

# RFP2P08 RFP2P10

## P-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

### Features

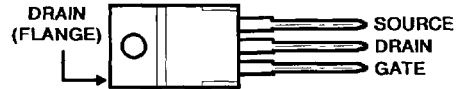
- -2A, -80V and -100V
- $r_{DS(ON)} = 3.5\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

### Description

The RFP2P08 and RFP2P10 are P-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring high speed and low gate-drive power. These types can be operated directly from integrated circuits.

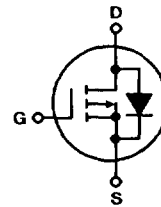
The RFP series types are supplied in the JEDEC TO-220AB plastic package.

### Package

 TO-220AB  
TOP VIEW


### Terminal Diagram

P-CHANNEL ENHANCEMENT MODE



### Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ ) Unless Otherwise Specified

	RFP2P08	RFP2P10	UNITS	
Drain-Source Voltage .....	$V_{DS}$	-80	-100	V
Drain-Gate Voltage ( $R_{GS} = 1\text{m}\Omega$ ) .....	$V_{DGR}$	-80	-100	V
Continuous Drain Current				
RMS Continuous .....	$I_D$	2	2	A
Pulsed Drain Current .....	$I_{DM}$	5	5	A
Gate-Source Voltage .....	$V_{GS}$	$\pm 20$	$\pm 20$	V
Maximum Power Dissipation				
$T_C = +25^\circ\text{C}$ .....	$P_D$	25	25	W
Above $T_C = +25^\circ\text{C}$ , Derate Linearly .....		0.2	0.2	W/ $^\circ\text{C}$
Operating and Storage Junction .....	$T_J, T_{STG}$	-55 to +150	-55 to +150	$^\circ\text{C}$
Temperature Range				

**5**  
 P-CHANNEL  
 POWER MOSFETS

## Specifications RFP2P08, RFP2P10

**Electrical Characteristics** ( $T_C = +25^\circ\text{C}$ ), Unless Otherwise Specified

CHARACTERISTIC	SYMBOLS	TEST CONDITIONS	LIMITS				UNITS
			RFP2P08		RFP2P10		
			MIN	MAX	MIN	MAX	
Drain-Source Breakdown Voltage	$V_{DSS}$	$I_D = 1\text{mA}, V_{GS} = 0$	-80	-	-100	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 1\text{mA}$	-2	-4	-2	-4	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -65\text{V}$	-	-1	-	-	$\mu\text{A}$
		$V_{DS} = -80\text{V}$	-	-	-	-1	$\mu\text{A}$
		$T_C = +125^\circ\text{C}$ $V_{DS} = -65\text{V}$	-	-50	-	-	$\mu\text{A}$
		$V_{DS} = -80\text{V}$	-	-	-	-50	$\text{mA}$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0$	-	$\pm 100$	-	$\pm 100$	$\text{nA}$
Drain-Source On-Voltage	$V_{DS(on)}^*$	$I_D = 1\text{A}, V_{GS} = -10\text{V}$	-	-3.5	-	-3.5	V
		$I_D = 2\text{A}, V_{GS} = -10\text{V}$	-	-9.0	-	-9.0	V
Static Drain-Source On Resistance	$r_{DS(on)}^*$	$I_D = 1\text{A}, V_{GS} = -10\text{V}$	-	3.5	-	3.5	$\Omega$
Forward Transconductance	$g_{fs}^*$	$I_D = 1\text{A}, V_{DS} = -10\text{V}$	200	-	200	-	$\text{S} (\Omega^{-1})$
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{V}, V_{DS} = -25\text{V}$ $f = 1\text{MHz}$	-	150	-	150	$\text{pF}$
Output Capacitance	$C_{OSS}$		-	80	-	80	$\text{pF}$
Reverse Transfer Capacitance	$C_{RSS}$		-	30	-	30	$\text{pF}$
Turn-On Delay Time	$t_{d(on)}$	$I_D = 1\text{A}, V_{DD} = -50\text{V}$ $R_{GEN} = R_{GS} = 50\Omega$ $V_{GS} = -10\text{V}$	7 (typ)	25	7 (typ)	25	$\text{ns}$
Rise Time	$t_r$		15 (typ)	45	15 (typ)	45	$\text{ns}$
Turn-Off Delay Time	$t_{d(off)}$		14 (typ)	45	14 (typ)	45	$\text{ns}$
Fall Time	$t_f$		11 (typ)	25	11 (typ)	25	$\text{ns}$
Thermal Resistance Junction-to-Case	$R_{\theta JC}$		-	5	-	5	$^\circ\text{C/W}$

\* Pulsed: Pulse duration =  $300\mu\text{s}$  max., duty cycle = 2%.

### Source-Drain Diode Ratings and Characteristics

CHARACTERISTIC	SYMBOLS	TEST CONDITIONS	LIMITS				UNITS
			RFP2P08		RFP2P10		
			MIN	MAX	MIN	MAX	
Diode Forward Voltage	$V_{SD}^*$	$I_{SD} = -1\text{A}$	-	-1.4	-	-1.4	V
Diode Reverse Recovery Time	$t_{rr}$	$I_F = 2\text{A}$ $dI_F/dt = 50\text{A}/\mu\text{s}$	-	135 (typ)	-	135 (typ)	$\text{ns}$

\* Pulsed: Pulse duration =  $300\mu\text{s}$  max., duty cycle = 2%.

# RFP2P08, RFP2P10

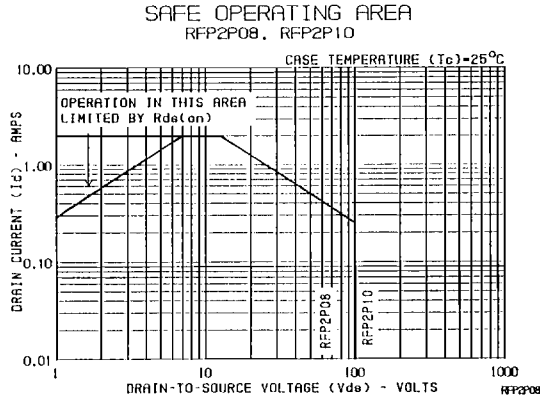


Fig. 1 - Maximum operating areas for all types.

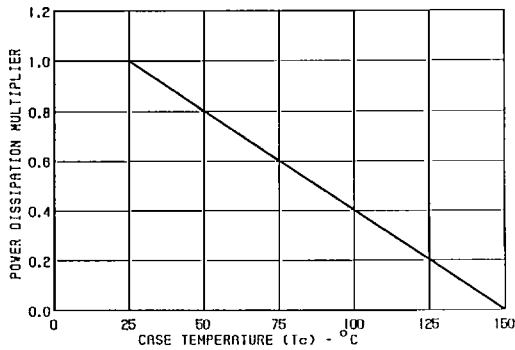


Fig. 2 - Normalized power dissipation vs temperature derating curve.

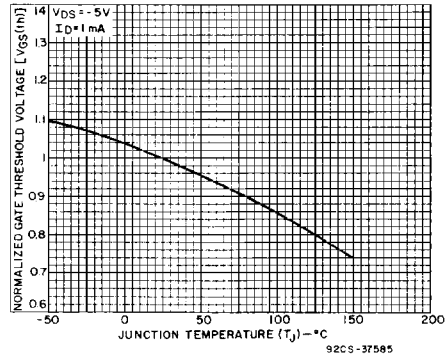


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

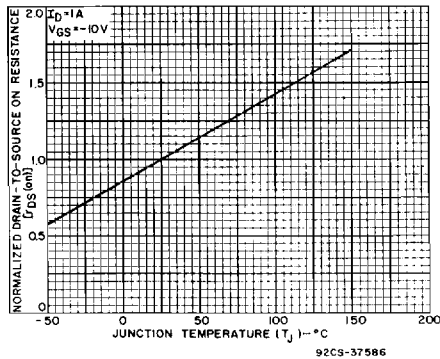


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

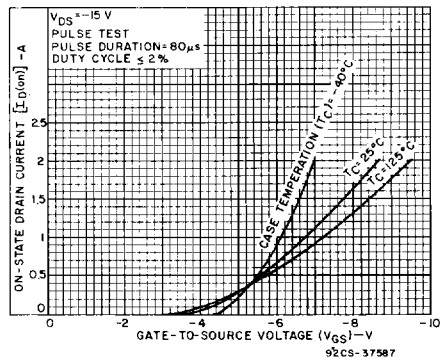


Fig. 5 - Typical transfer characteristics for all types.

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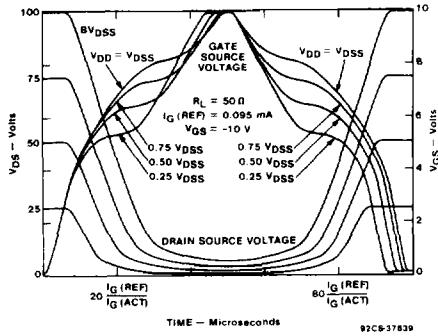


Fig. 6 - Normalized switching waveforms for constant gate-current.

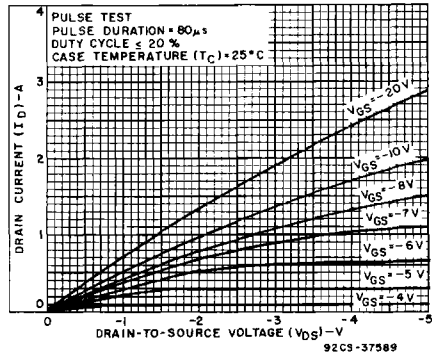


Fig. 7 - Typical saturation characteristics for all types.

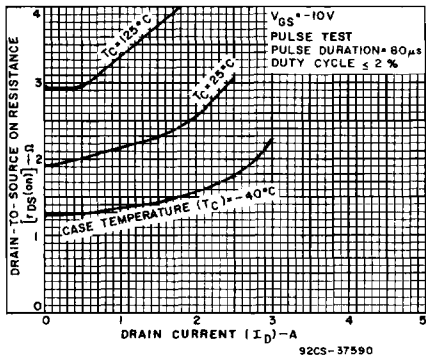


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

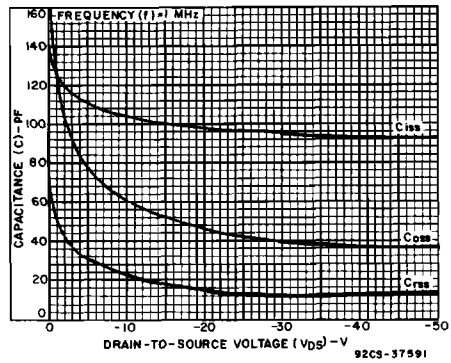


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

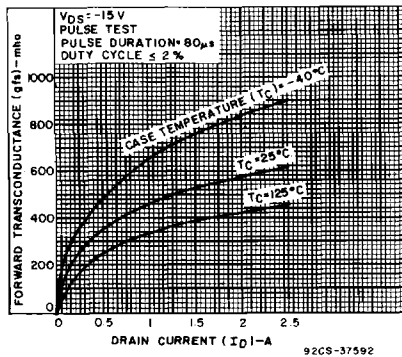


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

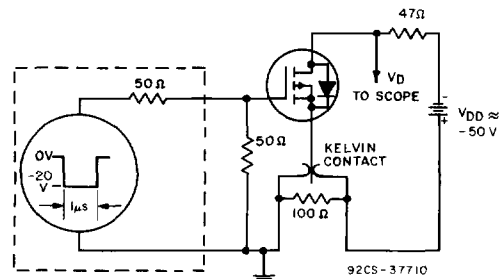


Fig. 11 - Switching time test circuit.