RFM4N35, RFM4N40, RFP4N35, RFP4N40

File Number **1491**

Power MOS Field-Effect Transistors

N-Channel Enhancement-Mode Power Field-Effect Transistors

4 A, 350 V and 400 V
$r_{DS}(on)$: 2Ω

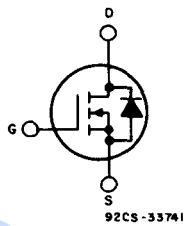
Features:
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*

The RFM4N35 and RFM4N40 and the RFP4N35 and RFP4N40* 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-series types are supplied in the JEDEC TO-204AA steel package and the RFP-series types in the JEDEC TO-220AB plastic package.

*The RFM and RFP series were formerly RCA developmental numbers TA9393 and TA9394, respectively.

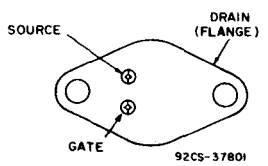
TERMINAL DIAGRAM



N-CHANNEL ENHANCEMENT MODE

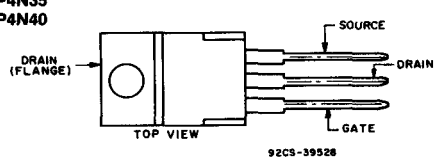
TERMINAL DESIGNATIONS

RFM4N35
RFM4N40



JEDEC TO-204AA

RFP4N35
RFP4N40



JEDEC TO-220AB

MAXIMUM RATINGS, *Absolute-Maximum Values (T_C=25° C):*

	RFM4N35	RFM4N40		RFP4N35	RFP4N40	
DRAIN-SOURCE VOLTAGE ..... V_{DSS}	350	400		350	400	V
DRAIN-GATE VOLTAGE (R_{gs}=1 MΩ) ... V_{DGR}	350	400		350	400	V
GATE-SOURCE VOLTAGE ..... V_{GS}			±20			V
DRAIN CURRENT, RMS Continuous ..... I_D			4			A
Pulsed ..... I_{DM}			8			A
POWER DISSIPATION @ T_C=25°C ..... P_T	75	75		60	60	W
Derate above T_C=25°C	0.6	0.6		0.48	0.48	W/°C
OPERATING AND STORAGE TEMPERATURE ..... T_J, T_{stg}			-55 to +150			°C

RFM4N35, RFM4N40, RFP4N35, RFP4N40

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) 25°C unless otherwise specified.*

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM4N35 RFP4N35		RFM4N40 RFP4N40		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=1 mA V_{GS}=0	350	—	400	—	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}=280 V V_{DS}=320 V	— —	10 —	— —	— 10	μA
		T_C=125°C V_{DS}=280 V V_{DS}=320 V	— —	100 —	— —	— 100	μA
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	—	4	—	4	V
		I_D=4 A V_{GS}=10 V	—	12	—	12	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=2 A V_{GS}=10 V	—	2	—	2	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V I_D=2 A	1	—	1	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V V_{GS}=0 V f=1 MHz	—	750	—	750	pF
Output Capacitance	C_{oss}		—	150	—	150	pF
Reverse Transfer Capacitance	C_{rss}		—	100	—	100	pF
Turn-On Delay Time	$t_d(on)$	V_{DD}=200 V I_D=2 A R_{gen}=R_{gs}=50 Ω V_{GS}=10 V	12(typ)	45	12(typ)	45	ns
Rise Time	t_r		42(typ)	60	42(typ)	60	ns
Turn-Off Delay Time	$t_d(off)$		130(typ)	200	130(typ)	200	ns
Fall Time	t_f		62(typ)	100	62(typ)	100	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM4N35, RFM4N40	—	1.67	—	1.67	°C/W
		RFP4N35, RFP4N40	—	2.083	—	2.083	°C/W

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM4N35 RFP4N35		RFM4N40 RFP4N40		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD} [a]	I_{SD}=2 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/μs	800(typ)		800(typ)		ns

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

RFM4N35, RFM4N40, RFP4N35, RFP4N40

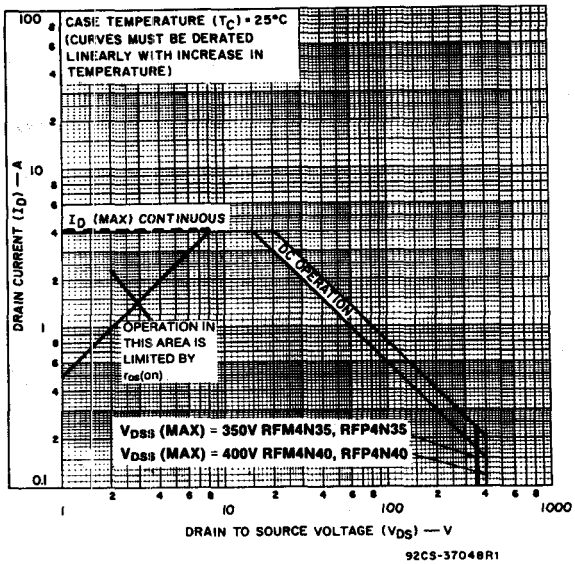


Fig. 1 — Maximum operating areas for all types.

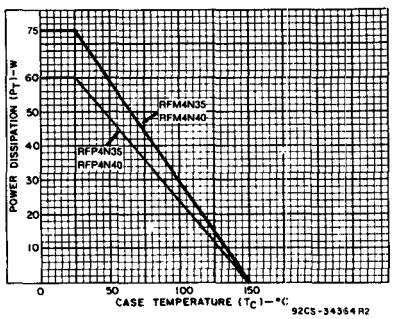


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

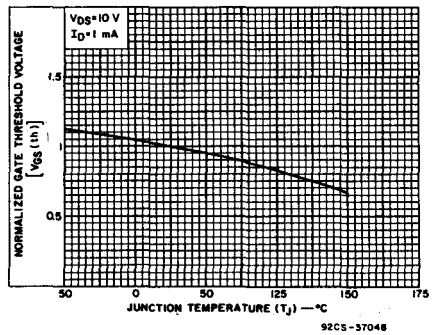


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

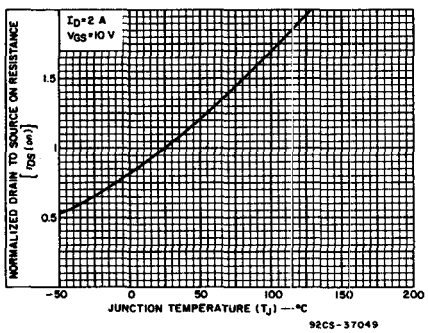


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

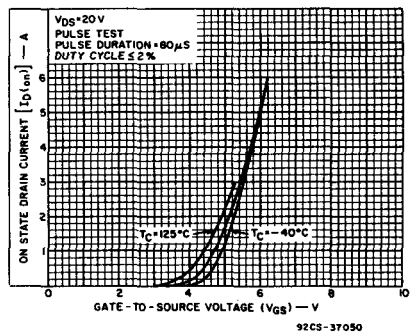


Fig. 5 — Typical transfer characteristics for all types.

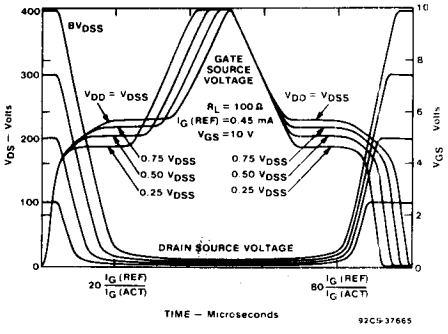


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

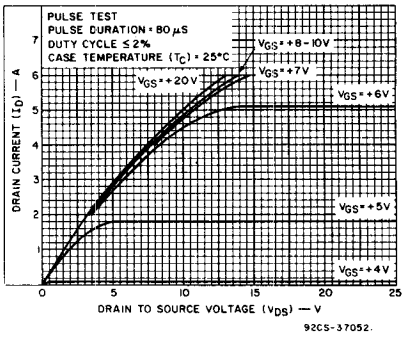


Fig. 7 — Typical saturation characteristics for all types.

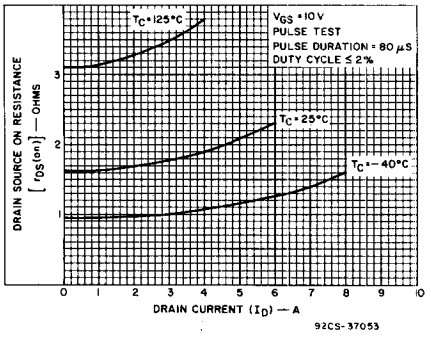


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

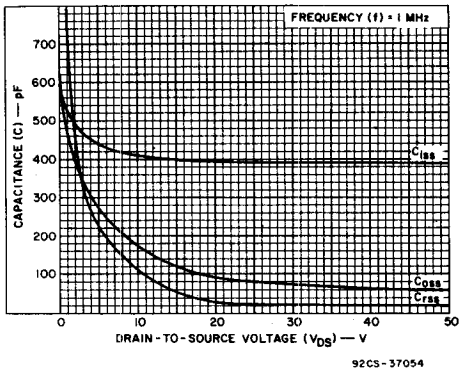


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

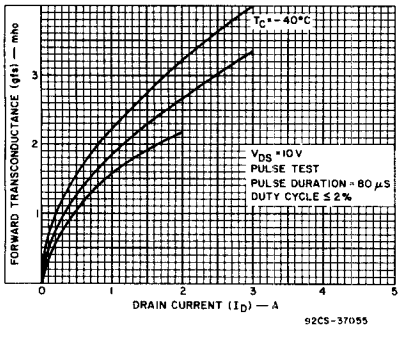


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

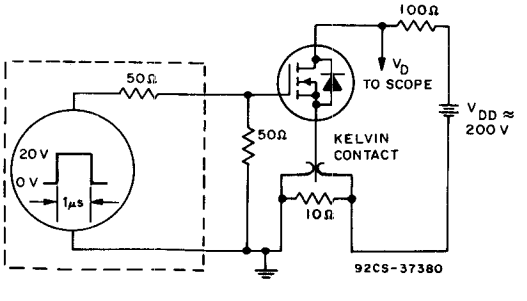


Fig. 11 — Switching Time Test Circuit