

Logic-Level Power MOSFETs

RFM15N05L, RFM15N06L, RFP15N05L, RFP15N06L

File Number 1558

Power Logic Level MOSFETs

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

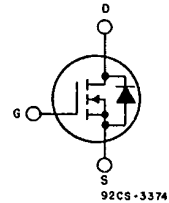
15 A, 50 and 60 V

r_{DS(On)}: 0.14 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

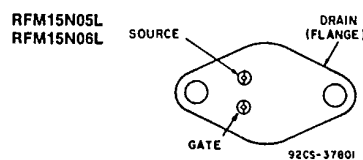
The RFM15N05L and RFM15N06L and the RFP15N05L and RFP15N06L* are N-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors 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.

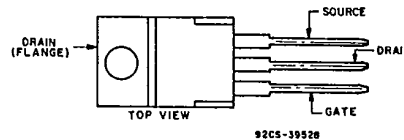
Because of space limitations branding (marking) on type RFP15N05L is F15N05L and on type RFP15N06L is F15N06L.

*The RFM and RFP series were formerly RCA developmental numbers TA9522 and TA9523, respectively.

TERMINAL DESIGNATIONS



JEDEC TO-204AA



JEDEC TO-220AB

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

	RFM15N05L	RFM15N06L	RFP15N05L	RFP15N06L		
DRAIN-SOURCE VOLTAGE	V _{DSS}	50	60	50	60	V
DRAIN-GATE VOLTAGE (R _{DS} = 1 MΩ)	V _{DGR}	50	60	50	60	V
GATE-SOURCE VOLTAGE	V _{GS}	±10				V
DRAIN CURRENT, RMS Continuous	I _D	15				A
..... Pulsed	I _{DM}	40				A
POWER DISSIPATION @ T _c = 25° C	P _r	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

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ELECTRICAL CHARACTERISTICS, At Case Temperature ($T_c = 25^\circ\text{C}$) unless otherwise specified

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM15N05L RFP15N05L		RFM15N06L RFP15N06L		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 1\text{ mA}$ $V_{GS} = 0$	50	—	60	—	V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$ $I_D = 1\text{ mA}$	1	2	1	2	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{ V}$ $V_{GS} = 50\text{ V}$	—	1	—	—	μA
		$T_c = 125^\circ\text{C}$ $V_{DS} = 40\text{ V}$ $V_{GS} = 50\text{ V}$	—	50	—	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 10\text{ V}$ $V_{DS} = 0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D = 7.5\text{ A}$ $V_{GS} = 5\text{ V}$	—	1.125	—	1.125	V
		$I_D = 15\text{ A}$ $V_{GS} = 5\text{ V}$	—	3.0	—	3.0	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D = 7.5\text{ A}$ $V_{GS} = 5\text{ V}$	—	0.14	—	0.14	Ω
Forward Transconductance	g_{fs}^a	$V_{DS} = 10\text{ V}$ $I_D = 7.5\text{ A}$	4.0	—	4.0	—	mho
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}$	—	900	—	900	pF
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	—	450	—	450	
Reverse-Transfer Capacitance	C_{rss}	$f = 1\text{ MHz}$	—	180	—	180	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$ $I_D = 7.5\text{ A}$ $R_{\theta gn} = \infty$ $R_{GS} = 6.25\ \Omega$ $V_{GS} = 5\text{ V}$	16(typ)	40	16(typ)	40	ns
Rise Time	t_r		250(typ)	325	250(typ)	325	
Turn-Off Delay Time	$t_{d(off)}$		200(typ)	325	200(typ)	325	
Fall Time	t_f		225(typ)	325	225(typ)	325	
Thermal Resistance Junction-to-Case	$R_{\theta jc}$	RFM15N05L, RFM15N06L	—	1.67	—	1.67	$^\circ\text{C/W}$
		RFP15N05L, RFP15N06L	—	2.083	—	2.083	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM15N05L RFP15N05L		RFM15N06L RFP15N06L		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}^a	$I_{SO} = 7.5\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	$I_F = 4\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$	225 (typ.)		225 (typ.)		ns

^a Pulsed: Pulse duration = 300 μs , duty cycle = 2%.

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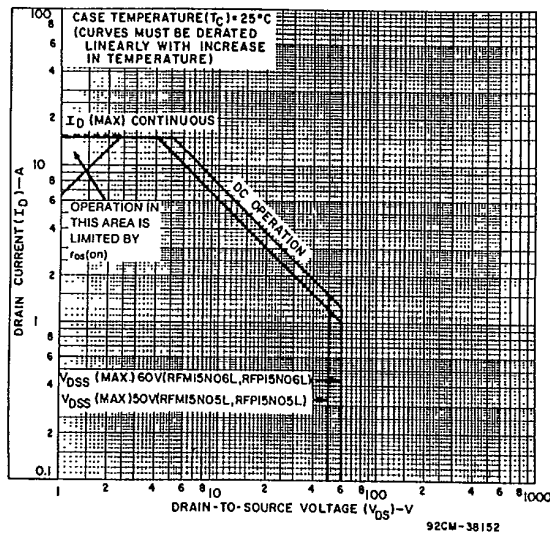


Fig. 1 - Maximum safe operating areas for all types.

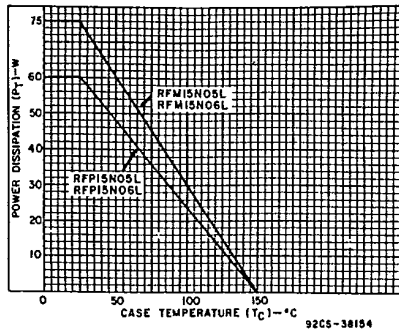


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

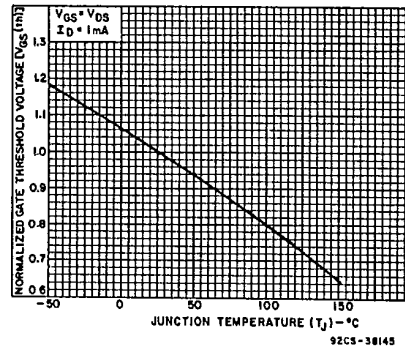


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

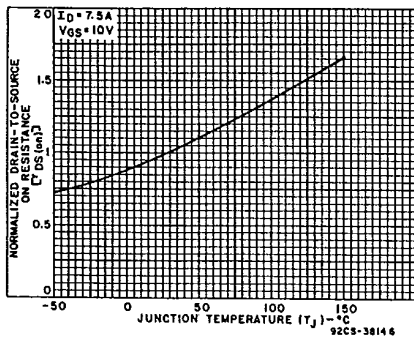


Fig. 4 - Normalized drain-to-source on resistance vs. junction temperature for all types.

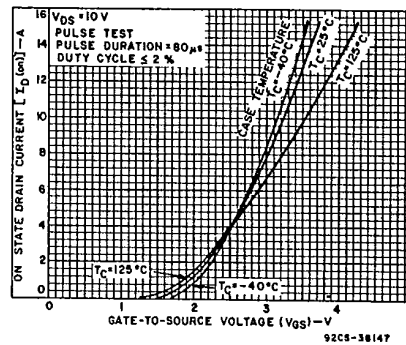


Fig. 5 - Typical transfer characteristics for all types.

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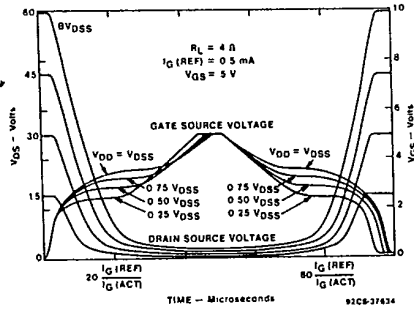


Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA Power MOSFETs PMP411A.

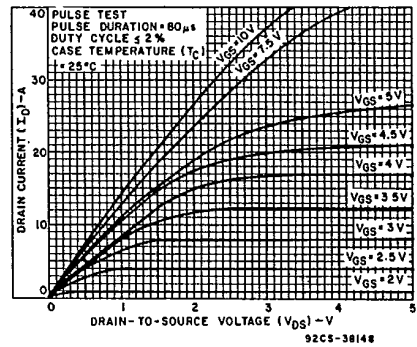


Fig. 7 - Typical saturation characteristics for all types.

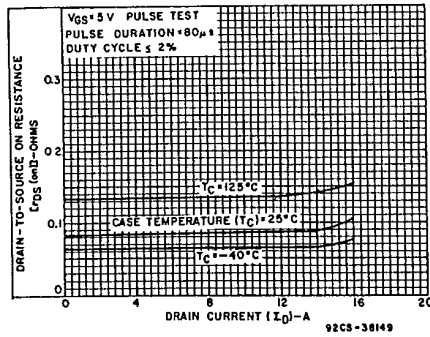


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

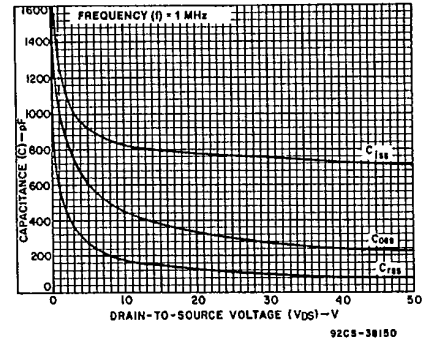


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

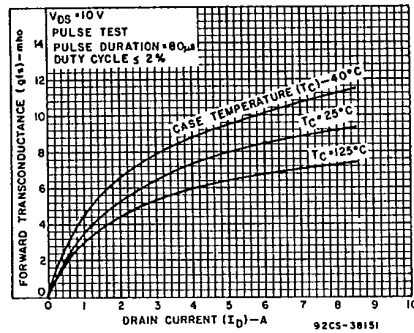


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

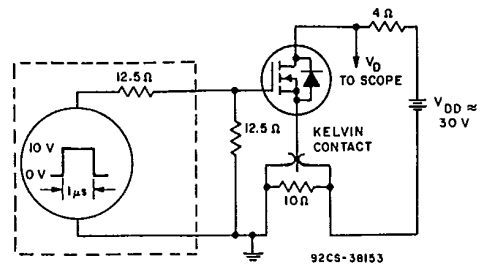


Fig. 11 - Switching Time Test Circuit.