HARRIS

RFL4N12
RFL4N15

N-Channel Enhancement-Mode Power Field-Effect Transistors

August 1991

Features

- 4A, 120V and 150V
- $r_{DS}(on) = 0.4\Omega$
- SOA is Power-Dissipation Limited
- Nanosecond Switching Speeds
- Linear Transfer Characteristics
- High Input Impedance
- Majority Carrier Device

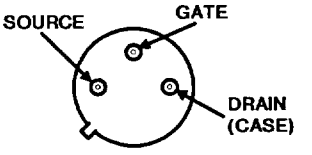
Description

The RFL4N12 and RFL4N15 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 RFL-series types are supplied in the JEDEC TO-205AF metal package.

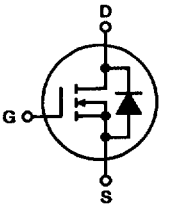
Package

TO-205AF



Terminal Diagram

N-CHANNEL ENHANCEMENT MODE



4 N-CHANNEL POWER MOSFETs

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

		RFL4N12	RFL4N15	UNITS
Drain-Source Voltage	V_{DSS}	120	150	V
Drain-Gate Voltage (R_{GS} = 1MΩ)	V_{DGR}	120	150	V
Continuous Drain Current				
T_C = +25°C	I_D	4	4	A
Pulsed Drain Current	I_{DM}	15	15	A
Gate-Source Voltage	V_{GS}	±20	±20	V
Maximum Power Dissipation				
T_C = +25°C	P_D	8.33	8.33	W
Linear Derating Factor		0.0667	0.0667	W/°C
Operating and Storage Temperature	T_J, T_{STG}	-55 to +150	-55 to +150	°C

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

File Number 1462.1

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFL4N12		RFL4N15		
			Min.	Max.	Min.	Max.	
Drain-Source Breakdown Voltage	BV_{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
Drain-Source On Voltage	$V_{DS}(on)$[a]	I_D=2 A V_{GS}=10 V	—	0.8	—	0.8	V
		I_D=4 A V_{GS}=10 V	—	3	—	3	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=2 A V_{GS}=10 V	—	0.40	—	0.40	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V I_D=2 A	1.5	—	1.5	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V	—	850	—	850	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	230	—	230	
Reverse-Transfer Capacitance	C_{rss}	f = 1MHz	—	100	—	100	
Turn-On Delay Time	$t_d(on)$	V_{DD} = 75 V	40(typ)	60	40(typ)	60	ns
Rise Time	t_r	I_D=2 A	165(typ)	250	165(typ)	250	
Turn-Off Delay Time	$t_d(off)$	R_{gen}=R_{gs}=50 Ω	90(typ)	135	90(typ)	135	
Fall Time	t_f	V_{GS}=10 V	90(typ)	135	90(typ)	135	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFL4N12, RFL4N15	—	15	—	15	°C/W

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFL4N12		RFL4N15		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V_{SD}[a]	I_{SD} = 2A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A d_{IF}/d_t = 100A/μs	200(typ.)		200(typ.)		ns

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

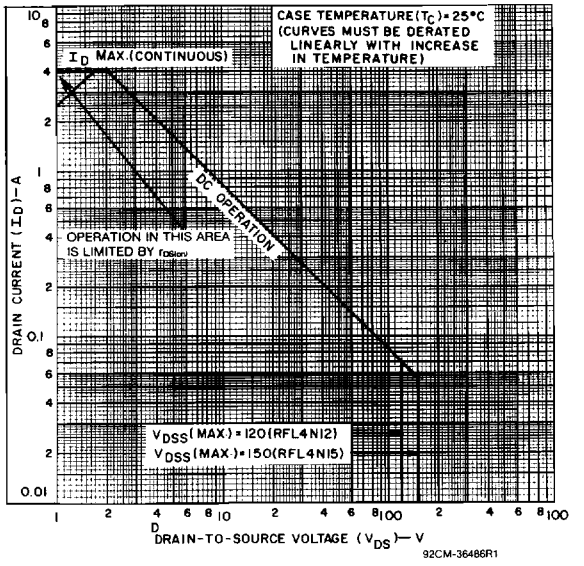


Fig. 1 - Maximum safe operating areas for all types.

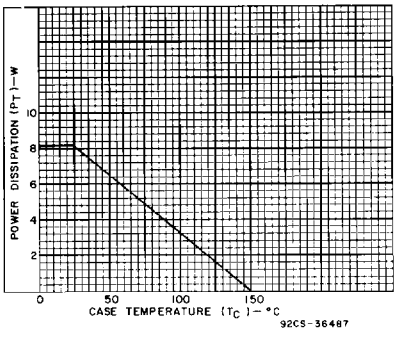


Fig. 2 - Power vs. temperature derating curve for all types.

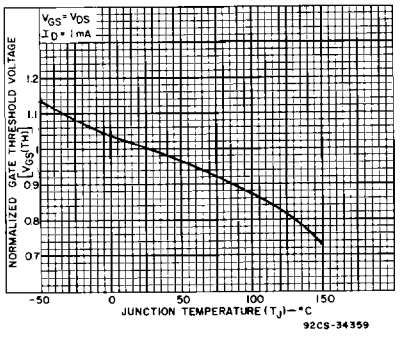


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

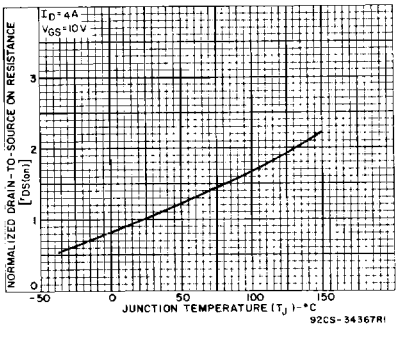


Fig. 4 - Normalized drain-to-source on resistance as a function of junction temperature for all types.

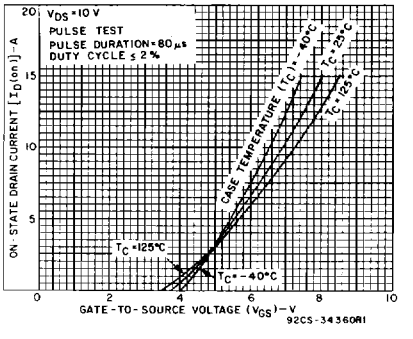


Fig. 5 - Typical transfer characteristics for all types.

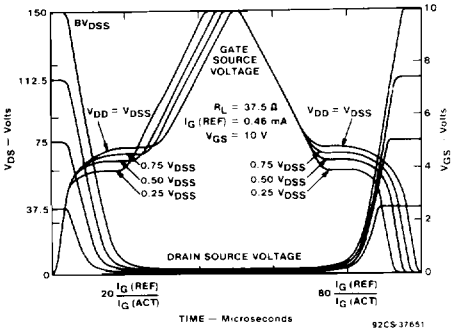


Fig. 6 – Normalized switching waveforms for constant gate-current. Refer to Harris application notes AN-7254 and AN-7260

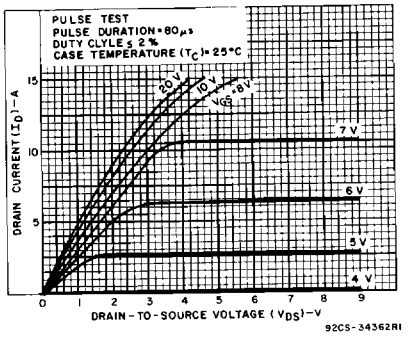


Fig. 7 - Typical saturation characteristics for all types.

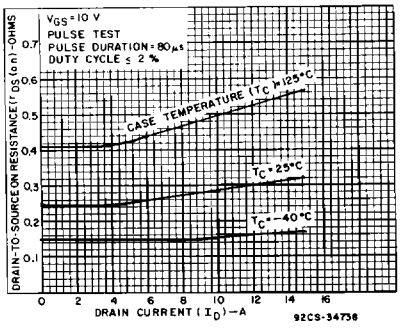


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

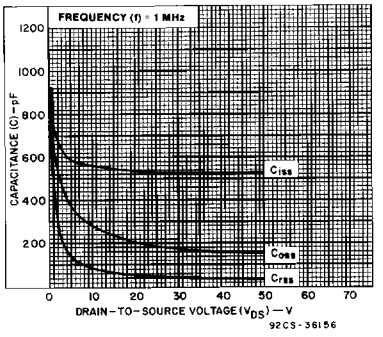


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

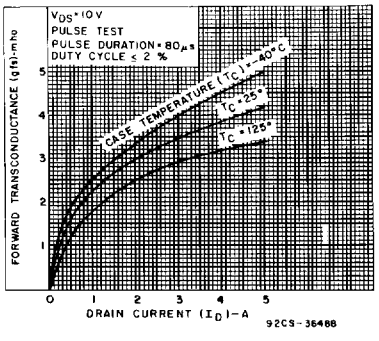


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

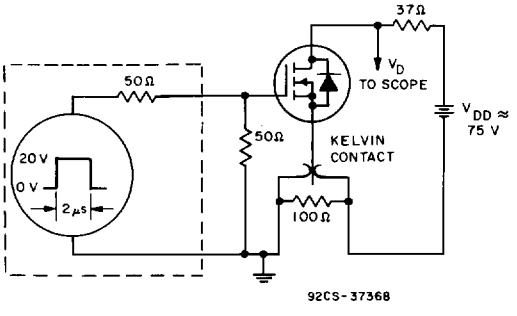


Fig. 11 - Switching Time Test Circuit.