HARRIS

RFH25N18
RFH25N20

N-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

Features

- 25A, 180V and 200V
- $r_{DS}(on) = 0.15\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device
- High-Carrier, Low-Inductance Package

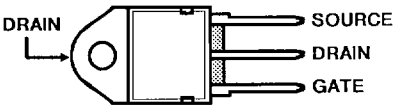
Description

The RFH25N18 and RFH25N20 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 RFH-types are supplied in the JEDEC TO-218AC plastic package.

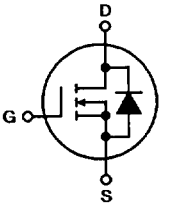
Package

TO-218AC
TOP VIEW



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



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

		RFH25N18	RFH25N20	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	25	25	A
Pulsed Drain Current	I_{DM}	60	60	A
Gate-Source Voltage	V_{GS}	±20	±20	V
Maximum Power Dissipation T_C = +25°C	P_D	150	150	W
Linear Derating Factor		1.2	1.2	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 1631.1

ELECTRICAL CHARACTERISTICS, at Case Temperature (T_C) = 25°C unless otherwise specified.

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFH25N18		RFH25N20		
			Min.	Max.	Min.	Max.	
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	—	1	—	—	μA
		V_{DS} = 160 V	—	—	—	1	
		T_C = 125°C V_{DS} = 145 V	—	50	—	—	
		V_{DS} = 160 V	—	—	—	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 = 12.5 A V_{GS} = 10 V	—	1.875	—	1.875	V
		I_D = 25 A V_{GS} = 10 V	—	5	—	5	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D = 12.5 A V_{GS} = 10 V	—	.15	—	.15	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = 10 V I_D = 12.5 A	7	—	7	—	mho
Input Capacitance	C_{iss}	V_{DS} = 25 V	—	3500	—	3500	pF
Output Capacitance	C_{oss}	V_{GS} = 0 V	—	900	—	900	
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	400	—	400	
Turn-On Delay Time	$t_d(on)$	V_{DS} = 100 V	40(typ)	80	40(typ)	80	ns
Rise Time	t_r	I_D = 12.5 A	150(typ)	225	150(typ)	225	
Turn-Off Delay Time	$t_d(off)$	R_{gen}=R_{gs}=50Ω	300(typ)	400	300(typ)	400	
Fall Time	t_f	V_{GS} = 10 V	120(typ)	200	120(typ)	200	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFH25N18, RFH25N20 Series	—	0.83	—	0.83	°C/W

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC		TEST CONDITIONS	LIMITS				UNITS
			RFH25N18		RFH25N20		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V_{SD} *	I_{SD} = 12.5A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A, d_{IF}/d_t = 100 A/μs	300 (typ.)		300 (typ.)		ns

* Pulse Test: Width ≤ 300 μs, Duty cycle ≤ 2%.

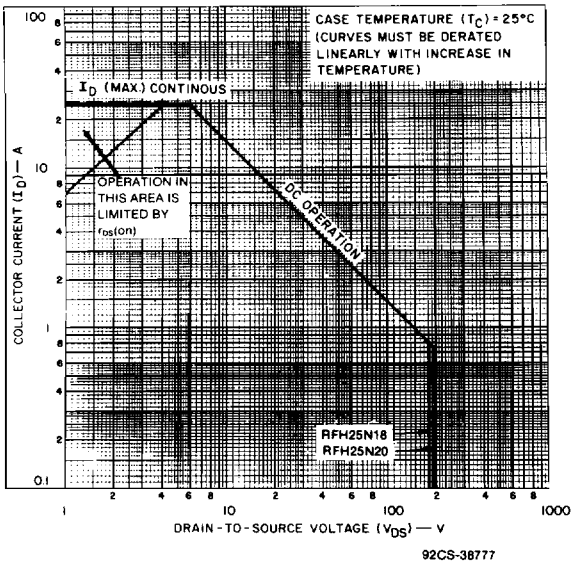


Fig. 1 - Maximum safe operating areas for all types.

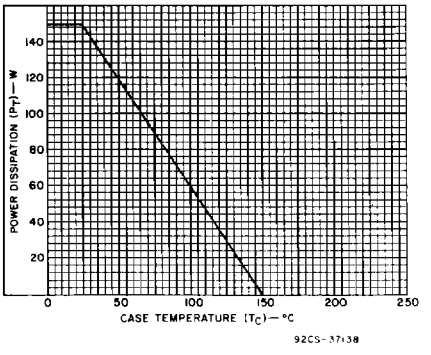


Fig. 2 - Power vs. temperature derating curve for all types.

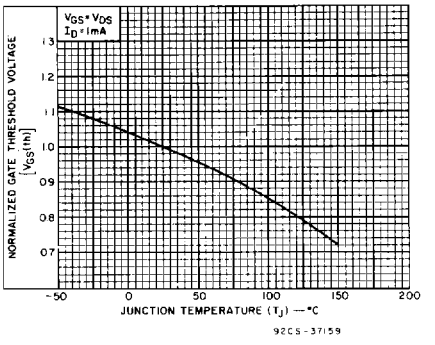


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

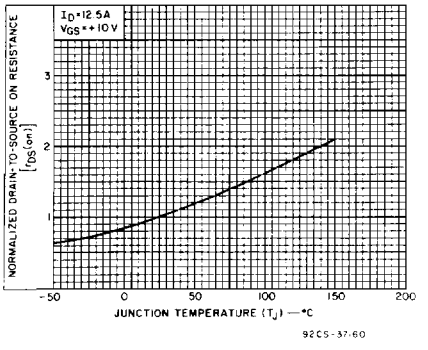


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

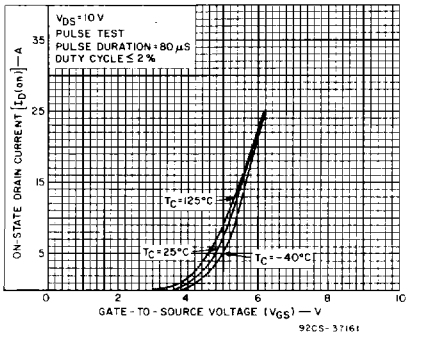


Fig. 5 - Typical transfer characteristics for all types.

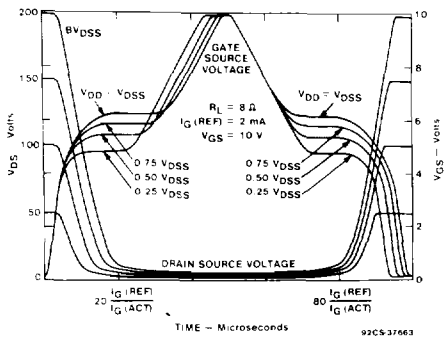


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260

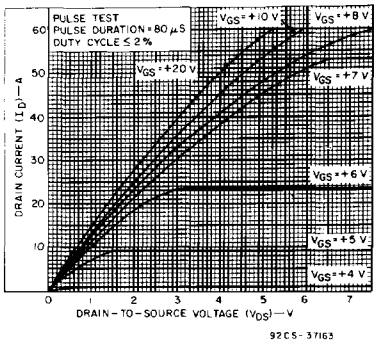


Fig. 7 - Typical saturation characteristics for all types.

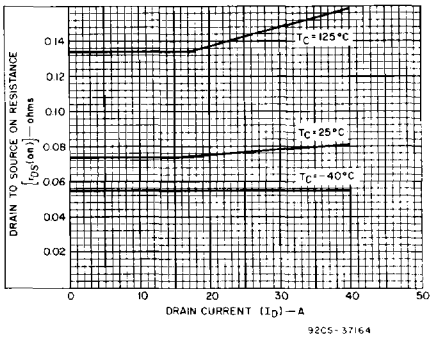


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

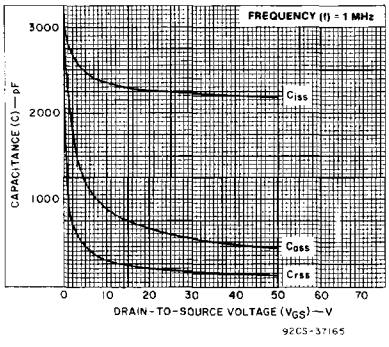


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

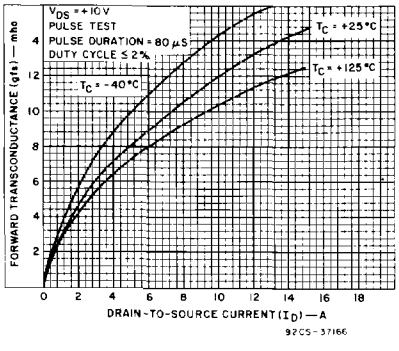


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

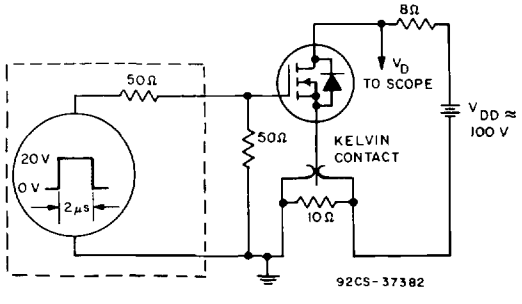


Fig. 11 - Switching Time Test Circuit.