

# Single N-channel MOSFET

## ELM33412CA-S

### ■ General description

ELM33412CA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate resistance.

### ■ Features

- $V_{ds}=20V$
- $I_d=6A$
- $R_{ds(on)} < 24m\Omega$  ( $V_{gs}=4.5V$ )
- $R_{ds(on)} < 32m\Omega$  ( $V_{gs}=2.5V$ )
- $R_{ds(on)} < 50m\Omega$  ( $V_{gs}=1.8V$ )

### ■ Maximum absolute ratings

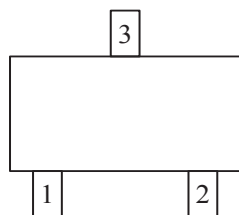
Parameter	Symbol	Limit	Unit	Note
Gate-source voltage	$V_{gs}$	$\pm 8$	V	
Continuous drain current	$I_d$	Ta=25°C	6	A
		Ta=70°C	5	
Pulsed drain current	$I_{dm}$	25	A	3
Avalanche current	$I_{as}$	21	A	
Avalanche energy	L=0.1mH	Eas	22	mJ
Power dissipation	$P_d$	Ta=25°C	1.0	W
		Ta=70°C	0.6	
Junction and storage temperature range	$T_j, T_{stg}$	-55 to 150	°C	

### ■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$R_{\theta ja}$		130	°C/W	

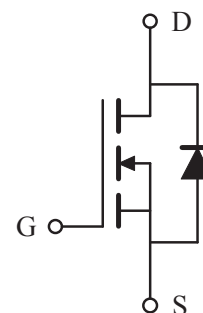
### ■ Pin configuration

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=10V, Vgs=0V, Tj=70°C			10		
Gate-body leakage current	Igss	Vds=0V, Vgs=±8V			±100	nA	
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	0.5	0.8	1.0	V	
On state drain current	Id(on)	Vgs=4.5V, Vds=10V	30			A	1
Static drain-source on-resistance	Rds(on)	Vgs=4.5V, Id=6A		18	24	mΩ	1
		Vgs=2.5V, Id=5A		21	32		
		Vgs=1.8V, Id=4A		29	50		
Forward transconductance	Gfs	Vds=5V, Id=6A		9		S	1
Diode forward voltage	Vsd	If=6A, Vgs=0V			1	V	1
Max. body-diode continuous current	Is				1.4	A	
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	Ciss			1030		pF	
Output capacitance	Coss	Vgs=0V, Vds=10V, f=1MHz		176		pF	
Reverse transfer capacitance	Crss			126		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Qg			13.2		nC	2
Gate-source charge	Qgs	Vgs=4.5V, Vds=10V, Id=6A		2.0		nC	2
Gate-drain charge	Qgd			4.0		nC	2
Turn-on delay time	td(on)			7		ns	2
Turn-on rise time	tr	Vgs=4.5V, Vds=10V, Id≈6A		13		ns	2
Turn-off delay time	td(off)		Rgen=6Ω		52		ns
Turn-off fall time	tf			16		ns	2
Body diode reverse recovery time	trr	If=6A, dl/dt=100A/μs		14.1		ns	
Body diode reverse recovery charge	Qrr			4.0		nC	

NOTE :

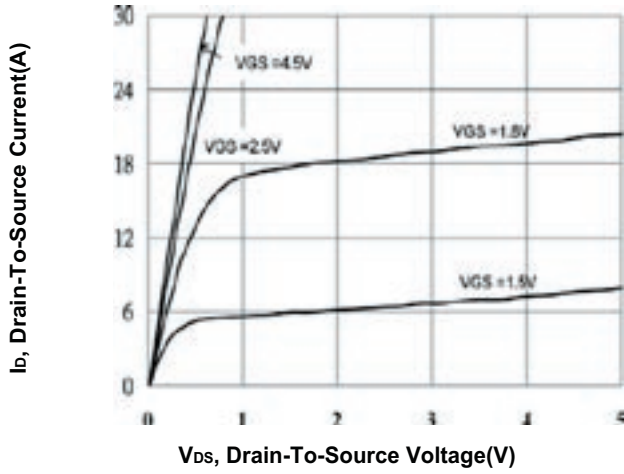
1. Pulse test : Pulsed width  $\leq 300\mu\text{sec}$  and Duty cycle  $\leq 2\%$ .
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.
4. Duty cycle  $\leq 1\%$ .

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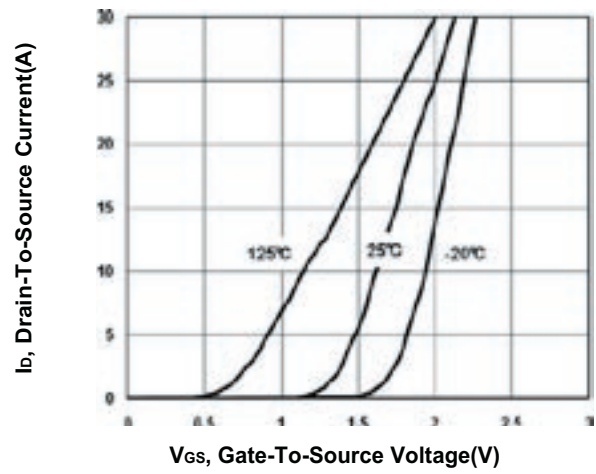
ELM33412CA-S

## ■ Typical electrical and thermal characteristics

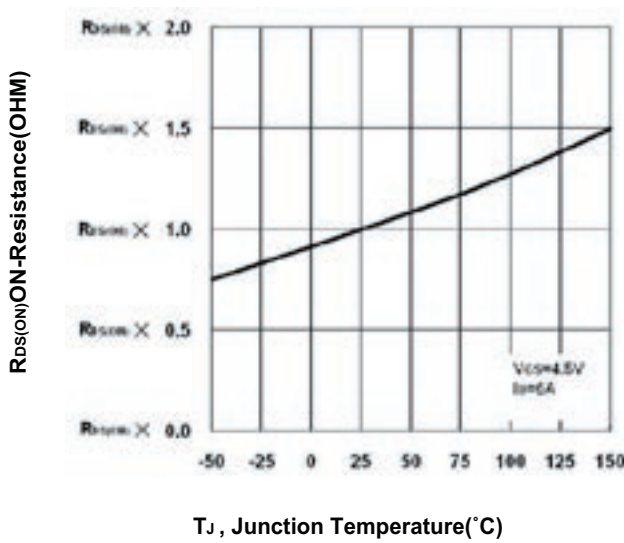
**Output Characteristics**



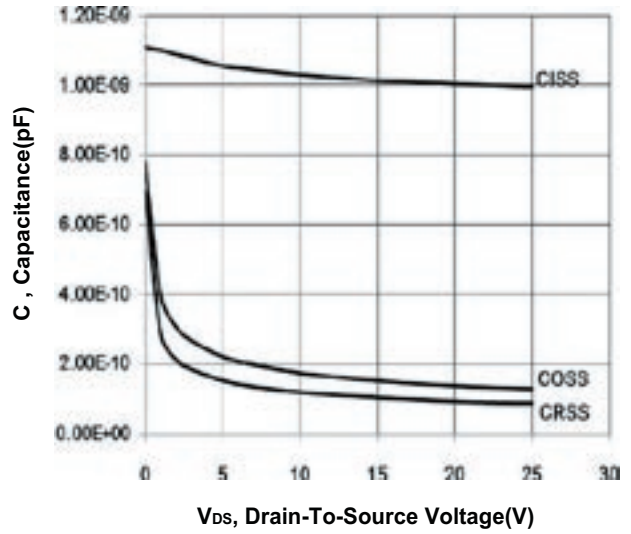
**Transfer Characteristics**



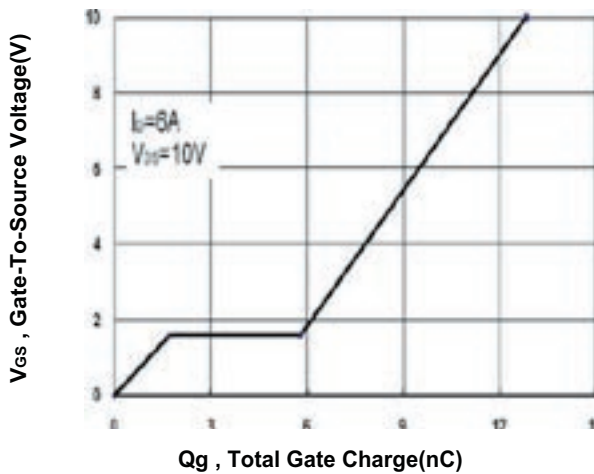
**On-Resistance VS Temperature**



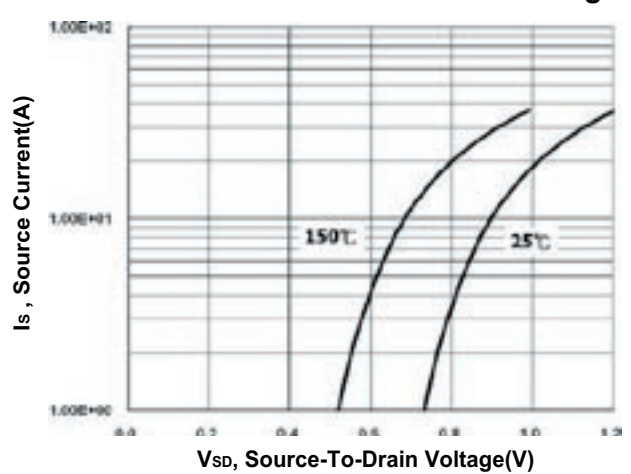
**Capacitance Characteristic**



**Gate charge Characteristics**



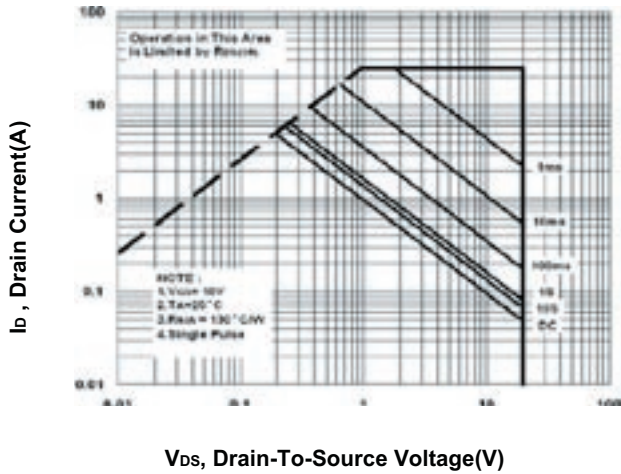
**Source-Drain Diode Forward Voltage**



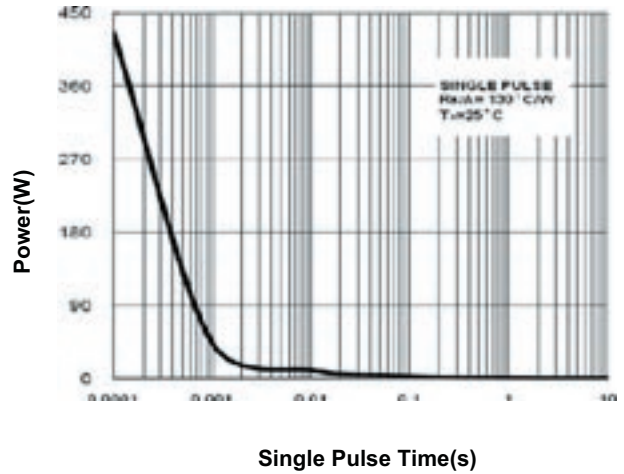
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## ELM33412CA-S

Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve

