

# Single N-channel MOSFET

## ELM33410CA-S

### ■ General description

ELM33410CA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate resistance.

### ■ Features

- $V_{ds}=20V$
- $I_d=5A$
- $R_{ds(on)} < 32m\Omega$  ( $V_{gs}=4.5V$ )
- $R_{ds(on)} < 50m\Omega$  ( $V_{gs}=2.5V$ )
- $R_{ds(on)} < 80m\Omega$  ( $V_{gs}=1.8V$ )

### ■ Maximum absolute ratings

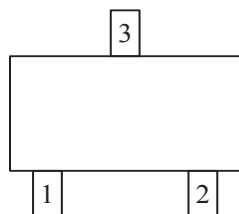
Parameter	Symbol	Limit	Unit	Note
Gate-source voltage	$V_{gs}$	$\pm 12$	V	
Continuous drain current	$I_d$	Ta=25°C	5	A
		Ta=70°C	4	
Pulsed drain current	$I_{dm}$	30	A	3
Power dissipation	$P_d$	Ta=25°C	1.25	W
		Ta=70°C	0.80	
Junction and storage temperature range	$T_j, T_{stg}$	-55 to 150	°C	

### ■ Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	Steady-state	$R\theta_{ja}$	75	100	°C/W	

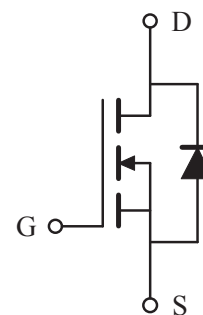
### ■ Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

### ■ Circuit



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### ■Electrical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	20			V	
Zero gate voltage drain current	Idss	Vds=16V, Vgs=0V			1	μA	
		Vds=16V, Vgs=0V, Tj=70°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	0.45	0.75	1.20	V	
On state drain current	Id(on)	Vgs=4.5V, Vds=5V	30			A	1
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=5A		27	32	mΩ	1
		Vgs=2.5V, Id=4A		38	50	mΩ	
		Vgs=1.8V, Id=2A		57	80	mΩ	
Forward transconductance	Gfs	Vds=5V, Id=5A		12		S	1
Diode forward voltage	Vsd	If=Is, Vgs=0V			1.3	V	1
Max. body-diode continuous current	Is				1.3	A	
Pulsed body-diode current	Ism				30	A	3
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss	Vgs=0V, Vds=10V, f=1MHz		740		pF	
Output capacitance	Coss			90		pF	
Reverse transfer capacitance	Crss			66		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg	Vgs=4.5V, Vds=10V, Id=5A		8.0	12.0	nC	2
Gate-source charge	Qgs			3.6		nC	2
Gate-drain charge	Qgd			2.0		nC	2
Turn-on delay time	td(on)	Vgs=4.5V, Vds=10V, Id≈1A Rgen=0.2Ω		8	14	ns	2
Turn-on rise time	tr			6	12	ns	2
Turn-off delay time	td(off)			19	45	ns	2
Turn-off fall time	tf			7	23	ns	2

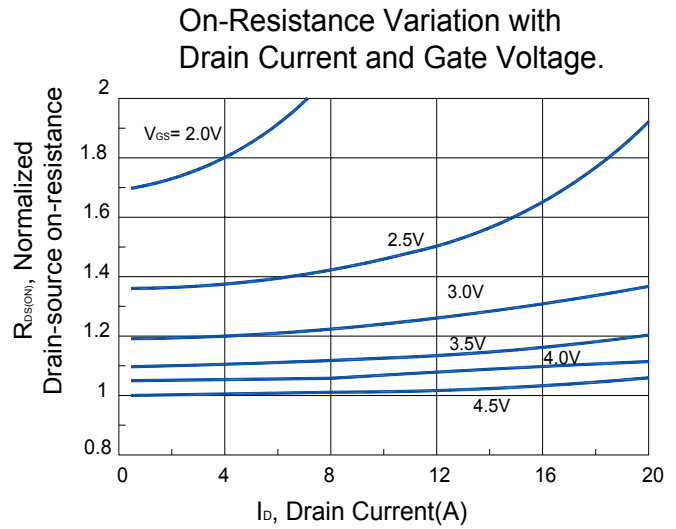
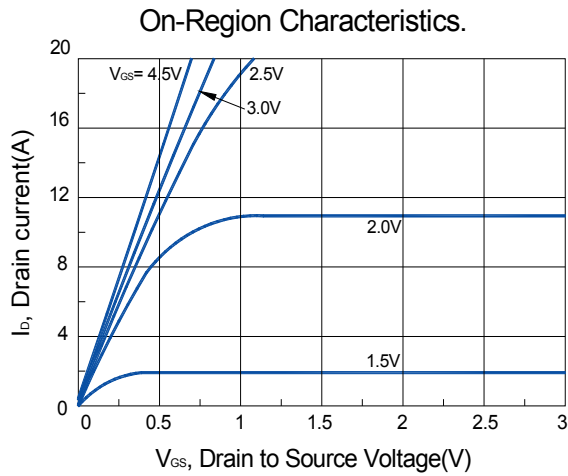
NOTE :

1. Pulse test : Pulsed width ≤ 300μsec and Duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.
4. Duty cycle ≤ 1%.

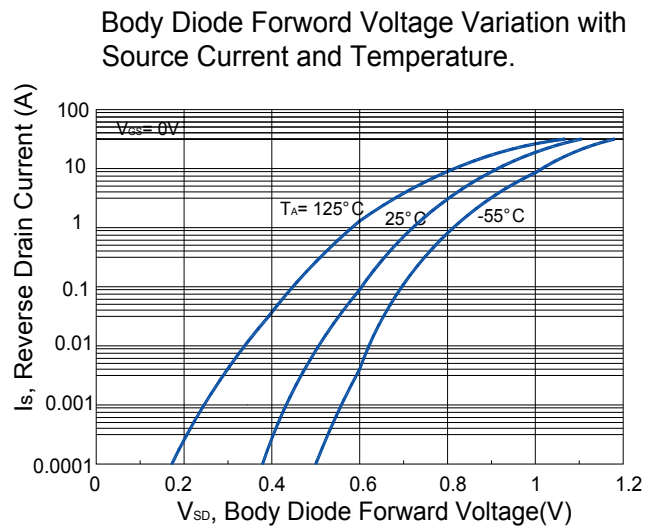
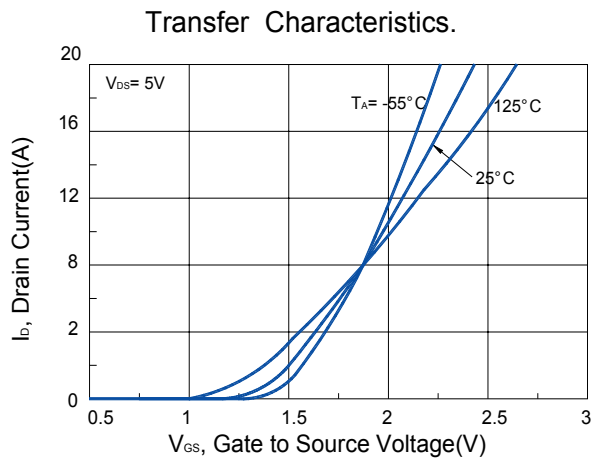
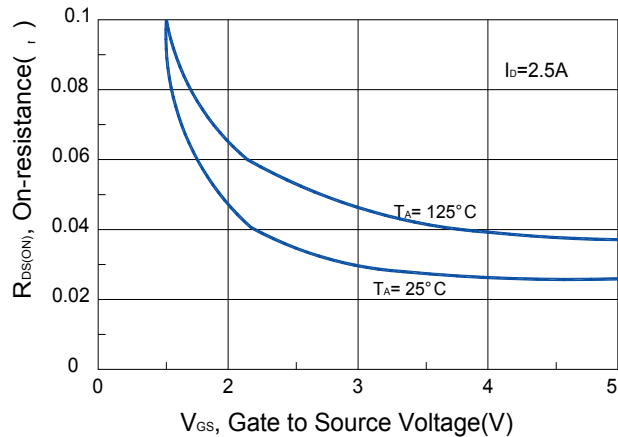
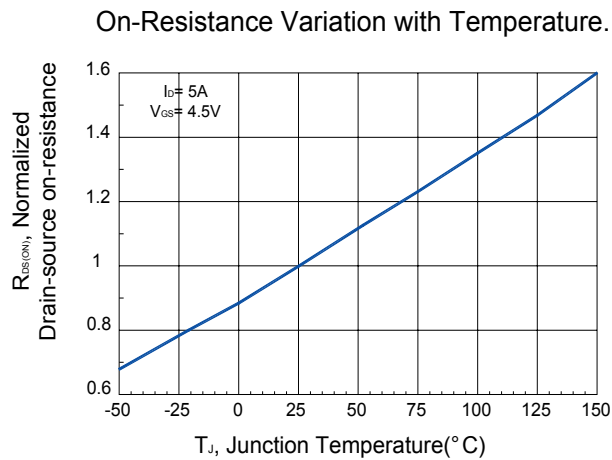
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### ■ Typical electrical and thermal characteristics



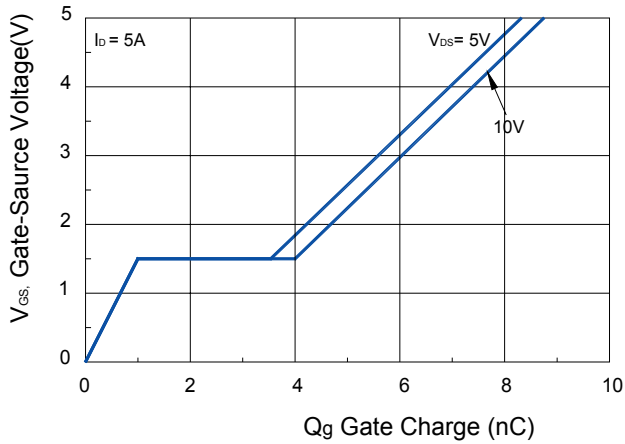
### On-Resistance Variation with Gate-to-Source Voltage.



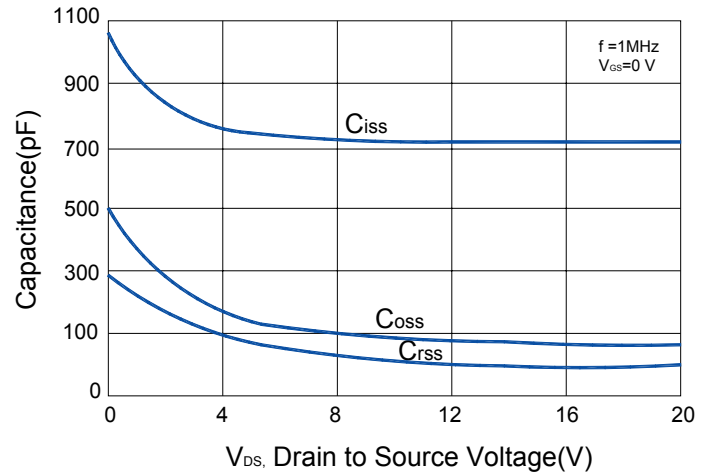
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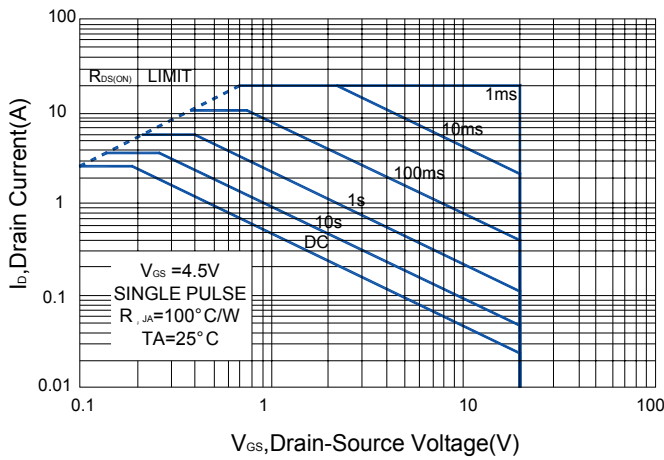
Gate-Charge Characteristics



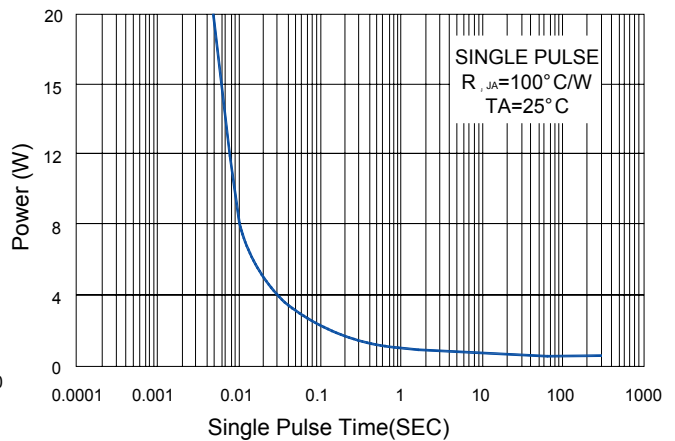
Capacitance Characteristics



Maximum Safe Operating Area.



Single Pulse Maximum Power Dissipation.



Transient Thermal Response Curve.

