

P-Channel Enhancement-Mode Power Field-Effect Transistors

10 A, -120V and -150 V

$r_{DS(on)} = 0.5 \Omega$

Features:

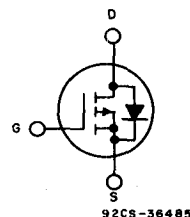
- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device

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-204A A steel package and the RFP-types in the JEDEC TO-220AB plastic package.

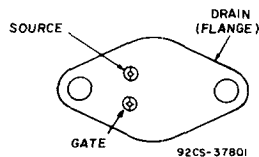
*The RFM and RFP series were formerly developmental TA9404 and TA9405, respectively.

TERMINAL DIAGRAM



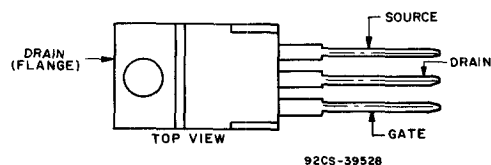
P-CHANNEL ENHANCEMENT MODE

TERMINAL DESIGNATION



JEDEC TO-204AA

TERMINAL DESIGNATION



JEDEC TO-220AB

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

	RFM10P12	RFM10P15	RFP10P12	RFP10P15		
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	10			A	
Pulsed	I_{DM}	30			A	
POWER DISSIPATION @ $T_C = 25^\circ\text{C}$	P_T	100	100	75	75	W
Derate above $T_C = 25^\circ\text{C}$		0.8	0.8	0.6	0.6	W/ $^\circ\text{C}$
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}	-55 to +150			$^\circ\text{C}$	

RFM10P12, RFM10P15, RFP10P12, RFP10P15

ELECTRICAL CHARACTERISTICS, At Case Temperature ($T_C = 25^\circ\text{C}$) 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	—	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 = 5 A V _{GS} = -10 V	—	-2.5	—	-2.5	V
		I _D = 10 A V _{GS} = -10 V	—	-6.0	—	-6.0	
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	
Reverse Transfer Capacitance	C _{rss}		—	350	—	350	
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	
Turn-Off Delay Time	t _{d(off)}		138(typ)	225	138(typ)	225	
Fall Time	t _f		61(typ)	100	61(typ)	100	
Thermal Resistance Junction-to-Case	Rθ _{JC}	RFM10P12, RFM10P15	—	1.25	—	1.25	°C/W
		RFP10P12, RFP10P15	—	1.67	—	1.67	

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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}	$I_F = 4A, dI_F/dt = 100 A/\mu s$	210 (typ.)		210 (typ.)		ns

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

RFM10P12, RFM10P15, RFP10P12, RFP10P15

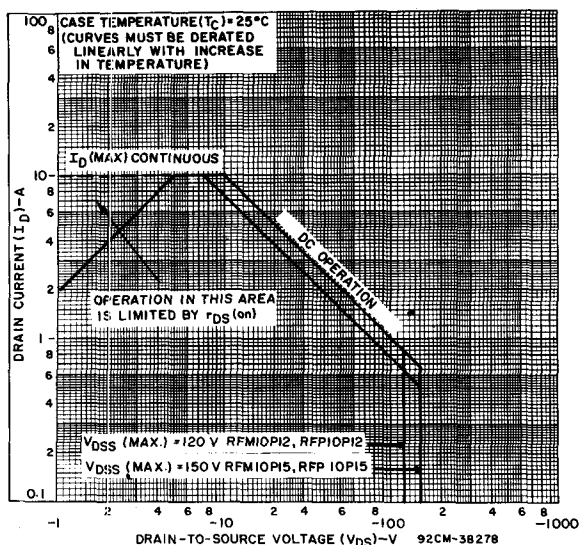


Fig. 1 - Maximum safe operating areas for all types.

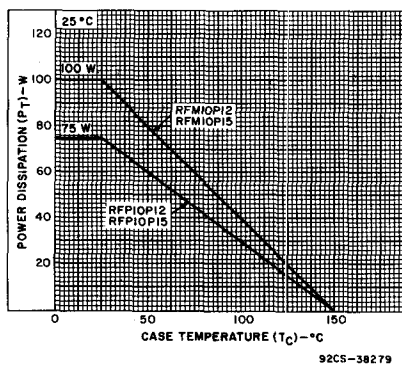


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

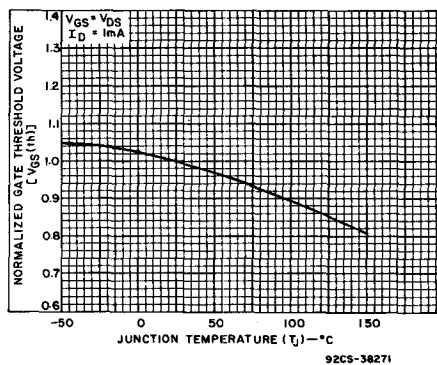


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

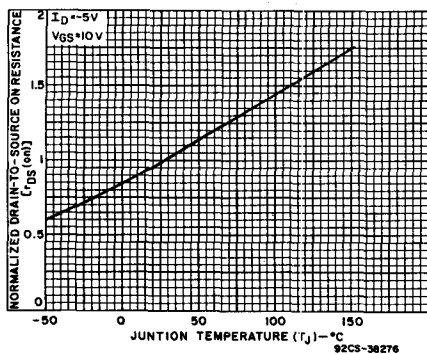


Fig. 4 - Normalized drain-to-source on resistance as a function of junction temperature for all types.

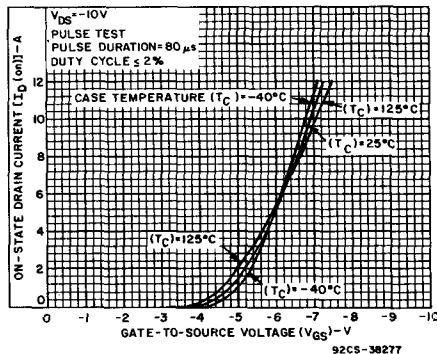


Fig. 5 - Typical transfer characteristics for all types.

RFM10P12, RFM10P15, RFP10P12, RFP10P15

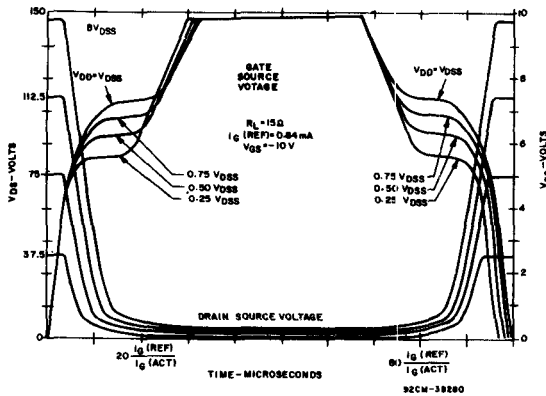


Fig. 6 - Normalized switching waveforms for constant gate-current drive. Refer to RCA application notes AN-7254 and AN-7260.

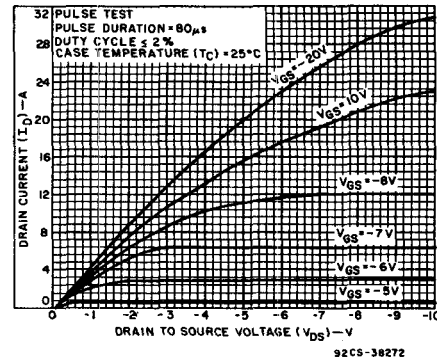


Fig. 7 - Typical saturation characteristics for all types.

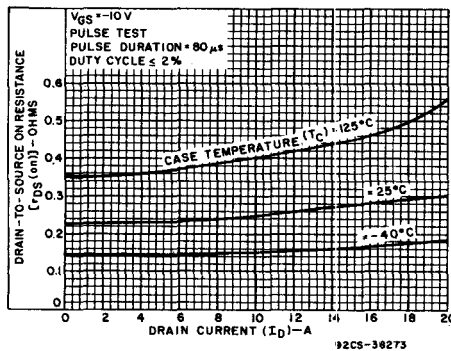


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

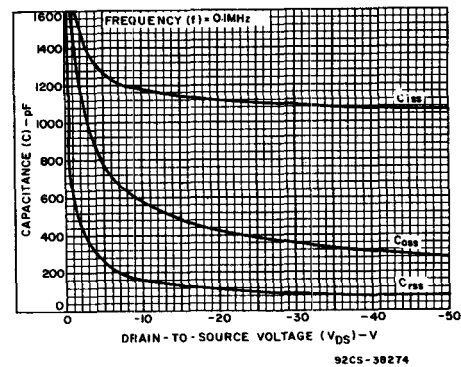


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

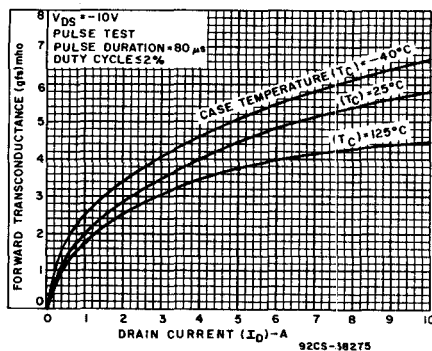


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

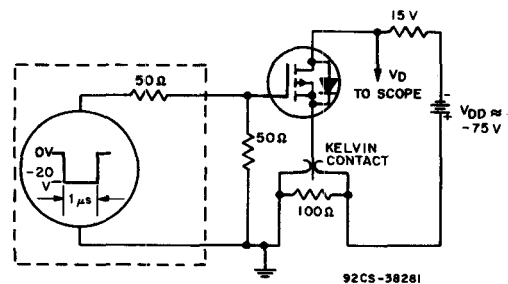


Fig. 11 - Switching Time Test Circuit.