RFM8N18, RFM8N20, RFP8N18, RFP8N20

File Number **1447**

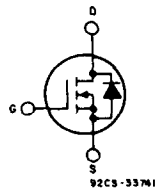
N-Channel Enhancement-Mode Power Field-Effect Transistors

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

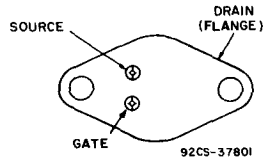
The RFM8N18 and RFM8N20 and the RFP8N18 and RFP8N20* are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring 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.

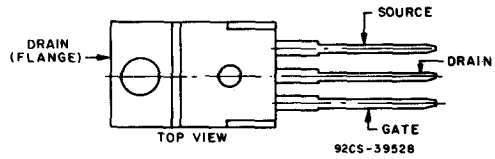
TERMINAL DESIGNATIONS

RFM8N18
RFM8N20



JEDEC TO-204AA

RFP8N18
RFP8N20



JEDEC TO-220AB

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

		RFM8N18	RFM8N20	RFP8N18	RFP8N20	
DRAIN-SOURCE VOLTAGE	V_{DSS}	180	200	180	200	V
DRAIN-GATE VOLTAGE (R_{GS} = 1MΩ)	V_{DGR}	180	200	180	200	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	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

RFM8N18, RFM8N20, RFP8N18, RFP8N20

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS RFM8N18 RFP8N18 MIN.	LIMITS RFM8N18 RFP8N18 MAX.	LIMITS RFM8N20 RFP8N20 MIN.	LIMITS RFM8N20 RFP8N20 MAX.	UNITS
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	—	—	
		T_C = 125° C, 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, V_{GS} = 0 V, f = 1MHz	—	750	—	750	pF
Output Capacitance	C_{oss}		—	250	—	250	
Reverse Transfer Capacitance	C_{rss}		—	100	—	100	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 100 V, I_D = 4 A, R_{gen} = R_{gs} = 50 Ω, V_{GS} = 10 V	30(typ.)	45	30(typ.)	45	ns
Rise Time	t_r		100(typ.)	150	100(typ.)	150	
Turn-Off Delay Time	$t_{d(off)}$		90(typ.)	135	90(typ.)	135	
Fall Time	t_f		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 RFM8N18 RFP8N18 Min.	LIMITS RFM8N18 RFP8N18 Max.	LIMITS RFM8N20 RFP8N20 Min.	LIMITS RFM8N20 RFP8N20 Max.	UNITS
Diode Forward Voltage	V_{SD}[a]	I_{SD} = 4A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A, d_{IF}/d_t = 100A/μs	225(typ.)		225(typ.)		ns

[a]Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

RFM8N18, RFM8N20, RFP8N18, RFP8N20

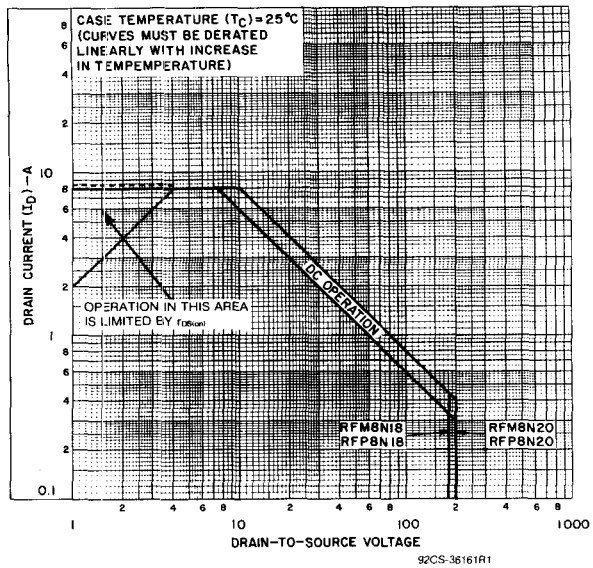


Fig. 1 — Maximum safe operating areas for all types.

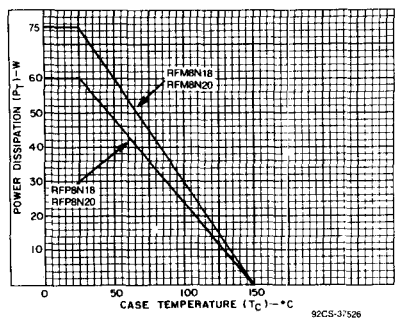


Fig. 2 — Power vs. temperature derating curve for all types.

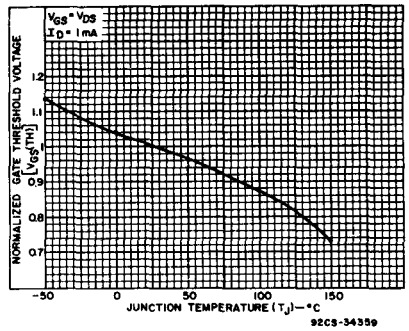


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

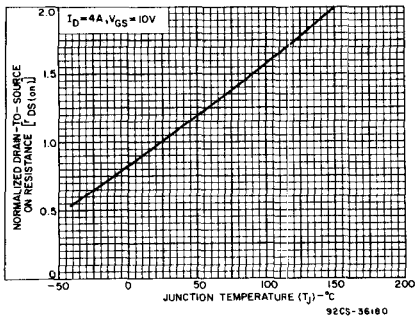


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

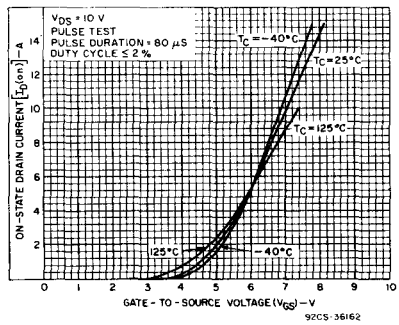


Fig. 5 — Typical transfer characteristics for all types.

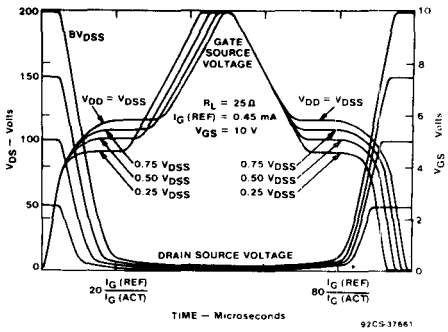


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

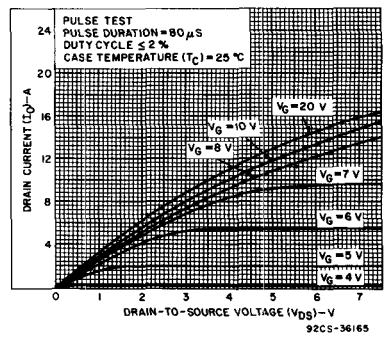


Fig. 7 — Typical saturation characteristics for all types.

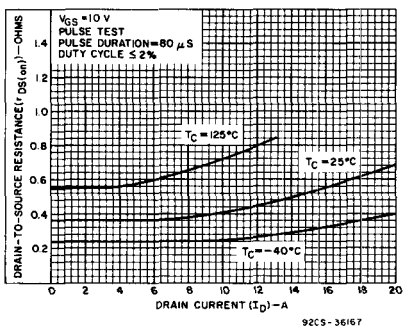


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

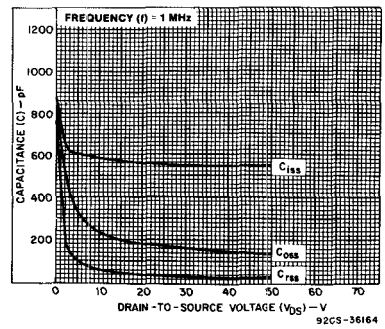


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

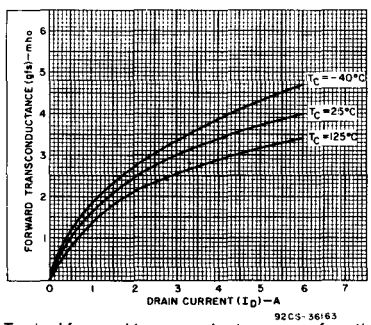


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

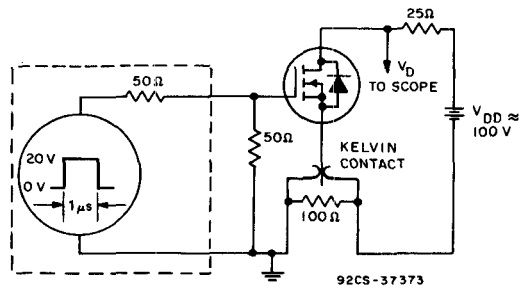


Fig. 11 — Switching Time Test Circuit.