

Complementary MOSFET (common drain)

ELM55604CA-S

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

■ General description

ELM55604CA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- | | |
|---|--|
| N-channel | P-channel |
| • $V_{ds}=40V$ | • $V_{ds}=-40V$ |
| • $I_d=8.0A$ | • $I_d=-7.0A$ |
| • $R_{ds(on)} = 20m\Omega(V_{gs}=10V)$ | • $R_{ds(on)} = 38m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)} = 30m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)} = 54m\Omega(V_{gs}=-4.5V)$ |

■ Maximum absolute ratings

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

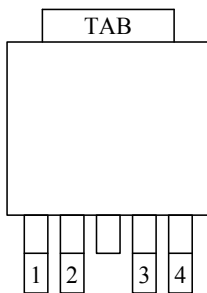
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit	
Drain-source voltage	V_{ds}	40	-40	V	
Gate-source voltage	V_{gs}	± 20	± 20	V	
Continuous drain current($T_j=150^\circ C$)	I_d	$T_a=25^\circ C$	8.0	-7.0	A
		$T_a=70^\circ C$	6.0	-6.0	
Pulsed drain current	I_{dm}	20	-30	A	
Power dissipation	P_d	$T_c=25^\circ C$	2.8	2.8	W
		$T_c=70^\circ C$	1.8	1.8	
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		62.5	$^\circ C/W$
Thermal resistance junction-to-ambient	$R_{\theta ja}$	P-ch		62.5	$^\circ C/W$

■ Pin configuration

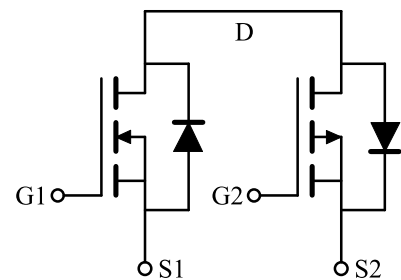
TO-252-4(TOP VIEW)



Pin No.	Pin name
1	SOURCE1
2	GATE1
3	SOURCE2
4	GATE2
TAB	DRAIN1/DRAIN2

■ Circuit

- N-ch
- P-ch



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■Electrical characteristics (N-ch)

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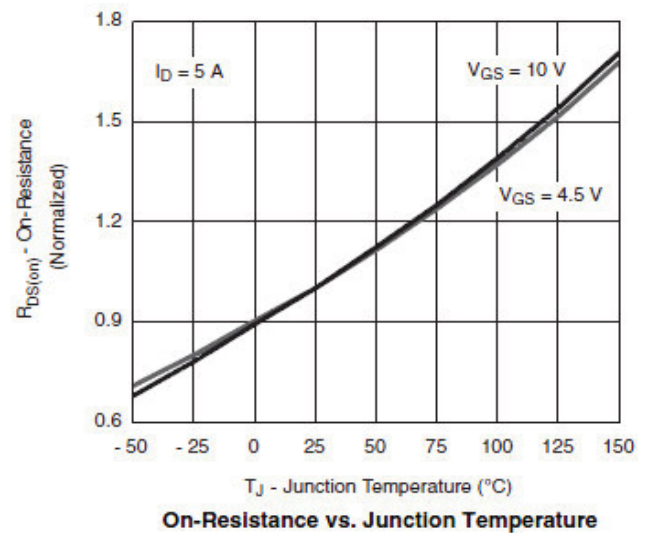
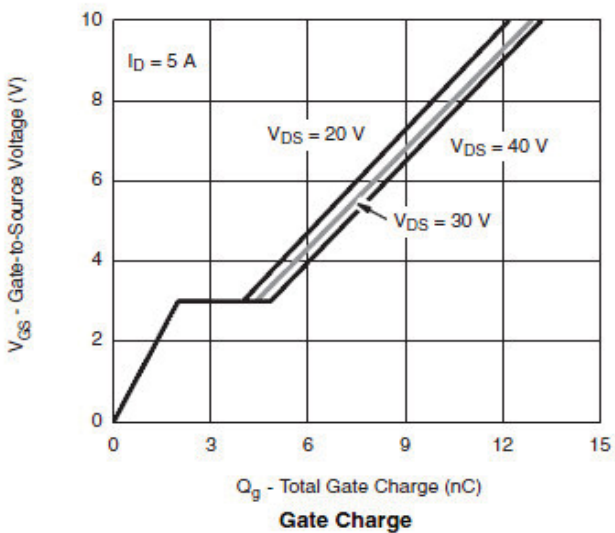
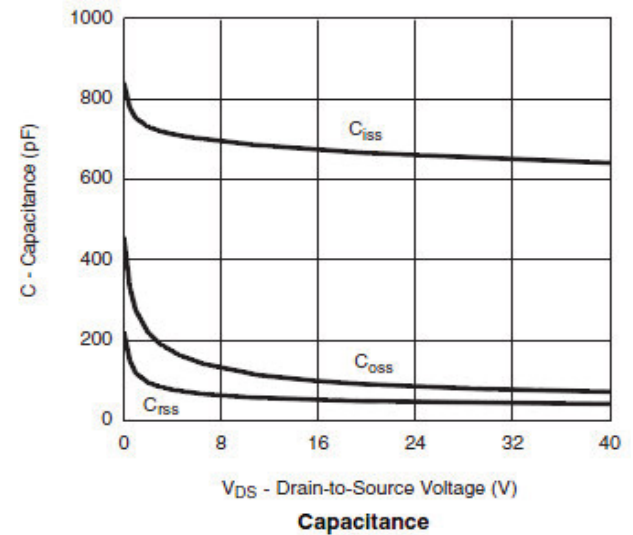
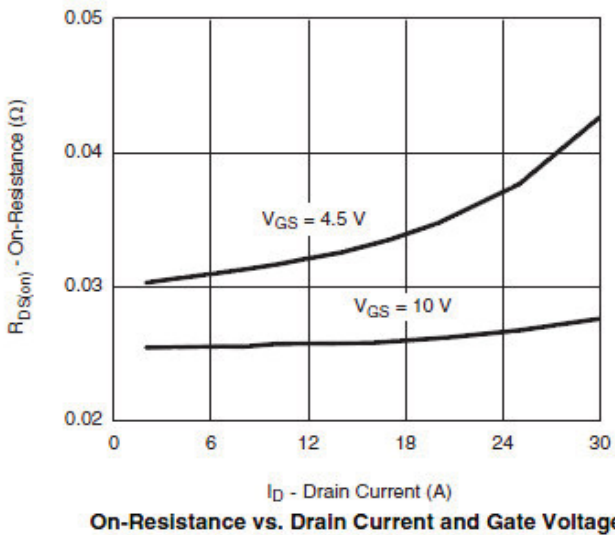
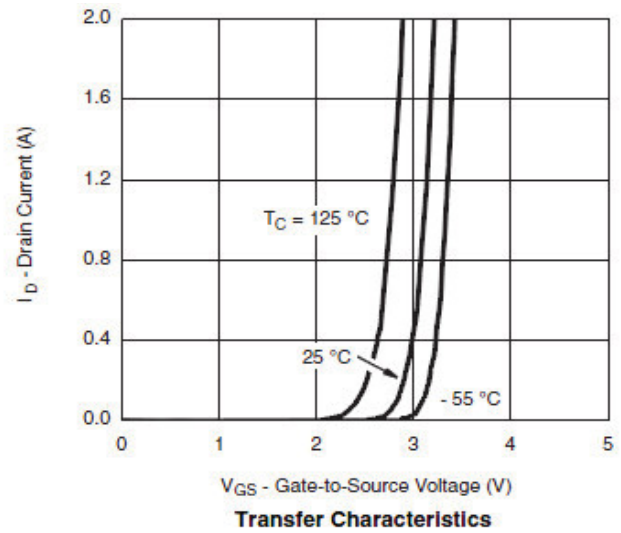
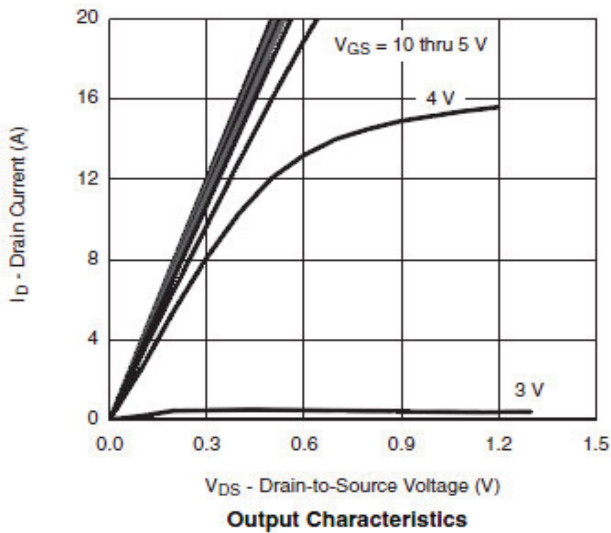
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	40			V
Zero gate voltage drain current	Idss	Vds=32V, Vgs=0V Ta=85°C			1	μA
					10	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0		3.0	V
On state drain current	Id(on)	Vgs=10V, Vds≥5V	20			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=15A		13	20	mΩ
		Vgs=4.5V, Id=12A		18	30	
Forward transconductance	Gfs	Vds=15V, Id=5.0A		25		S
Diode forward voltage	Vsd	Is=2A, Vgs=0V		0.85	1.20	V
Max. body-diode continuous current	Is				1.5	A
DYNAMIC PARAMETERS						
Input capacitance	Ciss	Vgs=0V, Vds=20V, f=1MHz		850		pF
Output capacitance	Coss			110		pF
Reverse transfer capacitance	Crss			75		pF
SWITCHING PARAMETERS						
Total gate charge	Qg	Vgs=4.5V, Vds=20V Id≐5.0A		10.0	14.0	nC
Gate-source charge	Qgs			2.8		nC
Gate-drain charge	Qgd			3.2		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=20V RL=4Ω, Id≐5.0A Rgen=1Ω		6	12	ns
Turn-on rise time	tr			10	20	ns
Turn-off delay time	td(off)			20	36	ns
Turn-off fall time	tf			6	12	ns

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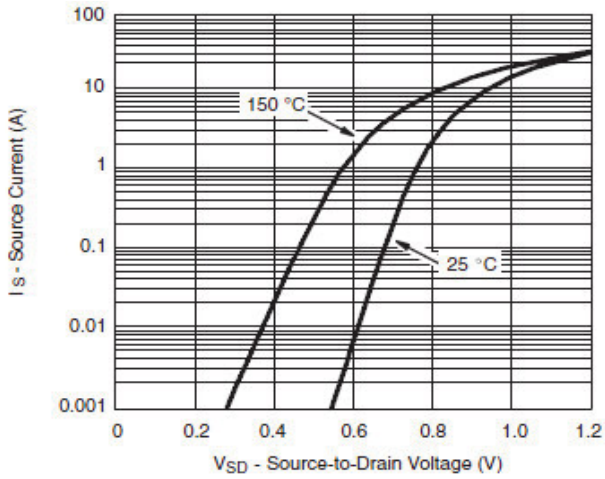
■ Typical electrical and thermal characteristics (N-ch)



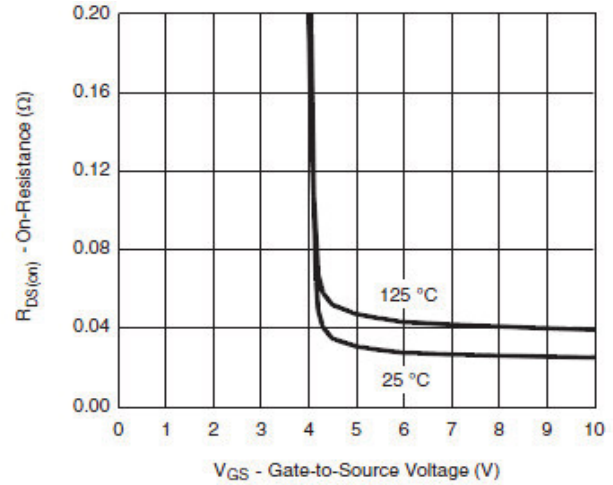
Complementary MOSFET (common drain)

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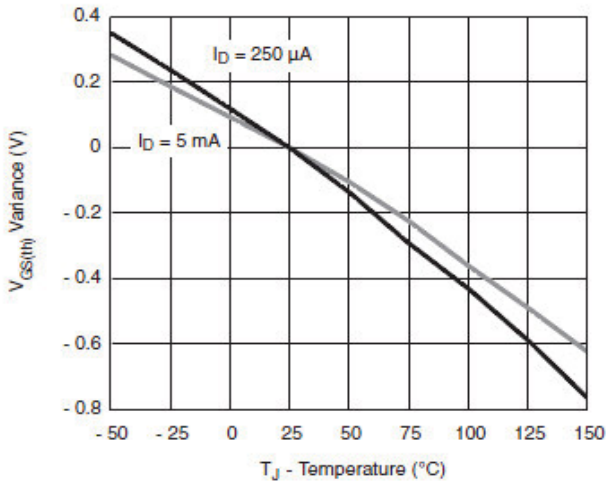
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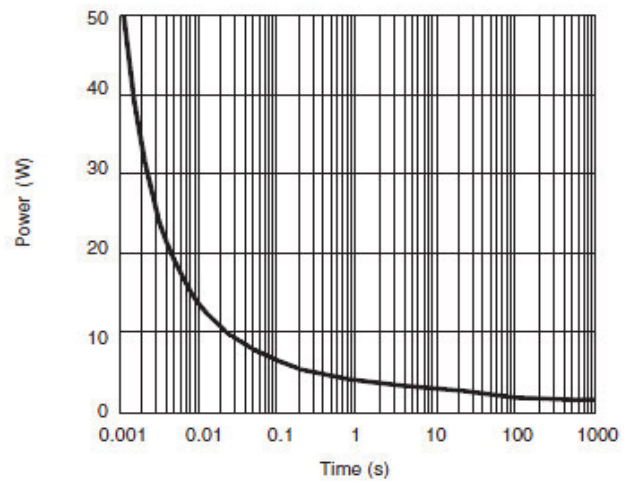
Source-Drain Diode Forward Voltage



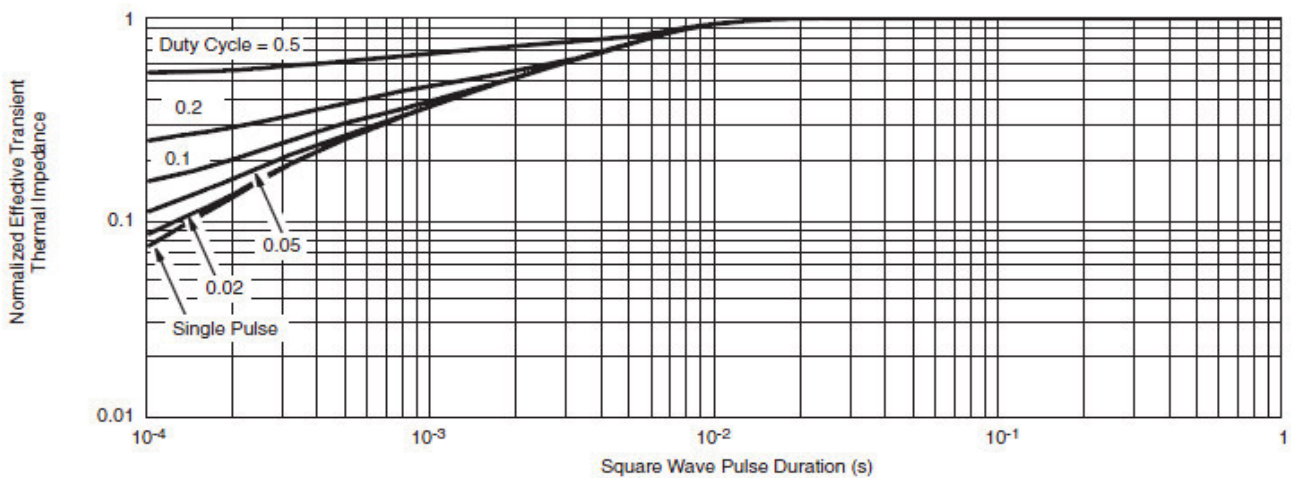
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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■Electrical Characteristics (P-ch)

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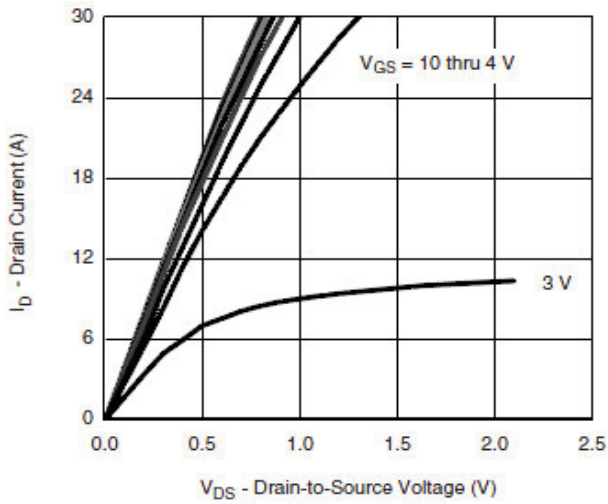
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
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Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V	-40			V
Zero gate voltage drain current	Idss	Vds=-32V, Vgs=0V Ta=85°C			-1	μA
					-20	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-1.0		-3.0	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-5V	-20			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-15A		30	38	mΩ
		Vgs=-4.5V, Id=-12A		44	54	
Forward transconductance	Gfs	Vds=-15V, Id=-5A		20		S
Diode forward voltage	Vsd	Is=-2A, Vgs=0V		-0.8	-1.2	V
Max. body-diode continuous current	Is				-1.7	A
DYNAMIC PARAMETERS						
Input capacitance	Ciss	Vgs=0V, Vds=-20V, f=1MHz		1100		pF
Output capacitance	Coss			145		pF
Reverse transfer capacitance	Crss			115		pF
SWITCHING PARAMETERS						
Total gate charge	Qg	Vgs=-4.5V, Vds=-20V Id=-5.0A		13.0	20.0	nC
Gate-source charge	Qgs			4.5		nC
Gate-drain charge	Qgd			6.5		nC
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-20V Id=-5.0A, RL=4Ω, Rgen=1Ω		40	80	ns
Turn-on rise time	tr			55	100	ns
Turn-off delay time	td(off)			30	60	ns
Turn-off fall time	tf			12	20	ns

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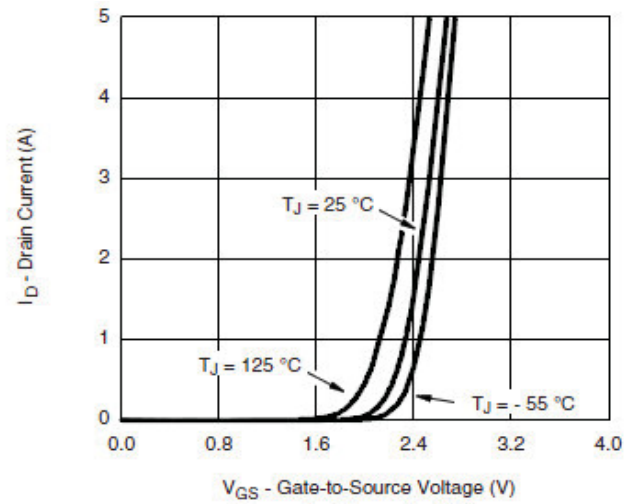
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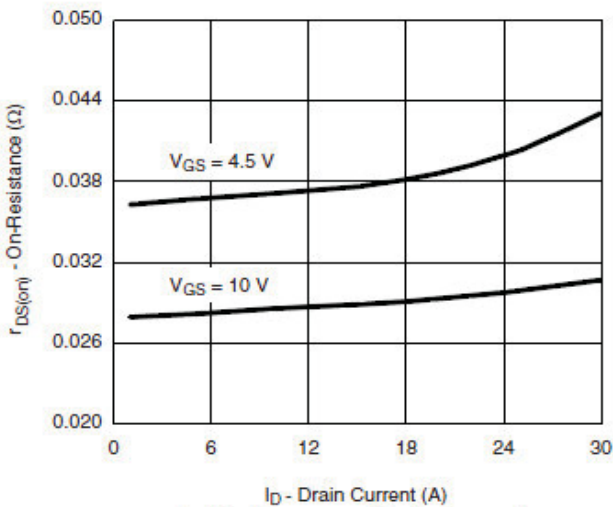
■ Typical electrical and thermal characteristics (P-ch)



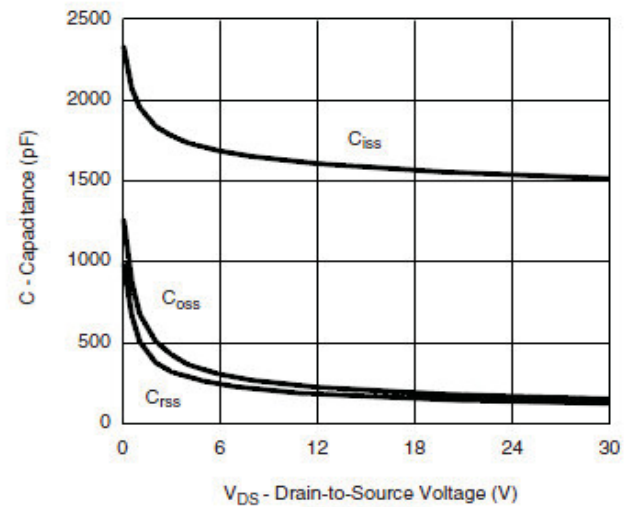
Output Characteristics



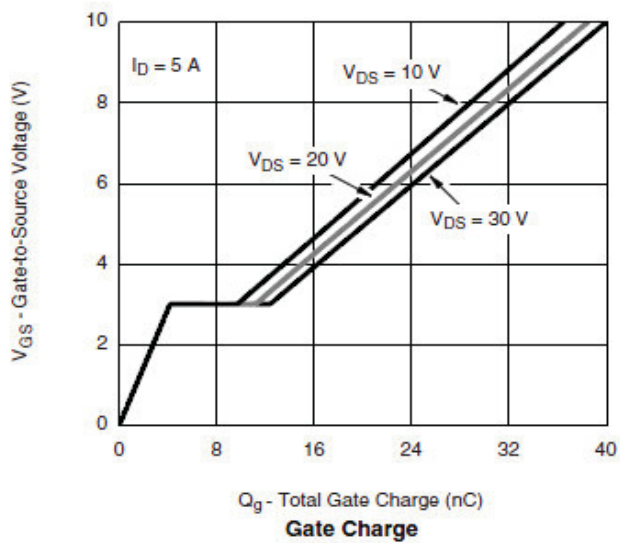
Transfer Characteristics



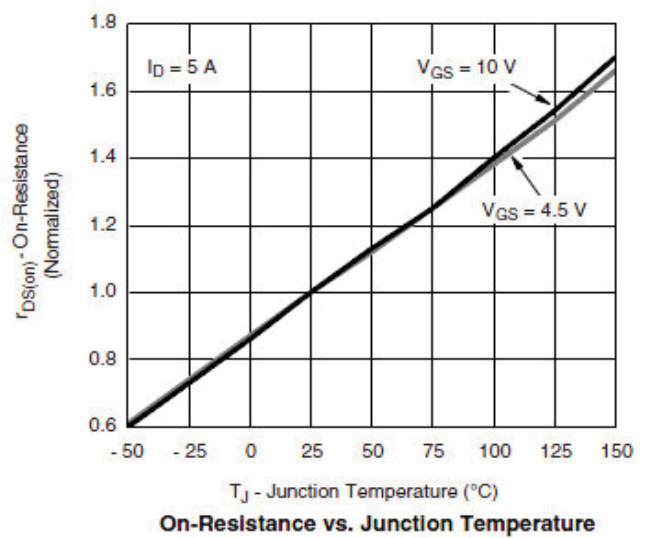
On-Resistance vs. Drain Current



Capacitance



Gate Charge

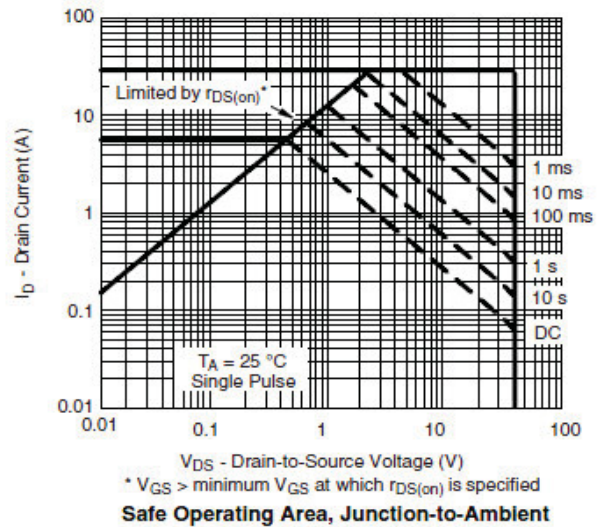
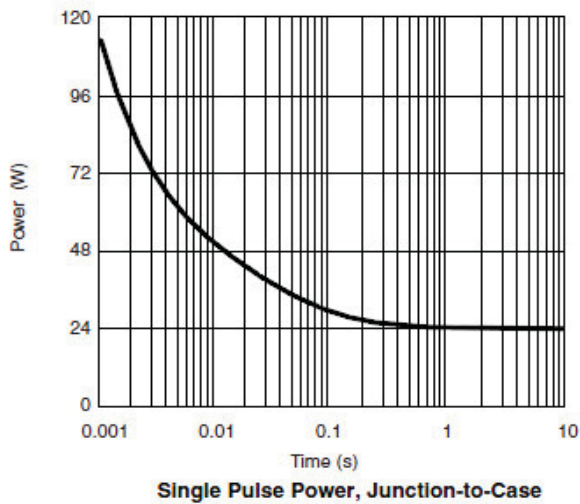
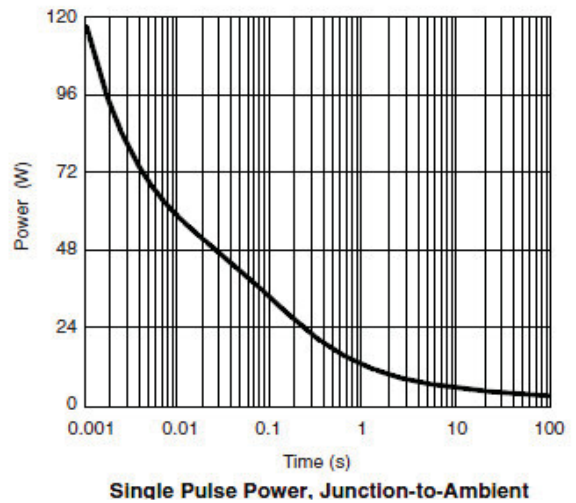
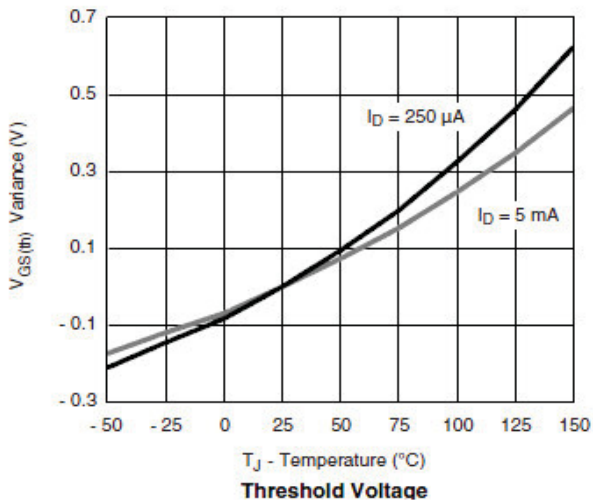
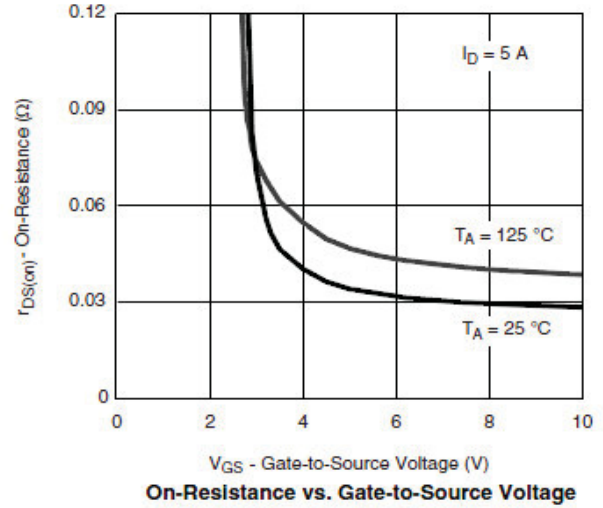
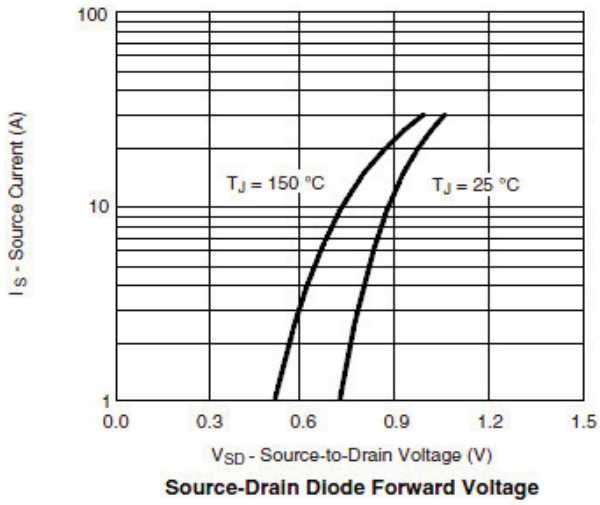


On-Resistance vs. Junction Temperature

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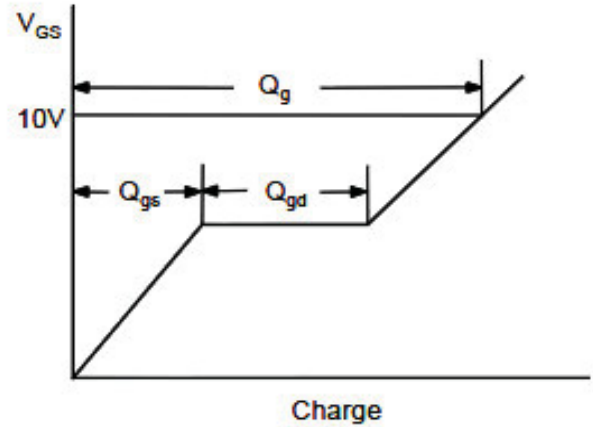
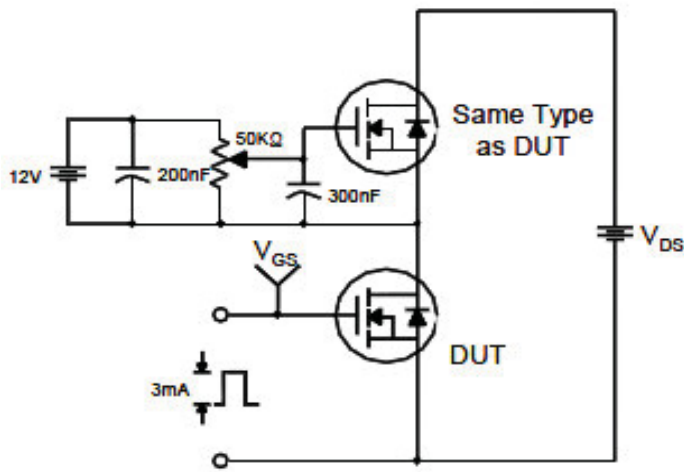
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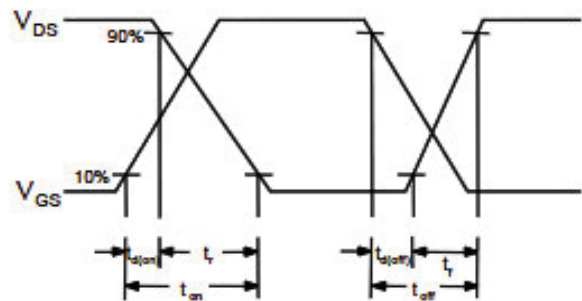
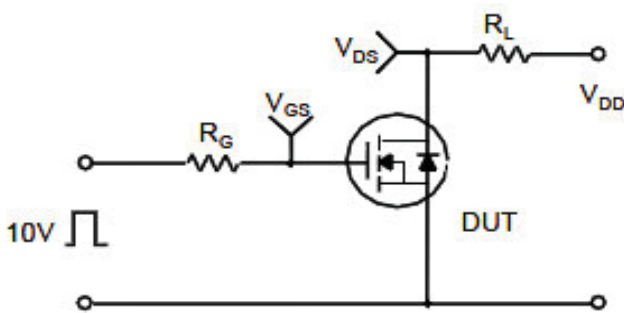
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■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

