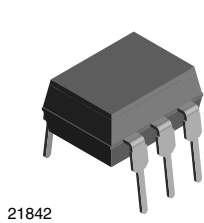
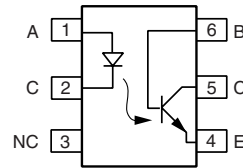


## Optocoupler, Phototransistor Output



21842



### FEATURES

- Isolation test voltage 5000 V<sub>RMS</sub>
- High common mode rejection
- Thickness though insulation  $\geq 0.4$  mm
- Creepage current resistance according to VDE 0303/IEC 60112 comparative tracking index: CTI  $\geq 275$
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- Switch-mode power supplies
- Line receiver
- Computer peripheral interface
- Microprocessor system interface
- Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation):
  - for appl. class I - IV at mains voltage  $\leq 300$  V
  - for appl. class I - III at mains voltage  $\leq 600$  V according to DIN EN 60747-5-5

### DESCRIPTION

The 4N38A consists of a phototransistor optically coupled to a gallium arsenide infrared-emitting diode in a 6 pin plastic dual inline package.  
The base of the phototransistor is not connected providing noise immunity.

### AGENCY APPROVALS

- UL1577, file no. E52744, double protection
- BSI IEC 60950; IEC 60065 pending
- DIN EN 60747-5-5 (VDE 0884)
- FIMKO

### ORDER INFORMATION

PART	REMARKS
4N38A	CTR > 20 %, DIP-6

### ABSOLUTE MAXIMUM RATINGS <sup>(1)</sup>

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>INPUT</b>				
Reverse voltage		V <sub>R</sub>	5	V
Forward current		I <sub>F</sub>	60	mA
Forward surge current	t <sub>p</sub> ≤ 10 μs	I <sub>FSM</sub>	3	A
Power dissipation		P <sub>diss</sub>	70	mW
Junction temperature		T <sub>j</sub>	125	°C
<b>OUTPUT</b>				
Collector emitter voltage		V <sub>CEO</sub>	70	V
Emitter collector voltage		V <sub>ECO</sub>	7	V
Collector current		I <sub>C</sub>	50	mA
Collector peak current	t <sub>p</sub> /T = 0.5, t <sub>p</sub> ≤ 10 ms	I <sub>CM</sub>	100	mA
Power dissipation		P <sub>diss</sub>	70	mW
Junction temperature		T <sub>j</sub>	125	°C

**ABSOLUTE MAXIMUM RATINGS (1)**

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
<b>COUPLER</b>				
Isolation test voltage (RMS)		$V_{ISO}$	5000	$V_{RMS}$
Total power dissipation		$P_{tot}$	200	mW
Ambient temperature range		$T_{amb}$	- 55 to + 100	°C
Storage temperature range		$T_{stg}$	- 55 to + 125	°C
Soldering temperature (2)	2 mm from case, $t \leq 10$ s	$T_{sld}$	260	°C

**Notes**

(1)  $T_{amb} = 25$  °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.

(2) Refer to wave profile for soldering conditions for through hole devices.

**ELECTRICAL CHARACTERISTICS**

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 50$ mA	$V_F$		1.25	1.6	V
Junction capacitance	$V_R = 0$ , $f = 1$ MHz	$C_j$		50		pF
<b>OUTPUT</b>						
Collector emitter voltage	$I_C = 1$ mA	$V_{CEO}$	80			V
	$I_C = 100$ $\mu$ A, $I_B = 1$ $\mu$ A	$BV_{CBO}$	80			V
Emitter collector voltage	$I_E = 100$ $\mu$ A	$V_{ECO}$	7			V
Collector emitter cut-off current	$V_{CE} = 20$ V, $I_F = 0$ , $E = 0$	$I_{CEO}$		200		nA
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_F = 10$ mA, $I_C = 1$ mA	$V_{CEsat}$			0.3	V
Cut-off frequency	$V_{CE} = 5$ V, $I_F = 10$ mA, $R_L = 100$ $\Omega$	$f_c$		110		kHz
Coupling capacitance	$f = 1$ MHz	$C_k$		0.6		pF

**Note**

$T_{amb} = 25$  °C, unless otherwise specified.

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

**CURRENT TRANSFER RATIO**

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
$I_C/I_F$	$V_{CE} = 10$ V, $I_F = 20$ mA	-	CTR	20			%
	$V_{CE} = 10$ V, $I_F = 10$ mA, $T_A = - 55$ °C to + 100 °C	-	CTR	30			%

**MAXIMUM SAFETY RATINGS**

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward current		$I_F$			130	mA
<b>OUTPUT</b>						
Power dissipation		$P_{diss}$			265	mW
<b>COUPLER</b>						
Rated impulse voltage		$V_{IOTM}$			6	kV
Safety temperature		$T_{si}$			150	°C

**Note**

According to DIN EN 60747-5-5. 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.

INSULATION RATED PARAMETERS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Partial discharge test voltage - routine test	100 %, $t_{\text{test}} = 1 \text{ s}$	$V_{\text{pd}}$	1.6			kV
Partial discharge test voltage - lot test (sample test)	$t_{\text{Tr}} = 60 \text{ s}$ , $t_{\text{test}} = 10 \text{ s}$ , (see figure 1)	$V_{\text{IOTM}}$	6			kV
		$V_{\text{pd}}$	1.3			kV
Insulation resistance	$V_{\text{IO}} = 500 \text{ V}$	$R_{\text{IO}}$	$10^{12}$			$\Omega$
	$V_{\text{IO}} = 500 \text{ V}$ , $T_{\text{amb}} = 100 \text{ }^{\circ}\text{C}$	$R_{\text{IO}}$	$10^{11}$			$\Omega$
	$V_{\text{IO}} = 500 \text{ V}$ , $T_{\text{amb}} = 150 \text{ }^{\circ}\text{C}$ (construction test only)	$R_{\text{IO}}$	$10^9$			$\Omega$

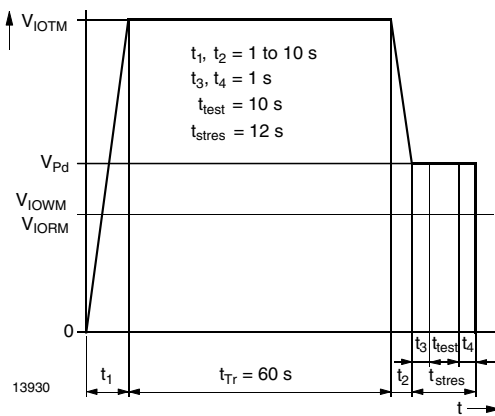


Fig. 1 - Test Pulse Diagram for Sample Test According to DIN EN 60747-5-5/DIN EN 60747-; IEC60747

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Switching time <sup>(1)</sup>	$V_{\text{CE}} = 10 \text{ V}$ , $I_{\text{F}} = 10 \text{ mA}$ , $T_{\text{A}} = -55 \text{ }^{\circ}\text{C}$ to $+100 \text{ }^{\circ}\text{C}$	$t_{\text{d}}$		4		$\mu\text{s}$

**Note**

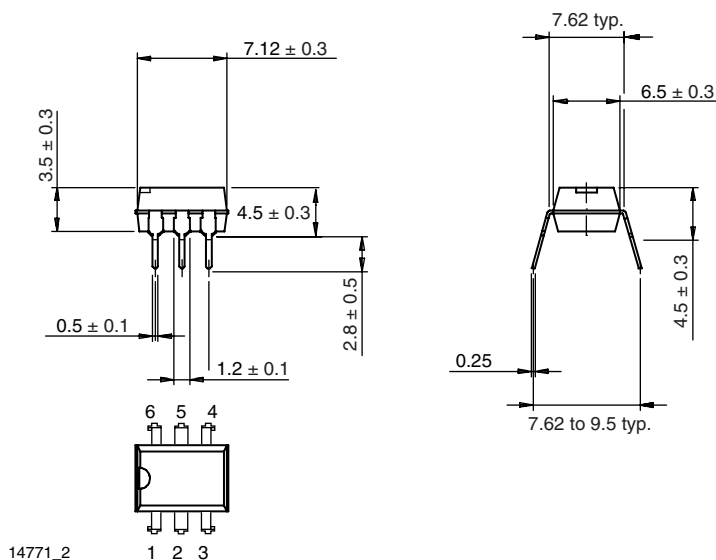
<sup>(1)</sup> Indicates JEDEC registered values

# 4N38A

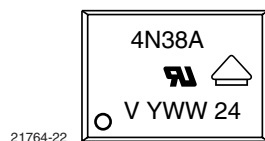
Vishay Semiconductors Optocoupler, Phototransistor Output



## PACKAGE DIMENSIONS in millimeters



## PACKAGE MARKING





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