



## N-Channel Power MOSFET 60V, 50A, 22 mΩ

These N-Channel power MOSFETs are manufactured using the MegaFET process. This process, which uses feature sizes approaching those of LSI integrated circuits gives optimum utilization of silicon, resulting in outstanding performance. They were designed for use in applications such as switching regulators, switching converters, motor drivers, and relay drivers. These transistors can be operated directly from integrated circuits.

Formerly developmental type TA49018.

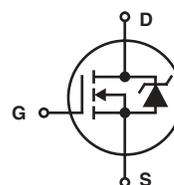
### Ordering Information

PART NUMBER	PACKAGE	BRAND
RFP50N06	TO-220AB	RFP50N06

### Features

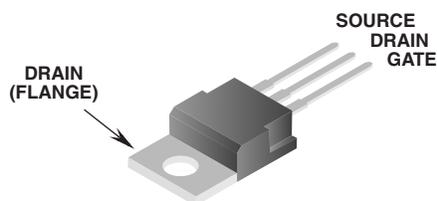
- 50A, 60V
- $r_{DS(ON)} = 0.022\Omega$
- Temperature Compensating PSpice<sup>®</sup> Model
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- 175°C Operating Temperature

### Symbol



### Packaging

#### JEDEC TO-220AB



# RFP50N06

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

	RFP50N06	UNITS
Drain to Source Voltage (Note 1) . . . . .	$V_{DSS}$	60 V
Drain to Gate Voltage ( $R_{GS} = 20k\Omega$ ) (Note 1) . . . . .	$V_{DGR}$	60 V
Gate to Source Voltage . . . . .	$V_{GS}$	$\pm 20$ V
Continuous Drain Current (Figure 2) . . . . .	$I_D$	50 A
Pulsed Drain Current . . . . .	$I_{DM}$	(Figure 5)
Pulsed Avalanche Rating . . . . .	$E_{AS}$	(Figure 6)
Power Dissipation . . . . .	$P_D$	131 W
Linear Derating Factor . . . . .		0.877 $W/^\circ\text{C}$
Operating and Storage Temperature . . . . .	$T_J, T_{STG}$	-55 to 175 $^\circ\text{C}$
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:

1.  $T_J = 25^\circ\text{C}$  to  $150^\circ\text{C}$ .

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS	
Drain to Source Breakdown Voltage	$BV_{DSS}$	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$ (Figure 11)	60	-	-	V	
Gate to Source Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$ (Figure 10)	2	-	4	V	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$	$T_C = 25^\circ\text{C}$	-	-	1	$\mu\text{A}$
			$T_C = 150^\circ\text{C}$	-	-	50	$\mu\text{A}$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA	
Drain to Source On Resistance	$r_{DS(ON)}$	$I_D = 50\text{A}, V_{GS} = 10\text{V}$ (Figures 9)	-	-	0.022	$\Omega$	
Turn-On Time	$t_{ON}$	$V_{DD} = 30\text{V}, I_D = 50\text{A}$ $R_L = 0.6\Omega, V_{GS} = 10\text{V}$ $R_{GS} = 3.6\Omega$ (Figure 13)	-	-	95	ns	
Turn-On Delay Time	$t_{d(ON)}$		-	12	-	ns	
Rise Time	$t_r$		-	55	-	ns	
Turn-Off Delay Time	$t_{d(OFF)}$		-	37	-	ns	
Fall Time	$t_f$		-	13	-	ns	
Turn-Off Time	$t_{OFF}$		-	-	75	ns	
Total Gate Charge	$Q_g(TOT)$	$V_{GS} = 0$ to 20V	$V_{DD} = 48\text{V}, I_D = 50\text{A},$ $R_L = 0.96\Omega$ $I_{g(REF)} = 1.45\text{mA}$ (Figure 13)	-	125	150	nC
Gate Charge at 10V	$Q_g(10)$	$V_{GS} = 0$ to 10V		-	67	80	nC
Threshold Gate Charge	$Q_g(TH)$	$V_{GS} = 0$ to 2V		-	3.7	4.5	nC
Input Capacitance	$C_{ISS}$	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$ $f = 1\text{MHz}$ (Figure 12)	-	2020	-	pF	
Output Capacitance	$C_{OSS}$		-	600	-	pF	
Reverse Transfer Capacitance	$C_{RSS}$		-	200	-	pF	
Thermal Resistance Junction to Case	$R_{\theta JC}$	(Figure 3)	-	-	1.14	$^\circ\text{C/W}$	
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	TO-220	-	-	62	$^\circ\text{C/W}$	
		-	-	-	-	-	

## Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage	$V_{SD}$	$I_{SD} = 50\text{A}$	-	-	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_{SD} = 50\text{A}, dI_{SD}/dt = 100\text{A}/\mu\text{s}$	-	-	125	ns

Typical Performance Curves Unless Otherwise Specified

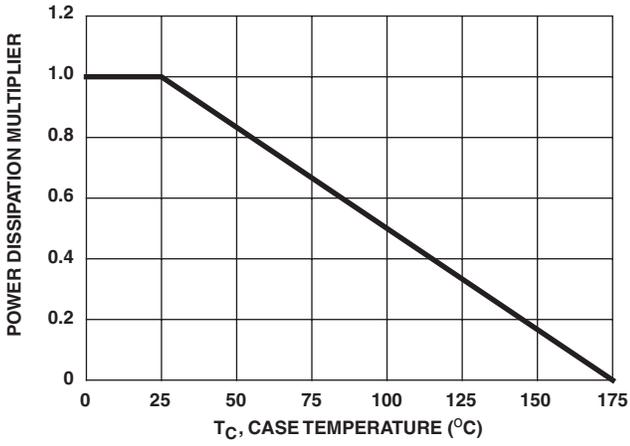


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

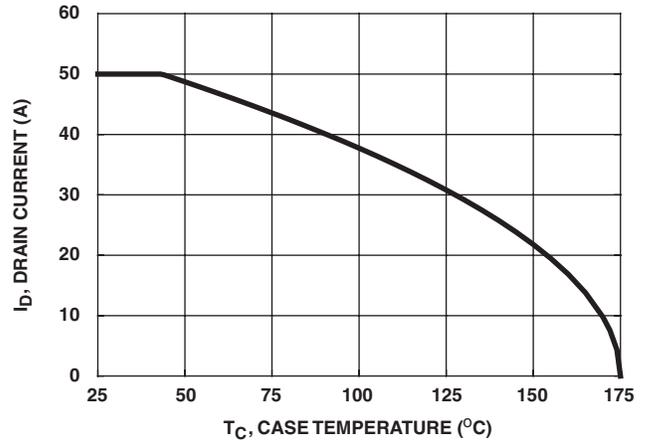


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

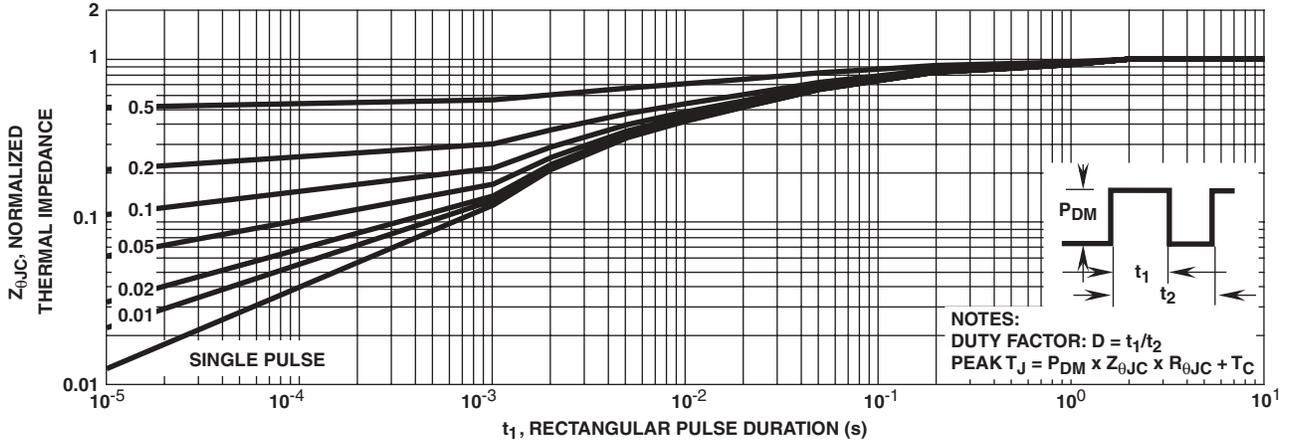


FIGURE 3. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

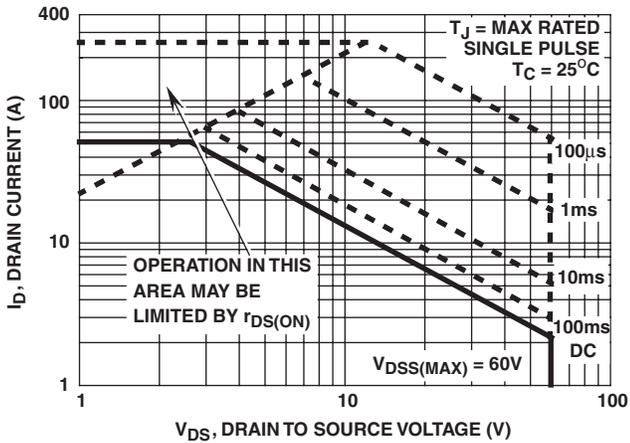


FIGURE 4. FORWARD BIAS SAFE OPERATING AREA

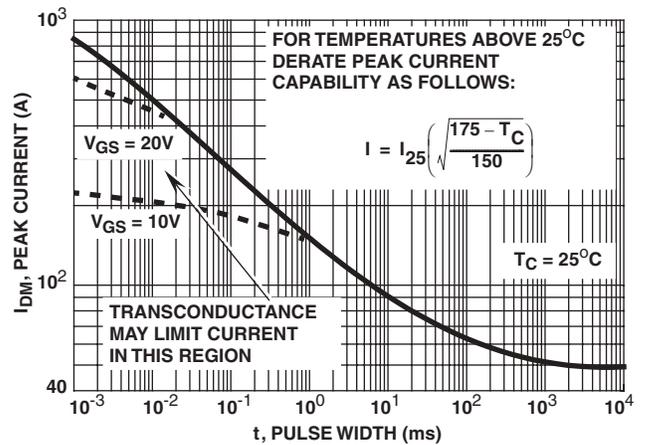


FIGURE 5. PEAK CURRENT CAPABILITY