## 15A, 50V, 0.150 Ohm, P-Channel Power MOSFETs

These are P-Channel power MOSFETs manufactured using the MegaFET process. This process which uses feature sizes approaching those of LSI integrated circuits, gives optimum utilization of silicon, resulting in outstanding performance. They were designed for use in applications such as switching regulators, switching converters, motor drivers, and relay drivers. These transistors can be operated directly from integrated circuits.

Formerly developmental type TA09833.

## Ordering Information

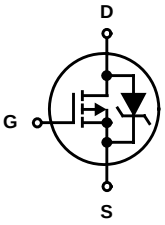
| PART NUMBER | PACKAGE | BRAND |
|---|---|---|
| RFD15P05 | TO-251AA | D15P05 |
| RFD15P05SM | TO-252AA | D15P05 |
| RFP15P05 | TO-220AB | RFP15P05 |

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252AA variant in the tape and reel, i.e., RFD15P05SM9A.

## Features

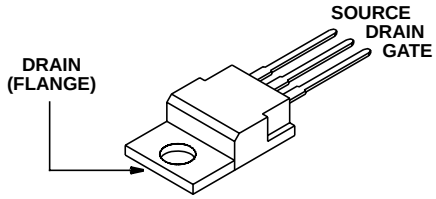
- 15A, 50V
- $r_{DS(ON)} = 0.150\Omega$
- Temperature Compensating PSPICE® Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Related Literature
  - TB334 “Guidelines for Soldering Surface Mount Components to PC Boards”

## Symbol

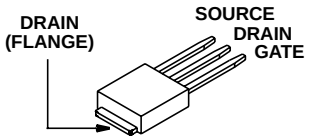



## Packaging

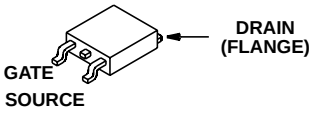
JEDEC TO-220AB




JEDEC TO-251AA




JEDEC TO-252AA



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

| | | RFD15P05, RFD15P05SM, RFP15P05 | UNITS |
|---|---|---|---|
| Drain Source Voltage (Note 1) | $V_{DSS}$ | -50 | V |
| Drain Gate Voltage ($R_G = 20K\Omega$) (Note 1) | $V_{DGR}$ | -50 | V |
| Gate Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current Continuous | $I_D$ | -15 | A |
| Pulsed (Note 3) | $I_{DM}$ | Refer to Peak Current Curve | |
| Single Pulse Avalanche Rating | $E_{AS}$ | Refer to UIS Curve | |
| Power Dissipation | $P_D$ | 80 | W |
| Derate above $25^oC$ | | 0.533 | $W/^oC$ |
| 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 | $BV_{DSS}$ | $I_D = 250\mu A$, $V_{GS} = 0V$ (Figure 11) | | -50 | - | - | V |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D = 250\mu A$ | | -2.0 | - | -4.0 | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = Rated $BV_{DSS}$ | | - | - | -1 | μA |
| | | $V_{DS} = 0.8$ x Rated $BV_{DSS}$, $T_C = 150^oC$ | | - | - | 25 | μA |
| Gate to Source Leakage Current | $I_{GSS}$ | $V_{GS} = \pm 20V$ | | - | - | ±100 | nA |
| Drain to Source On Resistance | $r_{DS(ON)}$ | $I_D = 15A$, $V_{GS} = -10V$ (Figure 9) | | - | - | 0.150 | Ω |
| Turn-On Time | $t_{ON}$ | $V_{DD} = -25V$, $I_D \approx 7.5A$, $R_G = 12.5\Omega$, $R_L = 3.3\Omega$, $V_{GS} = -10V$ (Figures 16, 17) | | - | - | 60 | ns |
| Turn-On Delay Time | $t_{D(ON)}$ | | | - | 16 | - | ns |
| Rise Time | $t_R$ | | | - | 30 | - | ns |
| Turn-Off Delay Time | $t_{D(OFF)}$ | | | - | 50 | - | ns |
| Fall Time | $t_F$ | | | - | 20 | - | ns |
| Turn-Off Time | $t_{OFF}$ | | | - | - | 100 | ns |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS} = 0V$ to $-20V$ | $V_{DD} = -40V$, $I_D = 15A$, $R_L = 2.67\Omega$, $I_{G(REF)} = -0.65mA$ (Figures 18, 19) | - | - | 150 | nC |
| Gate Charge at -10V | $Q_{G(-10)}$ | $V_{GS} = 0V$ to $-10V$ | | - | - | 75 | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | $V_{GS} = 0V$ to $-2V$ | | - | - | 3.5 | nC |
| Input Capacitance | $C_{ISS}$ | $V_{DS} = -25V$, $V_{GS} = 0V$ f = 1MHz (Figure 12) | | - | 1150 | - | pF |
| Output Capacitance | $C_{OSS}$ | | | - | 300 | - | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | - | 56 | - | pF |
| Thermal Resistance Junction to Case | $R_{\theta JC}$ | TO-220AB, TO-251AA, TO-252AA | | - | - | 1.875 | $^oC/W$ |
| Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | TO-251AA, TO-252AA | | - | - | 100 | $^oC/W$ |
| | | TO-220AB | | - | - | 62.5 | $^oC/W$ |

## Source to Drain Diode Specifications

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| Source to Drain Diode Voltage | $V_{SD}$ | $I_{SD} = -15A$ | - | - | -1.5 | V |
| Reverse Recovery Time | $t_{RR}$ | $I_{SD} = -15A$, $dI_{SD}/dt = -100A/\mu s$ | - | - | 125 | ns |

NOTES:

2. Pulse test: pulse duration ≤ 300ms, duty cycle ≤ 2%.
3. Repetitive rating: pulse width limited by maximum junction temperature. See Transient Thermal Impedance curve (Figure 3).