RFM5P12, RFM5P15, RFP5P12, RFP5P15

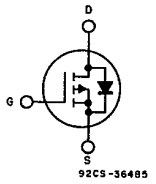
File Number **1463**

P-Channel Enhancement-Mode Power Field-Effect Transistors

5 A, 120 V — 150 V
$r_{DS(on)}$: 1Ω

Features:

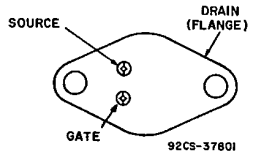
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*



P-CHANNEL ENHANCEMENT MODE

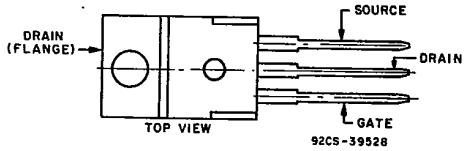
TERMINAL DESIGNATIONS

RFM5P12
RFM5P15



JEDEC TO-204AA

RFP5P12
RFP5P15



JEDEC TO-220AB

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.

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

		RFM5P12	RFM5P15	RFP5P12	RFP5P15	
DRAIN-SOURCE VOLTAGE	V_{DSS}	-120	-150	-120	-150	V
DRAIN-GATE VOLTAGE (R_{GS} = 1MΩ)	V_{DGR}	-120	-150	-120	-150	V
GATE-SOURCE VOLTAGE	V_{GS}	±20				V
DRAIN CURRENT RMS Continuous	I_D	5				A
Pulsed	I_{DM}	15				A
POWER DISSIPATION	P_T					
@ T_C = 25°C		75	75	60	60	W
Derate above T_C = 25°C		0.6	0.6	0.48	0.48	W/°C
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}	-55 to +150				°C

RFM5P12, RFM5P15, RFP5P12, RFP5P15

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM5P12 RFP5P12 Min.	LIMITS RFM5P12 RFP5P12 Max.	LIMITS RFM5P15 RFP5P15 Min.	LIMITS RFM5P15 RFP5P15 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	—	—	
		T_C = 125°C, 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, V_{GS} = 0 V, f = 1MHz	—	700	—	700	pF
Output Capacitance	C_{oss}		—	300	—	300	
Reverse-Transfer Capacitance	C_{rss}		—	100	—	100	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 1/2 BV_{DSS}, I_D = 2.5 A, R_{gen} = R_{gs} = 50Ω, V_{GS} = 10 V	20(typ.)	60	20(typ.)	60	ns
Rise Time	t_r		36(typ.)	100	36(typ.)	100	
Turn-Off Delay Time	$t_{d(off)}$		63(typ.)	150	63(typ.)	150	
Fall Time	t_f		40(typ.)	100	40(typ.)	100	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM5P12, RFM5P15	—	1.67	—	1.67	°C/W
		RFP5P12, RFP5P15	—	2.083	—	2.083	

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM5P12 RFP5P12 Min.	LIMITS RFM5P12 RFP5P12 Max.	LIMITS RFM5P15 RFP5P15 Min.	LIMITS RFM5P15 RFP5P15 Max.	UNITS
Diode Forward Voltage	V_{SD}	I_{SD} = 2.5A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F = 4A, d_{IF}/d_t = 100A/μs	300(typ.)		300(typ.)		ns

*Pulse Test: Width ≤ 300 μs, Duty Cycle ≤ 2%.

RFM5P12, RFM5P15, RFP5P12, RFP5P15

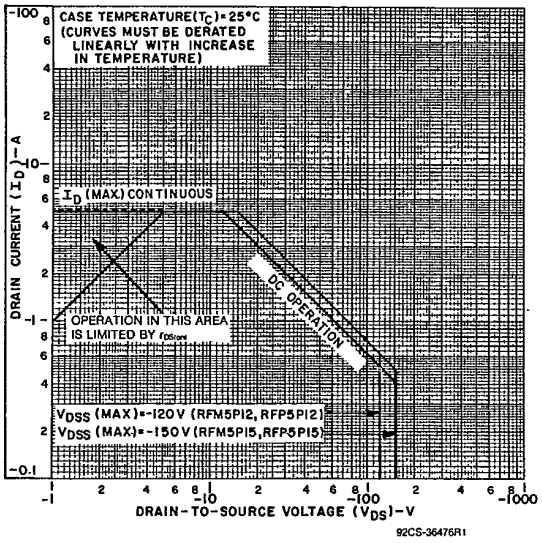


Fig. 1 - Maximum safe operating areas for all types.

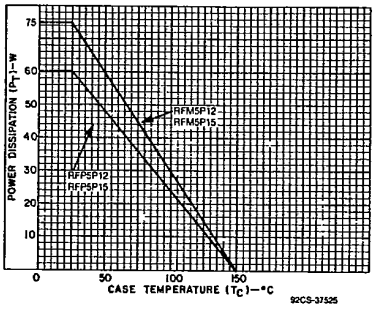


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

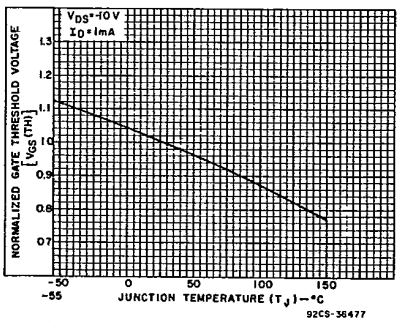


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

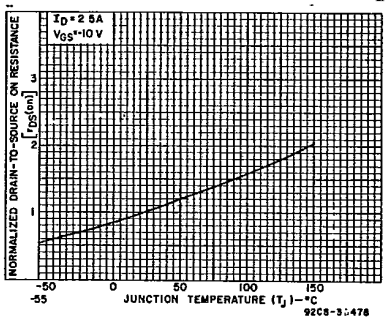


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

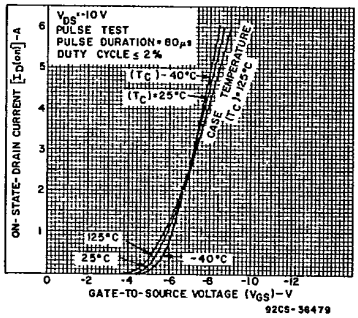


Fig. 5 - Typical transfer characteristics for all types.

RFM5P12, RFM5P15, RFP5P12, RFP5P15

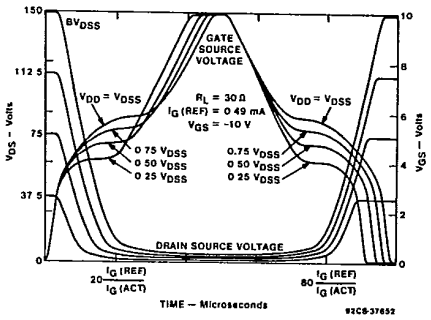


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

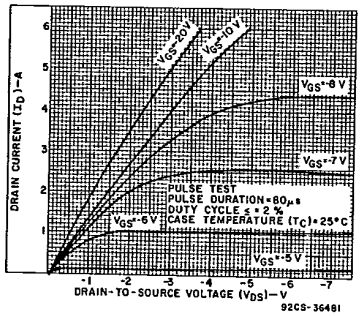


Fig. 7 - Typical saturation characteristics for all types.

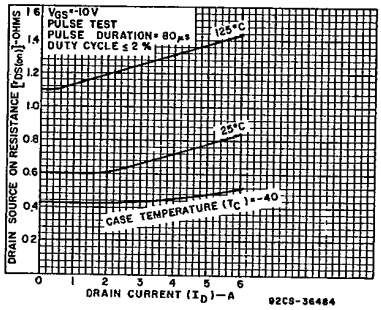


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

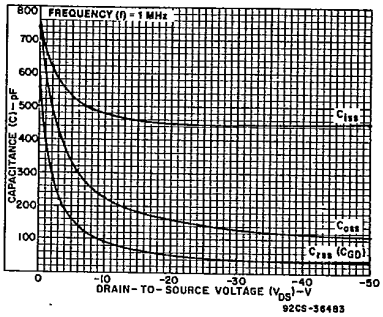


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

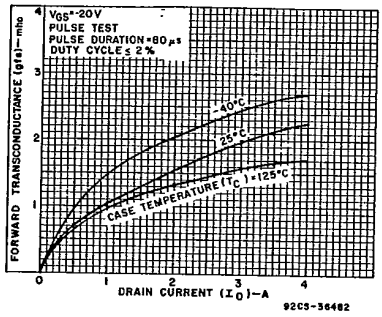


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

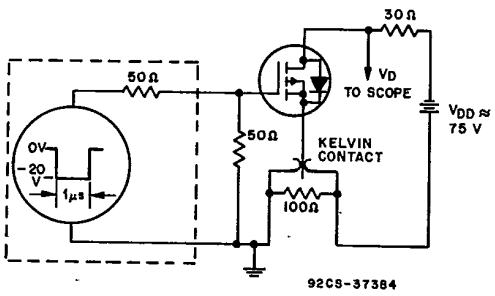


Fig. 11 - Switching Time Test Circuit.