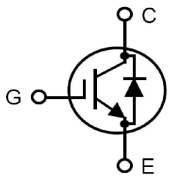
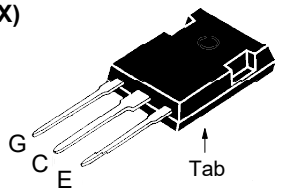
High Voltage XPT™ IGBT w/ Diode

IXYX25N250CV1
IXYX25N250CV1HV

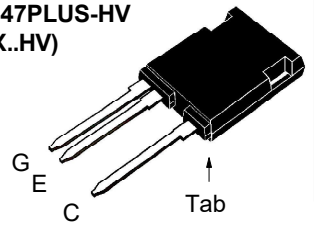
V_{CES} = 2500V
I_{C110} = 25A
$V_{CE(sat)}$ ≤ 4.0V
$t_{fi(typ)}$ = 246ns



PLUS247 (IXYX)



TO-247PLUS-HV (IXYX..HV)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	2500	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	2500	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	95	A
I_{C110}	T_C = 110°C	25	A
I_{F110}	T_C = 110°C	30	A
I_{CM}	T_C = 25°C, 1ms	235	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 5Ω Clamped Inductive Load	I_{CM} = 100 1500	A V
P_C	T_C = 25°C	937	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062in.) from Case for 10s	300	°C
F_C	Mounting Force	20..120 /4.5..27	N/lb
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	2500			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 = 100°C		100		μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 25A, V_{GE} = 15V, Note 1		3.4	4.0	V
	T_J = 150°C		4.7		V

Features

- High Voltage Packages
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 25A, V_{CE} = 10V, Note 1	16	27		S
R_{Gi}	Gate Input Resistance		2.8		Ω
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		3060		pF
C_{oes}			166		pF
C_{res}			43		pF
$Q_{g(on)}$	I_C = 25A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		147		nC
Q_{ge}			16		nC
Q_{gc}			68		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		15		ns
t_{ri}	I_C = 25A, V_{GE} = 15V		34		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 5Ω		8.3		mJ
$t_{d(off)}$	Note 2		230		ns
t_{fi}			246		ns
E_{off}			7.3		mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		18		ns
t_{ri}	I_C = 25A, V_{GE} = 15V		33		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 5Ω		11.0		mJ
$t_{d(off)}$	Note 2		225		ns
t_{fi}			350		ns
E_{off}			10.5		mJ
R_{thJC}				0.16	°C/W
R_{thCS}			0.15		°C/W

Reverse Sonic Diode (FRD)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 25A, V_{GE} = 0V, Note 1			3.5	V
	T_J = 150°C		3.1		V
I_{RM}	I_F = 25A, V_{GE} = 0V, T_J = 150°C		38		A
t_{rr}	$-di_F/dt$ = 500A/μs, V_R = 1200V		185		ns
R_{thJC}				0.32	°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

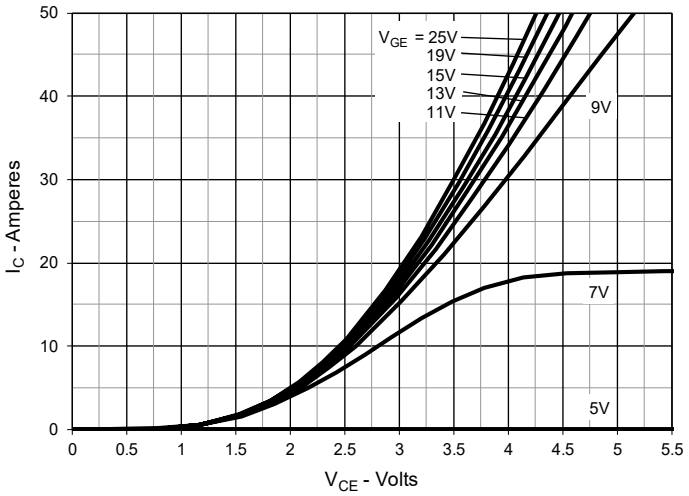


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

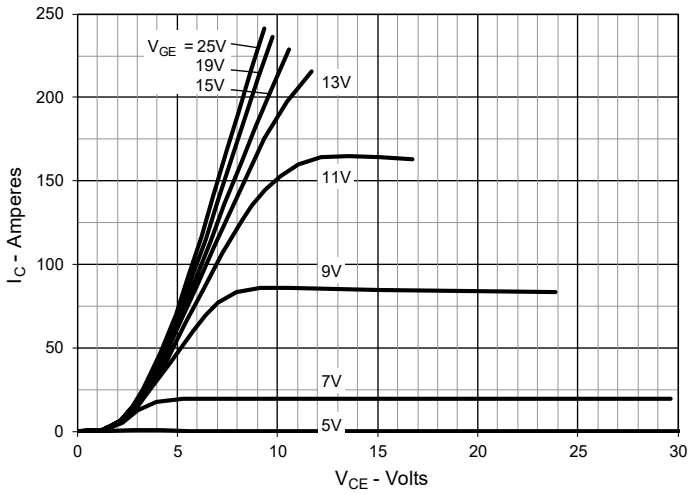


Fig. 3. Output Characteristics @ T_J = 150ºC

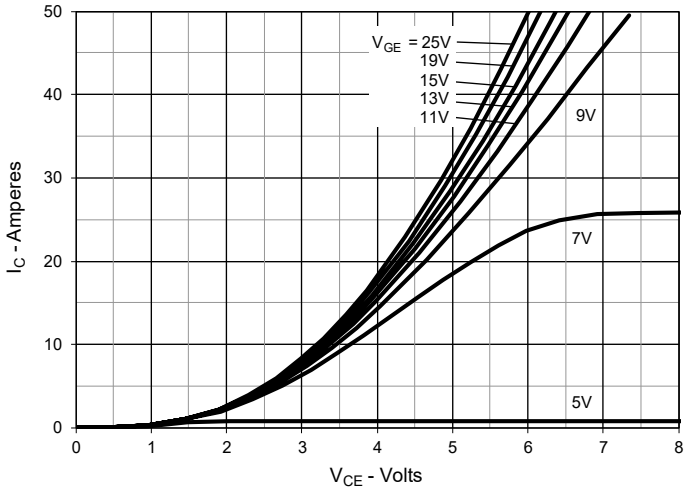


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

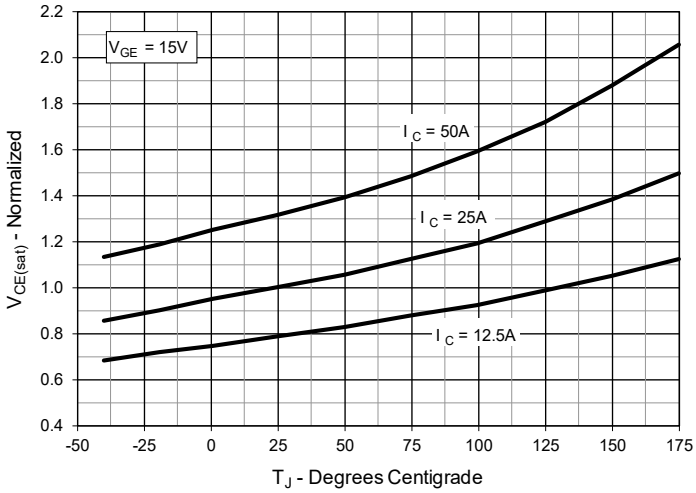


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

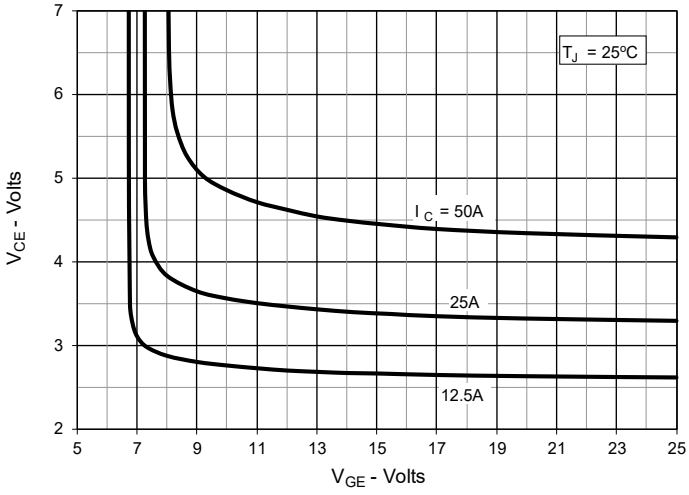


Fig. 6. Input Admittance

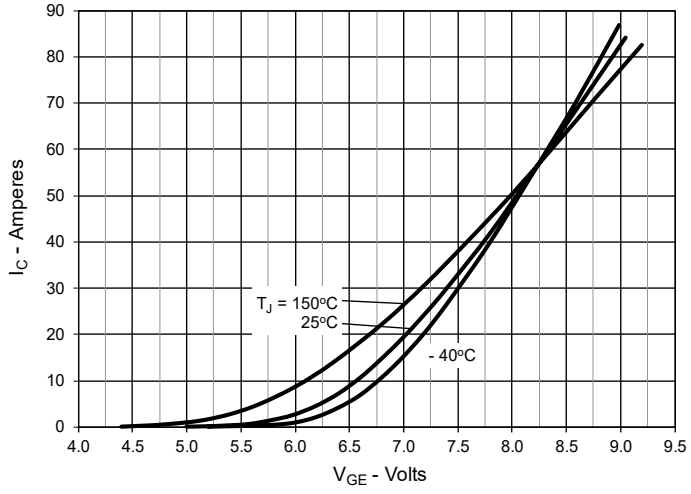


Fig. 7. Transconductance

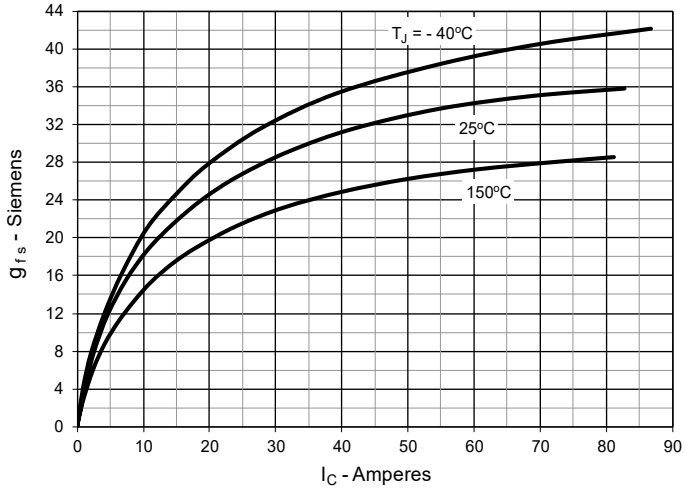


Fig. 8. Gate Charge

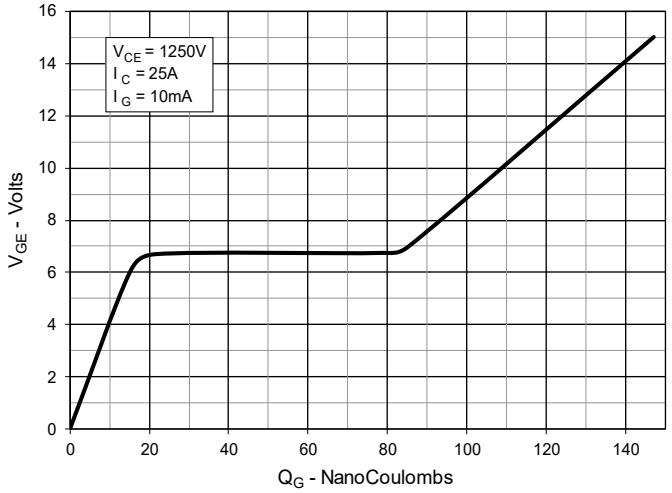


Fig. 9. Capacitance

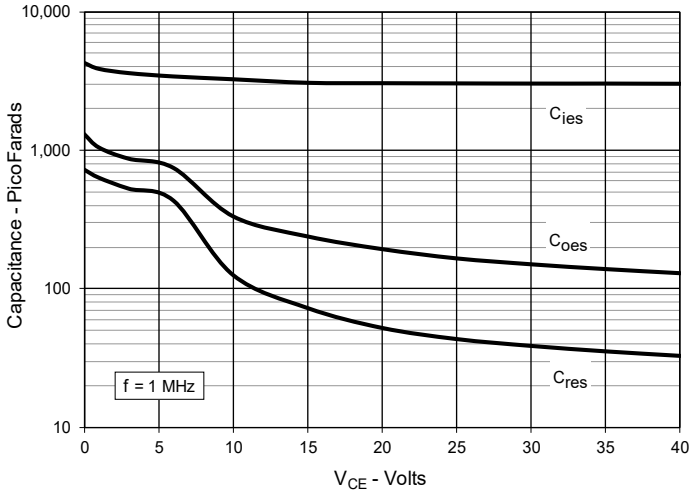


Fig. 10. Reverse-Bias Safe Operating Area

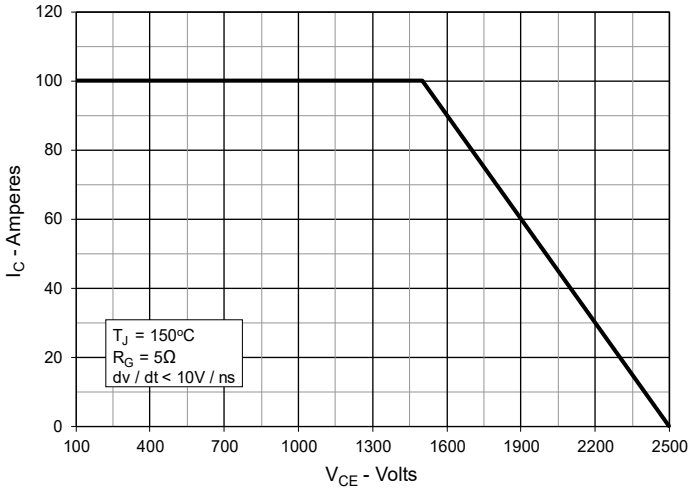


Fig. 11. Forward-Bias Safe Operating Area

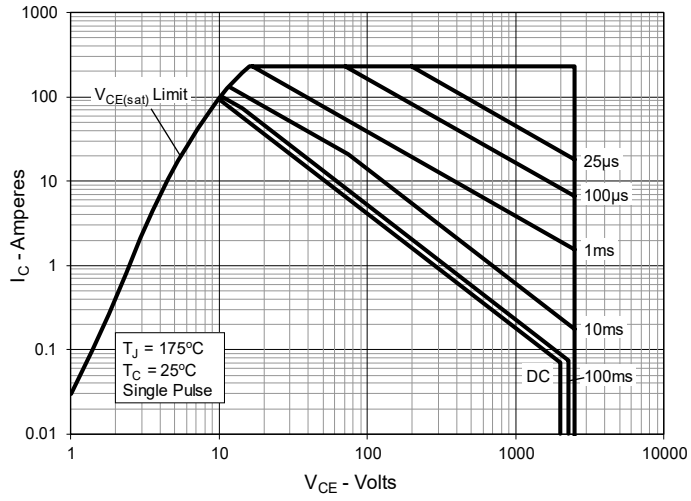


Fig. 12. Maximum Transient Thermal Impedance

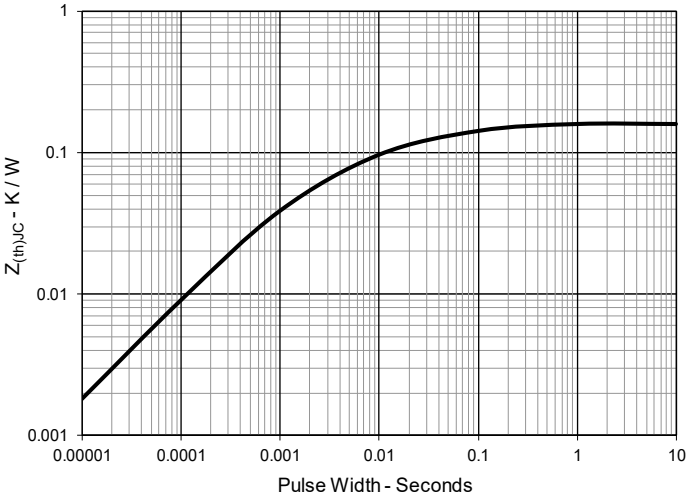


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

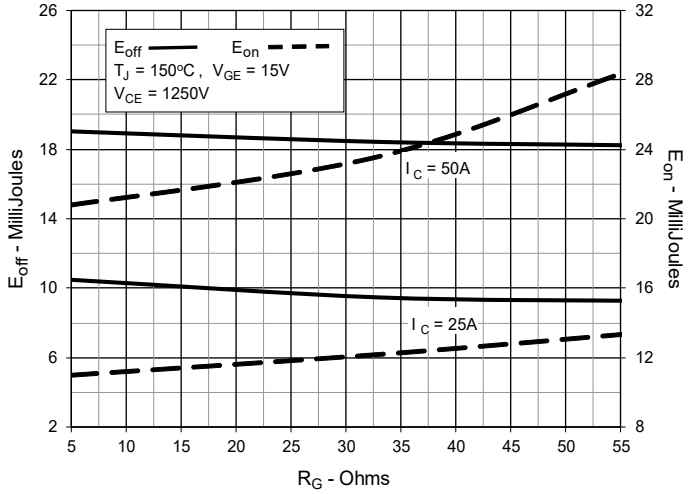


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

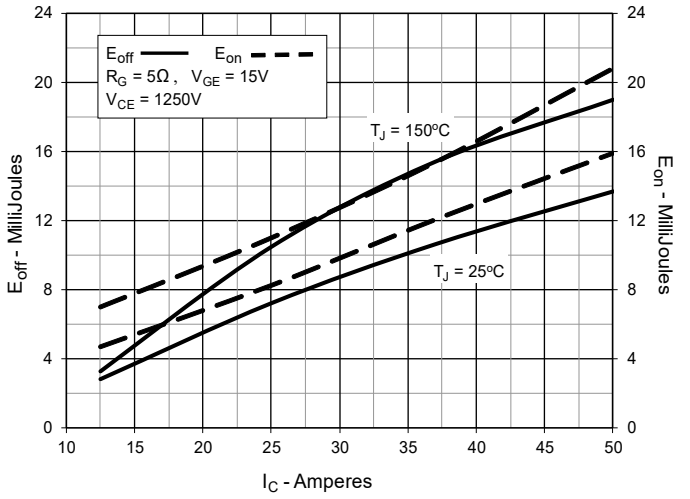


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

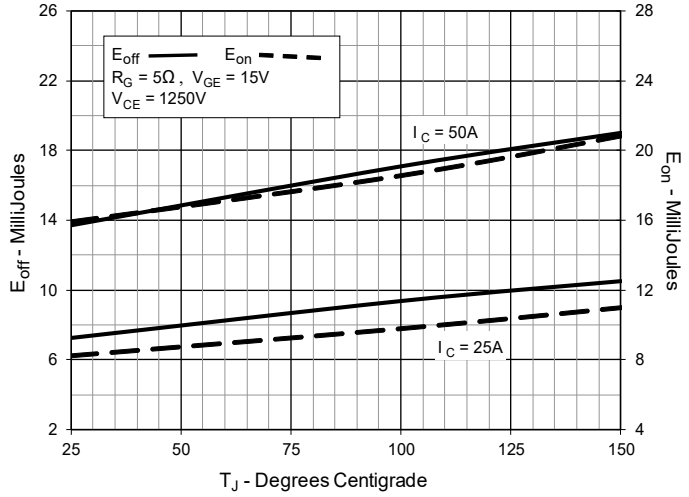


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

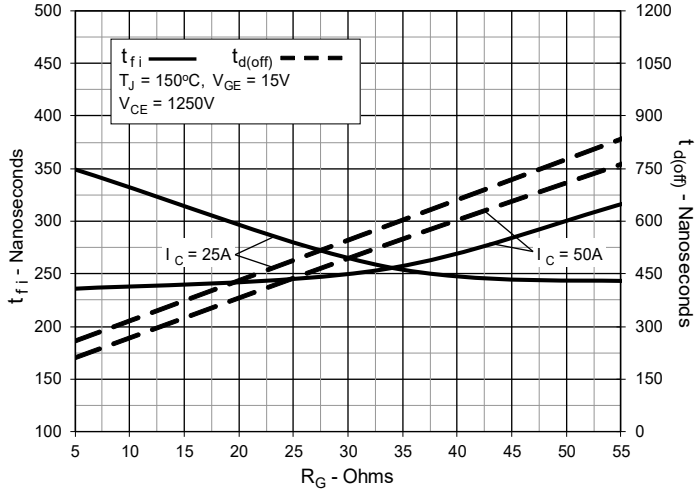


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

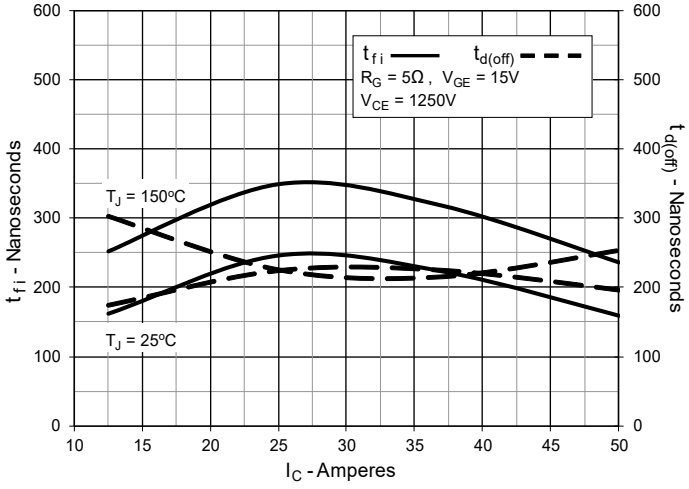


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

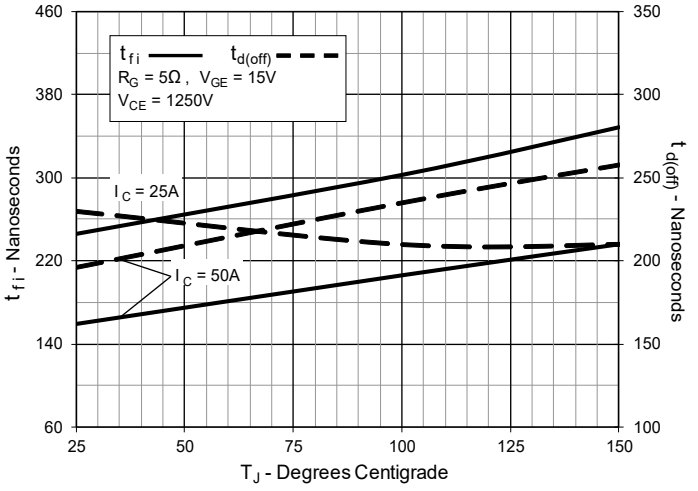


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

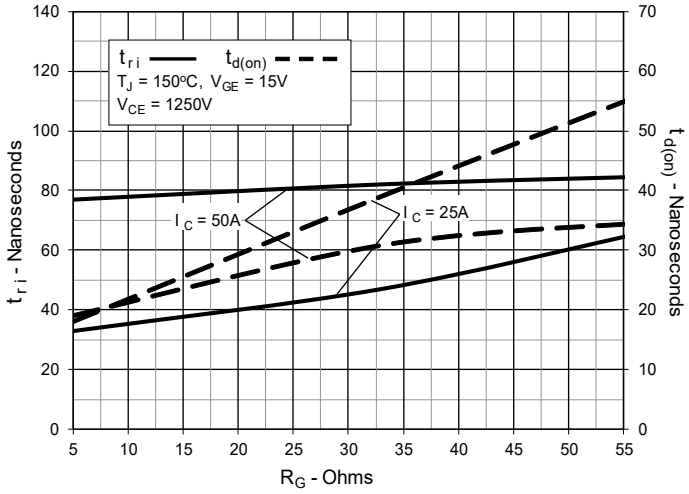


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

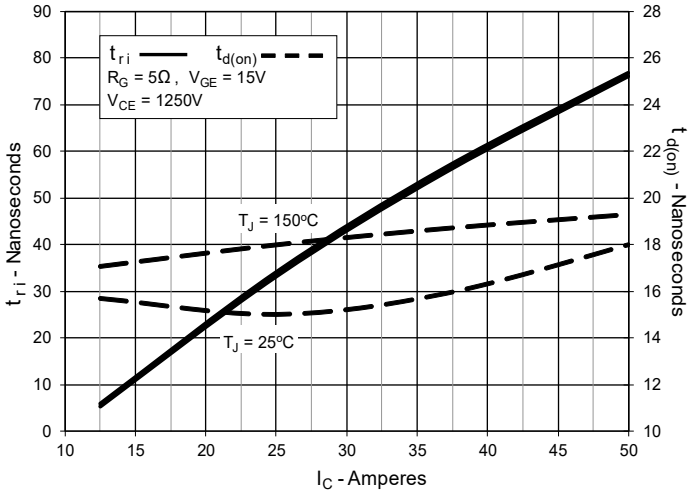


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

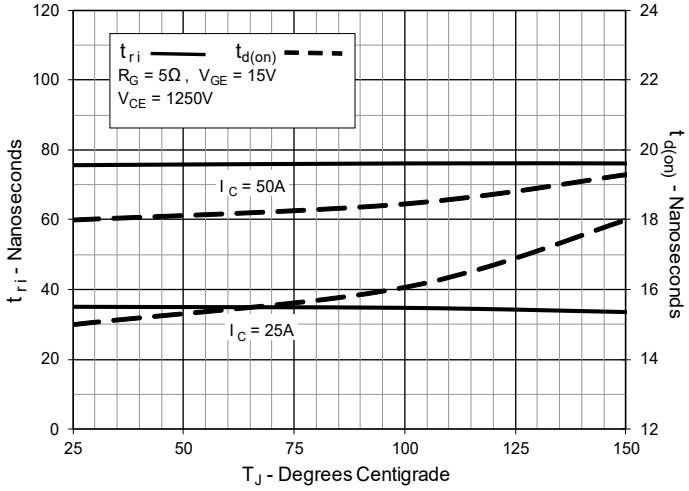


Fig. 22. Diode Forward Characteristics

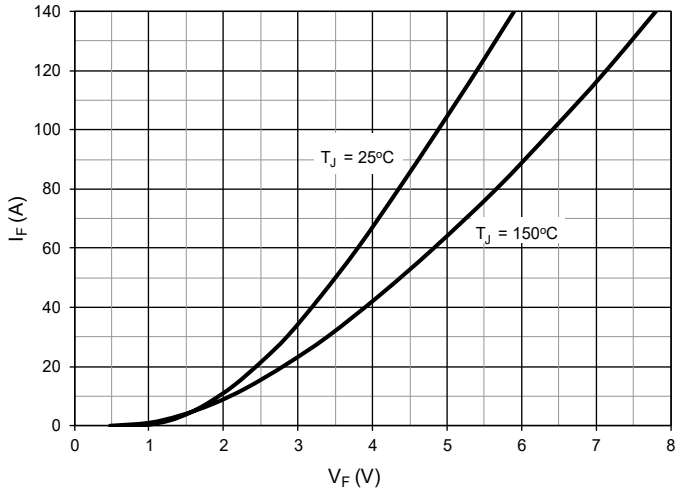


Fig. 23. Reverse Recovery Charge vs. -di_F/dt

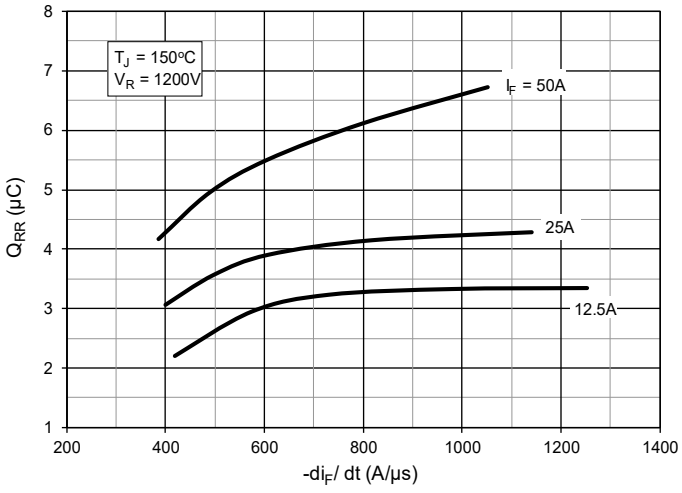


Fig. 24. Reverse Recovery Current vs. -di_F/dt

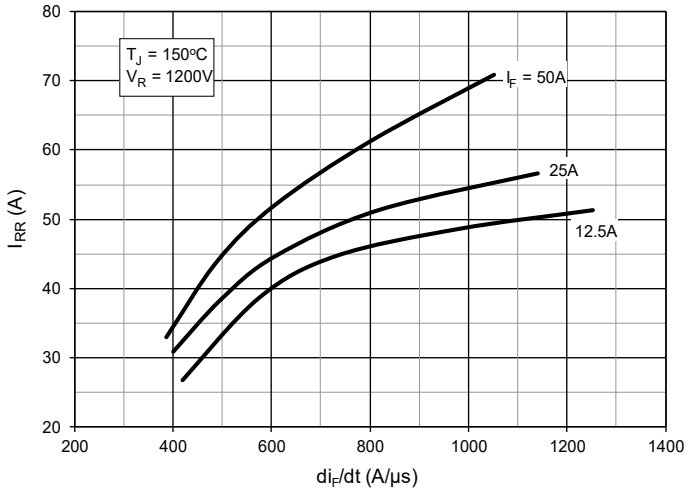


Fig. 25. Reverse Recovery Time vs. -di_F/dt

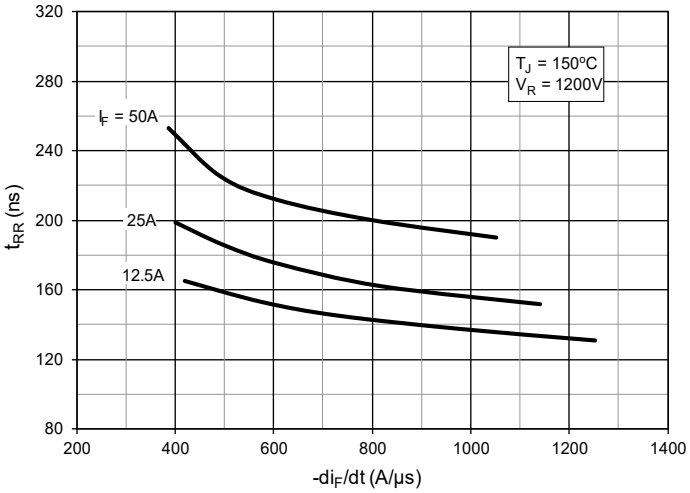


Fig. 26. Dynamic Parameters Q_{RR}, I_{RR} vs. Junction Temperature

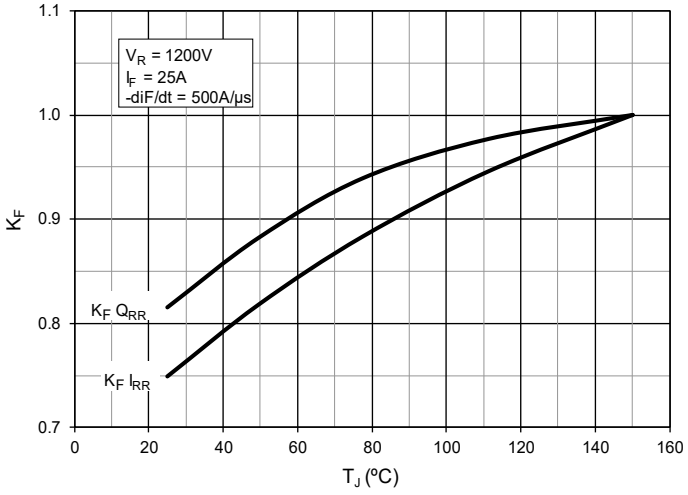
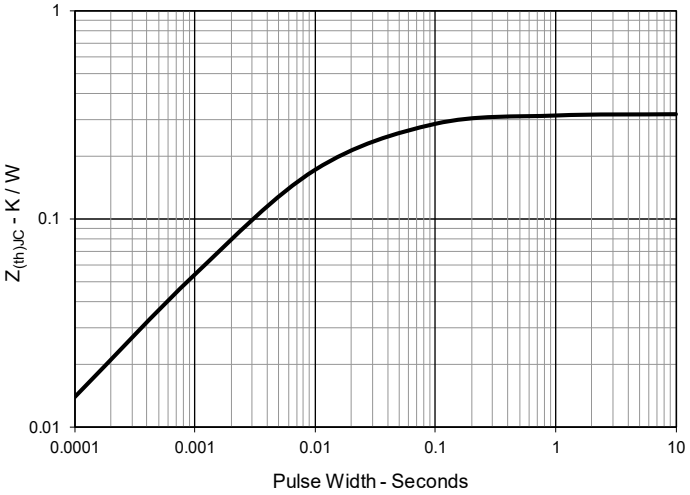
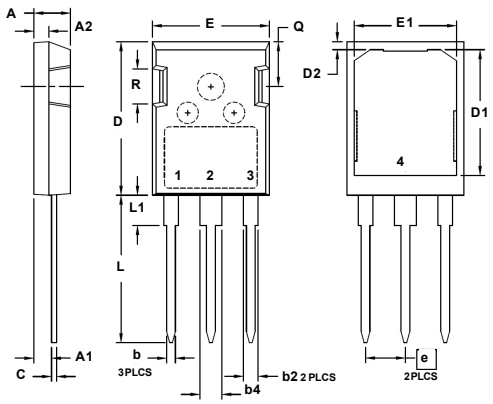


Fig. 27. Maximum Transient Thermal Impedance (Diode)



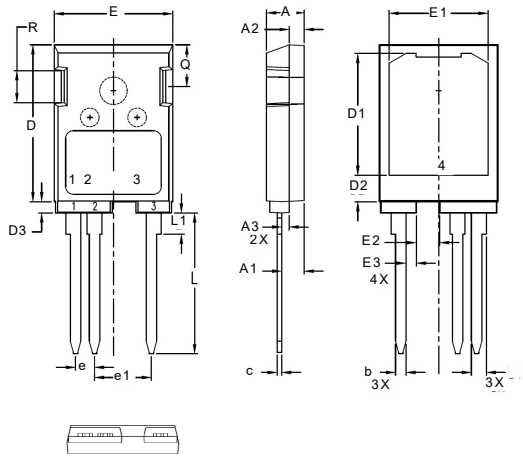
PLUS247™ Outline



1 - Gate 3 - Emitter
2,4 - Collector

SYM	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.193	0.205	4.83	5.21
A1	0.090	0.100	2.29	2.54
A2	0.075	0.085	1.91	2.16
b	0.045	0.055	1.14	1.40
b2	0.075	0.087	1.91	2.20
b4	0.115	0.126	2.92	3.20
C	0.024	0.031	0.61	0.80
D	0.819	0.840	20.80	21.34
D1	0.650	0.690	16.51	17.53
D2	0.035	0.050	0.89	1.27
E	0.620	0.635	15.75	16.13
E1	0.520	0.560	13.08	14.22
e	0.215	BSC	5.45	BSC
L	0.780	0.810	19.81	20.57
L1	0.150	0.170	3.81	4.32
Q	0.220	0.244	5.59	6.20
R	0.170	0.190	4.32	4.83

TO-247PLUS-HV Outline



1 - Gate
2,4 - Emitter
3 - Collector

SYM	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.193	0.201	4.90	5.10
A1	0.114	0.122	2.90	3.10
A2	0.075	0.083	1.90	2.10
A3	0.035	0.043	0.90	1.10
b	0.053	0.059	1.35	1.50
b1	0.075	0.083	1.90	2.10
c	0.022	0.030	0.55	0.75
D	0.819	0.843	20.8	21.4
D1	0.638	0.646	16.2	16.4
D2	0.134	0.146	3.40	3.70
D3	0.055	0.063	1.40	1.60
E	0.622	0.638	15.8	16.2
E1	0.520	0.528	13.2	13.4
E2	0.118	0.126	3.00	3.20
E3	0.051	0.059	1.30	1.50
e	0.100	BSC	2.54	BSC
e1	0.300	BSC	7.62	BSC
L	0.732	0.748	18.60	19.0
L1	0.106	0.118	2.70	3.00
Q	0.216	0.224	5.50	5.70
R	0.165	0.169	4.20	4.30