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1.0 General Descriptions Introduction

1.1 Introduction

The M104GNX1-R1 is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. It is composed of a TFT LCD panel, a backlight system, column driver and row driver circuit. This TFT LCD has a 10.4-inch diagonally measured active display area with resolution (1024 horizontal by 768 vertical pixels array).

1.2 Features

- 10.4” TFT LCD Panel
- LED Backlight System
- Supported 1024x768 pixels resolution
- RoHS Compliance
- 6/8 bit Selection
- Reverse Scan

1.3 Product Summary

Items	Specifications	Unit
Screen Diagonal	10.4	Inch
Active Area	211.2(H) x 158.4(V)	mm
Pixels H x V	1024(RGB) x768	-
Pixel Pitch	0.20625(H) x 0.20625(V)	mm
Pixel Arrangement	R.G.B. Vertical Stripe	-
Display Mode	Normally White	-
White Luminance	350(Typ.)	cd /m^2
Contrast Ratio	900:1(Typ)	-
Response Time	16	msec
Input Voltage	3.3	V
Weight	TBD	g
Outline Dimension	236.0(H) x 176.9(V) x 5.7(D)	mm
Electrical Interface (Logic)	LVDS	-
Support Color	16.7M/262K	-
Surface Treatment	Anti-glare, Hard-Coating (3H)	-
Operation Life	30,000(Min.)	Hrs
RoHS	RoHS Compliance	

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2.0 Absolute Maximum Ratings

Table 1 Absolute Ratings of Environment

Item	Symbol	Min.	Max.	Unit	Conditions
Operating Temperature	TOP	-20	70	℃	Note
Operating Humidity	HOP	10	85	%RH	Note
Storage Temperature	TST	-30	80	℃	Note
Storage Humidity	HST	10	95	%RH	Note

Note：Please make sure to keep the temperature of LCD module is less than 85℃.

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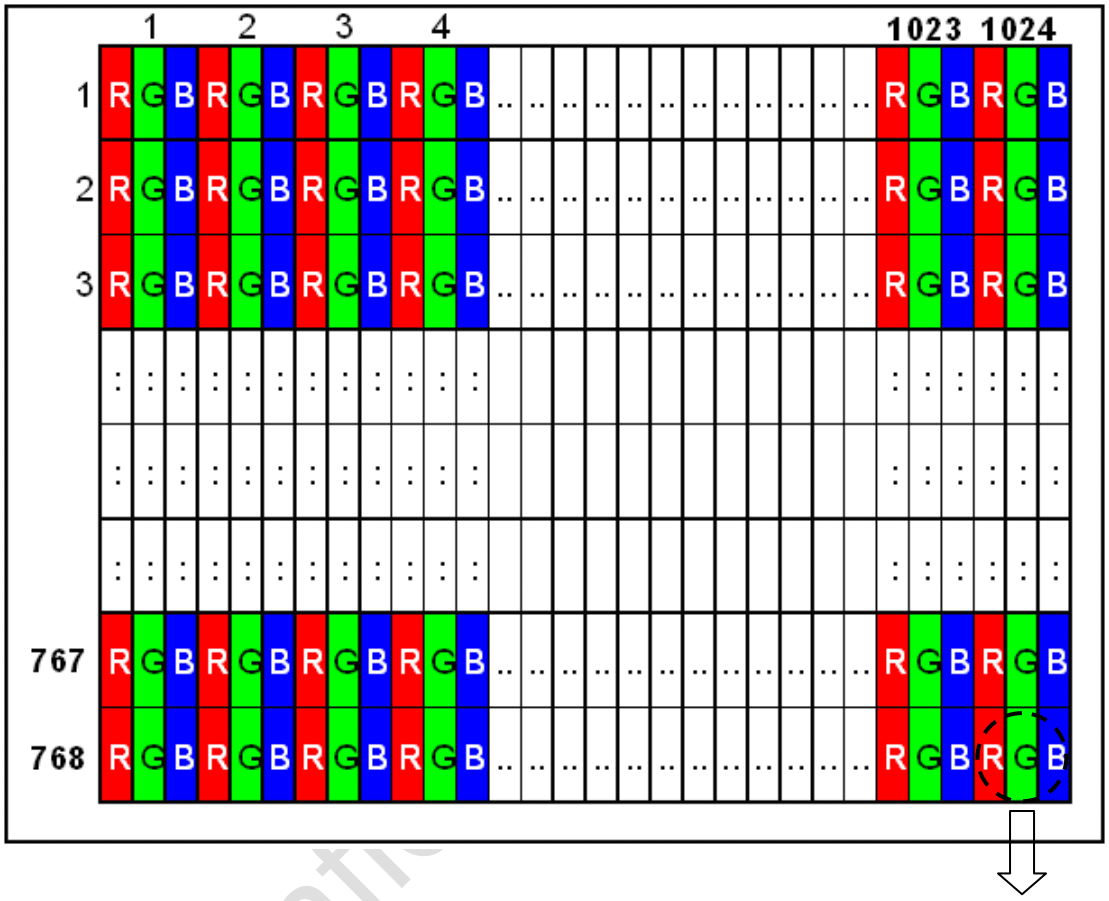
3.0 Pixel Format Image

Figure 1 shows the relationship of the input signals and LCD pixel format image.

Figure 1 Pixel Format



R+G+B dots=1 pixel

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4.0 Optical Characteristics

The optical characteristics are measured under stable conditions as following notes

Table 2 Optical Characteristics

Item	Conditions		Min.	Typ.	Max.	Unit	Note
Viewing Angle （CR>10）	Horizontal	θ_L	70	80	-	degree	(1),(2),(3)
		θ_R	70	80	-		
	Vertical	θ_T	70	80	-		
		θ_B	70	80	-		
Contrast Ratio	Center		-	900	-	-	(1),(2),(4)
Response Time	Rising		-	TBD	-	ms	(1),(2),(5)
	Falling		-	TBD	-	ms	
	Rising + Falling		-	16	-	ms	
Color Chromaticity (CIE1931)	NTSC		-	72	-	%	(1),(2)
	Red x		Typ. TBD	TBD	Typ. TBD	-	(1),(2)
	Red y			TBD		-	
	Green x			TBD		-	
	Green y			TBD		-	
	Blue x			TBD		-	
	Blue y			TBD		-	
	White x		0.255	0.305	0.355	-	
	White y		0.275	0.325	0.375	-	
White Luminance	Center		TBD	350	-	cd/m^2	(1),(2),(6)
Luminance Uniformity	9Points		75	80	-	%	(1),(2),(6)

Note (1) Measurement Setup:

The LCD module should be stabilized at given temperature(25℃) for 15 minutes to Avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting backlight for 15 minutes in a windless room.

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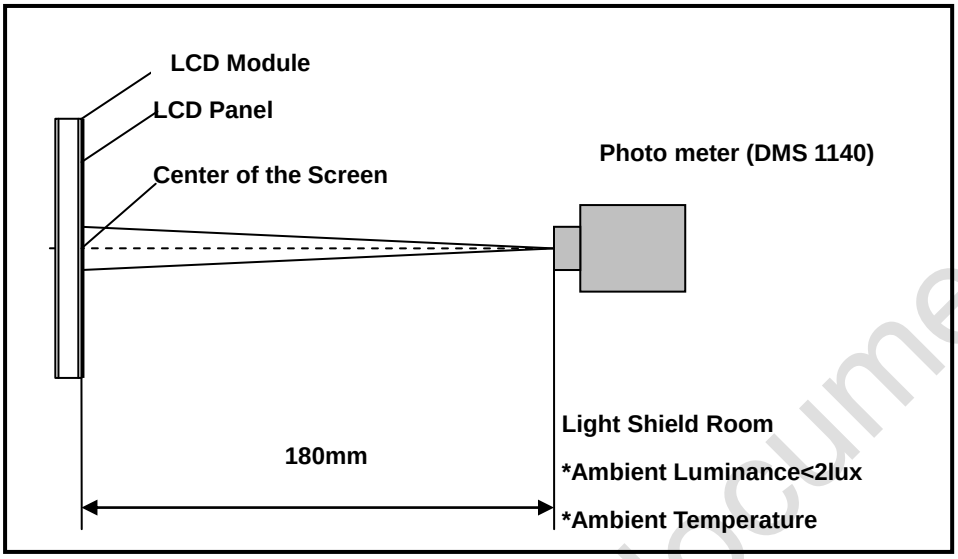
Figure 2 Measurement Setup



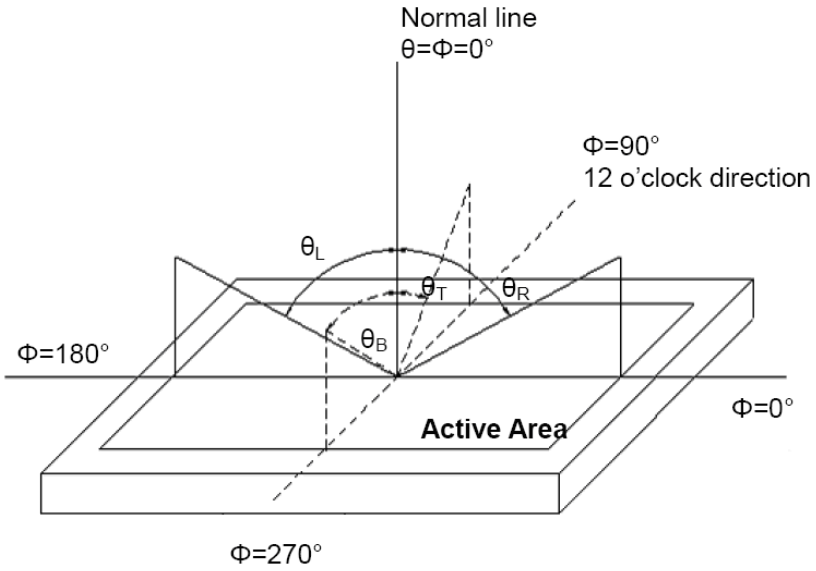
Note (2) The LED input parameter setting as:

VLED: 12V;

PWM_LED: Duty 100 %

Note (3) Definition of Viewing Angle

Figure 3 Definition of Viewing Angle



Note (4) Definition Of Contrast Ratio (CR)

The contrast ratio can be calculated by the following expression

Contrast Ratio (CR) = L255 / L0

L255: Luminance of gray level 255, L0: Luminance of gray level 0

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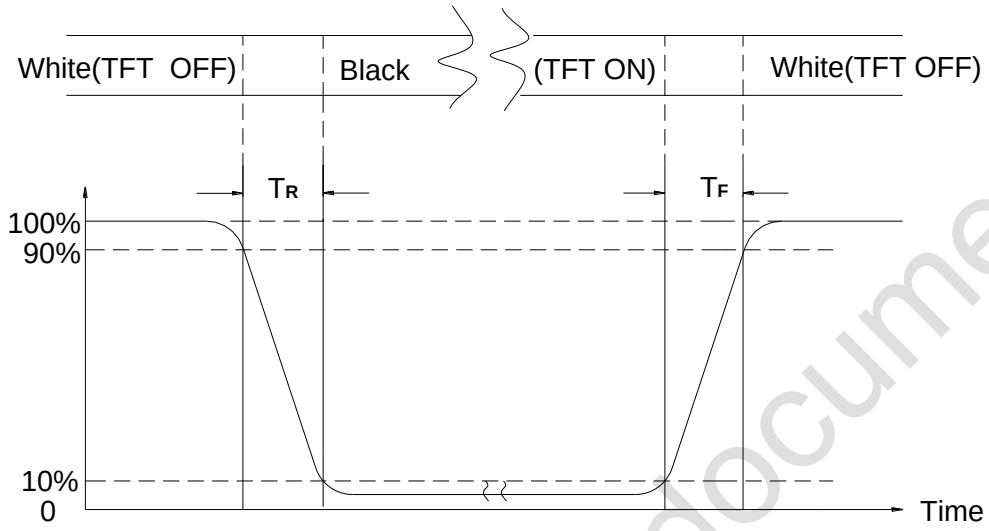
Note (5) Definition Of Response Time (T_R, T_F)

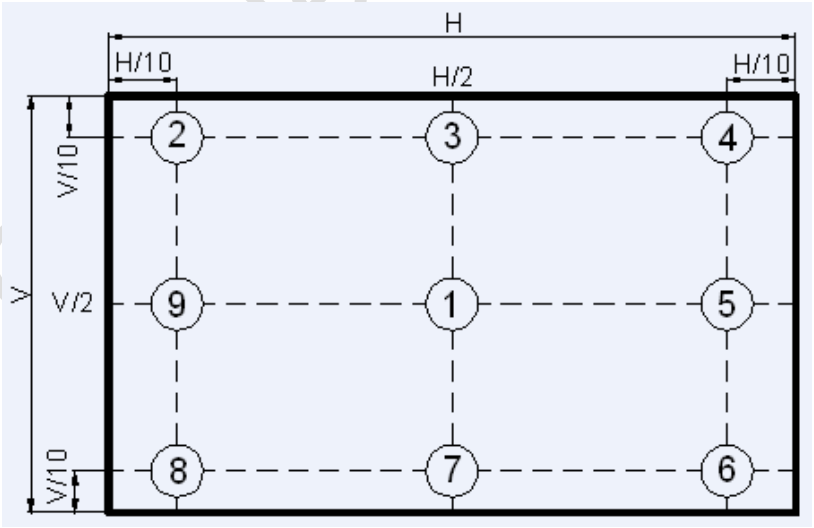
Figure 4 Definition of Response Time



Note (6) Definition Of Brightness Luminance

$$\text{Luminance Uniformity} = \frac{(\text{Min Luminance of 9 points})}{(\text{Max Luminance of 9 points})} \times 100\%$$

Figure 5 Measurement Locations



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5.0 Electrical Characteristics

5.1 TFT LCD Module Interface Connector

Table 3 Connector Name / Designation

Item	Description
Type / Part Number	STM MSB24013P20HA or compatible

Table 4 Signal Pin Assignment

Pin #	Signal Name	Description	Remarks
1	VDD	Power Supply, 3.3V (typical)	
2	VDD	Power Supply, 3.3V (typical)	
3	VSS	Ground	
4	REV	Reverse Scan selection	[H:Enable,L:Disable]
5	Rin1-	-LVDS differential data input	
6	Rin1+	+LVDS differential data input	
7	GND	Ground	
8	Rin2-	-LVDS differential data input	
9	Rin2+	+LVDS differential data input	
10	GND	Ground	
11	Rin3-	-LVDS differential data input	
12	Rin3+	+LVDS differential data input	
13	GND	Ground	
14	CIkIN-	-LVDS differential clock input	
15	CIkIN+	+LVDS differential clock input	
16	GND	Ground	
17	Rin4-	-LVDS differential data input	
18	Rin4+	+VDS differential data input	
19	SEL68	6/8 bits LVDS data input selection	[H:8bit L/NC:6bit]
20	Bist	Internal use	

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5.2 LED Interface Connector

Table 5 Connector Name / Designation

Connector Name/Designation	LED Driver Connector
Manufacturer	STM or Compatible
Connector Model Number	MSB24038P5A or Compatible

Table 6 LED Connector Pin Assignment

Pin#	Symbol	Signal Name
1	Vcc	12V
2	GND	GND
3	Enable	5V-On/0V-Off
4	Dimming	PWM Dimming or Analog Dimming
5	NC	NC

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6.0 Mechanical Characteristics

6.1 Outline Drawing

Figure 6 Reference Outline Drawing (Front Side)

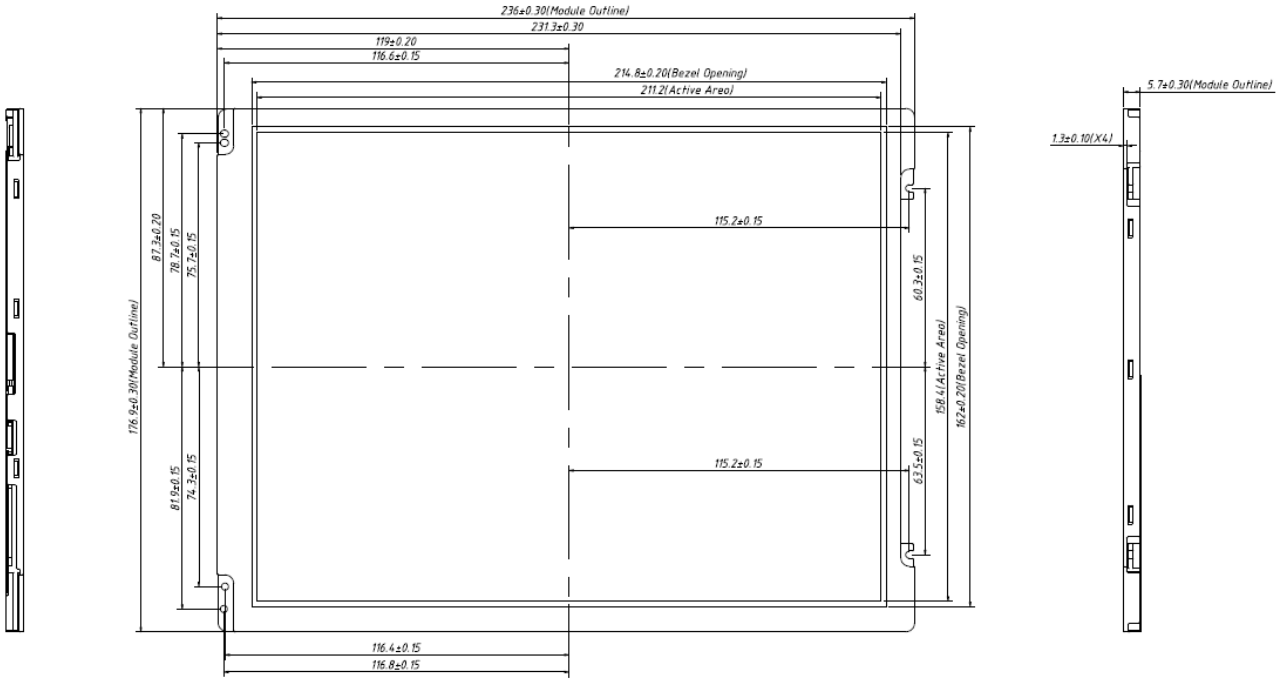
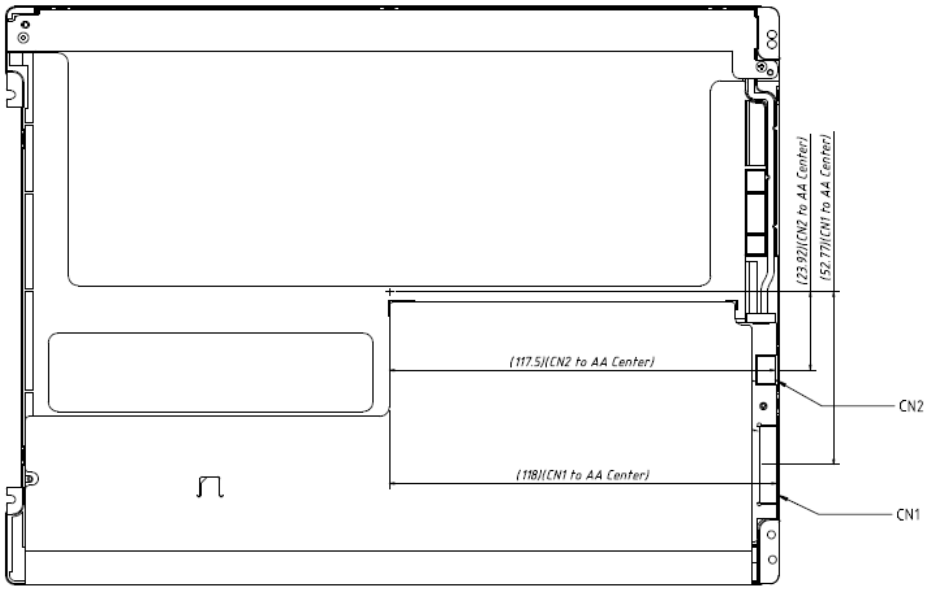


Figure 7 Reference Outline Drawing (Back Side)



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6.2 Dimension Specifications

Table 7 Module Dimension Specifications

Width [mm]	236.0
Height [mm]	176.9
Thickness [mm]	5.7(Max)
Weight [g]	TBD

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7.0 General Precaution

7.1 Use Restriction

This product is not authorized for use in life supporting systems, aircraft navigation control systems, military systems and any other application where performance failure could be life-threatening or otherwise catastrophic.

7.2 Handling Precaution

(1) Please mount LCD module by using mounting holes arranged in four corners tightly.

(2) Do not disassemble or modify the module. It may damage sensitive parts inside LCD module, and may cause scratches or dust on the display. IVO does not warrant the module, if customers disassemble or modify the module.

(3) If LCD panel is broken and liquid crystal spills out, do not ingest or inhale liquid Crystal, and do not contact liquid crystal with skin. If liquid crystal contacts mouth or eyes, rinse out with water immediately. If liquid crystal contacts skin or cloths, wash it off immediately with alcohol and Rinse thoroughly with water.

(4) Disconnect power supply before handling LCD module

(5) Refrain from strong mechanical shock and /or any force to the module.

(6) Do not exceed the absolute maximum rating values, such as the supply voltage variation, input voltage variation, variation in parts' parameters, environmental temperature; etc otherwise LCD module may be damaged. It's recommended employing protection circuit for power supply.

(7) Do not touch, push or rub the polarizer with anything harder than HB pencil lead. Use fingerstalls of soft gloves in order to keep clean display quality, when Persons handle the LCD module for incoming inspection or assembly.

(8) When the surface is dusty, please wipe gently with absorbent cotton or other soft Material. When cleaning the adhesives, please use absorbent cotton wetted with a little Petroleum benzene or other adequate solvent.

(9) Wipe off saliva or water drops as soon as possible. If saliva or water drops Contact with polarizer for a long time, they may causes deformation or color Fading.

(10) Protection film must remove very slowly from the surface of LCD module to Prevent from electrostatic occurrence.

(11) Because LCD module uses CMOS-IC on circuit board and TFT-LCD panel, it is Very weak to electrostatic discharge, Please be careful with electrostatic Discharge .Persons who handle the module should be grounded through adequate methods.

(12) Do not adjust the variable resistor located on the module.

7.3 Storage Precaution

(1) Please do not leave LCD module in the environment of high humidity and high temperature for a long time.

(2) The module shall not be exposed under strong light such as direct sunlight.Otherwise, Display characteristics may be changed.

(3) The module should be stored in a dark place. It is prohibited to apply sunlight or fluorescent light in storage.

7.4 Operation Precaution

(1) Do not connect or disconnect the module in the "Power On" condition.

(2) Power supply should always be turned on/off by 9.0 "Power on/off sequence"

(3) Module has high frequency circuits. Sufficient suppression to the electromagnetic

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interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(4) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

7.5 Others

(1) Ultra-violet ray filter is necessary for outdoor operation.

(2) Avoid condensation of water which may result in improper operation or disconnection of electrode.

(3) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen.

(4) This module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

7.6 Disposal

When disposing LCD module, obey the local environmental regulations.

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