

# Dual N-channel MOSFET

## ELM54910WA-N

<http://www.elm-tech.com>

### ■ General description

ELM54910WA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

### ■ Features

N1 channel:

- $V_{ds}=40V$
- $I_d=10.0A$
- $R_{ds(on)} = 19m\Omega$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 25m\Omega$  ( $V_{gs}=4.5V$ )

N2 channel:

- $V_{ds}=40V$
- $I_d=10.0A$
- $R_{ds(on)} = 10m\Omega$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 12m\Omega$  ( $V_{gs}=4.5V$ )

### ■ Maximum absolute ratings

$T_a=25^\circ C$ . Unless otherwise noted.

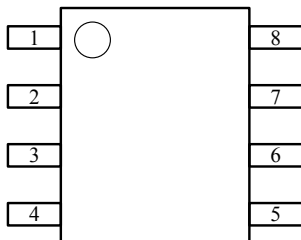
Parameter	Symbol	Limit		Unit
		N1	N2	
Drain-source voltage	$V_{ds}$	40	40	V
Gate-source voltage	$V_{gs}$	$\pm 20$	$\pm 20$	V
Continuous drain current( $T_j=150^\circ C$ )	$T_a=25^\circ C$	10	10	A
	$T_a=70^\circ C$	8	8	
Pulsed drain current	$I_{dm}$	20	30	A
Avalanche current	$L=0.1mH$	$I_{as}$	10	A
Avalanche energy		$E_{as}$	5	10
Power dissipation	$T_c=25^\circ C$	2.8		W
	$T_c=70^\circ C$	1.8		
Operating junction temperature	$T_j$	150		$^\circ C$
Storage temperature range	$T_{stg}$	-55 to 150		$^\circ C$

### ■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal resistance junction-to-ambient	$R_{\theta ja}$		62.5	$^\circ C/W$

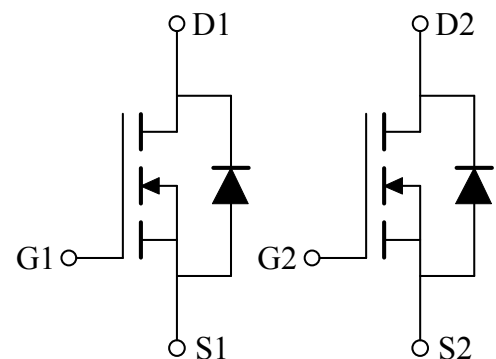
### ■ Pin configuration

SOP-8(TOP VIEW)



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

### ■ Circuit



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### ■N1 Electrical characteristics

Ta=25°C. Unless otherwise noted.

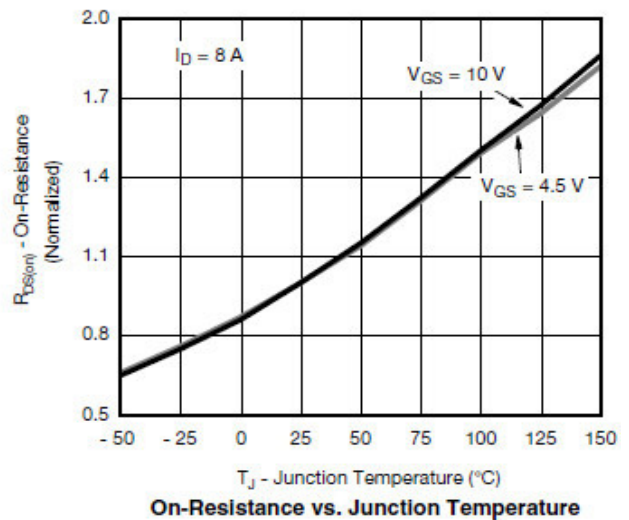
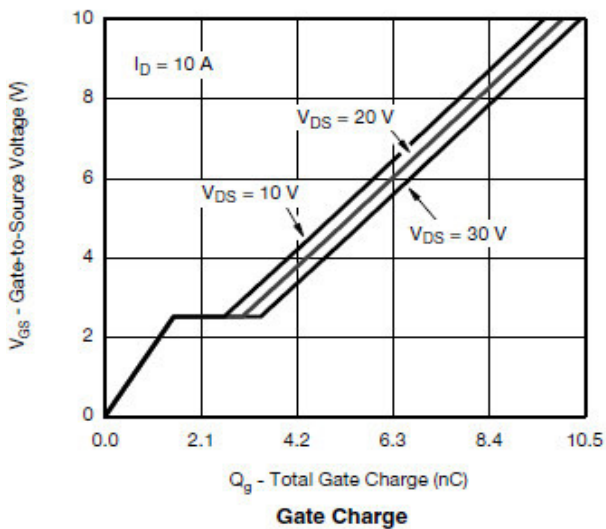
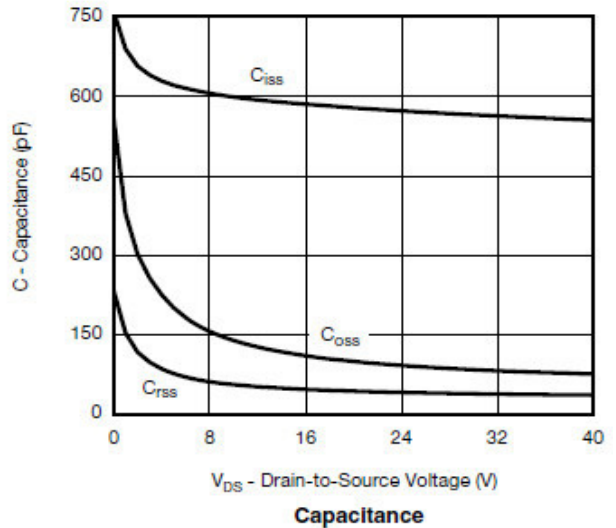
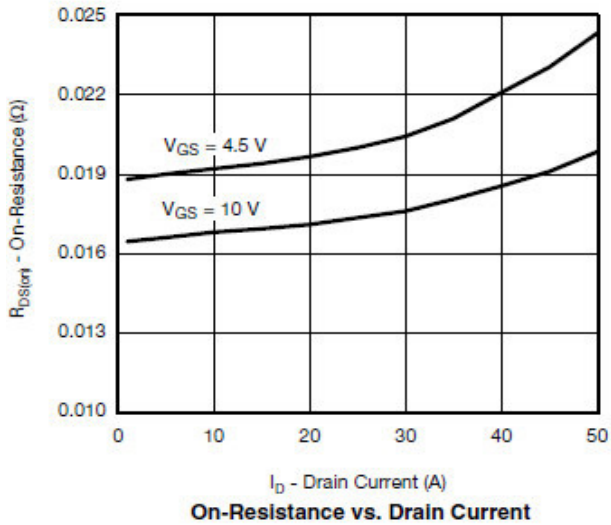
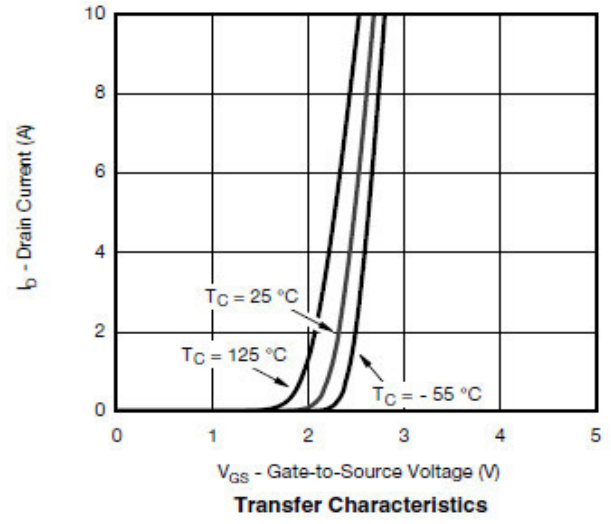
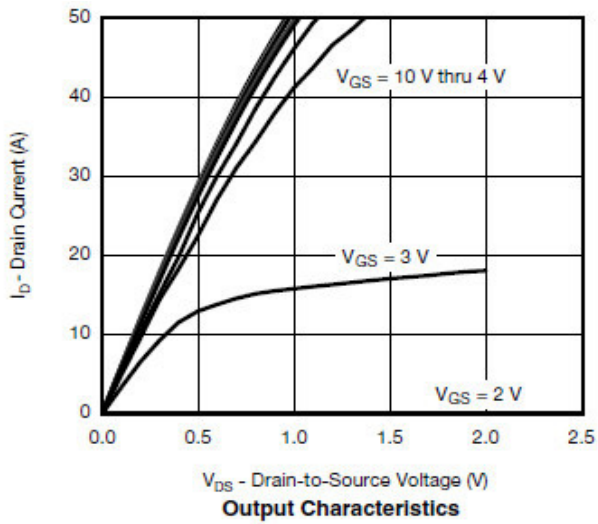
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	40			V
Zero gate voltage drain current	Idss	Vds=40V Vgs=0V			1	μA
		Ta=85°C			10	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0		3.0	V
On state drain current	Id(on)	Vgs=10V, Vds≥5V	20			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=10A		15.8	19.0	mΩ
		Vgs=4.5V, Id=8A		21.5	25.0	
Forward transconductance	Gfs	Vds=15V, Id=5.0A		25		S
Diode forward voltage	Vsd	Is=2A, Vgs=0V		0.85	1.20	V
Max. body-diode continuous current	Is				1.8	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	Ciss	Vgs=0V, Vds=20V, f=1MHz		600		pF
Output capacitance	Coss			100		pF
Reverse transfer capacitance	Crss			45		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vgs=4.5V, Vds=20V Id≐10.0A		5.0	10.0	nC
Gate-source charge	Qgs			1.5		nC
Gate-drain charge	Qgd			1.5		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=20V, Id≐10.0A RL=2.0Ω, Rgen=1.0Ω		7	15	ns
Turn-on rise time	tr			9	20	ns
Turn-off delay time	td(off)			16	30	ns
Turn-off fall time	tf			8	18	ns

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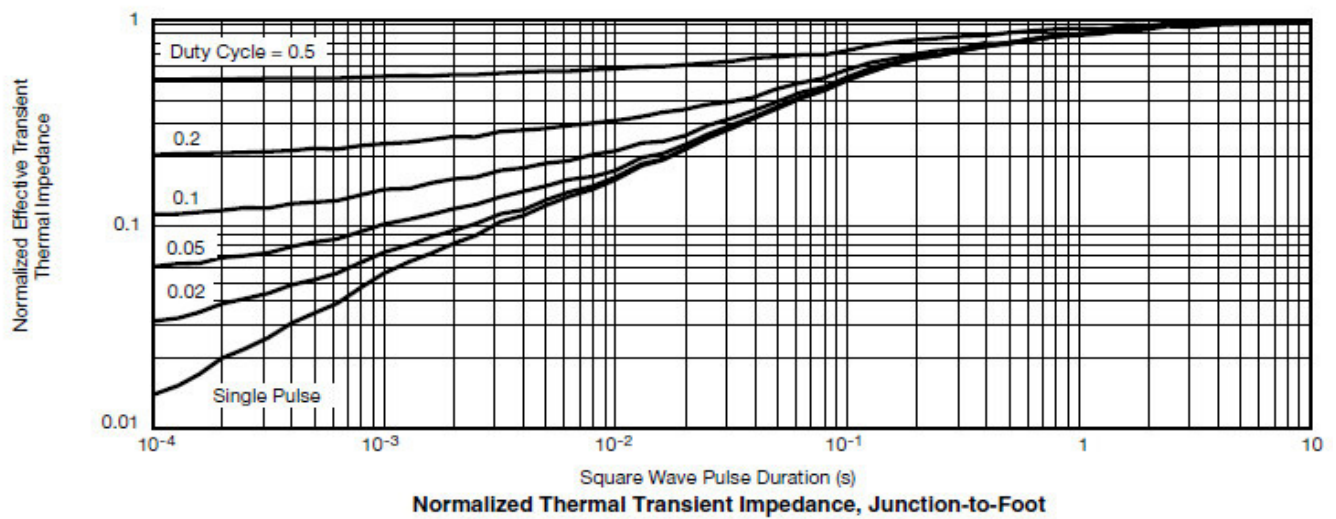
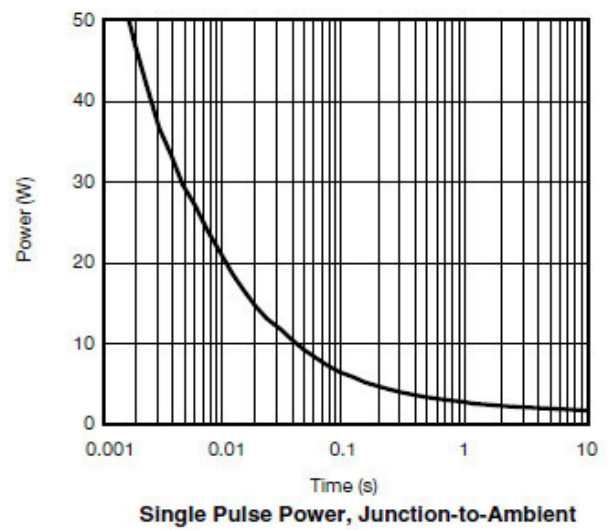
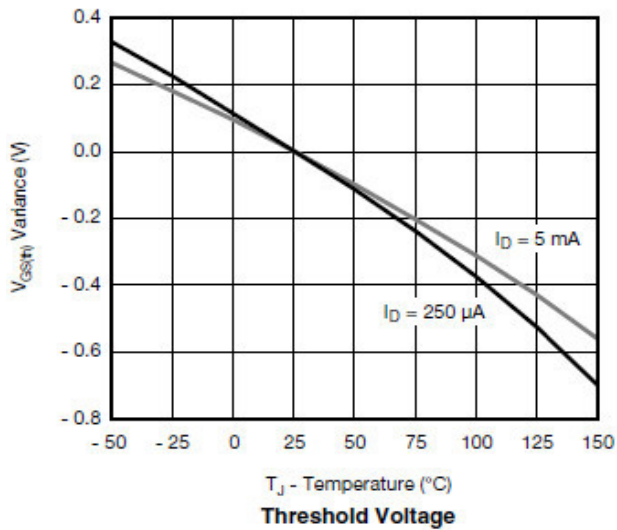
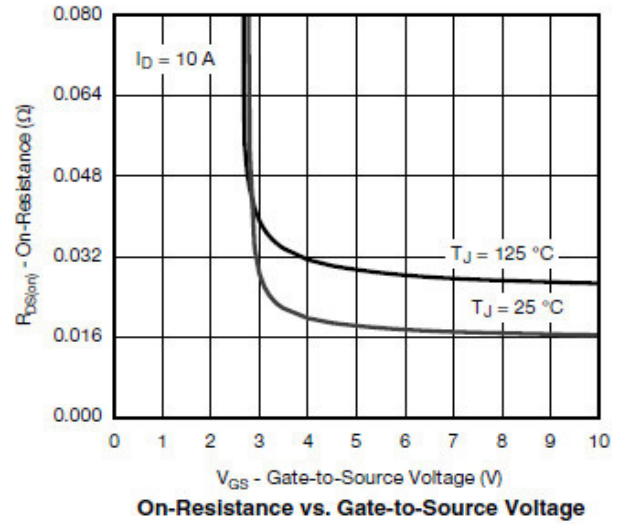
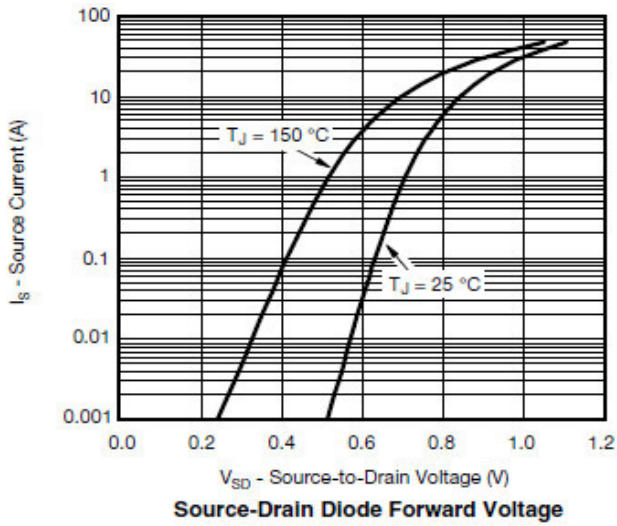
### ■ N1 Typical electrical and thermal characteristics



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# Dual N-channel MOSFET

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### ■N2 Electrical characteristics

Ta=25°C. Unless otherwise noted.

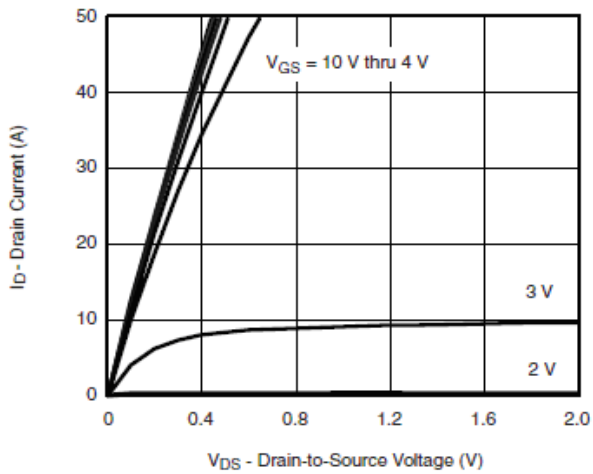
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	40			V
Zero gate voltage drain current	Idss	Vds=32V Vgs=0V			1	μA
		Ta=85°C			10	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0		3.0	V
On state drain current	Id(on)	Vgs=10V, Vds≥5V	30			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=10A		8.8	10.0	mΩ
		Vgs=4.5V, Id=8A		10.2	12.0	
Forward transconductance	Gfs	Vds=15V, Id=12.4A		56		S
Diode forward voltage	Vsd	Is=1.5A, Vgs=0V		0.85	1.20	V
Max. body-diode continuous current	Is				1.8	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	Ciss	Vgs=0V, Vds=20V, f=1MHz		2000		pF
Output capacitance	Coss			260		pF
Reverse transfer capacitance	Crss			150		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vgs=4.5V, Vds=10V Id≐8.0A		15.0	30.0	nC
Gate-source charge	Qgs			6.8		nC
Gate-drain charge	Qgd			5.2		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=20V, Id≐8.0A RL=2.0Ω, Rgen=1.0Ω		10	20	ns
Turn-on rise time	tr			15	30	ns
Turn-off delay time	td(off)			30	60	ns
Turn-off fall time	tf			10	20	ns

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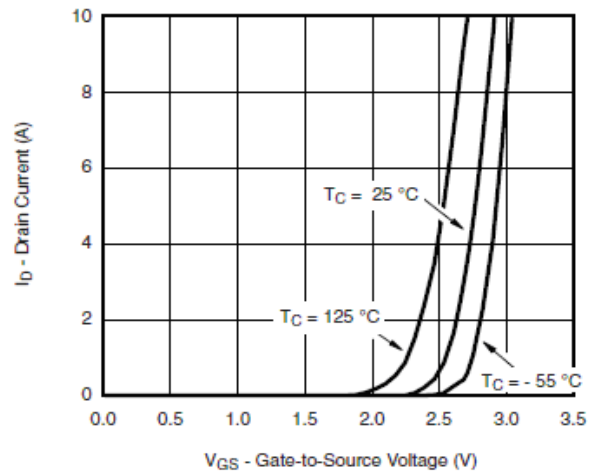
## ELM54910WA-N

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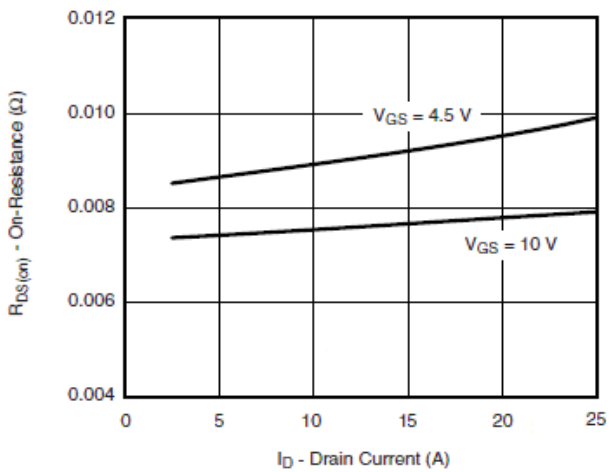
### ■ N2 Typical electrical and thermal characteristics



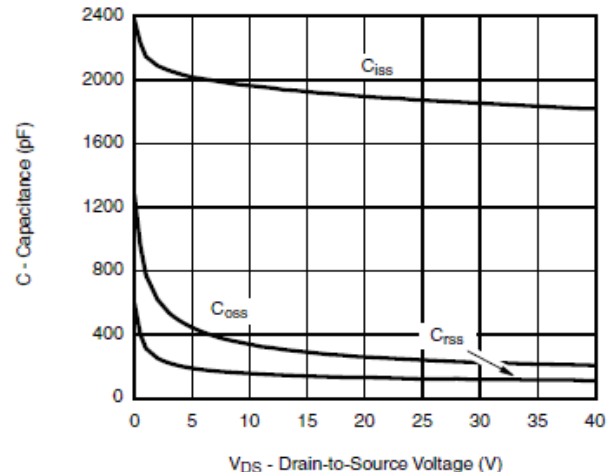
**Output Characteristics**



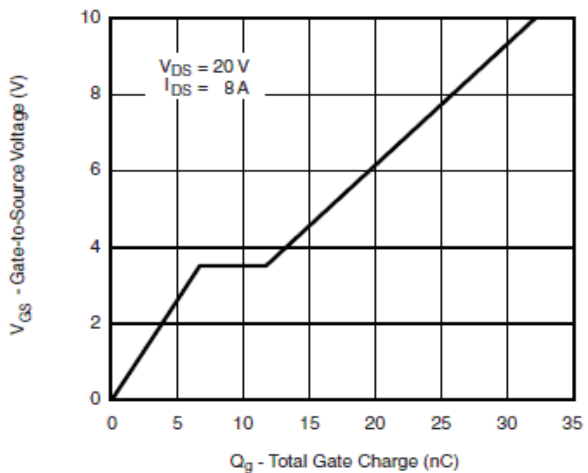
**Transfer Characteristics**



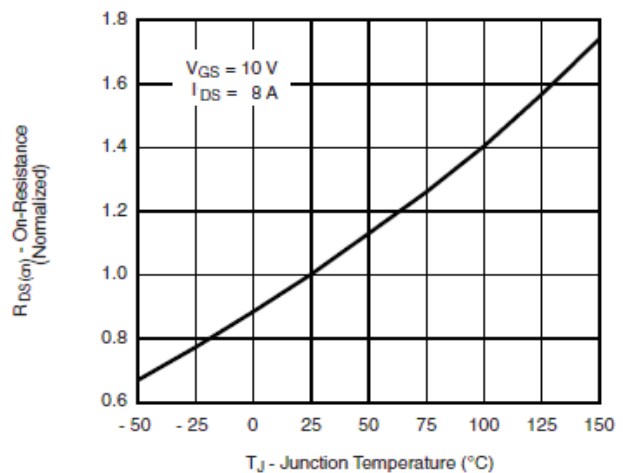
**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**



**Gate Charge**

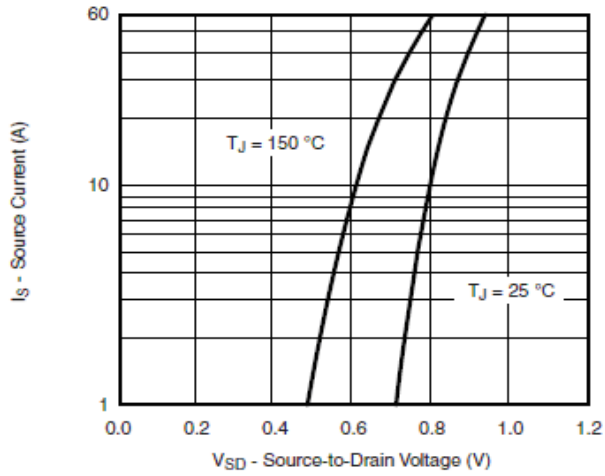


**On-Resistance vs. Junction Temperature**

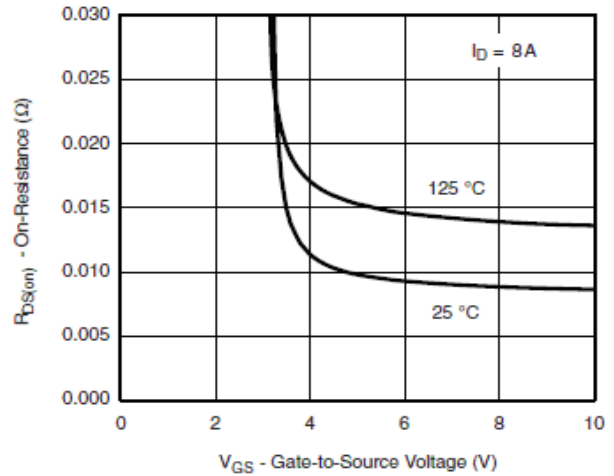
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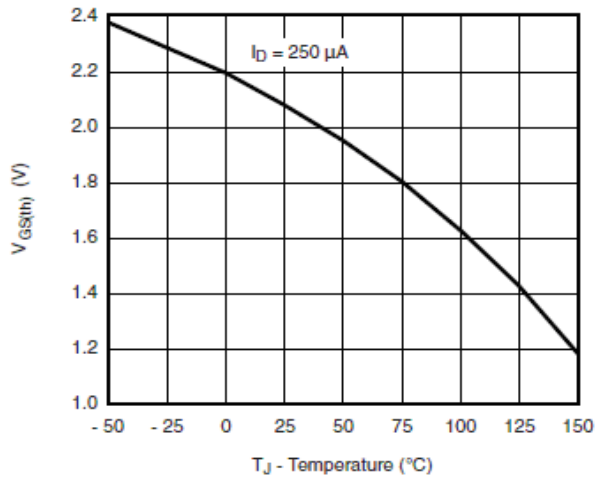
<http://www.elm-tech.com>



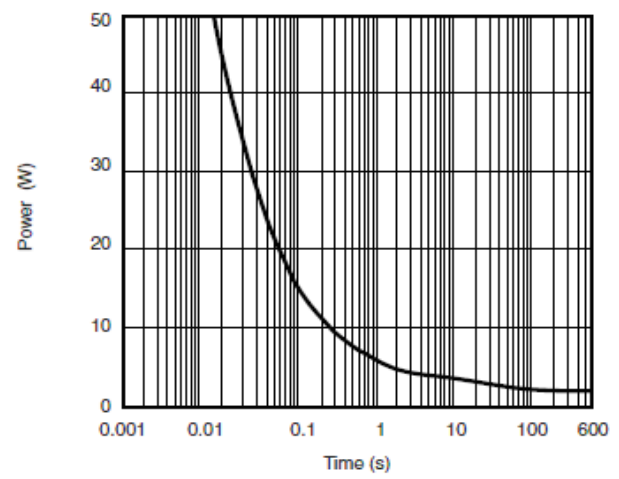
Source-Drain Diode Forward Voltage



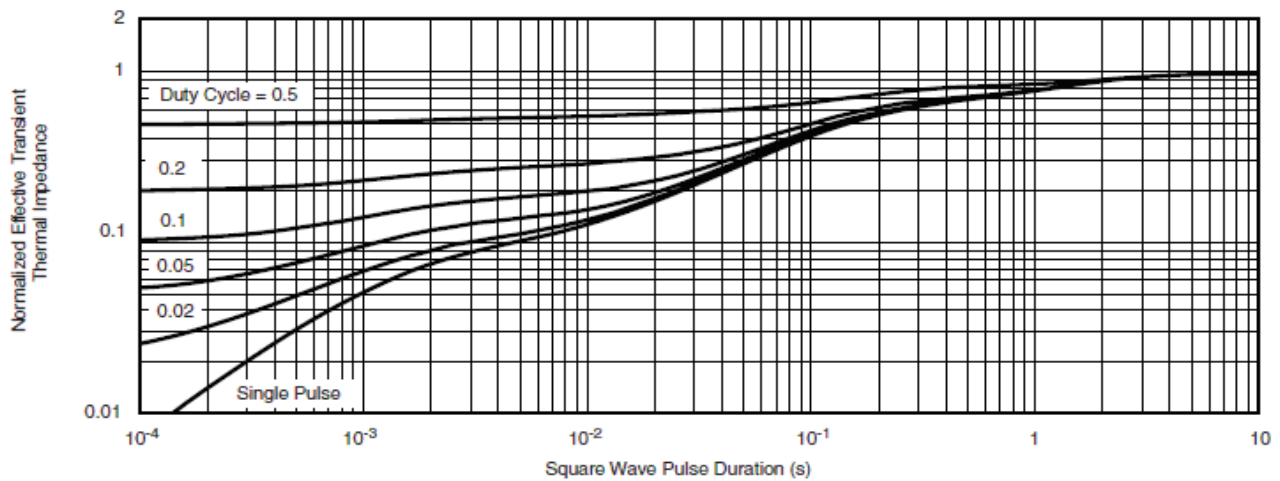
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power (Junction-to-Ambient)



Normalized Thermal Transient Impedance, Junction-to-Foot

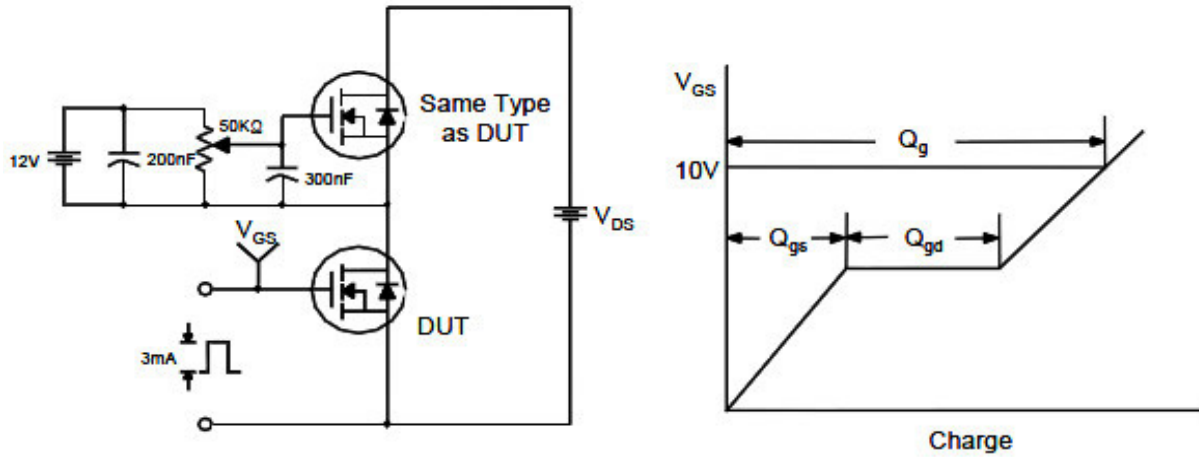
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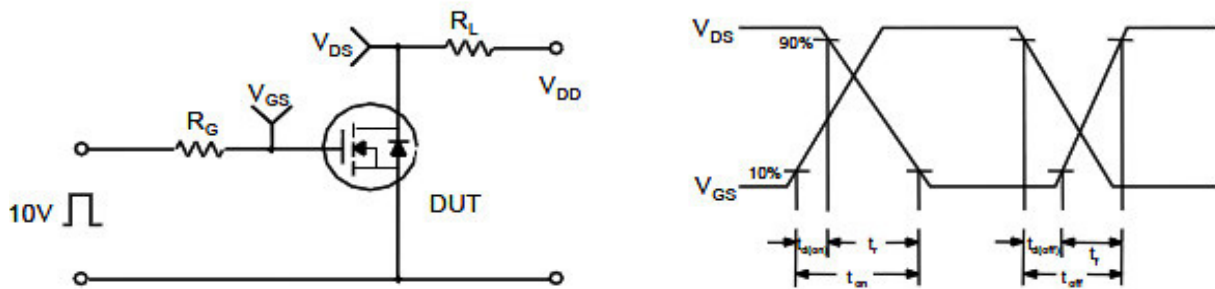
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## ■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

