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PNM

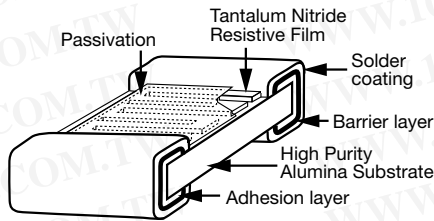
Vishay Dale Thin Film

Precision Thin Film Non-Magnetic Resistor, Surface Mount Chip, ± 25 ppm/ $^{\circ}$ C, Tolerances to 0.1 %



These devices eliminate materials that would disturb magnetic fields applications such as in MRI magnetic resonance imaging machines. The PNM series chip resistor has been carefully engineered with non-magnetic materials to eliminate the effects of these stray magnetic fields on circuit performance, thereby resulting in simplified shielding requirements and improved sound quality in audio applications. Providing signal conditioning without distortion from magnetic fields.

CONSTRUCTION



FEATURES

- Non-magnetic
- Moisture resistant
- High purity alumina substrate
- Non-standard values available
- MIL-STD-202 method 106 moisture resistance with 10 % power
- 100 % visual inspected per MIL-PRF-55342
- Very low noise and voltage coefficient (< -30 dB)
- Non-inductive
- Laser-trimmed tolerances to ± 0.1 %
- Wraparound resistance less than 10 m Ω
- Sulfur resistant (per ASTM B809-95 humid vapor test)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS*
Available

HALOGEN
FREE
Available

Note

* This datasheet provides information about parts that are RoHS-compliant and/or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information/tables in this datasheet for details.

TYPICAL PERFORMANCE

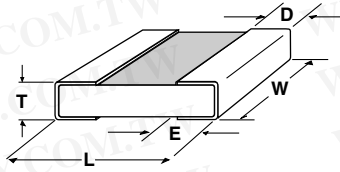
	ABSOLUTE
TCR	25
TOL.	0.1

STANDARD ELECTRICAL SPECIFICATIONS		
TEST	SPECIFICATIONS	CONDITIONS
Material	Tantalum nitride	-
Resistance Range	10 Ω to 3 M Ω	-
TCR: Absolute	± 25 ppm/ $^{\circ}$ C to ± 100 ppm/ $^{\circ}$ C	-55 $^{\circ}$ C to +125 $^{\circ}$ C
Tolerance: Absolute	± 0.1 % to ± 1.0 %	+25 $^{\circ}$ C
Stability: Absolute	$\Delta R \pm 0.03$ %	-
Stability: Ratio	-	-
Voltage Coefficient	0.1 ppm/V	-
Working Voltage	75 V to 200 V	-
Operating Temperature Range	-55 $^{\circ}$ C to +155 $^{\circ}$ C	-
Storage Temperature Range	-55 $^{\circ}$ C to +155 $^{\circ}$ C	-
Noise	< -30 dB	-
Shelf Life Stability: Absolute	-	-

COMPONENT RATINGS			
CASE SIZE ⁽¹⁾	POWER RATING (mW)	WORKING VOLTAGE (V)	RESISTANCE RANGE (Ω)
0402	50	75	20 to 35K
0502	100	75	20 to 65K
0505	150	75	20 to 130K
0603	150	75	10 to 130K
0805	200	100	10 to 301K
0705	200	100	10 to 301K
1005	250	100	10 to 301K
1010	500	150	50 to 600K
1206	400	200	10 to 1M
1505	400	150	10 to 1M
2208	750	150	10 to 1.75M
2010	800	200	10 to 2M
2512	1000	200	10 to 3M

Note

⁽¹⁾ 0705 and 0805 are the same (only use 0805 when ordering)

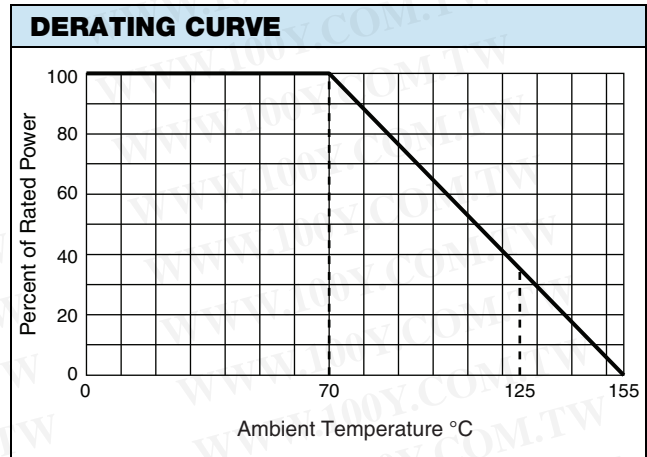
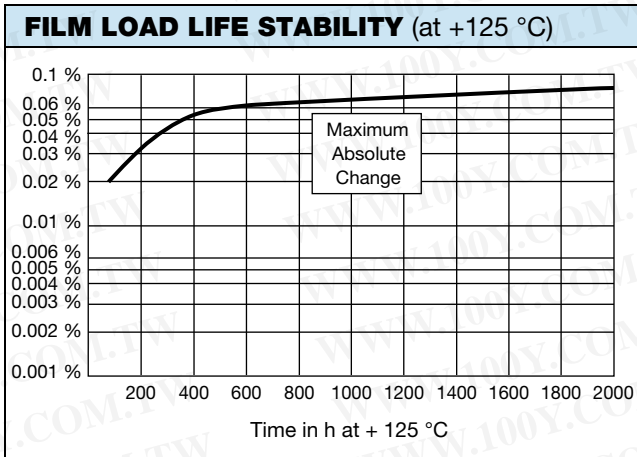
DIMENSIONS in inches


CASE SIZE	L	W	T	D	E
0402	0.042 ± 0.008	0.022 ± 0.005	0.012 to 0.033	0.010 ± 0.005	0.010 ± 0.005
0502	0.055 ± 0.006	0.025 ± 0.005	0.012 to 0.033	0.010 ± 0.005	0.015 ± 0.005
0505	0.055 ± 0.006	0.050 ± 0.005	0.012 to 0.033	0.010 ± 0.005	0.015 ± 0.005
0603	0.064 ± 0.006	0.032 ± 0.005	0.020 Max.	0.012 ± 0.005	0.015 ± 0.005
0705, 0805 ⁽¹⁾	0.080 ± 0.006	0.050 ± 0.005	0.015 to 0.033	0.015 ± 0.005	0.015 ± 0.005
1005	0.105 ± 0.007	0.050 ± 0.005	0.015 to 0.033	0.015 ± 0.005	0.015 ± 0.005
1010	0.105 ± 0.007	0.100 ± 0.005	0.015 to 0.033	0.015 ± 0.005	0.015 ± 0.005
1206	0.126 ± 0.008	0.063 ± 0.005	0.015 to 0.033	0.020 + 0.005/- 0.010	0.020 + 0.005/- 0.010
1505	0.155 ± 0.007	0.050 ± 0.005	0.015 to 0.033	0.015 ± 0.005	0.015 ± 0.005
2010	0.209 ± 0.009	0.098 ± 0.005	0.015 to 0.033	0.020 ± 0.005	0.020 ± 0.005
2208	0.230 ± 0.007	0.075 ± 0.005	0.015 to 0.033	0.020 ± 0.005	0.020 ± 0.005
2512	0.259 ± 0.009	0.124 ± 0.005	0.015 to 0.033	0.020 ± 0.005	0.020 ± 0.005

Note
⁽¹⁾ 0705 and 0805 are the same (only use 0805 when ordering)

ENVIRONMENTAL TESTS (Vishay Performance vs. MIL-PRF-55342 Requirements)

ENVIRONMENTAL TEST	LIMITS MIL-PRF-55342 CHARACTERISTIC "H"	TYPICAL VISHAY PERFORMANCE
Resistance Temperature Characteristic	± 50 ppm/°C	± 35 ppm/°C
Max. Ambient Temperature at Rated Wattage	+70 °C	+70 °C
Max. Ambient Temperature at Power Derating	+150 °C	+150 °C
Thermal Shock ΔR	± 0.25 %	± 0.040 %
Low Temperature Operation ΔR	± 0.25 %	± 0.005 %
Short Time Overload ΔR	± 0.10 %	± 0.010 %
High Temperature Exposure ΔR	± 0.20 %	± 0.150 %
Resistance to Bonding Exposure ΔR	± 0.25 %	± 0.005 %
Moisture Resistance ΔR	± 0.40 %	± 0.029 %
Life + 70 °C at 1000 hours ΔR	± 0.50 %	± 0.03 %
Insulation Resistance	10 000 Ω minimum	> 100 000 M Ω



GLOBAL PART NUMBER INFORMATION

P	N	M	1	2	0	6	E	1	0	0	2	B	B	T	1
GLOBAL MODEL	CASE SIZE	TCR CHARACTERISTIC	RESISTANCE				TOLERANCE	TERMINATION			PACKAGING				
PNM Non-magnetic resistor	0402 0502 0505 0603 0805 1005 1010 1206 1505 2208 2010 2512	E = 25 ppm (R > 100 Ω) H = 50 ppm (R > 50 Ω) K = 100 ppm (R > 10 Ω)	The first 3 digits are significant figures and the last digit specifies the number of zeros to follow. "R" designates the decimal point. Example: 10R0 = 10 Ω 1000 = 100 Ω 1001 = 1 kΩ				B = ± 0.1 % ⁽¹⁾ D = ± 0.5 % F = ± 1 % G = ± 2 % J = ± 5 %	B = Wraparound Sn/Pb solder 63 % Sn/ 37 % Pb S = Wraparound lead (Pb)-free solder 96.5 % Sn/3.0 % Ag/ 0.5 % Cu RoHS compliant - e1			BS = BULK 100 min., 1 mult WS = WAFFLE 100 min., 1 mult TAPE AND REEL T0 = 100 min., 100 mult T1 = 1000 min., 1000 mult ⁽²⁾ T3 = 300 min., 300 mult T5 = 500 min., 500 mult TF = Full reel TS = 100 min., 1 mult				

Notes

- (1) B = 0.1 % tolerance available only above 100 Ω.
- (2) Preferred packaging code.



Vishay Dale Thin Film Land Patterns

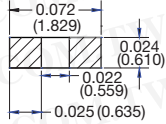
1. Scope

This technical note provides sample land patterns for Vishay Dale Thin Film SMT resistive products. The following drawings are based on IPC-SM-782 Surface Mount Design and Land Pattern Standard. These drawings are for reference only Vishay Thin Film recommends that the user contacts their PC board supplier for actual land patterns required. The pads are intended for lead (Pb)-free and tin / lead solder types.

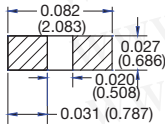
2. Product Series

Thin Film Surface Mount Chip Resistors (L, P, PTN, PLT, PLTT, PAT, PATT, PNM, M/D55342 QPL Series)

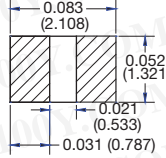
0402 Land Pattern



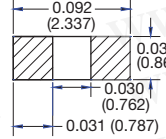
0502 Land Pattern



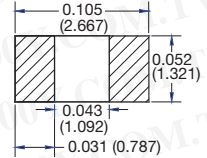
0505 Land Pattern



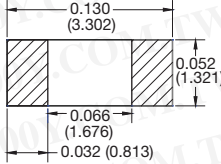
0603 Land Pattern



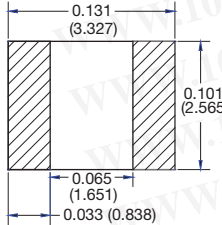
0705 Land Pattern



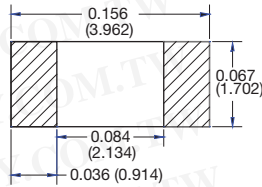
1005 Land Pattern



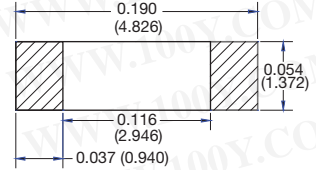
1010 Land Pattern



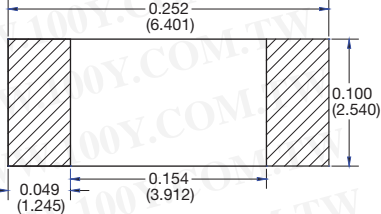
1206 Land Pattern



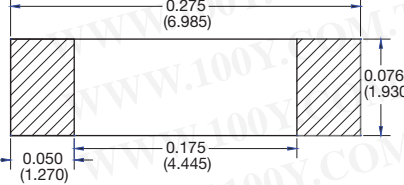
1505 Land Pattern



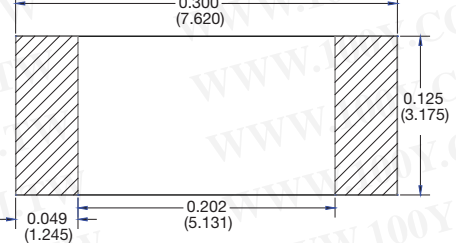
2010 Land Pattern



2208 Land Pattern



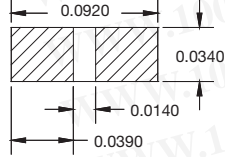
2512 Land Pattern



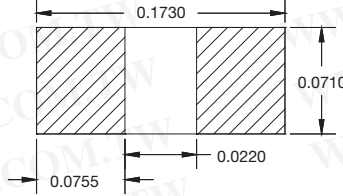


Thin Film Surface Mount Chip Resistors (PHP, PCAN Series)

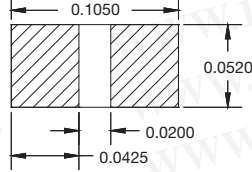
0603 Land Pattern



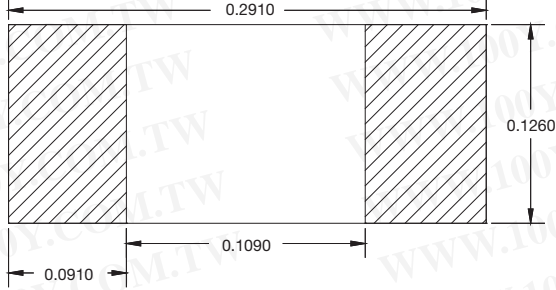
1206 Land Pattern



0805 Land Pattern

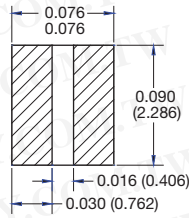


2512 Land Pattern

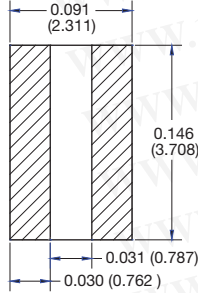


Thin Film Surface Mount Chip Resistors Long Axis Termination (L Series)

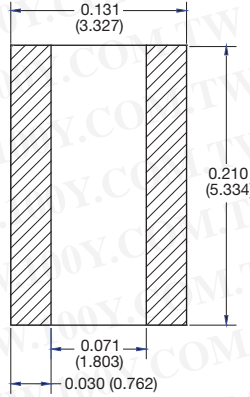
0508 Land Pattern



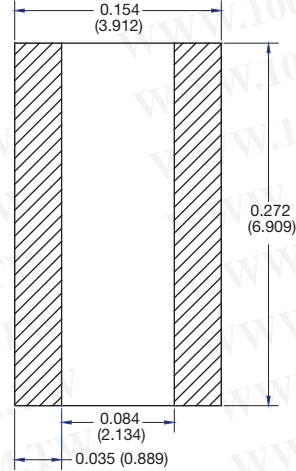
0612 Land Pattern



1020 Land Pattern



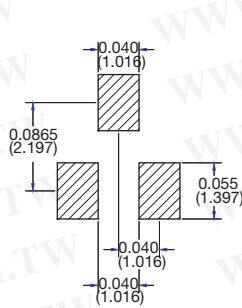
1225 Land Pattern



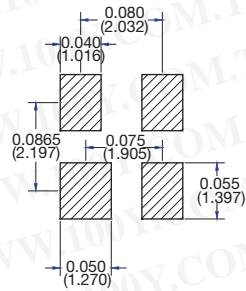


Surface Mount Networks (MPM, MPD, MP3, MP4 Series)

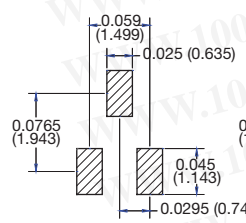
SOT-23 (MPM, MPMA)



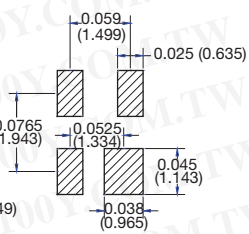
SOT-143 (MPD)



SC70-3 (MP3)

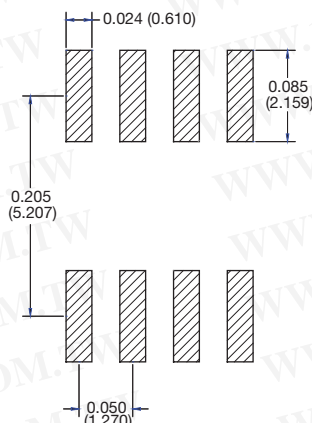


SC70-4 (MP4)

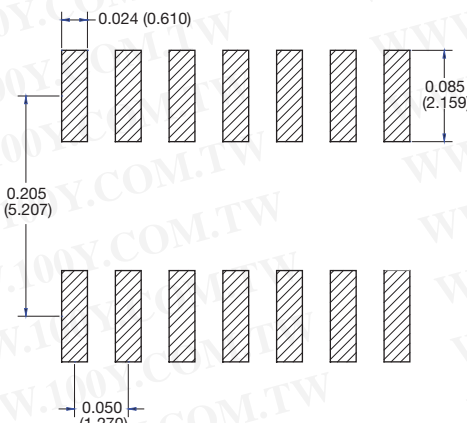


Surface Mount Networks SOIC Narrow Body 150 mils (ORN, CSO, MOMC, HTRN, AORN, MORN Series)

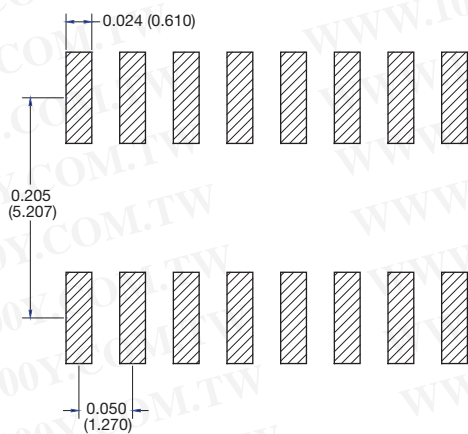
SOIC-8 (ORN, HTRN, AORN, CSO-8)



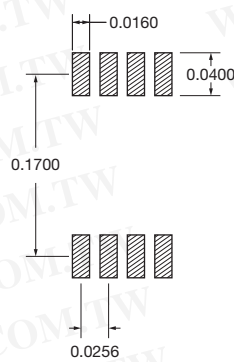
SOIC-14 (NOMC-14, NOMCA-14, CSO-14)



SOIC-16 (NOMC-16, NOMCA-16, CSO-16, VSOR-16)

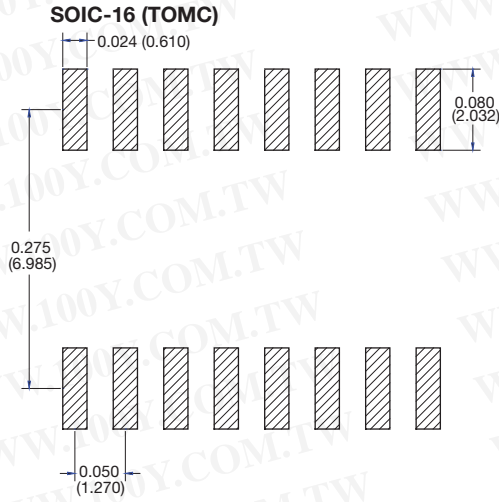


MORN MSOP MO-187AA (MORN-8)

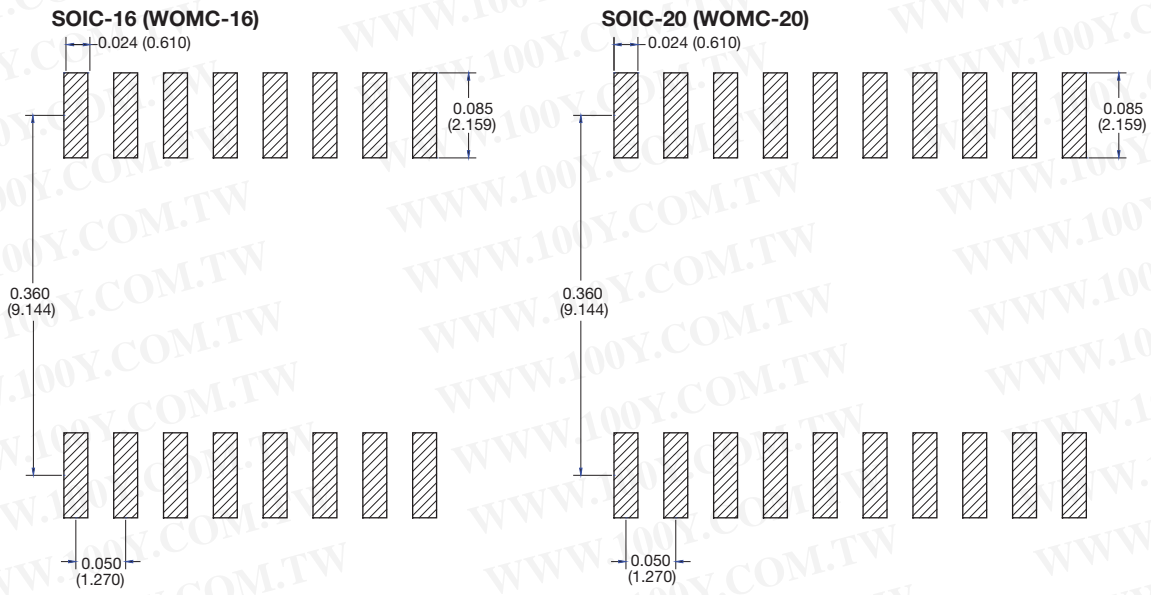




Surface Mount Networks SOIC Medium Body 220 mils (TOMC Series)



Surface Mount Networks SOIC Wide Body 300 mils (WOMC Series)

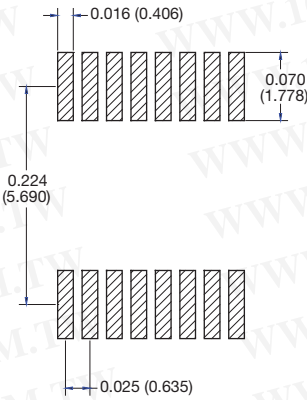




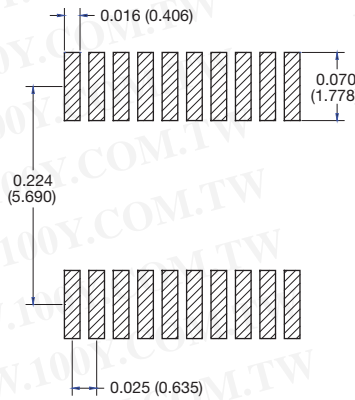
Surface Mount Networks High Density SSOP, TSOP (VSSR, VTSR Series)

SSOP MO-137

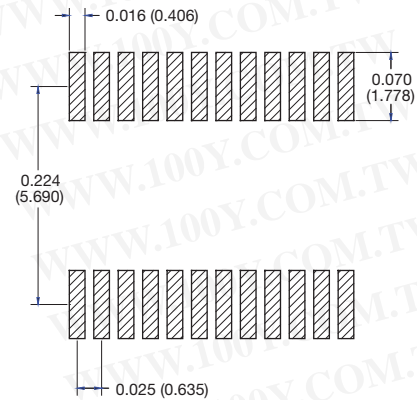
VSSR-16



OSOP-20, VSSR-20

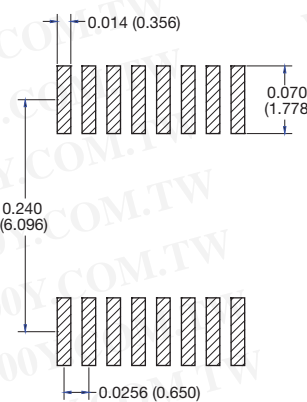


VSSR-24, HD-CSO-24

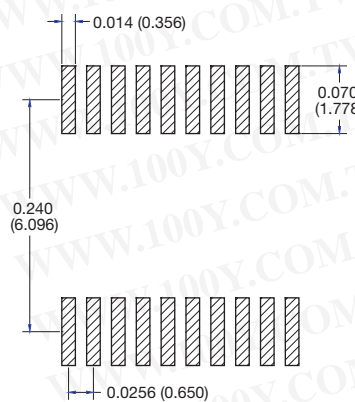


TSSOP MO-153

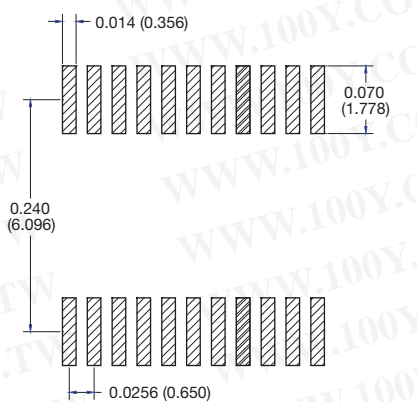
VTSR-16



VTSR-20



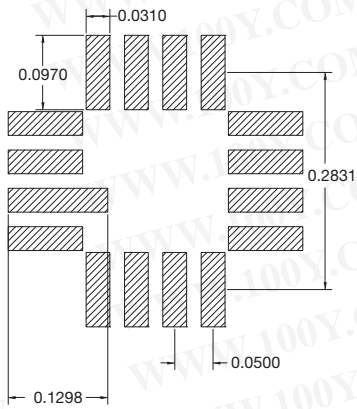
VTSR-24



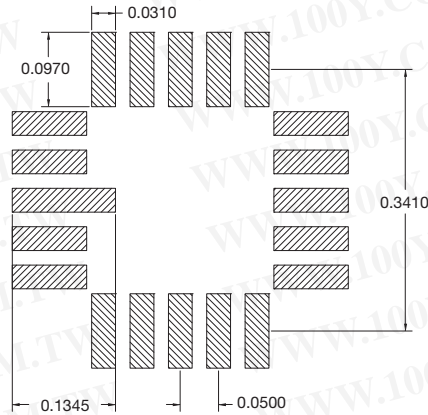


Surface Mount Leadless Networks (LCC Series)

16 Pin LCC

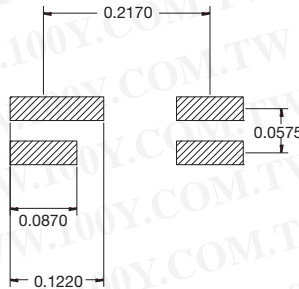


20 Pin LCC



Surface Mount Leadless Networks (MPH Series)

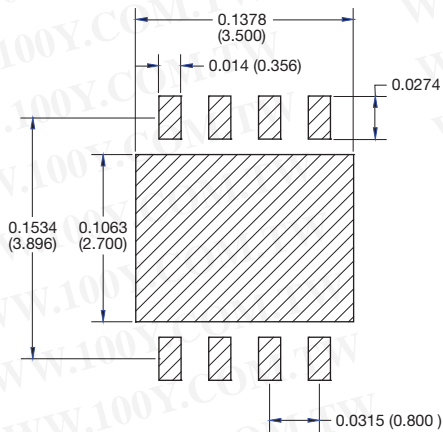
4 Pin LCC



Surface Mount Leadless Packages DUAL/ QUAD Flat No Lead (DFN, QFN Series)

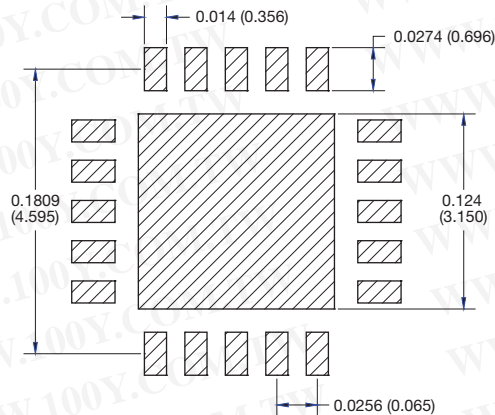
DFN MLP

DFN-8 4 x 5 mm Sq



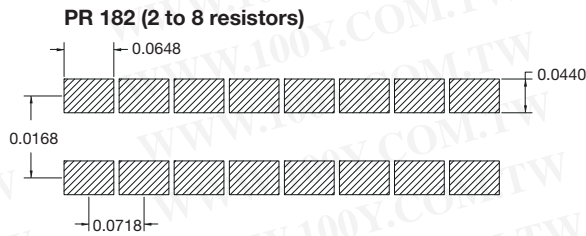
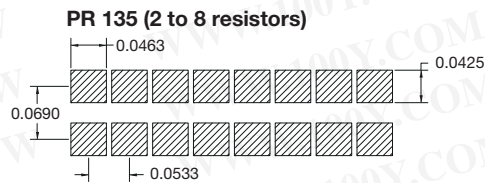
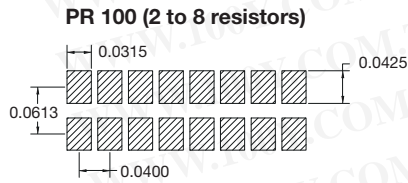
QFN MLP

QFN-20 5 x 5 mm Sq





Surface Mount Leadless Resistor Arrays (PR Series)

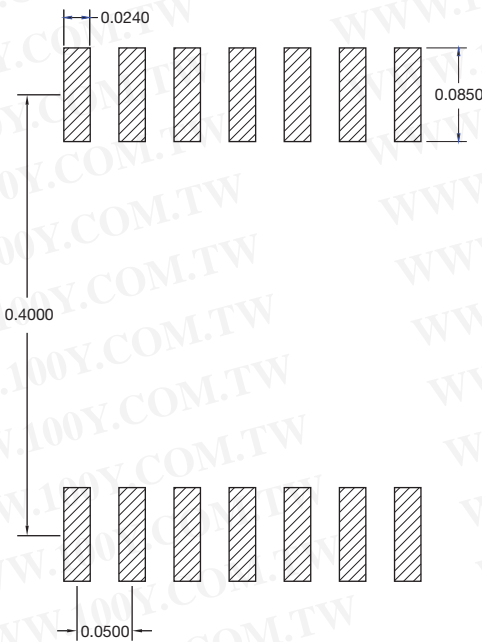


Note

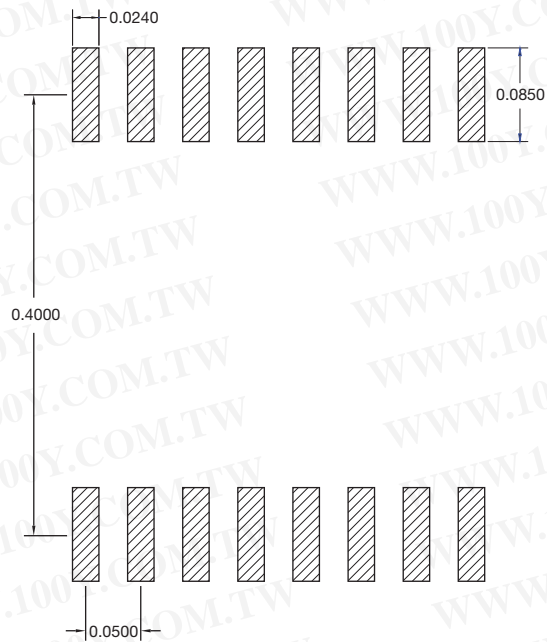
- All dimensions in inches (mm)

Flatpack

14 Pin Bottom Brazed Flatpack



16 Pin Bottom Brazed Flatpack





Disclaimer

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Material Category Policy

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.

Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.

Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.