Data Sheet April 1999 File Number 2874.2

2A, 120V, 1.750 Ohm, Logic Level, N-Channel Power MOSFET

The RFP2N12L 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 conduction at gate biases in the 3V - 5V range, thereby facilitating true on-off power control directly from logic circuit supply voltages.

Formerly developmental type TA09528.

Ordering Information

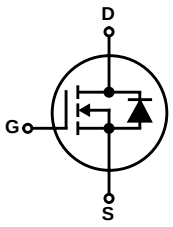
PART NUMBER	PACKAGE	BRAND
RFP2N12L	TO-220AB	RFP2N12L

NOTE: When ordering, include the entire part number.

Features

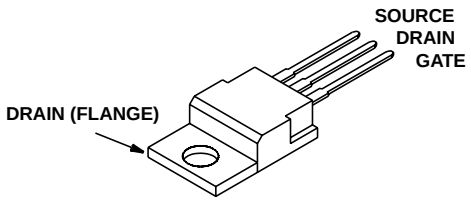
- 2A, 120V
- $r_{DS(ON)} = 1.750\Omega$
- Design Optimized for 5V Gate Drives
- Can be Driven Directly from QMOS, NMOS, TTL Circuits
- Compatible with Automotive Drive Requirements
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device
- Related Literature
  - TB334 “Guidelines for Soldering Surface Mount Components to PC Boards”

Symbol



Packaging

JEDEL TO-220AB



CAUTION: These devices are sensitive to electrostatic discharge; follow proper ESD Handling Procedures.
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Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

		RFP2N12L	UNITS
Drain to Source Voltage (Note 1)	V_{DSS}	120	V
Drain to Gate Voltage RGS = 20KΩ (Note 1)	V_{DGR}	120	V
Gate to Source Voltage	V_{GS}	±10	V
Continuous Drain Current	I_D	2	A
Pulsed Drain Current (Note 3)	I_{DM}	5	A
Maximum Power Dissipation	P_D	25	W
Derate Above $T_C = 25^oC$		0.2	W/ ^oC
Operating and Storage Temperature	T_J, T_{STG}	-55 to 150	^oC
Maximum Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	^oC
Package Body for 10s, See Techbrief 334	T_{pkg}	260	^oC

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

NOTE:

1. $T_J = 25^oC$ to 125^oC.

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0	120	-	-	V
Gate to Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}$, I_D = 250μA (Figure 8)	1	-	2	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = Rated BV_{DSS}, V_{GS} = 0V	-	-	1	μA
		V_{DS} = 0.8 x Rated BV_{DSS}, V_{GS} = 0V, $T_C = 125^oC$	-	-	25	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±10V, V_{DS} = 0V	-	-	±100	nA
Drain to Source On Voltage (Note 2)	$V_{DS(ON)}$	I_D = 2A, V_{GS} = 5V	-	-	3.5	V
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	I_D = 2A, V_{GS} = 5V (Figure 6, 7)	-	-	1.750	Ω
Turn-On Delay Time	$t_{d(ON)}$	$I_D \approx$ 2A, V_{DD} = 75V, R_G = 6.25Ω, R_L = 75Ω, V_{GS} = 5V (Figures 10, 11, 12)	-	10	25	ns
Rise Time	t_r		-	10	45	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	24	45	ns
Fall Time	t_f		-	20	25	ns
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz (Figure 9)	-	-	200	pF
Output Capacitance	C_{OSS}		-	-	80	pF
Reverse Transfer Capacitance	C_{RSS}		-	-	35	pF
Thermal Resistance Junction to Case	$R_{\theta JC}$		-	-	5	$^oC/W$

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage (Note 2)	V_{SD}	I_{SD} = 2A	-	-	1.4	V
Diode Reverse Recovery Time	t_{rr}	I_{SD} = 2A, dI_{SD}/dt = 50A/μs	-	150	-	ns

NOTES:

2. Pulsed: pulse duration = 300μs max, duty cycle = 2%.
3. Repetitive rating: pulse width limited by maximum junction temperature.

Typical Performance Curves Unless Otherwise Specified

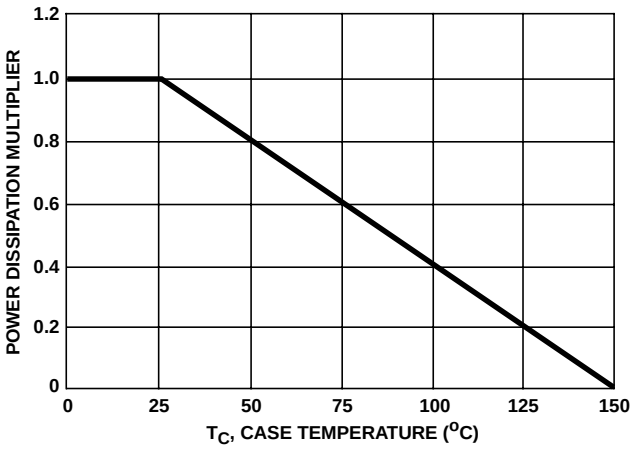


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

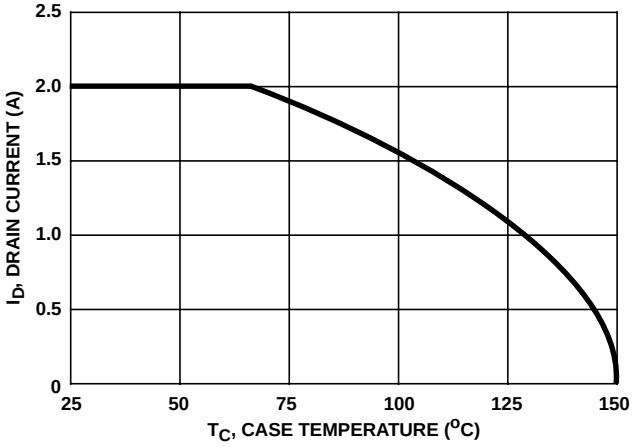


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

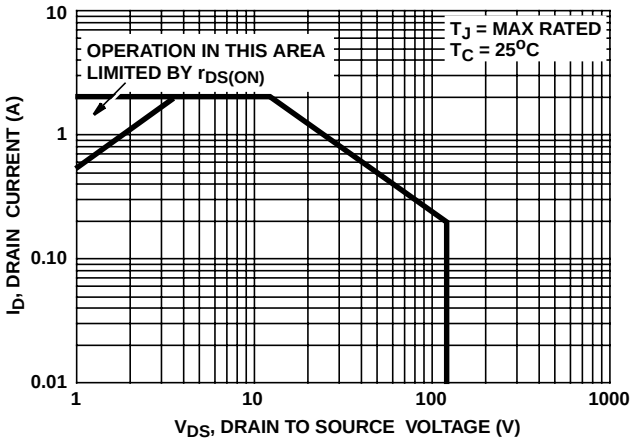


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

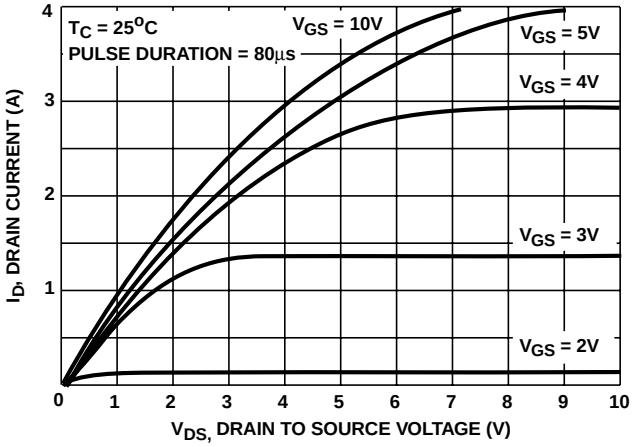


FIGURE 4. SATURATION CHARACTERISTICS

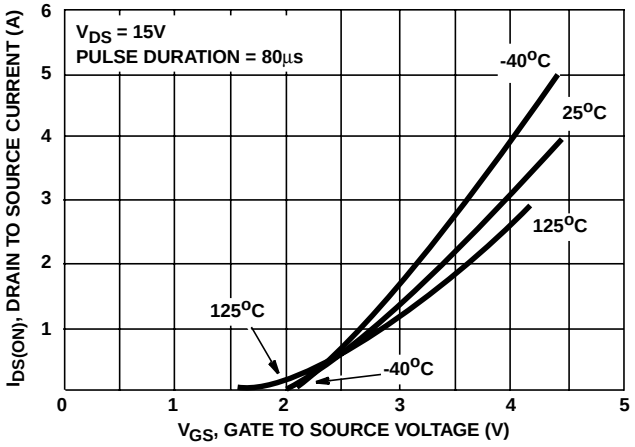


FIGURE 5. TRANSFER CHARACTERISTICS

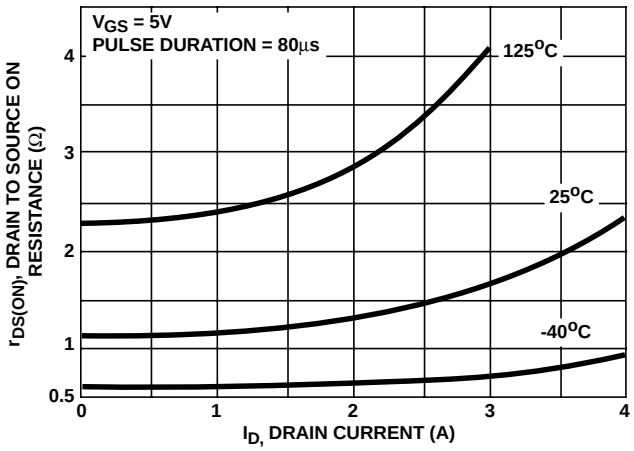


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs DRAIN CURRENT

Typical Performance Curves Unless Otherwise Specified (Continued)

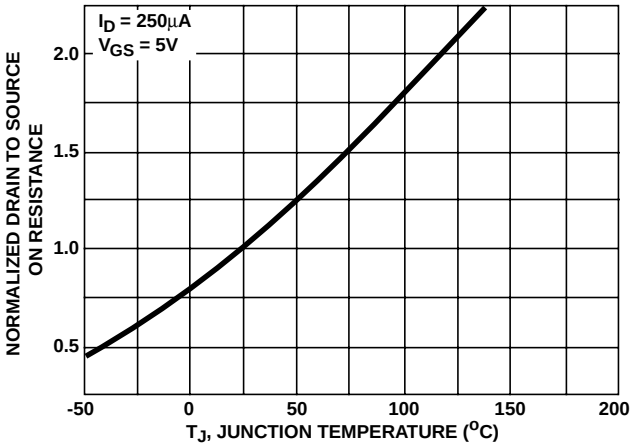


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

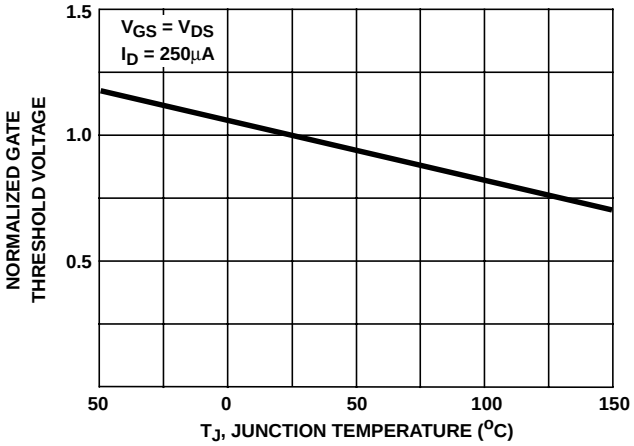


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

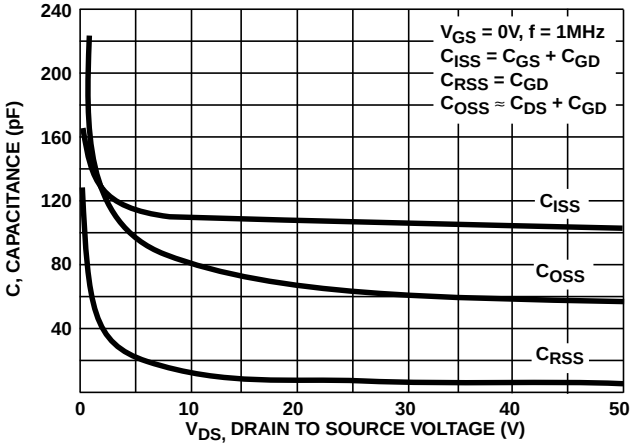
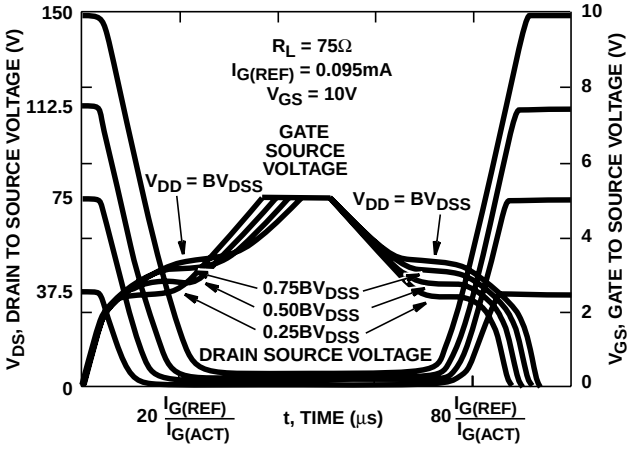


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Intersil Applications Notes AN7254 and AN7260

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

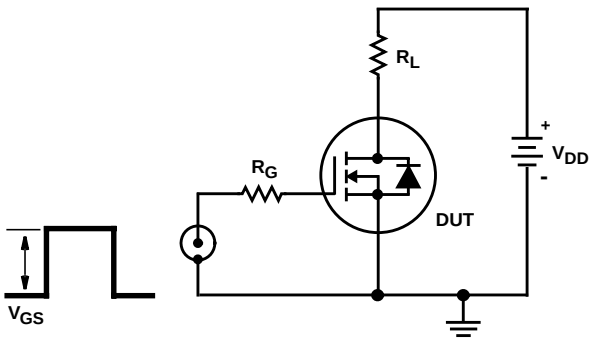


FIGURE 11. SWITCHING TIME TEST CIRCUIT

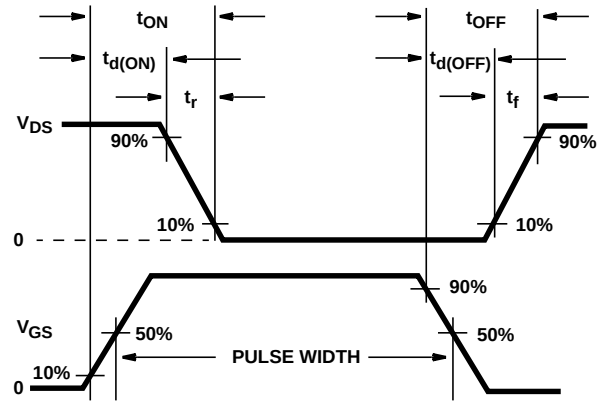


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

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