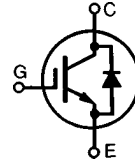
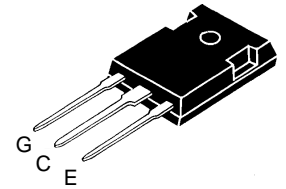


Low $V_{CE(sat)}$ IGBT with Diode High speed IGBT with Diode Combi Packs

	V_{CES}	I_{C25}	$V_{CE(sat)}$
IXGH10N60U1	600 V	20 A	2.5 V
IXGH10N60AU1	600 V	20 A	3.0 V



TO-247 AD



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

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}	$T_C = 25^\circ\text{C}$	20	A
I_{C90}	$T_C = 90^\circ\text{C}$	10	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	40	A
SSOA (RBSOA)	$V_{GE} = 15\text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 150\ \Omega$ Clamped inductive load, $L = 300\ \mu\text{H}$	$I_{CM} = 20$ @ $0.8\ V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	100	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 (M3)	1.13/10	Nm/lb.in.
Weight		6	g
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	$^\circ\text{C}$

Features

- International standard package JEDEC TO-247 AD
- IGBT and anti-parallel FRED in one package
- 2nd generation HDMOS™ process
- Low $V_{CE(sat)}$
 - for low 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

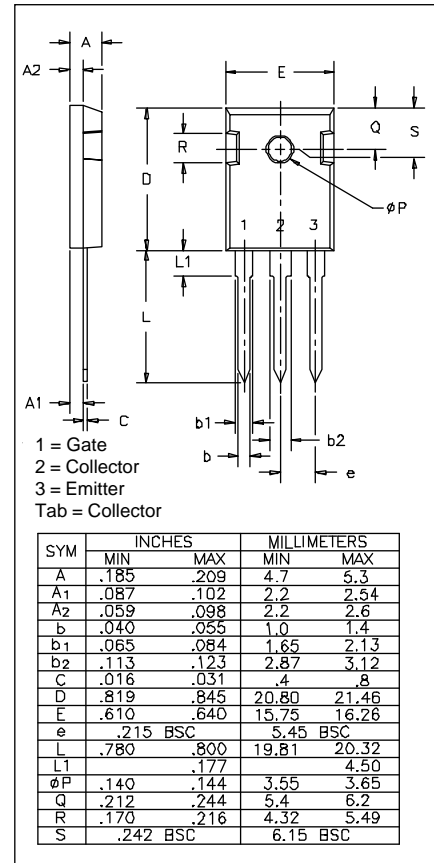
Advantages

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

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
BV_{CES}	$I_C = 750\ \mu\text{A}$, $V_{GE} = 0\text{ V}$	600		V
$V_{GE(th)}$	$I_C = 500\ \mu\text{A}$, $V_{CE} = V_{GE}$	2.5		5.5 V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$ $V_{GE} = 0\text{ V}$	$T_J = 25^\circ\text{C}$		260 μA
		$T_J = 125^\circ\text{C}$		2.5 mA
I_{GES}	$V_{CE} = 0\text{ V}$, $V_{GE} = \pm 20\text{ V}$			$\pm 100\text{ nA}$
$V_{CE(sat)}$	$I_C = I_{C90}$, $V_{GE} = 15\text{ V}$	10N60U1		2.5 V
		10N60AU1		3.0 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 %	4	8	S
C_{ies} C_{oes} C_{res}	V _{CE} = 25 V, V _{GE} = 0 V, f = 1 MHz		750	pF
			125	pF
			30	pF
Q_g Q_{ge} Q_{gc}	I _C = I _{C90} , V _{GE} = 15 V, V _{CE} = 0.5 V _{CES}		50	70 nC
			15	25 nC
			25	45 nC
t_{d(on)} t_{ri} E_{on} t_{d(off)} t_{fi} E_{off}	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} = 150 Ω Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		100	ns
			200	ns
			0.4	mJ
			600	ns
			300	ns
			0.6	mJ
t_{d(on)} t_{ri} E_{on} t_{d(off)} t_{fi} E_{off}	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} = 150 Ω Switching times may increase for V _{CE} (Clamp) > 0.8 • V _{CES} , higher T _J or increased R _G		100	ns
			200	ns
			1	mJ
			900	1500 ns
			570	2000 ns
			1.2	mJ
R_{thJC} R_{thCK}				1.25 K/W K/W

TO-247 AD Outline



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 %			1.75 V
I_{RM} t_{tr}	I _F = I _{C90} , V _{GE} = 0 V, -di _F /dt = 64 A/μs V _R = 360 V T _J = 100°C I _F = 1 A; -di _F /dt = 50 A/μs; V _R = 30 V T _J = 25°C		2.5	A
			165	50
R_{thJC}				2.5 K/W

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

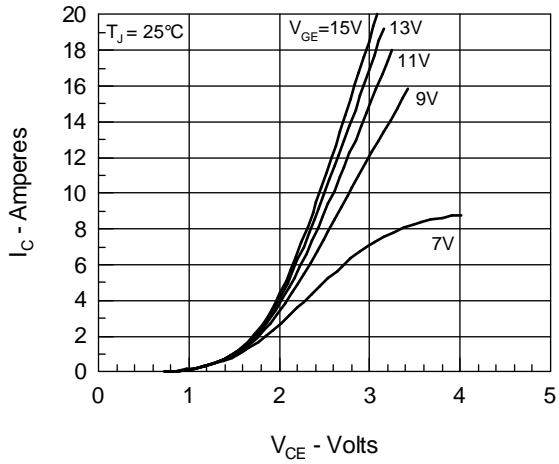
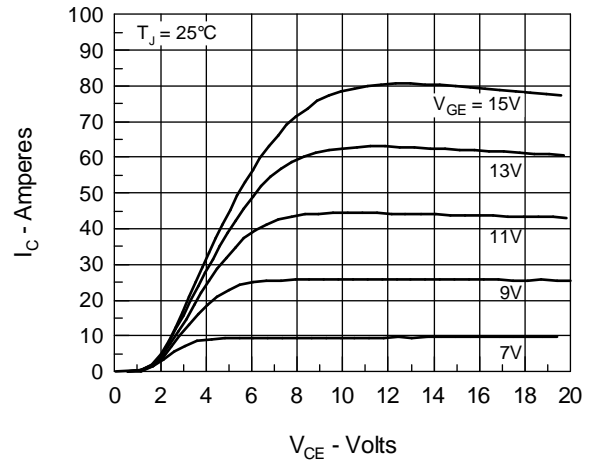
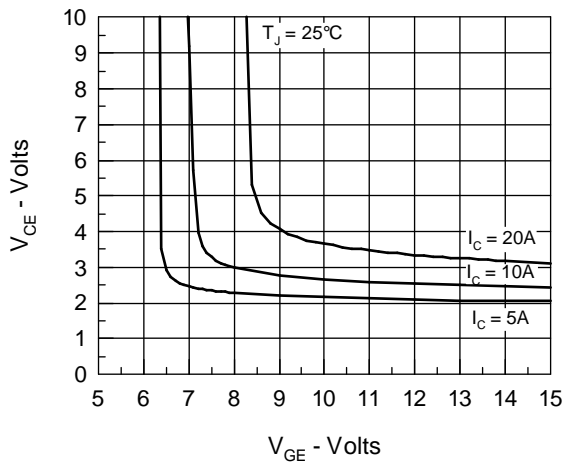
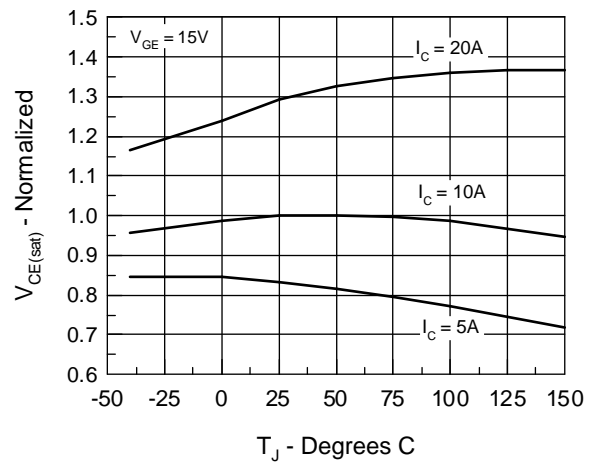
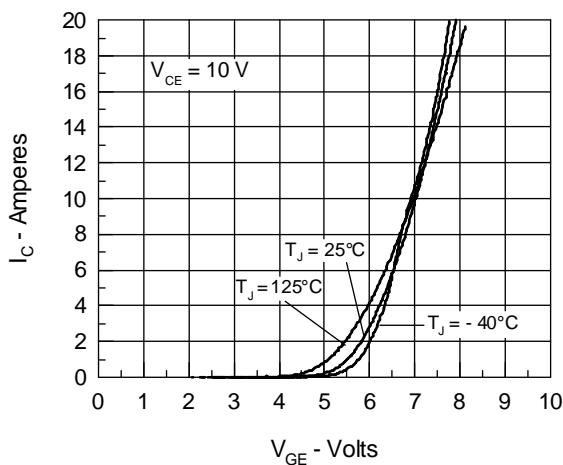
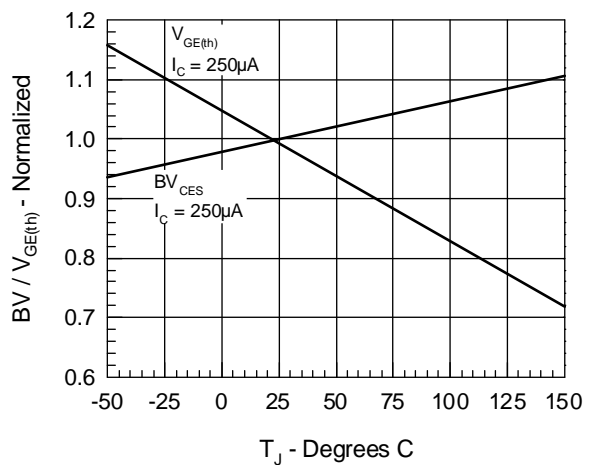
Fig. 1 Saturation Characteristics

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

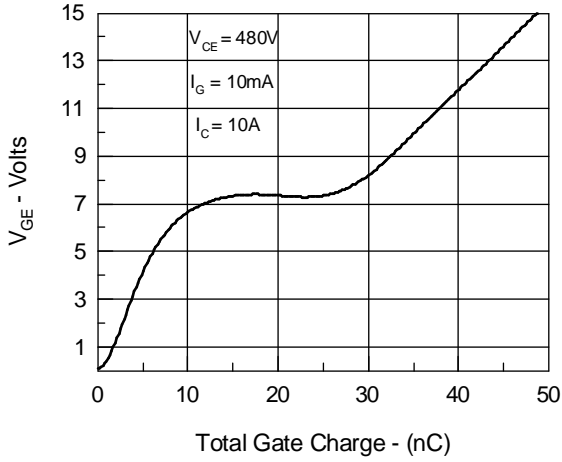


Fig.8 Turn-Off Safe Operating Area

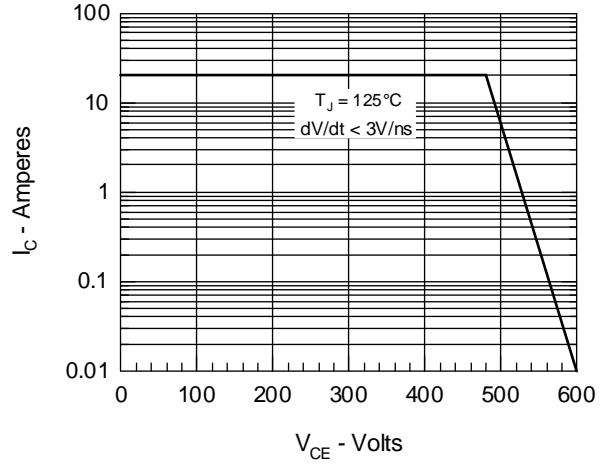


Fig.9 Capacitance Curves

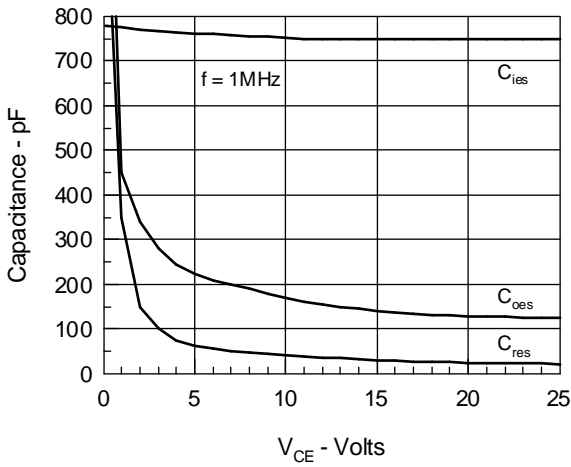
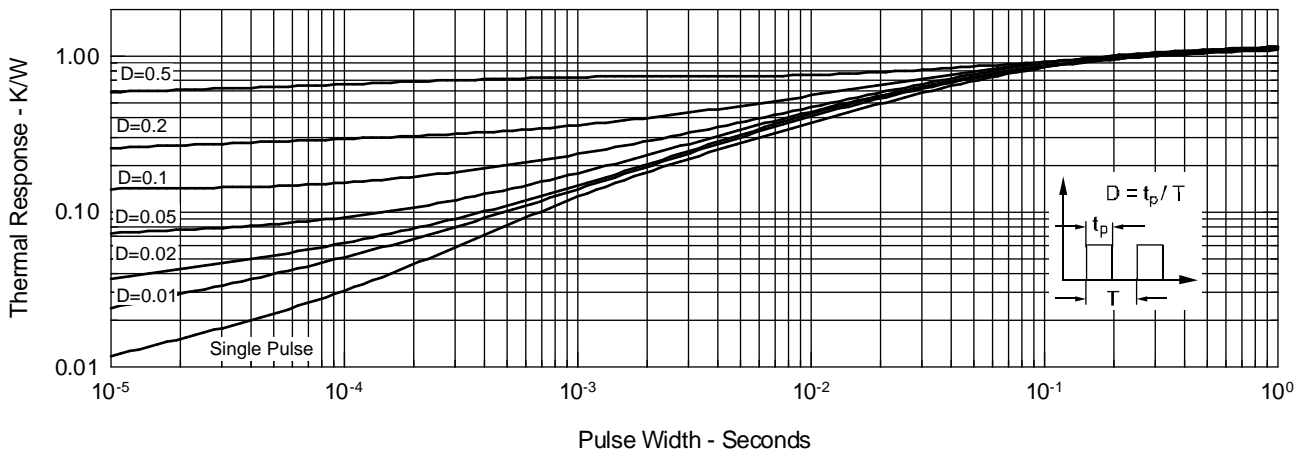


Fig.10 Transient Thermal Impedance



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4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025

Fig.11 Maximum Forward Voltage Drop

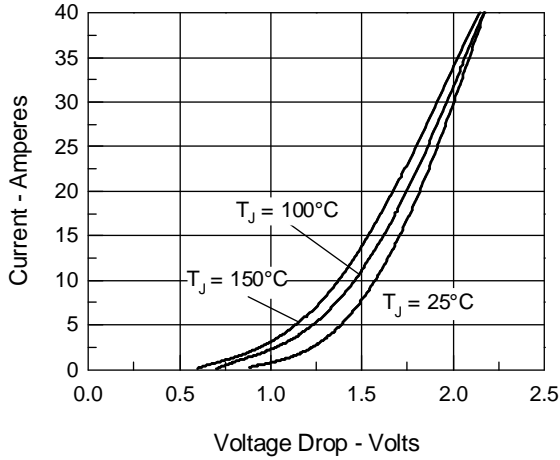


Fig.12 Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}

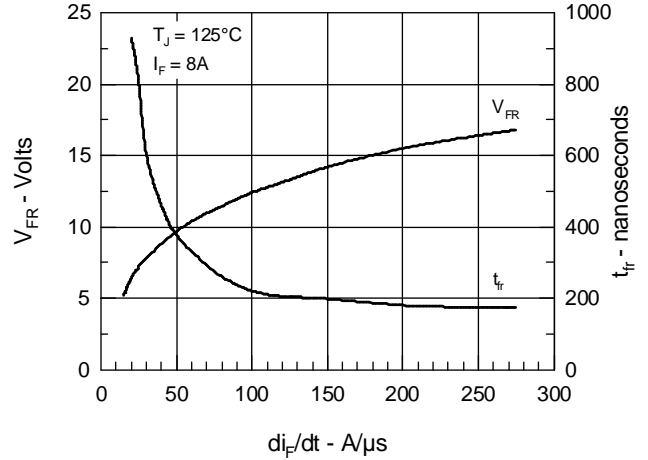


Fig.13 Junction Temperature Dependence off I_{RM} and Q_r

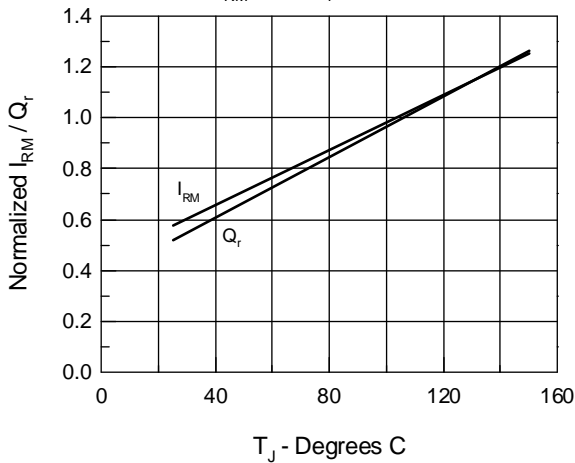


Fig.14 Reverse Recovery Charge

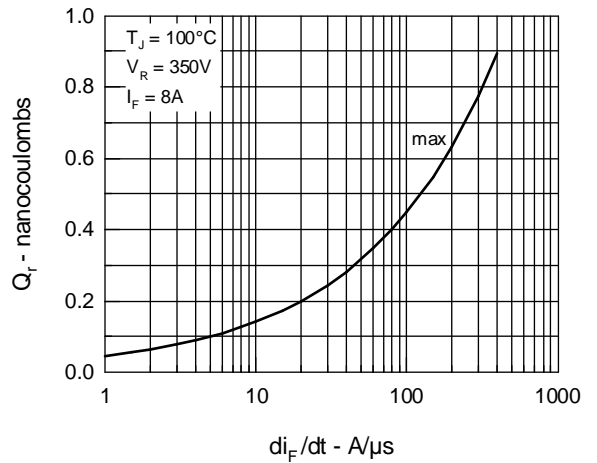


Fig.15 Peak Reverse Recovery Current

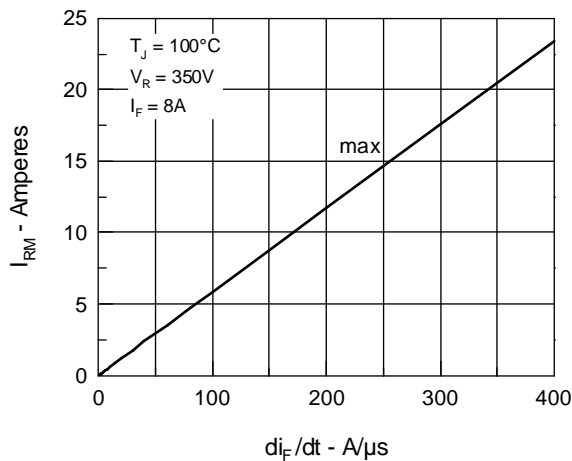


Fig.16 Reverse Recovery Time

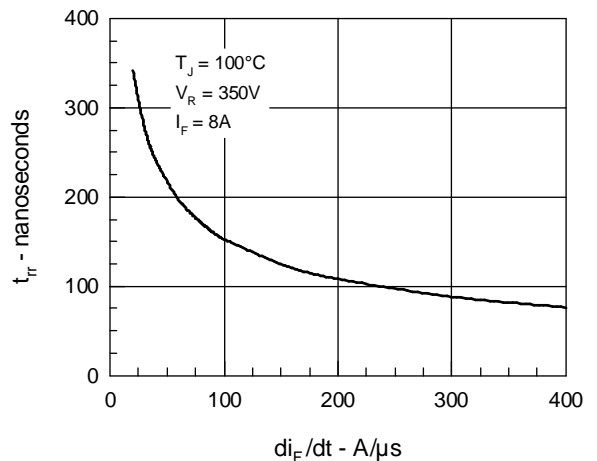
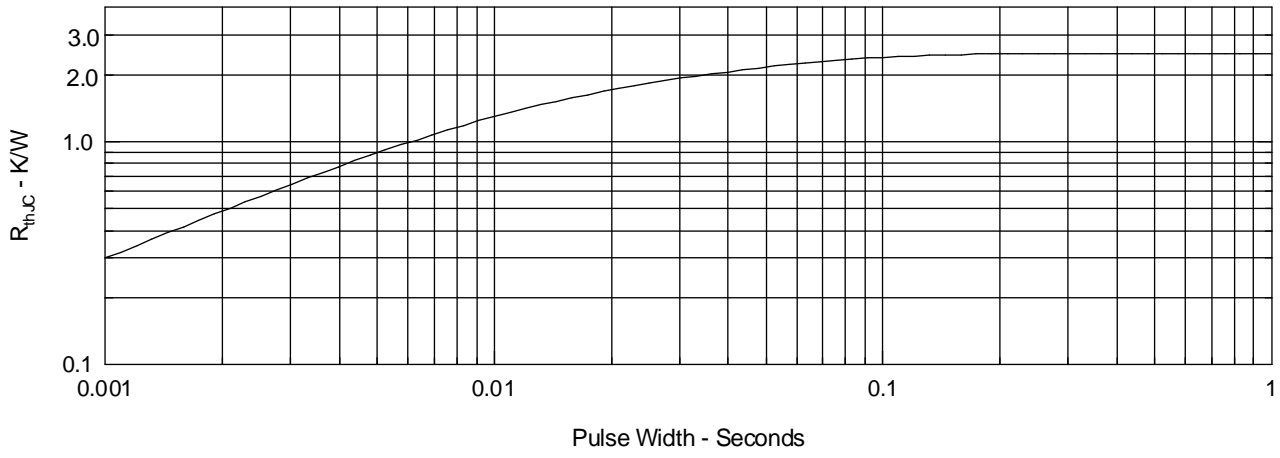


Fig.17 Diode Transient Thermal resistance junction to case



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4,850,072	4,931,844	5,034,796	5,063,307	5,237,481	5,381,025