

Single N-channel MOSFET

ELM4N2510FCA-S

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

■ General description

ELM4N2510FCA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds}=20V$
- $I_d=6A$ ($V_{gs}=4.5V$)
- $R_{ds(on)} = 26m\Omega$ ($V_{gs}=4.5V$)
- $R_{ds(on)} = 35m\Omega$ ($V_{gs}=2.5V$)
- $R_{ds(on)} = 50m\Omega$ ($V_{gs}=1.8V$)

■ Maximum absolute ratings

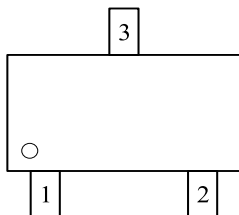
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	20	V		
Gate-source voltage	V_{gs}	± 12	V		
Continuous drain current ($V_{gs}=4.5V$)	I_d	Ta=25°C	6	A	1
		Ta=70°C	5		
Pulsed drain current	I_{dm}	17	A	2	
Total power dissipation	P_d	Ta=25°C	1.00	W	3
		Ta=70°C	0.66		
Storage temperature range	T_{stg}	-55 to 150	°C		
Operating junction temperature range	T_j	-55 to 150	°C		

■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	$R_{\theta ja}$	--	120	°C/W	1

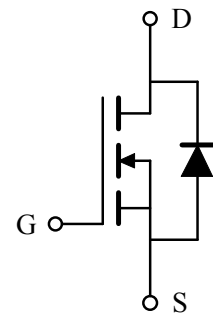
■ Pin configuration

SOT-23S(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	20	-	-	V	
BV _{dss} Temperature coefficient	$\frac{\Delta BV_{dss}}{\Delta T_j}$	Reference to 25°C, I _d =1mA	-	0.018	-	V/°C	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =4.5V, I _d =4A	-	21	26	mΩ	2
		V _{gs} =2.5V, I _d =3A	-	28	35		
		V _{gs} =1.8V, I _d =2A	-	40	50		
Gate threshold voltage	V _{gs(th)}	V _{gs} =V _{ds} , I _d =250μA	0.45	-	1.00	V	
V _{gs(th)} Temperature coefficient	ΔV _{gs(th)}		-	-3.1	-	mV/°C	
Drain-source leakage current	I _{dss}	V _{ds} =16V, V _{gs} =0V	-	-	1	μA	
		V _{ds} =16V, V _{gs} =0V, T _j =85°C	-	-	10		
Gate-source leakage current	I _{gss}	V _{gs} =±12V, V _{ds} =0V	-	-	±100	nA	
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =4A	-	30	-	S	
Continuous source current	I _s	V _{gs} =V _{ds} =0V, Force current	-	-	6	A	1, 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	-	670	-	pF	
Output capacitance	C _{oss}		-	75	-	pF	
Reverse transfer capacitance	C _{rss}		-	68	-	pF	
SWITCHING PARAMETERS							
Total gate charge (4.5V)	Q _g	V _{ds} =15V, V _{gs} =4.5V, I _d =4A	-	8.60	-	nC	
Gate-source charge	Q _{gs}		-	1.37	-	nC	
Gate-drain charge	Q _{gd}		-	2.30	-	nC	
Turn-on delay time	t _{d(on)}	V _{ds} =10V, V _{gs} =4.5V R _{gen} =3.3Ω, I _d =4A	-	5.2	-	ns	
Turn-on rise time	t _r		-	34.0	-	ns	
Turn-off delay time	t _{d(off)}		-	23.0	-	ns	
Turn-off fall time	t _f		-	9.2	-	ns	

NOTE :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z 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

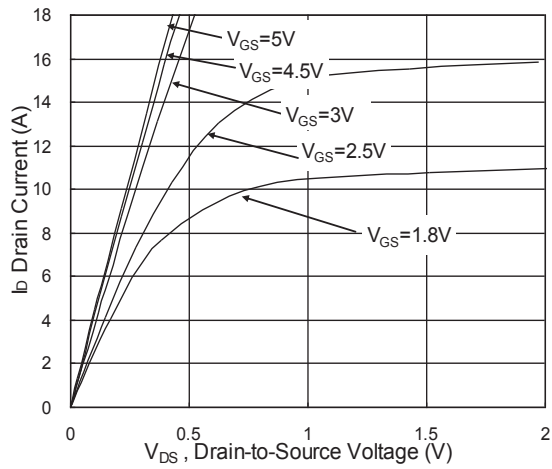


Fig.1 Typical Output Characteristics

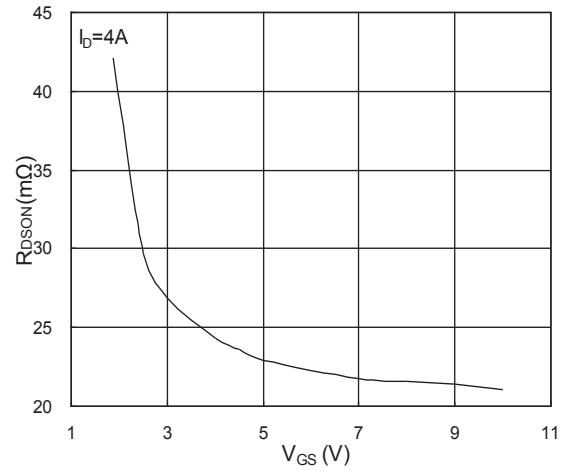


Fig.2 On-Resistance vs. Gate-Source

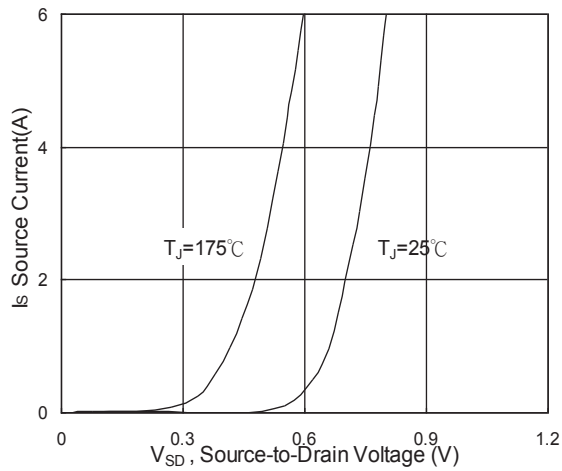


Fig.3 Forward Characteristics Of Reverse

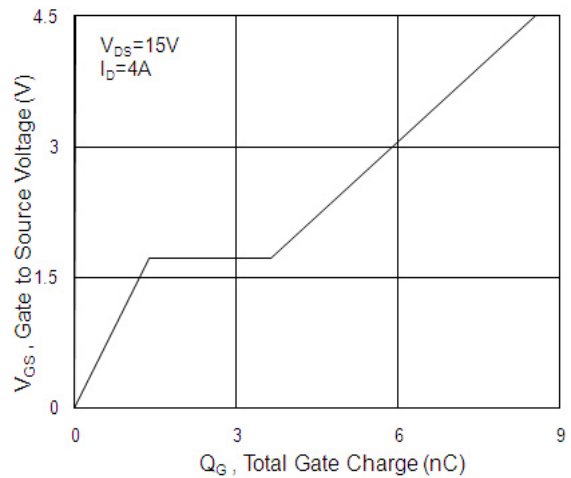


Fig.4 Gate-Charge Characteristics

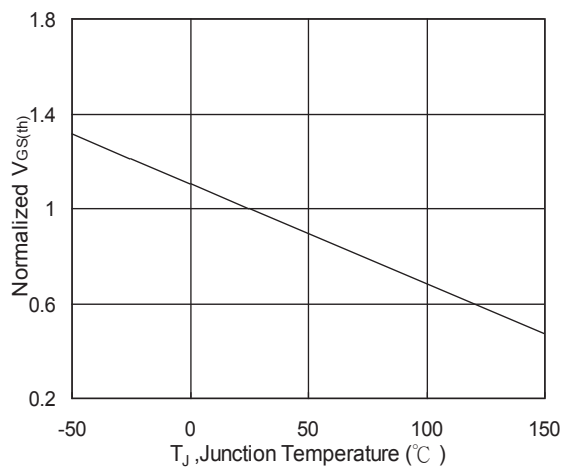


Fig.5 Normalized V_{GS(th)} vs. T_J

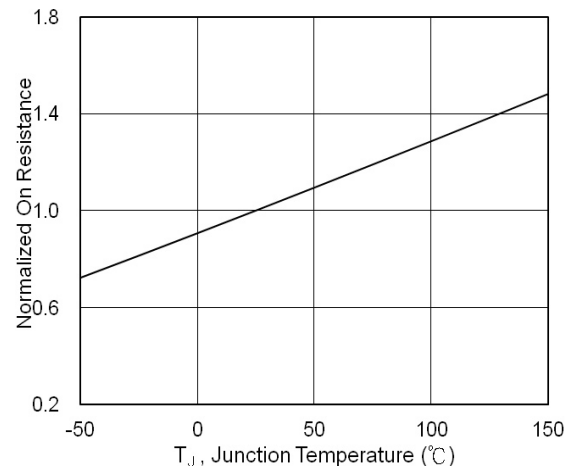


Fig.6 Normalized R_{DS(on)} vs. T_J

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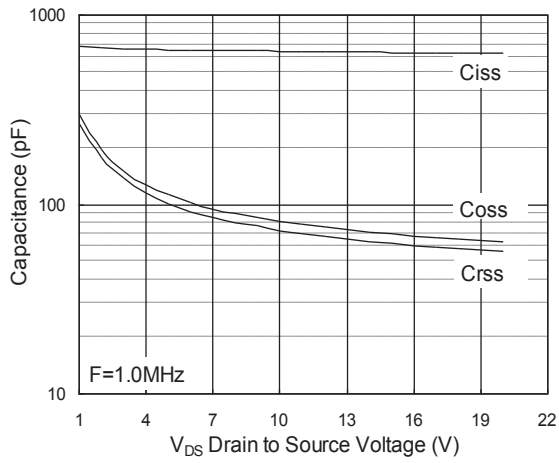


Fig.7 Capacitance

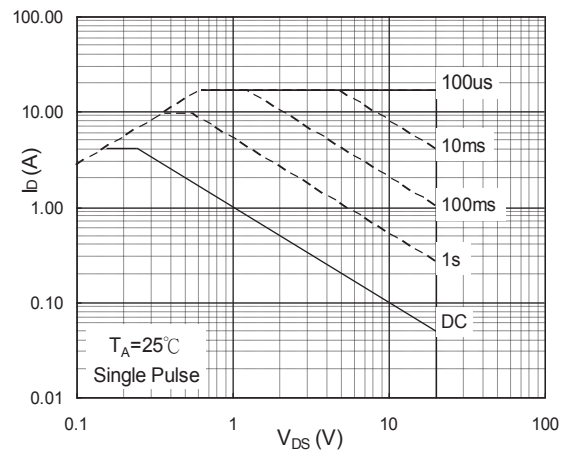


Fig.8 Safe Operating Area

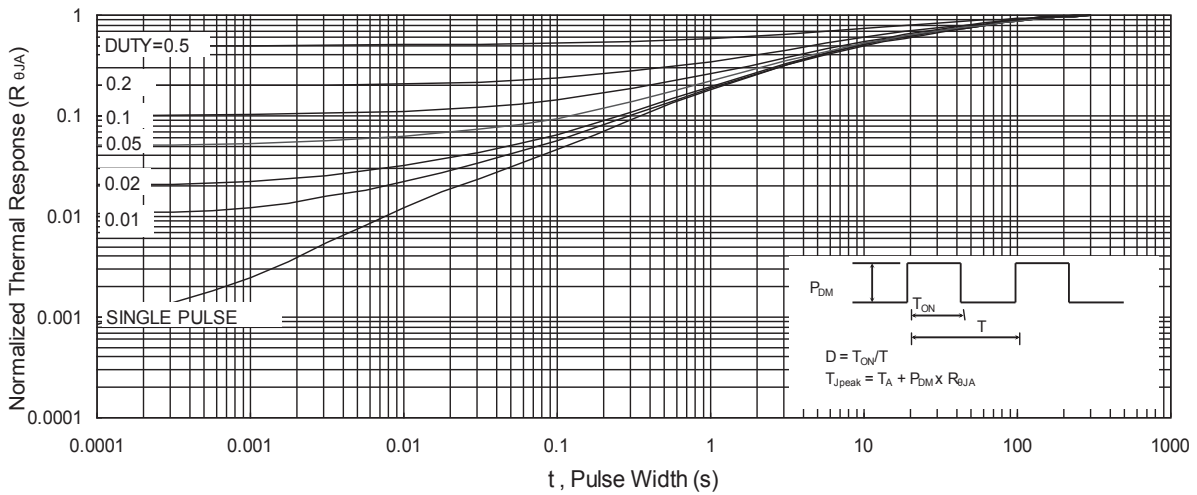


Fig.9 Normalized Maximum Transient Thermal Impedance

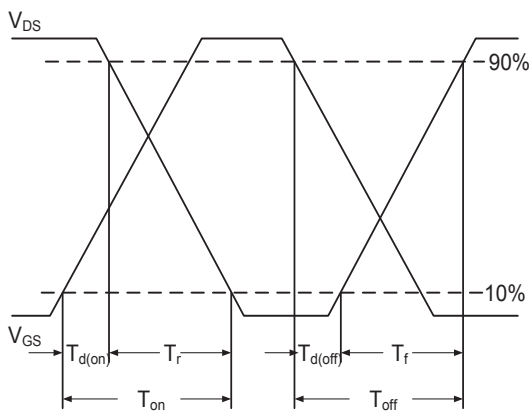


Fig.10 Switching Time Waveform

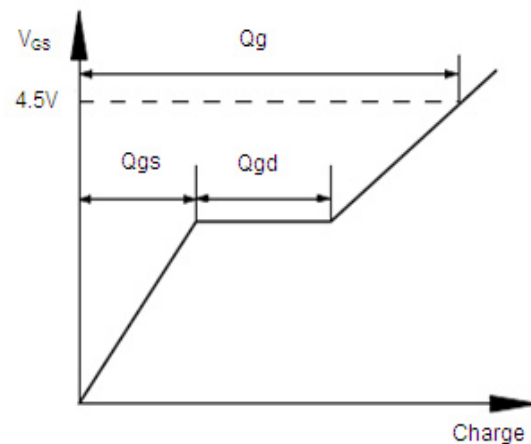


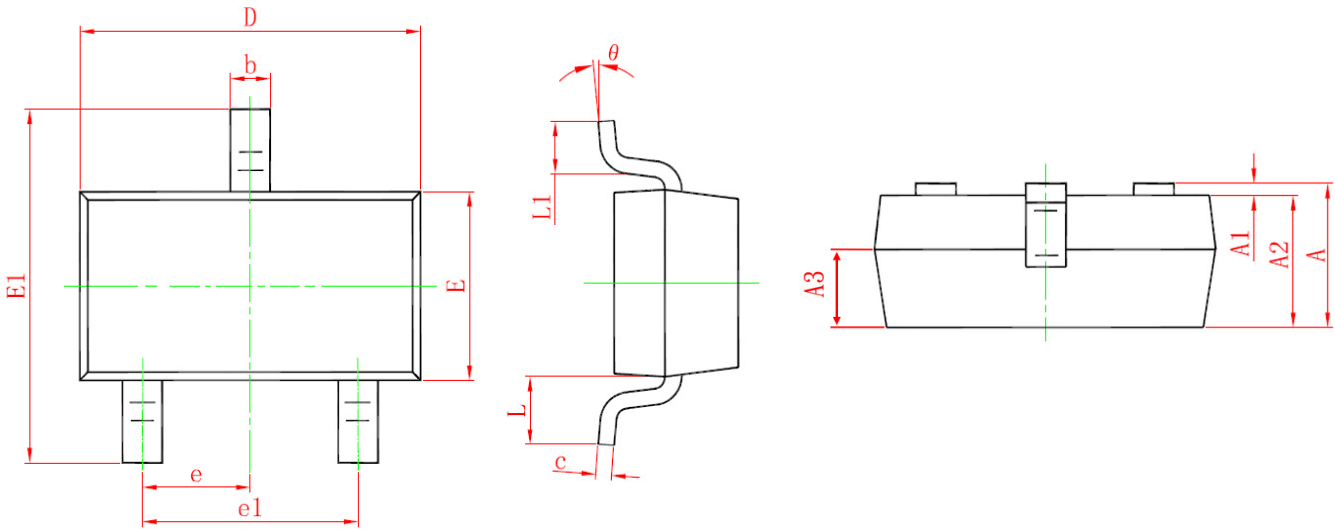
Fig.11 Gate Charge Waveform

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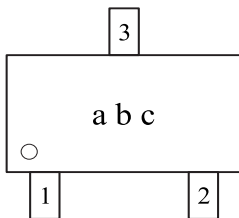
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■ SOT-23S dimension (3,000pcs/reel)



Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.89	1.12	0.035	0.044	E	1.20	1.40	0.047	0.055
A1	0.01	0.15	0.000	0.006	E1	2.10	2.64	0.083	0.104
A2	0.88	1.05	0.035	0.041	e	0.95 BSC		0.037 BSC	
A3	0.41	0.66	0.016	0.026	e1	1.90 BSC		0.075 BSC	
b	0.30	0.50	0.012	0.020	L	0.54 Ref		0.021 Ref	
c	0.08	0.20	0.003	0.008	L1	0.40	0.60	0.016	0.024
D	2.80	3.04	0.110	0.120	θ	0°	8°	0°	8°

■ Marking



Symbols	Content
a	Product code
b	Yearly code : ex 2019=9, 2020=A, 2021=B, 2022=C...
c	Sequence : 1 to 9, A to Z