

# HCM1A1305

## Automotive grade High current power inductors



### Product features

- AEC-Q200 Grade 1 qualified
- High current carrying capacity
- Magnetically shielded, low EMI
- Frequency range up to 1 MHz
- Inductance range from 0.1  $\mu$ H to 33  $\mu$ H
- Current range from 3.5 A to 80 A
- 13.8 mm x 12.5 mm footprint surface mount package in a 5.0 mm height
- Moisture Sensitivity Level (MSL): 1
- Alloy powder core material
- Halogen free, lead free, RoHS compliant

### Applications

- Body electronics
  - Central body control module
  - Headlamps, tail lamps and interior 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)
- 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

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm$ 20%	FLL <sup>2</sup> ( $\mu\text{H}$ ) minimum	$I_{\text{rms}}$ <sup>3</sup> (A)	$I_{\text{sat}}$ <sup>4</sup> (A)	DCR (m $\Omega$ ) typical @ +20°C	DCR (m $\Omega$ ) maximum @ +20°C	K-factor <sup>5</sup>
HCM1A1305-R10-R	0.10	0.064	43	80	0.52	0.59	818
HCM1A1305-R22-R	0.22	0.14	40	44	0.63	0.72	458
HCM1A1305-R33-R	0.33	0.21	35	44	0.80	0.92	379
HCM1A1305-R47-R	0.47	0.30	33	36	0.80	0.92	375
HCM1A1305-R56-R	0.56	0.36	28	36	1.15	1.33	265
HCM1A1305-R68-R	0.68	0.44	27	32	1.15	1.33	263
HCM1A1305-R82-R	0.82	0.52	26	26	1.4	1.61	262
HCM1A1305-1R0-R	1.0	0.64	22	30	2.1	2.42	214
HCM1A1305-1R5-R	1.5	0.96	18	22	2.75	3.16	177
HCM1A1305-1R8-R	1.8	1.15	16	20	4.0	4.6	154
HCM1A1305-2R2-R	2.2	1.41	15	18	4.6	5.29	153
HCM1A1305-3R3-R	3.3	2.11	12	16	7.7	9.2	134
HCM1A1305-4R7-R	4.7	3.01	9.3	15	11	12.7	102
HCM1A1305-5R6-R	5.6	3.58	8.8	15	12	13.8	89
HCM1A1305-6R0-R	6.0	3.84	8.1	12.5	12.5	14.5	90
HCM1A1305-6R8-R	6.8	4.35	8.3	13	13	15	74
HCM1A1305-7R8-R	7.8	4.99	7.6	15	16.8	19.4	70
HCM1A1305-8R2-R	8.2	5.25	7.3	13	17.5	20.1	67
HCM1A1305-100-R	10	6.40	6.8	13	19	21.9	65
HCM1A1305-120-R	12	7.68	5.5	9.0	21	24	81
HCM1A1305-150-R	15	9.6	5.8	11	29	33.4	49
HCM1A1305-220-R	22	14.1	3.5	6.8	45	51.8	43
HCM1A1305-330-R	33	21.1	4.0	7.0	74.5	85.5	32

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, 0.0 Adc, +25 °C

2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, I<sub>sat</sub>, +25 °C

3. I<sub>rms</sub>: 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<sub>sat</sub>: Peak current for approximately 20% rolloff @ +25 °C

5. K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \*  $\Delta$ I. B<sub>pp</sub>: (Gauss), K: (K-factor from table), L: (Inductance in  $\mu\text{H}$ ),  $\Delta$ I (Peak to peak ripple current in Amps).

6. Part Number Definition: HCM1A1305-xxx-R

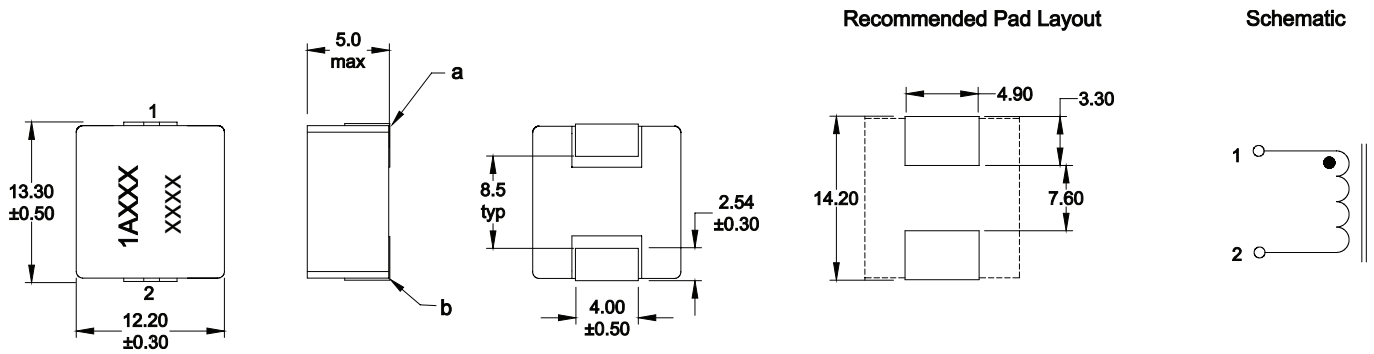
HCM1A1305 = Product code and size

xxx= inductance value in  $\mu\text{H}$ , R= decimal point,

If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

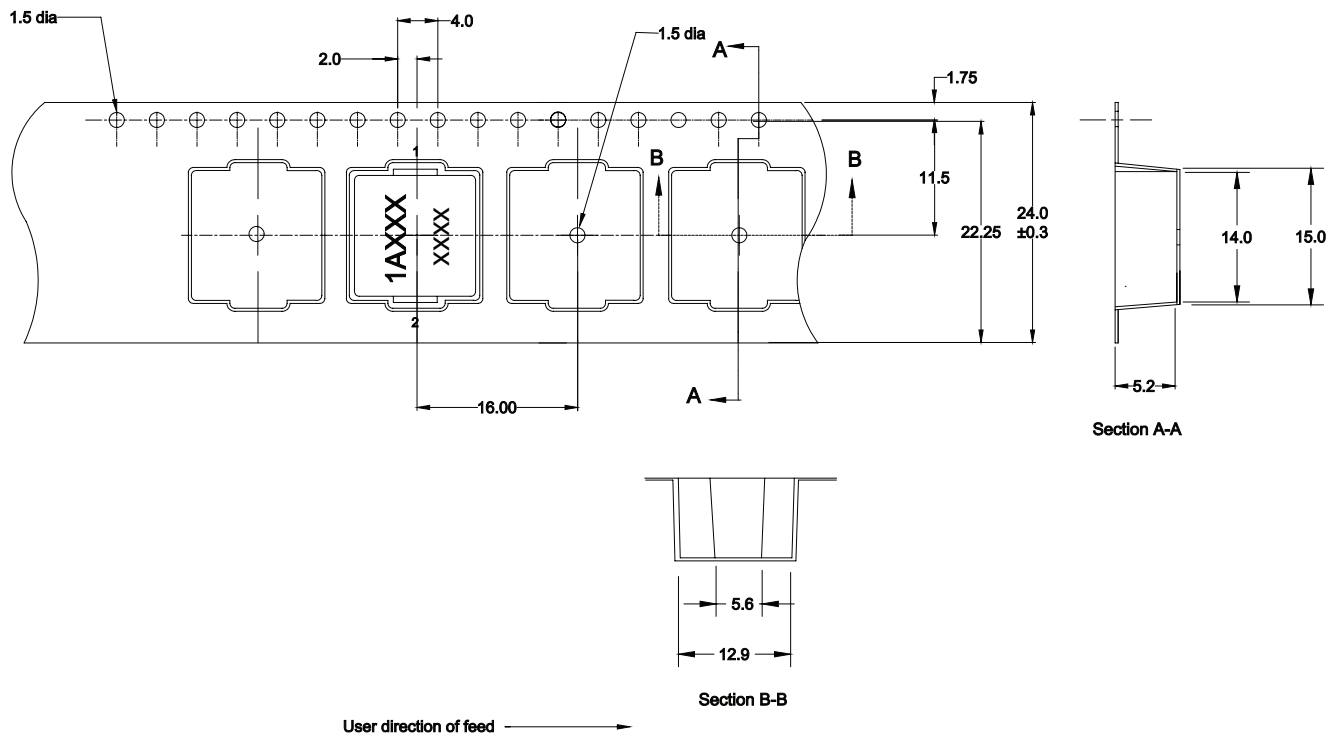
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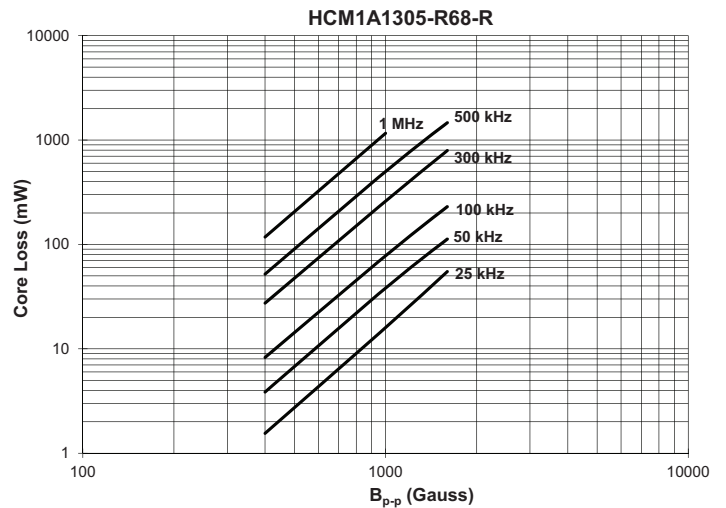
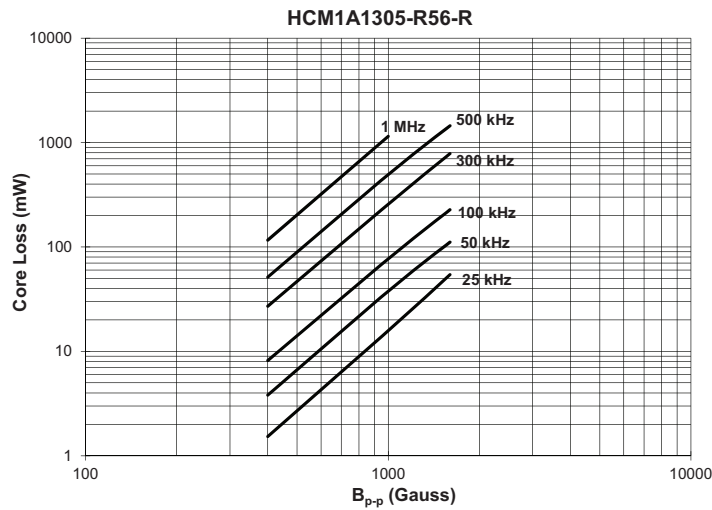
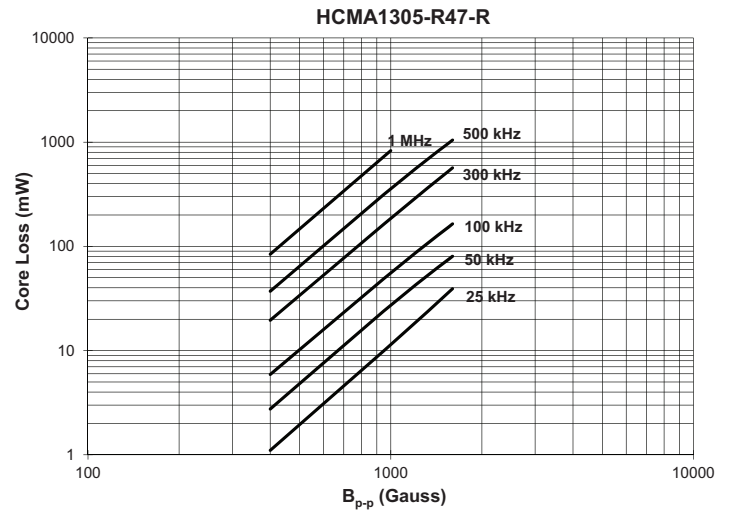
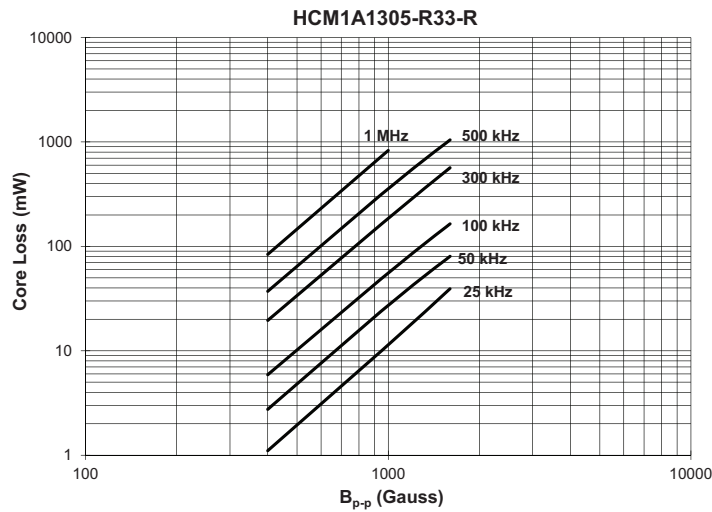
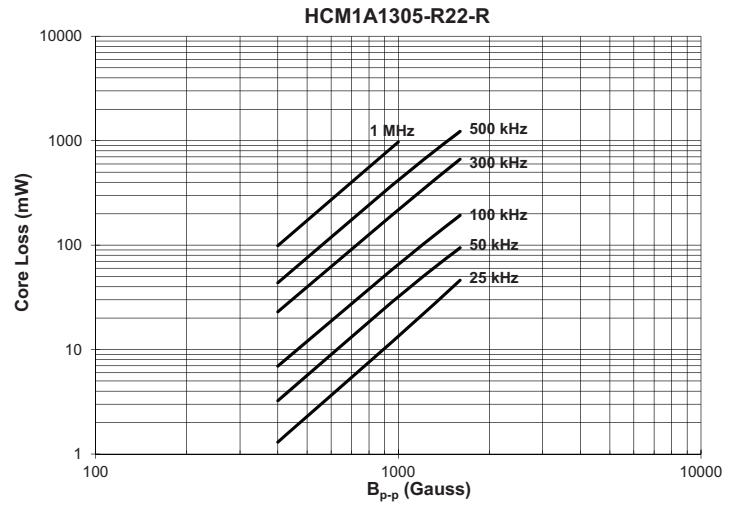
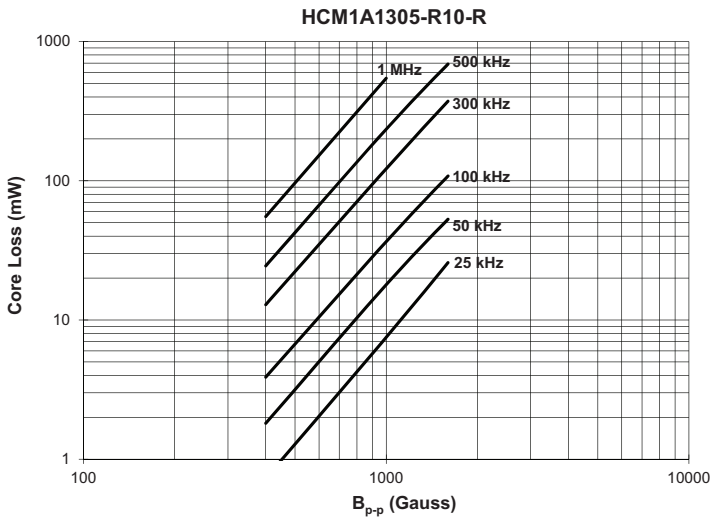
Part marking: 1AXXX=automotive grade, XXX=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros.  
 xxxx=Lot code  
 All soldering surfaces to be coplanar within 0.1 millimeters  
 Tolerances are ±0.3 millimeters unless stated otherwise  
 DCR measured from point "a" to point "b"  
 Color: Grey  
 Do not route traces or vias underneath the inductor

**Packaging information (mm)**

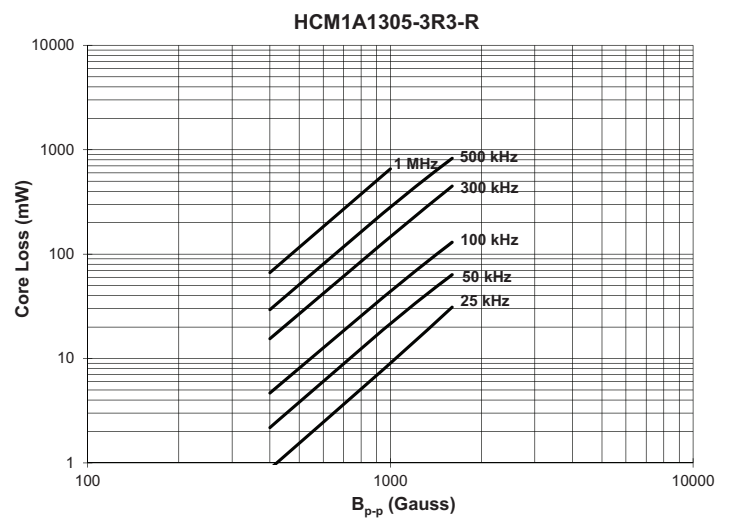
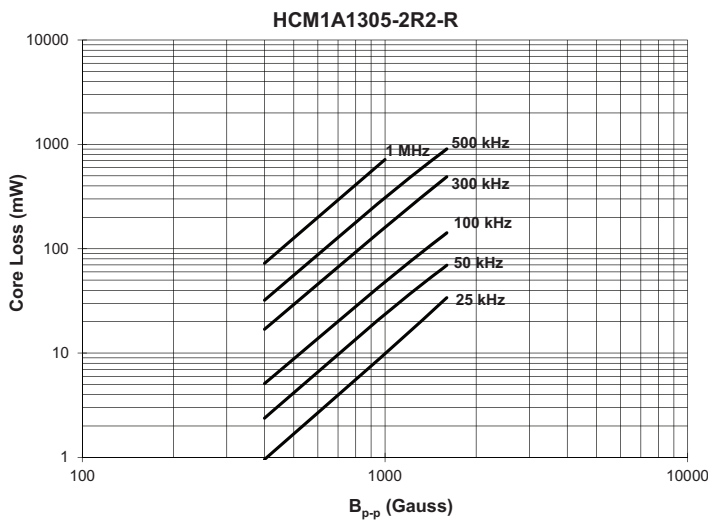
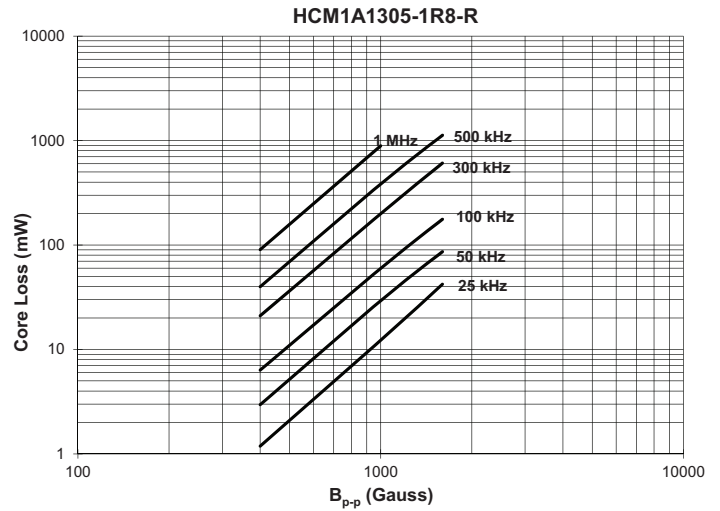
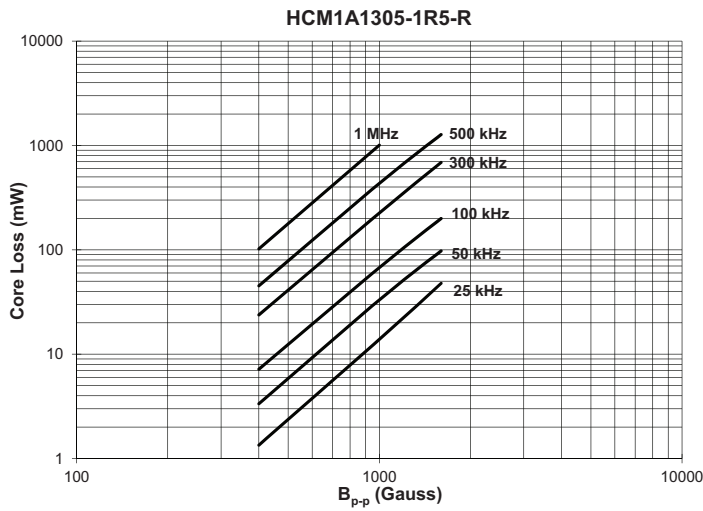
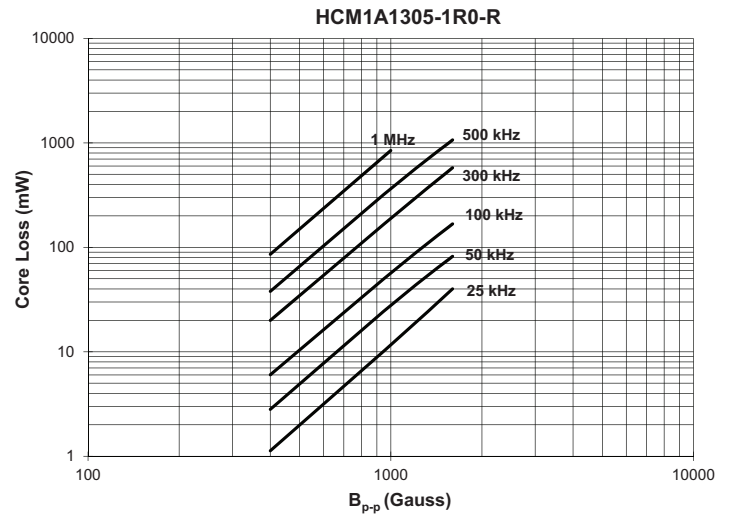
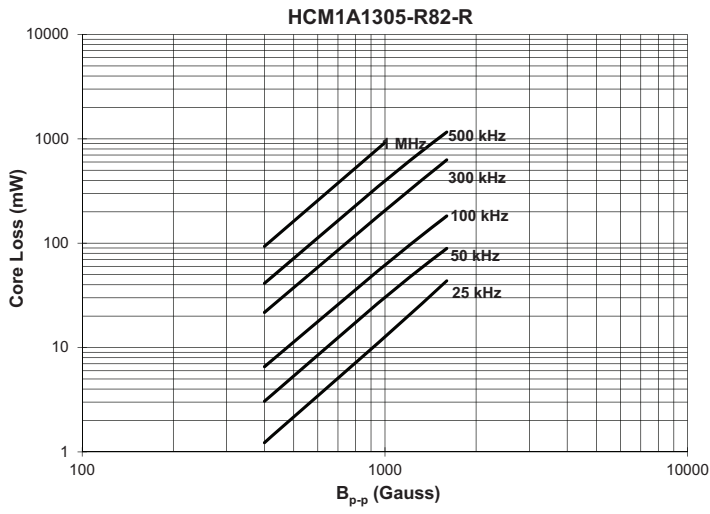
Drawing not to scale  
 Supplied in tape and reel packaging, 250 parts per 13" diameter reel



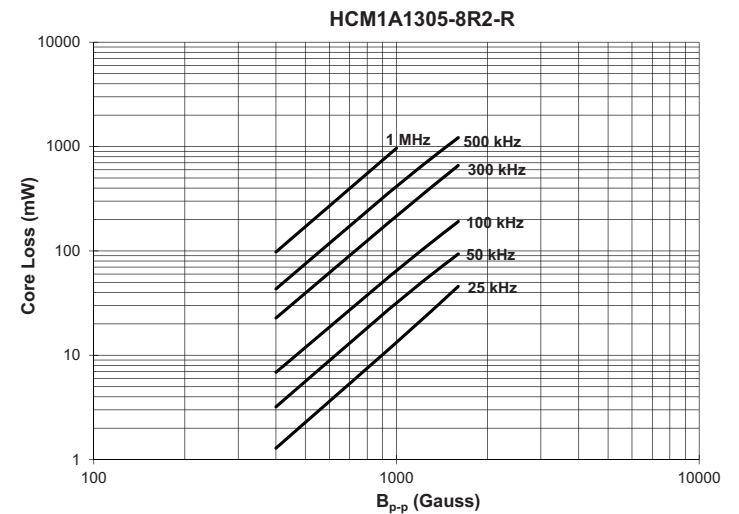
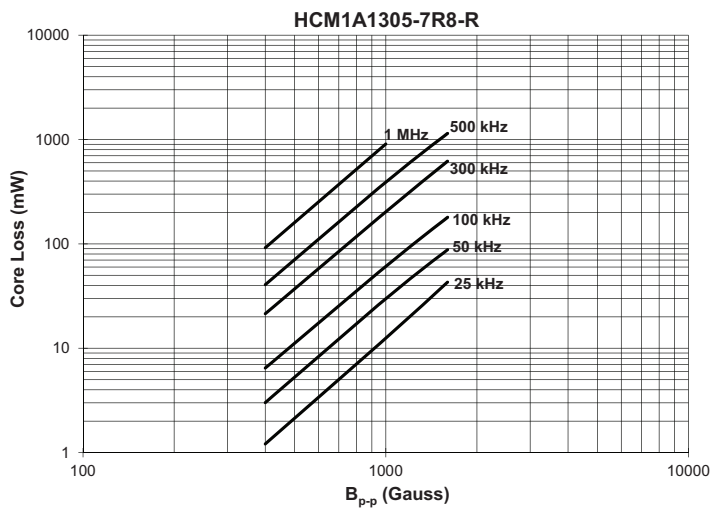
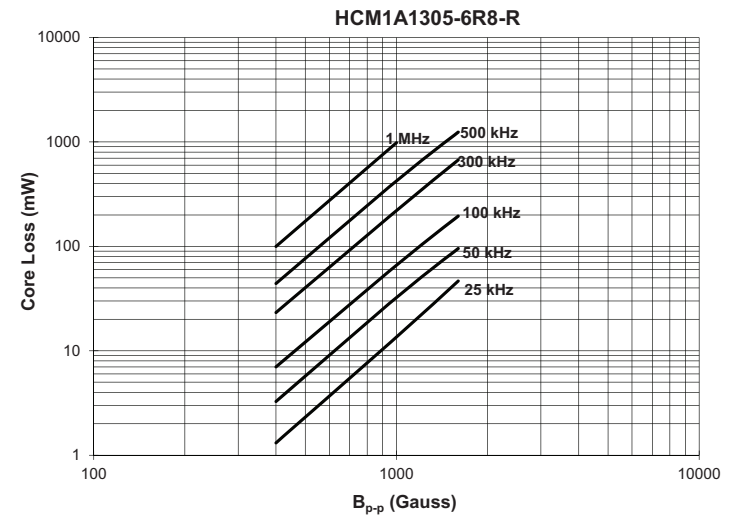
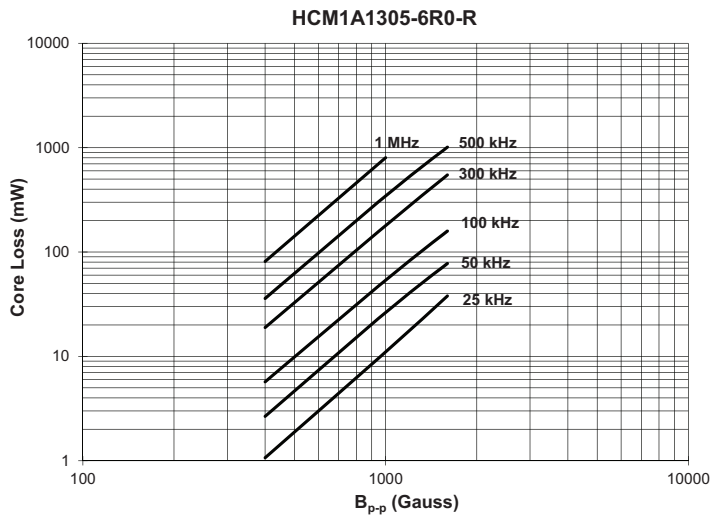
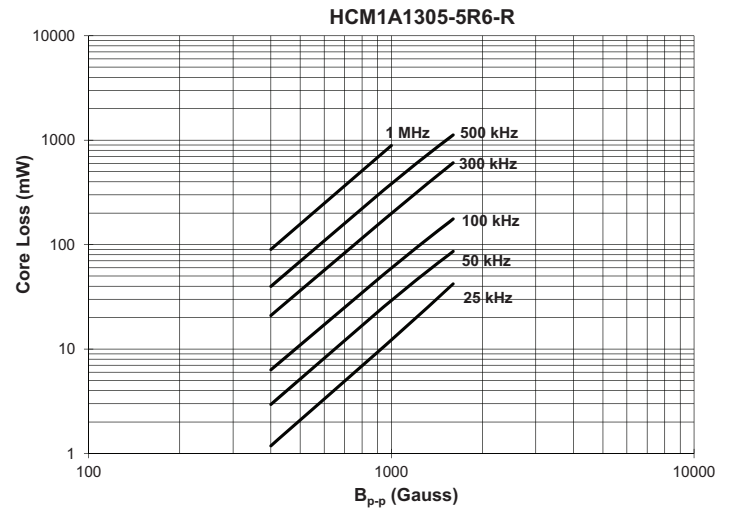
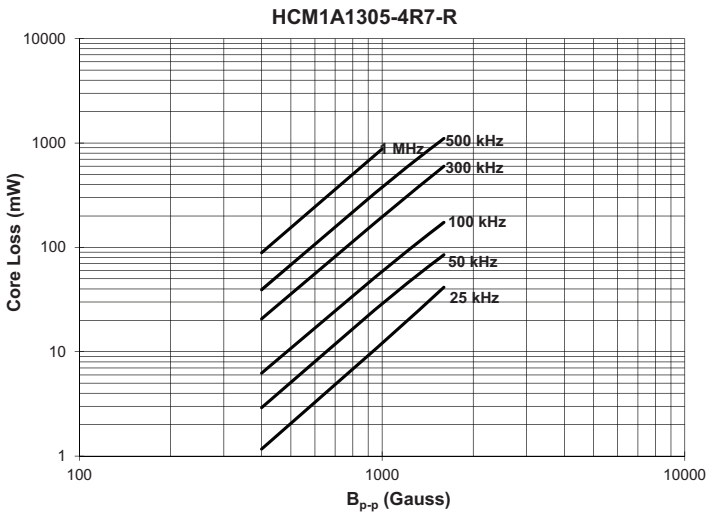
Core loss vs  $B_{p-p}$



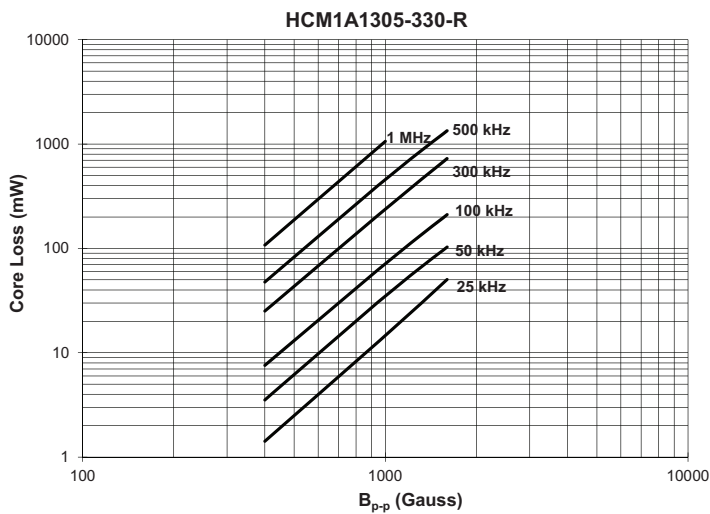
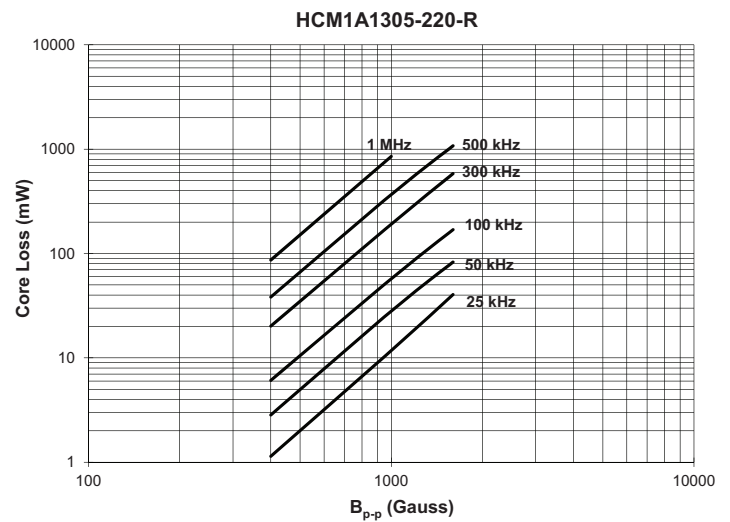
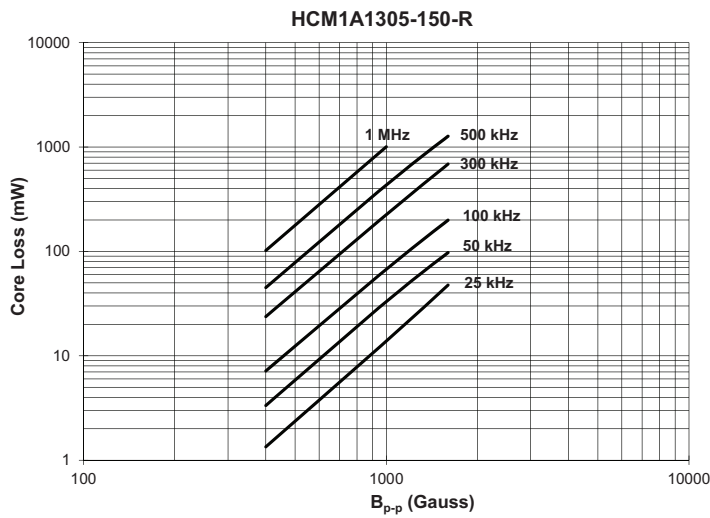
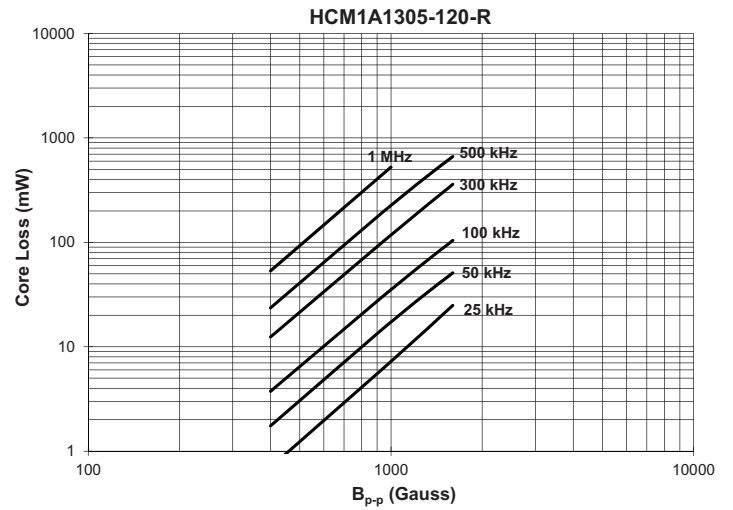
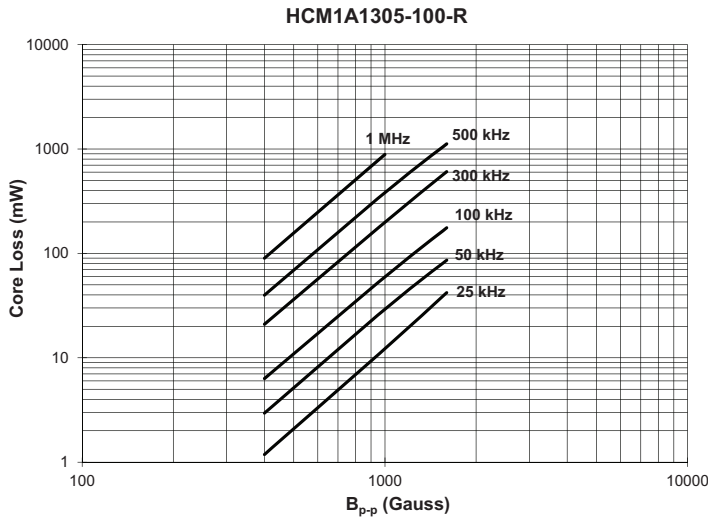
Core loss vs  $B_{p-p}$



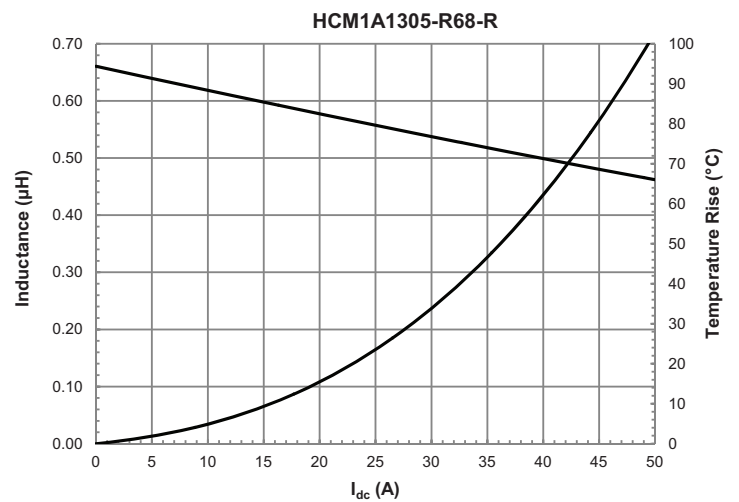
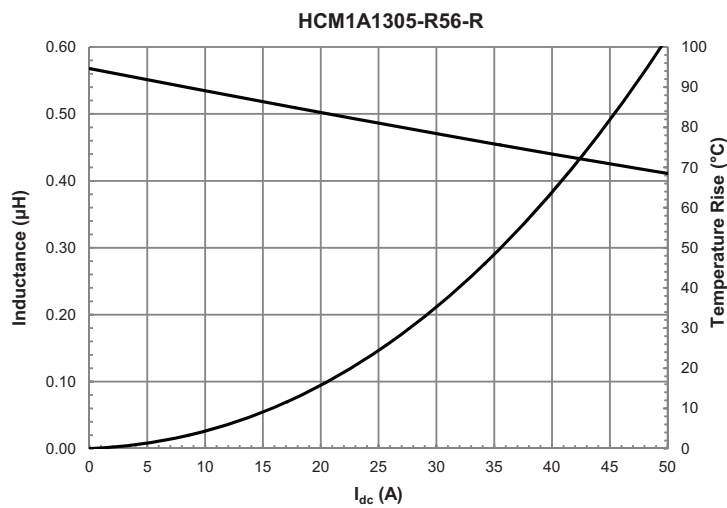
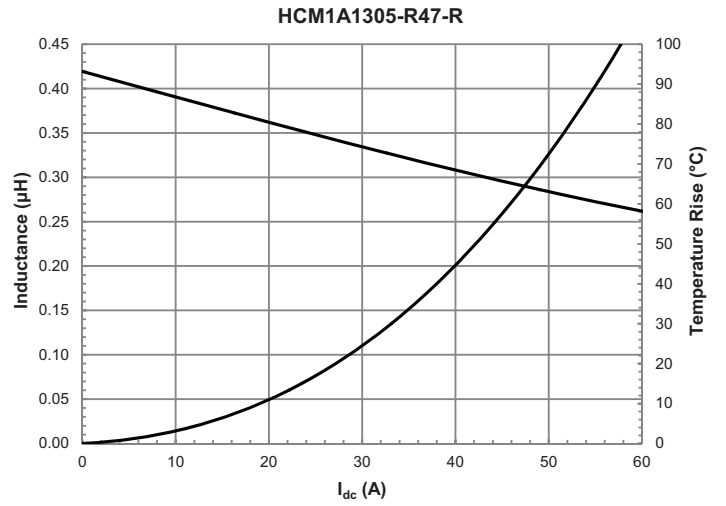
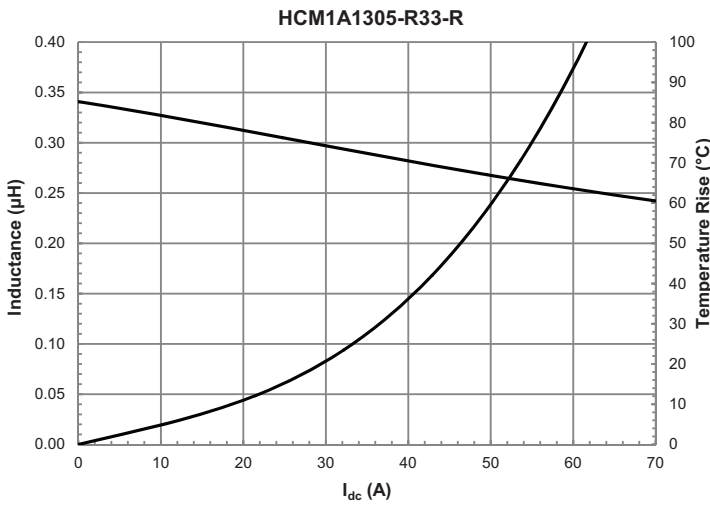
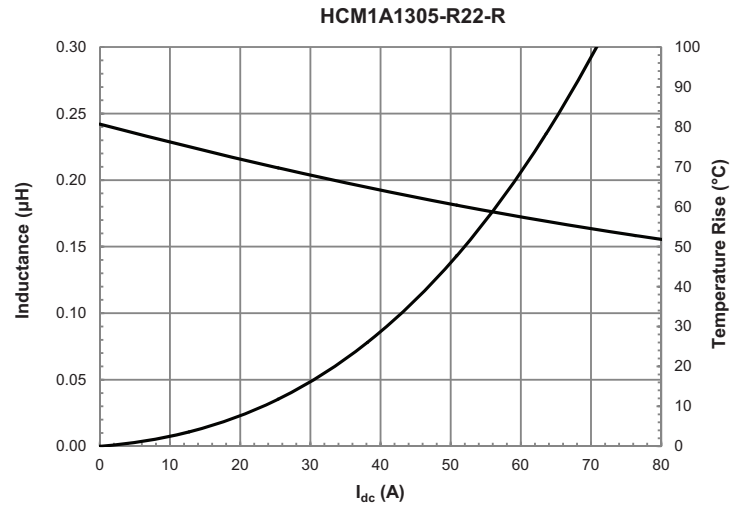
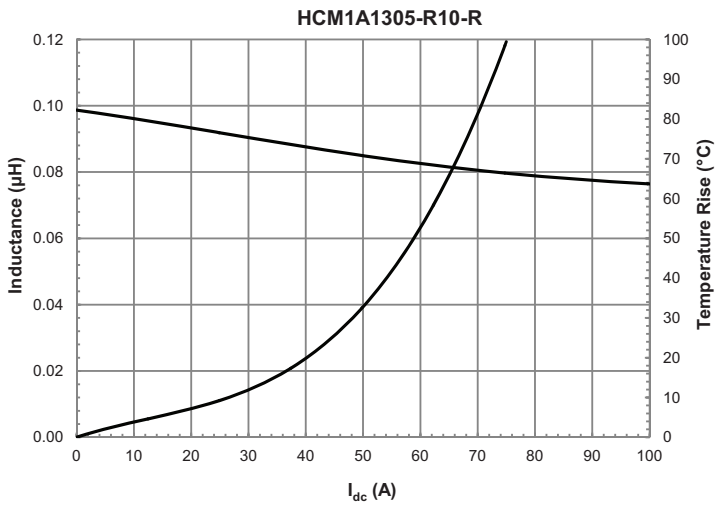
Core loss vs  $B_{p-p}$



Core loss vs  $B_{p-p}$

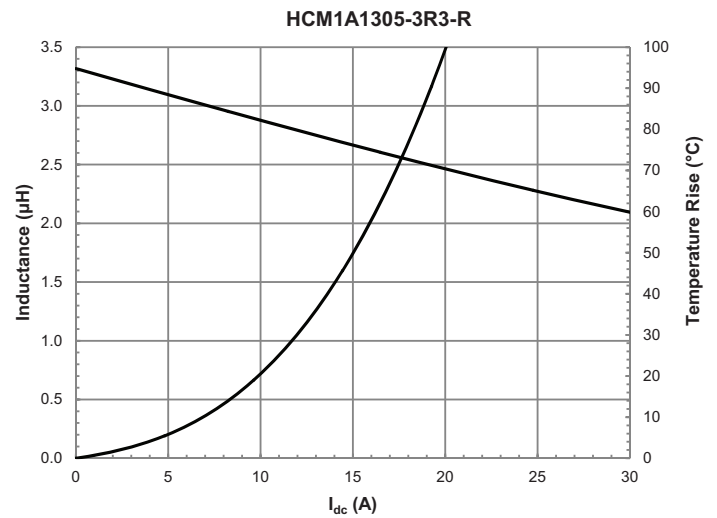
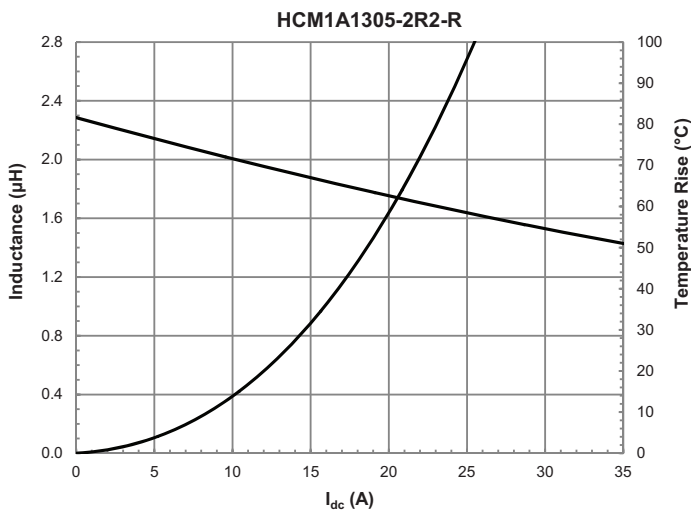
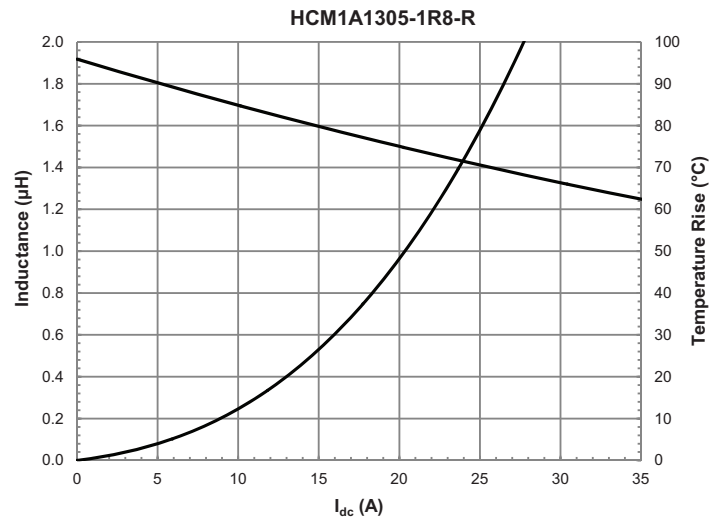
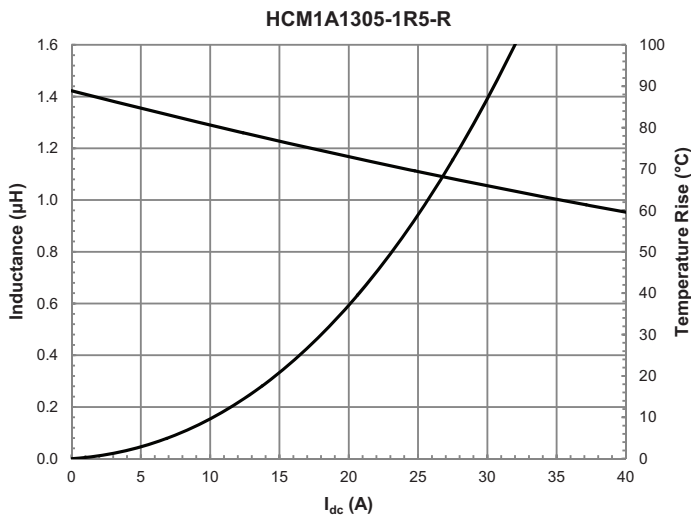
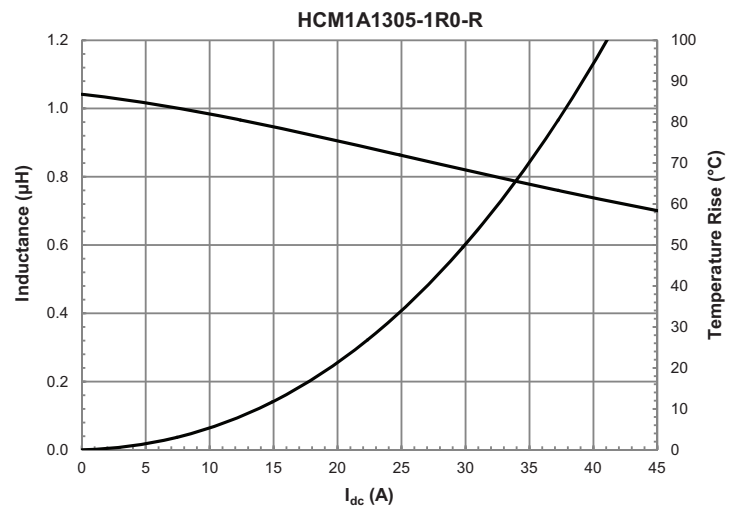
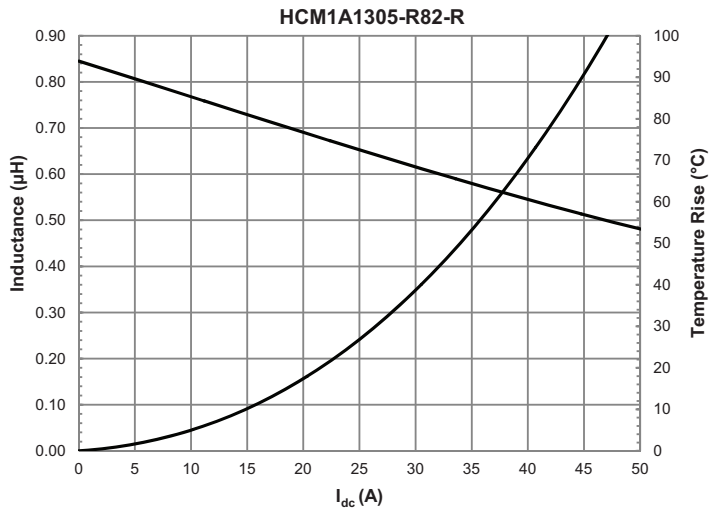


Inductance and temperature rise vs. current

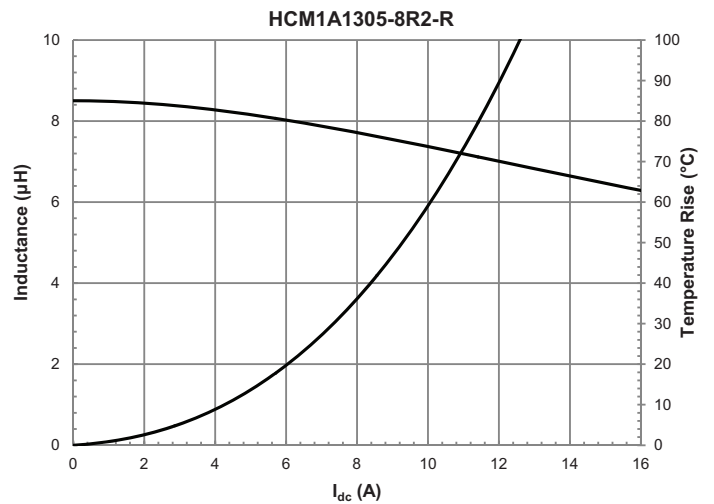
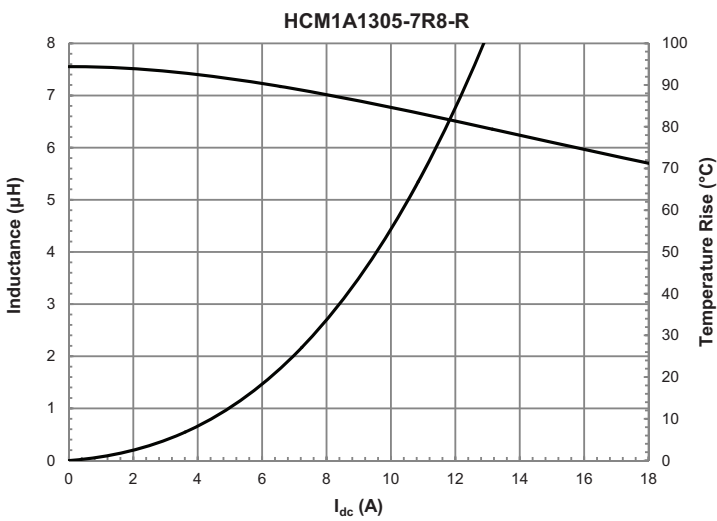
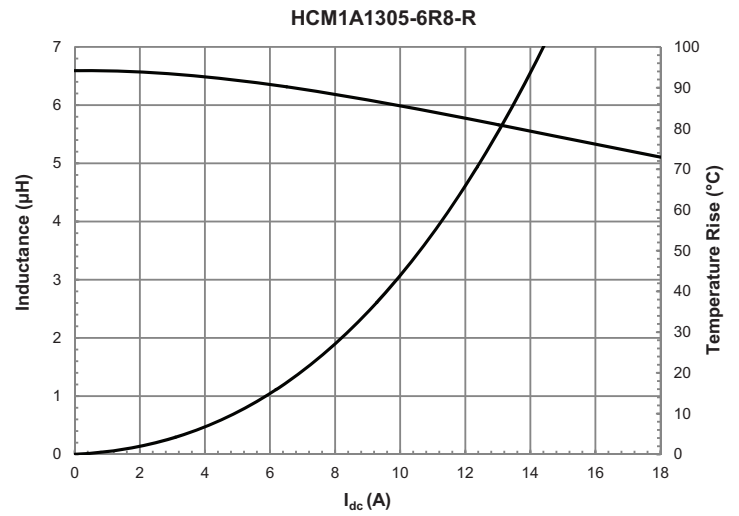
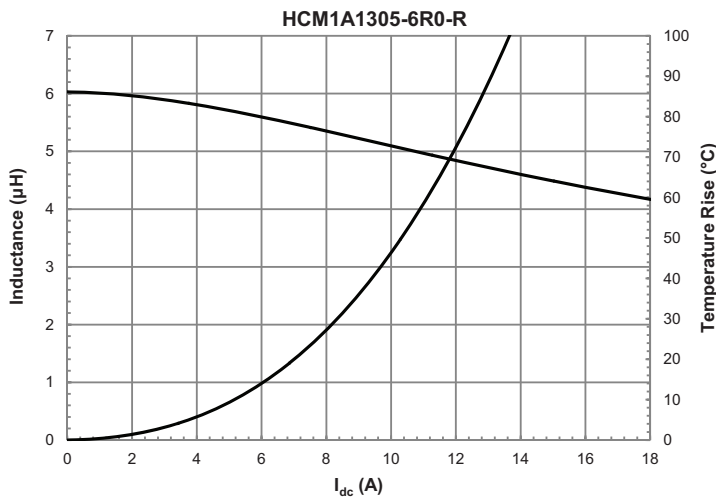
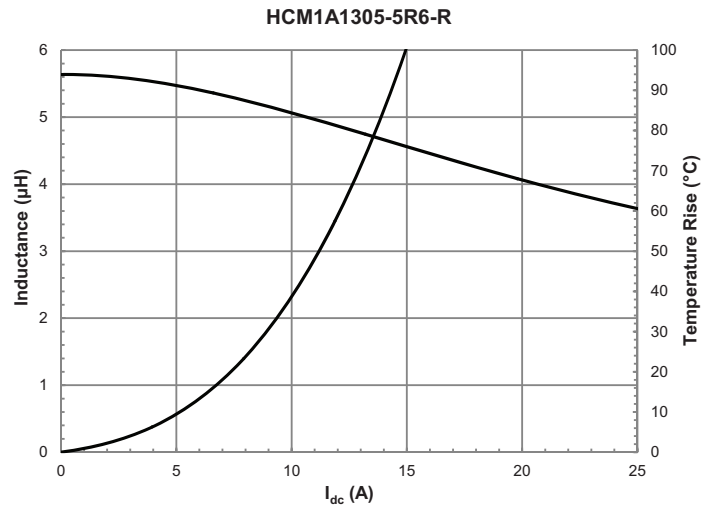
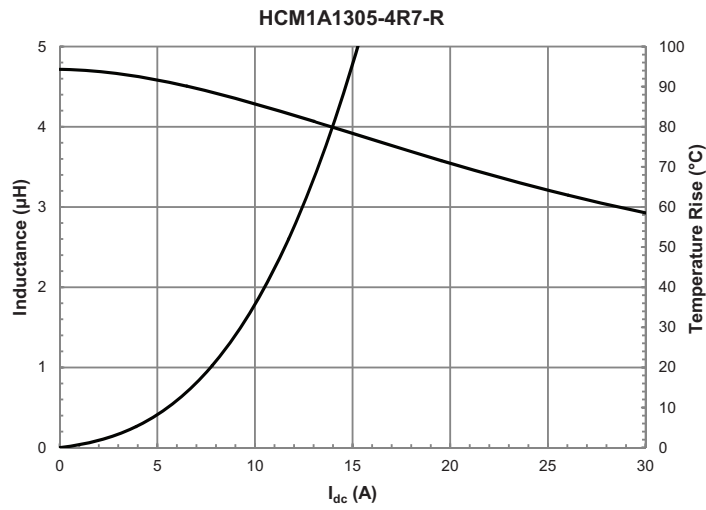




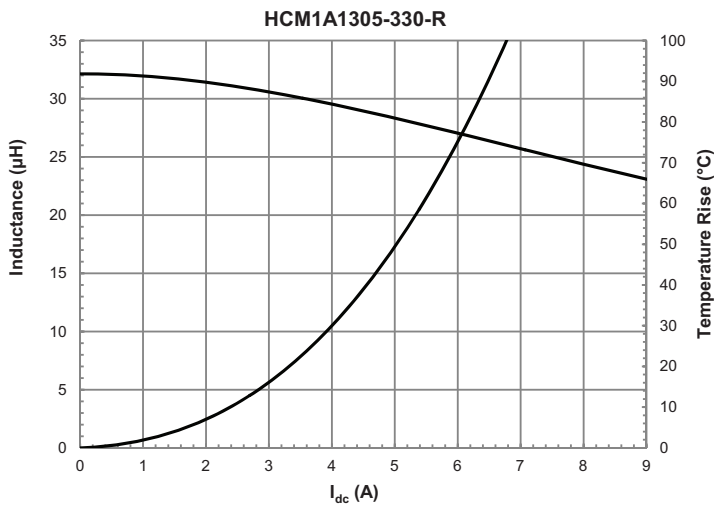
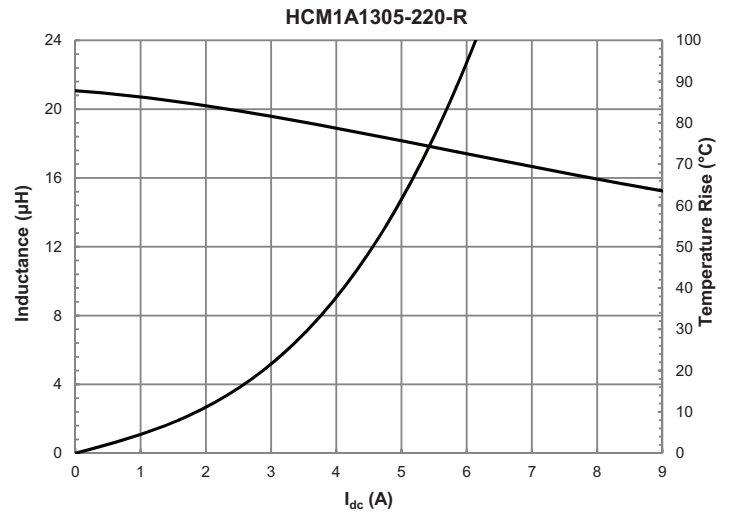
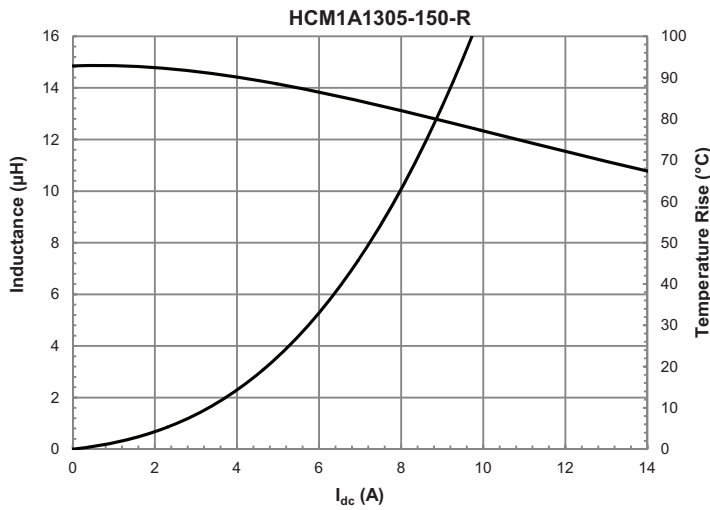
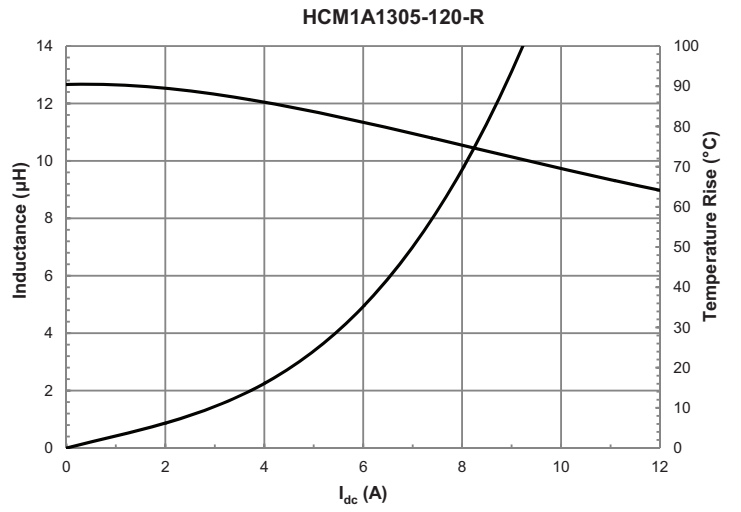
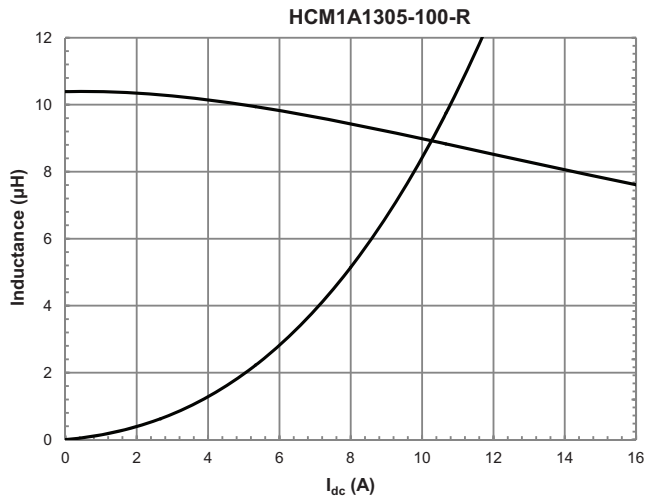
Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



Inductance and temperature rise vs. current



**Solder reflow profile**



**Table 1 - Standard SnPb Solder (T<sub>c</sub>)**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5mm)	235°C	220°C
≥2.5mm	220°C	220°C

**Table 2 - Lead (Pb) Free Solder (T<sub>c</sub>)**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350 - 2000	Volume mm <sup>3</sup> >2000
<1.6mm	260°C	260°C	260°C
1.6 - 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

**Reference JDEC J-STD-020**

Profile Feature	Standard SnPb Solder	Lead (Pb) Free Solder
Preheat and Soak		
• Temperature min. (T <sub>smin</sub> )	100°C	150°C
• Temperature max. (T <sub>smax</sub> )	150°C	200°C
• Time (T <sub>smin</sub> to T <sub>smax</sub> ) (t <sub>s</sub> )	60-120 Seconds	60-120 Seconds
Average ramp up rate T <sub>smax</sub> to T <sub>p</sub>	3°C/ Second Max.	3°C/ Second Max.
Liquidous temperature (T <sub>L</sub> )	183°C	217°C
Time at liquidous (t <sub>L</sub> )	60-150 Seconds	60-150 Seconds
Peak package body temperature (T <sub>p</sub> )*	Table 1	Table 2
Time (t <sub>p</sub> )** within 5 °C of the specified classification temperature (T <sub>c</sub> )	20 Seconds**	30 Seconds**
Average ramp-down rate (T <sub>p</sub> to T <sub>smax</sub> )	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<sub>p</sub>) is defined as a supplier minimum and a user maximum.  
\*\* Tolerance for time at peak profile temperature (t<sub>p</sub>) is defined as a supplier minimum and a user maximum.

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September 2016

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Наши преимущества:

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- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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