RFM12N08L, RFM12N10L, RFP12N08L, RFP12N10L

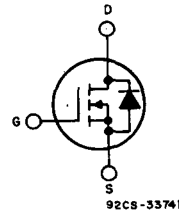
File Number **1512**

N-Channel Logic Level Power Field-Effect Transistors (L² FET)

12 A, 80 V and 100 V
$r_{DS}(on)$: 0.2 Ω

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 RFM12N08L and RFM12N10L and the RFP12N08L and RFP12N10L* 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.

Because of space limitations branding (marking) on type RFP12N08L is F12N08L and on type RFP12N10L is F12N10L.

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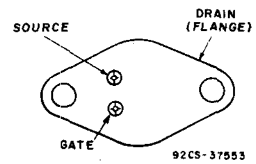
*The RFM and RFP series were formerly RCA developmental number TA9526 and TA9527.

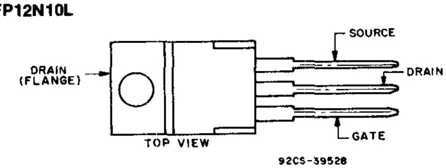
TERMINAL DESIGNATIONS

RFM12N08L
RFM12N10L



JEDEC TO-204AA

RFP12N08L
RFP12N10L



JEDEC TO-220AB

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

		RFM12N08L	RFM12N10L		RFP12N08L	RFP12N10L	
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}			±10			V
DRAIN CURRENT, RMS Continuous	I_D			12			A
Pulsed	I_{DM}			30			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

RFM12N08L, RFM12N10L, RFP12N08L, RFP12N10L

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM12N08L RFP12N08L MIN.	MAX.	RFM12N10L RFP12N10L MIN.	MAX.	UNITS
Drain-Source Breakdown Voltage	BV_{DDS}	I_D=1 mA V_{GS}=0	80	—	100	—	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}=65 V V_{DS}=80 V	— —	1 —	— —	— 1	μA
		T_C=125° C V_{DS}=65 V V_{DS}=80 V	— —	50 —	— —	— 50	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±10 V V_{DS}=0	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS}(on)$[a]	I_D=6 A V_{GS}=5 V	—	1.2	—	1.2	V
		I_D=12 A V_{GS}=5 V	—	3.3	—	3.3	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=6 A V_{GS}=5 V	—	0.2	—	0.2	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V I_D=6 A	4.0	—	4.0	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V	—	900	—	900	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	325	—	325	
Reverse-Transfer Capacitance	C_{rss}	f=1MHz	—	170	—	170	
Turn-On Delay Time	$t_d(on)$	V_{DD}=50 V	15(typ)	50	15(typ)	50	ns
Rise Time	t_r	I_D=6 A $R_{gen}=\infty$	70(typ)	150	70(typ)	150	
Turn-Off Delay Time	$t_d(off)$	R_{gs}=6.25 Ω	100(typ)	130	100(typ)	130	
Fall Time	t_f	V_{GS}=5 V	80(typ)	150	80(typ)	150	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM12N08L, RFM12N10L	—	1.67	—	1.67	°C/W
		RFP12N08L, RFP12N10L	—	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 RFM12N08L RFP12N08L MIN.	MAX.	RFM12N10L RFP12N10L MIN.	MAX.	UNITS
Diode Forward Voltage	V_{SD}	I_{SD}=6 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/μs	150(typ)		150(typ)		ns

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

RFM12N08L, RFM12N10L, RFP12N08L, RFP12N10L

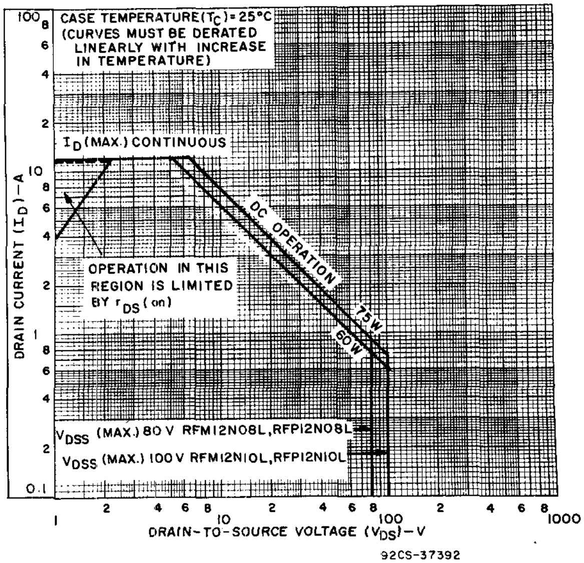


Fig. 1 — Maximum operating areas for all types.

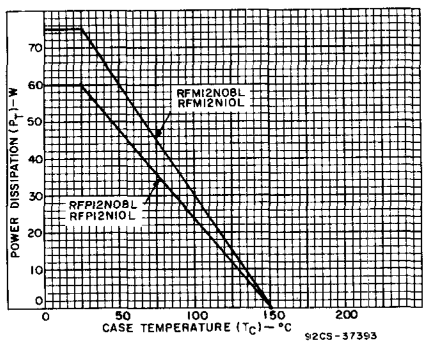


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

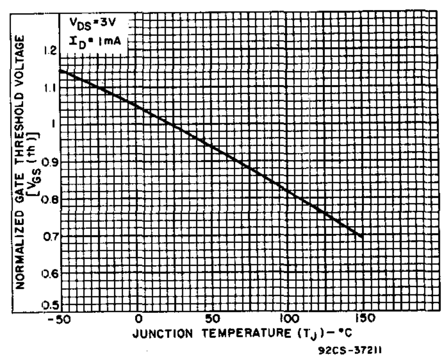


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

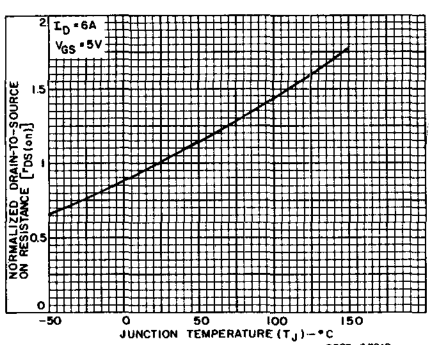


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

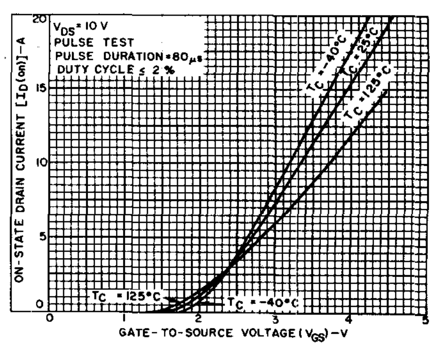


Fig. 5 — Typical transfer characteristics for all types.

RFM12N08L, RFM12N10L, RFP12N08L, RFP12N10L

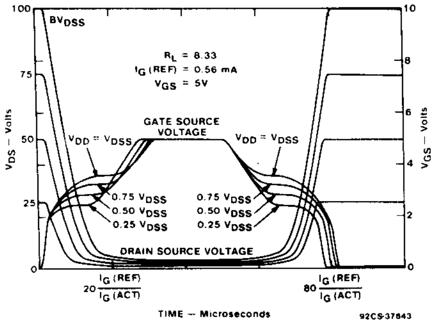


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

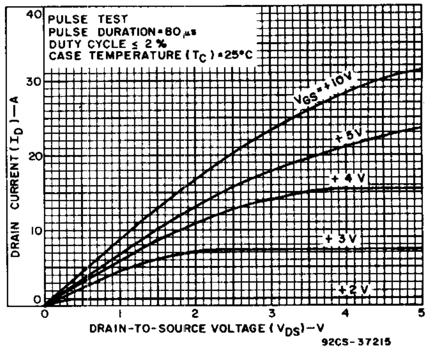


Fig. 7 — Typical saturation characteristics for all types.

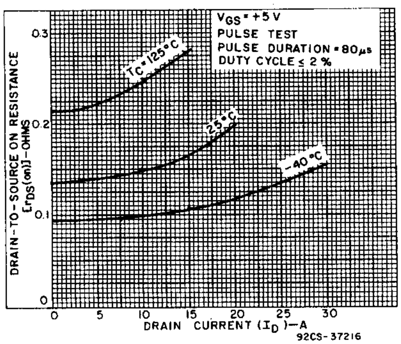


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

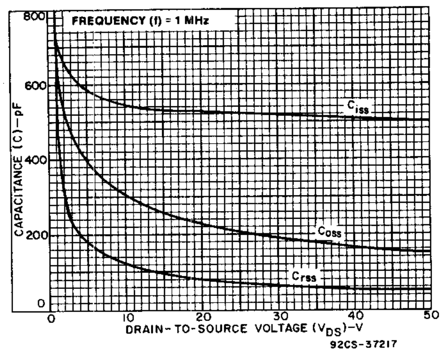


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

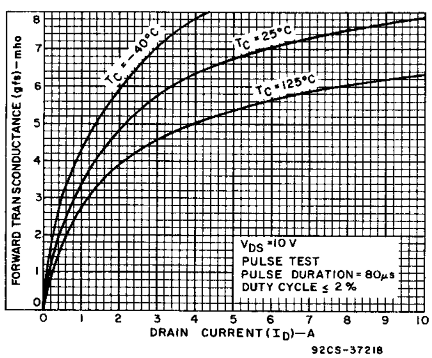


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

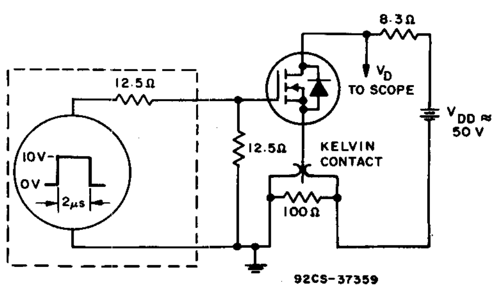


Fig. 11 — Switching Time Test Circuit.