● **EDIT HISTORY**

Version A: APR. 16, 2024

Preliminary Spec.

FM-RD-006A

● FEATURES

- ● Excellent character appearance.
- ● Case mold type.
- ● With Touch pad.
- ● Low current operation.
- ● RoHS Compliant, Pb Free.

● DESCRIPTION

The OPD-V1515F5-PD is a 15.0mm X 15.0mm

with Touch-Pad LED display, Built-in programmable LEDs.

This device is 256-step gray-scale output to allow 16,777,216 color display,

Built-in oscillator 20M.

The device is Opto Plus LED Corp standard LED Display.

The device has face and segment option, please refer to **PRODUCT APPEARANCE**.

● DEVICE

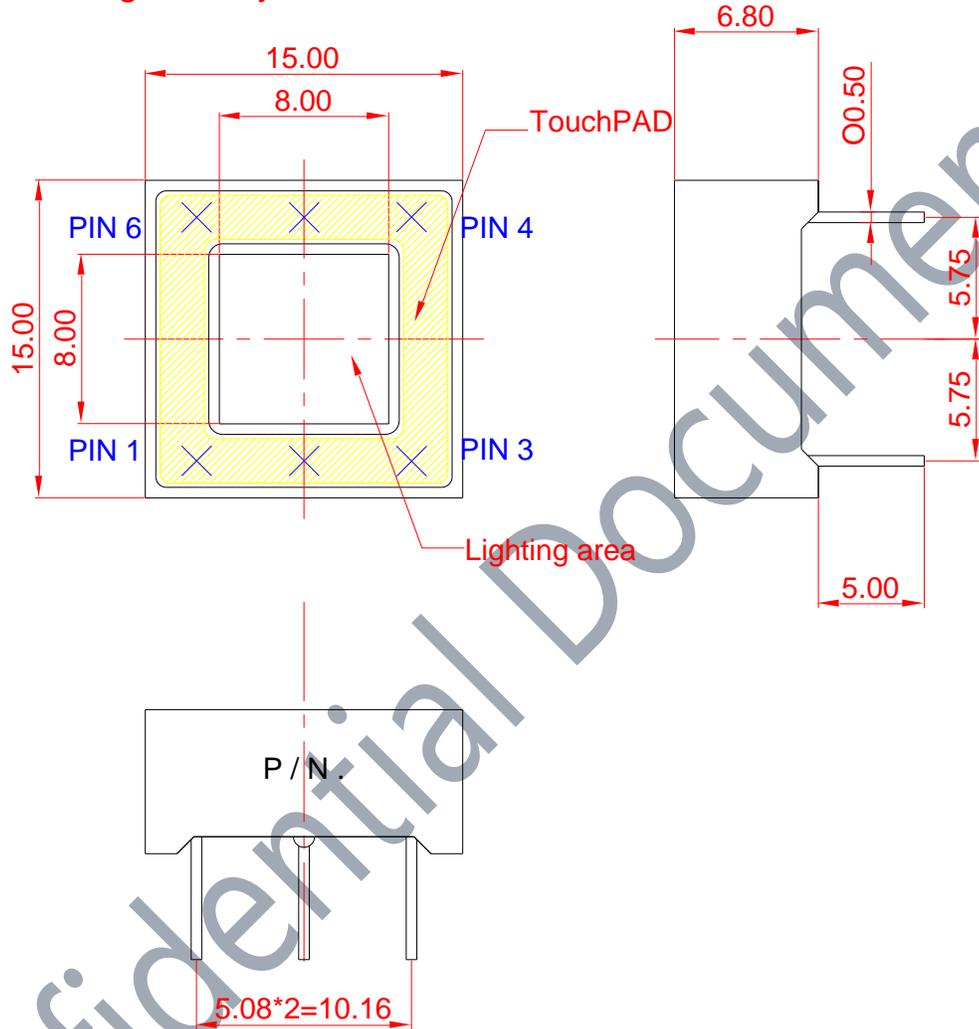| PART NO.		DESCRIPTION
	OPD-V1515F5-PD -GW	Single data line｜Gray face｜White segment
	OPD-V1515F5-PD -BW	Single data line｜Black face｜White segment

RoHS Compliance

Pb Free.

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Disclaimer:
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FM-RD-006A

● MECHANICAL DIMENSIONS

*Excluding Overlay

15.00
8.00
TouchPAD
PIN 6
PIN 4
15.00
8.00
PIN 1
PIN 3
Lighting area

6.80
O0.50
5.75
5.75
5.00

P / N .

5.08*2=10.16

NOTE:
Dimension in millimeters (inches),
and tolerances are ± 0.25mm (.01") specified.

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● **TYPICAL INTERNAL EQUIVALENT CIRCUIT**

*Overlay (Thickness=0.20mm)

PIN 6   PIN 4
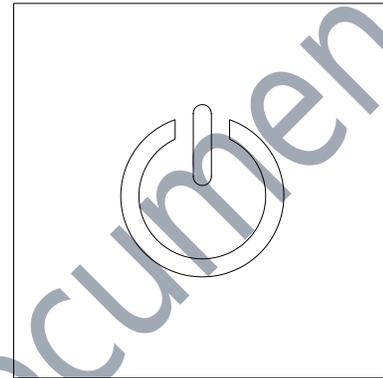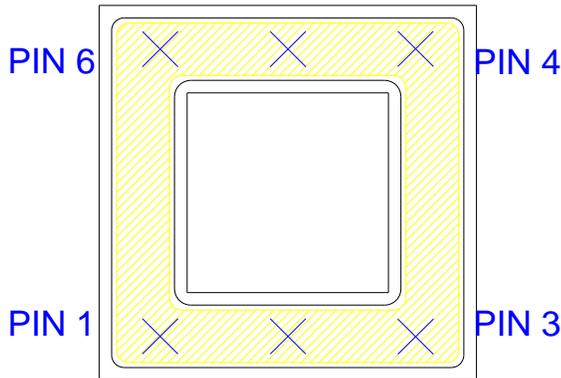
PIN 1   PIN 3

PIN 1 : Power Supply.
PIN 2 : Touch PAD.
PIN 3 : Control Data Signal Output.
PIN 4 : Ground.
PIN 5 : Touch PAD.
PIN 6 : Control Data Signal Input

※EMITTED COLOR：RED & GREEN & BLUE

IN THE PRACTICAL APPLICATION CIRCUIT, THE SIGNAL INPUT AND OUTPUT PINS OF THE IC SIGNAL INPUT AND OUTPUT PINS

SHOULD BE CONNECTED TO THE SIGNAL INPUT AND OUTPUT TERMINALS. IN ADDITION, IN ORDER TO MAKE THE IC CHIP IS MORE

STABLE, EVEN THE CAPACITANCE BETWEEN DISPLAY IS ESSENTIAL BACK; APPLICATION: DISPLAY TRANSMISSION DISTANCE IS

SHORT, SUGGESTED IN SIGNAL IN TIME THE CLOCK LINE INPUT AND OUTPUT END OF EACH CONNECTED IN SERIES PROTECTION

RESISTORS(ABOUT 470 OHMS). APPLICATION: FOR MODULE OR GENERAL SPECIAL-SHAPED PRODUCTS, DISPLAY TRANSMISSION

DISTANCE IS LONG, BECAUSE OF DIFFERENT WIRE AND TRANSMISSION DISTANCE, IN THE SIGNAL IN TIME CLOCK AT BOTH ENDS

OF THE LINE ON GROUNDING PROTECTION RESISTANCE WILL BE SLIGHTLY DIFFERENT;
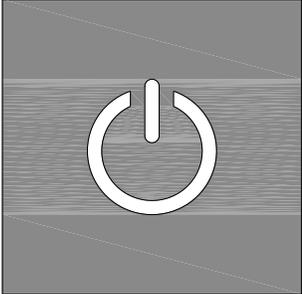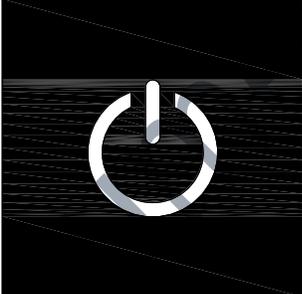
TO THE ACTUAL USE OF FIXED;

● PRODUCT APPEARANCE

The most common reflector color and segment color are show in below diagram.

-GW	-BW
※ REFLECTOR COLOR: Gray ※ SEGMENT COLOR: White	※ REFLECTOR COLOR: Black ※ SEGMENT COLOR: White

Opto Plus can customize reflector and segment colors by customer's request. If you have these request please visit www.opledtw.com or contact sales@opledtw.com for more **Standard Product Customization** information.

Part NO. related to reflector and segment colors show as table below.

PART NO.	DESCRIPTION
OPD-V1515F5-PD -GW	Single data line｜Gray face｜White segment
OPD-V1515F5-PD -BW	Single data line｜Black face｜White segment

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FM-RD-006A

● F5: FULL COLOR (AlInGaP/InGaP)

ABSOLUTE MAXIMUM RATING AT Ta=25° (Per SMD Chip)

| Parameter	Symbol	Maximum Rating	Unit
Supply Voltage	VDD	6.5	V
Power Dissipation	PD	<400	mW
Maximum Output Current	ILEDOUT	5	mA
Operating temperature	T_{OP}	-25 to + 85	°C
Storage temperature	T_{ST}	-25 to + 85	°C
Welding temperature	T_M	300(<8sec.)	°C

ELECTRICAL - OPTICAL CHARACTERISTICS AT TA=25℃ (PER SMD CHIP)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Supply Voltage	V_{DD}	4.5	5	5.5	V	
Operation Current	I_{DD}			2	mA	R、G、B no load
Input High "H" of DI	V_{IH}	2.7		VDD	V	
Input Low "L" of DI	V_{IL}	0		1.0	V	
Pull Down Resistance	R_{PD}		500K		Ω	DI, DO
Output High "H" of DO	V_{OH}	4.5			V	I_{OH}=4mA
Output Low "L" of DO	V_{OL}			0.4	V	I_{OL}=4mA
R, G, B Sink Current	I_{sink}	4.75	5	5.25	mA	Vo=VDD-3.0V @VDD=5V
Input leakage	I_{leak}			1	uA	DI=VDD
R , G , B off leakage current	I_{off}			1	uA	PWM=0(off), @R, G, B =5V

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Propagation delay time	tPLZ			300	ns	DI → DO, CL=15pF, RL=10KΩ
	tPZL			300	ns	
Rising time	tTZH			200	ns	R、G、B=20mA, CL=30pF
Falling time	tTHZ			200	ns	
Data rate	F_{data}		800		Khz	

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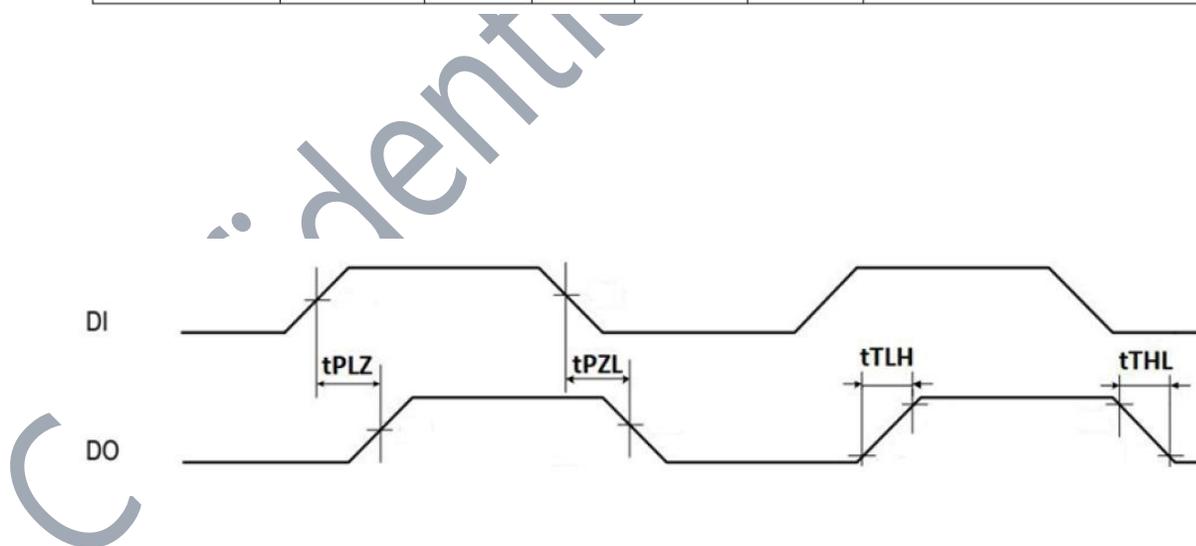
Data Transfer Protocol
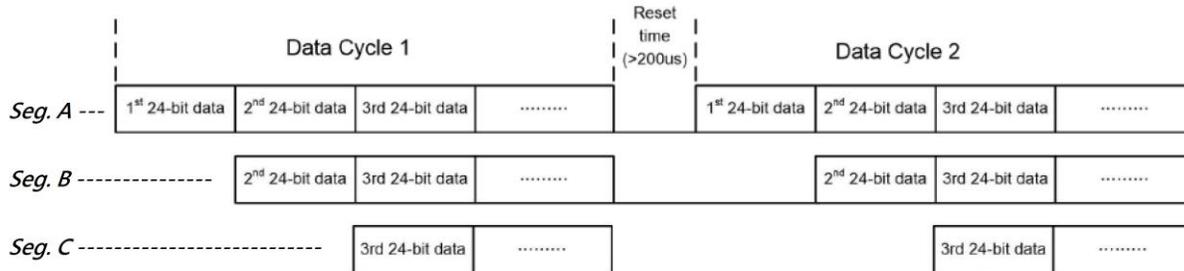
The single wire data transfer protocol supports 24-bit data for each LED RGB display data refresh. The IC receives 24-bit data and passes the remaining data to next LED. The 24-bit data consist of green, red and blue data, each with 8-bit width, and are transferred with MSB first.

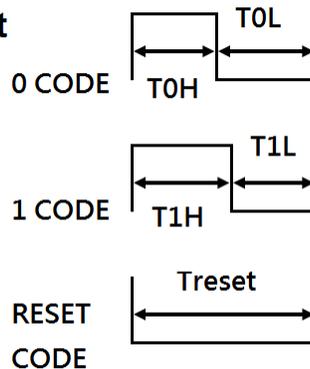| G7	G6	G5	G4	G3	G2	G1	G0	R7	R6	R5	R4	R3	R2	R1	R0	B7	B6	B5	B4	B3	B2	B1	B0

The transferred data are recognized based on the pulse widths received by the IC. A low bit 0 is represented by a 0.3us high pulse followed by a 0.9us low pulse. A high bit 1 is represented by a 0.9us high pulse followed by a 0.3us low pulse. A low pulse $\geqq$ 200us is used to issue a reset command to the IC to start a new cycle of serial commands.

Sequence Chart

0 CODE T0H T0L

1 CODE T1H T1L

RESET CODE Treset

(T0H:0.3us+0.15us,T0L:0.9us+0.15us)
(T1H:0.9us+0.15us,T1L:0.3us+0.15us)

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Sample CODE

```cpp
// Please write using Arduino IDE.
// Make sure that the Adafruit_NeoPixel library has been installed.
#include <Adafruit_NeoPixel.h>
#define LED_PIN    6   // Which pin on the Arduino is connected to the NeoPixels?
#define LED_COUNT  1   // How many NeoPixels are attached to the Arduino?
// Declare our NeoPixel strip object:
    Adafruit_NeoPixel strip(LED_COUNT, LED_PIN, NEO_GRB + NEO_KHZ800);
void setup() {
    strip.begin();// INITIALIZE NeoPixel strip object (REQUIRED)
    strip.show();
    //strip.setBrightness(255); // Set BRIGHTNESS to about 1/5 (max = 255)
    }
void loop() {
    strip.setBrightness(255);// Set BRIGHTNESS to about 1/5 (max = 255)
    strip.setPixelColor(0, 255, 255, 255); // Segment A //Turn on White.
    strip.show();
    delay(250);
    strip.setPixelColor(0, 0, 0, 0); // Segment A //Turn off White.
    strip.show();
    delay(250);
    strip.setBrightness(0);// Set BRIGHTNESS to about 1/5 (max = 255)
    strip.show();
    delay(250);
    }
```

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● **LUMINOUS INTENSITY (IV) BIN :**

BIN	**N**	**O**	**P**
(Red) @5mA	80-105 mcd	106-134 mcd	135-160 mcd

BIN	**Q**	**R**	**S**
(Green) @5mA	180-205 mcd	206-234 mcd	235-260 mcd

BIN	**K**	**L**	**M**
(Blue) @5mA	30-42 mcd	43-57 mcd	58-70 mcd

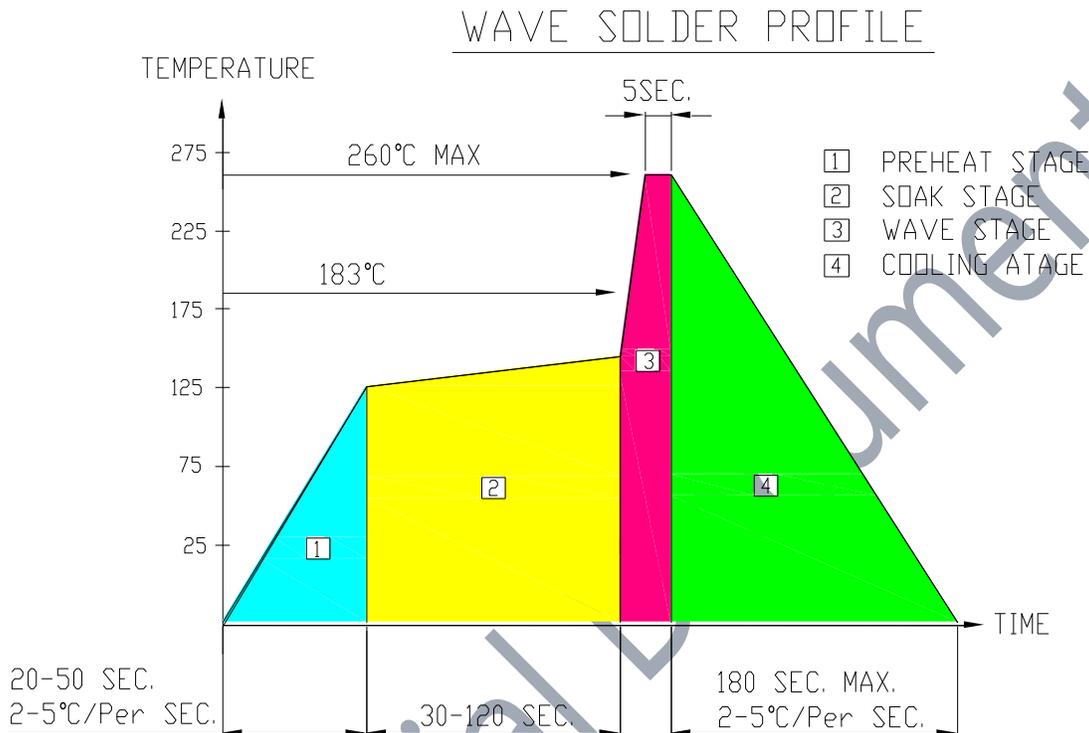Note: It maintains a tolerance of ±10% on Luminous Intensity.

● **WAVELENGTH(ʎD) BIN :**

BIN	**7**	**8**	**9**
(Red) @5mA	618-619 nm	620-623 mcd	624-625 nm

BIN	**4**	**5**	**6**
(Green) @5mA	520-524 nm	525-529 mcd	530-535 nm

BIN	**1**	**2**	**3**
(Blue) @5mA	460 – 464 nm	465-469 nm	470 – 474 nm

Note: It maintains a tolerance of ±0.5nm on Wavelength BIN.

● RECOMMEND SOLDERING PROFILE

WAVE SOLDER PROFILE

TEMPERATURE

5SEC.

275 — 260°C MAX

225

183°C

175

125

75

25

20-50 SEC.
2-5°C/Per SEC.

30-120 SEC.

180 SEC. MAX.
2-5°C/Per SEC.

TIME

① PREHEAT STAGE
② SOAK STAGE
③ WAVE STAGE
④ COOLING ATAGE

● Note:

• Recommend pre-heat temperature of 105°C or less (as measured with a thermocouple attached to the LED pins) prior to immersion in the solder wave with a maximum solder bath temperature of 260°C

• Peak wave soldering temperature between 245°C ~ 225°C for 3 sec (5 sec max)

• No more than one wave soldering pass

● SOLDERING IRON

Basic spec is ≦4 sec when 260°C. If temperature is higher, time should be shorter (+10°C→1 sec). Power dissipation of Iron should be smaller than 15W, and temperature should be controllable. Surface temperature of the device should be under 230°C.
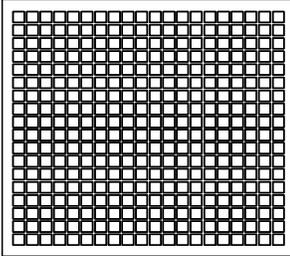
● REWORK

Customer must finish rework within ≦3 sec under 350°C.

The head of soldering iron cannot touch copper foil.

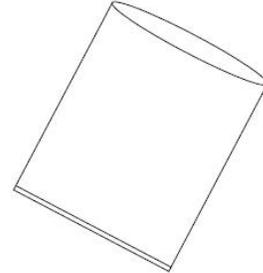FM-RD-006A

● **PACKAGE DIMENSIONS**

360 PCS (20X18) / 1 ESD Polyform
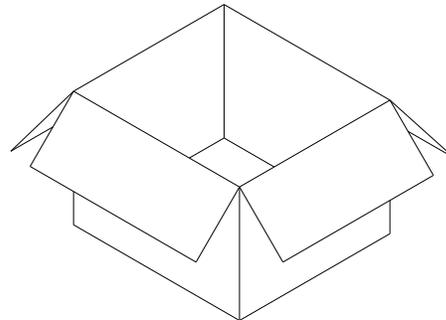

1800 PCS / 5 ESD Polyform / 1 ESD BAG

A reference for packing within ESD bag.

ESD BAG SIZE : 650 x 550 mm

3600 PCS / 2 ESD BAG / 1 OUTER CARTON

OUTER BOX SIZE : 430 x 390 x 300 mm

● **Note:**

LED DISPLAY STANDARD STORAGED CONDITION
Product in the original packaging material state is the recommended storage conditions.

TERATURE CONDITION	HUMIDITY CONDITION
5°C ~ 30°C	Below 60%RH

If the storage conditions do not meet specification standards, the component pins may become oxidized requiring re-plating and re-sorting before use. Suggest customers consume LEDs as soon as possible, andavoid long-term storage of large inventories.

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