

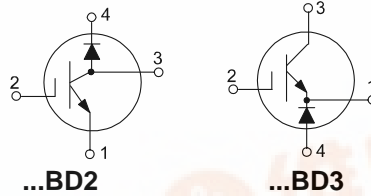


HiPerFAST™ IGBT with HiPerFRED

IXGN 50N60BD2 IXGN 50N60BD3

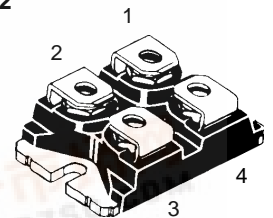
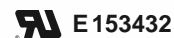
$V_{CES} = 600\text{ V}$
 $I_{C25} = 75\text{ A}$
 $V_{CE(sat)} = 2.5\text{ V}$
 $t_{fi} = 150\text{ ns}$

Buck & boost configurations



	Symbol	Test Conditions	Maximum Ratings	
IGBT	V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
	V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}; R_{GE} = 1\text{ M}\Omega$	600	V
	V_{GES}	Continuous	± 20	V
	V_{GEM}	Transient	± 30	V
	I_{C25}	$T_C = 25^\circ\text{C}$	75	A
	I_{C90}	$T_C = 90^\circ\text{C}$	50	A
	I_{CM}	$T_C = 25^\circ\text{C}, 1\text{ ms}$	200	A
	SSOA (RBSOA)	$V_{GE} = 15\text{ V}, T_{VJ} = 125^\circ\text{C}, R_G = 10\ \Omega$ Clamped inductive load, $L = 30\ \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	250	W	
Diode	V_{RRM}		600	V
	I_{FAVM}	$T_C = 70^\circ\text{C}; \text{rectangular, } d = 50\%$	60	A
	I_{FRM}	$t_p < 10\text{ ms}; \text{pulse width limited by } T_J$	600	A
	P_D	$T_C = 25^\circ\text{C}$	150	W
Case	T_J		-40 ... +150	$^\circ\text{C}$
	T_{JM}		150	$^\circ\text{C}$
	T_{stg}		-40 ... +150	$^\circ\text{C}$
	M_d	Mounting torque Terminal connection torque (M4)	1.5/13	Nm/lb.in.
	Weight		30	g
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

SOT-227B, miniBLOC



IXGN50N60BD2

1 = Emitter; 2 = Gate
3 = Collector; 4 = Diode cathode

IXGN50N60BD3

1 = Emitter/Diode Cathode; 2 = Gate
3 = Collector; 4 = Diode anode

Features

- International standard package miniBLOC
- Aluminium nitride isolation
 - high power dissipation
- Isolation voltage 3000 V~
- Very high current, fast switching IGBT & FRED diode
- MOS Gate turn-on
 - drive simplicity
- Low collector-to-case capacitance
- Low package inductance (< 10 nH)
 - easy to drive and to protect
- Molding epoxies meet UL94 V-0 flammability classification

Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Buck converters

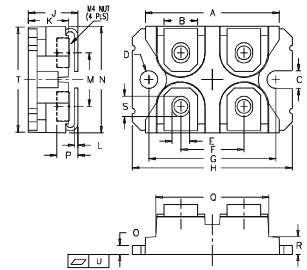
Advantages

- Easy to mount with 2 screws
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 250\ \mu\text{A}, V_{GE} = 0\text{ V}$	600		V
$V_{GE(th)}$	$I_C = 250\ \mu\text{A}, V_{CE} = V_{GE}$	2.5		V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$			200 μA 1 mA
I_{GES}	$V_{CE} = 0\text{ V}, V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}, V_{GE} = 15\text{ V}$			2.5 V



Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)			
		min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$	35	50	S	
C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$		4100	pF	
C_{oes}			290	pF	
C_{res}			50	pF	
Q_g	$I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$		110	nC	
Q_{ge}			30	nC	
Q_{gc}			35	nC	
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $L = 100\ \mu\text{H}$, $V_{CE} = 0.8 V_{CES}$, $R_G = R_{off} = 2.7\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$, higher T_J or increased R_G		50	ns	
t_{ri}			50	ns	
$t_{d(off)}$			110	250	ns
t_{fi}			150	220	ns
E_{off}			3.0	4.0	mJ
$t_{d(on)}$			Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}$, $V_{GE} = 15\text{ V}$, $L = 100\ \mu\text{H}$, $V_{CE} = 0.8 V_{CES}$, $R_G = R_{off} = 2.7\ \Omega$ Remarks: Switching times may increase for $V_{CE}(\text{Clamp}) > 0.8 \cdot V_{CES}$, higher T_J or increased R_G		50
t_{ri}	60	ns			
E_{on}	3.0	mJ			
$t_{d(off)}$	200	ns			
t_{fi}	250	ns			
E_{off}	4.2	mJ			
R_{thJC}			0.50	K/W	
R_{thCK}		0.05		K/W	

miniBLOC, SOT-227 B


M4 screws (4x) supplied

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	38.00	38.23	1.496	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.76	0.84	0.030	0.033
M	12.60	12.85	0.496	0.506
N	25.15	25.42	0.990	1.001
O	1.98	2.13	0.078	0.084
P	4.95	5.97	0.195	0.235
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.72	4.85	0.186	0.191
T	24.59	25.07	0.968	0.987
U	-0.05	0.1	-0.002	0.004

Reverse Diode (FRED)
Characteristic Values
($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Test Conditions	typ.	max.
I_R	$T_{VJ} = 25^\circ\text{C}$ $V_R = V_{RRM}$ $T_{VJ} = 150^\circ\text{C}$		650 uA 2.5 mA
V_F	$I_F = 60\text{ A}$, $T_{VJ} = 150^\circ\text{C}$ Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$ $T_{VJ} = 25^\circ\text{C}$		1.75 V 2.40 V
I_{RM}	$I_F = I_{C90}$, $V_{GE} = 0\text{ V}$, $-di_F/dt = 100\text{ A}/\mu\text{s}$ $V_R = 540\text{ V}$		8.0 A
t_{rr}	$I_F = 1\text{ A}$, $-di_F/dt = 50\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$ $T_J = 25^\circ\text{C}$	35	ns
R_{thJC}			0.85 K/W

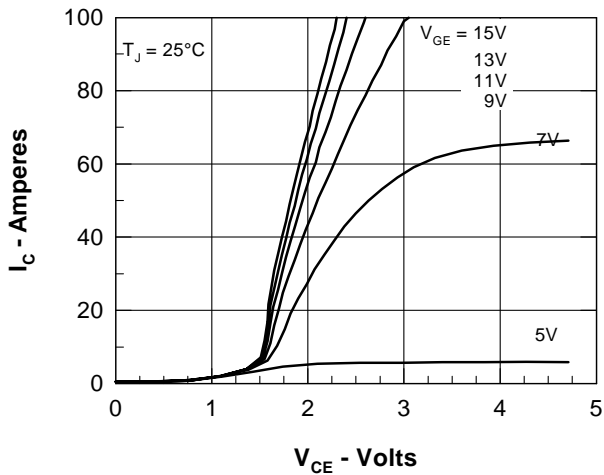


Fig. 1. Saturation Voltage Characteristics

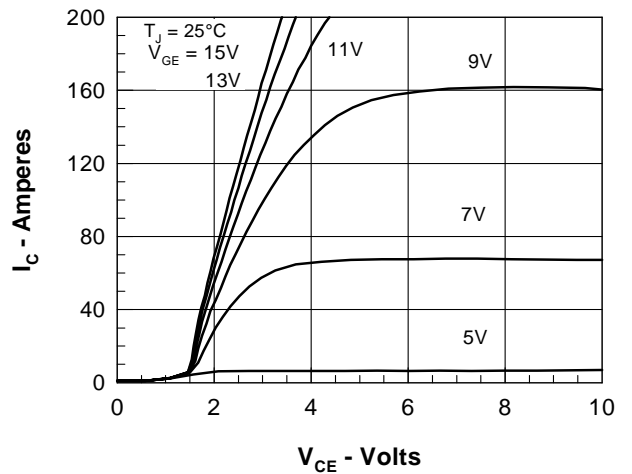


Fig. 2. Extended Output Characteristics

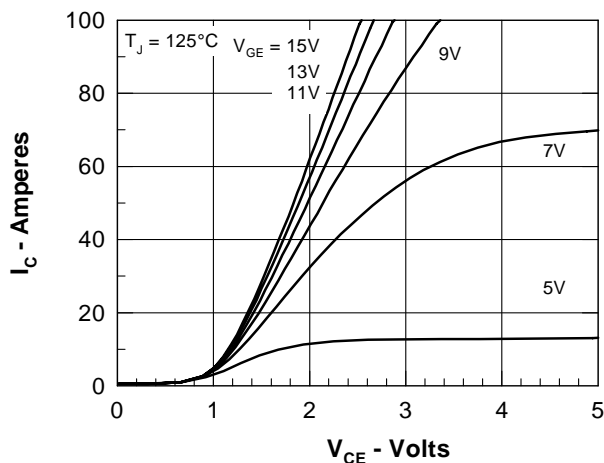


Fig. 3. Saturation Voltage Characteristics

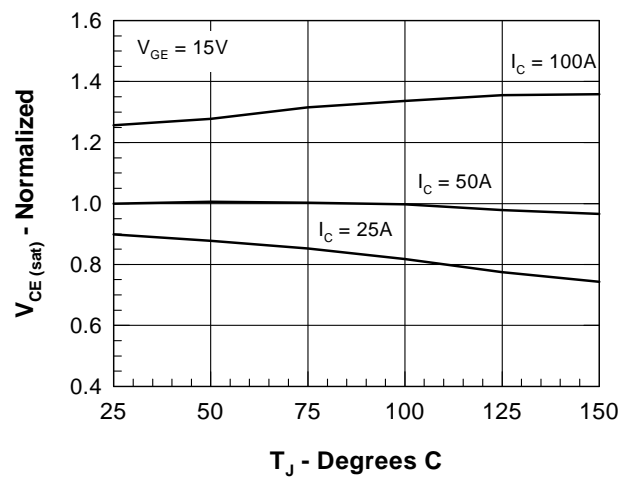


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

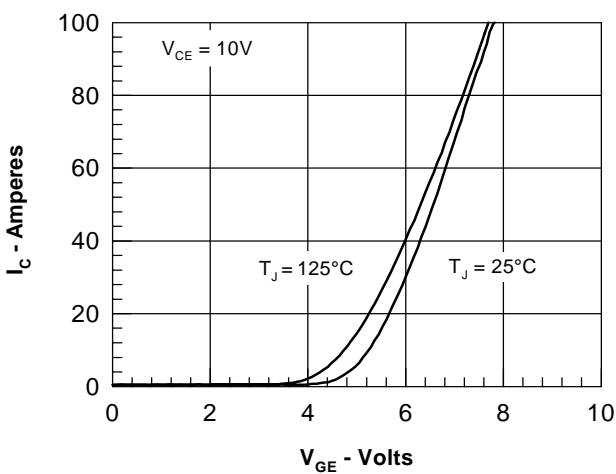


Fig. 5. Saturation Voltage Characteristics

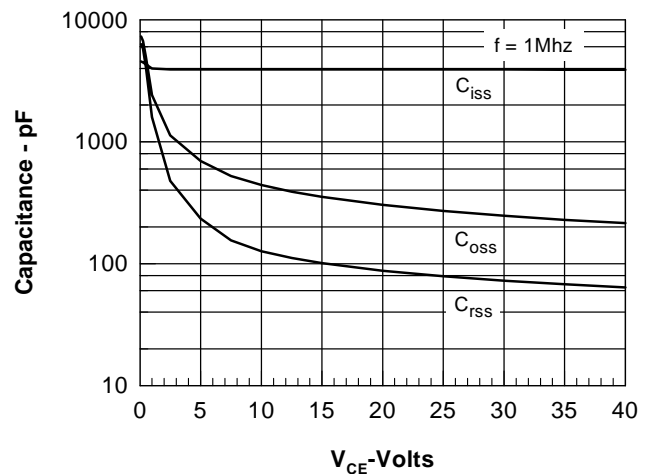


Fig. 6. Junction Capacitance Curves

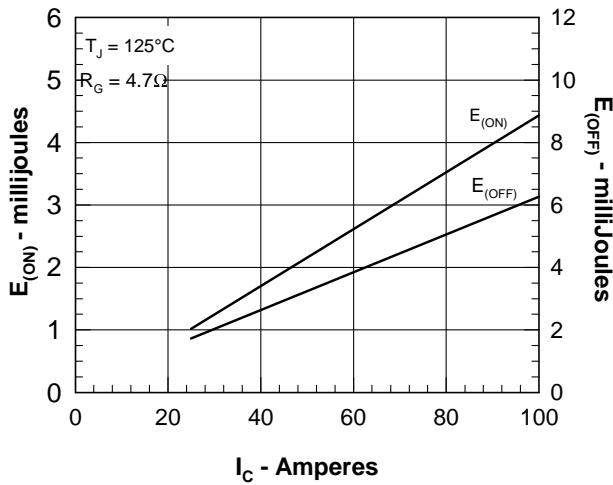


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C .

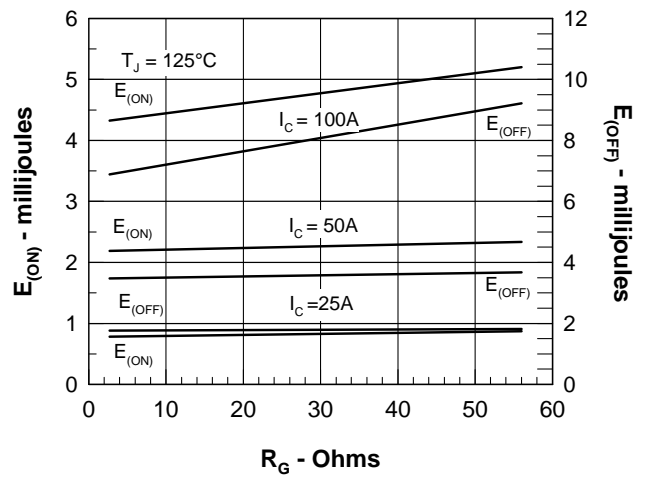


Fig. 8. Dependence of t_{fi} and E_{OFF} on R_G .

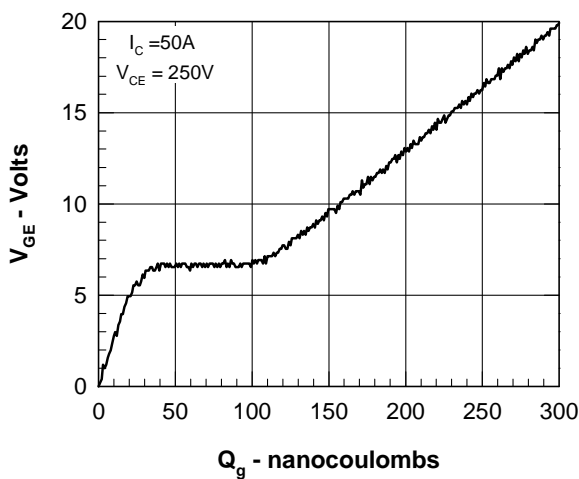


Fig. 9. Gate Charge

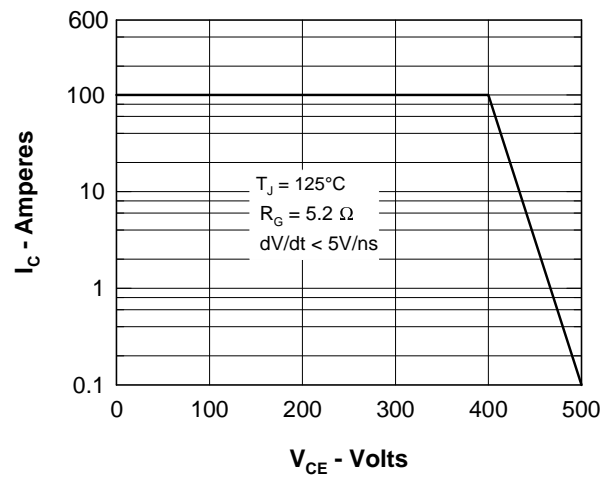


Fig. 10. Turn-off Safe Operating Area

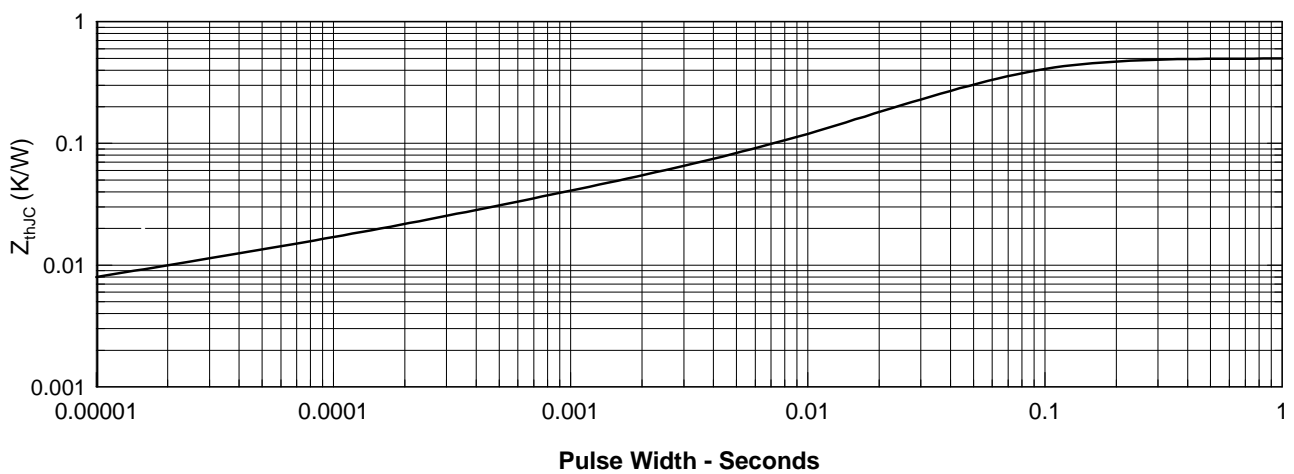


Fig. 11. Transient Thermal Resistance

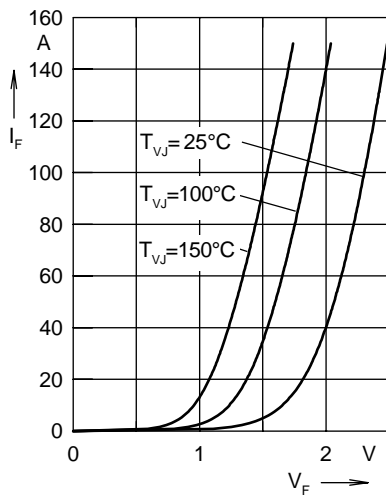


Fig. 12 Forward current I_F versus V_F

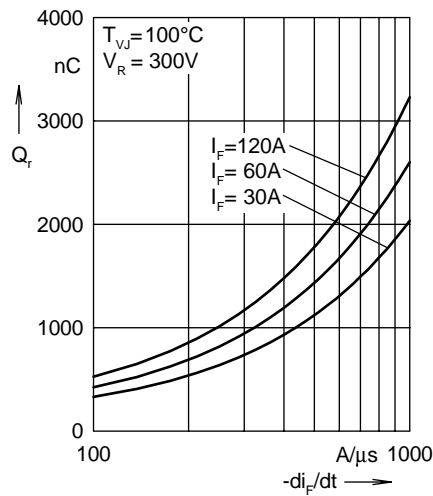


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

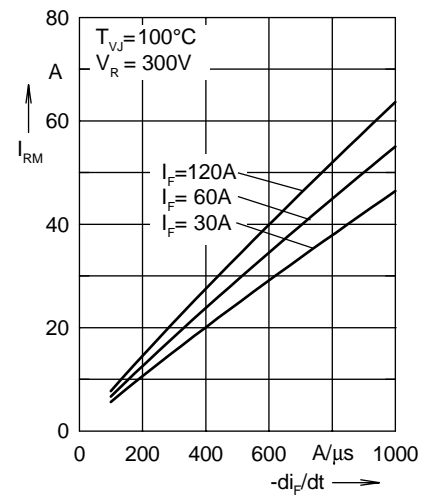


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

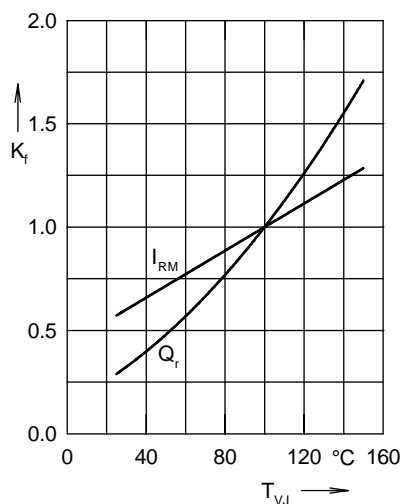


Fig. 15 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

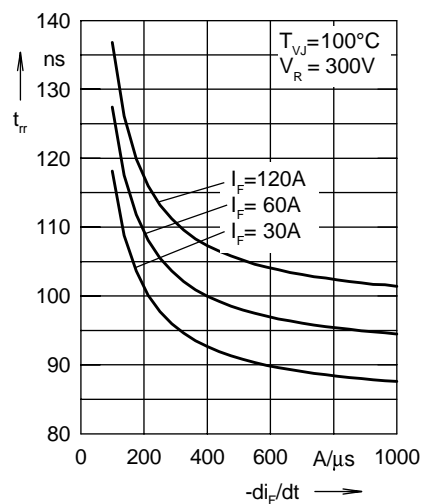


Fig. 16 Recovery time t_{tr} versus $-di_F/dt$

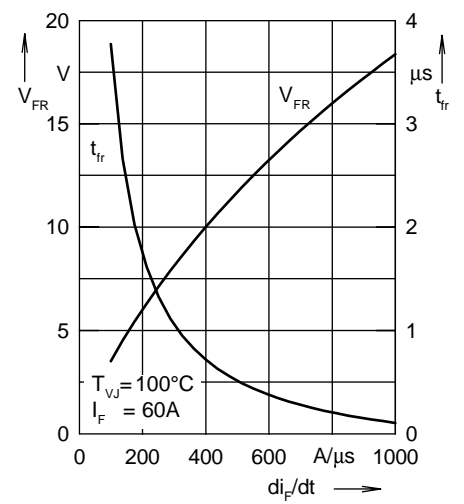


Fig. 17 Peak forward voltage V_{FR} and t_{tr} versus di_F/dt

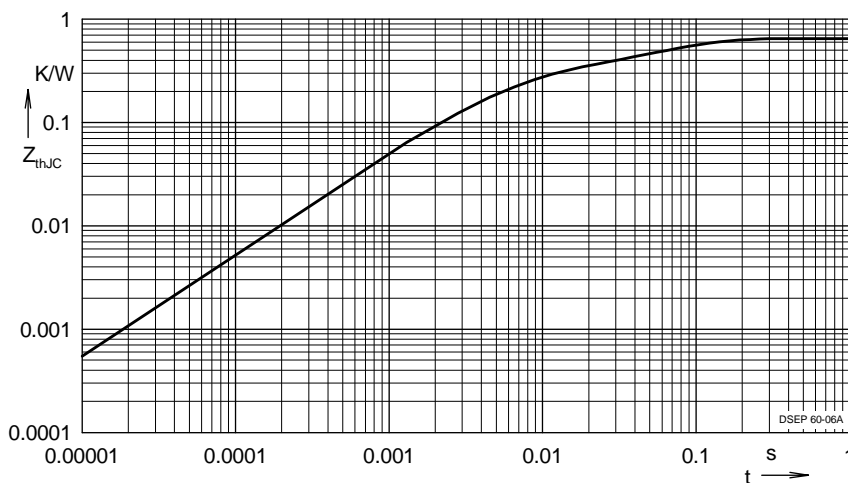


Fig. 18 Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.324	0.0052
2	0.125	0.0003
3	0.201	0.0385