

RFM25N05, RFM25N06, RFP25N05, RFP25N06

File Number 1492

Power MOS Field-Effect Transistors

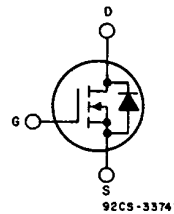
N-Channel Enhancement-Mode Power Field-Effect Transistors

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



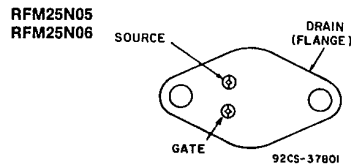
N-CHANNEL ENHANCEMENT MODE

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.

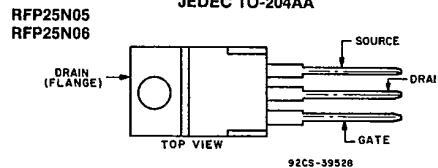
The RFM-types are supplied in the JEDEC TO-204AA steel package and the RFP-types in the JEDEC TO-220AB plastic package.

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

TERMINAL DESIGNATIONS



JEDEC TO-204AA



JEDEC TO-220AB

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

	RFM25N05	RFM25N06	RFP25N05	RFP25N06	
DRAIN-SOURCE VOLTAGE V_{DS}	50	60	50	60	V
DRAIN-GATE VOLTAGE ($R_{gs}=1 M\Omega$) V_{DGR}	50	60	50	60	V
GATE-SOURCE VOLTAGE V_{GS}	± 20		± 20		V
DRAIN CURRENT, RMS Continuous I_D	25		25		A
Pulsed I_{DM}	60		60		A
POWER DISSIPATION @ $T_C 25^\circ C$ P_T	100	100	75	75	W
Derate above $T_C 25^\circ C$	0.8	0.8	0.6	0.6	W/°C
OPERATING AND STORAGE TEMPERATURE T_T, T_{stg}	-55 to +150		-55 to +150		°C

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM25N05 RFP25N05		RFM25N06 RFP25N06		
			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 V _{GS} =50 V	—	1	—	—	μA
		T _c =125° C V _{DS} =40 V V _{GS} =50 V	—	50	—	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 =12.5 A V _{GS} =10 V	—	1.06	—	1.06	V
		I _D =25 A V _{GS} =10 V	—	2.5	—	2.5	
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	
Reverse Transfer Capacitance	C _{rss}	f = 1MHz	—	400	—	400	
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	
Turn-Off Delay Time	t _{d(off)}	R _{gen} =R _{gs} =50 Ω	123(typ)	225	123(typ)	225	
Fall Time	t _f	V _{GS} =10 V	123(typ)	200	123(typ)	200	
Thermal Resistance Junction-to-Case	R _{θJC}	RFM25N05, RFM25N06	—	1.25	—	1.25	
		RFP25N05, RFP25N06	—	1.67	—	1.67	

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM25N05 RFP25N05		RFM25N06 RFP25N06		
			MIN.	MAX.	MIN.	MAX.	
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 _I =100 A/μs	150(typ)		150(typ)		ns

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

RFM25N05, RFM25N06, RFP25N05, RFP25N06

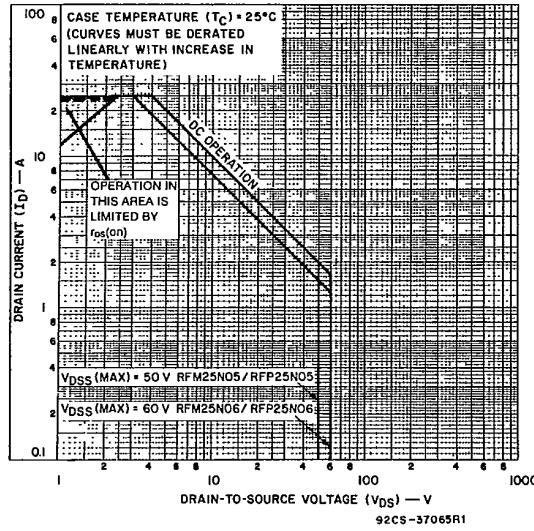


Fig. 1 — Maximum operating areas for all types.

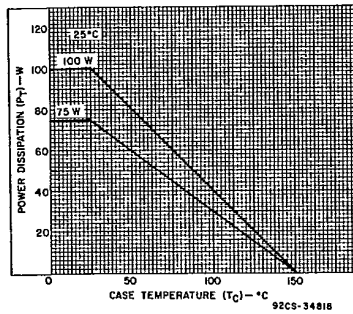


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

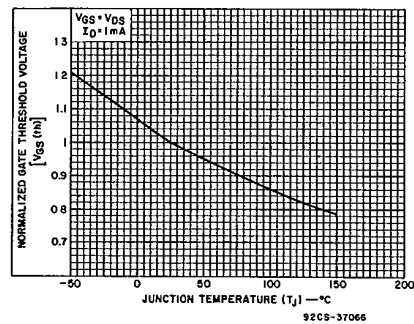


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

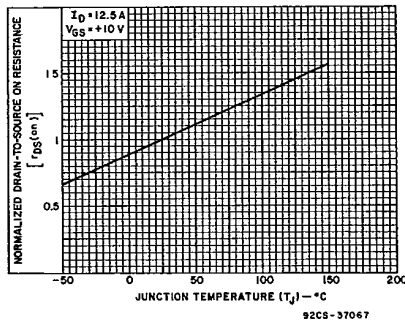


Fig. 4 — Normalized drain-to-source on resistance to junction temperature for all types.

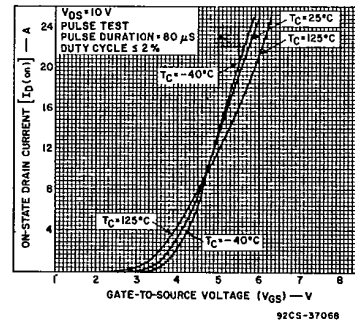


Fig. 5 — Typical transfer characteristics for all types.

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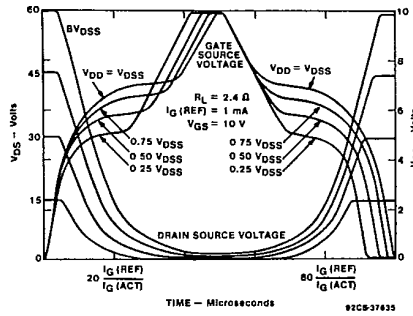


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

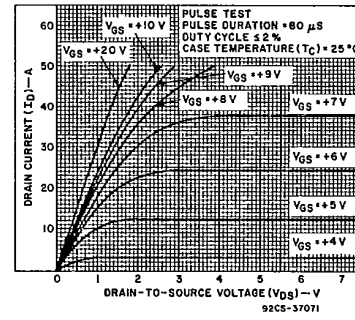


Fig. 7 - Typical saturation characteristics for all types.

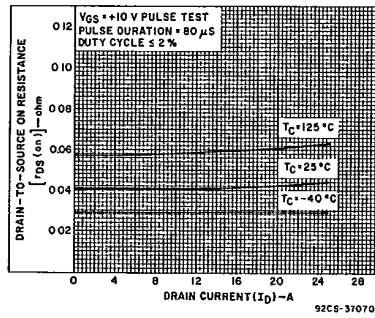


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

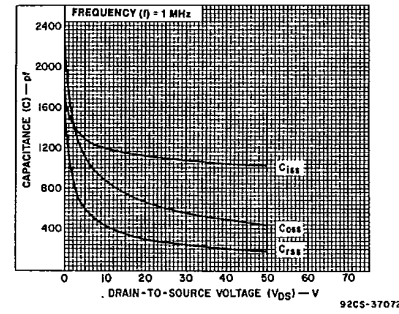


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

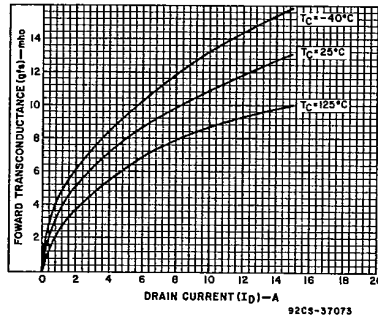


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

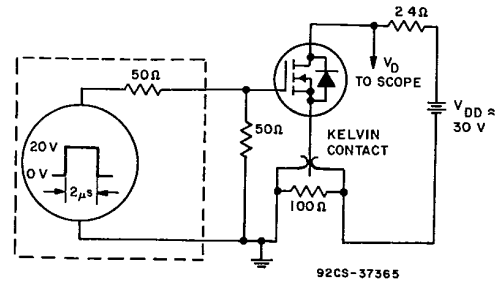


Fig. 11 - Switching Time Test Circuit