# Single N-channel MOSFET

## ELM4N6032AFDA-N



## ■General description

ELM4N6032AFDA-N uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate threshold voltage.

## ■Features

- Vds=60V
- Id=75A (Vgs=10V)
- Rds(on) = 8.5mΩ (Vgs=10V)

## ■Maximum absolute ratings

| Parameter | | Symbol | Limit | Unit | Note |
|---|---|---|---|---|---|
| Drain-source voltage | | Vds | 60 | V | |
| Gate-source voltage | | Vgs | ±20 | V | |
| Continuous drain current (Vgs=10V) | Tc=25°C | Id | 75 | A | 1 |
| | Tc=100°C | | 47 | | |
| Pulsed drain current | | Idm | 280 | A | 2 |
| Single pulsed avalanche energy | | Eas | 80 | mJ | 3 |
| Avalanche current | | Ias | 40 | A | |
| Total power dissipation | Tc=25°C | Pd | 41 | W | 4 |
| Storage temperature range | | Tstg | -55 to +150 | °C | |
| Operating junction temperature range | | Tj | -55 to +150 | °C | |

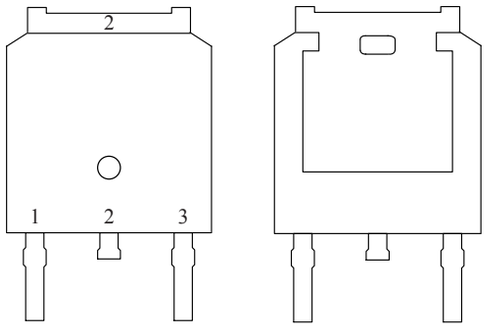
## ■Thermal characteristics

| Parameter | Symbol | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|
| Thermal resistance junction-ambient | Rθja | - | 62.0 | °C/W | 1 |
| Thermal resistance junction-case | Rθjc | - | 1.4 | | |

## ■Pin configuration

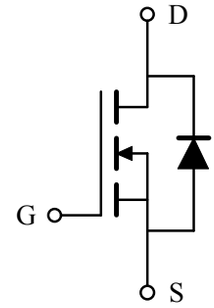
TO-252

(TOP VIEW) (BOTTOM VIEW)




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

## ■Circuit



## ■Electrical characteristics

Tj=25°C. Unless otherwise noted.

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Note |
|---|---|---|---|---|---|---|---|
| STATIC PARAMETERS | | | | | | | |
| Drain-source breakdown voltage | BVdss | Vgs=0V, Id=250μA | 60 | - | - | V | |
| Static drain-source on-resistance | Rds(on) | Vgs=10V, Id=20A | - | 7.1 | 8.5 | mΩ | 2 |
| Gate threshold voltage | Vgs(th) | Vgs=Vds, Id=250μA | 2.2 | - | 4.5 | V | |
| Drain-source leakage current | Idss | Vds=48V, Vgs=0V | - | - | 1 | μA | |
| | | Vds=48V, Vgs=0V, Tj=55°C | - | - | 5 | | |
| Gate-source leakage current | Igss | Vgs=±20V, Vds=0V | - | - | ±100 | nA | |
| Continuous source current | Is | Vgs=Vds=0V, Force current | - | - | 75 | A | 1, 5 |
| Diode forward voltage | Vsd | Vgs=0V, Is=1A | - | - | 1.2 | V | 2 |
| DYNAMIC PARAMETERS | | | | | | | |
| Input capacitance | Ciss | Vds=30V, Vgs=0V, f=1MHz | - | 3307 | - | pF | |
| Output capacitance | Coss | | - | 201 | - | pF | |
| Reverse transfer capacitance | Crss | | - | 151 | - | pF | |
| Gate resistance | Rg | Vds=0V, Vgs=0V, f=1MHz | - | 1.2 | - | Ω | |
| SWITCHING PARAMETERS | | | | | | | |
| Total gate charge (10V) | Qg | Vds=30V, Vgs=10V Id=18A | - | 57.0 | - | nC | |
| Gate-source charge | Qgs | | - | 8.7 | - | nC | |
| Gate-drain charge | Qgd | | - | 14.0 | - | nC | |
| Turn-on delay time | td(on) | Vds=30V, Vgs=10V Rgen=3.3Ω, Id=20A | - | 16.2 | - | ns | |
| Turn-on rise time | tr | | - | 41.2 | - | ns | |
| Turn-off delay time | td(off) | | - | 56.4 | - | ns | |
| Turn-off fall time | tf | | - | 16.2 | - | ns | |
| Reverse recovery time | trr | If=20A, di/dt=100A/μs | - | 22 | - | nS | |
| Reverse recovery charge | Qrr | | - | 72 | - | nC | |

NOTE :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs and duty cycle ≤ 2%.
3. The Eas data shows Max. rating . The test condition is Vds=50V, Vgs=10V, L=0.1mH, Ias=40A.
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as Id and Idm, in real applications, should be limited by total power dissipation.

## ■Typical characteristics

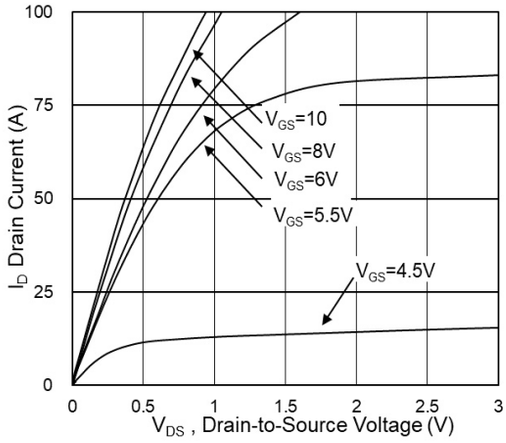



Fig.1 Typical Output Characteristics

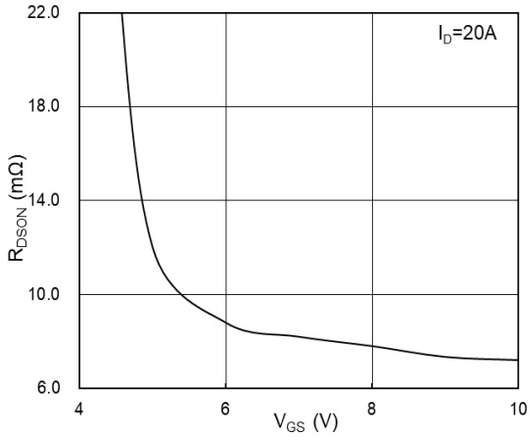



Fig.2 On-Resistance vs G-S Voltage

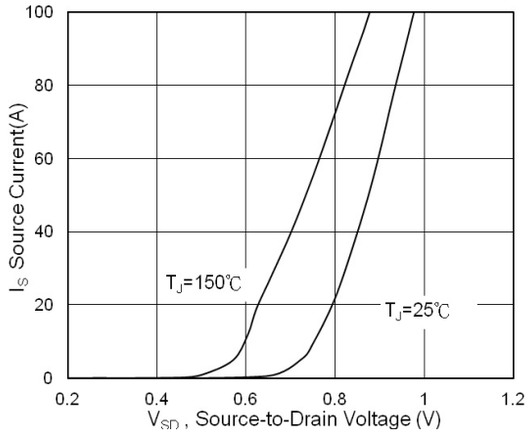



Fig.3 Source Drain Forward Characteristics

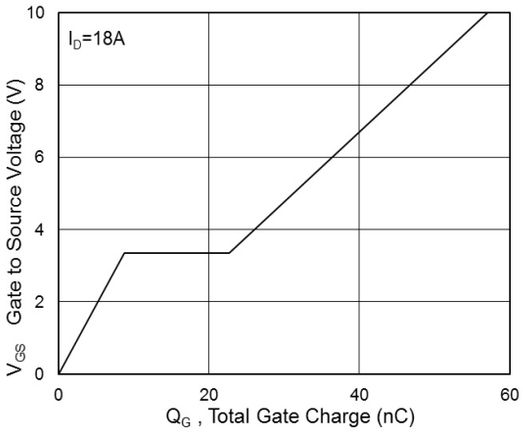



Fig.4 Gate-Charge Characteristics

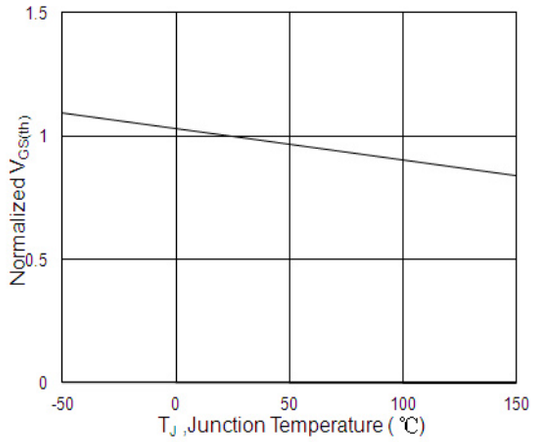



Fig.5 Normalized $V_{GS(th)}$ vs $T_J$

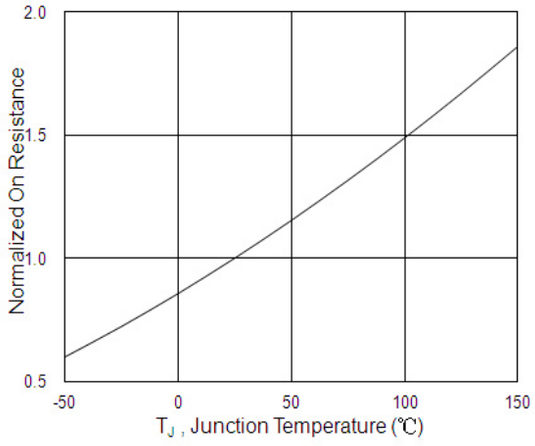



Fig.6 Normalized $R_{DSON}$ vs $T_J$

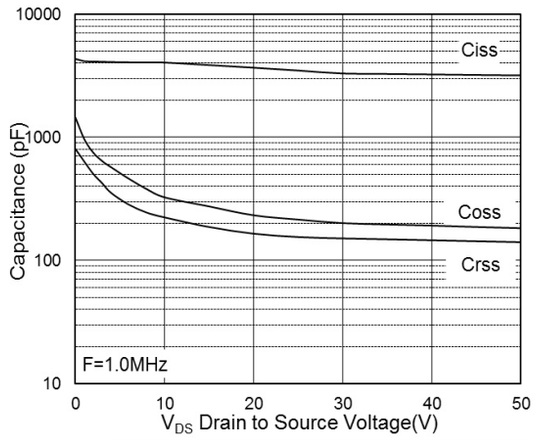



Fig.7 Capacitance

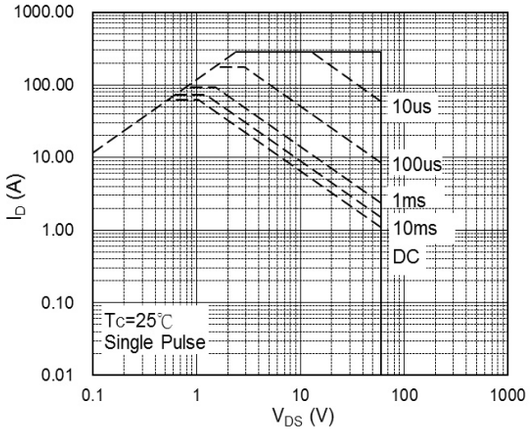



Fig.8 Safe Operating Area

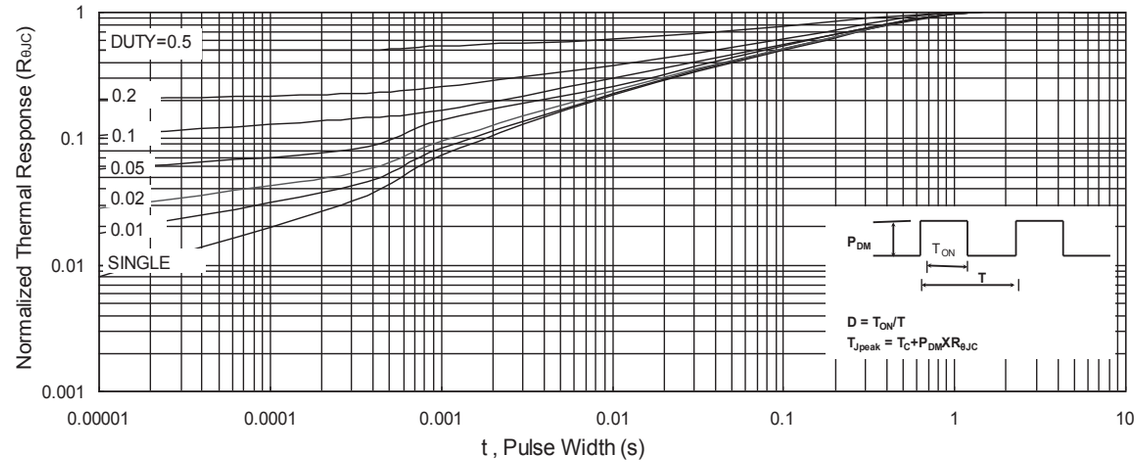



Fig.9 Normalized Maximum Transient Thermal Impedance

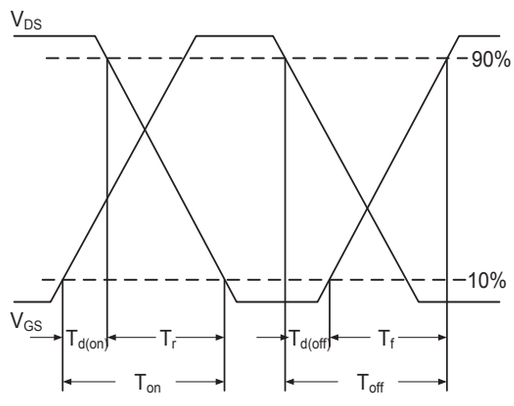



Fig.10 Switching Time Waveform

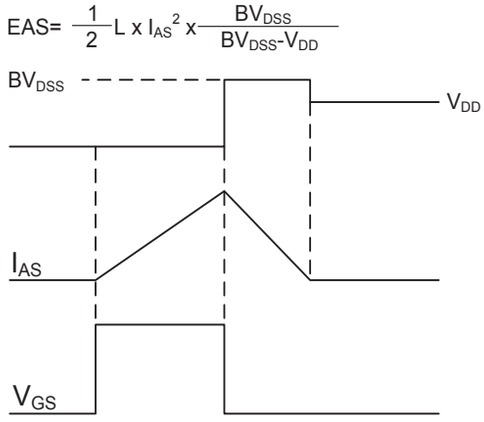
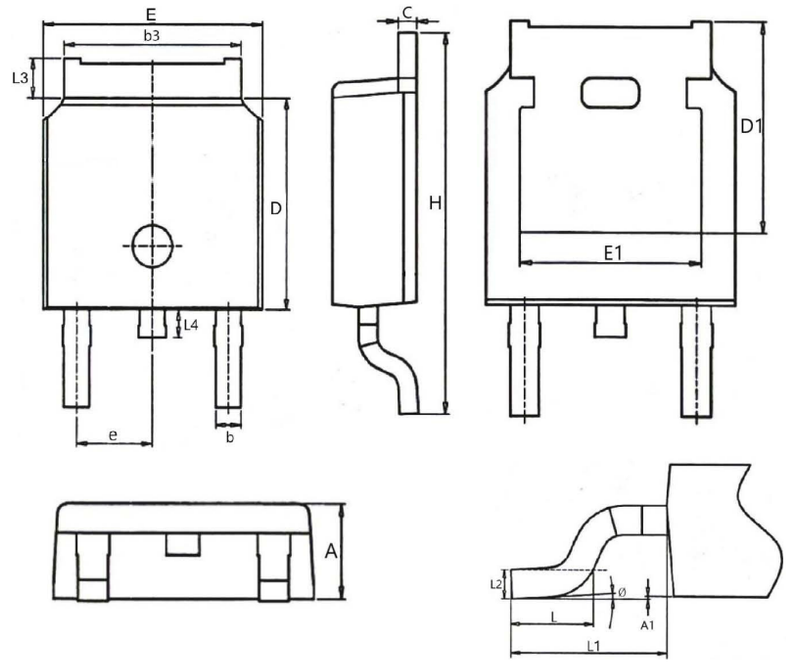


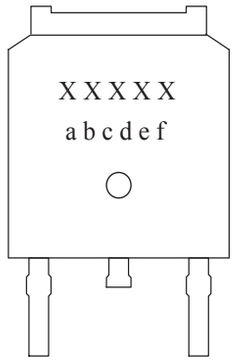

Fig.11 Unclamped Inductive Switching Waveform

## ■TO-252 dimension (2,500pcs/reel)




| Symbols | Millimeters | | Inches | | Symbols | Millimeters | | Inches | |
|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | Min. | Max. | | Min. | Max. | Min. | Max. |
| A | 2.18 | 2.40 | 0.086 | 0.095 | e | 2.286BSC | | 0.09BSC | |
| A1 | --- | 0.20 | --- | 0.008 | H | 9.40 | 10.50 | 0.370 | 0.413 |
| b | 0.68 | 0.90 | 0.026 | 0.036 | L | 1.38 | 1.78 | 0.054 | 0.070 |
| b3 | 4.95 | 5.46 | 0.194 | 0.215 | L1 | 2.90REF | | 0.114REF | |
| c | 0.43 | 0.89 | 0.017 | 0.035 | L2 | 0.51BSC | | 0.020BSC | |
| D | 5.97 | 6.22 | 0.235 | 0.245 | L3 | 0.88 | 1.28 | 0.034 | 0.050 |
| D1 | 5.300REF | | 0.209REF | | L4 | 0.50 | 1.00 | 0.019 | 0.039 |
| E | 6.35 | 6.73 | 0.250 | 0.265 | θ | 0° | 8° | 0° | 8° |
| E1 | 4.32 | --- | 0.170 | --- | | | | | |

## ■Marking




| Symbols | Content |
|---|---|
| xxxxx | Product code |
| a | Yearly code: 2019=K, 2020=L, 2021=M... |
| b, c | Weekly code: 01 to 53 |
| d, e | Sequence: 01 to 99 or 0A to 0Z |
| f | Assembly code: A to Z (I, O excepted) |