

# RFM18N08/18N10

# RFP18N08/18N10

## N-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

### Features

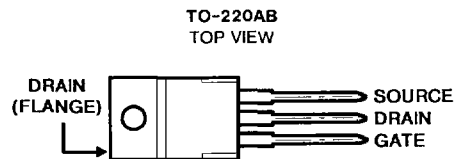
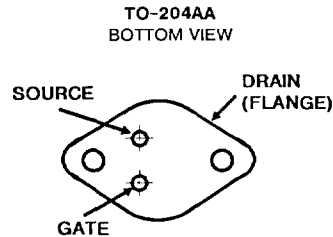
- 18A, 80V and 100V
- $r_{DS(on)} = 0.1\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

### Description

The RFM18N08 and RFM18N10 and the RFP18N08 and RFP18N10 are n-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.

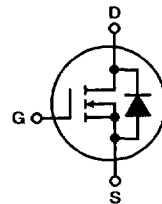
The RFM series types are supplied in the JEDEC TO-204AA steel package and the RFP series types in the JEDEC TO-220AB plastic package.

### Packages



### Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



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

	RFM18N08	RFM18N10	RFP18N08	RFP18N10	UNITS	
Drain-Source Voltage .....	$V_{DSS}$	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 .....	$I_D$	18	18	18	18	A
Pulsed Drain Current .....	$I_{DM}$	45	45	45	45	A
Gate-Source Voltage .....	$V_{GS}$	$\pm 20$	$\pm 20$	$\pm 20$	$\pm 20$	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 RFM18N08, RFM18N10, RFP18N08, RFP18N10

**ELECTRICAL CHARACTERISTICS** At Case Temperature ( $T_c$ ) = 25°C unless otherwise specified

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM18N08 RFP18N08		RFM18N10 RFP18N10		
			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	—	—	$\mu\text{A}$
		$T_C = 125^\circ\text{C}$ $V_{DS} = 65 \text{ V}$ $V_{GS} = 80 \text{ V}$	—	50	—	—	
			—	—	—	50	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20 \text{ V}$ $V_{DS} = 0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D = 9 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	0.9	—	0.9	V
		$I_D = 18 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	3.0	—	3.0	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D = 9 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	0.10	—	0.10	$\Omega$
Forward Transconductance	$g_{fs}^a$	$V_{DS} = 10 \text{ V}$ $I_D = 9 \text{ A}$	5	—	5	—	mho
Input Capacitance	$C_{iss}$	$V_{DS} = 25 \text{ V}$	—	1700	—	1700	pF
Output Capacitance	$C_{oss}$	$V_{GS} = 0 \text{ V}$	—	750	—	750	
Reverse Transfer Capacitance	$C_{riss}$	$f = 1 \text{ MHz}$	—	300	—	300	
Turn-On Delay Time	$t_d(on)$	$V_{DD} = 50 \text{ V}$	60(typ.)	90	60(typ.)	90	ns
Rise Time	$t_r$	$I_D = 9 \text{ A}$	300(typ.)	450	300(typ.)	450	
Turn-Off Delay Time	$t_d(off)$	$R_{gen} = R_{gs} = 50 \Omega$	150(typ.)	225	150(typ.)	225	
Fall Time	$t_f$	$V_{GS} = 10 \text{ V}$	150(typ.)	225	150(typ.)	225	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM18N08, RFM18N10	—	1.25	—	1.25	$^\circ\text{C/W}$
		RFP18N08, RFP18N10	—	1.67	—	1.67	

<sup>a</sup>Pulsed: Pulse duration = 300  $\mu\text{s}$  max., duty cycle = 2%.

**4**  
**N-CHANNEL  
POWER MOSFETS**

## SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM18N08 RFP18N10		RFP18N08 RFM18N10		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	$V_{SD}$	$I_{SD} = 9 \text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	$t_{rr}$	$I_F = 4 \text{ A}$ $d_I/d_t = 100 \text{ A}/\mu\text{s}$	150(typ)		150(typ)		ns

<sup>a</sup>Pulse Test: Width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

# RFM18N08, RFM18N10, RFP18N08, RFP18N10

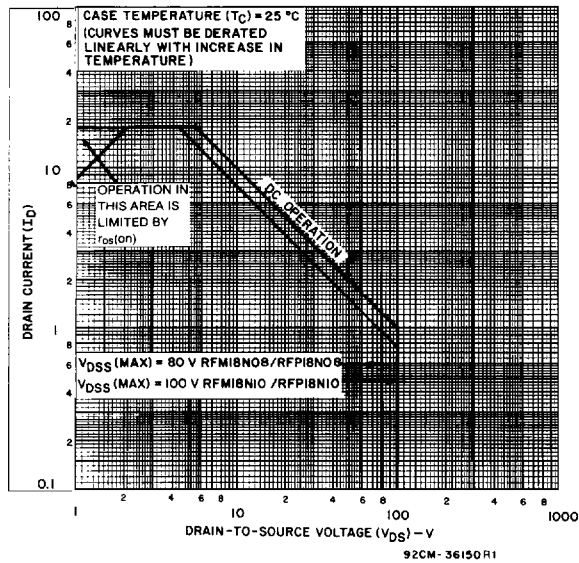


Fig. 1 — Maximum operating areas for all types.

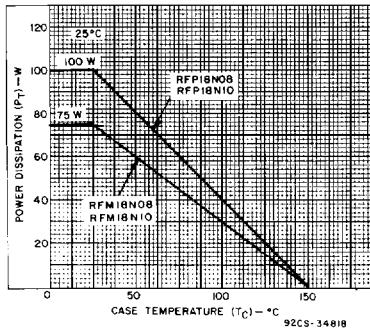


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

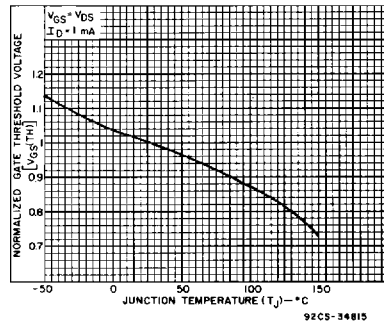


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

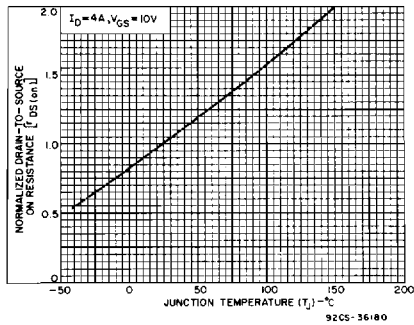


Fig. 4 — Normalized drain-to-source on resistance vs. junction temperature for all types.

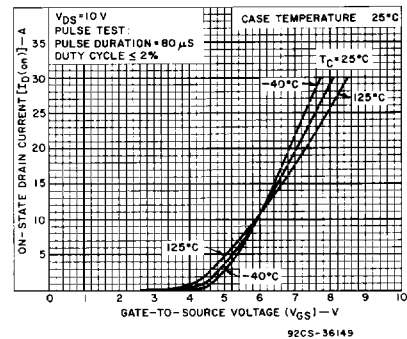


Fig. 5 — Typical transfer characteristics for all types.

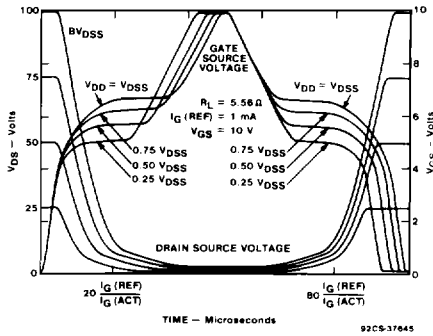


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

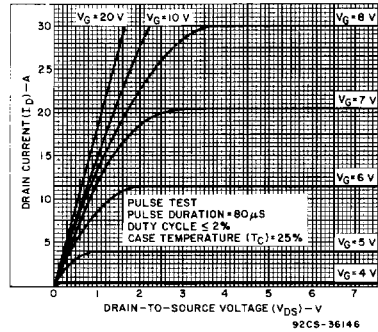


Fig. 7 - Typical saturation characteristics for all types.

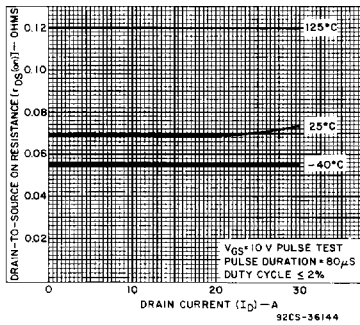


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

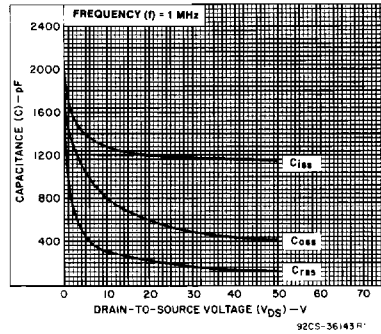


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

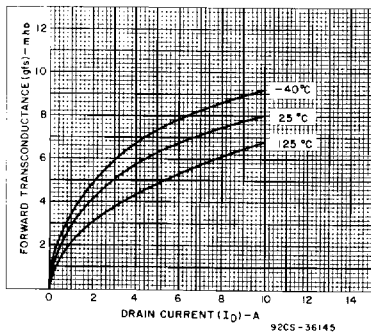


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

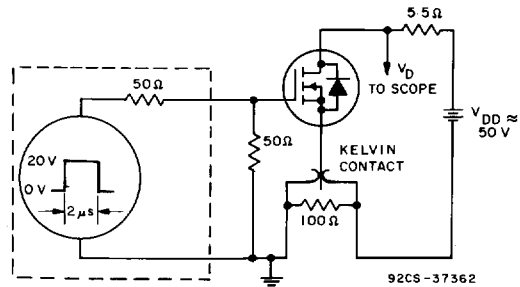


Fig. 11 - Switching Time Test Circuit