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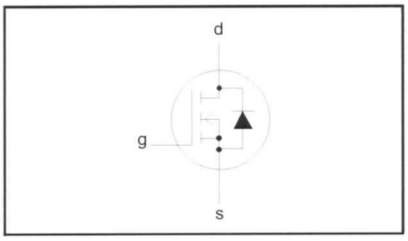
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# N-channel TrenchMOS transistor — IRF630, IRF630S

## FEATURES

- **'Trench'** technology
- Low on-state resistance
- Fast switching
- Low thermal resistance

## SYMBOL




## QUICK REFERENCE DATA

$V_{DSS}$ = 200 V

$I_D$ = 9 A

$R_{DS(ON)} \leq 400\ m\Omega$

## GENERAL DESCRIPTION

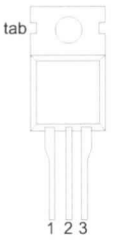
N-channel, enhancement mode field-effect power transistor using **Trench** technology, intended for use in off-line switched mode power supplies, T.V. and computer monitor power supplies, d.c. to d.c. converters, motor control circuits and general purpose switching applications.

The IRF630 is supplied in the SOT78 (TO220AB) conventional leaded package
The IRF630S is supplied in the SOT404 ($D^2PAK$) surface mounting package

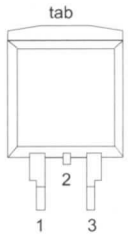
## PINNING

| PIN | DESCRIPTION |
|---|---|
| 1 | gate |
| 2 | drain[1] |
| 3 | source |
| tab | drain |

## SOT78 (TO220AB)




## SOT404 ($D^2PAK$)




## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{DSS}$ | Drain-source voltage | $T_j$ = 25 °C to 175°C | - | 200 | V |
| $V_{DGR}$ | Drain-gate voltage | $T_j$ = 25 °C to 175°C; $R_{GS}$ = 20 kΩ | - | 200 | V |
| $V_{GS}$ | Gate-source voltage | | - | ± 20 | V |
| $I_D$ | Continuous drain current | $T_{mb}$ = 25 °C; $V_{GS}$ = 10 V | - | 9 | A |
| | | $T_{mb}$ = 100 °C; $V_{GS}$ = 10 V | - | 6.3 | A |
| $I_{DM}$ | Pulsed drain current | $T_{mb}$ = 25 °C | - | 36 | A |
| $P_D$ | Total power dissipation | $T_{mb}$ = 25 °C | - | 88 | W |
| $T_j$, $T_{stg}$ | Operating junction and storage temperature | | - 55 | 175 | °C |

NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

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## AVALANCHE ENERGY LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $E_{AS}$ | Non-repetitive avalanche energy | Unclamped inductive load, $I_{AS}$ = 5 A; $t_p$ = 380 μs; $T_j$ prior to avalanche = 25˚C; $V_{DD} \leq$ 25 V; $R_{GS}$ = 50 Ω; $V_{GS}$ = 10 V; refer to fig;14 | - | 250 | mJ |
| $I_{AS}$ | Peak non-repetitive avalanche current | | - | 9 | A |

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $R_{th\ j\text{-}mb}$ | Thermal resistance junction to mounting base | | - | - | 1.7 | K/W |
| $R_{th\ j\text{-}a}$ | Thermal resistance junction to ambient | SOT78 package, in free air | - | 60 | - | K/W |
| | | SOT404 package, pcb mounted, minimum footprint | - | 50 | - | K/W |

## ELECTRICAL CHARACTERISTICS

$T_j$= 25˚C unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $V_{GS}$ = 0 V; $I_D$ = 0.25 mA; | 200 | - | - | V |
| | | $T_j$ = -55˚C | 178 | - | - | V |
| $V_{GS(TO)}$ | Gate threshold voltage | $V_{DS}$ = $V_{GS}$; $I_D$ = 1 mA | 2 | 3 | 4 | V |
| | | $T_j$ = 175˚C | 1 | - | - | V |
| | | $T_j$ = -55˚C | - | | 6 | V |
| $R_{DS(ON)}$ | Drain-source on-state resistance | $V_{GS}$ = 10 V; $I_D$ = 5.4 A | - | 300 | 400 | mΩ |
| | | $T_j$ = 175˚C | - | - | 1.12 | Ω |
| $g_{fs}$ | Forward transconductance | $V_{DS}$ = 25 V; $I_D$ = 5.4 A | 3.8 | 9 | - | S |
| $I_{GSS}$ | Gate source leakage current | $V_{GS}$ = ± 20 V; $V_{DS}$ = 0 V | - | 10 | 100 | nA |
| $I_{DSS}$ | Zero gate voltage drain current | $V_{DS}$ = 200 V; $V_{GS}$ = 0 V | - | 0.05 | 10 | μA |
| | | $V_{DS}$ = 160 V; $V_{GS}$ = 0 V; $T_j$ = 175˚C | - | - | 250 | μA |
| $Q_{g(tot)}$ | Total gate charge | $I_D$ = 5.9 A; $V_{DD}$ = 160 V; $V_{GS}$ = 10 V | - | - | 39 | nC |
| $Q_{gs}$ | Gate-source charge | | - | - | 6.3 | nC |
| $Q_{gd}$ | Gate-drain (Miller) charge | | - | - | 21 | nC |
| $t_{d\ on}$ | Turn-on delay time | $V_{DD}$ = 100 V; $R_D$ = 10 Ω; | - | 8 | - | ns |
| $t_r$ | Turn-on rise time | $V_{GS}$ = 10 V; $R_G$ = 5.6 Ω | - | 19 | - | ns |
| $t_{d\ off}$ | Turn-off delay time | Resistive load | - | 25 | - | ns |
| $t_f$ | Turn-off fall time | | - | 15 | - | ns |
| $L_d$ | Internal drain inductance | Measured tab to centre of die | - | 3.5 | - | nH |
| $L_d$ | Internal drain inductance | Measured from drain lead to centre of die (SOT78 package only) | - | 4.5 | - | nH |
| $L_s$ | Internal source inductance | Measured from source lead to source bond pad | - | 7.5 | - | nH |
| $C_{iss}$ | Input capacitance | $V_{GS}$ = 0 V; $V_{DS}$ = 25 V; f = 1 MHz | - | 959 | - | pF |
| $C_{oss}$ | Output capacitance | | - | 93 | - | pF |
| $C_{rss}$ | Feedback capacitance | | - | 54 | - | pF |

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## REVERSE DIODE LIMITING VALUES AND CHARACTERISTICS

$T_j$ = 25°C unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous source current (body diode) | | - | - | 9 | A |
| $I_{SM}$ | Pulsed source current (body diode) | | - | - | 36 | A |
| $V_{SD}$ | Diode forward voltage | $I_F$ = 9 A; $V_{GS}$ = 0 V | - | 0.85 | 1.2 | V |
| $t_{rr}$ | Reverse recovery time | $I_F$ = 9 A; -$dI_F/dt$ = 100 A/µs; | - | 92 | - | ns |
| $Q_{rr}$ | Reverse recovery charge | $V_{GS}$ = -10 V; $V_R$ = 25 V | - | 0.5 | - | µC |

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