Single N-channel MOSFET

ELM4N6014FRA-S

■General description

ELM4N6014FRA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate threshold voltage.

■Features

- Vds=60V
- Id=5A
- Rds(on) = 50mΩ (Vgs=10V)
- Rds(on) = 60mΩ (Vgs=4.5V)

■Maximum absolute ratings

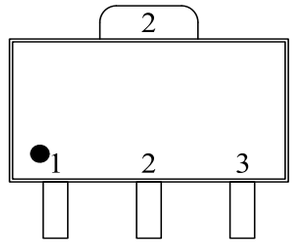
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	60	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current (Vgs=10V)	Ta=25°C	Id	5.0	A	1
	Ta=70°C		3.5		
Pulsed drain current		Idm	20	A	2
Single pulse avalanche energy		EAS	22	mJ	3
Avalanche current		Ias	21	A	
Power dissipation	Ta=25°C	Pd	2	W	4
Storage temperature range		Tstg	-55 to 150	°C	
Operating junction temperature range		Tj	-55 to 150	°C	

■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-to-ambient	Rθja	-	62.5	°C/W	1

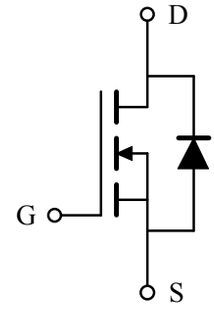
■Pin configuration

SOT-89(TOP VIEW)



Pin No.	Pin name
1	GATE
2	DRAIN
3	SOURCE

■Circuit



■Electrical characteristics

Tj=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	60	-	-	V	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=4A	-	40	50	mΩ	2
		Vgs=4.5V, Id=3A	-	45	60		
Gate threshold voltage	Vgs(th)	Vgs=Vds, Id=250μA	1.0	-	2.5	V	
Drain-source leakage current	Idss	Vds=48V, Vgs=0V	-	-	1	μA	
		Vds=48V, Vgs=0V, Tj=55°C	-	-	5		
Gate-body leakage current	Igss	Vgs=±20V, Vds=0V	-	-	±100	nA	
Forward transconductance	Gfs	Vds=5V, Id=4A	-	28.3	-	S	
Diode forward voltage	Vsd	Vgs=0V, Is=1A	-	-	1.2	V	2
Max. body-diode continuous current	Is	Vgs=Vds=0V, Force current	-	-	5	A	1, 5
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vds=15V, Vgs=0V, f=1MHz	-	1027	-	pF	
Output capacitance	Coss		-	65	-	pF	
Reverse transfer capacitance	Crss		-	46	-	pF	
SWITCHING PARAMETERS							
Total gate charge (10V)	Qg	Vds=48V, Vgs=10V, Id=4A	-	19.0	-	nC	
Gate-source charge	Qgs		-	2.6	-	nC	
Gate-drain charge	Qgd		-	4.1	-	nC	
Turn-on delay time	td(on)	Vds=30V, Vgs=10V Rgen=3.3Ω, Id=4A	-	3	-	ns	
Turn-on rise time	tr		-	34	-	ns	
Turn-off delay time	td(off)		-	23	-	ns	
Turn-off fall time	tf		-	6	-	ns	
Reverse recovery time	trr	If=4A, di/dt=100A/μs	-	12.1	-	ns	
Reverse recovery charge	Qrr		-	6.7	-	nC	

Note :

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
3. The EAS data shows Max. rating . The test condition is Vdd=25V, Vgs=10V, L=0.1mH, Ias=21A.
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as Id and Idm, in real applications, should be limited by total power dissipation.

■Typical characteristics

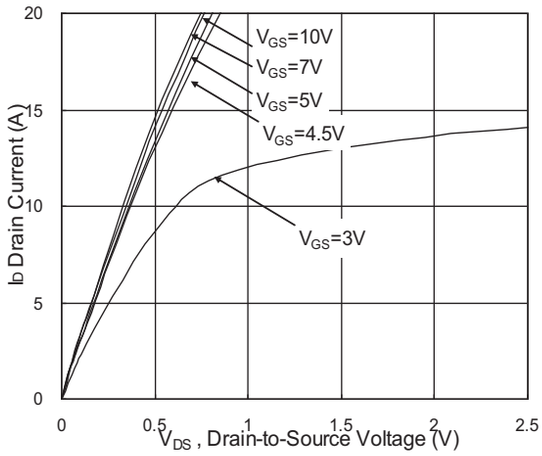


Fig.1 Typical Output Characteristics

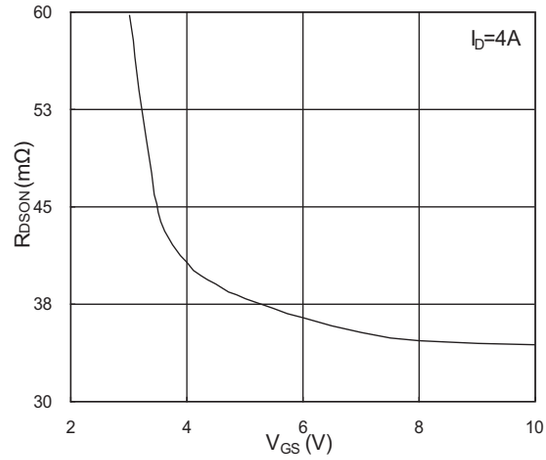


Fig.2 On-Resistance vs G-S Voltage

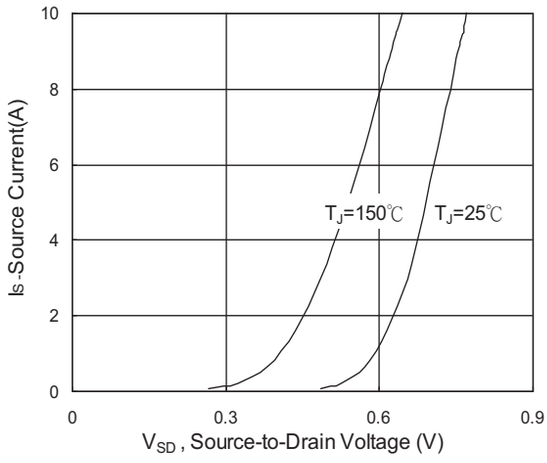


Fig.3 Source Drain Forward Characteristics

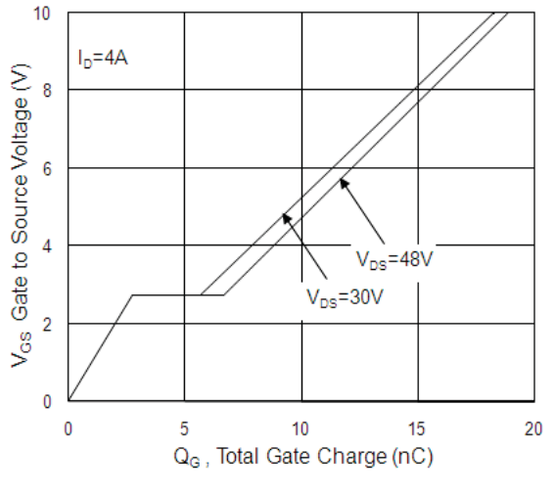


Fig.4 Gate-Charge Characteristics

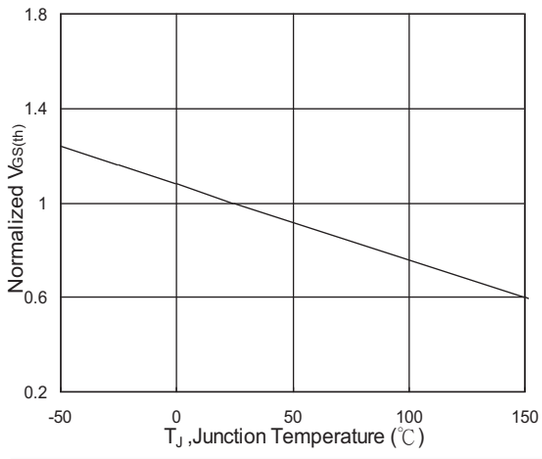


Fig.5 Normalized $V_{GS(th)}$ vs T_J

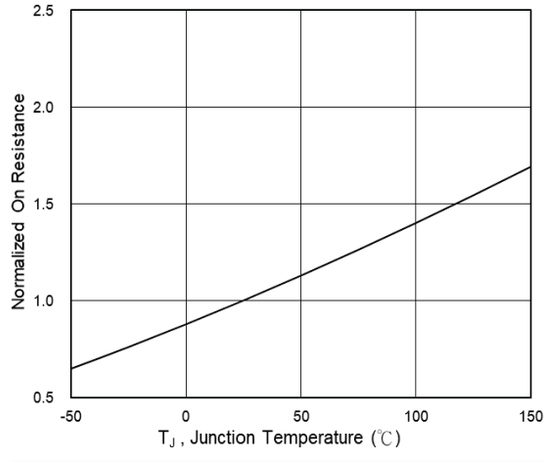


Fig.6 Normalized R_{DSON} vs T_J

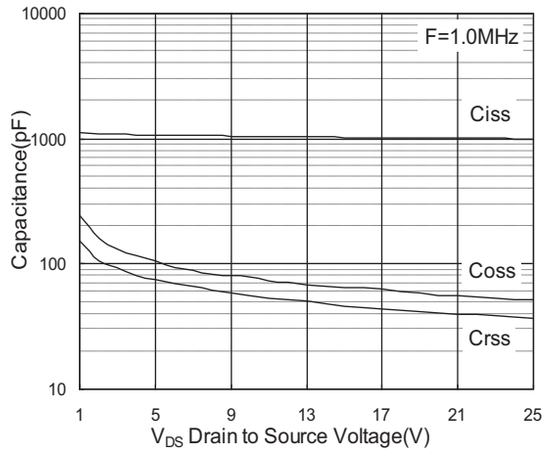


Fig.7 Capacitance

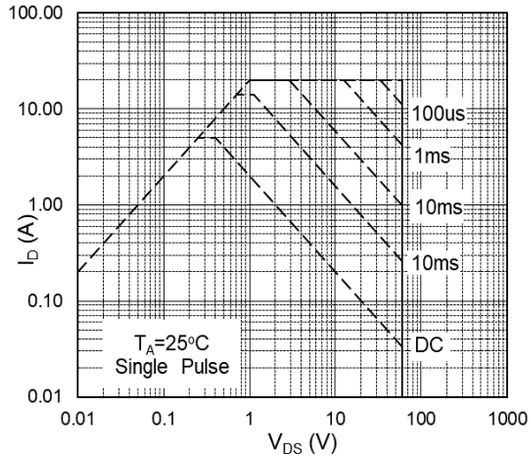


Fig.8 Safe Operating Area

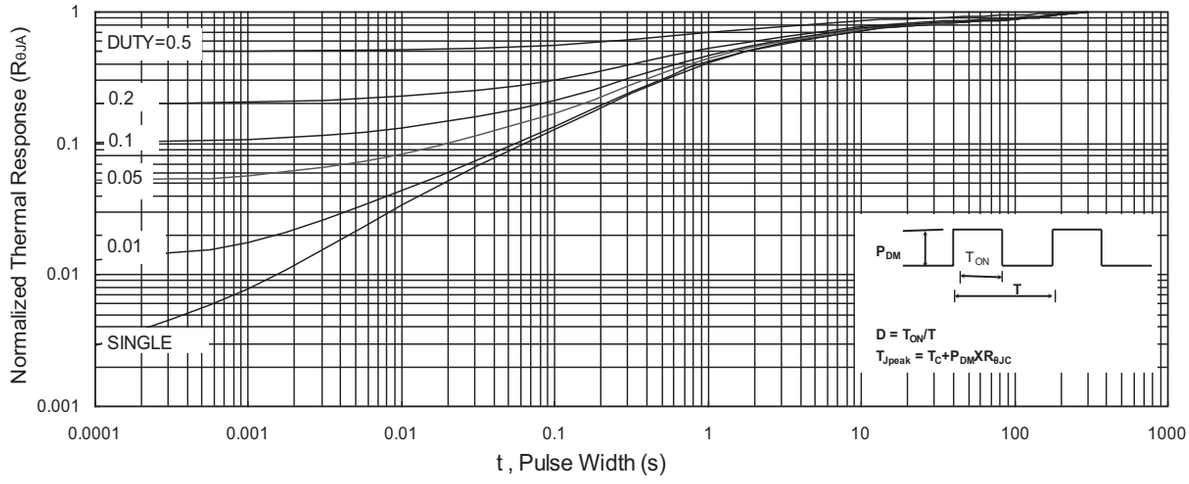


Fig.9 Normalized Maximum Transient Thermal Impedance

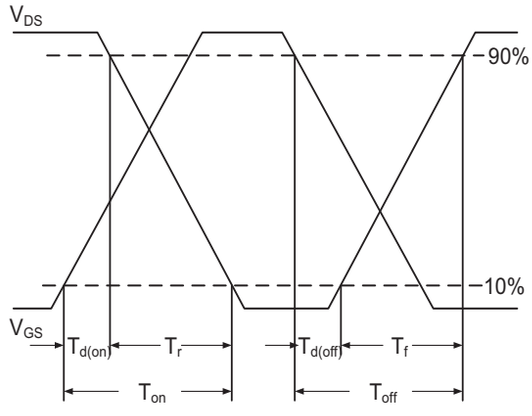


Fig.10 Switching Time Waveform

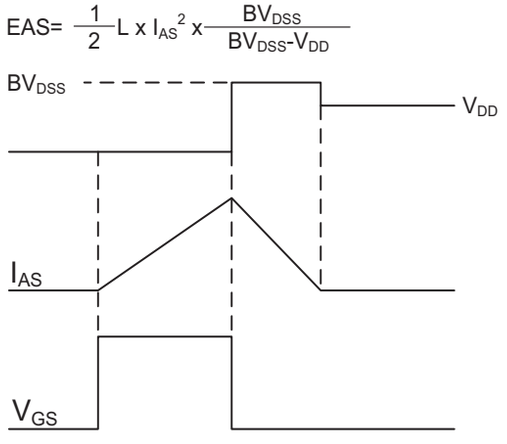


Fig.11 Unclamped Inductive Switching Waveform