

N-Channel Logic Level Enhancement-Mode Power Field-Effect Transistor (L²FET)

August 1991

Features

- 25A, 60V
- $r_{DS(ON)} = 0.085\Omega$
- Design Optimized for 5V Gate Drives
- Can be Driven Directly from QMOS, NMOS, TTL Circuits
- Compatible with Automotive Drive Requirements
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

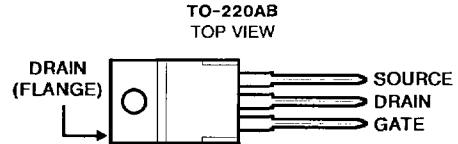
Description

The RFP25N06L is an N-Channel enhancement-mode silicon-gate power field-effect transistor specifically designed for use with logic level (5V) 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 conductance at gate biases in the 3V - 5V range, thereby facilitating true on-off power control directly from logic circuit supply voltages.

The RFP25N06L is supplied in the JEDEC TO-220AB plastic package.

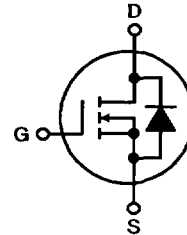
Because of space limitations branding (marking) on type RFP25N06L is F25N06L.

Package



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



Absolute Maximum Ratings ($T_C = +25^\circ\text{C}$) Unless Otherwise Specified

			UNITS
Drain-Source Voltage	V_{DS}	60	V
Drain-Gate Voltage ($R_{GS} = 1\text{M}\Omega$)	V_{DGR}	60	V
Continuous Drain Current			
RMS Continuous	I_D	25	A
RMS Continuous @ $T_C = +85^\circ\text{C}$		18	A
Pulsed Drain Current	I_{DM}	60	A
Gate-Source Voltage	V_{GS}	± 10	V
Maximum Power Dissipation			
$T_C = +25^\circ\text{C}$	P_D	75	W
Above $T_C = +25^\circ\text{C}$ Derate Linearly		0.6	W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Specifications RFP25N06L

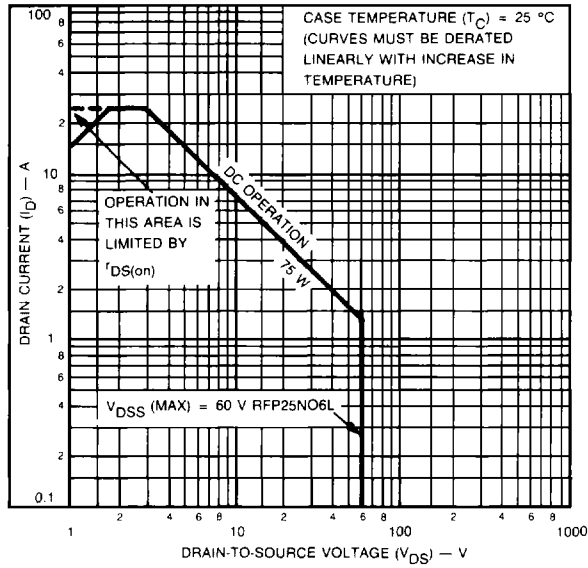
ELECTRICAL CHARACTERISTICS At Case Temperature (T_c) = 25° C Unless Otherwise Specified

CHARACTERISTICS	TEST CONDITIONS	LIMITS		UNITS
		RFP25N06L		
		MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS} $I_D = 1 \text{ mA}$ $V_{GS} = 0$	60	—	V
Gate Threshold Voltage	$V_{GS(th)}$ $V_{GS} = V_{DS}$ $I_D = 1 \text{ mA}$	1	2	V
Zero Gate Voltage Drain Current	I_{DSS} $V_{DS} = 40 \text{ V}$ $V_{DS} = 50 \text{ V}$ $T_c = 125^\circ \text{ C}$ $V_{DS} = 40 \text{ V}$ $V_{DS} = 50 \text{ V}$	— — — —	— 1 — 50	μA
Gate-Source Leakage Current	I_{GSS} $V_{GS} = 10 \text{ V}$ $V_{DS} = 0$	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$ $I_D = 12.5 \text{ A}$ $V_{GS} = 5 \text{ V}$ $I_D = 25 \text{ A}$ $V_{GS} = 5 \text{ V}$	— —	1.06 2.5	V
Static Drain-Source On Resistance	$r_{DS(on)}^a$ $I_D = 12.5 \text{ A}$ $V_{GS} = 5 \text{ V}$	—	0.085	Ω
Forward Transconductance	g_{fs}^a $V_{DS} = 5 \text{ V}$ $I_D = 12.5 \text{ A}$	5	—	mho
Input Capacitance	C_{iss} $V_{DS} = 25 \text{ V}$	—	2000	pF
Output Capacitance	C_{oss} $V_{GS} = 0 \text{ V}$	—	900	
Reverse Transfer Capacitance	C_{rss} $f = 1 \text{ MHz}$	—	400	
Turn-On Delay Time	$t_{d(on)}$ $V_{DS} = 30 \text{ V}$ $I_D = 12.5 \text{ A}$	18 (typ.)	60	ns
Rise Time	t_r $R_{gen} = \infty$	120 (typ.)	225	
Turn-Off Delay Time	$t_{d(off)}$ $R_{gs} = 6.25 \Omega$	123 (typ.)	225	
Fall Time	t_f $V_{GS} = 5 \text{ V}$	123 (typ.)	200	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$ RFP25N06L	—	1.67	°C/W

^aPulsed: Pulse duration = 300 μs max., duty cycle = 2%.

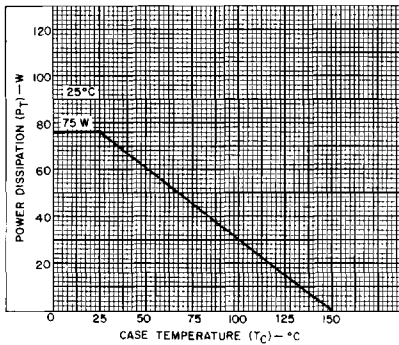
**LOGIC LEVEL
POWER MOSFETs**

RFP25N06L



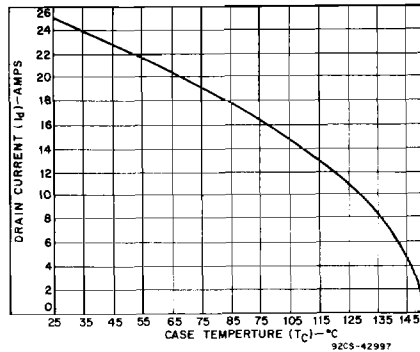
92GS-44238

Fig. 1 - Maximum operating areas for all types.



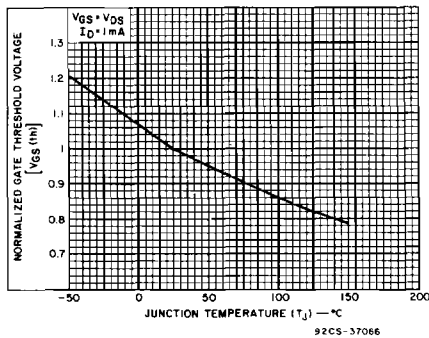
92CS-42990

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



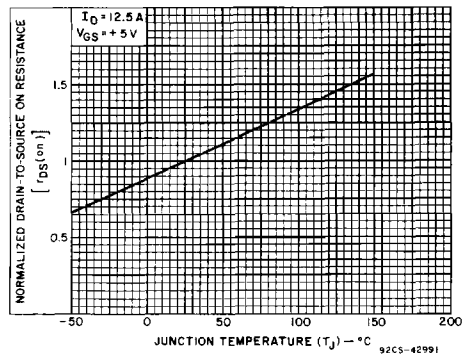
92CS-42997

Fig. 3 - Maximum continuous drain current vs. case temperature.



92CS-37086

Fig. 4 - Typical normalized gate threshold voltage as a function of junction temperature for all types.



92CS-42991

Fig. 5 - Normalized drain-to-source on resistance to junction temperature for all types.

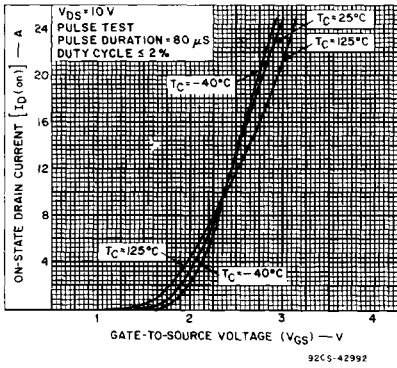


Fig. 6 - Typical transfer characteristics for all types.

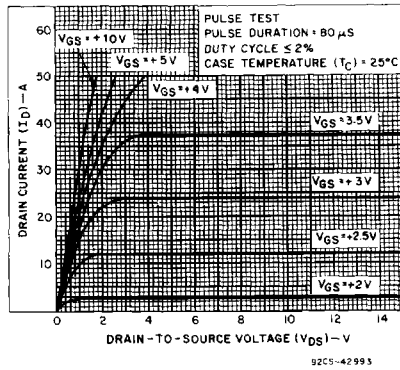


Fig. 7 - Typical output characteristics for all types.

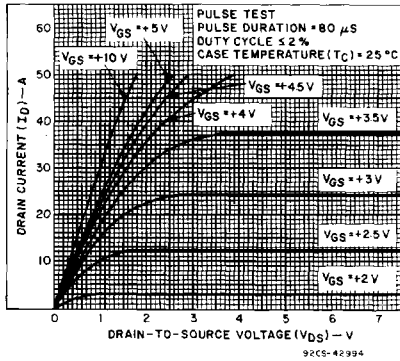


Fig. 8 - Typical saturation characteristics for all types.

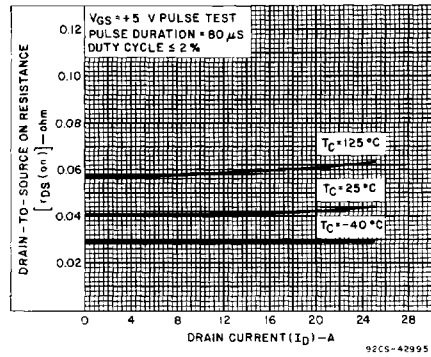


Fig. 9 - Typical drain-to-source on resistance as a function of drain current for all types.

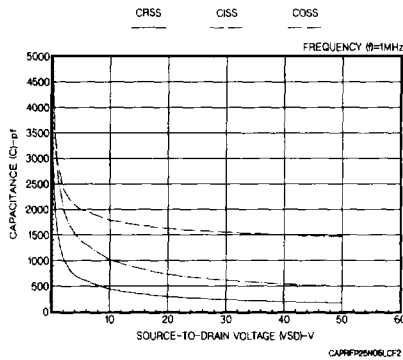


Fig. 10 - Typical capacitance vs. voltage.

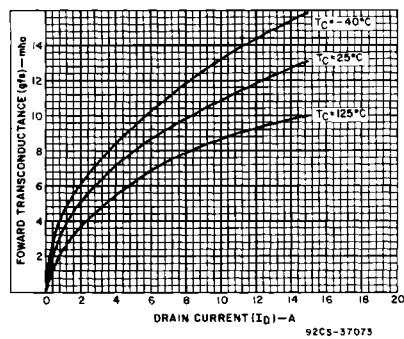


Fig. 11 - Typical forward transconductance as a function of drain current for all types.

RFP25N06L

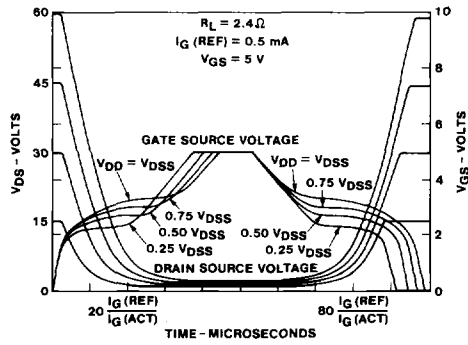


Fig. 12 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN7254 and AN-7260.