

Power MOS Field-Effect Transistors

P-Channel Enhancement-Mode Power Field-Effect Transistors

12 A, -80 V and -100 V
 $r_{DS(on)} = 0.3 \Omega$

Features:

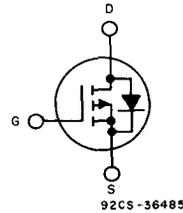
- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

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

*The RFM and RFP series were formerly RCA developmental numbers TA9410 and TA9411, respectively.

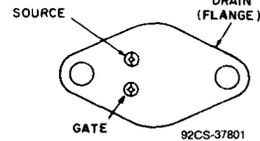
TERMINAL DIAGRAM



P-CHANNEL ENHANCEMENT MODE

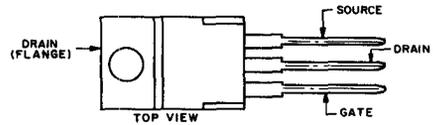
TERMINAL DESIGNATIONS

RFM12P08
RFM12P10



RFP12P08
RFP12P10

JEDEC TO-204AA



JEDEC TO-220AB

MAXIMUM RATINGS, Absolute-Maximum Values ($T_C=25^\circ C$):

	RFM12P08	RFM12P10		RFP12P08	RFP12P10	
DRAIN-SOURCE VOLTAGE	-80	-100		-80	-100	V
DRAIN-GATE VOLTAGE ($R_{DS}=1 M\Omega$)	-80	-100		-80	-100	V
GATE-SOURCE VOLTAGE	_____		± 20	_____		V
DRAIN CURRENT, RMS Continuous	_____		12	_____		A
Pulsed	_____		30	_____		A
POWER DISSIPATION @ $T_C=25^\circ C$	100	100		75	75	W
Derate above $T_C=25^\circ C$	0.8	0.8		0.6	0.6	W/ $^\circ C$
OPERATING AND STORAGE TEMPERATURE	_____		-55 to +150	_____		$^\circ C$

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}	$I_D=1\text{ mA}$ $V_{GS}=0$	-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	—	—	μA
		$T_c=125^\circ\text{C}$ $V_{DS}=-65\text{ V}$ $V_{GS}=-80\text{ V}$	—	50	—	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{ V}$ $V_{DS}=0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D=6\text{ A}$ $V_{GS}=-10\text{ V}$	—	-1.8	—	-1.8	V
		$I_D=12\text{ A}$ $V_{GS}=-10\text{ V}$	—	-4.8	—	-4.8	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D=6\text{ A}$ $V_{GS}=-10\text{ V}$	—	.3	—	.3	Ω
Forward Transconductance	g_{fs}^a	$V_{DS}=-10\text{ V}$ $I_D=6\text{ A}$	2	—	2	—	mho
Input Capacitance	C_{iss}	$V_{DS}=-25\text{ V}$	—	1500	—	1500	pF
Output Capacitance	C_{oss}	$V_{GS}=0\text{ V}$	—	700	—	700	
Reverse Transfer Capacitance	C_{rss}	$f=1\text{ MHz}$	—	300	—	300	
Turn-On Delay Time	$t_d(on)$	$V_{DD}=50\text{ V}$	18(typ)	60	18(typ)	60	ns
Rise Time	t_r	$I_D=6\text{ A}$	90(typ)	175	90(typ)	175	
Turn-Off Delay Time	$t_d(off)$	$P_{gen}=P_{gs}=50\text{ W}$	144(typ)	275	144(typ)	275	
Fall Time	t_f	$V_{GS}=-10\text{ V}$	94(typ)	175	94(typ)	175	
Thermal Resistance Junction-to-Case	$R_{\theta jc}$	RFM12P08, RFM12P10	—	1.25	—	1.25	$^\circ\text{C/W}$
		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}	$I_{SD}=6\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	$I_F=4\text{ A}$ $d_I/d_t=100\text{ A}/\mu\text{s}$	200(typ)		200(typ)		ns

^{*}Pulse Test: Width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

RFM12P08, RFM12P10, RFP12P08, RFP12P10

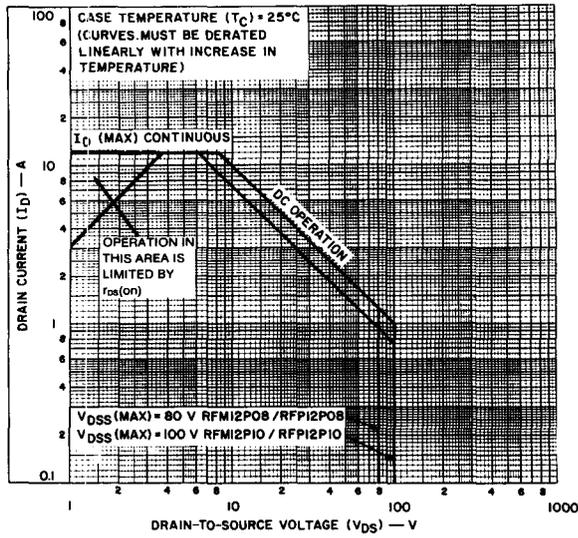


Fig. 1 — Maximum safe operating areas for all types.

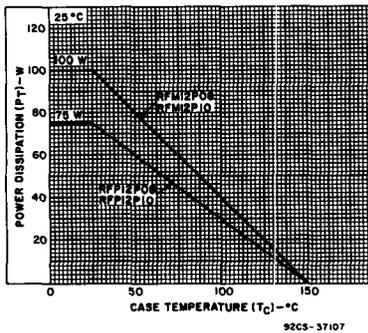


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

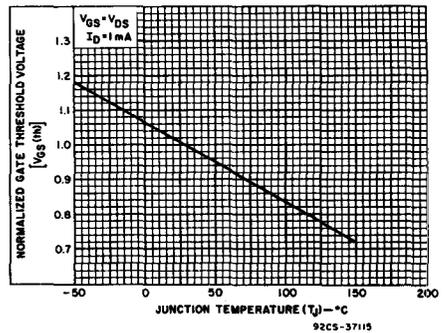


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

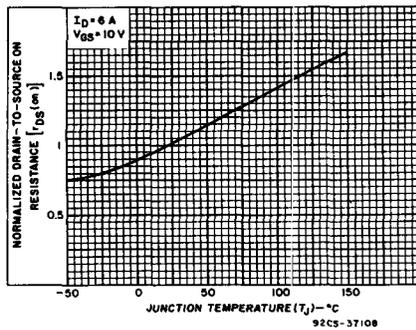


Fig. 4 — Normalized drain-to-source on resistance as a function of junction temperature for all types.

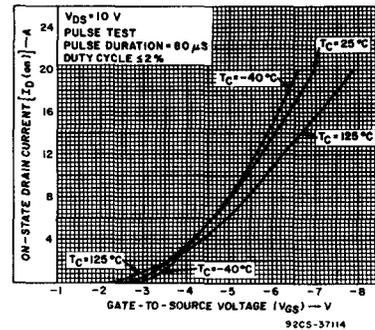


Fig. 5 — Typical transfer characteristics for all types.

RFM12P08, RFM12P10, RFP12P08, RFP12P10

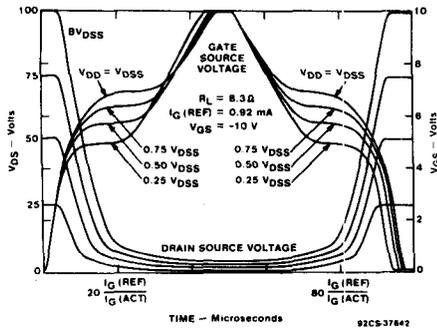


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

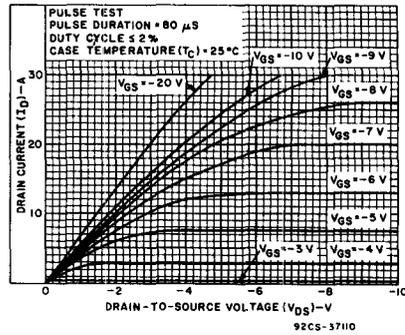


Fig. 7 - Typical saturation characteristics for all types.

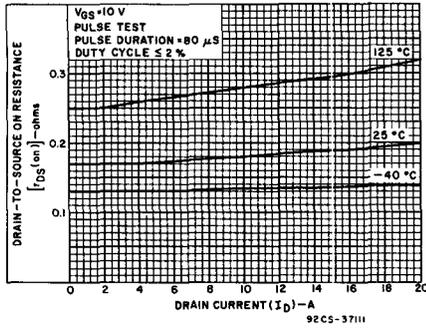


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

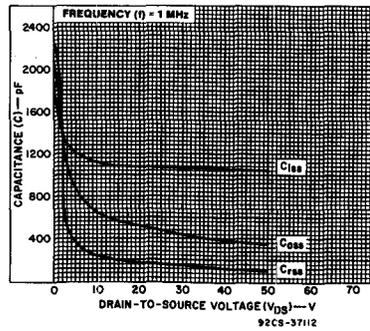


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

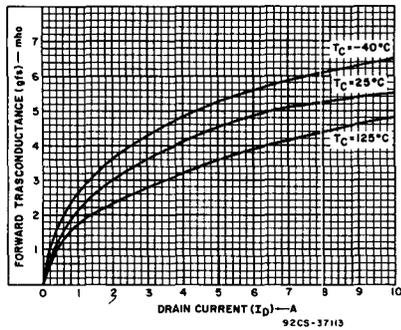


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

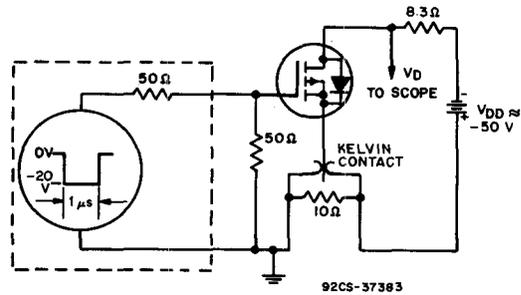


Fig. 11 - Switching Time Test Circuit