


**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**

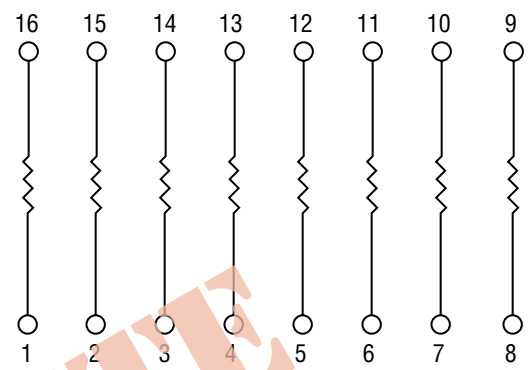
- Series bus resistance
- Pull-up/pull-down
- Ideal for space-constrained applications

**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		±0.5 %		±5 %	Ω
Ratio		±0.1 %		±2 %	Ω
TCR:					
Absolute			100	150	ppm/°C
Tracking				25	ppm/°C
Operating Voltage				50	V
<b>Environmental Characteristics</b>					
ESD		2 K			V
Operating Temperature	T <sub>J</sub>	-55		+125	°C
Storage Temperature	T <sub>stg</sub>	-65		+150	°C
Power Rating per Resistor @ 70 °C				0.1	Watt
Power Rating per Package @ 70 °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

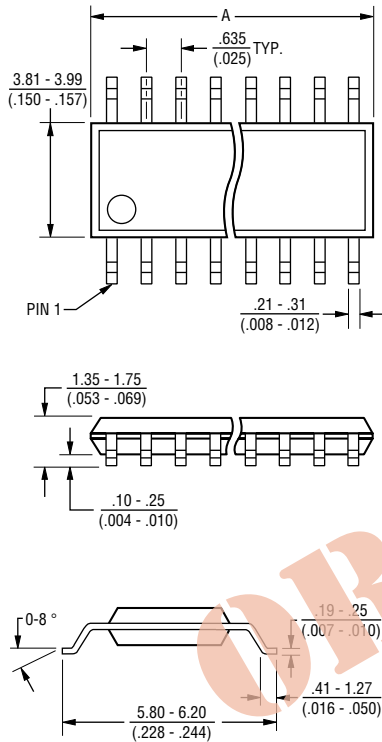
\*RoHS Directive 2002/95/EC Jan 27, 2003 including Annex  
 Specifications are subject to change without notice.  
 Customers should verify actual device performance in their specific applications.

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



## Mechanical Characteristics

### QSOP Package Dimensions

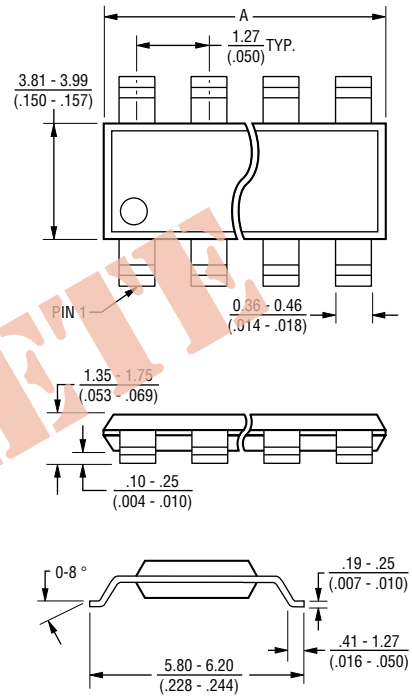


Model	A
2QSP16	4.80 - 4.98 (.189 - .196)
2QSP20	8.56 - 8.74 (.337 - .344)
2QSP24	8.56 - 8.74 (.337 - .344)
2QSP28	9.80 - 9.98 (.386 - .393)

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)

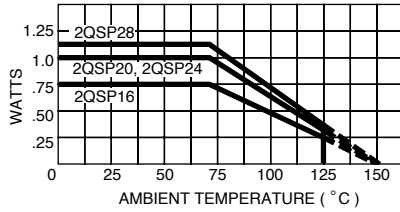
Governing dimensions are in mm. Dimensions in parentheses are in inches and are approximate.

JEDEC Reference Number MS-012.

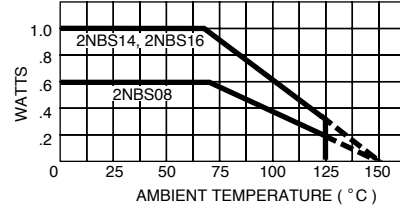
# Thin Film on Silicon 2QSP / 2NBS -XX1 Isolated Resistors



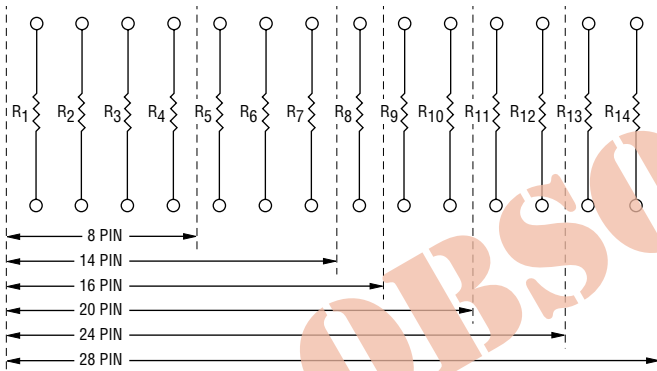
QSOP Package Power Temperature Derating Curve



Narrow-Body SOIC Package Power Temperature Derating Curve



## Schematic

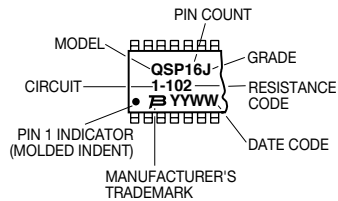


## Standard Resistance Values

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.

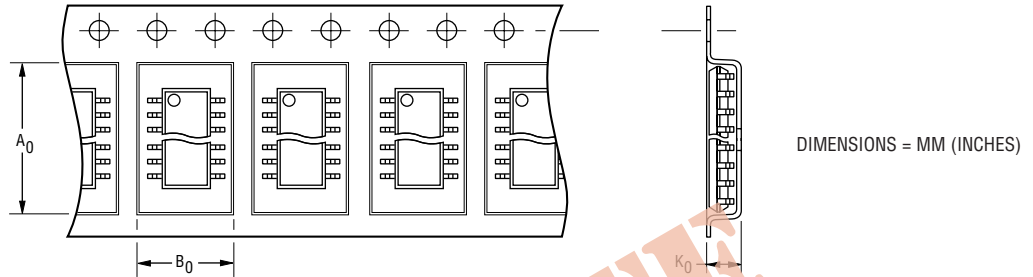


# Thin Film on Silicon 2QSP / 2NBS -XX1 Isolated Resistors



## Dispensing

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



Package	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	Width	Pitch	No. of Pieces per 13 reel	No. of Pieces per tube
<b>QSOP</b>							
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
<b>NBSOIC</b>							
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)



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