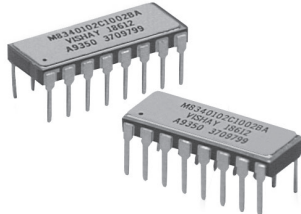


## Bulk Metal® Foil Technology 1445Q-14 Pin and 1446Q-16 Pin DIP Packages

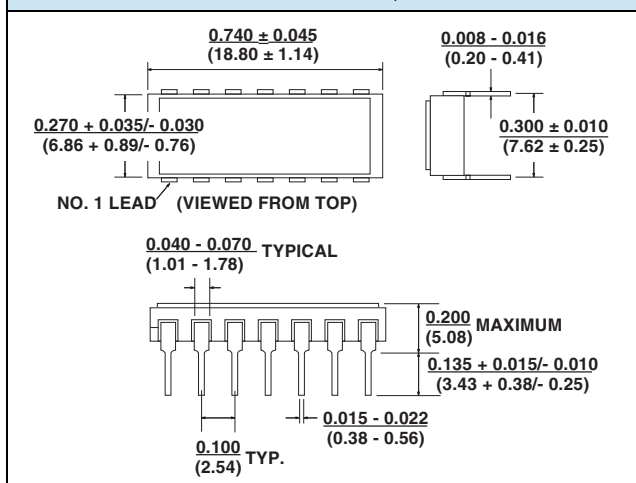


Product may not be to scale

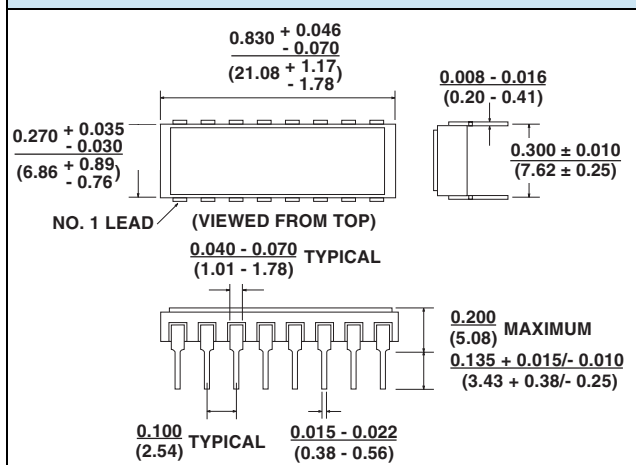
Vishay Models 1445Q and 1446Q networks are qualified to MIL-PRF-83401, Characteristic C, Schematic A. Actual performance exceeds all the requirements of MIL-PRF-83401 characteristics "C".

Model 1445Q contains 7 resistors and 1446Q contains 8 resistors. Qualified resistance range is 100 Ω through 10 kΩ. Other values are available non-QPL. Power rating is 0.1 Watt.

**FIGURE 1 - MODEL 1445Q DIMENSIONS**



**FIGURE 2 - MODEL 1446Q DIMENSIONS**



**FEATURES**

- Hermetically Sealed for maximum environmental protection - 100 % leak protection  
 Gross Leak: No bubbles  
 Fine Leak:  $< 5 \times 10^{-7}$  cc/sec  
 (MIL-STD-220, Method 112, Test C, Procedure 111A)
- Tested per MIL-PRF-83401
- Ceramic Package: 94 % Alumina (Al<sub>2</sub>O<sub>3</sub>)
- Lid: Gold plated Kovar
- Solder: Tin/Gold
- Leads: Alloy 42 (Iron Nickel) with 100 μ Inches gold plating (MIL-STD-1276, Type G-21-A)
- Gold ball wire bonding
- Foil Chips V15X5

**ADDITIONAL TESTING TO MIL SPEC**

Group A testing to MIL-PRF-83401 imposes the following:

1. Thermal shock 100 %  
 5X from - 65 to + 125 °C
2. Power conditioning 100 %
  2. 1 100 hours at 25 °C, full power
  2. 2 ΔR and ΔRatio calculation
3. Visual and Mechanical after the above tests (sample plan)
  3. 1 Conformity to physical size
  3. 2 Workmanship
  3. 3 Damage due to the above tests
4. 10 % PDA or one piece whichever is greater
5. Solderability (sample plan)

Group B sample testing to MIL-PRF-83401 imposes the following:

1. Temperature Coefficient of Resistance (sample plan)
2. Resistance to solvents (sample plan)

**TABLE 1 - TCR CHARACTERISTIC**

Qualification to Characteristic "C" allows Vishay to supply to the following characteristics <sup>1</sup> .			
CHARACTERISTIC	TCR ABSOLUTE	TCR TRACK	SEAL
C	± 50	± 5	Hermetic
V	± 50	± 5	Non-Hermetic
H	± 50	N.A.	Non-Hermetic
K	± 100	N.A.	Non-Hermetic
M	± 300	N.A.	Non-Hermetic

**NOTE:**

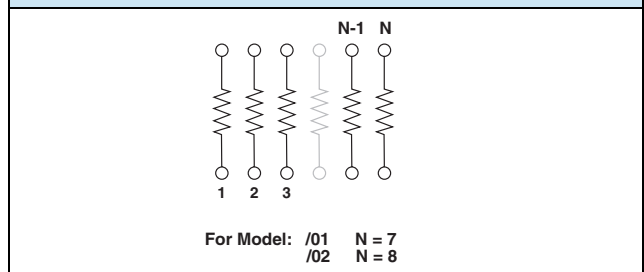
1. For characteristics H, K and M the "C" power rating must be acceptable.

**TABLE 2 - RESISTANCE VALUE**

A four digit designator in which the first three digits are significant figures and the fourth digit indicates the number of zeros to follow.

Example: 1002 = 10K

**FIGURE 3 - SCHEMATIC "A"**



**TABLE 3 - MIL-PRF-83401 PERFORMANCE SPECIFICATIONS**

TEST OR CONDITION	MIL-PRF-83401							
	Y	R	C	V	H	K	M	
Resistance Temp Characteristic ppm/°C	± 5	± 25	± 50	± 50	± 50	± 100	± 300	
Tracking To Reference Element (- 55 to + 125 °C) ppm/°C	± 5	± 5	± 5	± 5	NA	NA	NA	
Max Ambient Temp at Rated Wattage	+ 70 °C							
Max Ambient Temp at Zero Power	+ 125 °C							
Thermal Shock and Power Conditioning	± 0.02 % ± 0.01 %	± 0.08 % ± 0.04 %	± 0.25 % ± 0.03 %	± 0.25 % ± 0.03 %	± 0.50 % NA	± 0.70 % NA	± 0.70 % NA	
Low Temperature Operation ΔR	± 0.02 %	± 0.03 %	± 0.10 %	± 0.10 %	± 0.10 %	± 0.25 %	± 0.50 %	
Short Time Overload ΔR	± 0.02 %	± 0.03 %	± 0.10 %	± 0.10 %	± 0.10 %	± 0.25 %	± 0.50 %	
Terminal Strength ΔR	± 0.01 %	± 0.03 %	± 0.10 %	± 0.10 %	± 0.25 %	± 0.25 %	± 0.25 %	
Resistance to Soldering Heat ΔR	± 0.01 %	± 0.05 %	± 0.10 %	± 0.10 %	± 0.10 %	± 0.25 %	± 0.25 %	
Moisture Resistance ΔR	± 0.02 %	± 0.05 %	± 0.20 %	± 0.20 %	± 0.40 %	± 0.50 %	± 0.50 %	
Shock (Specified Pulse) ΔR	± 0.02 %	± 0.03 %	± 0.25 %	± 0.25 %	± 0.25 %	± 0.25 %	± 0.25 %	
Vibration, High Frequency ΔR	± 0.02 %	± 0.03 %	± 0.25 %	± 0.25 %	± 0.25 %	± 0.25 %	± 0.25 %	
Load Life (+ 70 °C, Full Power, 1000 hours) ΔR	± 0.05 %	± 0.1 %	± 0.10 %	± 0.10 %	± 0.50 %	± 0.50 %	± 2.00 %	
+ 25 °C Power Rating (1000 hrs.) ΔR	± 0.05 %	± 0.1 %	± 0.10 %	± 0.10 %	± 0.50 %	± 0.50 %	± 2.00 %	
High Temperature Exposure (+ 125 °C, 100 hours) ΔR	± 0.02 %	± 0.05 %	± 0.10 %	± 0.10 %	± 0.20 %	± 0.50 %	± 1.00 %	
Low Temperature Storage ΔR	± 0.01 %	± 0.03 %	± 0.10 %	± 0.10 %	± 0.10 %	± 0.25 %	± 0.50 %	
Insulation Resistance	10 000 MΩ							
Resistance Tolerance and, when applicable, Resistance Ratio Accuracy	± 0.005(V) ± 0.01(T) ± 0.05(A) ± 0.1(B) ± 0.5(D) ± 1.0(F)	± 0.05(A) ± 0.1(B) ± 0.5(D)	± 0.1 %(B) ± 0.5 %(D) ± 1.0 %(F)	± 0.1 %(B) ± 0.5 %(D) ± 1.0 %(F)	± 0.1 %(B) ± 0.5 %(D) ± 1.0 %(F)	± 0.1 %(B) ± 0.5 %(D) ± 1.0 %(F) ± 2.0 %(G)	± 0.5 %(D) ± 1.0 %(F) ± 2.0 %(G)	± 1.0 %(F) ± 2.0 %(G) ± 5.0 %(J)

**NOTE:**

1. ΔR's are not cumulative. For purposes of determining reliability calculations, consider the characteristics shown as figures of merit and allow no more than ± 0.05 % ΔR lifetime. Allow proportionately less if the severity of anticipated environmental stress is small compared to the tests as defined in MIL-PRF-83401.

**TABLE 4 - ORDERING INFORMATION - VISHAY QUALIFIED M83401 SERIES (MIL-PRF-83401) NETWORKS**

M83401	01	C	1002	B	A
MILITARY SPECIFICATION	SLASH SHEET	TCR CHARACTERISTIC	RESISTANCE VALUE	RESISTANCE TOLERANCE	SCHEMATIC <sup>2)</sup>
MIL-PRF-83401	Vishay is qualified to the following slash sheets: /01 14 pin DIP, Vishay P/N 1445Q /02 16 pin DIP, Vishay P/N 1446Q	Vishay is qualified to Characteristic C (see Table 1)	Vishay is qualified from 100 Ω through 10 kΩ (see Table 2)	Vishay is qualified to the following tolerances: B = 0.1 % D = 0.5 % <sup>1)</sup> F = 1.0 % <sup>1)</sup> G = 2.0 % J = 5.0 %	Vishay is qualified to schematic "A". (see Figure 3)

**NOTE:**

- For standard values by tolerance see Table III of MIL-PRF-83401. All values are considered standard when the specified tolerance is tighter than 0.10 %.
- What to do if QPL is required and no schematic is available:
  - Schematic "X" - Additional special schematics may be identified as "X" schematic and described fully in the detailed specifications.
  - DSCC Drawings - Anyone can request DSCC Drawings if the part is to be used on a military contract. Submit either a catalog sheet or SCD to DSCC or call Vishay for more information.
- Hot solder dip leads are available upon request.

**Example:**

**14 Pin, 7 Resistor, 10K000, 0.1 % Tolerance**

Military Specification: M83401

Slash Sheet: 01

TCR Characteristic: C

Resistance Value: 1002

Resistance Tolerance: B

Schematic: A

**16 Pin, 8 Resistor, 100R00, 0.1 % Tolerance**

Military Specification: M83401

Slash Sheet: 02

TCR Characteristic: C

Resistance Value: 1000

Resistance Tolerance: F

Schematic: A



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