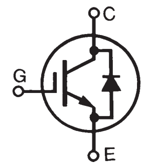
IXYS

High Voltage IGBT w/ Diode

IXGH28N120BD1
IXGT28N120BD1

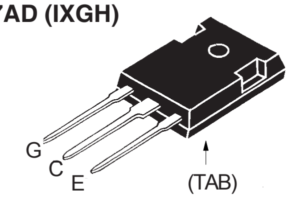
V_{CES} = 1200V
I_{C25} = 50A
$V_{CE(sat)}$ ≤ 3.5V
$t_{fi(typ)}$ = 170ns



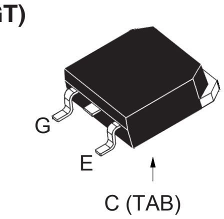
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1200	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	50	A
I_{C100}	T_C = 100°C	28	A
I_{F90}	T_C = 90°C	10	A
I_{CM}	T_C = 25°C, 1ms	150	A
SSOA	V_{GE}= 15V, T_J = 125°C, R_G = 5Ω	I_{CM} = 120	A
(RBSOA)	Clamped Inductive Load	0.8 • V_{CES}	
P_C	T_C = 25°C	250	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 (0.062 in.) from Case for 10	260	°C
M_d	Mounting Torque (TO-247)	1.13/10	Nm/lb.in.
Weight	TO-247	6	g
	TO-286	4	g

Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C, Unless Otherwise Specified)		Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	2.5		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE}= 0V			50	μA
	T_J = 125°C, Note1			250	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 28A, V_{GE} = 15V, Note 2		2.9	3.5	V
	T_J = 125°C		2.8		V

TO-247AD (IXGH)



TO-268 (IXGT)



G = Gate C = Collector
E = Emitter TAB = Collector

Features

- International Standard Packages JEDEC TO-247AD & TO-268
- IGBT and Anti-Parallel FRED for Resonant Power Supplies
  - Induction Heating
  - Rice Cookers
- MOS Gate Turn-On
- Fast Recovery Expitaxial Diode (FRED)
  - Soft Recovery with Low I_{RM}

Advantages

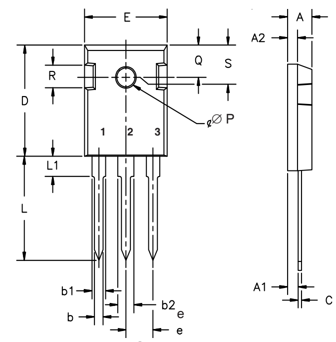
- Saves Space (Two Devices in One Package)
- Easy to Mount with 1 Screw (Isolated Mounting Screw Hole)
- Reduces Assembly Time and Cost

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- DC Choppers
- AC Motor Speed Drives
- DC Servo and Robot Drives

Symbol (TT_J = 25°C, Unless Otherwise Specified)	Test Conditions	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 28A, V_{CE} = 10V, Note 2	15	23		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1700		pF
C_{oes}			130		pF
C_{res}			45		pF
Q_g	I_C = 28A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		92		nC
Q_{ge}			13		nC
Q_{gc}			35		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C** I_C = 28A, V_{GE} = 15V V_{CE} = 0.8 • V_{CES}, R_G = 5Ω Note 3		30		ns
t_{ri}			20		ns
$t_{d(off)}$			210	280	ns
t_{fi}			170	320	ns
E_{off}			2.2	5.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C** I_C = 28A, V_{GE} = 15V V_{CE} = 0.8 • V_{CES}, R_G = 5Ω Note 3		35		ns
t_{ri}			28		ns
E_{on}			1.4		mJ
$t_{d(off)}$			250		ns
t_{fi}			340		ns
E_{off}			4.6		mJ
R_{thJC}				0.50	°C/W
R_{thCK}	(TO-247)		0.21		°C/W

TO-247 (IXGH) Outline



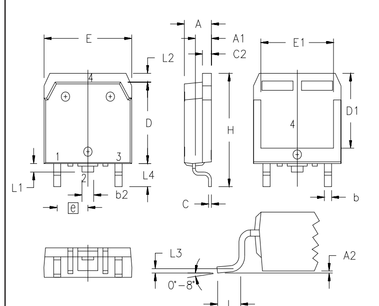
Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

Reverse Diode (FRED)

Symbol (TT_J = 25°C, Unless Otherwise Specified)	Test Conditions	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 10A, V_{GE} = 0V, Note 2			3.2	V
	T_J = 100°C		2.3		V
I_{RM}	I_F = 10A, V_{GE} = 0V, -di_F/dt = 400A/μs, V_R = 600V		14		A
t_{rr}			120		ns
t_{rr}	I_F = 1A, V_{GE} = 0V, -di_F/dt = 100A/μs, V_R = 30V		40		ns
R_{thJC}				2.5	°C/W

TO-268 (IXGT) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

Notes:
1. Part must be heatsunk for high-temp I_{CES} measurement.
2. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
3. Switching times & energy loses may increase for higher V_{CE}(Clamp), T_J or R_G.

Fig. 1. Output Characteristics @ 25 ºC

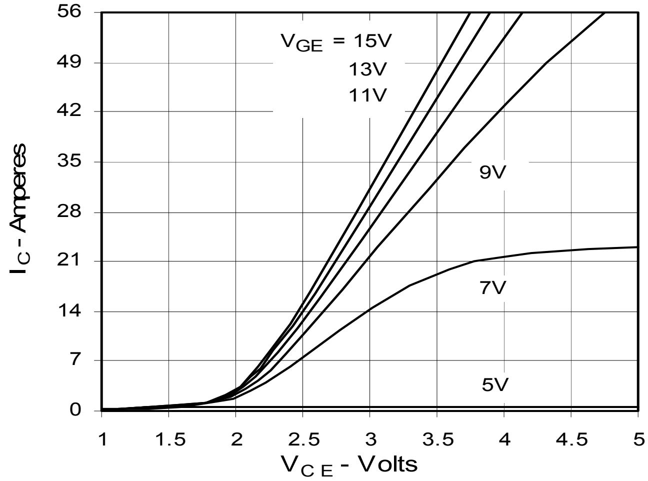


Fig. 2. Extended Output Characteristics @ 25 ºC

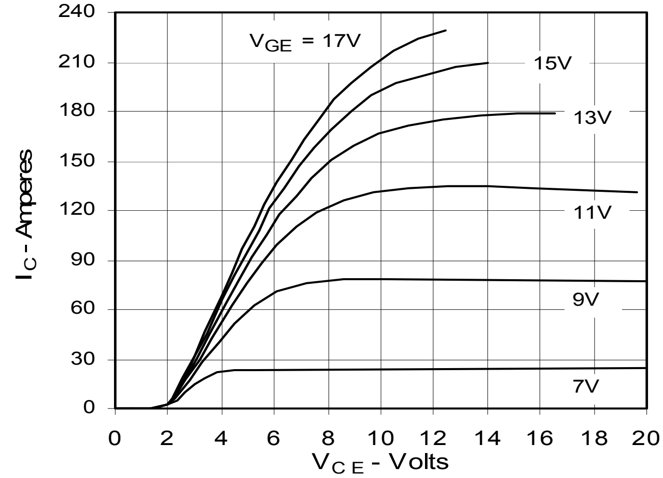


Fig. 3. Output Characteristics @ 125 ºC

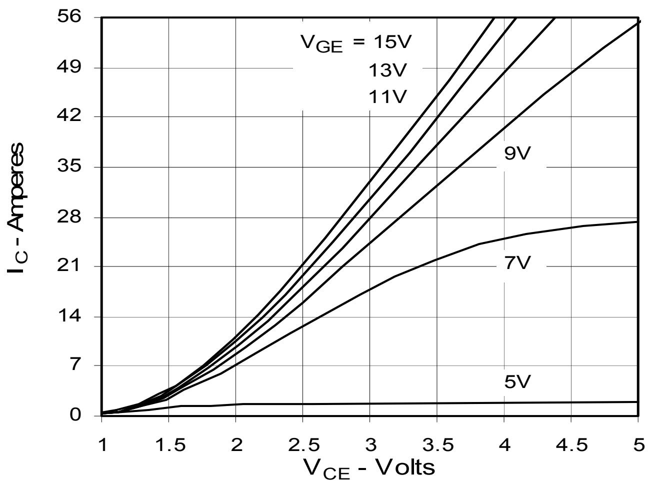


Fig. 4. Dependence of $V_{CE(sat)}$ on Temperature

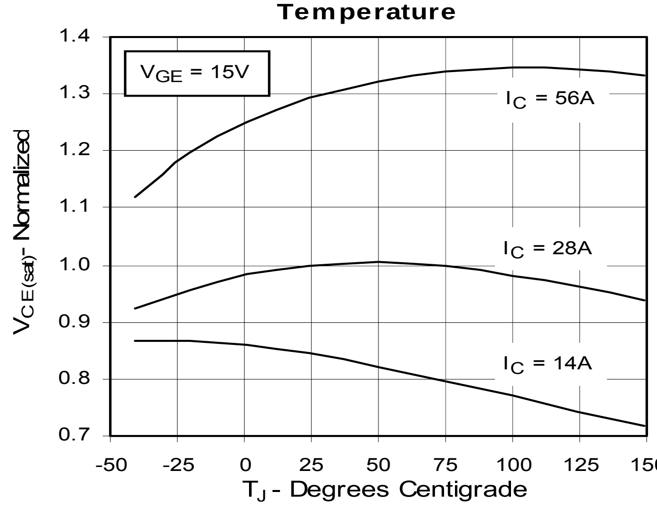


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter voltage

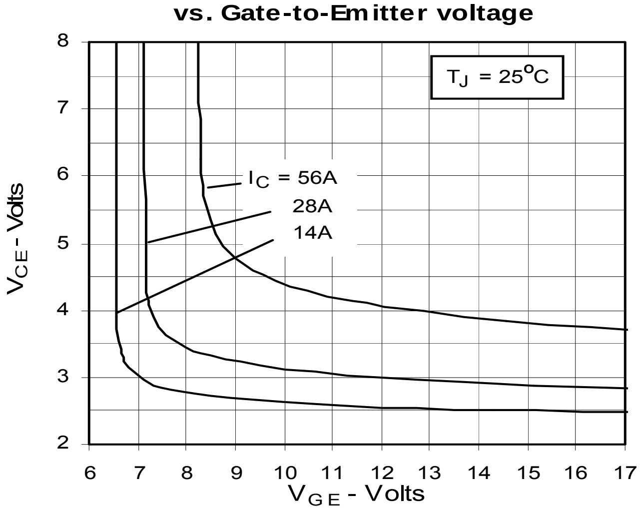


Fig. 6. Input Admittance

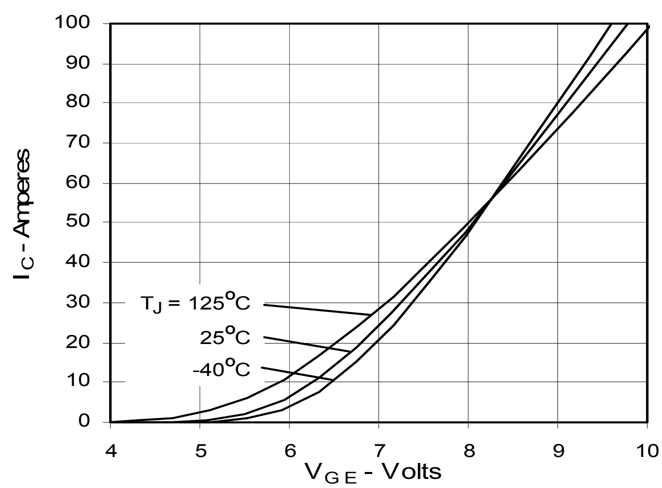


Fig. 7. Transconductance

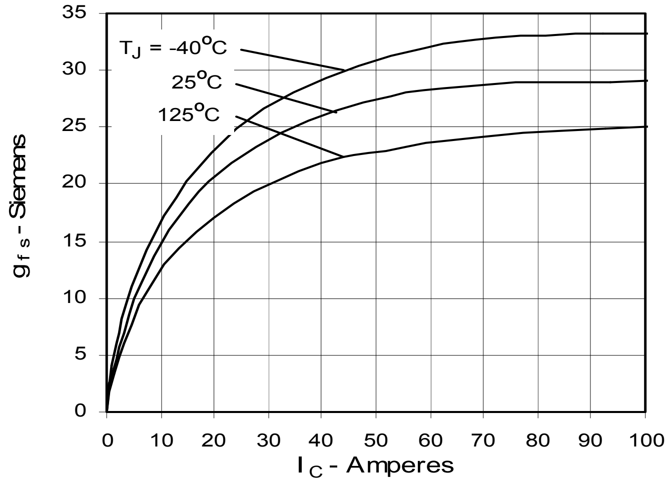


Fig. 8. Dependence of Turn-off Energy Loss on R_G

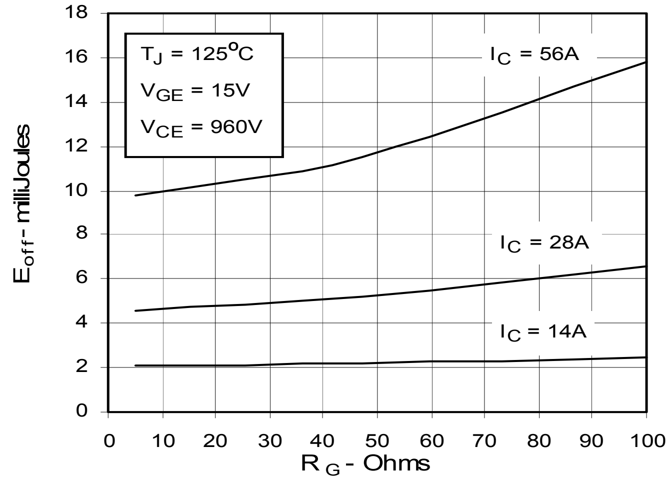


Fig. 9. Dependence of Turn-Off Energy Loss on I_C

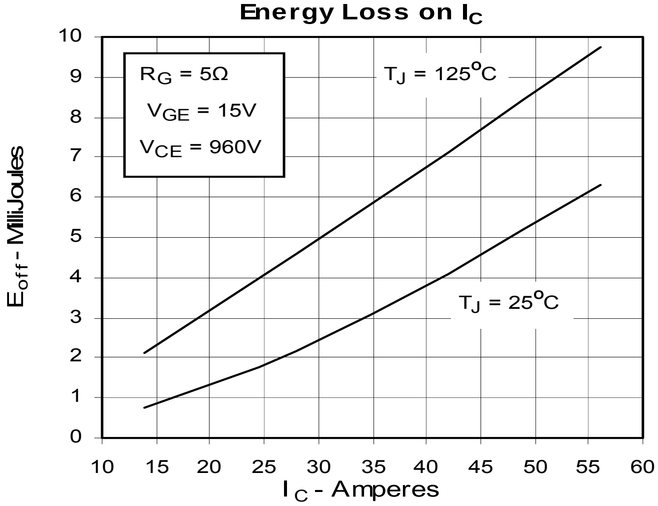


Fig. 10. Dependence of Turn-off Energy Loss on Temperature

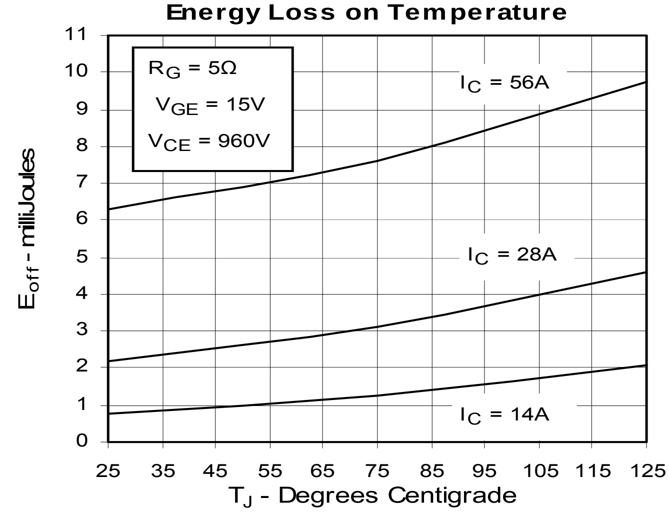


Fig. 11. Dependence of Turn-off Switching Time on R_G

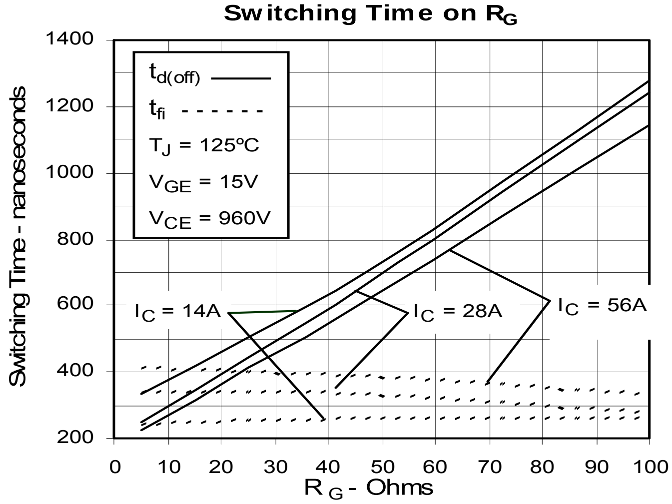


Fig. 12. Dependence of Turn-off Switching Time on I_C

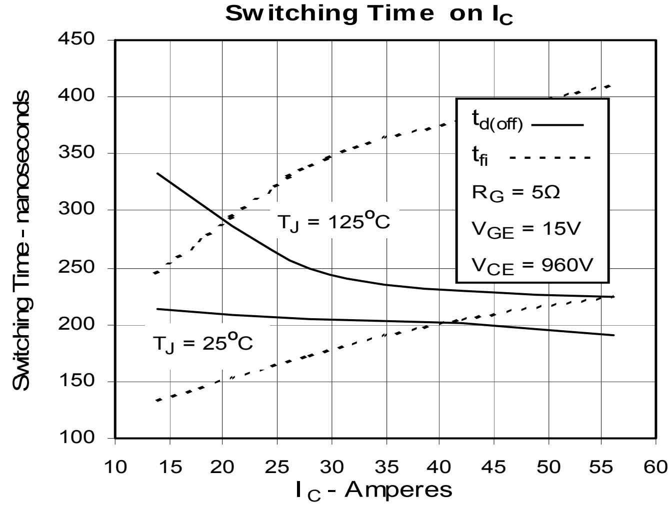


Fig. 13. Dependence of Turn-off Switching Time on Temperature

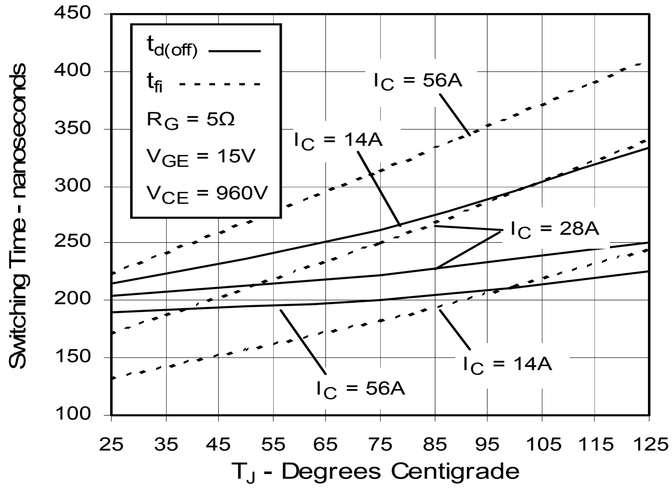


Fig. 14. Gate Charge

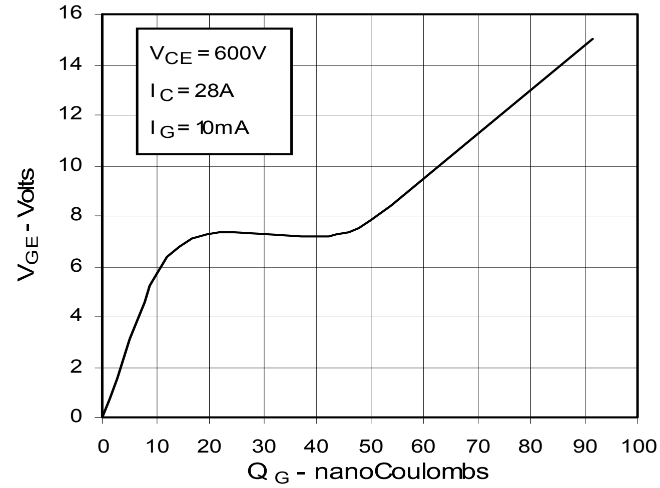


Fig. 15. Capacitance

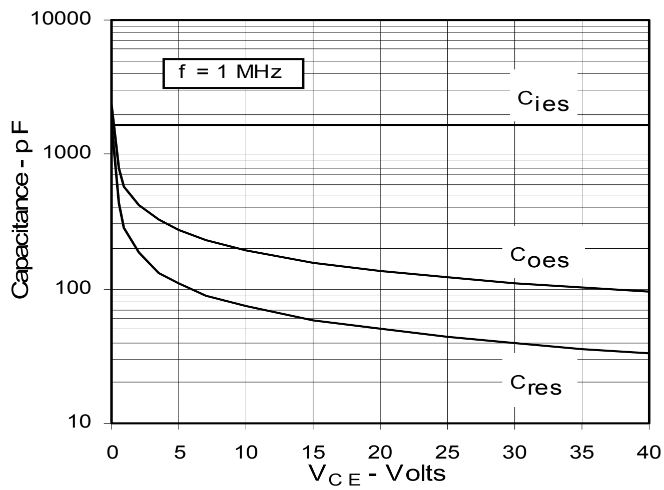


Fig. 16. Reverse-Bias Safe Operating Area

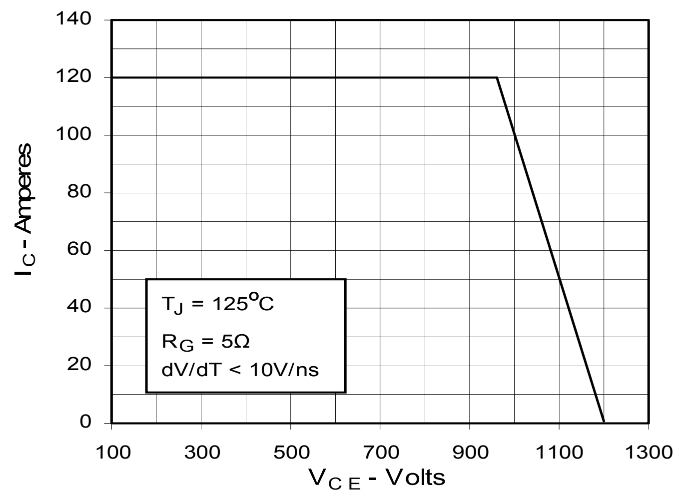
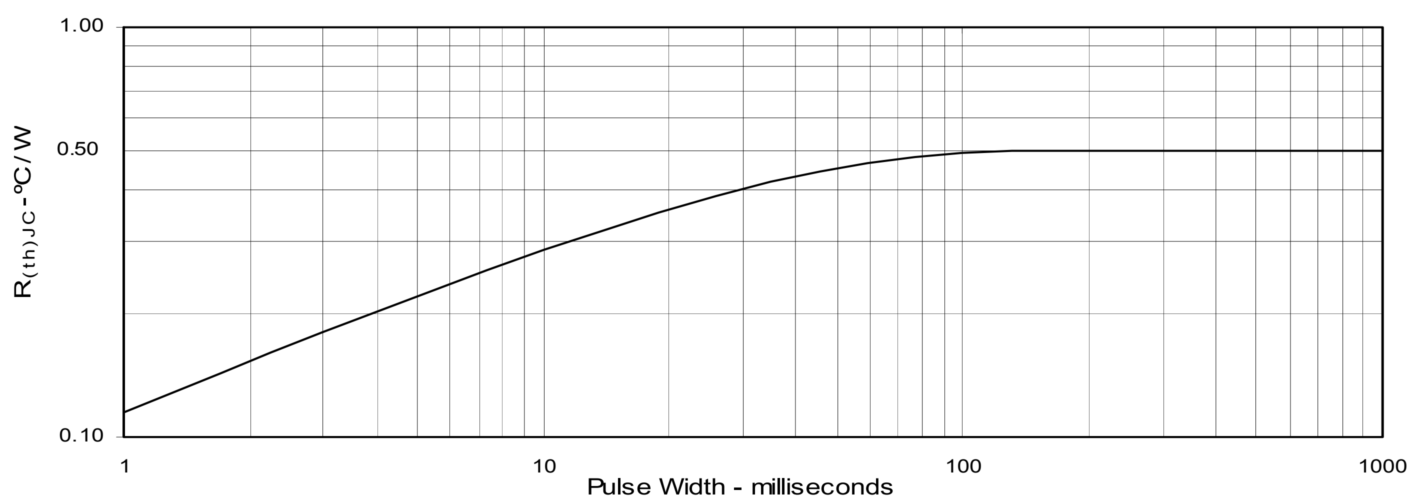


Fig. 17. Maximum Transient Thermal Resistance



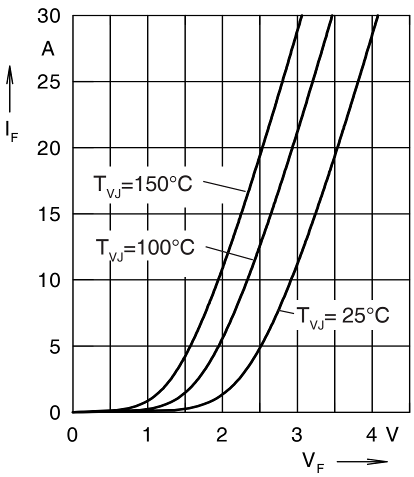


Fig. 18. Forward current I_F versus V_F

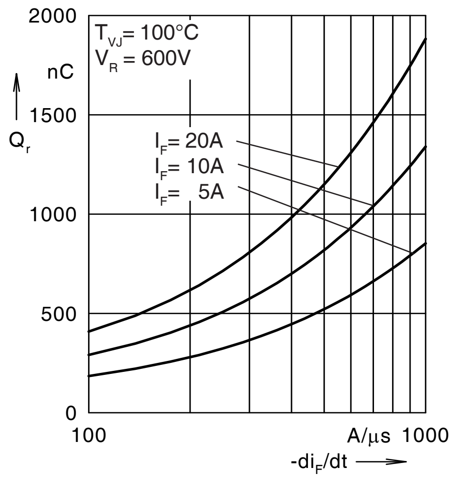


Fig. 19. Reverse recovery charge Q_r versus $-di_F/dt$

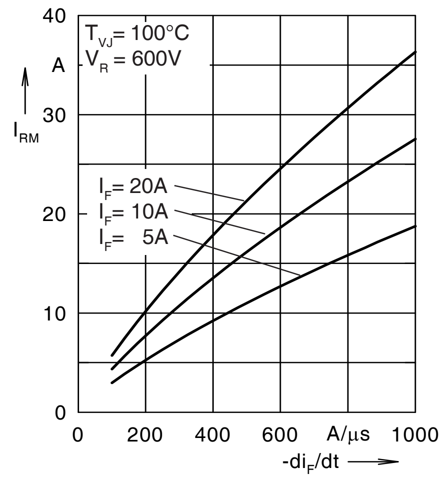


Fig. 20. Peak reverse current I_{RM} versus $-di_F/dt$

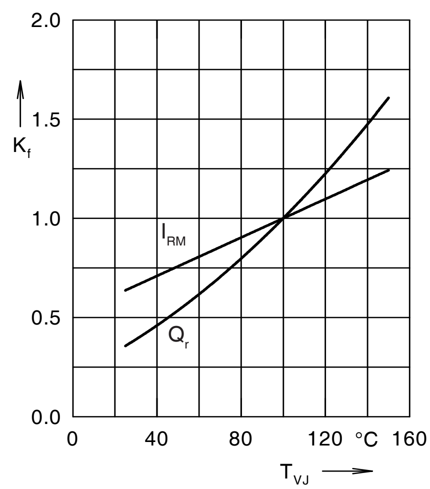


Fig. 21. Dynamic parameters Q_r, I_{RM} versus T_{VJ}

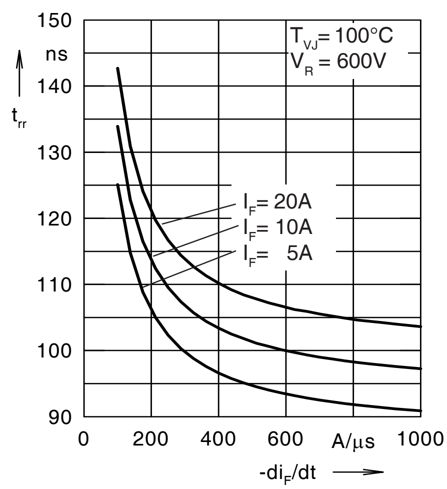


Fig. 22. Recovery time t_{rr} versus $-di_F/dt$

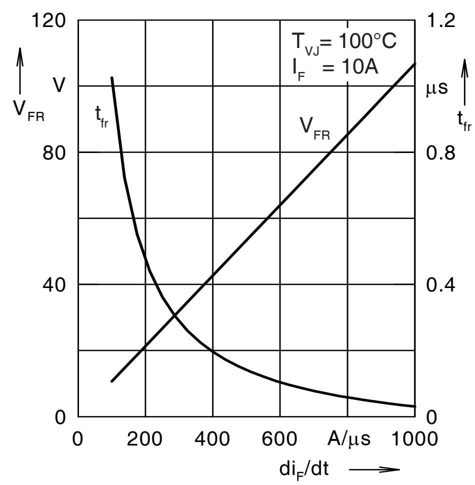


Fig. 23. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

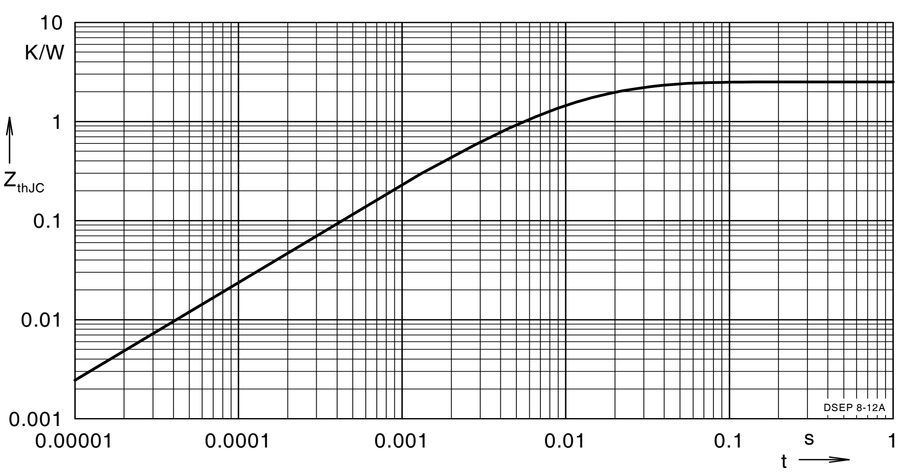


Fig. 24. Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	1.449	0.0052
2	0.558	0.0003
3	0.493	0.017