RFM12P08, RFM12P10, RFP12P08, RFP12P10

File Number 1495

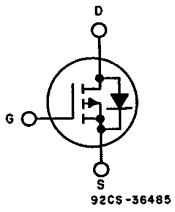
Power MOS Field-Effect Transistors

P-Channel Enhancement-Mode Power Field-Effect Transistors

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

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

TERMINAL DIAGRAM



P-CHANNEL ENHANCEMENT MODE

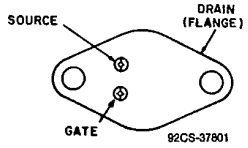
The RFM12P08 and RFM12P10 and the RFP12P08 and RFP12P10* are p-channel enhancement-mode silicon-gate power field-effect transistors designed for applications such as switching regulators, switching converters, motor drivers, relay drivers, and drivers for high-power bipolar switching transistors requiring 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.

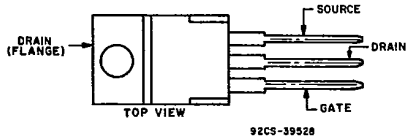
TERMINAL DESIGNATIONS

RFM12P08
RFM12P10



JEDEC TO-204AA

RFP12P08
RFP12P10



JEDEC TO-220AB

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

	RFM12P08	RFM12P10		RFP12P08	RFP12P10	
DRAIN-SOURCE VOLTAGE ..... V_{DSS}	-80	-100		-80	-100	V
DRAIN-GATE VOLTAGE (R_{gs}=1 MΩ) .... 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°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

RFM12P08, RFM12P10, RFP12P08, RFP12P10

T-39-23

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

CHARACTERISTICS	SYMBOL	TEST CONDITIONS	LIMITS				UNITS
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			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}=-65 V V_{DS}=-80 V	— —	1 —	— —	— 1	μA
		T_C=125°C V_{DS}=-65 V V_{DS}=-80 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=6 A V_{GS}=-10 V	—	-1.8	—	-1.8	V
		I_D=12 A V_{GS}=-10 V	—	-4.8	—	-4.8	V
Static Drain-Source On Resistance	$r_{DS}(on)$[a]	I_D=6 A V_{GS}=-10 V	—	.3	—	.3	Ω
Forward Transconductance	g_{fs}[a]	V_{DS}=-10 V I_D=6 A	2	—	2	—	mho
Input Capacitance	C_{iss}	V_{DS}=-25 V	—	1500	—	1500	pF
Output Capacitance	C_{oss}	V_{GS}=0 V	—	700	—	700	pF
Reverse Transfer Capacitance	C_{rss}	f = 1MHz	—	240	—	240	pF
Turn-On Delay Time	$t_d(on)$	V_{DD}=50 V	18(typ)	60	18(typ)	60	ns
Rise Time	t_r	I_D=6 A	90(typ)	175	90(typ)	175	ns
Turn-Off Delay Time	$t_d(off)$	R_{gen}=R_{gs}=50 Ω	144(typ)	275	144(typ)	275	ns
Fall Time	t_f	V_{GS}=-10 V	94(typ)	175	94(typ)	175	ns
Thermal Resistance Junction-to-Case	$R\theta_{JC}$	RFM12P08, RFM12P10	—	1.25	—	1.25	°C/W
		RFP12P08, RFP12P10	—	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				UNITS
			RFM12P08 RFP12P08		RFM12P10 RFP12P10		
			MIN.	MAX.	MIN.	MAX.	
Diode Forward Voltage	V_{SD}	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	200(typ)		200(typ)		ns

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

RFM12P08, RFM12P10, RFP12P08, RFP12P10

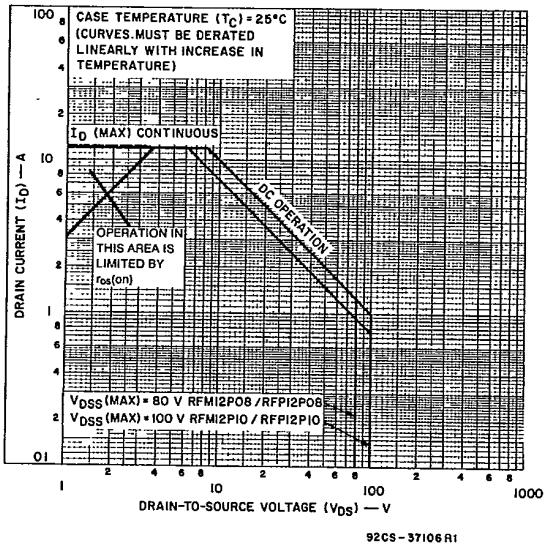


Fig. 1 — Maximum safe operating areas for all types.

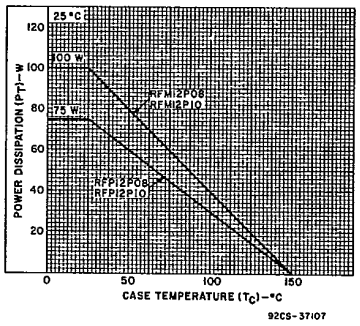


Fig. 2 — Power dissipation vs. case temperature derating curve for all types.

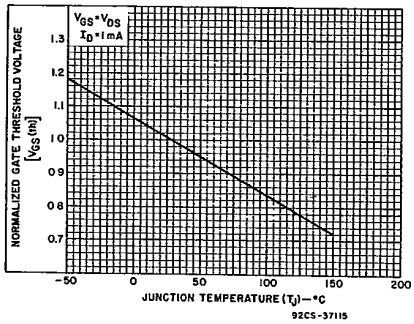


Fig. 3 — Typical normalized gate threshold voltage as a function of junction temperature for all types.

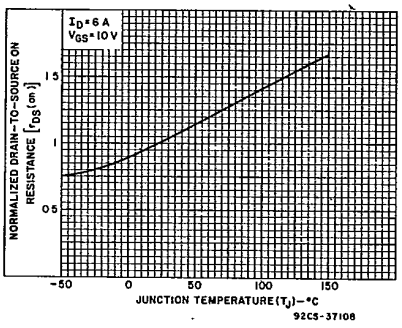


Fig. 4 — Normalized drain-to-source on resistance as a function of junction temperature for all types

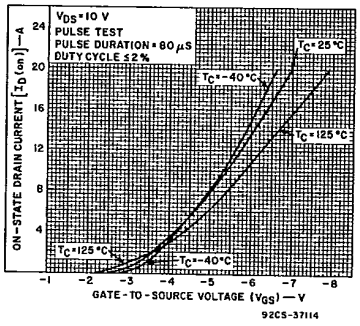


Fig. 5 — Typical transfer characteristics for all types.

RFM12P08, RFM12P10, RFP12P08, RFP12P10

T-39-23

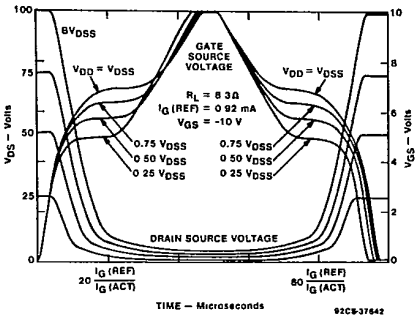


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

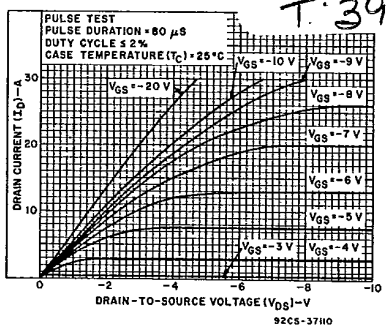


Fig. 7 — Typical saturation characteristics for all types.

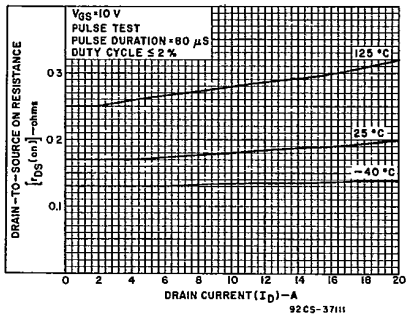


Fig. 8 — Typical drain-to-source on resistance as a function of drain current for all types.

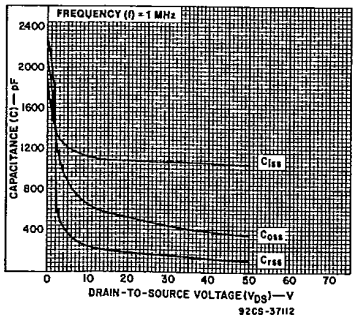


Fig. 9 — Capacitance as a function of drain-to-source voltage for all types.

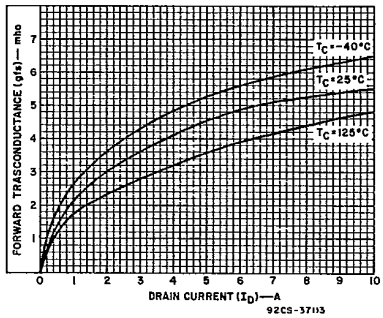


Fig. 10 — Typical forward transconductance as a function of drain current for all types

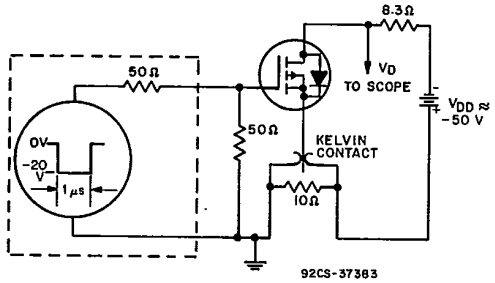


Fig 11 — Switching Time Test Circuit

RFH25P08, RFH25P10 File Number **1632**

Power MOS Field-Effect Transistors

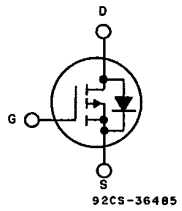
P-Channel Enhancement-Mode Power Field-Effect Transistors

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

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



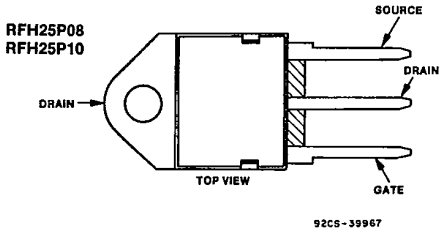
P-CHANNEL ENHANCEMENT MODE

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° C):

		RFH25P08	RFH25P10	
DRAIN-SOURCE VOLTAGE	V_{DSS}	-80	-100	V
DRAIN-GATE VOLTAGE, R_{GS} = 1 MΩ	V_{DGR}	-80	-100	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	150		W
Derate above T_C = 25°C		1.2		W/°C
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}	-55 to +150		°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	$R\theta_{JC}$	RFH25P08, RFH25P10 Series	—	0.83	—	0.83	°C/W

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

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

CHARACTERISTIC		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_{IF}/d_t = 100 A/μs	300 (typ.)		300 (typ.)		ns

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

RFH25P08, RFH25P10

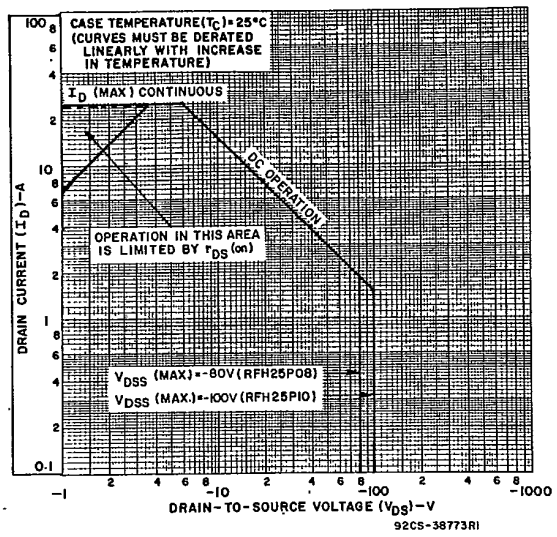


Fig. 1 - Maximum safe operating areas for all types.

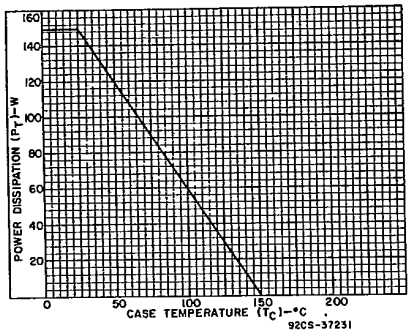


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

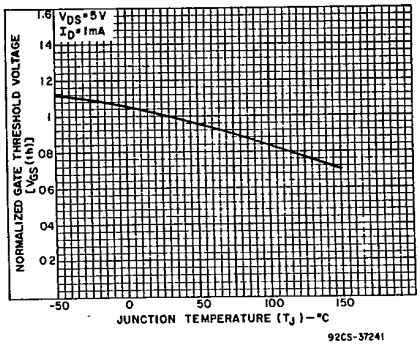


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

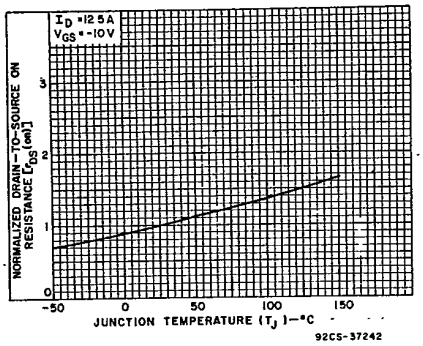


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

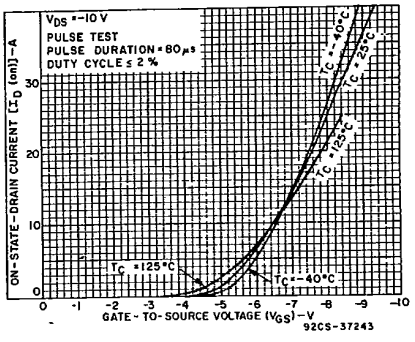


Fig. 5 - Typical transfer characteristics for all types.

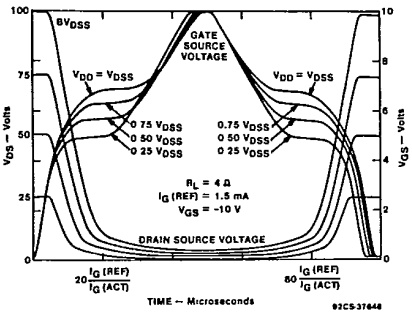


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

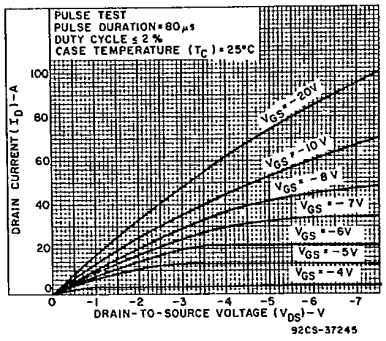


Fig. 7 - Typical saturation characteristics for all types.

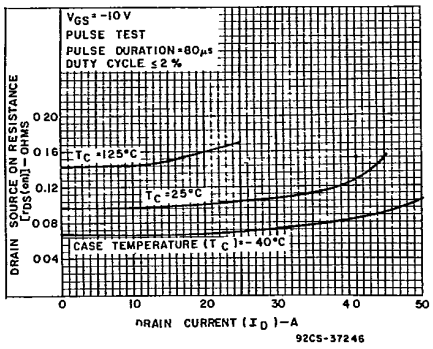


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

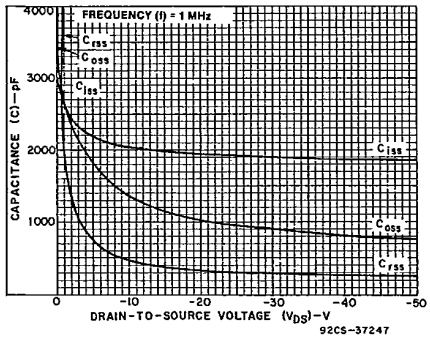


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

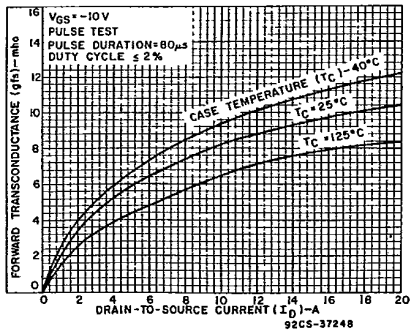


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

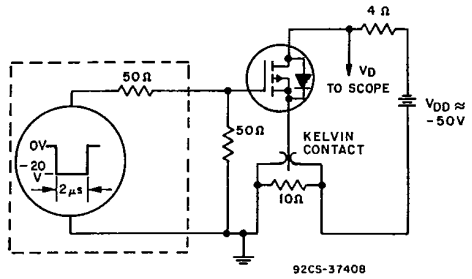


Fig. 11 - Switching Time Test Circuit.

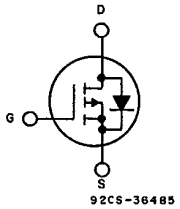
RFK25P08, RFK25P10 File Number **1516**

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*



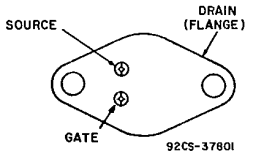
P-CHANNEL ENHANCEMENT MODE

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°C):*

		RFK25P10	RFK25P08	
DRAIN-SOURCE VOLTAGE	V_{DSS}	-100	-80	V
DRAIN-GATE VOLTAGE, R_{GS}=1 MΩ	V_{DGR}	-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°C		150		W
Derate above T_C=25°C		1.2		W/°C
OPERATING AND STORAGE TEMPERATURE	T_J, T_{stg}	-55 to +150		°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 mA V_{GS}=0	-100	—	-80	—	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	—	-2.5	—	-2.5	V
		I_D=25 A V_{GS}=-10 V	—	-6	—	-6	
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}=50 Ω	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	$R_{\theta jc}$	RFK25P10, RFK25P08	—	0.83	—	0.83	°C/W

[a]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 A	—	1.4	—	1.4	V
Reverse Recovery Time	t_{rr}	I_F=4 A d_{IF}/d_t=100 A/μs	300 typ.		300 typ.		ns

*Pulse Test: Width ≤ 300 μs, Duty Cycle ≤ 2%.

RFK25P08, RFK25P10

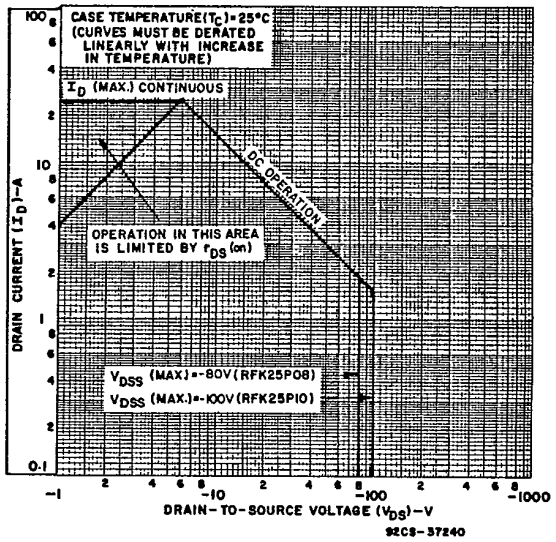


Fig. 1 - Maximum safe operating areas for all types.

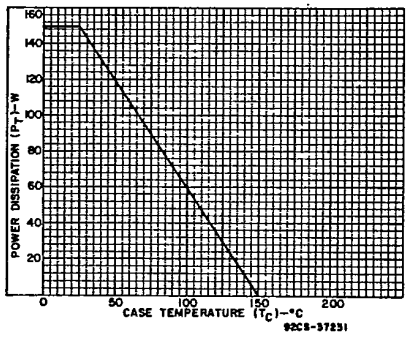


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

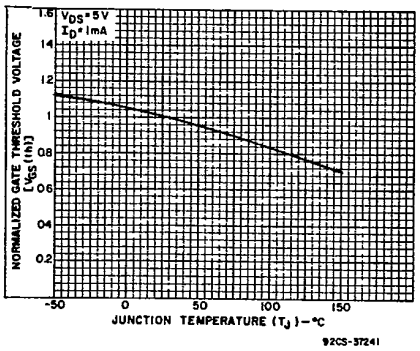


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

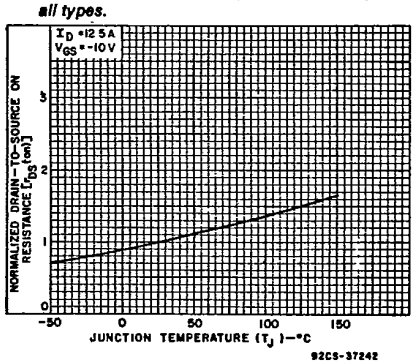


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

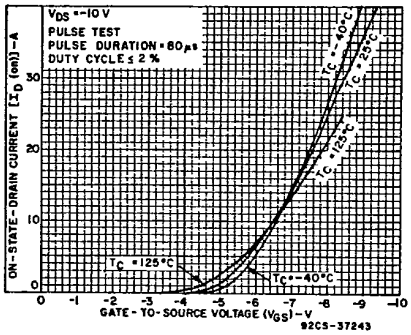


Fig. 5 - Typical transfer characteristics for all types.

RFK25P08, RFK25P10

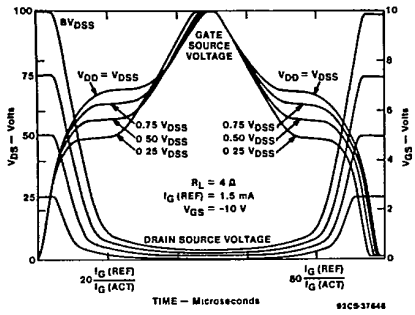


Fig. 6 - Normalized switching waveforms for constant gate-current drive.

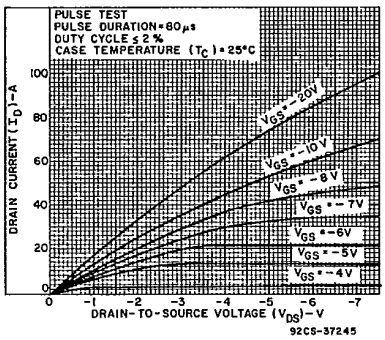


Fig. 7 - Typical saturation characteristics for all types.

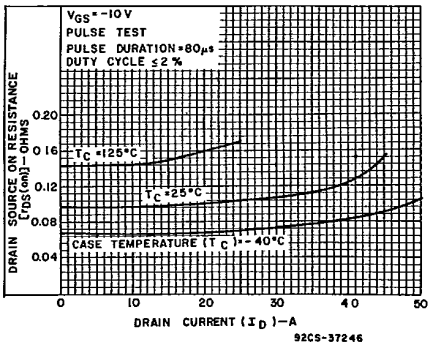


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

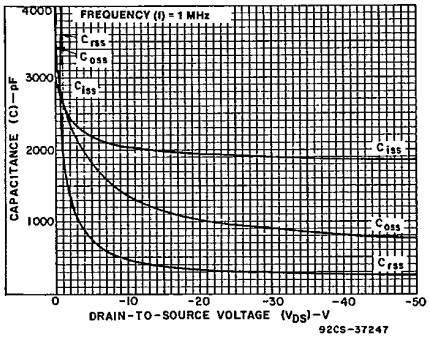


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

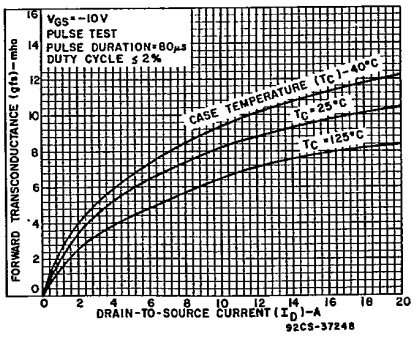


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

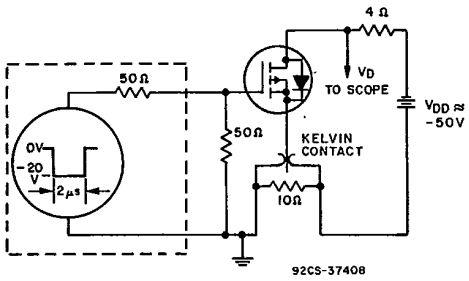


Fig. 11 - Switching time test circuit.