

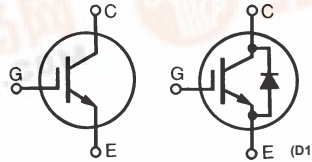


HiPerFAST™ IGBT ISOPLUS247™

(Electrically Isolated Back Surface)

IXGR 50N60B
IXGR 50N60BD1

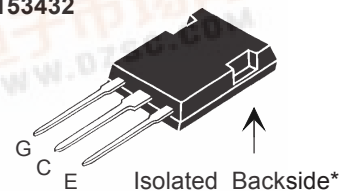
$$\begin{aligned} V_{CES} &= 600 \text{ V} \\ I_{C25} &= 75 \text{ A} \\ V_{CE(sat)} &= 2.5 \text{ V} \\ t_{fi(typ)} &= 85 \text{ ns} \end{aligned}$$



Symbol	Test Conditions	Maximum Ratings
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	600 V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°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_{C110}	$T_C = 110^\circ\text{C}$	45 A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	200 A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10 \Omega$ Clamped inductive load, $L = 100 \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$ A
P_C	$T_C = 25^\circ\text{C}$	250 W
T_J		$-55 \dots +150$ $^\circ\text{C}$
T_{JM}		150 $^\circ\text{C}$
T_{stg}		$-55 \dots +150$ $^\circ\text{C}$
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300 $^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS, $t = 1$ minute leads-to-tab	2500 V
Weight		5 g

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

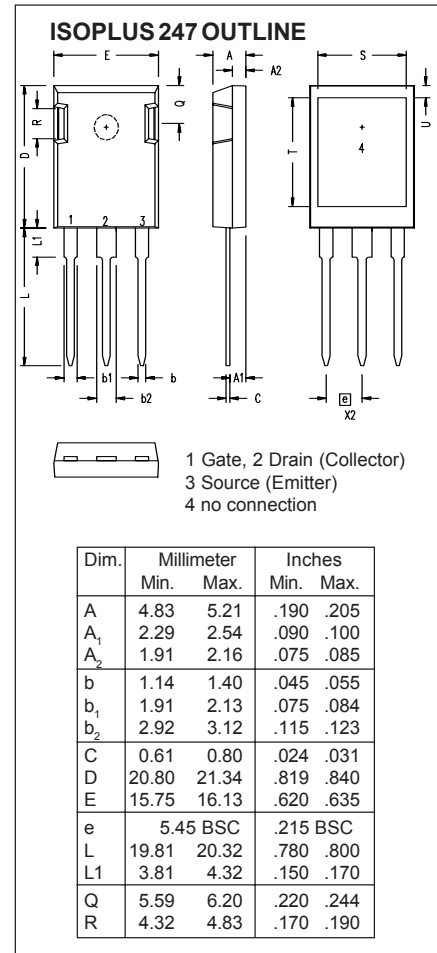
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

Advantages

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

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

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$I_C = I_T$; $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$	25	35	S
C_{ies}	$V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$, $f = 1\text{ MHz}$		4100	pF
C_{oes}			300	pF
C_{res}			50	pF
Q_g	$I_C = I_T$, $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$		110	nC
Q_{ge}			30	nC
Q_{gc}			35	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_T$, $V_{GE} = 15\text{ V}$, $L = 100\text{ }\mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}$, $R_G = R_{off} = 2.7\text{ }\Omega$ Remarks: Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G		50	ns
t_{ri}			50	ns
$t_{d(off)}$		110	270	ns
t_{fi}		85	150	ns
E_{off}		3.0	4.0	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_T$, $V_{GE} = 15\text{ V}$, $L = 100\text{ }\mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}$, $R_G = R_{off} = 2.7\text{ }\Omega$ Remarks: Switching times may increase for V_{CE} (Clamp) $> 0.8 \cdot V_{CES}$, higher T_J or increased R_G		50	ns
t_{ri}			60	ns
E_{on}			3	mJ
$t_{d(off)}$		200		ns
t_{fi}		250		ns
E_{off}		4.2		mJ
R_{thJC}				0.5 K/W
R_{thCK}		0.15		K/W



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

Note: $I_T = 50\text{ A}$

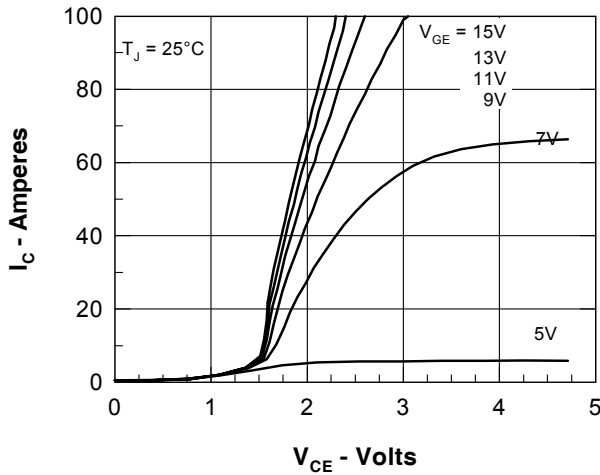


Fig. 1. Saturation Voltage Characteristics

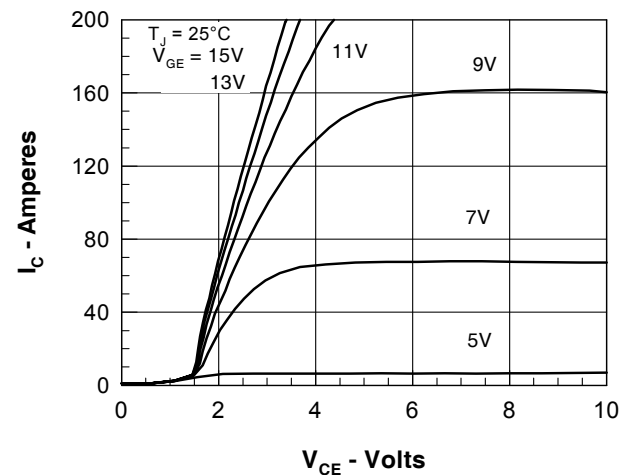


Fig. 2. Extended Output Characteristics

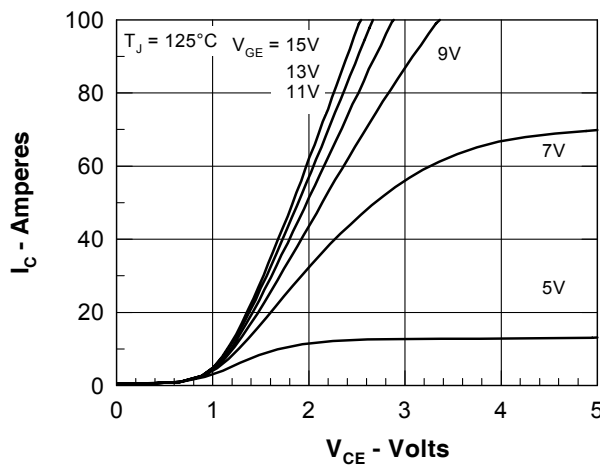


Fig. 3. Saturation Voltage Characteristics

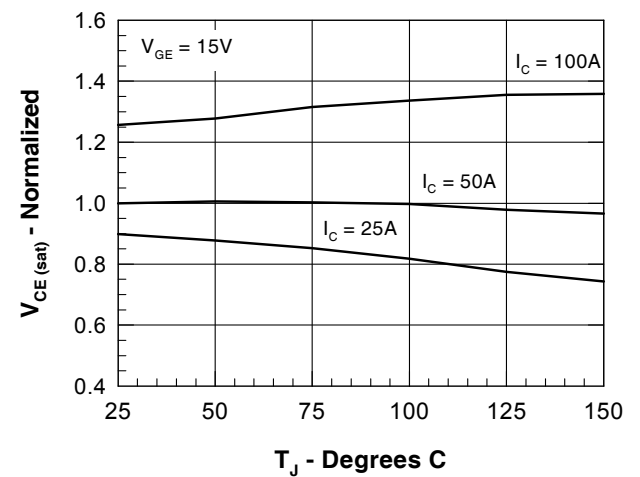
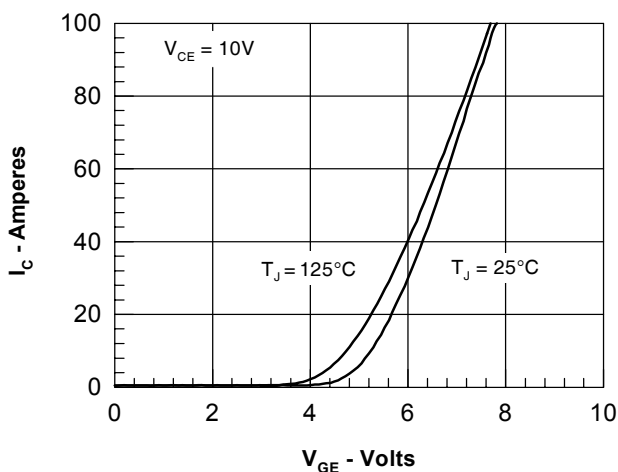

 Fig. 4. Temperature Dependence of $V_{CE(sat)}$


Fig. 5. Saturation Voltage Characteristics

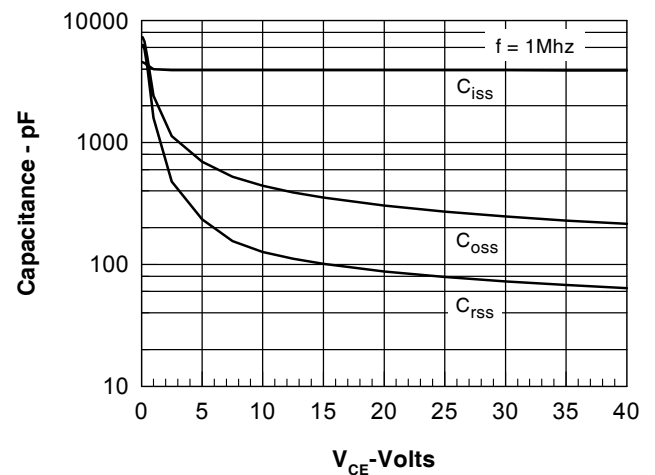


Fig. 6. Junction Capacitance Curves

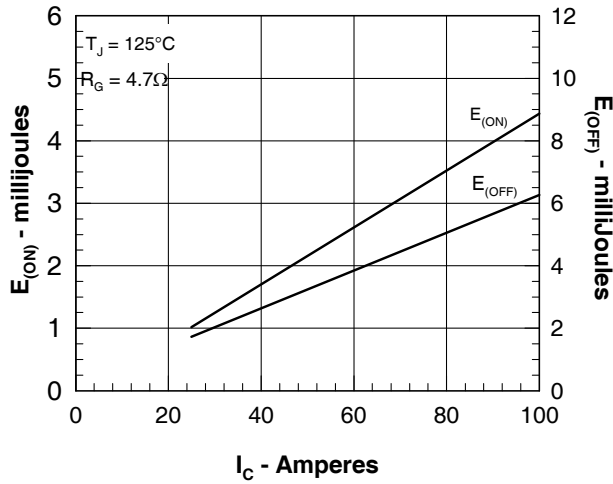


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C .

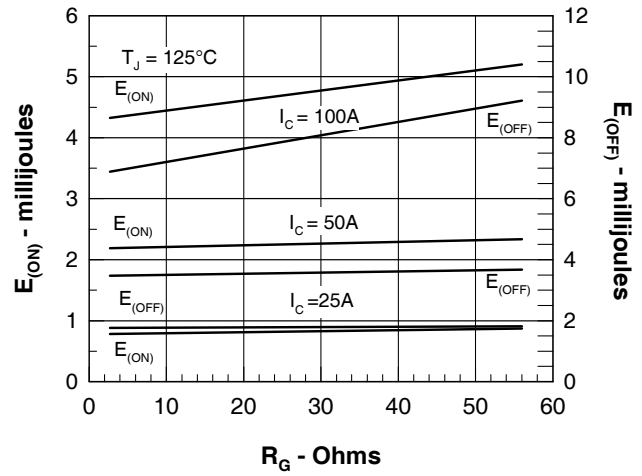


Fig. 8. Dependence of t_{fi} and E_{OFF} on R_G .

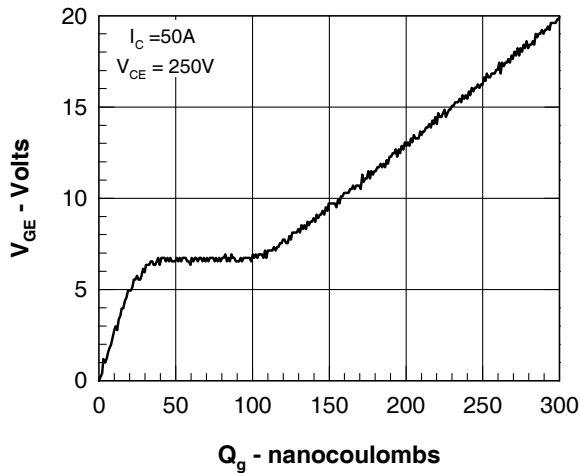


Fig. 9. Gate Charge

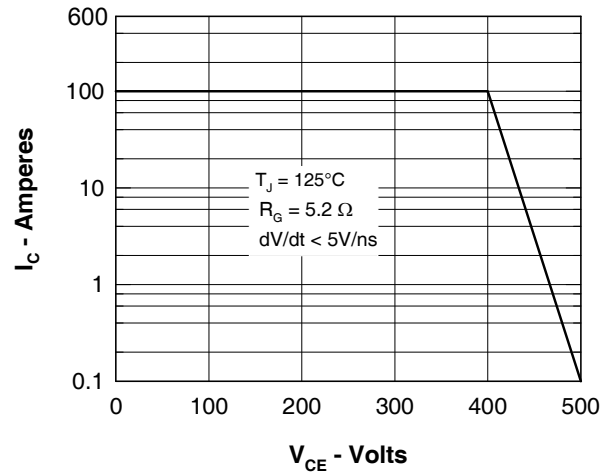


Fig. 10. Turn-off Safe Operating Area

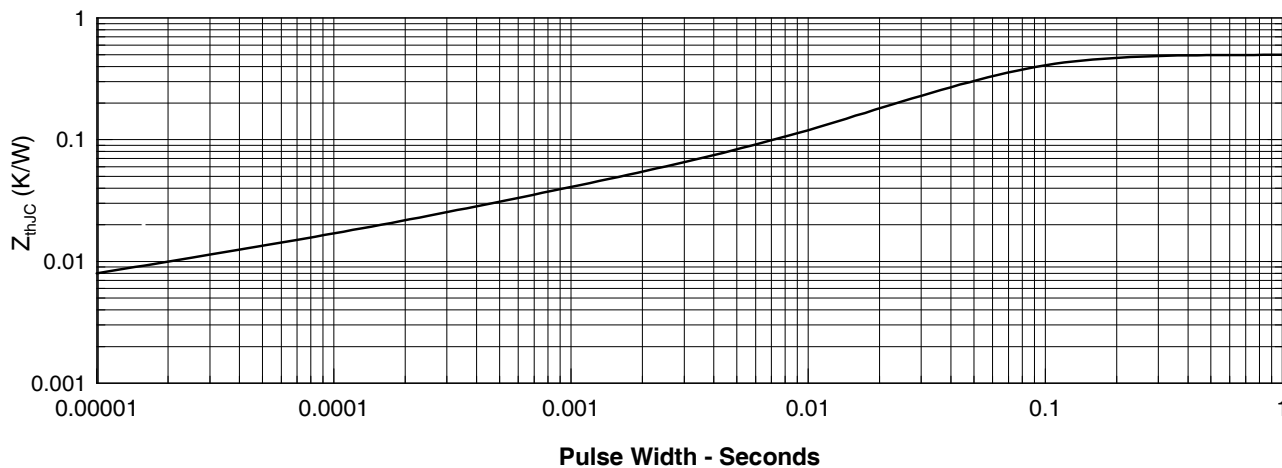


Figure 11. IGBT Transient Thermal Resistance

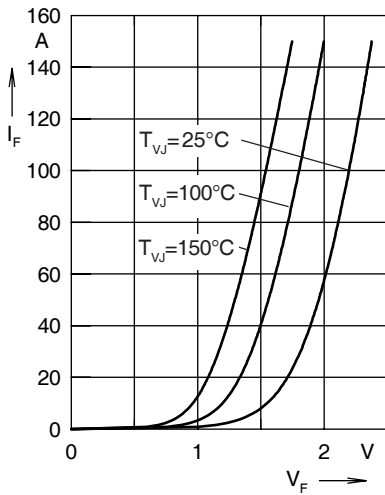


Fig. 12 Forward current I_F versus V_F

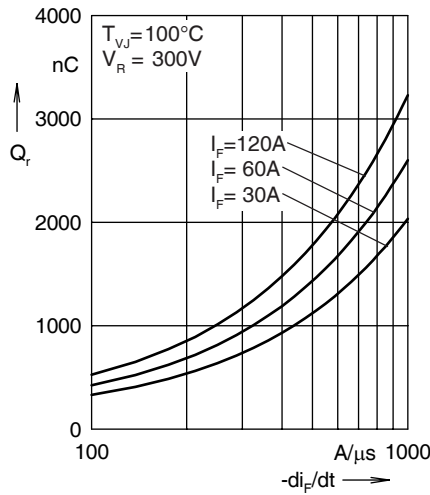


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

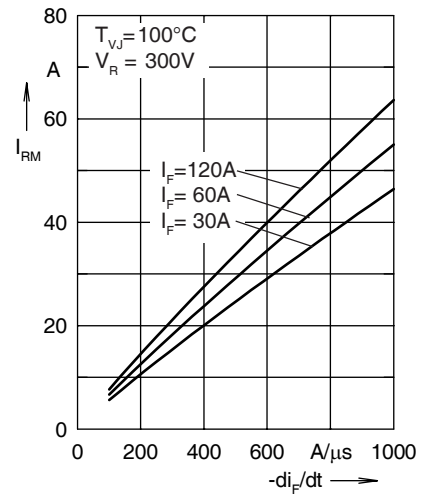


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

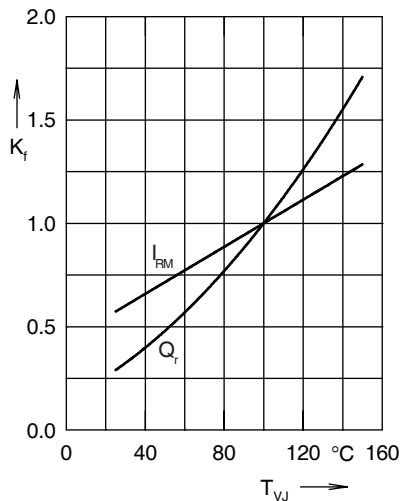


Fig. 15 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

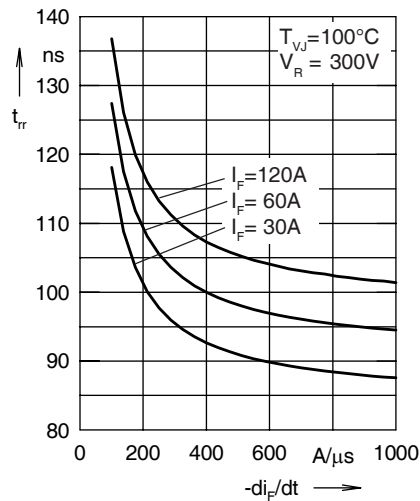


Fig. 16 Recovery time t_{rr} versus $-di_F/dt$

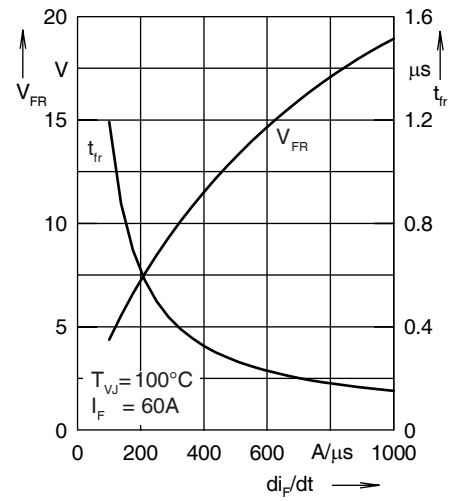


Fig. 17 Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

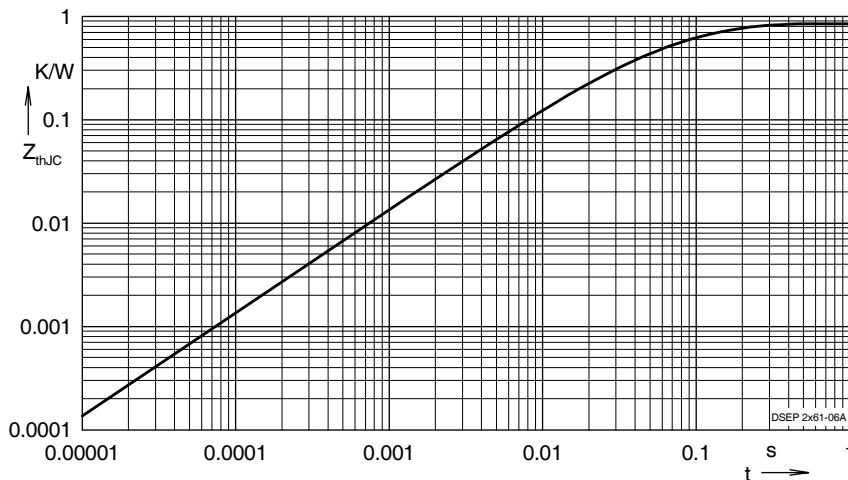


Fig. 18 Transient thermal resistance junction to case

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