

UDN-2975W AND UDN-2976W DUAL 4 A SOLENOID DRIVERS

FEATURES

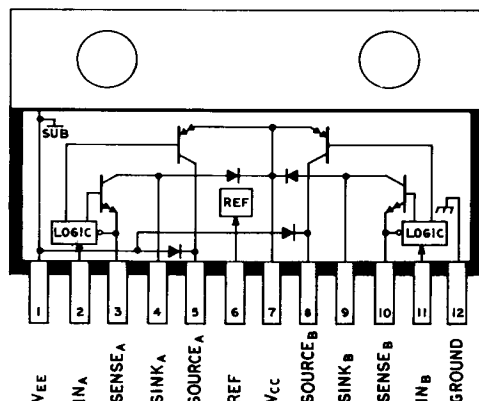
- 5 A Peak Output
- TTL/PMOS/CMOS Compatible Inputs
- Low Input Current
- Output Voltage to 60 V
- Single-Ended or Split Supply
- Adjustable Short-Circuit Protection
- Internal Clamp Diodes
- Plastic SIP With Heat-Sink Tab

CURRENT CONTROL for operation of a pair of print solenoids is provided by both Type UDN-2975W and UDN-2976W. Each IC's dual driver sections operate directly from the printer control line. The two devices differ only in output-voltage ratings. They can be used at currents of up to 4 A.

Type UDN-2975W is rated at 50 V. Type UDN-2976W is rated at 60 V or ± 30 V. Inputs are compatible with most TTL, DTL, LSTTL, and 5 V to 15 V CMOS and PMOS logic.

Current is controlled by a current-sensing latch method that uses only one external sensing resistor for each driver. The load current is compared with the reference voltage and, at the level fixed by the system designer ($V_{REF}/10 = I_{LOAD} \times R_{SENSE}$), a latch is set, shutting OFF one of the output transistors. The internal flyback diode then maintains the flux without further input from the power supply, resulting in maximum efficiency. The latch is reset by pulling the input high.

For the maximum in power-handling capability, the integrated circuits are supplied in 12-pin single



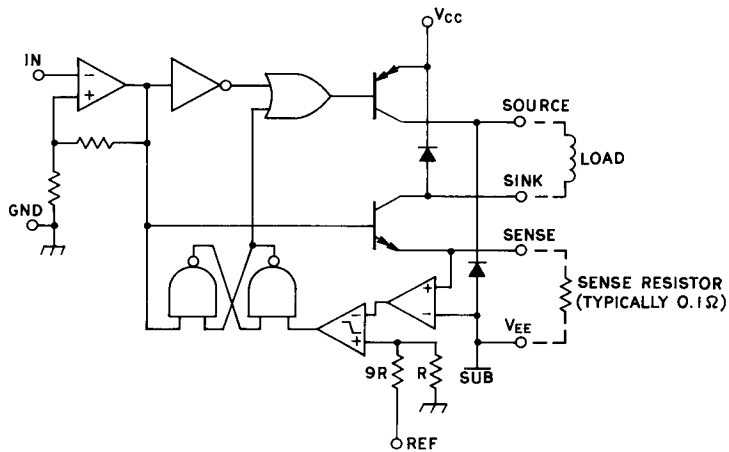
Dwg. No. A-12,105

in-line power tab packages. For proper operation, an external heat sink is required. The tab is at V_{EE} potential and must be insulated from ground when Type UDN-2976W is used with a split supply.

ABSOLUTE MAXIMUM RATINGS at $T_{TAB} = +70^{\circ}\text{C}$

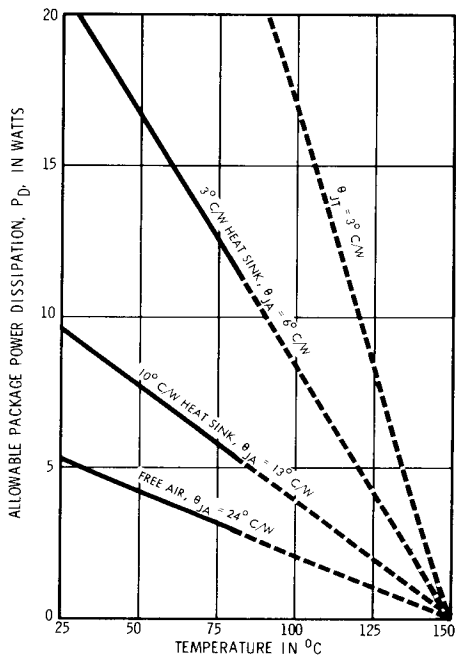
| | |
|--|-----------------|
| Supply Voltage, V_{CC} (Ref. V_{EE} , UDN-2975W) | 50 V |
| (Ref. V_{EE} , UDN-2976W) | 60 V |
| V_{EE} (Ref. GND, UDN-2975W) | 0 V |
| (Ref. GND, UDN-2976W) | -30 V |
| Peak Output Current, I_{OU} | 5 A |
| Input Voltage, V_{IN} | 15 V |
| Reference Voltage, V_{REF} | 5 V |
| Package Power Dissipation, P_D | See Graph |
| Operating Temperature Range, T_A | -20°C to +85°C |
| Storage Temperature Range, T_S | -55°C to +150°C |

FUNCTIONAL BLOCK DIAGRAM (ONE OF TWO DRIVERS)



Dwg. No. A-12,106A

ALLOWABLE AVERAGE PACKAGE POWER DISSIPATION AS A FUNCTION OF TEMPERATURE



Dwg. No. A-11,794A

To maintain isolation between integrated circuit components and to provide for normal transistor operation, the substrate (pin 1) must be connected to the most negative point in the external circuit.

TRUTH TABLE

| V_{IN} | V_{SENSE} | Source Driver | Sink Driver | Function |
|----------|----------------|---------------|-------------|----------|
| High | NA | Off | Off | Off |
| Low | $< V_{REF}/10$ | On | On | On |
| Low | $> V_{REF}/10$ | Off | On | Flyback |

UDN-2975W AND UDN-2976W
DUAL 4 A SOLENOID DRIVERS

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $T_{\text{JAB}} \leq +70^\circ\text{C}$, $V_{\text{CC}} = 45\text{ V}$ (UDN-2975W) or 55 V (UDN-2976W), $V_{\text{EE}} = V_{\text{SENSE}} = 0\text{ V}$ (unless otherwise noted)

| Characteristic | Symbol | Applicable Devices | Test Conditions | Limits | | |
|----------------------|-----------------|--------------------|-----------------|--------|------|-------|
| | | | | Min. | Max. | Units |
| Supply Voltage Range | V_{CC} | UDN-2975W | Operating | 20 | 50 | V |
| | | UDN-2976W | Operating | 20 | 60 | V |
| Supply Current | I_{CC} | Both | Outputs Open | — | 25 | mA |
| | I_{EE} | Both | Outputs Open | — | —20 | mA |

Output Drivers

| | | | | | | |
|---|----------------------|-----------|---|----|-----|---------------|
| Output Leakage Current | I_{CEX} | UDN-2975W | $V_{\text{IN}} = 2.4\text{ V}$, $V_{\text{CC}} = 50\text{ V}$, $V_{\text{SOURCE}} = 0\text{ V}$ | — | 100 | μA |
| | | | $V_{\text{IN}} = 2.4\text{ V}$, $V_{\text{SINK}} = V_{\text{CC}} = 50\text{ V}$ | — | 100 | μA |
| | | UDN-2976W | $V_{\text{IN}} = 2.4\text{ V}$, $V_{\text{CC}} = 60\text{ V}$, $V_{\text{SOURCE}} = 0\text{ V}$ | — | 100 | μA |
| | | | $V_{\text{IN}} = 2.4\text{ V}$, $V_{\text{SINK}} = V_{\text{CC}} = 60\text{ V}$ | — | 100 | μA |
| Output Saturation Voltage | $V_{\text{CE(SAT)}}$ | Both | Source Drivers, $I_{\text{LOAD}} = 4\text{ A}$ | — | 3.5 | V |
| | | | Sink Drivers, $I_{\text{LOAD}} = 4\text{ A}$ | — | 2.5 | V |
| Output Sustaining Voltage (Source drivers only) | $V_{\text{CE(SUS)}}$ | UDN-2975W | $I_{\text{LOAD}} = 4\text{ A}$, $L = 3.5\text{ mH}$ | 50 | — | V |
| | | UDN-2976W | $I_{\text{LOAD}} = 4\text{ A}$, $L = 3.5\text{ mH}$ | 60 | — | V |
| Clamp Diode Forward Voltage | V_{F} | Both | $I_{\text{F}} = 4\text{ A}$ | — | 2.0 | V |
| Output Rise Time | t_{r} | Both | $I_{\text{LOAD}} = 4\text{ A}$, 10% to 90%, Resistive Load | — | 2.0 | μs |
| Output Fall Time | t_{f} | Both | $I_{\text{LOAD}} = 4\text{ A}$, 90% to 10%, Resistive Load | — | 2.0 | μs |

Control Logic

| | | | | | | |
|---------------------------|---------------------|------|---|-----|------|---------------|
| Logic Input Voltage | $V_{\text{IN(1)}}$ | Both | | 2.0 | — | V |
| | $V_{\text{IN(0)}}$ | Both | See Notes | — | 0.5 | V |
| Logic Input Current | $I_{\text{IN(1)}}$ | Both | $V_{\text{IN}} = 2.4\text{ V}$ | — | 20 | μA |
| | $I_{\text{IN(0)}}$ | Both | $V_{\text{IN}} = 0.4\text{ V}$ | — | —20 | μA |
| | $I_{\text{REF(1)}}$ | Both | $V_{\text{REF}} = 5.0\text{ V}$ | — | —20 | μA |
| Reference/Sense Ratio | — | Both | $V_{\text{REF}} = 2.0\text{ to }5.0\text{ V}$ | 9.5 | 10.5 | — |
| Propagation Delay Time | t_{pd} | Both | 50% V_{in} to 50% V_{out} , Resistive Load | — | 3.0 | μs |
| | | | 100% V_{sense} to 50% V_{out} *, Resistive Load | — | 3.0 | μs |
| Minimum Reset Pulse Width | t_{in} | Both | | — | 1.0 | μs |

*Where $V_{\text{sense}} = V_{\text{REF}}/10.5$

NOTES: Negative current is defined as coming out of (sourcing) the specific device pin.

For improved noise immunity, hysteresis insures $V_{\text{IN(0)}}$ of 0.8 V max. after V_{in} is 0.5 V or less.