

Single N-channel MOSFET

ELM4N7002ECA-S

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

■ General description

ELM4N7002ECA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage. ESD protection is included.

■ Features

- $V_{ds}=60V$
- $I_d=400mA$
- $R_{ds(on)} = 2.2\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 3.0\Omega$ ($V_{gs}=4.5V$)
- ESD = 2KV HBM

■ 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	I_d	$T_a=25^\circ C$	400	mA
		$T_a=100^\circ C$	260	
Pulsed drain current	I_{dm}	1.2	A	1
Total power dissipation	P_d	$T_a=25^\circ C$	0.35	W
		$T_a=100^\circ C$	0.14	
Storage temperature range	T_{stg}	-40 to 150	$^\circ C$	
Operating junction temperature range	T_j	-40 to 150	$^\circ C$	

■ Thermal characteristics

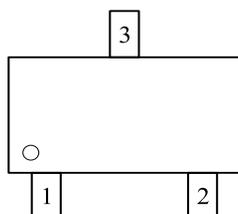
Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	$R_{\theta ja}$	--	385	$^\circ C/W$	

NOTE :

1. Pulse width limited by maximum junction temperature.

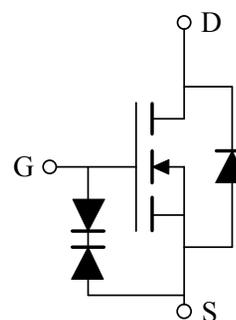
■ Pin configuration

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	60	--	--	V	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =200mA	--	1.6	2.2	Ω	1
		V _{gs} =4.5V, I _d =100mA	--	2.0	3.0		
Gate threshold voltage	V _{gs(th)}	V _{gs} =V _{ds} , I _d =250μA	1.0	1.6	2.5	V	
Drain-source leakage current	I _{dss}	V _{ds} =48V, V _{gs} =0V	--	--	1	μA	
		V _{ds} =40V, V _{gs} =0V, T _j =125°C	--	--	10		
On state drain current	I _{d(on)}	V _{ds} =10V, V _{gs} =10V	1.0	--	--	A	1
Gate-source leakage current	I _{gss}	V _{gs} =±16V, V _{ds} =0V	--	--	±30	μA	
Forward transconductance	G _{fs}	V _{ds} =20V, I _d =200mA	--	1.2	--	S	1
Continuous source current	I _s	V _{gs} =V _{ds} =0V, Force current	--	--	300	mA	
Diode forward voltage	V _{sd}	V _{gs} =0V, I _f =200mA	--	--	1.2	V	1
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{ds} =25V, V _{gs} =0V, f=1MHz	--	32	--	pF	
Output capacitance	C _{oss}		--	6	--	pF	
Reverse transfer capacitance	C _{rss}		--	2	4	pF	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{ds} =30V, V _{gs} =10V I _d =200mA	--	1.8	--	nC	2
Gate-source charge	Q _{gs}		--	0.5	--	nC	2
Gate-drain charge	Q _{gd}		--	0.9	--	nC	2

NOTE :

1. Pulse test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulse width limited by maximum junction temperature.

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■ Typical characteristics

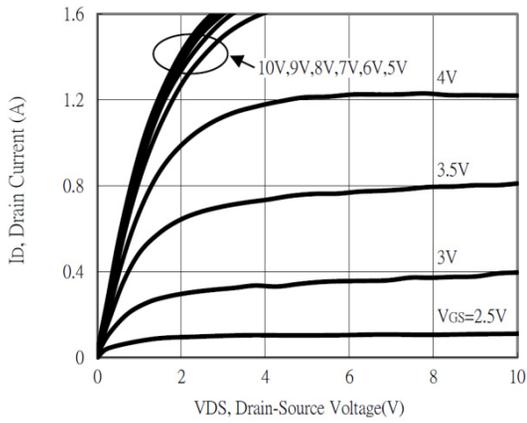


Fig.1 Typical Output Characteristics

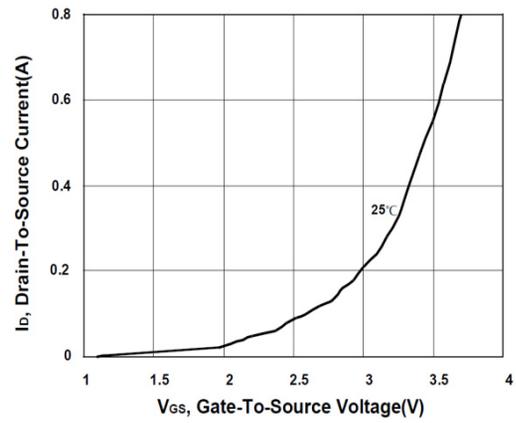


Fig.2 Transfer Characteristics

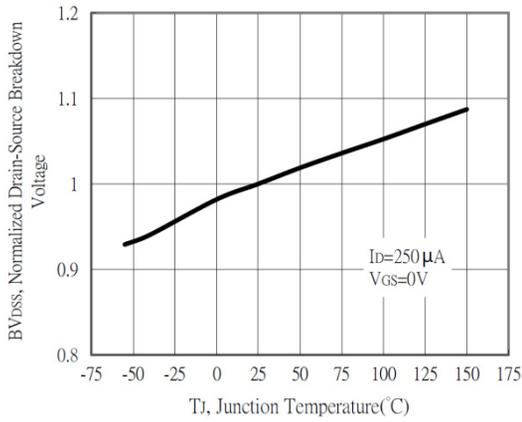


Fig.3 Breakdown Voltage vs. T_J

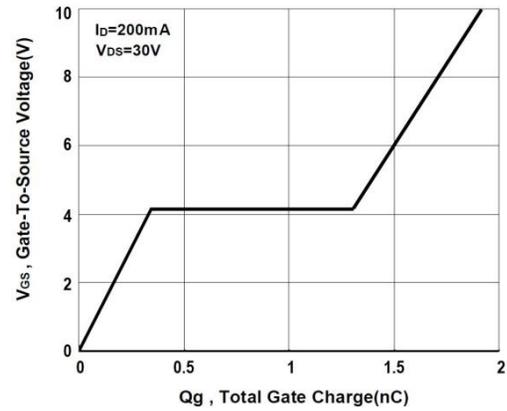


Fig.4 Gate-Charge Characteristics

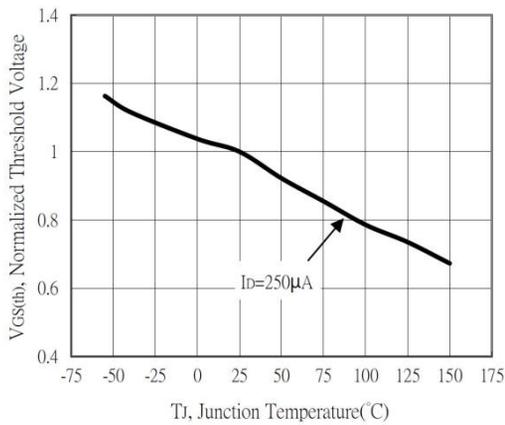


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

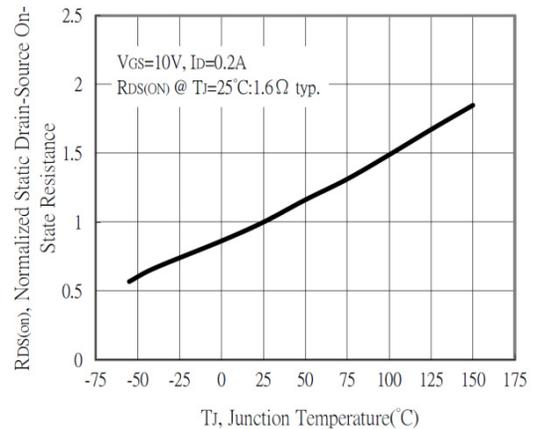


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

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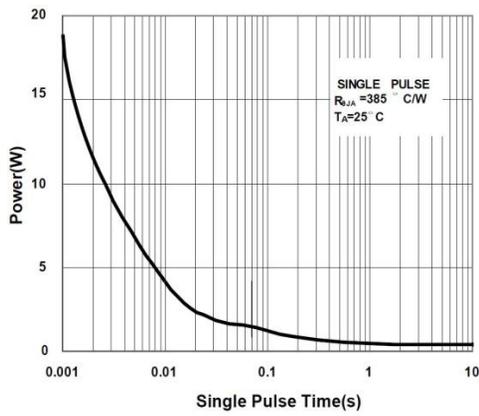


Fig.7 Single Pulse Max. Power Dissipation

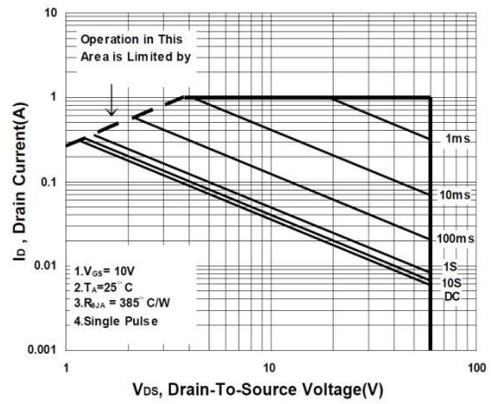


Fig.8 Safe Operating Area

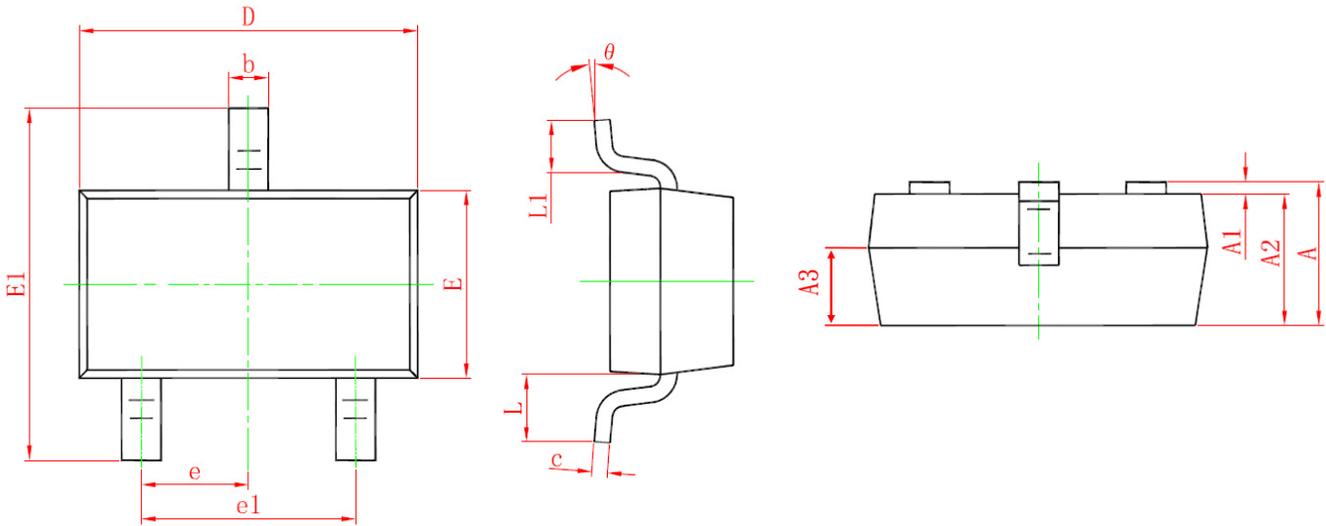
Fig.9 Normalized Maximum Transient Thermal Impedance

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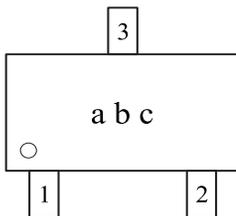
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■ SOT-23S dimension (3,000pcs/reel)



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