

Single N-channel MOSFET

ELM51402FA-S

■ General description

ELM51402FA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate resistance.

■ Features

- $V_{ds}=20V$
- $I_d=1.0A$
- $R_{ds(on)} < 280m\Omega$ ($V_{gs}=4.5V$)
- $R_{ds(on)} < 340m\Omega$ ($V_{gs}=2.5V$)
- $R_{ds(on)} < 680m\Omega$ ($V_{gs}=1.8V$)

■ Maximum absolute ratings

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

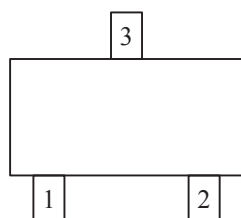
Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{ds}	20	V
Gate-source voltage	V_{gs}	± 12	V
Continuous drain current($T_j=150^\circ C$)	I_d	$T_a=25^\circ C$	1.0
		$T_a=70^\circ C$	0.6
Pulsed drain current	I_{dm}	6	A
Power dissipation	P_d	$T_c=25^\circ C$	0.35
		$T_c=70^\circ C$	0.22
Junction and storage temperature range	T_j, T_{stg}	- 55 to 150	$^\circ C$

■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit
Maximum junction-to-ambient	$R\theta_{ja}$		120	$^\circ C/W$

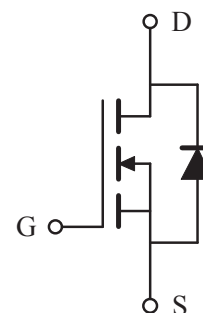
■ Pin configuration

SC-70(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

■ Circuit



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■ Electrical characteristics

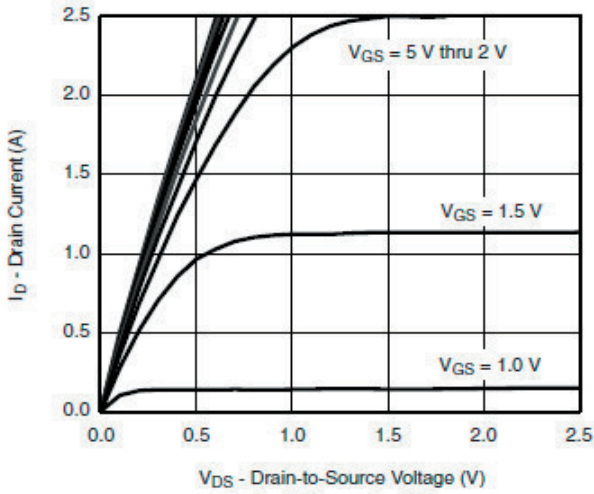
Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	20			V
Zero gate voltage drain current	Idss	Vds=20V, Vgs=0V			1	μA
					5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	0.4		1.0	V
On state drain current	Id(on)	Vgs=4.5V, Vds=5V	1.0			A
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=1.8A		240	280	mΩ
		Vgs=2.5V, Id=1.5A		300	340	
		Vgs=1.8V, Id=1.2A		600	680	
Forward transconductance	Gfs	Vds=10V, Id=1.0A		1		S
Diode forward voltage	Vsd	Is=1.0A, Vgs=0V		0.65	1.20	V
Max. body-diode continuous current	Is				1.0	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 RL=20Ω, Id=1.2A 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

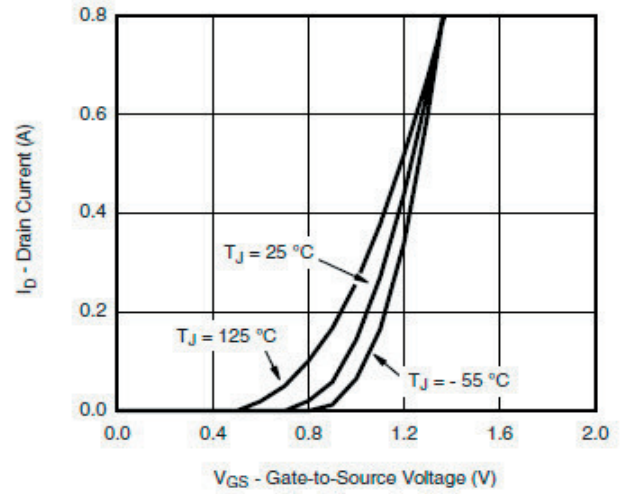
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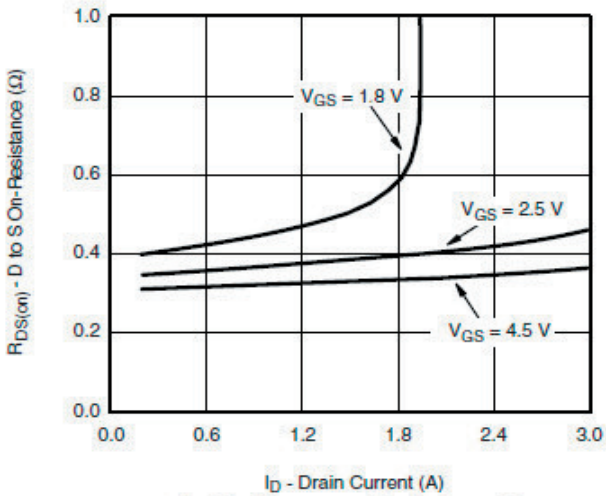
■ Typical electrical and thermal characteristics



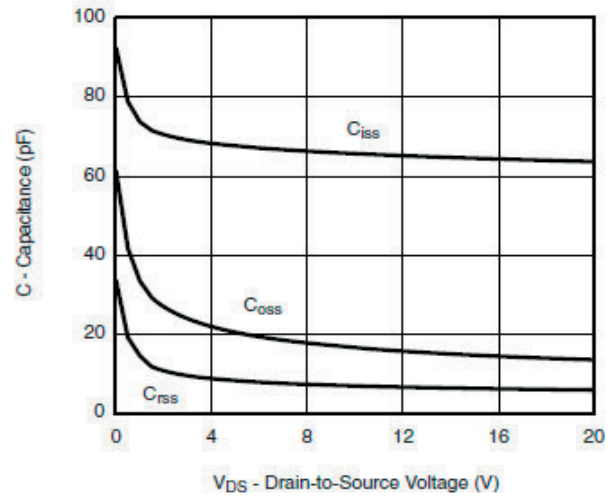
Output Characteristics



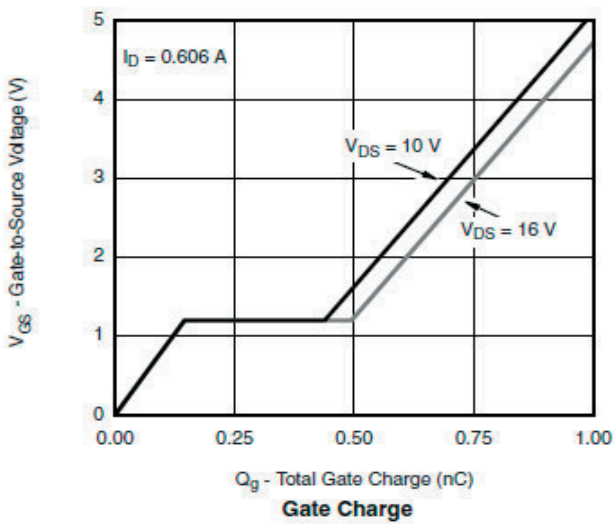
Transfer Characteristics



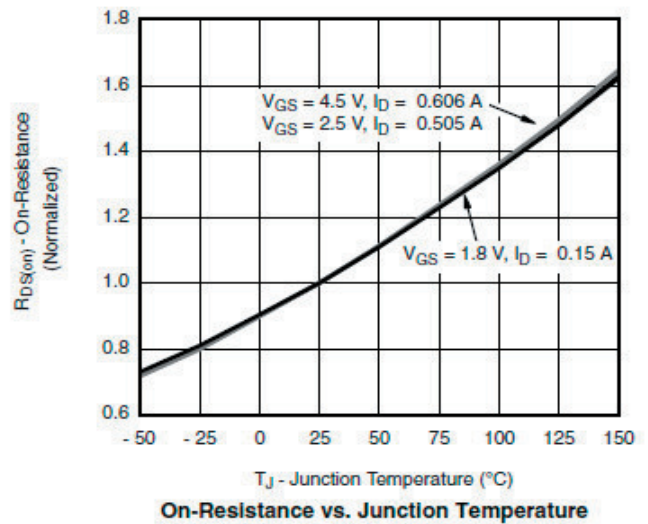
On-Resistance vs. Drain Current



Capacitance



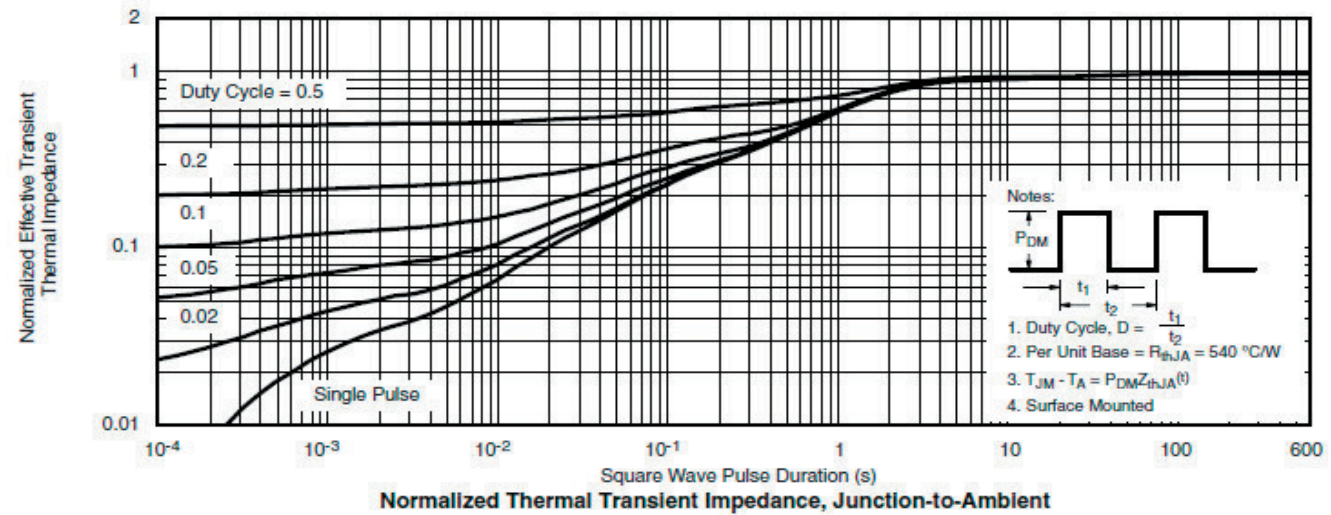
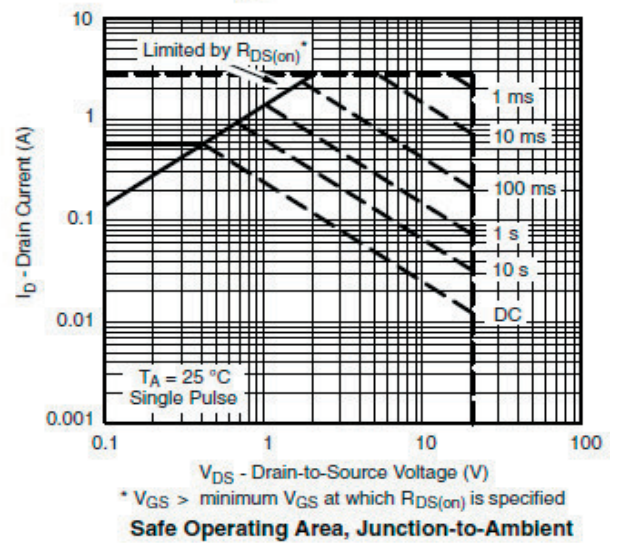
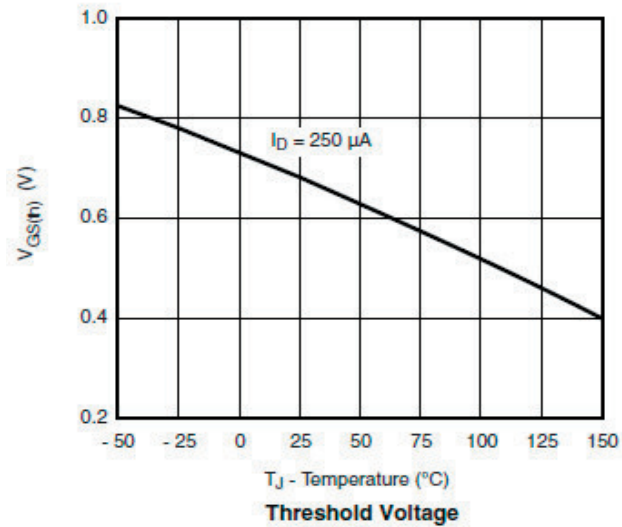
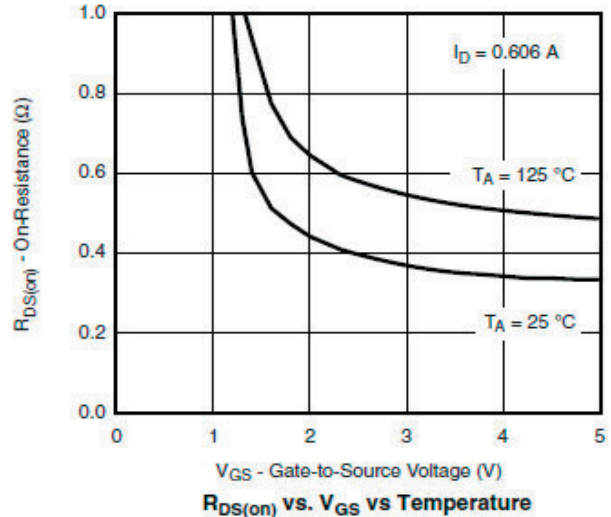
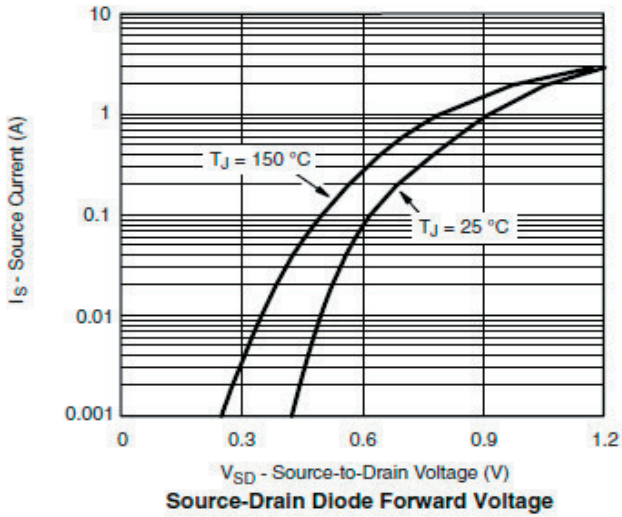
Gate Charge



On-Resistance vs. Junction Temperature

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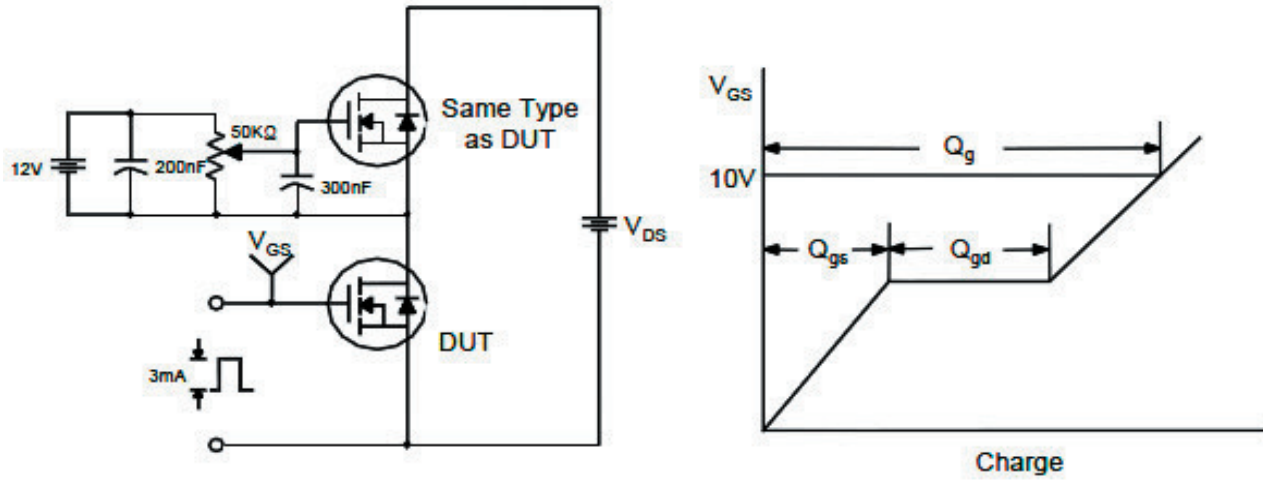


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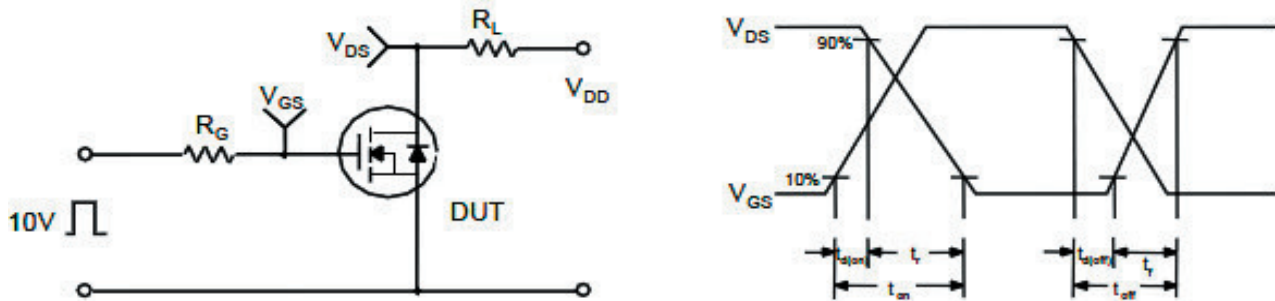
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■ Test circuit and waveform

Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms

