

# Single P-channel MOSFET

## ELM43401CA-S

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

### ■ General description

ELM43401CA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate threshold voltage.

### ■ Features

- $V_{ds} = -30V$
- $I_d = -4.3A$
- $R_{ds(on)} = 65m\Omega$  ( $V_{gs} = -10V$ )
- $R_{ds(on)} = 75m\Omega$  ( $V_{gs} = -4.5V$ )
- $R_{ds(on)} = 100m\Omega$  ( $V_{gs} = -2.5V$ )

### ■ Maximum absolute ratings

$T_a = 25^\circ C$ . Unless otherwise noted.

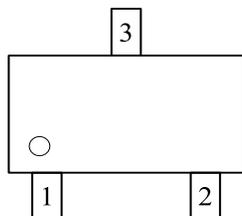
Parameter	Symbol	Limit	Unit	Note
Drain-source voltage	$V_{ds}$	-30	V	
Gate-source voltage	$V_{gs}$	$\pm 12$	V	
Continuous drain current	$I_d$	$T_a = 25^\circ C$	-4.3	A
		$T_a = 70^\circ C$	-3.6	
Pulsed drain current	$I_{dm}$	-20	A	2
Power dissipation	$P_d$	$T_c = 25^\circ C$	1.4	W
		$T_c = 70^\circ C$	0.9	
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-to-ambient	$R_{\theta ja}$	-	85	$^\circ C/W$	1
Thermal resistance junction-to-ambient		$t \leq 10s$	-	125	$^\circ C/W$

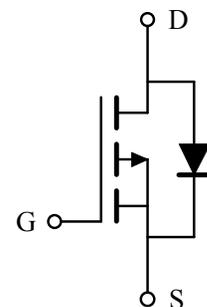
### ■ Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

### ■ Circuit



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### ■ Electrical characteristics

Ta=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	Vgs=0V, Id=-250μA	-30			V	
Zero gate voltage drain current	Idss	Vds=-24V, Vgs=0V			-1	μA	
		Vds=-24V, Vgs=0V, Ta=55°C			-5		
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA	-0.45		-1.20	V	
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-3.0A		55	65	mΩ	2
		Vgs=-4.5V, Id=-3.0A		65	75		
		Vgs=-2.5V, Id=-2.0A		85	100		
Forward transconductance	Gfs	Vds=-5V, Id=-3.0A		5.6		S	
Diode forward voltage	Vsd	Is=-1A, Vgs=0V			-1.2	V	2
Max. body-diode continuous current	Is	Vgs=Vds=0V, Force Current			-4.3	A	1, 4
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss	Vgs=0V, Vds=-15V, f=1MHz		920		pF	
Output capacitance	Coss			73		pF	
Reverse transfer capacitance	Crss			71		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge (-4.5V)	Qg	Vgs=-4.5V, Vds=-15V Id=-3.0A		11.9		nC	
Gate-source charge	Qgs			1.8		nC	
Gate-drain charge	Qgd			3.0		nC	
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-15V Id=-3.0A, Rgen=3.3Ω		6.6		ns	
Turn-on rise time	tr			27.8		ns	
Turn-off delay time	td(off)			46.2		ns	
Turn-off fall time	tf			20.6		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 Id and Idm, in real applications, should be limited by total power dissipation.

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## ■ Typical electrical and thermal characteristics

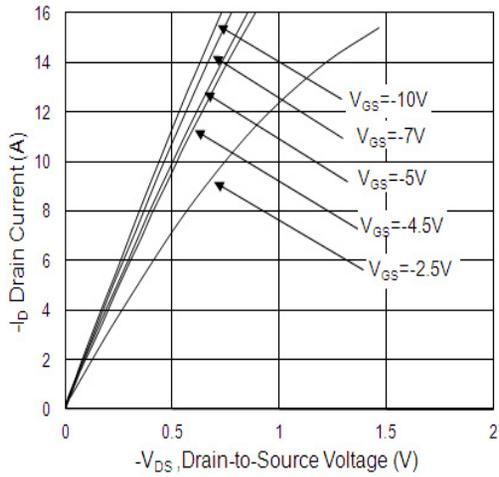


Fig.1 Typical Output Characteristics

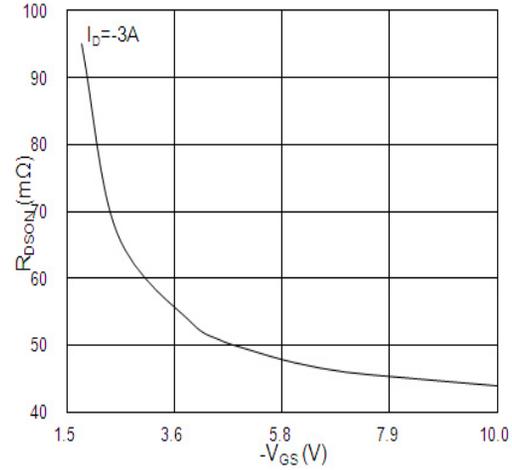


Fig.2 On-Resistance vs. G-S Voltage

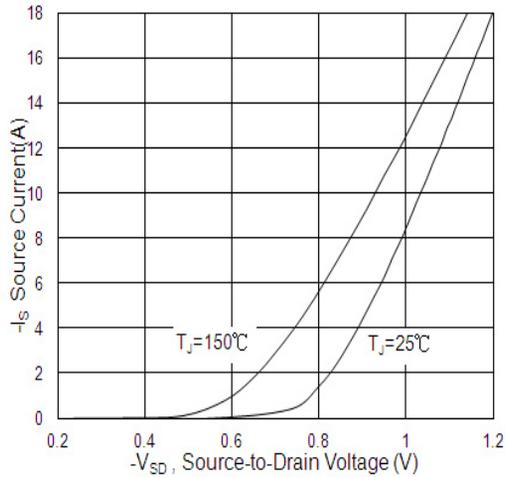


Fig.3 Source Drain Forward Characteristics

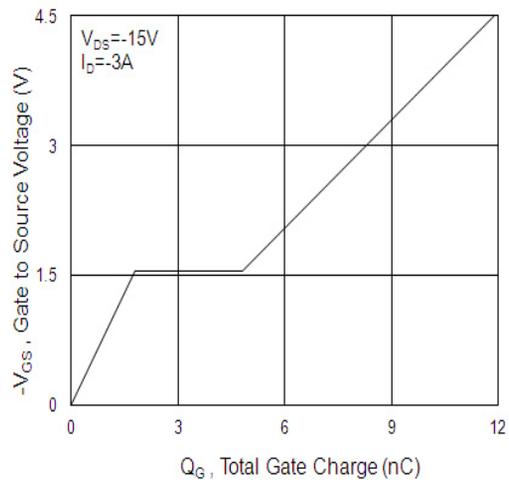


Fig.4 Gate-Charge Characteristics

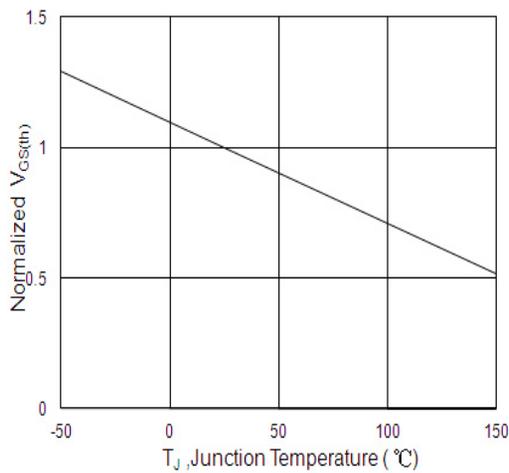


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

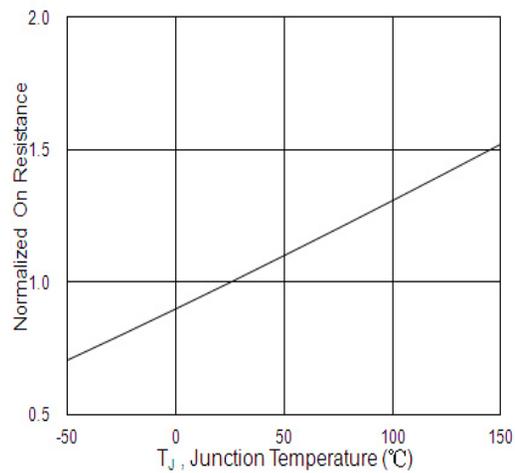


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

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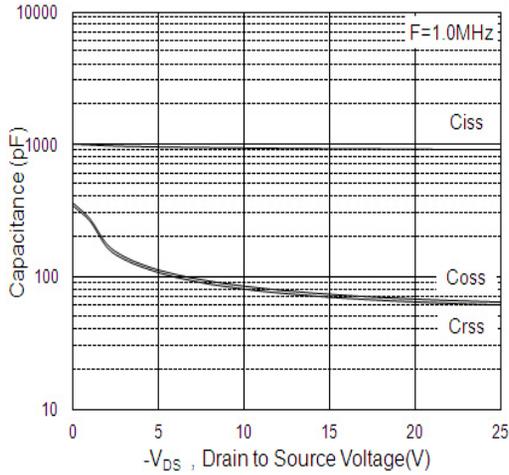


Fig.7 Capacitance

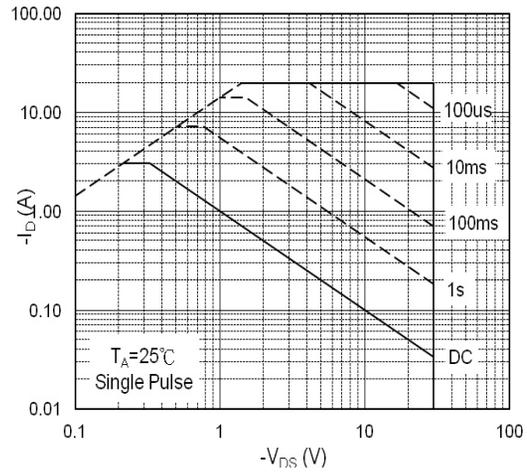


Fig.8 Safe Operating Area

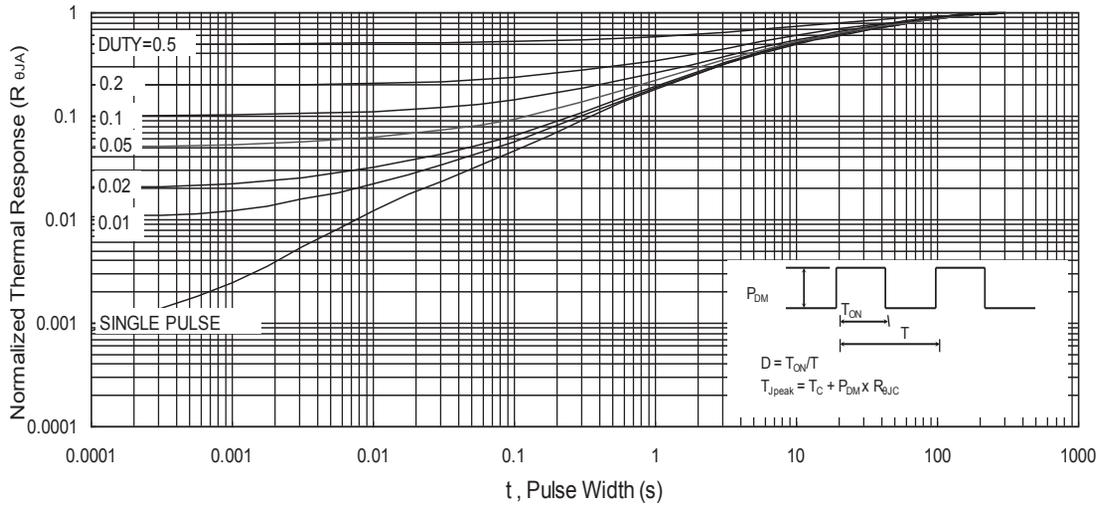


Fig.9 Normalized Maximum Transient Thermal Impedance

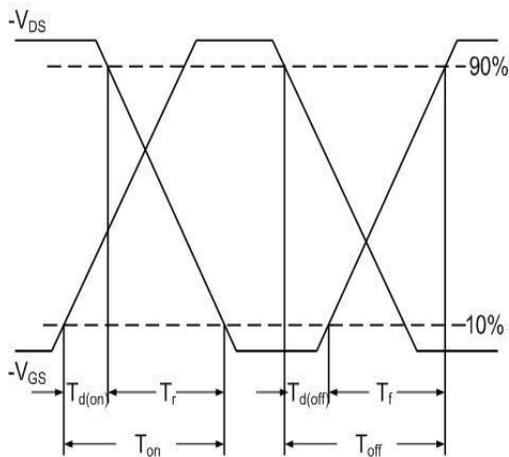


Fig.10 Switching Time Waveform

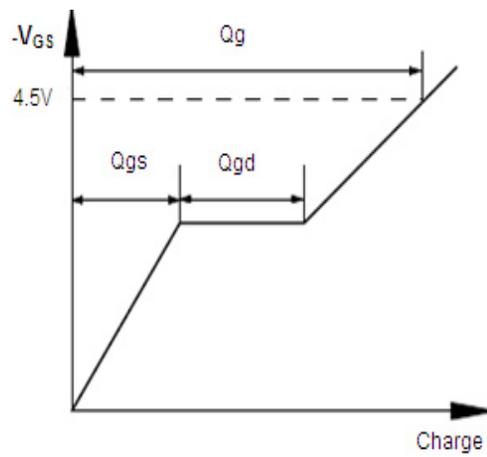


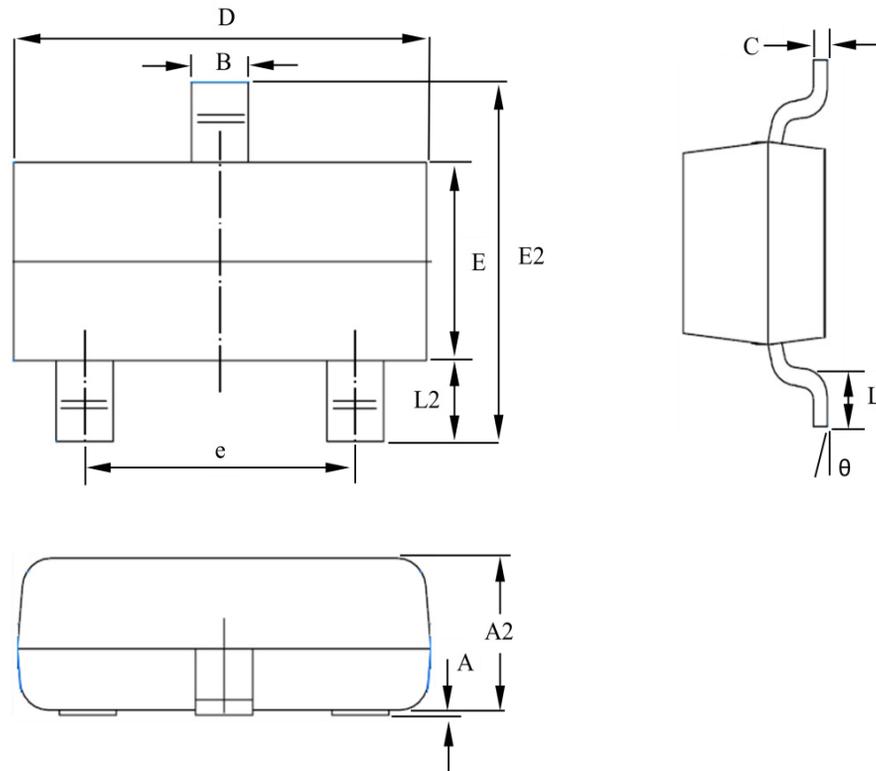
Fig.11 Gate Charge Waveform

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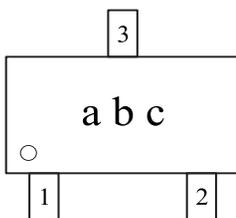
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■ SOT-23 dimension (3,000pcs/reel)



Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.00	0.10	0.000	0.004	E2	2.25	2.55	0.089	0.100
A2	0.90	1.10	0.035	0.041	L	0.30	0.50	0.012	0.020
B	0.30	0.50	0.012	0.020	L2	0.50	0.60	0.020	0.024
C	0.08	0.15	0.003	0.006	$\theta$	0°	8°	0°	8°
D	2.80	3.00	0.110	0.118	e	1.80	2.00	0.071	0.079
E	1.20	1.40	0.047	0.055					

## ■ 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