RFM10P12, RFM10P15, RFP10P12, RFP10P15

File Number 1595

P-Channel Enhancement-Mode Power Field-Effect Transistors

10 A, -120V and -150 V
$r_{DS(on)}$ = 0.5 Ω

Features:

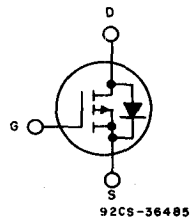
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*

The RFM10P12 and RFM10P15 and the RFP10P12 and RFP10P15* are *p-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.

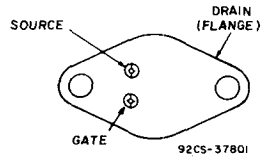
*The RFM and RFP series were formerly developmental TA9404 and TA9405, respectively.

TERMINAL DIAGRAM



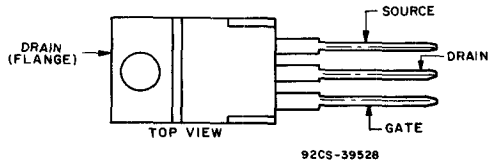
P-CHANNEL ENHANCEMENT MODE

TERMINAL DESIGNATION



JEDEC TO-204AA

TERMINAL DESIGNATION



JEDEC TO-220AB

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

	RFM10P12	RFM10P15	RFP10P12	RFP10P15	
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}	30				A
POWER DISSIPATION @ T_C = 25°C ..... P_T	100	100	75	75	W
Derate above T_C = 25°C	0.8	0.8	0.6	0.6	W/°C
OPERATING AND STORAGE TEMPERATURE ..... T_J, T_{stg}	-55 to +150				°C

RFM10P12, RFM10P15, RFP10P12, RFP10P15

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM10P12 RFP10P12		RFM10P15 RFP10P15		
			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 V_{DS} = -120 V	— —	1 —	— —	— 1	μA
		T_C = 125° C V_{DS} = -100 V V_{DS} = -120 V	— —	50 —	— —	— 50	μA
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 = 5 A V_{GS} = -10 V	—	-2.5	—	-2.5	V
		I_D = 10 A V_{GS} = -10 V	—	-6.0	—	-6.0	V
Static Drain-Source On Resistance	$r_{DS(on)}$[a]	I_D = 5 A V_{GS} = -10 V	—	0.5	—	0.5	Ω
Forward Transconductance	g_{fs}[a]	V_{DS} = -10 V I_D = 5 A	2	—	2	—	mho
Input Capacitance	C_{iss}	V_{DS} = -25 V V_{GS} = 0 V f = 1 MHz	—	1700	—	1700	pF
Output Capacitance	C_{oss}		—	600	—	600	pF
Reverse Transfer Capacitance	C_{rss}		—	350	—	350	pF
Turn-On Delay Time	$t_{d(on)}$	V_{DS} = -75 V I_D = 5 A R_{gen} = R_{gs} = 50 Ω V_{GS} = -10 V	24(typ)	50	24(typ)	50	ns
Rise Time	t_r		74(typ)	150	74(typ)	150	ns
Turn-Off Delay Time	$t_{d(off)}$		138(typ)	225	138(typ)	225	ns
Fall Time	t_f		61(typ)	100	61(typ)	100	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM10P12, RFM10P15	—	1.25	—	1.25	°C/W
		RFP10P12, RFP10P15	—	1.67	—	1.67	°C/W

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM10P12 RFP10P12		RFM10P15 RFP10P15		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}[a]	I_{SD} = 5A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A, dI_F/d_t = 100 A/μs	210 (typ.)		210 (typ.)		ns

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

RFM10P12, RFM10P15, RFP10P12, RFP10P15

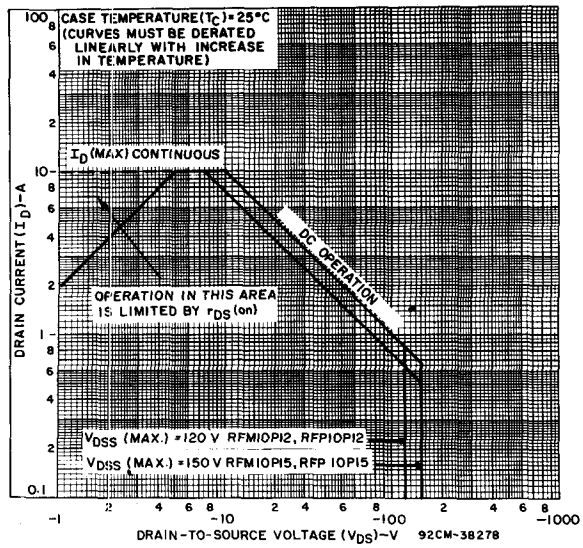


Fig. 1 - Maximum safe operating areas for all types.

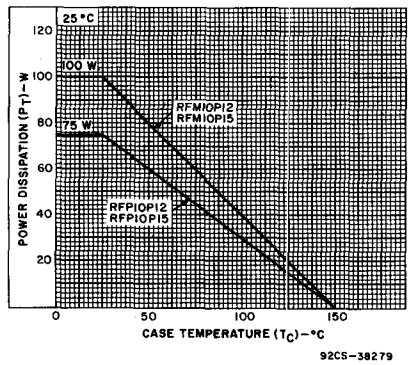


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

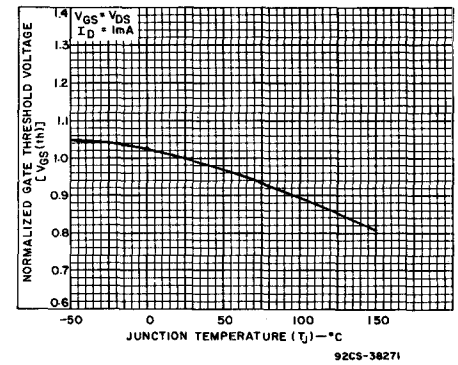


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

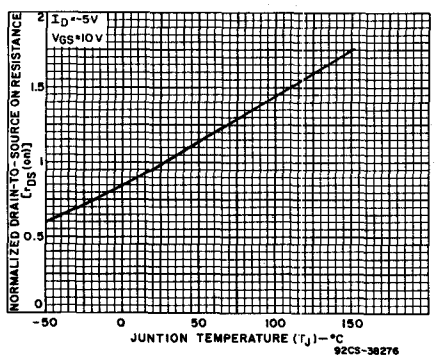


Fig. 4 - Normalized drain-to-source on resistance as as function of junction temperature for all types.

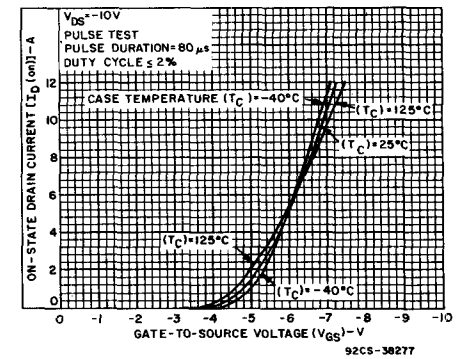


Fig. 5 - Typical transfer characteristics for all types.

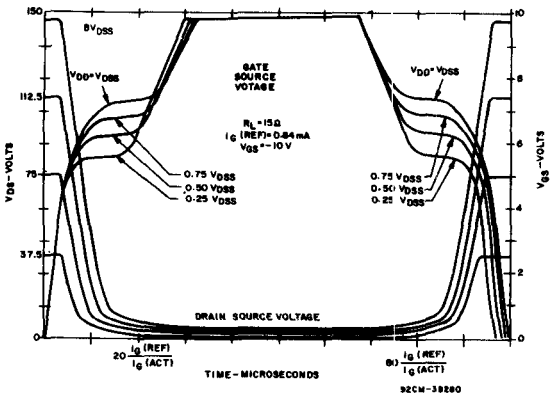


Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA application notes AN-7254 and AN-7260.

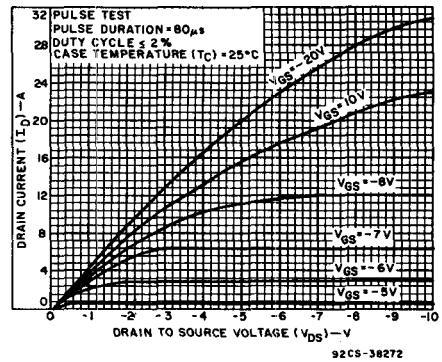


Fig. 7 - Typical saturation characteristics for all types.

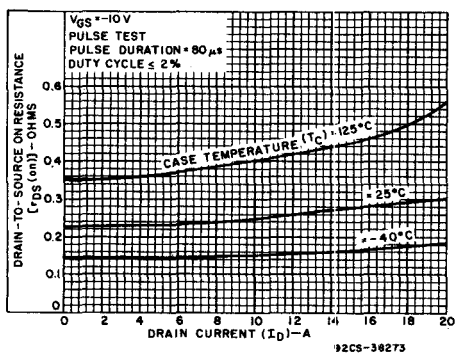


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

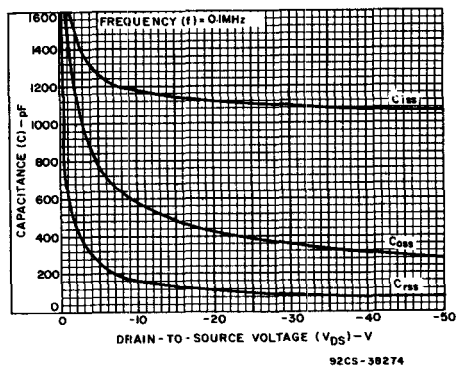


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

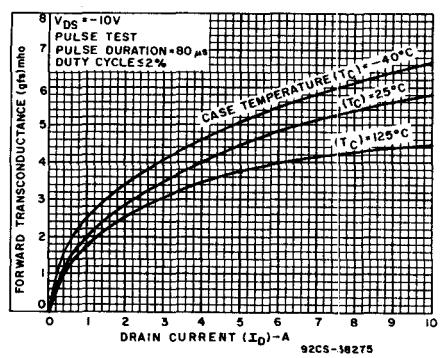


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

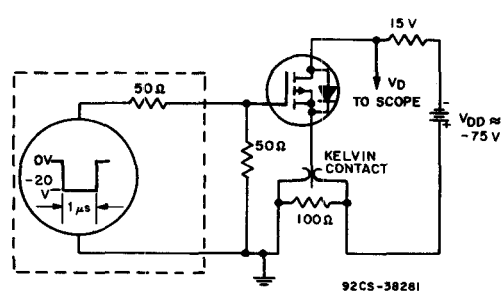


Fig. 11 - Switching Time Test Circuit.