

ULTRA LOW IMPEDANCE, RADIAL LEADS, POLARIZED, ALUMINUM ELECTROLYTIC

### FEATURES

- ULTRA LONG LIFE AT 105°C (12,000 ~ 20,000 hrs.)
- HIGH VOLTAGE, REDUCED SIZE



### CHARACTERISTICS

|                                                         |                 |                         |                   |                                       |      |      |      |      |
|---------------------------------------------------------|-----------------|-------------------------|-------------------|---------------------------------------|------|------|------|------|
| Rated Voltage Range                                     |                 | 160 ~ 450Vdc            |                   |                                       |      |      |      |      |
| Capacitance Range                                       |                 | 1.0 ~ 68μF              |                   |                                       |      |      |      |      |
| Operating Temperature Range                             |                 | 160V ~ 400V             | 450V              |                                       |      |      |      |      |
|                                                         |                 | -40°C ~ +105°C          | -25°C ~ +105°C    |                                       |      |      |      |      |
| Capacitance Tolerance                                   |                 | ±20% (M)                |                   |                                       |      |      |      |      |
| Maximum Leakage Current                                 | Duration        | CV ≤ 1000               | CV > 1000         |                                       |      |      |      |      |
|                                                         | After 1 minute  | LC=0.1CV + 40μA         | LC=0.04CV + 100μA |                                       |      |      |      |      |
|                                                         | After 5 minutes | LC=0.03CV + 15μA        | LC=0.02CV + 25μA  |                                       |      |      |      |      |
| Max. Tan δ at 120Hz/20°C                                |                 | W.V. (Vdc)              |                   | 160                                   | 200  | 250  | 400  | 450  |
|                                                         |                 | S.V. (Vdc)              |                   | 200                                   | 250  | 300  | 450  | 500  |
|                                                         |                 | Tan δ                   |                   | 0.24                                  | 0.24 | 0.24 | 0.24 | 0.24 |
| Low Temperature Stability Impedance Ratio @ 120Hz       |                 | W.V. (Vdc)              |                   | 160                                   | 200  | 250  | 400  | 450  |
|                                                         |                 | Z-25°C/Z+20°C           |                   | 3                                     | 3    | 3    | 6    | 6    |
|                                                         |                 | Z-40°C/Z+20°C           |                   | 8                                     | 8    | 8    | 10   | -    |
| Load Life Hours<br>Load Life Test at Rated W.V. & 105°C |                 | Capacitance Change      |                   | Within ±30% of initial measured value |      |      |      |      |
|                                                         |                 | Tan δ                   |                   | Less than 300% of specified value     |      |      |      |      |
|                                                         |                 | Leakage Current         |                   | Less than specified value             |      |      |      |      |
|                                                         |                 | Case Size               |                   | Load Life Hours                       |      |      |      |      |
|                                                         |                 | 6.3X11, 8X9, 10X9       |                   | 12,000 Hrs                            |      |      |      |      |
|                                                         |                 | 8X11.5, 10X12.5         |                   | 15,000 Hrs                            |      |      |      |      |
|                                                         |                 | 10X16, 10X20, φD > 12.5 |                   | 20,000 Hrs                            |      |      |      |      |

### PART NUMBER SYSTEM

NRB-XL 330 M 160V 10X16 TB F

RoHS Compliant  
TB = Tape & Box\*  
Case Size (mm)  
Working Voltage  
Tolerance Code M=20%  
Capacitance Code in μF  
Series

\*see tape specification for details

### PRECAUTIONS

Please review the notes on correct use, safety and precautions found on pages T10 & T11 of NIC's Electrolytic Capacitor catalog.

Also found at [www.niccomp.com/precautions](http://www.niccomp.com/precautions)

If in doubt or uncertainty, please review your specific application - process details with NIC's technical support personnel: [tpmg@niccomp.com](mailto:tpmg@niccomp.com)



### STANDARD PRODUCT, SPECIFICATIONS AND CASE SIZES D $\phi$ x L (mm)

| Part Number            | Cap.<br>(μF) | W.V.<br>(Vdc) | Dissipation Factor<br>+20°C/120Hz | Ripple Current Rating<br>(mA) +105°C |        | Max. ESR (Ω)<br>120Hz @ +20°C | LC (μA) after<br>5 minutes | Load Life Hours<br>@+105°C |
|------------------------|--------------|---------------|-----------------------------------|--------------------------------------|--------|-------------------------------|----------------------------|----------------------------|
|                        |              |               |                                   | 120Hz                                | 100KHz |                               |                            |                            |
| NRB-XL5R6M160V6.3X11F  | 5.6          | 160           | 0.24                              | 52                                   | 104    | 71.09                         | 41.88                      | 12,000                     |
| NRB-XL100M160V8X9F     | 10           |               | 0.24                              | 70                                   | 133    | 39.81                         | 57.0                       | 12,000                     |
| NRB-XL150M160V8X11.5F  | 15           |               | 0.24                              | 92                                   | 174    | 26.54                         | 73.0                       | 15,000                     |
| NRB-XL150M160V10X9F    |              |               | 0.24                              | 95                                   | 180    | 26.54                         | 73.0                       | 12,000                     |
| NRB-XL220M160V10X12.5F | 22           |               | 0.24                              | 121                                  | 217    | 18.09                         | 95.4                       | 15,000                     |
| NRB-XL330M160V10X16F   | 33           |               | 0.24                              | 158                                  | 284    | 12.06                         | 130.6                      | 20,000                     |
| NRB-XL2R2M200V6.3X11F  | 2.2          | 200           | 0.24                              | 36                                   | 72     | 180.95                        | 28.2                       | 12,000                     |
| NRB-XL3R3M200V6.3X11F  | 3.3          |               | 0.24                              | 42                                   | 84     | 120.63                        | 34.8                       | 12,000                     |
| NRB-XL4R7M200V6.3X11F  | 4.7          |               | 0.24                              | 49                                   | 98     | 84.70                         | 43.2                       | 12,000                     |
| NRB-XL5R6M200V8X9F     | 5.6          |               | 0.24                              | 56                                   | 112    | 71.09                         | 47.4                       | 12,000                     |
| NRB-XL6R8M200V8X9F     | 6.8          |               | 0.24                              | 62                                   | 117    | 58.54                         | 52.2                       | 12,000                     |
| NRB-XL8R2M200V8X9F     | 8.2          |               | 0.24                              | 66                                   | 125    | 48.55                         | 57.8                       | 12,000                     |
| NRB-XL100M200V8X11.5F  | 10           |               | 0.24                              | 80                                   | 152    | 39.81                         | 65.0                       | 15,000                     |
| NRB-XL120M200V10X9F    | 12           |               | 0.24                              | 88                                   | 167    | 33.17                         | 73.0                       | 12,000                     |
| NRB-XL180M200V10X12.5F | 18           |               | 0.24                              | 113                                  | 214    | 22.12                         | 97.0                       | 15,000                     |
| NRB-XL270M200V10X16F   | 27           |               | 0.24                              | 149                                  | 268    | 14.74                         | 133                        | 20,000                     |
| NRB-XL1R8M250V6.3X11F  | 1.8          | 250           | 0.24                              | 33                                   | 66     | 221.16                        | 28.5                       | 12,000                     |
| NRB-XL2R2M250V6.3X11F  | 2.2          |               | 0.24                              | 36                                   | 72     | 180.95                        | 31.5                       | 12,000                     |
| NRB-XL3R3M250V6.3X11F  | 3.3          |               | 0.24                              | 42                                   | 84     | 120.63                        | 39.75                      | 12,000                     |
| NRB-XL4R7M250V8X9F     | 4.7          |               | 0.24                              | 53                                   | 106    | 84.70                         | 48.5                       | 12,000                     |
| NRB-XL5R6M250V8X11.5F  | 5.6          |               | 0.24                              | 62                                   | 124    | 71.09                         | 53.0                       | 15,000                     |
| NRB-XL6R8M250V8X11.5F  | 6.8          |               | 0.24                              | 68                                   | 129    | 58.54                         | 59.0                       | 15,000                     |
| NRB-XL8R2M250V10X9F    | 8.2          |               | 0.24                              | 76                                   | 144    | 48.55                         | 66.0                       | 12,000                     |
| NRB-XL100M250V10X12.5F | 10           |               | 0.24                              | 90                                   | 171    | 39.81                         | 75.0                       | 15,000                     |
| NRB-XL120M250V10X12.5F | 12           |               | 0.24                              | 97                                   | 184    | 33.17                         | 85.0                       | 15,000                     |
| NRB-XL180M250V10X16F   | 18           |               | 0.24                              | 127                                  | 241    | 22.12                         | 115                        | 20,000                     |
| NRB-XL1R0M400V6.3X11F  | 1.0          | 400           | 0.24                              | 24                                   | 48     | 398.09                        | 27.0                       | 12,000                     |
| NRB-XL1R2M400V8X9F     | 1.2          |               | 0.24                              | 28                                   | 56     | 331.74                        | 29.4                       | 12,000                     |
| NRB-XL1R5M400V8X9F     | 1.5          |               | 0.24                              | 30                                   | 60     | 265.39                        | 33.0                       | 12,000                     |
| NRB-XL1R8M400V8X9F     | 1.8          |               | 0.24                              | 33                                   | 66     | 221.16                        | 36.6                       | 12,000                     |
| NRB-XL2R2M400V8X9F     | 2.2          |               | 0.24                              | 36                                   | 72     | 180.95                        | 41.4                       | 12,000                     |
| NRB-XL2R2M400V8X11.5F  |              |               | 0.24                              | 40                                   | 80     | 180.95                        | 41.4                       | 15,000                     |
| NRB-XL2R7M400V8X11.5F  | 2.7          |               | 0.24                              | 43                                   | 86     | 147.44                        | 46.6                       | 15,000                     |
| NRB-XL3R3M400V8X11.5F  | 3.3          |               | 0.24                              | 47                                   | 94     | 120.63                        | 51.4                       | 15,000                     |
| NRB-XL3R3M400V10X9F    |              |               | 0.24                              | 48                                   | 96     | 120.63                        | 51.4                       | 12,000                     |
| NRB-XL3R9M400V10X12.5F | 3.9          |               | 0.24                              | 57                                   | 114    | 102.07                        | 56.2                       | 15,000                     |
| NRB-XL4R7M400V10X12.5F | 4.7          |               | 0.24                              | 61                                   | 122    | 84.70                         | 62.6                       | 15,000                     |
| NRB-XL6R8M400V10X16F   | 6.8          |               | 0.24                              | 85                                   | 161    | 58.54                         | 79.4                       | 20,000                     |
| NRB-XL4R7M450V10X16F   | 4.7          | 450           | 0.24                              | 54                                   | 180    | 84.70                         | 67.3                       | 20,000                     |
| NRB-XL4R7M450V10X20F   |              |               | 0.24                              | 66                                   | 220    | 84.70                         | 67.3                       | 20,000                     |
| NRB-XL6R8M450V10X20F   | 6.8          |               | 0.24                              | 84                                   | 280    | 58.54                         | 86.2                       | 20,000                     |
| NRB-XL8R2M450V10X20F   | 8.2          |               | 0.24                              | 84                                   | 280    | 48.55                         | 98.8                       | 20,000                     |
| NRB-XL100M450V12.5X20F | 10           |               | 0.24                              | 135                                  | 450    | 39.81                         | 115                        | 20,000                     |
| NRB-XL150M450V12.5X25F | 15           |               | 0.24                              | 180                                  | 600    | 26.54                         | 160                        | 20,000                     |
| NRB-XL220M450V12.5X25F | 22           |               | 0.24                              | 240                                  | 600    | 18.09                         | 223                        | 20,000                     |
| NRB-XL220M450V16X20F   |              |               | 0.24                              | 292                                  | 730    | 18.09                         | 223                        | 20,000                     |
| NRB-XL330M450V16X25F   | 33           |               | 0.24                              | 392                                  | 980    | 12.06                         | 322                        | 20,000                     |
| NRB-XL330M450V18X20F   |              |               | 0.24                              | 312                                  | 780    | 12.06                         | 322                        | 20,000                     |
| NRB-XL470M450V18X25F   | 47           |               | 0.24                              | 480                                  | 1200   | 8.47                          | 448                        | 20,000                     |
| NRB-XL680M450V18X31.5F | 68           |               | 0.24                              | 520                                  | 1300   | 5.85                          | 637                        | 20,000                     |

### RIPPLE CURRENT FREQUENCY CORRECTION FACTOR

#### 160V ~ 400V

| Frequency (Hz) | 120 | 1K  | 10K | 100K ≤ |
|----------------|-----|-----|-----|--------|
| 1.0 ~ 5.6μF    | 1.0 | 1.6 | 1.8 | 2.0    |
| 6.8 ~ 18μF     | 1.0 | 1.5 | 1.7 | 1.9    |
| 22 ~ 33μF      | 1.0 | 1.4 | 1.6 | 1.8    |

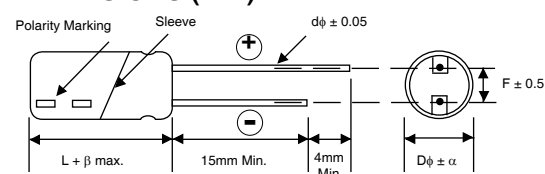
#### 450V

| Frequency (Hz) | 120 | 1K  | 10K | 100K ≤ |
|----------------|-----|-----|-----|--------|
| 4.7 ~ 15μF     | 0.3 | 0.6 | 0.9 | 1.0    |
| 22 ~ 68μF      | 0.4 | 0.7 | 0.9 | 1.0    |

### DIAMETER AND LEADSPACE (mm)

| Case Dia. (Dφ)   | 6.3 | 8   | 10  | 12.5 | 16  | 18  |
|------------------|-----|-----|-----|------|-----|-----|
| Lead Dia. (dφ)   | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 |
| Lead Spacing (F) | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 |
| Dim. α           | 0.5 | 0.5 | 0.5 | 0.5  | 0.5 | 0.5 |
| Dim. β           | 2.0 | 2.0 | 2.0 | 2.0  | 2.0 | 2.0 |

### DIMENSIONS (mm)

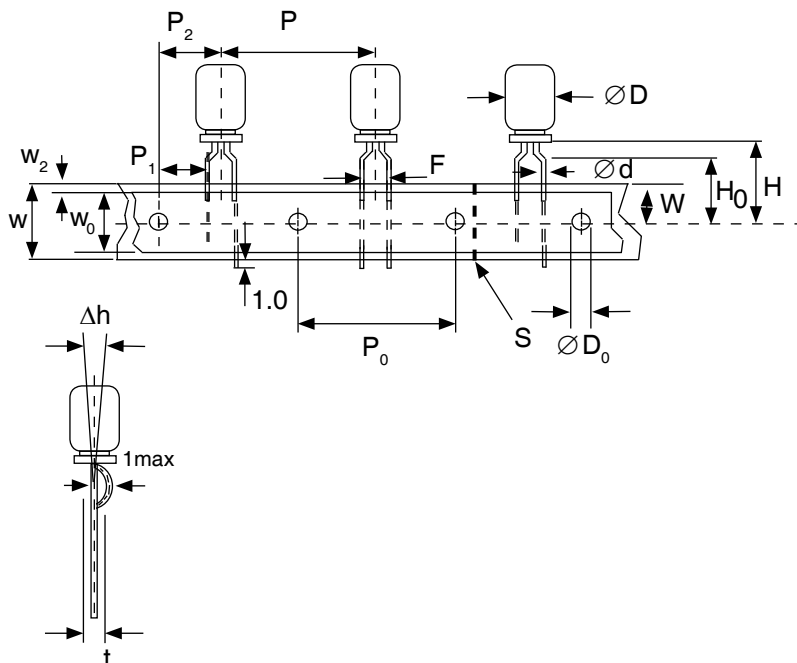


Drawing is representative of parts as supplied in bulk or straight lead format, please see taping specification for details on taped format packaging.

### STANDARD RADIAL TAPING (5mm LEAD SPACING, FORMED LEADS) TB

Taping Dimensions (mm)

| Case Dia.<br>(D $\phi$ ) | 6.3                                | 8      |
|--------------------------|------------------------------------|--------|
| Case Size<br>Dim.        | 6.3x11                             | 8x11.5 |
| d $\phi$ $\pm 0.05$      | 0.5                                | 0.6    |
| H $\pm 0.75$             | 18.5                               | 20.0   |
| F +0.8 ~ -0.2            | 5.0 -0.2 ~ +0.8                    |        |
| P                        | 12.7 $\pm 1.0$                     |        |
| P <sub>0</sub>           | 12.7 $\pm 0.2$                     |        |
| P <sub>1</sub>           | 3.85 $\pm 0.5$ (at end of tape)    |        |
| P <sub>2</sub>           | 6.35 $\pm 1.0$                     |        |
| W                        | 18.0 $\pm 0.5$                     |        |
| W <sub>0</sub>           | 11.5 min.                          |        |
| W <sub>1</sub>           | 9.0 $\pm 0.5$                      |        |
| W <sub>2</sub>           | 0 ~ 2.5                            |        |
| H <sub>0</sub>           | 16.0 $\pm 0.5$                     |        |
| l                        | 1.0 max.                           |        |
| D <sub>0</sub> $\phi$    | 4.0 $\pm 0.2$                      |        |
| $\Delta h$               | 0 $\pm 1.0$ (at top of can)        |        |
| t                        | 0.7 $\pm 0.2$ (not including lead) |        |

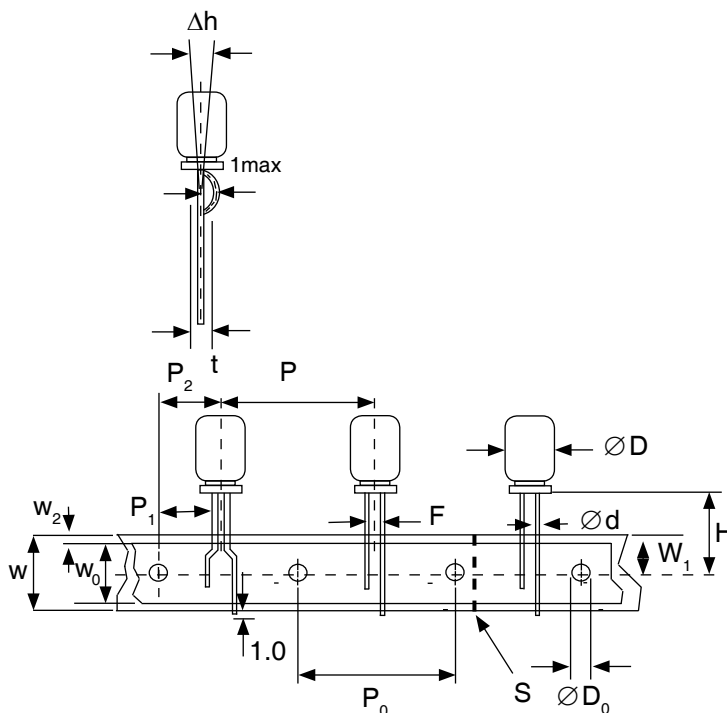


### SPECIAL STRAIGHT LEAD TAPING TBST\*

Taping Dimensions (mm)

| Case Dia.<br>(D $\phi$ ) | 6.3                                | 8      |
|--------------------------|------------------------------------|--------|
| Case Size<br>Dim.        | 6.3x11                             | 8x11.5 |
| d $\phi$ $\pm 0.05$      | 0.5                                | 0.6    |
| H $\pm 0.75$             | 18.5                               | 20.0   |
| F +0.8 ~ -0.2            | 2.5                                | 3.5    |
| P $\pm 1.0$              | 12.7 $\pm 0.2$                     |        |
| P <sub>0</sub>           | 12.7 $\pm 0.2$                     |        |
| P <sub>1</sub>           | 5.1                                | 4.6    |
| P <sub>2</sub>           | 6.35 $\pm 1.0$                     |        |
| W                        | 18.0 $\pm 0.5$                     |        |
| W <sub>0</sub>           | 11.5 min.                          |        |
| W <sub>1</sub>           | 9.0 $\pm 0.5$                      |        |
| W <sub>2</sub>           | 0 ~ 2.5                            |        |
| H <sub>0</sub>           | 16.0 $\pm 0.5$                     |        |
| l                        | 1.0 max.                           |        |
| D <sub>0</sub> $\phi$    | 4.0 $\pm 0.2$                      |        |
| $\Delta h$               | 0 $\pm 1.0$ (at top of can)        |        |
| t                        | 0.7 $\pm 0.2$ (not including lead) |        |

\* Parts with 4mm diameter are taped with a slight flare in the lead and a 2.0mm lead-space.



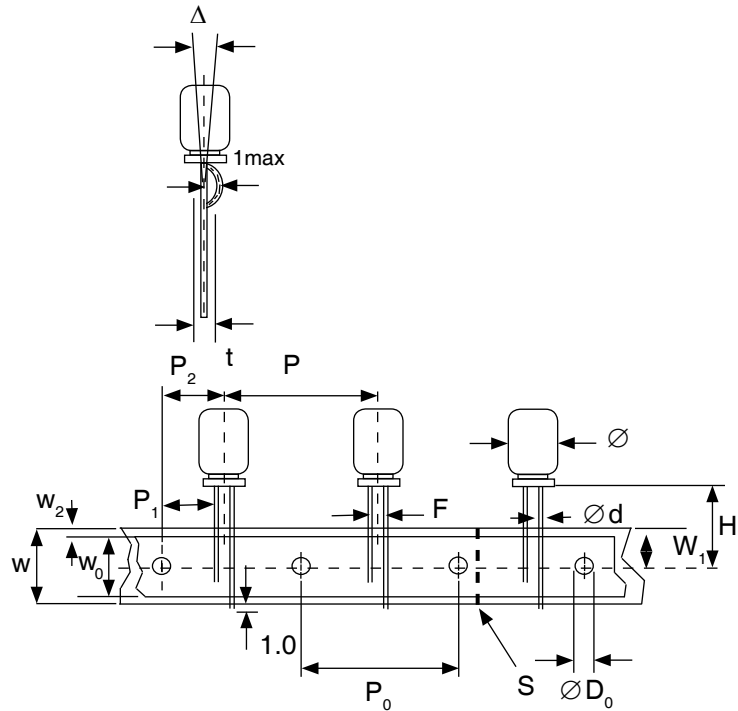
\*Straight leads will extend from the base of the component to the edge of the carrier. The section of lead below the adhesive tape may be straight or formed.

### STANDARD RADIAL TAPING (5mm LEAD SPACING, STRAIGHT LEADS) TB

Taping Dimensions (mm)

|                                                                                                                                                 |                                    |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|------|
| Case Dia.<br>(D $\phi$ )                                                                                                                        | 10                                 | 12.5 |
| Case Size                                                                                                                                       | All                                | All  |
| Dim.                                                                                                                                            |                                    |      |
| d $\phi$ $\pm 0.05$                                                                                                                             | 0.6                                | 0.6  |
| H $\pm 0.75$                                                                                                                                    | 19.0                               | 19.0 |
| F $+0.8 \sim -0.2$                                                                                                                              | 5.0                                | 5.0  |
| P $\pm 1.0$                                                                                                                                     | 25.4*                              |      |
| P <sub>0</sub>                                                                                                                                  | 12.7 $\pm 0.2$                     |      |
| P <sub>1</sub>                                                                                                                                  | 3.85                               |      |
| P <sub>2</sub>                                                                                                                                  | 6.35 $\pm 1.0$                     |      |
| W                                                                                                                                               | 18.0 $\pm 0.5$                     |      |
| W <sub>0</sub>                                                                                                                                  | 11.5 min                           |      |
| W <sub>1</sub>                                                                                                                                  | 9.0 $\pm 0.5$                      |      |
| W <sub>2</sub>                                                                                                                                  | 0 $\sim$ 2.5                       |      |
| H <sub>0</sub>                                                                                                                                  | 16.0 $\pm 0.5$                     |      |
| l                                                                                                                                               | 1.0 max.                           |      |
| D <sub>0</sub> $\phi$                                                                                                                           | 4.0 $\pm 0.2$                      |      |
| $\Delta h$                                                                                                                                      | 0 $\pm 1.0$ (at top of can)        |      |
| t                                                                                                                                               | 0.7 $\pm 0.2$ (not including lead) |      |
| <b>*Optional Taping Specifications</b>                                                                                                          |                                    |      |
| 10mm diameter available with P dim. = 12.7mm<br>(P/N Suffix: TB12.7MMP)                                                                         |                                    |      |
| 12.5mm diameter available with P dim. = 15mm, P <sub>1</sub> = 5.0mm,<br>P <sub>0</sub> = 15.0mm & P <sub>2</sub> = 7.5mm (P/N Suffix: TB15MMP) |                                    |      |

**NOTE:** ANODE (+) LEAD FEEDS OFF FIRST.  
FOR OPTION OF NEGATIVE (–) LEAD FIRST,  
SPECIFY “TBN”.



### RADIAL TAPED PACKAGING

Ammo Box (Tape & Box) TB, TBF1, TBST

Box quantity

| Case Size | Q'ty per Box<br>(pcs) |
|-----------|-----------------------|
| 6.3x11    | 2,000                 |
| 8x9       | 1,000                 |
| 8x11.5    | 1,000                 |
| 10x9      | 500                   |
| 10x12.5   | 500                   |
| 10x16     | 500                   |
| 10x20     | 500                   |
| 12.5.x20  | 500                   |
| 12.5x25   | 500                   |

Ammo Box Dimensions (mm)

