
HAF1002(L), HAF1002(S)

Silicon P Channel MOS FET Series
Power Switching

HITACHI

ADE-208-586 (Z)

1st. Edition

October 1997

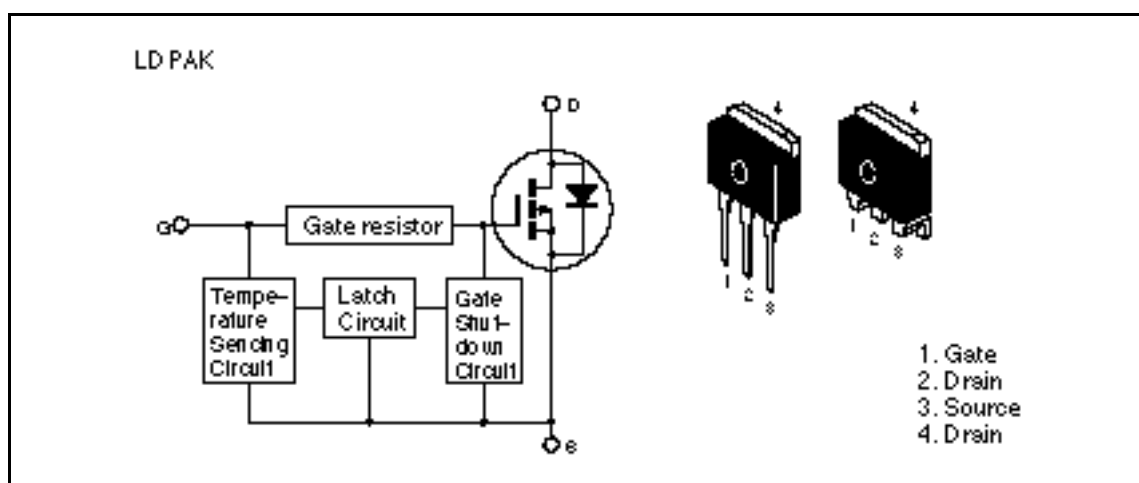
Features

This FET has the over temperature shut-down capability sensing to the junction temperature.

This FET has the built-in over temperature shut-down circuit in the gate area. And this circuit operation to shut-down the gate voltage in case of high junction temperature like applying over power consumption, over current etc.

- Logic level operation (-4 to -6 V Gate drive)
- High endurance capability against to the short circuit
- Built-in the over temperature shut-down circuit
- Latch type shut-down operation (Need 0 voltage recovery)

Outline



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Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DS}	−60	V
Gate to source voltage	V_{GS}	−16	V
Gate to source voltage	V_{GS}	3	V
Drain current	I_D	−15	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	−30	A
Body-drain diode reverse drain current	I_{DR}	−15	A
Channel dissipation	P_{ch} ^{Note2}	50	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	−55 to +150	°C

Note: 1. PW 10μs, duty cycle 1 %
2. Value at Tc = 25°C

Typical Operation Characteristics

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input voltage	V_{IH}	−3.5	—	—	V	
	V_{IL}	—	—	−1.2	V	
Input current (Gate non shut down)	I_{IH1}	—	—	−100	μA	$V_i = -8V, V_{DS} = 0$
	I_{IH2}	—	—	−50	μA	$V_i = -3.5V, V_{DS} = 0$
	I_{IL}	—	—	−1	μA	$V_i = -1.2V, V_{DS} = 0$
Input current (Gate shut down)	$I_{IH(sd)1}$	—	−0.8	—	mA	$V_i = -8V, V_{DS} = 0$
	$I_{IH(sd)2}$	—	−0.35	—	mA	$V_i = -3.5V, V_{DS} = 0$
Shut down temperature	T_{sd}	—	175	—	°C	Channel temperature
Gate operation voltage	V_{OP}	−3.5	—	−13	V	

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Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain current	I_{D1}	-7	—	—	A	$V_{GS} = -3.5V, V_{DS} = -2V$
Drain current	I_{D2}	—	—	-10	mA	$V_{GS} = -1.2V, V_{DS} = -2V$
Drain to source breakdown voltage	$V_{(BR)DSS}$	-60	—	—	V	$I_D = -10mA, V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	-16	—	—	V	$I_G = -100\mu A, V_{DS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	3	—	—	V	$I_G = 100\mu A, V_{DS} = 0$
Gate to source leak current	I_{GSS1}	—	—	-100	μA	$V_{GS} = -8V, V_{DS} = 0$
	I_{GSS2}	—	—	-50	μA	$V_{GS} = -3.5V, V_{DS} = 0$
	I_{GSS3}	—	—	-1	μA	$V_{GS} = -1.2V, V_{DS} = 0$
	I_{GSS4}	—	—	100	μA	$V_{GS} = 2.4V, V_{DS} = 0$
Input current (shut down)	$I_{GS(op)1}$	—	-0.8	—	mA	$V_{GS} = -8V, V_{DS} = 0$
	$I_{GS(op)2}$	—	-0.35	—	mA	$V_{GS} = -3.5V, V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	-250	μA	$V_{DS} = -50V, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.1	—	-2.25	V	$I_D = -1mA, V_{DS} = -10V$
Static drain to source on state resistance	$R_{DS(on)}$	—	100	130	m	$I_D = -7.5A, V_{GS} = -4V$ Note3
Static drain to source on state resistance	$R_{DS(on)}$	—	70	90	m	$I_D = -7.5A$ $V_{GS} = -10V$ Note3
Forward transfer admittance	$ y_{fs} $	5	10	—	S	$I_D = -7.5A, V_{DS} = -10V$ Note3
Output capacitance	C_{oss}	—	610	—	pF	$V_{DS} = -10V, V_{GS} = 0$ $f = 1\text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	7.5	—	μs	$I_D = -7.5A, V_{GS} = -5V$
Rise time	t_r	—	36	—	μs	$R_L = 4$
Turn-off delay time	$t_{d(off)}$	—	32	—	μs	
Fall time	t_f	—	29	—	μs	
Body-drain diode forward voltage	V_{DF}	—	-1.0	—	V	$I_F = -15A, V_{GS} = 0$
Body-drain diode reverse recovery time	t_{rr}	—	200	—	ns	$I_F = -15A, V_{GS} = 0$ $di_F/dt = 50A/\mu s$
Over load shut down	t_{os1}	—	3.7	—	ms	$V_{GS} = -5V, V_{DD} = -12V$
operation time Note4	t_{os2}	—	1	—	ms	$V_{GS} = -5V, V_{DD} = -24V$

Note: 3. Pulse test

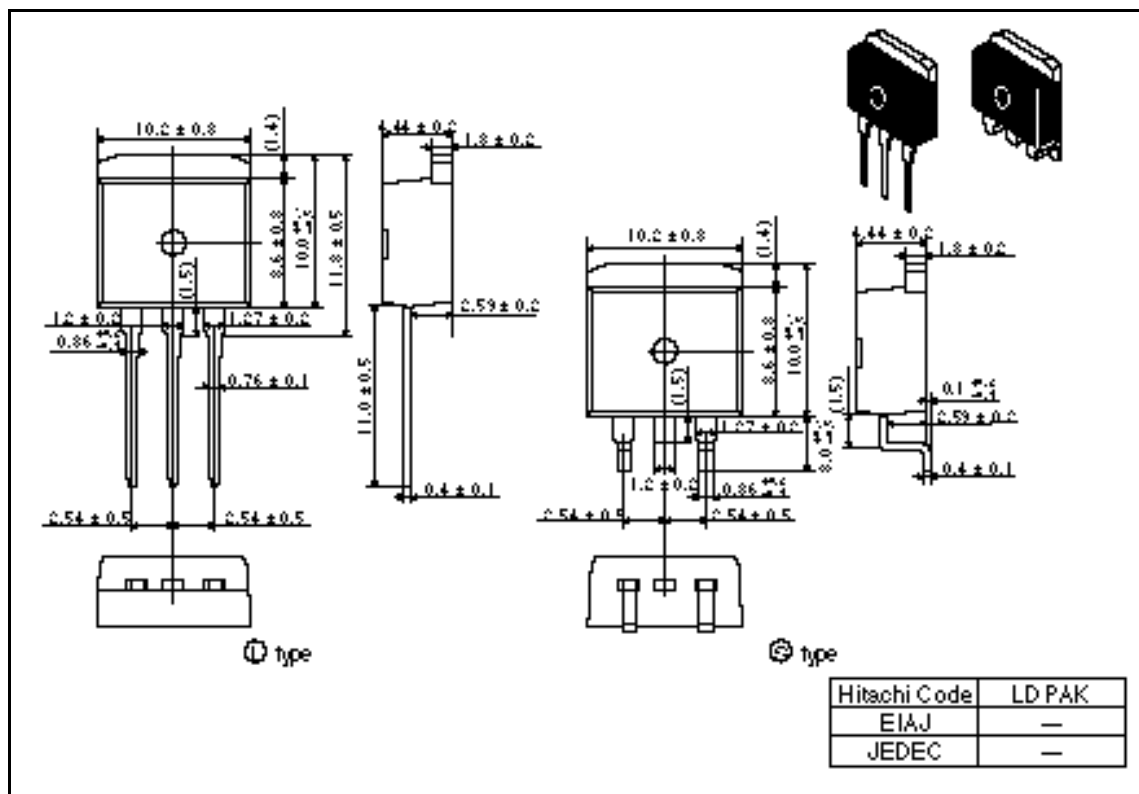
4. Include the time shift based on increasing of channel temperature when operate under over load condition.

See characteristics curve of HAF1001.

HAF1002(L), HAF1002(S)

Package Dimensions

Unit: mm



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