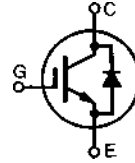


HiPerFAST™ IGBT with Diode

IXGK 50N60AU1

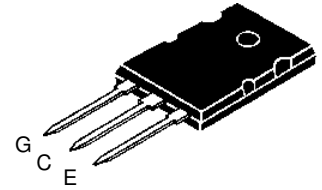
$V_{CES} = 600 \text{ V}$
 $I_{C25} = 75 \text{ A}$
 $V_{CE(sat)} = 2.7 \text{ V}$
 $t_{fi} = 275 \text{ ns}$

Combi Pack



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}	$T_C = 25^\circ\text{C}$, limited by leads	75	A
I_{C90}	$T_C = 90^\circ\text{C}$	50	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, $L = 30 \mu\text{H}$	$I_{CM} = 100$ @ $0.8 V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	300	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
M_d	Mounting torque (M4)	0.9/6	Nm/lb.in.
Weight		10	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

TO-264 AA



G = Gate, C = Collector,
 E = Emitter, TAB = Collector

Features

- International standard package JEDEC TO-264 AA
- High frequency IGBT and anti-parallel FRED in one package
- 2nd generation HDMOS™ process
- Low $V_{CE(sat)}$ - for minimum on-state conduction losses
- MOS Gate turn-on - drive simplicity
- Fast Recovery Epitaxial Diode (FRED) - soft recovery with low I_{RM}

Applications

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

Advantages

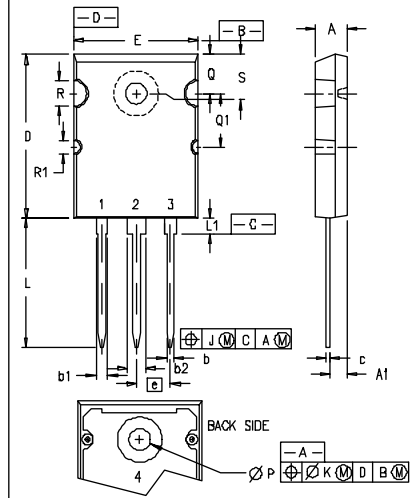
- Space savings (two devices in one package)
- Easy to mount with 1 screw (isolated mounting screw hole)
- Reduces assembly time and cost
- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 500 \mu\text{A}$, $V_{GE} = 0 \text{ V}$	600		V
$V_{GE(th)}$	$I_C = 500 \mu\text{A}$, $V_{CE} = V_{GE}$	2.5		5.5 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0 \text{ V}$			$T_J = 25^\circ\text{C}$: 250 μA $T_J = 125^\circ\text{C}$: 15 mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$			$\pm 100 \text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15 \text{ V}$			2.7 V

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 %	25	35	S
Q _g	I _C = I _{C90} , V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		200	nC
Q _{ge}			50	nC
Q _{gc}			80	nC
t _{d(on)}	Inductive load, T_J = 25°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH, V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 2.7 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		50	ns
t _{ri}			210	ns
t _{d(off)}			200	ns
t _{fi}			275	400 ns
E _{off}			4.8	mJ
t _{d(on)}	Inductive load, T_J = 125°C I _C = I _{C90} , V _{GE} = 15 V, L = 100 μH V _{CE} = 0.8 V _{CES} , R _G = R _{off} = 2.7 Ω Remarks: Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		50	ns
t _{ri}			240	ns
E _{on}			3	mJ
t _{d(off)}			280	ns
t _{fi}			600	ns
E _{off}		9.6	mJ	
R _{thJC}				0.42 K/W
R _{thCK}		0.15		K/W

Symbol	Test Conditions	Characteristic Values		
		(T _J = 25°C, unless otherwise specified)		
		min.	typ.	max.
V _F	I _F = I _{C90} , V _{GE} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %			1.7 V
I _{RM}	I _F = I _{C90} , V _{GE} = 0 V, -di _F /dt = 480 A/μs V _R = 360 V T _J = 125°C I _F = 1 A; -di/dt = 200 A/μs; V _R = 30 V T _J = 25°C		19	33 A
t _{rr}				175
R _{thJC}				0.75 K/W

TO-264 AA Outline



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215 BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

- 1 - GATE
- 2, 4 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)

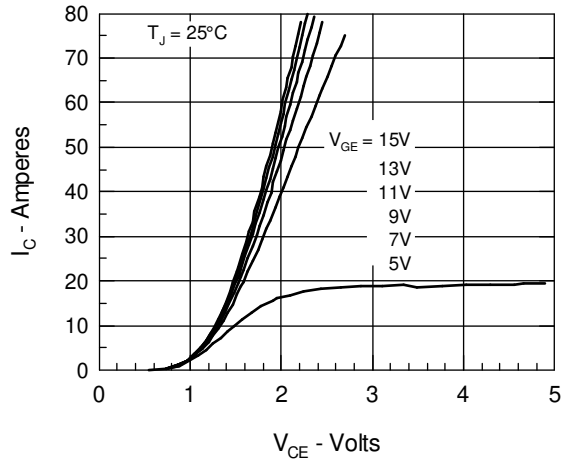
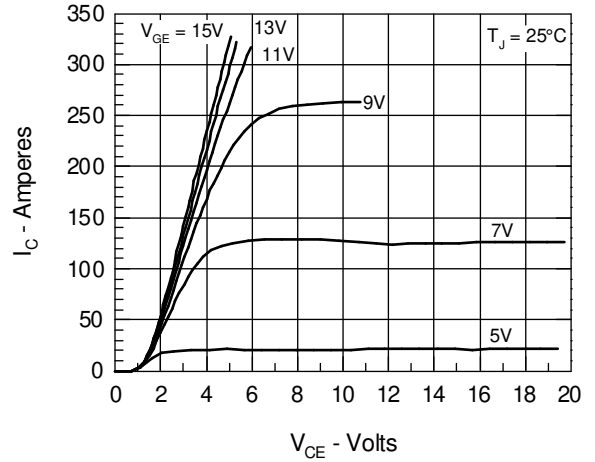
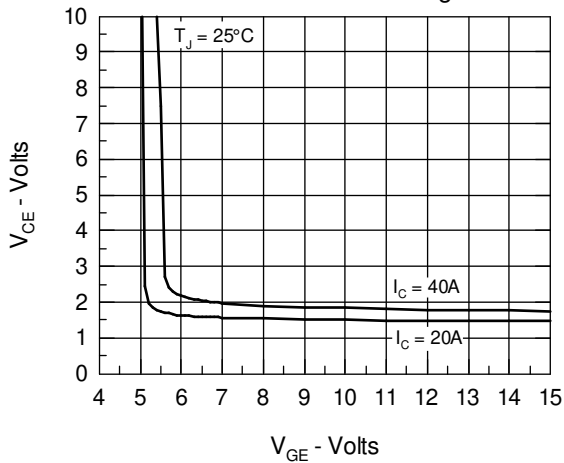
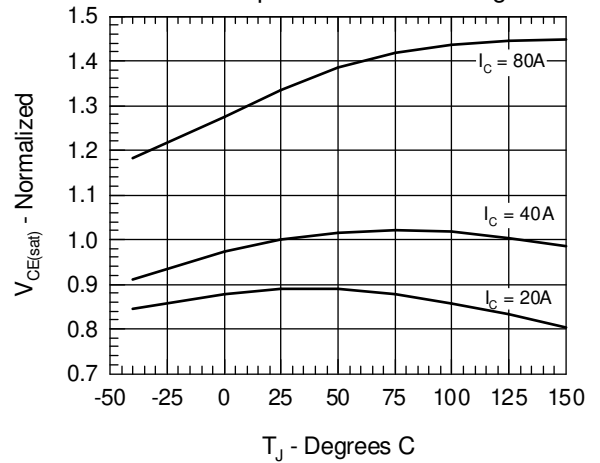
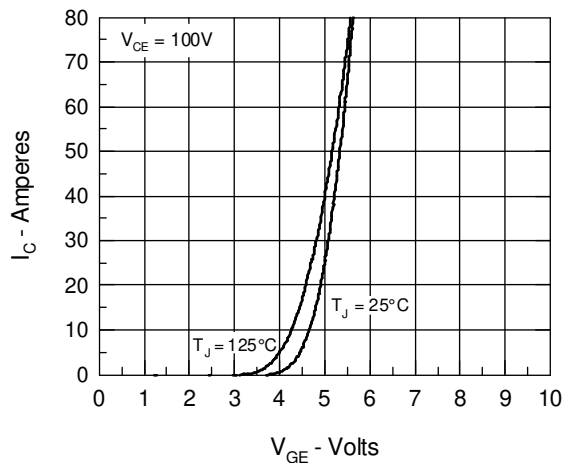
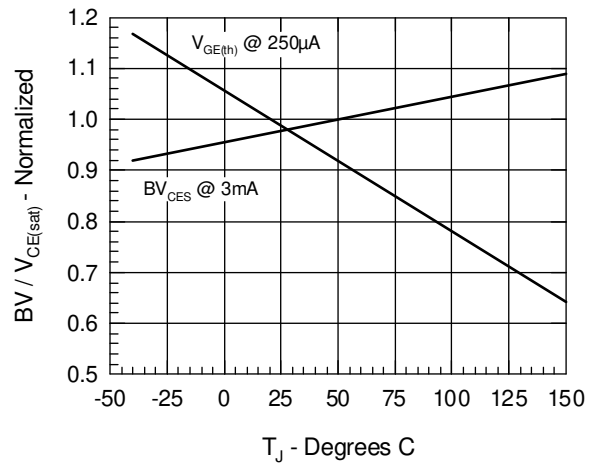
Fig. 1 Saturation Characteristics

Fig. 2 Output Characteristics

Fig. 3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

Fig. 4 Temperature Dependence of Output Saturation Voltage

Fig. 5 Input Admittance

Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage


Fig.7 Gate Charge

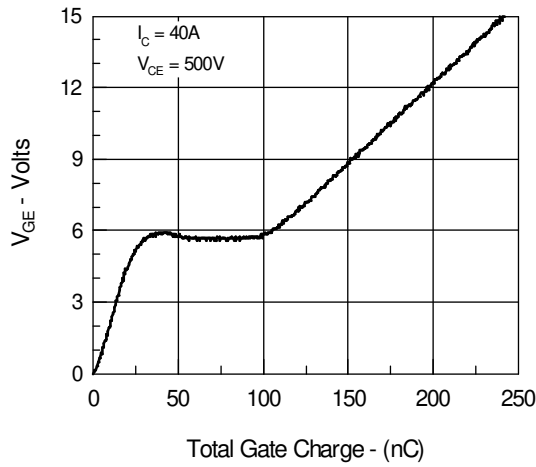


Fig.8 Turn-Off Safe Operating Area

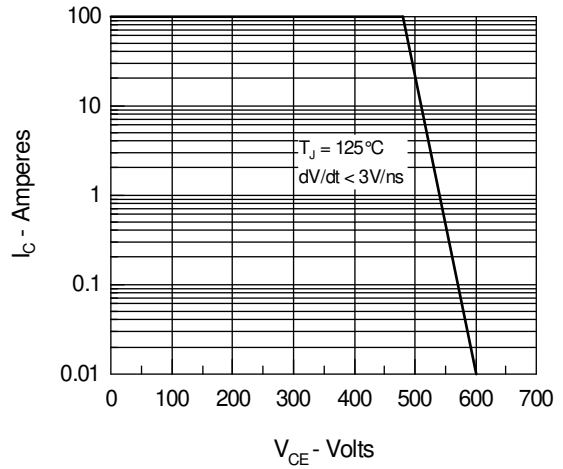


Fig.9 Capacitance Curves

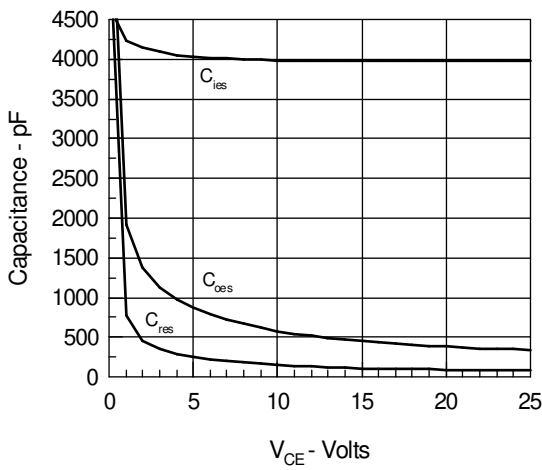
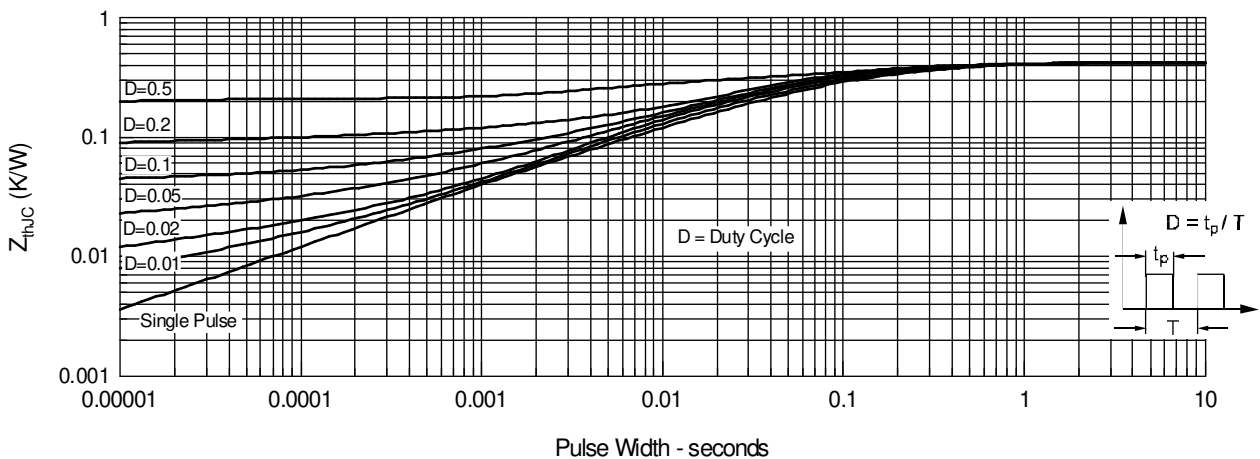


Fig.10 Transient Thermal Impedance



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	4,881,106	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. 12. Maximum Forward Voltage Drop

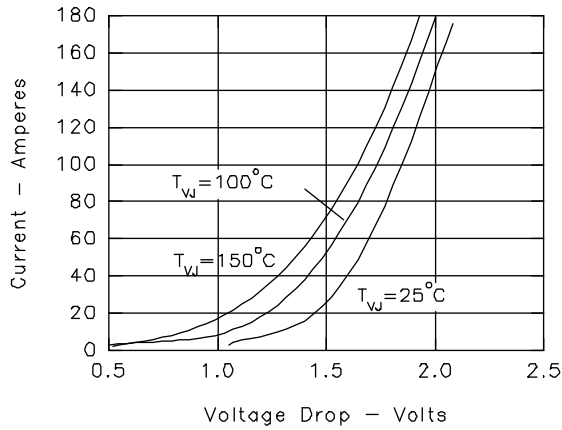


Fig. 13. Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}

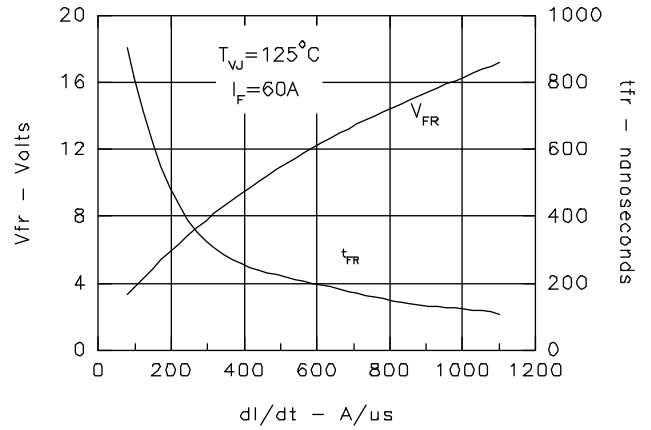


Fig. 14. Junction Temperature Dependence of I_{RM} and Q_R

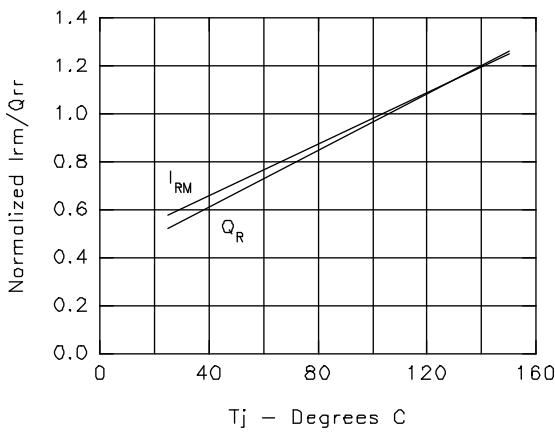


Fig. 15. Maximum Reverse Recovery Charge

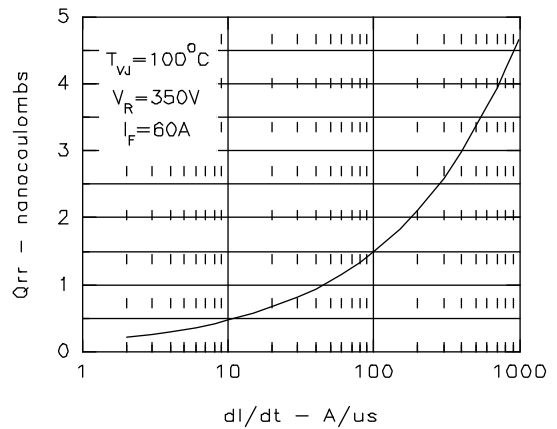


Figure 16. Peak Reverse Recovery Current.

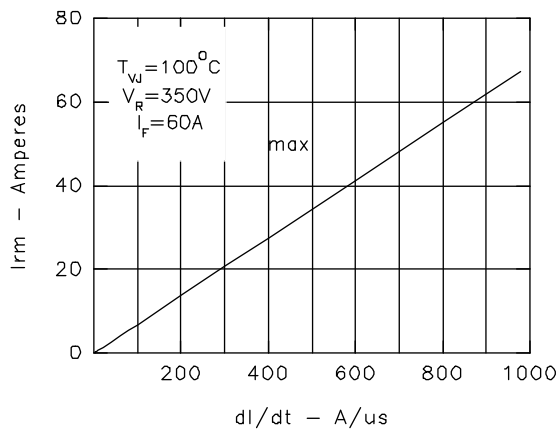
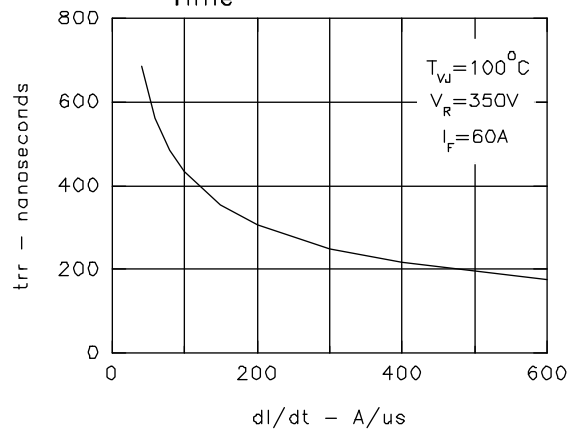


Fig. 17. Maximum Reverse Recovery Time



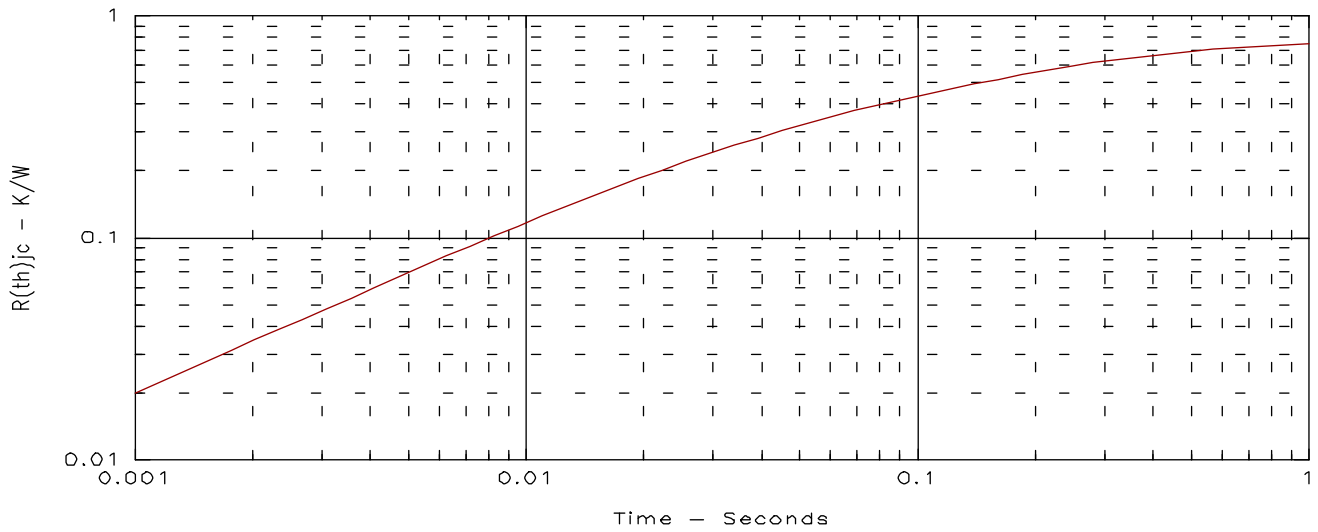


Fig. 18. Diode transient thermal resistance junction-to-case.