ENGINEERING DATA SHEET

TD-1412

REPEAT CYCLE-TIMER
1PST

APPLICATION NOTE:
101

FEATURES

- Small size and weight
- High-reliability design
- Hermetically sealed
- High transient immunity
- Qualified to MIL-PRF-83726/22
- Reverse Polarity Protection

PRINCIPLE TECHNICAL CHARACTERISTICS

Seal:Hermetic Tested per MIL-STD-883, Method 1014 Condition B, C	**$1x10^{-8}$ atm, cm^3/s max leakage**
Finish: per MIL-T-10727	**Tin Plate**
Terminals: "A" (Tin Plate) "W" (Tin Plate)	 **Solder-lug** **Plug-in PCB mountable**
Weight	**0.5 Ounce max.**

DESCRIPTION

The TD-1412 Time Delay Relays are designed with thick film hybrid microelectronics timing circuits and are packaged in a hermetically sealed military style enclosure. The TD-1412 series are qualified to MIL-PRF-83726/22 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.

Esterline Power Systems

*Featuring **LEACH**© power and control solutions*
www.esterline.com

AMERICAS
6900 Orangethorpe Ave.
P.O. Box 5032
Buena Park, CA 90622
Tel: (01) 714-736-7599
Fax: (01) 714-670-1145

EUROPE
2 Rue Goethe
57430 Sarralbe
France
Tel: (33) 3 87 97 31 01
Fax: (33) 3 87 97 96 86

ASIA
Units 602-603 6/F Lakeside 1
No.8 Science Park West Avenue
Phase Two, Hong Kong Science Park
Pak Shek Kok, Tai Po, N.T.
Hong Kong
Tel: (852) 2 191 3830
Fax: (852) 2 389 5803

ELECTRICAL SPECIFICATION

Input (Control) Parameters	
Timing: a. Operation, (Flasher) b. Method c. Range d. Accuracy	 Repeat Cycle Timer Fixed Cycle 1 to 600 Cycles/Min. [5] ±10% [1]
Recycle Time	10 ms, Max [4]
Operations: (X1-X2) a. Input & Control Voltage b. Operating Current	 18-32 Vdc 5 mA, Max @ +25° C
Transients: MIL-STD-704A, Limit 1 a. Spike Susceptibility b. Self-Generated Spikes	 +80 Volts Max -600 Volts Max None
Electromagnetic Interference Per MIL-STD-461A	Class 1D [2]
Duty Rating	Continuous
Output (Load) Parameters	
Contact Form Contact Rating: Voltage Drop	SPST 250 mA, Max. 2 Vdc, Max.
Dielectric Strength: a. @ Sea Level, 60 Hz b. @ 80,000 ft., 60 Hz	 1000 Vrms [3] 350 Vrms
Insulation Resistance @ 500 Vdc	1000 M Ω [3]

GENERAL CHARACTERISTICS

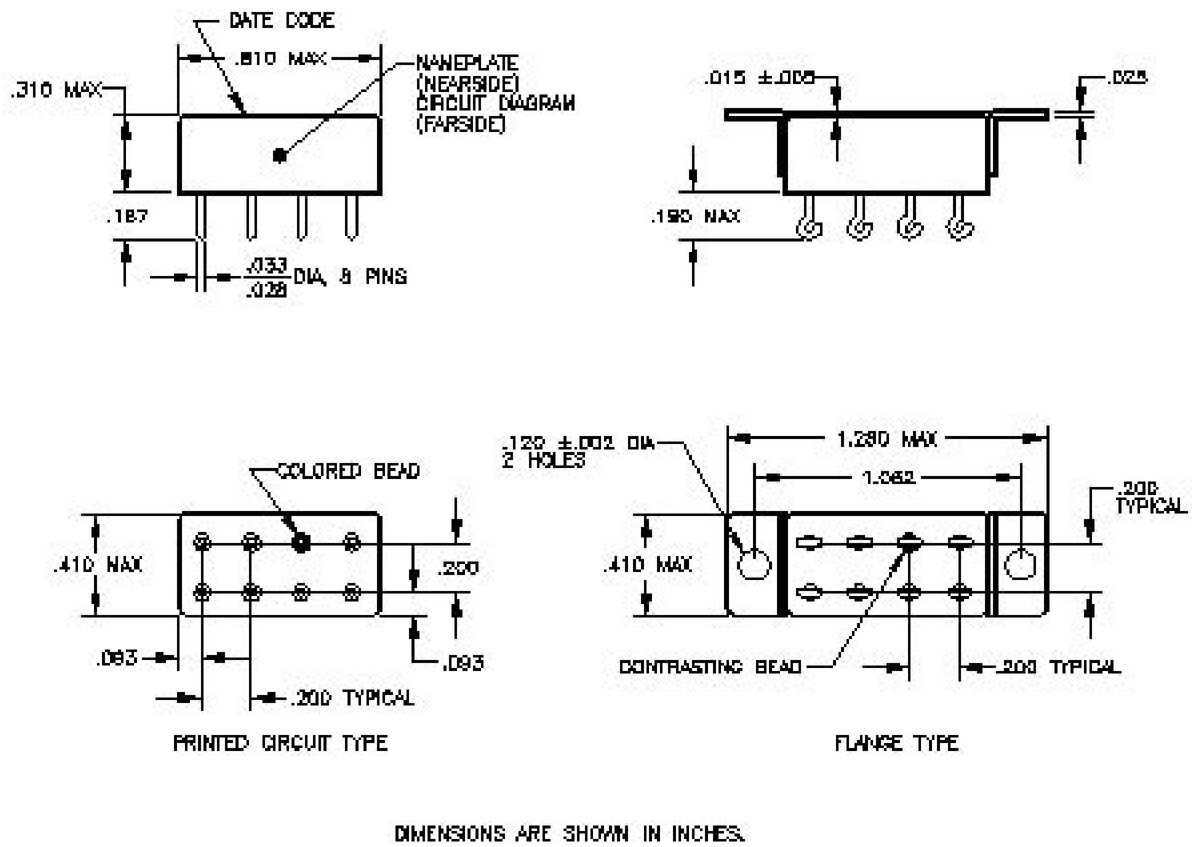
Ambient Temperatures Range: a. Operating b. Non-Operating	 -55 to +125° C -55 to +125° C
Vibration: a. Sinusoidal	
10-80 Hz 80-3000 Hz	0.06" DA 30 G
b. Random: 50-2000 Hz, MIL-STD-810	0.4 G^2/Hz
Shock, 0.5 MS, 1/2 Sine, 3 Axis	1,100 G
Acceleration, in any Axis	100 G
Life at Rated Resistive Load; Minimum	1,000,000 operations

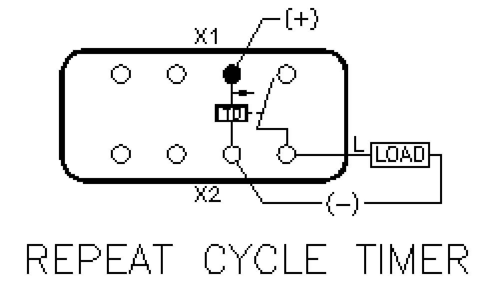
NUMBERING SYSTEM

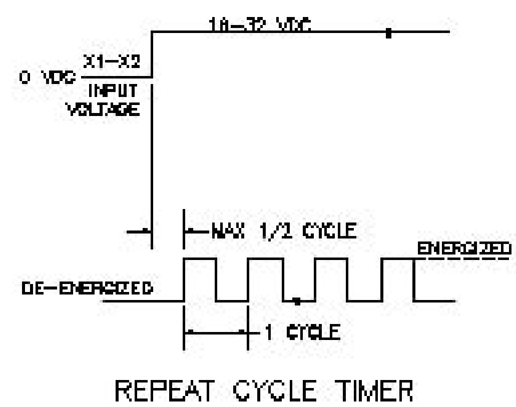
```
     PCB Mount                                    Flange Mount
TD-1412  - 2500   W                          TD-1412 - 2500  A
   |         |    |                             |        |   |
   1         3    4                             1        3   4

M83726/22 - 2500  W                          M83726/22 - 2500  A
   |   |     |    |                             |   |     |    |
   1   2     3    4                             1   2     3    4
```

1. Model Number or Basic "MIL-PRF" Series number.
2. Military "Slash" number.
3. Timing Cycle, Fixed: 100 milliseconds to 60 seconds. (See Note 5).
4. Mounting style and quality level (See Note 6).
   W = Printed circuit mountable.
   A = Flange mount with solder hook terminals.







NOTES

[1] The accuracy specification applies for any combination of operating temperature and voltage.
[2] EMI test limits will not be exceeded during the timing interval or when continuously energized under steady state conditions, per paragraph 3.23, MIL-PRF-83726C.
[3] Terminals X1 and X2 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.
[4] Recycle time is defined as the maximum time power must be removed from terminal X1 to assure that a new cycle can be completed within the specified timing tolerance.
[5] A four digit number defines the length of one complete cycle, expressed in milliseconds. "On" time is 50% of each cycle. The first three digits are significant figures, used to define the the specific cycle. The fourth digit represents the number of zeros to follow the first three digits.
Examples:

- 1001 = 1 cycle/second (1,000 milliseconds cycle)
- 2500 = 4 cycle/seconds (25 milliseconds cycle)
- 6002 = 1 cycle/minute (60,000 milliseconds cycle)

[6] 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.

Power = IE (Current x Voltage)

$$I_2 \, E_2 = 2/3 \, I_1 E_1$$

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 Amperes
E_1 = 28 VDC
E_2 = 55 VDC
I_2 = ? (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 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