Single N-channel MOSFET

ELM4N6008FRA-S

■General description

ELM4N6008FRA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate threshold voltage.

■Features

- Vds=60V
- Id=2.8A (Vgs=10V)
- Rds(on) = 100mΩ (Vgs=10V)
- Rds(on) = 110mΩ (Vgs=4.5V)

■Maximum absolute ratings

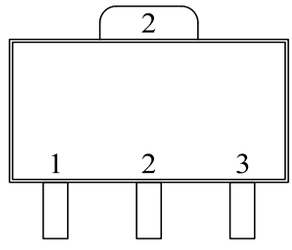
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	60	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current (Vgs=10V)	Ta=25°C	Id	2.8	A	1
	Ta=70°C		2.3		
Pulsed drain current		Idm	12	A	2
Total power dissipation	Ta=25°C	Pd	1.5	W	3
Storage temperature range		Tstg	-55 to +150	°C	
Operating junction temperature range		Tj	-55 to +150	°C	

■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	Rθja	--	85	°C/W	1
Thermal resistance junction-case	Rθjc	--	48	°C/W	1

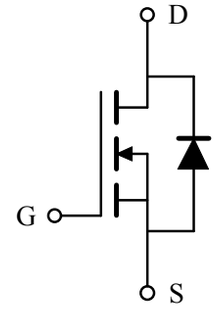
■Pin configuration

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	
BVdss Temperature coefficient	$\frac{\Delta BVdss}{\Delta Tj}$	Reference to 25°C, Id=1mA	--	0.054	--	V/°C	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=2.5A	--	80	100	mΩ	2
		Vgs=4.5V, Id=2.0A	--	85	110		
Gate threshold voltage	Vgs(th)	Vgs=Vds, Id=250μA	1.2	--	2.5	V	
Vgs(th) Temperature coefficient	ΔVgs(th)		--	-4.96	--	mV/°C	
Drain-source leakage current	Idss	Vds=48V, Vgs=0V	--	--	1	μA	
		Vds=48V, Vgs=0V, Tj=55°C	--	--	5		
Gate-source leakage current	Igss	Vgs=±20V, Vds=0V	--	--	±100	nA	
Forward transconductance	Gfs	Vds=5V, Id=2A	--	13	--	S	
Continuous source current	Is	Vgs=Vds=0V, Force current	--	--	2.8	A	1, 4
Pulsed source current	Ism		--	--	12.0	A	2, 4
Diode forward voltage	Vsd	Vgs=0V, Is=1A	--	--	1.2	V	2
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vds=15V, Vgs=0V, f=1MHz	--	511	715	pF	
Output capacitance	Coss		--	38	53	pF	
Reverse transfer capacitance	Crss		--	25	35	pF	
SWITCHING PARAMETERS							
Total gate charge (4.5V)	Qg	Vds=48V, Vgs=4.5V, Id=2A	--	5.00	7.00	nC	
Gate-source charge	Qgs		--	1.68	2.40	nC	
Gate-drain charge	Qgd		--	1.90	2.70	nC	
Turn-on delay time	td(on)	Vds=30V, Vgs=10V Rgen=3.3Ω, Id=2A	--	1.6	3.2	ns	
Turn-on rise time	tr		--	7.2	13.0	ns	
Turn-off delay time	td(off)		--	25.0	50.0	ns	
Turn-off fall time	tf		--	14.4	28.8	ns	
Reverse recovery time	trr	If=2A, di/dt=100A/μs	--	9.7	--	nS	
Reverse recovery charge	Qrr		--	5.8	--	nC	

NOTE :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs and duty cycle ≤ 2%.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as Id and Idm, in real applications, should be limited by total power dissipation.

■Typical characteristics

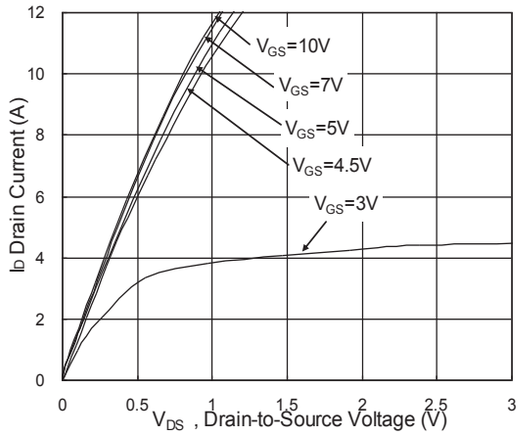


Fig.1 Typical Output Characteristics

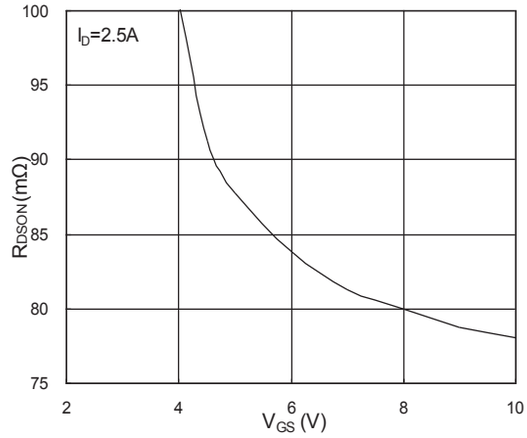


Fig.2 On-Resistance v.s Gate-Source

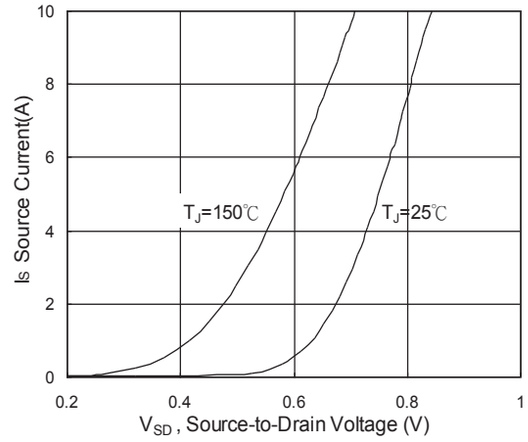


Fig.3 Forward Characteristics of Reverse

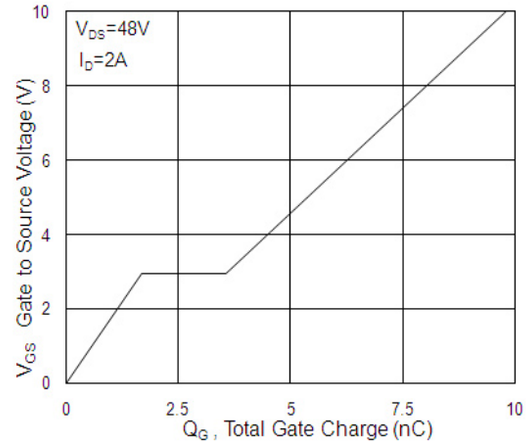


Fig.4 Gate-Charge Characteristics

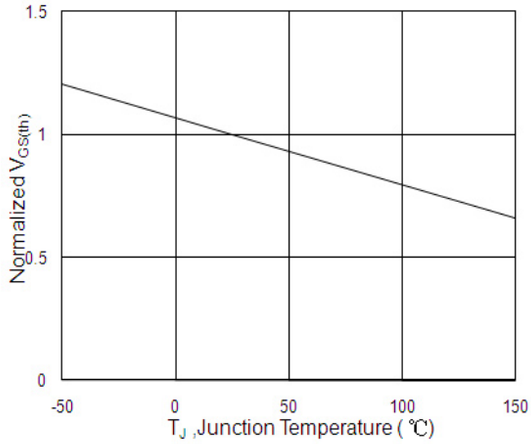


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

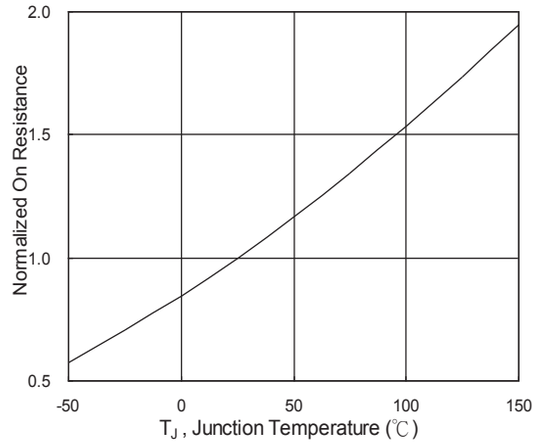


Fig.6 Normalized R_{DSON} v.s T_J

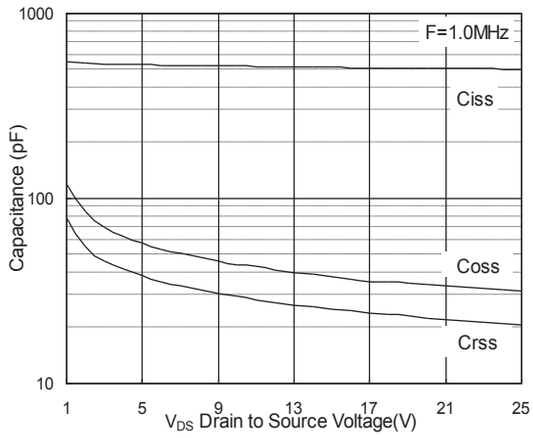


Fig.7 Capacitance

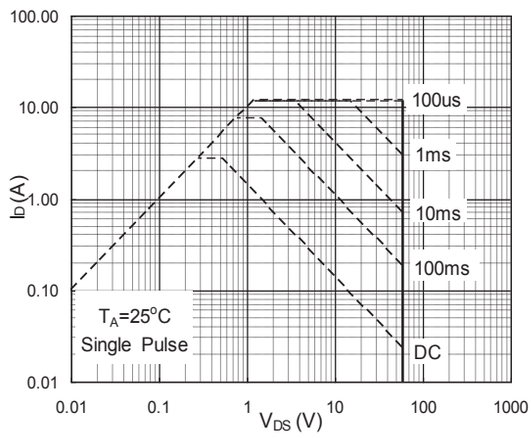


Fig.8 Safe Operating Area

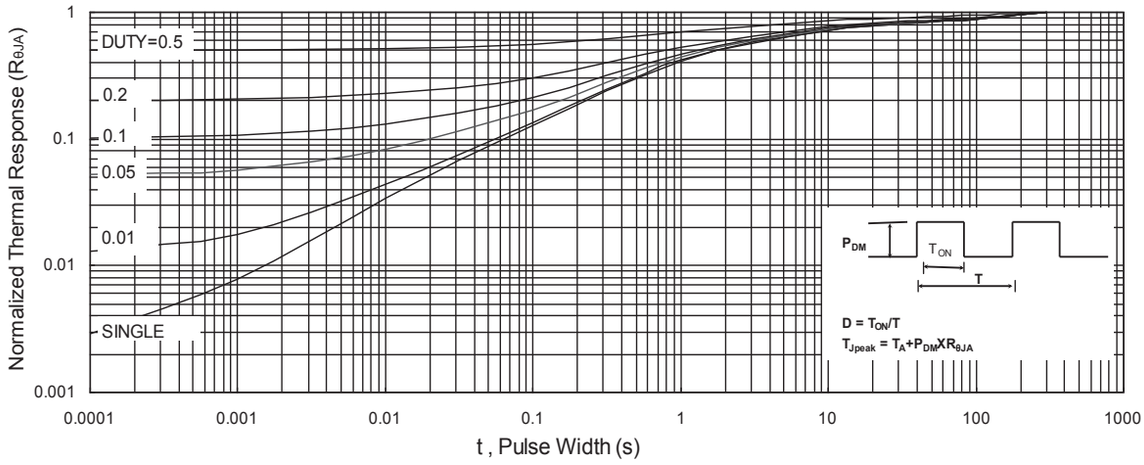


Fig.9 Normalized Maximum Transient Thermal Impedance

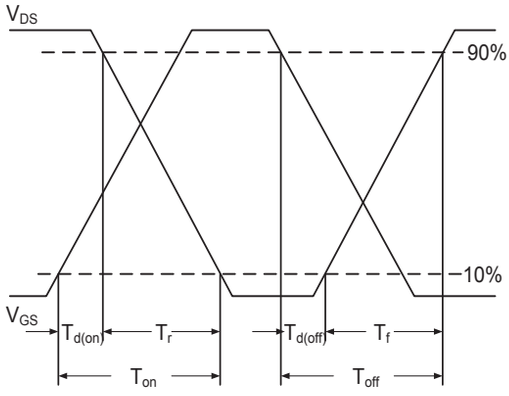


Fig.10 Switching Time Waveform

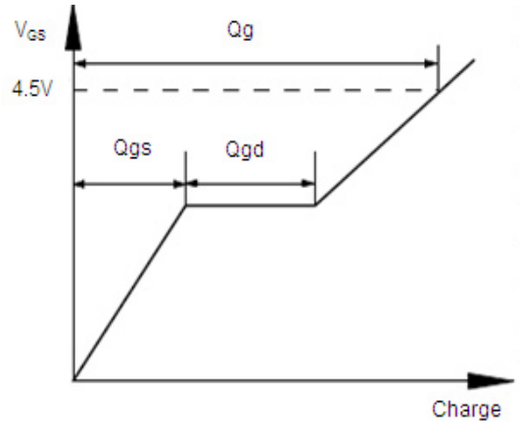
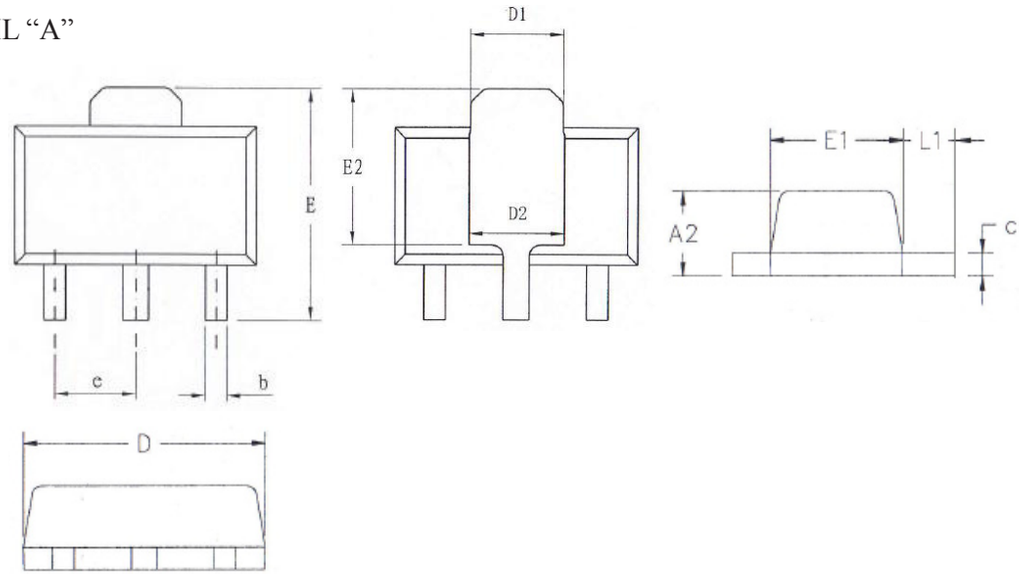


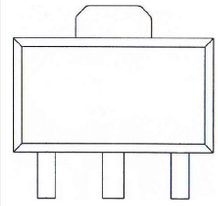
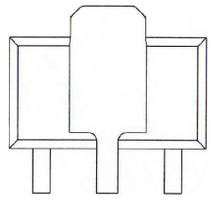
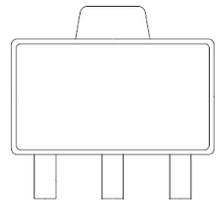
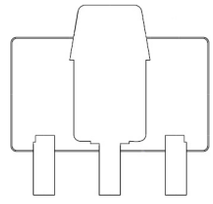
Fig.11 Gate Charge Waveform

■SOT-89 dimension (1,000pcs/reel)

SEE DETAIL "A"

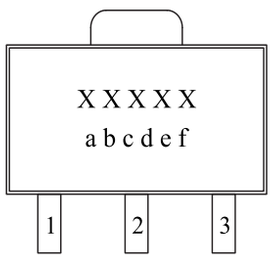


Detail "A"

	Top	Bottom		Top	Bottom
Option 1			Option 2		

Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A2	1.40	1.60	0.055	0.063	E	3.95	4.25	0.156	0.167
b	0.38	0.56	0.015	0.022	E1	2.40	2.60	0.094	0.102
c	0.35	0.44	0.014	0.017	E2	2.84 Ref		0.112 Ref	
D	4.40	4.60	0.173	0.181	e	1.50 BSC		0.059 BSC	
D1	1.62	1.83	0.064	0.072	L1	0.81	1.20	0.032	0.047
D2	1.75 Ref		0.069 Ref						

■Marking



Symbols	Content
xxxxx	Product code
a	Yearly code : 2019=K, 2020=L, 2021=M....
b, c	Weekly code : 01 to 53
d, e	Sequence : 01 to 99 or 0A to 0Z
f	Assembly code : A to Z (I, O excepted)