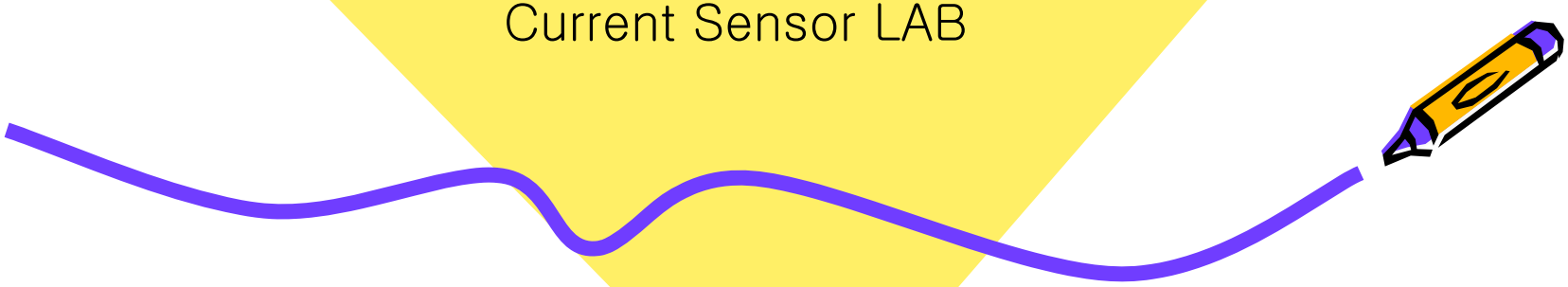
Non-Contact Current Sensor

2013. 06. 13

Current Sensor LAB



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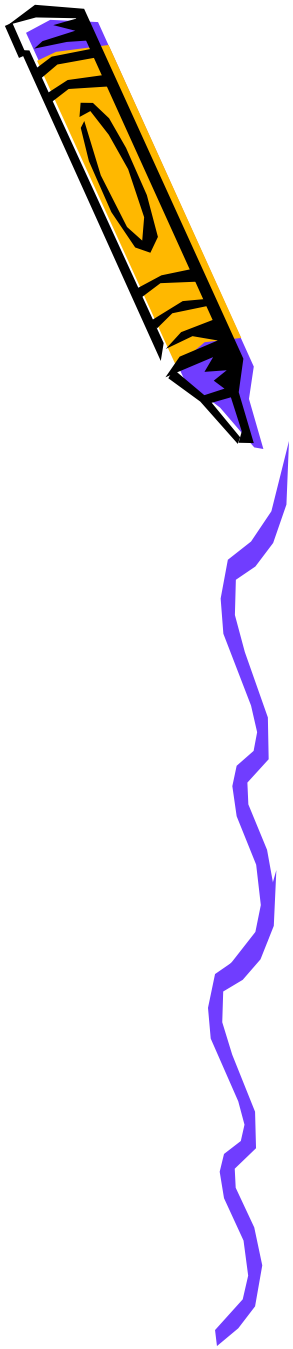
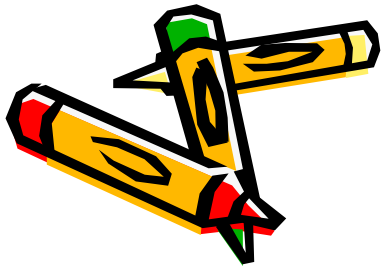
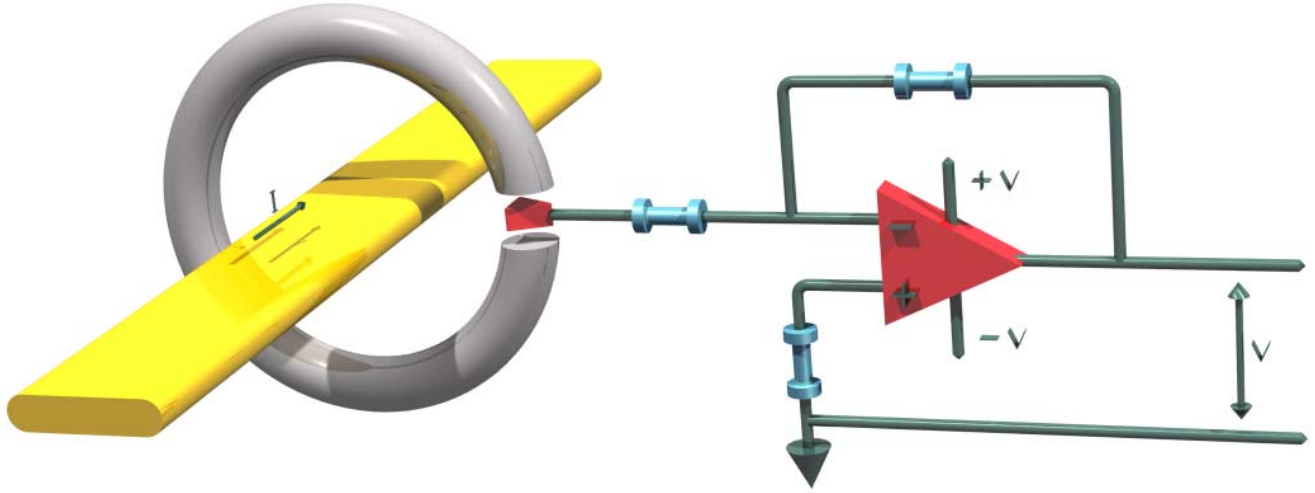
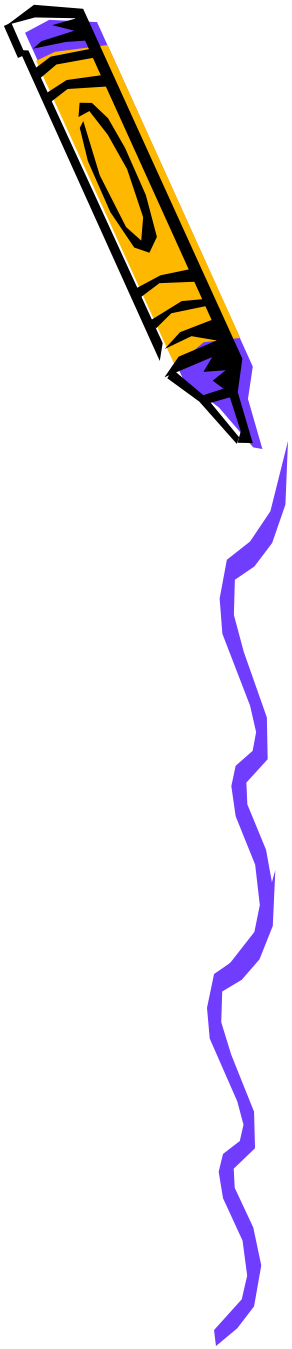




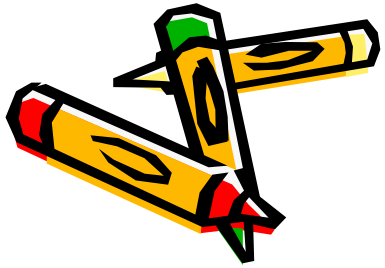
1. Open Loop Hall Type Current Sensor



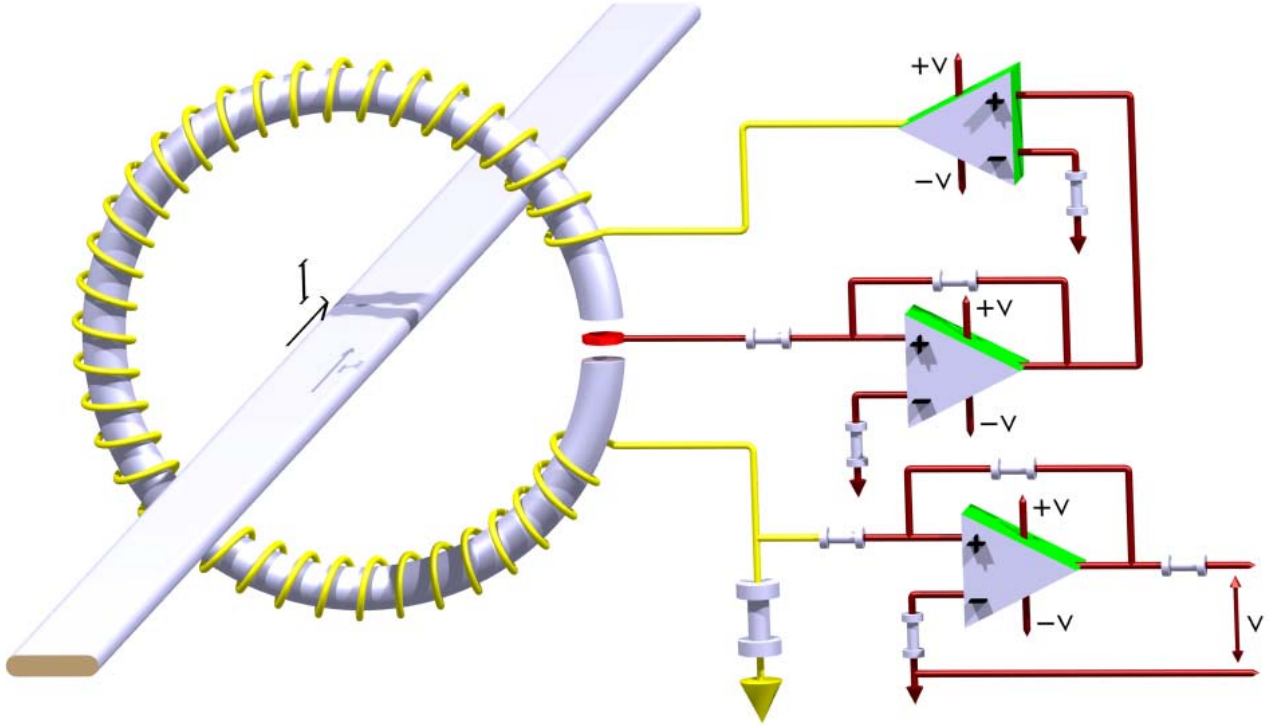
2. Open Loop Current Sensor Feature



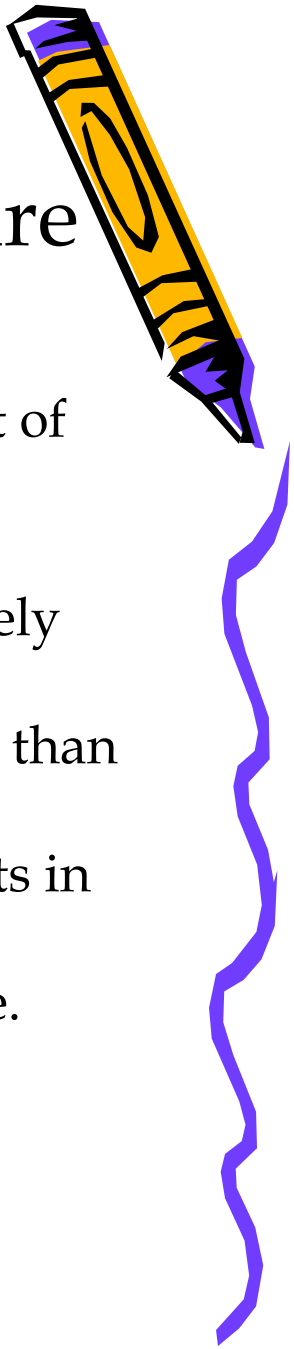
- Hall Effect Principles Used.
- 1879 American physicist Edwin Hall discovered
- Open Loop Type is haved low accuracy because of nonlinear Hysteresis of magnetic core for increasing magnetic flux.
- Hall device is had the presence of unbalanced voltage for quantum effects..
- GaAs type hall device is widely used in open loop type current seonsor because of more excellent temperature feature than InSb devices.
- Had low accuracy because of not feed back circuit.



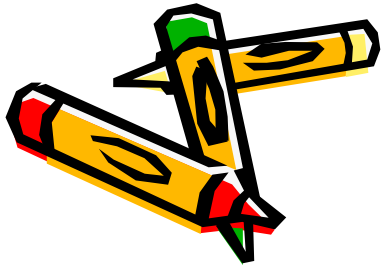
3. Closed Loop Hall Type Current Sensor



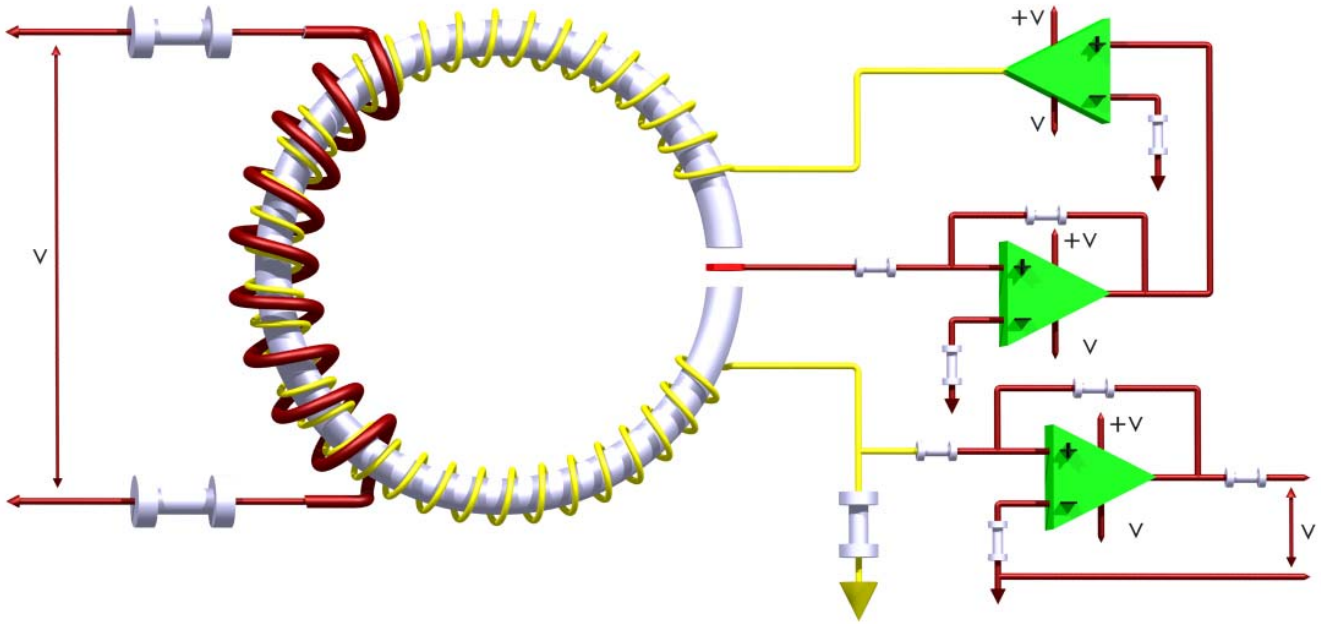
4. Closed Loop Current Sensor Feature



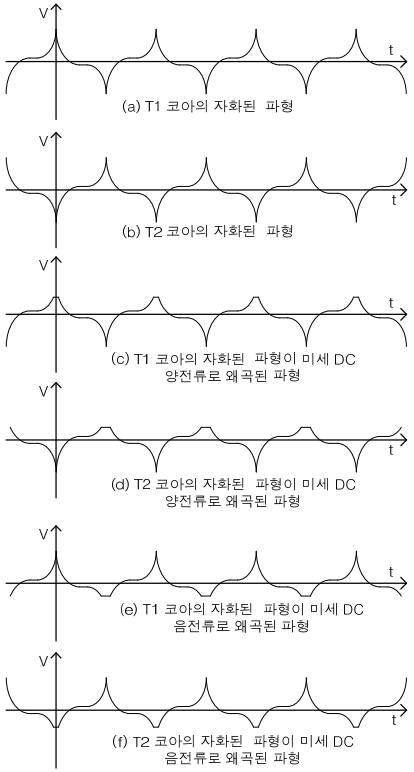
- For Improvement of nonlinear property, measurement of current by compensation current.
- Offset of Hall Sensor is still exists with Open Loop.
- InSb hall device is had greater Hall Voltage. It is widely used in Closed Loop Type.
- Because of used Feed Back circuit, had better accuracy than Open Loop.
- Flux change of magnetic core in magnetic field presents in compensation winding and electronic circuit.
- Closed Loop is sensitive to the nature of magnetic core.

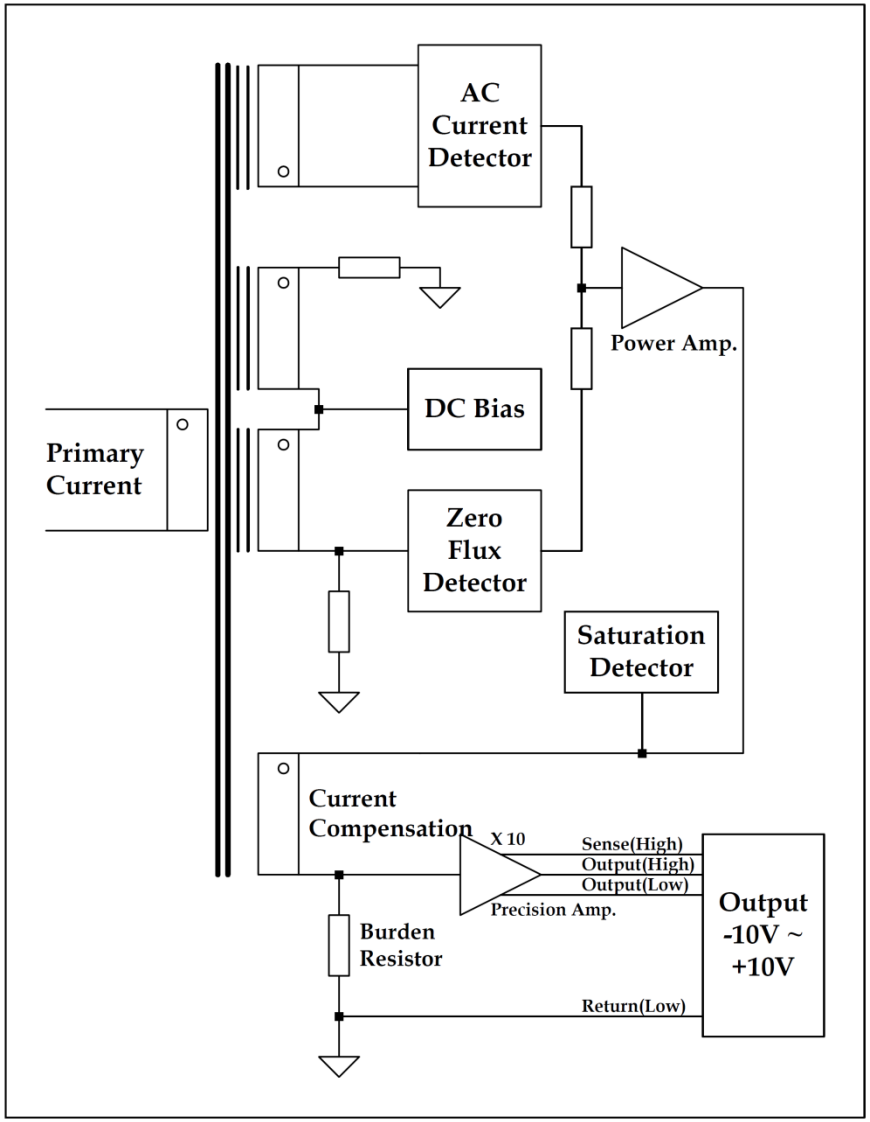


5. Closed Loop Hall Type Voltage Sensor



6. NFCT Current Sensor
(New Fluxgate Current Transformer)





Fluxgate current sensor

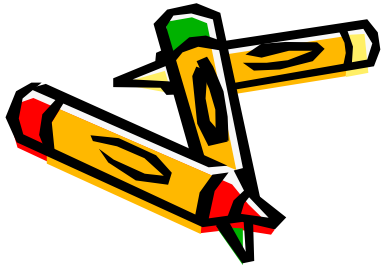
1. Tow Core used
2. Three Core used
3. Flux Detector Tech

NFCT Current Sensor
(Patent pending)

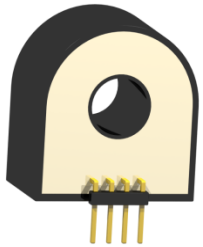
1. DC Bias Idea
2. New Fluxgate Technology of Flux detector method
3. Nano-crystalline Core
4. Cut Core available
5. Saturation Detecor Circuit Idea

7. NFCT Current Sensor Feature

- New Fluxgate Current Sensor is using the magnetic properties of the nonlinear.
- In the 1940, Developed in Germany, to search for the submarine.
- Hysteresis Property of Magnetic Core is include Odd Harmonic component
- Magnetic Flux that occur outside of magnetic core is includ Even Harmonic component.
- Core from the original use of the non-linear characteristics, so, Core is not affected by the deviation.
- Sensitive to changes in the magnetic field, so response is very excellent.

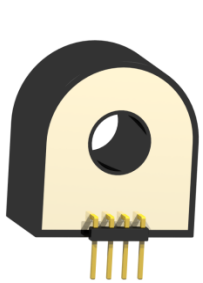


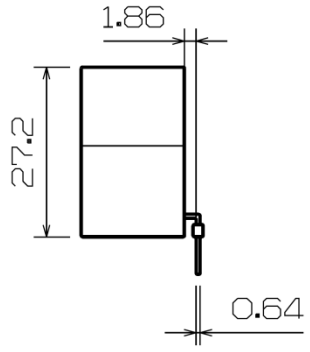
8. NFCT Type 100A Product

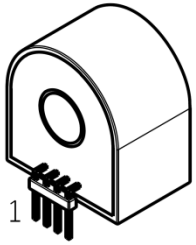


Nominal primary current	100A	A r.m.s.
Measuring range @ ±15V (±5%)	150A	A peak
Max. measuring resistance @ I_p max & ±15V (±5%)	40	Ω
Min. measuring resistance @ I_{PN} & ±15V (±5%)	5	Ω
Turn number	1500	turn
Secondary current at I_{PN}	100/1500	mA
Accuracy at I_{PN} @ +25°C	≤±0.1	%
Accuracy at I_{PN} @ -5 ~ +85°C	≤±0.2	%
Accuracy at I_{PN} @ -20 ~ +85°C	≤±0.5	%
Offset current @ +25°C	≤±100	uA
Linearity	≤±0.05	%
Thermal drift coefficient @ -5 ~ +85°C	≤2	uA/°C
Thermal drift coefficient @ -20 ~ +85°C	≤5	uA/°C
Delay time	≤0.5	us
di/dt correctly followed	≤60	A/us
Banwidth @ -1dB	≤300	kHz
Max. no-load consumption current @ ±15V (±5%)	≤20	mA
Secondary resistance @ +85°C	≤110	Ω
Dielectric strength Primary/Secondary @ 50Hz, 1min	3	kV
Supply voltage @ ±5%	±12 or ±15	V dc
Voltage drop	≤2	V
Mass	0.018	kg
Operating temperature	-20 ~ +85	°C
Storage temperature	-25 ~ +125	°C

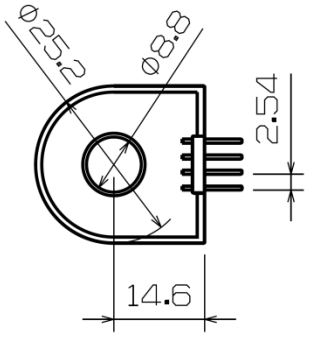
9. NFCT Type 100A Product Dimensions

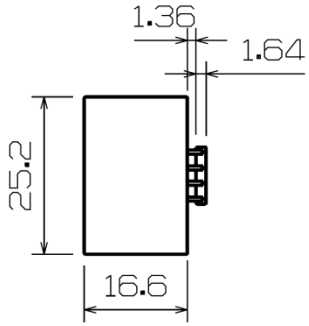


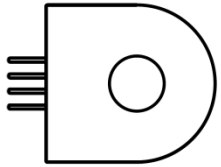




1 : +15V
2 : −15V
3 : Cout
4 : GND







10. L Company Hxx-600A Comparison

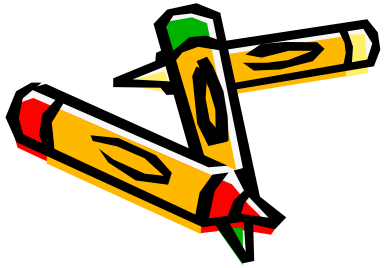
	L Company (Hxx600A)	HOCT600A
Measurement Type	Hall Voltage Detector Type	Hall Voltage Detector Type
Output Voltage @ I_{PN}	±4V ±40mV	±4V ±30mV
Residual Voltage @ 0A	< ±20mV	< ±15mV
Linearity @ 25°C	< ±1%	< ±1%
Maximum Measurement Current	0 ~ ±900A	0 ~ ±1000A
Thermal Drift(TCR) @ I_{PN}	< 0.1%/°C	< 0.1%/°C
Thermal Drift(TCR) @ 0A	< 1mV/°C	< 1mV/°C
Frequency Response@ 90% of I_P	< 3 μs (@ di/dt = 50A/μs)	< 3 μs (@ di/dt = 50A/μs)
Operating Temperature	-10°C ~ +80°C	-15°C ~ +85°C
Power Supply	±15V_{dc} ±5%	±15V_{dc} ±5%

HOCT(Hall Open Type Current Transformer) Feature

1. Excellent temperature characteristics
   - Low Thermal Expansion of Magnetic core
   - Additional temperature compensation circuit
2. Superior technology and improved productivity that increasing price competitiveness

11. L Company CKxx-50A Comparison

	L Company (CKxx 50A)	HOCT600A
Measurement Type	Fluxgate Type	Fluxgate Type
Output Voltage @ I_{PN}	+4V ±0.8%	+4V ±0.1%
Residual Voltage @ 0A	< ±10mV	< ±1mV
Linearity @ 25°C	< ±0.1%	< ±0.05%(50ppm)
Maximum Measurement Current	0 ~ ±150A	0 ~ ±150A
Thermal Drift(TCR) @ I_{PN}	< 0.05%/°C	< 0.01%/°C
Thermal Drift(TCR) @ 0A	< 100μV/°C	< 10μV/°C
Frequency Response@ 90% of I_P	300KHz(@3dB)	300KHz (@1dB)
Operating Temperature	-40°C ~ +105°C	-45°C ~ +125°C
Power Supply	$+5V_{dc}$ ±5%	$+5V_{dc}$ ±5%



NFCT(New Fluxgate Current Transformer) Feature

1. Very Excellent temperature characteristics
   - Using the three magnetic
   - Fluxgate Sensing Technology Adoption
2. Superior technology and improved productivity that increasing price competitiveness

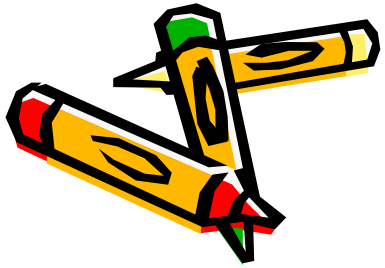
12. NFCT Product Code

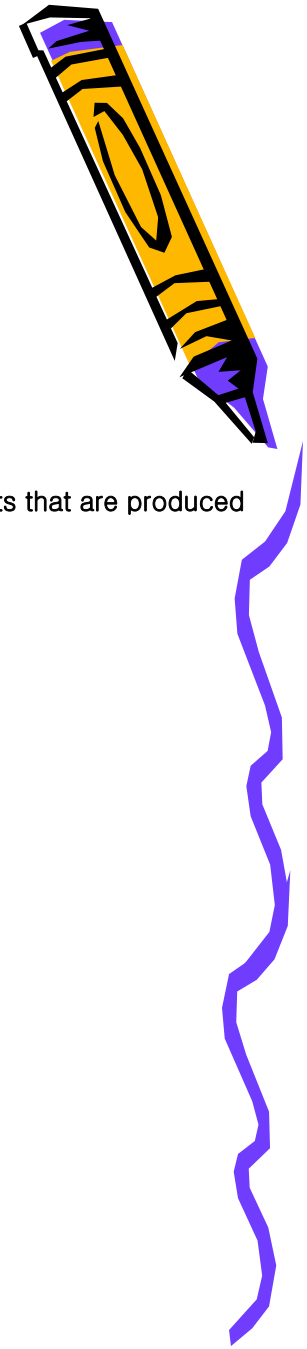
Product Code : NFCT xxxx xxx x

Measurement Capacity
0A01 : 10mA
0A02 : 20mA
0A25 : 250mA
0A50 : 500mA
03A0 : 3A
20A0 : 20A
50A0 : 50A
100A : 100A
300A : 300A
500A : 500A
1KA0 : 1000A
2KA0 : 2000A
2K5A : 2500A
5KA0 : 5000A
100K : 100KA

Supply PowerType
U05 : +5V
B05 : +/-5V
U15 : +15V
B15 : +/-15V
U24 : +24V
B24 : +/-24V

Mount Type
C : Connector
P : PCB





Family of products that are produced

NFCT0A25U05C
NFCT0A25U05P

NFCT03A0U05C
NFCT03A0U05P

NFCT20A0U05C
NFCT20A0U05P

NFCT50A0U05C
NFCT50A0U05P

NFCT100AU05C
NFCT100AU05P

NFCT50A0B15C
NFCT50A0B15P

NFCT100AB15C
NFCT100AB15P

NFCT300AU15C