

Complementary MOSFET

ELM52527CWA-N

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

■General Description

ELM52527CWA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge. ESD protection is included.

■Features

- | | |
|---------------------------------------|--|
| N-channel | P-channel |
| • $V_{ds}=20V$ | • $V_{ds}=-20V$ |
| • $I_d=4.5A$ | • $I_d=-4.5A$ |
| • $R_{ds(on)}=19m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)}=42m\Omega(V_{gs}=-4.5V)$ |
| • $R_{ds(on)}=23m\Omega(V_{gs}=2.5V)$ | • $R_{ds(on)}=52m\Omega(V_{gs}=-2.5V)$ |
| • $R_{ds(on)}=34m\Omega(V_{gs}=1.8V)$ | • $R_{ds(on)}=68m\Omega(V_{gs}=-1.8V)$ |
| • ESD protection | • ESD protection |

■Maximum Absolute Ratings

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

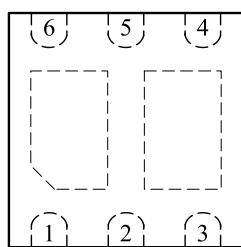
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	V_{ds}	20	-20	V
Gate-source voltage	V_{gs}	± 12	± 12	V
Continuous drain current($T_j=150^{\circ}\text{C}$)	I_d	4.5	-4.5	A
$T_a=70^{\circ}\text{C}$		4.5	-4.5	
Pulsed drain current	I_{dm}	20	-20	A
Power dissipation	P_d	7.8	7.8	W
$T_c=70^{\circ}\text{C}$		5.0	5.0	
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	52.0	$^{\circ}\text{C/W}$	
Thermal resistance junction-to-ambient	$R_{\theta ja}$				
Thermal resistance junction-to-case	$R_{\theta jc}$	N-ch	12.5	$^{\circ}\text{C/W}$	
Thermal resistance junction-to-case	$R_{\theta jc}$				

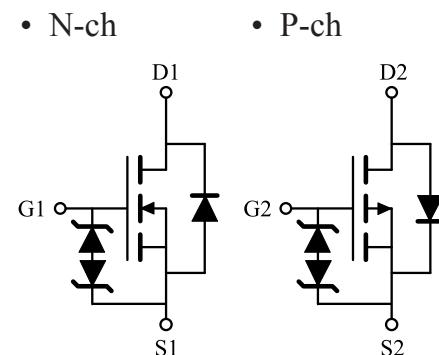
■Pin configuration

DFN6-2×2(TOP VIEW)



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

■Circuit



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■Electrical Characteristics (N-ch)

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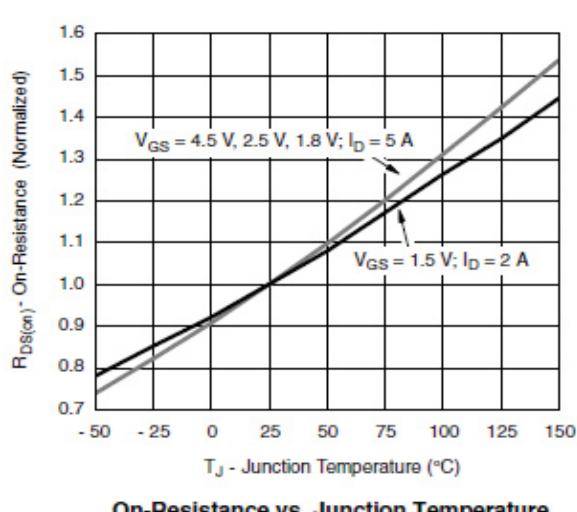
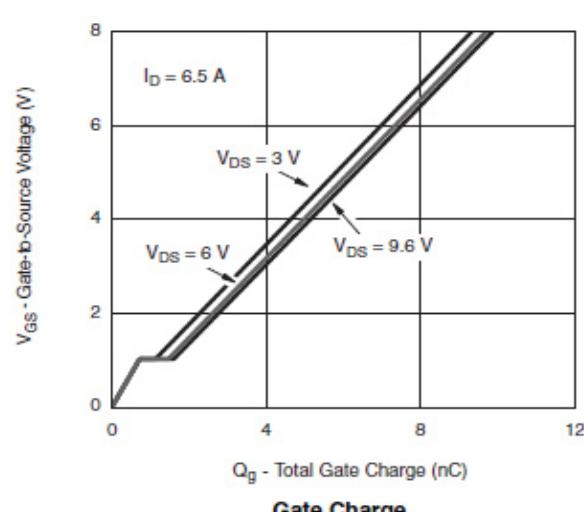
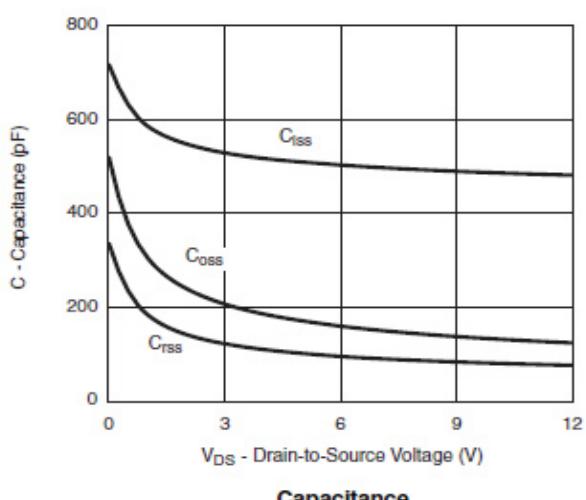
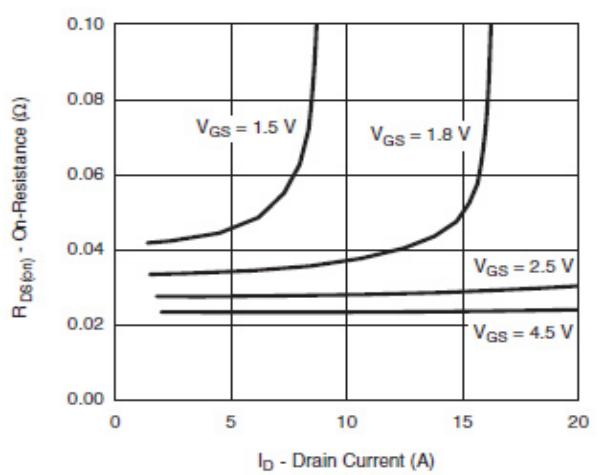
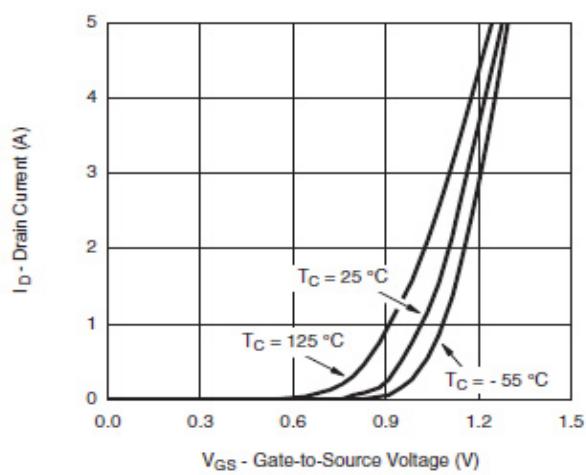
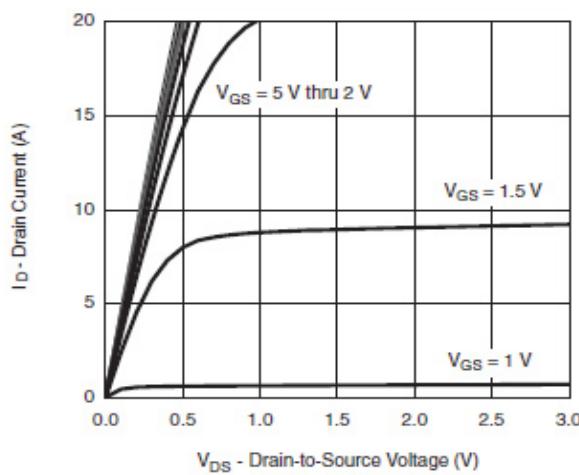
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit	
STATIC PARAMETERS								
Drain-source breakdown voltage	BVdss	Id=250µA, Vgs=0V		20			V	
Zero gate voltage drain current	Idss	Vds=16V, Vgs=0V	Ta=85°C			1	µA	
						10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V				±10	µA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250µA		0.4		1.0	V	
On state drain current	Id(on)	Vgs=4.5V, Vds≥5V		15			A	
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=5.0A			15	19	mΩ	
		Vgs=2.5V, Id=4.6A			18	23		
		Vgs=1.8V, Id=4.2A			27	34		
Forward transconductance	Gfs	Vds=6V, Id=5.0A			28		S	
Diode forward voltage	Vsd	Is=1.5A, Vgs=0V			0.85	1.20	V	
Max.body-diode continuous current	Is					1.6	A	
DYNAMIC PARAMETERS								
Input capacitance	Ciss	Vgs=0V, Vds=6V, f=1MHz			620		pF	
Output capacitance	Coss				180		pF	
Reverse transfer capacitance	Crss				100		pF	
SWITCHING PARAMETERS								
Total gate charge	Qg	Vgs=4.5V, Vds=6V, Id=5.0A			6.0	12.0	nC	
Gate-source charge	Qgs				0.8		nC	
Gate-drain charge	Qgd				0.8		nC	
Turn-on delay time	td(on)	Vgs=4.5V, Vds=10V, Id=3.6A RL=5.5Ω, Rgen=6Ω			10	20	ns	
Turn-on rise time	tr				10	20	ns	
Turn-off delay time	td(off)				25	40	ns	
Turn-off fall time	tf				10	20	ns	

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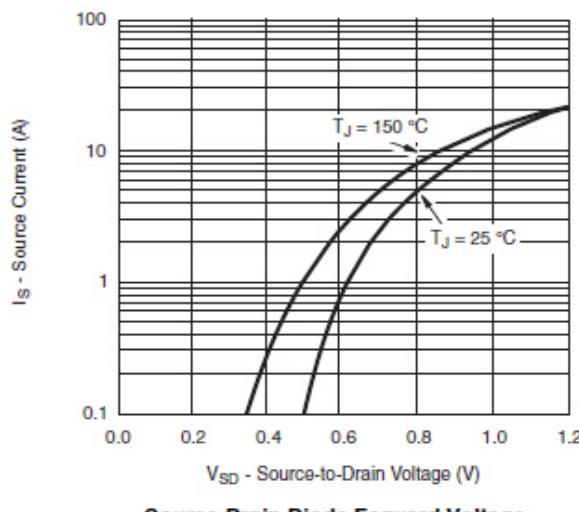
■ Typical Electrical and Thermal Characteristics (N-ch)



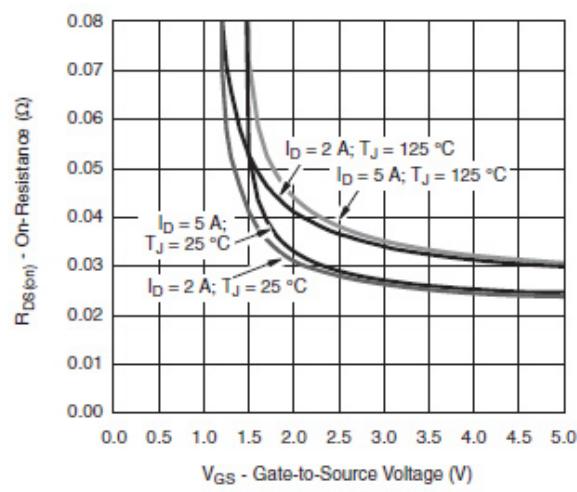
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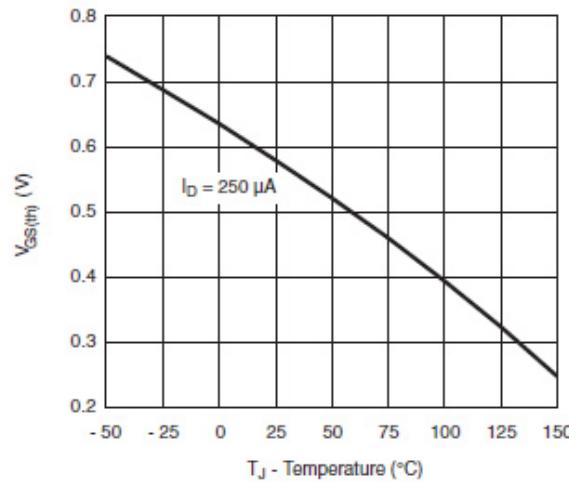
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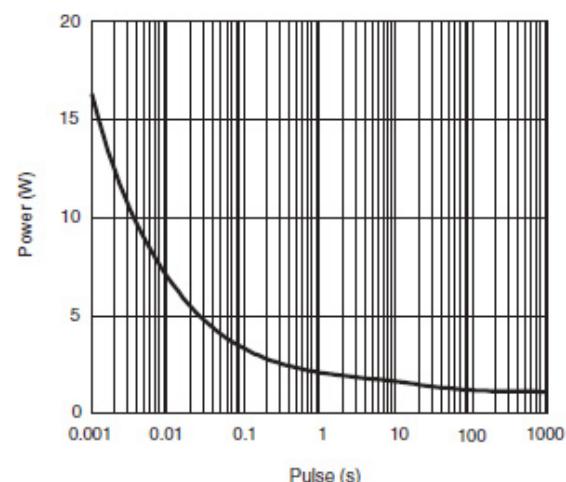
Source-Drain Diode Forward Voltage



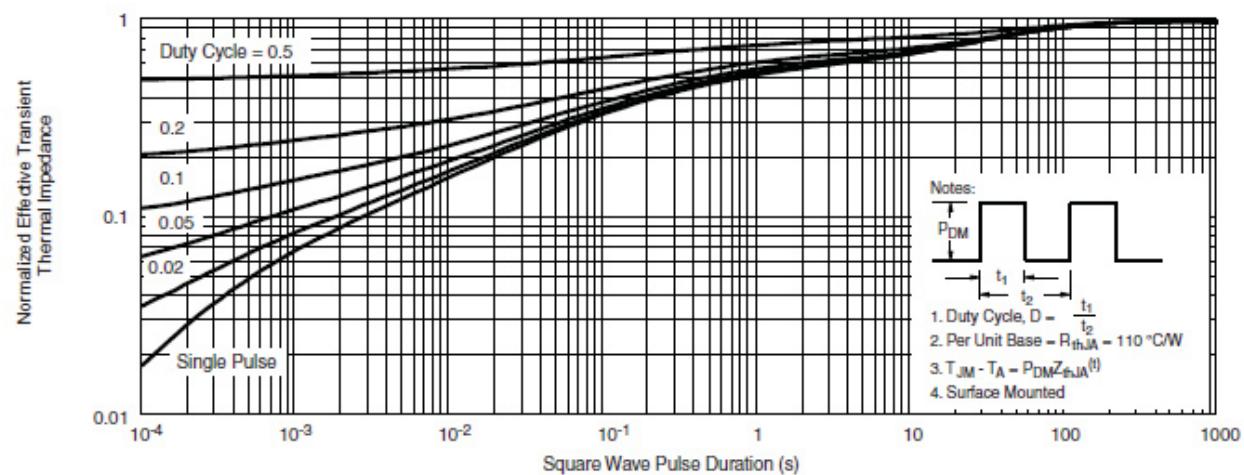
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power (Junction-to-Ambient)



Normalized Thermal Transient Impedance, Junction-to-Ambient

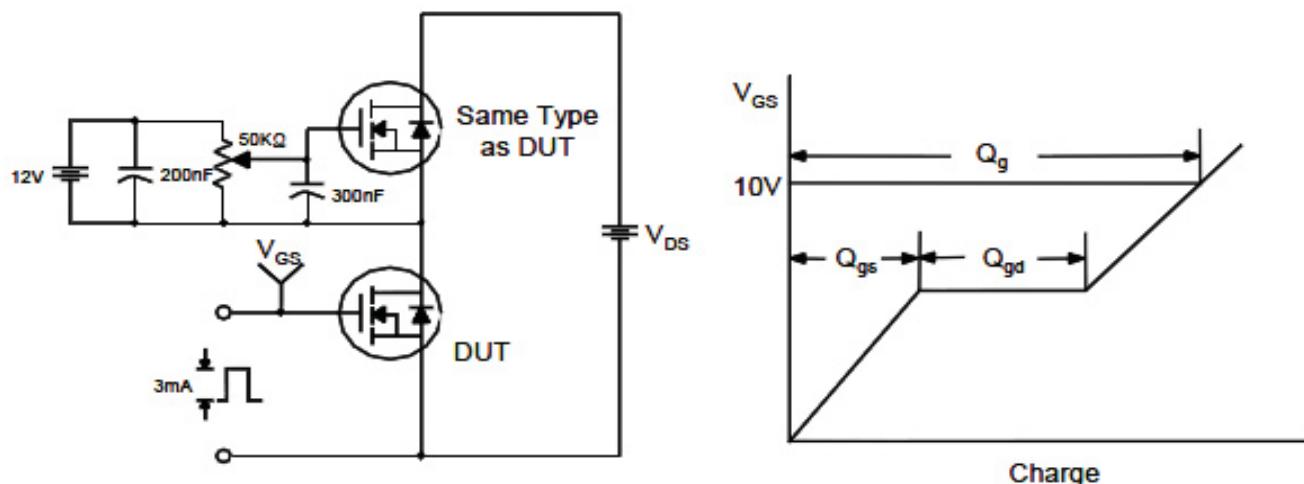
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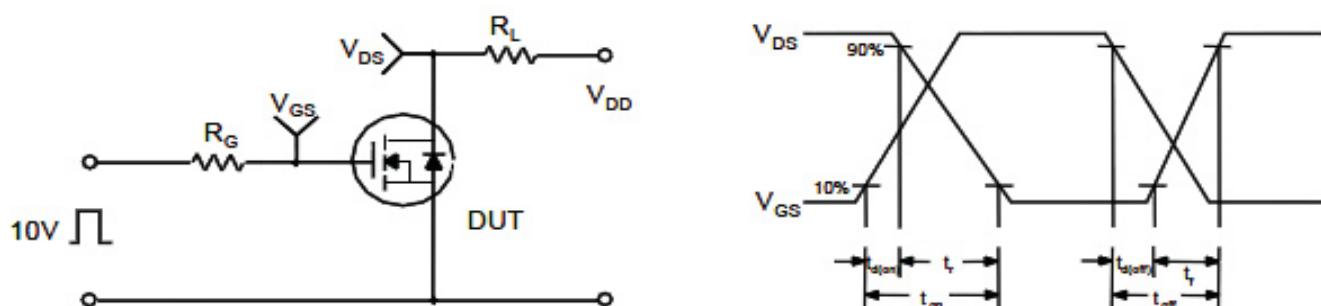
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■ Test circuit and waveform (N-ch)

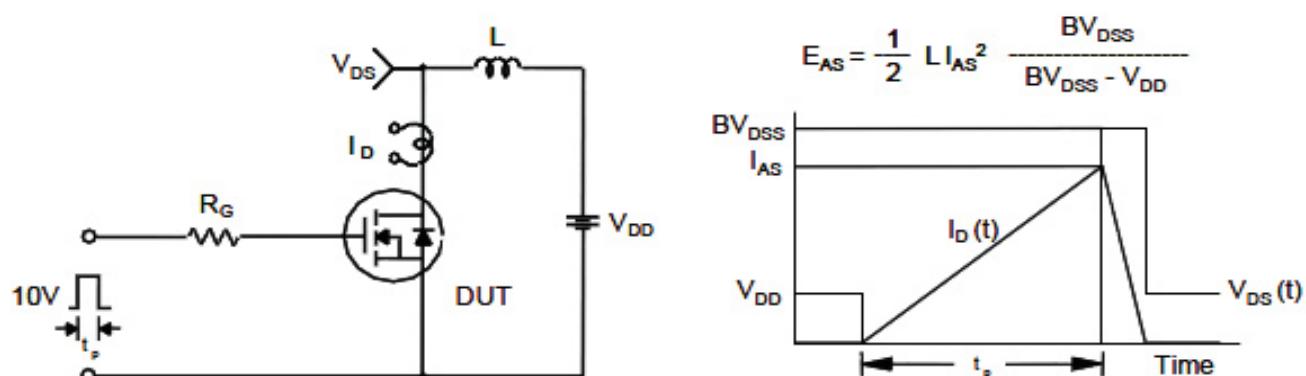
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



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■Electrical Characteristics (P-ch)

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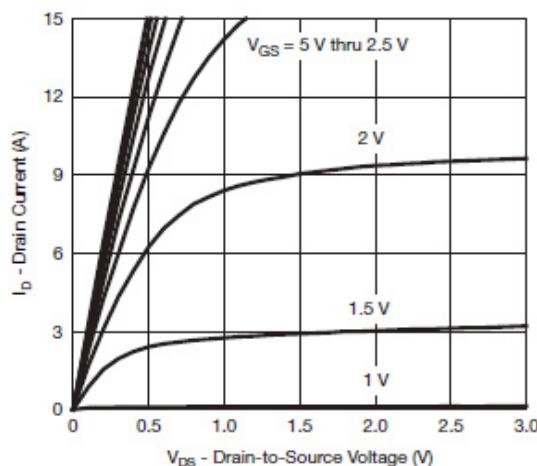
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit	
STATIC PARAMETERS								
Drain-source breakdown voltage	BVdss	Id=-250µA, Vgs=0V		-20			V	
Zero gate voltage drain current	Idss	Vds=-16V, Vgs=0V	Ta=85°C		-1		µA	
					-10			
Gate-body leakage current	Igss	Vds=0V, Vgs=±8V				±10	µA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250µA		-0.4		-1.0	V	
On state drain current	Id(on)	Vgs=-4.5V, Vds≥-5V		-10			A	
Static drain-source on-resistance	Rds(on)	Vgs=-4.5V, Id=-4.5A			37	42	mΩ	
		Vgs=-2.5V, Id=-3.4A			46	52		
		Vgs=-1.8V, Id=-2.4A			59	68		
Forward transconductance	Gfs	Vds=-6V, Id=-4.6A			12		S	
Diode forward voltage	Vsd	Is=-1.25A, Vgs=0V			-0.85	-1.20	V	
Max. body-diode continuous current	Is					-1.6	A	
DYNAMIC PARAMETERS								
Input capacitance	Ciss	Vgs=0V, Vds=-6V, f=1MHz			1450		pF	
Output capacitance	Coss				265		pF	
Reverse transfer capacitance	Crss				255		pF	
SWITCHING PARAMETERS								
Total gate charge	Qg	Vgs=-4.5V, Vds=-6V Id=-5.6A			10.0	18.0	nC	
Gate-source charge	Qgs				2.5		nC	
Gate-drain charge	Qgd				2.8		nC	
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-10V Id=3.7A, RL=2.7Ω Rgen=1Ω			15	25	ns	
Turn-on rise time	tr				25	40	ns	
Turn-off delay time	td(off)				40	65	ns	
Turn-off fall time	tf				15	25	ns	

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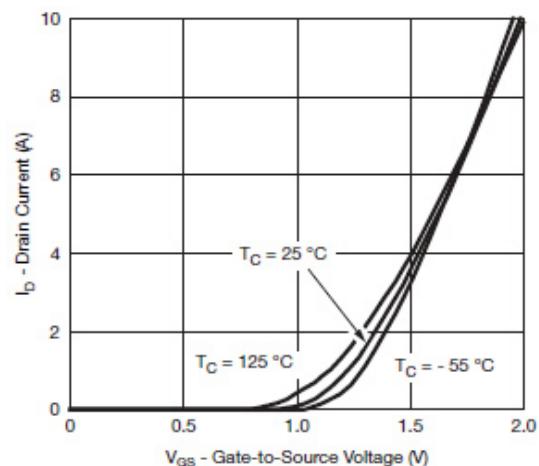
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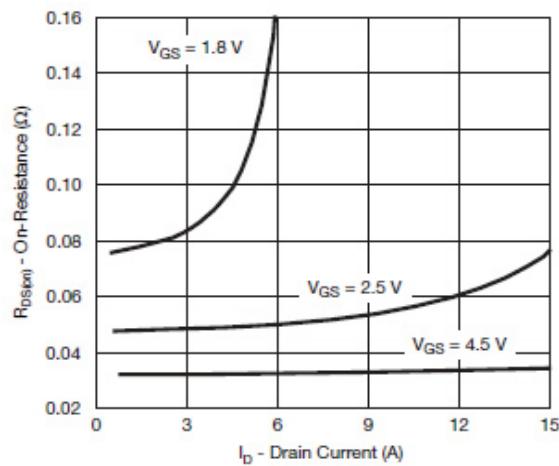
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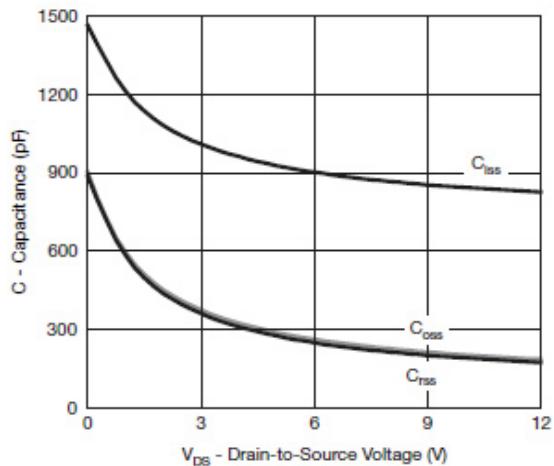
Output Characteristics



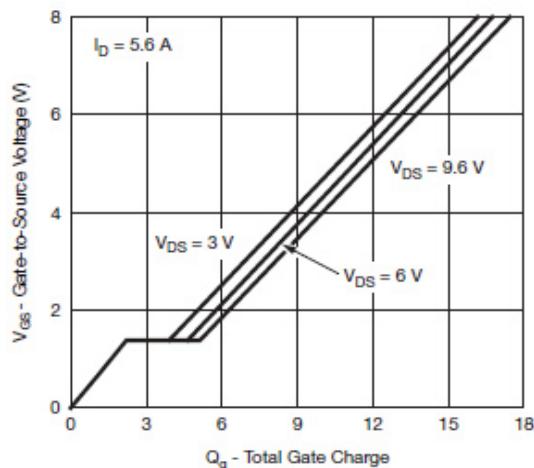
Transfer Characteristics



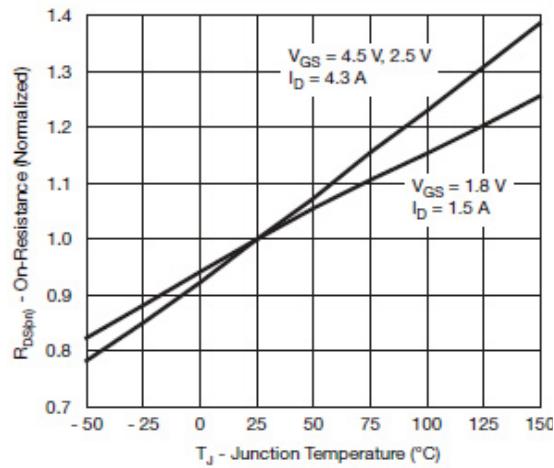
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge

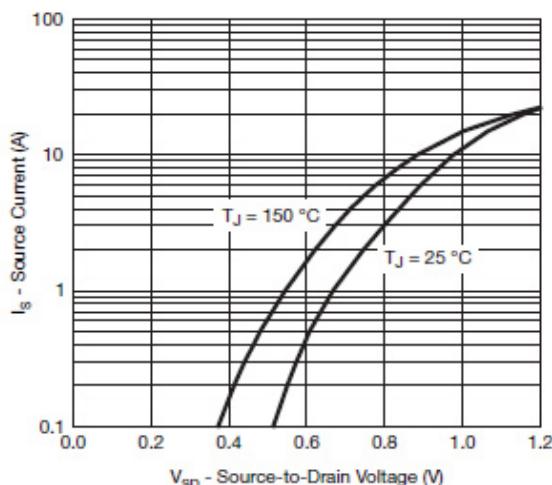


On-Resistance vs. Junction Temperature

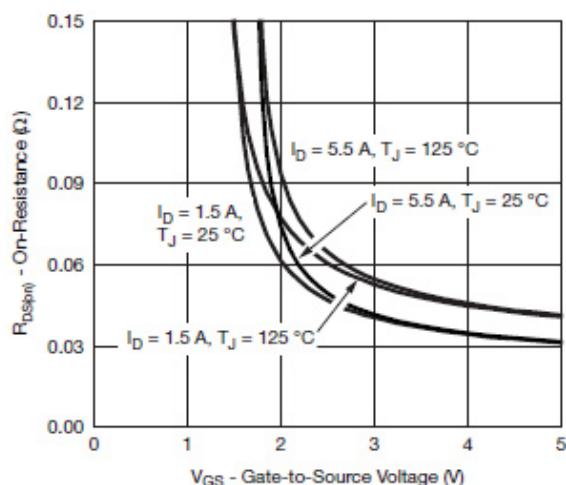
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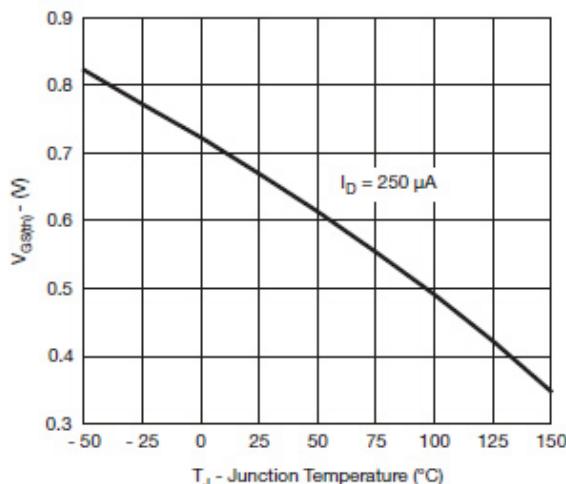
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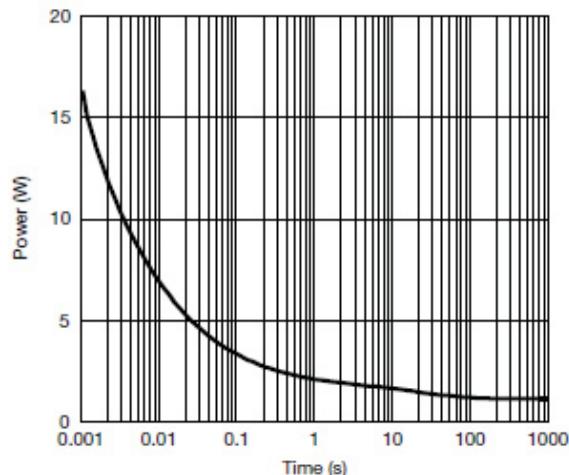
Source-Drain Diode Forward Voltage



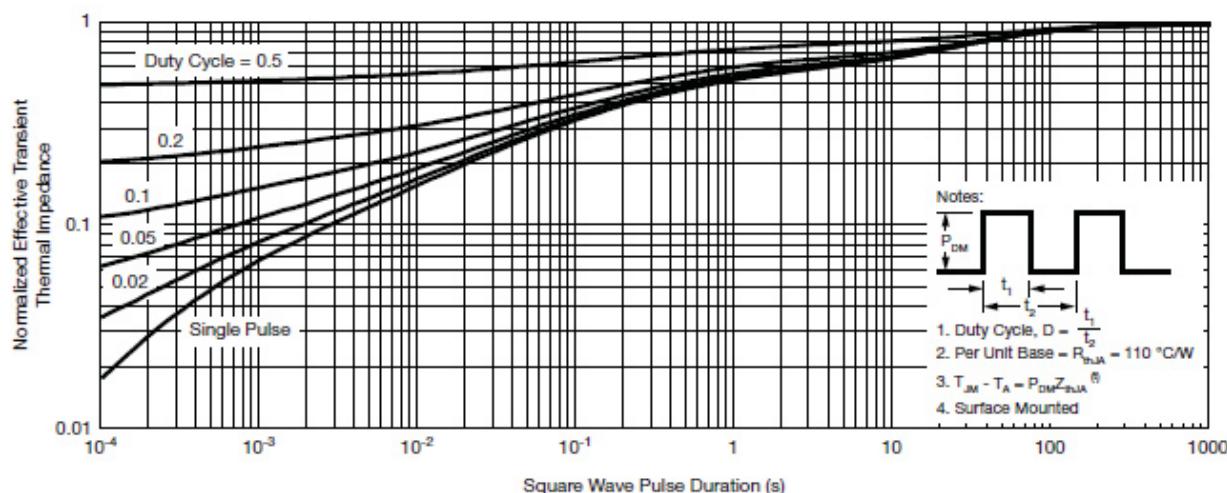
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Normalized Thermal Transient Impedance, Junction-to-Ambient

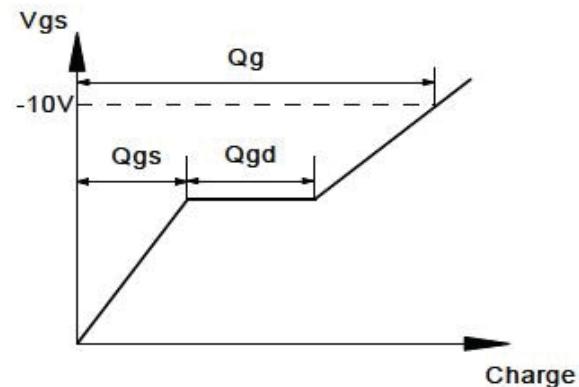
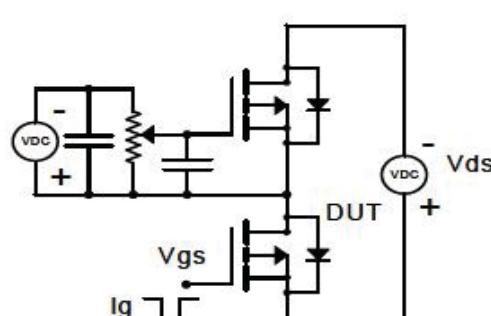
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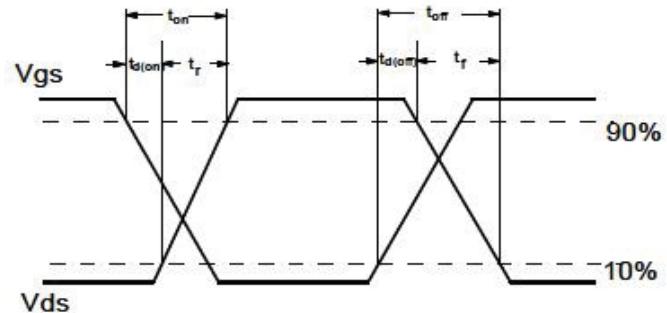
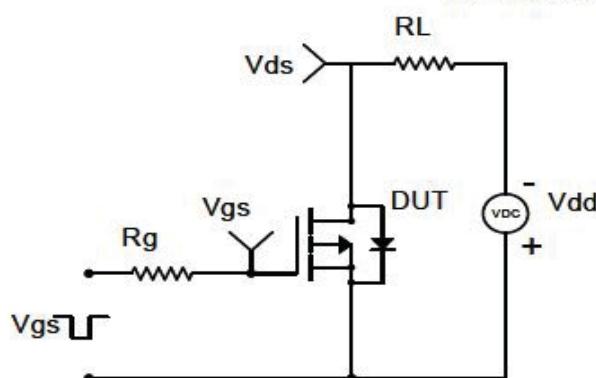
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■ Test circuit and waveform (P-ch)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

