Silicon N-MOSFET Transistor

RFP12N18

180V / 12A

DATASHEET

OEM – RCA

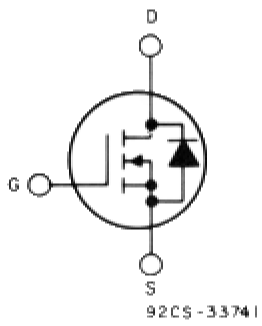
Source: RCA Databook MOSFET 1984

RFM12N18, RFM12N20, RFP12N18, RFP12N20 File Number **1461**

N-Channel Enhancement-Mode Power Field-Effect Transistors

12 A, 180 and 200 V
$r_{DS}(on)$: 0.25 Ω

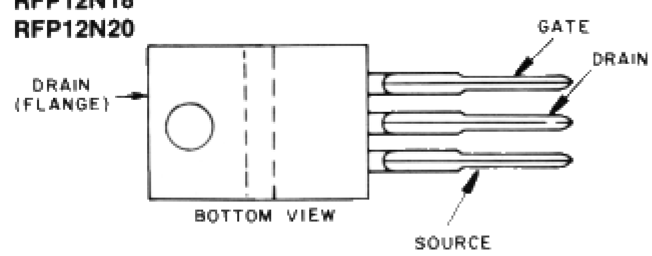
Features:
- *SOA is power-dissipation limited*
- *Nanosecond switching speeds*
- *Linear transfer characteristics*
- *High input impedance*
- *Majority carrier device*



N-CHANNEL ENHANCEMENT MODE

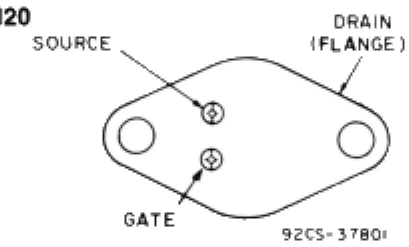
TERMINAL DESIGNATIONS

RFP12N18
RFP12N20



JEDEC TO-220AB

RFM12N18
RFM12N20



JEDEC TO-204MA

The RFM12N18 and RFM12N20 and the RFP12N18 and RFP12N20* 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-types are supplied in the JEDEC TO-204MA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

*The RFM and RFP series were formerly RCA developmental numbers TA9293 and TA9294, respectively.

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

	RFM12N18	RFM12N20		RFP12N18	RFP12N20	
DRAIN-SOURCE VOLTAGE .... V_{DSS}	180	200		180	200	V
DRAIN-GATE VOLTAGE (R_{GS}=1 MΩ) .. V_{DGR}	180	200		180	200	V
GATE-SOURCE VOLTAGE .... V_{GS}			±20			V
DRAIN CURRENT						
RMS Continuous .... I_D			12			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

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM12N18 RFP12N18 Min.	LIMITS RFM12N18 RFP12N18 Max.	LIMITS RFM12N20 RFP12N20 Min.	LIMITS RFM12N20 RFP12N20 Max.	UNITS
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=1 mA, V_{GS}=0	180	—	200	—	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}=145 V	—	1	—	—	µA
		V_{DS}=160 V	—	—	—	1	
		T_C=125° C, V_{DS}=145 V	—	50	—	—	
		T_C=125° C, V_{DS}=160 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=6 A, V_{GS}=10 V	—	1.5	—	1.5	V
		I_D=12 A, V_{GS}=10 V	—	3.6	—	3.6	
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=6 A, V_{GS}=10 V	—	0.25	—	0.25	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V, I_D=6 A	4	—	4	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V, V_{GS}=0 V, f=1 MHz	—	1250	—	1250	pF
Output Capacitance	C_{oss}		—	425	—	425	
Reverse-Transfer Capacitance	C_{rss}		—	125	—	125	
Turn-On Delay Time	$t_d(on)$	V_{DD}=100 V, I_D=6 A, $R_{gen}=R_{gs}$=50 Ω, V_{GS}=10 V	35(typ)	50	35(typ)	50	ns
Rise Time	t_r		130(typ)	200	130(typ)	200	
Turn-Off Delay Time	$t_d(off)$		120(typ)	180	120(typ)	180	
Fall Time	t_f		105(typ)	160	105(typ)	160	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFM12N18, RFM12N20	—	1.25	—	1.25	°C/W
		RFP12N18, RFP12N20	—	1.67	—	1.67	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM12N18 RFP12N18 MIN.	LIMITS RFM12N18 RFP12N18 MAX.	LIMITS RFM12N20 RFP12N20 MIN.	LIMITS RFM12N20 RFP12N20 MAX.	UNITS
Diode Forward Voltage	V_{SD}[a]	I_{SD}=6 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A, d_{IF}/d_t=100 A/µs	325(typ)		325(typ)		ns

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

RFM12N18, RFM12N20, RFP12N18, RFP12N20

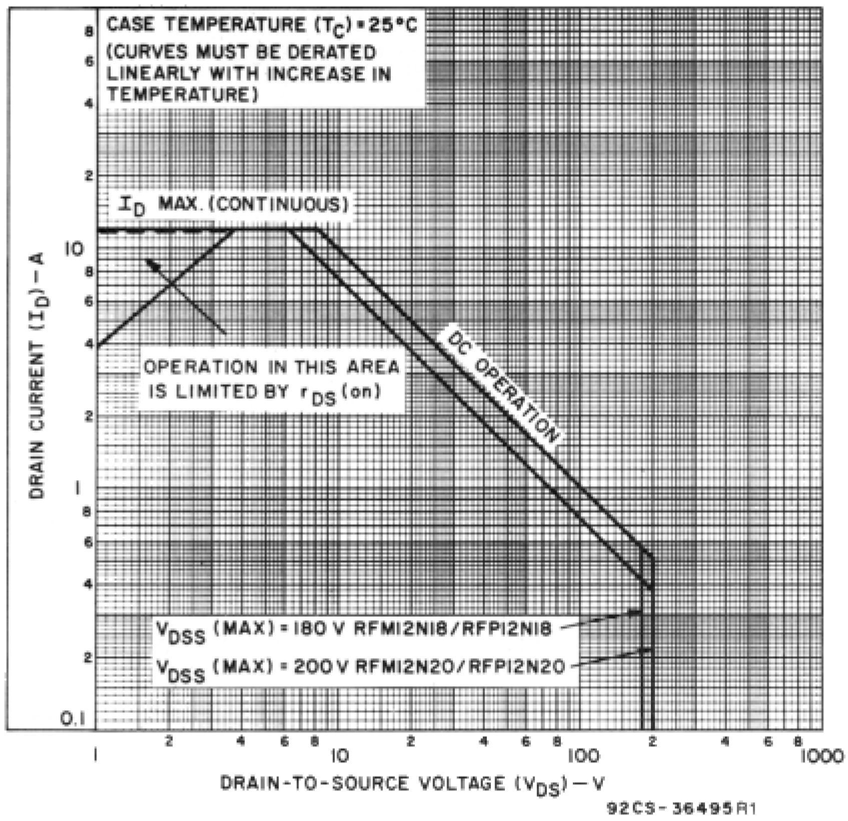


Fig. 1 - Maximum safe operating areas for all types.

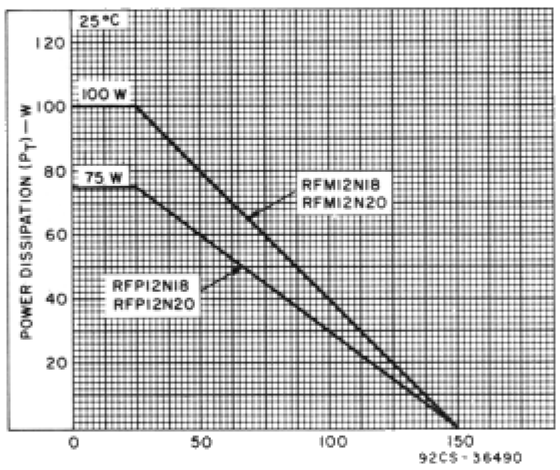


Fig. 2 - Power dissipation vs. case temperature derating curve for all types.

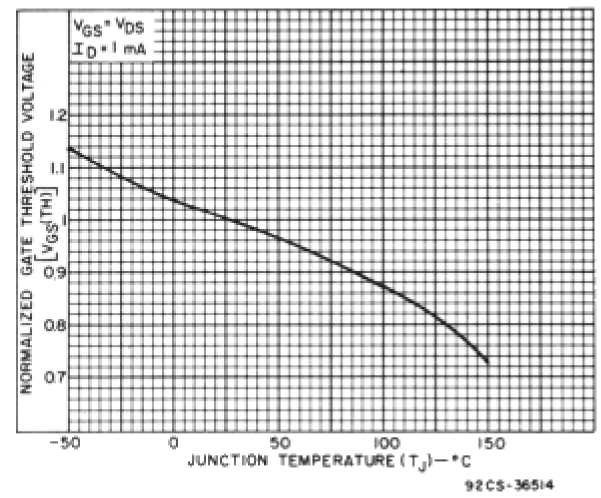


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

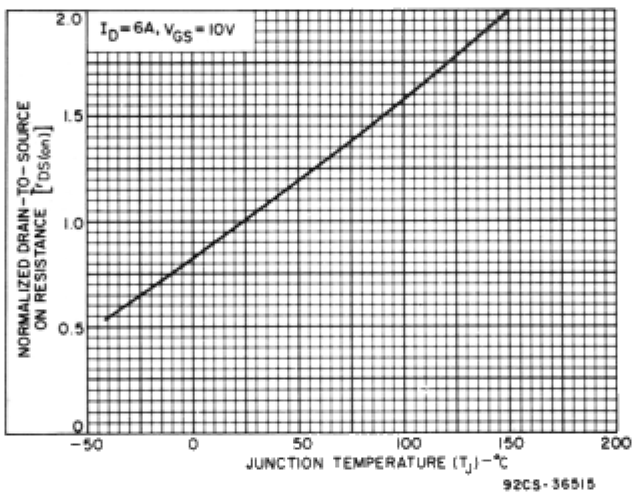


Fig. 4 - Normalized drain-to-source on resistance as a function of junction temperature for all types.

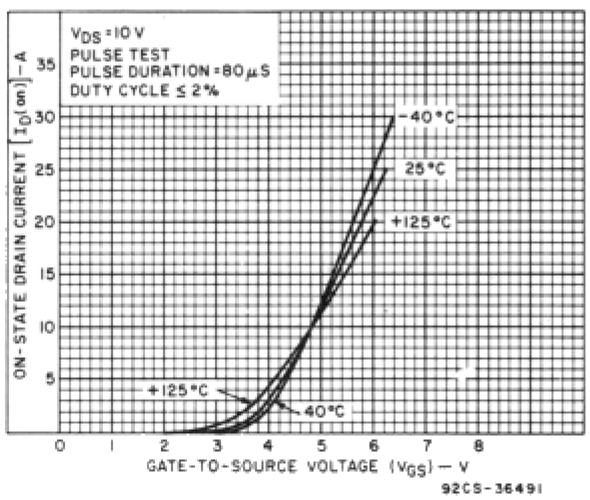


Fig. 5 - Typical transfer characteristics for all types.

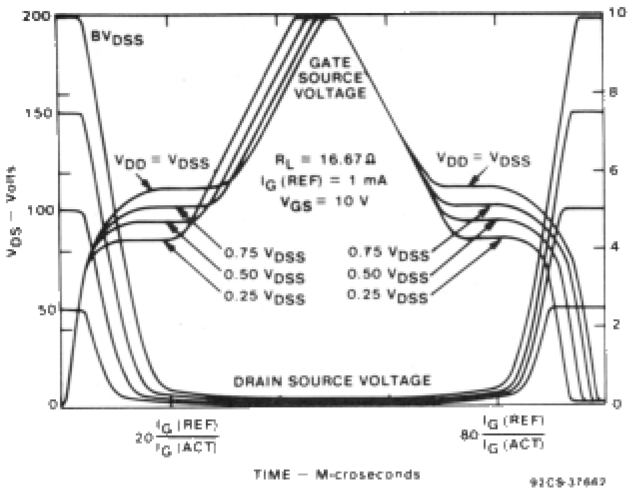


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

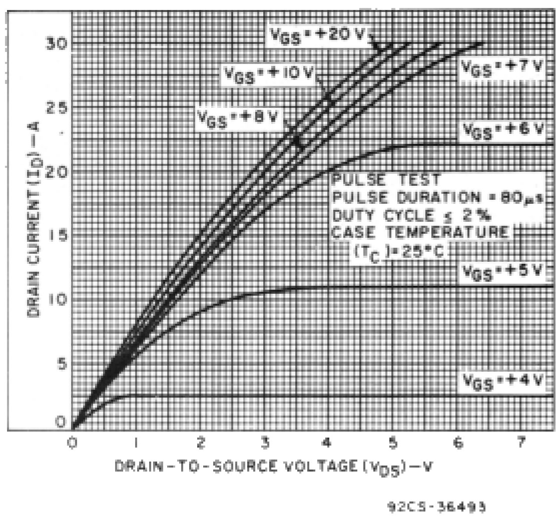


Fig. 7 - Typical saturation characteristics for all types.

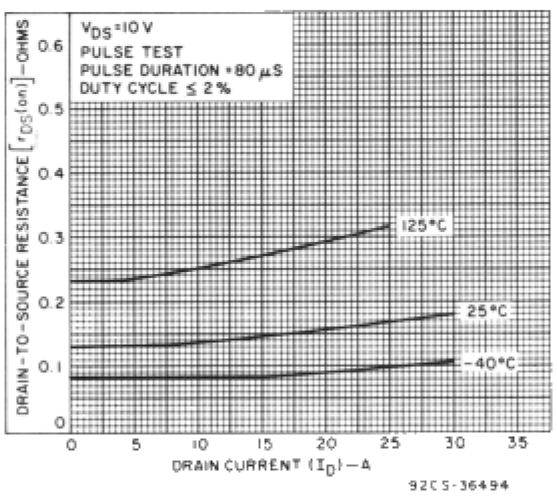


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

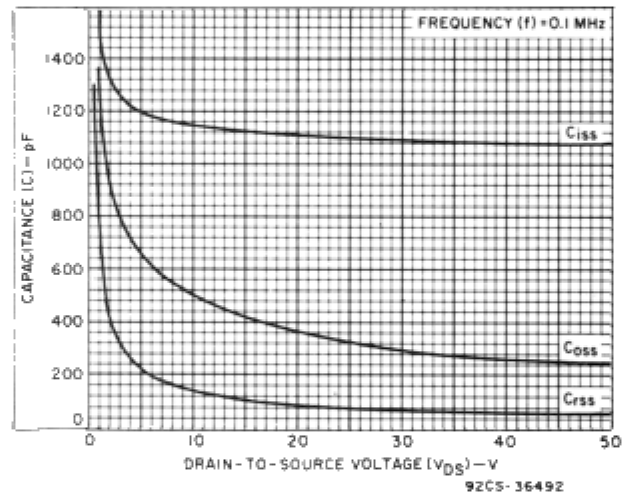


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

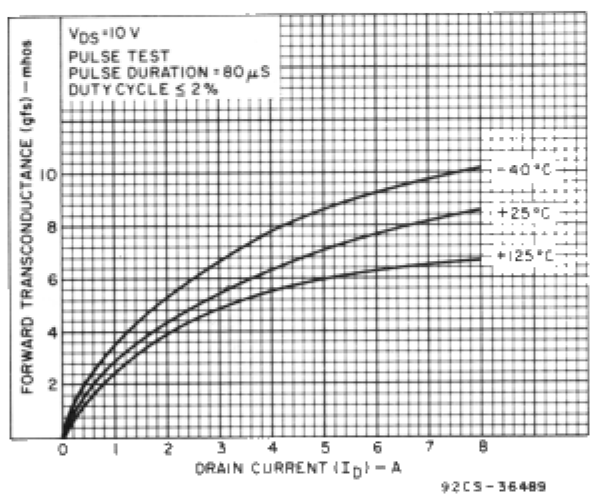


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

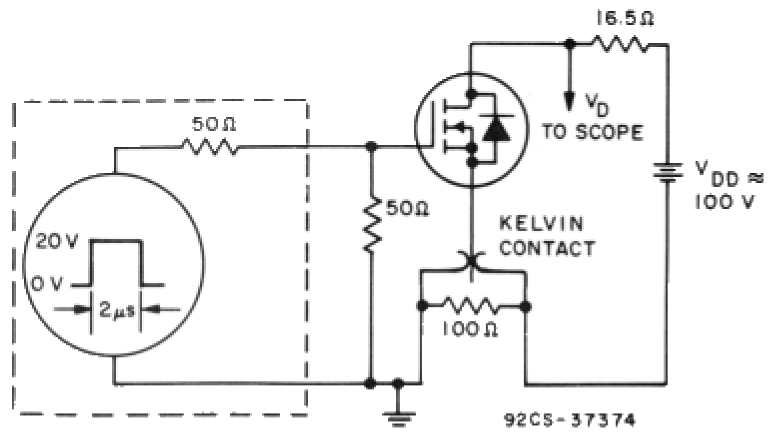


Fig. 11 — Switching Time Test Circuit