

# **Stepper motor driver IC SAA 1027**

RS stock number 300-237

The RS SAA1027 is a bipolar integrated circuit intended for driving a 4-phase two stator stepper motor. The circuit consists of a bidirectional 4-state counter and a code converter to drive the four outputs in the sequence required for driving a stepper motor.

It features high noise immunity inputs, clockwise and anticlockwise operation, a reset facility and high current outputs that are protected against damage by voltage overshoots.

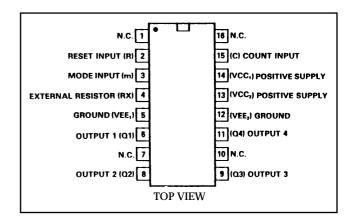
For further details of **RS** stepper motors please see Data Sheet 7017.

## Absolute maximum ratings

Supply voltage18	BVDC
Input voltage, all inputs	18V
Current into pin 4l	20mA
Output current5	300mA
Storage temperature range	125°C
Operating temperature range	+70°C

#### **Features**

- High noise immunity inputs
- Clockwise and counter-clockwise rotation
- Reset facility
- High output current
- Outputs protected against damage by overshoots.

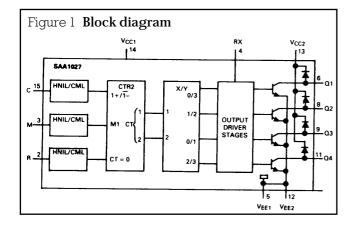


#### **Electrical characteristics**

 $V_{CC}$  = 9,5 to 18V;  $V_{EE}$  = 0V;  $T_{amb}$  = -20 to +70°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply V <sub>CC1</sub> and V <sub>CC2</sub> (pins 14 and 13)					
Supply current V <sub>CC1</sub> = 12V					
unloaded; all inputs HIGH; pin 4 open	$I_{CC}$	2	4,5	6,5	mA
Inputs C, M and R (pins 15, 3 and 2)					
Input voltage					
HIGH	$V_{IH}$	7,5	-	-	V
LOW	$V_{IL}$	-	-	4,5	V
Input current					
HIGH	$I_{\mathbf{IH}}$	-	1	-	μA
LOW	$-I_{IL}$	-	30	-	μA
External resistor pin RX (pin 4)					
Voltage at RX at $V_{CC}$ = 12V ± 15%;					
$R_{\mathbf{X}} = 130\mathbf{\Omega} \pm 5\%$	$V_{RX}$	3	-	4,5	V
Outputs Q1 to Q4					
Output voltage LOW					
at $I_{OL} = 350 \text{mA}$	$V_{OL}$	-	500	1000	mV
at $I_{OL} = 500 \text{mA}$	$V_{OL}$	-	700	-	mV
Output current					
LOW	$I_{OL}$	-	-	500*	mA
HIGH at $V_Q$ = 18V	$-I_{OH}$	-	-	50	μA

 $<sup>\</sup>ensuremath{^*}$  See Figures 3 and 4.



The blocks marked HNIL/CML are high noise immunity input stages, the block marked CTR2 is a bidirectional synchronous 2-bit (4-state) counter and the block marked X/Y is a code converter. C is the count input, M the mode input to select forward or reverse counting and R is the reset input which resets the counter to content zero.

# **Functional description**

#### **Count input C** (pin 15)

The outputs change state after each  ${\bf L}$  to  ${\bf H}$  signal transition at the count input.

#### Mode input M (pin 3)

With the mode input the sequence of output signals, and hence the direction of rotation of the stepping motor, can be chosen, as shown in the following table.

Counting	M = L			M = H				
sequence	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
0	L	Н	L	Н	L	Н	L	Н
1	Н	L	L	Н	L	Н	Н	L
2	Н	L	Н	L	Н	L	Н	L
3	L	Н	Н	L	Н	L	L	Н
0	L	Н	L	Н	L	Н	L	Н

#### Reset input R (pin 2)

A LOW level at the R input resets the counter to content zero. The outputs take on the levels shown in the upper and lower line of the table above.

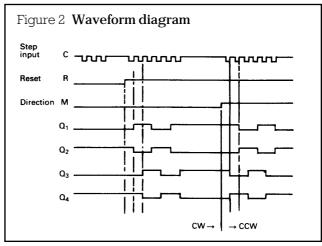
If this facility is not used the R pin should be connected to the supply.

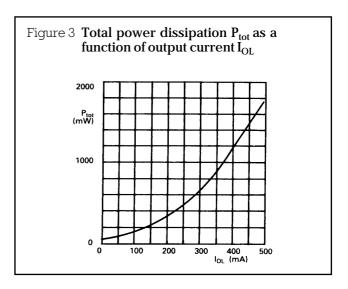
#### External resistor pin RX (pin 4)

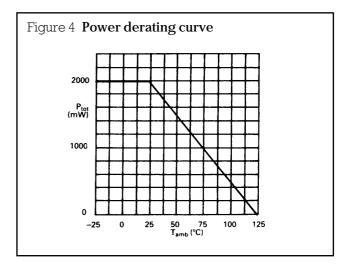
The external resistor R4 connected to RX sets the base current of the output transistors. Its value has to be chosen in accordance with the required output current (Figure 5).

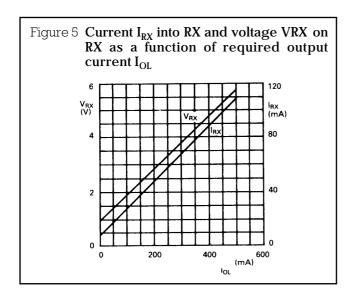
### Outputs Q1 to Q4 (pins 6, 8, 9 and 11)

The circuit has open-collector outputs. To prevent damage by an overshooting output voltage the outputs are protected by diodes connected to  $V_{\rm CC2}$ , pin 13. High output currents mainly determine the total dissipation, (Figure 3).

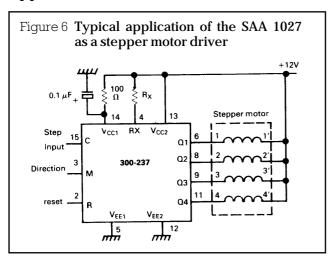








# Applications



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