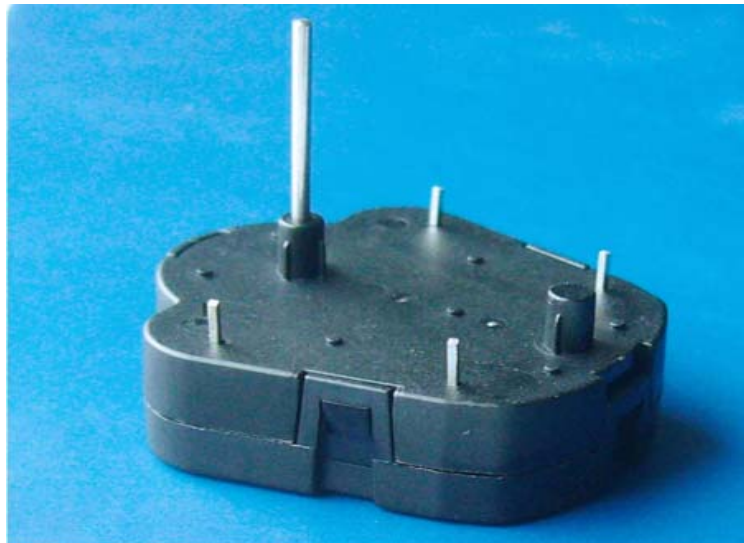




伟力驱动技术(深圳)有限公司
Hong Kong VID Company Limited

VID 78

Multi-polar Step Motor Series





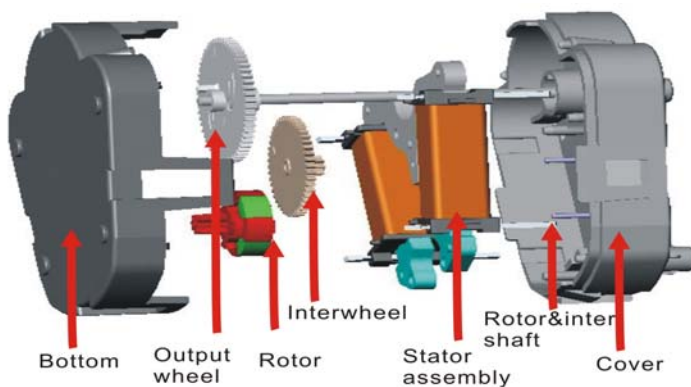
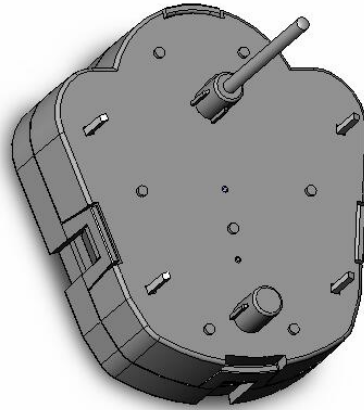
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A. VID78 Motor Introduction

VID78 Multi-polar Step Motor Series design based on VID new design electromagnetic micro-motor system (US Patent 20080018208, Chinese patent ZL 2006 20130640.5 and International patent is under application).

Extremely low noise, high torque and high precision are leading advance technology for new generation cluster step motor.

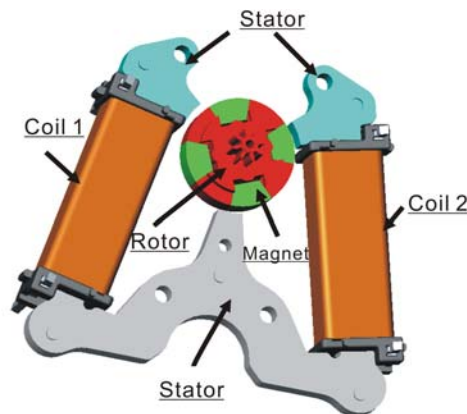


No.	Part Name	Qty.
1	Cover	1
2	Bottom	1
3	Rotor	1
4	Inter wheel	1
5	Output wheel	1
6	Rotor Shaft	2
7	Stator assembly	1

B. Design Features

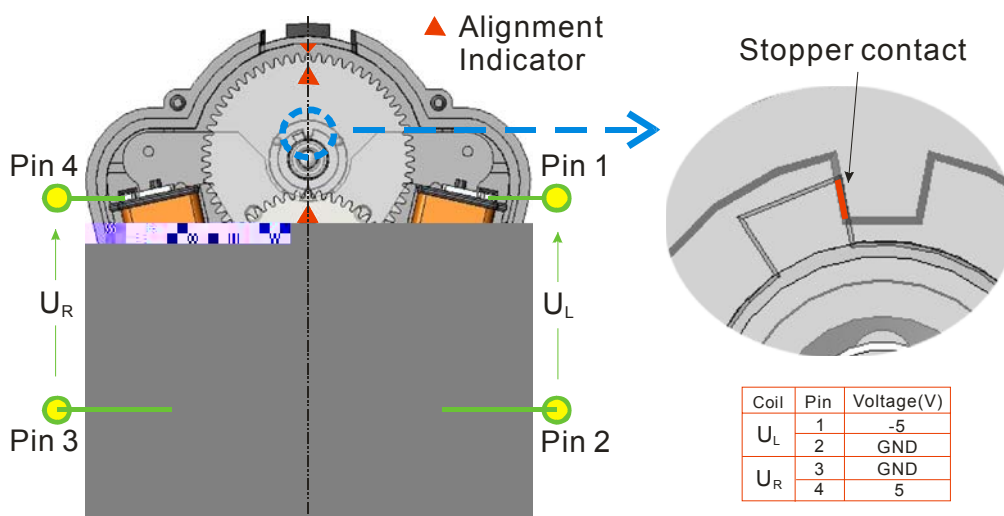
Creative New Patent Design

Regarding to the high quality requirement in automotive industry, VID create a new patent design to achieve extremely low noise and high torque motor. Core of micro-motor is composed of 8 poles of magnet and 3 poles of stator, this is a delicate design of electro-magnetic circuit. Rotor has high stability of rotation, low noise, high torque and precision contribution to the VID78 motor.



Default Zero Reset Position

Factory default zero reset position is defined corresponding to specific driving pulse for VID78 motor. That means magnetic orientation of rotor, hence driving pulse, has consistent fix relationship with and known for the zero reset position. It overcome a lot of traditional drawbacks from zero reset procedure, such as kick-back, graphic zero deviation, noise.





Low Noise

Gear profile design based on Swiss technology and combined with modern noise reduction design feature, VID78 motor operate in extremely low noise, less than 30 dBA at 200Hz. It is a merit for high class automotive requirement.

Low inertia

Low motor inertia design of VID78 is only $3.5 \times 10^{-6} \text{ kgm}^2$, it extend the range for the critical application. Inertia is always considered during cluster motor application. It is a critical parameter for pointer design and speed change control, i.e. acceleration and deceleration. Since, they are critical to avoid step loss at extreme conditions such vibration, shock, temperature change etc.

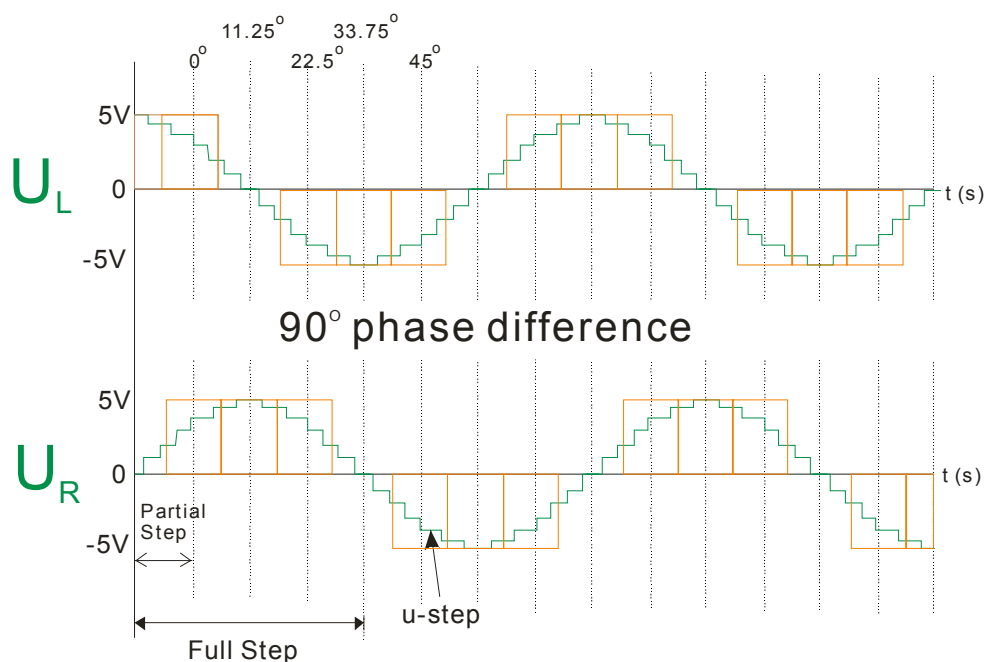
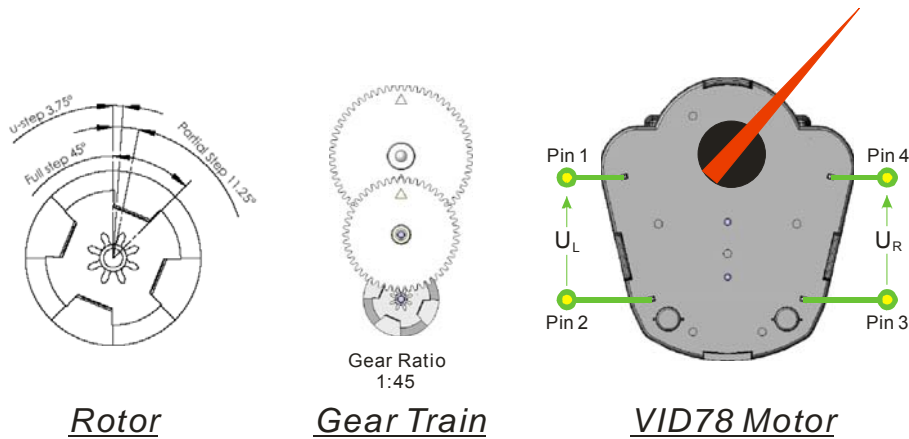
Working Temperature

Operational temperature range of VID78 motor is between -40°C to 105°C . By adopting the most modern material and design features, VID78 can withstand much extensive temperature range compare to other motors exist in the market.

C. Control Signal

VID78 motor is driven by sinusoid wave with 90° phase shift, and the gear ratio is 1:45. Various type of driving signal such as micro-steps, PWM, PFM or partial steps can be used. Step resolution is $0.083^\circ/\text{step}$ for 24 microsteps/waveform. Maximum driving speed is up to $800^\circ/\text{s}$. It is compatible with driving signal for motors with same requirement in the market.

Step Mode	Rotor ($^\circ$)	Pointer ($^\circ$)
1 u-step	3.75	0.083
1 partial step	11.25	0.25
1 full step	45	1

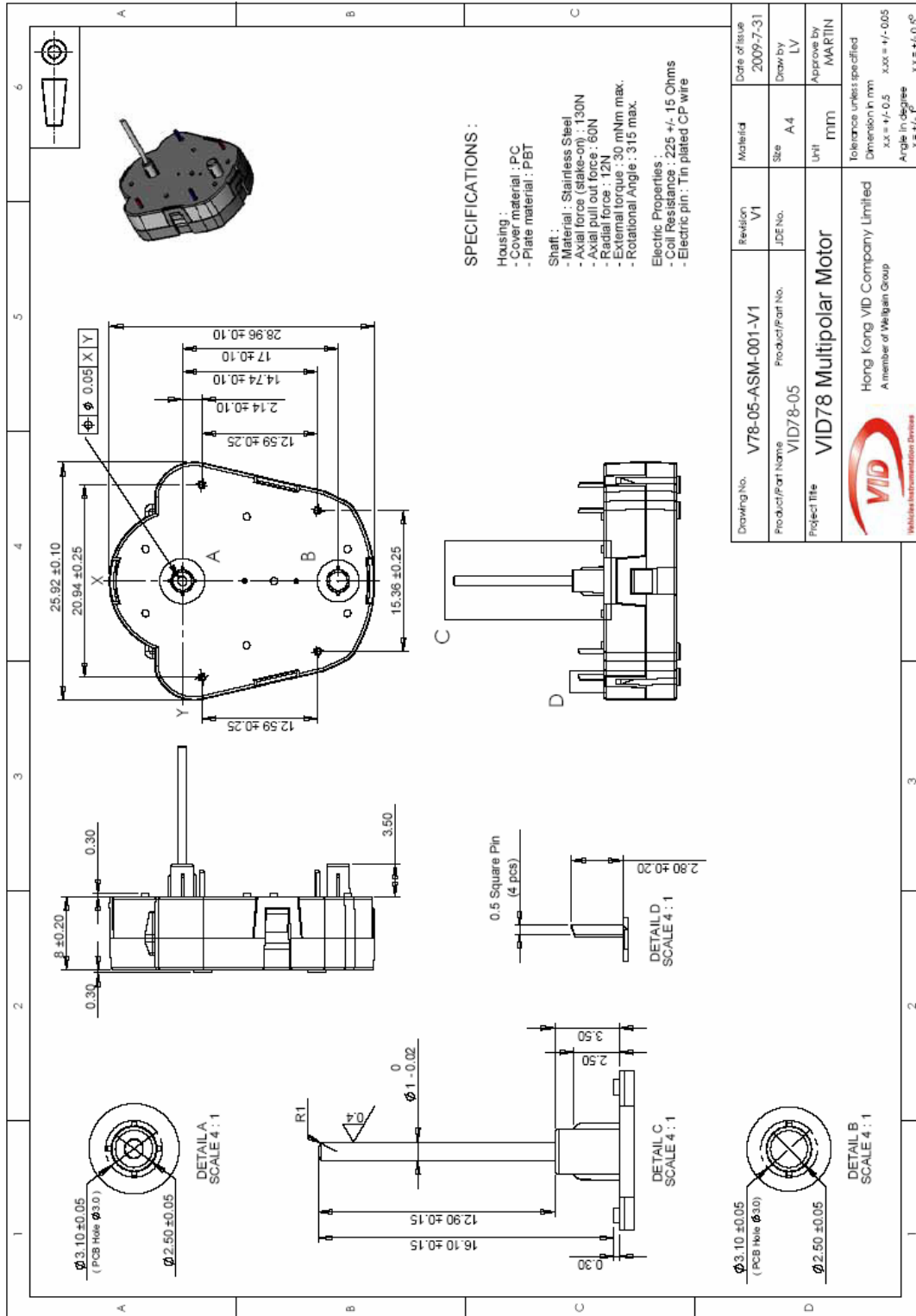




D. Mechanical and Electrical Characteristics

Testing Conditions : $T_{amb} = 22^{\circ}\text{C}$, in u-step mode @ max. voltage 5.0 V, unless other specified.					
Symbol Definition : fa – testing frequency, JL – testing pointer inertia, Ub – Driving voltage					
Parameters	Test Condition	Min.	Typ.	Max	Unit
Electrical Characteristics					
Operating temperature (Ta)		-40		105	$^{\circ}\text{C}$
Coil resistance (R)		210	225	240	Ω
Operating current (Im)			22		mA
Start-Stop frequency (fss)		125			Hz
Maximum speed (fmm)		800			$^{\circ}/\text{s}$
Mechanical Charateristics					
Dynamic Torque	fa = 200HZ	1.3	1.5		mNm
Static Torque (Ms)	Ub = 0 V		0.4		mNm
Holding Torque	Ub = 5 V	3.5	4		mNm
Equivalent Motor Inertia			3.5 E-06		kgm^2
Gear ratio			45 : 1		
Step size in full step mode			1		degree
Step size in partial step mode			0.25		degree
Step size in micro step mode	24 steps/waveform		0.083		degree
Backlash			0.8	1	degree
Noise (at 5 cm from top motor surface)					
Noise	fa = 200HZ		26	32	dB(A)
Others					
Angle of Rotation	built in stopper		315		degree
Axial push force				130	N
Axial pull force				70	N
Perpendicular force	8mm from motor front face			12	N
Max. external turning speed				60	$^{\circ}/\text{s}$

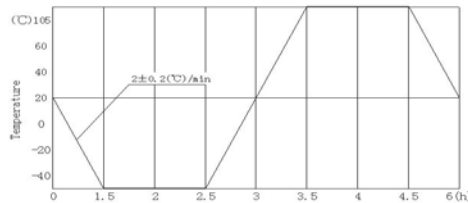
E. Dimensional Drawing



F. Reliability Test

Temperature Cycle Test

- Low Temperature: $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- High Temperature: $+105^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- Dwell time: each for 1 Hrs
- Transfer Time: 1.5 hrs
- Cycle times: 50 cycles total 300hrs
- Cycle mode: see right graph..
- Motor Status: running
- Reference standard: IEC68-2-14.



Thermal Shock Test

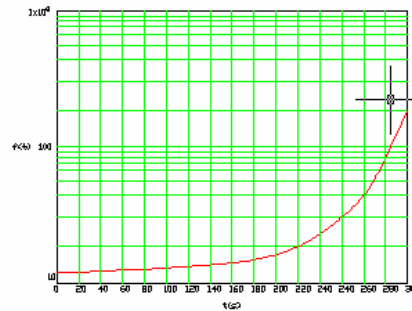
- Low Temperature: $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- High Temperature: $+105^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- Dwell time: each for 0.5hrs
- Transfer Time: within 30s
- Cycle: 100 Cycles total 100hrs
- Motor Status: non-running
- Reference standard: IEC68-2-14.

Humidity Test

- Temperature: $+65^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- Humidity: $95\pm 2\%\text{RH}$
- Duration: 144 Hrs
- Motor Status: non-running
- Reference standard: IEC68-2-3.

Mechanical Vibration Test

- Pulse shape: sine pulse form
- Range of frequency: 10Hz~200Hz(logarithm sweep)
- Sweep cycle: 300 sec.
- Direction: X,Y axis
- Duration: 8 hrs /each Direction
- Acceleration: 10 g
- Motor Status: running
- Reference standard: IEC68-2-6



High Temperature Test

- Temperature: $+105^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- Duration: 168 Hrs
- Motor Status: running
- Reference standard: IEC68-2-2.

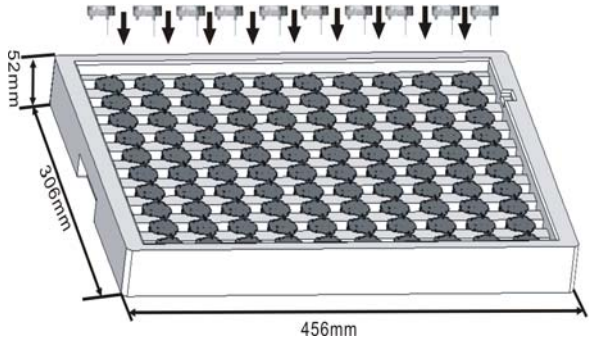
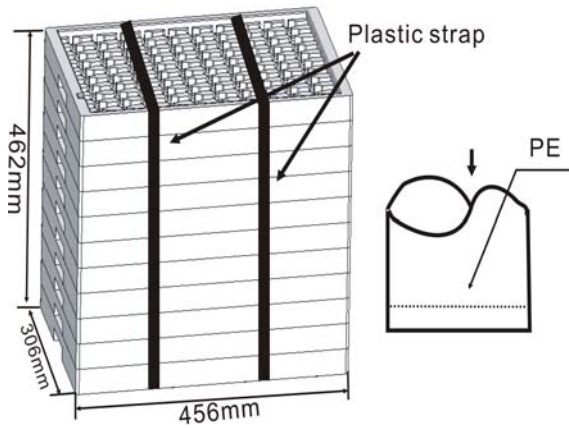
Low Temperature Test

- Temperature: $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$
- Duration: 48 Hrs
- Motor Status: running
- Reference standard: IEC68-2-1.

Mechanical Shocking Test

- Height: 1.2 m
- Direction: X/Y
- Motor Status: non-running
- Reference standard: IEC68-2-62

G. Package Reference

<p>Trap for 100 stepper motor VID78</p> <p>Material: Ployfoam</p> <p>Weight: Trap 1x95g=95g</p> <p>Motor 100x6.5g=650g</p> <p>Total 95g+650g=745g</p>	
<p>Stack for 1000 VID78 Motors</p> <p>Materials: 11Trays(including Cover)</p> <p>Strapped together with plastic band</p> <p>Weight: Traps 10x745g=7450g</p> <p>Cover trap 1x95g=95g</p> <p>Plastic strap 2x15g=30g</p> <p>PE bag 1x100g=100g</p> <p>Total 7450+100+95+30=7675g</p>	
<p>Master-carton for 1000pcs motors VID78</p> <p>Materials : Cardboard</p> <p>Weight : Master-carton 1x1800g=1800g</p> <p>Plastic strap 2x15g=30g</p> <p>Stack motors 1x7675=7675g</p> <p>Total 1800+30+7675=9505g</p>	