IXYS

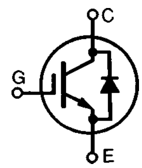
Preliminary data

HiPerFAST™ IGBT with Diode

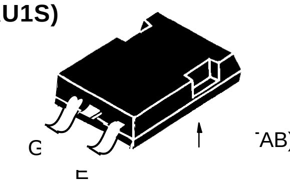
IXGX50N60AU1
IXGX50N60AU1S

Combi Pack

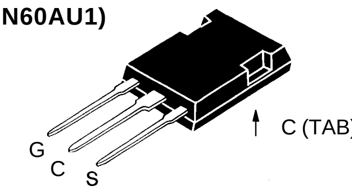
V_{CES} = 600 V
I_{C25} = 75 A
$V_{CE(sat)}$ = 2.7 V
t_{fi} = 275 ns



TO-247 Hole-less SMD (50N60AU1S)



TO-247 Hole-less (50N60AU1)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C, limited by leads	75	A
I_{C90}	T_C = 90°C	50	A
I_{CM}	T_C = 25°C, 1 ms	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	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Weight		6	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C

Features

- Hole-less TO-247 for clip mount
- High current capability
- High frequency IGBT and anti-parallel FRED in one package
- 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)
- Reduces assembly time and cost
- High power density

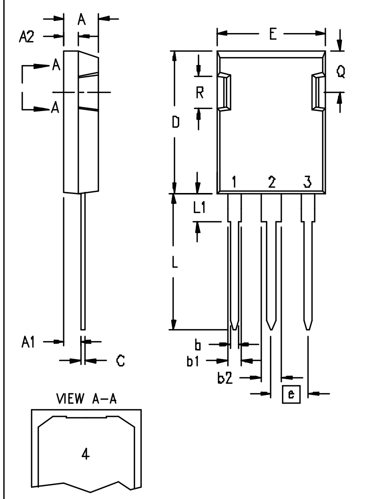
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 500 µA, V_{GE} = 0 V		600			V
$V_{GE(th)}$	I_C = 500 µA, V_{CE} = V_{GE}		2.5		5.5	V
I_{CES}	V_{CE} = 0.8 • V_{CES} V_{GE} = 0 V	T_J = 25°C T_J = 125°C			250 15	µA mA
I_{GES}	V_{CE} =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

Symbol	Test Conditions	min.	typ.	max.	
	Characteristic Values (T_J = 25°C, unless otherwise specified)				
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**		50		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH, V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 2.7 Ω		210		ns
$t_{d(off)}$			200		ns
t_{fi}	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or		275	400	ns
E_{off}	increased R_G		4.8		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		240		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		280		ns
t_{fi}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or		600		ns
E_{off}	increased R_G		9.6		mJ
R_{thJC}				0.42	K/W
R_{thCK}			0.15		K/W

Reverse Diode (FRED)

Symbol	Test Conditions	min.	typ.	max.	
	Characteristic Values (T_J = 25°C, unless otherwise specified)				
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

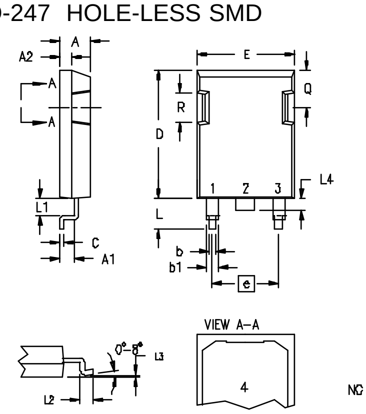
TO-247 HOLE-LESS



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – DRAIN (COLLECTOR)

TO-247 HOLE-LESS SMD



1 – GATE
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A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.430BSC		10.90 BSC	
L	.193	.201	4.90	5.10
L1	.106	.114	2.70	2.90
L2	.083	.091	2.10	2.30
L3	.00	.004	0.00	0.10
L4	.075	.083	1.90	2.10
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

NOTE: 1. This drawing meets all dimensions requirement of JEDEC outlines TO-247AD except L, L1, L2, L3, L4 and screw hole dia.
2. All metal surface are solder plated except trimmed area.

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

Fig. 1 Saturation Characteristics

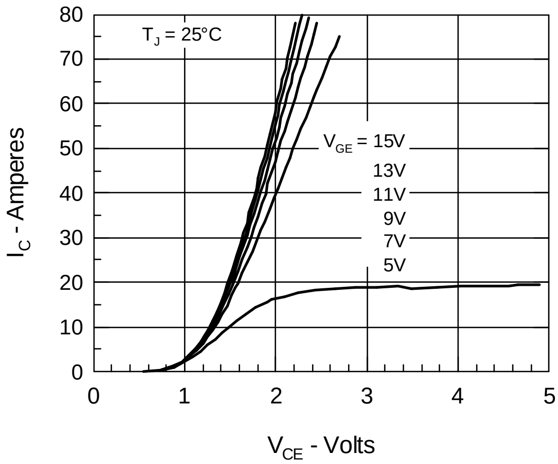


Fig. 2 Output Characterstics

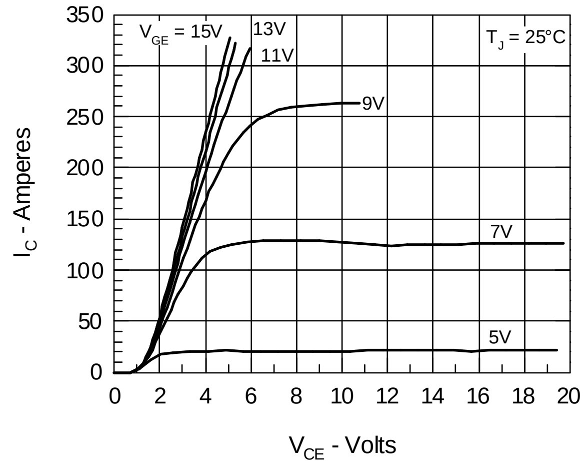


Fig. 3 Collector-Emitter Voltage vs. Gate-Emitter Voltage

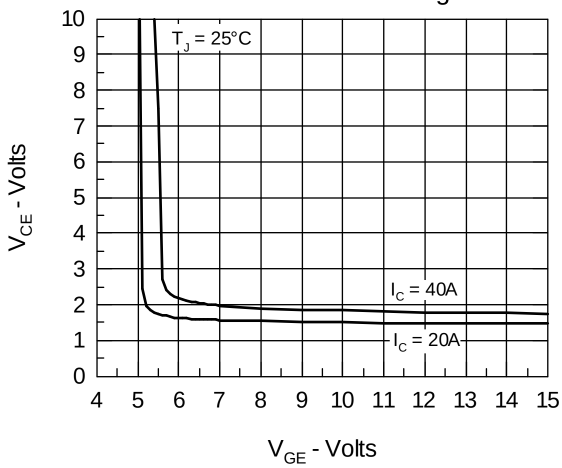


Fig. 4 Temperature Dependence of Output Saturation Voltage

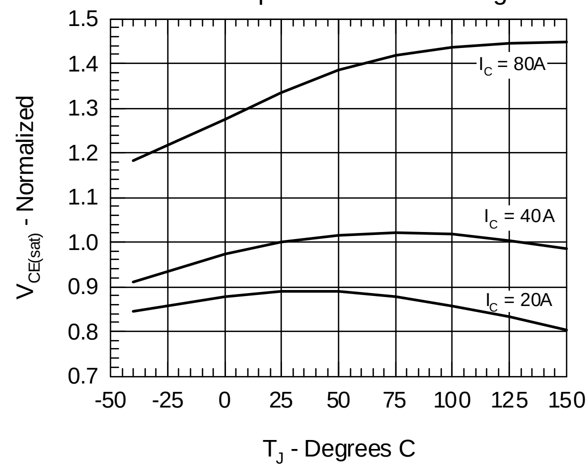


Fig. 5 Input Admittance

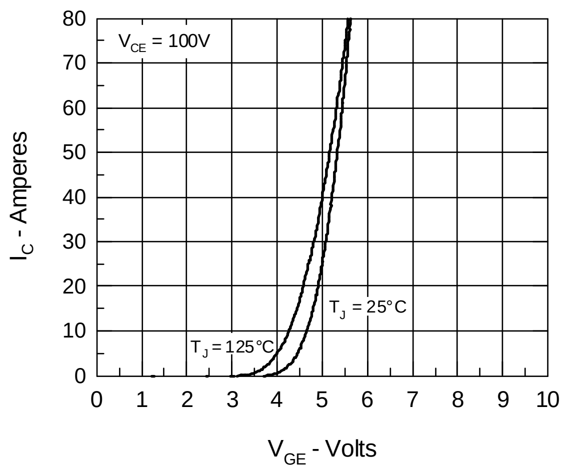


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

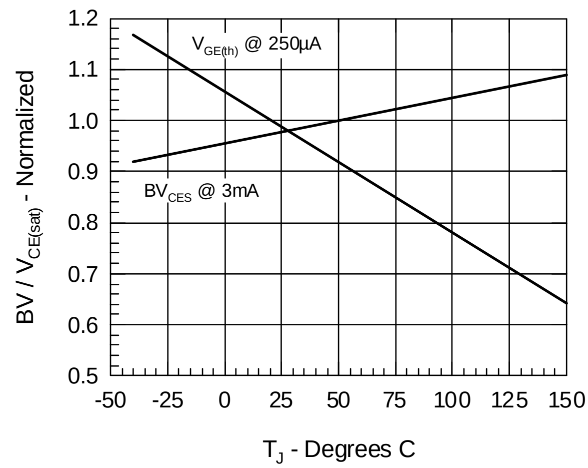


Fig.7 Gate Charge

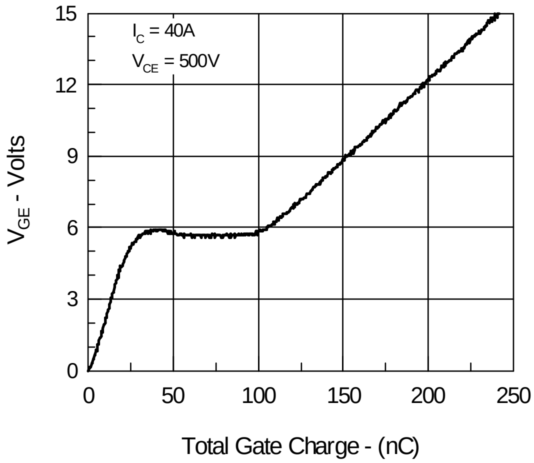


Fig.8 Turn-Off Safe Operating Area

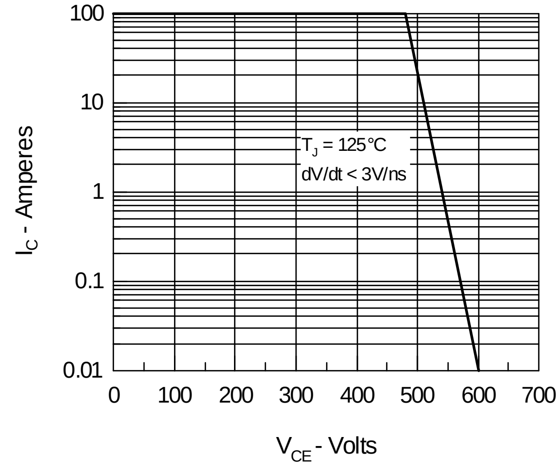


Fig.9 Capacitance Curves

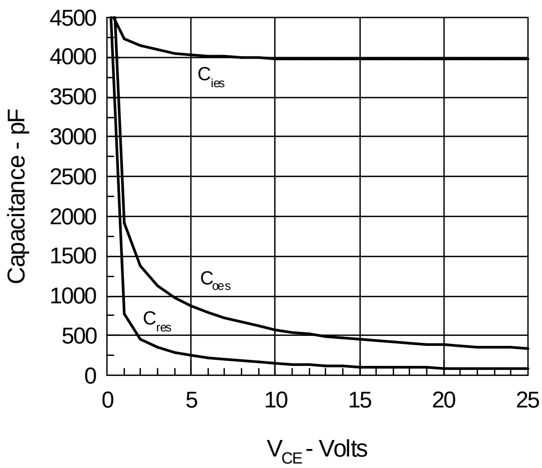


Fig.10 Transient Thermal Impedance

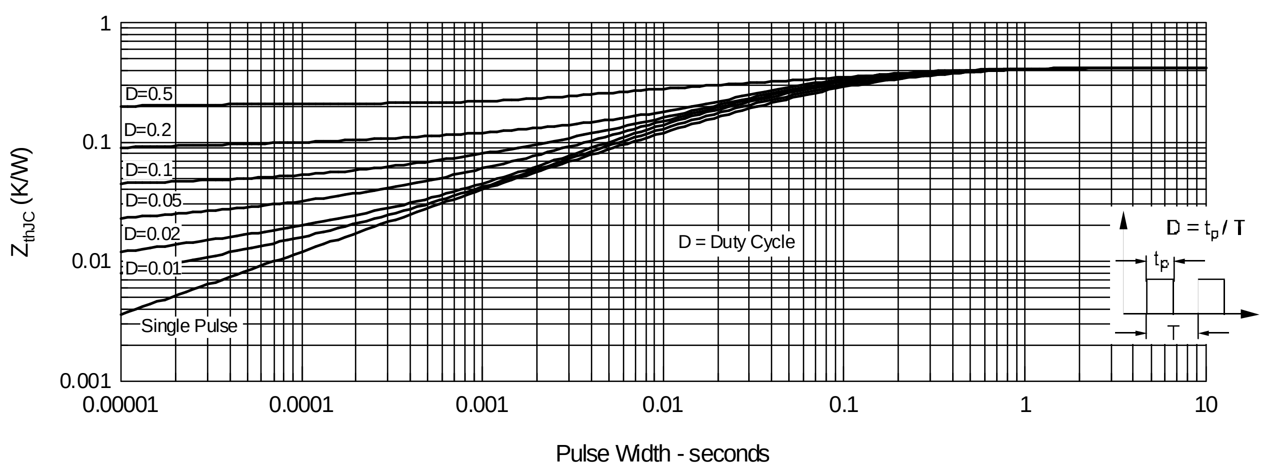


Fig. 12. Maximum Forward Voltage Drop

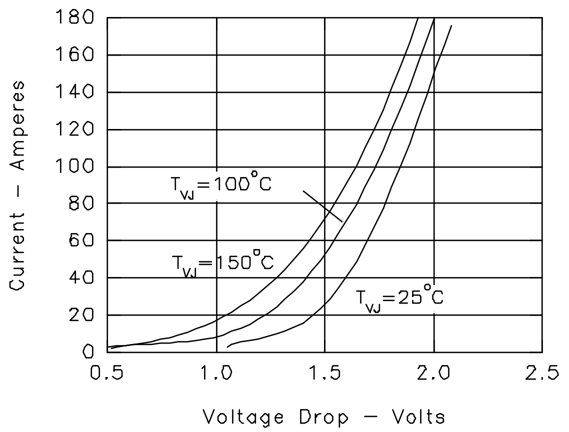


Fig. 13. Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}.

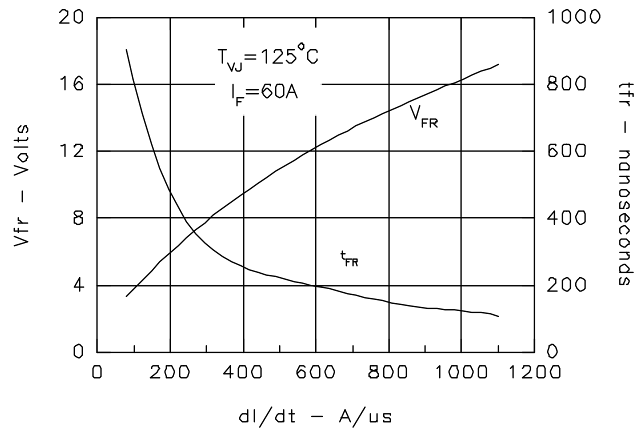


Fig. 14. Junction Temperature Dependence of I_{RM} and Q_R.

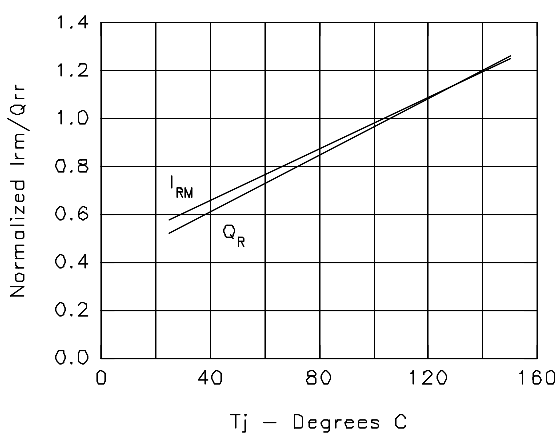


Fig. 15. Maximum Reverse Recovery Charge

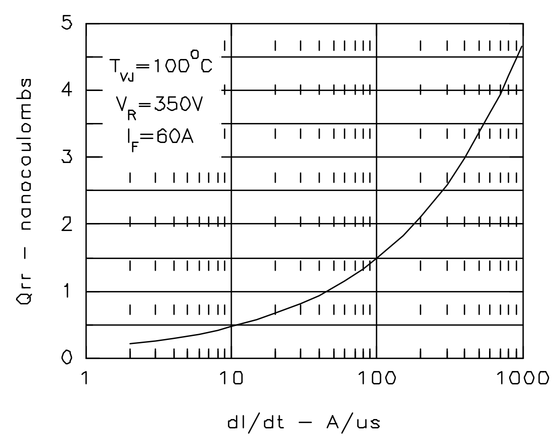


Figure 16. Peak Reverse Recovery Current.

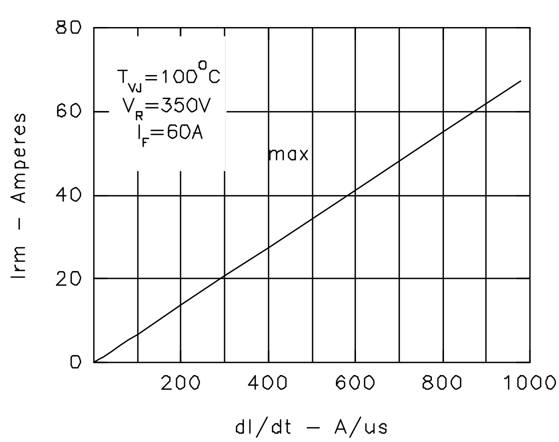
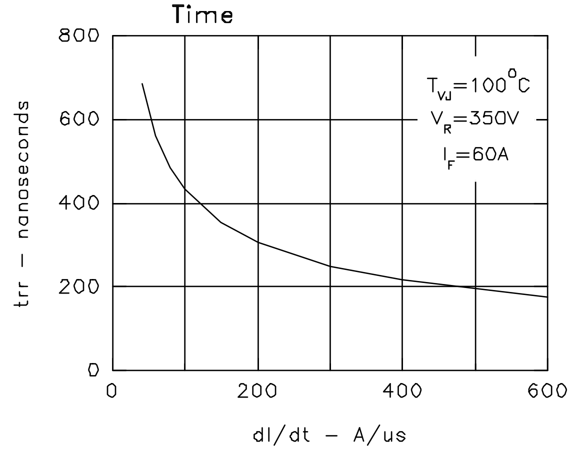


Fig. 17. Maximum Reverse Recovery Time



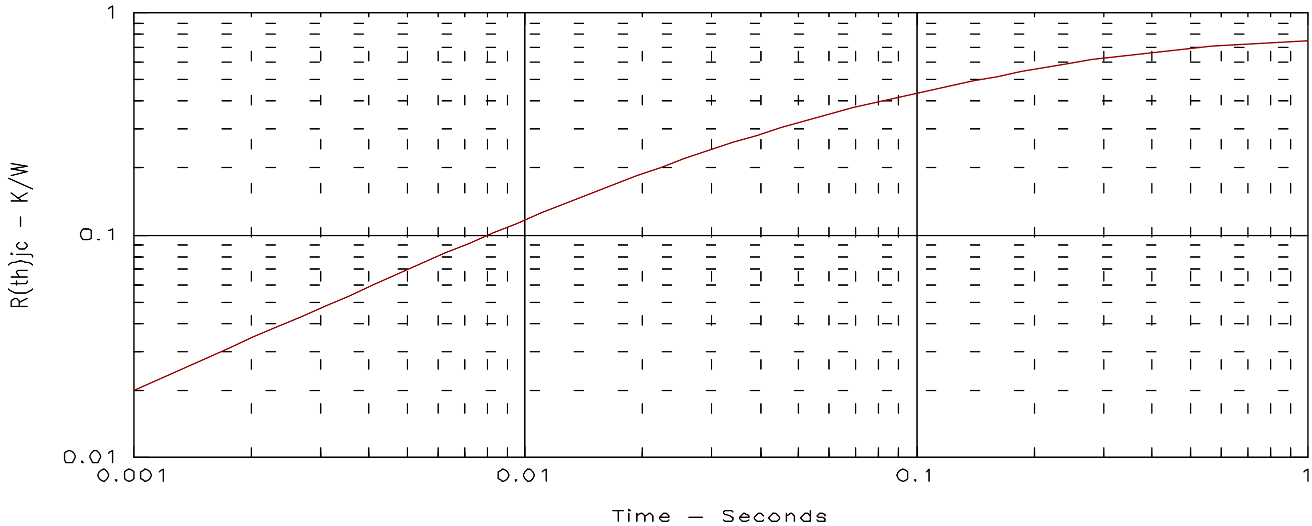


Fig. 18. Diode transient thermal resistance junction-to-case.