RFM25N05, RFM25N06, RFP25N05, RFP25N06

File Number **1492**

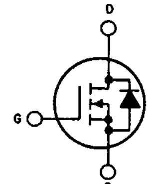
Power MOS Field-Effect Transistors

N-Channel Enhancement-Mode Power Field-Effect Transistors

25 A, 50 V - 60 V
$r_{DS}(on) = 0.07\Omega$

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

TERMINAL DIAGRAM



N-CHANNEL ENHANCEMENT MODE

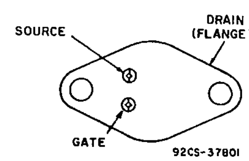
The RFM25N05 and RFM25N06 and the RFP25N05 and RFP25N06* are n-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring 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-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

*The RFM and RFP series were formerly RCA developmental numbers TA9386 and TA9387, respectively.

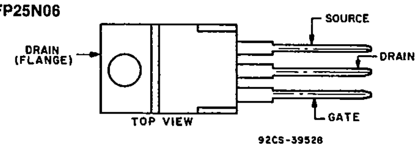
TERMINAL DESIGNATIONS

RFM25N05
RFM25N06



JEDEC TO-204AA

RFP25N05
RFP25N06



JEDEC TO-220AB

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

	RFM25N05	RFM25N06		RFP25N05	RFP25N06	
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			25			A
Pulsed .... I_{DM}			60			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

RFM25N05, RFM25N06, RFP25N05, RFP25N06

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS RFM25N05 RFP25N05 MIN.	MAX.	RFM25N06 RFP25N06 MIN.	MAX.	UNITS
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 V_{DS}=50 V	— —	1 —	— —	— 1	μA
		T_C=125°C V_{DS}=40 V V_{DS}=50 V	— —	50 —	— —	— 50	μA
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=12.5 A, V_{GS}=10 V	—	1.06	—	1.06	V
		I_D=25 A, V_{GS}=10 V	—	2.5	—	2.5	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=12.5 A, V_{GS}=10 V	—	0.07	—	0.07	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=10 V, I_D=12.5 A	5	—	5	—	mho
Input Capacitance	C_{iss}	V_{DS}=25 V	—	1700	—	1700	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	900	—	900	pF
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	400	—	400	pF
Turn-On Delay Time	$t_d(on)$	V_{DD}=30 V	18(typ)	60	18(typ)	60	ns
Rise Time	t_r	I_D=12.5 A	120(typ)	225	120(typ)	225	ns
Turn-Off Delay Time	$t_d(off)$	$R_{gen}=R_{gs}$=50 Ω	123(typ)	225	123(typ)	225	ns
Fall Time	t_f	V_{GS}=10 V	123(typ)	200	123(typ)	200	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM25N05, RFM25N06	—	1.25	—	1.25	°C/W
		RFP25N05, RFP25N06	—	1.67	—	1.67	°C/W

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS RFM25N05 RFP25N05 MIN.	MAX.	RFM25N06 RFP25N06 MIN.	MAX.	UNITS
Diode Forward Voltage	V_{SD}	I_{SD}=12.5 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A, d_{IF}/d_t=100 A/μs	150(typ)		150(typ)		ns

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

RFM25N05, RFM25N06, RFP25N05, RFP25N06

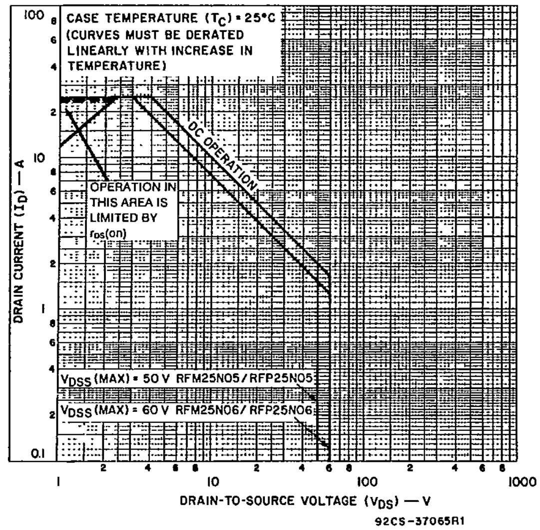


Fig. 1 — Maximum operating areas for all types.

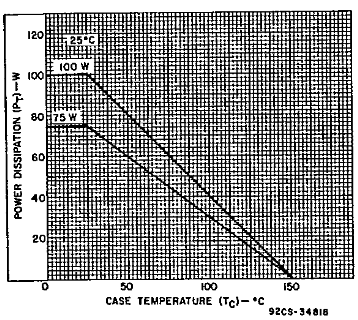


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

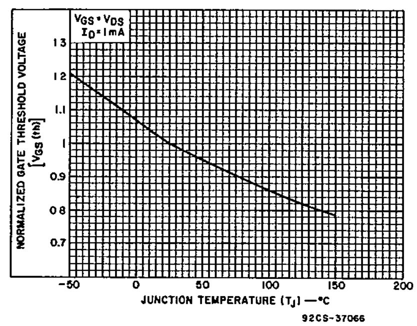


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

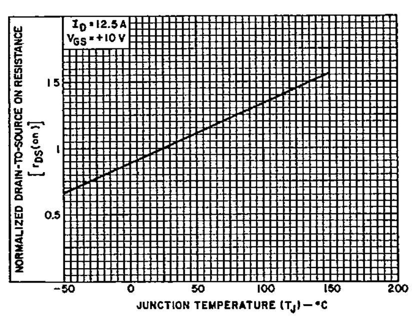


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

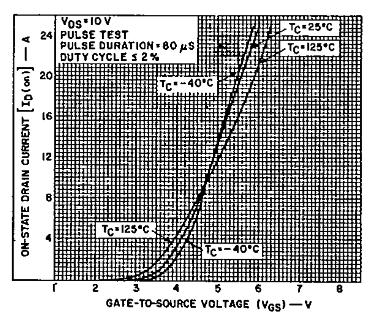


Fig. 5 — Typical transfer characteristics for all types.

RFM25N05, RFM25N06, RFP25N05, RFP25N06

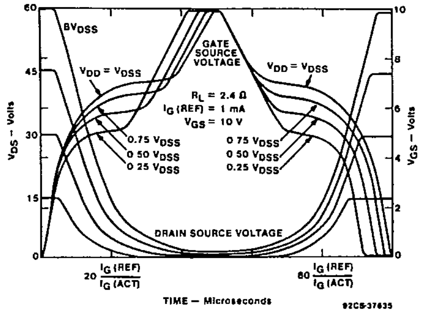


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

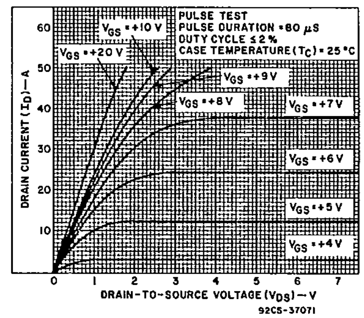


Fig. 7 — Typical saturation characteristics for all types.

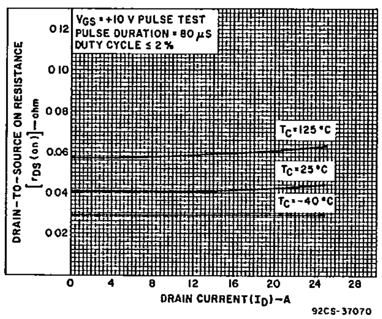


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

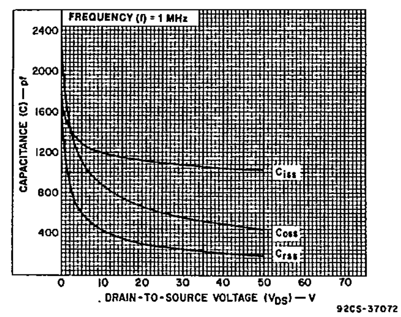


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

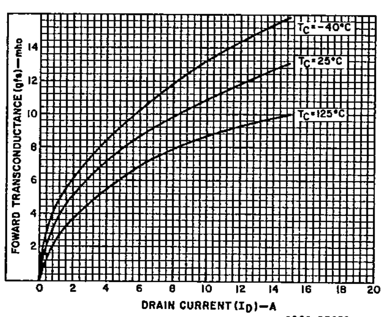


Fig. 10 — Typical forward transconductance as a function of drain current for all types.

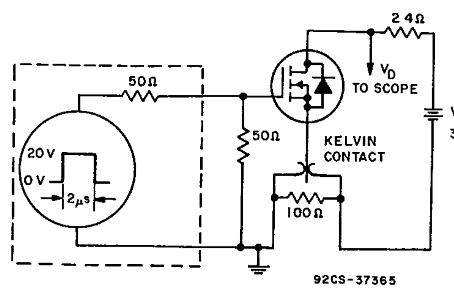


Fig. 11 — Switching Time Test Circuit