

Complementary MOSFET

ELM56610CWA-S

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

■General Description

ELM56610CWA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

■Features

- | N-channel | P-channel |
|--|---|
| • $V_{ds}=100V$ | • $V_{ds}=-100V$ |
| • $I_d=2.3A$ | • $I_d=-1.0A$ |
| • $R_{ds(on)}=310m\Omega(V_{gs}=10V)$ | • $R_{ds(on)}=650m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)}=320m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)}=700m\Omega(V_{gs}=-4.5V)$ |

■Maximum Absolute Ratings

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

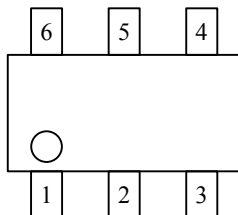
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	V_{ds}	100	-100	V
Gate-source voltage	V_{gs}	± 20	± 20	V
Continuous drain current($T_j=150^{\circ}C$)	I_d	2.3	-1.0	A
		1.8	-0.5	
Pulsed drain current	I_{dm}	4	-4	A
Power dissipation	P_d	2.0	2.0	W
		1.3	1.3	
Operating junction temperature	T_j	150	150	$^{\circ}C$
Storage temperature range	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		120	$^{\circ}C/W$
Thermal resistance junction-to-ambient	$R_{\theta ja}$	P-ch		120	$^{\circ}C/W$

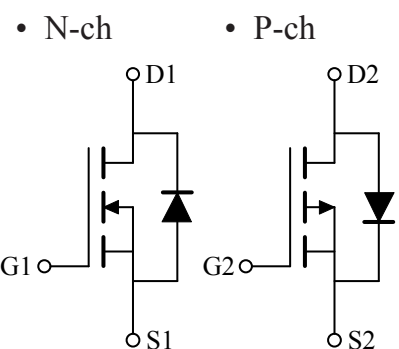
■Pin configuration

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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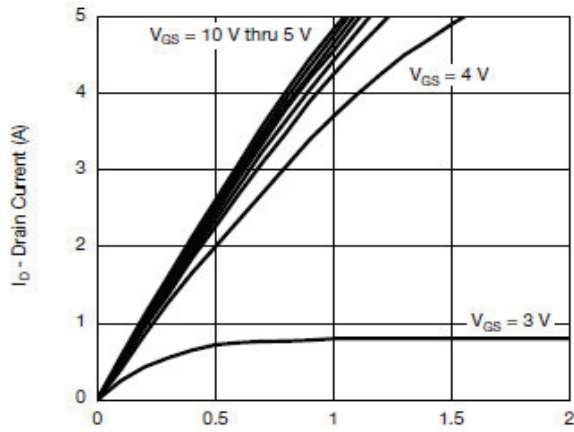
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V		100			V
Zero gate voltage drain current	Idss	Vds=80V, Vgs=0V				1	μA
			Ta=85°C				
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		1.0		2.0	V
On state drain current	Id(on)	Vgs=4.5V, Vds≥5V		5			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=2.3A				310	mΩ
		Vgs=4.5V, Id=1.8A				320	
Forward transconductance	Gfs	Vds=20V, Id=1.5A			2		S
Diode forward voltage	Vsd	Is=1.3A, Vgs=0V			0.85	1.20	V
Max.body-diode continuous current	Is					1.5	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=50V, f=1MHz			200		pF
Output capacitance	Coss				22		pF
Reverse transfer capacitance	Crss				13		pF
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=4.5V, Vds=50V, Id≒1.6A			2.80	5.80	nC
Gate-source charge	Qgs				0.75		nC
Gate-drain charge	Qgd				1.40		nC
Turn-on delay time	td(on)	Vgs=4.5V, Vds=50V, Id≒1.3A RL=39Ω, Rgen=1Ω			25	50	ns
Turn-on rise time	tr				20	50	ns
Turn-off delay time	td(off)				15	30	ns
Turn-off fall time	tf				10	25	ns

Complementary MOSFET

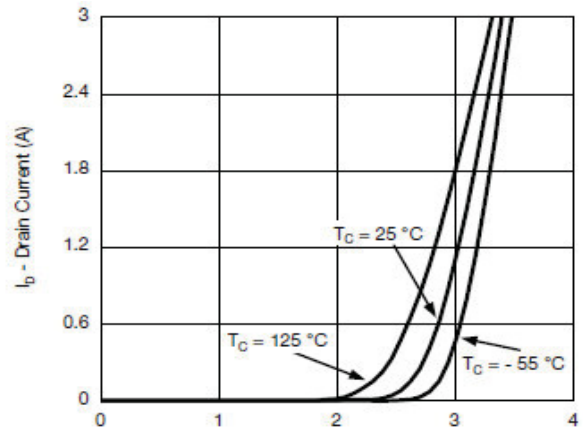
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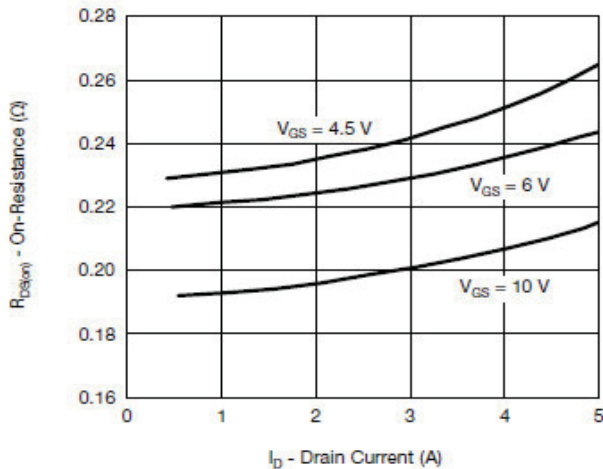
■ Typical Electrical and Thermal Characteristics (N-ch)



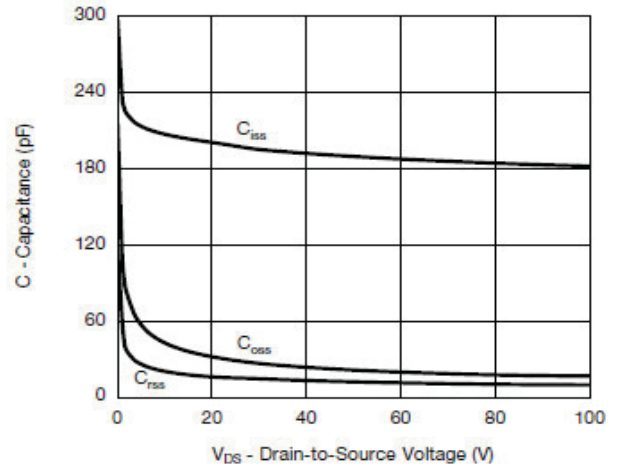
Output Characteristics



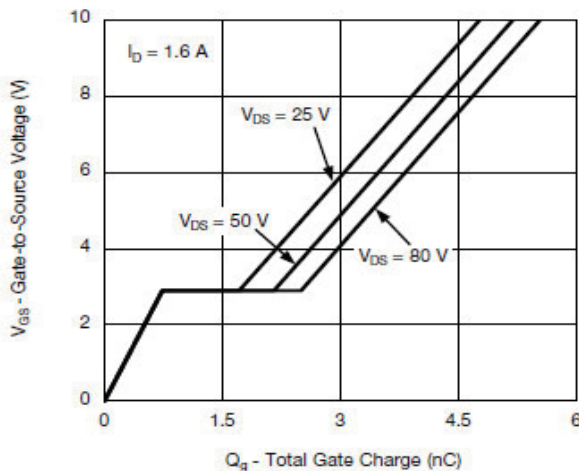
Transfer Characteristics



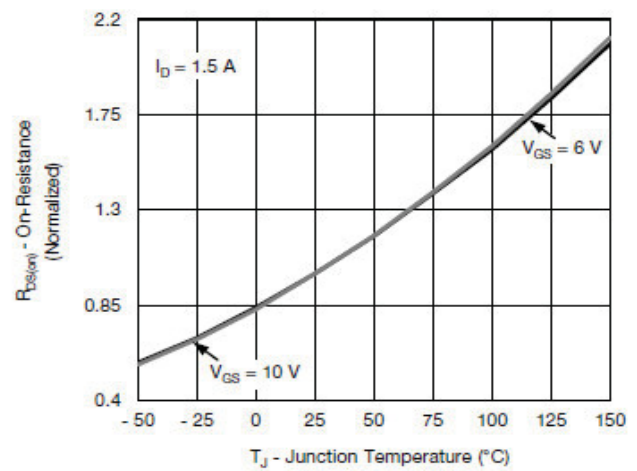
On-Resistance vs. Drain Current and Gate Voltage



Capacitance



Gate Charge

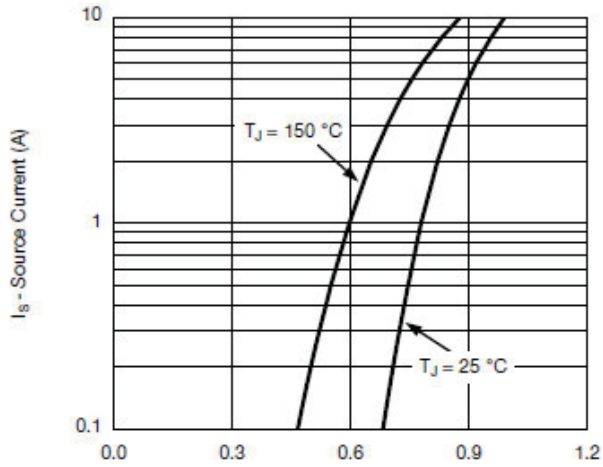


On-Resistance vs. Junction Temperature

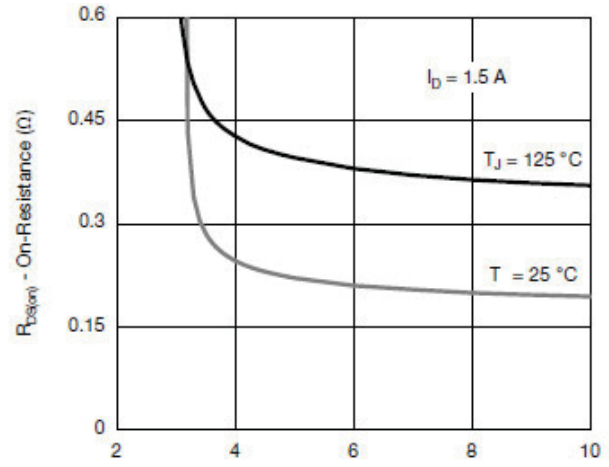
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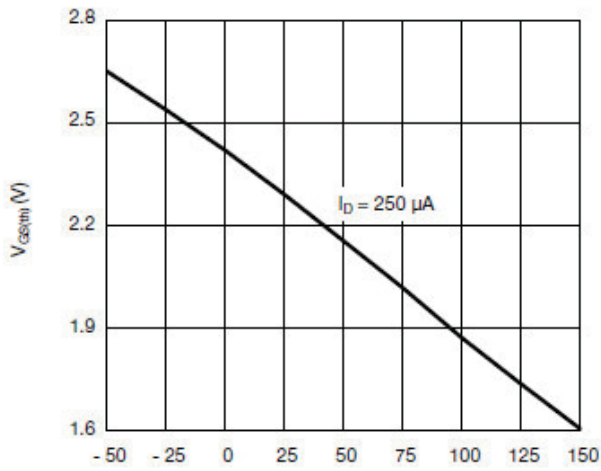
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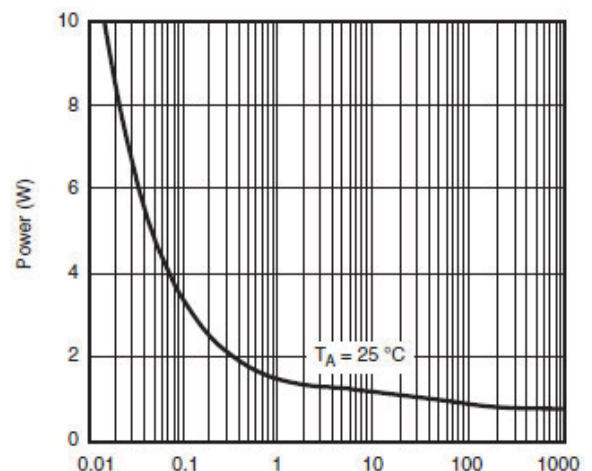
Source-Drain Diode Forward Voltage



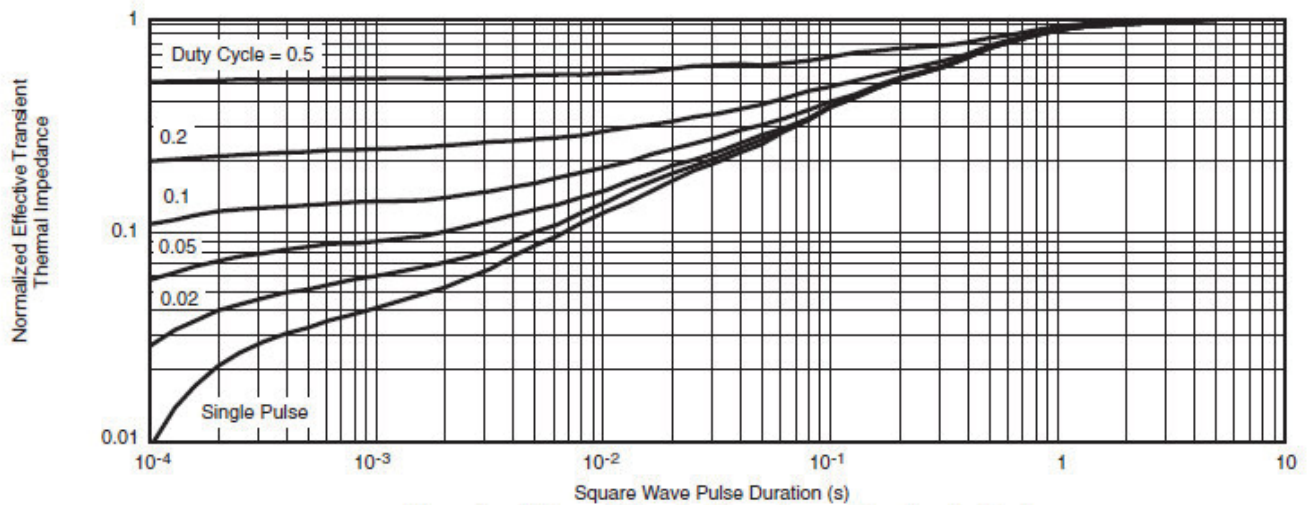
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Foot

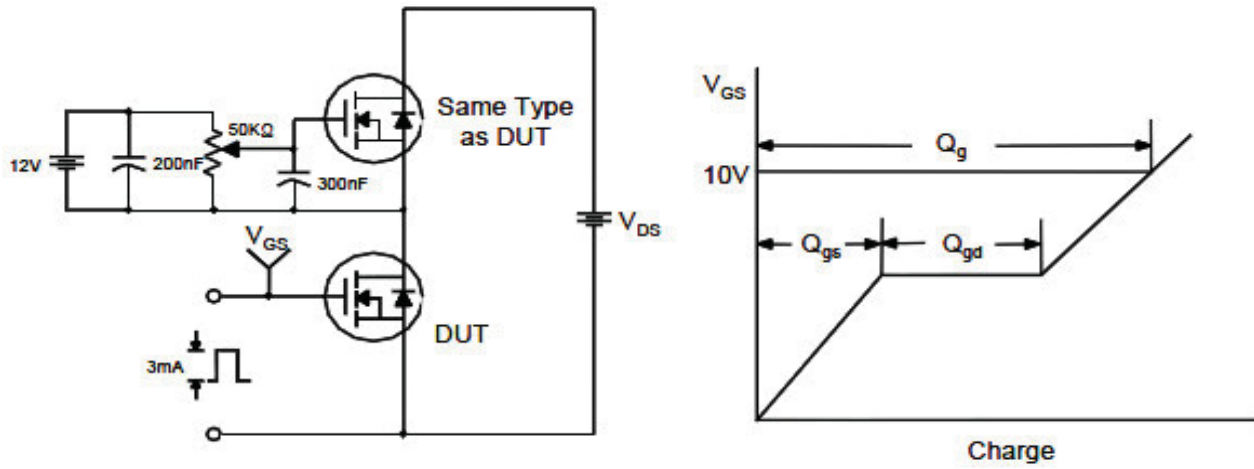
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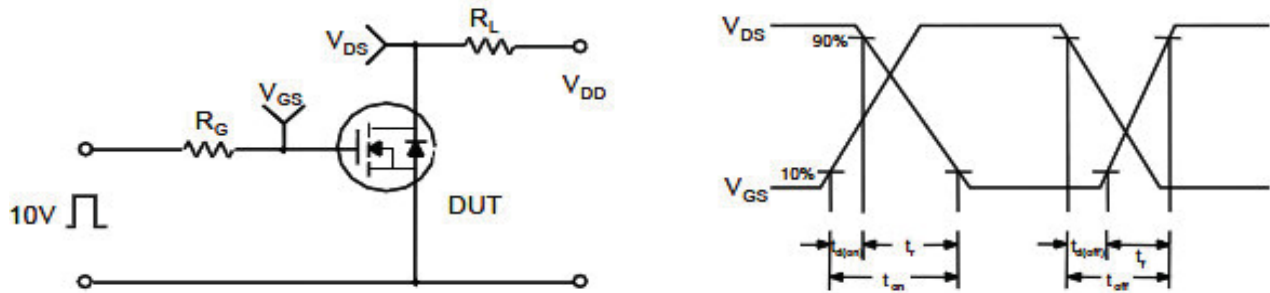
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■ Test circuit and waveform (N-ch)

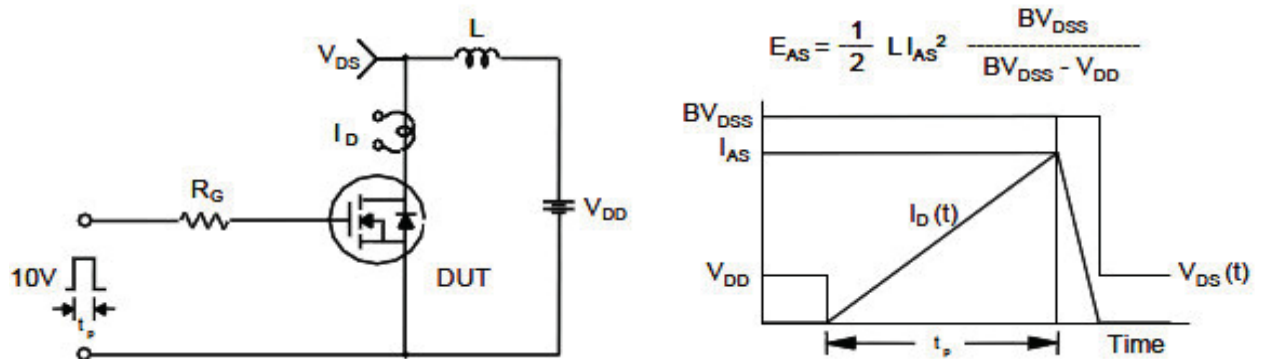
Gate Charge Test Circuit & Waveform



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.

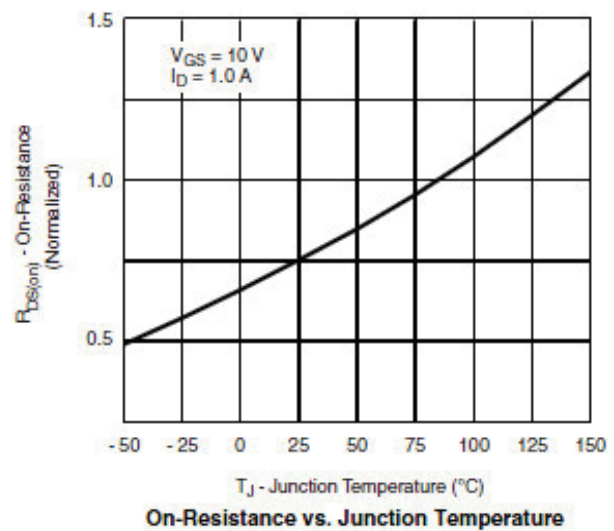
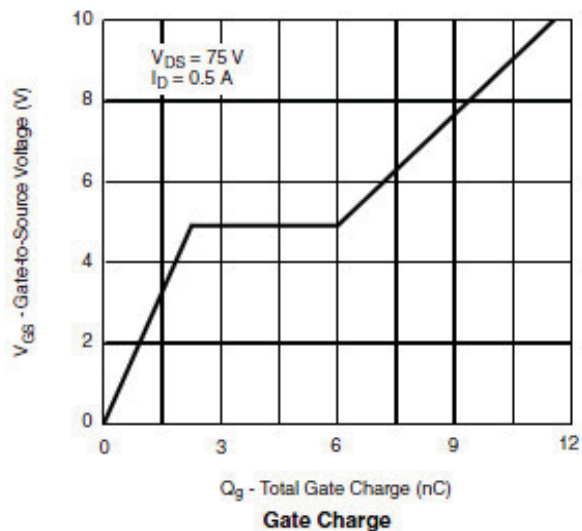
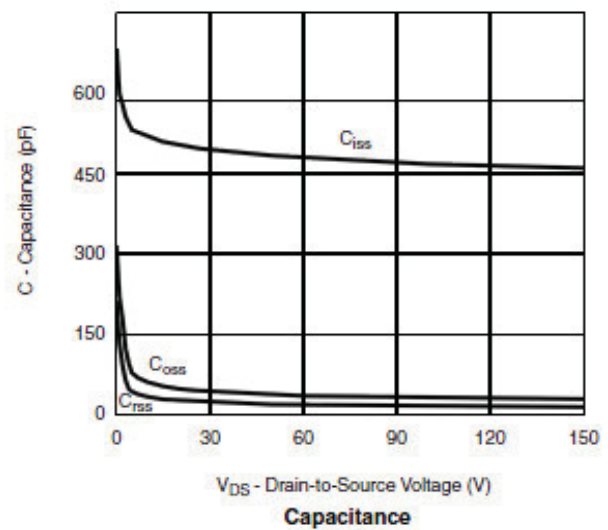
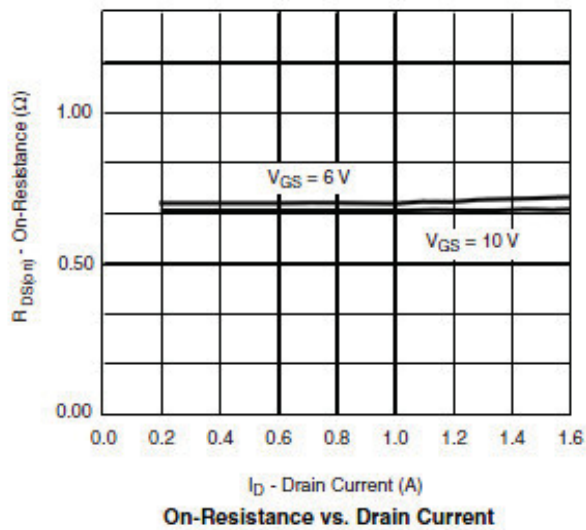
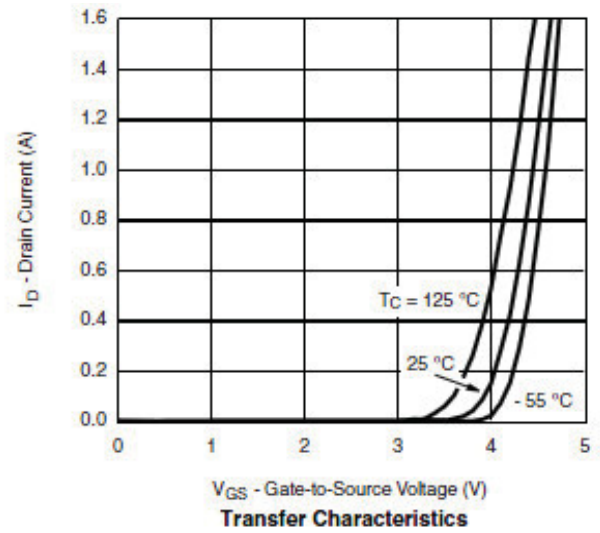
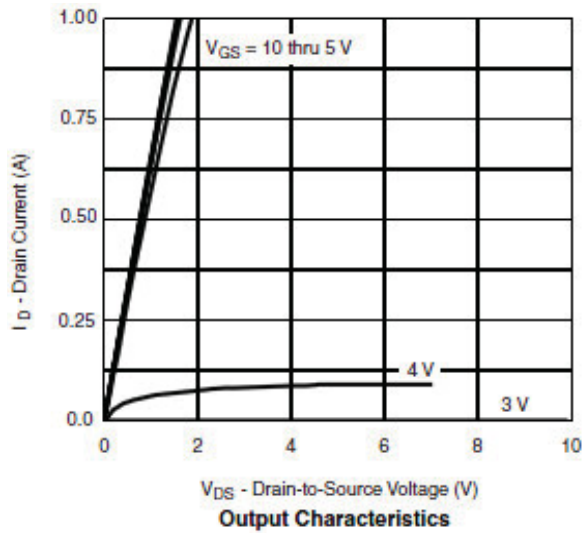
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V	-100			V
Zero gate voltage drain current	Idss	Vds=-80V, Vgs=0V			-1	μA
		Ta=85°C			-30	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-1.0		-2.5	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-15V	-1.6			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-1.0A		600	650	mΩ
		Vgs=-4.5V, Id=-0.5A		620	700	
Forward transconductance	Gfs	Vds=-15V, Id=-0.5A		2.8		S
Diode forward voltage	Vsd	Is=-0.5A, Vgs=0V		-0.75	-1.30	V
Max. body-diode continuous current	Is				-1.5	A
DYNAMIC PARAMETERS						
Input capacitance	Ciss	Vgs=0V, Vds=-25V, f=1MHz		450	650	pF
Output capacitance	Coss			50		pF
Reverse transfer capacitance	Crss			30		pF
SWITCHING PARAMETERS						
Total gate charge	Qg	Vgs=-10V, Vds=-75V Id≡-0.5A		9.0	20.0	nC
Gate-source charge	Qgs			2.5		nC
Gate-drain charge	Qgd			3.5		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-75V Id≡-1.0A, RL=75Ω Rgen=6Ω		10	20	ns
Turn-on rise time	tr			15	30	ns
Turn-off delay time	td(off)			20	40	ns
Turn-off fall time	tf			15	30	ns

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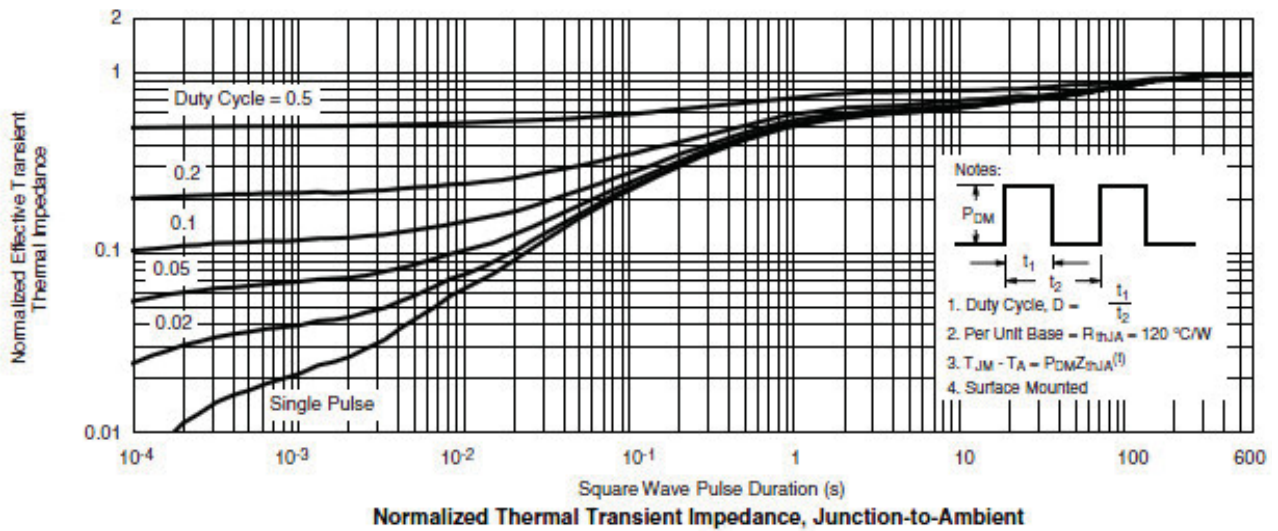
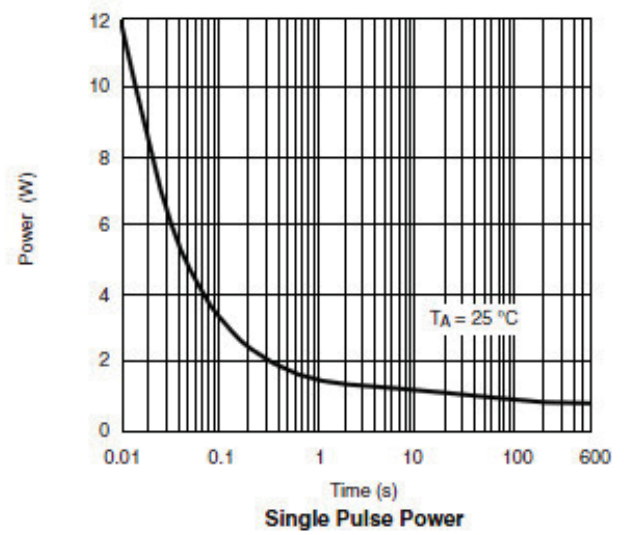
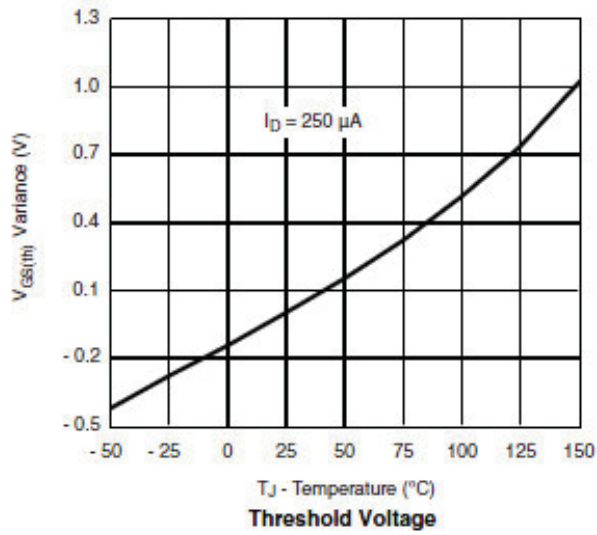
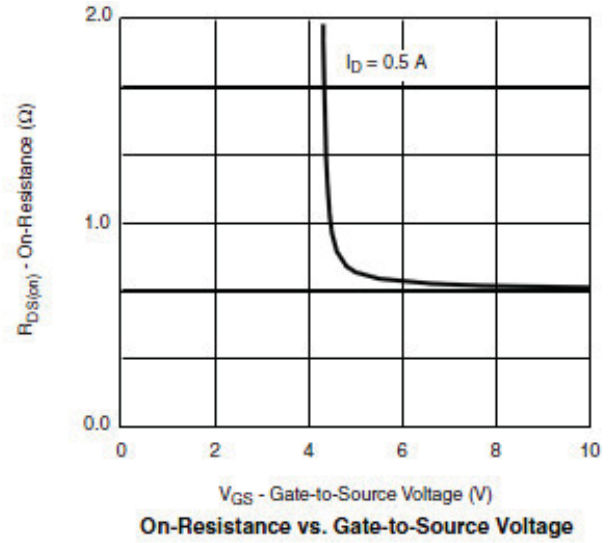
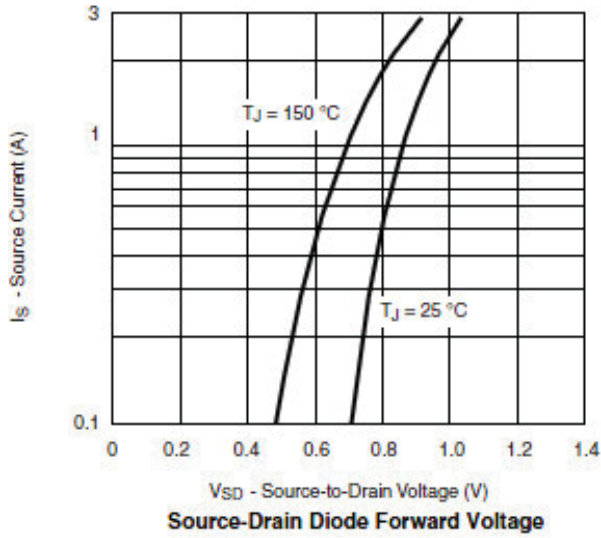
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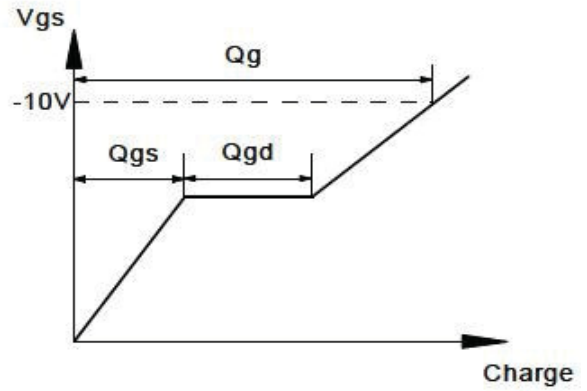
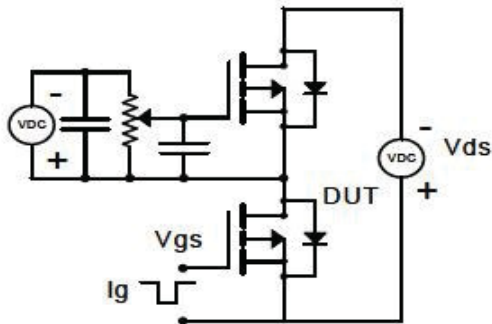
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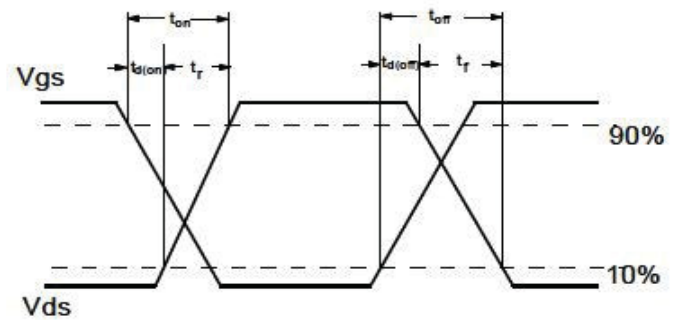
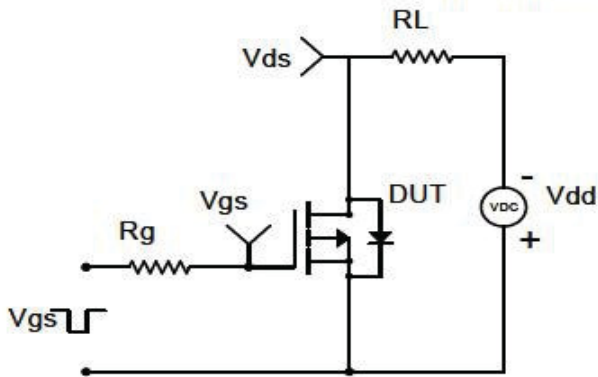
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■ Test circuit and waveform (P-ch)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

