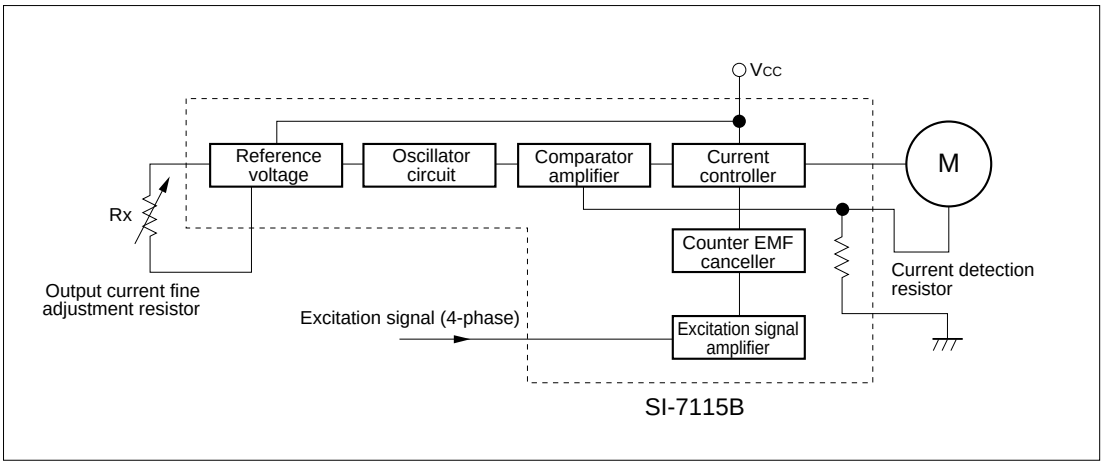
SI-7115B

■ Characteristics

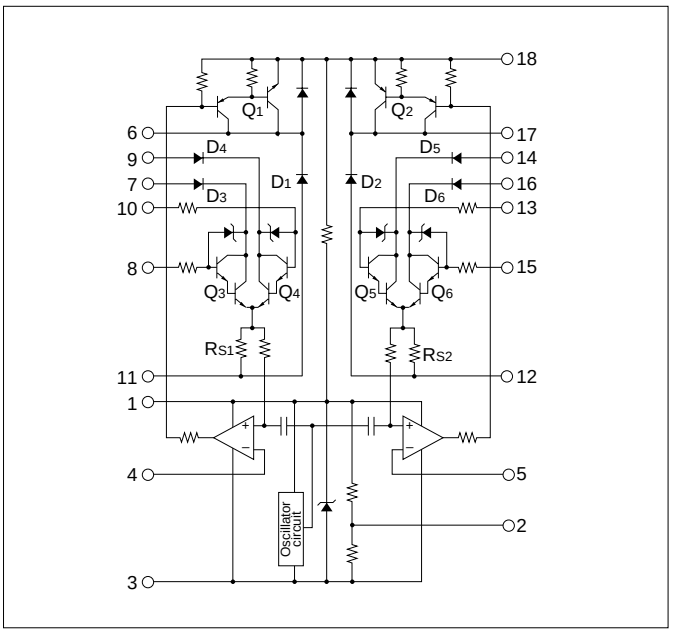
(Ta = 25°C)

Parameter / Type No.	Absolute maximum rating					Electrical characteristics									Phase switching signal input			
	Applied voltage	Output current	Junction temperature	Operating ambient temperature	Storage temperature	Supply voltage Vcc(V)			Output current Io(A)		Input current Iin(mA)		Oscillation frequency f (kHz)		ON			OFF
															Output current (A/ø)	Input voltage (V)min	Input current (mA)min	Input voltage (V)max
	Vsurge(V)	Io(A/ø)	Tj(°C)	Top(°C)	Tstg(°C)	min	typ	max	min	max	min	max	min	max				
SI-7115B	40	1.7	125	–20 to +80	–30 to +100	20	24	30	0.2	1.5		5.0	19	24	0.2	2.7	1.0	0.8
															0.5	3.1	1.2	
															1.0	3.6	1.4	
															1.5	4.5	2.0	

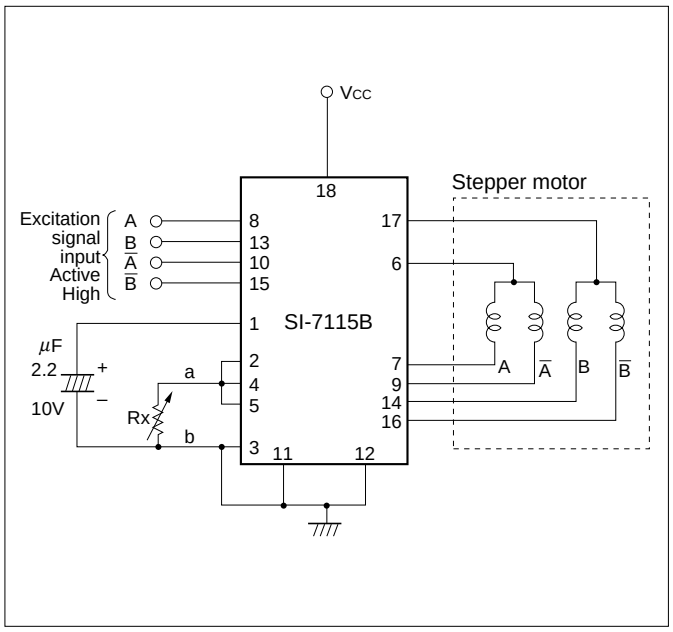
■ Block diagram



■ Equivalent circuit diagram

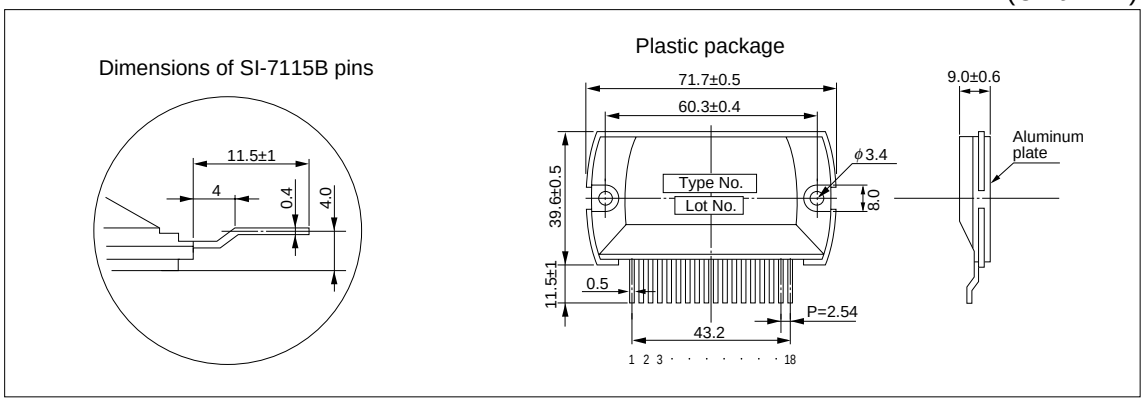


■ External connection diagram



■ External dimensions

(Unit: mm)



Application Note

■ Determining the output current Io (motor coil current)

The output current Io can be set to any value by connecting an external resistor Rx across pin 3 and all of pins 2, 4 and 5. Fig. A, B and C show the relationship between the external resistor and the output current, the supply voltage and the output current, and the output current and the temperature, respectively.

Output current Io

Output current Io	Rx
0.31 to 0.39 (A/ø)	200 (Ω)
0.95 to 1.05 (A/ø)	1.4 (kΩ)

Condition V_{CC} = 24V, Ta = 25°C
2-phase excitation
Holding mode
Motor: 23PM-C109

Fig. A SI-7115B External resistor vs. Output current

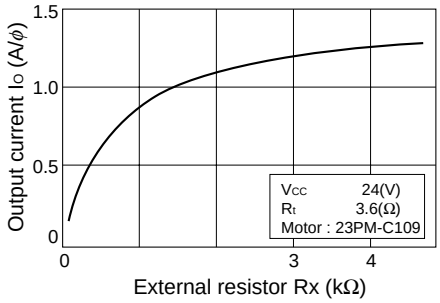


Fig. B SI-711B Supply voltage vs. Output current

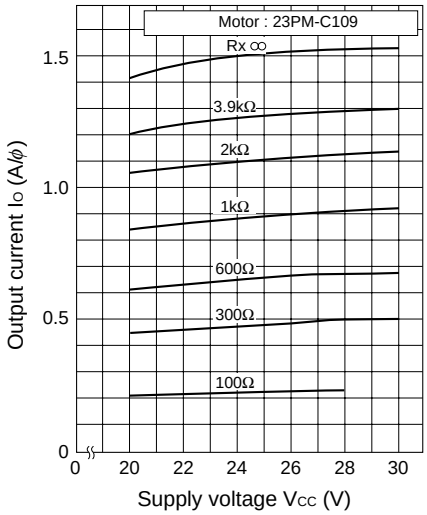
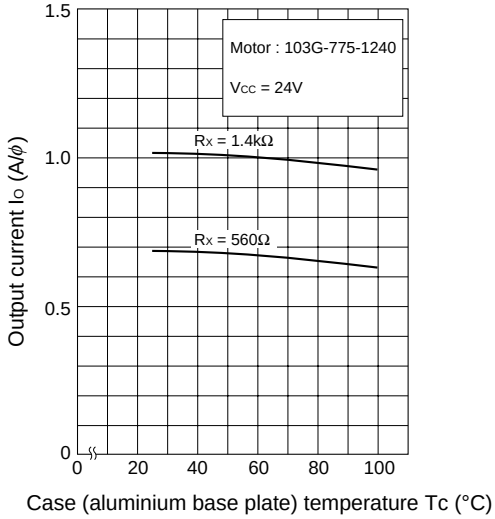


Fig. C SI-7511B Output current vs. Temperature

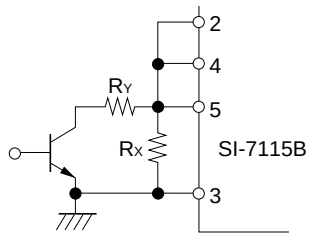


Application Note

■ Power down mode

The SI-7115B can be operated in power down mode. The circuit is shown below.
As shown in the figure, when the power down transistor is switched on, (Ry is power down resistor) R_X/R_Y becomes a current fixing resistance and the current during power down mode can be obtained by substituting this resistance to R_X in the previous Fig. A.

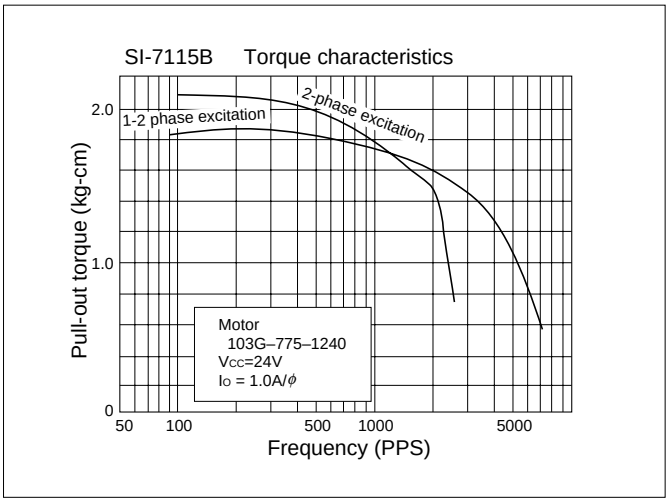
Power down circuit

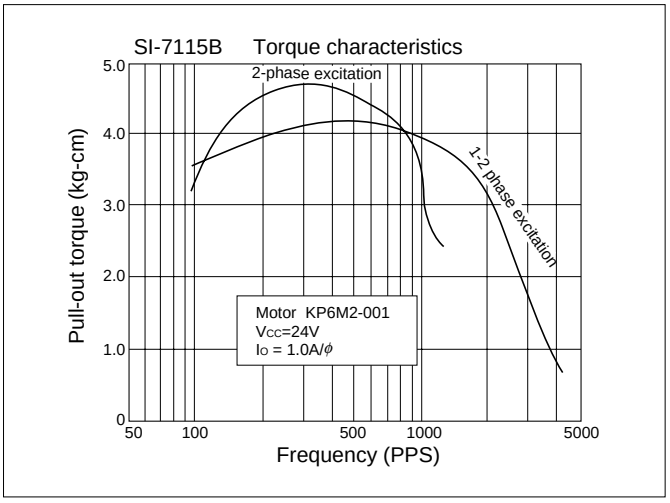


Power down Transistor T_R

■ Example of Frequency vs. Torque characteristics

The following two graphs show the relationship between frequency (pps) and pull-out torque (kg - cm) of SI-7115B when used with two types of motor.



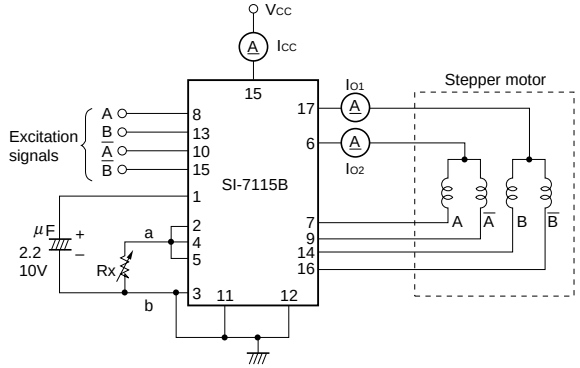


■ Thermal design

In SI-7115B, the avalanche diode of the phase-switching transistor is operated in breakdown condition and the energy built up in the inductance of the motor coil is dissipated as heat of the transistor. Hence, when the motor rotates, the internal heat dissipation increases compared with when the motor is stopped.
Therefore, the internal heat dissipation of 7115B can be computed from the data taken with actual load through the following procedures.

(1) Vary the rotation speed of the motor within the actual operating range in a circuit under actual load conditions and measure the supply current I_{CC} and the corresponding output current I_{O1} and I_{O2}.

Method for measuring current
(circuit under actual load conditions)

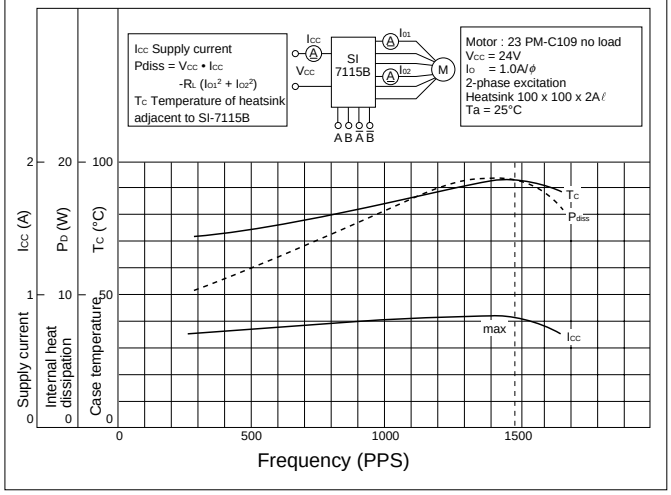


(2) Obtain the internal power dissipation Pdiss (4-phase) of 7115B through the following formula.

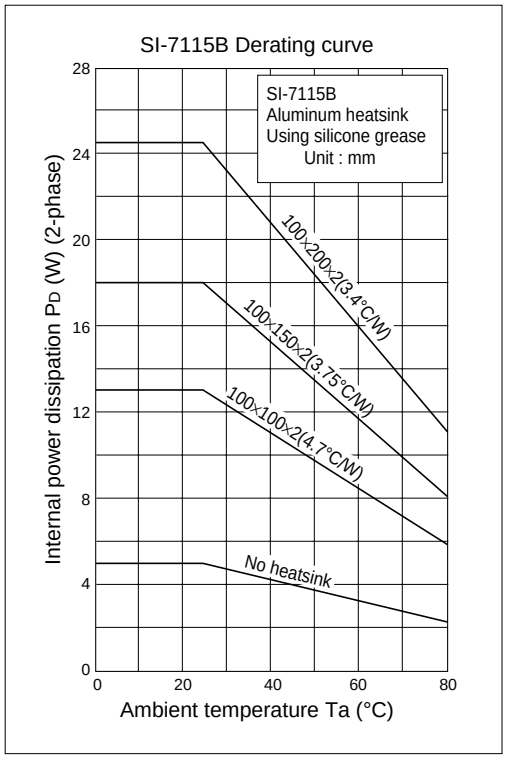
$$Pdiss = V_{CC} \bullet I_{CC} - (I_{O1}^2 + I_{O2}^2) \bullet R_L$$

The figure below shows the relationship between frequency (PPS) and I_{CC}, Pdiss, and case temperature T_C.

SI-7115B Frequency vs. Supply current, Internal power dissipation and Case temperature (Example)



Application Note



(3) Obtain the heatsink area corresponding to the ambient temperature Ta from the derating curve.

(4) Verify that the temperature of the aluminum base plate of 7115B or adjacent heatsinks is below 85°C (equivalent to max. ambient temperature) when operating under actual load conditions.