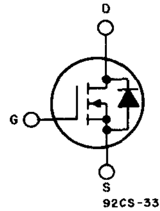
RFM8N18L, RFM8N20L, RFP8N18L, RFP8N20L File Number **1514**

N-Channel Logic Level Power Field-Effect Transistors (L^2 FET)

8 A, 180 V and 200 V
$r_{DS}(on)$: 0.5Ω

Features:

- *Design optimized for 5 volt gate drive*
- *Can be driven directly from Q-MOS, N-MOS, TTL Circuits*
- *Compatible with automotive drive requirements*
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*



N-CHANNEL ENHANCEMENT MODE

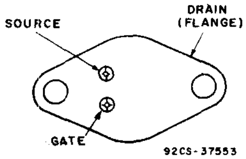
The RFM8N18L and RFM8N20L and the RFP8N18L and RFP8N20L are n-channel enhancement-mode silicon-gate power field-effect transistors specifically designed for use with logic level (5 volt) driving sources in applications such as programmable controllers, automotive switching, and solenoid drivers. This performance is accomplished through a special gate oxide design which provides full rated conduction at gate biases in the 3-5 volt range, thereby facilitating true on-off power control directly from logic circuit supply voltages.

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.

The RFM and RFP series were formerly RCA developmental numbers TA9534 and TA9535.

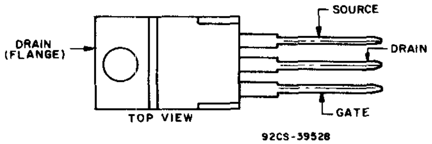
TERMINAL DESIGNATIONS

RFM8N18L
RFM8N20L



JEDEC TO-204AA

RFP8N18L
RFP8N20L



JEDEC TO-220AB

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

		RFM8N18L	RFM8N20L		RFP8N18L	RFP8N20L	
DRAIN-SOURCE VOLTAGE	V_{DSS}	180	200		180	200	V
DRAIN-GATE VOLTAGE (R_{gs}=1 MΩ)	V_{DGR}	180	200		180	200	V
GATE-SOURCE VOLTAGE	V_{GS}			±10			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

RFM8N18L, RFM8N20L, RFP8N18L, RFP8N20L

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM8N18L RFP8N18L		RFM8N20L RFP8N20L		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DDS}	I_D=1 mA V_{GS}=0	180	—	200	—	V
Gate Threshold Voltage	$V_{GS}(th)$	$V_{GS}=V_{DS}$ I_D=1 mA	1	2	1	2	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}	$V_{GS}=\pm10$ V V_{DS}=0	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS}(on)^a$	I_D=4 A V_{GS}=5 V	—	2.0	—	2.0	V
		I_D=8 A V_{GS}=5 V	—	4.6	—	4.6	
Static Drain-Source On Resistance	$r_{DS}(on)^a$	I_D=4 A V_{GS}=5 V	—	0.5	—	0.5	Ω
Forward Transconductance	g_{fs}^a	V_{DS}=10 V I_D=4 A	3.0	—	3.0	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V V_{GS}=0 V f=1MHz	—	900	—	900	pF
Output Capacitance	C_{oss}		—	250	—	250	
Reverse-Transfer Capacitance	C_{rss}		—	120	—	120	
Turn-On Delay Time	$t_d(on)$	V_{DD}=50 V I_D=4A $R_{gen}=\infty$ R_{gs}=6.25 Ω V_{GS}=5 V	15(typ)	45	15(typ)	45	ns
Rise Time	t_r		45(typ)	150	45(typ)	150	
Turn-Off Delay Time	$t_d(off)$		100(typ)	135	100(typ)	135	
Fall Time	t_f		60(typ)	105	60(typ)	105	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM8N18L, RFM8N20L	—	1.67	—	1.67	°C/W
		RFP8N18L, RFP8N20L	—	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
			RFM8N18L RFP8N18L		RFM8N20L RFP8N20L		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}	I_{SD}=4 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/µs	250(typ)		250(typ)		ns

*Pulse Test: Width ≤ 300 µs, duty cycle ≤ 2%.

RFM8N18L, RFM8N20L, RFP8N18L, RFP8N20L

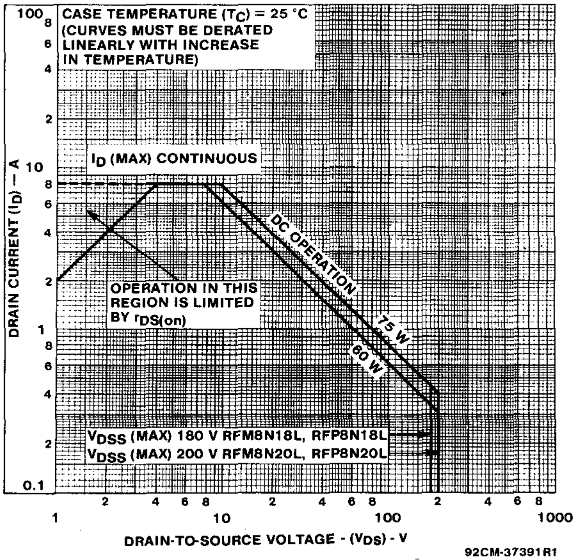


Fig. 1 — Maximum safe operating areas for all types.

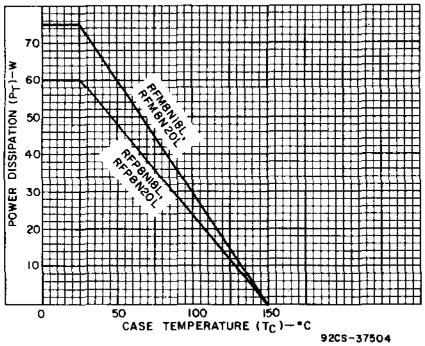


Fig. 2 — Power vs. temperature derating curve for all types.

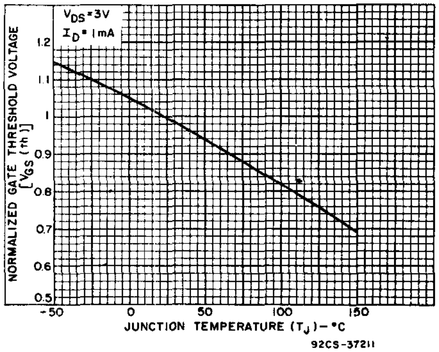


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

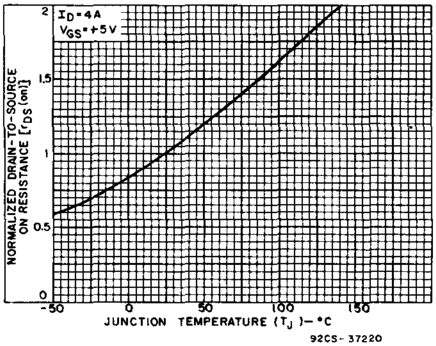


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

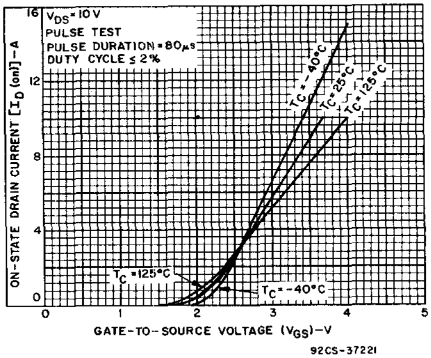


Fig. 5 — Typical transfer characteristics for all types.

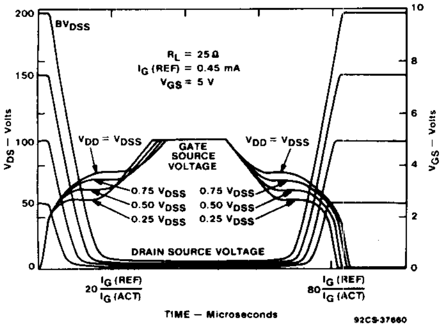


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

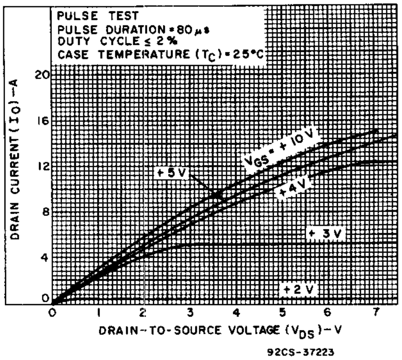


Fig. 7 — Typical saturation characteristics for all types.

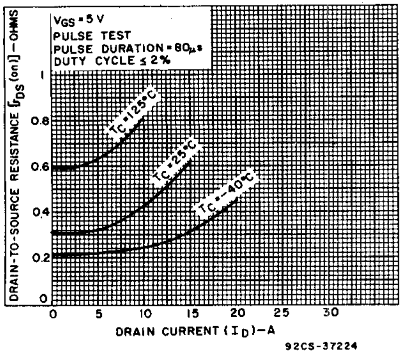


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

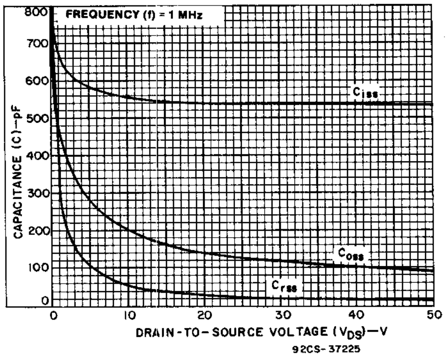


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

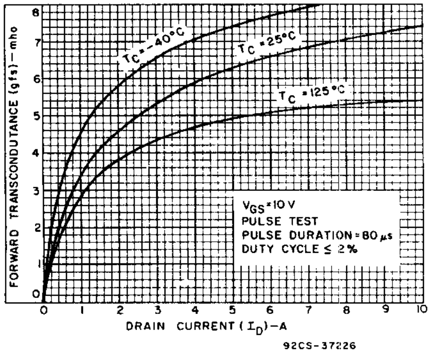


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

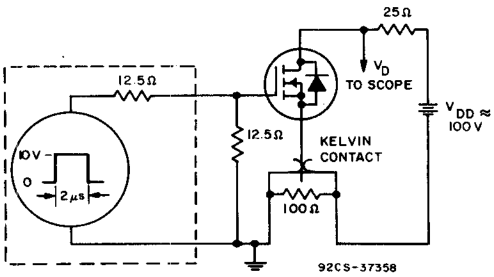


Fig. 11 — Switching Time Test Circuit.