

Complementary MOSFET (common drain)

ELM55614CA-S

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

■General description

ELM55614CA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■Features

- | | |
|---|--|
| N-channel | P-channel |
| • $V_{ds}=40V$ | • $V_{ds}=-40V$ |
| • $I_d=12.0A$ | • $I_d=-12.0A$ |
| • $R_{ds(on)} = 35m\Omega(V_{gs}=10V)$ | • $R_{ds(on)} = 65m\Omega(V_{gs}=-10V)$ |
| • $R_{ds(on)} = 42m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)} = 95m\Omega(V_{gs}=-4.5V)$ |

■Maximum absolute ratings

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

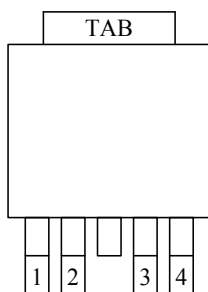
Parameter	Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage	V_{ds}	40	-40	V
Gate-source voltage	V_{gs}	± 20	± 20	V
Continuous drain current($T_j=150^{\circ}C$)	I_d	12.0	-12.0	A
		10.0	-10.0	
Pulsed drain current	I_{dm}	30	-30	A
Power dissipation	P_d	22	22	W
		12	12	
Operating junction temperature	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

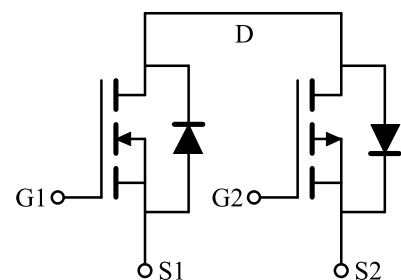
TO-252-4(TOP VIEW)



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

■Circuit

- N-ch
- P-ch



Complementary MOSFET (common drain)

ELM55614CA-S

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

■Electrical characteristics (N-ch)

Ta=25°C. Unless otherwise noted.

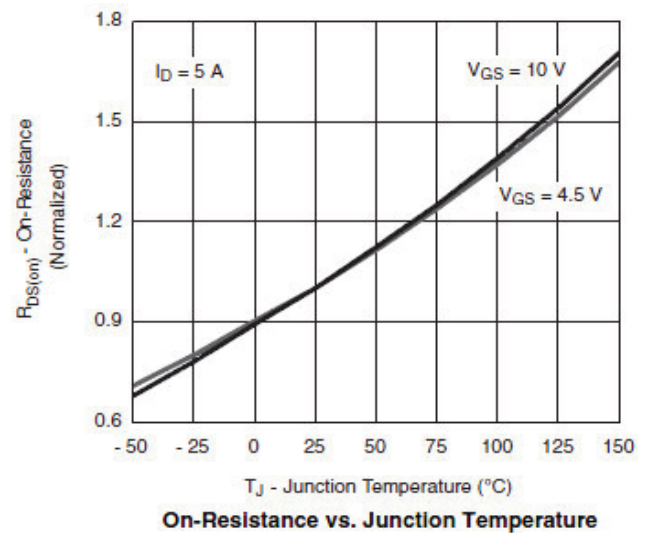
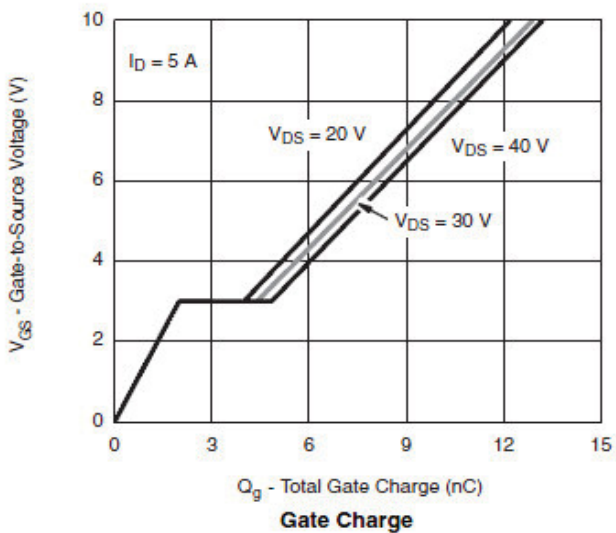
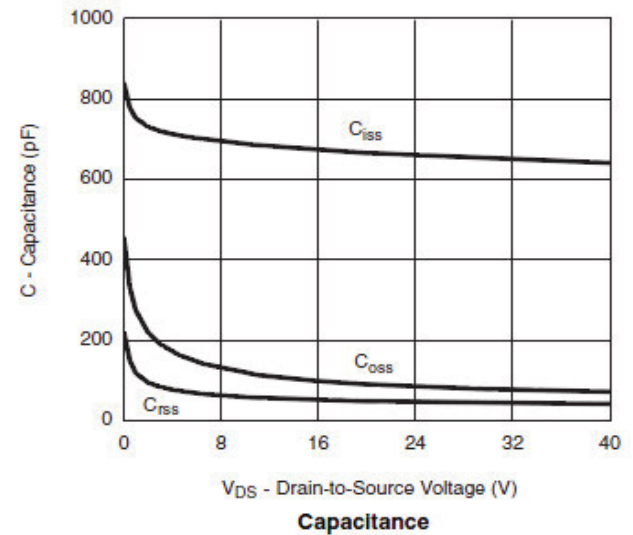
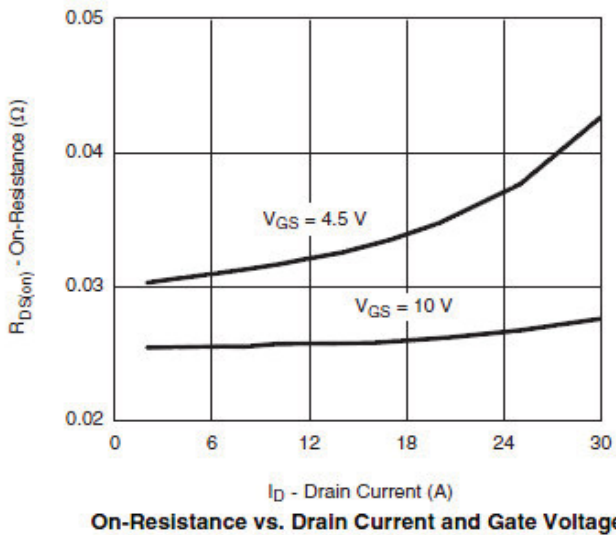
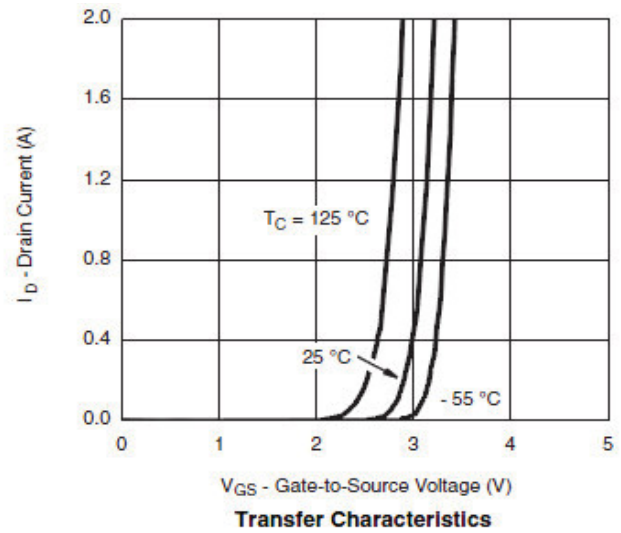
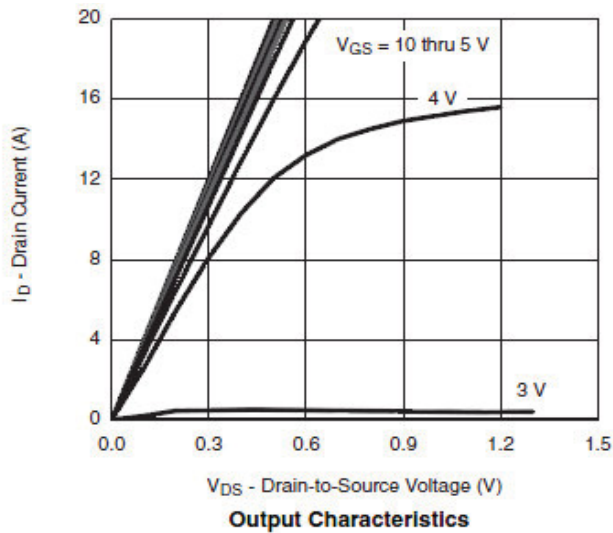
Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V		40			V
Zero gate voltage drain current	Idss	Vds=32V, Vgs=0V				1	μA
			Ta=85°C			10	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		1.0		2.0	V
On state drain current	Id(on)	Vgs=10V, Vds≥5V		30			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=7A			26	35	mΩ
		Vgs=4.5V, Id=6A			32	42	
Forward transconductance	Gfs	Vds=5V, Id=12.0A			25		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=20V, f=1MHz			750		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

Complementary MOSFET (common drain)

ELM55614CA-S

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

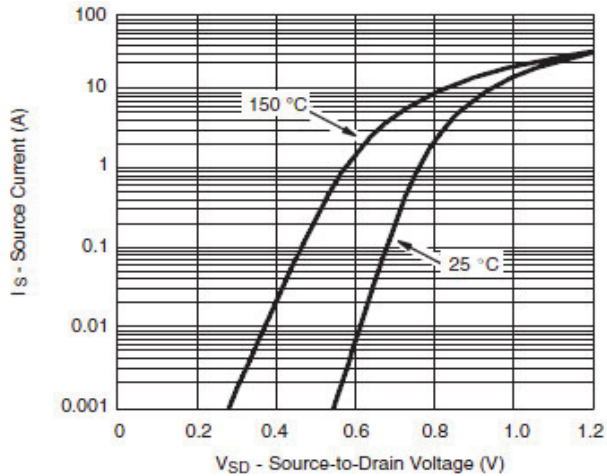
■ Typical electrical and thermal characteristics (N-ch)



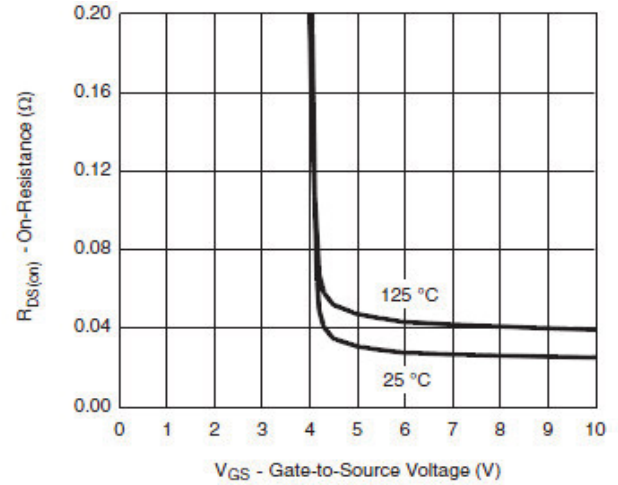
Complementary MOSFET (common drain)

ELM55614CA-S

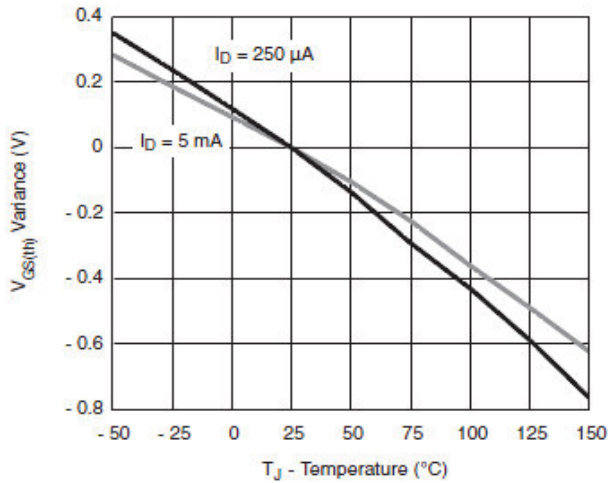
<http://www.elm-tech.com>



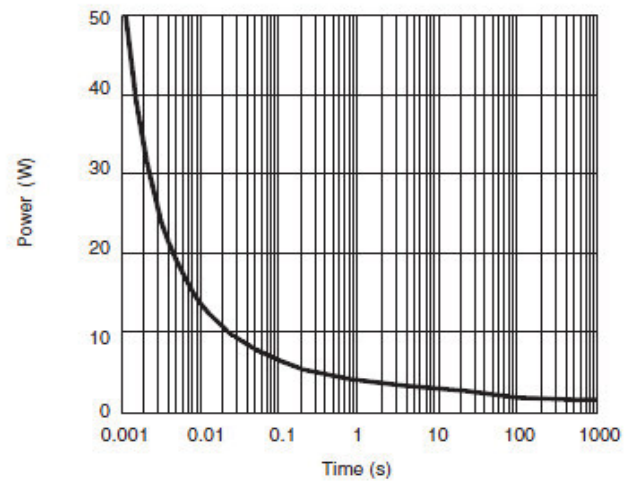
Source-Drain Diode Forward Voltage



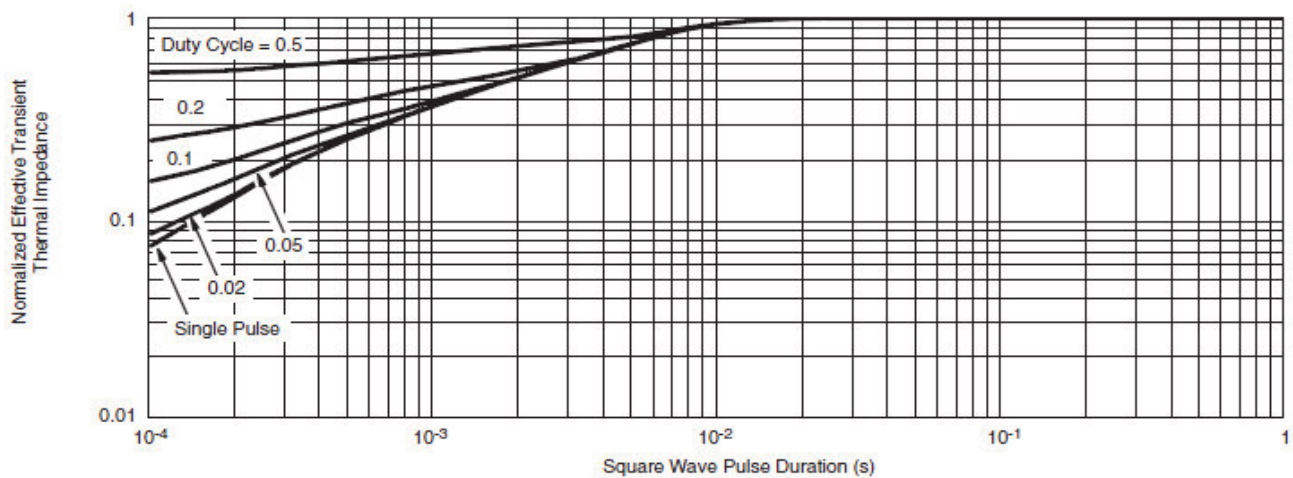
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

Complementary MOSFET (common drain)

ELM55614CA-S

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

■Electrical Characteristics (P-ch)

Ta=25°C. Unless otherwise noted.

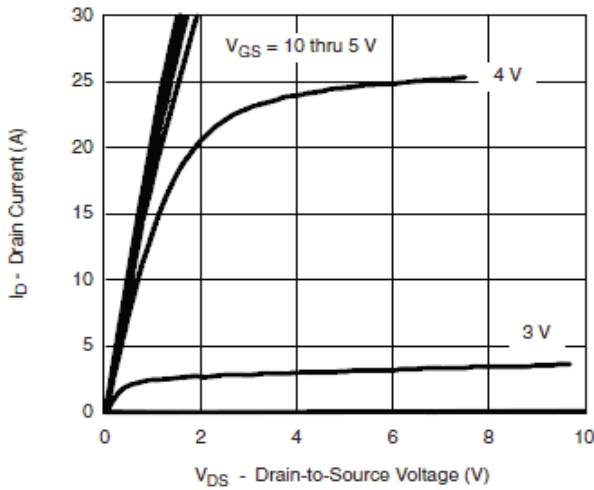
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	Id=-250μA, Vgs=0V		-40			V
Zero gate voltage drain current	Idss	Vds=-32V, Vgs=0V				-1	μA
			Ta=85°C			-20	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA		-1.0		-2.0	V
On state drain current	Id(on)	Vgs=-10V, Vds≥-5V		-30			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-6A			60	65	mΩ
		Vgs=-4.5V, Id=-5A			85	95	
Forward transconductance	Gfs	Vds=-5V, Id=-12A			25		S
Diode forward voltage	Vsd	Is=-2A, Vgs=0V			-0.8	-1.3	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				195		pF
Reverse transfer capacitance	Crss				105		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

Complementary MOSFET (common drain)

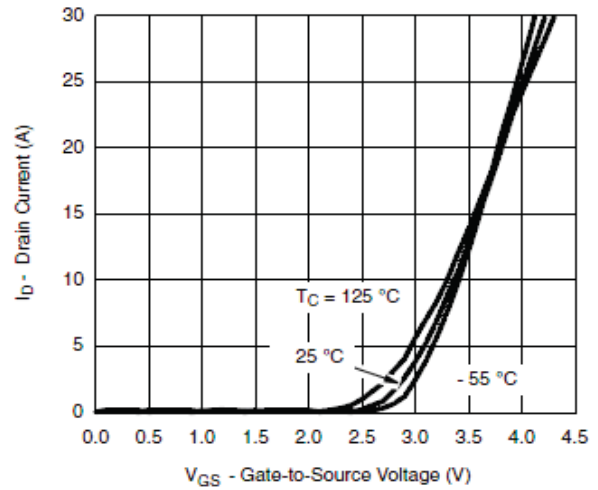
ELM55614CA-S

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

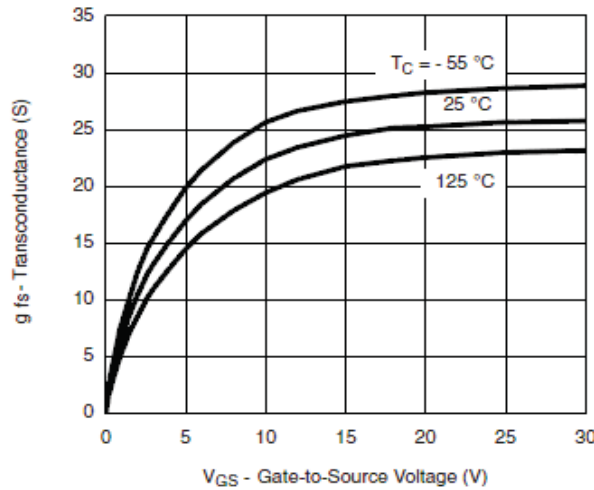
■ Typical electrical and thermal characteristics (P-ch)



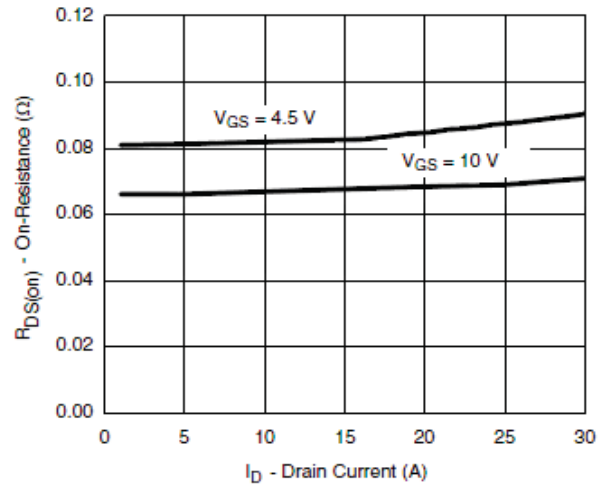
Output Characteristics



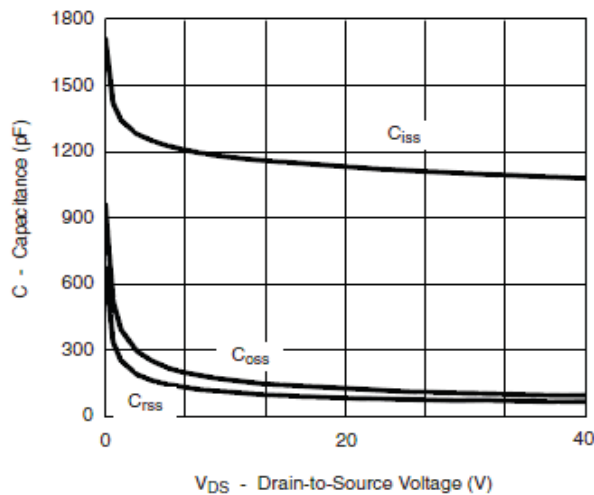
Transfer Characteristics



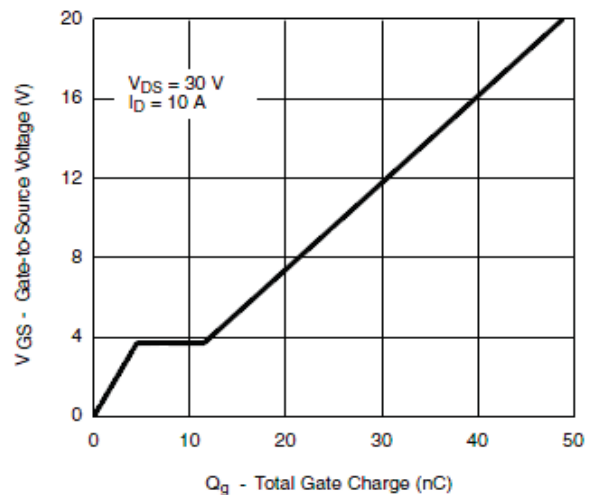
Transconductance



On-Resistance vs. Drain Current



Capacitance

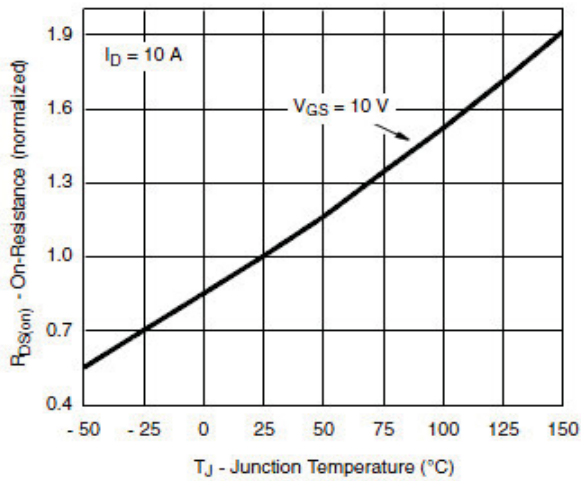


Gate Charge

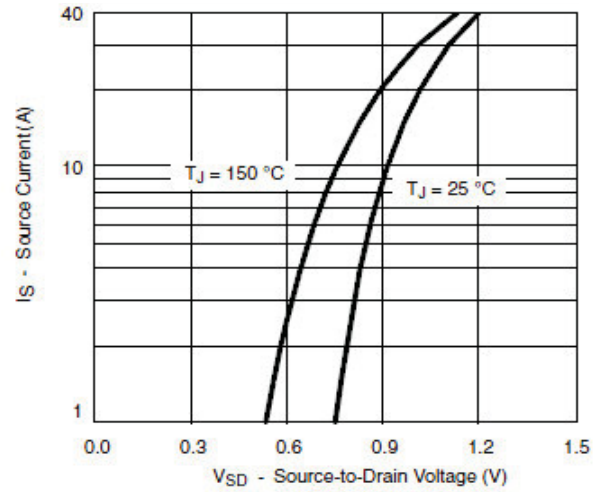
Complementary MOSFET (common drain)

ELM55614CA-S

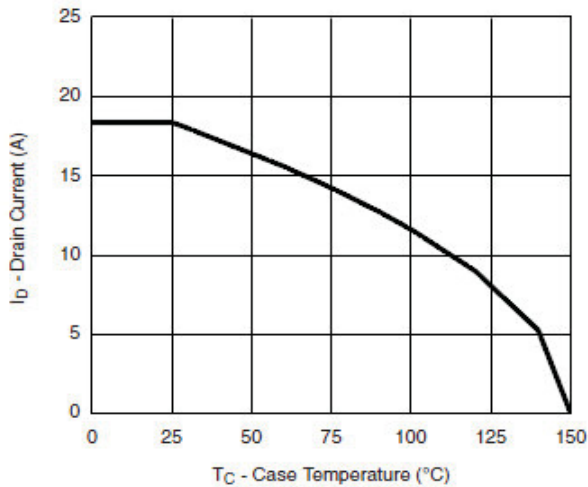
<http://www.elm-tech.com>



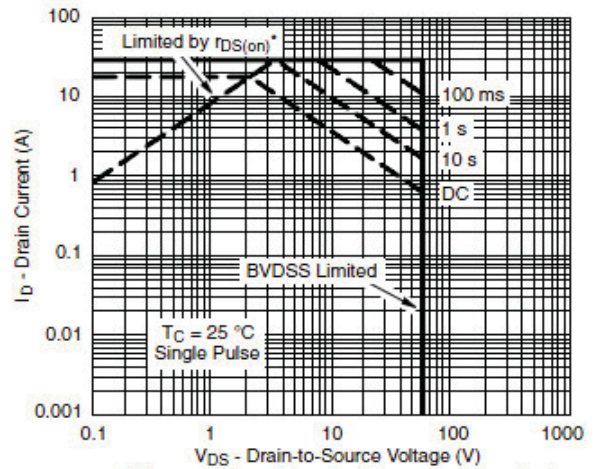
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

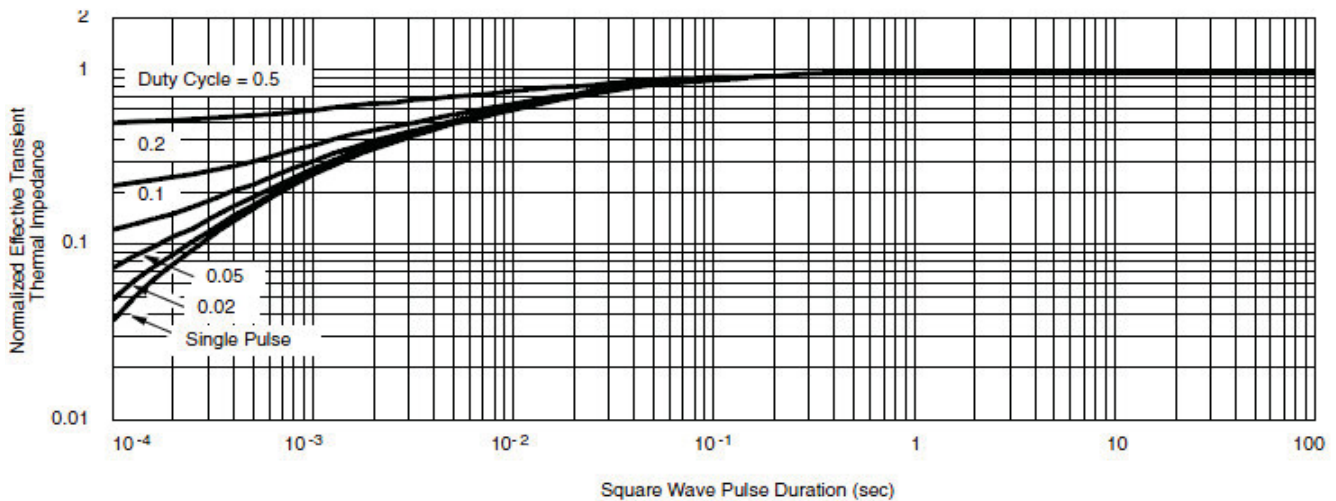


Maximum Drain Current vs. Case Temperature



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

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

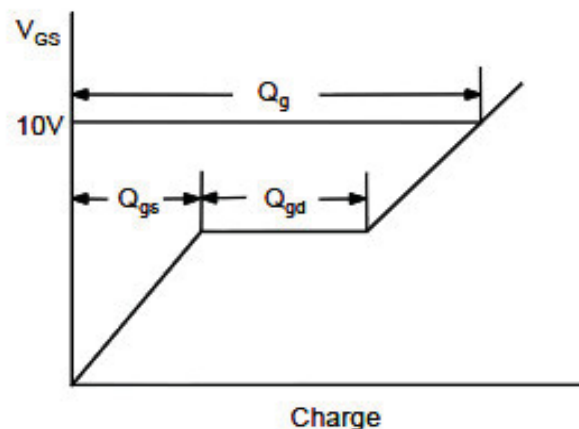
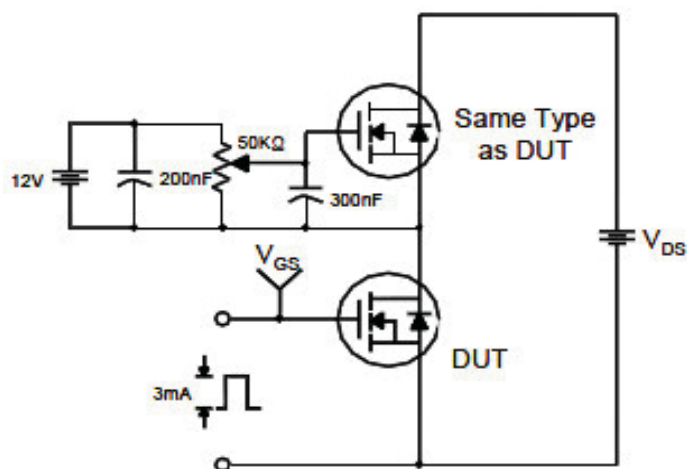
Complementary MOSFET (common drain)

ELM55614CA-S

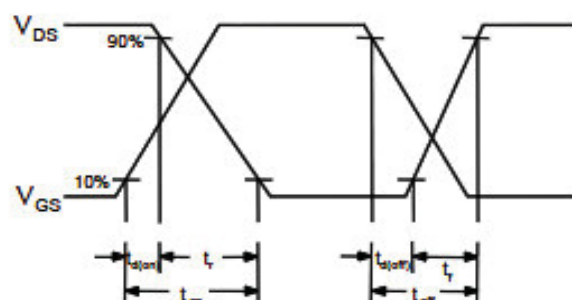
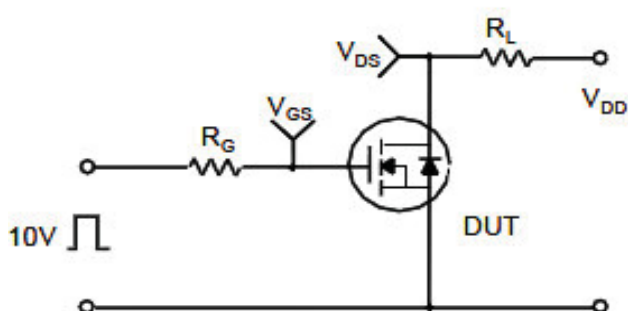
<http://www.elm-tech.com>

■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

