

Complementary MOSFET

ELM56606CWA-S

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

■General Description

ELM56606CWA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

■Features

- | | |
|--|---|
| N-channel | P-channel |
| • $V_{ds}=60V$ | • $V_{ds}=-60V$ |
| • $I_d=2.8A$ | • $I_d=-1.8A$ |
| • $R_{ds(on)}=135m\Omega(V_{gs}=10V)$ | • $R_{ds(on)}=310m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)}=145m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)}=340m\Omega(V_{gs}=-4.5V)$ |

■Maximum Absolute Ratings

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

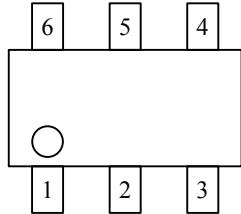
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	V_{ds}	60	-60	V
Gate-source voltage	V_{gs}	± 20	± 20	V
Continuous drain current($T_j=150^{\circ}\text{C}$)	I_d	2.8	-1.8	A
		2.0	-1.4	
Pulsed drain current	I_{dm}	8	-8	A
Power dissipation	P_d	2.0	2.0	W
		1.3	1.3	
Operating junction temperature	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		120	$^{\circ}\text{C}/\text{W}$
Thermal resistance junction-to-ambient	$R_{\theta ja}$	P-ch		120	$^{\circ}\text{C}/\text{W}$

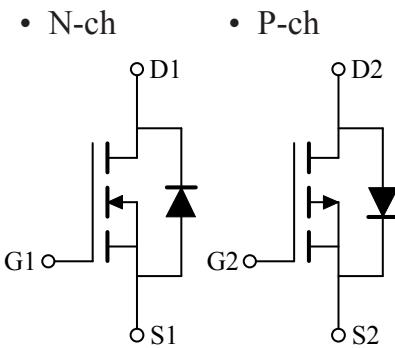
■Pin configuration

SOT-26(TOP VIEW)



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

■Circuit



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■Electrical Characteristics (N-ch)

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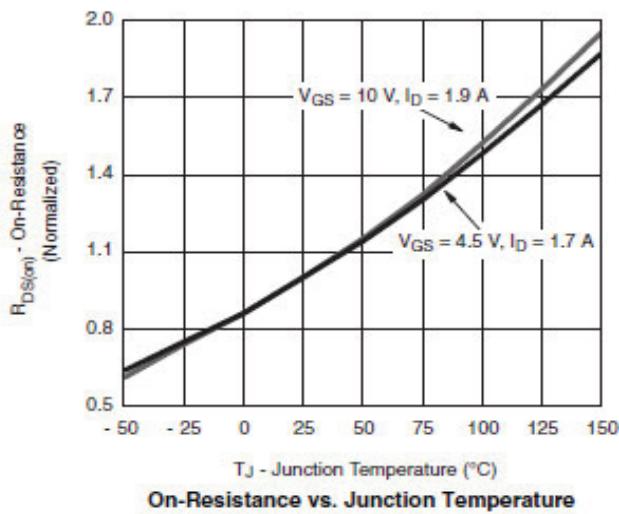
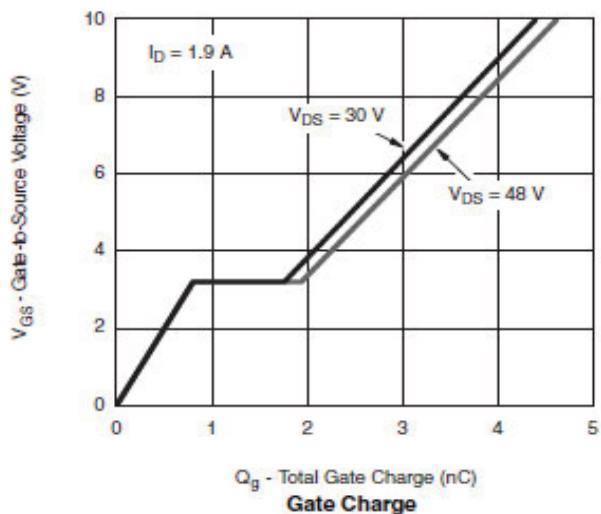
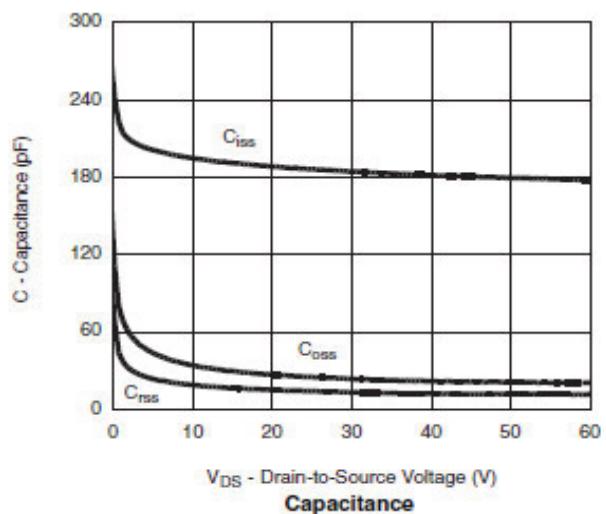
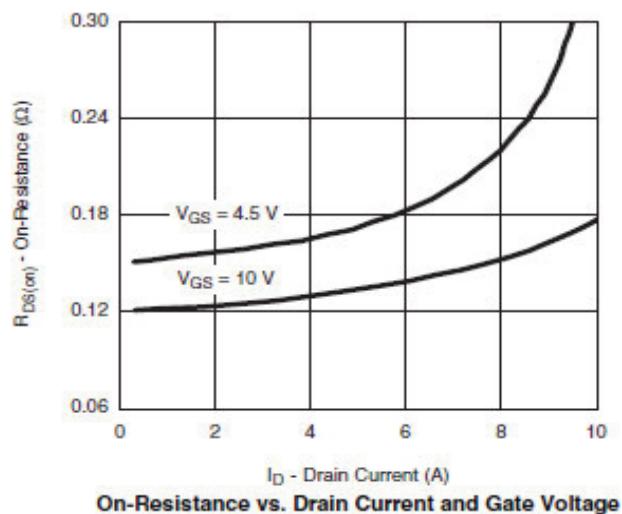
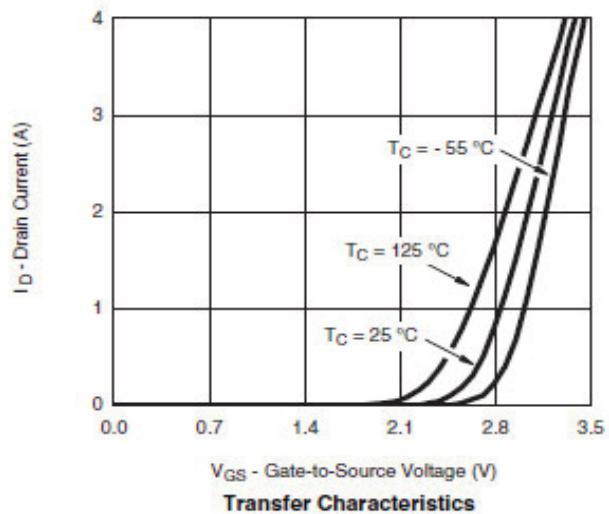
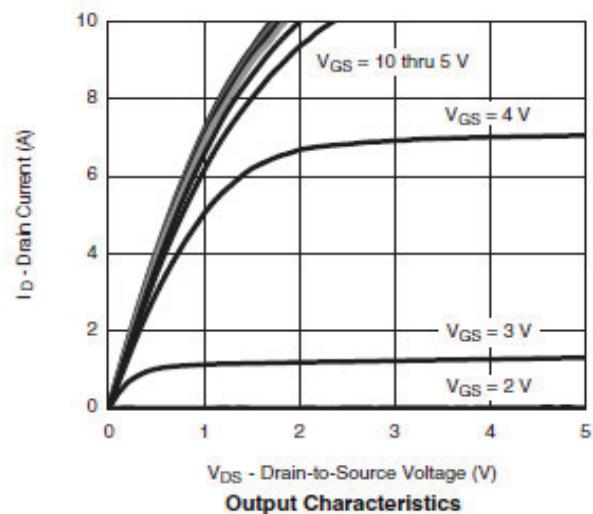
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit	
STATIC PARAMETERS								
Drain-source breakdown voltage	BVdss	Id=250µA, Vgs=0V		60			V	
Zero gate voltage drain current	Idss	Vds=48V, Vgs=0V	Ta=85°C			1	µA	
						10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250µA		0.7		2.5	V	
On state drain current	Id(on)	Vgs=10V, Vds≥5V		5			A	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=2.8A			115	135	mΩ	
		Vgs=4.5V, Id=2.0A			125	145		
Forward transconductance	Gfs	Vds=15V, Id=2.0A			5		S	
Diode forward voltage	Vsd	Is=2.5A, Vgs=0V			0.85	1.20	V	
Max.body-diode continuous current	Is					1.5	A	
DYNAMIC PARAMETERS								
Input capacitance	Ciss	Vgs=0V, Vds=30V, f=1MHz			200		pF	
Output capacitance	Coss				20		pF	
Reverse transfer capacitance	Crss				10		pF	
SWITCHING PARAMETERS								
Total gate charge	Qg	Vgs=4.5V, Vds=30V, Id=2.0A			2.5	3.5	nC	
Gate-source charge	Qgs				0.8		nC	
Gate-drain charge	Qgd				1.0		nC	
Turn-on delay time	td(on)	Vgs=10V, Vds=30V, Id=1.5A RL=20Ω, Rgen=1Ω			4	8	ns	
Turn-on rise time	tr				10	20	ns	
Turn-off delay time	td(off)				10	40	ns	
Turn-off fall time	tf				6	10	ns	

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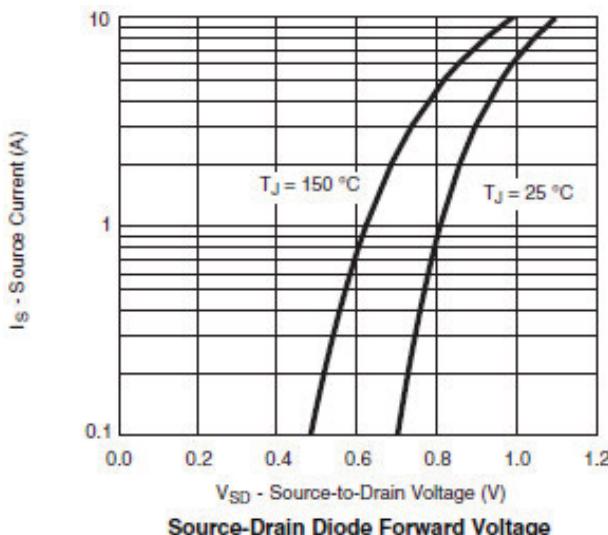
■ Typical Electrical and Thermal Characteristics (N-ch)



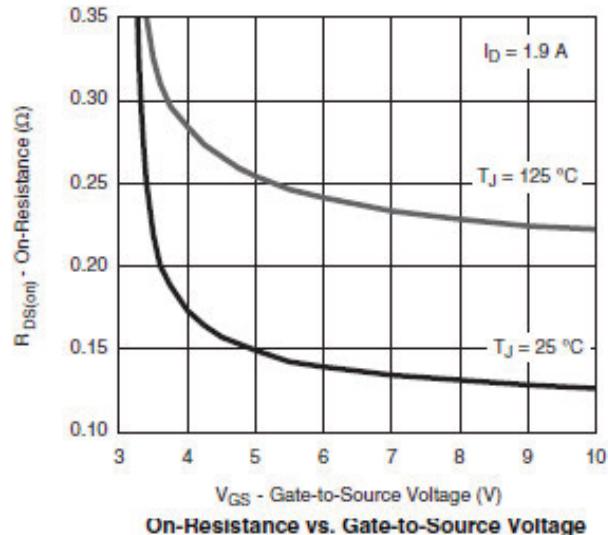
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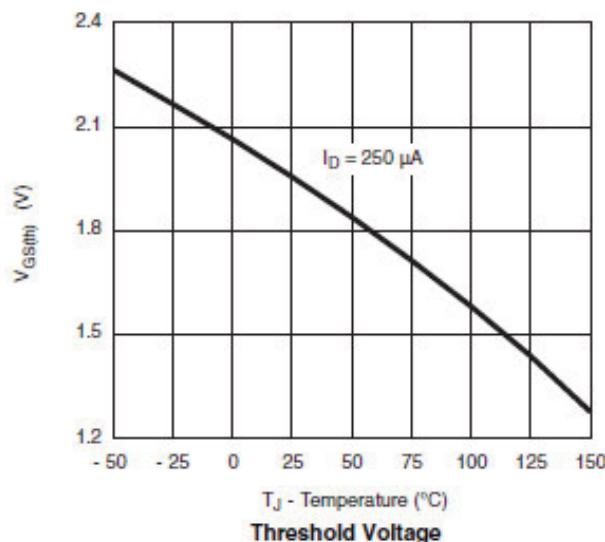
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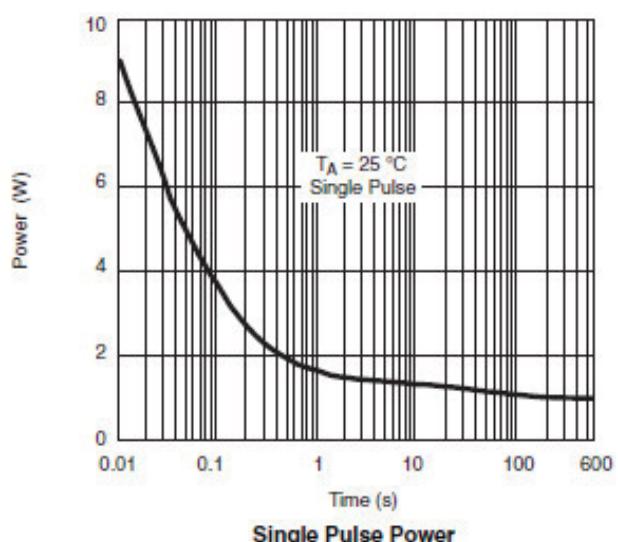
Source-Drain Diode Forward Voltage



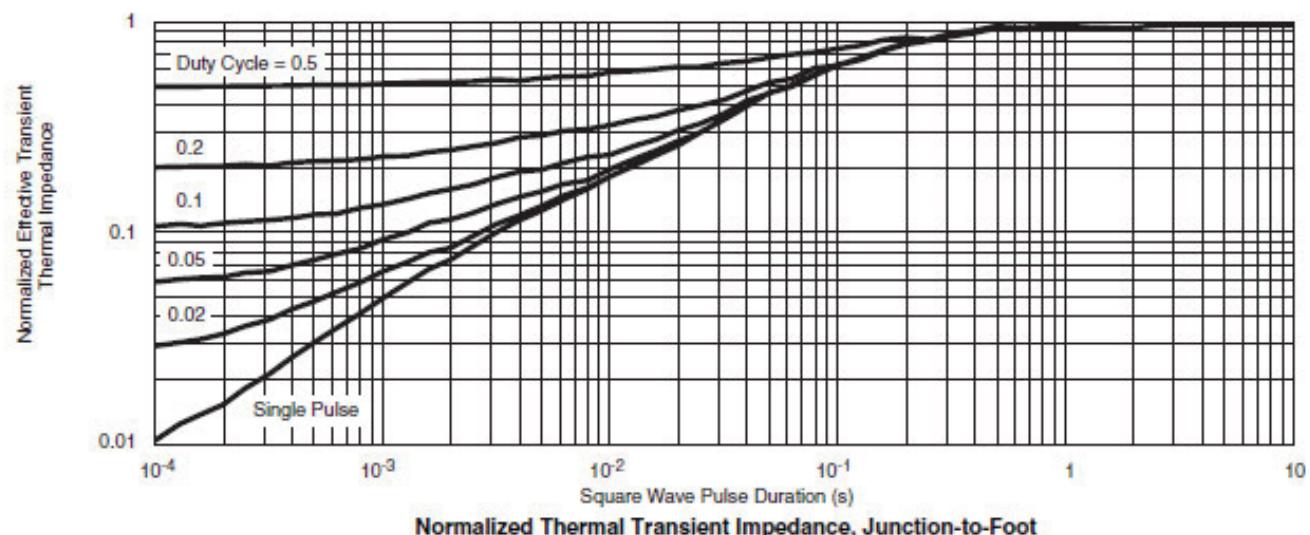
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Foot

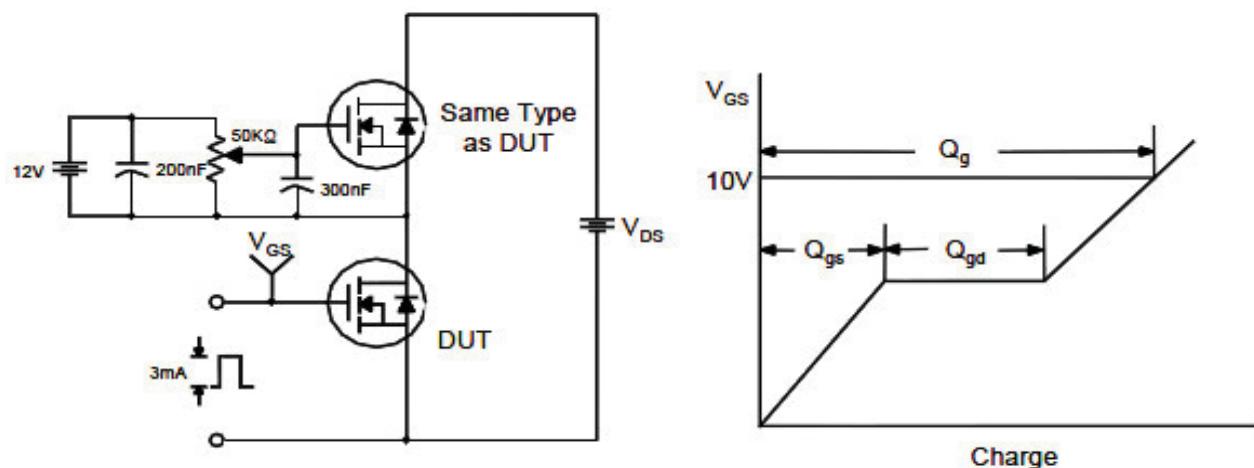
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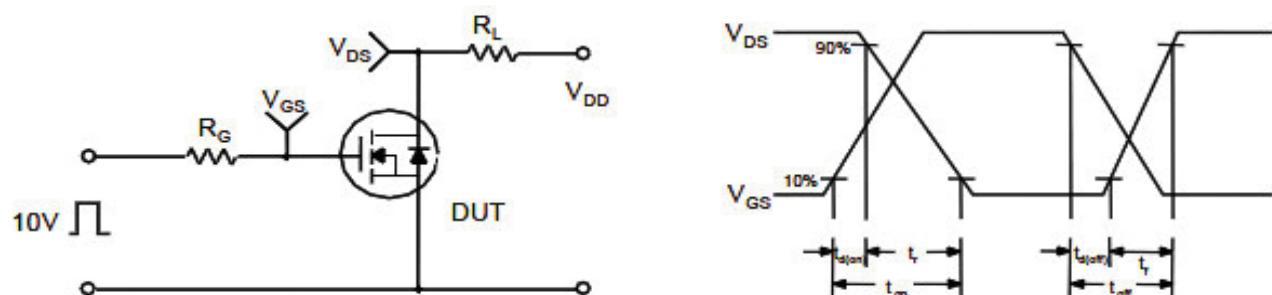
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■ Test circuit and waveform (N-ch)

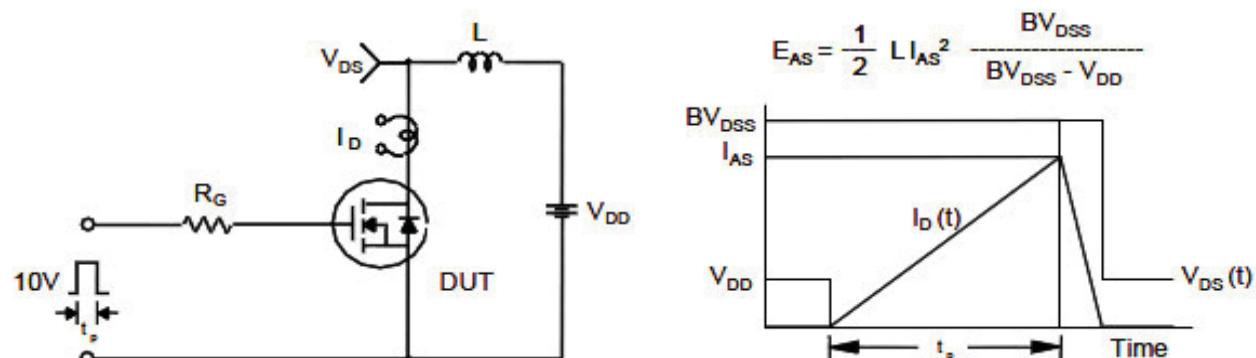
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



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■Electrical Characteristics (P-ch)

Ta=25°C. Unless otherwise noted.

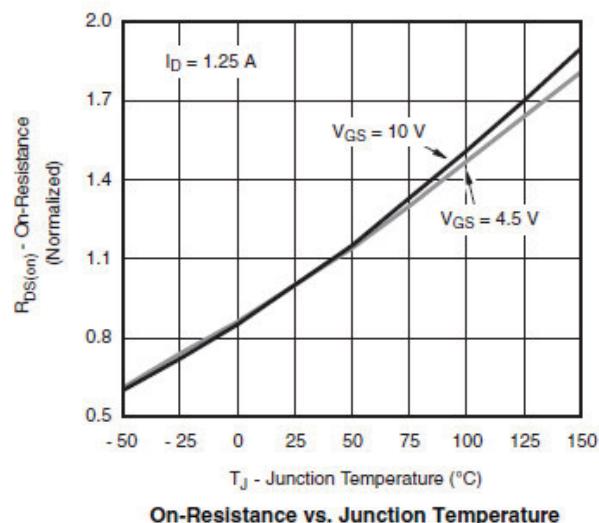
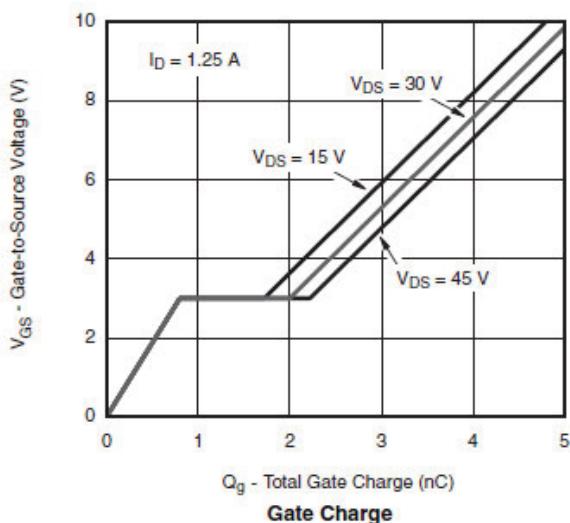
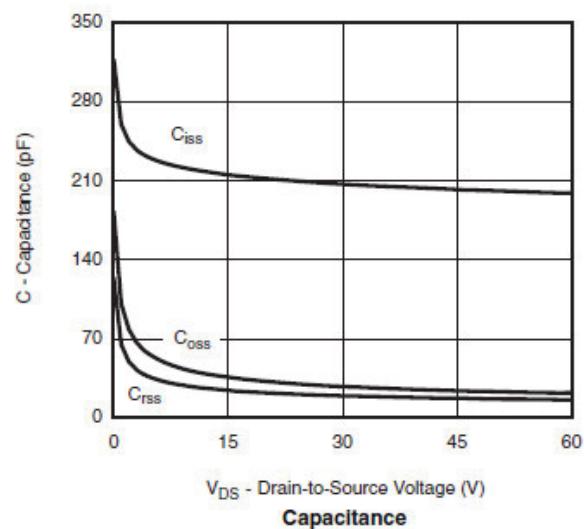
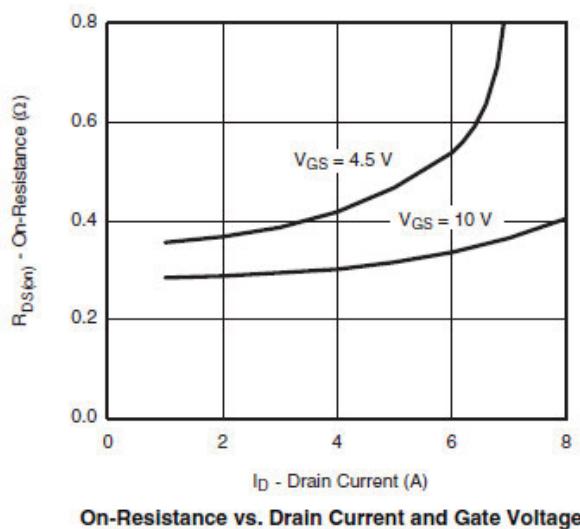
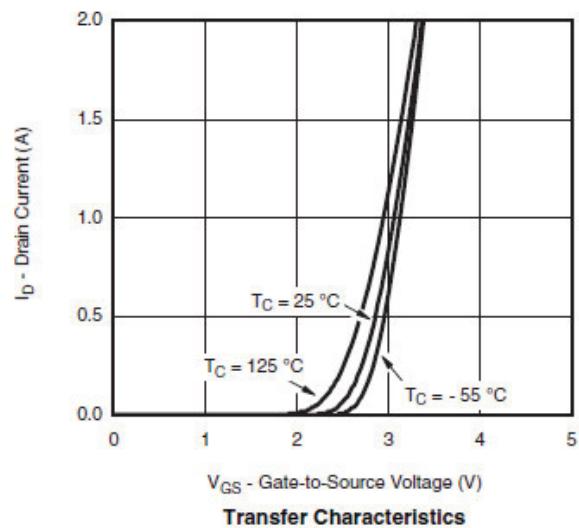
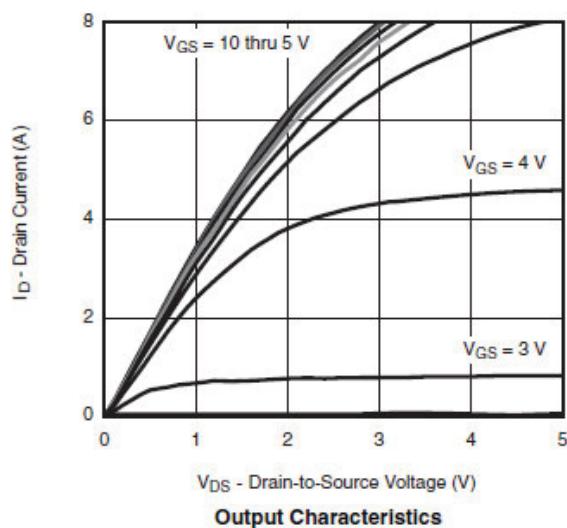
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=-250µA, Vgs=0V		-60			V
Zero gate voltage drain current	Idss	Vds=-48V, Vgs=0V			-1		µA
			Ta=85°C			-30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250µA		-1.0		-2.0	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-5V		-6			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-1.8A			280	310	mΩ
		Vgs=-4.5V, Id=-1.4A			295	340	
Forward transconductance	Gfs	Vds=-10V, Id=-1.0A			2.8		S
Diode forward voltage	Vsd	Is=-1.0A, Vgs=0V			-0.75	-1.30	V
Max. body-diode continuous current	Is					-1.5	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-30V, f=1MHz			210		pF
Output capacitance	Coss				25		pF
Reverse transfer capacitance	Crss				18		pF
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-4.5V, Vds=-30V Id=-1.25A			2.7	4.5	nC
Gate-source charge	Qgs				0.7		nC
Gate-drain charge	Qgd				1.2		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-30V Id=-1.0A, RL=30Ω Rgen=1Ω			5	10	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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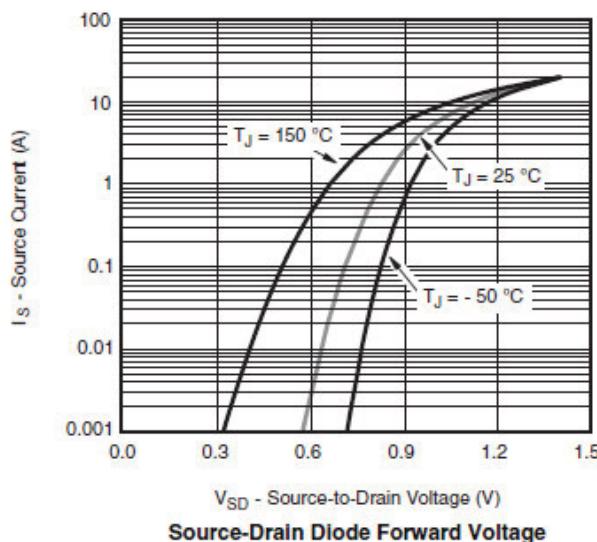
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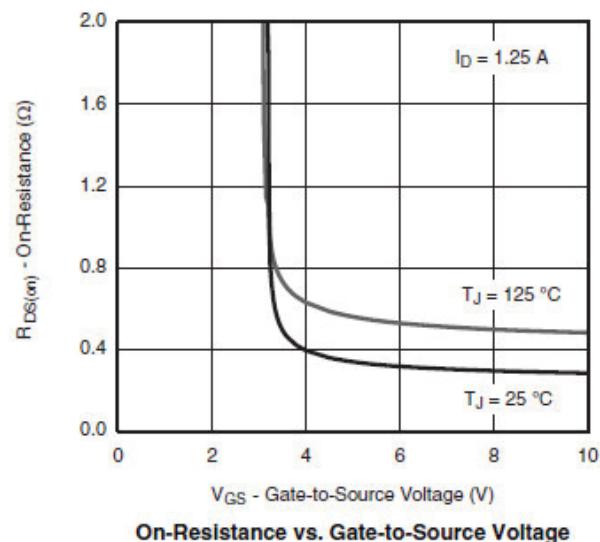
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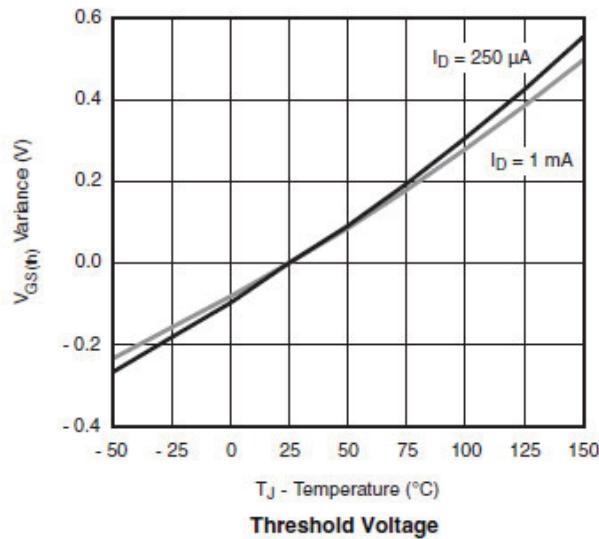
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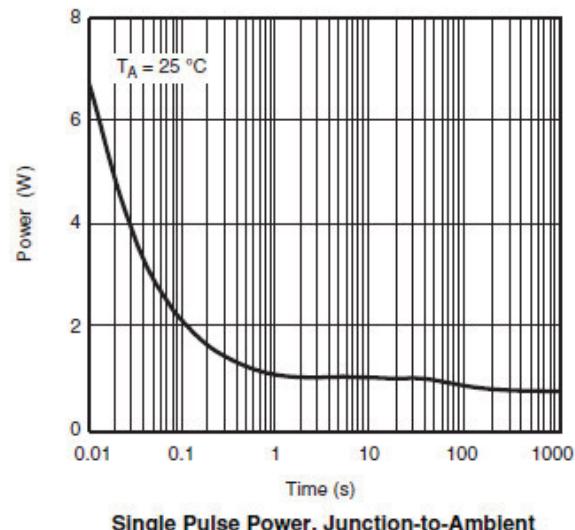
Source-Drain Diode Forward Voltage



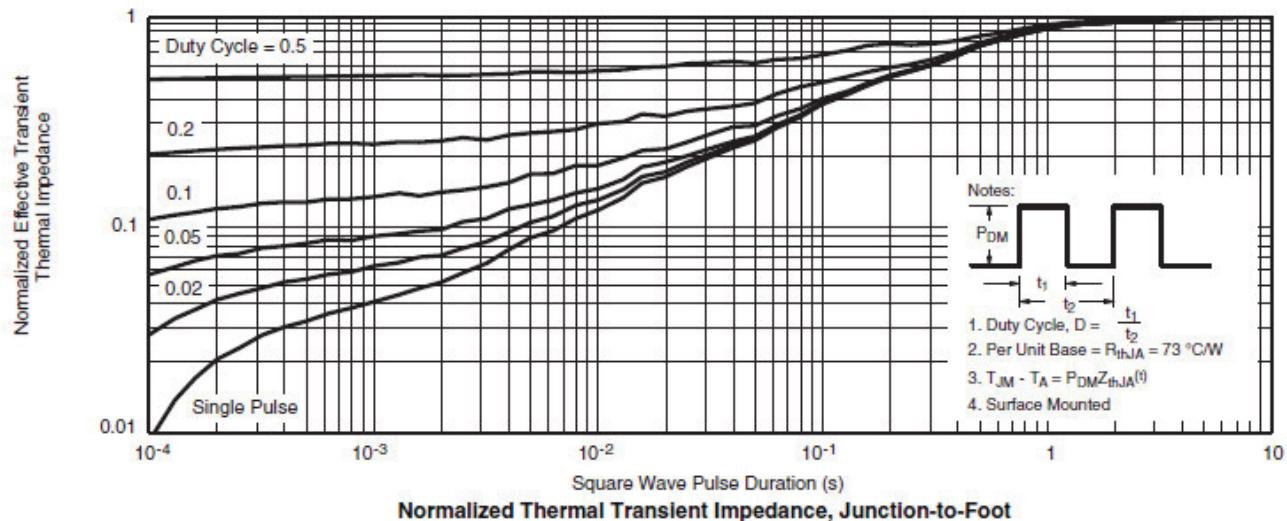
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



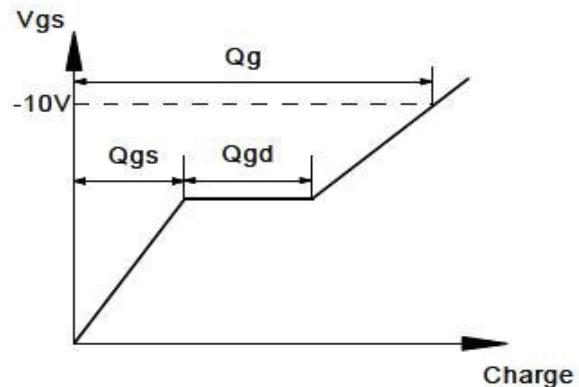
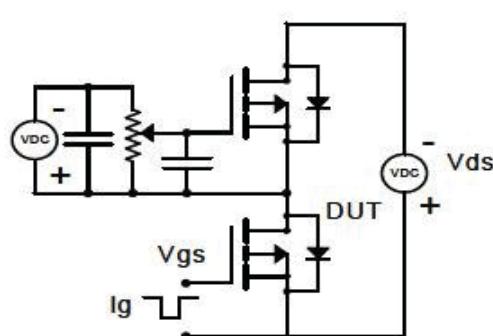
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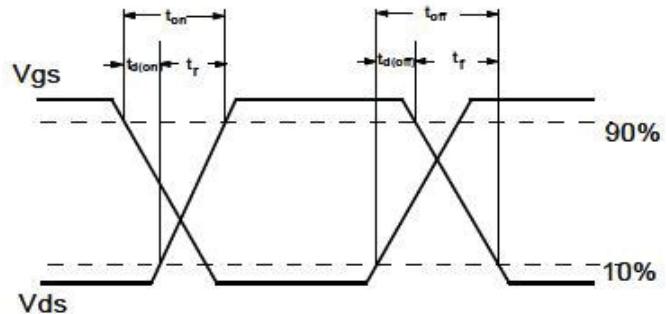
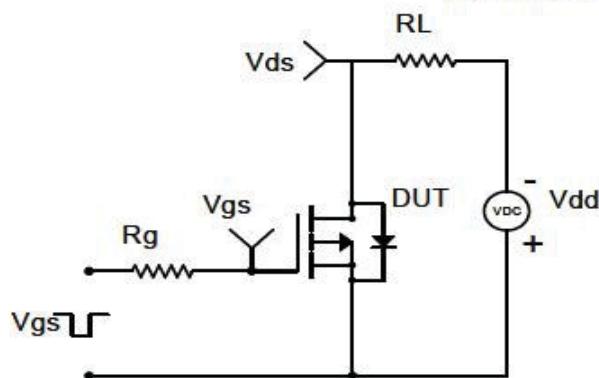
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■ Test circuit and waveform (P-ch)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

