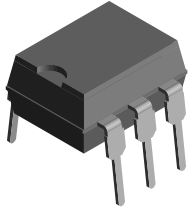
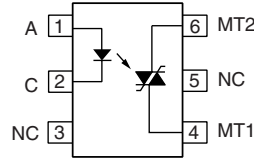


## Optocoupler, Phototriac Output, Low Input Current



I179035



### DESCRIPTION

The IL440 consists of a GaAs infrared emitter optically coupled to a silicon planar triac chip with a non-zero crossing network. The two semiconductors are assembled in a 6 pin dual-in-line plastic package. The IL440 can handle currents up to 100 mA RMS.

### AGENCY APPROVALS

- UL1577, file no. E52744 system code H or J, double protection
- CSA 93751
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI IEC 60950; IEC 60065

### FEATURES

- 400 V blocking voltage
- 5.0 mA maximum trigger current
- Isolation test voltage, 5300 V<sub>RMS</sub>, t = 1.0 s
- Isolation materials per UL94
- Pin compatible with optocouplers:
  - IL440-4 MOC 3021
  - IL440-5 MOC 3022
  - IL440-6 MOC 3023
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- High current triac driver
- Solid state relay
- Switch small AC loads

ORDER INFORMATION	
PART	REMARKS
IL440-4	15 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , DIP-6
IL440-5	10 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , DIP-6
IL440-6	5.0 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , DIP-6
IL440-4X007	15 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , SMD-6 (option 7)
IL440-4X009	15 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , SMD-6 (option 9)
IL440-5X006	10 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , DIP-6 400 mil (option 6)
IL440-5X009	10 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , SMD-6 (option 9)
IL440-6X006	5.0 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , DIP-6 400 mil (option 6)
IL440-6X007	5.0 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , SMD-6 (option 7)
IL440-6X009	5.0 mA I <sub>FT</sub> , 400 V V <sub>DRM</sub> , SMD-6 (option 9)

### Note

For additional information on the available options refer to option information.

ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>					
PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
<b>INPUT</b>					
Reverse voltage			$V_R$	5	V
Forward current			$I_F$	60	mA
Surge current	P.W. < 10 $\mu$ s		$I_{FSM}$	3	A
Power dissipation			$P_{diss}$	100	mW
Junction temperature			$T_j$	100	$^{\circ}$ C
<b>OUTPUT</b>					
Peak off-state voltage		IL440-4	$V_{DRM}$	400	V
		IL440-5	$V_{DRM}$	400	V
		IL440-6	$V_{DRM}$	400	V
On-state RMS current			$I_{D(RMS)}$	100	mA
Peak surge current	$t_p \leq 10$ ms		$I_{FSM}$	1.2	A
Peak on-state current	$t_p/T = 0.01 \leq 100$ $\mu$ s		$I_{DRM}$	2	A
Power dissipation			$P_{diss}$	300	mW
Junction temperature			$T_j$	125	$^{\circ}$ C
<b>COUPLER</b>					
Isolation voltage	$t = 1.0$ s		$V_{ISO}$	5300	$V_{RMS}$
Creepage distance				$\geq 7$	mm
Clearance distance				$\geq 7$	mm
Isolation resistance	$V_{IO} = 500$ V, $T_{amb} = 25$ $^{\circ}$ C		$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500$ V, $T_{amb} = 100$ $^{\circ}$ C		$R_{IO}$	$\geq 10^{11}$	$\Omega$
Total power dissipation			$P_{tot}$	330	mW
Storage temperature range			$T_{stg}$	- 55 to + 125	$^{\circ}$ C
Ambient temperature			$T_{amb}$	- 40 to + 100	$^{\circ}$ C
Junction temperature			$T_j$	100	$^{\circ}$ C
Lead soldering temperature <sup>(2)</sup>	2 mm from case, $t < 10$ s		$T_{slid}$	260	$^{\circ}$ C

**Notes**

<sup>(1)</sup>  $T_{amb} = 25$   $^{\circ}$ C, unless otherwise specified. Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

<sup>(2)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 50$ mA	$V_F$		1.25		V
Reverse voltage	$I_R = 10$ $\mu$ A	$V_R$	5			V
Junction capacitance	$V_R = 0$ V, $f = 1$ MHz	$C_j$		50		pF
<b>OUTPUT <sup>(2)</sup></b>						
Peak on-state voltage	$I_{TM} = 100$ mA, $I_{FT} = 30$ mA	$V_{TM}$		1.5	3	V
Critical rate of rise of off-state voltage	$I_F = 0$ , $V_D = 0.67$ $V_{DRM}$	$dV/dt_{cr}$		50		V/ $\mu$ s
Critical rate of rise of on-state current commutation	$I_F = 30$ mA, $V_D = 60$ $V_{RMS}$	$dV/dt_{crq}$	0.13	0.25		V/ $\mu$ s
<b>COUPLER</b>						
Holding current	$I_F \geq 10$ mA, $V_S \geq 3$ V	$I_H$		1		mA

**Notes**

<sup>(1)</sup>  $T_{amb} = 25$   $^{\circ}$ C, unless otherwise specified. Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

<sup>(2)</sup> Off-state output terminal voltage (see table 1.)



I <sub>FT</sub> AND BLOCKING VOLTAGE SELECTION		
BIN NUMBER	B <sub>V</sub> (V) MAXIMUM at I <sub>DRM</sub> = 500 nA	I <sub>FT</sub> MAXIMUM at V <sub>T</sub> = 6 V, R <sub>L</sub> = 150 Ω
IL440-4	400	15
IL440-5	400	10
IL440-6	400	5

**Note**

Test voltage must be applied within dV/dt rating of 0.13 V/μs.

MAXIMUM SAFETY RATINGS (1)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT (2)</b>						
Forward voltage		I <sub>S, INPUT</sub>			130	mA
<b>OUTPUT</b>						
Power dissipation		P <sub>S, OUTPUT</sub>			300	mW

**Notes**

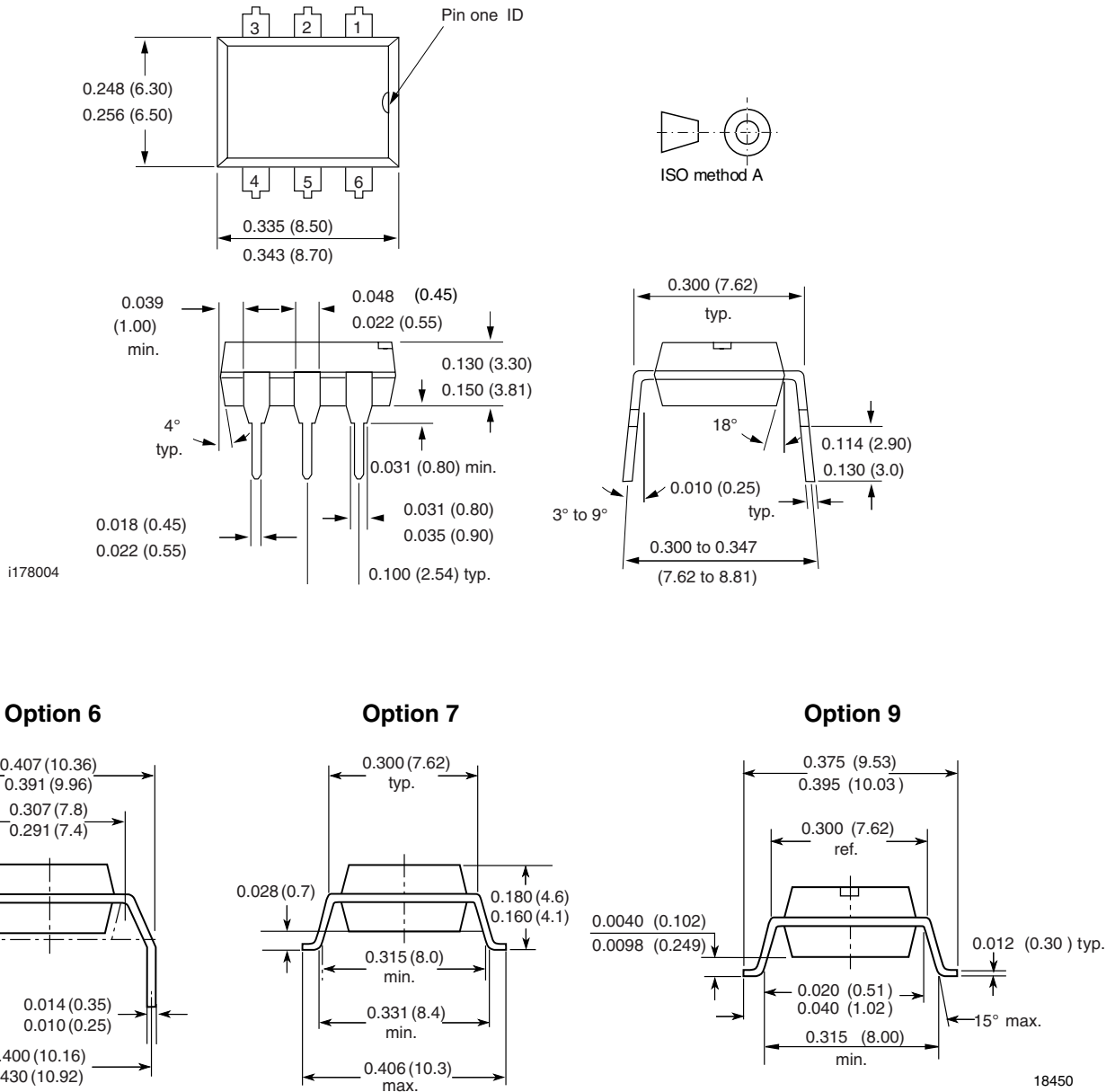
- (1) According to DIN EN 60747-5-5 (see figure 1). This optocoupler is suitable for safe electrical isolation only within the safety ratings. Compliance with the safety ratings shall be ensured by means of suitable protective circuits.
- (2) The device is used for protective separation against electrical shock within the maximum safety ratings. This must be ensured by protective circuits in the applications.

SAFETY AND INSULATION RATINGS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Climatic classification (according to IEC 68 part 1)				55/100/21		
Pollution degree	DIN VDE 0109			2		
Comparative tracking index		CTI	175			
V <sub>IO TM</sub>			8000			V <sub>peak</sub>
V <sub>IO RM</sub>			890			V <sub>peak</sub>
Insulation resistance at 25 °C	V <sub>IO</sub> = 500 V	R <sub>IS</sub>			≥ 10 <sup>12</sup>	Ω
Insulation resistance at T <sub>S</sub>	V <sub>IO</sub> = 500 V	R <sub>IS</sub>			≥ 10 <sup>9</sup>	Ω
Insulation resistance at 100 °C	V <sub>IO</sub> = 500 V	R <sub>IS</sub>			≥ 10 <sup>11</sup>	Ω
Partial discharge test voltage	Method a, V <sub>pd</sub> = V <sub>IO RM</sub> × 1.875	V <sub>pd</sub>			1669	V <sub>peak</sub>
P <sub>SO</sub>					500	mW
I <sub>SI</sub>					250	mA
T <sub>SI</sub>					175	°C
Clearance distance	standard DIP-6		7			mm
Creepage distance	standard DIP-6		7			mm
Clearance distance	400 mil DIP-6		8			mm
Creepage distance	400 mil DIP-6		8			mm

**Note**

As per IEC60747-5-2, § 7.4.3.8.1, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

**PACKAGE DIMENSIONS** in inches (millimeters)



**OZONE DEPLETING SUBSTANCES POLICY STATEMENT**

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

We reserve the right to make changes to improve technical design  
and may do so without further notice.

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Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany



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