

# RFM6P08/6P10 RFP6P08/6P10

P-Channel Enhancement-Mode  
Power Field-Effect Transistors

August 1991

### Features

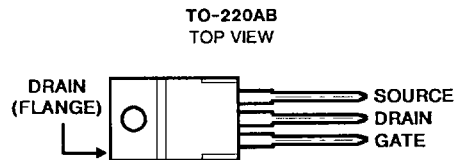
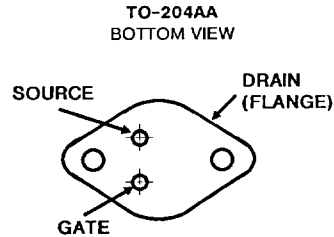
- -6A, -80V and -100V
- $r_{DS(on)} = 0.6\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

### Description

The RFM6P08 and RFM6P10 and the RFP6P08 and RFP6P10 are p-channel enhancement-mode silicon gate power field-effect transistors designed for high-speed applications such as switching regulators, switching converters, relay drivers, and drivers for high-power bipolar switching transistors.

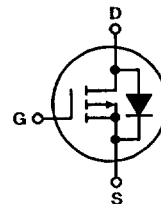
The RFM series types are supplied in the JEDEC TO-204AA metal package and the RFP series types in the JEDEC TO-220AB plastic package. All these types are supplied without an internal gate zener diode.

### Packages



### Terminal Diagram

P-CHANNEL ENHANCEMENT MODE



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

	RFM6P08	RFM6P10	RFP6P08	RFP6P10	UNITS	
Drain-Source Voltage .....	$V_{DS}$	80	100	80	100	V
Drain-Gate Voltage ( $R_{GS} = 1\text{m}\Omega$ ) .....	$V_{DGR}$	80	100	80	100	V
Continuous Drain Current						
RMS Continuous .....	$I_D$	6	6	6	6	A
Pulsed Drain Current .....	$I_{DM}$	20	20	20	20	A
Gate-Source Voltage .....	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	V
Maximum Power Dissipation						
$T_C = +25^\circ\text{C}$ .....	$P_D$	75	75	60	60	W
Above $T_C = +25^\circ\text{C}$ , Derate Linearly .....		0.6	0.6	0.48	0.48	W/ $^\circ\text{C}$
Operating and Storage Junction .....	$T_J, T_{STG}$	-55 to +150	-55 to +150	-55 to +150	-55 to +150	$^\circ\text{C}$
Temperature Range						

## Specifications RFM6P08, RFM6P10, RFP6P08, RFP6P10

**ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ )=25°C unless otherwise specified.**

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM6P08 RFP6P08		RFM6P10 RFP6P10		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=1\text{ mA}$ $V_{GS}=0$	-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	$I_{DSS}$	$V_{DS}=-65\text{ V}$ $V_{GS}=-80\text{ V}$	—	1	—	—	$\mu\text{A}$
		$T_C=125^\circ\text{ C}$ $V_{DS}=-65\text{ V}$ $V_{GS}=-80\text{ V}$	—	50	—	50	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20\text{ V}$ $V_{DS}=0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D=3\text{ A}$ $V_{GS}=-10\text{ V}$	—	-1.8	—	-1.8	V
		$I_D=6\text{ A}$ $V_{GS}=-10\text{ V}$	—	-6	—	-6	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D=3\text{ A}$ $V_{GS}=-10\text{ V}$	—	0.6	—	0.6	$\Omega$
Forward Transconductance	$g_{fs}^a$	$V_{DS}=10\text{ V}$ $I_D=3\text{ A}$	1	—	1	—	mho
Input Capacitance	$C_{iss}$	$V_{DS}=25\text{ V}$	—	800	—	800	pF
Output Capacitance	$C_{oss}$	$V_{GS}=0\text{ V}$	—	350	—	350	
Reverse Transfer Capacitance	$C_{rss}$	$f=1\text{ MHz}$	—	150	—	150	
Turn-On Delay Time	$t_d(on)$	$V_{DD}=50\text{ V}$	11(typ)	60	11(typ)	60	ns
Rise Time	$t_r$	$I_D=3\text{ A}$	48(typ)	100	48(typ)	100	
Turn-Off Delay Time	$t_d(off)$	$R_{gen}=R_{gs}=50\ \Omega$	102(typ)	150	102(typ)	150	
Fall Time	$t_f$	$V_{GS}=10\text{ V}$	70(typ)	100	70(typ)	100	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM6P08, RFM6P10	—	1.67	—	1.67	$^\circ\text{C/W}$
		RFP6P08, RFP6P10	—	2.083	—	2.083	

<sup>a</sup>Pulsed: Pulse duration = 300  $\mu\text{s}$  max., duty cycle = 2%.

### SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM6P08 RFP6P08		RFM6P10 RFP6P10		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	$V_{SD}$	$I_{SD}=3\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	$t_{rr}$	$I_F=4\text{ A}$ $dI_F/dt=50\text{ A}/\mu\text{s}$	150(typ)		150(typ)		ns

<sup>a</sup>Pulse Test: Width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .

# RFM6P08, RFM6P10, RFP6P08, RFP6P10

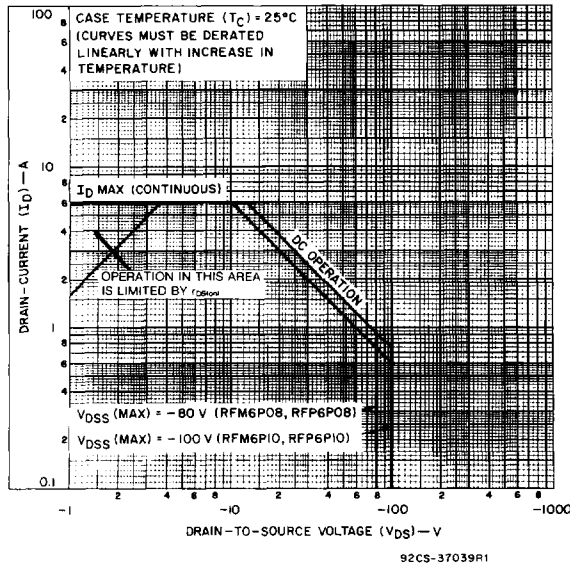


Fig. 1 — Maximum safe operating areas for all types.

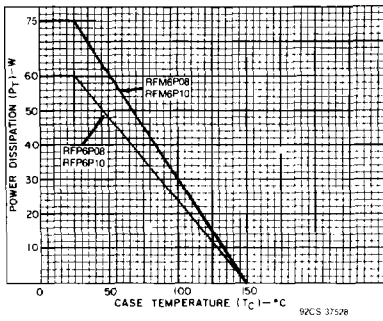


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

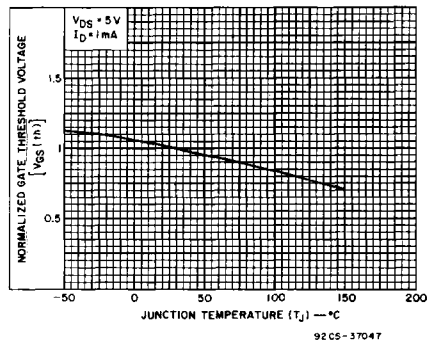


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

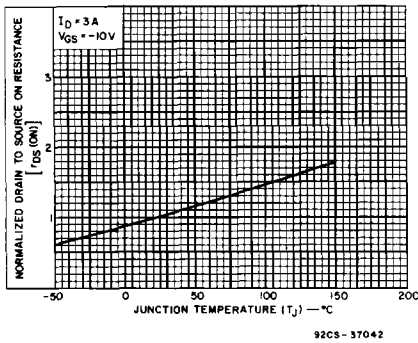


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

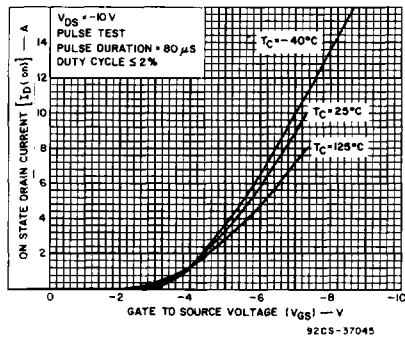


Fig. 5 — Typical transfer characteristics for all types.

5  
P-CHANNEL  
POWER MOSFETS

# RFM6P08, RFM6P10, RFP6P08, RFP6P10

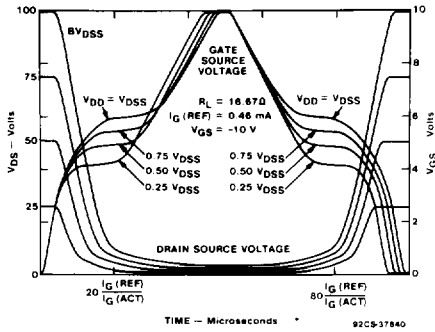


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

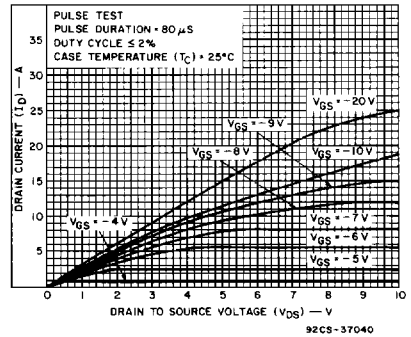


Fig. 7 - Typical saturation characteristics for all types.

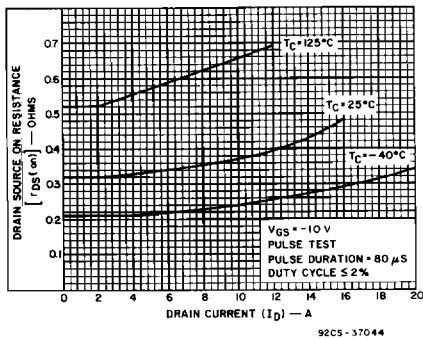


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

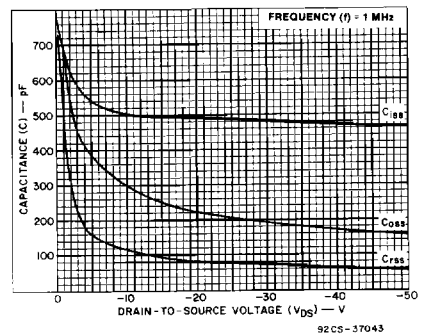


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

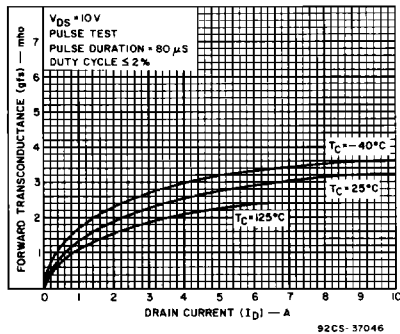


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

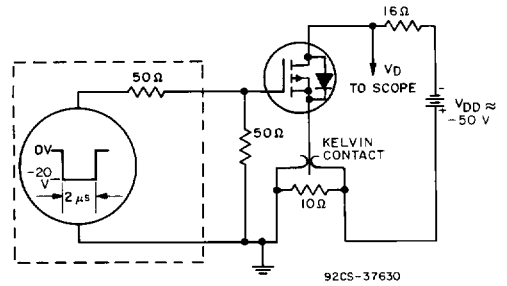


Fig. 11 - Switching Time Test Circuit.