HCM1A1707V2
Automotive grade
High current power inductors

Product features
• AEC-Q200 qualified
• High current carrying capacity
• Magnetically shielded, low EMI
• DC-DC converter applications up to 1 MHz
• Filtering applications up to Self Resonant Frequency (SRF) [See product specification table]
• Inductance range from 1.0 μH to 68 μH
• Current range from 5.0 A to 27 A
• 17.45 mm x 17.15 mm footprint surface mount package in a 7.0 mm height
• Moisture Sensitivity Level (MSL): 1
• Alloy powder core material

Applications
• Body electronics
  • Central body control module
  • Headlamps, tail lamps and interior lighting and LED lighting
  • Heating ventilation and air conditioning controllers (HVAC)
  • Doors, window lift and seat control
• Advanced driver assistance systems
  • Adaptive cruise control (ACC)
  • Automatic parking control
  • Collision avoidance system/ Car black box system
• Infotainment and cluster electronics
  • Audio subsystem: head unit and trunk amp
  • Digital instrument cluster
  • In-vehicle infotainment (IVI) and navigation
• Chassis and safety electronics
  • Airbag control unit
  • Electronic stability control system (ESC)
  • Electric parking brake
  • Electronic power steering (EPS)/ Anti-locking braking system (ABS)
• Engine and Powertrain Systems
  • Electric pumps, motor control and auxiliaries
  • Powertrain control module (PCU)/ Engine Control Unit (ECU)
  • Transmission Control Unit (TCU)

Environmental data
• 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
### Product specifications

<table>
<thead>
<tr>
<th>Part number</th>
<th>OCL (μH) ± 20%</th>
<th>FLL (μH) minimum</th>
<th>$I_{\text{rms}}$ (A)</th>
<th>$I_{\text{sat}}$ (A)</th>
<th>DCR (mΩ) typical @ +20 °C</th>
<th>DCR (mΩ) maximum @ +20 °C</th>
<th>SRF (MHz) typical</th>
<th>K-factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCM1A1707V2-1R0-R</td>
<td>1.0</td>
<td>0.64</td>
<td>36</td>
<td>57</td>
<td>1.24</td>
<td>1.46</td>
<td>34</td>
<td>110</td>
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<tr>
<td>HCM1A1707V2-1R5-R</td>
<td>1.5</td>
<td>0.96</td>
<td>23</td>
<td>41</td>
<td>1.94</td>
<td>2.24</td>
<td>25</td>
<td>93</td>
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<tr>
<td>HCM1A1707V2-2R2-R</td>
<td>2.2</td>
<td>1.41</td>
<td>22</td>
<td>31</td>
<td>2.25</td>
<td>2.41</td>
<td>18</td>
<td>82</td>
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<td>HCM1A1707V2-3R3-R</td>
<td>3.3</td>
<td>2.11</td>
<td>19.5</td>
<td>28</td>
<td>3.00</td>
<td>3.27</td>
<td>15</td>
<td>80</td>
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<td>HCM1A1707V2-4R7-R</td>
<td>4.7</td>
<td>3.01</td>
<td>18</td>
<td>27</td>
<td>4.10</td>
<td>4.72</td>
<td>12</td>
<td>59</td>
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<td>HCM1A1707V2-6R8-R</td>
<td>6.8</td>
<td>4.35</td>
<td>14</td>
<td>20</td>
<td>6.22</td>
<td>7.16</td>
<td>9</td>
<td>58</td>
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<tr>
<td>HCM1A1707V2-8R2-R</td>
<td>8.2</td>
<td>5.25</td>
<td>12.5</td>
<td>20</td>
<td>7.96</td>
<td>8.7</td>
<td>8</td>
<td>46</td>
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<tr>
<td>HCM1A1707V2-100-R</td>
<td>10</td>
<td>6.40</td>
<td>12</td>
<td>17</td>
<td>8.94</td>
<td>10</td>
<td>6</td>
<td>42</td>
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<tr>
<td>HCM1A1707V2-150-R</td>
<td>15</td>
<td>9.60</td>
<td>11.8</td>
<td>11</td>
<td>12.6</td>
<td>15.5</td>
<td>5</td>
<td>30</td>
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<tr>
<td>HCM1A1707V2-220-R</td>
<td>22</td>
<td>14.1</td>
<td>7.7</td>
<td>11.5</td>
<td>21.0</td>
<td>22.2</td>
<td>5</td>
<td>25</td>
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<tr>
<td>HCM1A1707V2-330-R</td>
<td>33</td>
<td>21.1</td>
<td>6.2</td>
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<td>34.8</td>
<td>37</td>
<td>3</td>
<td>19</td>
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<tr>
<td>HCM1A1707V2-470-R</td>
<td>47</td>
<td>30.1</td>
<td>5.5</td>
<td>8</td>
<td>39.9</td>
<td>46</td>
<td>2</td>
<td>17</td>
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<tr>
<td>HCM1A1707V2-680-R</td>
<td>68</td>
<td>43.5</td>
<td>5.0</td>
<td>6.8</td>
<td>55.5</td>
<td>60</td>
<td>2</td>
<td>16</td>
</tr>
</tbody>
</table>

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 Vrms, 0.0 Adc, +25 °C
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 Vrms, $I_{\text{sat}}$, +25 °C
3. $I_{\text{rms}}$: DC current for an approximate temperature rise of 30 °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. $I_{\text{sat}}$: Peak current for approximately 20% rolloff @ +25 °C
5. K-factor: Used to determine $B_{p-p}$ for core loss (see graph). $B_{p-p} = K \times L \times \Delta I$. $B_{p-p}$: (Gauss), K: (K-factor from table), L: (Inductance in μH), $\Delta I$ (Peak to peak ripple current in Amps).
6. Part Number Definition: HCM1A1707V2-xxx-R
   HCM1A1707V2 = 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

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### Dimensions (mm)

**Schematic**

Part marking: 1A1707V2, XXX=inductance value in μH, R=decimal point. If no R is present then last character equals number of zeros.

xxxx=Lot code

All soldering surfaces to be coplanar within 0.1 millimeters

Tolerances are ±0.3 millimeters unless stated otherwise

Pad layout tolerances are ±0.1 millimeters unless stated otherwise

Do not route traces or vias underneath the inductor

www.eaton.com/electronics
HCM1A1707V2
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Packaging information (mm)
Drawing not to scale
Supplied in tape and reel packaging, 200 parts per 13” diameter reel

Core loss vs $B_{p-p}$

![Graphs showing core loss vs $B_{p-p}$ for different inductors (HCM1A1707V2-1R0-R, HCM1A1707V2-1R5-R, HCM1A1707V2-2R2-R, HCM1A1707V2-3R3-R)]
Core loss vs $B_{p-p}$

HCM1A1707V2-4R7-R

HCM1A1707V2-6R8-R

HCM1A1707V2-8R2-R

HCM1A1707V2-100-R

HCM1A1707V2-150-R

HCM1A1707V2-220-R
HCM1A1707V2
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Core loss vs $B_{pp}$

![Graph of Core loss vs $B_{pp}$ for HCM1A1707V2-330-R](image)

![Graph of Core loss vs $B_{pp}$ for HCM1A1707V2-470-R](image)

![Graph of Core loss vs $B_{pp}$ for HCM1A1707V2-680-R](image)
Inductance and impedance vs. frequency

HCM1A1707V2-1R0-R

HCM1A1707V2-1R5-R

HCM1A1707V2-2R2-R

HCM1A1707V2-3R3-R

HCM1A1707V2-4R7-R

HCM1A1707V2-6R8-R
Inductance and impedance vs. frequency

HCM1A1707V2-100-R

HCM1A1707V2-150-R

HCM1A1707V2-220-R

HCM1A1707V2-330-R

HCM1A1707V2-470-R
Inductance and impedance vs. frequency

Inductance and temperature rise vs. current
Inductance and temperature rise vs. current

HCM1A1707V2-4R7-R

HCM1A1707V2-6R8-R

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HCM1A1707V2-220-R

HCM1A1707V2-150-R
Inductance and temperature rise vs. current

HCM1A1707V2-330-R

HCM1A1707V2-470-R

HCM1A1707V2-680-R
Solder reflow profile

Table 1 - Standard SnPb solder ($T_c$)

<table>
<thead>
<tr>
<th>Package thickness</th>
<th>Volume mm$^3$ &lt;350</th>
<th>Volume mm$^3$ ≥350</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;2.5 mm)</td>
<td>235 °C</td>
<td>220 °C</td>
</tr>
<tr>
<td>≥2.5 mm</td>
<td>220 °C</td>
<td>220 °C</td>
</tr>
</tbody>
</table>

Table 2 - Lead (Pb) free solder ($T_c$)

<table>
<thead>
<tr>
<th>Package thickness</th>
<th>Volume mm$^3$ &lt;350</th>
<th>Volume mm$^3$ 350 - 2000</th>
<th>Volume mm$^3$ &gt;2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.6 mm</td>
<td>260 °C</td>
<td>260 °C</td>
<td>260 °C</td>
</tr>
<tr>
<td>1.6 – 2.5 mm</td>
<td>260 °C</td>
<td>250 °C</td>
<td>245 °C</td>
</tr>
<tr>
<td>&gt;2.5 mm</td>
<td>250 °C</td>
<td>245 °C</td>
<td>245 °C</td>
</tr>
</tbody>
</table>

Reference J-STD-020

<table>
<thead>
<tr>
<th>Profile feature</th>
<th>Standard SnPb solder</th>
<th>Lead (Pb) free solder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat and soak</td>
<td>Temperature min. ($T_{s\text{min}}$)</td>
<td>100 °C</td>
</tr>
<tr>
<td></td>
<td>Temperature max. ($T_{s\text{max}}$)</td>
<td>150 °C</td>
</tr>
<tr>
<td></td>
<td>Time ($T_{s\text{min}}$ to $T_{s\text{max}}$) ($t_s$)</td>
<td>60-120 seconds</td>
</tr>
<tr>
<td></td>
<td>Average ramp up rate ($T_{s\text{max}}$ to $T_p$)</td>
<td>3 °C/ second max.</td>
</tr>
<tr>
<td></td>
<td>Liquidous temperature ($T_L$)</td>
<td>183 °C</td>
</tr>
<tr>
<td></td>
<td>Time at liquidous ($t_L$)</td>
<td>60-150 seconds</td>
</tr>
<tr>
<td></td>
<td>Peak package body temperature ($T_p^*$)</td>
<td>Table 1</td>
</tr>
<tr>
<td></td>
<td>Time ($T_p^*$) within 5 °C of the specified classification temperature ($T_c$)</td>
<td>20 seconds**</td>
</tr>
<tr>
<td></td>
<td>Average ramp-down rate ($T_p$ to $T_{s\text{max}}$)</td>
<td>6 °C/ second max.</td>
</tr>
<tr>
<td></td>
<td>Time 25 °C to Peak Temperature</td>
<td>6 minutes max.</td>
</tr>
</tbody>
</table>

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