

Single N-channel MOSFET

ELM32402LA-S

■ General description

ELM32402LA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate resistance.

■ Features

- $V_{ds}=20V$
- $I_d=20A$
- $R_{ds(on)} < 50m\Omega$ ($V_{gs}=5V$)
- $R_{ds(on)} < 85m\Omega$ ($V_{gs}=2.5V$)

■ Maximum absolute ratings

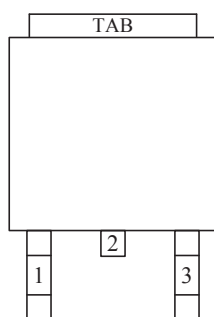
| Parameter | Symbol | Limit | Unit | Note |
|--|----------------|-------------------|------------|------|
| Gate-source voltage | V_{gs} | ± 16 | V | |
| Continuous drain current | I_d | $T_a=25^\circ C$ | 20 | A |
| | | $T_a=100^\circ C$ | 13 | |
| Pulsed drain current | I_{dm} | 40 | A | 3 |
| Power dissipation | P_d | $T_a=25^\circ C$ | 26 | W |
| | | $T_a=100^\circ C$ | 11 | |
| 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-case | Steady-state | $R_{\theta jc}$ | | 4.8 | $^\circ C/W$ | |
| Maximum junction-to-ambient | Steady-state | $R_{\theta ja}$ | | 110.0 | $^\circ C/W$ | |

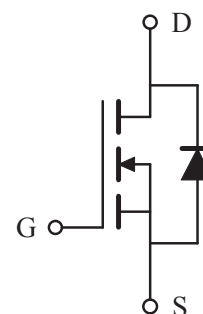
■ Pin configuration

TO-252-3(TOP VIEW)



| Pin No. | Pin name |
|---------|----------|
| 1 | GATE |
| 2 | DRAIN |
| 3 | SOURCE |

■ Circuit



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■Electrical characteristics

Ta=25°C

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|------------------------------------|---------|--|------|------|------|------|------|
| STATIC PARAMETERS | | | | | | | |
| Drain-source breakdown voltage | BVdss | Id=250μA, Vgs=0V | 20 | | | V | |
| Zero gate voltage drain current | Idss | Vds=16V, Vgs=0V | | | 1 | μA | |
| | | Vds=13.2V, Vgs=0V, Tj=125°C | | | 10 | | |
| Gate-body leakage current | Igss | Vds=0V, Vgs=±16V | | | ±100 | nA | |
| Gate threshold voltage | Vgs(th) | Vds=Vgs, Id=250μA | 0.45 | 0.75 | 1.00 | V | |
| On state drain current | Id(on) | Vgs=4.5V, Vds=10V | 20 | | | A | 1 |
| Static drain-source on-resistance | Rds(on) | Vgs=5V, Id=6A | | 37 | 50 | mΩ | 1 |
| | | Vgs=2.5V, Id=5A | | 55 | 85 | mΩ | |
| Forward transconductance | Gfs | Vds=10V, Id=6A | | 13 | | S | 1 |
| Diode forward voltage | Vsd | If=Is, Vgs=0V | | | 1.3 | V | 1 |
| Max. body-diode continuous current | Is | | | | 20 | A | |
| Pulsed body-diode current | Ism | | | | 40 | A | 3 |
| DYNAMIC PARAMETERS | | | | | | | |
| Input capacitance | Ciss | Vgs=0V, Vds=15V, f=1MHz | | 195 | | pF | |
| Output capacitance | Coss | | | 125 | | pF | |
| Reverse transfer capacitance | Crss | | | 50 | | pF | |
| SWITCHING PARAMETERS | | | | | | | |
| Total gate charge | Qg | Vgs=5V, Vds=10V, Id=10A | | 7.5 | | nC | 2 |
| Gate-source charge | Qgs | | | 0.9 | | nC | 2 |
| Gate-drain charge | Qgd | | | 4.0 | | nC | 2 |
| Turn-on delay time | td(on) | Vgs=5V, Vds=10V, Id≈1A Rl=1Ω, Rgen=3.3Ω | | 4.5 | | ns | 2 |
| Turn-on rise time | tr | | | 49.5 | | ns | 2 |
| Turn-off delay time | td(off) | | | 12.0 | | ns | 2 |
| Turn-off fall time | tf | | | 6.0 | | ns | 2 |

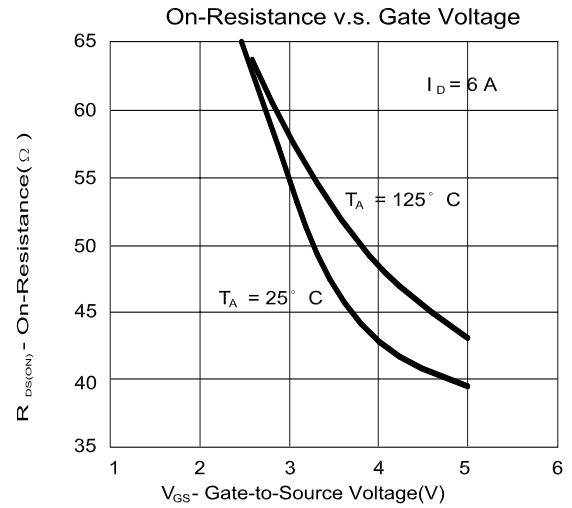
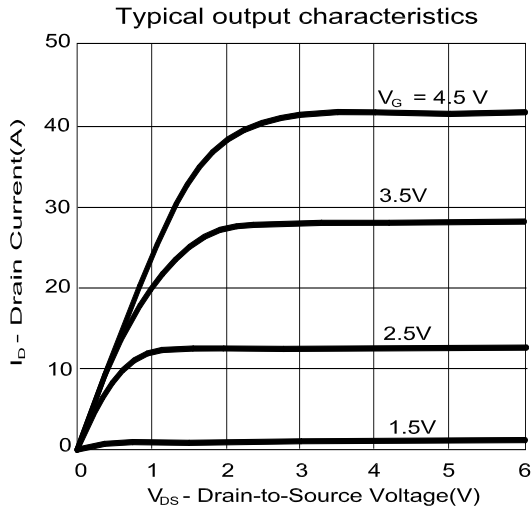
NOTE :

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 $\leq 1\%$.

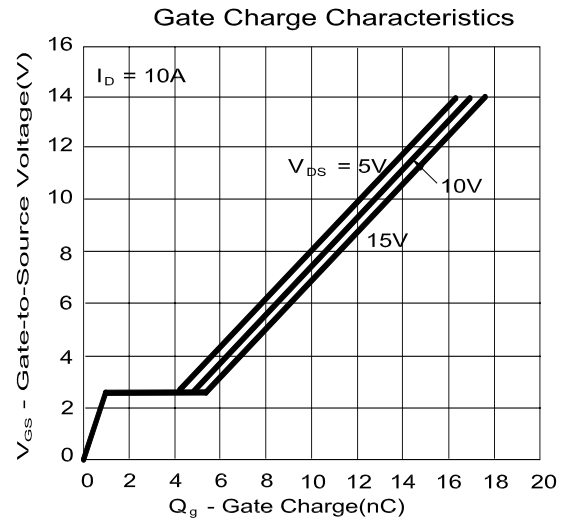
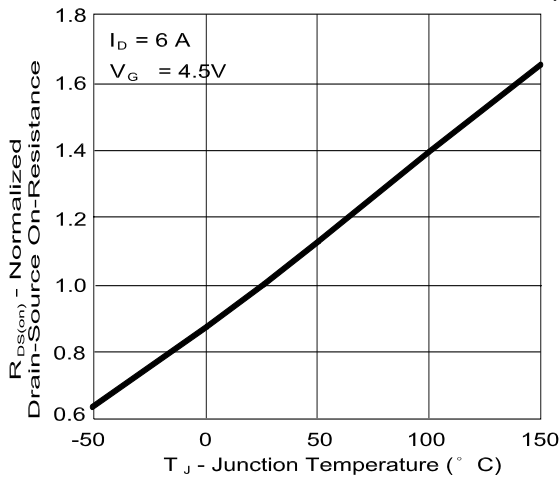
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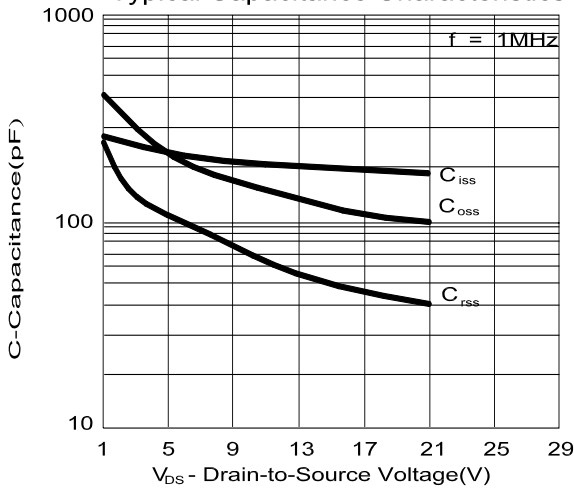
■ Typical electrical and thermal characteristics



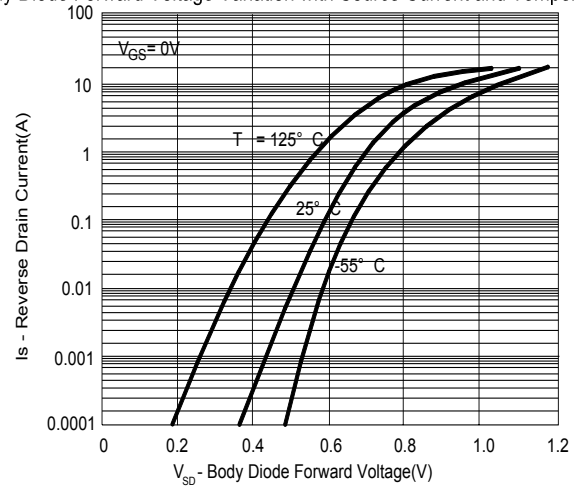
Normalized on-Resistance v.s. Junction Temperature



Typical Capacitance Characteristics



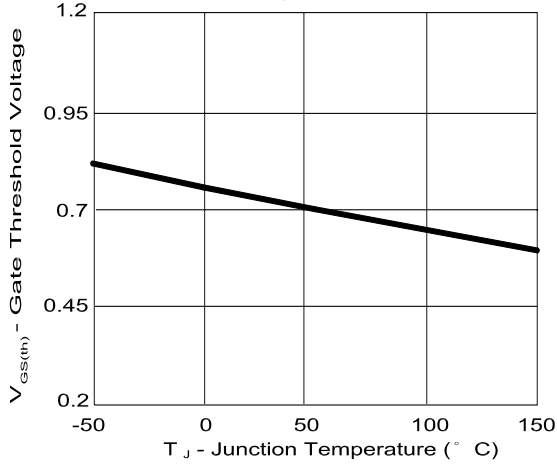
Body Diode Forward Voltage Variation with Source Current and Temperature



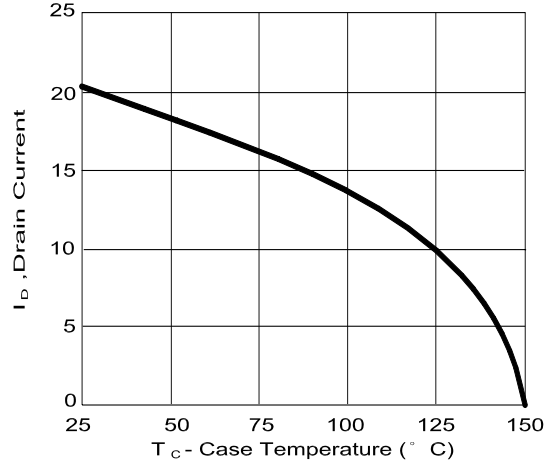
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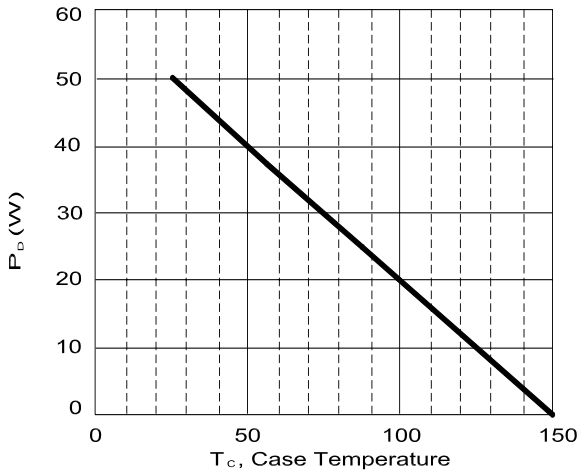
Gate Threshold Voltage v.s. Junction Temperature



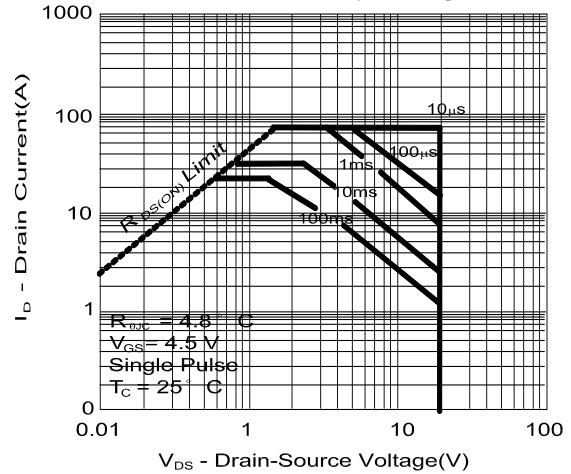
Maximum Drain Current v.s. Case Temperature



Typical Power Dissipation



Maximum Safe Operating Area



Effective Transient Thermal Impedance

