Single N-channel MOSFET

ELM4N0008FRA-S

■General description

ELM4N0008FRA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate threshold voltage.

■Features

- Vds=100V
- Id=2.2A
- Rds(on) = 310mΩ (Vgs=10V)
- Rds(on) = 320mΩ (Vgs=4.5V)

■Maximum absolute ratings

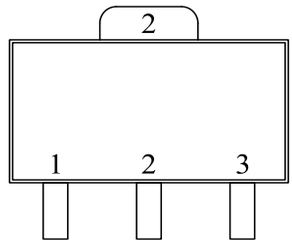
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	100	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current (Vgs=10V)	Ta=25°C	Id	2.2	A	1
	Ta=70°C		1.7		
Pulsed drain current		Idm	5.5	A	2
Power dissipation	Ta=25°C	Pd	1.5	W	3
Storage temperature range		Tstg	-55 to 150	°C	
Operating junction temperature range		Tj	-55 to 150	°C	

■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-to-ambient	Rθja	-	85	°C/W	1
Thermal resistance junction-to-case	Rθjc	-	36	°C/W	1

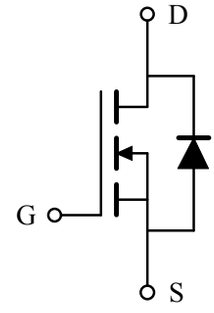
■Pin configuration

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	100	-	-	V	
Drain-source leakage current	Idss	Vds=80V, Vgs=0V	-	-	1	μA	
		Vds=80V, Vgs=0V, Tj=55°C	-	-	5		
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V	-	-	±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0	1.5	2.5	V	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=2A	-	260	310	mΩ	2
		Vgs=4.5V, Id=1A	-	270	320		
Forward transconductance	Gfs	Vds=5V, Id=2A	-	5.4	-	S	
Diode forward voltage	Vsd	Is=1A, Vgs=0V	-	-	1.2	V	2
Max. body-diode continuous current	Is	Vgs=Vds=0V, Force current	-	-	2.2	A	1, 4
Pulsed body-diode current	Ism		-	-	5.5	A	2, 4
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V, f=1MHz	-	508.0	711.0	pF	
Output capacitance	Coss		-	29.0	41.0	pF	
Reverse transfer capacitance	Crss		-	16.4	33.0	pF	
Gate resistance	Rg	Vds=0V, Vgs=0V, f=1MHz	-	2.8	5.6	Ω	
SWITCHING PARAMETERS							
Total gate charge (10V)	Qg	Vgs=10V, Vds=50V, Id=2A	-	9.1	12.7	nC	
Gate-source charge	Qgs		-	2.0	2.8	nC	
Gate-drain charge	Qgd		-	1.4	2.0	nC	
Turn-on delay time	td(on)	Vgs=10V, Vds=50V, Id=2A Rgen=3.3Ω	-	2.0	4.0	ns	
Turn-on rise time	tr		-	21.6	39.0	ns	
Turn-off delay time	td(off)		-	11.2	22.0	ns	
Turn-off fall time	tf		-	18.8	37.6	ns	
Reverse recovery time	trr	If=2A, di/dt=100A/μs	-	17.5	-	ns	
Reverse recovery charge	Qrr		-	14.0	-	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

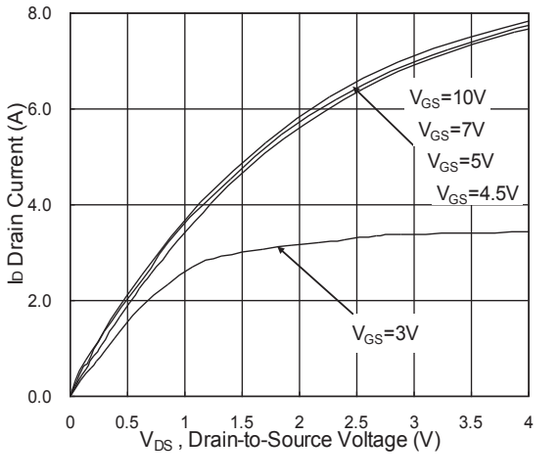


Fig.1 Typical Output Characteristics

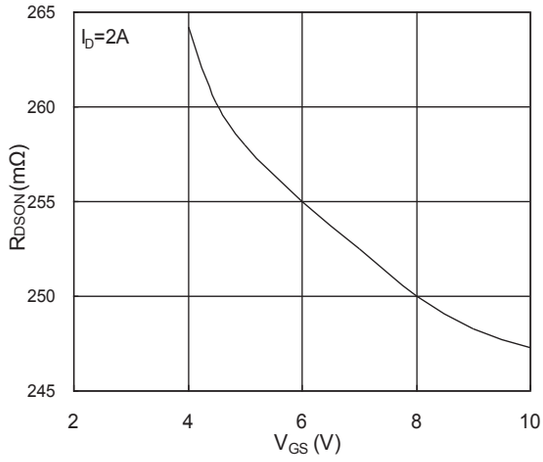


Fig.2 On-Resistance vs G-S Voltage

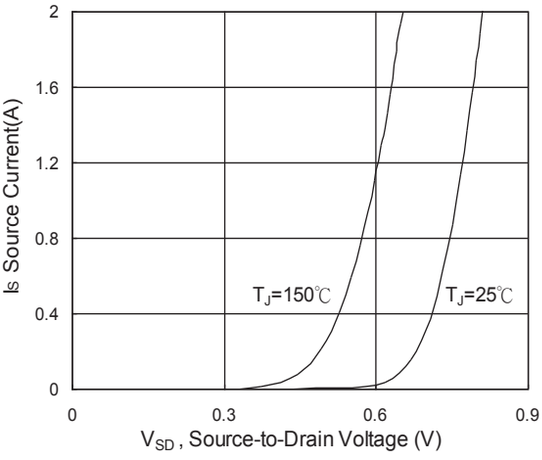


Fig.3 Source Drain Forward Characteristics

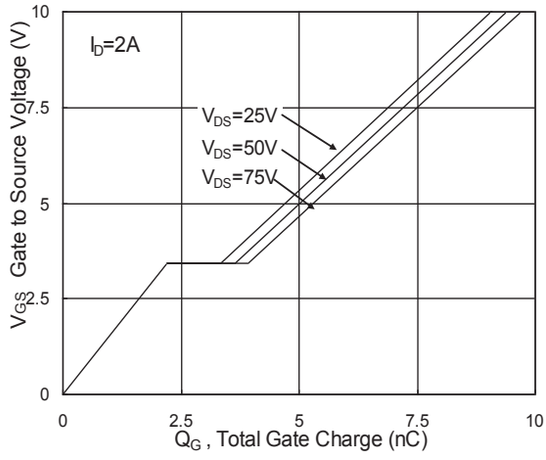


Fig.4 Gate-Charge Characteristics

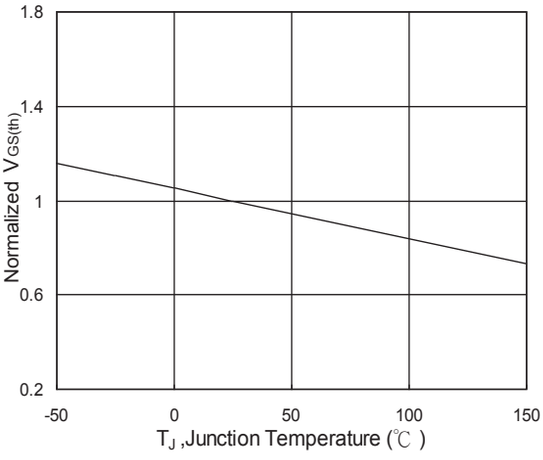


Fig.5 Normalized $V_{GS(th)}$ vs T_J

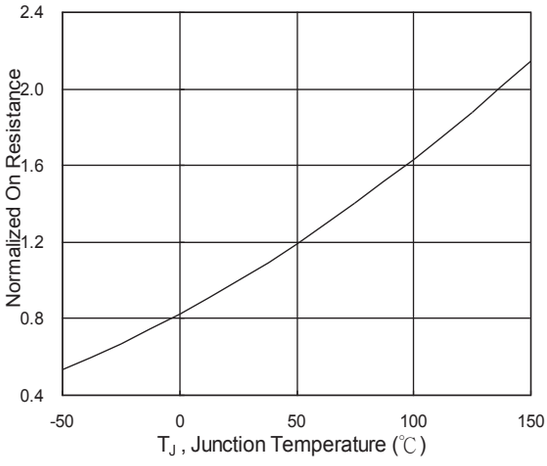


Fig.6 Normalized R_{DSON} vs T_J

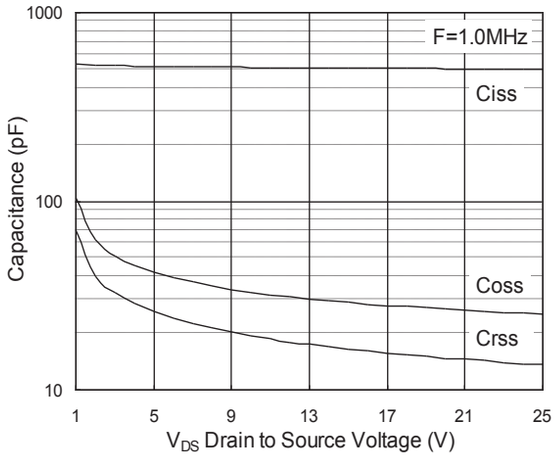


Fig.7 Capacitance

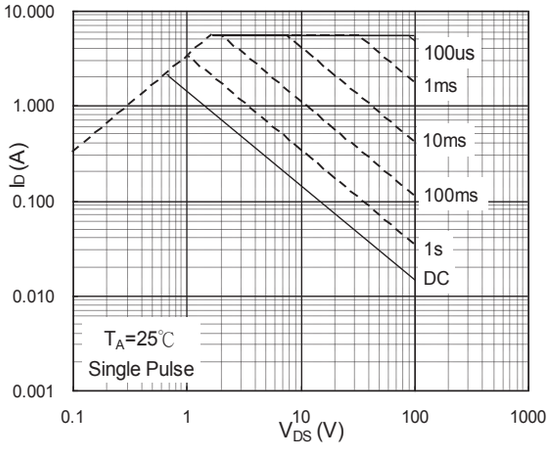


Fig.8 Safe Operating Area

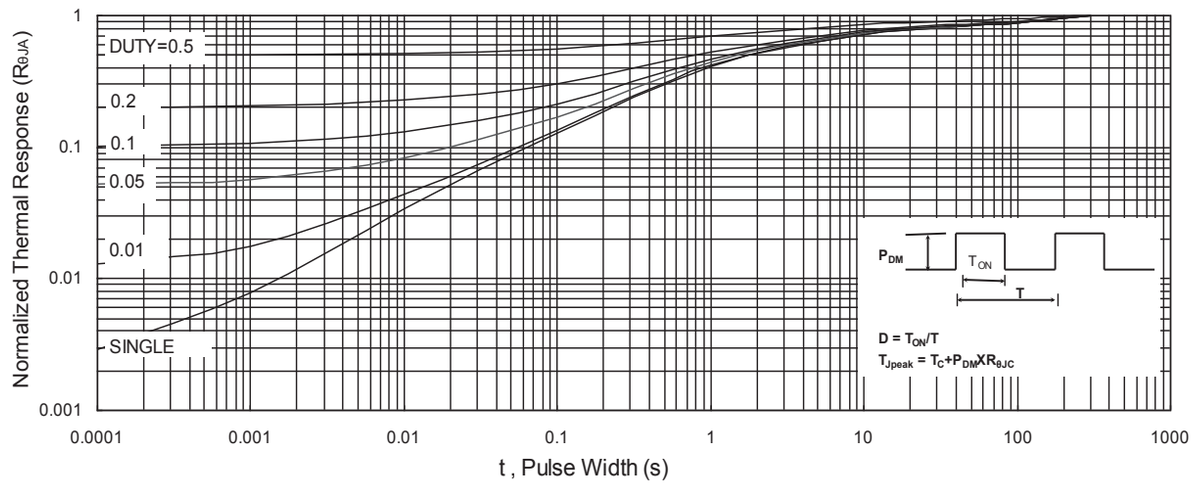


Fig.9 Normalized Maximum Transient Thermal Impedance

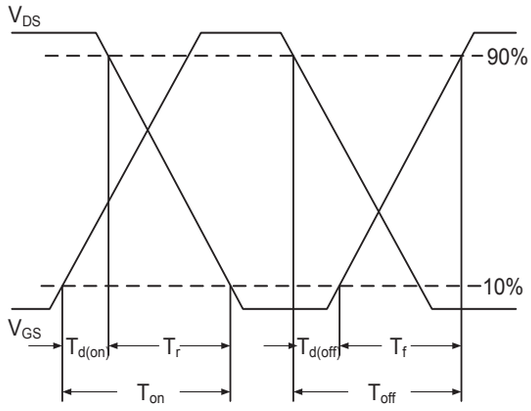


Fig.10 Switching Time Waveform

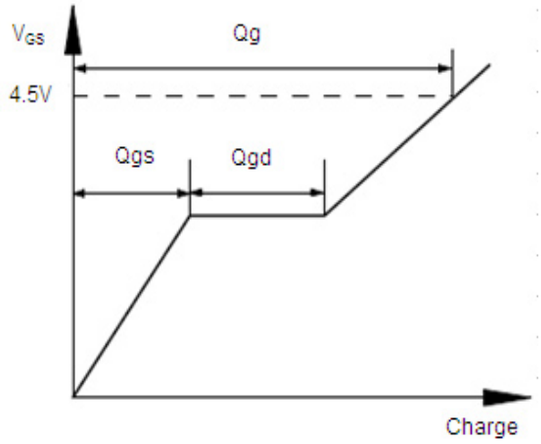
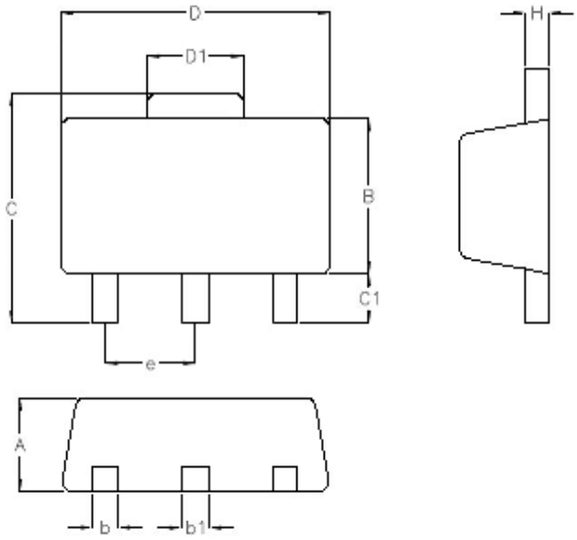


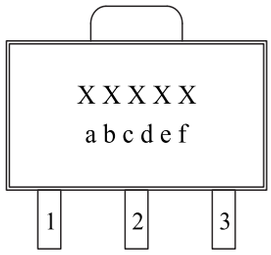
Fig.11 Gate Charge Waveform

■SOT-89 dimension



Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	1.397	1.600	0.055	0.063
b	0.420	0.540	0.017	0.021
b1	0.420	0.540	0.017	0.021
B	2.388	2.591	0.094	0.102
C	3.937	4.242	0.155	0.167
C1	0.787	1.194	0.031	0.047
D	4.394	4.597	0.173	0.181
D1	1.397	1.753	0.055	0.069
e	1.448	1.549	0.057	0.061
H	0.350	0.440	0.014	0.017

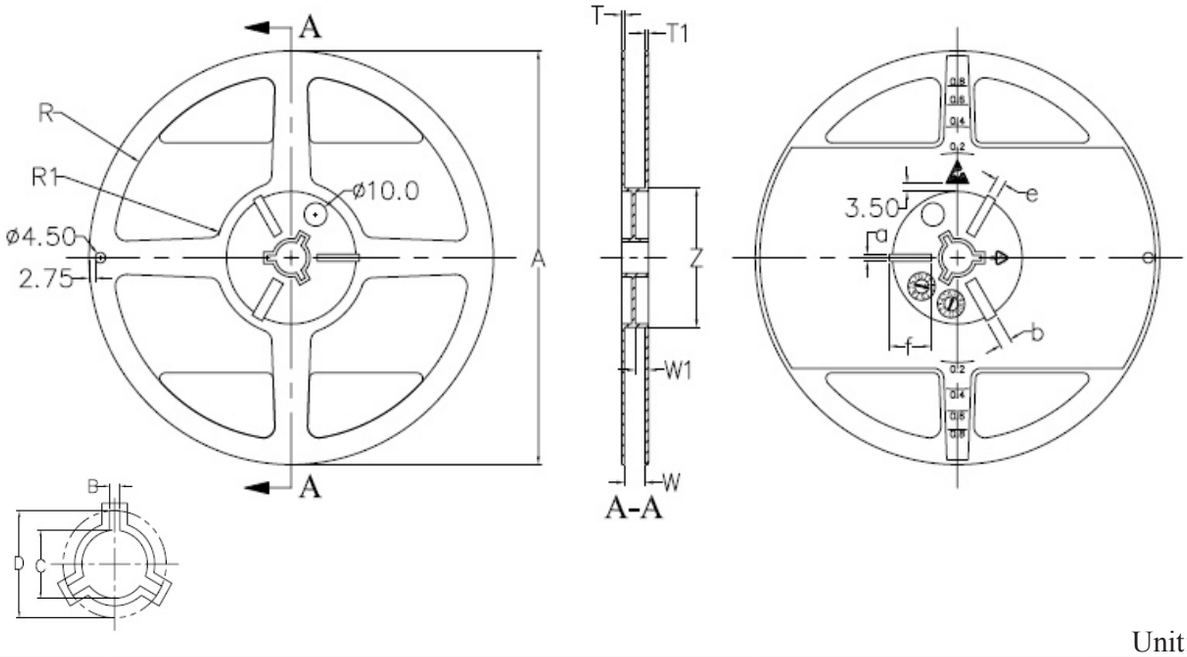
■Marking



Symbols	Content
xxxxx	K0008: Product code
a	Yearly code (2019=K, 2020=L, 2021=M, 2022=N.....
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))

■SOT-89 Reel & carrier tape dimension

• Reel 7” (1,000 pcs/reel)



Unit: mm

Tape size	A	B	C	D	Z	T	W
12mm	ø178±1.0	2.1±0.2	ø13.0 $^{+0.50}_{-0.20}$	21.2±0.3	ø60.0±0.5	1.30±0.1	12.4 $^{+2.0}_{-0.0}$
W1	R	R1	a	b	e	f	T1
5.80±0.1	78.5±0.3	33.5±0.3	3.0±0.1	5.0±0.1	4.0±0.1	18.46 Ref	1.50±0.1

• Carrier tape