

Complementary MOSFET

ELM14611AA-N

General Description

ELM14611AA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- | | |
|--|---|
| N-channel | P-channel |
| • $V_{ds}=60V$ | $V_{ds}=-60V$ |
| • $I_d=6.3A(V_{gs}=10V)$ | $I_d=-4.9A(V_{gs}=-10V)$ |
| • $R_{ds(on)} < 25m\Omega (V_{gs}=10V)$ | $R_{ds(on)} < 42m\Omega (V_{gs}=-10V)$ |
| • $R_{ds(on)} < 30m\Omega (V_{gs}=4.5V)$ | $R_{ds(on)} < 52m\Omega (V_{gs}=-4.5V)$ |

Maximum Absolute Ratings

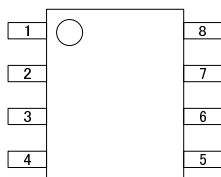
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note	
Drain-source voltage	V_{ds}	60	-60	V		
Gate-source voltage	V_{gs}	± 20	± 20	V		
Continuous drain current	I_d	$T_a=25^\circ C$	6.3	-4.9	A	1
		$T_a=70^\circ C$	5.0	-3.9		
Pulsed drain current	I_{dm}	40	-30	A	2	
Power dissipation	P_d	$T_a=25^\circ C$	2.00	2.00	W	
		$T_a=70^\circ C$	1.28	1.28		
Junction and storage temperature range	T_j, T_{stg}	-55 to 150	-55 to 150	$^\circ C$		

Thermal Characteristics

Parameter	Symbol	Device	Typ.	Max.	Unit	Note	
Maximum junction-to-ambient	$R_{\theta ja}$	N-ch	$t \leq 10s$	48.0	62.5	$^\circ C/W$	1
			Steady-state	74.0	110.0	$^\circ C/W$	
			Maximum junction-to-lead	$R_{\theta jl}$	35.0	60.0	
Maximum junction-to-ambient	$R_{\theta ja}$	P-ch	$t \leq 10s$	48.0	62.5	$^\circ C/W$	1
			Steady-state	74.0	110.0	$^\circ C/W$	
			Maximum junction-to-lead	$R_{\theta jl}$	35.0	40.0	

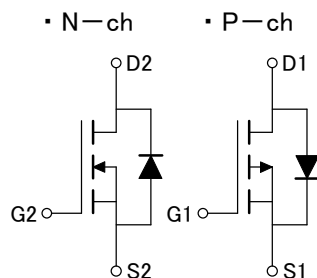
Pin Configuration

SOP-8 (TOP VIEW)



Pin No.	Pin name
1	SOURCE2
2	GATE2
3	SOURCE1
4	GATE1
5	DRAIN1
6	DRAIN1
7	DRAIN2
8	DRAIN2

Circuit



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■ Electrical Characteristics (N-ch)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BV _{dss}	I _d =250 μA, V _{gs} =0V	60			V
Zero gate voltage drain current	I _{dss}	V _{ds} =48V V _{gs} =0V			1	μA
		T _j =55°C			5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±20V			100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μA	1.0	2.1	3.0	V
On state drain current	I _{d(on)}	V _{gs} =10V, V _{ds} =5V	40			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V I _d =6.3A		20	25	mΩ
		T _j =125°C		34	42	
		V _{gs} =4.5V, I _d =5.7A		22	30	
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =6.3A		27		S
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.74	1.00	V
Max.body-diode continuous current	I _s				3	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =30V, f=1MHz		1920	2300	pF
Output capacitance	C _{oss}			155		pF
Reverse transfer capacitance	C _{rss}			116		pF
Gate resistance	R _g			0.65	0.80	Ω
SWITCHING PARAMETERS						
Total gate charge (10V)	Q _g	V _{gs} =10V, V _{ds} =30V, I _d =6.3A		47.6	58.0	nC
Total gate charge (4.5V)	Q _g			24.2	30.0	nC
Gate-source charge	Q _{gs}			6.0		nC
Gate-drain charge	Q _{gd}			14.4		nC
Turn-on delay time	t _{d(on)}			7.6		ns
Turn-on rise time	t _r	V _{gs} =10V, V _{ds} =30V		5.0		ns
Turn-off delay time	t _{d(off)}	R _l =4.7 Ω, R _{gen} =3 Ω		28.9		ns
Turn-off fall time	t _f			5.5		ns
Body-diode reverse recovery time	t _{rr}	I _f =6.3A, dI/dt=100A/μs		33.2	40.0	ns
Body-diode reverse recovery charge	Q _{rr}	I _f =6.3A, dI/dt=100A/μs		43.0		nC

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with T_a=25°C. The value in any given applications depends on the user's specific board design, The current rating is based on the t_{≤10s} thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80 μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_a=25°C. The SOA curve provides a single pulse rating.

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Typical Electrical and Thermal Characteristics (N-ch)

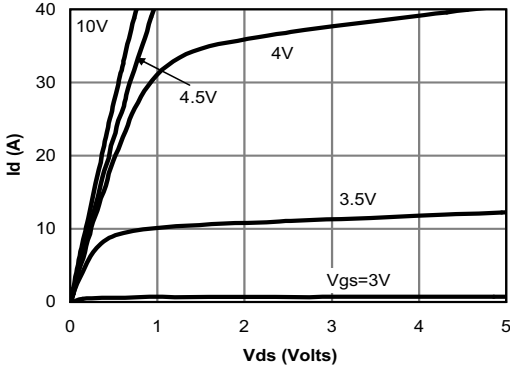


Fig 1: On-Region Characteristics

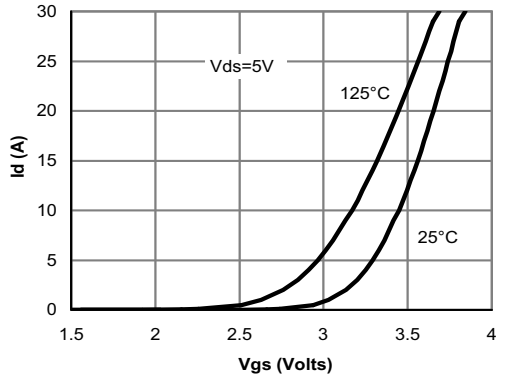


Figure 2: Transfer Characteristics

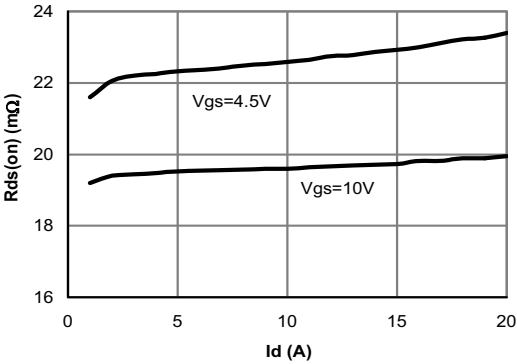


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

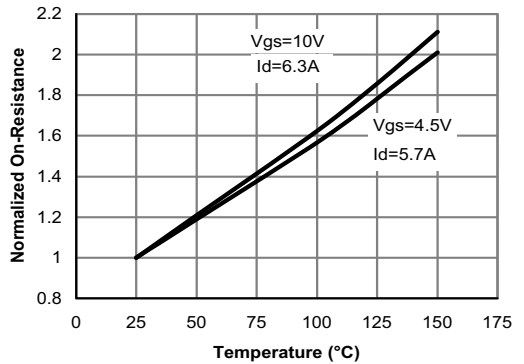


Figure 4: On-Resistance vs. Junction Temperature

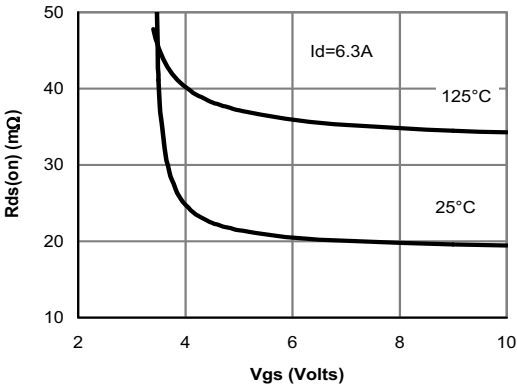


Figure 5: On-Resistance vs. Gate-Source Voltage

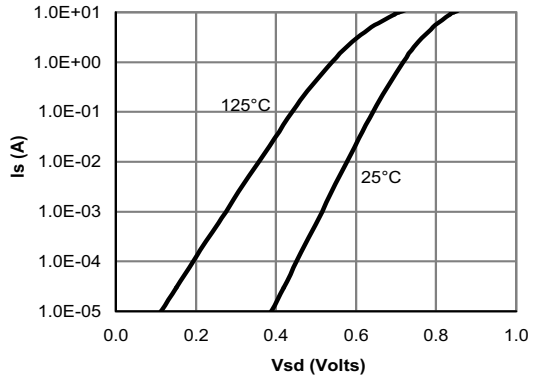


Figure 6: Body-Diode Characteristics

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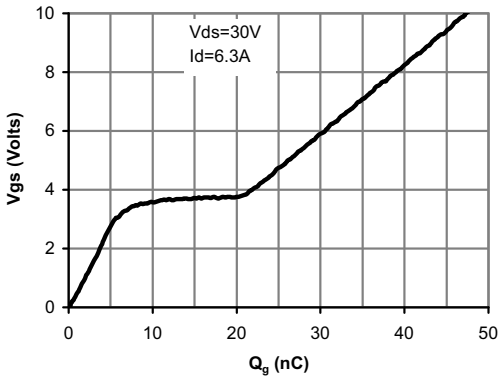


Figure 7: Gate-Charge Characteristics

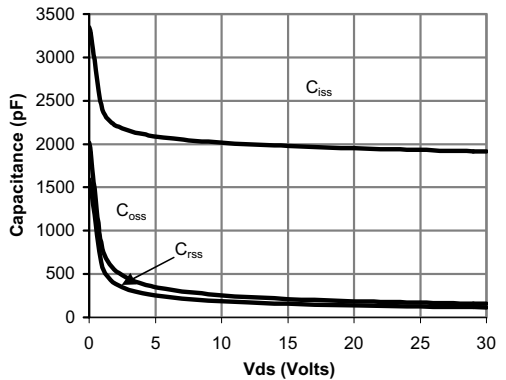


Figure 8: Capacitance Characteristics

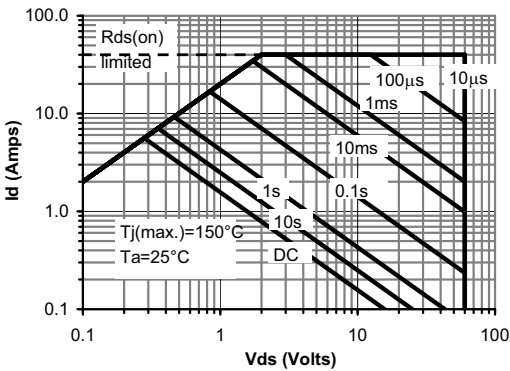


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

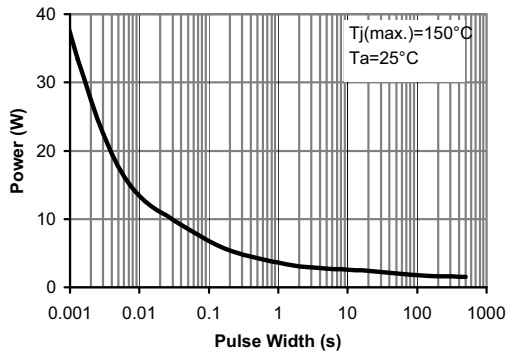


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

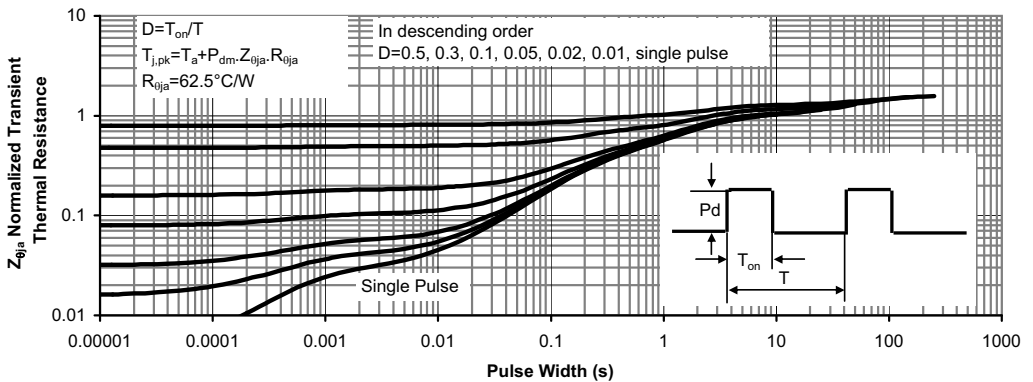


Figure 11: Normalized Maximum Transient Thermal Impedance

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Electrical Characteristics (P-ch)

T_a=25°C

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BV _{dss}	I _d =-250 μA, V _{gs} =0V	-60			V
Zero gate voltage drain current	I _{dss}	V _d =-48V			-1	μA
		V _{gs} =0V			-5	
		T _j =55°C				
Gate-body leakage current	I _{gss}	V _d =0V, V _{gs} =±20V			±100	nA
Gate threshold voltage	V _{gs(th)}	V _d =V _{gs} , I _d =-250 μA	-1.0	-1.9	-3.0	V
On state drain current	I _{d(on)}	V _{gs} =-10V, V _d =-5V	-30			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V		34	42	mΩ
		I _d =-4.9A		58	72	
			T _j =125°C			
		V _{gs} =-4.5V, I _d =-4.4A		42	52	mΩ
Forward transconductance	G _{fs}	V _d =-5V, I _d =-4.9A		17.8		S
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V		-0.73	-1.00	V
Max. body-diode continuous current	I _s				-3	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}			2417	2900	pF
Output capacitance	C _{oss}	V _{gs} =0V, V _d =-30V, f=1MHz		179		pF
Reverse transfer capacitance	C _{rss}			120		pF
Gate resistance	R _g	V _{gs} =0V, V _d =0V, f=1MHz		1.9	2.3	Ω
SWITCHING PARAMETERS						
Total gate charge (10V)	Q _g			45.2	55.0	nC
Total gate charge (4.5V)	Q _g	V _{gs} =-10V, V _d =-30V		22.8	28.0	nC
Gate-source charge	Q _{gs}	I _d =-4.9A		5.8		nC
Gate-drain charge	Q _{gd}			9.6		nC
Turn-on delay time	t _{d(on)}			9.8		ns
Turn-on rise time	t _r	V _{gs} =-10V, V _d =-30V		6.1		ns
Turn-off delay time	t _{d(off)}	R _l =6.2 Ω, R _{gen} =3 Ω		44.0		ns
Turn-off fall time	t _f			12.7		ns
Body diode reverse recovery time	t _{rr}	I _f =-4.9A, dI/dt=100A/μs		32	42	ns
Body diode reverse recovery charge	Q _{rr}	I _f =-4.9A, dI/dt=100A/μs		42		nC

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with T_a=25°C. The value in any given applications depends on the user's specific board design, The current rating is based on the t_{≤10s} thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5%max.
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Typical Electrical and Thermal Characteristics (P-ch)

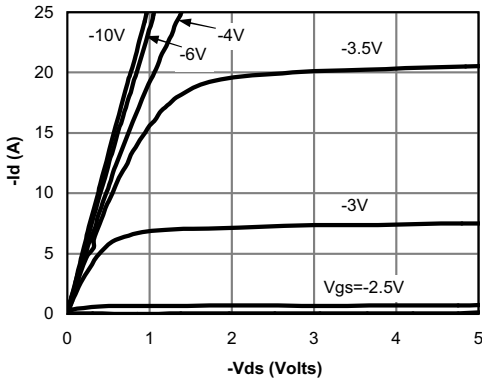


Fig 1: On-Region Characteristics

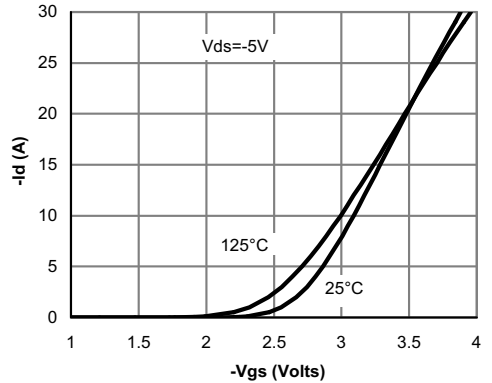


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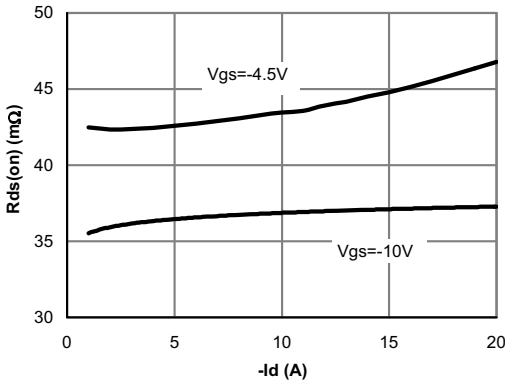


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

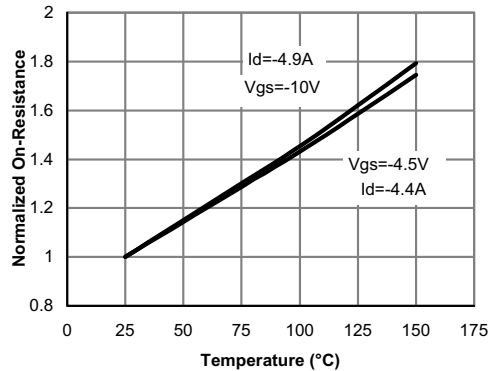


Figure 4: On-Resistance vs. Junction Temperature

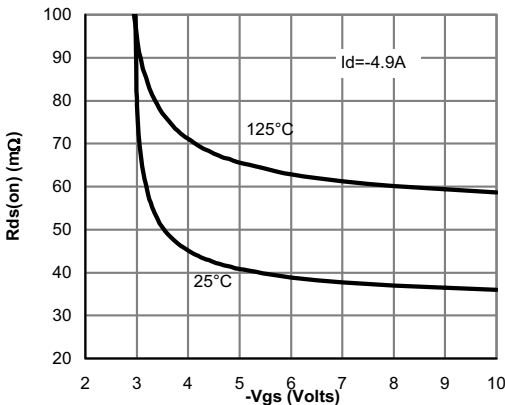


Figure 5: On-Resistance vs. Gate-Source Voltage

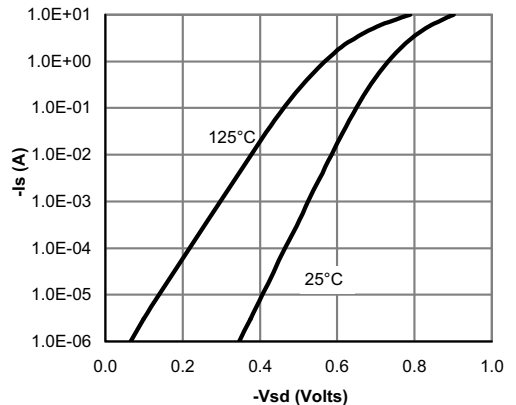


Figure 6: Body-Diode Characteristics

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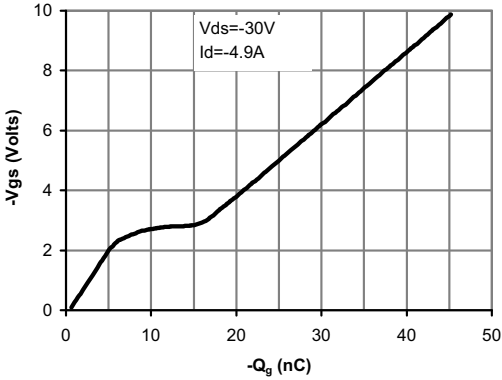


Figure 7: Gate-Charge Characteristics

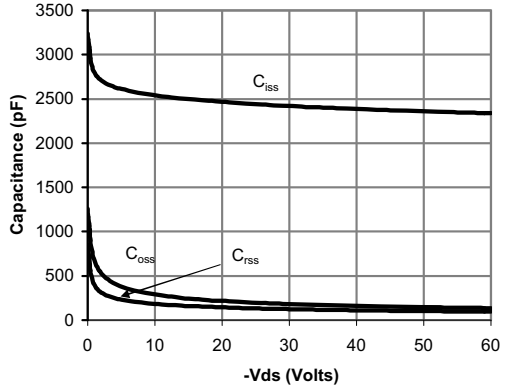


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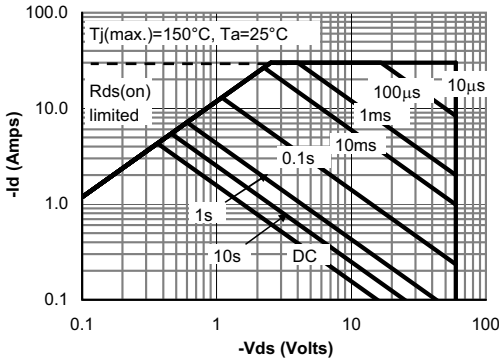


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

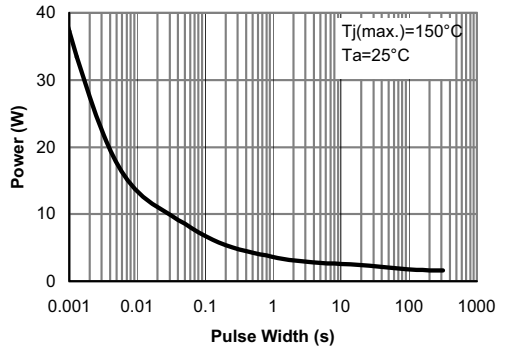


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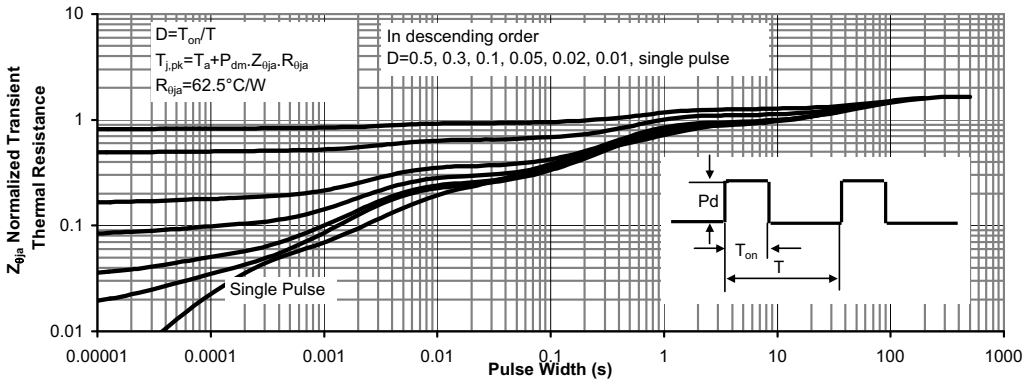


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