DHA® QJ/DHA 01.01-1997 **LD1041**

Automotive Direction Indicator IC

Description

LD1041 (analog UAA1041B) was designed for use in conjunction with a relay in automotive applications. It is also applicable for other warning lamps such as “handbrake ON,” etc.

Features

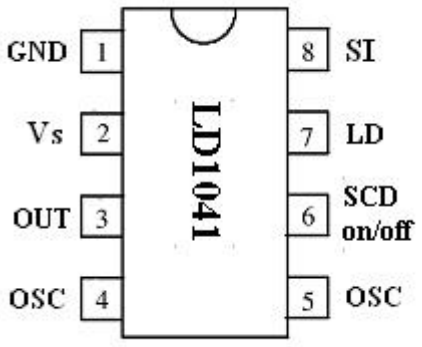
- Defective Lamp Detection
- Overvoltage Protection
- Reverse Battery Connection Protection
- Integrated Suppression Clamp Diode
- Short Circuit Detection and Relay Shutdown to Prevent Risk of Fire

Ordering Information

Package	Remarks
SOP8	Tubed, Reeled, Pb-free
DIP8	Tubed, Pb-free

Pin Description

Pin	Symbol	Function
1	GND	IC ground
2	Vs	Supply voltage
3	OUT	Relay control output
4	OSC	Oscillator
5	OSC	Oscillator
6	SCD on/off	Short circuit detection on/off
7	LD	Lamp failure detection
8	SI	Start input



Pins Figure

Maximum Ratings

Parameters	Symbol	Value	Unit
Power dissipation	P_D	350	mW
Output current	Iout	300	mA
Junction temperature	T_J(max)	150	℃
Work temperature	T_A	-40 ~ +100	℃
Storage temperature	T_{stg}	-65 ~ +150	℃

Electrical Characteristics（Ta = 25℃）

Characteristics	Symbol	Test condition	Min	Typ	Max	Unit
Battery Voltage Range	V_B		8.0		18.0	V
Overvoltage Detector Threshold	$D_{th(OV)}$	V_2-V_1	18.0	20.2	21.5	V
Clamping Voltage	V_{IK}	V_2-V_1	29.0	31.5	34.0	V
Short Circuit Detector Threshold	$D_{th(SV)}$	V_2-V_7	0.63	0.7	0.77	V
Oscillator Constant (normal operation)	Kn		1.4	1.5	1.6	
Oscillator Constant (1 lamp defect of 21 W)	Kf		0.63	0.68	0.73	
Oscillator Constant	K1 K2 K3		0.16 0.25 0.126	0.18 0.27 0.13	0.193 0.29 0.14	
Defect Lamp Detector Threshold	Vth (Vpin2-Vpin7)	V_{Pin2} =13.5V R_3 =220Ω	79.0	85.3	91.0	mV
Starter Resistance	Rst	R_2+R_{Lamp}			3.6	KΩ
Duty Cycle (normal operation)			45	50	55	%
Duty Cycle (1 lamp defect of 21 W)			35	40	45	%
Current Consumption (relay off) Pin1	Icc（off）	V_{Pin2}- V_{Pin1} =8.0V =13.5V =18V	- -2.4 -	-0.9 -1.6 -2.2	- -1.0 -	mA
Current Consumption (relay on) Pin1	Icc（on）	V_{Pin2}- V_{Pin1} =8.0V =13.5V =18V		-3.8 -5.6 -6.9		mA

Circuit Description

The circuit is designed to drive the direction indicator flasher relay. Figure 1 shows the typical system configuration with the external components. It consists of a network (R_1, C_1) to determine the oscillator frequency, shunt resistor (R_S) to detect defective bulbs and short circuits in the system, and two current limiting resistors (R_2 / R_3) to protect the IC against load dump transients. The circuit can be used either with or without short circuit detection, and features overvoltage, defective lamp and short circuit detection.

The light bulbs L_1, L_2, L_3, L_4 are the turn signal indicators. When switch K_1 is closed, after a time delay of t_1 (in our example $t_1 \approx 75$ ms), the relay will be actuated. The corresponding light bulbs (L_1, L_2 or L_3, L_4) will flash at the oscillator frequency, independent of the battery voltage of 8.0V to 18V. The flashing cycle stops and the circuit is reset to the initial position when switch K_1 is open.

Overvoltage Detection

Senses the battery voltage. When this voltage exceeds 20.2V (12V Flasher) or 30.5V (24V Flasher), (this is the case when two batteries are connected in series), the relay will be turned off to protect the light bulbs.

Light bulb Defect Detector

Senses the current through the shunt resistor R_S. When one of the light bulbs is defective, the failure is indicated by doubling the flashing frequency.

Short Circuit Detector

Detects excessive current ($I_{sh} > 25$ A) flowing in the shunt resistor R_S. The detection takes place after a time delay of t_3 ($t_3 \approx 55$ ms). In this case, the relay will be turned off. The circuit is reset by switching S_1 to the off position.

Operation with Short Circuit Detection

Pin 6 has to be left open and a capacitor C_2 has to be connected between Pin 1 and Pin 2.

Operation without Short Circuit Detection

Pin 6 has to be connected to Pin 2, and the use of capacitor C_2 is not necessary. The circuit can also be used for other warning flashers.

Application Information

1. The flashing cycle is started by closing K_1.

   The switch position is sensed across resistor R_2 and R_{Lamp} by Input pin 8. $R_{st} = R_2 + R_{Lamp}$.

   The condition for the start is: $R_{st} < 3.6\ k\Omega$.

   For correct operation, leakage resistance from Pin 8 to ground must be greater than 5.6 kΩ.

2. Flashing frequency: $f_n = 1/ (R_1 \times C_1 \times Kn)$

3. Flashing frequency in the case of one defective lightbulb of 21 W:

   $f_F = 1 / (R_1 \times C_1 \times KF)$ $Kn = 2.2KF$

4. t_1: delay at the moment when K_1 is closed and first flash $t_1 = K1 \times R_1 \times C_1$

5. t_2: defective lightbulb detection delay $t_2 = K2 \times R_1 \times C_1$

6. t_3: short circuit detection delay $t_3 = K3 \times R_1 \times C_1$

Application circuit

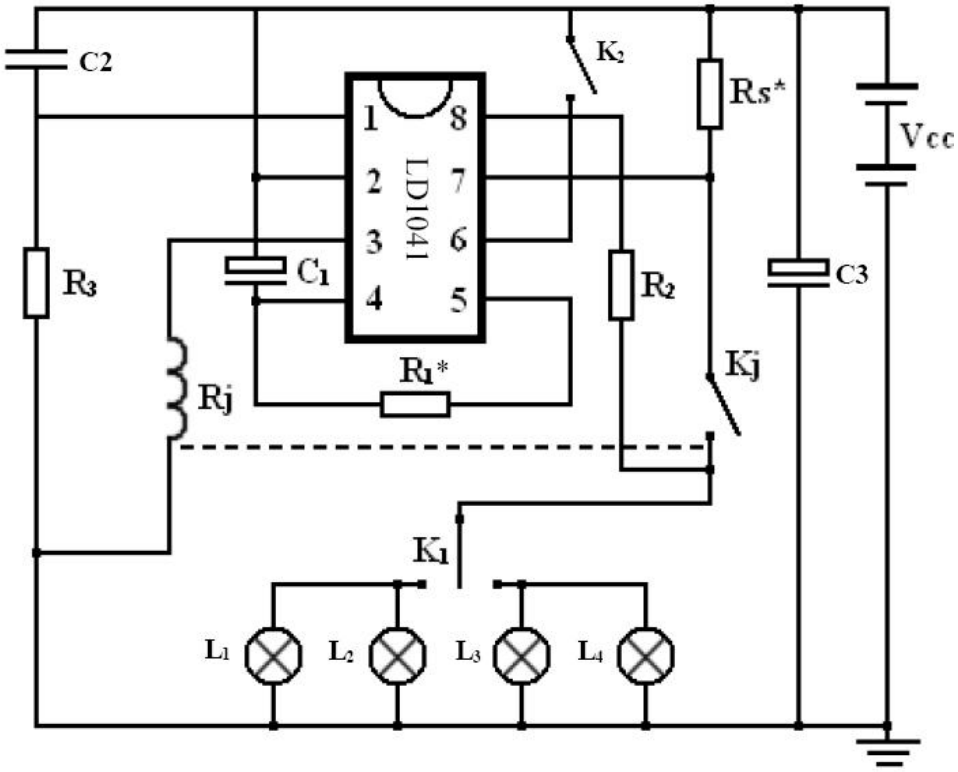


Figure 1. 12V Typical Application Circuit

External Parts List			
R1*	75 KΩ~150KΩ	C1	4.7μF
R2	3.3KΩ	C2	0.047μF
R3	220Ω	C3	47μF/50V
Rs*	30mΩ Rs* According to the different circuit board layout, can adjust.		
Kj / Rj Relay coil resistance range 100Ω			
K2：Turn off K2, have short-circuit protection. Turn on K2, not short-circuit protection, C2 may be deleted also.			

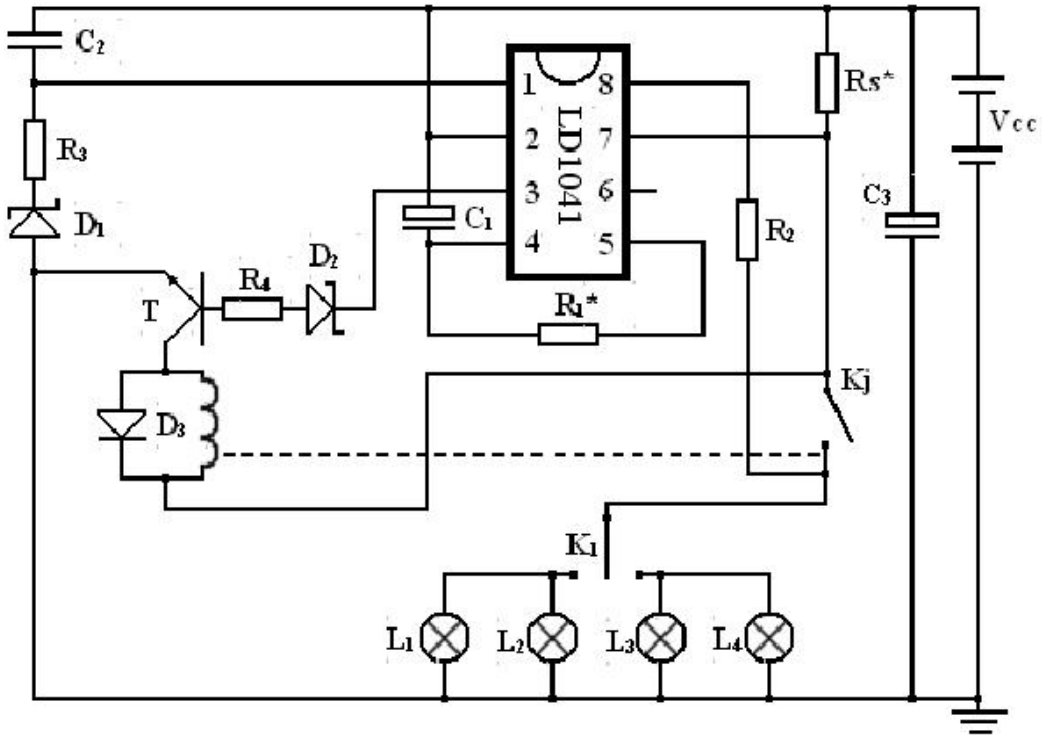


Figure 2. 24V Typical Application Circuit

External Parts List			
R1*	82KΩ	C1	4.7μF
R2	6.8KΩ	C2	0.047μF
R3	680Ω	C3	47μF/50V
R4	4.7KΩ	D1	Clamp 6.8V
Rs*	66mΩ	D2*	Clamp 16V
T	C1008(O)或 8050	D3	1N4004
Relay coil resistance range 360Ω			

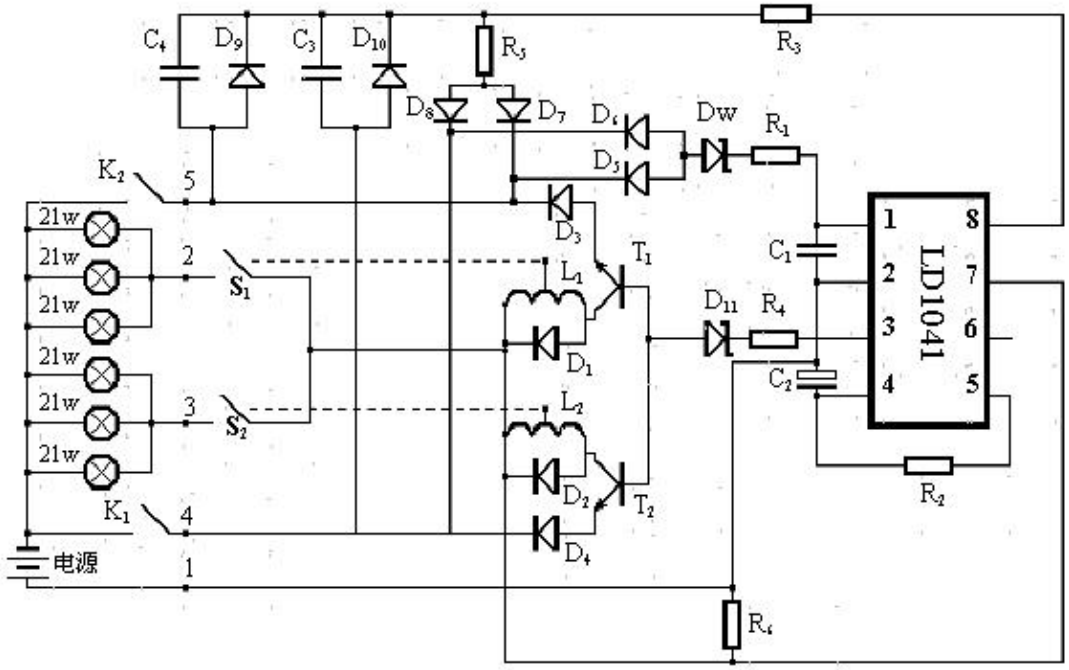


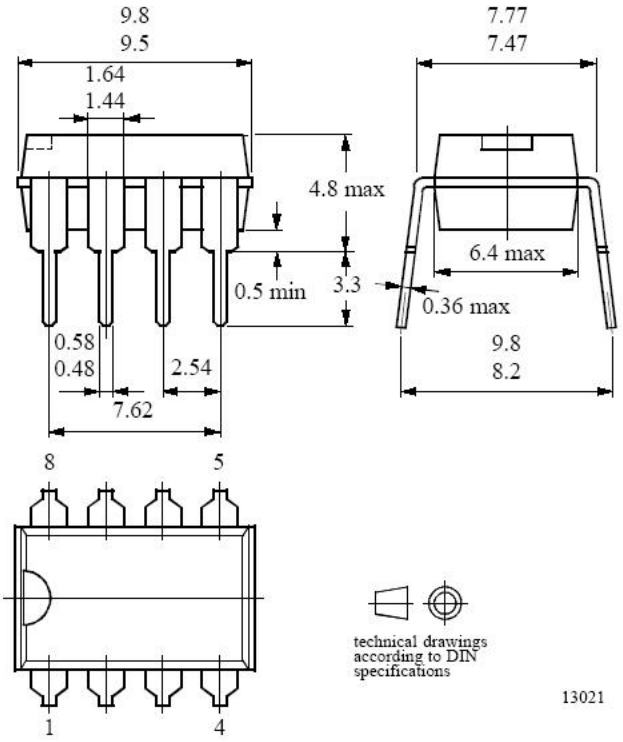
Figure 3. 24V Dual Output Typical Application Circuit

External Parts List					
R1	680Ω	C1	0.047μF	D1, D2, D3, D4, D5, D6	IN4004
R2	82KΩ	C2	4.7μF	D7, D8, D9, D10	IN4148
R3	6.8KΩ	C3	0.047μF	T1, T2	2SC1008 or S8050
R4	4.7KΩ	C4	0.047μF		
R5	3.3KΩ	DW	Clamp 6.8V		
R6	66mΩ	D11	Clamp 16V		
L1, L2 Relay coil resistance range 360Ω Overvoltage Protection Short Circuit Protection					

Package Information

DIP8

Dimensions in mm



SOP8

Dimensions in mm