Single N-channel MOSFET

ELM4N4048FDA-N

■General description

ELM4N4048FDA-N uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate threshold voltage.

■Features

- Vds=40V
- Id=100A (Vgs=10V)
- Rds(on) = 1.9mΩ(Typ.) (Vgs=10V)
- Rds(on) = 2.5mΩ(Typ.) (Vgs=4.5V)

■Maximum absolute ratings

Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	40	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current (Vgs=10V)	Tc=25°C	Id	100	A	1, 6
	Tc=100°C		82		
Pulsed drain current		Idm	400	A	2
Single pulsed avalanche energy		Eas	400	mJ	3
Avalanche current		Ias	40	A	
Total power dissipation	Tc=25°C	Pd	125	W	4
Storage temperature range		Tstg	-55 to +150	°C	
Operating junction temperature range		Tj	-55 to +150	°C	

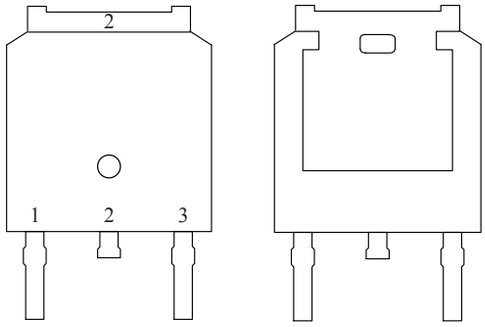
■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	Rθja	-	50	°C/W	1
Thermal resistance junction-case	Rθjc	-	1	°C/W	1

■Pin configuration

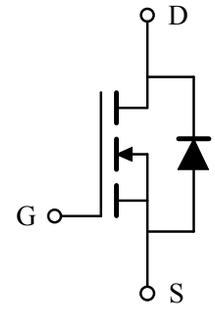
TO-252

(TOP VIEW) (BOTTOM 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	Vgs=0V, Id=250μA	40	-	-	V	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=20A	-	1.9	2.4	mΩ	2
		Vgs=4.5V, Id=20A	-	2.5	3.6		
Gate threshold voltage	Vgs(th)	Vgs=Vds, Id=250μA	1.2	1.6	2.2	V	
Drain-source leakage current	Idss	Vds=32V, Vgs=0V	-	-	1	μA	
		Vds=32V, Vgs=0V, Tj=55°C	-	-	5		
Gate-source leakage current	Igss	Vgs=±20V, Vds=0V	-	-	±100	nA	
Forward transconductance	Gfs	Vds=5V, Id=20A	-	53	-	S	
Continuous source current	Is	Vgs=Vds=0V, Force current	-	-	100	A	1, 6
Diode forward voltage	Vsd	Vgs=0V, Is=1A	-	-	1.2	V	2
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vds=20V, Vgs=0V, f=1MHz	-	3972	4650	pF	
Output capacitance	Coss		-	1119	1310	pF	
Reverse transfer capacitance	Crss		-	82	105	pF	
Gate resistance	Rg	Vds=0V, Vgs=0V, f=1MHz	-	1.0	2.5	Ω	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vds=15V, Vgs=4.5V, Id=20A	-	45.0	54.0	nC	
Total gate charge	Qg	Vds=15V, Vgs=10V, Id=20A	-	90.0	108.0	nC	
Gate-source charge	Qgs		-	12.0	15.0	nC	
Gate-drain charge	Qgd		-	18.5	24.0	nC	
Turn-on delay time	td(on)	Vds=15V, Vgs=10V Rgen=3.3Ω, Id=20A	-	18.5	23.0	ns	
Turn-on rise time	tr		-	9.0	12.0	ns	
Turn-off delay time	td(off)		-	58.5	70.0	ns	
Turn-off fall time	tf		-	32.0	39.0	ns	

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 Eas data shows Max. rating . The test condition is Vdd=25V, Vgs=10V, L=0.5mH, Ias=40A.
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.
6. Package limitation current is 100A.

■Typical characteristics

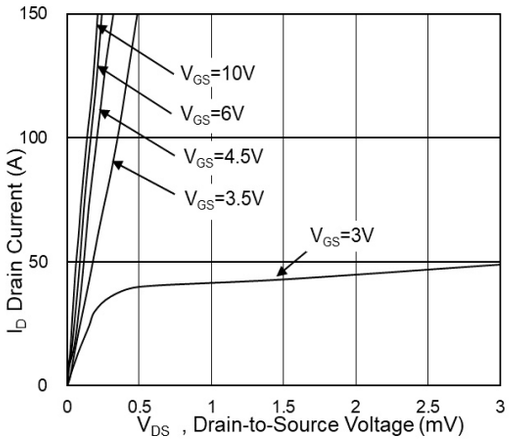


Fig.1 Typical Output Characteristics

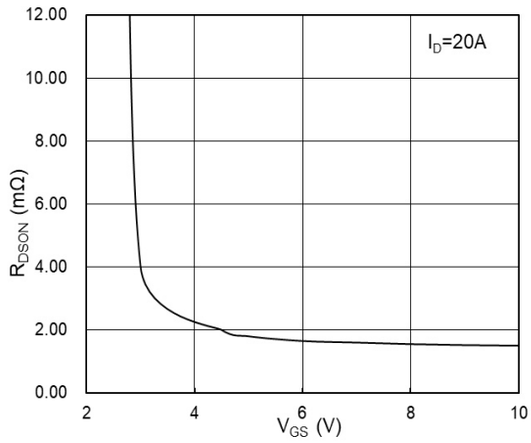


Fig.2 On-Resistance vs G-S Voltage

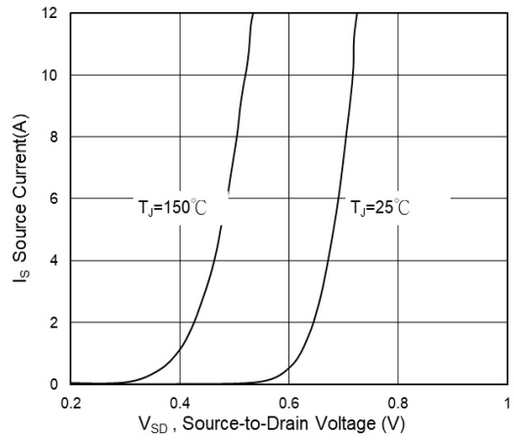


Fig.3 Source Drain Forward Characteristics

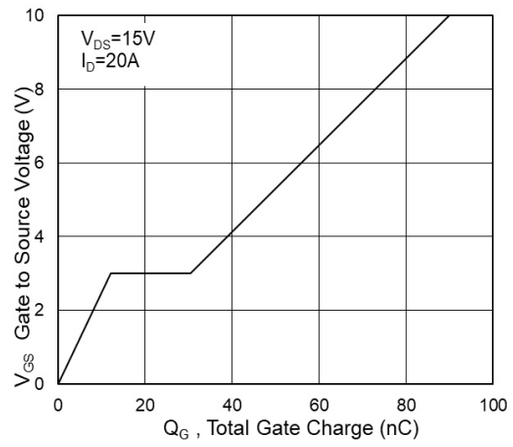


Fig.4 Gate-Charge Characteristics

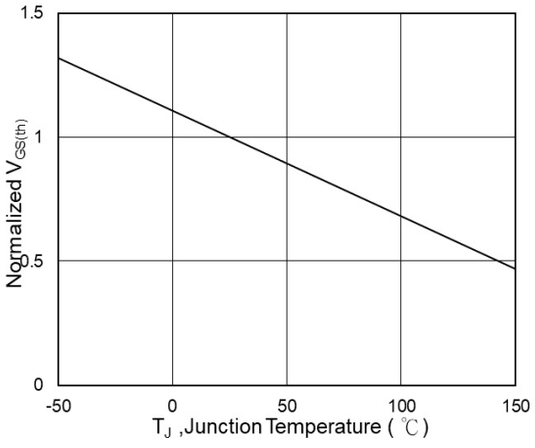


Fig.5 Normalized $V_{GS(th)}$ vs T_J

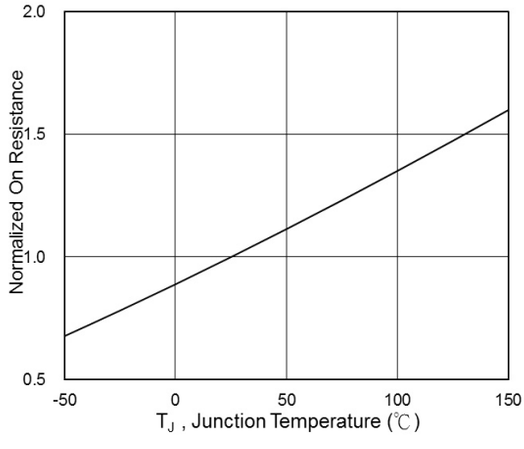


Fig.6 Normalized R_{DSON} vs T_J

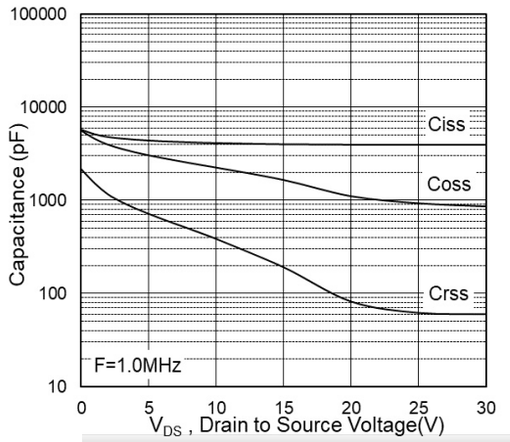


Fig.7 Capacitance

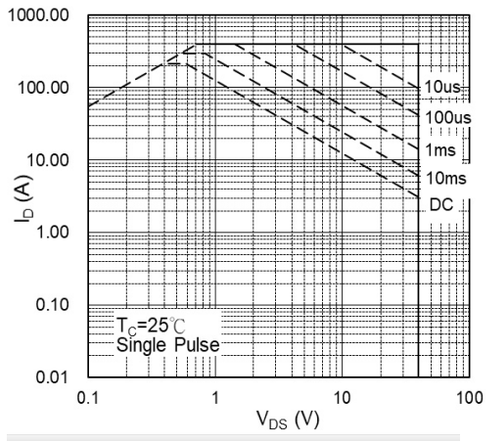


Fig.8 Safe Operating Area

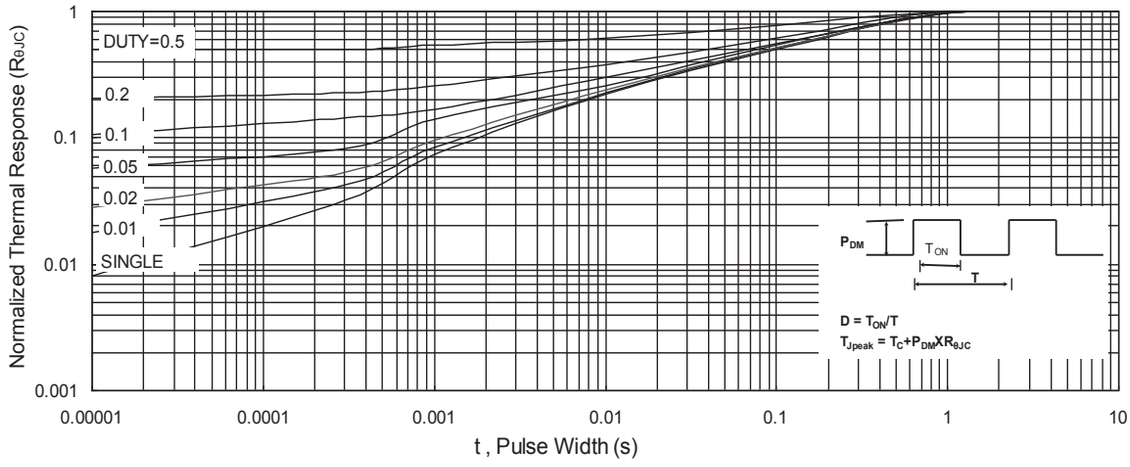


Fig.9 Normalized Maximum Transient Thermal Impedance

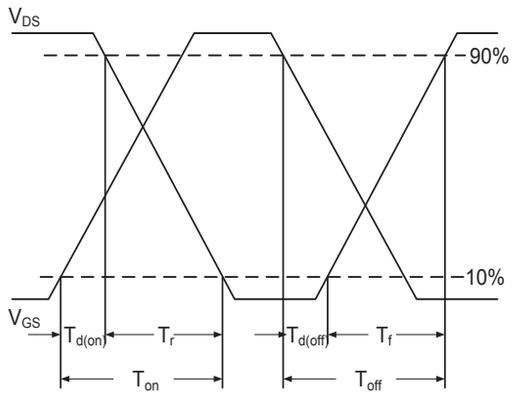


Fig.10 Switching Time Waveform

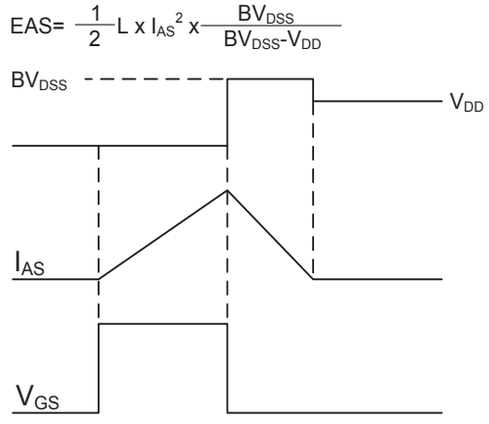
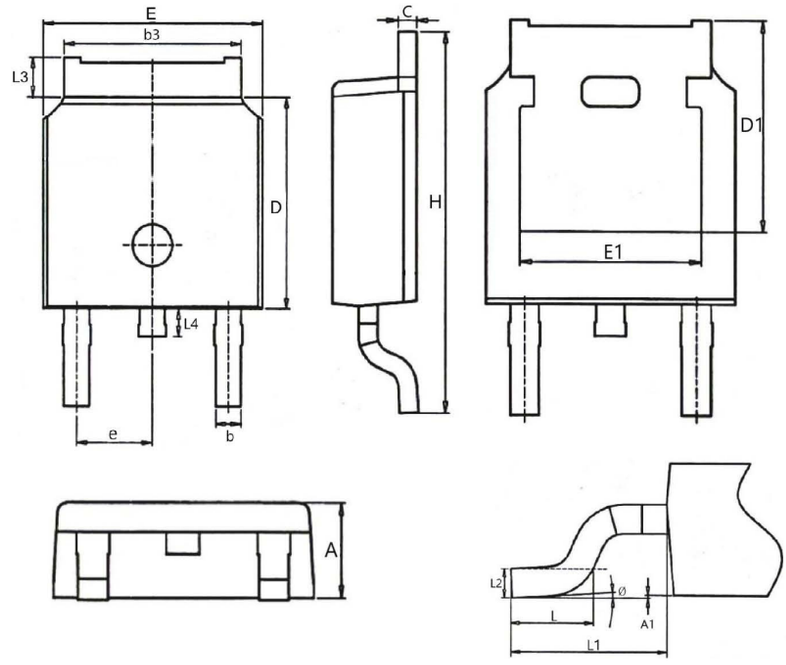


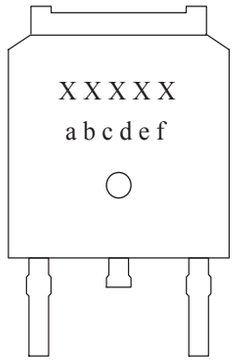
Fig.11 Unclamped Inductive Switching Waveform

■TO-252 dimension (2,500pcs/reel)



Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	2.18	2.40	0.086	0.095	e	2.286BSC		0.09BSC	
A1	---	0.20	---	0.008	H	9.40	10.50	0.370	0.413
b	0.68	0.90	0.026	0.036	L	1.38	1.78	0.054	0.070
b3	4.95	5.46	0.194	0.215	L1	2.90REF		0.114REF	
c	0.43	0.89	0.017	0.035	L2	0.51BSC		0.020BSC	
D	5.97	6.22	0.235	0.245	L3	0.88	1.28	0.034	0.050
D1	5.300REF		0.209REF		L4	0.50	1.00	0.019	0.039
E	6.35	6.73	0.250	0.265	θ	0°	8°	0°	8°
E1	4.32	---	0.170	---					

■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)