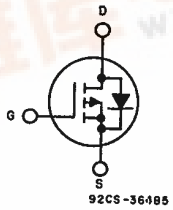
RFM6P08, RFM6P10, RFP6P08, RFP6P10

File Number **1490**

P-Channel Enhancement-Mode Power Field-Effect Transistors

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

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



P-CHANNEL ENHANCEMENT MODE

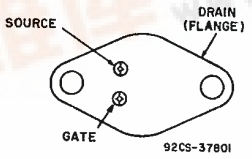
The RFM6P08 and RFM6P10 and the RFP6P08 and RFP6P10* are P-Channel enhancement-mode silicon-gate power field-effect transistors designed for high-speed applications such as switching regulators, switching converters, relay drivers, and drivers for high-power bipolar switching transistors.

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.

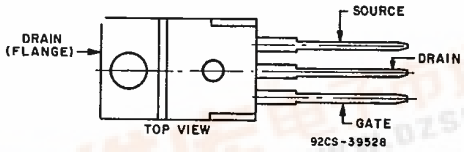
TERMINAL DESIGNATIONS

RFM6P08
RFM6P10



JEDEC TO-204AA

RFP6P08
RFP6P10



JEDEC TO-220AB

MAXIMUM RATINGS, *Absolute-Maximum Values (T_C=25° C):*

	RFM6P08	RFM6P10		RFP6P08	RFP6P10	
DRAIN-SOURCE VOLTAGE ..... V_{DSS}	80	100		80	100	V
DRAIN-GATE VOLTAGE (R_{GS}=1 MΩ) ... V_{DGR}	80	100		80	100	V
GATE-SOURCE VOLTAGE ..... V_{GS}			±20			V
DRAIN CURRENT, RMS Continuous ..... I_D			6			A
Pulsed ..... I_{DM}			20			A
POWER DISSIPATION @ T_C=25°C ..... P_T	75	75		60	60	W
Derate above T_C=25°C	0.6	0.6		0.48	0.48	W/°C
OPERATING AND STORAGE TEMPERATURE ..... T_J, T_{stg}			-55 to +150			°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 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	—	1	—	—	μA
		V_{DS}=-80 V	—	—	—	1	
		T_C=125° C, V_{DS}=-65 V	—	50	—	—	
		V_{DS}=-80 V	—	—	—	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=3 A, V_{GS}=-10 V	—	-1.8	—	-1.8	V
		I_D=6 A, V_{GS}=-10 V	—	-6	—	-6	
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	
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	150	—	150	
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	
Turn-Off Delay Time	$t_{d(off)}$	R_{gen}=R_{gs}=50 Ω	102(typ)	150	102(typ)	150	
Fall Time	t_f	V_{GS}=10 V	70(typ)	100	70(typ)	100	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM6P08, RFM6P10	—	1.67	—	1.67	°C/W
		RFP6P08, RFP6P10	—	2.083	—	2.083	

[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%.

RFM6P08, RFM6P10, RFP6P08, RFP6P10

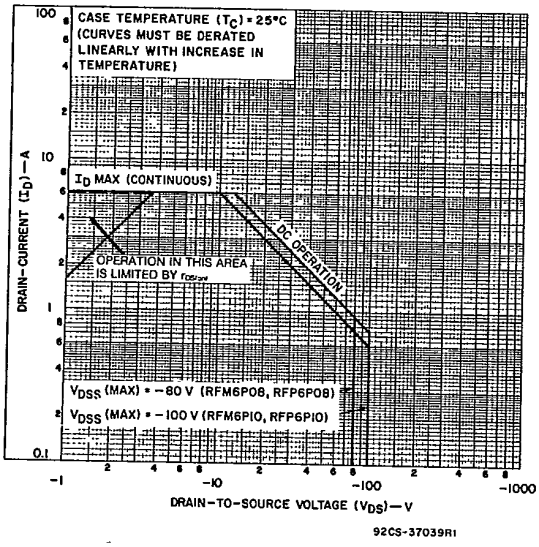


Fig. 1 — Maximum safe operating areas for all types.

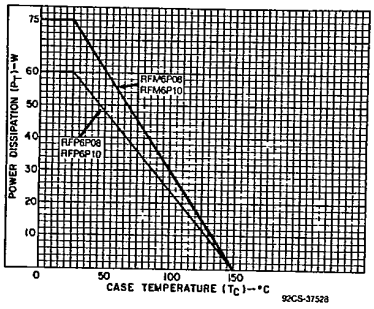


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

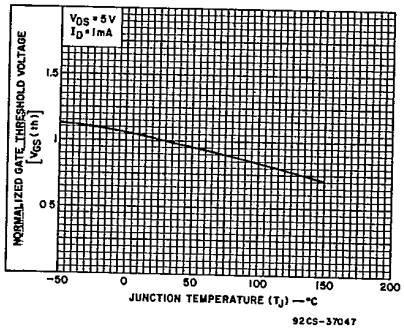


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

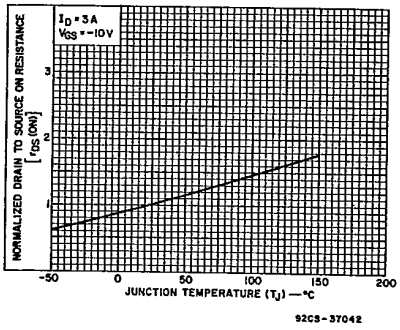


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

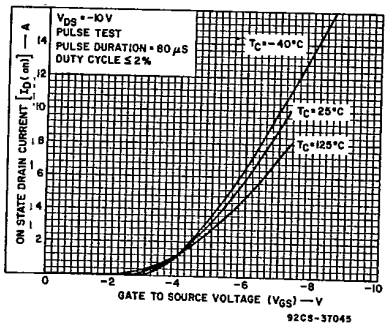


Fig. 5 — Typical transfer characteristics for all types.

RFM6P08, RFM6P10, RFP6P08, RFP6P10

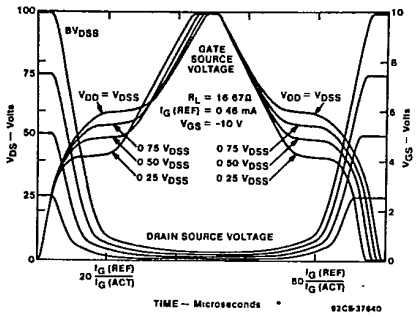


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

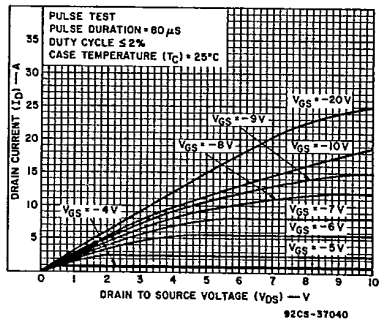


Fig. 7 — Typical saturation characteristics for all types.

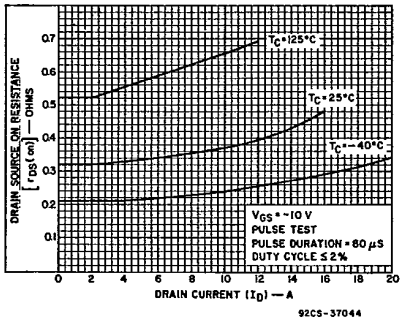


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

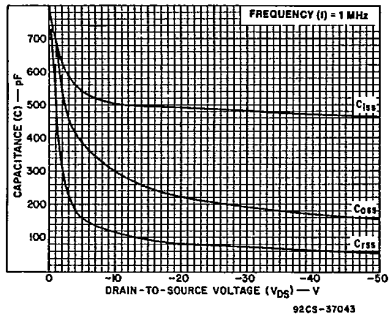


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

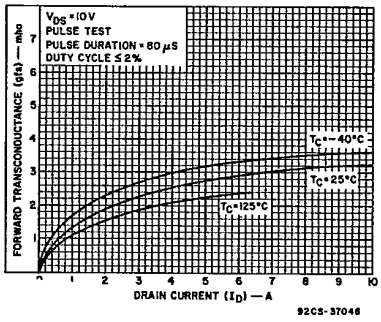


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

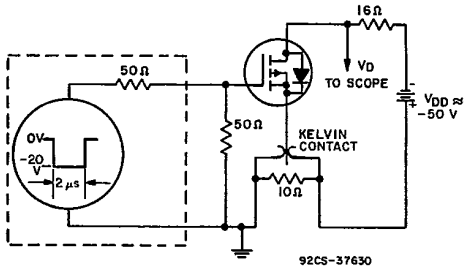


Fig. 11 - Switching Time Test Circuit.

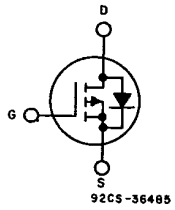
RFM8P08, RFM8P10, RFP8P08, RFP8P10

File Number **1496**

P-Channel Enhancement-Mode Power Field-Effect Transistors

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

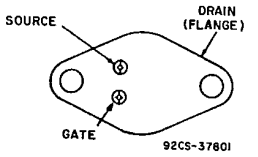
Features:
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*



P-CHANNEL ENHANCEMENT MODE

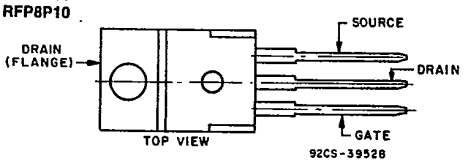
TERMINAL DESIGNATIONS

RFM8P08
RFM8P10



JEDEC TO-204AA

RFP8P08
RFP8P10



JEDEC TO-220AB

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° C):*

	RFM8P08	RFM8P10		RFP8P08	RFP8P10	
DRAIN-SOURCE VOLTAGE ..... V_{DSS}	-80	-100		-80	-100	V
DRAIN-GATE VOLTAGE (R_{GS}=1 MΩ) .... 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°C ..... P_T	100	100		75	75	W
Derate above T_C=25°C	0.8	0.8		0.6	0.6	W/°C
OPERATING AND STORAGE TEMPERATURE ..... T_J, T_{stg}			-55 to +150			°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 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=4 A V_{GS}=-10 V	—	-1.6	—	-1.6	V
		I_D=8 A V_{GS}=-10 V	—	-4.0	—	-4.0	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=4 A V_{GS}=-10 V	—	.4	—	.4	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=-10 V I_D=4 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	—	240	—	240	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=4 A	70(typ)	150	70(typ)	150	ns
Turn-Off Delay Time	$t_d(off)$	$R_{gen}=R_{gs}$=50 Ω	166(typ)	275	166(typ)	275	ns
Fall Time	t_f	V_{GS}=-10 V	94(typ)	175	94(typ)	175	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM8P08, RFM8P08	—	1.25	—	1.25	°C/W
		RFP8P10, RFP8P10	—	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
			RFM8P08 RFP8P08		RFM8P10 RFP8P10		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V_{SD}	I_{SD} = 4A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A d_{IF}/d_t = 100A/μs	200(typ.)		200(typ.)		ns

*Pulse Test: Width ≤ 300 μs, Duty Cycle ≤ 2%.

RFM8P08, RFM8P10, RFP8P08, RFP8P10

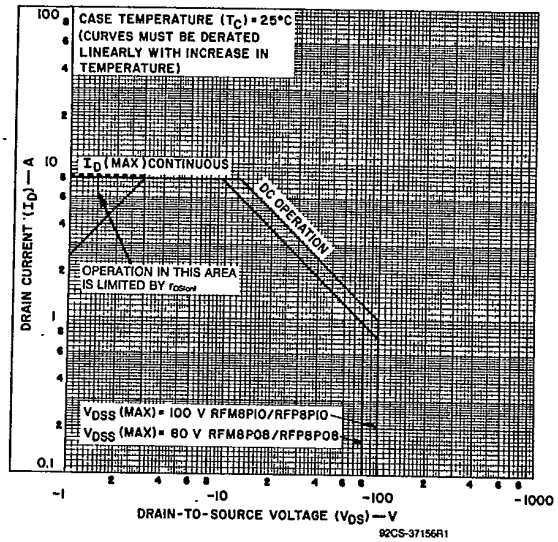


Fig. 1 — Maximum operating areas for all types.

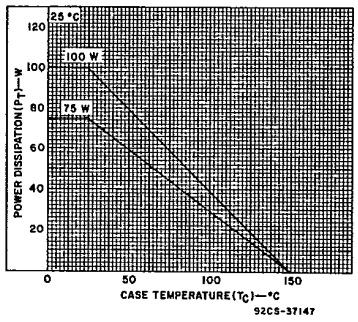


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

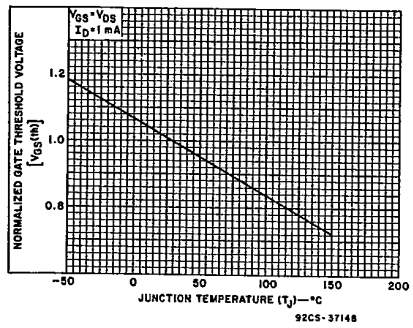


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

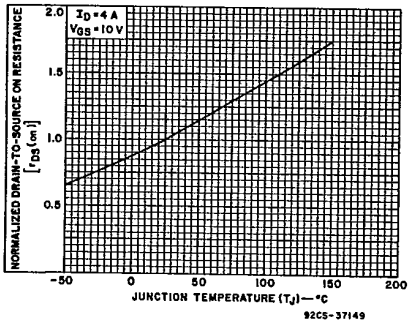


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

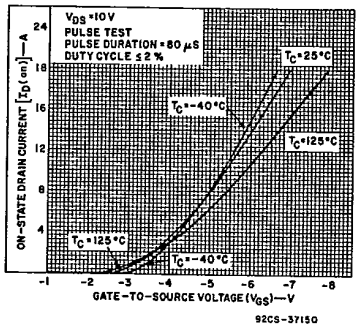


Fig. 5 — Typical transfer characteristics for all types.

RFM8P08, RFM8P10, RFP8P08, RFP8P10

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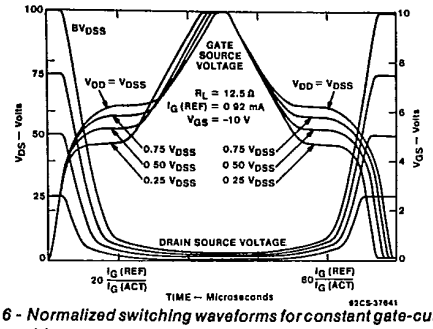

Fig. 6 - Normalized switching waveforms for constant gate-current drive.

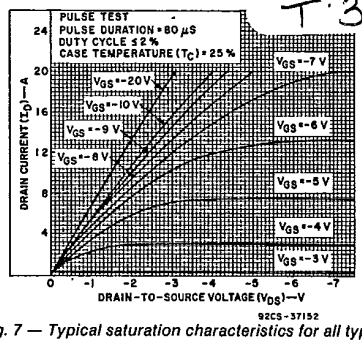

Fig. 7 — Typical saturation characteristics for all types.

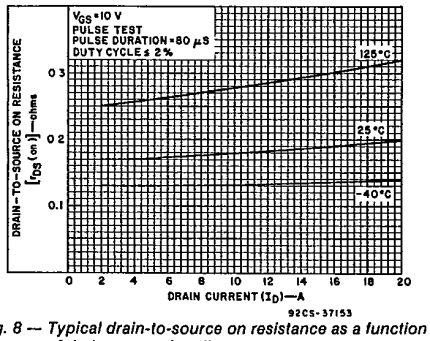

Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

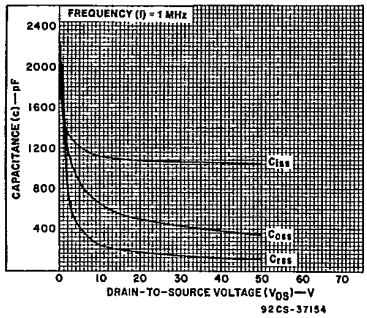

Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

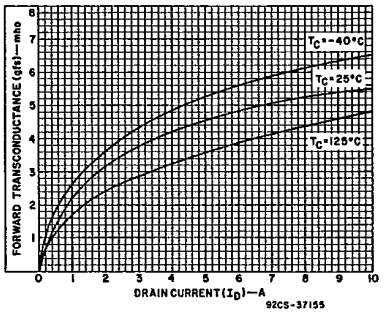

Fig. 10 — Typical forward transconductance as a function of drain current for all types.

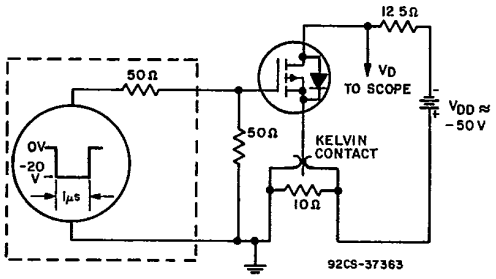

Fig. 11 — Switching Time Test Circuit.