HARRIS

RFM8N18/8N20
RFP8N18/8N20

N-Channel Enhancement Mode Power Field Effect Transistors

Features

- 8A, 180V and 200V
- $r_{DS(on)} = 0.5\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

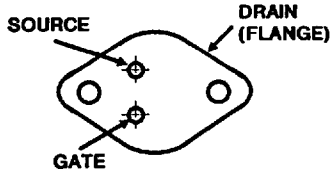
Description

The RFM8N18 and RFM8N20 and the RFP8N18 and RFP8N20 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.

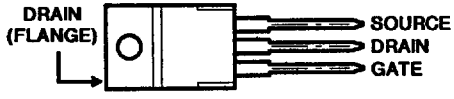
The RFM-types are supplied in the JEDEC TO-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

Packages

TO-204AA

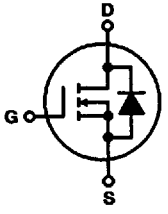


TO-220AB
TOP VIEW



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



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

	RFM8N18	RFM8N20	RFP8N18	RFP8N20	UNITS
Drain-Source Voltage ..... V_{DSS}	180	200	180	200	V
Drain-Gate Voltage ($R_{GS} = 1m\Omega$) ..... V_{DGR}	180	200	180	200	V
Continuous Drain Current					
RMS Continuous ..... I_D	8	8	8	8	A
Pulsed Drain Current ..... I_{DM}	20	20	20	20	A
Gate-Source Voltage ..... V_{GS}	±20	±20	±20	±20	V
Maximum Power Dissipation					
$T_C = +25^oC$ ..... P_D	75	75	60	60	W
Above $T_C = +25^oC$, Derate Linearly	0.6	0.6	0.48	0.48	W/^{o}C
Operating and Storage Junction Temperature Range ..... T_J, T_{STG}	-55 to +150	-55 to +150	-55 to +150	-55 to +150	^{o}C

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

File Number 1447.1

ELECTRICAL CHARACTERISTICS *At Case Temperature (T_c) = 25° C unless otherwise specified*

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS RFM8N18 RFP8N18 MIN.	LIMITS RFM8N18 RFP8N18 MAX.	LIMITS RFM8N20 RFP8N20 MIN.	LIMITS RFM8N20 RFP8N20 MAX.	UNITS
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 1 mA V_{GS} = 0	180	—	200	—	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} = V_{DS} I_D = 1 mA	2	4	2	4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 145 V V_{DS} = 160 V	— —	1 —	— —	— 1	μA
		T_C = 125° C V_{DS} = 145 V V_{DS} = 160 V	— —	50 —	— —	— 50	
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ± 20 V V_{DS} = 0	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS}(on)$[a]	I_D = 4 A V_{GS} = 10 V	—	2.0	—	2.0	V
		I_D = 8 A V_{GS} = 10 V	—	5.5	—	5.5	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D = 4 A V_{GS} = 10 V	—	0.5	—	0.5	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = 10 V I_D = 4 A	1.5	—	1.5	—	mho
Input Capacitance	C_{iss}	V_{DS} = 25 V V_{GS} = 0 V f = 1MHz	—	750	—	750	pF
Output Capacitance	C_{oss}		—	250	—	250	
Reverse Transfer Capacitance	C_{rss}		—	100	—	100	
Turn-On Delay Time	$t_d(on)$	V_{DD} = 100 V I_D = 4 A R_{gen} = R_{gs} = 50 Ω V_{GS} = 10 V	30(typ.)	45	30(typ.)	45	ns
Rise Time	t_r		100(typ.)	150	100(typ.)	150	
Turn-Off Delay Time	$t_d(off)$		90(typ.)	135	90(typ.)	135	
Fall Time	t_f		70(typ.)	105	70(typ.)	105	
Thermal Resistance Junction-to-Case	RθJC	RFM8N18, RFM8N20	—	1.67	—	1.67	°C/W
		RFP8N18, RFP8N20	—	2.083	—	2.083	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM8N18 RFP8N18 Min.	LIMITS RFM8N18 RFP8N18 Max.	LIMITS RFM8N20 RFP8N20 Min.	LIMITS RFM8N20 RFP8N20 Max.	UNITS
Diode Forward Voltage	V_{SD}[a]	I_{SD} = 4A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A d_{IF}/d_t = 100A/μs	225(typ.)		225(typ.)		ns

[a]Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

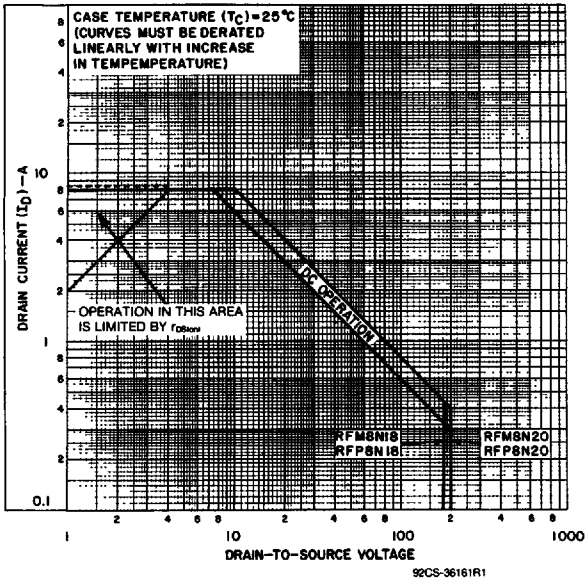


Fig. 1 — Maximum safe operating areas for all types.

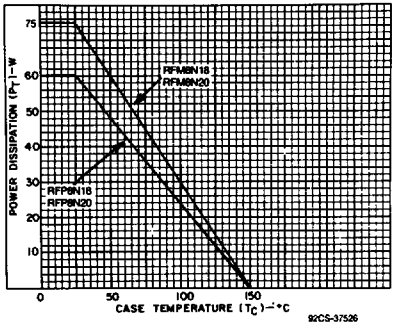


Fig. 2 — Power vs. temperature derating curve for all types.

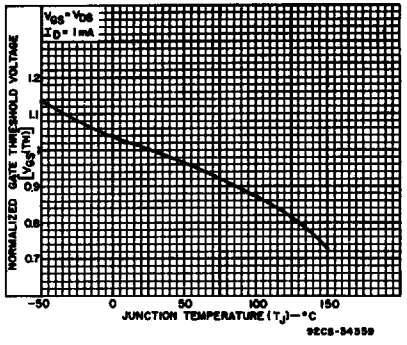


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

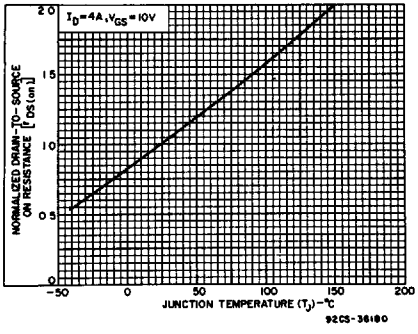


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

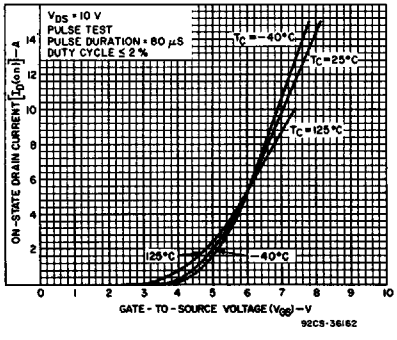


Fig. 5 — Typical transfer characteristics for all types.

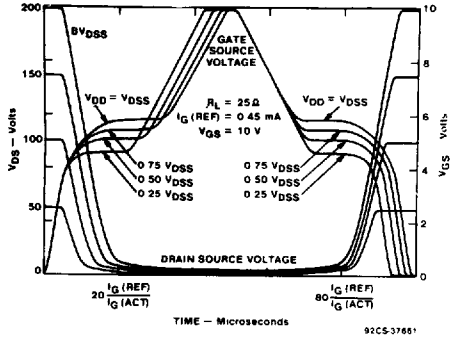


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260

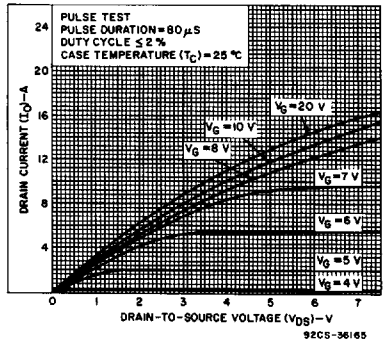


Fig. 7 — Typical saturation characteristics for all types.

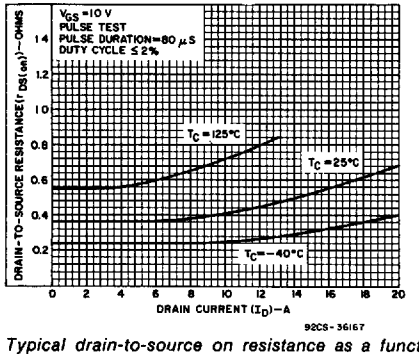


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

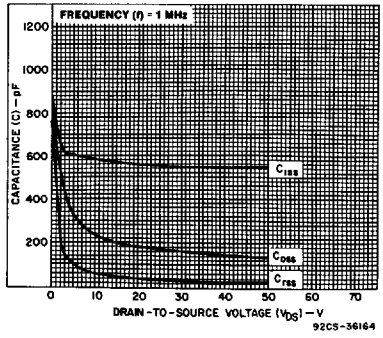


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

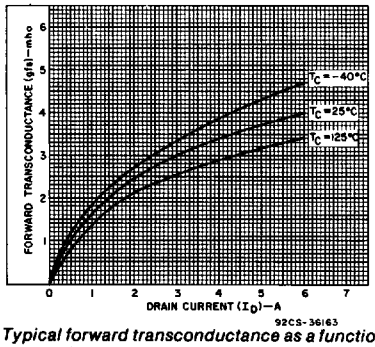


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

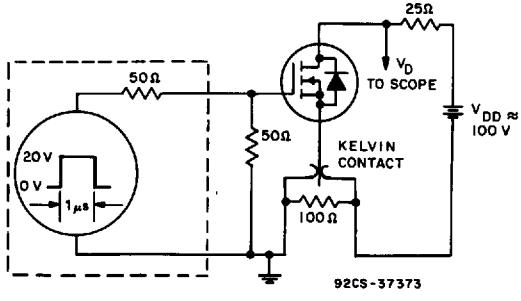


Fig. 11 — Switching Time Test Circuit.