

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:

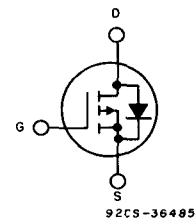
- SOA is power-dissipation limited
- Nanosecond switching speeds
- Linear transfer characteristics
- High input impedance
- Majority carrier device
- High-current, low-inductance package

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.

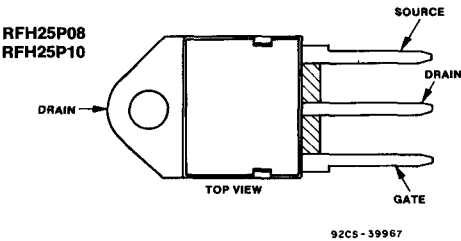
*The RFH25P08 and RFH25P10 types were formerly RCA developmental numbers TA9577A and TA9577B respectively.

TERMINAL DIAGRAM



P-CHANNEL ENHANCEMENT MODE

TERMINAL DESIGNATIONS



JEDEC TO-218AC

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

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

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}	$I_D = 1 \text{ mA}$ $V_{GS} = 0$	-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}	$V_{DS} = -80 \text{ V}$	—	—	—	1	μA
		$V_{DS} = -65 \text{ V}$	—	1	—	—	
		$T_C = 125^\circ\text{C}$ $V_{DS} = -80 \text{ V}$	—	—	—	50	
		$V_{DS} = -65 \text{ V}$	—	50	—	—	
Gate-Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20 \text{ V}$ $V_{DS} = 0$	—	100	—	100	nA
Drain-Source On Voltage	$V_{DS(on)}^{\text{a}}$	$I_D = 12.5 \text{ A}$ $V_{GS} = -10 \text{ V}$	—	-1.88	—	-1.88	V
		$I_D = 25 \text{ A}$ $V_{GS} = -10 \text{ V}$	—	-4.5	—	-4.5	
Static Drain-Source On Resistance	$r_{DS(on)}^{\text{a}}$	$I_D = 12.5 \text{ A}$ $V_{GS} = -10 \text{ V}$	—	0.15	—	0.15	Ω
Forward Transconductance	g_{fs}^{a}	$V_{DS} = -10 \text{ V}$ $I_D = 12.5 \text{ A}$	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}	$f = 1\text{MHz}$	—	600	—	600	
Turn-On Delay Time	$t_d(\text{on})$	$V_{DD} = -50 \text{ V}$	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	$t_d(\text{off})$	$R_{gen}=R_{gs}=50\Omega$	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	$R\theta_{JC}$	RFH25P08, RFH25P10 Series	—	0.83	—	0.83	$^\circ\text{C/W}$

^aPulsed: 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}	$I_F = 4A, dI_F/dt = 100 A/\mu s$	300 (typ.)		300 (typ.)		ns

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

RFH25P08, RFH25P10

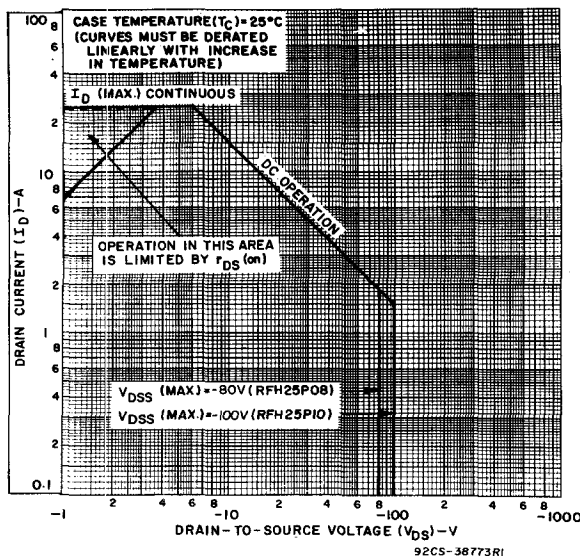


Fig. 1 - Maximum safe operating areas for all types.

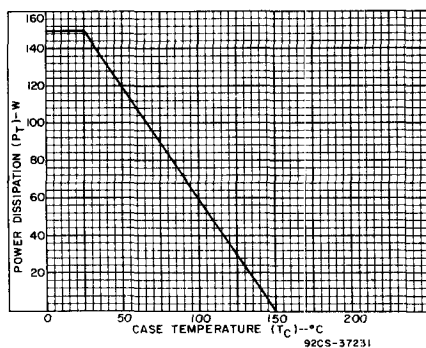


Fig. 2 - Power dissipation vs. temperature derating curve for all types.

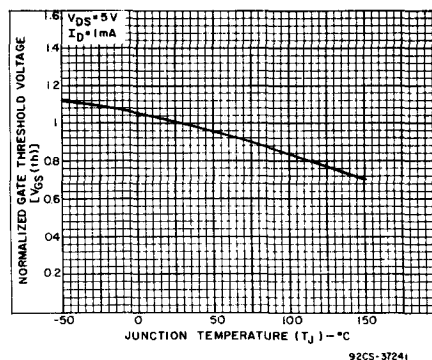


Fig. 3 - Typical normalized gate threshold voltage as a function of junction temperature for all types.

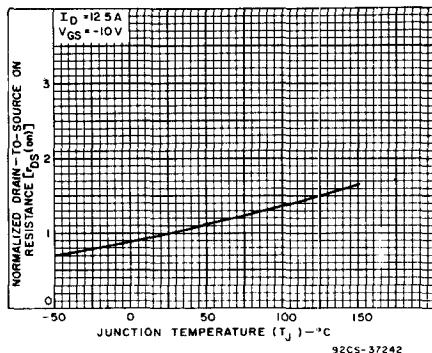


Fig. 4 - Normalized drain-to-source on resistance to junction temperature for all types.

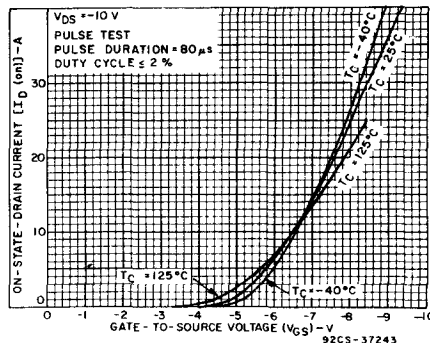


Fig. 5 - Typical transfer characteristics for all types.

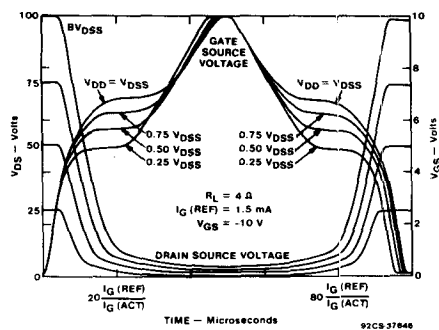


Fig. 6 - Normalized switching waveforms for constant gate-current. Refer to RCA application notes AN-7254 and AN-7260.

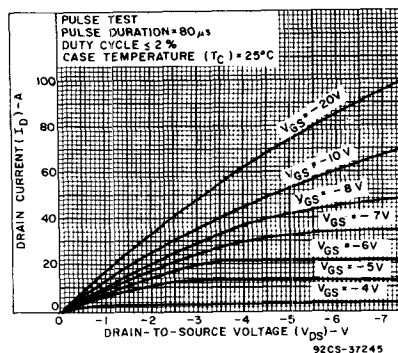


Fig. 7 - Typical saturation characteristics for all types.

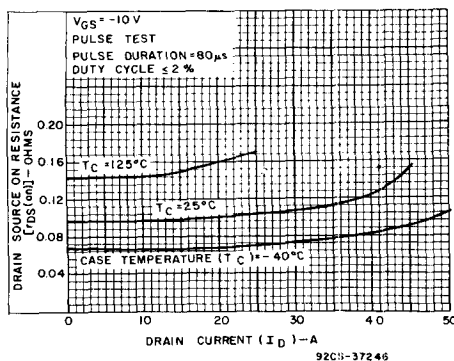


Fig. 8 - Typical drain-to-source on resistance as a function of drain current for all types.

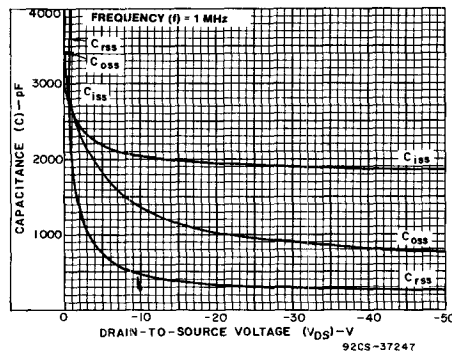


Fig. 9 - Capacitance as a function of drain-to-source voltage for all types.

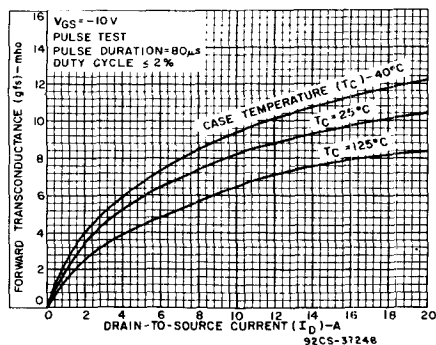


Fig. 10 - Typical forward transconductance as a function of drain current for all types.

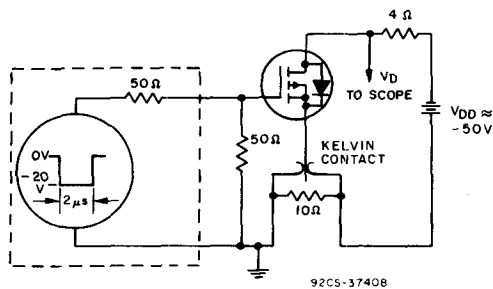


Fig. 11 - Switching Time Test Circuit.