

Automotive Direction Indicator

This device 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.

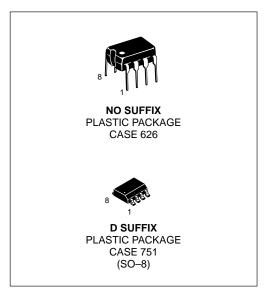
- Defective Lamp Detection
- Overvoltage Protection
- Short Circuit Detection and Relay Shutdown to Prevent Risk of Fire
- Reverse Battery Connection Protection
- Integrated Suppression Clamp Diode

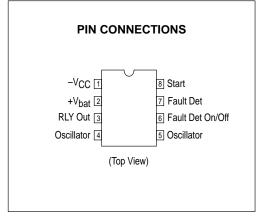
Figure 1. Typical Automotive System C2 -Vcc Rs 8 **UAA1041** 3 6 C1 5 R2≷ Relay S1 \diamondsuit L1: 1.2 W, warning light handbrake ON L2, L3, L4, L5: 21 W, turn signals $R_S = 30 \text{ m}\Omega$ R2 = 3.3 k $C1 = 5.6 \,\mu\text{F}$ $\mathsf{R3} = 220~\Omega$ $C2 = 0.047 \,\mu\text{F}$

UAA1041B

AUTOMOTIVE DIRECTION INDICATOR

SEMICONDUCTOR TECHNICAL DATA





ORDERING INFORMATION

Device	Operating Temperature Range	Package
UAA1041BD	$T_A = -40^{\circ} \text{ to } +100^{\circ}\text{C}$	SO-8
UAA1041B	1A = -40 10 +100 C	Plastic DIP

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MAXIMUM RATINGS

Rating	Pin	Value	Unit
Current: Continuous/Pulse*	1	+150/+500	mA
	_	-35/-500	
	2	±350/1900	
	3	±300/1400	
	8	±25/50	
Junction Temperature	TJ	150	°C
Operating Ambient Temperature Range	T _A	-40 to + 100	°C
Storage Temperature Range	T _{stg}	-65 to + 150	°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	100	°C/W (Typ)

 $[\]ensuremath{^{\star}}$ One pulse with an exponential decay and with a time constant of 500 ms.

ELECTRICAL CHARACTERISTICS $(T_1 = 25^{\circ}C)$

Characteristics		Symbol	Min	Тур	Max	Unit
Battery Voltage Range (normal operation)		VB	8.0	-	18	V
Overvoltage Detector Threshold	(VPin2-VPin1)	D _{th(OV)}	19	20.2	21.5	V
Clamping Voltage	(V _{Pin2} -V _{Pin1})	VIK	29	31.5	34	V
Short Circuit Detector Threshold	(VPin2-VPin7)	D _{th(SC)}	0.63	0.7	0.77	V
Output Voltage (I _{relay} = -250 mA)	(VPin2-VPin3)	Vo	-	-	1.5	V
Starter Resistance R _{St} = R ₂ + R _{Lamp}		R _{st}	-	-	3.6	kن
Oscillator Constant (normal operation)		Kn	1.4	1.5	1.6	-
Temperature Coefficient of Kn		Kn	-	-1.5x10 ⁻³	_	1/°C
Duty Cycle (normal operation)		-	45	50	55	%
Oscillator Constant – (1 lamp defect of 21 W)	1	K _F	0.63	0.68	0.73	-
Duty Cycle (1 lamp defect of 21 W)		-	35	40	45	%
Oscillator Constant		K1 K2 K3	0.167 0.25 0.126	0.18 0.27 0.13	0.193 0.29 0.14	-
Current Consumption (relay off) Pin 1; at VPin2 - VPin1 = 8.0 V = 13.5 V = 18 V		Icc	- -2.5 -	-0.9 -1.6 -2.2	- -1.0 -	mA
Current Consumption (relay on) Pin 1; at VPin2 - VPin1 = 8.0 V = 13.5 V = 18 V		-	- - -	-3.8 -5.6 -6.9	- - -	mA
Defect Lamp Detector Threshold at Vpin2 to and R $_3$ = 220 Ω	V _B = 8.0 V = 13.5 V = 18 V	VPin2-VPin7 VPin2-VPin7 VPin2-VPin7	- 79 -	68 85.3 100	– 91 –	mV

[†] See Note 1 of Application Information

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CIRCUIT DESCRIPTION

The circuit is designed to drive the direction indicator flasher relay. Figure 2 shows the typical system configuration with the external components. It consists of a network (R1, C1) to determine the oscillator frequency, shunt resistor (R $_{\rm S}$) to detect defective bulbs and short circuits in the system, and two current limiting resistors (R $_{\rm Z}/R_{\rm 3}$) 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 lightbulbs L2, L3, L4, L5 are the turn signal indicators with the dashboard–light L6. When switch S1 is closed, after a time delay of t_1 (in our example t_1 = 75 ms), the relay will be actuated. The corresponding lightbulbs (L2, L3 or L4, L5) will flash at the oscillator frequency, independent of the battery voltage of 8.0 V to 18 V. The flashing cycle stops and the circuit is reset to the initial position when switch S1 is open.

Overvoltage Detection

Senses the battery voltage. When this voltage exceeds 20.2 V (this is the case when two batteries are connected in series), the relay will be turned off to protect the lightbulbs.

Lightbulb Defect Detector

Senses the current through the shunt resistor R_S. When one of the lightbulbs 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 t₃ (t₃ = 55 ms). In this case, the relay will be turned off. The circuit is reset by switching S1 to the off position.

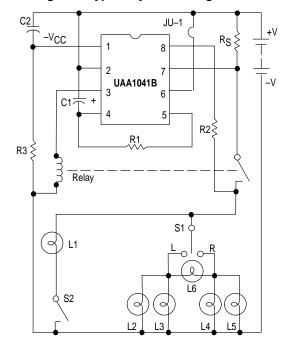
Operation with Short Circuit Detection

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 C₂ is not necessary. The circuit can also be used for other warning flashers. In this example, when the handbrake is engaged, it is signaled by the light (L1).

Figure 2. Typical System Configuration



PARTS LIST

$R1 = 75 \text{ k}\Omega$	Relay-Coil Resistance
$R2 = 3.3 \text{ k}\Omega$	Range 60 Ω to 800 Ω
$R3 = 220 \Omega$	
$R_S = 30 \text{ m}\Omega$	Note: Per text connect
Wire Resistor	jumper JU-1 bypass
$C1 = 5.6 \mu F$	short circuit detector
$C2 = 0.047 \mu\text{F}$	C2 may be deleted also.

APPLICATION INFORMATION

1. The flashing cycle is started by closing S1. The switch position is sensed across resistor R2 and R1 amp by Input 8.

$$R_{st} = R_2 + R_{Lamp}$$
.

The condition for the start is: R_{St} < 3.6 k Ω . For correct operation, leakage resistance from Pin 8 to ground must be greater than 5.6 k Ω .

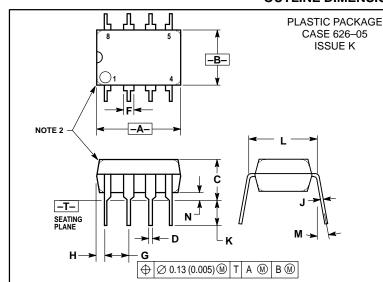
- 2. Flashing frequency: $f_n = \frac{1}{R_1 C_1 K_n}$
- Flashing frequency in the case of one defective lightbulb of 21 W:

$$f_F = \frac{1}{R_1 C_1 K_F} K_n = 2.2 K_F$$

- t₁: delay at the moment when S1 is closed and first flash t₁ = K₁R₁C
- 5. t2: defective lightbulb detection delay t2 = K2R1C1
- t3: short circuit detection delay t3 = K₁R₁C₁
 In the case of short circuit it is assumed that the voltage (V_{Pin2}–V_{Pin1})≥8.0 V. The relay will be turned off after delay t3. The circuit is reset by switching S1 to the off position. The capacitor C2 is not obligatory when the short circuit
- detector is not used. In this case Pin 6 has to be connected to Pin 2.
 - When overvoltage is sensed $(V_{Pin2} V_{Pin1})$ the relay is
- turned off to protect the relay and the lightbulbs against excessive currents.

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OUTLINE DIMENSIONS

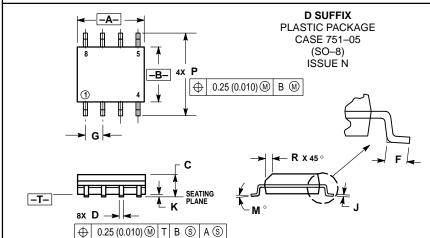


NOTES

- 1. DIMENSION L TO CENTER OF LEAD WHEN
- FORMED PARALLEL.

 2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
- 3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	MILLIMETERS		INC	HES
DIM	MIN	MAX	MIN	MAX
Α	9.40	10.16	0.370	0.400
В	6.10	6.60	0.240	0.260
С	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100	BSC
Н	0.76	1.27	0.030	0.050
7	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300	BSC
M		10°	_	10°
N	0.76	1.01	0.030	0.040



NOTES

- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: MILLIMETER.
 DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
- 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006)
- PER SIDE.

 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION ALLOWABLE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES		
DIM	MIN	MAX	MIN	MAX	
Α	4.80	5.00	0.189	0.196	
В	3.80	4.00	0.150	0.157	
С	1.35	1.75	0.054	0.068	
D	0.35	0.49	0.014	0.019	
F	0.40	1.25	0.016	0.049	
G	1.27 BSC		0.050 BSC		
J	0.18	0.25	0.007	0.009	
K	0.10	0.25	0.004	0.009	
M	0 °	7 °	0 °	7 °	
Р	5.80	6.20	0.229	0.244	
R	0.25	0.50	0.010	0.019	

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How to reach us:

USA/EUROPE/Locations Not Listed: Motorola Literature Distribution: P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447 or 602-303-5454

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE 602-244-6609 INTERNET: http://Design-NET.com

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-81-3521-8315

ASIA/PACIFIC: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park, 51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



