RFM15N05, RFM15N06, RFP15N05, RFP15N06

File Number **1478**

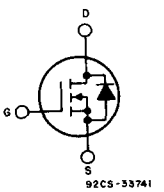
Power MOS Field-Effect Transistors

N-Channel Enhancement-Mode Power Field-Effect Transistors

15 A, 50 and 60 V
$r_{DS}(on)$: 0.14 Ω

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

TERMINAL DIAGRAM



N-CHANNEL ENHANCEMENT MODE

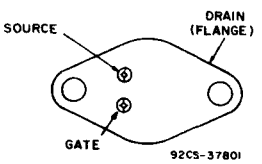
The RFM15N05 and RFM15N06 and the RFP15N05 and RFP15N06* are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring high speed and low gate-drive power. These types can be operated directly from integrated circuits.

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

*The RFM and RFP series were formerly RCA developmental numbers TA9382 and TA9383, respectively.

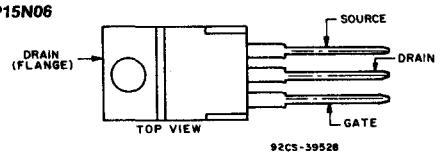
TERMINAL DESIGNATIONS

RFM15N05
RFM15N06



JEDEC TO-204AA

RFP15N05
RFP15N06



JEDEC TO-220AB

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

	RFM15N05	RFM15N06		RFP15N05	RFP15N06	
DRAIN-SOURCE VOLTAGE ..... V_{DSS}	50	60		50	60	V
DRAIN-GATE VOLTAGE (R_{GS}=1 MΩ) ... V_{DGR}	50	60		50	60	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°C ..... P_T	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

RFM15N05, RFM15N06, RFP15N05, RFP15N06

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM15N05 RFP15N05		RFM15N06 RFP15N06		
			Min.	Max.	Min.	Max.	
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=1 mA V_{GS}=0	50	—	60	—	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}=40 V	—	1	—	—	μA
		V_{DS}=50 V	—	—	—	1	
		T_C=125° C V_{DS}=40 V	—	50	—	—	
		V_{DS}=50 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	—	1.05	—	1.05	V
		I_D=15 A V_{GS}=10 V	—	2.5	—	2.5	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=7.5 A V_{GS}=10 V	—	0.14	—	0.14	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V I_D=7.5 A	2	—	2	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V	—	850	—	850	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	450	—	450	
Reverse-Transfer Capacitance	C_{rss}	f = 1MHz	—	180	—	180	
Turn-On Delay Time	$t_d(on)$	V_{DD}=30 V	16(typ)	40	16(typ)	40	ns
Rise Time	t_r	I_D=7.5 A	100(typ)	175	100(typ)	175	
Turn-Off Delay Time	$t_d(off)$	$R_{gen}=R_{gs}$=50 Ω	72(typ)	175	72(typ)	175	
Fall Time	t_f	V_{GS}=10 V	66(typ)	140	66(typ)	140	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFM15N05, RFM15N06	—	1.67	—	1.67	°C/W
		RFP15N05, RFP15N06	—	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				UNITS
			RFM15N05 RFP15N05		RFM15N06 RFP15N06		
			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_{IF}/d_t=100 A/μs	100 (typ)		100(typ)		ns

*Pulse Test: Width ≤ 300 μs, duty cycle ≤ 2%.

RFM15N05, RFM15N06, RFP15N05, RFP15N06

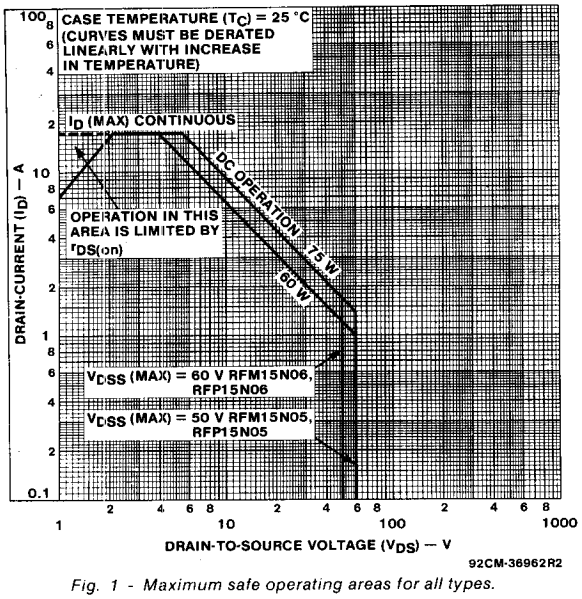


Fig. 1 - Maximum safe operating areas for all types.

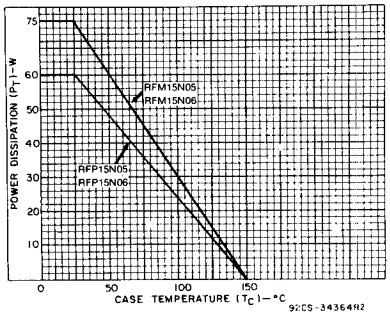


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

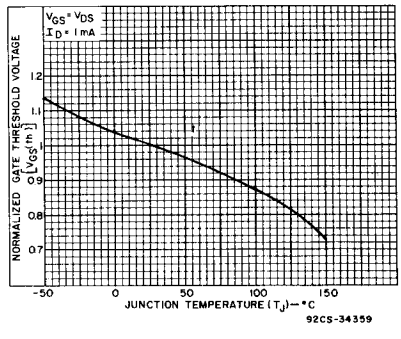


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

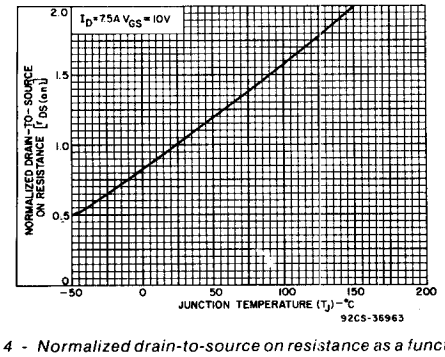


Fig. 4 - Normalized drain-to-source on resistance as a function of junction temperature for all types.

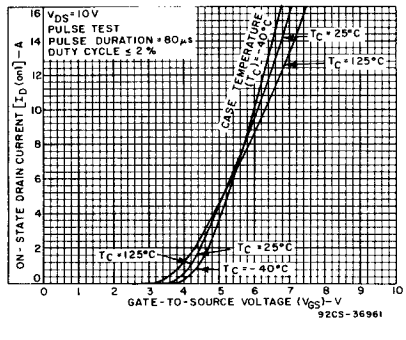


Fig. 5 - Typical transfer characteristics for all types.

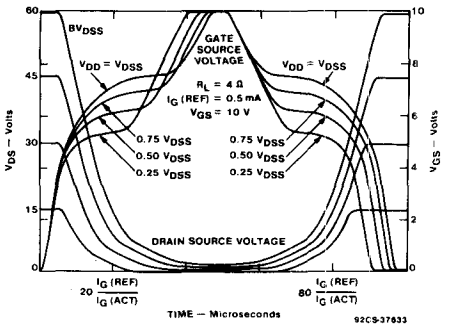


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

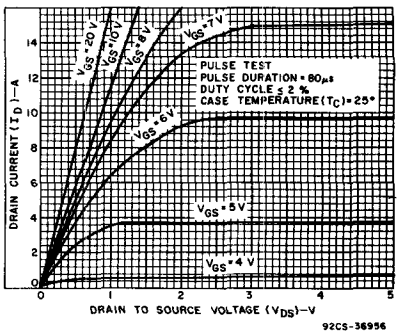


Fig. 7 - Typical saturation characteristics for all types.

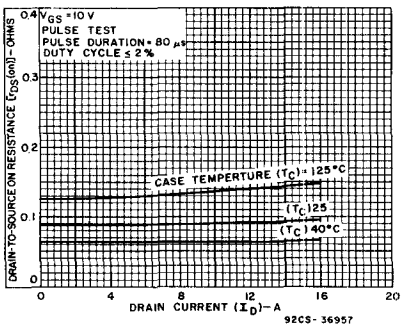


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

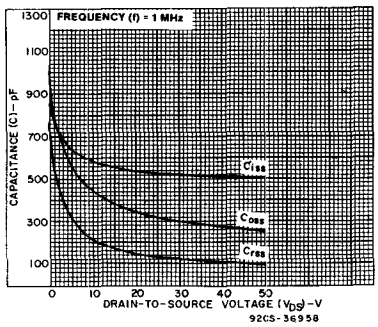


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

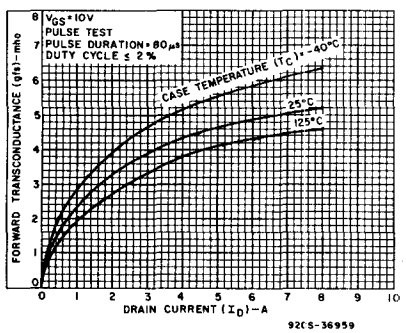


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

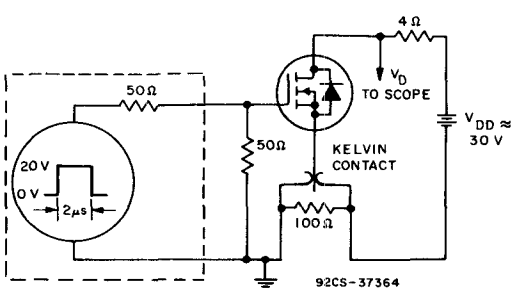


Fig. 11 — Switching Time Test Circuit