

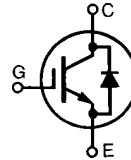
HiPerFAST™ IGBT with Diode

IXGK 50N50BU1
IXGK 50N60BU1

V_{CES}	I_{C25}	$V_{CE(sat)}$	t_{fi}
500 V	75 A	2.3 V	100ns
600 V	75 A	2.5 V	120ns

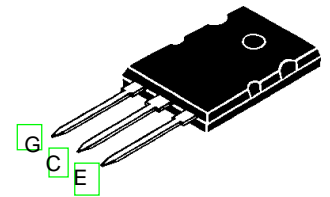
Combi Pack

Preliminary data



Symbol	Test Conditions	Maximum Ratings		
		50N50	50N60	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	500	600	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1\text{ M}\Omega$	500	600	V
V_{GES}	Continuous	± 20	± 20	V
V_{GEM}	Transient	± 30	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	75	75	A
I_{C90}	$T_C = 90^\circ\text{C}$	50	50	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	200	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	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

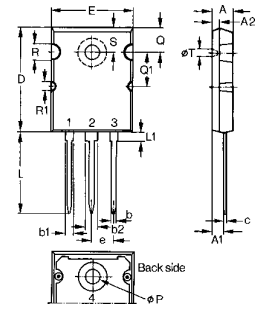
- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switch-mode and resonant-mode power supplies

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}	$I_C = 500\ \mu\text{A}$, $V_{GE} = 0\text{ V}$	50N50 50N60	500 600	V
$V_{GE(th)}$	$I_C = 500\ \mu\text{A}$, $V_{CE} = V_{GE}$		2.5	5.5 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		250 μA 15 mA
I_{GES}	$V_{CE} = 0\text{ V}$, $V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15\text{ V}$	50N50BU1 50N60BU1		2.3 V 2.5 V

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)			
		min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; $V_{CE} = 10\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$ Remarks: Add capacitance from IXGH50N60B (DS95585B)	25	35	S	
Q_g	$I_C = I_{C90}$; $V_{GE} = 15\text{ V}$, $V_{CE} = 0.5 V_{CES}$		200	nC	
Q_{ge}			50	nC	
Q_{gc}			70	nC	
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = I_{C90}$; $V_{GE} = 15\text{ V}$, $L = 100\ \mu\text{H}$, $V_{CE} = 0.8 V_{CES}$; $R_G = R_{off} = 2.7\ \Omega$ 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	ns	
t_{fi}		50N50	80	150	ns
E_{off}		50N60	1.8	3.0	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C90}$; $V_{GE} = 15\text{ V}$, $L = 100\ \mu\text{H}$ $V_{CE} = 0.8 V_{CES}$; $R_G = R_{off} = 2.7\ \Omega$ 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	
$t_{d(off)}$		50N50	100	ns	
t_{fi}		50N60	250	ns	
E_{off}		50N50	2.6	mJ	
	50N60	4.2	mJ		
R_{thJC}			0.42	K/W	
R_{thCK}		0.15		K/W	

TO-264 AA Outline


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.82	5.13	.190	.202
A1	2.54	2.89	.100	.114
A2	2.00	2.10	.079	.083
b	1.12	1.42	.044	.056
b1	2.39	2.69	.094	.106
b2	2.90	3.09	.114	.122
c	0.53	0.83	.021	.033
D	25.91	26.16	1.020	1.030
E	19.81	19.96	.780	.786
e	5.46	BSC	.215	BSC
J	0.00	0.25	.000	.010
K	0.00	0.25	.000	.010
L	20.32	20.83	.800	.820
L1	2.29	2.59	.090	.102
P	3.17	3.66	.125	.144
Q	6.07	6.27	.239	.247
Q1	8.38	8.69	.330	.342
R	3.81	4.32	.150	.170
R1	1.78	2.29	.070	.090
S	6.04	6.30	.238	.248
T	1.57	1.83	.062	.072

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_F	$I_F = I_{C90}$; $V_{GE} = 0\text{ V}$, Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$		1.7	V
I_{RM}	$I_F = I_{C90}$; $V_{GE} = 0\text{ V}$, $-di_F/dt = 480\text{ A}/\mu\text{s}$ $V_R = 360\text{ V}$ $T_J = 125^\circ\text{C}$ $I_F = 1\text{ A}$; $-di/dt = 200\text{ A}/\mu\text{s}$; $V_R = 30\text{ V}$ $T_J = 25^\circ\text{C}$		19	A
t_{rr}			175	ns
			35	50
R_{thJC}			0.75	K/W

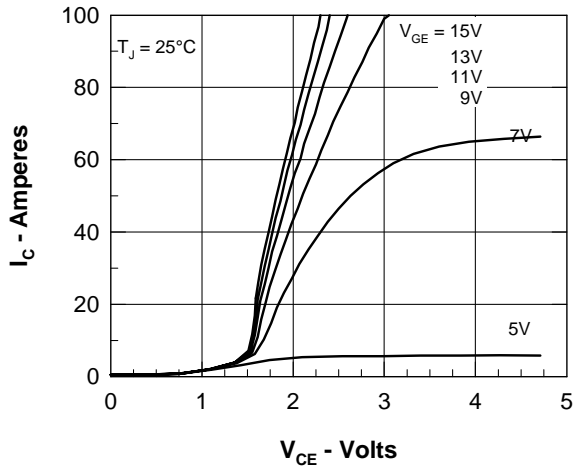


Figure 1. Saturation Voltage Characteristics

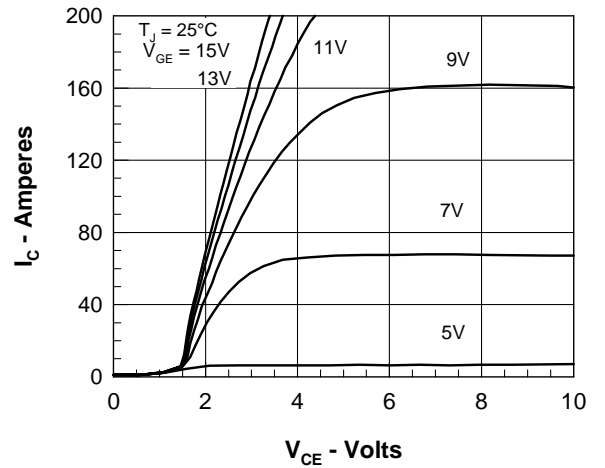


Figure 2. Extended Output Characteristics

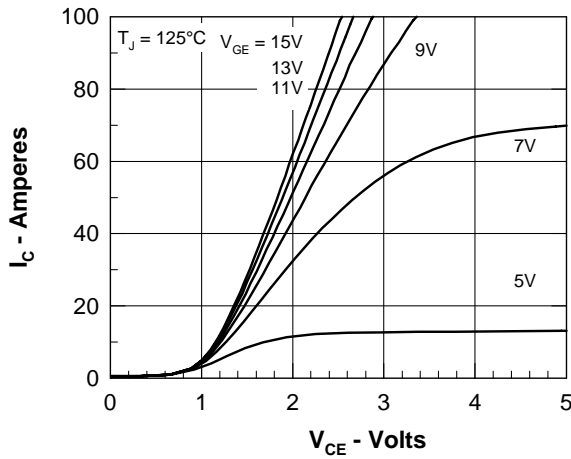


Figure 3. Saturation Voltage Characteristics

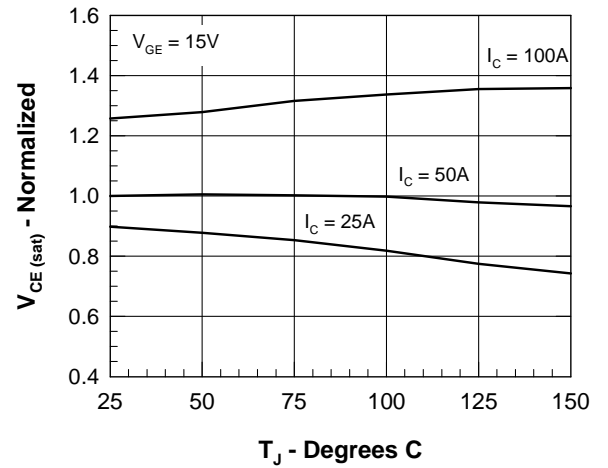
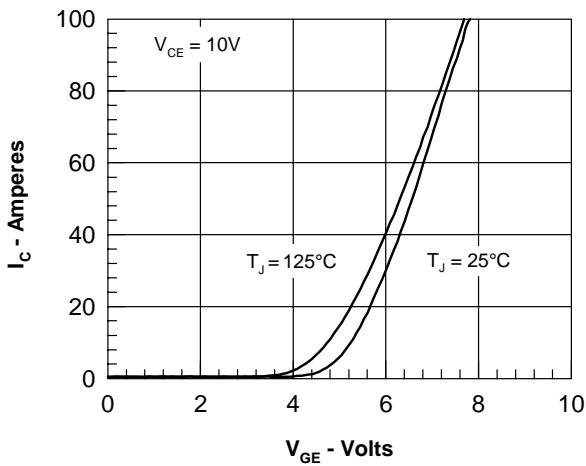

 Figure 4. Temperature Dependence of $V_{CE(sat)}$


Figure 5. Admittance Curves

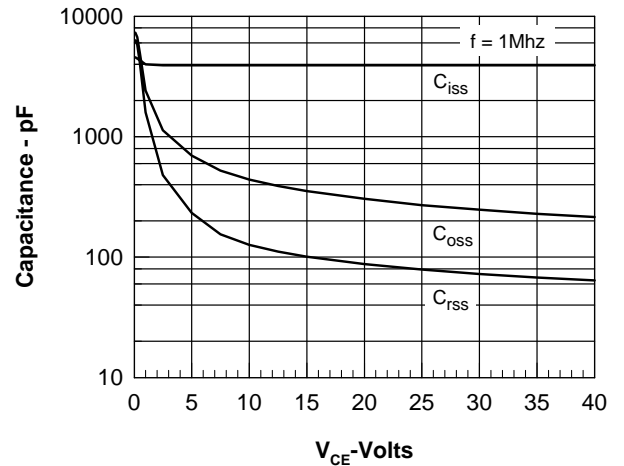


Figure 6. Capacitance Curves

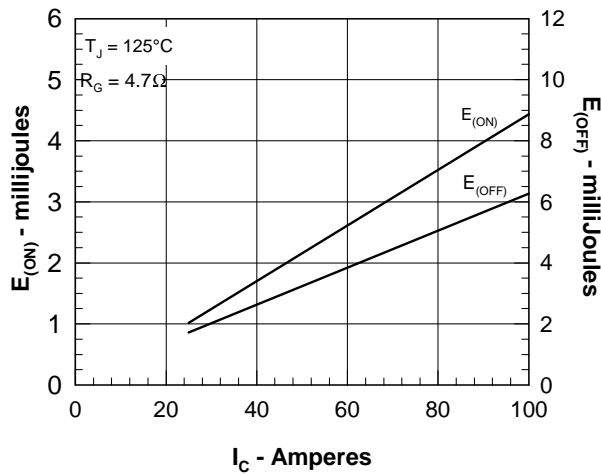


Figure 7. Dependence of E_{ON} and E_{OFF} on I_C .

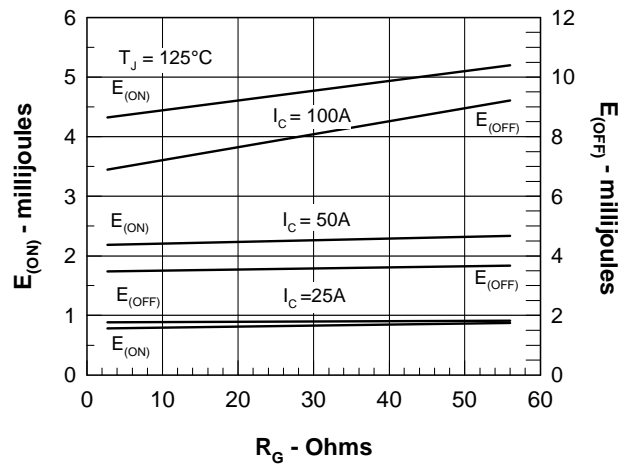


Figure 8. Dependence of E_{ON} and E_{OFF} on R_G .

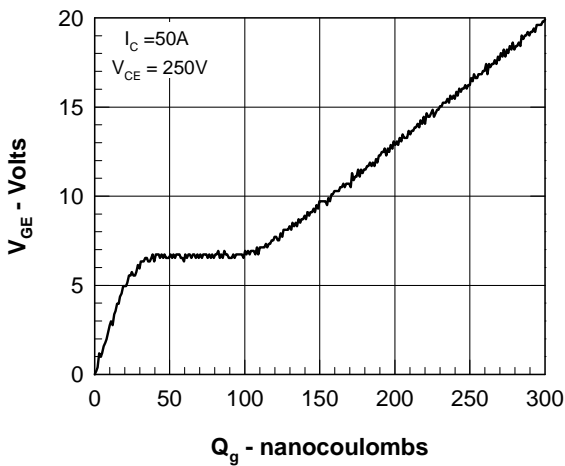


Figure 9. Gate Charge

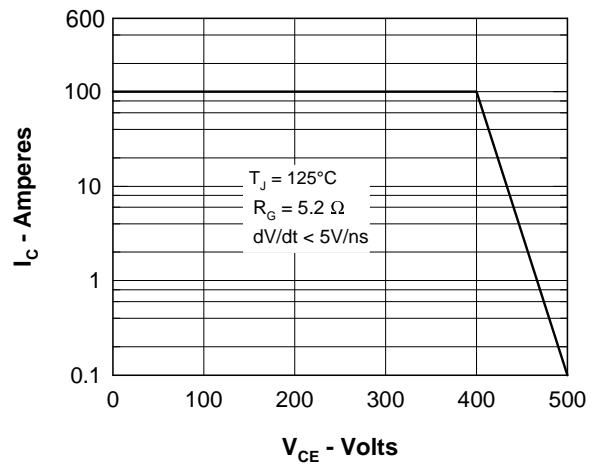


Figure 10. Turn-off Safe Operating Area

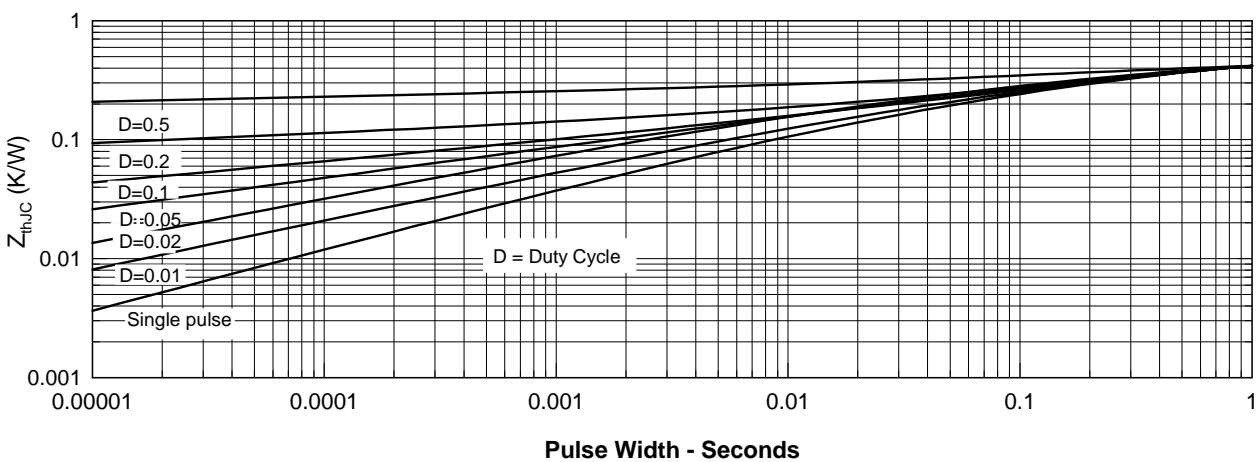


Figure 11. IGBT Transient Thermal Resistance

Fig. 12. Maximum Forward Voltage Drop

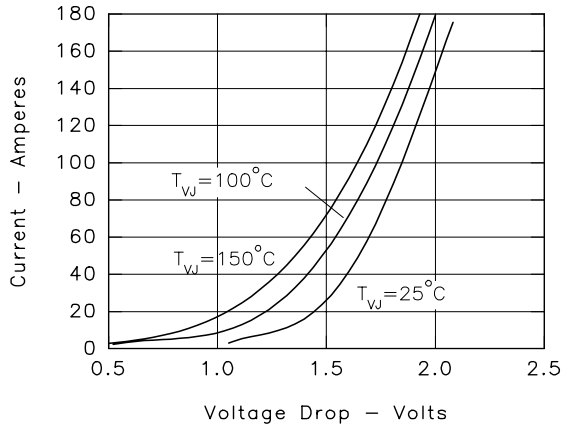


Fig. 13. Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}

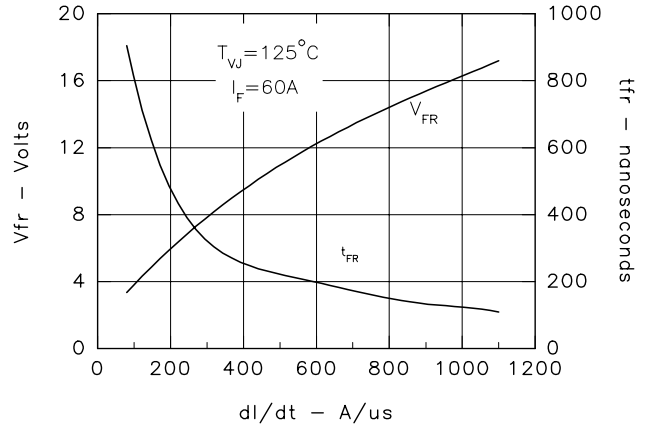


Fig. 14. Junction Temperature Dependence of I_{RM} and Q_R

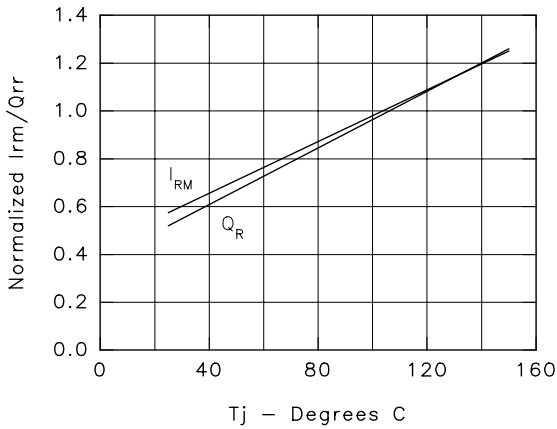


Fig. 15. Maximum Reverse Recovery Charge

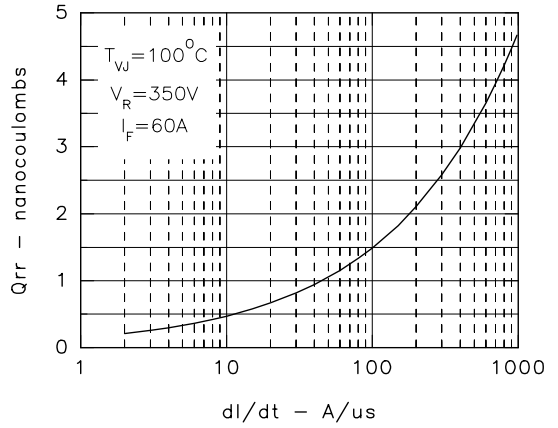


Figure 16. Peak Reverse Recovery Current.

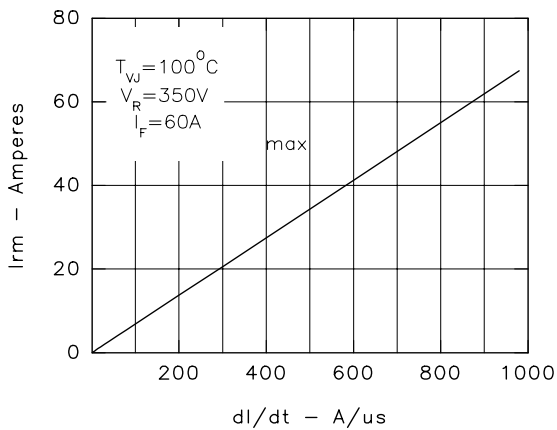
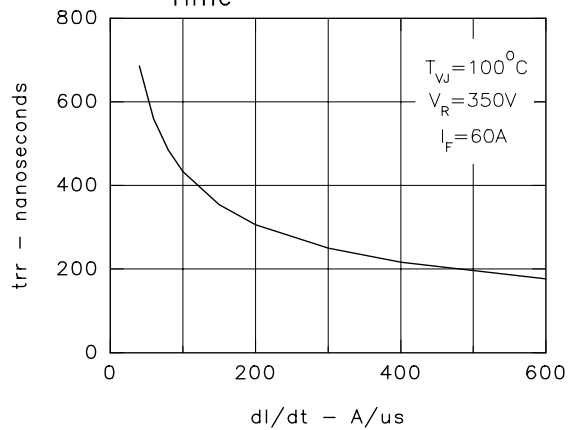


Fig. 17. Maximum Reverse Recovery Time



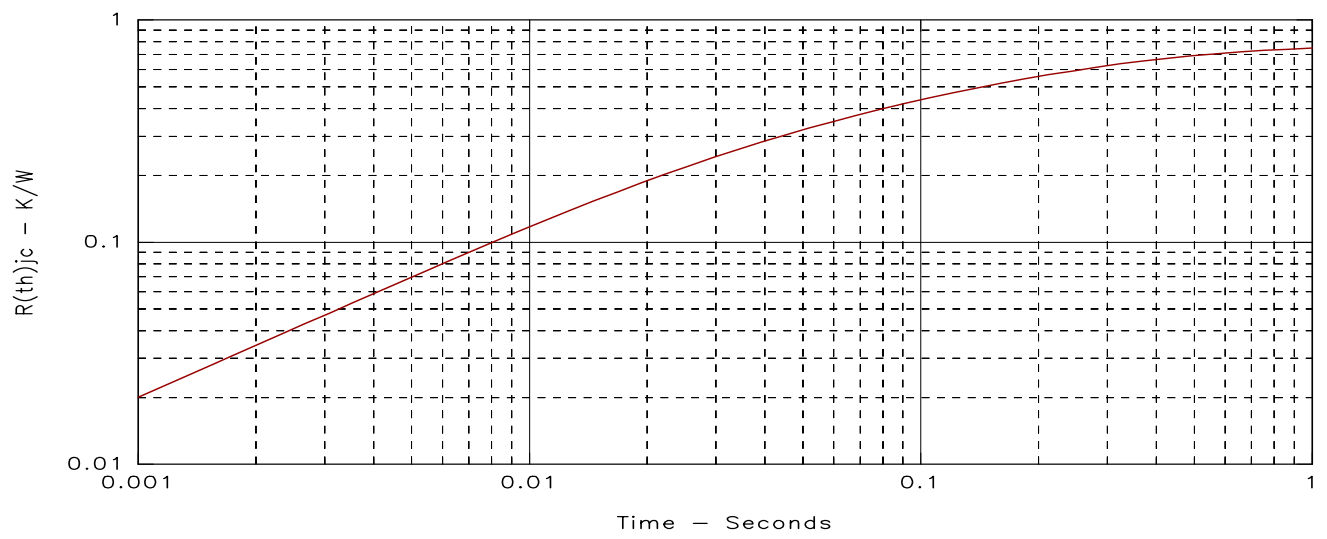


Fig. 18. Diode transient thermal resistance junction-to-case.