

# Single P-channel MOSFET

ELM33407CA-S

## General description

ELM33407CA-S uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate resistance.

## Features

- $V_{ds} = -20V$
- $I_d = -3A$
- $R_{ds(on)} < 150m\Omega$  ( $V_{gs} = -4.5V$ )
- $R_{ds(on)} < 250m\Omega$  ( $V_{gs} = -2.5V$ )

## Maximum absolute ratings

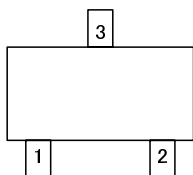
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	$V_{ds}$	-20	V		
Gate-source voltage	$V_{gs}$	$\pm 12$	V		
Continuous drain current	$I_d$	$T_a = 25^\circ C$	-3.0	A	
		$T_a = 70^\circ C$	-1.4		
Pulsed drain current	$I_{dm}$	-10	A	3	
Power dissipation	$P_d$	$T_a = 25^\circ C$	1.25	W	
		$T_a = 70^\circ C$	0.80		
Junction and storage temperature range	$T_j, T_{stg}$	-55 to 150	$^\circ C$		

## Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	Steady-state	$R_{\theta ja}$		166	$^\circ C/W$	

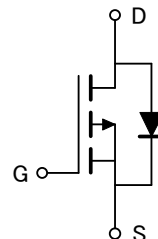
## Pin configuration

SOT-23 (TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

## Circuit



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### Electrical characteristics

T<sub>a</sub>=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
<b>STATIC PARAMETERS</b>							
Drain-source breakdown voltage	BV <sub>dss</sub>	V <sub>gs</sub> =0V, I <sub>d</sub> =-250μA	-20			V	
Zero gate voltage drain current	I <sub>dss</sub>	V <sub>ds</sub> =-16V, V <sub>gs</sub> =0V			-1	μA	
		V <sub>ds</sub> =-16V, V <sub>gs</sub> =0V, T <sub>j</sub> =125°C			-10		
Gate-body leakage current	I <sub>gss</sub>	V <sub>ds</sub> =0V, V <sub>gs</sub> =±12V			±100	nA	
Gate threshold voltage	V <sub>gs(th)</sub>	V <sub>ds</sub> =V <sub>gs</sub> , I <sub>d</sub> =-250μA	-0.5	-0.9	-1.2	V	
On state drain current	I <sub>d(on)</sub>	V <sub>gs</sub> =-4.5V, V <sub>ds</sub> =-5V	-6			A	1
Static drain-source on-resistance	R <sub>ds(on)</sub>	V <sub>gs</sub> =-4.5V, I <sub>d</sub> =-2A		100	150	mΩ	1
		V <sub>gs</sub> =-2.5V, I <sub>d</sub> =-1A		180	250	mΩ	
Forward transconductance	G <sub>fs</sub>	V <sub>ds</sub> =-5V, I <sub>d</sub> =-2A		16		S	1
Diode forward voltage	V <sub>sd</sub>	I <sub>s</sub> =-1A, V <sub>gs</sub> =0V			-1.2	V	1
Max. body-diode continuous current	I <sub>s</sub>				-1.6	A	
Pulsed body-diode current	I <sub>sm</sub>				-3	A	3
<b>DYNAMIC PARAMETERS</b>							
Input capacitance	C <sub>iss</sub>	V <sub>gs</sub> =0V, V <sub>ds</sub> =-6V, f=1MHz		410		pF	
Output capacitance	C <sub>oss</sub>			220		pF	
Reverse transfer capacitance	C <sub>rss</sub>			85		pF	
<b>SWITCHING PARAMETERS</b>							
Total gate charge	Q <sub>g</sub>	V <sub>gs</sub> =-4.5V, V <sub>ds</sub> =-10V I <sub>d</sub> =-2A		5.80	10.00	nC	2
Gate-source charge	Q <sub>gs</sub>			0.85		nC	2
Gate-drain charge	Q <sub>gd</sub>			1.70		nC	2
Turn-on delay time	t <sub>d(on)</sub>	V <sub>gs</sub> =-4.5V, V <sub>ds</sub> =-10V I <sub>d</sub> ≈ -1A, R <sub>gen</sub> =6Ω		13		ns	2
Turn-on rise time	t <sub>r</sub>			36		ns	2
Turn-off delay time	t <sub>d(off)</sub>			42		ns	2
Turn-off fall time	t <sub>f</sub>			34		ns	2

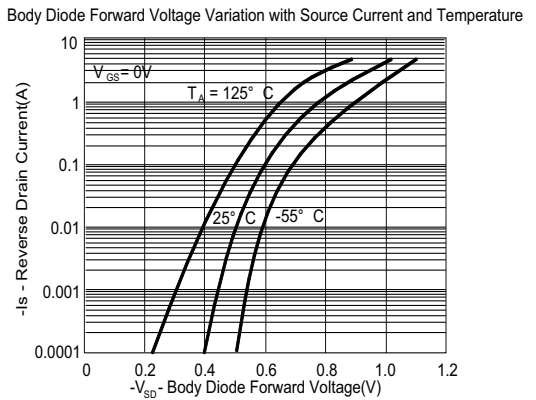
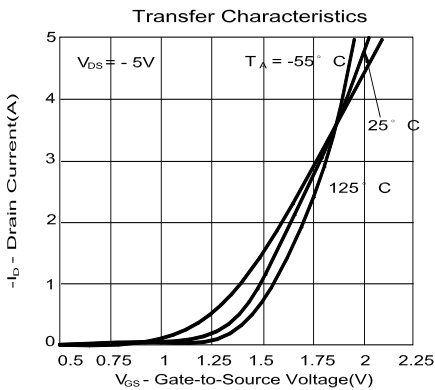
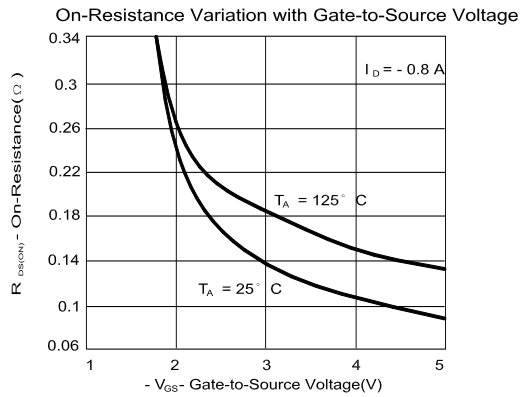
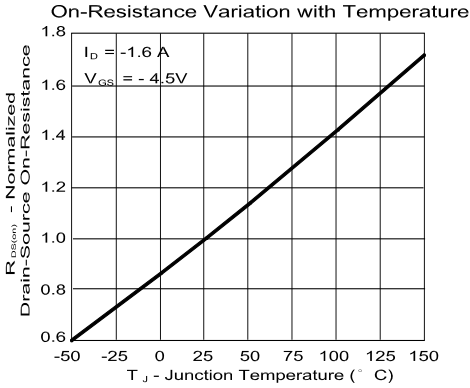
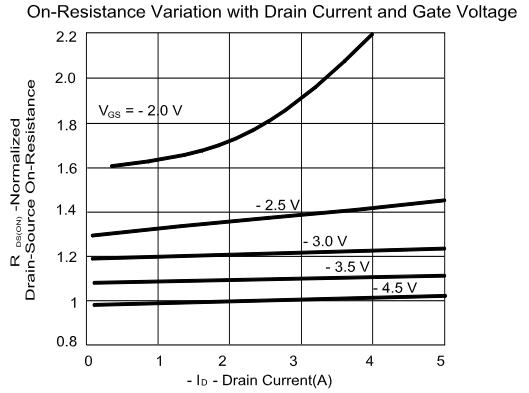
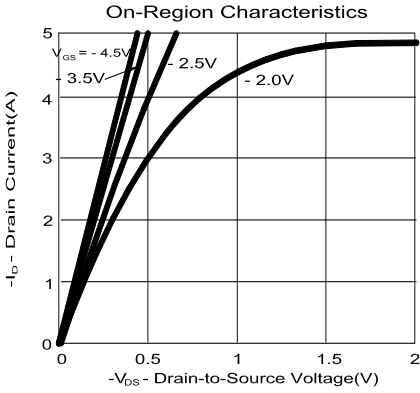
NOTE :

1. 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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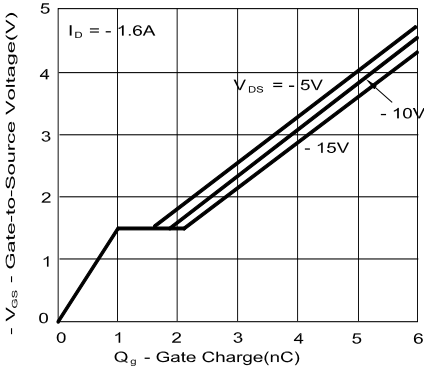
### Typical electrical and thermal characteristics



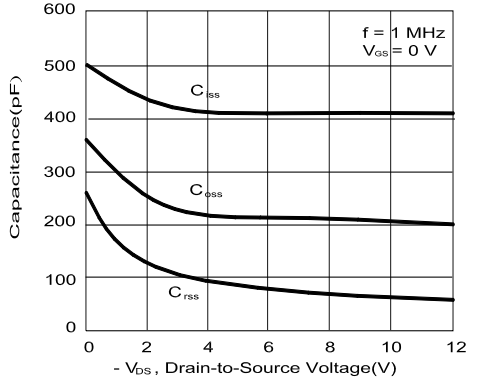
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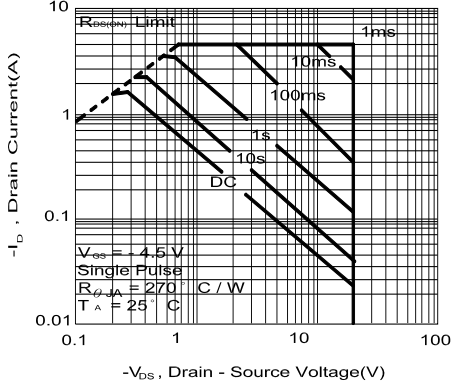
Gate Charge Characteristics



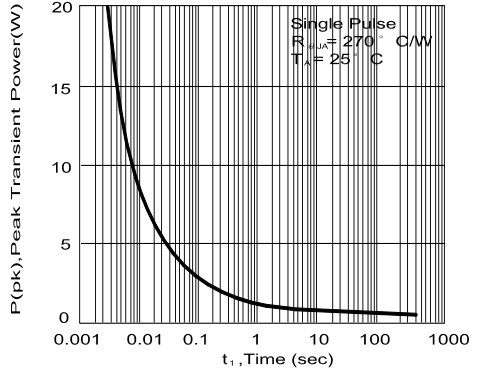
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve

