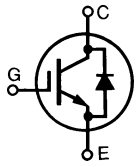
IXYS

HiPerFAST™ IGBT with Diode
Combi Pack

	V_{CES}	$I_{C(25)}$	$V_{CE(sat)}$	t_{fi}
IXGH24N50BU1	500 V	48 A	2.3 V	80 ns
IXGH24N60BU1	600 V	48 A	2.5 V	80 ns

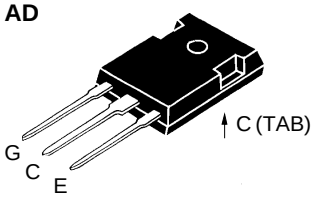
Preliminary data



Symbol	Test Conditions	Maximum Ratings		
		24N50	24N60	
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	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C		48	A
I_{C90}	T_C = 90°C		24	A
I_{CM}	T_C = 25°C, 1 ms		96	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 22 Ω Clamped inductive load, L = 100 μH		I_{CM} = 48 @ 0.8 V_{CES}	A
P_C	T_C = 25°C		150	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
Maximum Lead and Tab temperature for soldering 1.6 mm (0.062 in.) from case for 10 s			300	°C
M_d	Mounting torque		1.13/10	Nm/lb.in.
Weight			6	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 750 μA, V_{GE} = 0 V	24N50	500			V
		24N60	600			V
$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}		2.5		5.5	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			500	μA
	V_{GE} = 0 V	T_J = 125°C			8	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V	24N50			2.3	V
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V	24N60			2.5	V

TO-247 AD



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

Features

- International standard package JEDEC TO-247 AD
- High frequency IGBT and antiparallel FRED in one package
- High current handling capability
- 3rd generation HDMOS™ process
- MOS Gate turn-on
  - drive simplicity

Applications

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

Advantages

- Space savings (two devices in one package)
- High power density
- Suitable for surface mounting
- Switching speed for high frequency applications
- Easy to mount with 1 screw (insulated mounting screw hole)

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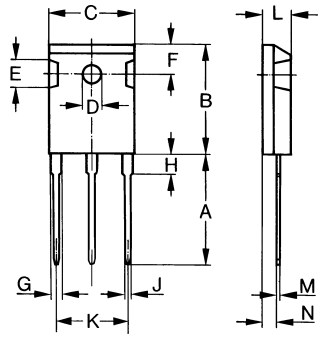
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %		9	13		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz			1500		pF
C_{oes}				175		pF
C_{res}				40		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}			90	120	nC
Q_{ge}				11	15	nC
Q_{gc}				30	40	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**			25		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,			15		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω			0.6		mJ
$t_{d(off)}$	Remarks: Switching times may			150	200	ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES},			80	150	ns
E_{off}	higher T_J or increased R_G	24N50BU1		0.62		mJ
		24N60BU1		0.8		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**			25		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH			15		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω			0.8		mJ
$t_{d(off)}$	Remarks: Switching times may increase			250		ns
t_{fi}	for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or			100		ns
E_{off}	increased R_G	24N50BU1		0.9		mJ
		24N60BU1		1.4		mJ
R_{thJC}					0.83	K/W
R_{thCK}				0.25		K/W

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 %				1.6	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, $-di_F/dt$ = 240 A/µs			10	15	A
t_{rr}	V_R = 360 V	T_J = 125°C		150		ns
	I_F = 1 A; -di/dt = 100 A/µs; V_R = 30 V	T_J = 25°C		35	50	ns
R_{thJC}					1	K/W

TO-247 AD (IXGH) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

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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

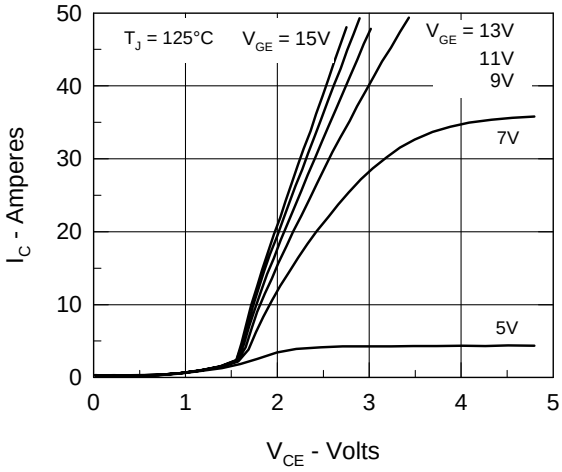

Fig. 1. Saturation Voltage Characteristics

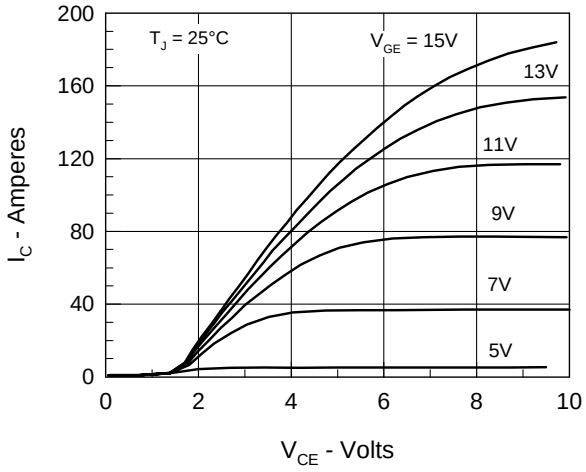

Fig. 2. Extended Output Characteristics

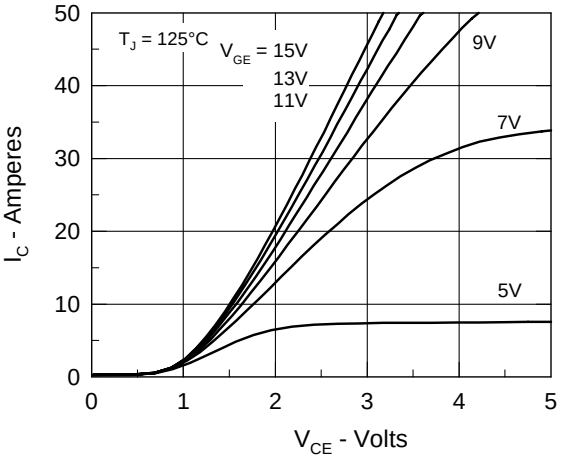

Fig. 3. Saturation Voltage Characteristics

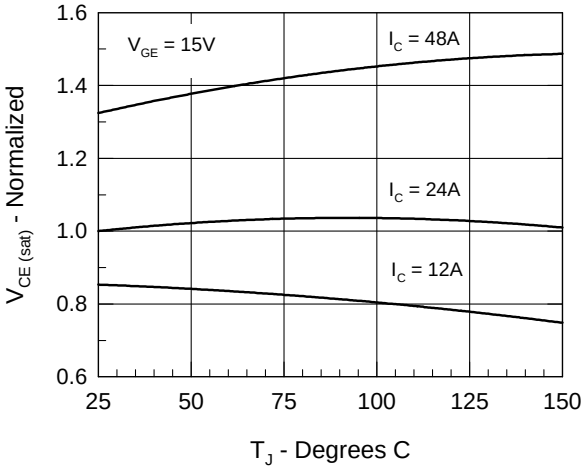

Fig. 4. Temperature Dependence of $V_{CE(sat)}$

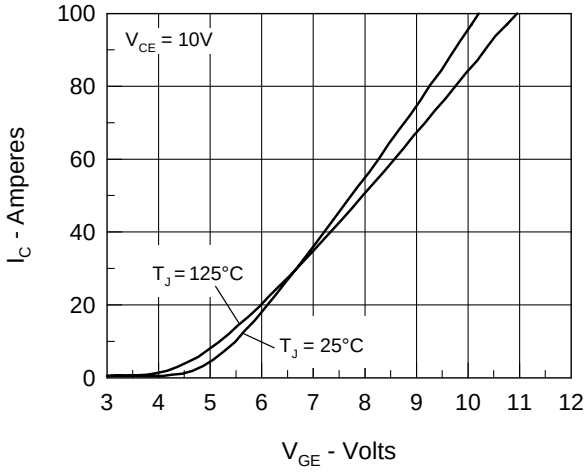

Fig. 5. Admittance Curves

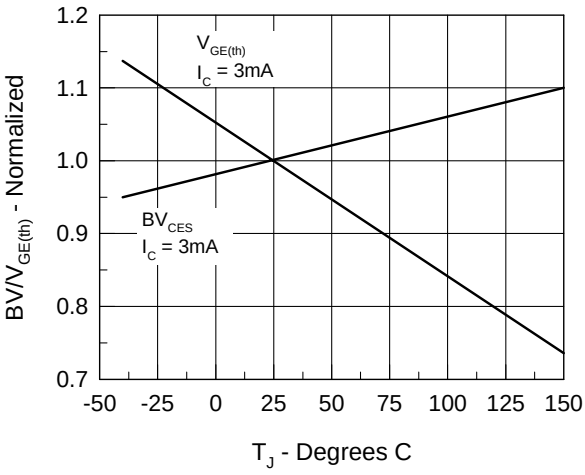

Fig. 6. Temperature Dependence of BV_{DSS} & $V_{GE(th)}$

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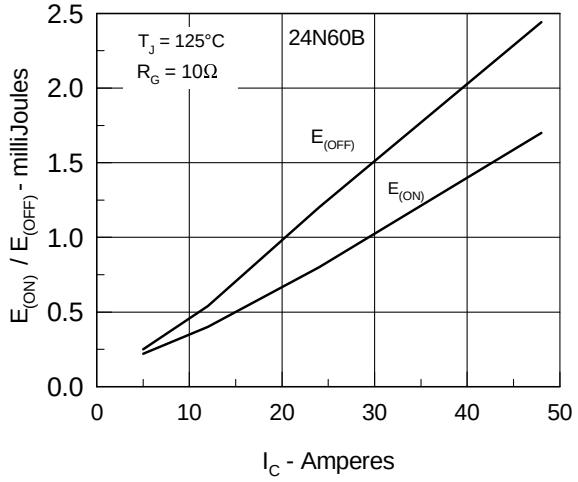

Fig. 7. Dependence of tfi and E_{OFF} on I_C.

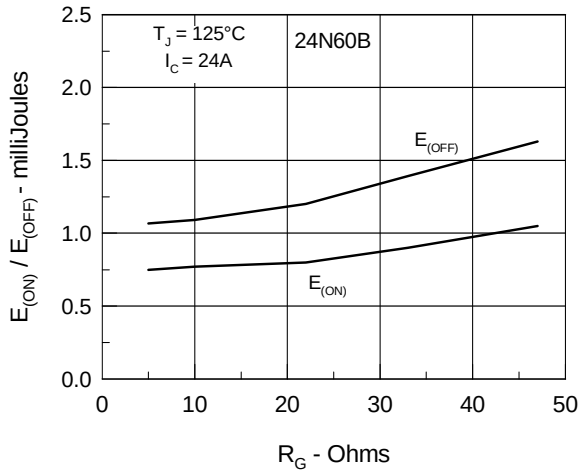

Fig. 8. Dependence of tfi and E_{OFF} on R_G.

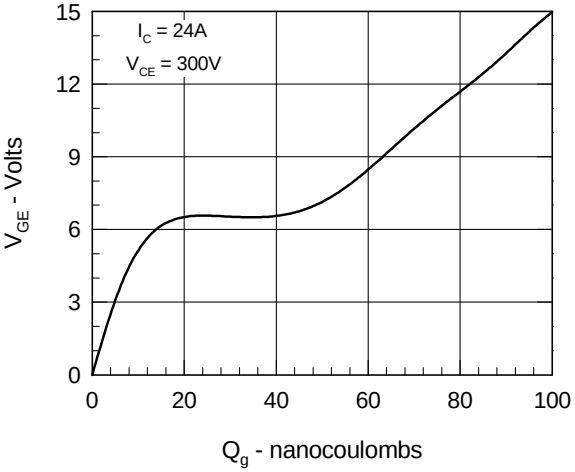

Fig. 9. Gate Charge

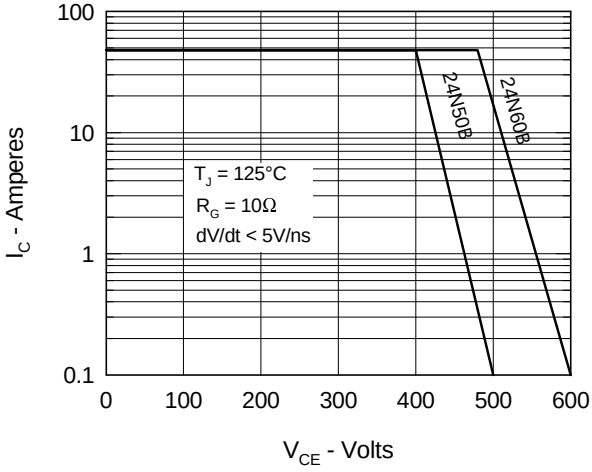

Fig. 10. Turn-off Safe Operating Area

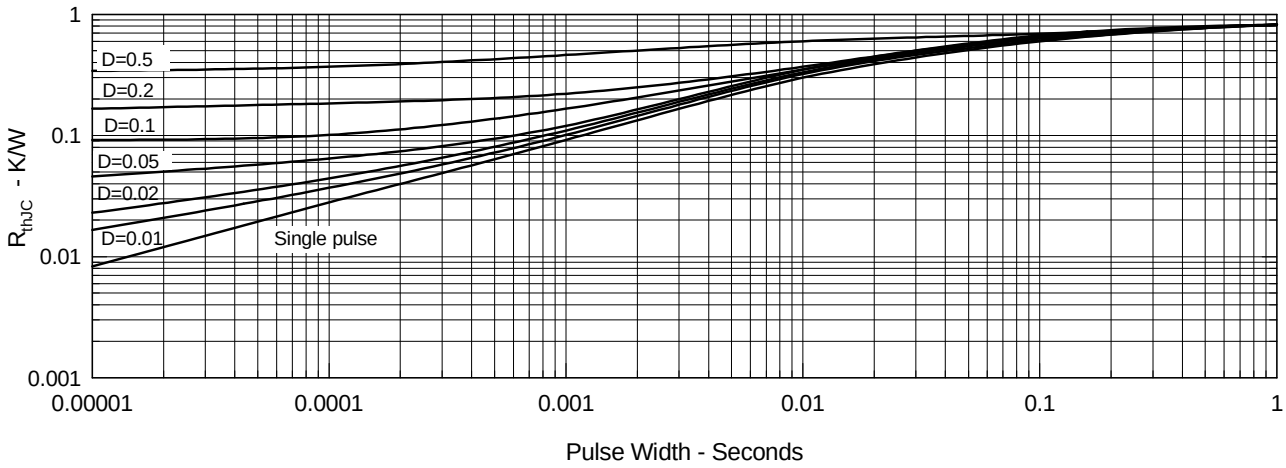

Fig. 11. Transient Thermal Resistance

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Fig.12 Maximum Forward Voltage Drop

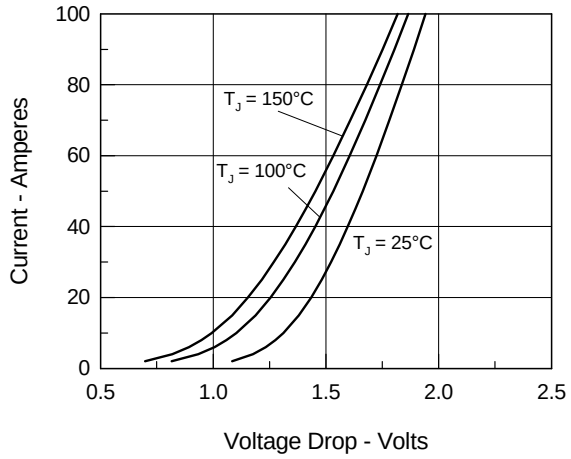

Fig.13 Peak Forward Voltage V_{FR} and Forward Recovery Time t_{FR}

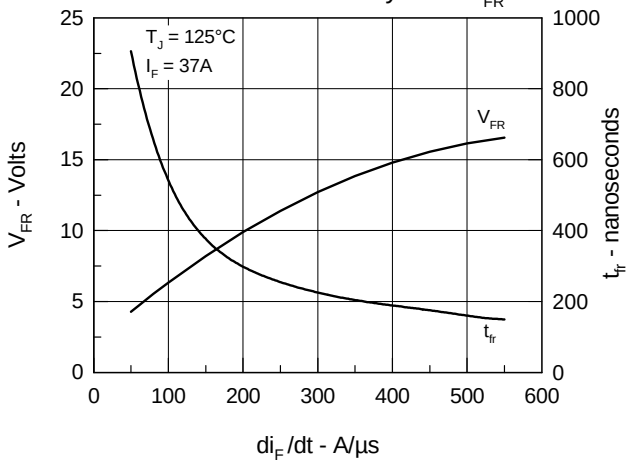

Fig.14 Junction Temperature Dependence off I_{RM} and Q_r

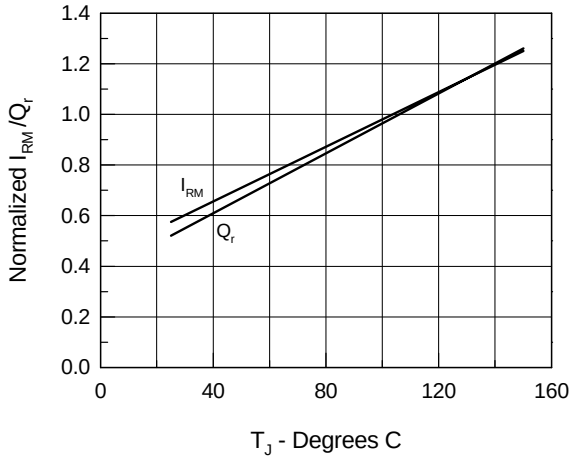

Fig.15 Reverse Recovery Chargee

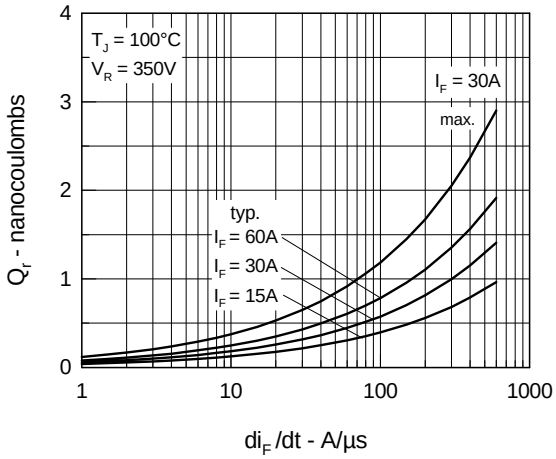

Fig.16 Peak Reverse Recovery Current

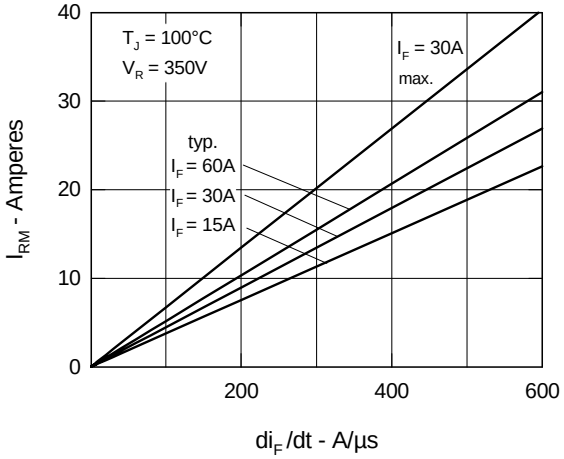

Fig.17 Reverse Recovery Time

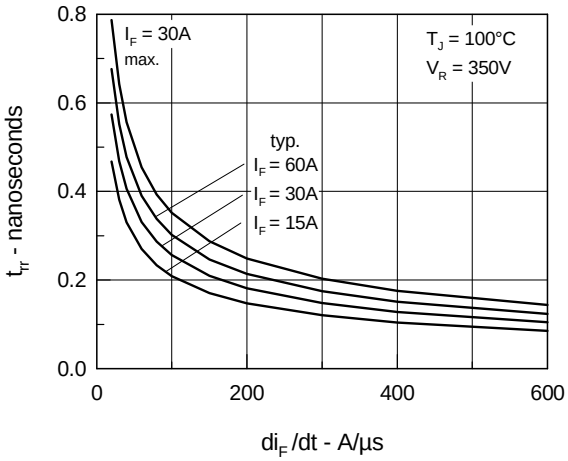

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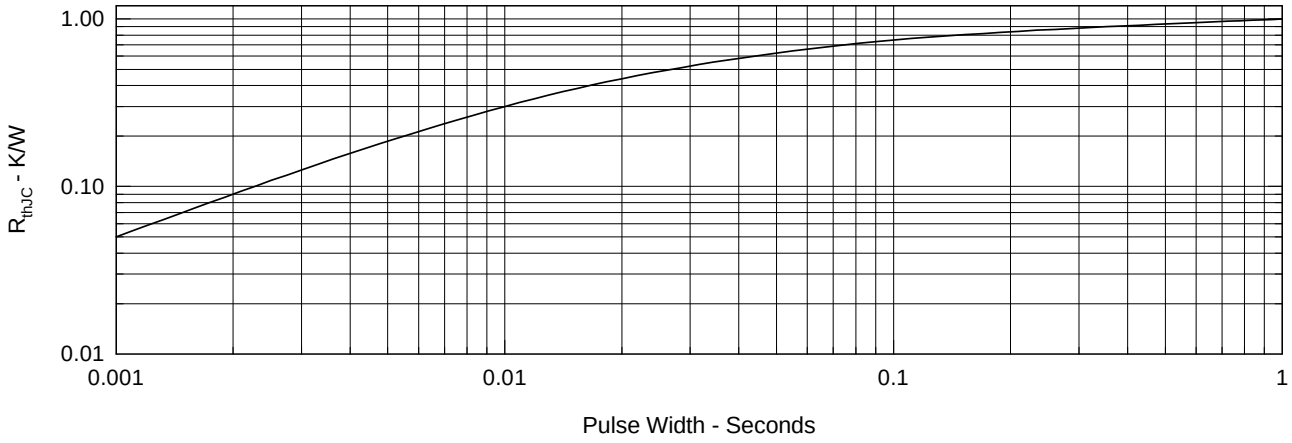
Fig.17 Diode Transient Thermal resistance junction to case



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