

# Single N-channel MOSFET

## ELM4N4048FDA-N

<https://www.elm-tech.com>

### ■ General description

ELM4N4048FDA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate threshold voltage.

### ■ Features

- $V_{ds}=40V$
- $I_d=100A$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 1.9m\Omega$  (Typ.) ( $V_{gs}=10V$ )
- $R_{ds(on)} = 2.5m\Omega$  (Typ.) ( $V_{gs}=4.5V$ )

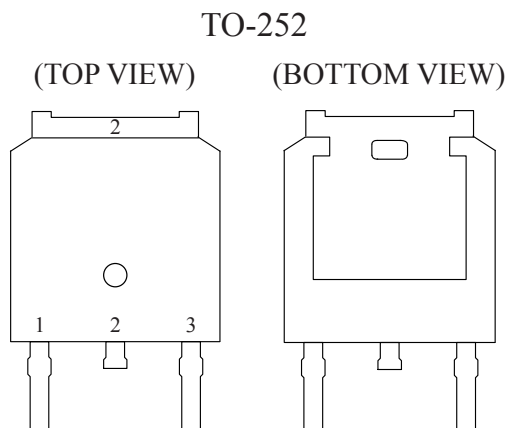
### ■ Maximum absolute ratings

Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	$V_{ds}$	40	V		
Gate-source voltage	$V_{gs}$	$\pm 20$	V		
Continuous drain current ( $V_{gs}=10V$ )	$I_d$	$T_c=25^\circ C$	100	A	1, 6
		$T_c=100^\circ C$	82		
Pulsed drain current	$I_{dm}$	400	A	2	
Single pulsed avalanche energy	$E_{as}$	400	mJ	3	
Avalanche current	$I_{as}$	40	A		
Total power dissipation	$P_d$	$T_c=25^\circ C$	125	W	4
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ C$	
Operating junction temperature range	$T_j$	-55 to 150	$^\circ C$		

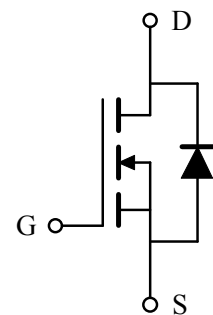
### ■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	$R_{\theta ja}$	--	50	$^\circ C/W$	1
Thermal resistance junction-case	$R_{\theta jc}$	--	1	$^\circ C/W$	1

### ■ Pin configuration



### ■ Circuit



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### ■Electrical characteristics

Tj=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
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
<b>DYNAMIC PARAMETERS</b>							
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	
<b>SWITCHING PARAMETERS</b>							
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)	Vdd=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 inch<sup>2</sup> 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.

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### ■ Typical characteristics

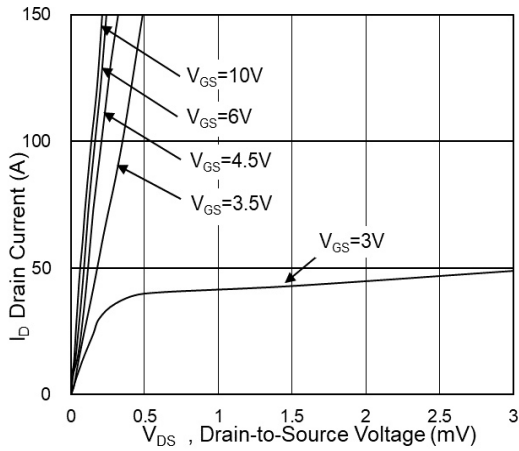


Fig.1 Typical Output Characteristics

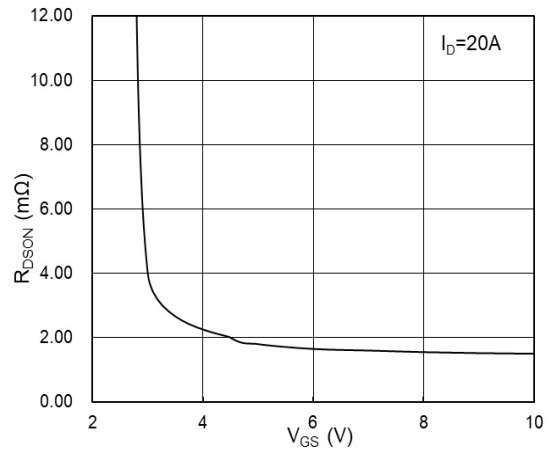


Fig.2 On-Resistance vs G-S Voltage

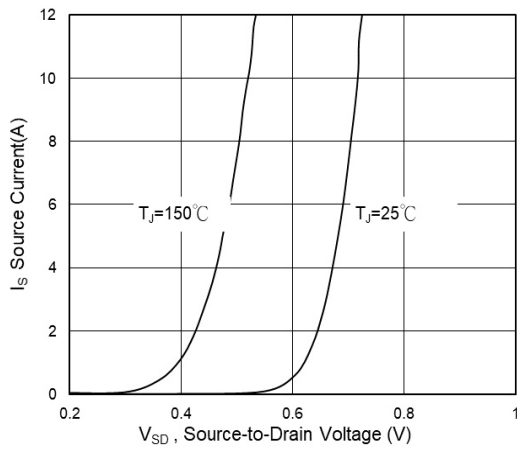


Fig.3 Source Drain Forward Characteristics

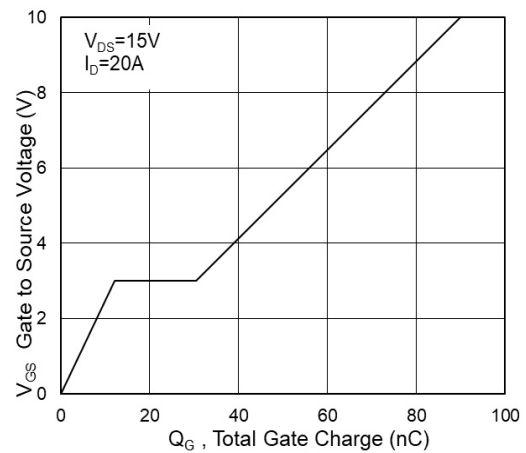


Fig.4 Gate-Charge Characteristics

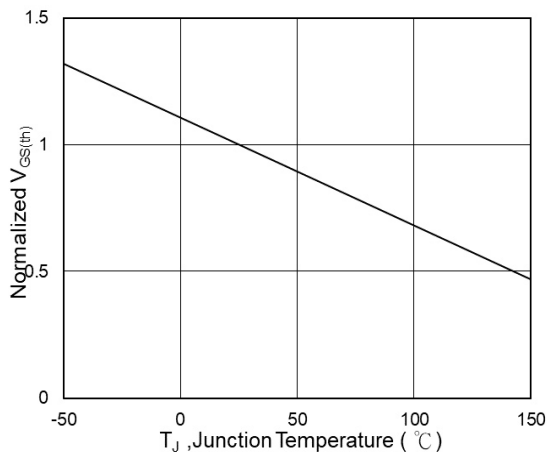


Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$

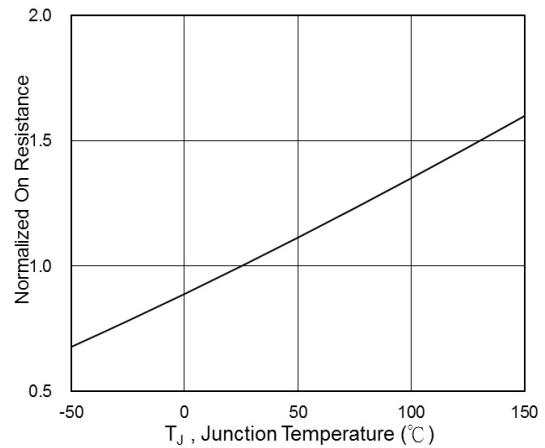


Fig.6 Normalized  $R_{DSON}$  vs  $T_J$

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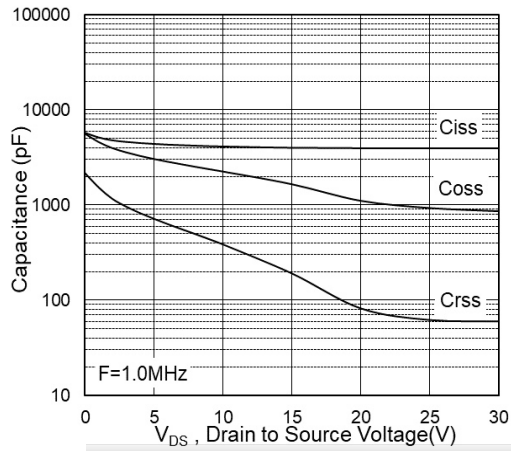


Fig.7 Capacitance

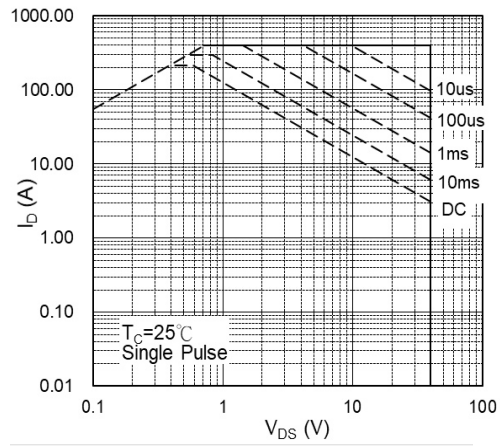


Fig.8 Safe Operating Area

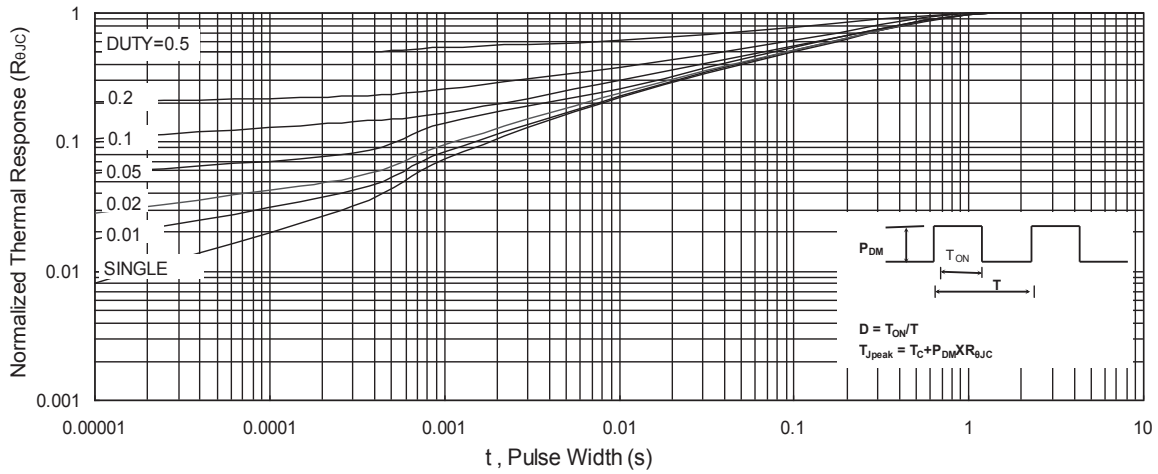


Fig.9 Normalized Maximum Transient Thermal Impedance

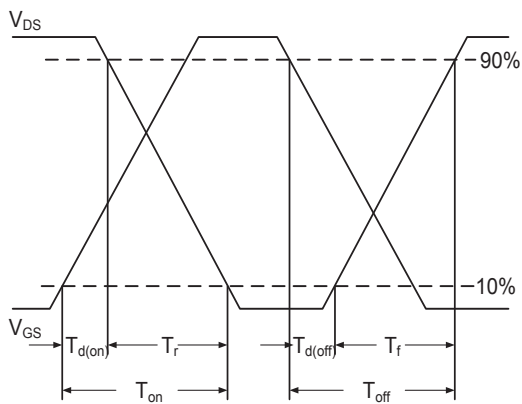


Fig.10 Switching Time Waveform

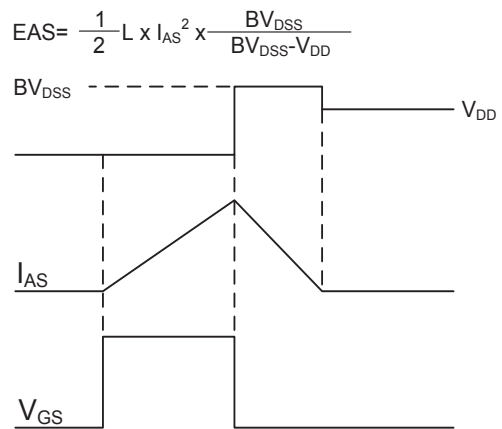


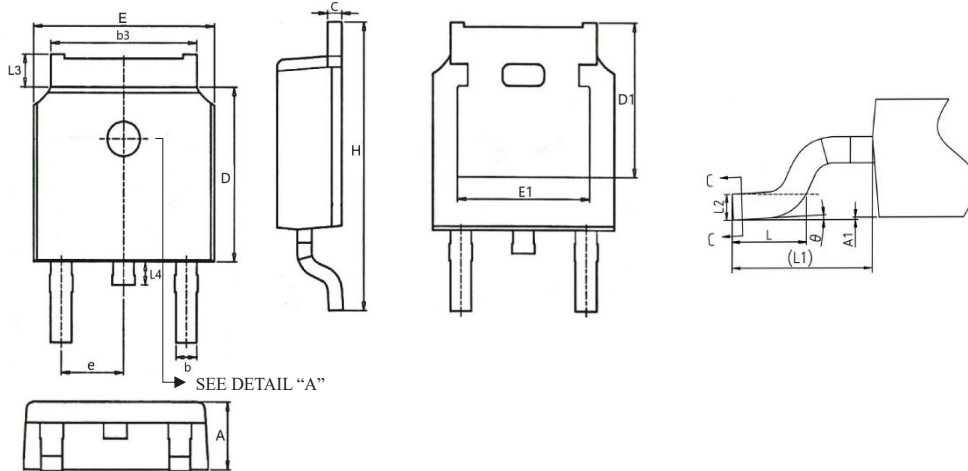
Fig.11 Unclamped Inductive Switching Waveform

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## TO-252 dimension (2,500pcs/reel)

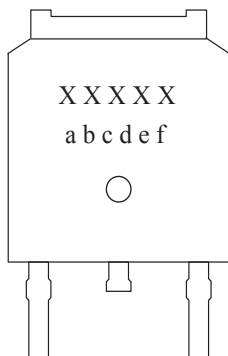


Detail "A"

	Top	Bottom		Top	Bottom
Option 1			Option 3		
Option 2			Option 4		

Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	2.18	2.40	0.086	0.094	e	2.29 BSC		0.090 BSC	
A1	0.00	0.20	0.000	0.008	H	9.40	10.50	0.370	0.413
b	0.64	0.90	0.025	0.035	L	1.27	2.03	0.050	0.080
b3	4.95	5.50	0.195	0.217	L1	2.90 REF		0.114 REF	
c	0.43	0.61	0.017	0.024	L2	0.51 BSC		0.020 BSC	
D	5.90	6.30	0.232	0.248	L3	0.88	1.28	0.035	0.050
D1	5.30 REF		0.209 REF		L4	0.50	1.02	0.020	0.040
E	6.35	6.80	0.250	0.268	θ	0°	10°	0°	10°
E1	4.32	4.95	0.170	0.195					

## Marking



Symbols	Content
xxxxxx	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)