

# LCPI

## Toroid power inductors



### Applications

- Filters
- Buck and boost switches
- Chokes

### Product features

- Low loss, iron powder cores with stable electrical operating characteristics maximize inductor efficiency by minimizing copper losses
- Available in vertical and horizontal self leaded and header mounted configurations
- Inductance values range from 10  $\mu\text{H}$  to 1000  $\mu\text{H}$
- Current values range from 1.5 A to 29.5 A
- Meets UL 94V-0 flammability standard
- Iron powder core material

### Environmental Data

- Storage temperature range (Component): -40 °C to +105 °C
- Operating temperature range: -40 °C to +105 °C (ambient plus self-temperature rise)



Product Specifications

| Vertical Part Number | Horizontal Part Number | Header Mounted Part Number | OCL <sup>(1)</sup><br>µH +/- 20% | I <sub>DC</sub> <sup>(2)</sup><br>(A) | I <sub>SAT</sub> <sup>(3)</sup><br>(A) | Volt-µsec <sup>(4)</sup><br>Vµs | Energy <sup>(5)</sup><br>µJ | DCR (Ω) <sup>(6)</sup><br>max |
|----------------------|------------------------|----------------------------|----------------------------------|---------------------------------------|--|---------------------------------|-----------------------------|-------------------------------|
| CTX10-1-52-R         | CTX10-1-52LP-R         | CTX10-1-52M-R              | 10.14                            | 2.4                                   | 2.1                                    | 5.4                             | 15                          | 0.0481                        |
| CTX20-1-52-R         | CTX20-1-52LP-R         | CTX20-1-52M-R              | 20.22                            | 1.8                                   | 2.2                                    | 7.8                             | 36                          | 0.0829                        |
| CTX50-1-52-R         | CTX50-1-52LP-R         | CTX50-1-52M-R              | 50.29                            | 2.6                                   | 2.7                                    | 16.3                            | 130                         | 0.0715                        |
| CTX100-1-52-R        | CTX100-1-52LP-R        | CTX100-1-52M-R             | 100.40                           | 2.5                                   | 2.4                                    | 27.5                            | 197                         | 0.1060                        |
| CTX150-1-52-R        | CTX150-1-52LP-R        | CTX150-1-52M-R             | 151.70                           | 2.1                                   | 2.3                                    | 35.7                            | 283                         | 0.1620                        |
| CTX250-1-52-R        | CTX250-1-52LP-R        | CTX250-1-52M-R             | 250.90                           | 1.9                                   | 2.2                                    | 47.8                            | 421                         | 0.2210                        |
| CTX500-1-52-R        | CTX500-1-52LP-R        | CTX500-1-52M-R             | 505.00                           | 1.7                                   | 1.9                                    | 77.9                            | 645                         | 0.3610                        |
| CTX750-1-52-R        | CTX750-1-52LP-R        | CTX750-1-52M-R             | 754.40                           | 1.8                                   | 2.4                                    | 114.3                           | 1530                        | 0.4340                        |
| CTX1000-1-52-R       | CTX1000-1-52LPR        | CTX1000-1-52M-R            | 1004.00                          | 1.5                                   | 2.1                                    | 131.9                           | 1530                        | 0.6380                        |
| CTX10-2-52-R         | CTX10-2-52LP-R         | CTX10-2-52M-R              | 9.60                             | 4.7                                   | 4.5                                    | 6.6                             | 68                          | 0.0183                        |
| CTX20-2-52-R         | CTX20-2-52LP-R         | CTX20-2-52M-R              | 19.60                            | 3.2                                   | 3.2                                    | 9.4                             | 69                          | 0.0392                        |
| CTX50-2-52-R         | CTX50-2-52LP-R         | CTX50-2-52M-R              | 50.00                            | 4.9                                   | 4.9                                    | 21.3                            | 420                         | 0.0326                        |
| CTX100-2-52-R        | CTX100-2-52LP-R        | CTX100-2-52M-R             | 101.70                           | 4.4                                   | 4.3                                    | 35.0                            | 643                         | 0.0534                        |
| CTX150-2-52-R        | CTX150-2-52LP-R        | CTX150-2-52M-R             | 148.00                           | 4.3                                   | 4.0                                    | 47.6                            | 829                         | 0.0719                        |
| CTX250-2-52-R        | CTX250-2-52LP-R        | CTX250-2-52M-R             | 251.10                           | 4.2                                   | 4.2                                    | 66.0                            | 1540                        | 0.0833                        |
| CTX500-2-52-R        | CTX500-2-52LP-R        | CTX500-2-52M-R             | 499.40                           | 3.1                                   | 3.3                                    | 104.0                           | 1890                        | 0.1830                        |
| CTX750-2-52-R        | CTX750-2-52LP-R        | CTX750-2-52M-R             | 749.30                           | 3.4                                   | 3.4                                    | 147.3                           | 2960                        | 0.2080                        |
| CTX10-5-52-R         | CTX10-5-52LP-R         | CTX10-5-52M-R              | 9.68                             | 8.7                                   | 11.1                                   | 9.4                             | 417                         | 0.0104                        |
| CTX20-5-52-R         | CTX20-5-52LP-R         | CTX20-5-52M-R              | 21.25                            | 7.8                                   | 9.3                                    | 16.0                            | 643                         | 0.0260                        |
| CTX50-5-52-R         | CTX50-5-52LP-R         | CTX50-5-52M-R              | 49.60                            | 7.6                                   | 9.4                                    | 29.3                            | 1530                        | 0.0248                        |
| CTX100-5-52-R        | CTX100-5-52LP-R        | CTX100-5-52M-R             | 97.20                            | 8.2                                   | 7.5                                    | 45.7                            | 1890                        | 0.0267                        |
| CTX150-5-52-R        | CTX150-5-52LP-R        | CTX150-5-52M-R             | 150.60                           | 7.7                                   | 7.5                                    | 66.0                            | 2960                        | 0.0401                        |
| CTX250-5-52-R        | CTX250-5-52LP-R        |                            | 254.40                           | 9.2                                   | 8.1                                    | 102.4                           | 5860                        | 0.0400                        |
| CTX10-7-52-R         | CTX10-7-52LP-R         | CTX10-7-52M-R              | 10.04                            | 11.4                                  | 13.5                                   | 11.0                            | 640                         | 0.0080                        |
| CTX20-7-52-R         | CTX20-7-52LP-R         | CTX20-7-52M-R              | 20.96                            | 11.4                                  | 14.5                                   | 19.1                            | 1540                        | 0.0110                        |
| CTX50-7-52-R         | CTX50-7-52LP-R         | CTX50-7-52M-R              | 52.27                            | 10.5                                  | 10.2                                   | 33.5                            | 1900                        | 0.0163                        |
| CTX100-7-52-R        | CTX100-7-52LP-R        |                            | 101.40                           | 12.0                                  | 9.1                                    | 54.2                            | 2960                        | 0.0167                        |
| CTX150-7-52-R        | CTX150-7-52LP-R        |                            | 152.80                           | 12.8                                  | 10.5                                   | 79.3                            | 5900                        | 0.0204                        |
| CTX10-10-52-R        | CTX10-10-52LP-R        |                            | 10.04                            | 16.9                                  | 20.9                                   | 13.2                            | 1530                        | 0.0051                        |
| CTX20-10-52-R        | CTX20-10-52LP-R        |                            | 21.17                            | 16.0                                  | 16.0                                   | 21.3                            | 1900                        | 0.0070                        |
| CTX50-10-52-R        | CTX50-10-52LP-R        |                            | 52.37                            | 13.9                                  | 12.7                                   | 38.9                            | 2960                        | 0.0124                        |
| CTX100-10-52-R       | CTX100-10-52LPR        |                            | 99.38                            | 17.6                                  | 13.0                                   | 64.0                            | 5880                        | 0.0109                        |
| CTX10-16-52-R        | CTX10-16-52LP-R        |                            | 9.90                             | 27.3                                  | 29.3                                   | 16.9                            | 2970                        | 0.0032                        |
| CTX20-16-52-R        | CTX20-16-52LP-R        |                            | 19.24                            | 31.5                                  | 29.5                                   | 28.1                            | 5860                        | 0.0034                        |

Notes:

- (1) Open circuit inductance test parameters: 100 kHz, 0.250 Vrms, 0 Adc.
- (2) DC current for an approximate ΔT of 30 °C at +75 °C Ambient with no core loss. See Chart 2 for derating of I<sub>DC</sub> with core loss.
- (3) Peak current for an approximate 30% roll-off in OCL. For other current levels see Chart 1.
- (4) Applied Volt-Time product (Vµs) across the inductor. This value represents the Vµs at 100 kHz necessary to generate a core loss equal to 10% of the total losses for 30°C rise. For other frequencies and operating levels see Chart 2. (Note: skin effect losses not included.)
- (5) Energy storage (µJ) at I<sub>SAT</sub>. For other current levels see Chart 1.
- (6) Maximum D.C. resistance at +20 °C.

Dimensions- mm

| <b>Vertical and Horizontal Self Leaded Mounting Options</b> |  |                     |                     |                     |                    |                    |                    |                    |
|---|--|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Vertical P/N<br/>See Figure 1</b>                        | <b>Horizontal P/N<br/>See Figure 2</b> | <b>OD<br/>(max)</b> | <b>ID<br/>(typ)</b> | <b>Ht<br/>(max)</b> | <b>X<br/>(typ)</b> | <b>Y<br/>(typ)</b> | <b>T<br/>(typ)</b> | <b>H<br/>(typ)</b> |
| CTX10-1-52-R  | CTX10-1-52LP-R                         | 8.6                 | 0.0                 | 4.7                 | 3.8                | 7.3                | 0.42               | 0.67               |
| CTX20-1-52-R  | CTX20-1-52LP-R                         | 9.1                 | 0.0                 | 6.7                 | 5.6                | 7.4                | 0.37               | 0.62               |
| CTX50-1-52-R  | CTX50-1-52LP-R                         | 16.2                | 4.2                 | 9.0                 | 7.5                | 13.7               | 0.58               | 0.83               |
| CTX100-1-52-R   | CTX100-1-52LP-R                        | 15.5                | 4.2                 | 12.4                | 10.7               | 13.7               | 0.58               | 0.83               |
| CTX150-1-52-R   | CTX150-1-52LP-R                        | 20.7                | 6.6                 | 9.4                 | 7.8                | 18.8               | 0.52               | 0.77               |
| CTX250-1-52-R   | CTX250-1-52LP-R                        | 20.9                | 6.0                 | 13.0                | 11.0               | 18.8               | 0.52               | 0.77               |
| CTX500-1-52-R   | CTX500-1-52LP-R                        | 24.0                | 9.0                 | 15.3                | 14.0               | 21.2               | 0.52               | 0.77               |
| CTX750-1-52-R   | CTX750-1-52LP-R                        | 29.8                | 11.7                | 17.4                | 15.6               | 28.2               | 0.52               | 0.77               |
| CTX1000-1-52-R  | CTX1000-1-52LP-R                       | 29.8                | 11.7                | 17.1                | 15.5               | 28.0               | 0.46               | 0.71               |
| CTX10-2-52-R  | CTX10-2-52LP-R                         | 12.7                | 0.0                 | 7.8                 | 6.3                | 11.0               | 0.71               | 0.96               |
| CTX20-2-52-R  | CTX20-2-52LP-R                         | 12.5                | 0.0                 | 7.5                 | 6.3                | 11.0               | 0.58               | 0.83               |
| CTX50-2-52-R  | CTX50-2-52LP-R                         | 21.6                | 6.1                 | 13.6                | 11.0               | 19.5               | 0.89               | 1.14               |
| CTX100-2-52-R   | CTX100-2-52LP-R                        | 24.0                | 8.8                 | 16.6                | 13.9               | 21.8               | 0.89               | 1.14               |
| CTX150-2-52-R   | CTX150-2-52LP-R                        | 30.6                | 11.2                | 11.4                | 9.3                | 28.5               | 0.80               | 1.05               |
| CTX250-2-52-R   | CTX250-2-52LP-R                        | 31.2                | 9.1                 | 19.0                | 15.7               | 28.5               | 0.89               | 1.14               |
| CTX500-2-52-R   | CTX500-2-52LP-R                        | 36.7                | 11.7                | 14.8                | 12.5               | 34.5               | 0.71               | 0.96               |
| CTX750-2-52-R   | CTX750-2-52LP-R                        | 43.3                | 19.9                | 18.2                | 15.8               | 41.5               | 0.80               | 1.05               |
| CTX10-5-52-R  | CTX10-5-52LP-R                         | 22.2                | 5.4                 | 13.9                | 11.5               | 19.9               | 1.11               | 1.36               |
| CTX20-5-52-R  | CTX20-5-52LP-R                         | 24.5                | 8.8                 | 16.6                | 14.5               | 22.0               | 0.89               | 1.14               |
| CTX50-5-52-R  | CTX50-5-52LP-R                         | 32.3                | 10.1                | 18.9                | 16.5               | 28.8               | 1.11               | 1.36               |
| CTX100-5-52-R   | CTX100-5-52LP-R                        | 37.8                | 11.2                | 16.8                | 13.6               | 35.5               | 1.24               | 1.49               |
| CTX150-5-52-R   | CTX150-5-52LP-R                        | 46.4                | 18.8                | 19.8                | 16.8               | 43.4               | 1.24               | 1.49               |
| CTX250-5-52-R   | CTX250-5-52LP-R                        | 53.7                | 18.8                | 24.3                | 20.1               | 49.4               | 1.38               | 1.63               |
| CTX10-7-52-R  | CTX10-7-52LP-R                         | 25.7                | 6.5                 | 18.0                | 16.0               | 22.4               | 1.38               | 1.63               |
| CTX20-7-52-R  | CTX20-7-52LP-R                         | 32.4                | 8.5                 | 19.8                | 16.8               | 29.2               | 1.38               | 1.63               |
| CTX50-7-52-R  | CTX50-7-52LP-R                         | 39.0                | 10.8                | 16.8                | 13.9               | 35.7               | 1.38               | 1.63               |
| CTX100-7-52-R   | CTX100-7-52LP-R                        | 48.5                | 17.1                | 21.8                | 17.2               | 43.4               | 1.73               | 1.98               |
| CTX150-7-52-R   | CTX150-7-52LP-R                        | 54.5                | 17.1                | 25.4                | 21.2               | 50.9               | 1.73               | 1.98               |
| CTX10-10-52-R   | CTX10-10-52LP-R                        | 34.0                | 7.0                 | 21.4                | 17.0               | 29.6               | 1.73               | 1.98               |
| CTX20-10-52-R   | CTX20-10-52LP-R                        | 40.5                | 9.0                 | 18.0                | 14.3               | 35.2               | 1.73               | 1.98               |
| CTX50-10-52-R   | CTX50-10-52LP-R                        | 47.5                | 17.1                | 21.3                | 17.5               | 42.8               | 1.73               | 1.98               |
| CTX100-10-52-R  | CTX100-10-52LP-R                       | 57.0                | 15.0                | 27.5                | 21.3               | 50.6               | 2.15               | 2.45               |
| CTX10-16-52-R   | CTX10-16-52LP-R                        | 50.3                | 13.0                | 24.0                | 18.6               | 43.0               | 2.41               | 2.70               |
| CTX20-16-52-R   | CTX20-16-52LP-R                        | 59.0                | 13.0                | 28.0                | 23.0               | 50.7               | 2.69               | 2.99               |

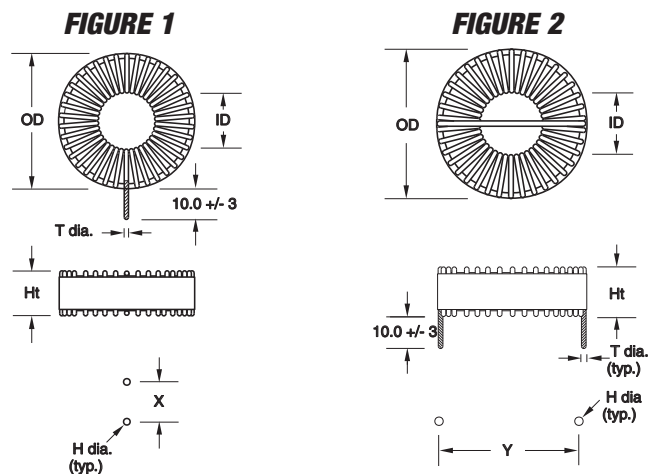
Note: All dimensions are in millimeters.



**VERTICAL  
SELF LEADED  
MOUNT**



**HORIZONTAL  
SELF LEADED  
MOUNT**



Dimensions- mm

| <b>Header Mounted Option</b> |              |          |         |         |         |         |         |         |         |
|------------------------------|--------------|----------|---------|---------|---------|---------|---------|---------|---------|
| Header Mounted Part Number   | See Figure # | OD (max) | A (max) | B (max) | C (max) | X (typ) | Y (typ) | T (typ) | H (typ) |
| CTX10-1-52M-R                | 3            | 8.6      | 9.4     | 9.4     | 6.9     | 6.5     | 6.5     | —       | —       |
| CTX20-1-52M-R                | 3            | 9.1      | 9.4     | 9.4     | 9.0     | 6.5     | 6.5     | —       | —       |
| CTX50-1-52M-R                | 4            | 16.2     | 19.6    | 16.1    | 20.0    | 15.3    | 6.4     | —       | —       |
| CTX100-1-52M-R               | 4            | 15.5     | 19.6    | 16.1    | 19.7    | 15.3    | 6.4     | —       | —       |
| CTX150-1-52M-R               | 4            | 20.7     | 19.6    | 16.1    | 24.2    | 15.3    | 6.4     | —       | —       |
| CTX250-1-52M-R               | 5            | 20.9     | 31.0    | 16.0    | 22.5    | 20.3    | 10.2    | 1.20    | 1.45    |
| CTX500-1-52M-R               | 5            | 24.0     | 35.4    | 21.7    | 25.0    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX750-1-52M-R               | 5            | 29.8     | 35.4    | 21.7    | 31.6    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX1000-1-52M-R              | 5            | 29.8     | 35.4    | 21.7    | 31.2    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX10-2-52M-R                | 3            | 12.7     | 13.6    | 11.4    | 11.7    | 10.8    | 7.5     | —       | —       |
| CTX20-2-52M-R                | 3            | 12.5     | 13.6    | 11.4    | 11.4    | 10.8    | 7.5     | —       | —       |
| CTX50-2-52M-R                | 5            | 21.6     | 31.0    | 16.0    | 23.5    | 20.3    | 10.2    | 1.20    | 1.45    |
| CTX100-2-52M-R               | 5            | 24.0     | 35.4    | 21.7    | 26.0    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX150-2-52M-R               | 5            | 30.6     | 31.0    | 16.0    | 32.5    | 20.3    | 10.2    | 1.20    | 1.45    |
| CTX250-2-52M-R               | 5            | 31.2     | 35.4    | 21.7    | 33.4    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX500-2-52M-R               | 5            | 36.7     | 31.0    | 16.0    | 38.4    | 20.3    | 10.2    | 1.20    | 1.45    |
| CTX750-2-52M-R               | 5            | 43.3     | 35.4    | 21.7    | 45.4    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX10-5-52M-R                | 5            | 22.2     | 31.0    | 16.0    | 22.7    | 20.3    | 10.2    | 1.20    | 1.45    |
| CTX20-5-52M-R                | 5            | 24.5     | 35.4    | 21.7    | 25.5    | 23.0    | 15.4    | 1.20    | 1.45    |
| CTX50-5-52M-R                | 5            | 32.3     | 35.4    | 21.7    | 33.7    | 23.0    | 15.4    | 1.11    | 1.36    |
| CTX100-5-52M-R               | 5            | 37.8     | 35.4    | 21.7    | 40.2    | 23.0    | 15.4    | 1.24    | 1.49    |
| CTX150-5-52M-R               | 5            | 46.4     | 35.4    | 21.7    | 47.0    | 23.0    | 15.4    | 1.24    | 1.49    |
| CTX10-7-52M-R                | 5            | 25.7     | 35.4    | 21.7    | 26.7    | 23.0    | 15.4    | 1.38    | 1.63    |
| CTX20-7-52M-R                | 5            | 32.4     | 35.4    | 21.7    | 34.2    | 23.0    | 15.4    | 1.38    | 1.63    |
| CTX50-7-52M-R                | 5            | 39.0     | 35.4    | 21.7    | 40.3    | 23.0    | 15.4    | 1.38    | 1.63    |

Note: All dimensions are in millimeters.

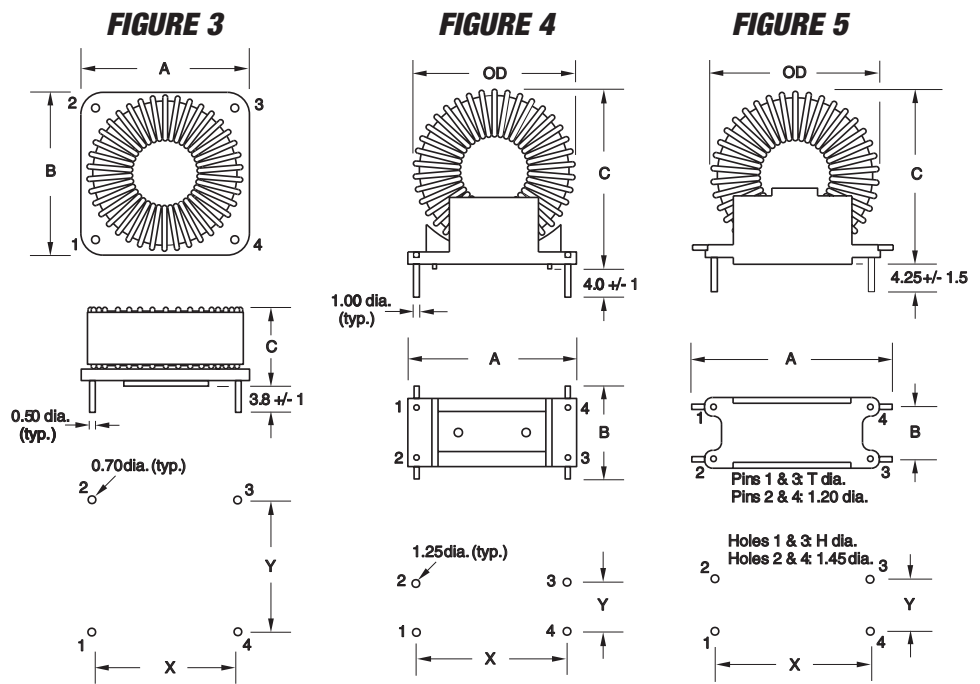


Figure4

Core loss



Inductance characteristics



## Wave solder profile- Through-hole components

Reflow soldering not recommended



### Reference EN 61760-1:2006

| Profile Feature                     | Standard SnPb Solder                          | Lead (Pb) Free Solder                     |
|-------------------------------------|---|---|
| Preheat                             | • Temperature min. ( $T_{smin}$ )             | 100°C                                     |
|                                     | • Temperature typ. ( $T_{styp}$ )             | 120°C                                     |
|                                     | • Temperature max. ( $T_{smax}$ )             | 130°C                                     |
|                                     | • Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ ) | 70 seconds                                |
| $\Delta$ preheat to max Temperature | 150°C max.                                    | 150°C max.                                |
| Peak temperature ( $T_p$ )*         | 235°C – 260°C                                 | 250°C – 260°C                             |
| Time at peak temperature ( $t_p$ )  | 10 seconds max<br>5 seconds max each wave     | 10 seconds max<br>5 seconds max each wave |
| Ramp-down rate                      | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max     | ~ 2 K/s min<br>~3.5 K/s typ<br>~5 K/s max |
| Time 25°C to 25°C                   | 4 minutes                                     | 4 minutes                                 |

### Manual solder

350°C, 4-5 seconds. (by soldering iron), generally manual, hand soldering is not recommended.

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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