

Features

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



Models 2QSP-XX1 and 2NBS-XX1 are obsolete and not recommended for new designs.

Applications

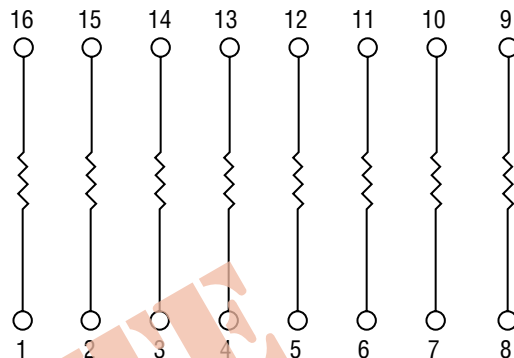
- Series bus resistance
- Pull-up/pull-down
- Ideal for space-constrained applications

Thin Film on Silicon 2QSP / 2NBS -XX1 Isolated Resistors

General Information

Isolated resistor networks are commonly used in digital circuits where series resistors are required on the system bus. Fabricated with Tantalum Nitride and Nickel Chromium technology on Silicon, these resistors feature excellent stability, TCR and tracking performance. This product series is 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 | 10 | | 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.

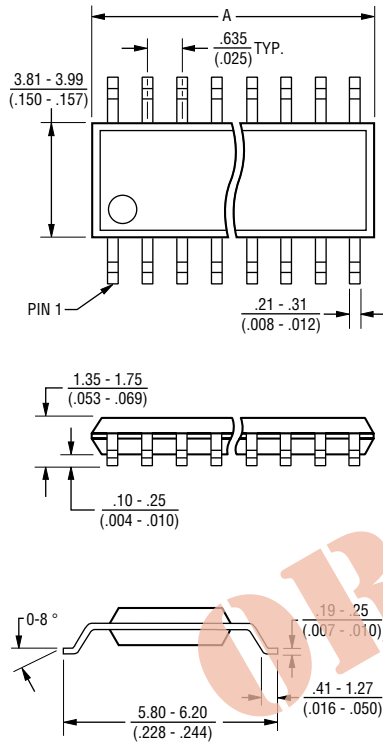
Customers should verify actual device performance in their specific applications.

Thin Film on Silicon 2QSP / 2NBS -XX1 Isolated Resistors



Mechanical Characteristics

QSOP Package Dimensions

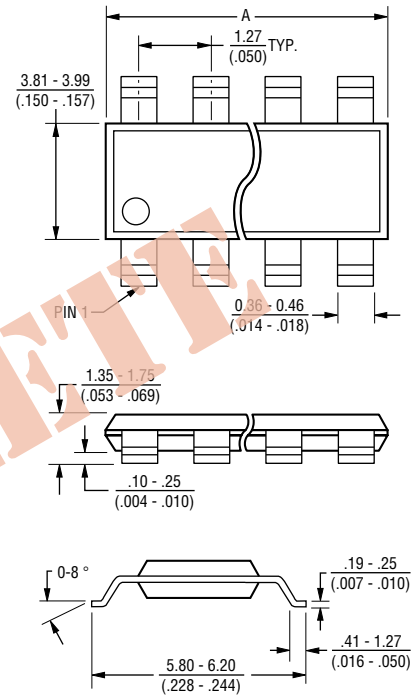


| Model | A |
|--------|---------------------------|
| 2QSP16 | 4.80 - 4.98 (.189 - .196) |
| 2QSP20 | 8.56 - 8.74 (.337 - .344) |
| 2QSP24 | 8.56 - 8.74 (.337 - .344) |
| 2QSP28 | 9.80 - 9.98 (.386 - .393) |

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.

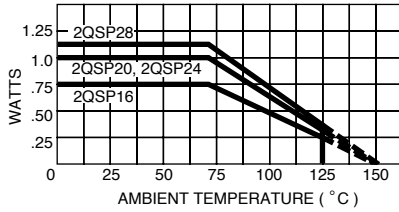
JEDEC Reference Number MS-012.

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

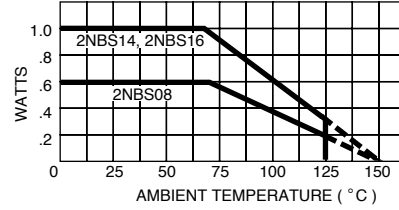
Thin Film on Silicon 2QSP / 2NBS -XX1 Isolated Resistors



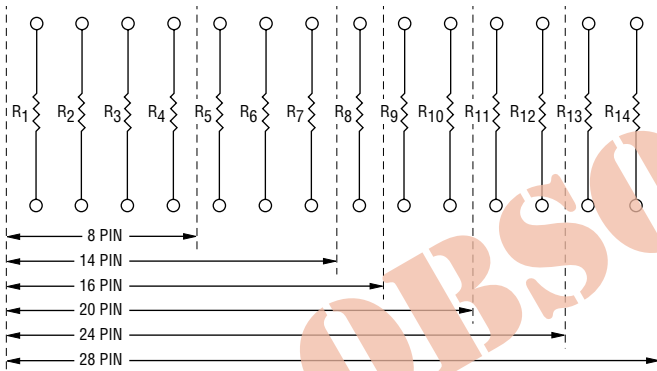
QSOP Package Power Temperature Derating Curve



Narrow-Body SOIC Package Power Temperature Derating Curve



Schematic

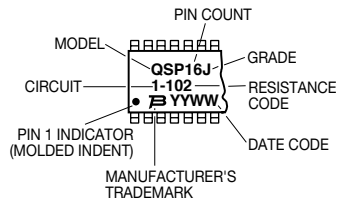


Standard Resistance Values

| Resistance (ohms) | Resistance Code |
|-------------------|-----------------|
| 10 | 100 |
| 22 | 220 |
| 33 | 330 |
| 39 | 390 |
| 47 | 470 |
| 51 | 510 |
| 68 | 680 |
| 120 | 121 |
| 220 | 221 |
| 270 | 271 |
| 330 | 331 |
| 470 | 471 |
| 510 | 511 |
| 680 | 681 |
| 1 K | 102 |
| 2.2 K | 222 |
| 4.7 K | 472 |
| 5 K | 502 |
| 8.2 K | 822 |
| 10 K | 103 |
| 18 K | 183 |
| 20 K | 203 |
| 47 K | 473 |
| 50 K | 503 |
| 100 K | 104 |

Typical Part Marking

Represents total content. Layout may vary.



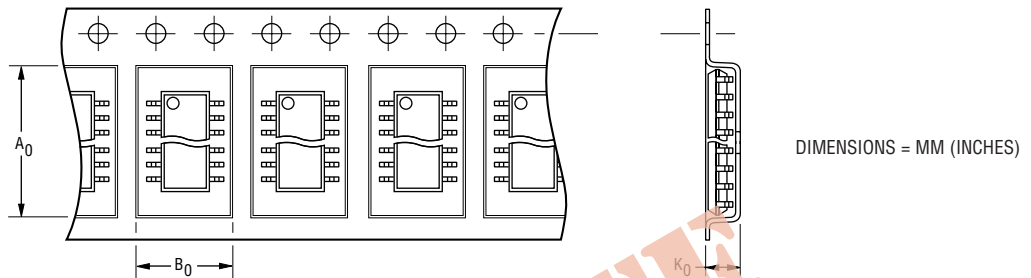
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Dispensing

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 16 - T J 1 - 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 _____
1 = Isolated

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)



Asia-Pacific:

Tel: +886-2 2562-4117 • Fax: +886-2 2562-4116

Europe:

Tel: +41-41 768 5555 • Fax: +41-41 768 5510

The Americas:

Tel: +1-951 781-5500 • Fax: +1-951 781-5700

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