

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

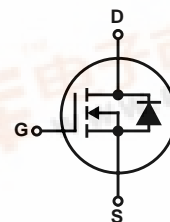
| PART NUMBER | PACKAGE | BRAND |
|-------------|----------|----------|
| RFP2N12L | TO-220AB | RFP2N12L |

NOTE: When ordering, include the entire part number.

Features

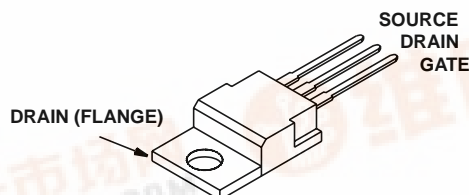
- 2A, 120V
- $r_{DS(ON)} = 1.750\Omega$
- Design Optimized for 5V Gate Drives
- Can be Driven Directly from QMOS, NMOS, TTL Circuits
- Compatible with Automotive Drive Requirements
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance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

Symbol



Packaging

JEDEL TO-220AB



RFP2N12L

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

| | RFP2N12L | UNITS |
|--|------------|---------------------|
| Drain to Source Voltage (Note 1) | 120 | V |
| Drain to Gate Voltage $R_{GS} = 20\text{K}\Omega$ (Note 1) | 120 | V |
| Gate to Source Voltage | ± 10 | V |
| Continuous Drain Current | 2 | A |
| Pulsed Drain Current (Note 3) | 5 | A |
| Maximum Power Dissipation | 25 | W |
| Derate Above $T_C = 25^\circ\text{C}$ | 0.2 | W/ $^\circ\text{C}$ |
| Operating and Storage Temperature | -55 to 150 | $^\circ\text{C}$ |
| Maximum Temperature for Soldering | | |
| Leads at 0.063in (1.6mm) from Case for 10s | 300 | $^\circ\text{C}$ |
| Package Body for 10s, See Techbrief 334 | 260 | $^\circ\text{C}$ |

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. $T_J = 25^\circ\text{C}$ to 125°C .

Electrical Specifications $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|--|-----------------|---|-----|-----|-----------|--------------------|
| Drain to Source Breakdown Voltage | BV_{DSS} | $I_D = 250\mu\text{A}$, $V_{GS} = 0$ | 120 | - | - | V |
| Gate to Threshold Voltage | $V_{GS(TH)}$ | $V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$ (Figure 8) | 1 | - | 2 | V |
| Zero-Gate Voltage Drain Current | I_{DSS} | $V_{DS} = \text{Rated } BV_{DSS}$, $V_{GS} = 0\text{V}$ | - | - | 1 | μA |
| | | $V_{DS} = 0.8 \times \text{Rated } BV_{DSS}$, $V_{GS} = 0\text{V}$, $T_C = 125^\circ\text{C}$ | - | - | 25 | μA |
| Gate to Source Leakage Current | I_{GSS} | $V_{GS} = \pm 10\text{V}$, $V_{DS} = 0\text{V}$ | - | - | ± 100 | nA |
| Drain to Source On Voltage (Note 2) | $V_{DS(ON)}$ | $I_D = 2\text{A}$, $V_{GS} = 5\text{V}$ | - | - | 3.5 | V |
| Drain to Source On Resistance (Note 2) | $r_{DS(ON)}$ | $I_D = 2\text{A}$, $V_{GS} = 5\text{V}$ (Figure 6, 7) | - | - | 1.750 | Ω |
| Turn-On Delay Time | $t_{d(ON)}$ | $I_D \approx 2\text{A}$, $V_{DD} = 75\text{V}$, $R_G = 6.25\Omega$, $R_L = 75\Omega$, $V_{GS} = 5\text{V}$ (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} | $V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$ (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 | $^\circ\text{C/W}$ |

Source to Drain Diode Specifications

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

NOTES:

2. Pulsed: pulse duration = $300\mu\text{s}$ max, duty cycle = 2%.
3. Repetitive rating: pulse width limited by maximum junction temperature.

Typical Performance Curves Unless Otherwise Specified

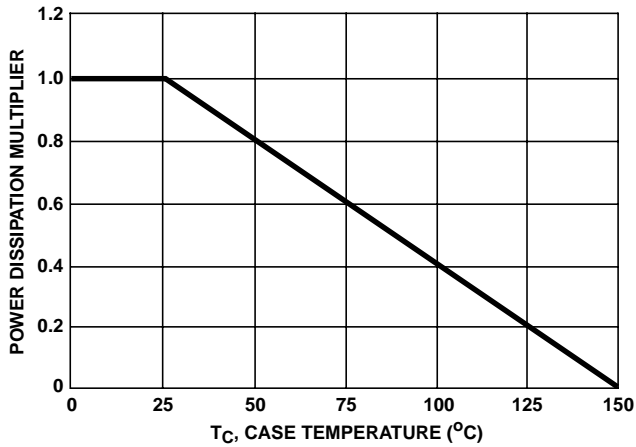


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

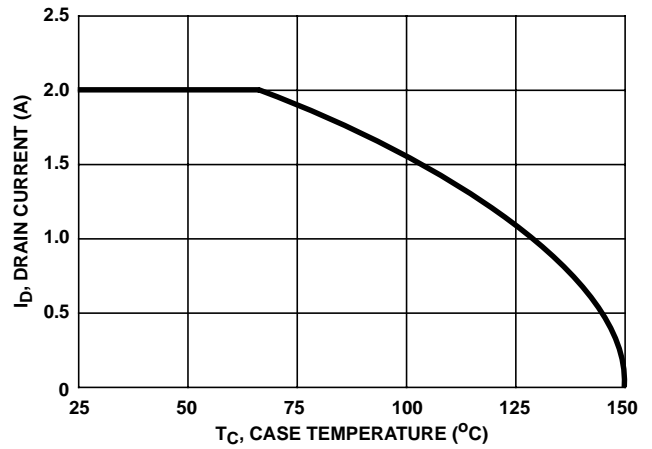


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

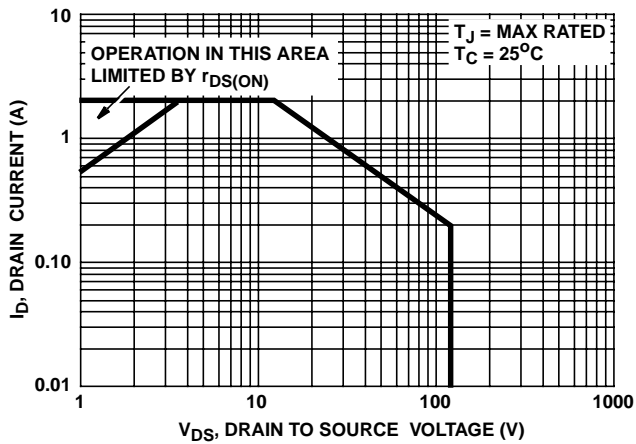


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

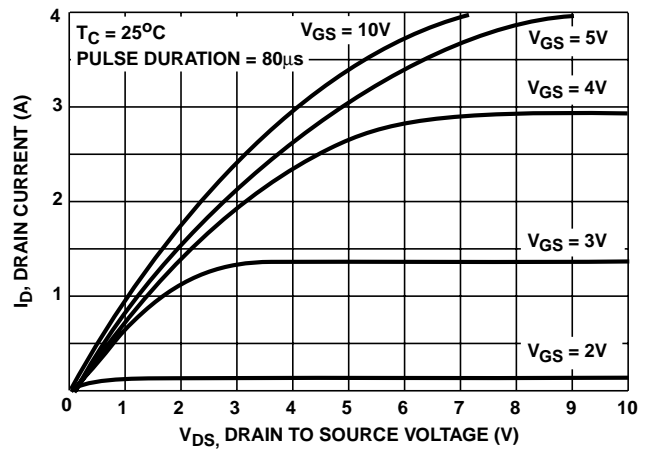


FIGURE 4. SATURATION CHARACTERISTICS

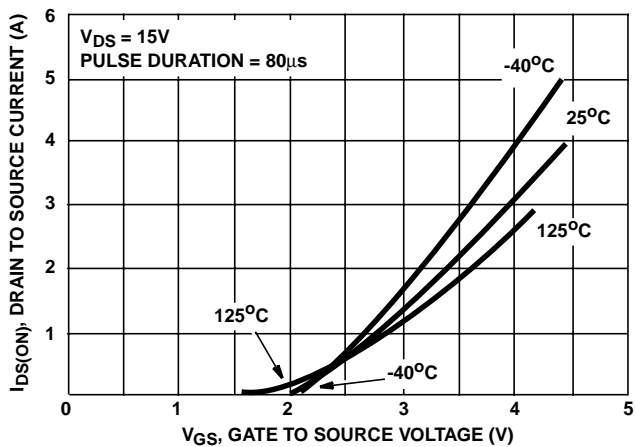


FIGURE 5. TRANSFER CHARACTERISTICS

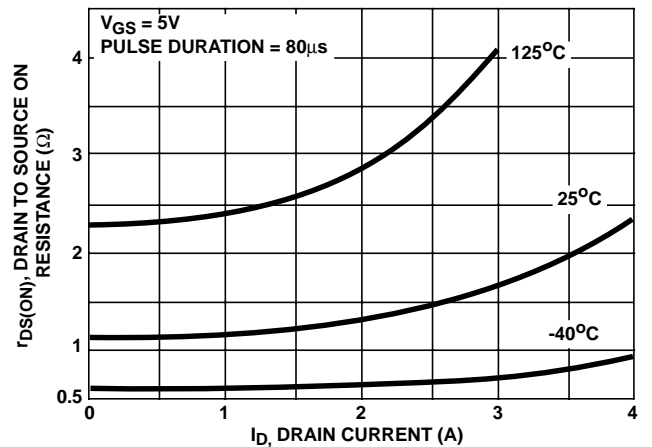


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs DRAIN CURRENT

Typical Performance Curves Unless Otherwise Specified (Continued)

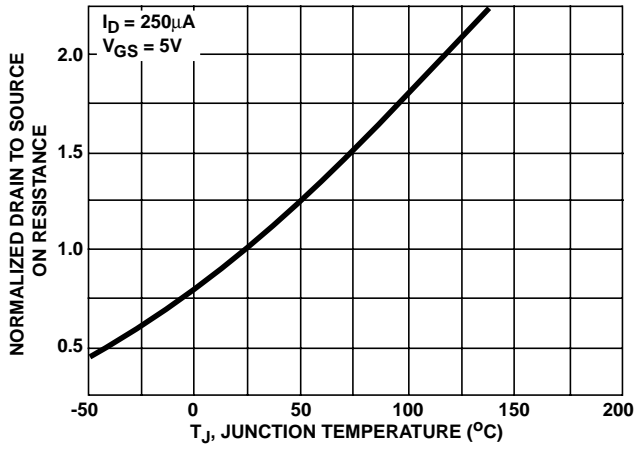


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

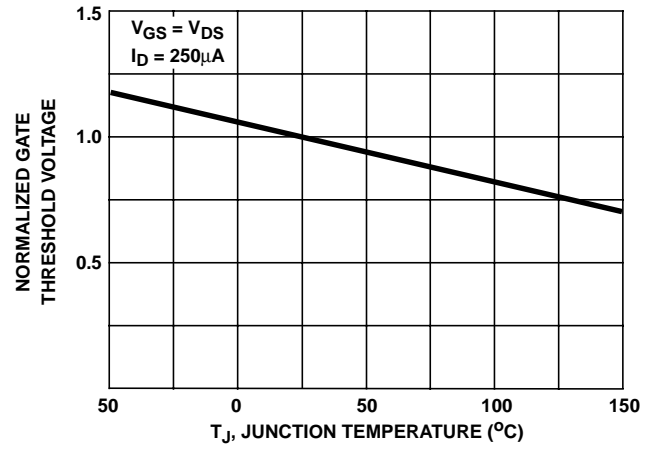


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

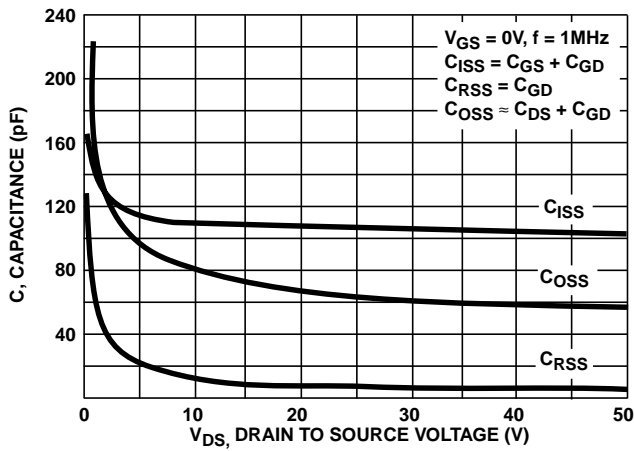
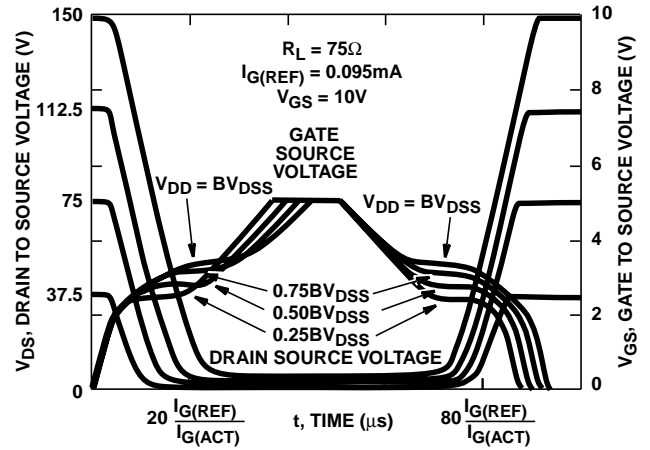


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Intersil Applications Notes AN7254 and AN7260

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

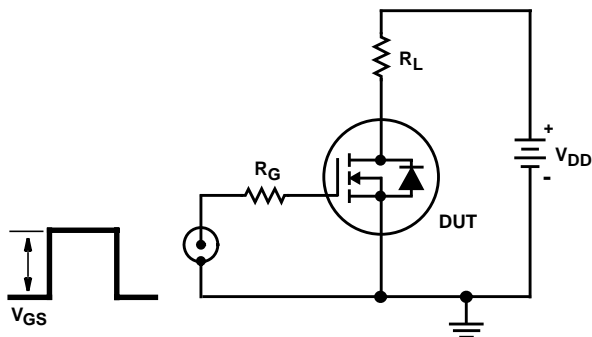


FIGURE 11. SWITCHING TIME TEST CIRCUIT

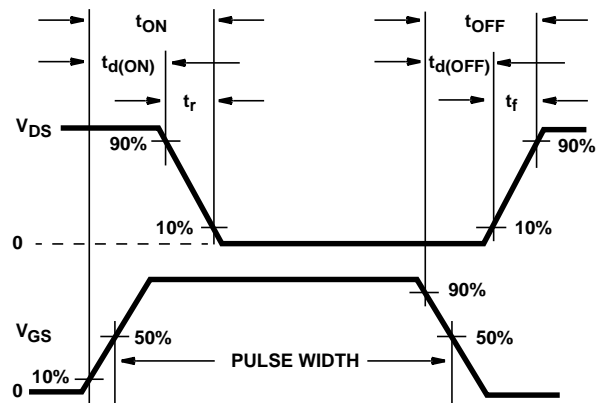


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

RFP2N12L

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