

# Single P-channel MOSFET

## ELM52431WSA-N

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

### ■ General description

ELM52431WSA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate threshold voltage.

### ■ Features

- $V_{ds} = -20V$
- $I_d = -9.6A$
- $R_{ds(on)} = 25m\Omega$  ( $V_{gs} = -4.5V$ )
- $R_{ds(on)} = 33m\Omega$  ( $V_{gs} = -2.5V$ )
- $R_{ds(on)} = 42m\Omega$  ( $V_{gs} = -1.8V$ )

### ■ Maximum absolute ratings

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

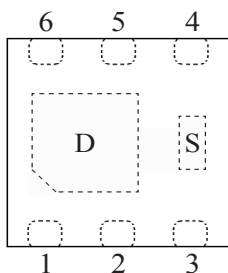
Parameter	Symbol	Limit	Unit
Drain-source voltage	$V_{ds}$	-20	V
Gate-source voltage	$V_{gs}$	$\pm 12$	V
Continuous drain current	$I_d$	$T_a = 25^\circ C$	-9.6
		$T_a = 70^\circ C$	-7.7
Pulsed drain current	$I_{dm}$	-30	A
Power dissipation	$P_d$	$T_c = 25^\circ C$	2.5
		$T_c = 70^\circ C$	2.2
Operating 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	$R_{\theta ja}$		36	$^\circ C/W$

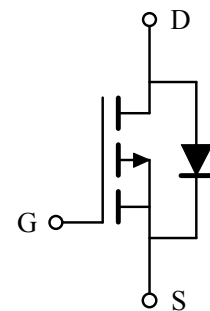
### ■ Pin configuration

DFN6-2x2(TOP VIEW)



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

### ■ Circuit



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### ■ Electrical characteristics

Ta=25°C. Unless otherwise noted.

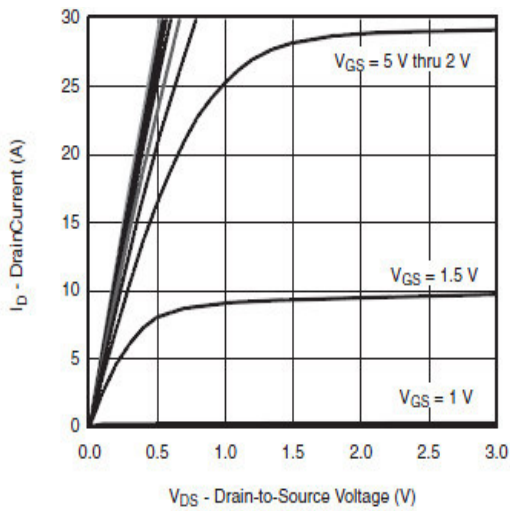
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Vgs=0V, Id=-250μA	-20			V
Zero gate voltage drain current	Idss	Vds=-16V, Vgs=0V			-1	μA
		Vds=-16V, Vgs=0V, Ta=85°C			-30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-0.4		-0.7	V
On state drain current	Id(on)	Vgs=-4.5V, Vds≥-5V	-20			A
Static drain-source on-resistance	Rds(on)	Vgs=-4.5V, Id=-3.0A		19	25	mΩ
		Vgs=-2.5V, Id=-3.0A		25	33	
		Vgs=-1.8V, Id=-2.5A		34	42	
Forward transconductance	Gfs	Vds=-10V, Id=-6.5A		31		S
Diode forward voltage	Vsd	Is=-1.0A, Vgs=0V		-0.75	-1.30	V
Max. body-diode continuous current	Is				-2.9	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	Ciss			1700		pF
Output capacitance	Coss	Vgs=0V, Vds=-10V, f=1MHz		350		pF
Reverse transfer capacitance	Crss			250		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vgs=-4.5V, Vds=-10V Id≐-9.6A		24	50	nC
Gate-source charge	Qgs			3		nC
Gate-drain charge	Qgd			6		nC
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-10V RL=1.3Ω, Id≐-7.7A		25	45	ns
Turn-on rise time	tr			30	55	ns
Turn-off delay time	td(off)	Rgen=1.0Ω		60	100	ns
Turn-off fall time	tf			25	40	ns

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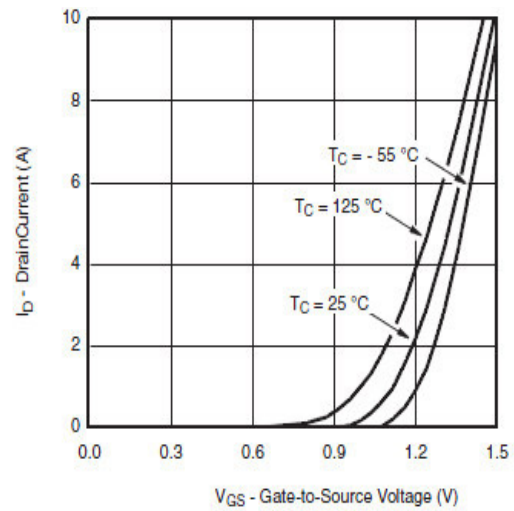
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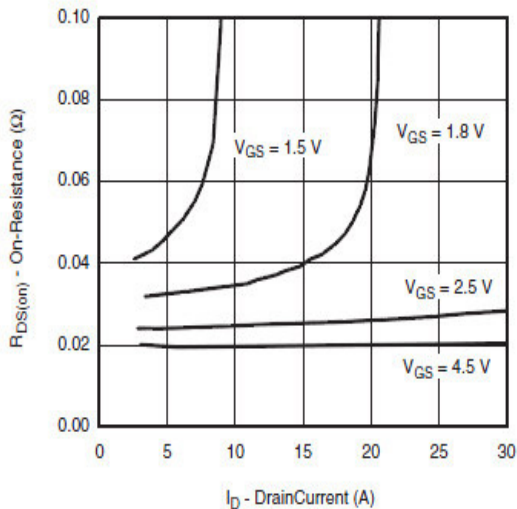
## ■ Typical electrical and thermal characteristics



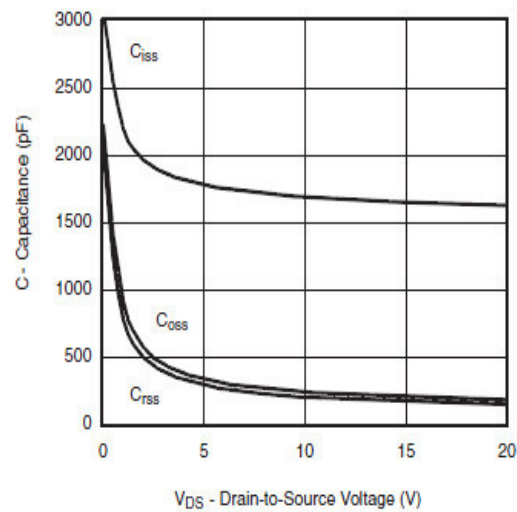
Output Characteristics



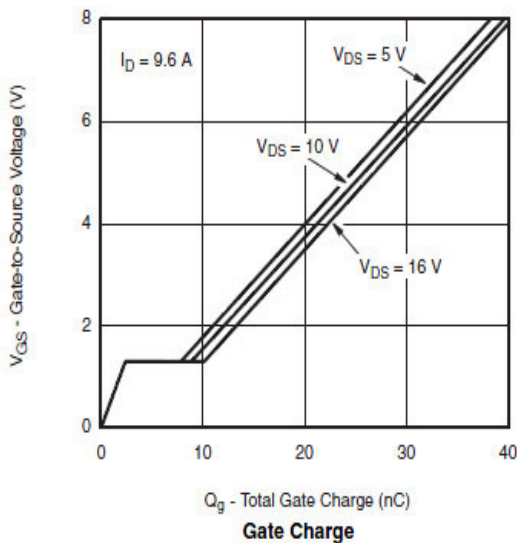
Transfer Characteristics



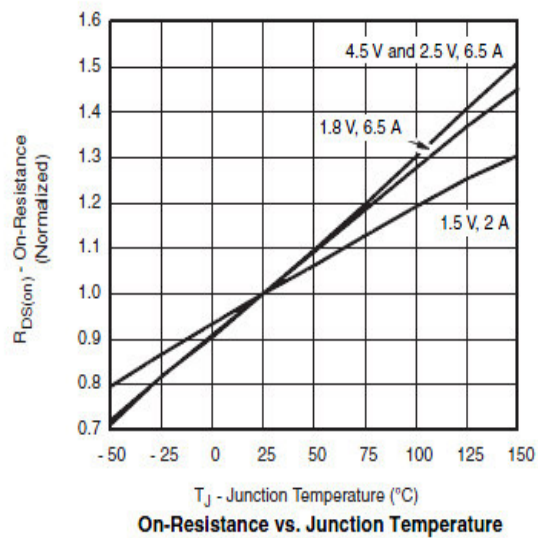
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge

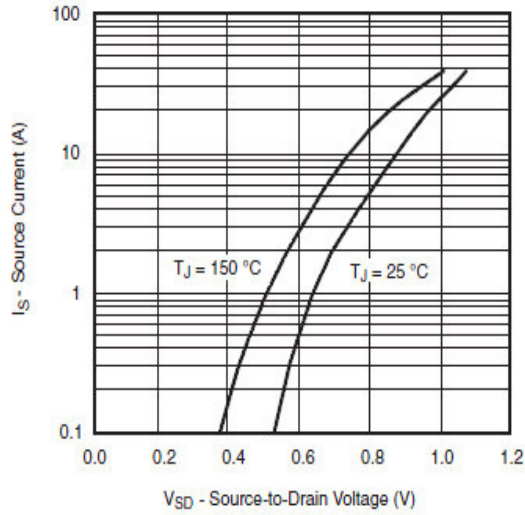


On-Resistance vs. Junction Temperature

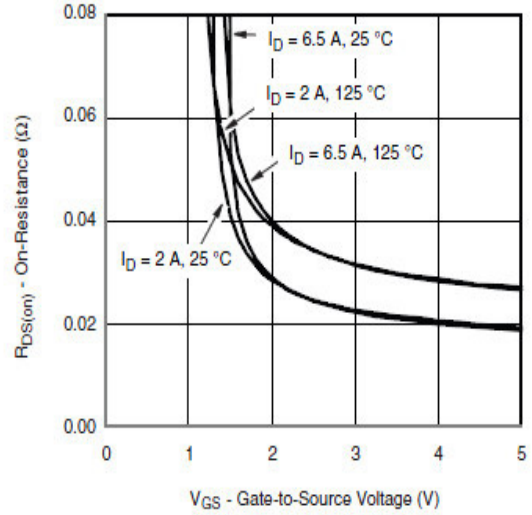
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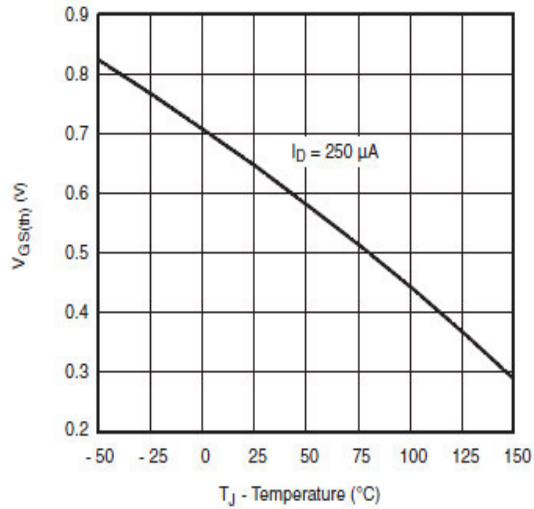
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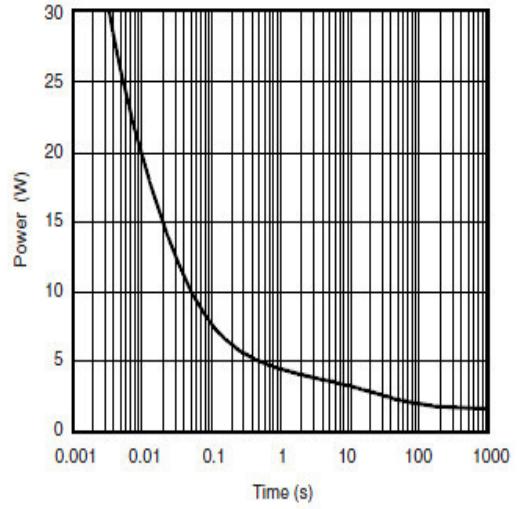
Source-Drain Diode Forward Voltage



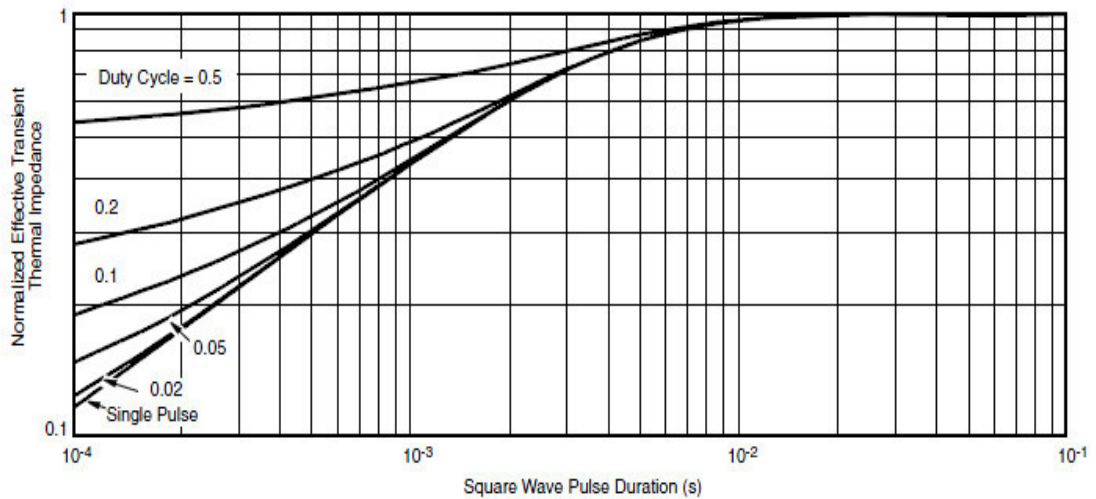
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

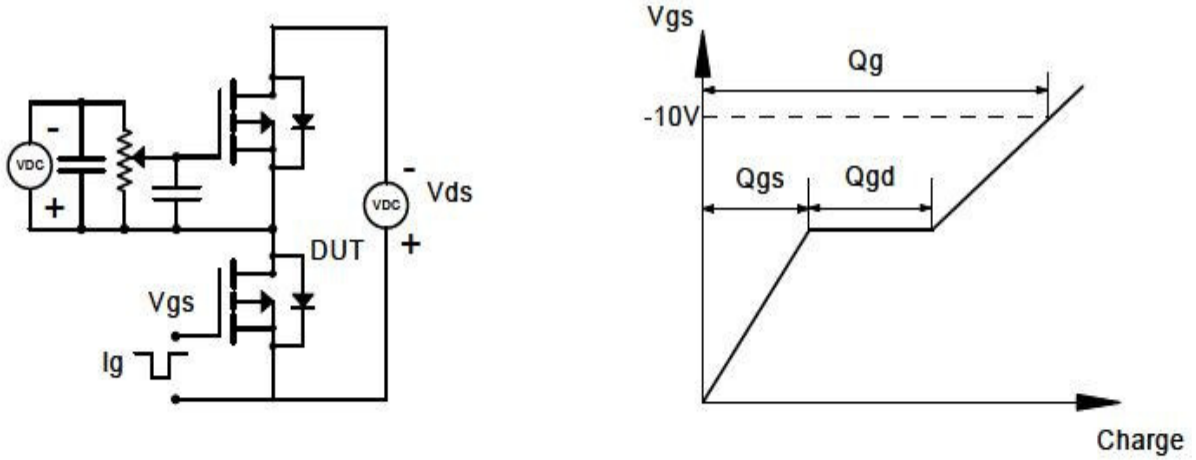
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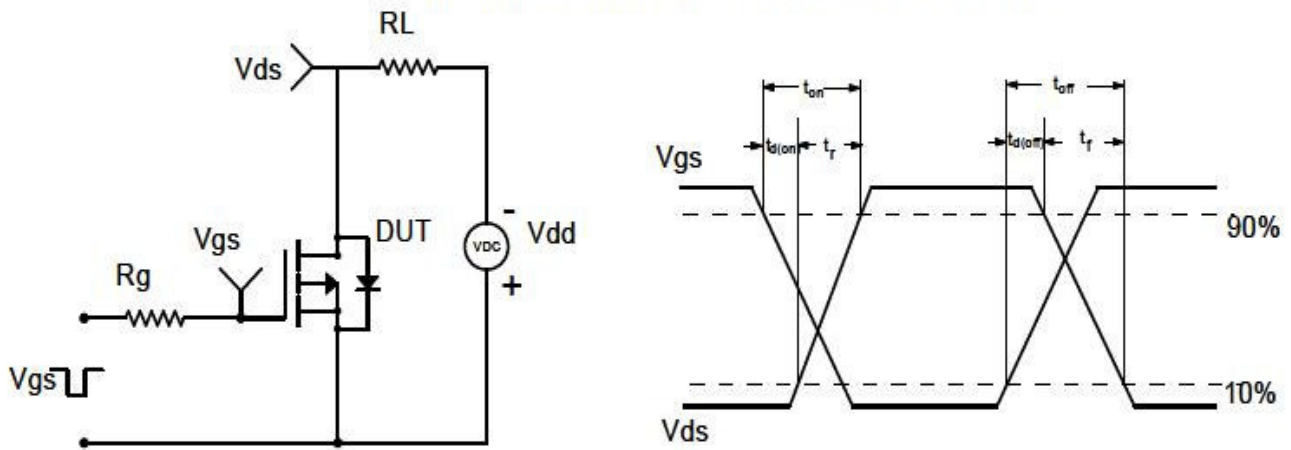
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## ■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

