[redacted]

## 35A, 55V, 0.034 Ohm, N-Channel UltraFET Power MOSFETs

These N-Channel power MOSFETs are 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 TA75321.

## Ordering Information

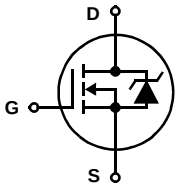
| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| HUF75321P3 | TO-220AB | 75321P |
| HUF75321S3S | TO-263AB | 75321S |

NOTE: When ordering, use the entire part number. Add the suffix T to obtain the TO-263AB variant in tape and reel, e.g., HUF75321S3ST.

## Features

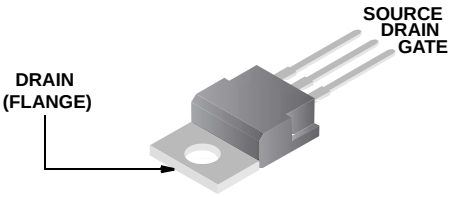
- 35A, 55V
- Simulation Models
  - Temperature Compensated PSPICE® and SABER™ Models
  - Thermal Impedance SPICE and SABER Models Available on the WEB at: www.fairchildsemi.com
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Related Literature
  - TB334, “Guidelines for Soldering Surface Mount Components to PC Boards”

## Symbol

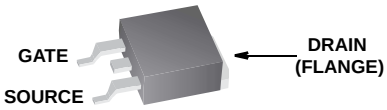



## Packaging

JEDEC TO-220AB




JEDEC TO-263AB



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

| | | | UNITS |
|---|---|---|---|
| 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) | $I_D$ | 35 | A |
| Pulsed Drain Current | $I_{DM}$ | Figure 4 | |
| Pulsed Avalanche Rating | $E_{AS}$ | Figures 6, 14, 15 | |
| Power Dissipation | $P_D$ | 93 | W |
| Derate Above $25^oC$ | | 0.625 | $W/^oC$ |
| 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 |
|---|---|---|---|---|---|---|
| **OFF STATE SPECIFICATIONS** | | | | | | |
| Drain to Source Breakdown Voltage | $BV_{DSS}$ | $I_D$ = 250μA, $V_{GS}$ = 0V (Figure 11) | 55 | - | - | 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 |
| **ON STATE SPECIFICATIONS** | | | | | | |
| Gate to Source Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D$ = 250μA (Figure 10) | 2 | - | 4 | V |
| Drain to Source On Resistance | $r_{DS(ON)}$ | $I_D$ = 35A, $V_{GS}$ = 10V (Figure 9) | - | 0.028 | 0.034 | Ω |
| **THERMAL SPECIFICATIONS** | | | | | | |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | (Figure 3) | - | - | 1.6 | $^oC/W$ |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | TO-220, TO-263 | - | - | 62 | $^oC/W$ |
| **SWITCHING SPECIFICATIONS** ($V_{GS}$ = 10V) | | | | | | |
| Turn-On Time | $t_{ON}$ | $V_{DD}$ = 30V, $I_D \cong$ 35A, $R_L$ = 0.86Ω, $V_{GS}$ = 10V, $R_{GS}$ = 25Ω | - | - | 100 | ns |
| Turn-On Delay Time | $t_{d(ON)}$ | | - | 11 | - | ns |
| Rise Time | $t_r$ | | - | 55 | - | ns |
| Turn-Off Delay Time | $t_{d(OFF)}$ | | - | 47 | - | ns |
| Fall Time | $t_f$ | | - | 66 | - | ns |
| Turn-Off Time | $t_{OFF}$ | | - | - | 170 | ns |
| **GATE CHARGE SPECIFICATIONS** | | | | | | |
| Total Gate Charge | $Q_{g(TOT)}$ | $V_{GS}$ = 0V to 20V; $V_{DD}$ = 30V, $I_D \cong$ 35A, $R_L$ = 0.86Ω, $I_{g(REF)}$ = 1.0mA (Figure 13) | - | 36 | 44 | nC |
| Gate Charge at 10V | $Q_{g(10)}$ | $V_{GS}$ = 0V to 10V | - | 21 | 26 | nC |
| Threshold Gate Charge | $Q_{g(TH)}$ | $V_{GS}$ = 0V to 2V | - | 1.3 | 1.6 | nC |
| Gate to Source Gate Charge | $Q_{gs}$ | | - | 3 | - | nC |
| Reverse Transfer Capacitance | $Q_{gd}$ | | - | 9 | - | nC |

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

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| **CAPACITANCE SPECIFICATIONS** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz (Figure 12) | - | 680 | - | pF |
| Output Capacitance | $C_{OSS}$ | | - | 270 | - | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | - | 60 | - | pF |

## Source to Drain Diode Specifications

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Source to Drain Diode Voltage | $V_{SD}$ | $I_{SD}$ = 35A | - | - | 1.25 | V |
| Reverse Recovery Time | $t_{rr}$ | $I_{SD}$ = 35A, $dI_{SD}/dt$ = 100A/µs | - | - | 59 | ns |
| Reverse Recovered Charge | $Q_{RR}$ | $I_{SD}$ = 35A, $dI_{SD}/dt$ = 100A/µs | - | - | 82 | nC |

## *Typical Performance Curves*

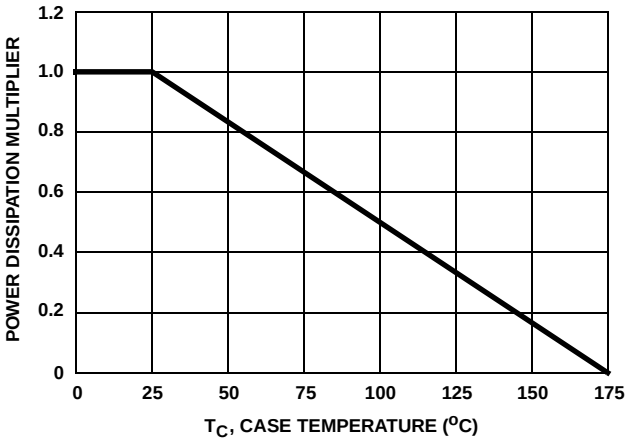



**FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE**

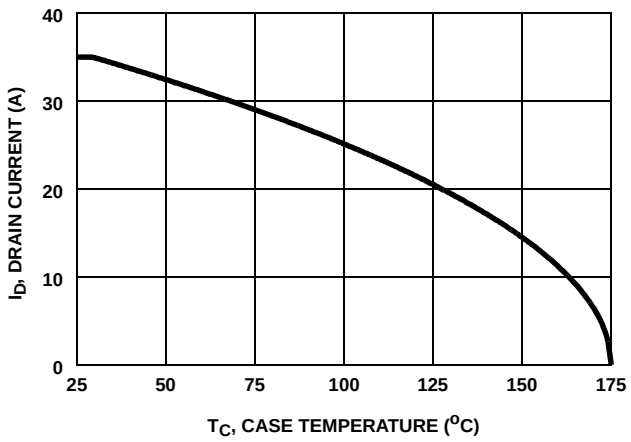



**FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE**

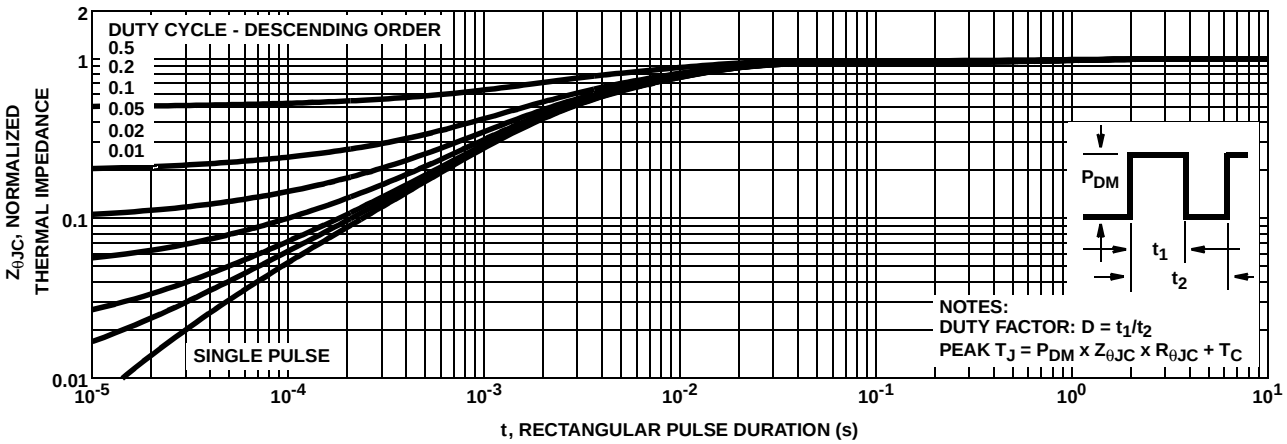



**FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE**