

RFM5P12, RFM5P15, RFP5P12, RFP5P15

File Number 1463

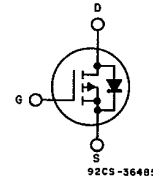
P-Channel Enhancement-Mode
Power Field-Effect Transistors

5 A, 120 V — 150 V

 $r_{DS(on)}$: 1 Ω

Features:

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



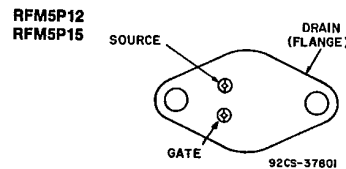
P-CHANNEL ENHANCEMENT MODE

The RFM5P12 and RFM5P15 and the RFP5P12 and RFP5P15* are P-Channel enhancement-mode silicon gate power field-effect transistors designed for high-speed applications such as switching regulators, switching converters, relay drivers, and drivers for high-power bipolar switching transistors.

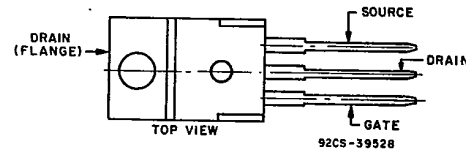
The RFM-Series types are supplied in the JEDEC TO-204AA metal package and the RFP-Series types in the JEDEC TO-220AB plastic package. All these types are supplied without an internal gate Zener diode.

* The RFM and RFP series were formerly RCA developmental numbers TA9320 and TA9321 respectively.

TERMINAL DESIGNATIONS



JEDEC TO-204AA

RFP5P12
RFP5P15

JEDEC TO-220AB

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

		RFM5P12	RFM5P15	RFP5P12	RFP5P15	
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}					V
DRAIN CURRENT RMS Continuous	I_D					A
Pulsed	I_{DM}					A
POWER DISSIPATION	P_T					W
@ $T_C = 25^\circ\text{C}$		75	75	60	60	W
Derate above $T_C = 25^\circ\text{C}$		0.6	0.6	0.48	0.48	W/ $^\circ\text{C}$
OPERATING AND STORAGE TEMPERATURE	T_A, T_{stg}			-55 to +150		$^\circ\text{C}$

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CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM5P12 RFP5P12		RFM5P15 RFP5P15		
			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 = 2.5 A V _{GS} = -10 V	—	-2.5	—	-2.5	V
		I _D = 5A V _{GS} = -10 V	—	-8	—	-8	
Static Drain-Source On Resistance	r _{DS(on)} ^a	I _D = 2.5 A V _{GS} = -10 V	—	1	—	1	Ω
Forward Transconductance	g _{fs} ^a	V _{DS} = 10 V I _D = 2.5 A	0.75	—	0.75	—	mho
Input Capacitance	C _{iss}	V _{DS} = 25 V	—	700	—	700	pF
Output Capacitance	C _{oss}	V _{GS} = 0 V	—	300	—	300	
Reverse-Transfer Capacitance	C _{rss}	f = 1MHz	—	100	—	100	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 1/2 BV _{DSS}	20(typ.)	60	20(typ.)	60	ns
Rise Time	t _r	I _D = 2.5 A	36(typ.)	100	36(typ.)	100	
Turn-Off Delay Time	t _{d(off)}	R _{gen} = R _{gs} = 50Ω	63(typ.)	150	63(typ.)	150	
Fall Time	t _f	V _{GS} = 10 V	40(typ.)	100	40(typ.)	100	
Thermal Resistance Junction-to-Case	Rθ _{JC}	RFM5P12, RFM5P15	—	1.67	—	1.67	°C/W
		RFP5P12, RFP5P15	—	2.083	—	2.083	

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNIT:
			RFM5P12 RFP5P12		RFM5P15 RFP5P15		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V _{SD}	I _{SD} = 2.5A	—	1.4	—	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 4A dI _F /dI _t = 100A/μs	300(typ.)		300(typ.)		ns

^aPulse Test: Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2\%$.

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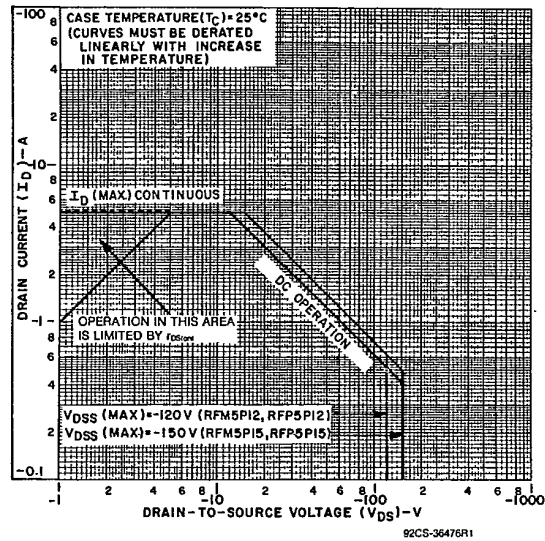


Fig. 1 - Maximum safe operating areas for all types.

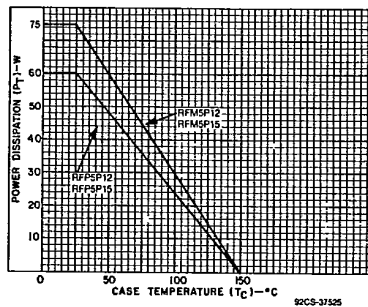


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

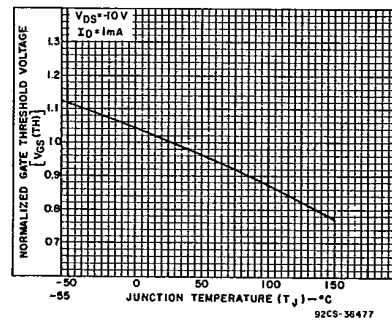


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

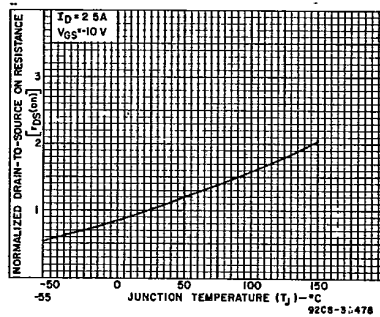


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

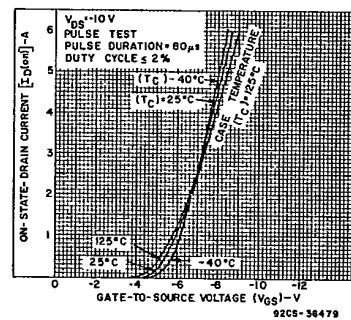


Fig. 5 - Typical transfer characteristics for all types.

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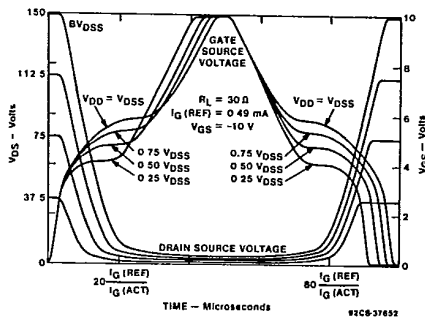


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

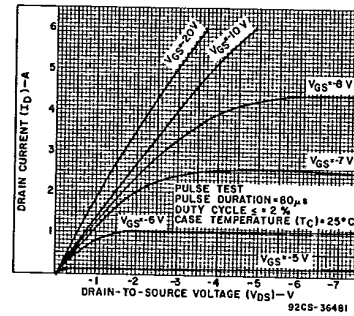


Fig. 7 - Typical saturation characteristics for all types.

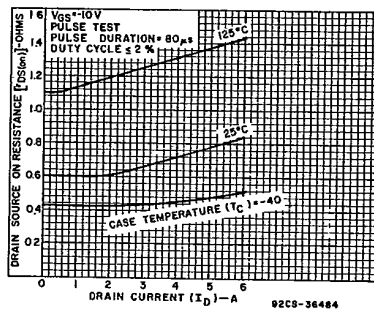


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

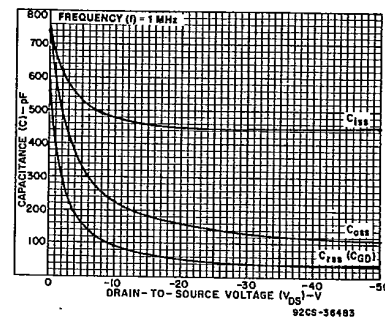


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

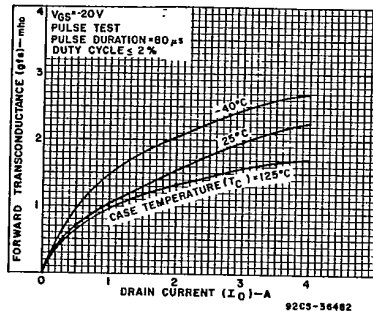


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

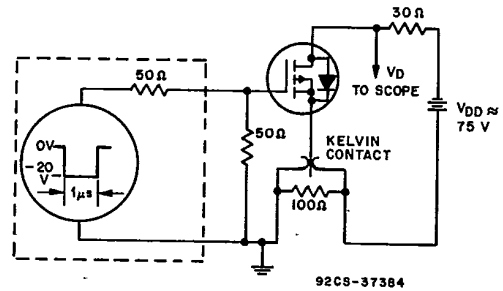


Fig. 11 - Switching Time Test Circuit.