

Bipolar Driver IC

SI-7200M

■ Ratings

(Ta = 25°C)

Type No.	Supply voltage (V)		Output current (A)	Junction temperature (°C)	Operating ambient temperature (°C)	Storage temperature (°C)
	V _{CC1}	V _{CC2}	I _o	T _j	T _{op}	T _{stg}
SI-7200M	50	10	1.2	+125	-20 to +80	-30 to +100

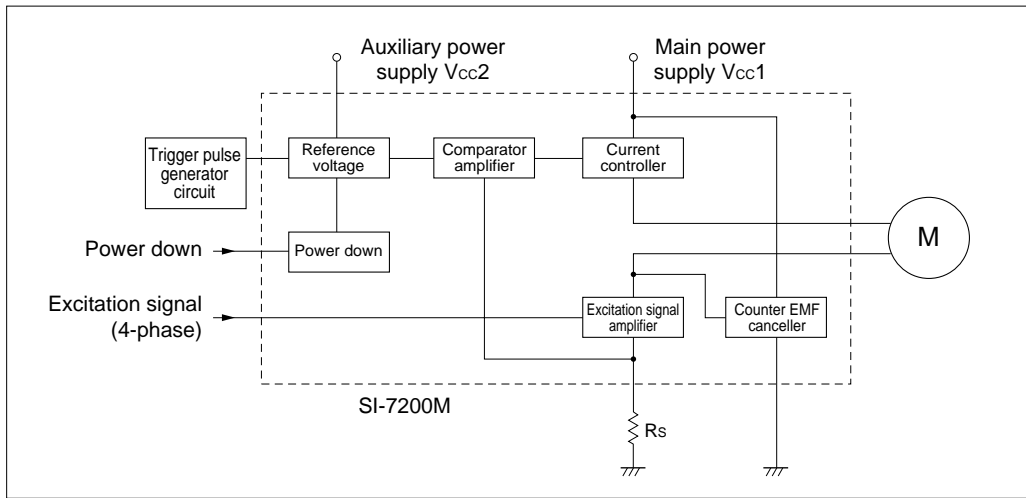
■ Characteristics

Type No.	Supply voltage (V)						*Output current (mA)						Excitation signal				Power down				Trigger pulse						V _{CC2} input current (mA)					
	V _{CC1}		V _{CC2}		I _o		I _{o1}		I _{o2} (Power down)		V _{IL} (ON)		V _{IH} (OFF)		I _L	V _{PD-L} (OFF)		V _{PD-H} (ON)		I _{PD-L}	I _{PD-H}	V _{trig}		T _{trig}		F _{trig}		I _{CC2}				
	min	typ	max	min	typ	max	min	max	min	typ	max	min	max	min	max	min	max	min	max	min	max	min	max	min	typ	typ	max	max				
SI-7200M	15	30	40	4.5	5	5.5	200	1000	390	440	490	235	275	315	0	0.5	V _{CC2} -0.4	V _{CC2} +2	1.6	0	0.4	2	V _{CC2}	1	2	3.5	V _{CC2}	1.0	2.0	20	25	45

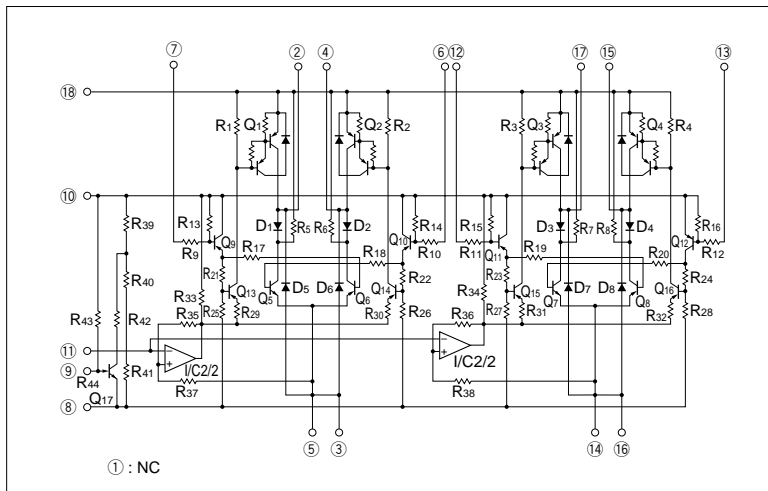
* I_{o1} : Measurement conditions shown in the external connection diagram

I_{o2} : Measurement conditions shown in the external connection diagram with pin 9 open

■ Block diagram

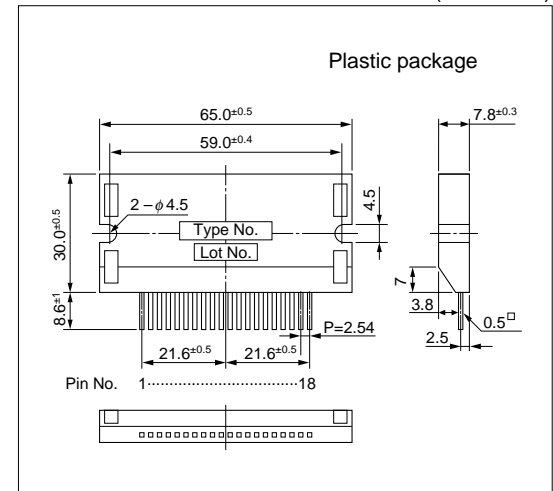


■ Equivalent circuit diagram



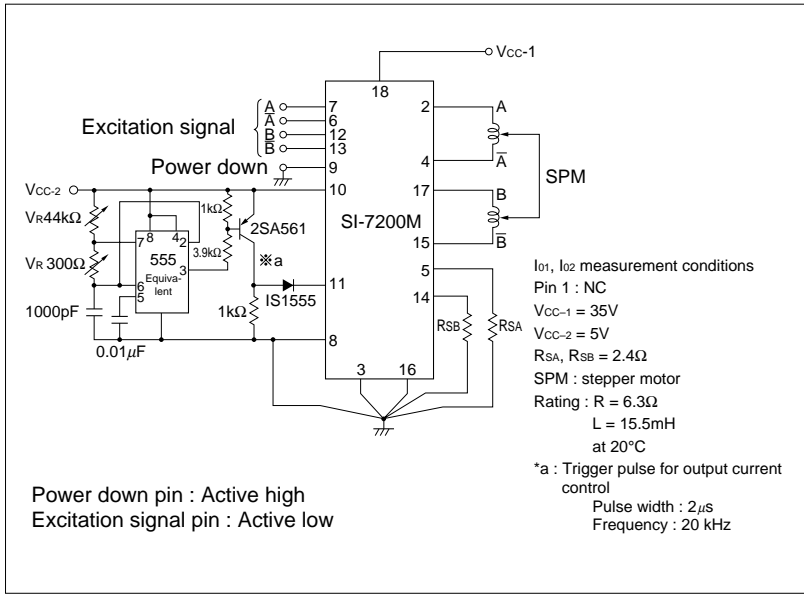
■ External dimensions

(Unit: mm)

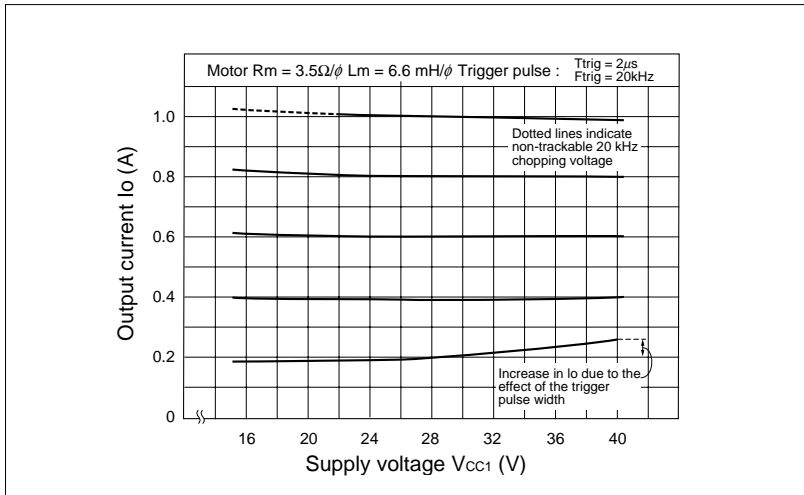


SI-7200M

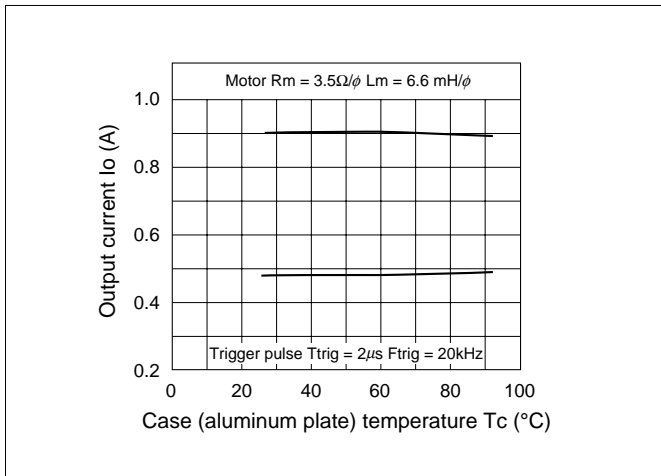
External connection diagram



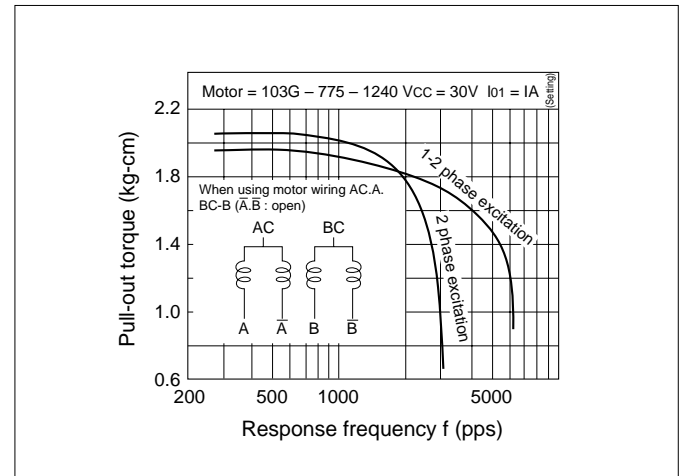
Supply voltage and output current



Output current and temperature



Torque and response frequency



Application Note

■ Determining the output current I_o (motor coil current)

The output current, I_o is fixed by the following circuit elements:

R_s : Current detection resistor

V_{CC-2} : Auxiliary supply voltage

Based on the specifications of SI-7200M, its output current I_o can be seen as:

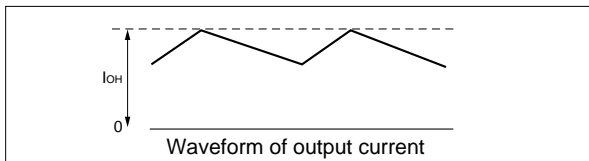
I_{o1} (effective value): 390 to 490mA

To compute I_o when different values are used for R_s and V_{CC-2} , use the approximation formula below or the graph at the right. The maximum ripple value I_{OH} of the output current waveform is within the $I_{OH(MIN)} \sim I_{OH(MAX)}$ range shown by the following formulas:

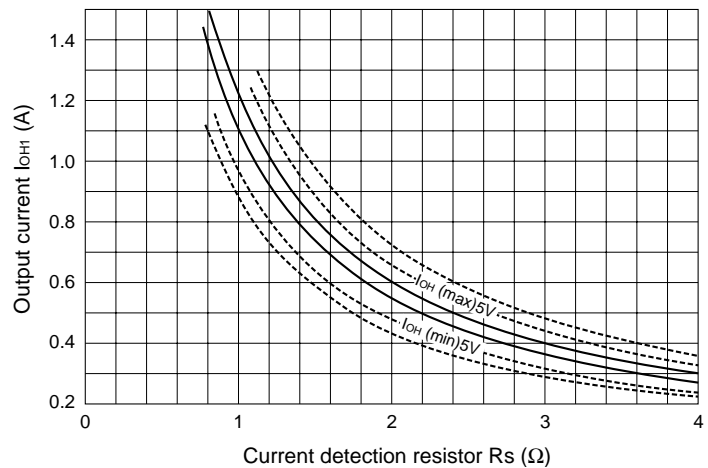
$$I_{OH(max)} \doteq \frac{1}{R_s} (0.247 \times V_{CC-2} - 0.03) \text{ [A]}$$

$$I_{OH(min)} \doteq \frac{1}{R_s} (0.225 \times V_{CC-2} - 0.024) \text{ [A]}$$

To fine-adjust the output current, connect a 20K Ω variable resistor across pins 8 and 11.



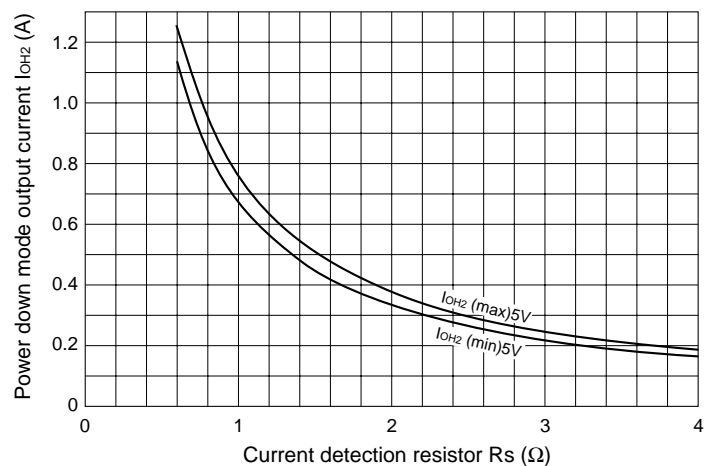
Output current vs. Current detection resistor



■ Power down mode

The SI-7200M can be operated in power down mode. By pulling up pin 9 to high level I_o can be reduced to 60% of the motor rotation current.

Power down output current vs. Current detection resistor



■ Operating voltage range

The SI-7200M can be used in applications (low coil resistance R_L and high supply voltage V_{CC}) where SI-7200E and SI-7230E cannot be used.

Application Note

Thermal design

Procedures for thermal design of SI-7200M are shown below.

(1) As shown in the figure below, the supply current I_{CC} and the output current I_o are measured at the maximum level of the supply voltage V_{CC} . However, the motor is in holding mode at the 2-phase excitation.

(2) From the above measurements, the internal power dissipation (2-phase) of the hybrid IC can be obtained through the following formula.

$$P_D = V_{CC} \times I_{CC} - 2I_o^2 (R_L + R_s)$$

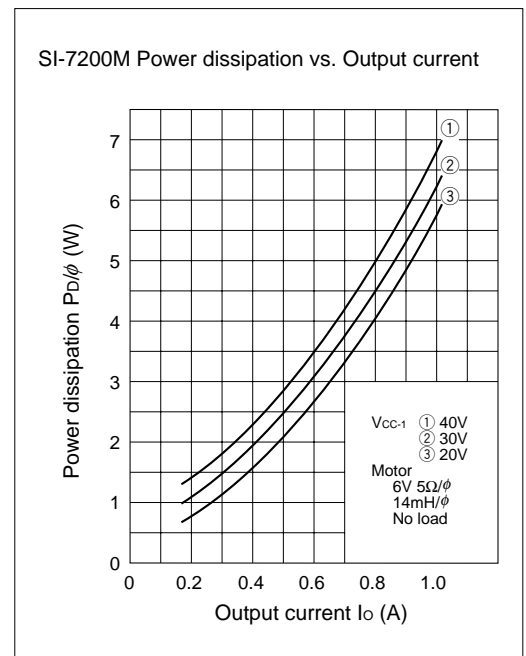
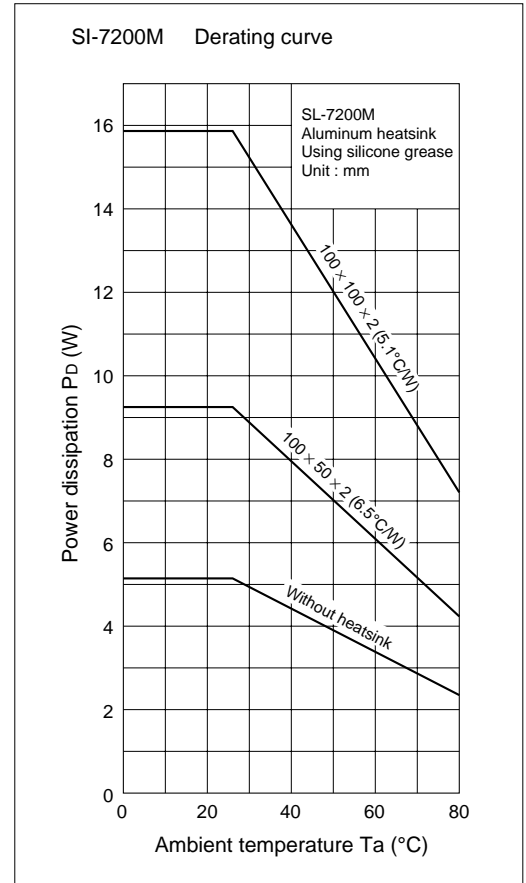
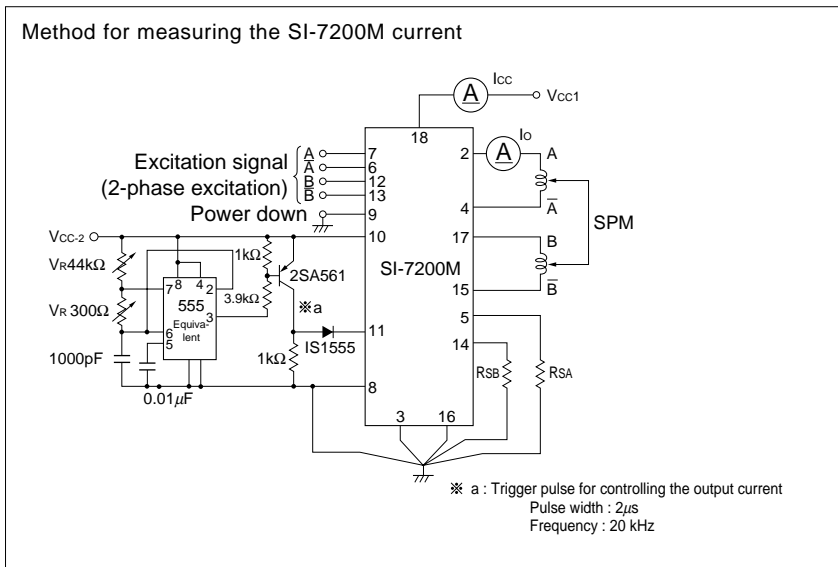
Where R_L : Resistance of the motor coil between pins 2 and 4 and pins 15 and 17

Shown in the lower graph is a sample calculation of P_D vs. I_o .

(3) The heatsink area corresponding to the ambient temperature can be obtained from the SI-7200M derating curve shown in the right.

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

* For details on thermal design, refer to the technical data book



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.