

## Power Logic Level MOSFETs

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

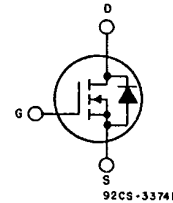
15 A, 50 and 60 V

$r_{DS(on)}$ : 0.14  $\Omega$

#### 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

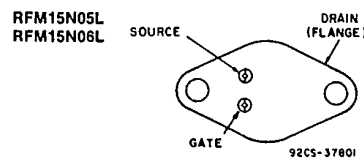
The RFM15N05L and RFM15N06L and the RFP15N05L and RFP15N06L\* are N-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors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

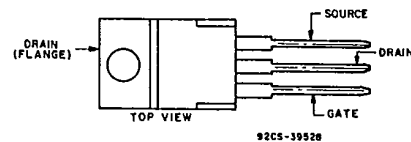
Because of space limitations branding (marking) on type RFP15N05L is F15N05L and on type RFP15N06L is F15N06L.

\*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 ( $T_c = 25^\circ\text{C}$ ):

	RFM15N05L	RFM15N06L	RFP15N05L	RFP15N06L	
DRAIN-SOURCE VOLTAGE	50	60	50	60	V
DRAIN-GATE VOLTAGE ( $R_{DS} = 1\text{ M}\Omega$ )	50	60	50	60	V
GATE-SOURCE VOLTAGE			$\pm 10$		V
DRAIN CURRENT, RMS Continuous			15		A
Pulsed			40		A
POWER DISSIPATION @ $T_c = 25^\circ\text{C}$	75	75	60	60	W
Derate above $T_c = 25^\circ\text{C}$	0.6	0.6	0.48	0.48	W/ $^\circ\text{C}$
OPERATING AND STORAGE TEMPERATURE			-55 to +150		$^\circ\text{C}$

## RFM15N05L, RFM15N06L, RFP15N05L, RFP15N06L

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	$I_{OSS}$	$V_{DS} = 40\text{ V}$	—	1	—	—	$\mu\text{A}$
		$V_{DS} = 50\text{ V}$	—	—	—	1	
		$T_C = 125^\circ\text{C}$ $V_{DS} = 40\text{ V}$	—	50	—	—	
		$V_{DS} = 50\text{ V}$	—	—	—	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	$\Omega$
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	$t_{d(on)}$	$V_{DD} = 30\text{ V}$ $I_D = 7.5\text{ A}$ $R_{gen} = \infty$	16(typ)	40	16(typ)	40	ns
Rise Time	$t_r$	$R_{gs} = 6.25\ \Omega$ $V_{GS} = 5\text{ V}$	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	$V_{SD}^a$	$I_{SD} = 7.5A$	—	1.4	—	1.4	V
Reverse Recovery Time	$t_{rr}$	$I_F = 4A, dI_F/dt = 100A/\mu s$	225 (typ.)		225 (typ.)		ns

<sup>a</sup> Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle = 2%.

RFM15N05L, RFM15N06L, RFP15N05L, RFP15N06L

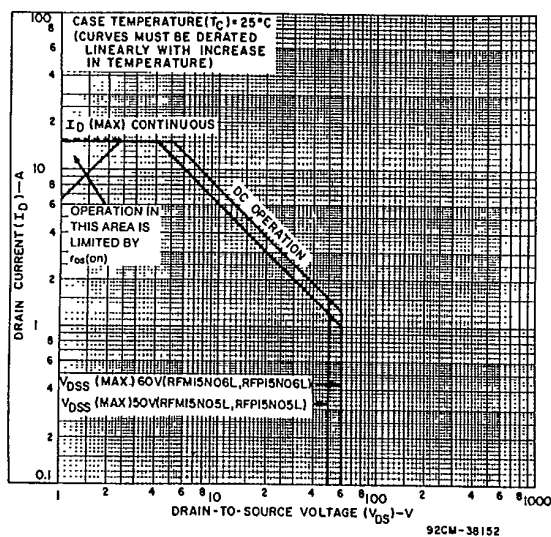


Fig. 1 - Maximum safe operating areas for all types.

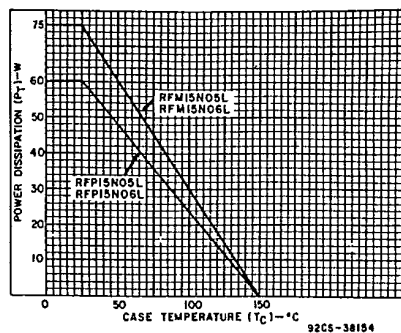


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

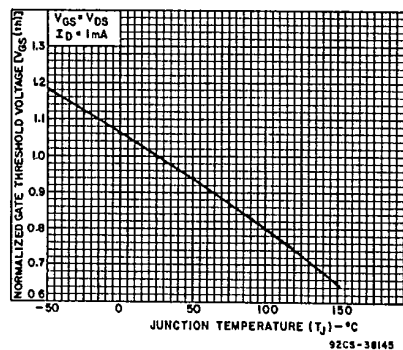


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

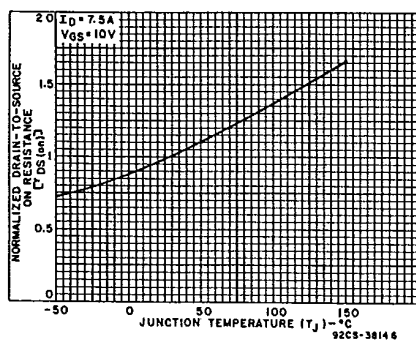


Fig. 4 - Normalized drain-to-source on resistance vs. junction temperature for all types.

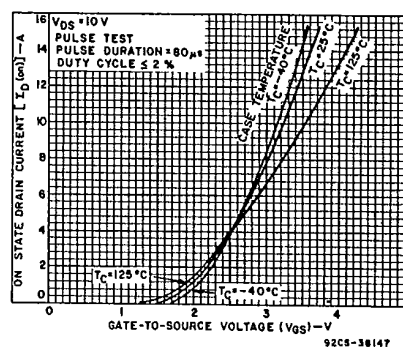


Fig. 5 - Typical transfer characteristics for all types.

RFM15N05L, RFM15N06L, RFP15N05L, RFP15N06L

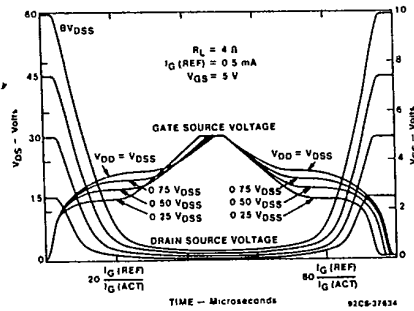


Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA Power MOSFETs PMP411A.

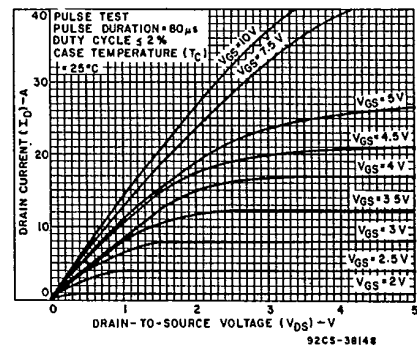


Fig. 7 - Typical saturation characteristics for all types.

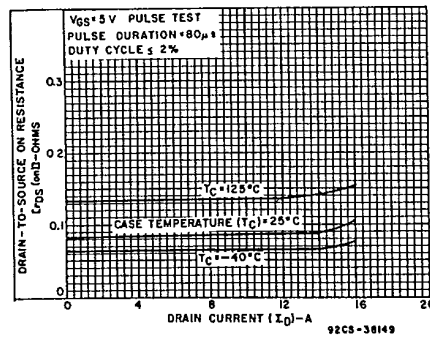


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

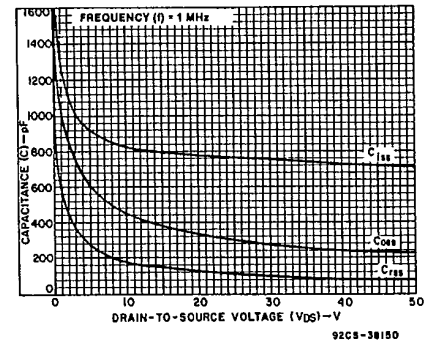


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

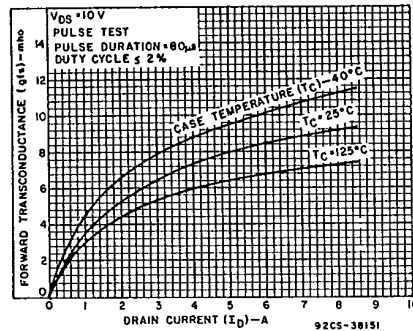


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

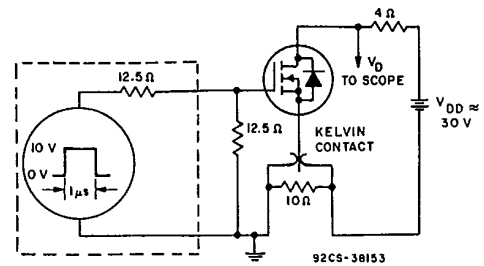


Fig. 11 - Switching Time Test Circuit.