

3875081 G E SOLID STATE
Standard Power MOSFETs

01E 18125 D T-39-11

RFM4N35, RFM4N40, RFP4N35, RFP4N40

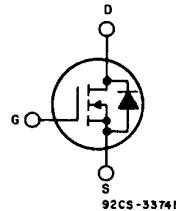
File Number 1491

Power MOS Field-Effect Transistors**N-Channel Enhancement-Mode
Power Field-Effect Transistors**

4 A, 350 V and 400 V

 $r_{ds(on)} = 1.5\Omega$ **Features:**

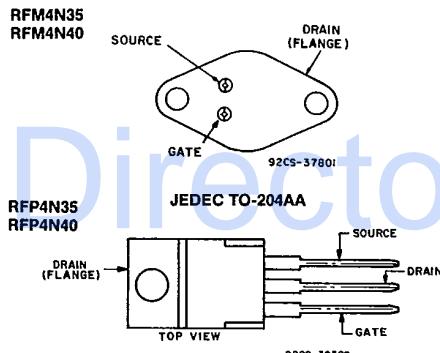
- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

TERMINAL DIAGRAM

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.

N-CHANNEL ENHANCEMENT MODE**TERMINAL DESIGNATIONS****MAXIMUM RATINGS, Absolute-Maximum Values ($T_c=25^\circ C$):**

	RFM4N35	RFM4N40	RFP4N35	RFP4N40	
DRAIN-SOURCE VOLTAGE	V_{DSS}	350	400	350	400
DRAIN-GATE VOLTAGE ($R_{gs}=1 M\Omega$) ...	V_{DGR}	350	400	350	400
GATE-SOURCE VOLTAGE	V_{GS}			± 20	V
DRAIN CURRENT, RMS Continuous	I_D			4	V
Pulsed	I_{DM}			8	A
POWER DISSIPATION @ $T_c=25^\circ C$	P_f	7.5	7.5	60	60
Derate above $T_c=25^\circ C$		0.6	0.6	0.48	0.48
OPERATING AND STORAGE					W/C
TEMPERATURE	T_J, T_{stg}			-55 to +150	$^\circ C$

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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}	$I_D=1 \text{ mA}$ $V_{GS}=0$	350	—	400	—	V	
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{GS}=V_{DS}$ $I_D=1 \text{ mA}$	2	4	2	4	V	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=280 \text{ V}$ $V_{DS}=320 \text{ V}$	—	10	—	—	μA	
		$T_c=125^\circ\text{C}$ $V_{DS}=280 \text{ V}$ $V_{DS}=320 \text{ V}$	—	100	—	—		
Gate-Source Leakage Current	I_{GS}	$V_{GS}=\pm 20 \text{ V}$ $V_{DS}=0$	—	100	—	100	nA	
Drain-Source On Voltage	$V_{DS(\text{on})^a}$	$I_D=2 \text{ A}$ $V_{GS}=10 \text{ V}$	—	4	—	4	V	
		$I_D=4 \text{ A}$ $V_{GS}=10 \text{ V}$	—	12	—	12		
Static Drain-Source On Resistance	$r_{DS(\text{on})^a}$	$I_D=2 \text{ A}$ $V_{GS}=10 \text{ V}$	—	1.5	—	1.5	Ω	
Forward Transconductance	g_{fs}^a	$V_{DS}=10 \text{ V}$ $I_D=2 \text{ A}$	1	—	1	—	mho	
Input Capacitance	C_{iss}	$V_{DS}=25 \text{ V}$ $V_{GS}=0 \text{ V}$ $f=1 \text{ MHz}$	—	650	—	650	pF	
	C_{oss}		—	150	—	150		
	C_{rss}		—	50	—	50		
Turn-On Delay Time	$t_d(\text{on})$	$V_{DD}=200 \text{ V}$ $I_D=2 \text{ A}$ $R_{gen}=R_{gs}=50 \Omega$	12(typ)	45	12(typ)	45	ns	
Rise Time	t_r		42(typ)	60	42(typ)	60		
Turn-Off Delay Time	$t_d(\text{off})$		130(typ)	200	130(typ)	200		
Fall Time	t_f		62(typ)	100	62(typ)	100		
Thermal Resistance Junction-to-Case	$R_{\theta_{JC}}$	RFM4N35, RFM4N40	—	1.67	—	1.67	$^\circ\text{C/W}$	
		RFP4N35, RFP4N40	—	2.083	—	2.083		

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	$I_{SD}=2 \text{ A}$	—	1.4	—	1.4	V	
Reverse Recovery Time	t_{rr}	$I_F=4 \text{ A}$ $d_I/d_t=100 \text{ A}/\mu\text{s}$	800(typ)		800(typ)		ns	

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

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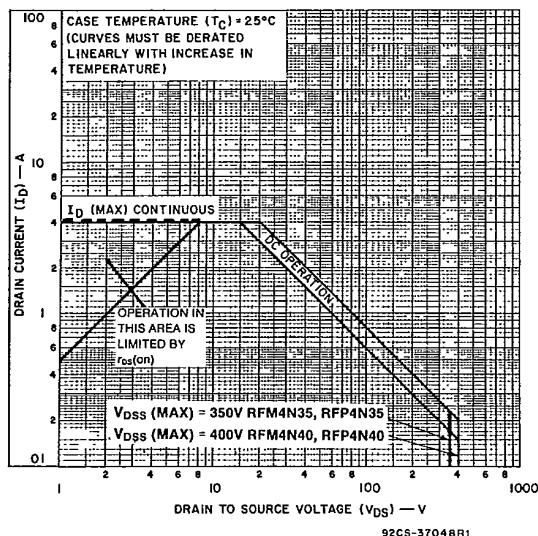


Fig. 1 — Maximum operating areas for all types

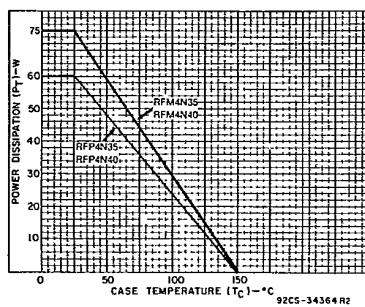


Fig. 2 — Power dissipation vs. temperature derating curve for all types.

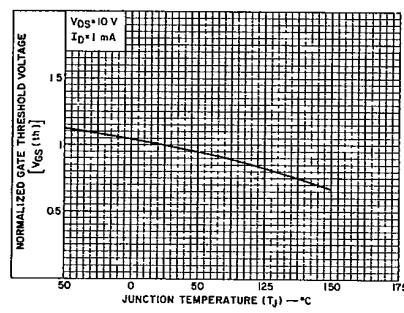


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

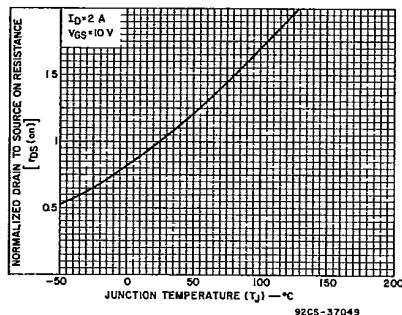


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types

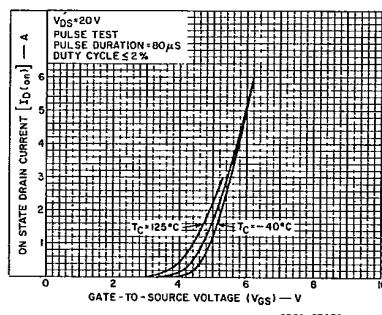


Fig. 5 — Typical transfer characteristics for all types.

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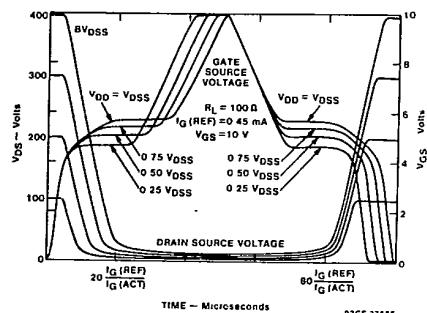


Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA Power MOSFETs PMP411A.

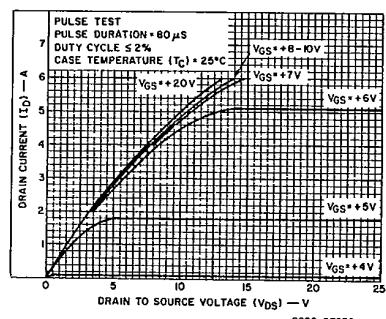


Fig. 7 — Typical saturation characteristics for all types.

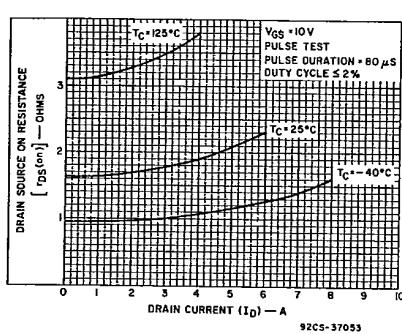


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

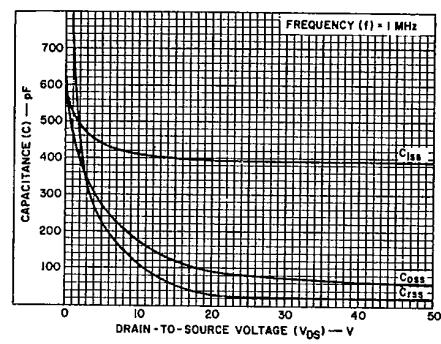


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

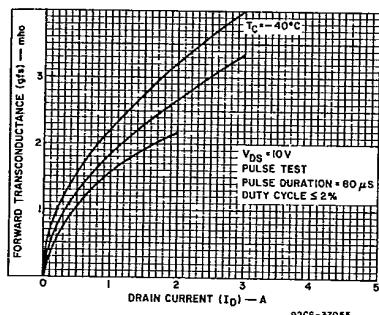


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

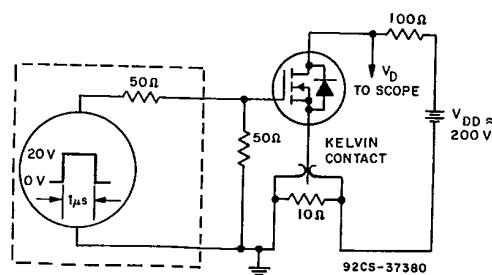


Fig. 11 — Switching Time Test Circuit