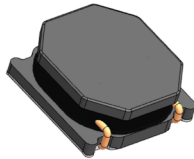


SDCHA1V50

Automotive grade semi-shielded power inductors



Product features

- AEC-Q200 qualified
- High current carrying capacity
- High power density, low core losses
- Magnetically semi-shielded
- Inductance range from 1 μ H to 22 μ H
- Current range from 1.1 A to 5.0 A
- SDCHA1V5020: 5.2 mm x 5.2 mm surface mount package in a maximum 2.0 mm height
- SDCHA1V5040: 5.15 mm x 5.15 mm surface mount package in a maximum 4.1 mm height
- NiZn ferrite magnetic material
- Moisture sensitivity level (MSL): 1

Applications

- LED lighting
- Advanced driver assistance systems (ADAS)
- Adaptive cruise control (ACC)
- Collision avoidance
- Infotainment and cluster electronics
- Electronic control unit (ECU)

Environmental compliance and general specifications

- Storage temperature range (component): -55 °C to +125 °C
- Operating temperature range: -55 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



Product specifications

| Part number ⁵ | OCL ¹ (μ H) | Tolerance | FLL ² (μ H) minimum | I_{RMS} ³ (A) | I_{SAT} ⁴ (A) | DCR (m Ω) \pm 20% @ +25 °C | SRF (MHz) typical |
|--------------------------|--------------------------------|-----------|--|-------------------------------|-------------------------------|---|----------------------|
| SDCHA1V5020 | | | | | | | |
| SDCHA1V5020-1R0-R | 1.0 | \pm 30% | 0.49 | 4.1 | 5.0 | 20 | 137 |
| SDCHA1V5020-1R5-R | 1.5 | \pm 30% | 0.74 | 3.5 | 4.5 | 25 | 100 |
| SDCHA1V5020-2R2-R | 2.2 | \pm 20% | 1.23 | 3.3 | 4.1 | 32 | 86 |
| SDCHA1V5020-3R3-R | 3.3 | \pm 20% | 1.85 | 2.8 | 3.5 | 43 | 66 |
| SDCHA1V5020-4R7-R | 4.7 | \pm 20% | 2.63 | 2.4 | 2.7 | 60 | 55 |
| SDCHA1V5020-5R6-R | 5.6 | \pm 20% | 3.14 | 2.1 | 2.4 | 69 | 50 |
| SDCHA1V5020-6R8-R | 6.8 | \pm 20% | 3.81 | 1.9 | 2.1 | 90 | 45 |
| SDCHA1V5020-8R2-R | 8.2 | \pm 20% | 4.59 | 1.75 | 1.9 | 98 | 41 |
| SDCHA1V5020-100-R | 10 | \pm 20% | 5.6 | 1.6 | 1.7 | 110 | 38 |
| SDCHA1V5020-150-R | 15 | \pm 20% | 8.4 | 1.25 | 1.3 | 165 | 31 |
| SDCHA1V5020-220-R | 22 | \pm 20% | 12.32 | 1.1 | 1.1 | 225 | 24 |
| SDCHA1V5040 | | | | | | | |
| SDCHA1V5040-1R0-R | 1.0 | \pm 20% | 0.56 | 5.0 | 7.5 | 12 | 140 |
| SDCHA1V5040-1R5-R | 1.5 | \pm 20% | 0.84 | 4.5 | 6.5 | 15 | 70 |
| SDCHA1V5040-2R2-R | 2.2 | \pm 20% | 1.23 | 3.8 | 5.7 | 21 | 55 |
| SDCHA1V5040-3R3-R | 3.3 | \pm 20% | 1.85 | 3.5 | 4.4 | 24 | 43 |
| SDCHA1V5040-4R7-R | 4.7 | \pm 20% | 2.63 | 3.2 | 3.9 | 32 | 36 |
| SDCHA1V5040-6R8-R | 6.8 | \pm 20% | 3.81 | 2.5 | 3.3 | 43 | 29 |
| SDCHA1V5040-100-R | 10 | \pm 20% | 5.6 | 2.2 | 2.52 | 56 | 26 |
| SDCHA1V5040-150-R | 15 | \pm 20% | 8.4 | 1.8 | 2.0 | 80 | 21 |
| SDCHA1V5040-220-R | 22 | \pm 20% | 12.32 | 1.5 | 1.62 | 123 | 16 |

1. Open circuit inductance (OCL) test parameters: 100 kHz, 1.0 Vrms, 0.0 Adc, +25 °C

2. Full load inductance (FLL) test parameters: 100 kHz, 1.0 Vrms, I_{RMS} , +25 °C

3. I_{RMS} : 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 +125 °C under worst case operating conditions verified in the end application.

4. I_{SAT} : Peak current for approximately 30% maximum rolloff @ +25 °C

5. Part number definition: SDCHA1V5020-xxx-R

SDCHA1V5020 = Product code and size

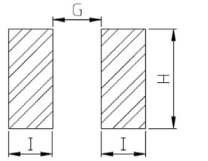
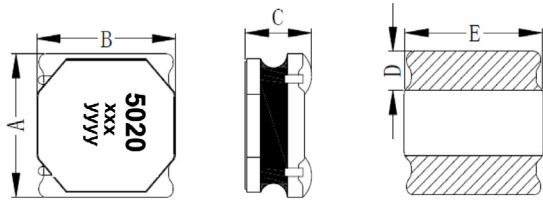
xxx= Inductance value in μ H, R=decimal point, If no R is present last digit indicates number of zeros

-R suffix = RoHS compliant

6. Rated operating voltage (across inductor) 20 V ref.

Dimensions-mm

SDCHA1V5020

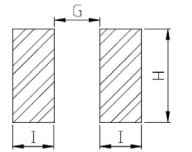
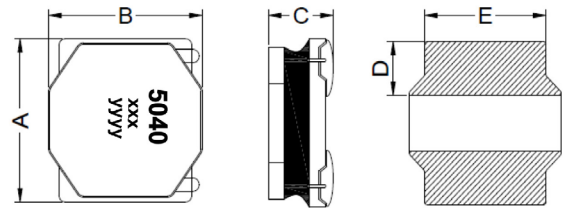


Recommended PCB Layout

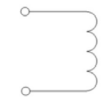


Schematic

SDCHA1V5040



Recommended PCB Layout



Schematic

| Dimension | SDCHA1V5020-xxx-R |
|-----------|-------------------|
| A | 5.0 ± 0.2 |
| B | 5.0 ± 0.2 |
| C | 1.8 ± 0.2 |
| D | 1.3 ± 0.2 |
| E | 4.7 ± 0.2 |
| G | 2.1 |
| H | 4.7 |
| I | 1.5 |

| Dimension | SDCHA1V5040-xxx-R |
|-----------|---|
| A | 4.95 ± 0.2 |
| B | 4.95 ± 0.2 |
| C | 3.9 ± 0.2 (≤10 μH) 3.8 ± 0.2 (> 10 μH) |
| D | 1.3 ± 0.3 |
| E | 4.2 ± 0.2 |
| G | 2.1 |
| H | 4.2 |
| I | 1.5 |

Part marking: 5020, 5040, xxx= inductance value in uH, R= decimal point. If no R is present then last character equals number of zeros, yyyy= lot code

Tolerances are ±0.3 millimeters unless stated otherwise

All soldering surfaces to be coplanar within 0.1 millimeters

Pad layout tolerances are ±0.1 millimeters unless stated otherwise

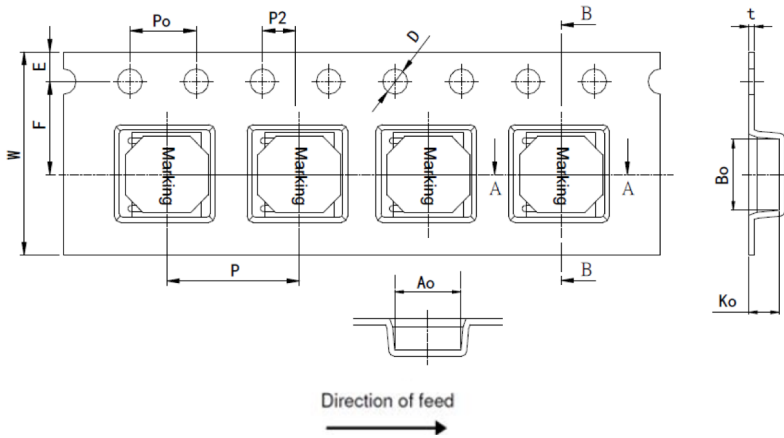
Traces or vias underneath the inductor is not recommended

Packaging information- mm

SDCHA1V5020

Supplied in tape and reel packaging, 2500 parts per 13" diameter reel (EIA-481 compliant)

Drawing not to scale

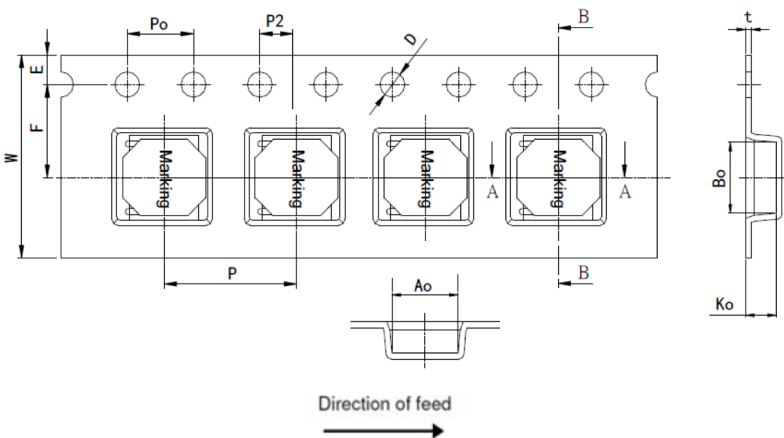


| Dimension | Value |
|-----------|------------|
| W | 12.0 ± 0.3 |
| F | 7.5 ± 0.1 |
| E | 1.75 ± 0.1 |
| P0 | 4.0 ± 0.1 |
| P | 8.0 ± 0.1 |
| P2 | 2.0 ± 0.1 |
| D | 1.5 ± 0.1 |
| A0 | 5.4 ± 0.1 |
| B0 | 5.4 ± 0.1 |
| K0 | 2.2 ± 0.1 |
| t | 0.4 ± 0.1 |

SDCHA1V5040

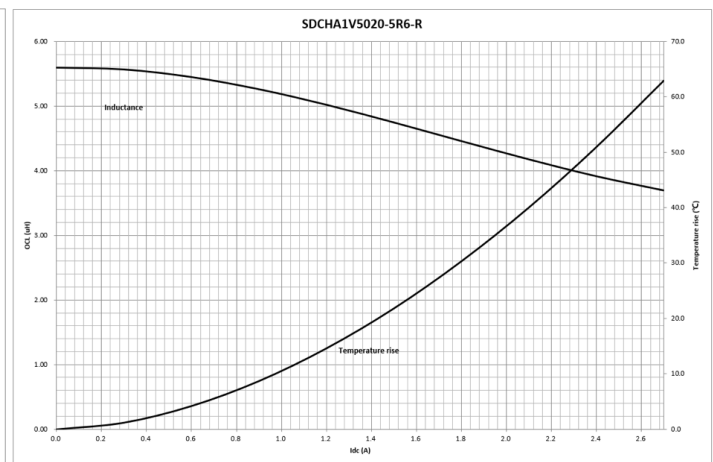
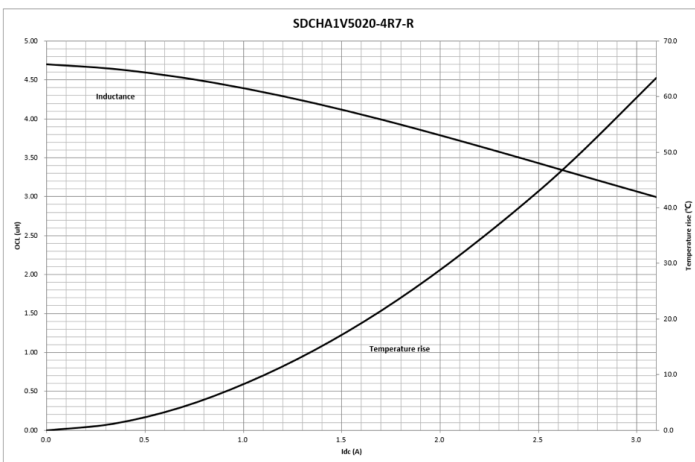
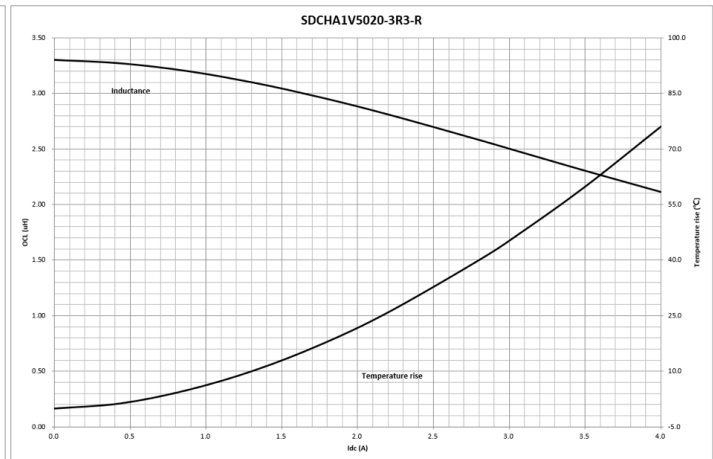
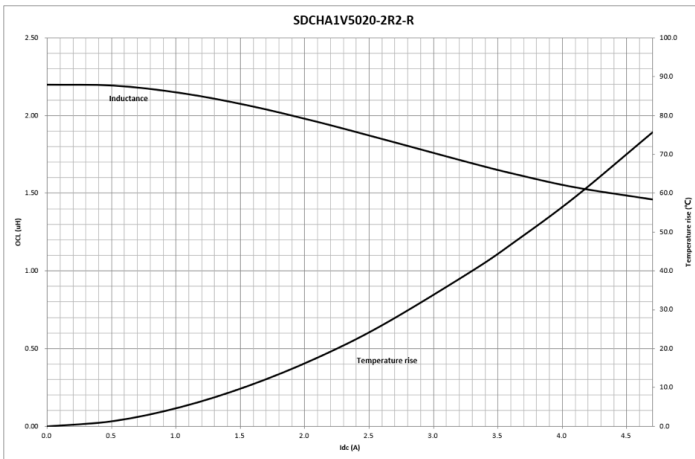
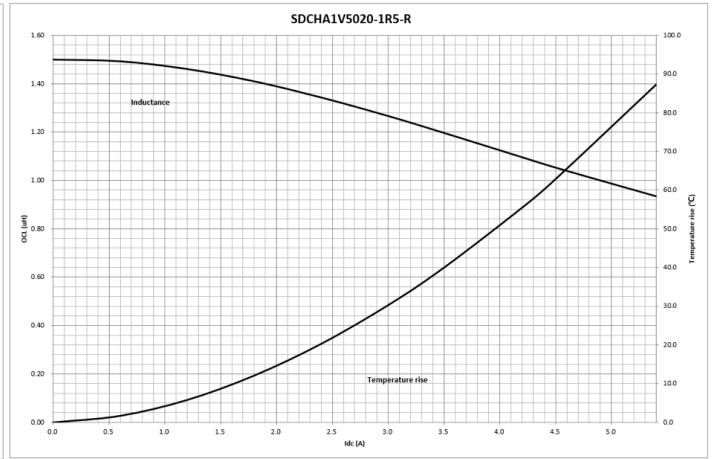
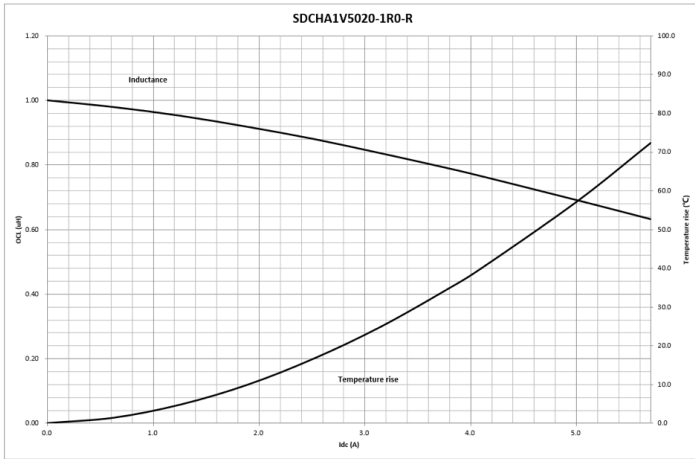
Supplied in tape and reel packaging, 1500 parts per 13" diameter reel (EIA-481 compliant)

Drawing not to scale



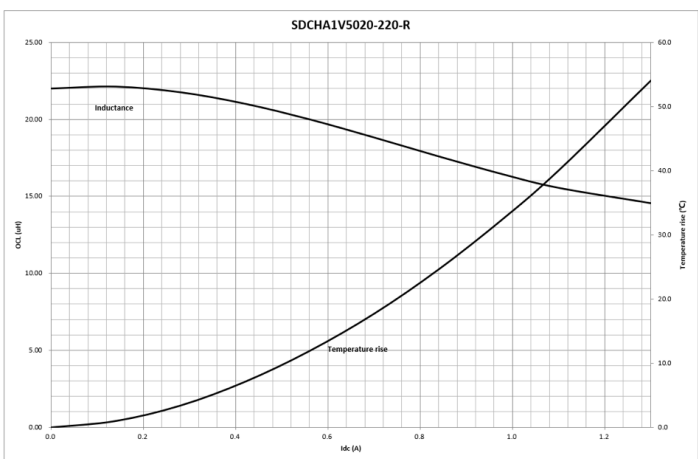
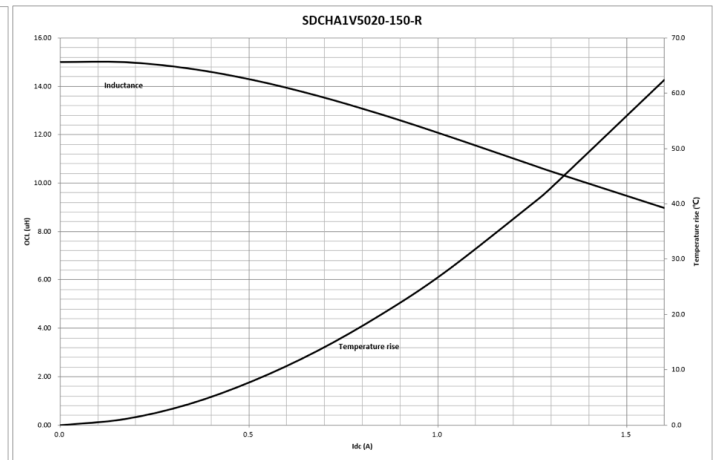
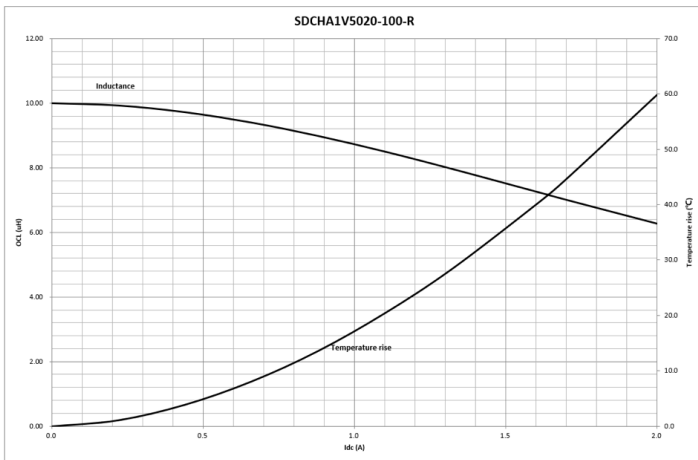
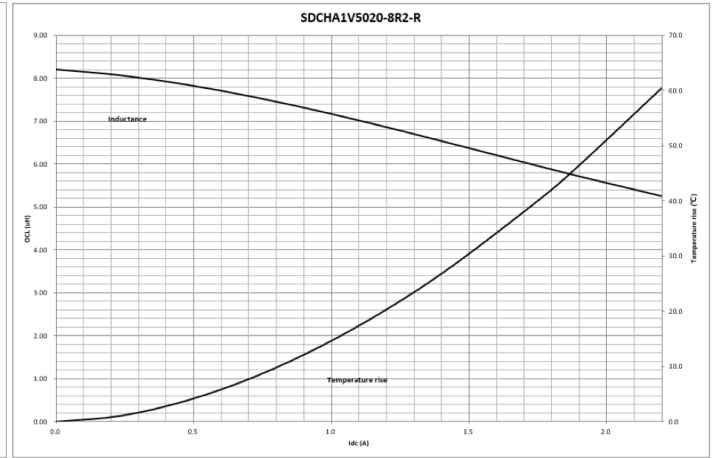
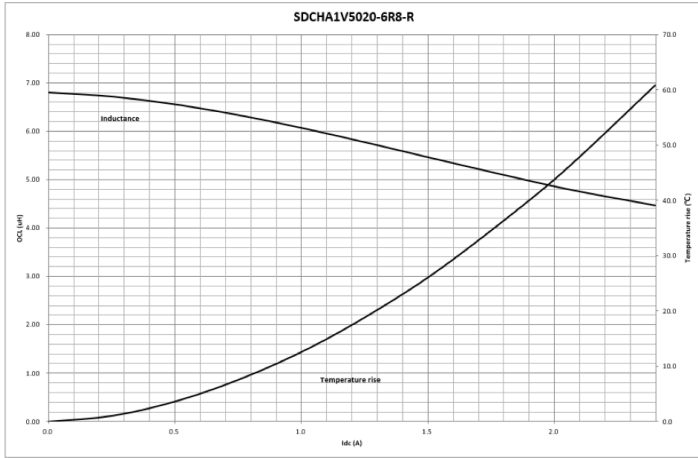
| Dimension | Value |
|-----------|------------|
| W | 12.0 ± 0.3 |
| F | 7.5 ± 0.1 |
| E | 1.75 ± 0.1 |
| P0 | 4.0 ± 0.1 |
| P | 8.0 ± 0.1 |
| P2 | 2.0 ± 0.1 |
| D | 1.5 ± 0.1 |
| A0 | 5.4 ± 0.1 |
| B0 | 5.4 ± 0.1 |
| K0 | 4.3 ± 0.1 |
| t | 0.4 ± 0.1 |

Inductance and temperature rise vs current
SDCHA1V5020



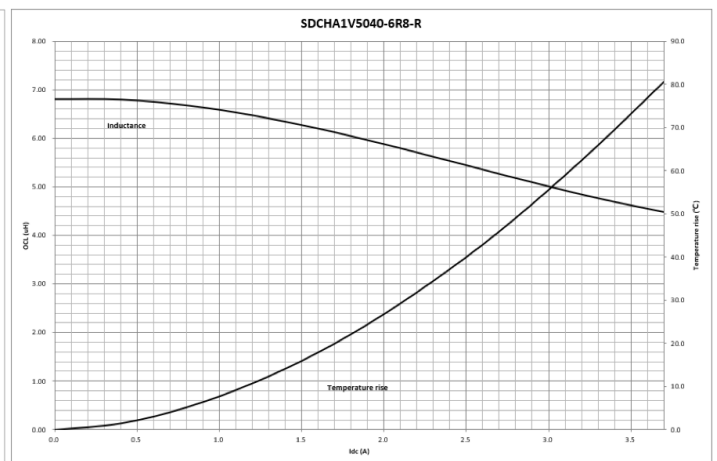
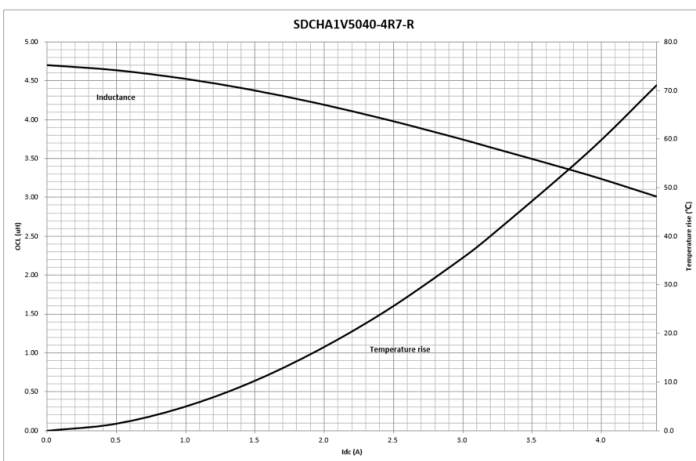
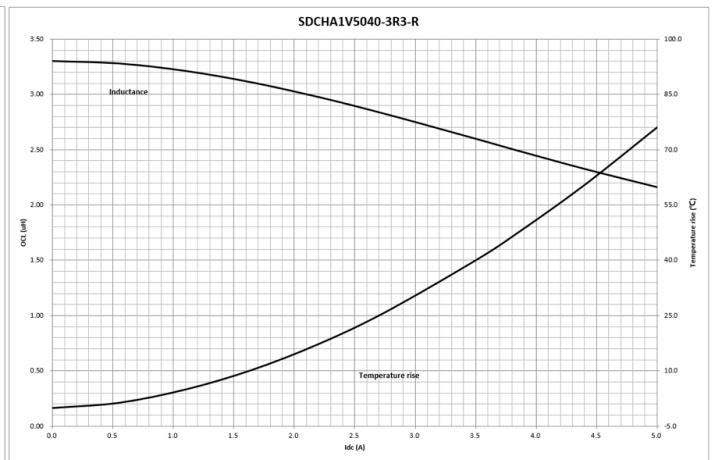
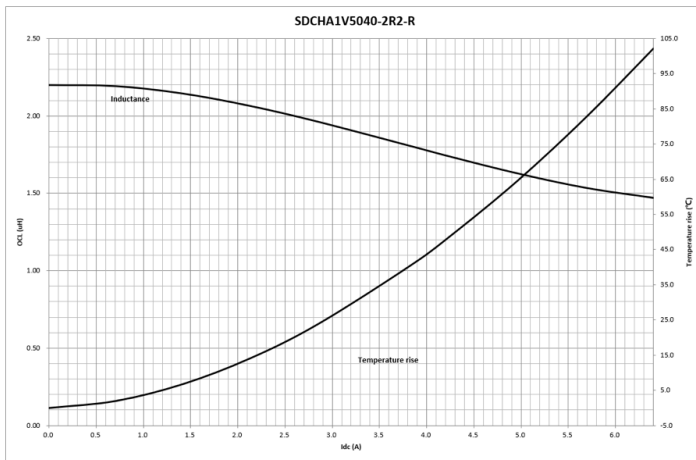
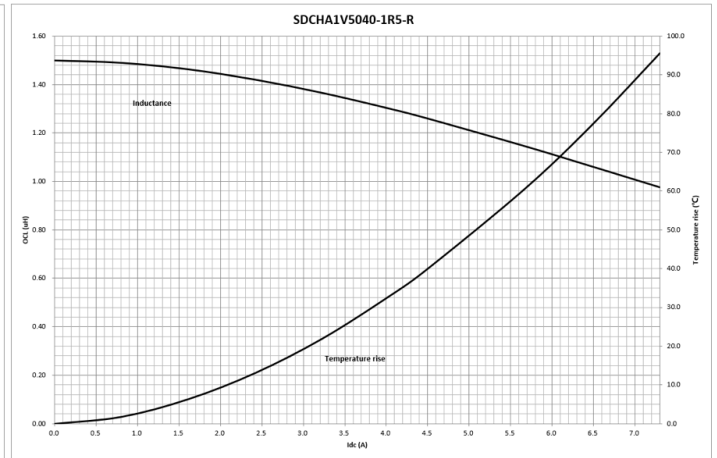
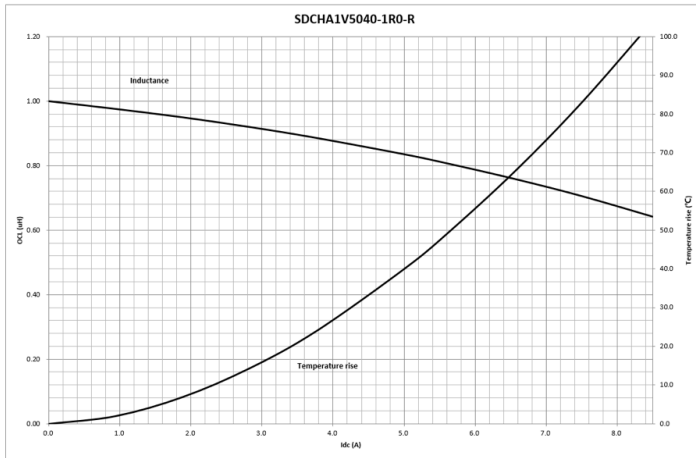
Inductance and temperature rise vs current

SDCHA1V5020



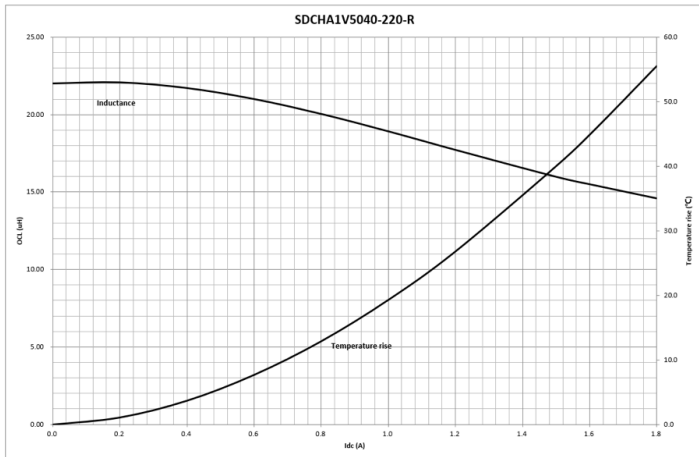
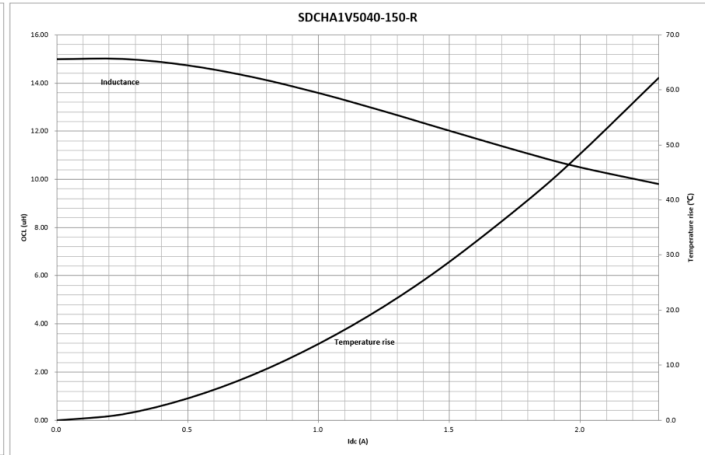
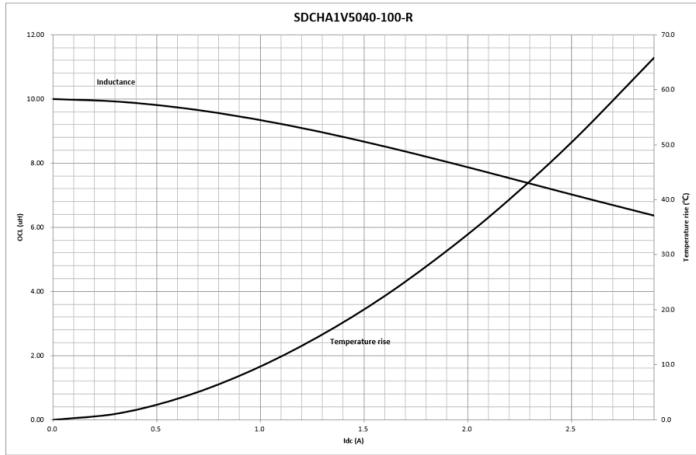
Inductance and temperature rise vs current

SDCHA1V5040



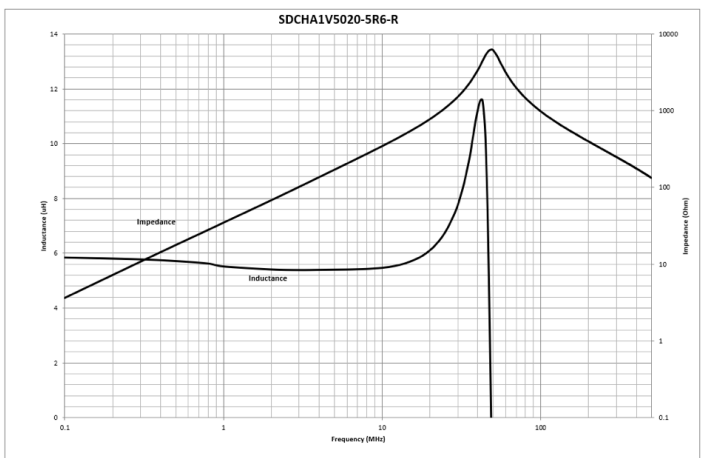
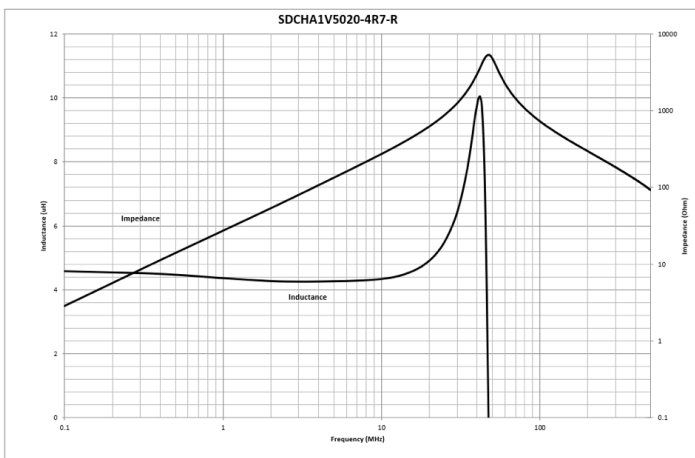
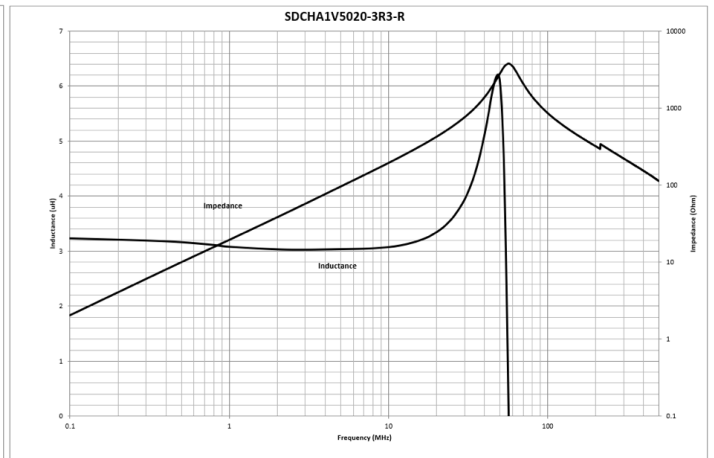
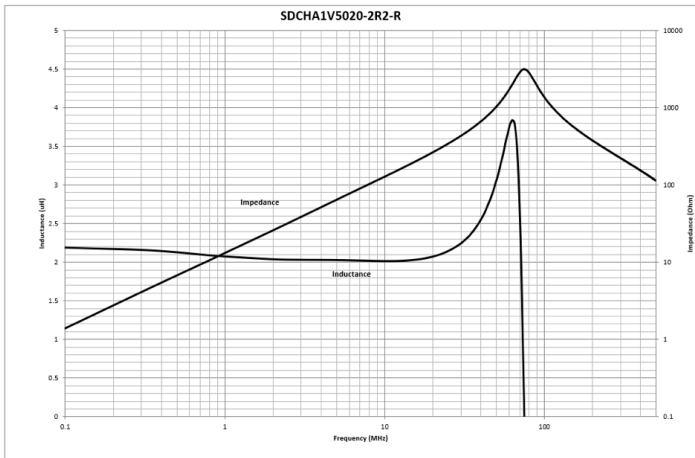
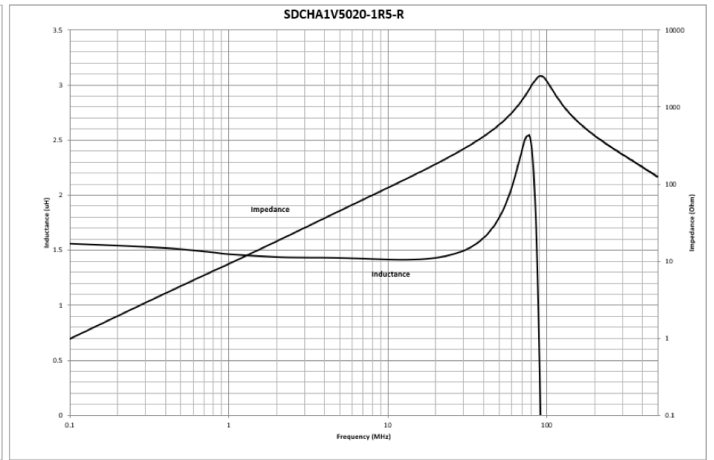
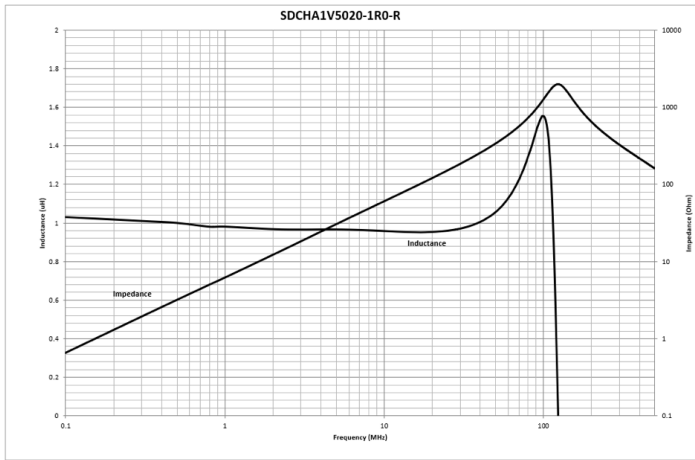
Inductance and temperature rise vs current

SDCHA1V5040



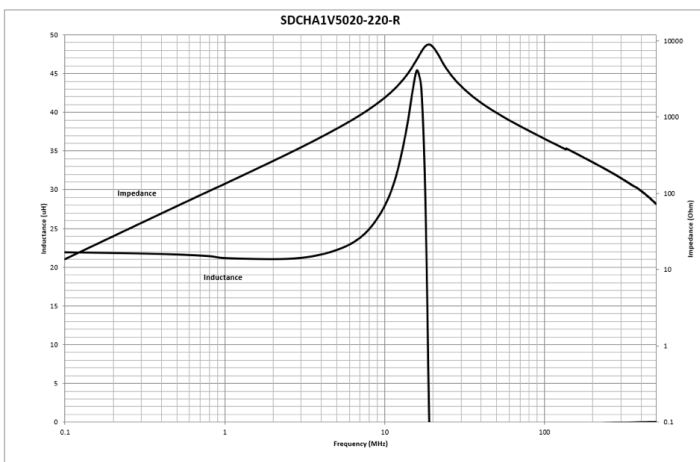
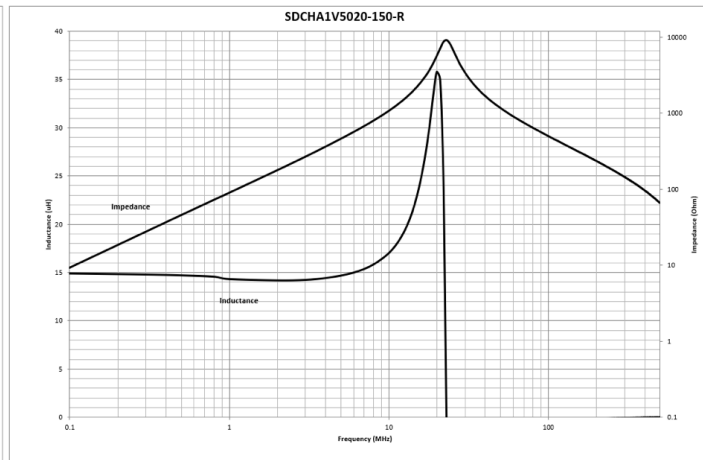
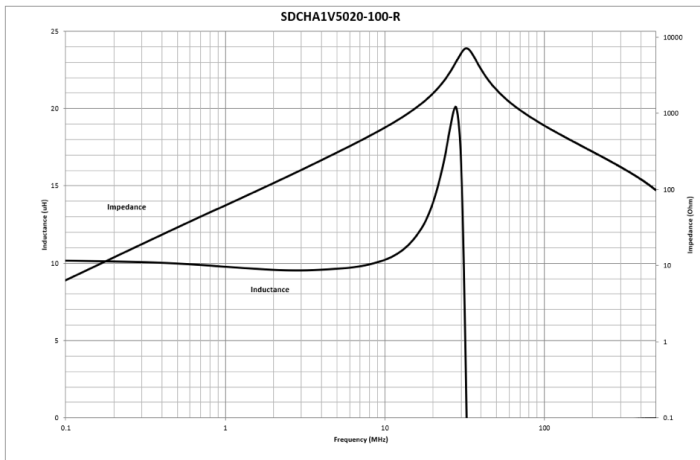
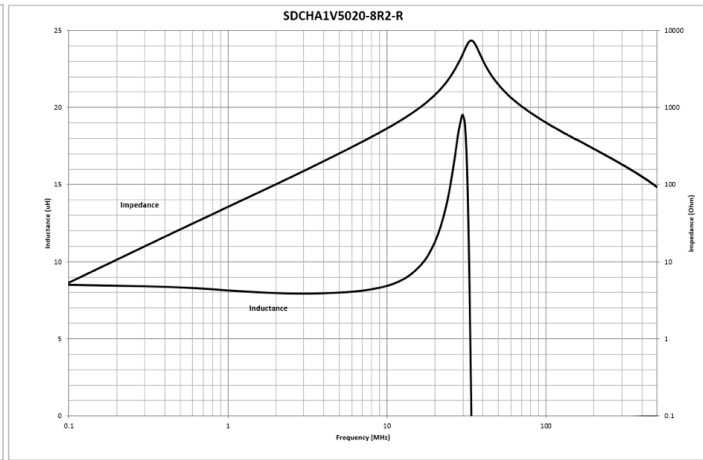
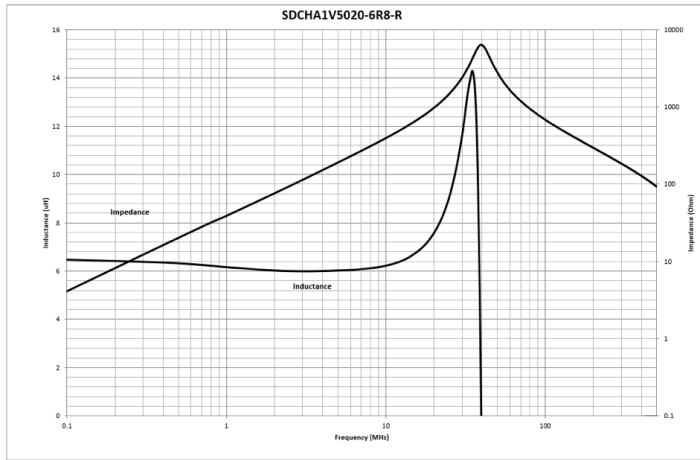
Inductance and impedance vs. frequency curve

SDCHA1V5020



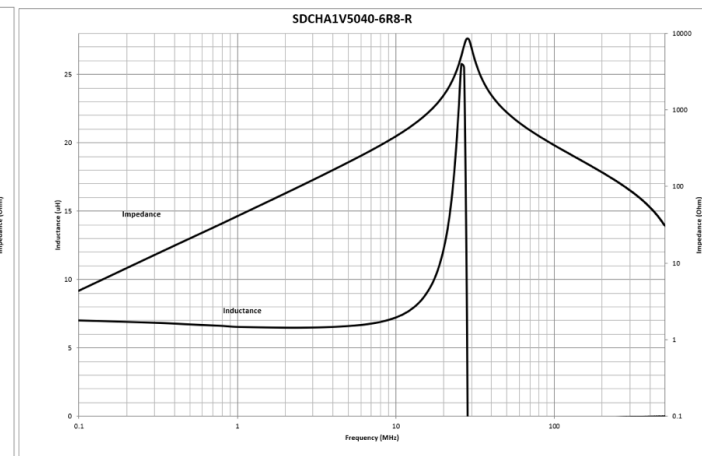
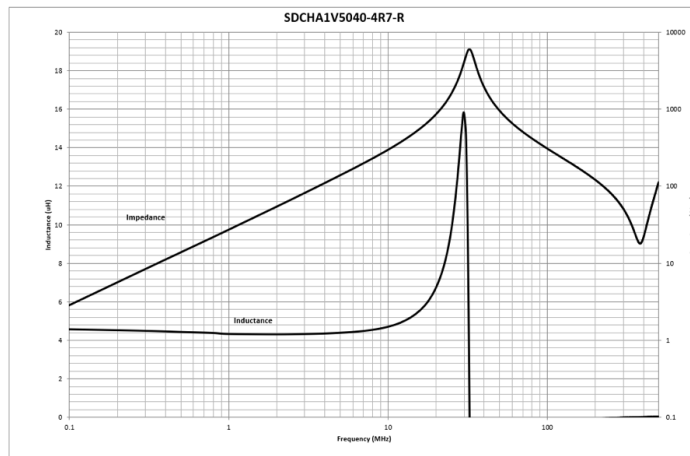
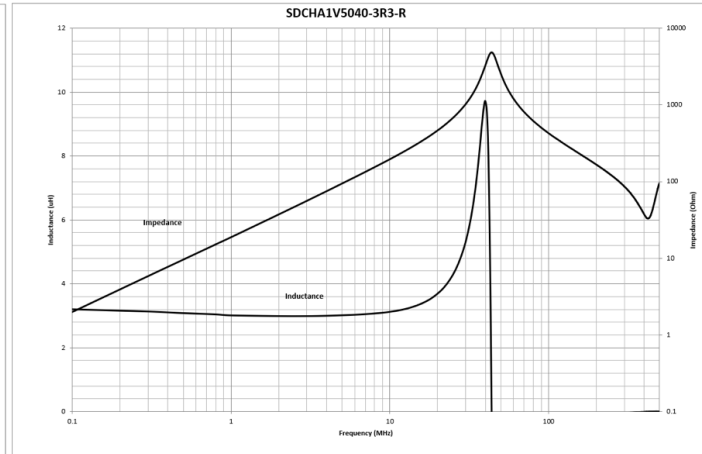
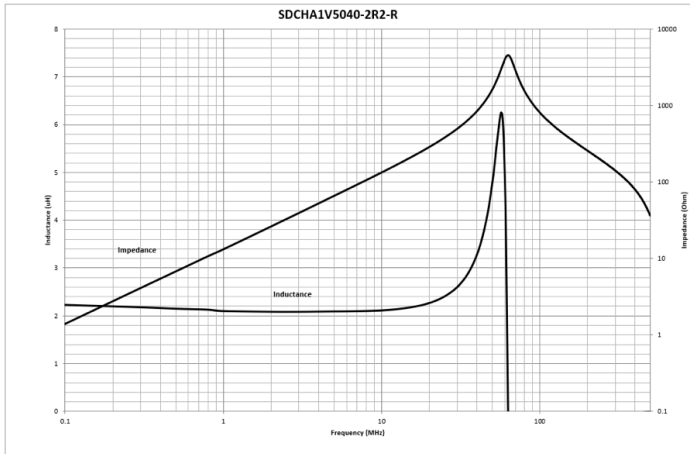
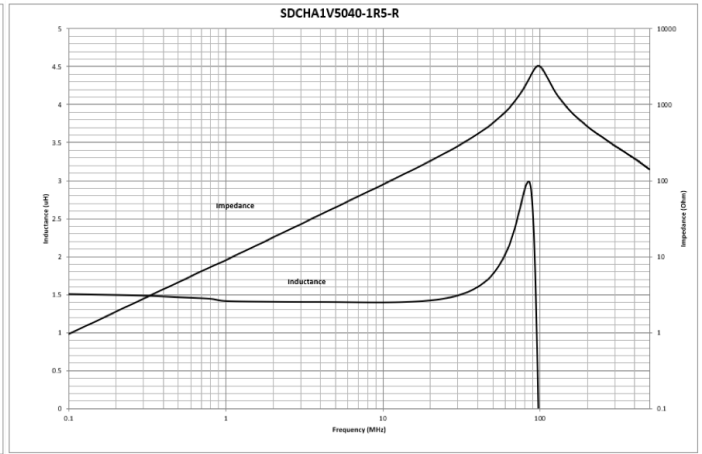
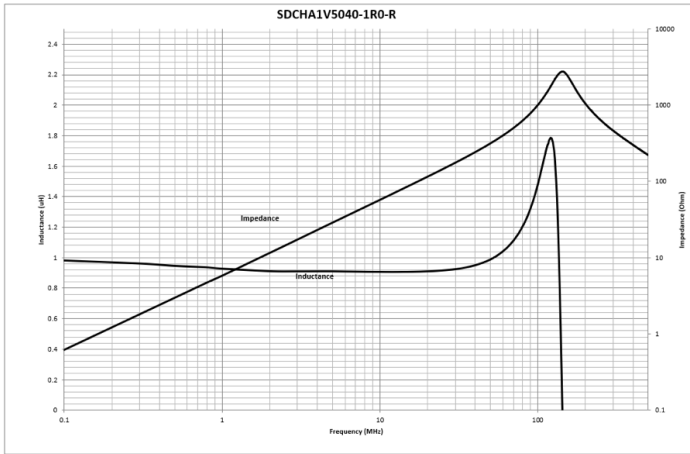
Inductance and impedance vs. frequency curve

SDCHA1V5020



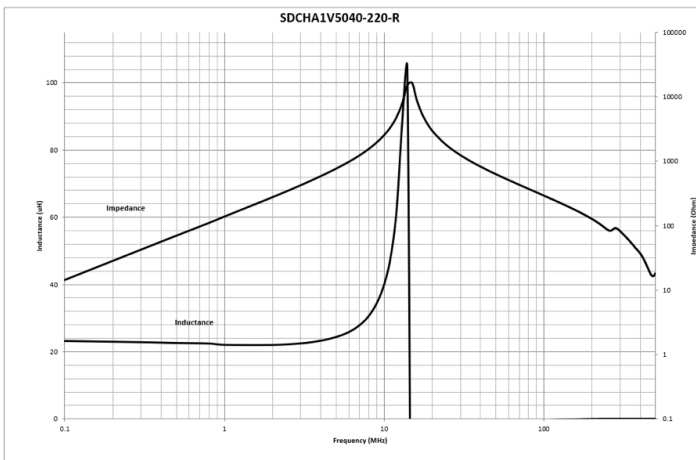
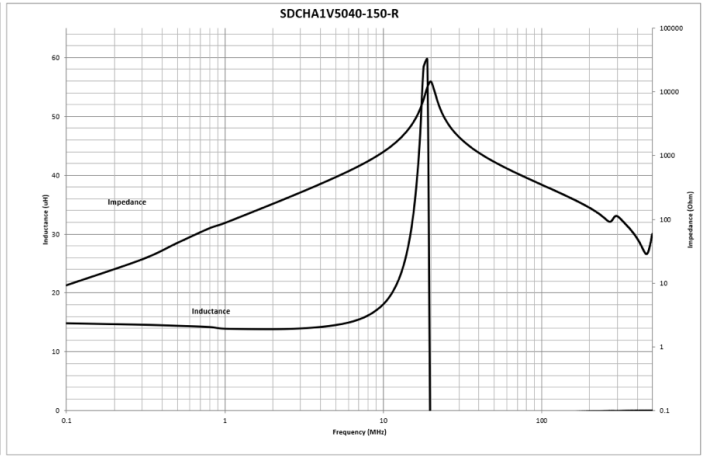
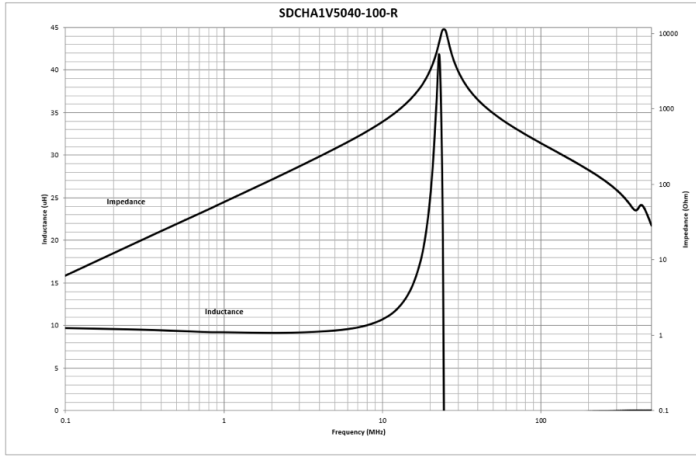
Inductance and impedance vs. frequency curve

SDCHA1V5040



Inductance and impedance vs. frequency curve

SDCHA1V5040



Solder reflow profile

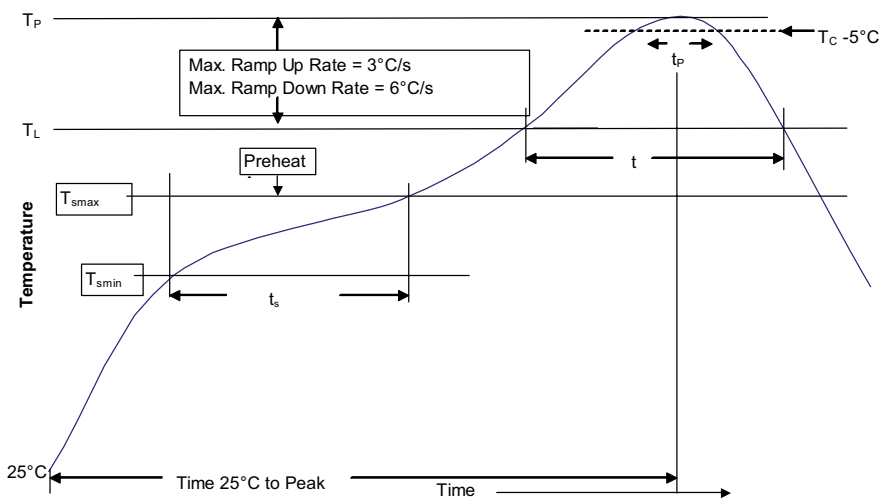


Table 1 - Standard SnPb solder (T_C)

| Package thickness | Volume mm ³ <350 | Volume mm ³ ≥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 mm ³ <350 | Volume mm ³ 350 - 2000 | Volume mm ³ >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) | 183 °C | 217 °C |
| Time (t _L) maintained above T _L | 60-150 seconds | 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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September 2021

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