



**FC Packaging Diff_TDR Device
GATS-333A
(MODEL.RMZ1346)**

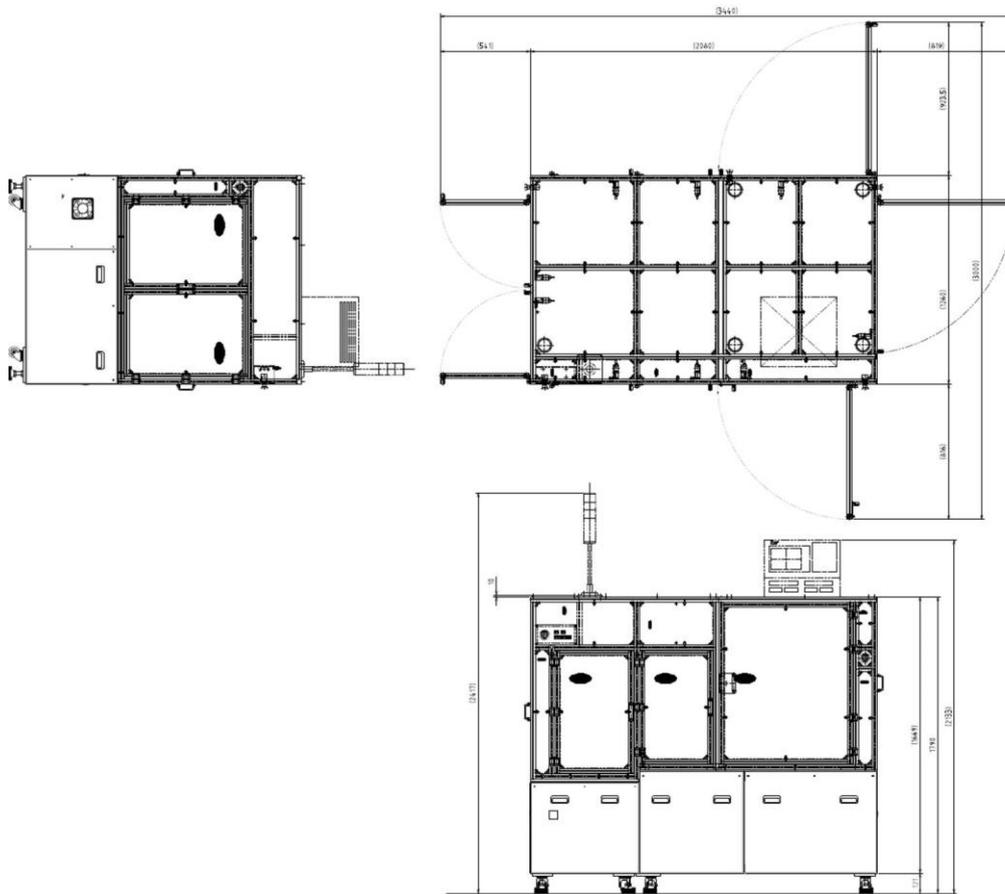
Product Specification

1. Overview

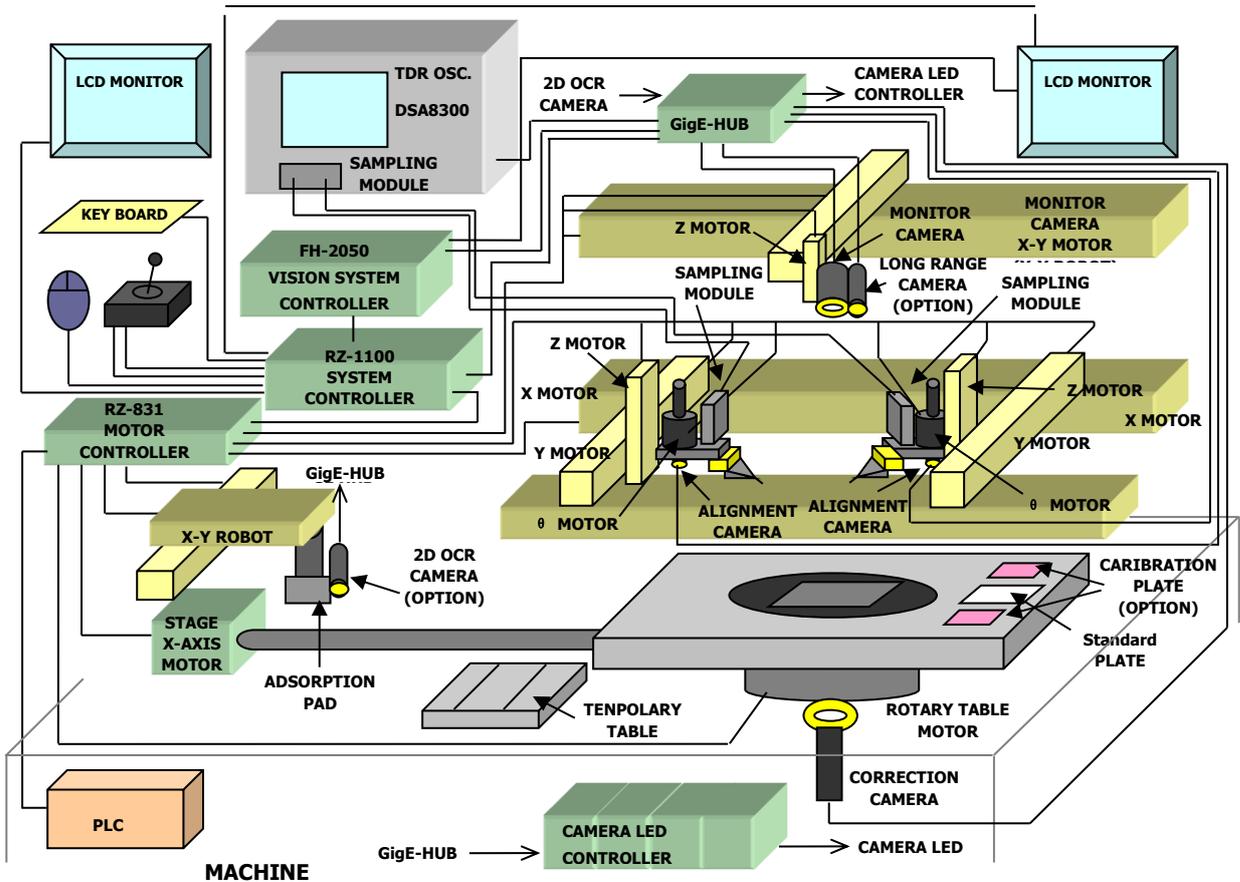
- 1: Two Cascade probes are adopted in this device to automatically measure the FC surface of the semiconductor packaging and the TDR differential impedance difference of the solder bump.
- 2: In order to ensure that the Cascade probes can efficiently contact the designated detection point, a rotation mechanism is configured on the heads of the Cascade probes, and a rotation mechanism being set in a unit of 10° is configured on the detection workbench end.
- 3: The use of detection work is limited to JEDEC-TRAY implementation.
- 4: In order to ensure that the exchanged Cascade probes can be used immediately, a structure that compensates for position information of the probe PIN head is adopted for the continuous automatic measurement. After the Cascade probes are exchanged, a series of continuous actions for automatic measurement can still be continued.
- 5: After the TDR measurement is completed, the PASS and FAIL judgments are made within the specified range by specifying the judgment range for the acquired waveform. If there are multiple judgment positions, multiple ranges (up to 4 waveforms at specified positions) can be specified for one waveform acquisition.

1 System Structure

1.1 Profile of System



1.2 System Configuration



1) Main Unit

- | | |
|--|----------|
| (1) GATS-333A mechanical unit | 1 set |
| System controller | 1 piece |
| Multiple axis Control Controller (Motor Controller) | 1 piece |
| PLC | 1 piece |
| Optical Equipment Unit (Vision System Controller) | 1 set |
| Monitor | 2 pieces |
| (2) Digital Serial Analyzer sampling oscilloscope (DSA8300 provided by your company) | 1 set |

* The sampling head is provided by your company.
 For the probe, refer to the system specifications described later.

Precautions for Measuring Apparatus

1. Usage

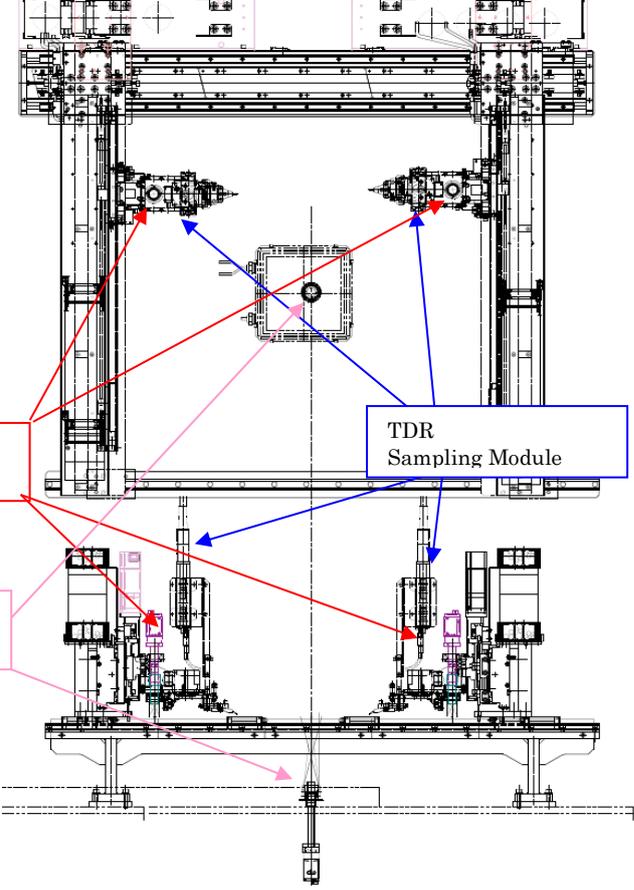
The oscilloscope and the attached sampling head module are easily damaged by static electricity. Therefore, it is required to refer to the instruction manual of the oscilloscope during the usage, and the operation should be carried out by personnel with sufficient knowledge and skills. Prior to the work, the operator should wear anti-static clothes and shoes, and wear an anti-static wrist strap.

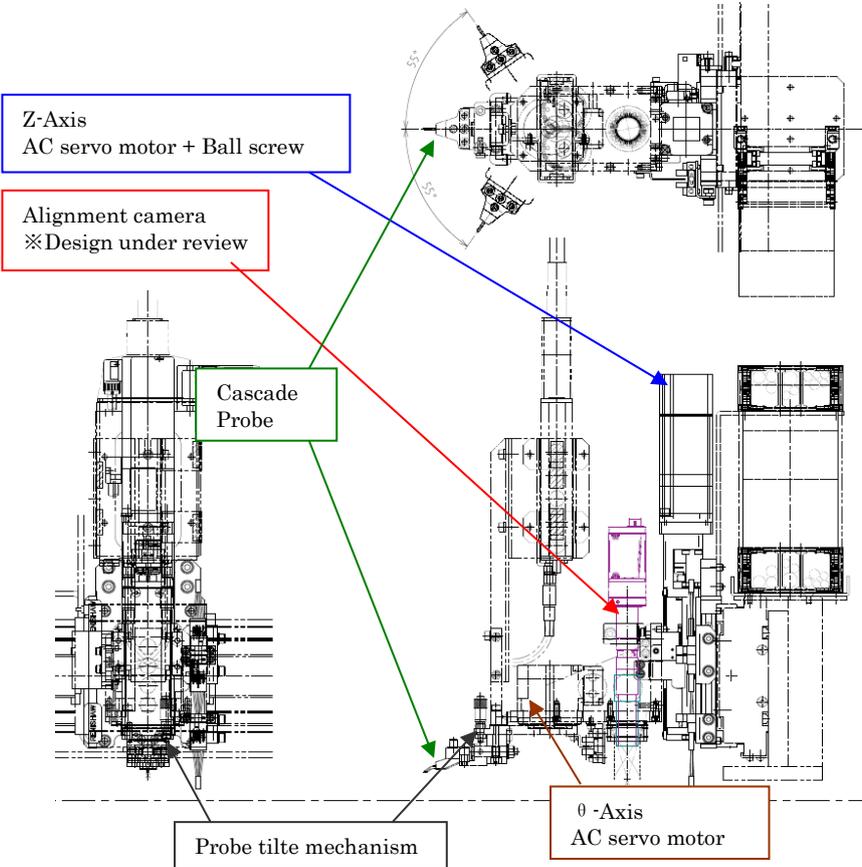
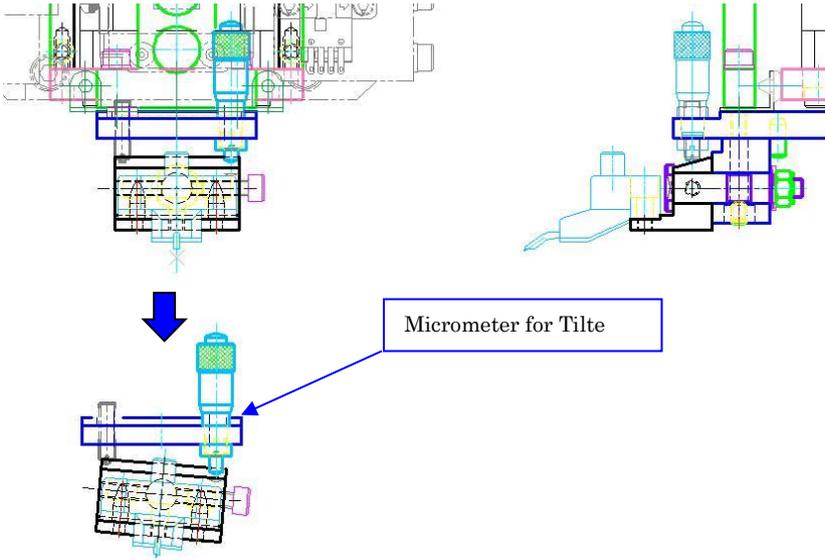
In the GATS-333A system, please note that Tektronix products such as oscilloscopes and sampling head modules are not covered by the warranty of this mechanical device.

2. Installation Conditions

The operator who is operating the oscilloscope, sampling head and probe should lay at the grounded anti-static mat around the apparatus.

1.3 Overview of Components

No	Category	Item
1	Probing Unit Layout (1)	<p data-bbox="544 353 786 387">Entire probing unit</p>  <p data-bbox="552 786 783 842">Alignment Camera ※Design under review</p> <p data-bbox="552 954 783 1010">Collection Camera ※Design under review</p> <p data-bbox="1190 763 1433 819">TDR Sampling Module</p>

No	Category	Item
2	Probing part Layout(2)	 <p>Z-Axis AC servo motor + Ball screw</p> <p>Alignment camera ※Design under review</p> <p>Cascade Probe</p> <p>Probe tilte mechanism</p> <p>θ -Axis AC servo motor</p>
3	Probe tilt mechanism	<p>Make adjustments by visual confirmation.</p>  <p>Micrometer for Tilt</p>

No	Category	Item
4	Work-holder mechanism & Correction Camera	<p>Table XT-Axis Ball screw</p> <p>Rotary table (Work-holder)</p> <p>Collection camera ※Design under review</p>

2 Specifications

2.1 General Specifications

No	Category	Item	Specifications
1	Check the limitations of the target work	Dimension	10mm~150mm
		Thickness	0.3mm~2.0mm
		FC protrusion interval	90 μ m~400 μ m
		Protrusion diameter	58 μ m~100 μ m
		Warpage	(Porous suction) The suction is allowed, and the range of warpage can be corrected by suction However, no parts should be installed on the back
		JEDEC-TRAY	322.6mm L×135.9mm W×7.6mm H standard-TRAY 322.6mm L×135.9mm W×12.2mm H Two trays abovementioned can be supported
	Others	During automatic operation, it should be negotiated separately if a product that can be transported by PP for suction and transport (the surface has a range that can be transported by suction by a commercially available sucker) fails to meet the above conditions.	
2	Device	Dimension	(D) 2080mm×(W) 1260mm×(H) 1800 mm * Excluding the protrusions
		Weight	Approx. 1,000kg
		Rotary Table & Work-holder	It has a structure in which the works are placed one by one on the work holder. The work holder can be rotated in a unit of 10°. The substrates of the packaged parts and the substrates with pins should be separately manufactured with dedicated work holder.
		Alignment	Mechanics Repetition: $\pm 7.5\mu$ m (mechanical repetitive positioning accuracy, theoretical value) Total alignment accuracy: $\pm 20\mu$ m (comprehensive alignment accuracy, including alignment camera accuracy)
3	Measurement	Speed	When averaging 16 times, the measurement duration for each checkpoint is about 1 second
		Measurement accuracy	The actual measurement accuracy is subject to the detection accuracy of the oscilloscope.
4	Contact detection	TDR waveform observation	The gold-plated board installed on the workbench is used as the reference height, and is lowered to the height of the protrusion design of substrate. The probe is slowly lowered during the measurement. When the detection waveform is stable, it is regarded as contact detection.
5	Cable	High-frequency cable	Specification of high-frequency cable from sampling head to CASCADE probe <ul style="list-style-type: none"> Support coaxial cables above 40GHz, length 200mm, 2.92mm connector (male-to-male)

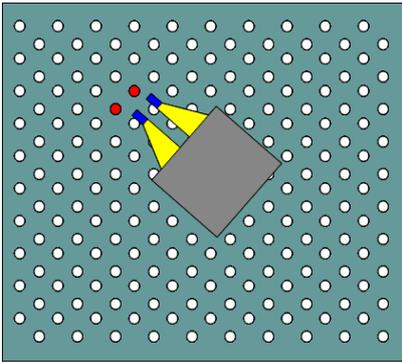
2.2 Electrical

No	Category	Specifications	
1	Control	This is controlled by the company's control PC and Mitsubishi PLC	
2	Emergency Stop	Rotary return switch, with yellow ring	
3	Warning Light Specifications Alarm (Our company's standard specifications)	Red Light ON	Emergency stop, abnormal stop
		Yellow Light ON	End of automatic operation
		Yellow Light Flashing	Pause
		Green Light ON	Automatic operation (including pause)
		Green Light Flashing	Automatic operation start conditions are met
		Buzzer 1	Emergency stop, abnormal stop, warning
		Buzzer 2	Pause, loop stop
4	Interlock	<p>The stop mode is shown below.</p> <p>Emergency stop (EMS): Disconnect the power supply by pressing the emergency stop switch, etc.</p> <p>All axes stop at this position, and the compressed air drive equipment stops at the end of the movement direction.</p> <p>→ It is necessary to return to the origin when restoring.</p>	
5	Security Mechanism	Interlock through the safety guard.	
		The operation is prohibited when the guard cover is open. If the guard cover is opened during automatic operation and manual operation, it will stop immediately.	
		The safety restrictions for each operation are set when returning to the origin is not completed,	
		The safety restrictions are set for manual operations in automatic operation.	
		The operation cannot be recovered when the abnormal position is not cleared.	

2.3 System Specifications

No	Category	Item	Specifications
1	TDR Oscilloscope (Provided by user, excluding the right probe)	Oscilloscope	DSA8300: produced by Tektronix
		Sampling Head	80E10B (50GHz,2ch)
		Dimension, Weight, Power	(W) 475mm, (H) 343mm (L) 419mm, weight 21kg 90V~250VAC±10%, 50Hz to 400Hz, 330W MAX600W
		Probe	Produced by CASCADE Model: designated as ACP40-xxx-△△△△ xxx: Probe type: GS, SG, etc. △△△: Probe interval: 250,300, etc. * Two pieces are attached during the delivery. The model can be negotiated separately.
2	System Controller (RZ-1100)	PC	WINDOWS PC, O/S: Win10 (English) Model selected by our company
		Keyboard	An attachment of PC above
		Mouse	An attachment of PC above
		Dimension, Weight, Power	178mm×452mm×448mm (W D H) approx. 12kg Max. 365W (Change due to different model selection)
		Others	MONITOR×2 (Compatible with camera monitor)
			JOY STICK LAN I/F
3	Motor Controller (RZ-831)	USB Motor Controller	16-axis +I/O (input 40, output 24)
		Dimension, Weight, Power	430mm×400mm×150mm (W D H) 3kg 100V~220V 300W
4	Vision Controller	Dimension, Weight	115mm×182.5mm×190mm (W D H) approx. 3.4kg
		Power Voltage / Current Consumption	DC20.4V~DC26.4V/4.6A or less
5	Lighting Power	Controller Unit (Camera LED)×4	Output 2ch MAX 1.4A/2ch
		Dimension, Weight, Efficiency (one-piece specifications)	59mm×80mm×113.5mm (W D H) 0.25kg DC24V 40W
6	Camera One set	Monitoring Camera	Compatible with GigE 5M Pixel camera
		Alignment Camera×2	Compatible with GigE 1.3M Pixel camera
		Correction Camera	Compatible with GigE 1.3M Pixel camera
		OCR/QD (Optional)	FH series produced by ORMON
		Telephoto Camera (Optional)	Compatible with GigE 2M Pixel camera
7	Others	Calibration Plate	Standard impedance substrate produced by CASCADE

2.4 Operation Specifications

No	Category	Item	Description
1	Check file loading	Data Input	A format in compliance with IPC-D-356A standards
		Designation of checkpoint	Specify it on the attached software IPC Viewer Samples are required in advance.
2	Probe exchange	Exchange	Manually replace the CASCADE probe that meets the requirements of the checkpoint.
		Correction	Perform correction actions to adjust the X, Y, θ and Z axes to compensate for errors during installation.
3	Auto Run	Start	Perform alignment to compensate the contact probe position.
		Check	The storage method of the inspected substrate shall be described later. During automatic operation and continuous failures, it will enter the pause state after an abnormal stop.
4	Manual Operation	Re-teach	Manually operate it in JOG mode. Use the main camera to capture the position of PAD and probe and confirm the positional relationship. If the position is misaligned, use the joystick to manually make fine adjustments relative to the contact coordinates (X, Y), and then re-register to compensate.
		Diagram	This is an example where the target protrusion is in the red position and the probe's contact is in the blue position 

No	Category	Item	Description																																						
5	Step Switching	Substrate Direction Switching	The direction of the substrate is switched by automatic rotation for continuous inspection. Steps 1~4 in the following table																																						
		Probe Exchange	When replacing the CASCADE probe, re-calibrate and calibrate it. Steps 5, 6 & 7 in the following table																																						
		Diagram	<table border="1"> <thead> <tr> <th>STEP</th> <th>Work direction</th> <th>Left probe Cascade</th> <th>Right probe Cascade</th> <th>work on exchange</th> </tr> </thead> <tbody> <tr> <td>1</td> <td></td> <td>SG 350um</td> <td>GS 200um</td> <td>input a program Probe set</td> </tr> <tr> <td>2</td> <td></td> <td>SG 350um</td> <td>GS 200um</td> <td></td> </tr> <tr> <td>3</td> <td></td> <td>SG 350um</td> <td>GS 200um</td> <td></td> </tr> <tr> <td>4</td> <td></td> <td>SG 350um</td> <td>GS 200um</td> <td></td> </tr> <tr> <td>5</td> <td></td> <td>SG 350um</td> <td>SG 200um</td> <td>Right probe Exchange Program exchange</td> </tr> <tr> <td>6</td> <td></td> <td>GS 350um</td> <td>SG 200um</td> <td>Left probe Exchange Program exchange</td> </tr> <tr> <td>7</td> <td></td> <td>GS 350um</td> <td>GS 200um</td> <td>Right probe Exchange Program exchange</td> </tr> </tbody> </table>	STEP	Work direction	Left probe Cascade	Right probe Cascade	work on exchange	1		SG 350um	GS 200um	input a program Probe set	2		SG 350um	GS 200um		3		SG 350um	GS 200um		4		SG 350um	GS 200um		5		SG 350um	SG 200um	Right probe Exchange Program exchange	6		GS 350um	SG 200um	Left probe Exchange Program exchange	7		GS 350um
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6	Storage	Fixed Position Mode	Both PASS and FAIL trays are placed in the substrate storage position on the tray without changing the position before inspection.																																						
		Diagram	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>検査前</p> </div> <div style="text-align: center;"> <p>検査後</p> </div> </div>																																						

2.5 Software Specifications

No	Category	Item	Description
1	Check File Creation	Input Data	Register the coordinates by reading IPC-D-356A.
		Designation of Checkpoint	This is a function that allows the selection of checkpoints and probes, and performs waveform sampling and confirmation manually. For a sampled waveform, up to 4 judgment areas can be specified.
2	Probe Exchange	Correction	During the probe exchange, it can detect the tip of probe through image processing by using the calibration camera of main unit.
		Calibration (Optional)	After the probe exchange, it is allowed to manually touch the substrate mounted on main unit to compensate the resistance value as needed.
3	Log	Check Log	This is the function of logging the waveform of each checkpoint. Alternatively, a QR code or OCR image can be recorded.
4	Check Data Creation	IPC Viewer	Use IPC-D-356A format to create inspection data. The application is standard on the main unit (authorization is provided).

2.6 Power Specifications

No	Category	Item	Specifications
1	Power Supply	Power Voltage	Three-phase 200V/220V, 50/60Hz, 6KVA (TNC system)
2	Compressed Air	Pressure	0.4MPa or above (input 0.5MPa~0.99MPa)
		Flow	0.5MPa or above (clean and dry compressed air)
		Connection	Coupling (NITTO KOKI Quick Coupling 20SH), air hose (inner diameter 1/4 inch)

2.7 Environmental Specifications

No	Category	Item	Specifications
1	Environmental Specifications of Device and Oscilloscope	Temperature	23°C±2°C (Recommended environment for testing) Working temperature +10~+40°C
		Humidity	30~60% during operation
		Environment	No corrosive gas or condensation in the environment of class 10,000 Do not directly expose the oscilloscope to wind.
		Ground	1. No vibration (including external vibration influence) ⇒ our company recommends VC-B (reference curve for precision equipment speed response _VC curve) Generic Vibration Criteria for Vibration-Sensitive Equipment _Vibration criterion curves 2. The ground strength should be above 500kg/m2.

2.8 Other Precautions

The parts shown below are not included.

1. Substrate produced by CASCADE on the shuttle
2. External monitor for oscilloscope
3. Workbench for installation and operation of monitor, keyboard, mouse, etc.

3 Installation and Delivery

- Delivery should be arranged in accordance with the transaction provisions agreed in the signed purchase and sale contract.
- The mechanical installation is included in the responsibility of your company. After the mechanical installation, our company shall be responsible for leveling and device adjustments before delivering it as final.
- AC cable and compressed air piping on the input side should be connected by your company.
- The secondary connection to this device is made by our company (AC cable and air hose connected to this device should be prepared by your company and connected to this device).

4 Acceptance Criteria

The device after the pre-factory inspection at our company shall be delivered to your company, and your company's supervisor shall be responsible for confirming that the device is restored without any abnormality before acceptance.

However, the delivery that is delayed due to your company's reasons shall not be covered in the criteria. The acceptance shall be subject to the negotiation between the two parties.

5 Packaging and Transport

- (1) The adequate protection shall be provided to prevent water and foreign objects from entering the main unit.
- (2) The moisture-proof and rust-proof treatment shall be made.

6 Warranty

- Our company shall dispose of all defects in design, material, and processing found within 12 months after acceptance

(Note) When transferring the device overseas after delivery, please contact our company.

In principle, in case of any technical support of our company through business trips due to repairs or after-sales service, even during the free warranty period, the "business trip operation cost + local transportation cost" are required separately.

7 Confidentiality

NDR contract shall be signed separately.

8 Submissions

Operating Instructions	English	plain paper	1 copy	
	English	air-laid paper	1 copy	
	Chinese (Simplified Chinese)	plain paper		1 copy

9 Others

The stated specifications may be changed without notice.

Any doubt about the Specifications shall immediately be negotiated by the two parties for decision.

In the event of any change to the device installation space designated by your company, the change on the device dimension is possible.

Japanese version of the Specifications shall prevail if there is any doubt about the contents of Japanese and English versions.

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