

Complementary MOSFET

ELM56332CESA-S

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

General Description

ELM56332CESA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge. ESD protection is included.

Features

- | N-channel | P-channel |
|--|---|
| • $V_{ds}=20V$ | • $V_{ds}=-20V$ |
| • $I_d=1.2A$ | • $I_d=-1.0A$ |
| • $R_{ds(on)}=320m\Omega(V_{gs}=4.5V)$ | • $R_{ds(on)}=580m\Omega(V_{gs}=-4.5V)$ |
| • $R_{ds(on)}=420m\Omega(V_{gs}=2.5V)$ | • $R_{ds(on)}=780m\Omega(V_{gs}=-2.5V)$ |
| • $R_{ds(on)}=580m\Omega(V_{gs}=1.8V)$ | • $R_{ds(on)}=980m\Omega(V_{gs}=-1.8V)$ |
| • ESD protection | • ESD protection |

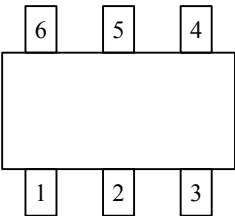
Maximum Absolute Ratings

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

Parameter		Symbol	N-ch (Max.)	P-ch (Max.)	Unit
Drain-source voltage		V_{ds}	20	-20	V
Gate-source voltage		V_{gs}	± 12	± 12	V
Continuous drain current($T_j=150^{\circ}C$)	$T_a=25^{\circ}C$	I_d	1.2	-1.0	A
	$T_a=70^{\circ}C$		0.9	-0.7	
Pulsed drain current		I_{dm}	4	-3	A
Power dissipation	$T_c=25^{\circ}C$	P_d	0.3	0.3	W
	$T_c=70^{\circ}C$		0.2	0.2	
Operating junction temperature		T_j	-55 to 150	-55 to 150	$^{\circ}C$
Storage temperature range		T_{stg}	-55 to 150	-55 to 150	$^{\circ}C$

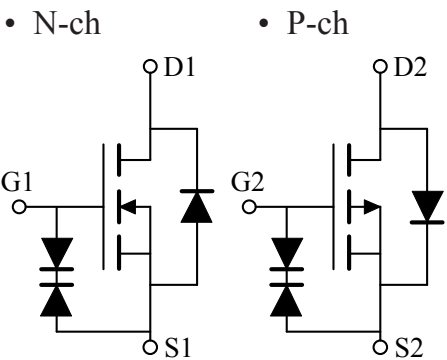
Pin configuration

SC-70-6(TOP VIEW)



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

Circuit



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■Electrical Characteristics (N-ch)

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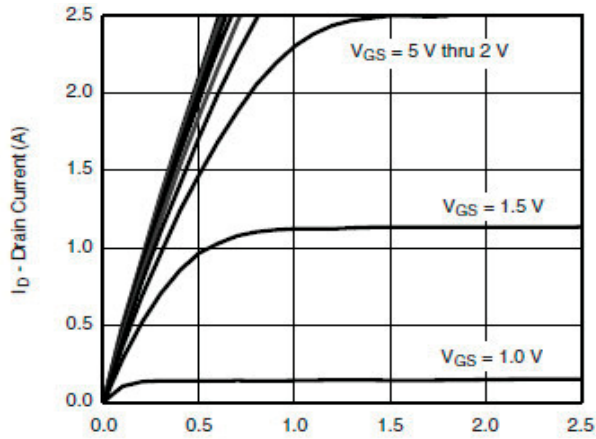
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	20			V
Zero gate voltage drain current	Idss	Vds=16V, Vgs=0V			1	μA
		Ta=85°C			5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±1	mA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	0.3		1.0	V
On state drain current	Id(on)	Vgs=4.5V, Vds≥5V	1.2			A
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=0.7A		230	320	mΩ
		Vgs=2.5V, Id=0.6A		280	420	
		Vgs=1.8V, Id=0.5A		400	580	
Forward transconductance	Gfs	Vds=10V, Id=1.0A		1		S
Diode forward voltage	Vsd	Is=1.0A, Vgs=0V		0.65	1.50	V
Max.body-diode continuous current	Is				0.6	A
DYNAMIC PARAMETERS						
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		70		pF
Output capacitance	Coss			20		pF
Reverse transfer capacitance	Crss			8		pF
SWITCHING PARAMETERS						
Total gate charge	Qg	Vgs=4.5V, Vds=10V, Id≐1.2A		1.06	1.38	nC
Gate-source charge	Qgs			0.18		nC
Gate-drain charge	Qgd			0.32		nC
Turn-on delay time	td(on)	Vgs=4.5V, Vds=10V, Id≐1.2A RL=20Ω, Rgen=1Ω		18	26	ns
Turn-on rise time	tr			20	28	ns
Turn-off delay time	td(off)			70	110	ns
Turn-off fall time	tf			25	40	ns

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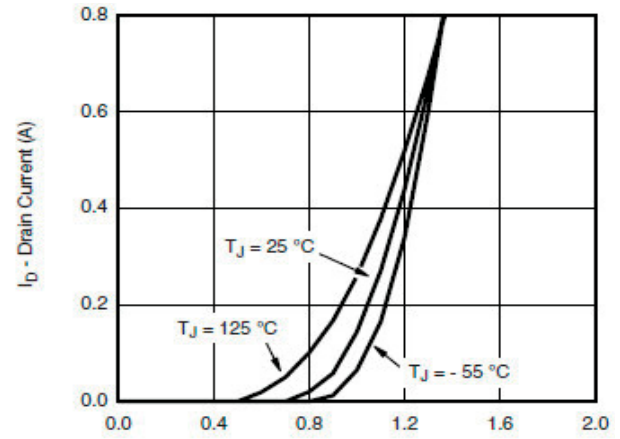
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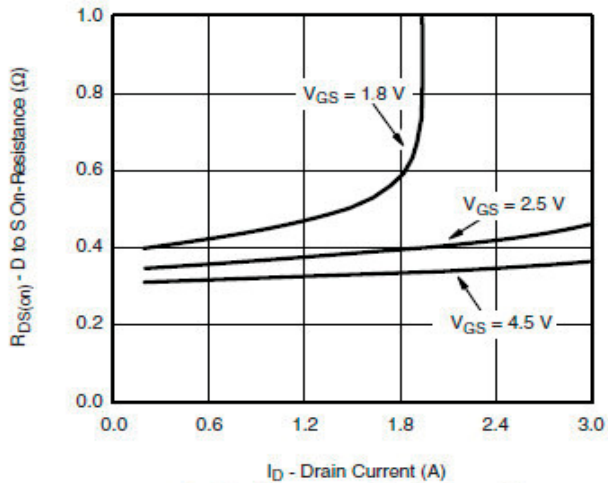
■ Typical Electrical and Thermal Characteristics (N-ch)



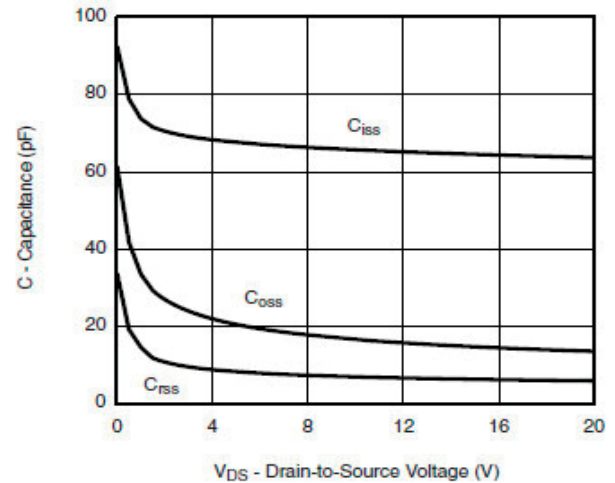
Output Characteristics



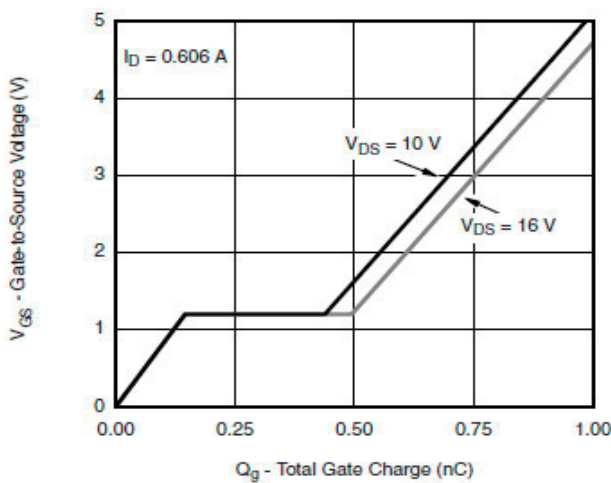
Transfer Characteristics



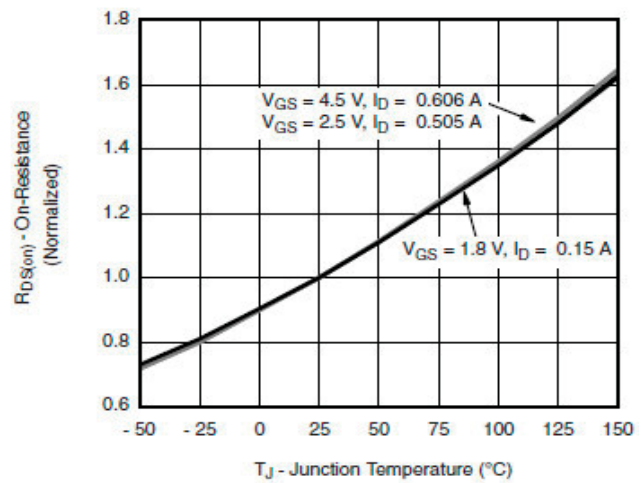
On-Resistance vs. Drain Current



Capacitance



Gate Charge

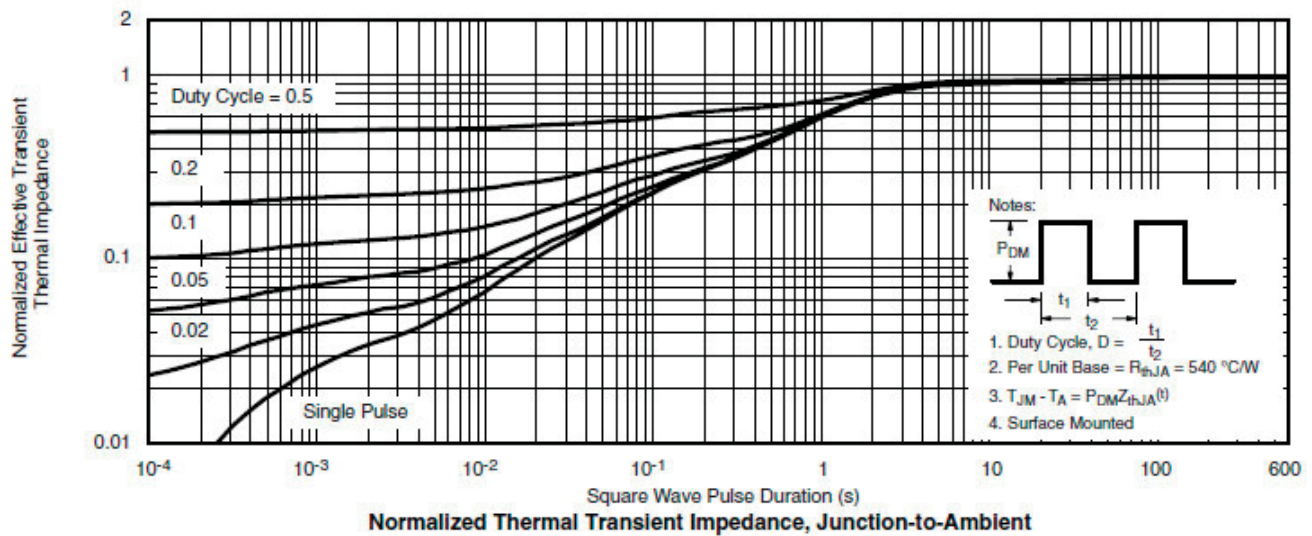
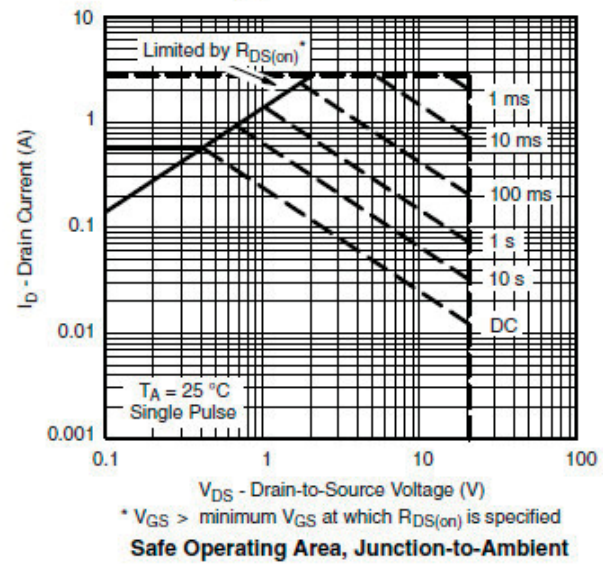
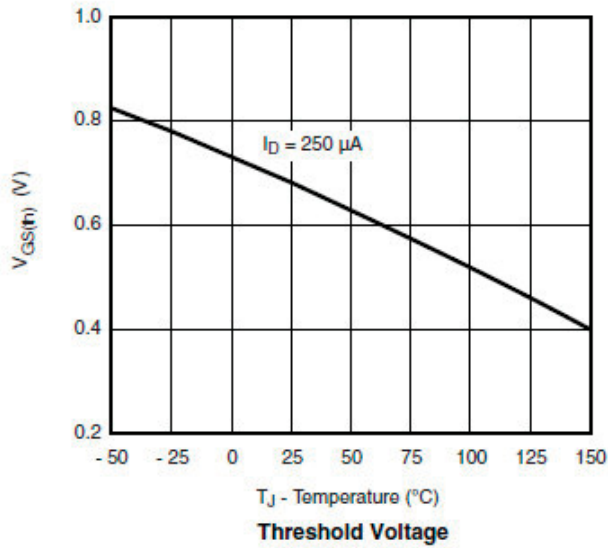
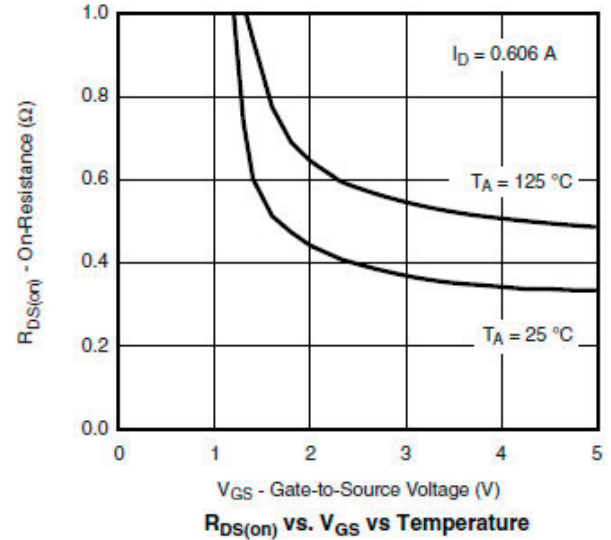
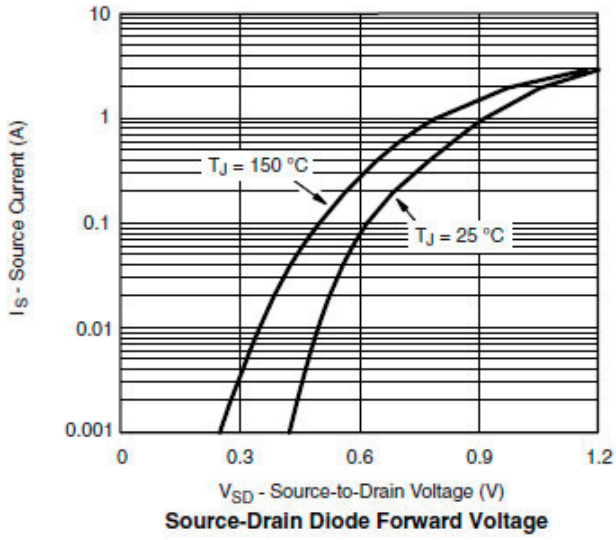


On-Resistance vs. Junction Temperature

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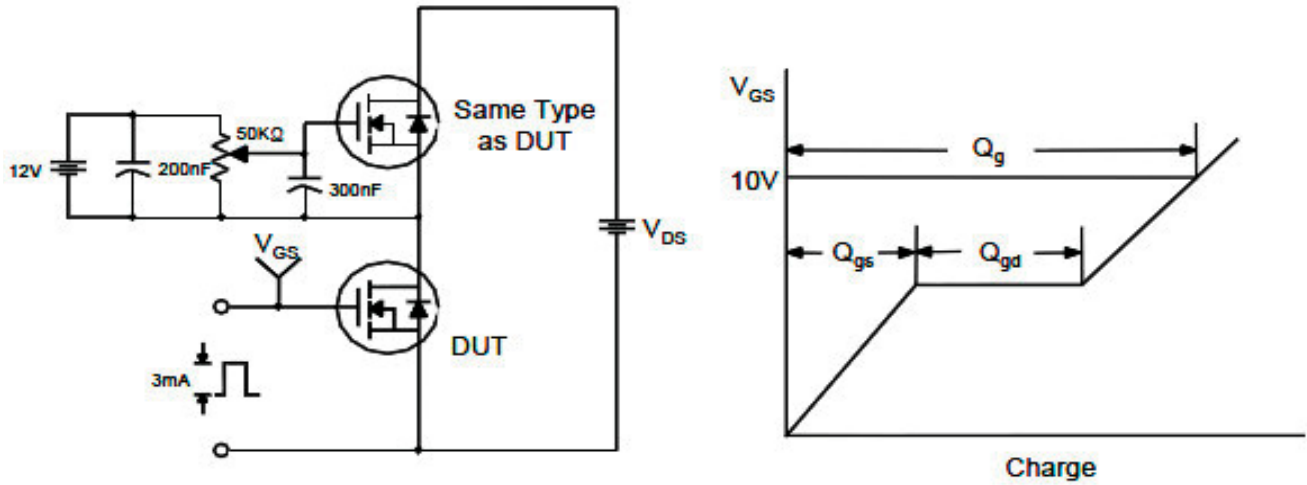
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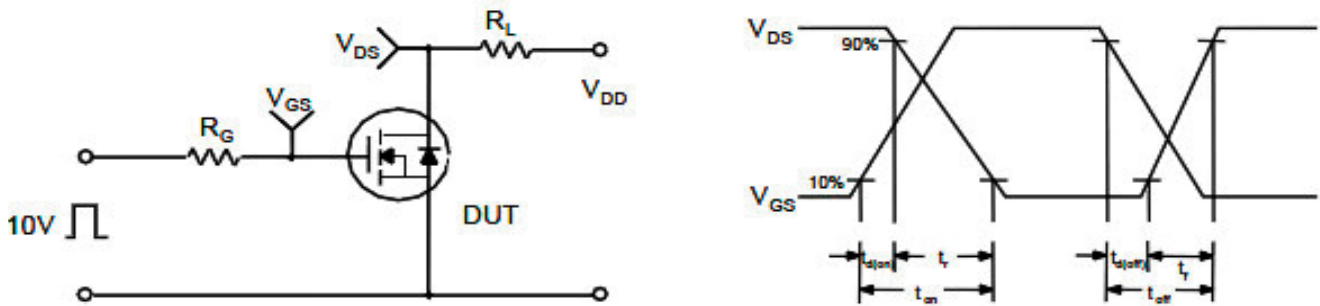
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■ Test circuit and waveform (N-ch)

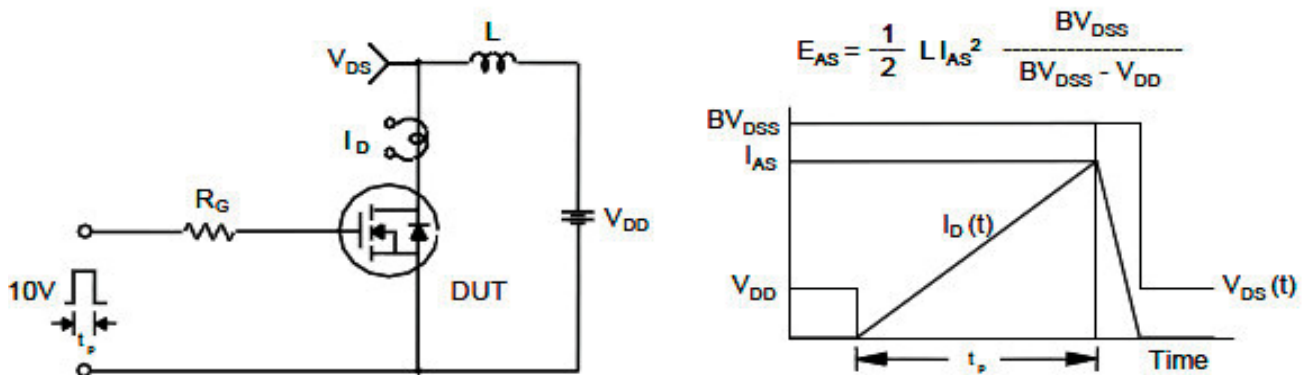
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



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■Electrical Characteristics (P-ch)

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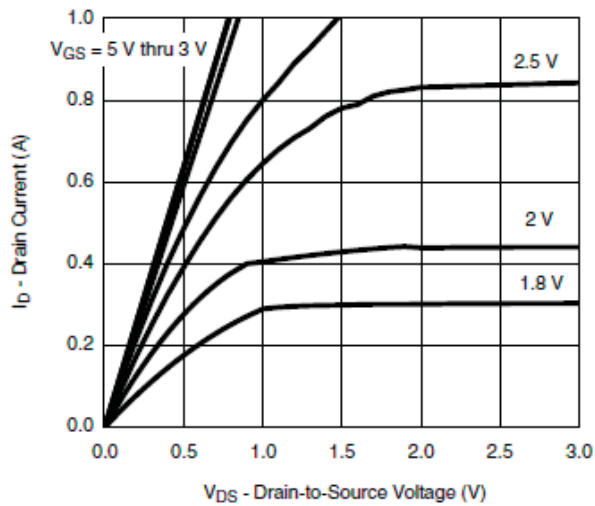
Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V		-20			V
Zero gate voltage drain current	Idss	Vds=-16V, Vgs=0V				-1	μA
			Ta=85°C			-5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V				±1	mA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA		-0.3		-1.0	V
On state drain current	Id(on)	Vgs=-4.5V, Vds≥-5V		-0.7			A
Static drain-source on-resistance	Rds(on)	Vgs=-4.5V, Id=-0.6A			380	580	mΩ
		Vgs=-2.5V, Id=-0.5A			520	780	
		Vgs=-1.8V, Id=-0.4A			690	980	
Forward transconductance	Gfs	Vds=-10V, Id=-0.4A			1		S
Diode forward voltage	Vsd	Is=-0.15A, Vgs=0V			-0.65	-1.50	V
Max. body-diode continuous current	Is					-0.6	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-10V, f=1MHz			70	100	pF
Output capacitance	Coss				20		pF
Reverse transfer capacitance	Crss				10		pF
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-4.5V, Vds=-10V Id≡-0.25A			1.0	1.3	nC
Gate-source charge	Qgs				0.1		nC
Gate-drain charge	Qgd				0.3		nC
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-10V Id≡-0.2A, RL=30Ω Rgen=10Ω			10	15	ns
Turn-on rise time	tr				10	15	ns
Turn-off delay time	td(off)				40	60	ns
Turn-off fall time	tf				30	50	ns

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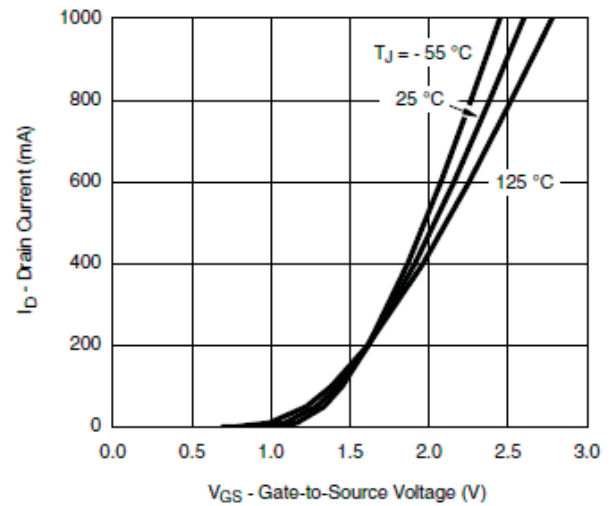
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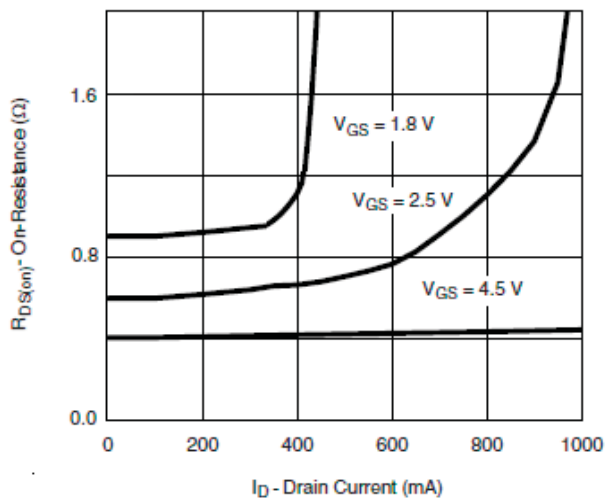
■ Typical Electrical and Thermal Characteristics (P-ch)



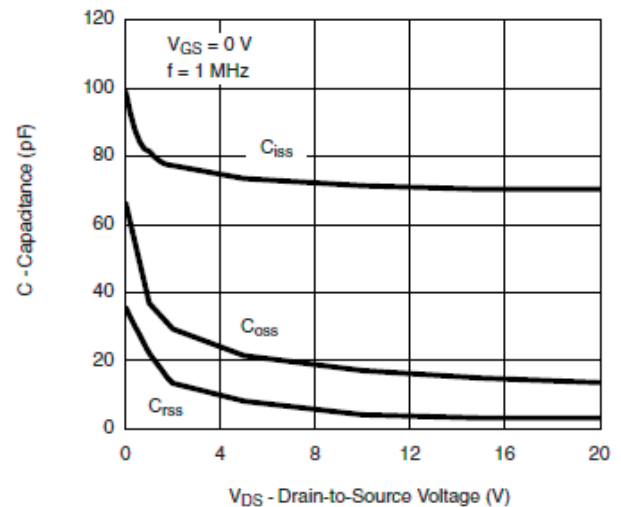
Output Characteristics



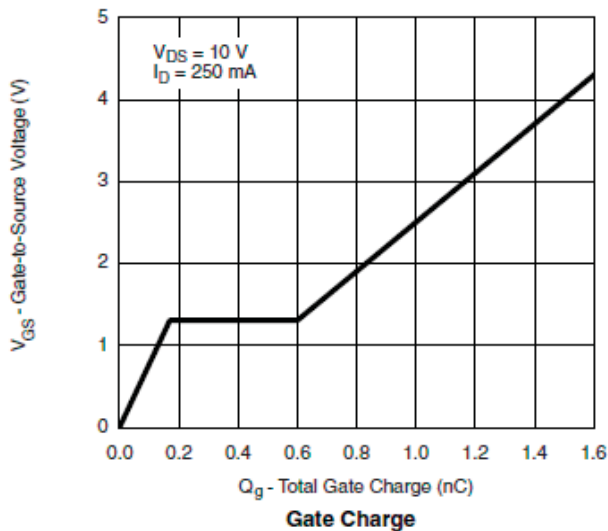
Transfer Characteristics



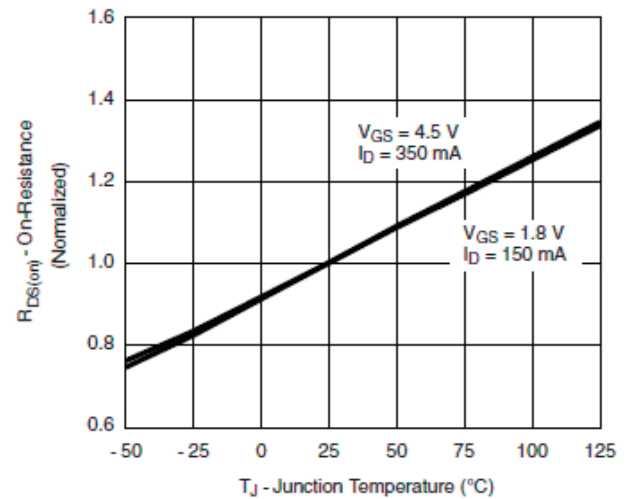
On-Resistance vs. Drain Current



Capacitance



Gate Charge

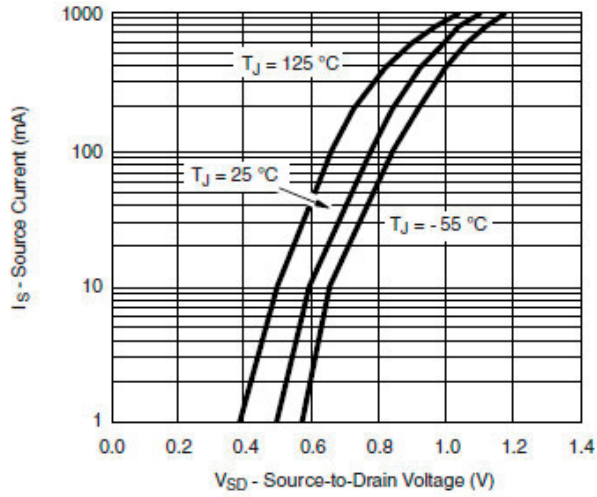


On-Resistance vs. Junction Temperature

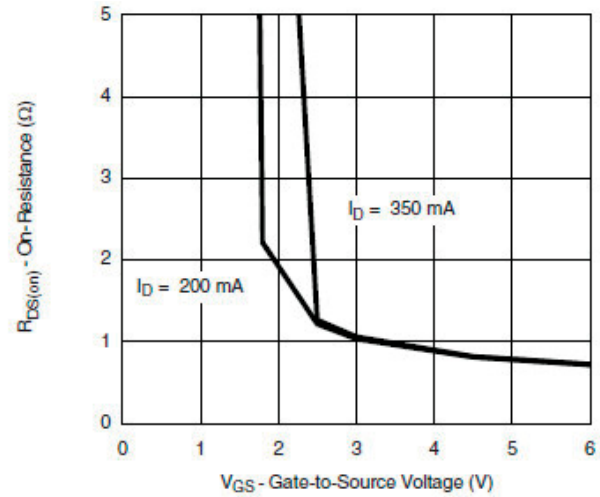
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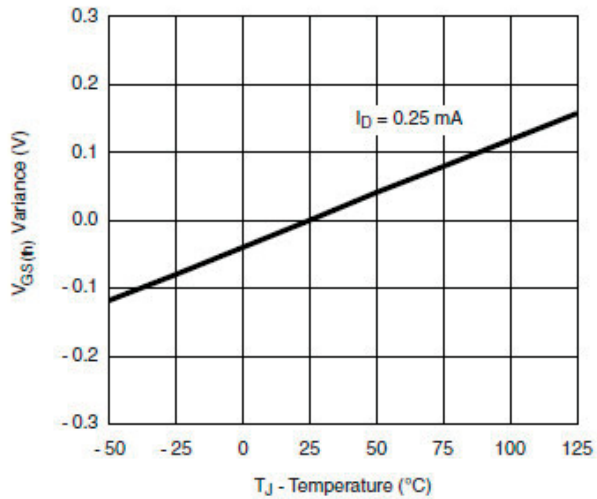
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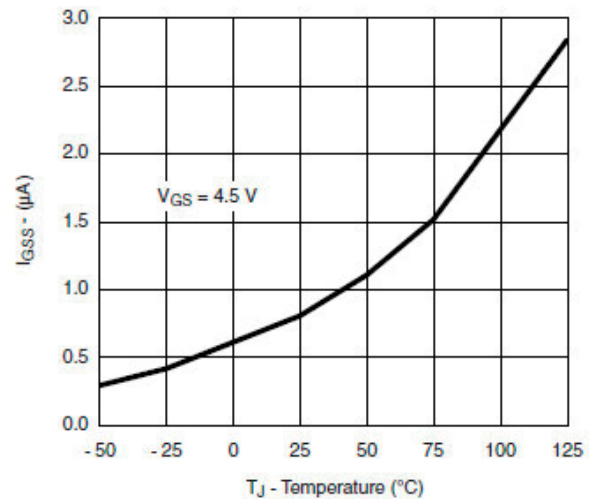
Source-Drain Diode Forward Voltage



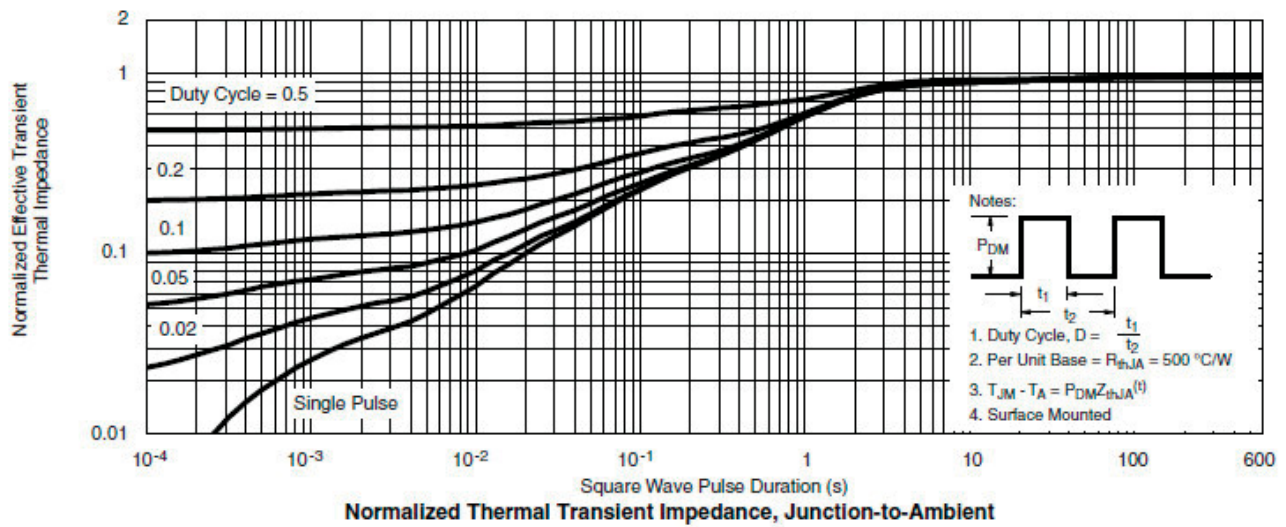
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage Variance vs. Temperature



I_{GSS} vs. Temperature



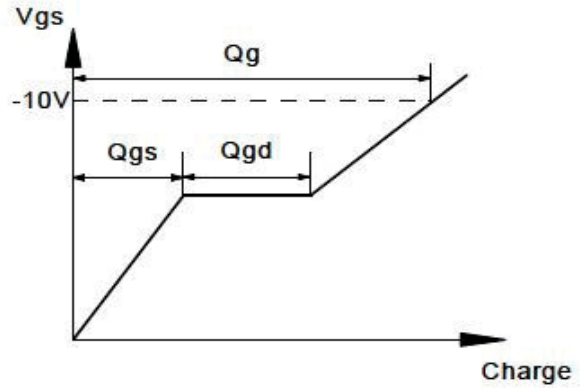
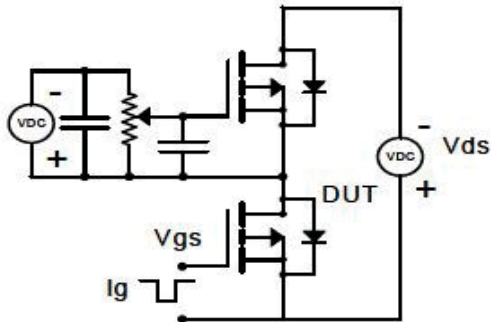
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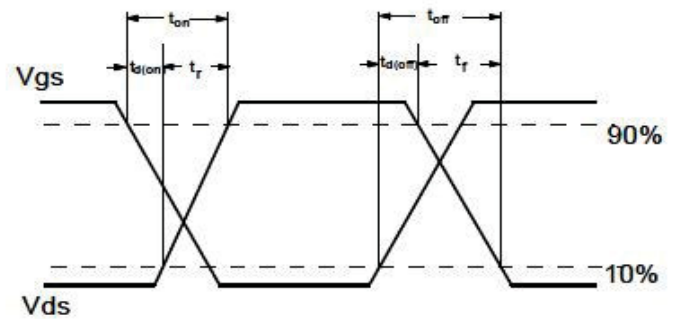
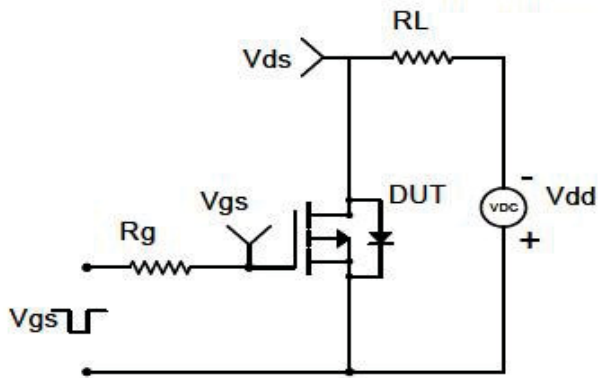
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■ Test circuit and waveform (P-ch)

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

