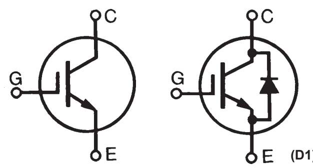
HiPerFAST™ IGBT ISOPLUS247™

(Electrically Isolated Back Surface)

IXGR 50N60B
IXGR 50N60BD1

V_{CES}	=	600	V
I_{C25}	=	75	A
$V_{CE(sat)}$	=	2.5	V
$t_{fi(typ)}$	=	85	ns

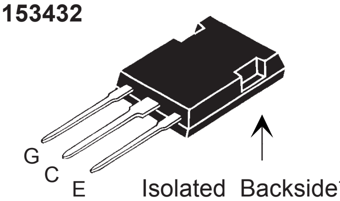


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	75	A
I_{C110}	T_C = 110°C	45	A
I_{CM}	T_C = 25°C, 1 ms	200	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load, L = 100 µH	I_{CM} = 100 @ 0.8 V_{CES}	A
P_C	T_C = 25°C	250	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
V_{ISOL}	50/60 Hz, RMS, t = 1minute leads-to-tab	2500	V
Weight		5	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250 µA, V_{CE} = V_{GE}	50N60B	2.5		5.0	V
	I_C = 500 µA	50N60BD1	2.5		5.0	V
I_{CES}	V_{CE} = 600V	50N60B			200	µA
	V_{GE} = 0 V	50N60BD1			650	µA
		50N60B	T_J = 125°C		1	mA
		50N60BD1			5	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_T, V_{GE} = 15 V				2.5	V

ISOPLUS 247

E153432



G = Gate, C = Collector
E = Emitter

* Patent pending

Features

- DCB Isolated mounting tab
- Meets TO-247AD package Outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on
  - drive simplicity

Applications

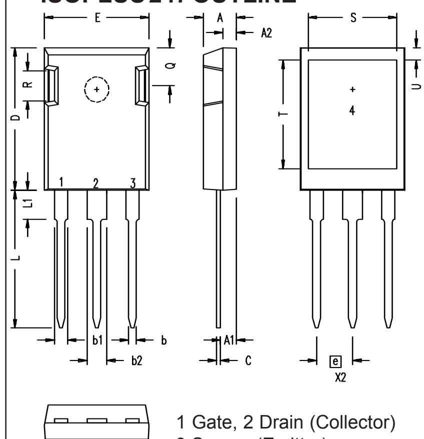
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

Advantages

- Easy assembly
- High power density
- Very fast switching speeds for high frequency applications

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	I_C = I_T; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	25	35		S
C_{ies}			4100		pF
					pF
C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		300		pF
C_{res}			50		pF
Q_g			110		nC
Q_{ge}	I_C = I_T, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		30		nC
Q_{gc}			35		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		50		ns
t_{ri}	I_C = I_T, V_{GE} = 15 V, L = 100uH		50		ns
$t_{d(off)}$	V_{CE} = 0.8 • V_{CES}, R_G = R_{off} = 2.7 Ω		110	270	ns
t_{fi}	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES},		85	150	ns
E_{off}	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_T, V_{GE} = 15 V, L = 100uH		60		ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = R_{off} = 2.7 Ω		3		mJ
$t_{d(off)}$	Remarks: Switching times may		200		ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		250		ns
E_{off}			4.2		mJ
R_{thJC}				0.5	K/W
R_{thCK}			0.15		K/W

ISOPLUS 247 OUTLINE



1 Gate, 2 Drain (Collector)
3 Source (Emitter)
4 no connection

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	.244
R	4.32	4.83	.170	.190

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	I_F = I_T, V_{GE} = 0 V, T_J = 150°C			1.6	V
	Pulse test, t ≤ 300 ms, duty cycle ≤ 2 %			2.5	V
I_{RM}	I_F = I_T, V_{GE} = 0 V, -di_F/dt = 100 A/ms, T_J = 100°C		3.2		A
	V_R = 100 V				ns
t_{rr}	I_F = 1 A; -di/dt = 200 A/ms; V_R = 30 V		35		ns
R_{thJC}				0.85	K/W

Note: I_T,= 50A

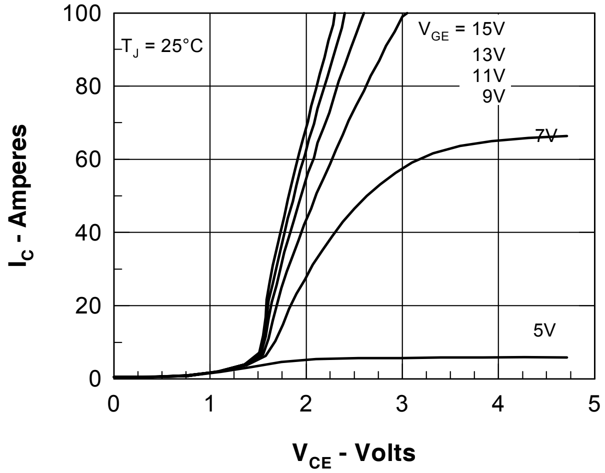


Fig. 1. Saturation Voltage Characteristics

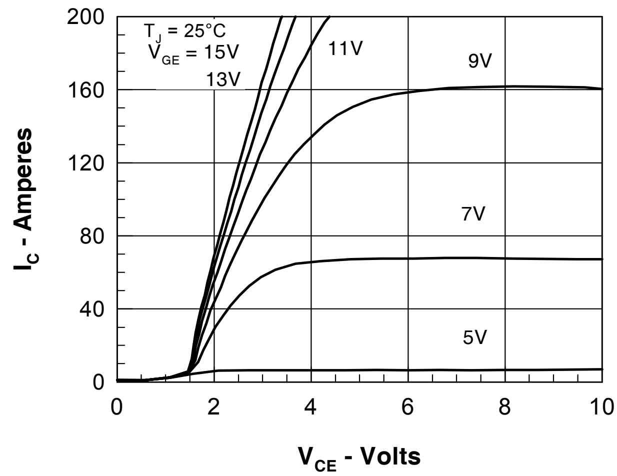


Fig. 2. Extended Output Characteristics

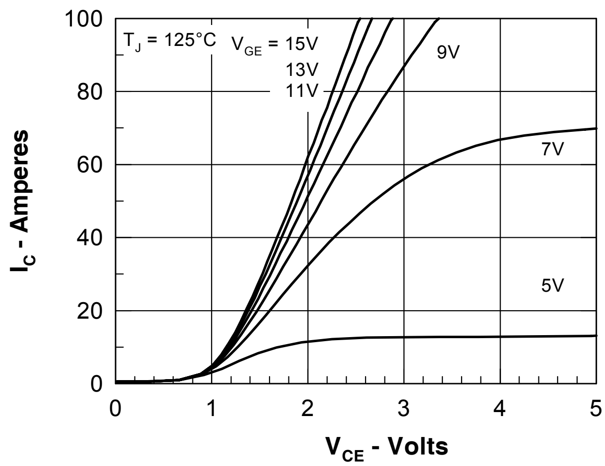


Fig. 3. Saturation Voltage Characteristics

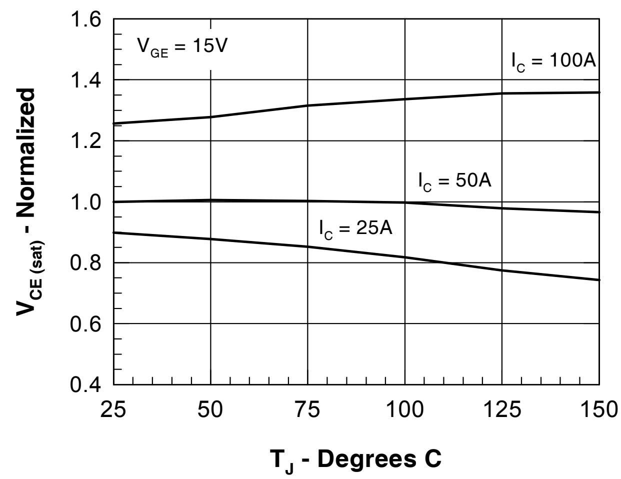


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

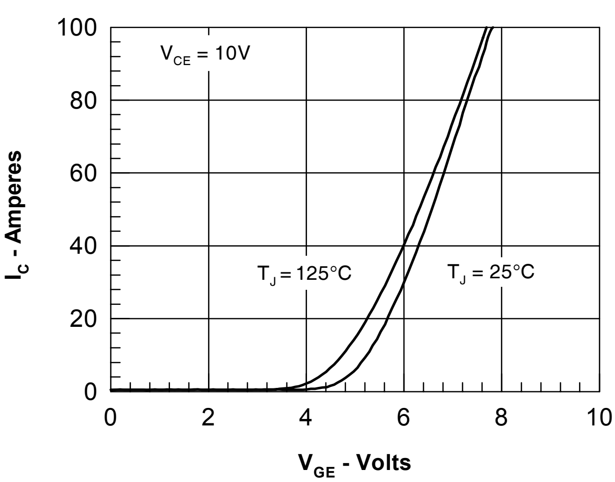


Fig. 5. Saturation Voltage Characteristics

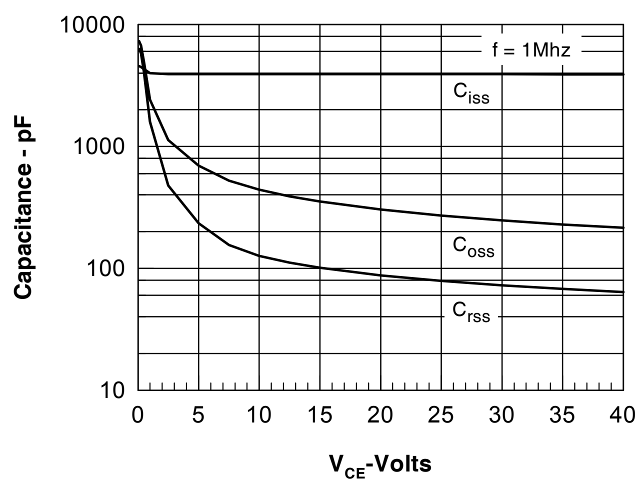


Fig. 6. Junction Capacitance Curves

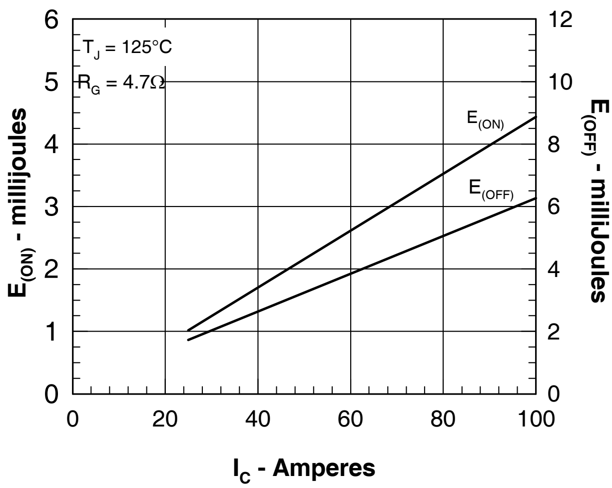


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C.

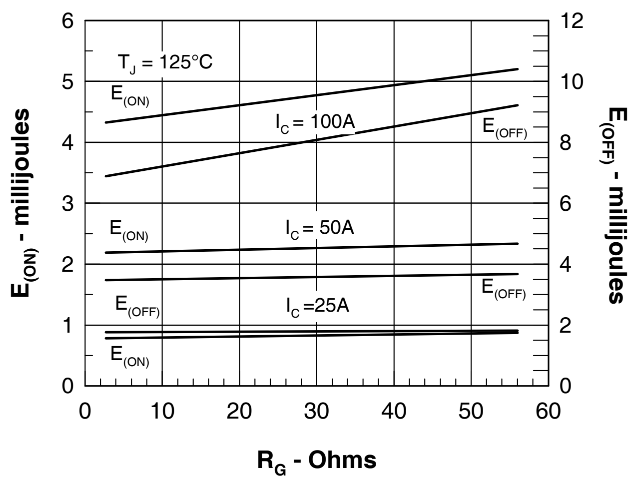


Fig. 8. Dependence of tfi and E_{OFF} on R_G.

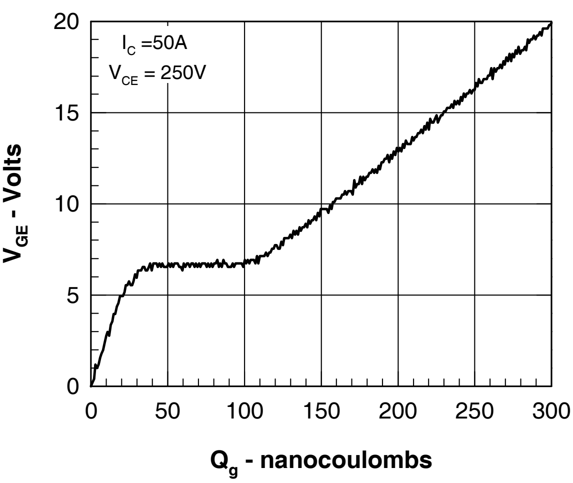


Fig. 9. Gate Charge

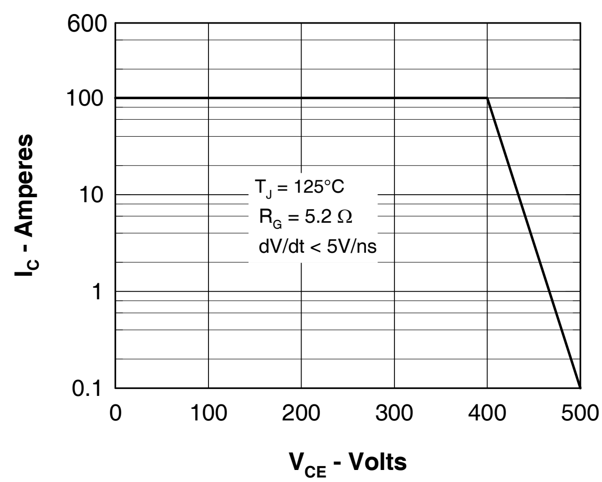


Fig. 10. Turn-off Safe Operating Area

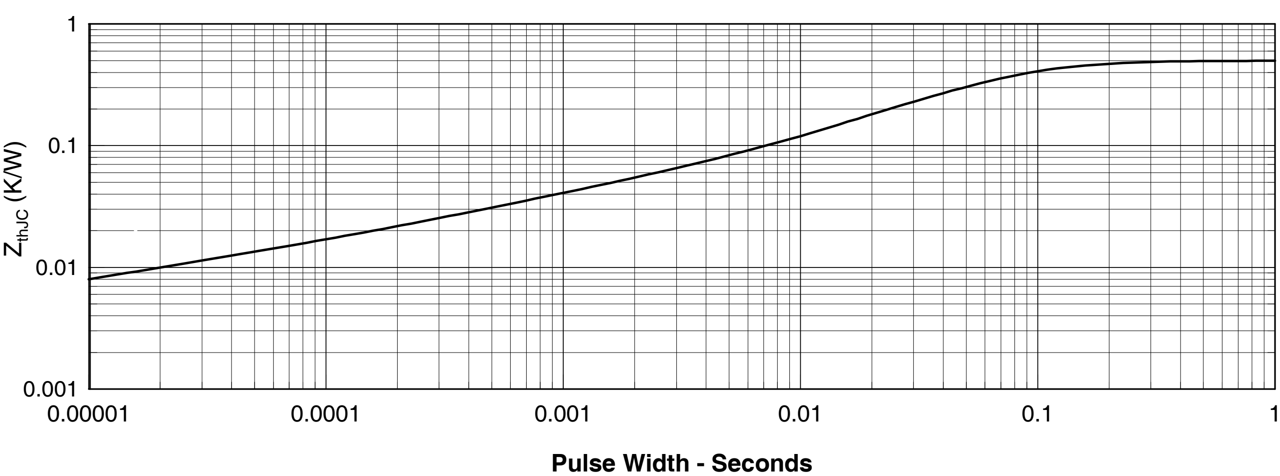


Figure 11. IGBT Transient Thermal Resistance

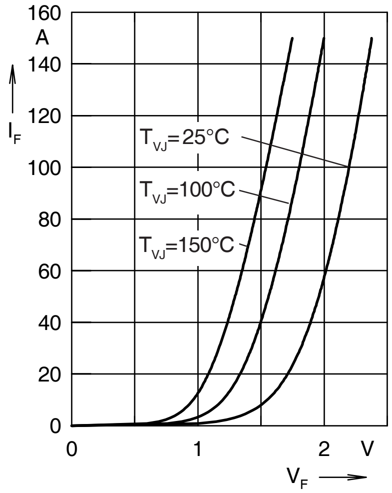


Fig. 12 Forward current I_F versus V_F

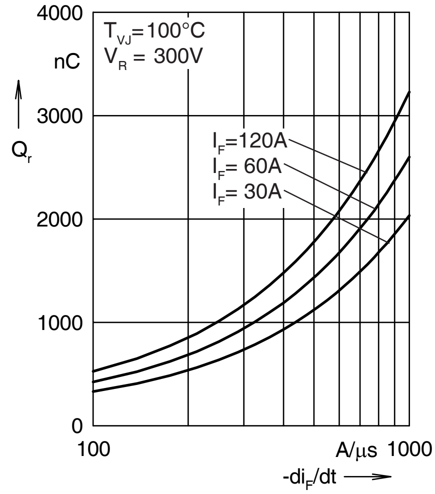


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

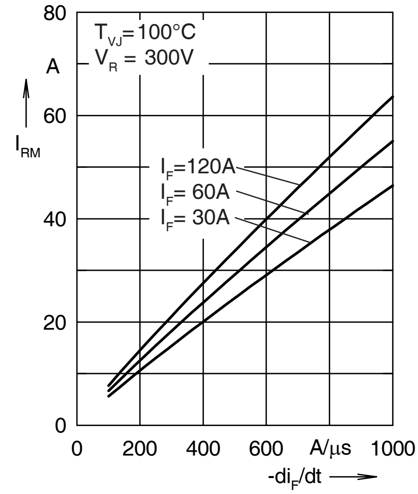


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

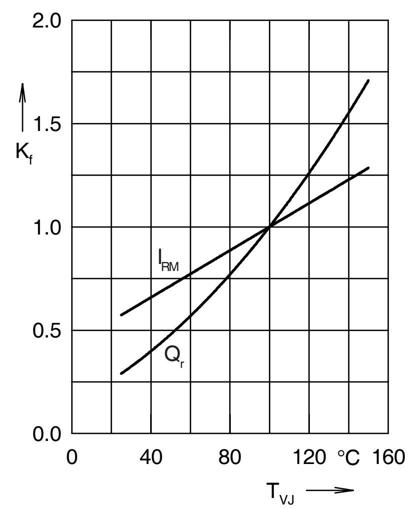


Fig. 15 Dynamic parameters Q_r, I_{RM} versus T_{VJ}

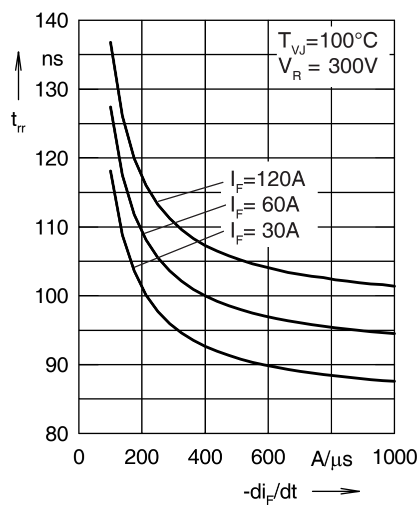


Fig. 16 Recovery time t_{rr} versus $-di_F/dt$

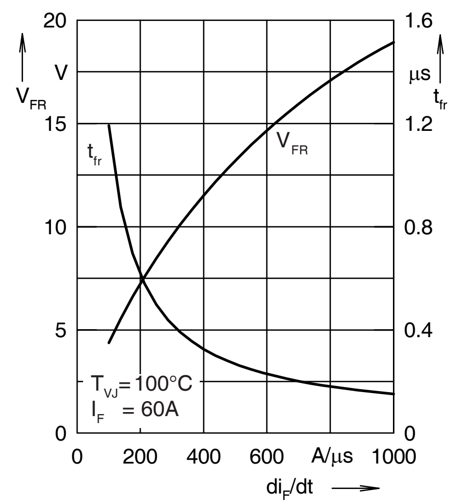


Fig. 17 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

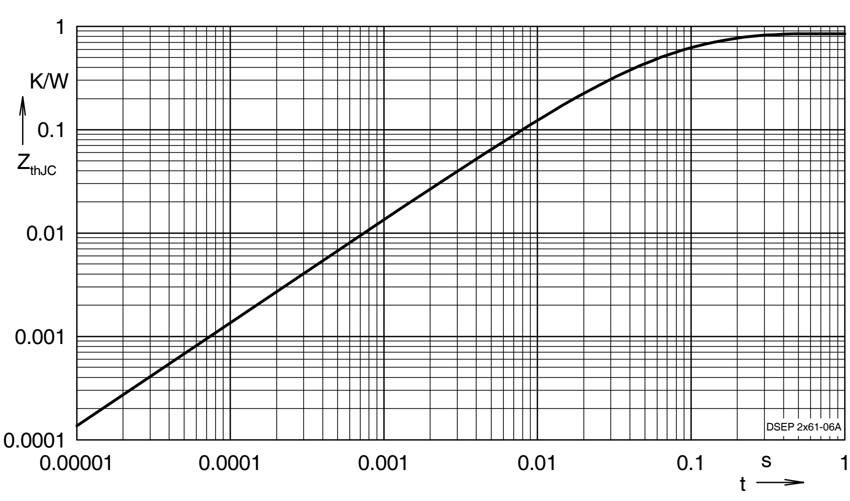


Fig. 18 Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.3073	0.0055
2	0.3533	0.0092
3	0.0887	0.0007
4	0.1008	0.0399