Data Sheet   **January 2002**

8A, 50V, 0.300 Ohm, P-Channel Power MOSFETs

These products are P-Channel power MOSFETs manufactured using the MegaFET process. This process, which uses feature sizes approaching those of LSI 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 TA09832.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RFD8P05	TO-251AA	D8P05
RFD8P05SM	TO-252AA	D8P05
RFP8P05	TO-220AB	RFP8P05

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252AA variant in tape and reel, i.e., RFD8P05SM9A.
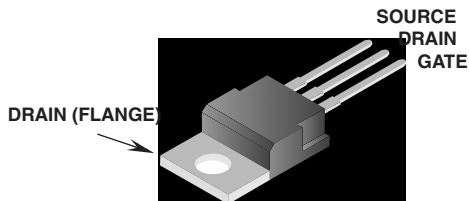
Features

- 8A, 50V
- $r_{DS(ON)} = 0.300\Omega$
- UIS SOA Rating Curve
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Related Literature
  - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"
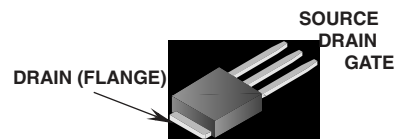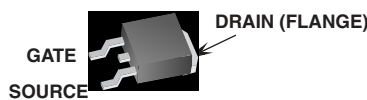
Symbol
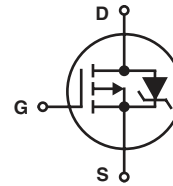
Packaging

JEDEC TO-220AB

JEDEC TO-251AA

JEDEC TO-252AA

RFD8P05, RFD8P05SM, RFP8P05

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

	RFD8P05, RFD8P05SM, RFP8P05	UNITS
Drain to Source Voltage (Note 1) . . . .V_{DSS}	-50	V
Drain to Gate Voltage (R_{GS} = 20KΩ) (Note 1) . . . .V_{DGR}	-50	V
Continuous Drain Current . . . .I_D	-8	A
Pulsed Drain Current (Note 3) . . . . I_{DM}	-20	A
Gate to Source Voltage . . . .V_{GS}	±20	V
Maximum Power Dissipation . . . . P_D	48	W
Dissipation Derating Factor	0.27	W/^oC
Single Pulse Avalanche Energy Rating . . . . E_{AS}	See Figure 6	
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 9)		-50	-	-	V
Gate Threshold Voltage	V$_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250µA (Figure 8)		-2	-	-4	V
Zero Gate Voltage Drain Current	I$_{DSS}$	V_{DS} = Rated BV$_{DSS}$, V_{GS} = 0V		-	-	1	µA
		V_{DS} = 0.8 x Rated BV$_{DSS}$, T_J = 150^oC		-	-	25	µA
Gate to Source Leakage Current	I$_{GSS}$	V_{GS} = ±20V		-	-	±100	nA
Drain to Source On Resistance (Note 2)	r$_{DS(ON)}$	I_D = 8A, V_{GS} = -10V (Figure 7)		-	-	0.300	Ω
Turn-On Time	t$_{ON}$	V_{DD} = -25V, $I_D \approx$ 4A, R_G = 9.1Ω, R_L = 6.25Ω, V_{GS} = -10V		-	-	60	ns
Turn-On Delay Time	t$_{d(ON)}$			-	16	-	ns
Rise Time	t$_r$			-	30	-	ns
Turn-Off Delay Time	t$_{d(OFF)}$			-	42	-	ns
Fall Time	t$_f$			-	20	-	ns
Turn-Off Time	t$_{OFF}$			-	-	100	ns
Total Gate Charge	Q$_{g(TOT)}$	V_{GS} = 0 to -20V	V_{DD} = -40V, I_D = 8A, R_L = 5Ω, $I_{G(REF)}$ = -0.3mA	-	-	80	nC
Gate Charge at -5V	Q$_{g(-10)}$	V_{GS} = 0 to -10V		-	-	40	nC
Threshold Gate Charge	Q$_{g(TH)}$	V_{GS} = 0 to -2V		-	-	2	nC
Thermal Resistance Junction to Case	R$_{θJC}$			-	-	3.125	^oC/W
Thermal Resistance Junction to Ambient	R$_{θJA}$	TO-251AA, TO-252AA		-	-	100	^oC/W
		TO-220AB				62.5	^oC/W

Source to Drain Diode Specifications $T_C = 25^oC$ Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage (Note 2)	V$_{SD}$	I_{SD} = -8A	-	-	-1.5	V
Reverse Recovery Time	t$_{rr}$	I_{SD} = -8A, dI_{SD}/dt = 100A/µs	-	-	125	ns

NOTE:

2. Pulse test: pulse width ≤ 300µs, Duty Cycle ≤ 2%.

3. Repetitive rating: pulse width is limited by maximum junction temperature.

Typical Performance Curves Unless Otherwise Specified
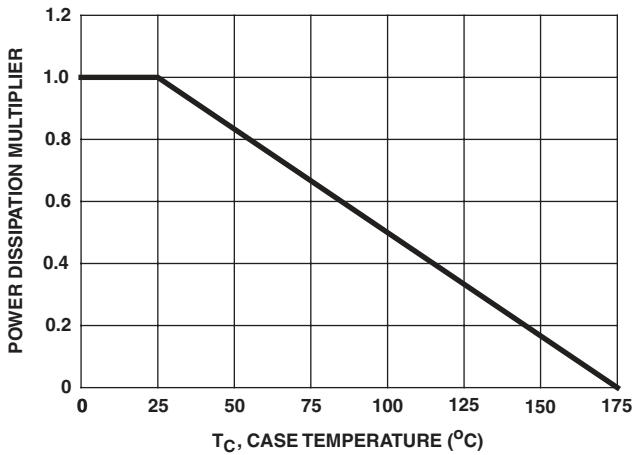

FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE
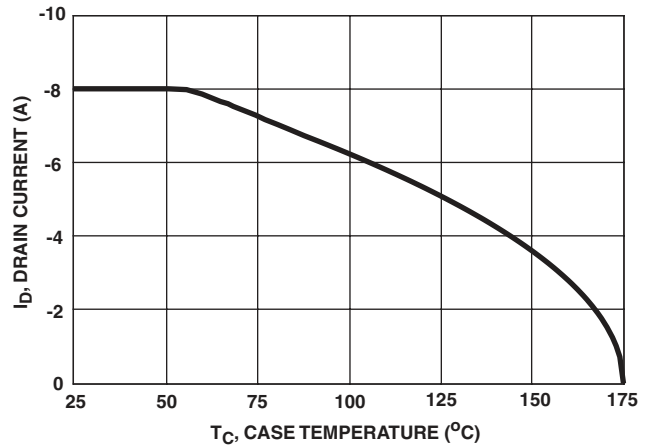TEMPERATURE

FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs
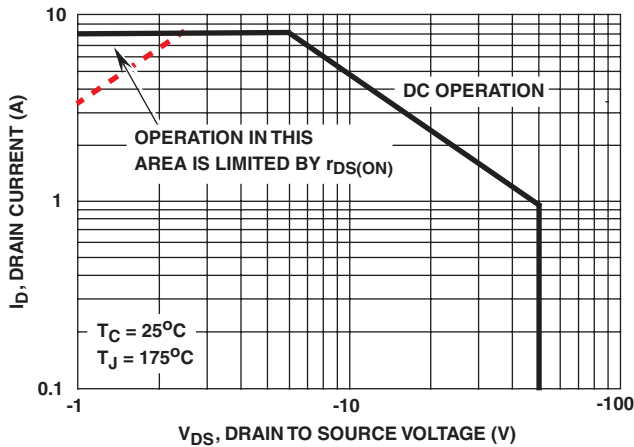CASE TEMPERATURE
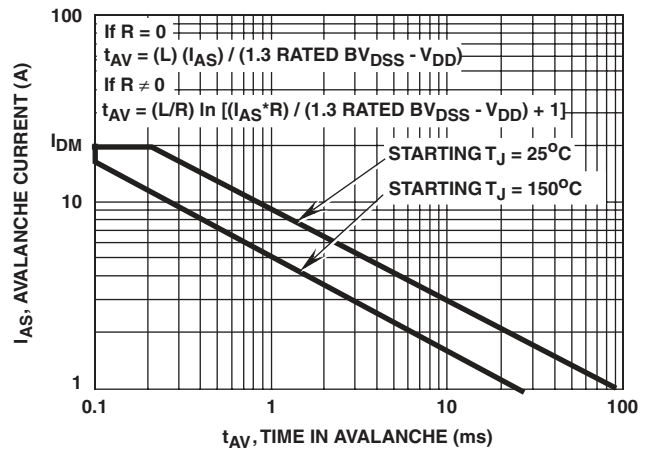

FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

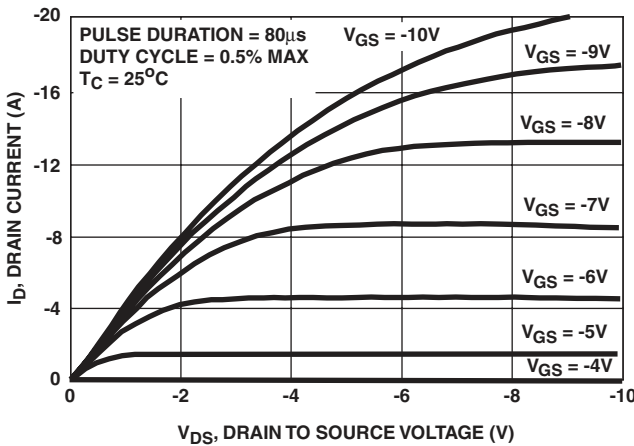FIGURE 4. UNCLAMPED INDUCTIVE SWITCHING CAPABILITY
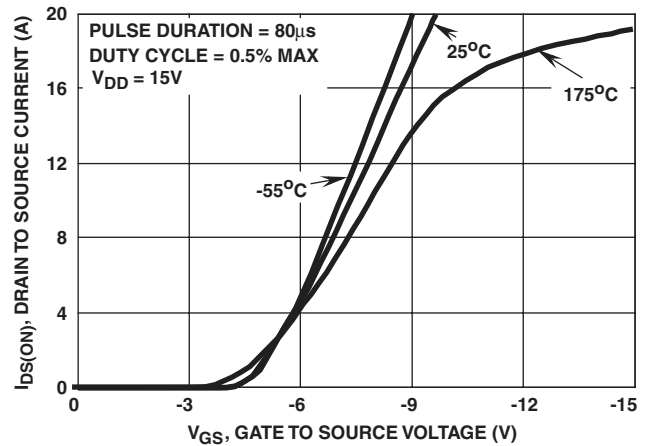

FIGURE 5. SATURATION CHARACTERISTICS

FIGURE 6. TRANSFER CHARACTERISTICS
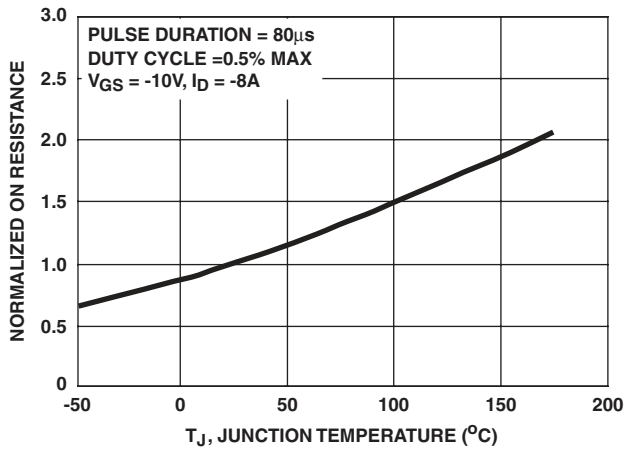
Typical Performance Curves Unless Otherwise Specified

FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE
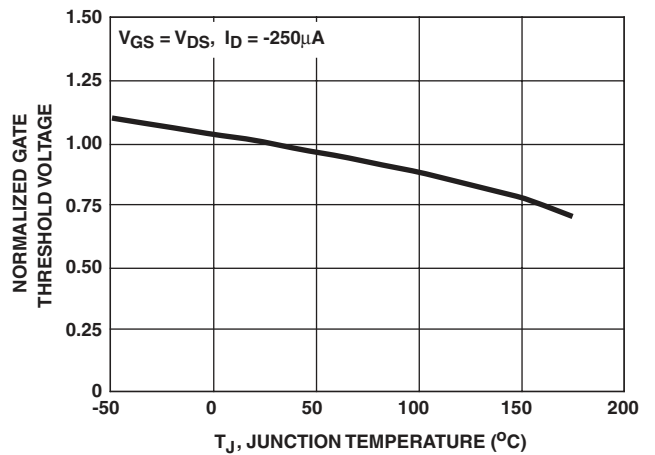
FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE
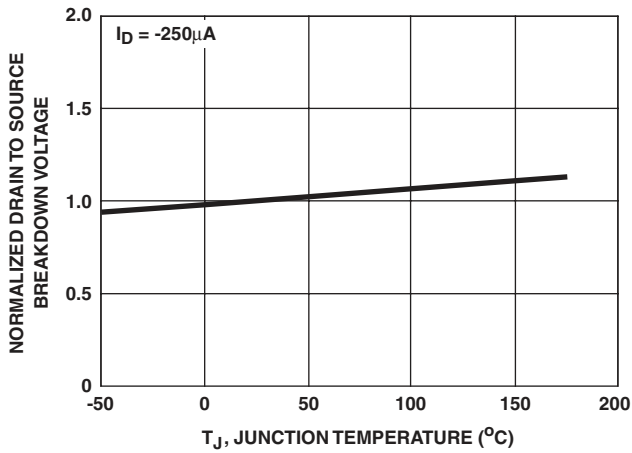

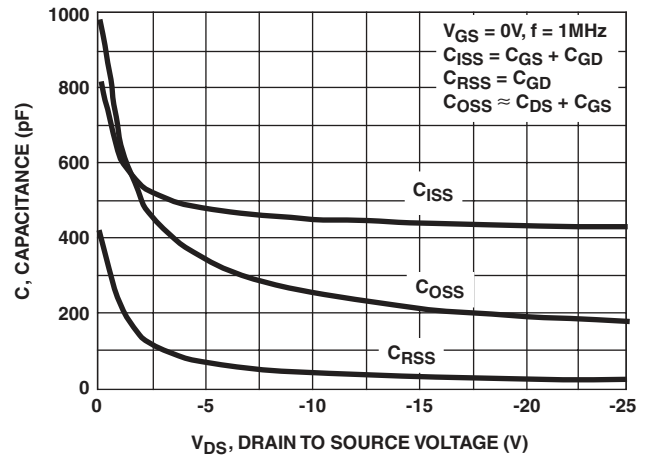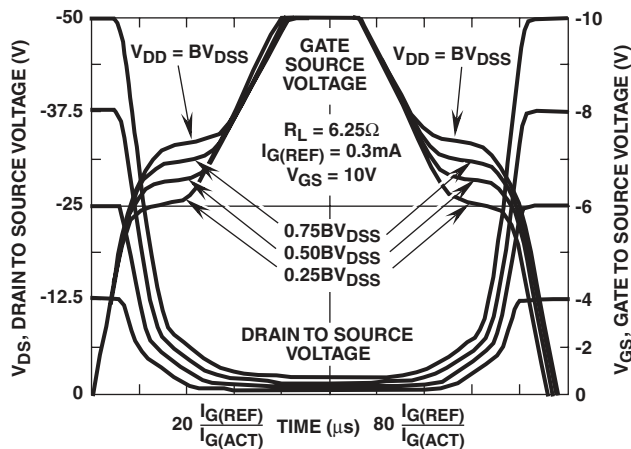**FIGURE 9. NORMALIZED DRAIN TO SOURCE BREAKDOWN VOLTAGE vs JUNCTION TEMPERATURE**

FIGURE 10. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE

NOTE: Refer to Application Notes AN7254 and AN7260.

FIGURE 11. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT
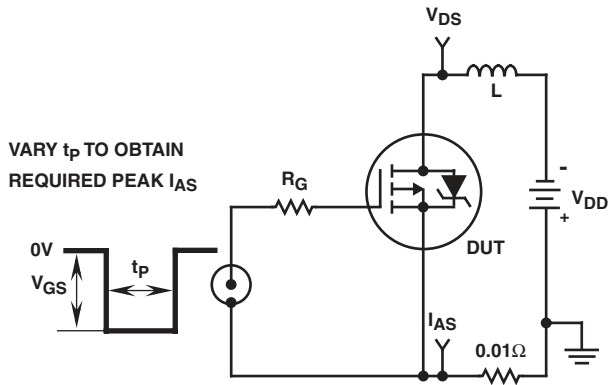
Test Circuits and Waveforms

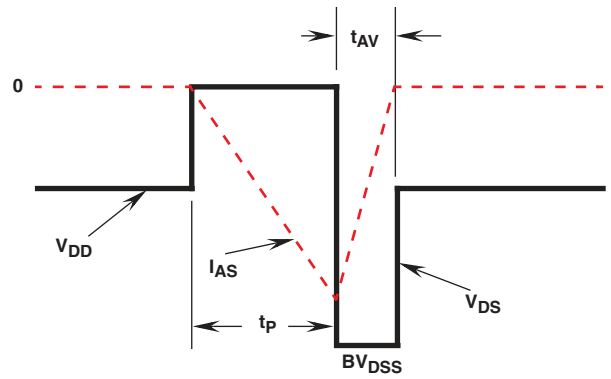FIGURE 12. UNCLAMPED ENERGY TEST CIRCUIT

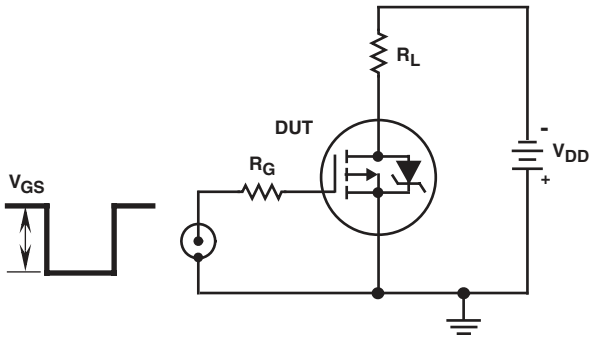FIGURE 13. UNCLAMPED ENERGY WAVEFORMS
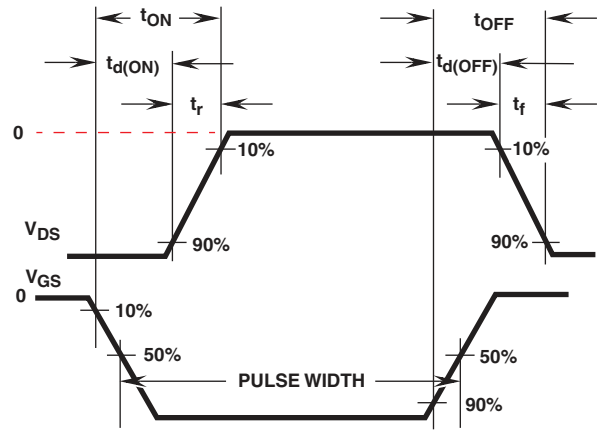
FIGURE 14. SWITCHING TIME TEST CIRCUIT

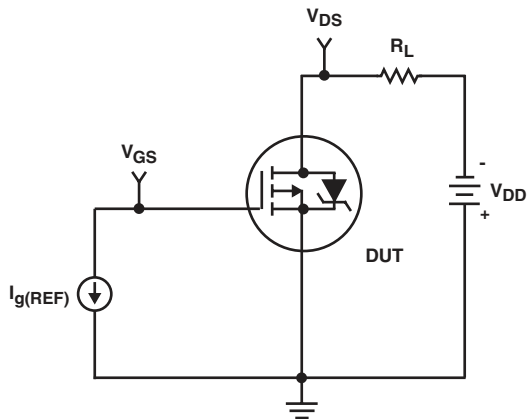FIGURE 15. RESISTIVE SWITCHING WAVEFORMS

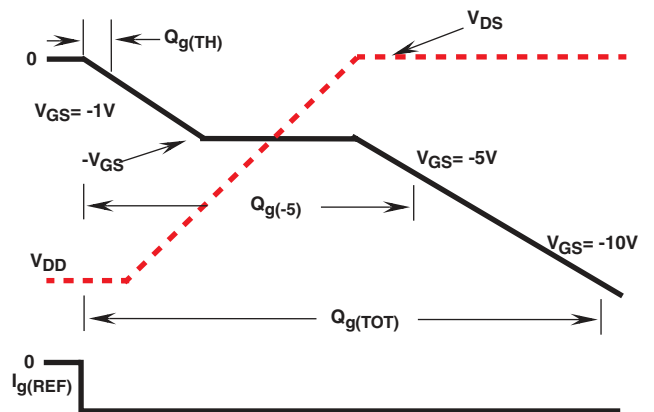FIGURE 16. GATE CHARGE TEST CIRCUIT

FIGURE 17. GATE CHARGE WAVEFORMS

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