June 2nd, 2017

Product EOL/Replacement Transition Guide

EOL: NHD-2.7-12864UCY3 | **NEW:** NHD-2.7-12864WDY3

The Newhaven Display 2.7" Monochrome Graphics OLED module, **NHD-2.7-12864UCY3**, has reached End-Of-Life and is being replaced by our new and improved 2.7" OLED module, the **NHD-2.7-12864WDY3**.
The new module has been designed to match the physical dimensions of its predecessor, and will fit into any existing housings/enclosures used currently. However, due to the current OLED panel's built-in controller being discontinued, the new module will not be a drop-in replacement.

The purpose of this document is to highlight and explain the key differences that need to be accounted for when transitioning from the 'EOL' to 'NEW' 2.7" Monochrome Graphics OLED module from Newhaven Display.

-Design Improvements

- EMI protection on all I/O pins brought out to the user
- Image quality improvements (uniformity, contrast ratio, max brightness)
- Additional interface option (3-wire Serial)
- New features/power options (for details, refer to the Pinout Comparison section below)

-Pinout Comparison

	EOL (NHD-2.7-12864UCY3)		NEW (NHD-2.7-12864WDY3)	
PIN #	**Symbol (Parallel Interface)**	**Symbol (Serial Interface)**	**Symbol (Parallel Interface)**	**Symbol (Serial Interface)**
1	VSS	VSS	VSS	VSS
2	VDD	VDD	VDD	VDD
3	N.C.	N.C.	N.C. (BC_VDD)	N.C. (BC_VDD)
4	D/C	D/C	D/C	D/C
5	R/W (6800) /WR (8080)	VSS	R/W (6800) /WR (8080)	VSS
6	E (6800) /RD (8080)	VSS	E (6800) /RD (8080)	VSS
7	DB0	SCLK	DB0	SCLK
8	DB1	SDIN	DB1	SDIN
9	DB2	N.C.	DB2	N.C.
10	DB3	VSS	DB3	VSS
11	DB4	VSS	DB4	VSS
12	DB5	VSS	DB5	VSS
13	DB6	VSS	DB6	VSS
14	DB7	VSS	DB7	VSS
15	N.C.	N.C.	N.C. (VCC)	N.C. (VCC)
16	/RES	/RES	/RES	/RES
17	/CS	/CS	/CS	/CS
18	N.C.	N.C.	/SHDN	/SHDN
19	BS2	BS2	BS1	BS1
20	BS1	BS1	BS0	BS0

- Pin #3:
  - EOL (NHD-2.7-12864UCY3) – This pin is a 'No Connect'.
  - NEW (NHD-2.7-12864WDY3) – This pin is a 'No Connect' by default, but can be configured via jumper to allow the user to provide an independent supply voltage (2.8 – 12V DC) to the on-board boost converter, for increased efficiency and a reduction in current consumption.
- Pin #15:
  - EOL (NHD-2.7-12864UCY3) – This pin is a 'No Connect'.
  - NEW (NHD-2.7-12864WDY3) – This pin is a 'No Connect' by default, but can be configured via jumper to allow the user to provide an independent supply voltage (14.5 – 15.5V DC) to the OLED panel, (by default this is provided by the on-board boost converter), for greatly increased efficiency and a vast reduction in current consumption.
- Pin #18:
  - EOL (NHD-2.7-12864UCY3) – This pin is a 'No Connect'.
  - NEW (NHD-2.7-12864WDY3) – This pin is by default the active low shutdown (/SHDN) signal, (internally pulled high via 15kΩ pull-up resistor), for the on-board boost converter. This pin can be configured via jumper to be a 'No Connect'.
- Pin #19, #20:
  - These pins are still used as Interface Selection pins. If using the existing 4-wire serial interface, no change is needed. The differences are shown in the Interface section below.

-Interface

- Setting the Interface Mode:
  - The configuration of pins 19 & 20 has changed, specifically with the way the user selects between the two parallel interface modes. If using the existing 4-wire serial interface, no change is needed.

EOL (NHD-2.7-12864UCY3)

PIN #	Symbol	6800-mode 8-bit Parallel	8080-mode 8-bit Parallel	4-wire Serial	-
19	BS2	1	1	0	-
20	BS1	0	1	0	-

NEW (NHD-2.7-12864WDY3)

PIN #	Symbol	6800-mode 8-bit Parallel	8080-mode 8-bit Parallel	4-wire Serial	3-wire Serial
19	BS1	1	1	0	0
20	BS0	1	0	0	1

- Sending Commands:
  - EOL (NHD-2.7-12864UCY3) – Sending subsequent bytes, or command parameters, after the first command is sent is done by keeping the D/C (pin #4) signal LOW.
  - NEW (NHD-2.7-12864WDY3) – Sending subsequent bytes, or command parameters, after the first command is sent is done by pulling the D/C (pin #4) signal HIGH.

-Software

- Initialization:

Note: the writeCommand() and writeData() functions listed below are identical except for the logic state of the D/C (pin #4) signal. For writeCommand(), D/C pin = LOW. For writeData(), D/C pin = HIGH.

Command #	EOL (NHD-2.7-12864UCY3)	NEW (NHD-2.7-12864WDY3)	Command Description
1	writeCommand(0xAE);	writeCommand(0xAE);	//display OFF
2	writeCommand(0xB3); writeCommand(0x91);	writeCommand(0xB3); writeData(0x91);	//set CLK div. & OSC freq.
3	writeCommand(0xA8); writeCommand(0x3F);	writeCommand(0xCA); writeData(0x3F);	//set MUX ratio
4	writeCommand(0xA2); writeCommand(0x4C);	writeCommand(0xA2); writeData(0x00);	//set offset
5	writeCommand(0xAD); writeCommand(0x02);	*Not used*	//master config
6	*Not used*	writeCommand(0xAB); writeData(0x01);	//function selection (internal VDD reg.)

7	writeCommand(0xA0);
	writeCommand(0x52);
		writeCommand(0xA0);
		writeData(0x16);
		writeData(0x11);
			//set re-map

8	writeCommand(0x86);	writeCommand(0xC7); writeData(0x0F);	//master contrast current
9	writeCommand(0x81); writeCommand(0x7F);	writeCommand(0xC1); writeData(0x9F);	//set contrast current
10	writeCommand(0xB1); writeCommand(0x55);	writeCommand(0xB1); writeData(0xF2);	//set phase length
11	writeCommand(0xBC); writeCommand(0x18);	writeCommand(0xBB); writeData(0x1F);	//set pre-charge voltage
12	writeCommand(0xB4); writeCommand(0x03);	*Not used*	//set pre-charge compensation
13	writeCommand(0xB0); writeCommand(0x28);	*Not used*	//enable pre-charge compensation

14	writeCommand(0xBF);
	writeCommand(0x0E);
		writeCommand(0xB4);
		writeData(0xA0);
		writeData(0xFD);
			//set VSL

15	writeCommand(0xBE); writeCommand(0x1C);	writeCommand(0xBE); writeData(0x04);	//set VCOMH
16	writeCommand(0xA4);	writeCommand(0xA6);	//set display mode (normal display)
17	writeCommand(0xAF);	writeCommand(0xAF);	//display ON

- Addressing:
  - The new OLED controller's memory mapping scheme has changed, affecting the software value the user would use to specify a **column**'s address on the panel. The **row** memory mapping is unaffected by this change, and therefore uses the same values as the EOL model.

EOL (NHD-2.7-12864UCY3)

	Column 1	Column 128	Row 1	Row 64
Value to use in software:	0	63	0	63

NEW (NHD-2.7-12864WDY3)

	Column 1	Column 128	Row 1	Row 64
Value to use in software:	28	91	0	63

- Writing Pixel Data:
    - The same low-level routines to send a data byte to the controller can be used between both the EOL and NEW models, however the way the pixel data is written into Graphics Display Data RAM (GDDRAM) is different between them. Provided below are a couple of example routine comparisons to illustrate the differences.

EOL (NHD-2.7-12864UCY3) – Write 2 pixels:

```
void oldWrite2Pixels(unsigned char xPos, unsigned char yPos, unsigned char pixel1, unsigned char pixel2){
  unsigned char combinedPixelValue;
  if(pixel1>=1) pixel1 = 0xFF;              //set 1st pixel value to ON
  else pixel1 = 0x00;                       //set 1st pixel value to OFF
  if(pixel2>=1) pixel2 = 0xFF;              //set 2nd pixel value to ON
  else pixel2 = 0x00;                       //set 2nd pixel value to OFF
  if(pixel1) combinedPixelValue = (pixel1<<4)|(pixel2);   //check if 1st pixel value is 0
  else{
    pixel1|=0x0F;                           //handle case where upper nibble is 0
    combinedPixelValue = (pixel1)&(pixel2);    //combine both pixel values into one data byte
  }                                         //(1st pixel = upper nibble, 2nd pixel = lower nibble)
  if(xPos>127) xPos = 127;                  //boundary check (MIN xPos = 0, MAX xPos = 127)
  xPos = xPos/2;                            //account for GDDRAM address mapping
  if(yPos>63) yPos = 63;                    //boundary check (MIN yPos = 0, MAX yPos = 63)
  oldSetColumn(xPos,xPos);                  //set column (x-axis) start/end address
  oldSetRow(yPos,yPos);                     //set row (y-axis) start/end address
  writeData(combinedPixelValue);            //write 2 pixels to the display
}
void oldSetColumn(unsigned char xStart, unsigned char xEnd){
  writeCommand(0x15);       //set column (x-axis) start/end address
  writeCommand(xStart);     //column start; 0 is left-most column
  writeCommand(xEnd);       //column end; 63 is right-most column
}
void oldSetRow(unsigned char yStart, unsigned char yEnd){
  writeCommand(0x75);       //set row (y-axis) start/end address
  writeCommand(yStart);     //row start; 0 is top row
  writeCommand(yEnd);       //row end; 63 is bottom row
}
```

NEW (NHD-2.7-12864WDY3) – Write 2 pixels:

```
void newWrite2Pixels(unsigned char xPos, unsigned char yPos, unsigned char pixel1, unsigned char pixel2){
  if(pixel1>=1) pixel1 = 0xFF;              //set 1st pixel value to ON
  else pixel1 = 0x00;                       //set 1st pixel value to OFF
  if(pixel2>=1) pixel2 = 0xFF;              //set 2nd pixel value to ON
  else pixel2 = 0x00;                       //set 2nd pixel value to OFF
  if(xPos>127) xPos = 127;                  //boundary check (MIN xPos = 0, MAX xPos = 127)
  xPos = xPos/2;                            //account for GDDRAM address mapping
  xPos+=28;                                 //account for GDDRAM address mapping
  if(yPos>63) yPos = 63;                    //boundary check (MIN yPos = 0, MAX yPos = 63)
  newSetColumn(xPos,xPos);                  //set column (x-axis) start/end address
  newSetRow(yPos,yPos);                     //set row (y-axis) start/end address
  writeRAM();                               //single byte command (0x5C) to initiate pixel data write to GDDRAM;
  writeData(pixel1);                        //write 1st of 2 pixels to the display
  writeData(pixel2);                        //write 2nd of 2 pixels to the display
}
void newSetColumn(unsigned char xStart, unsigned char xEnd){
  writeCommand(0x15);       //set column (x-axis) start/end address
  writeData(xStart);        //column start; 28 is left-most column
  writeData(xEnd);          //column end; 91 is right-most column
}
void newSetRow(unsigned char yStart, unsigned char yEnd){
  writeCommand(0x75);       //set row (y-axis) start/end address
  writeData(yStart);        //row start; 0 is top row
  writeData(yEnd);          //row end; 63 is bottom row
}
```

- Writing a 128x64 bitmap:

  Note: To use these routines, the bitmap must be 128x64 pixels, monochrome bitmap format, horizontal pixel arrangement, 8-pixels per byte. With modification to the below, other formats may be used.

EOL (NHD-2.7-12864UCY3)

```
void oldDisplayArray12864(const unsigned char arr[]){
  unsigned int i;
  oldSetColumn(0,63);
  oldSetRow(0,63);
  for(i=0;i<1024;i++){            //translate each byte/bit into pixel data
    switch(arr[i]&0xC0){
     case 0x00:
       writeData(0x00); break;
     case 0x40:
       writeData(0x0F); break;
     case 0x80:
       writeData(0xF0); break;
     case 0xC0:
       writeData(0xFF); break;
     default:
       break;
    }
    switch(arr[i]&0x30){
     case 0x00:
       writeData(0x00); break;
     case 0x10:
       writeData(0x0F); break;
     case 0x20:
       writeData(0xF0); break;
     case 0x30:
       writeData(0xFF); break;
     default:
       break;
    }
    switch(arr[i]&0x0C){
     case 0x00:
       writeData(0x00); break;
     case 0x04:
       writeData(0x0F); break;
     case 0x08:
       writeData(0xF0); break;
     case 0x0C:
       writeData(0xFF); break;
     default:
       break;
    }
    switch(arr[i]&0x03){
     case 0x00:
       writeData(0x00); break;
     case 0x01:
       writeData(0x0F); break;
     case 0x02:
       writeData(0xF0); break;
     case 0x03:
       writeData(0xFF); break;
     default:
       break;
    }
  }
}
```

NEW (NHD-2.7-12864WDY3)

```
void newDisplayArray12864(const unsigned char arr[]){
  unsigned int i, j;
  newSetColumn(28,91);
  newSetRow(0,63);
  writeRAM();
  for(i=0;i<1024;i++){            //translate each byte/bit into pixel data
   for(j=0;j<8;j++){
    if(((arr[i]<<j)&0x80)==0x80){
     writeData(0xFF);
    }
    else{
     writeData(0x00);
    }
   }
  }
}
```

(Example bitmap array)

```
const unsigned char NHDlogo [] = {              //128x64 monochrome bitmap, horizontal pixel arrangement, 8-pixels per byte, 1,024 bytes
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x7C, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF, 0xFF,
0xD9, 0x83, 0xC6, 0x31, 0x98, 0xC1, 0x82, 0x0C, 0x3C, 0x63, 0x00, 0x00, 0x00, 0x00, 0xFF, 0xFF, 0xD9, 0x87, 0xC6, 0x33, 0x98, 0xC1, 0x83, 0x0C, 0x7C, 0x73, 0x00, 0x00,
0x00, 0x00, 0xFC, 0x00, 0x1D, 0x86, 0x03, 0x33, 0x18, 0xC3, 0xC3, 0x18, 0xC0, 0x7B, 0x00, 0x00, 0x00, 0x00, 0x7C, 0x7F, 0xDD, 0x8E, 0xE3, 0x7B, 0x1F, 0xC3, 0x61,
0xB8, 0xFC, 0x7B, 0x00, 0x00, 0x00, 0x00, 0x00, 0xFF, 0xDF, 0x8F, 0xC1, 0xDF, 0x1F, 0xC6, 0x61, 0xB1, 0xFC, 0x6F, 0x00, 0x00, 0x00, 0x3C, 0x01, 0xC0, 0x1B, 0x84, 0x01,
0xCE, 0x18, 0xC7, 0xE0, 0xF0, 0xC0, 0x67, 0x00, 0x00, 0x00, 0x7E, 0x07, 0x9F, 0xDB, 0x87, 0xE1, 0xCE, 0x18, 0xCE, 0x70, 0xE0, 0x7C, 0x67, 0x00, 0x00, 0x00, 0x7F, 0xFE,
0x3F, 0xD9, 0x83, 0xE0, 0xCC, 0x18, 0xCC, 0x38, 0x60, 0x3C, 0x63, 0x00, 0x00, 0x00, 0xFF, 0xFC, 0xE0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x7E, 0x01, 0xC0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x0E, 0x3C, 0x01, 0x80, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x1F, 0x00, 0x07, 0x80, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x1F, 0x80, 0x0E, 0x00, 0x3F, 0x0C, 0x3F,
0x8F, 0xC3, 0x00, 0xC3, 0x18, 0x00, 0x00, 0x00, 0x00, 0x3F, 0xFF, 0xFC, 0x00, 0x3F, 0x8C, 0x3F, 0x8C, 0xE3, 0x01, 0xC3, 0x98, 0x00, 0x00, 0x00, 0x00, 0x1F, 0xFF, 0xF8,
0x00, 0x31, 0xCC, 0x30, 0x0C, 0x63, 0x01, 0x60, 0xF0, 0x00, 0x00, 0x00, 0x00, 0x1F, 0x80, 0x00, 0x00, 0x30, 0xCC, 0x3F, 0x0E, 0xC3, 0x03, 0x20, 0xE0, 0x00, 0x00, 0x00,
0x00, 0x07, 0x00, 0x00, 0x00, 0x30, 0xCC, 0x03, 0x8F, 0xC3, 0x03, 0xF0, 0x60, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x3F, 0x8C, 0x3F, 0x8C, 0x03, 0x07, 0xF0,
0x60, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x3F, 0x8C, 0x3F, 0x0C, 0x03, 0xE6, 0x18, 0x60, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x01, 0x83, 0x41, 0xE0, 0x70, 0x78, 0x24, 0x0C, 0x0F, 0x06, 0x0F, 0x06, 0x81, 0x80,
0x80, 0x00, 0x01, 0x83, 0xC0, 0xC0, 0xE0, 0x58, 0x34, 0x0C, 0x06, 0x06, 0x09, 0x07, 0x81, 0x80, 0x80, 0x00, 0x01, 0x82, 0xC0, 0xC0, 0xC0, 0x70, 0x3C, 0x1E, 0x06, 0x06,
0x09, 0x05, 0x83, 0xC0, 0x80, 0x00, 0x01, 0x82, 0x40, 0xC0, 0x70, 0x58, 0x2C, 0x12, 0x06, 0x06, 0x0F, 0x04, 0x82, 0x40, 0xE0, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00,
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