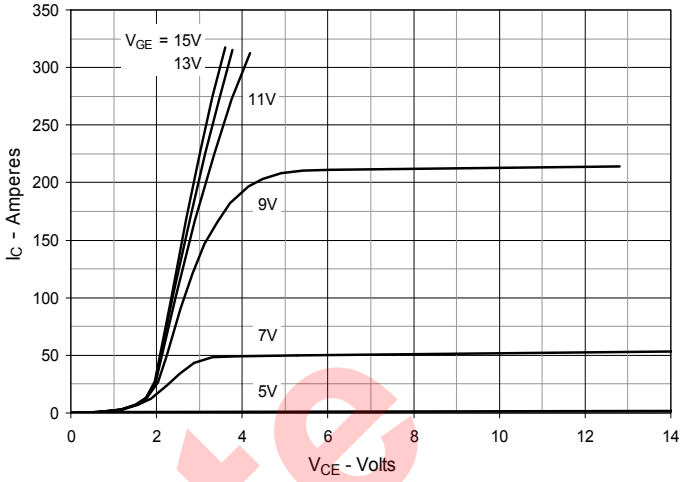


Fig. 3. Output Characteristics @ T_J = 125ºC

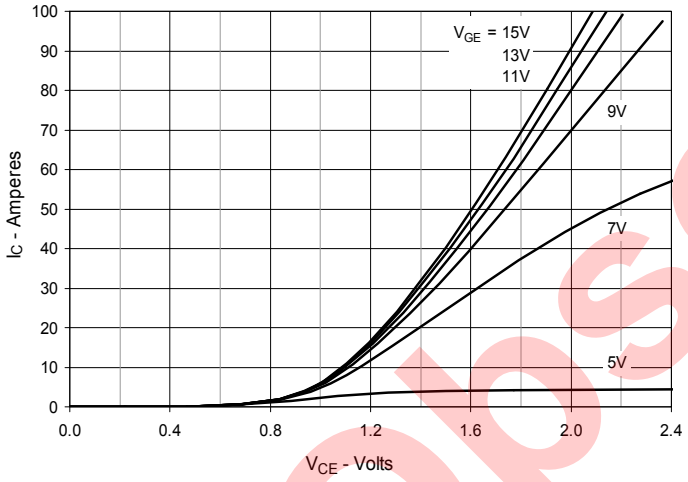


Fig. 4. Dependence of $V_{CE(sat)}$ on JunctionTemperature

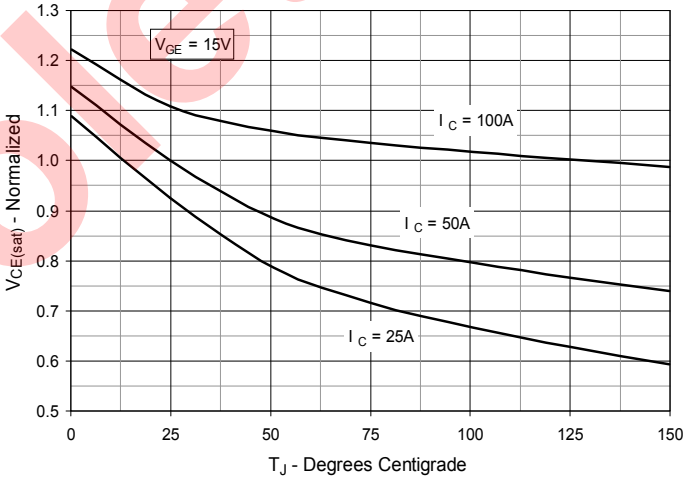


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

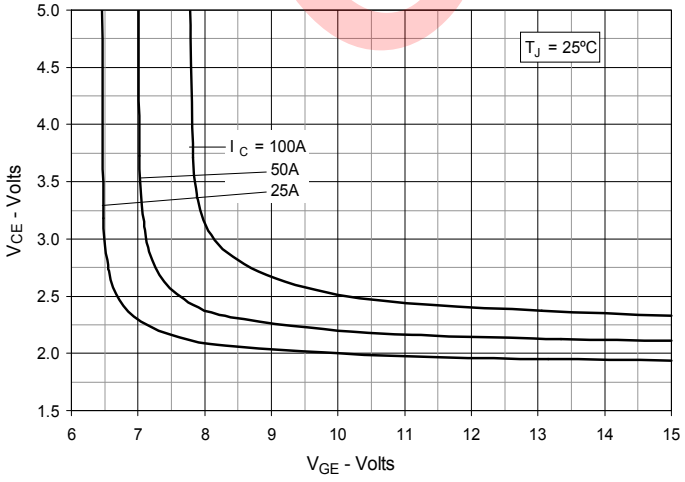


Fig. 6. Input Admittance

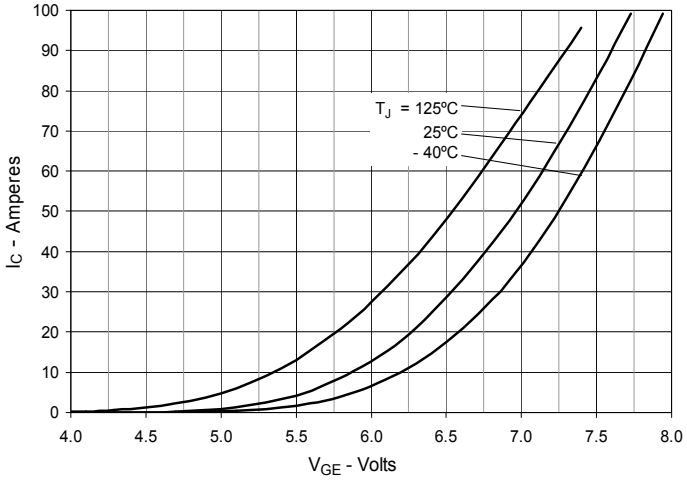


Fig. 7. Transconductance

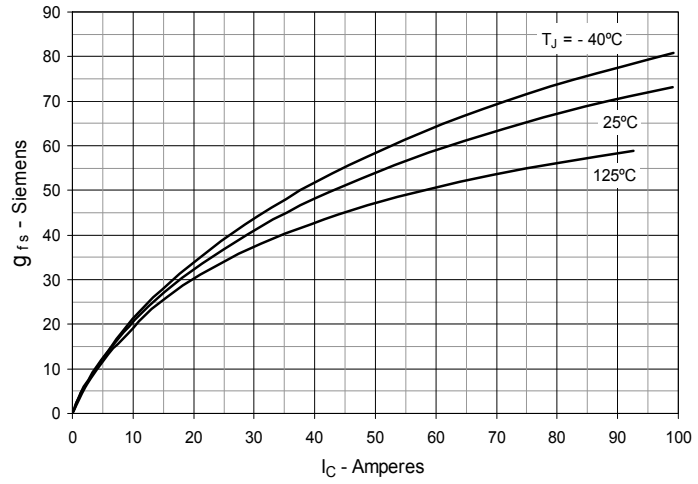


Fig. 8. Gate Charge

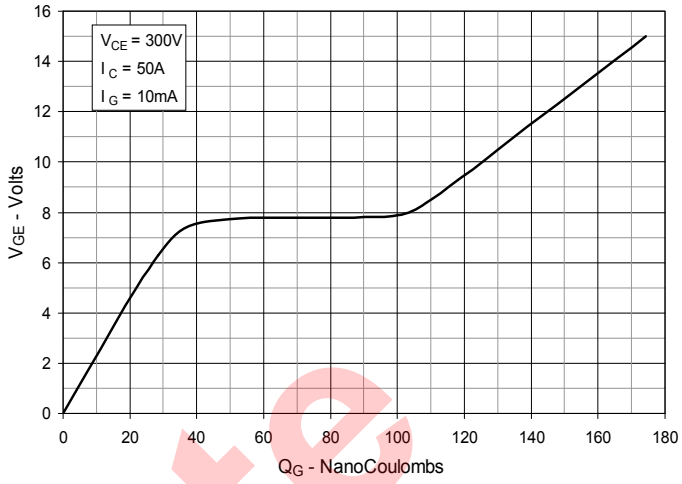


Fig. 9. Capacitance

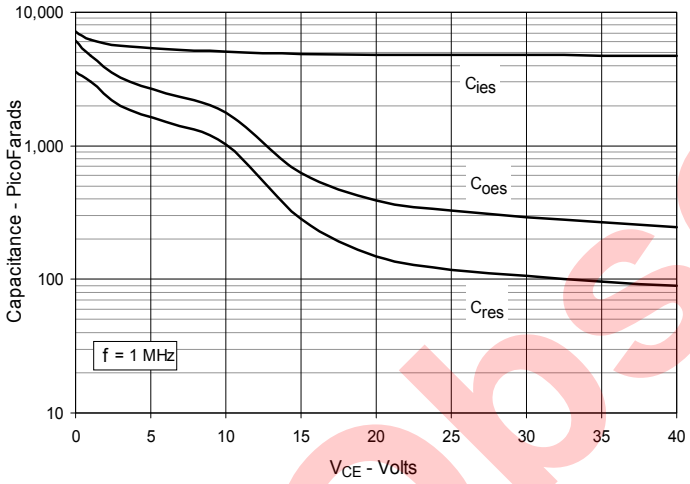


Fig. 10. Reverse-Bias Safe Operating Area

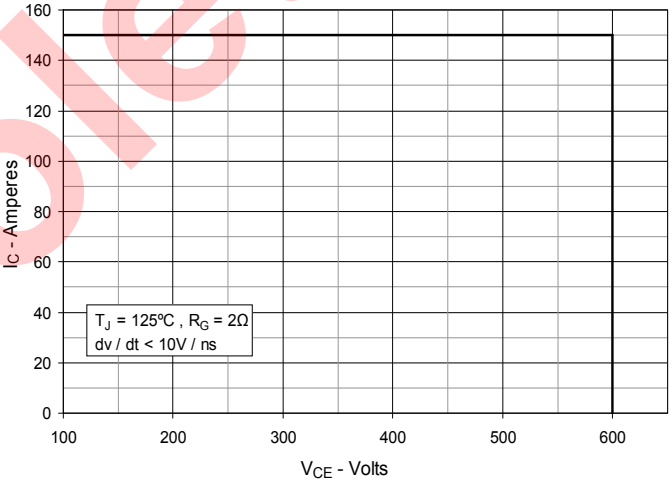


Fig. 11. Maximum Transient Thermal Impedance

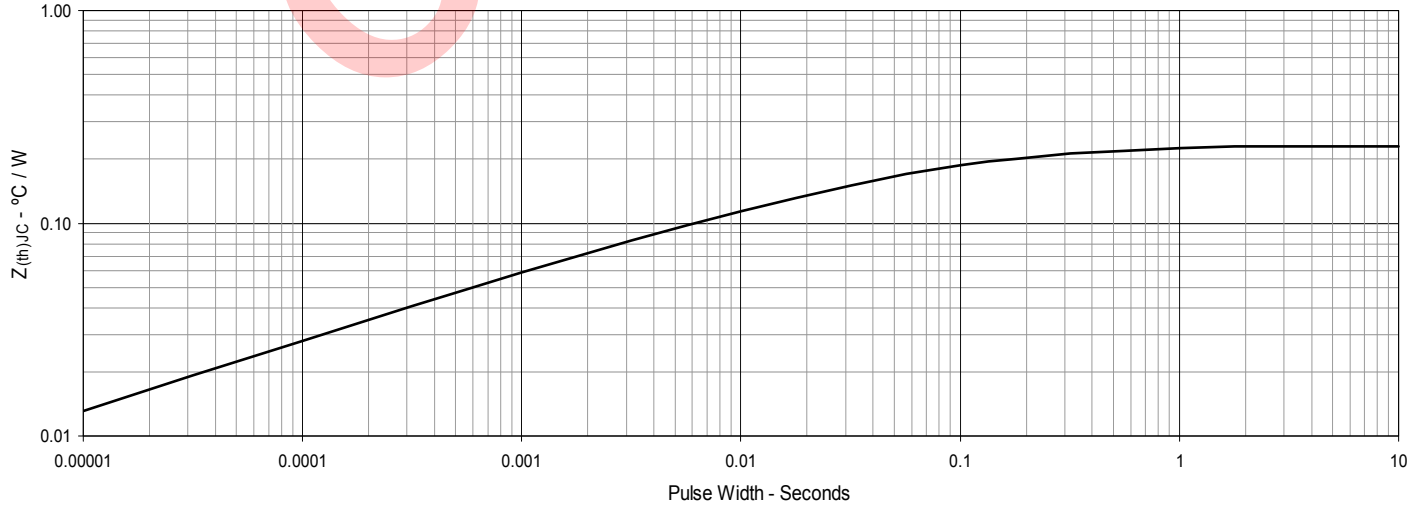


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

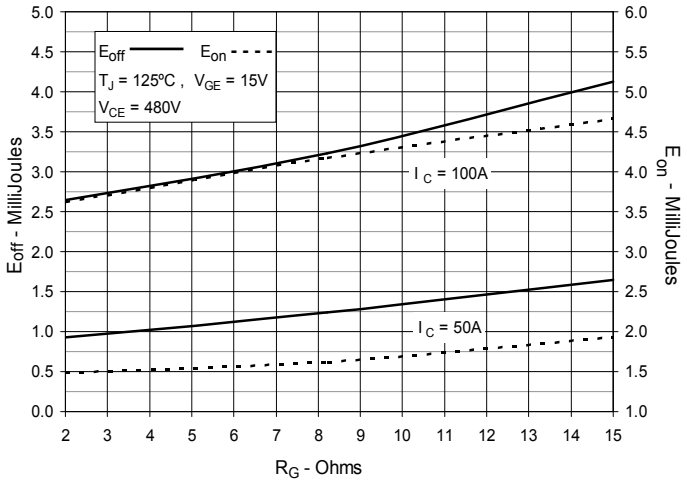


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

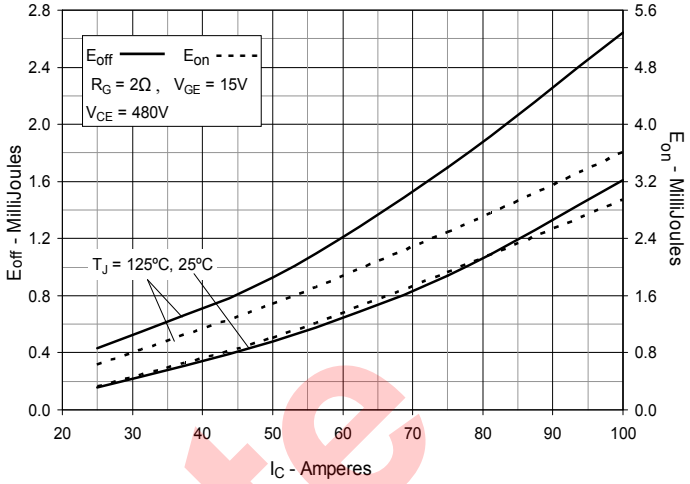


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

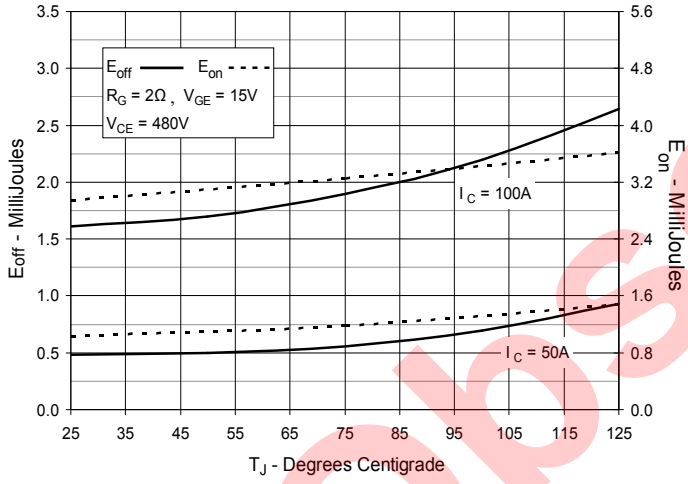


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

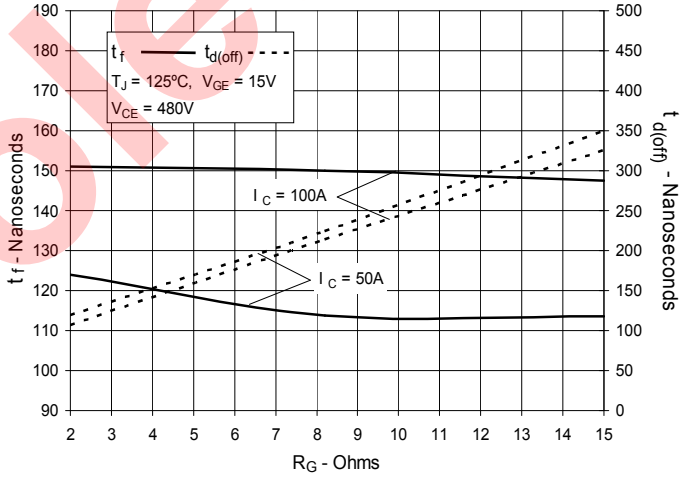


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

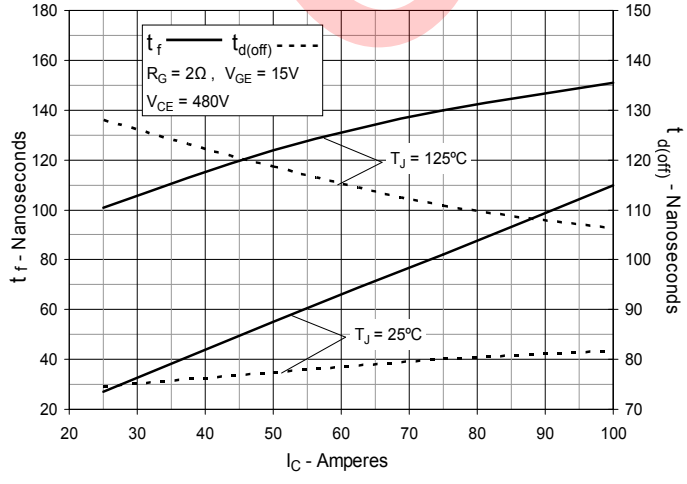


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

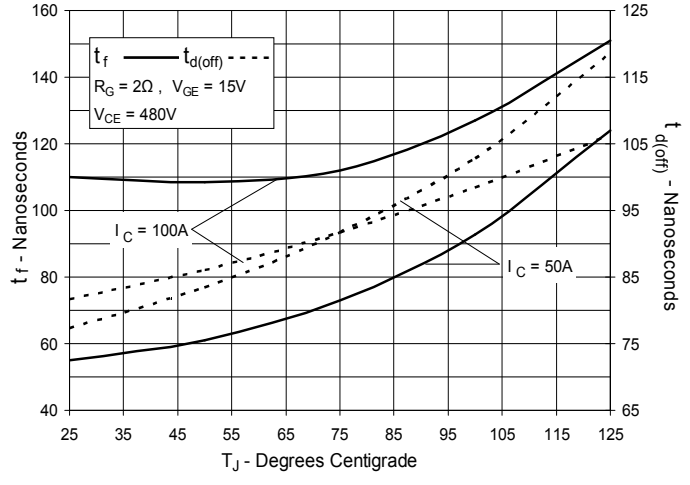


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

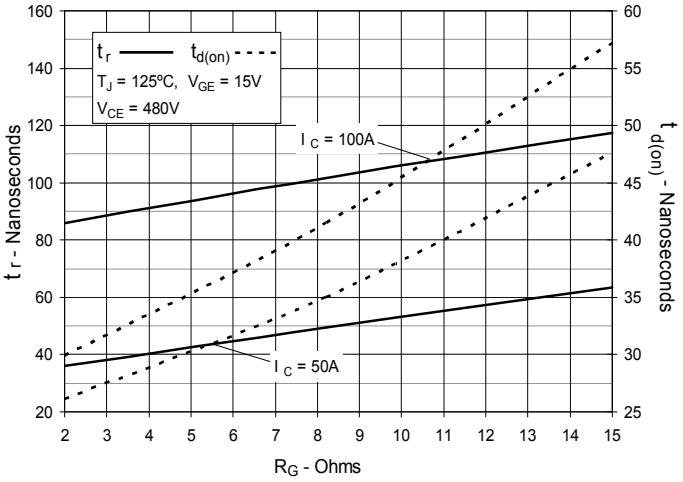


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

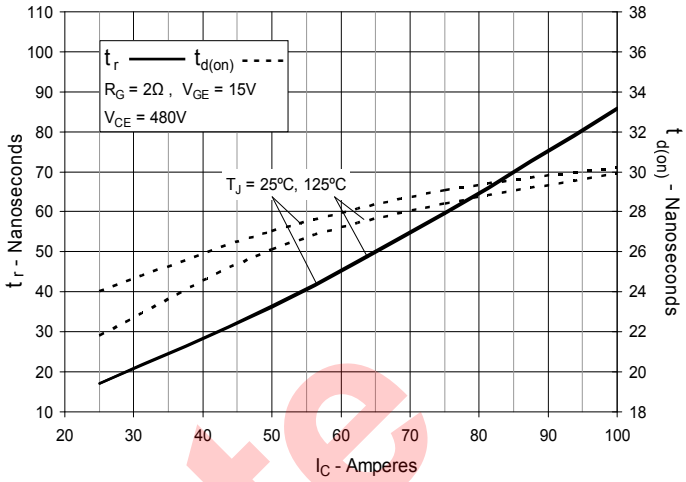
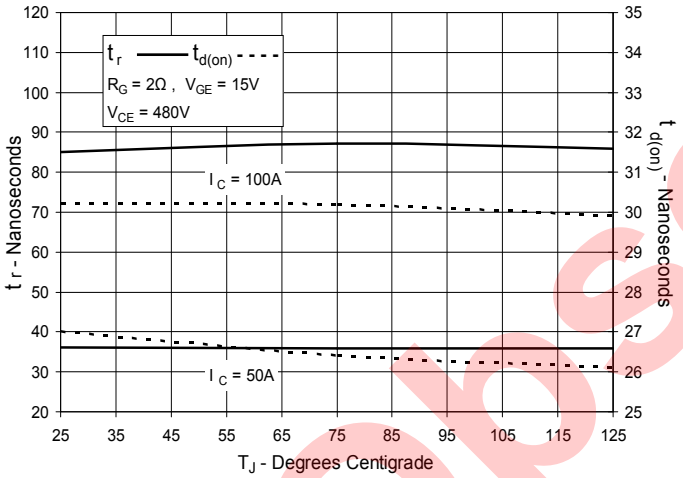


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



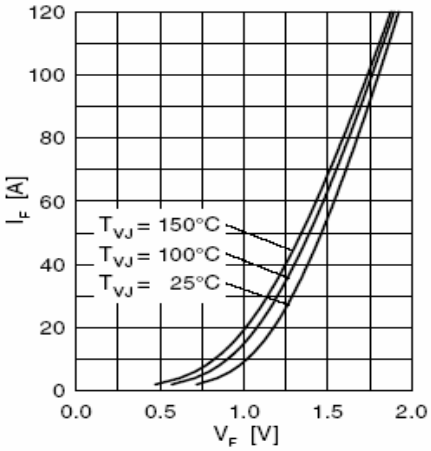


Fig. 1 Forward current I_F vs. V_F

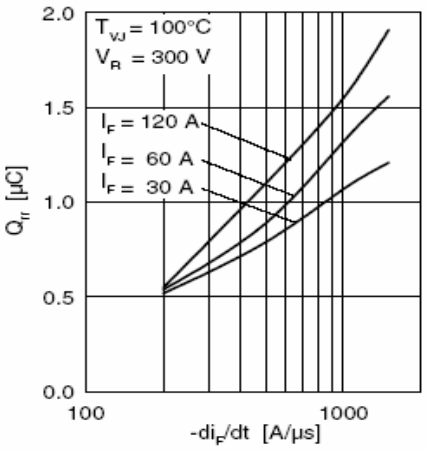


Fig. 2 Typ. reverse recovery charge Q_{rr}

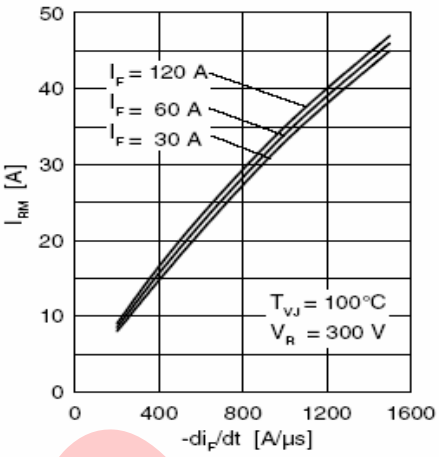


Fig. 3 Typ. peak reverse current I_{RM}

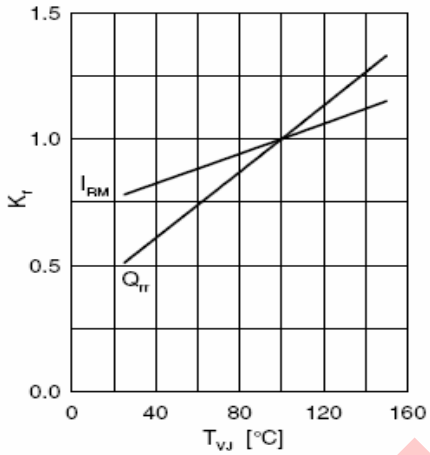


Fig. 4 Typ. dynamic parameters Q_{rr}, I_{RM}

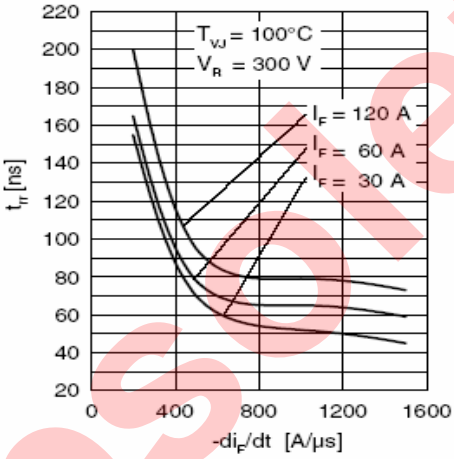


Fig. 5 Typ. recovery time t_{rr}

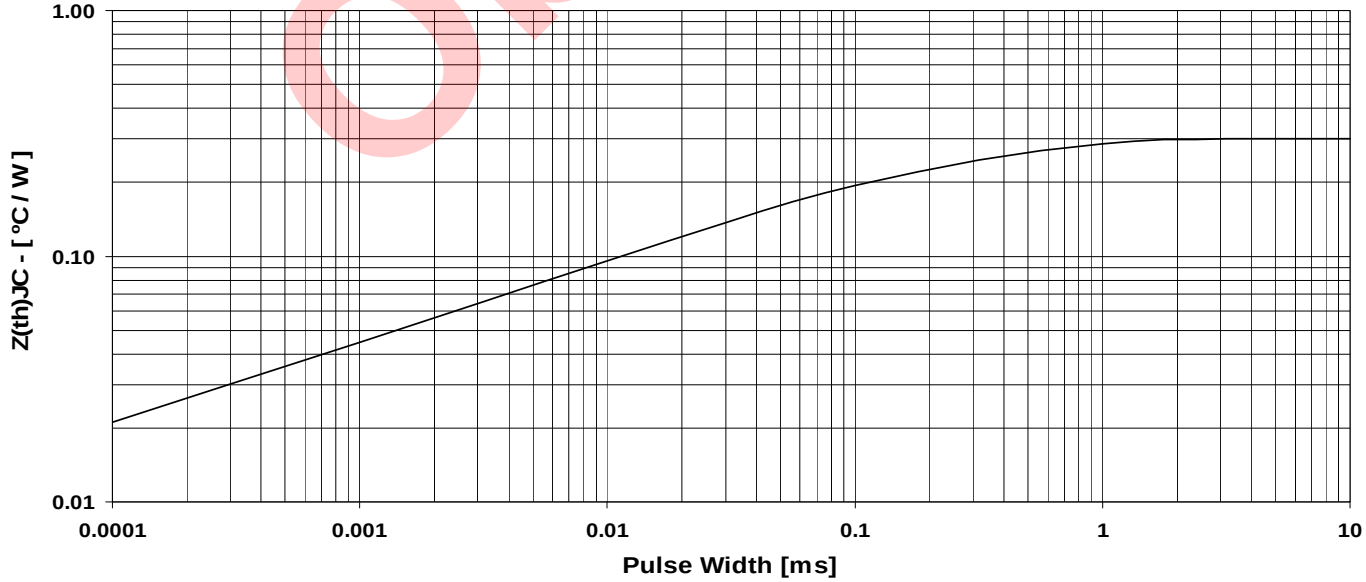


Fig. 26 Maximum transient thermal impedance junction to case (for diode)

IXYS
A Littelfuse Technology