

Single N-channel MOSFET

ELM4N20N15FDA-N

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

■General description

ELM4N20N15FDA-N uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■Features

- $V_{ds}=150V$
- $I_d=20A$ ($V_{gs}=10V$)
- $R_{ds(on)} = 88m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 100m\Omega$ ($V_{gs}=4.5V$)

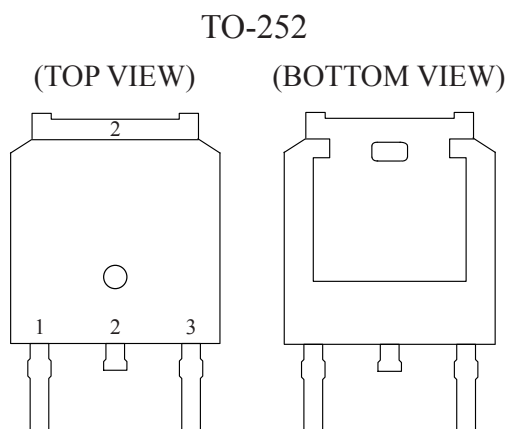
■Maximum absolute ratings

Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		V_{ds}	150	V	
Gate-source voltage		V_{gs}	± 20	V	
Continuous drain current ($V_{gs}=10V$)	$T_c=25^\circ C$	I_d	20.0	A	1
	$T_c=100^\circ C$		14.0		
	$T_a=25^\circ C$		3.0		
	$T_a=70^\circ C$		2.5		
Pulsed drain current		I_{dm}	40	A	2
Single pulsed avalanche energy		E_{as}	53	mJ	3
Avalanche current		I_{as}	18	A	
Total power dissipation	$T_c=25^\circ C$	P_d	72.6	W	4
	$T_a=25^\circ C$		2.1	W	
Storage temperature range		T_{stg}	-55 to 150	$^\circ C$	
Operating junction temperature range		T_j	-55 to 150	$^\circ C$	

■Thermal characteristics

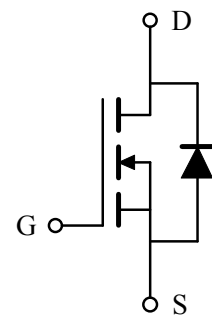
Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	$R_{\theta ja}$	-	60	$^\circ C/W$	1
Thermal resistance junction-case	$R_{\theta jc}$	-	1.72	$^\circ C/W$	1

■Pin configuration



Pin No.	Pin name
1	GATE
2	DRAIN
3	SOURCE

■Circuit



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■Electrical characteristics

T_j=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Vgs=0V, Id=250μA	150	-	-	V	
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=10A	-	-	88	mΩ	2
		Vgs=4.5V, Id=10A	-	-	100		
Gate threshold voltage	Vgs(th)	Vgs=Vds, Id=250μA	1.2	-	2.5	V	
Drain-source leakage current	Idss	Vds=120V, Vgs=0V	-	-	1	μA	
		Vds=120V, Vgs=0V, Tj=55°C	-	-	5		
Gate-source leakage current	Igss	Vgs=±20V, Vds=0V	-	-	±100	nA	
Forward transconductance	Gfs	Vds=5V, Id=10A	-	33	-	S	
Continuous source current	Is	Vgs=Vds=0V, Force current	-	-	20	A	1, 5
Pulsed source current	Ism		-	-	40	A	2, 5
Diode forward voltage	Vsd	Vgs=0V, Is=1A	-	-	1.2	V	2
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vds=25V, Vgs=0V, f=1MHz	-	2285	-	pF	
Output capacitance	Coss		-	110	-	pF	
Reverse transfer capacitance	Crss		-	83	-	pF	
SWITCHING PARAMETERS							
Total gate charge	Qg	Vds=75V, Vgs=4.5V, Id=10A	-	25.1	-	nC	
Gate-source charge	Qgs		-	6.8	-	nC	
Gate-drain charge	Qgd		-	12.6	-	nC	
Turn-on delay time	td(on)	Vdd=75V, Vgs=10V Rgen=3.3Ω, Id=10A	-	13.0	-	ns	
Turn-on rise time	tr		-	8.2	-	ns	
Turn-off delay time	td(off)		-	25.0	-	ns	
Turn-off fall time	tf		-	11.0	-	ns	
Reverse recovery time	trr	If=10A, di/dt=100A/μs	-	37	-	nS	
Reverse recovery charge	Qrr		-	263	-	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 Eas data shows Max. rating . The test condition is V_{dd}=25V, V_{gs}=10V, L=0.3mH, I_{as}=18A.
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as I_d and I_{dm}, in real applications, should be limited by total power dissipation.

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■ Typical characteristics

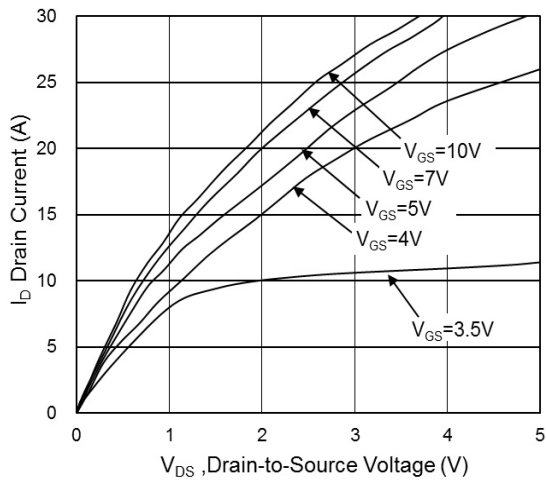


Fig.1 Typical Output Characteristics

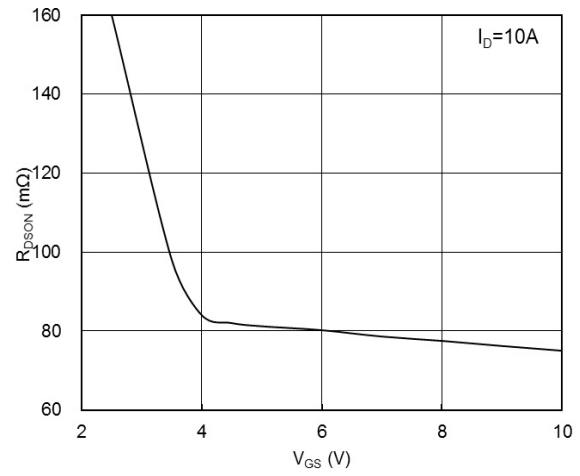


Fig.2 On-Resistance vs. Gate-Source Voltage

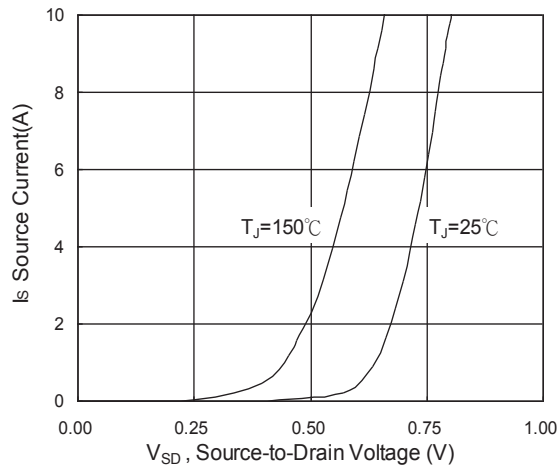


Fig.3 Forward Characteristics of Reverse

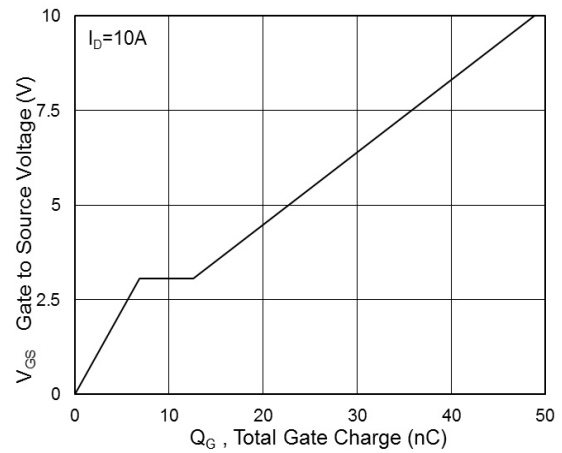


Fig.4 Gate-Charge Characteristics

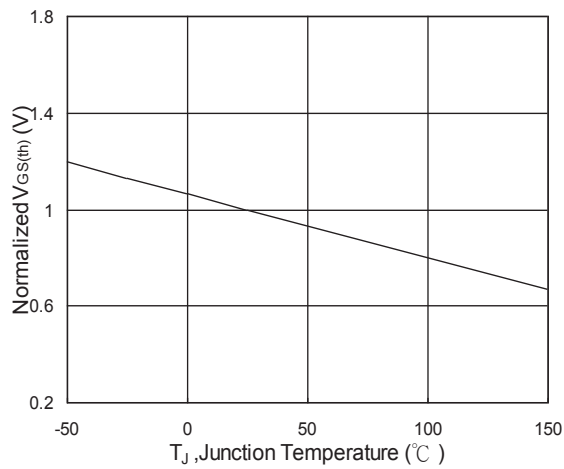


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

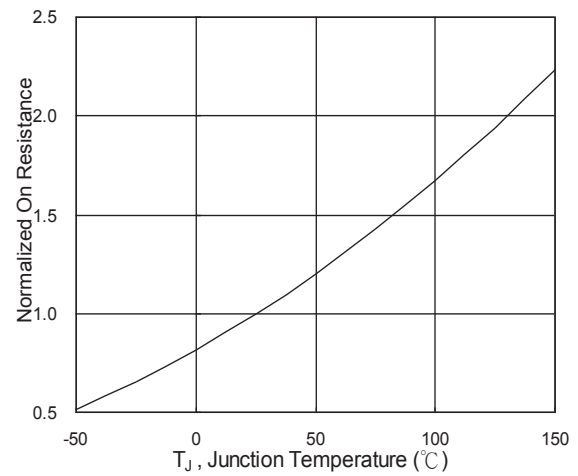


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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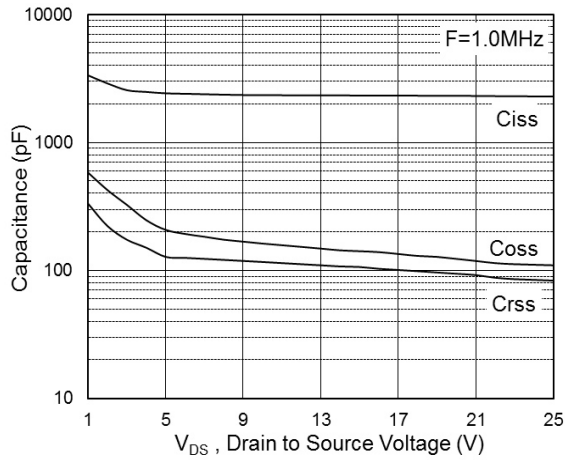


Fig.7 Capacitance

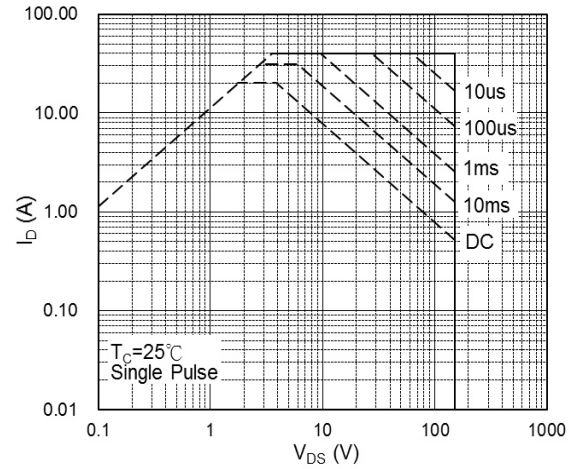


Fig.8 Safe Operating Area

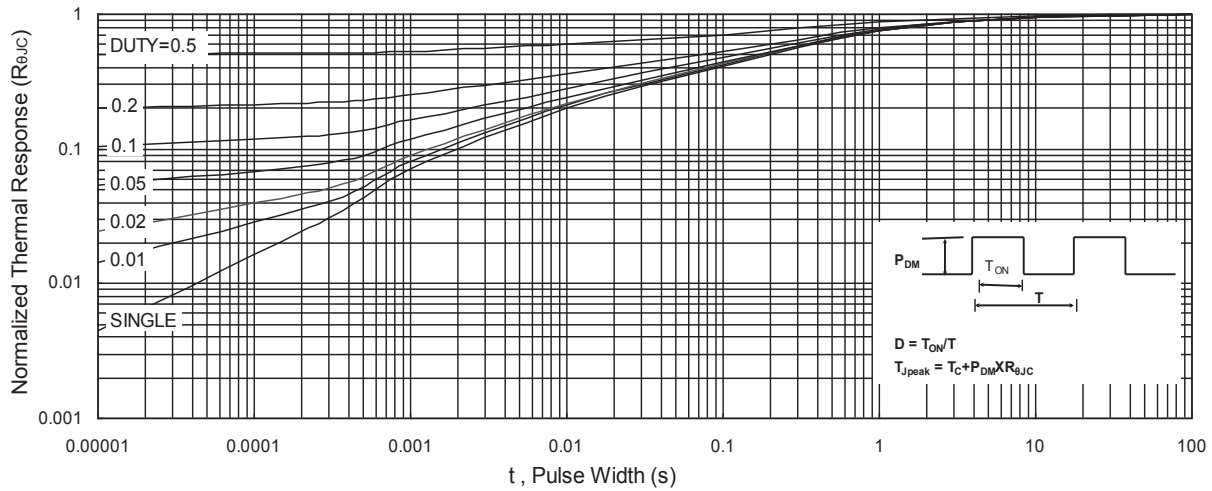


Fig.9 Normalized Maximum Transient Thermal Impedance

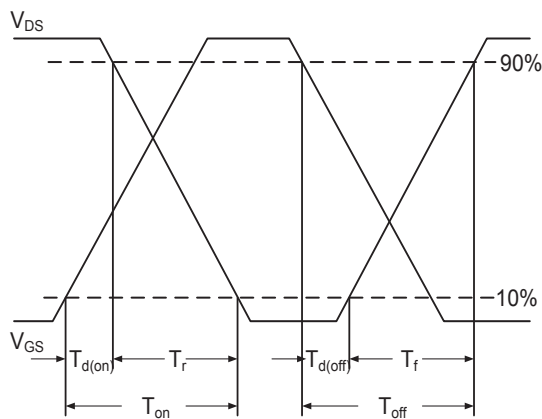


Fig.10 Switching Time Waveform

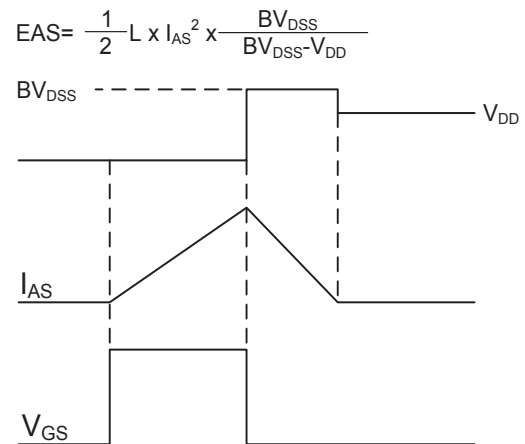


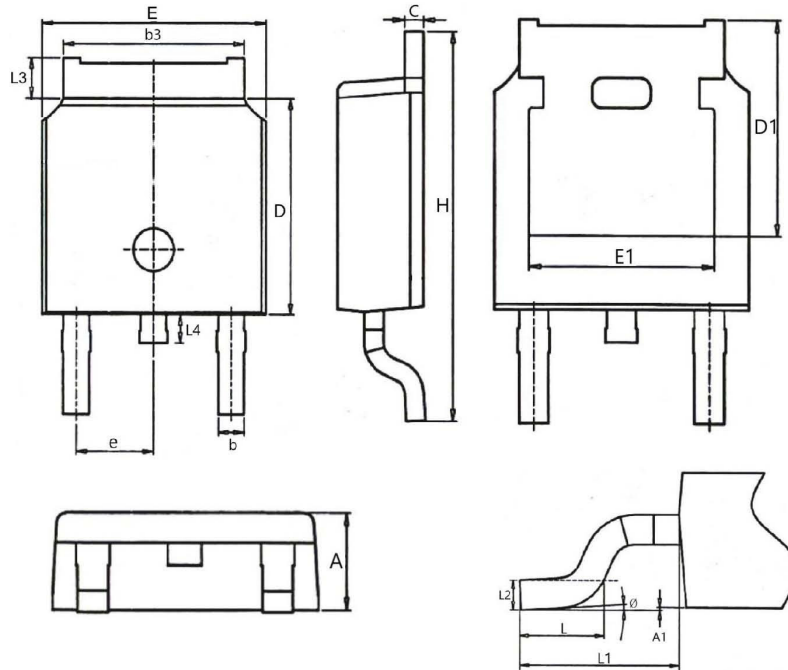
Fig.11 Unclamped Inductive Switching Waveform

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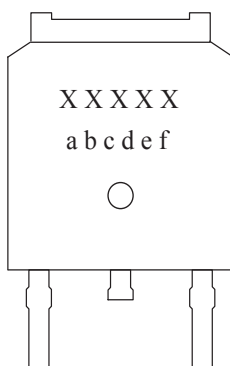
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■TO-252 dimension (2,500pcs/reel)



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
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)