

Single N-channel MOSFET

ELM4N8048FDA-N

<http://www.elm-tech.com>

■ General description

ELM4N8048FDA-N uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds}=80V$
- $I_d=48A$ ($V_{gs}=10V$)
- $R_{ds(on)} = 6.5m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} = 8.5m\Omega$ ($V_{gs}=4.5V$)

■ Maximum absolute ratings

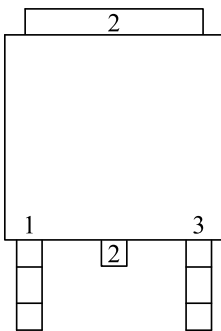
| Parameter | Symbol | Limit | Unit | Note | |
|--|----------|-------------------|------------|------|------|
| Drain-source voltage | V_{ds} | 80 | V | | |
| Gate-source voltage | V_{gs} | ± 20 | V | | |
| Continuous drain current ($V_{gs}=10V$) | I_d | $T_c=25^\circ C$ | 48.0 | A | 1, 6 |
| | | $T_c=100^\circ C$ | 42.5 | | |
| Pulsed drain current | I_{dm} | 170 | A | 2 | |
| Single pulse avalanche energy | E_{as} | 57.8 | mJ | 3 | |
| Avalanche current | I_{as} | 34 | A | | |
| Power dissipation | P_d | $T_c=25^\circ C$ | 56 | W | 4 |
| Storage temperature range | | | | | |
| Operating junction temperature range | T_j | -55 to 150 | $^\circ C$ | | |

■ Thermal characteristics

| Parameter | Symbol | Typ. | Max. | Unit | Note |
|--|-----------------|------|------|--------------|------|
| Thermal resistance junction-ambient | $R_{\theta ja}$ | - | 62.0 | $^\circ C/W$ | 1 |
| Thermal resistance junction-case ambient | $R_{\theta jc}$ | - | 2.2 | $^\circ C/W$ | 1 |

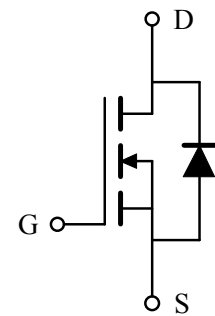
■ Pin configuration

TO-252(TOP VIEW)



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

■ Circuit



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■ Electrical characteristics

T_j=25°C. Unless otherwise noted.

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit | Note | |
|------------------------------------|---------------------|---|----------------------|------|------|------|------|--|
| STATIC PARAMETERS | | | | | | | | |
| Drain-source breakdown voltage | BV _{dss} | V _{gs} =0V, I _d =250μA | 80 | - | - | V | | |
| Drain-source leakage current | I _{dss} | V _{ds} =64V, V _{gs} =0V | - | - | 1 | μA | | |
| | | V _{ds} =64V, V _{gs} =0V, T _j =55°C | - | - | 5 | | | |
| Gate-body leakage current | I _{gss} | V _{gs} =±20V, V _{ds} =0V | - | - | ±100 | nA | | |
| Gate threshold voltage | V _{gs(th)} | V _{ds} =V _{gs} , I _d =250μA | 1.2 | - | 2.3 | V | | |
| Static drain-source on-resistance | R _{ds(on)} | V _{gs} =10V, I _d =20A | - | 4.3 | 6.5 | mΩ | 2 | |
| | | V _{gs} =4.5V, I _d =20A | - | 6.3 | 8.5 | | | |
| Forward transconductance | G _{fs} | V _{ds} =5V, I _d =20A | - | 75 | - | S | | |
| Diode forward voltage | V _{sd} | V _{gs} =0V, I _s =1A | - | 0.77 | 1.00 | V | 2 | |
| Max. body-diode continuous current | I _s | V _{gs} =V _{ds} =0V, Force current | - | - | 48 | A | 1, 5 | |
| DYNAMIC PARAMETERS | | | | | | | | |
| Input capacitance | C _{iss} | V _{ds} =40V, V _{gs} =0V, f=1MHz | - | 2860 | - | pF | | |
| Output capacitance | C _{oss} | | - | 410 | - | pF | | |
| Reverse transfer capacitance | C _{rss} | | - | 38 | - | pF | | |
| Gate resistance | R _g | V _{ds} =0V, V _{gs} =0V, f=1MHz | - | 0.5 | - | Ω | | |
| SWITCHING PARAMETERS | | | | | | | | |
| Total gate charge (10V) | Q _g | V _{ds} =40V, V _{gs} =10V, I _d =20A | - | 40.0 | - | nC | | |
| Gate-source charge | Q _{gs} | | - | 7.2 | - | nC | | |
| Gate-drain charge | Q _{gd} | | - | 6.5 | - | nC | | |
| Turn-on delay time | t _{d(on)} | V _{ds} =40V, V _{gs} =10V, I _d =20A | - | 8.3 | - | ns | | |
| Turn-on rise time | t _r | | - | 4.2 | - | ns | | |
| Turn-off delay time | t _{d(off)} | | R _{gen} =3Ω | - | 36.0 | - | ns | |
| Turn-off fall time | t _f | | - | 6.9 | - | ns | | |
| Reverse recovery time | t _{rr} | I _f =20A, di/dt=100A/μs | - | 27 | - | nS | | |
| Reverse recovery charge | Q _{rr} | | - | 89 | - | 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 ≤ 300us , duty cycle ≤ 2%.
3. The Eas data shows Max. rating . The test condition is V_{dd}=25V, V_{gs}=10V, L=0.1mH, I_{as}=34A
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as I_d and I_{dm}, in real applications, should be limited by total power dissipation.
6. The maximum current rating is package limited.

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■ Typical characteristics

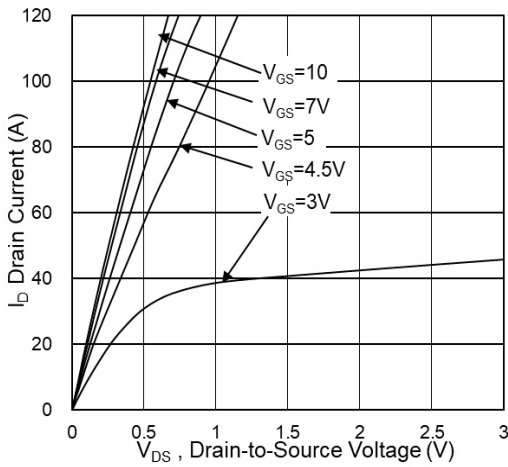


Fig.1 Typical Output Characteristics

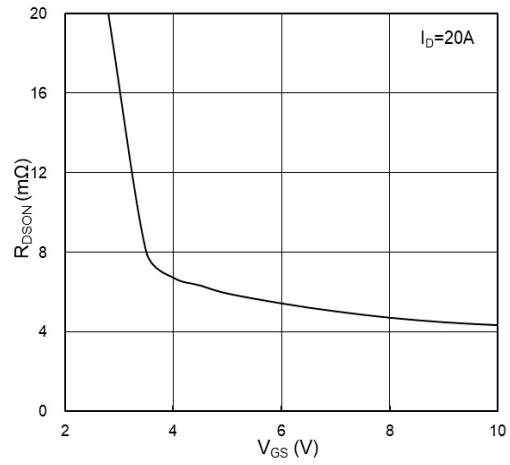


Fig.2 On-Resistance vs G-S Voltage

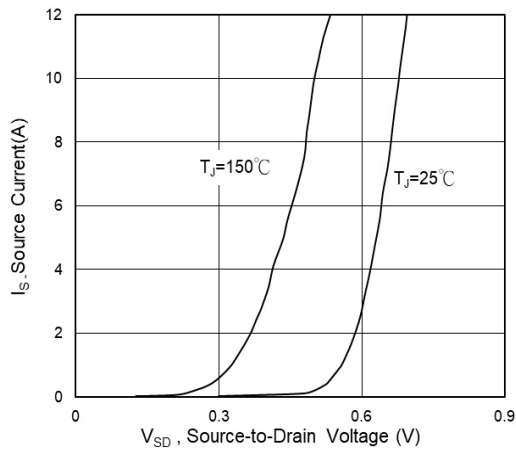


Fig.3 Source Drain Forward Characteristics

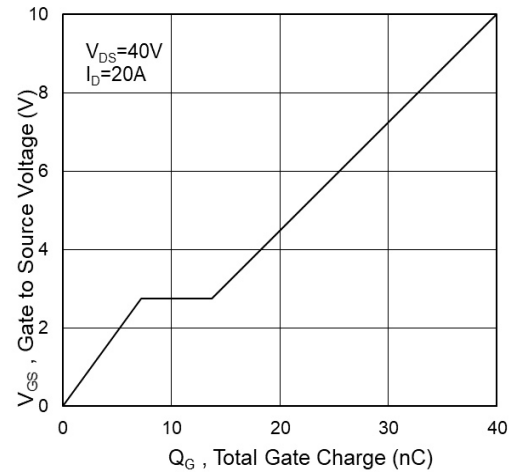


Fig.4 Gate-Charge Characteristics

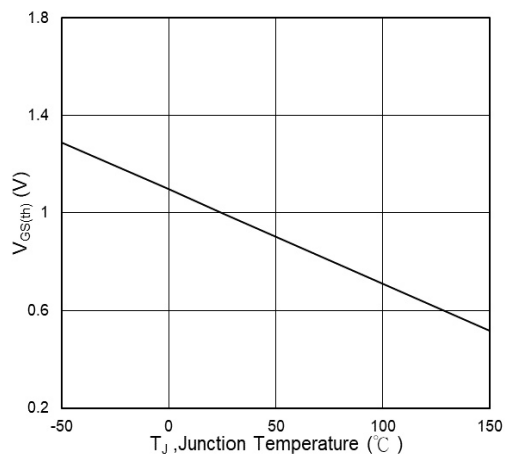


Fig.5 Normalized $V_{GS(th)}$ vs T_J

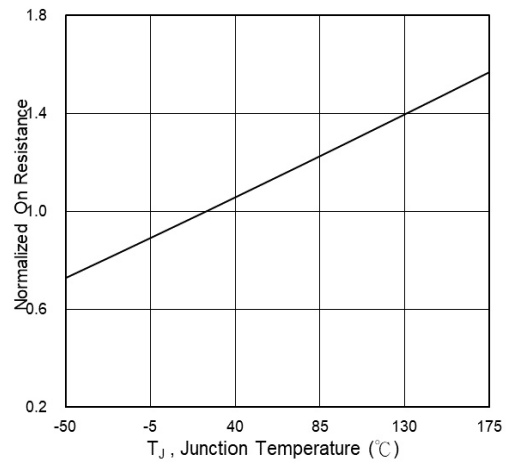


Fig.6 Normalized $R_{DS(on)}$ vs T_J

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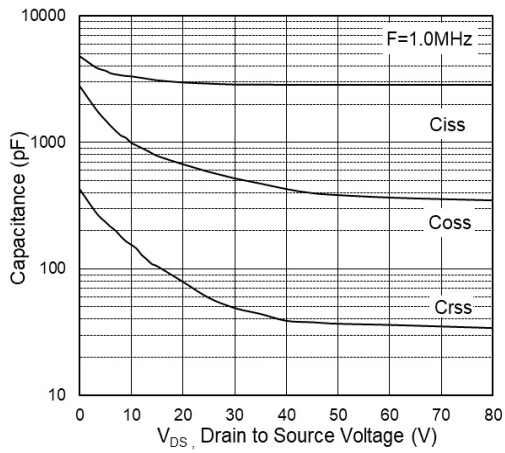


Fig.7 Capacitance

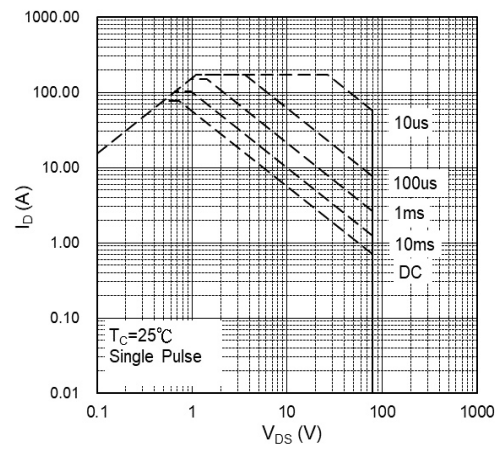


Fig.8 Safe Operating Area

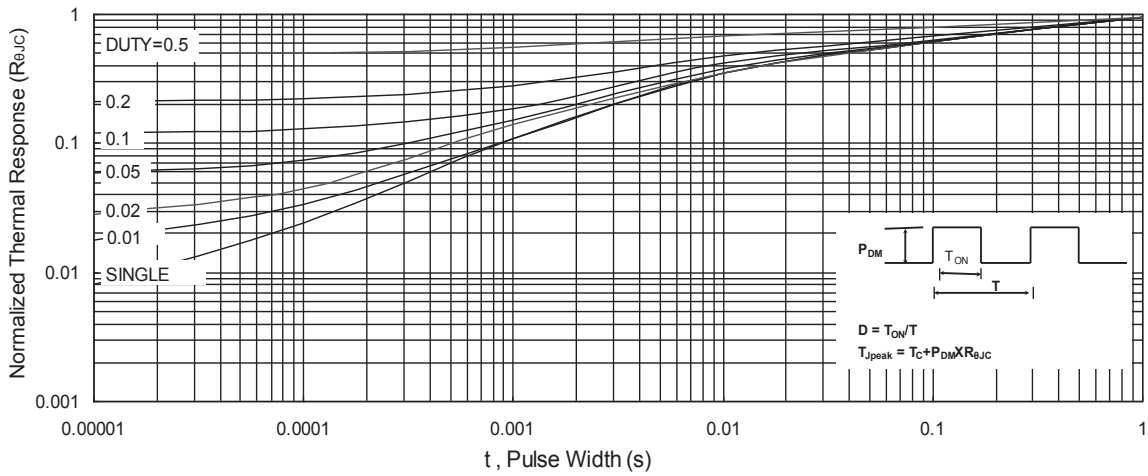


Fig.9 Normalized Maximum Transient Thermal Impedance

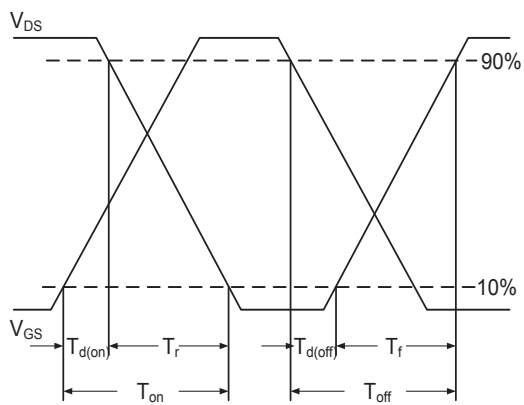


Fig.10 Switching Time Waveform

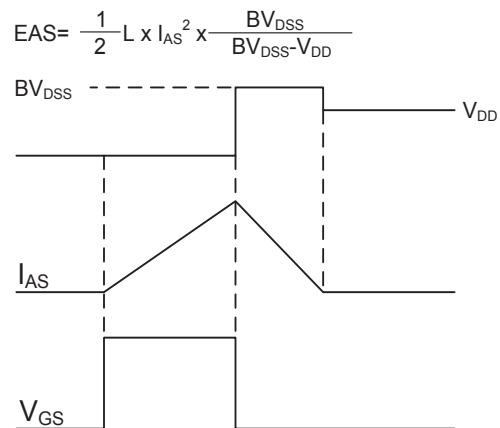


Fig.11 Unclamped Inductive Switching Waveform