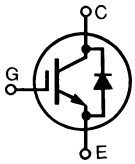
IXYS

HiPerFAST™ IGBT with Diode

Combi Pack

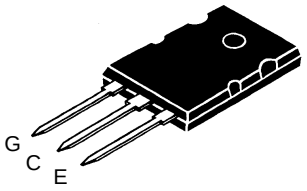
	V_{CES}	I_{C25}	$V_{CE(sat)}$	t_{fi}
IXGK 50N50BU1	500 V	75 A	2.3 V	100ns
IXGK 50N60BU1	600 V	75 A	2.5 V	120ns

Preliminary data



Symbol	Test Conditions	Maximum Ratings 50N50	50N60	
V_{CES}	T_J = 25°C to 150°C	500	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	500	600	V
V_{GES}	Continuous	±20	±20	V
V_{GEM}	Transient	±30	±30	V
I_{C25}	T_C = 25°C	75	75	A
I_{C90}	T_C = 90°C	50	50	A
I_{CM}	T_C = 25°C, 1 ms	200	200	A
SSOA (RBSOA)	V_{GE}= 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load, L = 30 μH	I_{CM} = 100 @ 0.8 V_{CES}		A
P_C	T_C = 25°C	300	300	W
T_J		-55 ... +150		°C
T_{JM}		150		°C
T_{stg}		-55 ... +150		°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		°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°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 500 μA, V_{GE} = 0 V	50N50	500			V
		50N60	600			V
$V_{GE(th)}$	I_C = 500 μA, V_{CE} = V_{GE}		2.5		5.5	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			250	μA
	V_{GE} = 0 V	T_J = 125°C			15	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V	50N50BU1			2.3	V
		50N60BU1			2.5	V

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

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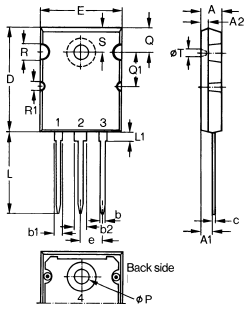
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 % Remarks: Add capacitance from IXGH50N60B (DS95585B)		25	35		S
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}			200		nC
Q_{ge}				50		nC
Q_{gc}				70		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**			50		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,			50		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 2.7 Ω			110		ns
t_{fi}	Remarks: Switching times may increase	50N50		80	150	ns
	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or	50N60		150		ns
E_{off}	increased R_G	50N50		1.8		mJ
		50N60			3.0	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**			50		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH			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 increase			200		ns
t_{fi}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or	50N50		100		ns
	increased R_G	50N60		250		
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 Min.	Max.	Inches 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

Reverse Diode (FRED)

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			19	33	A
t_{rr}	V_R = 360 V	T_J = 125°C		175		ns
	I_F = 1 A; -di/dt = 200 A/µs; V_R = 30 V	T_J = 25°C		35	50	ns
R_{thJC}					0.75	K/W

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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

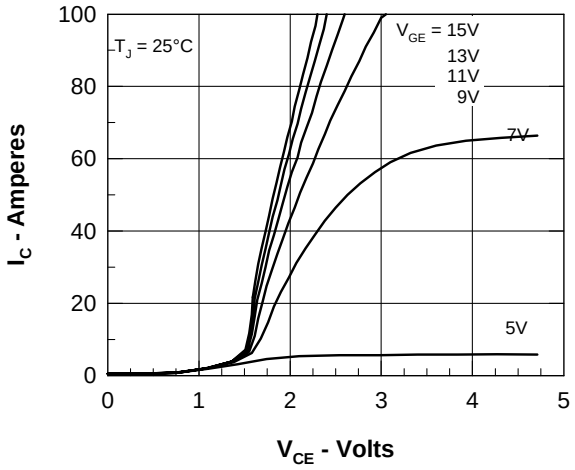

Figure 1. Saturation Voltage Characteristics

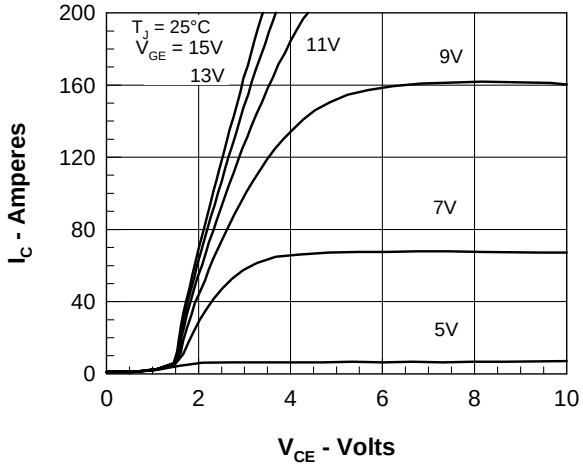

Figure 2. Extended Output Characteristics

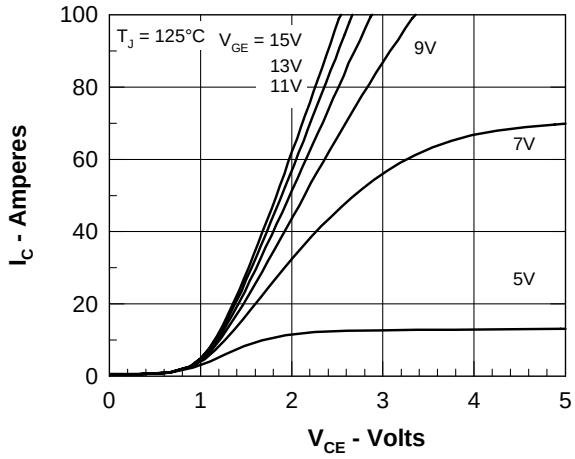

Figure 3. Saturation Voltage Characteristics

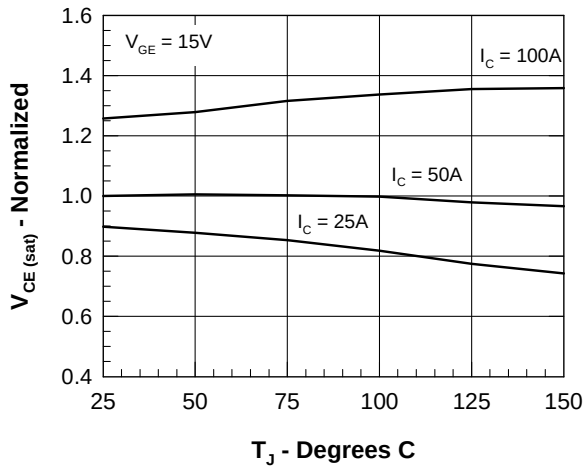

Figure 4. Temperature Dependence of $V_{CE(sat)}$

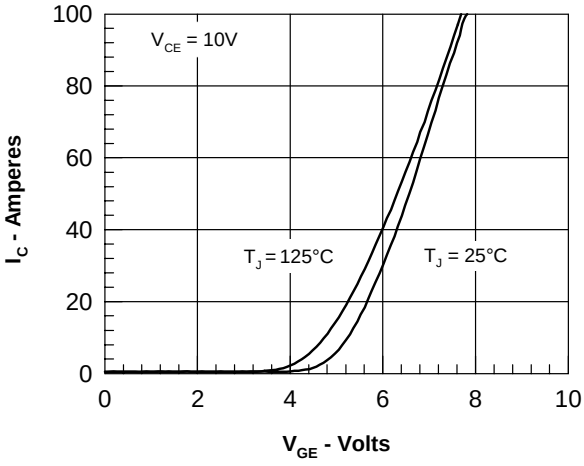

Figure 5. Admittance Curves

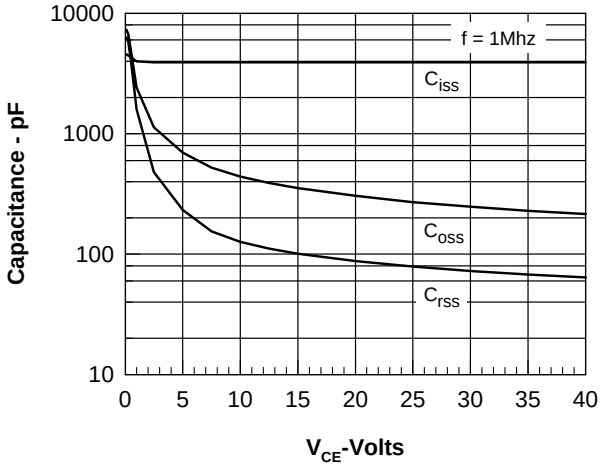

Figure 6. Capacitance Curves

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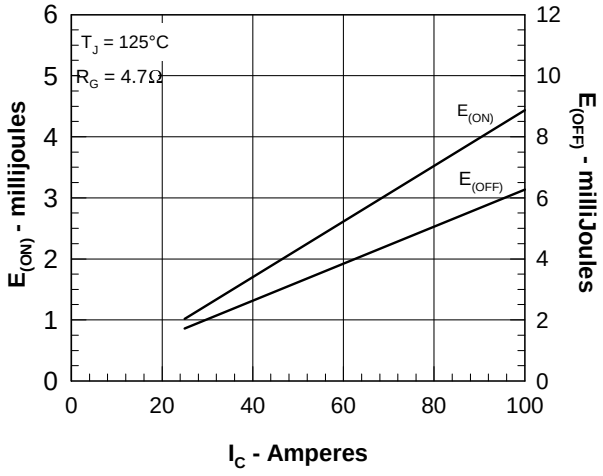

Figure 7. Dependence of E_{ON} and E_{OFF} on I_C.

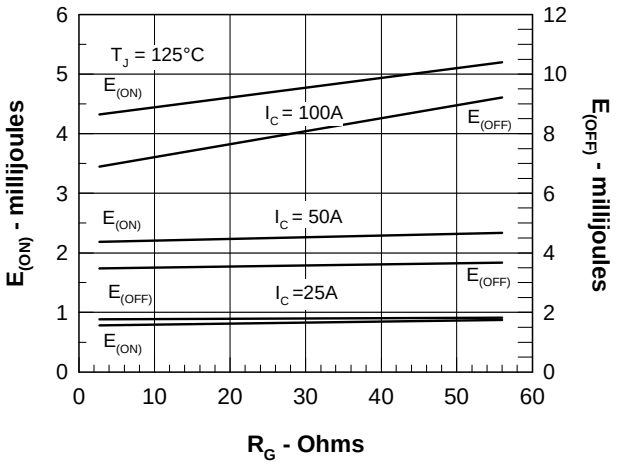

Figure 8. Dependence of E_{ON} and E_{OFF} on R_G.

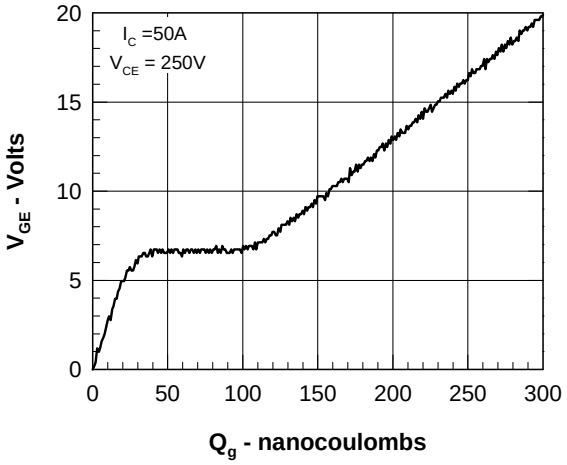

Figure 9. Gate Charge

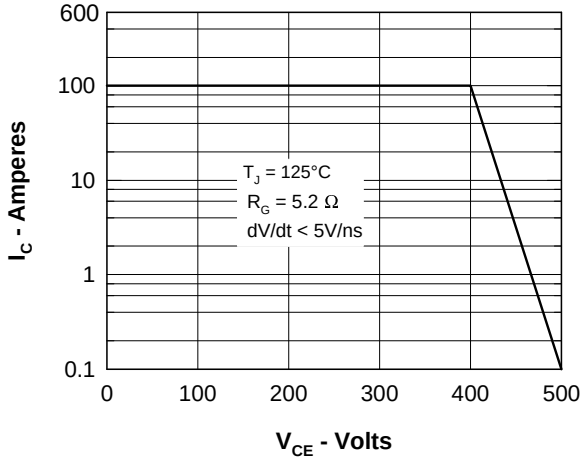

Figure 10. Turn-off Safe Operating Area

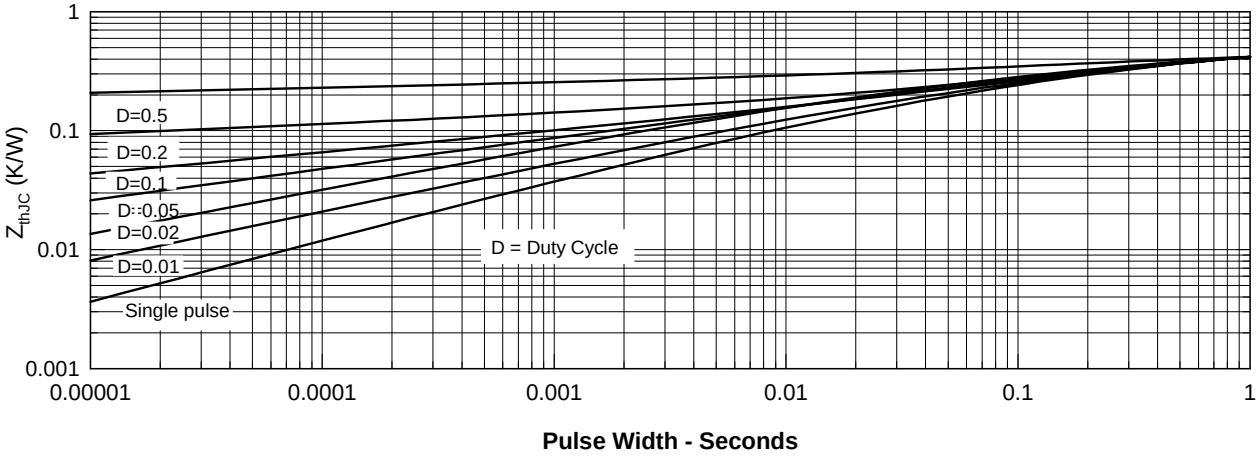

Figure 11. IGBT Transient Thermal Resistance

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Fig. 12. Maximum Forward Voltage Drop

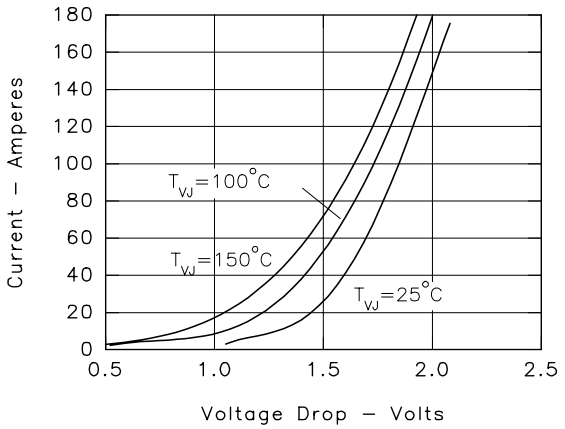


Fig. 13. Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}.

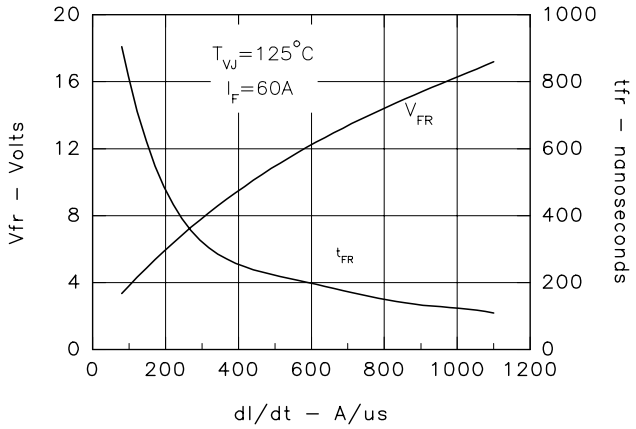


Fig. 14. Junction Temperature Dependence of I_{RM} and Q_R.

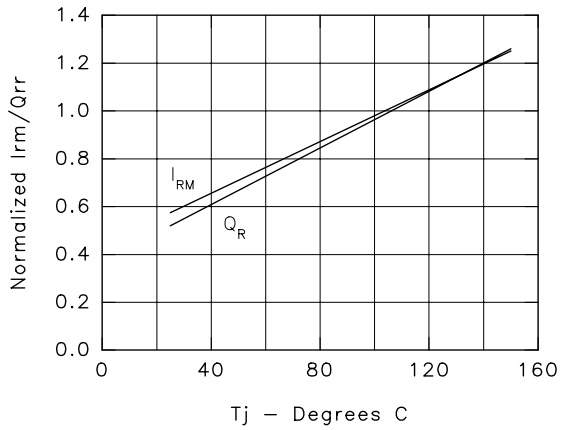


Fig. 15. Maximum Reverse Recovery Charge

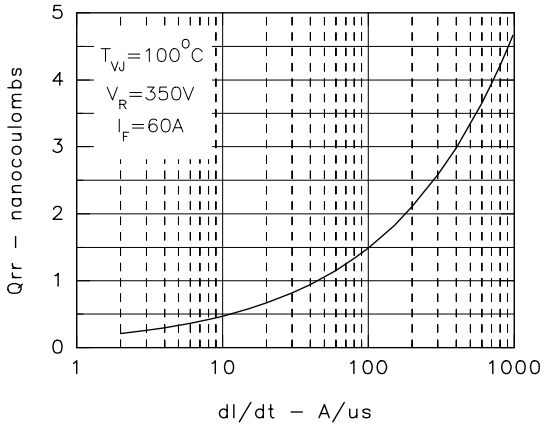


Figure 16. Peak Reverse Recovery Current.

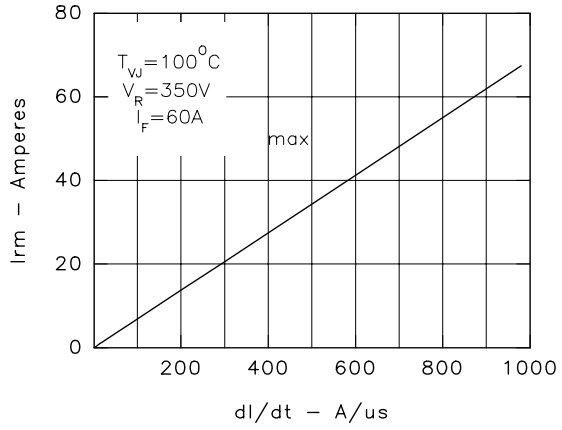
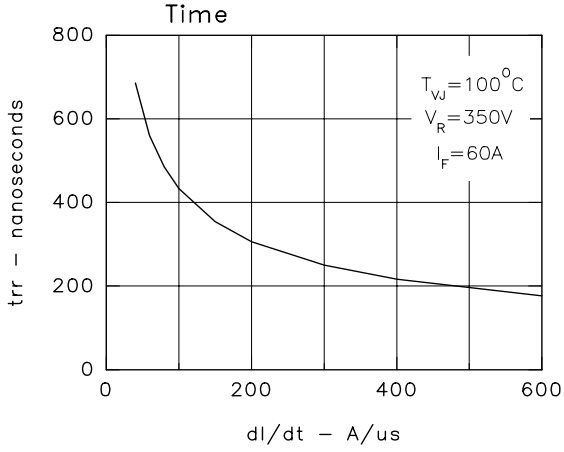


Fig. 17. Maximum Reverse Recovery Time



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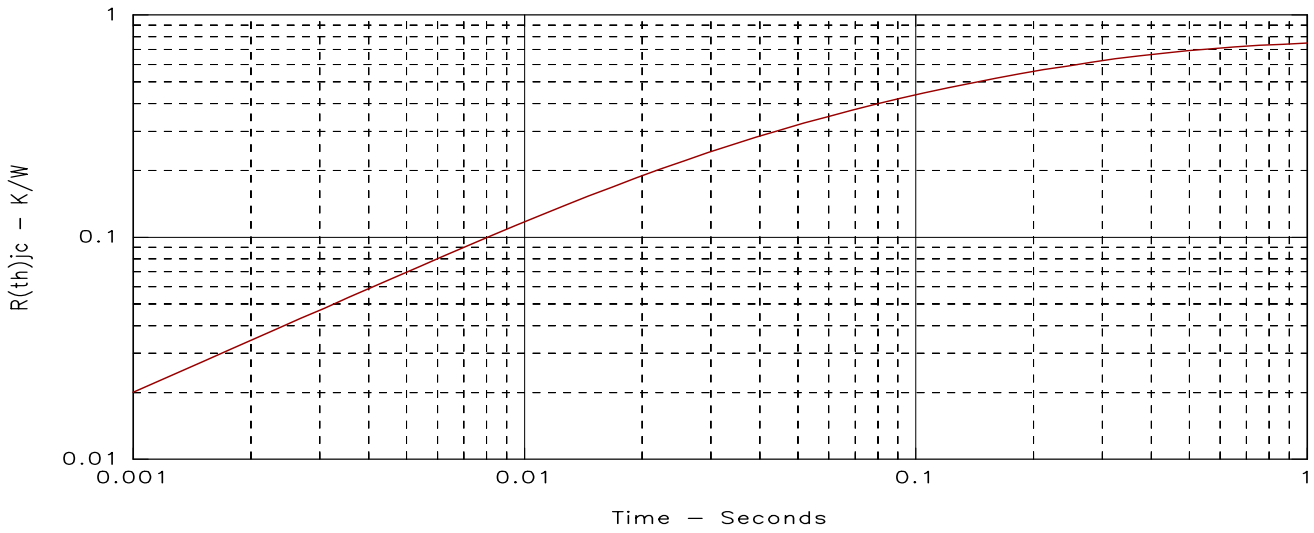

Fig. 18. Diode transient thermal resistance junction-to-case.

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