



PHOTOCOUPLER

PS9801

0.6 A OUTPUT CURRENT, HIGH CMR IGBT GATE DRIVE 8-PIN SSOP (SO-8) PHOTOCOUPLER

–NEPOC Series–

DESCRIPTION

The PS9801 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.

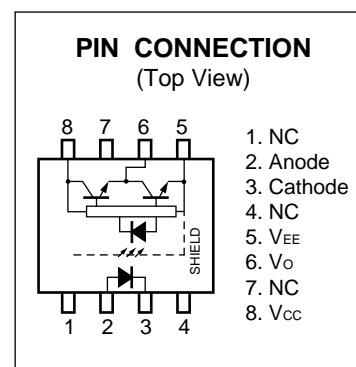
The PS9801 is designed specifically for high common mode transient immunity (CMR) and high switching speed. It is suitable for driving IGBTs and MOS FETs.

FEATURES

- Peak output current (0.6 A MAX., 0.4 A MIN.)
- High speed switching (t_{PLH} , t_{PHL} = 0.65 μ s MAX.)
- High common mode transient immunity (CM_H , CM_L = ± 25 kV/ μ s MIN.)
- Pb-Free product

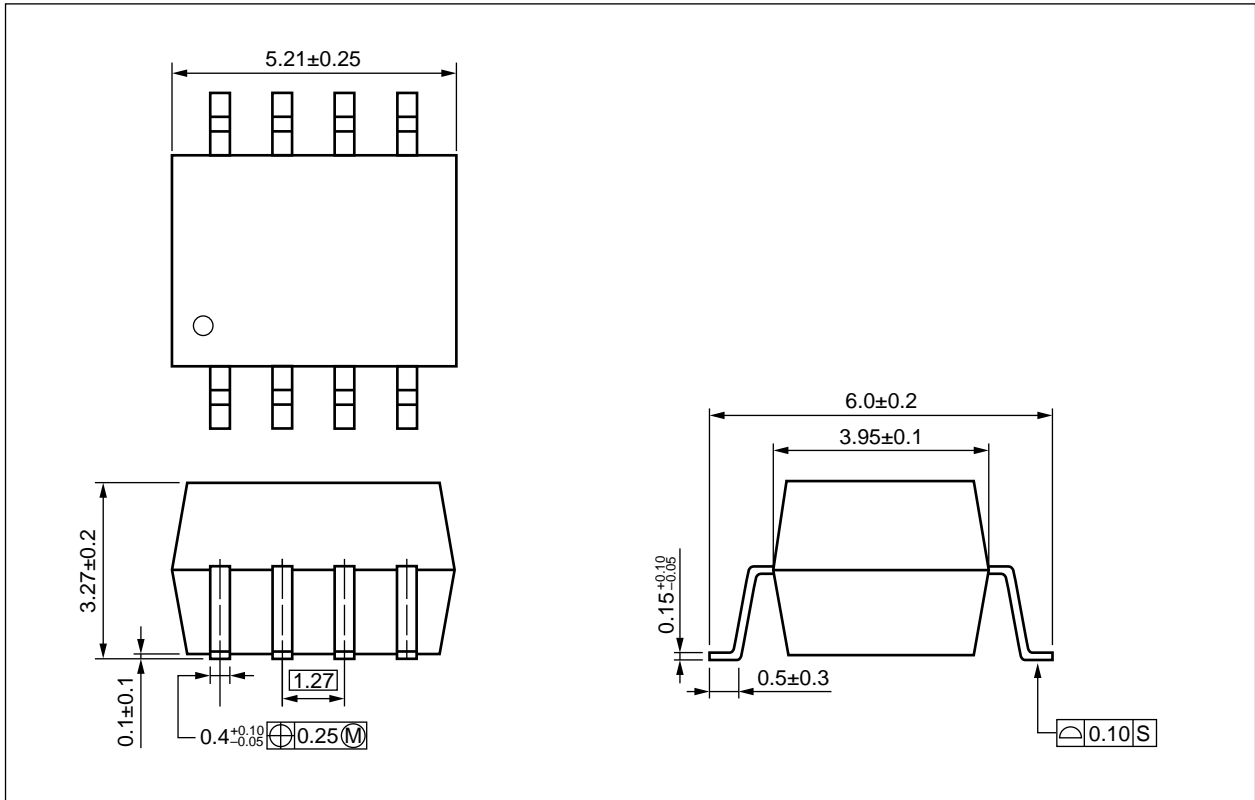
APPLICATIONS

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

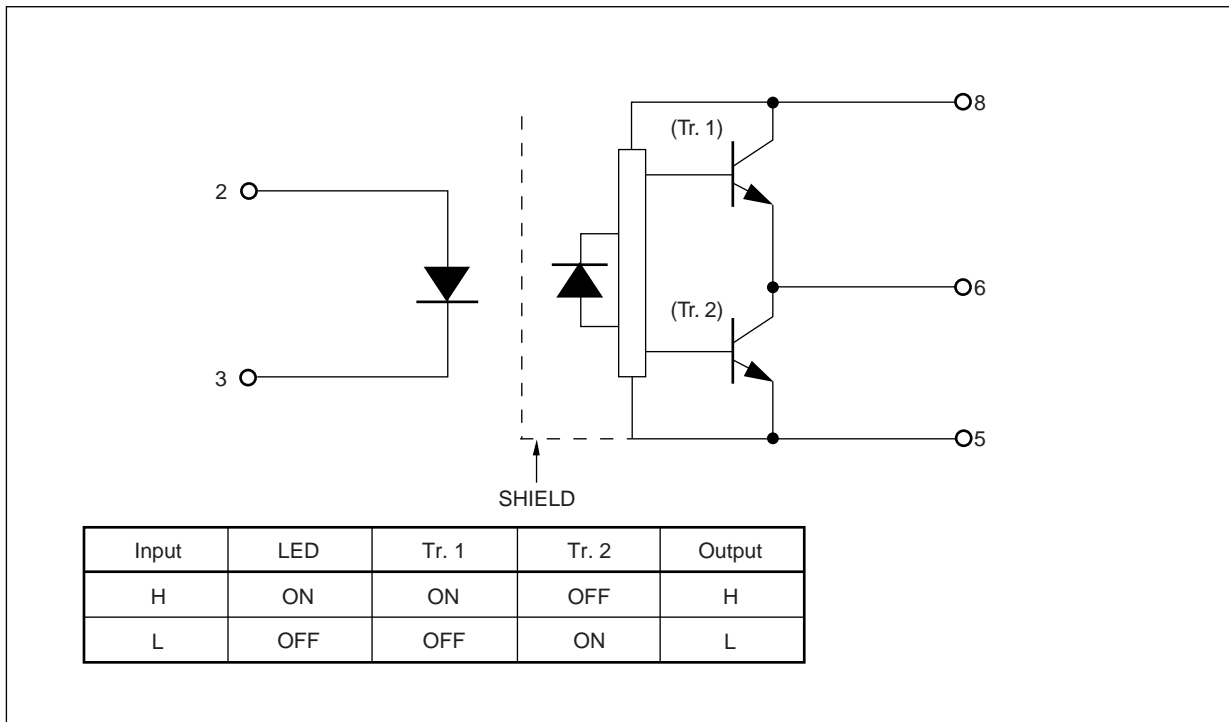


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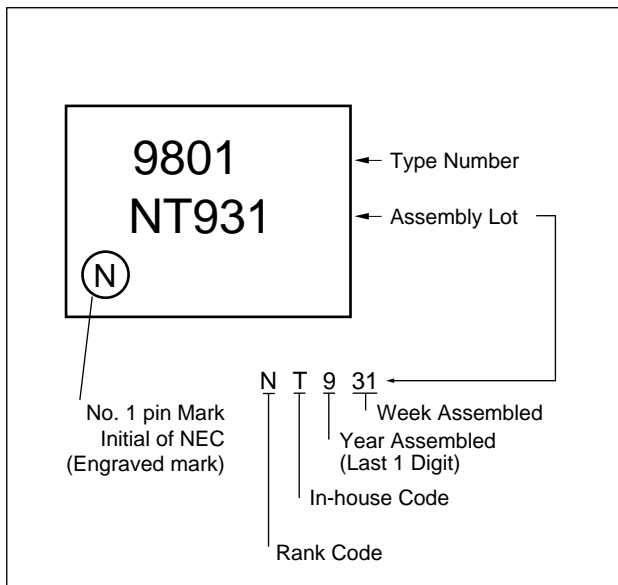
PACKAGE DIMENSIONS (UNIT: mm)



FUNCTIONAL DIAGRAM



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)}	0.6 (MAX.)	A
	Low Level Peak Output Current ^{*2}	I _{OL (PEAK)}	0.6 (MAX.)	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	3 750	Vr.m.s.
Operating Frequency ^{*5}		f	25	kHz
Operating Ambient Temperature		T _A	-40 to +100	°C
Storage Temperature		T _{stg}	-55 to +125	°C

*1 Reduced to 1.5 mW/°C at T_A = 80°C or more.

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

*3 Reduced to 4.1 mW/°C at T_A = 60°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)} ≤ 0.4 A (≤ 2.0 μs), I_{OL (PEAK)} ≤ 0.4 A (≤ 2.0 μs)

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage	(V _{CC} - V _{EE})	10		30	V
Forward Current (ON)	I _{F (ON)}	8		12	mA
Forward Voltage (OFF)	V _{F (OFF)}	-2		0.8	V
Operating Ambient Temperature	T _A	-40		100	°C

ELECTRICAL CHARACTERISTICS ($T_A = -40$ to $+100^\circ\text{C}$, $V_{CC} = 10$ to 30 V, $I_F(\text{ON}) = 8$ to 12 mA, $V_F(\text{OFF}) = -2$ to 0.8 V, $V_{EE} = \text{GND}$, unless otherwise specified)

Parameter		Symbol	Conditions	MIN.	TYP.* ¹	MAX.	Unit
Diode	Forward Voltage	V_F	$I_F = 10$ mA, $T_A = 25^\circ\text{C}$	1.2	1.56	1.9	V
	Reverse Current	I_R	$V_R = 3$ V, $T_A = 25^\circ\text{C}$			10	μA
	Terminal Capacitance	C_t	$f = 1$ MHz, $V_F = 0$ V, $T_A = 25^\circ\text{C}$		30		pF
Detector	High Level Output Current	I_{OH}	$V_O = (V_{CC} - 4 \text{ V})^{*2}$	0.2			A
			$V_O = (V_{CC} - 10 \text{ V})^{*3}$	0.4	0.6		
	Low Level Output Current	I_{OL}	$V_O = (V_{EE} + 2.5 \text{ V})^{*2}$	0.2	0.5		A
			$V_O = (V_{EE} + 10 \text{ V})^{*3}$	0.4	0.6		
	High Level Output Voltage	V_{OH}	$I_O = -100$ mA ^{*4}	$V_{CC} - 4.0$	$V_{CC} - 1.8$		V
	Low Level Output Voltage	V_{OL}	$I_O = 100$ mA		0.4	1.0	V
	High Level Supply Current	I_{CCH}	$V_O = \text{open}$, $I_F = 10$ mA		0.8	3.0	mA
	Low Level Supply Current	I_{CCL}	$V_O = \text{open}$, $I_F = 0$ mA		1.4	3.0	mA
Coupled	Threshold Input Current (L \rightarrow H)	I_{FLH}	$I_O = 0$ mA, $V_O > 5$ V			6.0	mA
	Threshold Input Voltage (H \rightarrow L)	V_{FHL}	$I_O = 0$ mA, $V_O < 5$ V	0.8			V
	Isolation Capacitance	C_{I-O}	$f = 1$ MHz, $V_F = 0$ V, $T_A = 25^\circ\text{C}$		30		pF

*1 Typical values at $T_A = 25^\circ\text{C}$.

*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.

SWITCHING CHARACTERISTICS ($T_A = -40$ to $+100^\circ\text{C}$, $V_{CC} = 10$ to 30 V, I_F (ON) = 8 to 12 mA, V_F (OFF) = -2 to 0.8 V, $V_{EE} = \text{GND}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.* ¹	MAX.	Unit
Propagation Delay Time (L → H)	t_{PLH}	$I_F = 10$ mA, $R_g = 47 \Omega$, $C_g = 3$ nF, $f = 10$ kHz, Duty Cycle = 50% ²	0.05	0.2	0.65	μs
Propagation Delay Time (H → L)	t_{PHL}		0.05	0.3	0.65	μs
Pulse Width Distortion (PWD)	$ t_{PHL} - t_{PLH} $				0.5	μs
Propagation Delay Time (Difference Between Any Two Products)	$t_{PHL} - t_{PLH}$		-0.5		0.5	μs
Rise Time	t_r				50	ns
Fall Time	t_f				50	ns
Common Mode Transient Immunity at High Level Output ³	$ CM_H $		$T_A = 25^\circ\text{C}$, $I_F = 10$ mA, $V_{CC} = 30$ V, $V_{O(MIN.)} = 26$ V, $V_{CM} = 1.5$ kV	25		
Common Mode Transient Immunity at Low Level Output ³	$ CM_L $	$T_A = 25^\circ\text{C}$, $I_F = 0$ mA, $V_{CC} = 30$ V, $V_{O(MAX.)} = 1$ V, $V_{CM} = 1.5$ kV	25			kV/ μs

*1 Typical values at $T_A = 25^\circ\text{C}$.

*2 This load condition is equivalent to the IGBT load at 1 200 V/25 A.

*3 Connect pin 1 and pin 4 to the LED common.

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M8E 02.11-1

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