12A, 80V and 100V, 0.300 Ohm, P-Channel Power MOSFETs

The RFP12P08, and RFP12P10 are P-Channel enhancement mode silicon gate power field effect transistors designed for applications such as switching regulators, switching convertors, 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 TA17511.

Ordering Information

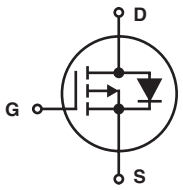
PART NUMBER	PACKAGE	BRAND
RFP12P08	TO-220AB	RFP12P08
RFP12P10	TO-220AB	RFP12P10

NOTE: When ordering, include the entire part number.

Features

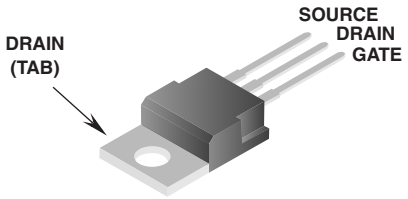
- 12A, 80V and 100V
- $r_{DS(ON)} = 0.300\Omega$
- SOA is Power Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device
- Related Literature
  - TB334 “Guidelines for Soldering Surface Mount Components to PC Boards”

Symbol



Packaging

TO-220AB



Absolute Maximum Ratings $T_C = 25^oC$, Unless Otherwise Specified

		RFP12P08	RFP12P10	UNITS
Drain to Source Voltage (Note 1)	V_{DS}	-80	-100	V
Drain to Gate Voltage (R_{GS} = 20KΩ) (Note 1)	V_{DGR}	-80	-100	V
Continuous Drain Current				
RMS Continuous	I_D	12	12	A
Pulsed Drain Current (Note 3)	I_{DM}	30	30	A
Gate to Source Voltage	V_{GS}	±20	±20	V
Maximum Power Dissipation	P_D	75	75	W
Linear Derating Factor		0.6	0.6	$W/^oC$
Operating and Storage Temperature	T_J, T_{STG}	-55 to 150	-55 to 150	^oC
Maximum Temperature for Soldering				
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	300	^oC
Package Body for 10s, See Techbrief 334	T_{pkg}	260	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				
RFP12P08			-80	-	-	V
RFP12P10			-100	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250μA	-2	-	-4	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} = ±20V, V_{DS} = 0	-	-	±100	nA
Drain to Source On Voltage (Note 2)	$V_{DS(ON)}$	I_D = 12A, V_{GS} = -10V	-	-	-3.6	V
Drain to Source On Resistance (Note 2)	$r_{DS(ON)}$	I_D = 12A, V_{GS} = -10V, (Figures 6, 7)	-	-	0.300	Ω
Turn-On Delay Time	$t_{d(ON)}$	$I_D \approx$ 12A, V_{DD} = 50V, R_G = 50Ω, R_L = 4.1Ω, V_{GS} = -10V (Figure 10)	-	18	60	ns
Rise Time	t_r		-	90	175	ns
Turn-Off Delay Time	$t_{d(OFF)}$		-	144	275	ns
Fall Time	t_f		-	94	175	ns
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = -25V, f = 1MHz (Figure 9)	-	-	1500	pF
Output Capacitance	C_{OSS}		-	-	700	pF
Reverse Transfer Capacitance	C_{RSS}		-	-	300	pF
Thermal Resistance, Junction to Case	$R_{\theta JC}$	RFP12P08, RFP12P10	-	-	1.67	$^oC/W$

Source to Drain Diode Specifications

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Source to Drain Diode Voltage (Note 2)	V_{SD}	I_{SD} = -12A	-	-	1.4	V
Diode Reverse Recovery Time	t_{rr}	I_{SD} = -12A, dI_{SD}/dt = 100A/μs	-	200	-	ns

NOTES:

2. Pulse Test: Pulse Width = ≤ 300μs Max, Duty Cycle ≤ 2%
3. Repetitive rating: pulse width limited by maximum junction temperature.

Typical Performance Curves

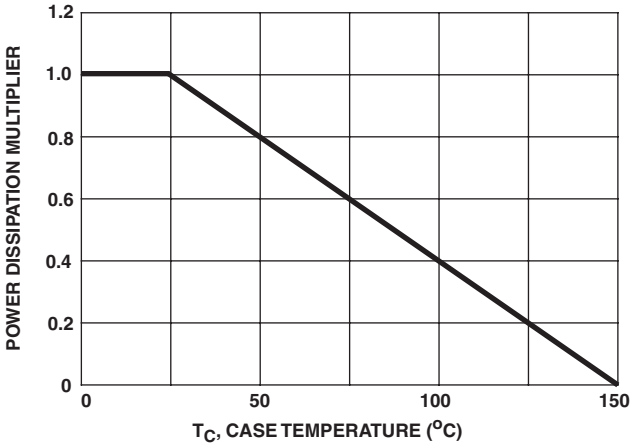


FIGURE 1. NORMALIZED POWER DISSIPATION vs CASE TEMPERATURE

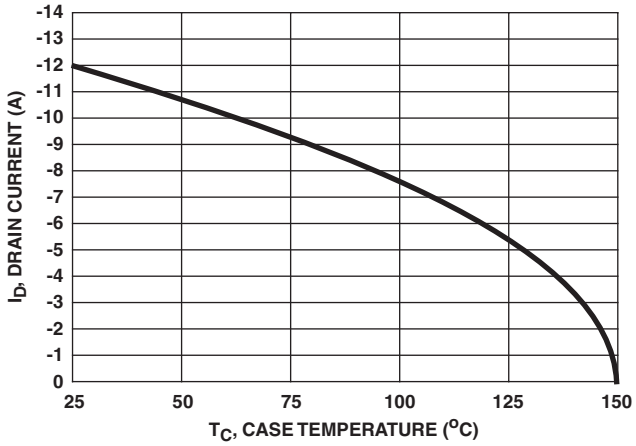


FIGURE 2. MAXIMUM CONTINUOUS DRAIN CURRENT vs CASE TEMPERATURE

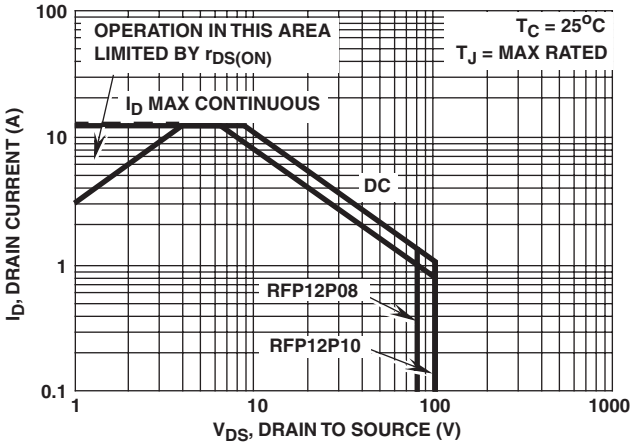


FIGURE 3. FORWARD BIAS SAFE OPERATING AREA

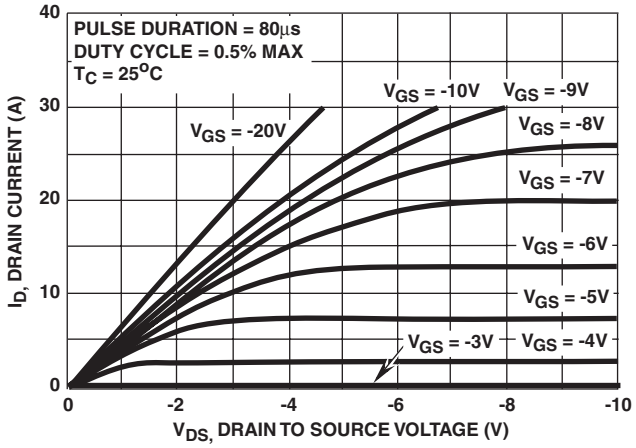


FIGURE 4. SATURATION CHARACTERISTICS

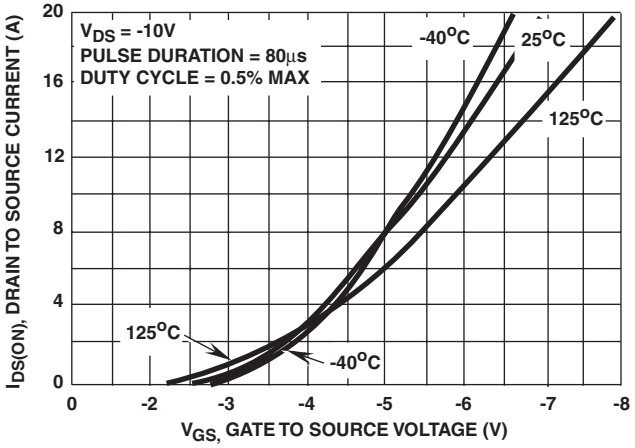


FIGURE 5. TRANSFER CHARACTERISTICS

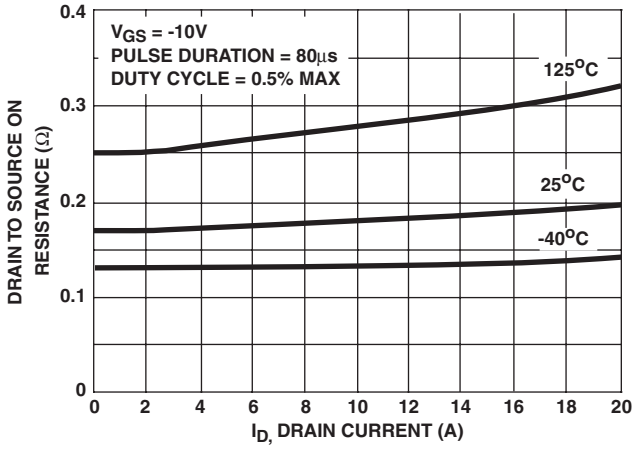


FIGURE 6. DRAIN TO SOURCE ON RESISTANCE vs GATE VOLTAGE AND DRAIN CURRENT

Typical Performance Curves (Continued)

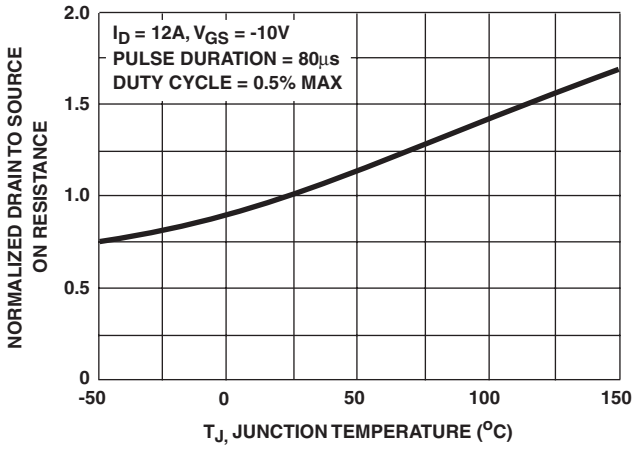


FIGURE 7. NORMALIZED DRAIN TO SOURCE ON RESISTANCE vs JUNCTION TEMPERATURE

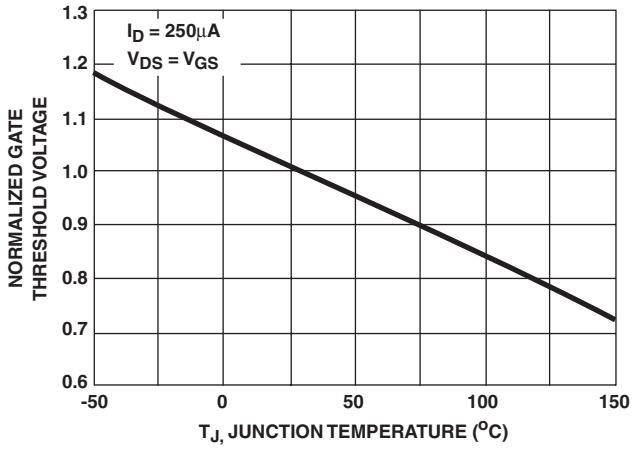


FIGURE 8. NORMALIZED GATE THRESHOLD VOLTAGE vs JUNCTION TEMPERATURE

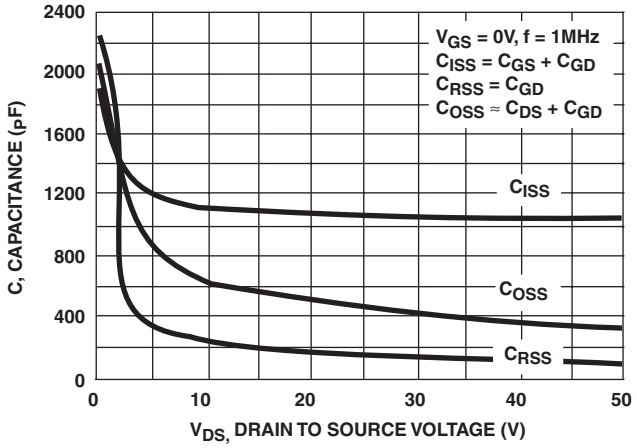
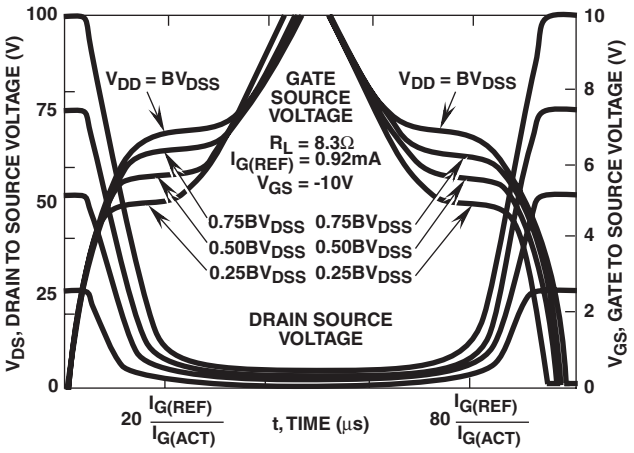


FIGURE 9. CAPACITANCE vs DRAIN TO SOURCE VOLTAGE



NOTE: Refer to Fairchild Application Notes AN7254 and AN7260

FIGURE 10. NORMALIZED SWITCHING WAVEFORMS FOR CONSTANT GATE CURRENT

Test Circuits and Waveforms

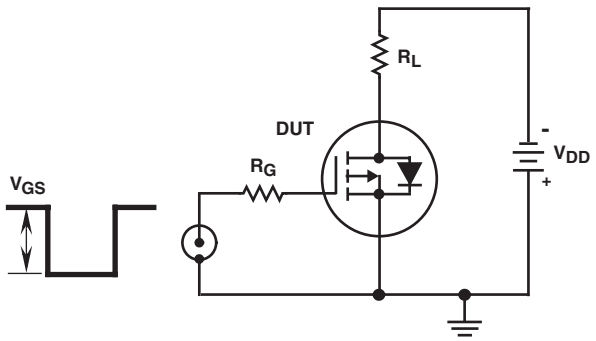


FIGURE 11. SWITCHING TIME TEST CIRCUIT

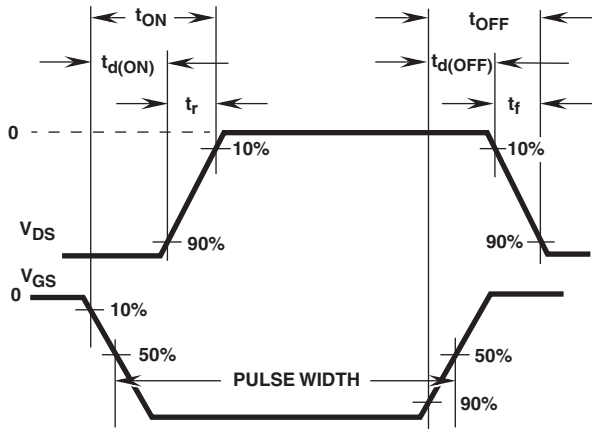


FIGURE 12. RESISTIVE SWITCHING WAVEFORMS

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACEx™	FAST ®	OPTOLOGIC™	SMART START™	VCX™
Bottomless™	FASTr™	OPTOPLANAR™	STAR*POWER™	
CoolFET™	FRFET™	PACMAN™	Stealth™	
CROSSVOLT™	GlobalOptoisolator™	POP™	SuperSOT™-3	
DenseTrench™	GTO™	Power247™	SuperSOT™-6	
DOME™	HiSeC™	PowerTrench®	SuperSOT™-8	
EcoSPARK™	ISOPLANAR™	QFET™	SyncFET™	
E^2CMOS™	LittleFET™	QS™	TinyLogic™	
EnSigna™	MicroFET™	QT Optoelectronics™	TruTranslation™	
FACT™	MicroPak™	Quiet Series™	UHC™	
FACT Quiet Series™	MICROWIRE™	SILENT SWITCHER®	UltraFET®	

STAR*POWER is used under license

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.