

RFH30N12 RFH30N15

N-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

Features

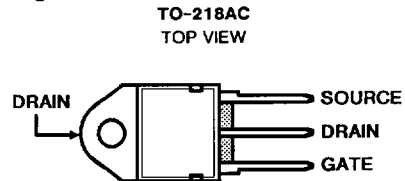
- 30A, 120V and 150V
- $r_{DS(on)} = 0.075\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device
- High-Carrier, Low-Inductance Package

Description

The RFH30N12 and RFH30N15 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.

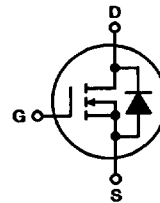
The RFH-types are supplied in the JEDEC TO-218AC plastic package.

Package



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



Absolute Maximum Ratings ($T_C = +25^\circ\text{C}$), Unless Otherwise Specified

	RFH30N12	RFH30N15	UNITS	
Drain-Source Voltage	V_{DSS}	120	150	V
Drain-Gate Voltage ($R_{GS} = 1M\Omega$)	V_{DGR}	120	150	V
Continuous Drain Current	I_D	30	30	A
Pulsed Drain Current	I_{DM}	100	100	A
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Maximum Power Dissipation				
$T_C = +25^\circ\text{C}$	P_D	150	150	W
Linear Derating Factor		1.2	1.2	W/ $^\circ\text{C}$
Operating and Storage Temperature	T_J, T_{STG}	-55 to +150	-55 to +150	$^\circ\text{C}$

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**N-CHANNEL
POWER MOSFETS**

Specifications RFH30N12, RFH30N15

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFH30N12		RFH30N15		
			Min.	Max.	Min.	Max.	
Drain-Source Breakdown Voltage	V _{DSS}	I _D = 1 mA V _{GS} = 0	120	—	150	—	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} = 100 V	—	1	—	—	μA
		V _{DS} = 120 V	—	—	—	1	
		T _C = 125° C V _{DS} = 100 V	—	50	—	—	
		V _{DS} = 120 V	—	—	—	50	
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ± 20 V V _{DS} = 0	—	100	—	100	nA
On-State Gate Voltage	V _{GS(on)} ^a	V _{DS} = 5 V I _D = 15 A	—	8	—	8	V
		V _{DS} = 10 V I _D = 30 A	—	10	—	10	
Drain-Source On Voltage	V _{DS(on)} ^a	I _D = 15 A V _{GS} = 10 V	—	1.125	—	1.125	V
		I _D = 30 A V _{GS} = 10 V	—	2.65	—	2.65	
Static Drain-Source On Resistance	r _{DS(on)} ^a	I _D = 15 A V _{GS} = 10 V	—	0.075	—	0.075	Ω
Forward Transconductance	g _{fs} ^a	V _{DS} = 10 V I _D = 15 A	10	—	10	—	mho
Input Capacitance	C _{iss}	V _{DS} = 25 V	—	3000	—	3000	pF
Output Capacitance	C _{oss}	V _{GS} = 0 V	—	1200	—	1200	
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz	—	500	—	500	
Turn-On Delay Time	t _{d(on)}	V _{DS} = 75 V I _D = 15 A R _{θen} = R _{θs} = 50Ω V _{GS} = 10 V	75(typ)	115	75(typ)	115	ns
Rise Time	t _r		420(typ)	630	420(typ)	630	
Turn-Off Delay Time	t _{d(off)}		300(typ)	450	300(typ)	450	
Fall Time	t _f		250(typ)	375	250(typ)	375	
Thermal Resistance Junction-to-Case	R _{θJC}		RFH30N12, RFH30N15 Series	—	0.83	—	

^aPulsed: Pulse duration = 300 μs max., duty cycle = 2%.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFH30N12		RFH30N15		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V _{SD} *	I _{SD} = 15A	—	1.4	—	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 4A, d _{IF} /d _t = 100 A/μs	200 (typ.)		200 (typ.)		ns

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

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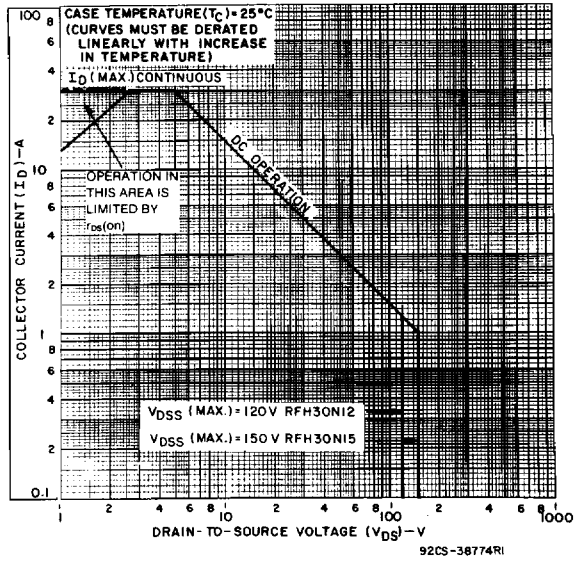


Fig. 1 - Maximum safe operating areas for all types.

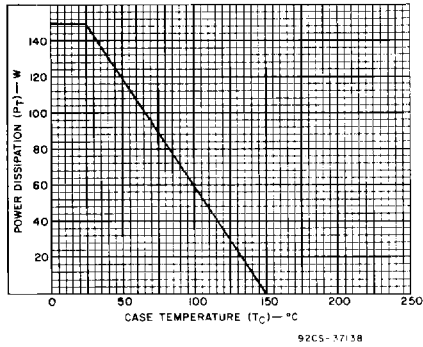


Fig. 2 - Power vs. temperature derating curve for all types.

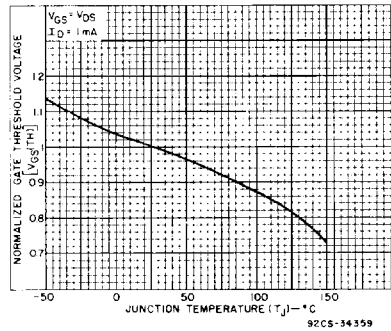


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

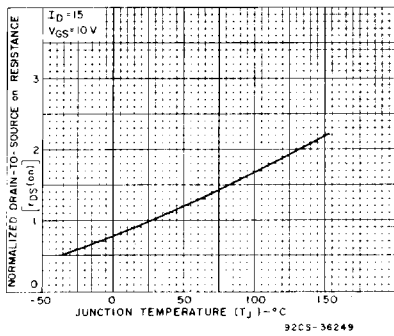


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

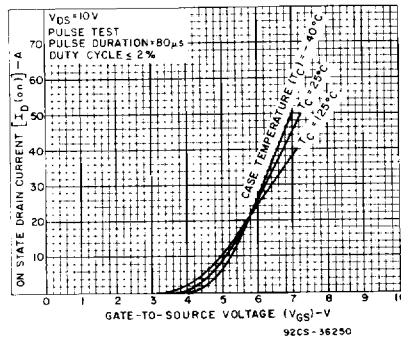


Fig. 5 - Typical transfer characteristics for all types.

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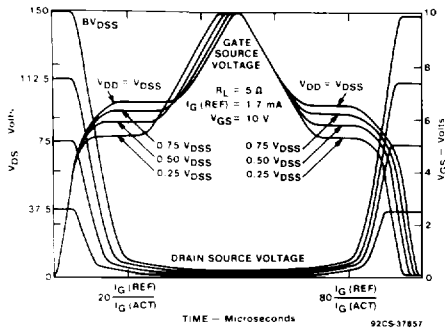


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260

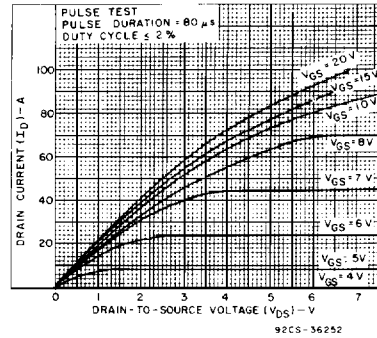


Fig. 7 - Typical saturation characteristics for all types.

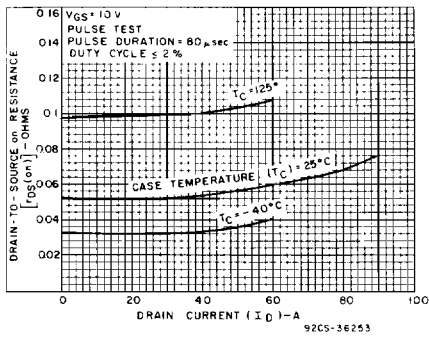


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

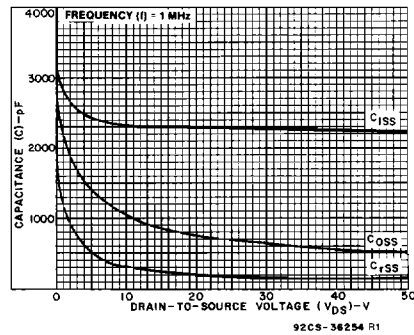


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

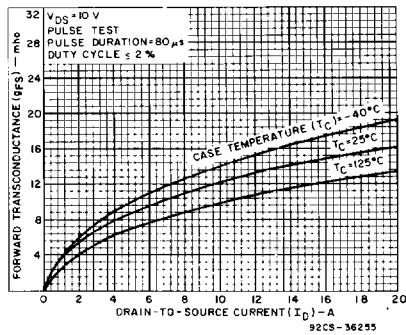


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

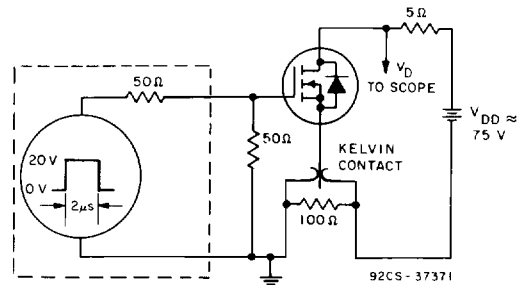


Fig. 11 - Switching Time Test Circuit.