

TH0410 High Frequency Coaxial Shunt



1. Summary

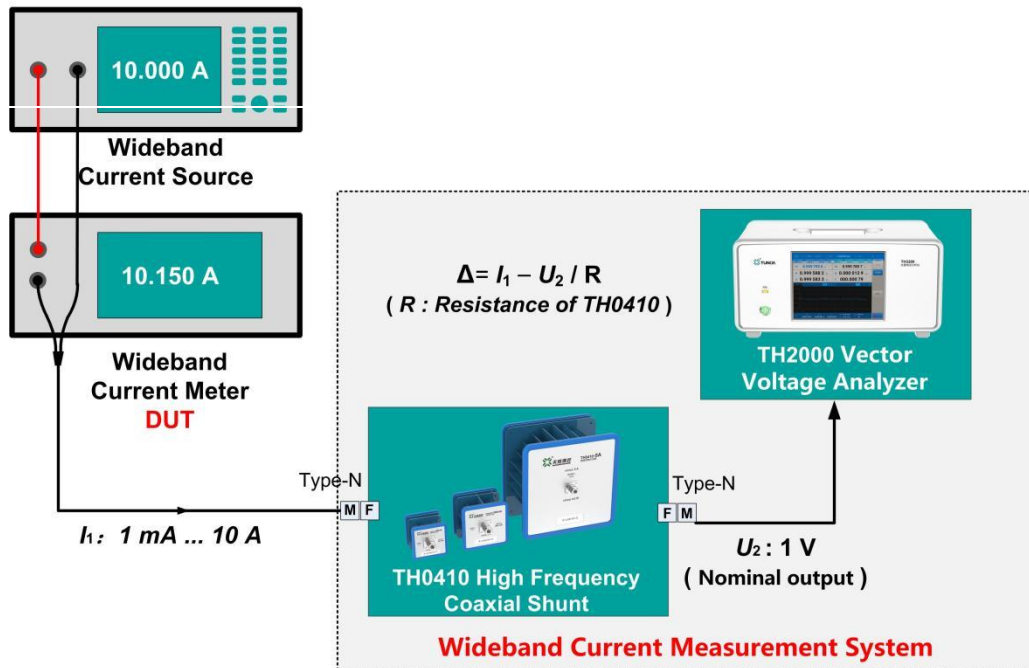
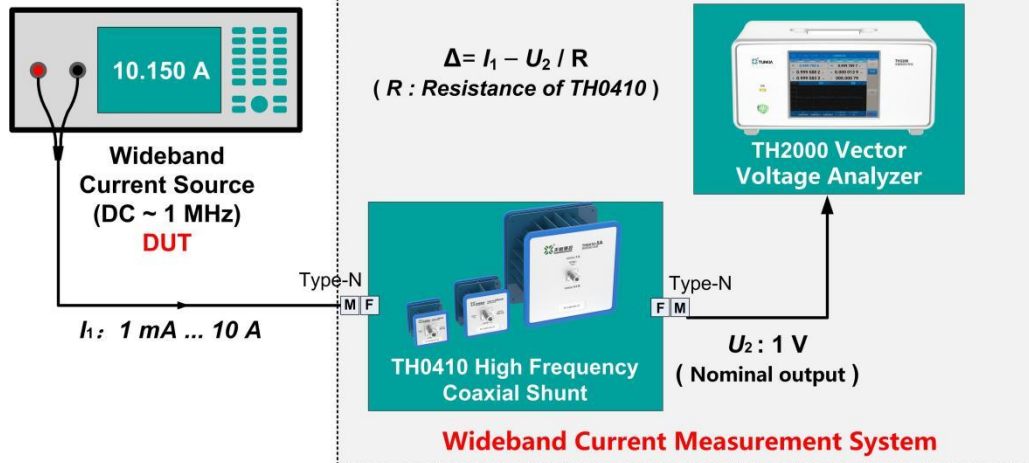
TH0410 is a set of nine precision AC/DC shunts of different ranges that convert a nominal input current of 20 mA ~ 10 A to 1 V Small voltage, easy to access voltage high-speed sampling system or high-precision data meter, to achieve wideband or complex waveform current measurement, or used to calibrate wideband current sources, transformers, sensors, etc.

2. Features

- Operating frequency: DC ~ 1 MHz
- AC and DC difference: ≤ 30 ppm @53Hz
- Optimal phase displacement: 5 μ rad
- The nominal output voltage is 1 V (other voltage values can be customized).
- The typical annual variation is typically 5 ppm and the maximum is 18 ppm.
- The 1 mA, 10 mA versions mate buffers to reduce output impedance.

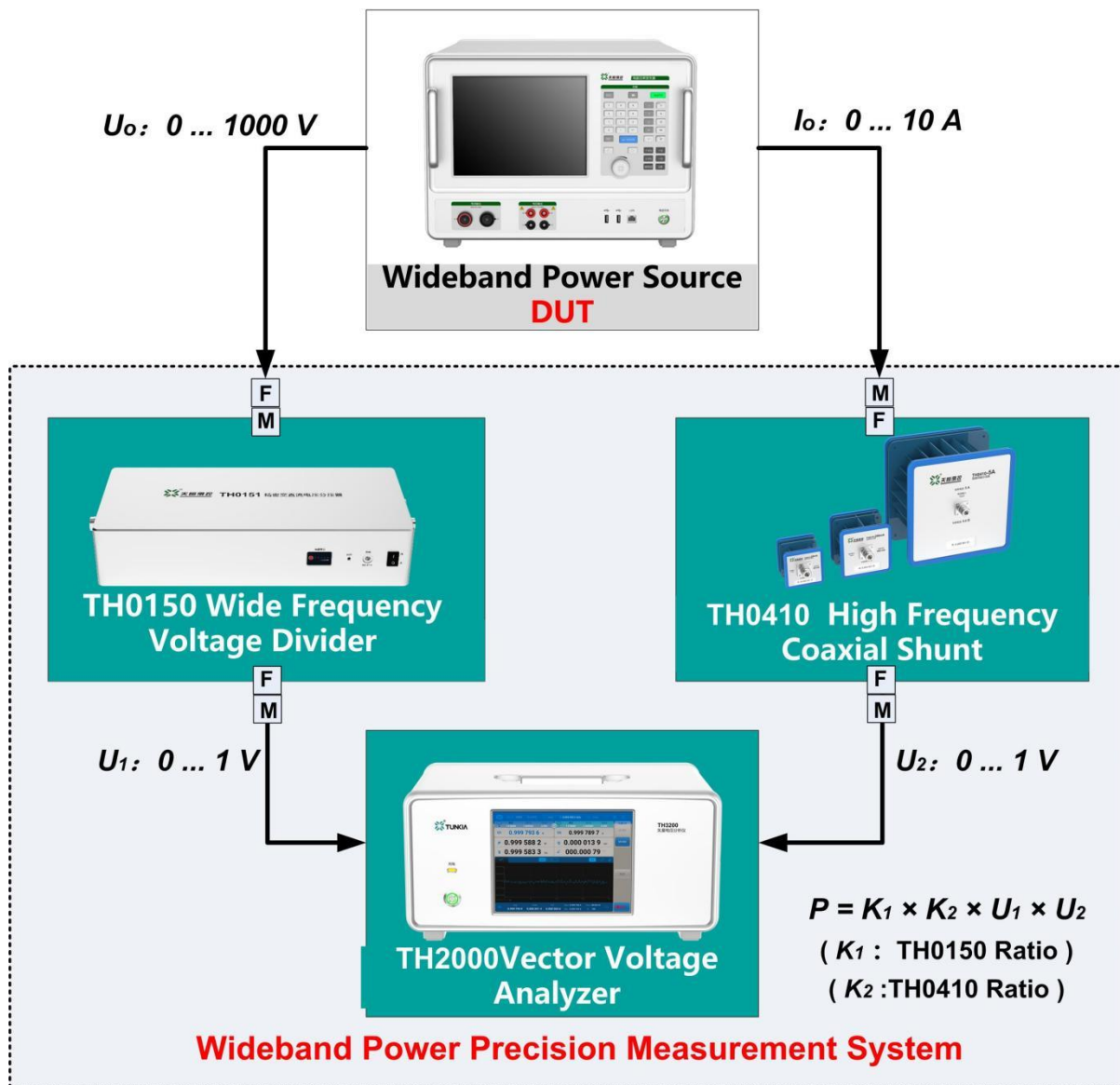
3. Applications

☆ Build Wideband Current Measurement System



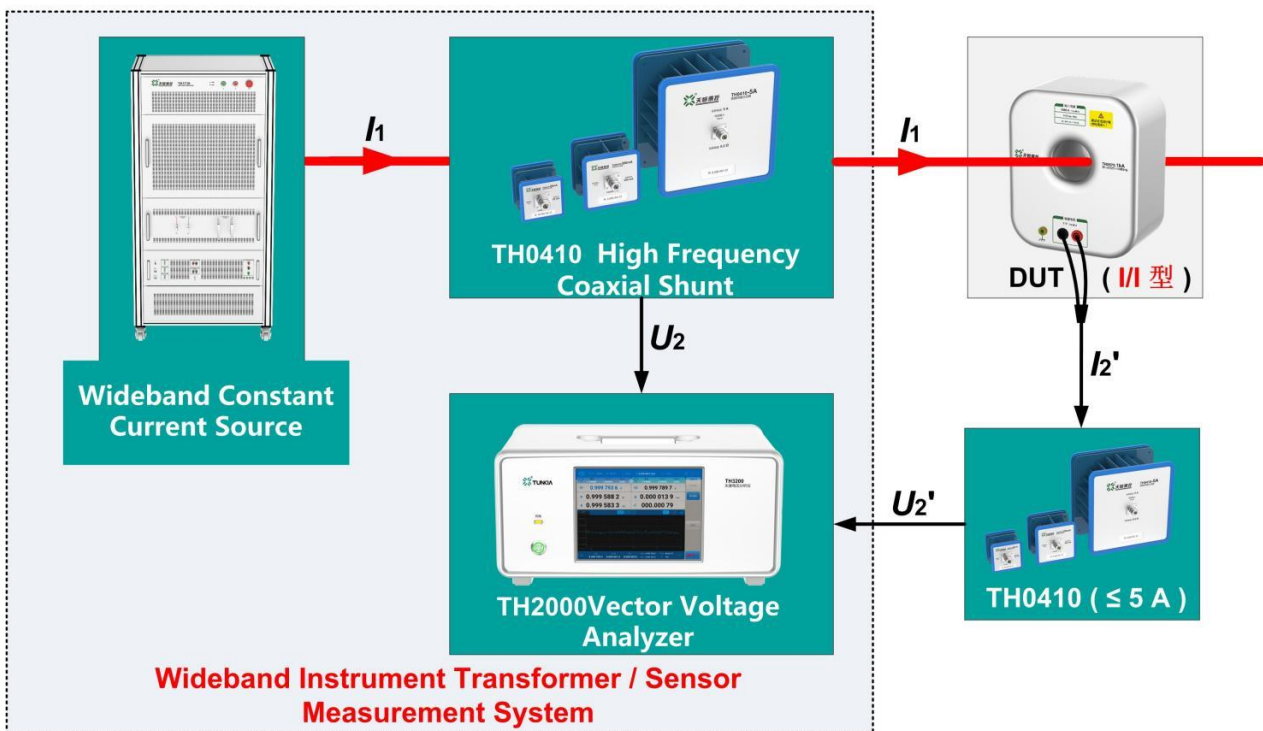
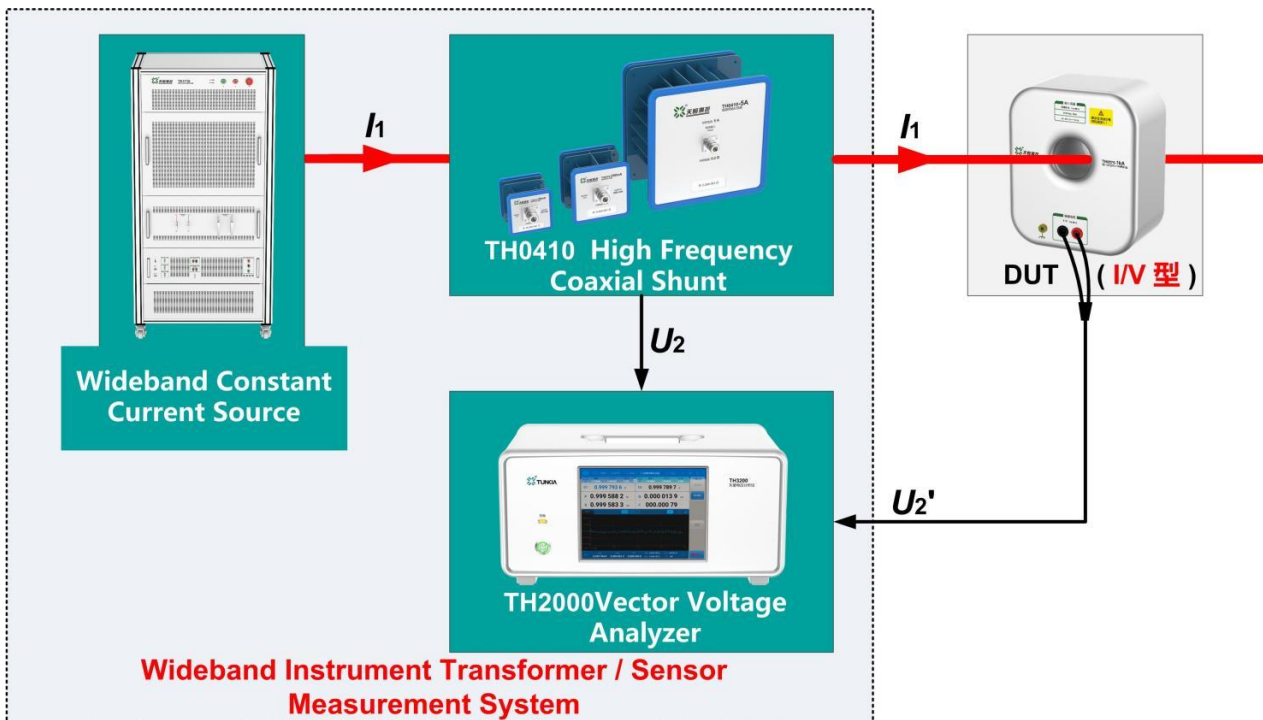
TH0410 can be used with wideband current source, wideband standard voltmeter (such as TH2000 vector voltage analyzer), etc. to form a wideband current **measurement system**, which is used to measure wideband current signals, calibrate wideband current sources, wideband ammeters, etc.

☆ Set up wideband power precision measurement system



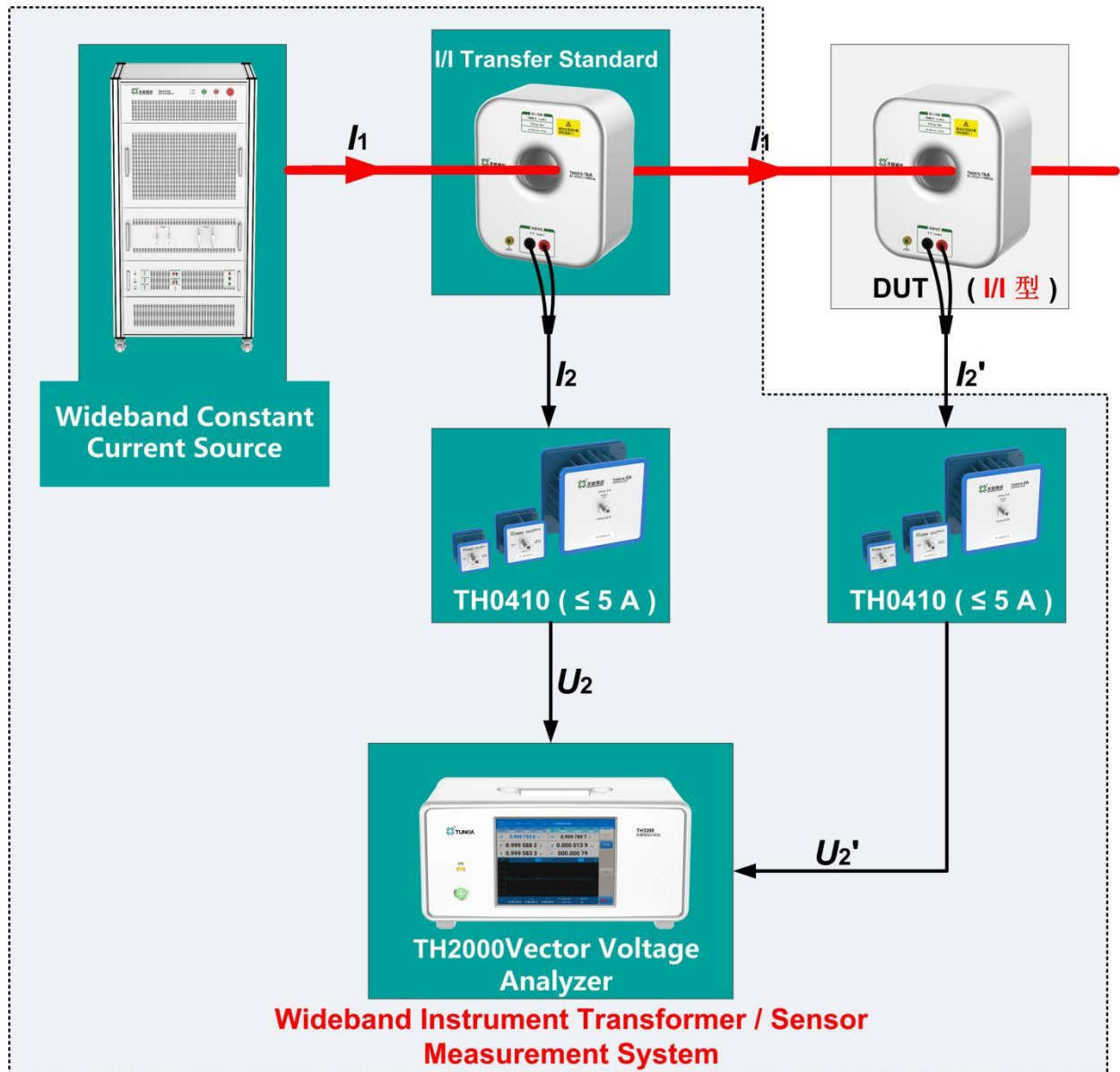
TH0410 can be used with high-frequency V/V conversion standard and TH2000 vector voltage analyzer to form a wideband power/energy precision measurement system for measuring wideband power/ Power signal, calibration of wideband power source, wideband power meter, power analyzer and other equipment.

☆ Build a wideband instrument transformer / sensor measurement system



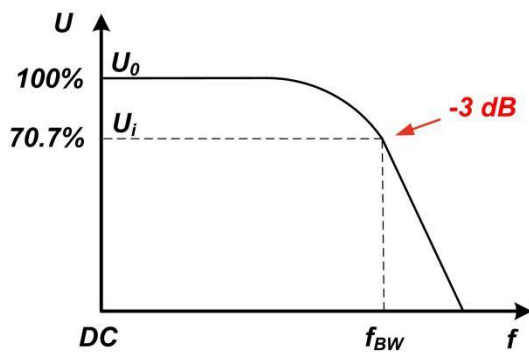
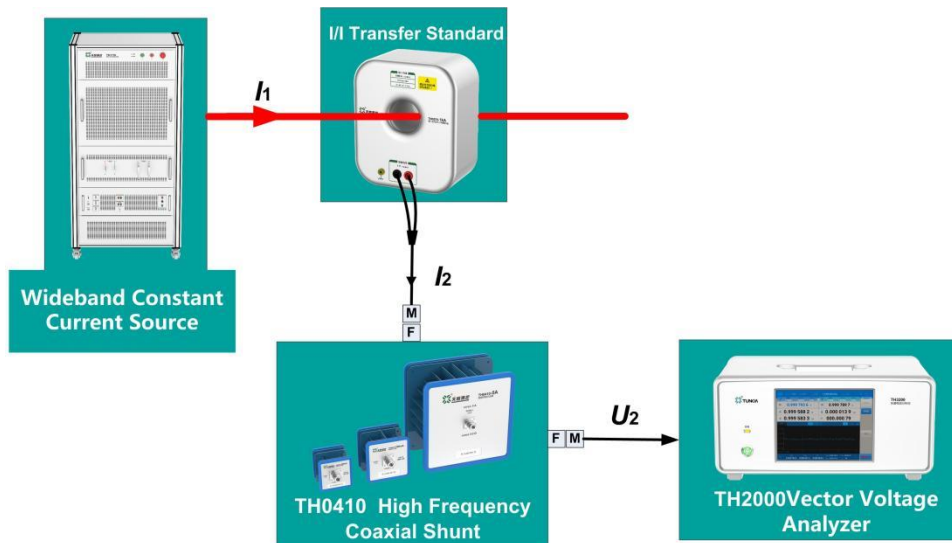
For the calibration of the transformer or sensor under test with a nominal current of $\leq 10A$, TH0410 can be used directly as the standard device, with a wideband constant current source and a wideband sensor tester (vector voltage analyzer), etc. to form **a wideband transformer/sensor measurement system.**

☆ Build a wideband transformer/sensor calibration system



For calibration of transformers or sensors with nominal currents greater than 10 A, TH0410 is used as a secondary signal I/V converter for standard and tested equipment, with wideband constant current source, wideband sensor testers (vector voltage analyzers), etc. form **wideband transformers/sensor measurement systems**.

☆ Set up sensor bandwidth calibration system



Note: Bandwidth - as the frequency increases, the output amplitude drops to 70.7% of the initial value;
Calculation formula: $G = 20\lg(U_0/U_i) = -3 \text{ dB}$

TH0410 can be used with wideband standard voltmeters (such as TH2000 vector voltage analyzer) to form a **sensor bandwidth calibration system**.

4. Specifications

4.1 Resistance

Specifications	Nominal resistance (Z)	Initial deviation [1] (±μΩ/Ω) @ (23±1)°C	Annual stability (±μΩ/Ω)	Temperature coefficient (±ppm/K)	Power factor [2]. (±ppm/rated power)
TH0410-20mA	50	50	18	2.5	1
TH0410-50mA	20	50	18	2.5	1
TH0410-100mA	10	50	18	2.5	2
TH0410-200mA	5	50	18	2.5	4
TH0410-500mA	2	50	18	2.5	12
TH0410-1A	1	50	18	4.0	25
TH0410-2A	500 m	50	18	4.0	25
TH0410-5A	200 m	50	18	4.0	30
TH0410-10A	100 m	50	18	4.0	60

Note [1]: The initial deviation is the maximum offset of the resistance value under DC conditions, usually the manufacturer's factory warranty; Higher accuracy can be customized according to user requirements, such as 20 μΩ/Ω.

Note [2]: When measuring DCI with a coaxial shunt, the resistance value changes due to the heat generation of the resistor itself at different input currents, resulting in an error, and the calculation formula is:

$$\gamma = \text{power coefficient} \times \left[1 - \left(\frac{\text{Current measurement}}{\text{Nominal current value}} \right)^2 \right]$$

4.2 Current measurement

Specifications	Primary nominal current (A)	Secondary nominal Voltage (V)	AC/DC difference ^[3] (±ppm)			Maximum operating Current (A)	Instantaneous current (A, <5 s)
			50 Hz	1 kHz	1 MHz		
TH0410-20mA	20 m	1	20	25	50	40m	250m
TH0410-50mA	50 m	1	20	25	50	100m	500m
TH0410-100mA	100 m	1	20	25	25	200m	1.5
TH0410-200mA	200 m	1	20	25	25	500m	2
TH0410-500mA	500 m	1	20	25	25	1	3
TH0410-1A	1	1	20	25	30	1.5	4
TH0410-2A	2	1	20	30	50	2.5	6
TH0410-5A	5	1	20	30	80	5.5	20
TH0410-10A	10	1	20	30	100	11	30

Note [3]: The measured value of AC current should be calculated according to the following formula, and the unit of AC and DC difference is ppm:

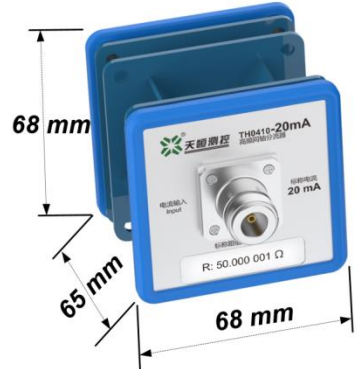
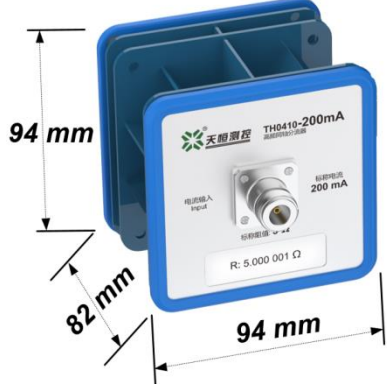
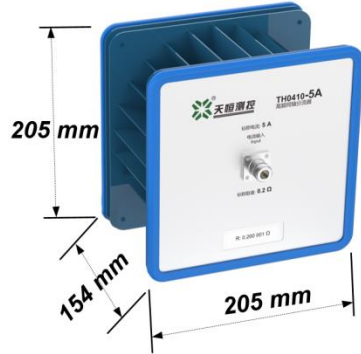
$$\text{AC current measurement} = \left(\frac{\text{Voltage measurement}}{\text{nominal resistance}} \right) \times \left(1 + \frac{\text{AC} - \text{DC difference}}{1\,000\,000} \right)$$

4.3 Phase displacement

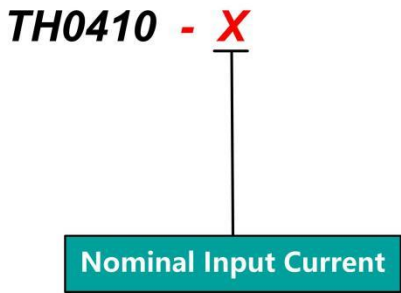
Specifications	Phase displacement ($\pm\mu\text{rad}$)						
	53 Hz	400 Hz	1 kHz	10 kHz	50 kHz	100 kHz	1 MHz
TH0410-20mA	5	5	10	100	400	800	800
TH0410-50mA	5	5	10	100	400	800	800
TH0410-100mA	5	5	10	60	300	500	500
TH0410-200mA	5	5	10	60	300	500	500
TH0410-500mA	5	5	10	60	300	500	500
TH0410-1A	5	5	10	60	300	500	500
TH0410-2A	10	10	15	110	500	1000	1000
TH0410-5A	10	15	25	200	1000	2000	2000
TH0410-10A	10	20	40	300	1500	3000	3000

5. General Specifications

Power supply	—
Temperature performance	Working temperature: 13°C~33°C; Calibration temperature: 18°C~28°C; Storage temperature: 5°C ~ 45°C Note: When stored in harsh temperature environments, it may cause a temporary change in the resistance value and return to the original resistance value within the next 30 days.
Humidity performance	Operating humidity: < 50% R·H Storage humidity: (15%~80%) R·H, no condensing
Altitude	< 3000 m
Connection method	Input connection: Use Type-N female plug; Output connection: Use Type-N female plug.

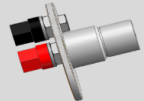
Specifications	Size(mm) (W×D×H) (without terminal blocks)	Weight (kg)	Dimensional drawing
TH0410-20 mA TH0410-50 mA TH0410-100mA	65 × 68 × 68	0.1	
TH0410-200mA TH0410-500mA TH0410-1A TH0410-2A	82 × 94 × 94	0.2	
TH0410-5A TH0410-10A	154 × 205 × 205	1	

6. Ordering Information

	Model	Nominal current
	TH0410-20mA	20 mA
	TH0410-50mA	50 mA
	TH0410-100mA	1,00 mA
	TH0410-200mA	200 mA
	TH0410-500mA	500 mA
	TH0410-1A	1 A
	TH0410-2A	2 A
	TH0410-5A	5 A
	TH0410-10A	10 A

7. Accessories

7.1 Accessory List

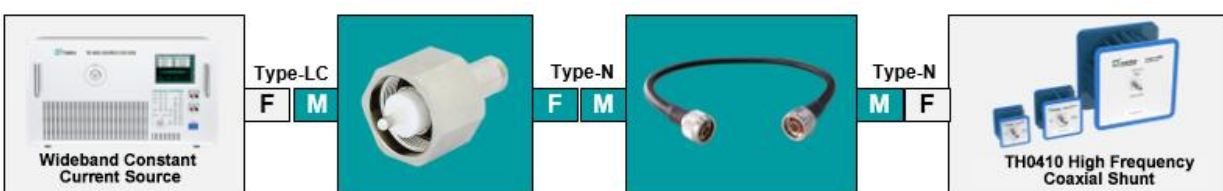
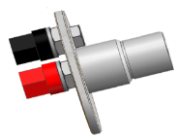
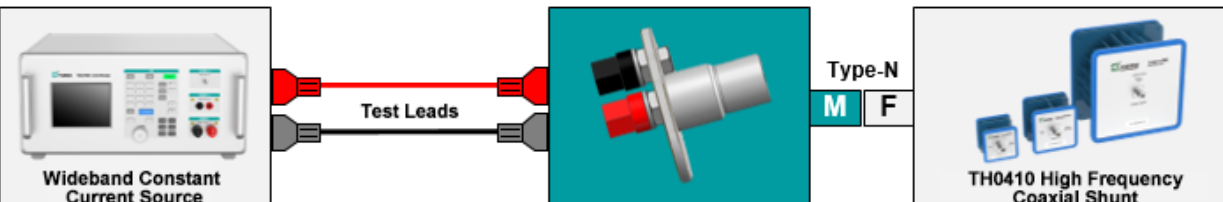
S/N	Pic	Name	Specification	Qty	Remark
1		Adapter	LC male-N female, 20 A	1	Optional
2		Current connecting wire	N male-N male	2	Optional
3		Adapter	N male-terminal block	2	Optional
4		Low Current T-Connector	N female connector, 20 A	1	Optional
5		Adapter	N male-BNC female	2	Optional
6		Voltage test wire	BNC male-BNC male	2	Optional
7		Adapter	BNC male-dual banana	2	Optional
8		Adapter	BNC female-BNC female	2	Optional
9		Voltage test lead	N male-N male	2	Optional
10		Single gain precision buffer	1MHz, N female input-N male output	1	Optional
11		Adapter	N female-N female	2	Optional
12		Voltage test lead	BNC male-dual banana plug	2	Optional
13		Adapter	BNC male-dual banana	2	Optional

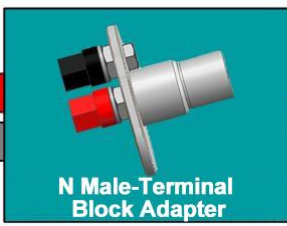
S/N	Pic	Name	Specification	Qty	Remark
14		Packing box	Portable storage box	1	Optional

Note: The above is the quantity included in the complete set of accessories, users can also purchase them separately. The ordering information must be specified in the contract.

7.2 Accessory Application

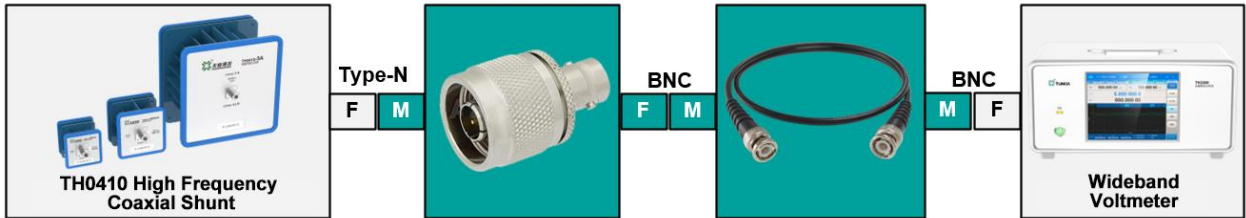
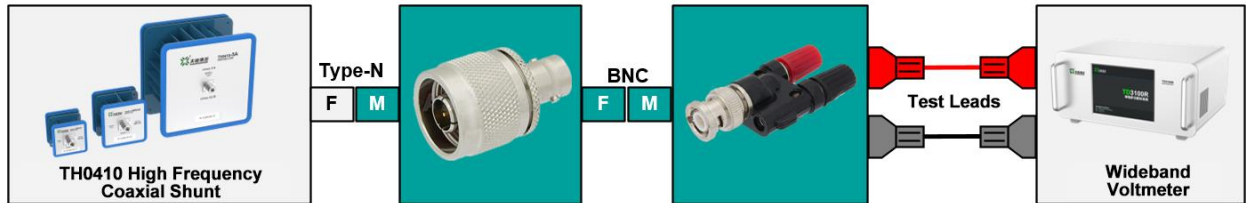
7.2.1 Current Input Terminal

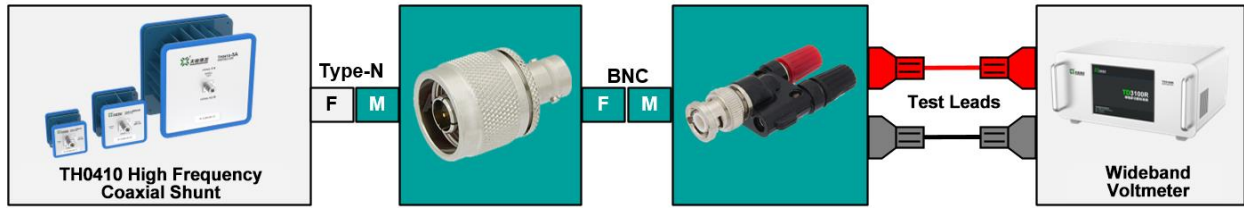
Name and Picture	Qty	Application
 LC Male-N Female Adapter	1	As a current connector, it is used to connect a wideband current source with a female LC output end to TH0410. The application diagram is shown below.
 N Male-N Male Current Input Cable	1	
		
 N Male-Terminal Block Adapter	1	As a current connector, it is used to connect the wideband current source of the conventional terminal block with TH0410. The application diagram is shown below.
		

Name and Picture	Qty	Application
 Low Current T-Connector for Calibration	1	As a current connector, the wideband current source, the standard coaxial shunt, and the coaxial shunt to be tested are connected in series for the calibration of the coaxial shunt. The application diagram is shown below.
 Wideband Constant Current Source  N Male-Terminal Block Adapter  Standard High Frequency Coaxial Shunt  N Male-N Male Current Input Line  Low Current T-Connector for Calibration  N Male-N Male Current Input Line  High Frequency Coaxial Shunt Under Test  Test Leads Type-N M F Type-N F M Type-N M F Type-N F M		

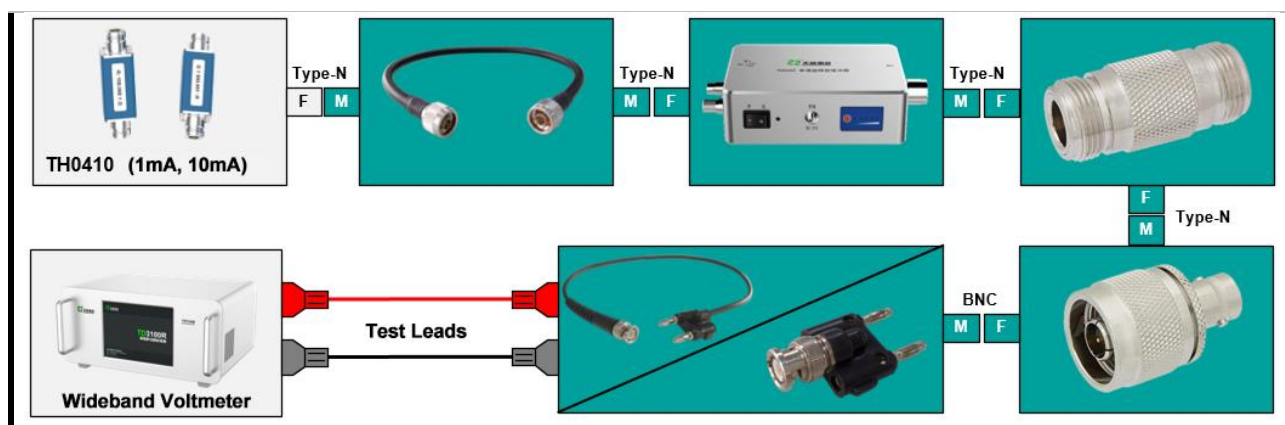
Note: The above is the quantity included in the complete set of accessories, users can also purchase them separately. The ordering information must be specified in the contract or technical agreement.

7.2.2 Voltage Output Terminal

Name and Picture	Qty	Application
 N Male - BNC Female Adapter	1	As a voltage measurement connector, it is used to connect the output of the TH0410 to a wideband voltmeter with a BNC female input. The application diagram is shown below.
 BNC Male-BNC Male Connecting Cable	1	
		
 BNC Male - Dual Banana Socket	2	As a voltage measurement connector, it is used to connect a BNC female connector to a test probe or banana plug. The application diagram is shown below.
		
 BNC Female-BNC Female Adapter	2	Used to connect a BNC male connector to another BNC male connector, it can serve as an adapter for line extension. The application diagram is shown below.



Name and Picture	Qty	Application
 N Male-N Male Voltage Test Lead	1	As a voltage measurement connector, it is used to connect the output of the TH0410 to the input of the TH0600. The application diagram is shown below.
 TH0470 Precision Wideband Buffer	1	It can convert a high-impedance signal into a low-impedance output. Typically used at the voltage output of high-resistance coaxial shunts, such as 1 mA or 10 mA specifications. The application diagram is shown below.
 N Female-N Female Adapter	1	Used to connect N male connectors. The application diagram is shown below.
 BNC Male-Dual Banana Plug Test Leads	1	Used as a voltage connector, used in conjunction with an N male to BNC female adapter to connect the output of the TH0410 to a wideband voltmeter with plug-type voltage input. The application diagram is shown below.
 BNC Male-Dual Banana Plug	1	



Note: The above is the quantity included in the complete set of accessories, users can also purchase them separately. The ordering information must be specified in the contract or technical agreement.

7.2.3 Other Accessory

Picture	Name	Qty	Description
	Special portable storage box	1	Dedicated portable storage and transport case for TH0410: waterproof, dustproof, highly impact-resistant, and highly reliable; capable of holding a complete set of coaxial shunts, providing convenience for user operation and transportation.

Note: The above accessories need to be purchased separately and must be specified in the order contract.