

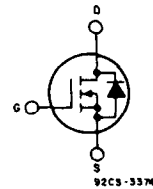
N-Channel Enhancement-Mode Power Field-Effect Transistors

8 A, 180 V — 200 V

 $r_{DS(on)}$: 0.5 Ω

Features:

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



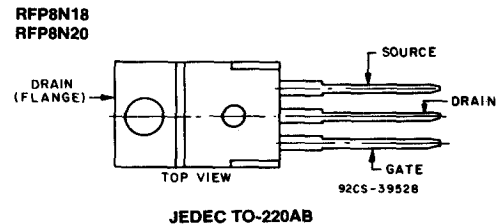
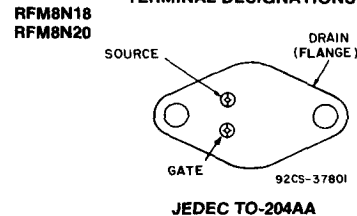
N-Channel Enhancement Mode

The RFM8N18 and RFM8N20 and the RFP8N18 and RFP8N20* 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-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 TA9291 and TA9292, respectively.

TERMINAL DESIGNATIONS



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

		RFM8N18	RFM8N20		RFP8N18	RFP8N20	
DRAIN-SOURCE VOLTAGE	V_{DS}	180	200		180	200	V
DRAIN-GATE VOLTAGE ($R_{GS} = 1\text{M}\Omega$)	V_{DGR}	180	200		180	200	V
GATE-SOURCE VOLTAGE	V_{GS}	± 20			± 20		V
DRAIN CURRENT RMS Continuous	I_D	8			8		A
Pulsed	I_{DM}	20			20		A
POWER DISSIPATION							
@ $T_c = 25^\circ\text{C}$	P_T	75	75		60	60	W
Derate above $T_c = 25^\circ\text{C}$		0.6	0.6		0.48	0.48	W/ $^\circ\text{C}$
OPERATING AND STORAGE TEMPERATURE	T_A, T_{stg}	-55 to +150			-55 to +150		$^\circ\text{C}$

RFM8N18, RFM8N20, RFP8N18, RFP8N20**ELECTRICAL CHARACTERISTICS** At Case Temperature (T_c) = 25°C unless otherwise specified

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM8N18 RFP8N18		RFM8N20 RFP8N20		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 1 mA V _{GS} = 0	180	—	200	—	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} = 145 V	—	1	—	—	μA
		V _{DS} = 160 V	—	—	—	1	
		T _C = 125°C V _{DS} = 145 V	—	50	—	—	
		V _{DS} = 160 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 = 4 A V _{GS} = 10 V	—	2.0	—	2.0	V
		I _D = 8 A V _{GS} = 10 V	—	5.5	—	5.5	
Static Drain-Source On Resistance	r _{DS(on)} ^a	I _D = 4 A V _{GS} = 10 V	—	0.5	—	0.5	Ω
Forward Transconductance	g _{fs} ^a	V _{DS} = 10 V I _D = 4 A	1.5	—	1.5	—	mho
Input Capacitance	C _{iss}	V _{DS} = 25 V	—	750	—	750	pF
Output Capacitance	C _{oss}	V _{GS} = 0 V	—	250	—	250	
Reverse Transfer Capacitance	C _{rss}	f = 1MHz	—	100	—	100	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 100 V	30(typ.)	45	30(typ.)	45	ns
Rise Time	t _r	I _D = 4 A	100(typ.)	150	100(typ.)	150	
Turn-Off Delay Time	t _{d(off)}	R _{gen} = R _{gs} = 50 Ω	90(typ.)	135	90(typ.)	135	
Fall Time	t _f	V _{GS} = 10 V	70(typ.)	105	70(typ.)	105	
Thermal Resistance Junction-to-Case	RθJC	RFM8N18, RFM8N20	—	1.67	—	1.67	°C/W
		RFP8N18, RFP8N20	—	2.083	—	2.083	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM8N18 RFP8N18		RFM8N20 RFP8N20		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V _{SD} ^a	I _{SD} = 4A	—	1.4	—	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 4A d _I F/d _t = 100A/μs	225(typ.)		225(typ.)		ns

^aPulsed: Pulse duration = 300 μs max., duty cycle = 2%.

RFM8N18, RFM8N20, RFP8N18, RFP8N20

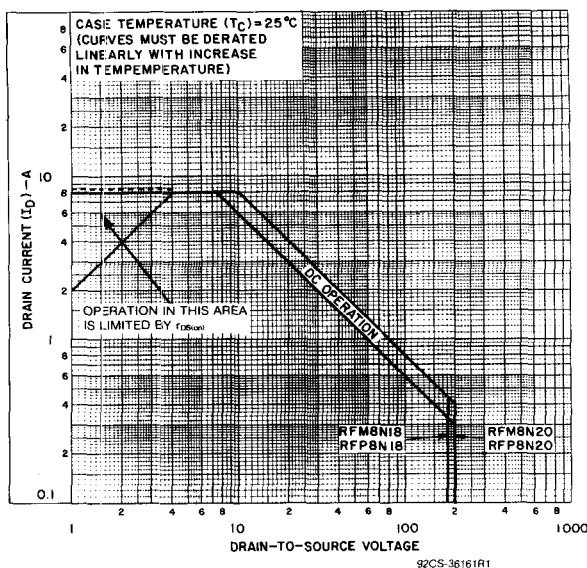


Fig. 1 — Maximum safe operating areas for all types.

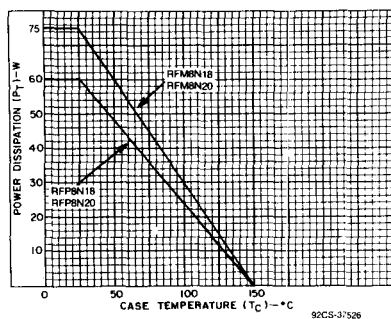


Fig. 2 — Power vs. temperature derating curve for all types.

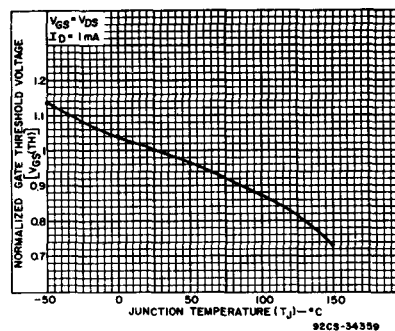


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

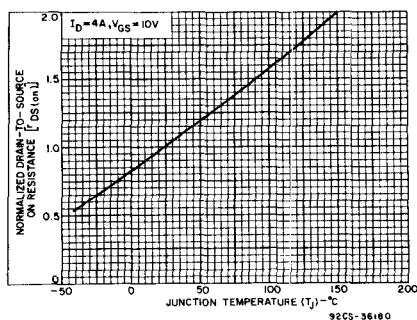


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

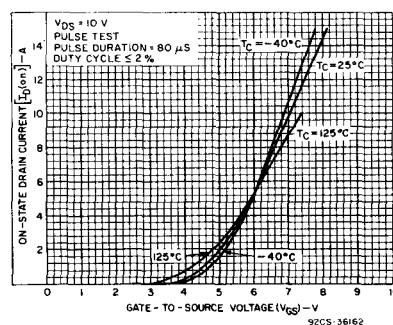


Fig. 5 — Typical transfer characteristics for all types.

PULSE TEST
PULSE DURATION = $80 \mu\text{s}$
DUTY CYCLE $\leq 2\%$
CASE TEMPERATURE (T_c) = 25°C

Drain Current (I_D) - A

Drain-to-Source Voltage (V_{DS}) - V

Curves shown for V_{GS} values: 10 V, 20 V, 7 V, 6 V, 5 V, 4 V.

$V_{GS} = 10\text{ V}$
 PULSE TEST
 PULSE DURATION = $80\text{ }\mu\text{S}$
 DUTY CYCLE $\leq 2\%$

Y-axis: DRAIN-TO-SOURCE RESISTANCE ($r_{DS(on)}$) - OHMS
 X-axis: DRAIN CURRENT (I_D) - A

Curves shown for:
 $T_C = 125^\circ\text{C}$
 $T_C = 25^\circ\text{C}$
 $T_C = -40^\circ\text{C}$

92C5-36/67

A graph showing the capacitance characteristics of the 2N3638 tube. The y-axis is labeled 'CAPACITANCE (C) - pF' and ranges from 0 to 1200 in increments of 200. The x-axis is labeled 'DRAIN-TO-SOURCE VOLTAGE (V_{DS}) - V' and ranges from 0 to 70 in increments of 10. The graph is plotted on a grid. Three curves are shown, labeled C_{iss} , C_{oss} , and C_{rss} . The C_{iss} curve starts at approximately 800 pF at 0 V and decreases to about 600 pF at 50 V. The C_{oss} curve starts at approximately 800 pF at 0 V and decreases to about 200 pF at 50 V. The C_{rss} curve starts at approximately 800 pF at 0 V and decreases to about 100 pF at 50 V. The frequency is specified as 1 MHz.

V_{DS} (V)	C_{iss} (pF)	C_{oss} (pF)	C_{rss} (pF)
0	800	800	800
10	650	350	150
20	620	250	120
30	610	220	110
40	605	210	105
50	600	200	100

A graph showing Forward Transconductance (g_{fs}) in mho on the y-axis (0 to 6) versus Drain Current (I_D) in A on the x-axis (0 to 7). Three curves are plotted for different gate-source voltages (V_c): $V_c = -40V$ (top curve), $V_c = -25V$ (middle curve), and $V_c = -125V$ (bottom curve). The curves show that g_{fs} increases with I_D and is higher for more negative V_c .

I_D (A)	g_{fs} (mho) at $V_c = -40V$	g_{fs} (mho) at $V_c = -25V$	g_{fs} (mho) at $V_c = -125V$
0	0	0	0
1	1.2	0.8	0.5
2	2.5	1.8	1.2
3	3.5	2.5	1.8
4	4.2	3.0	2.2
5	4.8	3.5	2.6
6	5.2	4.0	2.9

2P4S-16163

92CS-37373

3-403