# ACDL1V

## Automotive class D audio inductor alloy powder


### Product features

- AEC-Q200
- Shielded construction
- Dual inductors in a single package
- 12.2 mm x 9.8 mm footprint surface mount package in a 11.6 mm height
- Low loss, low DCR
- High $I_{sat}$
- Alloy powder core material
- Moisture sensitivity level (MSL) 1

### Applications

Automotive class D audio amplifiers

- Automotive 12 V/24 V/48 V bidirectional DC/DC converters
- EV battery chargers
- On-board-chargers
- xEV Electrical systems (multiple phases)

### Environmental compliance and general specifications

- Storage temperature range (component): -55 °C to +155 °C
- Operating temperature range: -55 °C to +155 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant

Pb HALOGEN HF FREE RoHS

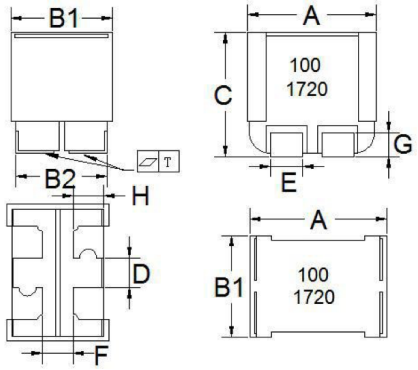
Powering Business Worldwide

## Product specifications

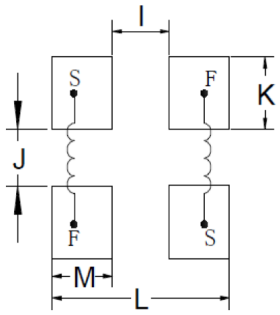
| Part number[5] | OCL[3] (µH) ± 20% | $I_{rms}$[3] (A) | $I_{sat}$[4] (A) | DCR (mΩ) typical @ +25 °C | DCR (mΩ) maximum @ +25 °C | SRF (MHz) reference |
|---|---|---|---|---|---|---|
| ACDL1V1004-5R6-R | 5.6 | 6.0 | 9.0 | 20 | 24 | 15 |
| ACDL1V1004-7R5-R | 7.5 | 5.3 | 8.0 | 25 | 30 | 14 |
| ACDL1V1004-100-R | 10 | 4.4 | 6.4 | 30.5 | 36.6 | 12 |
| ACDL1V1004-150-R | 15 | 4.1 | 5.0 | 43.5 | 52.2 | 10 |
| ACDL1V1004-220-R | 22 | 3.5 | 4.5 | 62 | 74.4 | 8.0 |
| ACDL1V1004-330-R | 33 | 2.8 | 4.0 | 100 | 120 | 7.0 |

1. Open circuit inductance (OCL) test parameters: 100 kHz, 1.0 $V_{rms}$, 0.0 Adc, +25 °C
2. All test data referenced to +25°C ambient.
3. $I_{rms}$ (per winding): DC current for an approximate temperature rise of 40 °C without core loss. Derating is necessary for AC currents. PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed +155 °C under worst case operating conditions verified in the end application.
4. $I_{sat}$ (per winding): Peak current for approximately 30% rolloff @ +25 °C.
5. Part number definition: ACDL1V1004-xxx-R
(ACDL1V1004)= Product code and size
xxx= inductance value in ,µH, R= decimal point, if no R is present then last character equals number of zeros
-R suffix = RoHS compliant
Note: Rated DC current: The lower value of $I_{rms}$ or $I_{sat}$.

## Mechanical parameters, schematic, pad layout (mm)

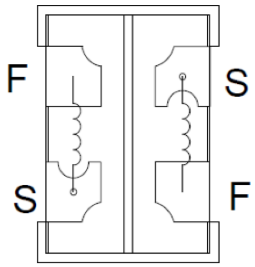



### Recommended pad layout




| | |
|---|---|
| I | 2.9 |
| J | 1.5 |
| K | 3.3 |
| L | 9.7 |
| M | 3.4 |

### Schematic




| Part number | A | B1 | B2 | C | D | E | F | G | H | T |
|---|---|---|---|---|---|---|---|---|---|---|
| ACDL1V1004 | 12 ± 0.20 | 9.6 ± 0.20 | 8.7 ± 0.25 | 11.3 ± 0.30 | 1.95 ± 0.15 | 2.8 ± 0.10 | 3.4 minimum | 2.3 ± 0.30 | 2.5 ± 0.30 | ≤ 0.1 |

Part marking: example 100
1720

100= inductance value in µH, last digit indicates number of zeros (100=10 µH)

1720= (randomly generated lot code)

PCB layout is for reference

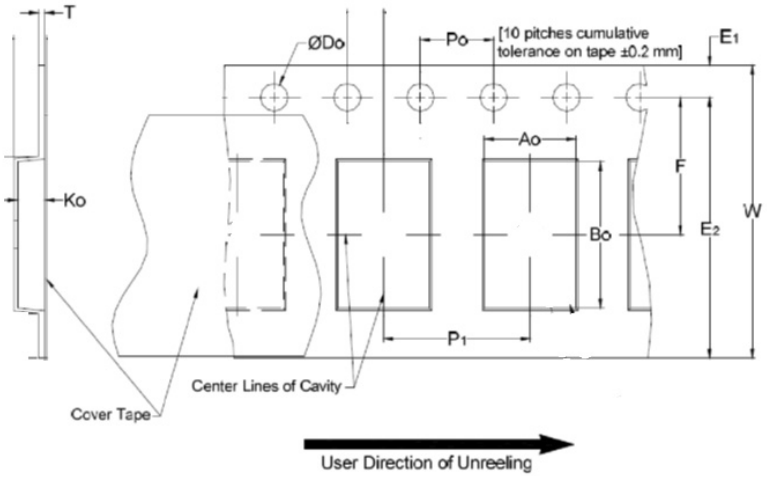
Recommended solder paste thickness at 0.15 mm and above.

Traces or vias underneath the inductor is not recommended.

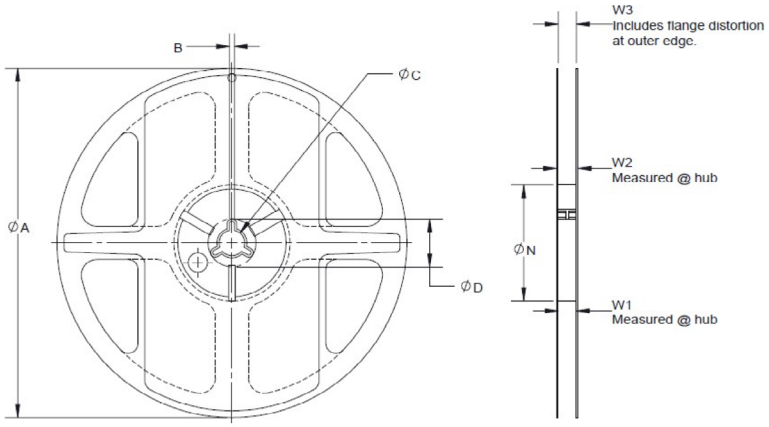
**Packaging information (mm)**

Drawing not to scale

Supplied in tape and reel packaging, 300 parts per 13" diameter reel (EIA-481 compliant)




| | |
|---|---|
| W | 24.0 ± 0.3 |
| F | 11.5 ± 0.1 |
| E1 | 1.75 ± 0.10 |
| E2 | NA |
| P0 | 4 ± 0.10 |
| P1 | 16.0 ± 0.1 |
| ØD0 | 1.5 ± 0.1 |
| A0 | 10.0 ± 0.1 |
| B0 | 12.5 ± 0.1 |
| K0 | 11.55 ± 0.10 |
| T | 0.50 ± 0.05 |

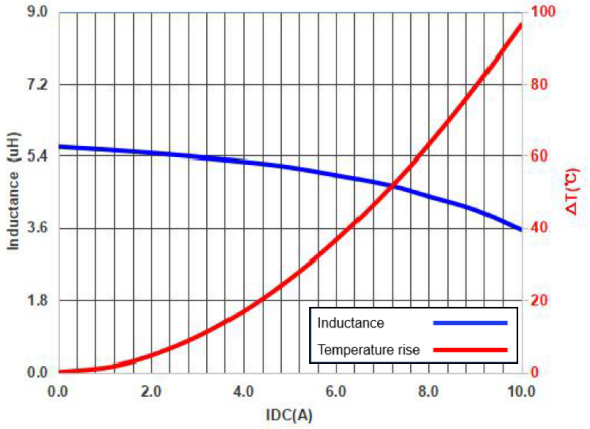



Shape & Appearance For Reference Only

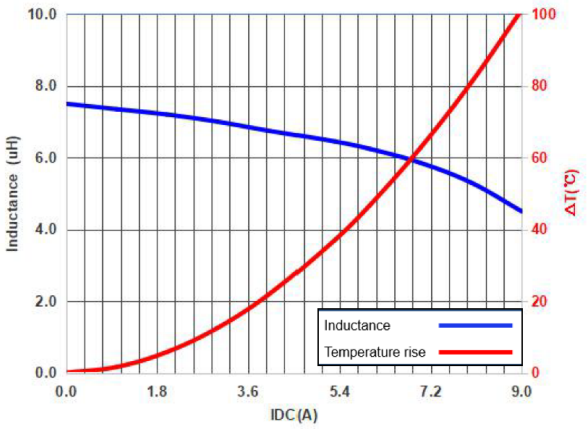
| | |
|---|---|
| A | 330 ± 2 |
| B | 2.3 ± 0.3 |
| C | 13 + 0.5/-0.2 |
| D | 20.2 minimum |
| N | 97 ± 0.5 |
| W1 | 24.4 + 2.0/-0 |
| W2 | 30.4 maximum |
| W3 | NA |

**Inductance and temperature rise vs. Idc**

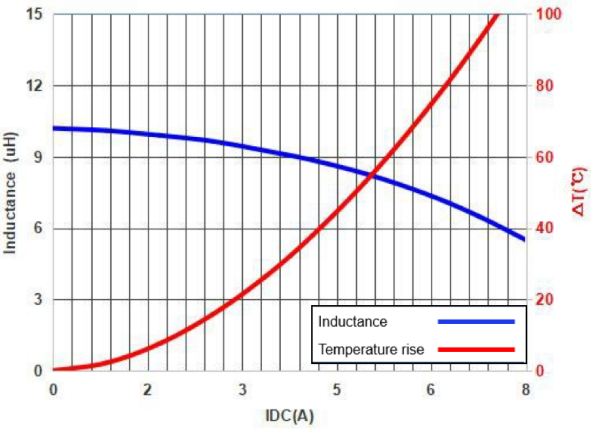
**ACDL1V1004-5R6-R**



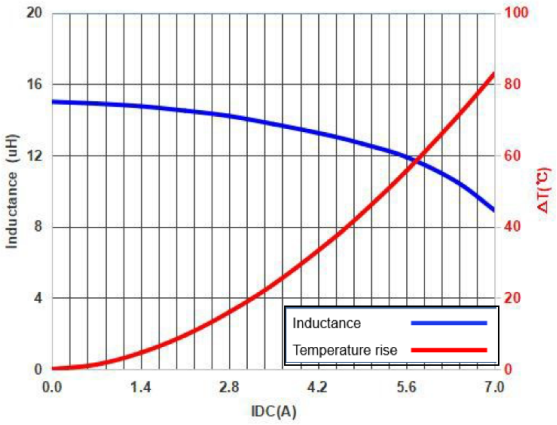

**ACDL1V1004-7R5-R**



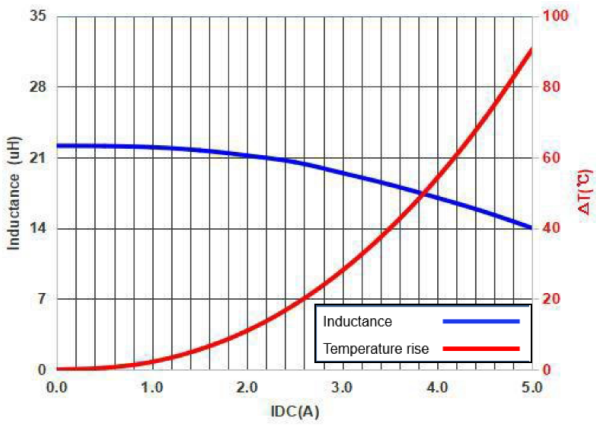

**ACDL1V1004-100-R**



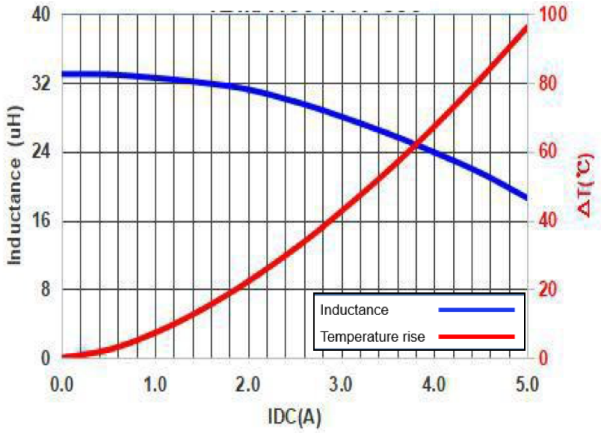

**ACDL1V1004-150-R**




**ACDL1V1004-220-R**




**ACDL1V1004-330-R**



## Solder reflow profile

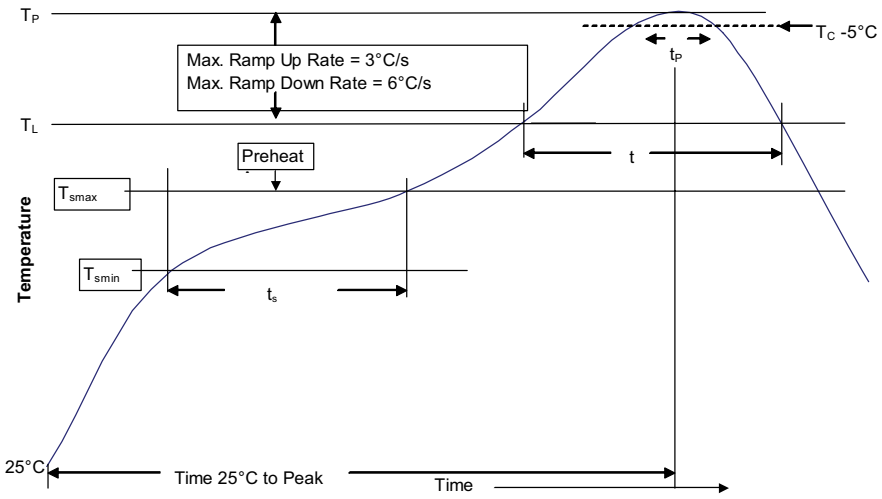



**Table 1 - Standard SnPb solder ($T_C$)**

| Package thickness | Volume mm3 <350 | Volume mm3 ≥350 |
|---|---|---|
| <2.5 mm | 235 °C | 220 °C |
| ≥2.5 mm | 220 °C | 220 °C |

**Table 2 - Lead (Pb) free solder ($T_C$)**

| Package thickness | Volume mm³ <350 | Volume mm³ 350 - 2000 | Volume mm³ >2000 |
|---|---|---|---|
| <1.6 mm | 260 °C | 260 °C | 260 °C |
| 1.6 – 2.5 mm | 260 °C | 250 °C | 245 °C |
| >2.5 mm | 250 °C | 245 °C | 245 °C |

## Reference J-STD-020

| Profile feature | | Standard SnPb solder | Lead (Pb) free solder |
|---|---|---|---|
| Preheat and soak | • Temperature min. ($T_{smin}$) | 100 °C | 150 °C |
| | • Temperature max. ($T_{smax}$) | 150 °C | 200 °C |
| | • Time ($T_{smin}$ to $T_{smax}$) ($t_s$) | 60-120 seconds | 60-120 seconds |
| Ramp up rate $T_L$ to $T_p$ | | 3 °C/ second max. | 3 °C/ second max. |
| Liquidous temperature ($T_L$)<br>Time ($t_L$) maintained above $T_L$ | | 183 °C<br>60-150 seconds | 217 °C<br>60-150 seconds |
| Peak package body temperature ($T_P$)* | | Table 1 | Table 2 |
| Time ($t_p$)* within 5 °C of the specified classification temperature ($T_C$) | | 20 seconds* | 30 seconds* |
| Ramp-down rate ($T_p$ to $T_L$) | | 6 °C/ second max. | 6 °C/ second max. |
| Time 25 °C to peak temperature | | 6 minutes max. | 8 minutes max. |

* Tolerance for peak profile temperature ($T_p$) is defined as a supplier minimum and a user maximum.



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