

# Single N-channel MOSFET

## ELM54874WSA-N

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

### ■ General description

ELM54874WSA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate threshold voltage.

### ■ Features

- $V_{ds}=60V$
- $I_d=12A$
- $R_{ds(on)} = 11m\Omega$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 13m\Omega$  ( $V_{gs}=6V$ )

### ■ Maximum absolute ratings

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

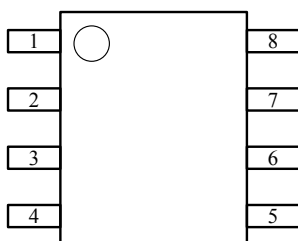
Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{ds}$	60	V
Gate-source voltage	$V_{gs}$	$\pm 20$	V
Continuous drain current( $T_j=150^\circ C$ )	$I_d$	$T_a=25^\circ C$	12
		$T_a=70^\circ C$	10
Pulsed drain current	$I_{dm}$	40	A
Power dissipation	$P_d$	$T_c=25^\circ C$	2.8
		$T_c=70^\circ C$	1.8
Operating 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	$^\circ C/W$

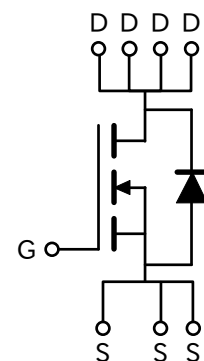
### ■ Pin configuration

SOP-8(TOP VIEW)



Pin No.	Pin name
1	SOURCE
2	SOURCE
3	SOURCE
4	GATE
5	DRAIN
6	DRAIN
7	DRAIN
8	DRAIN

### ■ Circuit



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## ■ Electrical characteristics

Ta=25°C. Unless otherwise noted.

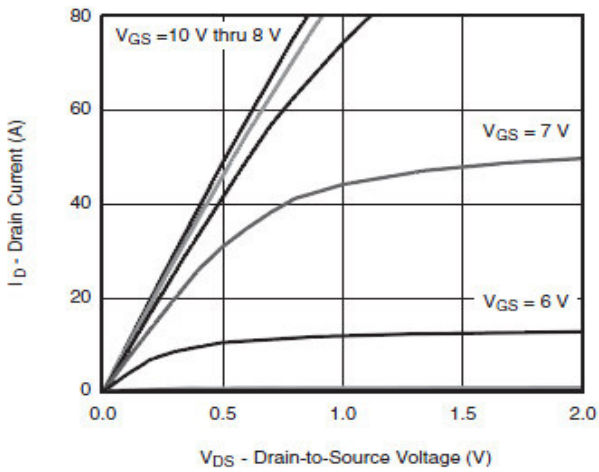
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	60			V
Zero gate voltage drain current	Idss	Vds=48V, Vgs=0V			1	μA
		Vds=48V, Vgs=0V, Ta=85°C			30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	2.0		4.0	V
On state drain current	Id(on)	Vgs=10V, Vds≥10V	40			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=12A		9	11	mΩ
		Vgs=6V, Id=10A		10	13	
Forward transconductance	Gfs	Vds=15V, Id=10A		38		S
Diode forward voltage	Vsd	Is=10A, Vgs=0V		0.8	1.3	V
Max. body-diode continuous current	Is				1.5	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	Ciss	Vgs=0V, Vds=30V, f=1MHz		2080		pF
Output capacitance	Coss			320		pF
Reverse transfer capacitance	Crss			120		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vds=30V, Vgs=10V Id≐10A		35	60	nC
Gate-source charge	Qgs			12		nC
Gate-drain charge	Qgd			10		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=30V RL=1.53Ω, Id≐10A Rgen=1.0Ω		10	20	ns
Turn-on rise time	tr			10	20	ns
Turn-off delay time	td(off)			15	30	ns
Turn-off fall time	tf			10	20	ns

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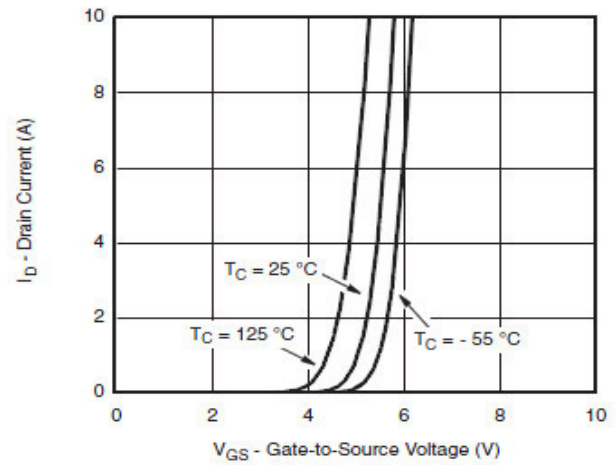
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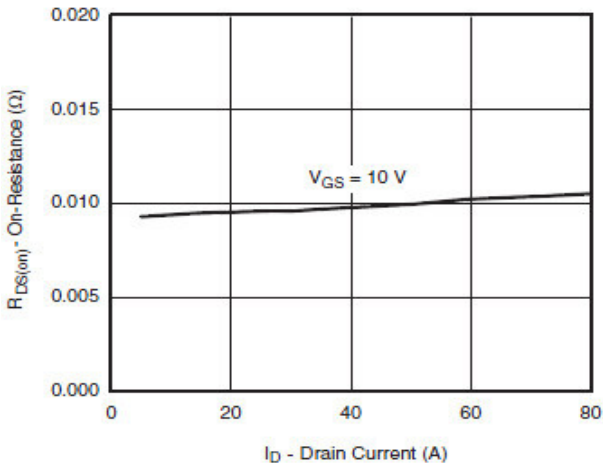
## ■ Typical electrical and thermal characteristics



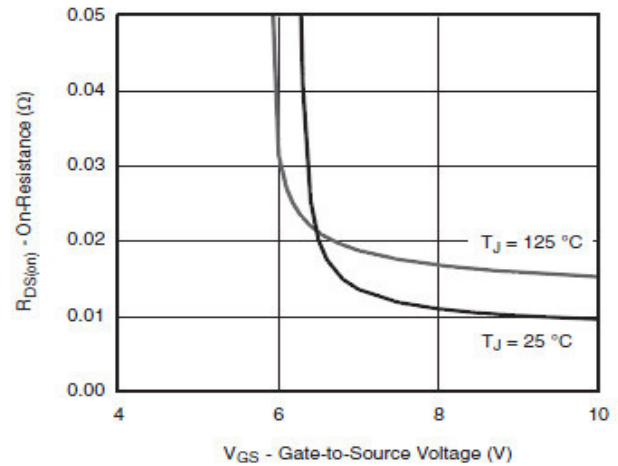
Output Characteristics



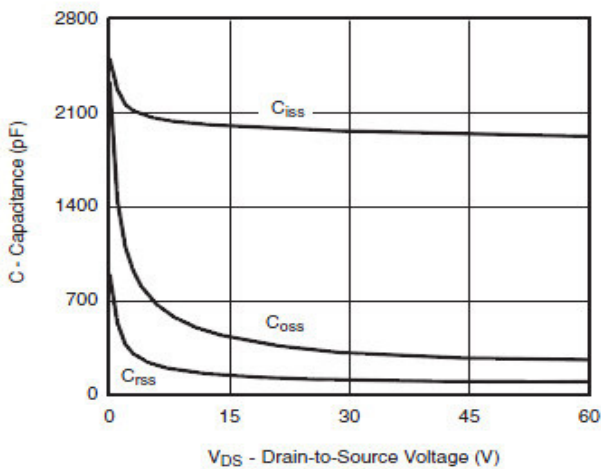
Transfer Characteristics



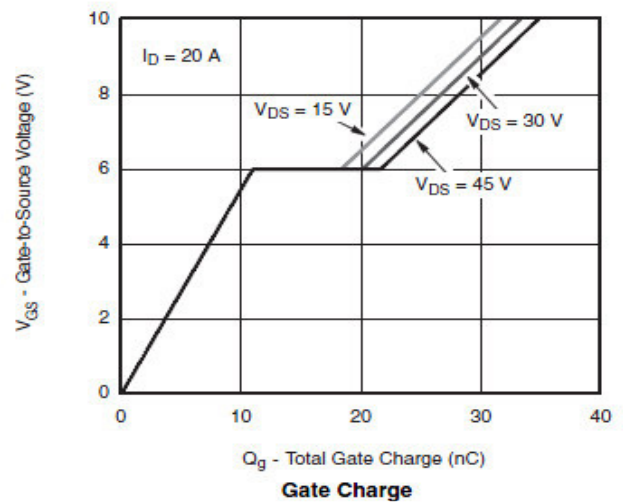
On-Resistance vs. Drain Current



On-resistance vs. Gate-to-Source Voltage



Capacitance

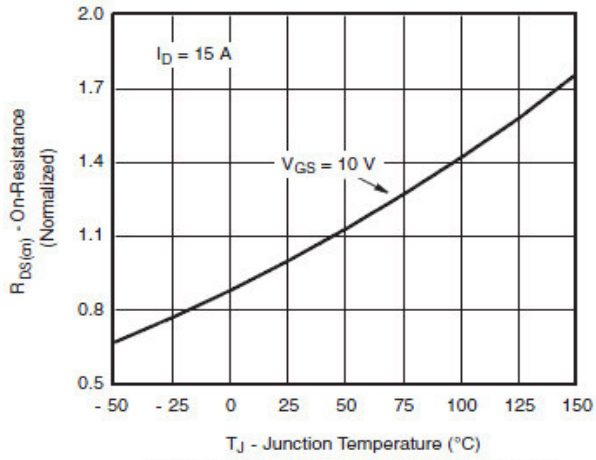


Gate Charge

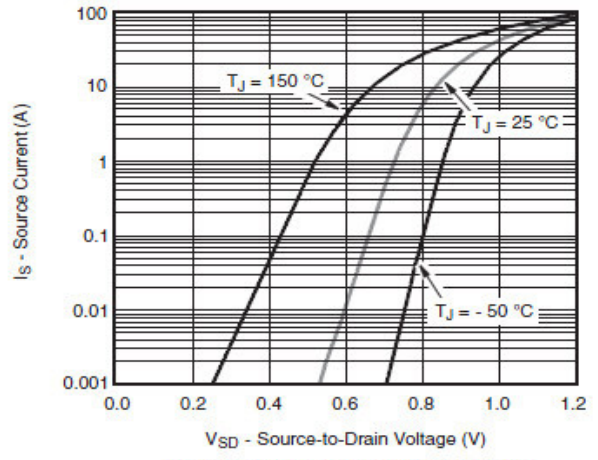
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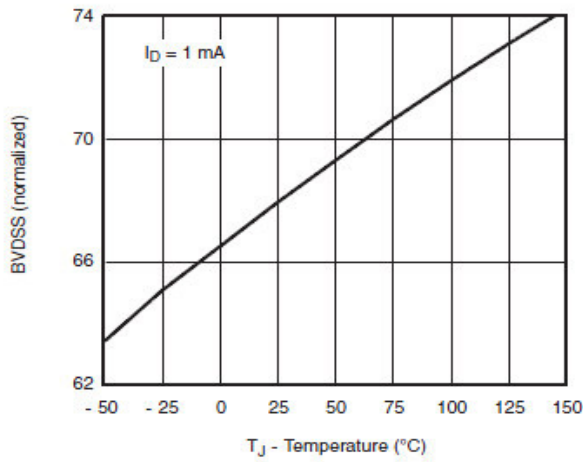
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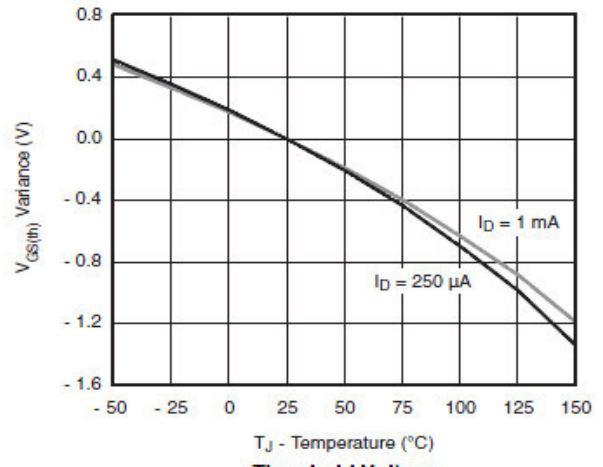
**On-Resistance vs. Junction Temperature**



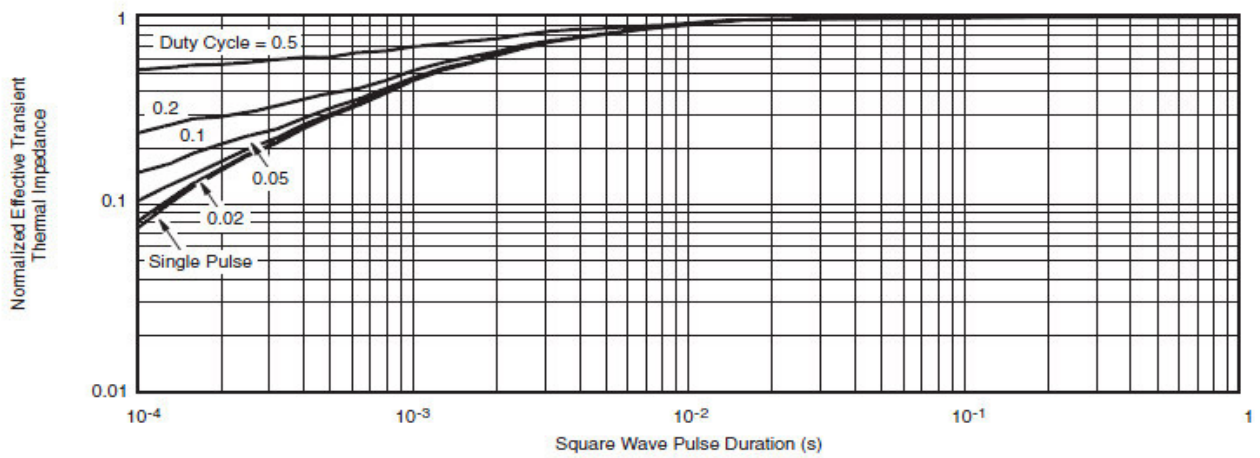
**Source-Drain Diode Forward Voltage**



**Drain-Source Breakdown vs. Junction Temperature**



**Threshold Voltage**



**Normalized Thermal Transient Impedance, Junction-to-Case**

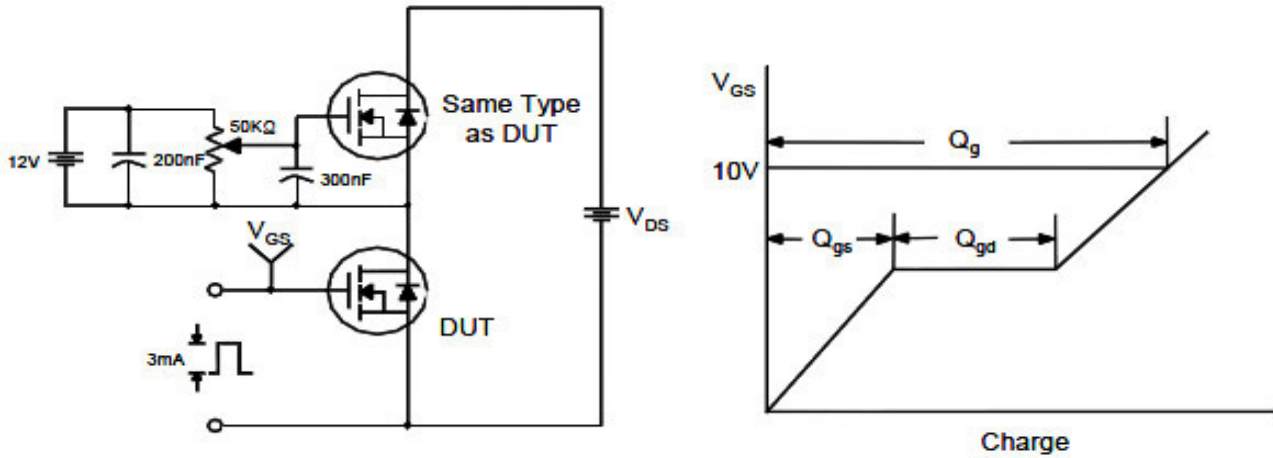
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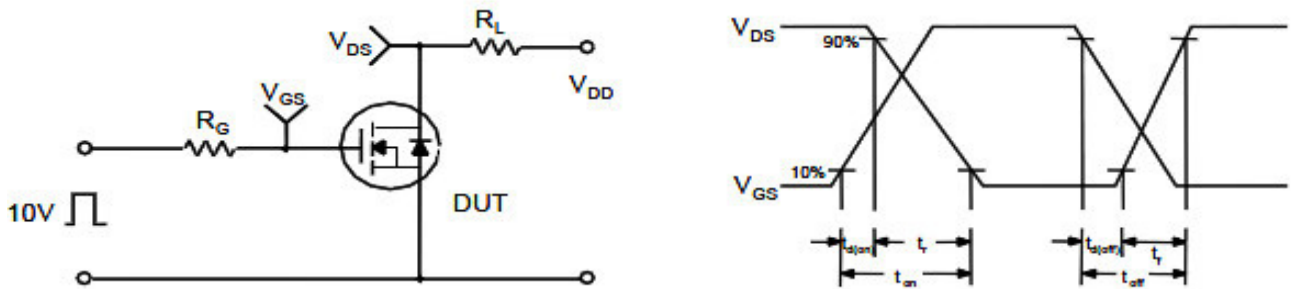
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## ■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

