# Single N-channel MOSFET

## ELM32416LA-S

### ■General description

ELM32416LA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate resistance.

### ■Features

- Vds=25V
- Id=46A
- Rds(on) < 17mΩ (Vgs=10V)
- Rds(on) < 25mΩ (Vgs=7V)

### ■Maximum absolute ratings

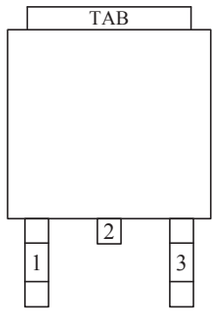
| Parameter | | Symbol | Limit | Unit | Note |
|---|---|---|---|---|---|
| Gate-source voltage | | Vgs | ±20 | V | |
| Continuous drain current | Ta=25°C | Id | 46 | A | |
| | Ta=100°C | | 28 | | |
| Pulsed drain current | | Idm | 140 | A | 3 |
| Avalanche current | | Iar | 20 | A | |
| Avalanche energy | L=0.1mH | Eas | 140 | mJ | |
| Repetitive avalanche energy | L=0.05mH | Ear | 5.6 | mJ | 4 |
| Power dissipation | Ta=25°C | Pd | 55 | W | |
| | Ta=100°C | | 33 | | |
| Junction and storage temperature range | | Tj, Tstg | -55 to 150 | °C | |

### ■Thermal characteristics

| Parameter | | Symbol | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|
| Maximum junction-to-case | Steady-state | Rθjc | | 3.0 | °C/W | |
| Maximum junction-to-ambient | Steady-state | Rθja | | 70.0 | °C/W | |
| Maximum case-to-heatsink | | Rθcs | 0.7 | | °C/W | |

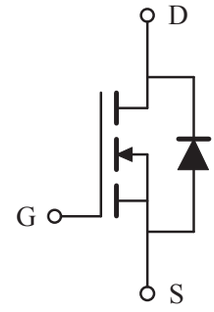
### ■Pin configuration

TO-252-3(TOP VIEW)




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

### ■Circuit



## ■Electrical characteristics

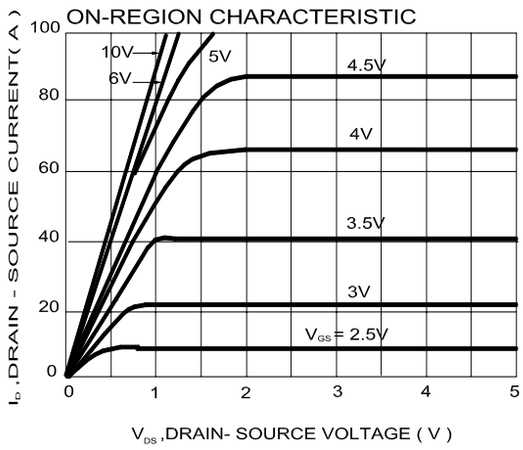
Ta=25°C

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| STATIC PARAMETERS | | | | | | | |
| Drain-source breakdown voltage | BVdss | Id=250μA, Vgs=0V | 25 | | | V | |
| Zero gate voltage drain current | Idss | Vds=20V, Vgs=0V | | | 25 | μA | |
| | | Vds=20V, Vgs=0V, Tj=125°C | | | 250 | | |
| Gate-body leakage current | Igss | Vds=0V, Vgs=±20V | | | ±250 | nA | |
| Gate threshold voltage | Vgs(th) | Vds=Vgs, Id=250μA | 0.8 | 1.2 | 2.5 | V | |
| On state drain current | Id(on) | Vgs=10V, Vds=10V | 45 | | | A | 1 |
| Static drain-source on-resistance | Rds(on) | Vgs=10V, Id=20A | | 14 | 17 | mΩ | 1 |
| | | Vgs=7V, Id=18A | | 18 | 25 | mΩ | |
| Forward transconductance | Gfs | Vds=15V, Id=30A | | 16 | | S | 1 |
| Diode forward voltage | Vsd | If=Is, Vgs=0V | | | 1.3 | V | 1 |
| Max. body-diode continuous current | Is | | | | 45 | A | |
| Pulsed body-diode current | Ism | | | | 150 | A | 3 |
| DYNAMIC PARAMETERS | | | | | | | |
| Input capacitance | Ciss | Vgs=0V, Vds=15V, f=1MHz | | 600 | | pF | |
| Output capacitance | Coss | | | 290 | | pF | |
| Reverse transfer capacitance | Crss | | | 100 | | pF | |
| SWITCHING PARAMETERS | | | | | | | |
| Total gate charge | Qg | Vgs=10V, Vds=12.5V Id=20A | | 25.0 | | nC | 2 |
| Gate-source charge | Qgs | | | 2.9 | | nC | 2 |
| Gate-drain charge | Qgd | | | 7.0 | | nC | 2 |
| Turn-on delay time | td(on) | Vgs=10V, Vds=15V, Id≈30A Rl=1Ω,Rgen=2.5Ω | | 7 | | ns | 2 |
| Turn-on rise time | tr | | | 7 | | ns | 2 |
| Turn-off delay time | td(off) | | | 24 | | ns | 2 |
| Turn-off fall time | tf | | | 6 | | ns | 2 |
| Body diode reverse recovery time | trr | If=Is, dI/dt=100A/μs | | 37 | | ns | |
| Peak reverse recovery current | Irm(rec) | | | 200 | | A | |
| Body diode reverse recovery charge | Qrr | | | 0.043 | | μC | |

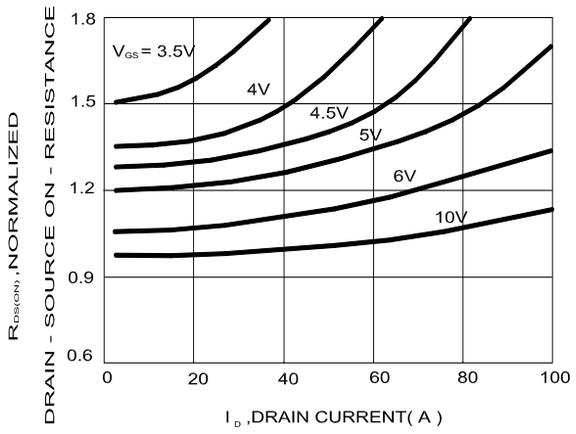
NOTE :
1. Pulse test : Pulsed width ≤ 300μsec and Duty cycle ≤ 2%.
2. Independent of operating temperature.
3. Pulsed width limited by maximum junction temperature.
4. Duty cycle ≤ 1%.

## ■Typical electrical and thermal characteristics

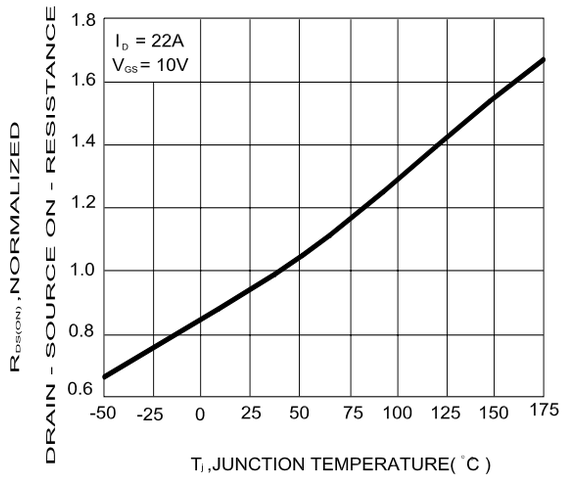
ON-REGION CHARACTERISTIC



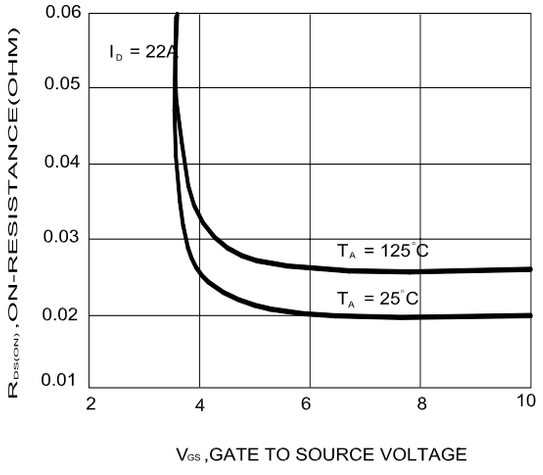

ON- RESISTANCE VARIATION WITH DRAIN CURRENT AND GATE



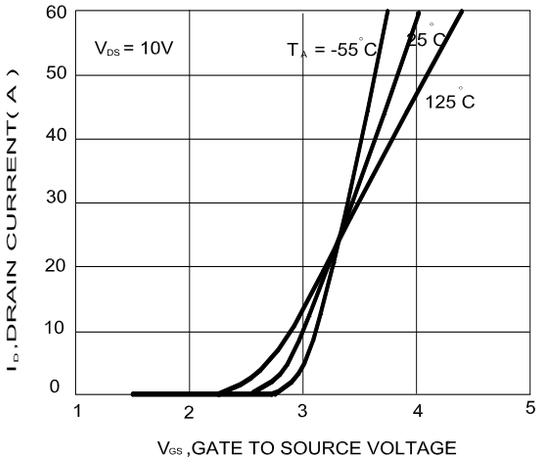

ON- RESISTANCE VARIATION WITH TEMPERATURE



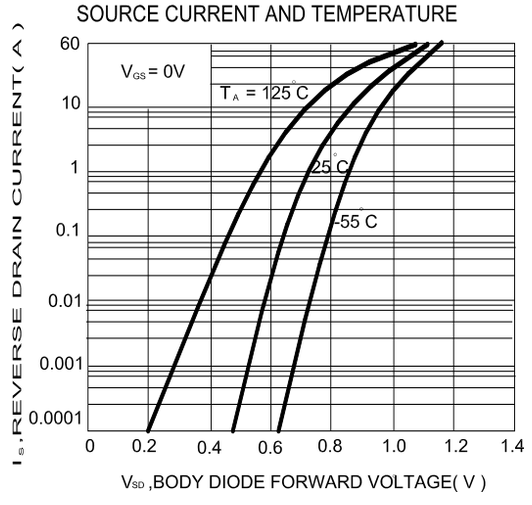

ON-RESISTANCE VARIATION WITH GATE-TO-SOURCE VOLTAGE



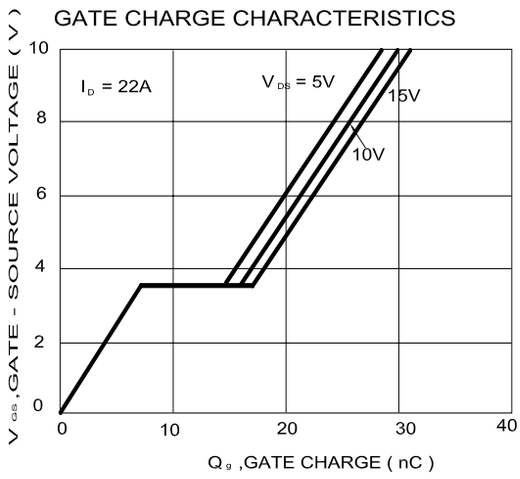

TRANSFER CHARACTERISTICS



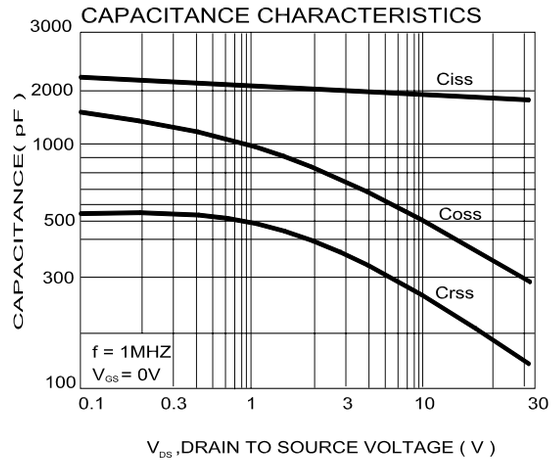

BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE



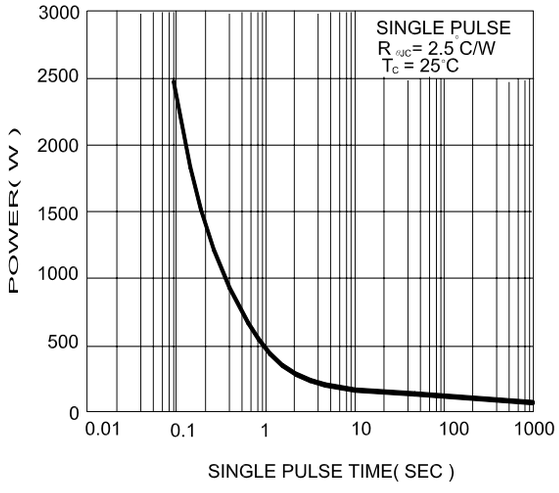
GATE CHARGE CHARACTERISTICS



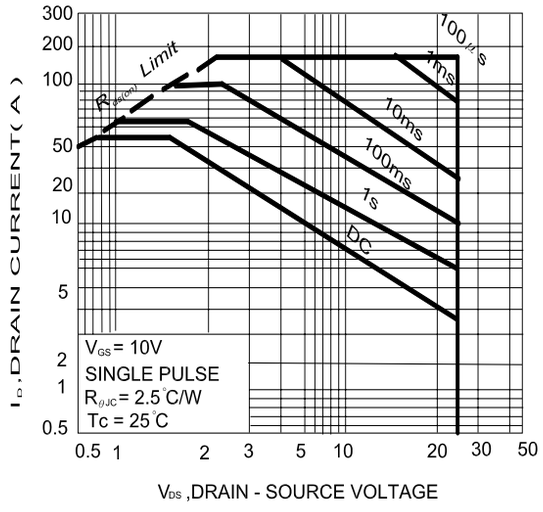

CAPACITANCE CHARACTERISTICS




SINGLEPULSE MAXIMUM POWER DISSIPATION




MAXIMUMSAFE OPERATINGAREA




TRANSIENT THERMAL RESPONSE CURVE