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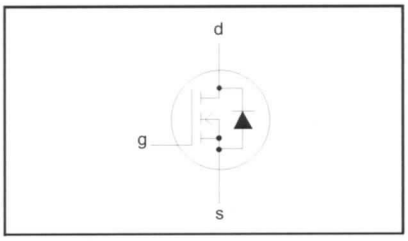
N-channel TrenchMOS transistor — IRF630, IRF630S

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

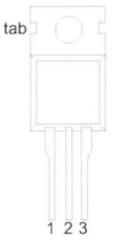
N-channel, enhancement mode field-effect power transistor using **Trench** technology, intended for use in off-line switched mode power supplies, T.V. and computer monitor power supplies, d.c. to d.c. converters, motor control circuits and general purpose switching applications.

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

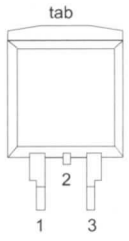
PINNING

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

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

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