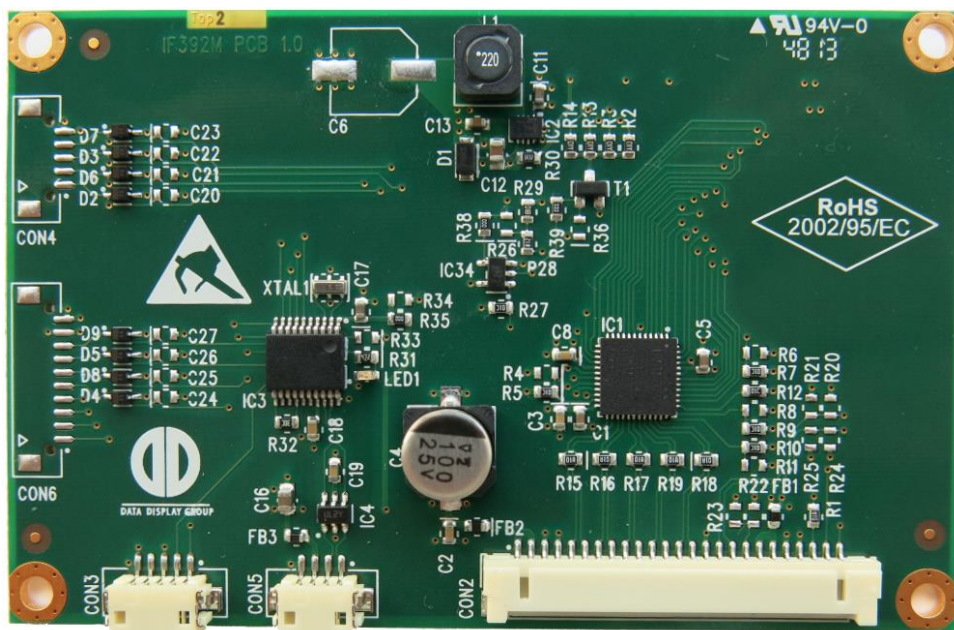


# Datasheet

## IF392M

**LVDS-to-TTL converter, LED Backlight Driver, Optional:  
Resistive Touch Controller for Mitsubishi Panels**

ZU-02-392A, ZU-02-392



Version 1.9

**24.10.2016**

The information contained in this document has been carefully researched and is, to the best of our knowledge, accurate. However, we assume no liability for any product failures or damages, immediate or consequential, resulting from the use of the information provided herein. Our products are not intended for use in systems in which failures of product could result in personal injury. All trademarks mentioned herein are property of their respective owners. All specifications are subject to change without notice.



## Table of Contents

Revision History .....	3
1 Overview .....	4
1.1 Features.....	4
2 Mechanical Overview.....	5
3 Connectors .....	5
3.1 Connector Pinning .....	6
3.2 Pinning for Optional Connectors.....	8
4 Electrical Specifications .....	9
5 ChandlerRover and MarsRover Settings .....	10
6 Environmental Conditions .....	10
7 Ordering Information .....	10
8 News and Updates .....	11



## Revision History

Date	Rev.No.	Description	Page
09.01.2014	1.0	Initial version	All
22.01.2014	1.1	Release Version	
23.01.2014	1.2	Marked optional connectors	
15.07.2014	1.3	Added ChandlerRover and MarsRover Settings section	10
15.10.2014	1.4	Clarified 18 Bit / 24 Bit confusion. Marked optional pins on CON2	4, 7
12.11.2015	1.5	Tested LCDs: AA050MG03--T1 added	4
21.12.2015	1.6	Weight added	5
13.10.2016	1.7	Corrected „Operating Temperature Range“	10
		Company logo updated	All
		Added LED Driver Specification Note 4	9
		Added environmental Conditions Note 1	10
		Added Chapter 7	10
21.10.2016	1.8	Added Ordering Information ZU-02-392A	1, 10
		Moved CON 7, CON 3 and CON 5 to the optional connectors	5
		Changed CON3 to CON3 (Optional)	7
		Changed CON5 to CON5 (Optional)	7
		Changed CON7 to CON7 (Optional)	8
24.10.2016	1.9	Added Ordering Information "Board Type"	10
		Changed IF392M-01 to IF392M	1



## 1 Overview

IF392M provides an LVDS interface to drive TTL Panels together with a converter to drive LED backlight units. It also accommodates a resistive touch controller, capable of supporting 4, 5 or 8 wire touch screens, with USB or serial connectivity and driver support for Windows, Linux, and embedded architectures.

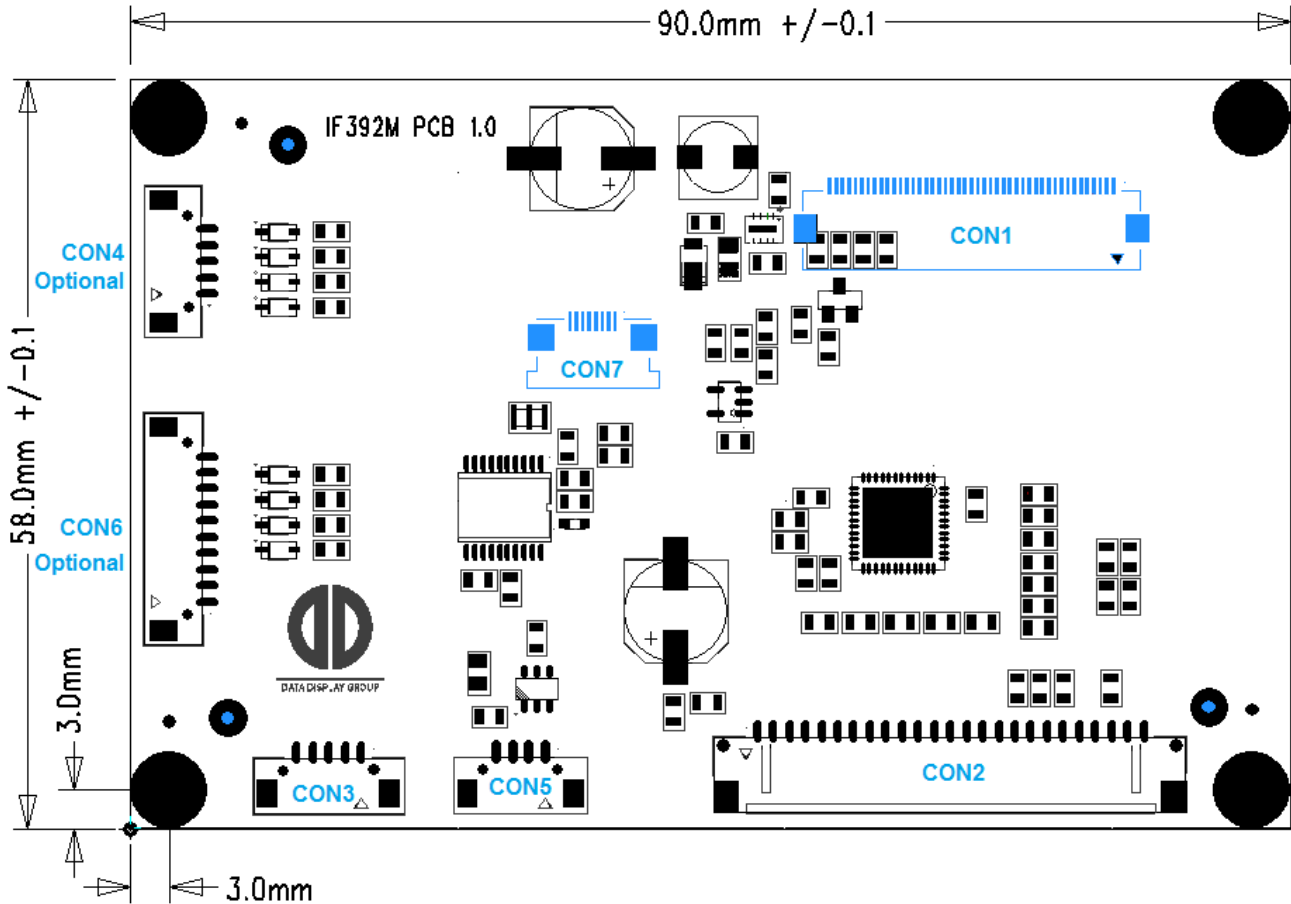
IF392M provides the user with standard backlight controls of backlight enable and backlight dimming control. For LCDs with an available stand-by mode for conserving power and scan direction control signals, the IF392 provides an interface to these features as well.

### 1.1 Features

- 24 bit LVDS input support
  - VESA Color mapping (Non-conventional)
- LED converter
  - Backlight enable
  - PWM dimming control
  - Analog dimming control (Optional)
  - Overvoltage protection: 42 Volts
- Touchscreen Controller
  - Supports 4/5/8 Wire Resistive Touchscreens
  - USB output
  - Serial RS232 (TTL level) Touch Interface
- Tested LCDs:
  - AA050MG01
  - AA050MG01--T1
  - AA050MG03
  - AA050MG03--T1



## 2 Mechanical Overview



Note: Blue Connectors are at the bottom layer.

Weight: 21.3 grams

## 3 Connectors

	Description	Type	Manufacturer	Note
CON1	TTL Output	FH12A-45S-0.5SH(55)	Hirose	
CON2	LVDS Input	DF14-25P-1.25H(25)	Hirose	
<b>Optional Connectors</b>				
CON3	Touchscreen Controller RS232 Output (TTL Level)	DF13-5P-1.25H(21)	Hirose	(1)
CON4	4 Wire Touchscreen Input	DF13-5P-1.25H(21)	Hirose	
CON5	Touchscreen Controller USB Output	DF13-4P-1.25H(21)	Hirose	(1)
CON6	8 Wire Touchscreen Input	DF13-10P-1.25H(20)	Hirose	
CON7	8 Wire Touchscreen Input (AA050MG01—T1 mating)	08FLZ-xSM2-TB	JST	(1)

**Note 1:** The hardware version ZU-02-292 is equipped with the connections CON3, CON5, CON7 and the resistive touch controller for Mitsubishi panels.



## 3.1 Connector Pinning

CON1 - TTL Connector		
Pin	Signal	Description
1	GND	Ground
2	GND	Ground
3	VCC	Power output 3.3V (Unregulated)
4	VCC	Power output 3.3V (Unregulated)
5	R0	Red Data Signal (LSB)
6	R1	Red Data Signal
7	R2	Red Data Signal
8	R3	Red Data Signal
9	R4	Red Data Signal
10	R5	Red Data Signal
11	R6	Red Data Signal
12	R7	Red Data Signal (MSB)
13	G0	Green Data Signal (LSB)
14	G1	Green Data Signal
15	G2	Green Data Signal
16	G3	Green Data Signal
17	G4	Green Data Signal
18	G5	Green Data Signal
19	G6	Green Data Signal
20	G7	Green Data Signal (MSB)
21	B0	Blue Data Signal (LSB)
22	B1	Blue Data Signal
23	B2	Blue Data Signal
24	B3	Blue Data Signal
25	B4	Blue Data Signal
26	B5	Blue Data Signal
27	B6	Blue Data Signal
28	B7	Blue Data Signal (MSB)
29	GND	Ground
30	CLK	Clock Data
31	DISP	Display on/off (Low: off, High: on)
32	HSYNC	Horizontal Sync Signal
33	VSYNC	Vertical Sync Signal
34	DE	Data Enable
35	N.C.	No Connection
36	LEFT_RIGHT	Scan Direction Signal
37	GND	Ground
38	VLED_N	Backlight LED Cathode
39	VLED_P	Backlight LED Anode
40	VLED_N	Backlight LED Cathode
41	VLED_P	Backlight LED Anode
42	VLED_N	Backlight LED Cathode
43	VLED_P	Backlight LED Anode
44	VLED_N	Backlight LED Cathode
45	VLED_P	Backlight LED Anode



<b>CON2 - LVDS Connector</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	VCC	Power supply +3,3V
2		
3	GND	Ground
4		
5	RX0-	LVDS Data In
6	RX0+	LVDS Data In
7	RX1-	LVDS Data In
8	RX1+	LVDS Data In
9	RX2-	LVDS Data In
10	RX2+	LVDS Data In
11	RXCL-	LVDS Data In
12	RXCL+	LVDS Data In
13	RX3-	LVDS Data In
14	RX3+	LVDS Data In
15	GND	Ground
16	DISP	Panel Enable Signal (Max. 3.3 V)
17	LEFT_RIGHT	Scan Direction Input Logic low: normal, Logic high: reverse
18	N.C.	Not connected
19	VIN_12V	Backlight Power supply +12V
20		
21	GND	Ground
22		
23	BKLT_EN	Backlight Enable
24	N.C.	Not connected ( Optional: Analog Backlight dimming)
25	PWM_IN	Backlight Dimming (PWM)

<b>CON3 (Optional) - Touch Controller Output –RS232</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	UART-TX	Serial Transmit
2	UART-RX	Serial Receive
3	VCC	3.3V
4	N.C.	No Connection
5	GND	Ground

<b>CON5 (Optional) -Touchscreen Controller Output – USB</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	USB+	USB Data +
2	USB-	USB Data -
3	VBUS_5V	USB 5V
4	GND	Ground



<b>CON7 (Optional) - 8 Wire Touchscreen input</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	XM	Touch Input - X-
2	SXM	Touch Input - X- Sense
3	YM	Touch Input - Y+
4	SYM	Touch Input - X- Sense
5	XP	Touch Input - X+
6	SXP	Touch Input - X+Sense
7	YP	Touch Input - Y+
8	YP_SYP	Touch Input - Y+ Sense

## 3.2 Pinning for Optional Connectors

<b>CON4 (Optional) - 4 wire Touch screen input</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	XP	Touch Input - X+
2	YP_SYP	Touch Input - Y+
3	XM	Touch Input - X-
4	YM	Touch Input - Y-
5	GND	Ground

<b>CON6 (Optional) - 8 Wire Touchscreen input</b>		
<b>Pin</b>	<b>Signal</b>	<b>Description</b>
1	XP	Touch Input - X+
2	YP_SYP	Touch Input - Y+ Sense
3	XM	Touch Input - X-
4	YM	Touch Input - Y-
5	SXP	Touch Input - X+Sense
6	YP	Touch Input - Y+
7	SXM	Touch Input - X- Sense
8	SYM	Touch Input - Y- Sense
9	VCC	3.3V
10	GND	Ground





## 4 Electrical Specifications

### Operating conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage	VCC	3.1	3.3	3.5	V	(1)
Supply Current without Display	I <sub>IL</sub>		34	37	mA	
Supply Current with AA050MG01	I <sub>ILD</sub>		84	92	mA	Black picture
Supply Current with AA050MG01	I <sub>ILD</sub>		102	112	mA	White picture
Supply Current with AA050MG01	I <sub>ILD</sub>		147	162	mA	1 pixel chessboard
Backlight Supply Voltage	V <sub>IN_12V</sub>	10	12	14	V	
Backlight Supply Current without Display	I <sub>BL</sub>	-	0.61	0.67	mA	
Backlight Supply Current with AA050MG01	I <sub>BLOMX</sub>		127	140	mA	PWM Duty cycle 100 %
Backlight Supply Current with AA050MG01	I <sub>BLOMN</sub>		8	9	mA	PWM Duty cycle 6 %

### Maximal allowed power consumption for TFT Panels operating with +3.3V

Item	Symbol	Max.	Unit	Note
+3.3V display power CON1	I <sub>DISP</sub>	1	A	without backlight (3)

### LED Driver Specification

Item	Symbol	Min.	Max.	Unit	Note
Rail voltage	V <sub>LED</sub>		42	V	
Rail current	I <sub>LED</sub>		500	mA	(4)

**Note (1):** With-in operating temperature

**Note (2):** Permanent damage to the device may occur if maximum values are exceeded.

Functional operation should be restricted to the conditions described under normal operating conditions.

**Note (3):** Display power output at CON1 is not regulated and directly connected to the input power at CON2. Absolute maximum ratings are depending on display specification.

**Note (4):** The LED current is set by hardware. Please see Chapter 7 for Ordering Information.



## 5 ChandlerRover and MarsRover Settings

Item	Value
LVDS Data mapping	Nonconventional (VESA)
PWM Voltage	3.3 V
PWM Dimming Range	6-100%
PWM Frequency	225 Hz
BKL_EN Voltage	3.3V

## 6 Environmental Conditions

### Environmental Conditions

Item	Symbol	Min.	Max.	Unit	Note
Operating Temperature	T <sub>OP</sub>	-20	80	°C	(1)
Storage Temperature	T <sub>STORE</sub>	-35	85	°C	

**Note (1):** The maximum operating temperature is depending on the backlight power consumption. Please see Chapter 7 for Ordering Information.

## 7 Ordering Information

### Ordering Information

Ordering Number / Board-Typ	Panel	Rail Current I <sub>LED</sub>	Rail Voltage V <sub>LED</sub>	Operating Temperature	Hardware Version	Note
ZU-02-392 / IF392M-00	AA050MG03	60mA	24V	-20°C - +80°C	Obsolete	
ZU-02-392A / IF392M-01	AA050MG03	60mA	24V	-20°C - +80°C	Active	(1)

**Note (1):** The hardware version ZU-02-292A is not equipped with the connections CON3, CON5, CON7 and the resistive touch controller for Mitsubishi panels.



## 8 News and Updates

The latest version of documents, drivers and software packages can be found at:

German Site <http://www.datadisplay-group.de/service/downloads/>

English Site <http://www.datadisplay-group.com/service/downloads/>

Our company network supports you worldwide with offices in Germany, Great Britain, Turkey and the USA.  
For more information please contact:



## DATA DISPLAY GROUP

A **FORTEC** GROUP MEMBER

### **Distec GmbH**

Augsburger Str. 2b  
82110 Germering  
Germany

Phone: +49 (0)89 / 89 43 63-0  
Fax: +49 (0)89 / 89 43 63-131  
E-Mail: [info@datadisplay-group.de](mailto:info@datadisplay-group.de)  
Internet: [www.datadisplay-group.de](http://www.datadisplay-group.de)

### **Display Technology Ltd.**

5 The Oaks Business Village  
Revenge Road, Lordswood  
Chatham, Kent, ME5 8LF  
United Kingdom  
Phone: +44 (0)1634 / 67 27 55  
Fax: +44 (0)1634 / 67 27 54  
E-Mail: [info@displaytechnology.co.uk](mailto:info@displaytechnology.co.uk)  
Internet: [www.datadisplay-group.com](http://www.datadisplay-group.com)

### **Sales Partner:**

### **DATA DISPLAY BİLİŞİM TEKNOLOJİLERİ İÇ VE DIŞ TİCARET LİMİTED ŞİRKETİ**

Barbaros Mh. Ak Zambak Sk. A Blok D:143  
34376 Ataşehir / Istanbul  
Turkey  
Phone: +90 (0)216 / 688 04 68  
Fax: +90 (0)216 / 688 04 69  
E-Mail: [info@data-display.com.tr](mailto:info@data-display.com.tr)  
Internet: [www.data-display.com.tr](http://www.data-display.com.tr)

### **FORTEC Elektronik AG**

Lechwiesenstr. 9  
86899 Landsberg am Lech  
Germany

Phone: +49 (0)8191 / 911 72-0  
Fax: +49 (0)8191 / 217 70  
E-Mail: [sales@fortecag.de](mailto:sales@fortecag.de)  
Internet: [www.fortecag.de](http://www.fortecag.de)

### **Apollo Display Technologies, Corp.**

87 Raynor Avenue,  
Unit 1 Ronkonkoma,  
NY 11779  
United States of America  
Phone: +1 631 / 580-43 60  
Fax: +1 631 / 580-43 70  
E-Mail: [info@apolloDisplays.com](mailto:info@apolloDisplays.com)  
Internet: [www.apolloDisplays.com](http://www.apolloDisplays.com)