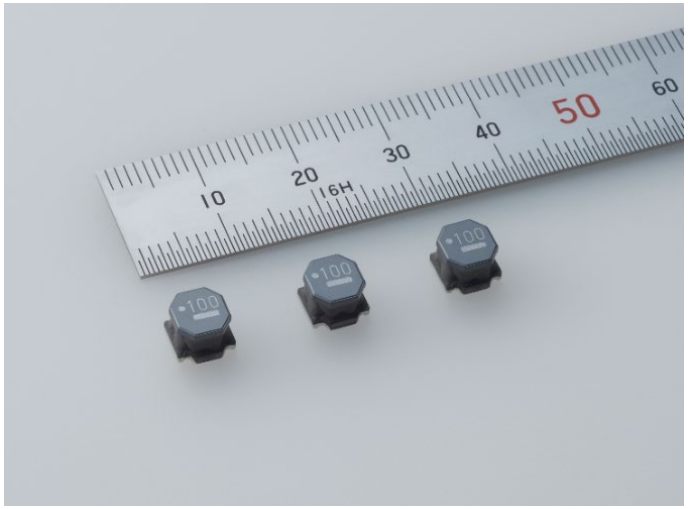
Three functions of an Inductor (coil)

Inductors have the following three functions.

(1)convert electrical energy into magnetic energy, store it, and release it.
(2)When a current flows, a magnetic field is generated, and when the magnetic field changes, a current flows.
(3)Direct current passes through, but AC is difficult to pass through, and the higher the frequency, the harder it is to pass through.

For details, please refer to the following product introduction page.

https://www.yuden.co.jp/or/solutions/inductor/



Viewing the Catalog of Typical Power Inductors (TAIYO YUDEN)

・Nominal inductance
The inductance value at the measured frequency of 100KHz.

6060YE type

New part number	Old part number (for reference)	Nominal inductance [μH]	Inductance tolerance	DC Resistance [mΩ] Max (Typ)	Rated current ※) [A]			Measuring frequency[MHz]
					Saturation current Idc1 Max (Typ)	Temperature rise current① Idc2 Max (Typ)	Temperature rise current② Idc2 Max (Typ)	
LCXHF6060YEL1R0NMR	NRM6045T 1R0NMRRV	1	±30%	13 (10)	13.50 (14.50)	4.00 (6.00)	6.20 (7.00)	0.1
LCXHF6060YEL1R5NMR	NRM6045T 1R5NMRRV	1.5	±30%	19 (14)	10.00 (11.00)	3.40 (4.70)	5.50 (6.40)	0.1
LCXHF6060YEL2R2NMR	NRM6045T 2R2NMRRV	2.2	±30%	23 (18)	8.50 (9.50)	3.00 (4.00)	4.40 (5.10)	0.1
LCXHF6060YEL3R3MMR	NRM6045T 3R3MMRSV	3.3	±20%	27.6(23)	7.00 (7.50)	2.50 (3.50)	4.00 (4.50)	0.1
LCXHF6060YEL4R7MMR	NRM6045T 4R7MMRRV	4.7	±20%	36 (30)	6.00 (6.50)	2.20 (3.00)	3.60 (3.90)	0.1
LCXHF6060YEL6R8MMR	NRM6045T 6R8MMRRV	6.8	±20%	52 (43)	5.10 (5.60)	1.90 (2.60)	3.10 (3.50)	0.1
LCXHF6060YEL100MMR	NRM6045T 100MMRSV	10	±20%	60 (50)	4.00 (4.40)	1.80 (2.40)	2.60 (3.20)	0.1
LCXHF6060YEL150MMR	NRM6045T 150MMRRV	15	±20%	105 (87)	3.10 (3.50)	1.40 (1.80)	2.15 (2.45)	0.1
LCXHF6060YEL220MMR	NRM6045T 220MMRRV	22	±20%	132 (110)	2.50 (3.00)	1.20 (1.60)	1.80 (2.00)	0.1
LCXHF6060YEL330MMR	NRM6045T 330MMRRV	33	±20%	216 (180)	1.75 (1.95)	0.75 (0.95)	1.25 (1.35)	0.1
LCXHF6060YEL470MMR	NRM6045T 470MMRRV	47	±20%	272 (227)	1.55 (1.70)	0.70 (0.90)	1.20 (1.30)	0.1
LCXHF6060YEL680MMR	NRM6045T 680MMRRV	68	±20%	385 (320)	1.20 (1.30)	0.65 (0.85)	1.05 (1.20)	0.1
LCXHF6060YEL101MMR	NRM6045T 101MMRRV	100	±20%	600 (475)	1.05 (1.15)	0.55 (0.70)	0.85 (0.95)	0.1
LCXHF6060YEL151MMR	NRM6045T 151MMRRV	150	±20%	816 (680)	0.83 (0.90)	0.48 (0.65)	0.76 (0.85)	0.1
LCXHF6060YEL221MMR	NRM6045T 221MMRRV	220	±20%	1320 (1100)	0.70 (0.75)	0.35 (0.50)	0.57 (0.65)	0.1
LCXHF6060YEL331MMR	NRM6045T 331MMRRV	330	±20%	1872 (1580)	0.55 (0.60)	0.29 (0.39)	0.45 (0.54)	0.1
LCXHF6060YEL471MMR	NRM6045T 471MMRRV	470	±20%	2760 (2300)	0.45 (0.50)	0.22 (0.30)	0.38 (0.45)	0.1

・DC Resistance
The resistance when DC is applied.
The main resistance is the winding resistance.

・Saturation current (Isat)
The current value at which the inductance value is -10% to 30% (depending on the item) by DC superposition.
For the NR series, it is -30%.

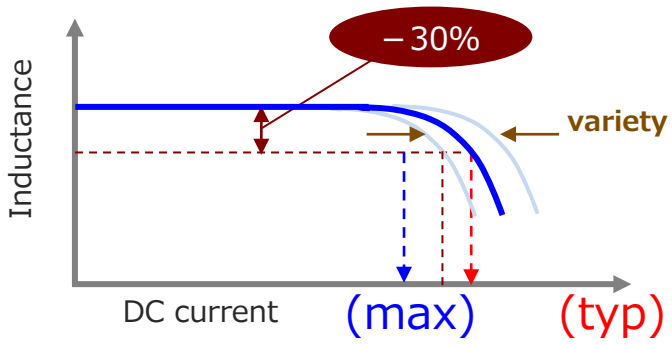
・Temperature rise current (Itemp)
The current value at which the temperature rises between 20°C and 40°C (depending on the item) when DC current is applied.
In the case of the NR series, it is 20°C and 40°C.

Rated current : Superimposed current, temperature rise, whichever is less Current value guaranteed value is Max.

DC superposition characteristics and temperature rise characteristics

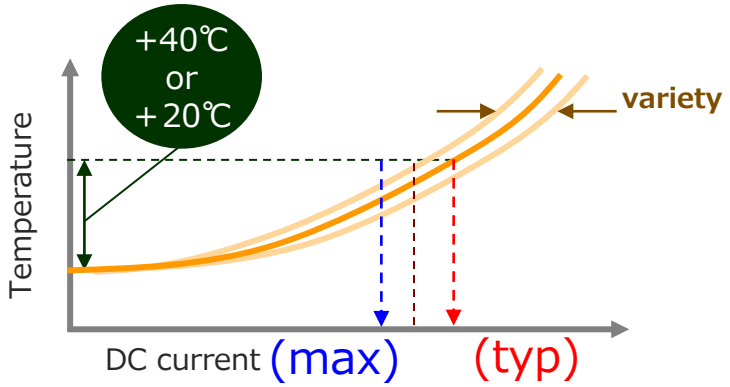
This is IDC1

DC Superposition Characteristics (Saturation Allowable Current) Idc1



This is IDC2

Temperature Rise Characteristics IDC2



Typ : Median Value MAX : Values that take account of variation

・Permissible DC superposition current when the L value drops by 30%

The magnetic saturation lowers the L value and increases the ripple current, causing the IC to lose control. Alternatively, the IC may be damaged.

・The current at a temperature rise of 40°C is the temperature rise allowable current.

As DC current increases, heat generation increases and reliability decreases. In the worst case, wire insulation failure occurs and the wire is burned.