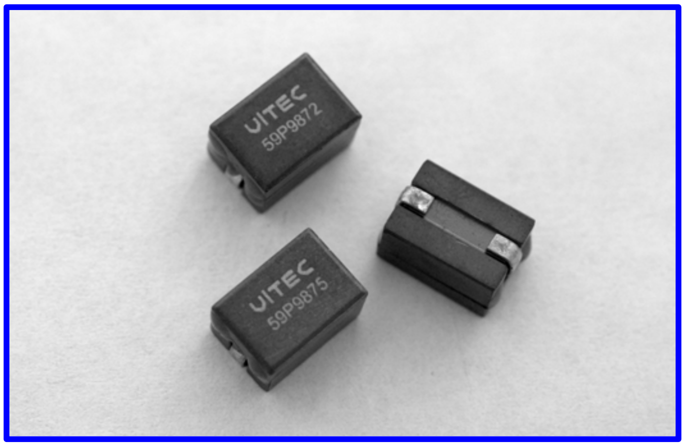
SMD High Frequency Power Inductor

Designed for VRD & VRM 10.x & 11.x Applications

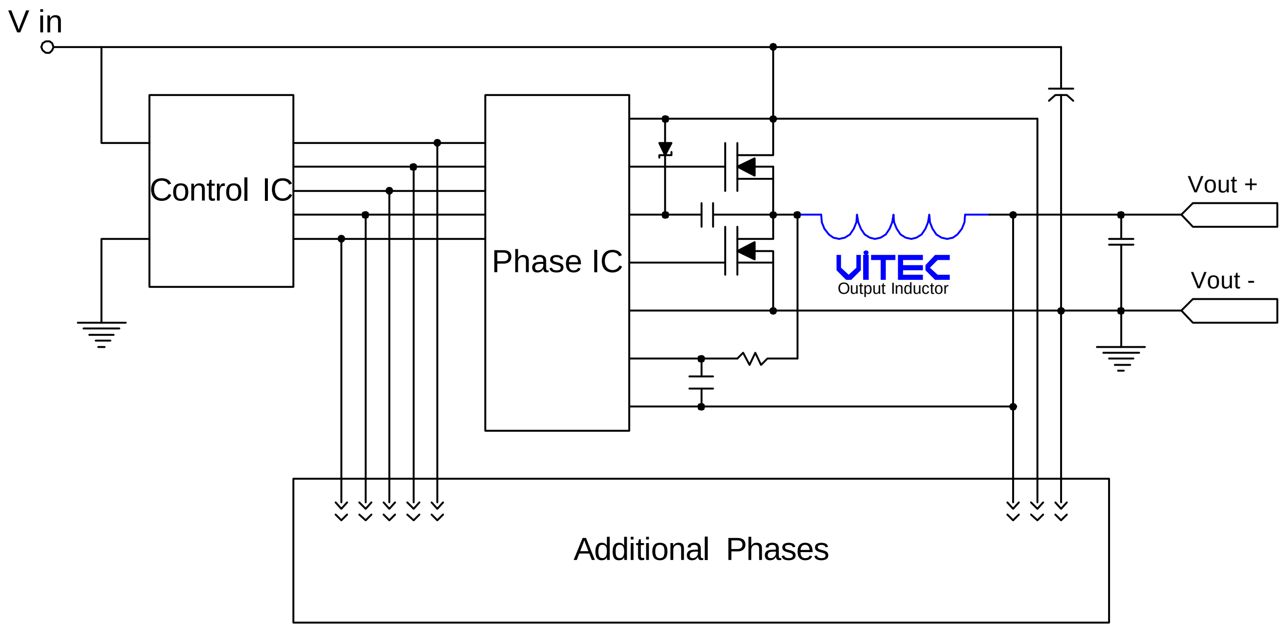
FEATURES

- **Recommended for use with all major Voltage Regulator ICs**
- **High Current handling capability in the smallest footprint**
- **Up to 2MHz operating frequency**
- **Extended operating temperature range: -40C to 125C**
- **Robust SMD package capable of handling the most aggressive SMT assembly process**
- **RoHS compliant**
- **100% tested to a 10% DCR tolerance**



APPLICATIONS

- VRD and VRM 10.x and 11.x based designs
- Multi-Phase Voltage regulator designs
- Server, Desktop, PDA, Graphics cards, Notebook computers, DDR, telecom switches and routers
- DC-DC converters, Battery powered devices, high current power supplies
- High Current NPUs in networking equipment
- Point-of-load Modules
- DCR sensing



Typical Multi-Phase Application Circuit for a Buck Converter

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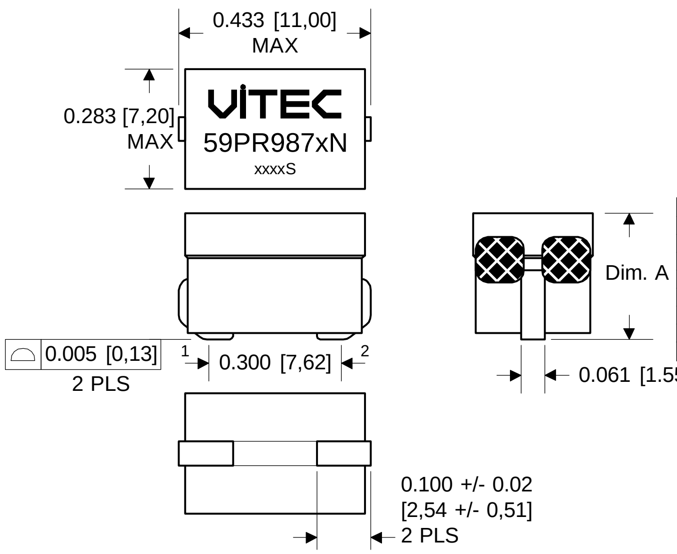
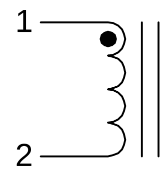
PACKAGE



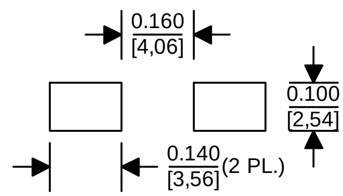
Dimension A	
P/N	MAX
59P9870N	0.307 [7.80]
59P9871N	0.299 [7.60]
59P9872N	0.299 [7.60]
59P9873N	0.295 [7.50]
59P9874N	0.295 [7.50]
59P9875N	0.295 [7.50]
59P9876N	0.295 [7.50]

Dimensions: Inches [mm]. Tolerances: +/- 0.005" [0,13mm] unless otherwise noted

SCHEMATIC



SUGGESTED PCB LAYOUT



Drawing NOT to scale

ELECTRICAL CHARACTERISTICS @ 25ºC (unless otherwise noted)

Part Number		Inductance[3] @ 0 Adc	Inductance[3] @ Isat[1] (25ºC)	DCR	Isat[1] (Max Saturation Current)			Temp. Rise Current[2]	Temp. Rise Factor A (TRF A)[4]	Temp. Rise Factor B (TRF B)[4]	Temp. Rise Factor C (TRF C)[4]
		nH	nH	mOhms	ADC			ADC			
Classic	RoHS	± 15%	MIN	± 10%	25ºC	100ºC	125ºC	MAX			
59P9870N	59PR9870N	70	48	0.29	138	120	116	48	6.10	0.004428	0.01364
59P9871N	59PR9871N	120	82	0.29	87	76	73	48	6.10	0.004296	0.02357
59P9872N	59PR9872N	150	102	0.29	70	60	58	48	6.10	0.004265	0.02950
59P9873N	59PR9873N	220	150	0.29	47	41	39	48	6.10	0.004223	0.04334
59P9874N	59PR9874N	300	204	0.29	34	30	29	48	6.10	0.004203	0.05914
59P9875N	59PR9875N	400	272	0.29	23	20	19	48	6.10	0.004191	0.07887
59P9876N	59PR9876N	510	347	0.29	17	15	14	48	6.10	0.004183	0.10057

Add an "R" to the part number after "P" for the RoHS compliant version (i.e. 59PR9871N is the RoHS compliant version of 59P9871N).

1. The Saturation Current (Isat) is the current at which the Inductance drops by a maximum of 20% below the lower limit of its value specified at 0 ADC Bias. Inductance at Isat is measured at the specified Ambient Temperature by applying DC Bias by a short period of time to minimize the self-heating effect of the component.
2. The Temperature Rise Current is the current at which the temperature of the part increases by 50ºC. This test is performed with the part mounted on a PCB with traces having 1.7 times the cross sectional area of the copper leads of the part. The temperature of the part is measured after applying the DC current for a minimum of 10 minutes.
3. Inductance is measured at 100 KHz and 1.0 Vrms.
4. Temperature Rise can be estimated using the following formulas:

$$\text{Trise (ºC)} = \left(\frac{\text{Core Loss + DCR Loss}}{\text{TRF A}}\right)^{0.833}$$

$$\text{DCR Loss (mW)} = \left(\text{Idc}^2 + \left(\frac{\Delta I}{2}\right)^2\right) \text{ x TYP DCR (mOhms)}$$

$$\text{Core Loss (mW)} = \text{TRF B x (F)}^{1.84} \text{ x (TRF C x } \Delta I)^{2.28}$$

IDC = DC output current (ADC)
Δ I = Delta I across the inductor (Amps)
F = Switching frequency (kHz)

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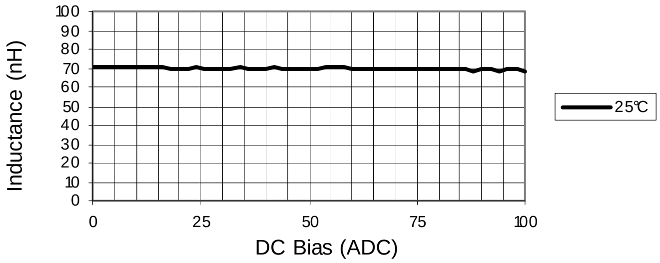
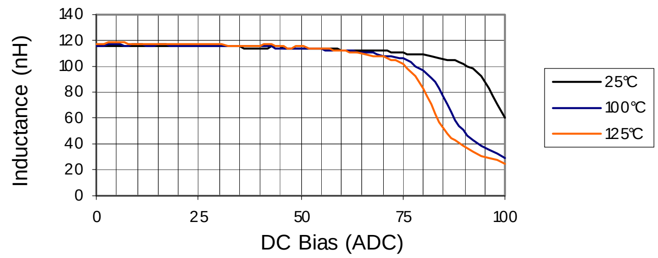
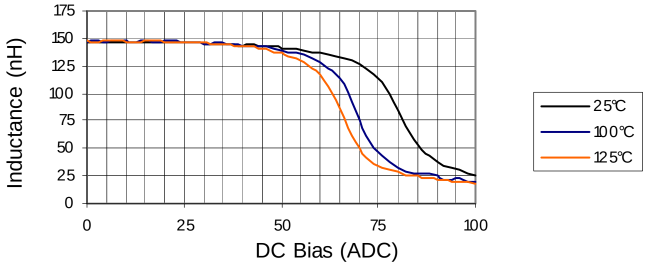
59PR9870N Inductance vs. Idc @ 25ºC



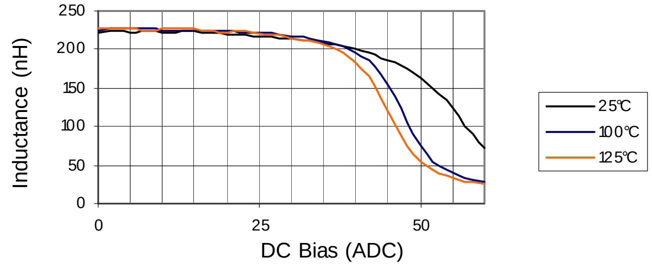
59PR9871N Inductance vs. Idc @ 25ºC



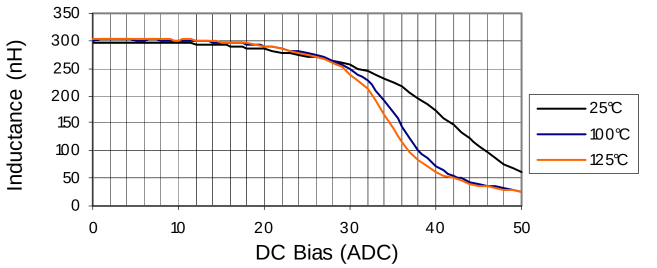
59PR9872N Inductance vs. Idc @ 25ºC



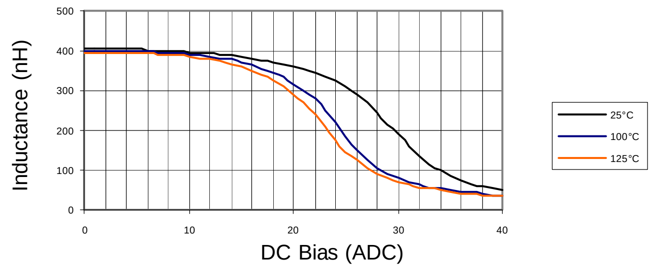
59PR9873N Inductance vs. Idc @ 25ºC



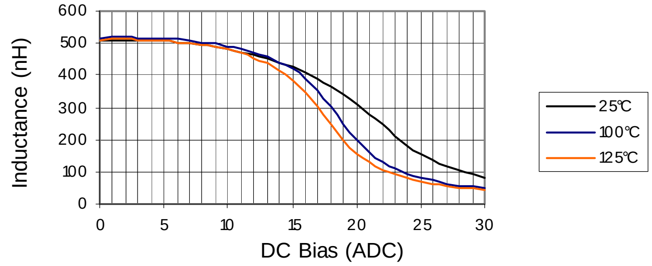
59PR9874N Inductance vs. Idc @ 25ºC



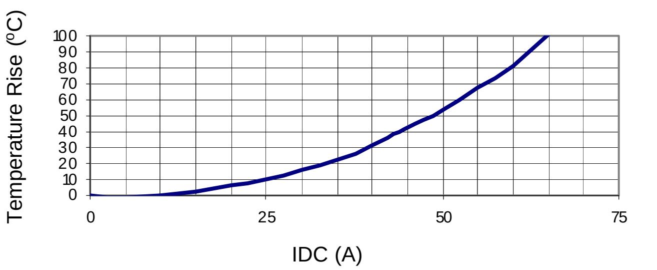
59PR9875N Inductance vs. Idc @ 25ºC



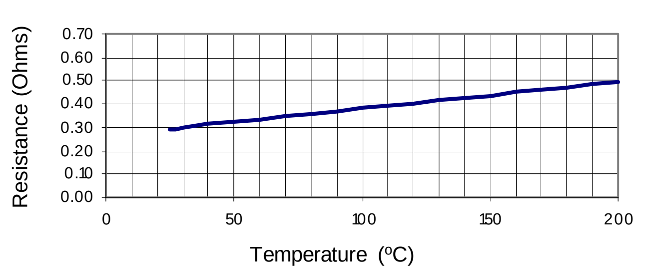
59PR9876N Inductance vs. Idc @ 25ºC



59PR987XN Temp. Rise vs. Idc



59PR987XN Rdc vs. Temp. Rise



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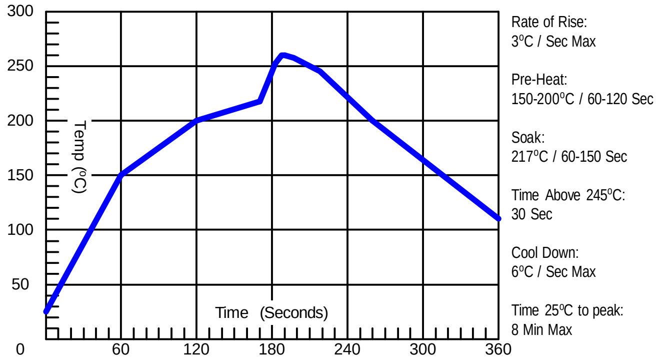
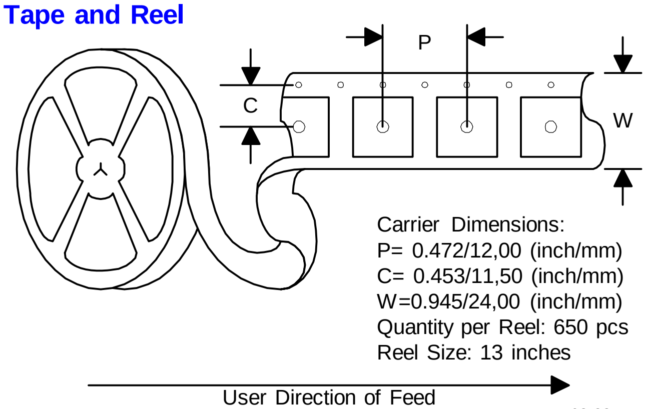
IR Profile



Tape and Reel



63-224A1

ENVIRONMENTAL & RELIABILITY DATA

Storage Temperature: -40C to +125C
Operating Temperature: -40C to +125C
Resistance to Solder Reflow: 3 passes thru. +235C for 30 seconds minimum

Marking permanency: Tested per JESD22-B107-A
Solderability: Tested per MIL-STD-750D
Life Test: Tested per MIL-STD-202F, Method 108A
Thermal Cycle: Tested per JESD22-B104-B, Test Condition G

ABOUT US

Vitec Electronics Corporation, founded in 1986, is a worldwide leader in the design, manufacture and sale of magnetic solutions. Vitec's market focus includes the power, power conditioning, telecom, networking, communications and computing. Vitec has also established strong alliances with chip manufacturers whereby magnetic solutions are designed in conjunction with unique silicon requirements and are offered as reference designs by the chip companies.

With its Corporate Headquarters and Research & Development center located in Carlsbad, California, and its state of the art manufacturing facility and material sourcing in China, Vitec is uniquely positioned to supply the latest technology at the lowest cost. Vitec offers both standard and custom product design capabilities with all of its facilities being ISO certified.

QUALITY POLICY

Vitec will provide products and services that meet or exceed our Customer's requirements, conform to company policies and standards, and exhibit continuously improving levels of Quality.

COMMITMENT

VITEC Electronics empowers each of its employees by providing a business environment that encourages a commitment to excellence, a sense of ownership and personal accountability to all Vitec Customers.

Competitive Pricing, Quality Products, and On Time Deliveries are expected from today's World Class Magnetics Suppliers. The high standards of today's customer are strengthening the dedication and commitment of VITEC Electronics to provide Total Customer Service.

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