

# Complementary MOSFET

## ELM54590CWSA-N

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

### ■General Description

ELM54590CWSA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

### ■Features

- |                                       |   |
|---------------------------------------|---|
| N-channel                             | P-channel                               |
| • $V_{ds}=100V$                       | • $V_{ds}=-100V$                        |
| • $I_d=6.2A$                          | • $I_d=-5.2A$                           |
| • $R_{ds(on)}=45m\Omega(V_{gs}=10V)$  | • $R_{ds(on)}=90m\Omega(V_{gs}=-10V)$   |
| • $R_{ds(on)}=50m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)}=100m\Omega(V_{gs}=-4.5V)$ |

### ■Maximum Absolute Ratings

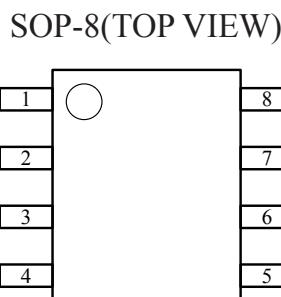
$T_a=25^{\circ}\text{C}$ . Unless otherwise noted.

Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	$V_{ds}$	100	-100	V
Gate-source voltage	$V_{gs}$	$\pm 20$	$\pm 20$	V
Continuous drain current( $T_j=150^{\circ}\text{C}$ )	$I_d$ $T_a=25^{\circ}\text{C}$	6.2	-5.2	A
	$T_a=70^{\circ}\text{C}$	4.2	-3.4	
Pulsed drain current	$I_{dm}$	20	-20	A
Power dissipation	$T_c=25^{\circ}\text{C}$	2.8	2.8	W
	$T_c=70^{\circ}\text{C}$	1.8	1.8	
Operating junction temperature	$T_j$	150	150	$^{\circ}\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	-55 to 150	$^{\circ}\text{C}$

### ■Thermal Characteristics

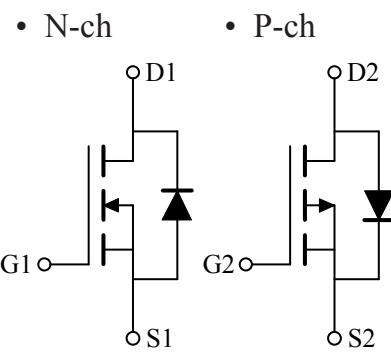
Parameter	Symbol	Device	Typ.	Max.	Unit
Thermal resistance junction-to-ambient	$R_{\theta ja}$	N-ch		62.5	$^{\circ}\text{C/W}$
Thermal resistance junction-to-ambient	$R_{\theta ja}$	P-ch		62.5	$^{\circ}\text{C/W}$

### ■Pin configuration



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

### ■Circuit



# Complementary MOSFET

## ELM54590CWSA-N

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

### ■Electrical Characteristics (N-ch)

Ta=25°C. Unless otherwise noted.

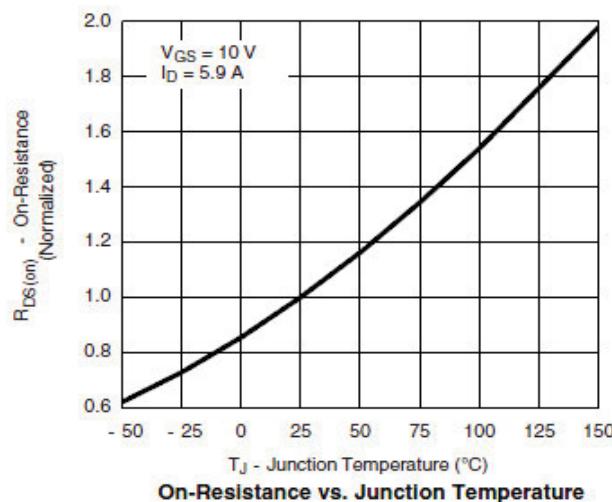
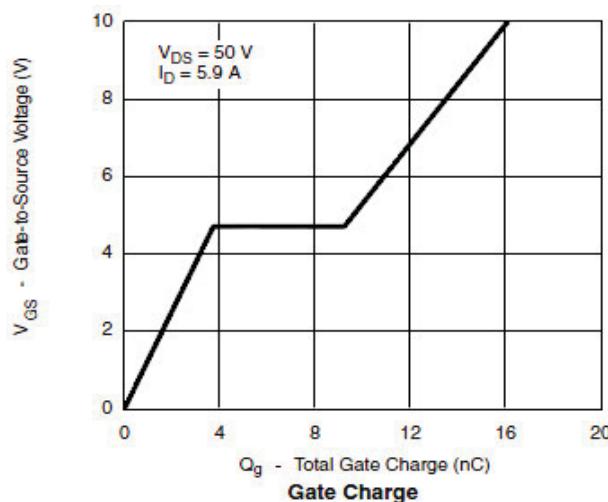
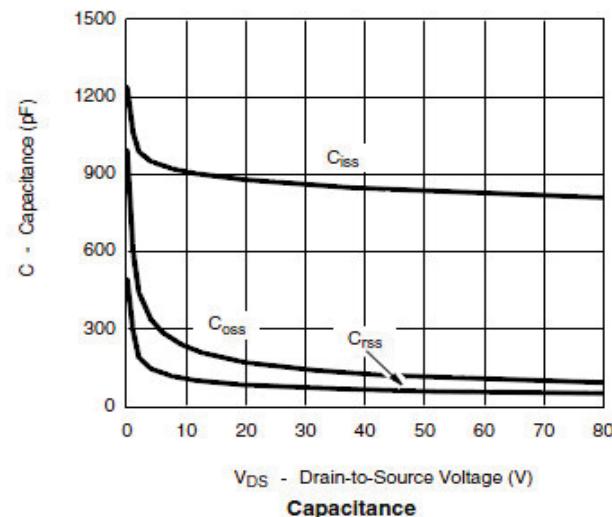
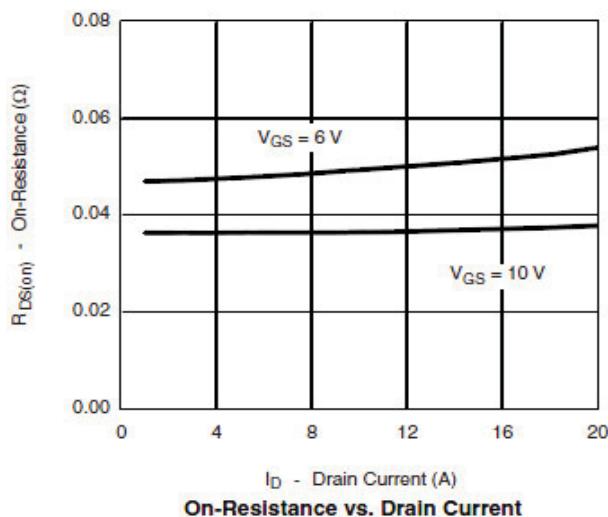
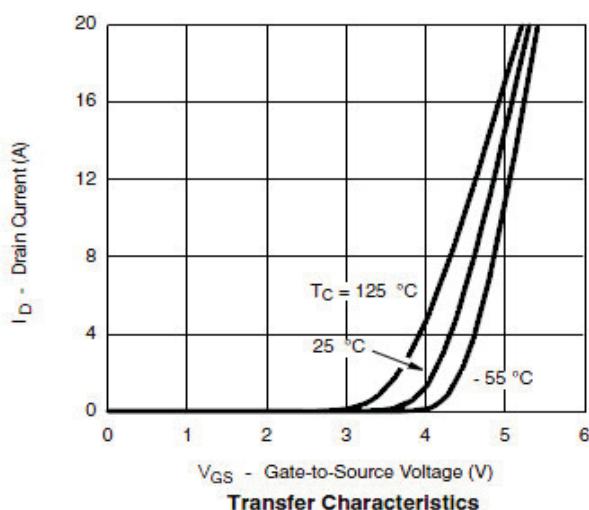
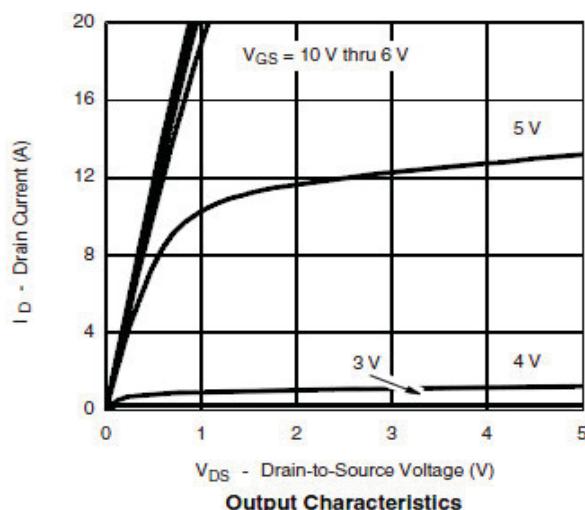
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit	
<b>STATIC PARAMETERS</b>								
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V		100			V	
Zero gate voltage drain current	Idss	Vds=80V, Vgs=0V	Ta=85°C			1	μA	
						5		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		1.0		2.0	V	
On state drain current	Id(on)	Vgs=4.5V, Vds≥5V		20			A	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=6.2A			38	45	mΩ	
		Vgs=4.5V, Id=4.2A			42	50		
Forward transconductance	Gfs	Vds=15V, Id=6.0A			14		S	
Diode forward voltage	Vsd	Is=2.0A, Vgs=0V			0.8	1.3	V	
Max.body-diode continuous current	Is					3	A	
<b>DYNAMIC PARAMETERS</b>								
Input capacitance	Ciss	Vgs=0V, Vds=50V, f=1MHz			850		pF	
Output capacitance	Coss				90		pF	
Reverse transfer capacitance	Crss				40		pF	
<b>SWITCHING PARAMETERS</b>								
Total gate charge	Qg	Vgs=10V, Vds=50V, Id=5.9A			16	24	nC	
Gate-source charge	Qgs				4		nC	
Gate-drain charge	Qgd				6		nC	
Turn-on delay time	td(on)	Vgs=10V, Vds=50V, Id=5.9A RL=50Ω, Rgen=6Ω			15	25	ns	
Turn-on rise time	tr				15	25	ns	
Turn-off delay time	td(off)				35	55	ns	
Turn-off fall time	tf				20	35	ns	

# Complementary MOSFET

## ELM54590CWSA-N

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

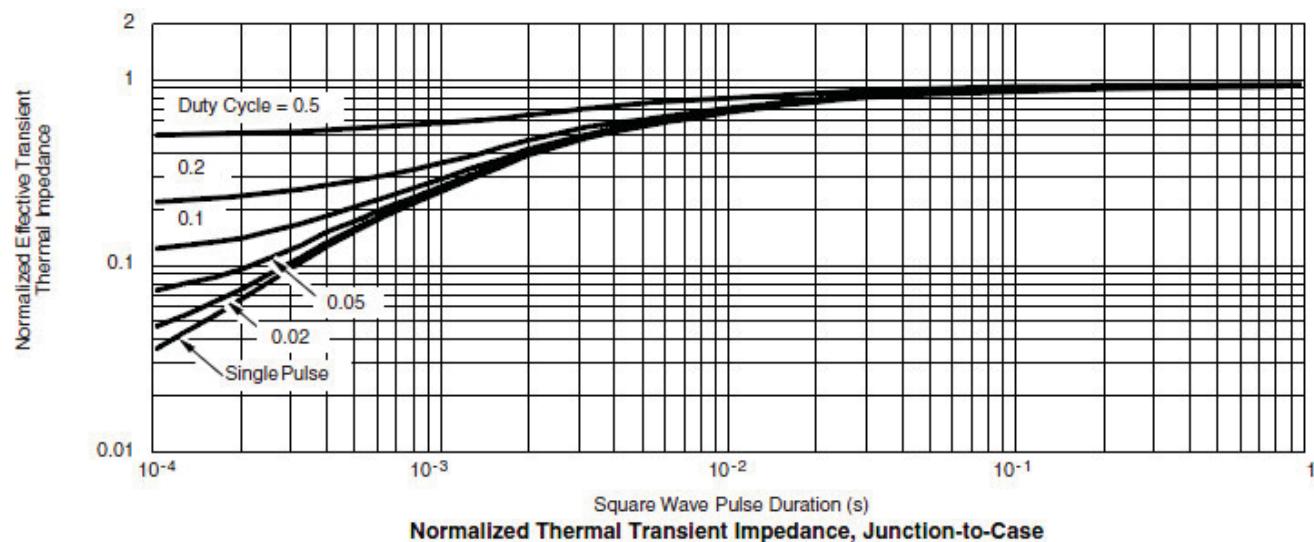
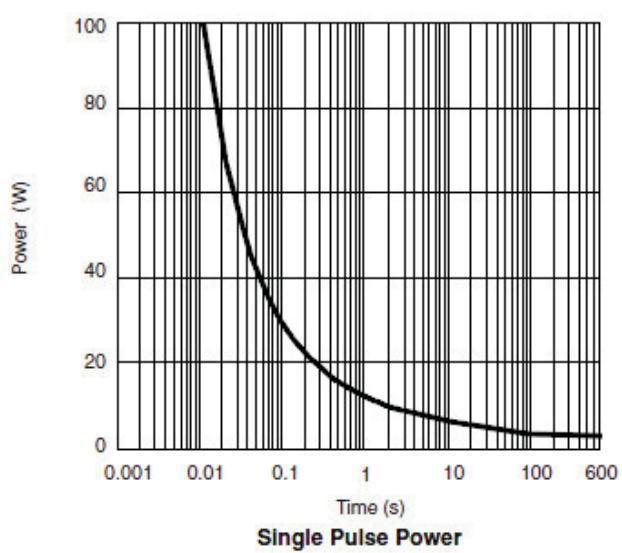
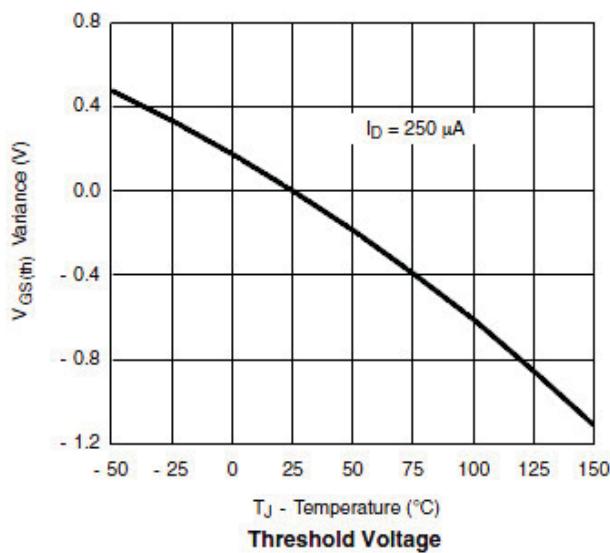
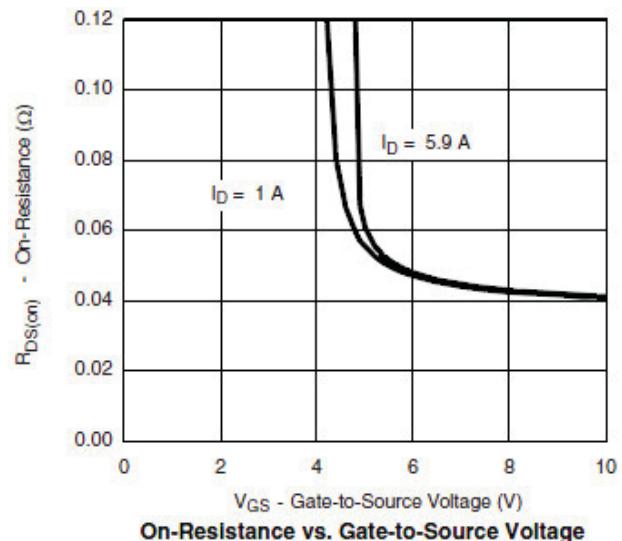
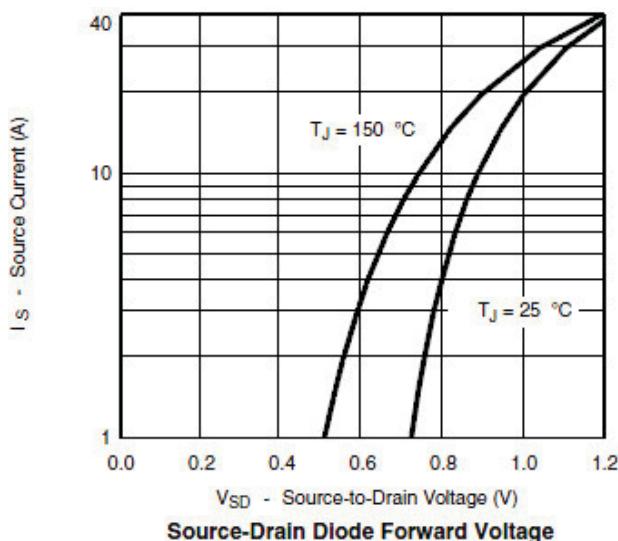
### ■ Typical Electrical and Thermal Characteristics (N-ch)



# Complementary MOSFET

**ELM54590CWSA-N**

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



# Complementary MOSFET

## ELM54590CWSA-N

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

### ■Electrical Characteristics (P-ch)

Ta=25°C. Unless otherwise noted.

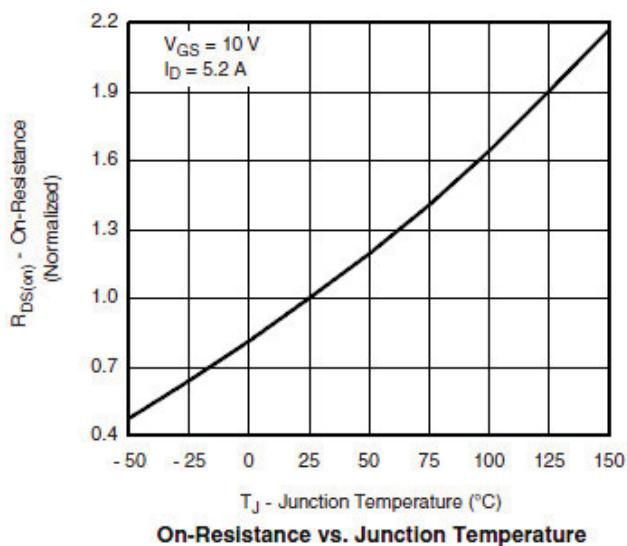
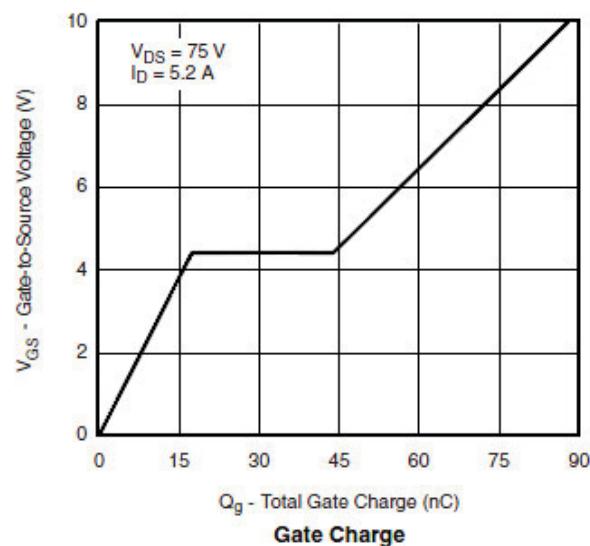
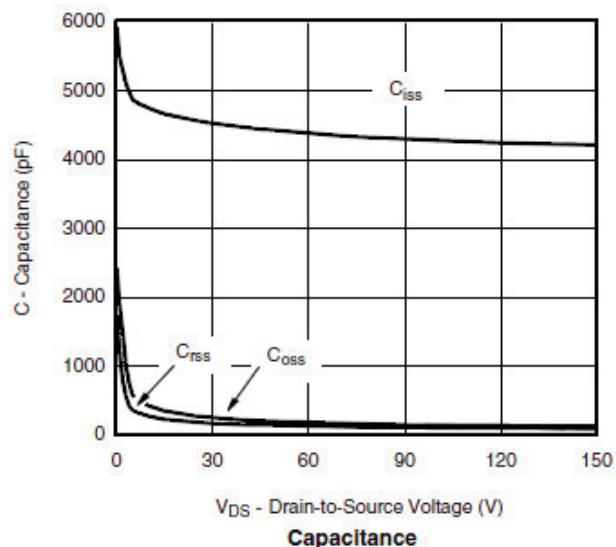
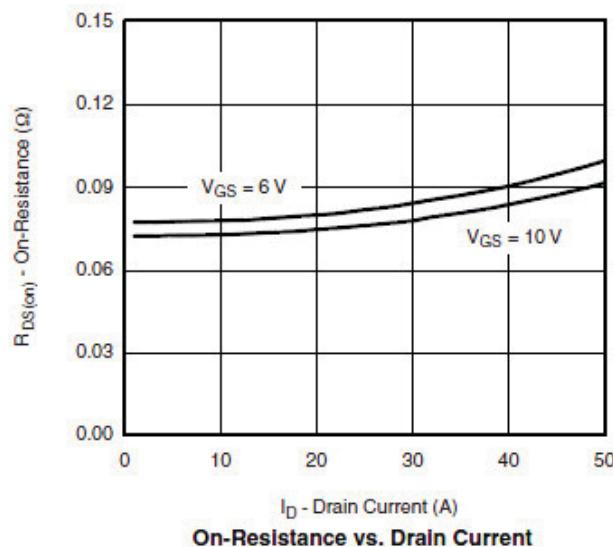
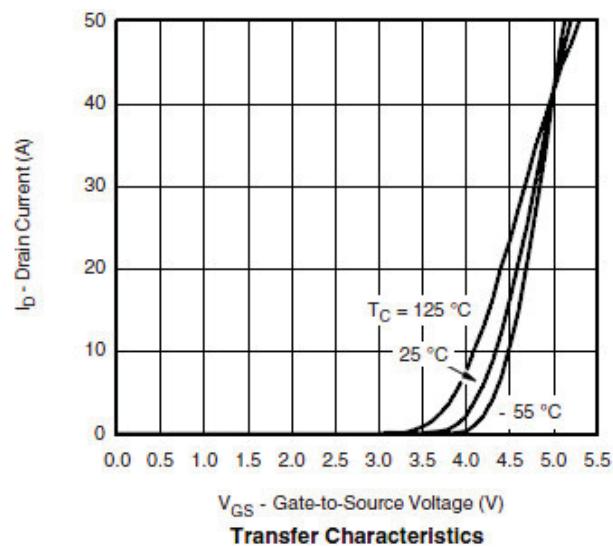
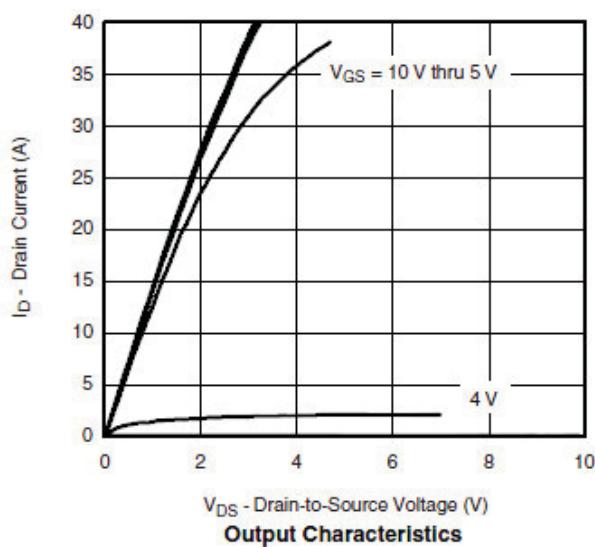
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V		-100			V
Zero gate voltage drain current	Idss	Vds=-80V, Vgs=0V			-1		μA
			Ta=85°C			-30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA		-1.0		-2.5	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-10V		-20			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-5.2A			80	90	mΩ
		Vgs=-4.5V, Id=-3.5A			87	100	
Forward transconductance	Gfs	Vds=-15V, Id=-5A			19		S
Diode forward voltage	Vsd	Is=-2.0A, Vgs=0V			-0.8	-1.3	V
Max. body-diode continuous current	Is					-3	A
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss	Vgs=0V, Vds=-60V, f=1MHz			4300		pF
Output capacitance	Coss				280		pF
Reverse transfer capacitance	Crss				220		pF
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=-10V, Vds=-75V Id=-5.2A			85	150	nC
Gate-source charge	Qgs				18		nC
Gate-drain charge	Qgd				28		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-75V Id=-5.2A, RL=16Ω Rgen=6Ω			25	50	ns
Turn-on rise time	tr				45	85	ns
Turn-off delay time	td(off)				115	200	ns
Turn-off fall time	tf				65	130	ns

# Complementary MOSFET

ELM54590CWSA-N

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

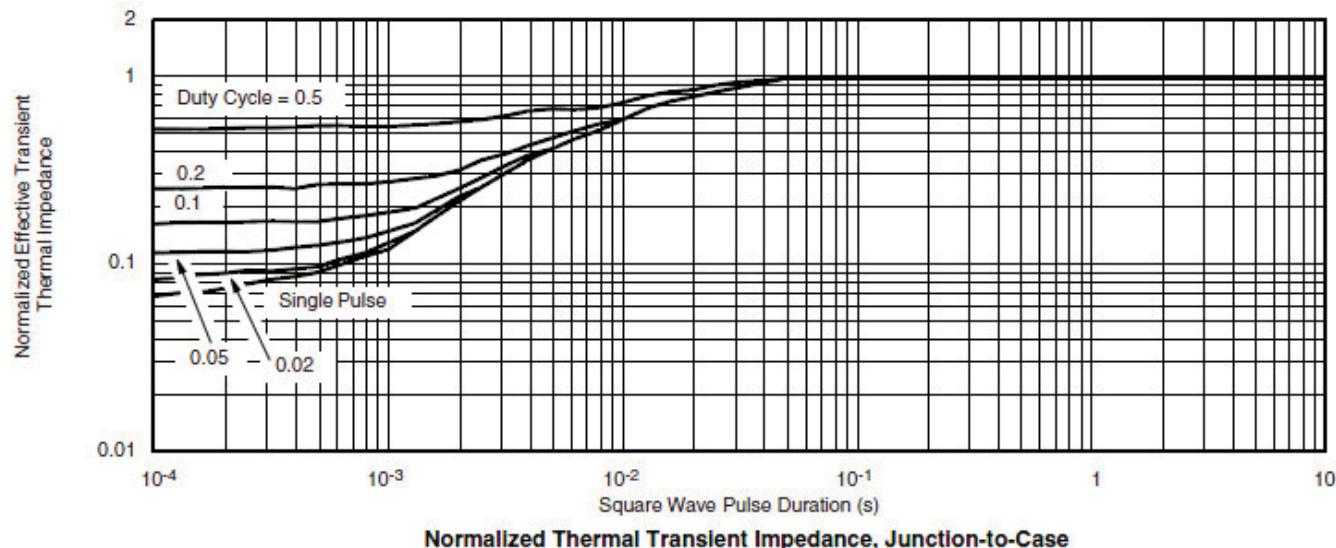
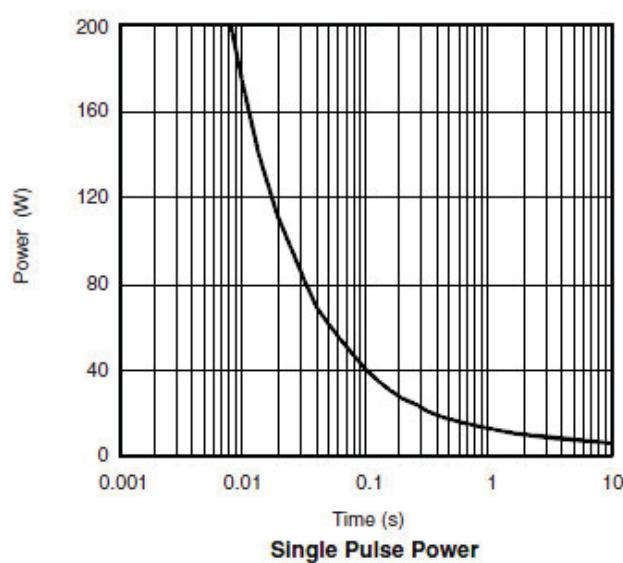
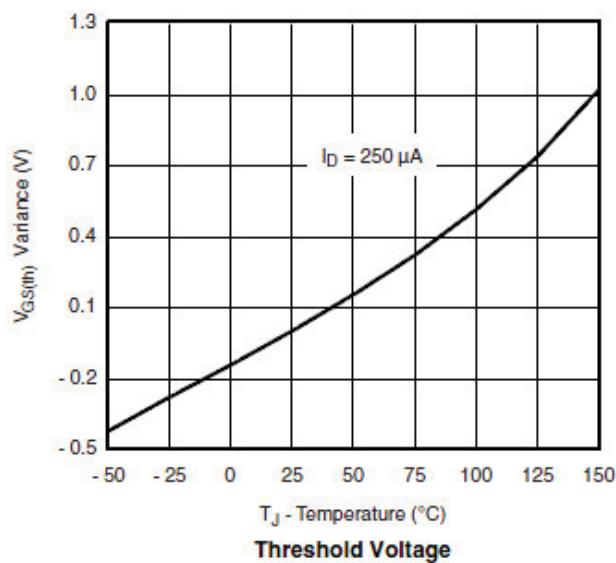
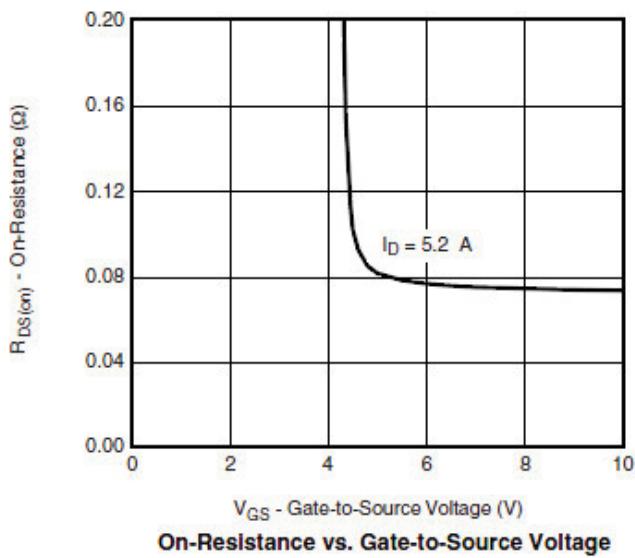
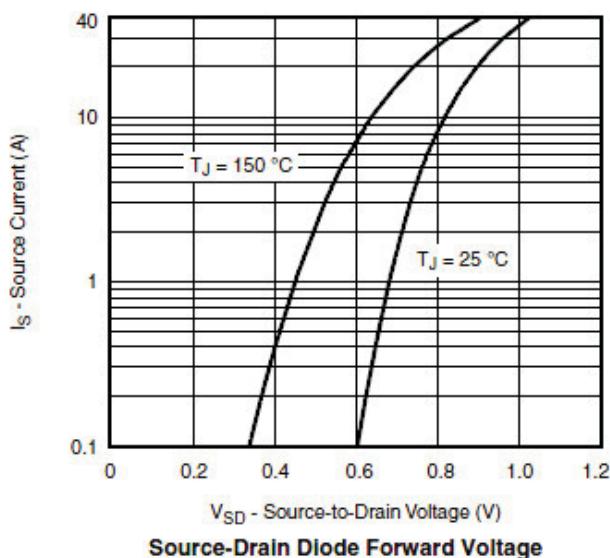
## ■ Typical Electrical and Thermal Characteristics (P-ch)



# Complementary MOSFET

**ELM54590CWSA-N**

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



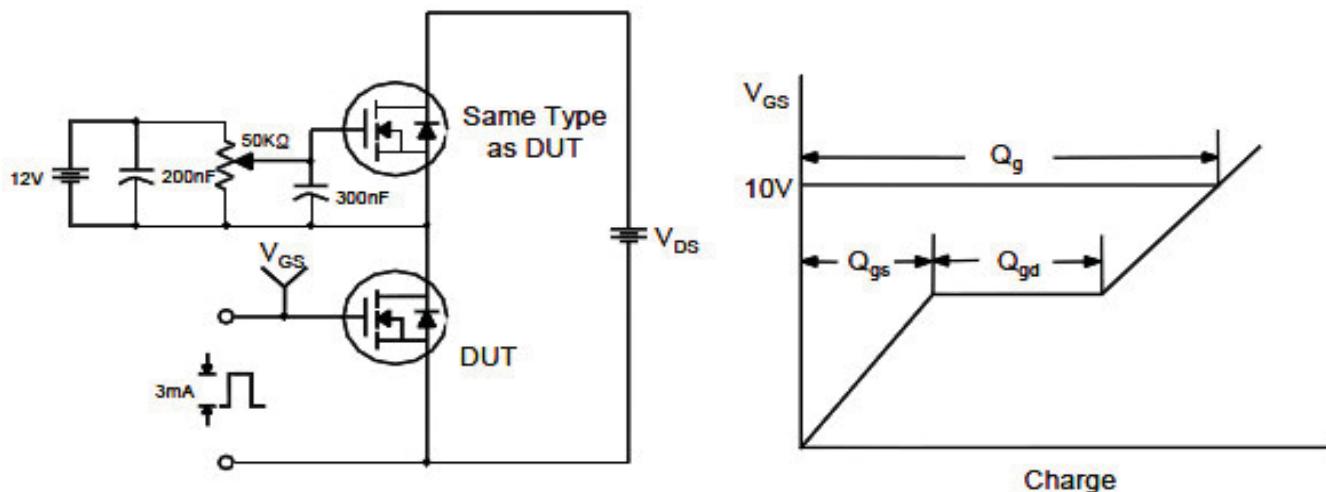
# Complementary MOSFET

## ELM54590CWSA-N

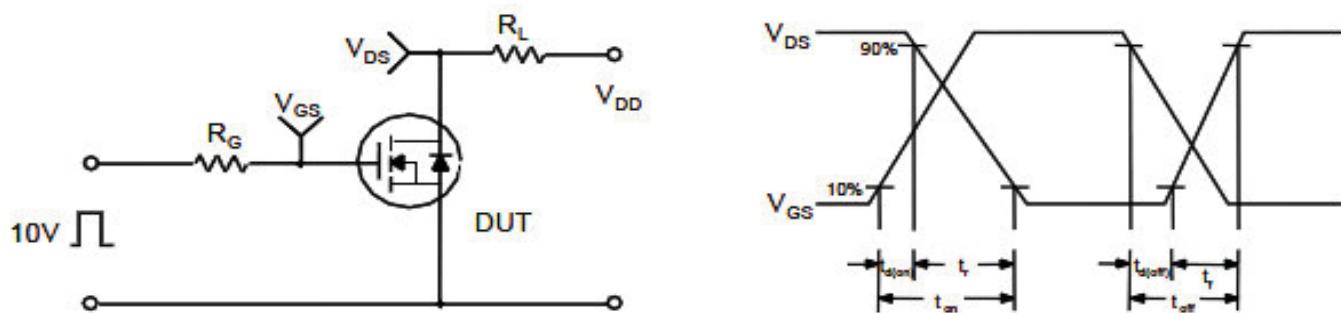
<http://www.elm-tech.com>

### ■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

