

DATA SHEET

Multi-Layer Chip Varistors (MLV)

- DESCRIPTION

Yageo Multilayer Chip Varistors (MLV) are designed to protect sensitive electronics devices against high voltage transient surges in the low voltage region. They offer excellent transient energy absorption due to improved energy volume distribution and power dissipation. The wide operating voltage and energy range make them suitable for numerous applications on Vcc protection, I/O protection, Keyboard protection, LCD protection and Sensor protection...etc.

- FEATURES

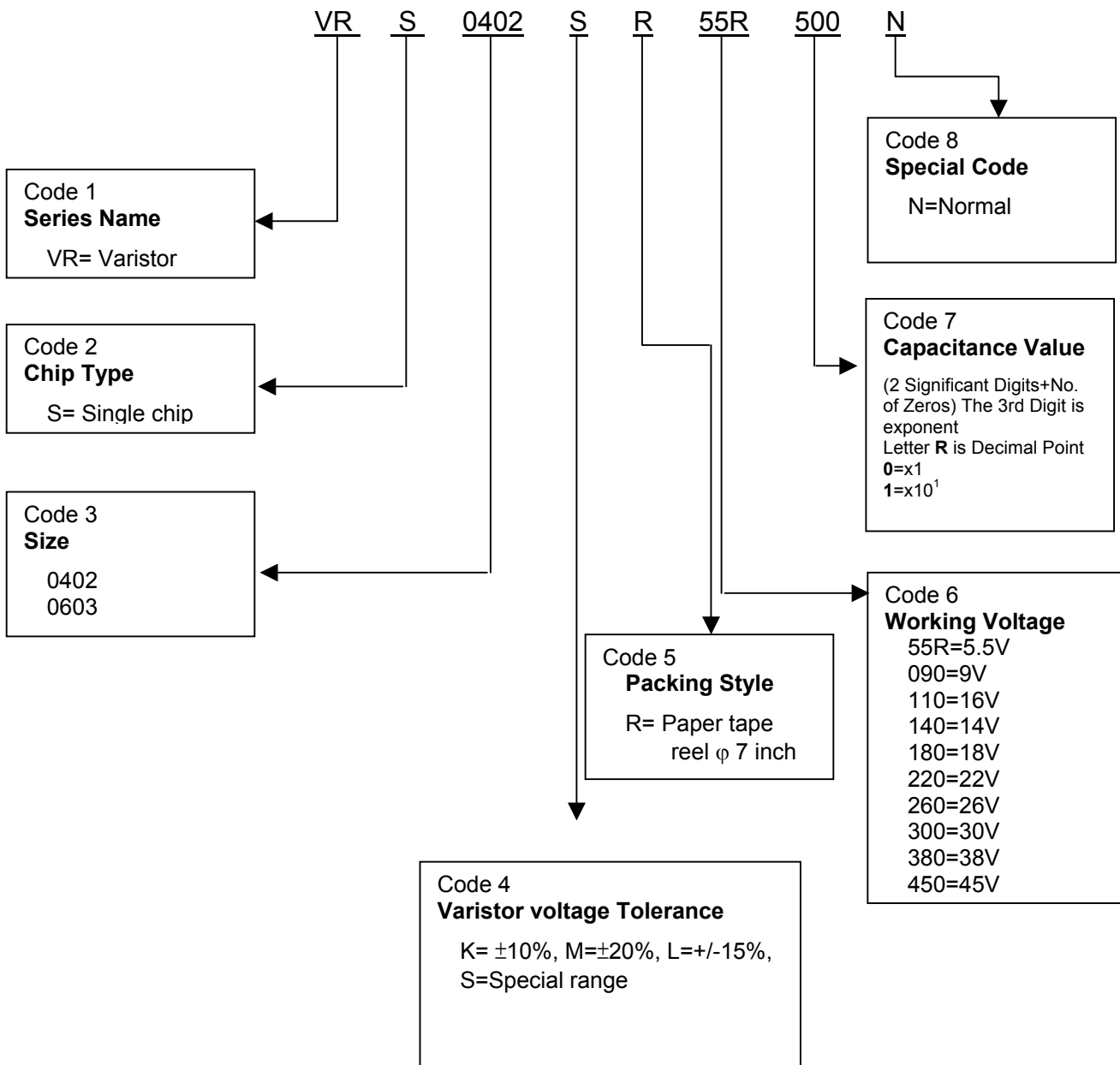
1. Excellent clamping voltage
2. Excellent energy dissipation capability
3. Quick response time (<1n sec.)
4. Adjustable capacitance values
5. High reliability
6. High transient current capability
7. Symmetrical Voltage-Current characteristics

- APPLICATIONS

Major application areas for Yageo's Phycomp-branded Multilayer Chip Varistors (MLV) series include:

- Consumer electronic equipment
- Telecommunications
- Notebook

Ordering information



• **DEVICE RATING AND SPECIFICATIONS**

Table 1
0402

| Phycomp Part number | Size | Varistor voltage/ Breakdown Voltage | Maximum Continuous Voltage/ Working Voltage | Clamping Voltage | | Peak current | Resistance | | Capacitance @ 1 V(rms) (pF) | |
|------------------------|--------|--|---|---------------------|--------------|-----------------|----------------|-------------------------------------|---------------------------------------|------|
| | | DC @1mA | D.C | 8/20 μ s | 8/20 μ s | R.T.(15~35°C) | | | | |
| | (Inch) | (V) | (V) max. | (V) max. | (A) | (A) max. | Voltage (V) | Resistance (M Ω) min. | 1KHz | 1MHz |
| VRS0402MR55R651N | 0402 | 6.4~9.6 | 5.5 | 14 | 1 | 30 | 3 | 1 | 650 | 390 |
| VRS0402MR55R331N | 0402 | 6.4~9.6 | 5.5 | 15 | 1 | 30 | 3 | 1 | 330 | 200 |
| VRS0402KR090500N | 0402 | 10.2~13.8 | 9 | 22 | 1 | 20 | 3 | 1 | 50 | 30 |
| VRS0402KR090101N | 0402 | 10.2~13.8 | 9 | 22 | 1 | 20 | 3 | 1 | 100 | 60 |
| VRS0402LR090201N | 0402 | 10.2~13.8 | 9 | 22 | 1 | 20 | 3 | 1 | 200 | 120 |
| VRS0402LR110181N | 0402 | 12.75~17.25 | 11 | 27 | 1 | 20 | 3 | 1 | 180 | 110 |
| VRS0402LR140161N | 0402 | 15.3~20.7 | 14 | 33 | 1 | 20 | 3 | 1 | 160 | 96 |
| VRS0402KR160121N | 0402 | 19.8~24.2 | 16 | 40 | 1 | 18 | 3 | 1 | 120 | 72 |
| VRS0402KR180900N | 0402 | 21.6~26.4 | 18 | 44 | 1 | 14 | 3 | 1 | 90 | 54 |
| VRS0402KR220820N | 0402 | 24.3~29.7 | 22 | 49 | 1 | 14 | 3 | 1 | 82 | 50 |
| VRS0402KR260550N | 0402 | 29.7~36.3 | 26 | 60 | 1 | 10 | 3 | 1 | 55 | 33 |
| VRS0402KR300400N | 0402 | 35.1~42.9 | 30 | 71 | 1 | 8 | 3 | 1 | 40 | 24 |
| VRS0402SR55R220N | 0402 | 10~14 | 5.5 | 22 | 1 | 2 | 3 | 1 | 22 | 13 |
| VRS0402SR55R330N | 0402 | 10~14 | 5.5 | 22 | 1 | 4 | 3 | 1 | 33 | 20 |
| VRS0402SR55R500N | 0402 | 10~14 | 5.5 | 22 | 1 | 6 | 3 | 1 | 50 | 30 |
| VRS0402SR55R680N | 0402 | 10~14 | 5.5 | 22 | 1 | 8 | 3 | 1 | 68 | 41 |
| VRS0402SR55R820N | 0402 | 10~14 | 5.5 | 22 | 1 | 9 | 3 | 1 | 82 | 49 |
| VRS0402SR55R101N | 0402 | 10~14 | 5.5 | 22 | 1 | 11 | 3 | 1 | 100 | 60 |
| VRS0402SR55R601N | 0402 | 10~14 | 5.5 | 22 | 1 | 65 | 3 | 1 | 600 | 360 |
| VRS0402SR140500N | 0402 | 18~24 | 14 | 38 | 1 | 7 | 3 | 1 | 50 | 30 |
| VRS0402SR140101N | 0402 | 18~24 | 14 | 38 | 1 | 15 | 3 | 1 | 100 | 60 |
| VRS0402SR180820N | 0402 | 24~32 | 18 | 51 | 1 | 2 | 3 | 1 | 82 | 49 |
| VRS0402SR180120N | 0402 | 24~32 | 18 | 51 | 1 | 2 | 3 | 1 | 12 | 7 |
| VRS0402SR180150N | 0402 | 24~32 | 18 | 51 | 1 | 3 | 3 | 1 | 15 | 9 |
| VRS0402SR180270N | 0402 | 24~32 | 18 | 51 | 1 | 5 | 3 | 1 | 27 | 16 |
| VRS0402SR180121N | 0402 | 24~32 | 18 | 51 | 1 | 20 | 3 | 1 | 120 | 72 |
| VRS0402SR180181N | 0402 | 24~32 | 18 | 51 | 1 | 20 | 3 | 1 | 180 | 108 |
| VRS0402SR180030N | 0402 | 38~46 | 18 | 76 | 1 | 3 | 3 | 1 | 3 | 1.8 |

Fig2. Clamping Volatge

- ESD Test
 - Standard IEC 61000-4-2
 - ESD discharge circuit according to IEC 61000-4-2

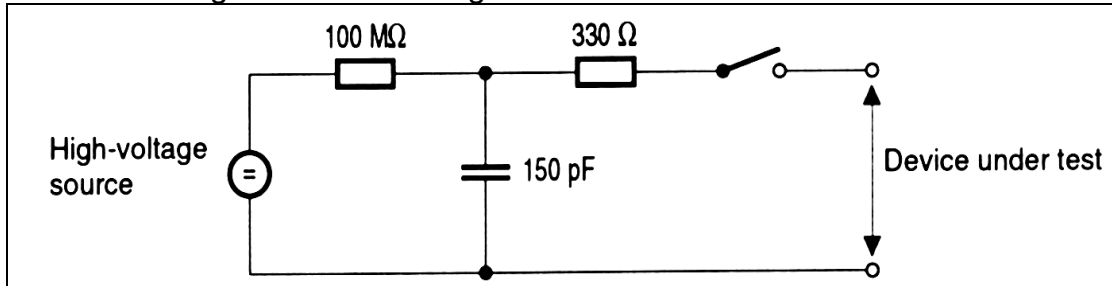
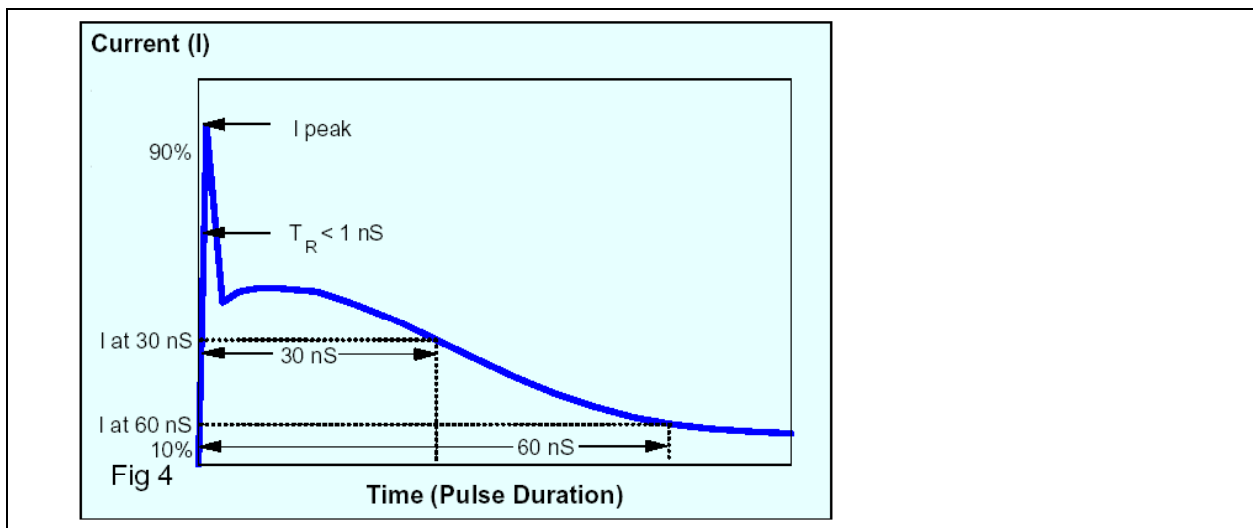


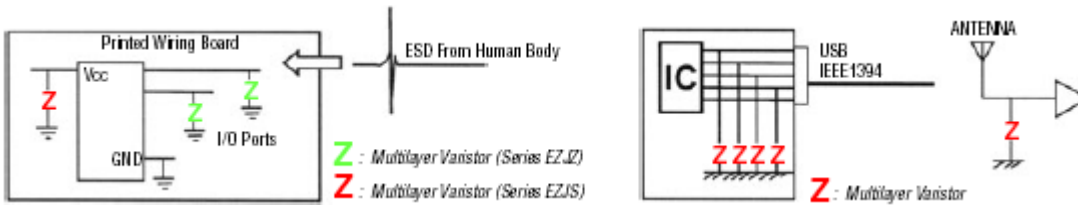
Fig3. ESD discharge circuit

- ESD discharge current according to IEC 61000-4-2 as fig 4

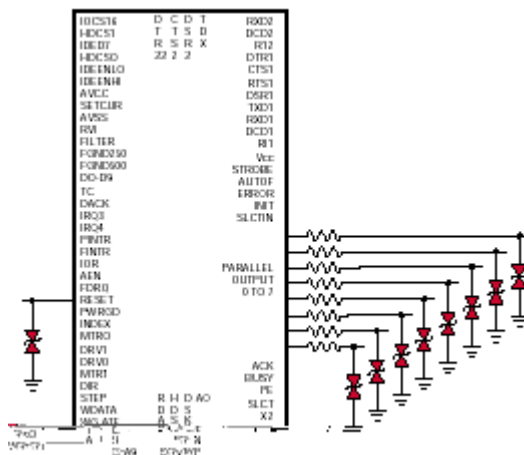


- Specification of Electrostatic discharge (ESD) Test:
According to Standard EN 61000-4-2 , Up to 15KV(Air discharge).

- APPLICATION EXAMPLES



SUB NOTEBOOK & PDA'S



NOTEBOOK & WORK STATION

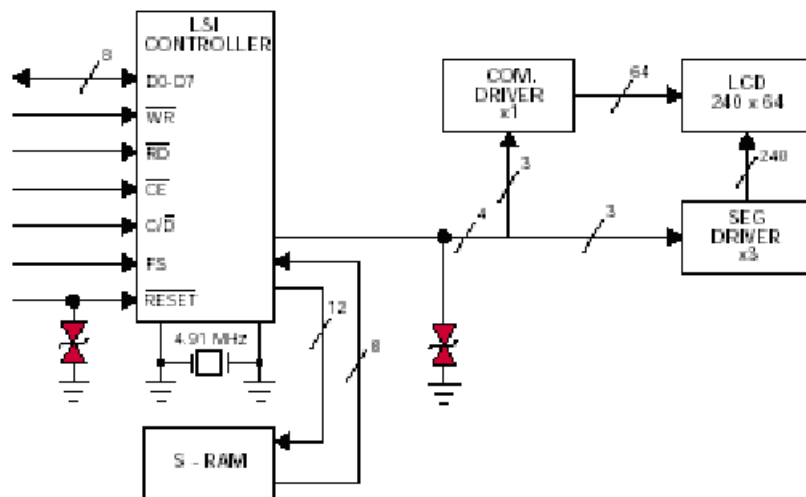
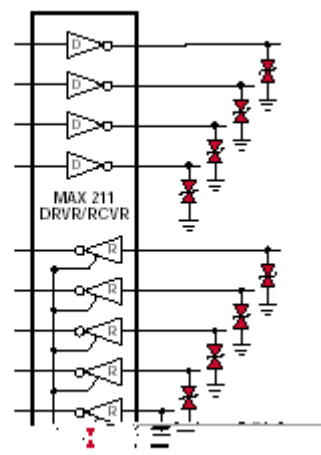


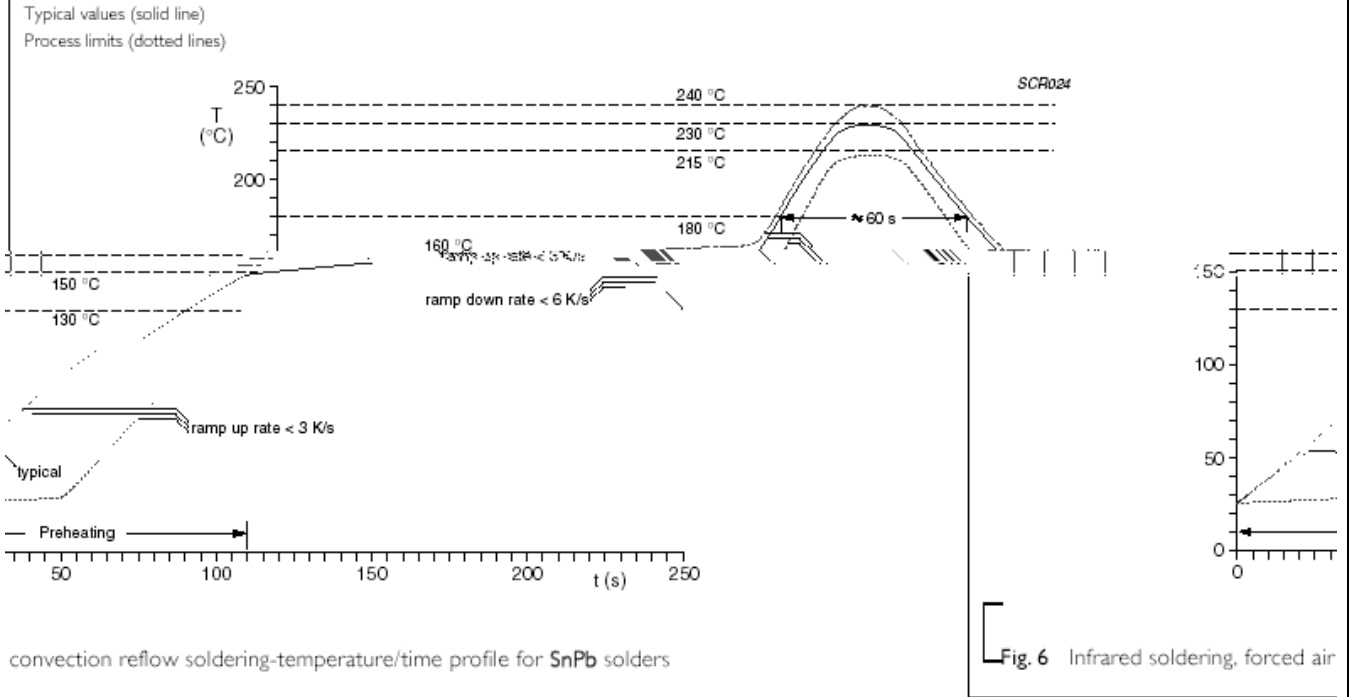
Fig 5.Appl. Example

• Competitor Cross Reference

| Yageo part number | Innochips | Littelfuse | TDK | Amotech | EPCOS | AVX |
|-------------------|-----------------|----------------------------|--|--------------|------------|--------------|
| VRS0402MR55R331N | ICVN0505X150 | V5.5MLA0402 | AVR-M1005C080M-AAB AVR-M1005C080M-ADB | AVL5M02200 | | VC040205X150 |
| VRS0402LR090201N | ICVN0509X200 | | AVR-M1005C120M-AAB | AVL8M02200 | | VC040209X200 |
| VRS0402LR110181N | | V9MLA0402 | | AVL11L02200 | | |
| VRS0402LR140161N | | V5.5MLA0402L V14MLA0402 | | AVL14K0200 | | VC040214X300 |
| VRS0402KR160121N | ICVN0514X300 | | | | | |
| VRS0402KR180900N | | | | AVL18K02200 | CT0402L14G | VC040218X400 |
| VRS0402KR220820N | | V18MLA0402 | AVR-M1005C270M-AAB | | | |
| VRS0402KR260550N | ICVN0518X400 | | | | | |
| VRS0402SR55R500N | ICVL0505600V150 | | | AVLC5S02050 | | |
| VRS0402SR55R101N | ICVL0505101V150 | | | AVLC5S02100 | | |
| VRS0402SR140500N | | | | AVLC14S02050 | | |
| VRS0402SR140101N | | | | AVLC14S02100 | | |
| VRS0402SR180120N | ICVL0518100Y500 | | | | | |
| VRS0402SR180150N | ICVL0518150Y500 | | | AVLC18S02015 | | |
| VRS0402SR180270N | ICVL0518400Y500 | | | | | |
| VRS0402SR300030N | ICVL0518030 | | | AVLC18S02003 | | |
| VRS0603MR55R801N | ICVN1005A150 | V5.5MLA0603 | AVR-M1608C080M-AAB | AVL5M03300 | CT0603M4G | VC060305A150 |
| VRS0603LR090681N | ICVN1009A200 | | AVR-M1608C120M-6AB AVR-M1608C120M-2AB | AVL8M03300 | CT0603M6G | VC060309A200 |
| VRS0603LR110481N | | V9MLA0603 | | AVL11L03300 | CT0603L8G | |
| VRS0603LR140361N | ICVN1014A300 | V14MLA0603 | AVR-M1608C180M-6AB | AVL14K03300 | CT0603K11G | VC060314A300 |
| VRS0603KR180301N | | | | AVL18K03300 | CT0603K14G | VC060318A400 |
| VRS0603KR220241N | ICVN1018A400 | V18MLA0603 | AVR-M1608C270K-6AB AVR-M1608C270K-2AB | | CT0603K17G | |
| VRS0603KR260201N | | | | | CT0603K20G | VC060326A580 |
| VRS0603KR300121N | ICVN1030A650 | V26MLA0603 | | | | |
| VRS0603KR380101N | ICVN1026A580 | V30MLA0603 | | | | |

• **Soldering condition**

Typical examples of soldering processes that provide reliable joints without any damage are given in fig. 6, 7 & 8



Typical values (solid line)
Process limits (dotted lines)

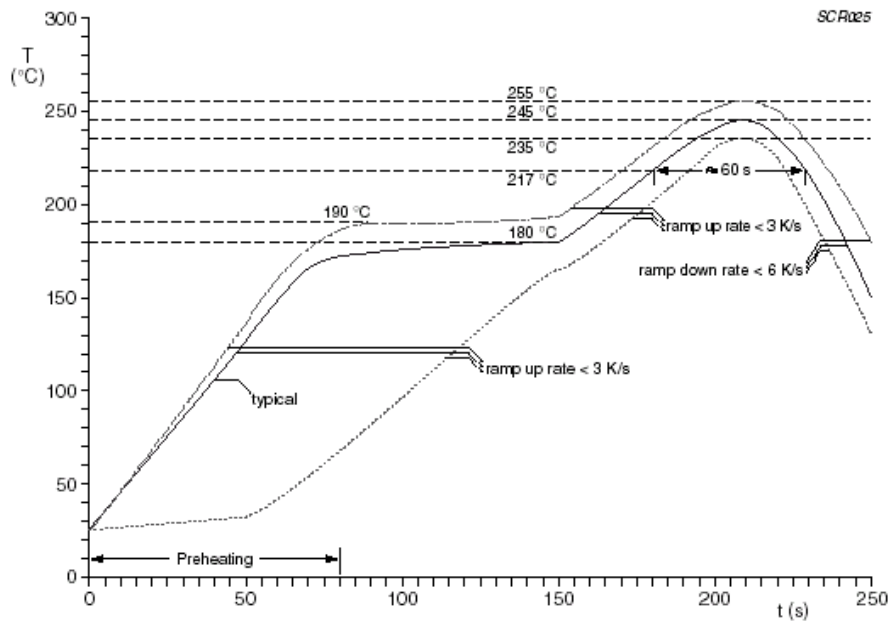


Fig. 7 Infrared soldering, forced air convection reflow soldering-temperature/time profile for SnAgCu solders

Typical values (solid line)
 Process limits (dotted lines)
 The resistors may be soldered twice in accordance with this method if desired

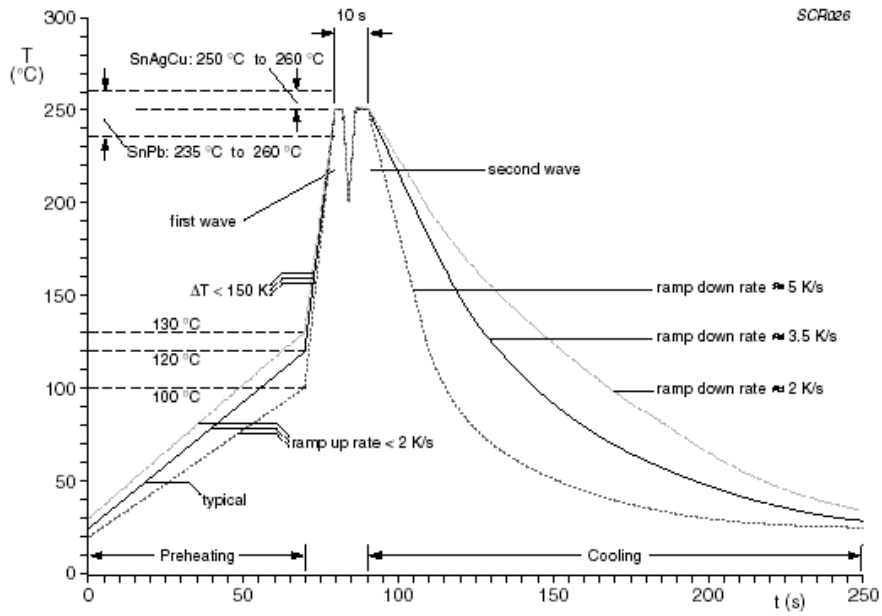


Fig. 8 Double wave soldering for SnPb and leadfree SnAgCu solder- temperature/time profile (terminal temperature)

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