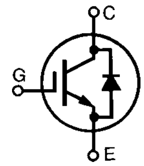
HiPerFAST™ IGBT with Diode

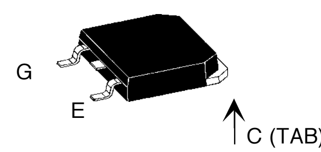
Combi Pack

IXGH 30N60BU1
IXGT 30N60BU1

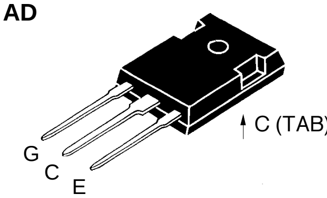
V_{CES} = 600 V
I_{C25} = 60 A
$V_{CE(sat)}$ = 1.8 V
t_{fi} = 100 ns



TO-268 (IXGT)



TO-247 AD



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} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	60	A
I_{C110}	T_C = 110°C	30	A
I_{CM}	T_C = 25°C, 1 ms	120	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 33 Ω Clamped inductive load, L = 100 µH	I_{CM} = 60 @ 0.8 V_{CES}	A
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum Lead and Tab temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
M_d	Mounting torque, TO-247 AD	1.13/10	Nm/lb.in.
Weight	TO-268	4	g
	TO-247 AD	6	g

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 750µA, V_{GE} = 0 V	600			V
	BV_{CES} temperature coefficient		0.072		%/K
$V_{GE(th)}$	I_C = 250 µA, V_{CE} = V_{GE}	2.5		5.5	V
	$V_{GE(th)}$ temperature coefficient		-0.286		%/K
I_{CES}	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0 V; T_J = 25°C			500	µA
	T_J = 150°C			3	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V			±100	nA
$V_{CE(sat)}$	I_C = I_{C110}, V_{GE} = 15 V			1.8	V
$V_{CE(sat)}$	I_C = I_{C110}, V_{GE} = 15 V, T_J = 150°C			2.0	V

Features

- International standard packages JEDEC TO-247 SMD surface mountable and JEDEC TO-247 AD
- High frequency IGBT and antiparallel FRED in one package
- High current handling capability
- Newest generation HDMOS™ process
- MOS Gate turn-on
  - drive simplicity

Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies

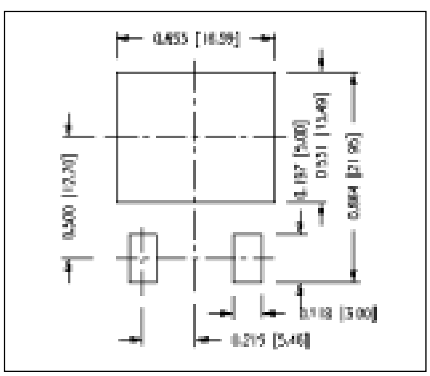
Advantages

- Space savings (two devices in one package)
- High power density
- Optimized $V_{CE(sat)}$ and switching speeds for medium frequency applications

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C110}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %		25		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		2710		pF
C_{oes}			240		pF
C_{res}			50		pF
Q_g	$I_C = I_{C110}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		110	150	nC
Q_{ge}			22	35	nC
Q_{gc}			40	75	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		25		ns
t_{ri}	$I_C = I_{C110}$, V_{GE} = 15 V, L = 100 µH, V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 4.7 Ω		30		ns
$t_{d(off)}$	Remarks: Switching times may		130	220	ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES},		100	190	ns
E_{off}	higher T_J or increased R_G		1.0	2.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		25		ns
t_{ri}	$I_C = I_{C110}$, V_{GE} = 15 V, L = 100 µH		35		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 4.7 Ω		1		mJ
$t_{d(off)}$	Remarks: Switching times may		200		ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES},		230		ns
E_{off}	higher T_J or increased R_G		2.5		mJ
R_{thJC}				0.62	K/W
R_{thCK}			0.25		K/W

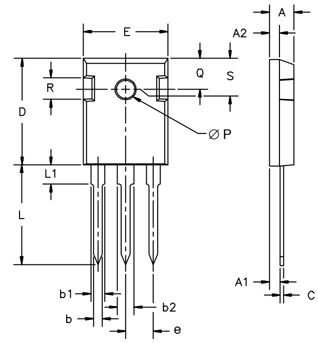
Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C110}$, V_{GE} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %			1.6	V
I_{RM}	$I_F = I_{C110}$, V_{GE} = 0 V, -di_F/dt = 240 A/µs, V_R = 360 V		10	15	A
t_{rr}	I_F = 1 A; -di/dt = 100 A/µs; V_R = 30 V		35	50	ns
R_{thJC}				1	K/W



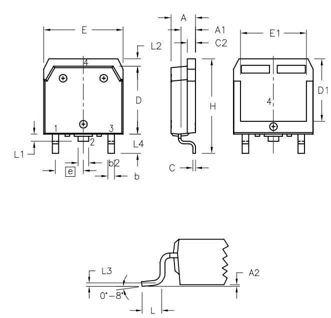
Min Recommended Footprint

TO-247 AD Outline



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

TO-247 AA (D^3 PAK)



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.9	5.1	.193	.201
A_1	2.7	2.9	.106	.114
A_2	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b_2	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E_1	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161

IXYS reserves the right to change limits, test conditions, and dimensions.

Fig. 1. Saturation Voltage Characteristics

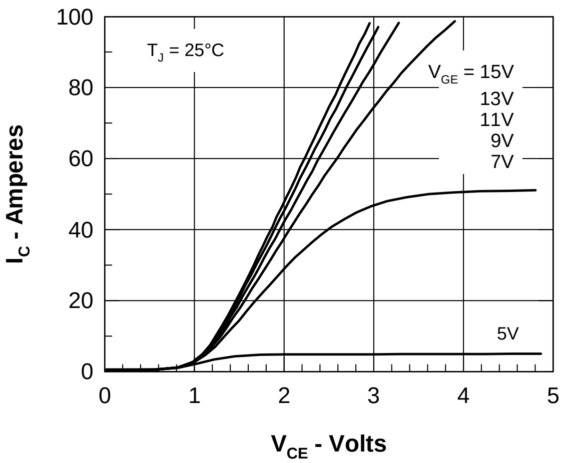


Fig. 2. Extended Output Characteristics

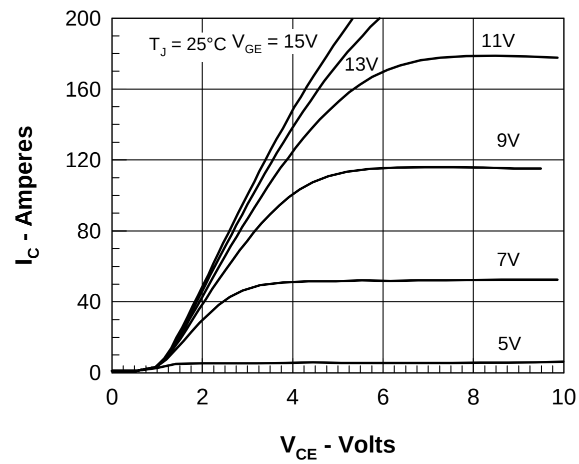


Fig. 3. Saturation Voltage Characteristics

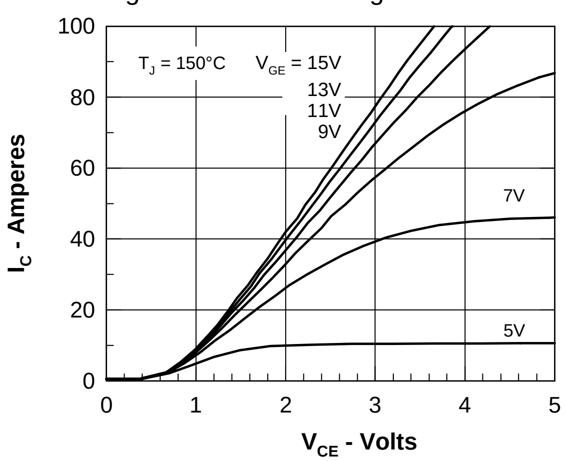


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

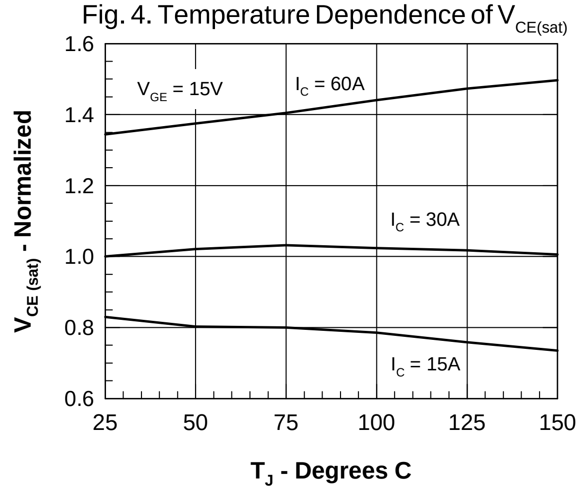


Fig. 5. Admittance Curves

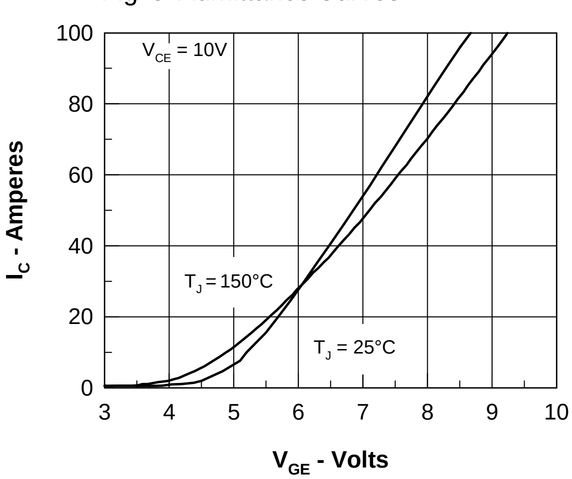


Fig. 6. Temperature Dependence of BV_{DSS} & $V_{GE(th)}$

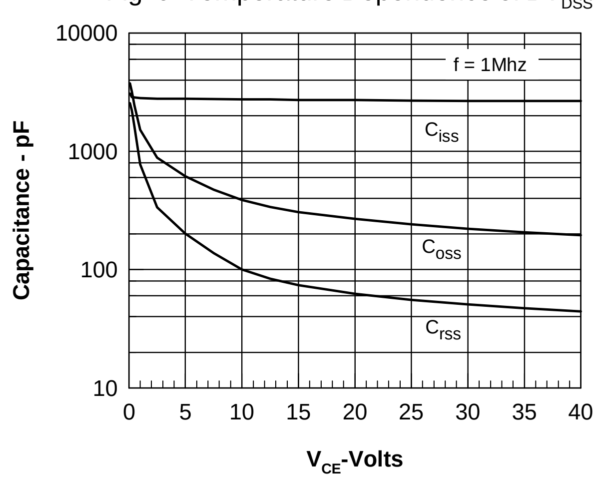


Fig. 7. Dependence of E_{OFF} and E_{OFF} on I_C.

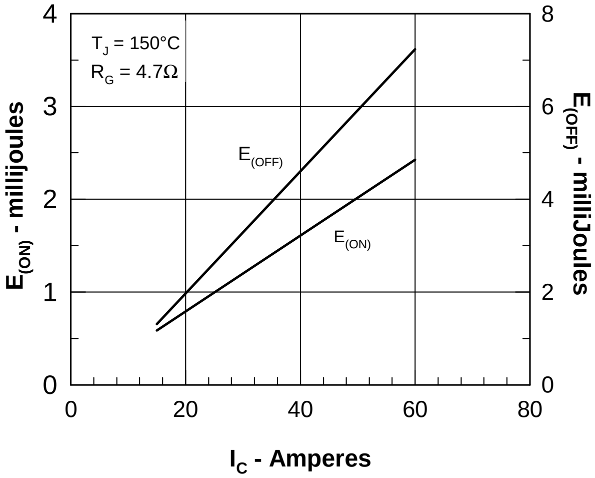


Fig. 8. Dependence of E_{OFF} on R_G.

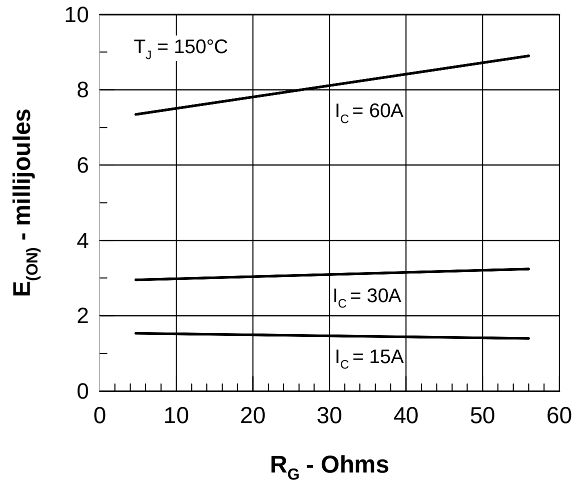


Fig. 9. Gate Charge

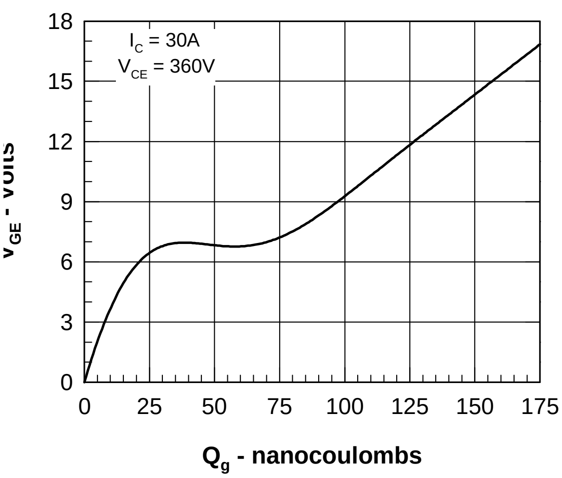


Fig. 10. Turn-off Safe Operating Area

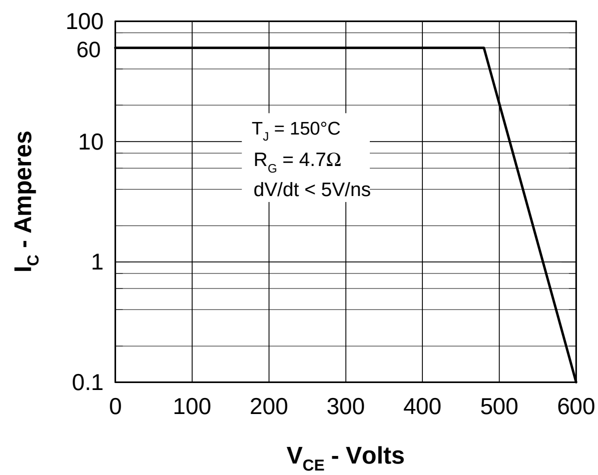
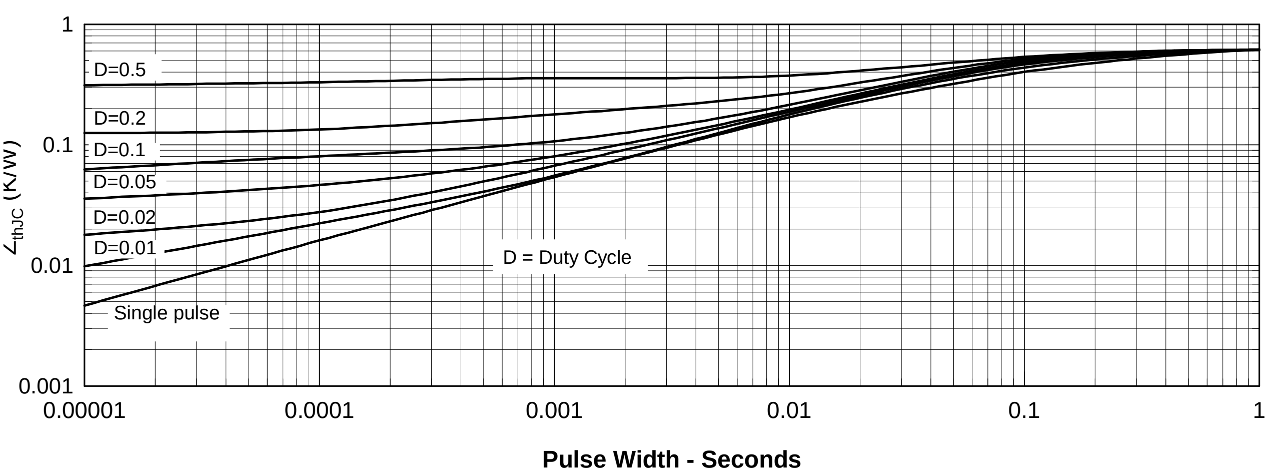


Fig. 11. IGBT Transient Thermal Resistance



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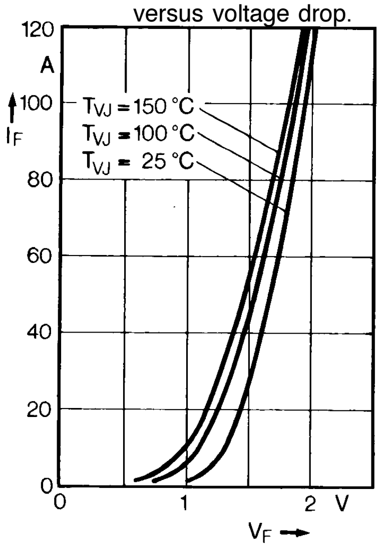

Fig. 12. Forward current versus voltage drop.

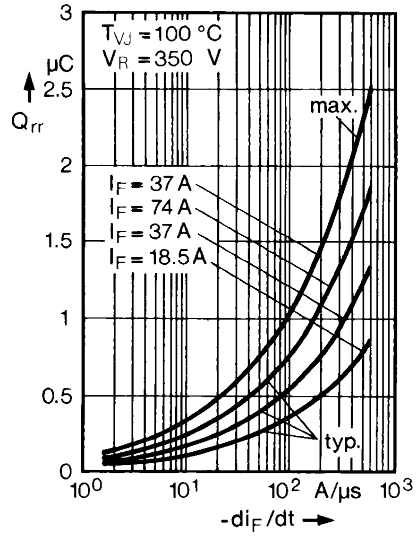

Fig. 13. Recovery charge versus $-di_F/dt$.

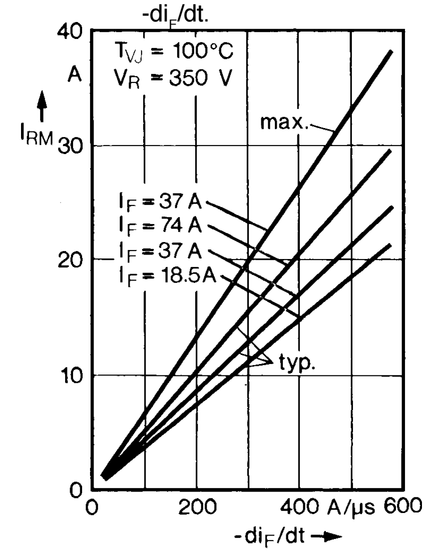

Fig. 14. Peak reverse current versus $-di_F/dt$.

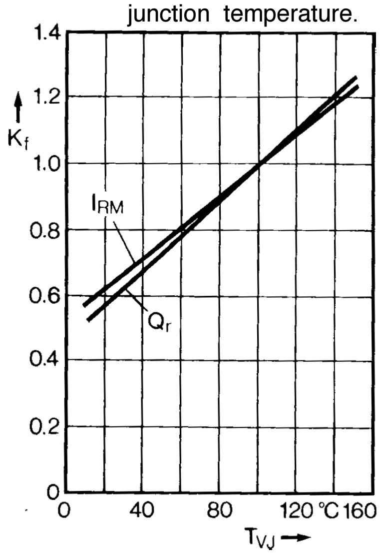

Fig. 15. Dynamic parameters versus junction temperature.

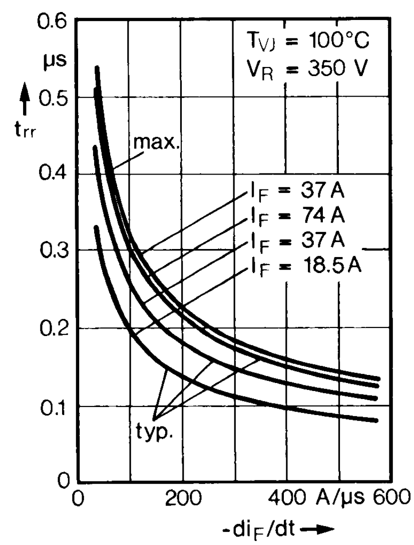

Fig. 16. Reverse recovery time vs $-di_F/dt$.

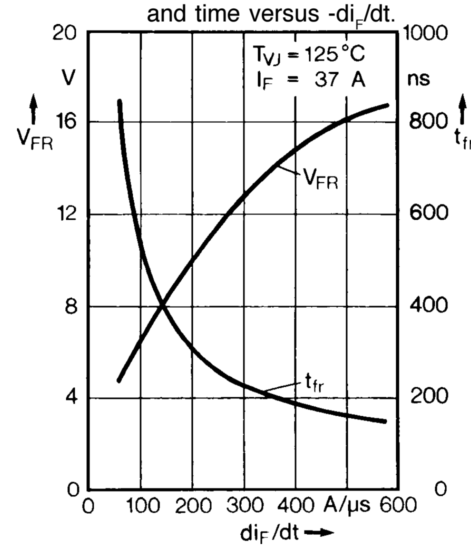

Fig. 17. Forward voltage recovery and time versus $-di_F/dt$.

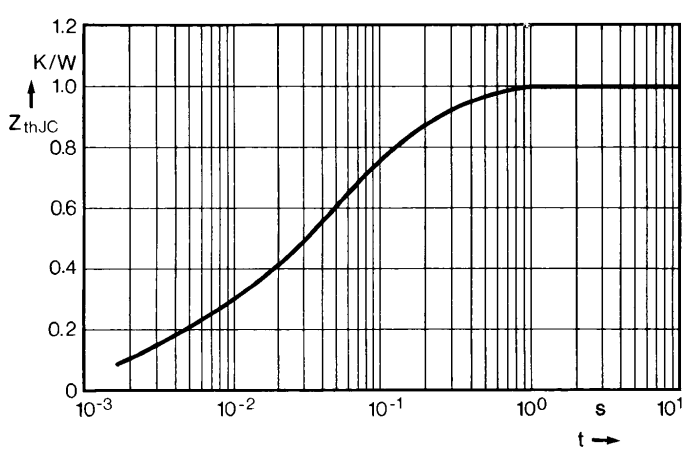

Fig. 18. Transient thermal resistance junction to case.