RFM10N12L, RFM10N15L, RFP10N12L, RFP10N15L

File Number **1559**

Power Logic Level MOSFETs

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

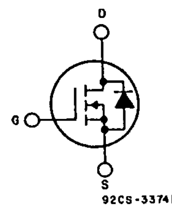
10 A, 120 V — 150 V

$r_{DS(on)}$: 0.3 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*

TERMINAL DIAGRAM



N-CHANNEL ENHANCEMENT MODE

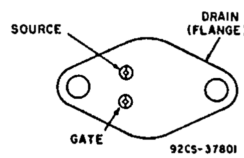
The RFM10N12L and RFM10N15L and the RFP10N12L and RFP10N15L* are N-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors 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.

Because of space limitations branding (marking) on type RFP10N12L is F10N12L and on type RFP10N15L is F10N15L.

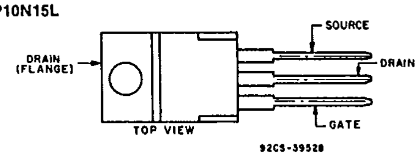
TERMINAL DESIGNATIONS

RFM10N12L
RFM10N15L



JEDEC TO-204AA

RFP10N12L
RFP10N15L



JEDEC TO-220AB

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*The RFM and RFP series were formerly RCA developmental numbers TA9530 and TA9531, respectively.

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

		RFM10N12L	RFM10N15L	RFP10N12L	RFP10N15L	
DRAIN-SOURCE VOLTAGE	V_{DSS}	120	150	120	150	V
DRAIN-GATE VOLTAGE (R_{GS} = 1 MΩ)	V_{DGR}	120	150	120	150	V
GATE-SOURCE VOLTAGE	V_{GS}	±10				V
DRAIN CURRENT, RMS Continuous	I_D	10				A
Pulsed	I_{DM}	25				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

RFM10N12L, RFM10N15L, RFP10N12L, RFP10N15L

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM10N12L RFP10N12L MIN.	MAX.	RFM10N15L RFP10N15L MIN.	MAX.	UNITS
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 1 mA, V_{GS} = 0	120	—	150	—	V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$, I_D = 2 mA	1	2	1	2	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V	—	1	—	—	μA
		V_{DS} = 120 V	—	—	—	1	
		T_C = 125° C, V_{DS} = 100 V	—	50	—	—	
		V_{DS} = 120 V	—	—	—	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 = 5 A, V_{GS} = 5 V	—	1.5	—	1.5	V
		I_D = 10 A, V_{GS} = 5 V	—	4	—	4	
Static Drain-Source On Resistance	$r_{DS(on)}$[a]	I_D = 5 A, V_{GS} = 5 V	—	0.3	—	0.3	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = 10 V, I_D = 5 A	4.0	—	4.0	—	mho
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1MHz	—	1200	—	1200	pF
Output Capacitance	C_{oss}		—	250	—	250	
Reverse-Transfer Capacitance	C_{rss}		—	60	—	60	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 75 V, I_D = 5 A, $R_{gen} = \infty$, R_{gs} = 6.25 Ω, V_{GS} = 5 V	15(typ)	60	15(typ)	60	ns
Rise Time	t_r		50(typ)	135	50(typ)	135	
Turn-Off Delay Time	$t_{d(off)}$		90(typ)	135	90(typ)	135	
Fall Time	t_f		90(typ)	135	90(typ)	135	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM10N12L, RFM10N15L	—	1.67	—	1.67	°C/W
		RFP10N12L, RFP10N15L	—	2.083	—	2.083	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM10N12L RFP10N12L MIN.	MAX.	RFM10N15L RFP10N15L MIN.	MAX.	UNITS
Diode Forward Voltage	V_{SD}[a]	I_{SD} = 5A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A, d_{IF}/d_t = 100 A/μs	150 (typ.)		150 (typ.)		ns

[a] Pulse Test: Width ≤ 300 μs, Duty cycle ≤ 2%

RFM10N12L, RFM10N15L, RFP10N12L, RFP10N15L

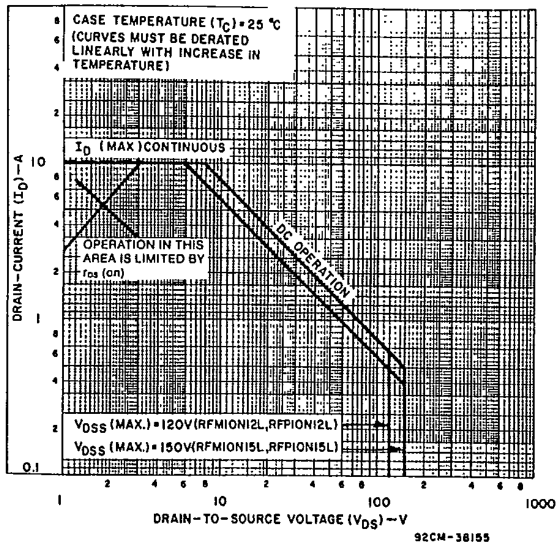

Fig. 1 - Maximum safe operating areas for all types.

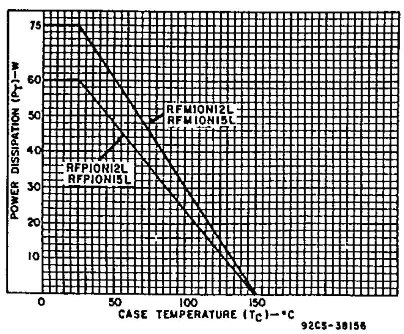

Fig. 2 - Power vs. temperature derating curve for all types.

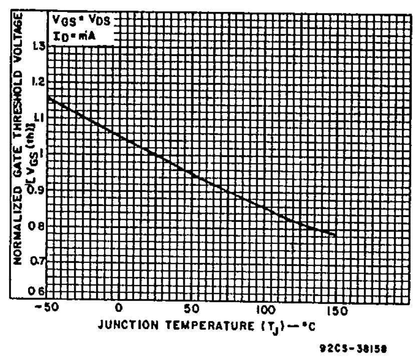

Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

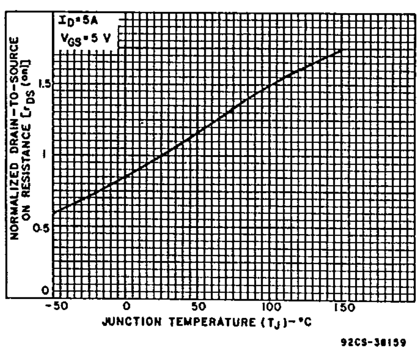

Fig. 4 - Normalized drain-to-source on resistance vs. junction temperature for all types.

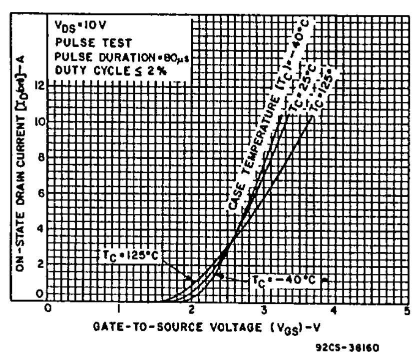

Fig. 5 - Typical transfer characteristics for all types.

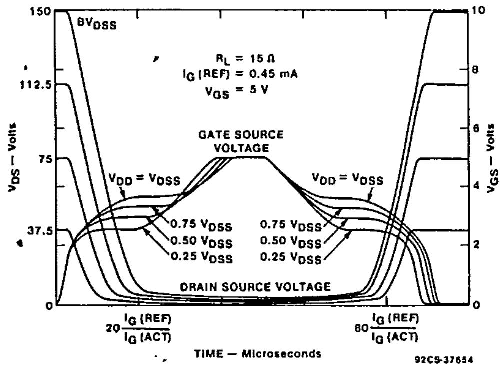

Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA Power MOSFETs PMP411A.

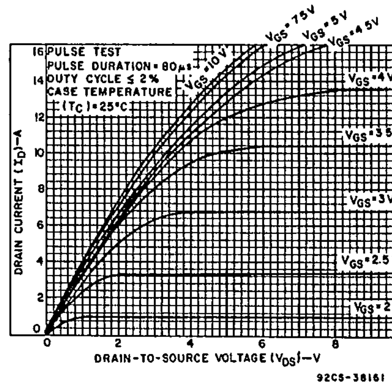

Fig. 7 - Typical saturation characteristics for all types.

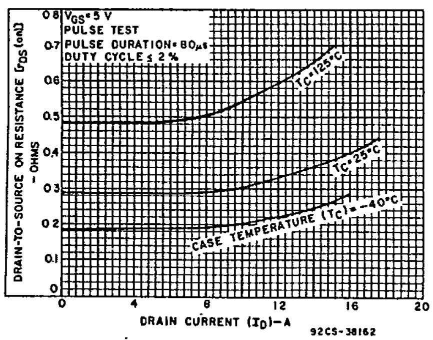

Fig. 8 - Typical drain-to-source on resistance as a function drain current for all types.

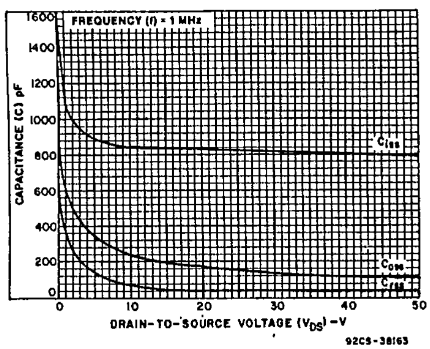

Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

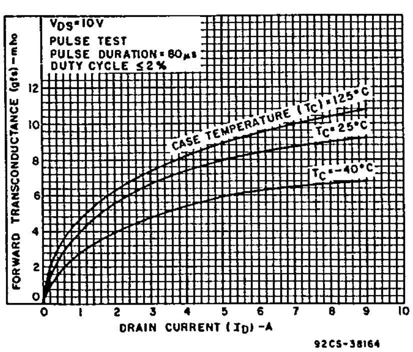

Fig. 10 - Typical forward transconductance as a function of drain current for all types.

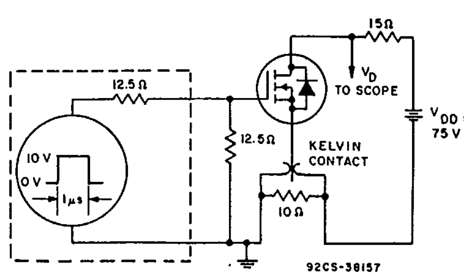

Fig. 11 - Switching Time Test Circuit.