

RFM10N12, RFM10N15, RFP10N12, RFP10N15



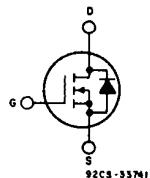
N-Channel Enhancement-Mode Power Field-Effect Transistors

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



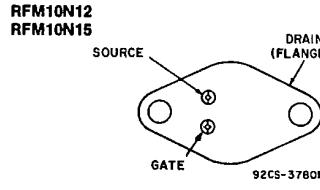
N-Channel Enhancement Mode

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.

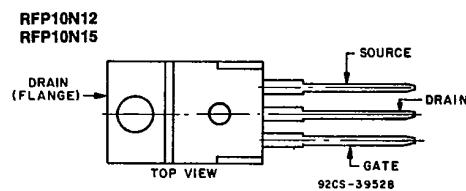
The RFM-types are supplied in the JEDEC TO-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

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

TERMINAL DESIGNATIONS



JEDEC TO-204AA



JEDEC TO-220AB

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

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

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ELECTRICAL CHARACTERISTICS At Case Temperature ($T_c = 25^\circ C$ 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}	$V_{DS} = 100 \text{ V}$ $V_{DS} = 120 \text{ V}$	—	1	—	—	μA	
		$T_c = 125^\circ C$ $V_{DS} = 100 \text{ V}$ $V_{DS} = 120 \text{ V}$	—	50	—	—		
		—	—	—	—	50		
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$ $V_{DS} = 0$	—	100	—	100	nA	
Drain-Source On Voltage	$V_{DS(on)}^*$	$I_D = 5 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	1.5	—	1.5	V	
		$I_D = 10 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	4	—	4		
Static Drain-Source On Resistance	$r_{DS(on)}^*$	$I_D = 5 \text{ A}$ $V_{GS} = 10 \text{ V}$	—	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 Output Capacitance Reverse Transfer Capacitance	C_{iss} C_{oss} C_{res}	$V_{DS} = 25 \text{ V}$	—	650	—	650	pF	
		$V_{GS} = 0 \text{ V}$	—	230	—	230		
		$f = 1 \text{ MHz}$	—	60	—	60		
Turn-On Delay Time Rise Time Turn-Off Delay Time Fall Time	$t_d(\text{on})$ t_r $t_d(\text{off})$ t_f	$V_{DD} = 75 \text{ V}$ $I_D = 5 \text{ A}$	40(typ.)	60	40(typ.)	60	ns	
		$R_{gen} = R_{gs} = 50 \Omega$	165(typ.)	250	165(typ.)	250		
		$V_{GS} = 10 \text{ V}$	90(typ.)	135	90(typ.)	135		
		90(typ.)	135	90(typ.)	135	90(typ.)		
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}	$I_F = 4 \text{ A}$ $d_{rr}/d_t = 100 \text{ A}/\mu\text{s}$	200(typ.)	—	200(typ.)	—	ns	

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

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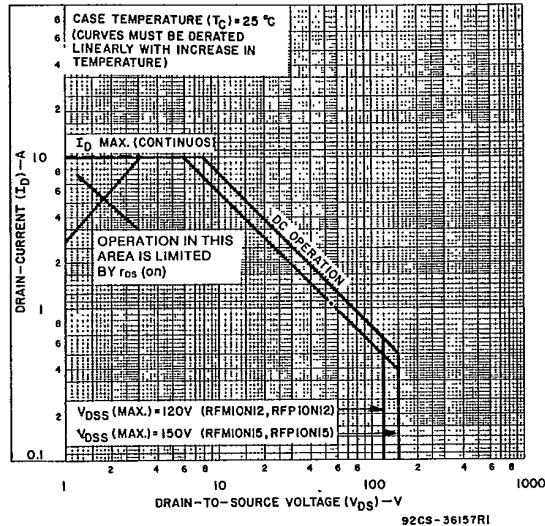


Fig. 1 — Maximum safe operating areas for all types.

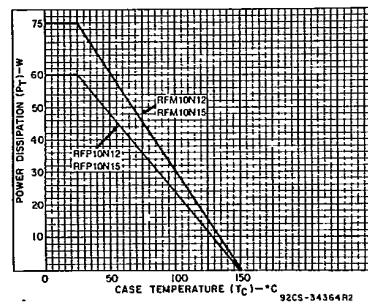


Fig. 2 — Power vs. temperature derating curve for all types.

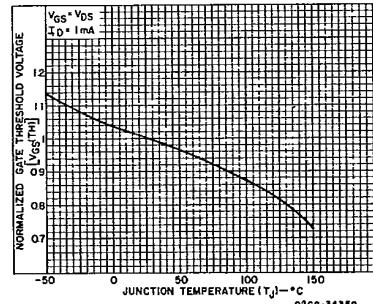


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

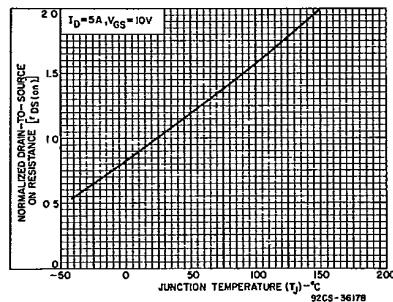


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

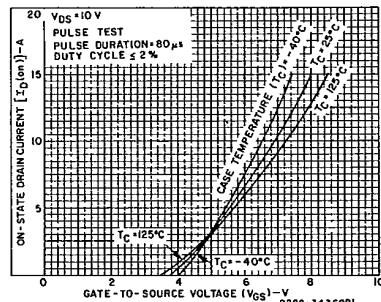


Fig. 5 — Typical transfer characteristics for all types.

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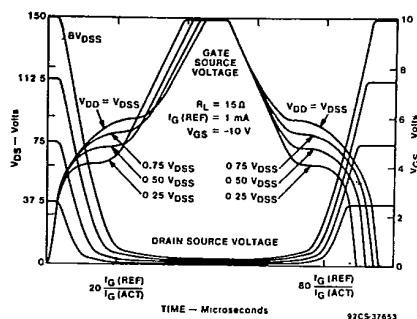


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

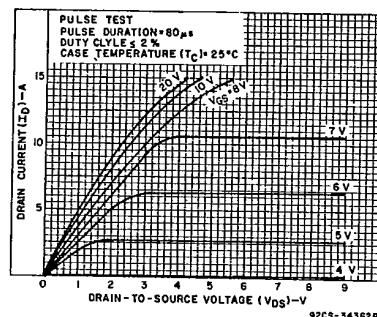


Fig. 7 — Typical saturation characteristics for all types.

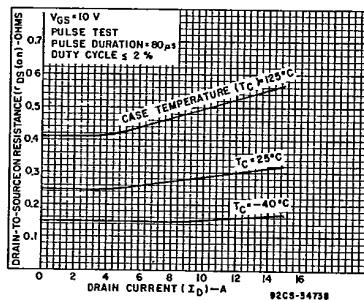


Fig. 8 - Typical drain-to-source on resistance as a function drain current for all types.

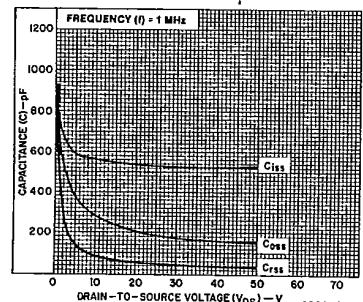


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

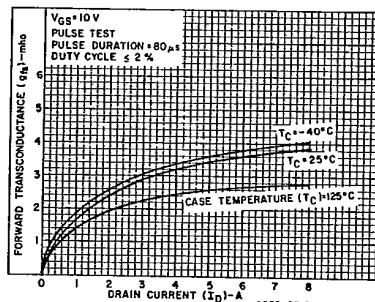


Fig. 10 - Typical forward transconductance as a function drain current for all types.

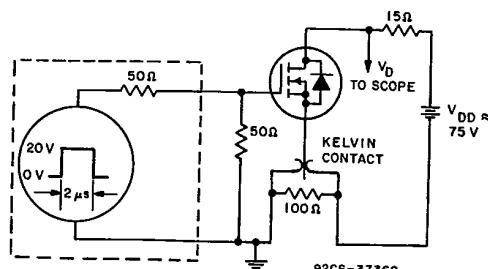


Fig. 11 — Switching Time Test Circuit