

# Complementary MOSFET

## ELM54539CWSA-N

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

### ■ General Description

ELM54539CWSA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

### ■ Features

- N-channel  
 $V_{ds}=30V$ ,  $I_d=5.0A$ ,  $R_{ds(on)}=36m\Omega$  ( $V_{gs}=10V$ )  
 $V_{ds}=30V$ ,  $I_d=4.7A$ ,  $R_{ds(on)}=46m\Omega$  ( $V_{gs}=4.5V$ )
- P-channel  
 $V_{ds}=-30V$ ,  $I_d=-5.4A$ ,  $R_{ds(on)}=62m\Omega$  ( $V_{gs}=-10V$ )  
 $V_{ds}=-30V$ ,  $I_d=-4.2A$ ,  $R_{ds(on)}=90m\Omega$  ( $V_{gs}=-4.5V$ )

### ■ Maximum Absolute Ratings

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

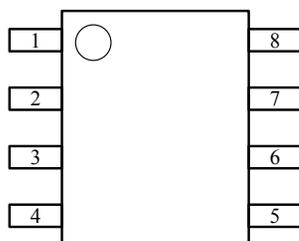
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	$V_{ds}$	30	-30	V
Gate-source voltage	$V_{gs}$	$\pm 20$	$\pm 20$	V
Continuous drain current ( $T_j=150^\circ C$ )	$I_d$	$T_a=25^\circ C$	5.4	-5.4
		$T_a=70^\circ C$	4.0	-4.2
Pulsed drain current	$I_{dm}$	20	-30	A
Power dissipation	$P_d$	$T_c=25^\circ C$	2.8	2.8
		$T_c=70^\circ C$	1.8	1.8
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
Thermal resistance junction-to-ambient	$R_{\theta ja}$	N-ch		62.5	$^\circ C/W$
Thermal resistance junction-to-ambient	$R_{\theta ja}$	P-ch		62.5	$^\circ C/W$

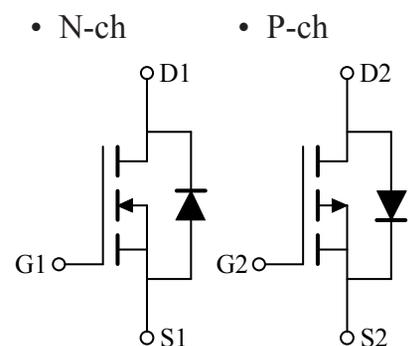
### ■ Pin configuration

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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### ■Electrical Characteristics (N-ch)

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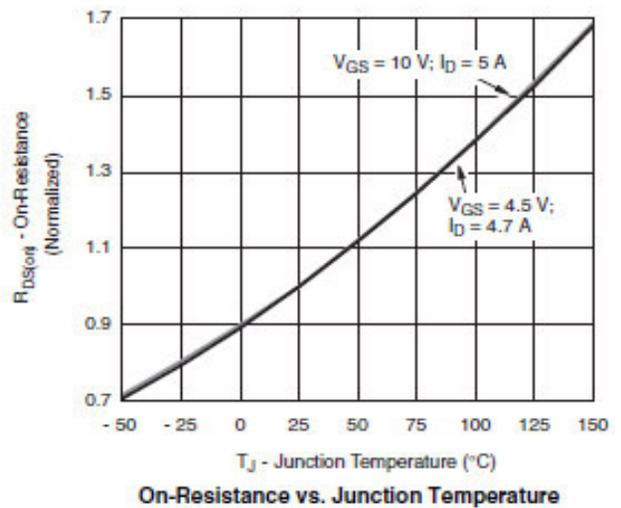
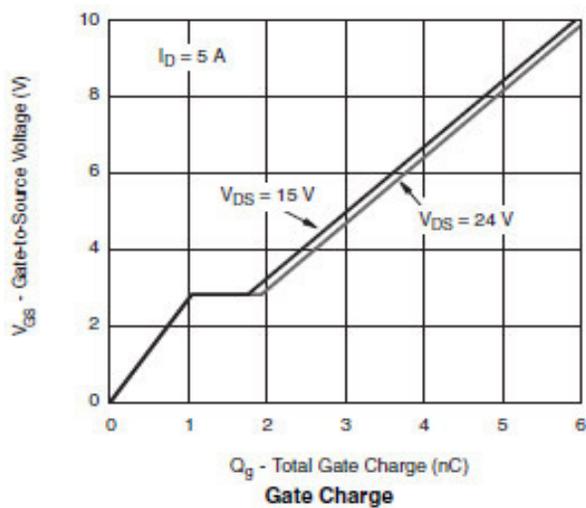
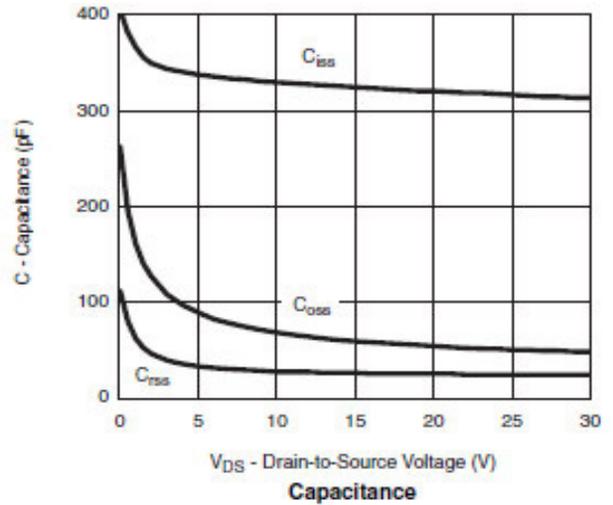
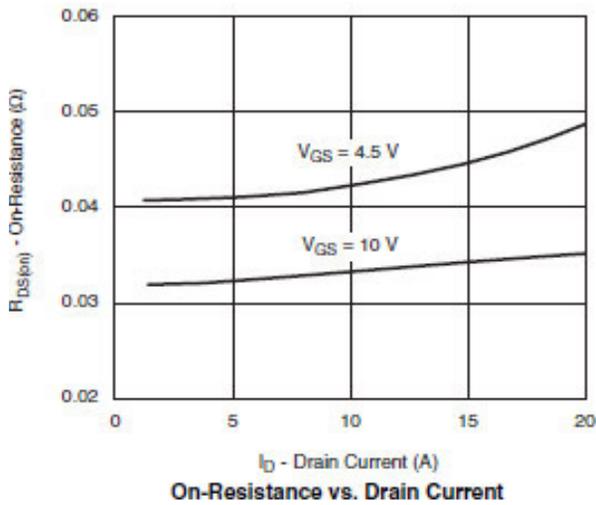
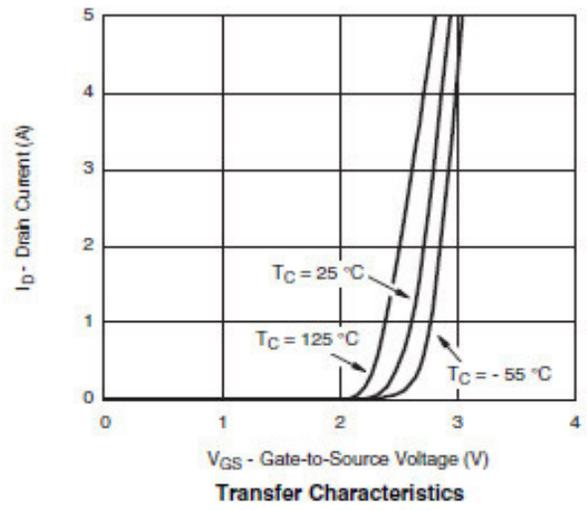
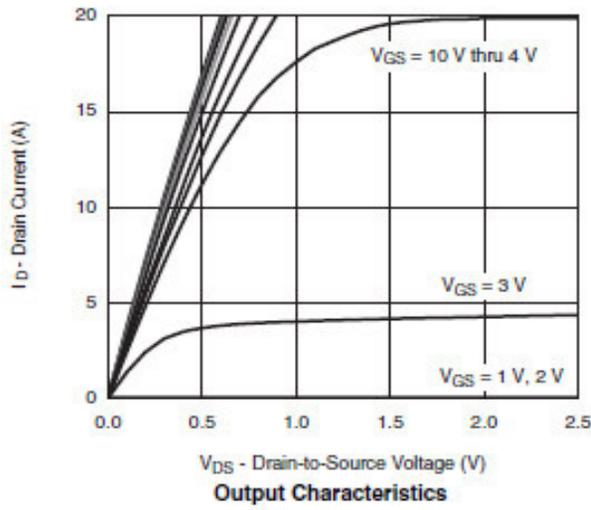
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	30			V
Zero gate voltage drain current	Idss	Vds=24V, Vgs=0V Ta=85°C			1	μA
					30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.3		2.1	V
On state drain current	Id(on)	Vgs=4.5V, Vds=5V	10			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=5.0A		30	36	mΩ
		Vgs=4.5V, Id=4.7A		40	46	
Forward transconductance	Gfs	Vds=15V, Id=5.2A		13		S
Diode forward voltage	Vsd	Is=1.6A, 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=20V, f=1MHz		700		pF
Output capacitance	Coss			75		pF
Reverse transfer capacitance	Crss			45		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vgs=4.5V, Vds=20V, Id=5.2A		8.0	12.0	nC
Gate-source charge	Qgs			1.6		nC
Gate-drain charge	Qgd			2.4		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=15V, Id=1.0A RL=15Ω, Rgen=6Ω		8	12	ns
Turn-on rise time	tr			12	18	ns
Turn-off delay time	td(off)			28	40	ns
Turn-off fall time	tf			10	18	ns

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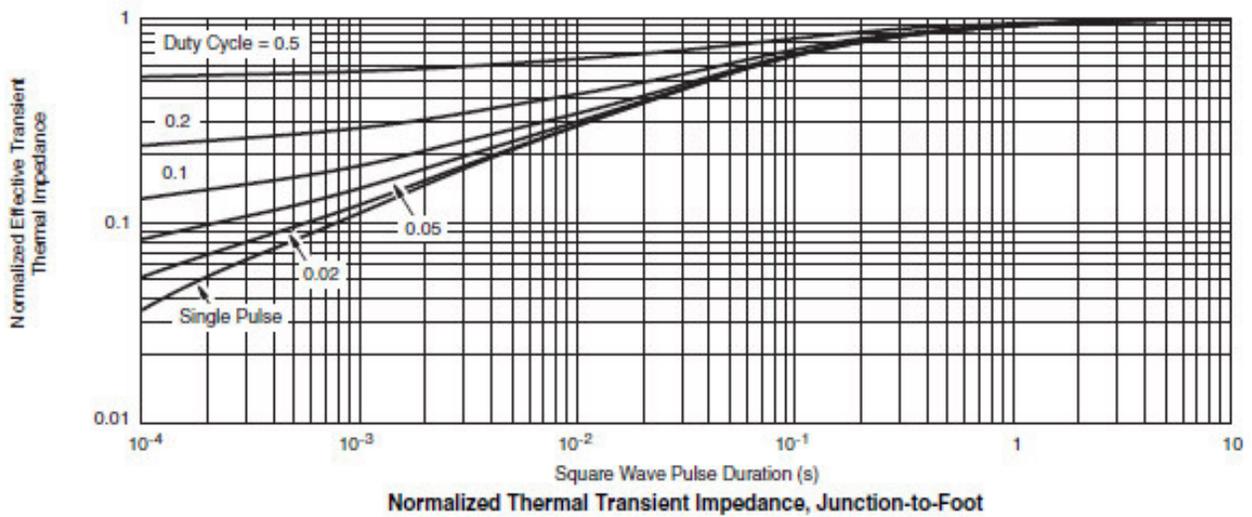
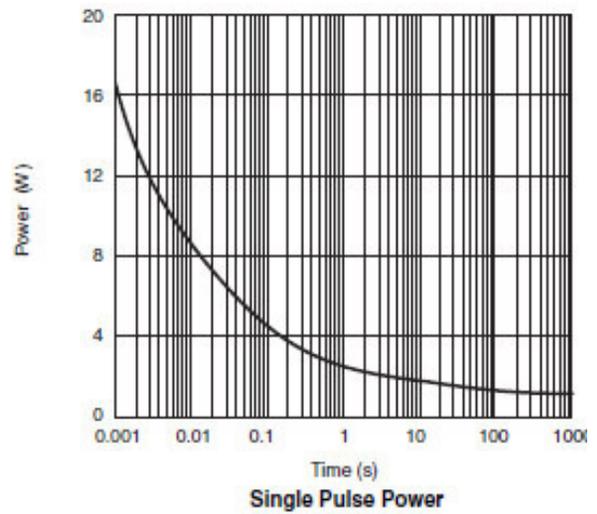
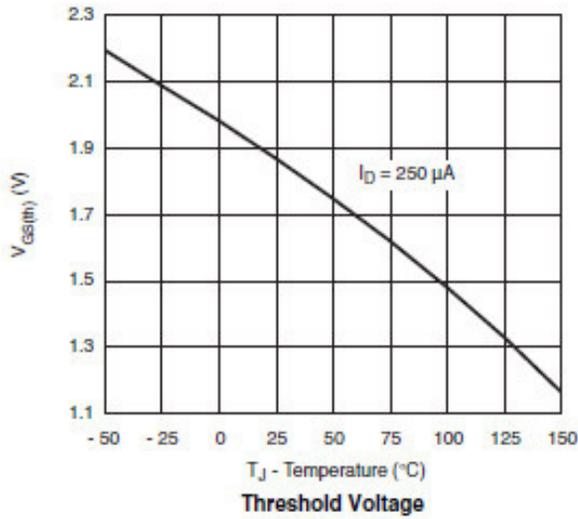
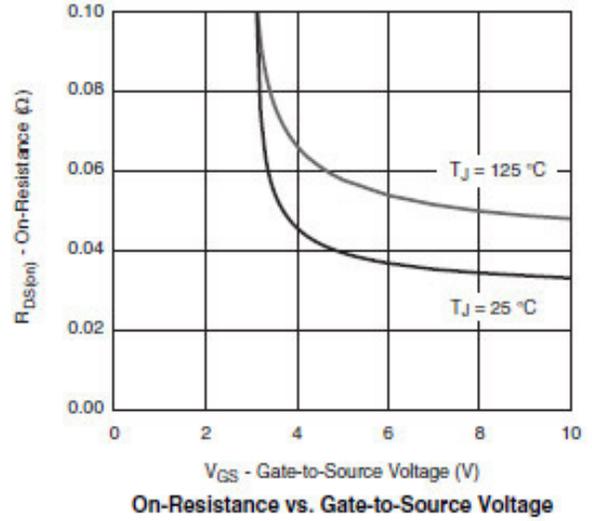
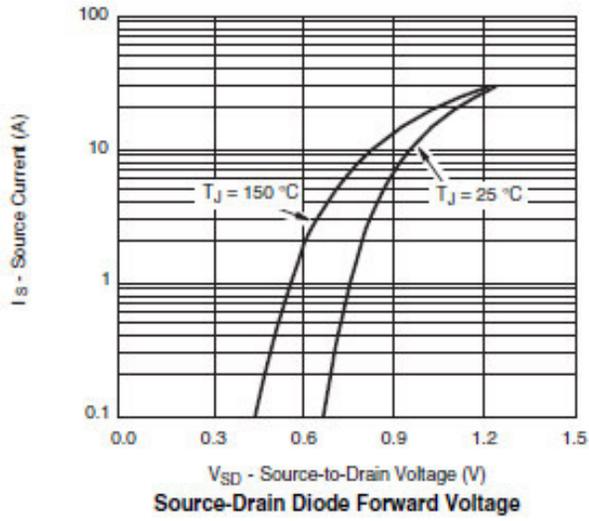
## ■ Typical Electrical and Thermal Characteristics (N-ch)



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### ■ Electrical Characteristics (P-ch)

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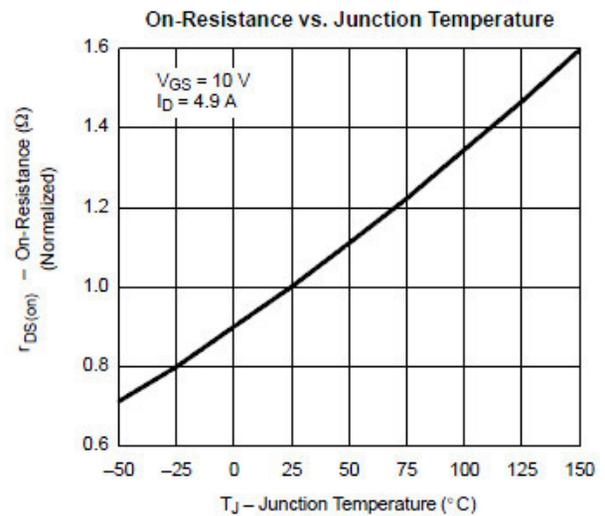
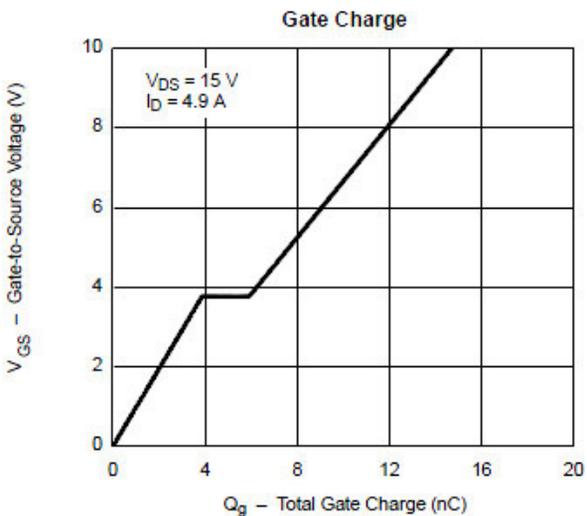
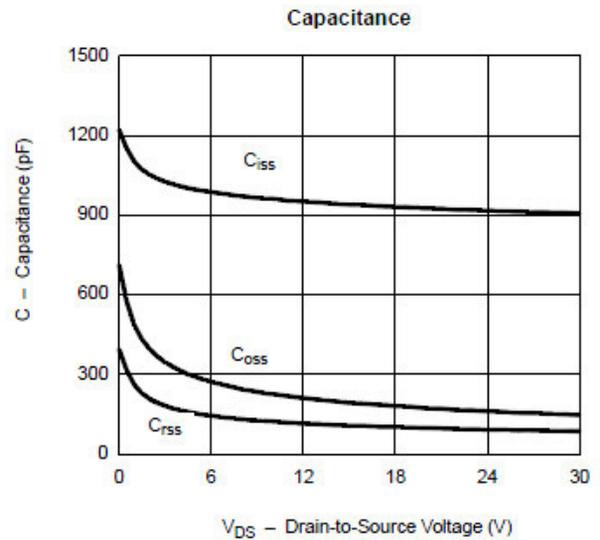
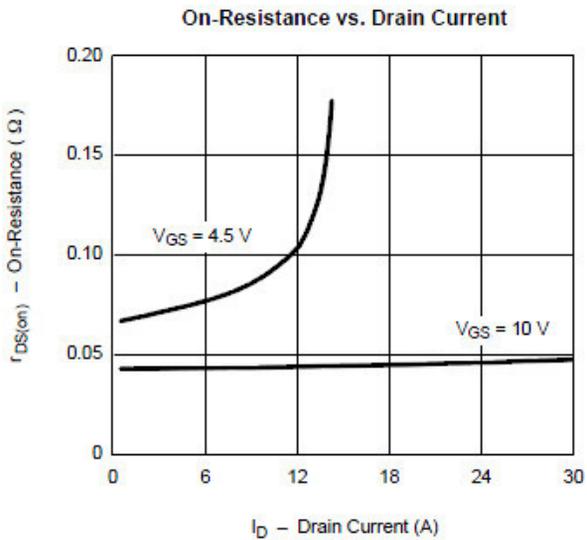
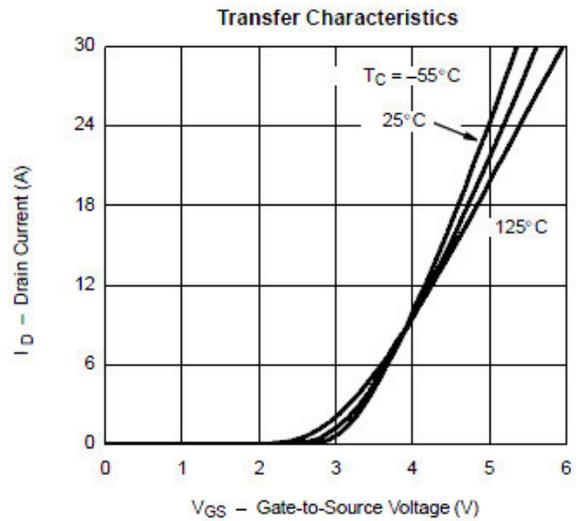
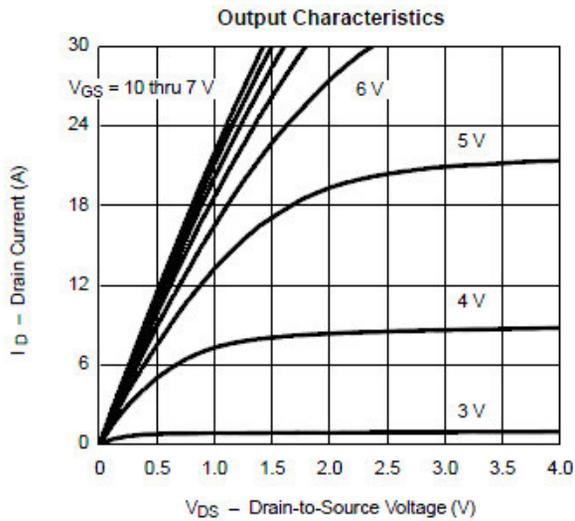
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Zero gate voltage drain current	Idss	Vds=-24V, Vgs=0V Ta=85°C			-1	μA
					-30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-1.0		-2.5	V
On state drain current	Id(on)	Vgs=-10V, Vds=-5V	-25			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-5.4A		52	62	mΩ
		Vgs=-4.5V, Id=-4.2A		70	90	
Forward transconductance	Gfs	Vds=-10V, Id=-4.9A		10		S
Diode forward voltage	Vsd	Is=-1.7A, Vgs=0V		-0.8	-1.3	V
Max. body-diode continuous current	Is				-1.7	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	Ciss	Vgs=0V, Vds=-15V, f=1MHz		500		pF
Output capacitance	Coss			100		pF
Reverse transfer capacitance	Crss			55		pF
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Qg	Vgs=-10V, Vds=-15V Id=-5.0A		10.0	18.0	nC
Gate-source charge	Qgs			1.6		nC
Gate-drain charge	Qgd			3.0		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-15V Id=-1.0A, RL=15Ω, Rgen=6Ω		8	18	ns
Turn-on rise time	tr			8	18	ns
Turn-off delay time	td(off)			25	50	ns
Turn-off fall time	tf			25	35	ns

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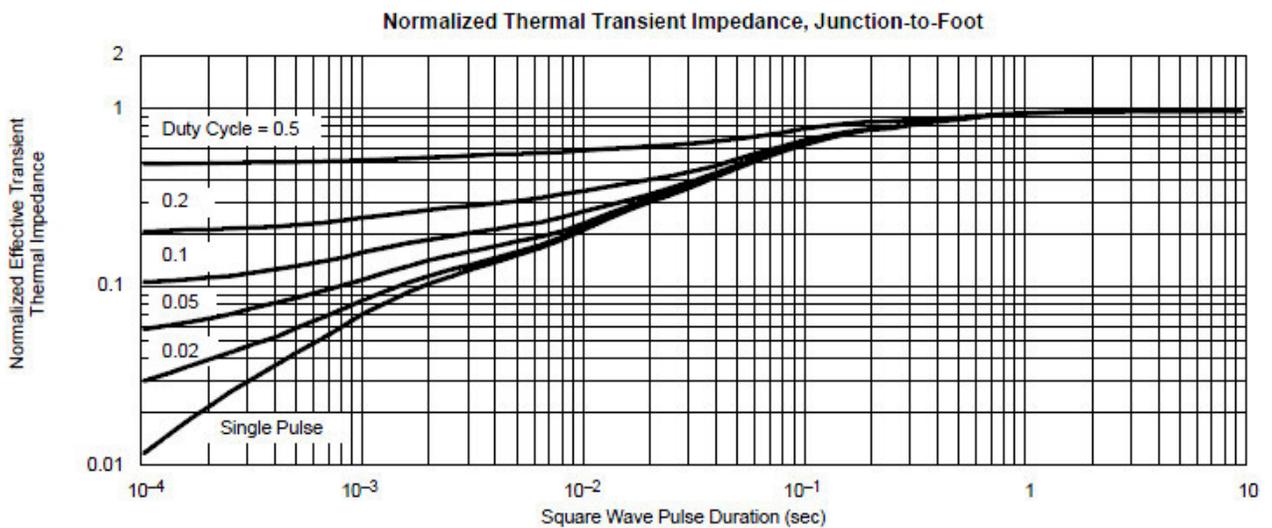
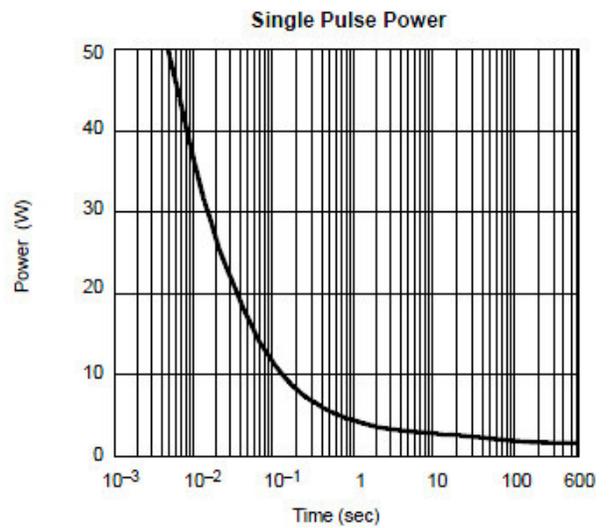
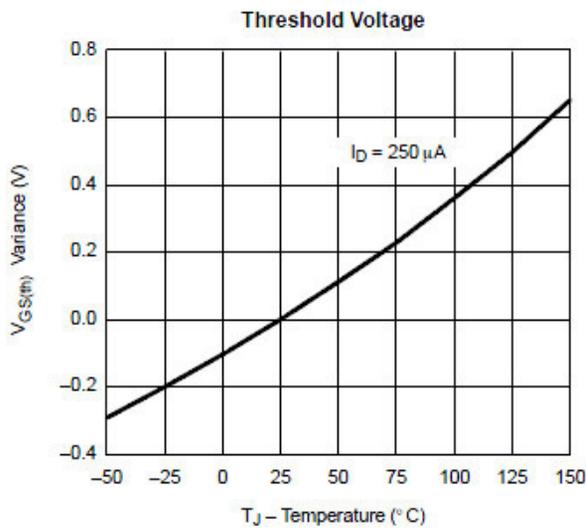
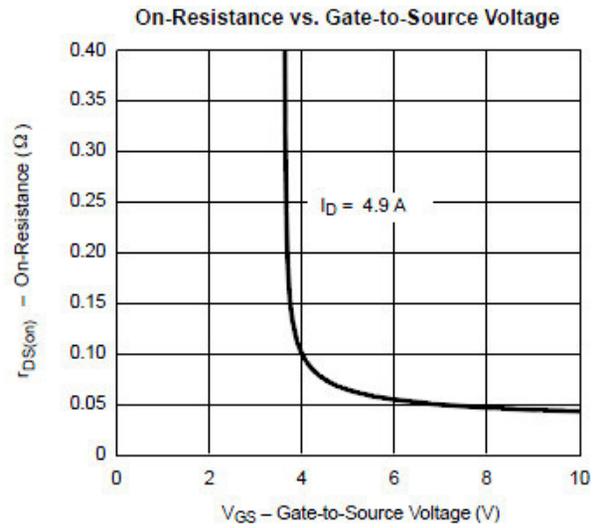
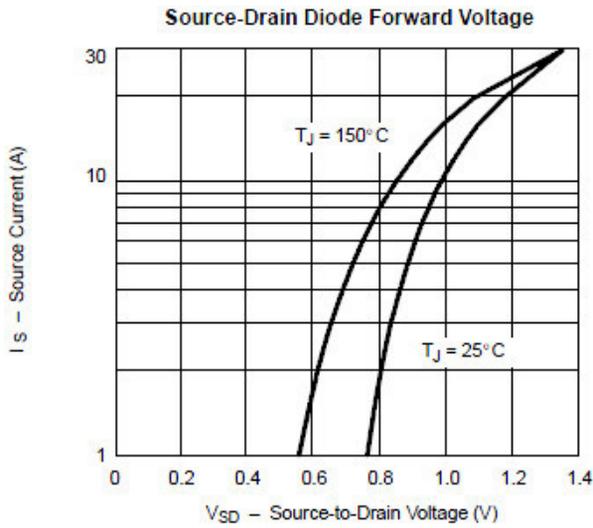
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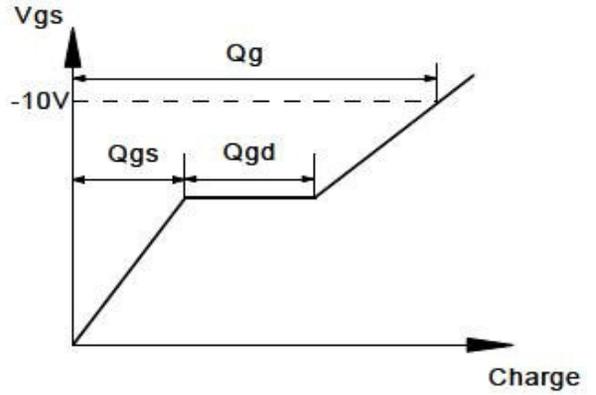
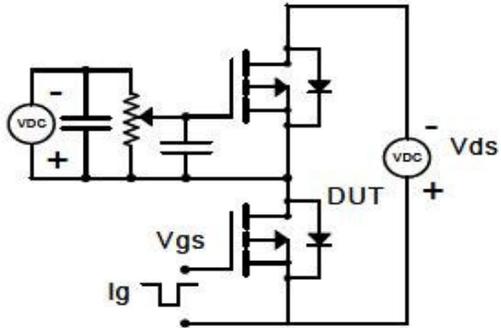
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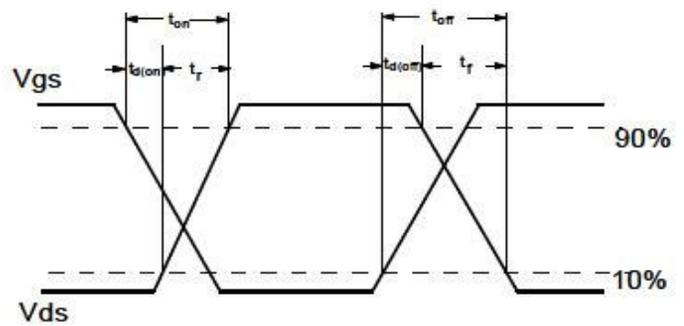
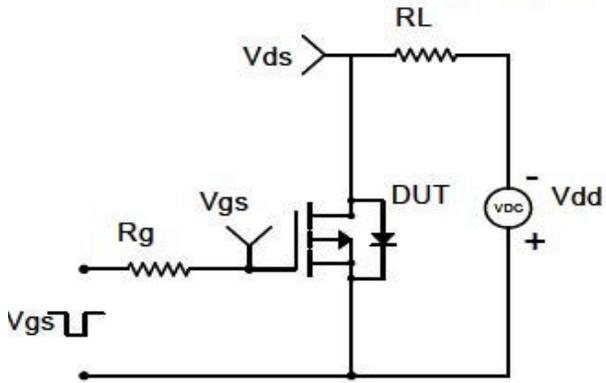
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## ■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

