

HIGH CURRENT POWER INDUCTORS

CEP 104 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

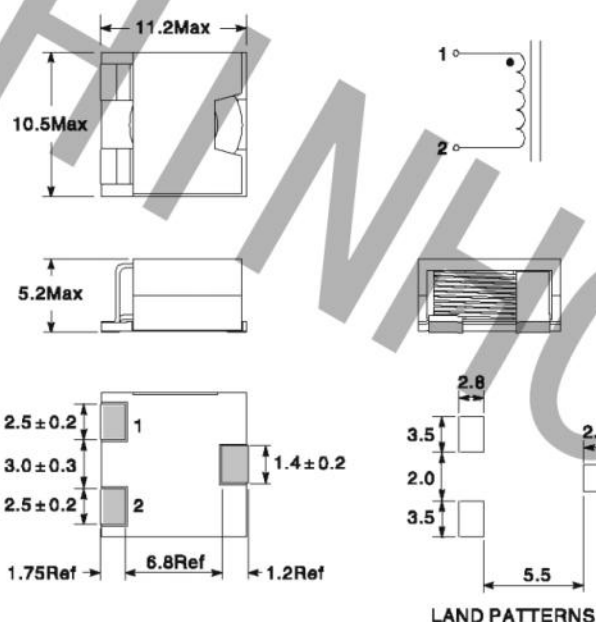
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @ 100KHz (μ H) $\pm$ 20%	DCR (m Ω) Max	DC saturation current			Temperature rise 40°C current (A) Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP104-0R8	0.8	4.0	24.9	25.2	25.6	16.3
CEP104-1R0	1.0	4.0	16.5	17.0	17.5	16.3
CEP104-1R2	1.2	6.0	20.5	21.0	21.3	15.0
CEP104-1R3	1.3	4.0	12.9	16.8	17.2	16.3
CEP104-1R5	1.5	4.0	13.5	14.0	14.5	16.3
CEP104-1R8	1.8	6.0	13.3	13.8	14.3	15.0
CEP104-2R0	2.0	9.0	15.3	15.8	16.2	11.5
CEP104-2R2	2.2	4.0	8.9	9.6	10.0	16.3
CEP104-2R5	2.5	7.5	11.4	11.8	12.1	12.0
CEP104-3R2	3.2	6.0	7.3	8.0	8.5	15.0
CEP104-4R0	4.0	9.0	8.3	8.5	8.8	11.5
CEP104-4R3	4.3	7.5	8.4	8.8	7.0	12.0
CEP104-5R7	5.7	9.0	5.4	5.8	6.0	11.5

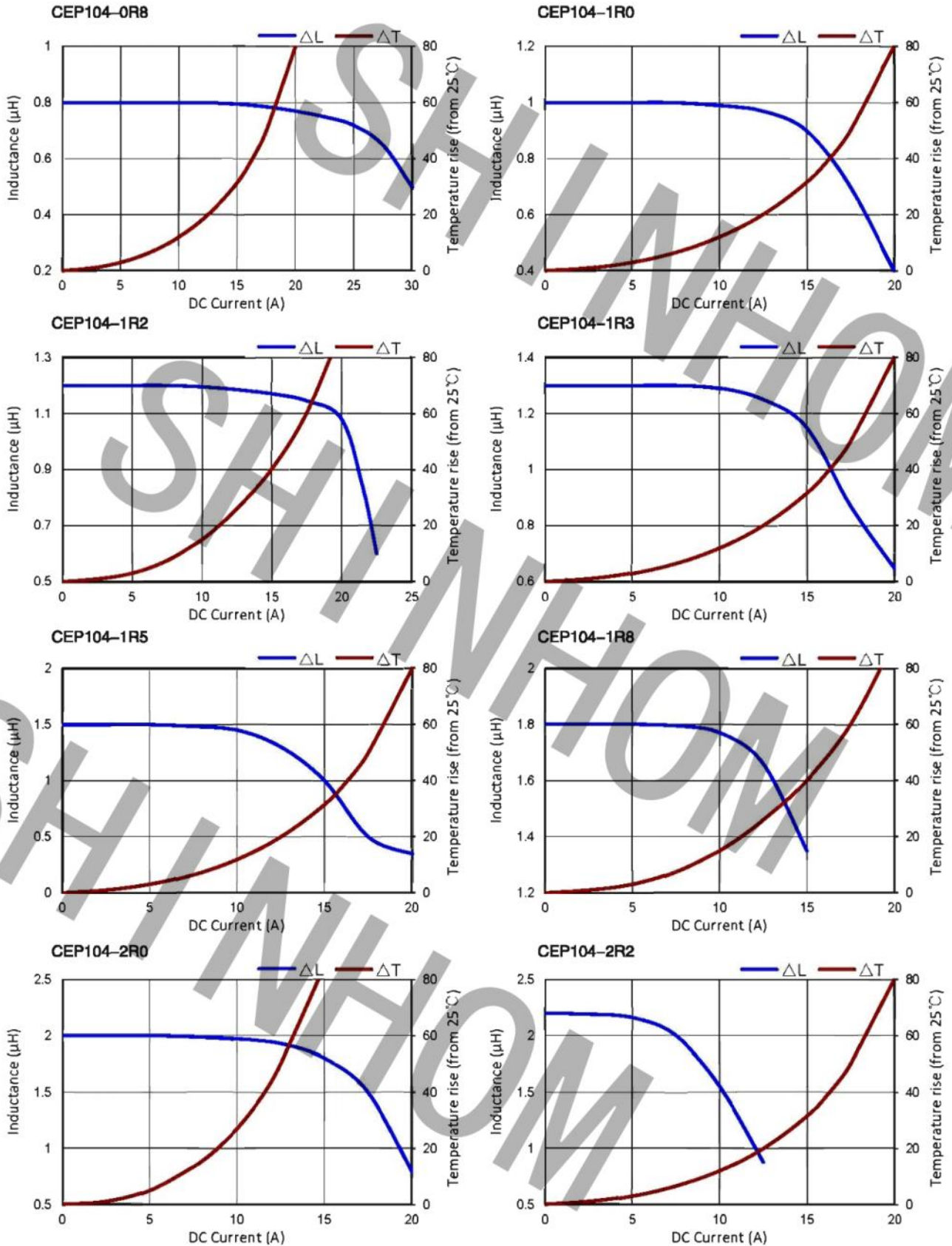
TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)

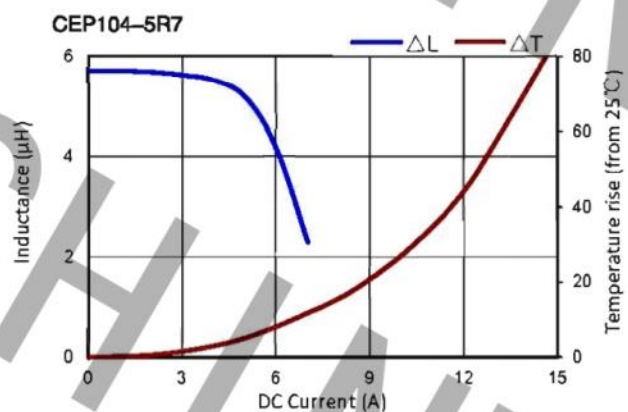
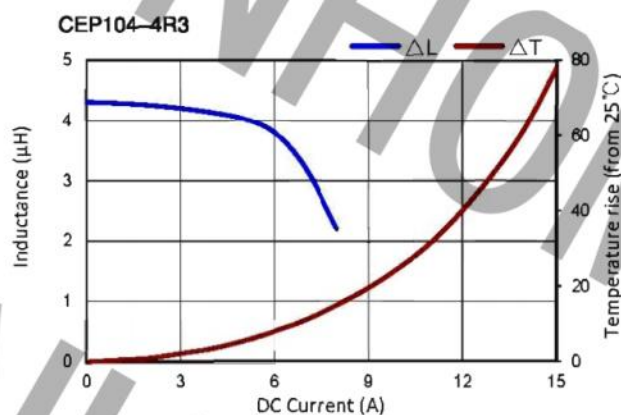
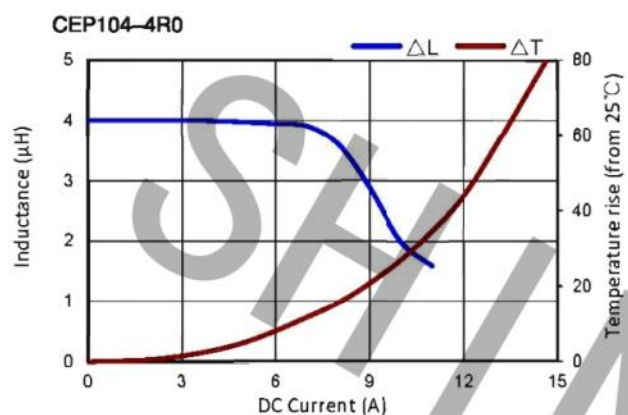
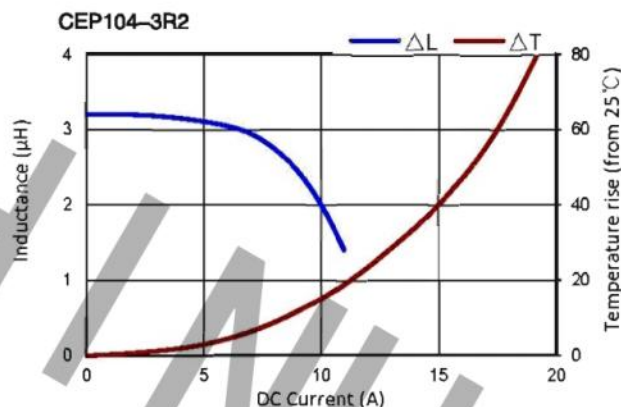
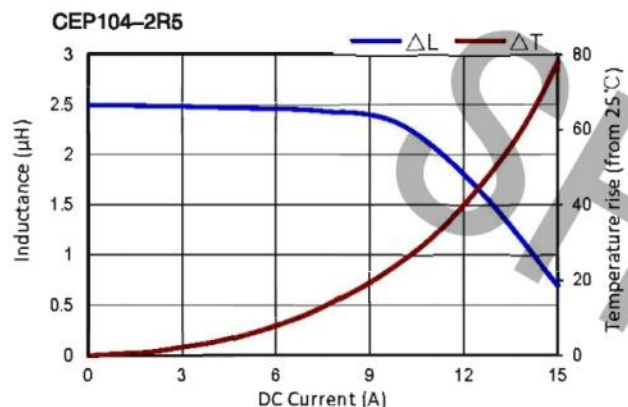


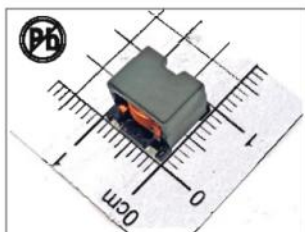
- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +105°C.
- All specifications subject to change without notice.

ELECTRICAL CHARACTERISTIC CURVE:



ELECTRICAL CHARACTERISTIC CURVE:





HIGH CURRENT POWER INDUCTORS

CEP 105 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

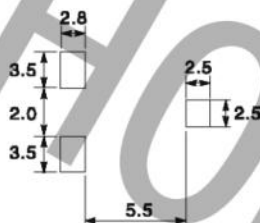
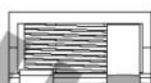
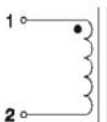
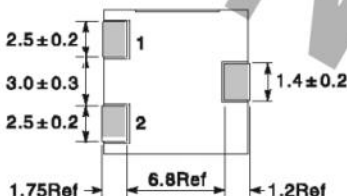
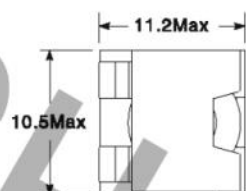
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @ 100KHz (μ H) $\pm$ 20%	DCR (m Ω) Max	DC saturation current			Temperature rise 40°C current (A) Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP105-5R6	5.6	10.5	4.0	7.8	10.5	8.5
CEP105-6R8	6.8	12.0	3.5	6.8	9.8	7.8
CEP105-9R0	9.0	16.0	3.2	5.7	9.1	6.6
CEP105-100	10.0	18.8	3.0	5.5	9.0	6.0
CEP105-120	12.0	21.0	2.4	5.0	7.2	5.2
CEP105-150	15.0	26.5	2.0	4.2	6.5	4.6
CEP105-220	22.0	40.0	2.0	3.0	5.2	4.0

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

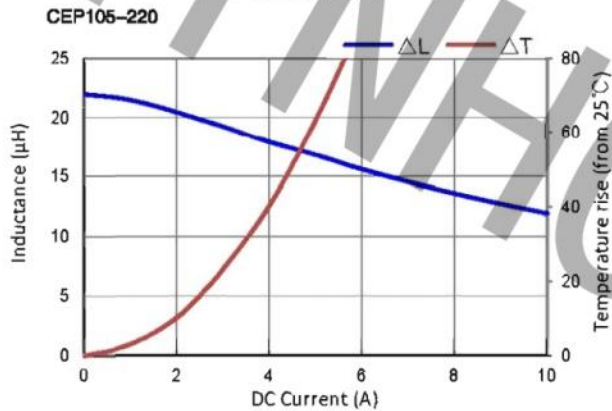
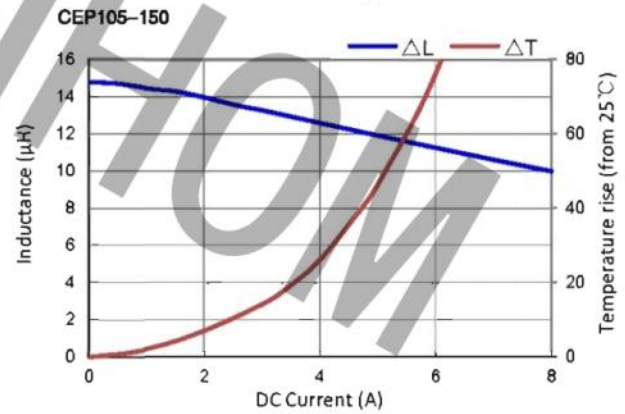
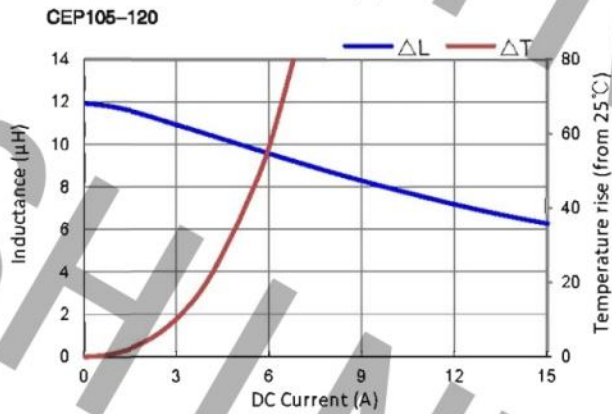
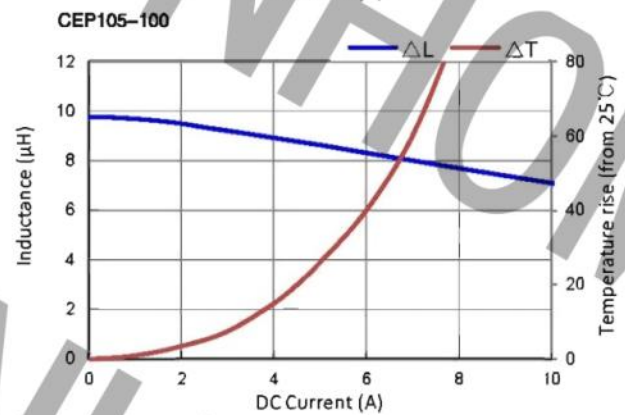
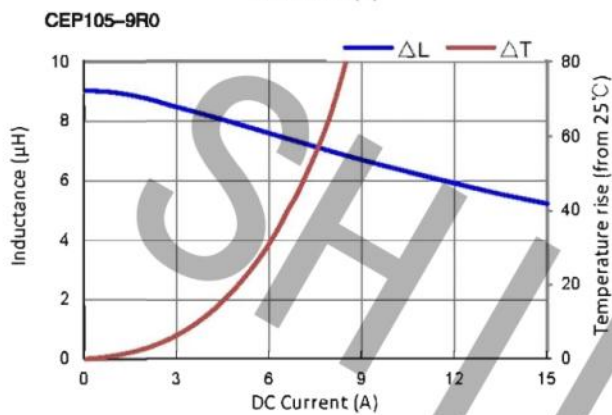
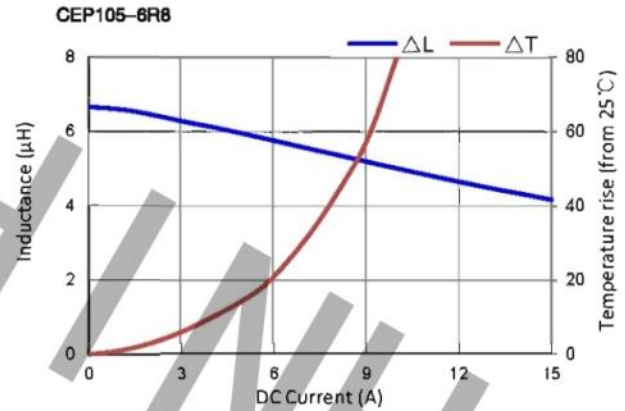
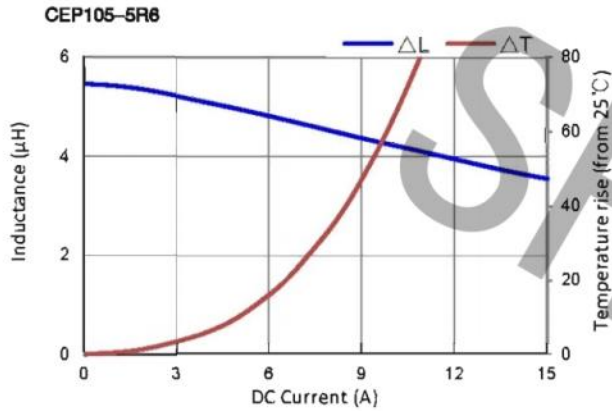
Dimensions(mm)

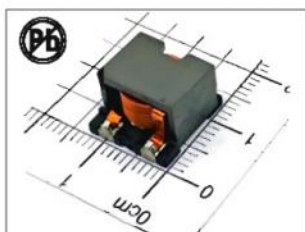


LAND PATTERNS

- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +105°C.
- All specifications subject to change without notice.

ELECTRICAL CHARACTERISTIC CURVE:





HIGH CURRENT POWER INDUCTORS

CEP 136 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

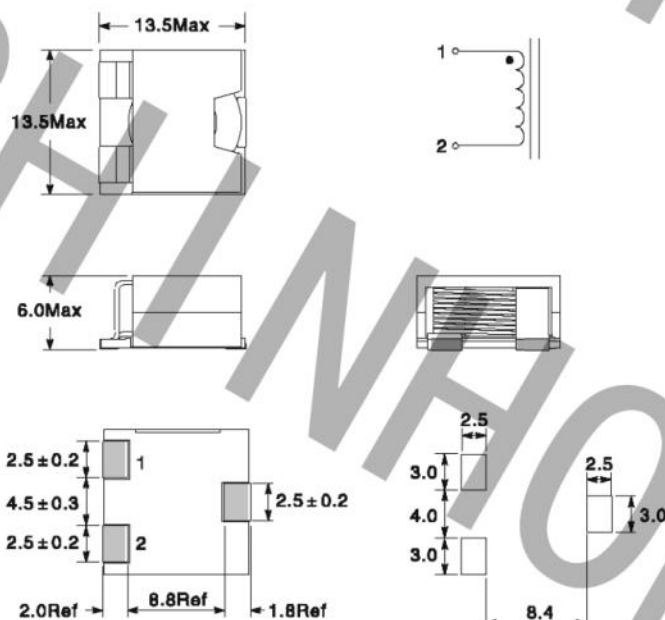
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @ 100KHz (μ H) $\pm$ 20%	DCR (m Ω) Max	DC saturation current			Temperature rise 40°C current (A) Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP136-1R0	1.0	2.6	32	33	33.5	13
CEP136-2R2	2.2	2.6	15	17	18	13
CEP136-2R7	2.7	2.6	12	13	14	13
CEP136-3R3	3.3	6.0	11.5	12.5	13.5	9.4
CEP136-4R7	4.7	6.0	9.5	11	12	9.4
CEP136-6R8	6.8	6.0	8.0	9	9.5	9.4
CEP136-8R2	8.2	10.8	7.5	8.5	9	7.6
CEP136-100	10	10.8	6.2	7	7.5	7.6

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

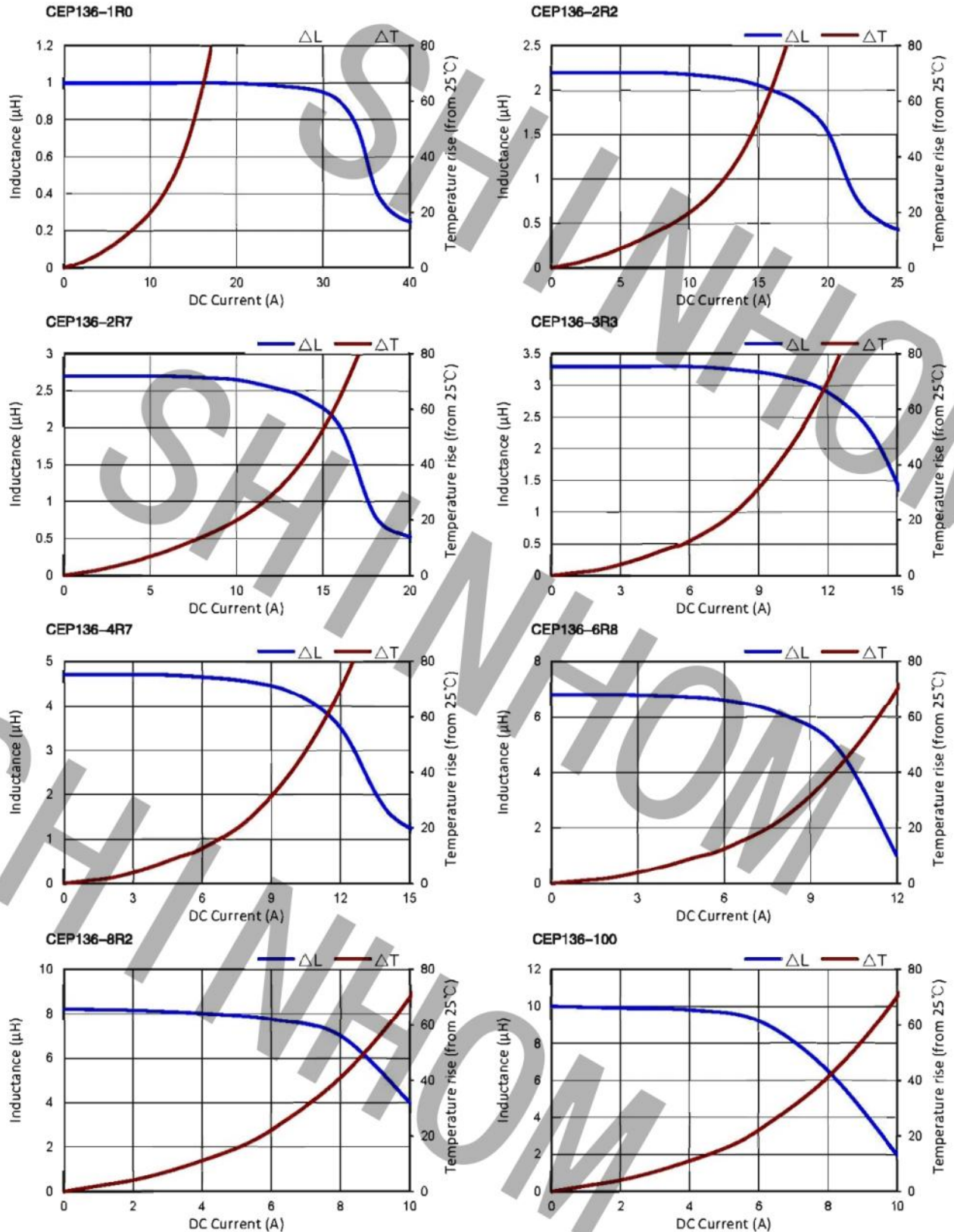
Dimensions(mm)

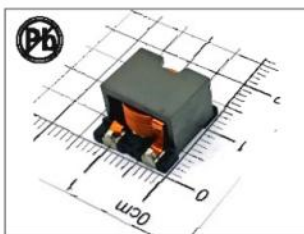


LAND PATTERNS

- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +105°C.
- All specifications subject to change without notice.

ELECTRICAL CHARACTERISTIC CURVE:





HIGH CURRENT POWER INDUCTORS

CEP 139 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

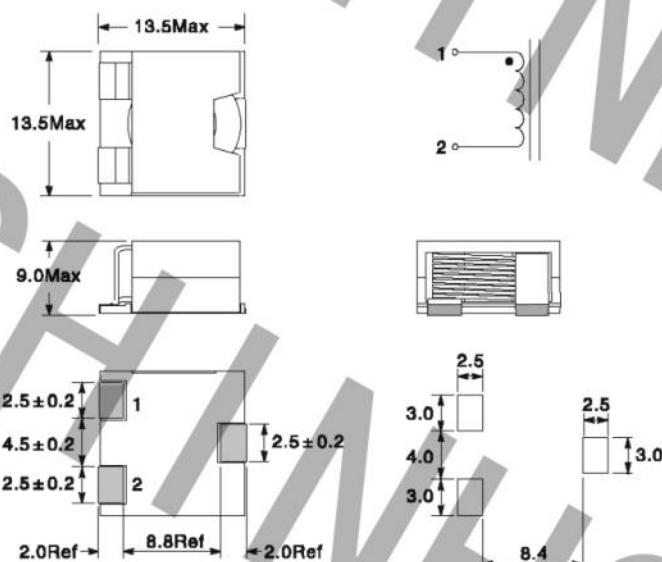
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

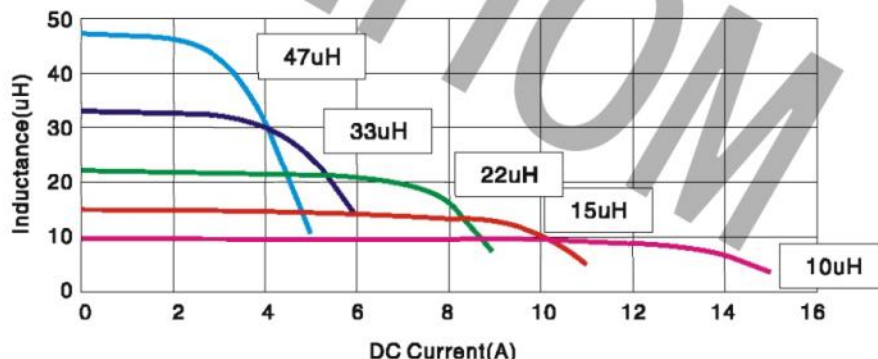
Part No.	Inductance @100KHz (uH) $\pm 20\%$	DCR (m Ω)	DC saturation current			Temperature rise 40°C current (A)Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP139-100	10	15	11.4	12.6	13.2	9.2
CEP139-150	15	15	7.2	8.1	8.7	9.2
CEP139-220	22	23	6.1	6.8	7.4	7.7
CEP139-330	33	23	3.8	4.4	4.8	7.7
CEP139-470	47	23	2.6	3.0	3.2	7.7

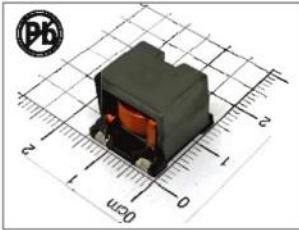
TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C – +105°C.
- All specifications subject to change without notice.





HIGH CURRENT POWER INDUCTORS

CEP 1412 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

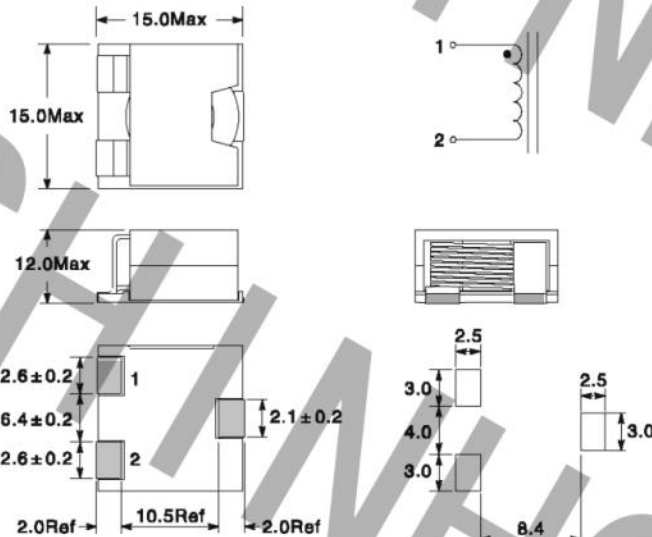
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

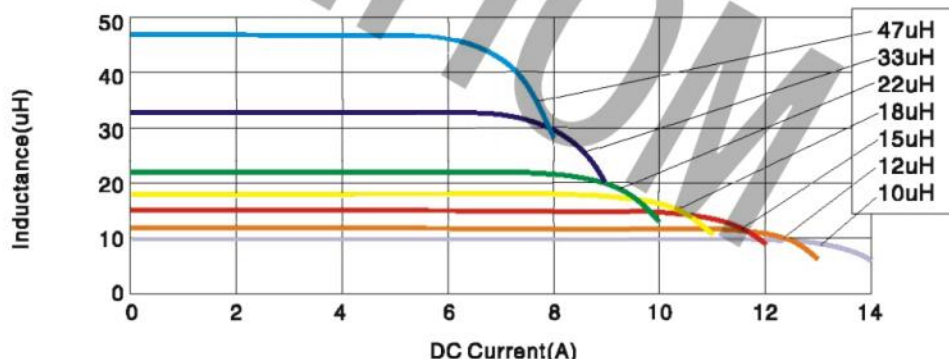
Part No.	Inductance @ 100KHz (uH) $\pm 20\%$	DCR (m Ω)	DC saturation current			Temperature rise 40°C current (A)Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP1412-100	10	7.98	11.9	13.1	13.5	10.1
CEP1412-120	12	9.42	10.7	11.8	12.5	9.7
CEP1412-150	15	10.8	9.8	10.9	11.6	9.1
CEP1412-180	18	12.6	9.1	10.0	10.5	8.4
CEP1412-220	22	15.2	7.9	8.8	9.4	7.8
CEP1412-330	33	17.9	7.0	7.9	8.6	7.1
CEP1412-470	47	17.9	6.0	6.9	7.4	6.5

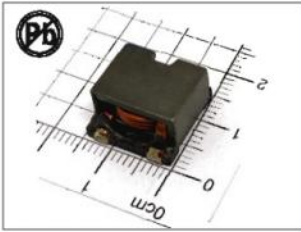
TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C ~ +105°C.
- All specifications subject to change without notice.





HIGH CURRENT POWER INDUCTORS

CEP 148 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

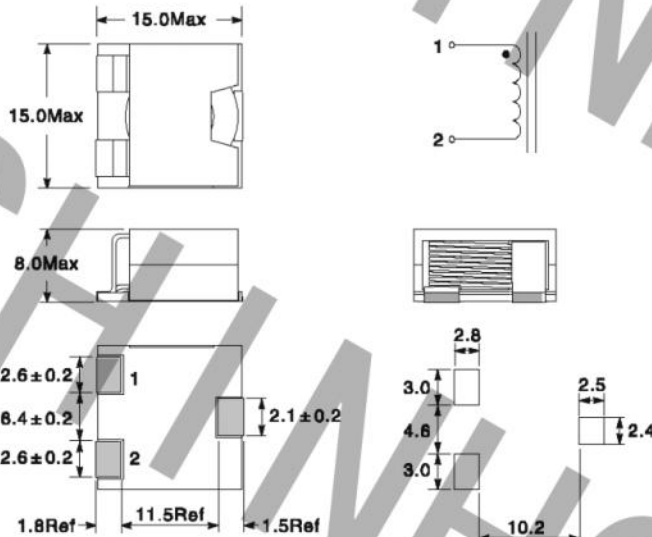
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

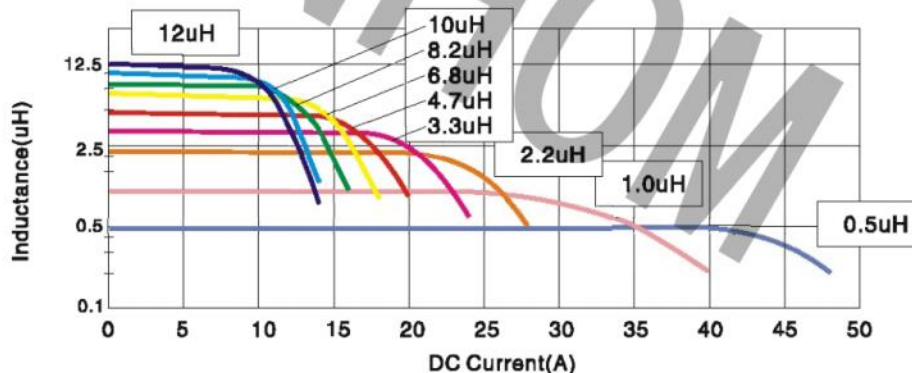
Part No.	Inductance @ 100KHz (uH) $\pm 20\%$	DCR (m Ω)	DC saturation current			Temperature rise 40°C current (A)Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
CEP148-0R5	0.5	1.2	39.0	42.0	43.0	23
CEP148-1R0	1.0	1.2	25.4	28.0	29.2	23
CEP148-2R2	2.2	2.0	19.0	21.0	21.8	20
CEP148-3R3	3.3	3.3	15.0	17.0	18.0	17.5
CEP148-4R7	4.7	5.0	12.0	14.0	15.0	16
CEP148-6R8	6.8	6.0	10.2	12.0	12.8	12.5
CEP148-8R2	8.2	7.8	9.0	10.0	10.7	11
CEP148-100	10.0	9.8	8.5	9.5	10.2	10
CEP148-120	12.0	13.0	7.5	8.5	9.2	8.5

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C ~ +105°C.
- All specifications subject to change without notice.





HIGH CURRENT POWER INDUCTORS

CEP 1812 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

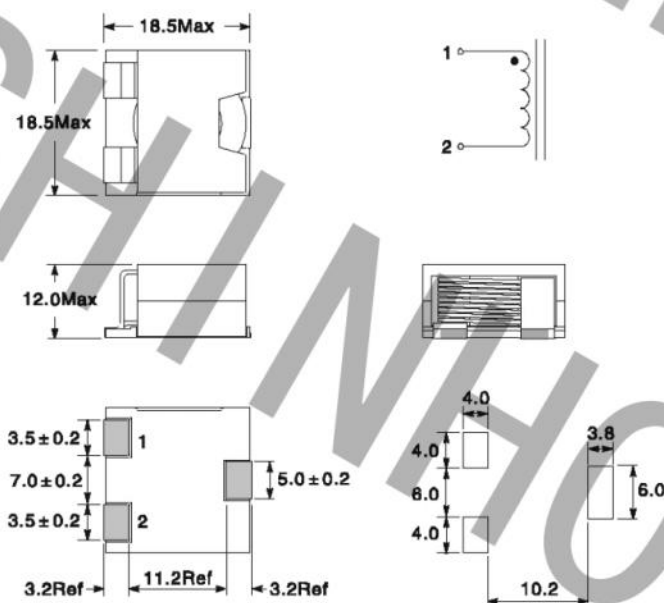
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @ 100KHz (uH) $\pm 20\%$	DCR (m Ω) Max	DC saturation current L0 Drop 25% Max	Temperature rise 40°C current (A) Max
CEP1812-5R6	5.6	2.00	12.0	22.5
CEP1812-8R2	8.2	2.42	10.8	19.5
CEP1812-120	12	3.29	9.0	18.0
CEP1812-150	15	4.33	8.0	16.5
CEP1812-220	22	5.60	6.8	16.0
CEP1812-270	27	7.92	6.7	12.5
CEP1812-330	33	8.94	5.5	12.0

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +105°C.
- All specifications subject to change without notice.

SMD HIGH CURRENT POWER INDUCTOR CEP2214 SERIES

FEATURES:

- Magnetic shielding structure, excellent resistance to electromagnetic interference
- Flat wire winding, low ESR, small parasitic capacitance
- Additional terminal design structure, soldering firmly
- Compact design saves Installation area
- Low power loss, suitable for applications of wide temperature and frequency range

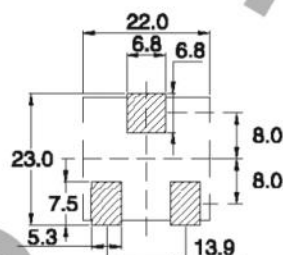
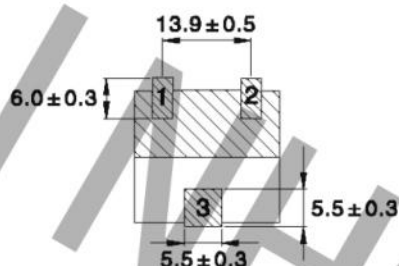
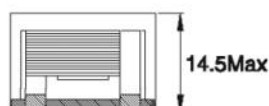
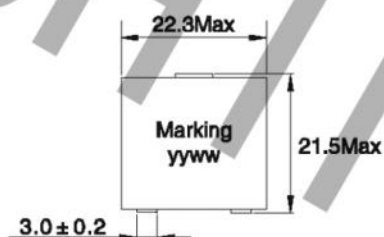


ELECTRICAL CHARACTERISTICS:@25°C

Part Number	Inductance (uH) ± 20%	DCR (mΩ) Max	Saturation current Isat(A)	Temperature rise current Irms(A)
CEP2214-3R3M	3.3	1.87	52	36.5
CEP2214-6R8M	6.8	1.87	27	36.5
CEP2214-120M	12.0	4.32	23.2	23.5
CEP2214-220M	22.0	4.32	12.5	23.5
CEP2214-330M	33.0	12.6	13.5	12.8
CEP2214-470M	47.0	12.6	10	12.8

PHYSICAL CHARACTERISTICS:

WINDING:



GENERAL SPECIFICATIONS:

- All data is tested based on 25 °C ambient temperature
- Inductance measure condition at 100kHz, 1.0V.
- Saturation current: the actual value of DC current when the inductance decrease 20% of its initial value
- Temperature rise current: the actual value of DC current when the temperature rise is Δ T40 °C (Ta=25 °C)
- Special remind:Circuit design, component placement, PCB size and thickness, cooling system and etc. all will affect the product temperature. Please verify the product temperature in the final application
- Operating temperature : -40 °C to +125 °C (Including coil's temperature rise)

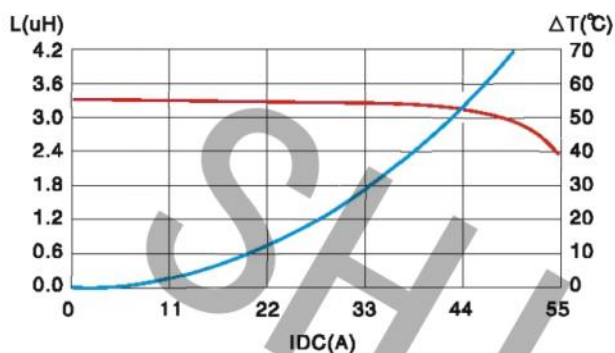
Note:All specifications subject to change without notice.

SMD HIGH CURRENT POWER INDUCTOR CEP2214 SERIES

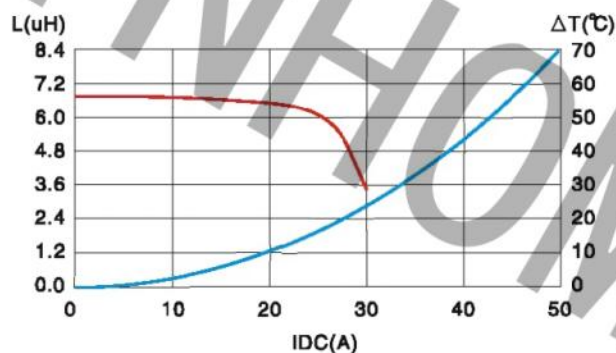


SATURATION CURRENT VS TEMPERATURE RISE CURRENT CURVE

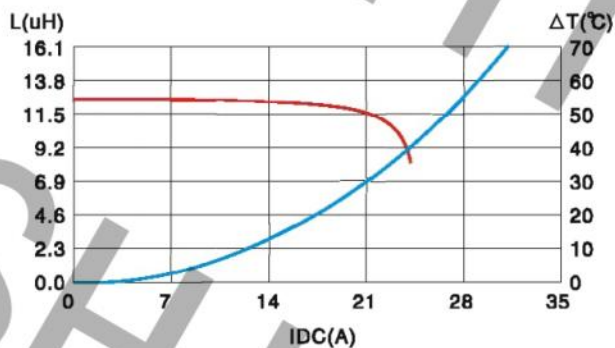
CEP2214-3R3M



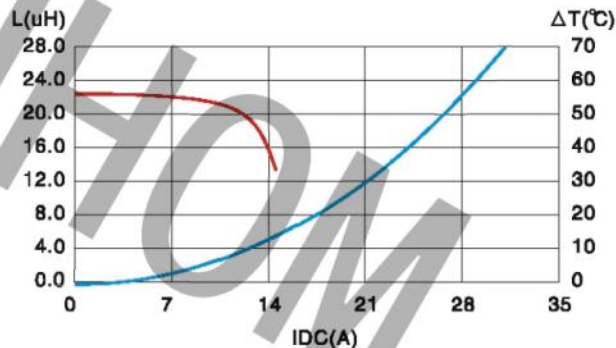
CEP2214-6R8M



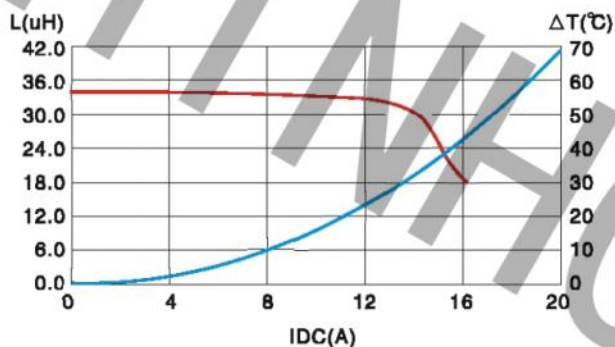
CEP2214-120M



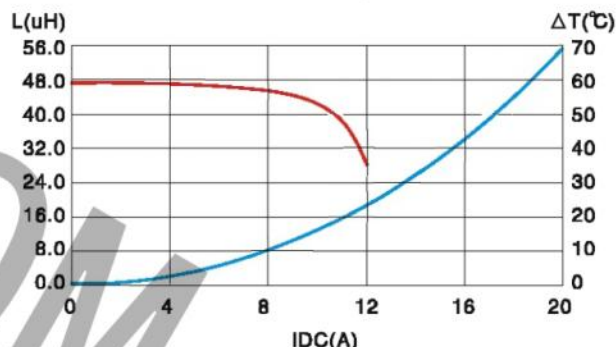
CEP2214-220M



CEP2214-330M



CEP2214-470M

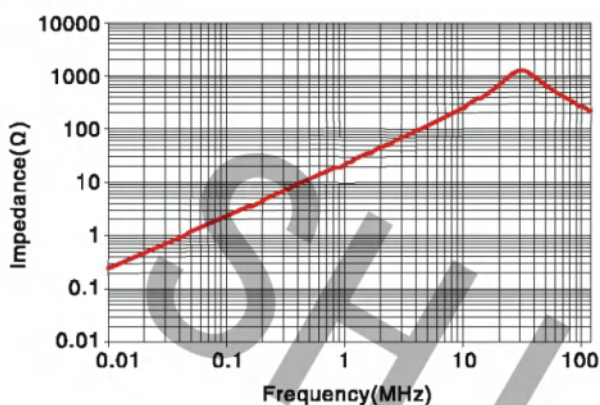


SMD HIGH CURRENT POWER INDUCTOR CEP2214 SERIES

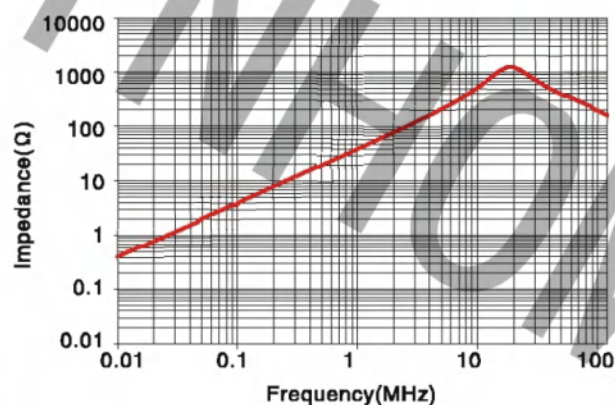


IMPEDANCE VS FREQUENCY

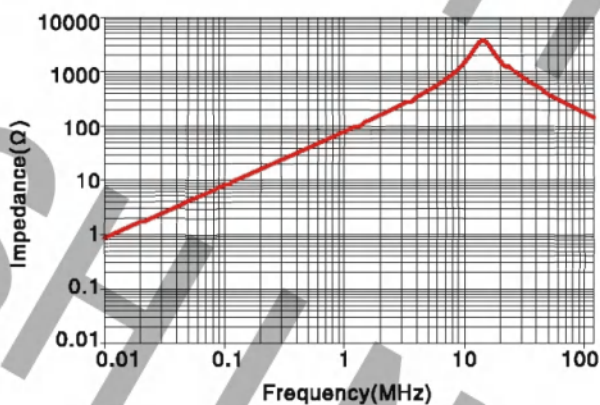
CEP2214-3R3M



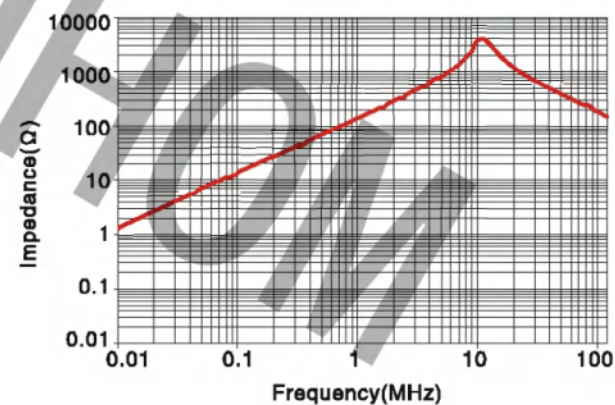
CEP2214-6R8M



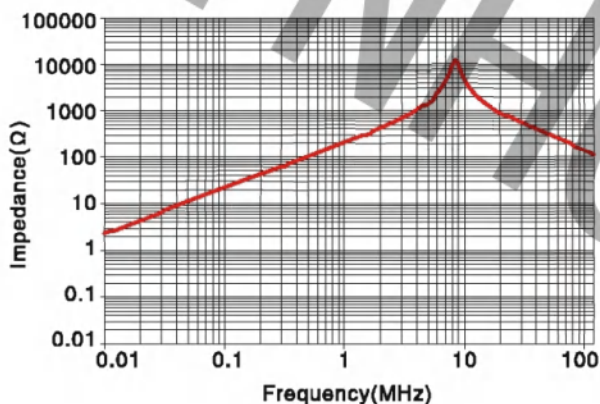
CEP2214-120M



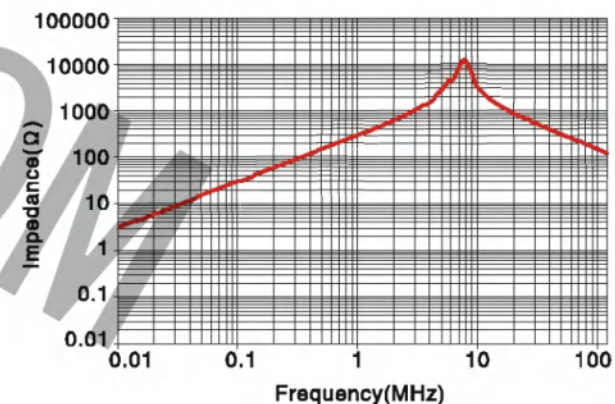
CEP2214-220M



CEP2214-330M



CEP2214-470M



HIGH CURRENT THROUGH-HOLE INDUCTOR

DEP2520 SERIES

APPLICATIONS:

- High current and high temperature applications
- DC/DC converters
- High current motor and switching noise suppression
- Inverters

FEATURES:

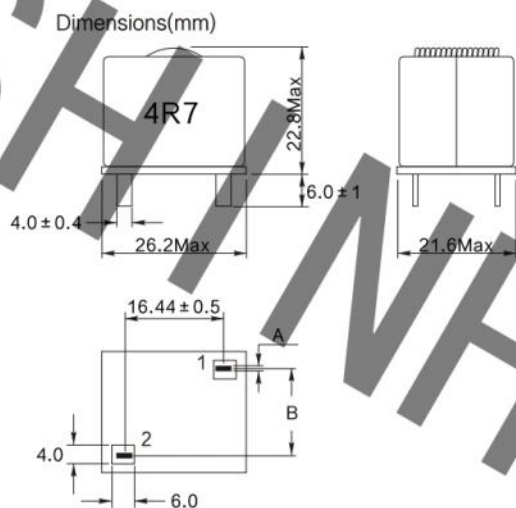
- High temperature operation, up to 180°C continuous with no aging
- Low DCR to minimize losses and reduce temperature rise
- Powdered iron alloy core technology provides stable inductance and saturation over operating temperature with satisfactory core losses
- Soft saturation gives predictable inductance decrease with increasing DC current independent of temperature
- Standard terminal is stripped and tinned for through hole mounting but other terminal configurations such as bare copper, SMD, and press fit pin are available upon request
- Custom options are available



ELECTRICAL CHARACTERISTICS@25°C

Part Number	Inductance (uH) $\pm 20\%$ 100KHz, 0.25V	DCR (mΩ) Max	SRF (MHz) Typ	Heat rating current Irms (A)	Saturation current Isat 1 (A)	Saturation current Isat 2 (A)
DEP2520-1R2M	1.2	0.30	90	80	110	150
DEP2520-2R2M	2.2	0.40	45	70	75	110
DEP2520-3R3M	3.3	0.70	25	50	60	90
DEP2520-4R7M	4.7	0.95	15	45	50	70
DEP2520-6R8M	6.8	1.15	10	40	45	60
DEP2520-8R2M	8.2	1.50	9	35	35	50
DEP2520-100M	10	2.00	8	30	30	45

TECHNICAL INFORMATION & WINDING



Part Number	A	B
DEP2520-1R2M	3.2	10.14
DEP2520-2R2M	2.5	10.84
DEP2520-3R3M	2.0	11.34
DEP2520-4R7M	1.8	11.54
DEP2520-6R8M	1.6	11.74
DEP2520-8R2M	1.4	11.94
DEP2520-100M	1.1	12.24

Note:

- All test data is referenced to 25°C ambient
- Operating temperature range -40°C to +180°C
- The part temperature (ambient + temp. rise) should not exceed 180°C under worst case operating conditions. Circuit design, component placement, PWB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application
- Isolation voltage, coil to core: 350 VDC, 60s, 5 mA max.
- Heat Rated Current (Irms) will cause the coil temperature rise approximately, $\Delta T = 40^\circ\text{C}$ without core loss.
- Saturation Current (Isat 1) will cause L0 to drop approximately 20%
- Saturation Current (Isat 2) will cause L0 to drop approximately 30%

Note: All specifications subject to change without notice.

HIGH CURRENT POWER INDUCTOR

DEP3231 SERIES



APPLICATIONS:

- PV inverter/Industrial control/New energy
- DC /DC converters/Motherboards/Filter
- High current switching regulators

FEATURES:

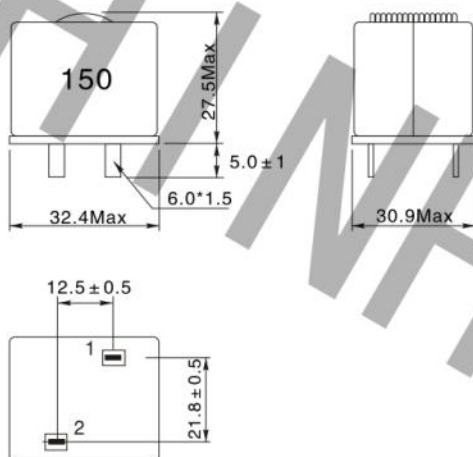
- Excellent DC bias capability to handle instantaneous peak current.
- Flat wire winding, achieving very low DC resistance.
- The inductance value and DC bias characteristic are little affected by temperature.
- Magnetically shielded structure, excellent resistance to electromagnetic interference.
- Compact design saves PCB mounting area.
- Operating temperature: $-55^{\circ}\text{C} \sim +155^{\circ}\text{C}$ (Including coil's temperature rise)

ELECTRICAL CHARACTERISTICS@25°C

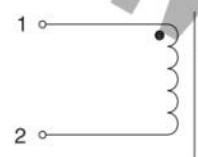
Part Number	Inductance (uH) $\pm 20\%$ 100KHz,0.1V	DCR (m Ω) Typ	DCR (m Ω) Max	Heat rating current I _{rms} (A)	Saturation current I _{sat} (A)
DEP3231-6R2M	6.2	0.55	0.66	68.0	100
DEP3231-8R2M	8.2	0.70	0.85	60.0	88.0
DEP3231-100M	10	0.88	1.05	50.0	78.0
DEP3231-120M	12	1.10	1.30	45.0	70.0
DEP3231-150M	15	1.35	1.60	42.0	64.0
DEP3231-180M	18	1.55	1.85	38.0	58.0
DEP3231-220M	22	1.8	2.15	35.0	54.0
DEP3231-250M	25	2.10	2.50	32.0	50.0
DEP3231-300M	30	2.45	2.95	30.0	47.0

TECHNICAL INFORMATION & WINDING

Dimensions(mm)



Winding

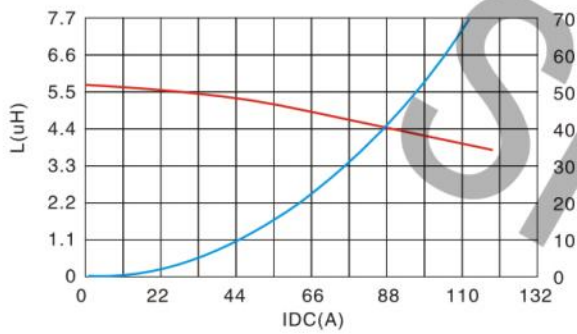


Note:

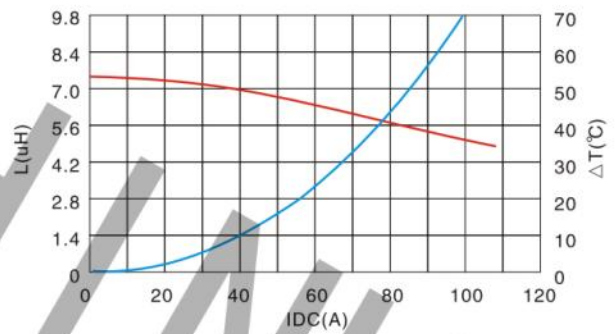
- All test data is referenced to 25°C ambient
- Operating temperature range -55°C to $+155^{\circ}\text{C}$
- Heat Rated Current (I_{rms}) will cause the coil temperature rise approximately, $\Delta T=50^{\circ}\text{C}$ without core loss.
- Saturation Current (I_{sat}) will cause L0 to drop approximately 30%

SATURATION CURRENT VS TEMPERATURE RISE CURRENT CURVE

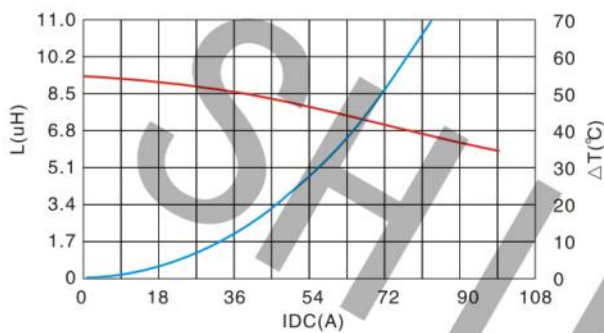
DEP3231-6R2M



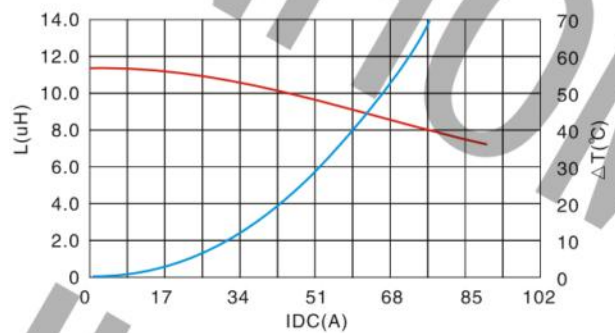
DEP3231-8R2M



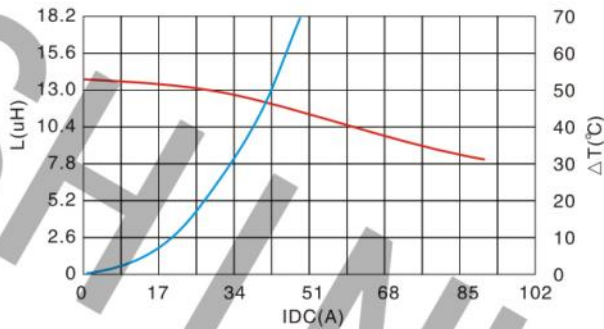
DEP3231-100M



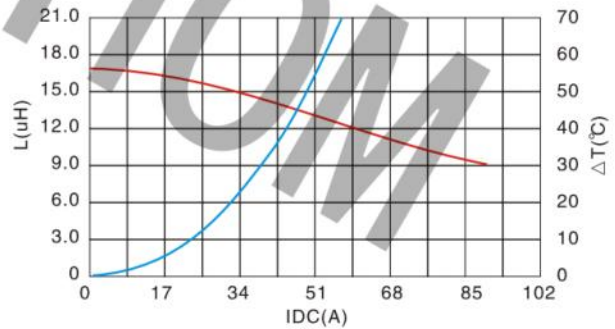
DEP3231-120M



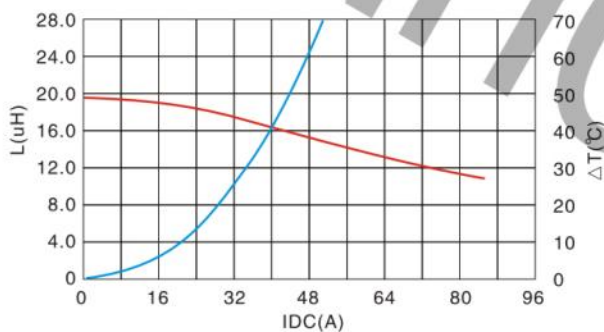
DEP3231-150M



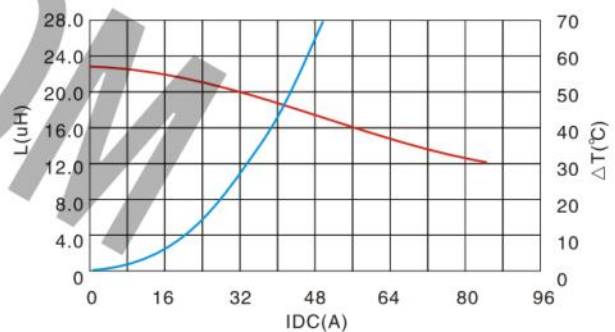
DEP3231-180M



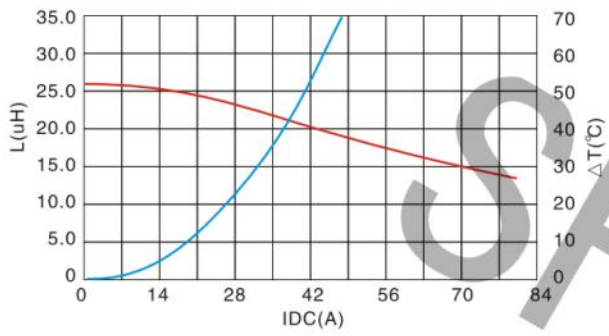
DEP3231-220M



DEP3231-250M

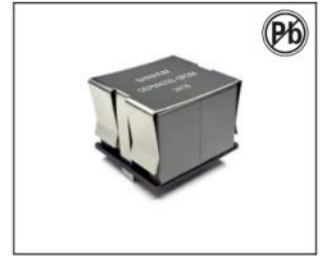


DEP3231-300M



HIGH CURRENT POWER INDUCTOR

DEPM4233 SERIES



FEATURES:

- Core material Ferrite
- AEC-Q200 Grade 1 (40°C to +125°C)
- Flat wire windings provide extremely low DC and AC resistance.
- Through-hole mounting for excellent board adhesion
- Cover has solderable tabs for additional mounting stability.
- High current, high inductance power inductors designed for high current power supply applications
- RoHS compliant

ELECTRICAL CHARACTERISTICS@25°C

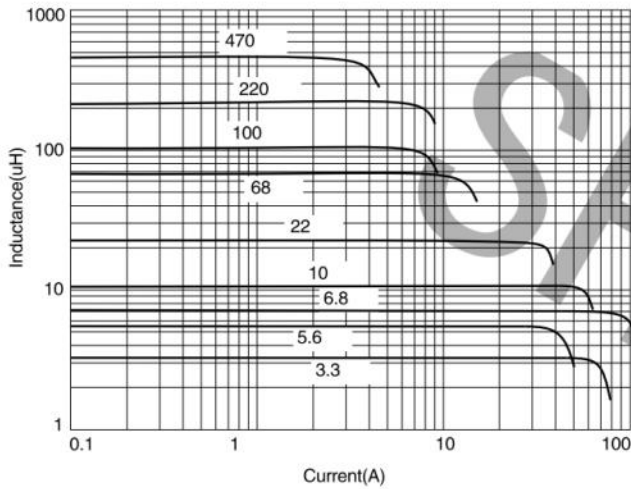
Part Number	Inductance (uH) $\pm 20\%$ 100KHz, 0.1V	DCR (m Ω)Max	SRF (MHz)Typ	Heat rating current I _{rms} (A)	Saturation current I _{sat} (A)		
					10% drop	20% drop	30% drop
DEPM4233-3R3M	3.3	0.75	27.7	44	92.0	95.0	98.0
DEPM4233-5R6M	5.6	0.75	22.8	44	63.0	65.0	67.0
DEPM4233-6R8M	6.8	2.95	21.7	34	92.0	97.8	101.8
DEPM4233-100M	10	2.95	18.8	34	56.0	60.0	63.0
DEPM4233-150M	15	2.95	15.2	34	45.0	47.0	49.0
DEPM4233-220M	22	2.95	12.0	34	32.8	35.4	36.6
DEPM4233-330M	33	2.95	10.0	34	22.5	24.7	25.8
DEPM4233-470M	47	2.95	8.5	34	16.0	17.6	18.6
DEPM4233-680M	68	2.95	6.4	34	10.6	12.2	13.0
DEPM4233-101M	100	2.95	5.2	34	6.88	7.8	8.36
DEPM4233-151M	150	2.95	4.2	34	4.18	4.96	5.4
DEPM4233-221M	220	11.55	5.0	17.5	6.4	7.2	7.6
DEPM4233-331M	330	11.55	4.1	17.5	4.6	5.2	5.6
DEPM4233-471M	470	11.55	3.6	17.5	3.0	3.6	3.8

Note:

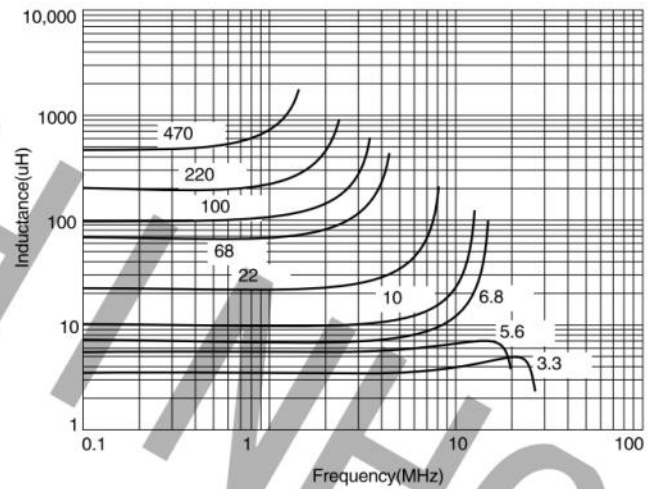
- All test data is referenced to 25°C ambient
- Ambient temperature 40°C to +125°C with I_{rms} current, +125°C to +165°C with derated current
- Storage temperature Component: 40°C to +165°C. Tray packaging: 40°C to +80°C
- Inductance tested at 100kHz, 0.1Vrms on Agilent/HP4192A.
- DCR measured on a Keithley 580 micro-ohmmeter or equivalent.
- Moisture Sensitivity Level (MSL) 1 (unlimited floor life at <30°C / 85% relative humidity)
- Packaging 9 parts per tray
- PCB washing Tested to MIL-STD-202 Method 215 plus an additional aqueous wash.

Note: All specifications subject to change without notice.

TYPICAL L VS CURRENT



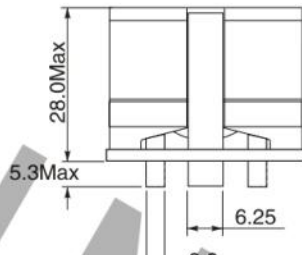
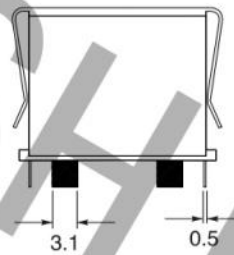
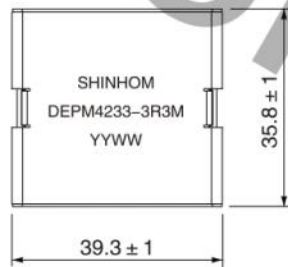
TYPICAL L VS FREQUENCY



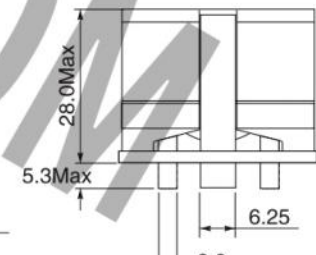
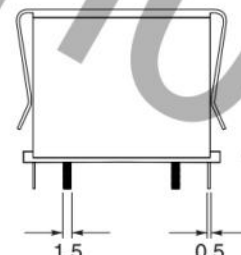
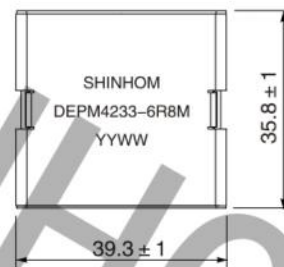
TECHNICAL INFORMATION & WINDING

Dimensions(mm)

3.3~5.6uH



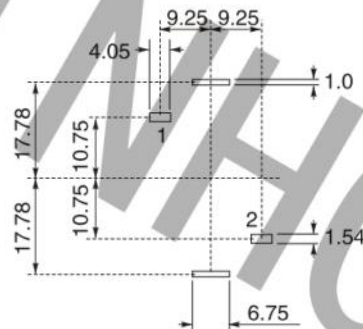
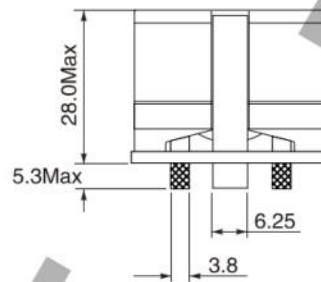
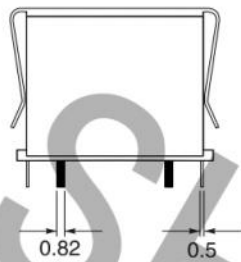
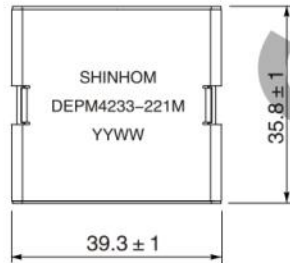
6.8~150uH



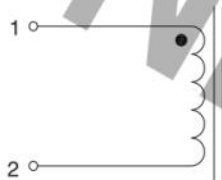
TECHNICAL INFORMATION & WINDING

Dimensions(mm)

220~470uH



Winding





HIGH CURRENT POWER INDUCTORS

LPA2110 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

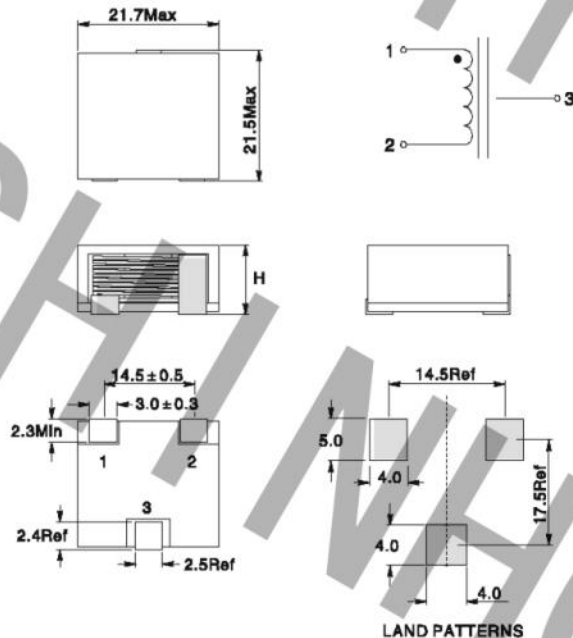
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @100KHz (μ H) $\pm 20\%$	DCR (m Ω)Max	Temperature rise current Irms(A)Max	Saturation current @25 $^{\circ}$ C Isat(A)Max	Height (mm)
LPA2110-1R0M	1	1.4	40	70	10.6
LPA2110-1R5M	1.5	1.4	40	52	10.6
LPA2110-2R2M	2.2	1.8	34	46	10.6
LPA2110-3R3M	3.3	2.2	28	37	10.6
LPA2110-4R7M	4.7	2.8	26	30	11.5

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- Irms: DC current (A) that will cause an approximate ΔT of 40 $^{\circ}$ C
- Isat: DC current (A) that will cause L_0 to drop approximately 30%
- The part temperature (ambient + temp rise) should not exceed 125 $^{\circ}$ C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40 $^{\circ}$ C - +125 $^{\circ}$ C.
- All specifications subject to change without notice.



HIGH CURRENT POWER INDUCTORS

LPA2112 SERIES

FEATURES:

- Compact size using flat wire, and SMD type
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

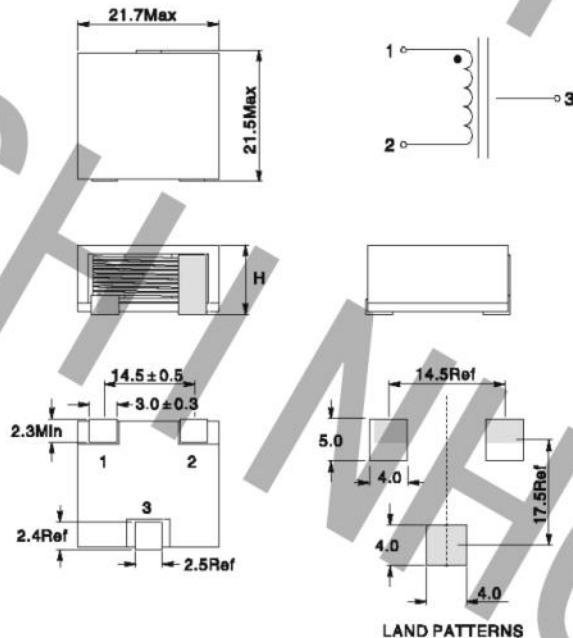
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

Part No.	Inductance @ 100KHz (μ H) $\pm 20\%$	DCR (m Ω)Max	Temperature rise current Irms(A)Max	Saturation current @ 25 $^{\circ}$ C Isat(A)Max	Height (mm)
LPA2112-6R8M	6.8	3.8	22	26	12.5
LPA2112-100M	10.5	6	17.5	22.5	12.5
LPA2112-150M	15.2	9.2	14	18.5	12.5
LPA2112-240M	24.5	15	11	14.5	12.5
LPA2112-320M	32.0	21.5	9	12.5	12.5
LPA2112-500M	50.0	32.6	7.4	10	12.5

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- Irms: DC current (A) that will cause an approximate ΔT of 40 $^{\circ}$ C
- Isat: DC current (A) that will cause L_0 to drop approximately 30%
- The part temperature (ambient + temp rise) should not exceed 125 $^{\circ}$ C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40 $^{\circ}$ C - +125 $^{\circ}$ C.
- All specifications subject to change without notice.



HIGH CURRENT POWER INDUCTORS

LPQ2716 SERIES

FEATURES:

- Using flat wire
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

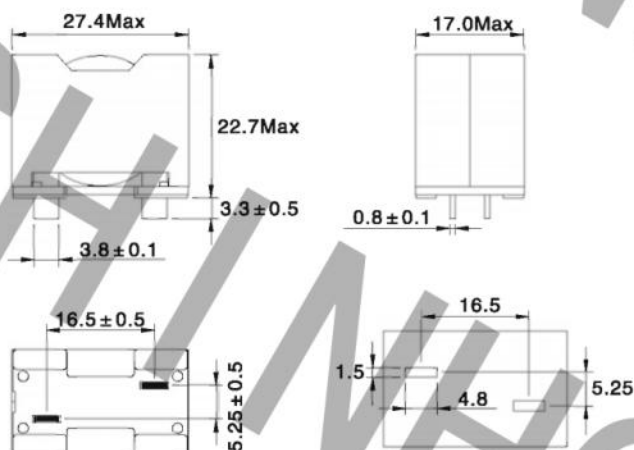
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

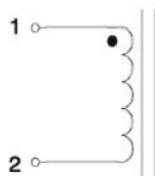
Part No.	Inductance @ 100KHz (uH) $\pm 20\%$	DCR (m Ω)Max	DC saturation current			Temperature rise 40°C current (A)Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
LPQ2716-3R3M	3.3	2.86	91	92.5	93.6	28
LPQ2716-4R7M	4.7	2.86	59	61.2	62.4	28
LPQ2716-6R8M	6.8	2.86	42	45	45.9	28
LPQ2716-100M	10	2.86	28	31.2	32.1	28
LPQ2716-150M	15	2.86	18	21.2	21.9	28
LPQ2716-220M	22	2.86	12	14.0	15.0	28
LPQ2716-330M	33	2.86	7	8.7	9.6	28

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)

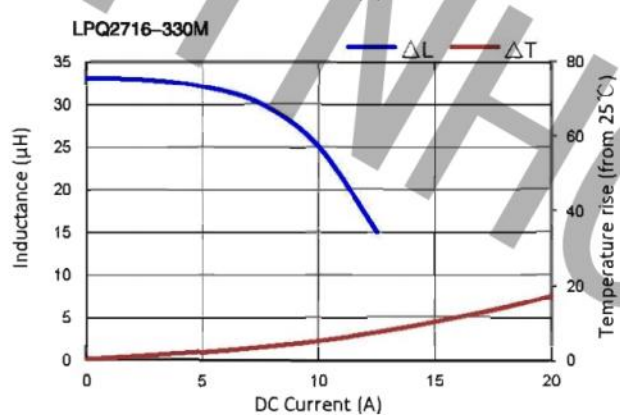
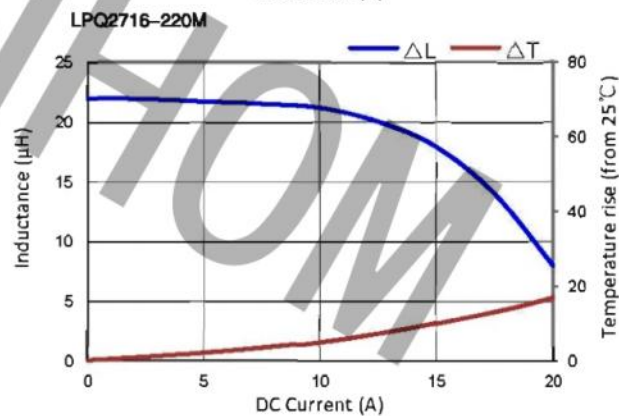
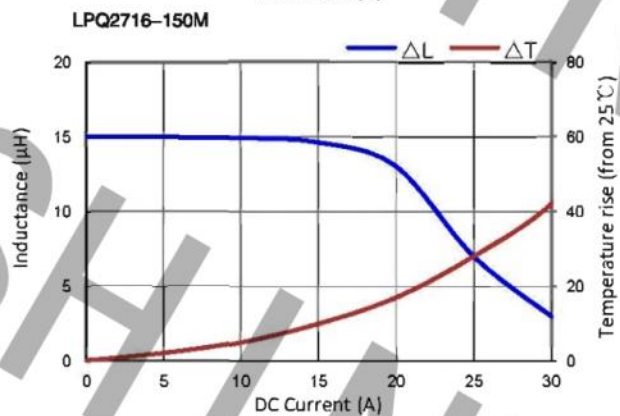
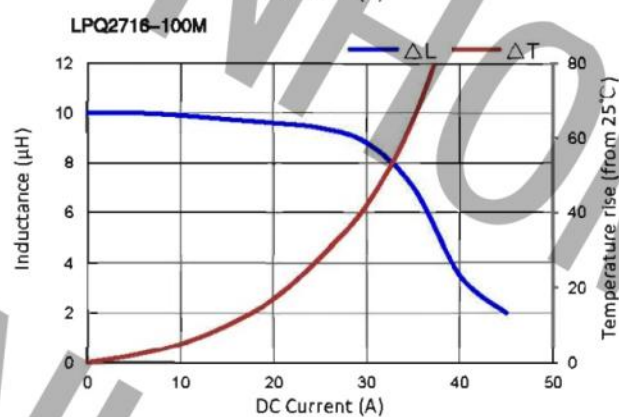
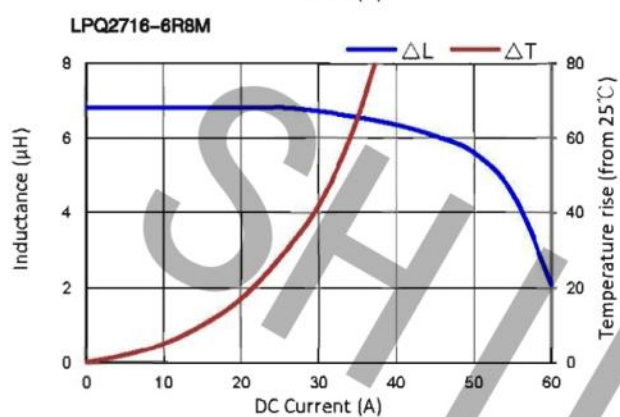
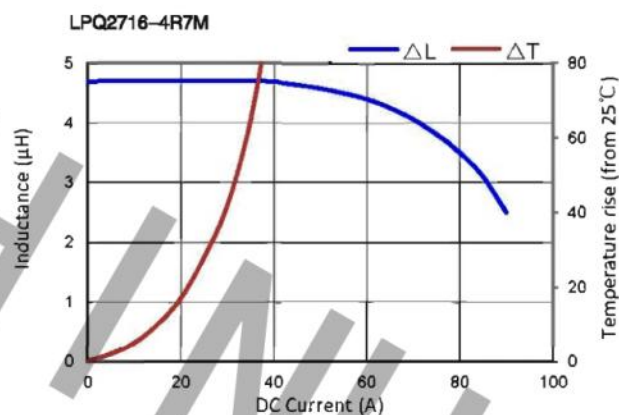
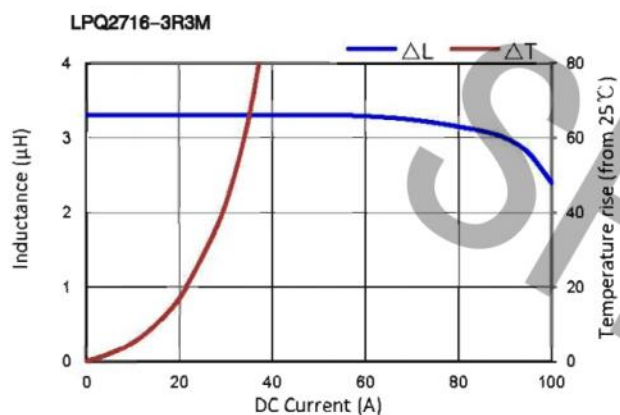


Winding



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +125°C.
- All specifications subject to change without notice.

ELECTRICAL CHARACTERISTIC CURVE:





HIGH CURRENT POWER INDUCTORS

LPQ2716B SERIES

FEATURES:

- Using flat wire
- Low radiation noise by magnetically shielded construction
- High current
- Low resistance

COMMON APPLICATIONS:

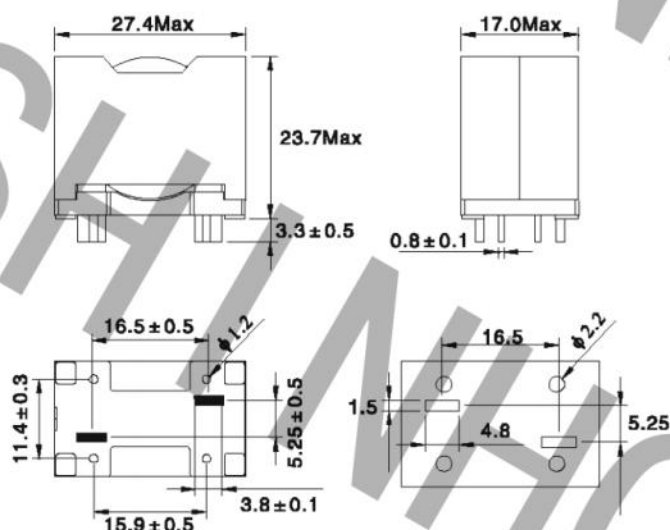
- High efficiency DC/DC converters
- Single and polyphase buck converters
- Filter for audio applications
- Optimized for high current boost applications

ELECTRICAL CHARACTERISTICS:

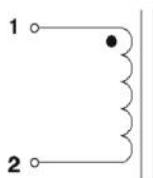
Part No.	Inductance @ 100KHz (μ H) $\pm$ 20%	DCR (m Ω)Max	DC saturation current			Temperature rise 40°C current (A)Max
			L0 Drop 10% Max	L0 Drop 20% Max	L0 Drop 30% Max	
LPQ2716B-3R3M	3.3	2.86	91	92.5	93.6	28
LPQ2716B-4R7M	4.7	2.86	59	61.2	62.4	28
LPQ2716B-6R8M	6.8	2.86	42	45	45.9	28
LPQ2716B-100M	10	2.86	28	31.2	32.1	28
LPQ2716B-150M	15	2.86	18	21.2	21.9	28
LPQ2716B-220M	22	2.86	12	14.0	15.0	28
LPQ2716B-330M	33	2.86	7	8.7	9.6	28

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)

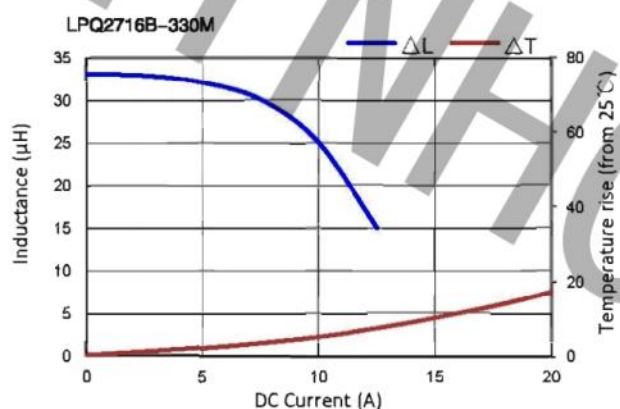
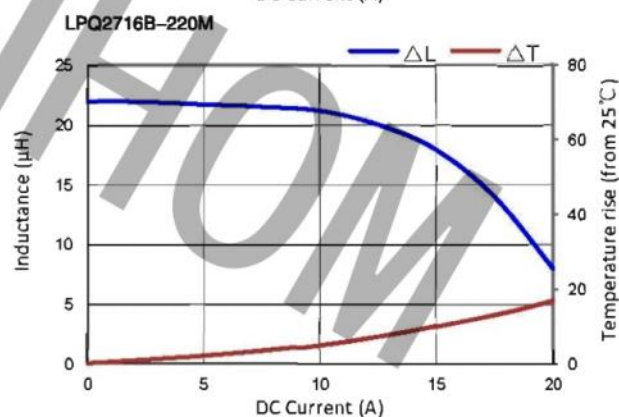
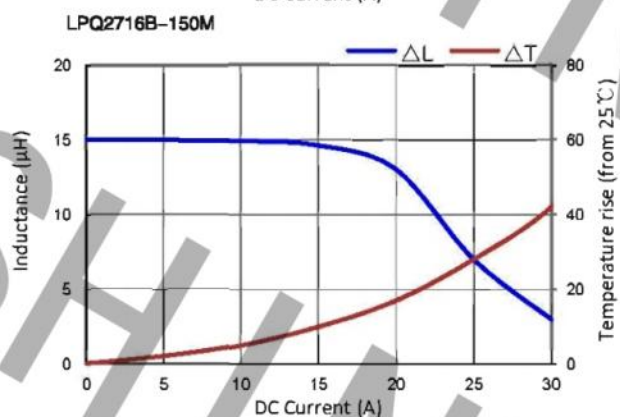
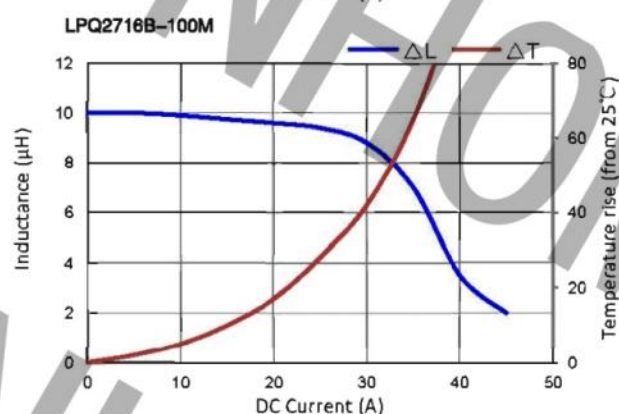
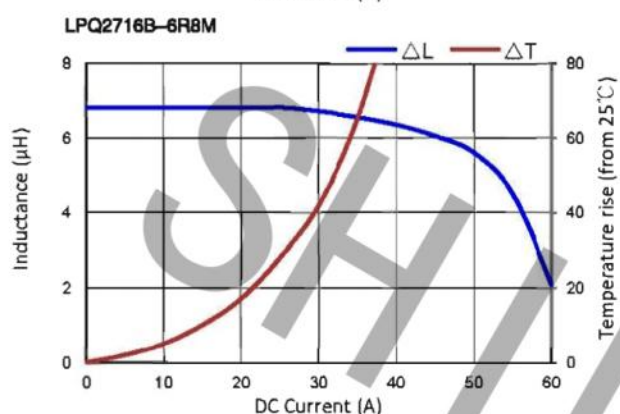
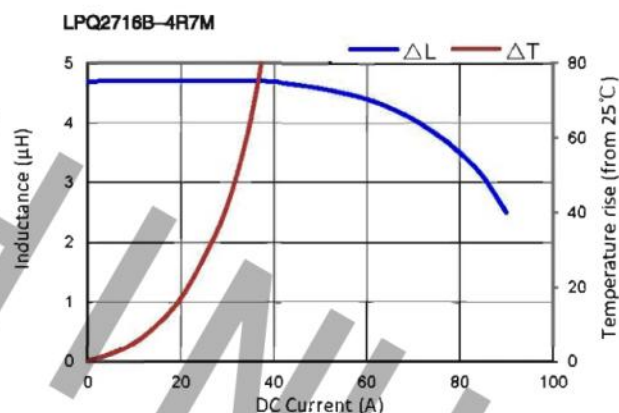
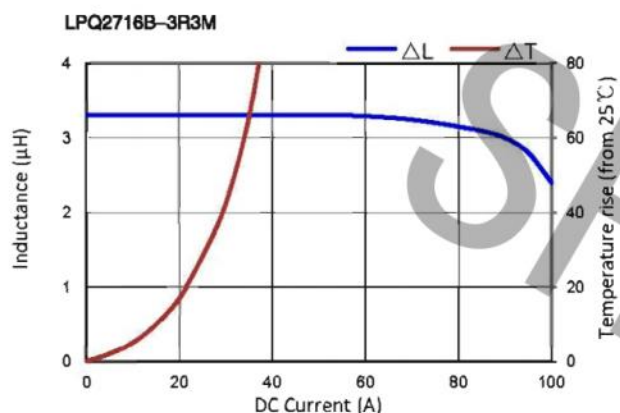


Winding



- Test Frequency : 100KHz / 0.25V
- Testing Instrument : L:HP4284A, CH11025, CH3302, CH1320, CH1320S LCR METER/Rdc:CH16502, Agilent33420A MICRO OHMMETER.
- The part temperature (ambient + temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- Operating Temperature & Storage Temperature: -40°C - +125°C.
- All specifications subject to change without notice.

ELECTRICAL CHARACTERISTIC CURVE:



HIGH CURRENT POWER INDUCTORS LPQ3218 SERIES



FEATURES:

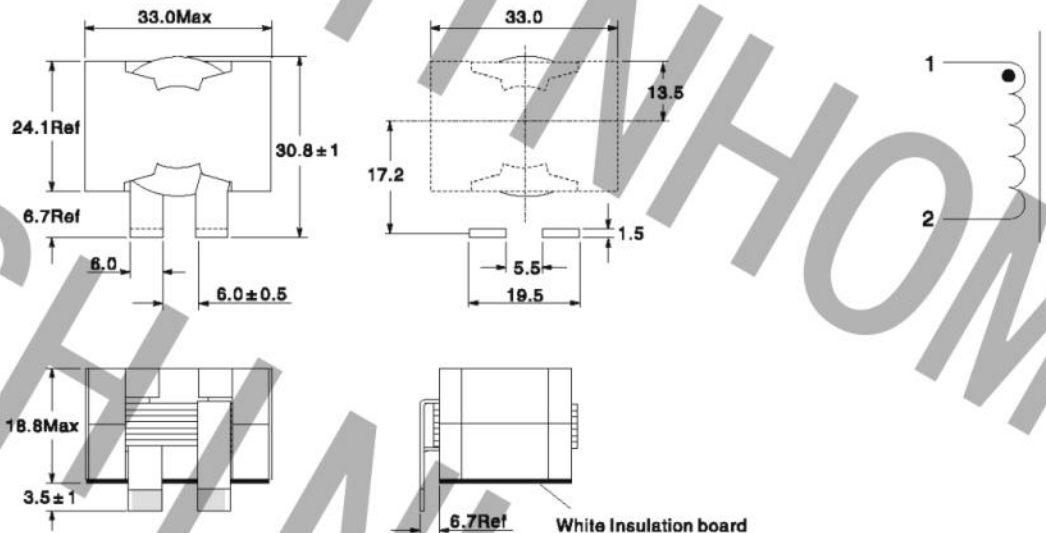
- Assemblage design, sturdy structure
- High inductance, high current, low magnetic loss, low ERS, small parasitic capacitance
- Flat wire winding, achieve a low DCR
- Temperature rise current and saturation current is less influenced by environment

ELECTRICAL CHARACTERISTICS@25°C

Part Number	Inductance 100KHz, 0.1V (μ H) $\pm$ 10%	DCR (m Ω) Max	Isat (A) typ.	Irms (A) typ.
LPQ3218-3R3M	3.3	1.45	80	45
LPQ3218-4R7M	4.7	1.45	75	45
LPQ3218-5R0M	5.0	1.45	70	45
LPQ3218-6R0M	6.0	1.45	55	45
LPQ3218-6R8M	6.8	1.45	50	45

Note: 1. K= $\pm$ 10%, M= $\pm$ 20%, N= $\pm$ 30%

PHYSICAL CHARACTERISTICS & WINDING



- All test data is referenced to 25°C ambient.
- Test condition: 100KHz, 0.1V
- I_{rms}: DC current(A) that will cause an approximate Δ T of 40°C.
- I_{sat}: DC current(A) that will cause L_o to drop approximate 30%.
- Operating temperature range is -25°C to 125°C.
- The part temperature(ambient and temp rise) should not exceed 125°C under worst case operating conditions. Circuit design, component placement, PWB trace size and thickness, airflow and other cooling provision all affect the part temperature. Part temperature should be verified in the end application.

HIGH CURRENT POWER INDUCTORS

SPQ2615A SERIES

FEATURES:

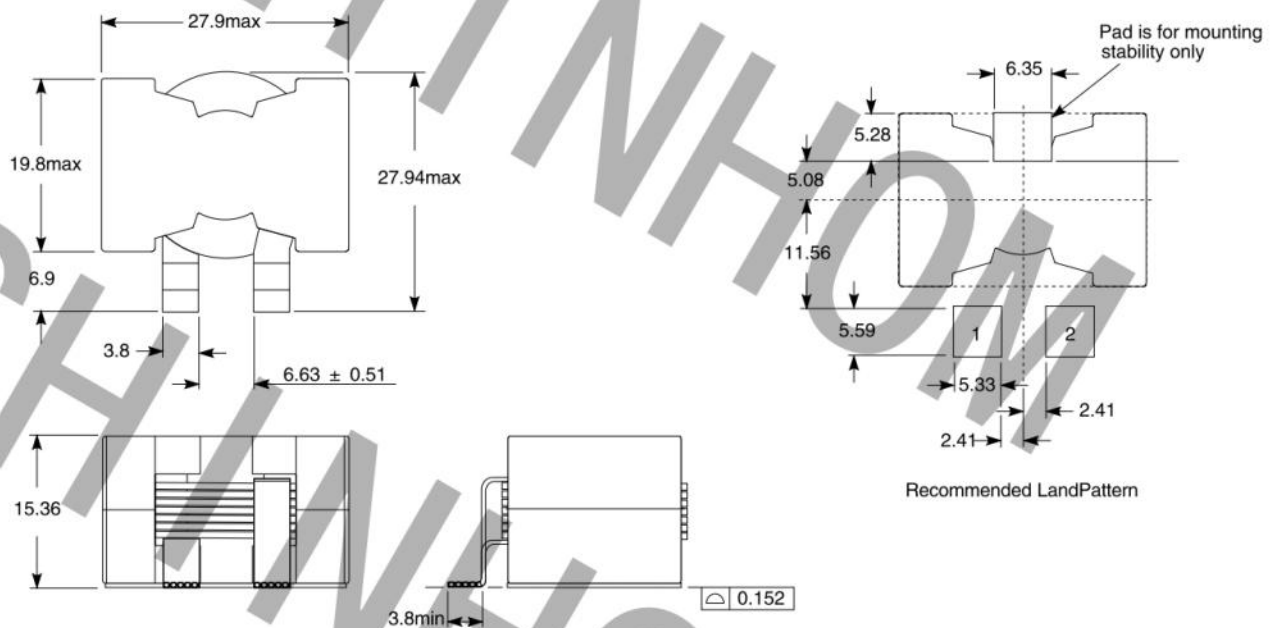
- High inductance, low magnetic loss, small parasitic capacitance
- Extremely low DCR; Current handling to >100 Amps
- Temperature rise current and saturation current is less influenced by environment
- Third mounting pad for greater stability and board adhesion



ELECTRICAL CHARACTERISTICS@25°C

Part Number	Inductance 500KHz, 0.1V (uH) $\pm 10\%$	DCR (m Ω) Max	SRF (MHz) typ	I _{rms} (A) typ.		I _{sat} (A) typ.		
				20°C rise	40°C rise	10% drop	20% drop	30% drop
SPQ2615A-2R2K	2.2	2.05	40	20	30	100	>100	>100
SPQ2615A-3R3K	3.3	2.05	30	20	30	62.0	66.9	68.4
SPQ2615A-4R7K	4.7	2.05	25	20	30	42.0	48.0	50.1
SPQ2615A-6R8K	6.8	2.05	20	20	30	30.0	34.5	36.2
SPQ2615A-100K	10	2.05	15	20	30	18.0	21.5	23.4
SPQ2615A-150K	15	2.05	12	20	30	11.5	14.0	15.2
SPQ2615A-220K	22	2.05	10	20	30	7.0	8.6	9.6
SPQ2615A-330K	33	2.05	8	20	30	4.0	5.1	5.9

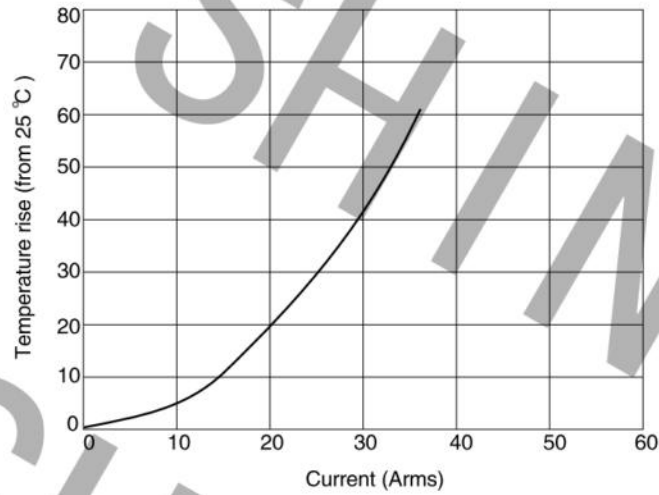
PHYSICAL CHARACTERISTICS & WINDING



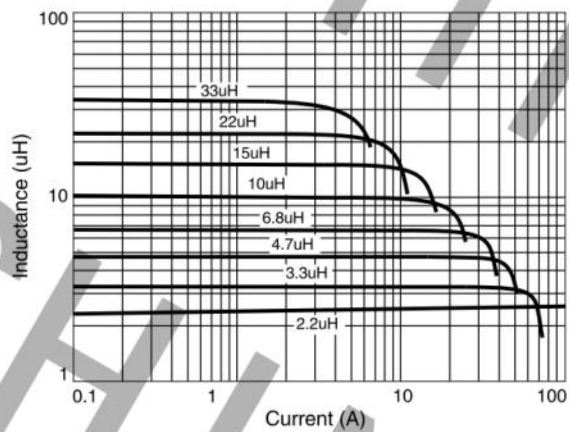
- All test data is referenced to 25°C ambient.
- Test condition: 500KHz, 0.1V, 0 A_{dc} on an Agilent/HP 4284A LCR meter or equivalent.
- I_{rms}: Current that causes the specified temperature rise from 25°C ambient. This information is for reference only and does not represent absolute maximum ratings. When I_{rms} is greater than I_{sat}, I_{sat} is the more critical specification.
- I_{sat}: DC current at 25°C that causes the specified inductance drop from its value without current. When I_{sat} rating is less than I_{rms}, I_{sat} is the more critical specification.
- Operating temperature range is -25°C to 125°C.
- Ambient temperature -40°C to +85°C with (40°C rise) I_{rms} current.
- Maximum part temperature +125°C (ambient + temp rise)
- Storage temperature Component: -40°C to +125°C
- Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

HIGH CURRENT POWER INDUCTORS

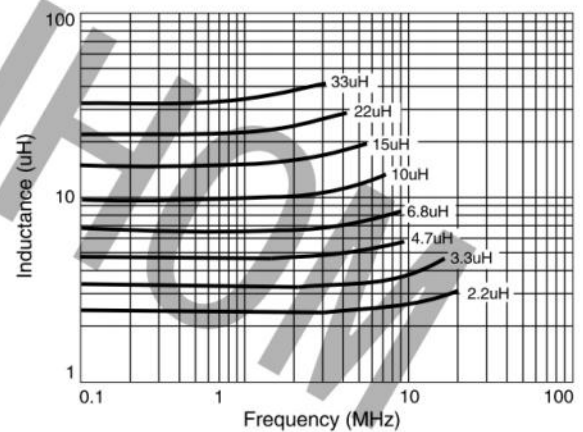
TEMPERATURE RISE VS CURRENT



L VS CURRENT



L VS FREQUENCY



HIGH CURRENT POWER INDUCTORS SPQ2615B SERIES

FEATURES:

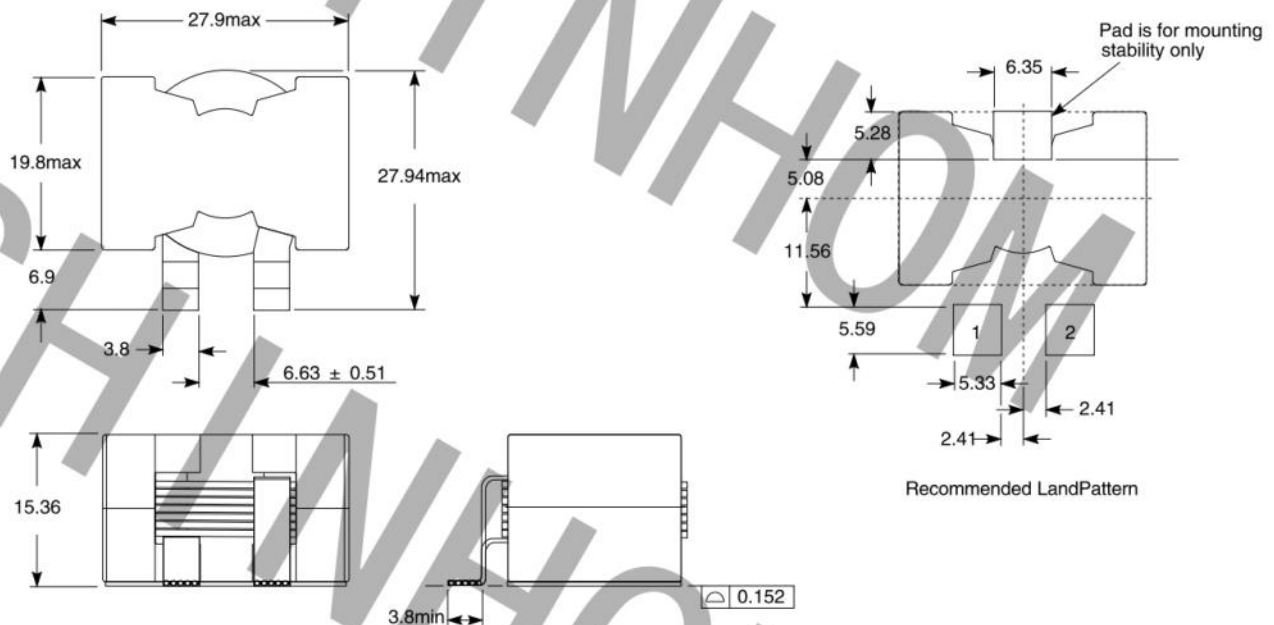
- High inductance, low magnetic loss, small parasitic capacitance
- Extremely low DCR; Current handling to >100 Amps
- Temperature rise current and saturation current is less influenced by environment
- Third mounting pad for greater stability and board adhesion



ELECTRICAL CHARACTERISTICS@25°C

Part Number	Inductance 500KHz, 0.1V (uH) $\pm 10\%$	DCR (m Ω)Max	SRF (MHz)typ	I _{rms} (A)typ.		I _{sat} (A)typ.		
				20°C rise	40°C rise	10% drop	20% drop	30% drop
SPQ2615B-1R5K	1.5	1.65	60	20	30	100	>100	>100
SPQ2615B-2R2K	2.2	1.65	50	20	30	82.0	84.0	84.8
SPQ2615B-3R3K	3.3	1.65	40	20	30	48.0	54.0	57.0
SPQ2615B-4R7K	4.7	1.65	30	20	30	33.0	36.9	39.0
SPQ2615B-6R8K	6.8	1.65	25	20	30	22.0	26.0	27.8
SPQ2615B-100K	10	1.65	20	20	30	13.0	16.2	17.6
SPQ2615B-150K	15	1.65	15	20	30	7.5	9.8	11.0
SPQ2615B-220K	22	1.65	10	20	30	4.5	6.0	6.8
SPQ2615B-330K	33	1.65	7	20	30	2.0	2.6	3.3

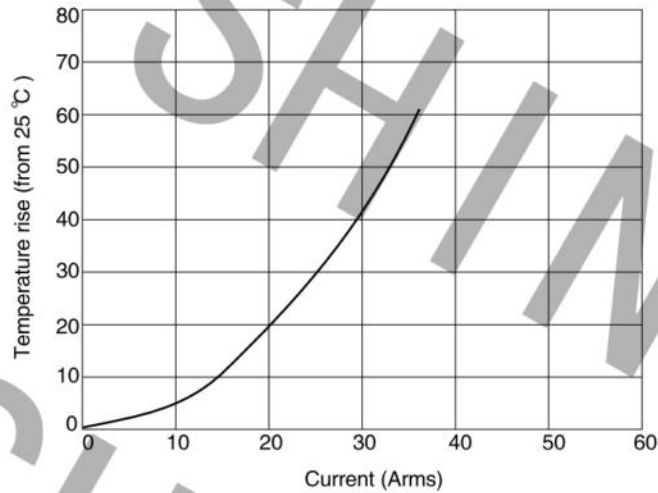
PHYSICAL CHARACTERISTICS & WINDING



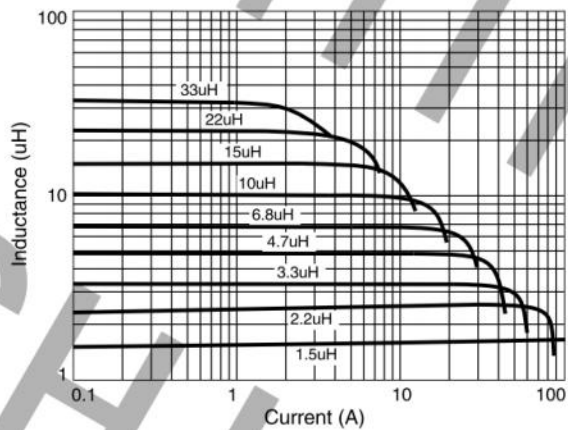
- All test data is referenced to 25°C ambient.
- Test condition: 500KHz, 0.1V, 0 A_{dc} on an Agilent/HP 4284A LCR meter or equivalent.
- I_{rms}: Current that causes the specified temperature rise from 25°C ambient. This information is for reference only and does not represent absolute maximum ratings. When I_{rms} is greater than I_{sat}, I_{sat} is the more critical specification.
- I_{sat}: DC current at 25°C that causes the specified inductance drop from its value without current. When I_{sat} rating is less than I_{rms}, I_{sat} is the more critical specification.
- Operating temperature range is -25°C to 125°C.
- Ambient temperature -40°C to +85°C with (40°C rise) I_{rms} current.
- Maximum part temperature +125°C (ambient + temp rise)
- Storage temperature Component: -40°C to +125°C
- Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

HIGH CURRENT POWER INDUCTORS

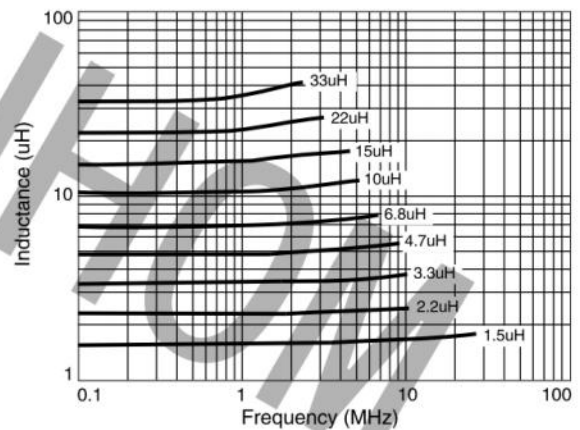
TEMPERATURE RISE VS CURRENT



L VS CURRENT



L VS FREQUENCY



HIGH CURRENT POWER INDUCTORS

SPQ2618A SERIES

FEATURES:

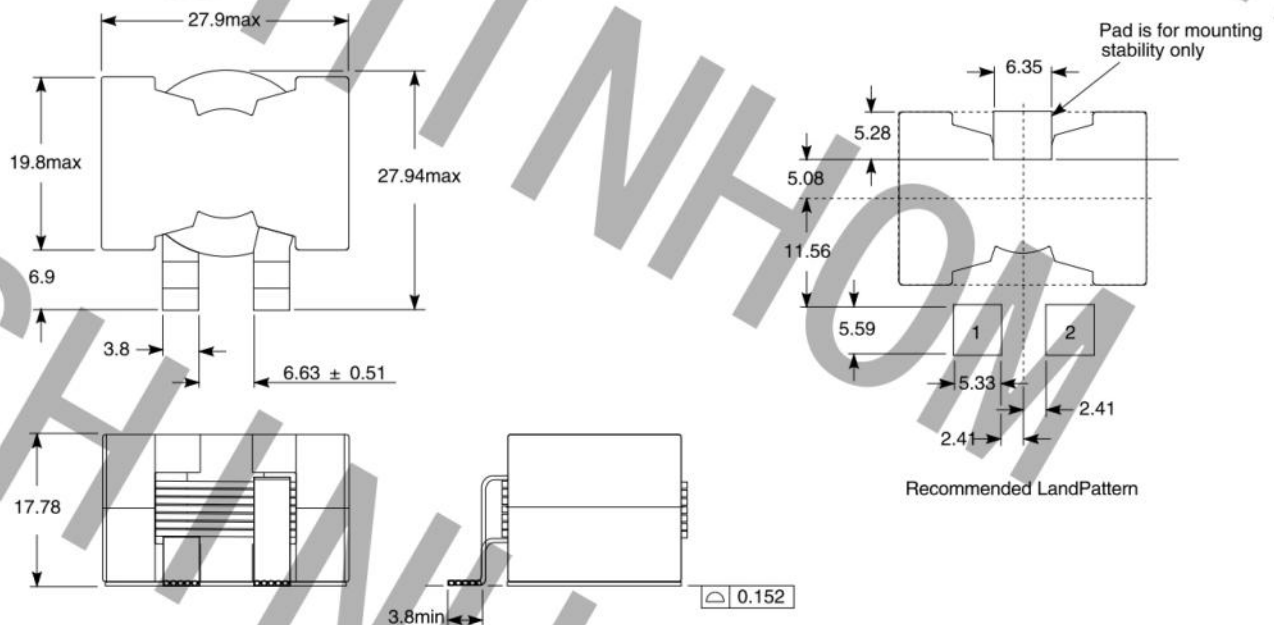
- High inductance, low magnetic loss, small parasitic capacitance
- Extremely low DCR; Current handling to 93 Amps
- Temperature rise current and saturation current is less influenced by environment
- Third mounting pad for greater stability and board adhesion



ELECTRICAL CHARACTERISTICS@25°C

Part Number	Inductance 500KHz, 0.1V (uH) $\pm 10\%$	DCR (m Ω)Max	SRF (MHz)typ	Irms(A)typ.		Isat(A)typ.		
				20°C rise	40°C rise	10% drop	20% drop	30% drop
SPQ2618A-3R3K	3.3	2.86	40	20	28	91.0	92.5	93.6
SPQ2618A-4R7K	4.7	2.86	30	20	28	59.0	61.2	62.4
SPQ2618A-6R8K	6.8	2.86	25	20	28	42.0	45.0	45.9
SPQ2618A-100K	10	2.86	20	20	28	28.0	31.2	32.1
SPQ2618A-150K	15	2.86	16	20	28	18.0	21.2	21.9
SPQ2618A-220K	22	2.86	15	20	28	12.0	14.0	15.0
SPQ2618A-330K	33	2.86	10	20	28	7.0	8.7	9.6

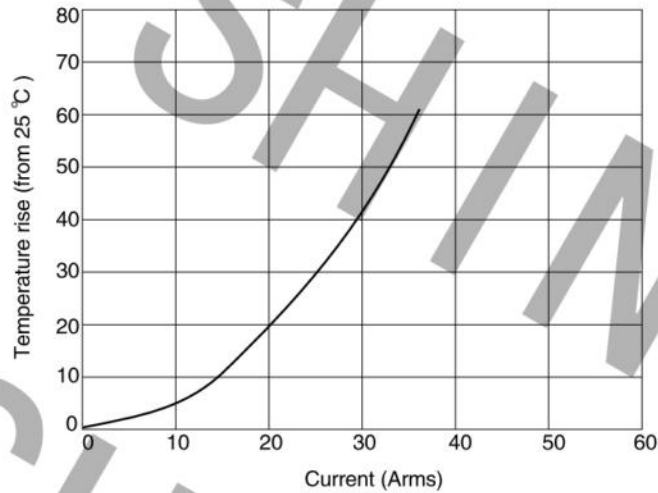
PHYSICAL CHARACTERISTICS & WINDING



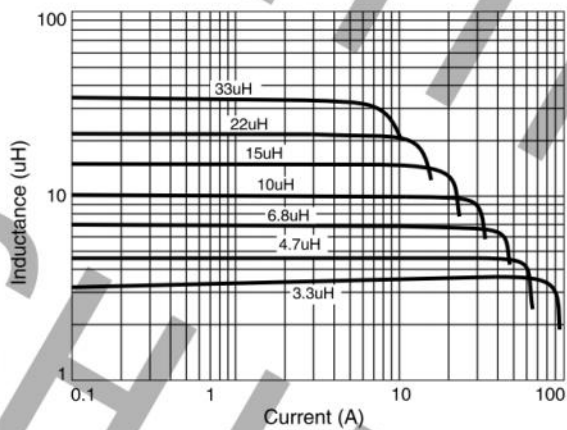
- All test data is referenced to 25°C ambient.
- Test condition: 500KHz, 0.1V, 0 A on an Agilent/HP 4284A LCR meter or equivalent.
- Irms: Current that causes the specified temperature rise from 25°C ambient. This information is for reference only and does not represent absolute maximum ratings. When Irms is greater than Isat, Isat is the more critical specification.
- Isat: DC current at 25°C that causes the specified inductance drop from its value without current. When Isat rating is less than Irms, Isat is the more critical specification.
- Operating temperature range is -25°C to 125°C.
- Ambient temperature -40°C to +85°C with (40°C rise) Irms current.
- Maximum part temperature +125°C (ambient + temp rise)
- Storage temperature Component: -40°C to +125°C
- Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

HIGH CURRENT POWER INDUCTORS

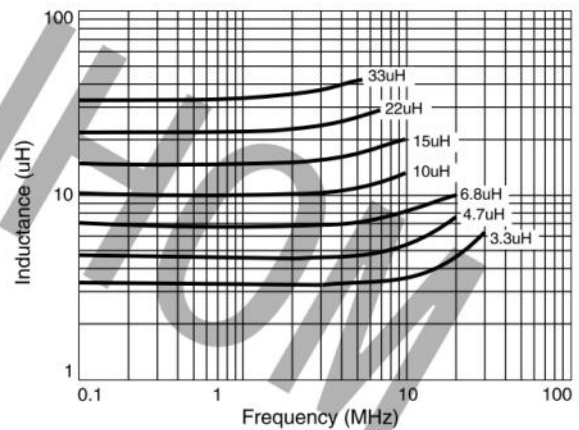
TEMPERATURE RISE VS CURRENT



L VS CURRENT



L VS FREQUENCY



HIGH CURRENT POWER INDUCTORS

SPQ2618B SERIES

FEATURES:

- Susing flat wire, and SMD type.
- Low radiation noise by magnetically shielded construction
- High current, Low resistance.
- Operating temperature :-40°C~+125°C

APPLICATIONS:

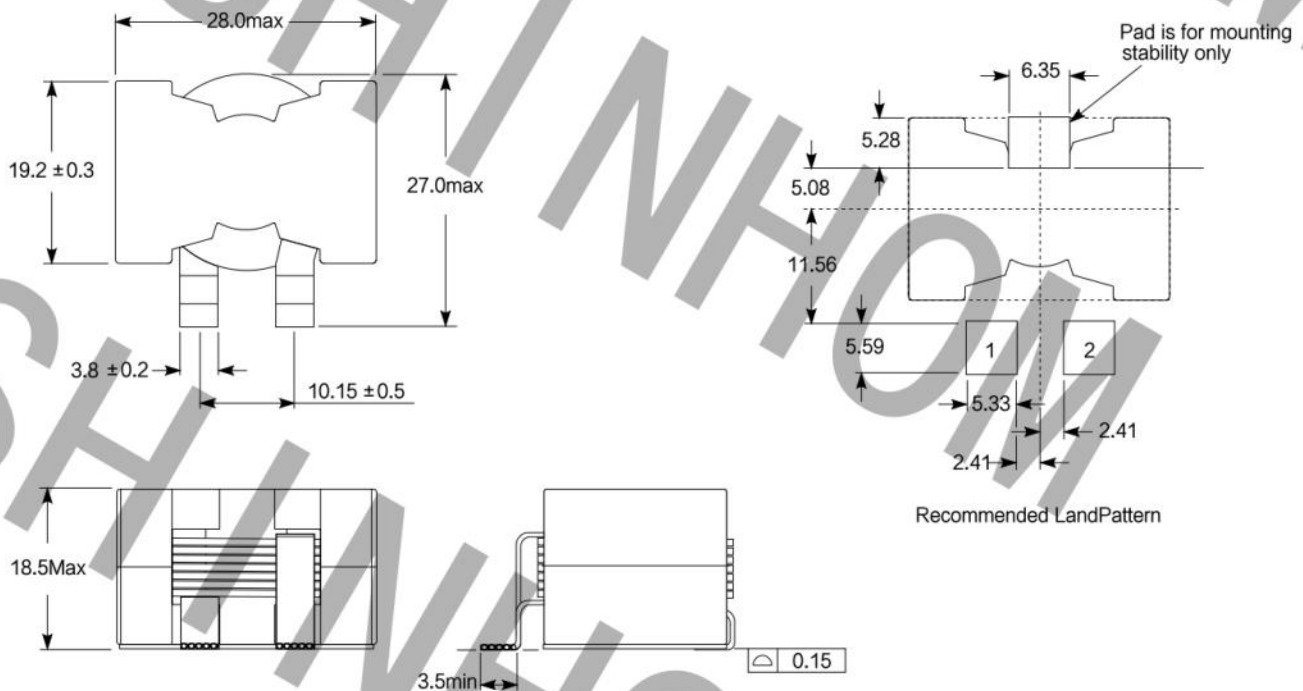
- High efficiency DC/DC converters.
- Single and polyphase buck converters.
- Filter for audio applications.
- Optimized for high current boost applications.



ELECTRICAL CHARACTERISTICS@25°C

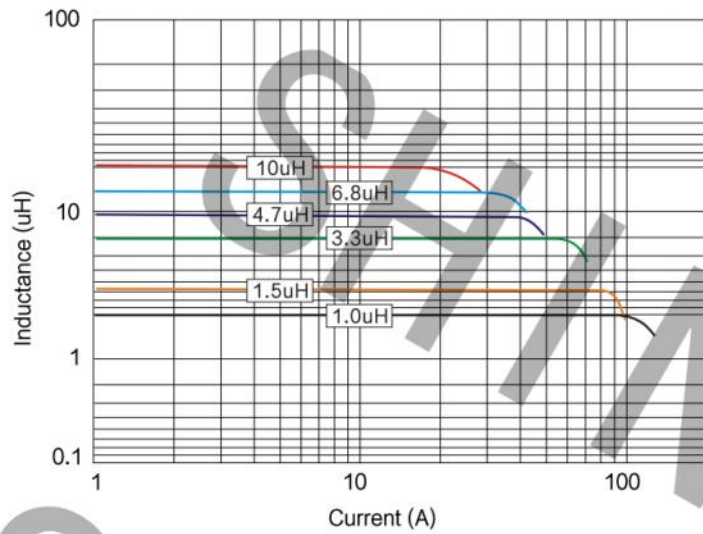
Part Number	Inductance 500KHz,0.1V (uH) ± 10%	DCR (mΩ)Max	SRF (MHz)typ	I _{rms} (A)typ.		I _{sat} (A)typ.		
				20°C rise	40°C rise	10% drop	20% drop	30% drop
SPQ2618B-1R0K	1.0	0.48	53	56	86	122	124	125
SPQ2618B-1R5K	1.5	0.48	37	56	86	85	89	91.8
SPQ2618B-3R3K	3.3	0.97	28	47	58	61	68	70
SPQ2618B-4R7K	4.7	0.97	22	47	58	43.6	48.2	49.4
SPQ2618B-6R8K	6.8	0.97	18	47	58	31.8	37.8	39.2
SPQ2618B-100K	10	0.97	15	47	58	22.8	24	25

PHYSICAL CHARACTERISTICS & WINDING

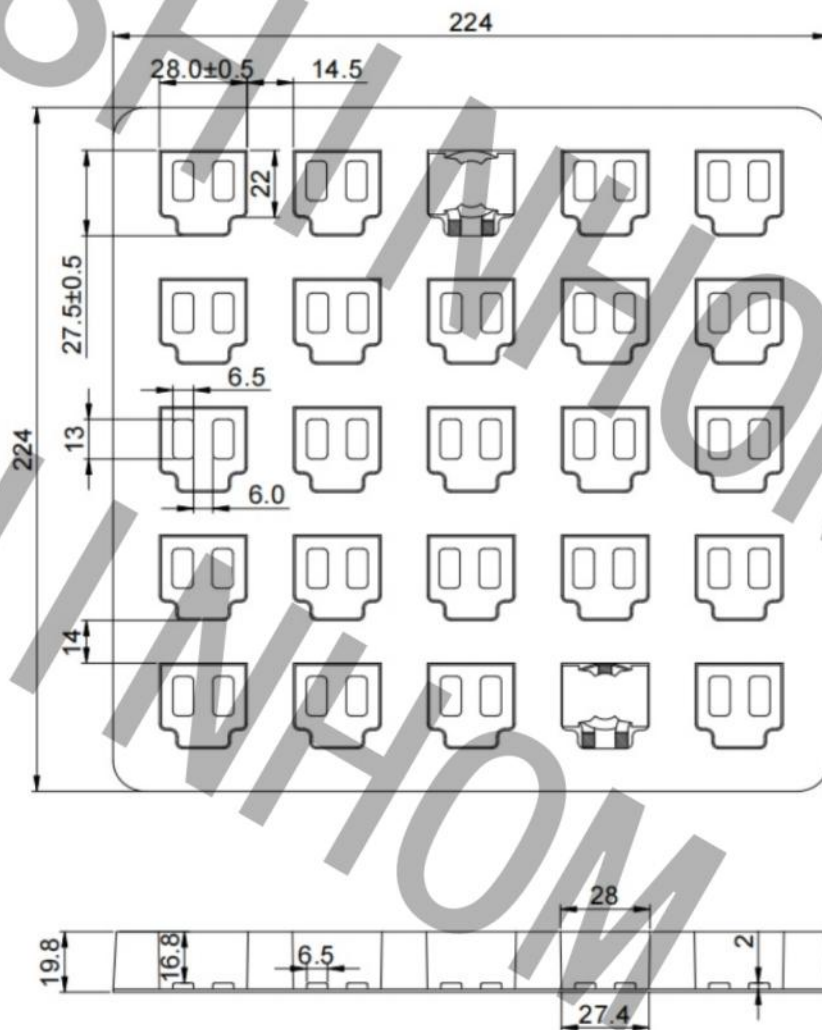


- All test data is referenced to 25°C ambient.
- Inductance is measured with a LCR meter Agilent 4284A or equivalent. Test frequency at 500kHz
- DC resistance is measured with Keithley 580 Milliohm Meter, or equivalent. Reference ambient temperature 25°C
- SRF measured using an Agilent 4395A network analyzer and an Agilent 16193A test fixture.
- DC current at 25°C that causes the specified Inductance drop from its value without current.
- Current that causes the specified temperature rise from 25°C ambient. This information is for reference only and does not represent absolute maximum ratings.
- Operating temperature -40°C ~ +125°C
- Storage temperature Component: -40°C to +125°C
- Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

L VS CURRENT



PACKAGING



Weight: 38.1g/PCS
Packaging: 25PCS/Tray

SMT FLAT WIRE COUPLED INDUCTOR ERU2314 SERIES



FEATURES:

- High saturation current
- Low DC resistance
- RoHS-compatible
- Compact coupled inductors
- AEC-Q200 qualified

COMMON APPLICATIONS:

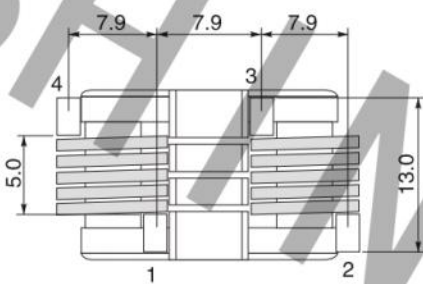
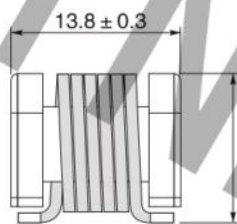
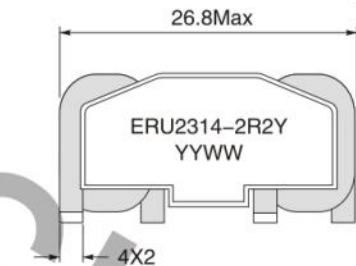
- Dual phase Buck, Boost, and Buck-Boost converters
- 48 Vin~12 Vout hybrid converter

ELECTRICAL CHARACTERISTICS:

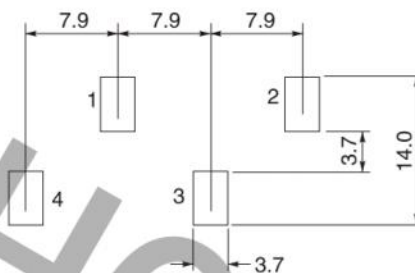
Part No.	Inductance 2-4(Short1,3) (uH) $\pm 10\%$	Inductance 1-4=2-3 (uH) $\pm 15\%$	DCR 1-4=2-3 (m Ω) $\pm 7\%$	Isat(A) Max 25°C	Isat(A) Typ 25°C	Isat(A) Typ 100°C	Itemp(A) Typ	Height H $\pm 0.3\text{mm}$
ERU2314-4R1Y	4.1	7.9	1.85	45	50	39.5	24	13.7
ERU2314-3R2Y	3.2	5.9	1.85	57.5	63.5	49	24	13.7
ERU2314-2R8Y	2.8	5.4	1.25	55	61	47	27	13.8
ERU2314-2R2Y	2.2	4.1	1.25	71	77	58	27	13.8
ERU2314-1R8Y	1.8	3.5	0.82	73	81	62	33	14.0
ERU2314-1R4Y	1.4	2.6	0.82	88	97	73	33	14.0

TECHNICAL INFORMATION & PHYSICAL CHARACTERISTICS:

Dimensions(mm)

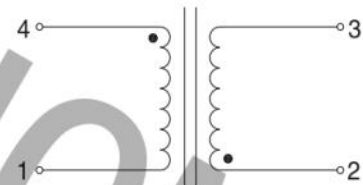


(Bottom view)



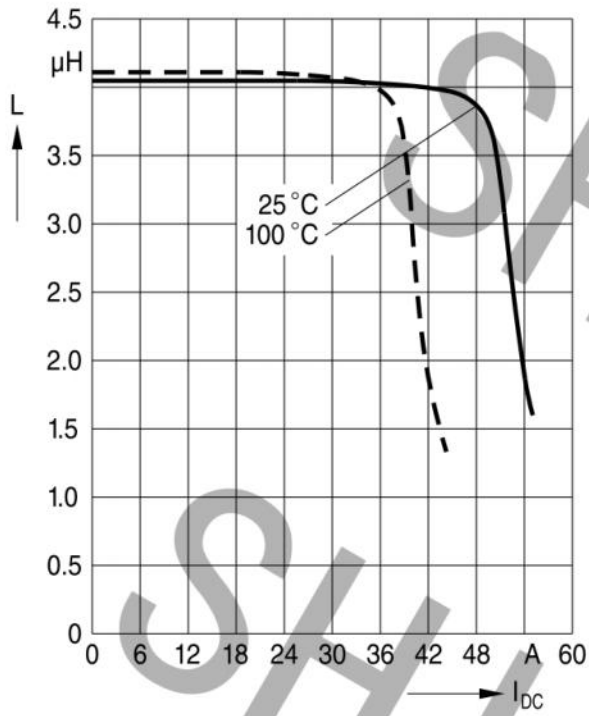
Recommended PCB layout
(Top view)

Winding

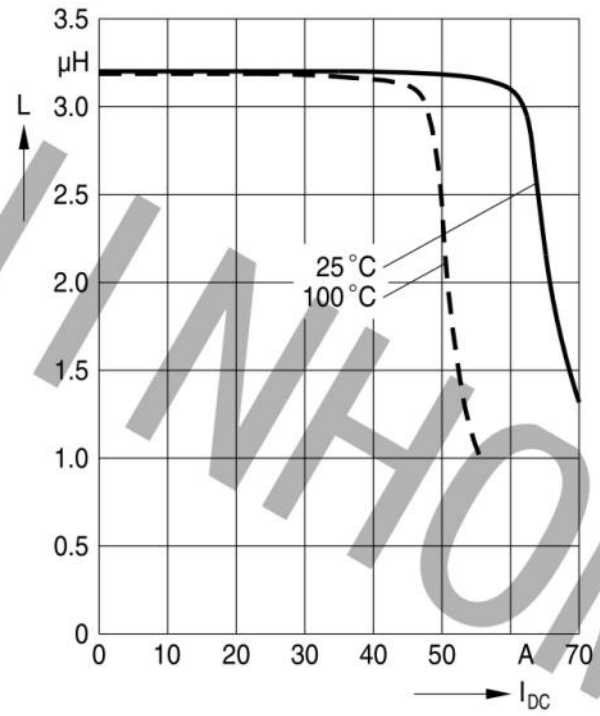


- Test Frequency : 100KHz / 0.1V
- Testing Instrument : L:HP4284A, CH11025,
- Saturation current Isat-typ: DC current with inductance decrease of Pin(2-4) by approximately 20%(Short Pin1,3)
- Saturation current Isat-max: DC current with causes Pin(2-4) to decrease by approximately 20% at Pin(2-4)'s maximum value(Short Pin1,3)
- Rated current Itemp,typ: Current that will cause a $\Delta 40^{\circ}\text{C}$ self-heating at room temperature
- High voltage: N1,N2 to Core: 200VDC
- Operating Temperature: $-40^{\circ}\text{C} \sim +150^{\circ}\text{C}$.
- All specifications subject to change without notice.

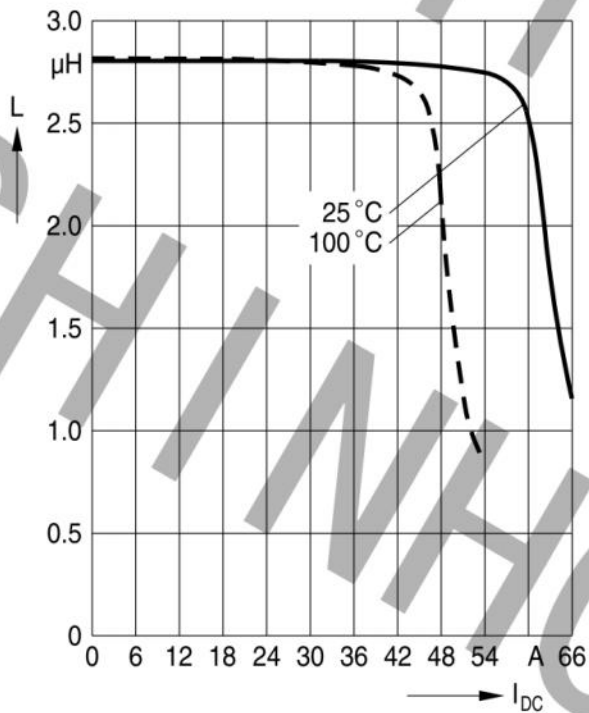
ERU2314-4R1Y



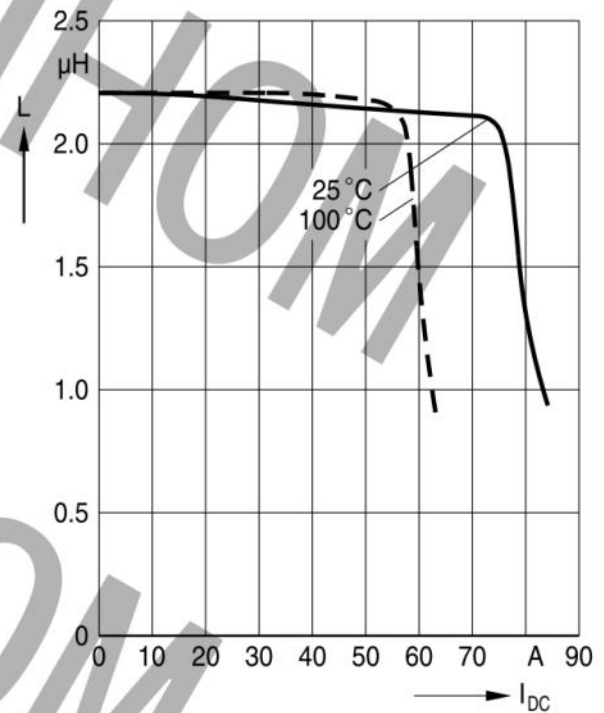
ERU2314-3R2Y



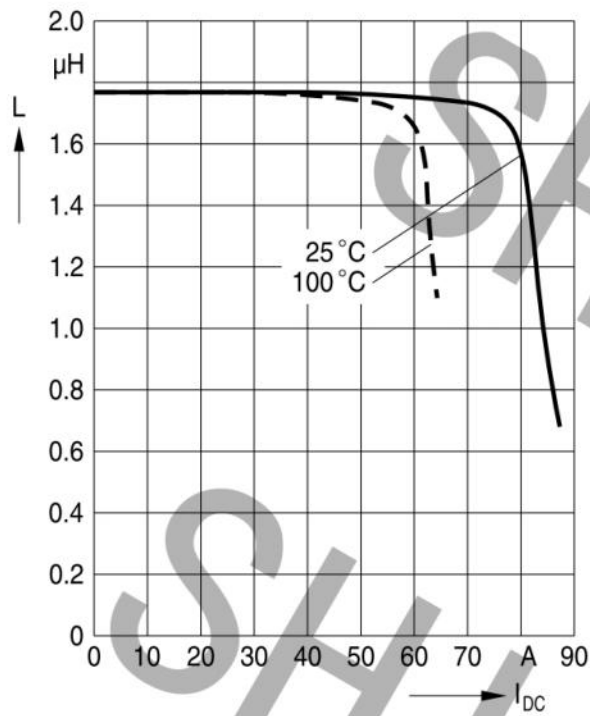
ERU2314-2R8Y



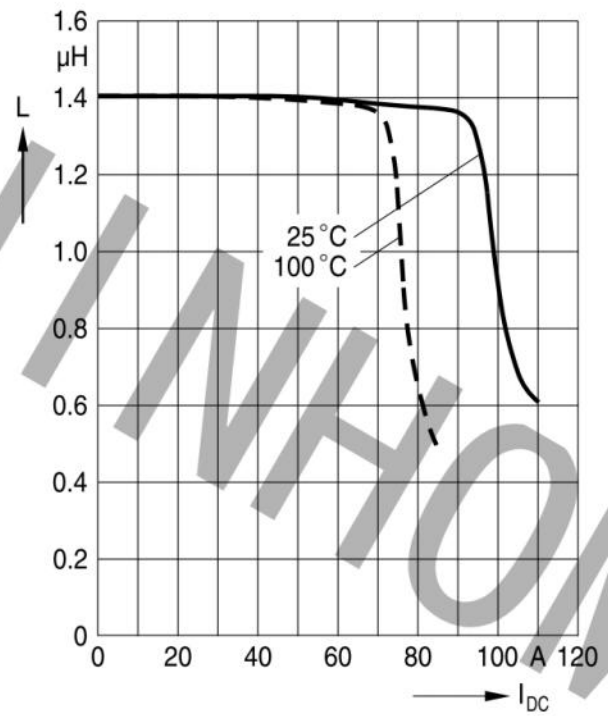
ERU2314-2R2Y



ERU2314-1R8Y



ERU2314-1R4Y



TORPFC TOROIDAL PFC CHOKE

TR75 SERIES



FEATURES:

- Typical topology Boost CCM
- Offline working voltage
- Flat Wire windings, low DCR and allow better cooling
- Operating Temperature Range -40°C to +155°C
- Standard: AEC-Q200 Grade 1

APPLICATIONS:

- Fixed chargers on streets and garages(EV charger)
- Solar Inverters
- Industrial or Medical AC-DC
- Telecom PSU

ELECTRICAL CHARACTERISTICS@25°C

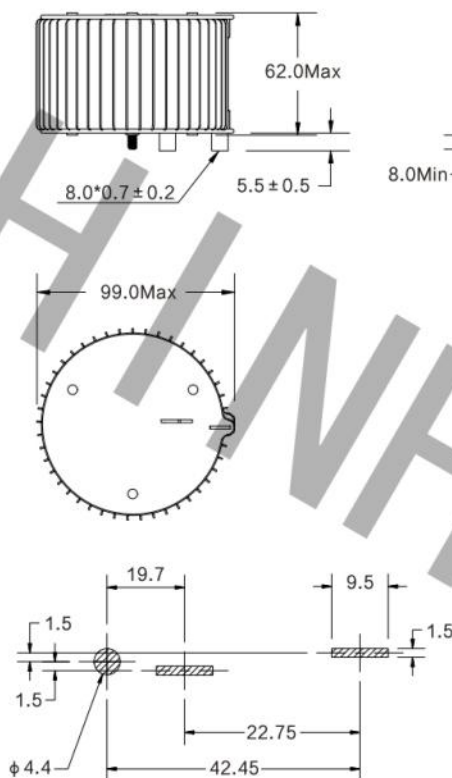
Part Number	Inductance (uH) ± 20%	Irms 1 (A)	Irms 2 (A)	Isat (A)	DCR (mΩ)	Insulation voltage(Vdc) Coil to Core
TR75-181M-43A	180	24.5	48	43	20	1000
TR75-181M-105A	180	24.5	48	105	20	1000
TR75-721M-38A	720	17.2	31.6	38	42	1000

Note:

- Inductance test at 100KHz,0.1V
- Irms 1:DC current(A)that will cause an approximate $\Delta T 40^{\circ}\text{C}$. Irms 2: $\Delta T = 40^{\circ}\text{C}$, 4 m/s Fan
- Isat: DC current(A)that will cause L0 to drop approximately 30%Typ
- Operating temperature range: -40°C~ +155°C
- All test data is based on 20°C ambient.

TECHNICAL INFORMATION & WINDING

Dimensions(mm)

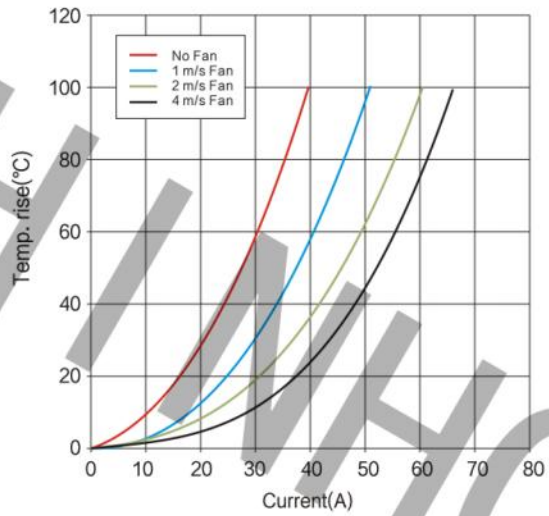
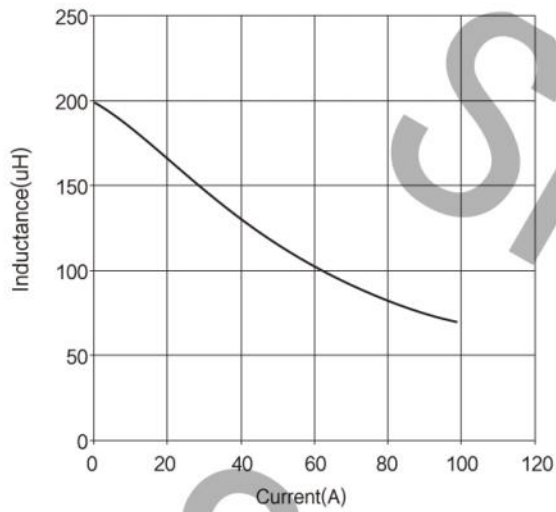


Winding

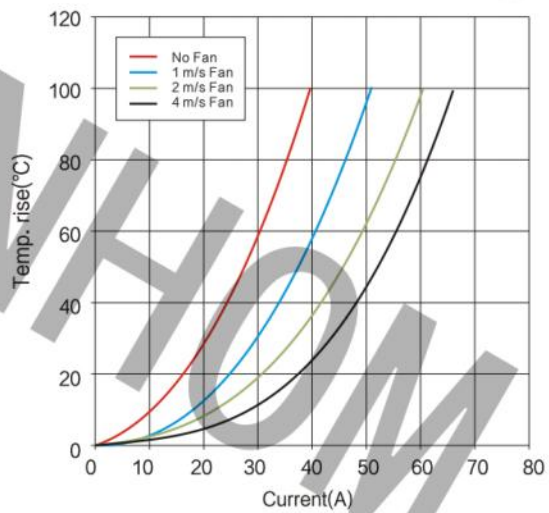
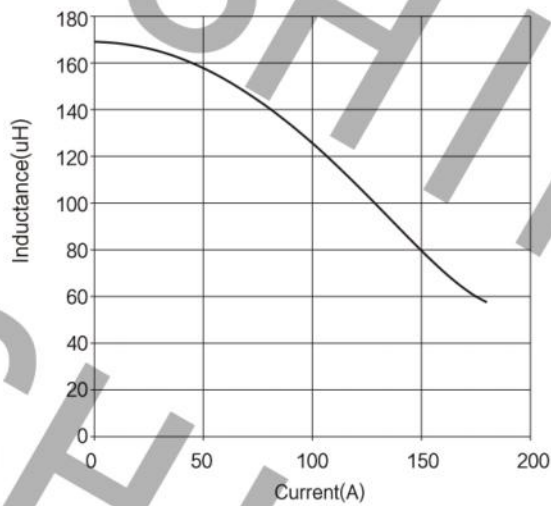


TYPICAL CURVE

TR75-181-43A



TR75-181-105A



TR75-721-38A

