

Single N-channel MOSFET

ELM4N6014FUA-S

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

■ General description

ELM4N6014FUA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds}=60V$
- $I_d=5A$ ($V_{gs}=10V$)
- $R_{ds(on)} = 50m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 60m\Omega$ ($V_{gs}=4.5V$)

■ Maximum absolute ratings

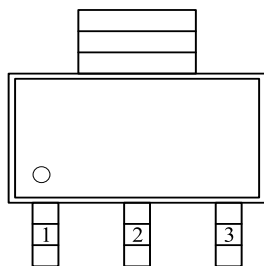
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	60	V		
Gate-source voltage	V_{gs}	± 20	V		
Continuous drain current ($V_{gs}=10V$)	I_d	$T_a=25^\circ C$	5.0	A	1
		$T_a=70^\circ C$	3.5		
Pulsed drain current	I_{dm}	30	A	2	
Single pulsed avalanche energy	E_{as}	22	mJ	3	
Avalanche current	I_{as}	21	A		
Total power dissipation	P_d	$T_a=25^\circ C$	2.7	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	$R_{\theta ja}$	--	85	$^\circ C/W$	1
Thermal resistance junction-case	$R_{\theta jc}$	--	45	$^\circ C/W$	1

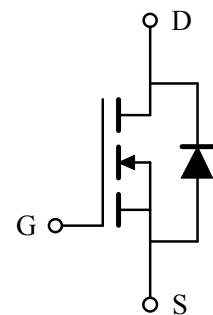
■ Pin configuration

SOT-223(TOP VIEW)



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	BV _{dss}	V _{gs} =0V, I _d =250μA	60	--	--	V	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =4A	--	--	50	mΩ	2
		V _{gs} =4.5V, I _d =2A	--	--	60		
Gate threshold voltage	V _{gs(th)}	V _{gs} =V _{ds} , I _d =250μA	1.0	--	2.5	V	
Drain-source leakage current	I _{dss}	V _{ds} =48V, V _{gs} =0V	--	--	1	μA	
		V _{ds} =48V, V _{gs} =0V, T _j =55°C	--	--	5		
Gate-source leakage current	I _{gss}	V _{gs} =±20V, V _{ds} =0V	--	--	±100	nA	
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =4A	--	28.3	--	S	
Continuous source current	I _s	V _{gs} =V _{ds} =0V, Force current	--	--	5	A	1, 5
Diode forward voltage	V _{sd}	V _{gs} =0V, I _s =1A	--	--	1.2	V	2
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{ds} =15V, V _{gs} =0V, f=1MHz	--	1027	--	pF	
Output capacitance	C _{oss}		--	65	--	pF	
Reverse transfer capacitance	C _{rss}		--	46	--	pF	
SWITCHING PARAMETERS							
Total gate charge (10V)	Q _g	V _{ds} =48V, V _{gs} =10V, I _d =4A	--	19.0	--	nC	
Gate-source charge	Q _{gs}		--	2.6	--	nC	
Gate-drain charge	Q _{gd}		--	4.1	--	nC	
Turn-on delay time	t _{d(on)}	V _{dd} =30V, V _{gs} =10V R _{gen} =3.3Ω, I _d =4A	--	3	--	ns	
Turn-on rise time	t _r		--	34	--	ns	
Turn-off delay time	t _{d(off)}		--	23	--	ns	
Turn-off fall time	t _f		--	6	--	ns	
Reverse recovery time	t _{rr}	I _f =4A, di/dt=100A/μs	--	12.1	--	nS	
Reverse recovery charge	Q _{rr}		--	6.7	--	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=0.1mH, I_{as}=21A.
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

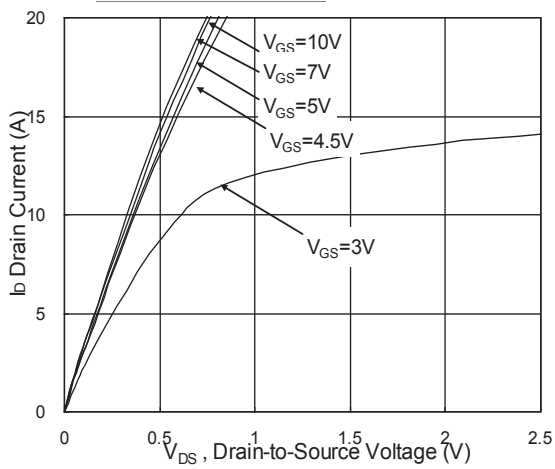


Fig.1 Typical Output Characteristics

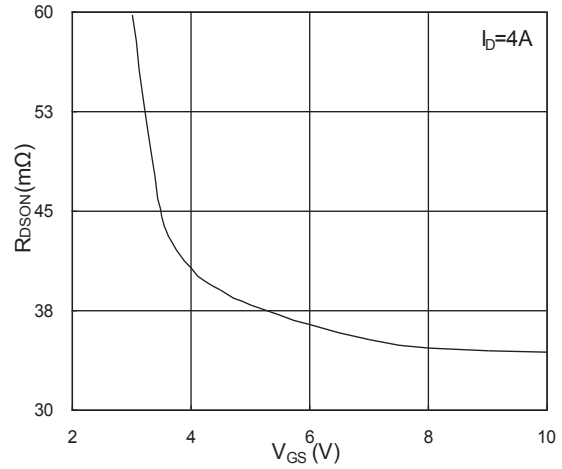


Fig.2 On-Resistance vs. G-S Voltage

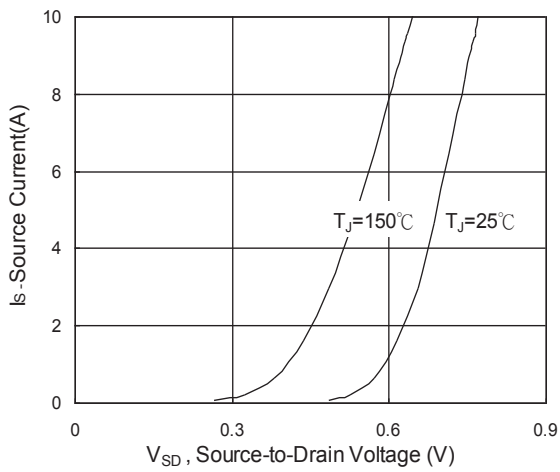


Fig.3 Source Drain Forward Characteristics

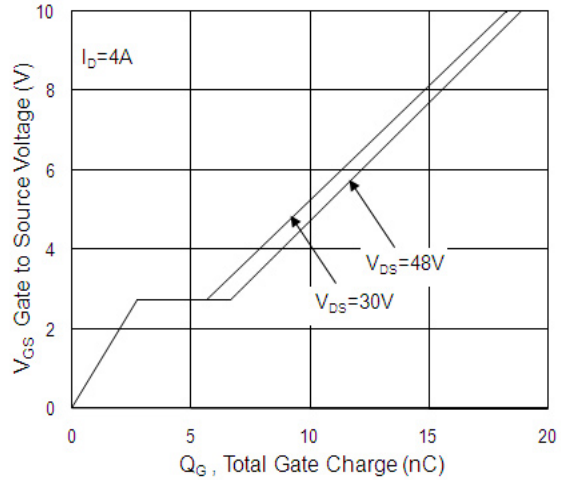


Fig.4 Gate-Charge Characteristics

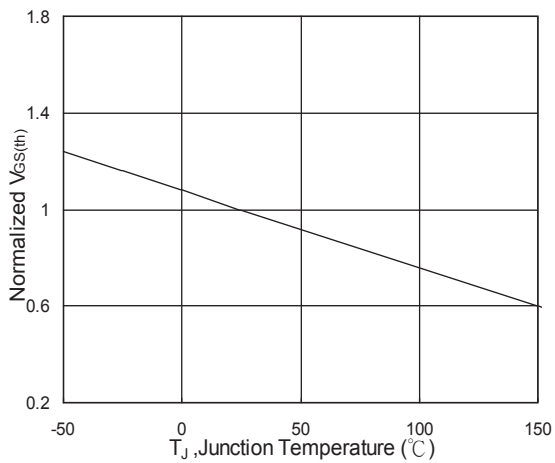


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

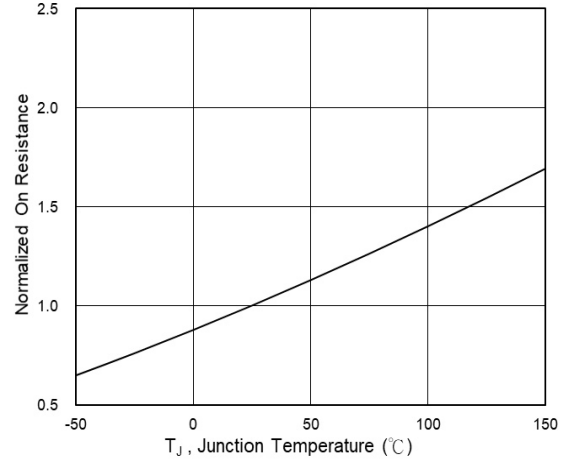


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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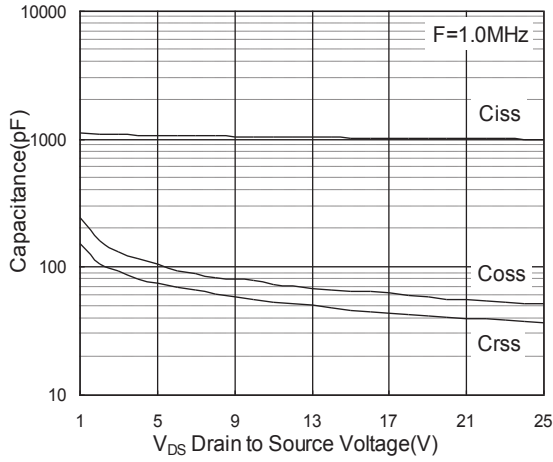


Fig.7 Capacitance

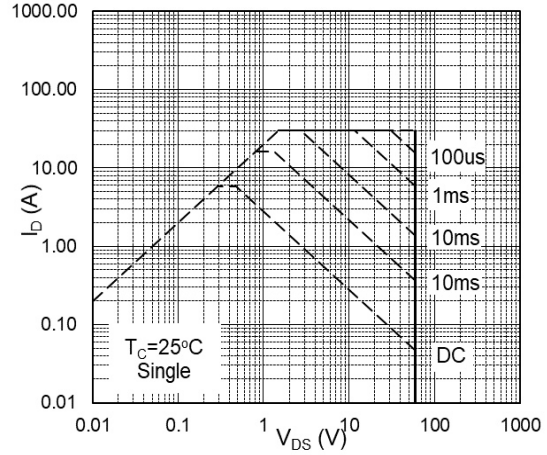


Fig.8 Safe Operating Area

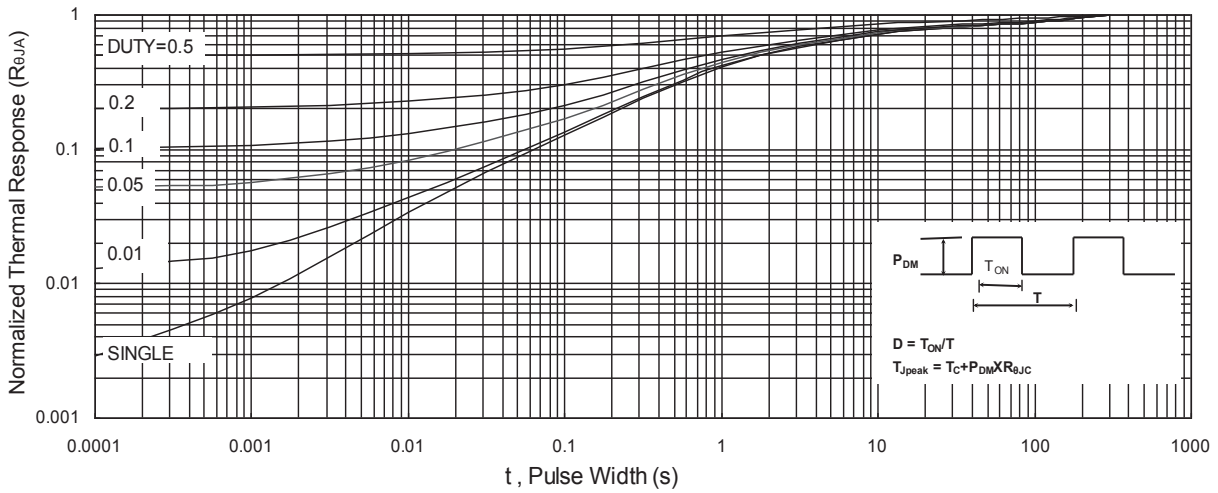


Fig.9 Normalized Maximum Transient Thermal Impedance

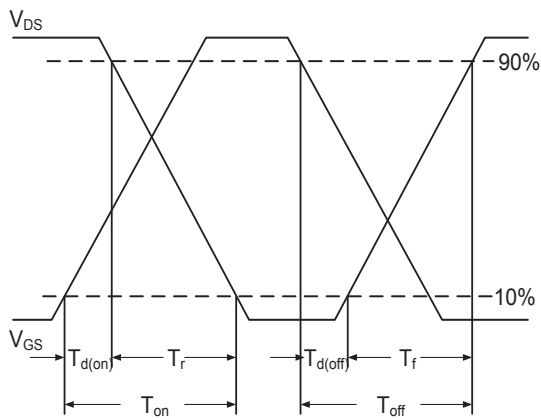


Fig.10 Switching Time Waveform

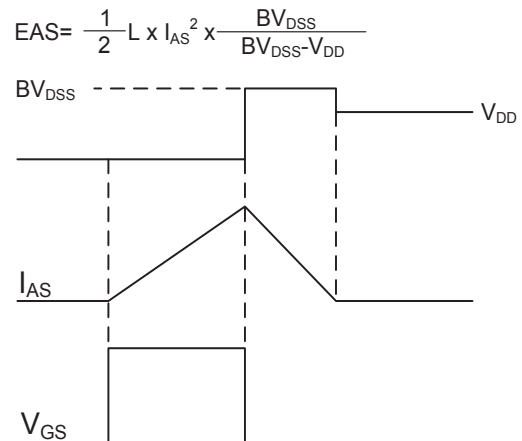


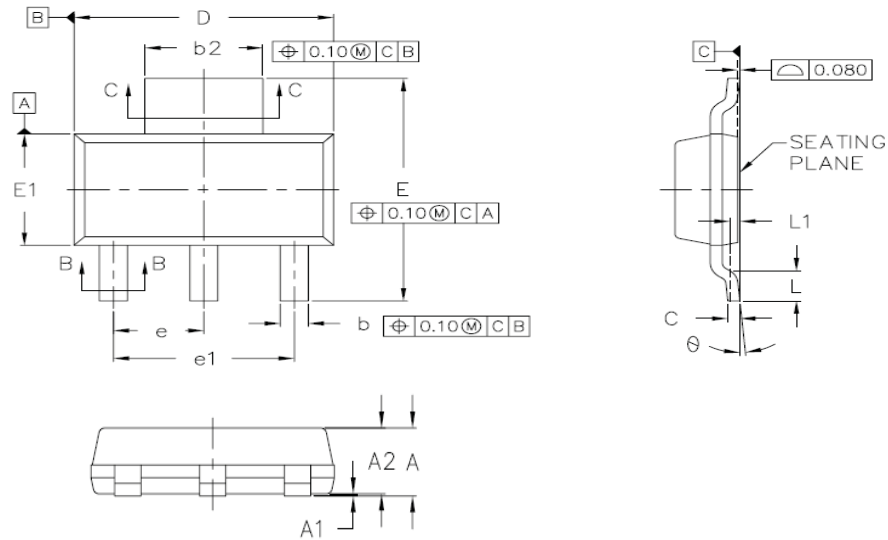
Fig.11 Unclamped Inductive Switching Waveform

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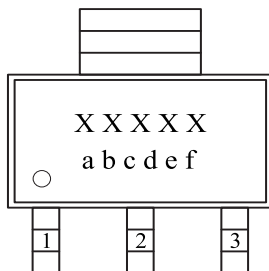
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■SOT-223 dimension (3,000pcs/reel)



Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	--	1.80	--	0.071
A1	0.02	0.10	0.001	0.004
A2	1.50	1.70	0.059	0.067
b	0.66	0.84	0.026	0.033
b1	0.60	0.79	0.024	0.031
b2	2.90	3.10	0.114	0.122
b3	2.84	3.05	0.112	0.120
c	0.23	0.35	0.009	0.014
c1	0.23	0.33	0.009	0.013
D	6.30	6.70	0.248	0.264
E	6.70	7.30	0.264	0.287
E1	3.30	3.70	0.130	0.146
e	2.30 BSC.		0.091 BSC.	
e1	4.60 BSC.		0.182 BSC.	
L	0.81	--	0.032	--
L1	0.25 BSC.		0.010 BSC.	
θ	0°	10°	0°	10°

■Marking



Symbols	Content
XXXXX	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.)