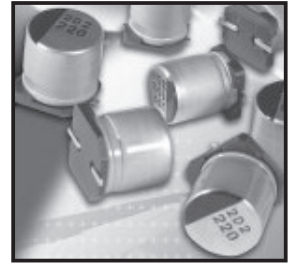




FEATURES

- CYLINDRICAL V-CHIP CONSTRUCTION FOR SURFACE MOUNTING
 - HIGH TEMPERATURE, EXTEND LIFE (5000 HOURS @ 105°C)
 - 4X6.3mm ~ 18X22mm CASE SIZES
 - DESIGNED FOR REFLOW SOLDERING
 - MEETS THE REQUIREMENTS OF AEC-Q200*
- *Contact NIC for supporting test data

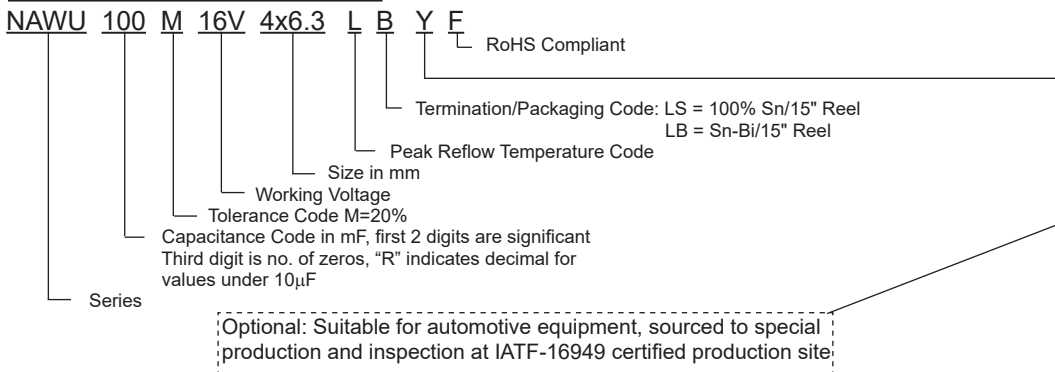
*Expanded
Capacitance/Voltage
Range*



CHARACTERISTICS

| | | | | | | | | | | | | |
|---|------------------------------------|--|------|------|------|------|------|------|-----|--------------------------|------|--|
| Rated Voltage Range | 6.3 ~ 400Vdc | | | | | | | | | | | |
| Rate Capacitance Range | 1.0 ~ 220µF | | | | | | | | | | | |
| Operating Temp. Range | -40°C ~ +105°C | | | | | | | | | | | |
| Capacitance Tolerance | ±20% (M) | | | | | | | | | | | |
| Max. Leakage Current After 2 Minutes @ 20°C | 0.01CV or 3µA whichever is greater | | | | | | | | | ≤ 1000µF = 0.03CV + 15µA | | |
| Tan δ @120Hz/20°C | W.V. (Vdc) | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 160 | 200 | 400 | |
| | S.V.(Vdc) | 8 | 13 | 20 | 32 | 44 | 63 | 125 | 200 | 250 | 450 | |
| | Tan δ | 0.30 | 0.24 | 0.20 | 0.16 | 0.14 | 0.14 | 0.18 | 0.2 | 0.2 | 0.25 | |
| Low Temperature Stability Impedance Ratio @ 120Hz | W.V. (Vdc) | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 160 | 200 | 400 | |
| | Z-25°C/Z+20°C | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 6 | |
| | Z-40°C/Z+20°C | 10 | 7 | 5 | 3 | 3 | 3 | 3 | 6 | 6 | 10 | |
| Load Life Test @ 105°C 5,000hrs | Capacitance Change | Within ± 30% of initial measured value | | | | | | | | | | |
| | Tan δ | Less than 300% of specified max. value | | | | | | | | | | |
| | Leakage Current | Less than specified max. value | | | | | | | | | | |

PART NUMBER SYSTEM



PEAK REFLOW TEMPERATURE CODES

| Code | Peak Reflow Temperature |
|------|-------------------------|
| L | 250°C |
| K | 245°C |
| J | 240°C |
| H | 235°C |
| G | 230°C |

TERMINATION FINISH & PACKAGING OPTIONS CODES

| Code | Finish & Reel Size |
|------|---------------------------|
| LB | Sn-Bi Finish & 15" Reel |
| LS | 100% Sn Finish & 15" Reel |

Note: 16mm & 18mm diameter parts are only available with Sn finish

PRECAUTIONS

Please review the notes on correct use, safety and precautions found at <https://www.niccomp.com/resource/files/aluminum/AlumApplInfoCautions.pdf> If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: tpmg@niccomp.com



**STANDARD VALUES, PART NUMBERS AND
MAXIMUM RIPPLE CURRENT**

| Part Number | W.V. (Vdc) | Cap. (μ F) | Dissipation Factor (Tan δ) | Ripple Current Rating (mA @ 105°C/120Hz) | Load Life Hours @ +105°C |
|-------------------------|---------------|--------------------|---------------------------------------|---|-----------------------------|
| NAWU330M6.3V5X6.3LLBF | 6.3 | 33 | 0.30 | 35 | 5,000 |
| NAWU470M6.3V5X6.3LLBF | | 47 | 0.30 | 38 | 5,000 |
| NAWU101M6.3V6.3X6.3LLBF | | 100 | 0.30 | 69 | 5,000 |
| NAWU221M6.3V6.3X8LLBF | | 220 | 0.30 | 101 | 5,000 |
| NAWU220M10V5X6.3LLBF | 10 | 22 | 0.24 | 30 | 5,000 |
| NAWU330M10V5X6.3LLBF | | 33 | 0.24 | 35 | 5,000 |
| NAWU470M10V6.3X6.3LLBF | | 47 | 0.24 | 50 | 5,000 |
| NAWU101M10V6.3X8LLBF | | 100 | 0.24 | 81 | 5,000 |
| NAWU100M16V4X6.3LLBF | 16 | 10 | 0.20 | 18 | 5,000 |
| NAWU220M16V5X6.3LLBF | | 22 | 0.20 | 30 | 5,000 |
| NAWU330M16V6.3X6.3LLBF | | 33 | 0.20 | 48 | 5,000 |
| NAWU470M16V6.3X6.3LLBF | | 47 | 0.20 | 50 | 5,000 |
| NAWU101M16V6.3X8LLBF | | 100 | 0.20 | 81 | 5,000 |
| NAWU100M25V5X6.3LLBF | 25 | 10 | 0.16 | 25 | 5,000 |
| NAWU220M25V6.3X6.3LLBF | | 22 | 0.16 | 42 | 5,000 |
| NAWU330M25V6.3X6.3LLBF | | 33 | 0.16 | 50 | 5,000 |
| NAWU470M25V6.3X8LLBF | | 47 | 0.16 | 63 | 5,000 |
| NAWU4R7M35V4X6.3LLBF | 35 | 4.7 | 0.14 | 16 | 5,000 |
| NAWU100M35V5X6.3LLBF | | 10 | 0.14 | 27 | 5,000 |
| NAWU220M35V6.3X6.3LLBF | | 22 | 0.14 | 44 | 5,000 |
| NAWU330M35V6.3X8LLBF | | 33 | 0.14 | 57 | 5,000 |
| NAWU1R0M50V4X6.3LLBF | 50 | 1.0 | 0.14 | 8.0 | 5,000 |
| NAWU2R2M50V4X6.3LLBF | | 2.2 | 0.14 | 11 | 5,000 |
| NAWU3R3M50V4X6.3LLBF | | 3.3 | 0.14 | 14 | 5,000 |
| NAWU4R7M50V5X6.3LLBF | | 4.7 | 0.14 | 19 | 5,000 |
| NAWU100M50V6.3X6.3LLBF | | 10 | 0.14 | 32 | 5,000 |
| NAWU220M50V6.3X8LLBF | | 22 | 0.14 | 49 | 5,000 |
| NAWU100M160V10X10.8JLBF | 160 | 10 | 0.20 | 43 | 5,000 |
| NAWU220M160V12.5X14HLBF | | 22 | 0.20 | 112 | 5,000 |
| NAWU330M160V12.5X14HLBF | | 33 | 0.20 | 137 | 5,000 |
| NAWU470M160V16X17GLSF | | 47 | 0.20 | 180 | 5,000 |
| NAWU680M160V16X17GLSF | | 68 | 0.20 | 215 | 5,000 |
| NAWU820M160V16X17GLSF | | 82 | 0.20 | 235 | 5,000 |
| NAWU101M160V18X17.5GLSF | | 100 | 0.20 | 320 | 5,000 |
| NAWU121M160V18X22GLSF | | 120 | 0.20 | 340 | 5,000 |
| NAWU3R3M200V8X10.8JLBF | 200 | 3.3 | 0.20 | 31 | 5,000 |
| NAWU4R7M200V8X10.8JLBF | | 4.7 | 0.20 | 37 | 5,000 |
| NAWU100M200V10X10.8JLBF | | 10 | 0.20 | 43 | 5,000 |
| NAWU220M200V12.5X14HLBF | | 22 | 0.20 | 112 | 5,000 |
| NAWU330M200V12.5X14HLBF | | 33 | 0.20 | 137 | 5,000 |
| NAWU470M200V16X17GLSF | | 47 | 0.20 | 180 | 5,000 |
| NAWU680M200V16X17GLSF | | 68 | 0.20 | 215 | 5,000 |
| NAWU680M200V18X17.5GLSF | | 68 | 0.20 | 270 | 5,000 |
| NAWU101M200V18X22GLSF | | 100 | 0.20 | 330 | 5,000 |
| NAWU2R2M400V8X10.8JLBF | | 400 | 2.2 | 0.25 | 25 |
| NAWU3R3M400V10X10.8JLBF | 3.3 | | 0.25 | 36 | 5,000 |
| NAWU4R7M400V10X10.8JLBF | 4.7 | | 0.25 | 38 | 5,000 |
| NAWU100M400V12.5X14HLBF | 10 | | 0.25 | 57 | 5,000 |
| NAWU220M400V16X17GLSF | 22 | | 0.25 | 115 | 5,000 |
| NAWU270M400V18X17.5GLSF | 27 | | 0.25 | 125 | 5,000 |
| NAWU330M400V18X22GLSF | 33 | | 0.25 | 160 | 5,000 |

For Automotive Equipment see part number system

**RIPPLE CURRENT
FREQUENCY CORRECTION FACTOR**

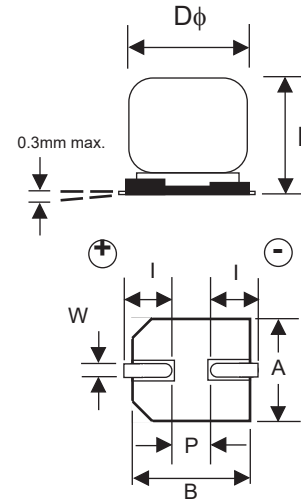
| Frequency Hz | 100 ≤ F < 1K | 1K ≤ F < 10K | 10K ≤ F < 100K | 100K ≤ F |
|-----------------|--------------|--------------|----------------|----------|
| C ≤ 4.7 | 1.00 | 1.30 | 1.50 | 1.80 |
| 4.7 < C ≤ 33 | 1.00 | 1.20 | 1.30 | 1.45 |
| 33 < C | 1.00 | 1.10 | 1.20 | 1.30 |
| All 160V ~ 400V | 50 | 120 | 300 | 1K |
| | 0.75 | 1.00 | 1.20 | 1.30 |

STANDARD PRODUCTS AND CASE SIZE TABLE D x L (mm)

| Cap (μF) | Code | Working Voltage (Vdc) | | | | | | | | | |
|----------|------|-----------------------|---------|---------|---------|---------|---------|-----|---------|---------|---------|
| | | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 160 | 200 | 400 |
| 1.0 | 1R0 | - | - | - | - | - | 4X6.3 | - | - | - | - |
| 2.2 | 2R2 | - | - | - | - | - | 4X6.3 | - | - | - | 8X10.8 |
| 3.3 | 3R3 | - | - | - | - | - | 4X6.3 | - | - | 8X10.8 | 10X10.8 |
| 4.7 | 4R7 | - | - | - | - | 4X6.3 | 5X6.3 | - | - | 8X10.8 | 10X10.8 |
| 10 | 100 | - | - | 4X6.3 | 5X6.3 | 5X6.3 | 6.3X6.3 | - | 10X10.8 | 10X10.8 | 12.5X14 |
| 22 | 220 | - | 5X6.3 | 5X6.3 | 5X6.3 | 6.3X6.3 | 6.3X8 | - | 12.5X14 | 12.5X14 | 16X17 |
| 27 | 270 | - | - | - | - | - | - | - | - | - | 18X17.5 |
| 33 | 330 | 5X6.3 | 5X6.3 | 6.3X6.3 | 6.3X6.3 | 6.3X8 | - | - | 12.5X14 | 12.5X14 | 18X22 |
| 47 | 470 | 5X6.3 | 6.3X6.3 | 6.3X6.3 | 6.3X8 | - | - | - | 16X17 | 16X17 | - |
| 68 | 680 | - | - | - | - | - | - | - | 16X17 | 16X17 | - |
| | | | | | | | | | | 18X17.5 | - |
| 82 | 820 | - | - | - | - | - | - | - | 16X17 | - | - |
| 100 | 101 | 6.3X6.3 | 6.3X8 | 6.3X8 | - | - | - | - | 18X17.5 | 18X22 | - |
| 120 | 121 | - | - | - | - | - | - | - | 18X22 | - | - |
| 220 | 221 | 6.3X8 | - | - | - | - | - | - | - | - | - |

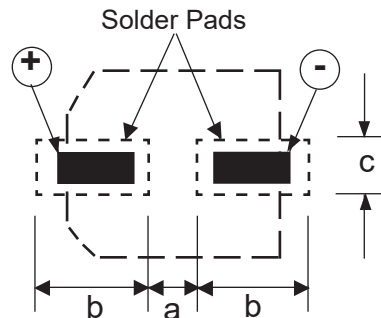
DIMENSIONS D x L (mm)

| Case Size | φD | L max.* | A ± 0.2 | B ± 0.2 | I ± 0.2 | W | P ± 0.2 |
|------------|------|---|---------|---------|---------|-----------|---------|
| 4x6.3(6.1) | 4.0 | 6.3 | 4.3 | 4.3 | 1.8 | 0.5 ~ 0.8 | 1.0 |
| 5x6.3 | 5.0 | 6.3 | 5.3 | 5.3 | 2.2 | 0.5 ~ 0.8 | 1.3 |
| 6.3x6.3 | 6.3 | 6.3 | 6.6 | 6.6 | 2.5 | 0.5 ~ 0.8 | 1.8 |
| 6.3X8 | 6.3 | 8.0 | 6.6 | 6.6 | 2.5 | 0.5 ~ 0.8 | 2.2 |
| 8x10.5 | 8.0 | 10.5 | 8.3 | 8.3 | 2.9 | 0.7 ~ 1.1 | 3.2 |
| 8x10.8 | 8.0 | 10.8 | 8.3 | 8.3 | 2.9 | 0.7 ~ 1.1 | 3.2 |
| 10x10.8 | 10.0 | 10.8 | 10.3 | 10.3 | 3.2 | 0.7 ~ 1.4 | 4.6 |
| 12.5x14 | 12.5 | 14 | 12.8 | 12.8 | 4.5 | 1.0 ~ 1.4 | 4.6 |
| 16x17 | 16 | 17 | 16.3 | 16.3 | 5.5 | 1.8 ~ 2.1 | 7.0 |
| 18X17.5 | 18 | 17.5 | 19.0 | 19.0 | 6.5 | 1.7 ~ 2.1 | 7.0 |
| 18X22 | 18 | *21.5 ^{+0.5} / _{-1.0} | 19.0 | 19.0 | 6.5 | 1.7 ~ 2.1 | 7.0 |



RECOMMENDED LAND PATTERN (mm)

| Case Dia. | a | b | c |
|-----------|-----|-----|-----|
| 4 | 1.0 | 2.6 | 1.6 |
| 5 | 1.4 | 3.0 | 1.6 |
| 6.3 | 2.1 | 3.5 | 1.6 |
| 8 | 2.8 | 4.1 | 2.1 |
| 10 | 4.3 | 4.4 | 2.5 |
| 12.5 | 4.3 | 5.8 | 2.5 |
| 16 | 6.6 | 6.5 | 5.0 |
| 18 | 6.6 | 7.7 | 5.0 |

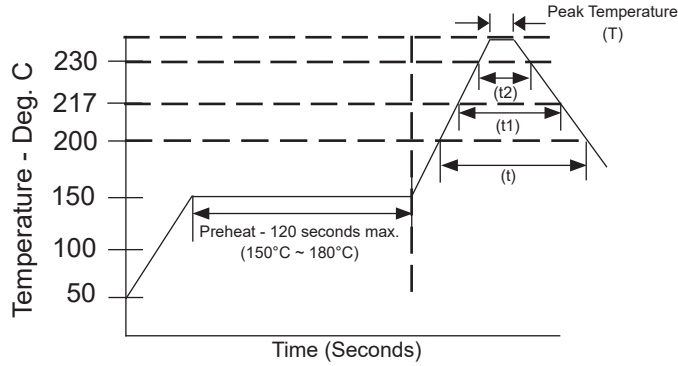




PEAK REFLOW TEMPERATURE AND DURATION

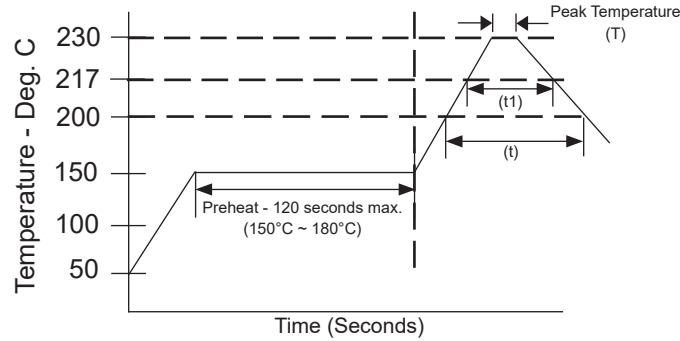
| Voltage | Diameter | Time above 200°C (t) | Time above 217°C (t1) | Time above 230°C (t2) | Peak Temperature 5 seconds (T) |
|------------|-------------|----------------------|-----------------------|-----------------------|--------------------------------|
| 6.3 ~ 50V | 4 ~ 6.3mm φ | 70 sec. max. | 60 sec. max. | 40 sec. max. | 250°C |
| 100V | 8mm φ | 60 sec. max. | 40 sec. max. | 30 sec. max. | 240°C |
| 160 ~ 400V | 8 ~ 10mm φ | 50 sec. max. | 30 sec. max. | 20 sec. max. | 240°C |
| | 12.5mm φ | 45 sec. max. | 20 sec. max. | 10 sec. max. | 235°C |

Capacitors can withstand two times reflow at the above conditions. Second reflow shall be at least one hour after natural cool to room temperature.



PEAK REFLOW TEMPERATURE AND DURATION

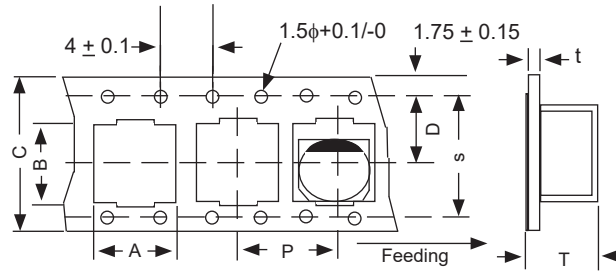
| Voltage | Diameter | Time above 200°C (t) | Time above 217°C (t1) | Peak Temperature 5 seconds (T) |
|------------|-------------|----------------------|-----------------------|--------------------------------|
| 160 ~ 400V | 16 ~ 18mm φ | 30 sec. max. | 15 sec. max. | 230°C |



Review & Compare Reflow Soldering Heat Limits
V-chip SMT Aluminum Electrolytic Capacitors
www.niccomp.com/RSL

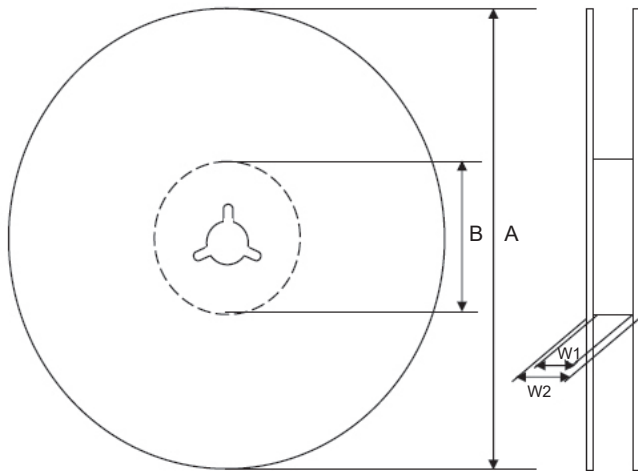
CARRIER TAPE DIMENSIONS (mm)

| Case Size | A ±0.5 | B ±0.2 | C ±0.3 | D ±0.1 | P ±0.1 | T ±0.2 | t max. | S ± 0.1 |
|--------------|--------|--------|--------|--------|--------|--------|--------|---------|
| 4 x 6.3(6.1) | 4.7 | 4.7 | 12.0 | 5.5 | 8.0 | 6.2 | 0.6 | - |
| 5 x 6.3 | 5.7 | 5.7 | 12.0 | 5.5 | 12.0 | 6.2 | 0.6 | - |
| 6.3 x 6.3 | 7.0 | 7.0 | 16.0 | 7.5 | 12.0 | 6.2 | 0.6 | - |
| 6.3 x 8 | 7.0 | 7.0 | 16.0 | 7.5 | 12.0 | 8.2 | 0.6 | - |
| 8 x 10.8 | 8.7 | 8.7 | 24.0 | 11.5 | 16.0 | 11.1 | 0.6 | - |
| 10 x 10.8 | 10.7 | 10.7 | 24.0 | 11.5 | 16.0 | 11.2 | 0.6 | - |
| 12.5 x 14 | 13.2 | 13.2 | 32.0 | 14.2 | 24.0 | 14.3 | 0.6 | 28.4 |
| 16 x 17 | 17.5 | 17.5 | 44.0 | 20.2 | 28.0 | 17.3 | 0.6 | 40.4 |
| 18X17.5 | 19.5 | 17.5 | 44.0 | 20.2 | 32.0 | 17.8 | 0.6 | 40.4 |
| 18X22 | 19.5 | 17.5 | 44.0 | 20.2 | 32.0 | 22.5 | 0.6 | 40.4 |



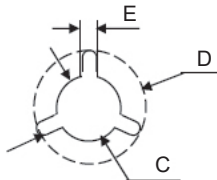
V-Chip 15" (380mm) Reels (LB suffix)

Dimensions (mm)



| Case Size | Tape Width | W1 | W2 |
|-----------------------|------------|-------------|-------------|
| 4x6.3, 5x6.3 | 12.0 | 12.5 ~ 14.0 | 15.5 ~ 20.0 |
| 6.3x6.3, 6.3x8 | 16.0 | 16.5 ~ 18.0 | 19.5 ~ 24.0 |
| 8x10.8, 10x10.8 | 24.0 | 24.5 ~ 26.0 | 27.5 ~ 32.0 |
| 12.5x14 | 32.0 | 33.0 ~ 34.0 | 36.5 ~ 38.5 |
| 16x17, 18x17.5, 18x22 | 44.0 | 45.0 ~ 46.0 | 48.5 ~ 50.5 |

| Case Size | Tape Width | A | B | C | D | E |
|-----------------------|------------|---------|---------|----------|----------|----------|
| 4x6.3, 5x6.3 | 12.0 | φ380 ±2 | φ80~105 | φ13 ±0.5 | φ21 ±1.0 | 2.0 ±0.5 |
| 6.3x6.3, 6.3x8 | 16.0 | | | | | |
| 8x10.8, 10x10.8 | 24.0 | | | | | |
| 12.5x14 | 32.0 | | | | | |
| 16x17, 18x17.5, 18x22 | 44.0 | | | | | |



| Case Size | Quantity per Reel 15" (380mm) |
|------------|----------------------------------|
| 4x6.3(6.1) | 2000 |
| 5x6.3 | 1000 |
| 6.3x6.3 | 1000 |
| 6.3x8 | 900 |
| 8x10.8 | 500 |
| 10x10.8 | 500 |
| 12.5x14 | 250 |
| 16x17 | 200 |
| 18x17.5 | 175 |
| 18x22 | 125 |