Complementary MOSFET

ELM54599CWA-N

■General Description

ELM54599CWA-N uses advanced trench technology to provide excellent Rds(on) and low gate charge.

■Features

- N-channel
  Vds=40V, Id=8.0A, Rds(on)=22mΩ(Vgs=10V)
  Vds=40V, Id=6.0A, Rds(on)=28mΩ(Vgs=4.5V)
- P-channel
  Vds=-40V, Id=-7.2A, Rds(on)=42mΩ(Vgs=-10V)
  Vds=-40V, Id=-6.2A, Rds(on)=60mΩ(Vgs=-4.5V)

■Maximum Absolute Ratings

Ta=25°C. Unless otherwise noted.

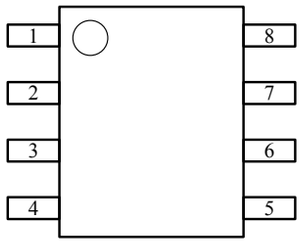
Parameter		Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage		Vds	40	-40	V
Gate-source voltage		Vgs	±20	±20	V
Continuous drain current(Tj=150°C)	Ta=25°C	Id	8.0	-7.2	A
	Ta=70°C		6.0	-6.2	
Pulsed drain current		Idm	25	-25	A
Power dissipation	Tc=25°C	Pd	2.8	2.8	W
	Tc=70°C		1.8	1.8	
Junction and storage temperature range		Tj,Tstg	-55 to 150	-55 to 150	°C

■Thermal Characteristics

Parameter		Symbol	Device	Typ.	Max.	Unit
Maximum junction-to-ambient	Steady-state	Rθja	N-ch		62.5	°C/W
Maximum junction-to-ambient	Steady-state	Rθja	P-ch		62.5	°C/W

■Pin configuration

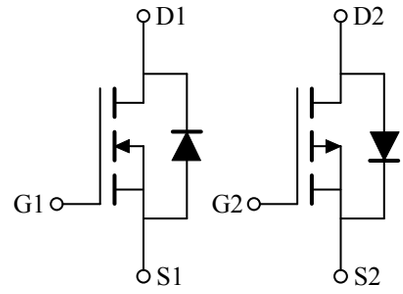
SOP-8(TOP VIEW)



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

■Circuit

• N-ch • P-ch

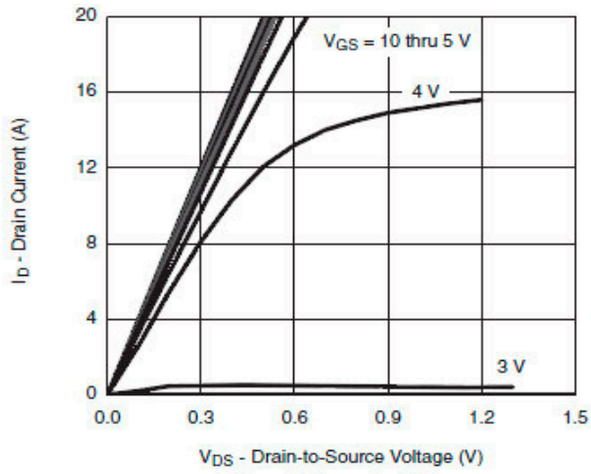


■Electrical Characteristics (N-ch)

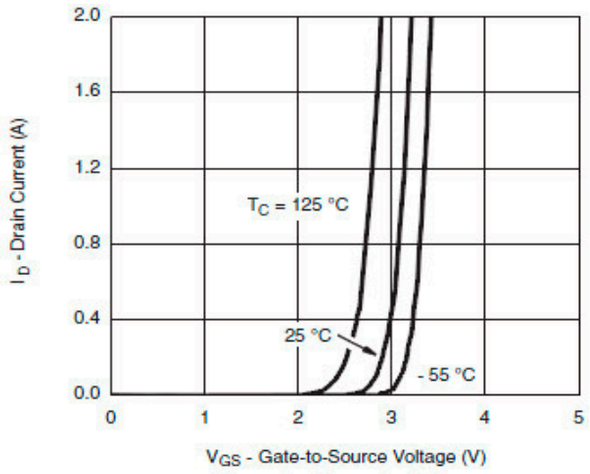
Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V		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		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=8.0A			16	22	mΩ
		Vgs=4.5V, Id=6.0A			20	28	
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=5A			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, Id=5.0A RL=4Ω, 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

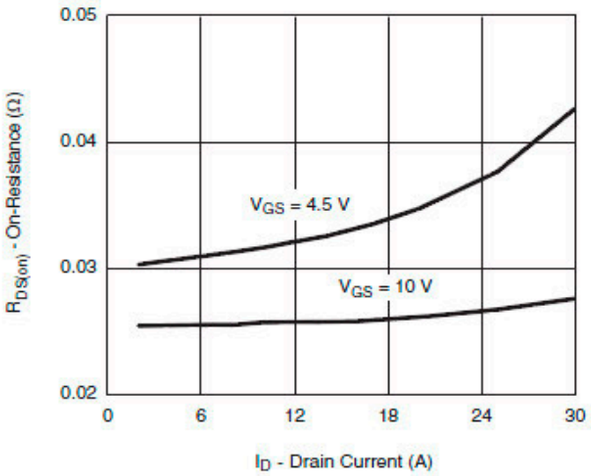
■Typical Electrical and Thermal Characteristics (N-ch)



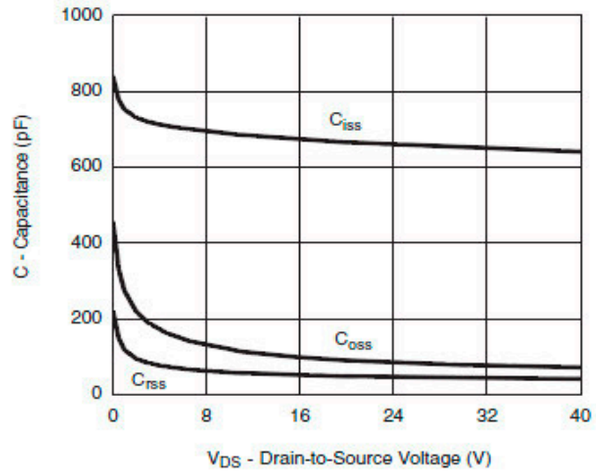
Output Characteristics



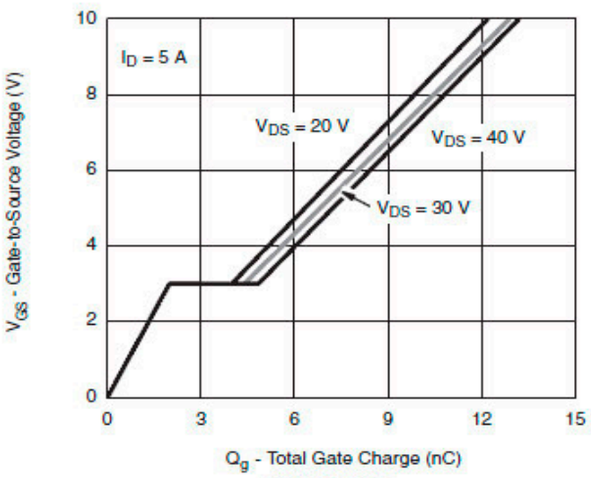
Transfer Characteristics



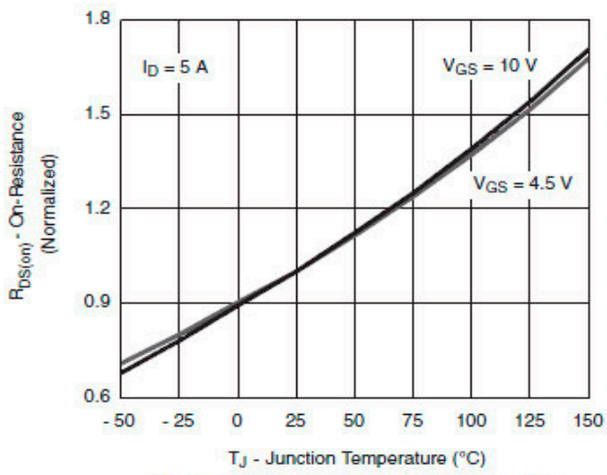
On-Resistance vs. Drain Current and Gate Voltage



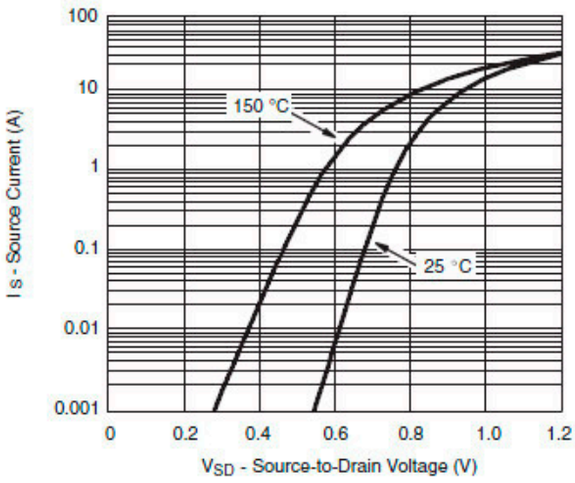
Capacitance



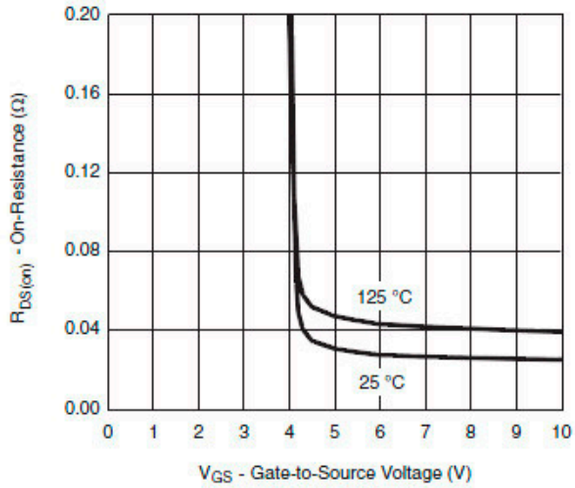
Gate Charge



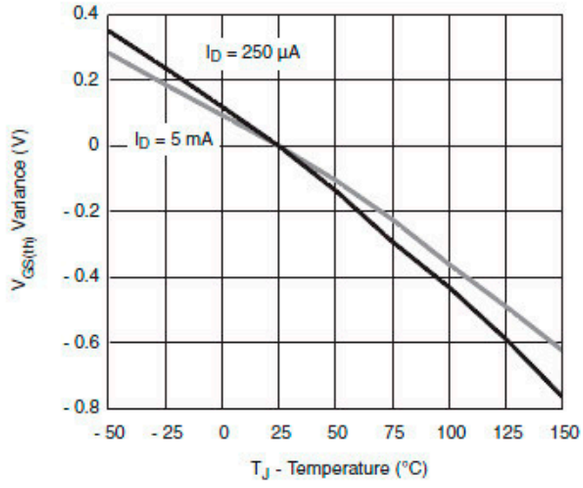
On-Resistance vs. Junction Temperature



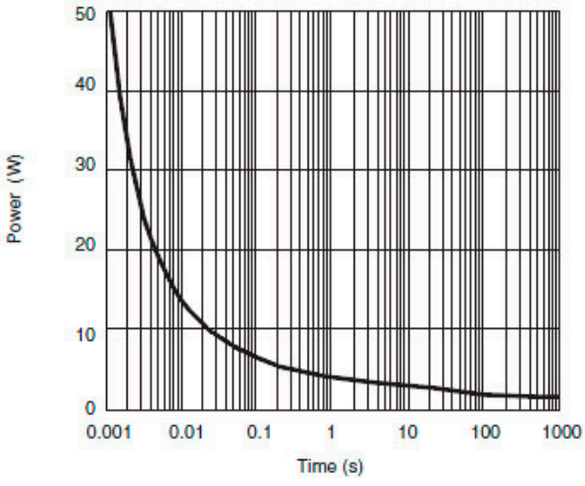
Source-Drain Diode Forward Voltage



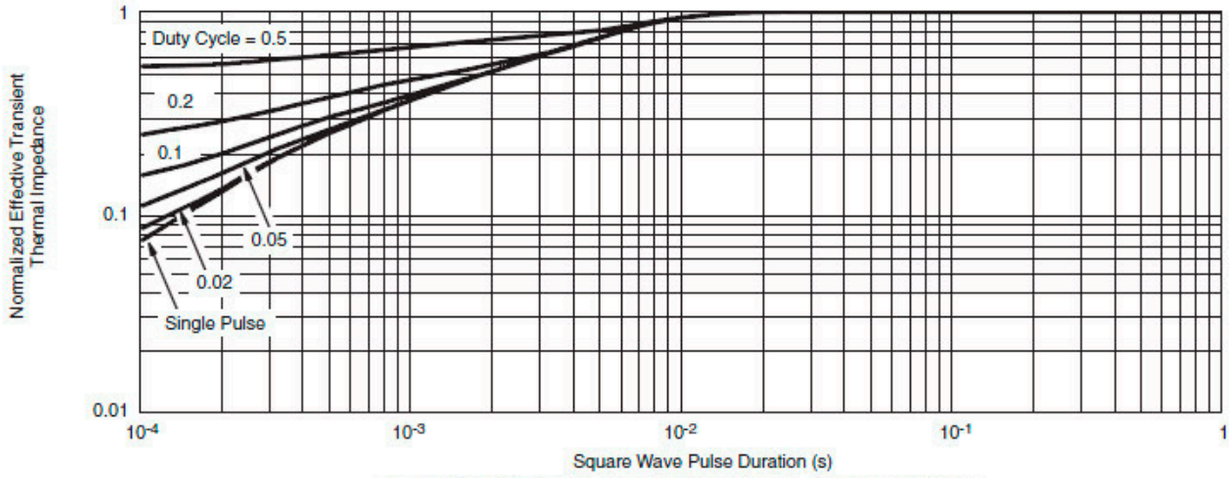
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power, Junction-to-Ambient



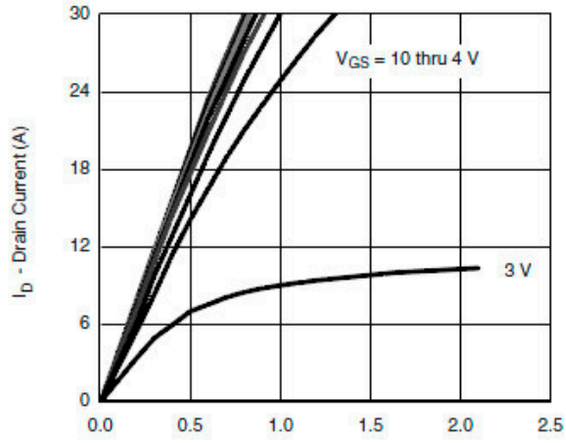
Normalized Thermal Transient Impedance, Junction-to-Case

■Electrical Characteristics (P-ch)

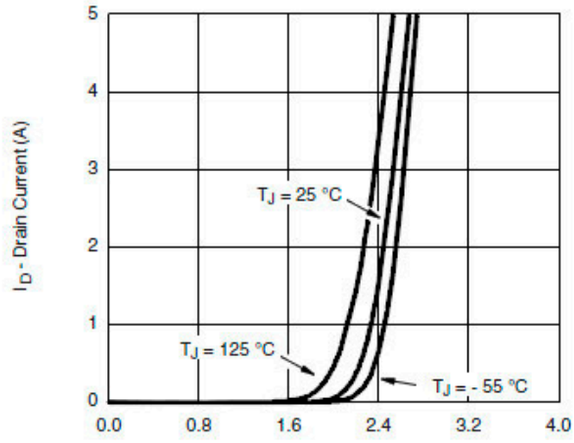
Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V		-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		-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=-7.2A			34	42	mΩ
		Vgs=-4.5V, Id=-6.2A			50	60	
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=-5A			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=-5A, 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

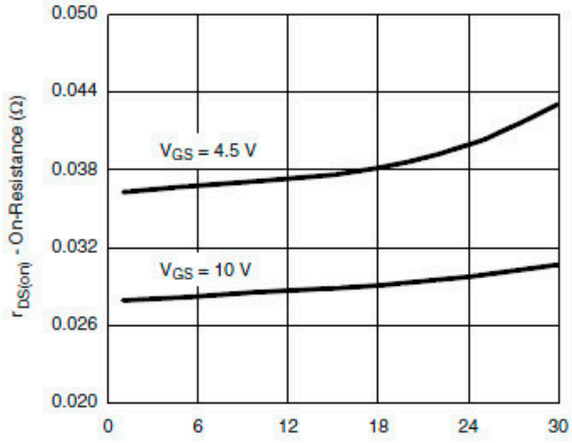
■Typical Electrical and Thermal Characteristics (P-ch)



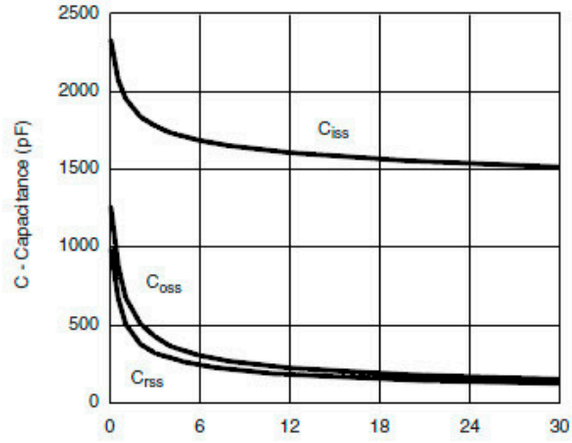
Output Characteristics



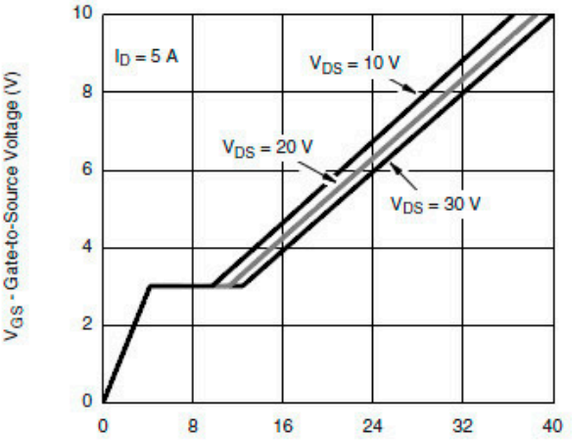
Transfer Characteristics



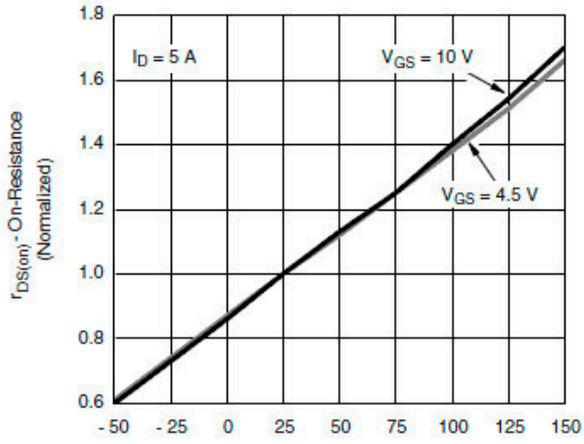
On-Resistance vs. Drain Current



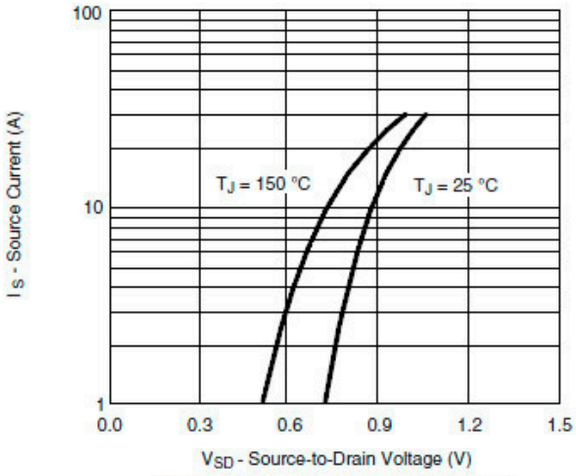
Capacitance



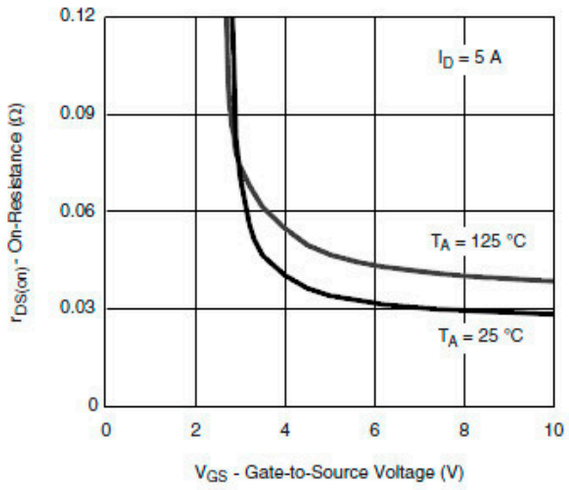
Gate Charge



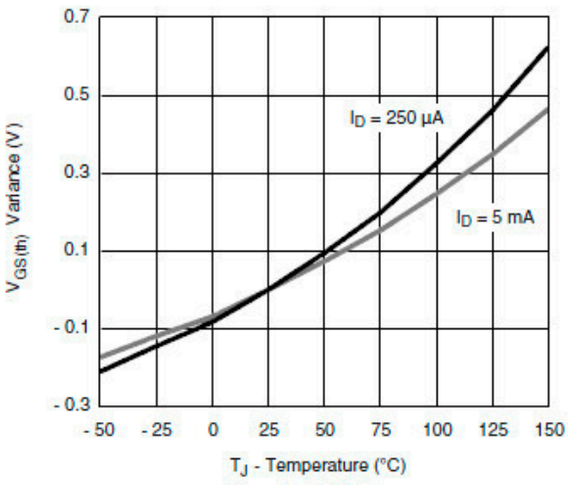
On-Resistance vs. Junction Temperature



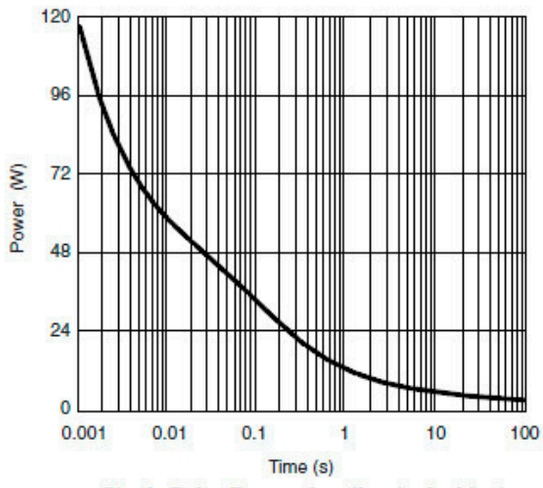
Source-Drain Diode Forward Voltage



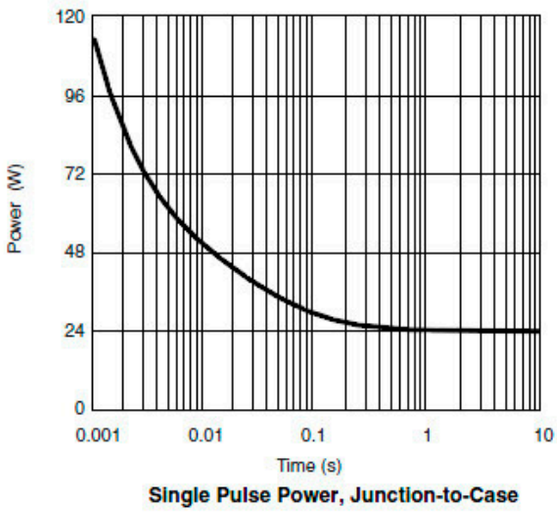
On-Resistance vs. Gate-to-Source Voltage



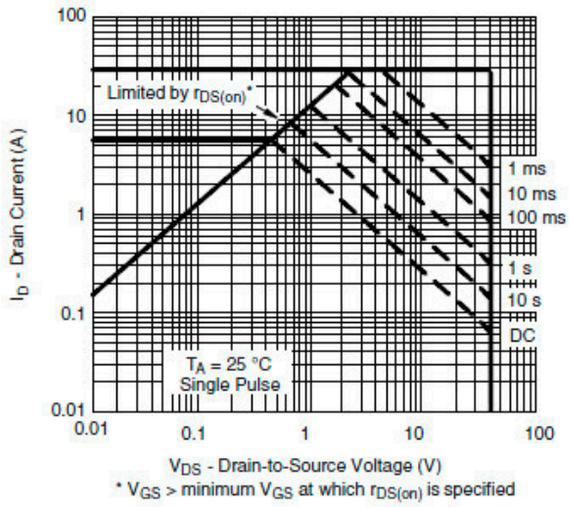
Threshold Voltage



Single Pulse Power, Junction-to-Ambient



Single Pulse Power, Junction-to-Case

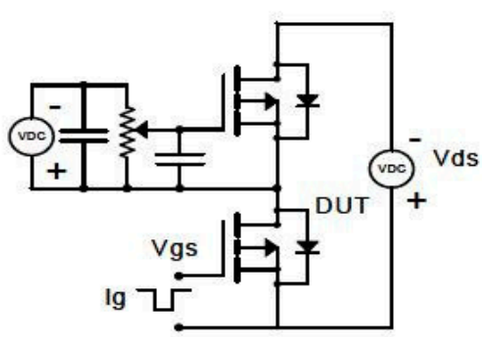


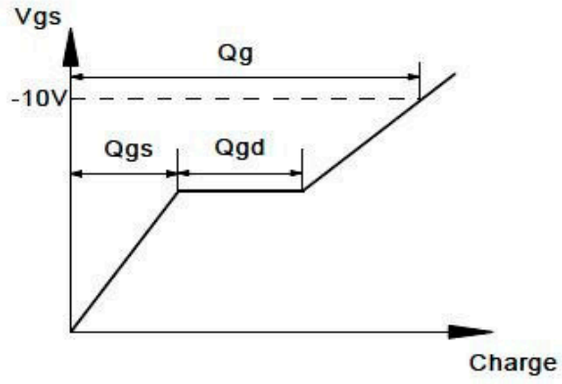
* V_{GS} > minimum V_{GS} at which $r_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

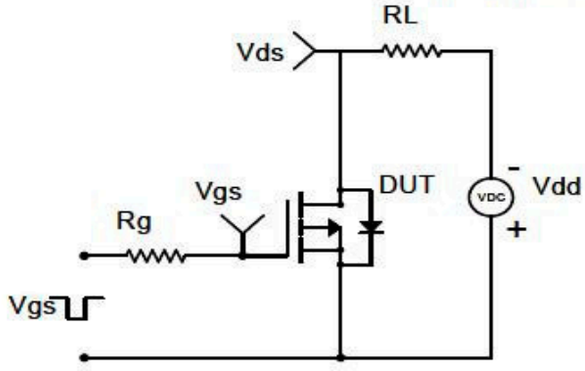
■Test circuit and waveform

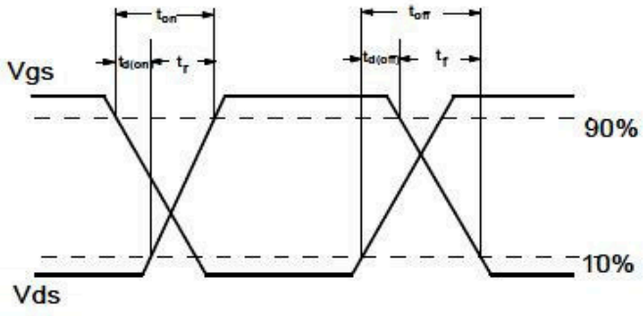
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms