

# Single N-channel MOSFET

## ELM4N0010FCA-S

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

### ■General description

ELM4N0010FCA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate threshold voltage.

### ■Features

- $V_{ds}=100V$
- $I_d=2.1A$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 120m\Omega$  ( $V_{gs}=10V$ )
- $R_{ds(on)} = 150m\Omega$  ( $V_{gs}=4.5V$ )

### ■Maximum absolute ratings

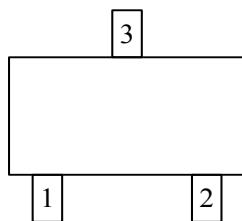
Parameter	Symbol	Limit	Unit	Note
Drain-source voltage	$V_{ds}$	100	V	
Gate-source voltage	$V_{gs}$	$\pm 20$	V	
Continuous drain current ( $V_{gs}=10V$ )	$I_d$	2.1	A	
		1.7		
Pulsed drain current	$I_{dm}$	8.4	A	2
Power dissipation	$P_d$	1.00	W	3
		0.64		
Storage temperature range	$T_{stg}$	-55 to 150	°C	
Operating junction temperature range	$T_j$	-55 to 150	°C	

### ■Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-to-ambient	$R_{\theta ja}$	-	125	°C/W	1
Thermal resistance junction-to-ambient ( $t \leq 10s$ )	$R_{\theta ja}$	-	85	°C/W	1

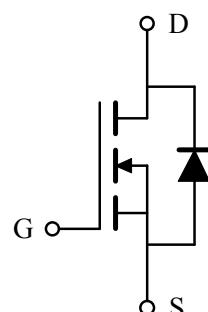
### ■Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

### ■Circuit



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### ■Electrical characteristics

T<sub>j</sub>=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	V <sub>gs</sub> =0V, I <sub>d</sub> =250μA	100	-	-	V	
Drain-source leakage current	Idss	V <sub>ds</sub> =80V, V <sub>gs</sub> =0V	-	-	1	μA	
		V <sub>ds</sub> =80V, V <sub>gs</sub> =0V, T <sub>j</sub> =55°C	-	-	5		
Gate-body leakage current	Igss	V <sub>gs</sub> =±20V, V <sub>ds</sub> =0V	-	-	±100	nA	
Gate threshold voltage	V <sub>gs(th)</sub>	V <sub>ds</sub> =V <sub>gs</sub> , I <sub>d</sub> =250μA	1.2	2.0	2.3	V	
Static drain-source on-resistance	R <sub>ds(on)</sub>	V <sub>gs</sub> =10V, I <sub>d</sub> =2A	-	93	120	mΩ	2
		V <sub>gs</sub> =4.5V, I <sub>d</sub> =1A	-	128	150		
Diode forward voltage	V <sub>sd</sub>	I <sub>s</sub> =1A, V <sub>gs</sub> =0V	-	-	1.2	V	2
Max. body-diode continuous current	I <sub>s</sub>	V <sub>gs</sub> =V <sub>ds</sub> =0V, Force current	-	-	2.1	A	1, 4
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	C <sub>iss</sub>	V <sub>ds</sub> =50V, V <sub>gs</sub> =0V, f=1MHz	-	180.0	-	pF	
Output capacitance	C <sub>oss</sub>		-	32.0	-	pF	
Reverse transfer capacitance	C <sub>rss</sub>		-	2.5	-	pF	
Gate resistance	R <sub>g</sub>	V <sub>ds</sub> =0V, V <sub>gs</sub> =0V, f=1MHz	-	3.5	-	Ω	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Q <sub>g</sub>	V <sub>ds</sub> =50V, V <sub>gs</sub> =10V, I <sub>d</sub> =2A	-	3.49	-	nC	
Gate-source charge	Q <sub>gs</sub>		-	0.66	-	nC	
Gate-drain charge	Q <sub>gd</sub>		-	0.92	-	nC	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>ds</sub> =50V, V <sub>gs</sub> =10V, I <sub>d</sub> =1A R <sub>gen</sub> =3Ω	-	4.8	-	ns	
Turn-on rise time	t <sub>r</sub>		-	19.0	-	ns	
Turn-off delay time	t <sub>d(off)</sub>		-	17.0	-	ns	
Turn-off fall time	t <sub>f</sub>		-	6.2	-	ns	

#### NOTE :

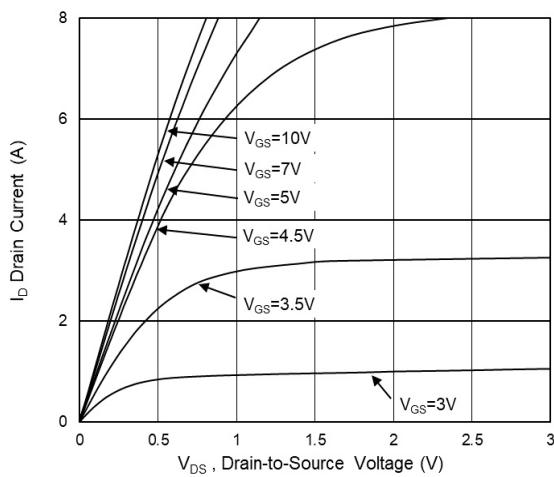
1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs and duty cycle ≤ 2%.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as I<sub>d</sub> and I<sub>dm</sub>, in real applications, should be limited by total power dissipation.

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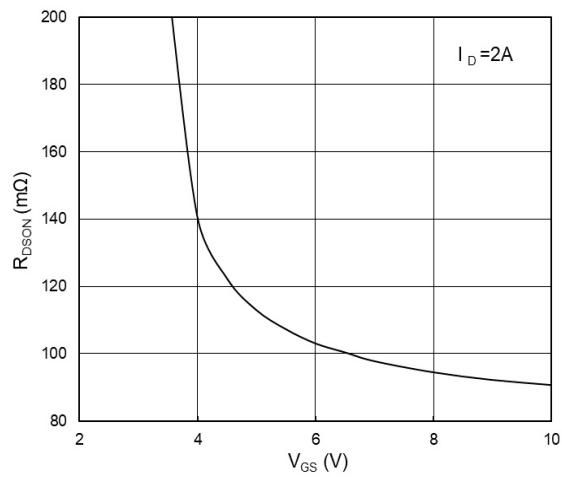
**ELM4N0010FCA-S**

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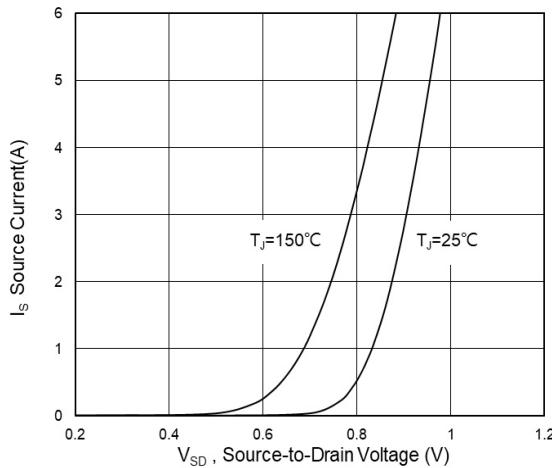
## ■ Typical characteristics



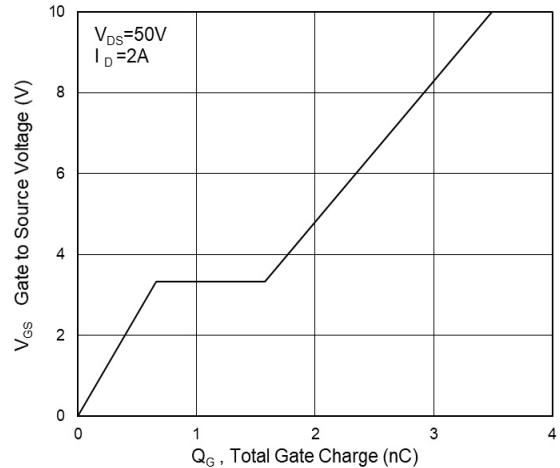
**Fig.1 Typical Output Characteristics**



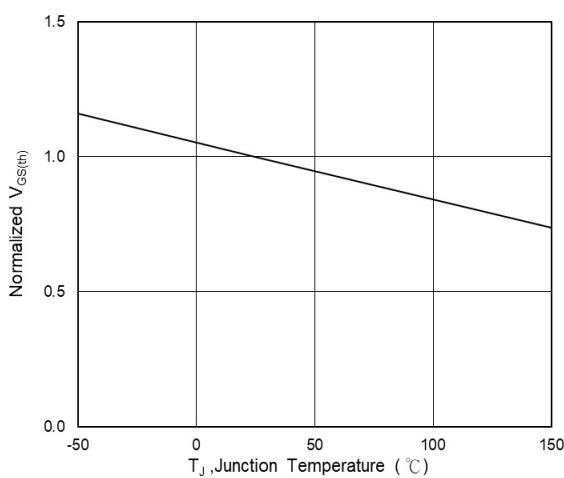
**Fig.2 On-Resistance vs G-S Voltage**



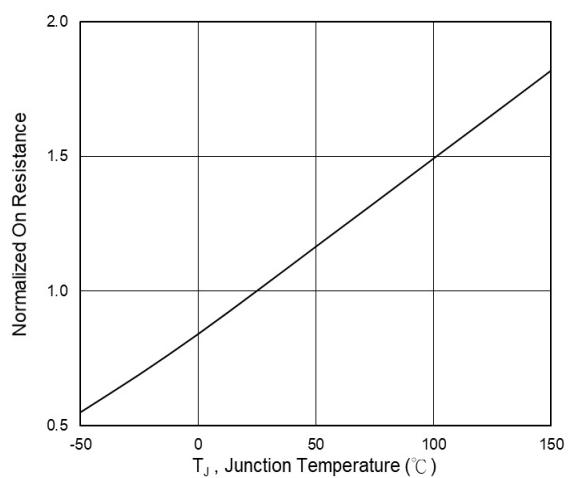
**Fig.3 Source Drain Forward Characteristics**



**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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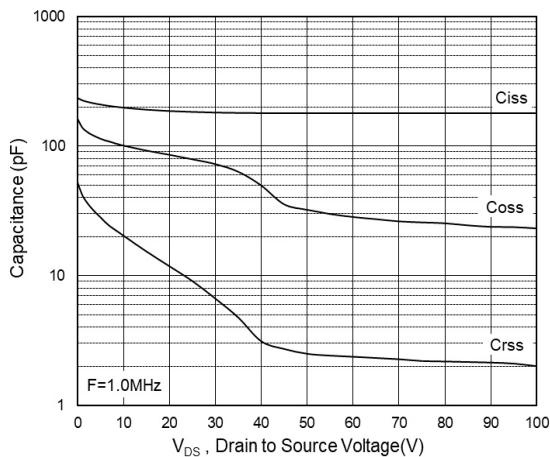


Fig.7 Capacitance

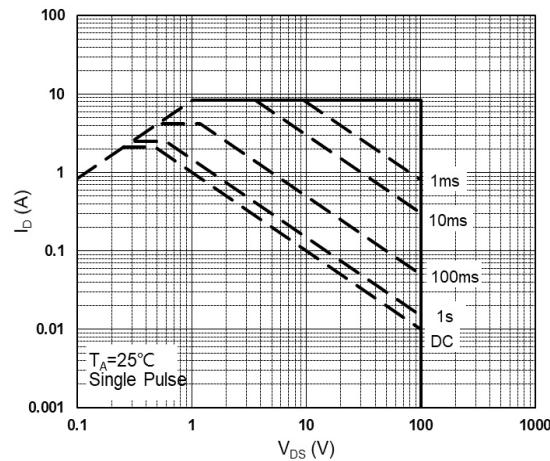


Fig.8 Safe Operating Area

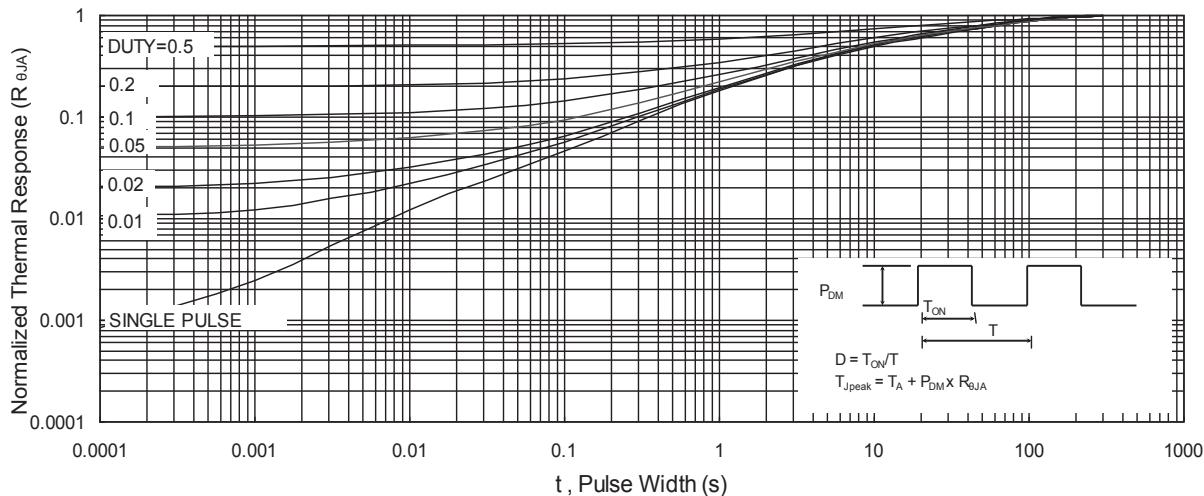


Fig.9 Normalized Maximum Transient Thermal Impedance

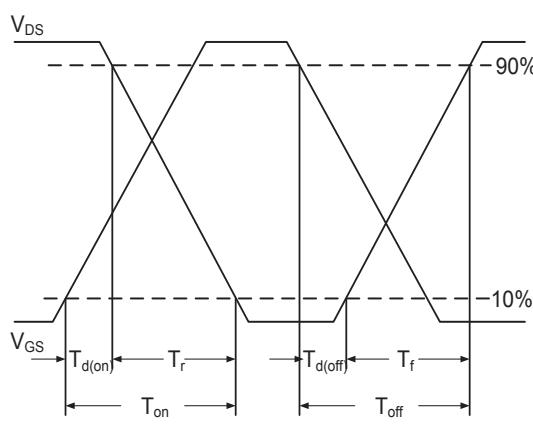


Fig.10 Switching Time Waveform

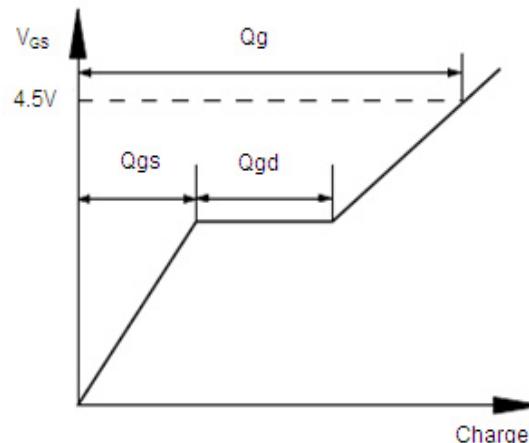


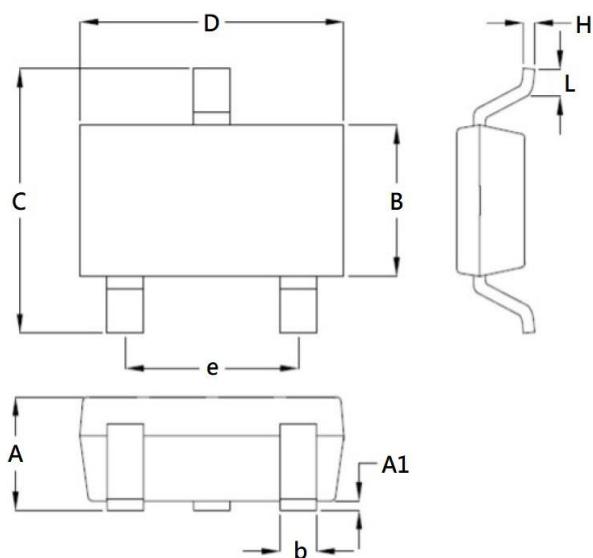
Fig.11 Gate Charge Waveform

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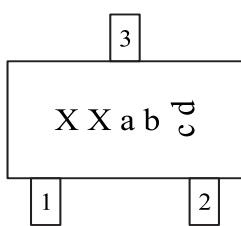
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■SOT-23 dimension (3,000pcs/reel)



Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.850	1.295	0.033	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.300	0.508	0.012	0.020
C	2.591	3.010	0.102	0.119
D	2.692	3.100	0.106	0.122
e	1.900		0.075	
H	0.080	0.254	0.003	0.010
L	0.300	0.610	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)