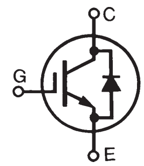
IXYS

1200V XPT™ IGBT GenX3™ w/ Diode

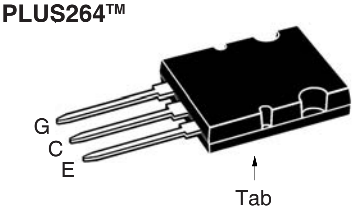
IXYB82N120C3H1

V_{CES}	=	1200V
I_{C110}	=	82A
$V_{CE(sat)}$	≤	3.2V
$t_{fi(typ)}$	=	93ns

High-Speed IGBT
for 20-50 kHz Switching



PLUS264™



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

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 (Chip Capability)	164	A
I_{LRMS}	Lead Current Limit	160	A
I_{C110}	T_C = 110°C	82	A
I_{F110}	T_C = 110°C	42	A
I_{CM}	T_C = 25°C, 1ms	320	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 164 @$V_{CE} \leq V_{CES}$	A
P_C	T_C = 25°C	1040	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
F_C	Mounting Force	30..120 / 6.7..27	N/lb.
Weight		10	g

Features

- Optimized for Low Switching Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- Positive Thermal Coefficient of Vce(sat)
- High Current Handling Capability
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

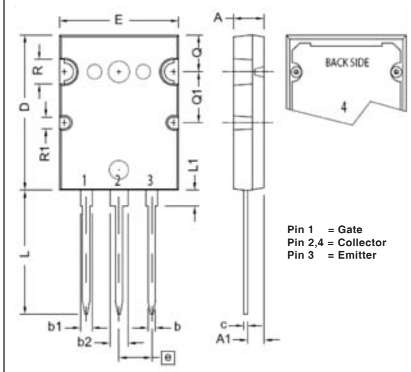
Applications

- 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			50	µA
	T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 82A, V_{GE} = 15V, Note 1		2.75	3.20	V
	T_J = 125°C		3.50		V

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	30	50		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4060		pF
C_{oes}			285		pF
C_{res}			110		pF
$Q_{g(on)}$	I_C = 82A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		215		nC
Q_{ge}			26		nC
Q_{gc}			84		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		29		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		78		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 2Ω		4.95		mJ
$t_{d(off)}$	Note 2		192	280	ns
t_{fi}			93		ns
E_{off}			2.78	5.00	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		29		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		90		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 2Ω		7.45		mJ
$t_{d(off)}$	Note 2		200		ns
t_{fi}			95		ns
E_{off}			3.70		mJ
R_{thJC}				0.12	°C/W
R_{thCS}			0.13		°C/W

PLUS264™ (IXYB) Outline



Dim.	Millimeter min	Millimeter max	Inches min	Inches max
A	4.70	5.31	0.185	0.209
A1	2.59	3.00	0.102	0.118
b	0.94	1.40	0.037	0.055
b1	2.21	2.59	0.087	0.102
b2	2.79	3.20	0.110	0.126
c	0.43	0.74	0.017	0.029
D	25.58	26.59	1.007	1.047
E	19.30	20.29	0.760	0.799
e	5.45 BSC		0.215 BSC	
L	19.79	21.39	0.779	0.842
L1	2.21	2.59	0.087	0.102
Q	6.10	6.50	0.240	0.256
Q1	8.38	8.79	0.330	0.346
Ø R	3.94	4.75	0.155	0.187
ØR1	2.16	2.36	0.085	0.093

Reverse Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Min.	Typ.	Max.	
V_F	I_F = 60A, V_{GE} = 0V, Note 1			2.7	V
	T_J = 125°C		1.9		V
I_{RM}	I_F = 60A, V_{GE} = 0V, T_J = 125°C		41		A
t_{rr}	$-di_F/dt$ = 700A/μs, V_R = 600V		420		ns
R_{thJC}				0.35	°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 @ $T_J = 25^oC$

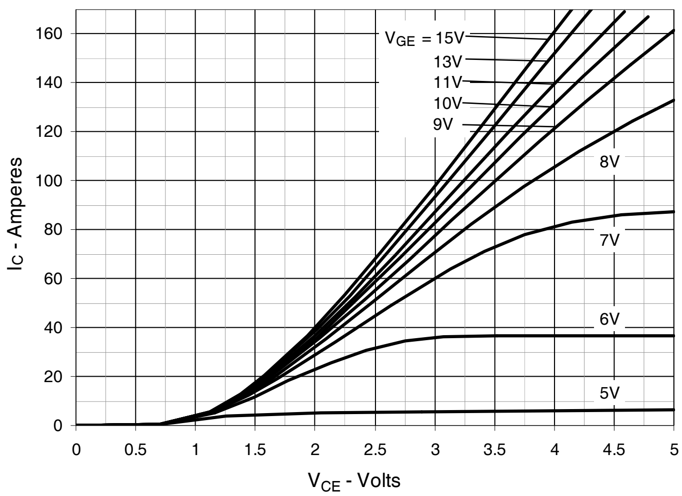


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

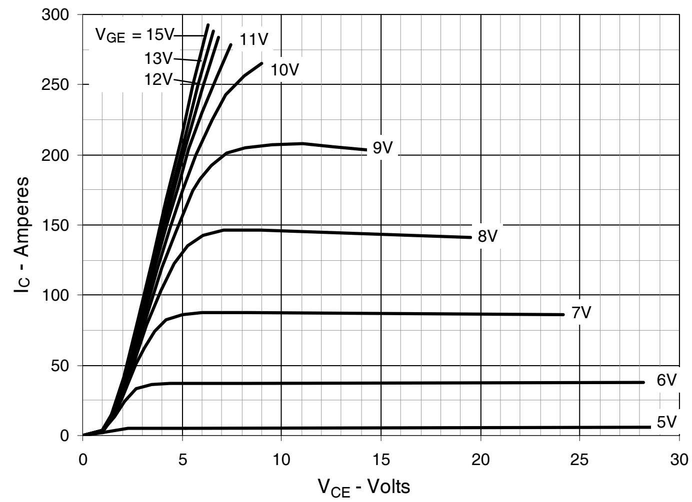


Fig. 3. Output Characteristics @ $T_J = 125^oC$

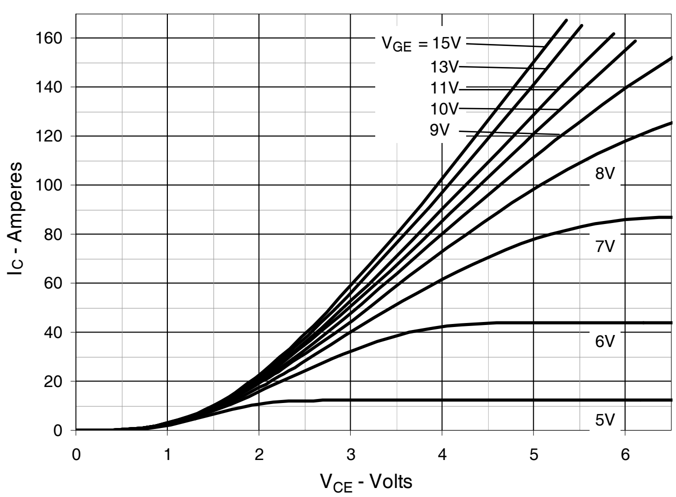


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

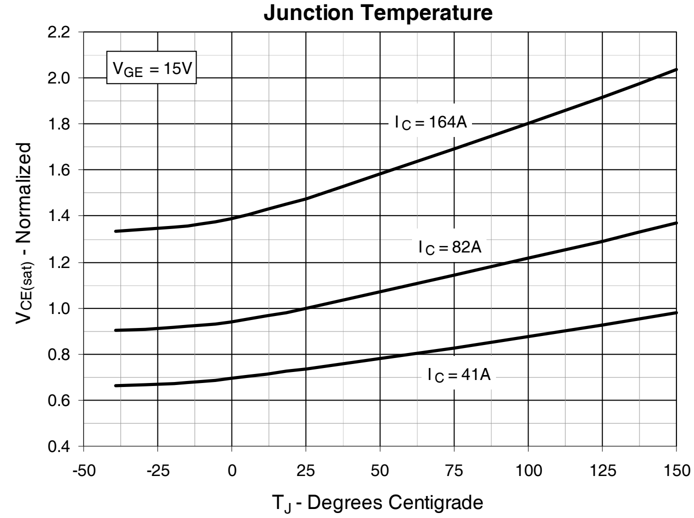


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

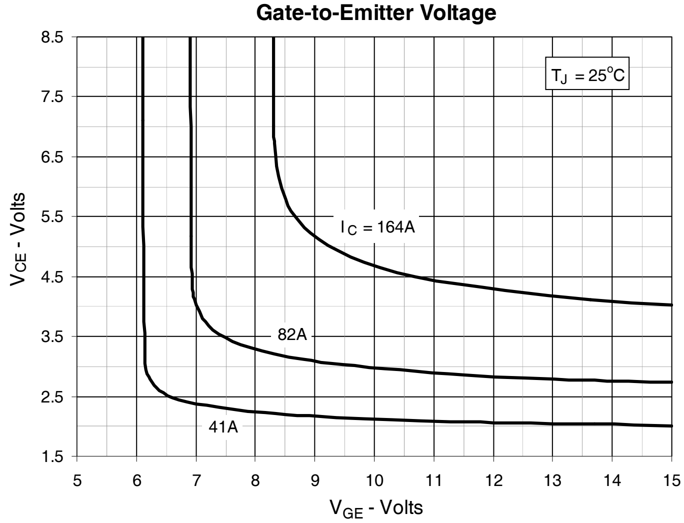
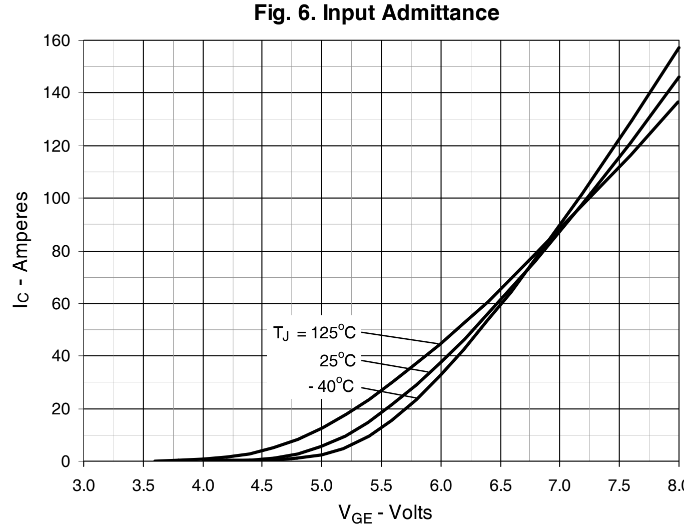


Fig. 6. Input Admittance



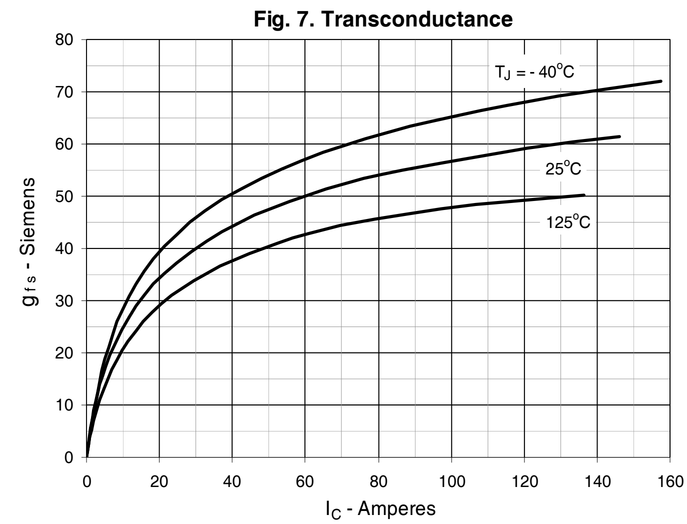


Fig. 7. Transconductance
T_J = - 40°C
25°C
125°C
g_{fs} - Siemens
I_C - Amperes
0
10
20
30
40
50
60
70
80
0
20
40
60
80
100
120
140
160

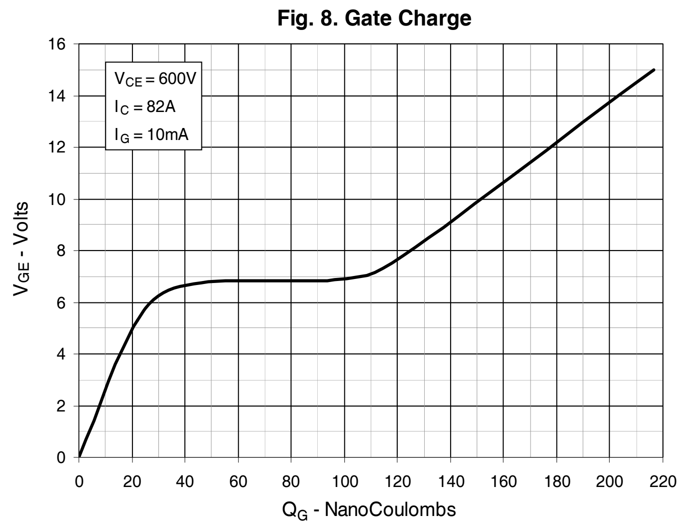


Fig. 8. Gate Charge
V_{CE} = 600V
I_C = 82A
I_G = 10mA
V_{GE} - Volts
Q_G - NanoCoulombs
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120
140
160
180
200
220

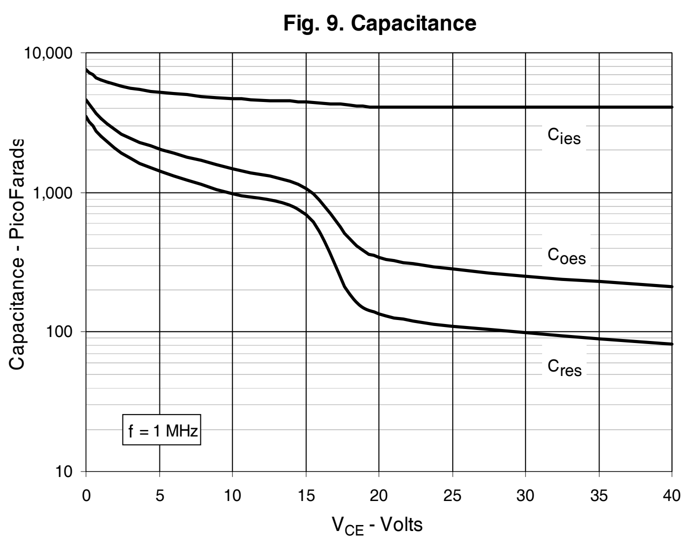


Fig. 9. Capacitance
C_{ies}
C_{oes}
C_{res}
f = 1 MHz
Capacitance - PicoFarads
V_{CE} - Volts
10
100
1,000
10,000
0
5
10
15
20
25
30
35
40

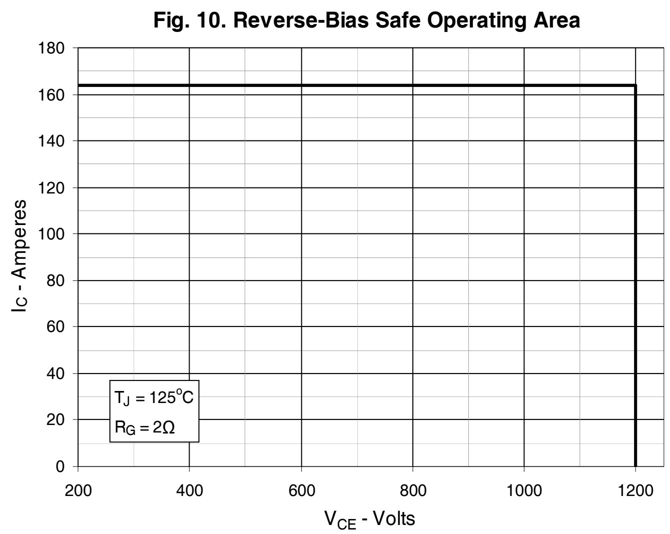


Fig. 10. Reverse-Bias Safe Operating Area
T_J = 125°C
R_G = 2Ω
I_C - Amperes
V_{CE} - Volts
0
20
40
60
80
100
120
140
160
180
200
400
600
800
1000
1200

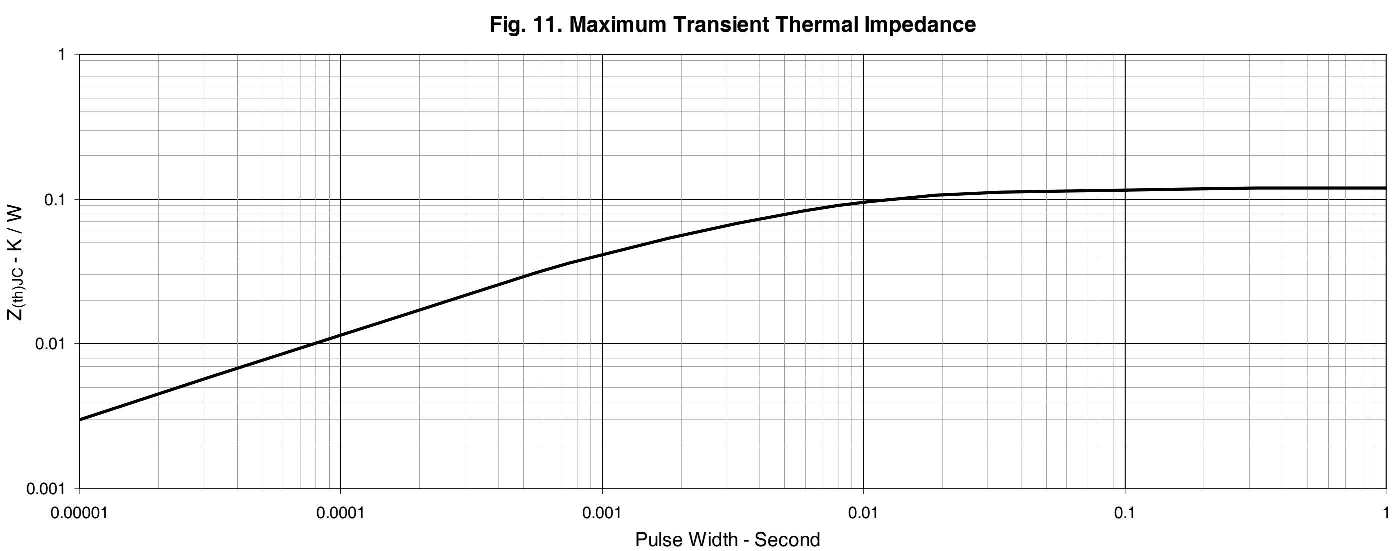


Fig. 11. Maximum Transient Thermal Impedance
$Z_{(th)JC}$ - K / W
Pulse Width - Second
0.001
0.01
0.1
1
0.00001
0.0001
0.001
0.01
0.1
1

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

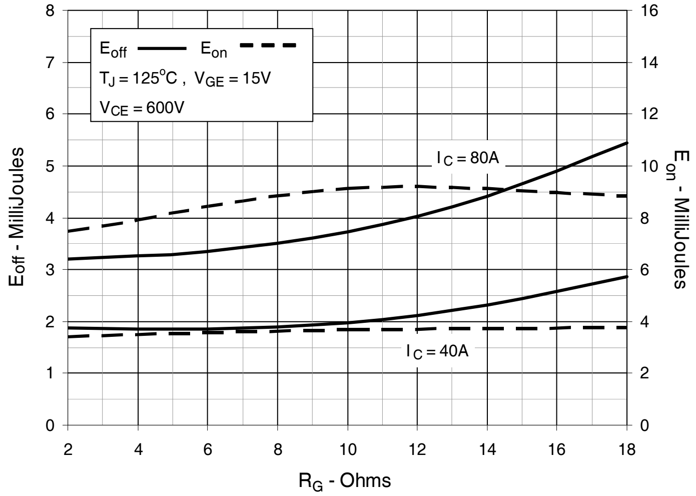


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

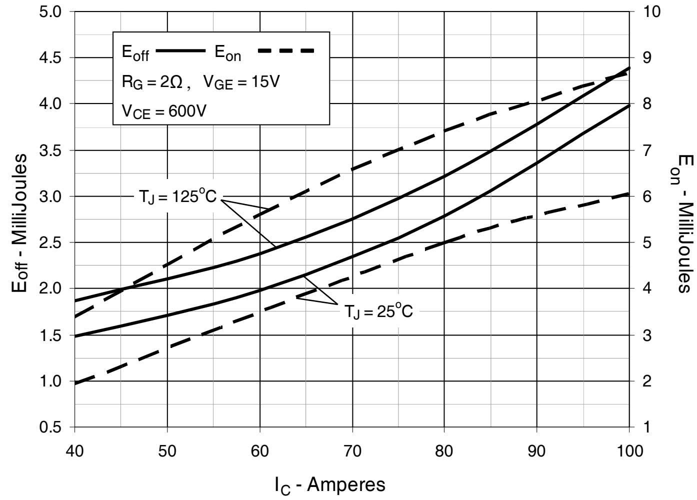


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

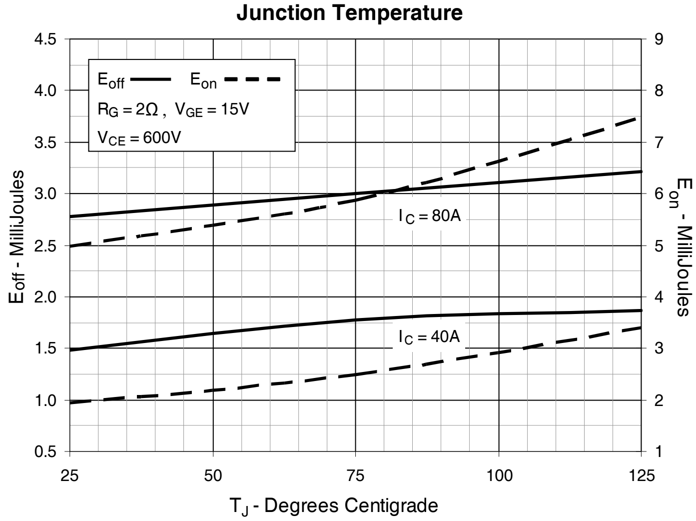


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

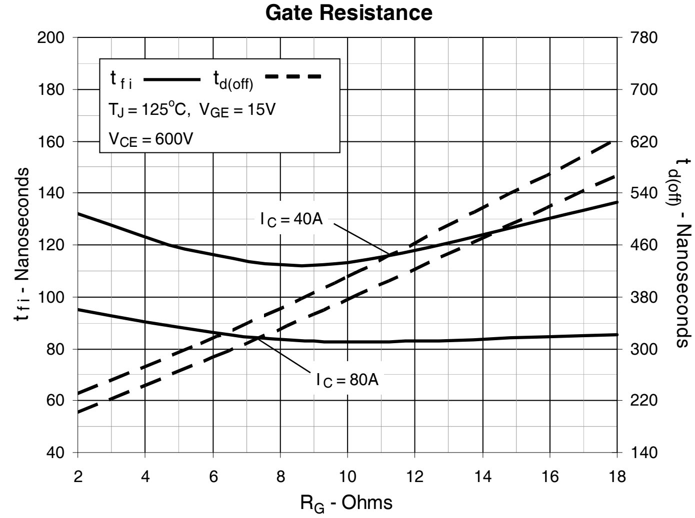


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

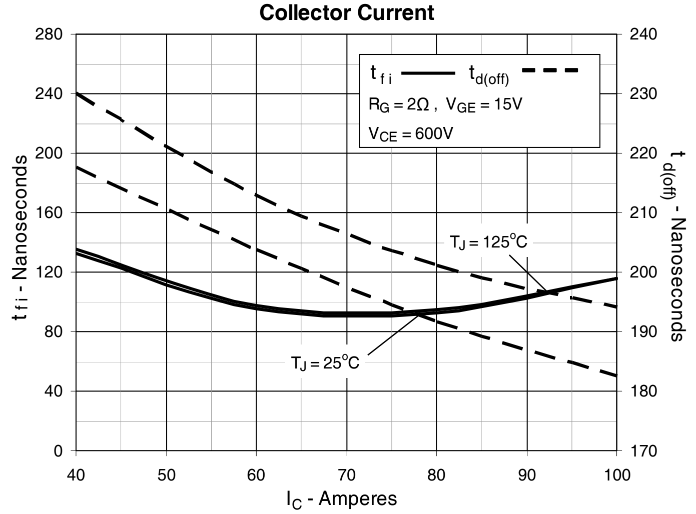
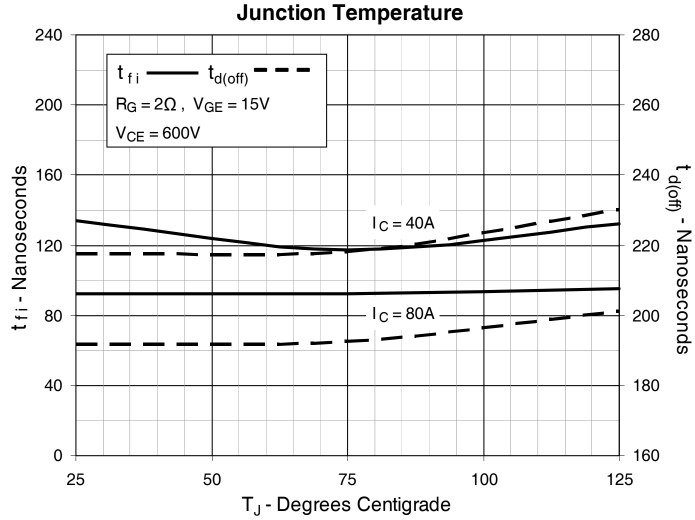


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



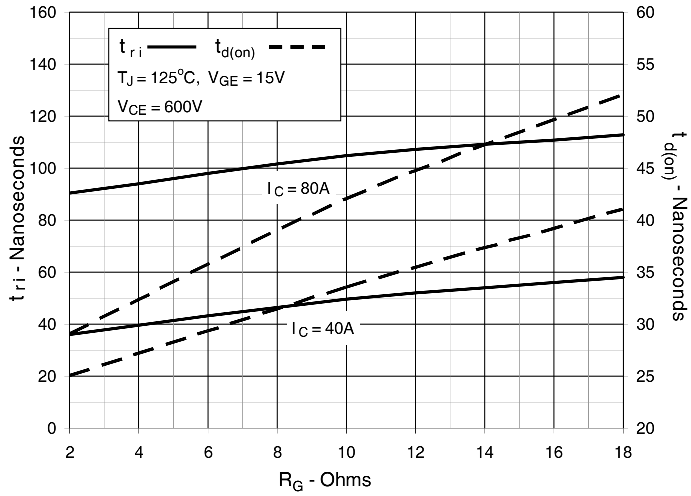


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

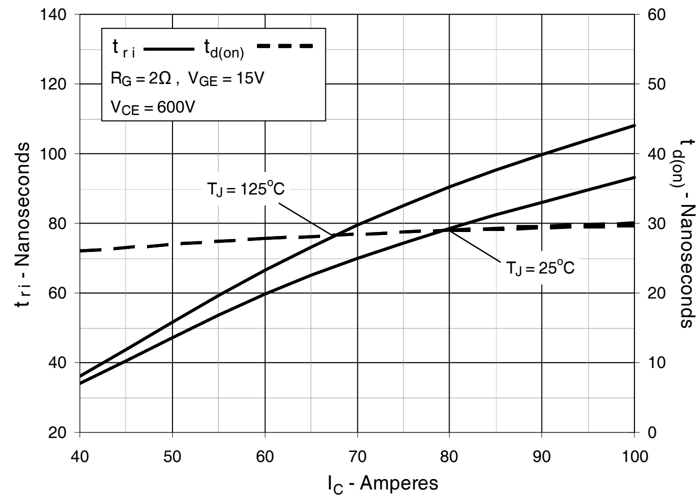


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

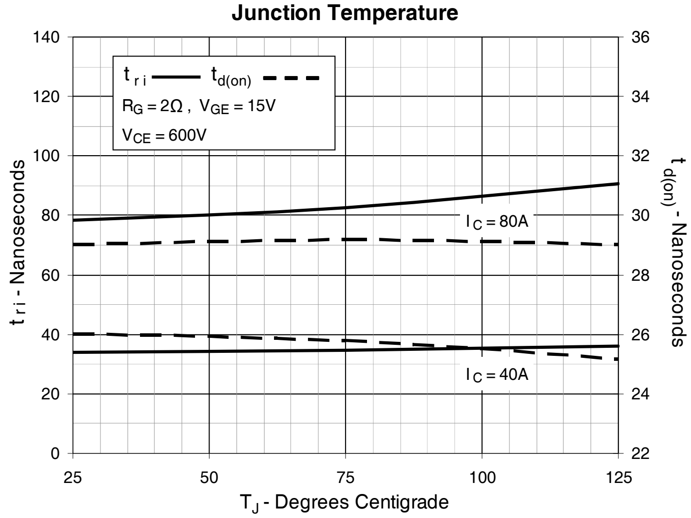


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

Fig. 21. Forward Characteristics

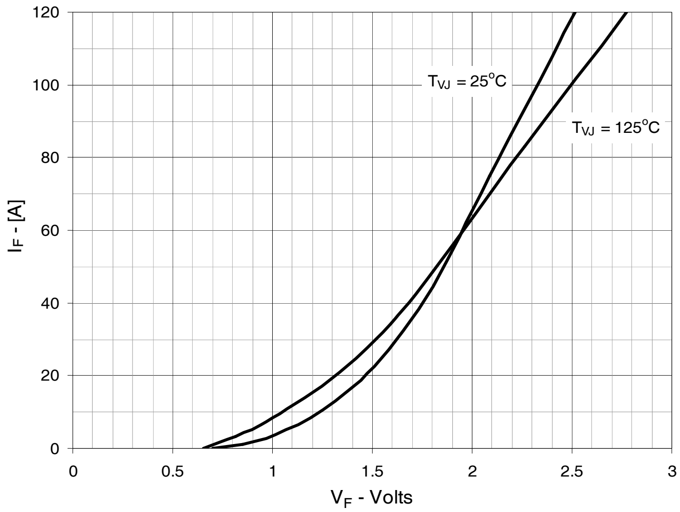


Fig. 22. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

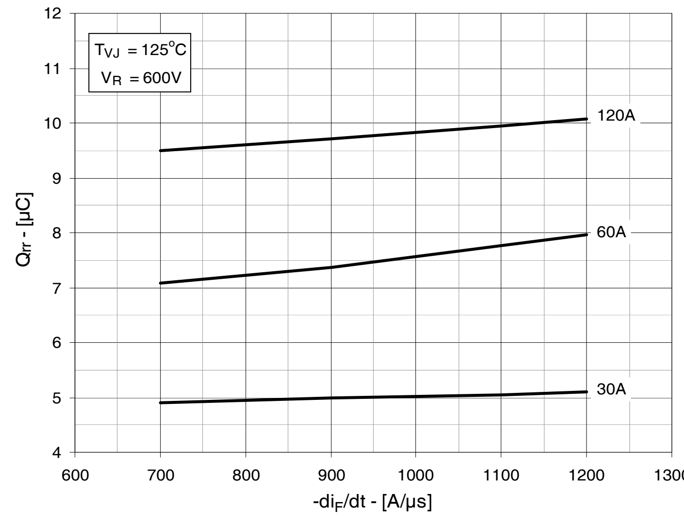


Fig. 23. PeakReverse Current I_{RM} vs. $-di_F/dt$

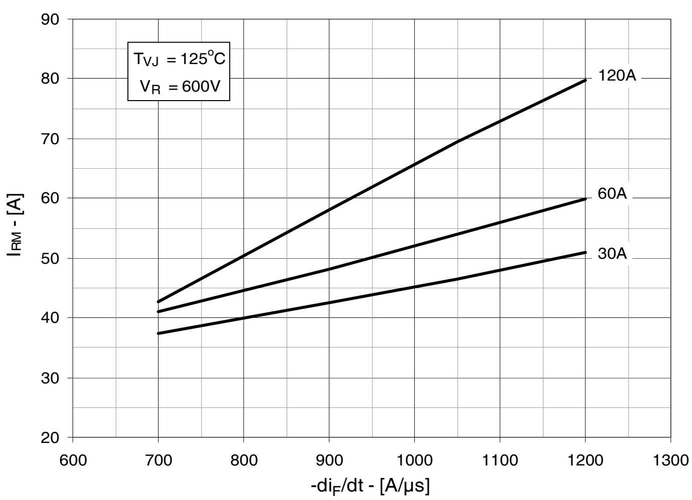


Fig. 24. Recovery Time t_{rr} vs. $-di_F/dt$

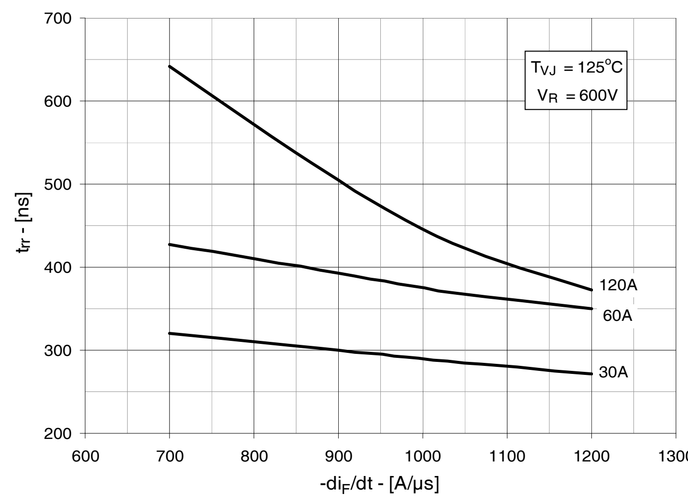


Fig. 25. Recovery Energy E_{rec} vs. $-di_F/dt$

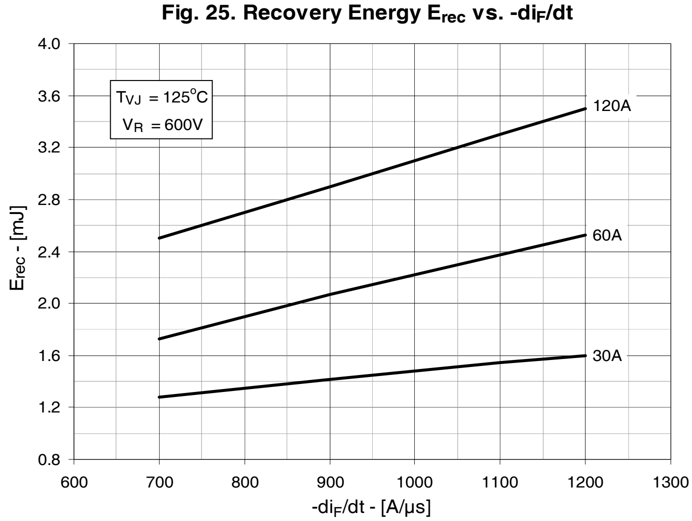


Fig. 26. Maximum Transient Thermal Impedance