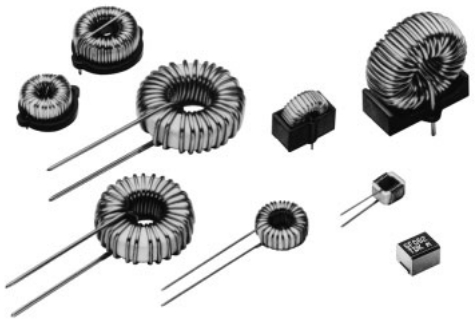
Differential Mode Choke Coils Application Manual

SF Series

The TDK's SF Coil is outstanding in preventing electromagnetic interference(EMI) and radio frequency interference(RFI). The material is used which, in comparison with conventional ferrite materials, shows a marked improvement in the prevention of EMI and RFI.



SF CORE FEATURES

- Since an extremely high saturation flux density is maintained, large current use is possible and the shape is reduced for compact designing.
- As a result of outstanding permeability frequency characteristics, impedance-frequency characteristics are expansive and fully covered of the RF band.
- Temperature characteristics shows excellent linearity.
- Since the relative loss factor is very high, the EMI/RFI prevention effect is remarkable.

SF COIL FEATURES

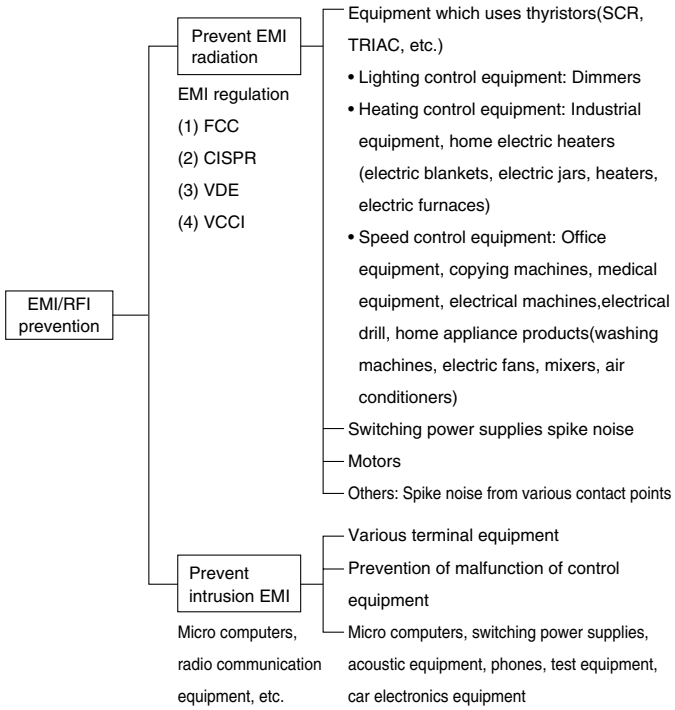
As a result of employing the SF Core, which has the outstanding characteristics described previously, the SF Coil provides the following features.

- As compared to conventional coil which used ferrite or silicon steel cores, EMI/RFI prevention effect shows a good result.
- More compact designing is possible in comparison to conventional coils.
- Since a toroidal shape is employed, leakage flux and acoustic noise are low level.
- Outstanding effectiveness against EMI/RFI entering through the AC lines and generated from thyristor control circuit.

TEMPERATURE RANGES

Operating	–25 to +105°C[Including self-temperature rise]
Storage	–25 to +105°C

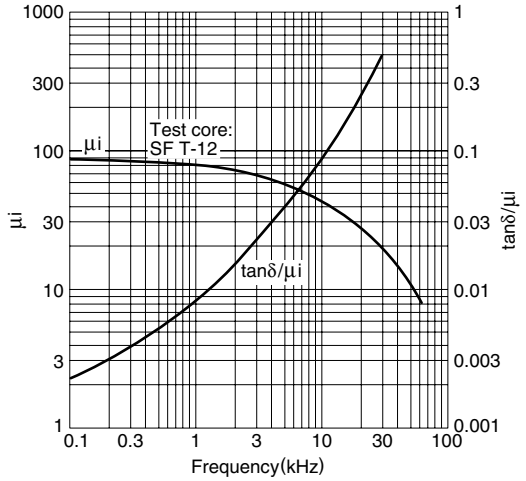
APPLICATIONS



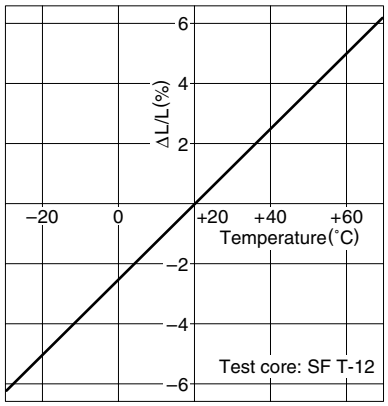
CHARACTERISTICS OF SF CORE MATERIAL

Item	Unit	Typical value	Fig.
μi		75(at 300kHz)	1
tanδ	$\times 10^{-3}$	3(at 300kHz)	1
Applicable frequency	MHz	up to 10	1
Temperature stability ΔL/L	%	5.2(-20 to +20°C) 5.2(+20 to +60°C)	2
Saturation magnetic flux density Bs	mT	1400	3

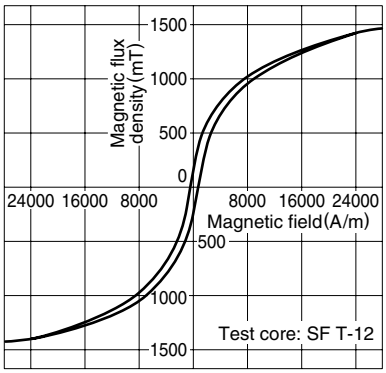
TYPICAL ELECTRICAL CHARACTERISTICS
μi-f AND Tanδ/μ-f CHARACTERISTICS(Fig.1)



TEMPERATURE CHARACTERISTICS(Fig.2)



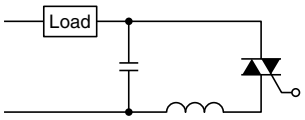
DC HYSTERESIS CHARACTERISTICS(Fig.3)



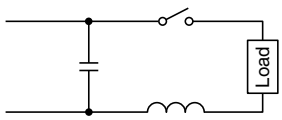
TYPICAL CIRCUITS

(1) PREVENT EMI RADIATION

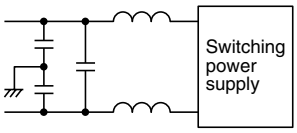
Thyristor noise



Contact noise

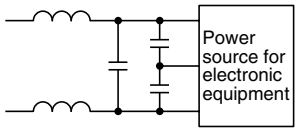


Semiconductor switching noise

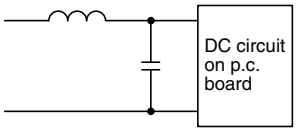


(2) PREVENTING INTRUSION EMI

Preventing external noise, AC line



Preventing external noise, DC line

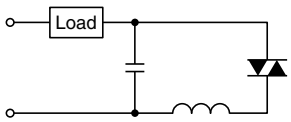


CIRCUIT DESIGN NOTES WHEN USING SF COIL

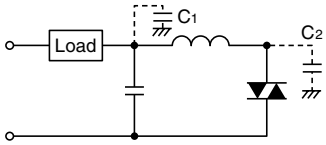
Observe the following points for effective design of circuits when employing SF coil in thyristor control circuit.

(1) CORRECT SF COIL INSTALLATION POSITION

Correct



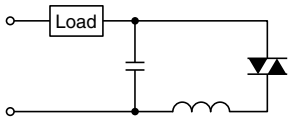
Incorrect



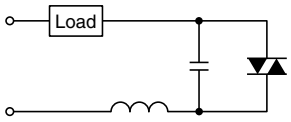
The coil will float more because of C1 and C2 and its preventive effect will be reduced.

(2) CORRECT CAPACITOR INSTALLATION POSITION

Correct



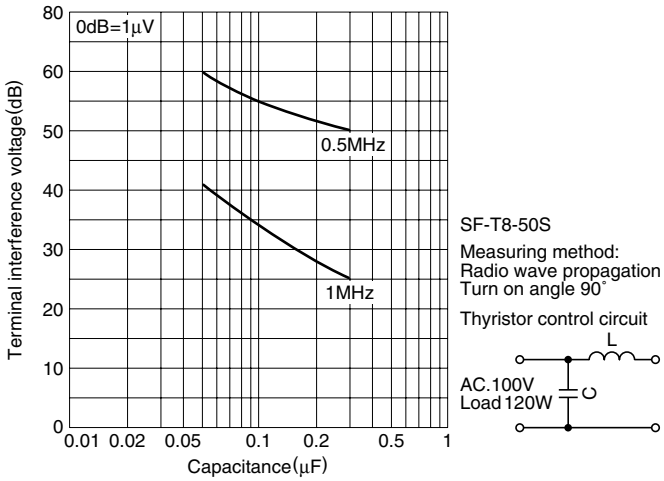
Incorrect



(3) SUITABLE CAPACITOR

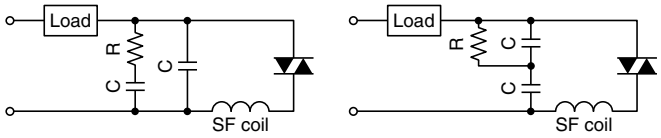
An optimum low pass filter designed can be obtained by employing a capacitor of 0.1 to 0.3μF.

TYPICAL EFFECT OF CAPACITOR



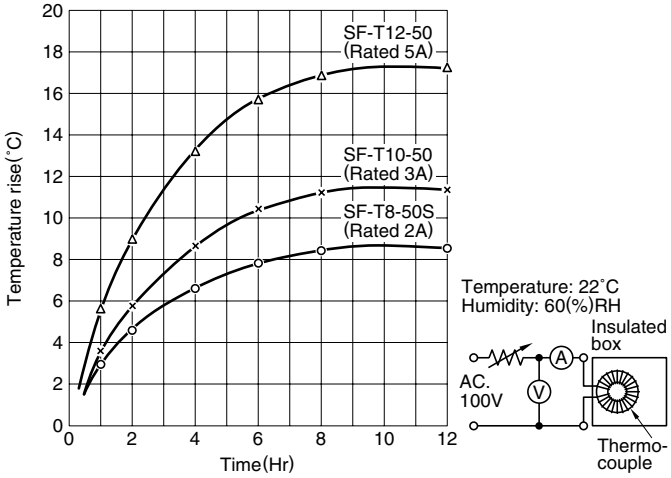
(4) C.R. INSTALLATION POSITION FOR TURNOFF PREVENTION

When a low pass filter is installed in a thyristor control circuit, since ignition may become impossible due to L and C oscillating current, install turnoff prevention C.R. as shown in below.

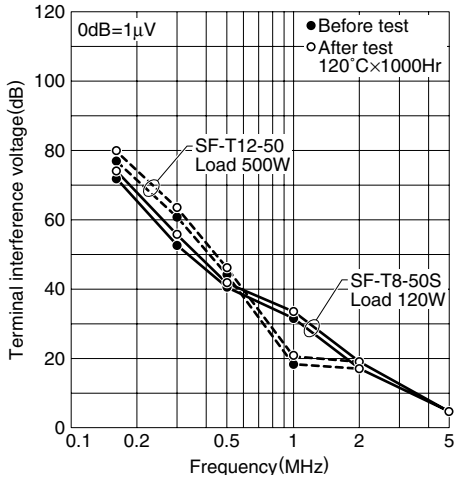


TYPICAL RELIABILITIES

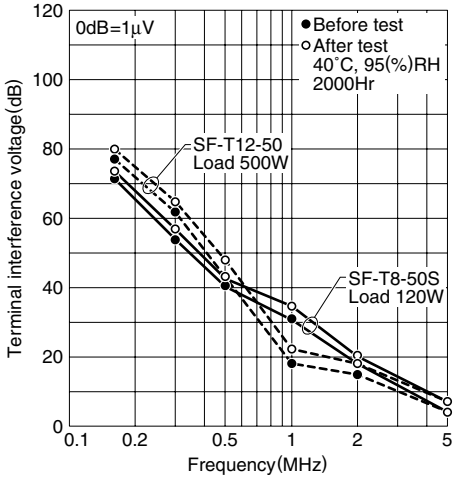
TEMPERATURE INCREASE WITH RESPECT TO RATED CURRENT



TEMPERATURE STABILITY

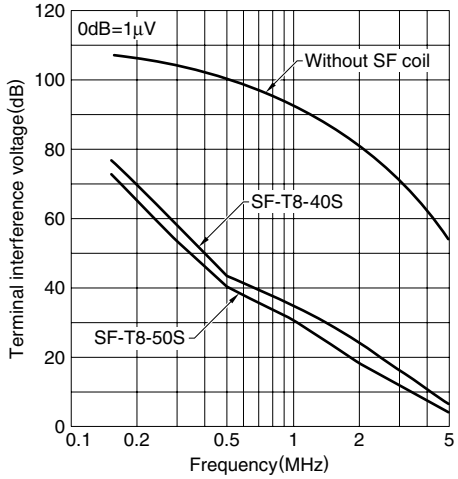


HUMIDITY STABILITY

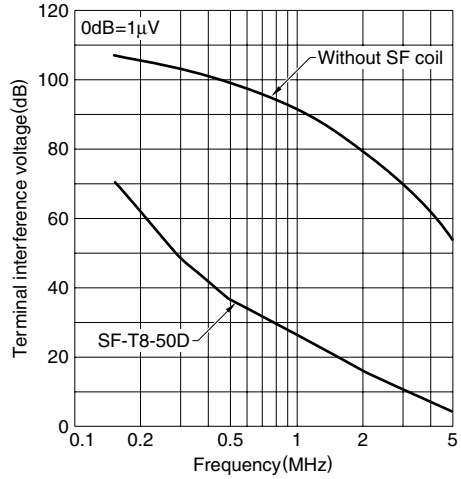


TYPICAL EMI PREVENTION EFFECTS

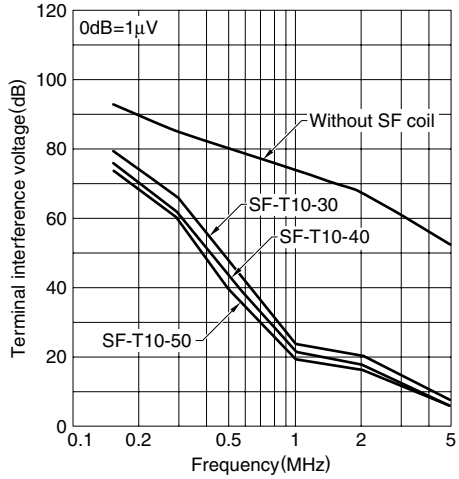
EMI PREVENTION EFFECTS (1)



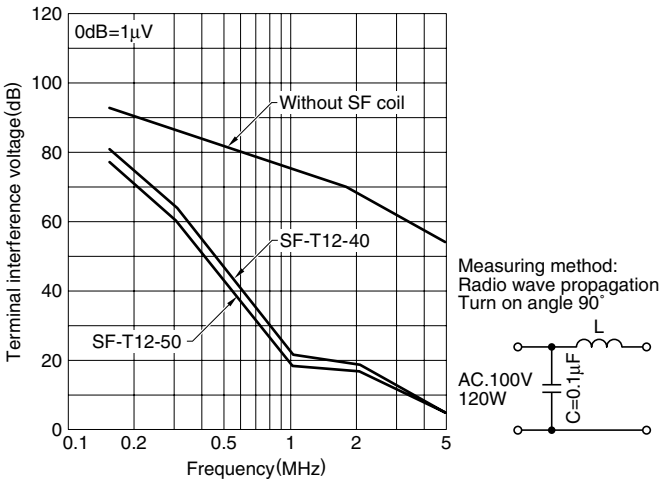
EMI PREVENTION EFFECTS (2)



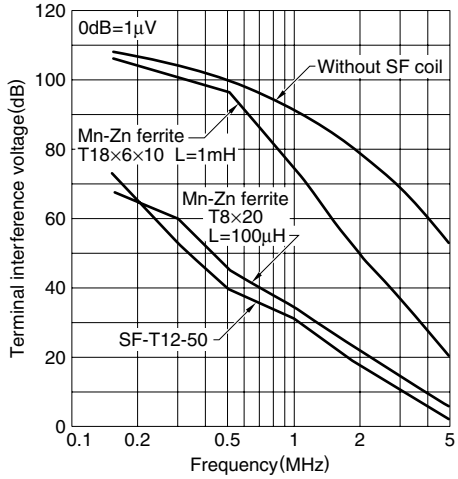
EMI PREVENTION EFFECTS (3)



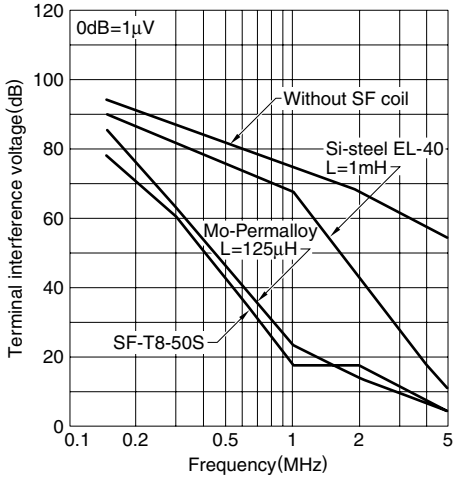
EMI PREVENTION EFFECTS (4)



EMI PREVENTION EFFECTS (5)
COMPARED TO FERRITE



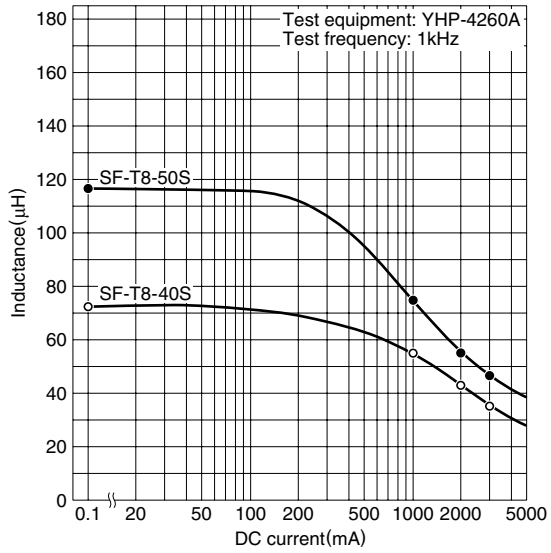
EMI PREVENTION EFFECTS (6)
COMPARED TO Si-STEEL AND Mo-PERMALLOY



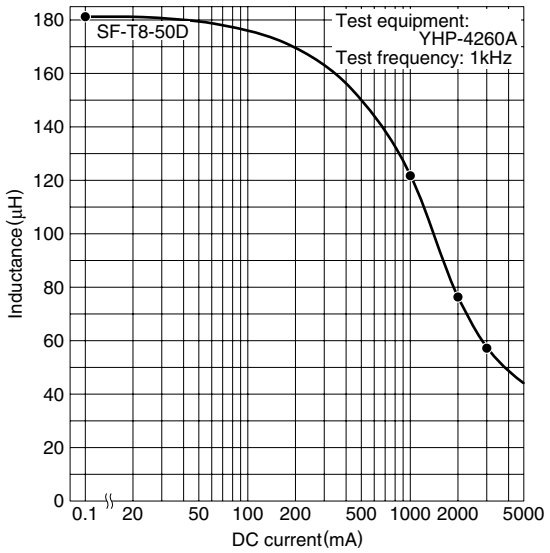
TYPICAL ELECTRICAL CHARACTERISTICS

INDUCTANCE vs. DC SUPERPOSITION CHARACTERISTICS

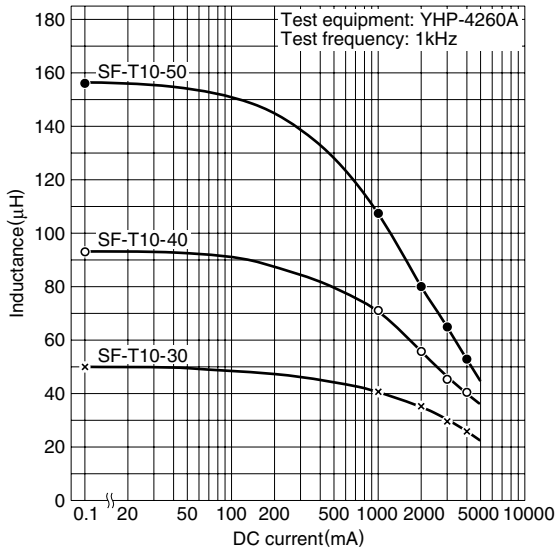
SF-T8S



SF-T8D



SF-T10



SF-T12