RFM10N12, RFM10N15, RFP10N12, RFP10N15

File Number **1445**

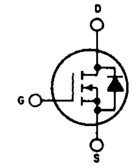
N-Channel Enhancement-Mode Power Field-Effect Transistors

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

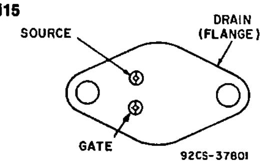
The RFM10N12 and RFM10N15 and the RFP10N12 and RFP10N15* are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring 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.

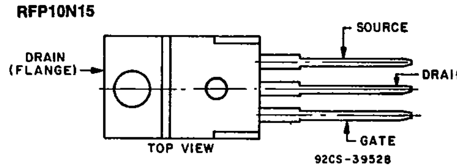
TERMINAL DESIGNATIONS

RFM10N12
RFM10N15



JEDEC TO-204AA

RFP10N12
RFP10N15



JEDEC TO-220AB

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

	RFM10N12	RFM10N15		RFP10N12	RFP10N15	
DRAIN-SOURCE VOLTAGE .... V_{DSS}	120	150		120	150	V
DRAIN-GATE VOLTAGE (R_{gs}=1 MΩ) ... 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°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

RFM10N12, RFM10N15, RFP10N12, RFP10N15

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS RFM10N12 RFP10N12 MIN.	LIMITS RFM10N12 RFP10N12 MAX.	LIMITS RFM10N15 RFP10N15 MIN.	LIMITS RFM10N15 RFP10N15 MAX.	UNITS
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 = 2 mA	2	4	2	4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V V_{DS} = 120 V	— —	1 —	— —	— 1	μA
		T_C = 125°C V_{DS} = 100 V V_{DS} = 120 V	— —	50 —	— —	— 50	
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ± 20 V V_{DS} = 0	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS}(on)$*	I_D = 5 A V_{GS} = 10 V	—	1.5	—	1.5	V
		I_D = 10 A V_{GS} = 10 V	—	4	—	4	
Static Drain-Source On Resistance	$r_{DS}(on)$*	I_D = 5 A V_{GS} = 10 V	—	0.3	—	0.3	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = 10 V I_D = 5 A	2	—	2	—	mho
Input Capacitance Output Capacitance Reverse Transfer Capacitance	C_{iss} C_{oss} C_{rss}	V_{DS}=25 V V_{GS} = 0 V f = 1MHz.	— — —	650 230 60	— — —	650 230 60	pF
Turn-On Delay Time Rise Time Turn-Off Delay Time Fall Time	$t_d(on)$ t_r $t_d(off)$ t_f	V_{DD}=75 V I_D = 5 A R_{gen} = R_{gs} = 50 Ω V_{GS} = 10 V	40(typ.) 165(typ.) 90(typ.) 90(typ.)	60 250 135 135	40(typ.) 165(typ.) 90(typ.) 90(typ.)	60 250 135 135	ns
Thermal Resistance Junction-to-Case	RθJC	RFM10N12, RFM10N15	—	1.67	—	1.67	°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 RFM10N12 RFP10N12 MIN.	LIMITS RFM10N12 RFP10N12 MAX.	LIMITS RFM10N15 RFP10N15 MIN.	LIMITS RFM10N15 RFP10N15 MAX.	UNITS
Diode Forward Voltage	V_{SD}	I_{SD}=5 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/μs	200(typ)		200(typ)		ns

[a] Pulse Test: Width ≤ 300 μs, Duty Cycle ≤ 2%.

RFM10N12, RFM10N15, RFP10N12, RFP10N15

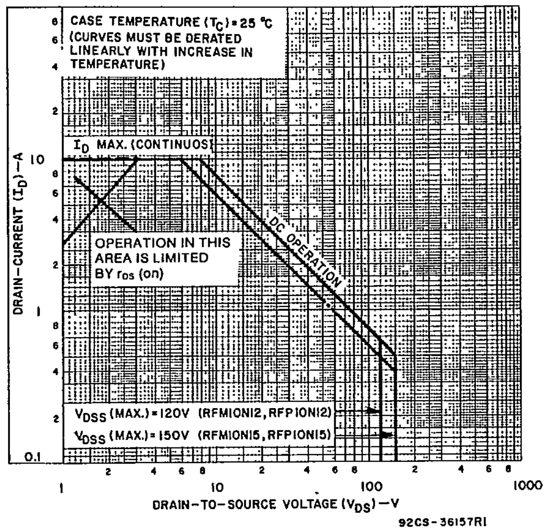


Fig. 1 — Maximum safe operating areas for all types.

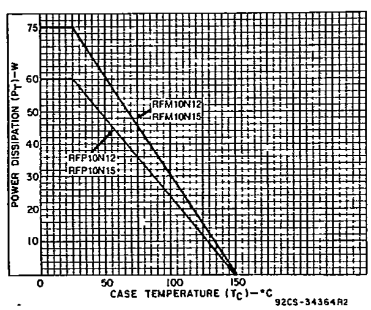


Fig. 2 — Power vs. temperature derating curve for all types.

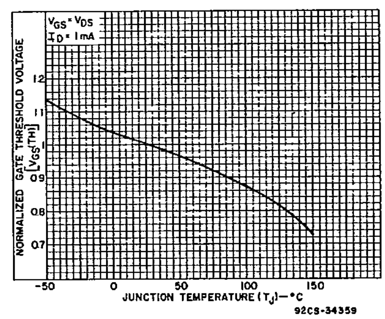


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

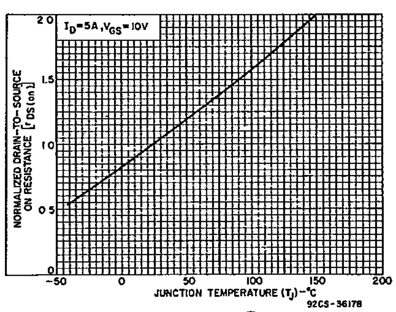


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

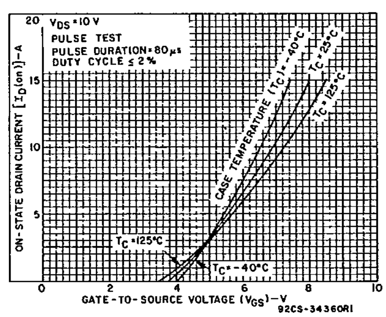


Fig. 5 — Typical transfer characteristics for all types.

RFM10N12, RFM10N15, RFP10N12, RFP10N15

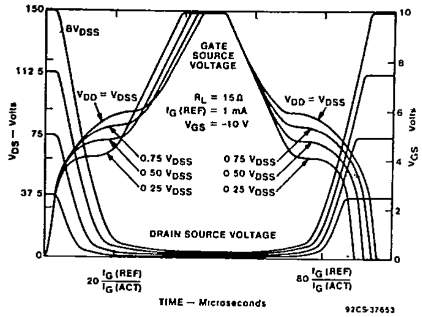


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

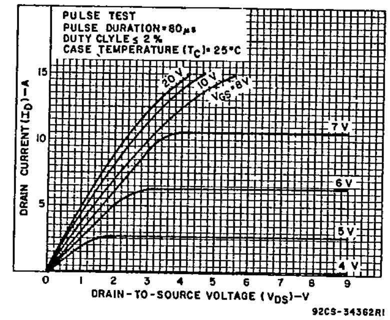


Fig. 7 — Typical saturation characteristics for all types.

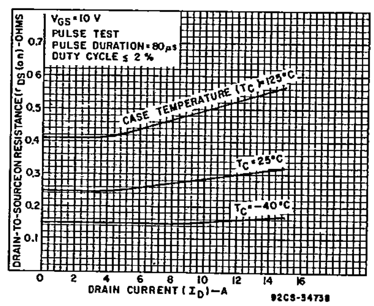


Fig. 8 - Typical drain-to-source on resistance as a function drain current for all types.

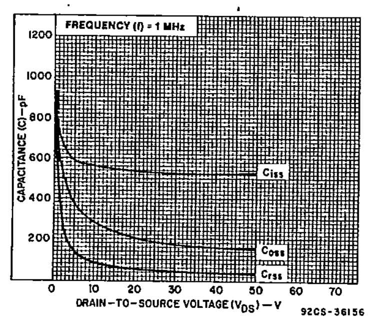


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

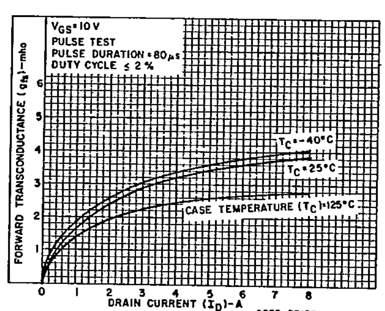


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

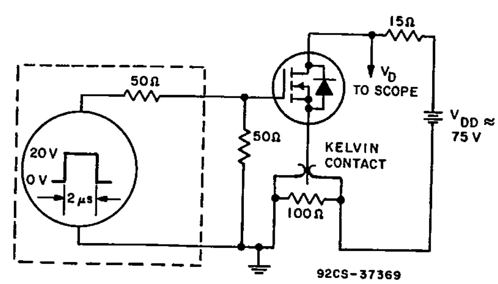


Fig. 11 — Switching Time Test Circuit