

RFM6P08, RFM6P10, RFP6P08, RFP6P10

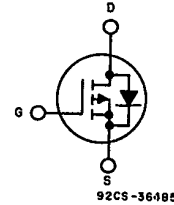
File Number **1490**

P-Channel Enhancement-Mode Power Field-Effect Transistors

6 A, 80 V — 100 V
 $r_{DS(on)} = 0.6 \Omega$

Features:

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

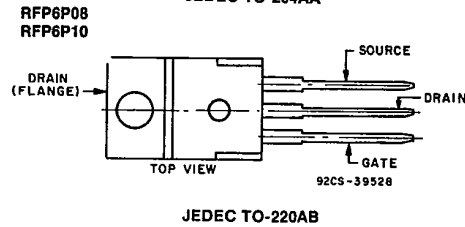
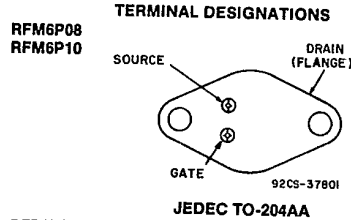


P-CHANNEL ENHANCEMENT MODE

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.

*The RFM and RFP series were formerly RCA developmental numbers TA9406 and TA9407, respectively.



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

	RFM6P08	RFM6P10		RFP6P08	RFP6P10	
DRAIN-SOURCE VOLTAGE	V_{DS}	80	100	80	100	V
DRAIN-GATE VOLTAGE ($R_{GS}=1 M\Omega$) ...	V_{DGR}	80	100	80	100	V
GATE-SOURCE VOLTAGE	V_{GS}	±20		±20		V
DRAIN CURRENT, RMS Continuous	I_D	6		6		A
Pulsed	I_{DM}	20		20		A
POWER DISSIPATION @ $T_C=25^\circ C$	P_T	75	75	60	60	W
Derate above $T_C=25^\circ C$		0.6	0.6	0.48	0.48	W/ $^\circ C$
OPERATING AND STORAGE TEMPERATURE	T_j, T_{stg}	-55 to +150				$^\circ C$

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	—	—	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	$V_{DS(on)}^a$	$I_D=3\text{ A}$ $V_{GS}=-10\text{ V}$	—	-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	Ω
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	$t_{d(on)}$	$V_{DD}=50\text{ V}$ $I_D=3\text{ A}$ $R_{\theta en}=R_{\theta gs}=50\ \Omega$ $V_{GS}=10\text{ V}$	11(typ)	60	11(typ)	60	ns
Rise Time	t_r		48(typ)	100	48(typ)	100	
Turn-Off Delay Time	$t_{d(off)}$		102(typ)	150	102(typ)	150	
Fall Time	t_f		70(typ)	100	70(typ)	100	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$		RFM6P08, RFM6P10	—	1.67	—	
		RFP6P08, RFP6P10	—	2.083	—	2.083	

^aPulsed: 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}	$I_{SD}=3\text{ A}$	—	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

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

RFM6P08, RFM6P10, RFP6P08, RFP6P10

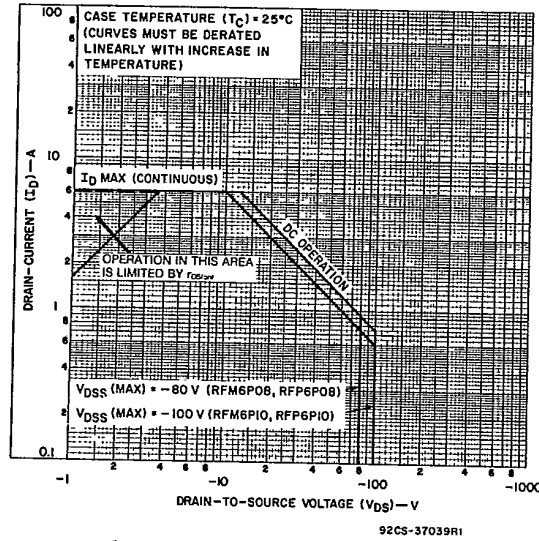


Fig. 1 — Maximum safe operating areas for all types.

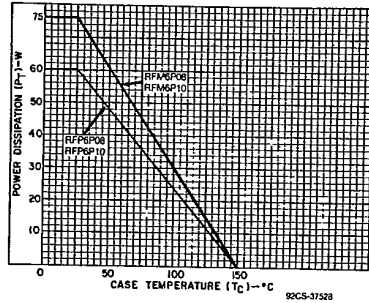


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

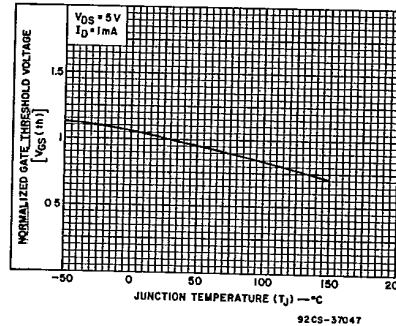


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

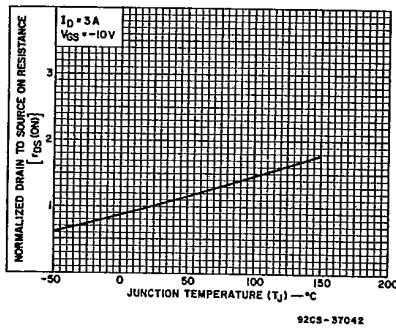


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

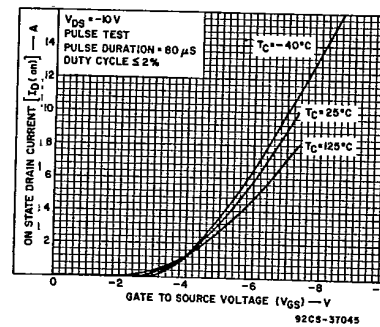


Fig. 5 — Typical transfer characteristics for all types.

RFM6P08, RFM6P10, RFP6P08, RFP6P10

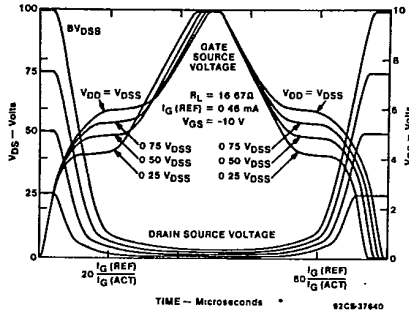


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

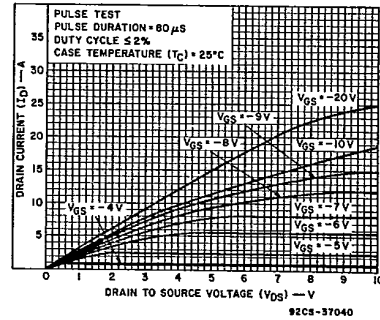


Fig. 7 - Typical saturation characteristics for all types.

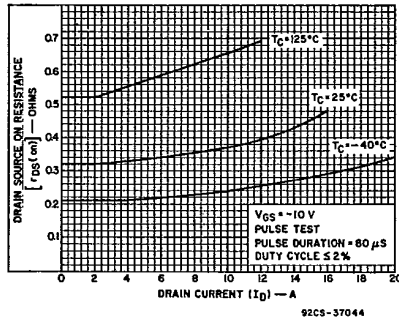


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

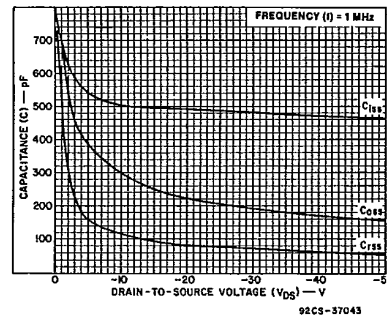


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

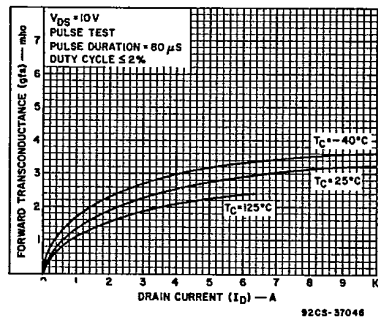


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

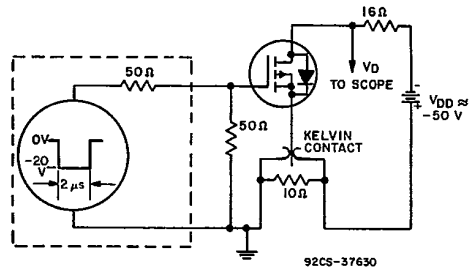


Fig. 11 - Switching Time Test Circuit.

RFM8P08, RFM8P10, RFP8P08, RFP8P10

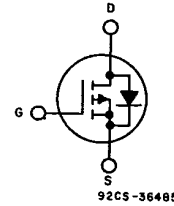
File Number 1496

P-Channel Enhancement-Mode
Power Field-Effect Transistors

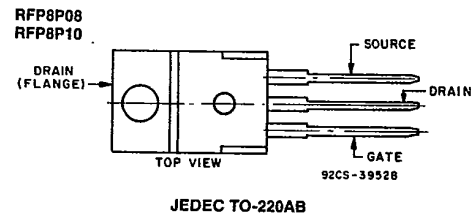
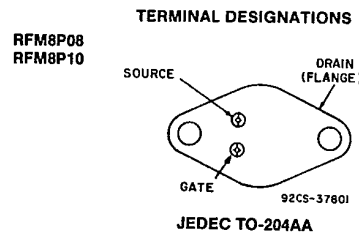
8 A, -80 V and -100 V
 $r_{DS(on)} = 0.4 \Omega$

Features:

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



P-CHANNEL ENHANCEMENT MODE



The RFM8P08 and RFM8P10 and the RFP8P08 and RFP8P10* 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.

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

	RFM8P08	RFM8P10		RFP8P08	RFP8P10	
DRAIN-SOURCE VOLTAGE V_{DS}	-80	-100		-80	-100	V
DRAIN-GATE VOLTAGE ($R_{GS}=1 M\Omega$) ... V_{DGR}	-80	-100		-80	-100	V
GATE-SOURCE VOLTAGE V_{GS}	_____		± 20	_____		V
DRAIN CURRENT, RMS Continuous I_D	_____		8	_____		A
Pulsed I_{DM}	_____		20	_____		A
POWER DISSIPATION @ $T_c=25^\circ C$ P_T	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 T_j, T_{stg}	_____		-55 to +150	_____		$^\circ C$

RFM8P08, RFM8P10, RFP8P08, RFP8P10

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM8P08 RFP8P08		RFM8P10 RFP8P10		
			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	$V_{DS(on)}^a$	$I_D=4\text{ A}$ $V_{GS}=-10\text{ V}$	—	-1.6	—	-1.6	V
		$I_D=8\text{ A}$ $V_{GS}=-10\text{ V}$	—	-4.0	—	-4.0	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D=4\text{ A}$ $V_{GS}=-10\text{ V}$	—	.4	—	.4	Ω
Forward Transconductance	g_{fs}^a	$V_{DS}=-10\text{ V}$ $I_D=4\text{ A}$	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}	$f=1\text{ MHz}$	—	240	—	240	
Turn-On Delay Time	$t_d(on)$	$V_{DD}=50\text{ V}$ $I_D=4\text{ A}$ $R_{gen}=R_{gs}=50\ \Omega$	18(typ)	60	18(typ)	60	ns
Rise Time	t_r		70(typ)	150	70(typ)	150	
Turn-Off Delay Time	$t_d(off)$		166(typ)	275	166(typ)	275	
Fall Time	t_f		94(typ)	175	94(typ)	175	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFM8P08, RFM8P08	—	1.25	—	1.25	$^\circ\text{C/W}$
		RFP8P10, RFP8P10	—	1.67	—	1.67	

*Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM8P08 RFP8P08		RFM8P10 RFP8P10		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V_{SD}	$I_{SD}=4\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_r	$I_F=4\text{ A}$ $d_I/d_t=100\text{ A}/\mu\text{s}$	200(typ.)		200(typ.)		ns

*Pulse Test: Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

RFM8P08, RFM8P10, RFP8P08, RFP8P10

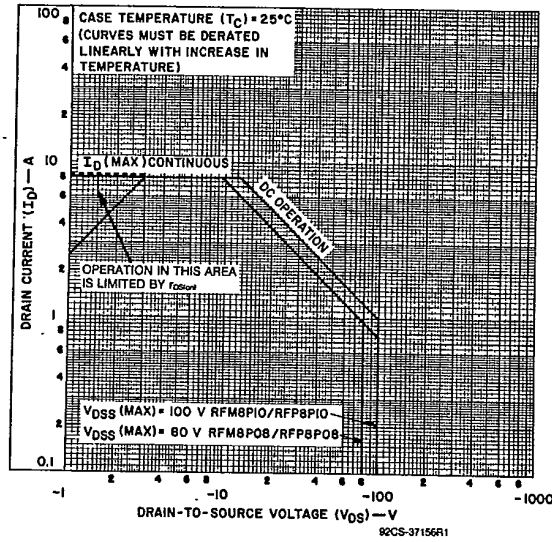


Fig. 1 — Maximum operating areas for all types.

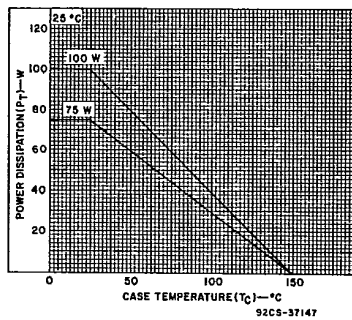


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

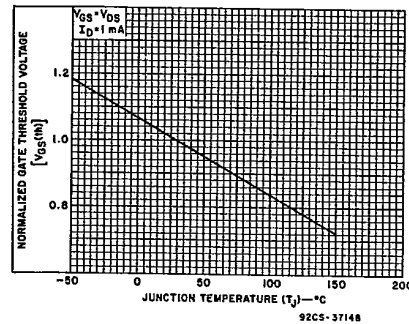


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

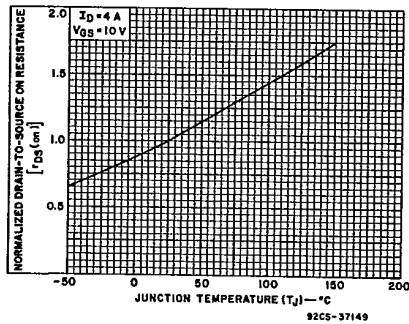


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

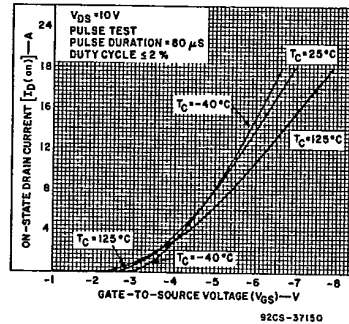


Fig. 5 — Typical transfer characteristics for all types.

RFM8P08, RFM8P10, RFP8P08, RFP8P10

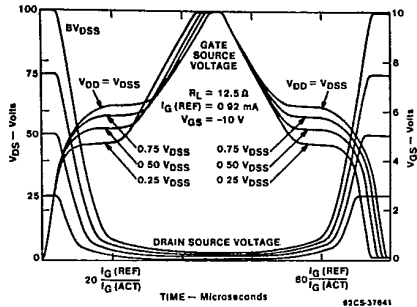


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

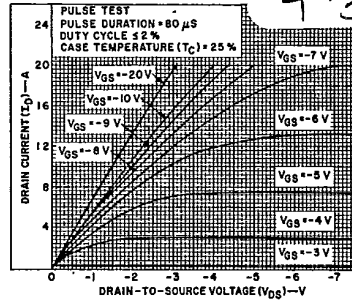


Fig. 7 - Typical saturation characteristics for all types.

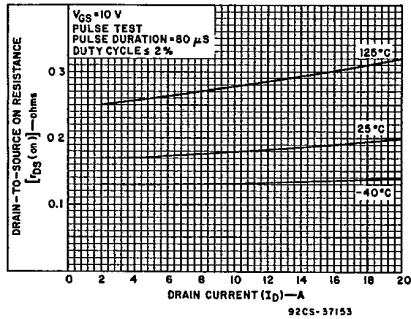


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

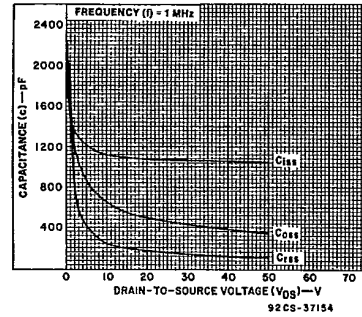


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

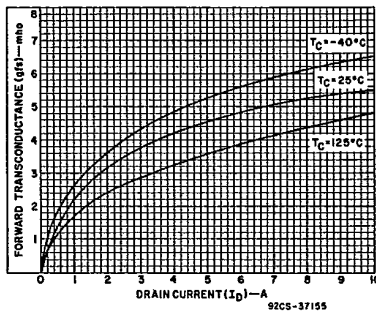


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

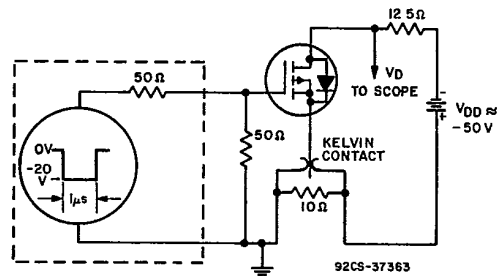


Fig. 11 - Switching Time Test Circuit.