

Complementary MOSFET (common drain)

ELM55616CA-S

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

■General description

ELM55616CA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■Features

- | | |
|---|--|
| N-channel | P-channel |
| • $V_{ds}=60V$ | • $V_{ds}=-60V$ |
| • $I_d=7.0A$ | • $I_d=-7.0A$ |
| • $R_{ds(on)} = 34m\Omega(V_{gs}=10V)$ | • $R_{ds(on)} = 56m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)} = 40m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)} = 68m\Omega(V_{gs}=-4.5V)$ |

■Maximum absolute ratings

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

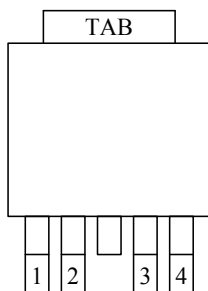
Parameter		Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage		V_{ds}	60	-60	V
Gate-source voltage		V_{gs}	± 20	± 20	V
Continuous drain current($T_j=150^{\circ}C$)	$T_a=25^{\circ}C$	I_d	7.0	-7.0	A
	$T_a=70^{\circ}C$		6.0	-6.0	
Pulsed drain current		I_{dm}	30	-30	A
Power dissipation	$T_c=25^{\circ}C$	P_d	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

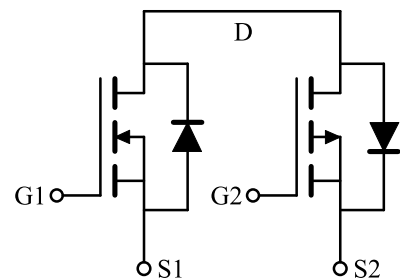
TO-252-4(TOP VIEW)



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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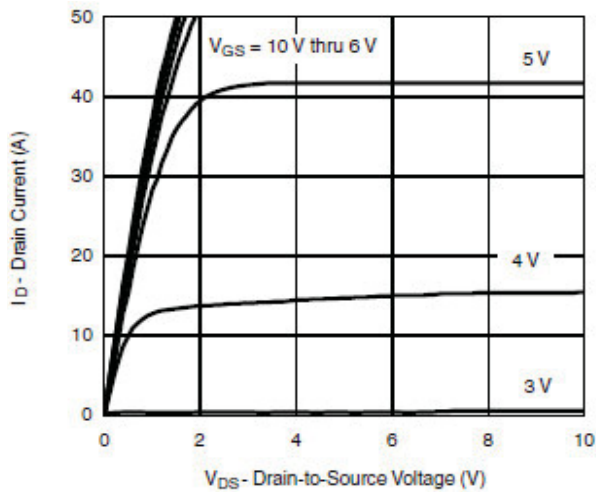
Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V		60			V
Zero gate voltage drain current	Idss	Vds=60V, Vgs=0V				1	μA
			Ta=85°C			5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		1.0		2.5	V
On state drain current	Id(on)	Vgs=4.5V, Vds≥5V		30			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=7.0A			25	34	mΩ
		Vgs=4.5V, Id=6.0A			30	40	
Forward transconductance	Gfs	Vds=15V, Id=5.3A			24		S
Diode forward voltage	Vsd	Is=2A, Vgs=0V			0.8	1.3	V
Max. body-diode continuous current	Is					1.5	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=25V, f=1MHz			700		pF
Output capacitance	Coss				150		pF
Reverse transfer capacitance	Crss				70		pF
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=4.5V, Vds=30V Id≐23.0A			7.0	15.0	nC
Gate-source charge	Qgs				3.2		nC
Gate-drain charge	Qgd				3.2		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=30V RL=1.3Ω, Id≐23.0A Rgen=1.0Ω			10	20	ns
Turn-on rise time	tr				15	30	ns
Turn-off delay time	td(off)				30	65	ns
Turn-off fall time	tf				25	50	ns

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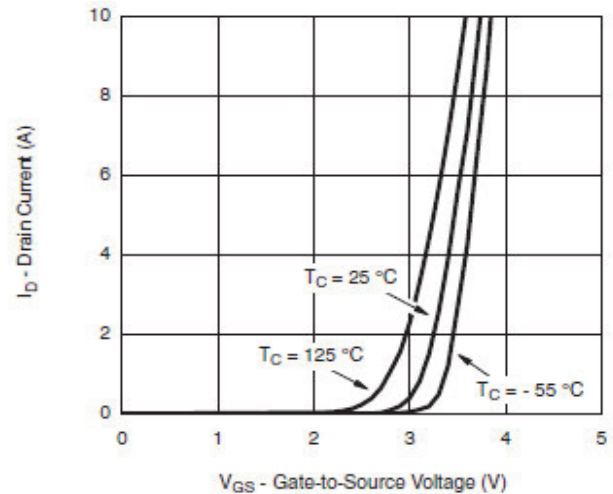
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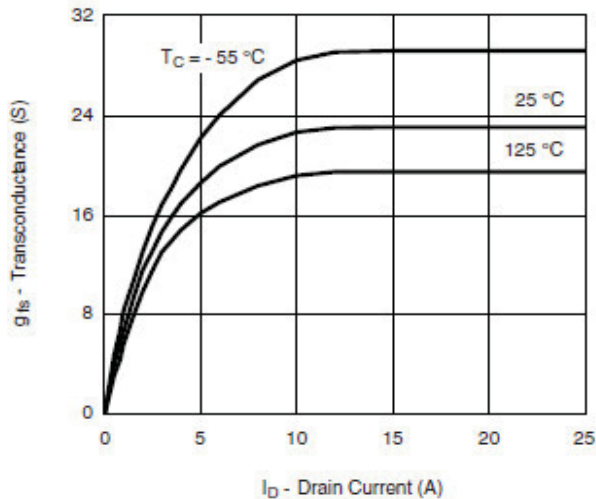
■ Typical electrical and thermal characteristics (N-ch)



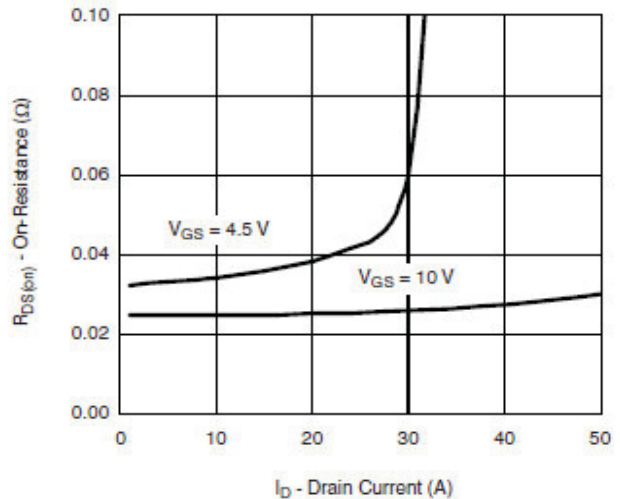
Output Characteristics



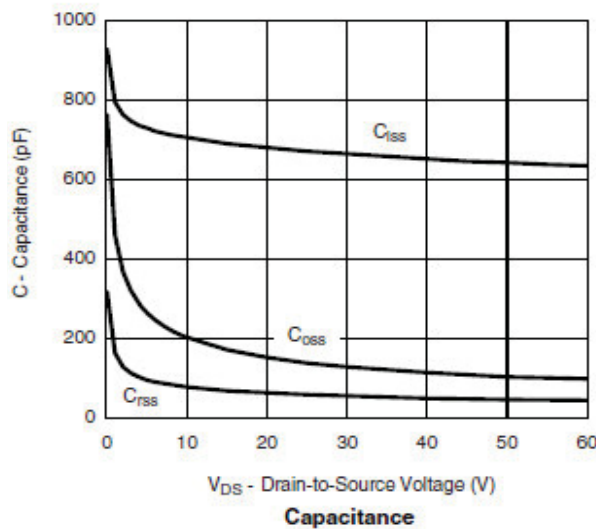
Transfer Characteristics



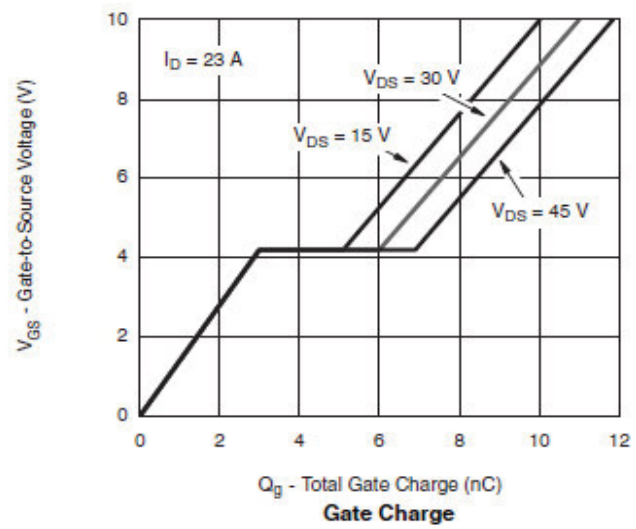
Transconductance



On-Resistance vs. Drain Current



Capacitance

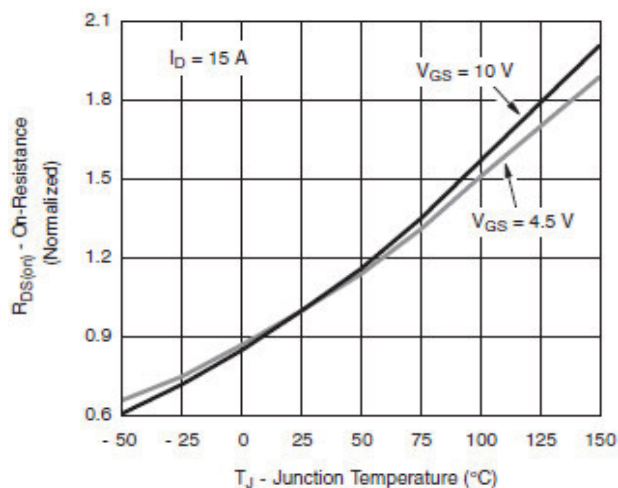


Gate Charge

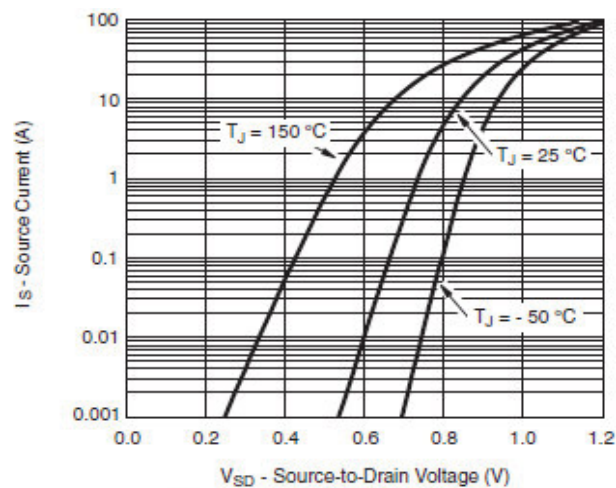
Complementary MOSFET (common drain)

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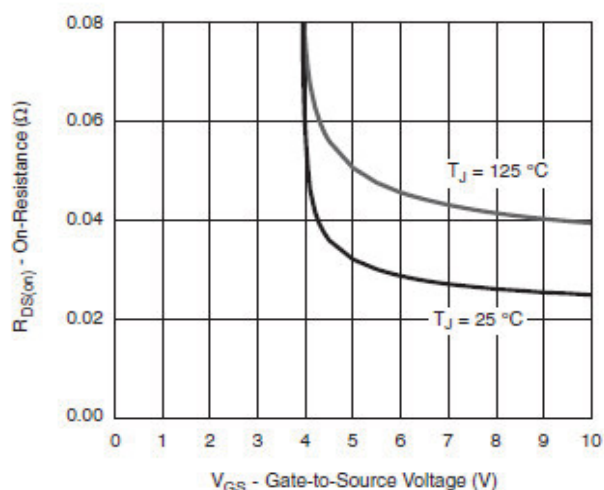
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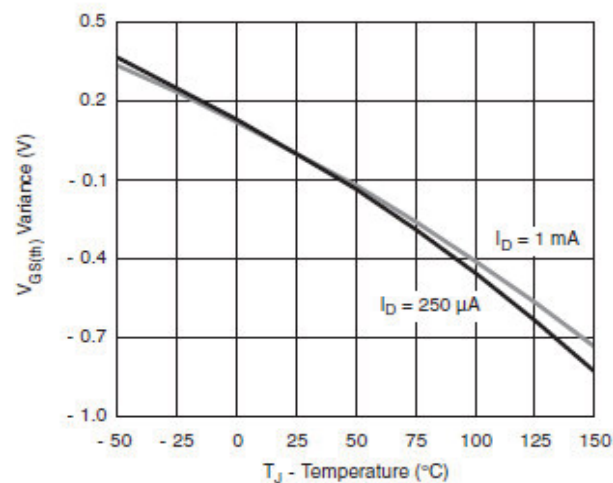
On-Resistance vs. Junction Temperature



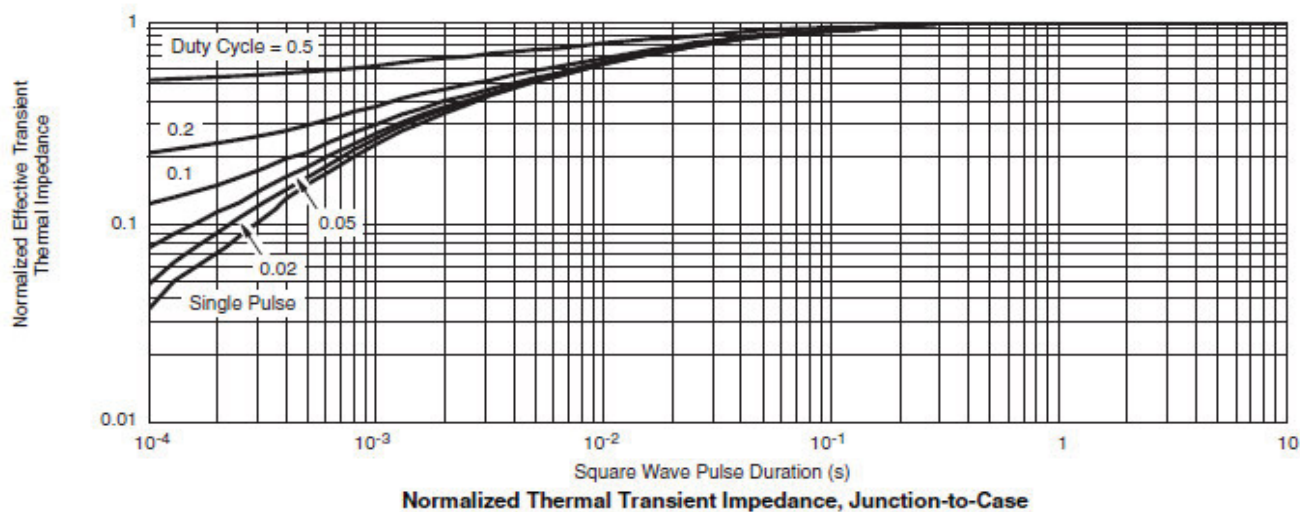
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Normalized Thermal Transient Impedance, Junction-to-Case

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■Electrical Characteristics (P-ch)

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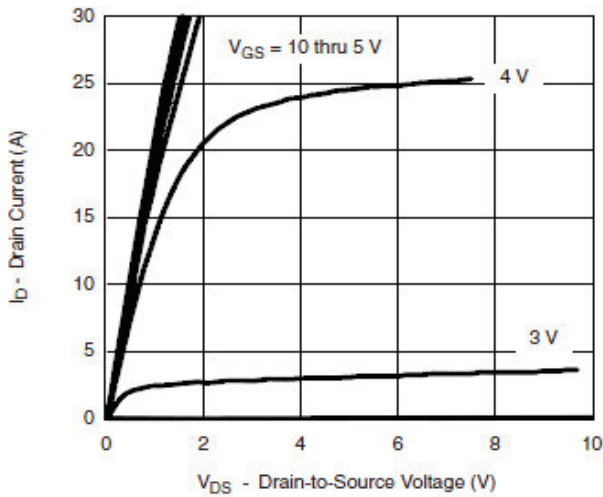
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	Id=-250μA, Vgs=0V		-60			V
Zero gate voltage drain current	Id _{ss}	Vds=-48V, Vgs=0V				-1	μA
			Ta=85°C			-20	
Gate-body leakage current	Ig _{ss}	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA		-1.0		-2.5	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-5V		-30			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-7.0A			46	56	mΩ
		Vgs=-4.5V, Id=-6.0A			56	68	
Forward transconductance	Gfs	Vds=-15V, Id=-3.2A			12		S
Diode forward voltage	Vsd	Is=-3A, Vgs=0V			-0.8	-1.3	V
Max. body-diode continuous current	Is					-1.7	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-25V, f=1MHz			1200	2000	pF
Output capacitance	Coss				140		pF
Reverse transfer capacitance	Crss				90		pF
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-10V, Vds=-30V Id=-10.0A			25	40	nC
Gate-source charge	Qgs				5		nC
Gate-drain charge	Qgd				8		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-30V Id=-18.0A, RL=3.0Ω Rgen=2.5Ω			10	20	ns
Turn-on rise time	tr				10	20	ns
Turn-off delay time	td(off)				45	80	ns
Turn-off fall time	tf				25	40	ns

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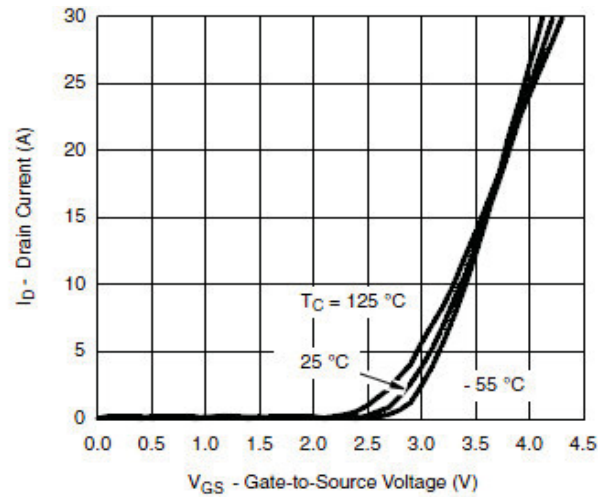
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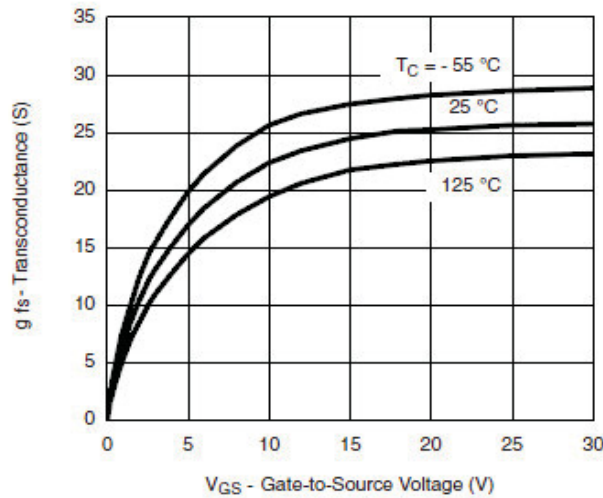
■ Typical electrical and thermal characteristics (P-ch)



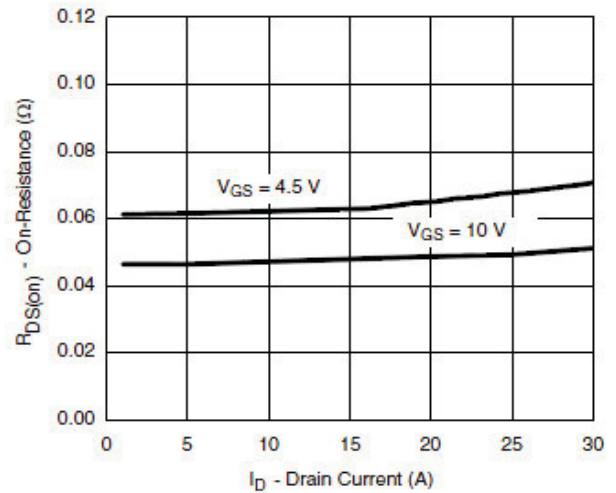
Output Characteristics



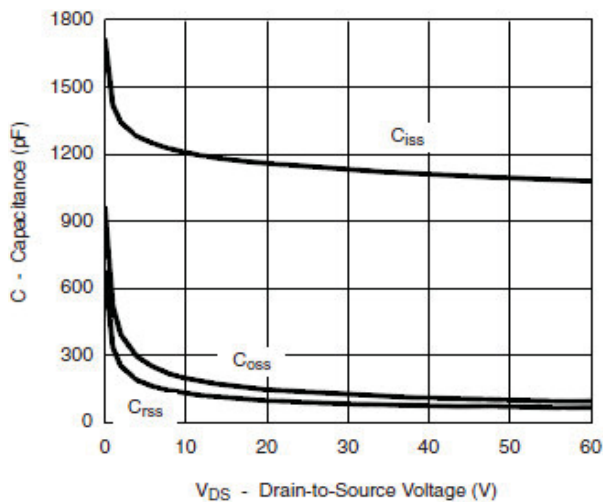
Transfer Characteristics



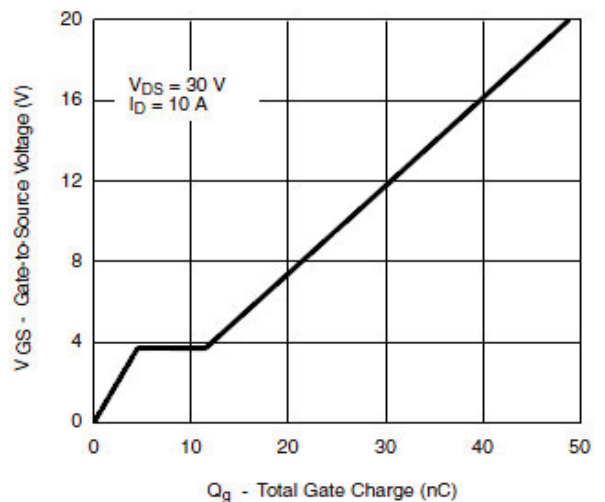
Transconductance



On-Resistance vs. Drain Current



Capacitance

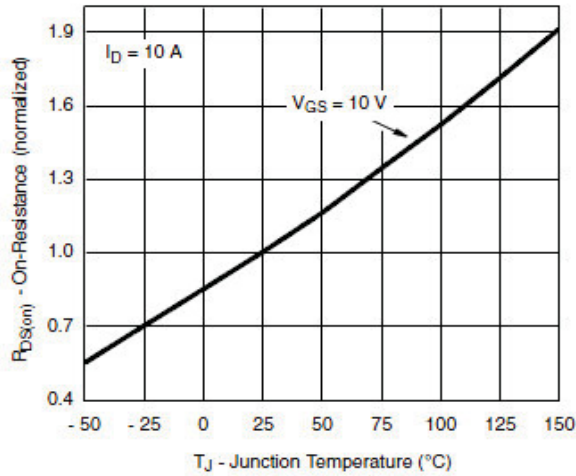


Gate Charge

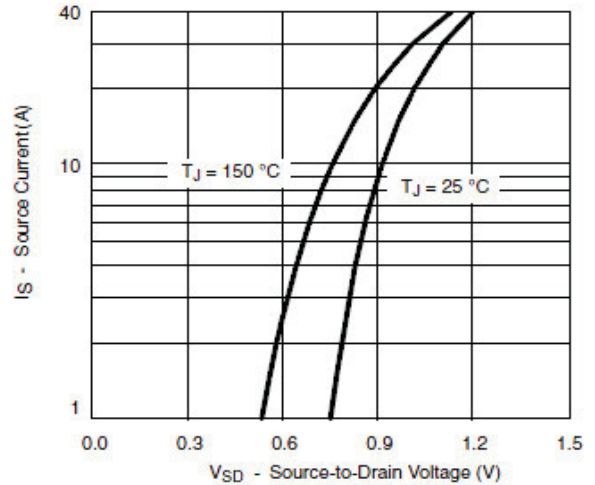
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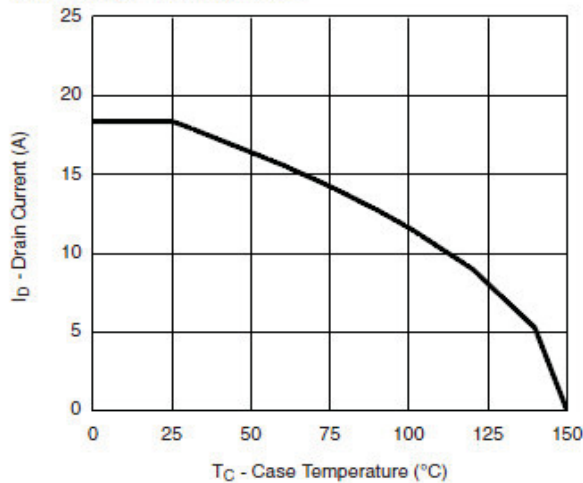


On-Resistance vs. Junction Temperature

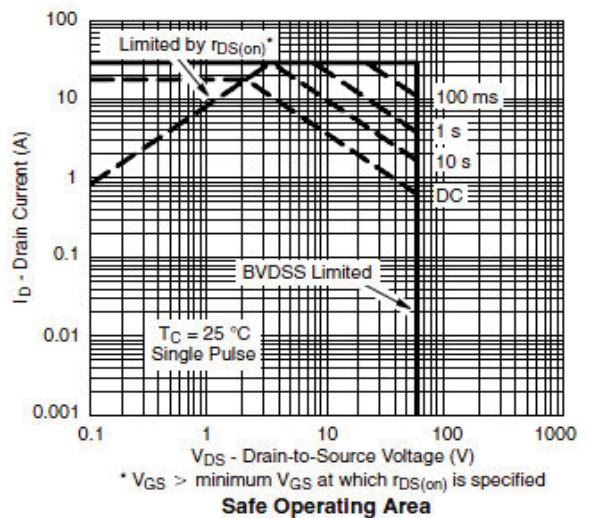


Source-Drain Diode Forward Voltage

THERMAL RATINGS

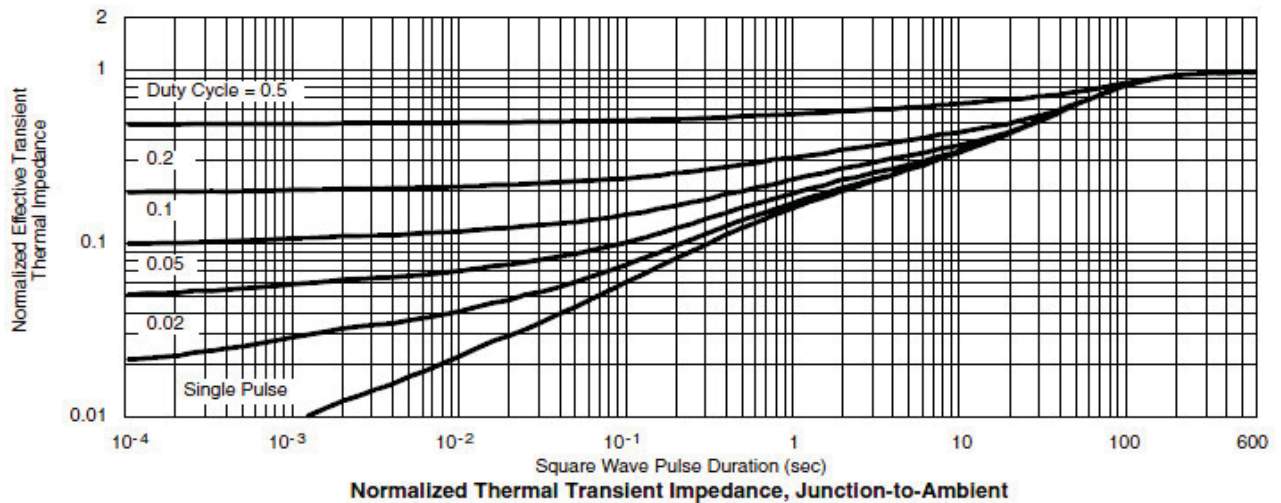


Maximum Drain Current vs. Case Temperature



* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

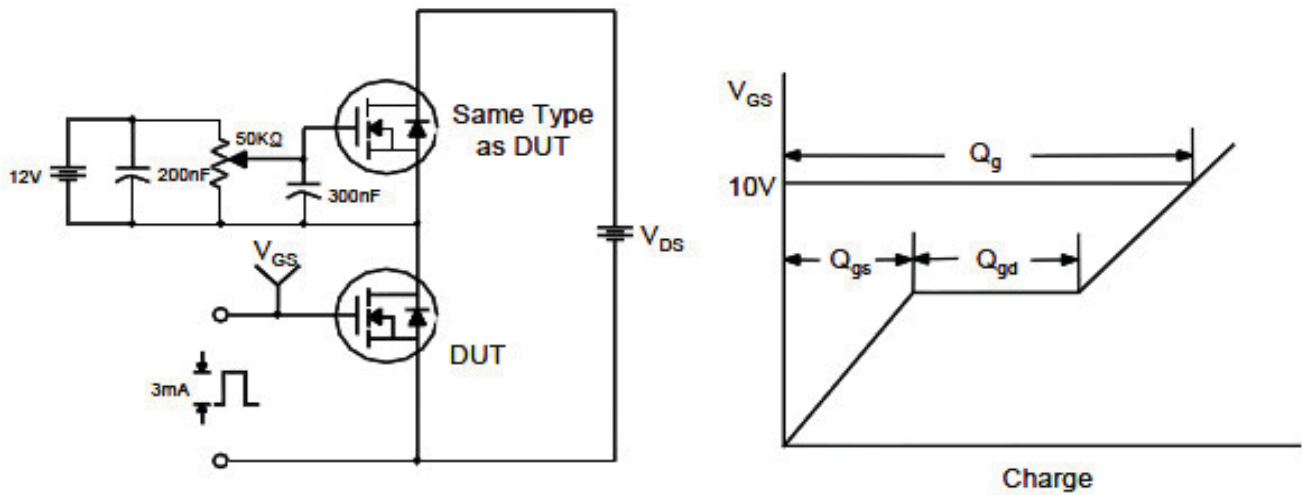
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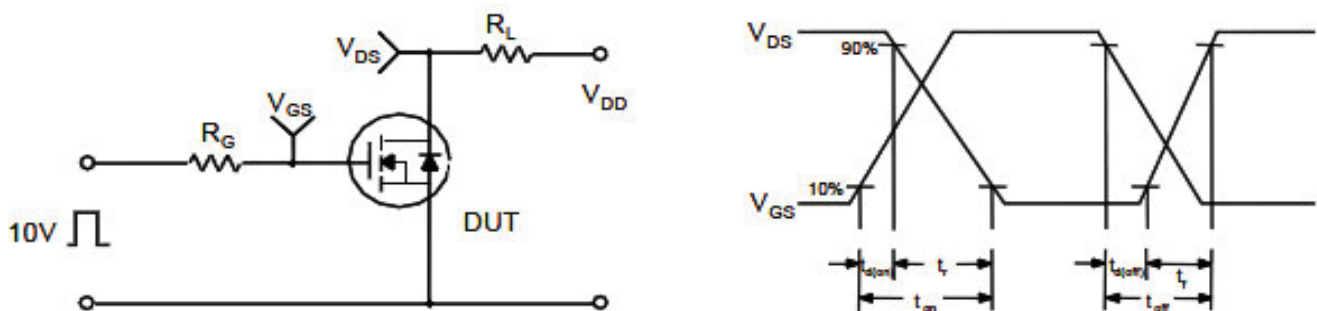
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■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

