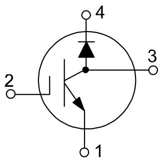
IXYS

HiPerFAST™ IGBT with HiPerFRED

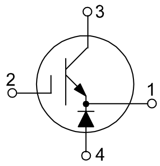
IXGN 50N60BD2
IXGN 50N60BD3

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

Buck & boost configurations



...BD2



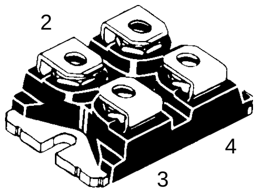
...BD3

	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

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} V_{GE} = 0 V	T_J = 25°C T_J = 125°C			200 1	µA 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

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

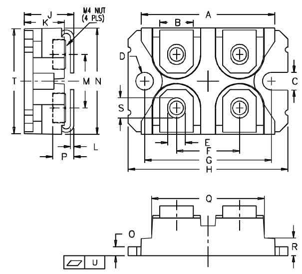
- Easy to mount with 2 screws
- Space savings
- High power density

IXYS reserves the right to change limits, test conditions, and dimensions. 98502C (8/99)

Characteristic Values (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions	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, V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 2.7 Ω		50		ns
$t_{d(off)}$	Remarks: Switching times may increase		110	250	ns
t_{fi}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or		150	220	ns
E_{off}	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.	Millimeter Max.	Inches Min.	Inches 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°C, unless otherwise specified)

Symbol	Test Conditions	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, V_R = 540 V		8.0	A
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

IXYS MOSFETS and IGBTs are covered by one or more of the following U.S. patents:
4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

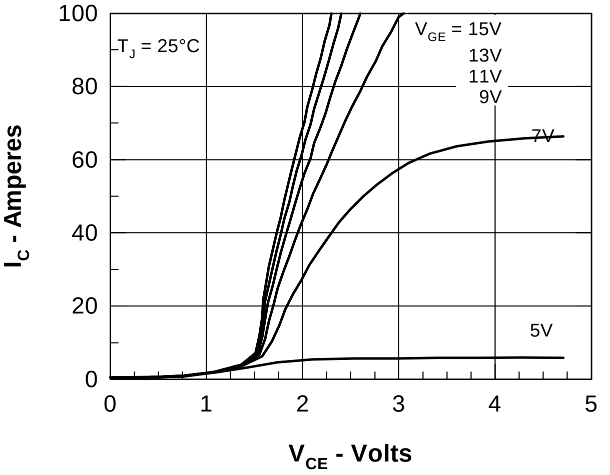


Fig. 1. Saturation Voltage Characteristics

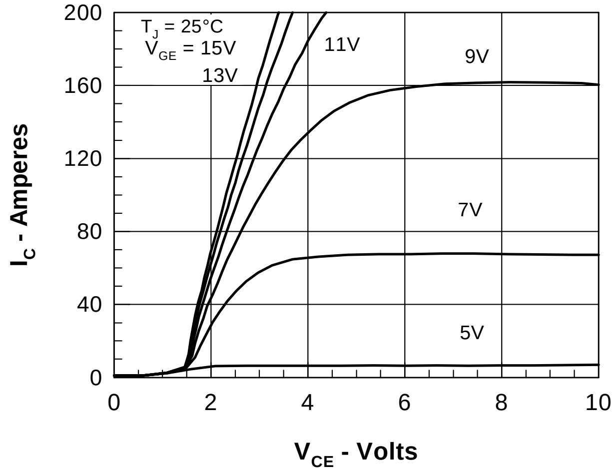


Fig. 2. Extended Output Characteristics

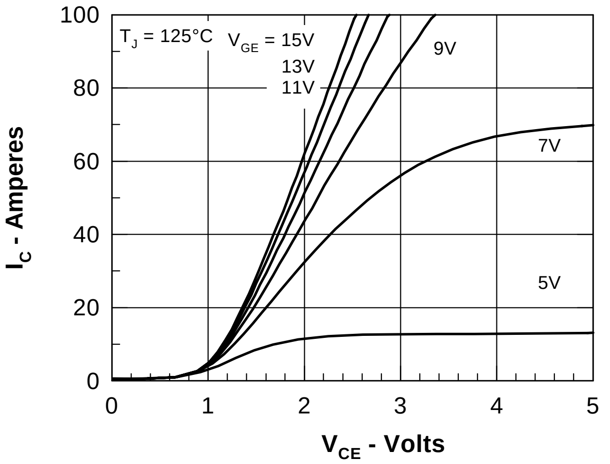


Fig. 3. Saturation Voltage Characteristics

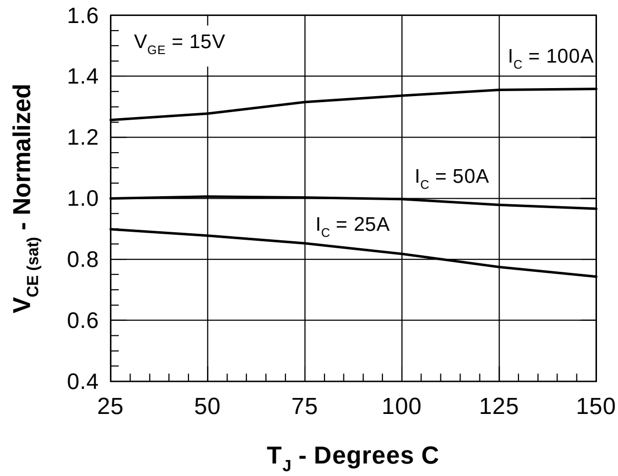


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

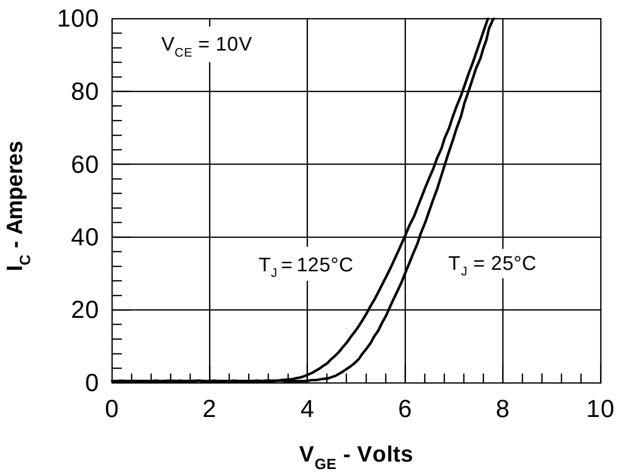


Fig. 5. Saturation Voltage Characteristics

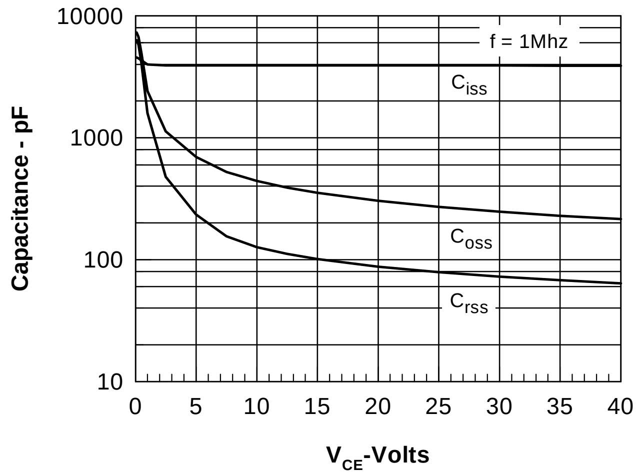


Fig. 6. Junction Capacitance Curves

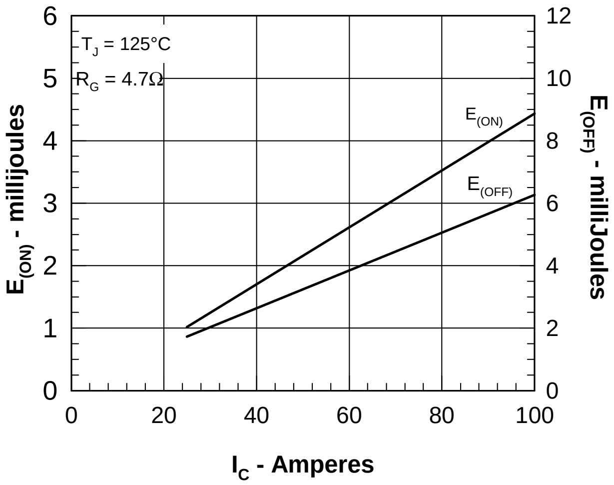


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C.

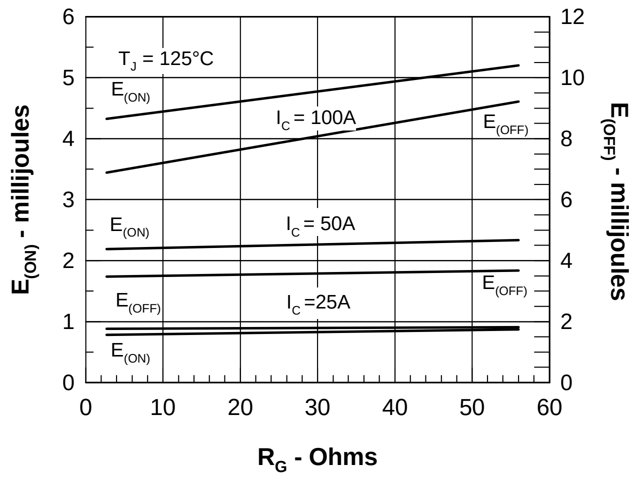


Fig. 8. Dependence of tfi and E_{OFF} on R_G.

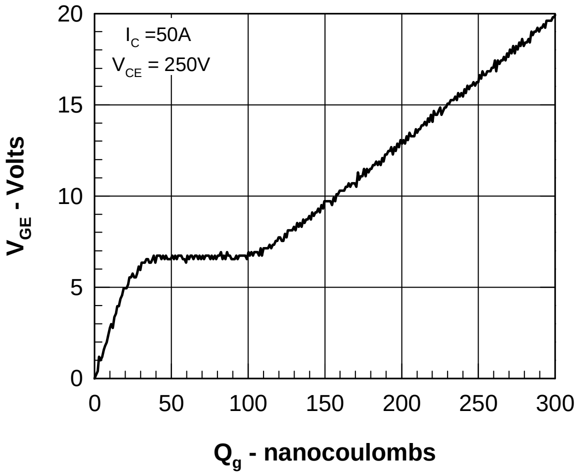


Fig. 9. Gate Charge

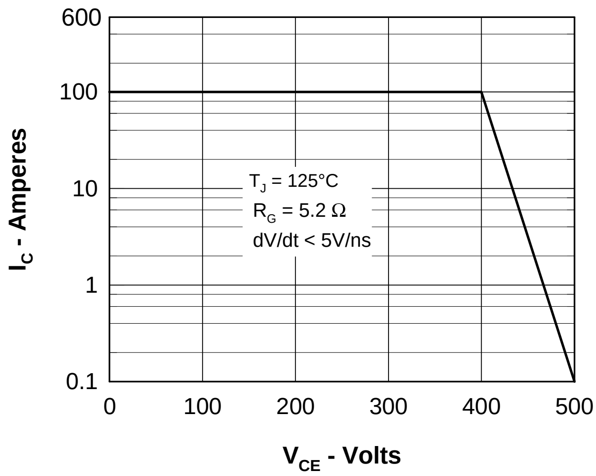


Fig. 10. Turn-off Safe Operating Area

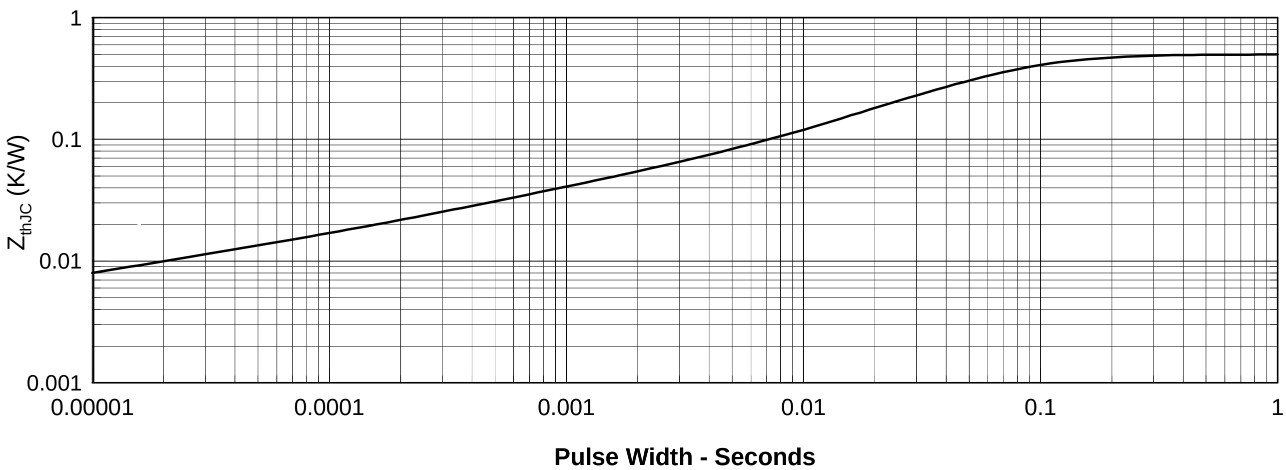


Fig. 11. Transient Thermal Resistance

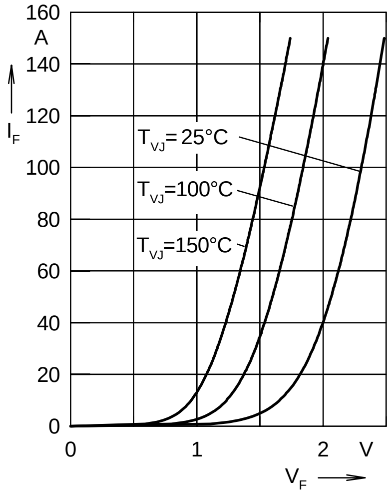


Fig. 12 Forward current I_F versus V_F

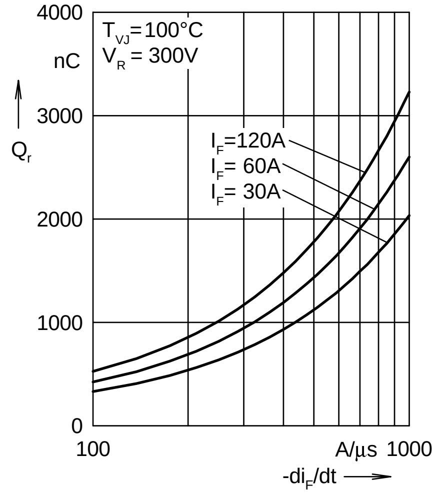


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

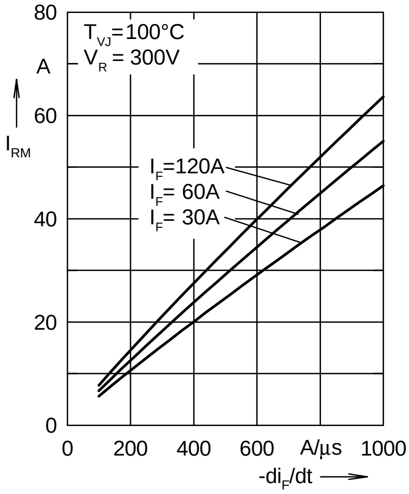


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

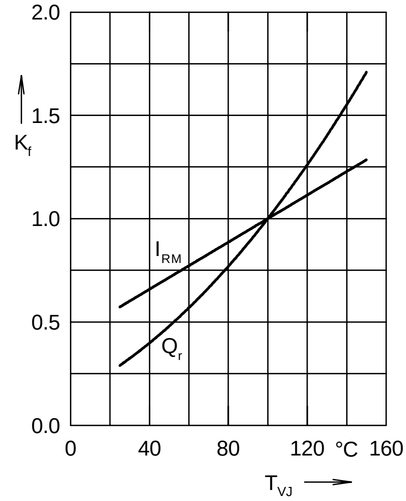


Fig. 15 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

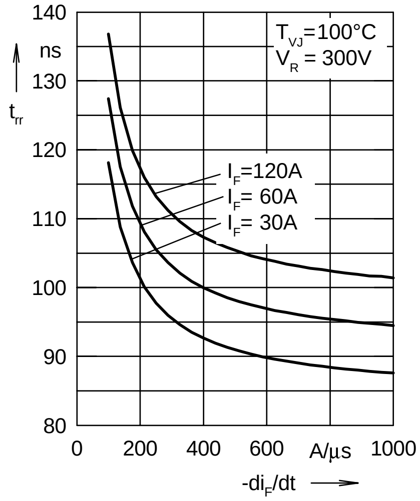


Fig. 16 Recovery time t_{rr} versus $-di_F/dt$

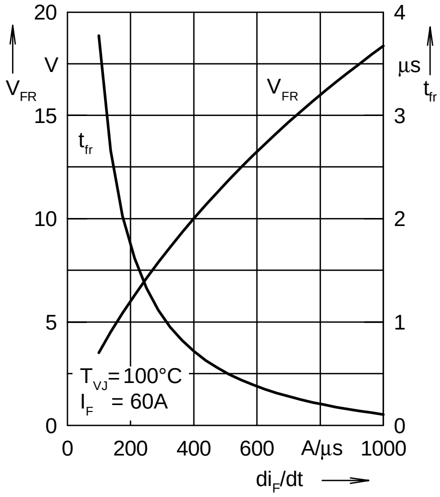


Fig. 17 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

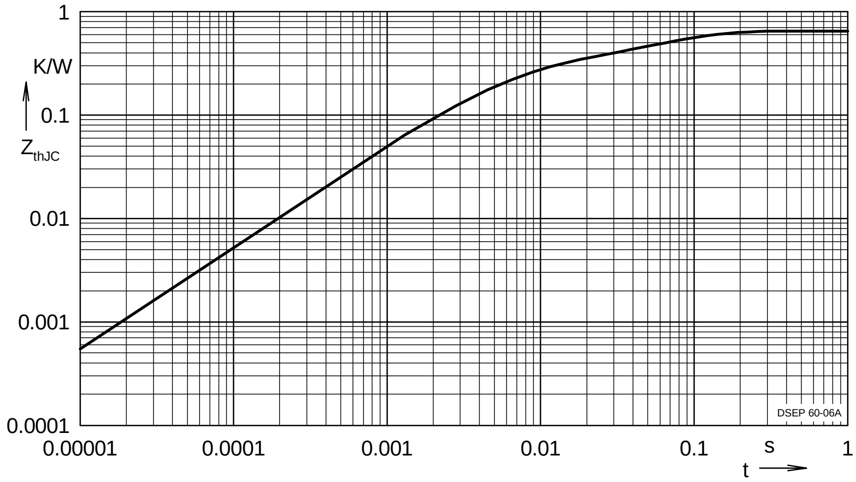


Fig. 18 Transient thermal resistance junction to case

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