DOCUMENT NUMBER: **MS603573**

TITLE: **TouchPro® 15.6" TDK Touchscreen Specification**

CUSTOMER: **Novo Engineering**

ELO P/N: **E976783**

ELO M/N: **TDK-TP-FZW15.6-E534846-AB-R**

REVISION HISTORY

Rev	ECO	Date	Author	Description
0.1	N/A (not for release yet)	May 24, 2024	T.Shih	First draft
0.2	N/A	Jun 14,2024	T.Shih	Update TDM brightness, adding 5VDC/2.5A in DC input
A	CO-24-1909	Nov 04, 2024	T.Shih	Initial released.

1. PURPOSE

This document contains specifications for an Elo TouchPro TDM touchscreen.

2. TDM(Touch Display Module) Characteristics

Application	Indoor application
Size	15.6''
Technology	Pro-F stacks,optical bonding with LCD panel
Resolution	1920x1080
Temp Range	-20 to +70°C
Brightness	Panel 500 nit typical,TDM 310 nit typical
Backlight life	50,000 hrs typical

3. TOUCHSCREEN SPECIFICATIONS

General

Type	Projected Capacitive
Construction	G/F/F (Glass/Film/Film stackup)
Cover layer material	Glass
Glass Thickness	1.8mm
Cover layer surface treatment	Clear
Cover layer hardness	7H

Optical

Light Transmittance	88% ± 3 %

Touch Performance

Input methods	Finger Input Type
Number of touches	10
Accuracy	+/- 2.5mm
Streaming report rate	>100Hz

Interface

Device type	USB
USB Device Class	HID Digitizer
Connector	4pin FPC ZIF gold fingers
Recommended mating connector	N/A
Connector pinout	Pin Number: Signal Name 1: GND 2: D+

	3	D-
	4	USB 5V
Supply voltage requirements	5V +/- 10%	
Supply current requirements	60 mA typ	

OS/Driver Support

Microsoft	7/8/10/XP/WinCE 6, WinCE 7, WES7 E
Linux	Kernel 2.6.32 and later
Android	Android 4.0 and later
Mac	MacOS 10.9 and later

4. LCD SPECIFICATIONS

Only a subset of specifications are listed here. Complete LCD panel datasheet is available separately, contact Elo Sales (with all information required for complete display system design: LVDS signal timing characteristics, power/LVDS/backlight sequencing, LVDS data formatting, signal electrical characteristics, etc).

General

Display Mode	AHVA,Normally Black
Aspect Ratio	16:9
Diagonal	15.6 inches
Display resolution	1920x1080
Pixel arrangement	RGB Vertical Stripe
Power Consumption	LCD 2.11(max)W/BL 10.4(max)W

Photometric

Brightness	Panel 500 nit typical,TDM 310 nit typical
Backlight uniformity	80% minimum
Backlight life	50,000 hrs typical
Contrast	1,000 typical
Response Time	25 ms typical Rising+Falling
Viewing Angle	89 degree typical, horizontal and vertical
Number of colors	16.7M colors(RGB 8-bits)
Color gamut	72%

TFT LCD Module

Power Specification

Input power specifications are as follows
The power specification are measured under 25℃ and frame frenquency under 60Hz

Symble	Parameter	Min	Typ	Max	Units	Remark
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	
PDD	VDD Power	-	1.75	2.11	[Watt]	All White Pattern (VDD=3.3V, at 60Hz),Note 1
IDD	IDD Current	-	0.53	0.64	[A]	All White Pattern (VDD=3.3V, at 60Hz) Note 2
IRush	Inrush Current	-	-	2000	[mA]	Note 1
VDDrp	Allowable Logic/LCD Drive Ripple Voltage	-	-	100	[mV] p-p	All White Pattern (VDD=3.3V, at 60Hz)

Note 1 : Maximum Measurement Condition： White Pattern at 3.3V driving voltage. (Pmax=V3.3 x Iwhite)
Typical Measurement Condition: Mosaic Pattern

Note 2 : Current fuse is built in a module. Current capacity of power supply for VDD should be larger than 1.5A, so that the fuse can be opened at the trouble of electrical circuit of module.

Note 3： Measure Condition

LVDS DC Signal Electrical Characteristics

Input signals shall be low or High-impedance state when VDD is off.

Symbol	Item	Min	Typ.	Max.	Unit	Remark
VTH	Differential Input Higi Treshold			+100	[mV]	VCM=1.2V
VTL	Differential Input Low Treshold	-100			[mV]	VCM=1.2V
VID	Input Diferential Voltage	100		600	[mV]	
VICM	Differential Input Common Mode Voltage	1.0	1.2	1.5	[V]	VTH/VTL=+-100mV

Video signal & backlight interface

Video Interface	LVDS Interface
Connector	3808K-F05N-02 or compatible Matching：H208K-D05N-22B or compatible

Pin No.	Symbol	Description
Pin1	VLED	12V input
Pin2	GND	GND
Pin3	VLED_EN	5V-ON,0V-OFF
Pin4	VPWM_EN	PWM
Pin5	NA	NC

Parameter guideline for LED

Following characteristics are measured under a stable condition using an inverter at 25℃(Room temperature)

LED characteristics

Parameter	Symbol	Min	Typ	Max	Units	Condition
Backlight Power Consumption	PLED	-	8.3	10.4	[Watt]	(Ta=25℃), Note 1 Vin =12V
LED Life-Time	N/A	50,000	-	-	Hour	(Ta=25℃), Note 2,3

Note 1: Ta means ambient temperature of TFT-LCD module.
Note 2: If G156HAN02.3 module is diven at high ambient temperature & humidity condition. The operating life will be reduced.
Note 3: Operating life means brightness goes down to 50% initial brightness. Min. operating life time is estimated data.

Backlight input signal characteristics

Parameter	Symbol	Min	Typ	Max	Units	Remark
LED Power Supply	VLED	10.8	12	13.2	[Volt]	Define as Connector Interface (Ta=25℃)
LED Enable Input High Level	VLED_EN	2.5	--	5.5	[Volt]	
LED Enable Input Low Level		0	--	0.7	[Volt]	
PWM Logic Input High Level	VPWM_EN	2.5	--	5.5	[Volt]	
PWM Logic Input Low Level		0	--	0.7	[Volt]	
PWM Input Frequency	FPWM	200	1K	15K	Hz	
PWM Duty Ratio	Duty	10	--	100	%	

TFT LCD Module: LVDS Connector

TFT-LCD Connector	Manufacturer	P-TWO	STM
	Part Number	1834- 009	MSBKT2407P30HB
Mating Connector	Manufacturer	JAE or Equivalent	
	Part Number	FI-X30HL (Locked Type)	

PIN #	Symbol	Description	Remark
1	RxO0-	Negative LVDS differential data input (Odd data)	
2	RxO0+	Positive LVDS differential data iput (Odd data)	
3	RxO1-	Negative LVDS differetal ata input (Odd data)	
4	RxO1+	Positive LVDS differetial data input (Odd data)	
5	RxO2-	Negative LVDS differential data input (Odd data)	
6	RxO2+	Positive LVDS differential data input (Odd data)	
7	GND	Ground	
8	RxOCLK-	Negative LVDS differential clock input (Odd clock)	
9	RxOCLK+	Positive LVDS differential clock input (Odd clock)	
10	RxO3-	Negative LVDS differential data input (Odd data)	
11	RxO3+	Positive LVDS differential data input (Odd data)	
12	RxE0-	Negative LVDS differential data input (Even data)	
13	RxE0+	Positive LVDS differential data input (Even data)	
14	GND	Ground	
15	RxE1-	Negative LVDS differential data input (Even data)	
16	RxE1+	Positive LVDS differential data input (Even data)	
17	GND	Ground	
18	RxE2-	Negative LVDS differential data input (Even data)	
19	RxE2+	Positive LVDS differential data input (Even data)	
20	RxECLK-	Negative LVDS differential clock input (Even clock)	
21	RxECLK+	Positive LVDS differential clock input (Even clock)	
22	RxE3-	Negative LVDS differential data input (Even data)	
23	RxE3+	Positive LVDS differential data input (Even data)	
24	GND	Must Connect to GND	
25	NC	No connection (for AUO test only. Do not connect)	
26	NC	No connection (for AUO test only. Do not connect)	
27	NC	No connection (for AUO test only. Do not connect)	
28	VDD	Power Supply Input Voltage	

29	VDD	Power Supply Input Voltag	
30	VDD	Power Supply Input Voltag	

Note 1: Input signals shall be low or High-impedance state when VDD is off.

AD Board:

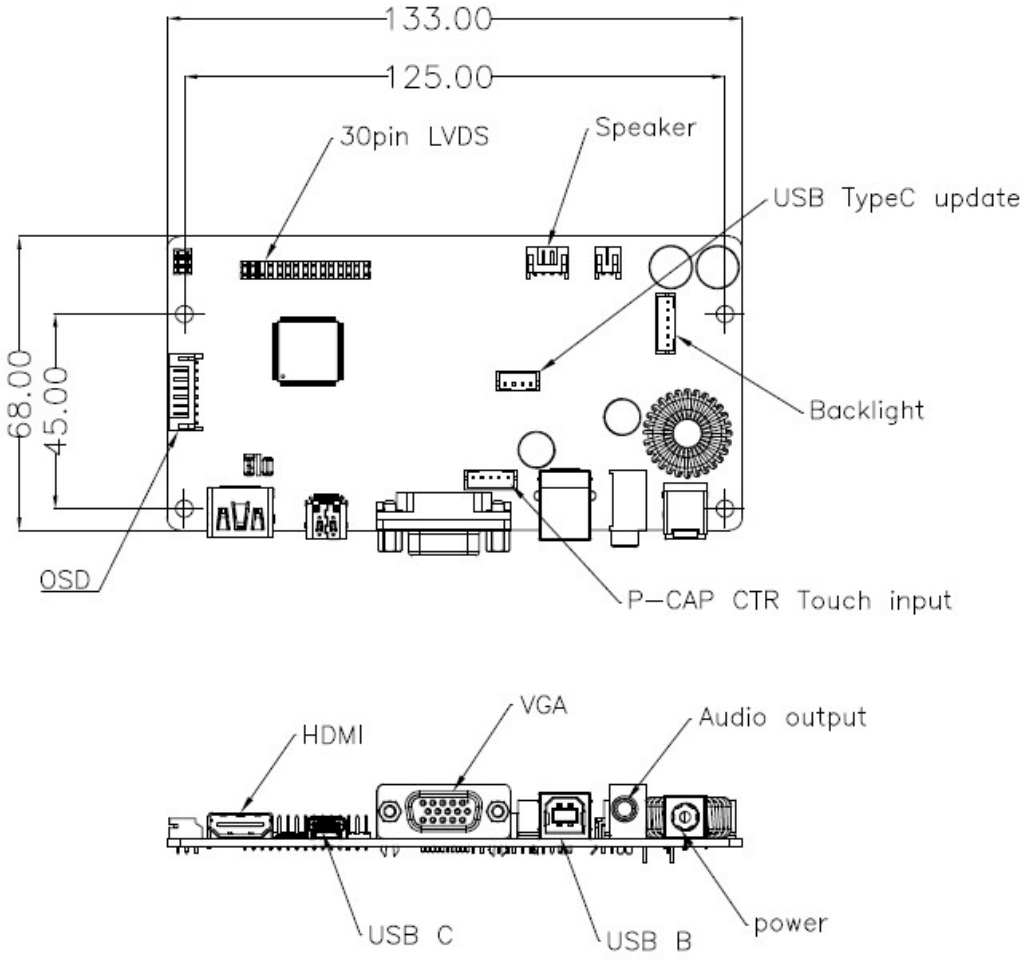
Part Number

Part Number	Description
E133474	PCA-ADB-2AMT-525A-E004

Specification

Main Chipset	REALTEK RTD2525AR-CG	
Input	Line-In	Ø3.5mm Phone Jack
	VGA	Analog RGB (0.7Vpp), D-Sub R/A 15P Screw Lock
	USB TYPE-C	USB Type-C Upstream port*1, DP Alt Mode 1.2, PD 3.0 (Max. 22.5W)
	HDMI	HDMI 1.4, R/A
Output	Support Resolution	Up to 1920*1080 @75Hz
	Panel Interface	Single/Dual 8bit LVDS
	USB TYPE-B	Touchscreen Signal Output (Optional)
	Earphone Output	Ø3.5mm Phone Jack
	Speaker	2*2W(4Ω) @0.5Vrms THD + N<10%
	LED Backlight	Panel Backlight Control Signal&Power
Other Support	OSD (Keyboard Control)	
	Touchscreen Signal Input	
	USB TYPE-C Chipset Update	
	LCD Driver Voltage Selection: 3.3V, 5V, 12V	
	Panel LED Driver	
DC Input	12VDC/3A, Ø2.0mm DC Jack	
	5VDC/2.5A,9VDC/2.5A, 15VDC/1.5A, 20VDC/1.25A, TYPE-C	

Drawing



OSD KEY CONTROL (8P 2.0mm Wafer R/A)

Pin no.	SYMBOL
1	MENU
2	SELECT
3	RIGHT
4	LEFT
5	GROUND
6	LED G
7	LED R
8	POWER

LVDS (2*15P 2.0mm Header)

Pin No.	SYMBOL	Pin No.	SYMBOL
1	LCD Drive Voltage (+3.3V/5V/12V)	2	LCD Drive Voltage (+3.3V/5V/12V)
3	LCD Drive Voltage (+3.3V/5V/12V)	4	GND
5	GND	6	NC
7	TXE0N	8	TXE0P
9	TXE1N	10	TXE1P
11	TXE2N	12	TXE2P
13	GND	14	GND
15	TXECN	16	TXECP
17	TXE3N	18	TXE3P
19	TXO0N	20	TXO0P
21	TXO1N	22	TXO1P
23	TXO2N	24	TXO2P

25	GND	**26**	GND
27	TXECN	**28**	TXECP
29	TXO3N	**30**	TXO3P

SPEAKER (4P 2.0mm Wafer R/A)

Pin No.	SYMBOL
1	R+
2	R-
3	L-
4	L+

LED DRIVER (2P 2.0mm Wafer R/A)

Pin No.	Symbols
1	LED+
2	LED-

BACKLIGHT CONTROL (6P 2.0mm Wafer Vertical)

Pin No.	SYMBOL	Pin No.	SYMBOL
1	GND	**4**	Backlight Enable
2	GND	**5**	+12V
3	Backlight PWM	**6**	+12V

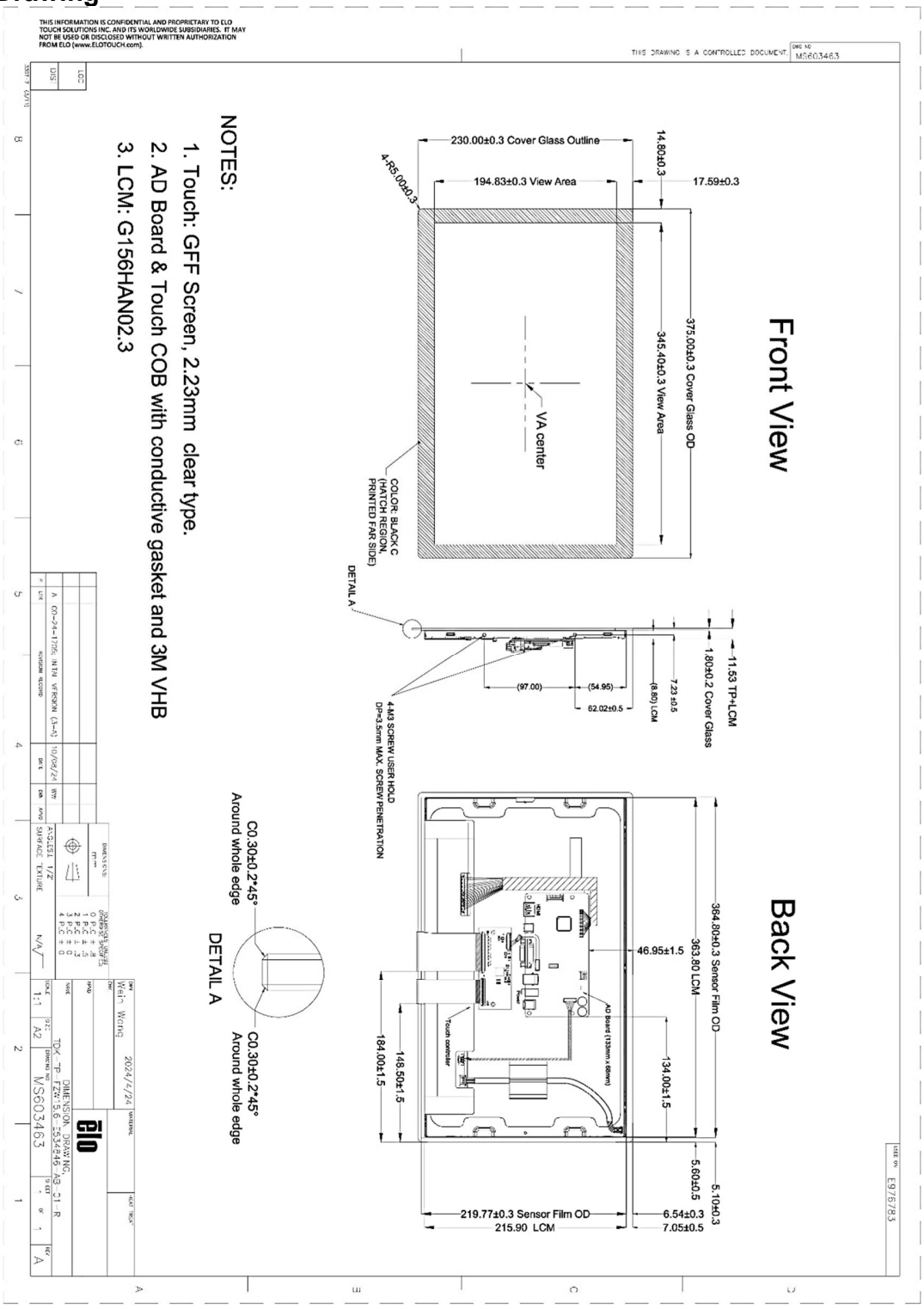
TOUCH INPUT (5P 2.0mm Wafer Vertical)

Pin No.	SYMBOL
1	GND
2	GND
3	DP
4	DN
5	+5V

TYPE-C UPDATE (4P 2.0mm Wafer Vertical)

Pin No.	SYMBOL
1	+5
2	DN
3	DP
4	GND

5. MS Drawing



6. ENVIRONMENTAL/Reliability testing

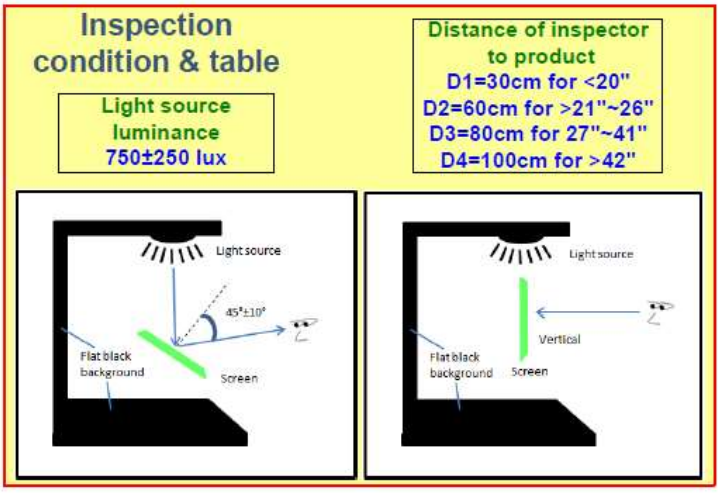
High Temperature Operation	T=+70 °C,240hrs
Low Temperature Operation	T=-20°C,240hrs
High Temperature Storage (non-operation)	T=+70 °C,240 hrs
Low Temperature Storage (non-operation)	T=-20 °C,240 hrs
High Temperature &High Humidity Operation	T=+60°C,90%RH,240 hrs
Thermal Shock (non-operation)	-20C to +60C, 50 cycles, 1 hour soak

7. QUALITY

7.1. Touchscreen cosmetic characteristics

7.1.1. Visual Inspection Method

Total inspection time 30 seconds



Total Inspection Time: up to 30 seconds.

1) Mark any defect within 15 sec @ vertical
2) Mark any defect within 15 sec @ 45°
3) Measure defect after inspection is completed
4) Disposition of product
5) Ignored defects have no separation requirement
6) Defects Min Separation: 25mm
7) Any cleanable defects are considered as acceptable

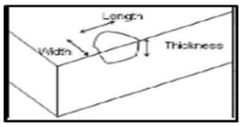
W (Width) L (Length) D(Diameter)									
Inspection Order	1.Judgment by D.	1.Judgment by D.	1. Judgment by L & T 2. Judgment by D 3. Final Judgment by D, if L & T are OK	1. Judgment by L & T 2. Judgment by D 3. Final Judgment by D, if L & T are OK	1. Judgment by L & T 2. Judgment by D 3. Final Judgment by D, if L & T are OK	1. Judgment of Linear defect	1. Judgment of Linear defect	1. Judgment of Linear defect	1. Judgment by L & T 2. Judgment by D 3. Final Judgment by D, if L & T are OK

7.1.2. Cosmetic Standard

Defect Items	Defect Size	Screen Size				Note
		<=14in	15-20in	21-26in	27-60in	
Black spot/white spot/dent/stab/circular foreign matter /Bubble	D<=0.3	Ignore				Qty Allowed
	0.3<D<=0.5	Max 4	Max 5	Max 8	Max 10	
	0.5<D<=1.0	None allowed		Max 2	Max 5	
	D>1.0	None Allowed				
AG deciduate spot /clouding spot /pit /other dot defect of AG	D<=0.3	Ignore				
	0.3<D<=0.6	Max 4	Max 5	Max 8	Max 10	
	0.6<D<=1.0	Max 2	Max 3	Max 4	Max 5	
	D>1.0	None Allowed				
Pin hole (Printed Area)	D<=0.3	Ignore				
	0.3<D<=0.6	Max 4	Max 5	Max 6	Max 7	
	D>0.6	None Allowed				
Linear defects /Scratch/Foreign matter (Active Area)	W<=0.1	L<=8	L<=10	L<=15	L<=20	Length (mm) - Qty Allowed
	0.1<W<=0.2	L<=8 Max 4	L<=8 Max 5	L<=8 Max 8	L<=8 Max 10	
	0.1<W<=0.2	L>8 0	L>8 0	L>8 0	L>8 0	
	0.2<W<=0.3	L<=8 0	L<=8 Max 1	L<=8 Max 2	L<=8 Max 4	
	0.2<W<=0.3	L>8 0	L>8 0	L>8 0	L>8 0	
	W>0.3	None Allowed				
Linear defects /Scratch/Foreign matter (Printed Area)	W<=0.1	L<=10	L<=10	L<=15	L<=20	
	0.1<W<=0.2	L<=10 Max 4	L<=10 Max 5	L<=10 Max 8	L<=10 Max 10	
	0.1<W<=0.2	L>10 0	L>10 0	L>10 0	L>10 0	
	0.2<W<=0.3	L<=10 0	L<=10 Max 1	L<=10 Max 2	L<=10 Max 4	
	0.2<W<=0.3	L>10 0	L>10 0	L>10 0	L>10 0	
	W>0.3	None Allowed				
Zigzag (inner edge)		Max 0.2		Max 0.3	Max 0.5	Max Length
Zigzag (Outer edge)		Max 0.3		Max 0.5	Max 0.7	
Pin hole/spot defect/Zigzag (Logo)		Max 0.15				
Dots defect (Camera Window)	D<=0.1	Ignore (Dots Gathering None Allowed)				Qty
	0.1<D<=0.2	Max 1				

	D>0.2	None allowed
	Clarity (AG Residual)	None allowed
Zigzag (Camera Window)	D<=0.3	Ignore
	D>0.3	None allowed
Linear (Camera Window)	W<=0.1	Ignore
	W>0.1	None allowed

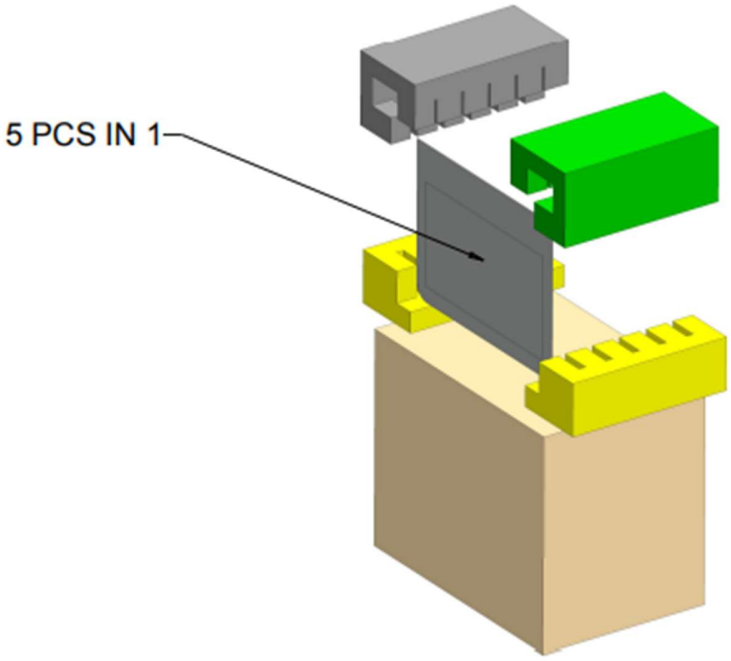
7.1.3. Edge Chips

	Criteria (mm)	Allowed Qty
	L≤0.5 and W<0.5 and T< TG	Ignore
	0.5<L≤5 and 0.5<W< 2.5 and T< TG	5
	L > 5 or W > 2.5 or T > TG	0
Note: Glass Thickness <1.1mm, TG=Glass Thickness. Glass Thickness >=1.1mm, TG=. Glass Thickness		
Crack	None Allowed	

8. SAFETY

Impact resistance	Pass UL60950 (500g/1.3M/1 point - no shards) IK07, IK08
Certification	Certified by TUV to EN 60950 and EN 62368-1:2014

9. PACKAGING



10. WARRANTY

2 years limited warranty

11. HANDLING

The parts are ESD-sensitive devices. Operators and handling materials should follow JEDEC JESD625 (or equivalent industry standard) ESD handling procedures. Degraded performance or destruction of the part may occur if the assembly is mishandled.