

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

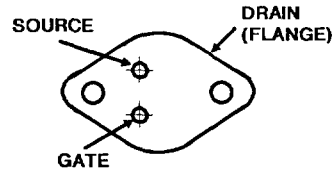
Description

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.

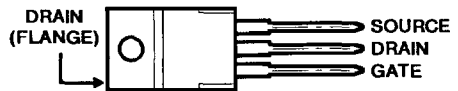
The RFM series types are supplied in the JEDEC TO-204AA steel package and the RFP series types in the JEDEC TO-220AB plastic package.

Packages

TO-204AA
BOTTOM VIEW

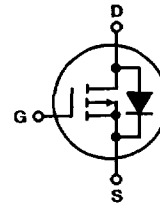


TO-220AB
TOP VIEW



Terminal Diagram

P-CHANNEL ENHANCEMENT MODE



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

	RFM12P08	RFM12P10	RFP12P08	RFP12P10	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	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						
$T_C = +25^\circ\text{C}$	P_D	100	100	75	75	W
Above $T_C = +25^\circ\text{C}$, Derate Linearly		0.8	0.8	0.6	0.6	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 RFM12P08, RFM12P10, RFP12P08, RFP12P10

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 _{GS} =-80 V	—	1	—	—	μA
		T _C =125°C V _{DS} =-65 V V _{GS} =-80 V	—	50	—	50	
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	
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	
Reverse Transfer Capacitance	C _{rss}	f = 1MHz	—	300	—	300	
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	
Turn-Off Delay Time	t _{d(off)}	R _{gen} =R _{qs} =50 Ω	144(typ)	275	144(typ)	275	
Fall Time	t _f	V _{GS} =-10 V	94(typ)	175	94(typ)	175	
Thermal Resistance Junction-to-Case	R _{θJC}	RFM12P08, RFM12P10	—	1.25	—	1.25	
		RFP12P08, RFP12P10	—	1.67	—	1.67	

^aPulsed: 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 _f /d _r =100 A/μs	200(typ)		200(typ)		ns

^aPulse Test: Width ≤ 300 μs, duty cycle ≤ 2%.

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**P-CHANNEL
POWER MOSFETS**

RFM12P08, RFM12P10, RFP12P08, RFP12P10

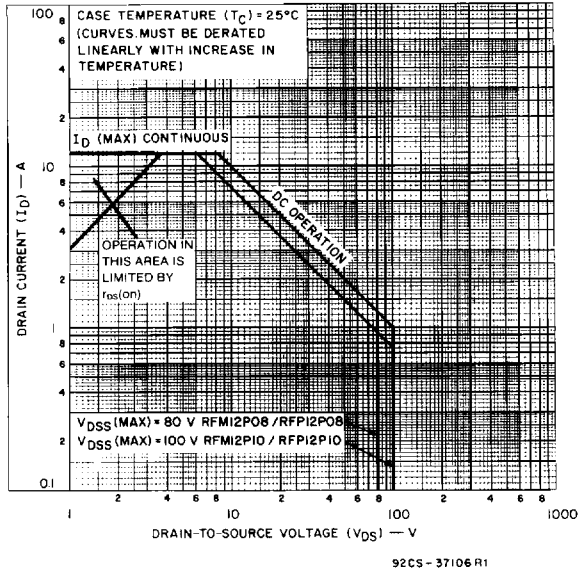


Fig. 1 — Maximum safe operating areas for all types.

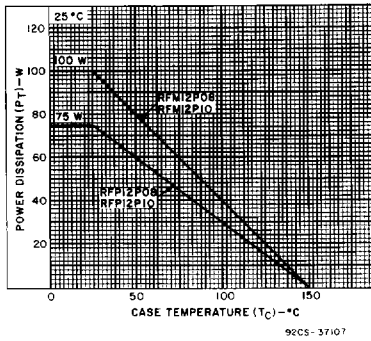


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

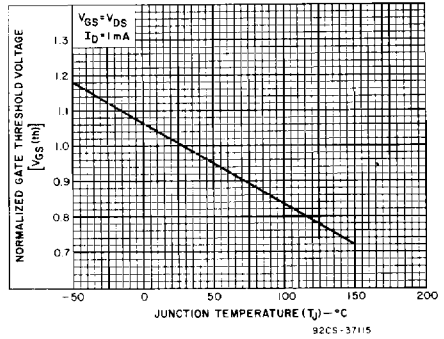


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

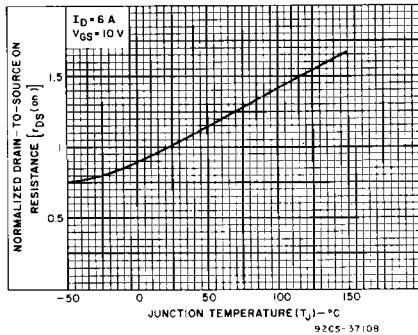


Fig. 4 — Normalized drain-to-source on resistance as a function of junction temperature for all types.

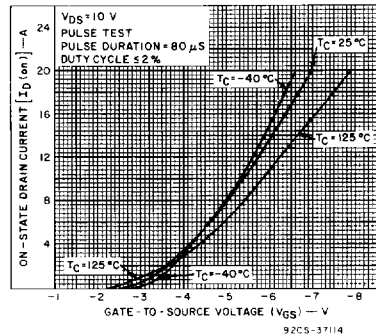


Fig. 5 — Typical transfer characteristics for all types.

RFM12P08, RFM12P10, RFP12P08, RFP12P10

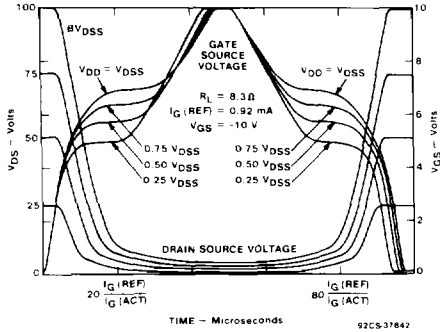


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

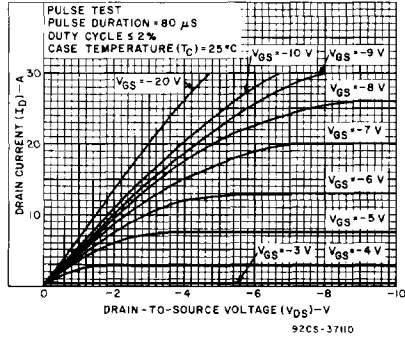


Fig. 7 - Typical saturation characteristics for all types.

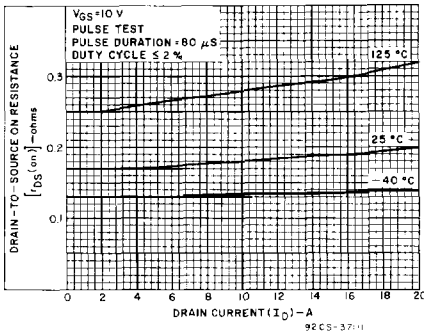


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

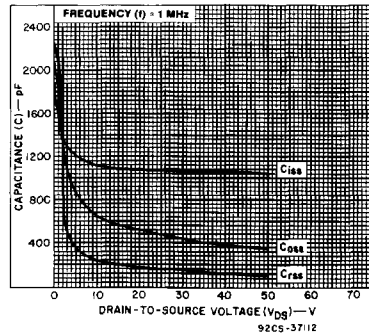


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

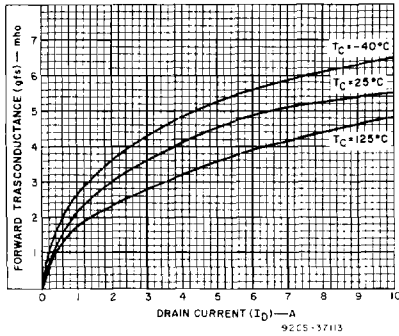


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

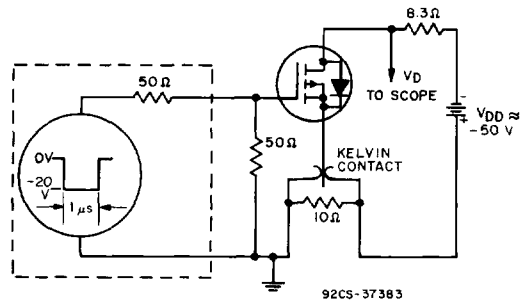


Fig. 11 - Switching Time Test Circuit

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P-CHANNEL
POWER MOSFETS