

Single N-channel MOSFET

ELM4N6016FAA-N

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

■ General description

ELM4N6016FAA-N uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds}=60V$
- $I_d=8A$ ($V_{gs}=10V$)
- $R_{ds(on)} = 12m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 15m\Omega$ ($V_{gs}=4.5V$)

■ Maximum absolute ratings

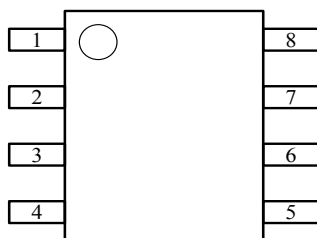
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	60	V		
Gate-source voltage	V_{gs}	± 20	V		
Continuous drain current ($V_{gs}=10V$)	I_d	$T_a=25^\circ C$	8.0	A	1
		$T_a=70^\circ C$	6.4		
Pulsed drain current	I_{dm}	32	A	2	
Single pulse avalanche energy	EAS	72	mJ	3	
Avalanche current	I_{as}	38	A		
Total power dissipation	P_d	1.5	W	4	
					$T_a=25^\circ C$
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	$R_{\theta jc}$	--	24		

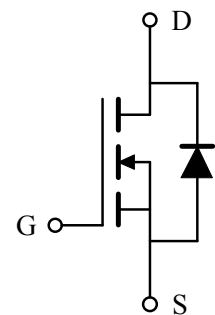
■ Pin configuration

SOP-8(TOP VIEW)



Pin No.	Pin name
1	SOURCE
2	SOURCE
3	SOURCE
4	GATE
5	DRAIN
6	DRAIN
7	DRAIN
8	DRAIN

■ 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	
BV _{dss} Temperature coefficient	$\frac{\Delta BV_{dss}}{\Delta T_j}$	Reference to 25°C, I _d =1mA	--	0.052	--	V/°C	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =8A	--	10.2	12.0	mΩ	2
		V _{gs} =4.5V, I _d =6A	--	13.0	15.0		
Gate threshold voltage	V _{gs(th)}	V _{gs} =V _{ds} , I _d =250μA	1.2	--	2.5	V	
V _{gs(th)} Temperature coefficient	ΔV _{gs(th)}		--	-5.76	--	mV/°C	
Drain-source leakage current	I _{dss}	V _{ds} =48V V _{gs} =0V	--	--	1	μA	
		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 =8A	--	45	--	S	
Continuous source current	I _s	V _{gs} =V _{ds} =0V, Force current	--	--	8	A	1, 5
Pulsed source current	I _{sm}		--	--	32	A	2, 5
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V	--	--	1.2	V	2
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{ds} =15V, V _{gs} =0V, f=1MHz	--	3240	--	pF	
Output capacitance	C _{oss}		--	210	--	pF	
Reverse transfer capacitance	C _{rss}		--	146	--	pF	
Gate resistance	R _g	V _{ds} =0V, V _{gs} =0V, f=1MHz	--	1.5	--	Ω	
SWITCHING PARAMETERS							
Total gate charge (4.5V)	Q _g	V _{ds} =48V, V _{gs} =4.5V I _d =8A	--	30.0	--	nC	
Gate-source charge	Q _{gs}		--	10.7	--	nC	
Gate-drain charge	Q _{gd}		--	9.4	--	nC	
Turn-on delay time	t _{d(on)}	V _{dd} =30V, V _{gs} =10V R _{gen} =3.3Ω, I _d =8A	--	10.6	--	ns	
Turn-on rise time	t _r		--	9.0	--	ns	
Turn-off delay time	t _{d(off)}		--	65.6	--	ns	
Turn-off fall time	t _f		--	4.8	--	ns	
Reverse recovery time	t _{rr}	I _f =8A, di/dt=100A/μs	--	18.0	--	nS	
Reverse recovery charge	Q _{rr}		--	15.6	--	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 ≤ 300us, 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}=38A.
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 electrical and thermal characteristics

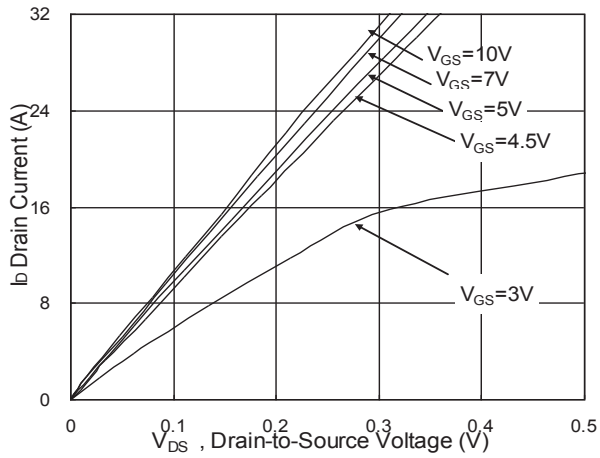


Fig.1 Typical Output Characteristics

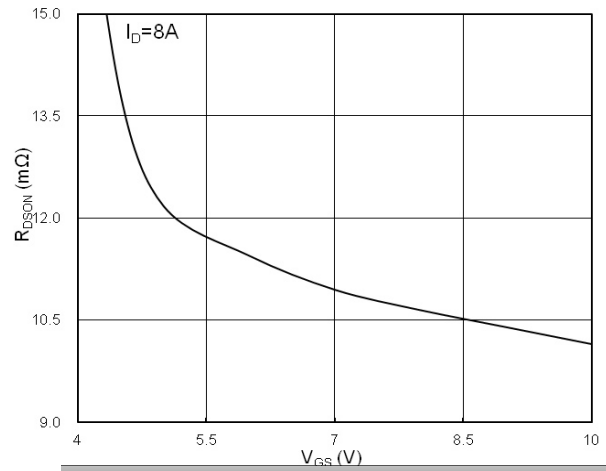


Fig.2 On-Resistance v.s Gate-Source

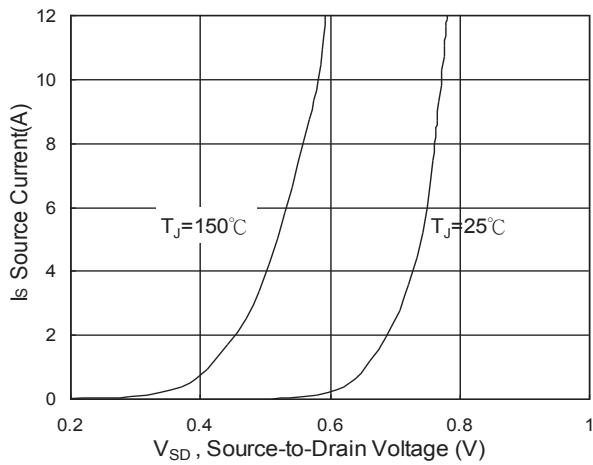


Fig.3 Forward Characteristics of Reverse

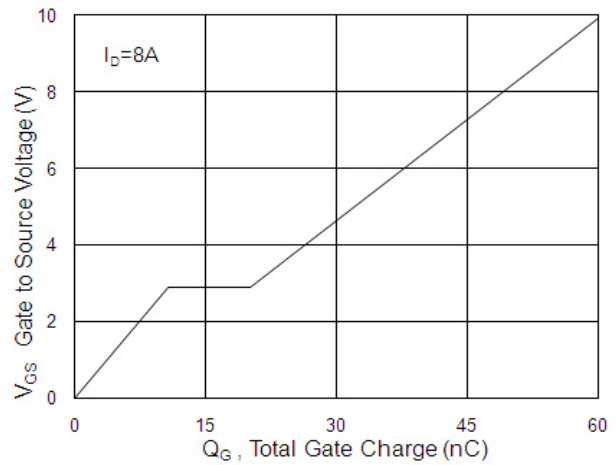


Fig.4 Gate-Charge Characteristics

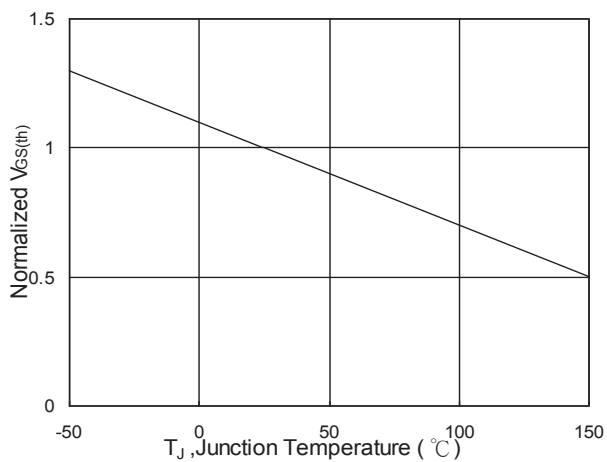


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

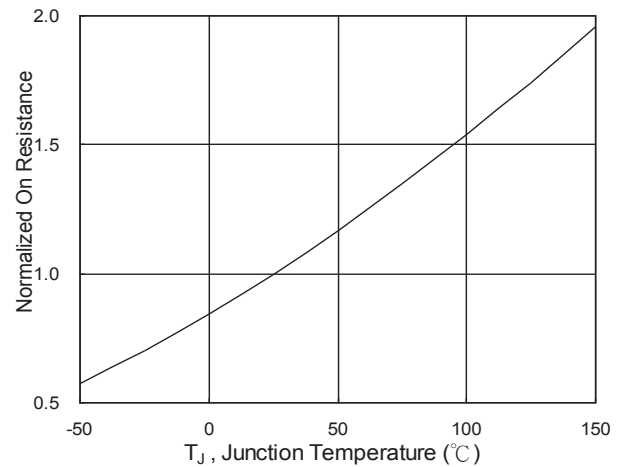


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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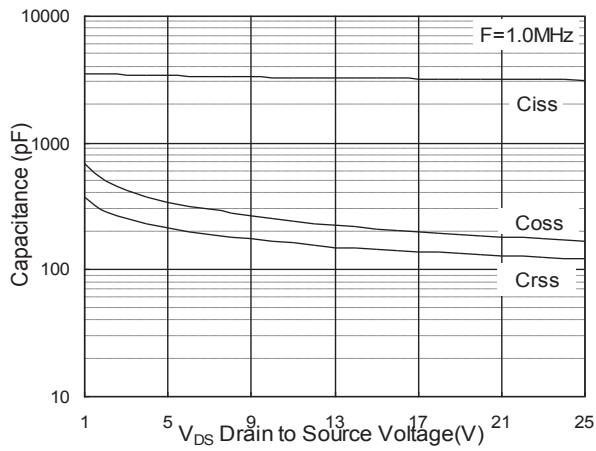


Fig.7 Capacitance

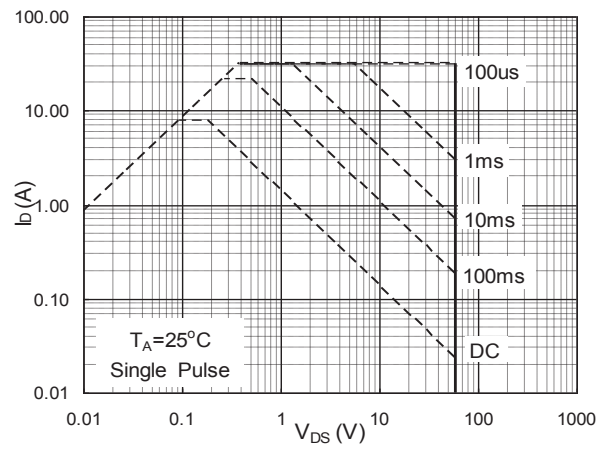


Fig.8 Safe Operating Area

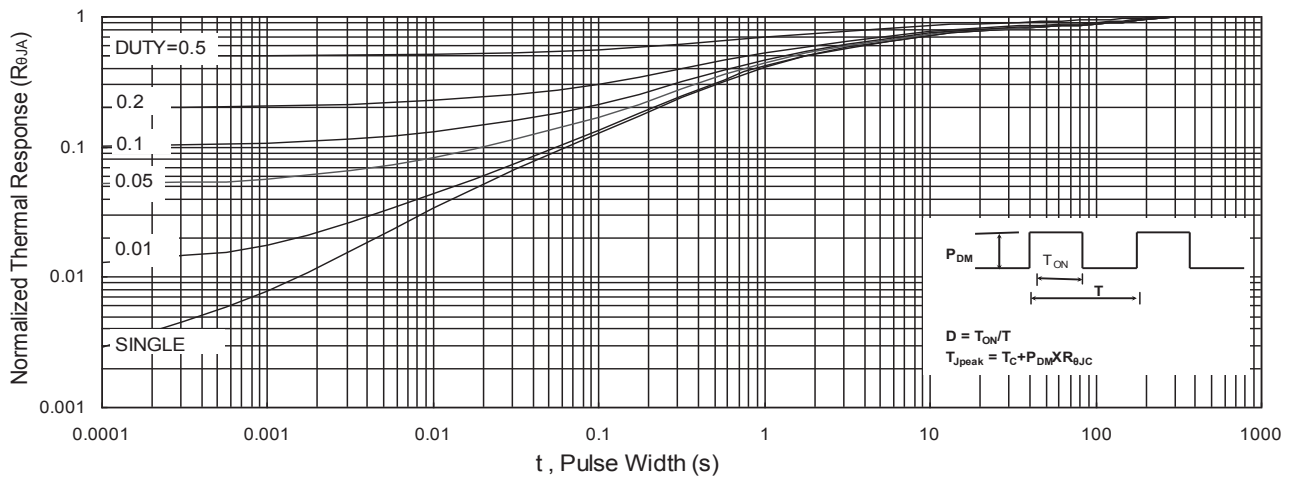


Fig.9 Normalized Maximum Transient Thermal Impedance

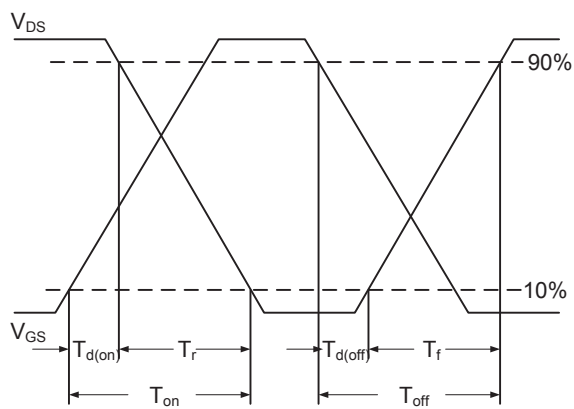


Fig.10 Switching Time Waveform

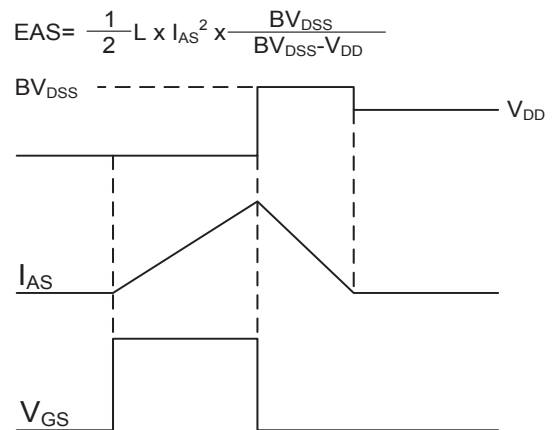


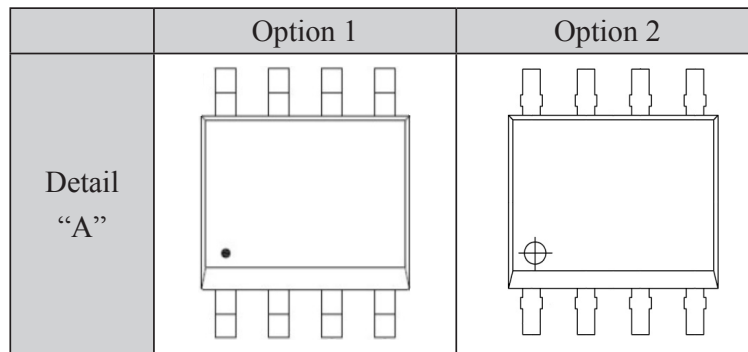
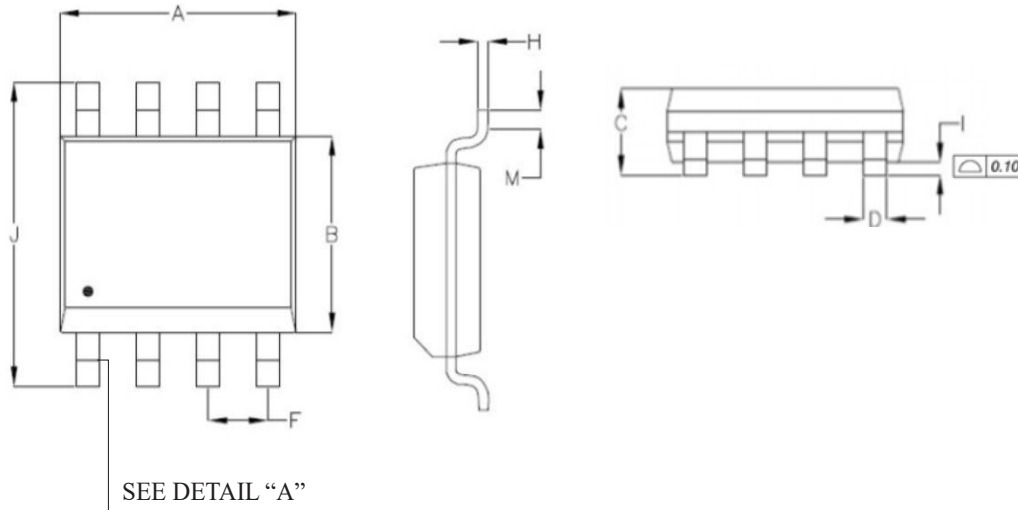
Fig.11 Unclamped Inductive Switching Waveform

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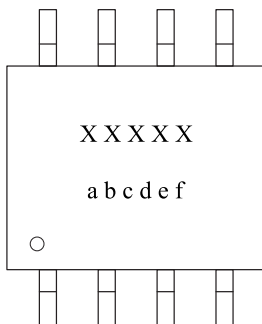
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■SOP-8 dimension (2,500pcs/reel)



Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.80	5.00	0.189	0.197	H	0.17	0.25	0.007	0.010
B	3.80	4.00	0.150	0.157	I	0.10	0.25	0.004	0.010
C	1.35	1.75	0.053	0.069	J	5.80	6.20	0.228	0.244
D	0.31	0.51	0.012	0.020	M	0.40	1.27	0.016	0.050
F	1.27 BSC		0.050 BSC						

■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)