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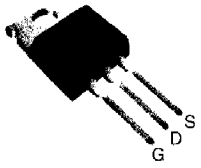
IRF510, SiHF510

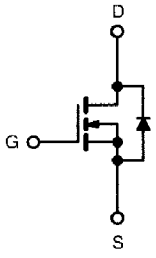
PRODUCT SUMMARY		
V_{DS} (V)	100	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.54
Q_g (Max.) (nC)	8.3	
Q_{gs} (nC)	2.3	
Q_{gd} (nC)	3.8	
Configuration	Single	

FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- 175 °C Operating Temperature
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements

TO-220AB





N-Channel MOSFET

The TO-220AB package is universally preferred for all commercial-industrial applications at power dissipation levels to approximately 50 W. The low thermal resistance and low package cost of the TO-220AB contribute to its wide acceptance throughout the industry.

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF510PbF
	SiHF510-E3
SnPb	IRF510
	SiHF510

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	100	V
Gate-Source Voltage			V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	T_C = 25 °C	I_D	5.6	A
		T_C = 100 °C		4.0	
Pulsed Drain Current[a]			I_{DM}	20	
Linear Derating Factor				0.29	W/°C
Single Pulse Avalanche Energy[b]			E_{AS}	100	mJ
Repetitive Avalanche Current[a]			I_{AR}	5.6	A
Repetitive Avalanche Energy[a]			E_{AR}	4.3	mJ
Maximum Power Dissipation	T_C = 25 °C		P_D	43	W
Peak Diode Recovery dV/dt[c]			dV/dt	5.5	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 175	°C
Soldering Recommendations (Peak Temperature)	for 10 s			300[d]	
Mounting Torque	6-32 or M3 screw			10	lbf · in
				1.1	N · m

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. V_{DD} = 25 V, starting T_J = 25 °C, L = 4.8 mH, R_g = 25 Ω, I_{AS} = 5.6 A (see fig. 12).
c. I_{SD} ≤ 5.6 A, dI/dt ≤ 75 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 175 °C.
d. 1.6 mm from case.

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	62	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.50	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	3.5	

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 µA	100	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA	-	0.12	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V	-	-	25	µA
		V_{DS} = 80 V, V_{GS} = 0 V, T_J = 150 °C	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10 V; I_D = 3.4 A[b]	-	-	0.54	Ω
Forward Transconductance	g_{fs}	V_{DS} = 50 V, I_D = 3.4 A[b]	1.3	-	-	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V,	-	180	-	pF
Output Capacitance	C_{oss}	V_{DS} = 25 V,	-	81	-	
Reverse Transfer Capacitance	C_{rss}	f = 1.0 MHz, see fig. 5	-	15	-	
Total Gate Charge	Q_g	V_{GS} = 10 V; I_D = 5.6 A, V_{DS} = 80 V	-	-	8.3	nC
Gate-Source Charge	Q_{gs}	V_{DS} = 10 V,	-	-	2.3	
Gate-Drain Charge	Q_{gd}	see fig. 6 and 13[b]	-	-	3.8	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 50 V, I_D = 5.6 A, R_g = 24 Ω, R_D = 8.4 Ω, see fig. 10[b]	-	6.9	-	ns
Rise Time	t_r		-	16	-	
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	9.4	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 	-	4.5	-	nH
Internal Source Inductance	L_S		-	7.5	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	5.6	A
Pulsed Diode Forward Current[a]	I_{SM}		-	-	20	
Body Diode Voltage	V_{SD}	T_J = 25 °C, I_S = 5.6 A, V_{GS} = 0 V[b]	-	-	2.5	V
Body Diode Reverse Recovery Time	t_{rr}	T_J = 25 °C, I_F = 5.6 A, dI/dt = 100 A/µs[b]	-	100	200	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.44	0.88	µC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width ≤ 300 µs; duty cycle ≤ 2 %.