PS9305L

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Rev.0.01
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–NEPOC Series–

2.5 A OUTPUT CURRENT, HIGH CMR, IGBT GATE DRIVE, 8-PIN SDIP PHOTOCOUPLER

DESCRIPTION

The PS9305L is an optically coupled isolator containing a GaAlAs LED on the input side and a photo diode, a signal processing circuit and a power output transistor on the output side on one chip.

The PS9305L is designed specifically for high common mode transient immunity (CMR), high output current and high switching speed.

The PS9305L is suitable for driving IGBTs and MOS FETs.

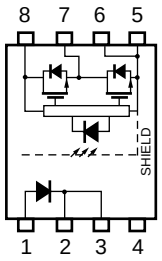
FEATURES

- Long creepage distance (8 mm MIN.)
- Large peak output current (2.5 A MAX., 2.0 A MIN.)
- High speed switching (t_{PLH}, t_{PHL} = 0.25 μs MAX.)
- UVLO (Under Voltage Lock Out) protection with hysteresis
- High common mode transient immunity (CM_H, CM_L = ±25 kV/μs MIN.)

APPLICATIONS

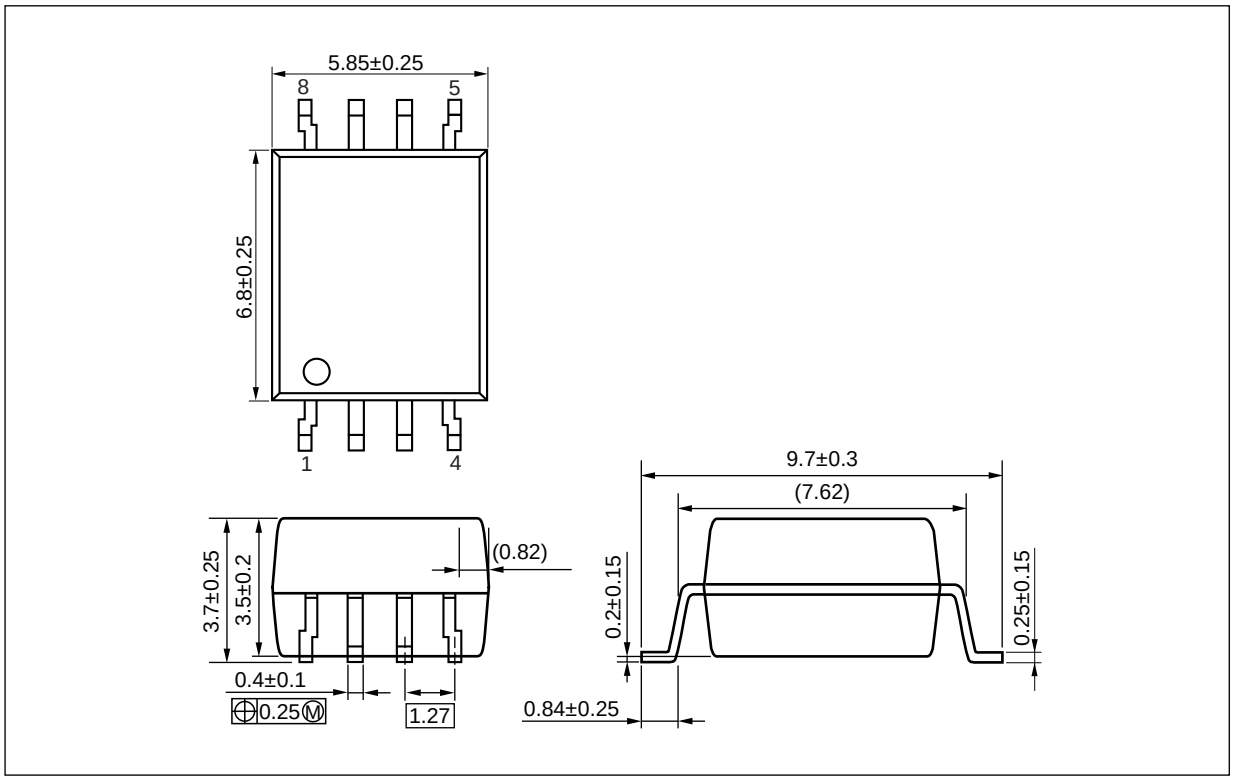
- IGBT, Power MOS FET Gate Driver
- Industrial inverter
- IH (Induction Heating)

PIN CONNECTION
(Top View)



1. Anode
2. Cathode
3. Cathode
4. NC
5. V_{EE}
6. V_{EE}
7. V_O
8. V_{CC}

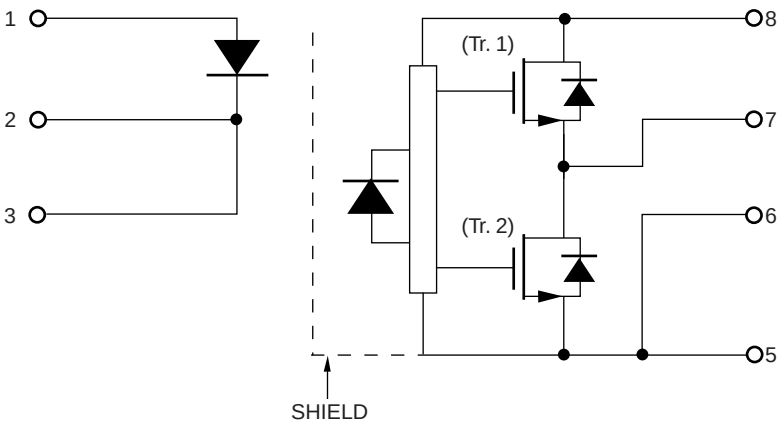
PACKAGE DIMENSIONS (UNIT: mm)



PHOTOCOUPLER CONSTRUCTION

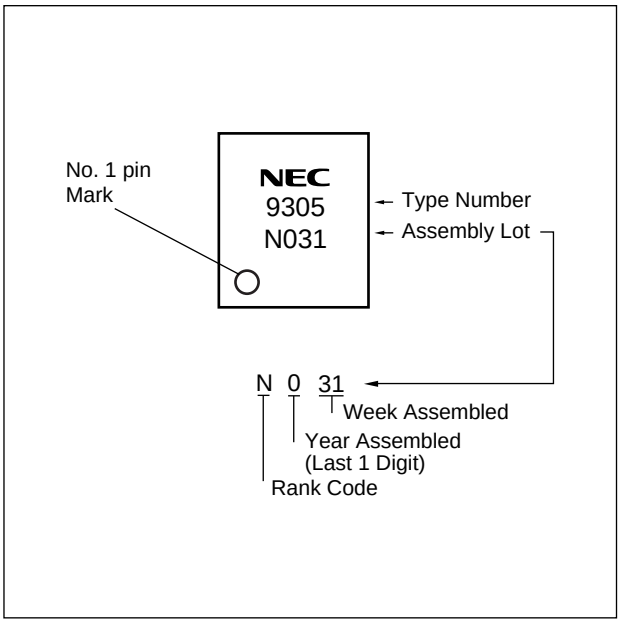
Parameter	Unit (MIN.)
Air Distance	7 mm
Outer Creepage Distance	8 mm
Isolation Distance	0.4 mm

FUNCTIONAL DIAGRAM



Input	LED	Tr. 1	Tr. 2	Output
H	ON	ON	OFF	H
L	OFF	OFF	ON	L

MARKING EXAMPLE



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter		Symbol	Ratings	Unit
Diode	Forward Current	I_F	25	mA
	Peak Transient Forward Current (Pulse Width < 1 μs)	$I_{F\ (TRAN)}$	1.0	A
	Reverse Voltage	V_R	5	V
	Power Dissipation *1	P_D	45	mW
Detector	High Level Peak Output Current *2	$I_{OH\ (PEAK)}$	2.5	A
	Low Level Peak Output Current *2	$I_{OL\ (PEAK)}$	2.5	A
	Supply Voltage	(V_{CC} - V_{EE})	0 to 35	V
	Output Voltage	V_O	0 to V_{CC}	V
	Power Dissipation *3	P_C	250	mW
Isolation Voltage *4		BV	5 000	Vr.m.s.
Operating Frequency *5		f	50	kHz
Operating Ambient Temperature		T_A	–40 to +110	°C
Storage Temperature		T_{stg}	–55 to +125	°C

***1** Reduced to 1.6 mW/°C at T_A = 85°C or more.

***2** Maximum pulse width = 10 μs, Maximum duty cycle = 0.2%

***3** Reduced to 4.5 mW/°C at T_A = 80°C or more.

***4** AC voltage for 1 minute at T_A = 25°C, RH = 60% between input and output.
Pins 1-4 shorted together, 5-8 shorted together.

***5** $I_{OH\ (PEAK)} \leq$ 2.0 A (≤ 0.3 μs), $I_{OL\ (PEAK)} \leq$ 2.0 A (≤ 0.3 μs)

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	(V_{CC} - V_{EE})	15		30	V
Forward Current (ON)	$I_{F\ (ON)}$	7	10	16	mA
Forward Voltage (OFF)	$V_{F\ (OFF)}$	–2		0.8	V
Operating Ambient Temperature	T_A	–40		110	°C

ELECTRICAL CHARACTERISTICS (T_A = –40 to +110°C, V_{CC} = 15 to 30 V, $I_{F\,(ON)}$ = 7 to 16 mA, $V_{F\,(OFF)}$ = –2 to 0.8 V, V_{EE} = GND, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Diode	Forward Voltage	V_F	I_F = 10 mA, T_A = 25°C	1.2	1.56	1.8	V
	Reverse Current	I_R	V_R = 3 V, T_A = 25°C			10	μA
	Terminal Capacitance	C_t	f = 1 MHz, V_F = 0 V, T_A = 25°C		30		pF
Detector	High Level Output Current	I_{OH}	V_O = (V_{CC} – 4 V) *2	0.5	2.0		A
			V_O = (V_{CC} – 15 V) *3	2.0			
	Low Level Output Current	I_{OL}	V_O = (V_{EE} + 2.5 V) *2	0.5	2.0		A
			V_O = (V_{EE} + 15 V) *3	2.0			
	High Level Output Voltage	V_{OH}	I_O = –100 mA *4	V_{CC} – 3.0	V_{CC} – 1.5		V
	Low Level Output Voltage	V_{OL}	I_O = 100 mA		0.1	0.5	V
	High Level Supply Current	I_{CCH}	V_O = open, I_F = 10 mA		2.0	3.0	mA
	Low Level Supply Current	I_{CCL}	V_O = open, V_F = 0 to +0.8 V		2.0	3.0	mA
	UVLO Threshold	V_{UVLO+}	V_O > 5 V, I_F = 10 mA	10.8	12.3	13.4	V
		$V_{UVLO–}$		9.5	11.0	12.5	
	UVLO Hysteresis	$UVLO_{HYS}$	V_O > 5 V, I_F = 10 mA	0.4	1.3		V
Coupled	Threshold Input Current (L → H)	I_{FLH}	I_O = 0 mA, V_O > 5 V		2.0	5.0	mA
	Threshold Input Voltage (H → L)	V_{FHL}	I_O = 0 mA, V_O < 5 V	0.8			V

***1** Typical values at T_A = 25°C.

***2** Maximum pulse width = 50 μs, Maximum duty cycle = 0.5%.

***3** Maximum pulse width = 10 μs, Maximum duty cycle = 0.2%

***4** V_{OH} is measured with the DC load current in this testing (Maximum pulse width = 2 ms, Maximum duty cycle = 20%).

SWITCHING CHARACTERISTICS (T_A = –40 to +110°C, V_{CC} = 15 to 30 V, $I_{F\ (ON)}$ = 7 to 16 mA, $V_{F\ (OFF)}$ = –2 to 0.8 V, V_{EE} = GND, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.*1	MAX.	Unit
Propagation Delay Time (L → H)	t_{PLH}	R_g = 10 Ω, C_g = 10 nF, f = 10 kHz,		0.18	0.25	μs
Propagation Delay Time (H → L)	t_{PHL}	Duty Cycle = 50%*2, I_F = 10 mA		0.18	0.25	μs
Pulse Width Distortion (PWD)	$\|t_{PHL}–t_{PLH}\|$		–0.1	0.02	0.1	μs
Propagation Delay Time (Difference Between Any Two Products)	$t_{PHL}–t_{PLH}$		–0.1		0.1	μs
Rise Time	t_r			50		ns
Fall Time	t_f			50		ns
UVLO (Turn On Delay)	$t_{UVLO\ ON}$	V_O > 5 V, I_F = 10 mA		0.8		μs
UVLO (Turn Off Delay)	$t_{UVLO\ OFF}$	V_O < 5 V, I_F = 10 mA		0.6		μs
Common Mode Transient Immunity at High Level Output*3	$\|CM_H\|$	T_A = 25°C, I_F = 10 mA, V_{CC} = 30 V, $V_{O\ (MIN.)}$ = 26 V, V_{CM} = 1.5 kV	25			kV/μs
Common Mode Transient Immunity at Low Level Output*3	$\|CM_L\|$	T_A = 25°C, I_F = 0 mA, V_{CC} = 30 V, $V_{O\ (MAX.)}$ = 1 V, V_{CM} = 1.5 kV	25			kV/μs

***1** Typical values at T_A = 25°C.

***2** This load condition is equivalent to the IGBT load at 1 200 V/75 A.

***3** Connect pin 4 to the LED common.

Caution GaAs Products	This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points. • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth.

Revision History	PS9305L Preliminary Data Sheet

Rev.	Date	Description	
		Page	Summary
0.01	May 12, 2010	–	First Edition issued