

30V N-Channel MOSFETs

General Description

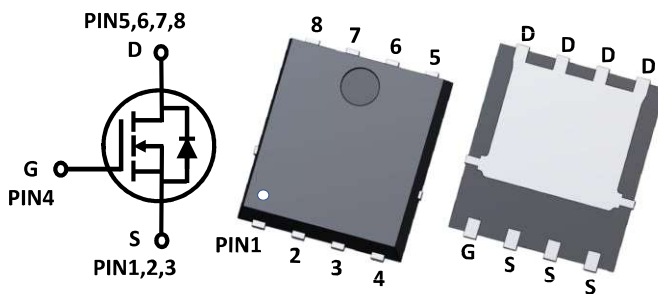
These N-Channel enhancement mode power field effect transistors are using trench - technology. This advanced technology is designed to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche period. These devices are well suited for high efficiency fast switching applications.

| | | |
|---------------|---------------|-------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D |
| 30V | 3.5m Ω | 98A |

Features

- Advanced Trench Process
- Low- $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability

Power PAK 5060 Pin Configuration



Applications

- Load Switch
- Switching Power Supplies

Absolute Maximum Ratings ($T_J=25^\circ\text{C}$, unless otherwise noted)

| Symbol | Parameter | Value | Unit | |
|----------------|--|---------------------------|------------------|----|
| V_{DS} | Drain-Source Voltage | 30 | V | |
| V_{GS} | Gate-Source Voltage | ± 20 | | |
| I_D | Drain Current-Continuous ^A | $T_A = 25^\circ\text{C}$ | A | |
| | | $T_A = 70^\circ\text{C}$ | | 23 |
| | | $T_C = 25^\circ\text{C}$ | | 19 |
| | | $T_C = 100^\circ\text{C}$ | | 98 |
| I_{DM} | Drain Current-Pulsed ^{A, B} | $T_A = 25^\circ\text{C}$ | 60 | |
| I_{AS} | Non-repetitive Avalanche Current ^E | | 220 | |
| E_{AS} | Single Pulse Drain-to-Source Avalanche Energy ^E | | 40 | |
| P_D | Maximum Power Dissipation | $T_A = 25^\circ\text{C}$ | W | |
| | | $T_C = 25^\circ\text{C}$ | | 80 |
| T_J, T_{STG} | Operating and Storage Temperature Range | -55 to +150 | $^\circ\text{C}$ | |

Thermal Characteristics

| Symbol | Parameter | Conditions | Value | Unit |
|-----------------|----------------------------------|--------------|-------|---------------------------|
| $R_{\theta JA}$ | Junction-to-Ambient ^C | Steady State | 35 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JC}$ | Junction-to-Case | Steady State | 2.0 | $^\circ\text{C}/\text{W}$ |

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Static State Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|----------------------|----------------------------------|---|------|------|------|------|
| V _{(BR)DSS} | Drain-Source Breakdown Voltage | V _{GS} = 0V, I _{DS} = 250μA | 30 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 24V, V _{GS} = 0V | - | - | 1 | μA |
| | | V _{DS} = 24V, V _{GS} = 0V, T _J = 125°C | - | - | 10 | μA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} = ±20V, V _{DS} = 0V | - | - | ±100 | nA |
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} , I _{DS} = 250μA | 1.2 | 1.6 | 2.5 | V |
| R _{DS(ON)} | Drain-Source On-State Resistance | V _{GS} = 10V, I _{DS} = 15A | - | 2.9 | 3.5 | mΩ |
| | | V _{GS} = 4.5V, I _{DS} = 12A | - | 3.8 | 4.9 | mΩ |
| g _{fs} | Forward Transconductance | V _{DS} = 10V, I _{DS} = 3A | - | 22 | - | S |

Dynamic Characteristics Note D

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit | |
|---------------------|------------------------------|---|---|------|------|------|----|
| C _{iss} | Input Capacitance | V _{DS} = 15V, V _{GS} = 0V, f = 1MHz | - | 2320 | - | pF | |
| C _{oss} | Output Capacitance | | - | 340 | - | pF | |
| C _{rss} | Reverse Transfer Capacitance | | - | 230 | - | pF | |
| R _g | Gate Resistance | V _{DS} = 0V, f = 1MHz | - | 2 | - | Ω | |
| Q _g | Total Gate charge | V _{DD} = 15V, I _{DS} = 30A | V _{GS} = 10V | - | 48 | - | nC |
| | | | V _{GS} = 4.5V | - | 24 | - | nC |
| Q _{gs} | Gate to Source Charge | | - | 7.8 | - | nC | |
| Q _{gd} | Gate to Drain Charge | | - | 11 | - | nC | |
| T _{d(on)} | Turn-On Delay Time | | V _{DD} = 15V, V _{GS} = 10V, I _{DS} = 30A, R _{G,ext} = 3Ω | - | 9 | - | ns |
| t _r | Rise Time | | | - | 80 | - | ns |
| T _{d(off)} | Turn-Off Delay Time | - | | 36 | - | ns | |
| t _f | Fall Time | - | | 105 | - | ns | |

Drain-Source Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------|---|------|------|------|------|
| I _S | Diode continuous forward current | - | - | - | 98 | A |
| I _{SM} | Diode pulse current ^B | - | - | - | 220 | A |
| V _{SD} | Diode Forward Voltage ^B | V _{GS} = 0V, I _S = 1A | - | - | 1 | V |
| t _{rr} | Diode Reverse Recovery Time | I _S = 30A, di/dt = 100A/μs | - | 13 | - | ns |
| Q _{rr} | Diode Reverse Recovery Charge | | - | 4.5 | - | nC |

Note A, The maximum current rating is package limited.

Note B, The test condition is pulse width ≤ 300μs, duty cycle ≤ 2%.

Note C, The R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. copper, determined by the PCB design, in a still air environment with T_A=25°C.

Note D, The switching characteristics are independent of operating junction temperatures. Not subject to product testing.

Note E, Maximum UIS current limited by test equipment. The test condition is L=0.1mH, Starting T_J=25°C.