HARRIS

RFP2N12
RFP2N15

N-Channel Enhancement-Mode
Power Field-Effect Transistors
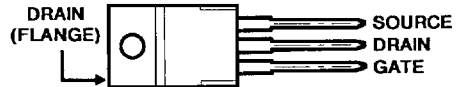
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Features

- 2A, 120V and 150V
- r_{DS}(on) = 1.75Ω
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

Description

The RFP2N12 and RFP2N15 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.
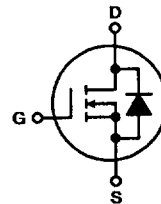
The RFP series types are supplied in the JEDEC TO-220AB plastic package.

Package

TO-220AB
TOP VIEW

DRAIN (FLANGE) — SOURCE, DRAIN, GATE

Terminal Diagram

N-CHANNEL ENHANCEMENT MODE

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

	RFP2N12	RFP2N15	UNITS
Drain-Source Voltage . . . V_{DSS}	120	150	V
Drain-Gate Voltage (R_{GS} = 1MΩ) . . . V_{DGR}	120	150	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/^{o}C
Operating and Storage Temperature . . . T_J, T_{STG}	–55 to +150	–55 to +150	^{o}C

File Number **2882**

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

CHARACTERISTIC	SYMBOLS	TEST CONDITIONS	LIMITS				UNITS
			RFP2N12		RFP2N15		
			MIN	MAX	MIN	MAX	
Drain–Source Breakdown Voltage	BV_{DSS}	I_D = 1mA, V_{GS} = 0	120	–	150	–	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} = 100V	–	1	–	–	µA
		V_{DS} = 120V	–	–	–	1	µA
		T_C = +125°C V_{DS} = 100V	–	50	–	–	µA
		V_{DS} = 120V	–	–	–	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	–	1.75	–	1.75	V
		I_D = 2A, V_{GS} = 10V	–	6.0	–	6.0	V
Static Drain–Source On Resistance	$r_{DS(on)}$*	I_D = 1A, V_{GS} = 10V	–	1.75	–	1.75	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}		–	80	–	80	pF
Reverse–Transfer Capacitance	C_{RSS}		–	25	–	25	pF
Turn–On Delay Time	$t_{d(on)}$	I_D = 1A, V_{DD} = 75V R_{GEN} = R_{GS} = 50Ω V_{GS} = 10V	17 (typ)	25	17 (typ)	25	ns
Rise Time	t_r		30 (typ)	45	30 (typ)	45	ns
Turn–Off Delay Time	$t_{d(off)}$		30 (typ)	45	30 (typ)	45	ns
Fall Time	t_f		17 (typ)	25	17 (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
			RFP2N12		RFP2N15		
			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 dI_F/dt = 50A/µs	150 (typ)	150 (typ)	150 (typ)	150 (typ)	ns

* Pulsed: Pulse duration = 300µs max., duty cycle = 2%.
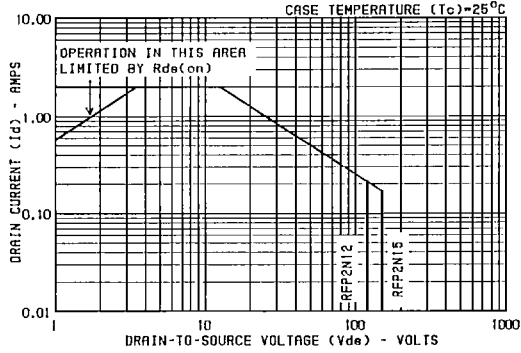
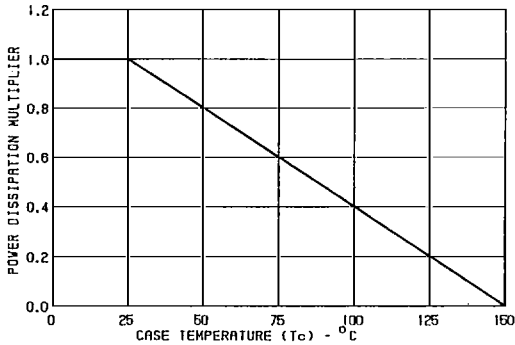Fig. 1 — Maximum operating areas for all types.

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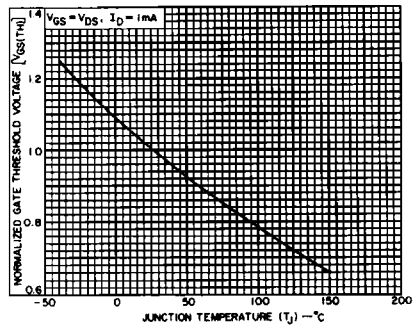

Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.
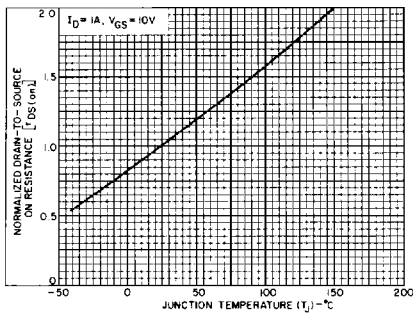

Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.
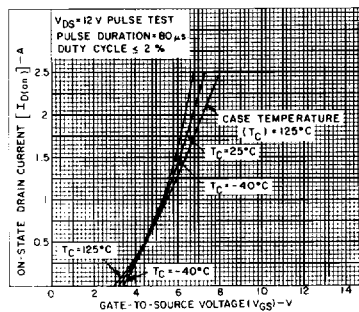

Fig. 5 — Typical transfer characteristics for all types.

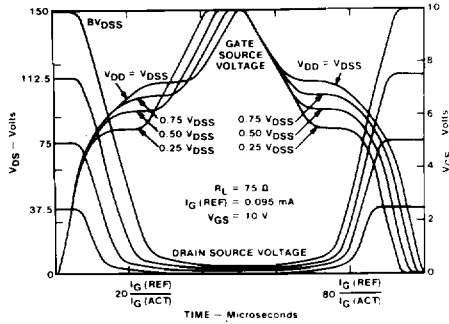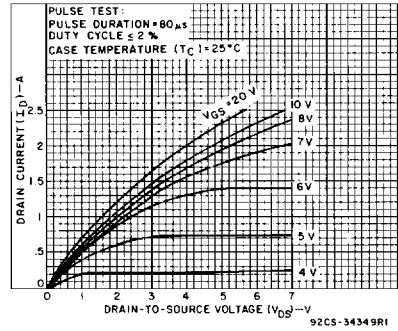Fig. 6 – Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260.

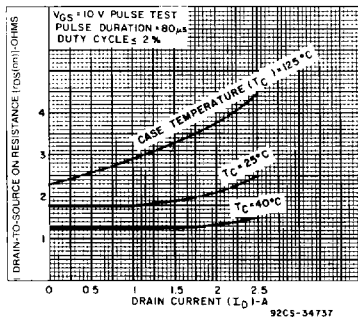Fig. 7 — Typical saturation characteristics for all types.

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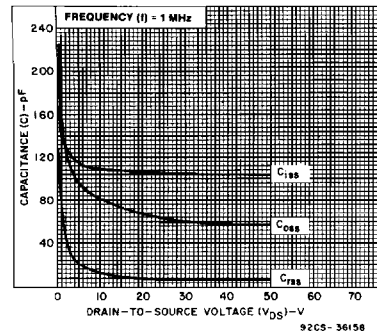

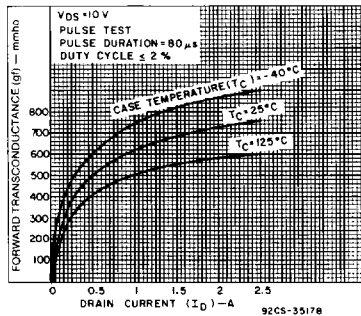Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

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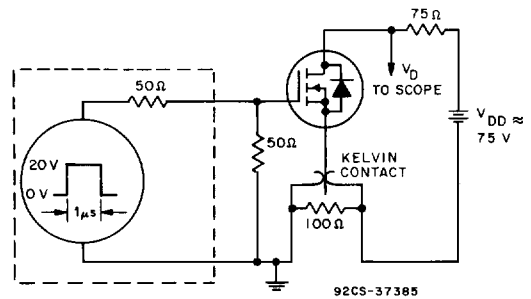

Fig. 11 — Switching Time Test Circuit.