

Single N-channel MOSFET

ELM4N6008FCA-S

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

■ General description

ELM4N6008FCA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds}=60V$
- $I_d=2.3A$ ($V_{gs}=10V$)
- $R_{ds(on)} = 100m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 110m\Omega$ ($V_{gs}=4.5V$)

■ Maximum absolute ratings

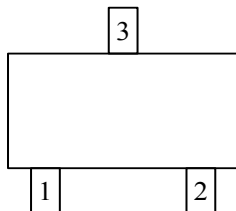
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	60	V		
Gate-source voltage	V_{gs}	± 20	V		
Continuous drain current ($V_{gs}=10V$)	I_d	$T_a=25^\circ C$	2.3	A	1
		$T_a=70^\circ C$	1.8		
Pulsed drain current	I_{dm}	9.2	A	2	
Total power dissipation	P_d	1	W	3	
Storage temperature range	T_{stg}	-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	$R_{\theta ja}$	--	125	$^\circ C/W$	1
Thermal resistance junction-case	$R_{\theta jc}$	--	80	$^\circ C/W$	1

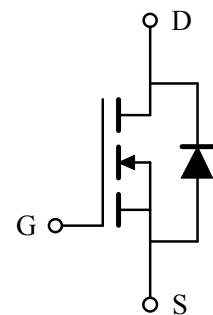
■ Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	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	--	0.054	--	V/°C	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =2A	--	80	100	mΩ	2
		V _{gs} =4.5V, I _d =1A	--	85	110		
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)}		--	-4.96	-	mV/°C	
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 =2A	--	13	--	S	
Continuous source current	I _s	V _{gs} =V _{ds} =0V, Force current	--	--	2.3	A	1, 4
Pulsed source current	I _{sm}		--	--	9.2	A	2, 4
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	--	511	715	pF	
Output capacitance	C _{oss}		--	38	53	pF	
Reverse transfer capacitance	C _{rss}		--	25	35	pF	
SWITCHING PARAMETERS							
Total gate charge (4.5V)	Q _g	V _{ds} =48V, V _{gs} =4.5V, I _d =2A	--	5.00	7.00	nC	
Gate-source charge	Q _{gs}		--	1.68	2.40	nC	
Gate-drain charge	Q _{gd}		--	1.90	2.70	nC	
Turn-on delay time	t _{d(on)}	V _{dd} =30V, V _{gs} =10V R _{gen} =3.3Ω, I _d =2A	--	1.6	3.2	ns	
Turn-on rise time	t _r		--	7.2	13.0	ns	
Turn-off delay time	t _{d(off)}		--	25.0	50.0	ns	
Turn-off fall time	t _f		--	14.4	28.8	ns	
Reverse recovery time	t _{rr}	I _f =2A, di/dt=100A/μs	--	9.7	-	nS	
Reverse recovery charge	Q _{rr}		--	5.8	-	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 power dissipation is limited by 150°C junction temperature.
4. 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

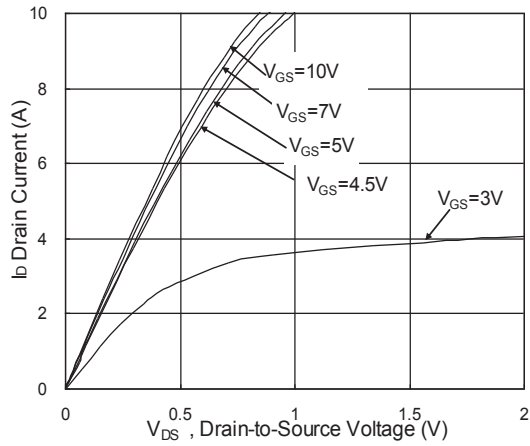


Fig.1 Typical Output Characteristics

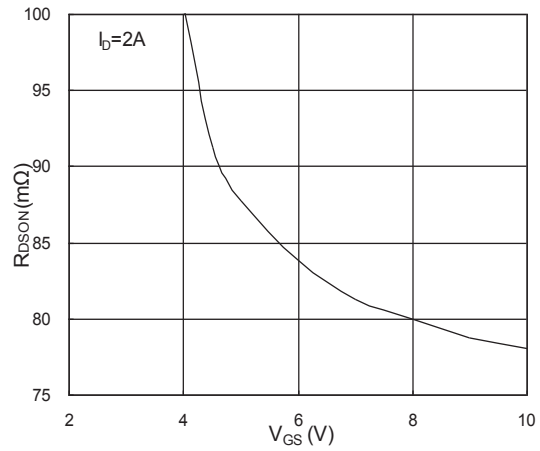


Fig.2 On-Resistance v.s Gate-Source

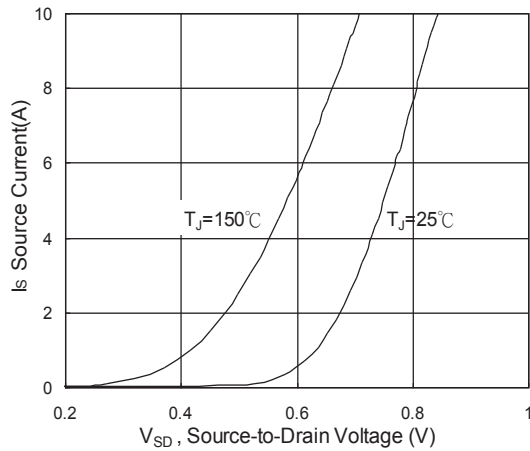


Fig.3 Forward Characteristics of Reverse

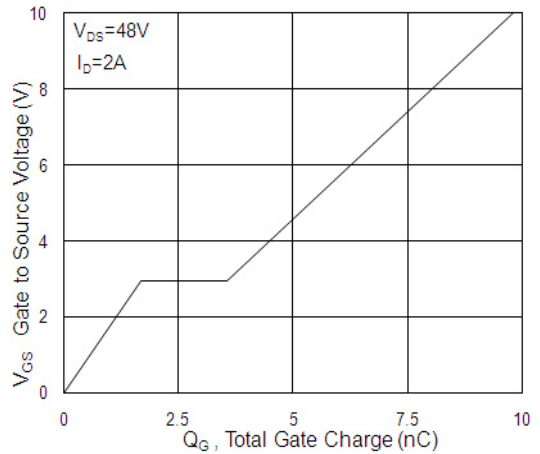


Fig.4 Gate-Charge Characteristics

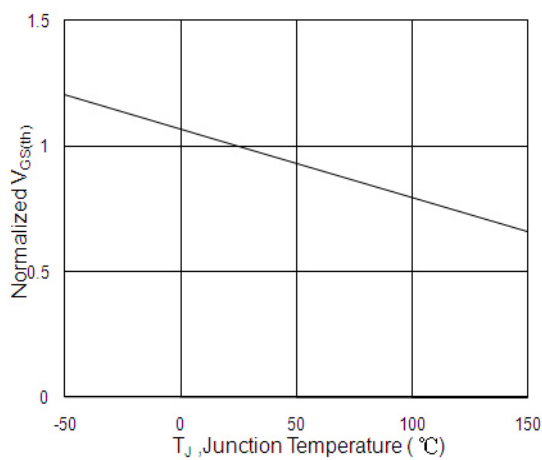


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

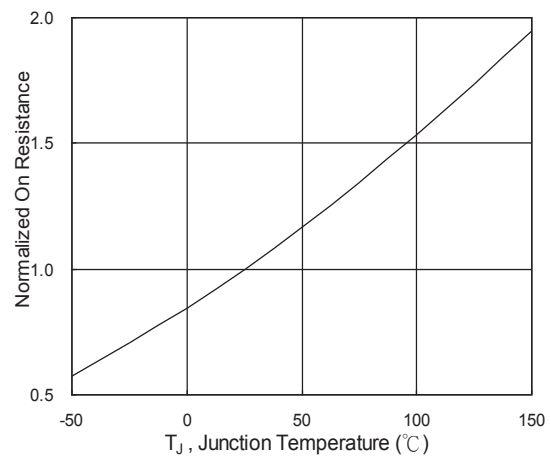


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

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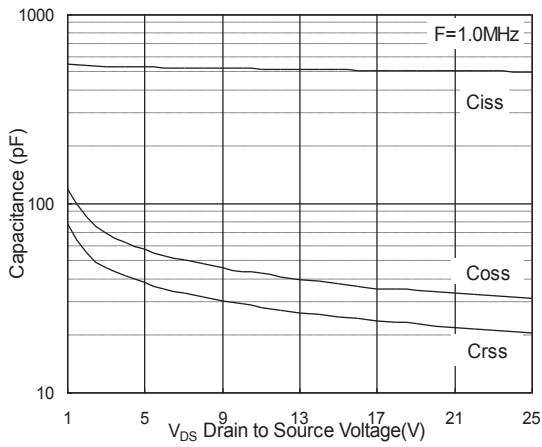


Fig.7 Capacitance

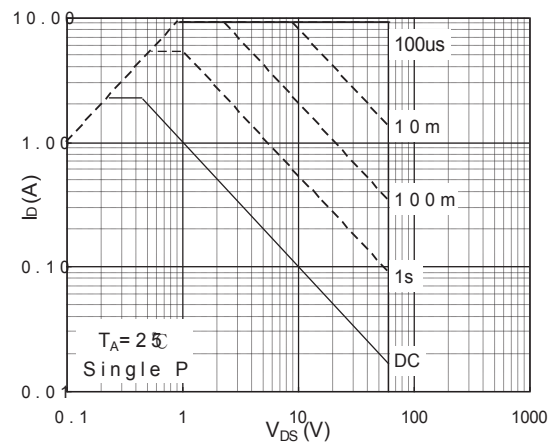


Fig.8 Safe Operating Area

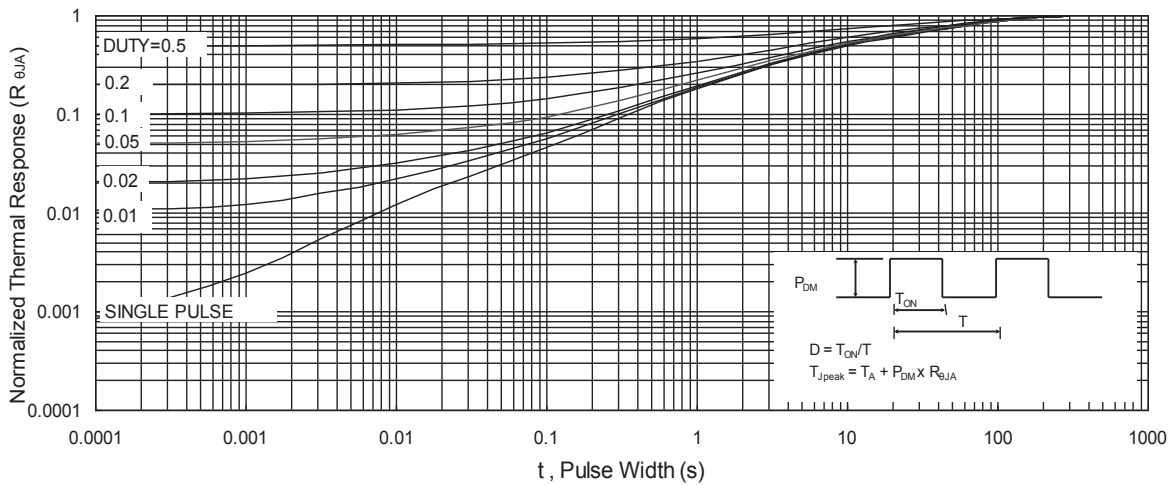


Fig.9 Normalized Maximum Transient Thermal Impedance

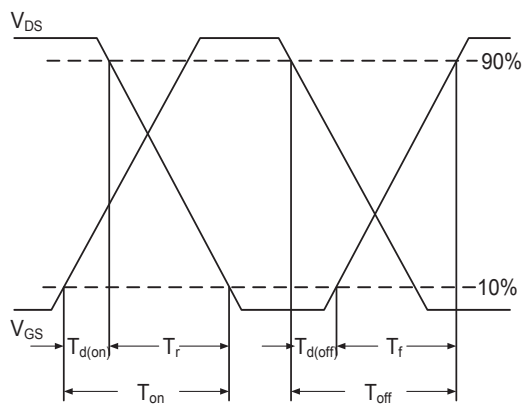


Fig.10 Switching Time Waveform

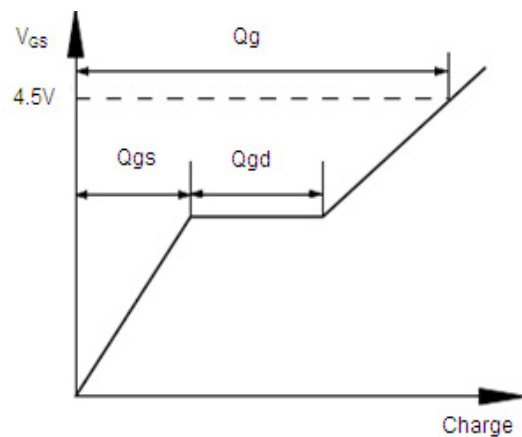


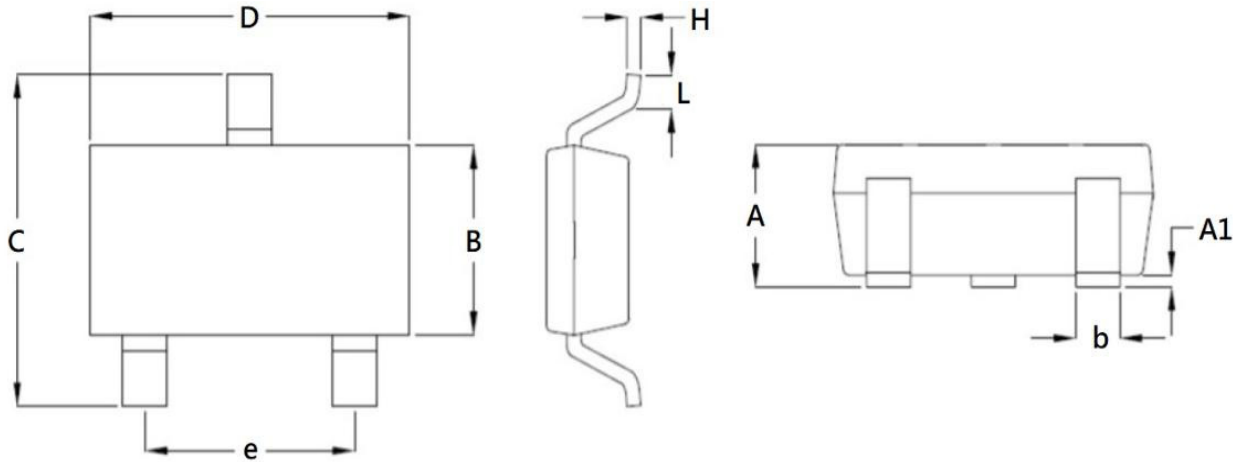
Fig.11 Gate Charge Waveform

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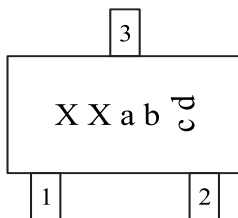
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■SOT-23 dimension (3,000pcs/reel)



Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.85	1.25	0.033	0.049
A1	0.00	0.15	0.000	0.006
B	1.40	1.80	0.055	0.071
b	0.30	0.50	0.012	0.020
C	2.60	3.00	0.102	0.118
D	2.80	3.10	0.110	0.122
e	1.90 BSC		0.075 BSC	
H	0.08	0.20	0.003	0.008
L	0.30	0.60	0.012	0.024

■Marking



Symbols	Content
xx	Product code
a	Yearly code : 2019=9, 2020=A, 2021=B, 2022=C.....
b	Weekly code : A to Z, a to z (53 weeks in total)
c	Sequence : 1 to 9 or A to Z
d	Assembly code : A to Z (I, O excepted)