ENGINEERING DATA SHEET

TDH-8080/8081
ON RELEASE-ADJUSTABLE PERIOD
2 PDT, 10 AMP

FEATURES

- Small size and weight
- High-reliability design
- Hermetically sealed
- High transient immunity
- Reverse Polarity Protection

PRINCIPLE TECHNICAL CHARACTERISTICS

Seal: Hermetic Tested per MIL-STD-883, Method 1014 Condition B, C
1 x 10^-8 atm, cm^3/s max leakage

Finish: per MIL-T-10727

Tin Plate

Terminals:
TDH 8081 (Tin Plate)
TDH 8080 (Gold Plate)

Solder-lug
Plug-In

Weight
2.5 Ounce max.

APPLICATION NOTE:

101

APPLICABLE SOCKET:

SO-1048-8308

DESCRIPTION

The TDH-8080/81 Time Delay Relays have been designed with thick film hybrid microelectronics timing circuits and MIL-R-6106 relays, packaged in a hermetically sealed military style enclosure. The TDH-8080/81 series are qualified to MIL-PRF-83726/31 and designed to withstand severe environmental conditions encountered in military/aerospace applications. These relays are suited for use in power control, communication circuits and many other applications where power switching and high reliability are required over a wide temperature range.

Featuring LEACH© power and control solutions
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Data sheets are for initial product selection and comparison. Contact Esterline Power Systems prior to choosing a component.

Date of issue: 3/06
### Input (Control) Parameters

<table>
<thead>
<tr>
<th>Timing:</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Operation, Time Delay on</td>
<td>Adjustable Period</td>
</tr>
<tr>
<td>b. Method</td>
<td>0.1 to 600 Seconds [6]</td>
</tr>
<tr>
<td>c. Range</td>
<td>±10% [1]</td>
</tr>
<tr>
<td>d. Accuracy</td>
<td></td>
</tr>
</tbody>
</table>

| Recycle Time     | 50 ms, Max [5]                               |

<table>
<thead>
<tr>
<th>Operations: (X1-X2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Input &amp; Control Voltage</td>
<td>20-30 Vdc</td>
</tr>
<tr>
<td>b. Operating Current</td>
<td>150 mA, Max @ 25° C</td>
</tr>
<tr>
<td>c. Control Current</td>
<td>15 mA, Max @ 25° C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transients:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Positive, MIL-STD-704A, Figure9, Limit 1</td>
<td>+80 Volts Max</td>
</tr>
<tr>
<td>b. Spike, MIL-STD-704A, 0-10 µs</td>
<td>±600 Volts Max</td>
</tr>
<tr>
<td>c. Self-Generated</td>
<td>±50 Volts Max</td>
</tr>
<tr>
<td>d. Susceptibility</td>
<td>+80; -600 Volts Max</td>
</tr>
</tbody>
</table>

| Electromagnetic Interference Per MIL-STD-461A | Class 1D [3] |
| Power Loss                                      | 500 Microseconds [2] |

### Output (Load) Parameters

<table>
<thead>
<tr>
<th>Contact Form</th>
<th>2 PDT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Rating:</td>
<td>10 Amperes</td>
</tr>
<tr>
<td>a. Resistive</td>
<td>8 Amperes</td>
</tr>
<tr>
<td>b. Inductive</td>
<td>4 Amperes</td>
</tr>
<tr>
<td>c. Motor</td>
<td>2 Amperes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dielectric Strength:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. @ Sea Level, 60 Hz</td>
<td>1000 Vrms [4]</td>
</tr>
<tr>
<td>b. @ 80,000 ft., 60 Hz</td>
<td>350 Vrms</td>
</tr>
</tbody>
</table>

| Insulation Resistance @ 500 Vdc | 1000 MΩ [4] |

### GENERAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Ambient Temperatures Range:</th>
<th>-55 to +125° C</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Operating</td>
<td>-65 to +125° C</td>
</tr>
<tr>
<td>b. Non-Operating</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Sinusoidal, 10-3000 Hz</td>
<td>30 G</td>
</tr>
<tr>
<td>b. Random: 50-2000 Hz, MIL-STD-810</td>
<td>0.4 G²/Hz</td>
</tr>
</tbody>
</table>

| Shock @ 6 ± 1 MS, 1/2 Sine, 3 Axis | 100 G |
| Acceleration, in any Axis        | 15 G  |

| Life at Rated Resistive Load; Minimum | 100,000 operations |

### NUMBERING SYSTEM

<table>
<thead>
<tr>
<th>Plug-in Terminal</th>
<th>Solder Hook Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDH-8080 - 1001 P</td>
<td>TDH-8081 - 1001 S</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

1. Model Number or Basic "MIL-PRF" Series number.
2. Pin Style or Military "Slash" number.
3. Timing Range, Fixed: 100 milliseconds to 600 seconds. (See Note 6).
4. Mounting style and quality level (See Note 7).

<table>
<thead>
<tr>
<th>P = Plug-in terminal.</th>
<th>S = Solder hook terminal.</th>
</tr>
</thead>
</table>

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NOTES

[1] The accuracy specification applies for any combination of operating temperature and voltage.
For units with a timing range less than 1 second, add ±10 milliseconds to the ±10% tolerance.
[2] Transient and power loss specification are based on a maximum duty cycle of 1/50.
[3] EMI test limits will not be exceeded during the timing interval or when continuously energized
under steady state conditions, per paragraph 3.23, MIL-R-83726B.
[4] Terminals X1, X2, C1, D1 and D3 must be connected together during the test. Dielectric
withstanding voltage and insulation resistance are measured at sea level between all mutually
insulated terminals and between all terminals and case.
[5] Recycle time is defined as the minimum time power must be applied to the control terminal to
assure that the next timing cycle will be completed within the specified timing tolerance.
(Units can be recycled during timing or after time-out.)
[6] Time delays greater than 500 seconds are not MIL qualified.
A four digit number defines the adjustable time delay range in seconds (or milliseconds).
The first three digits are significant figures, used to define the upper limit of a DECADE RANGE.
The fourth digit represents the number of zeros to follow the first three digits.

**SPECIFY STANDARD DECADE RANGE**
- 1001 = 0.1 to 1 second (100 to 1,000 milliseconds)
- 1002 = 1.0 to 10 seconds
- 5002 = 5 to 50 seconds
- 5003 = 50 to 500 seconds

An external resistor is used to obtain a specific time delay within the specified decade range.
The formula below provides the proper resistance value to achieve the desired time delay:

\[
R_{\text{ext}} = \left( \frac{T_1}{T_0} - 1 \right) 100,000 \text{ Ohms}
\]

Where: \( R_{\text{ext}} \) = External resistance value (Ohms)
\( T_1 \) = Desired time in seconds
\( T_0 \) = Minimum time (low end of the decade range) in seconds

As an example, if using a 5 to 50 second adjustable timer and a 30 second delay is desired, the
calculation is:

\[
R_{\text{ext}} = \left( \frac{30}{5} - 1 \right) 100,000 \text{ Ohms or } R_{\text{ext}} = 500 \text{ K Ohms}
\]

Recommended resistors IAW MIL-R-55182 1/8 Watt, 1% (RNC60HXXXXFS). External resistor not supplied.
[7] Quality level as specified in MIL-R-83726B, paragraph 3.1.1, 3.1.2 and 3.1.3.
DERATING OF CONTACTS FOR DC VOLTAGES
ABOVE NOMINAL RATING

To establish a standard for the derating of relay contacts is, at best, a subjective practice. Limitations are governed by the type of relay, contact gap, maximum voltage capabilities of the relay contact system, and the contact material.

The most common method is to derate the contacts by use of the Power Formula, using the known current and voltage. This method is valid only for **Resistive Loads**, and is an approximation only; keeping in mind the limitations mentioned above.

\[
\text{Power} = IE \ (\text{Current} \times \text{Voltage})
\]

\[
I_2 E_2 = \frac{2}{3} I_1 E_1
\]

Example:
A designer is working with a 55 volt DC system and has a relay rated at 10 amps resistive at 28 volts DC. What is the maximum current that can be switched at 55 Vdc.

\[
I_1 = 10 \ \text{Amperes}
\]
\[
E_1 = 28 \ \text{VDC}
\]
\[
E_2 = 55 \ \text{VDC}
\]

\[
I_2 = ? \ (\text{Current ratings at 55 VDC Resistive})
\]

\[
I_2 E_2 = 2 I_1 E_1 / 3
\]

\[
I_2 = 2 I_1 E_1 / E_2 / 3
\]

\[
= 2 (10 \times 28) / 55 \times 3
\]

\[
= 560 / 165
\]

\[
I_2 = 3.4 \ \text{Amperes at 55VDC}
\]

In addition, the user should always be concerned about the following:

1. Derating contacts that are rated for less than 10 Amperes at nominal voltage.
2. Derating contacts for use in system voltages above 130 Volts DC.
ENGINEERING DATA SHEET

SO-1048-8308/8518
RELAY SOCKET
12 AMP

BASIC SOCKET SERIES DESIGNATION FOR:
Series K
Series TDH-8070, TDH-8080
TDH-8050, TDH-8060, VS400

MEETS THE REQUIREMENTS OF:
MIL-DTL-12883

GENERAL CHARACTERISTICS

1. Supplied with mounting hardware and No. 16 contacts, No. 16 crimp (SO-1048-8308); No. 16 contacts, No. 20 crimp (SO-1048-8518).
2. Standard tolerances: .xx ±.01; xxx ±.005
3. Weight: .115 lb. max
4. Temperature range: -70° C to +125° C

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