

**2A, 200V, 3.500 Ohm, Logic Level,  
N-Channel Power MOSFET**

The RFP2N20L N-Channel enhancement mode silicon gate power field effect transistor is 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 TA09532.

**Ordering Information**

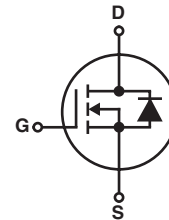
PART NUMBER	PACKAGE	BRAND
RFP2N20L	TO-220AB	RFP2N20L

NOTE: When ordering, include the entire part number.

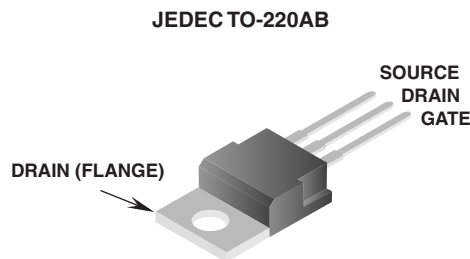
**Features**

- 2A, 200V
- $r_{DS(ON)} = 3.500\Omega$
- 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**



# RFP2N20L

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

	RFP2N20L	UNITS
Drain to Source Voltage (Note 1) . . . . .	$V_{DSS}$	200 V
Drain to Gate Voltage $R_{GS} = 20\text{K}\Omega$ (Note 1) . . . . .	$V_{DGR}$	200 V
Gate to Source Voltage . . . . .	$V_{GS}$	$\pm 10$ V
Drain Current, RMS Continuous . . . . .	$I_D$	2 A
Pulsed (Note 3) . . . . .	$I_{DM}$	4 A
Maximum Power Dissipation . . . . .	$P_D$	25 W
Derate Linearly Above $T_C = 25^\circ\text{C}$ . . . . .		0.2 W/ $^\circ\text{C}$
Operating and Storage Temperature . . . . .	$T_J, T_{STG}$	-55 to 150 $^\circ\text{C}$
Maximum Temperature for Soldering		
Leads at 0.063in (1.6mm) from Case for 10s . . . . .	$T_L$	300 $^\circ\text{C}$
Package Body for 10s, See Techbrief 334 . . . . .	$T_{pkg}$	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:

- $T_J = 25^\circ\text{C}$  to  $125^\circ\text{C}$ .

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Drain to Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	200	-	-	V
Gate to Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1	-	2	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = \text{Rated } BV_{DSS}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
		$V_{DS} = 0.8 \times \text{Rated } BV_{DSS}, V_{GS} = 0\text{V}, T_C = 125^\circ\text{C}$	-	-	25	$\mu\text{A}$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 10\text{V}, V_{DS} = 0$	-	-	$\pm 100$	nA
Drain to Source On Voltage (Note 2)	$V_{DS(ON)}$	$I_D = 2\text{A}, V_{GS} = 5\text{V}$	-	-	7	V
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	$I_D = 2\text{A}, V_{GS} = 5\text{V}$ (Figures 6, 7)	-	-	3.500	$\Omega$
Turn-On Delay Time	$t_{d(ON)}$	$I_D = 2\text{A}, V_{DD} = 100\text{V}, R_G = 6.25\Omega, V_{GS} = 5\text{V}, R_L = 50\Omega$ (Figures 10, 11, 12)	-	10	25	ns
Rise Time	$t_r$		-	10	30	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	25	40	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	$C_{OSS}$		-	-	60	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
Reverse Recovery Time	$t_{rr}$	$I_{SD} = 2\text{A}, dI_{SD}/dt = 50\text{A}/\mu\text{s}$	-	200	-	ns

### NOTES:

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

Typical Performance Curves Unless Otherwise Specified

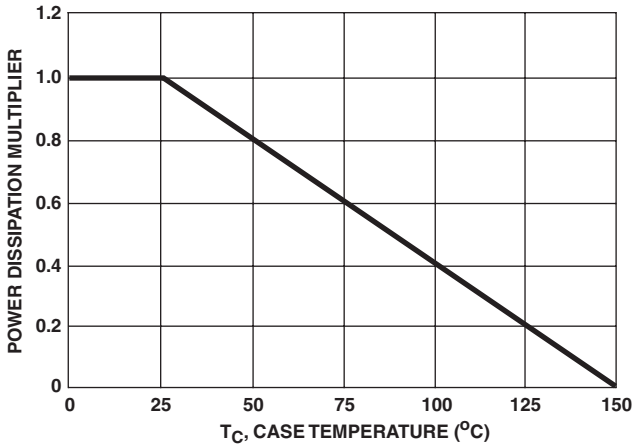


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

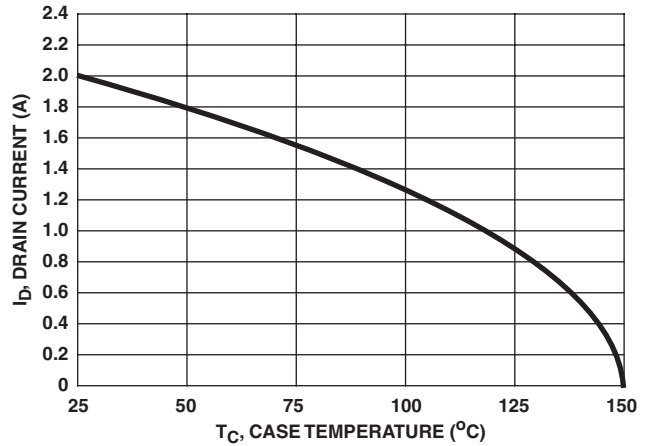


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

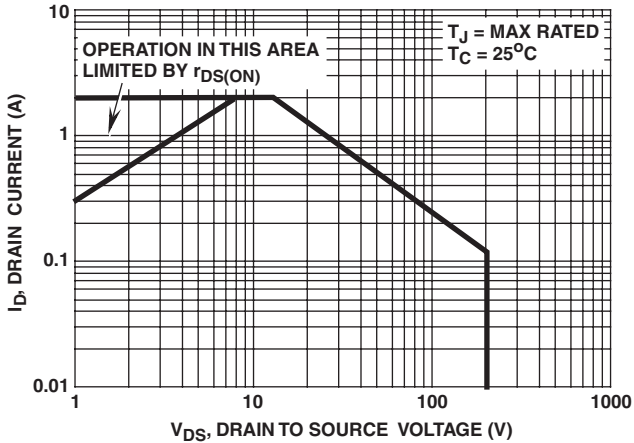


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

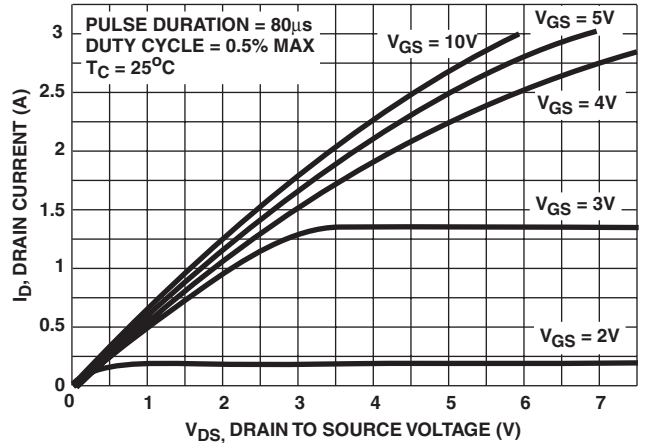


FIGURE 4. SATURATION CHARACTERISTICS

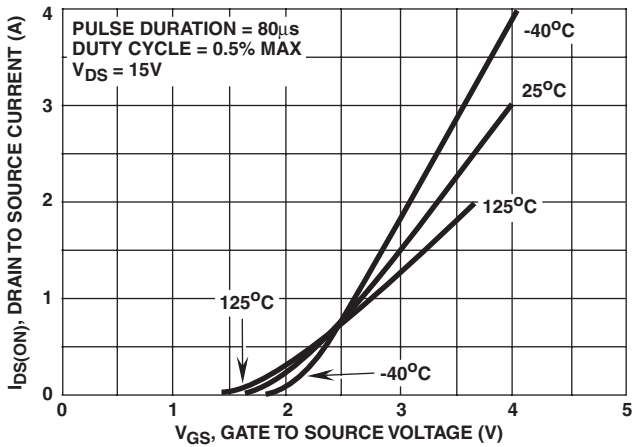


FIGURE 5. TRANSFER CHARACTERISTICS

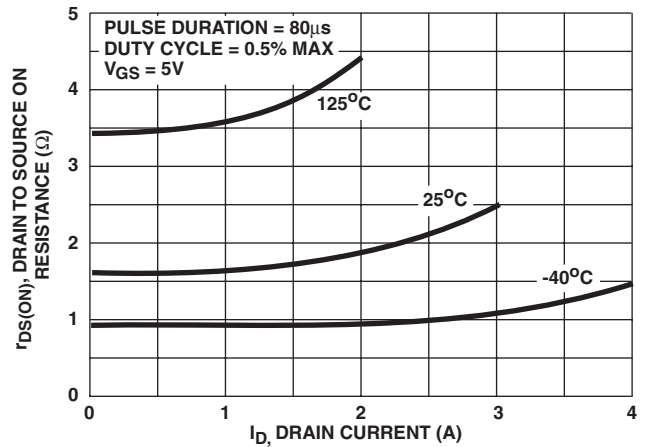


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs DRAIN CURRENT

**Typical Performance Curves** Unless Otherwise Specified (Continued)

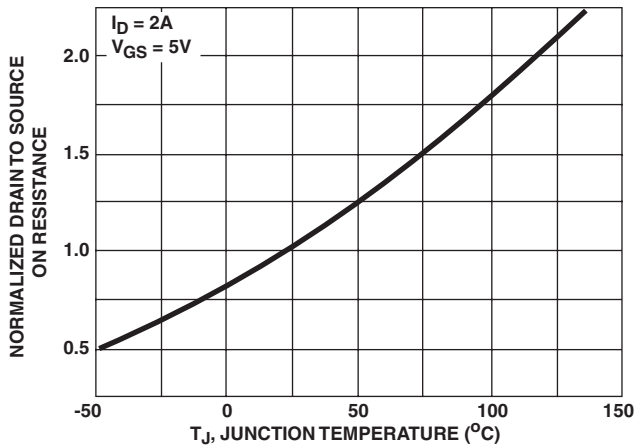


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

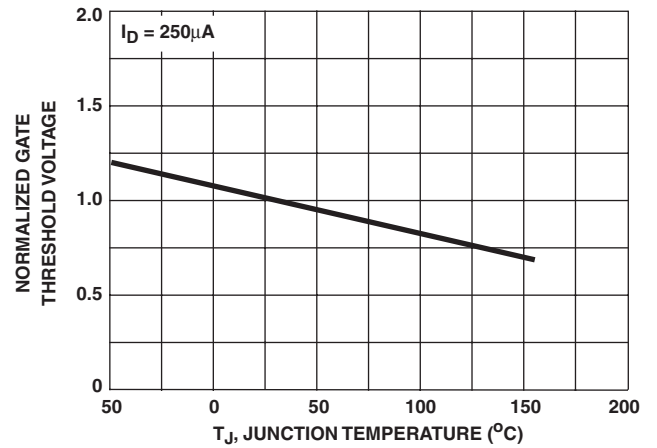


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

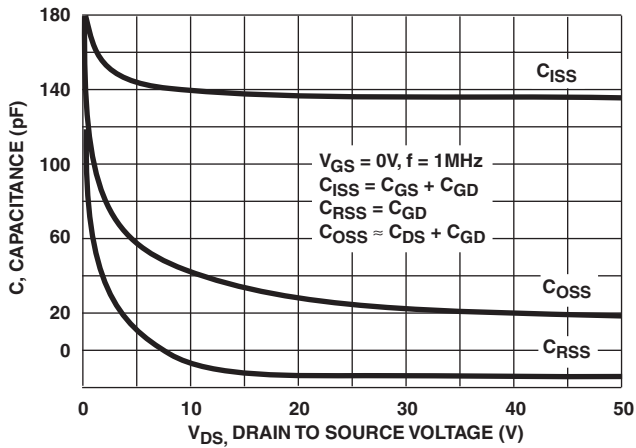
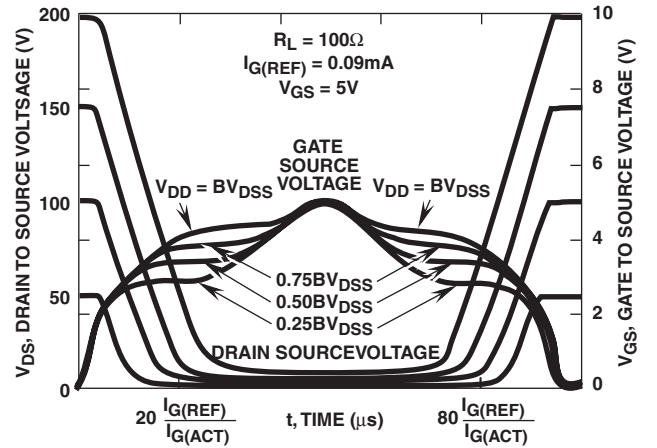


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Applications Notes AN7254 and AN7260

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

**Test Circuits and Waveforms**

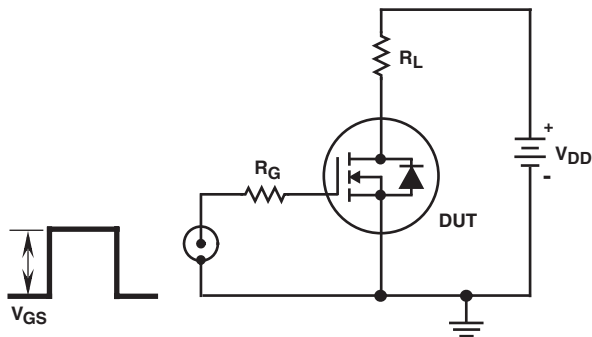


FIGURE 11. SWITCHING TIME TEST CIRCUIT

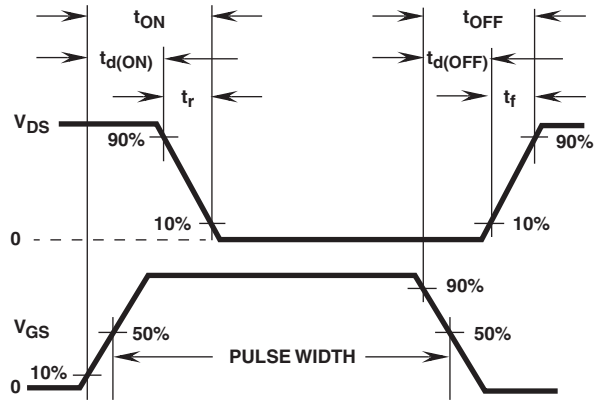


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

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DenseTrench <sup>TM</sup>	GTO <sup>TM</sup>	Power247 <sup>TM</sup>	SuperSOT <sup>TM</sup> -6	
DOMET <sup>TM</sup>	HiSeC <sup>TM</sup>	PowerTrench <sup>®</sup>	SuperSOT <sup>TM</sup> -8	
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