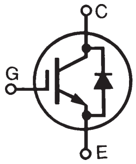
IXYS

1200V XPT™ IGBT GenX3™ w/ Diode

IXYT20N120C3D1HV

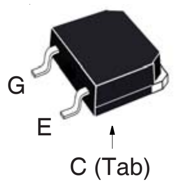
V_{CES} = 1200V
I_{C110} = 17A
$V_{CE(sat)}$ ≤ 3.4V
$t_{fi(typ)}$ = 108ns

High-Speed IGBT
for 20-50 kHz Switching



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	36	A
I_{C110}	T_C = 110°C	17	A
I_{F110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	88	A
I_A	T_C = 25°C	10	A
E_{AS}	T_C = 25°C	400	mJ
SSOA **(RBSOA)**	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 40 @$V_{CE} \le V_{CES}$	A
P_C	T_C = 25°C	230	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
Weight		4	g

TO-268HV



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

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Positive Thermal Coefficient of Vce(sat)
- High Voltage Package
- Anti-Parallel Ultra Fast Diode
- Avalanche Rated

Advantages

- High Power Density
- Low Gate Drive Requirement

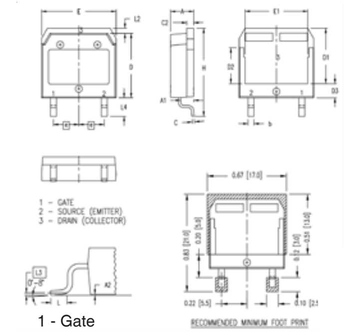
Applications

- High Frequency 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	1200			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	µA
	T_J = 125°C			350	µA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 1			3.4	V
	T_J = 150°C		4.0		V

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$I_C = 20A$, $V_{CE} = 10V$, Note 1	7.0	11.5		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		1110		pF
C_{oes}			120		pF
C_{res}			27		pF
$Q_{g(on)}$	$I_C = 20A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		53		nC
Q_{ge}			9		nC
Q_{gc}			22		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 0.5 \bullet V_{CES}$, $R_G = 10\Omega$ Note 2		20		ns
t_{ri}			29		ns
E_{on}			1.3		mJ
$t_{d(off)}$			90		ns
t_{fi}			108		ns
E_{off}			0.5	1.0	mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$** $I_C = 20A$, $V_{GE} = 15V$ $V_{CE} = 0.5 \bullet V_{CES}$, $R_G = 10\Omega$ Note 2		20		ns
t_{ri}			40		ns
E_{on}			3.7		mJ
$t_{d(off)}$			115		ns
t_{fi}			105		ns
E_{off}			0.7		mJ
R_{thJC}				0.54	°C/W

TO-268HV Outline



1 - Gate
2 - Emitter
3 - Collector

Dim.	Millimeter min	Millimeter max	Inches min	Inches max
A	4.90	5.10	0.193	0.201
A1	2.70	2.90	0.106	0.114
A2	0.02	0.25	0.001	0.100
b	1.15	1.45	0.045	0.057
C	0.40	0.65	0.016	0.026
C 2	1.45	1.60	0.057	0.063
D	13.80	14.00	0.543	0.551
D1	11.80	12.10	0.465	0.476
D2	7.50	7.80	0.295	0.307
D3	2.90	3.20	0.114	0.126
E	15.85	16.05	0.624	0.632
E1	13.30	13.60	0.524	0.535
e	5.45 BSC		0.215 BSC	
H	18.70	19.10	0.736	0.752
L	1.70	2.00	0.067	0.079
L2	1.00	1.15	0.039	0.045
L3	0.25 BSC		0.010 BSC	
L4	3.80	4.10	0.150	0.161

Reverse Diode (FRED)

($T_J = 25°C$, Unless Otherwise Specified)

Symbol	Test Conditions		Characteristic Value Min.	Typ.	Max.	
V_F	$I_F = 30A$, $V_{GE} = 0V$, Note 1				3.00	V
		$T_J = 150°C$		1.75		V
I_{RM}	$I_F = 30A$, $V_{GE} = 0V$, $-di_F/dt = 100A/\mu s$,	$T_J = 100°C$			9	A
t_{rr}	$V_R = 600V$	$T_J = 100°C$		195		ns
R_{thJC}					0.90	°C/W

Notes:

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

Fig. 1. Output Characteristics @ T_J = 25ºC

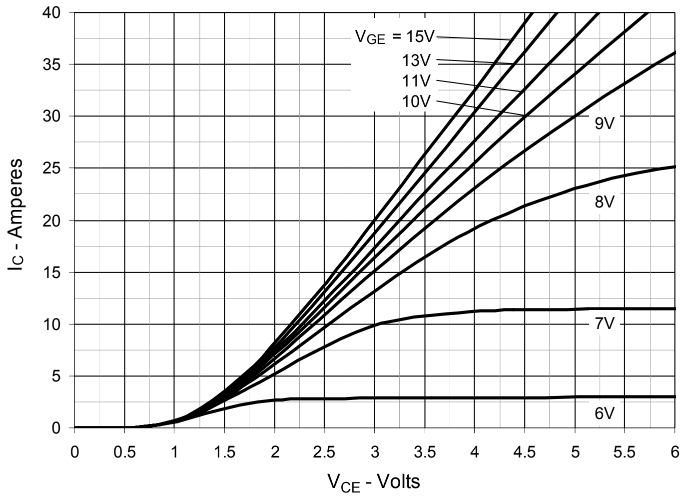


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

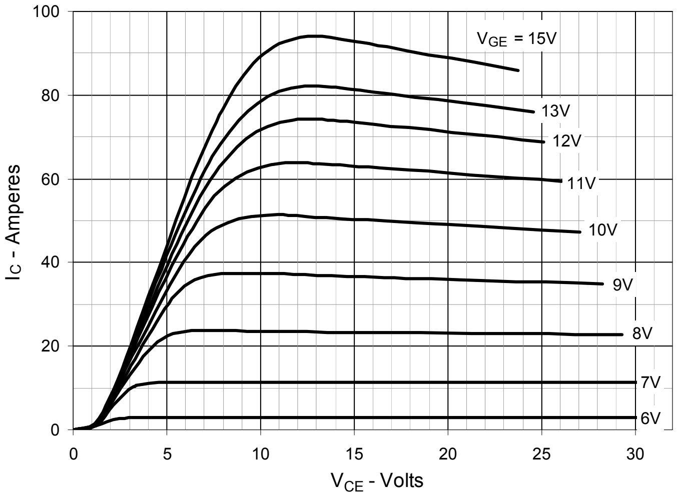


Fig. 3. Output Characteristics @ T_J = 150ºC

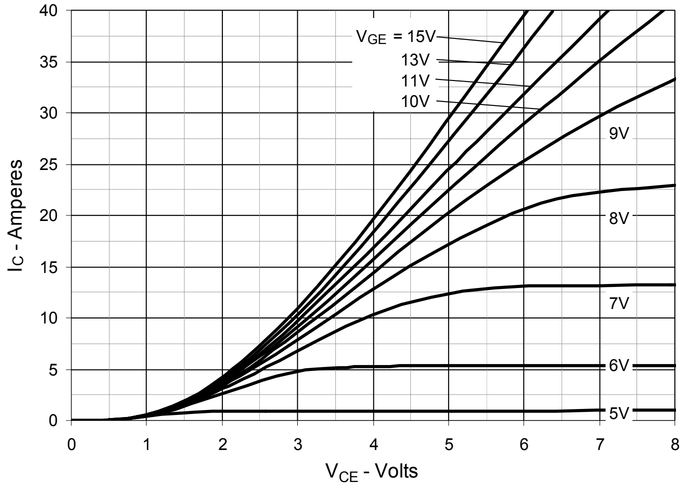


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

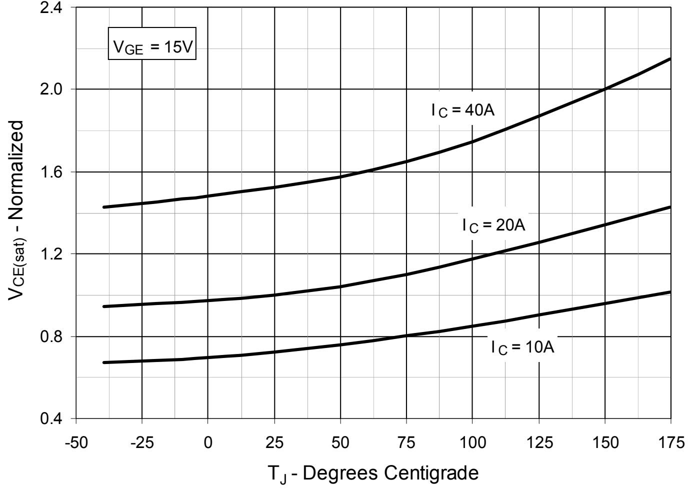


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

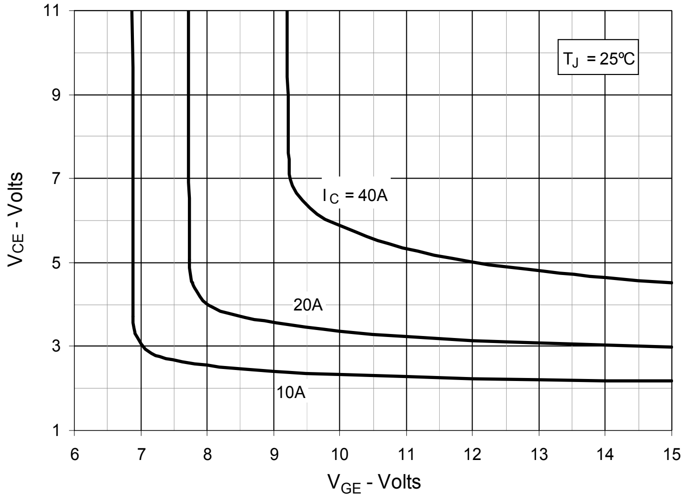


Fig. 6. Input Admittance

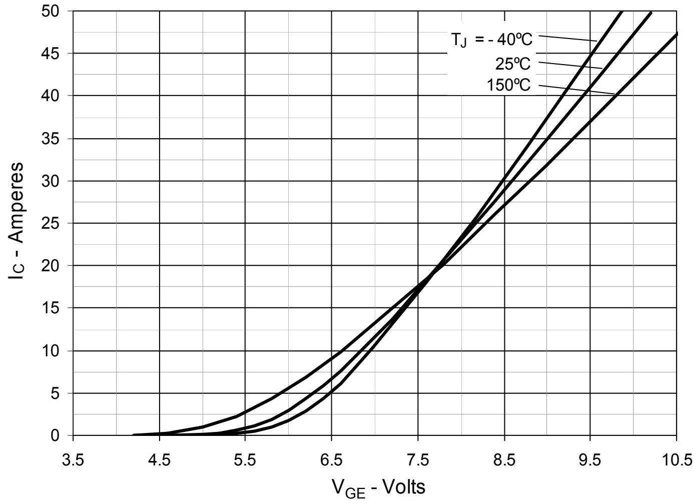


Fig. 7. Transconductance

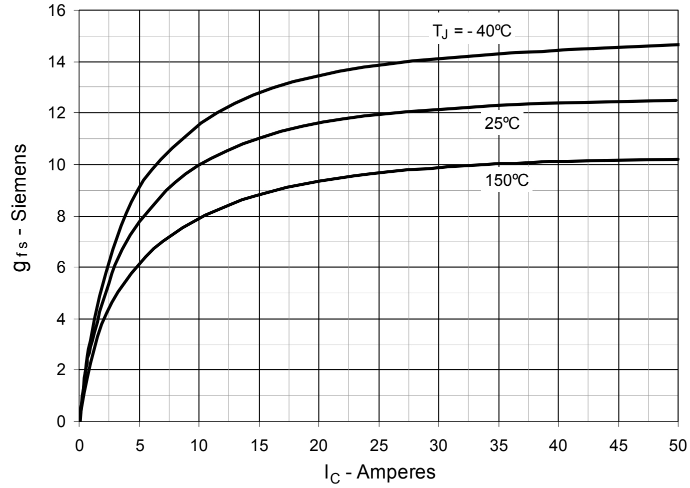


Fig. 8. Gate Charge

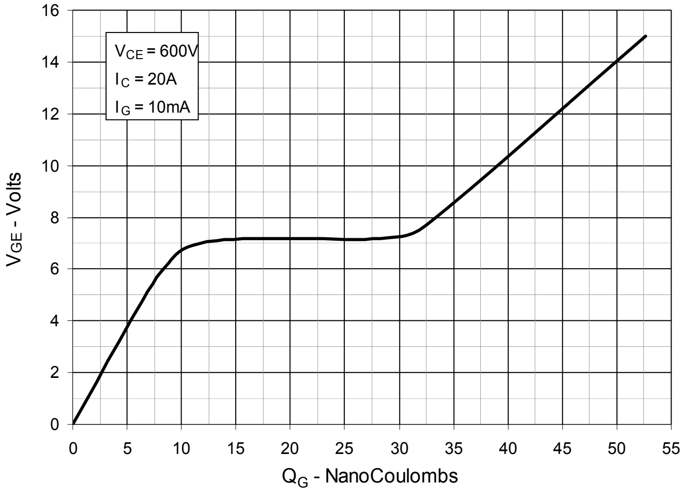


Fig. 9. Capacitance

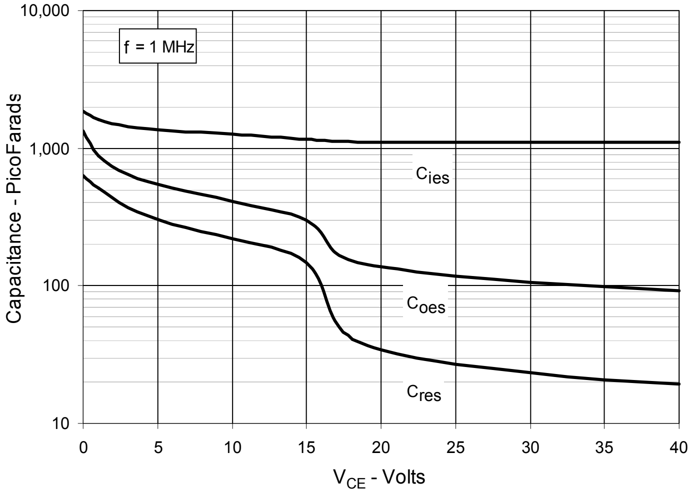


Fig. 10. Reverse-Bias Safe Operating Area

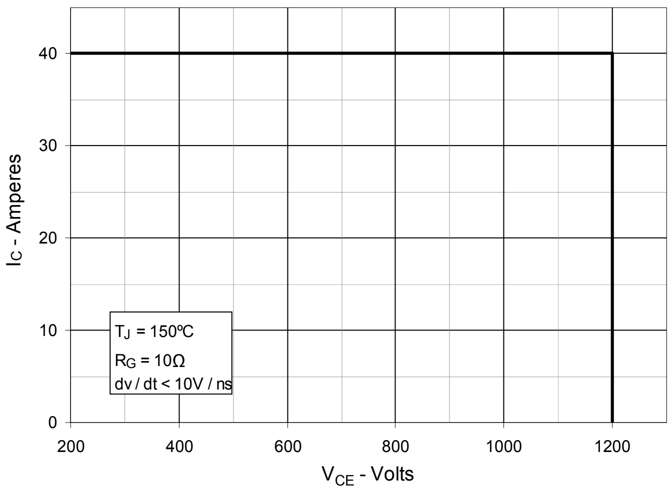


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

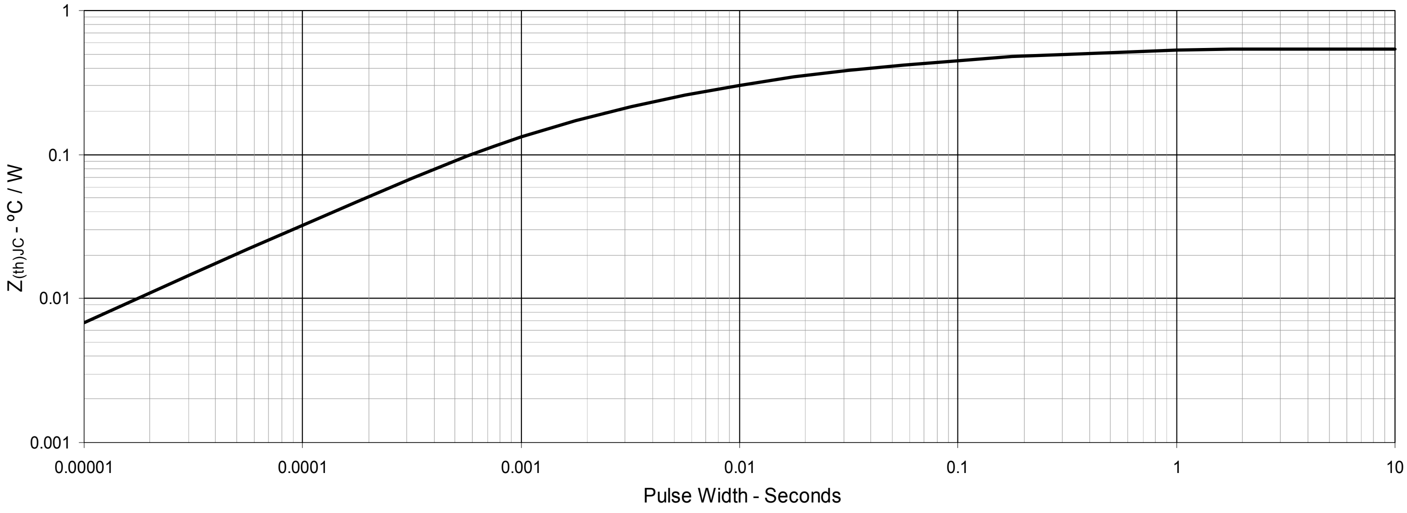


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

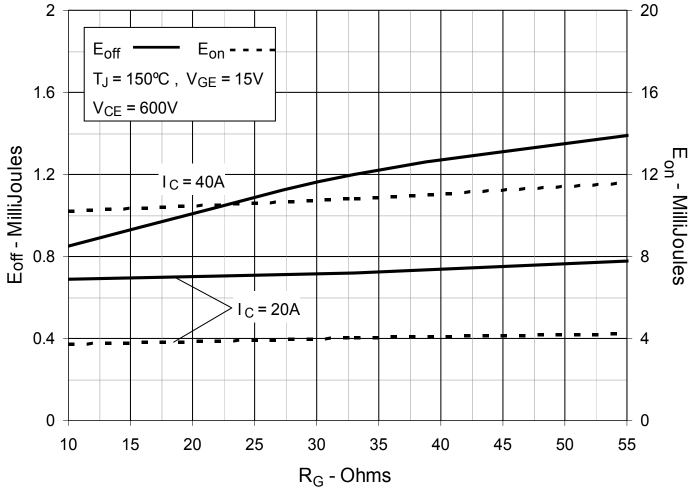


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

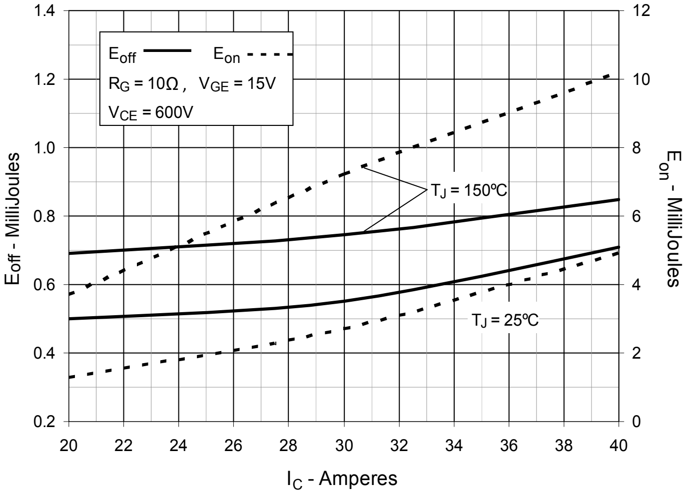


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

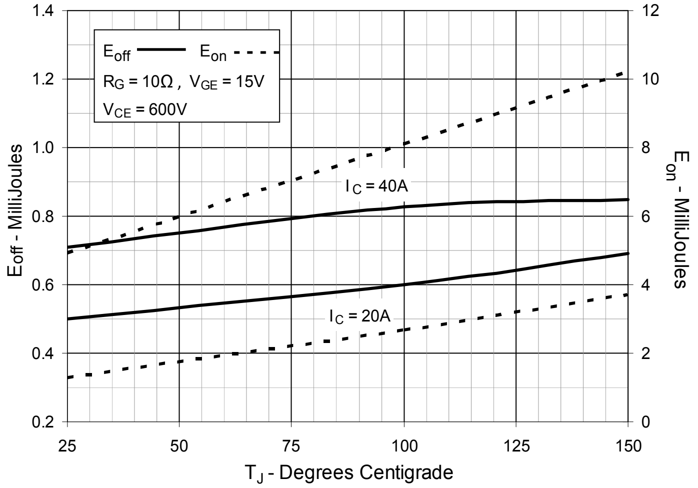


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

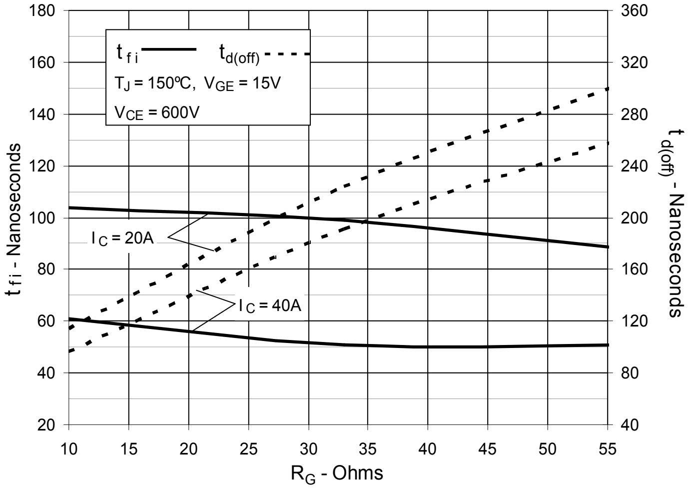


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

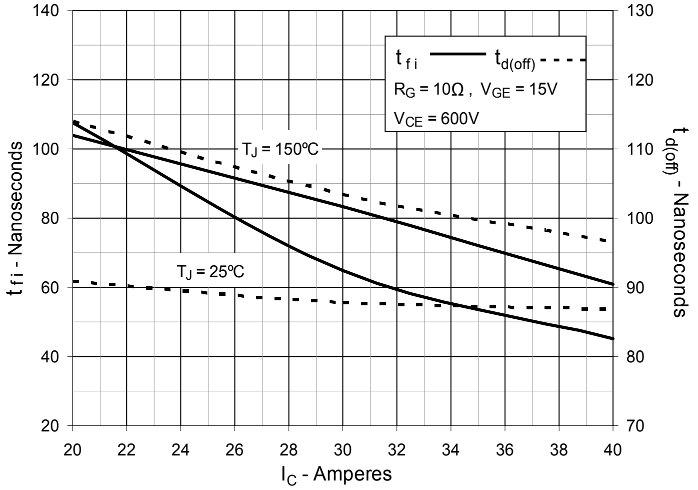


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

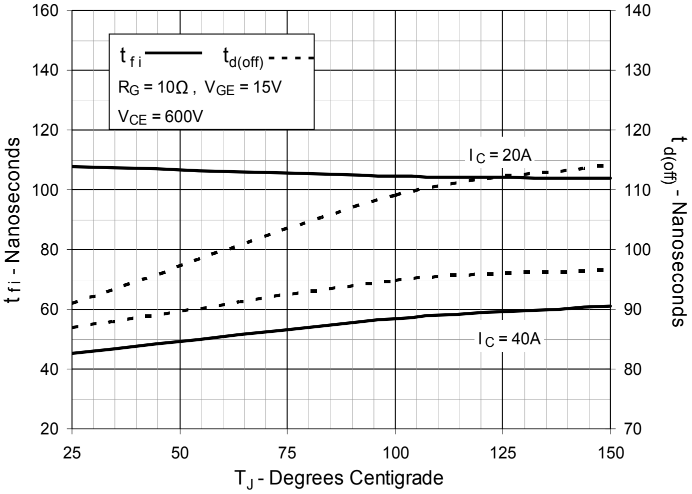


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

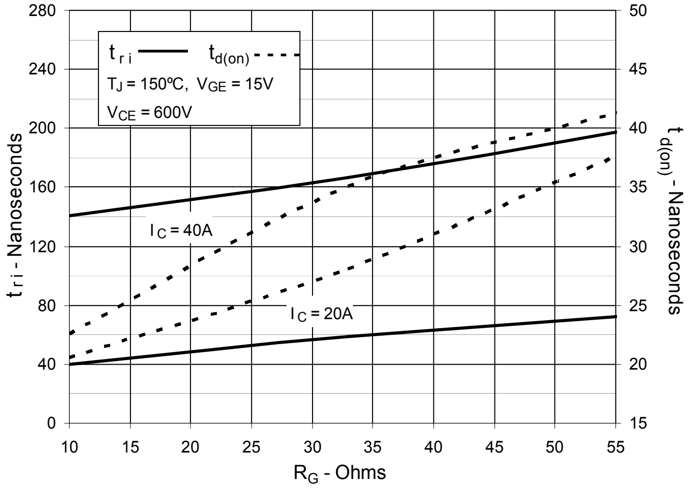


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

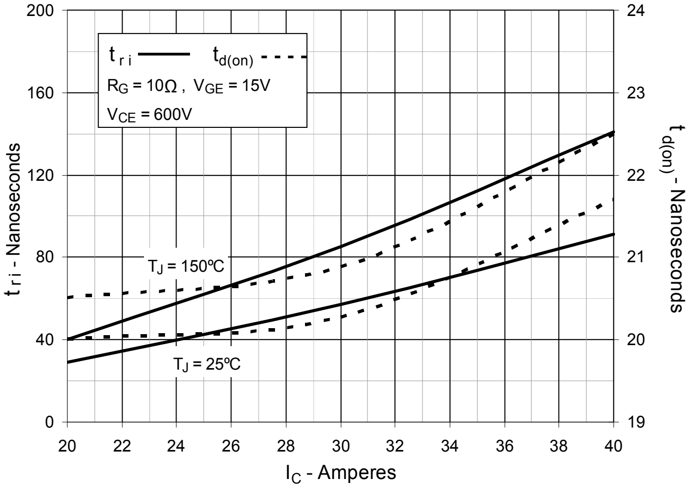


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

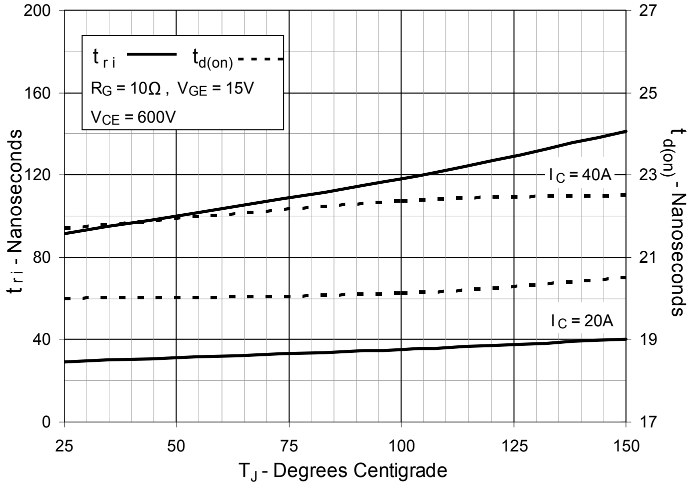


Fig. 21. Maximum Peak Load Current vs. Frequency

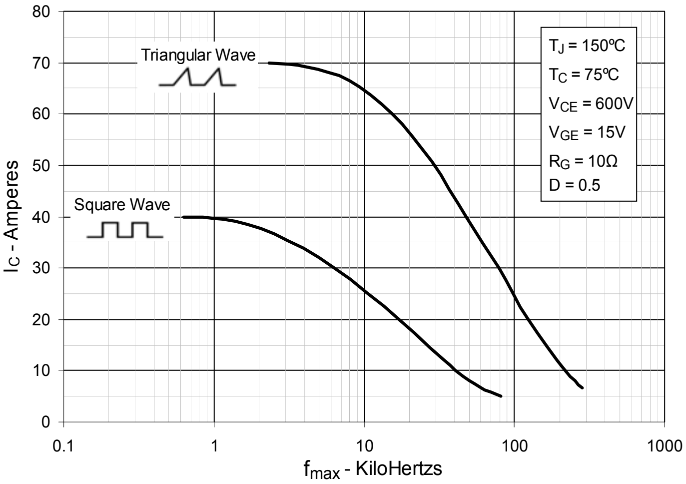


Fig. 22 . Maximum Transient Thermal Impedance (Diode)

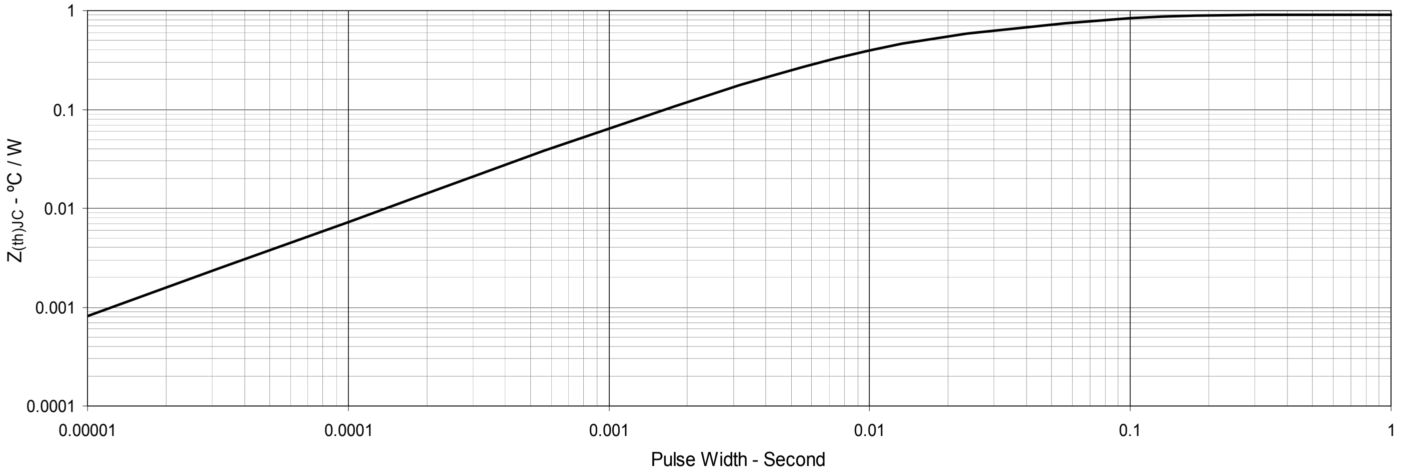


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Fig. 23. Forward Current I_F vs V_F

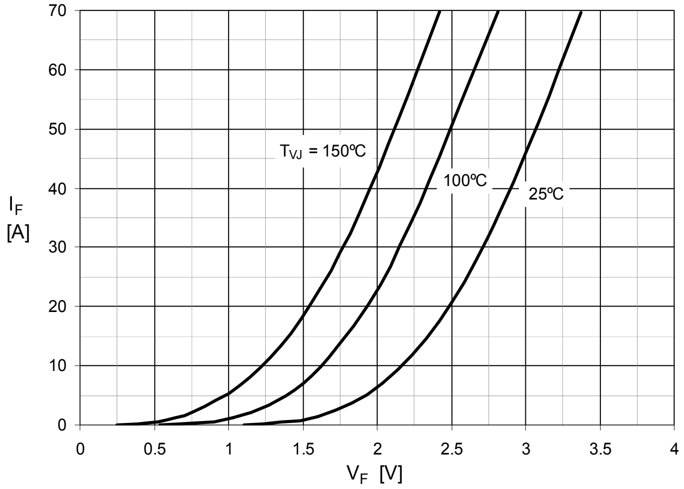

Fig. 24. Reverse Recovery Charge Q_{RM} vs. $-di_F/dt$

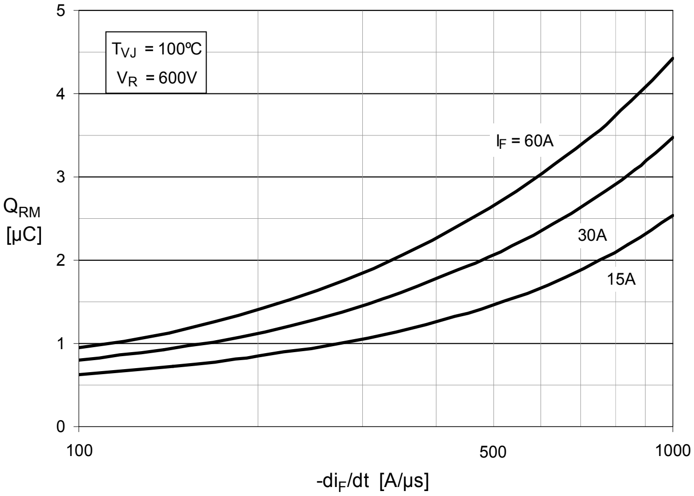

Fig. 25. Peak Reverse Current I_{RM} vs. $-di_F/dt$

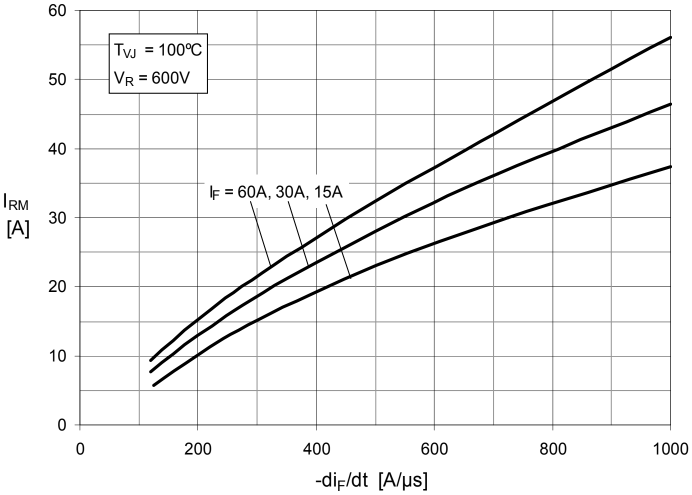

Fig. 26. Dynamic Parameters Q_{RM}, I_{RM} vs. T_{VJ}

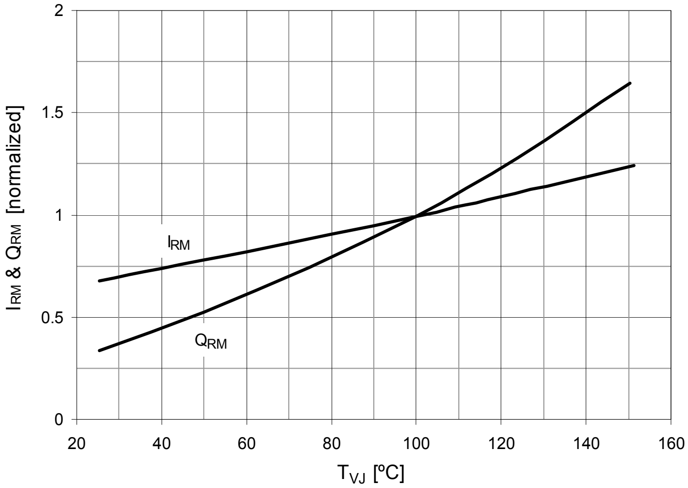

Fig. 27. Recovery Time t_{rr} vs. $-di_F/dt$

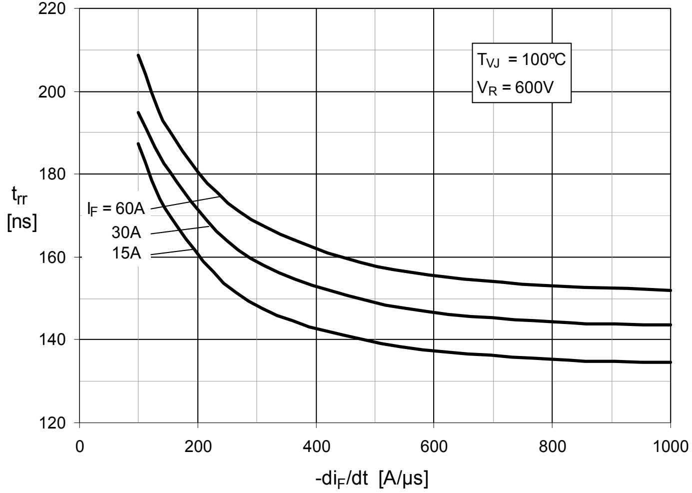

Fig. 28. Peak Forward Voltage V_{FR}, t_{rr} vs $-di_F/dt$