T-39-13

RFM15N12, RFM15N15, RFP15N12, RFP15N15

File Number **1443**

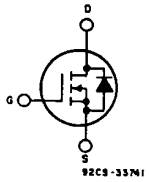
N-Channel Enhancement-Mode Power Field-Effect Transistors

15 A, 120 V — 150 V

$r_{DS}(on)$: 0.15 Ω

Features:

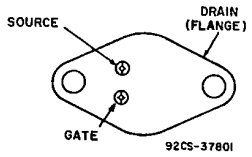
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*



N-Channel Enhancement Mode

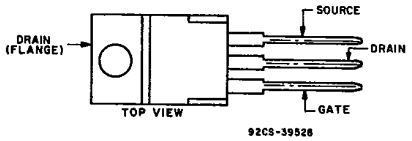
TERMINAL DESIGNATIONS

RFM15N12
RFM15N15



JEDEC TO-204AA

RFP15N12
RFP15N15



JEDEC TO-220AB

The RFM15N12 and RFM15N15 and the RFP15N12 and RFP15N15* 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 TA9195 and TA9230, respectively.

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

		RFM15N12	RFM15N15	RFP15N12	RFP15N15	
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	15				A
Pulsed	I_{DM}	40				A
POWER DISSIPATION @ T_C=25°C	P_T	100	100	75	75	W
Derate above T_C=25°C		0.80	0.80	0.6	0.6	W/°C
OPERATING AND STORAGE TEMPERATURE	T_j, T_{stg}	−55 to +150				°C

RFM15N12, RFM15N15, RFP15N12, RFP15N15

T-39-11
T-39-13

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS RFM15N12 RFP15N12 MIN.	RFM15N12 RFP15N12 MAX.	RFM15N15 RFP15N15 MIN.	RFM15N15 RFP15N15 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 = 1 mA	2	4	2	4	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V	—	1	—	—	μA
		V_{DS} = 120 V	—	—	—	1	
		T_C = 125°C					
		V_{DS} = 100 V	—	50	—	—	
		V_{DS} = 120 V	—	—	—	50	
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 = 7.5 A, V_{GS} = 10 V	—	1.125	—	1.125	V
		I_D = 15 A, V_{GS} = 10 V	—	3	—	3	
Static Drain-Source On Resistance	$r_{DS(on)}$[a]	I_D = 7.5 A, V_{GS} = 10 V	—	0.15	—	0.15	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = 10 V, I_D = 7.5 A	5	—	5	—	mho
Input Capacitance	C_{iss}	V_{DS} = 25 V	—	1700	—	1700	pF
Output Capacitance	C_{oss}	V_{GS} = 0 V	—	750	—	750	
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	350	—	350	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=75 V	50(typ.)	75	50(typ.)	75	ns
Rise Time	t_r	I_D = 7.5 A	150(typ.)	225	150(typ.)	225	
Turn-Off Delay Time	$t_{d(off)}$	R_{gen} = R_{gs} = 50 Ω	185(typ.)	280	185(typ.)	280	
Fall Time	t_f	V_{GS} = 10 V	125(typ.)	190	125(typ.)	190	
Thermal Resistance Junction-to-Case	RθJC	RFM15N12, RFM15N15	—	1.25	—	1.25	°C/W
		RFP15N12, RFP15N15	—	1.67	—	1.67	

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM15N12 RFP15N12 MIN.	RFM15N12 RFP15N12 MAX.	RFM15N15 RFP15N15 MIN.	RFM15N15 RFP15N15 MAX.	UNITS
Diode Forward Voltage	V_{SD}	I_{SD}=7.5 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

*Pulse Test: Width ≤ 300 μs, duty cycle ≤ 2%.

RFM15N12, RFM15N15, RFP15N12, RFP15N15

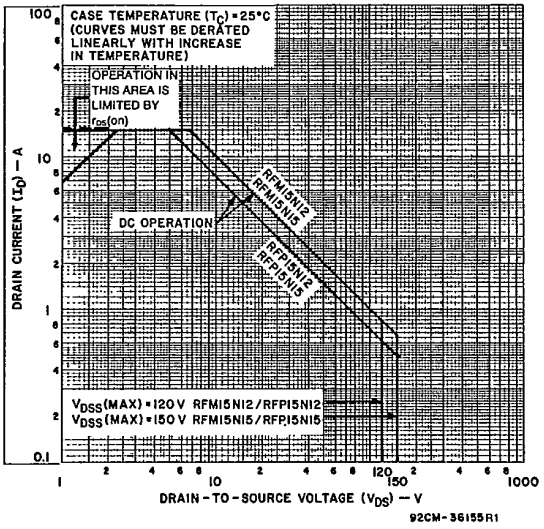


Fig. 1 — Maximum operating areas for all types.

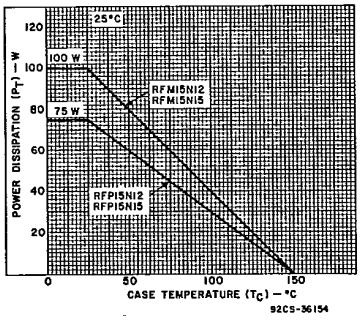


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

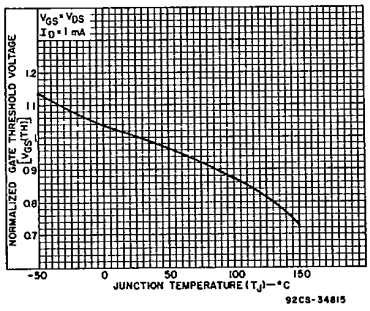


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

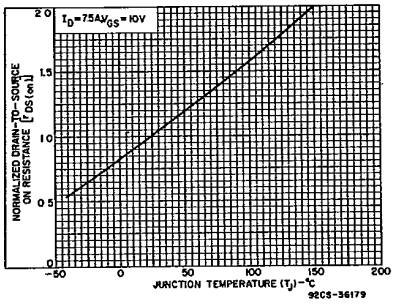


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

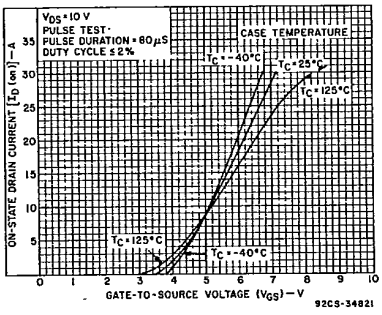


Fig. 5 — Typical transfer characteristics for all types.

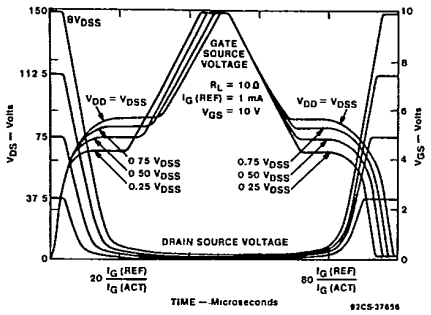


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

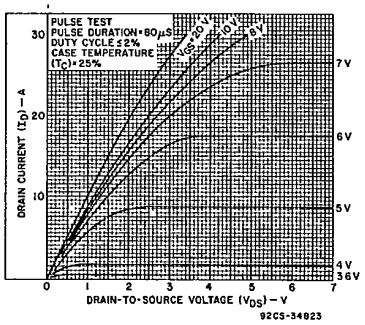


Fig. 7 — Typical saturation characteristics for all types.

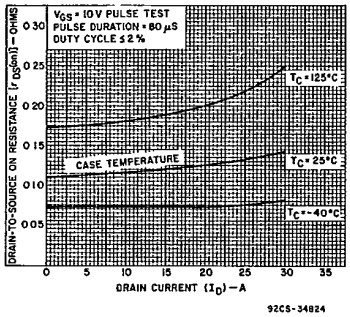


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

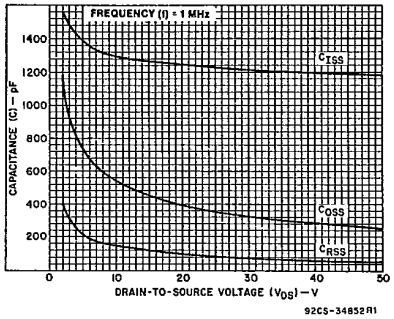


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

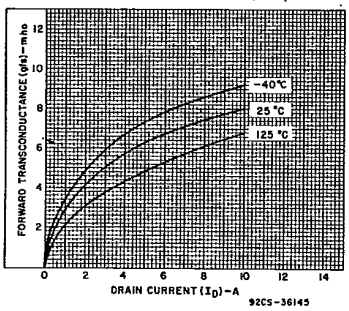


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

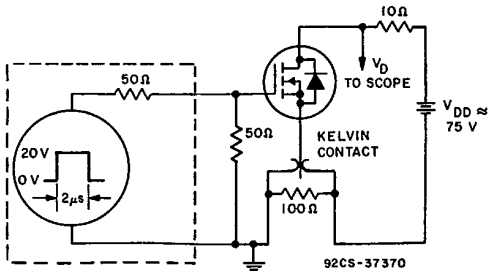


Fig. 11 — Switching Time Test Circuit