

台灣富創得工程股份有限公司

FORTREND ENGINEERING (HsinChu) CORP



Innovation in Surface Curing Technologies

**Ultra clean oven to meet your
Nano-Process requirement**





Fortrend USA



Fortrend China



Fortrend Taiwan

About Us

Fortrend Taiwan is founded in 1998 in Hsinchu city, Taiwan. Fortrend has always been the top leader in batch wafer transfer technologies, Standard Mechanical Interface (SMIF) technologies, ultra-clean automation solutions, and wafer surface curing processes for the semiconductor and PV industries. Fortrend SMIF products have become the crucial automation connections between process equipment and the factory delivery system and between different processing equipment. Fortrend's standard 200mm and 300mm front end automation modules are readily integrated into processing tools reliably and cost effectively. Fortrend's 3DIC thermal curing tools set the industrial standards for wafer surface curing processes. Fortrend offers not only standard automation and thermal curing modules, but also custom solutions allowing us to meet custom challenges and difficult configuration requirements quickly with a minimum of expenses. Contact Fortrend and experience our engineering excellence first hand.

What Set Us Apart

- serving 200mm SMIF automation market since 1998 and the dominant solution provider for 200mm SMIF market
- Custom mini-environment solution provider. Specialized in ultra-clean, air-tight, humidity controlled, airborne particle controlled, and chemical isolation mini-environments
- Complete 300mm wafer handling product lines (sorters, EFEM, clean room substract handling robots, FOUP openers, and factory automation software) since 2008
- Worldwide leader in ultra-clean wafer baking oven for 3DIC and polymer curing applications since 2012
- IP developer in robotic solutions and control technologies with worldwide patent protection

SIO-300-200 Series

300mm thermal curing system



The SIO-300-200 is a very successful TC chamber system. Its extreme-clean thermal chamber improves the yield of products obviously. The very low running cost on gas and energy consumption reduce the running cost very obvious. Which make it be a favorite process oven system.

The SIO-300-200 can be used for Atmosphere curing. Tts cleanness can reach class 10 easily and temperature uniformity +/- 3.5 degree. Its gentle heating way cure wafer very safety – no overheating on the surface of wafer.

Application :

- 3DIC profile curing
- Photo-resist baking
- Moist removal
- Reflow
- Anneal
- No oxidation baking (vacuum)
- Toxic vapor removal (vacuum)
- Other thermal process

Key Feature

- ◆ *The Oven system has integrated mini-environment, 300mm load ports, wafer robot, cassette robot, and oven and control unit.*
- ◆ *Field proven application: 3DIC baking, photo-resist baking, moist removal, reflow and thermal process.*
- ◆ *200mm cassette manual/auto load available.*
- ◆ *Wide operating range: ambient ~ 250 °C.*
- ◆ *Full automatic.*
- ◆ *Friendly operational interface.*
- ◆ *Class 10 for Baking Chamber*
- ◆ *Better Class 10 for Oven System*
- ◆ *Process Gas Input: N₂,*
- ◆ *Nitrogen Consumption: 0~50L/min*
- ◆ *Temperature Uniformity: ± 3.5°C*
- ◆ *Number of Recipe: Programmable*
- ◆ *Wafer and robotic arm protrusion detection*
- ◆ *Main controller: IPC – Windows 10 or newer*
- ◆ *Modular design minimizes adjustments, maintenance and downtime*
- ◆ *Thermal Chamber complies SEMI S2S8 standard*

Model Information

Model	SIO-300-200-4	SIO-300-200-5H
Oven Maximum Temperature	250°C	250°C
Wafer Orientation	Vertical	Horizontal
Number of Oven	SunTech Oven x 2	SunTech Oven x 4
Wafer robot	Single Arm	Dual Arm
End-Effector	Single Blade	1+5 Blade
Cassette robot	Vertical cassette transfer	NA
No of Load ports	4	4
V-turn	Vertical	NA
Cool station	3	4

FVO-450 Series

200mm/300mm PI Thermal Curing System



Key Features

- ◆ *Fully Automatically Operation with 2 or 4 FOUP/Pod opener*
- ◆ *Friendly GUI operating interface*
- ◆ *Multi recipes and CIM control*
- ◆ *Data collection to record process variables such as temperature, pressure, gas flow,.. for real time control*
- ◆ *Reliable dual arm robot for wafer transfer*
- ◆ *Transfer environmental cleanness: better than class 10*
- ◆ *Oven Chamber cleanness: class10*
- ◆ *Scroll Pump assembly, dry, lubricant-free, vacuum pump*
- ◆ *Preheated N₂ Process Gas*
- ◆ *O₂ concentration < 10 ppm*
- ◆ *TC in chamber to monitor temperature in real time*
- ◆ *Air-cooled chamber with external forced air convection*
- ◆ *Dual Condensate Filter Assembly*

- ◆ *ID-System: Standard RFID reader, Optional IR-Link or Barcode*
- ◆ *E-84 Function for OHT system (Optional)*
- ◆ *SECS/GEM Communication with Host (Optional)*
- ◆ *Thermal Chamber complies SEMI S2S8 standard*

The PI curing oven is special design for following process

- ◆ *Polyimide cure*
- ◆ *BCB cure*
- ◆ *Photoresist cure process effluents*
- ◆ *Copper Anneal*
- ◆ *Copper Oxide Removal*

The Curing Process for Polyimides

Since most polyimides are virtually insoluble in common organic solvents, a soluble polyimide precursor is generally applied. This precursor has to be converted to the final polyimide by a subsequent thermal treatment or curing.

The chemical conversion, or curing, of polyimide is done by heating in an inert gas atmosphere and/or under vacuum.

The imidization process results in molecular rigidity and an increase of glass transition temperature. When the glass transition point of the polymer reaches the reaction temperature imidization slows down. The ramp up/down time of a curing cycle should be adjusted to both individual requirements and layer thickness.

A standard curing cycle involves either gradual heating to 300°C within 3 hours or stepwise curing at 100°C, 200°C, and 300°C for 30 minutes each with a ramping time from one temperature to the next of about 30 minutes. The reverse cycle applies to the cooling process. Special care should be taken that rapid cooling is avoided to reduce stress. Prolonged curing and cool down times are recommended for thick layers.

Specifications

System Specifications		
Model	FVO-450-1	FVO-450-2
Bake Chamber	1x FVO-12-50 for vertically stacked 300mm/ 200mm wafer	2x FVO-12-50 for vertically stacked 300mm/ 200mm wafer
Robot	1 SCARA Robot without Track, Dual Arm with mapping sensor.	1 SCARA Robot with Track, Dual Arm with mapping sensor.
FOUP Opener	2x SEMI Standard FOUP Openers	4x SEMI Standard FOUP Openers
EFEM	FFU: 99.9995% at 0.12 um	
Controller	IPC+ Electrical Control System, OS Win 10 or newer	
UPS	30 minutes for IPC only, Exclude Bake Oven	
Safe Device	Door interlock, Over Current Protection, Leakage Circuit Breaker, Over temp protection	

SunTech Table Top Thermal Chamber

150mm/200mm/300mm Thermal chamber



300mm Thermal Chamber

SunTech Thermal Chamber is a high performance ISO Class 4 (Federal class-10) Cleanliness oven. It is highly reliable and easy to operate. It offers both horizontal and vertical cassettes ideal for applications.

SunTech Thermal Chamber can be used for thermal curing at atmosphere environment and remain good uniformity. In most applications, the uniformity can reach better +/- 3.5 degrees.

SunTech Thermal Chamber complies SEMI S2S8 standard.

Application :

- ✓ 3DIC profile curing
- ✓ Photo-resist baking
- ✓ Moist removal
- ✓ Reflow
- ✓ Anneal
- ✓ No oxidation baking (vacuum)
- ✓ Toxic vapor removal (vacuum)
- ✓ Polyimide cure
- ✓ BCB cure
- ✓ Copper Anneal
- ✓ Copper Oxide Removal
- ✓ Other thermal process

Model Information

Atmosphere model	FLO-10C-12W
Wafer Size	150-300mm
Capacity	300mm cassette (25 wafers) x 1 200mm cassette (25 wafers) x 1 150mm cassette (25 wafers) x 4
Oven Maximum Temperature	250°C
Uniformity	± 3.5°C
Wafer Orientation	Horizontal / Vertical
TC sensor	None
N2 heater	Pre-heat by chamber
N2 flow rate	0~50 LPM
Cleanness	Class 10

Accessory

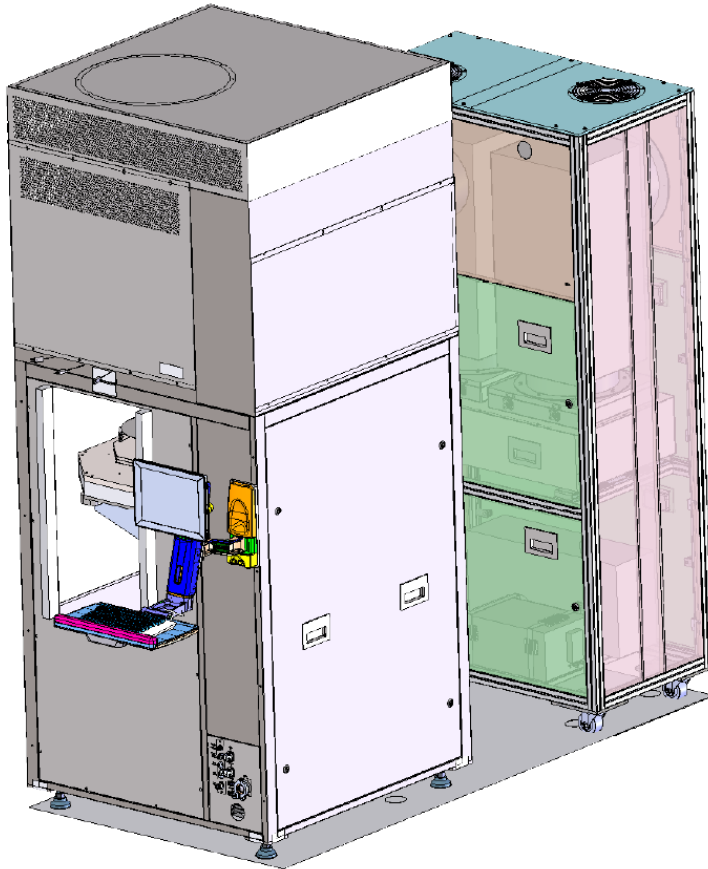


Quartz Cassette



Metal Cassette (Horizontal or Vertical)

FVO-12-50 High Temperature Vacuum Oven



The PI curing oven is special design for following process

- Polyimide cure
- BCB cure
- Photoresist cure
- Copper Anneal
- Copper Oxide Removal

Key Feature

- ◆ Up to 300mm wafer capacity of 50
- ◆ Low O₂ (Less than 10ppm over background)
- ◆ Continuous laminar flow of process gas parallel to wafer
 - Removes aerosol particles released by thermal expansion
 - Uniform gas environment around wafers improves film solvent evaporation and removal.
- ◆ Process Temperature Range Ambient +20~450°C
- ◆ Three Process Temperature Control Zone and Temperature Uniformity Better than $\pm 3^{\circ}\text{C}$ after Stabilization
- ◆ Maximum Heating Ramp 8°C/minute and Cooling Ramp 6°C/minute
- ◆ Process gas heated to process temperature before entering chamber.
- ◆ Manually operation or integrated with a EFEM to be a fully automation tool.
- ◆ Chamber Vacuum Exhaust Condensate Trap
 - Vacuum line cooler and coalescing filters trap condensable process effluents
 - Prevents contamination of vacuum valves and vacuum pump
 - Standard commercial filter element

Specification:

Model	FVO-12-50
Wafer size	Up to 300mm
Cleanness	Class 10 (ISO Class 4)
Capacity	50 pcs of 300mm wafer or 75 pcs of 200mm wafer
Operation range	Ambient +20°C - 450°C
Temperature uniformity	$\leq 300^{\circ}\text{C}$: $\pm 3^{\circ}\text{C}$ degree after stabilization. $> 300^{\circ}\text{C}$: $\pm 3.5^{\circ}\text{C}$ degree after stabilization When test uniformity (300mm cassette), put 3 TC wafers at slot 8, 33, and 64.
Chamber Material	SUS 316L
Process gas input	1x Standard N2 port, optional to 3x.
N2 consumption	0~200 LPM
OS	Window CE 6.0 or newer
Memory	2.5" HDD 500G
Interface	12" LED touch screen
GUI	Graphical icon
Internet	TCP/IP
Recipe Number	More than 999
Flow Meter	Digital flow meter (10~200 LPM)
Pressure Sensor Range	-100~100kPa (Related to atmospheric pressure)
Interior Chamber Dimension	Φ 447.8mm x 867mm
Overall Dimension	1041mm x 1101.5mm x 2510mm
Overall Dimension (with optional Cooling Station)	1102mm x 2195mm x 2510mm
Power requirement	220 V, 50/60 Hz, 60A, 4 wires, 3 phase (Y connection)
Weight (approx.)	950 kg

Fortrend Engineering Corp

Patent List

No.	Country	Patent	Filing Date	Title
1	USA	5,193,969	5/20/1991	Wafer transfer machine
2	USA	5,506,744	4/28/1994	Ionized airflow manifold for static reduction
3	USA	5,706,201	5/7/1996	Software to determine the position of the center of a wafer
4	USA	5,870,488	5/7/1996	Method and apparatus for prealigning wafers in a wafer sorting system
5	USA	5,934,991	2/1/1998	Pod loader interface improved clean air system
6	USA	5,885,045	3/11/1998	Integrated wafer pod-load/unload and mass-transfer system
7	USA	5,984,610	3/7/1995	Pod load interface
8	USA	6,086,323	6/29/1999	Method for supplying wafers to an IC manufacturing process
9	Taiwan	105,433	3/16/1998	Integrated wafer pod-load/unload and mass-transfer system
10	Taiwan	105,434	3/18/1998	Integrated wafer pod-load/unload and mass-transfer system
11	USA	6,610,993	6/21/1999	Load Port Door Assembly With Integrated Wafer Mapper
12	USA	6,013,920	11/25/1999	Wafer -mapping load post interface having an effector position sensing device
13	USA	6,193,459	3/12/1999	Integrated wafer pod-load/unload and mass-transfer system
14	USA	6,239,963	6/21/1999	Wafer support with electrostatic discharge bus
15	USA	6,396,072	4/3/2000	Load Port Door Assembly With Integrated Wafer Mapper
16	Taiwan	511,119	6/20/2000	Load Port Door Assembly With Integrated Wafer Mapper
17	USA	6,494,666	1/26/2001	Simplified and enhanced SCARA arm
18	USA	6,932,558	7/3/2002	Wafer Aligner
19	USA	6,616,034	9/9/2003	Radio Frequency Identification Device
20	Taiwan	I 228484	6/12/2003	Universal Reticle Transfer System
21	Europe	3,739,118	1/11/2005	Universal Reticle Transfer System
22	USA	7,318,697 B2	6/12/2003	Universal Reticle Transfer System
23	USA	2005013684 (A1)	7/14/2004	Single Reticle Transfer System Provisional Patent Application
24	Taiwan	發明第 I 300585 號	9/11/2008	轉塔式光罩管理系統 (Carousel Type Reticle Stocker)

No.	Country	Patent	Filing Date	Title
25	Taiwan	發明第 I 293939 號	3/1/2008	光罩盒搬運車 (Portable Reticle Transportation Cart)
26	Taiwan	新型第 M304619 號	1/11/2007	具識別及充氣裝置之氮氣櫃 (N2 Chamber with Lot Tracking Systems)
27	Taiwan	發明第 I 245225 號	12/11/2005	在製造環境下追蹤物品之系統及其方法 (Systems and Methods to Track Materials for Manufacturing)
28	Taiwan	新型第 M276318 號	9/21/2005	晶圓盒檢測機台 (Wafer Box Inspection System)
29	Taiwan	新型第 M272224 號	8/1/2005	半導體製程料號識別裝置 (Material ID Device for Semiconductor Manufacturing Process)
30	Taiwan	新型第 223405 號	5/1/2004	晶圓片推撥機構 (Wafer Seater Device)
31	Taiwan	新型第 217504 號	1/1/2004	晶圓片烘烤裝置 (Wafer Oven System)
32	Taiwan	新型第 217667 號	1/1/2004	雙軌式晶圓盒開盒機構 (Dual Track Wafer Pod Opening Device)
33	Taiwan	新型第 209032 號	8/11/2003	晶圓盒自動載入及開啟裝置 (Automated Wafer Cassette Transfer and Pod Opening System)
34	Taiwan	新型第 202968 號	4/21/2003	磁力牽引之晶圓盒泊靠裝置 (Magnetic Pod Moving Device)
35	Taiwan	新型第 198284 號	12/11/2002	可彈性擴張的定位裝置 (Elastic Inflation Type Positioning Device)
36	Taiwan	新型第 197981 號	11/21/2002	晶圓盒快速開啟裝置 (Fast Pod Cover Opening Device)
37	Taiwan	新型第 198752 號	11/21/2002	晶圓盒開啟裝置之承接面調整機構 (Pod Opener Mechanical Interface Device)
38	China	发明 200910010033.3	9/8/2010	翻转式晶圆自动传输装置
39	China	发明 200910010030.X	9/8/2010	旋转式晶圆自动传输装置
40	China	发明 200910010032.9	9/8/2010	紧凑式晶圆自动传输装置
41	China	新型 200920010067.8	12/30/2010	平移翻转式晶圆自动传输装置
42	Taiwan	新型第 M376557 號	3/21/2010	晶片間距轉換裝置 (Chip space converter)

43	Taiwan	新型第 M389928 號	10/1/2010	光罩儲存器 (Reticle storage)
44	Taiwan	新型第 M603197 號	10/21/2020	冷卻裝置及使用該冷卻裝置之真空烤箱 (Cooling device and vacuum oven using the cooling device)
45	Taiwan	新型第 M604058 號	11/11/2020	輸送模組及使用該輸送模組之設備前端模組 (Conveying module and equipment front-end module using the conveying module)
46	Taiwan	新型第 M604970 號	12/1/2020	自動化真空烤箱設備模組 (Automatic vacuum oven equipment module)
47	Taiwan	新型第 M630402 號	8/1/2022	邊緣夾持之晶圓翻轉裝置 (Wafer flipping device by holding edge)
48	Taiwan	發明第 I786019 號	12/1/2022	晶圓承載座及其使用方法 (WAFER HOLDER AND METHOD OF USING THE SAME)
49	Taiwan	發明第 I799261 號	4/11/2023	具晶圓承載座之上下料自動化作業設備 (AUTOMATIC LOADING AND UNLOADING APPARATUS WITH WAFER HOLDER)

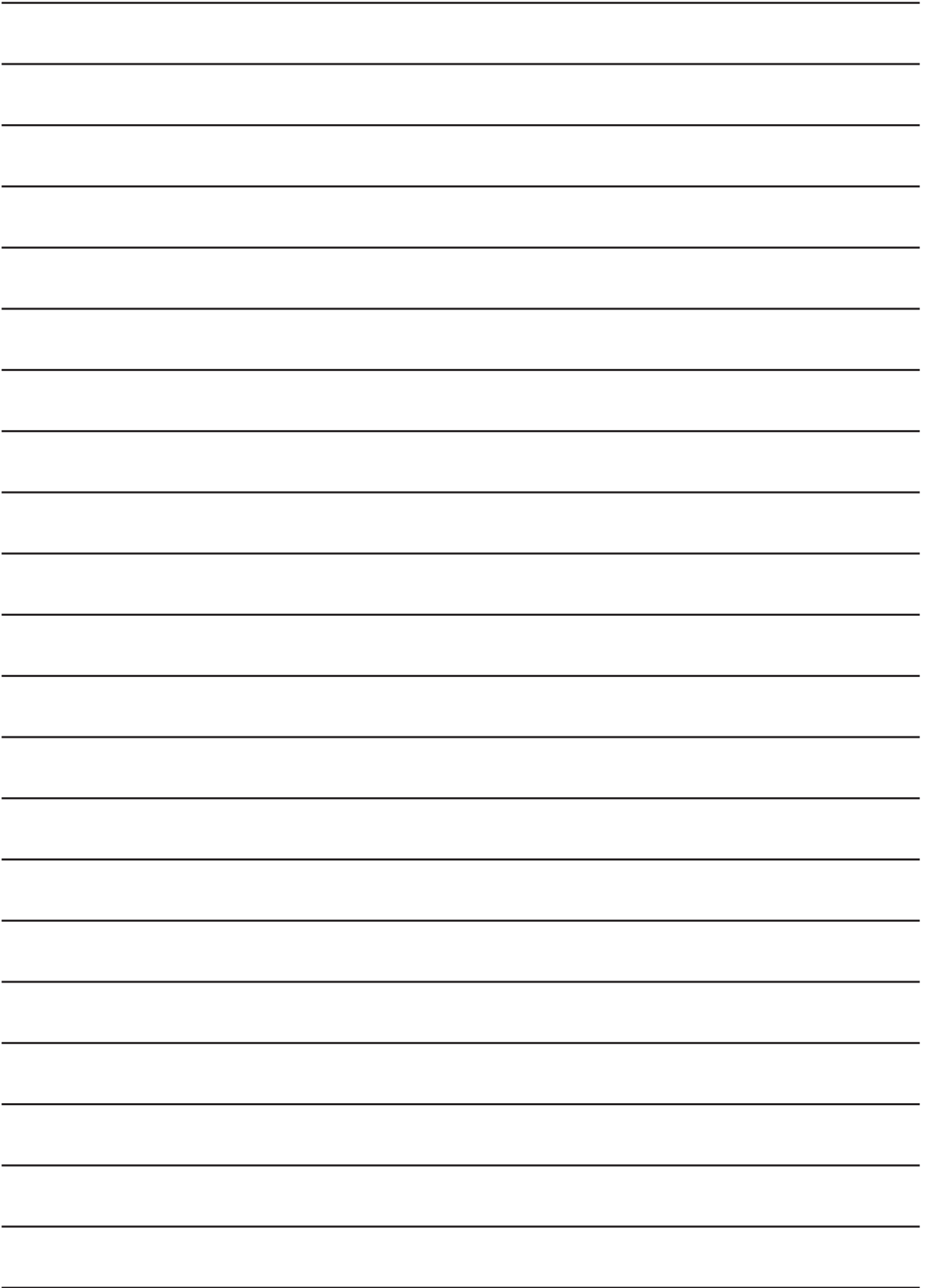


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