



## Pin Descriptions

Pin No.	Pin name	Pin No.	Pin name
1	FG amp. output	13	Motor drive output W
2	FG divider	14	Motor drive output U
3	Velocity error output	15	Motor drive output V
4	Error amp. inversion input	16	V <sub>CC</sub>
5	Error amp. output	17	Hall amp. 1 +input
6	Low-pass filter	18	Hall amp. 1 -input
7	Oscillation circuit 2	19	Hall amp. 2 +input
8	Oscillation circuit 1	20	Hall amp. 2 -input
9	Start/stop switching	21	Hall amp. 3 -input
10	300/360 rpm switching	22	Hall amp. 3 +input
11	GND	23	FG amp. +input
12	Current sensing	24	FG amp. +input

## Absolute Maximum Ratings (T<sub>a</sub>=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V <sub>CC</sub>	20	V
Motor drive pin voltage	V <sub>13</sub> , V <sub>14</sub> , V <sub>15</sub>	20	V
Pin applied voltage 1	V <sub>1</sub> ~V <sub>9</sub> , V <sub>24</sub>	-0.3 to +5.5	V
Pin applied voltage 2	V <sub>17</sub> ~V <sub>22</sub>	0 to V <sub>CC</sub>	V
Supply current	I <sub>CC</sub>	900	mA
Pin current 1	I <sub>12</sub>	-900 to 0	mA
Motor drive pin current	I <sub>13</sub> , I <sub>14</sub> , I <sub>15</sub>	-900 to +900	mA
Pin current 2	I <sub>23</sub>	-20 to +1	mA
Power dissipation	P <sub>D</sub>	2.5	W
Operating ambient temperature	T <sub>opr</sub>	-20 to +75	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

## Electrical Characteristics (V<sub>CC</sub>=12V, T<sub>a</sub>=25°C)

Parameter	Symbol	Condition	min	typ	max	Unit
Standby quiescent current	I <sub>QS</sub>	V <sub>S/S</sub> =2V	—	0.3	0.5	mA
No-load quiescent current	I <sub>QN</sub>	V <sub>S/S</sub> =0V	—	18	25	mA

### Reference Voltage Part

Reference voltage	V <sub>OR</sub>	I <sub>OR</sub> =0mA	2.3	—	2.8	V
Output sink current	I <sub>OR</sub> <sup>+</sup>		0.5	—	—	mA
Output source current	I <sub>OR</sub> <sup>-</sup>		—	-15	-10	mA
Output impedance	Z <sub>OR</sub>	I <sub>OR</sub> =0 to -10mA	—	5	10	Ω

### FG Amp./Schmitt Part

Offset voltage	V <sub>OSF</sub>		-15	—	15	mV
Feedback resistance	R <sub>FF</sub>		—	—	—	kΩ
Output sink current	I <sub>OF</sub> <sup>+</sup>	V <sub>S</sub> =0V, V <sub>R</sub> =3V	3	—	—	mA
Output source current	I <sub>OF</sub> <sup>-</sup>	V <sub>S</sub> =0V, V <sub>R</sub> =2V	—	—	-3	mA

**Electrical Characteristics (Cont.)** ( $V_{CC}=12V$ ,  $T_a=25^\circ C$ )

Parameter	Symbol	Condition	min	typ	max	Unit
<b>Speed Error Detect Part (Logic)</b>						
Count switch-over voltage	$V_{FG}$		1.0	1.8	2.5	V
Count No. 1	$N_{CT1}$	300rpm mode	—	1006	—	Time
Count No. 2	$N_{CT2}$	300rpm mode	—	838	—	Time
<b>Speed Error Output Part</b>						
Output low voltage	$V_{OLC}$		—	0.1	0.3	V
Output high voltage	$V_{OHC}$		2.4	—	5.5	V
Output sink current	$I_{OC}^+$		300	—	—	$\mu A$
Output source current	$I_{OC}^-$		—	—	150	$\mu A$
<b>Error Amp. Part</b>						
Output sink current	$I_{OE}^+$		2	—	—	mA
Output source current	$I_{OE}^-$		—	—	-2	mA
Gain bandwidth product	$f_{GBE}$		—	800	—	kHz
FG divider change-over	—	$V_{FG}=0V$	—	600/720	—	rpm
300/360 rpm change-over	—	$V_{FG}=2.5V$	—	300/360	—	rpm
<b>Drive Control Amp. Part</b>						
Threshold voltage	$V_{THD}$		2.3	2.55	2.8	V
Drive gain	$A_{GD}$		1.6	1.8	2.0	Time
Limiter voltage	$V_{LD}$		0.59	0.66	0.72	V
Open loop drive gain	$A_{OD}$		—	30	—	dB
<b>Hall Amp. Part</b>						
Phase input voltage range	$V_{ICH}$		2	—	$V_{CC}-2$	V
Error input voltage range	$V_{IDH}$		—	—	400	mV
Hall input sensitivity	$V_{ISH}$		—	10	—	mV
Hall offset voltage	$V_{OSH}$		—	—	20	mV
Input bias current	$I_{BH}$		—	1.0	5.0	$\mu A$
<b>Drive Output Part</b>						
Saturation voltage (on $V_{CC}$ )	$V_{SU}$		—	—	1.4	V
Saturation voltage (on ground)	$V_{SL}$		—	—	1.1	V
OFF leak current	$I_{LO}$		-20	—	20	$\mu A$
<b>Start/Stop Control Part</b>						
Input low voltage	$V_{IL}$		—	—	0.7	V
Input high voltage	$V_{IH}$		2	—	—	V
Input low current	$I_{IL}$	$V_{SS}=0V$	-100	-50	—	$\mu A$
Input high current	$I_{IH}$	$V_{SS}=2V$	—	10	100	$\mu A$
<b>Speed Error Output Part</b>						
Output leak current	$I_{LC}^*$		—	—	0.1	$\mu A$
Input bias current	$I_{BE}^*$		—	—	0.1	$\mu A$
Quiescent breakdown level	$V_S^*$	Applied between GND and each pin (C=100pF, No R)	300	—	—	V

 Note) Operating Supply Voltage Range :  $V_{CC(oper)}=9$  to 16V

\* These values are of reference values but not guaranteed values.

## ■ Characteristics Curve

