

RFM10N12, RFM10N15, RFP10N12, RFP10N15

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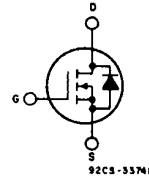
**N-Channel Enhancement-Mode
Power Field-Effect Transistors**

10 A, 120 V — 150 V

$r_{DS(on)}$: 0.3 Ω

Features:

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



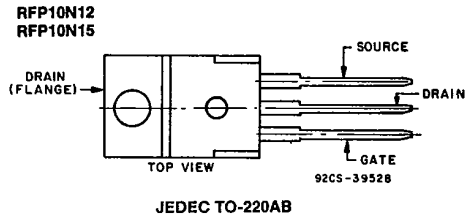
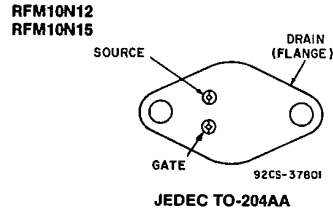
N-Channel Enhancement Mode

The RFM10N12 and RFM10N15 and the RFP10N12 and RFP10N15* 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-types are supplied in the JEDEC TO-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

*The RFM and RFP series were formerly RCA developmental numbers TA9192 and TA9212, respectively.

TERMINAL DESIGNATIONS



MAXIMUM RATINGS, Absolute-Maximum Values ($T_c=25^\circ\text{C}$):

	RFM10N12	RFM10N15		RFP10N12	RFP10N15	
DRAIN-SOURCE VOLTAGE V_{DSS}	120	150		120	150	V
DRAIN-GATE VOLTAGE ($R_{gk}=1\text{ M}\Omega$) ... V_{DGR}	120	150		120	150	V
GATE-SOURCE VOLTAGE V_{GS}	_____		± 20	_____		V
DRAIN CURRENT, RMS Continuous I_D	_____		10	_____		A
Pulsed I_{DM}	_____		25	_____		A
POWER DISSIPATION @ $T_c=25^\circ\text{C}$ P_T	75	75		60	60	W
Derate above $T_c=25^\circ\text{C}$	0.6	0.6		0.48	0.48	W/ $^\circ\text{C}$
OPERATING AND STORAGE						
TEMPERATURE T_j, T_{stg}	_____		-55 to +150	_____		$^\circ\text{C}$

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM10N12 RFP10N12		RFM10N15 RFP10N15		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 1 \text{ mA}$ $V_{GS} = 0$	120	—	150	—	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}$ $I_D = 2 \text{ mA}$	2	4	2	4	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 100 \text{ V}$	—	1	—	—	μA
		$V_{DS} = 120 \text{ V}$	—	—	—	1	
		$T_c = 125^\circ\text{C}$	—	50	—	—	
		$V_{DS} = 100 \text{ V}$ $V_{DS} = 120 \text{ V}$	—	—	—	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$ $V_{DS} = 0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D = 5 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	1.5	—	1.5	V
		$I_D = 10 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	4	—	4	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D = 5 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	0.3	—	0.3	Ω
Forward Transconductance	g_{fs}^a	$V_{DS} = 10 \text{ V}$ $I_D = 5 \text{ A}$	2	—	2	—	mho
Input Capacitance	C_{iss}	$V_{DS} = 25 \text{ V}$	—	650	—	650	pF
Output Capacitance	C_{oss}	$V_{GS} = 0 \text{ V}$	—	230	—	230	
Reverse Transfer Capacitance	C_{rss}	$f = 1 \text{ MHz}$	—	60	—	60	
Turn-On Delay Time	$t_d(on)$	$V_{DD} = 75 \text{ V}$	40(typ.)	60	40(typ.)	60	ns
Rise Time	t_r	$I_D = 5 \text{ A}$	165(typ.)	250	165(typ.)	250	
Turn-Off Delay Time	$t_d(off)$	$R_{\theta en} = R_{\theta s} = 50 \Omega$	90(typ.)	135	90(typ.)	135	
Fall Time	t_f	$V_{GS} = 10 \text{ V}$	90(typ.)	135	90(typ.)	135	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFM10N12, RFM10N15	—	1.67	—	1.67	$^\circ\text{C/W}$
		RFP10N12, RFP10N15	—	2.083	—	2.083	

*Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM10N12 RFP10N12		RFM10N15 RFP10N15		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}	$I_{SD} = 5 \text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	$I_F = 4 \text{ A}$ $d_{IF}/d_t = 100 \text{ A}/\mu\text{s}$	200(typ)		200(typ)		ns

* Pulse Test: Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.

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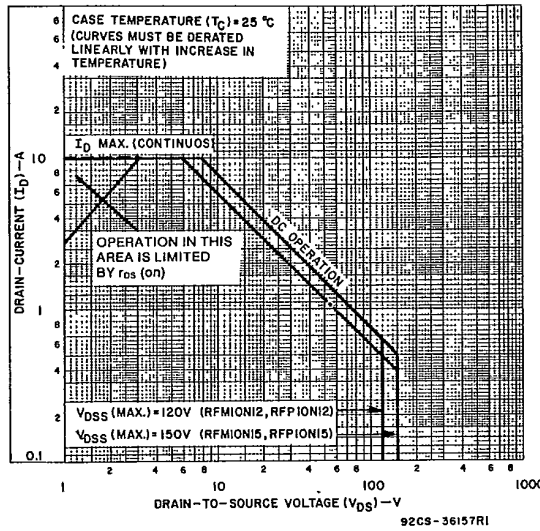


Fig. 1 — Maximum safe operating areas for all types.

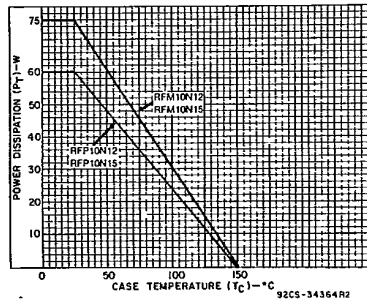


Fig. 2 — Power vs. temperature derating curve for all types.

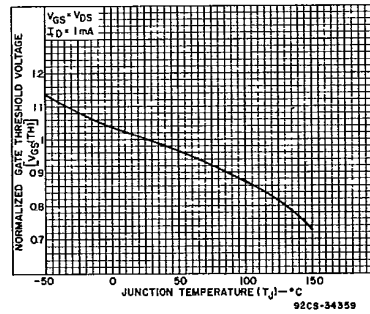


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

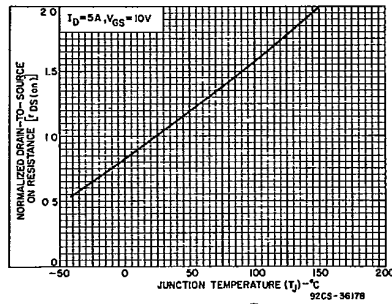


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

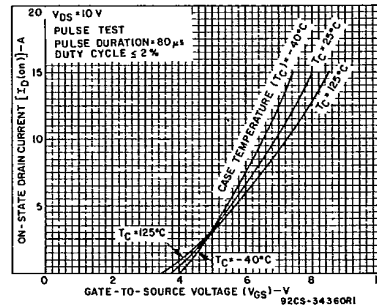


Fig. 5 — Typical transfer characteristics for all types.

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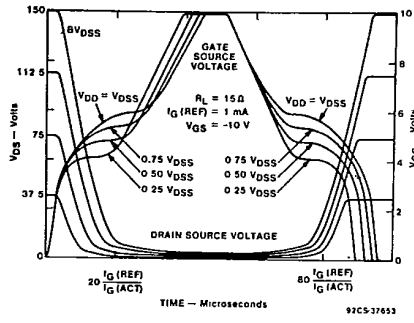


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

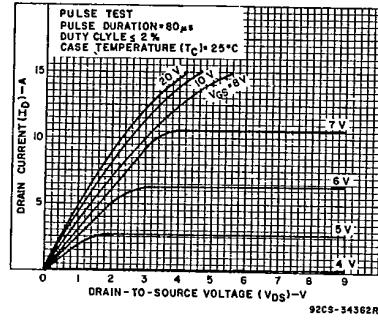


Fig. 7 - Typical saturation characteristics for all types.

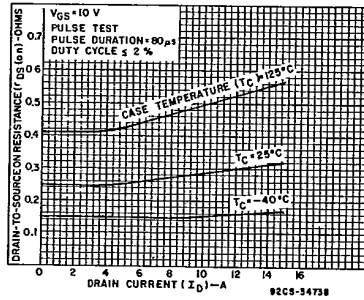


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

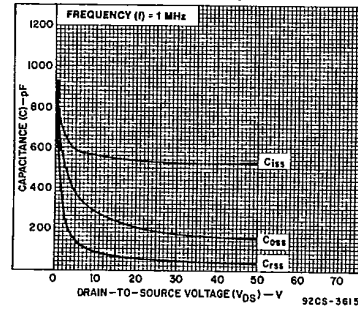


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

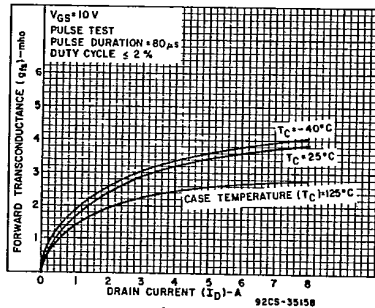


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

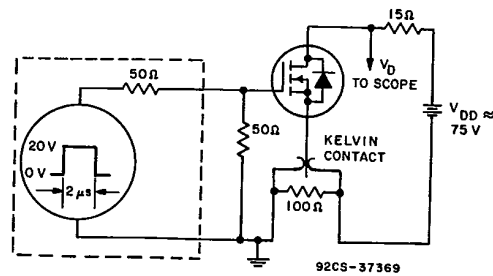


Fig. 11 - Switching Time Test Circuit