

# Power Inductor

## Automotive Grade

### APXX Series



#### Overview

Power inductors are passive electronic components used in various circuits to store energy in a magnetic field when electrical current flows through them. They are critical in filtering, energy storage, and noise suppression in power electronic systems. They are designed to handle higher currents and are optimized for minimal power loss and thermal efficiency.

#### Benefits

1. Automotive grade available
2. Plated terminals on the ferrite core, frameless can be low profile
3. High inductance up to 1000 $\mu$ H
4. Operating temperature range  $-40^{\circ}\text{C} \sim 165^{\circ}\text{C}$ (Including self - temperature rise)
5. No thermal aging

#### Applications

1. Automotive Systems for Dashboard, CCD Module
2. Media player, Audio class-D
3. Net working
4. MR16 Lighting, LCD Panel/TV

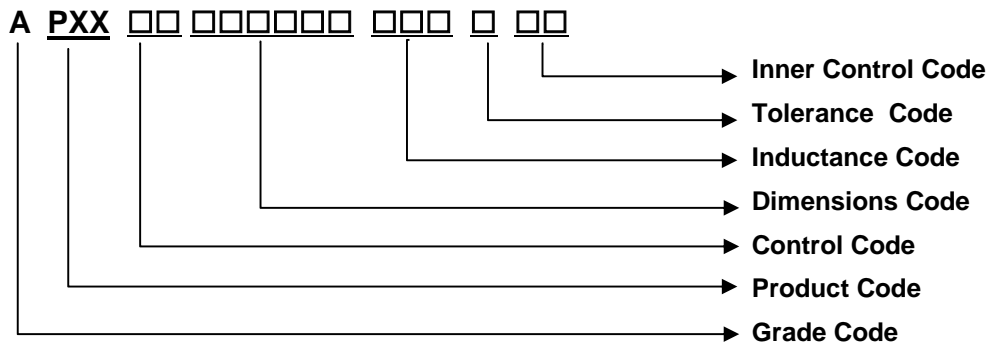
#### Product Information

Series	L (mm)	W(mm)	T (mm)	Inductance ( $\mu$ H)
APXX	4.0	4.0	1.8	0.56 ~ 330
	4.0	4.0	1.8	
	5.0	5.0	3.0	



**1 Scope:** This specification applies to the Pb Free high current type SMD inductors

**2 Part Numbering:**



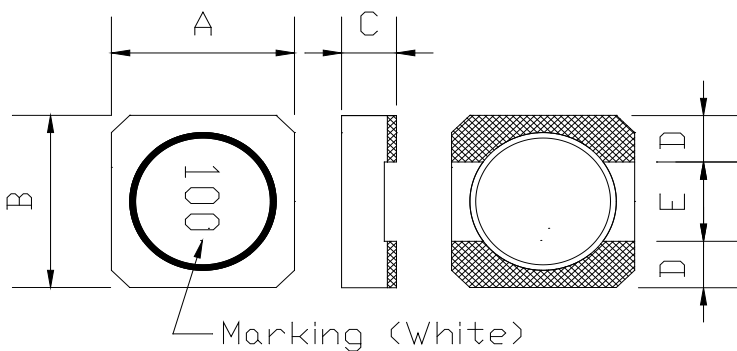
**3 Rating:**

Operating Temperature range: -55°C ~ +150°C (Including self temp. rise)  
 Storage Temperature range: -55°C ~ +150°C (For after the circuit board is mounted)  
 Storage Temperature: (on tape & reel): -20°C to +40°C; 75% RH max.

**4 Standard Testing Condition:**

	Unless otherwise specified	In case of doubt
Temperature	Ordinary Temperature(15 to 35°C)	20 to 30°C
Humidity	Ordinary Humidity(25 to 85% RH)	50 to 80 %RH

**5 Configuration and Dimensions and Unit Weight:**



- A: 4.00±0.4 mm
- B: 4.00±0.4 mm
- C: 1.80 Max. mm
- D: 1.10 Typ. mm
- E: 1.80 Typ. mm

Net Weight (grms)

SIZE CODE	Net Weight (grms)
040418	0.102(Typ.)

**6 Electrical Characteristics:**

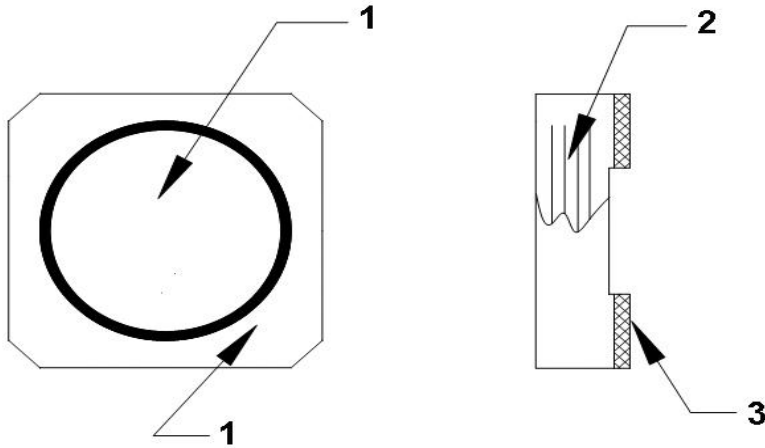
Part No.	Inductance L(μH)	Test Frequency	Resistance RDC(Ω) Max.	Rated DC Current		Tolerance	Marking
				Isat(A)	Irms(A)		
APXX00040418R56□80	0.56	100kHz/0.1V	30m	4.80	2.80	T	R56
APXX00040418R68□80	0.68	100kHz/0.1V	35m	4.50	2.75	T	R68
APXX000404181R0□80	1.0	100kHz/0.1V	40m	3.40	2.70	M,T	1R0
APXX000404181R5□80	1.5	100kHz/0.1V	50m	2.70	2.50	M,T	1R5
APXX000404181R6□80	1.6	100kHz/0.1V	50m	2.70	2.50	T	1R6
APXX000404181R8□80	1.8	100kHz/0.1V	60m	2.60	2.40	T	1R8
APXX000404182R2□80	2.2	100kHz/0.1V	70m	2.50	2.20	M,T	2R2
APXX000404182R5□80	2.5	100kHz/0.1V	75m	2.40	2.10	T	2R5
APXX000404183R3□80	3.3	100kHz/0.1V	80m	2.20	2.00	M,T	3R3
APXX000404183R6□80	3.6	100kHz/0.1V	0.10	2.00	1.80	T	3R6
APXX000404183R9□80	3.9	100kHz/0.1V	0.10	2.00	1.80	M,T	3R9
APXX000404184R7□80	4.7	100kHz/0.1V	0.125	1.70	1.60	M,T	4R7
APXX000404185R6□80	5.6	100kHz/0.1V	0.135	1.50	1.45	M,T	5R6
APXX000404186R8□80	6.8	100kHz/0.1V	0.15	1.20	1.30	M,T	6R8
APXX00040418100□80	10	100kHz/0.1V	0.20	1.10	1.15	M,T	100
APXX00040418150□80	15	100kHz/0.1V	0.28	0.86	0.90	M,T	150
APXX00040418180□80	18	100kHz/0.1V	0.30	0.78	0.88	M,T	180
APXX00040418220□80	22	100kHz/0.1V	0.36	0.74	0.85	M,T	220
APXX00040418330□80	33	100kHz/0.1V	0.46	0.58	0.77	M,T	330
APXX00040418470□80	47	100kHz/0.1V	0.75	0.51	0.63	M,T	470
APXX00040418680□80	68	100kHz/0.1V	1.07	0.41	0.48	M,T	680
APXX00040418820□80	82	100kHz/0.1V	1.22	0.38	0.44	M,T	820
APXX00040418101□80	100	100kHz/0.1V	1.64	0.34	0.42	M,T	101
APXX00040418121□80	120	100kHz/0.1V	1.88	0.31	0.38	M,T	121
APXX00040418151□80	150	100kHz/0.1V	2.45	0.27	0.31	M,T	151
APXX00040418181□80	180	100kHz/0.1V	2.91	0.24	0.30	M,T	181
APXX00040418221□80	220	100kHz/0.1V	4.20	0.22	0.24	M,T	221
APXX00040418331□80	330	100kHz/0.1V	5.90	0.18	0.22	M,T	331
APXX00040418471□80	470	100kHz/0.1V	7.10	0.14	0.20	M,T	471

**NOTE: tolerance M=±20% , T=±30%**

1. Isat : Based on inductance change (ΔL/Lo : drop 30% Max.) @ambient temperature 25°C
2. Irms : Based on temperature rise (ΔT : 40°C Typ.)

**APXX00040418 Series Specification**

**6.1 Construction:**



**6.2 Material List:**

NO.	ITEM	DESCRIPTION & TYPE
1	CORE	FERRITE
2	WIRE	MAGNET WIRE (P180)
3	TERMINAL	Ag/Cu/Ni/Sn

**ELECTRICAL**

TEST ITEM	SPECIFICATION	TEST DETAILS
Temperature characteristics	$\Delta L/L20^{\circ}\text{C} \leq \pm 10\%$ 0 ~ 2000 ppm/ $^{\circ}\text{C}$	The test shall be performed after the sample has stabilized in an ambient temperature of -20 to +85 $^{\circ}\text{C}$ , and the value calculated based on the value applicable in a normal temperature and normal humidity shall be $\Delta L/L20^{\circ}\text{C} \leq \pm 10\%$ .

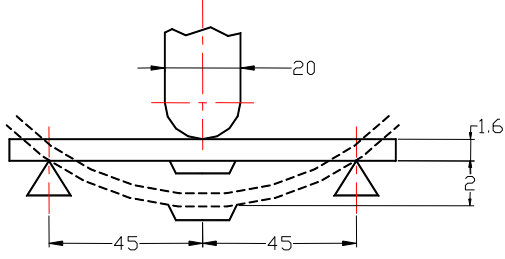
**MECHANICAL**

TEST ITEM	SPECIFICATION	TEST DETAILS
High Temperature Exposure (Storage)	1. $\Delta L/L_0 \leq \pm 10\%$ 2. Appearance-No damage (OM)	Refer to MIL-STD-202 Method 108 1. preconditioning :reflow 3 times. 2. 1000hrs. at rated operating temperature, part can be stored for 1000 hrs. @ 150 $^{\circ}\text{C}$ . Unpowered. Measurement at 24 $\pm$ 4 hours after test conclusion.
Temperature Cycling	1. $\Delta L/L_0 \leq \pm 10\%$ 2. Appearance-No damage (OM)	Refer to JESD22 Method JA-104 1. preconditioning :reflow 3 times. 2. 1000 cycles (-55 $^{\circ}\text{C}$ to +150 $^{\circ}\text{C}$ ). Measurement at 24 $\pm$ 4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1 min. maximum transition time.
Biased Humidity	1. $\Delta L/L_0 \leq \pm 10\%$ 2. Appearance-No damage (OM)	Refer to MIL-STD-202 Method 103 1. preconditioning :reflow 3 times. 2. 1000 hrs 85 $^{\circ}\text{C}$ /85%RH. Unpowered. Measurement at 24 $\pm$ 4 hours after test conclusion.
Operational Life	1. $\Delta L/L_0 \leq \pm 10\%$ 2. Appearance-No damage (OM)	Refer to MIL-PRF-27 1. preconditioning :reflow 3 times. 2. 1000 hrs. @150 $^{\circ}\text{C}$ . Measurement 24 $\pm$ 4 hours after test conclusion.
Physical Dimensions	Product spec	Refer to JESD22-B100 Verify physical dimensions to the applicable device detail specification.

**MECHANICAL**

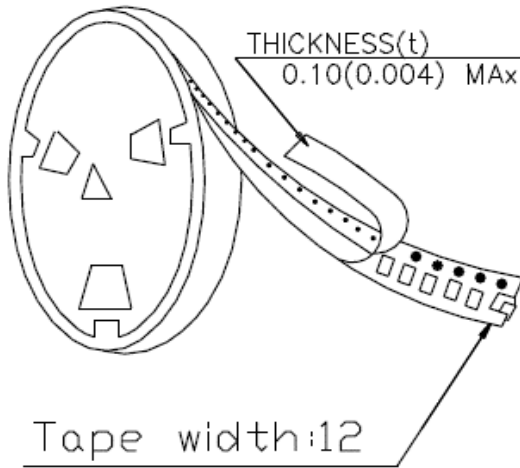
TEST ITEM	SPECIFICATION	
Resistance to Solvent	1. Marking -No constitute failure 2. No damage or degradation that has occurred due to solvent	Refer to MIL-STD-202 Method 215 Immersion 3+0.5/-0 minutes in Terpene defluxer. Brush 10 strokes (wet bristle) 2 to 3 oz. Rinse in water. Air blow dry.
Mechanical Shock	1. $\Delta L/L_o \leq \pm 10\%$ 2. Appearance-No damage (OM)	MIL-STD-202 Method 213 Units are non-operating. Pulse shape : Half-sine waveform Impact acceleration : 100 g's Pulse duration : 6 ms Number of shocks : 18 shocks ( 3 shocks for each face)
Vibration	1. $\Delta L/L_o \leq \pm 10\%$ 2. Appearance-No damage (OM)	MIL-STD-202 Method 204 5 g's for 20 minutes, 12 cycles each of 3 orientations. Test from 10-2000Hz.
Resistance to Soldering heat (reflow soldering)	1. $\Delta L/L_o \leq \pm 10\%$ 2. Appearance-No damage (OM)	<p style="text-align: center;"><b>Temperature profile of reflow soldering</b></p> <p style="text-align: center;">                     Ramp up: 3°C/sec. max.      Ramp down: 6°C/sec. max.                      260°C                      217°C                      160°C                      25°C                 </p> <p style="text-align: center;">                     ← Preheat →      ← Liquidus →                      150-200°C      &gt;217°C                      60-120 sec.      60-150 sec.                 </p> <p style="text-align: center;">                     Soldering                      260°C ± 3°C                      10 - 30 sec.                 </p> <p>                     Refer to MIL-STD-202 Method 210                      SMD: Condition K, time above 217°C, 60s – 150s, 3Cycles                 </p>
Solderability	All terminations shall exhibit a continuous solder coating free from defects for a minimum of 95% of the critical area of any individual termination.	Refer to J-STD-002 For both Leaded & SMD. Electrical Test not required. Magnification 30X. Conditions: SMD: a) Method B1 @ 245°C, 5+0/-0.5 s.

ENVIRONMENT CHARACTERISTICS

TEST ITEM	SPECIFICATION	TEST DETAILS
Board Flex	1. $\Delta L/L_0 \leq \pm 10\%$ 2. No Crack	Refer to AEC-Q200-005 Bend the board (D) X = 2mm, 60sec minimum holding time. 
Terminal Strength	1. $\Delta L/L_0 \leq \pm 10\%$ 2. Appearance-No damage (OM)	Refer to AEC-Q200-006 Apply a 1.8Kg force to the side of a device bending tested. The force shall be applied for 60+1 seconds.
Electrical Characterization	User Specification.	Parametrically test per lot and sample size requirements. Summary to show minimum, maximum, mean and standard deviation at room, minimum and maximum operating temperatures.
ESD		Refer to AEC-Q200-002 or ISO/DIS 10605 Refer to attachment third party report
Flammability	The marking and A side have no obvious broken, and the marking are clearly	Refer to UL 94 Burning stops within 10 seconds on a vertical specimen; drips of particles allowed as long as they are not inflamed.

**7 Packaging:**

**7.1 Packaging -Cover Tape**

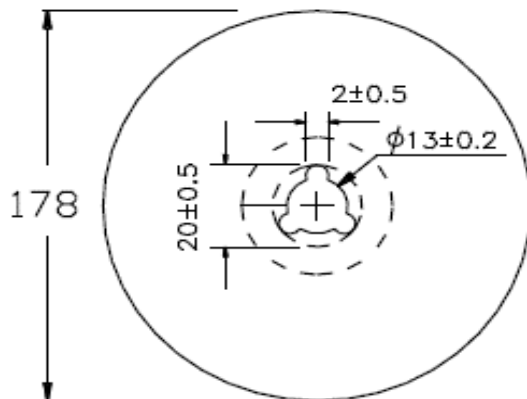


**7.2 Packaging Quantity**

TYPE	PCS/REEL
APXX00040418	1000

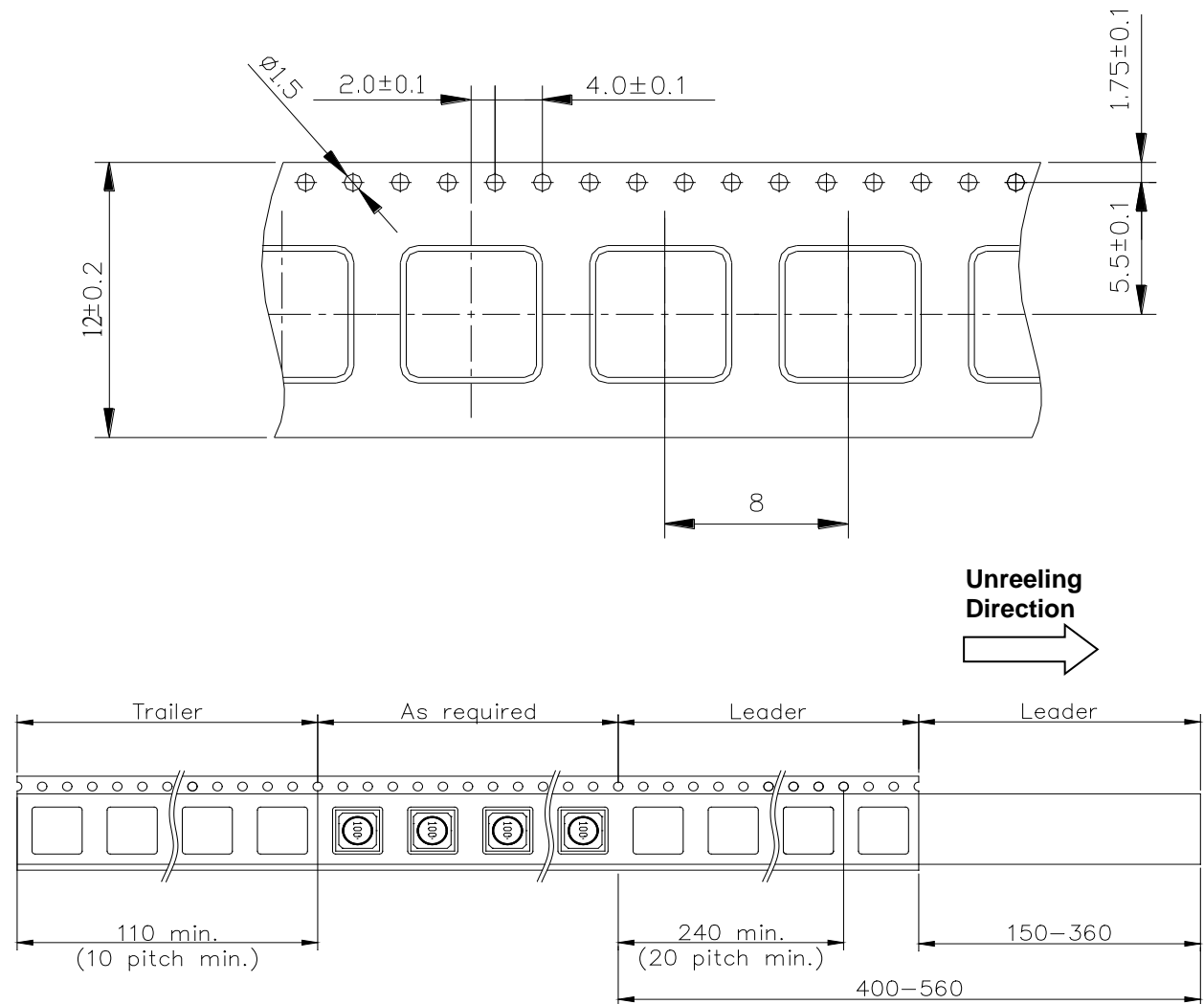
**7.3 Reel Dimensions**

Unit : mm



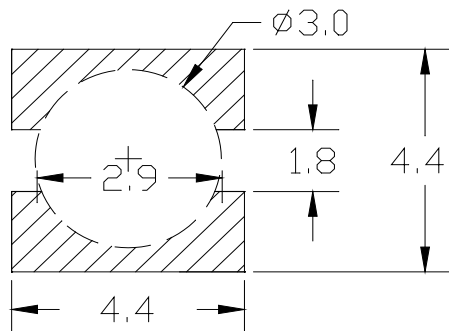
**7 Packaging:**

**7.4 Tape Dimensions in mm**



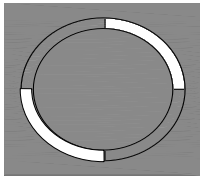
**8 Recommended Land Pattern:**

(STANDARD PATTERN) Unit : mm



**9** Note:

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. Do not knock or drop.
3. All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.
4. Please keep the distance between transformer/coil and other components (refer to the standard IEC 950)
5. The moisture sensitivity level (MSL) of products is classified as level 1.
6. Void Appearance Tolerance Limit



6-1. The length of the hole in the epoxy of the sealed glue position should be less than  $1/2$  of the DR core's circumference, otherwise, it is NG.

6-2. The total length of the amount of hole in the epoxy should be less than  $1/2$  of the DR core's circumference, otherwise, it is NG.

7. Suggestion

On customer side this product series need to be fixed by the glue after IR reflow.

Please refer to below example photo:

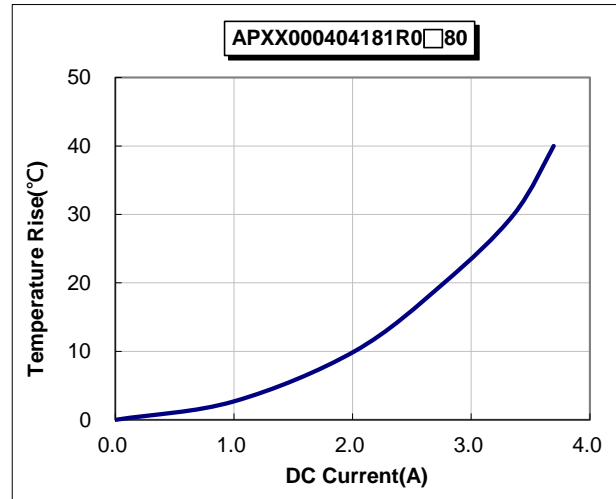
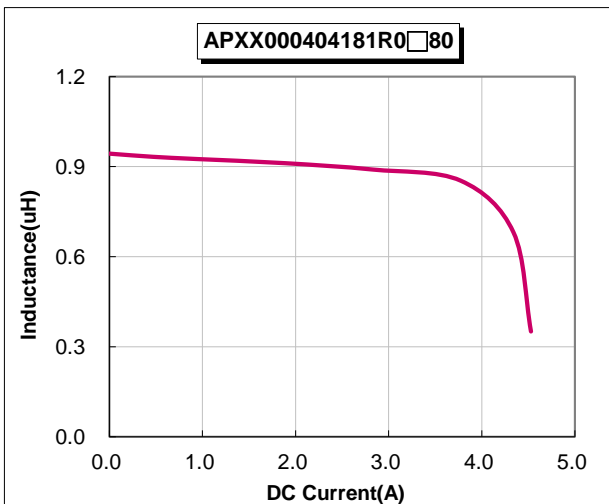
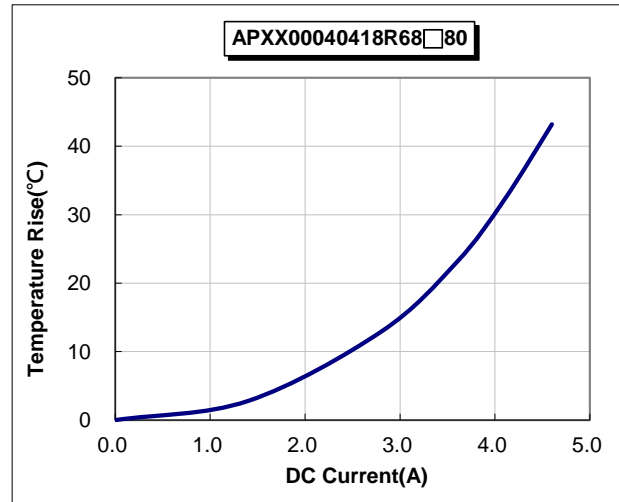
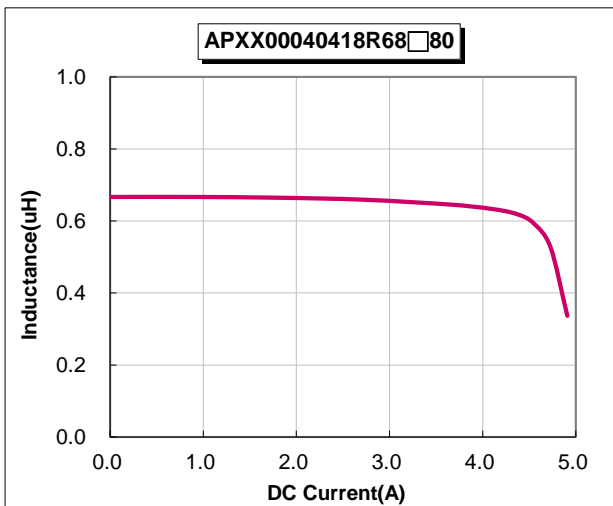
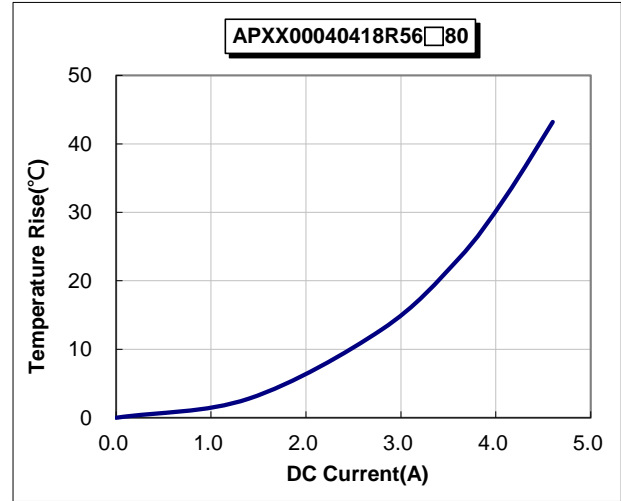
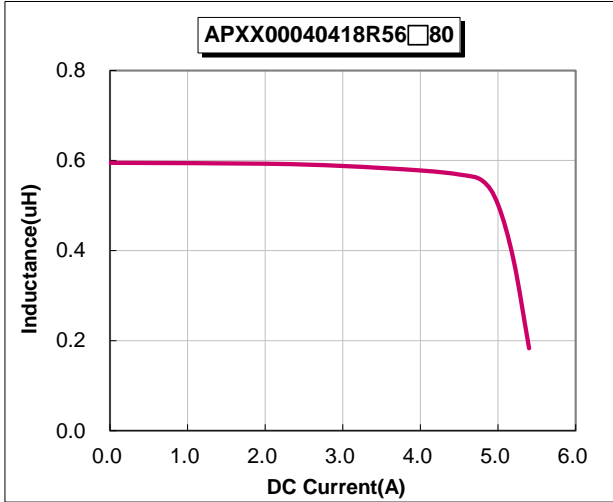


Glue

TYPICAL ELECTRICAL CHARACTERISTICS

INDUCTANCE vs. DC CURRENT  
@100KHz/0.1V

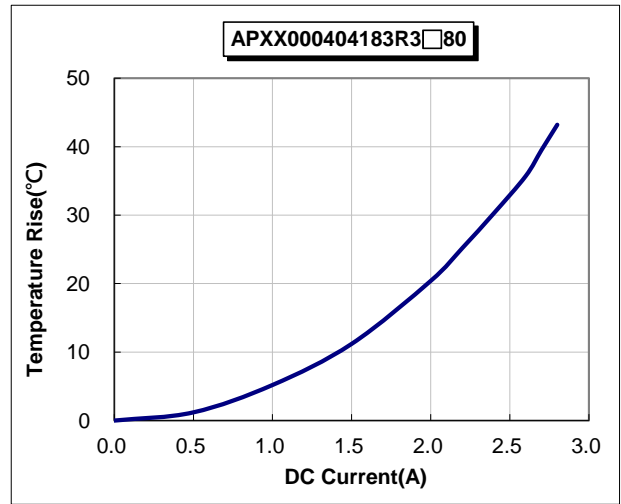
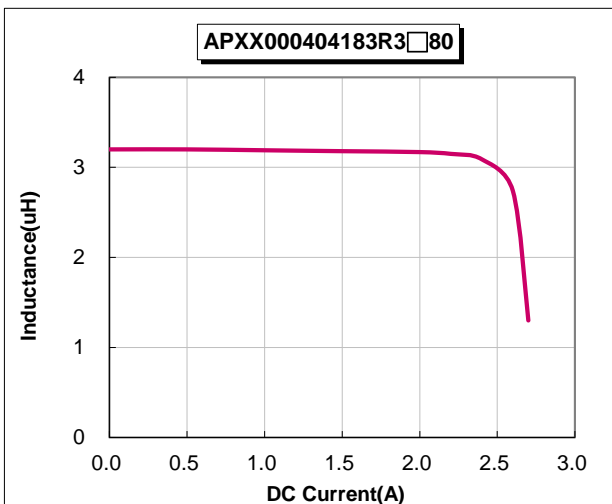
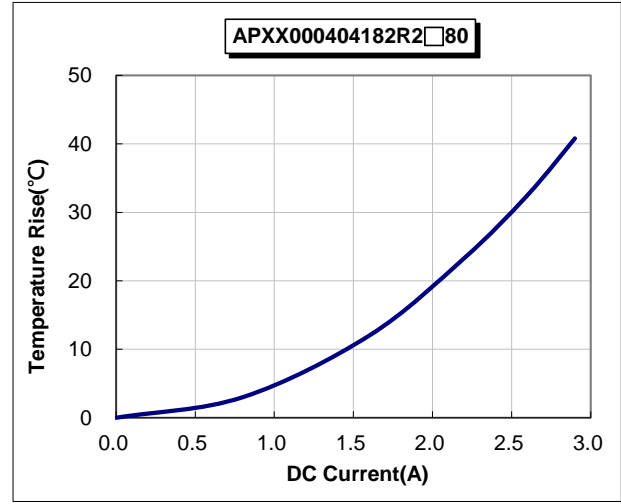
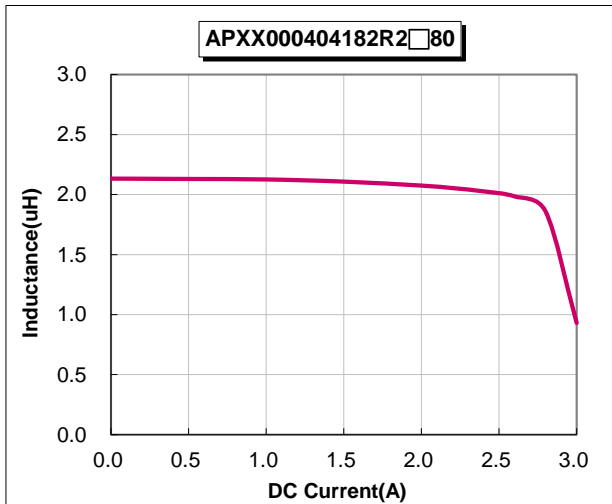
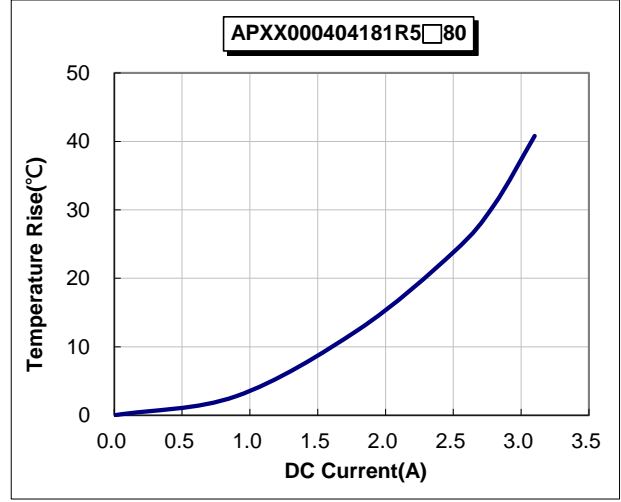
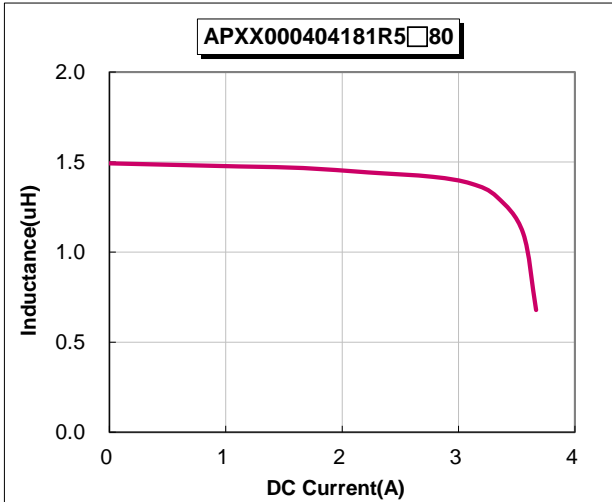
TEMPERATURE vs. DC CURRENT



TYPICAL ELECTRICAL CHARACTERISTICS

INDUCTANCE vs. DC CURRENT  
@100KHz/0.1V

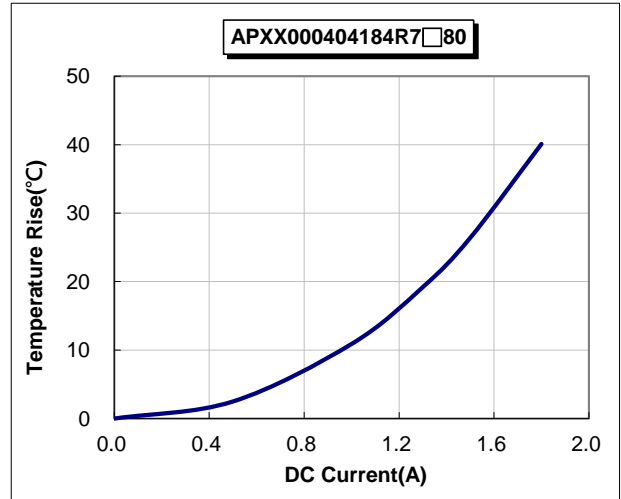
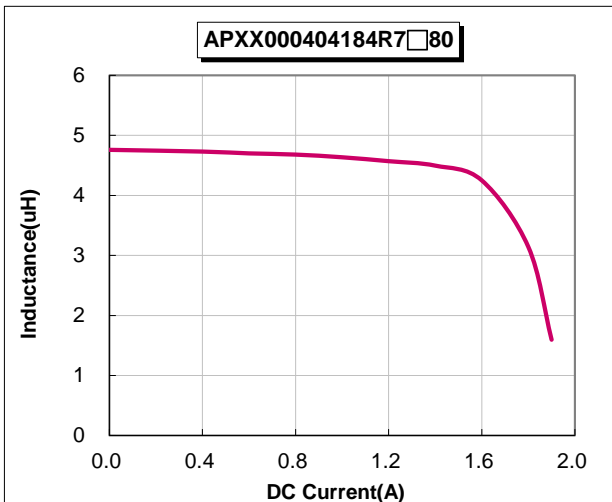
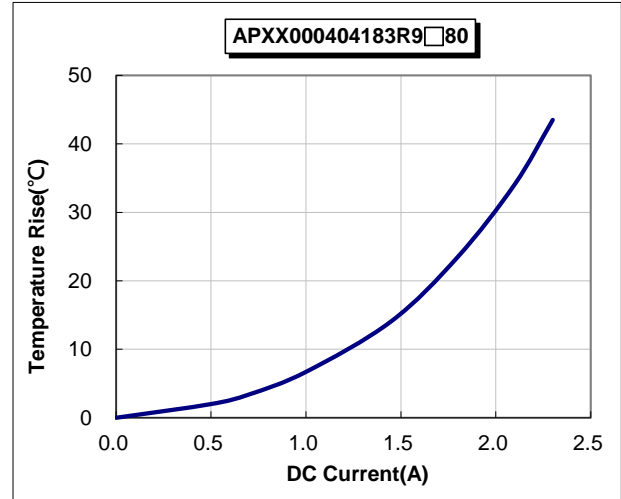
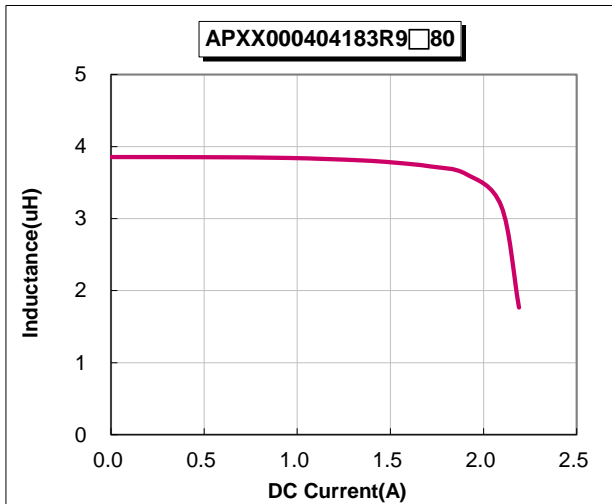
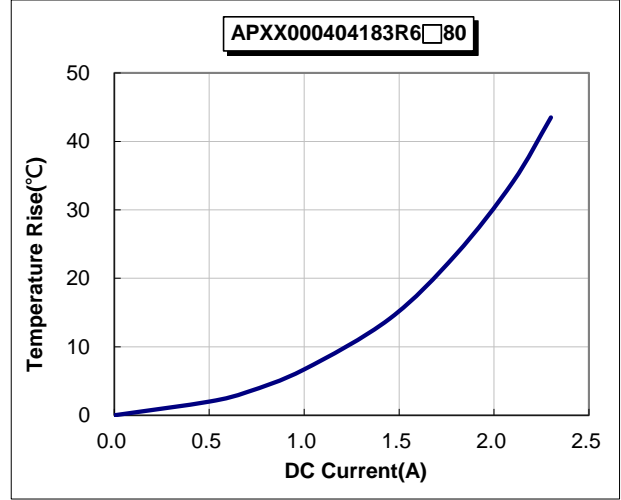
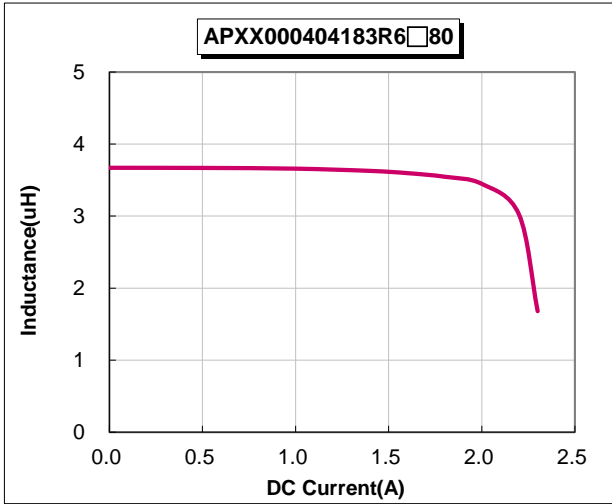
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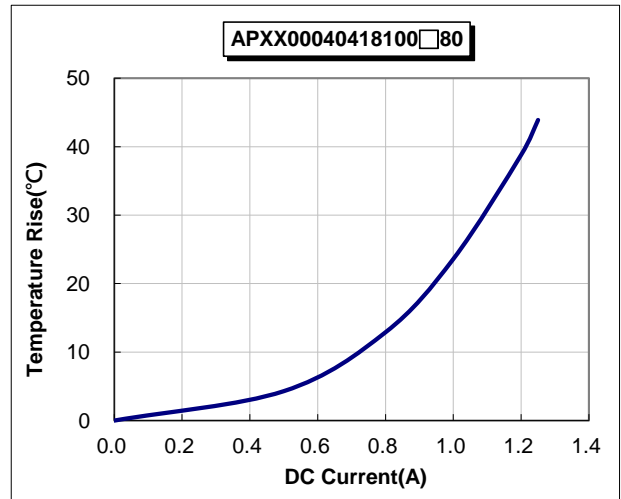
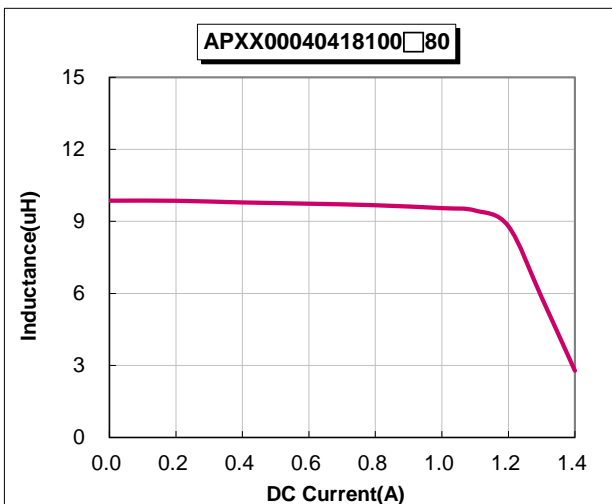
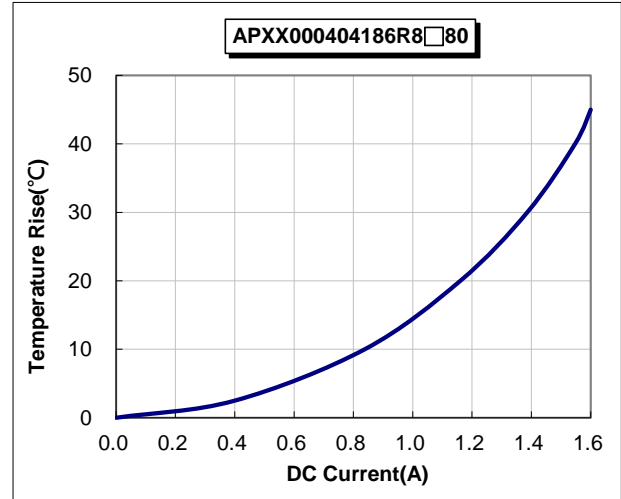
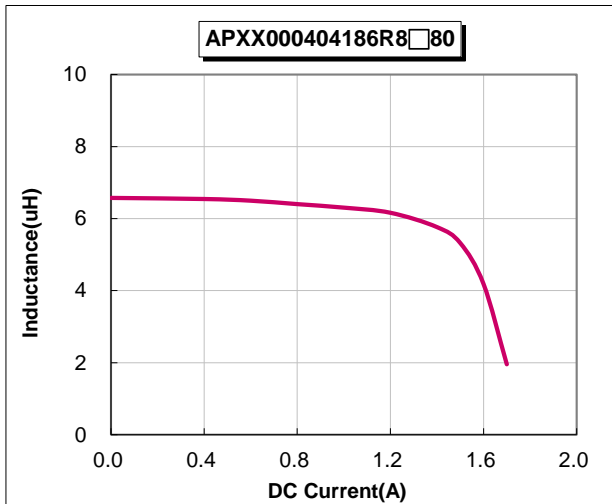
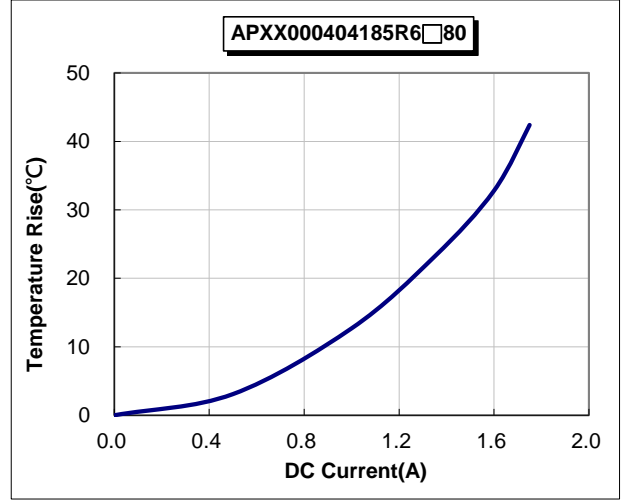
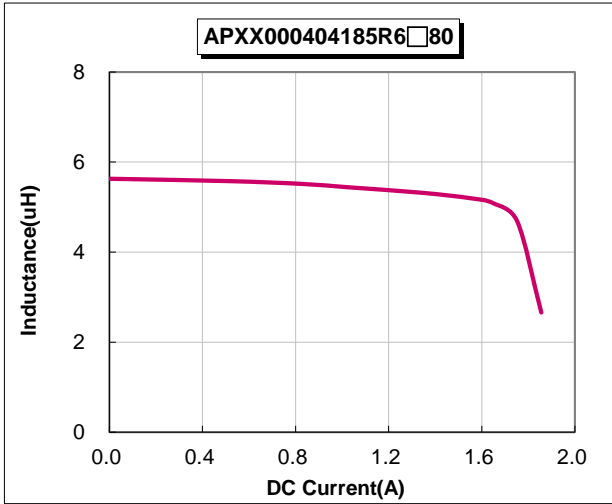
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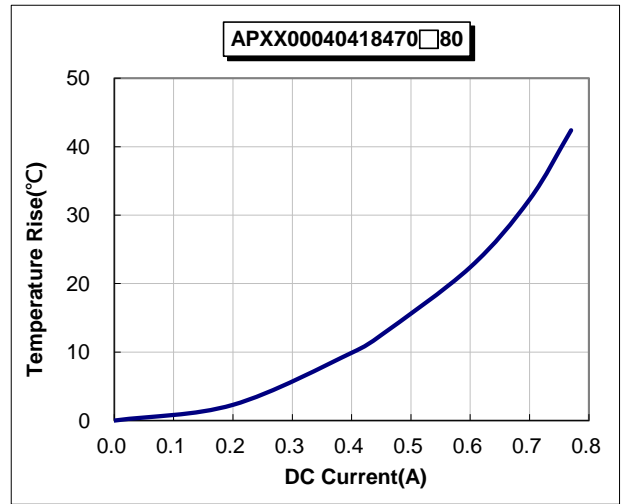
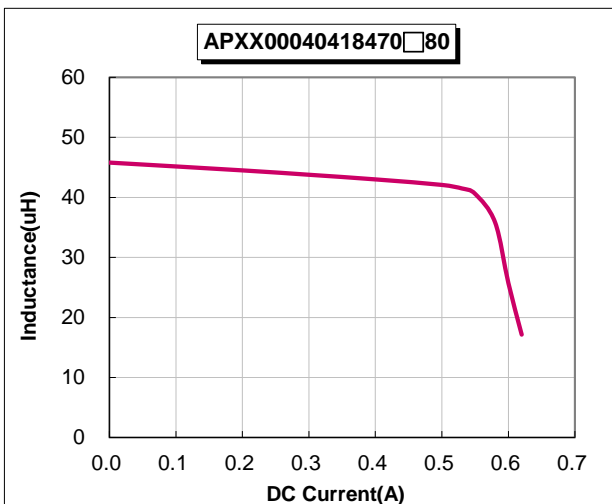
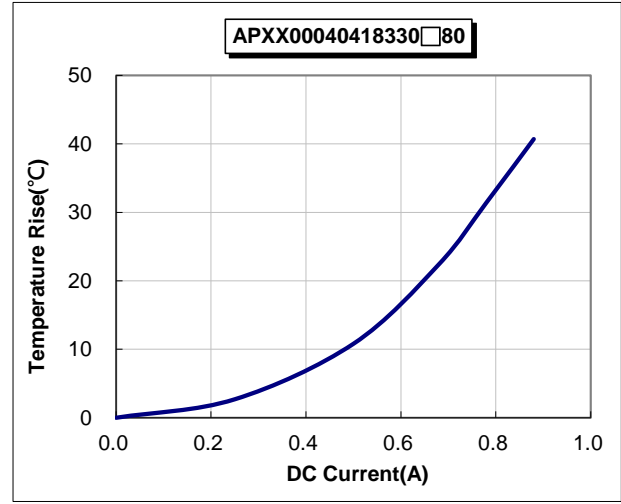
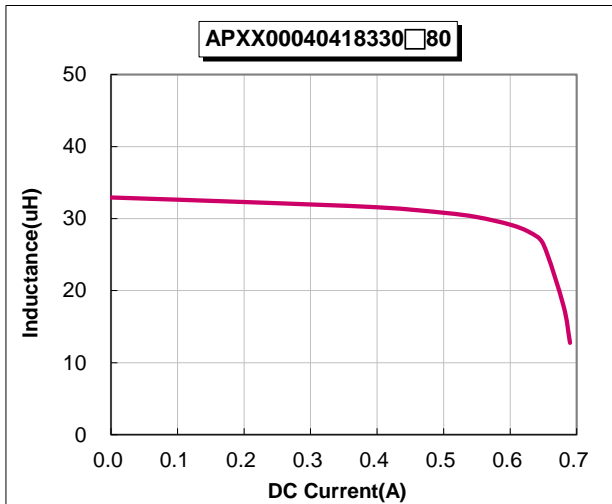
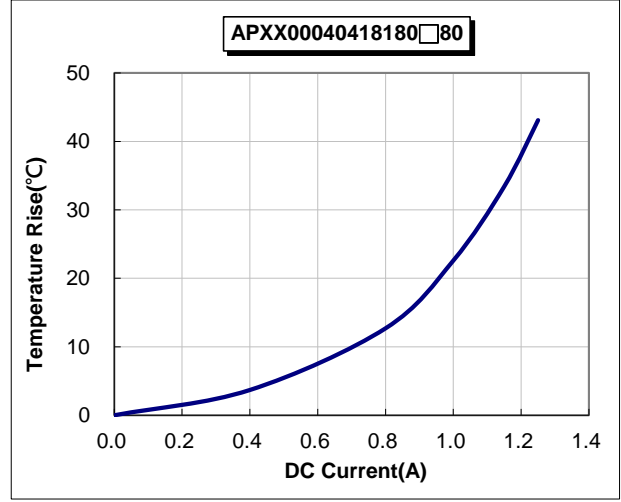
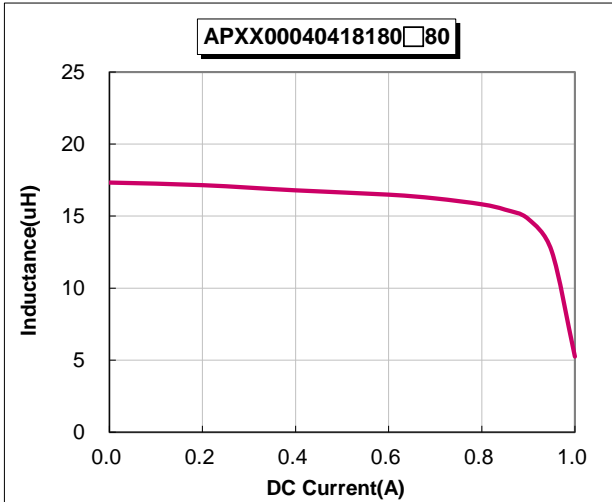
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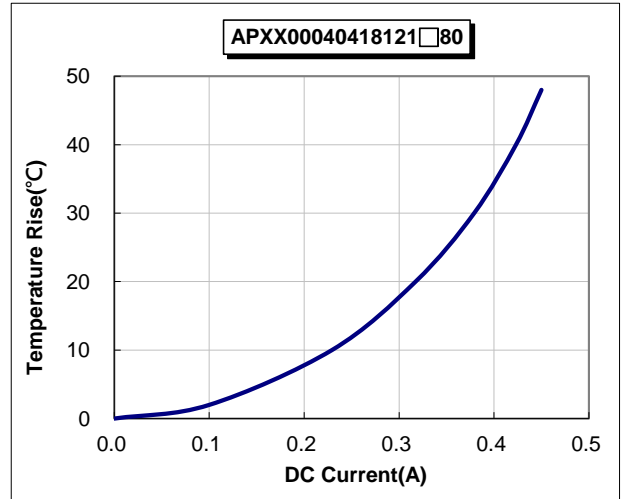
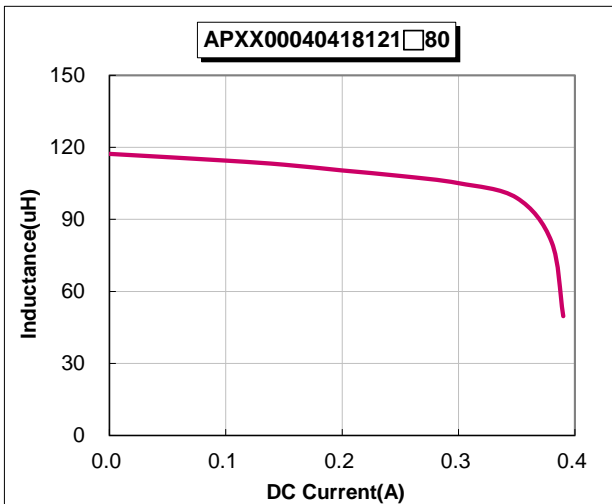
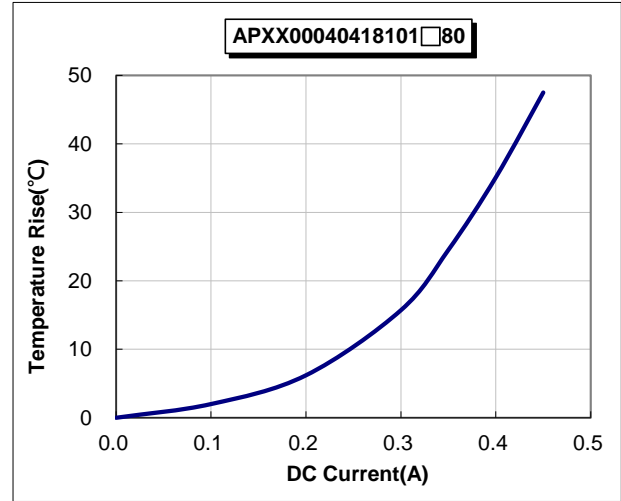
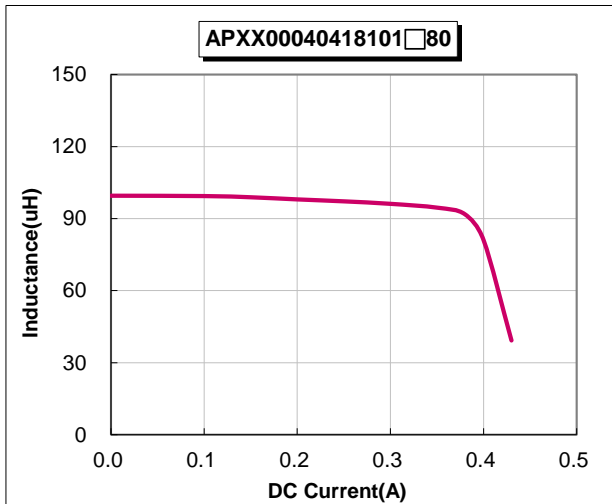
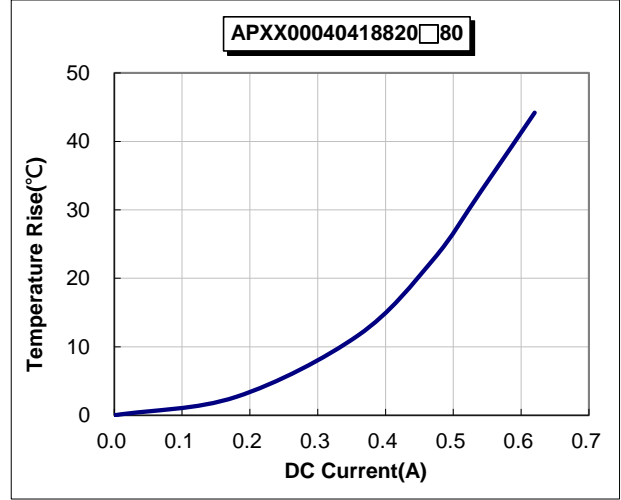
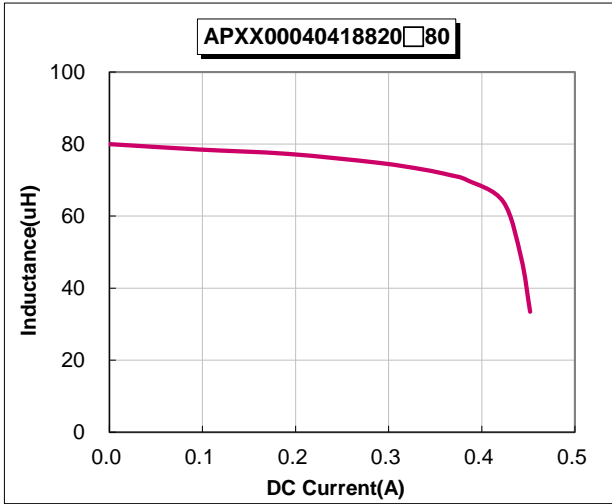
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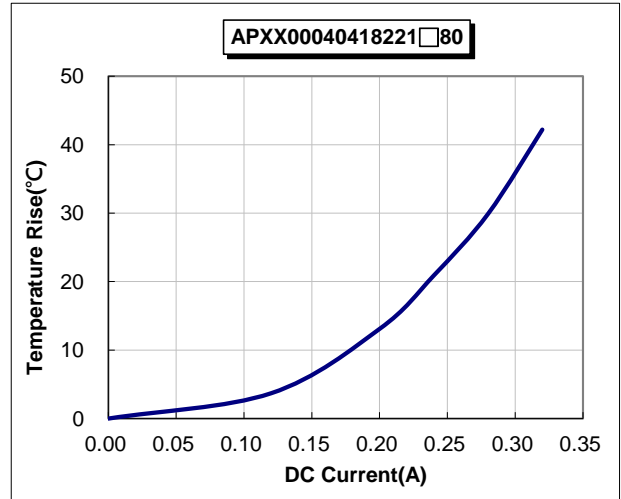
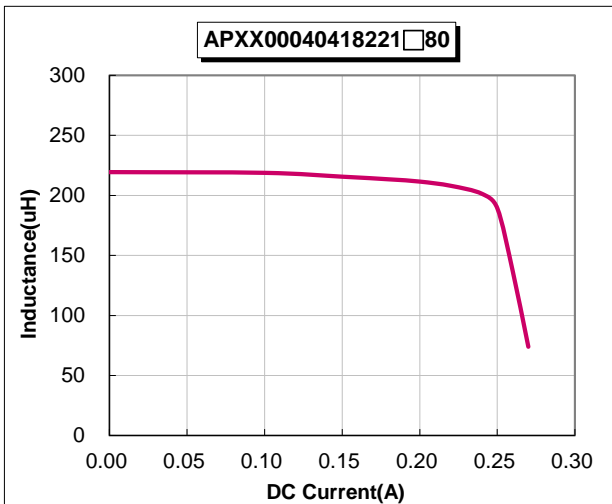
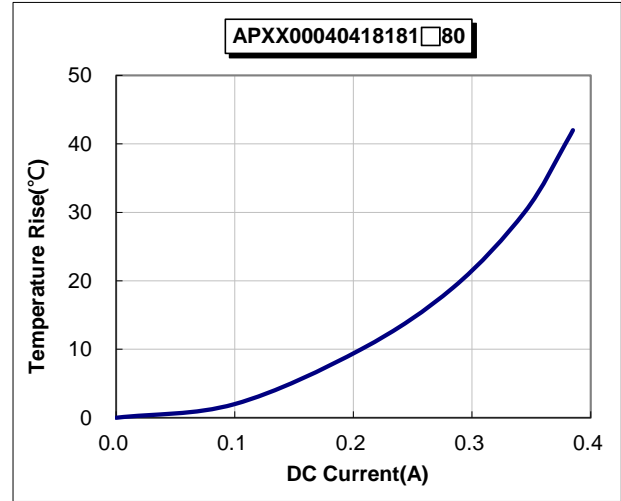
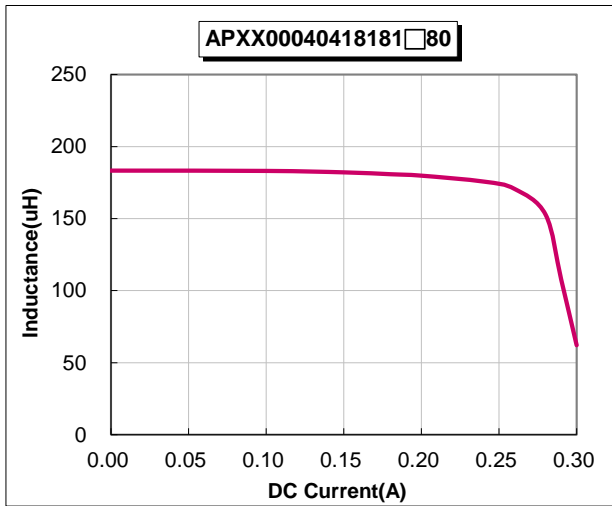
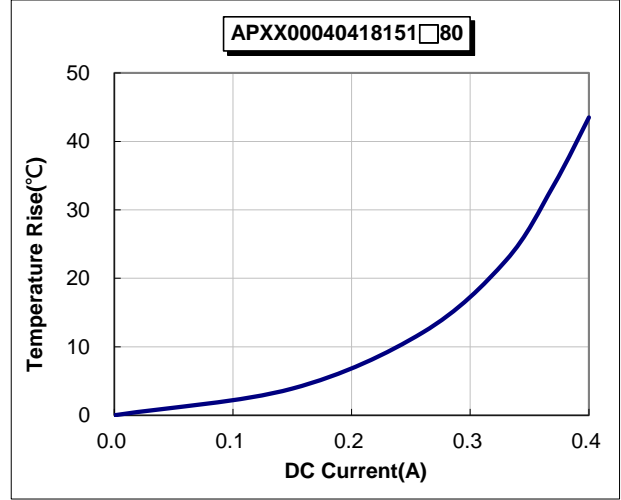
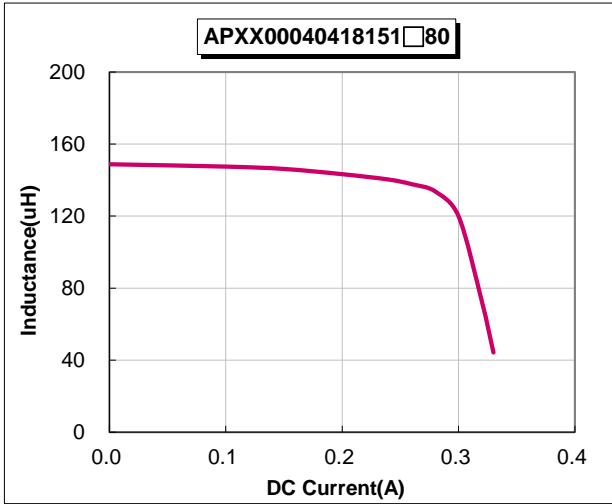
TEMPERATURE vs. DC CURRENT



TYPICAL ELECTRICAL CHARACTERISTICS

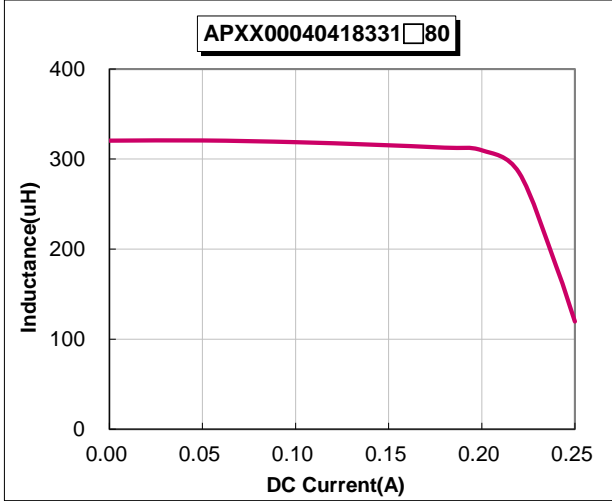
INDUCTANCE vs. DC CURRENT  
@100KHz/0.1V

TEMPERATURE vs. DC CURRENT



TYPICAL ELECTRICAL CHARACTERISTICS

INDUCTANCE vs. DC CURRENT  
@100KHz/0.1V



TEMPERATURE vs. DC CURRENT

