

Features

- Lead free
- RoHS compliant*
- Multiple resistors tied to a common node
- Stable thin-film-on-silicon technology
- Ultra-miniature packages to JEDEC standards



Models 2QSP-XX2 and 2NBS-XX2 are obsolete and not recommended for new designs.

Applications

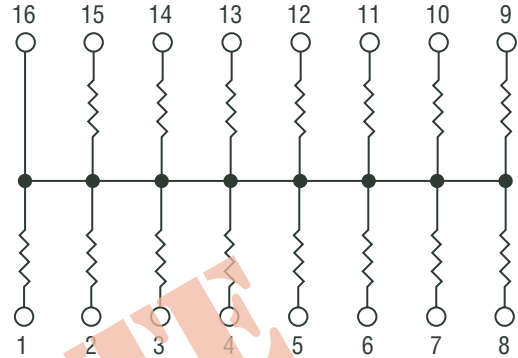
- Bus termination
- Pull-up/pull-down
- Ideal for space-constrained applications

Thin Film on Silicon 2QSP / 2NBS-XX2 Bussed Resistors

General Information

Bussed Resistor networks are typically used in DC pull-up and pull-down applications where system data or control lines must be tied to a fixed potential. Fabricated with a Tantalum Nitride and Nickel Chromium on Silicon process, these resistors feature excellent stability, TCR and tracking performance. Bussed Resistor Networks are available in a range of miniature package types conforming to JEDEC standards.

Package Schematic



Electrical & Environmental Characteristics

| Electrical Characteristics | Symbol | Minimum | Nominal | Maximum | Unit |
|--|-----------|-------------|---------|-----------|-------------------------|
| Resistance Range | R | 100 | | 100 K | Ω |
| Tolerance: | | | | | |
| Absolute | | $\pm 0.5\%$ | | $\pm 5\%$ | Ω |
| Ratio | | $\pm 0.1\%$ | | $\pm 2\%$ | Ω |
| TCR: | | | | | |
| Absolute | | | 100 | 150 | ppm/ $^{\circ}\text{C}$ |
| Tracking | | | | 25 | ppm/ $^{\circ}\text{C}$ |
| Operating Voltage | | | | 50 | V |
| Environmental Characteristics | | | | | |
| ESD | | 2 K | | | V |
| Operating Temperature | T_J | -55 | | +125 | $^{\circ}\text{C}$ |
| Storage Temperature | T_{stg} | -65 | | +150 | $^{\circ}\text{C}$ |
| Power Rating per Resistor @ 70 $^{\circ}\text{C}$ | | | | 0.1 | Watt |
| Power Rating per Package @ 70 $^{\circ}\text{C}$: | | | | | |
| QSOP: 16 Pin | | | | 0.75 | Watt |
| 20, 24 Pin | | | | 1.00 | Watt |
| 28 Pin | | | | 1.12 | Watt |
| NBSOIC: 8 Pin | | | | 0.60 | Watt |
| 14, 16 Pin | | | | 1.00 | Watt |

*RoHS Directive 2002/95/EC Jan 27, 2003 including Annex

Specifications are subject to change without notice.

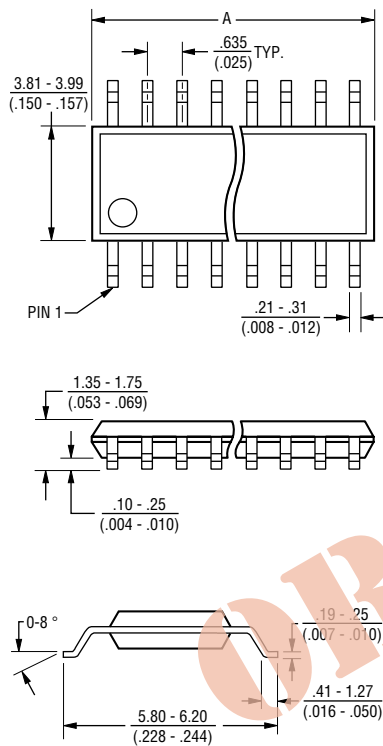
Customers should verify actual device performance in their specific applications.

Thin Film on Silicon 2QSP / 2NBS -XX2 Bussed Resistors



Mechanical Characteristics

QSOP Package Dimensions

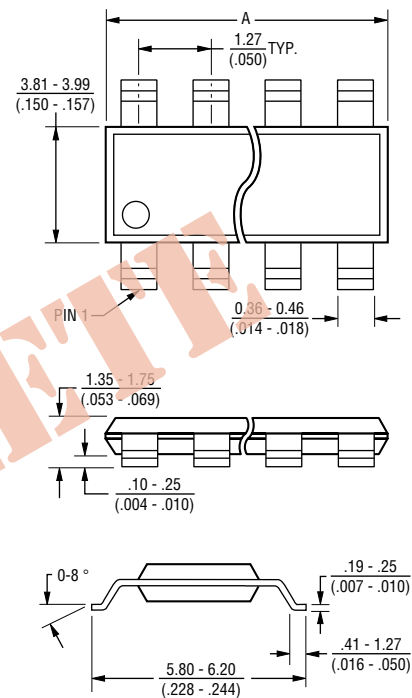


| Model | A |
|--------|---------------------------|
| 2QSP16 | 4.80 - 4.98 (.189 - .196) |
| 2QSP20 | 8.56 - 8.74 (.337 - .344) |
| 2QSP24 | 8.56 - 8.74 (.337 - .344) |
| 2QSP28 | 9.80 - 9.98 (.386 - .393) |

Governing dimensions are in mm. Dimensions in parentheses are in inches and are approximate.

JEDEC Reference Number MO-137.

Narrow-Body SOIC Package Dimensions



| Model | A |
|--------|---------------------------|
| 2NBS08 | 4.80 - 4.98 (.189 - .196) |
| 2NBS14 | 8.56 - 8.74 (.337 - .344) |
| 2NBS16 | 9.80 - 9.98 (.386 - .393) |

Governing dimensions are in mm. Dimensions in parentheses are in inches and are approximate.

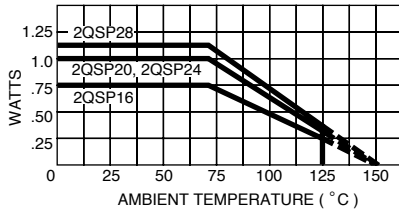
JEDEC Reference Number MS-012.

Specifications are subject to change without notice. Customers should verify actual device performance in their specific applications.

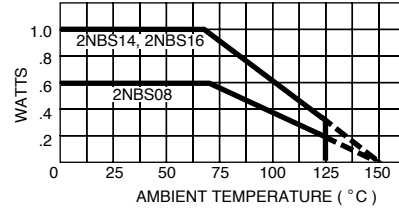
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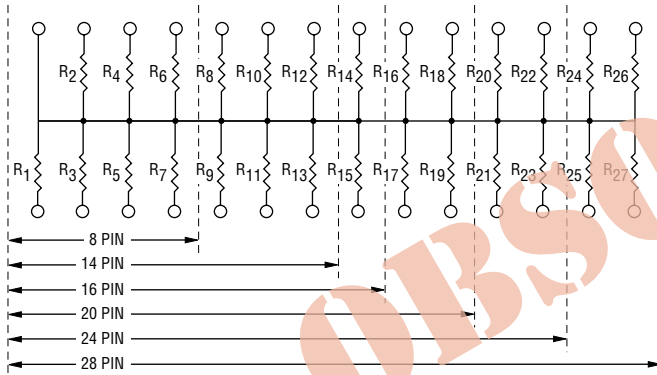
QSOP Package Power Temperature Derating Curve



Narrow-Body SOIC Package Power Temperature Derating Curve



Schematic

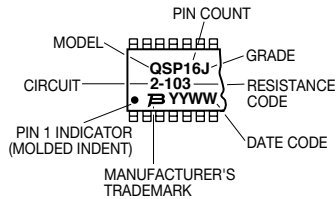


Standard Resistance Values

| Resistance (ohms) | Resistance Code |
|-------------------|-----------------|
| 100 | 101 |
| 120 | 121 |
| 220 | 221 |
| 270 | 271 |
| 330 | 331 |
| 390 | 391 |
| 470 | 471 |
| 510 | 511 |
| 680 | 681 |
| 1 K | 102 |
| 1.5 K | 152 |
| 2 K | 202 |
| 2.2 K | 222 |
| 2.7 K | 272 |
| 3.3 K | 332 |
| 4.7 K | 472 |
| 5.1 K | 512 |
| 10 K | 103 |
| 20 K | 203 |
| 27 K | 273 |
| 47 K | 473 |
| 51 K | 513 |
| 75 K | 753 |
| 82 K | 823 |
| 100 K | 104 |

Typical Part Marking

Represents total content. Layout may vary.

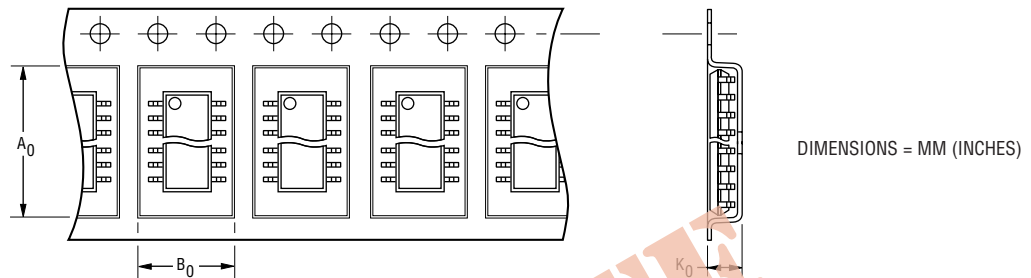


Thin Film on Silicon 2QSP / 2NBS -XX2 Bussed Resistors



Dispensing

For large quantities, the product will be dispensed in Tape and Reel (see diagram below).



| Package | A ₀ | B ₀ | K ₀ | Width | Pitch | No. of Pieces per 13 reel | No. of Pieces per tube |
|---------------|----------------|----------------|----------------|------------|-----------|---------------------------|------------------------|
| QSOP | | | | | | | |
| 16 Pin | 6.4 (0.252) | 5.2 (0.205) | 2.1 (0.083) | 12 (0.472) | 8 (0.315) | 3,500 | 98 |
| 20, 24 Pin | 6.5 (0.256) | 9.0 (0.354) | 2.1 (0.083) | 16 (0.630) | 8 (0.315) | 3,500 | 56 |
| 28 Pin | 6.5 (0.256) | 10.3 (0.406) | 2.1 (0.083) | 16 (0.630) | 8 (0.315) | 3,500 | 49 |
| NBSOIC | | | | | | | |
| 8 Pin | 6.4 (0.252) | 9.0 (0.354) | 2.1 (0.083) | 12 (0.472) | 8 (0.315) | 3,500 | 98 |
| 14 Pin | 6.5 (0.256) | 9.0 (0.354) | 2.1 (0.083) | 16 (0.630) | 8 (0.315) | 3,500 | 56 |
| 16 Pin | 6.5 (0.256) | 9.0 (0.354) | 2.1 (0.083) | 16 (0.630) | 8 (0.315) | 3,500 | 49 |

How To Order

2 QSP 20 - T J 2 - 472 LF

Product Class _____
Thin-Film-on-Silicon

Standard Package Style _____
QSP = QSOP
NBS = Narrow-Body SOIC

Pin Count _____
QSP = 16, 20, 24, 28
NBS = 8, 14, 16

Dispensing _____
R = Reel
T = Tube

Standard Grade _____
Tolerance
J = ±5 %
G = ±2 %
F = ±1 %

Circuit _____
2 = Bussed

Resistance Value Code _____
1st two digits are significant,
3rd digit = number of zeros to follow to give resistance value in ohms.

Terminations _____
LF = 100 % Sn (lead free)



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