Cosmo Ferrites Limited, India

Ferrites in LED application

EE1011A, EE1011B
EE1306, EE1306B
EE1605, EE1605A
EEL1605D, EE2005S,

PQ2620, PQ2625
PQ3220, PQ3230

EFF1505A, EFF2007A
EFF2507, EFF3009

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New Improved Ferrite Material for LED Application - CF295

- LED Lighting circuits use different converter topologies—buck, boost, buck-boost in frequency range of 50-200 kHz.
- Line Switches are frequently used as power semiconductor —typically at 66 / 132 kHz operating at 100°C

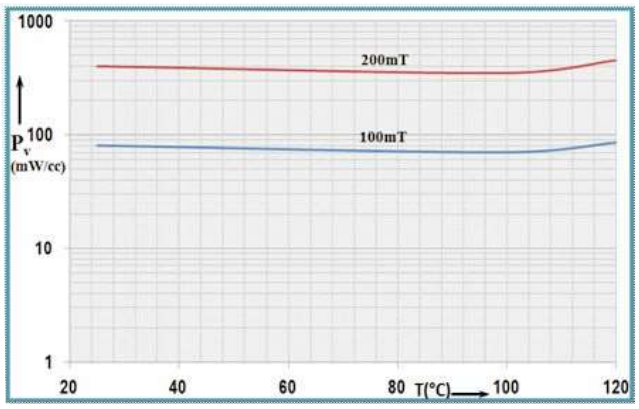
  The converter circuits need be compact with large area of heat dissipation
- LED lighting is widely used in automotive sector where the converters are exposed to varying ambient conditions.
- The ferrite material must have low core loss at the typical frequencies of application and operating temperatures.
- The ferrite material must have ***high saturation flux density*** at the operating temperature to cater for high input voltages.
- The ferrite material should have ***a flat loss-temperature curve*** to have the similar core loss and hence efficiency for shifting ambient and load resulting in varying operating temperatures.
- The ferrite core should have the best dissipation area and EFD, PQ,RM cores are preferred for this reason.
- PQ cores also have the best area product for the same footprint and have a near-closed magnetic circuit to contain leakage flux.
- For low wattage LED's, EE cores are also available.

CF295 Material Properties:

Property	Symbol	Unit	Value
Initial Permeability(T = 25°C)	μ_i		3000±20%
Flux density (H = 1000 A/m,f = 10 kHz)	Bs (25°C) Bs (100°C)	mT	525 410
Residual Flux Density	Br (25°C)	mT	80
Power loss density 100 kHz, 100 mT, 25°C 100°C 100 kHz, 200 mT, 25°C 100°C	P_v	kW/m³	 ≤100 ≤90 ≤400 ≤350
Curie Temperature	T_c	°C	>220°C
Resistivity	ρ	Ωm	8
Density	d	kg/m³	4800

CF295 Core Loss vs Temperature at 100 kHz

Flat power loss from 25 C to 120 C.



Better Power Loss:

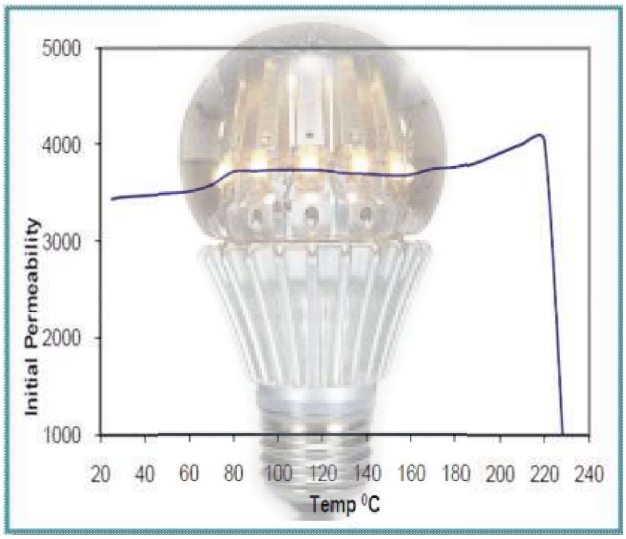
Less power loss variation over operating temperature range as compared to other power ferrite material.

Variation in Core Loss	*100kHz/100mT*	*100kHz/200mT*
CF295	15 kW/m³	300 kW/m³
Other Power Ferrite material	75 kW/m³	450 kW/m³

Initial Permeability vs Temperature

Only 10% variation in permeability in operating temperature range, results in better efficiency of the system.

Curie Temperature: Curie Temperature > 220 C, safe to use with any class of insulation material.

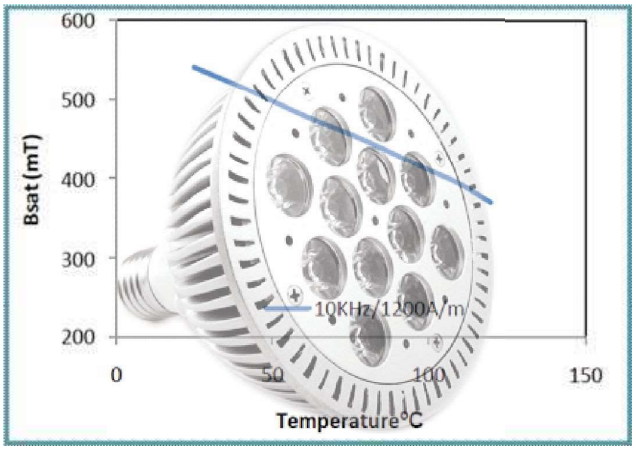


Saturation Flux Density vs Temperature:

Better DC bias for the core used as choke inductor, fly- back transformer or 1 quadrant converter.

Bsat 25 C=510mT

Bsat 100 C=410mT



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