



Mn-Zn

# Ferrite Cores for Switching Power Supplies

# LP series

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 **REMINDERS FOR USING THESE PRODUCTS**

Please be sure to read this manual thoroughly before using the products.

The products listed on this catalog are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) under a normal operation and use condition.

The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.

When using the products for specific purposes, please first make confirmations in areas such as safety, reliability, and quality.

Please understand that we are not in a position to be held responsible for any damage or the like caused by any use exceeding the range or conditions of this specification sheet or by any use in the specific applications.

- |   |  |
|---|--|
| (1) Aerospace/Aviation equipment                            | (8) Public information-processing equipment                                  |
| (2) Transportation equipment (electric trains, ships, etc.) | (9) Military equipment   |
| (3) Medical equipment                                       | (10) Electric heating apparatus, burning equipment                           |
| (4) Power-generation control equipment                      | (11) Disaster prevention/crime prevention equipment                          |
| (5) Atomic energy-related equipment                         | (12) Safety equipment  |
| (6) Seabed equipment  | (13) Other applications that are not considered general-purpose applications |
| (7) Transportation control equipment                        |  |

When using this product in general-purpose standard applications, you are kindly requested to take into consideration securing protection circuit/equipment or providing backup circuits, etc to ensure higher safety.

# Ferrite Cores for Switching Power Supplies

Product compatible with RoHS directive  
Halogen-free

## Overview of the LP Series

### FEATURES

- TDK's original shapes.
- The LP Cores have low profiles, and so are useful in situations where mounting is subject to restrictions.

### APPLICATION

Transformers and coils for Switched-mode power supplies (High Mounting Density, Low Profile)

### PART NUMBER CONSTRUCTION

PC47	LP23/8	Z	-	1	2
<b>Material</b>	<b>Size of LP core</b>	<b>AL-value (Z: without air gap)</b>		<b>Type</b>	<b>Number of lead slot</b>
PC47	LP23/8 LP22/13 LP32/13			1 Without air gap 2 With air gap	

### RANGE OF USE AND STORAGE TEMPERATURE

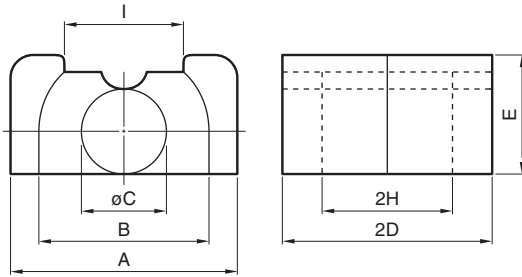
Temperature range	
Operating temperature (°C)	Storage temperature (°C)
-30 to +105	-30 to +85

- RoHS Directive Compliant Product: See the following for more details related to RoHS Directive compliant products. <http://www.tdk.co.jp/rohs/>
- Halogen-free: Indicates that Cl content is less than 900ppm, Br content is less than 900ppm, and that the total Cl and Br content is less than 1500ppm.

• All specifications are subject to change without notice.

# Mn-Zn LP Cores

## SHAPES AND DIMENSIONS



LP	LP23/8	Z	1	2
Material	Size of LP core	AL-value (Z: without air gap)	Type	Number of lead slot
			1 Without air gap	
			2 With air gap	

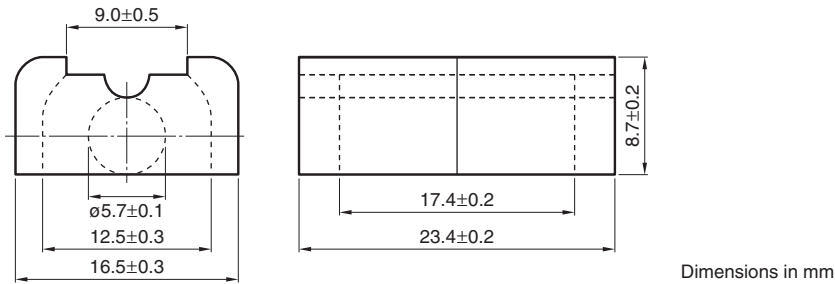
Part No.	Dimensions (mm)						
	A	B	øC	2D	E	2H	I
PC47LP23/8Z-12	16.5±0.3	12.5±0.3	5.7±0.1	23.4±0.2	8.7±0.2	17.4±0.2	9.0±0.5
PC47LP22/13Z-12	25.0±0.4	19.0±0.3	8.6±0.2	22.4±0.2	12.9±0.3	16.4±0.3	13.5±0.5
PC47LP32/13Z-12	25.0±0.4	19.0±0.3	8.6±0.2	31.8±0.2	12.9±0.3	24.1±0.3	13.5±0.5

Part No.	Effective parameter					Electrical characteristics		
	Core factor $C_1(\text{mm}^{-1})$	Effective cross-sectional area $A_e(\text{mm}^2)$	Effective magnetic path length $\ell_e(\text{mm})$	Effective core volume $V_e(\text{mm}^3)$	Weight (g)	AL-value (nH/N <sup>2</sup> ) 1kHz 0.5mA 100Ts Without air gap   With air gap		Core loss (W) max. 100kHz 200mT 100°C
PC47LP23/8Z-12	1.41	31.3	44.1	1380	9.6	1600±25%	63±5% 100±7% 250±13%	0.48
PC47LP22/13Z-12	0.721	67.9	49.0	3330	21	3310±25%	100±5% 200±7% 400±10%	1.22
PC47LP32/13Z-12	0.909	70.3	64.0	4500	30	2630±25%	100±5% 200±7% 400±10%	1.60

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## Mn-Zn LP series Part No.: PC47LP23/8Z-12

## SHAPES AND DIMENSIONS

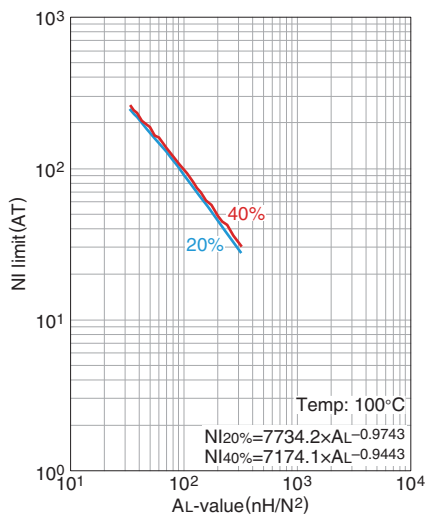


Effective parameter								Electrical characteristics		
Core factor	Effective magnetic path length $l_e$	Effective cross-sectional area $A_e$	Effective core volume $V_e$	Cross-sectional center pole area $A_{cp}$	Minimum cross-sectional center pole area $A_{cp \text{ min.}}$	Cross-sectional winding area of core $A_{cw}$	Weight	AL-value *		Core loss
$C_1$ ( $\text{mm}^{-1}$ )	(mm)	( $\text{mm}^2$ )	( $\text{mm}^3$ )	( $\text{mm}^2$ )	( $\text{mm}^2$ )	( $\text{mm}^2$ )	(g/set)	( $\text{nH/N}^2$ ) 1kHz 0.5mA	100kHz 200mT	(W)max. 100kHz 200mT 100°C
1.41	44.1	31.3	1380	25.5	24.6	59.2	9.6	1600±25%	2230 min.	0.48

\* Coil :  $\phi 0.3$  2UEW 100Ts

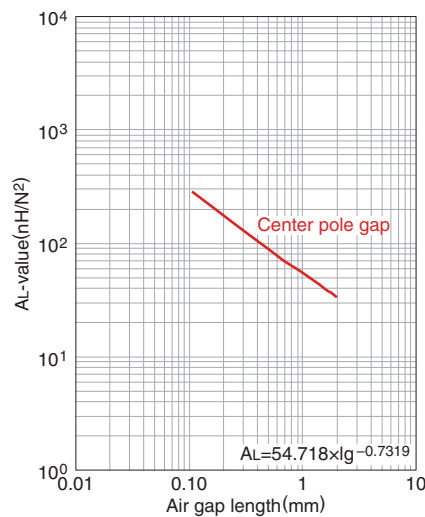
○ Calculated output power (forward converter mode): 54W (100kHz)

## NI limit vs. AL-value (Typ.)



The 20% and 40% graph shows when a 20% and 40% drop from the initial AL-value has been made due to the DC superimposition.

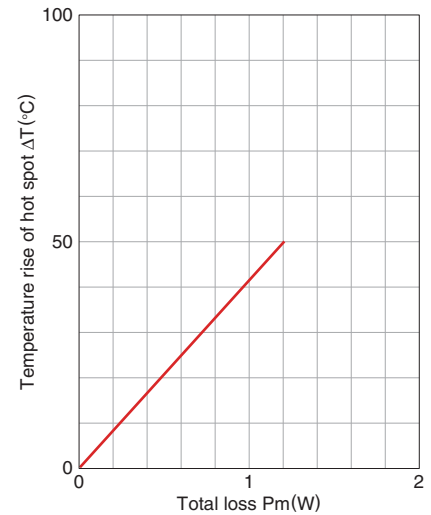
## AL-value vs. Air gap length (Typ.)



Measuring conditions

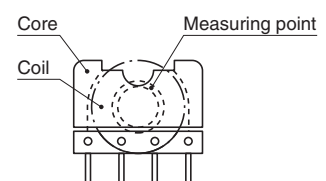
- Coil :  $\phi 0.3$  2UEW 100Ts
- Frequency : 1kHz
- Current level : 0.5mA
- Ambient temperature : 25°C

## Temperature rise vs. Total loss (Typ.)



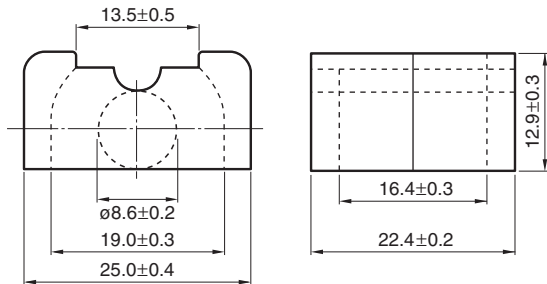
Measuring conditions

- Room space: approx. 400x300x 300cm
- Ambient temperature : 25°C
- Humidity : 45(%RH).



## Mn-Zn LP series Part No.: PC47LP22/13Z-12

## SHAPES AND DIMENSIONS



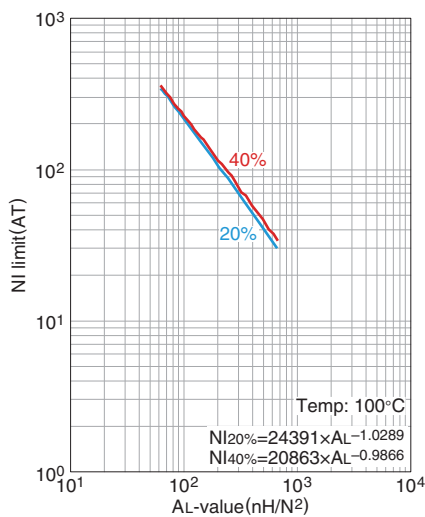
Dimensions in mm

Effective parameter								Electrical characteristics		
Core factor	Effective magnetic path length $l_e$	Effective cross-sectional area $A_e$	Effective core volume $V_e$	Cross-sectional center pole area $A_{cp}$	Minimum cross-sectional center pole area $A_{cp \text{ min.}}$	Cross-sectional winding area of core $A_{cw}$	Weight	AL-value *		Core loss
$C_1$ (mm <sup>-1</sup> )	(mm)	(mm <sup>2</sup> )	(mm <sup>3</sup> )	(mm <sup>2</sup> )	(mm <sup>2</sup> )	(mm <sup>2</sup> )	(g/set)	(nH/N <sup>2</sup> ) 1kHz 0.5mA	100kHz 200mT	(W)max. 100kHz 200mT 100°C
0.721	49.0	67.9	3330	58.1	55.4	84.2	21	3310±25%	4700 min.	1.22

\* Coil : ø0.35 2UEW 100Ts

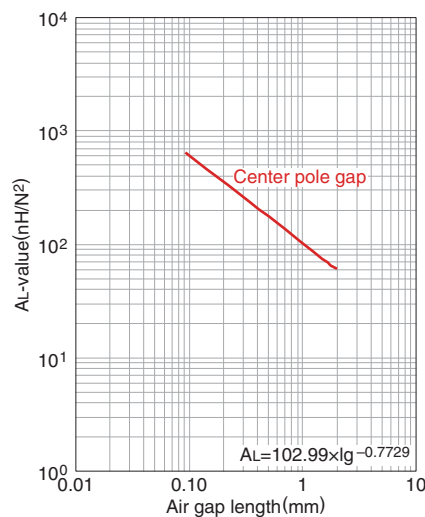
○ Calculated output power (forward converter mode): 135W (100kHz)

## NI limit vs. AL-value (Typ.)



The 20% and 40% graph shows when a 20% and 40% drop from the initial AL-value has been made due to the DC superimposition.

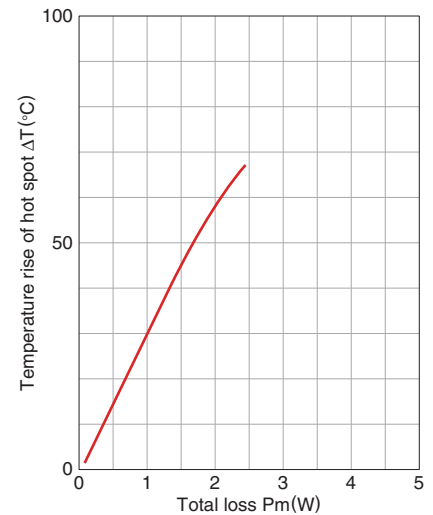
## AL-value vs. Air gap length (Typ.)



Measuring conditions

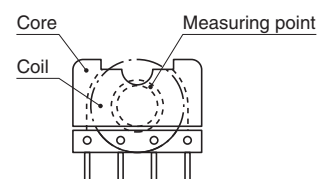
- Coil : ø0.35 2UEW 100Ts
- Frequency : 1kHz
- Current level : 0.5mA
- Ambient temperature : 25°C

## Temperature rise vs. Total loss (Typ.)



Measuring conditions

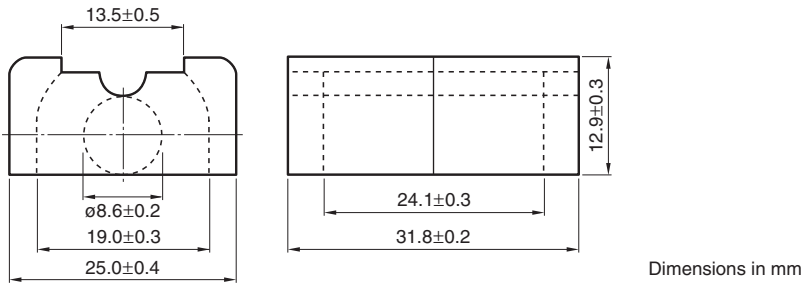
- Room space: approx. 400x300x 300cm
- Ambient temperature : 25°C
- Humidity: 45%(%)RH.



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## Mn-Zn LP series Part No.: PC47LP32/13Z-12

## SHAPES AND DIMENSIONS

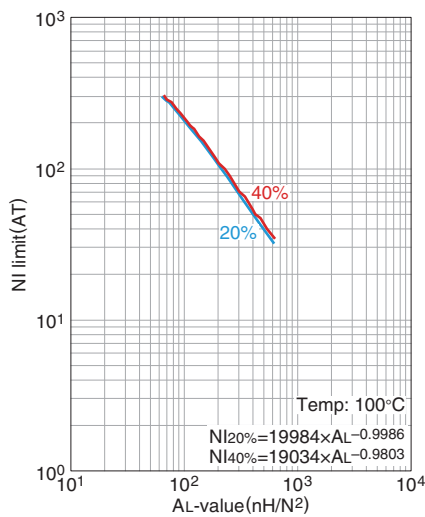


Effective parameter								Electrical characteristics		
Core factor	Effective magnetic path length $l_e$ (mm)	Effective cross-sectional area $A_e$ (mm <sup>2</sup> )	Effective core volume $V_e$ (mm <sup>3</sup> )	Cross-sectional center pole area $A_{cp}$ (mm <sup>2</sup> )	Minimum cross-sectional center pole area $A_{cp \text{ min.}}$ (mm <sup>2</sup> )	Cross-sectional winding area of core $A_{cw}$ (mm <sup>2</sup> )	Weight (g/set)	AL-value *		Core loss (W)max.
$C_1$ (mm <sup>-1</sup> )								1kHz 0.5mA	100kHz 200mT	100kHz 200mT 100°C
0.909	64.0	70.3	4500	58.1	55.4	125.3	30	2630±25%	3730 min.	1.60

\* Coil :  $\phi 0.35$  2UEW 100Ts

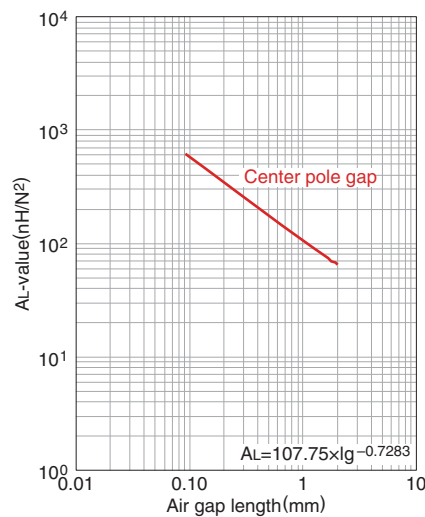
○ Calculated output power (forward converter mode): 182W (100kHz)

## NI limit vs. AL-value (Typ.)



The 20% and 40% graph shows when a 20% and 40% drop from the initial AL-value has been made due to the DC superimposition.

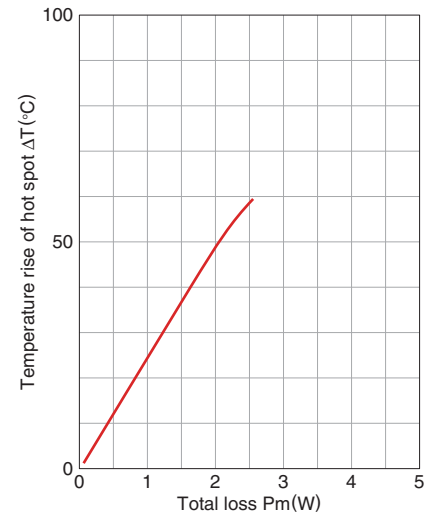
## AL-value vs. Air gap length (Typ.)



Measuring conditions

- Coil :  $\phi 0.35$  2UEW 100Ts
- Frequency : 1kHz
- Current level : 0.5mA
- Ambient temperature : 25°C

## Temperature rise vs. Total loss (Typ.)



Measuring conditions

- Room space: approx. 400x300x 300cm
- Ambient temperature : 25°C
- Humidity : 45%(%)RH.

