HARRIS

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

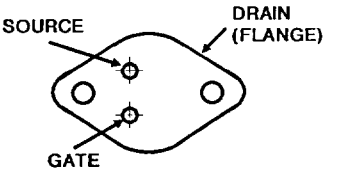
Description

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.

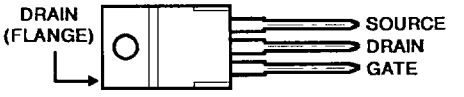
The RFM series types are supplied in the JEDEC TO-204AA metal package and the RFP series types in the JEDEC TO-220AB plastic package. All these types are supplied without an internal gate zener diode.

Packages

TO-204AA
BOTTOM VIEW

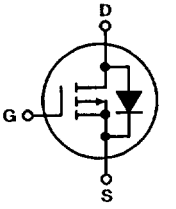


TO-220AB
TOP VIEW



Terminal Diagram

P-CHANNEL ENHANCEMENT MODE



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

	RFM6P08	RFM6P10	RFP6P08	RFP6P10	UNITS
Drain-Source Voltage ..... V_{DS}	80	100	80	100	V
Drain-Gate Voltage ($R_{GS} = 1m\Omega$) ..... 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}	±20	±20	±20	±20	V
Maximum Power Dissipation					
$T_C = +25^oC$ ..... P_D	75	75	60	60	W
Above $T_C = +25^oC$, Derate Linearly	0.6	0.6	0.48	0.48	W/^{o}C
Operating and Storage Junction ..... T_J, T_{STG} Temperature Range	-55 to +150	-55 to +150	-55 to +150	-55 to +150	^{o}C

CAUTION: These devices are sensitive to electrostatic discharge. Proper I.C. handling procedures should be followed.

File Number **1490**

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 mA V_{GS}=0	-80	—	-100	—	V
Gate Threshold Voltage	$V_{GS}(th)$	$V_{GS}=V_{DS}$ I_D=1 mA	-2	-4	-2	-4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-65 V V_{DS}=-80 V	— —	1 —	— —	— 1	μA
		T_C=125° C V_{DS}=-65 V V_{DS}=-80 V	— —	50 —	— —	— 50	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20 V V_{DS}=0	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS}(on)$[a]	I_D=3 A V_{GS}=-10 V	—	-1.8	—	-1.8	V
		I_D=6 A V_{GS}=-10 V	—	-6	—	-6	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=3 A V_{GS}=-10 V	—	0.6	—	0.6	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V I_D=3 A	1	—	1	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V	—	800	—	800	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	350	—	350	pF
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	150	—	150	pF
Turn-On Delay Time	$t_d(on)$	V_{DD} = 50 V	11(typ)	60	11(typ)	60	ns
Rise Time	t_r	I_D=3 A	48(typ)	100	48(typ)	100	ns
Turn-Off Delay Time	$t_d(off)$	$R_{gen}=R_{gs}$=50 Ω	102(typ)	150	102(typ)	150	ns
Fall Time	t_f	V_{GS}=10 V	70(typ)	100	70(typ)	100	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM6P08, RFM6P10	—	1.67	—	1.67	°C/W
		RFP6P08, RFP6P10	—	2.083	—	2.083	°C/W

[a]Pulsed: Pulse duration = 300 μs 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 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=50 A/μs	150(typ)		150(typ)		ns

*Pulse Test: Width ≤ 300 μs, duty cycle ≤ 2%.

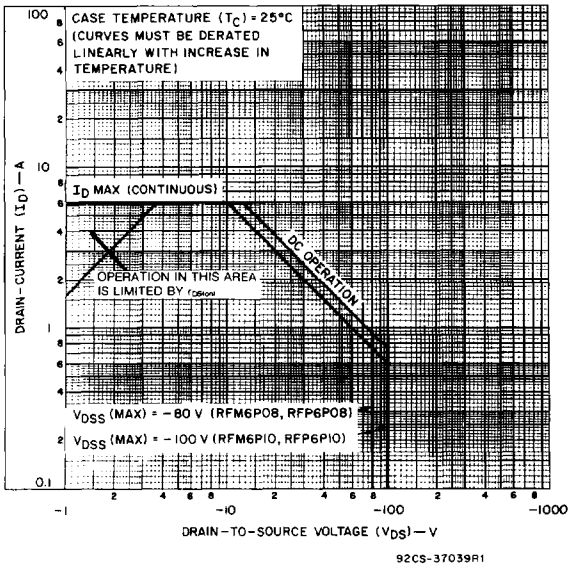


Fig. 1 — Maximum safe operating areas for all types.

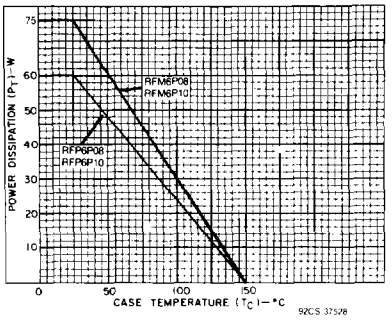


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

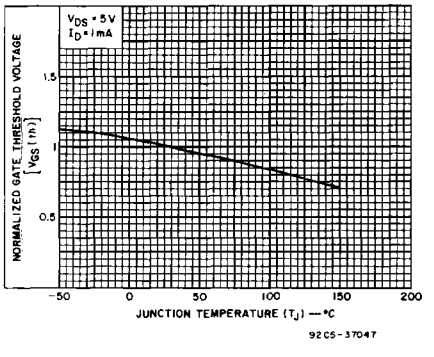


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

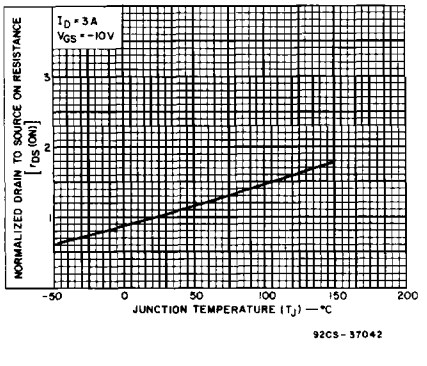


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

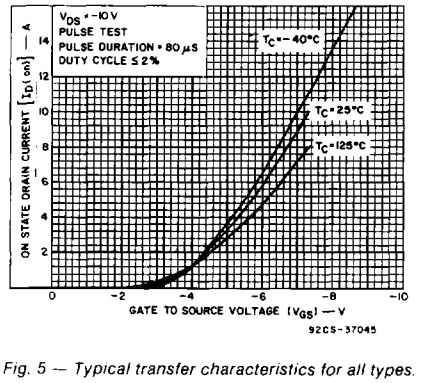


Fig. 5 — Typical transfer characteristics for all types.

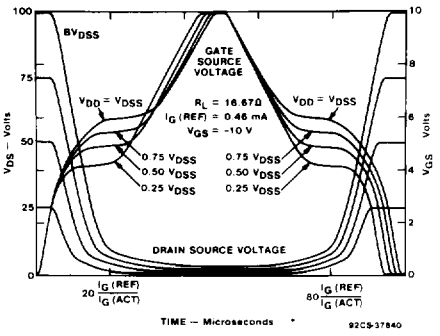


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

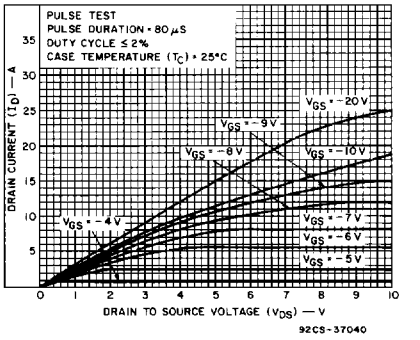


Fig. 7 — Typical saturation characteristics for all types.

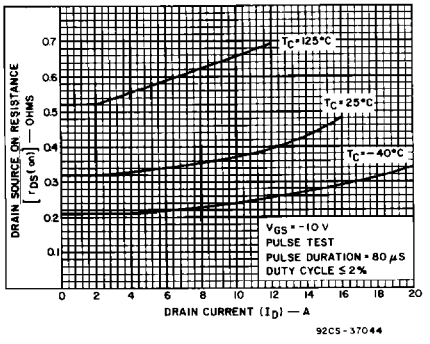


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

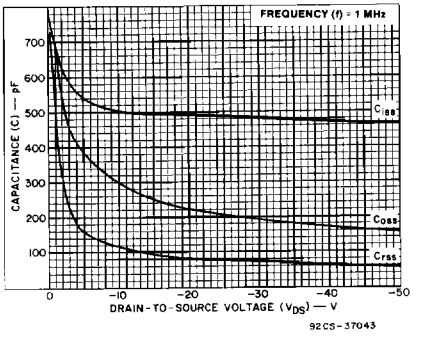


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

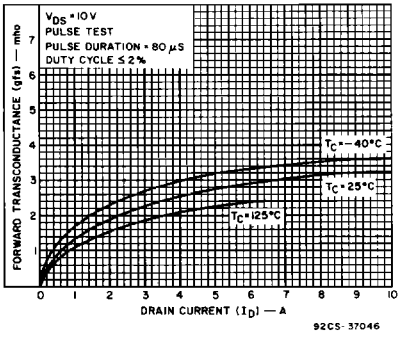


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

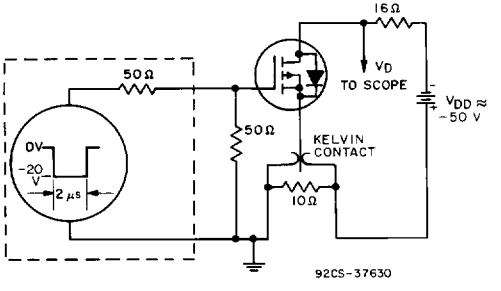


Fig. 11 - Switching Time Test Circuit.