

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

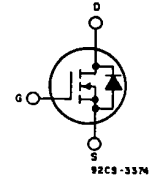
Features:

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

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.

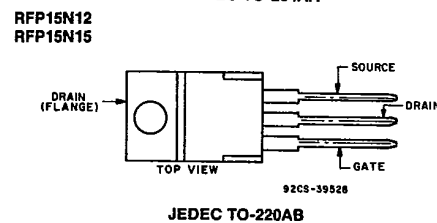
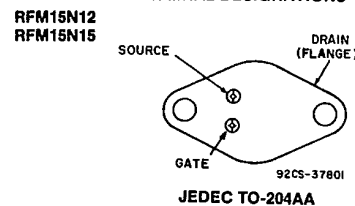
The RFM-types are supplied in the JEDEC TO-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

*The RFM and RFP series were formerly RCA developmental numbers TA9195 and TA9230, respectively.



N-Channel Enhancement Mode

TERMINAL DESIGNATIONS



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

		RFM15N12	RFM15N15		RFP15N12	RFP15N15		
DRAIN-SOURCE VOLTAGE	V_{DS}	120	150		120	150	V	
DRAIN-GATE VOLTAGE ($R_{GS}=1\text{ M}\Omega$)	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								
@ $T_C=25^\circ\text{C}$	P_T	100	100		75	75	W	
Derate above $T_C=25^\circ\text{C}$		0.80	0.80		0.6	0.6	W/ $^\circ\text{C}$	
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}						$-55\text{ to }+150$	$^\circ\text{C}$

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM15N12 RFP15N12		RFM15N15 RFP15N15		
			MIN.	MAX.	MIN.	MAX.	
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	—	50	—	—	
		V _{DS} = 100 V	—	—	—	—	
		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	

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM15N12 RFP15N12		RFM15N15 RFP15N15		
			MIN.	MAX.	MIN.	MAX.	
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 _I /d _t =100 A/μs	200(typ)		200(typ)		ns

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

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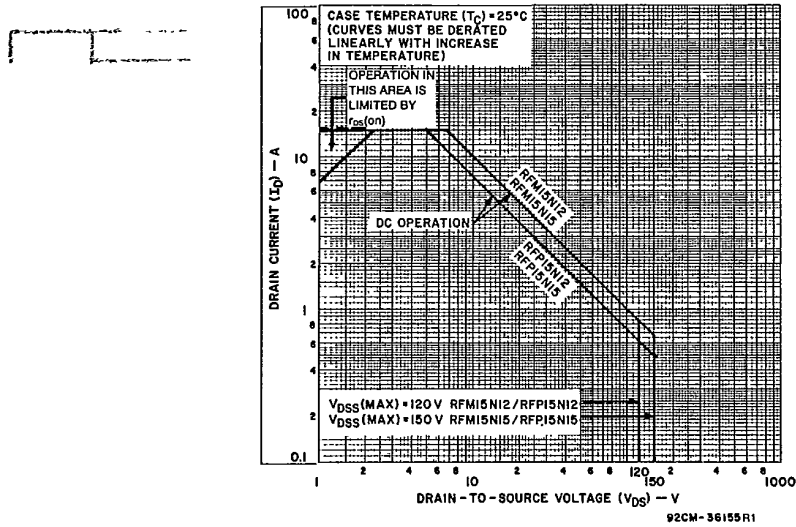


Fig. 1 — Maximum operating areas for all types.

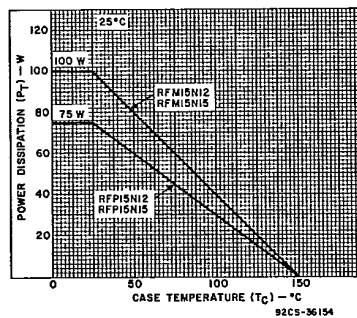


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

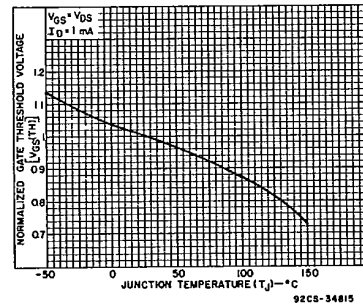


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

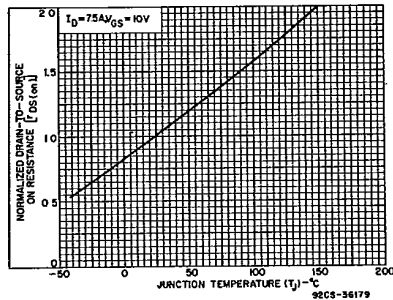


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

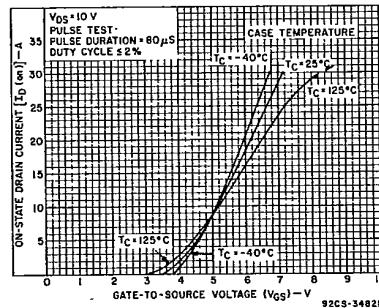


Fig. 5 — Typical transfer characteristics for all types.

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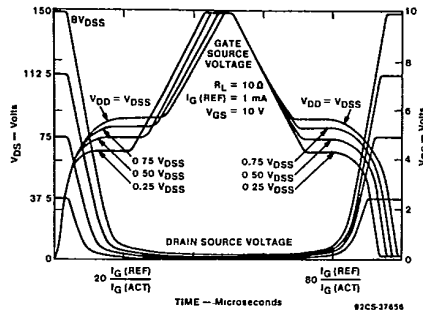


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

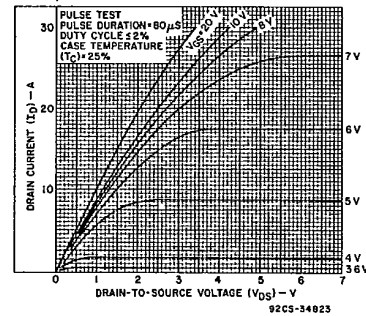


Fig. 7 - Typical saturation characteristics for all types.

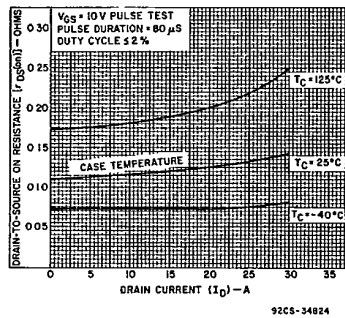


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

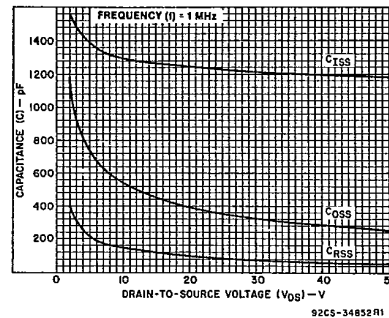


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

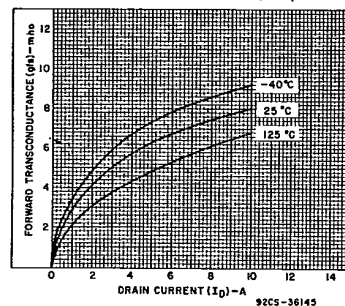


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

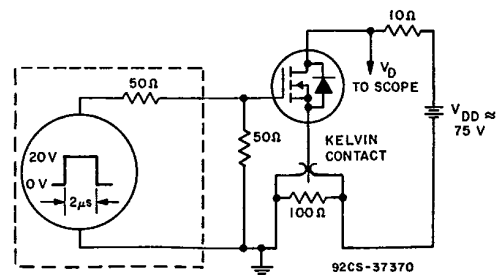


Fig. 11 - Switching Time Test Circuit