L01Z Series

Application Manual

■ Overview

The L01Z series comprises "through-type and onboard" current sensors of the open-loop type.

■ Characteristics

· Single 5V power supply.
· Through-type measured current.
· Open-loop-type circuit configuration.
· Onboard type
· Wide range of rated current, 50A ~ 600A.
· The reference point of the output voltage is the midpoint (Vcc/2) of the power-supply voltage Vcc and is proportional to Vcc.
· Simple structure

■ Uses

· General-purpose inverter
· Motor drive
· DCDC converter
· Generator

Format 1

L01Z 050 S 05

- 05 — Power-supply voltage 05: 5V
- S — Power-supply type S: Single power supply
- 050 — Rated current value 050: 50A
  - 100: 100A
  - 150: 150A
  - 200: 200A
  - 300: 300A
  - 400: 400A
  - 500: 500A
  - 600: 600A
- L01Z — Series name

Block diagram

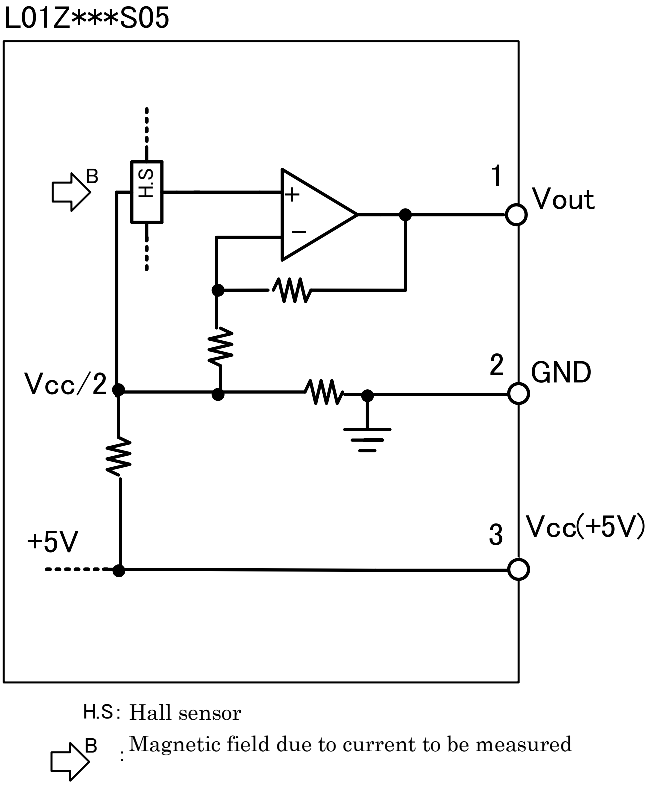


Fig. 1: Internal block diagram

Table 1: Description of terminals

Terminal number	Terminal name	Description	Remarks
1	Vout	Output terminal. When the rated current If (current to be measured) flows through the through-hole, an output voltage of 1.50 Vtyp is output with reference to Vref (=Vcc/2). Reference voltage is Vref=Vcc/2 and changes in proportion to Vcc. The current detection sensitivity G does not depend on the power-supply voltage. (*) Standard load resistance: 10 kΩ	
2	GND	GND terminal	
3	Vcc	Apply voltage within +5V ± 2 %	

* The standard value of the output voltage is $Vout = G \times I + \frac{Vcc}{2}$; $G \equiv \frac{1.5V}{If}$ If : Rated current

Example of circuit

Standard circuit

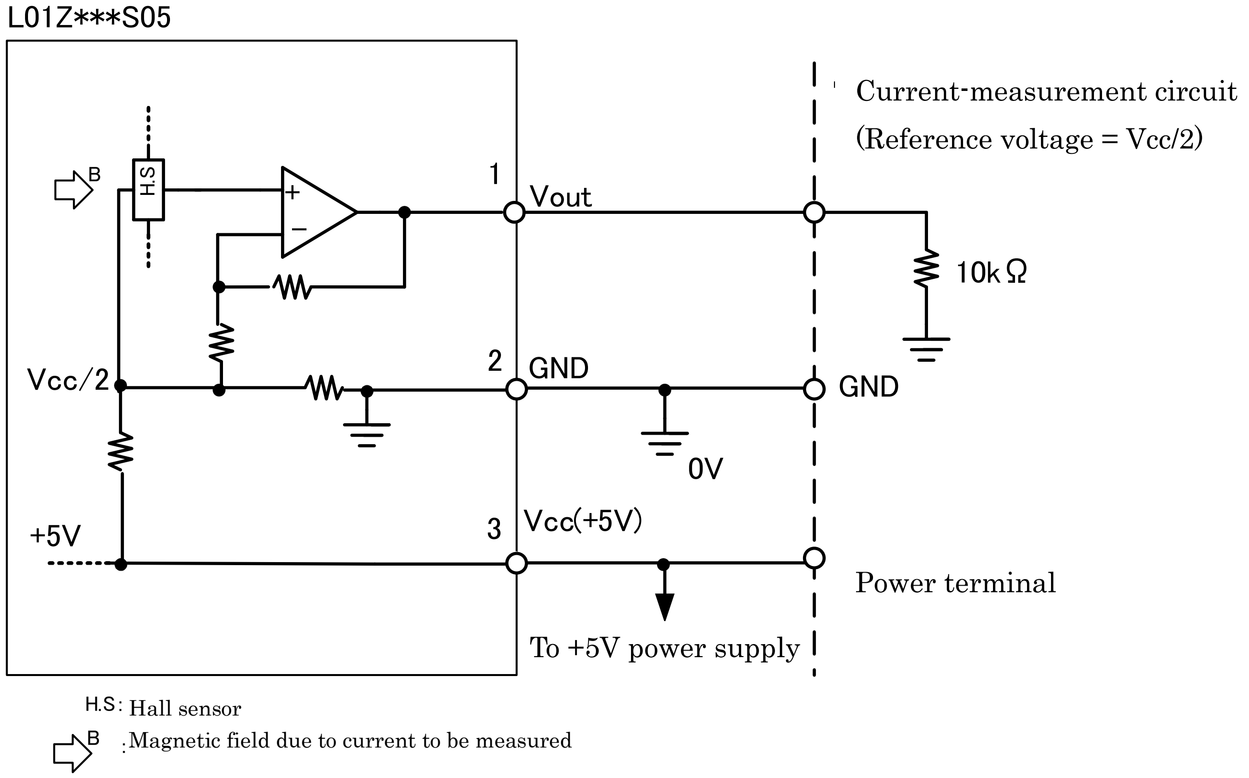


Fig. 2: Standard circuit

□Description of Fig. 2

This current sensor converts a measured current into a voltage. The output voltage Vout (1) in Fig. 2 is based on Vref, which is half the power-supply voltage Vcc, i.e., $Vref = \frac{Vcc}{2}$. When the current to be measured is 0, Vout (1) = Vcc/2. When the current to be measured is in the plus direction, Vout (1) becomes (Vcc/2) + (voltage converted from the measured current). When the current to be measured is in the minus direction, Vout (1) becomes (Vcc/2) – (voltage converted from the measured current).

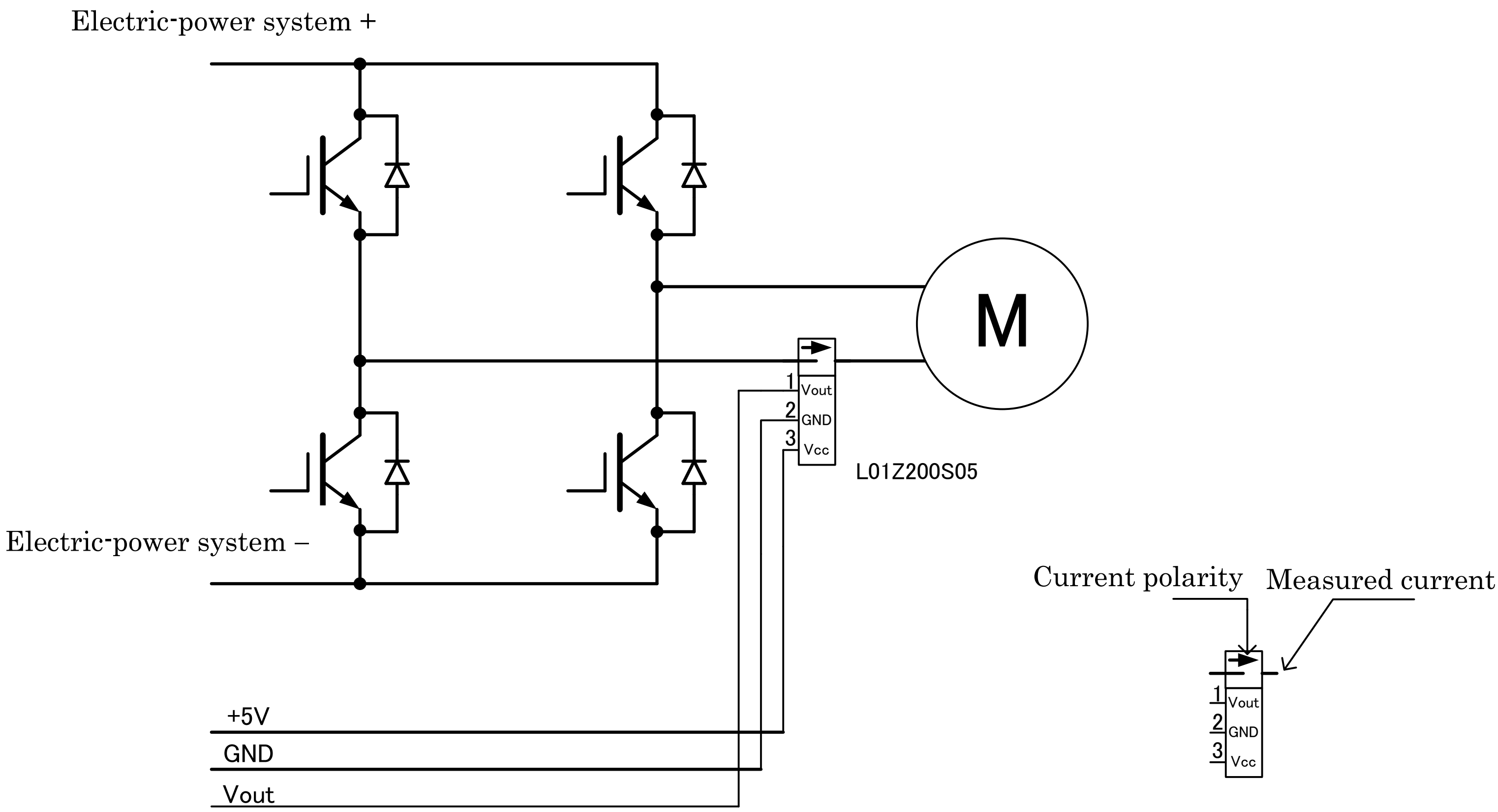
When the power-supply voltage Vcc fluctuates, the reference voltage (Vref) also changes accordingly, and the voltage converted from the measured current is always output with the reference voltage (Vref) given by half the Vcc. Therefore, by connecting the power supply of this sensor and that of the current-measuring circuit to the same power supply, it is possible to reduce the difference from the reference voltage (Vref). However, the sensitivity G of the current sensor does not change in proportion to the power-supply voltage Vcc, but is fixed. The standard value of the output voltage is

$$Vout = G \times If + Vref \quad ; \; G \equiv \frac{1.5}{If} \quad Vref = \frac{Vcc}{2}$$

The relationship between Vout (1) and the current to be measured for each model number is shown in graphs 1 to 8 at the end of this document. Graphs 1 to 8 represent the standard values, and the effects of offset voltage, hysteresis errors, etc., are not included. The plus direction of the current to be measured is indicated by → on the chassis (case or nameplate).

10 kΩ in Fig. 2 is the equivalent resistance of the receiving circuit of the current sensor output Vout (1). The load resistance between the Vout terminal (1) and the GND potential (0V) is the standard 10 kΩ.

■Application circuit



The input resistance of the receiving circuit is the standard value 10 kΩ

Through-type current sensor
Symbol

Fig. 3: Example of application to motor-drive circuit

Implementation

Example of pattern design

Example of bus bar design

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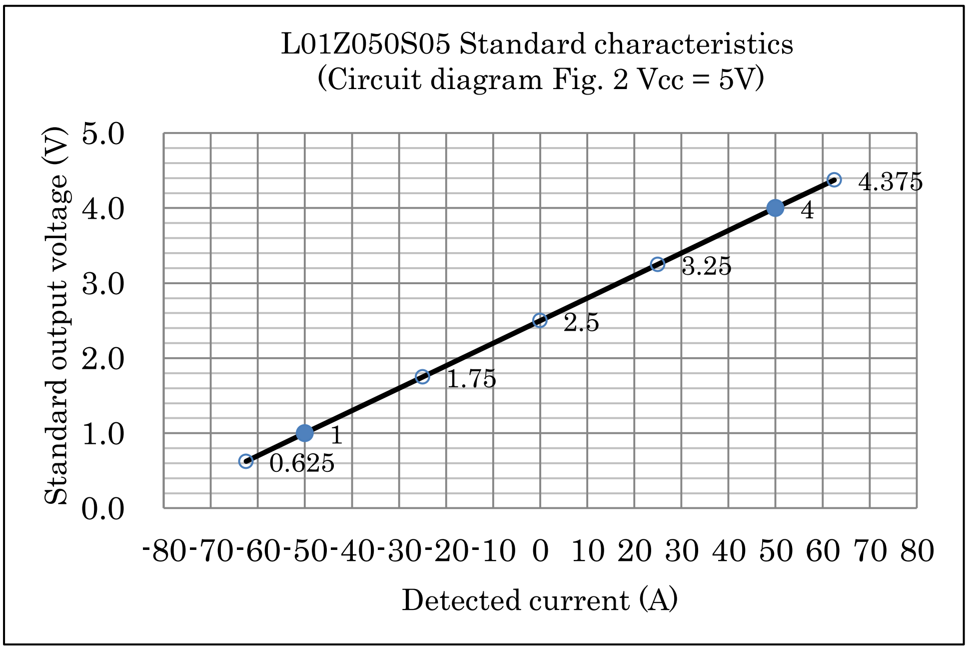
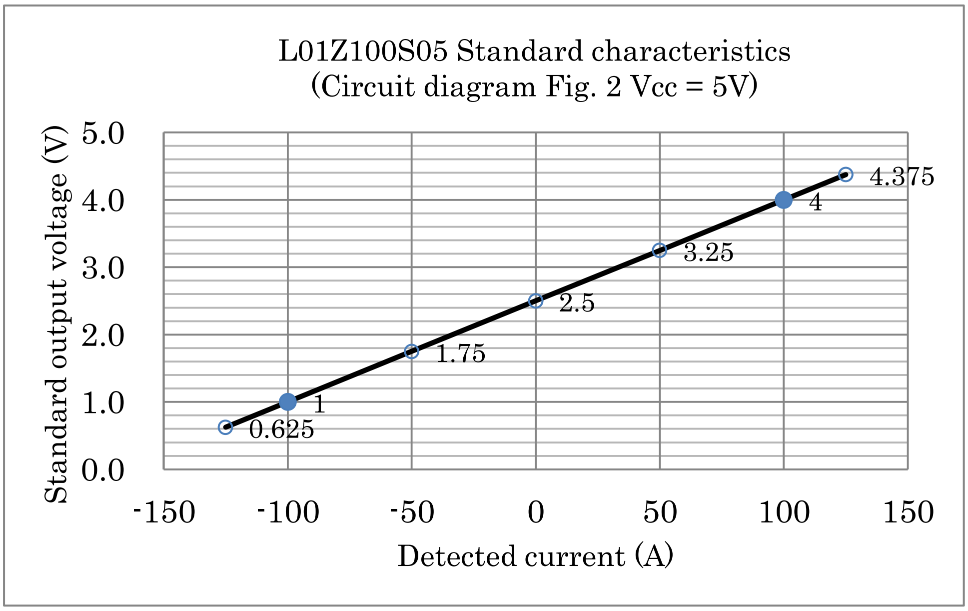
Graph 1



* •: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

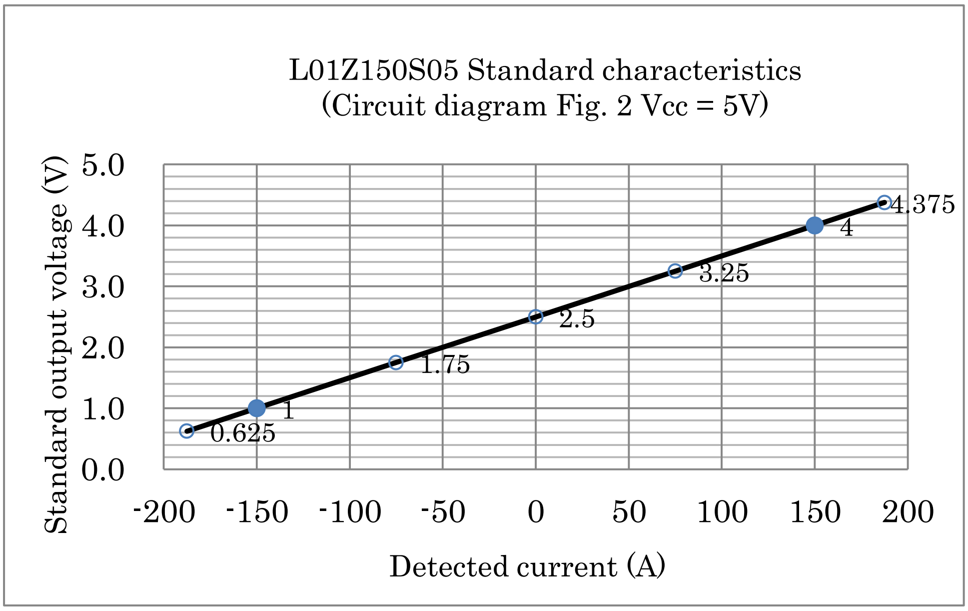
Graph 2



* •: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

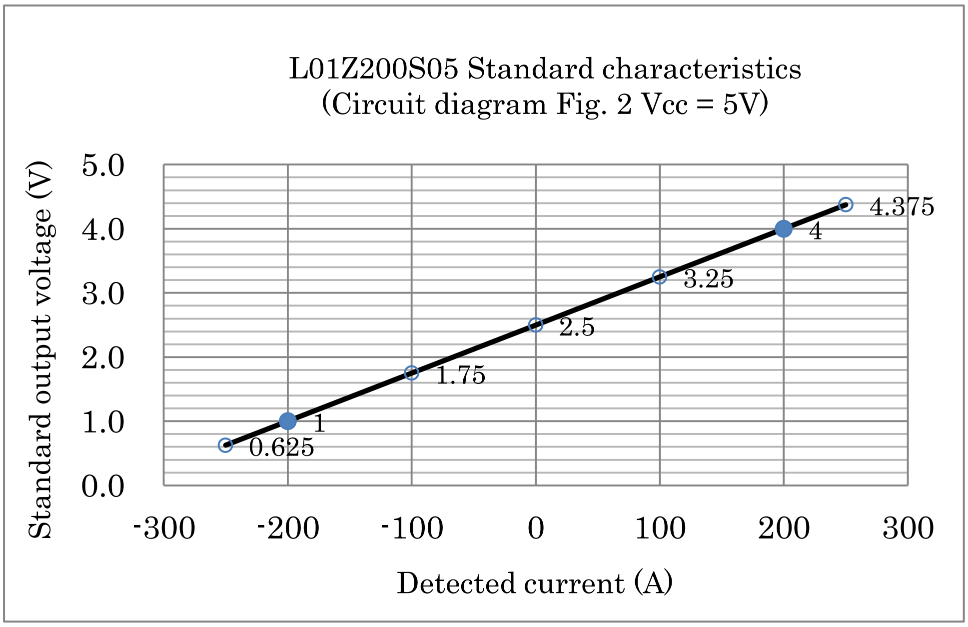
Graph 3



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

Graph 4



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

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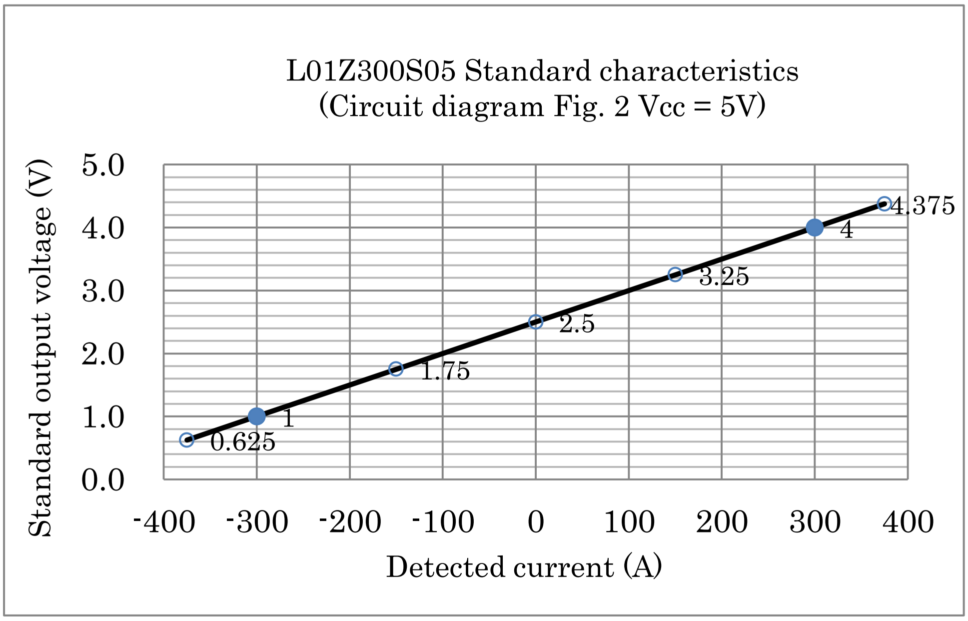
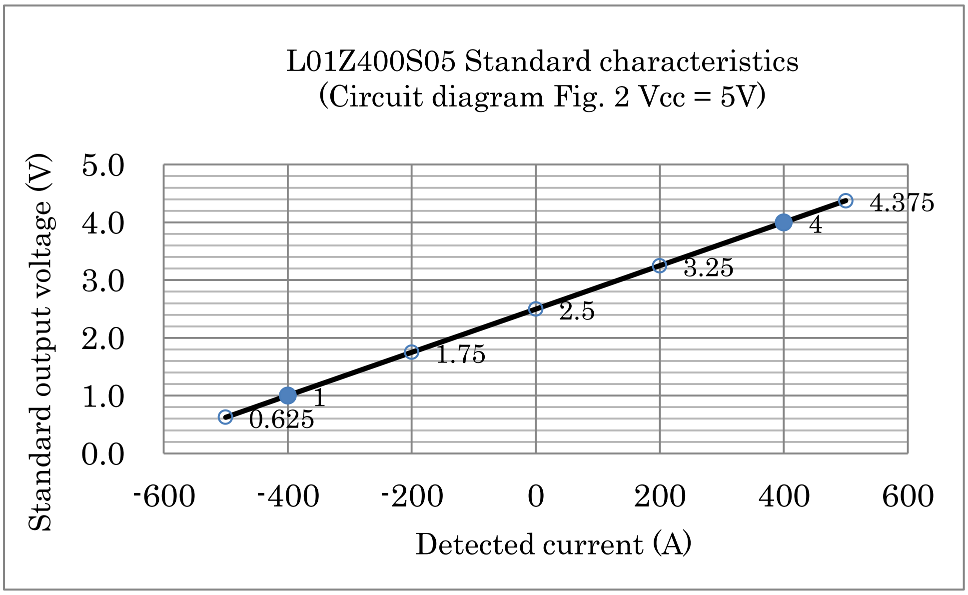
Graph 5



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

Graph 6



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

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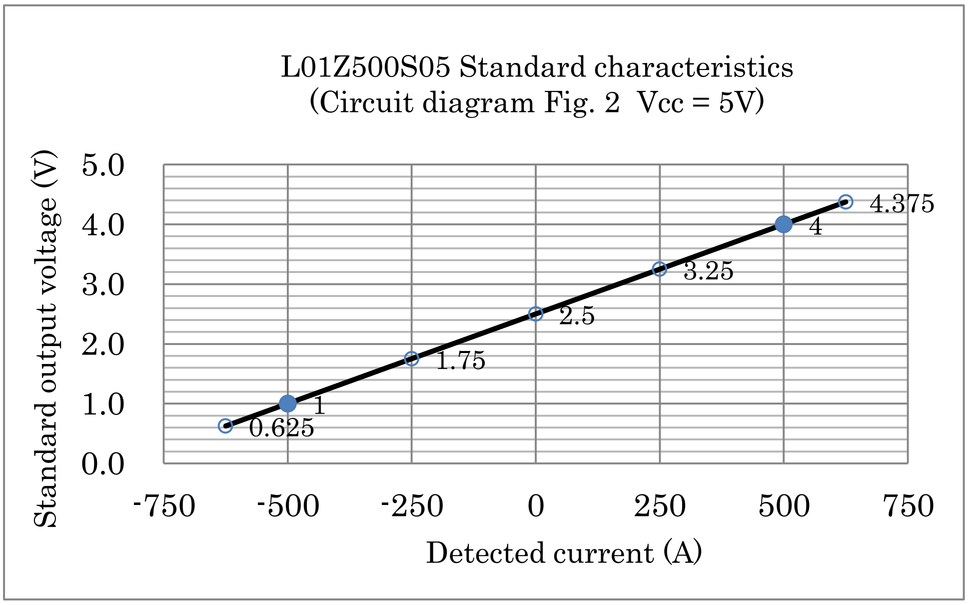
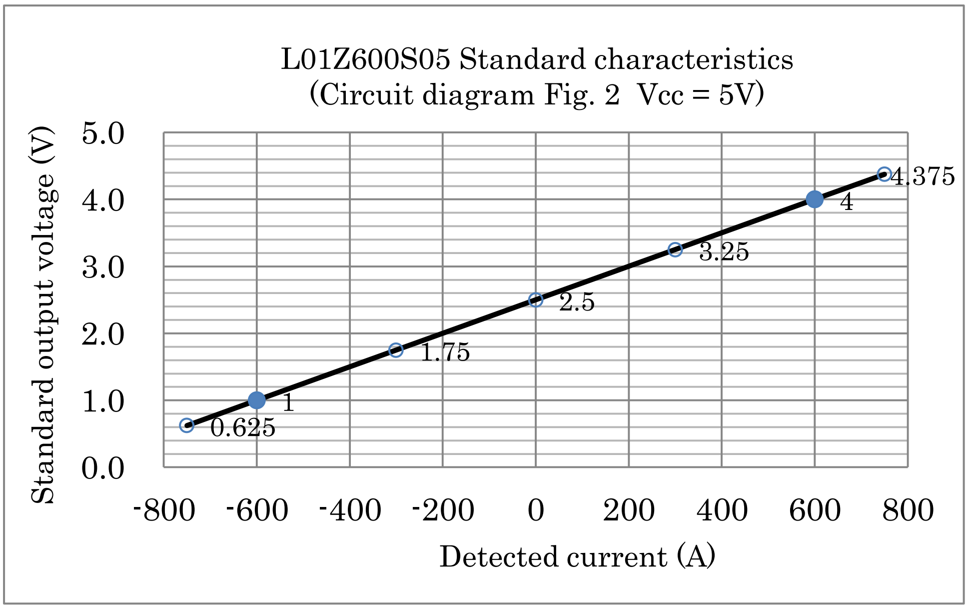
Graph 7



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).

Graph 8



* ●: The standard output voltage of the sensor versus the rated current.

** The reference voltage (detected current = 0) is the midpoint of the power-supply voltage (Vcc/2).