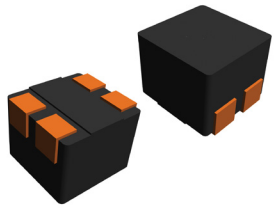
AEC-Q200 high-current coupled inductors for high-temperature automotive applications



Eaton's HCSA1V1008 is a high-current molded coupled inductor suitable for high-performance, higher power automotive SEPIC applications.

Product description

Eaton's HCSA is a high-current molded coupled inductor suitable for high-performance, higher power automotive SEPIC applications. Its unique molded construction provides higher inductance and high operating current capability over a wide operating temperature range from -55 °C to +155 °C. This inductor offers a soft roll-off essential to maintain the highest inductance under high current and temperature conditions. Eaton HCSA comes in one popular size measuring 10 mm x 10 mm x 8mm and three popular inductance values; 10 µH, 15 µH, and 22 µH. HCSA1V supports high-current SEPIC applications in LEDs up to 11 A, which is desirable for new-generation automotive headlamps.

Features and benefits

- AEC-Q200 Grade-1 rated
- Molded design for reliable performance under high current and temperatures
- High current capability ranging from 3.5 A to 11.2 A
- Coupled inductors to handle multiple load circuits, save space, and lower costs
- Low DCR for lower power dissipation
- Operating temperature range from -55 °C to +155 °C

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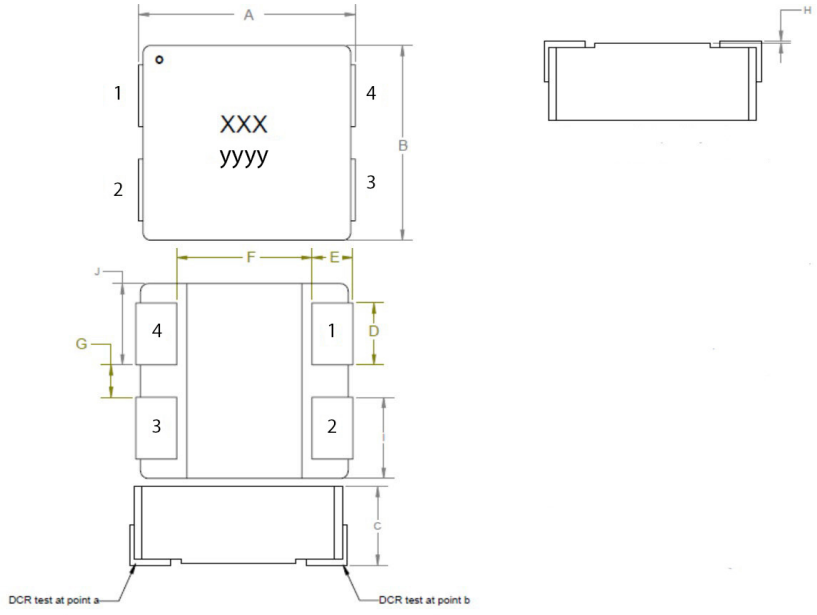
Product specifications

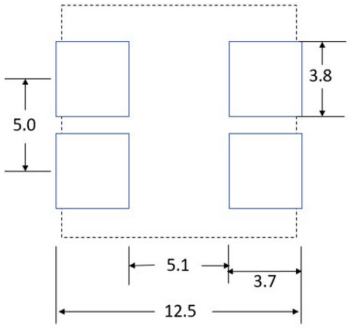
Part number[7]	OCL[1] (µH) ± 20%	FLL[2] (µH) minimum	I_{rms}[3] (A) maximum	I_{sat}[4] (A) maximum	DCR (mΩ) typical @ +20 °C	DCR (mΩ) maximum @ +20 °C	Coupling coefficient (K)	SCL (µH) typical[5]	SRF (MHz) typical	K-factor[6]
HCSA1V1008-100-R	10	5.6	5.0	11.2	35.8	40.45	0.95	0.30	8.4	39
HCSA1V1008-150-R	15	8.4	3.8	9.1	58.37	65.96	0.95	0.35	7.0	29
HCSA1V1008-220-R	22	12.3	3.32	7.5	74.4	84.07	0.96	0.35	5.0	25

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V_{rms}, 0.0 Adc, +25 °C, pins (1 - 3), (2 - 4)
2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V_{rms}, I_{sat}, , +25 °C, pins (1 - 3), (2 - 4)
3. I_{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_{sat}: Peak current for approximately 30% rolloff @ +25 °C, pins: (1 - 3), (2 - 4)
5. Short circuit inductance (SCL) test parametrs: 100 kHzs, 0.25 Vrms, 0.0 Adc, pins: (1 - 3) short pins (2 - 4)
6. K-factor: Used to determine B_{p-p} for core loss (see graph). Bp-p = K * L * ΔI. B_{p-p}: (Gauss), K: (K-factor from table), L: (Inductance in µH), ΔI (Peak to peak ripple current in Amps).
7. Part Number Definition: HCSA1V1008-xxx-R
   HCSA1V1008 = 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

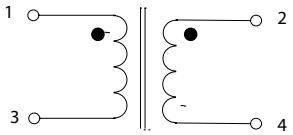
Dimensions- mm



Recommended pad layout



Schematic



Part number	A	B	C	D	E	F	G	H	I	J
HCSA1V1008-xxx-R	11 ±0.35	10 ±0.3	8.2 maximum	3.1 ±0.3	2.4 ±0.5	6.4 typical	1.6 ±0.2	0.05~0.25	4.2 reference	4.2 reference

Part marking: xxx= inductance value in µH, R= decimal point, If no R is present then last character equals number of zeros
yyyy= 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
DCR is measured from point "a" to point "b"
Traces or vias underneath the inductor is not recommended

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