

HiPerFAST™ IGBT IXGR 50N60B

ISOPLUS247™ IXGR 50N60BD1

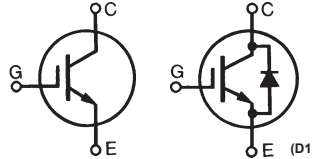
(Electrically Isolated Back Surface)

$$V_{CES} = 600 \text{ V}$$

$$I_{C25} = 75 \text{ A}$$

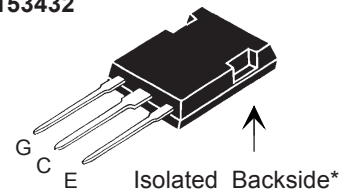
$$V_{CE(sat)} = 2.5 \text{ V}$$

$$t_{fi(typ)} = 85 \text{ ns}$$



Symbol	Test Conditions	Maximum Ratings	
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_{C110}	$T_C = 110^\circ\text{C}$	45	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, $L = 100 \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$	A
P_c	$T_C = 25^\circ\text{C}$	250	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +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, $t = 1 \text{ minute leads-to-tab}$	2500	V
Weight		5	g

ISOPLUS 247



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

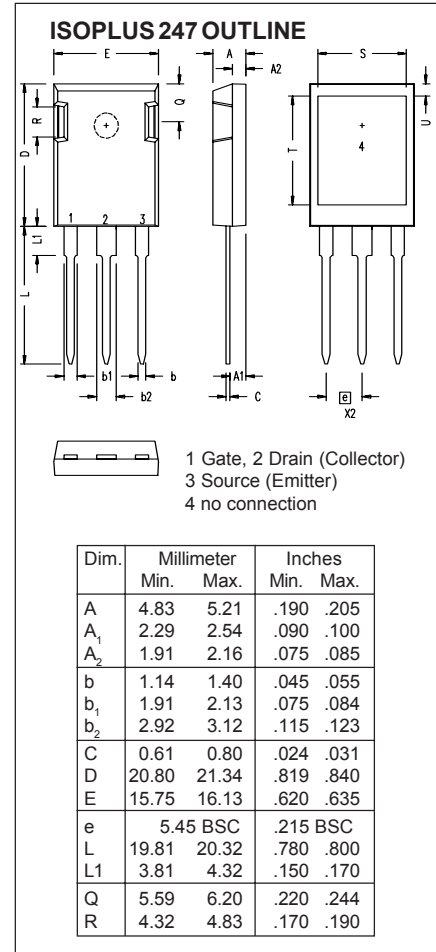
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- AC motor speed control
- DC servo and robot drives
- DC choppers

Advantages

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

Symbol	Test Conditions	Characteristic Values			
		$(T_J = 25^\circ\text{C}, \text{ unless otherwise specified})$			
		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, $t \leq 300\ \mu\text{s}$, 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, $T_J = 25^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}, L = 100\ \mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = R_{off} = 2.7\ \Omega$ 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, $T_J = 125^\circ\text{C}$ $I_C = I_T, V_{GE} = 15\text{ V}, L = 100\ \mu\text{H}$ $V_{CE} = 0.8 \cdot V_{CES}, R_G = R_{off} = 2.7\ \Omega$ 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	



Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_F	$I_F = I_T, V_{GE} = 0\text{ V}$, 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}	$I_F = 1\text{ A}; -di/dt = 200\text{ A/ms}; V_R = 30\text{ V}$		35	ns
R_{thJC}				0.85 K/W

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

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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585
4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	
4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	

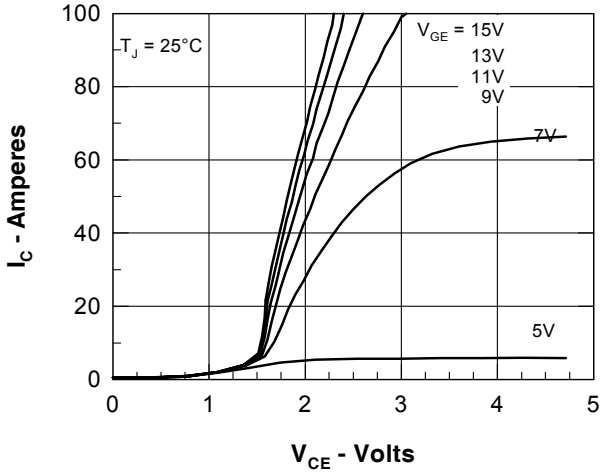


Fig. 1. Saturation Voltage Characteristics

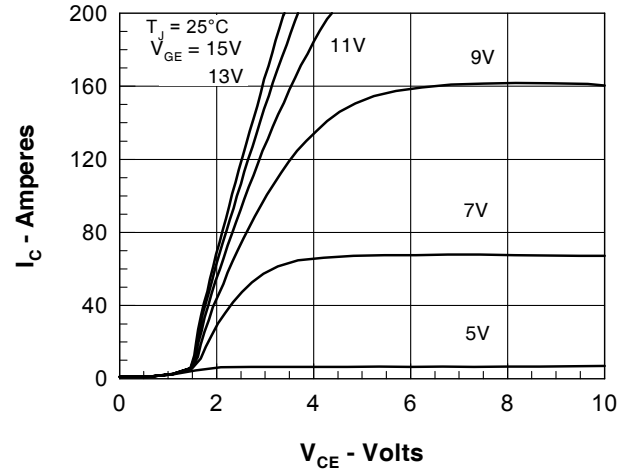


Fig. 2. Extended Output Characteristics

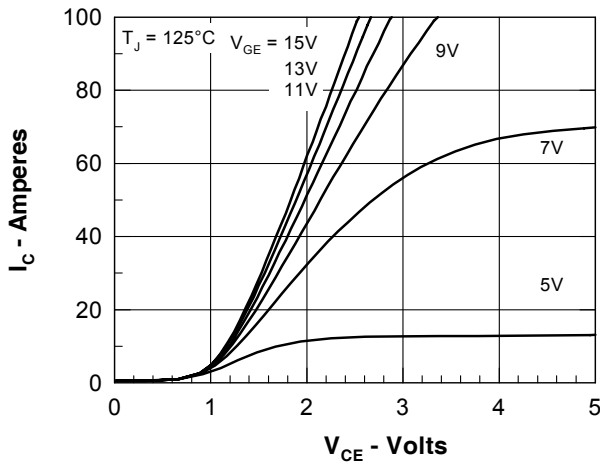


Fig. 3. Saturation Voltage Characteristics

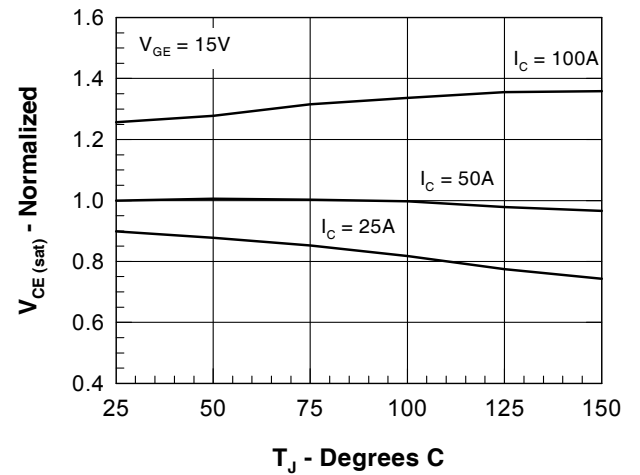


Fig. 4. Temperature Dependence of $V_{CE(sat)}$

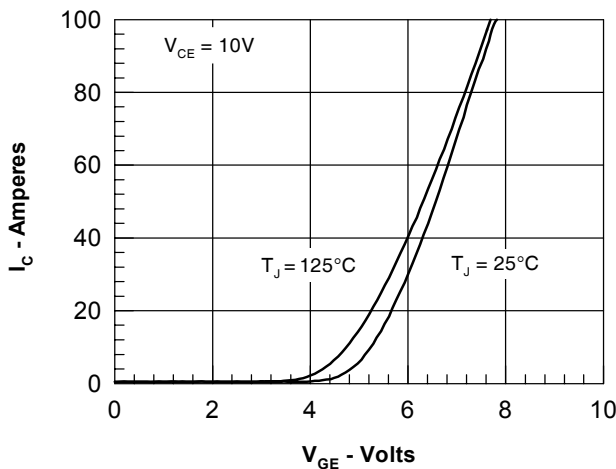


Fig. 5. Saturation Voltage Characteristics

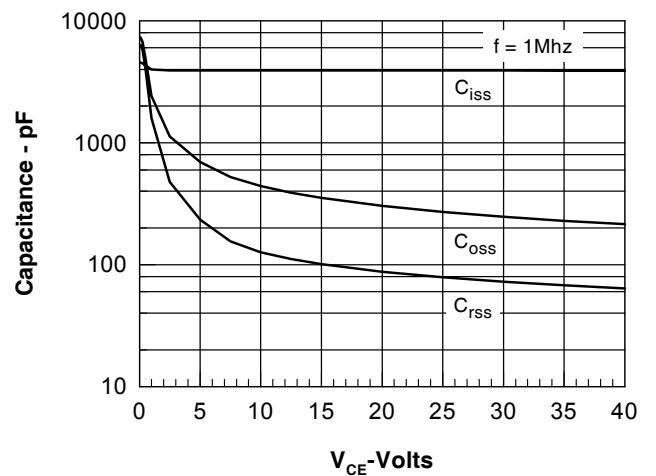


Fig. 6. Junction Capacitance Curves

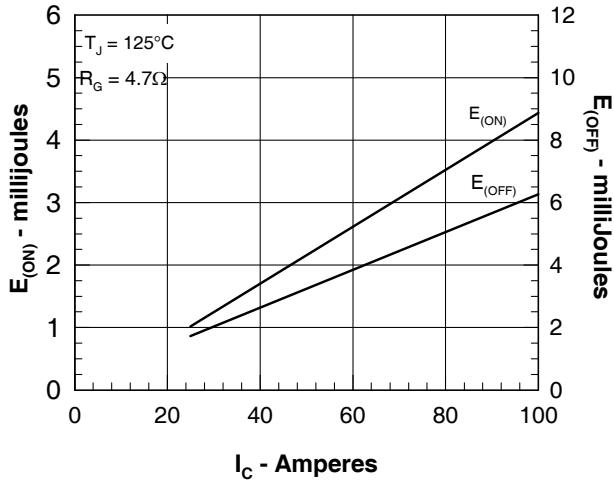


Fig. 7. Dependence of E_{ON} and E_{OFF} on I_C .

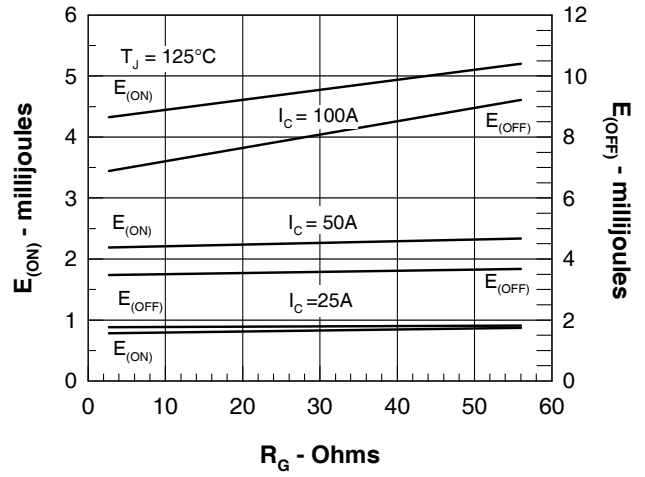


Fig. 8. Dependence of t_{fi} and E_{OFF} on R_G .

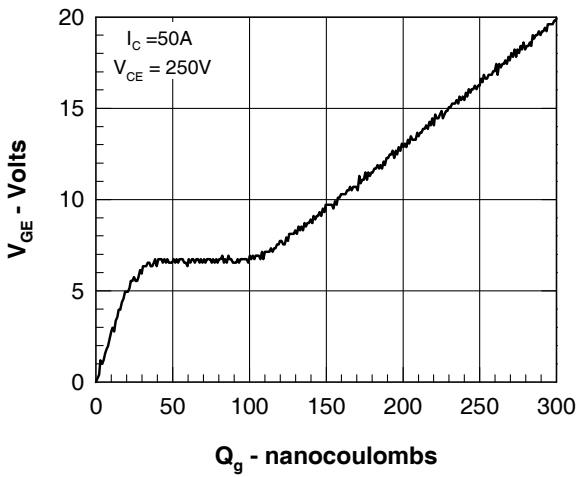


Fig. 9. Gate Charge

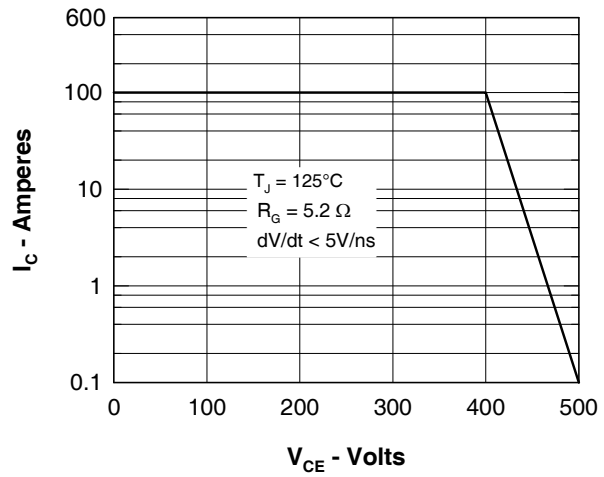


Fig. 10. Turn-off Safe Operating Area

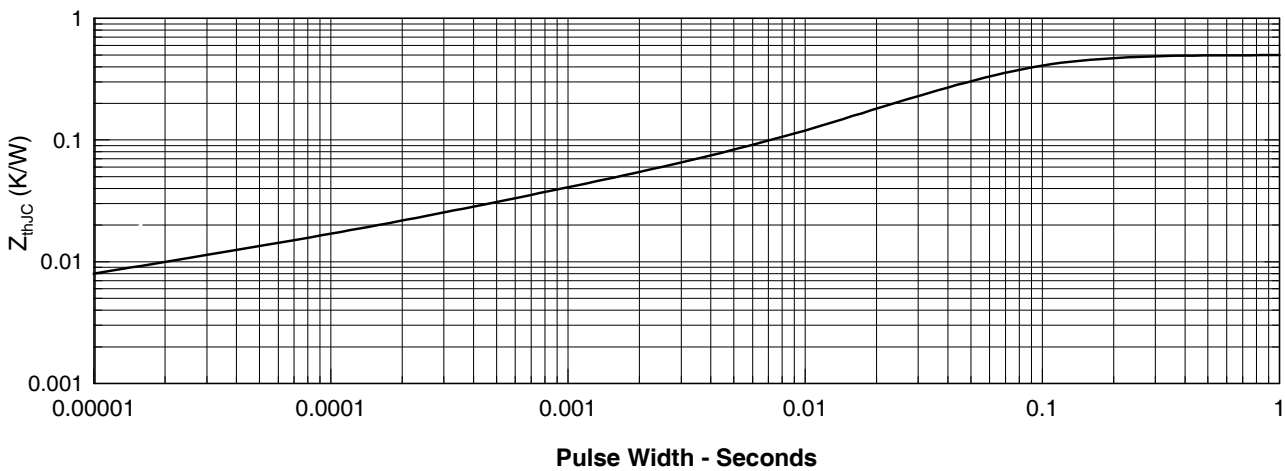


Figure 11. IGBT Transient Thermal Resistance

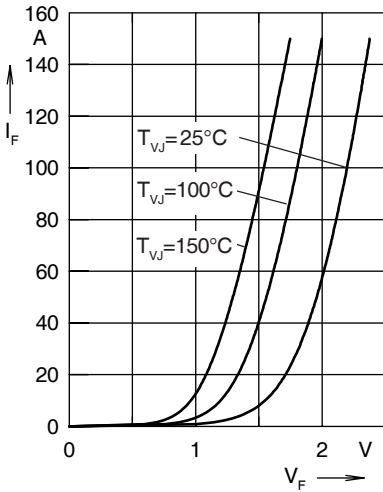


Fig. 12 Forward current I_F versus V_F

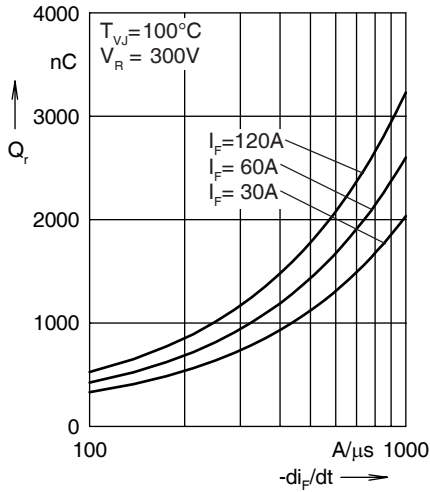


Fig. 13 Reverse recovery charge Q_r versus $-di_F/dt$

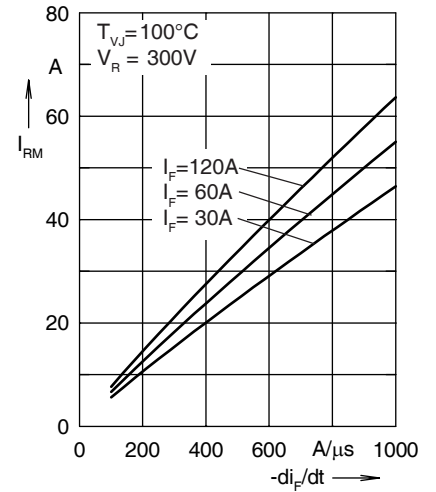


Fig. 14 Peak reverse current I_{RM} versus $-di_F/dt$

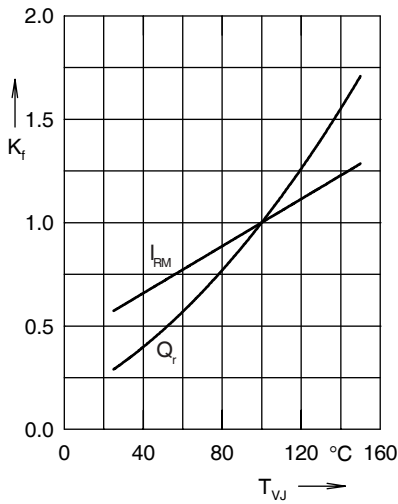


Fig. 15 Dynamic parameters Q_r , I_{RM} versus T_{VJ}

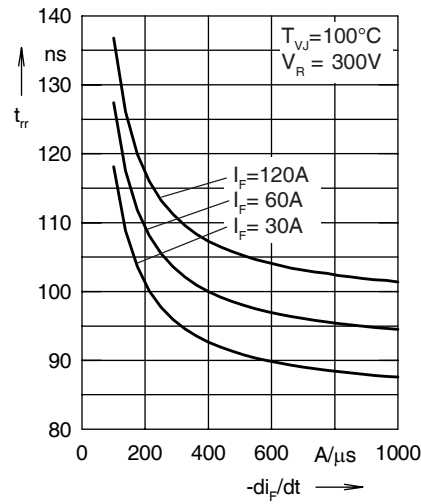


Fig. 16 Recovery time t_{rr} versus $-di_F/dt$

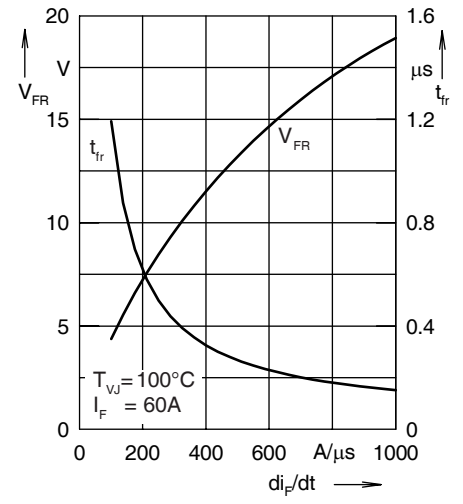


Fig. 17 Peak forward voltage V_{FR} and t_{rr} versus di_F/dt

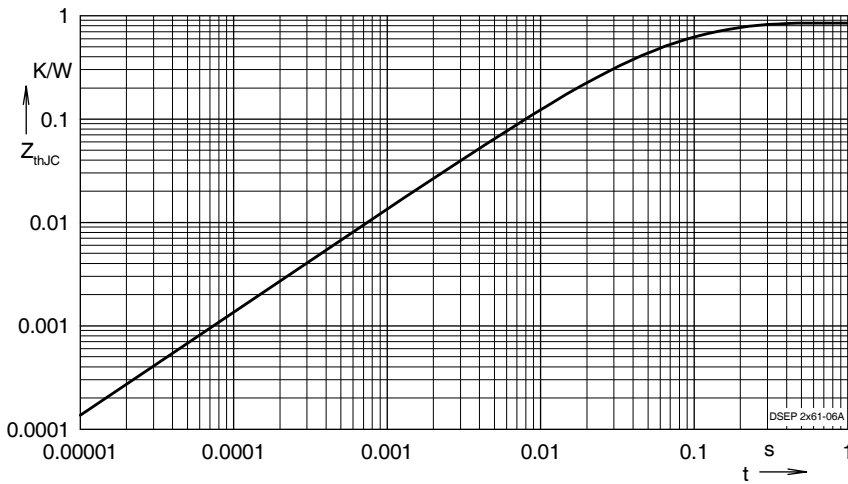


Fig. 18 Transient thermal resistance junction to case

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