

30V N-Channel MOSFETs

General Description

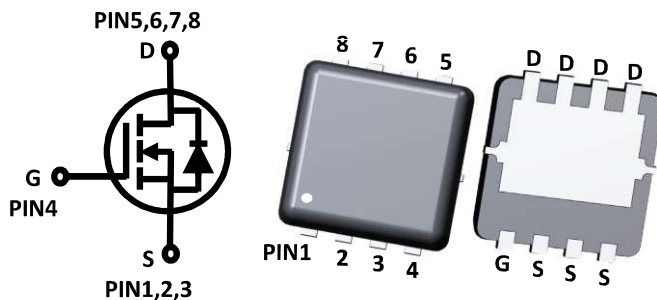
These N-Channel enhancement mode power field effect transistors are using trench - technology. This advanced technology is designed to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche period. These devices are well suited for high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

| | | |
|---------------|---------------|-------|
| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | I_D |
| 30V | 7.9m Ω | 39A |

Features

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

Power PAK 3333 Pin Configuration



Applications

- Load Switch
- Switching Power Supplies
- General Purpose Applications

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 | $T_A = 25^\circ\text{C}$ | 14 | A |
| | | $T_A = 70^\circ\text{C}$ | 11 | |
| | | $T_C = 25^\circ\text{C}$ | 39 | |
| | | $T_C = 100^\circ\text{C}$ | 25 | |
| I_{DM} | Drain Current-Pulsed ^{A, B} | $T_A = 25^\circ\text{C}$ | 140 | |
| I_{AS} | Non-repetitive Avalanche Current ^E | | 30 | |
| E_{AS} | Single Pulse Drain-to-Source Avalanche Energy ^E | | 45 | mJ |
| P_D | Maximum Power Dissipation | $T_A = 25^\circ\text{C}$ | 3.0 | W |
| | | $T_C = 25^\circ\text{C}$ | 22.3 | |
| 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 | 40 | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Junction-to-Case | Steady State | 5.6 | $^\circ\text{C/W}$ |

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 _D = 250μA | 30 | - | - | V |
| I _{DSS} | Zero Gate Voltage Drain Current | V _{DS} = 30V, 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 _D = 250μA | 1.2 | 1.6 | 2.5 | V |
| R _{DS(on)} | Drain-Source On-State Resistance | V _{GS} = 10V, I _D = 15A | - | 6.6 | 7.9 | mΩ |
| | | V _{GS} = 4.5V, I _D = 10A | - | 9.2 | 12 | mΩ |
| g _{fs} | Forward Transconductance | V _{DS} = 10V, I _D = 3A | - | 20 | - | S |

Dynamic Characteristics Note D

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit | |
|---------------------|------------------------------|---|---|------|------|------|----|
| C _{iss} | Input Capacitance | V _{DS} = 15V, V _{GS} = 0V, f = 1MHz | - | 900 | - | pF | |
| C _{oss} | Output Capacitance | | - | 130 | - | pF | |
| C _{rss} | Reverse Transfer Capacitance | | - | 110 | - | pF | |
| R _g | Gate Resistance | V _{DS} = 0V, f = 1MHz | - | 2 | - | Ω | |
| Q _g | Total Gate charge | V _{DD} = 15V, I _{DS} = 25A | V _{GS} = 10V | - | 18.3 | - | nC |
| | | | V _{GS} = 4.5V | - | 8.8 | - | nC |
| Q _{gs} | Gate to Source Charge | | - | 2.5 | - | nC | |
| Q _{gd} | Gate to Drain Charge | | - | 4.3 | - | nC | |
| T _{d(on)} | Turn-On Delay Time | | V _{DD} = 15V, V _{GS} = 10V, I _{DS} = 25A, R _{G,ext} = 6Ω | - | 5 | - | ns |
| t _r | Rise Time | | | - | 13 | - | ns |
| T _{d(off)} | Turn-Off Delay Time | - | | 28 | - | ns | |
| t _f | Fall Time | - | | 8 | - | ns | |

Drain-Source Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|------------------------------------|---|------|------|------|------|
| I _S | Diode continuous forward current | - | - | - | 14 | A |
| I _{SM} | Diode pulse current ^B | - | - | - | 140 | A |
| V _{SD} | Diode Forward Voltage ^B | V _{GS} = 0V, I _S = 1A | - | - | 1 | V |
| t _{rr} | Diode Reverse Recovery Time | I _S = 15A, dI _F /dt = 100A / us | - | 8.2 | - | nS |
| Q _{rr} | Diode Reverse Recovery Charge | | - | 1.8 | - | nC |

Note A, The maximum current rating is package limited.

Note B, The test condition is pulse width ≤ 300us, 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.