HARRIS

RFM12P08/12P10
RFP12P08/12P10

P-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

Features

- -12A, -80V and -100V
- $r_{DS(on)} = 0.3\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

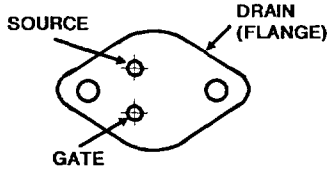
Description

The RFM12P08 and RFM12P10 and the RFP12P08 and RFP12P10 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.

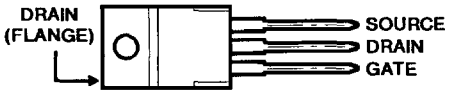
The RFM series types are supplied in the JEDEC TO-204AA steel package and the RFP series types in the JEDEC TO-220AB plastic package.

Packages

TO-204AA
BOTTOM VIEW

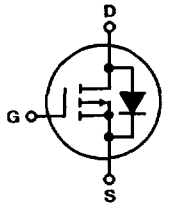


TO-220AB
TOP VIEW



Terminal Diagram

P-CHANNEL ENHANCEMENT MODE



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

	RFM12P08	RFM12P10	RFP12P08	RFP12P10	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	12	12	12	12	A
Pulsed Drain Current ..... I_{DM}	30	30	30	30	A
Gate-Source Voltage ..... V_{GS}	±20	±20	±20	±20	V
Maximum Power Dissipation					
$T_C = +25^oC$ ..... P_D	100	100	75	75	W
Above $T_C = +25^oC$, Derate Linearly	0.8	0.8	0.6	0.6	$W/^oC$
Operating and Storage Junction Temperature Range ..... T_J, T_{STG}	-55 to +150	-55 to +150	-55 to +150	-55 to +150	^oC

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

File Number **1495**

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			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=6 A V_{GS}=-10 V	—	-1.8	—	-1.8	V
		I_D=12 A V_{GS}=-10 V	—	-4.8	—	-4.8	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=6 A V_{GS}=-10 V	—	.3	—	.3	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=-10 V I_D=6 A	2	—	2	—	mho
Input Capacitance	C_{iss}	V_{DS}=-25 V	—	1500	—	1500	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	700	—	700	pF
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	300	—	300	pF
Turn-On Delay Time	$t_d(on)$	V_{DD}=50 V	18(typ)	60	18(typ)	60	ns
Rise Time	t_r	I_D=6 A	90(typ)	175	90(typ)	175	ns
Turn-Off Delay Time	$t_d(off)$	R_{gen}=R_{gs}=50 Ω	144(typ)	275	144(typ)	275	ns
Fall Time	t_f	V_{GS}=-10 V	94(typ)	175	94(typ)	175	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM12P08, RFM12P10	—	1.25	—	1.25	°C/W
		RFP12P08, RFP12P10	—	1.67	—	1.67	°C/W

[a]Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}	I_{SD}=6 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/μs	200(typ)		200(typ)		ns

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

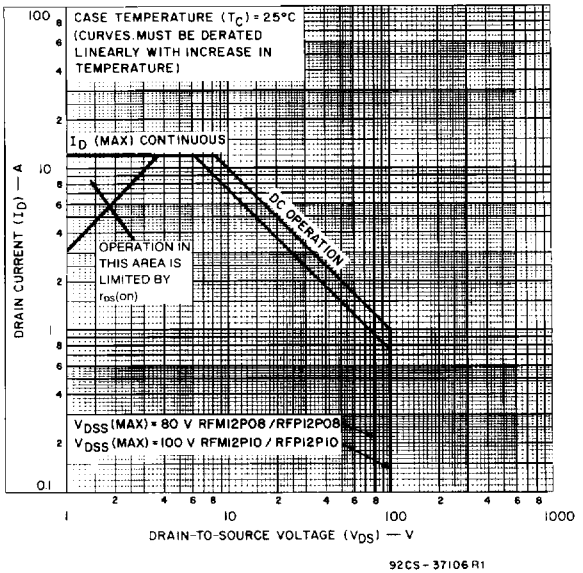


Fig. 1 — Maximum safe operating areas for all types.

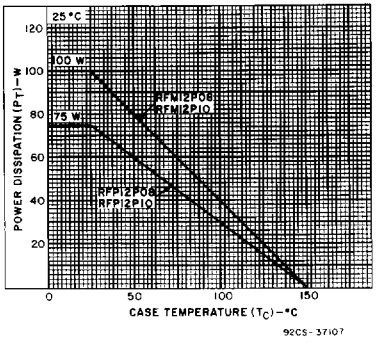


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

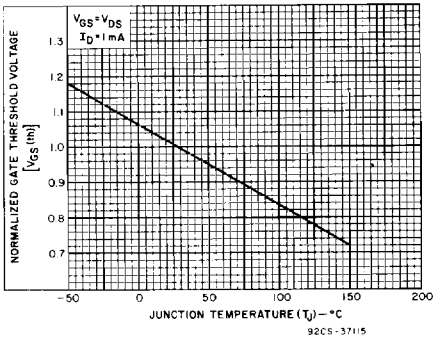


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

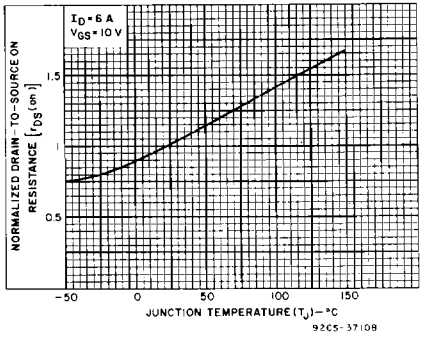


Fig. 4 — Normalized drain-to-source on resistance as a function of junction temperature for all types.

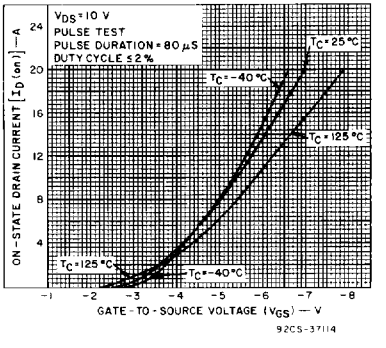


Fig. 5 — Typical transfer characteristics for all types.

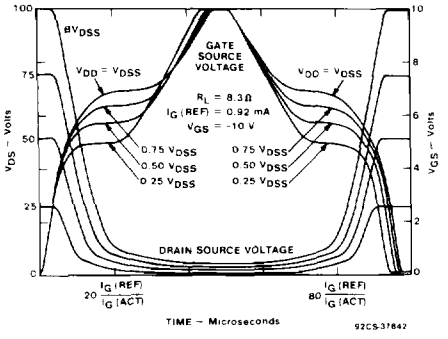


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

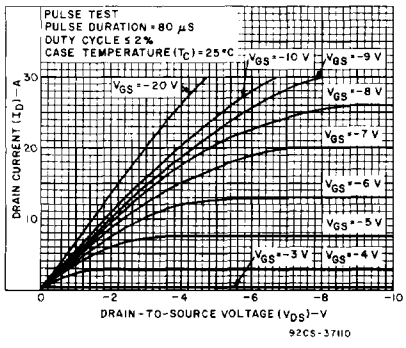


Fig. 7 — Typical saturation characteristics for all types.

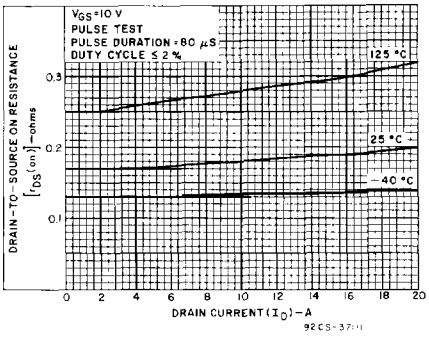


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

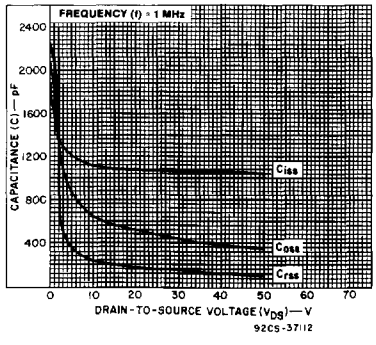


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

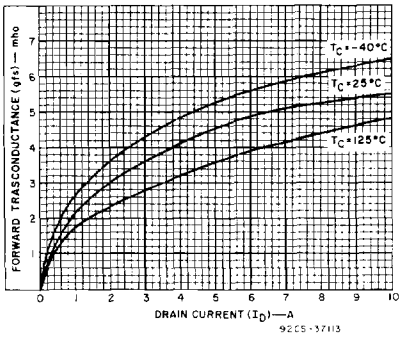


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

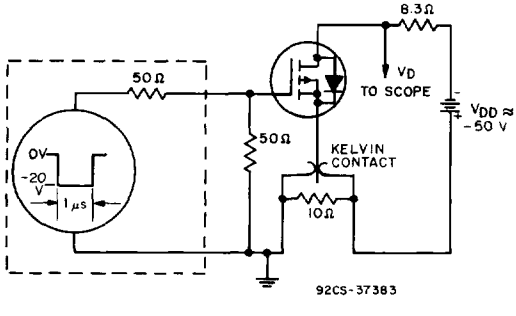


Fig. 11 — Switching Time Test Circuit