

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 μH to 1000 μH
- 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 ⁽¹⁾ µH +/- 20% | I _{DC} ⁽²⁾ (A) | I _{SAT} ⁽³⁾ (A) | Volt-µsec ⁽⁴⁾ Vµs | Energy ⁽⁵⁾ µJ | DCR (Ω) ⁽⁶⁾ 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_{DC} 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_{SAT}. For other current levels see Chart 1.
- (6) Maximum D.C. resistance at +20 °C.

Dimensions- mm

| Vertical and Horizontal Self Leaded Mounting Options | | | | | | | | |
|---|--|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|--------------------|
| Vertical P/N See Figure 1 | Horizontal P/N See Figure 2 | OD (max) | ID (typ) | Ht (max) | X (typ) | Y (typ) | T (typ) | H (typ) |
| 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

| Header Mounted Option | | | | | | | | | |
|-----------------------------------|---------------------|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 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 |

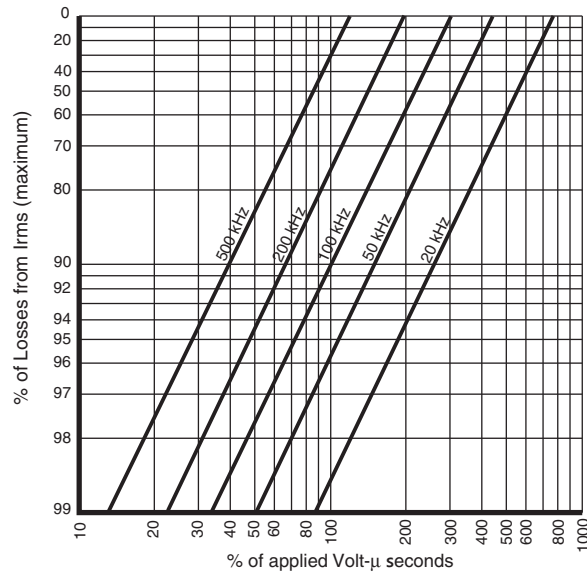
Note: All dimensions are in millimeters.



Drawings are not to scale.

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 |
| Δ 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 5 seconds max each wave | 10 seconds max 5 seconds max each wave |
| Ramp-down rate | ~ 2 K/s min ~3.5 K/s typ ~5 K/s max | ~ 2 K/s min ~3.5 K/s typ ~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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Printed in USA
Publication No. 4304
July 2017