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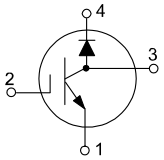
IXYS

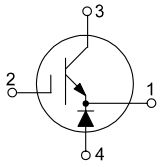
HiPerFAST™ IGBT with HiPerFRED

IXGN 50N60BD2
IXGN 50N60BD3

Buck & boost configurations



...BD2



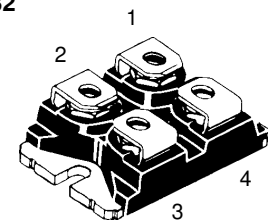
...BD3

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

	Symbol	Test Conditions	Maximum Ratings	
IGBT	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	75	A
	I_{C90}	T_C = 90°C	50	A
	I_{CM}	T_C = 25°C, 1 ms	200	A
	SSOA (RBSOA)	V_{GE}= 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load, L = 30 μH	I_{CM} = 100 @ 0.8 V_{CES}	A
	P_C	T_C = 25°C	250	W
Diode	V_{RRM}		600	V
	I_{FAVM}	T_C = 70°C; rectangular, d = 50%	60	A
	I_{FRM}	t_P z<10 ms; pulse width limited by T_J	600	A
	P_D	T_C = 25°C	150	W
Case	T_J		-40 ... +150	°C
	T_{JM}		150	°C
	T_{stg}		-40 ... +150	°C
	M_d	Mounting torque Terminal connection torque (M4)	1.5/13 1.5/13	Nm/lb.in. Nm/lb.in.
	Weight		30	g
	Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C

SOT-227B, miniBLOC

E 153432



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 UL 94 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

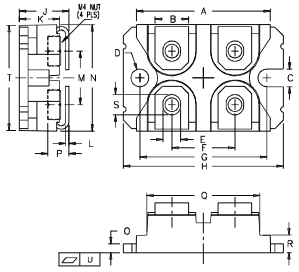
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 250 μA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}		2.5		5	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			200	μA
	V_{GE} = 0 V	T_J = 125°C			1	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V				2.5	V

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

98502C (8/99)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	35	50		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		4100		pF
C_{oes}			290		pF
C_{res}			50		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 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°C**		50		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		50		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 2.7 Ω		110	250	ns
t_{fi}	Remarks: Switching times may increase		150	220	ns
E_{off}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		3.0	4.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		50		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH		60		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 2.7 Ω		3.0		mJ
$t_{d(off)}$	Remarks: Switching times may increase		200		ns
t_{fi}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or		250		ns
E_{off}	increased R_G		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 Min.	Max.	Inches 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)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) typ.	max.	
I_R	T_{VJ} = 25°C $V_R = V_{RRM}$		650	uA
	T_{VJ} = 150°C		2.5	mA
V_F	I_F = 60 A, T_{VJ} = 150°C		1.75	V
	Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 % T_{VJ} = 25°C		2.40	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, $-di_F/dt$ = 100 A/µs		8.0	A
	V_R = 540 V			
t_{rr}	I_F = 1 A, -di/dt = 50 A/µs, V_R = 30 V T_J = 25°C	35		ns
R_{thJC}			0.85	K/W

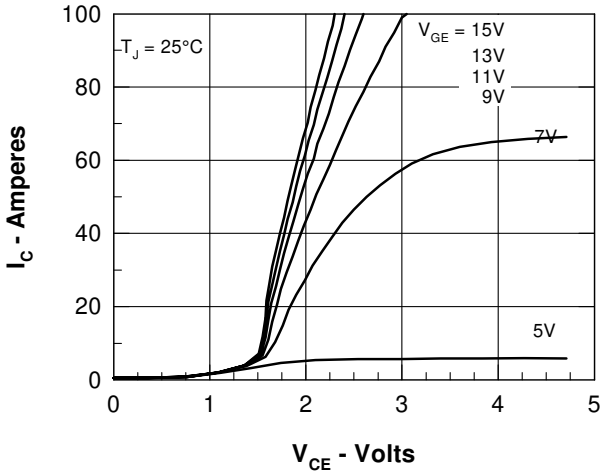


Fig. 1. Saturation Voltage Characteristics

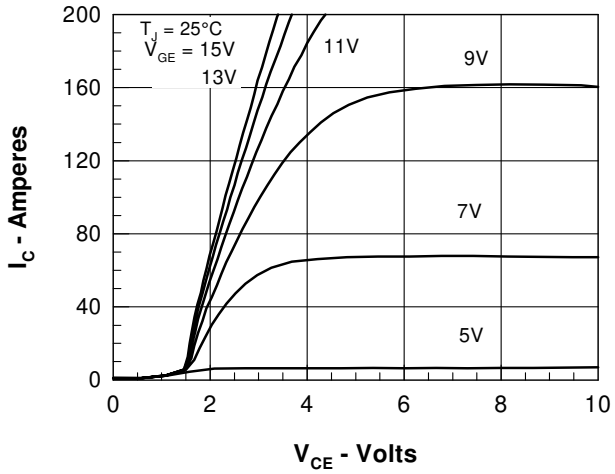


Fig. 2. Extended Output Characteristics

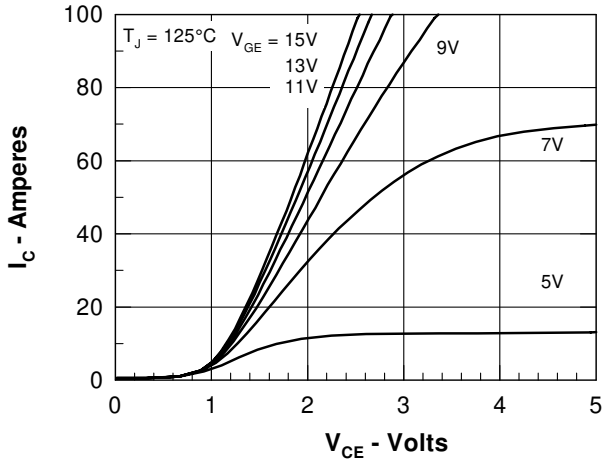


Fig. 3. Saturation Voltage Characteristics

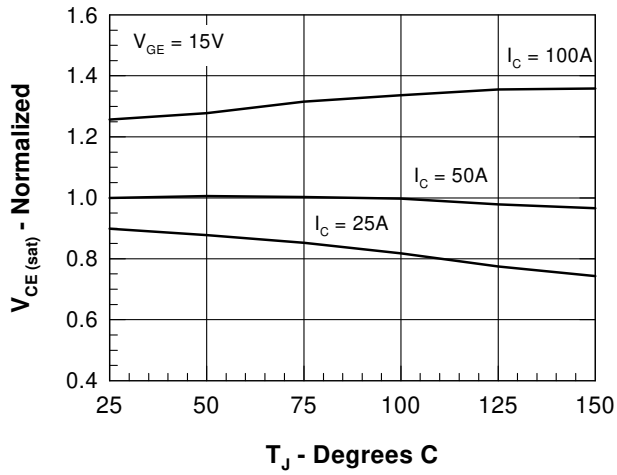


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

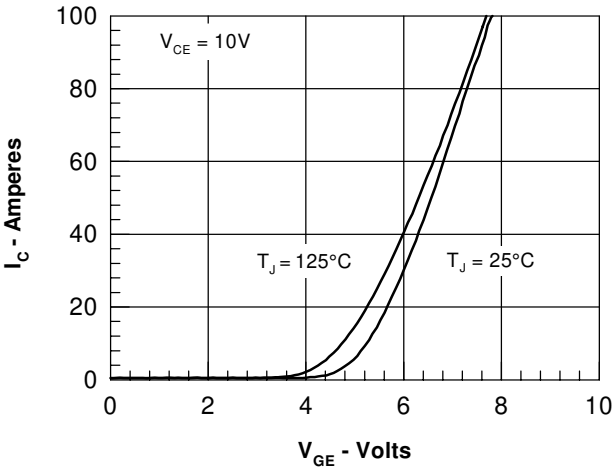


Fig. 5. Saturation Voltage Characteristics

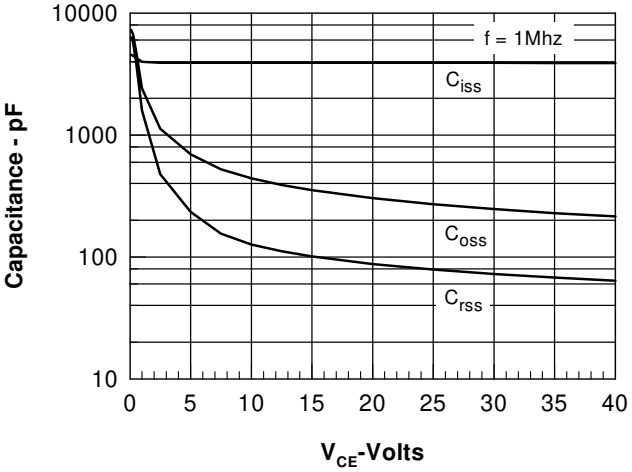


Fig. 6. Junction Capacitance Curves

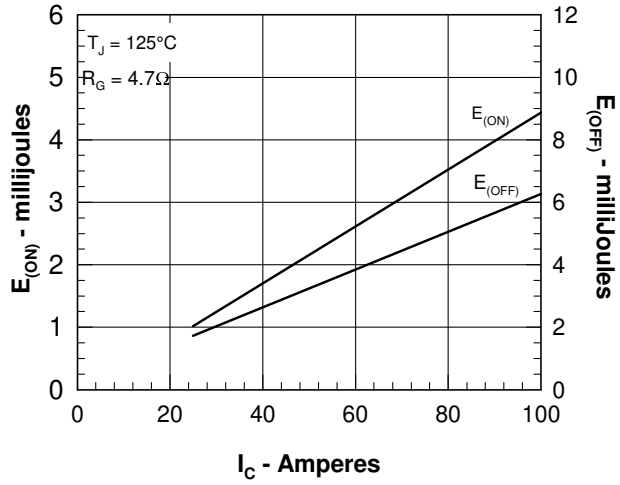


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C.

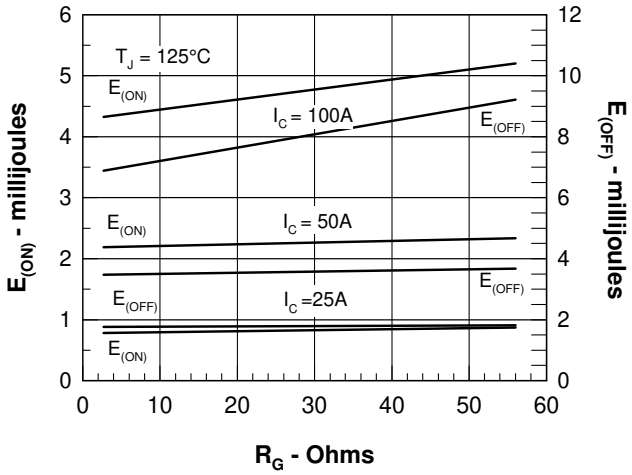


Fig. 8. Dependence of tfi and E_{OFF} on R_G.

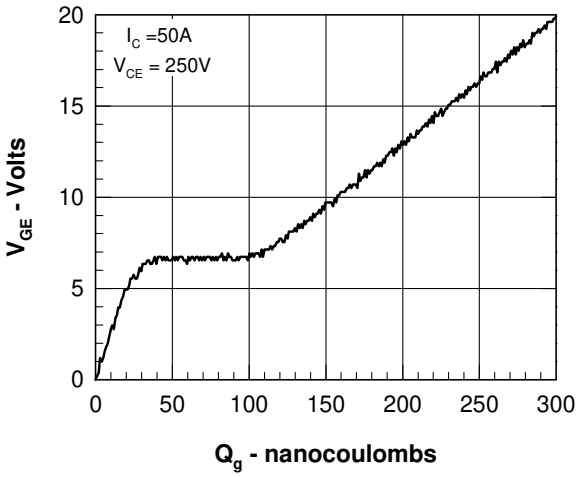


Fig. 9. Gate Charge

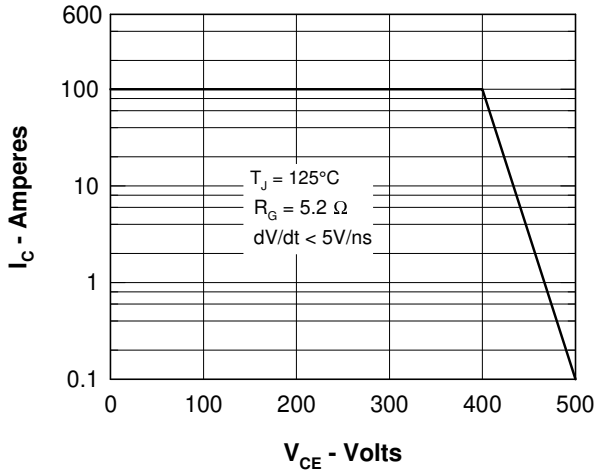


Fig. 10. Turn-off Safe Operating Area

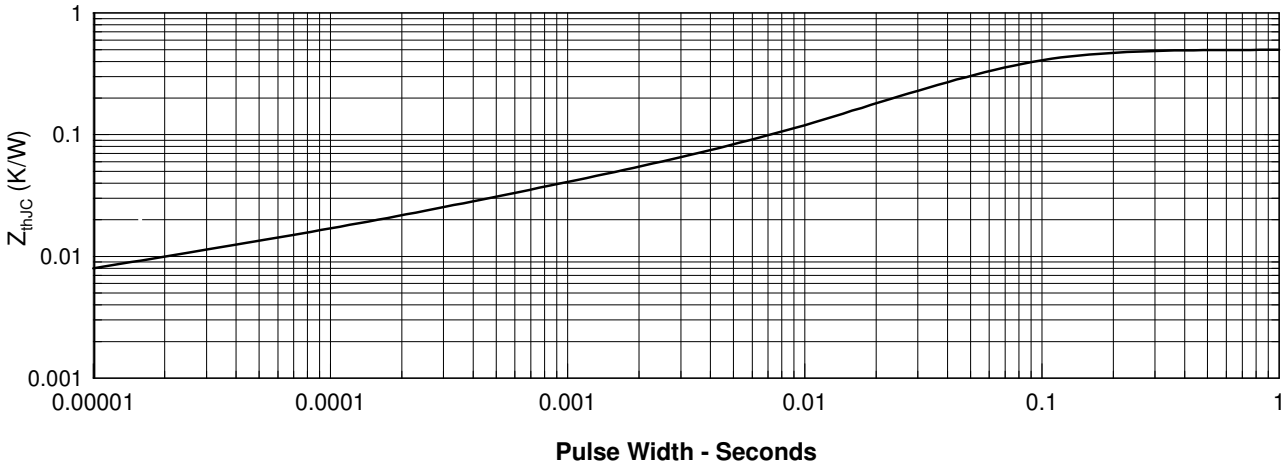


Fig. 11. Transient Thermal Resistance

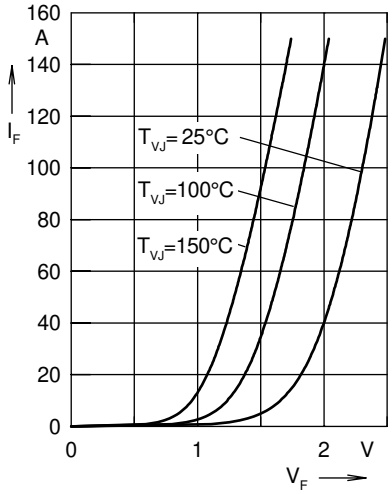


Fig. 12 Forward current I_F versus V_F

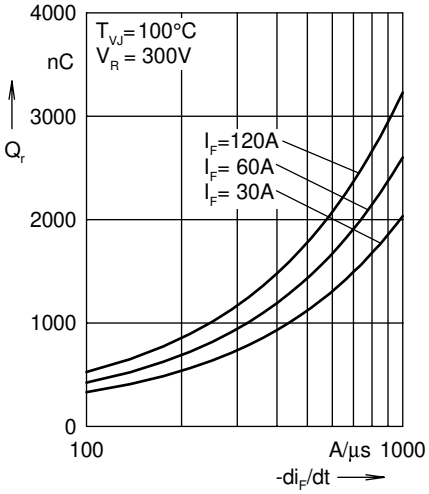


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

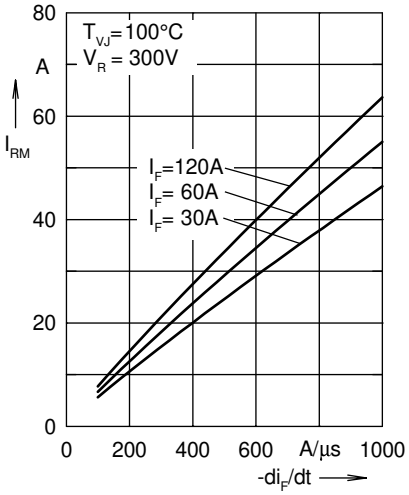


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

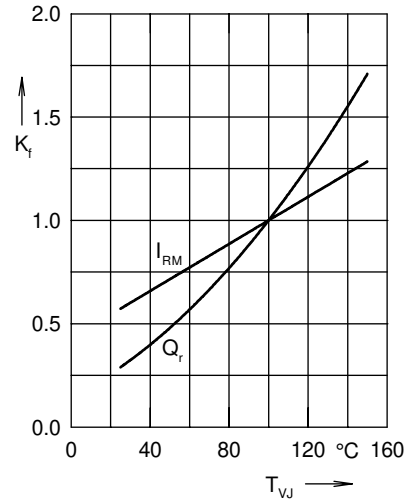


Fig. 15 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

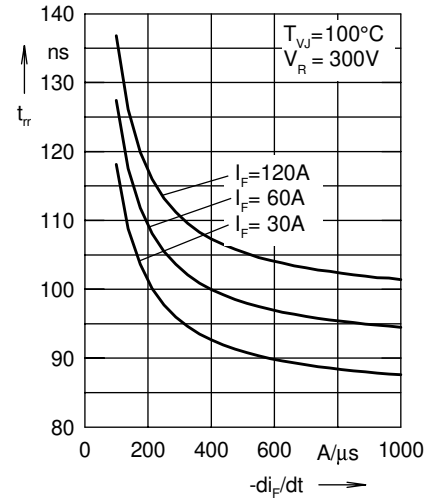


Fig. 16 Recovery time t_{rr} versus $-di_F/dt$

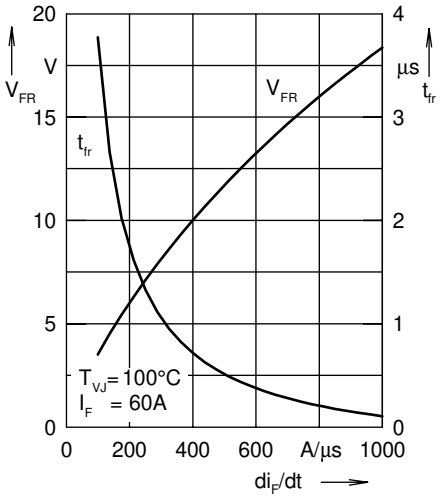


Fig. 17 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

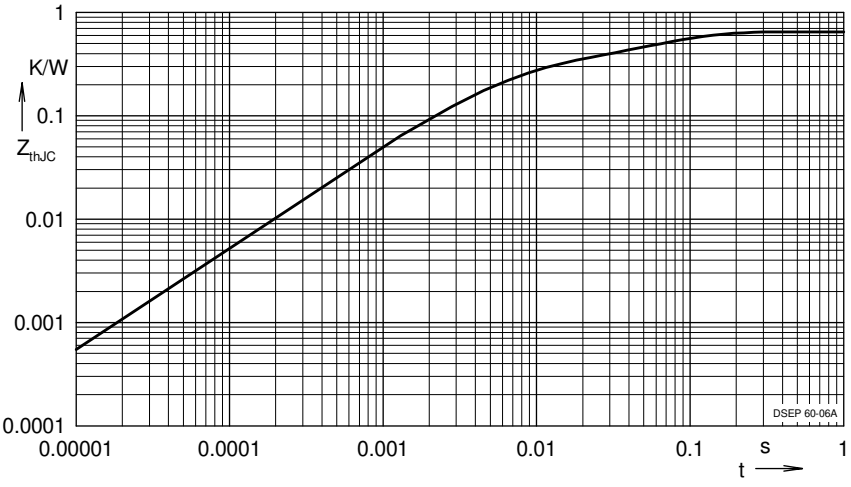


Fig. 18 Transient thermal resistance junction to case

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