

# RFP2N12, RFP2N15

**2A, 120V and 150V, 1.750 Ohm,  
N-Channel Power MOSFETs**

September 1998

## Features

- 2A, 120V and 150V
- $r_{DS(ON)} = 1.750\Omega$
- Related Literature
  - TB334 "Guidelines for Soldering Surface Mount Components to PC Boards"

## Ordering Information

PART NUMBER	PACKAGE	BRAND
RFP2N12	TO-220AB	RFP2N12
RFP2N15	TO-220AB	RFP2N15

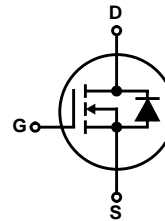
NOTE: When ordering, include the entire part number.

## Description

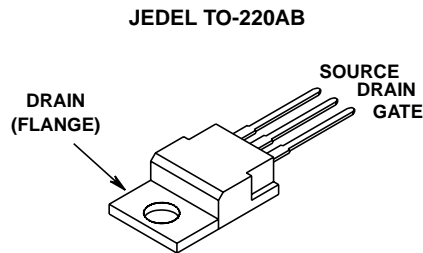
These are N-Channel enhancement mode silicon gate power field effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers and drivers for high power bipolar switching transistors requiring high speed and low gate drive power. These types can be operated directly from integrated circuits.

Formerly developmental type TA09196.

## Symbol



## Packaging



## RFP2N12, RFP2N15

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

	RFP2N12	RFP2N15	UNITS	
Drain to Source Voltage (Note 1) . . . . .	$V_{DS}$	120	150	V
Drain to Gate Voltage ( $R_{GS} = 20k\Omega$ ) (Note 1) . . . . .	$V_{DGR}$	120	150	V
Continuous Drain Current . . . . .	$I_D$	2	2	A
Pulsed Drain Current (Note 3) . . . . .	$I_{DM}$	5	5	A
Gate to Source Voltage . . . . .	$V_{GS}$	$\pm 20$	$\pm 20$	V
Maximum Power Dissipation . . . . .	$P_D$	25	25	W
Linear Derating Factor . . . . .		0.2	0.2	W/ $^\circ\text{C}$
Operating and Storage Temperature . . . . .	$T_J, T_{STG}$	-55 to 150	-55 to 150	$^\circ\text{C}$
Maximum Temperature for Soldering				
Leads at 0.063in (1.6mm) from Case for 10s . . . . .	$T_L$	300	300	$^\circ\text{C}$
Package Body for 10s, See Techbrief 334 . . . . .	$T_{pkg}$	260	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	$BV_{DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	RFP2N12	120	-	-	V
			RFP2N15	150	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ , (Figure 8)	2	-	4	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	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 100$	nA	
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	$I_D = 2\text{A}, V_{GS} = 10\text{V}$ (Figures 6, 7)	-	-	1.750	$\Omega$	
Drain to Source On Voltage	$V_{DS(ON)}$	$I_D = 2\text{A}, V_{GS} = 10\text{V}$	-	-	3.5	V	
Turn-On Delay Time	$t_{d(ON)}$	$I_D \approx 1\text{A}, V_{DD} = 75\text{V}, R_G = 50\Omega,$ $R_L = 73\Omega, V_{GS} = 10\text{V}$ (Figures 10, 11, 12)	-	17	25	ns	
Rise Time	$t_r$		-	30	45	ns	
Turn-Off Delay Time	$t_{d(OFF)}$		-	30	45	ns	
Fall Time	$t_f$		-	17	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	$C_{RSS}$		-	-	25	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)	$V_{SD}$	$I_{SD} = -1\text{A}$	-	-	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:

- Pulsed test: Pulse width  $\leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Repetitive rating: pulse width limited by maximum junction temperature.

**Typical Performance Curves** Unless Otherwise Specified

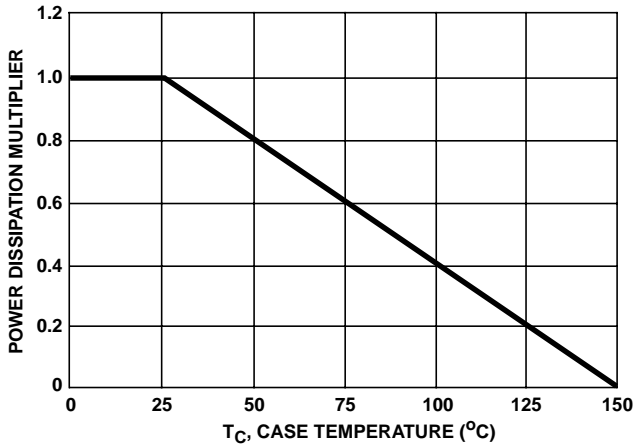


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

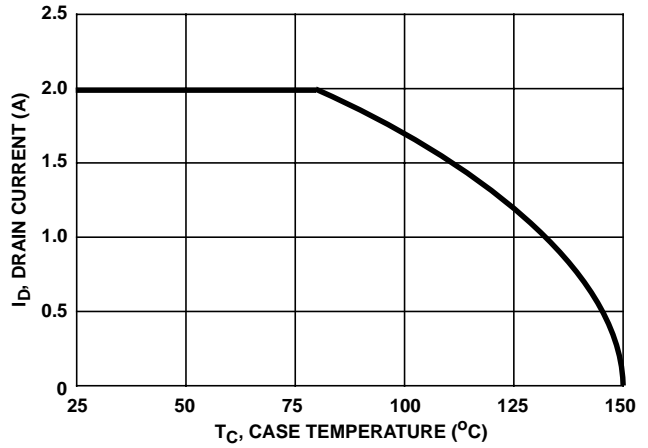


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

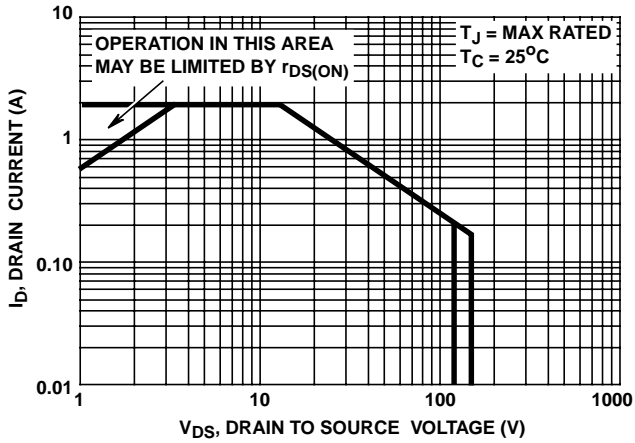


FIGURE 3. FORWARD BIAS OPERATING AREA

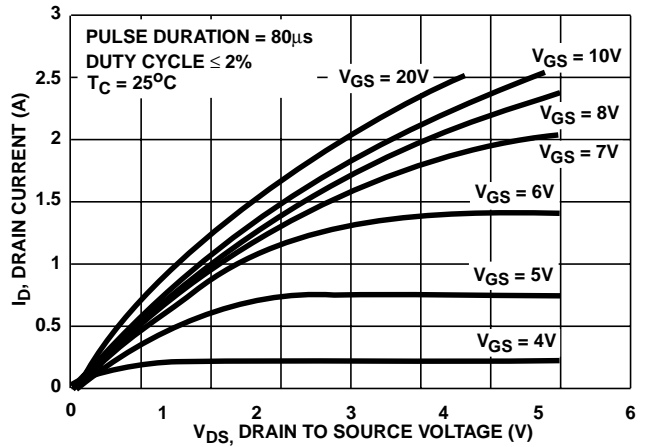


FIGURE 4. SATURATION CHARACTERISTICS

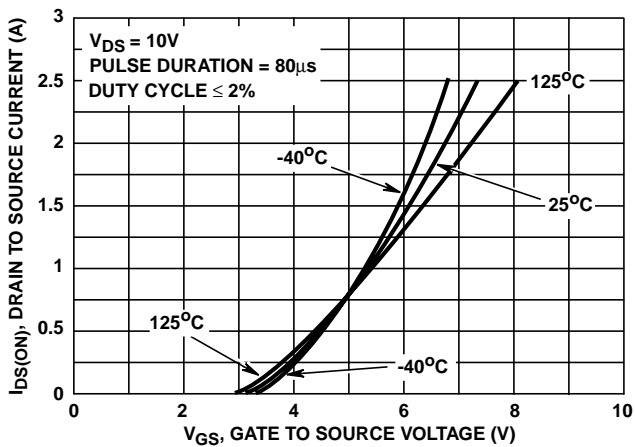


FIGURE 5. TRANSFER CHARACTERISTICS

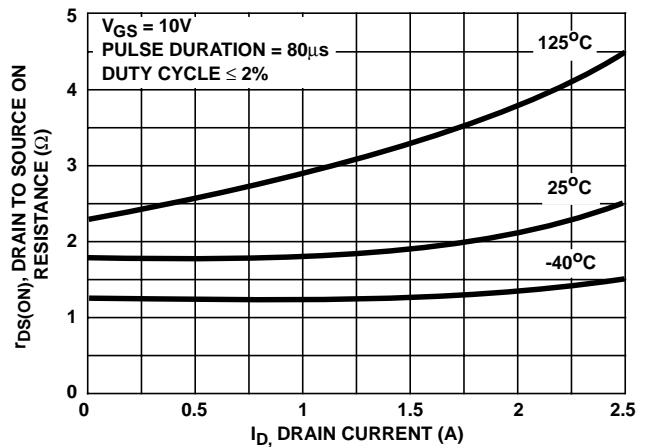


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs DRAIN CURRENT

Typical Performance Curves Unless Otherwise Specified (Continued)

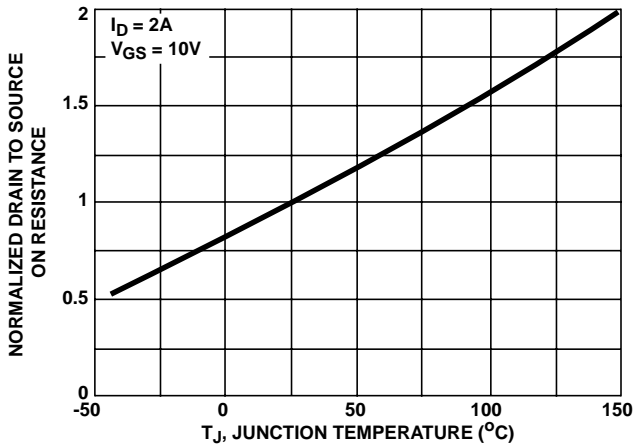


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

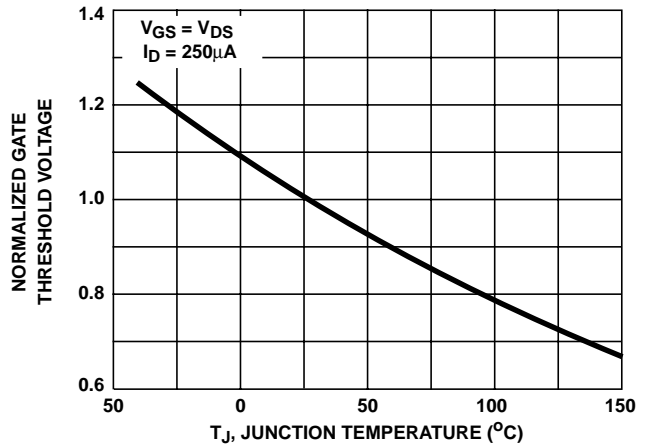


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

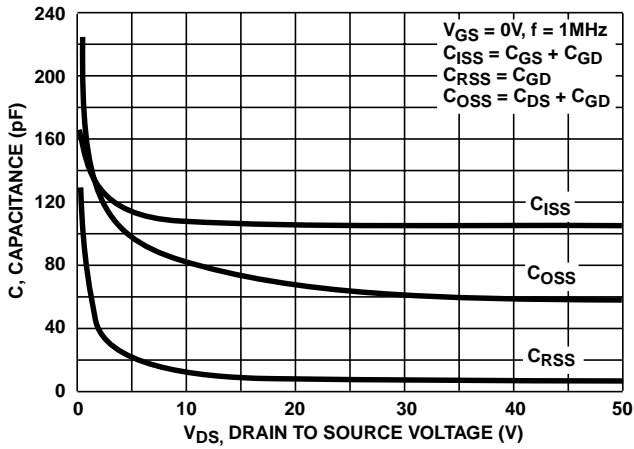
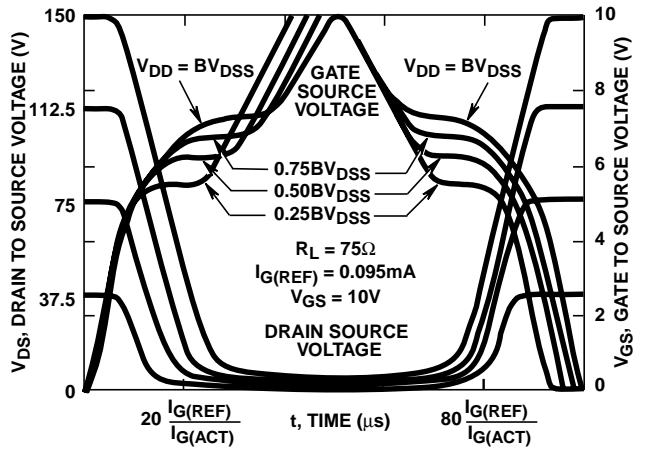


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Harris Applications Notes AN7254 and AN7260

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

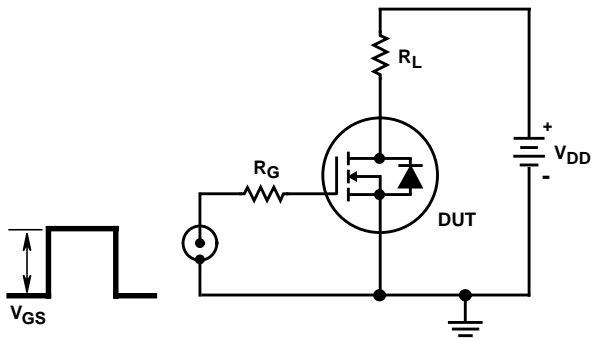


FIGURE 11. SWITCHING TIME TEST CIRCUIT

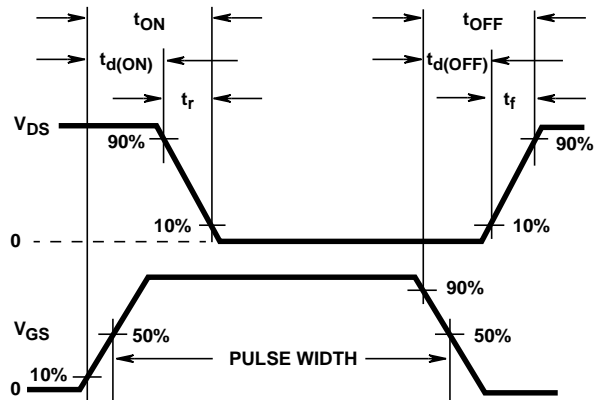


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

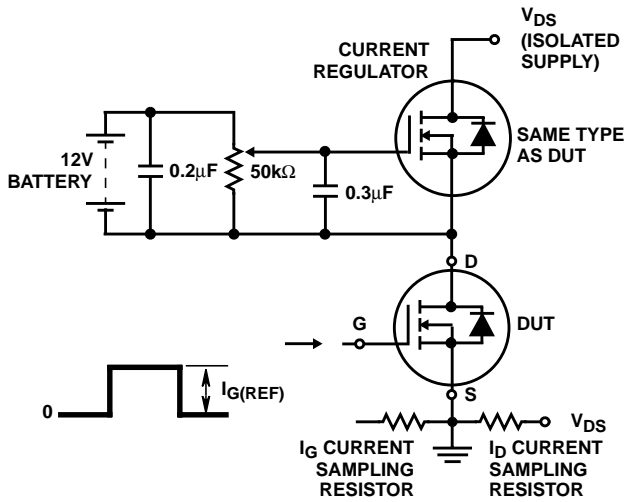


FIGURE 13. GATE CHARGE TEST CIRCUIT

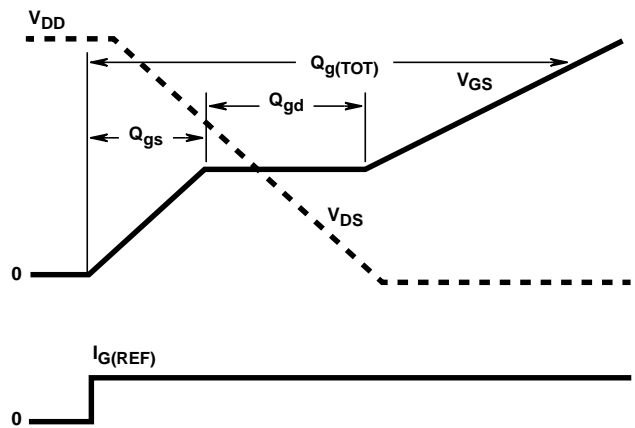


FIGURE 14. GATE CHARGE WAVEFORMS