

## 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

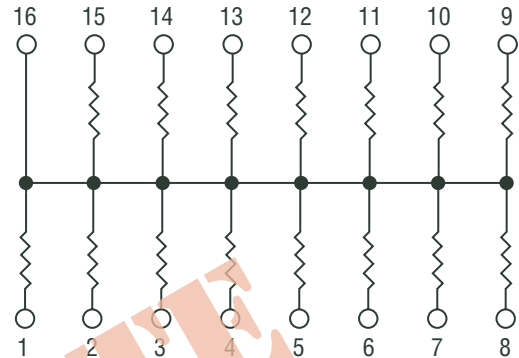
- Bus termination
- Pull-up/pull-down
- Ideal for space-constrained applications

# 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	$\Omega$
Tolerance:					
Absolute		$\pm 0.5\%$		$\pm 5\%$	$\Omega$
Ratio		$\pm 0.1\%$		$\pm 2\%$	$\Omega$
TCR:					
Absolute			100	150	ppm/ $^{\circ}$ C
Tracking				25	ppm/ $^{\circ}$ C
Operating Voltage				50	V
<b>Environmental Characteristics</b>					
ESD		2 K			V
Operating Temperature	$T_J$	-55		+125	$^{\circ}$ C
Storage Temperature	$T_{stg}$	-65		+150	$^{\circ}$ C
Power Rating per Resistor @ 70 $^{\circ}$ C				0.1	Watt
Power Rating per Package @ 70 $^{\circ}$ 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.

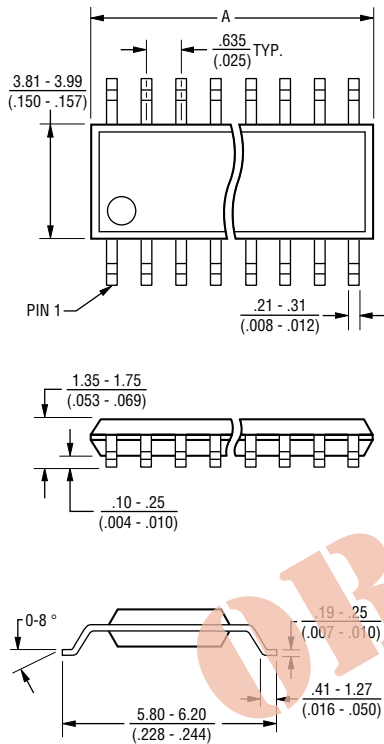
Customers should verify actual device performance in their specific applications.

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



## Mechanical Characteristics

### QSOP Package Dimensions

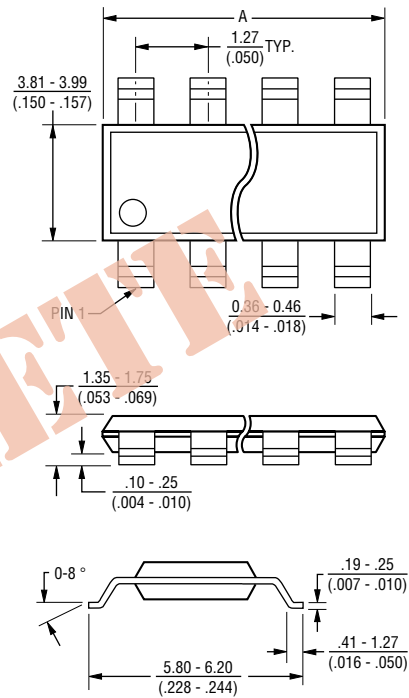


Model	A
2QSP16	4.80 - 4.98 (.189 - .196)
2QSP20	8.56 - 8.74 (.337 - .344)
2QSP24	8.56 - 8.74 (.337 - .344)
2QSP28	9.80 - 9.98 (.386 - .393)

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)

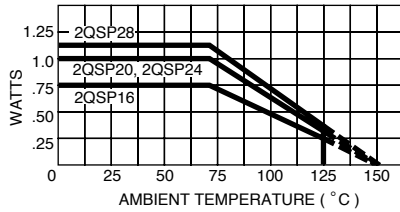
Governing dimensions are in mm. Dimensions in parentheses are in inches and are approximate.

JEDEC Reference Number MS-012.

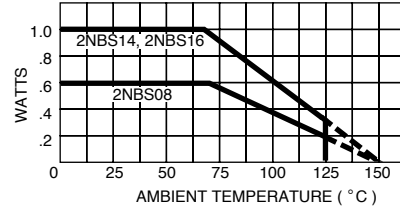
# Thin Film on Silicon 2QSP / 2NBS -XX2 Bussed Resistors



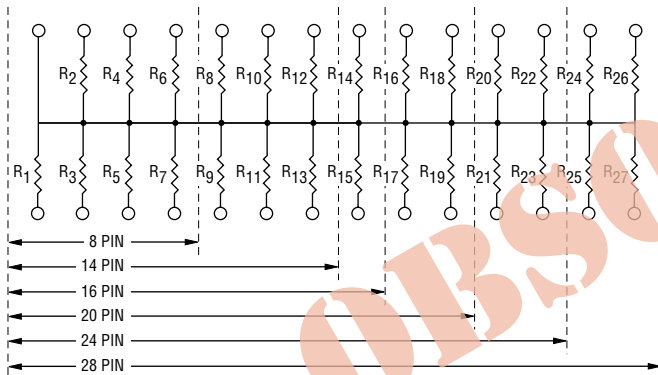
QSOP Package Power Temperature Derating Curve



Narrow-Body SOIC Package Power Temperature Derating Curve



## Schematic

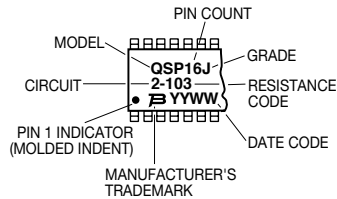


## Standard Resistance Values

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.

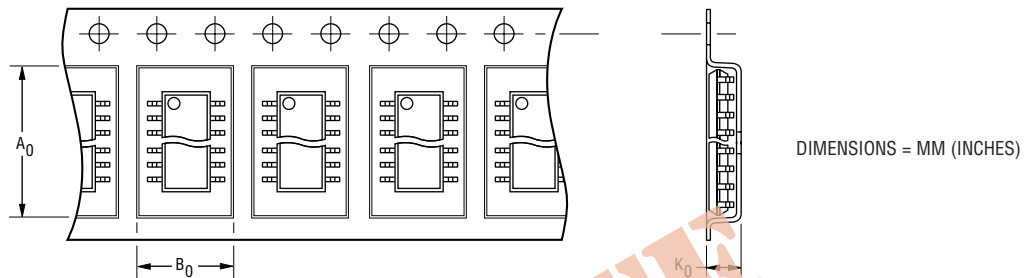


# Thin Film on Silicon 2QSP / 2NBS -XX2 Bussed Resistors



## Dispensing

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



Package	A <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 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)



### 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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