

Unipolar Driver ICs

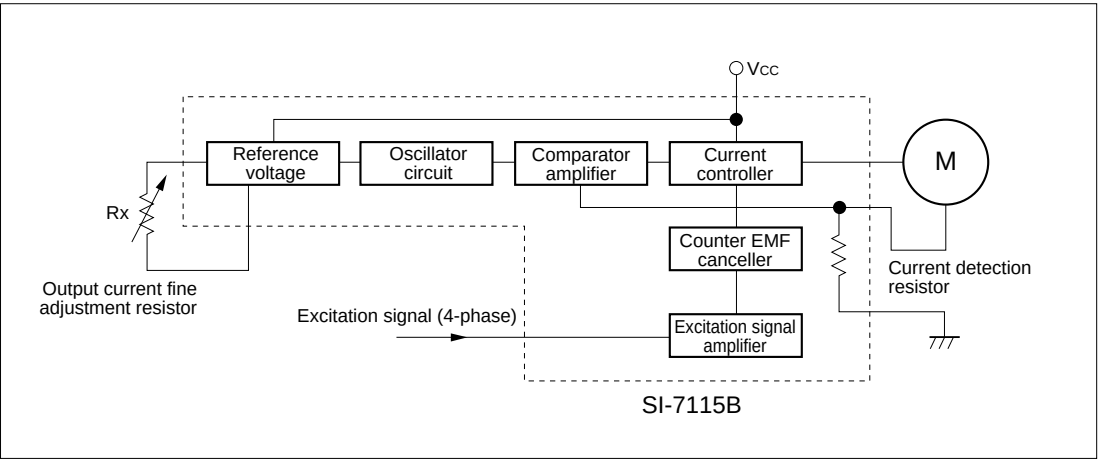
SI-7115B

■ Characteristics

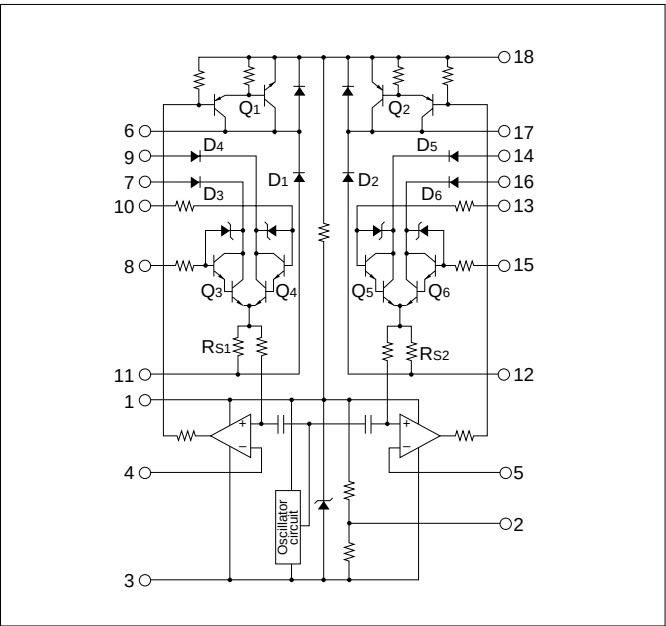
(Ta = 25°C)

Parameter Type No.	Absolute maximum rating					Electrical characteristics								Phase switching signal input				
	Applied voltage Vsurge(V)	Output current Io(A/ø)	Junction temperature Tj(°C)	Operating ambient temperature Top(°C)	Storage temperature Tstg(°C)	Supply voltage Vcc(V)			Output current Io(A)		Input current Iin(mA)		Oscillation frequency f (kHz)		ON		OFF	
						min	typ	max	min	max	min	max	min	max	Output current (A/ø)	Input voltage (V)min	Input current (mA)min	Input voltage (V)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	

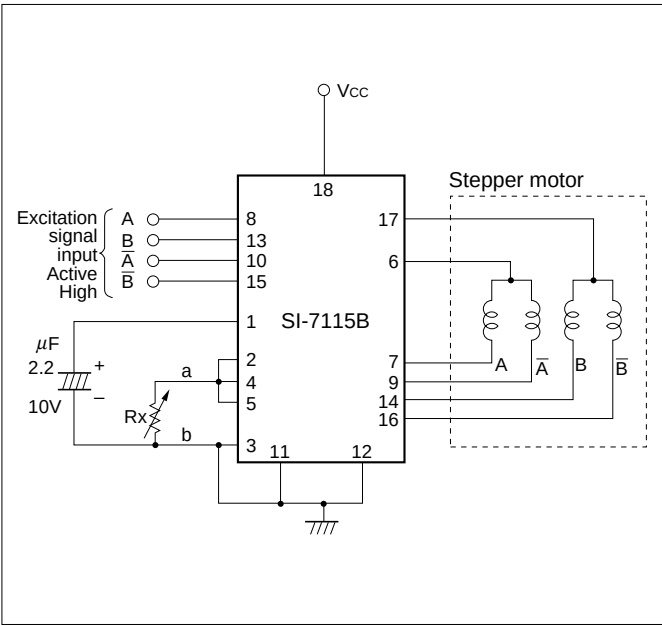
■ Block diagram



■ Equivalent circuit diagram



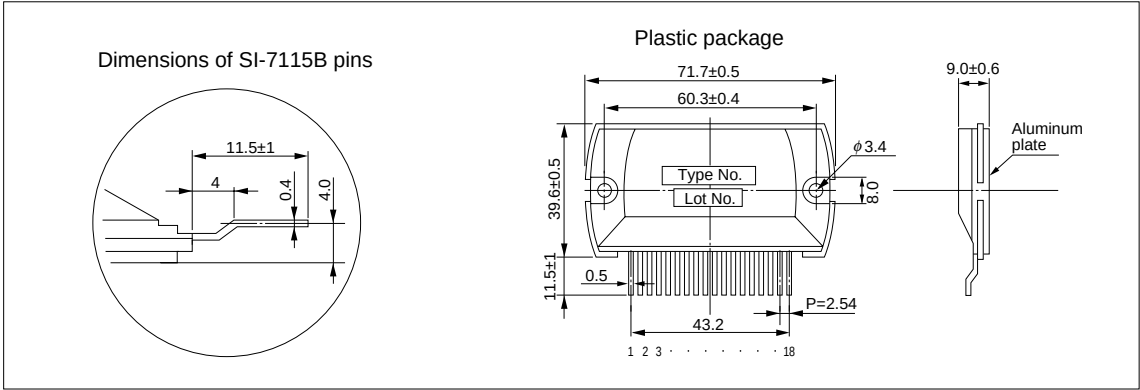
■ External connection diagram



SI-7115B

External dimensions

(Unit: mm)



Application Note

Determining the output current I_o (motor coil current)

The output current I_o can be set to any value by connecting an external resistor R_x 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 I_o

Output current I _o	R _x
0.31 to 0.39 (A/ø)	200 (Ω)
0.95 to 1.05 (A/ø)	1.4 (kΩ)

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

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

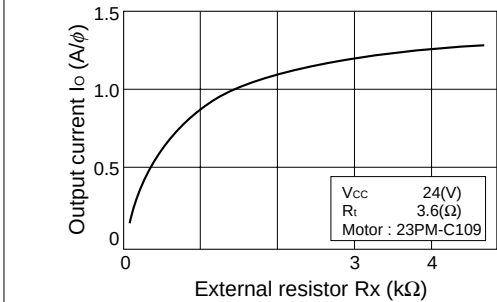


Fig. B SI-711B Supply voltage vs. Output current

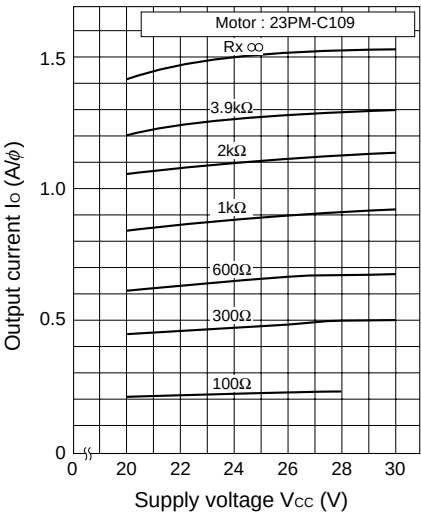
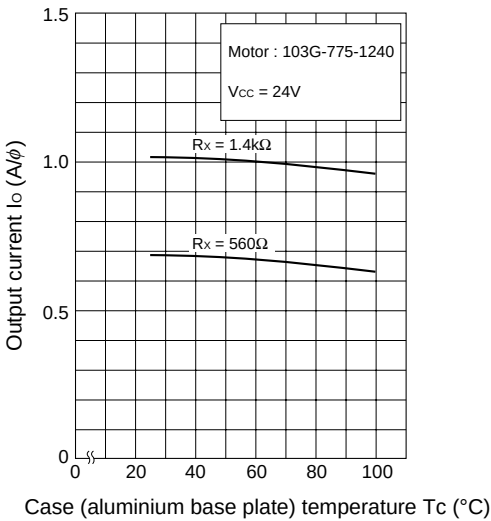


Fig. C SI-7511B Output current vs. Temperature

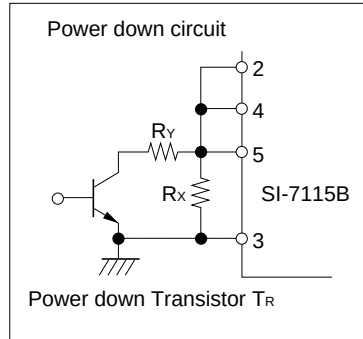


Application Note

Power down mode

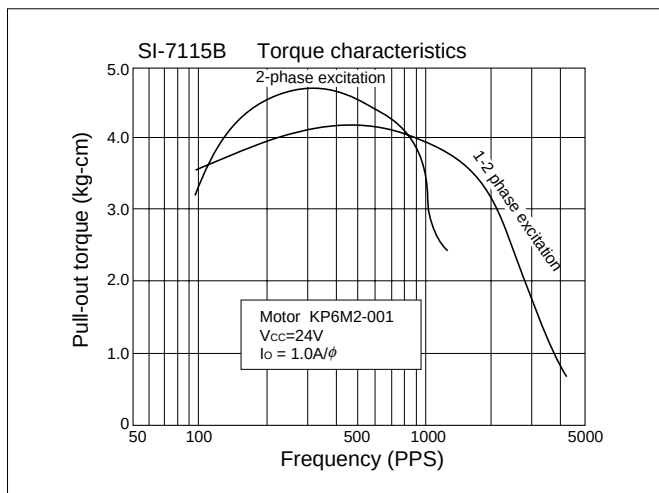
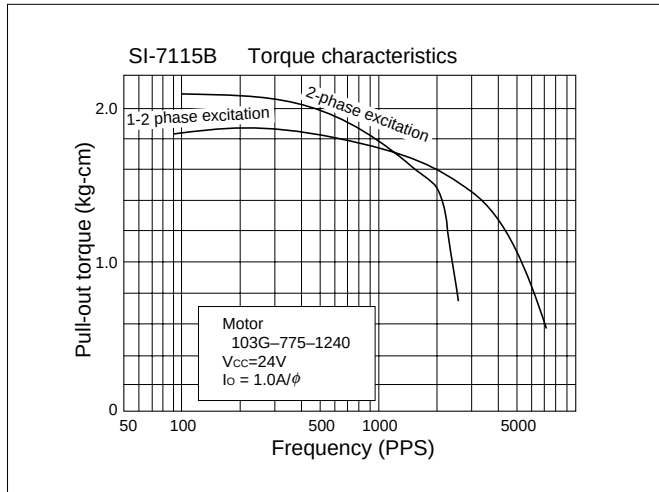
The SI-7115B can be operated in power down mode. The circuit is shown below.

As shown in the figure, when the power down transistor is switched on, (R_Y 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.



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.



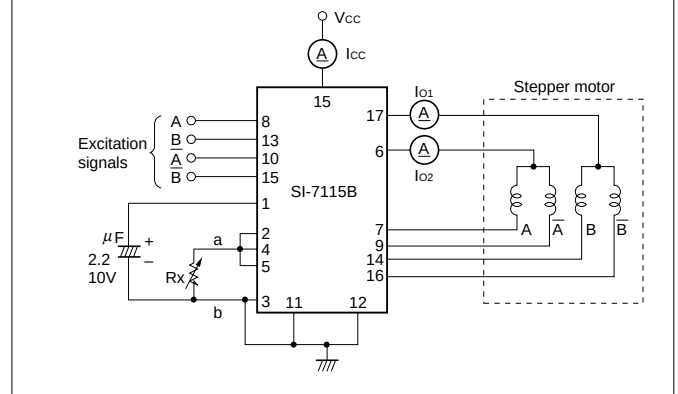
Thermal design

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)

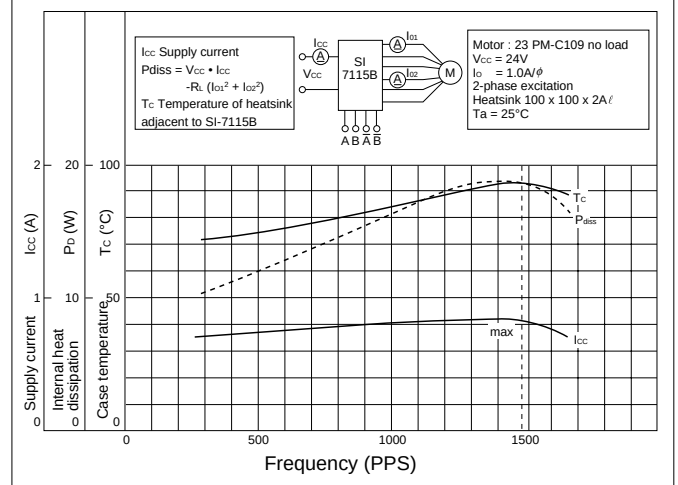


- (2) Obtain the internal power dissipation P_{diss} (4-phase) of 7115B through the following formula.

$$P_{diss} = V_{CC} \cdot I_{CC} - (I_{O1}^2 + I_{O2}^2) \cdot R_L$$

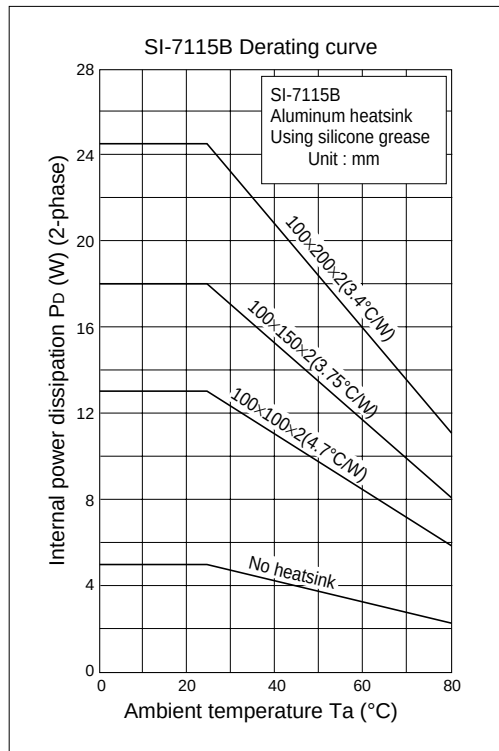
The figure below shows the relationship between frequency (PPS) and I_{CC} , P_{diss} , and case temperature T_C .

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



SI-7115B

Application Note



- (3) Obtain the heatsink area corresponding to the ambient temperature T_a 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.

SI-7200M, SI-7230M, SI-7115B, SI-7300A, SI-7330A, SI-7500A and SI-7502

Handling Precautions

(Note: The SI-7502 is applicable for item (2) only.)

For details, refer to the relevant product specifications.

(1) Tightening torque:

The torque to be applied in tightening screws when mounting the IC on a heatsink should be below 49N•m.

(2) Solvent:

Do not use the following solvents:

Substances that dissolve the package	Chlorine-based solvents : Trichloroethylene, Trichloroethane, etc. Aromatic hydrogen compounds: Benzene, Toluene, Xylene, etc. Ketone and Acetone group solvents
Substances that weaken the package	Gasoline, Benzine and Kerosene

(3) Silicone grease:

The silicone grease to be used between the aluminum base plate of the hybrid IC and the heatsink should be any of the following:

- G-746 SHINETSU CHEMICAL INDUSTRIES CO., LTD.
- YG6260 TOSHIBA SILICONE CO., LTD.
- SC102 DOW CORNING TORAY SILICONE CO., LTD.

Please pay sufficient attention in selecting silicone grease since oil in some grease may penetrate the product, which will result in an extremely short product life.

Others

• Resistance against radiation

Resistance against radiation was not considered in the development of these ICs because it is assumed that they will be used in ordinary environment.