

RFM12P08, RFM12P10, RFP12P08, RFP12P10
Power MOS Field-Effect Transistors

P-Channel Enhancement-Mode Power Field-Effect Transistors

12 A, -80 V and -100 V
 $r_{DS(on)} = 0.3 \Omega$

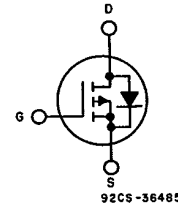
- Features:**
- SOA is power-dissipation limited
 - Nanosecond switching speeds
 - Linear transfer characteristics
 - High input impedance
 - Majority carrier device

The RFM12P08 and RFM12P10 and the RFP12P08 and RFP12P10* are p-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.

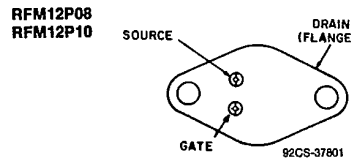
*The RFM and RFP series were formerly RCA developmental numbers TA9410 and TA9411, respectively.

TERMINAL DIAGRAM



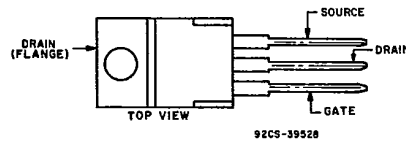
P-CHANNEL ENHANCEMENT MODE

TERMINAL DESIGNATIONS



RFP12P08
RFP12P10

JEDEC TO-204AA



JEDEC TO-220AB

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

	RFM12P08	RFM12P10		RFP12P08	RFP12P10	
DRAIN-SOURCE VOLTAGE V_{DS}	-80	-100		-80	-100	V
DRAIN-GATE VOLTAGE ($R_{DS}=1 M\Omega$) V_{DGR}	-80	-100		-80	-100	V
GATE-SOURCE VOLTAGE V_{GS}	_____		± 20	_____		V
DRAIN CURRENT, RMS Continuous I_D	_____		12	_____		A
Pulsed I_{DM}	_____		30	_____		A
POWER DISSIPATION @ $T_c=25^\circ C$ 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_p, T_{stg}	_____		-55 to +150	_____		°C

RFM12P08, RFM12P10, RFP12P08, RFP12P10

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

T-39-23

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=1\text{ mA}$ $V_{GS}=0$	-80	—	-100	—	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$ $I_D=1\text{ mA}$	-2	-4	-2	-4	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-65\text{ V}$ $V_{DS}=-80\text{ V}$	—	1	—	—	μA
		$T_C=125^\circ\text{ C}$ $V_{DS}=-65\text{ V}$ $V_{DS}=-80\text{ V}$	—	50	—	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{ V}$ $V_{DS}=0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^a$	$I_D=6\text{ A}$ $V_{GS}=-10\text{ V}$	—	-1.8	—	-1.8	V
		$I_D=12\text{ A}$ $V_{GS}=-10\text{ V}$	—	-4.8	—	-4.8	
Static Drain-Source On Resistance	$r_{DS(on)}^a$	$I_D=6\text{ A}$ $V_{GS}=-10\text{ V}$	—	.3	—	.3	Ω
Forward Transconductance	g_{fs}^a	$V_{DS}=-10\text{ V}$ $I_D=6\text{ A}$	2	—	2	—	mho
Input Capacitance	C_{iss}	$V_{GS}=-25\text{ V}$	—	1500	—	1500	pF
Output Capacitance	C_{oss}	$V_{GS}=0\text{ V}$	—	700	—	700	
Reverse Transfer Capacitance	C_{rss}	$f=1\text{ MHz}$	—	240	—	240	
Turn-On Delay Time	$t_d(on)$	$V_{DD}=50\text{ V}$ $I_D=6\text{ A}$ $R_{\theta en}=R_{\theta gs}=50\ \Omega$ $V_{GS}=-10\text{ V}$	18(typ)	60	18(typ)	60	ns
Rise Time	t_r		90(typ)	175	90(typ)	175	
Turn-Off Delay Time	$t_d(off)$		144(typ)	275	144(typ)	275	
Fall Time	t_f		94(typ)	175	94(typ)	175	
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM12P08, RFM12P10	—	1.25	—	1.25	$^\circ\text{C/W}$
		RFP12P08, RFP12P10	—	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
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}	$I_{SD}=6\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	$I_F=4\text{ A}$ $d_{IF}/d_t=100\text{ A}/\mu\text{s}$	200(typ)		200(typ)		ns

^{*}Pulse Test: Width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

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T-39-23

RFM12P08, RFM12P10, RFP12P08, RFP12P10

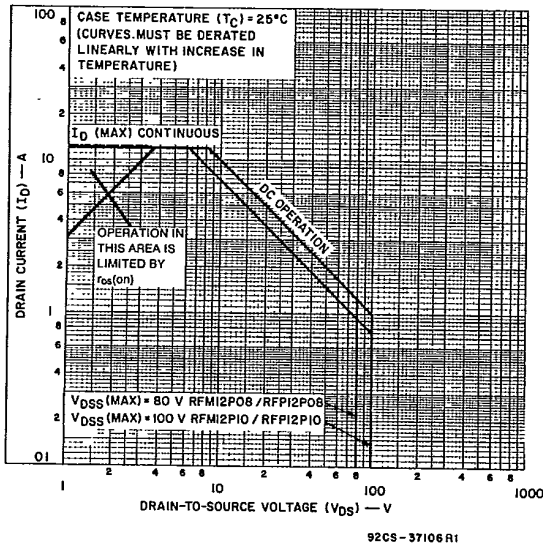


Fig. 1 — Maximum safe operating areas for all types.

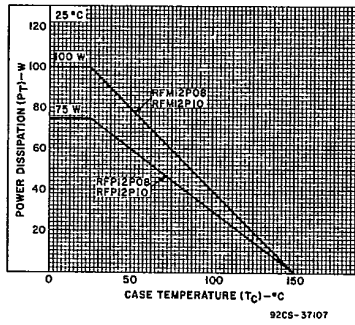


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

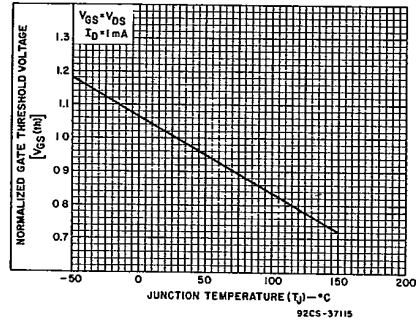


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

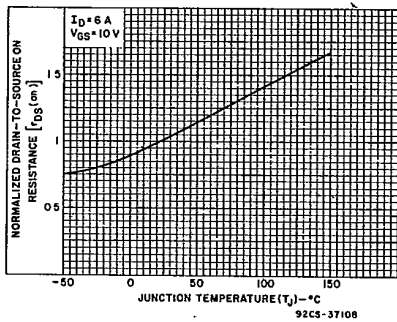


Fig. 4 — Normalized drain-to-source on resistance as a function of junction temperature for all types

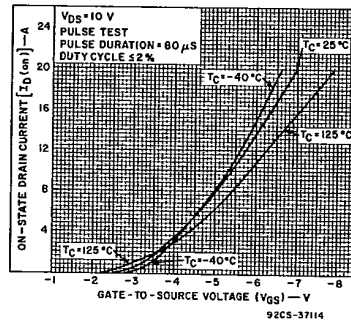


Fig. 5 — Typical transfer characteristics for all types.

RFM12P08, RFM12P10, RFP12P08, RFP12P10

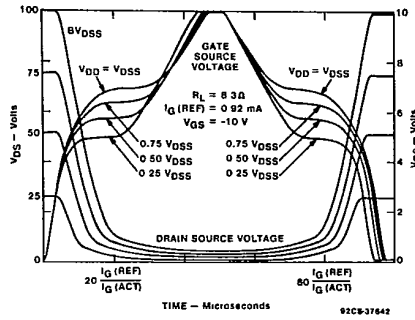


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

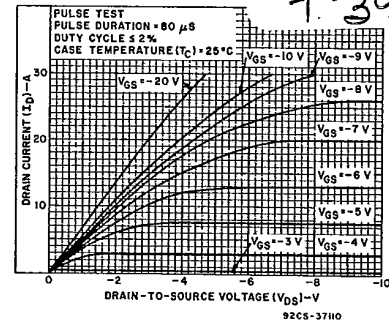


Fig. 7 - Typical saturation characteristics for all types.

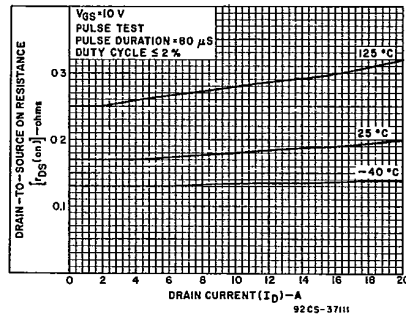


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

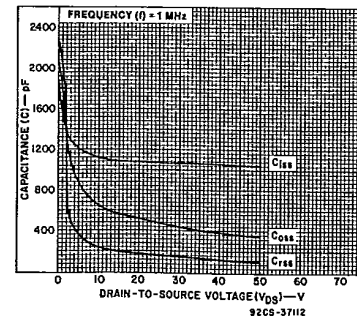


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

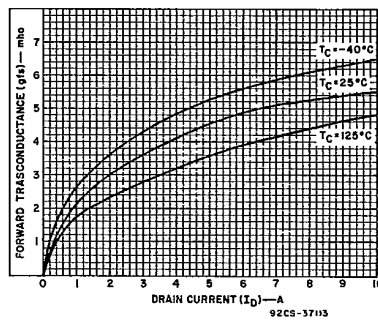


Fig. 10 - Typical forward transconductance as a function of drain current for all types

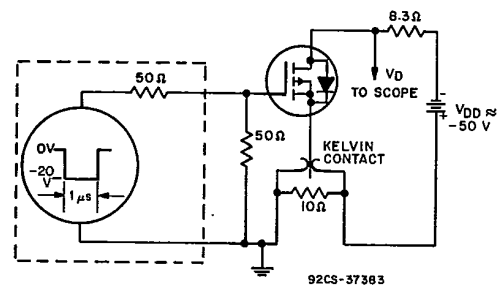


Fig. 11 - Switching Time Test Circuit

RFH25P08, RFH25P10

File Number 1632

Power MOS Field-Effect Transistors

P-Channel Enhancement-Mode
Power Field-Effect Transistors

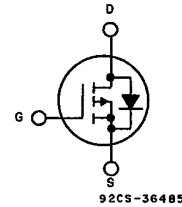
25 A, -80 V - -100 V

$r_{DS(on)} = 0.15 \Omega$

Features:

- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device
- High-current, low-inductance package

TERMINAL DIAGRAM



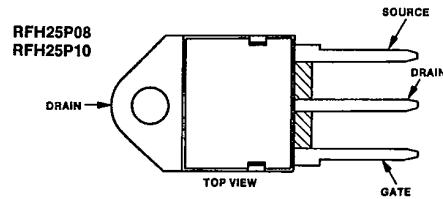
P-CHANNEL ENHANCEMENT MODE

The RFH25P08 and RFH25P10* are p-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 RFH-types are supplied in the JEDEC TO-218AC plastic package.

*The RFH25P08 and RFH25P10 types were formerly RCA developmental numbers TA9577A and TA9577B respectively.

TERMINAL DESIGNATIONS



JEDEC TO-218AC

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

	RFH25P08	RFH25P10	
DRAIN-SOURCE VOLTAGE	-80	-100	V
DRAIN-GATE VOLTAGE, $R_{gs} = 1 M\Omega$	-80	-100	V
GATE-SOURCE VOLTAGE	±20		V
DRAIN CURRENT, RMS Continuous	25		A
Pulsed	60		A
POWER DISSIPATION @ $T_c = 25^\circ C$	150		W
Derate above $T_c = 25^\circ C$	1.2		W/ $^\circ C$
OPERATING AND STORAGE TEMPERATURE	-55 to +150		$^\circ C$

RFH25P08, RFH25P10

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFH25P08		RFH25P10		
			Min.	Max.	Min.	Max.	
Drain-Source Breakdown Voltage	BV _{DSS}	I _D = 1 mA V _{GS} = 0	-80	—	-100	—	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} = -80 V	—	—	—	1	μA
		V _{DS} = -65 V	—	1	—	—	
		T _c = 125°C V _{DS} = -80 V	—	—	—	50	
		V _{DS} = -65 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 = 12.5 A V _{GS} = -10 V	—	-1.88	—	-1.88	V
		I _D = 25 A V _{GS} = -10 V	—	-4.5	—	-4.5	
Static Drain-Source On Resistance	r _{DS(on)} ^a	I _D = 12.5 A V _{GS} = -10 V	—	0.15	—	0.15	Ω
Forward Transconductance	g _{fs} ^a	V _{DS} = -10 V I _D = 12.5 A	4	—	4	—	mho
Input Capacitance	C _{iss}	V _{DS} = -25 V	—	3000	—	3000	pF
Output Capacitance	C _{oss}	V _{GS} = 0 V	—	1500	—	1500	
Reverse Transfer Capacitance	C _{rss}	f = 1MHz	—	500	—	500	
Turn-On Delay Time	t _{d(on)}	V _{DD} = -50 V	35(typ)	50	35(typ)	50	ns
Rise Time	t _r	I _D = 12.5 A	165(typ)	250	165(typ)	250	
Turn-Off Delay Time	t _{d(off)}	R _{gen} = R _{gs} = 50Ω	270(typ)	400	270(typ)	400	
Fall Time	t _f	V _{GS} = -10 V	165(typ)	250	165(typ)	250	
Thermal Resistance Junction-to-Case	R _{θJC}	RFH25P08, RFH25P10 Series	—	0.83	—	0.83	°C/W

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFH25P08		RFH25P10		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage	V _{SD} [*]	I _{SD} = 12.5A	—	1.4	—	1.4	V
Reverse Recovery Time	t _{rr}	I _F = 4A, d _I /d _I = 100 A/μs	300 (typ.)		300 (typ.)		ns

^{*} Pulse Test: Width ≤ 300 μs, Duty cycle ≤ 2%.

Standard Power MOSFETs

RFH25P08, RFH25P10

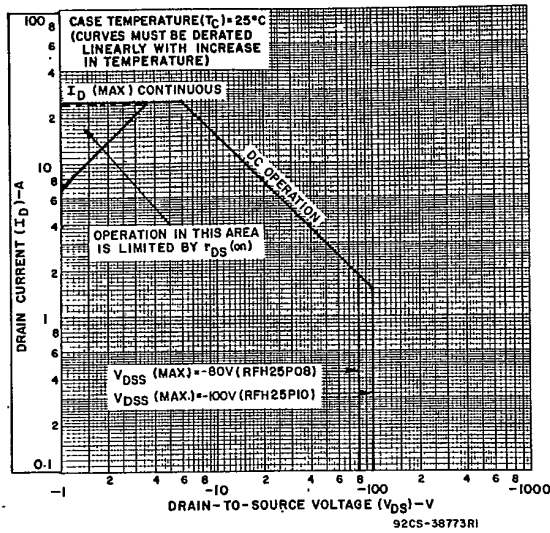


Fig. 1 - Maximum safe operating areas for all types.

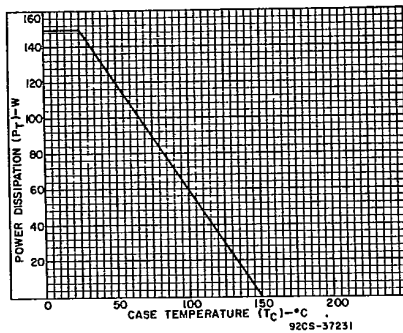


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

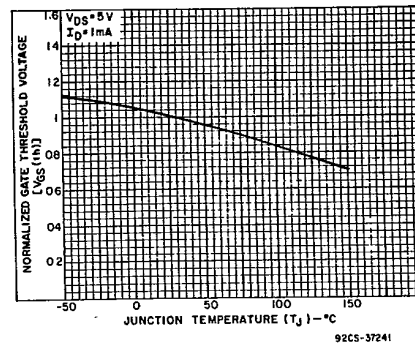


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

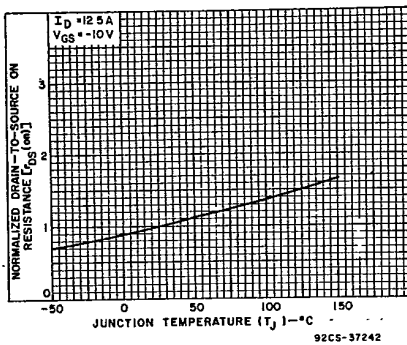


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

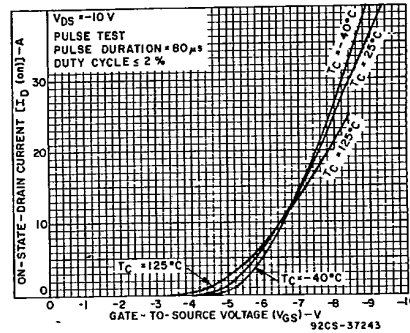


Fig. 5 - Typical transfer characteristics for all types.

Standard Power MOSFETs
RFH25P08, RFH25P10

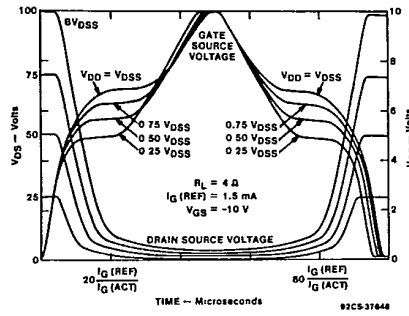


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

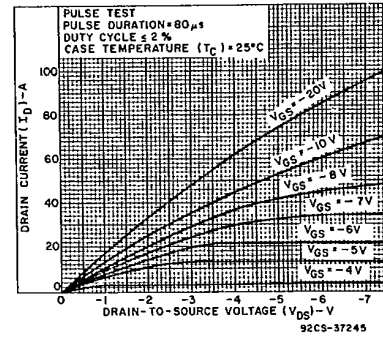


Fig. 7 - Typical saturation characteristics for all types.

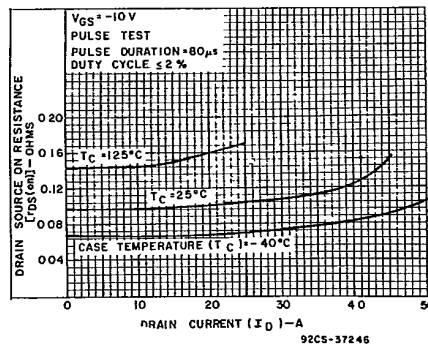


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

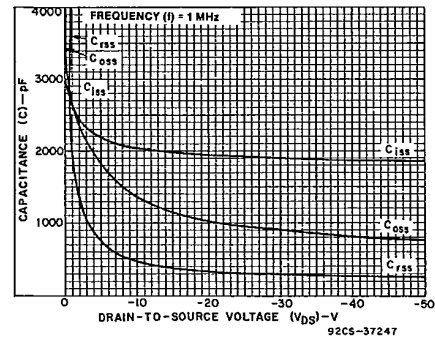


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

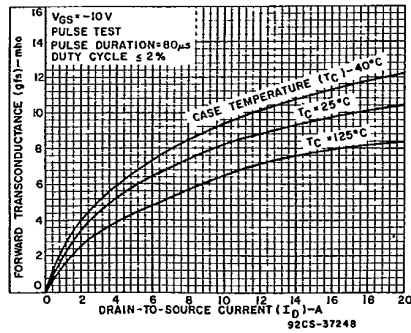


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

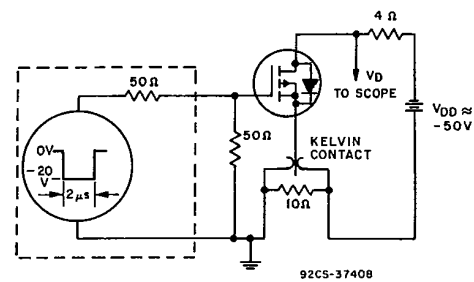


Fig. 11 - Switching Time Test Circuit.

RFK25P08, RFK25P10

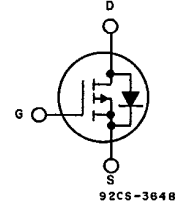
File Number **1516**

P-Channel Enhancement-Mode Power Field-Effect Transistors

25 A, -100 V — -80 V
 $r_{DS(on)}$: 0.15Ω

Features:

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



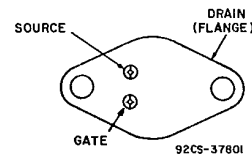
P-CHANNEL ENHANCEMENT MODE

The RFK25P10 and RFK25P08* are p-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 RFK-types are supplied in the JEDEC TO-204AE steel package.

*The RFK25P10 and RFK25P08 types were formerly RCA developmental numbers TA9412A and TA9412B, respectively.

TERMINAL DESIGNATIONS



JEDEC TO-204AE

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

	RFK25P10	RFK25P08		
DRAIN-SOURCE VOLTAGE	V_{DS}	-100	-80	V
DRAIN-GATE VOLTAGE, $R_{GS}=1 M\Omega$	V_{DGN}	-100	-80	V
GATE-SOURCE VOLTAGE	V_{GS}	± 20		V
DRAIN CURRENT, RMS Continuous	I_D	25		A
Pulsed	I_{DM}	60		A
POWER DISSIPATION	P_T			
@ $T_C = 25^\circ C$		150		W
Derate above $T_C=25^\circ C$		1.2		W/ $^\circ C$
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}	-55 to +150		$^\circ C$

RFK25P08, RFK25P10

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

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFK25P10		RFK25P08		
			MIN.	MAX.	MIN.	MAX.	
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=1\text{ mA}$ $V_{GS}=0$	-100	—	-80	—	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$ $I_D=1\text{ mA}$	-2	-4	-2	-4	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-80\text{ V}$ $V_{GS}=-65\text{ V}$	—	1	—	—	μA
		$T_c=125^\circ\text{C}$ $V_{DS}=-80\text{ V}$ $V_{GS}=-65\text{ V}$	—	50	—	—	
			—	—	—	50	
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20\text{ V}$ $V_{DS}=0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^*$	$I_D=12.5\text{ A}$ $V_{GS}=-10\text{ V}$	—	-2.5	—	-2.5	V
		$I_D=25\text{ A}$ $V_{GS}=-10\text{ V}$	—	-6	—	-6	
Static Drain-Source On Resistance	$r_{DS(on)}^*$	$I_D=12.5\text{ A}$ $V_{GS}=-10\text{ V}$	—	0.15	—	0.15	Ω
Forward Transconductance	g_{fs}^*	$V_{DS}=-10\text{ V}$ $I_D=12.5\text{ A}$	4	—	4	—	mho
Input Capacitance	C_{iss}	$V_{DS}=-25\text{ V}$	—	3000	—	3000	pF
Output Capacitance	C_{oss}	$V_{GS}=0\text{ V}$	—	1500	—	1500	
Reverse Transfer Capacitance	C_{rss}	$f=1\text{ MHz}$	—	500	—	500	
Turn-On Delay Time	$t_d(on)$	$V_{DD}=-50\text{ V}$	35(typ)	50	35(typ)	50	ns
Rise Time	t_r	$I_D=12.5\text{ A}$	165(typ)	250	165(typ)	250	
Turn-Off Delay Time	$t_d(off)$	$R_{GS}=R_{DS}=50\ \Omega$	270(typ)	400	270(typ)	400	
Fall Time	t_f	$V_{GS}=-10\text{ V}$	165(typ)	250	165(typ)	250	
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	RFK25P10, RFK25P08	—	0.83	—	0.83	$^\circ\text{C/W}$

*Pulsed: Pulse duration = 300 μs max., duty cycle = 2%.

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFK25P10		RFK25P08		
			Min.	Max.	Min.	Max.	
Diode Forward Voltage*	V_{SD}	$I_{SD}=12.5\text{ A}$	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	$I_F=4\text{ A}$ $dI_F/dt=100\text{ A}/\mu\text{s}$	300 typ.		300 typ.		ns

*Pulse Test: Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$.

RFK25P08, RFK25P10

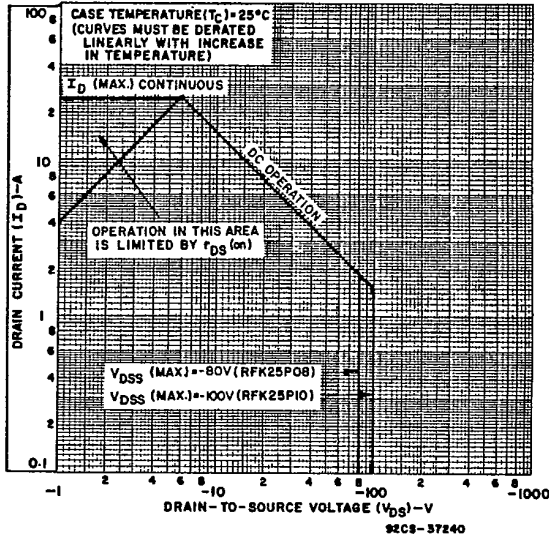


Fig. 1 - Maximum safe operating areas for all types.

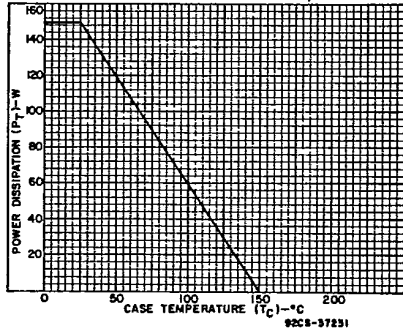


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

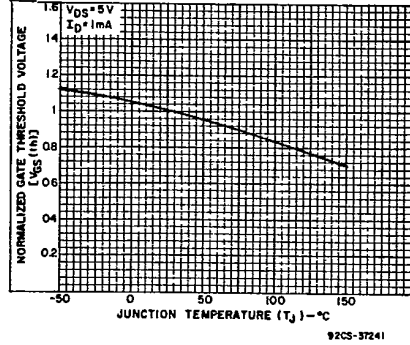


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

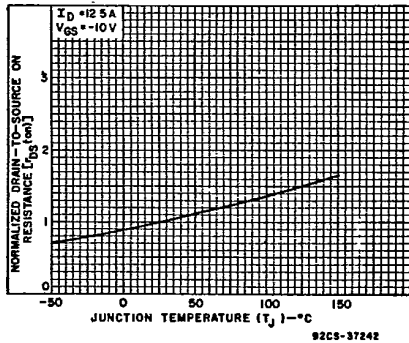


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

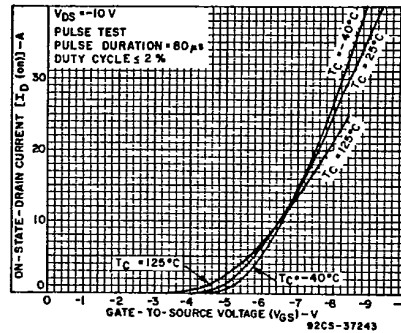


Fig. 5 - Typical transfer characteristics for all types.

RFK25P08, RFK25P10

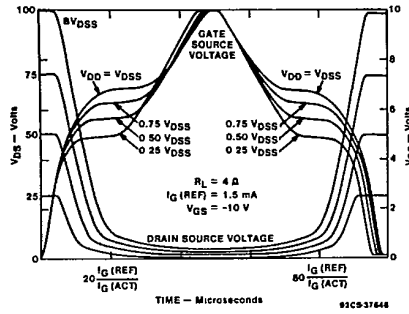


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

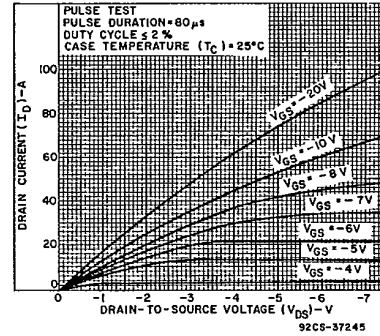


Fig. 7 - Typical saturation characteristics for all types.

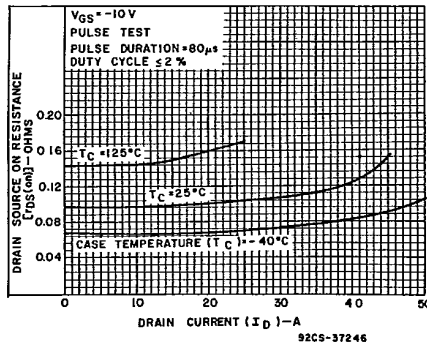


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

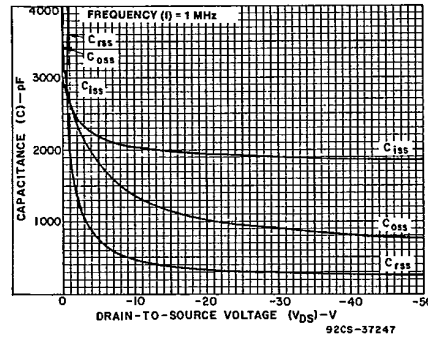


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

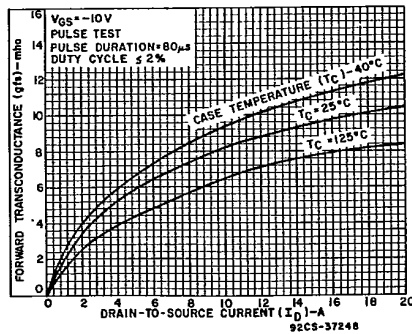


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

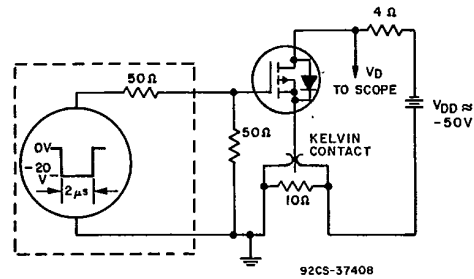


Fig. 11 - Switching time test circuit.