

Dual N-channel MOSFET (common drain)

ELM18804BA-S

General description

ELM18804BA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and operation with gate voltages as low as 1.8V and internal ESD protection.

Features

- $V_{ds}=20V$
- $I_d=8A$ ($V_{gs}=10V$)
- $R_{ds(on)} < 13m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} < 14m\Omega$ ($V_{gs}=4.5V$)
- $R_{ds(on)} < 19m\Omega$ ($V_{gs}=2.5V$)
- $R_{ds(on)} < 27m\Omega$ ($V_{gs}=1.8V$)
- ESD Rating : 2000V HBM

Maximum absolute ratings

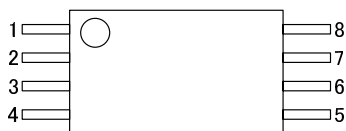
| Parameter | Symbol | Limit | Unit | Note |
|--|----------------|------------|-------------|------|
| Drain-source voltage | V_{ds} | 20 | V | |
| Gate-source voltage | V_{gs} | ± 12 | V | |
| Continuous drain current | I_d | 8.0 | A | 1 |
| | | 6.3 | | |
| Pulsed drain current | I_{dm} | 30 | A | 2 |
| Power dissipation | P_d | 1.50 | W | 1 |
| | | 1.08 | | |
| 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 | $R\theta_{ja}$ | 64 | 83 | $^{\circ}C/W$ | 1 |
| Maximum junction-to-ambient | | Steady-state | 89 | 120 | |
| Maximum junction-to-lead | $R\theta_{jl}$ | 53 | 70 | $^{\circ}C/W$ | 3 |

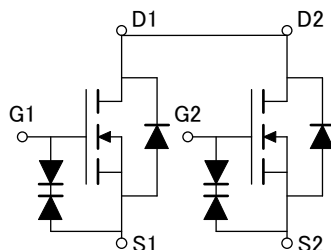
Pin configuration

TSSOP-8 (TOP VIEW)



| Pin No. | Pin name |
|---------|---------------|
| 1 | DRAIN1/DRAIN2 |
| 2 | SOURCE1 |
| 3 | SOURCE1 |
| 4 | GATE1 |
| 5 | GATE2 |
| 6 | SOURCE2 |
| 7 | SOURCE2 |
| 8 | DRAIN1/DRAIN2 |

Circuit



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Electrical characteristics

T_a=25°C

| Parameter | Symbol | Condition | Min. | Typ. | Max. | Unit |
|------------------------------------|---------------------|--|-----------------------------------|------|------|------|
| STATIC PARAMETERS | | | | | | |
| Drain-source breakdown voltage | BV _{dss} | I _d =250 μA, V _{gs} =0V | 20 | | | V |
| Zero gate voltage drain current | I _{dss} | V _{ds} =16V | | | 10 | μA |
| | | V _{gs} =0V | T _j =55°C | | 25 | |
| Gate-body leakage current | I _{gss} | V _{ds} =0V, V _{gs} =±10V | | | 10 | μA |
| Gate-source breakdown voltage | BV _{gso} | V _{ds} =0V, I _g =±250 μA | ±12 | | | V |
| Gate threshold voltage | V _{gs(th)} | V _{ds} =V _{gs} , I _d =250 μA | 0.50 | 0.75 | 1.00 | V |
| On state drain current | I _{d(on)} | V _{gs} =4.5V, V _{ds} =5V | 30 | | | A |
| Static drain-source on-resistance | R _{ds(on)} | V _{gs} =10V | | 10.0 | 13.0 | mΩ |
| | | I _d =8A | T _j =125°C | 13.3 | 16.0 | |
| | | V _{gs} =4.5V, I _d =5A | | 11.5 | 14.0 | mΩ |
| | | V _{gs} =2.5V, I _d =4A | | 15.4 | 19.0 | mΩ |
| | | V _{gs} =1.8V, I _d =3A | | 22.2 | 27.0 | mΩ |
| Forward transconductance | G _{fs} | V _{ds} =5V, I _d =8A | | 36 | | S |
| Diode forward voltage | V _{sd} | I _s =1A, V _{gs} =0V | | 0.73 | 1.00 | V |
| Max. body-diode continuous current | I _s | | | | 2.4 | A |
| DYNAMIC PARAMETERS | | | | | | |
| Input capacitance | C _{iss} | V _{gs} =0V, V _{ds} =10V, f=1MHz | | 1810 | | pF |
| Output capacitance | C _{oss} | | | 232 | | pF |
| Reverse transfer capacitance | C _{rss} | | | 200 | | pF |
| Gate resistance | R _g | V _{gs} =0V, V _{ds} =0V, f=1MHz | | 1.6 | | Ω |
| SWITCHING PARAMETERS | | | | | | |
| Total gate charge | Q _g | V _{gs} =4.5V, V _{ds} =10V, I _d =8A | | 17.9 | | nC |
| Gate-source charge | Q _{gs} | | | 1.5 | | nC |
| Gate-drain charge | Q _{gd} | | | 4.7 | | nC |
| Turn-on delay time | t _{d(on)} | V _{gs} =10V, V _{ds} =10V R _l =1.2 Ω, R _{gen} =3 Ω | | 2.5 | | ns |
| Turn-on rise time | t _r | | | 7.2 | | ns |
| Turn-off delay time | t _{d(off)} | | | 49.0 | | ns |
| Turn-off fall time | t _f | | | 10.8 | | ns |
| Body diode reverse recovery time | t _{rr} | | I _f =8A, dI/dt=100A/μs | | 20.2 | |
| Body diode reverse recovery charge | Q _{rr} | I _f =8A, dI/dt=100A/μs | | 8.0 | | nC |

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with T_a=25°C. The value in any given applications depends on the user's specific board design, The current rating is based on the t ≤ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_a=25°C. The SOA curve provides a single pulse rating.

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Typical electrical and thermal characteristics

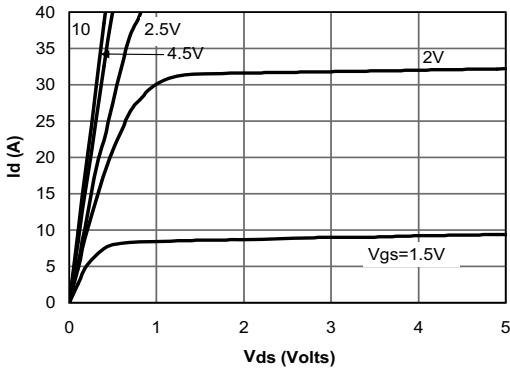


Figure 1: On-Region Characteristics

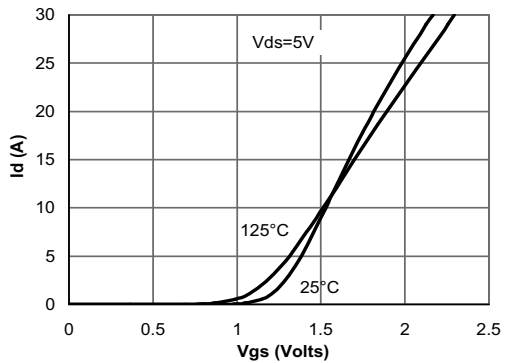


Figure 2: Transfer Characteristics

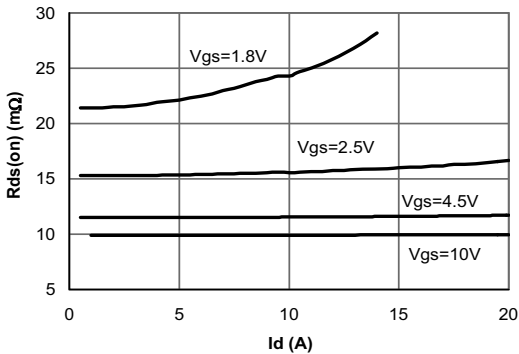


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

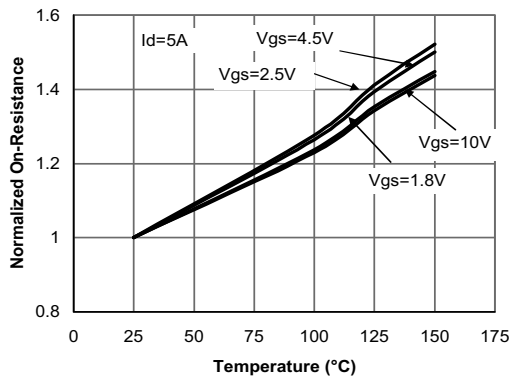


Figure 4: On-Resistance vs. Junction Temperature

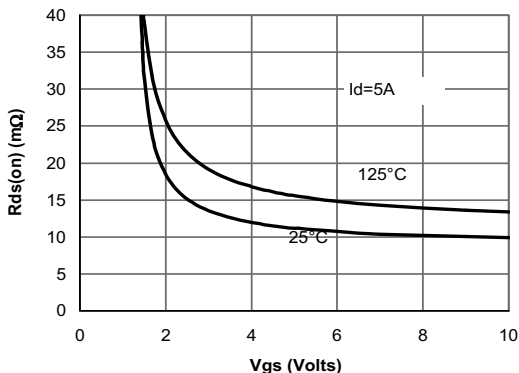


Figure 5: On-Resistance vs. Gate-Source Voltage

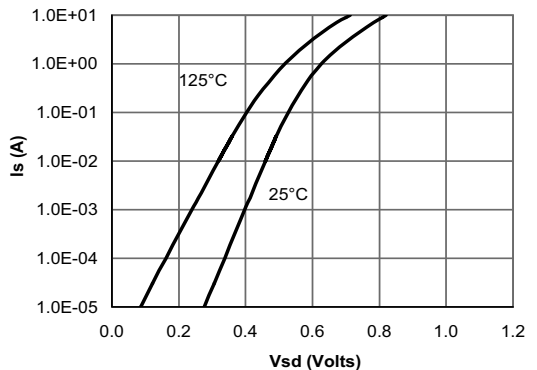


Figure 6: Body-Diode Characteristics

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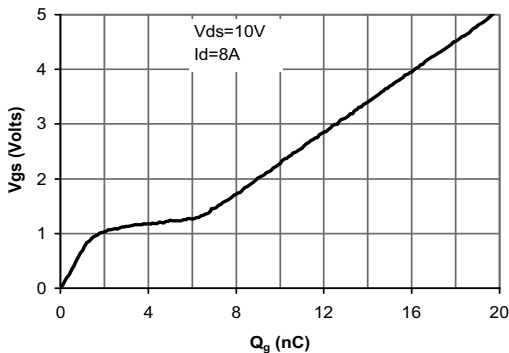


Figure 7: Gate-Charge Characteristics

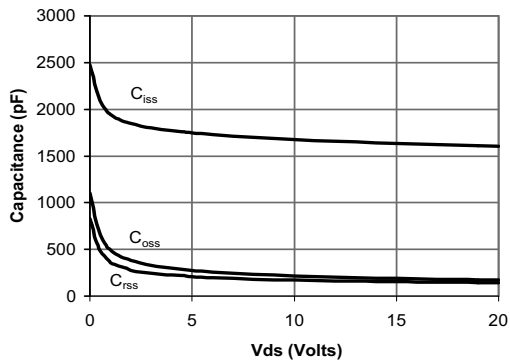


Figure 8: Capacitance Characteristics

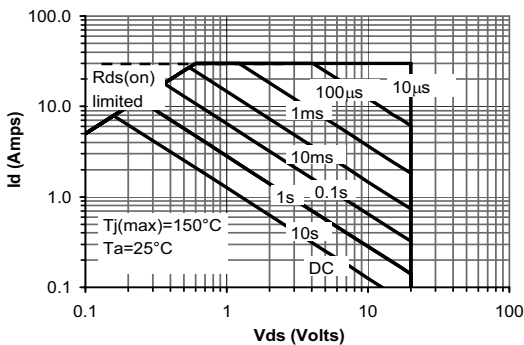


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

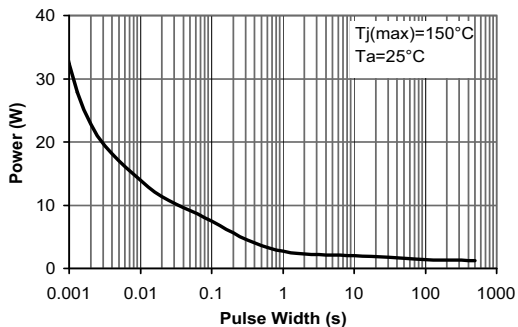


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

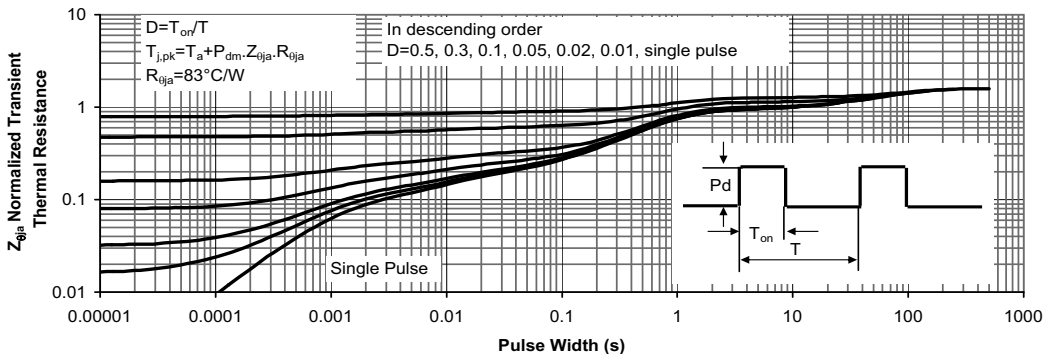


Figure 11: Normalized Maximum Transient Thermal Impedance