

Complementary MOSFET

ELM14603AA-N

General Description

ELM14603AA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- N-channel
 - $V_{ds}=30V$
 - $I_d=4.7A(V_{gs}=10V)$
 - $R_{ds(on)} < 55m\Omega (V_{gs}=10V)$
 - $R_{ds(on)} < 70m\Omega (V_{gs}=4.5V)$
 - $R_{ds(on)} < 110m\Omega (V_{gs}=2.5V)$
- P-channel
 - $V_{ds}=-30V$
 - $I_d=-5.8A(V_{gs}=-10V)$
 - $R_{ds(on)} < 38m\Omega (V_{gs}=-10V)$
 - $R_{ds(on)} < 63m\Omega (V_{gs}=-4.5V)$

Maximum Absolute Ratings

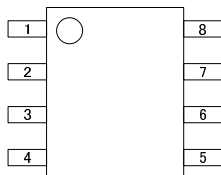
Parameter		Symbol	N-ch (Max.)	P-ch (Max.)	Unit	Note
Drain-source voltage		V_{ds}	30	-30	V	
Gate-source voltage		V_{gs}	± 12	± 20	V	
Continuous drain current	$T_a=25^\circ C$	I_d	4.7	-5.8	A	1
	$T_a=70^\circ C$		4.0	-4.9		
Pulsed drain current		I_{dm}	30	-40	A	2
Power dissipation	$T_a=25^\circ C$	P_d	2.00	2.00	W	
	$T_a=70^\circ C$		1.44	1.44		
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	$t \leq 10s$	$R_{\theta ja}$	N-ch	52.0	62.5	$^\circ C/W$	1
	Steady-state			78.0	110.0	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R_{\theta jl}$		48.0	50.0	$^\circ C/W$	3
Maximum junction-to-ambient	$t \leq 10s$	$R_{\theta ja}$	P-ch	50.0	62.5	$^\circ C/W$	1
	Steady-state			73.0	110.0	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R_{\theta jl}$		31.0	35.0	$^\circ C/W$	3

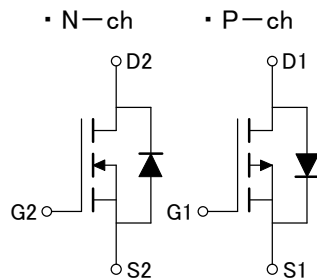
Pin Configuration

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	30			V
Zero gate voltage drain current	I _{dss}	V _{ds} =24V V _{gs} =0V			1	μA
		T _j =55°C			5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±12V			100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μA	0.6	1.0	1.4	V
On state drain current	I _{d(on)}	V _{gs} =4.5V, V _{ds} =5V	10			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V I _d =4A		45	55	mΩ
		T _j =125°C				
		V _{gs} =4.5V, I _d =3A		55	70	
		V _{gs} =2.5V, I _d =2A		83	110	
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =4A		8		S
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.8	1.0	V
Max.body-diode continuous current	I _s				2.5	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =15V, f=1MHz		390.0		pF
Output capacitance	C _{oss}			54.5		pF
Reverse transfer capacitance	C _{rss}			41.0		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		3		Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g	V _{gs} =4.5V, V _{ds} =15V, I _d =4A		0.60		nC
Gate-source charge	Q _{gs}			1.38		nC
Gate-drain charge	Q _{gd}			4.34		nC
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =15V R _l =3.75 Ω, R _{gen} =6 Ω		3.3		ns
Turn-on rise time	t _r			1.0		ns
Turn-off delay time	t _{d(off)}			21.7		ns
Turn-off fall time	t _f			2.1		ns
Body-diode reverse recovery time	t _{rr}		I _f =4A, dI/dt=100A/μs		12.0	
Body-diode reverse recovery charge	Q _{rr}	I _f =4A, dI/dt=100A/μs		6.3		nC

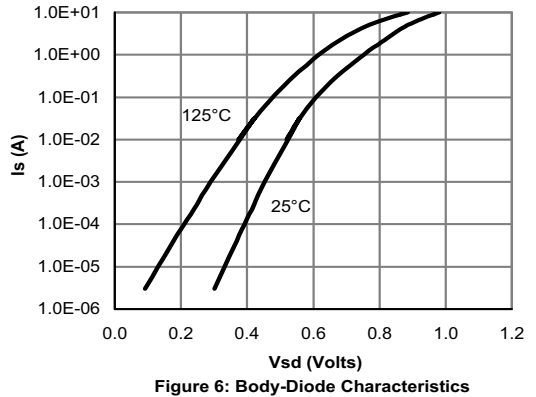
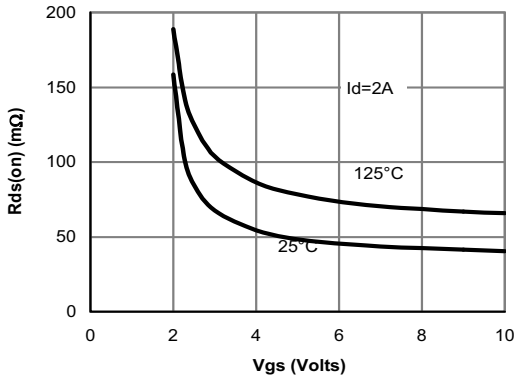
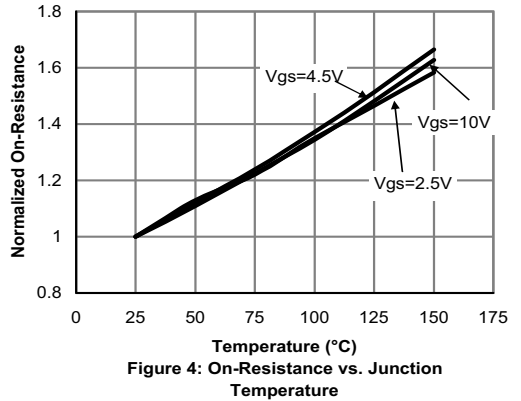
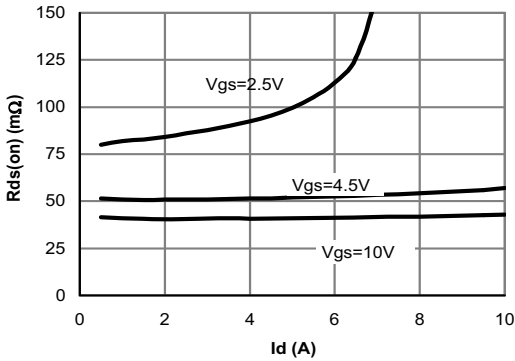
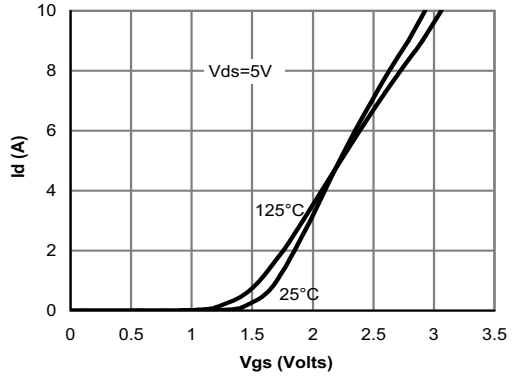
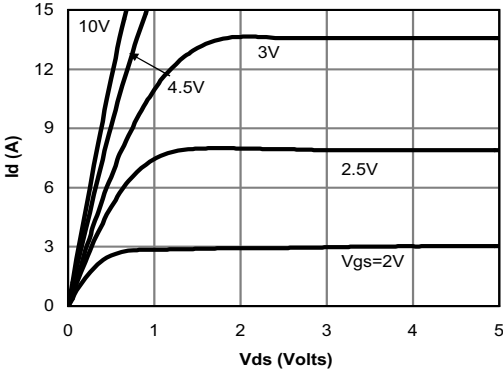
NOTE :

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.
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)



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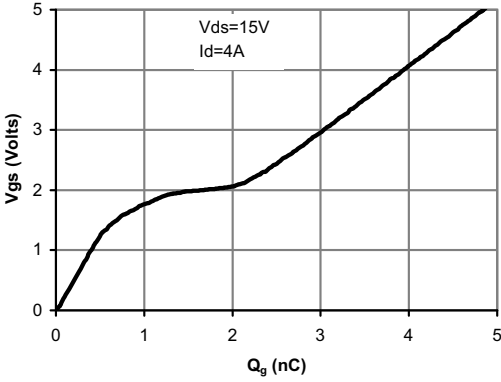


Figure 7: Gate-Charge Characteristics

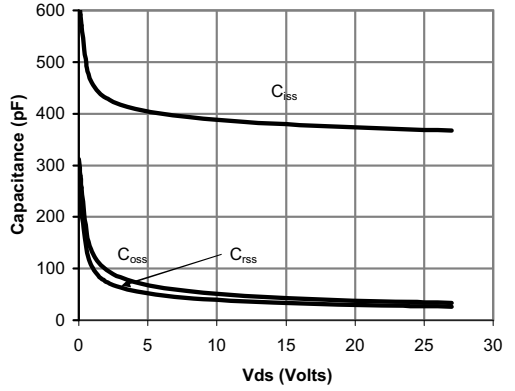


Figure 8: Capacitance Characteristics

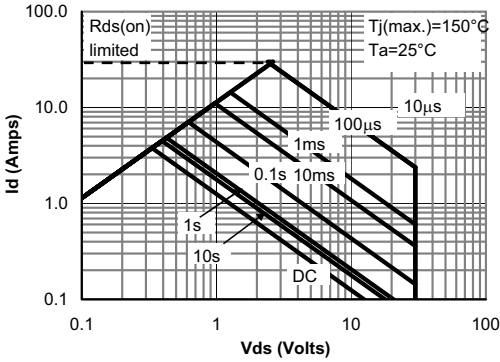


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

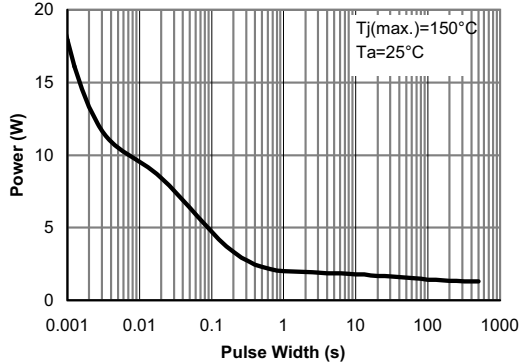


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

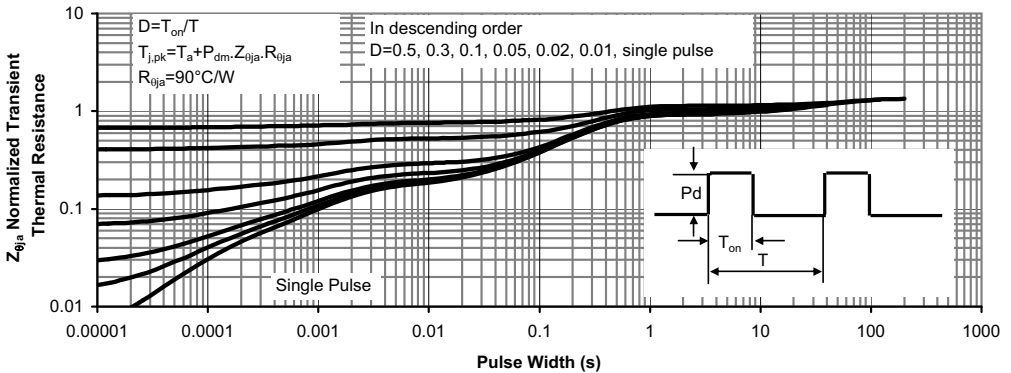


Figure 11: Normalized Maximum Transient Thermal Impedance

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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	-30			V
Zero gate voltage drain current	I _{dss}	V _{ds} =-24V V _{gs} =0V T _j =55°C			-1 -5	μA
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	-1.2	-1.8	-2.2	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 =-5A T _j =125°C		29	38	mΩ
		V _{gs} =-4.5V, I _d =-5A		40		mΩ
				39	63	mΩ
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-10A				S
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V		-0.75	-1.00	V
Max. body-diode continuous current	I _s				-4.2	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-15V, f=1MHz		920		pF
Output capacitance	C _{oss}			190		pF
Reverse transfer capacitance	C _{rss}			122		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		3.6		Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g	V _{gs} =-10V, V _{ds} =-15V I _d =-7.5A		2.4		nC
Gate-source charge	Q _{gs}			4.5		nC
Gate-drain charge	Q _{gd}			9.3		nC
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-15V R _l =2 Ω, R _{gen} =3 Ω		7.6		ns
Turn-on rise time	t _r			5.2		ns
Turn-off delay time	t _{d(off)}			21.6		ns
Turn-off fall time	t _f			8.0		ns
Body diode reverse recovery time	t _{rr}		I _f =-7.5A, dl/dt=100A/μs		20.0	
Body diode reverse recovery charge	Q _{rr}	I _f =-7.5A, dl/dt=100A/μs		8.8		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.
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Typical Electrical and Thermal Characteristics (P-ch)

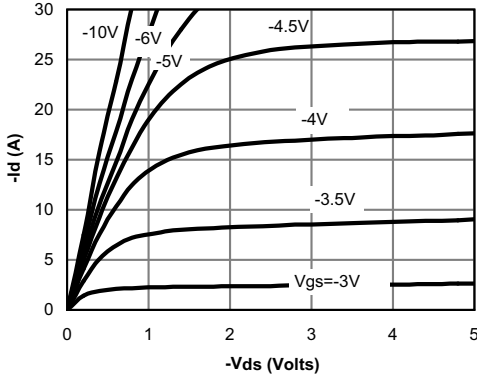


Fig 1: On-Region Characteristics

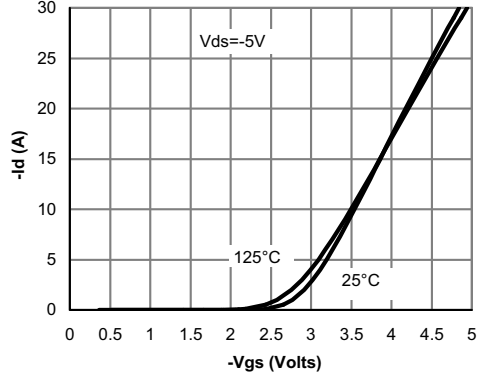


Figure 2: Transfer Characteristics

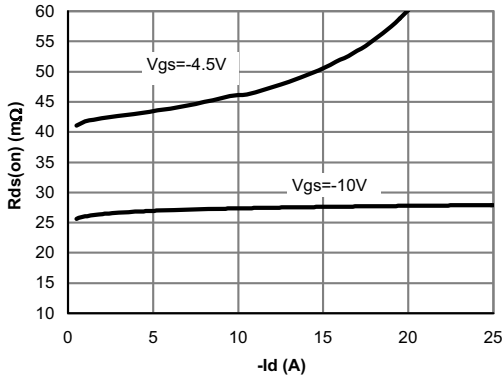


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

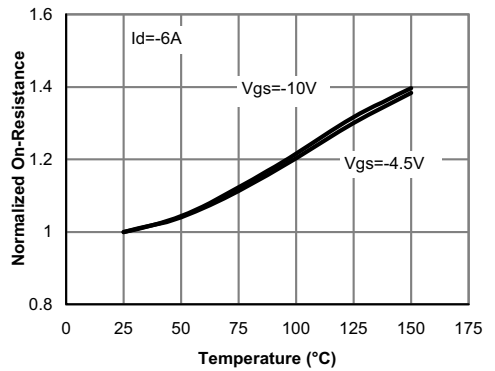


Figure 4: On-Resistance vs. Junction Temperature

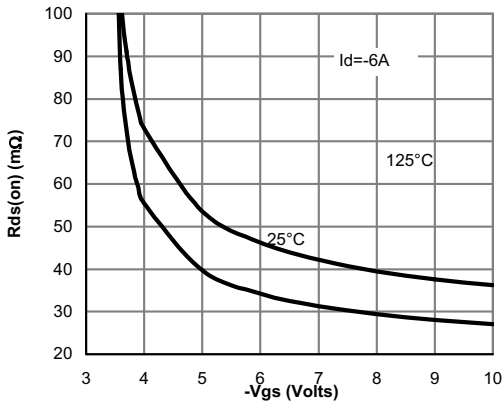


Figure 5: On-Resistance vs. Gate-Source Voltage

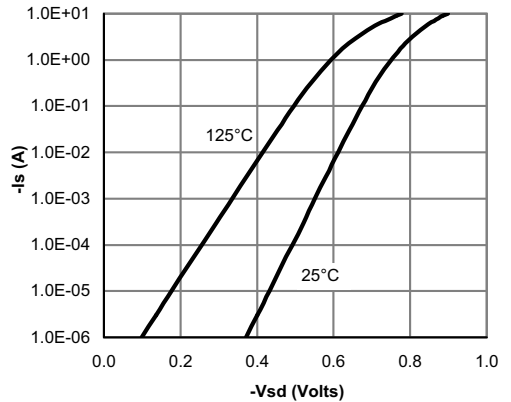


Figure 6: Body-Diode Characteristics

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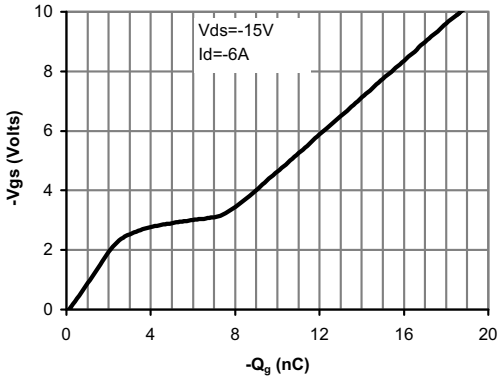


Figure 7: Gate-Charge Characteristics

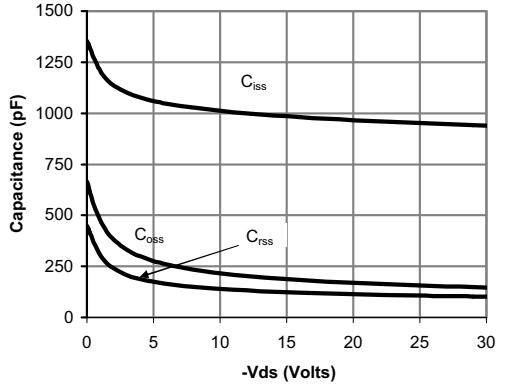


Figure 8: Capacitance Characteristics

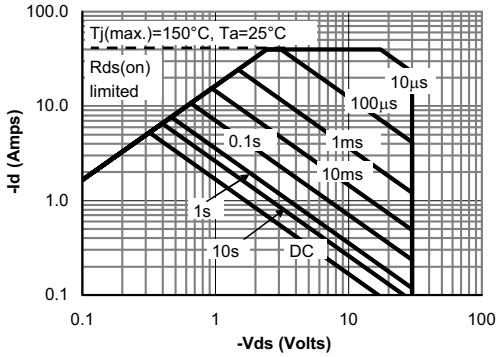


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

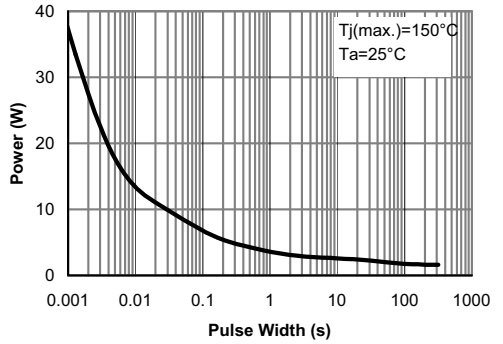


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

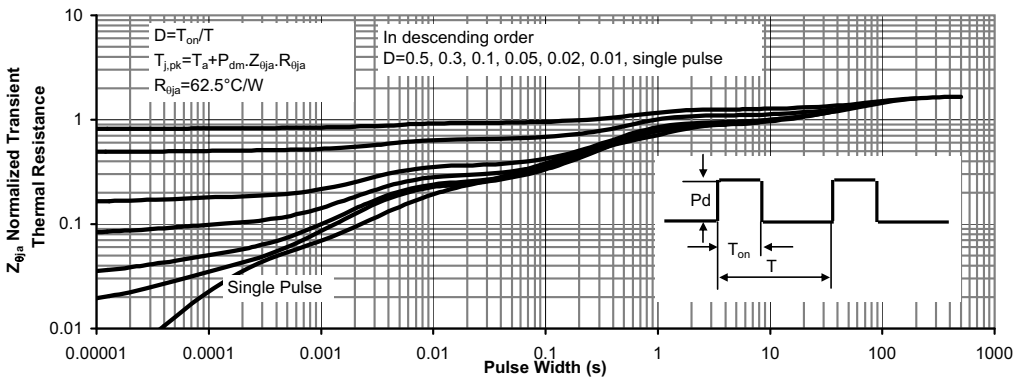


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