

Timing Matters

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EPSON TIMING DEVICES

Product Configuration Guide (PCS)

CONTENTS

- **Crystals**
 - MHz and kHz Crystals
 - LEGACY MHz and kHz Crystals
 - **Simple Packaged Crystal Oscillators (SPXO)**
 - **Programmable Oscillators (P-SPXO)**
 - **Temp. Compensated Crystal Oscillators (TCXO)**
 - **Real-Time Clocks (RTC)**
 - **Voltage Controlled Crystal Oscillators (VCXO)**
 - **SAW Oscillators**
 - **Gyro Sensors**
 - **Appendix** (Crystal Load Cap Info)
- Pages 3 – 50**
Pages 3 – 26
Pages 27 - 50
Pages 51 - 91
Pages 92 - 110
Pages 111 - 128
Pages 129 - 144
Pages 145 - 169
Pages 170 - 201
Pages 202 - 206
Pages 207 - 208

Extras:

Product Catalog w/ Datasheet – [Crystal Master](#)

Product Support Docs – [Environmental, Packing Spec., Quality, Handling Precautions, etc.](#)

Glossary – [Definition of Terms](#)

Technical Support in U.S. – Email TDTechSupport@ea.epson.com

Product Configuration Guide

CRYSTALS



MHz and kHz CRYSTAL

NOTE: Applies to all Crystal part numbers created since May 2016



Product Configuration System

32.768 kHz Crystal Unit

FC1610AN

32.768K

C5NN90KC5

1

Model

32.7680kHz Crystal Package Type:
1.60 x 1.00 x 0.5 mm

2

Frequency

3

4

5

6

7

8

Tape & Reel

Drive level

ESR unit (K = kΩ)

ESR

Frequency tolerance

Load capacitance

1

Model

FC1610AN

2

Frequency

32.768kHz

3

Load Cap

C5 = 12.5 pF
90 = 9.0 pF
70 = 7.0 pF
60 = 6.0 pF

4

Frequency Tolerance

NN = +/-20 ppm
AA = +/- 10 ppm

5

ESR

90 = 90 kΩ

6

ESR Unit

K = kΩ

7

Drive level

C = 0.5 μW

8

Tape & Reel

B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel
7 = 5000pc/reel



January 2025

NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

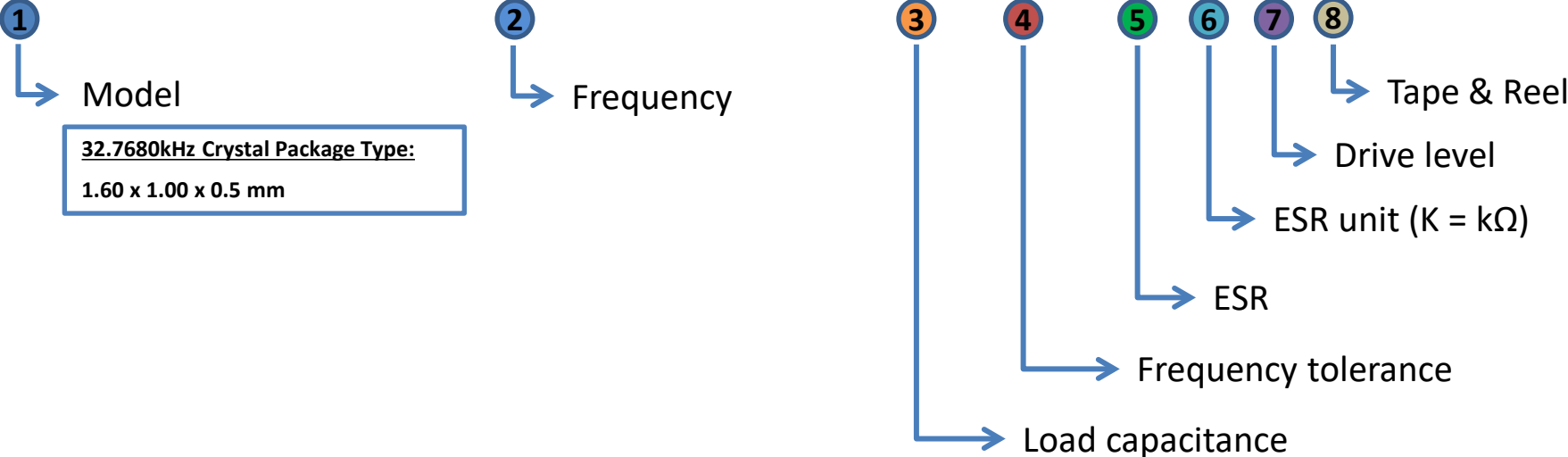


Product Configuration System

32.768 kHz Crystal Unit

FC1610BN

32.768K - C5NN60KC5



32.7680kHz Crystal Package Type:
1.60 x 1.00 x 0.5 mm

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------|-----------|-----------------------------|---------------------|---|----------|-------------|---|
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC1610AN | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF | NN = +/-20 ppm | 60 = 60 kΩ - @ -40C to +85C 70 = 70kΩ - @ -40 to +105C | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pc/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.



Product Configuration System

32.768 kHz Crystal Unit

FC2012AN

32.768K - 90NN50KCB

1

Model

32.7680kHz Crystal Package Type:
2.05 x 1.2 x 0.6 mm

2

Frequency

3

4

5

6

7

8

Tape & Reel

Drive level

ESR unit (K = kΩ)

ESR

Frequency tolerance

Load capacitance

1

Model

FC2012AN

2

Frequency

32.768kHz

3

Load Cap

C5 = 12.5 pF
90 = 9.0 pF
70 = 7.0 pF

4

Frequency Tolerance

NN = +/-20 ppm

5

ESR

60 = 60 kΩ
- @-40 to +105C
50 = 50 kΩ
- @-40 to +85C

6

ESR Unit

K = kΩ

7

Drive level

C = 0.5 μW

8

Tape & Reel

B = Bulk
7=5000pc/reel



January 2025

NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

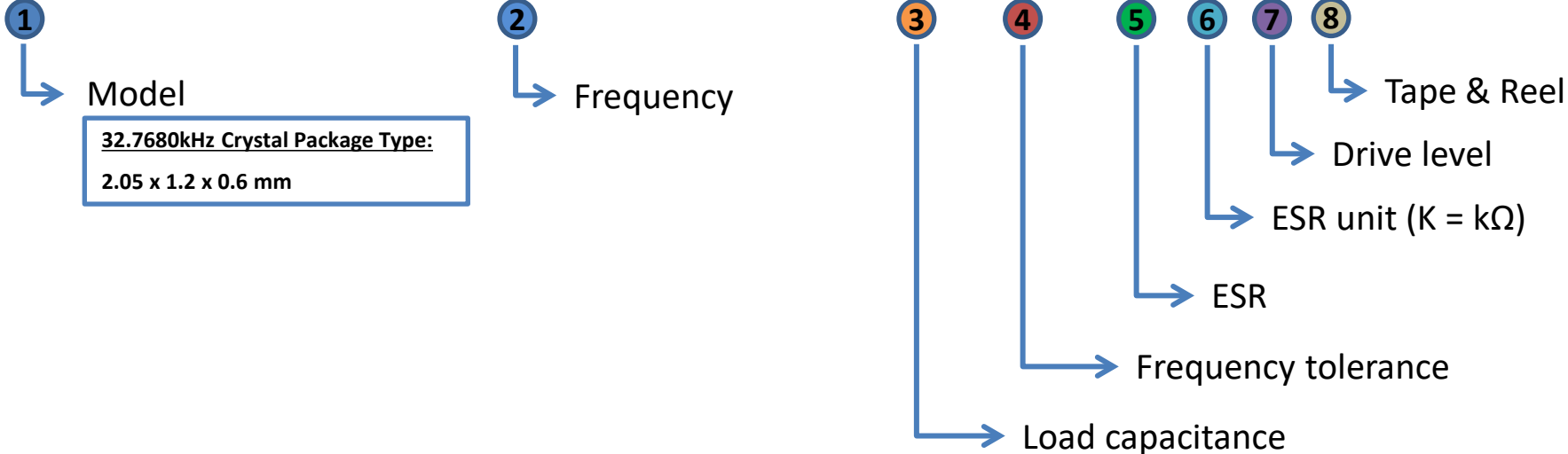


Product Configuration System

32.768 kHz Crystal Unit

FC2012SN

32.768K - 90NN90KCB



32.7680kHz Crystal Package Type:
2.05 x 1.2 x 0.6 mm

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------|-----------|--|---------------------|--|----------|-------------|--|
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC2012SN | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF | NN = +/-20 ppm | A0 = 100 kΩ - @-40 to +105C 90 = 90 kΩ - @-40 to +85C | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 7 = 5000pcs/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

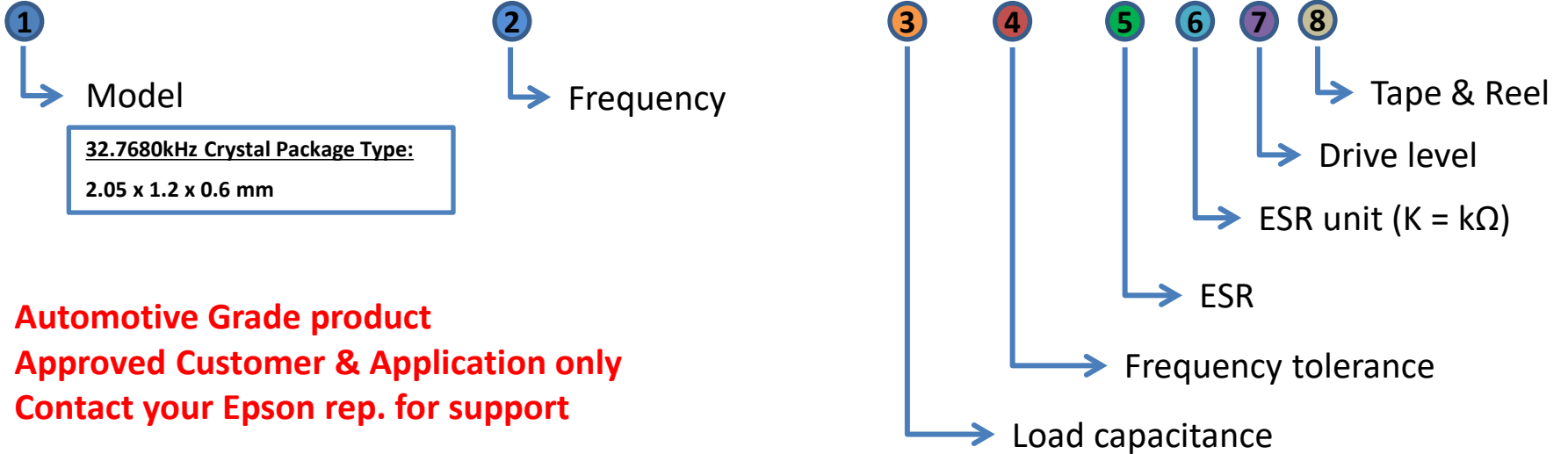


Product Configuration System

32.768 kHz Crystal Unit

FC2012AA

32.768K – 90NN70KCB



32.7680kHz Crystal Package Type:
2.05 x 1.2 x 0.6 mm

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| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------|-----------|--|---------------------|--|----------|-------------|---------------------------|
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC2012AN | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF | NN = +/-20 ppm | 70 = 70 kΩ -@-40 to +105C 75 = 75 kΩ -@-40 to +105C | K = kΩ | C = 0.5 μW | B = Bulk 7=5000pc/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

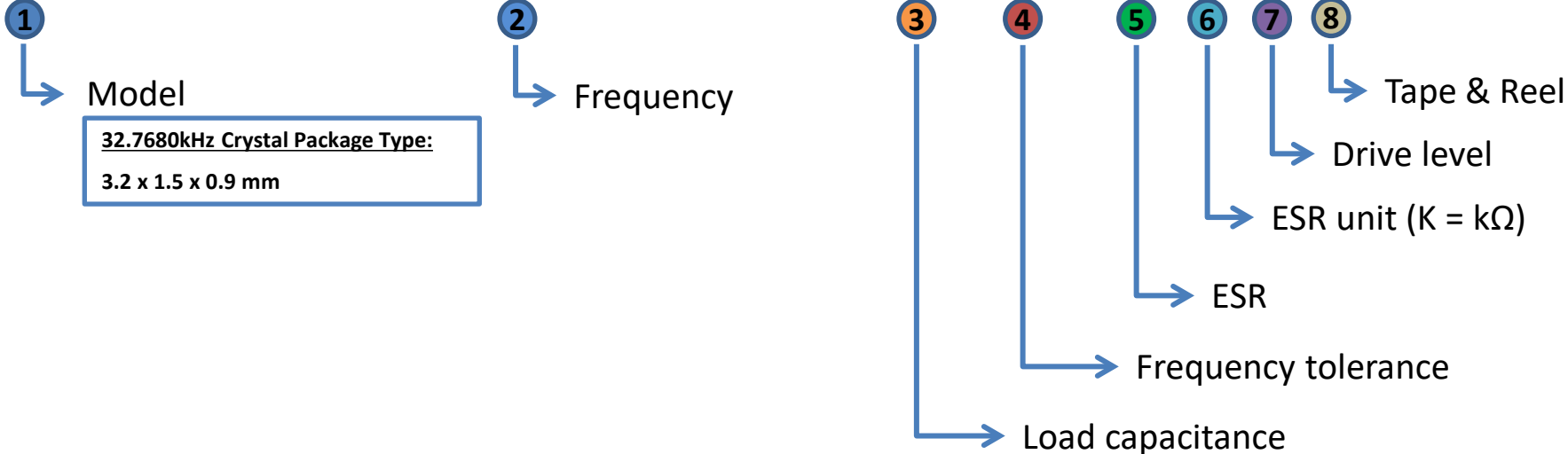


Product Configuration System

32.768 kHz Crystal Unit

FC3215AN

32.768K - 90NN50KCB



32.7680kHz Crystal Package Type:
3.2 x 1.5 x 0.9 mm

| | | | | | | | |
|--------------|------------------|--|----------------------------|---|-----------------|--------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| <u>Model</u> | <u>Frequency</u> | <u>Load Cap</u> | <u>Frequency Tolerance</u> | <u>ESR</u> | <u>ESR Unit</u> | <u>Drive level</u> | <u>Tape & Reel</u> |
| FC3215AN | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF | NN = +/-20 ppm | 60 = 60 kΩ - @-40 to +105C 50 = 50 kΩ - @-40 to +85C | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

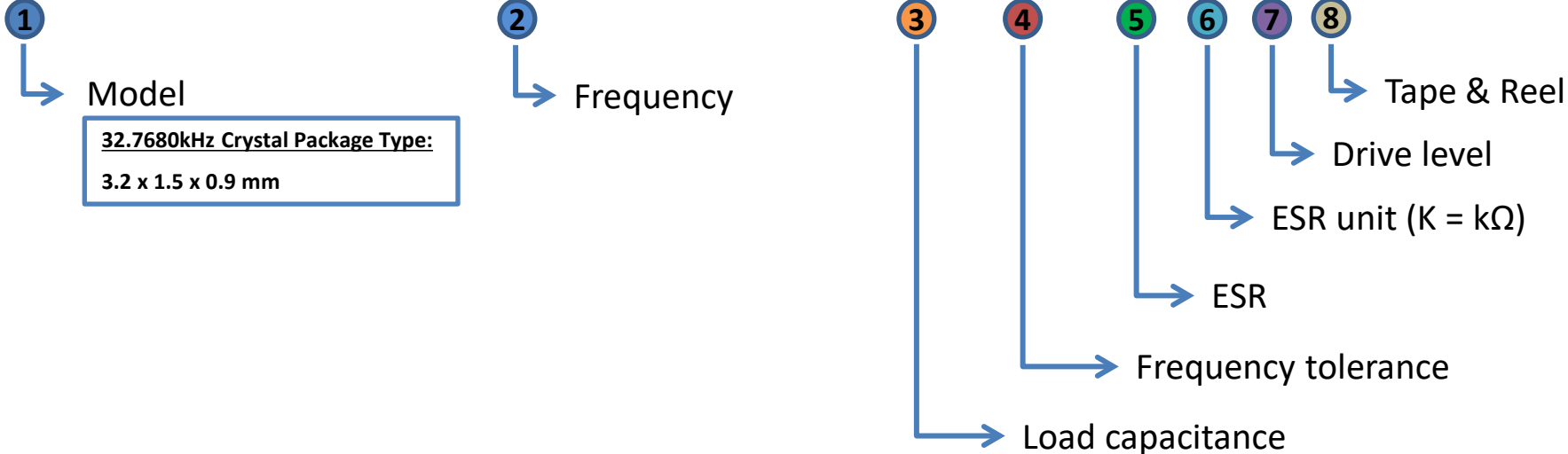


Product Configuration System

32.768 kHz Crystal Unit

FC-135

32.768K - 90NN70KCB



32.768kHz Crystal Package Type:
 3.2 x 1.5 x 0.9 mm

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--------------|------------------|--|----------------------------------|------------|-----------------|--------------------|--|
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC-135 | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF | NN = +/-20 ppm AA = +/-10 ppm | 70 = 70 kΩ | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

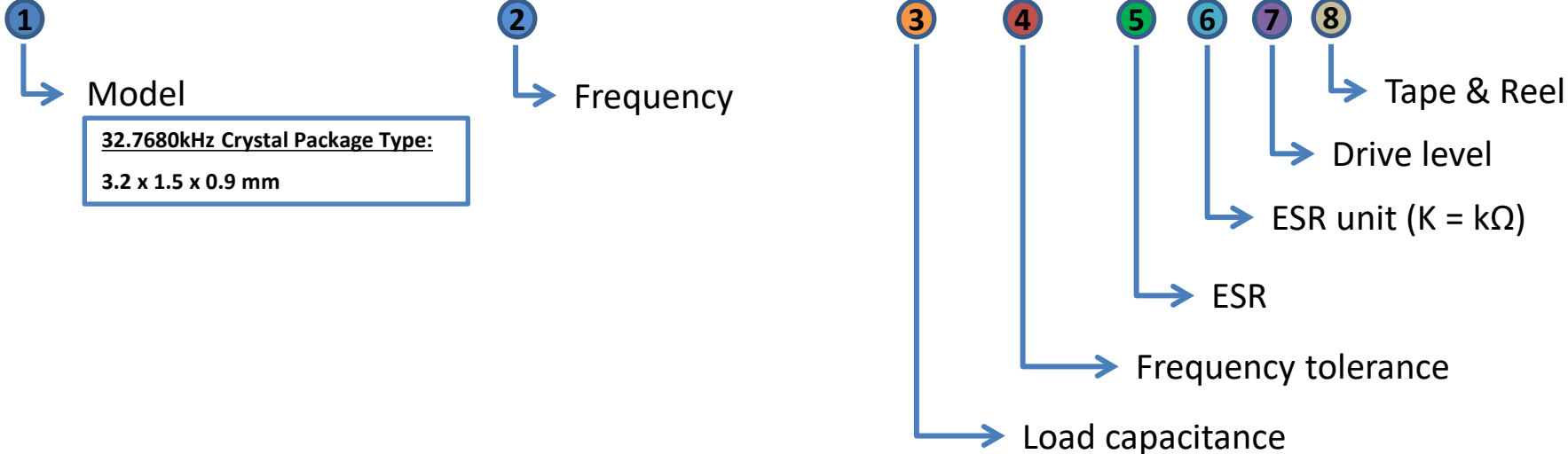


Product Configuration System

32.768 kHz Crystal Unit

FC-135R

32.768K - 90NN50KCB



32.768kHz Crystal Package Type:
3.2 x 1.5 x 0.9 mm

| | | | | | | | |
|--------------|------------------|---|----------------------------------|------------|-----------------|--------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC-135R | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF 60 = 6.0 pF | NN = +/-20 ppm AA = +/-10 ppm | 50 = 50 kΩ | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

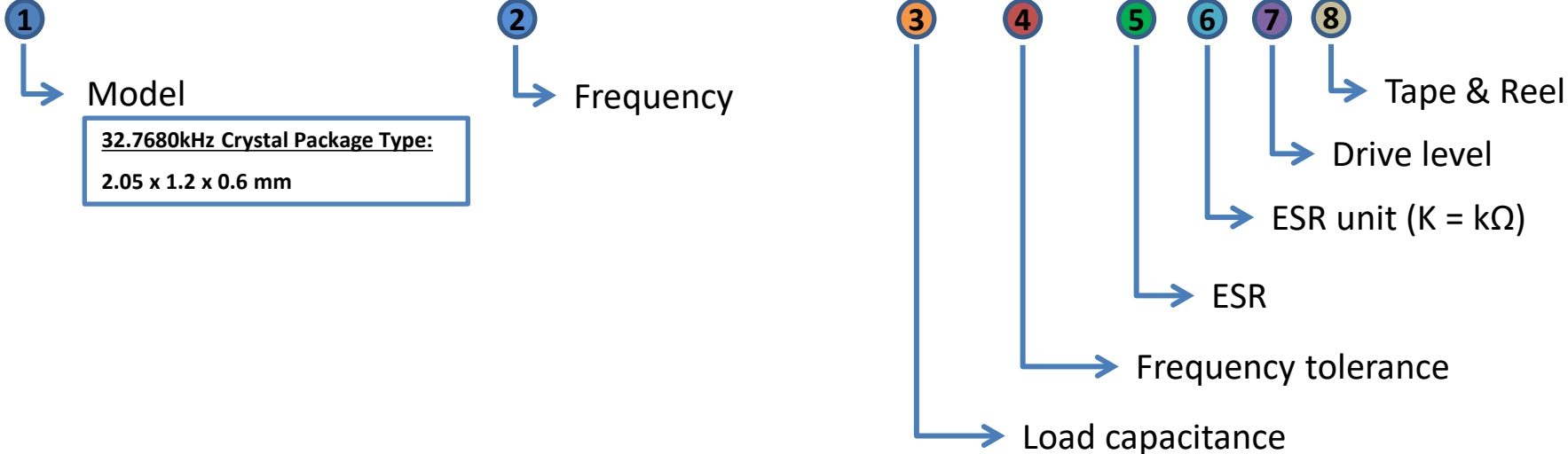


Product Configuration System

32.768 kHz Crystal Unit

FC-12M

32.768K - 90NN90KCB



32.7680kHz Crystal Package Type:
2.05 x 1.2 x 0.6 mm

| | | | | | | | |
|--------------|------------------|---|----------------------------------|------------|-----------------|--------------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Model | Frequency | Load Cap | Frequency Tolerance | ESR | ESR Unit | Drive level | Tape & Reel |
| FC-12M | 32.768kHz | C5 = 12.5 pF 90 = 9.0 pF 70 = 7.0 pF 60 = 6.0 pF | NN = +/-20 ppm AA = +/-10 ppm | 90 = 90 kΩ | K = kΩ | C = 0.5 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pcs/reel |



NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.



Product Configuration System

32.768 kHz Crystal Unit

FC-13A

32.768K - 90NN70KCB

1

Model

32.768kHz Crystal Package Type:
3.2 x 1.5 x 0.9 mm

2

Frequency

3

4

5

6

7

8

Tape & Reel

Drive level

ESR unit (K = kΩ)

ESR

Frequency tolerance

Load capacitance

Non Promotional

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1

Model
FC-13A

2

Frequency
32.768kHz

3

Load Cap
C5 = 12.5 pF
90 = 9.0 pF
70 = 7.0 pF
60 = 6.0 pF

4

Frequency Tolerance
NN = +/-20 ppm
AA = +/-10 ppm

5

ESR
70 = 70 kΩ

6

ESR Unit
K = kΩ

7

Drive level
C = 1.0 μW

8

Tape & Reel
B = Bulk
0 = 1000pcs/reel
5 = 3000pcs/reel

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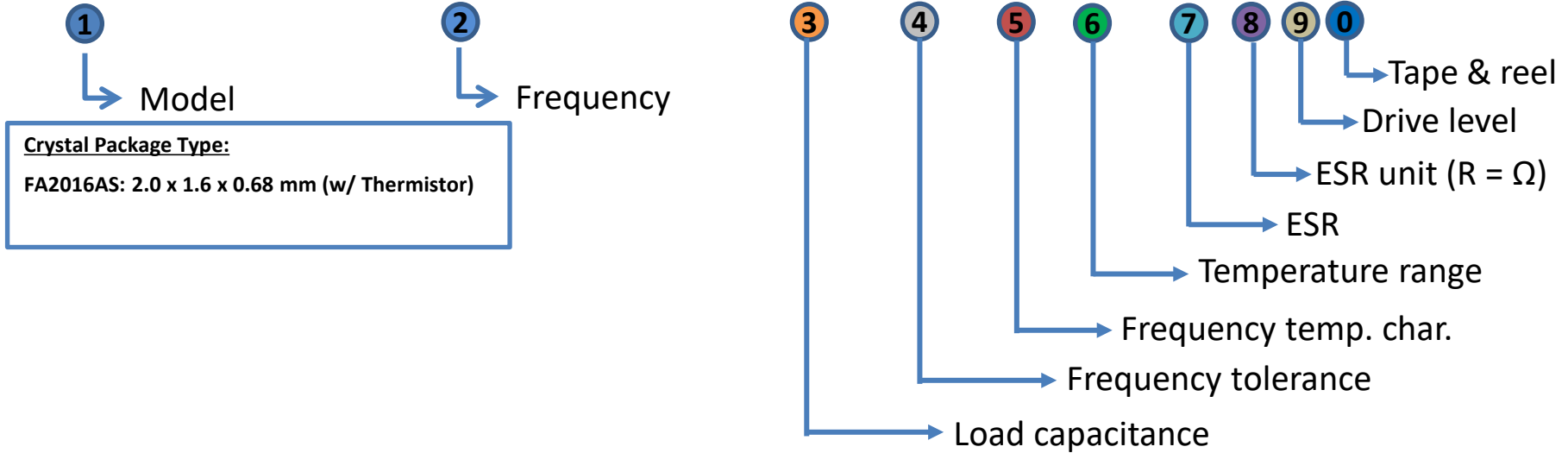
NOTES: The values listed above are common/standard values for kHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA2016AS 38.40M – 80AACCN80RG5



Crystal Package Type:
FA2016AS: 2.0 x 1.6 x 0.68 mm (w/ Thermistor)

| 1 Model | 3 Load cap | 4 Frequency tolerance | 5 Freq. temp. char. | 6 Temp. range | 7 ESR = Ω | 8 Drive level | 9 Tape & reel |
|----------|---|--|--|---|---|--------------------------|--|
| FA2016AS | N0 = 20 pF J0 = 18 pF G0 = 16pF F0 = 15pF C5 = 12.5pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF | bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm (STD) ZZ = Others | bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm CC = +/-12 ppm (STD) AA = +/- 10 ppm ZZ = Others | U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C J = -40 to 125C | A5 = 150 Ω A0 = 100 Ω 80 = 80 Ω 60 = 60 Ω 50 = 50 Ω | E = 100 μW G = 200 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pcs/reel |

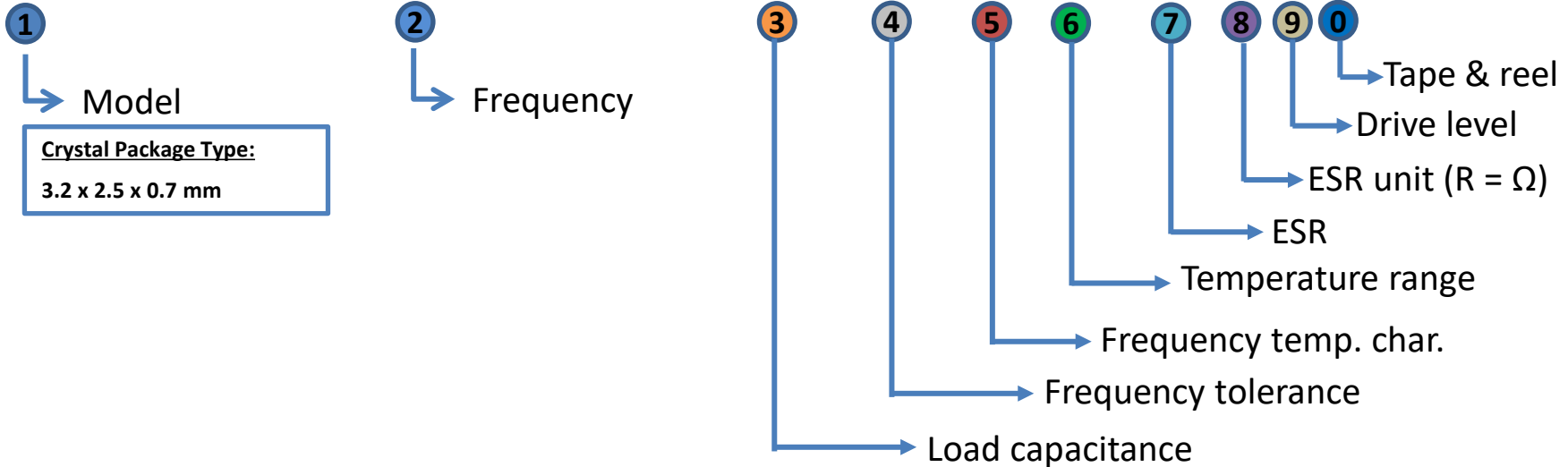
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA-238 **25.00M** – **90NNYYB80RG5**



| 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|------------------------|--|--|--|---|--|--|--|---|
| Model FA-238 | Load cap N0 = 20 pF J0 = 18 pF G0 = 16 pF C5 = 12.5 pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF | Frequency tolerance bb = +/-50 ppm YY = +/-30 ppm TT = +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm | Freq. temp. char. bb = +/-50 ppm YY = +/-30 ppm TT = +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm | Temp. range B = -20 to +70C U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | ESR = Ω 80 = 80 Ω 60 = 60 Ω 50 = 50 Ω 40 = 40 Ω | Drive level G = 200 μW E = 100 μW | Tape & reel B = Bulk 0 = 1000pcs/reel 6 = 2000pcs/reel 5 = 3000pcs/reel | |

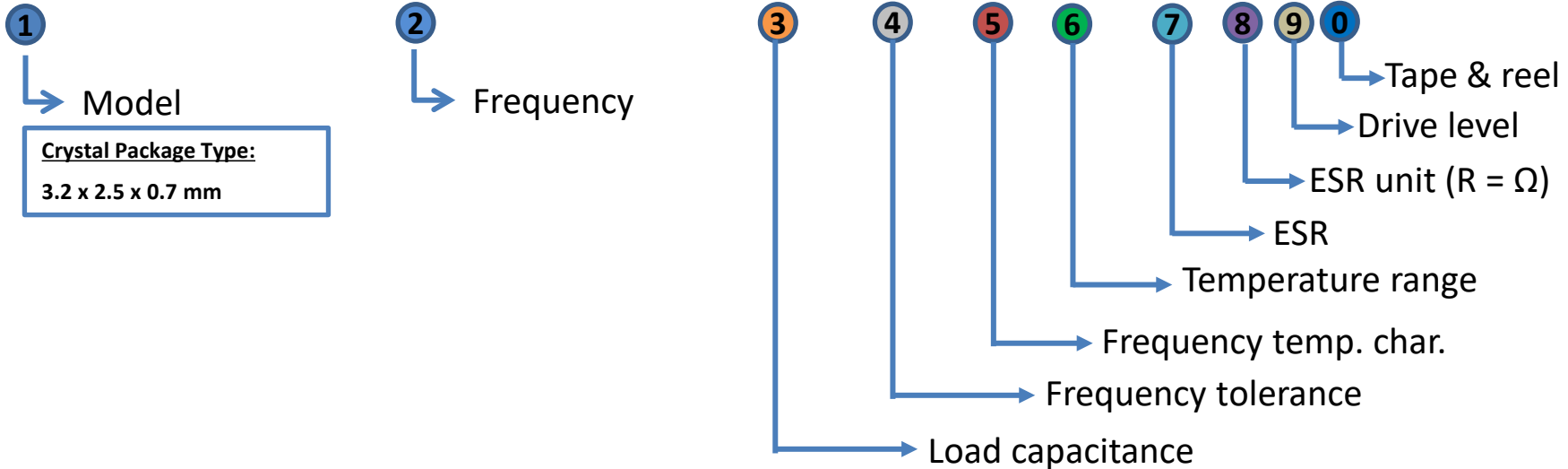
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA-238A 24.00M – CONNbbJ50RGO



| 1 Model | 3 Load cap | 4 Frequency tolerance | 5 Freq. temp. char. | 6 Temp. range | 7 ESR = Ω | 8 Drive level | 0 Tape & reel |
|-------------|--------------|-----------------------|---------------------|-----------------|-------------|---------------|------------------|
| FA-238A | N0=20pF | bb = +/-50 ppm | bb = +/-50 ppm | B = -20 to +70C | 120 = 120 Ω | G = 200 μW | B = Bulk |
| | J0 = 18 pF | YY= +/-30 ppm | YY= +/-30 ppm | U = -20 to +75C | 80 = 80 Ω | E = 100 μW | 0 = 1000pcs/reel |
| 2 Frequency | G0 = 16 pF | TT = +/-25 ppm | TT = +/-25 ppm | N = -30 to +85C | 60 = 60 Ω | | 6 = 2000pcs/reel |
| 12 ~ 50 MHz | C5 = 12.5 pF | NN = +/-20 ppm | NN = +/-20 ppm | G = -40 to +85C | 50 = 50 Ω | | 4 = 4000pcs/reel |
| | C0 = 12 pF | FF = +/-15 ppm | FF = +/-15 ppm | H = -40 to 105C | 40 = 40 Ω | | |
| | A0 = 10 pF | | | J = -40 to 125C | | | |
| | 90 = 9.0pF | | | | | | |
| | 80 = 8.0 pF | | | | | | |
| | 70 = 7.0 pF | | | | | | |

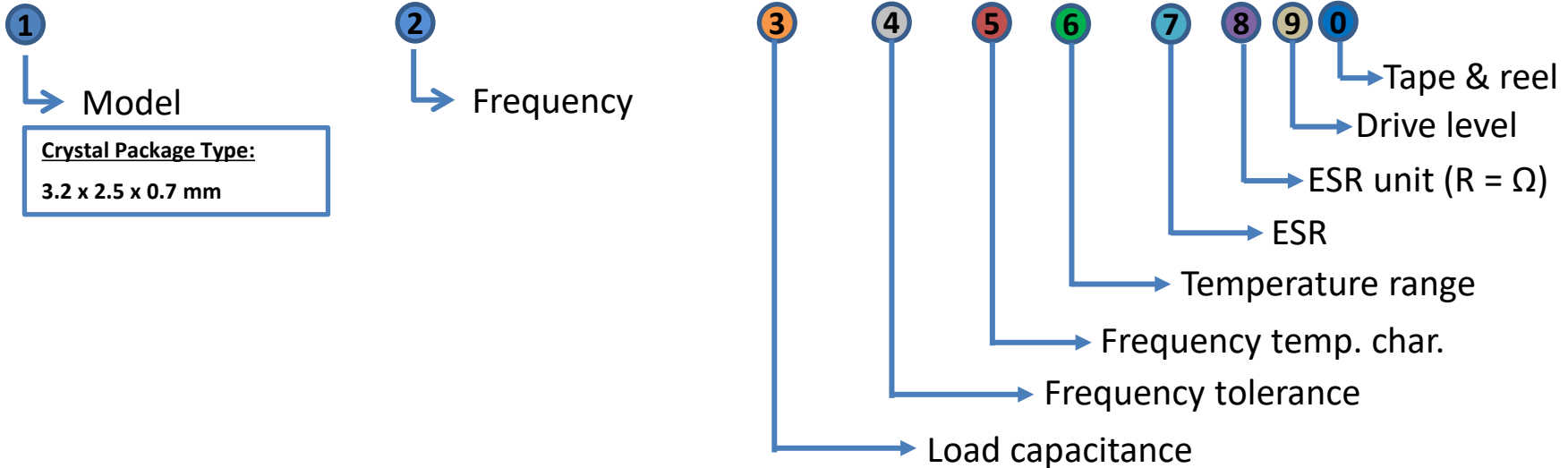
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA-238V 12.00M – 90NNYYBA0RG5



| 1 | Model | 3 | Load cap | 4 | Frequency tolerance | 5 | Freq. temp. char. | 6 | Temp. range | 7 | 8 | ESR = Ω | 9 | Drive level | 0 | Tape & reel |
|---|---------|---|--|---|--|---|--|---|---|---|---|-------------------------|---|--------------------------|---|--|
| | FA-238V | | N0 = 20 pF J0 = 18 pF F0 = 15 pF C5 = 12.5 pF C0 = 12 pF A0 = 10 pF 90 = 9.0pF 80 = 8.0 pF 70 = 7.0 pF | | bb = +/-50 ppm YY= +/-30 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | | bb = +/-50 ppm YY= +/-30 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | | B = -20 to +70C U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | | | A0 = 100 Ω 80 = 80 Ω | | E = 100 μW G = 200 μW | | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel |

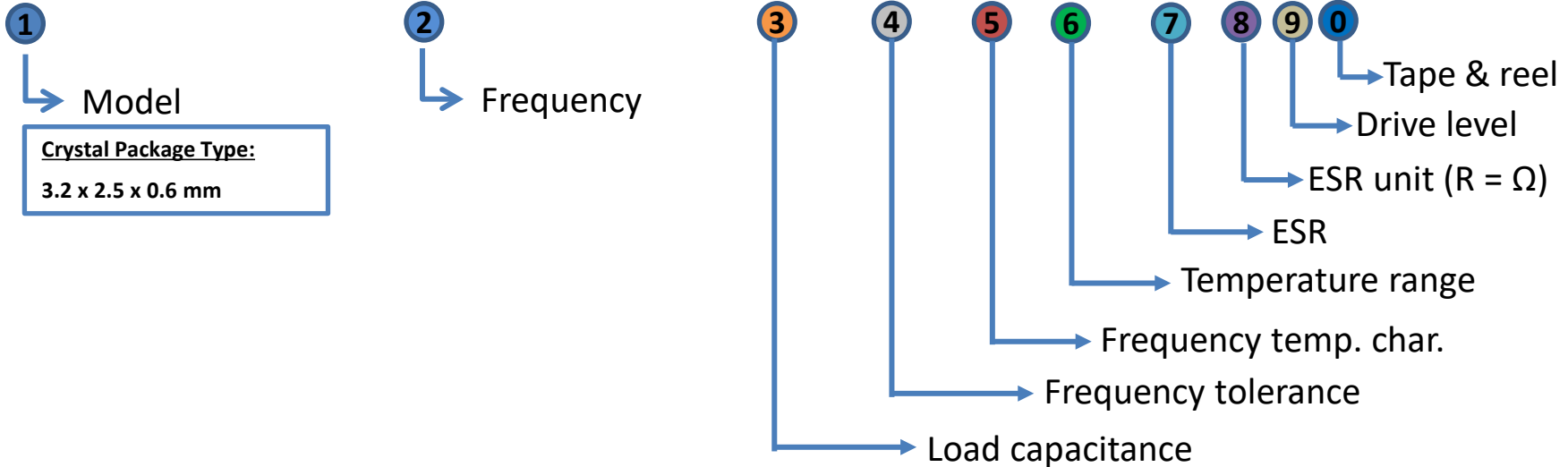
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

TSX-3225 25.00M – 90NNYYU60RG5



Crystal Package Type:
3.2 x 2.5 x 0.6 mm

| 1 Model | 3 Load cap | 4 Frequency tolerance | 5 Freq. temp. char. | 6 Temp. range | 7 ESR = Ω | 8 Drive level | 0 Tape & reel |
|----------|---|---|--|--|------------------------|--------------------------|--|
| TSX-3225 | Q0=22pF N0 = 20 pF J0 = 18 pF G0 = 16pF F0 = 15pF C5 = 12.5pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF D0= 13.0pF | bb = +/-50 ppm YY= +/-30 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm 77 = +/- 7ppm | bb = +/-50 ppm YY= +/-30 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | 60 = 60 Ω 40 = 40 Ω | E = 100 μW G = 200 μW | B = Bulk 0 = 1000pcs/reel 6 = 2000pcs/reel 5 = 3000pcs/reel |

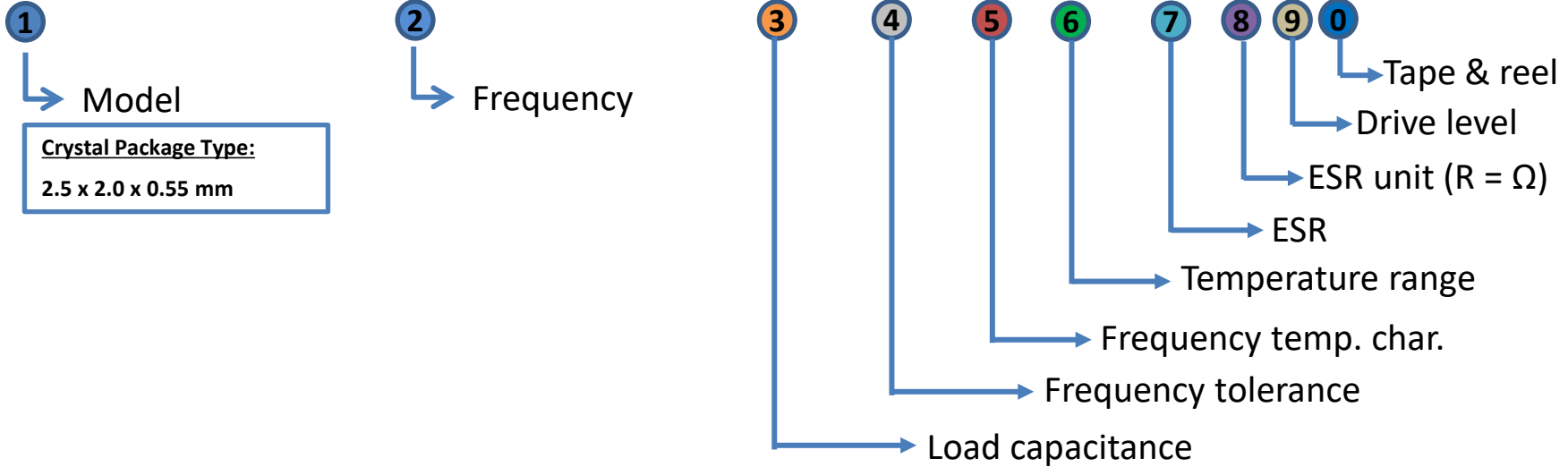
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA-20H **25.00M** – **60NNYYU80RE5**



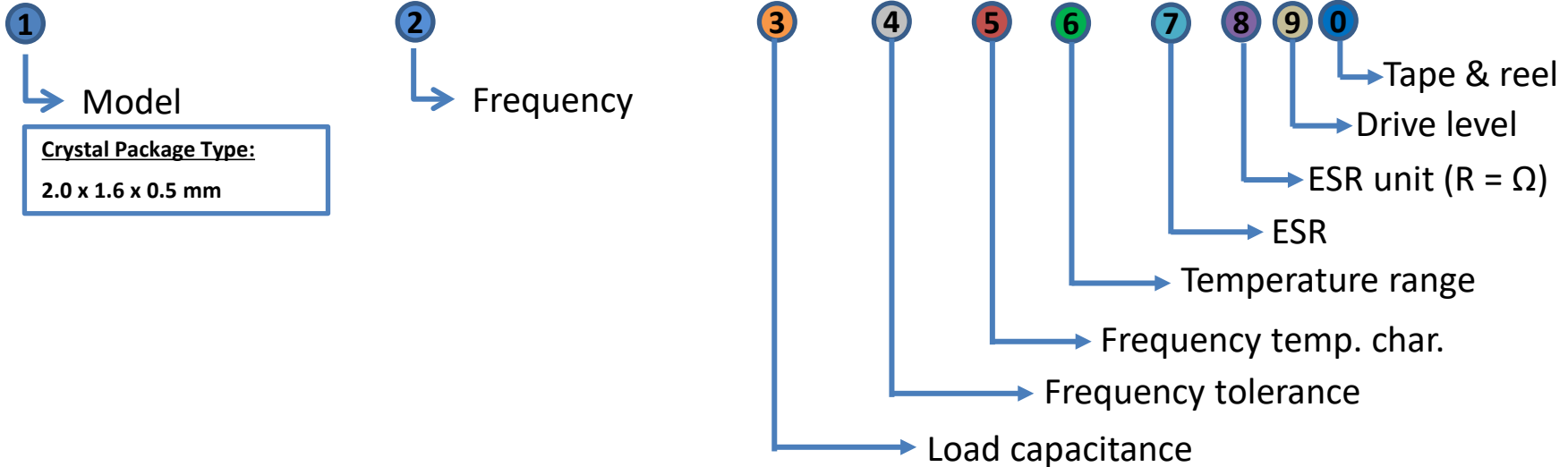
| 1 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 |
|---|---|---|---|--|--|--|--|---|
| Model FA-20H | Load cap N0 = 20 pF J0 = 18 pF G0 = 16pF F0 = 15pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF | Frequency tolerance bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | Freq. temp. char. bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | Temp. range U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | ESR = Ω A5 = 150 Ω 80 = 80 Ω 60 = 60 Ω 50 = 50 Ω 40 = 40 Ω | Drive level E = 100 μW G = 200 μW | Tape & reel B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel | |
| 2 Frequency 12 ~ 54 MHz | | | | | | | | |

Product Configuration System



MHz Range Crystal Units

FA-128 **25.00M** – **60NNYYUA0RE5**



| 1 Model | 3 Load cap | 4 Frequency tolerance | 5 Freq. temp. char. | 6 Temp. range | 7 8 ESR = Ω | 9 Drive level | 0 Tape & reel |
|---------|---|---|---|--|--|--------------------------|--|
| FA-128 | N0 = 20 pF J0 = 18 pF G0 = 16pF F0 = 15pF C5 = 12.5pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF | bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | bb = +/-50 ppm YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | A5 = 150 Ω A0 = 100 Ω 80 = 80 Ω 60 = 60 Ω | E = 100 μW G = 200 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 7 = 5000pcs/reel |

Product Configuration System



MHz Range Crystal Units

FA2016AA 40.00M – 80AAbbJ60RG7

1

Model

2

Frequency

Crystal Package Type:

FA2016AA: 2.0 x 1.6 x 0.5 mm

FA2016ASA: 2.0 x 1.6 x 0.5 mm (w/ Thermistor)

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3

Load capacitance

4

Frequency tolerance

5

Frequency temp. char.

6

Temperature range

7

ESR

8

ESR unit (R = Ω)

Drive level

Tape & reel

9

0

1

Model

FA2016AA
 FA2016ASA

3

Load cap

N0 = 20 pF
 J0 = 18 pF
 G0 = 16pF
 F0 = 15pF
 C5 = 12.5pF
 C0 = 12 pF
 A0 = 10 pF
 90 = 9.0 pF
 80 = 8.0 pF
 70 = 7.0 pF
 60 = 6.0 pF

4

Frequency tolerance

bb = +/-50 ppm
 YY= +/-30 ppm
 TT= +/-25 ppm
 NN = +/-20 ppm
 FF = +/-15 ppm
 AA = +/- 10 ppm
 ZZ = Others

5

Freq. temp. char.

bb = +/-50 ppm
 aa = +/- 40 ppm
 YY= +/-30 ppm
 TT= +/-25 ppm
 NN = +/-20 ppm
 FF = +/-15 ppm
 AA = +/- 10 ppm
 ZZ = Others

6

Temp. range

U = -20 to +75C
 N = -30 to +85C
 G = -40 to +85C
 H = -40 to 105C
 J = -40 to 125C

7

8

ESR = Ω

A5 = 150 Ω
 A0 = 100 Ω
 80 = 80 Ω
 60 = 60 Ω

9

Drive level

E = 100 μW
 G = 200 μW

0

Tape & reel

B = Bulk
 0 = 1000pcs/reel
 5 = 3000pcs/reel
 7 = 5000pcs/reel

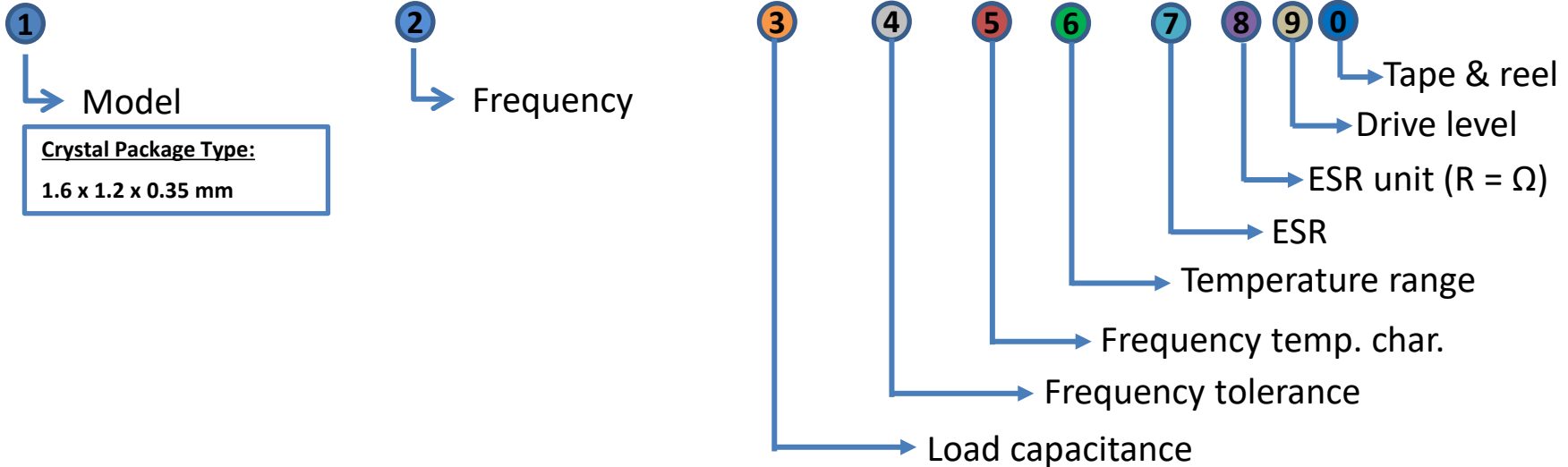
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA-118T 25.00M – 60NNYYUA0RE5



| 1 Model | 3 Load cap | 4 Frequency tolerance | 5 Freq. temp. char. | 6 Temp. range | 7 8 ESR = Ω | 9 Drive level | 0 Tape & reel |
|---------|---|---|---|--|---------------------------------------|--------------------------|--|
| FA-118T | N0 = 20 pF G0 = 16pF C0 = 12 pF A0 = 10 pF 90 = 9.0 pF 80 = 8.0 pF 70 = 7.0 pF 60 = 6.0 pF | YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | YY= +/-30 ppm TT= +/-25 ppm NN = +/-20 ppm FF = +/-15 ppm AA = +/- 10 ppm | U = -20 to +75C N = -30 to +85C G = -40 to +85C H = -40 to 105C | B0 = 200 Ω A0 = 100 Ω 80 = 80 Ω | E = 100 μW G = 200 μW | B = Bulk 0 = 1000pcs/reel 5 = 3000pcs/reel 8 = 6000pcs/reel |

Product Configuration System



MHz Range Crystal Units

FA1612AS 38.40M – 80AACCN80RG7

1

Model

2

Frequency

Crystal Package Type:

FA1612AS: 1.6 x 1.2 x 0.65 mm (w/ Thermistor)

3

4

5

6

7

8

9

0

Tape & reel

Drive level

ESR unit (R = Ω)

ESR

Temperature range

Frequency temp. char.

Frequency tolerance

Load capacitance

1

Model

FA1612AS

3

Load cap

N0 = 20 pF
 J0 = 18 pF
 G0 = 16pF
 F0 = 15pF
 C5 = 12.5pF
 C0 = 12 pF
 A0 = 10 pF
 90 = 9.0 pF
 80 = 8.0 pF
 70 = 7.0 pF
 60 = 6.0 pF

4

Frequency tolerance

bb = +/-50 ppm
 YY= +/-30 ppm
 TT= +/-25 ppm
 NN = +/-20 ppm
 FF = +/-15 ppm
 AA = +/- 10 ppm (STD)
 ZZ = Others

5

Freq. temp. char.

bb = +/-50 ppm
 YY= +/-30 ppm
 TT= +/-25 ppm
 NN = +/-20 ppm
 FF = +/-15 ppm
 CC = +/-12 ppm (STD)
 AA = +/- 10 ppm
 ZZ = Others

6

Temp. range

U = -20 to +75C
 N = -30 to +85C
 G = -40 to +85C
 H = -40 to 105C
 J = -40 to 125C

7

8

ESR = Ω

A5 = 150 Ω
 A0 = 100 Ω
 80 = 80 Ω
 60 = 60 Ω

9

Drive level

E = 100 μW
 G = 200 μW

0

Tape & reel

B = Bulk
 0 = 1000pcs/reel
 5 = 3000pcs/reel
 7 = 5000pcs/reel

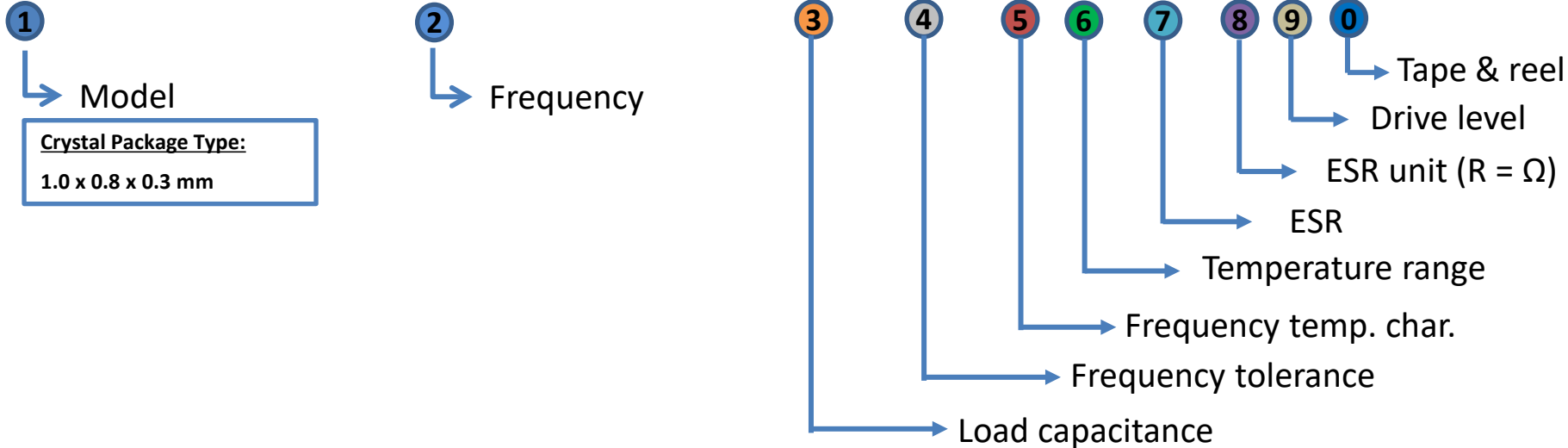
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA1210AN 32.00M – 80AAFFBA0REB



- 1 **Model**
FA1210AN
- 2 **Frequency**
32 ~ 100 MHz
- 3 **Load cap**
60 = 7.0 pF
80 = 8.0 pF
- 4 **Frequency tolerance**
AA = +/- 10 ppm
- 5 **Freq. temp. char.**
YY = +/- 30 ppm
NN = +/-20 ppm
FF = +/-15 ppm
- 6 **Temp. range**
B = -20 to 70C
G = -40 to +85C
- 7 **ESR = Ω**
A0 = 100 Ω
- 8 **Drive level**
E = 100 μW
- 9 **Tape & reel**
B = Bulk

EPSON

January 2025

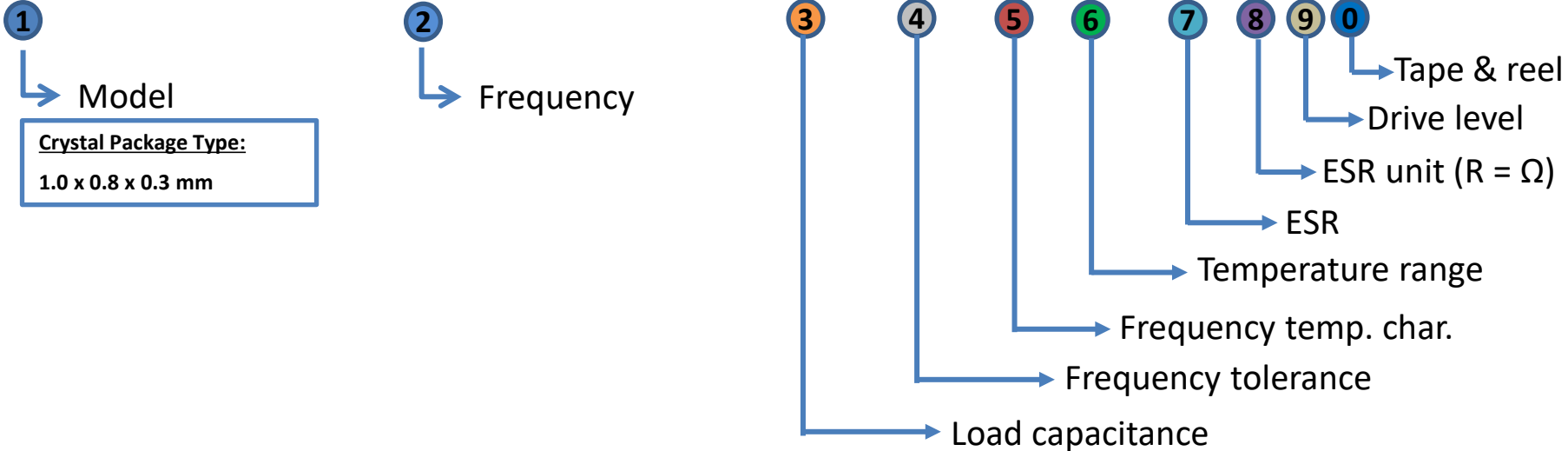
NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

Product Configuration System



MHz Range Crystal Units

FA1008AN52.00M – 80AANN60RGB



- 1 **Model**
FA1008AN
- 2 **Frequency**
40 ~ 100 MHz
- 3 **Load cap**
80 = 8.0 pF
- 4 **Frequency tolerance**
AA = +/- 10 ppm
- 5 **Freq. temp. char.**
 NN = +/-20 ppm (-40 to +85C)
 FF = +/-15 ppm (-30 to +85C)
 AA = +/- 10 ppm (-20 to +75C)
- 6 **Temp. range**
 G = -40 to +85C
 H = -40 to 105C (Contact Epson)
- 7 **ESR = Ω**
60 = 60 Ω
- 8 **Drive level**
G = 200 μW
- 0 **Tape & reel**
B = Bulk

NOTES: The values listed above are common/standard values for MHz crystals; some combinations are not possible depending the specific model. Please contact you Epson representative for assistance to verify the part configuration or inquire about a certain value that is not listed above.

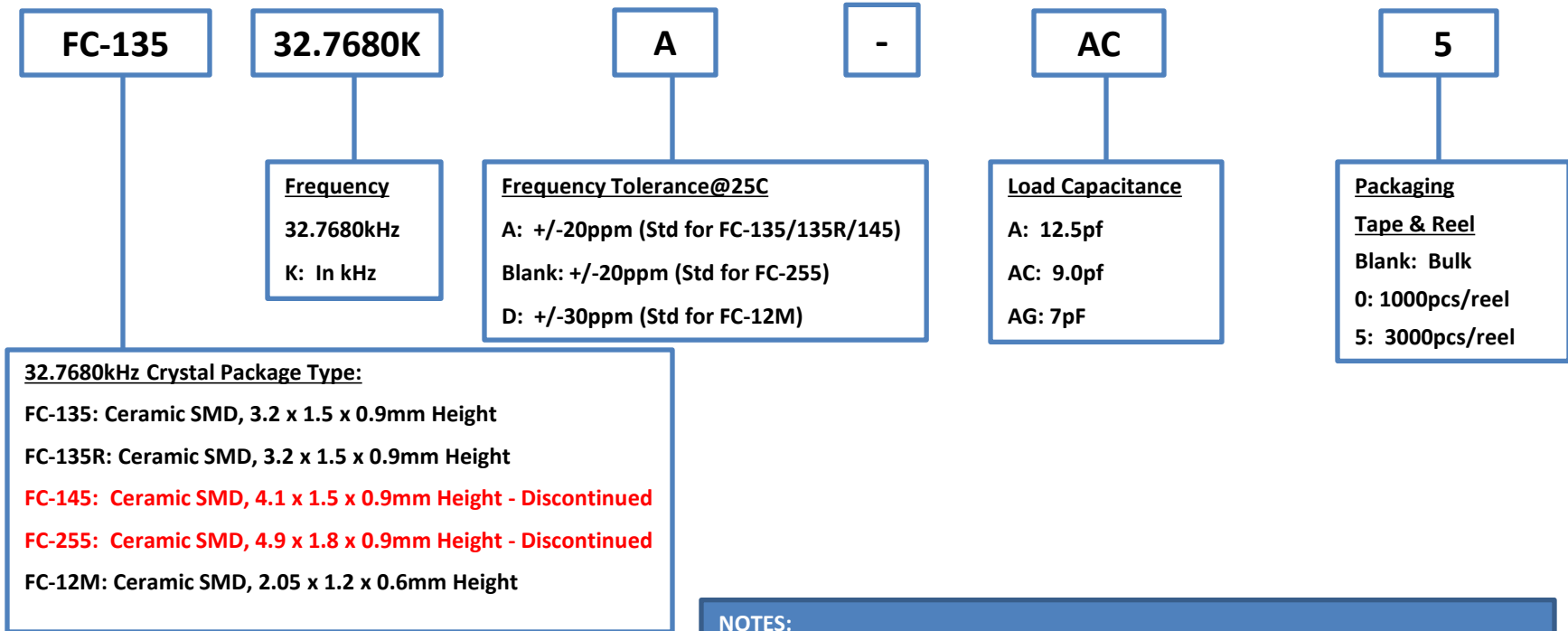
LEGACY - MHz and kHz CRYSTAL

NOTE: Applies to all Crystal part numbers created before May 2016

Product Configuration System



kHz Range Crystal Units



NOTES:

- 1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

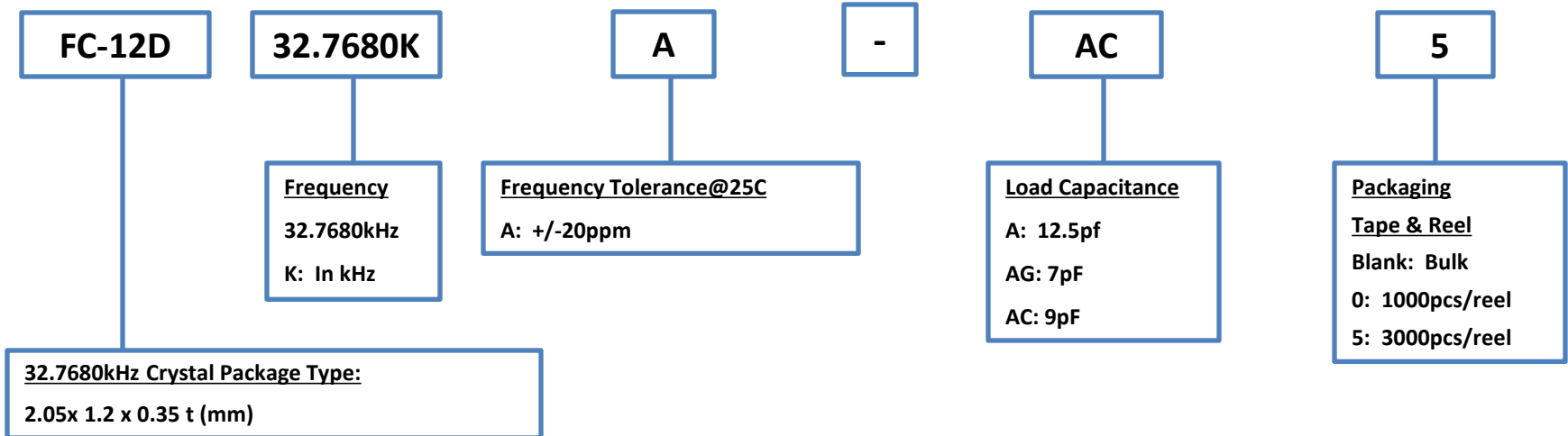




Product Configuration System

32.768 kHz Crystal Unit with 0.35mm height for Smart Card

Discontinued



NOTES:

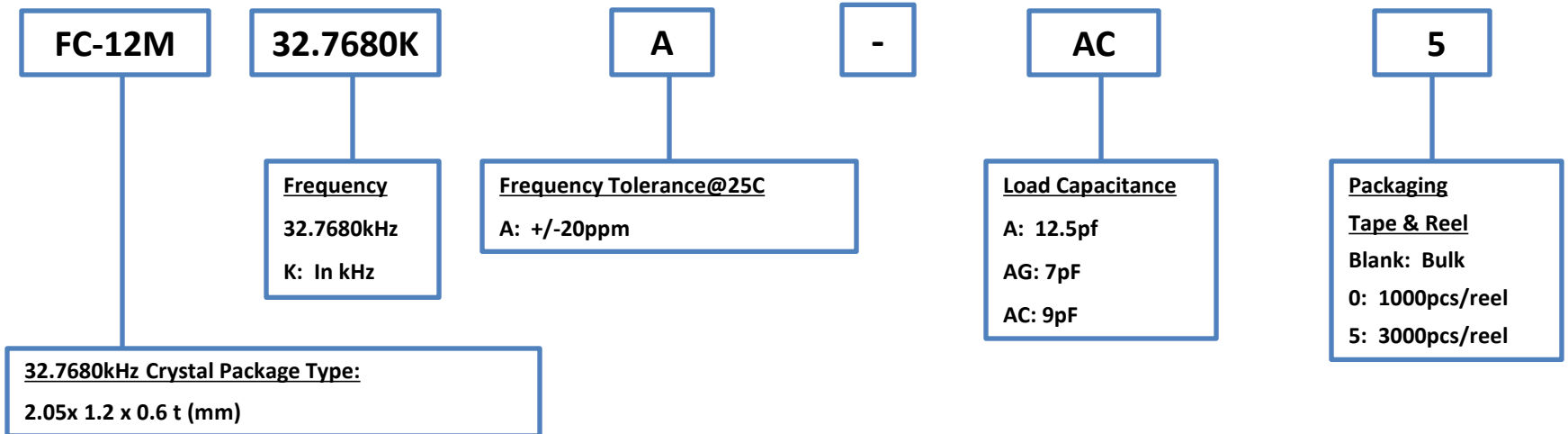
- 1) If your application for this part is not a Smart Card, please contact your Epson representative for assistance.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.





Product Configuration System

kHz Range Crystal Units



NOTES:

- 1) If you require a frequency or tolerance other than the above listed, please contact your Epson representative for assistance.

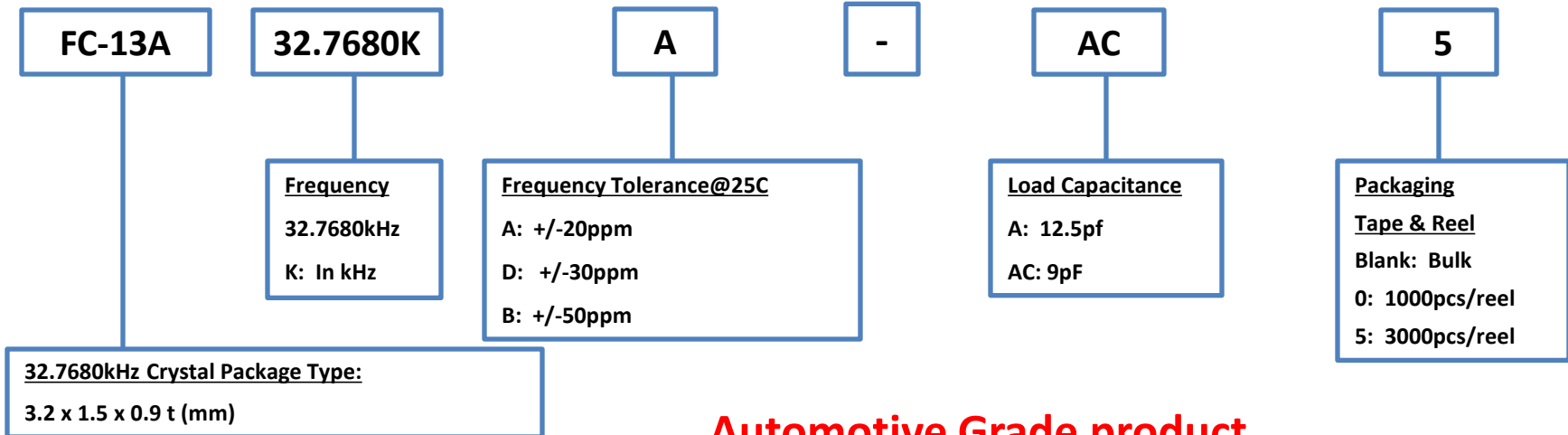
Product Configuration System



kHz Range Crystal Units

Non Promotional

Supported for Existing Customers only. No New Designs



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTES:

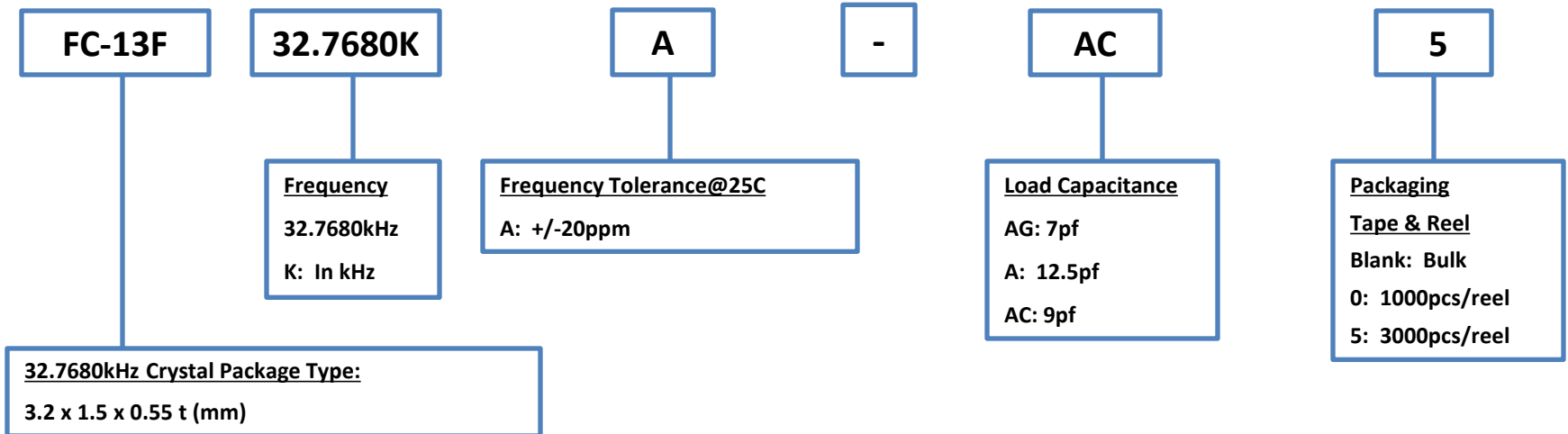
- 1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



kHz Range Crystal Units

Discontinued



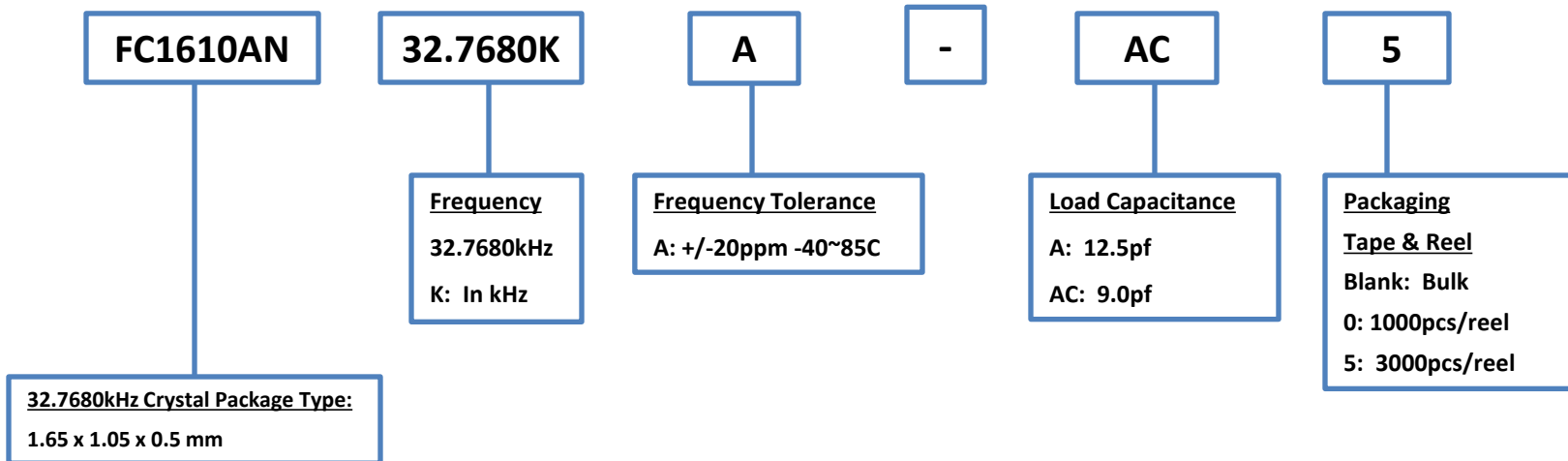
NOTES:

- 1) If you require a frequency or tolerance other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



kHz Range Crystal Unit



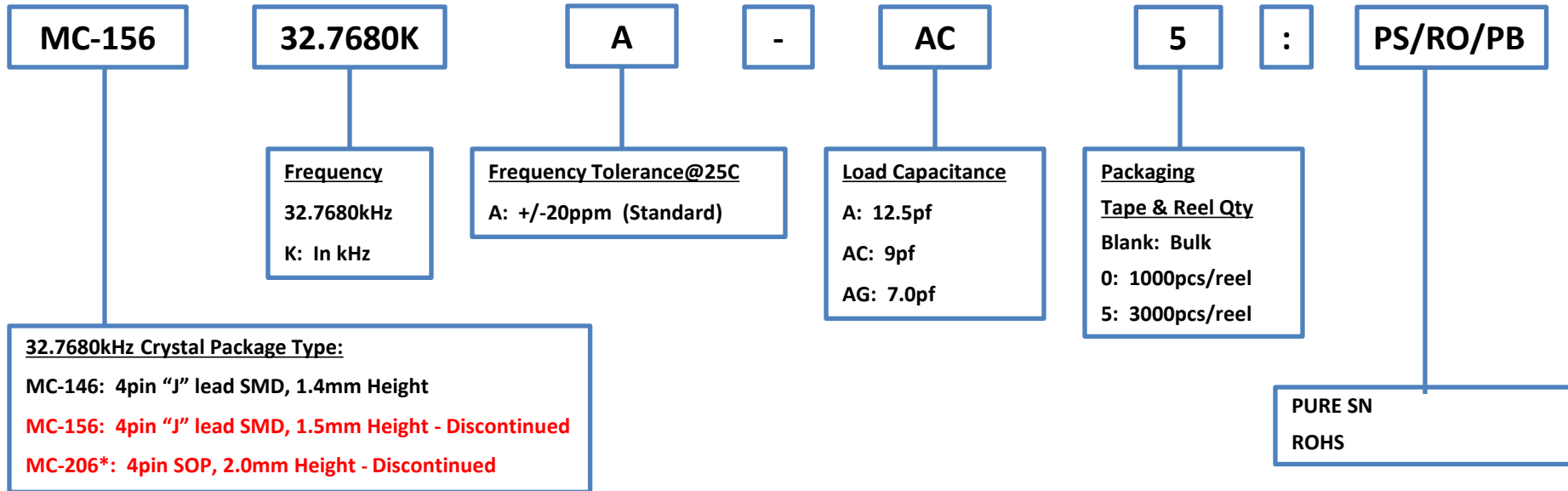
NOTES:

- 1) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



kHz Range Crystals Units



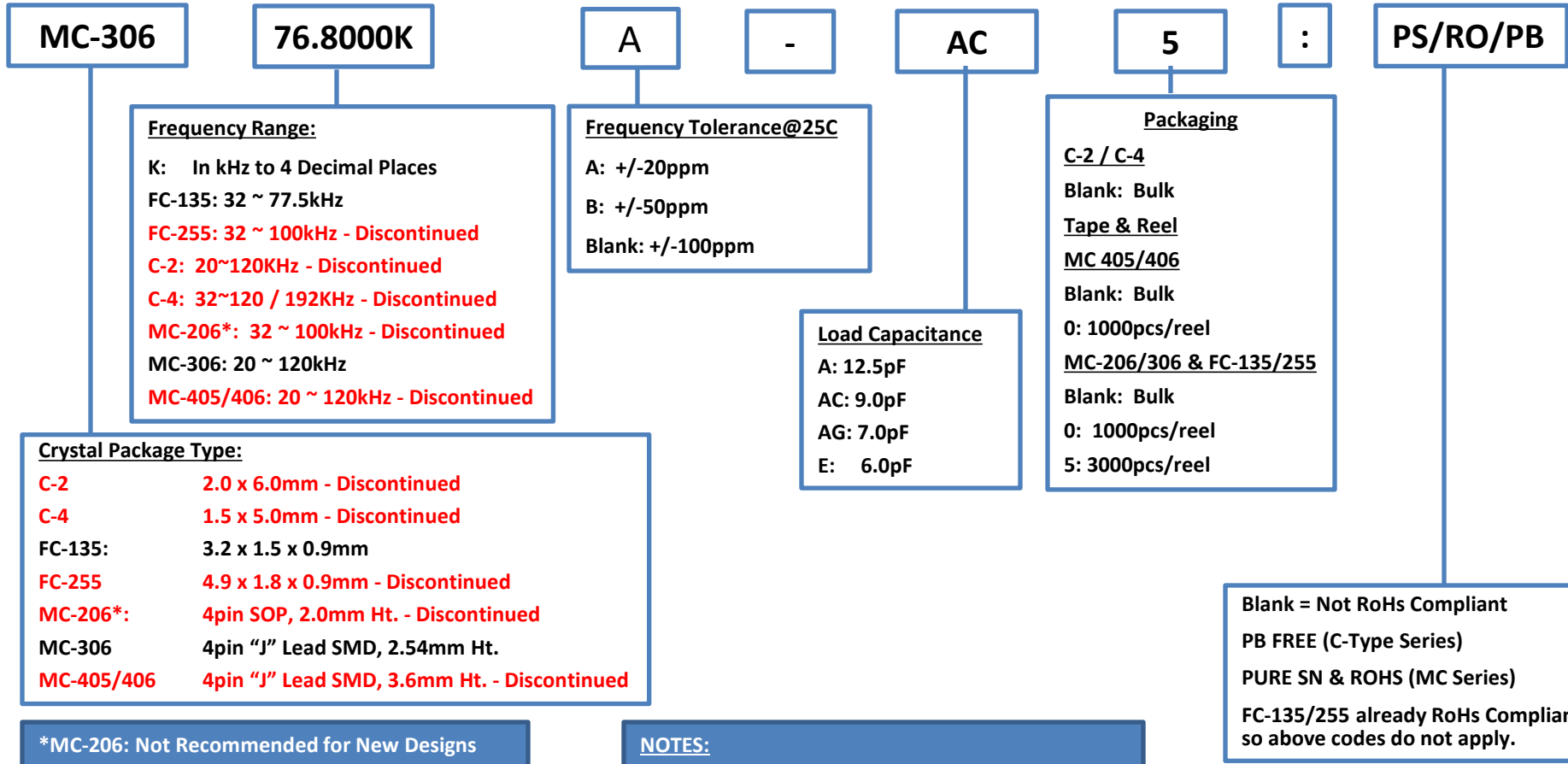
NOTES:

- 1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.



Product Configuration System

kHz Range Crystals Units



NOTES:

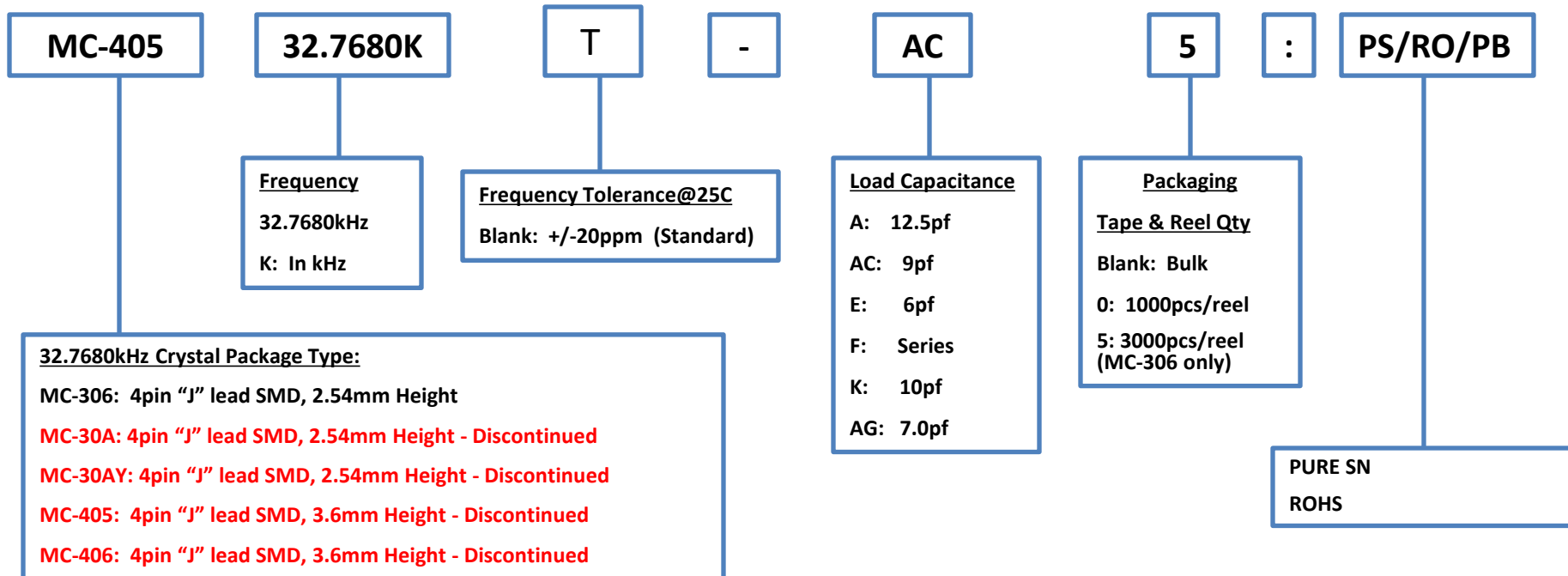
- 1) This product configuration guide is NOT applicable to 32.768kHz Crystals.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



kHz Range Crystals Units



NOTES:

- 1) This product configuration guide is applicable only to 32.7680kHz Crystals. For other frequencies, please reference the Standard kHz Crystal Product Configuration System.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.

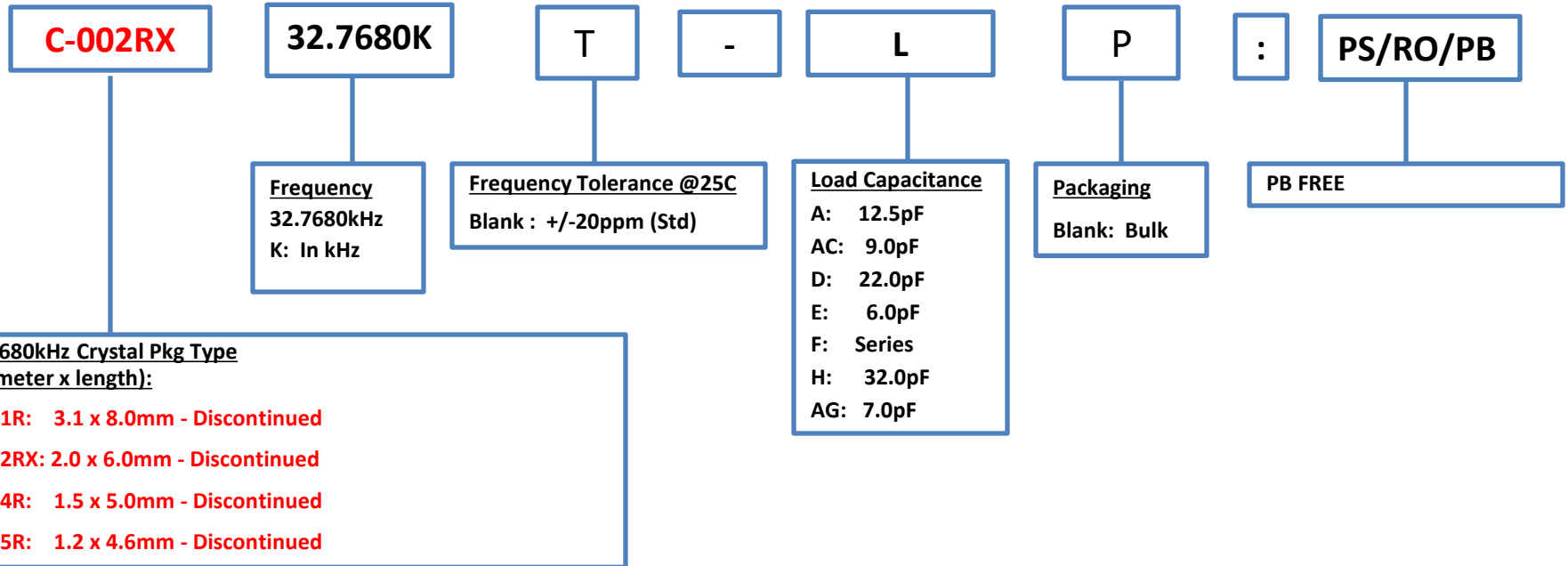


Product Configuration System



kHz Range Crystals Units

Discontinued



NOTES:

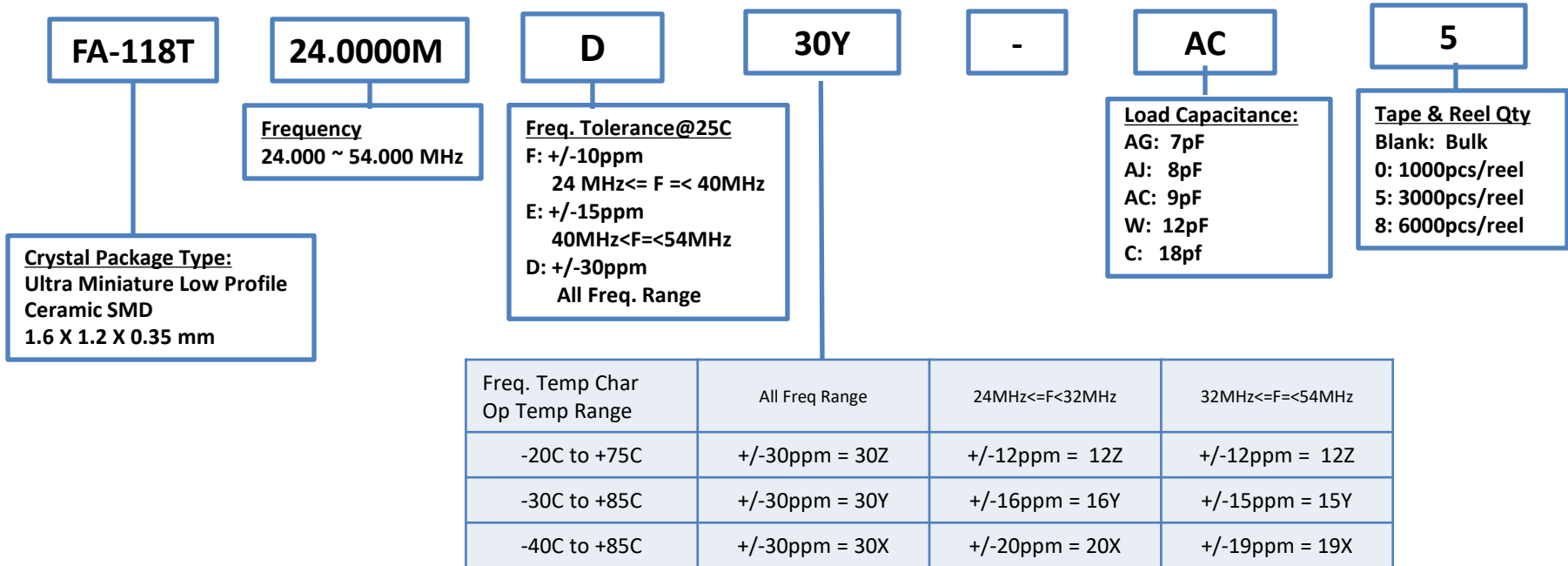
- 1) This product configuration guide is applicable only to 32.7680kHz crystals. For other frequencies, please refer to the Standard kHz Crystal Product Configuration System.
- 2) If you require a load capacitance other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



MHz Range Crystals Units



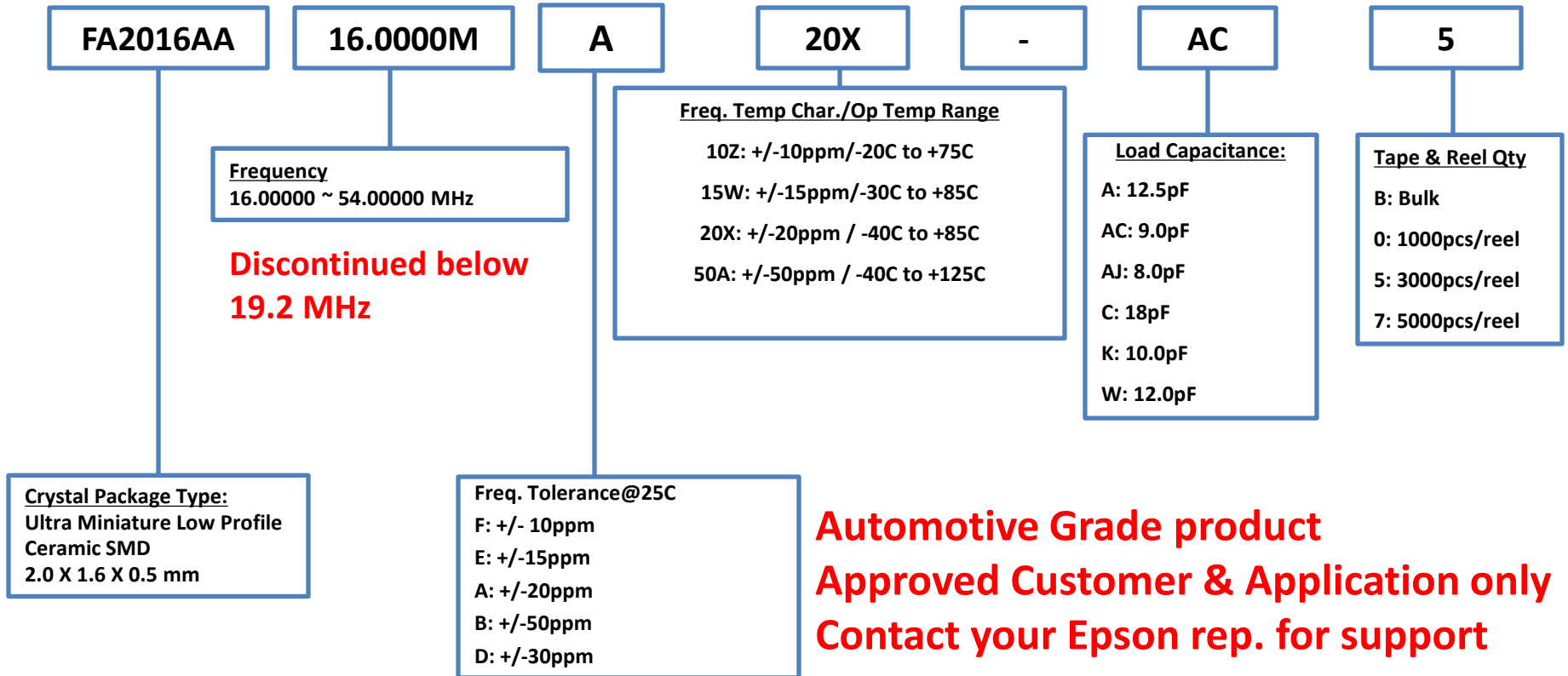
NOTES:

- 1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



MHz Range Crystal Units



NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

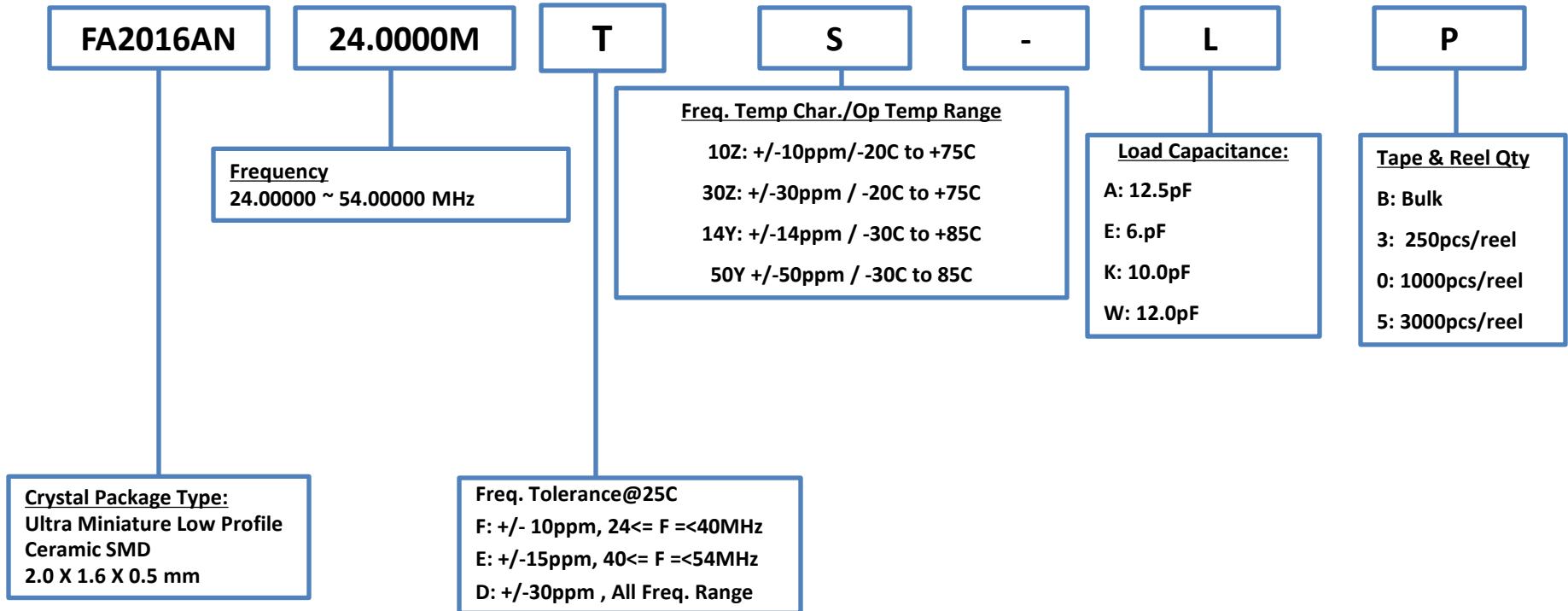


Product Configuration System



MHz Range Crystal Units

Not Recommended



NOTES:

1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

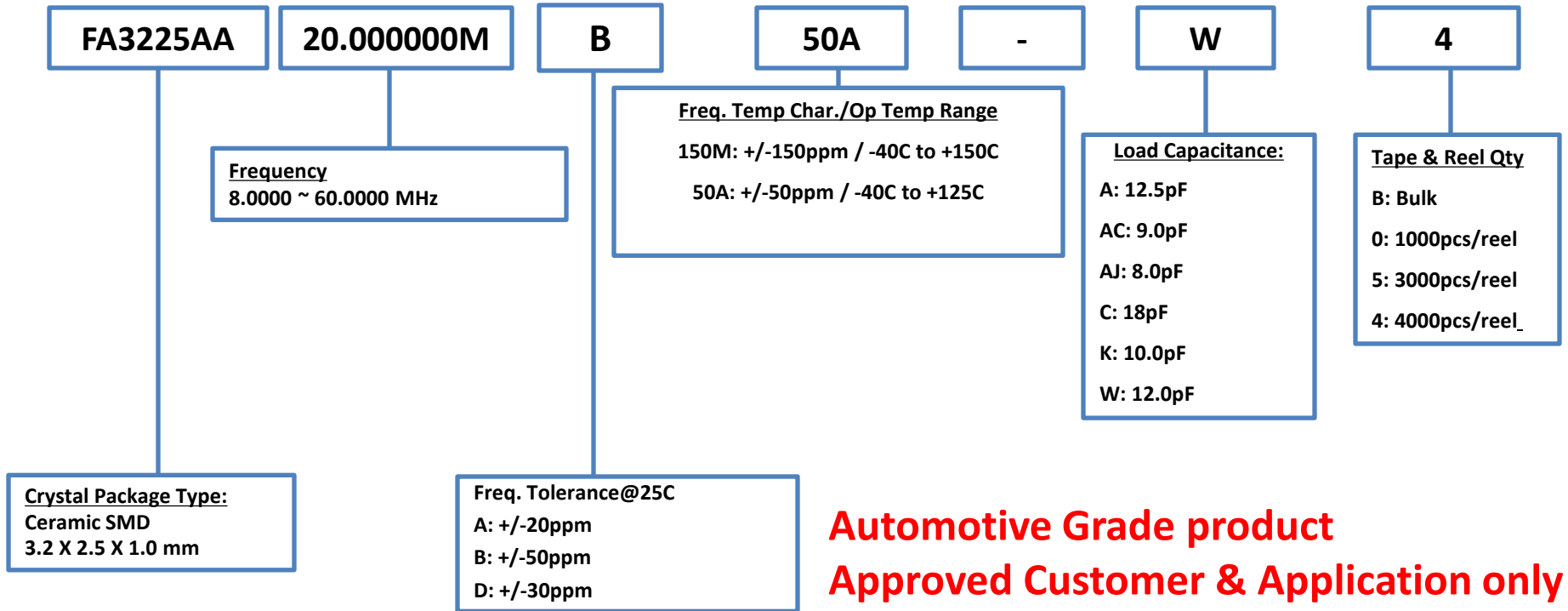


Product Configuration System



MHz Range Crystal Units

Not Recommended



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTES:

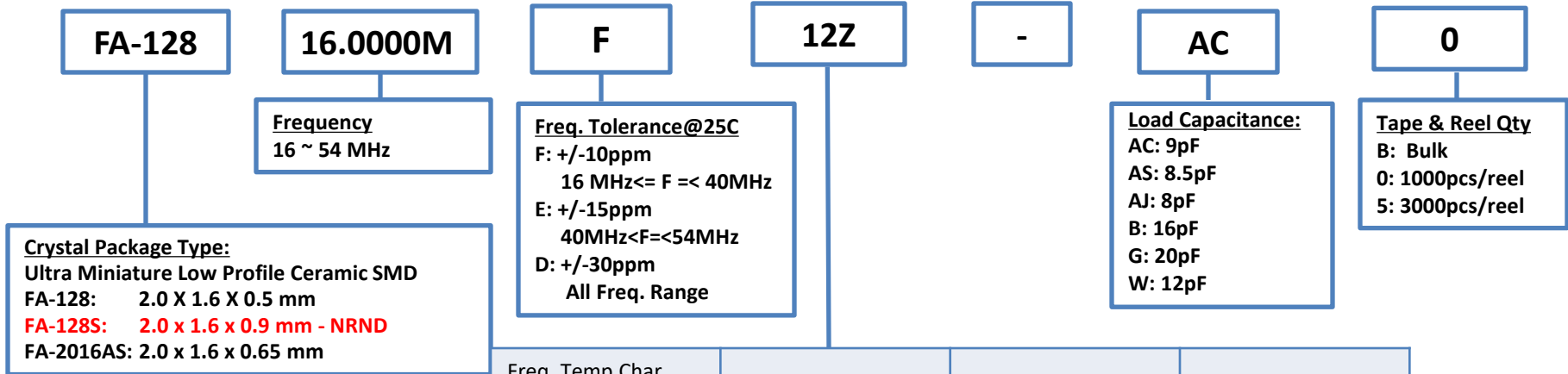
- 1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



MHz Range Crystals Units



| Freq. Temp Char Op Temp Range | All Freq Range | 16MHz<=F=<20MHz | 20MHz<F=54MHz |
|----------------------------------|----------------|-----------------|----------------|
| -20C to +75C | +/-20ppm = 20Z | +/-12ppm = 12Z | +/-10ppm = 10Z |
| -20C to +80C | +/-20ppm = 20K | +/-12ppm = 12K | +/-10ppm = 10K |
| -20C to +85C | +/-20ppm = 20P | +/-12ppm = 12P | +/-12ppm = 12P |
| -30C to +70C | +/-28ppm = 28R | +/-17ppm = 17R | +/-14ppm = 14R |
| -30C to +75C | +/-28ppm = 28E | +/-17ppm = 17E | +/-14ppm = 14E |
| -30C to +80C | +30ppm = 30W | +/-17ppm = 17W | +/-14ppm = 14W |
| -30C to +85C | +/-30ppm = 30Y | +/-17ppm = 17Y | +/-14ppm = 14Y |
| -30C to +85C | +/-50ppm = 50Y | +/-17ppm = 17Y | +/-14ppm = 14Y |
| -40C to +85C | +/-40ppm = 40X | +/-22ppm = 22X | +/-20ppm = 20X |

NOTE: 81Z = +8/-10ppm / -20C to +75C



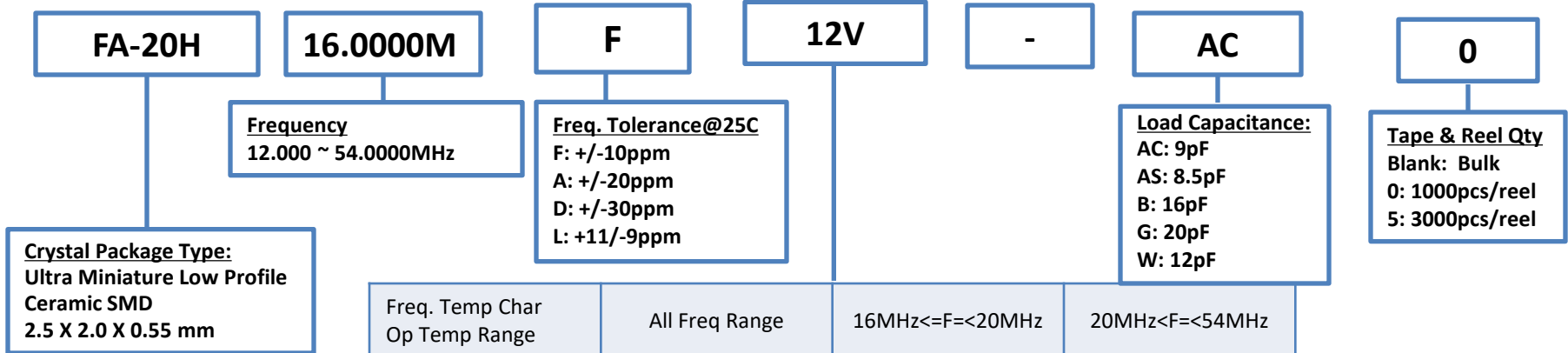
NOTES:

- 1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



MHz Range Crystals Units



| Freq. Temp Char Op Temp Range | All Freq Range | 16MHz<=F<20MHz | 20MHz<F<54MHz |
|----------------------------------|----------------|----------------|----------------|
| -20C to +70C | +/-20ppm = 20V | +/-12ppm = 12V | +/-10ppm = 10V |
| -20C to +70C | +/-30ppm = 30V | +/-12ppm = 12V | +/-10ppm = 10V |
| -20C to +75C | +/-20ppm = 20Z | +/-12ppm = 12Z | +/-10ppm = 10Z |
| -20C to +80C | +/-20ppm = 20K | +/-12ppm = 12K | +/-10ppm = 10K |
| -20C to +85C | +/-20ppm = 20P | +/-12ppm = 12P | +/-12ppm = 12P |
| -30C to +70C | +/-28ppm = 28R | +/-17ppm = 17R | +/-14ppm = 14R |
| -30C to +75C | +/-28ppm = 28E | +/-17ppm = 17E | +/-14ppm = 14E |
| -30C to +80C | +/-30ppm = 30W | +/-17ppm = 17W | +/-14ppm = 14W |
| -30C to +85C | +/-30ppm = 30Y | +/-17ppm = 17Y | +/-14ppm = 14Y |
| -30C to +85C | +/-50ppm = 50Y | +/-17ppm = 17Y | +/-14ppm = 14Y |
| -40C to +85C | +/-40ppm = 40X | +/-22ppm = 22X | +/-20ppm = 20X |

NOTE: 81Z = +8/-10ppm / -20C to +75C

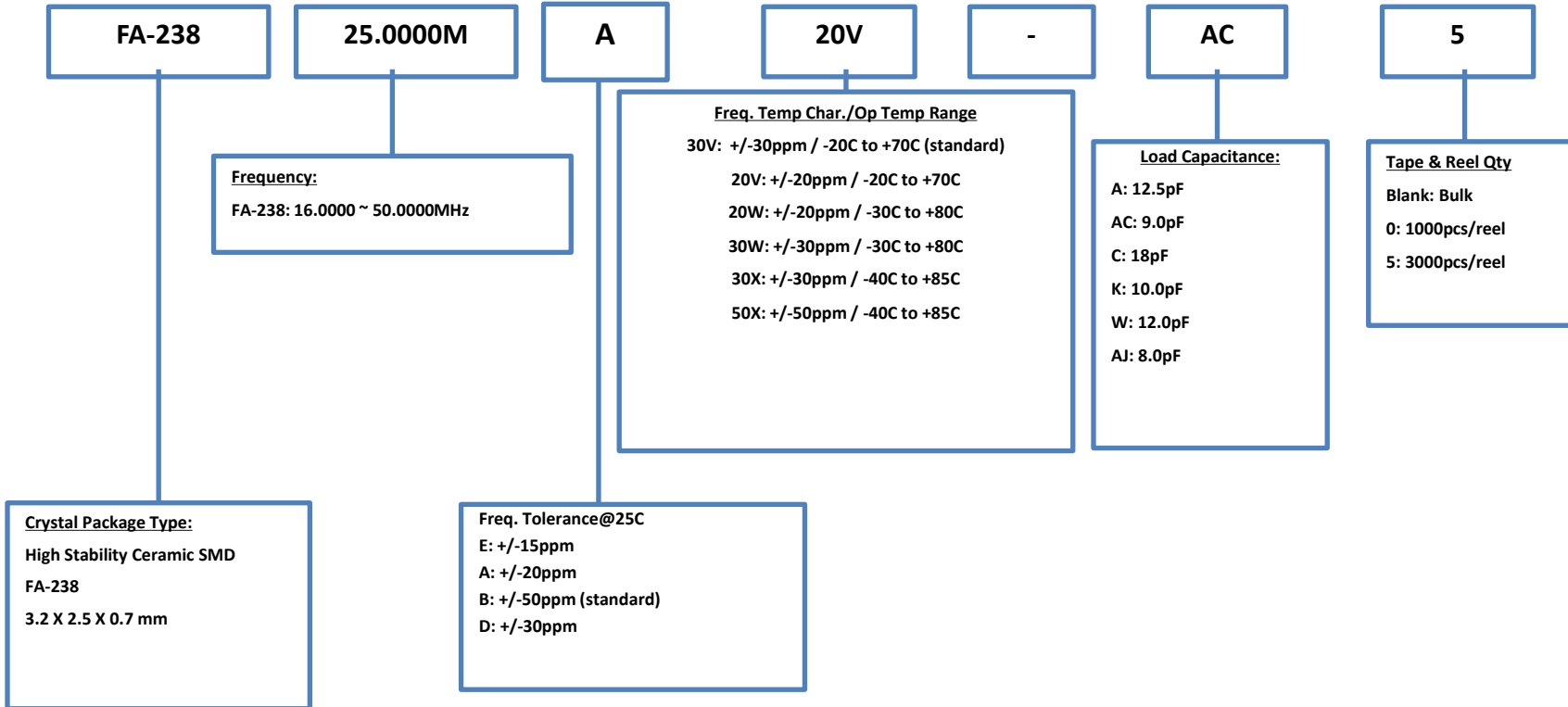
NOTES:

- 1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



MHz Range Crystal Units



NOTES:

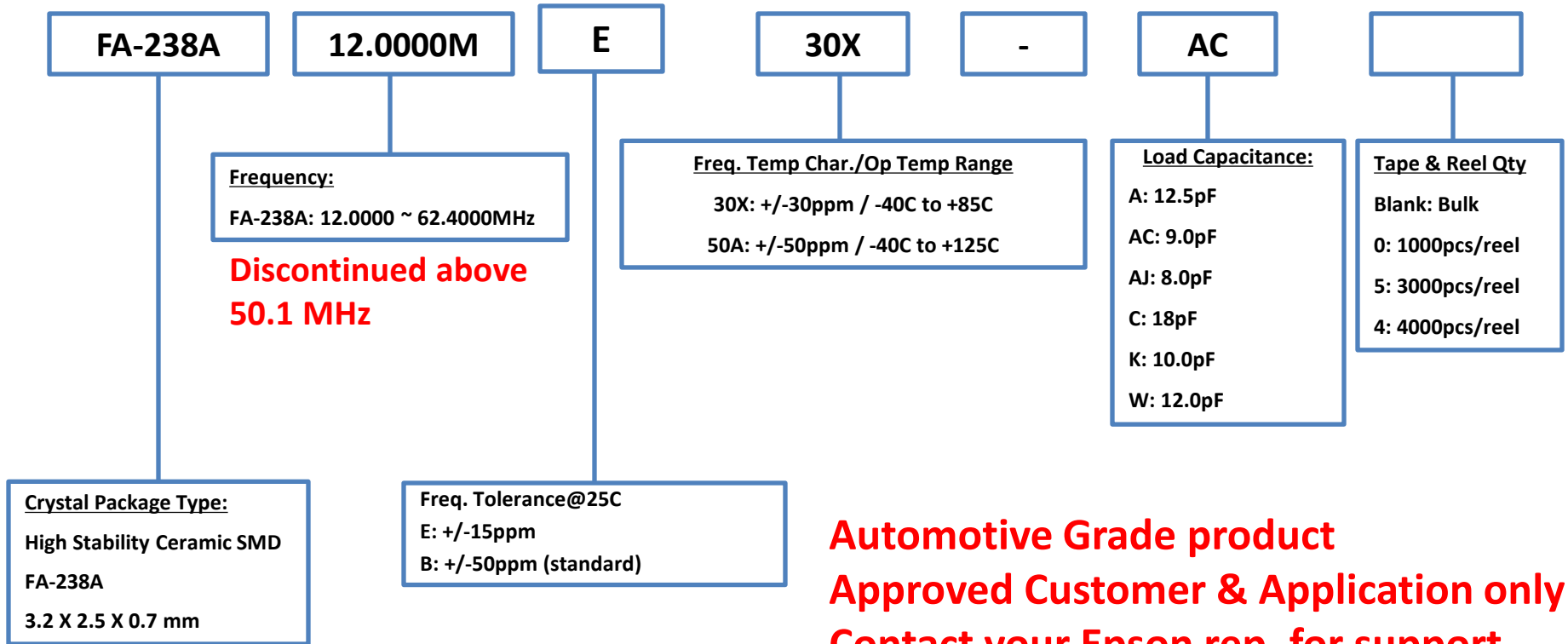
1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



MHz Range Crystal Units



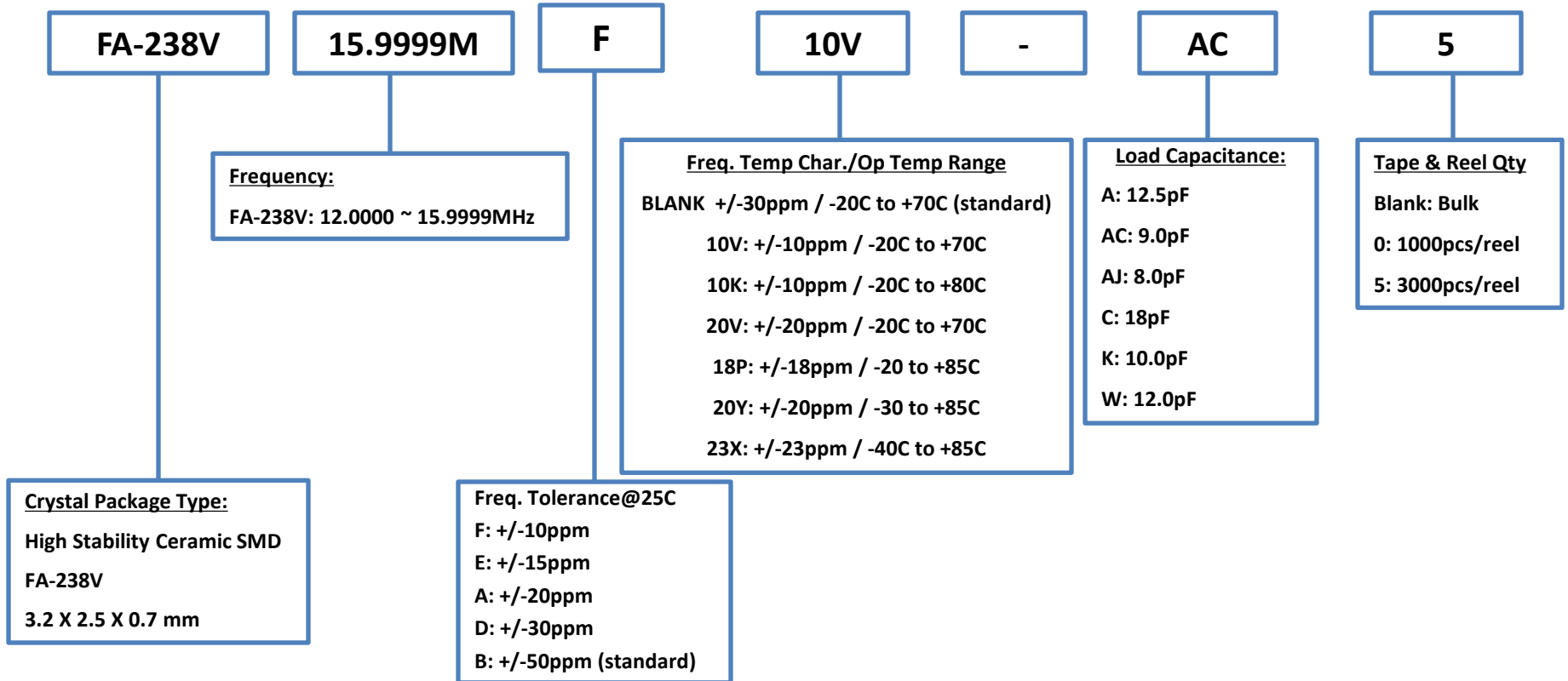
NOTES:
1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



MHz Range Crystal Units



NOTES:

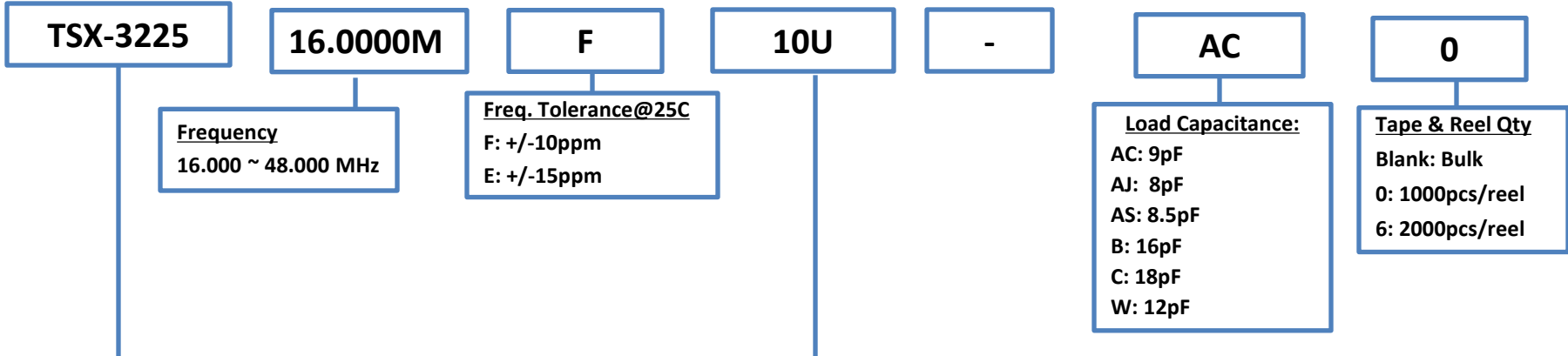
1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.



Product Configuration System



MHz Range Crystal Units



Crystal Package Type:
 Miniature Size Low Profile Ceramic SMD
 3.2 X 2.5 X 0.6 mm

| Freq. Temp Char Op Temp Range | 16MHz<=F<26.99MHz | 27MHz<F<48MHz |
|-------------------------------|---|----------------------------|
| -10C to 60C | +/-10ppm = 10U | +/-10ppm = 10U |
| -20C to +75C | +/-9ppm = 09Z | +/-9ppm = 09Z (for <40MHz) |
| -20C to +75C | +/-10ppm = 10Z | +/-10ppm = 10Z |
| -20C to +85C | +/-10ppm = 10P | +/-10ppm = 10P |
| -30C to +85C | +/-13ppm = 13Y | +/-15ppm = 15Y |
| -40C to +85C | +/-18ppm = 18X | +/-18ppm = 18X |
| -40C to +105C | +/-20ppm = 20G (for 20MHz and 24MHz only) | |



NOTES:

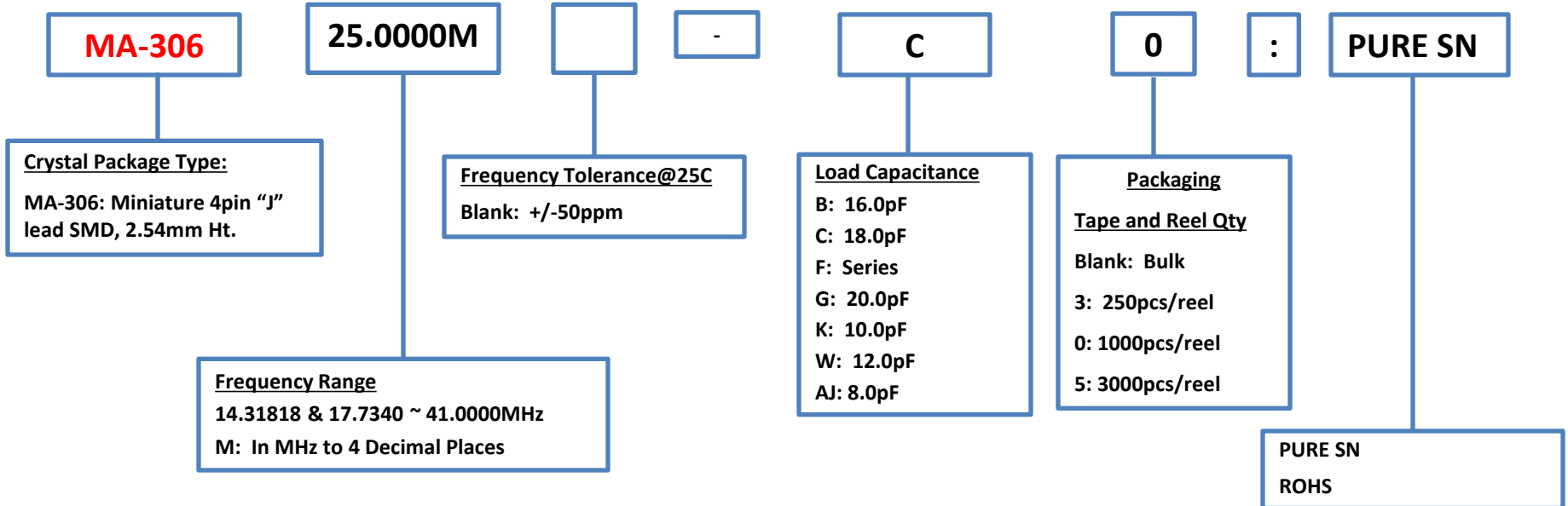
1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



MHz Range Crystal Units

Discontinued



NOTES:

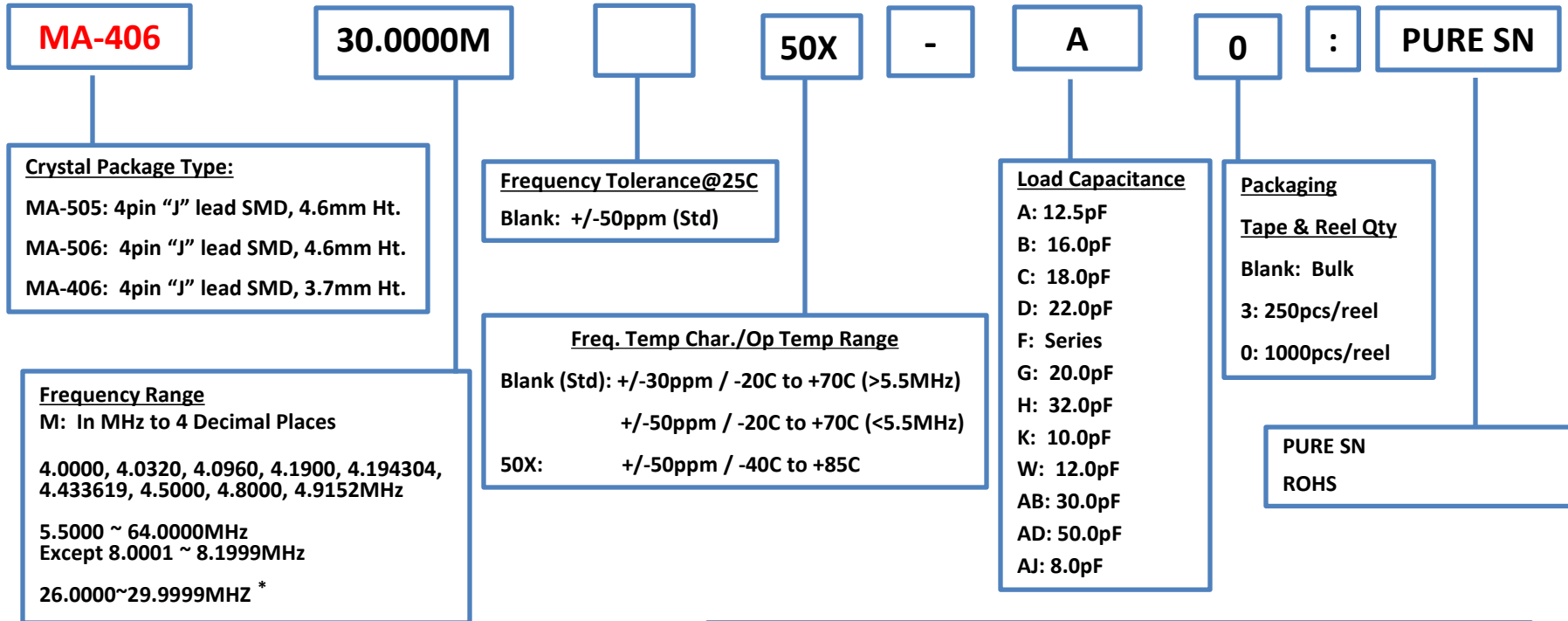
- 1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.

Product Configuration System



MHz Range Crystal Units

Discontinued



NOTES:

- 1) If you require frequency, tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.
- 2) For frequencies between 26.0000MHz and 29.9999MHz, please specify "(FUND)" at end of part number if fundamental mode required. Otherwise, 3rd Overtone is default.

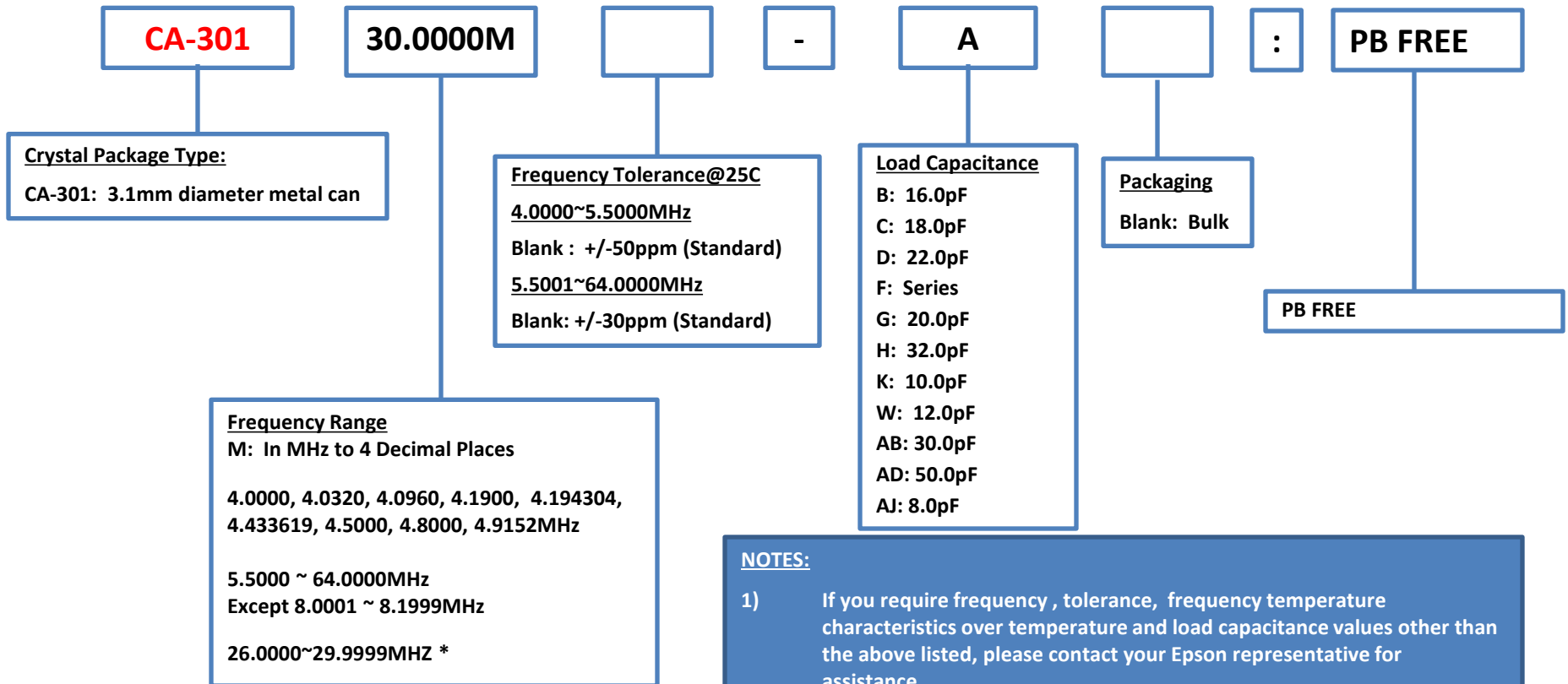


Product Configuration System



MHz Range Crystal Units

Discontinued



- NOTES:**
- 1) If you require frequency , tolerance, frequency temperature characteristics over temperature and load capacitance values other than the above listed, please contact your Epson representative for assistance.
 - 2) For frequencies between 26.0000MHz and 29.9999MHz, please specify “(FUND)” at end of part number if fundamental mode required. Otherwise, 3rd Overtone is default.



Product Configuration Guide

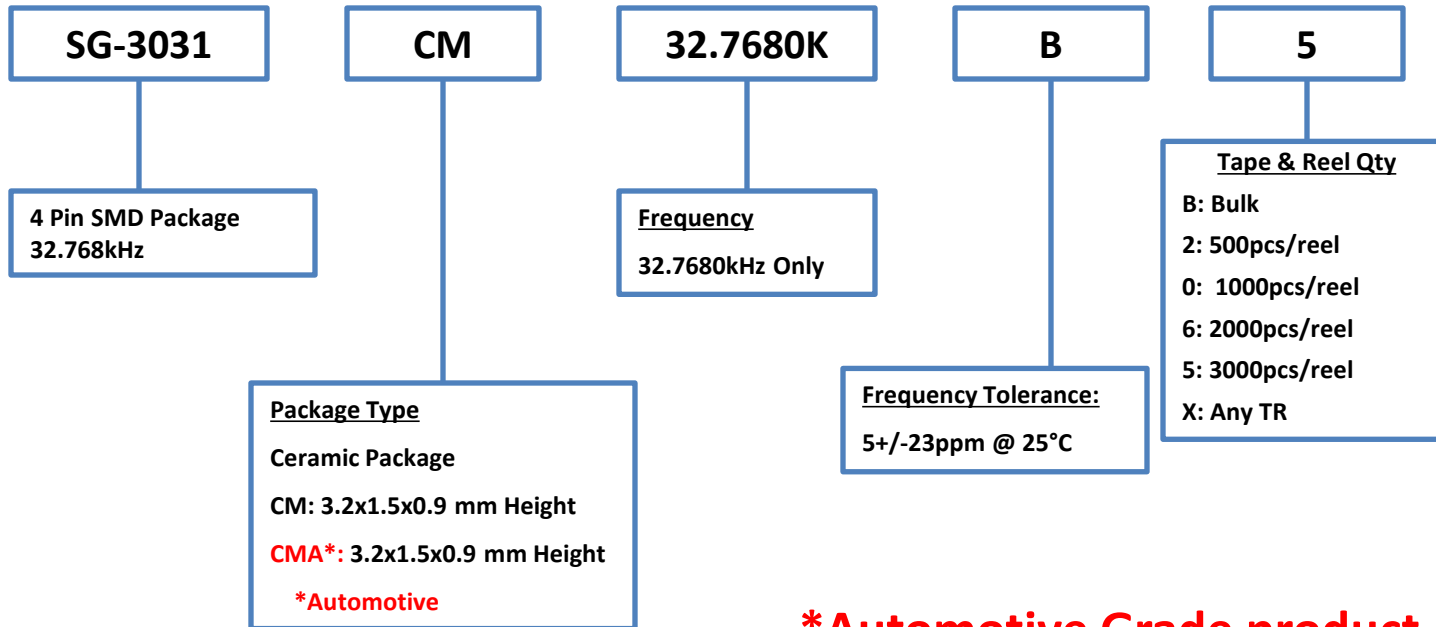
Simple Packaged Crystal Oscillators (SPXO)



Product Configuration System



Crystal Oscillators - SPXO



***Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support**

EPSON

January 2025

NOTE:

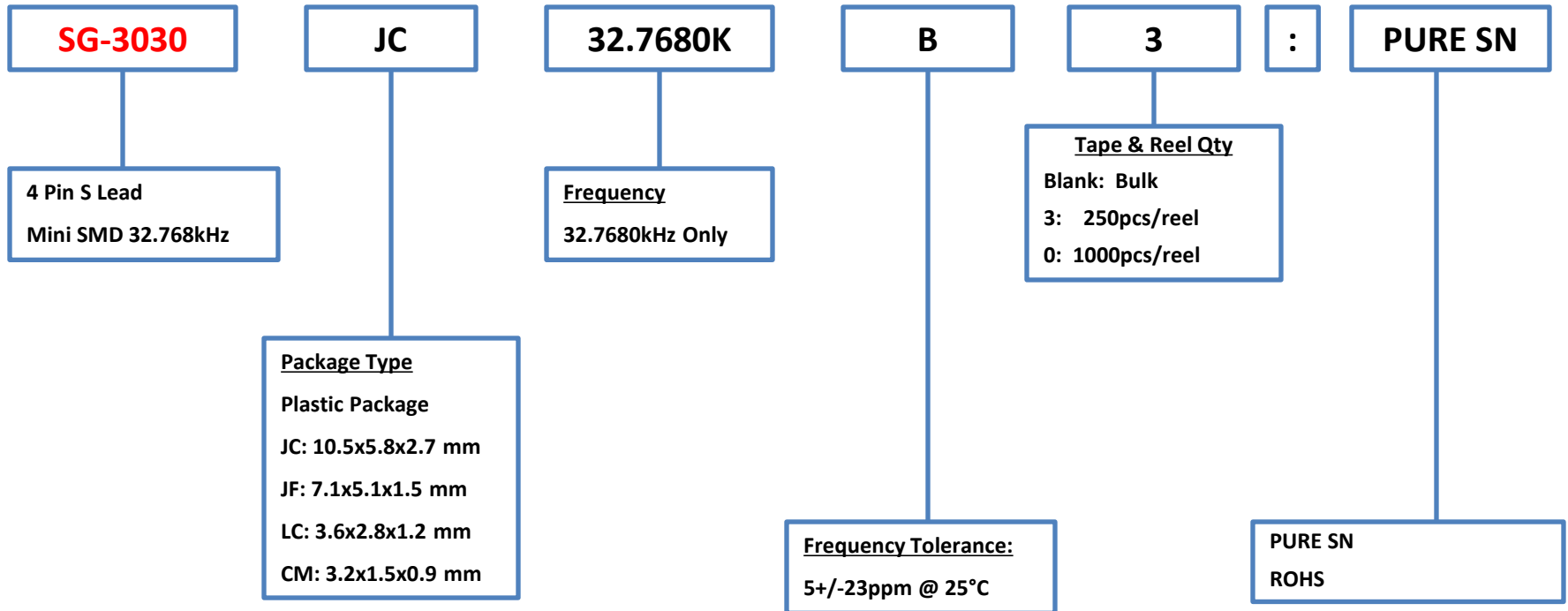
Please contact us for requirements not listed in this specification.

Product Configuration System



Crystal Oscillators - SPXO

Discontinued



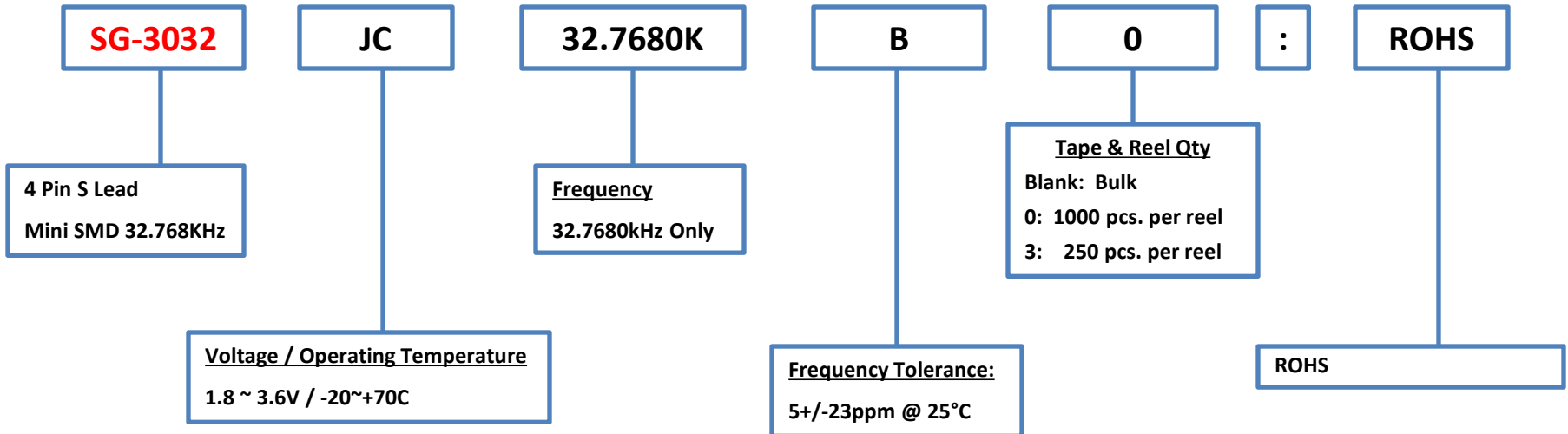
Note: All LC packages are RoHS Compliant, Pure SN

Product Configuration System



Crystal Oscillators - SPXO

Discontinued

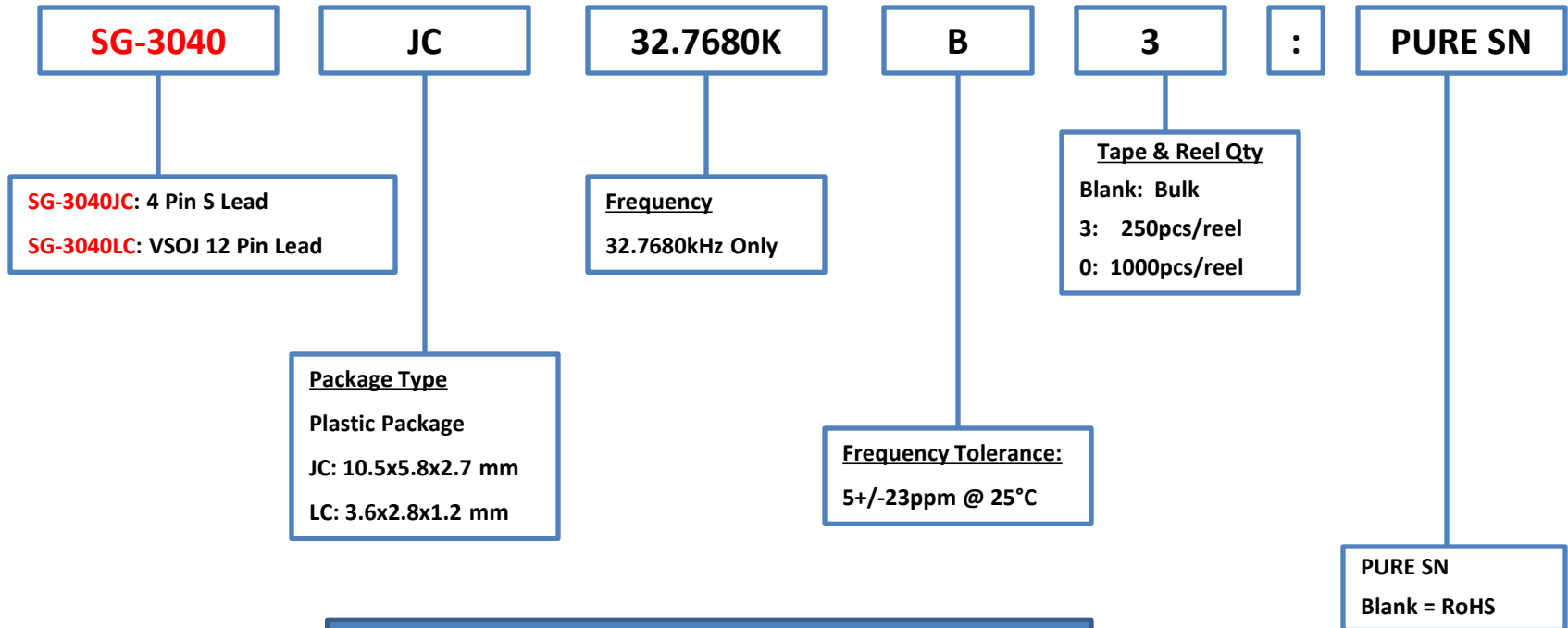


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



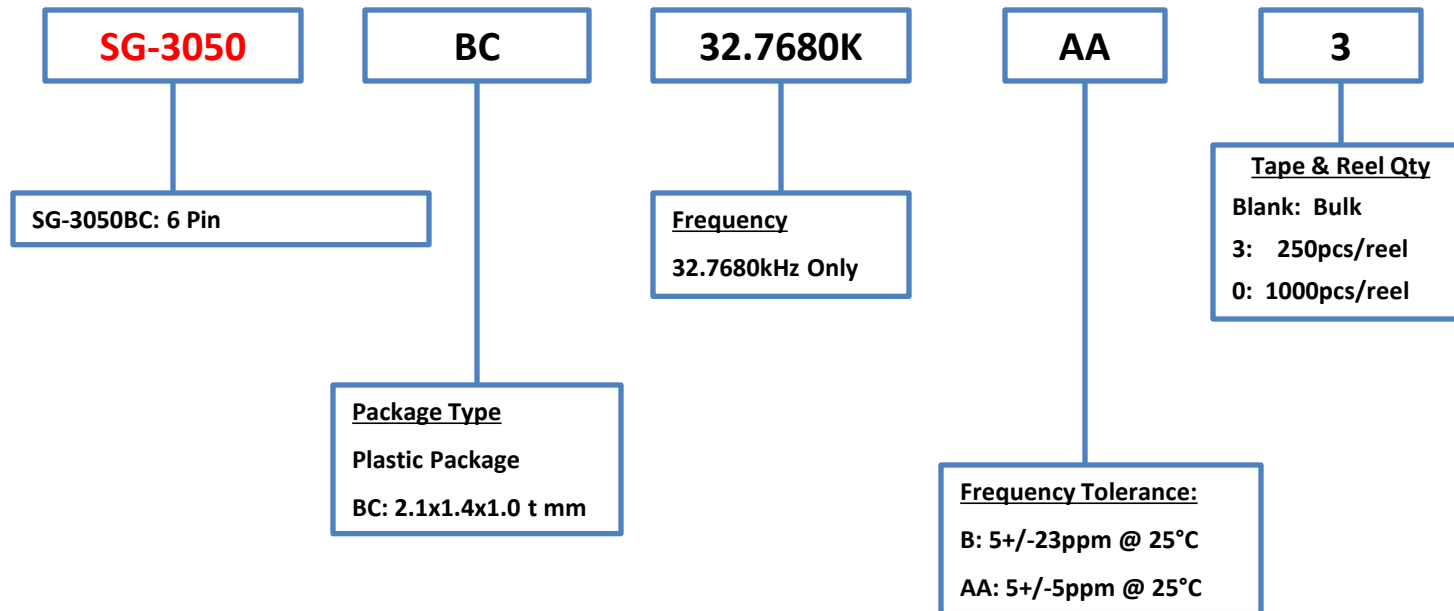
Note: All LC packages are RoHS Compliant, Pure SN

Product Configuration System



Crystal Oscillators - SPXO

Discontinued

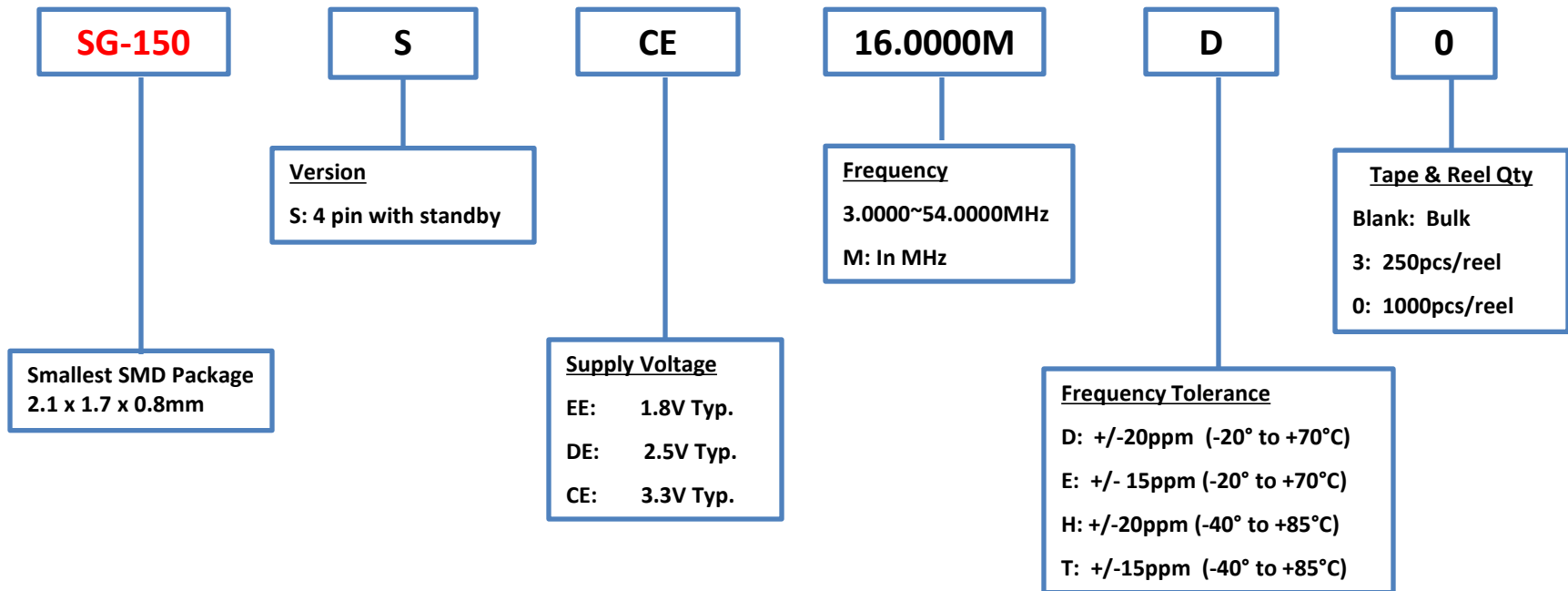


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

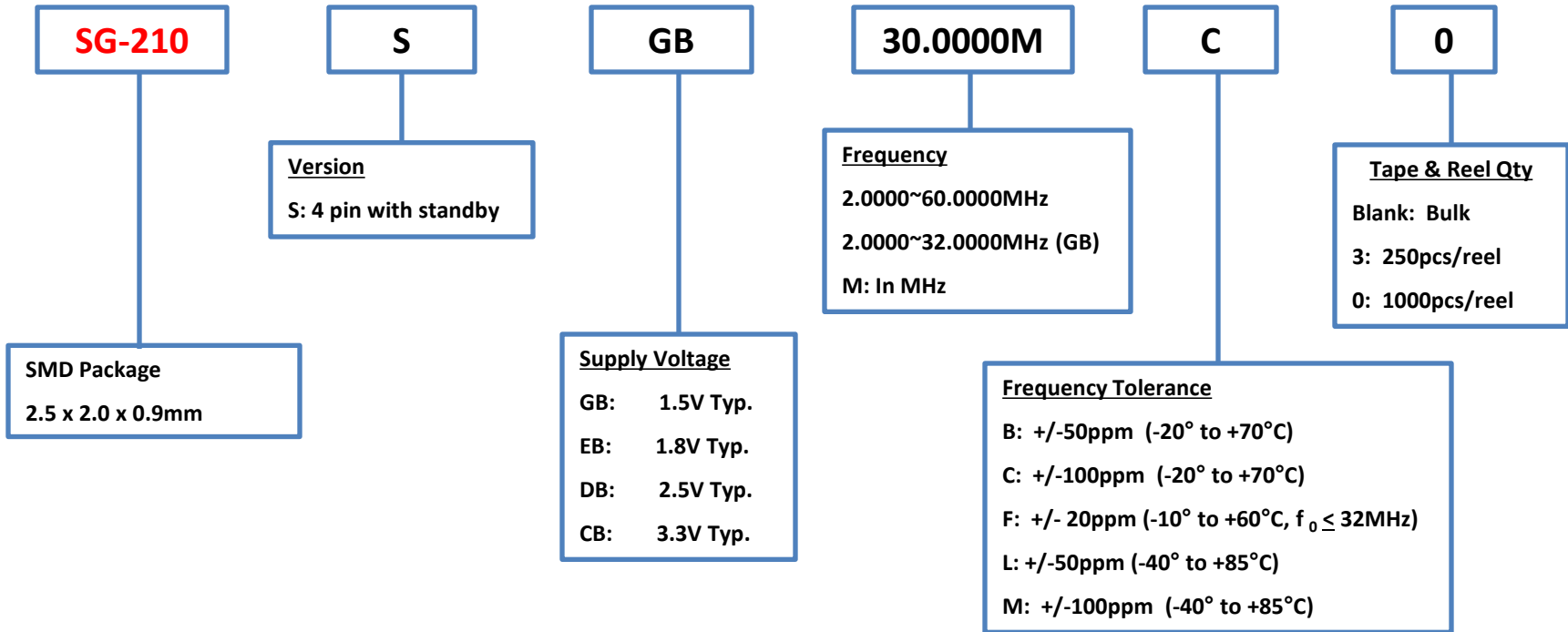


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

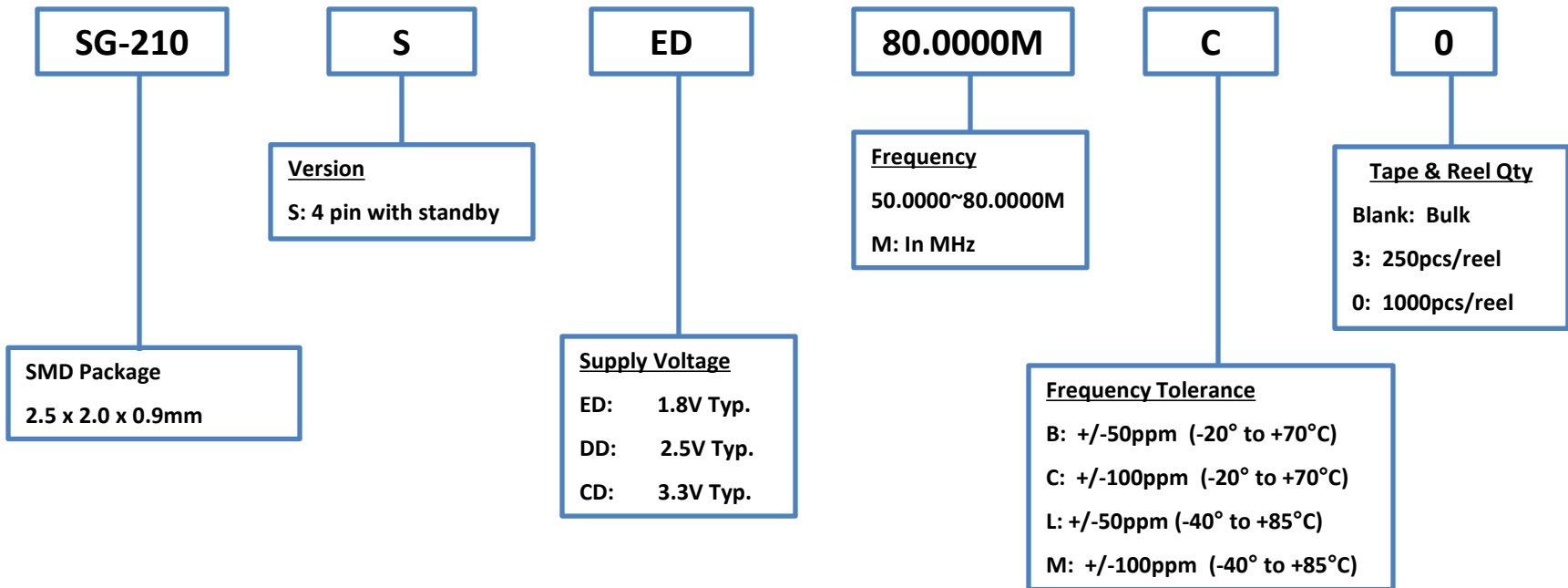


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

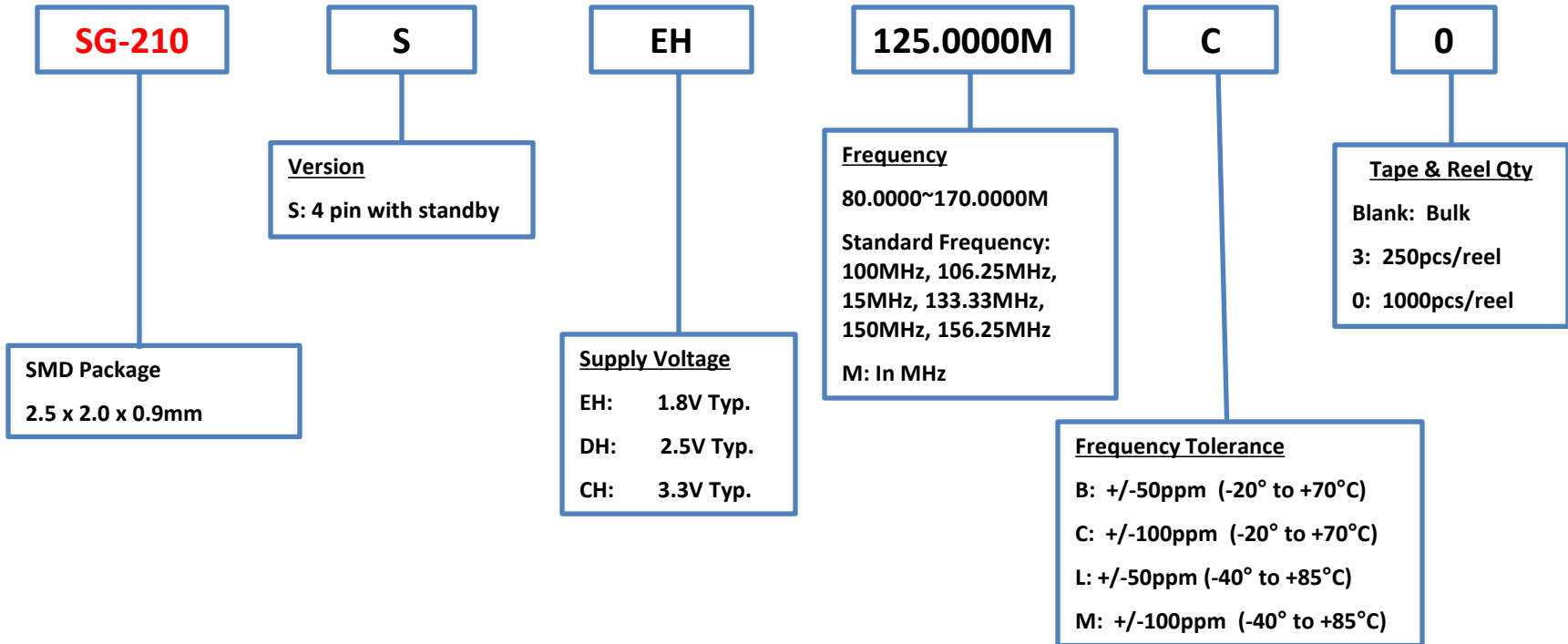


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



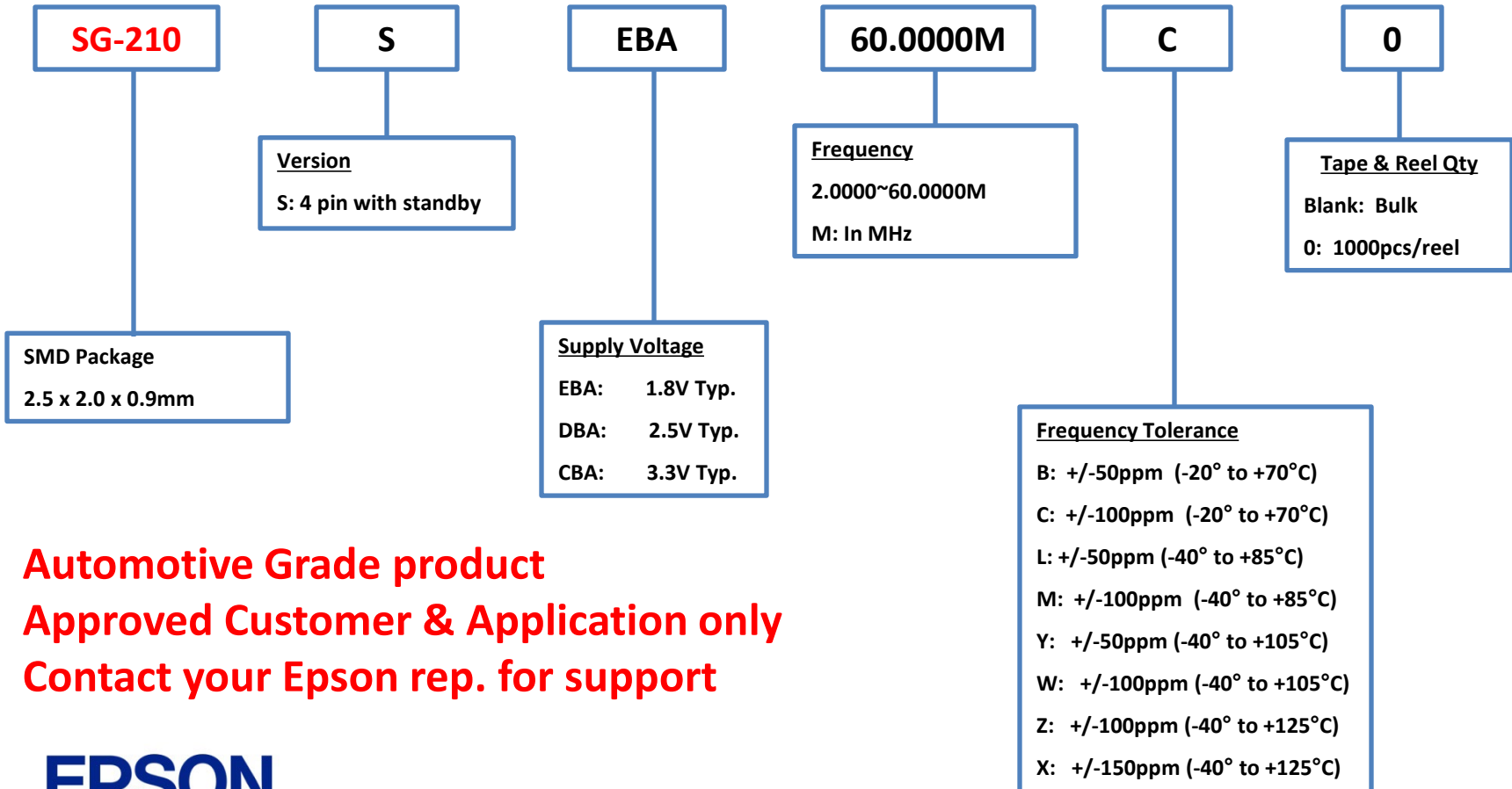
Product Configuration System



Crystal Oscillators - SPXO

Discontinued

**Consider
SG2520CAA (std freq)
Or SG-8101CGA**



**Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support**

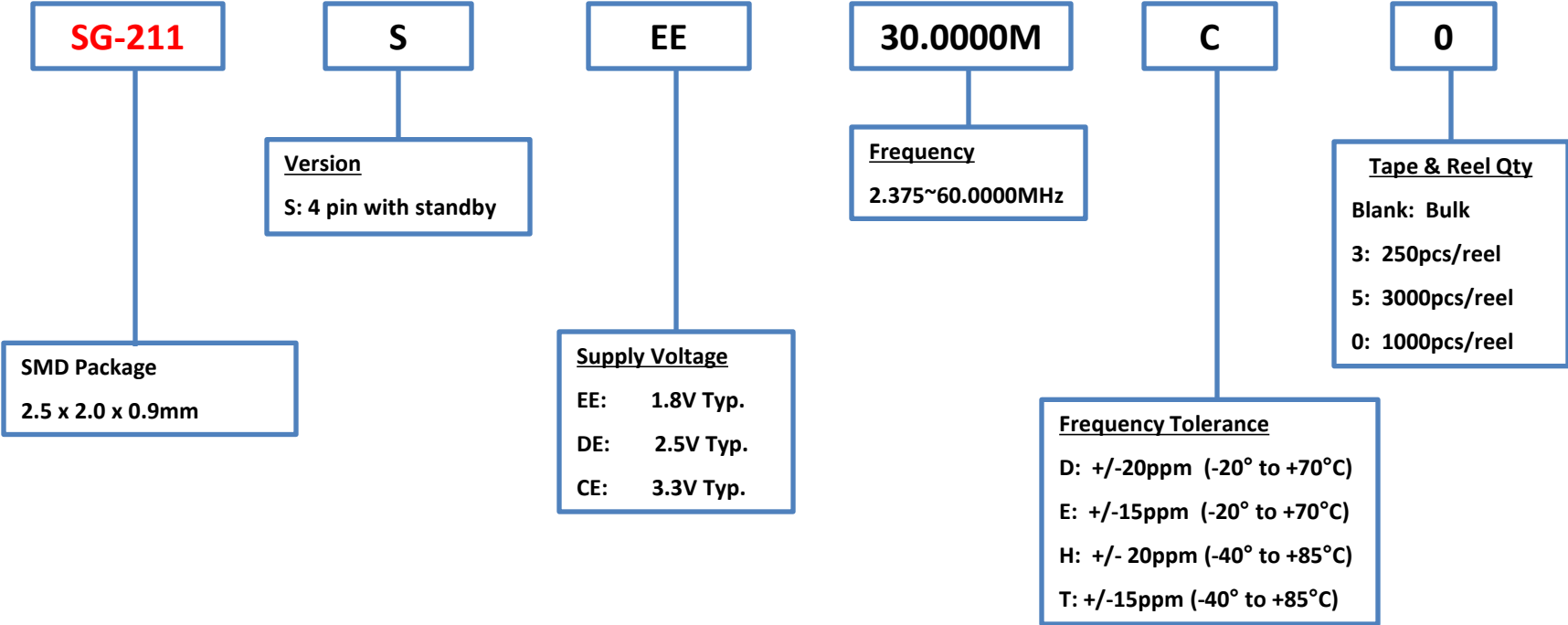




Product Configuration System

Crystal Oscillators - SPXO

Discontinued

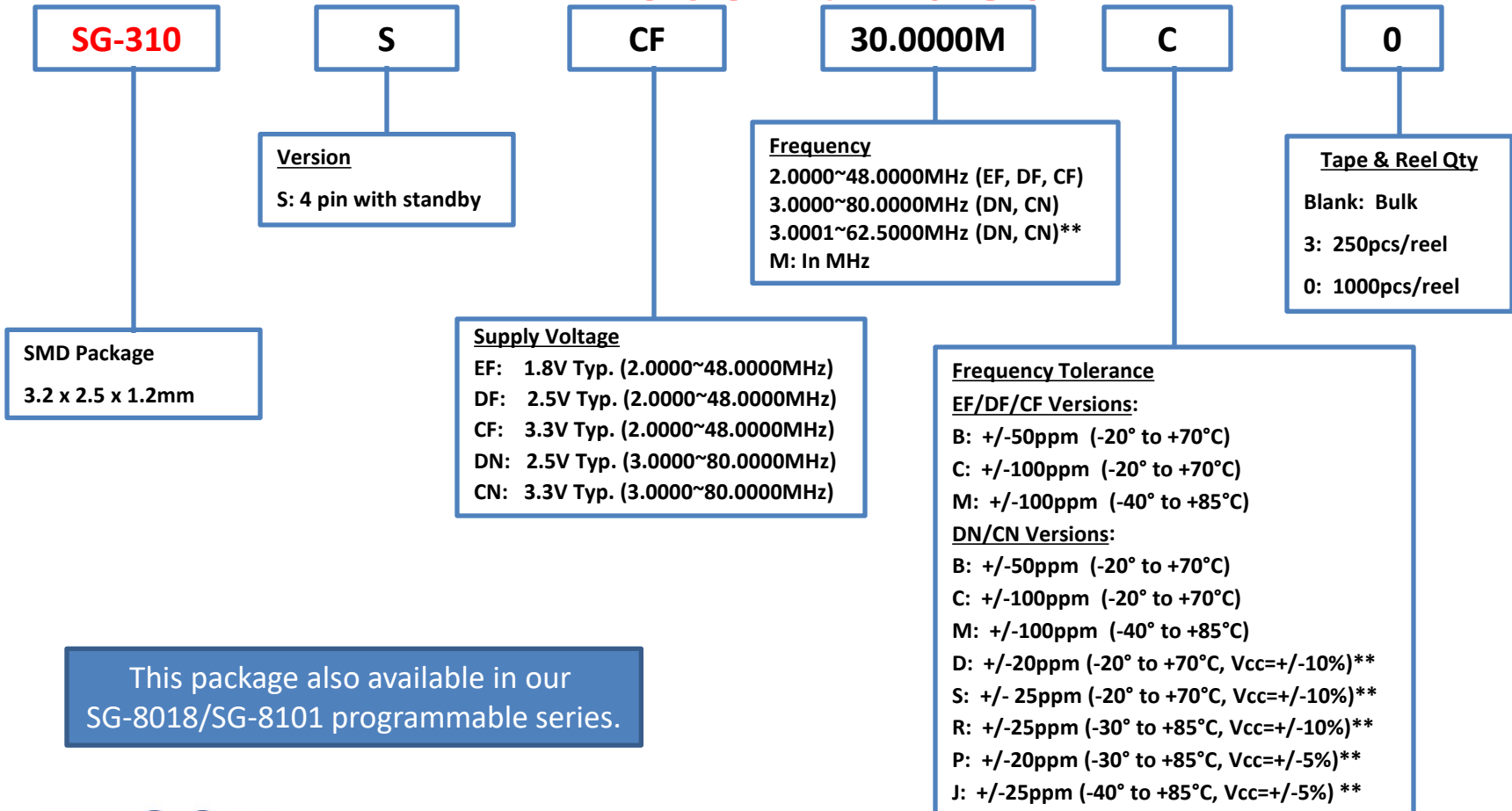


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



This package also available in our SG-8018/SG-8101 programmable series.

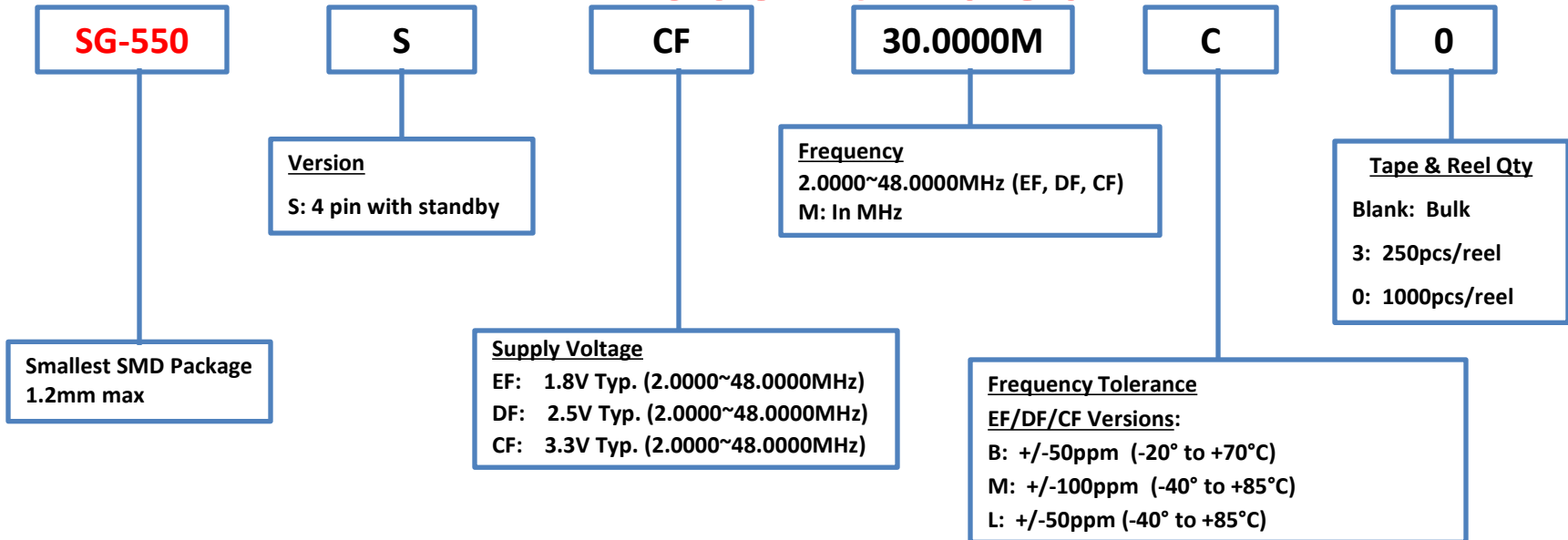


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



This package also available in our SG-8018/SG-8101 programmable series.

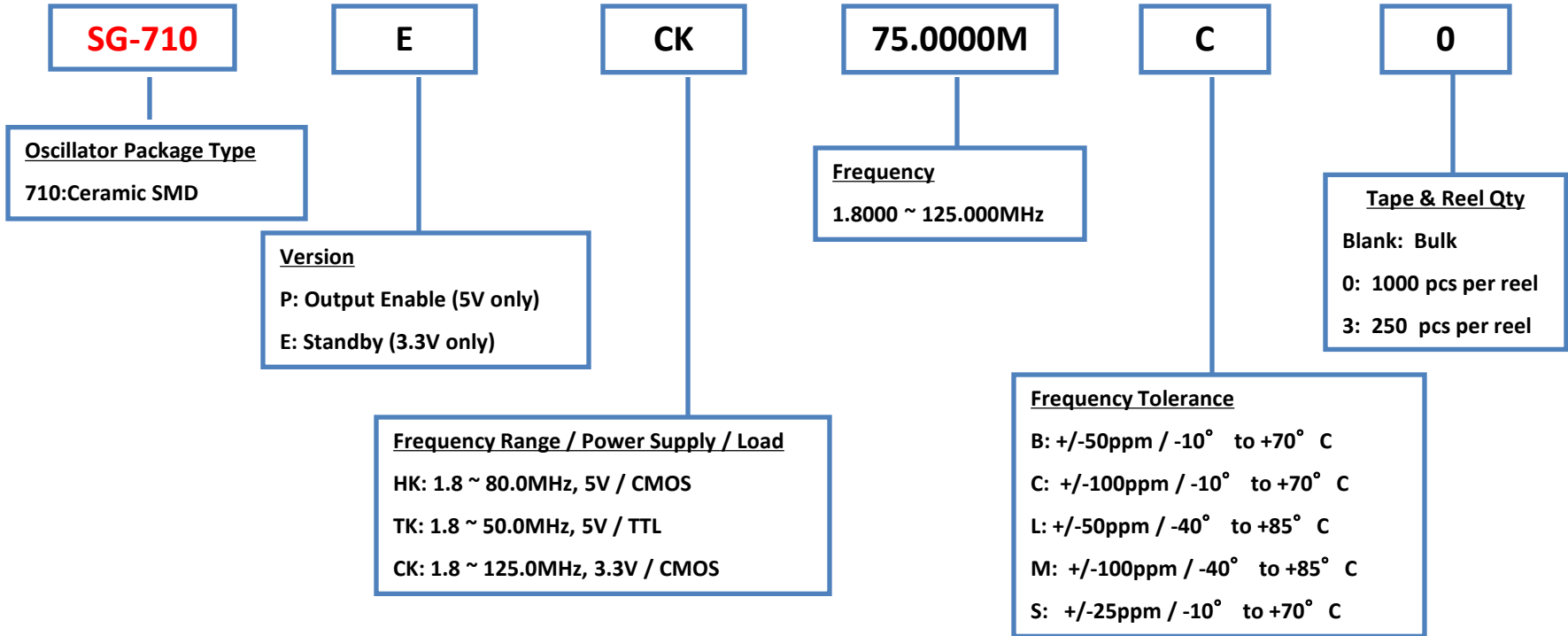


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



These packages also available in our SG-8018/SG-8101 programmable series.

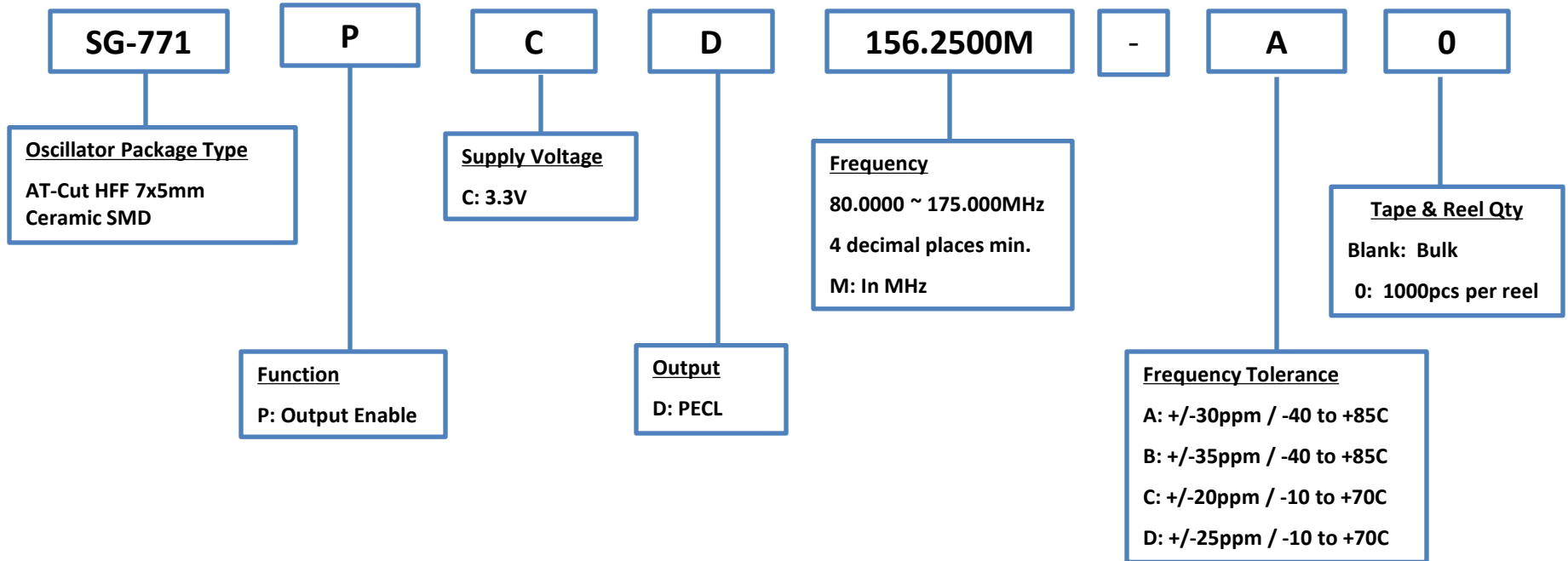


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

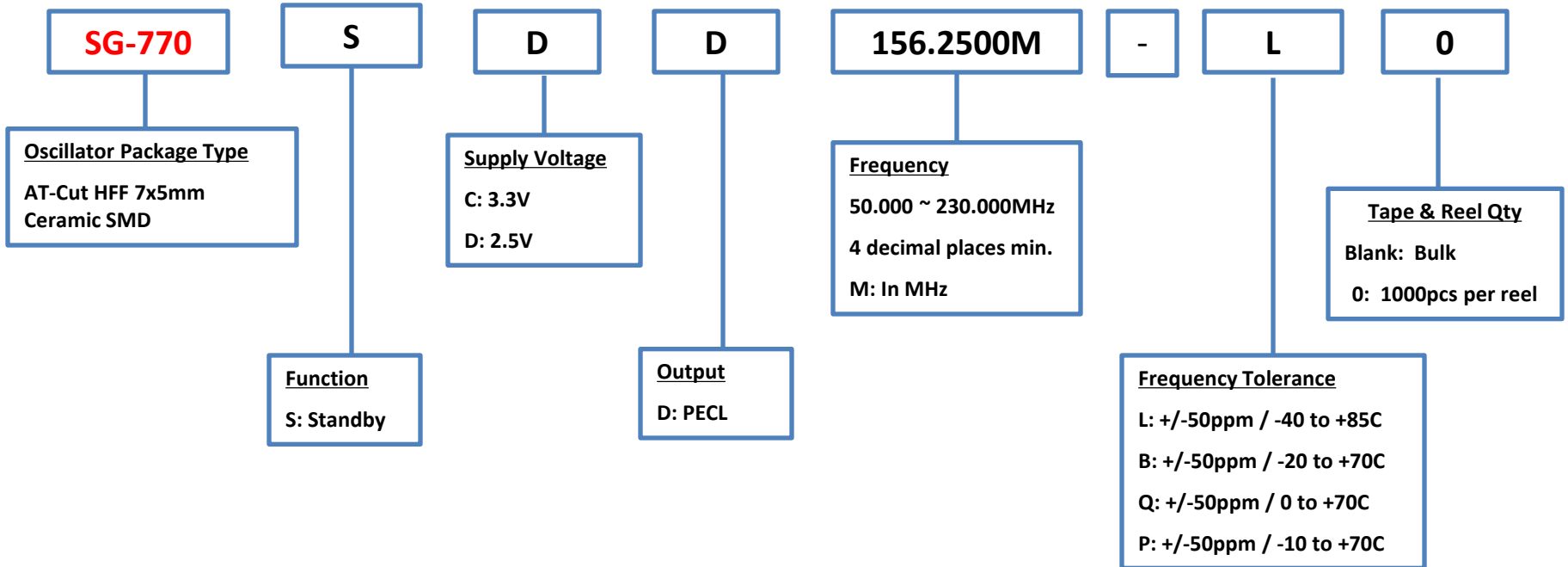


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



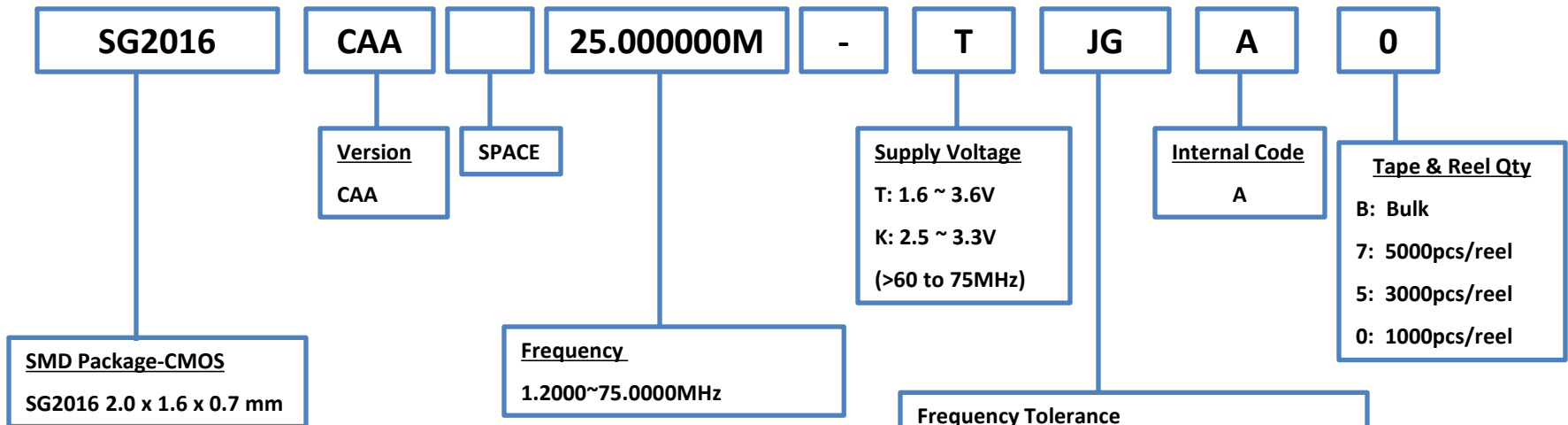
Replaces TCO-7116H1A



Product Configuration System



Crystal Oscillators – SPXO, Automotive
(Conforms to AEC-Q200 Requirement)



- Frequency Tolerance**
- JG: +/-50ppm (-40° to +85°C)
 - JH: +/-50ppm (-40° to +105°C)
 - KJ: +/-70ppm (-40° to +125°C)**
 - LG: +/-100ppm (-40° to +85°C)
 - LH: +/-100ppm (-40° to +105°C)
 - LJ: +/-100ppm (-40° to +125°C)
 - TJ: +/-150ppm (-40° to +125°C)

Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

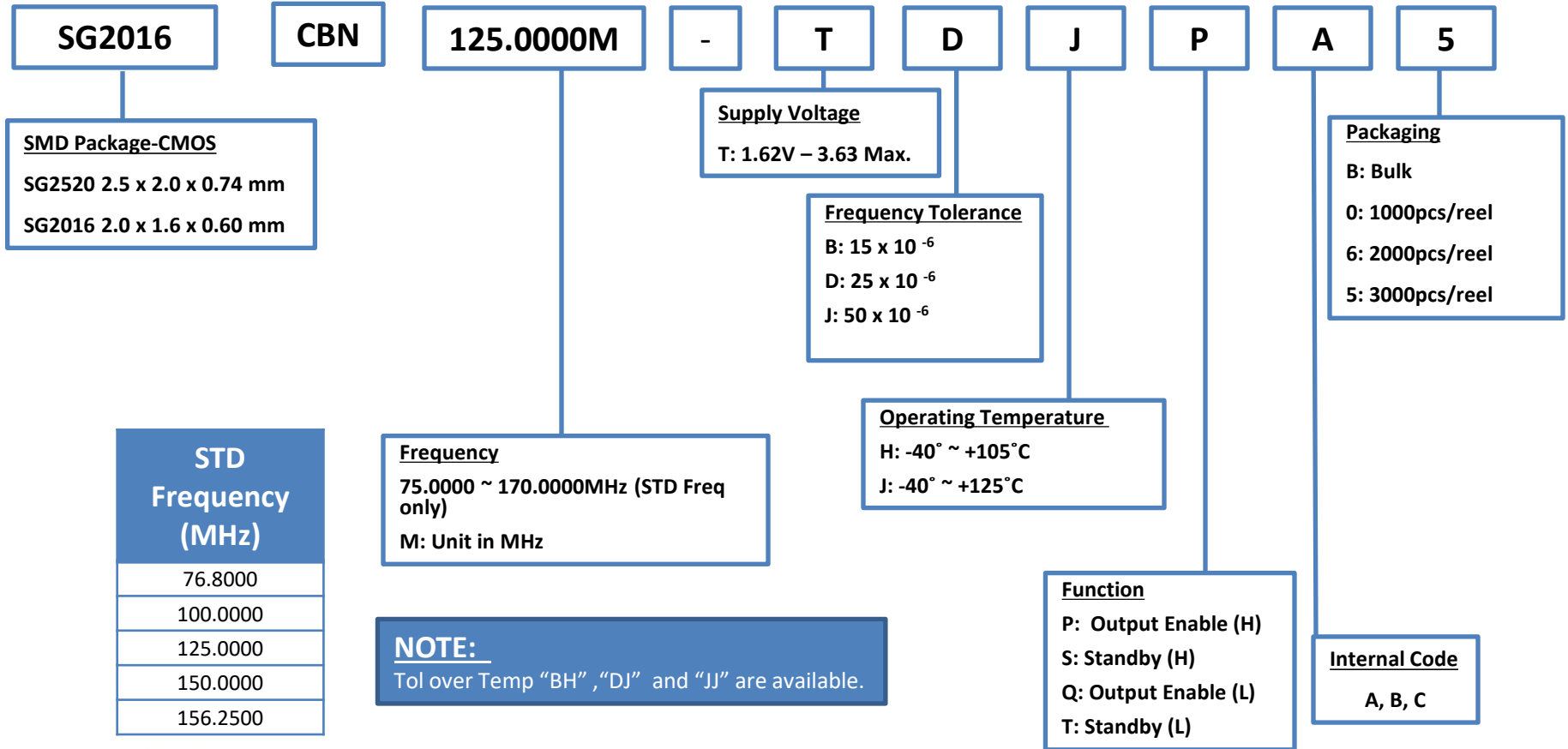
EPSON

Example: SG2016CAA 25.0000M-TJGA7
Please contact us about available frequencies

Product Configuration System



Crystal Oscillator (SPXO) – Low Jitter High Frequency

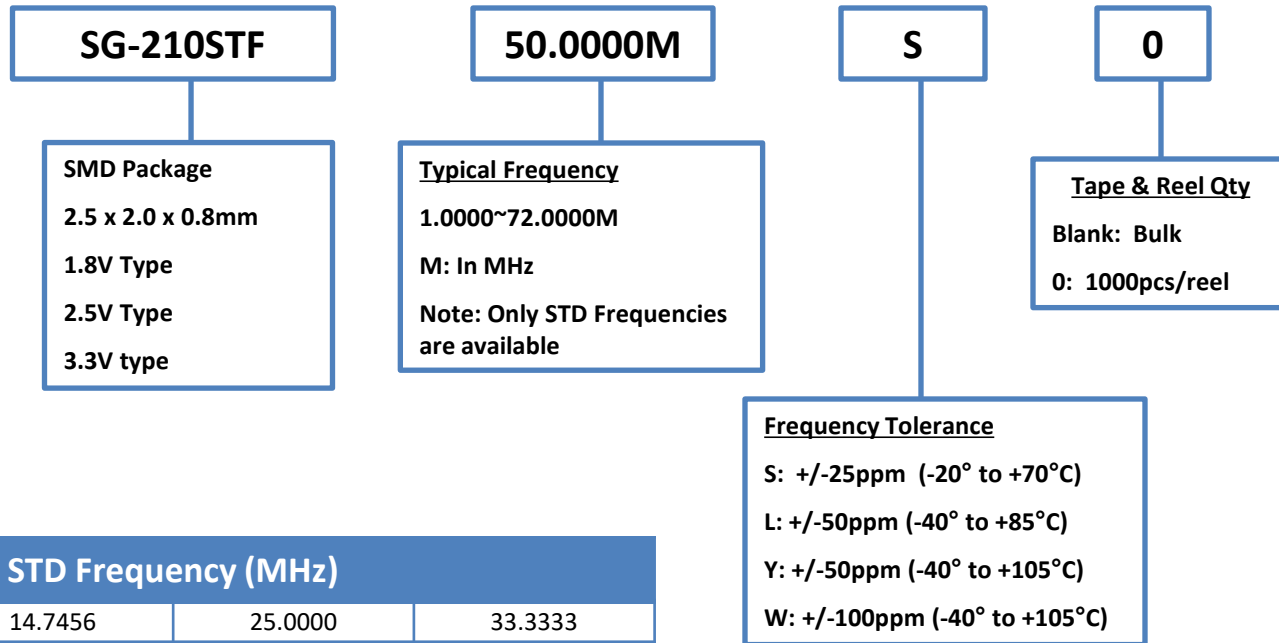


For non-standard frequencies, please see SG-8101 series

Product Configuration System



Crystal Oscillators - SPXO



| STD Frequency (MHz) | | | |
|---------------------|---------|---------|---------|
| 4.0000 | 14.7456 | 25.0000 | 33.3333 |
| 8.0000 | 16.0000 | 26.0000 | 40.0000 |
| 10.0000 | 20.0000 | 27.0000 | 48.0000 |
| 12.0000 | 24.0000 | 32.0000 | 50.0000 |
| 12.2880 | 24.5760 | 33.3300 | 72.0000 |

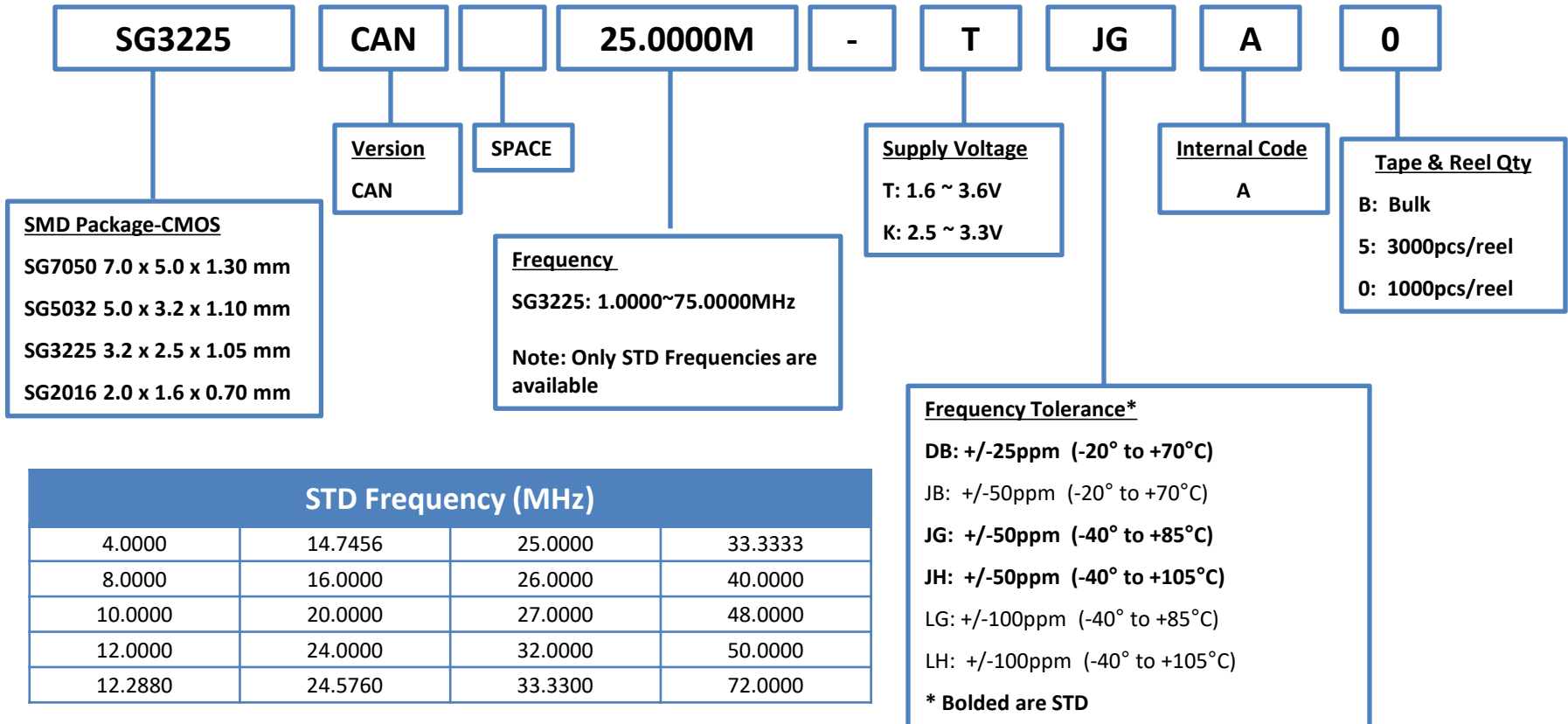


For non-standard frequencies, please see SG-8018CG



Product Configuration System

Crystal Oscillators - SPXO



| STD Frequency (MHz) | | | |
|---------------------|---------|---------|---------|
| 4.0000 | 14.7456 | 25.0000 | 33.3333 |
| 8.0000 | 16.0000 | 26.0000 | 40.0000 |
| 10.0000 | 20.0000 | 27.0000 | 48.0000 |
| 12.0000 | 24.0000 | 32.0000 | 50.0000 |
| 12.2880 | 24.5760 | 33.3300 | 72.0000 |



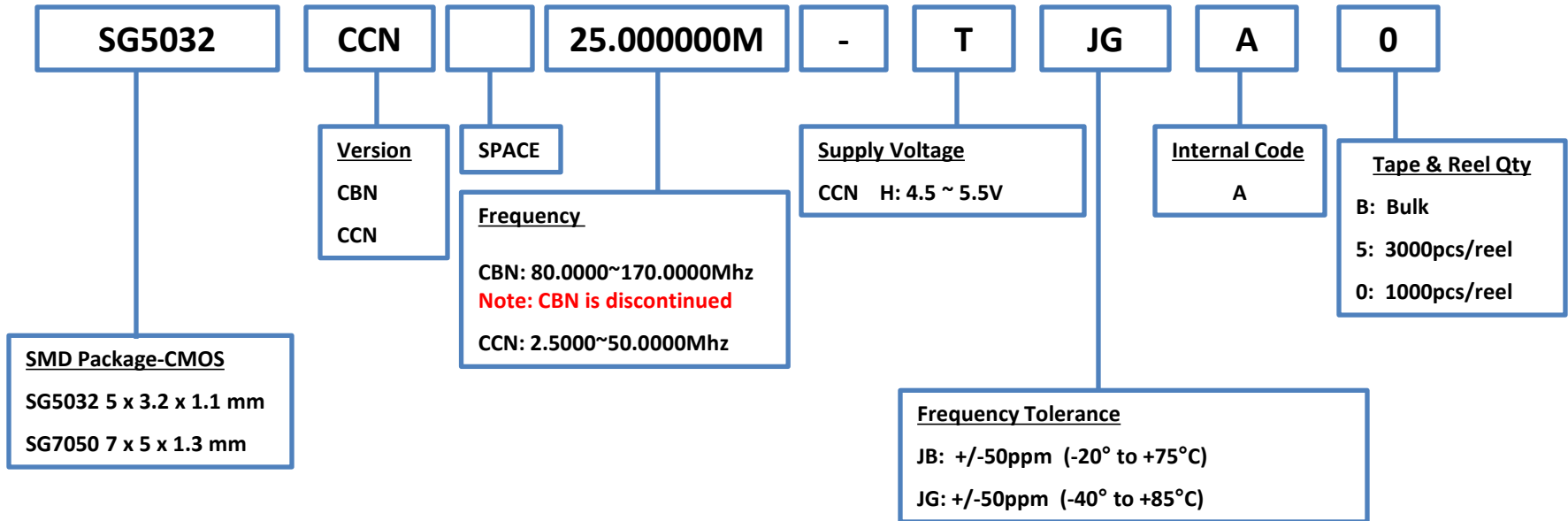
Example: SG3225CAN 25.0000M-TJGA

For non-standard frequencies, please see SG-8018CE



Product Configuration System

Crystal Oscillators - SPXO



Example: SG5032CCN 25.0000M-TJGA

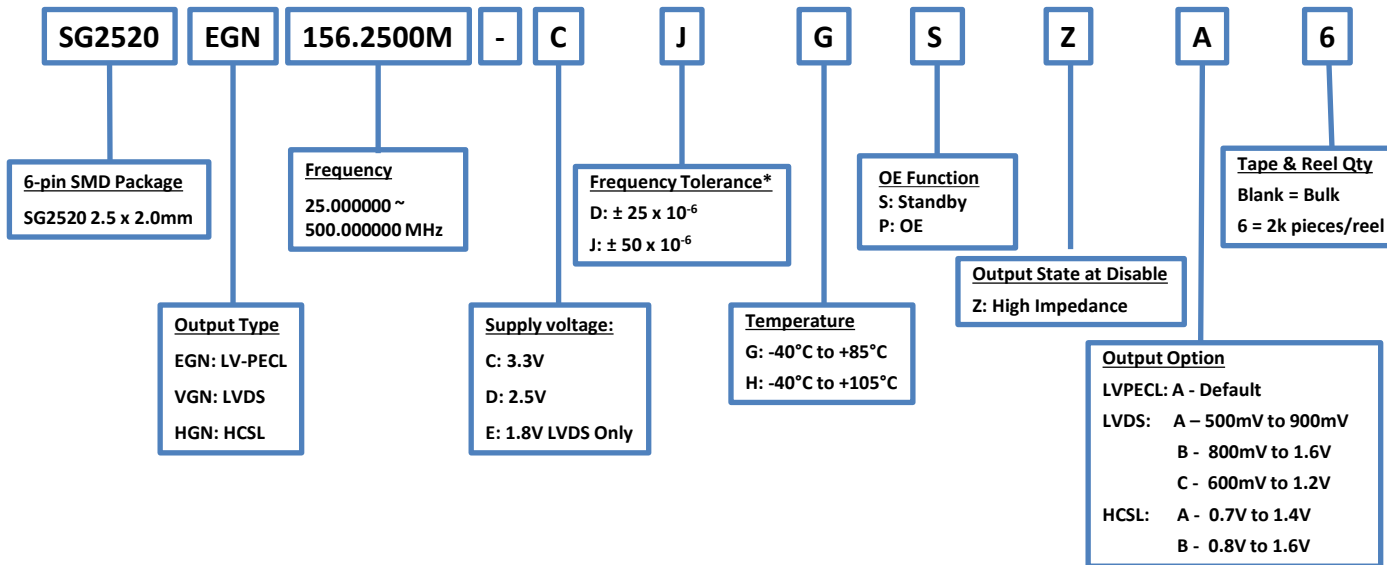
JH is not available



Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

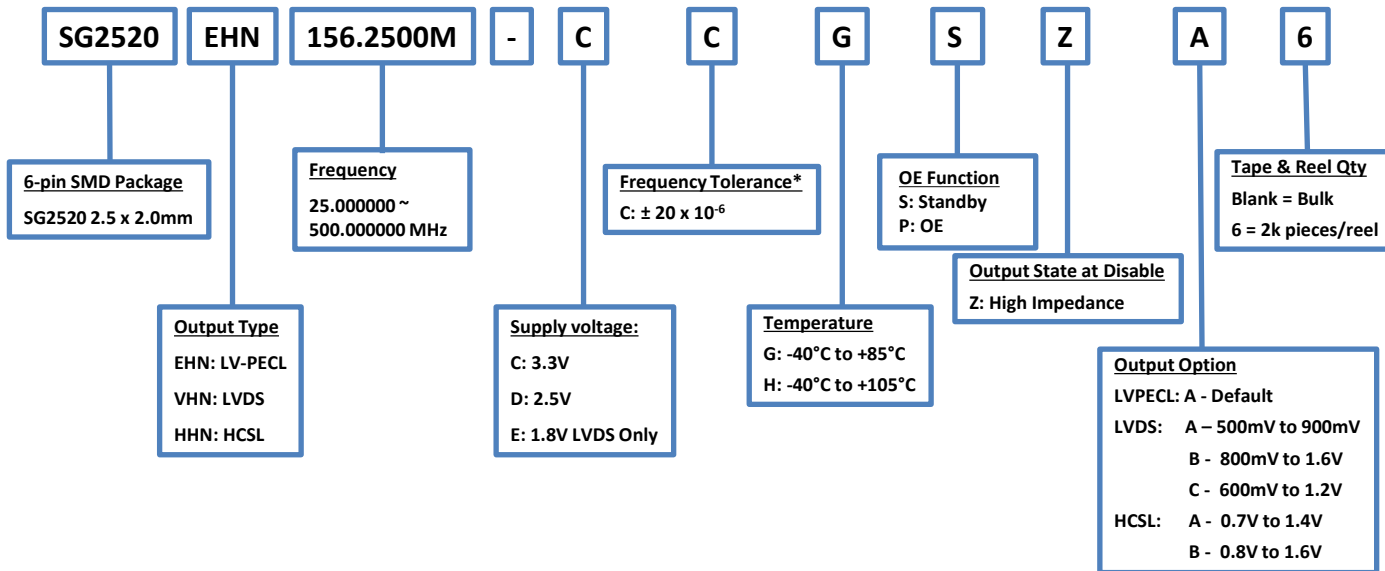


Note: All packages are RoHS Compliant

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

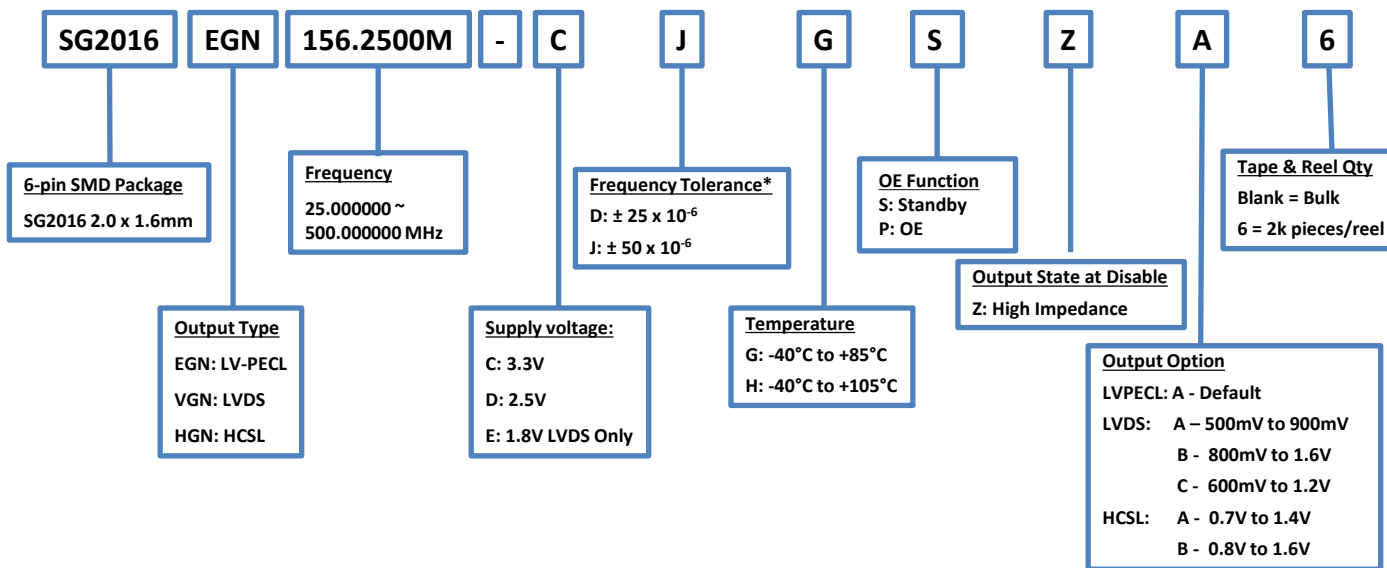
EPSON

Note: All packages are RoHS Compliant

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

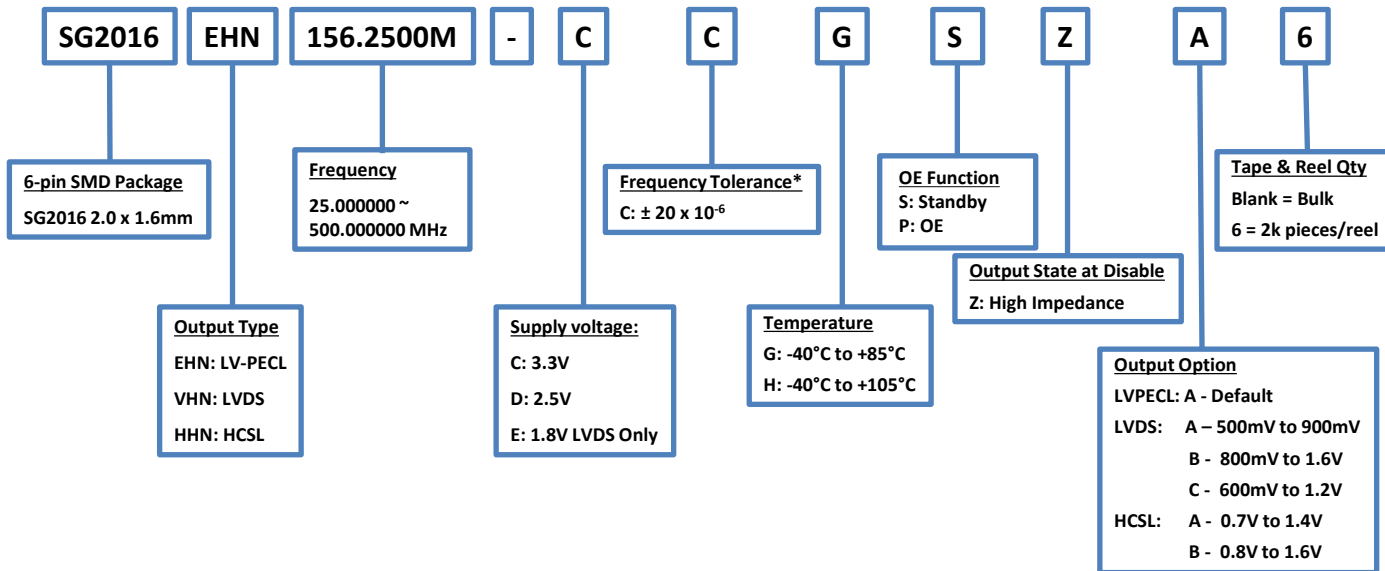


Note: All packages are RoHS Compliant

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

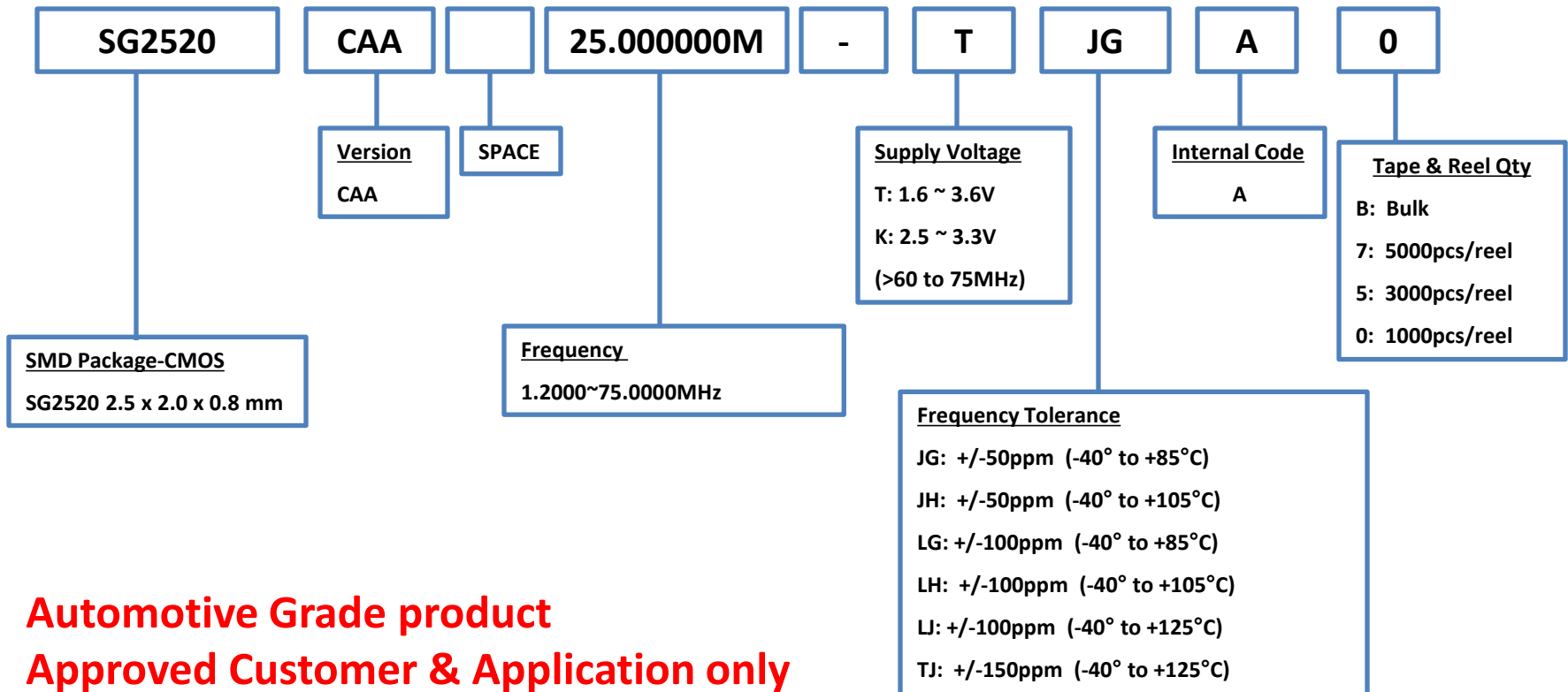


Note: All packages are RoHS Compliant

Product Configuration System



Crystal Oscillators – SPXO, Automotive (Conforms to AEC-Q200 Requirement)



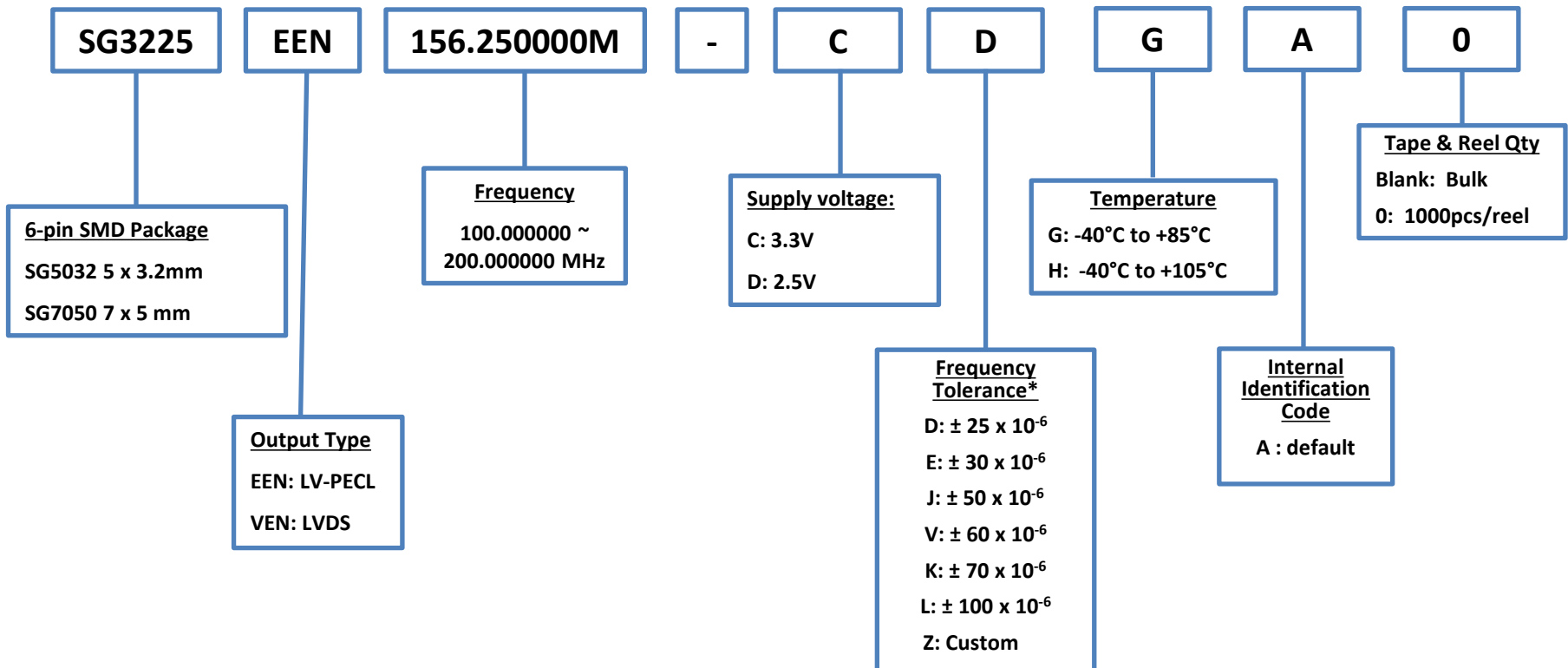
Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

EPSON

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

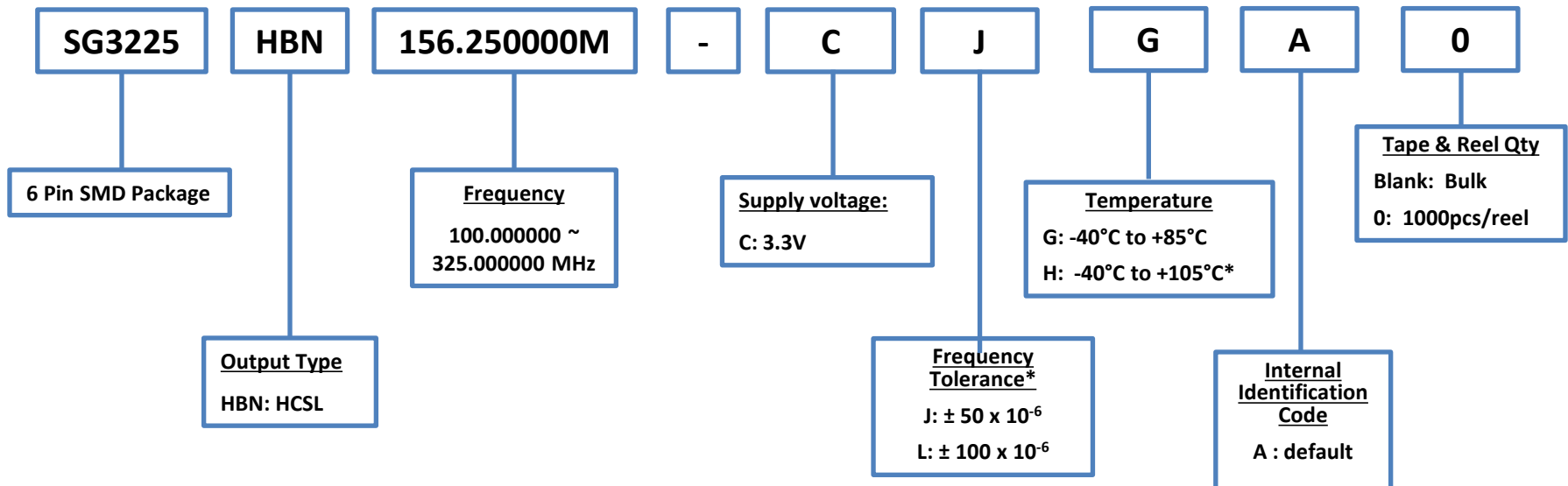


Note: All packages are RoHS Compliant

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range

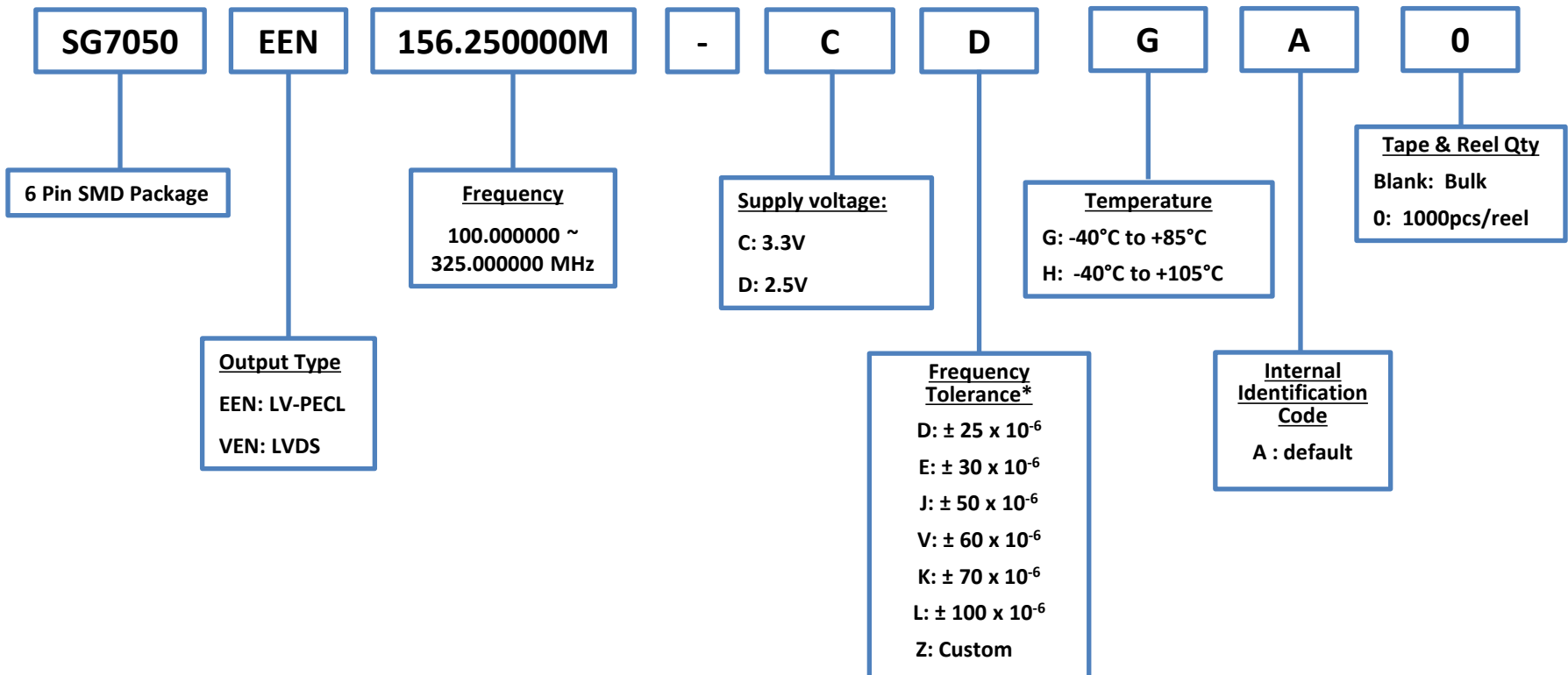


Note: All packages are RoHS Compliant
*For 105C, contact Epson

Product Configuration System



Crystal Oscillators - SPXO



* Please contact SEC for availability for a given temperature range



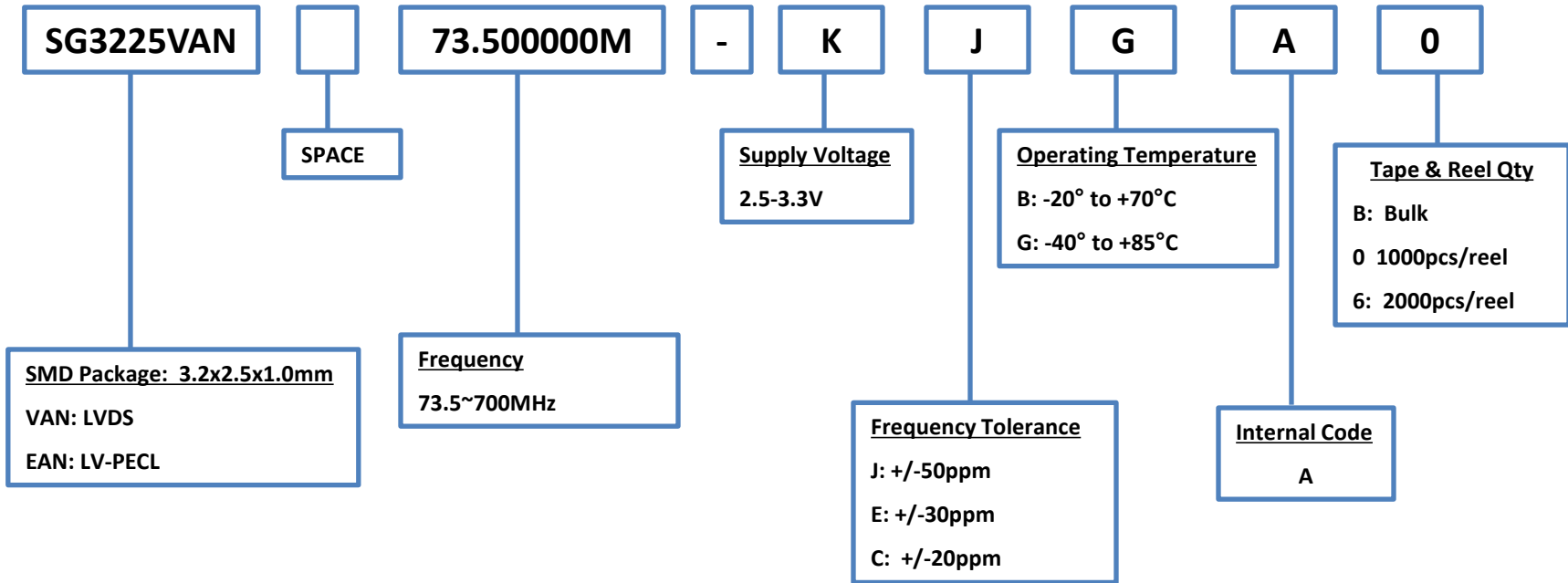
Note: All packages are RoHS Compliant



Product Configuration System

Crystal Oscillators – SPXO

Output : LV-PECL, LVDS



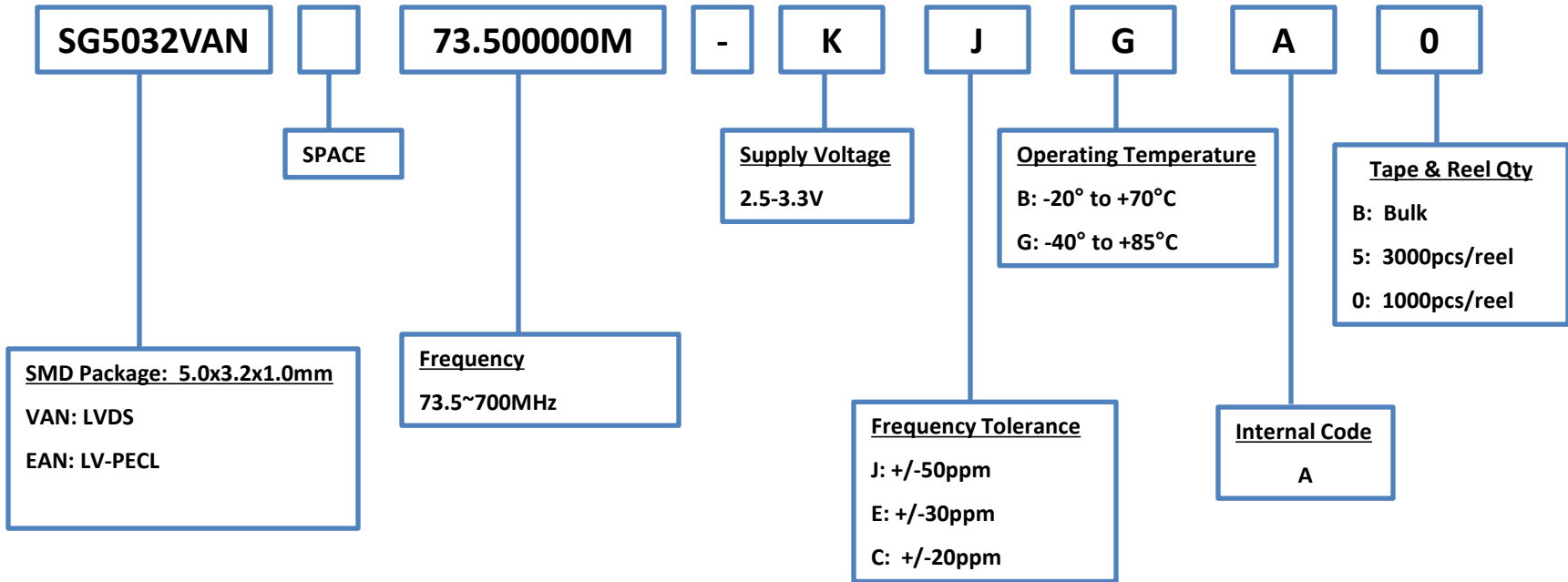
Example: SG3225EAN 73.500000M-KJGA
CG is not available



Product Configuration System

Crystal Oscillators – SPXO

Output : LV-PECL, LVDS



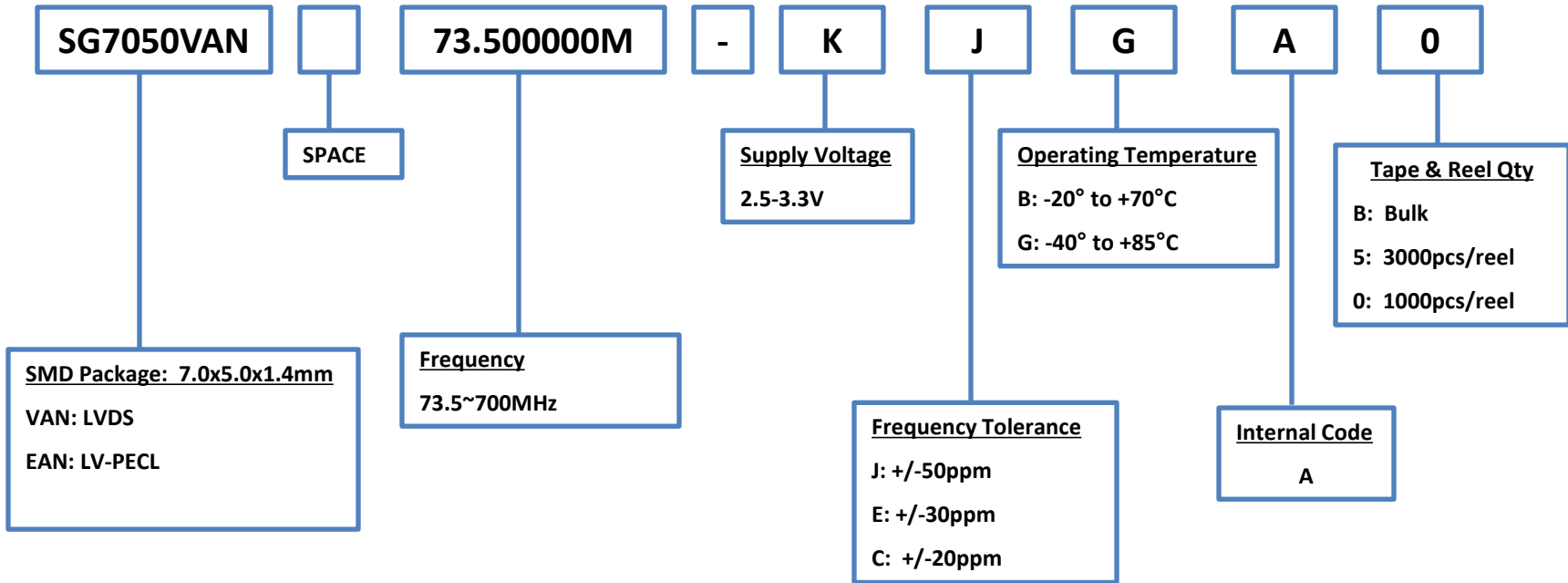
Example: SG5032EAN 73.500000M-KJGA
CG is not available



Product Configuration System

Crystal Oscillators – SPXO

Output : LV-PECL, LVDS



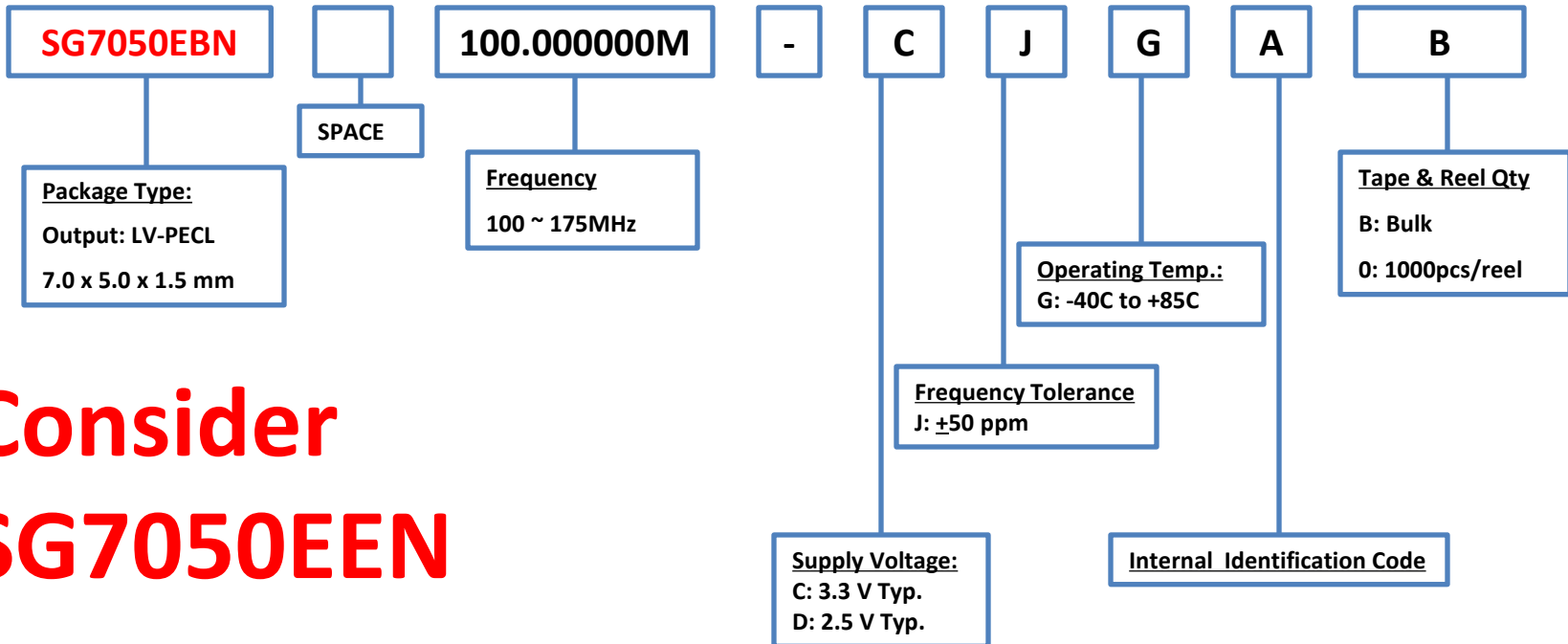
Example: SG7050EAN 73.500000M-KJGA
CG is not available

Product Configuration System



Crystal Oscillator - SPXO

Discontinued



Consider SG7050EEN

NOTE:

Please contact us for requirements not listed in this specification.

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Product Configuration System



Crystal Oscillators - SPXO

Discontinued

SG-615

P

CW

66.6667M

C

3

:

PURE SN

Oscillator Package Type

- 531: 8 pin plastic DIP
- 615: 4 pin "J" lead SMD
- 636: 4 pin "J" lead mini SMD
- 645: Plastic 5x7mm

Version

- P: Output Enable
- S: Standby Function

Function Description

- HW: 5.0V CMOS
- TW: 5.0V TTL
- CW: 3.3V CMOS

Frequency

5V, HW/TW

- SG-531 B Stability 55.0001~66.666MHz
- SG-531 C Stability 55.0001~135MHz
- SG-615 B Stability 55.0001~66.666MHz
- SG-615 C Stability 55.0001~135MHz
- SG-636 B Stability 32.0001~39.9999MHz
- SG-636 C Stability 32.0001~135MHz
- SG-645 B Stability 32.0001~39.9999MHz
- SG-645 C Stability 32.0001~135MHz

3.3V, CW

- SG-531 B/C/M Stability 55.0001~135MHz
- SG-615 B/C/M Stability 26.0001~135MHz
- SG-636 B/C Stability 32.0001~135MHz
- SG-645 B/C/M Stability 32.0001~135MHz

Tape & Reel Qty

- Blank: Bulk
- 0: 1000pcs per reel
- 3: 250pcs per reel

(Except SG-51/531)

- SG-51/531 Series
- Blank: Stick 25/35

PURE SN
ROHS

Frequency Tolerance

- B: +/-50ppm / -20 to +70C
- C: +/-100ppm / -20 to +70C

M: +/-100ppm/-40~+85C

- Available in 3.3V to 135MHz, SG-51/531 & SG-615
- (NOT available in SG-636)

These packages also available in our SG-8002 programmable series.

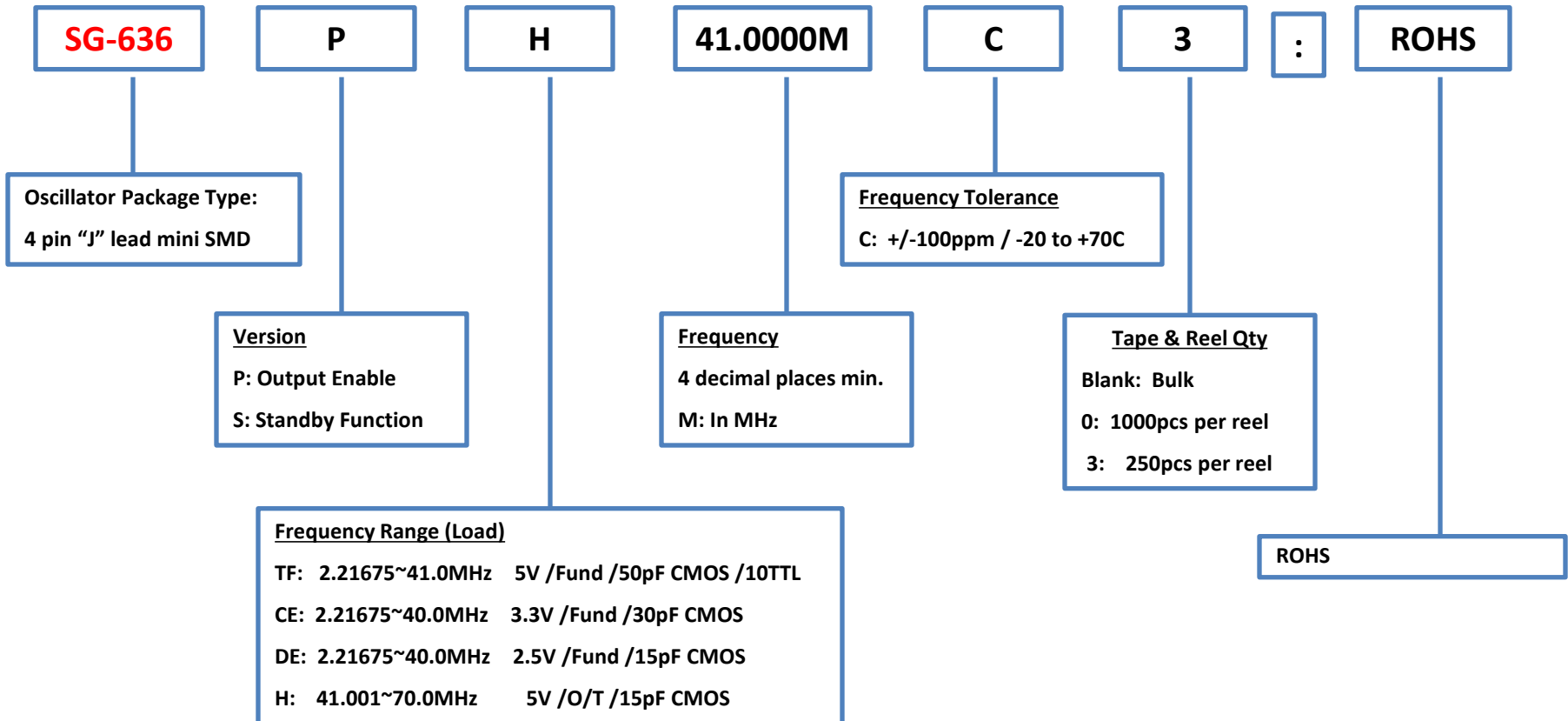


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



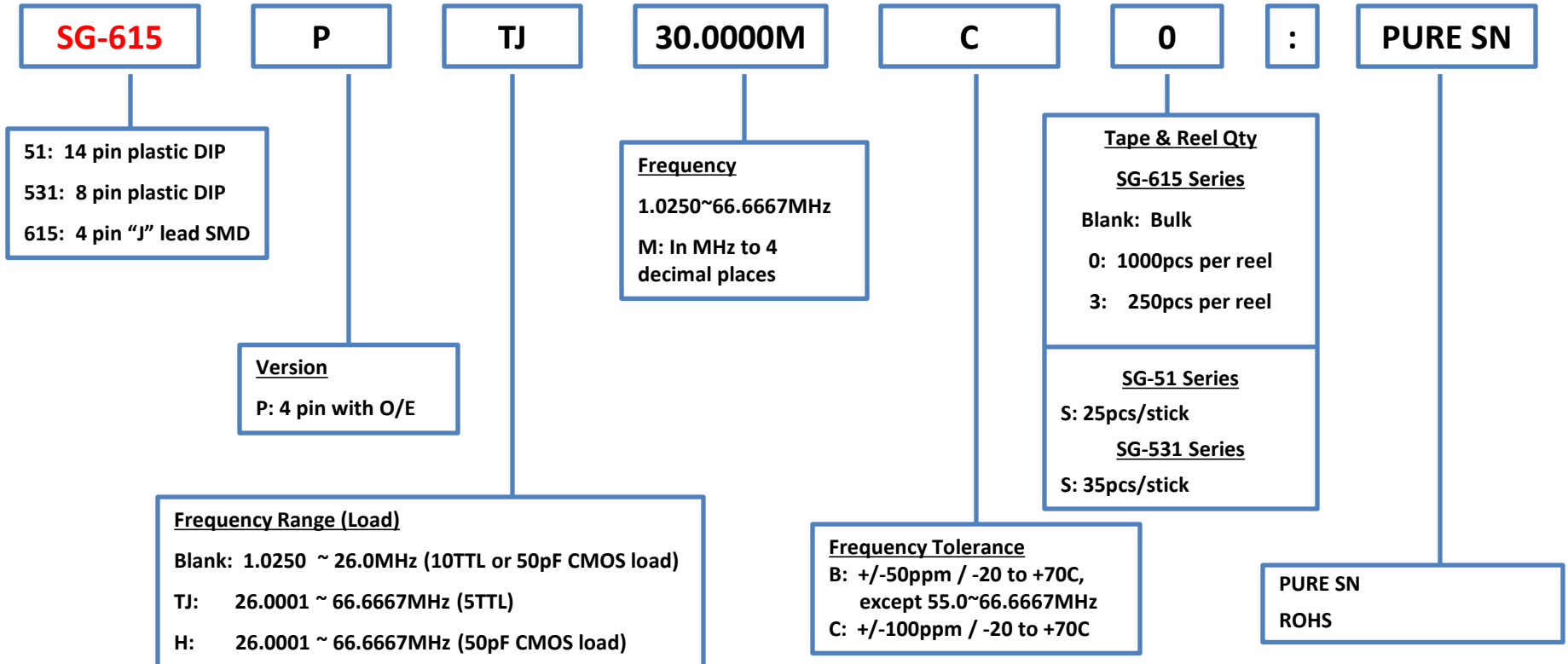
These packages also available in our SG-8002 programmable series.

Product Configuration System



Crystal Oscillators - SPXO

Discontinued



These packages also available in our SG-8002 programmable series.

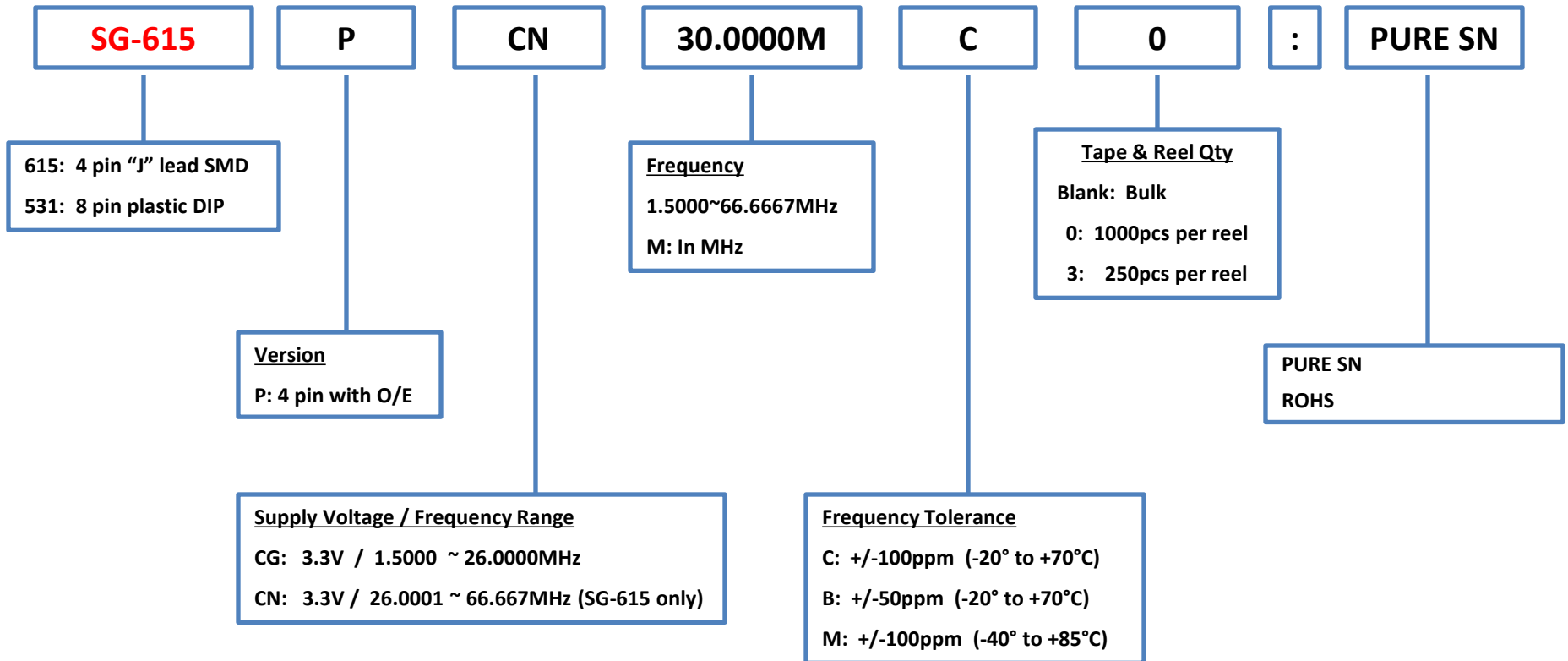


Product Configuration System



Crystal Oscillators - SPXO

Discontinued



These packages also available in our SG-8002 programmable series.

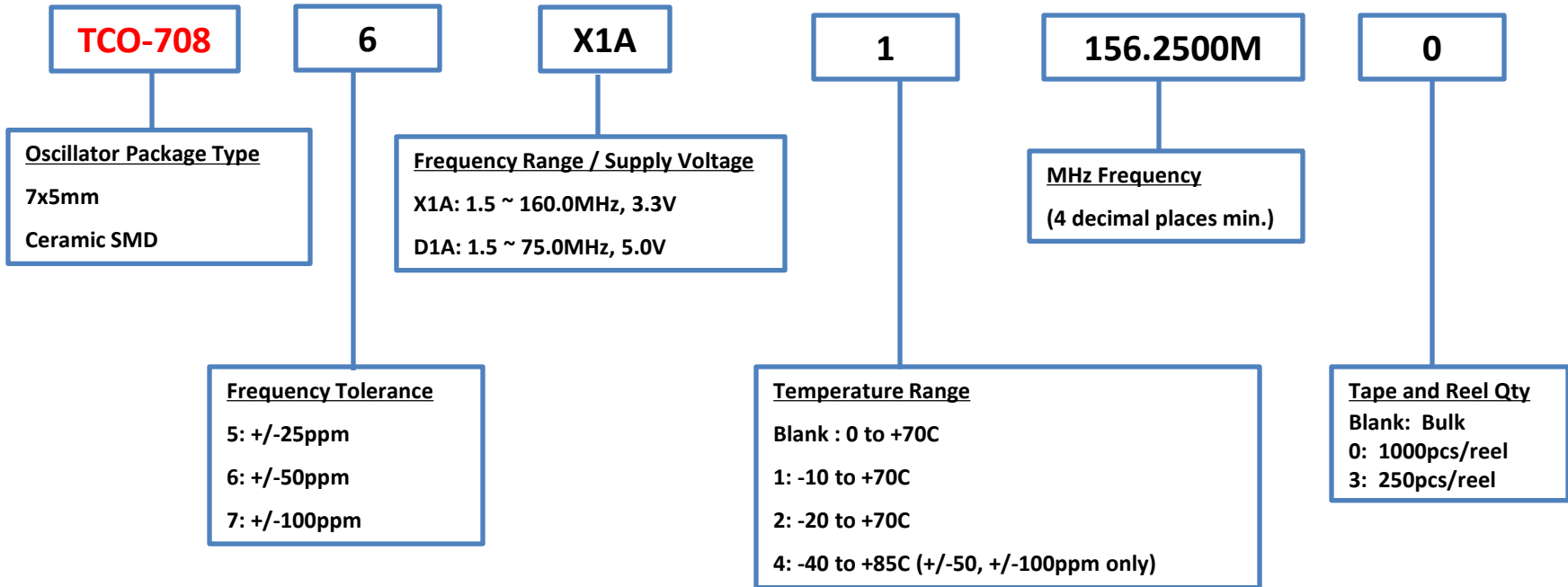


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

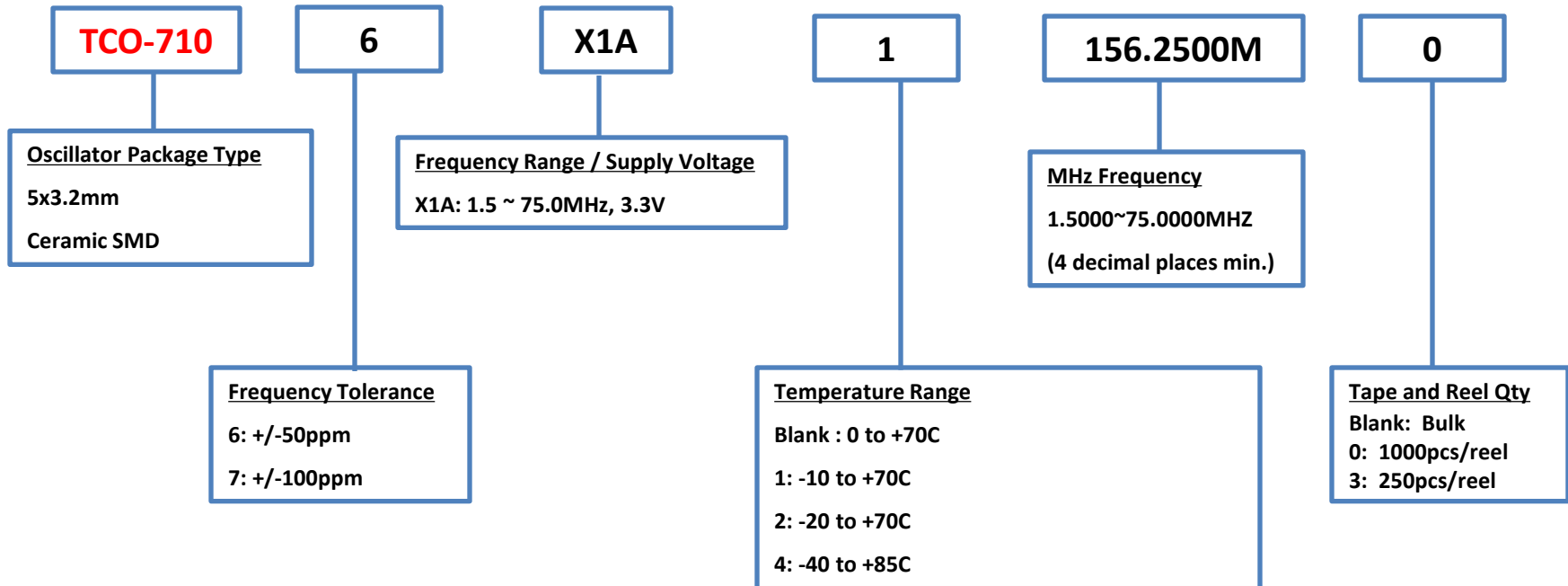


Product Configuration System



Crystal Oscillators - SPXO

Discontinued

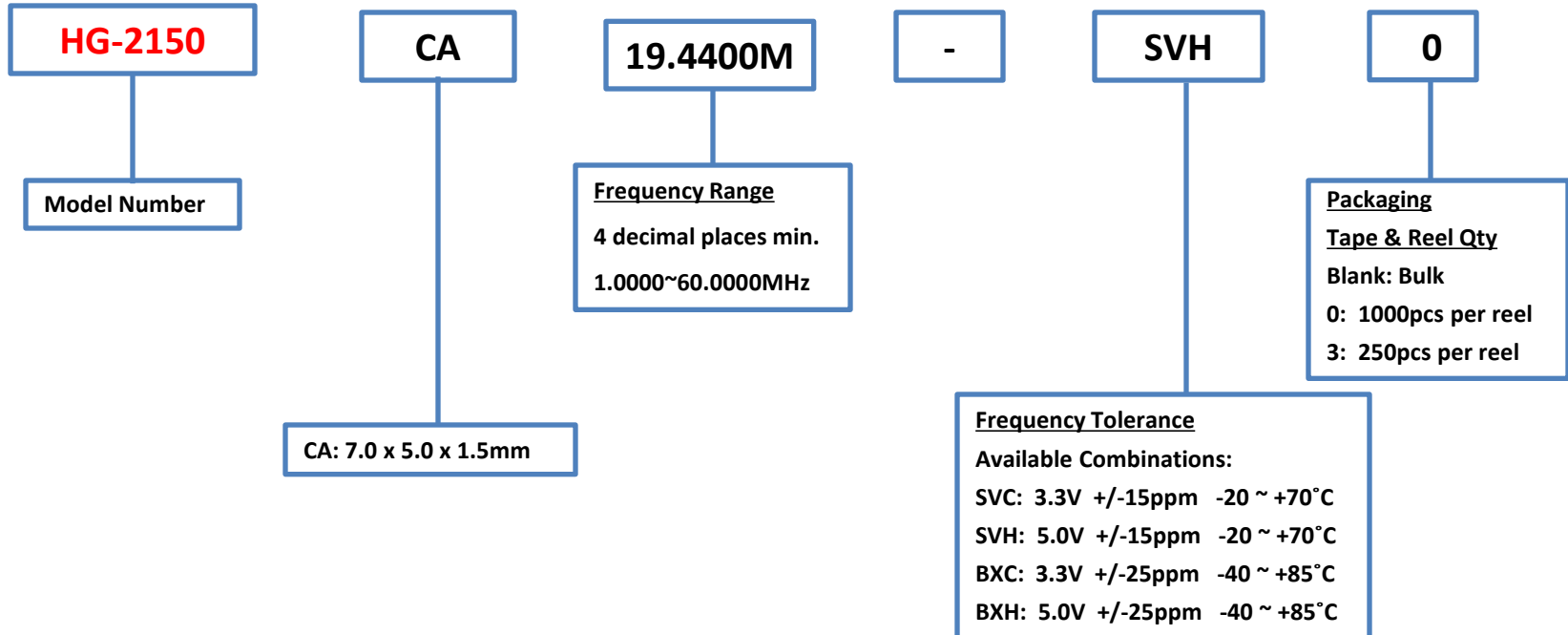


Product Configuration System



Crystal Oscillators - High Stability

Discontinued



Product Configuration Guide

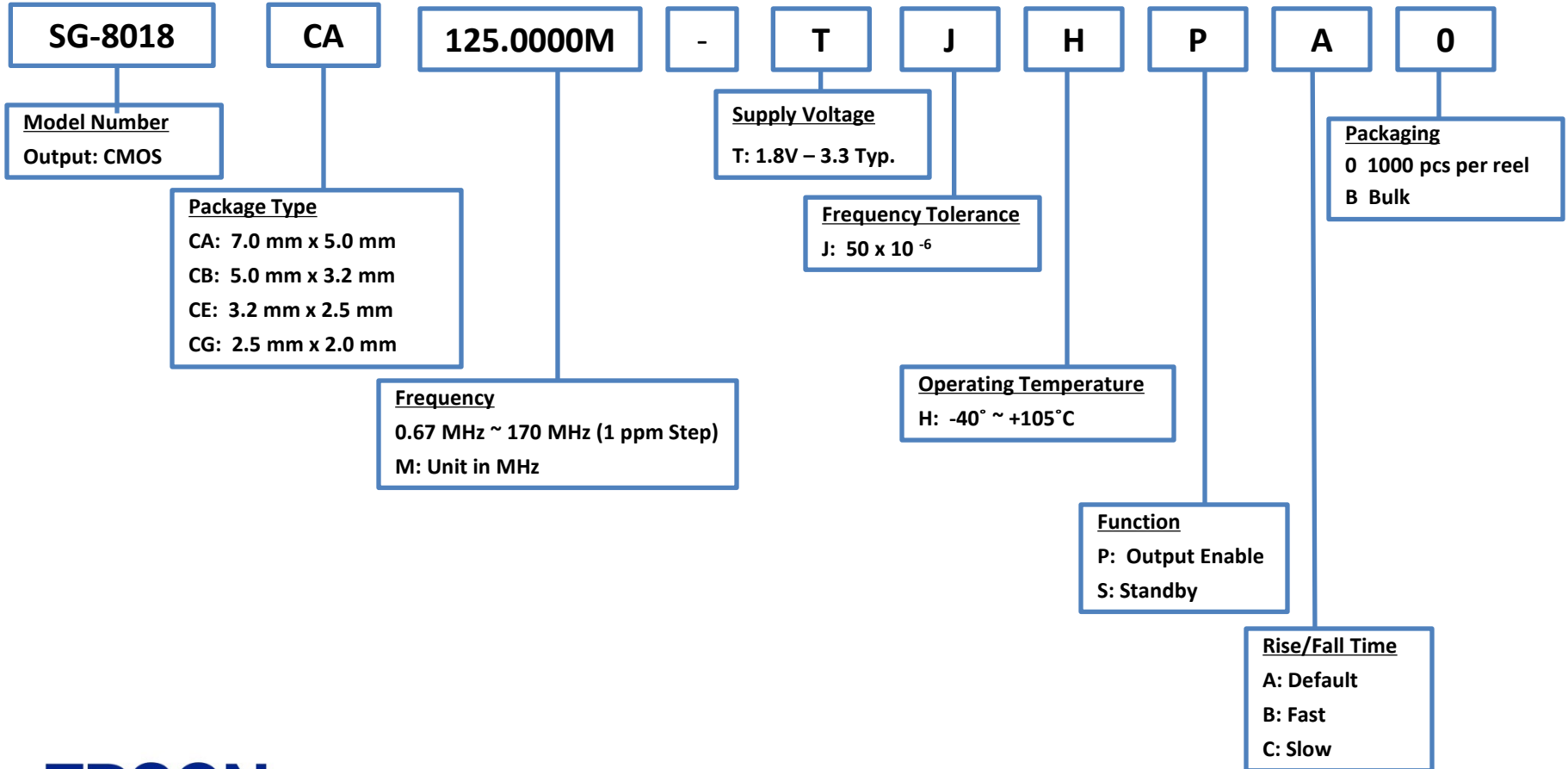
Programmable Oscillators (P-SPXO)



Product Configuration System



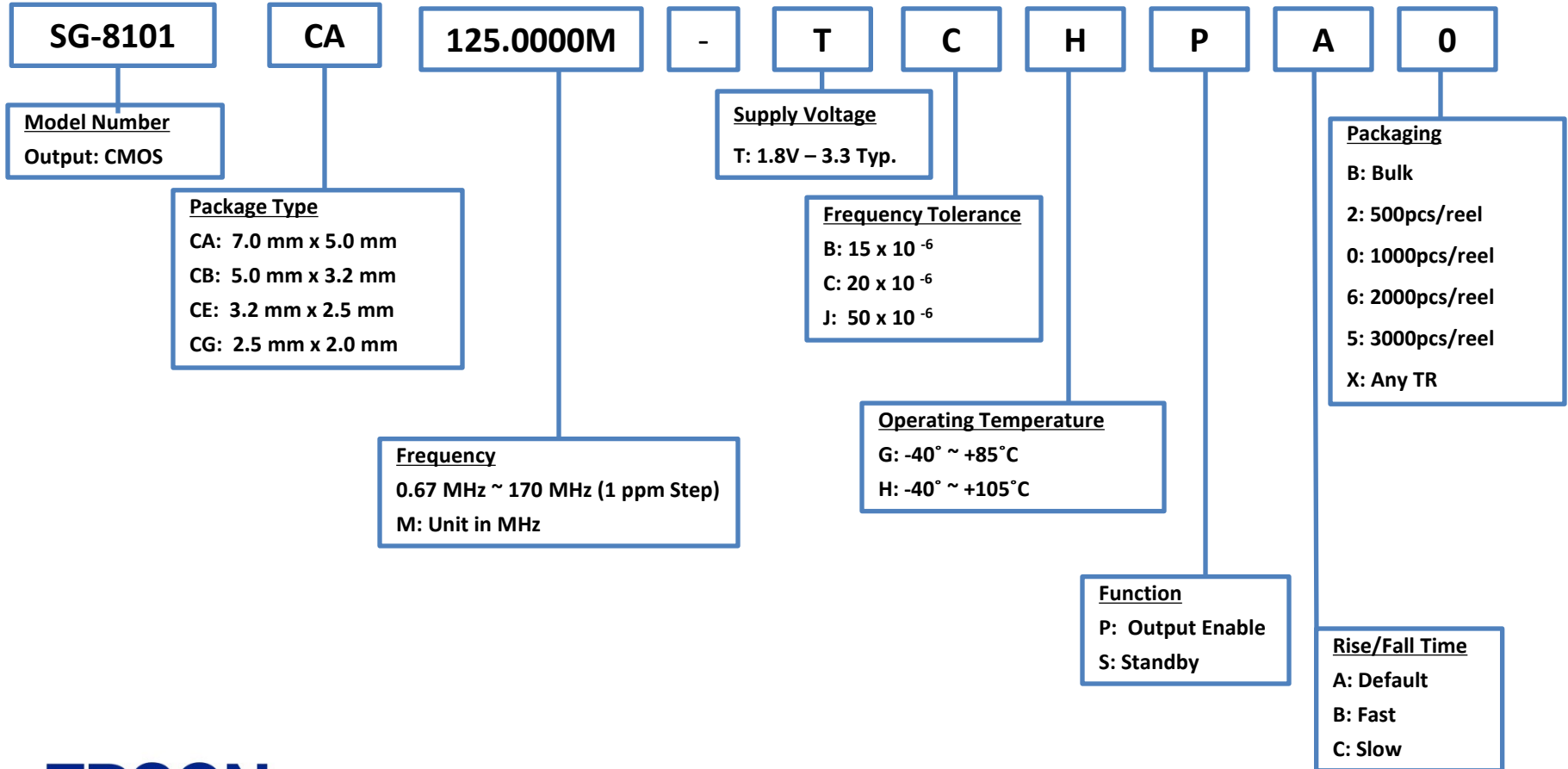
Crystal Oscillator (SPXO) – Programmable



Product Configuration System



Crystal Oscillator (SPXO) – Programmable, High Performance



NOTE:
See next page for available combinations

Product Configuration System



Crystal Oscillator (SPXO) – Programmable, High Performance

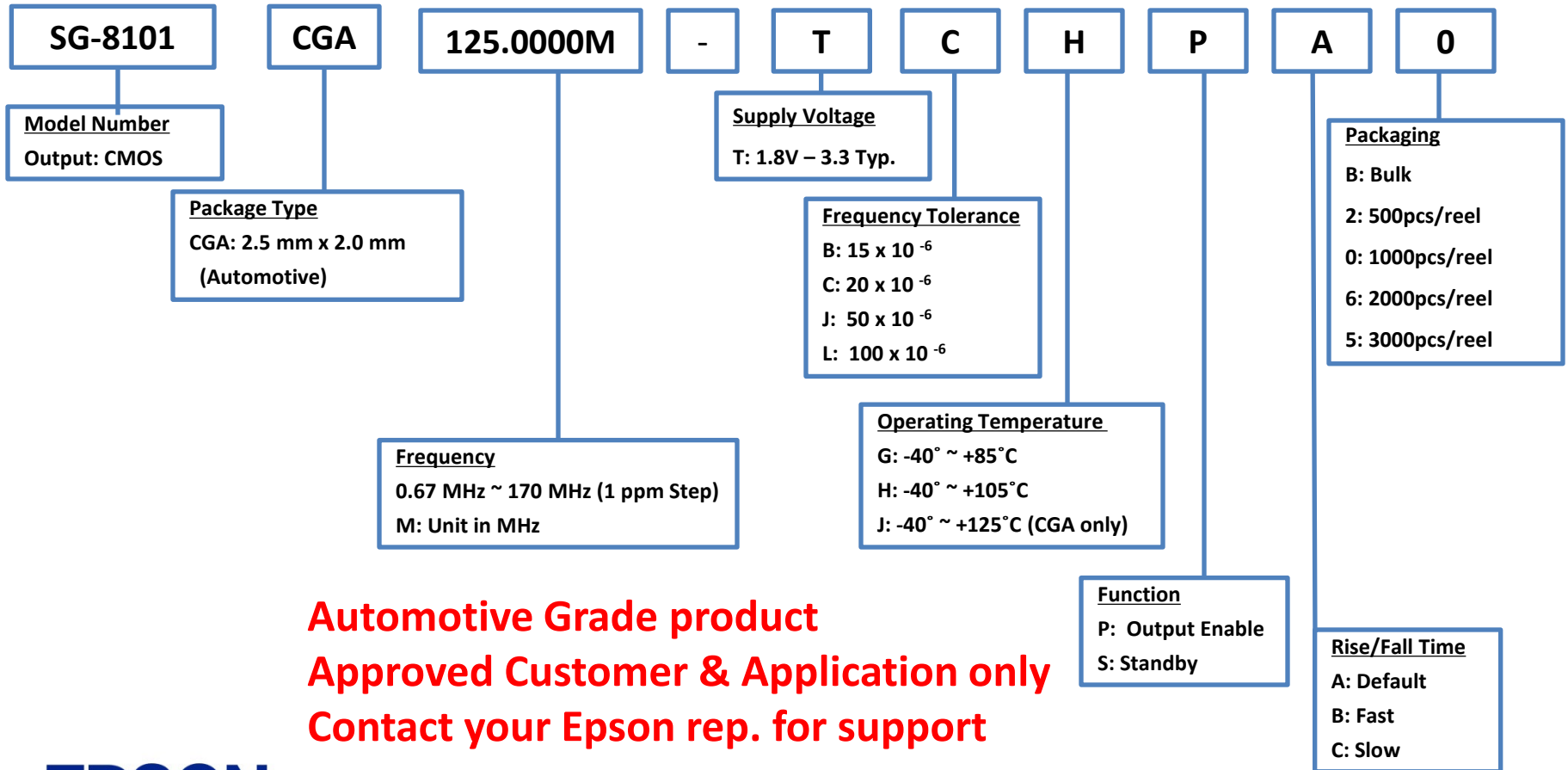
SG-8101 Available Combinations

| Available combination | | CA: 7.0 mm x 5.0 mm | | | CB: 5.0 mm x 3.2 mm | | | CE: 3.2 mm x 2.5 mm | | | CG: 2.5 mm x 2.0 mm | | |
|-----------------------|---------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Frequency tolerance | | B: 15 x 10 ⁻⁶ | C: 20 x 10 ⁻⁶ | J: 50 x 10 ⁻⁶ | B: 15 x 10 ⁻⁶ | C: 20 x 10 ⁻⁶ | J: 50 x 10 ⁻⁶ | B: 15 x 10 ⁻⁶ | C: 20 x 10 ⁻⁶ | J: 50 x 10 ⁻⁶ | B: 15 x 10 ⁻⁶ | C: 20 x 10 ⁻⁶ | J: 50 x 10 ⁻⁶ |
| Operating temperature | G: -40 °C ~ +85 °C | ✓ | | | ✓ | | | ✓ | | | ✓ | | |
| | H: -40 °C ~ +105 °C | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ |

Product Configuration System



Crystal Oscillator (SPXO) – Programmable, High Performance, Automotive (AECQ100)



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

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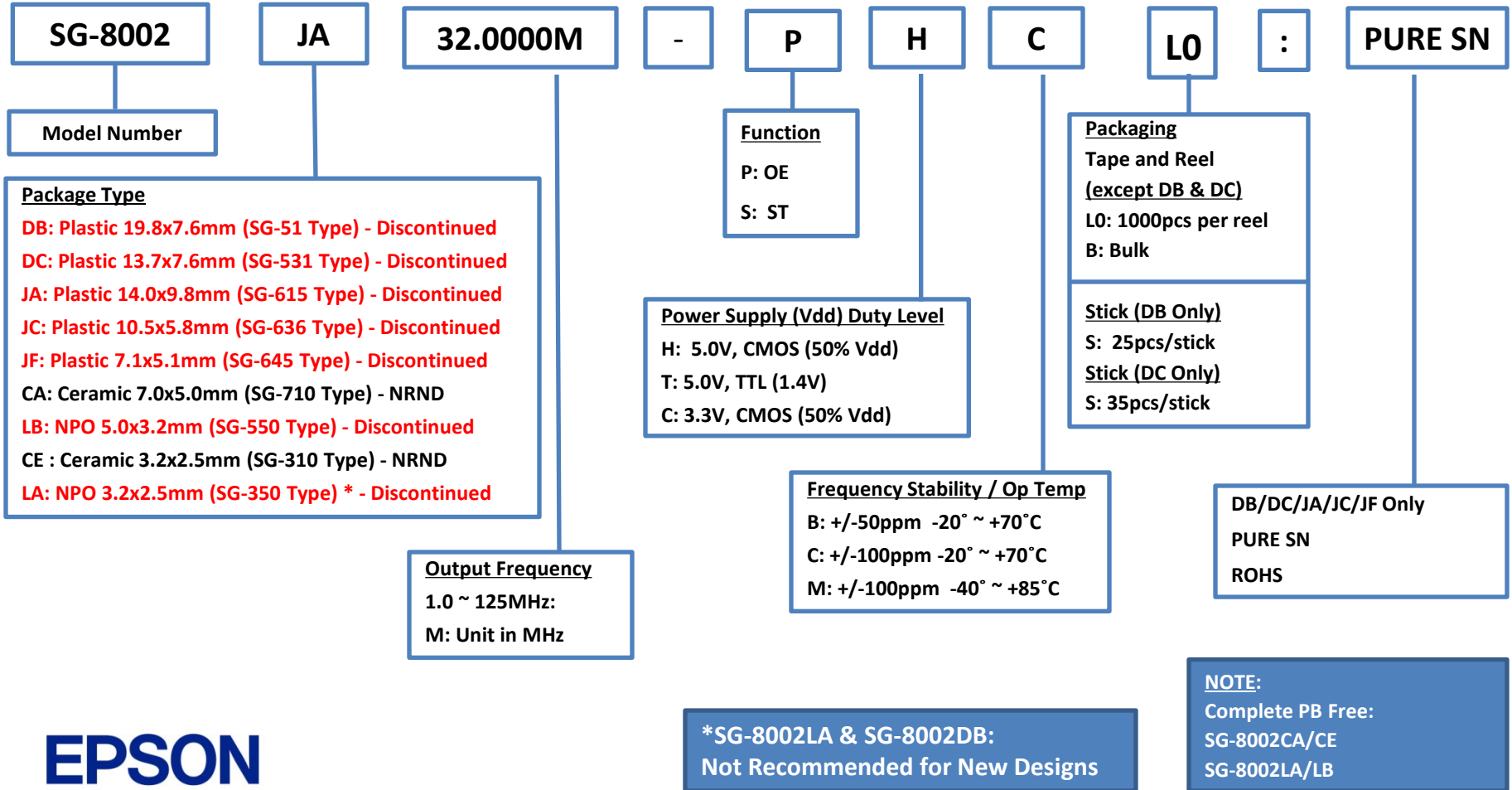
NOTE:

For Automotive SG-8101CGA, stability “JJ” (+/-50ppm -40/125C) and “LJ” (+/-100ppm -40/125C) are available. See previous slide for other possible combination.

Product Configuration System



Crystal Oscillators - Programmable

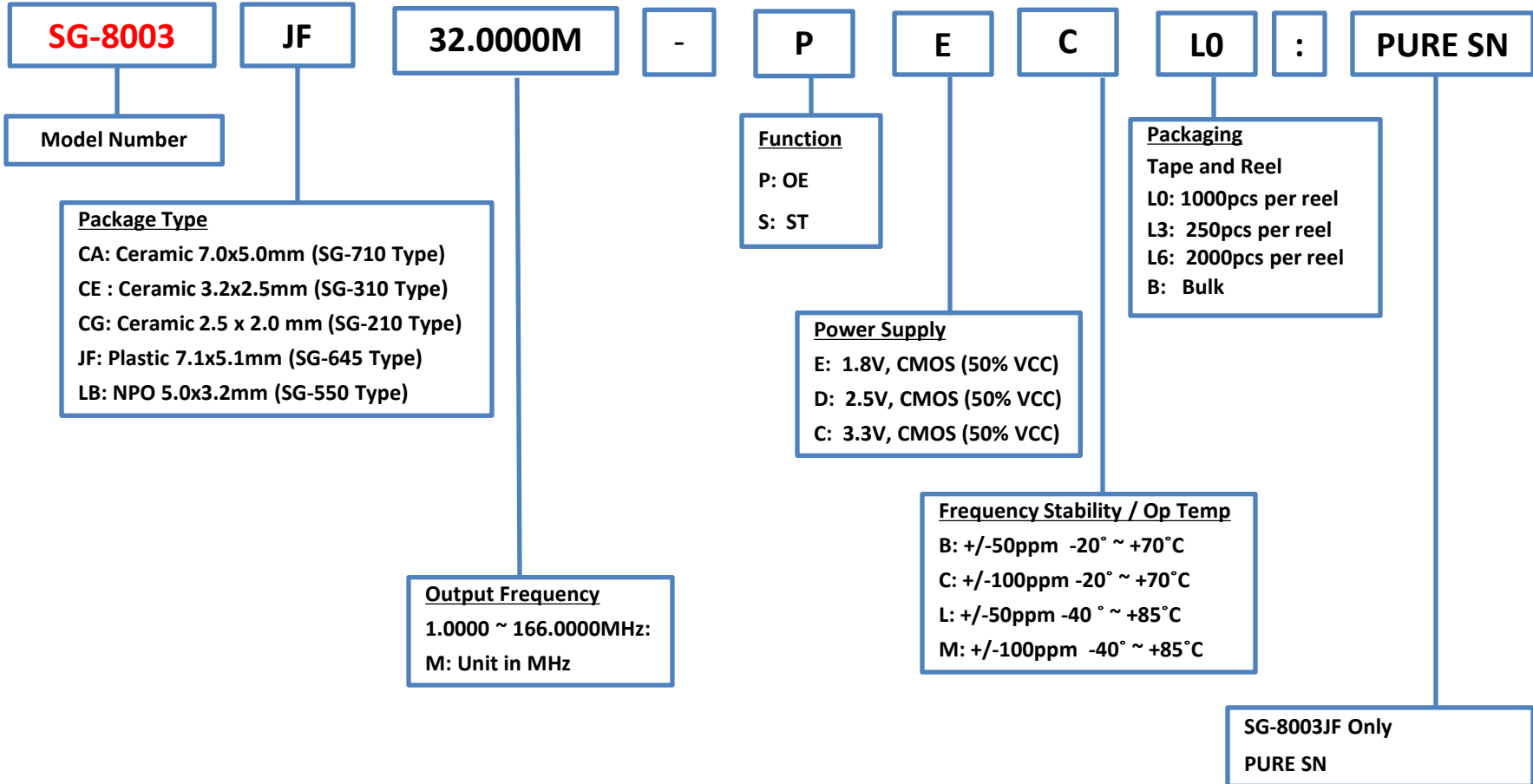


Product Configuration System



Crystal Oscillators - Programmable

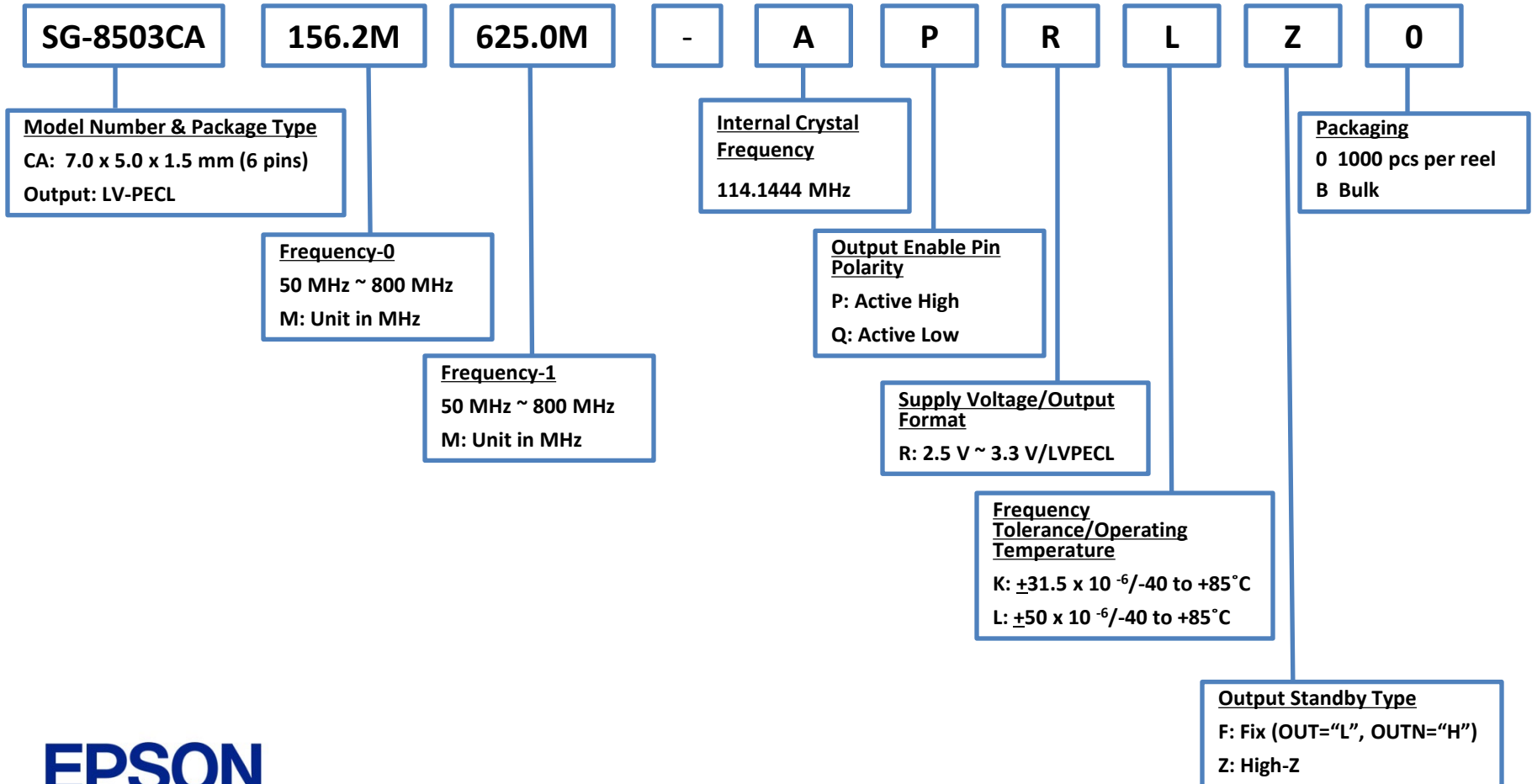
Discontinued



Product Configuration System



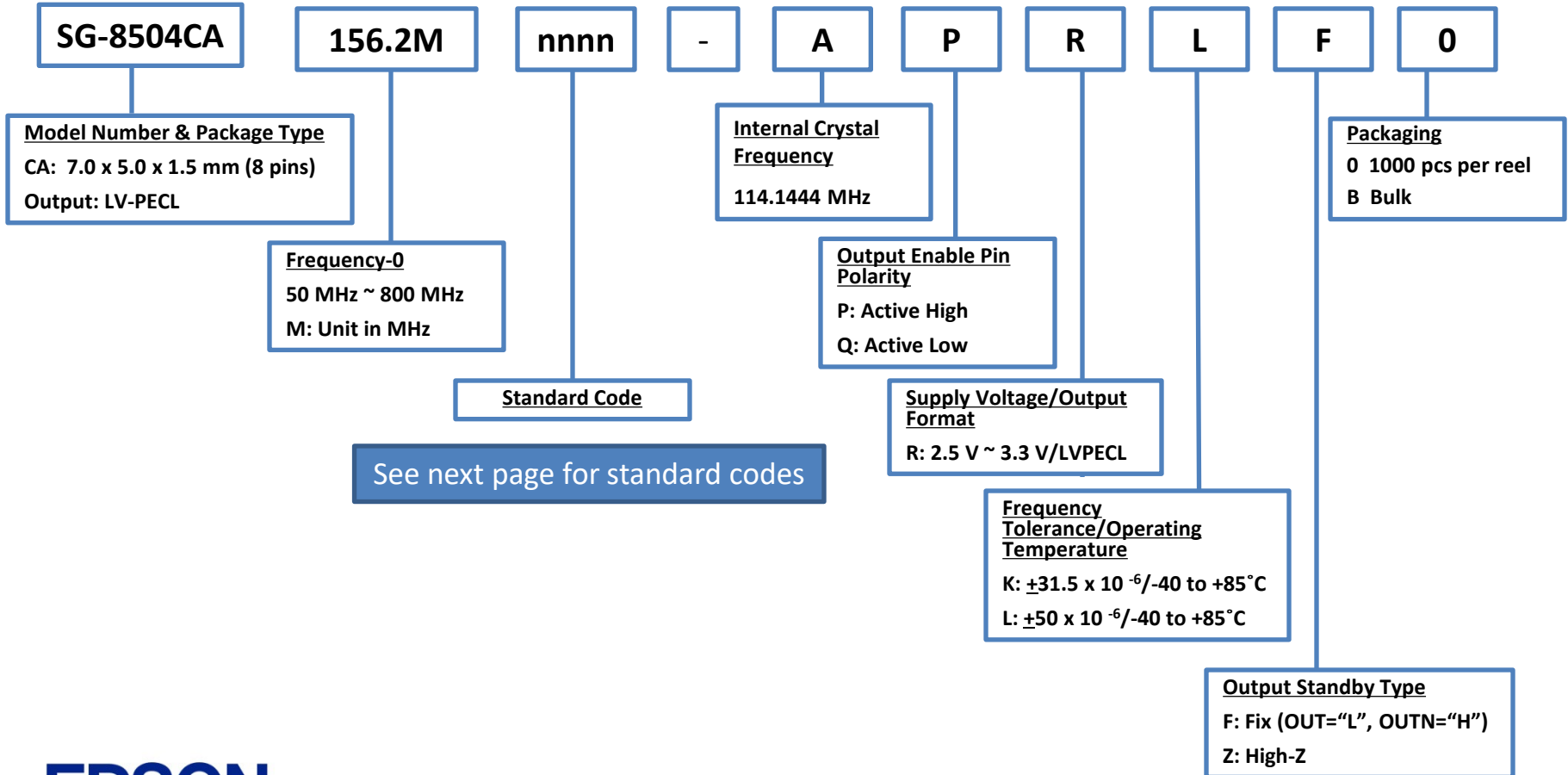
Dual Selectable Crystal Oscillator (SPXO) Programmable (Dual Frequencies Available)



Product Configuration System



Quad Selectable Crystal Oscillator (SPXO) Programmable (Quad Frequencies Available)



Product Configuration System



Quad Selectable Crystal Oscillator (SPXO) Programmable (Quad Frequencies Available)

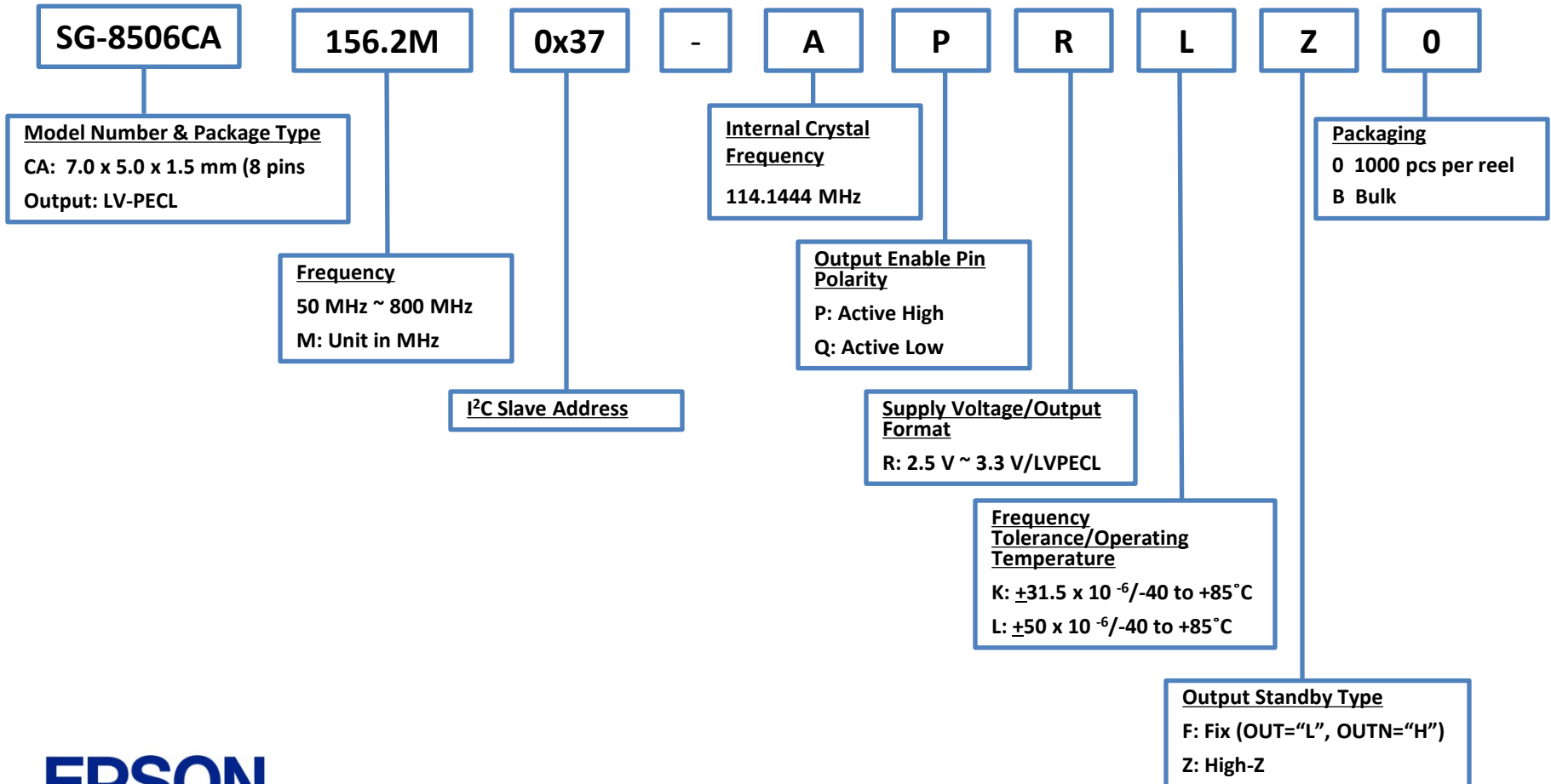
SG-8504 Standard Codes

| Standard Code (‘nnnn’) | Frequency 0 | Frequency 1 | Frequency 2 | Frequency 3 |
|-----------------------------------|------------------------|------------------------|------------------------|------------------------|
| 0007 | 75.00000 | 100.00000 | 150.00000 | 250.00000 |
| 0008 | 62.50000 | 125.00000 | 156.25000 | 250.00000 |
| 0009 | 106.25000 | 159.37500 | 212.50000 | 425.00000 |
| 0010 | 100.00000 | 133.33333 | 166.66666 | 200.00000 |
| 0011 | 100.00000 | 125.00000 | 156.25000 | 312.50000 |

Product Configuration System



User Programmable I²C Crystal Oscillator (SPXO)

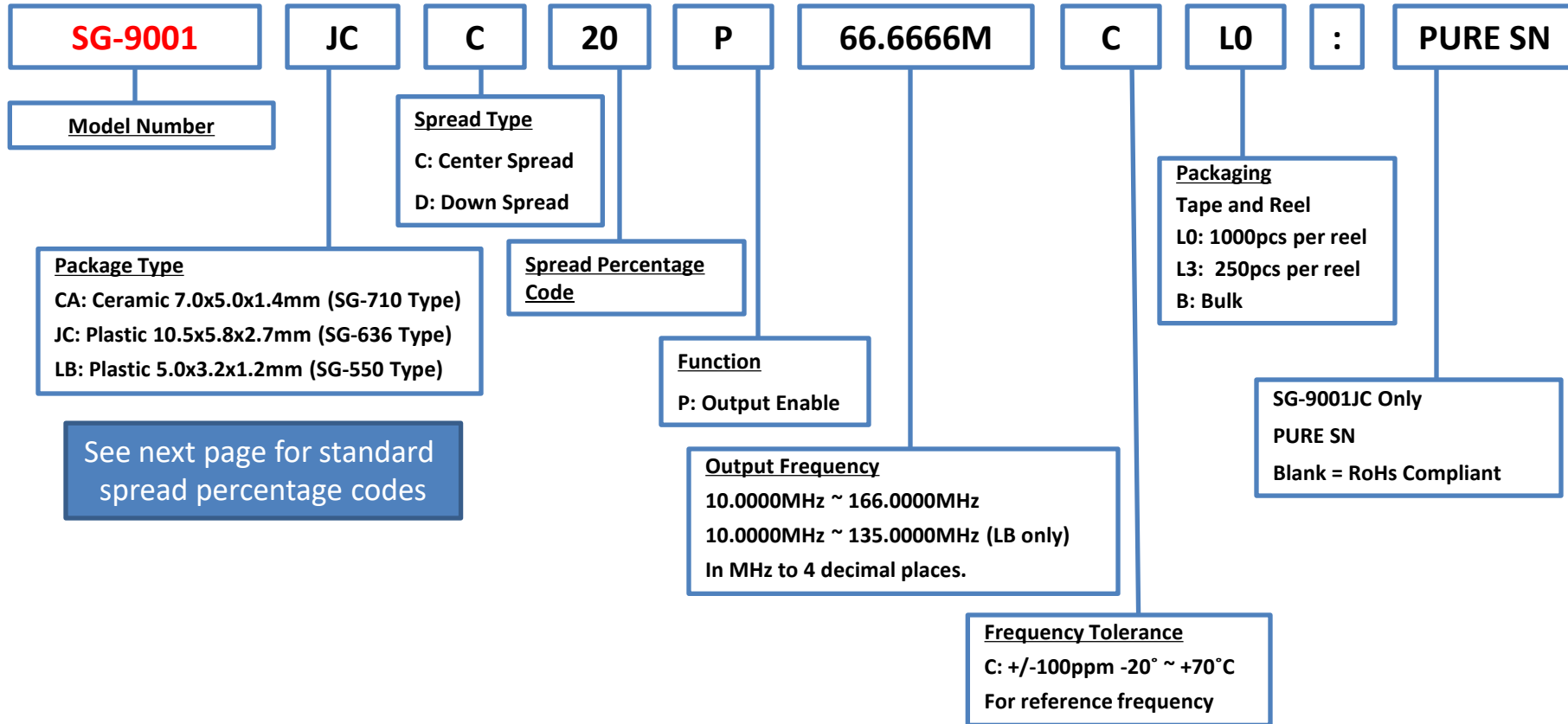


Product Configuration System



Crystal Oscillators - Spread Spectrum

Discontinued



NOTES:

SG-9001CA & SG-9001LB: Complete PB FREE
SG-9001JC: RoHS COMPLIANT

Spread Rate Options

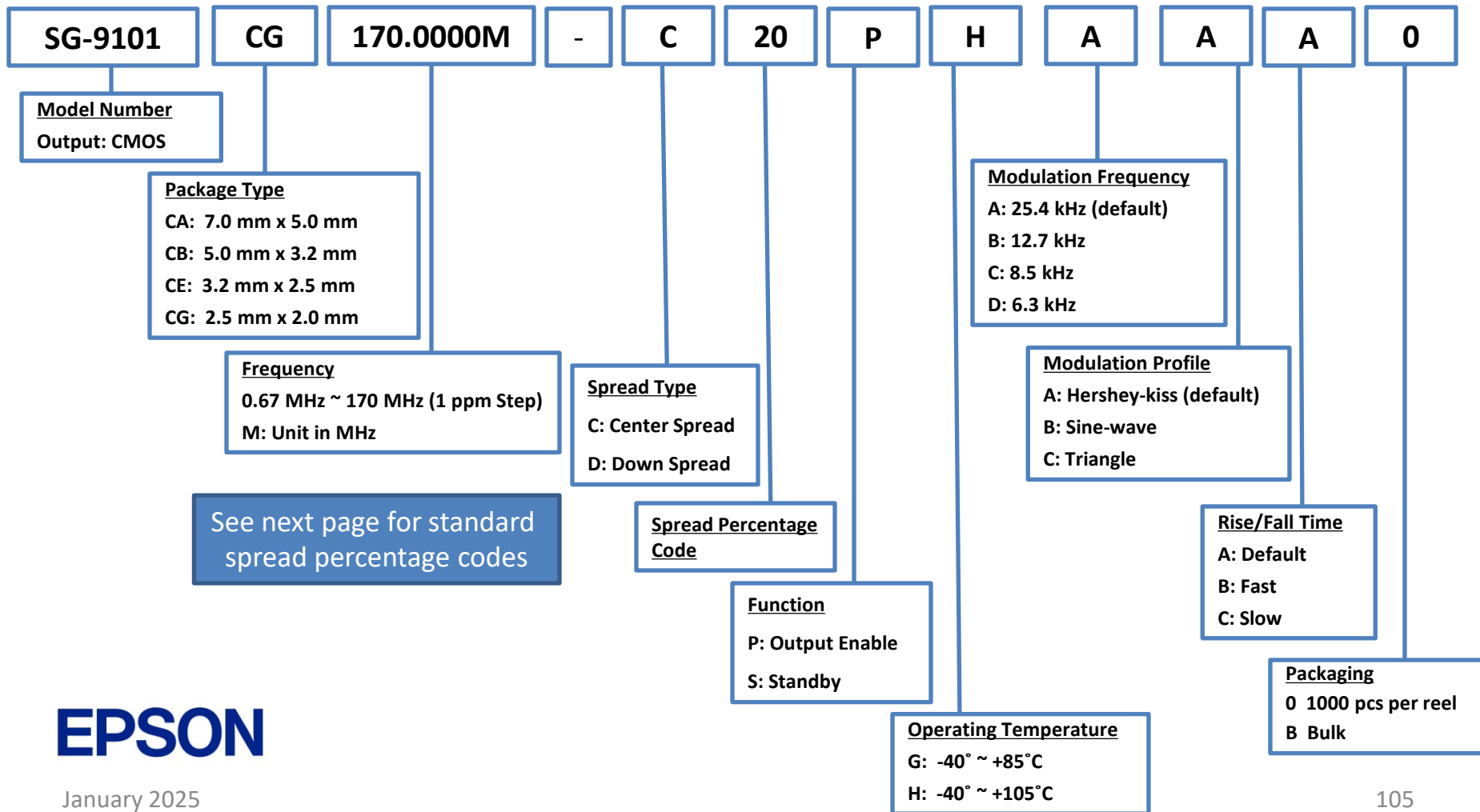
SG-9001

| Center Spread | | Down Spread | |
|----------------------------|---------------|----------------------------|---------------|
| Product Configuration Code | Spread Rate % | Product Configuration Code | Spread Rate % |
| C02 | +/- 0.25 | D05 | - 0.5 |
| C05 | +/- 0.5 | D10 | - 1.0 |
| C07 | +/- 0.75 | D15 | - 1.5 |
| C10 | +/- 1.0 | D20 | - 2.0 |
| C15 | +/- 1.5 | D30 | - 3.0 |
| C20 | +/- 2.0 | D40 | - 4.0 |

Product Configuration System



Crystal Oscillator (SPXO) – Programmable, Spread Spectrum



Spread Rate Options

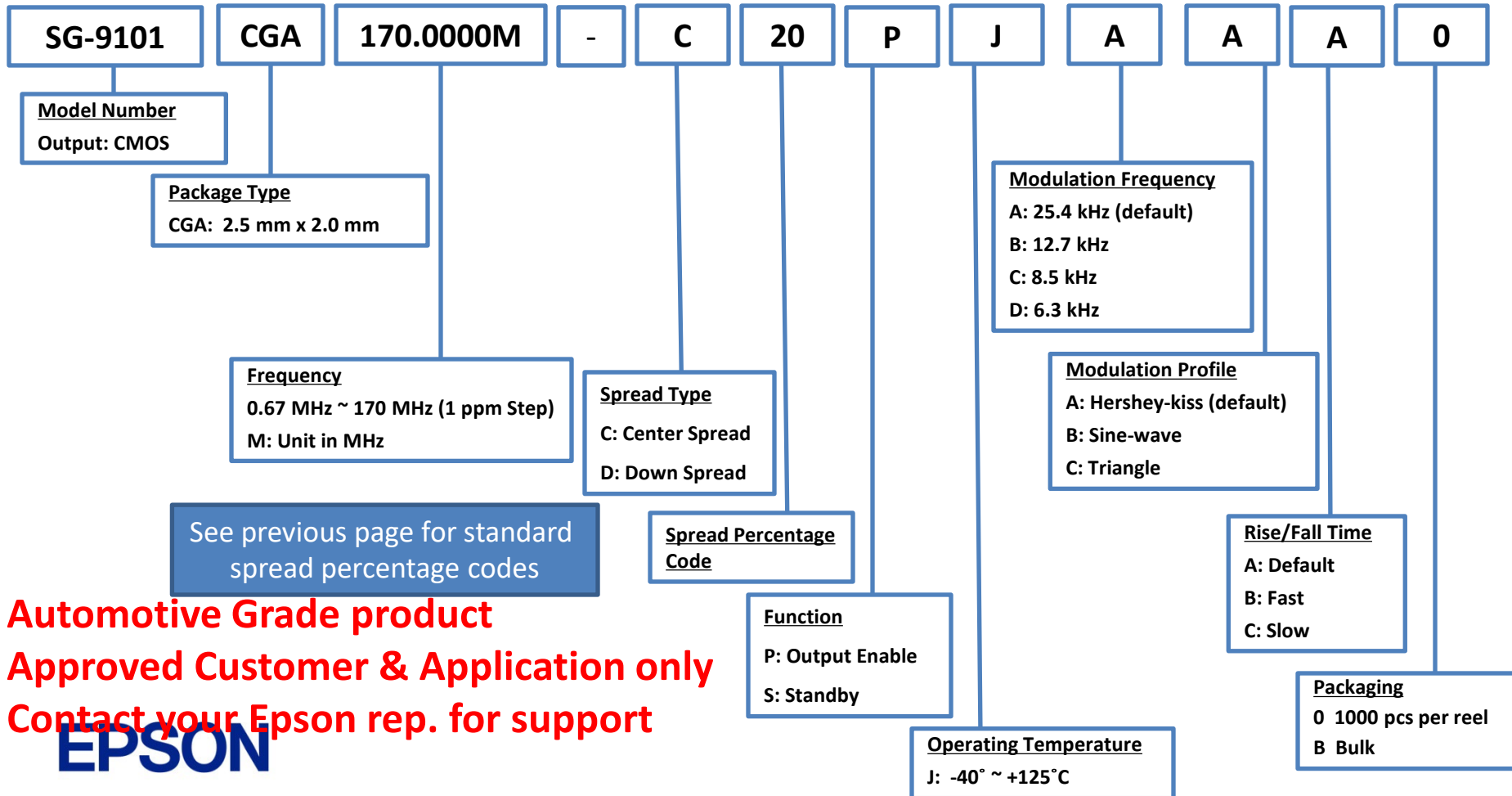
SG-9101

| Center Spread | | Down Spread | |
|----------------------------|---------------|----------------------------|---------------|
| Product Configuration Code | Spread Rate % | Product Configuration Code | Spread Rate % |
| C02 | +/- 0.25 | D05 | - 0.5 |
| C05 | +/- 0.5 | D10 | - 1.0 |
| C07 | +/- 0.75 | D15 | - 1.5 |
| C10 | +/- 1.0 | D20 | - 2.0 |
| C15 | +/- 1.5 | D30 | - 3.0 |
| C20 | +/- 2.0 | D40 | - 4.0 |

Product Configuration System



Crystal Oscillator (SPXO) – Programmable, Spread Spectrum, Automotive (AECQ100)



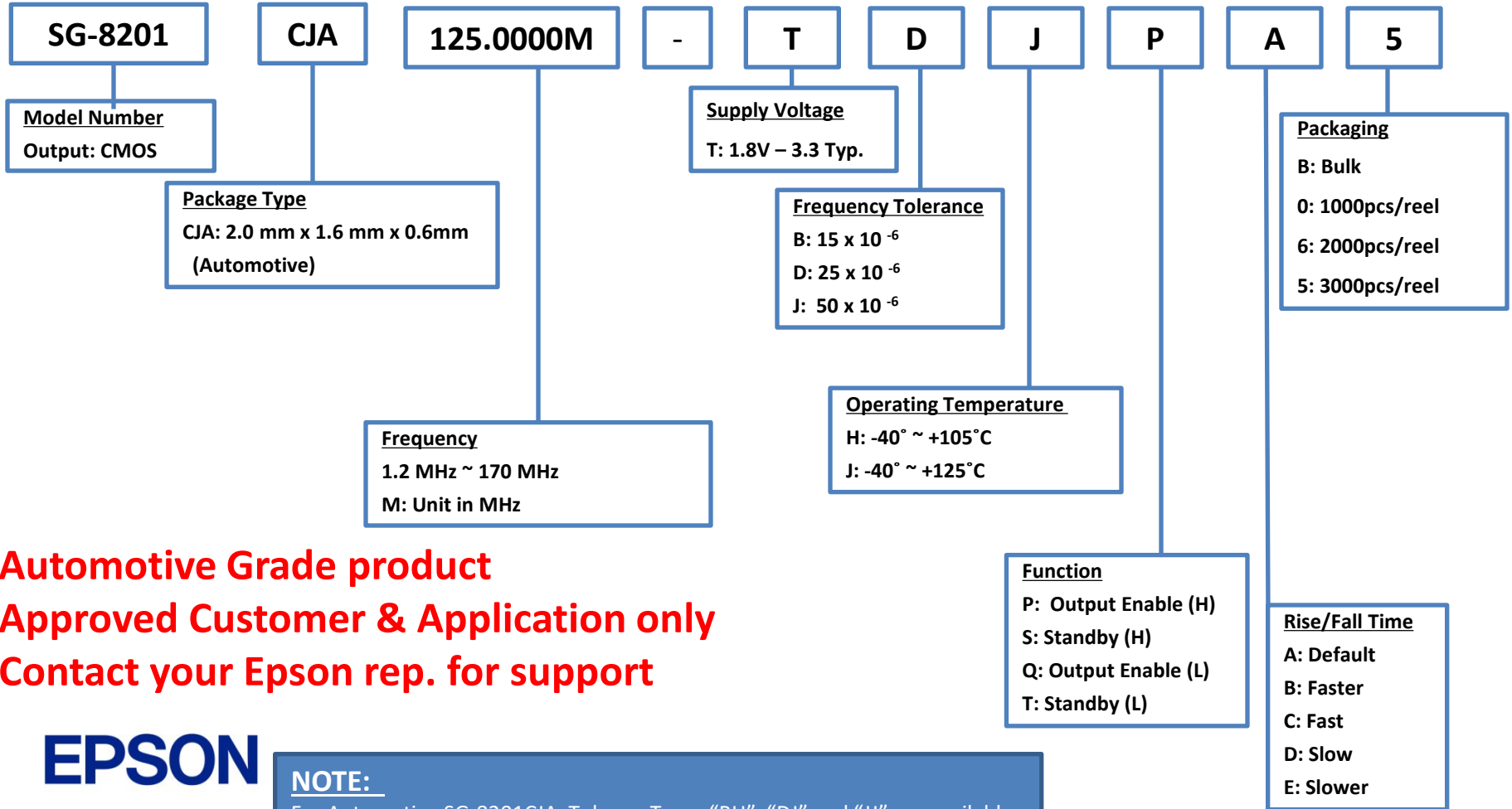
Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support



Product Configuration System



Crystal Oscillator (SPXO) – Programmable, Low Jitter, Automotive (AEC-Q100)



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support



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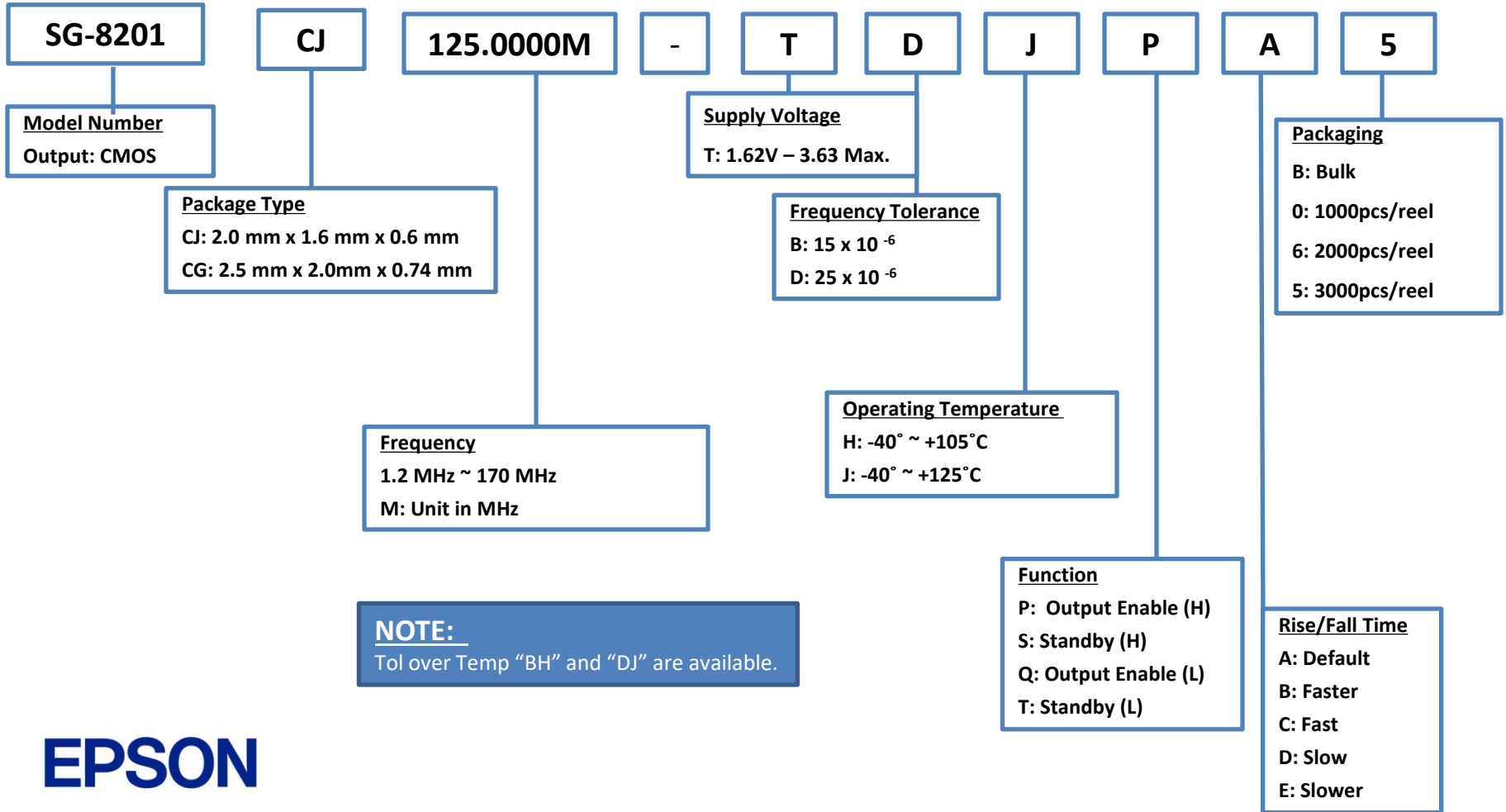
NOTE:

For Automotive SG-8201CJA, Tol over Temp “BH”, “DJ” and “JJ” are available. See previous slide for other possible combination.

Product Configuration System



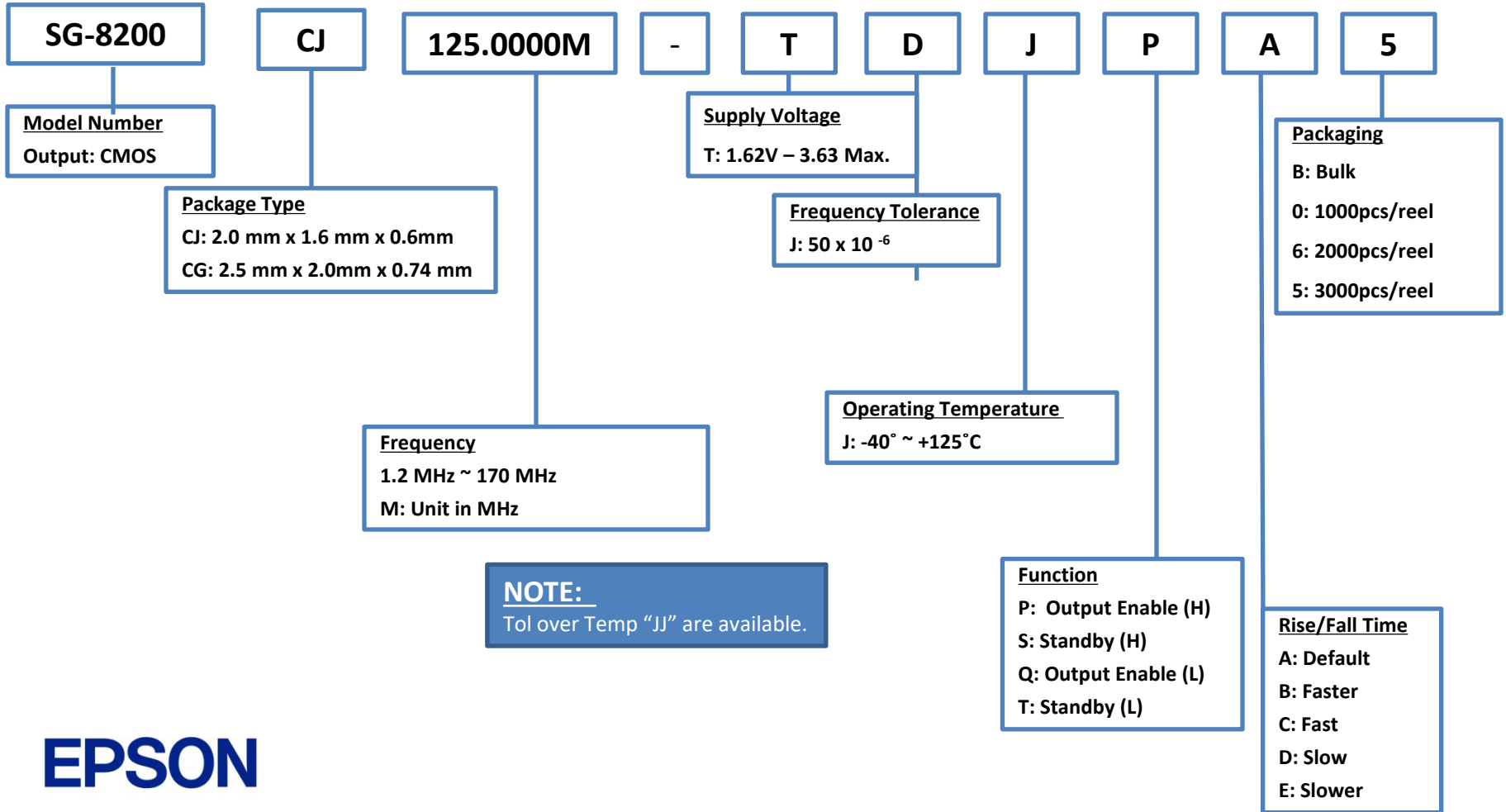
Crystal Oscillator (SPXO) – Programmable & Low Jitter



Product Configuration System

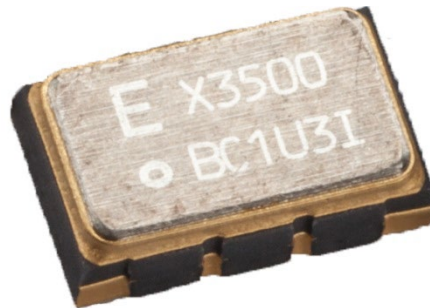


Crystal Oscillator (SPXO) – Programmable & Low Jitter



Product Configuration Guide

Temperature Compensated Crystal Oscillators (TCXO)



Product Configuration System



32.7680kHz TCXO

TG-3541CE

| Base Model | Pkg. |
|-----------------------------------|--------------------|
| TG-3541CE | 3.2 x 2.5 x 1.0 mm |
| TG-3541CEA* *Automotive | 10 PIN Ceramic |

32.7680K

Frequency
32.7680kHz Only

XA

Frequency Temp Char

XA=

+/-1.9PPM 0°C to 50°C
+/-3.4PPM -40°C to 85°C
+/-8.0ppm 85°C to 105°C

XB=

+/-3.8PPM 0°C to 50°C
+/-5.0PPM -40°C to 85°C
+/-8.0ppm 85°C to 105°C

0

Tape & Reel Qty

B: Bulk

0: 1000pcs/reel

6: 2000pcs/reel

***Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support**

EPSON

January 2025

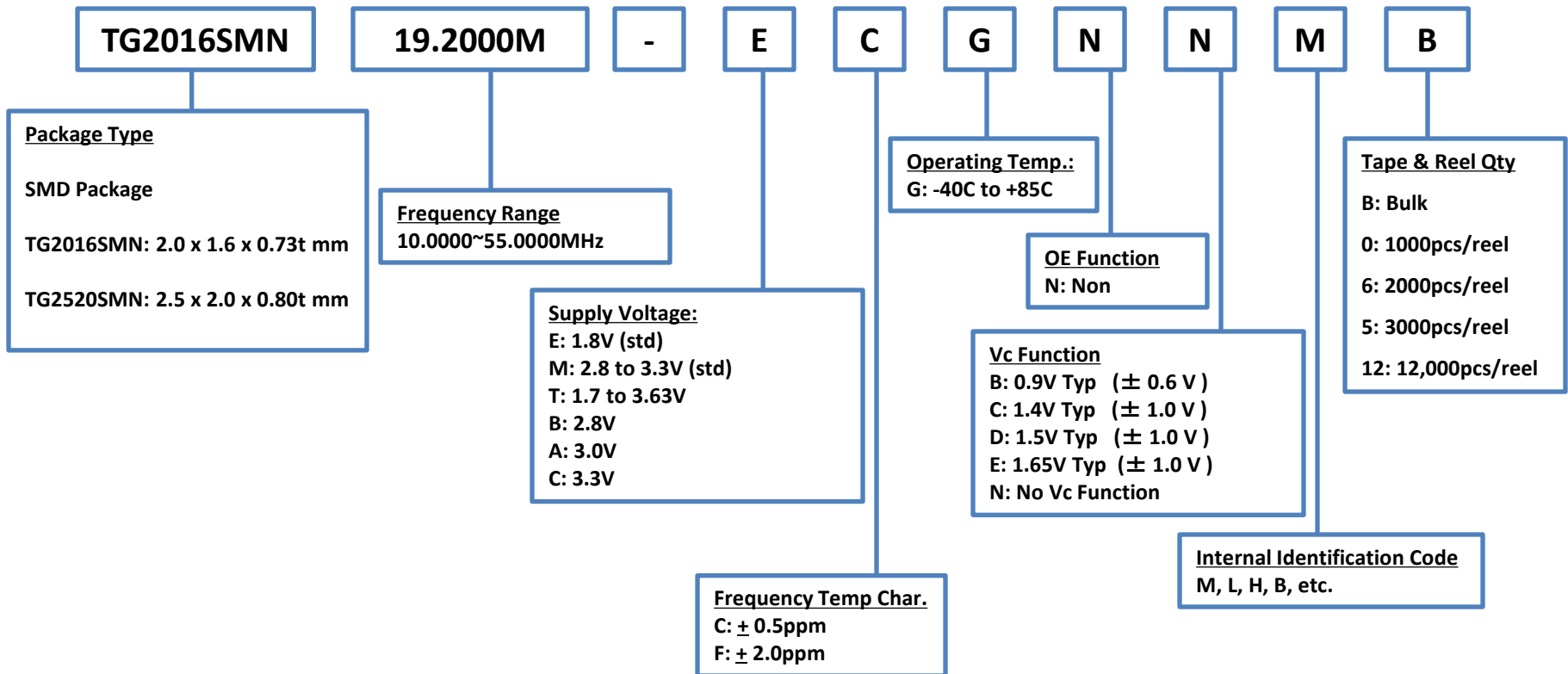
NOTE:

Please contact Epson for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO High Stability



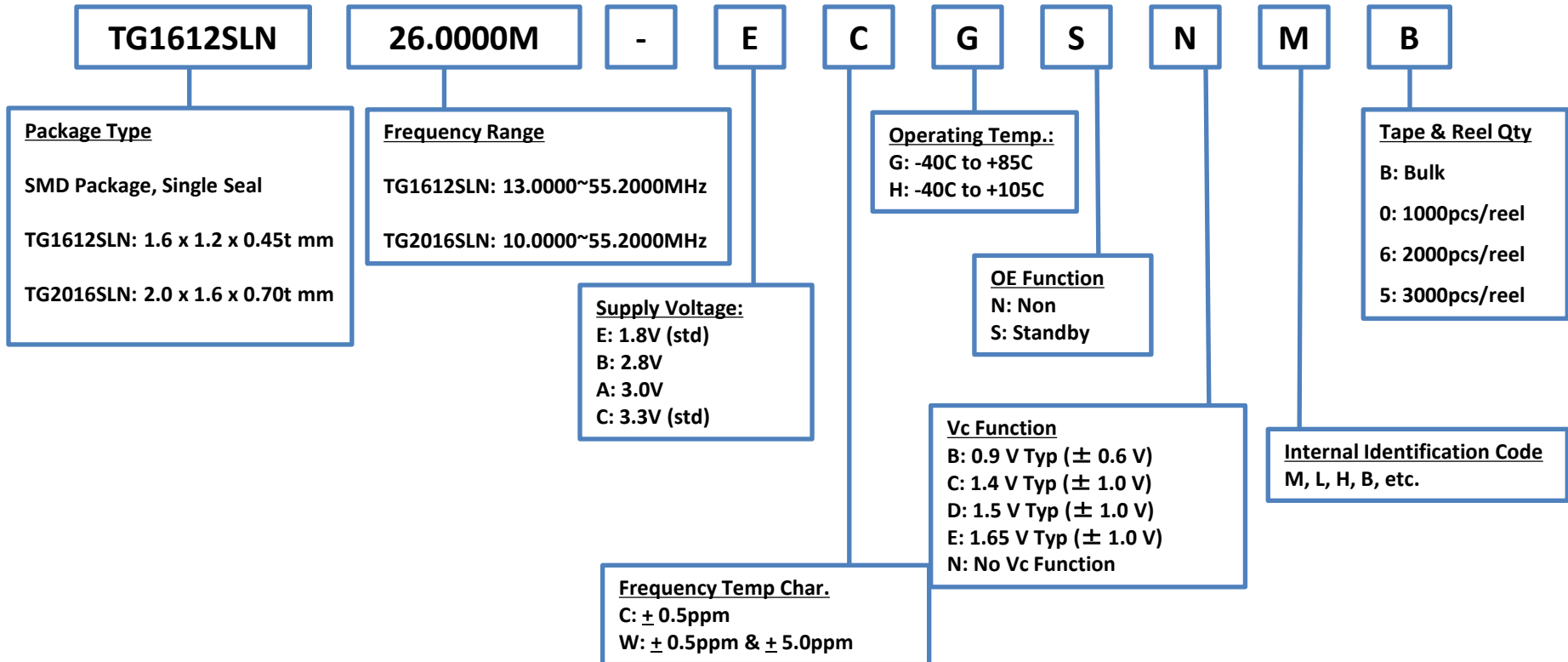
NOTE:

Please contact us for requirements not listed in this specification. Not all combination are possible.

Product Configuration System



TCXO/VC-TCXO High Stability



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January 2025

NOTE:

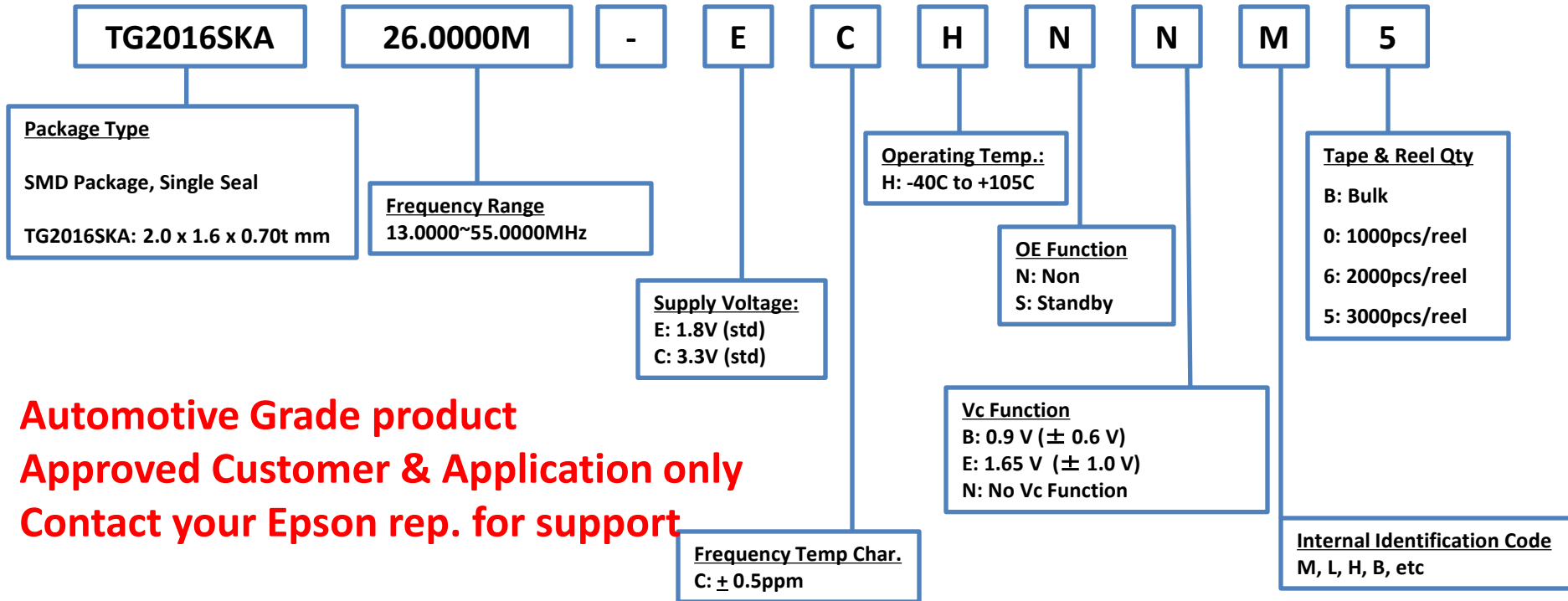
Stability "CG" (+/-0.5ppm -40/85C) , "WH" (+/- 0.5 & +/-5.0ppm -40/105C) are available.
For stability +/-0.5ppm -40/105C, please see TG2016SKA with stability "CH"

Please contact us for requirements not listed in this specification. Not all combination are possible.

Product Configuration System



TCXO/VC-TCXO High Stability for Automotive



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support

NOTE:

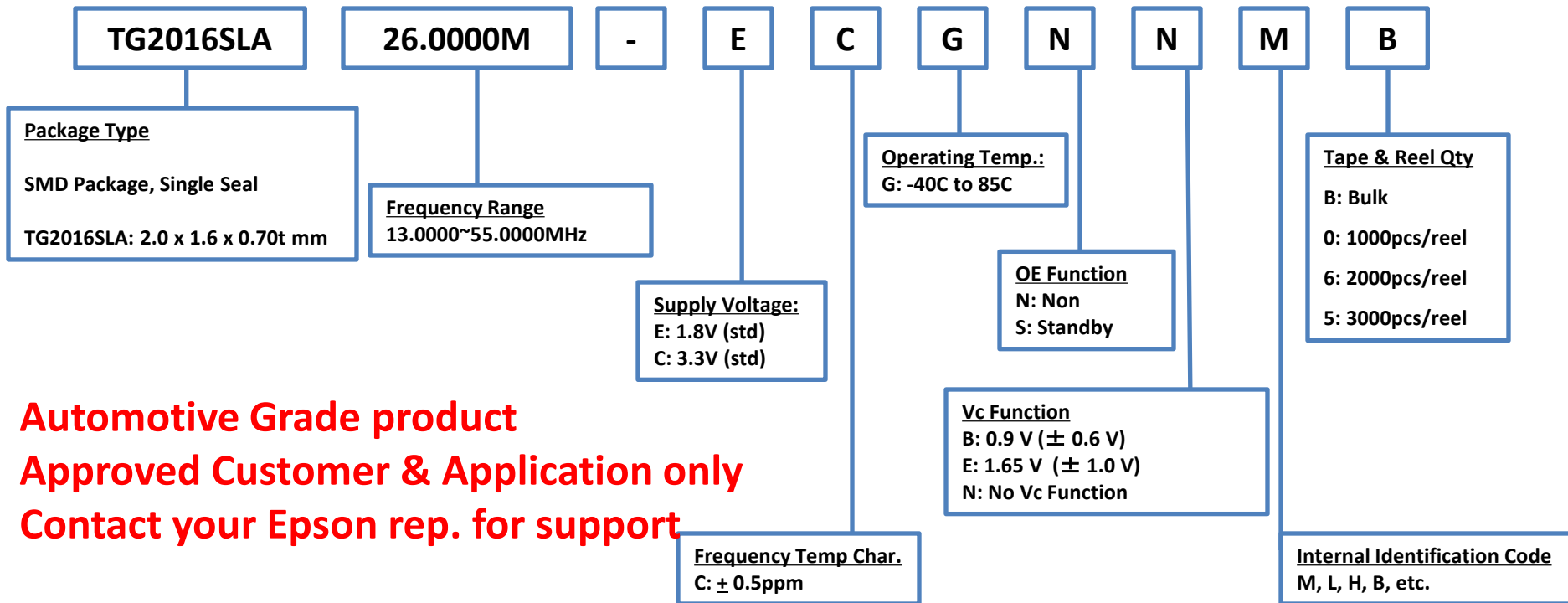
Please contact us for requirements not listed in this specification. Not all combination are possible.



Product Configuration System



TCXO/VC-TCXO High Stability for Automotive



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support



January 2025

NOTE:

Stability "CG" (+/-0.5ppm -40/85C) are available. For stability +/-0.5ppm -40/105C, please see TG2016SKA with stability "CH"

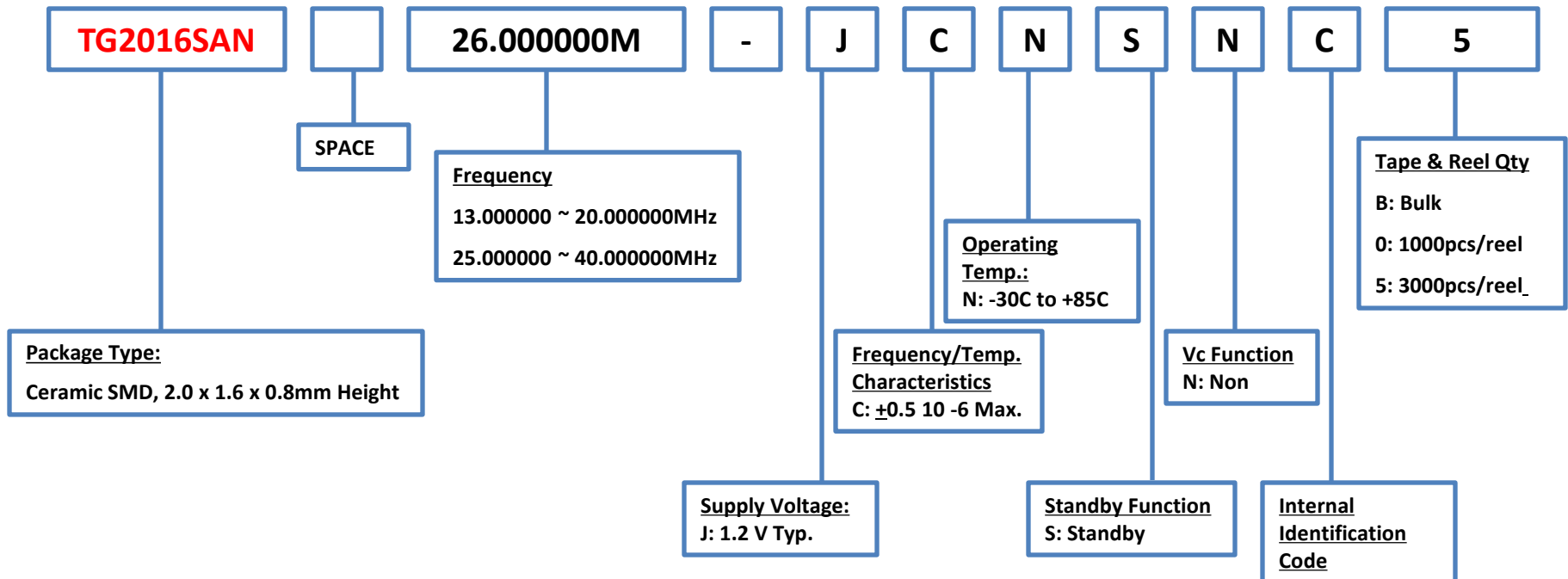
Please contact us for requirements not listed in this specification. Not all combination are possible.

Product Configuration System



TCXO

Discontinued



NOTE:

Please contact us for requirements not listed in this specification.

EPSON

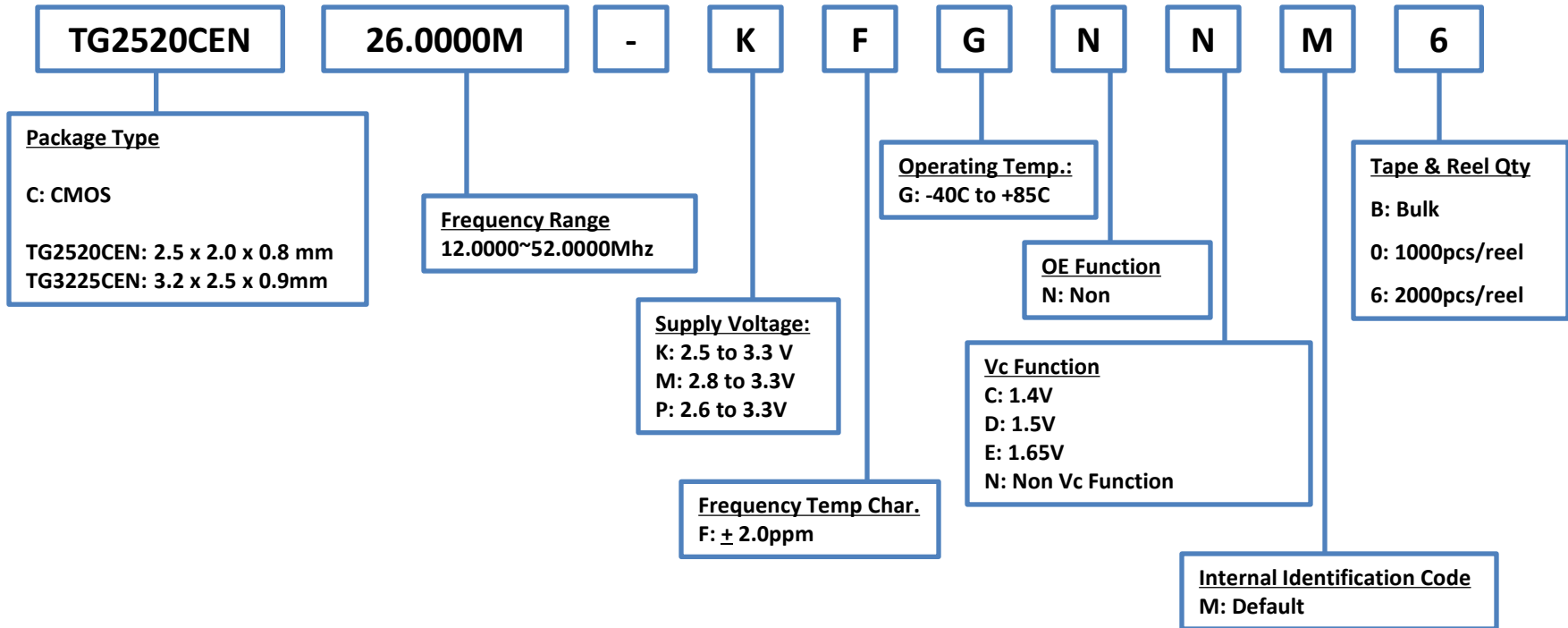
January 2025

117

Product Configuration System



TCXO/VC-TCXO High Stability



NOTE:

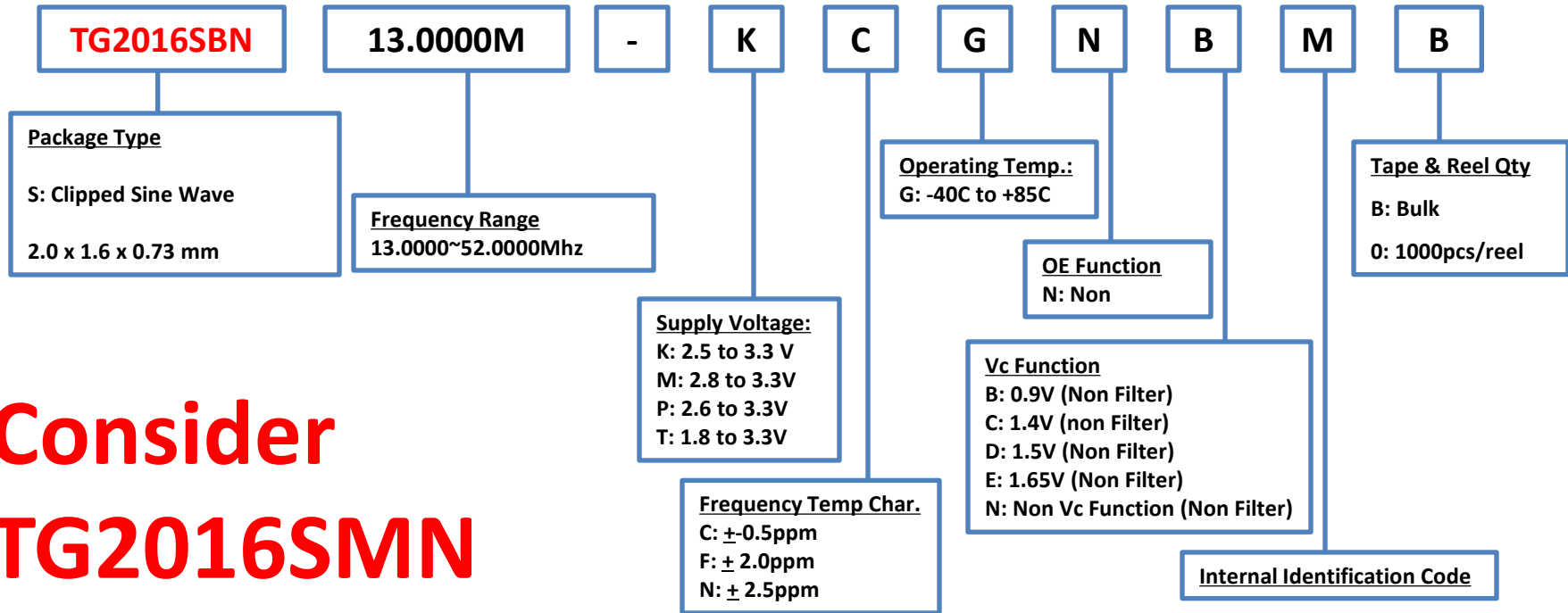
Please contact Epson for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO High Stability

Discontinued



Consider TG2016SMN

NOTE:

Please contact us for requirements not listed in this specification.

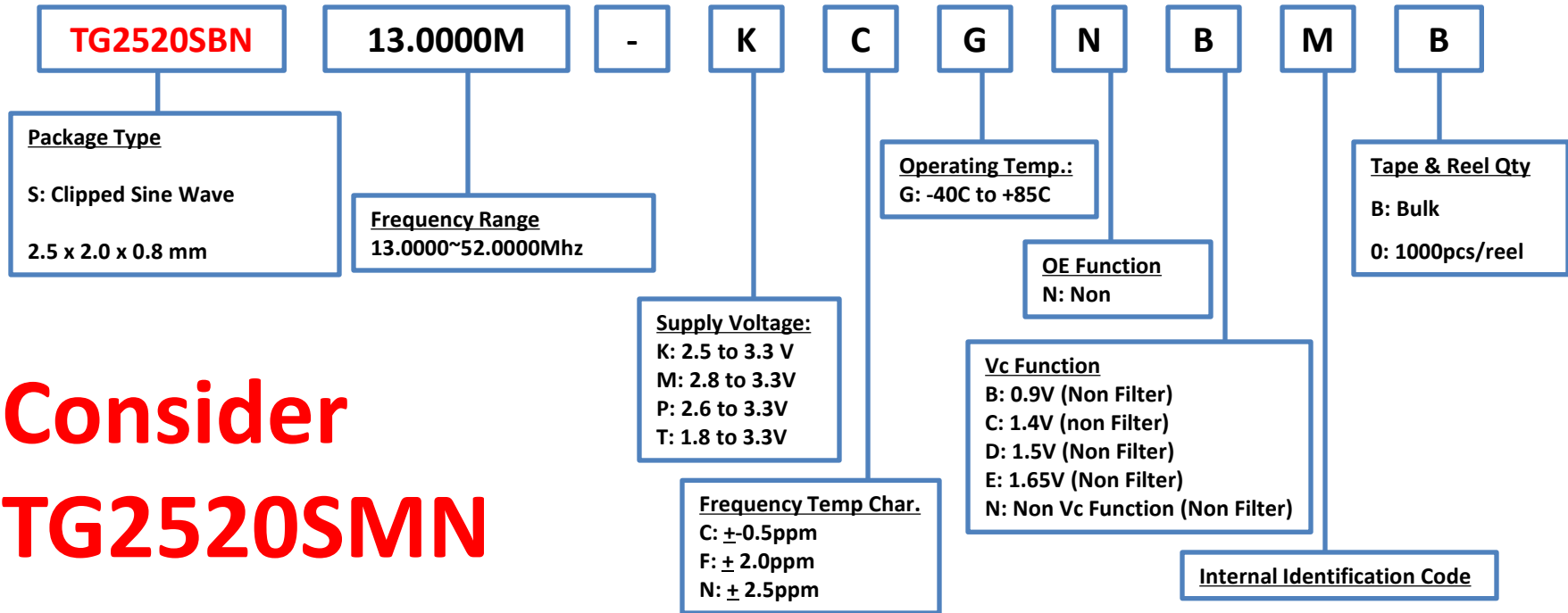


Product Configuration System



TCXO/VC-TCXO High Stability

Discontinued



Consider TG2520SMN

NOTE:

Please contact us for requirements not listed in this specification.



Product Configuration System



TCXO

TG-5006CJ

-

xxx

19.2000M

Package Type:

TG-5006CJ - 2.0 X 1.6 X 0.8 mm
TG-5006CG - 2.5 X 2.0 X 0.9 mm
TG-5006CE - 3.2 X 2.5 X 1.0 mm

TG-5035CJ - 2.0 X 1.6 X 0.8 mm
TG-5035CG - 2.5 X 2.0 X 0.9 mm
TG-5035CE - 3.2 X 2.5 X 1.0 mm

TG-5031CJ - 2.0 X 1.6 X 0.8 mm
TG-5021CG - 2.5 X 2.0 X 0.9 mm
TG-5021CE - 3.2 X 2.5 X 1.0 mm

Specification Code:

Issued by Epson after reviewing customer requirements

Frequency

TG-5006CJ/CG/CE: 13 ~ 52MHz
STD Freqs: 16.367667, 16.368, 16.369, 19.2, 26, 38.4MHz

TG-5035CE: 10 ~ 40 MHz
TG-5035CJ/CG/: 13 ~ 52MHz
STD Freqs: 13, 16.368, 16.369, 19.2, 26, 38.4MHz

TG-5031CJ/TG-5021CG: 13 ~ 52MHz
TG-5021CE: 10 ~ 40MHz
STD Freqs: 13, 19.2, 26, 38.4MHz

EPSON

January 2025

NOTE:

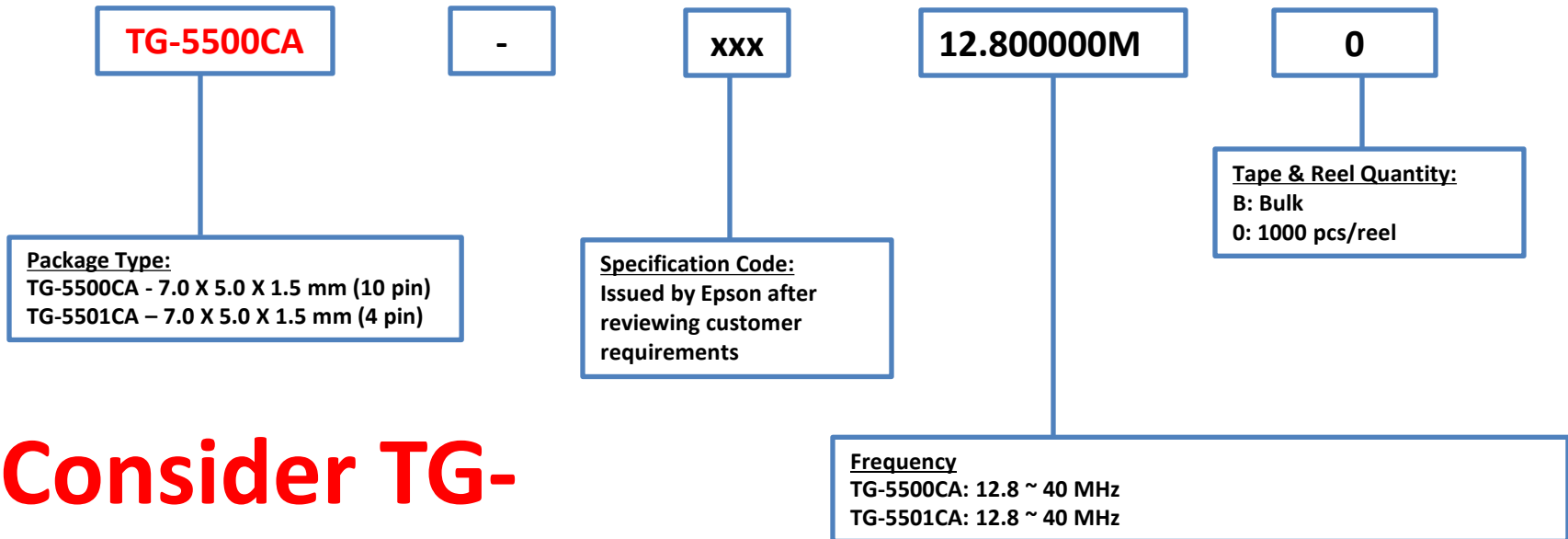
Please contact us for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO
Ultra High Stability

Discontinued



Consider TG-5510CA

January 2025

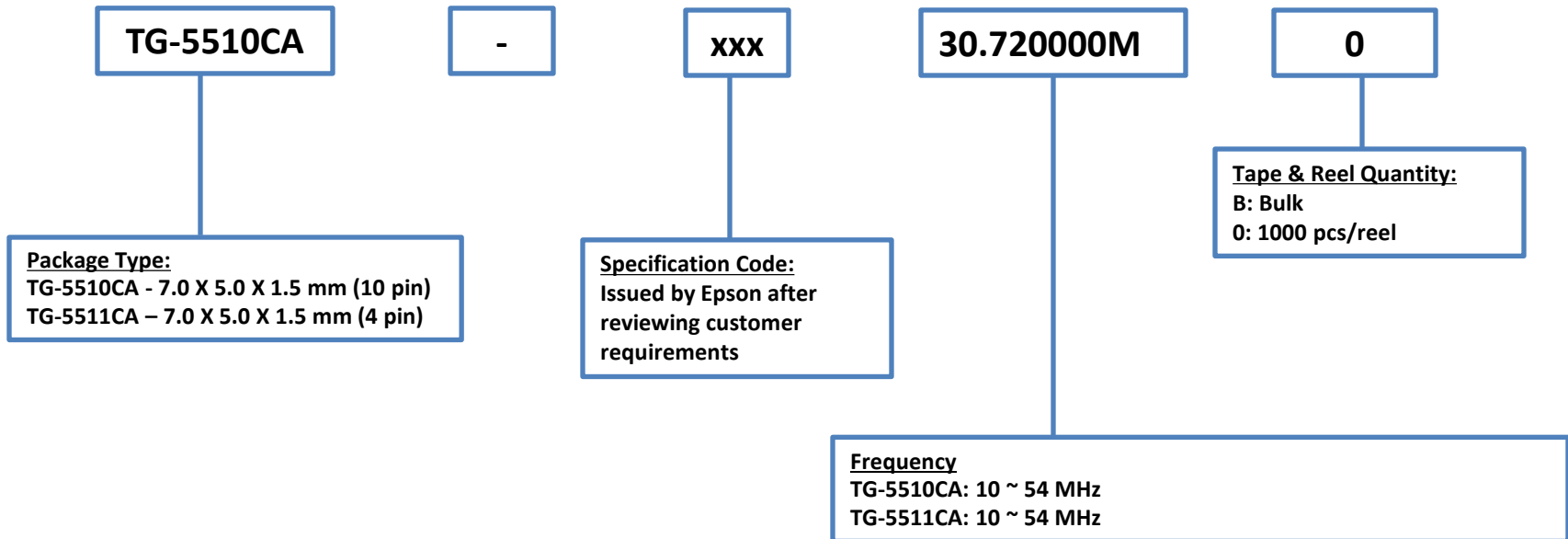
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO Ultra High Stability



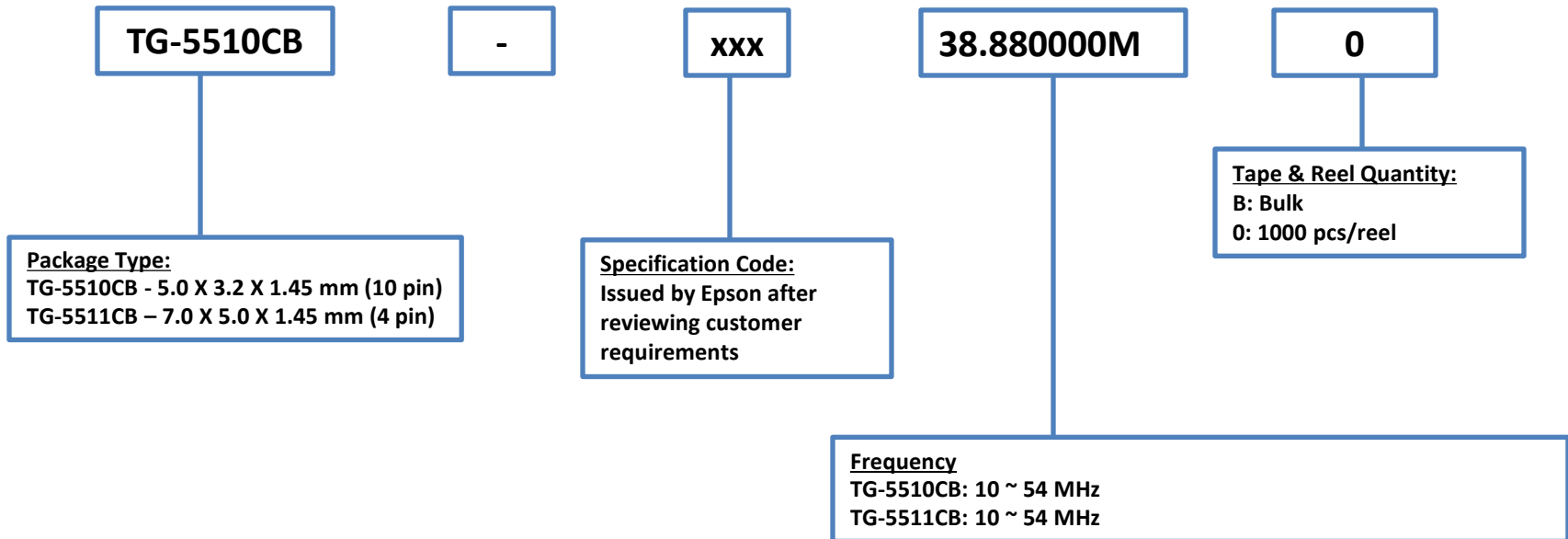
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO Ultra High Stability



NOTE:

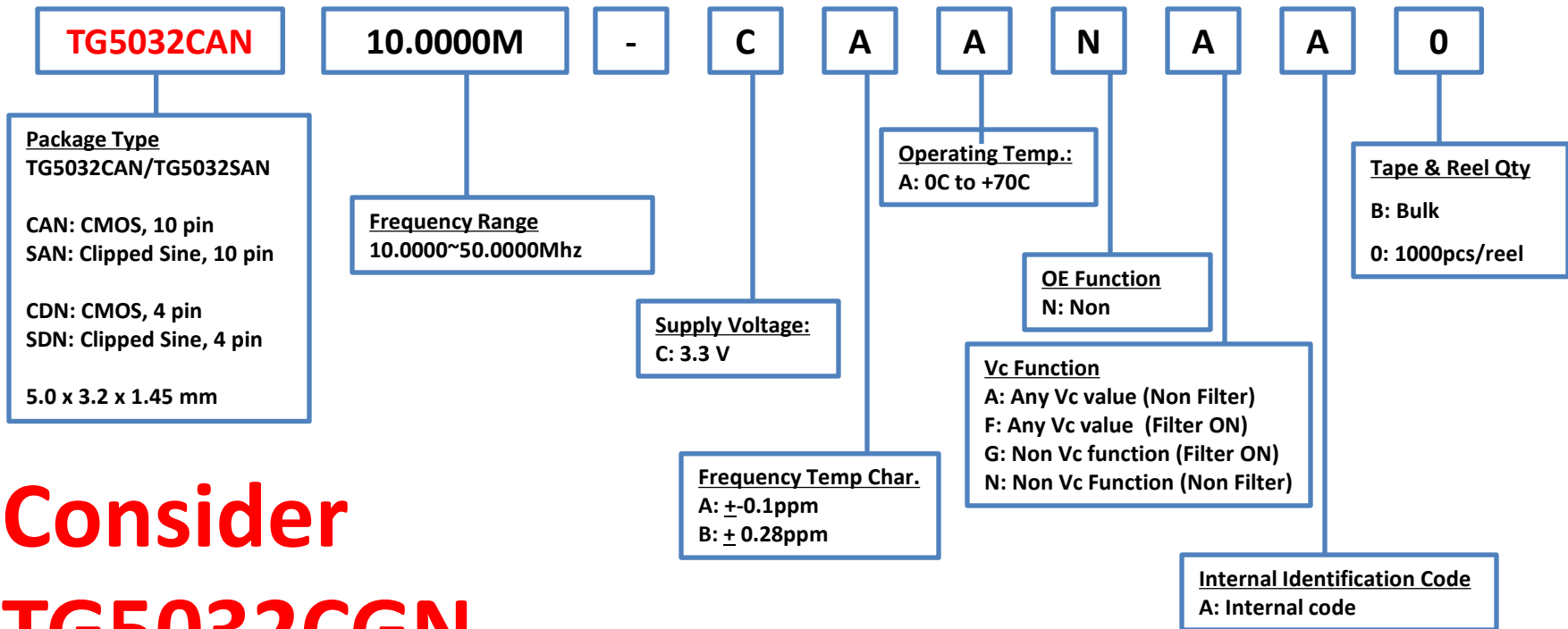
Please contact us for requirements not listed in this specification.

Product Configuration System



TCXO/VC-TCXO Ultra High Stability

Discontinued



Consider TG5032CGN

EPSON

January 2025

NOTE:

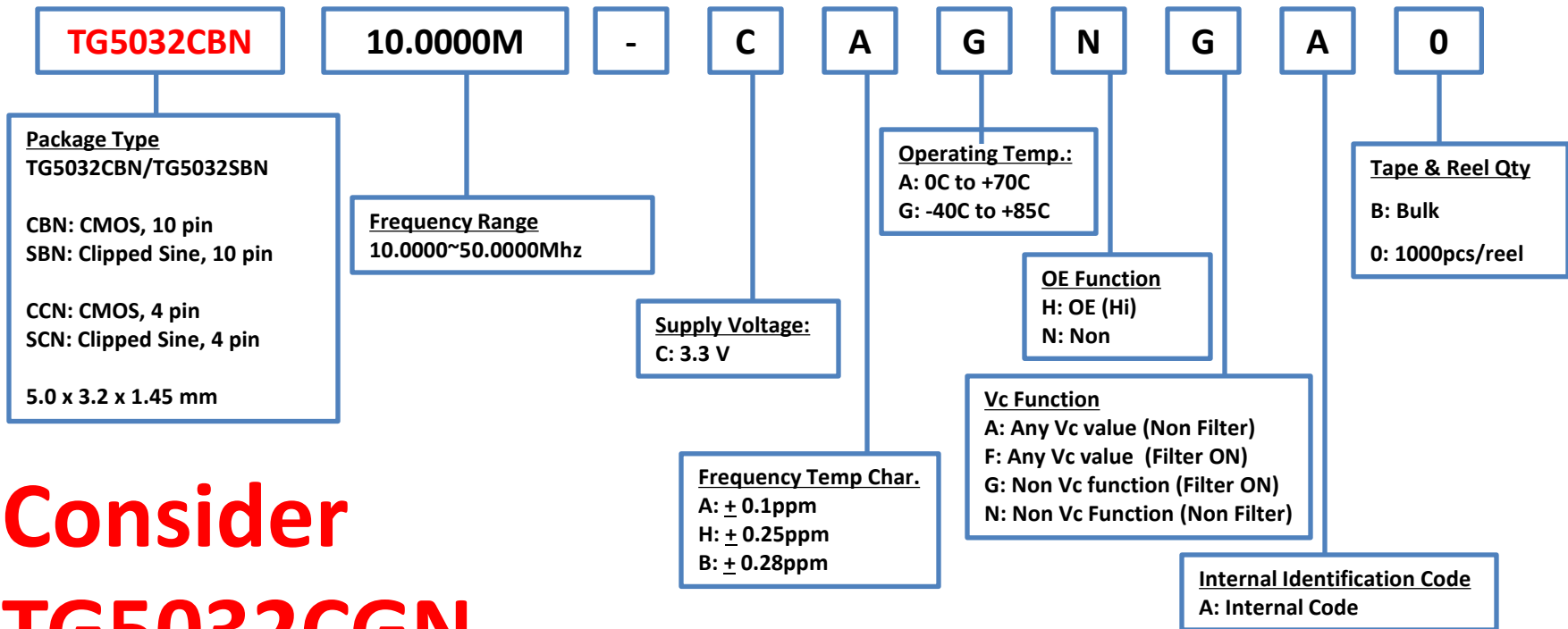
Please contact us for requirements not listed in this specification. 125

Product Configuration System



TCXO/VC-TCXO Ultra High Stability

Discontinued



Consider TG5032CGN

EPSON

January 2025

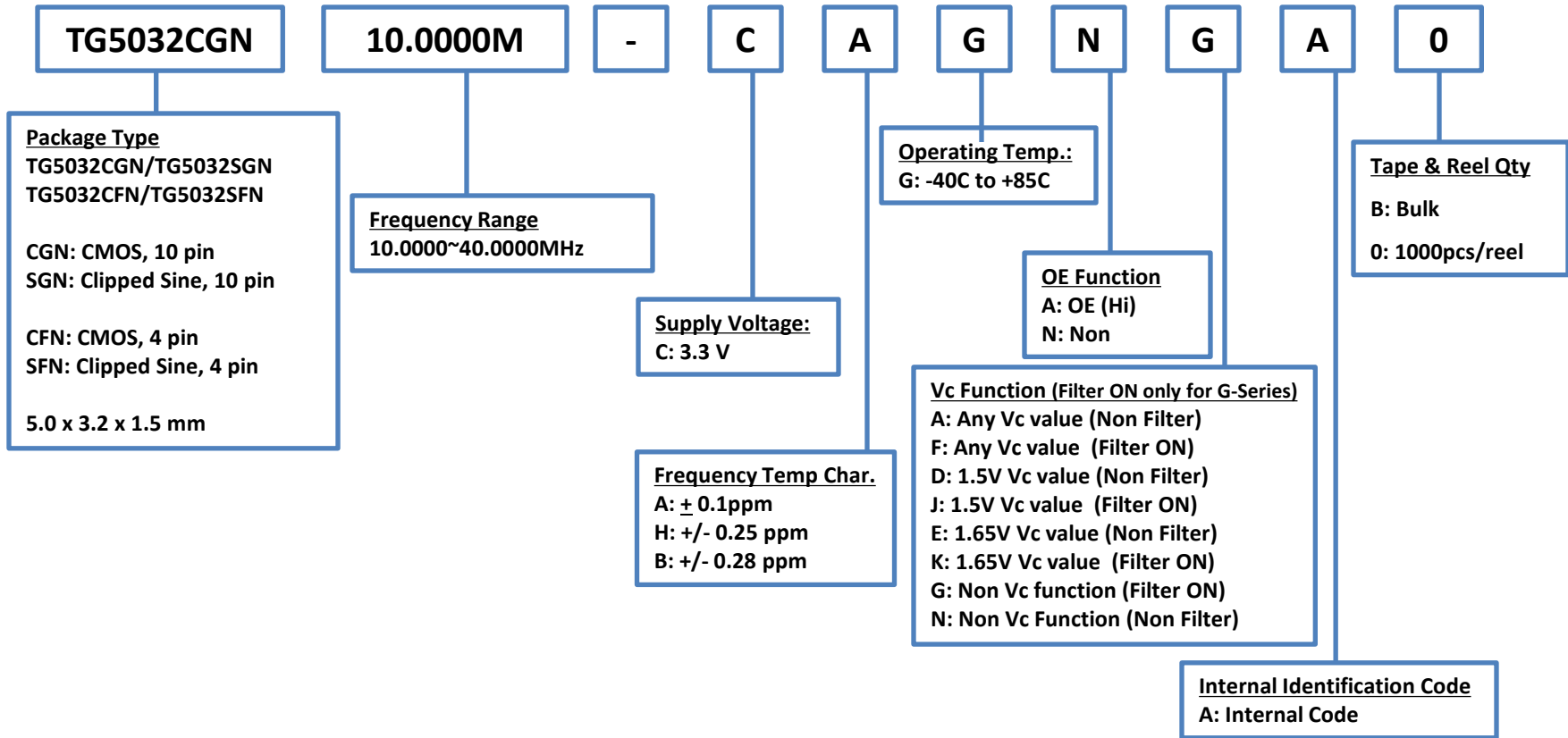
NOTE:

Please contact us for requirements not listed in this specification. 126

Product Configuration System



TCXO/VC-TCXO Ultra High Stability



January 2025

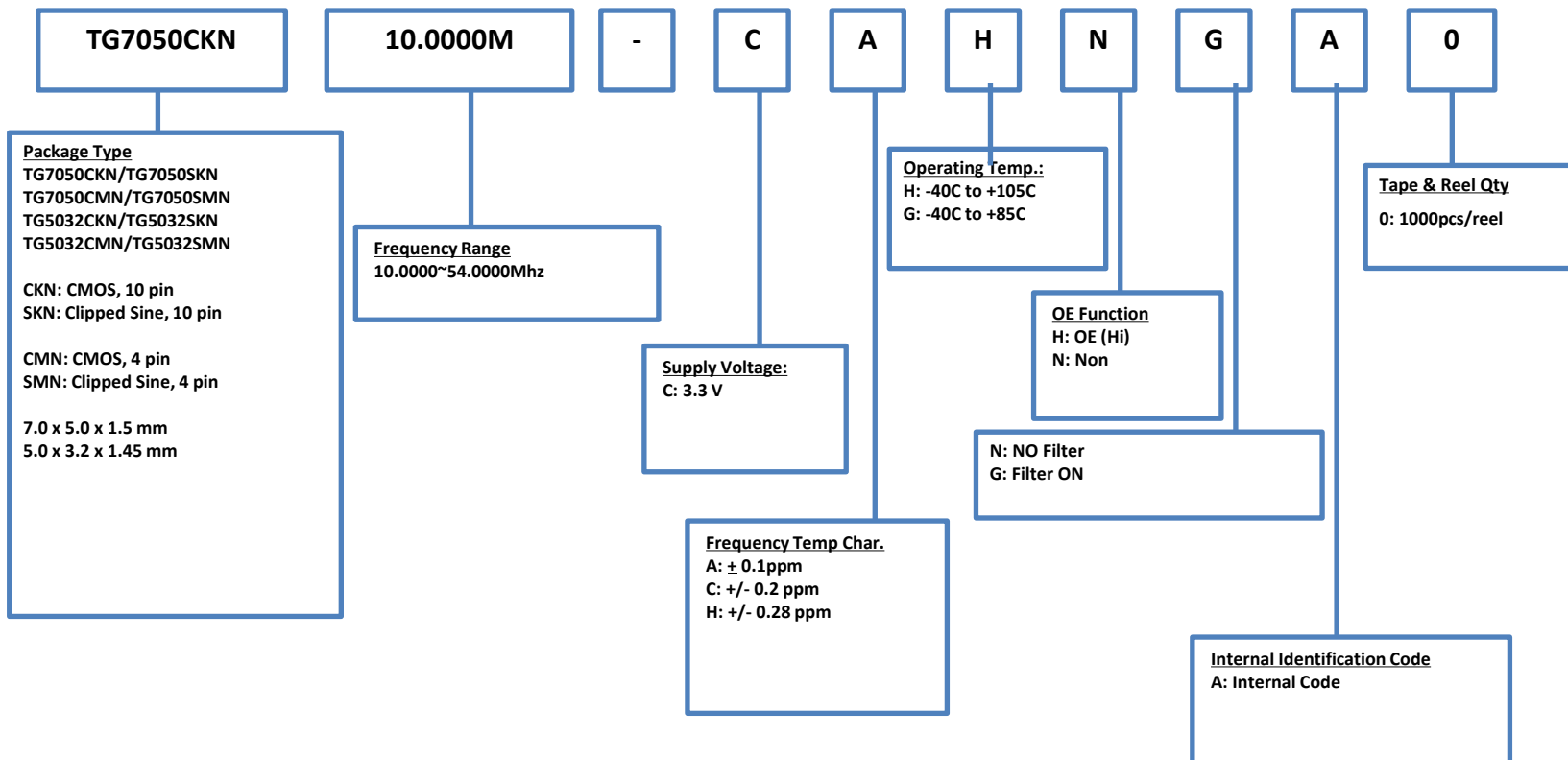
NOTE:

Please contact us for requirements not listed in this specification. 127

Product Configuration System



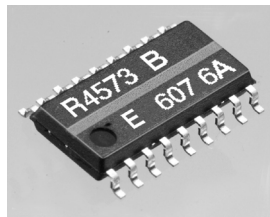
TCXO/VC-TCXO Ultra High Stability



NOTE:
 Please contact us for requirements not listed in this specification.

Product Configuration Guide

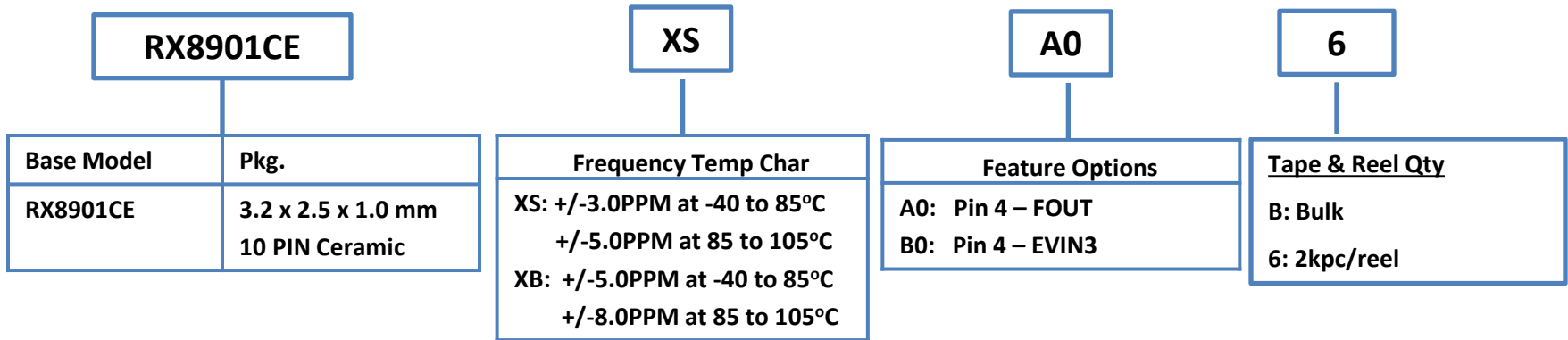
Real-Time Clocks (RTC)



Product Configuration System



Real Time Clock Modules – I²C-Bus



Examples:
 RX8901CE XB A06
 RX8901CE XS B06

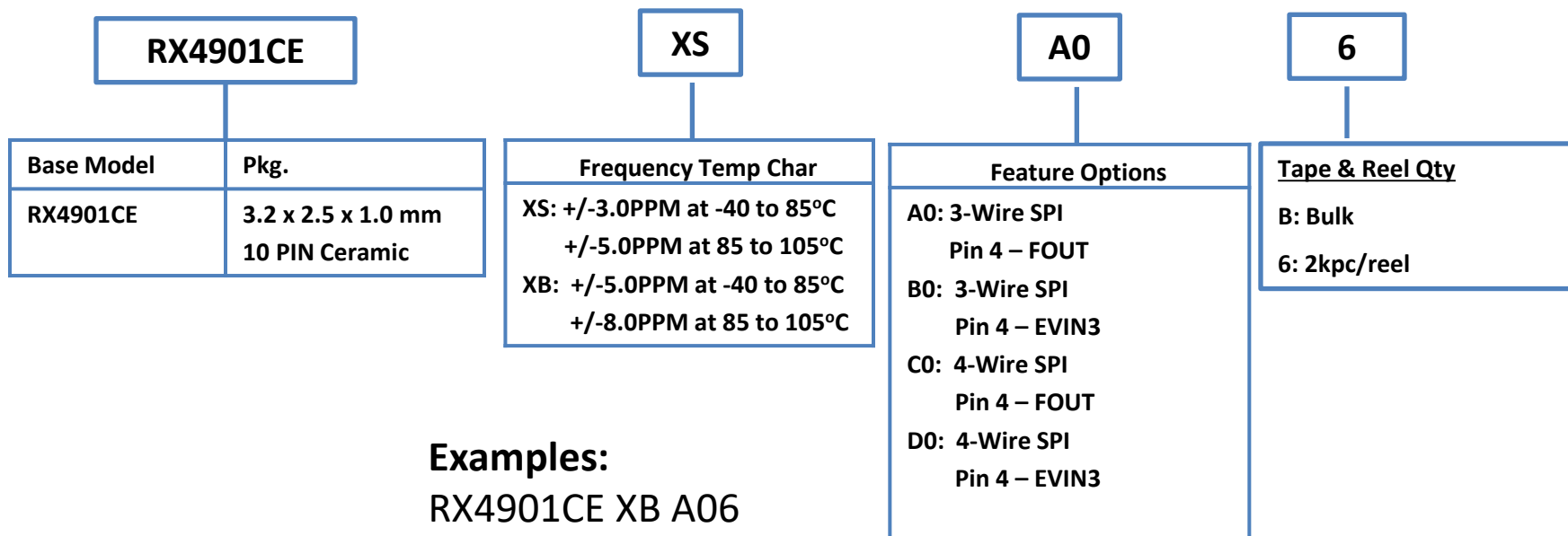
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



Real Time Clock Modules – SPI-Bus



Examples:
 RX4901CE XB A06
 RX4901CE XS B06

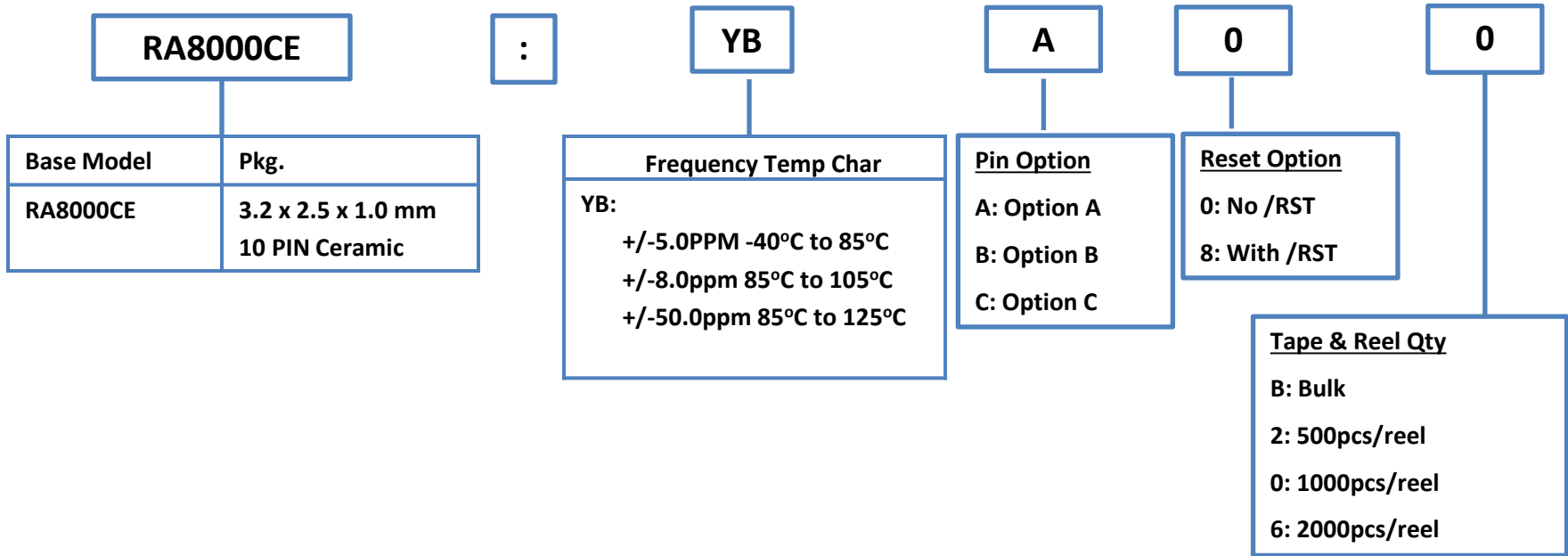
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



Real Time Clock Modules – I²C-Bus, Automotive (AEC-Q100)



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support



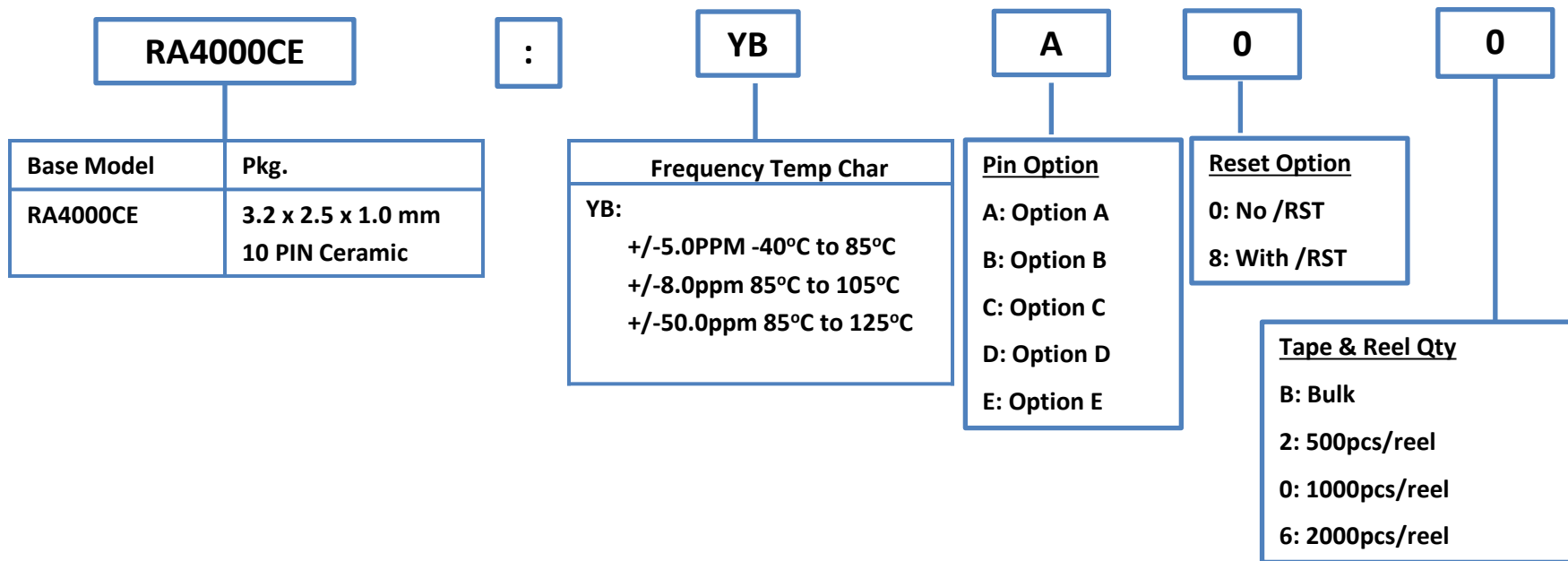
NOTE:

Please contact us for requirements not listed in this specification. Refer to DS for Pin and Reset options

Product Configuration System



Real Time Clock Modules – SPI-Bus, Automotive (AEC-Q100)



**Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support**



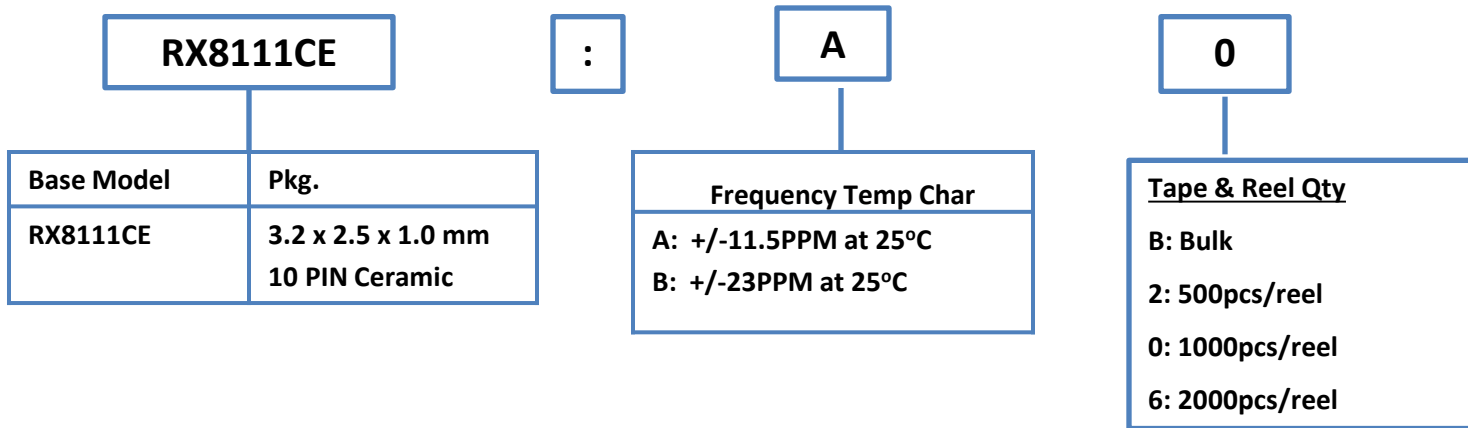
NOTE:

Please contact us for requirements not listed in this specification. Refer to DS for Pin and Reset options

Product Configuration System



Real Time Clock Modules – I²C-Bus



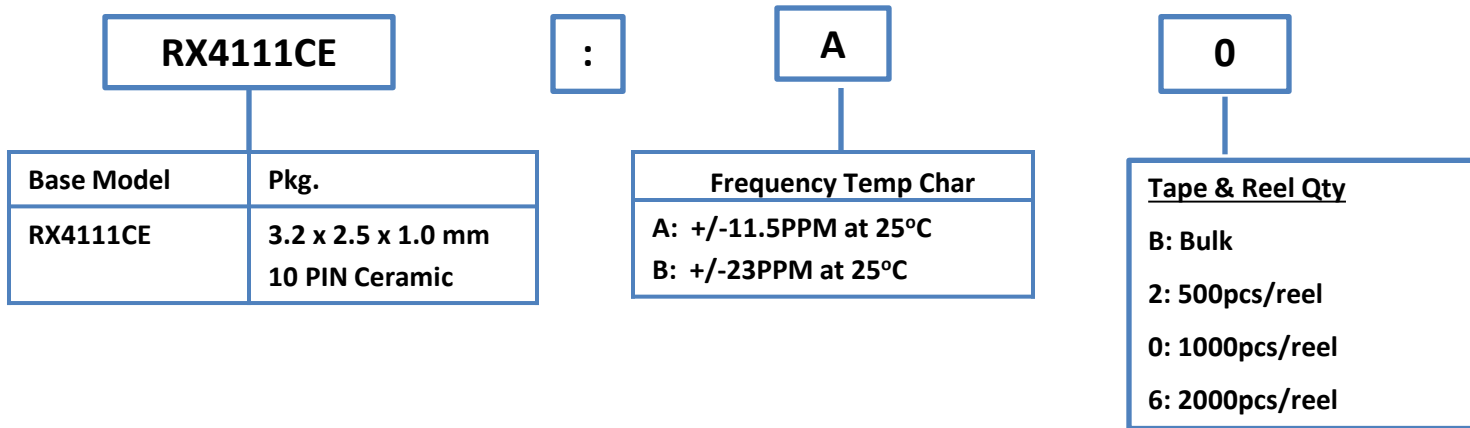
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



Real Time Clock Modules – SPI



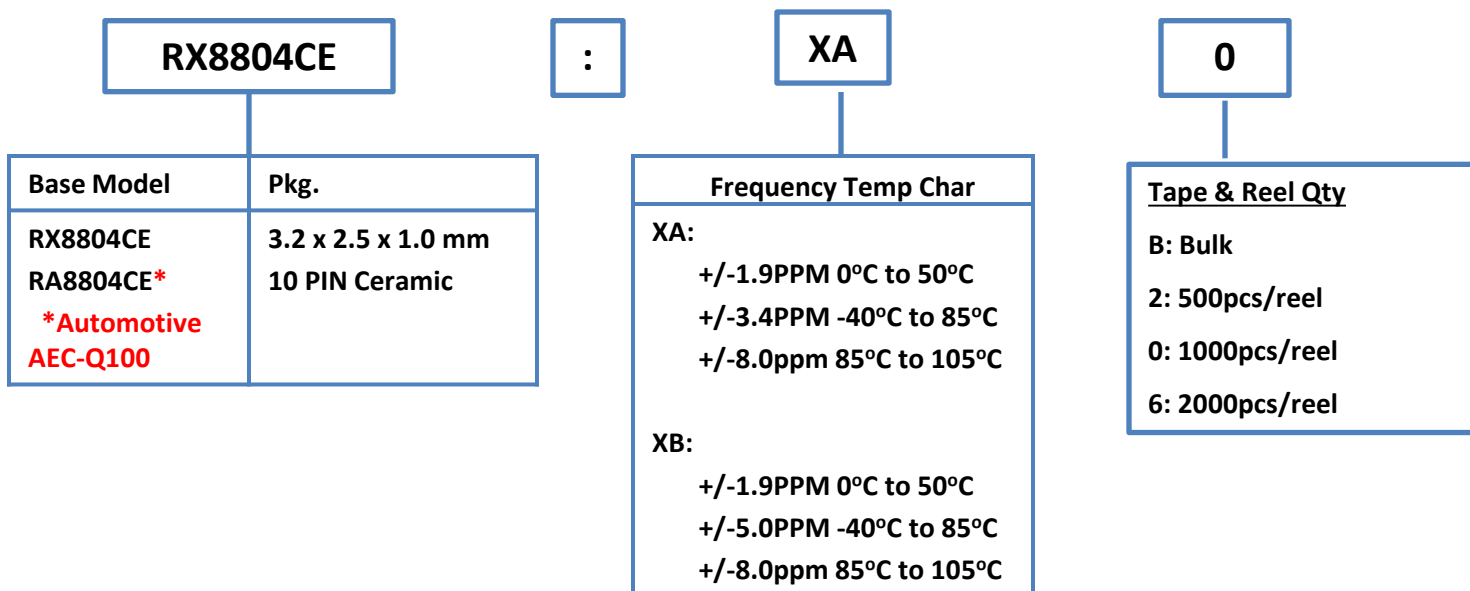
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



Real Time Clock Modules – I²C-Bus



***Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support**



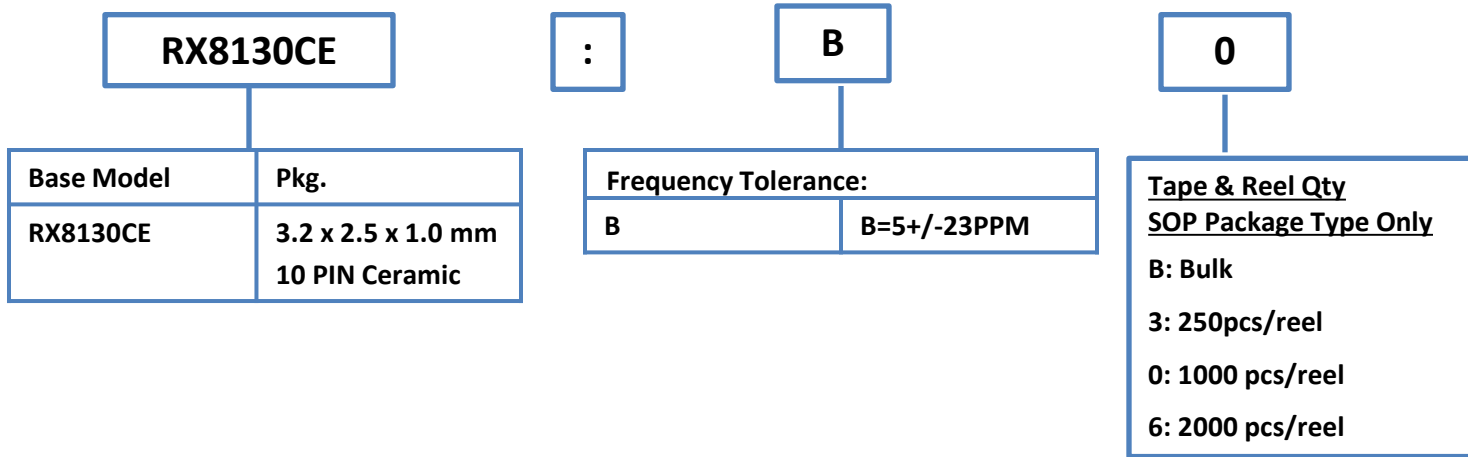
NOTE:

Please contact us for requirements not listed in this specification.

Product Configuration System



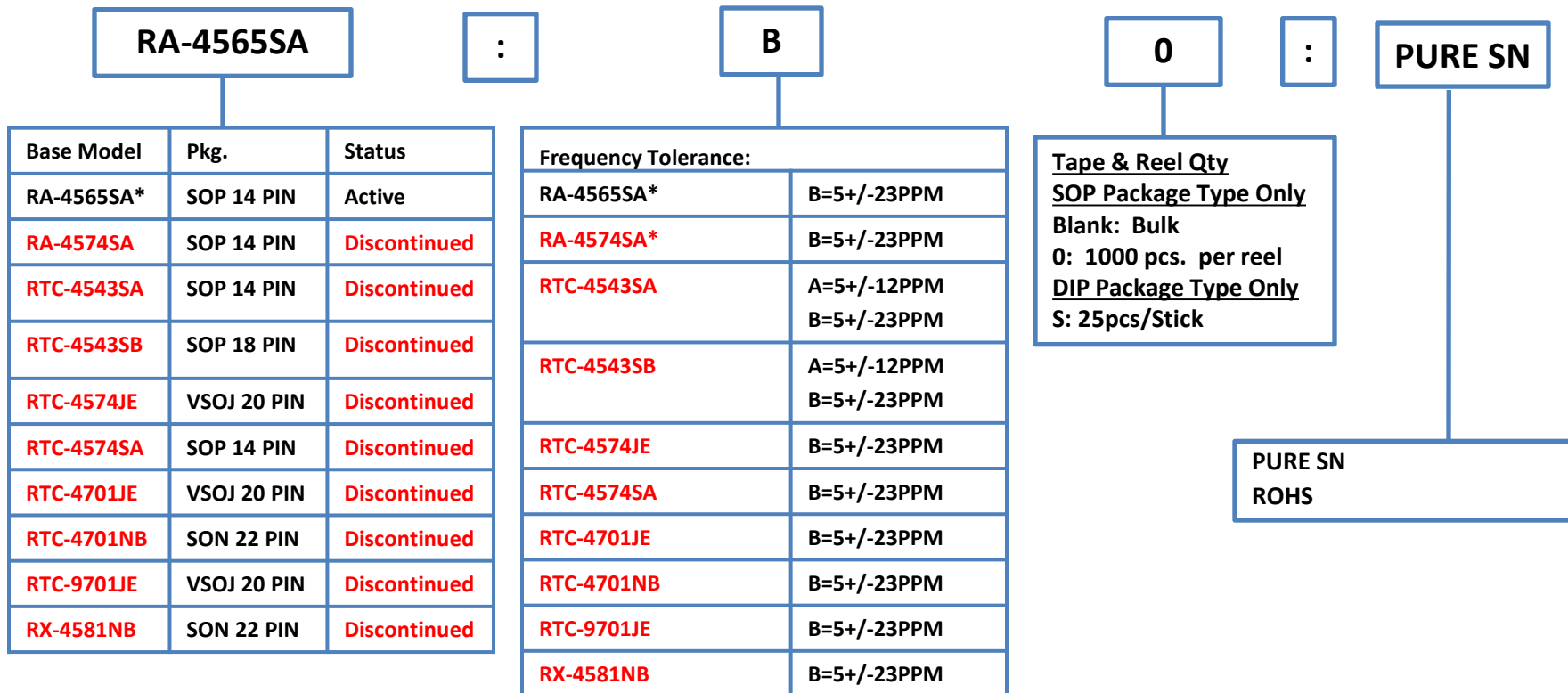
Real Time Clock Modules – I²C-Bus



Product Configuration System



Real Time Clock Modules – Serial (3 Wire & 4 Wire)



Automotive Grade product
Approved Customer & Application only
Contact your Epson rep. for support



Note:
 SA packages in "PURE SN" is **DISCONTINUED** but "RoHS " is ACTIVE.
 Model P/N in RED font = **DISCONTINUED**
 *Automotive AEC-Q200

Product Configuration System



Real Time Clock Modules – Serial (3 Wire & 4 Wire)

RX-4571SA

:

B

0

:

PURE SN

| Base Model | Pkg. | Status |
|-------------------|-------------|---------------------|
| RTC-4574NB | SON 22 PIN | Discontinued |
| RX-4045NB | SON 22 PIN | Active |
| RX-4045SA | SOP 14 PIN | Active |
| RX-4574LC | VSOJ 12 PIN | Discontinued |
| RX-4575LC | VSOJ 12 PIN | Discontinued |
| RX-4571LC | VSOJ 12 PIN | Active |
| RX-4571NB | SON 22 PIN | Active |
| RX-4571SA | SOP 14 PIN | Active |
| RX-4801SA | SOP 14 PIN | Discontinued |
| RX-4803SA | SOP 14 PIN | Active |
| RX-4803LC | VSOJ 12 PIN | Active |

| Frequency Tolerance (Ta =+25 °C): | |
|-----------------------------------|--|
| RTC-4574NB | B=5+/-23PPM |
| RX-4045NB, RX-4045SA | AA=5+/-5PPM AC=0+/-5PPM |
| RX-4574LC | B=5+/-23PPM |
| RX-4575LC | B=5+/-23PPM |
| RX-4571LC | B=5+/-23PPM |
| RX-4571NB | B=5+/-23PPM |
| RX-4571SA | B=5+/-23PPM |
| RX-4801SA | Over -40 to +85 °C UB=+/-5PPM |
| RX-4803SA, RX-4803LC | Over -40 to +85 °C UA=+/-3.4PPM UB=+/-5PPM |

Tape & Reel Qty
SOP Package Type Only
 Blank: Bulk
 0: 1000 pcs. per reel
DIP Package Type Only
 S: 25pcs/Stick (EOL)

PURE SN
 Blank : Already RoHS Compliant

Note:
 All LC packages are already RoHS Compliant with "PURE SN".
 LC packages with "PURE SN" are DISCONTINUED
 *RX-4575LC - Sn-Ag Plating NOT PURE SN
 Model P/N in RED font = DISCONTINUED



Product Configuration System



Real Time Clock Modules – I²C-Bus

RX-8571SA

:

B

0

:

PURE SN

| Base Model | Pkg. | Status |
|-------------------|-------------------|---------------------|
| RA-8565SA* | SOP 14 PIN | Discontinued |
| RX-8025NB | SON 22 PIN | Active |
| RX-8025SA | SOP 14 PIN | Active |
| RX-8564LC | VSOJ 12 PIN | Active |
| RX-8571SA | SOP 14 PIN | Active |
| RX-8571NB | SON 22 PIN | Active |
| RX-8571LC | VSOJ 12 PIN | Active |
| RX-8581JE | VSOJ 20 PIN | Discontinued |
| RX-8581NB | SON 22 PIN | Discontinued |
| RX-8581SA | SON 14 PIN | Discontinued |
| RX-8731LC | VSOJ 12 PIN | Active |

| Frequency Tolerance: | |
|----------------------|--------------------|
| RA-8565SA* | B=5+/-23PPM |
| RX-8025NB | AA=5+/-5PPM |
| RX-8025SA | AA=5+/-5PPM |
| RX-8564LC | B=5+/-23PPM |
| RX-8571SA | B=5+/-23PPM |
| RX-8571NB | B=5+/-23PPM |
| RX-8571LC | B=5+/-23PPM |
| RX-8581JE | B=5+/-23PPM |
| RX-8581NB | B=5+/-23PPM |
| RX-8581SA | B=5+/-23PPM |
| RX-8731LC | B=5+/-23PPM |

Tape & Reel Qty
SOP Package Type Only
 Blank: Bulk
 0: 1000 pcs. per reel
DIP Package Type Only
 S: 25pcs/Stick (EOL)

PURE SN
 Blank : Already RoHS Compliant

***Automotive Grade product**
Approved Customer & Application only
Contact your Epson rep. for support

Note:
 All LC packages are already RoHS Compliant with "PURE SN"
 Model P/N in RED font = DISCONTINUED
 *Automotive AEC-Q200



Product Configuration System



Real Time Clock Modules – I²C-Bus

***Automotive Grade product**
Approved Customer & Application only
Contact your Epson rep. for support

RA-8581SA

:

B

0

:

PURE SN

| Base Model | Pkg. | Status |
|------------|-------------------|--------------|
| RA-8581SA* | SOP 14 PIN | Discontinued |
| RTC-8564JE | VSOJ 20 PIN | Active |
| RTC-8564NB | SON 22 PIN | Active |
| RX8010SJ | SOP 8 PIN | Active |
| RA4803SA* | SOP 14 PIN | Active |
| RA8803SA* | SOP 14 PIN | Active |
| RX8900SA | SOP 14 PIN | Active |
| RA8900SA* | SOP 14 PIN | Active |
| RX8900CE | 3.2x2.5mm | Active |
| RA8900CE* | 10 PIN Ceramic | Active |

| Frequency Tolerance: | |
|----------------------|---------------|
| RA-8581SA* | B=5+/-23PPM |
| RTC-8564JE | B=5+/-23PPM |
| RTC-8564NB | B=5+/-23PPM |
| RX8010SA | B=5+/-23PPM |
| RX4803SA | UA= +/-3.4PPM |
| RA4803SA* | -40°C to 85°C |
| RX8803SA | UB= +/-5.0PPM |
| | -40°C to 85°C |
| | UC=+/- 5PPM |
| | -30°C to 70°C |
| | AA=5+/-5PPM |
| | 25°C |
| RX8900SA | UA=+/-3.4PPM |
| RA8900SA* | -40°C to 85°C |
| and | UB=+/-5PPM |
| RX8900CE | -40°C to 85°C |
| RA8900CE* | UC=+/-5PPM |
| | -30°C to 70°C |

Tape & Reel Qty
SOP Package Type Only
 B: Bulk
 0: 1000 pcs. per reel

Blank : CE Package
 RX8010SJ: PURE SN
 RA4803SA: PURE SN
 RX8803SA: PURE SN
 RX8900SA: PURE SN
 RA-8581SA: ROHS or PURE SN
 RTC-8564JE: ROHS
 RTC-8564NB: ROHS or PURE SN

Note:
 Model P/N in RED font = DISCONTINUED
 *Automotive AEC-Q200

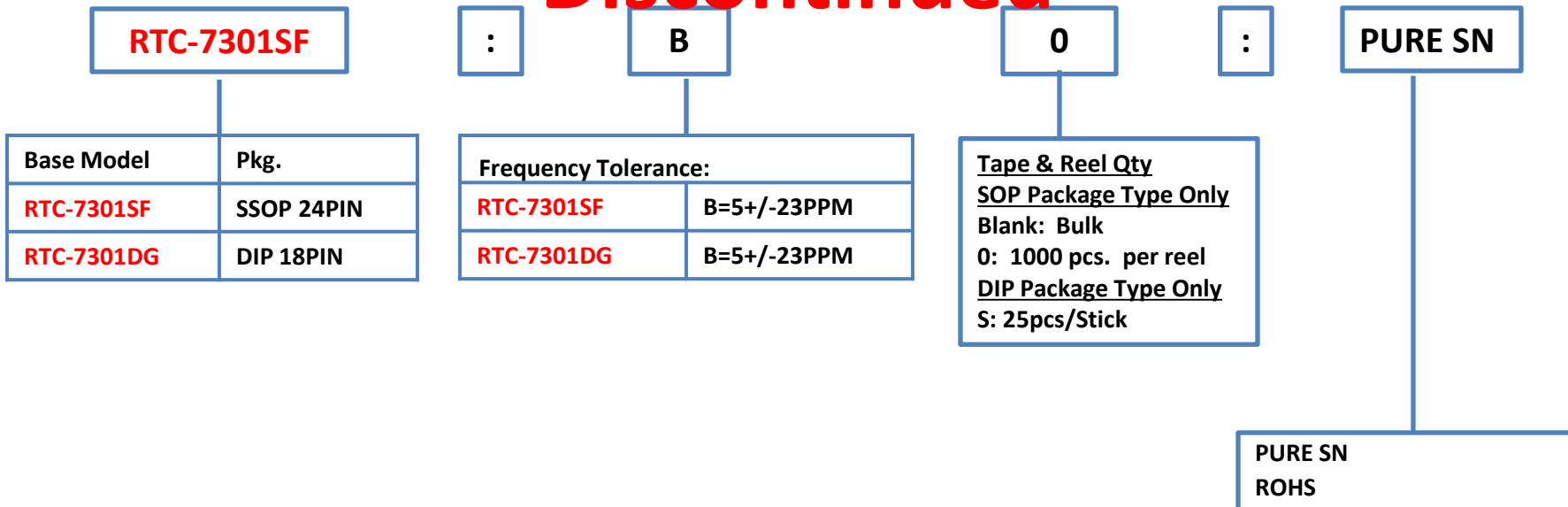


Product Configuration System



Real Time Clocks – Parallel 4-bit

Discontinued



Note:
 Model P/N in RED font = DISCONTINUED

Product Configuration System



Real Time Clocks – Parallel 4-bit

Discontinued

RTC-72423A

| Base Model | Pkg. | Freq. Tolerance |
|-------------------|------------|-----------------|
| RTC-62421A | DIP 18PIN | +/-10ppm |
| RTC-62421B | DIP 18PIN | +/-50ppm |
| RTC-72421A | DIP 18PIN | +/-10ppm |
| RTC-72421B | DIP 18PIN | +/-50ppm |
| RTC-72423A | SSOP 24PIN | +/-20ppm |
| RTC-72423B | SSOP 24PIN | +/-50ppm |

0

:

PURE SN

Tape & Reel Qty
SOP Package Type Only
 Blank: Bulk
 0: 1000 pcs. per reel
DIP Package Type Only
 S: 25pcs/Stick

PURE SN
 ROHS

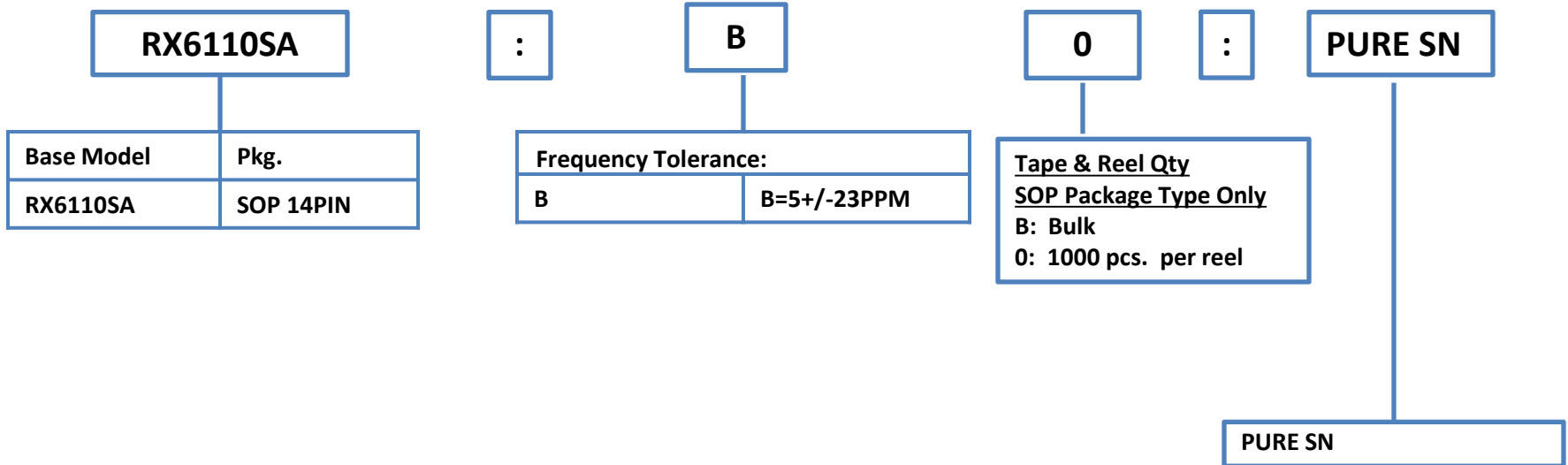


Note:
 Model P/N in RED font = DISCONTINUED

Product Configuration System



Real Time Clock Modules – I²C-Bus and SPI



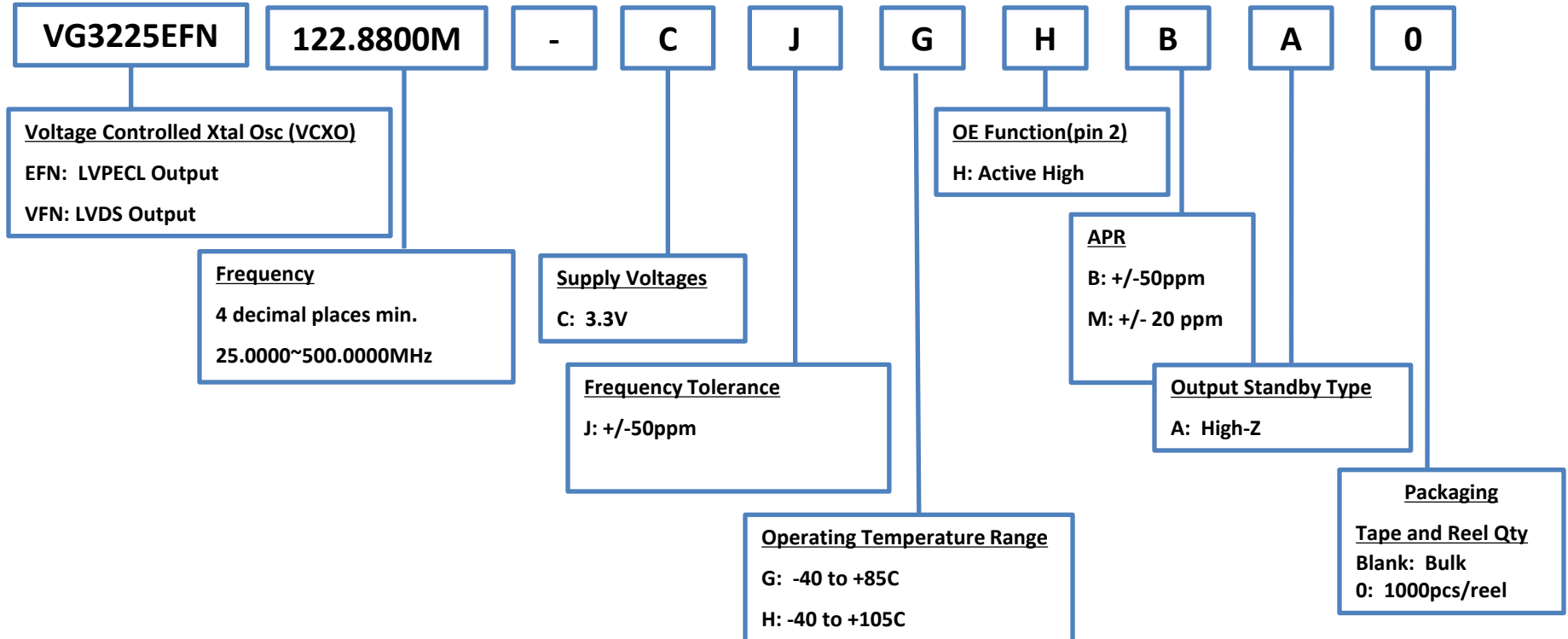
Product Configuration Guide

Voltage Controlled Crystal Oscillators (VCXO)



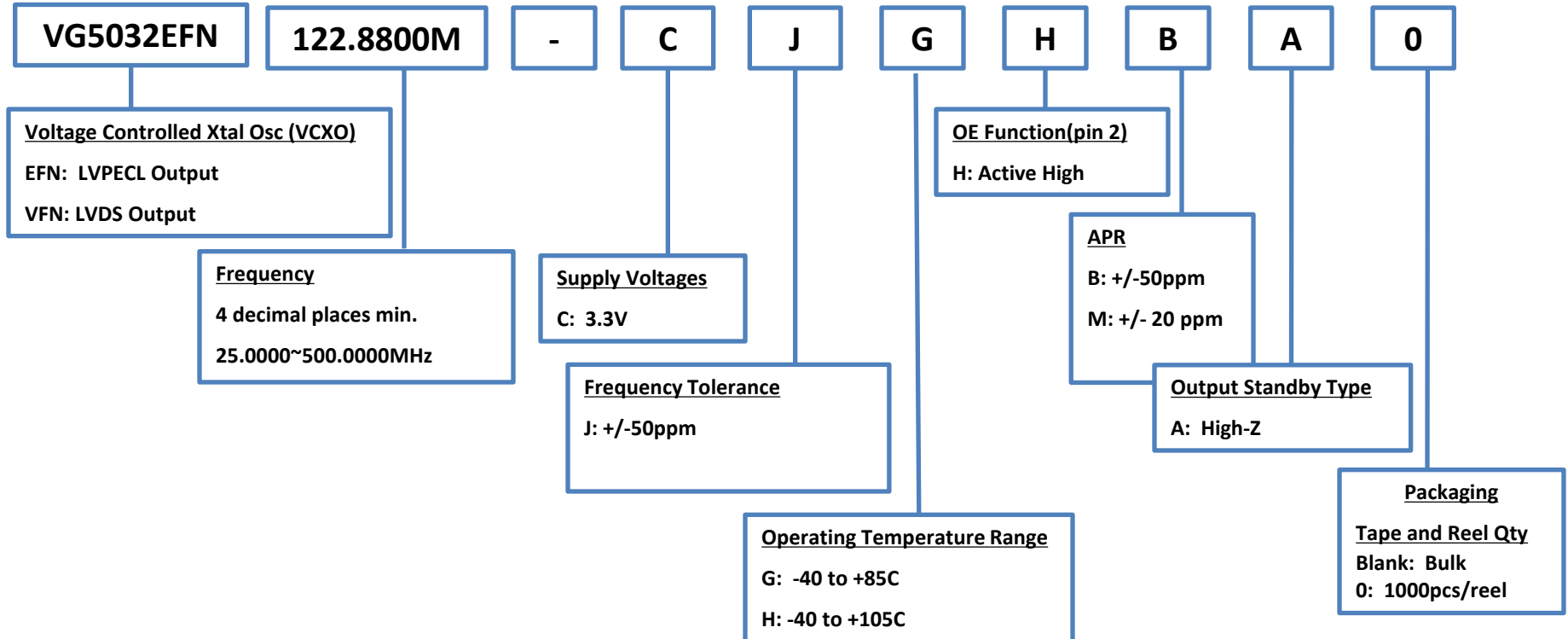
Product Configuration System

Oscillators - VCXO



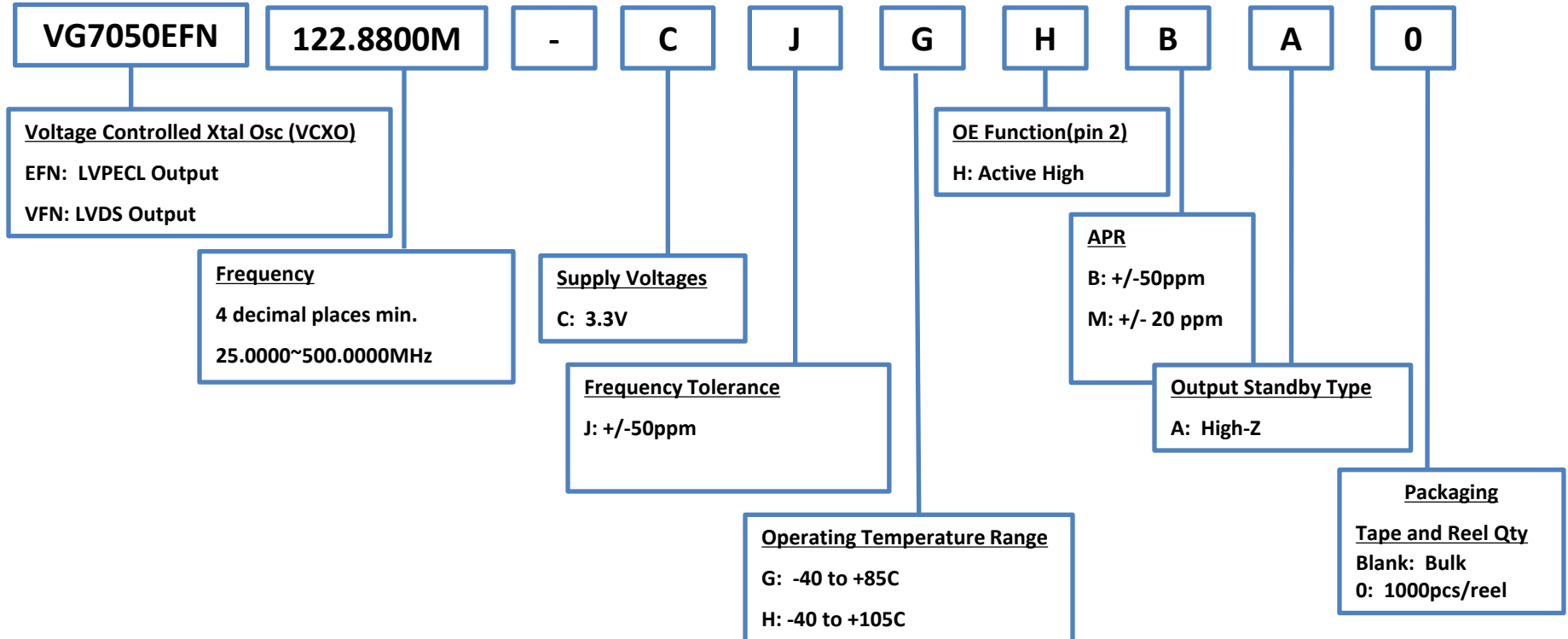
Product Configuration System

Oscillators - VCXO



Product Configuration System

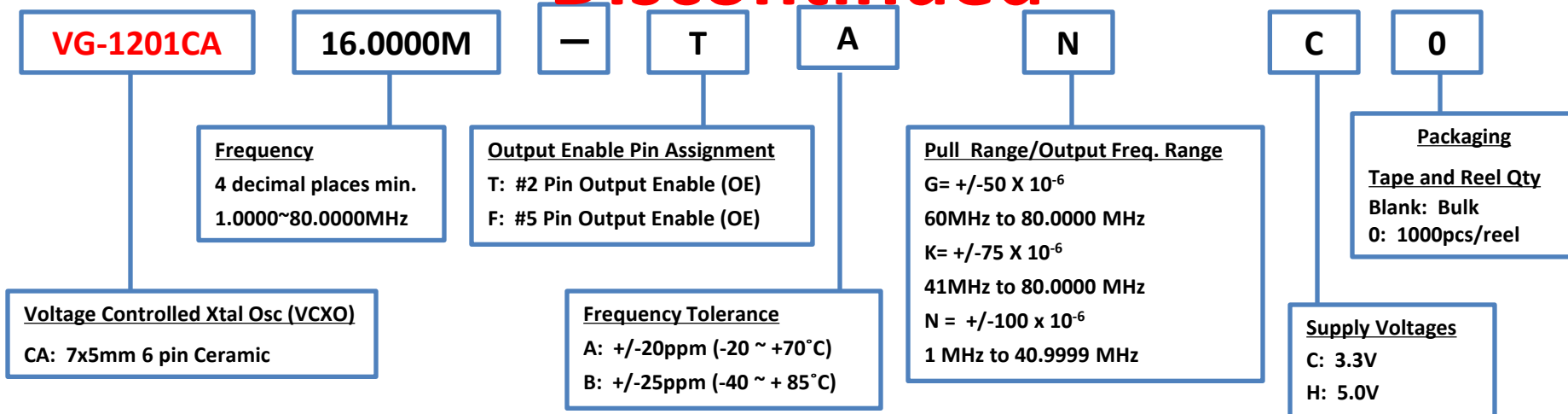
Oscillators - VCXO



Product Configuration System

Oscillators - VCXO

Discontinued



| CODE | STABILITY | OPERATING TEMP. | PULL RANGE | OUTPUT FREQ. |
|-----------|-----------|-----------------|------------|---------------------|
| ANC / ANH | +/-20PPM | -20C to +70°C | +/-100PPM | 1MHz to 40.9999MHz |
| AKC / AKH | +/-20PPM | -20C to +70°C | +/-75PPM | 41MHz to 80.0000MHz |
| BNC / BNH | +/-25PPM | -40C to +85°C | +/-100PPM | 1MHz to 40.9999MHz |
| BKC / BKH | +/-25PPM | -40C to +85°C | +/-75PPM | 41MHz to 80.0000MHz |

Product Configuration System



Oscillators - VCXO

Not Recommended

VG-4231CA

12.2880M

-

T

D

R

C

0

Voltage Controlled Xtal Osc (VCXO)

CA: 7x5mm 6 pin Ceramic

Output Enable Pin Assignment

T: #2 Pin Output Enable, 50Kohm min. input impedance

F: #5Pin Output Enable, 50Kohm min. input impedance

Z: #2pin Output Enable, 10Mohm min. input impedance

M: #5pin Output Enable, 10Mohm min. input impedance

Packaging

Tape and Reel Qty

Blank: Bulk

0: 1000pcs/reel

Frequency

1.0000~60.0000MHz

4 decimal places min.

Frequency Tolerance

D: +/-35ppm (-20 ~ +70°C)

G: +/-50ppm (-40 ~ + 85°C)

Freq Control Range

R: +/-130 X 10⁻⁶

Supply Voltage

C: 3.3V

H: 5.0V

Available Combinations

TDRH / FDRH

TGRC / TGRH / FGRC / FGRH

NOTE:

Output Enable Pin Assignment Z and M are not available with Supply Voltage H (5.0V)

EPSON

January 2025

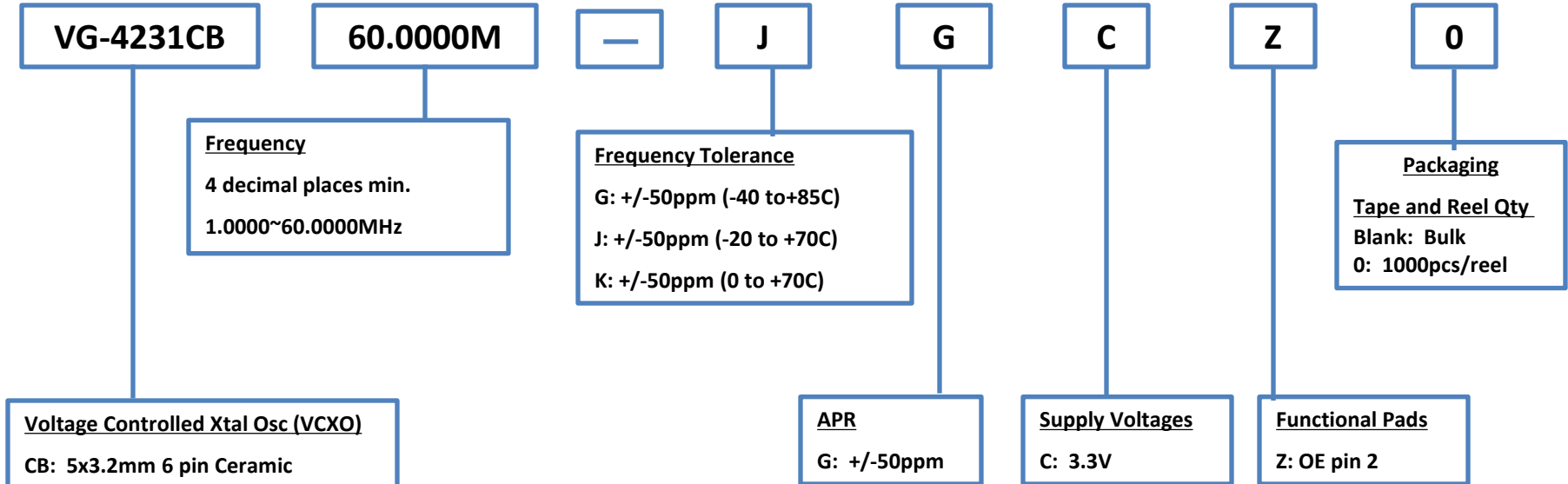
150



Product Configuration System

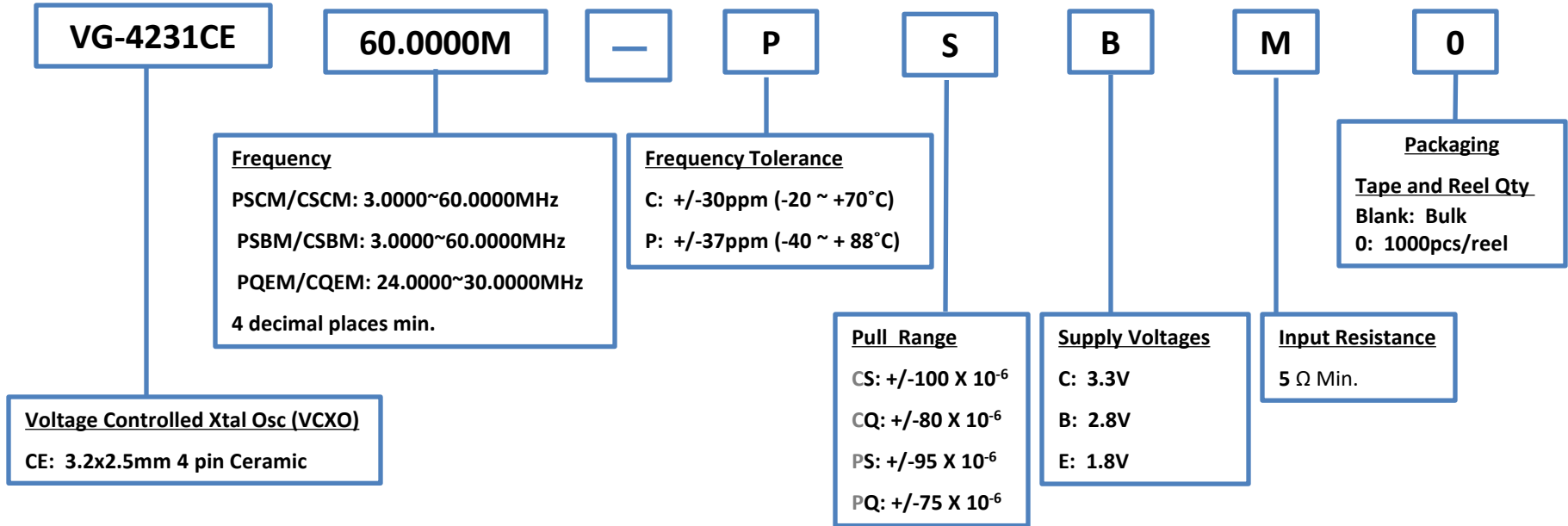
Oscillators - VCXO

Discontinued



Product Configuration System

Oscillators - VCXO



| CODE | | Frequency Tolerance | Temperature Range | Absolute Pull Range |
|------------------|---|--------------------------|-------------------|--|
| CSCM / CSBM/CQEM | C | +/-30 x 10 ⁻⁶ | -20 °C to +70°C | S : +/-100 x 10 ⁻⁶ / Q : +/-80 x 10 ⁻⁶ |
| PSCM/PSBM/PQEM | P | +/-37 X 10 ⁻⁶ | -40°C to +85°C | S : +/-95 x 10 ⁻⁶ / Q : +/-75 x 10 ⁻⁶ |

Product Configuration System



Oscillators - VCXO

Discontinued

VG-4232CA

61.4400M

-

T

G

G

C

0

Voltage Controlled Xtal Osc (VCXO)

CA: 7x5mm 6 pin Ceramic

Frequency

60.0001~80.0000MHz

4 decimal places min.

Absolute Pull Range

G: $\pm 50 \times 10^{-6}$

Supply Voltage

C: 3.3V

H: 5.0V

Output Enable Pin Assignment

T: #2 Pin Output Enable, 50Kohm min. input impedance

F: #5Pin Output Enable, 50Kohm min. input impedance

Z: #2pin Output Enable, 10Mohm min. input impedance

M: #5pin Output Enable, 10Mohm min. input impedance

Frequency Tolerance

G: ± 50 ppm (-40 ~ + 85°C)

J: ± 50 ppm (-20 ~ + 70°C)

K: ± 50 ppm (-0 ~ + 70°C)

Packaging

Tape and Reel Qty

Blank: Bulk

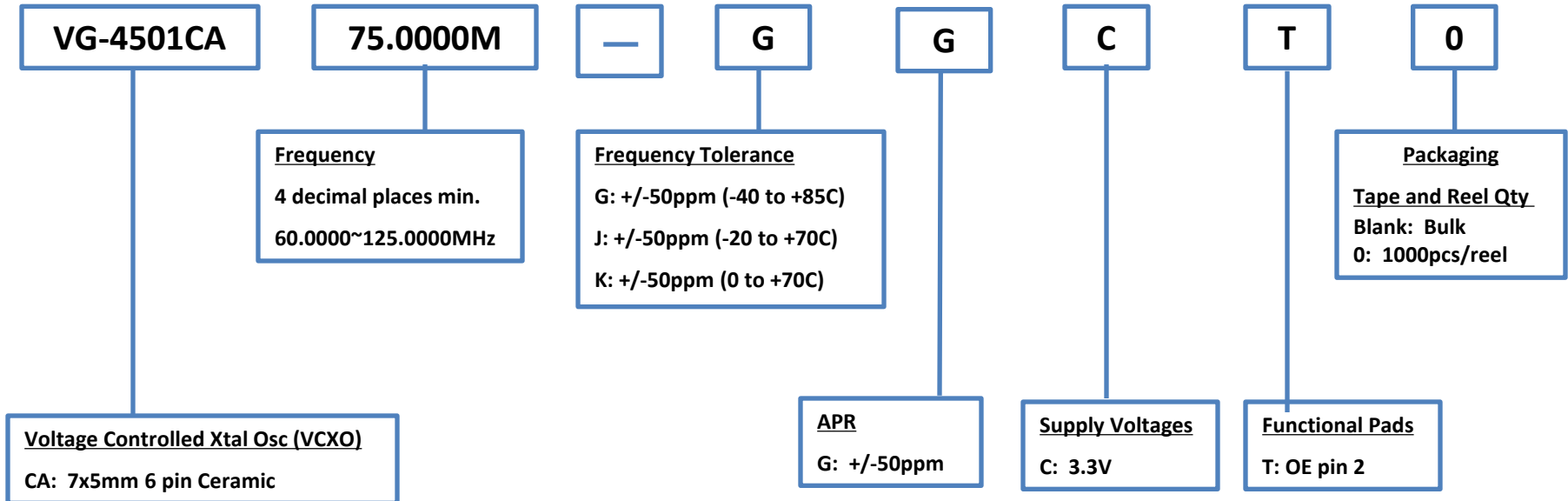
0: 1000pcs/reel



Product Configuration System

Oscillators - VCXO

Not Recommended

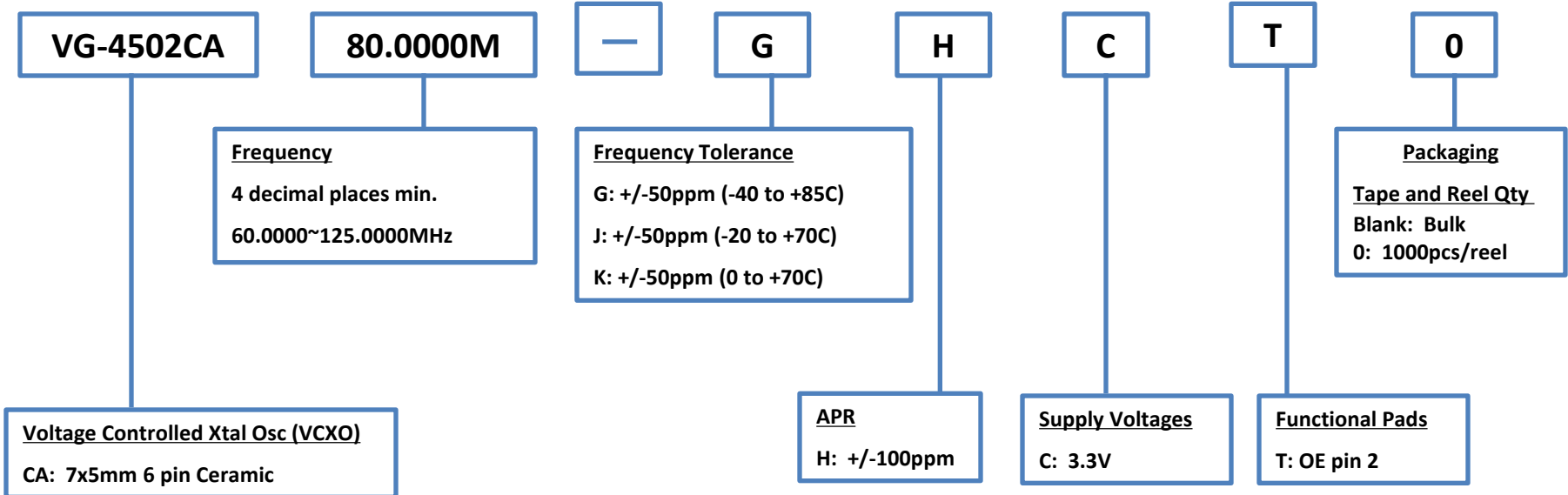


Product Configuration System



Oscillators - VCXO

Not Recommended

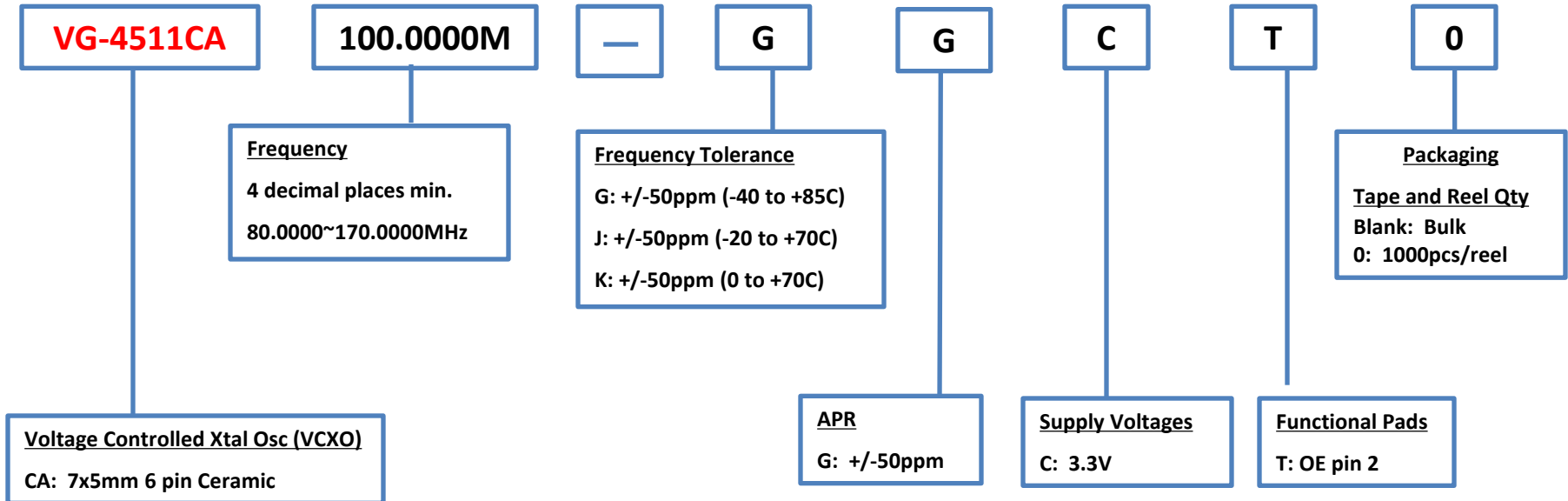




Product Configuration System

Oscillators - VCXO

Discontinued

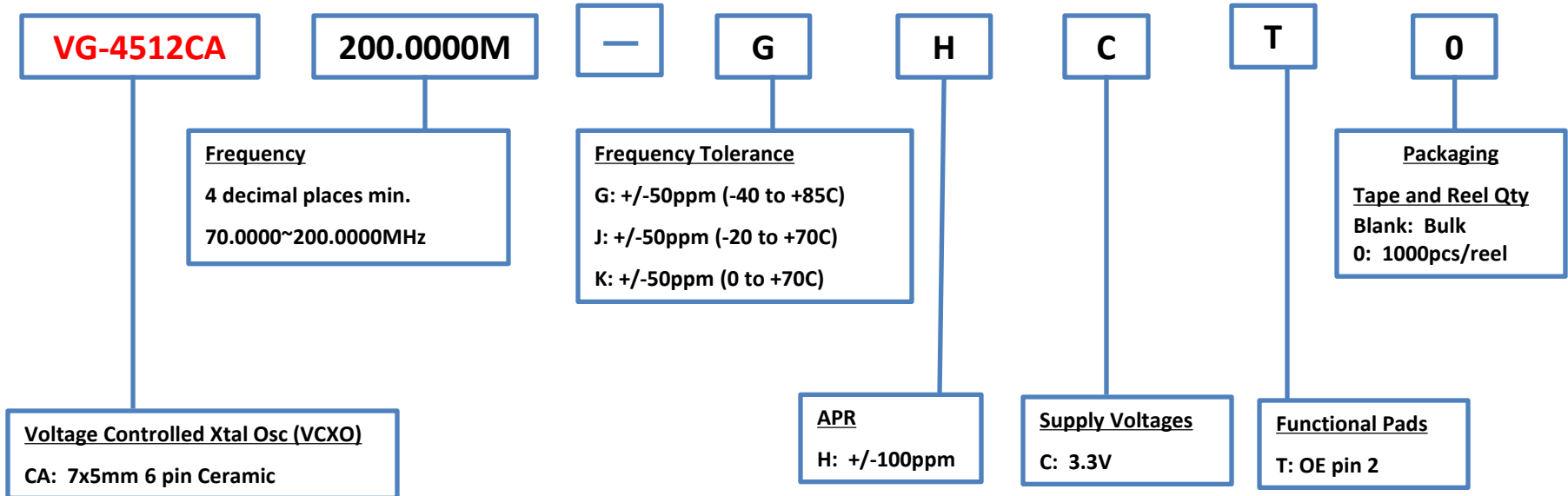




Product Configuration System

Oscillators - VCXO

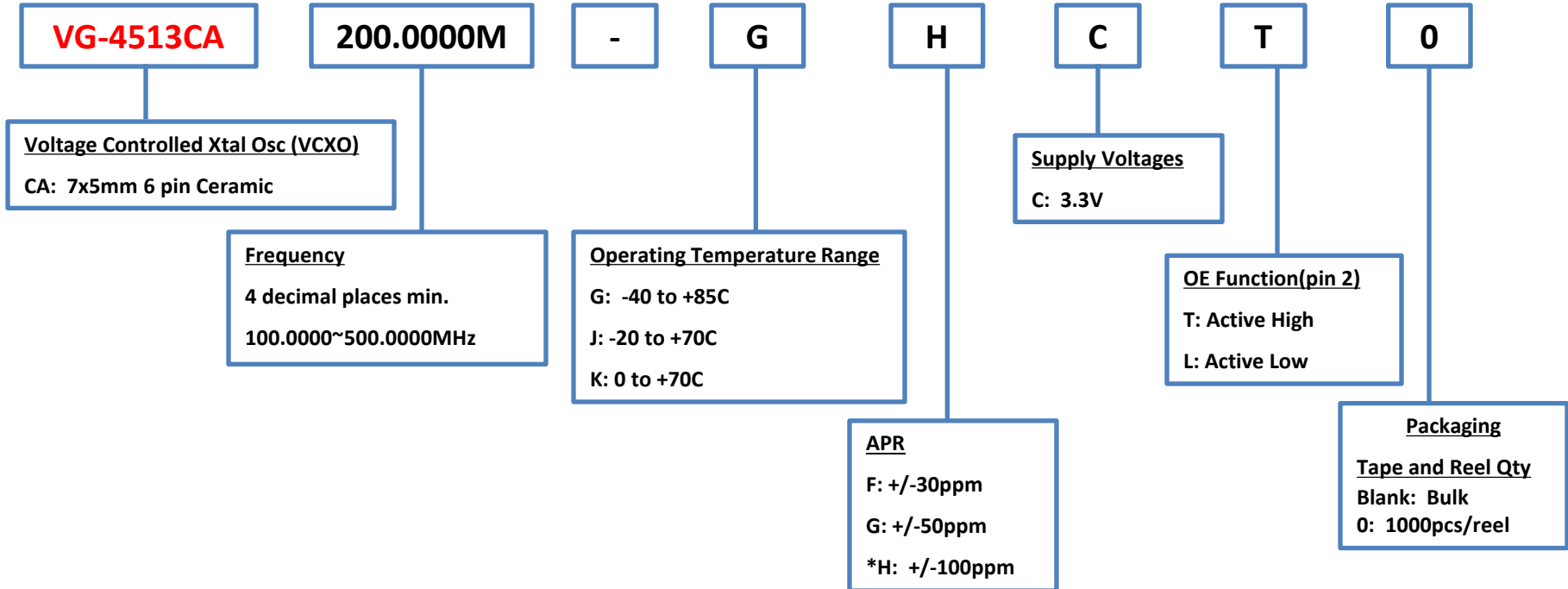
Discontinued



Product Configuration System

Oscillators - VCXO

Discontinued



*Only 120MHz ≤ f₀ ≤ 200MHz are available

NOTE:

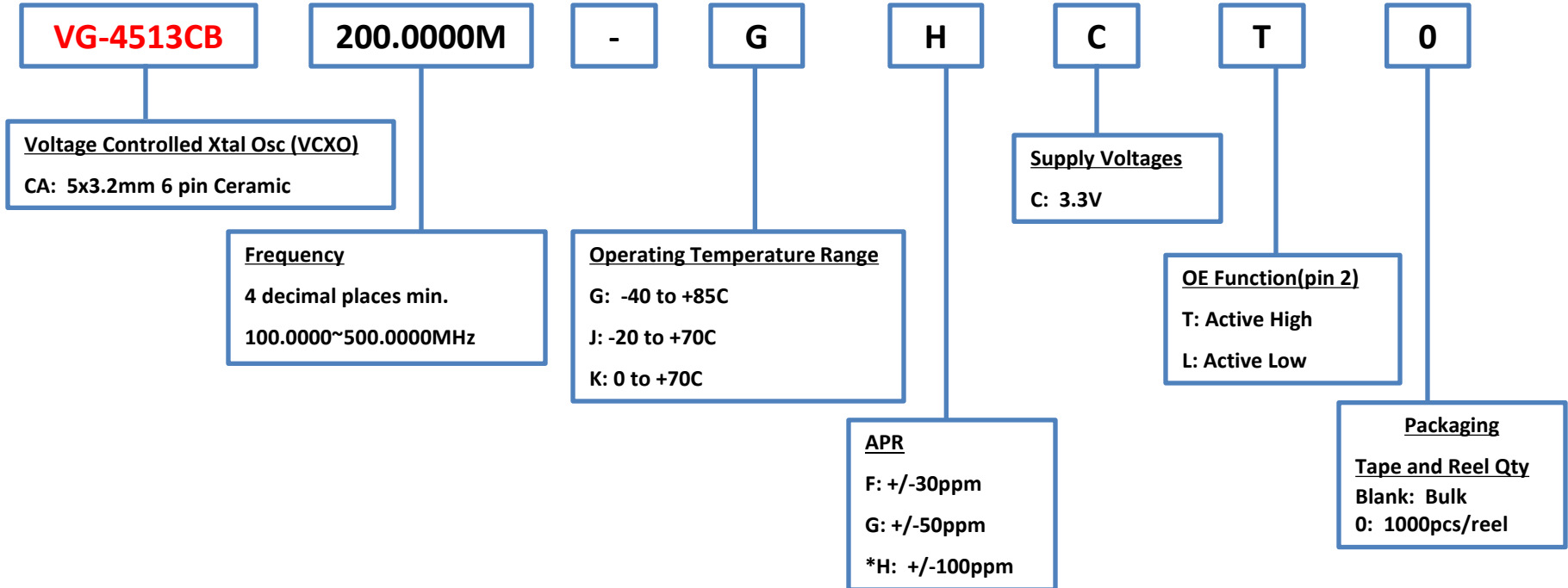
Standard Frequencies Offered: 100M, 122.88M, 125M, 148.351M, 148.5M, 153.6M, 155.52M, 156.25M, 200M

Please contact us for requirements not listed in this specification.

Product Configuration System

Oscillators - VCXO

Discontinued



*Only 120MHz ≤ f_0 ≤ 200MHz are available

NOTE:

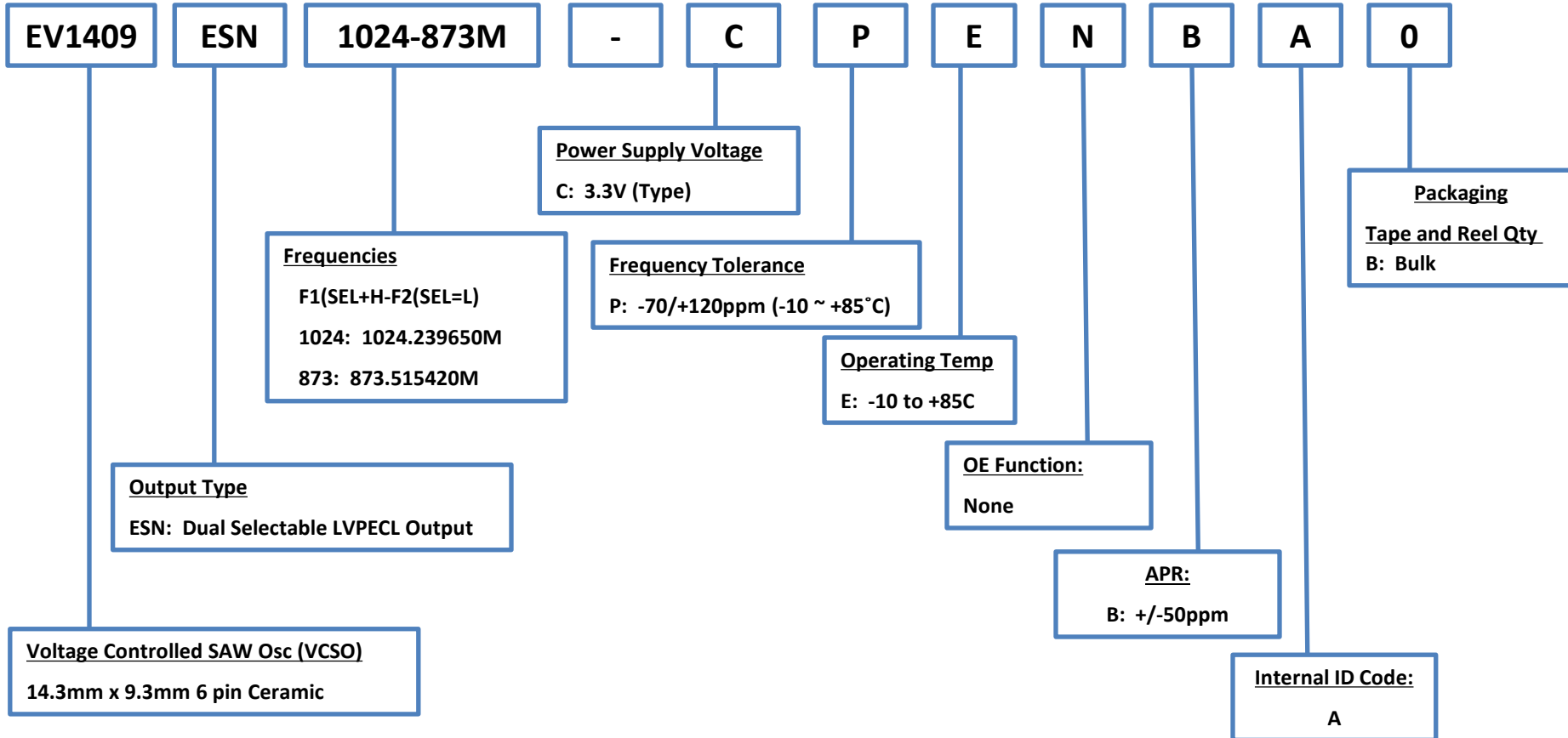
Standard Frequencies Offered: 122.88M, 153.6M

Please contact us for requirements not listed in this specification.

Product Configuration System



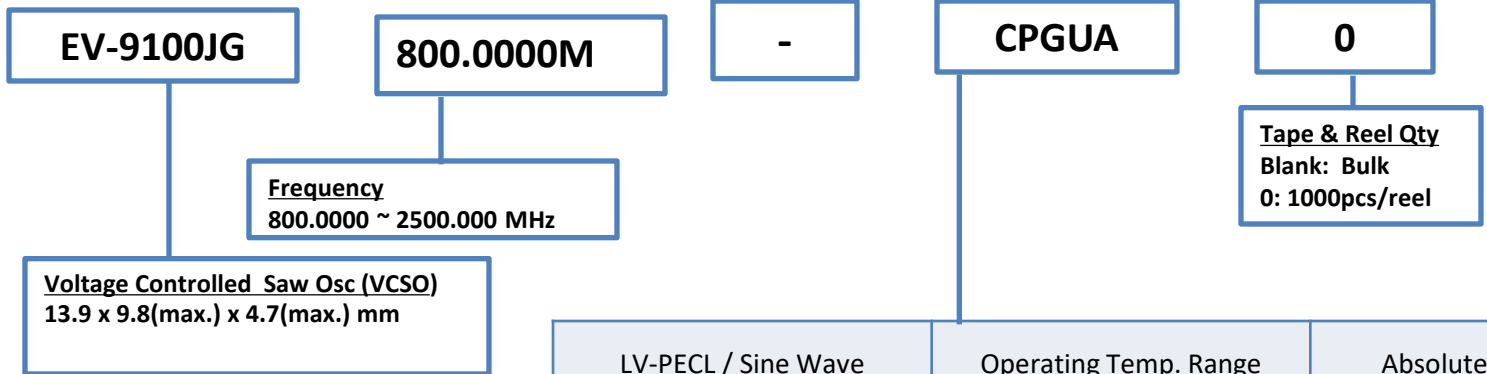
Oscillators - VCISO



Product Configuration System



Oscillators - VCISO

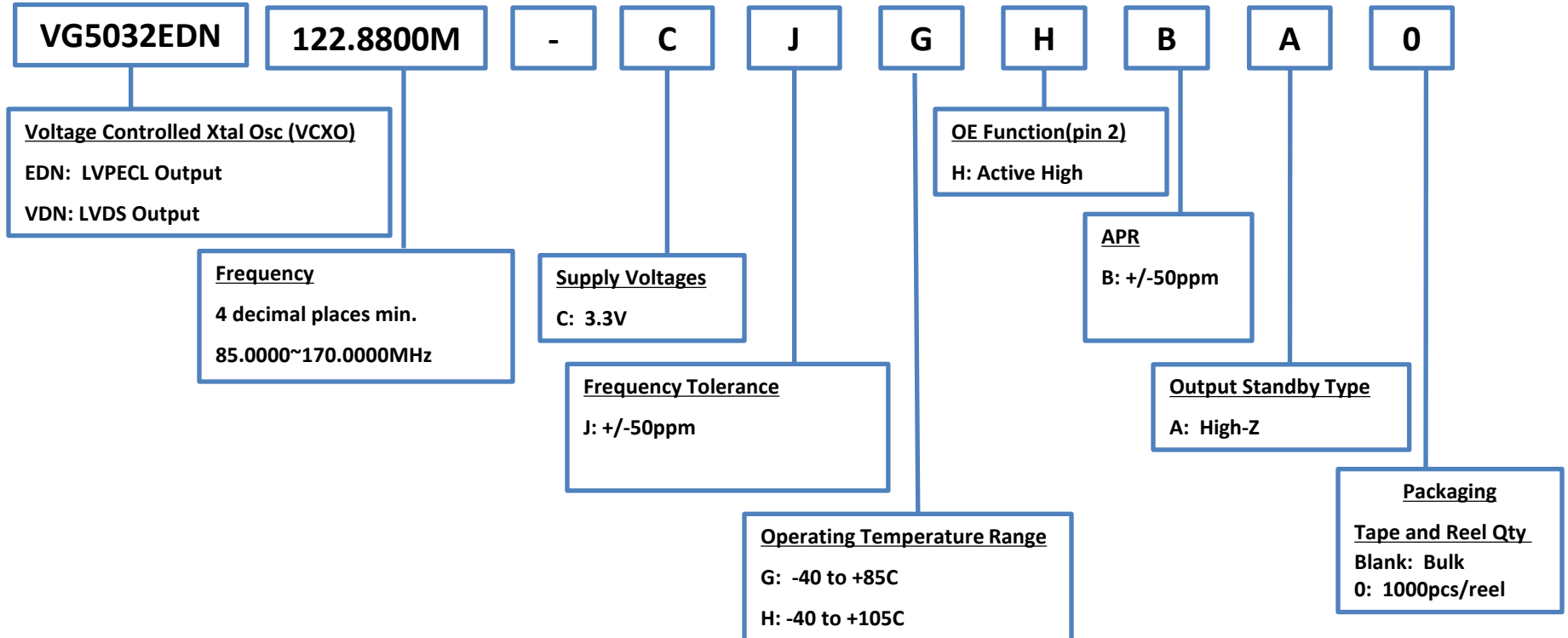


| LV-PECL / Sine Wave | Operating Temp. Range | Absolute Pull Range |
|---------------------|-----------------------|---------------------|
| CPGUA / CSGUA | -10C to +85C | +/-50PPM Min. *1 |
| CPGVA / CSGVA | -20C to +85C | |
| CPGMA / CSGMA | -40C to +85C | |

***1 NOTE:** Absolute Pull Range = Frequency Control Range – Frequency Tolerance

Product Configuration System

Oscillators - VCXO



NOTE:

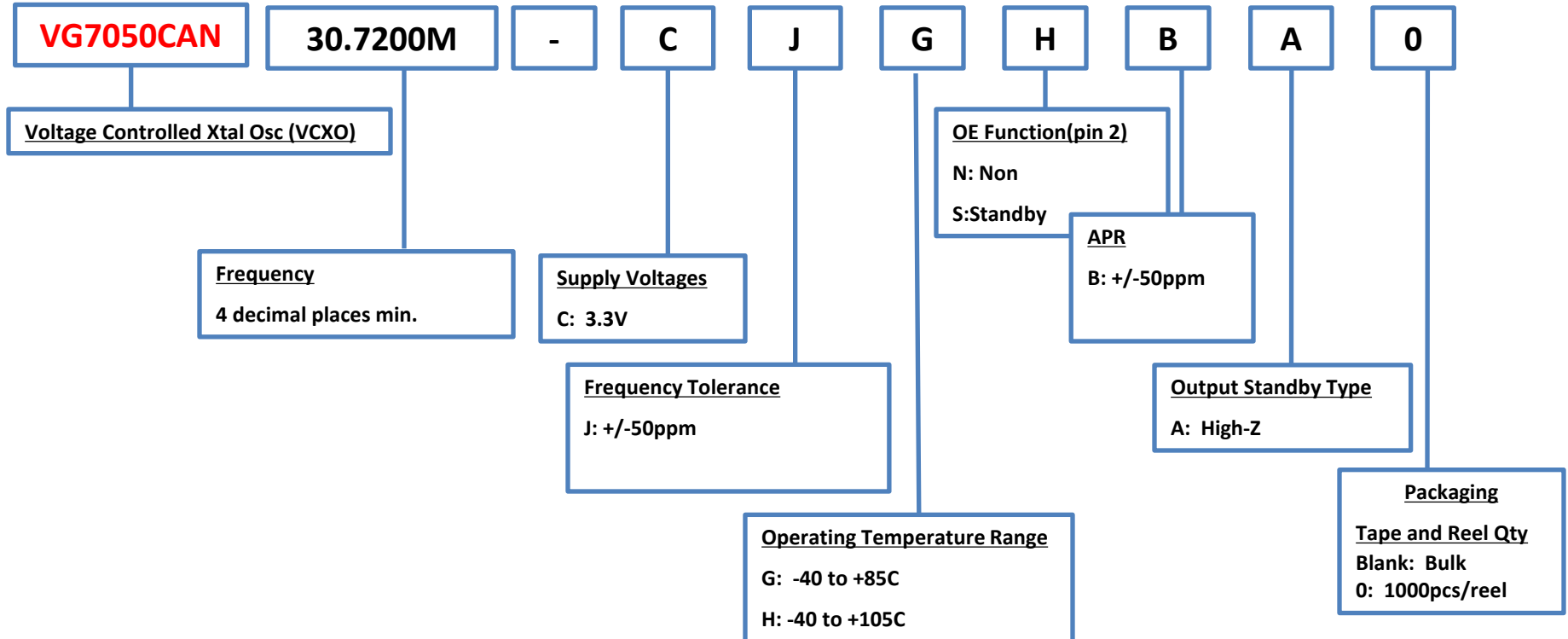
Standard Frequencies Offered: 122.88M

Please contact us for requirements not listed in this specification.

Product Configuration System

Oscillators - VCXO

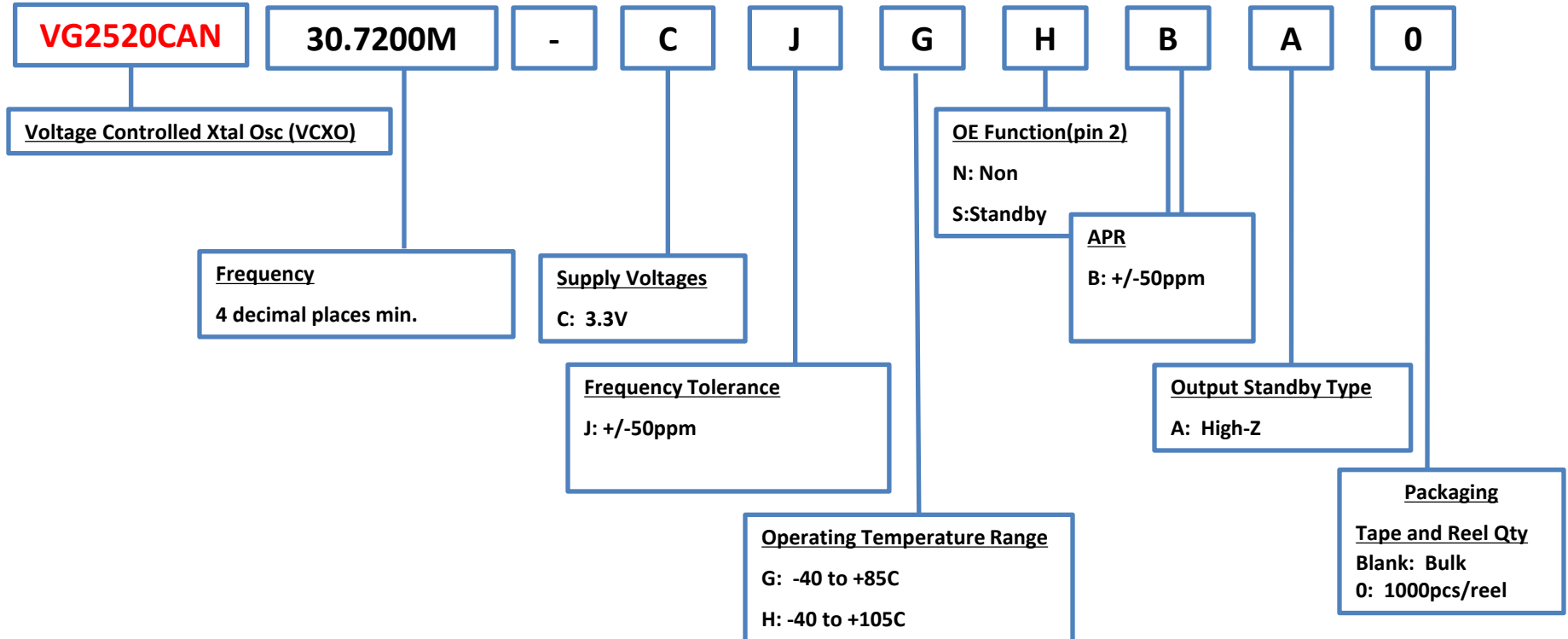
Discontinued



Product Configuration System

Oscillators - VCXO

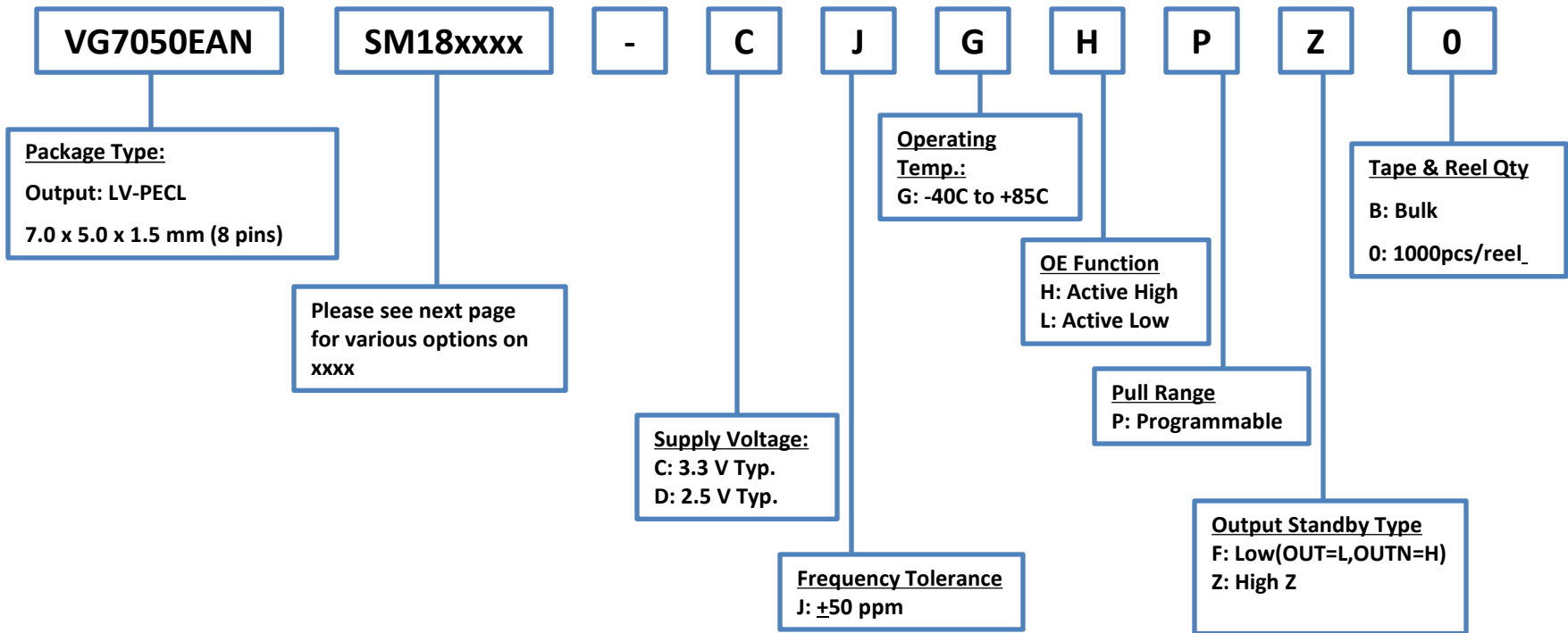
Discontinued



Product Configuration System



Programmable Voltage Controlled Oscillator (VCXO)



NOTE:

Frequency Range: 50~800MHz

Please contact us for requirements not listed in this specification.

Product Configuration System



Programmable Voltage Controlled Oscillator (VCXO)

VG7050EAN

| Part Number | Start-up frequency [MHz] | APR | | | Supply Voltage | OE function | Output Standby Type | |
|---------------------------|--------------------------|-----|---------|-------------|----------------|-------------|---------------------|-----------------------|
| | | Max | Initial | Vc range | | | | |
| VG7050EAN-SM18T001-CJGHPZ | 622.080000 | 180 | 100 | 1.65+/-1.25 | 3.3V | Active high | Hi-Z | |
| VG7050EAN-SM18T002-DJGHPZ | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050EAN-SM18T003-CJGLPZ | | | | 1.65+/-1.35 | 3.3V | Active low | | |
| VG7050EAN-SM18T004-DJGLPZ | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050EAN-SM18T005-CJGHPF | | | | 1.65+/-1.35 | 3.3V | Active high | | Low (OUT=L,OUTN=H) |
| VG7050EAN-SM18T006-DJGHPF | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050EAN-SM18T007-CJGLPF | | | | 1.65+/-1.35 | 3.3V | Active low | | |
| VG7050EAN-SM18T008-DJGLPF | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050EAN-SM18T009-CJGHPZ | 156.250000 | 180 | 100 | 1.65+/-1.25 | 3.3V | Active high | Hi-Z | |
| VG7050EAN-SM18T010-DJGHPZ | | | | 1.25+/-1.00 | 2.5V | | | |

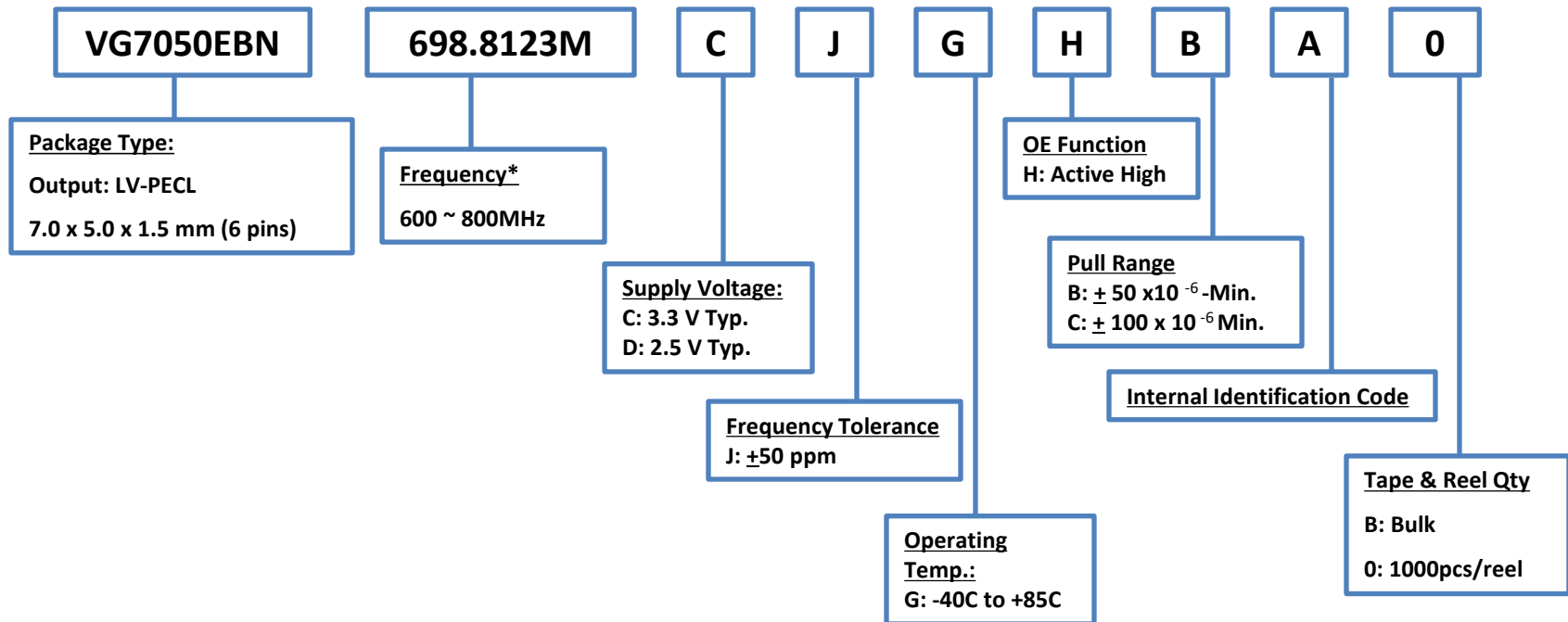
-If customer wants startup frequency other than 622.08MHz or 156.25MHz, please contact us for a custom part.

-Customer can always change the output frequency with the I2C (from 50MHz to 800MHz)

Product Configuration System



Programmable Voltage Controlled Oscillator (VCXO)



NOTE:

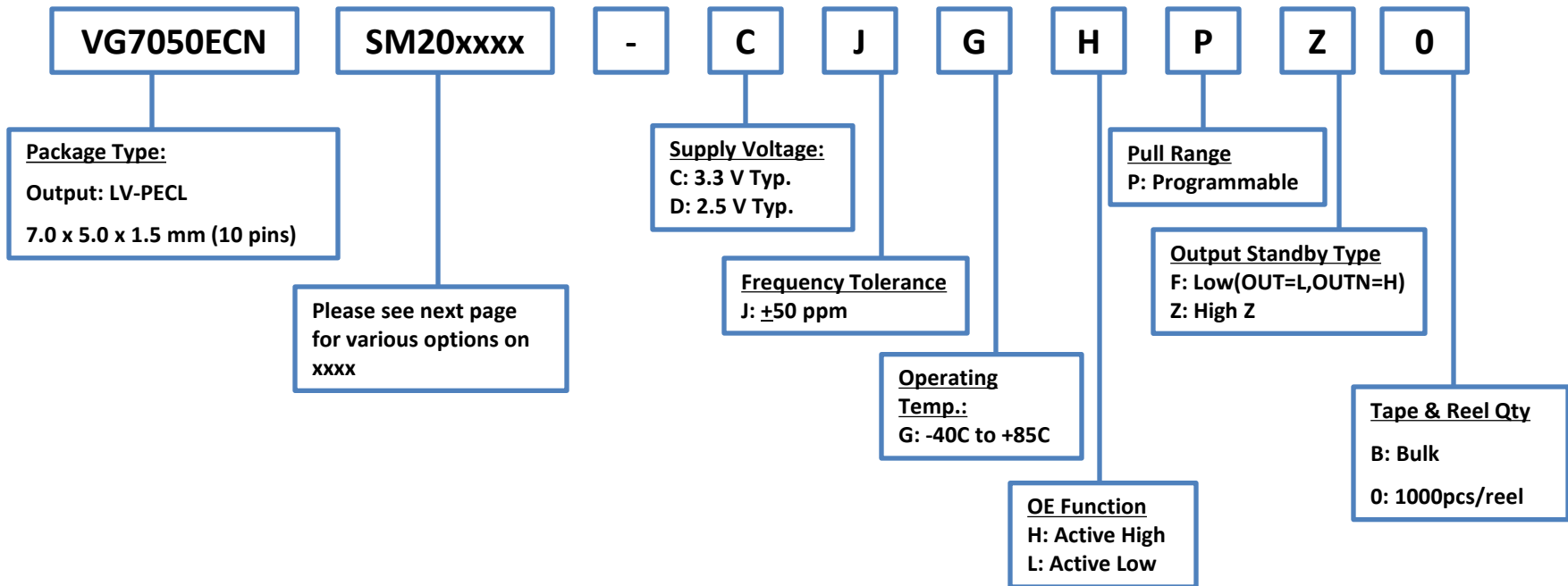
Standard Frequencies: 698.8123MHz, 753.6211MHz, 794.7278MHz

Please contact us for requirements not listed in this specification.

Product Configuration System



Programmable Voltage Controlled Oscillator (VCXO)



NOTE:
Frequency Range: 50~800MHz
Please contact us for requirements not listed in this specification.

Product Configuration System



Programmable Voltage Controlled Oscillator (VCXO)

VG7050ECN

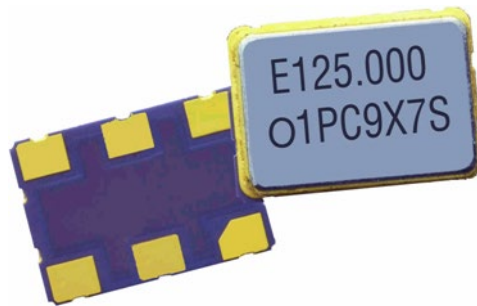
| Part Number | Start-up frequency [MHz] | | | | APR | | | Supply Voltage | OE function | Output | |
|---------------------------|--------------------------|-------------|-------------|-------------|-----|---------|-------------|----------------|-------------|---------|-----------------------|
| | frequency 1 | frequency 2 | frequency 3 | frequency 4 | Max | Initial | Vc range | | | Standby | Type |
| VG7050ECN-SM20T001-CJGHPZ | 622.080000 | 644.531250 | 669.326582 | 693.482991 | 180 | 100 | 1.65+/-1.25 | 3.3V | Active high | Hi-Z | |
| VG7050ECN-SM20T002-DJGHPZ | | | | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050ECN-SM20T003-CJGLPZ | | | | | | | 1.65+/-1.35 | 3.3V | Active low | | |
| VG7050ECN-SM20T004-DJGLPZ | | | | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050ECN-SM20T005-CJGHPP | | | | | | | 1.65+/-1.35 | 3.3V | Active high | | Low (OUT=L,OUTN=H) |
| VG7050ECN-SM20T006-DJGHPP | | | | | | | 1.25+/-1.00 | 2.5V | | | |
| VG7050ECN-SM20T007-CJGLPF | | | | | | | 1.65+/-1.35 | 3.3V | Active low | | |
| VG7050ECN-SM20T008-DJGLPF | | | | | | | 1.25+/-1.00 | 2.5V | | | |

-If customer wants different startup frequencies, please contact us for a custom part.

-Customer can always change the output frequencies with the I2C (from 50MHz to 800MHz)

Product Configuration Guide

SAW OSCILLATORS

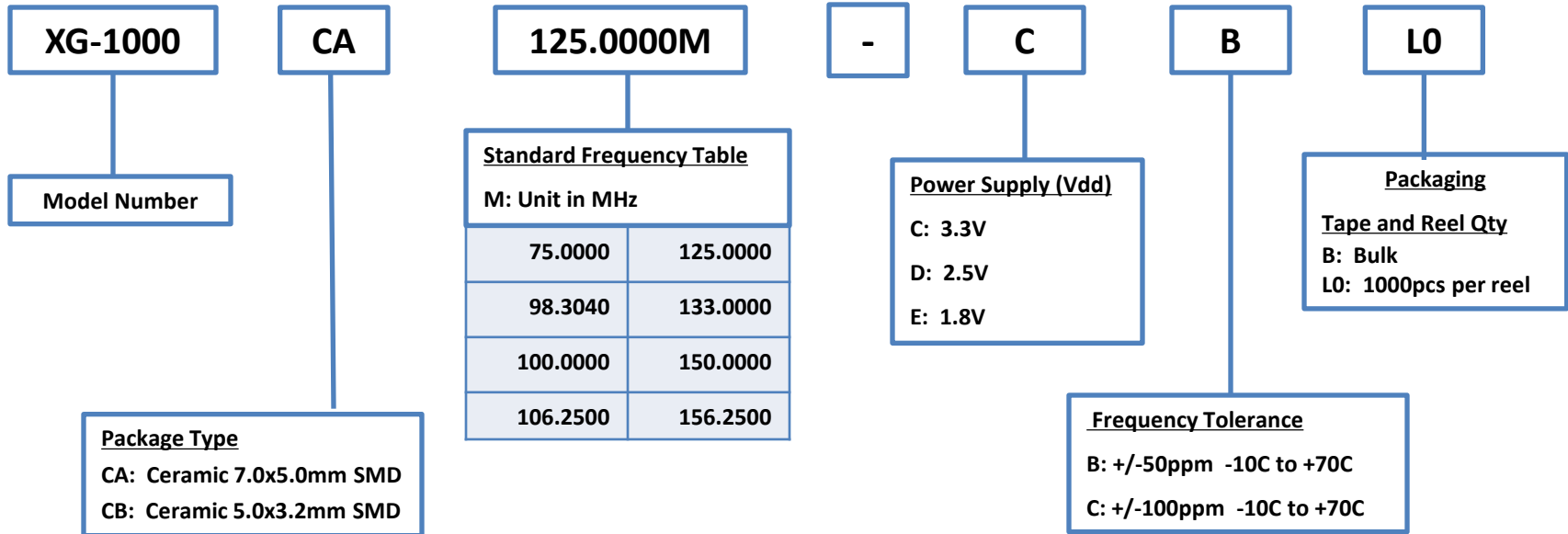


Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended

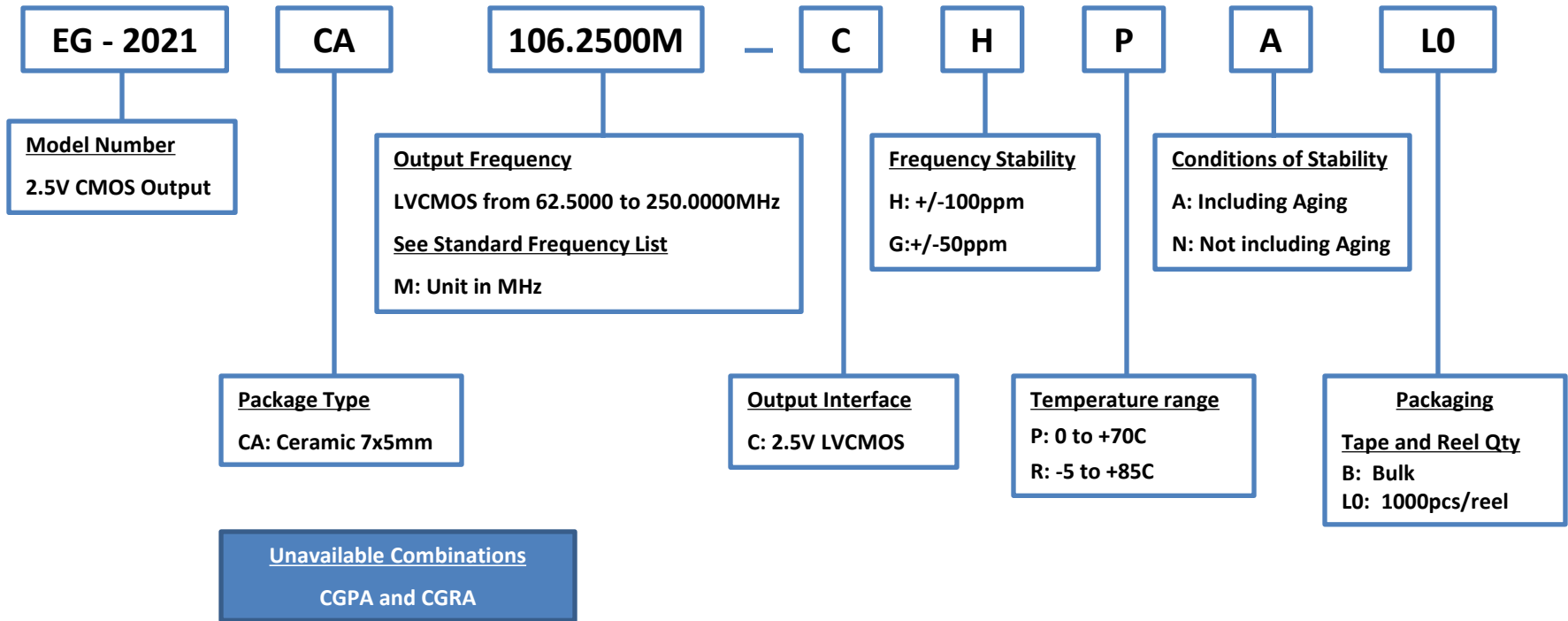


Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended



Standard Frequencies

EG-2021CA (2.5V CMOS)

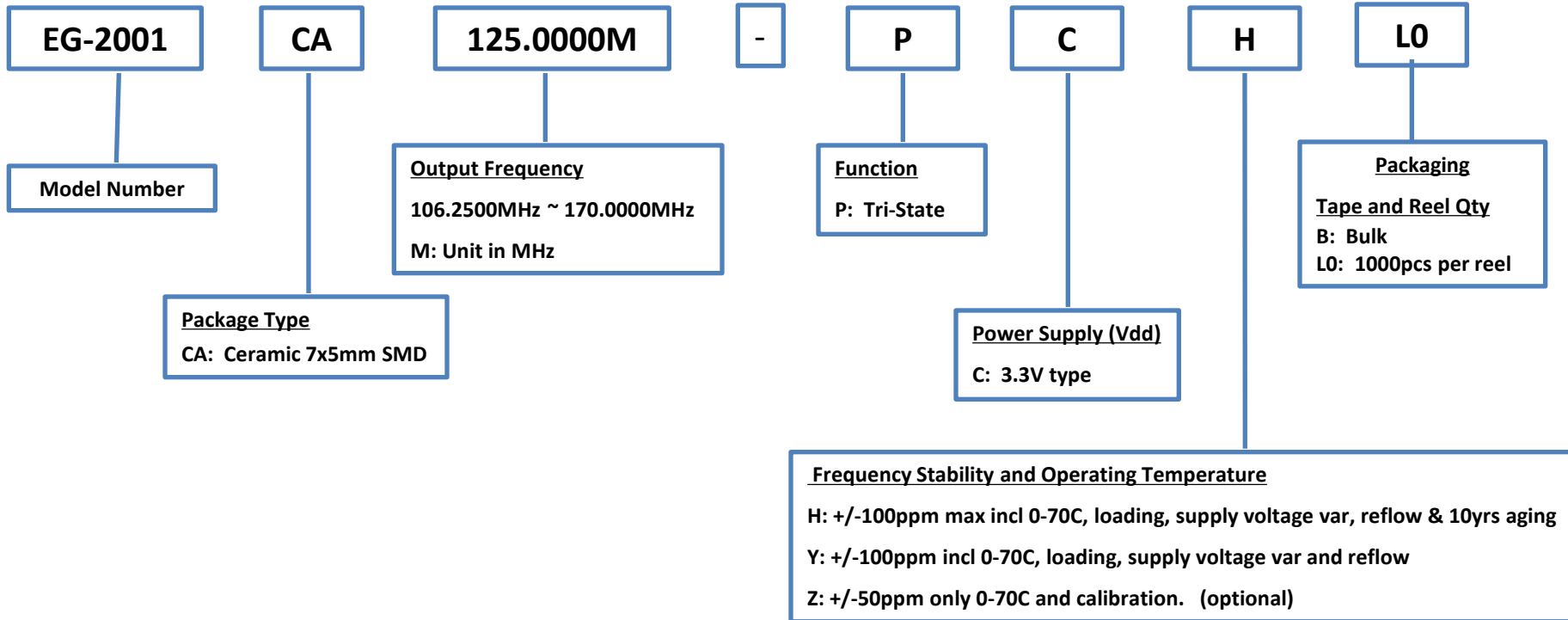
| | |
|-----------------|-----------------|
| 62.5000 | 125.0000 |
| 66.5000 | 133.0000 |
| 75.0000 | 150.0000 |
| 78.1250 | 156.2500 |
| 90.0000 | 250.0000 |
| 98.3040 | |
| 100.0000 | |
| 106.2500 | |
| 108.0000 | |
| 124.4160 | |

Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended



Standard Frequencies

EG-2001 (3.3V CMOS)

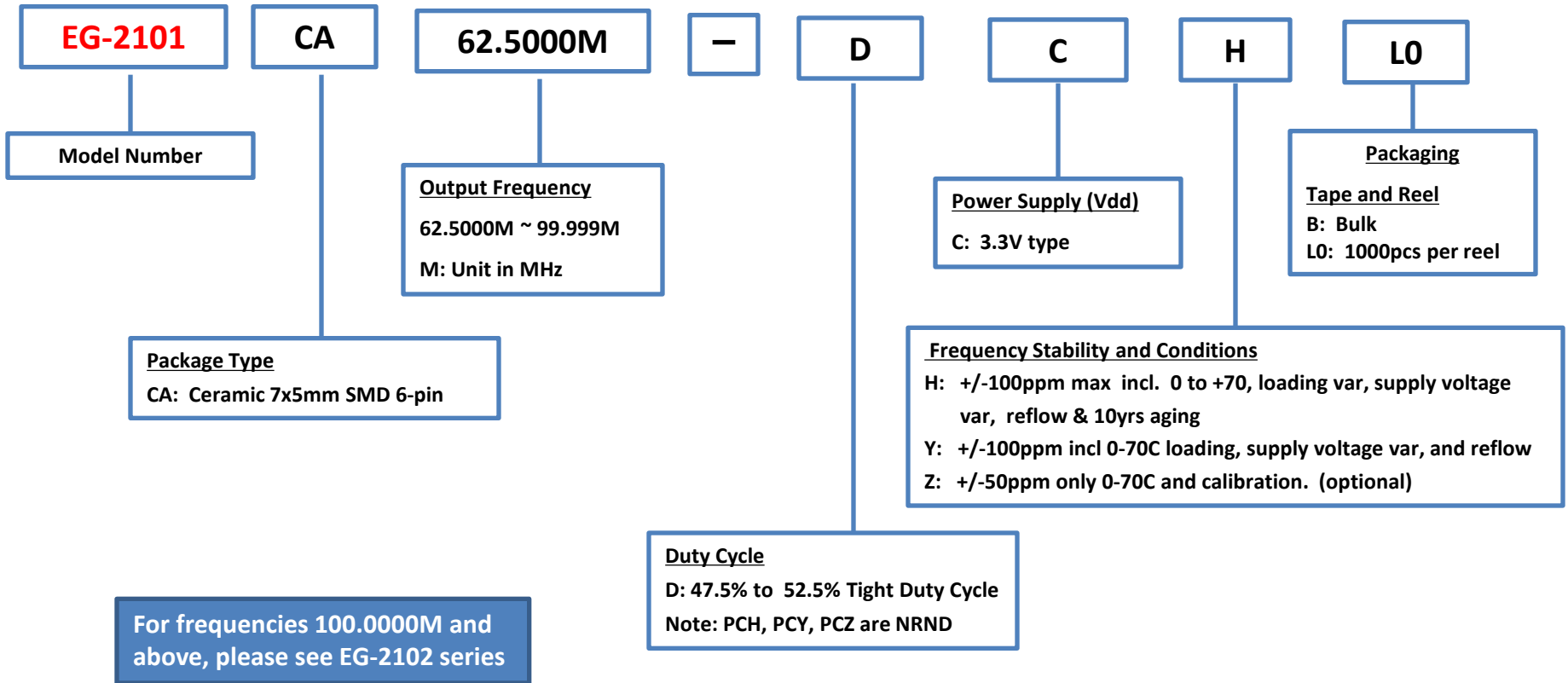
| | |
|----------|----------|
| 106.2500 | 155.5200 |
| 108.0000 | 156.2500 |
| 125.0000 | 159.3750 |
| 128.0000 | 160.0000 |
| 132.8125 | 161.1328 |
| 133.0000 | 166.0000 |
| 133.3333 | 166.6285 |
| 135.0000 | 166.6667 |
| 143.0000 | 167.3316 |
| 150.0000 | |

Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Discontinued



Standard Frequencies

EG-2101

| EG-2101CA DCx | |
|---------------|---------|
| 62.5000 | 79.6875 |
| 64.0000 | 80.0000 |
| 66.4063 | 80.5664 |
| 66.5000 | 83.0000 |
| 66.6667 | 83.3143 |
| 67.5000 | 83.3333 |
| 71.5000 | 83.6658 |
| 75.0000 | 87.5000 |
| 77.7600 | 90.0000 |
| 78.1250 | |

For frequencies 100.0000M and above, please see EG-2102 series

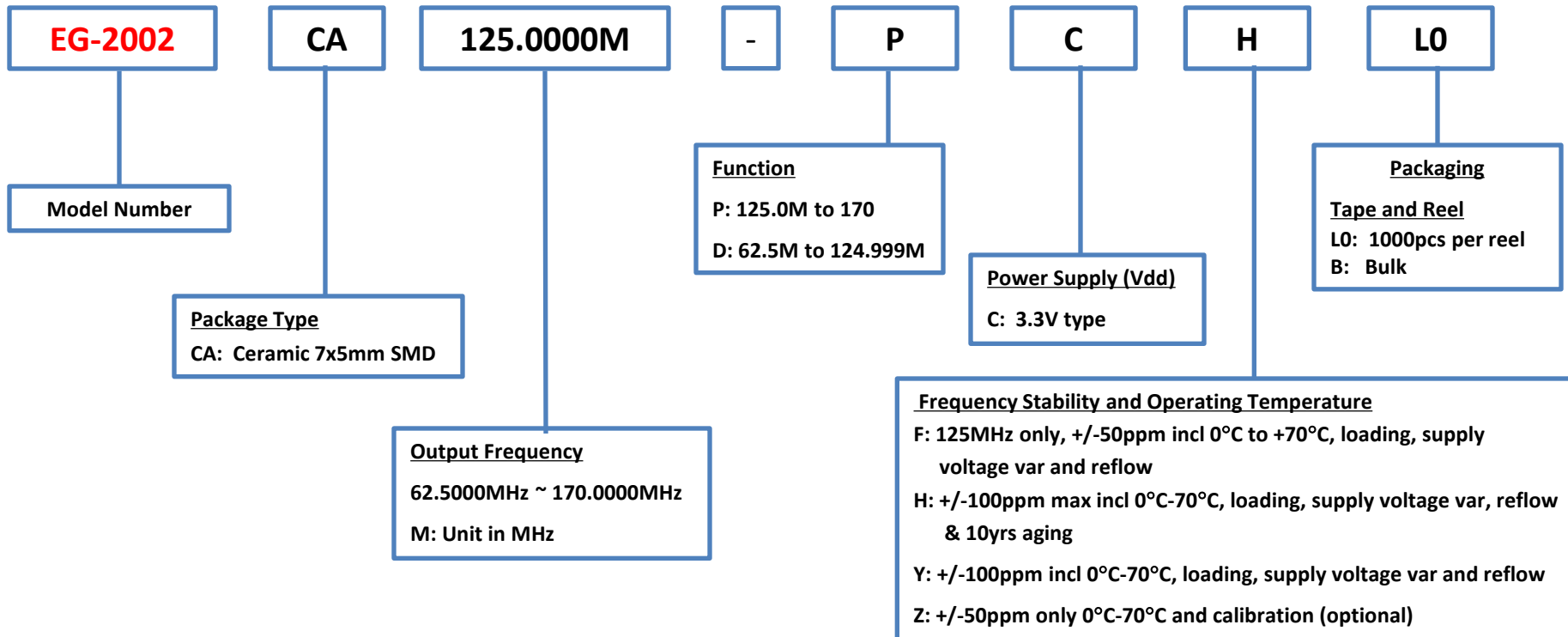


Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Discontinued



Standard Frequencies

EG-2002 (LVTTL)

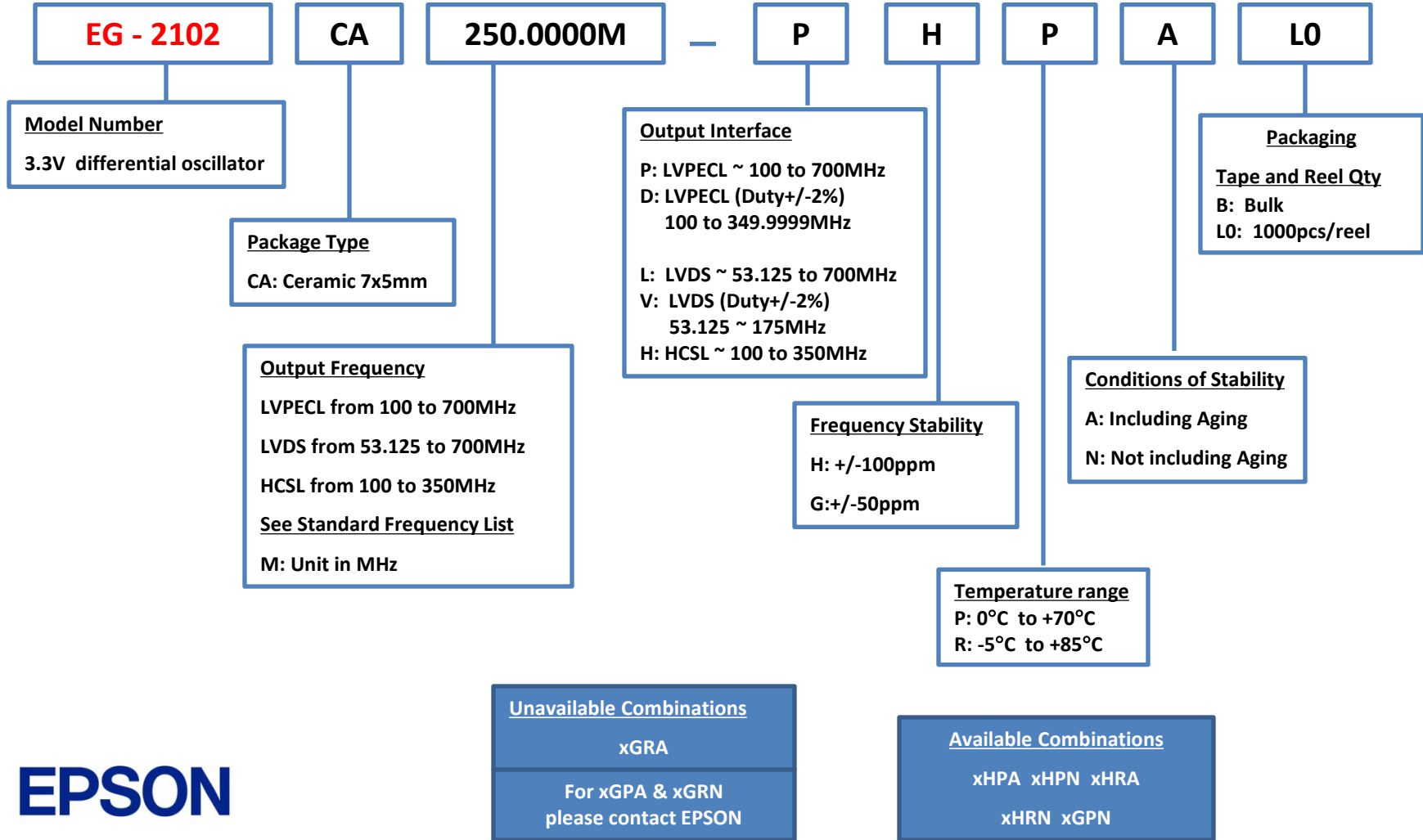
| EG-2002CA DCx | | EG-2002CA PCx | |
|---------------|----------|---------------|----------|
| 62.5000 | 80.5664 | 125.0000 | 161.1328 |
| 64.0000 | 83.0000 | 128.0000 | 166.0000 |
| 66.4063 | 83.3143 | 132.8125 | 166.6286 |
| 66.5000 | 83.3333 | 133.0000 | 166.6667 |
| 66.6667 | 83.6658 | 133.3333 | 167.3316 |
| 67.5000 | 87.5000 | 135.0000 | |
| 71.5000 | 90.0000 | 143.0000 | |
| 75.0000 | 100.0000 | 150.0000 | |
| 77.7600 | 106.2500 | 155.5200 | |
| 78.1250 | | 156.2500 | |
| 79.6875 | | 159.3750 | |
| 80.0000 | | 160.0000 | |

Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

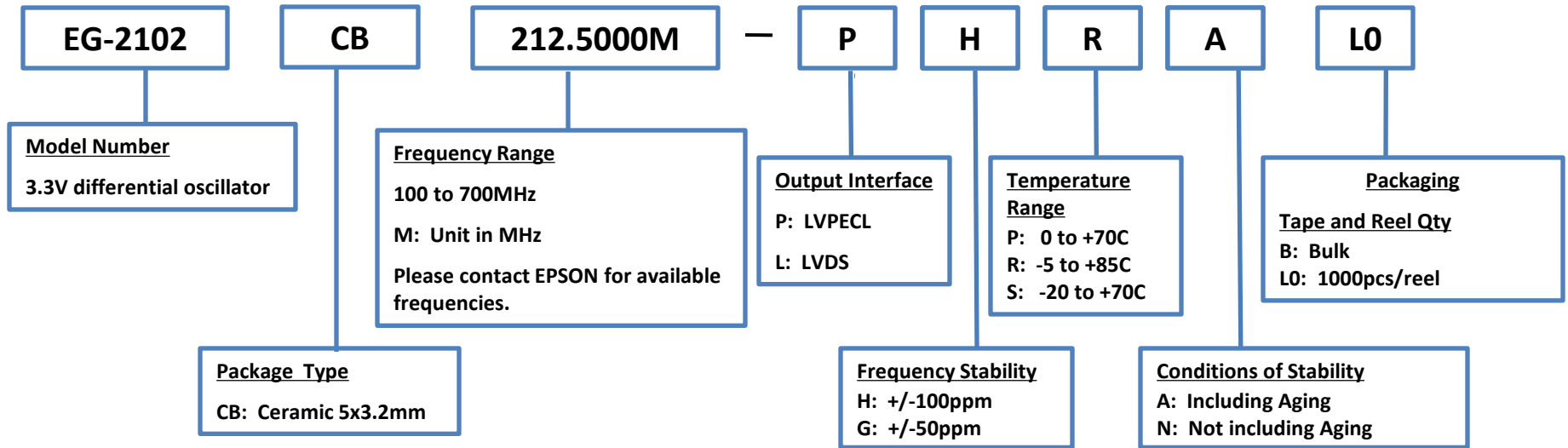
Discontinued



Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

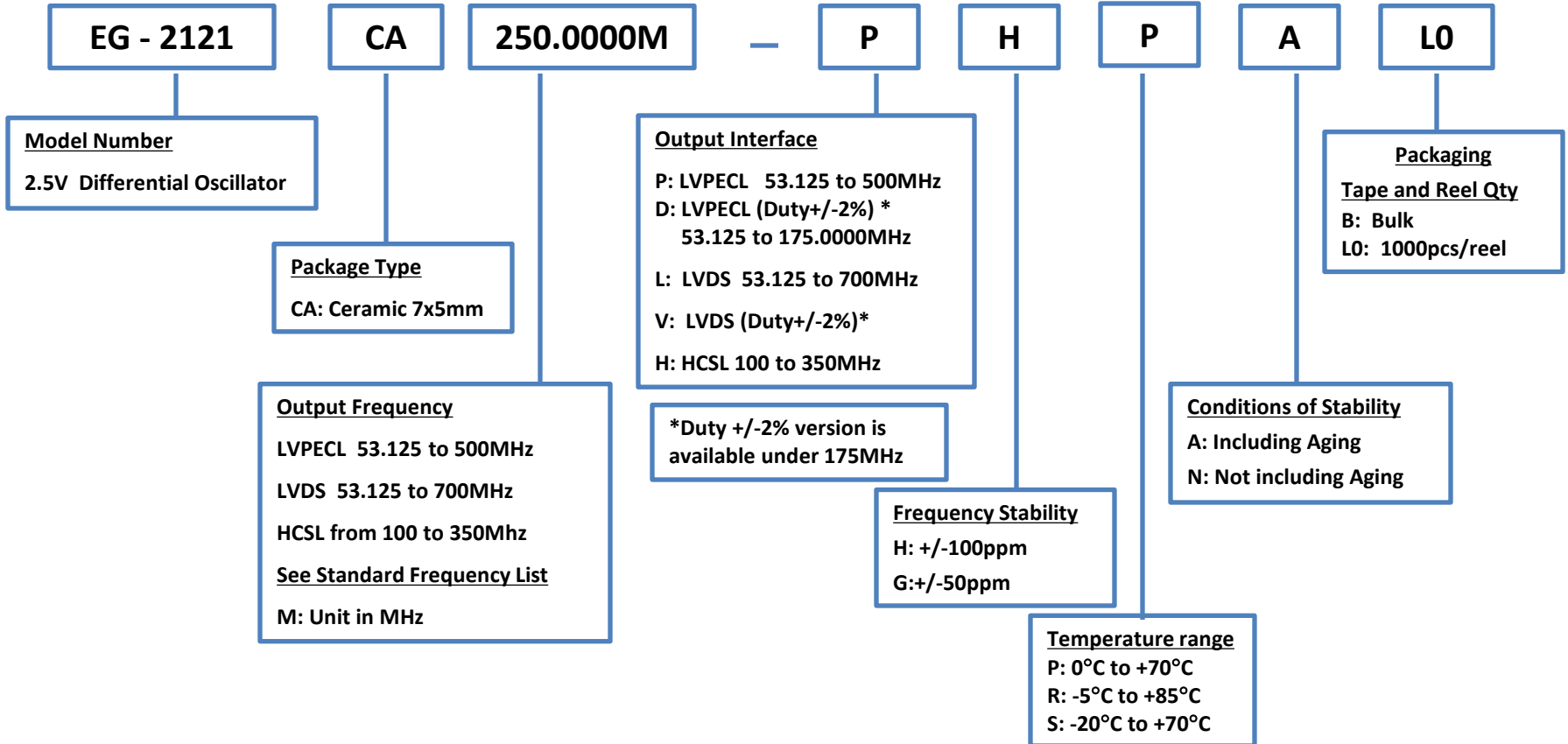


Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended



Unavailable Combinations
xGRA
For xGPA & xGRN
please contact EPSON

Available Combinations
xHPA xHPN xHRA
xHRN xGPN



Standard Frequencies

EG-2121 P (LVPECL)

| | | | |
|---|-----------------|-----------------|-----------------|
| 53.1250 * | 97.6563 | 195.3125 | 390.6250 |
| 62.5000 * | 98.3040 | 196.6080 | 393.2160 |
| 66.6667 * | 100.0000 | 200.0000 | 400.0000 |
| 75.0000 * | 106.2500 | 212.5000 | 425.0000 |
| 78.1250 * | 124.4160 | 248.8320 | 497.6640 |
| 79.6875 * | 125.0000 | 250.0000 | 500.0000 |
| 80.0000 * | 132.8125 | 265.6250 | |
| 87.5000 * | 133.0000 | 266.0000 | |
| | 148.3517 | 296.7033 | |
| | 150.0000 | 300.0000 | |
| | 150.8072 | 301.6144 | |
| | 155.5200 | 311.0400 | |
| | 156.2500 | 312.5000 | |
| | 159.3750 | 318.7500 | |
| | 161.1328 | 322.2657 | |
| | 164.3555 | 328.7110 | |
| | 166.6286 | 333.2572 | |
| | 167.3317 | 334.6633 | |
| | 173.3708 | 346.7415 | |
| | 175.0000 | 350.0000 | |
| * Frequency only available for xHPA and xHPN | | | |

Standard Frequencies

EG-2121 L (LVDS)

| | | | |
|--|----------|----------|----------|
| 53.1250 * | 97.6563 | 195.3125 | 390.6250 |
| 62.5000 * | 98.3040 | 196.6080 | 393.2160 |
| 66.6667 * | 100.0000 | 200.0000 | 400.0000 |
| 75.0000 * | 106.2500 | 212.5000 | 425.0000 |
| 78.1250 * | 124.4160 | 248.8320 | 497.6640 |
| 79.6875 * | 125.0000 | 250.0000 | 500.0000 |
| 80.0000 * | 132.8125 | 265.6250 | 531.2500 |
| 87.5000 * | 133.0000 | 266.0000 | 532.0000 |
| | 148.3517 | 296.7033 | 593.4066 |
| | 150.0000 | 300.0000 | 600.0000 |
| | 150.8072 | 301.6144 | 603.2288 |
| | 156.2500 | 312.5000 | 625.0000 |
| | 159.3750 | 318.7500 | 637.5000 |
| | 161.1328 | 322.2656 | 644.5313 |
| | 164.3555 | 328.7109 | 657.4219 |
| | 166.6286 | 333.2571 | 666.5143 |
| | 167.3316 | 334.6633 | 669.3266 |
| | 173.3707 | 346.7415 | 693.4830 |
| | 175.0000 | 350.0000 | 700.0000 |
| * Frequency only available for xHPA and xHPN | | | |

Standard Frequencies

EG-2121 (HCSL)

| | |
|----------|----------|
| - | 195.3125 |
| - | 196.6080 |
| 100.0000 | 200.0000 |
| 106.2500 | 212.5000 |
| 124.4160 | 248.8320 |
| 125.0000 | 250.0000 |
| 132.8125 | 265.6250 |
| 133.0000 | 266.0000 |
| 148.3517 | 296.7033 |
| 150.0000 | 300.0000 |
| 150.8072 | 301.6144 |
| 155.5200 | 311.0400 |
| 156.2500 | 312.5000 |
| 159.3750 | 318.7500 |
| 161.1328 | 322.2656 |
| 164.3555 | 328.7109 |
| 166.6286 | 333.2571 |
| 167.3316 | 334.6633 |
| 173.3707 | 346.7415 |
| 175.0000 | 350.0000 |

Standard Frequencies

EG-2102P (LVPECL)

| | | |
|----------|----------|----------|
| - | 195.3125 | 390.6250 |
| - | 196.6080 | 393.2160 |
| 100.0000 | 200.0000 | 400.0000 |
| 106.2500 | 212.5000 | 425.0000 |
| 124.4160 | 248.8320 | 497.6640 |
| 125.0000 | 250.0000 | 500.0000 |
| 132.8125 | 265.6250 | 531.2500 |
| 133.0000 | 266.0000 | 532.0000 |
| 148.3517 | 296.7033 | 593.4066 |
| 150.0000 | 300.0000 | 600.0000 |
| 150.8072 | 301.6144 | 603.2288 |
| 155.5200 | 311.0400 | 622.0800 |
| 156.2500 | 312.5000 | 625.0000 |
| 159.3750 | 318.7500 | 637.5000 |
| 161.1328 | 322.2656 | 644.5313 |
| 164.3555 | 328.7109 | 657.4219 |
| 166.6286 | 333.2571 | 666.5143 |
| 167.3316 | 334.6633 | 669.3266 |
| 173.3707 | 346.7415 | 693.4830 |
| 175.0000 | 350.0000 | 700.0000 |

Standard Frequencies

EG-2102 L (LVDS)

| | | | |
|-----------|----------|----------|----------|
| 53.1250 * | 97.6563 | 195.3125 | 390.6250 |
| 62.5000 * | 98.3040 | 196.6080 | 393.2160 |
| 66.6667 * | 100.0000 | 200.0000 | 400.0000 |
| 75.0000 * | 106.2500 | 212.5000 | 425.0000 |
| 78.1250 * | 124.4160 | 248.8320 | 497.6640 |
| 79.6875 * | 125.0000 | 250.0000 | 500.0000 |
| 80.0000 * | 132.8125 | 265.6250 | 531.2500 |
| 87.5000 * | 133.0000 | 266.0000 | 532.0000 |
| | 148.3517 | 296.7033 | 593.4066 |
| | 150.0000 | 300.0000 | 600.0000 |
| | 150.8072 | 301.6144 | 603.2288 |
| | 155.5200 | 311.0400 | 622.0800 |
| | 156.2500 | 312.5000 | 625.0000 |
| | 159.3750 | 318.7500 | 637.5000 |
| | 161.1328 | 322.2656 | 644.5313 |
| | 164.3555 | 328.7109 | 657.4219 |
| | 166.6286 | 333.2571 | 666.5143 |
| | 167.3316 | 334.6633 | 669.3266 |
| | 173.3707 | 346.7415 | 693.4830 |
| | 175.0000 | 350.0000 | 700.0000 |

* Frequency only available for xHPA and xHPN

Standard Frequencies

EG-2102P (HCSL)

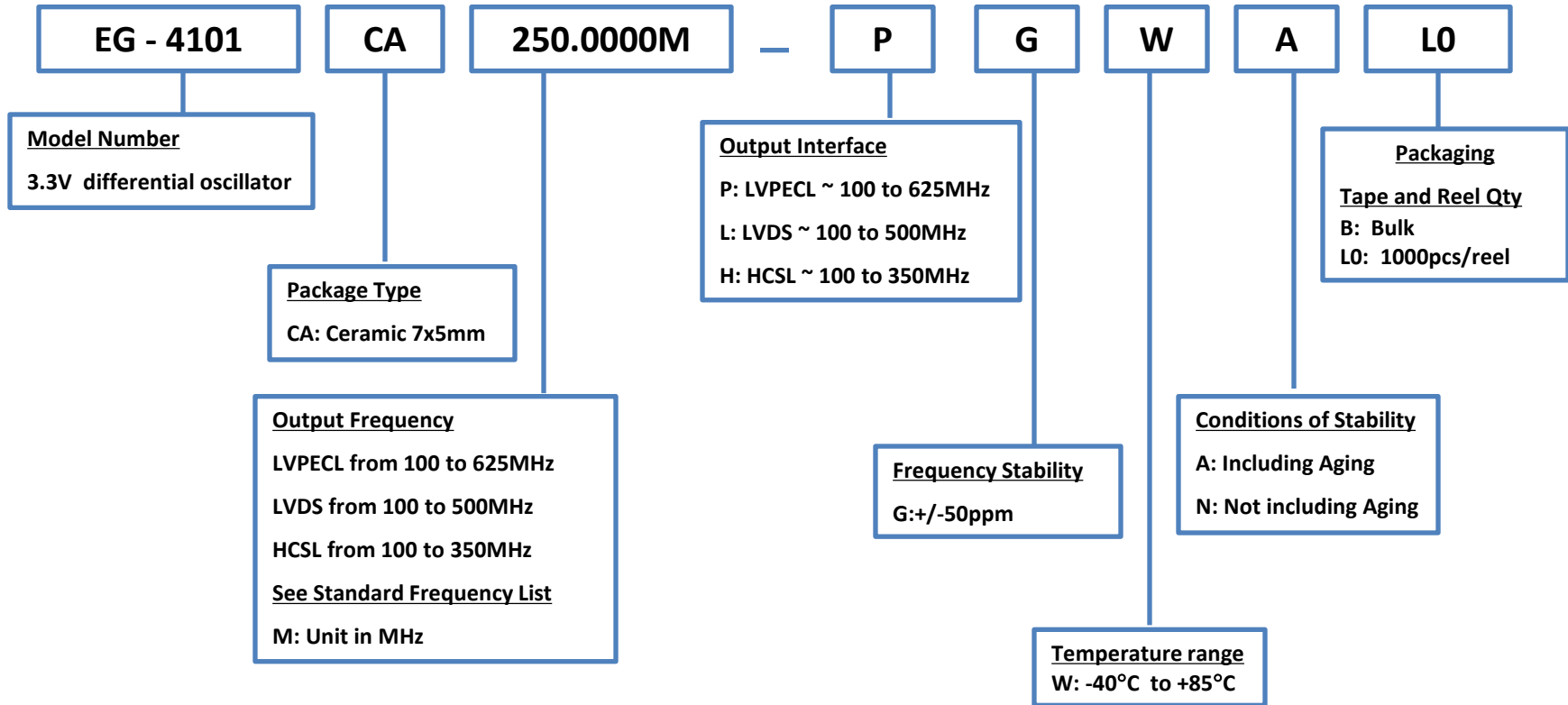
| | |
|----------|----------|
| - | 195.3125 |
| - | 196.6080 |
| 100.0000 | 200.0000 |
| 106.2500 | 212.5000 |
| 124.4160 | 248.8320 |
| 125.0000 | 250.0000 |
| 132.8125 | 265.6250 |
| 133.0000 | 266.0000 |
| 148.3517 | 296.7033 |
| 150.0000 | 300.0000 |
| 150.8072 | 301.6144 |
| 155.5200 | 311.0400 |
| 156.2500 | 312.5000 |
| 159.3750 | 318.7500 |
| 161.1328 | 322.2656 |
| 164.3555 | 328.7109 |
| 166.6286 | 333.2571 |
| 167.3316 | 334.6633 |
| 173.3707 | 346.7415 |
| 175.0000 | 350.0000 |



Product Configuration System



Crystal Oscillators – Low Jitter (SAW)



Standard Frequencies

EG-4101 (LVPECL)

| | | |
|----------|----------|--|
| 100.0000 | 400.0000 | |
| 106.2500 | 425.0000 | |
| 121.1090 | 484.4360 | |
| 133.0000 | 532.0000 | |
| 140.0000 | 560.0000 | |
| 140.6665 | 562.6660 | |
| 156.2500 | 625.0000 | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



Standard Frequencies

EG-4101 (LVDS)

| | | |
|----------|----------|--|
| 100.0000 | 400.0000 | |
| 106.2500 | 425.0000 | |
| 121.1090 | 484.4360 | |
| 133.0000 | | |
| 140.0000 | | |
| 140.6665 | | |
| 156.2500 | | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



Standard Frequencies

EG-4101 (HC SL)

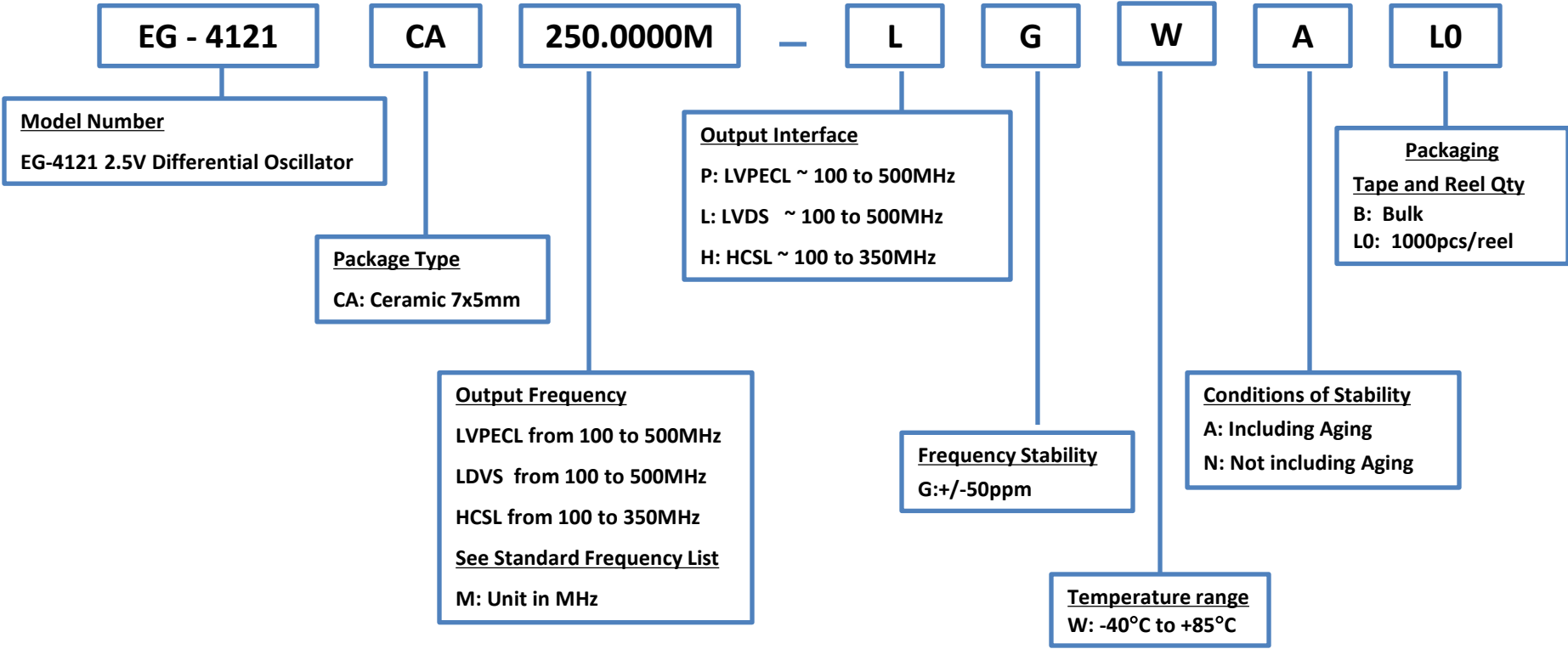
| | | |
|----------|--|--|
| 100.0000 | | |
| 106.2500 | | |
| 121.1090 | | |
| 133.0000 | | |
| 140.0000 | | |
| 140.6665 | | |
| 156.2500 | | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



Product Configuration System



Crystal Oscillators – Low Jitter (SAW)



Standard Frequencies

EG-4101 (LVPECL)

| | | |
|----------|----------|--|
| 100.0000 | 400.0000 | |
| 106.2500 | 425.0000 | |
| 121.1090 | 484.4360 | |
| 133.0000 | | |
| 140.0000 | | |
| 140.6665 | | |
| 156.2500 | | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



Standard Frequencies

EG-4101 (LVDS)

| | | |
|----------|----------|--|
| 100.0000 | 400.0000 | |
| 106.2500 | 425.0000 | |
| 121.1090 | 484.4360 | |
| 133.0000 | | |
| 140.0000 | | |
| 140.6665 | | |
| 156.2500 | | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



Standard Frequencies

EG-4101 (HC SL)

| | | |
|----------|--|--|
| 100.0000 | | |
| 106.2500 | | |
| 121.1090 | | |
| 133.0000 | | |
| 140.0000 | | |
| 140.6665 | | |
| 156.2500 | | |
| 161.1320 | | |
| 168.0407 | | |
| 170.0000 | | |
| 200.0000 | | |
| 212.5000 | | |
| 242.2180 | | |
| 266.0000 | | |
| 280.0000 | | |
| 281.3330 | | |
| 312.5000 | | |
| 322.2640 | | |
| 336.0814 | | |
| 340.0000 | | |



High-Frequency Applications for SAW Oscillators

- 75.000M Serial ATA/SAS
- 98.304M 1394b
- 100.000M PCI-Express, Serial ATA
- 106.250M Fibre Channel
- 125.000M 1GbEthernet; iSCSI, Infiniband, Hypertransport, PCI-express
- 133.000M Bus/Mem Clock, CPU
- 133.333M FB DIMM
- 150.000M Serial ATA, Serial SCSI
- 155.520M SONET OC-48
- 156.250M 10GbEthernet XAUI
- 159.375M 10GbFibre Channel XAUI
- 161.132M 10GbEthernet SERDES
- 164.355M 10GbFibre Channel SERDES
- 166.000M Bus/Mem Clock
- 200.000M Bus/Mem Clock
- 212.500M 4G Fibre Channel, 8Gb Fibre Channel, FCoE
- 250.000M Infiniband, High Speed Bus
- 312.500M 10GbE
- 500.000M High Speed Bus
- 622.080M SONET OC-192
- 625.000M 10GbEthernet XAUI, High Speed Bus
- 644.531M 10GbEthernet SERDES
- 669.326M SONET OC-192 Digital Wrapper

High Frequency Oscillator Applications

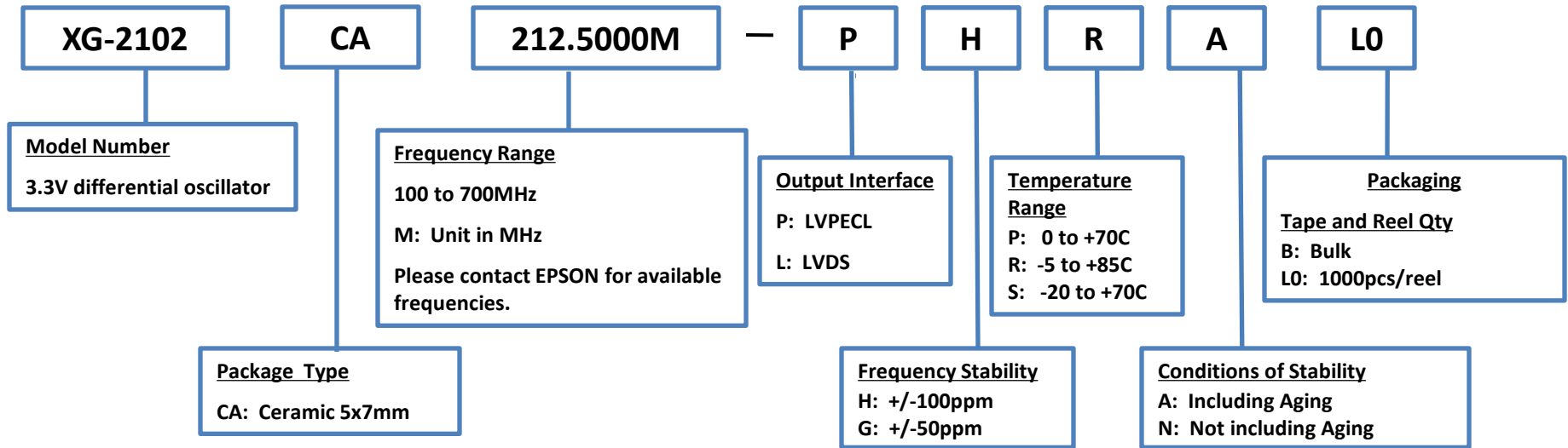
| XO / SO (MHz) | | | VCXO / VCSO (MHz) | | |
|---------------|--------------------|--|-------------------|------------|----------------|
| Fibre Channel | FC-2 | 106.2 | SONET | OC-3/12 | 19.44* |
| | FC-4/-8 | 212.5 / 425 | | OC-3/12 | 38.88* |
| | FC-10 | 159.375 | | OC-3/12/48 | 77.76* |
| Ethernet | GigE | 125 | | OC-3 | 155.52* |
| | 10 GigE/Infiniband | 125 / 250 | | w/ FEC | 166.6286 |
| | XAUI | 156.25 | | w/ FEC | 167.3316 |
| | XAUI2 | 312.5 | | OC-6 | 311.04* |
| | 10 GigE PHY | 161.1328 322.2656 644.5312 | | w/ FEC | 333.2572 |
| PCI-Express | Phase 1 | 100 | | w/ FEC | 334.6632 |
| | Phase 2 | 200 | | OC-12 | 622.08 |
| | Phase 3 | 400 | w/ FEC | 666.5144 | |
| Storage | SATA 1 | 75 / 150 | w/ FEC | 669.3264 | |
| | SATA 2 | 150 / 300 | OC-48 | 2488.32 | |
| | SAS 1 | 75 / 150 | | | |
| | SAS 2 | 150 / 300 | | | |
| Computer | Bus / Mem Clock | 100 / 125 / 133.33 / 166.66 200 / 266.67 | | | * XO / SO also |

Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended

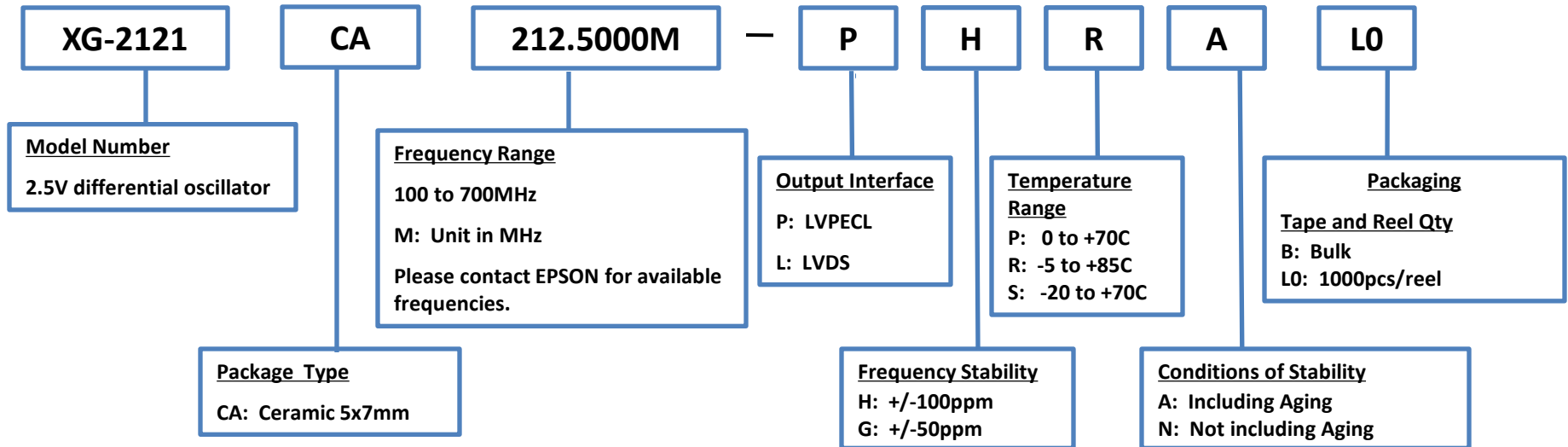


Product Configuration System



Crystal Oscillators – Low Jitter (SAW)

Not Recommended

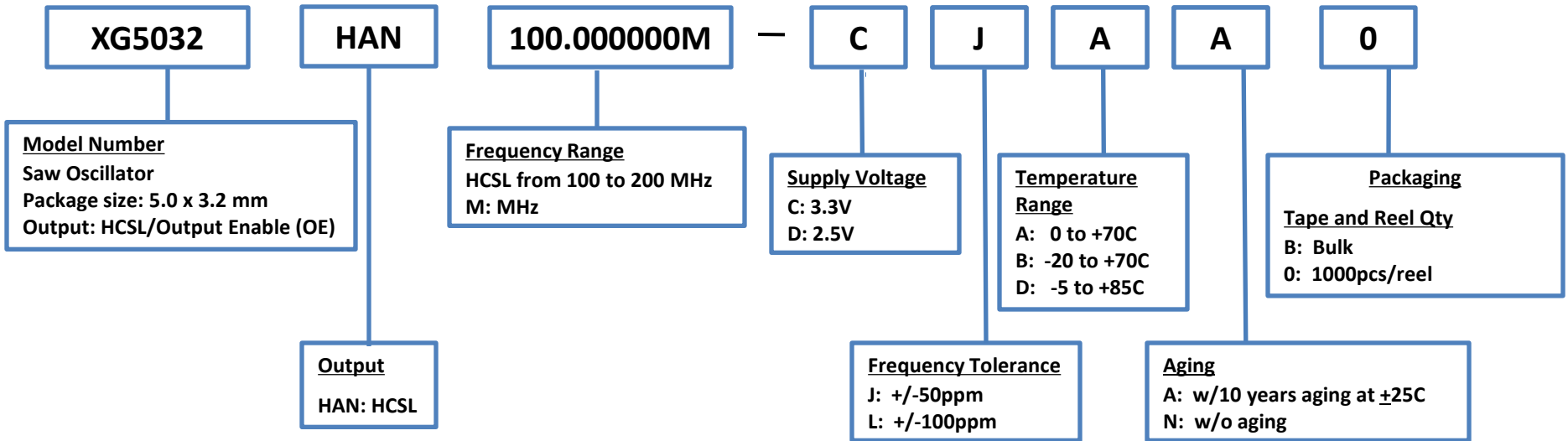


Product Configuration System



Low-Jitter SAW Oscillator (SPSO)

Not Recommended



Unavailable Combinations
JDA and JBA

Product Configuration Guide

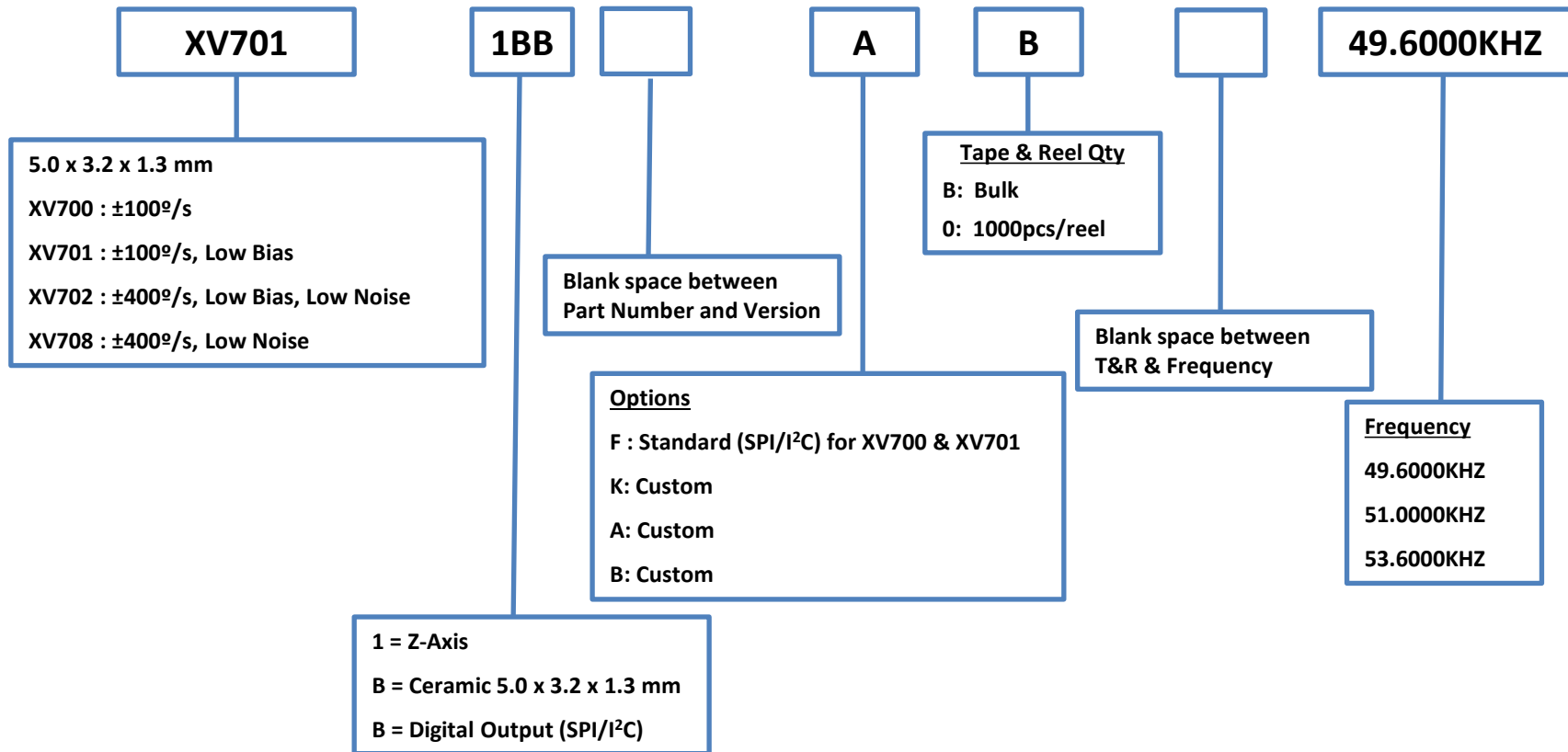
GYRO Sensors



Product Configuration System



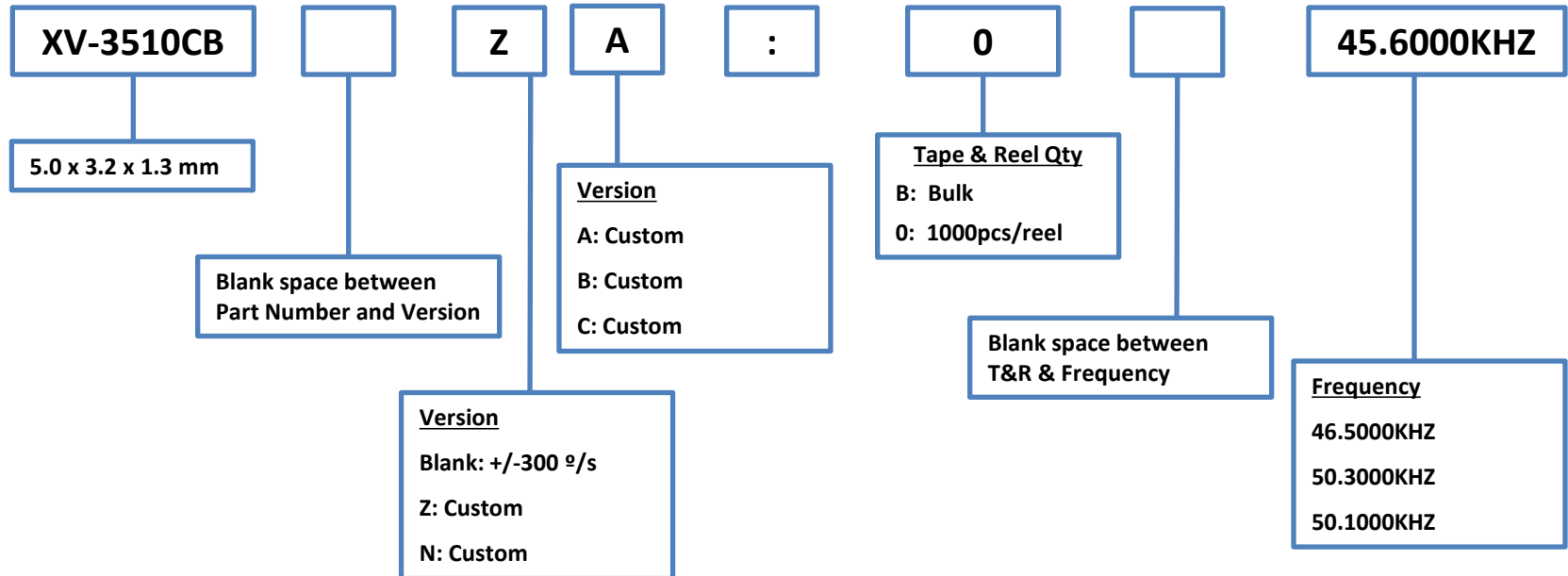
Gyro Sensor – Digital Output



Product Configuration System



Gyro Sensor – Analog Output

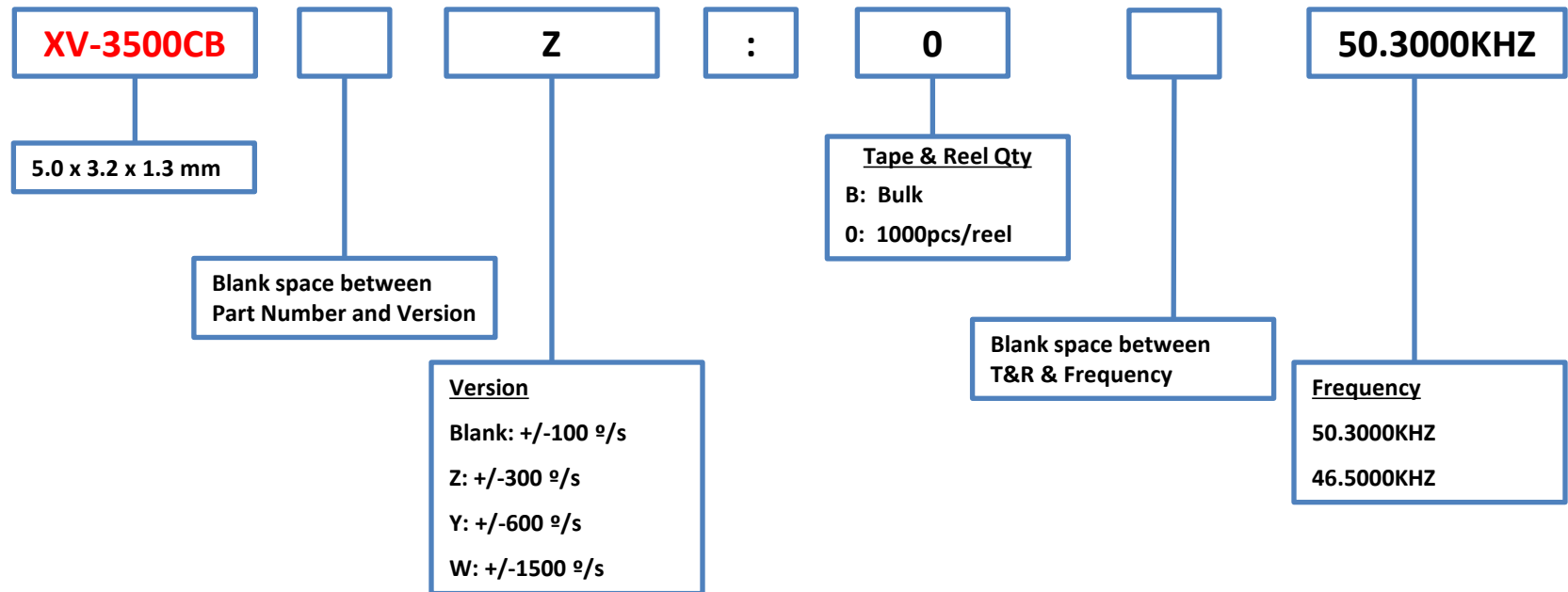


Product Configuration System



Gyro Sensor – Analog Output

Discontinued

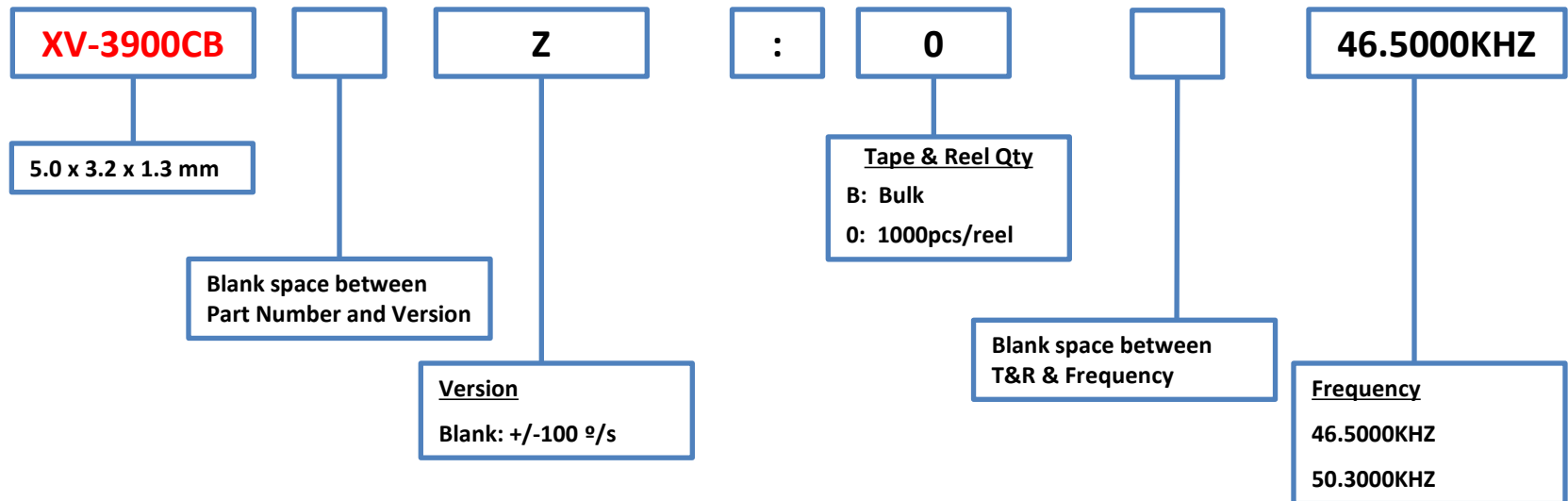


Product Configuration System



Gyro Sensor – Analog Output

Discontinued



Product Configuration Guide

Appendix

Product Configuration System

Crystal Units Load Cap Codes and Values (as of March 2014)

| Load Cap Code | Load Cap Value |
|---------------|----------------|
| AZ | 3.5 |
| VJ | 4.0 |
| EE | 4.4 |
| AT | 4.8 |
| X | 5.0 |
| JJ | 5.4 |
| E | 6.0 |
| FF | 6.4 |
| DD | 6.5 |
| VC | 6.7 |
| AG | 7.0 |
| AR | 7.1 |
| JK | 7.4 |
| VB | 7.6 |
| AN | 7.8 |
| AJ | 8.0 |
| AS | 8.5 |
| CC | 8.7 |
| GG | 8.8 |
| AC | 9.0 |
| AM | 9.2 |

| Load Cap Code | Load Cap Value |
|---------------|----------------|
| AL | 9.5 |
| S | 9.6 |
| VF | 9.8 |
| K | 10.0 |
| HH | 10.4 |
| AK | 10.5 |
| AP | 10.7 |
| P | 11.0 |
| AY | 11.2 |
| AW | 11.5 |
| W | 12.0 |
| A | 12.5 |
| T | 13.0 |
| N | 13.5 |
| Y | 14.0 |
| VH | 14.5 |
| R | 15.0 |
| B | 16.0 |
| AV | 17.0 |
| C | 18.0 |
| L | 18.3 |

| Load Cap Code | Load Cap Value |
|---------------|----------------|
| J | 18.5 |
| AQ | 19.0 |
| G | 20.0 |
| AF | 21.5 |
| D | 22.0 |
| AU | 22.5 |
| AE | 22.9 |
| AH | 23.0 |
| V | 24.0 |
| AI | 25.0 |
| Z | 26.0 |
| AA | 27.0 |
| Q | 28.0 |
| AB | 30.0 |
| H | 32.0 |
| I | 33.0 |
| U | 47.0 |
| AD | 50.0 |
| M | 100.0 |
| F | Series |