HUF75309P3, HUF75309D3, HUF75309D3S

17A, 55V, 0.070 Ohm, N-Channel, UltraFET Power MOSFETs

February 1998

Features

- 17A, 55V
- *Ultra Low On-Resistance,* $r_{DS(ON)} = 0.070\Omega$
- Diode Exhibits Both High Speed and Soft Recovery
- *Temperature Compensating* PSPICE Model
- *Thermal Impedance* SPICE Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Related Literature
  - TB334, "Guidelines for Soldering Surface Mount Components to PC Boards"

Description

The HUF75309 N-Channel power MOSFET is manufactured using the innovative UltraFET™ process. This advanced process technology achieves the lowest possible on-resistance per silicon area, resulting in outstanding performance. This device is capable of withstanding high energy in the avalanche mode and the diode exhibits very low reverse recovery time and stored charge. It was designed for use in applications where power efficiency is important, such as switching regulators, switching converters, motor drivers, relay drivers, low-voltage bus switches, and power management in portable and battery-operated products.

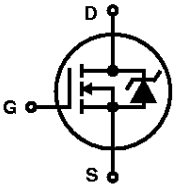
Formerly developmental type TA75309.

Ordering Information

PART NUMBER	PACKAGE	BRAND
HUF75309P3	TO-220AB	75309P
HUF75309D3	TO-251AA	75309D
HUF75309D3S	TO-252AA	75309D

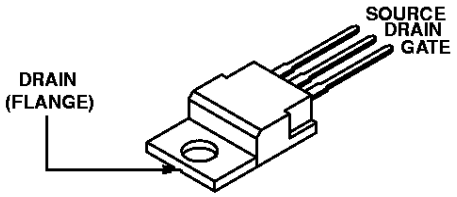
NOTE: When ordering, use the entire part number. Add the suffix T to obtain the TO-252AA variant in tape and reel, e.g., HUF75309D3ST.

Symbol

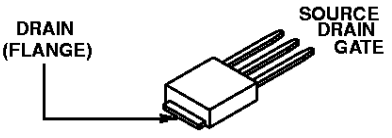


Packaging

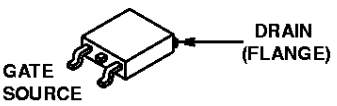
JEDEC TO-220AB



JEDEC TO-251AA



JEDEC TO-252AA



CAUTION: These devices are sensitive to electrostatic discharge. Users should follow proper ESD Handling Procedures.

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File Number **4358.2**

Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

Drain to Source Voltage (Note 1)	V_{DSS}	55	V
Drain to Gate Voltage (R_{GS} = 20kΩ) (Note 1)	V_{DGR}	55	V
Gate to Source Voltage	V_{GS}	±20	V
Drain Current			
Continuous (Figure 2)	I_D	17	A
Pulsed Drain Current	I_{DM}	Figure 5	
Pulsed Avalanche Rating	E_{AS}	Figures 6, 14, 15	
Power Dissipation	P_D	45	W
Derate Above 25^oC		0.30	$W/^oC$
Operating and Storage Temperature	T_J, T_{STG}	-55 to 175	^oC
Maximum Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	^oC
Package Body for 10s, See Techbrief 334	T_{pkg}	260	^oC

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. $T_J = 25^oC$ to 150^oC.

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V (Figure 11)		55	-	-	V
Gate to Source Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250μA (Figure 10)		2	-	4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 50V, V_{GS} = 0V		-	-	1	μA
		V_{DS} = 45V, V_{GS} = 0V, $T_C = 150^oC$		-	-	250	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V		-	-	±100	nA
Drain to Source On Resistance	$r_{DS(ON)}$	I_D = 17A, V_{GS} = 10V (Figure 9)		-	-	0.070	Ω
Turn-On Time	t_{ON}	V_{DD} = 30V, $I_D \cong$ 17A, R_L = 1.76Ω, V_{GS} = 10V, R_{GS} = 27Ω (Figures 18,19)		-	-	70	ns
Turn-On Delay Time	$t_{d(ON)}$			-	7	-	ns
Rise Time	t_r			-	39	-	ns
Turn-Off Delay Time	$t_{d(OFF)}$			-	24	-	ns
Fall Time	t_f			-	30	-	ns
Turn-Off Time	t_{OFF}			-	-	80	ns
Total Gate Charge	$Q_{g(TOT)}$	V_{GS} = 0V to 20V	V_{DD} = 30V, $I_D \cong$ 17A, R_L = 1.76Ω $I_{g(REF)}$ = 1.0mA (Figures 13, 16, 17)	-	20	24	nC
Gate Charge at 10V	$Q_{g(10)}$	V_{GS} = 0V to 10V		-	11	13.5	nC
Threshold Gate Charge	$Q_{g(TH)}$	V_{GS} = 0V to 2V		-	0.68	0.85	nC
Input Capacitance	C_{ISS}	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz (Figure 12)		-	350	-	pF
Output Capacitance	C_{OSS}			-	150	-	pF
Reverse Transfer Capacitance	C_{RSS}			-	39	-	pF
Thermal Resistance Junction to Case	$R_{\theta JC}$	(Figure 3)		-	-	3.25	$^oC/W$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	TO-220		-	-	62	$^oC/W$
		TO-251, TO252		-	-	100	$^oC/W$

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	V_{SD}	I_{SD} = 17A	-	-	1.25	V
Reverse Recovery Time	t_{rr}	I_{SD} = 17A, dI_{SD}/dt = 100A/μs	-	-	50	ns
Reverse Recovered Charge	Q_{RR}	I_{SD} = 17A, dI_{SD}/dt = 100A/μs	-	-	70	nC