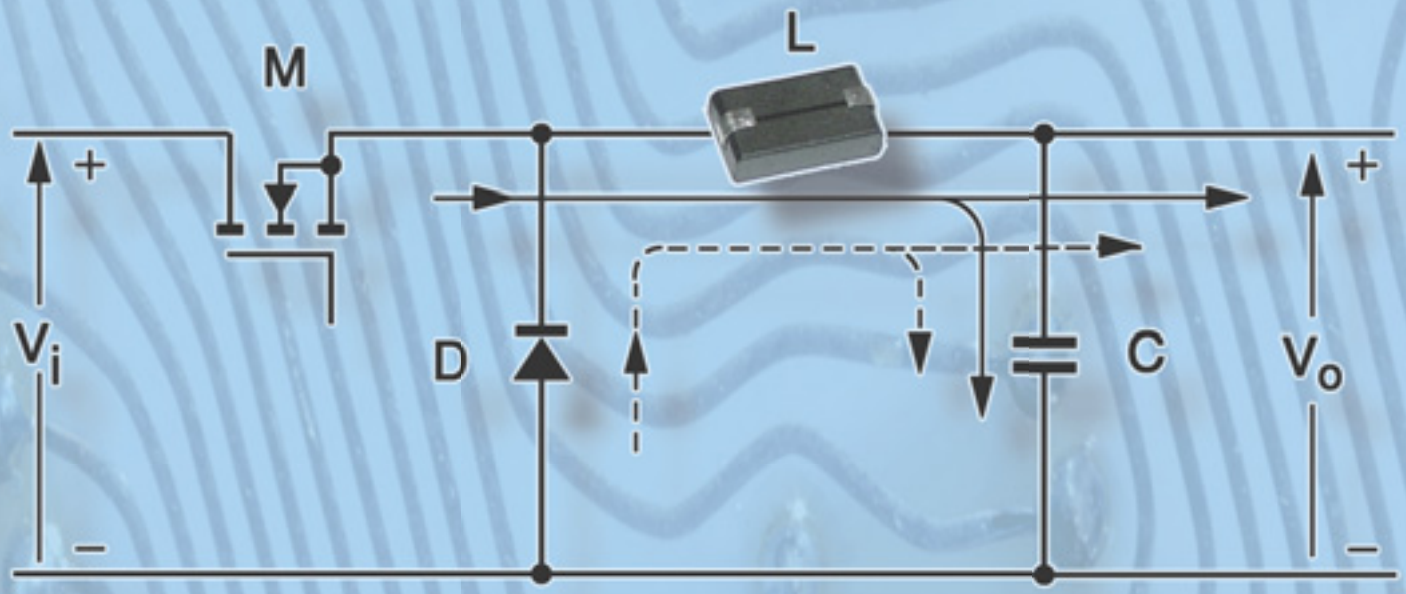
Gapped SMD beads for power inductors



current flow

mosfet conducting

mosfet cut-off

FERROXCUBE
A YAGEO COMPANY

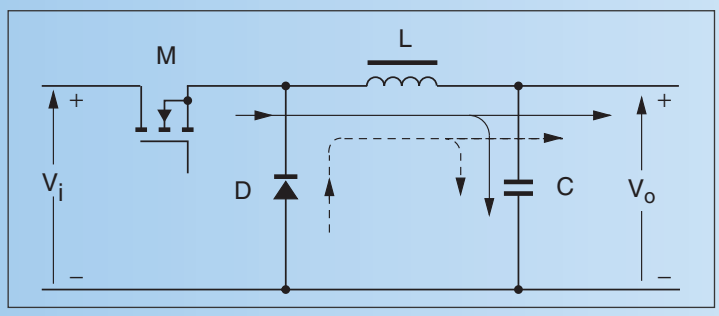
Gapped SMD beads for power inductors

Introduction

Traditional power supply architectures for PC's are facing problems with the latest generation of integrated circuits. Lower voltages and higher currents lead to increasing losses in supply lines and sensitivity to interference. On top of this, fast microprocessors introduce high frequency transients which are difficult to regulate with a voltage regulator module (VRM) from a distant main supply.
The fundamental solution utilizes an intermediate voltage and distributed point of load (POL) converters. These are small dc/dc converters, placed close to the load on the PCB.
FERROXCUBE now introduces gapped SMD beads, perfectly suitable for the POL concept. They are small inductors typically meant to serve as output inductor in buck / boost stages and feature the state of the art power material 3C96. Depending on relative ripple current, switching frequencies up to 1 MHz are possible to realize compact geometries. Saturation rated current goes up to 20 A and the dc resistance is less than 1 mΩ.
These gapped beads are available in 2 sizes (1812 and 3512), packed in tape on reel and they are SMD mountable. Furthermore, they are lead-free and fully comply with the RoHS regulations on hazardous substances.

Features

- Very suitable for POL converter concept.
- High switching frequency, up to 1 MHz.
- High current rating, up to 20 A.
- Low dc resistance, less than 1 mΩ.
- Small size (1812 and 3512).
- SMD mountable.
- Lead-free / RoHS-compliant.



Buck or down converter

Technical capabilities

General data

ITEM	SPECIFICATION
strip material	copper (Cu), tin (Sn) plated see website for lead-free info
Solderability	IEC 60068-2-58, part 2, test Ta, method 1
Taping method	IEC 60286-3, EIA 481-1 and EIA 481-2

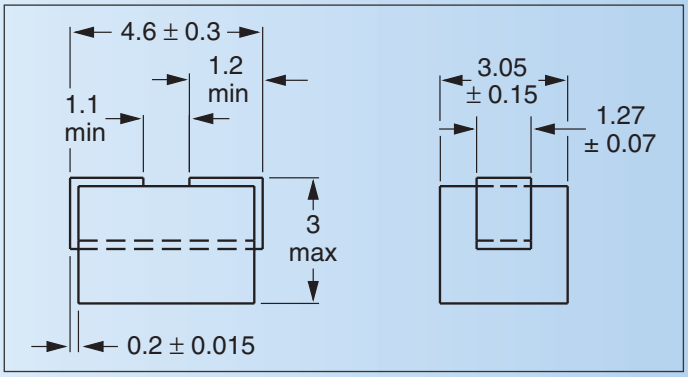
Parameters and type numbers

GRADE	L at 1 MHz (nH)	I_{max} (1) (A)	TYPE NUMBER
3C96	**BDS 3/3/4.6 ; mass ≈ 0.15 g (2)**		
	50 ± 20 %	20	BDS3/3/4.6-3C96-A50
	75 ± 20 %	15	BDS3/3/4.6-3C96-A75
3C96	**BDS 4.6/3/8.9 ; mass ≈ 0.5 g (3)**		
	100 ± 20 %	20	BDS4.6/3/8.9-3C96-A100
	150 ± 20 %	20	BDS4.6/3/8.9-3C96-A150

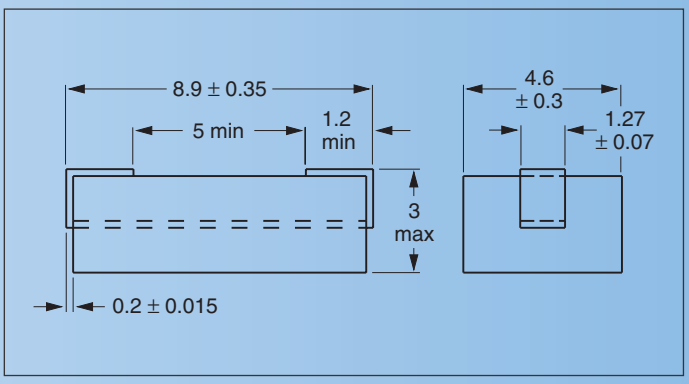
Note

1. Imax is the saturation rated current.
2. DC resistance < 0.6 mΩ.
3. DC resistance < 1.0 mΩ.

SMD bead BDS3/3/4.6



SMD bead BDS4.6/3/8.9



Advantages of the material 3C96 for power inductors

3C96 - Material Characteristics

	CONDITIONS	VALUE	UNIT
μ_i	25 °C, ≤ 10 kHz, 0.25 mT	2000 ± 20 %	
μ_a	100 °C, 25 kHz, 200 mT	≈ 5500	
B	25 °C, 10 kHz, 1200 A/m 100 °C, 10 kHz, 1200 A/m	≈ 500 ≈ 440	mT
P_v	100 °C, 100 kHz, 100 mT 100 °C, 100 kHz, 200 mT 100 °C, 500 kHz, 50 mT	≈ 40 ≈ 300 ≈ 250	kW/m^3
ρ	DC, 25 °C	≈ 5	Ωm
T_c		≥ 240	°C
density		≈ 4800	kg/m^3

Our lowest loss general power material 3C96 is an excellent choice to use in high-frequency output inductors. With a small ripple only, it can work at much higher switching frequency then it would as a transformer material, preserving its higher saturation over real high-frequency transformer materials. The main characteristics are given in the table, but for complete graphical information, see our handbook or look on the website.