HARRIS

RFP2N18
RFP2N20

N-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

Features

- 2A, 180V and 200V
- $r_{DS(on)} = 3.5\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

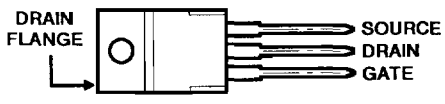
Description

The RFP2N18 and RFP2N20 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.

The RFP series types are supplied in the JEDEC TO-220AB plastic package.

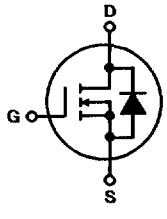
Package

TO-220AB
TOP VIEW



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



Absolute Maximum Ratings (T_C = +25°C), Unless Otherwise Specified

		RFP2N18	RFP2N20	UNITS
Drain-Source Voltage	V_{DSS}	180	200	V
Drain-Gate Voltage (R_{GS} = 1MΩ)	V_{DGR}	180	200	V
Continuous Drain Current	I_D	2	2	A
Pulsed Drain Current	I_{DM}	5	5	A
Gate-Source Voltage	V_{GS}	±20	±20	V
Maximum Power Dissipation				
T_C = +25°C	P_D	25	25	W
Derate Above T_C = +25°C		0.2	0.2	W/°C
Operating and Storage Temperature	T_J, T_{STG}	-55 to +150	-55 to +150	°C

4 N-CHANNEL POWER MOSFETs

CAUTION: These devices are sensitive to electrostatic discharge. Proper I.C. handling procedures should be followed.

File Number **2881**

Electrical Characteristics (T_C = +25°C), Unless Otherwise Specified

CHARACTERISTIC	SYMBOLS	TEST CONDITIONS	LIMITS				UNITS
			RFP2N18		RFP2N20		
			MIN	MAX	MIN	MAX	
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 1mA, V_{GS} = 0	180	-	200	-	V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$, I_D = 2mA	2	4	2	4	V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = 145V	-	1	-	-	μA
		V_{DS} = 160V	-	-	-	1	μA
		T_C = +125°C, V_{DS} = 145V	-	50	-	-	μA
		V_{DS} = 160V	-	-	-	50	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0	-	100	-	100	nA
Drain-Source On-Voltage	$V_{DS(on)}$*	I_D = 1A, V_{GS} = 10V	-	3.5	-	3.5	V
		I_D = 2A, V_{GS} = 10V	-	8.0	-	8.0	V
Static Drain-Source On Resistance	$r_{DS(on)}$*	I_D = 1A, V_{GS} = 10V	-	3.5	-	3.5	Ω
Forward Transconductance	g_{fs}*	I_D = 1A, V_{DS} = 10V	400	-	400	-	S (℧)
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz	-	200	-	200	pF
Output Capacitance	C_{OSS}		-	60	-	60	pF
Reverse-Transfer Capacitance	C_{RSS}		-	25	-	25	pF
Turn-On Delay Time	$t_{d(on)}$	I_D = 1A, V_{DD} = 100V, $R_{GEN} = R_{GS}$ = 50Ω, V_{GS} = 10V	15 (typ)	25	15 (typ)	25	ns
Rise Time	t_r		20 (typ)	30	20 (typ)	30	ns
Turn-Off Delay Time	$t_{d(off)}$		25 (typ)	40	25 (typ)	40	ns
Fall Time	t_f		15 (typ)	25	15 (typ)	25	ns
Thermal Resistance Junction-to-Case	$R_{\theta JC}$		-	5	-	5	°C/W

Source-Drain Diode Ratings and Characteristics

CHARACTERISTIC	SYMBOLS	TEST CONDITIONS	LIMITS				UNITS
			RFP2N18		RFP2N20		
			MIN	MAX	MIN	MAX	
Diode Forward Voltage	V_{SD}*	I_{SD} = -1A	-	1.4	-	1.4	V
Diode Reverse Recovery Time	t_{rr}	I_F = 2A, d_{IF}/dt = 50A/μs	200 (typ)	200 (typ)	200 (typ)	200 (typ)	ns

* Pulsed: Pulse duration = 300μs max., duty cycle = 2%.

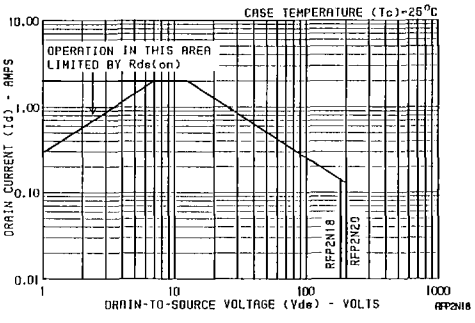


Fig. 1 - Maximum operating areas for all types.

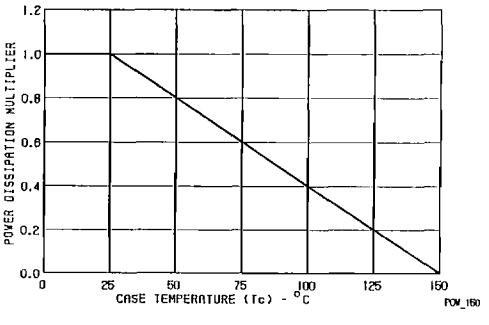


Fig. 2 – Normalized power dissipation vs temperature derating curve.

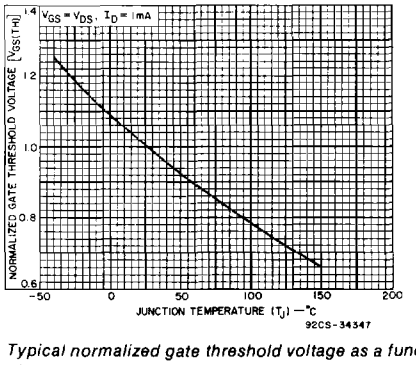


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

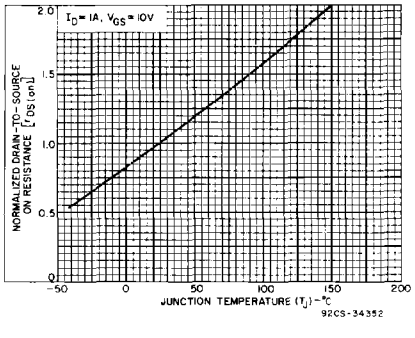


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

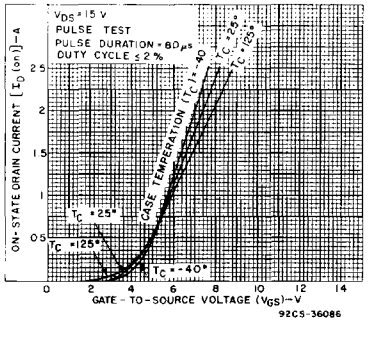


Fig. 5 - Typical transfer characteristics for all types.

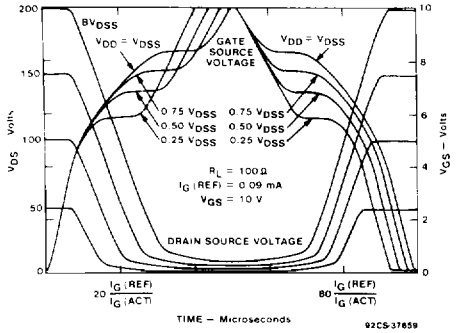


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

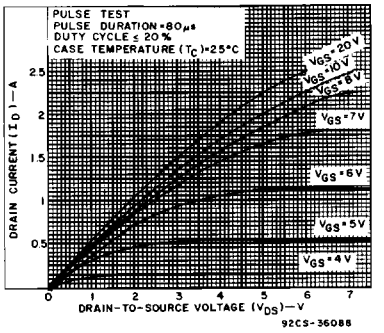


Fig. 7 - Typical saturation characteristics for all types.

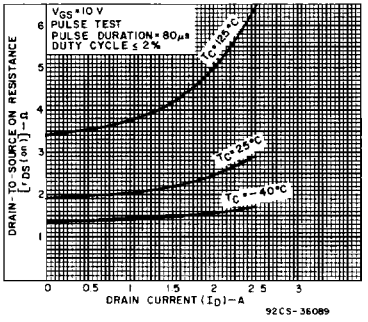


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

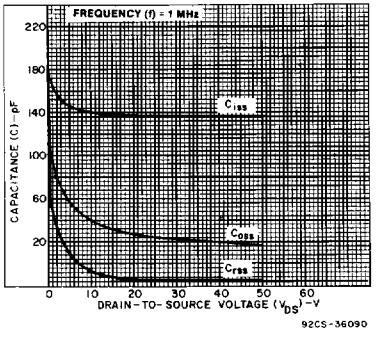


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

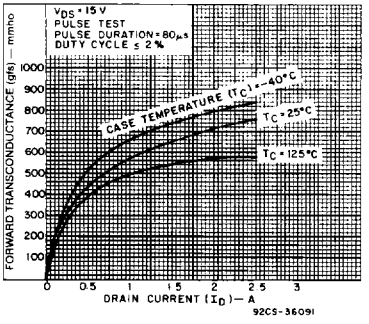


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

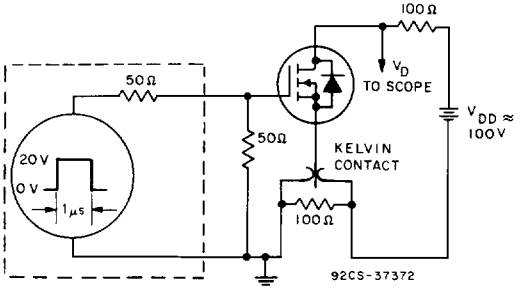


Fig. 11 — Switching Time Test Circuit.