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# Firefly Compatible Camera Connector Daughter Card User Guide

**FFCAM-DC-UG-v2.0**
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**www.efinixinc.com**

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# Contents

# Introduction

The FireFly Compatible Camera add-on kit works together with the Trion® T20 MIPI Development Kit.

The kit includes the Firefly Compatible Camera Connector Daughter Card, which bridges between the Trion® T20 MIPI Development Board and an OV13850 camera module that is compatible with the Firefly RK3288 or RK3399 development board. The daughter card connects to the camera using a 30 pin flat cable. Additionally, the board has a 10 pin header for optional camera control pins.
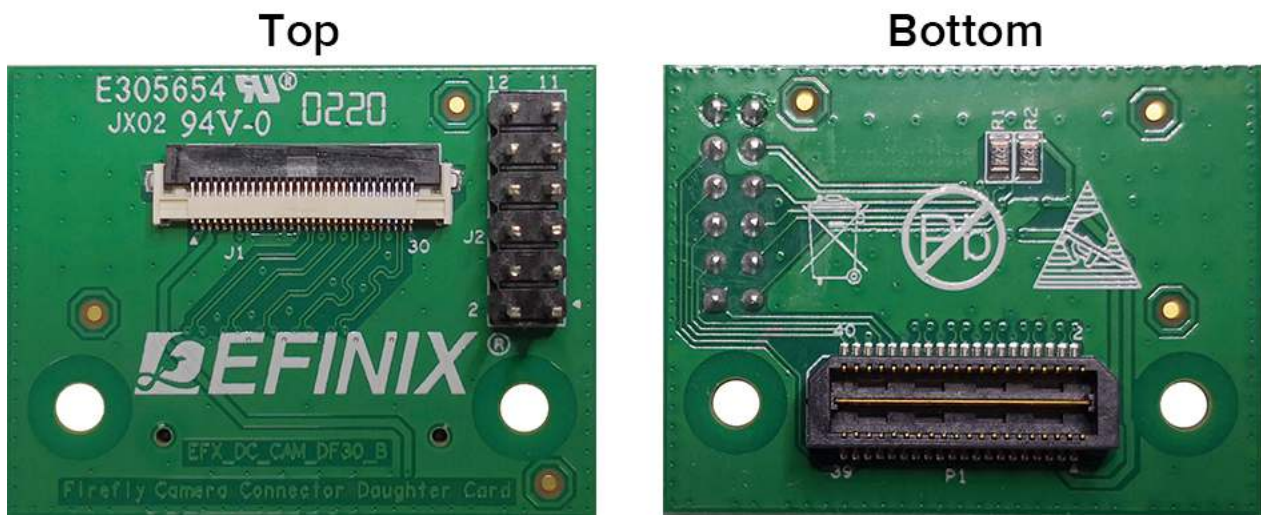
Cameras that are compatible with this daughter card are available from:
- **Firefly**
- **AliExpress**
- **Taobao**

**(i) Note:** For technical support using the camera, please refer to the camera vendor's web site.

*Figure 1: Firefly Compatible Camera Connector Daughter Card*



**⚠ Warning:** The board can be damaged without proper anti-static handling.

## What's in the Box?

The FireFly Compatible Camera add-on kit includes:
- Firefly Compatible Camera Connector Daughter Card
- 2 standoffs
- 2 screws
- 2 nuts

# Features

- Bridges 40 pin MIPI CSI-2 interface on Trion® T20 MIPI Development Board to 30 pin interface
- Pin to pin compatible with OV13850 camera modules that are compatible with the Firefly RK3288 or RK3399 development board
- Supports up to 1.5 Gbps on MIPI interface
- User selectable pins for optional camera functions
- Power supplied from the Trion® T20 MIPI Development Board; no external power required
  — Each pin supports up to 3 A

# Headers

*Table 1: FPC30 Camera Daughter Card Headers*

| Reference Designator | Description |
|---|---|
| P1 | 40 pin QTE header bringing MIPI signals, power, and 1.8 V GPIO pins from the Trion® T20 MIPI Development Board. |
| J1 | 30 pin flexible printed cable (FPC) connector for OV13850 camera modules that are compatible with the Firefly RK3288 or RK3399 development board. |
| J2 | 12 pin header for optional MIPI camera module signals. |

## Header P1 (Development Board Connector)

P1 is a 40 pin QTE header to connect the daughter card to the Trion® T20 MIPI Development Board. The header provides MIPI signals and power to the camera module.

*Table 2: Development Board Connector (P1)*

| Pin Number | Pin Name | Description | Pin Number | Pin Name | Description |
|---|---|---|---|---|---|
| 1 | 2V8_DF30 | 2.8 V power supply | 2 | MIPI_RXD_P0_DF30 | Differential MIPI receiver lane 0 |
| 3 | 1V8_DF30 | 1.8 V power supply | 4 | MIPI_RXD_N0_DF30 | |
| 5 | GND | Ground | 6 | GND | Ground |
| 7 | NC | No connect | 8 | MIPI_RXD_P1_DF30 | Differential MIPI receiver lane 1 |
| 9 | NC | | 10 | MIPI_RXD_N1_DF30 | |
| 11 | GND | Ground | 12 | GND | Ground |
| 13 | NC | No connect | 14 | MIPI_RXD_P2_DF30 | Differential MIPI receiver lane 2 |
| 15 | NC | | 16 | MIPI_RXD_N2_DF30 | |
| 17 | GND | Ground | 18 | GND | Ground |
| 19 | NC | No connect | 20 | MIPI_RXD_P3_DF30 | Differential MIPI receiver lane 3 |
| 21 | NC | | 22 | MIPI_RXD_N3_DF30 | |

| Pin Number | Pin Name | Description | Pin Number | Pin Name | Description |
|---|---|---|---|---|---|
| 23 | GND | Ground | 24 | GND | Ground |
| 25 | NC | No connect | 26 | MIPI_RXD_P4_DF30 | Differential MIPI receiver lane 4 |
| 27 | NC | | 28 | MIPI_RXD_N4_DF30 | |
| 29 | GND | Ground | 30 | GND | Ground |
| 31 | NC | No connect | 32 | GPIOL_69_1V8_SCL | 1.8 V GPIO |
| 33 | NC | | 34 | GPIOL_70_1V8_SDA | 1.8 V GPIO |
| 35 | GND | Ground | 36 | GND | Ground |
| 37 | 1V2_DF30 | 1.2 V power supply | 38 | GPIOL_71_1V8 | 1.8 V GPIO |
| 39 | GPIOL_73_1V8_REFCLK_DF30 | 1.8 V GPIO | 40 | GPIOL_72_1V8_DF30 | 1.8 V GPIO |

## Header J1 (FPC30 Connector)

J1 is a 30 pin flexible flat cable header for connecting to an OV13850 camera module that is compatible with the Firefly RK3288 or RK3399 development board.

*Table 3: FPC30 Connector (J1)*

| Pin Number | Pin Name | Description | Pin Number | Pin Name | Description |
|---|---|---|---|---|---|
| 1 | 1V8_DF30 | 1.8 V power supply | 16 | MIPI_RXD_P0_DF30 | Differential MIPI receiver lane 0 |
| 2 | 2V8_DF30 | 2.8 V power supply | 17 | MIPI_RXD_N0_DF30 | |
| 3 | 1V2_DF30 | 1.2 V power supply | 18 | GND | Ground |
| 4 | 1V8_DF30 | 1.8 V power supply | 19 | MIPI_RXD_P1_DF30 | Differential MIPI receiver lane 1 |
| 5 | NC | No connect | 20 | MIPI_RXD_N1_DF30 | |
| 6 | GND | Ground | 21 | GND | Ground |
| 7 | 2V8_DF30 | 2.8 V power supply | 22 | MIPI_RXD_P2_DF30 | Differential MIPI receiver lane 2 |
| 8 | GND | Ground | 23 | MIPI_RXD_N2_DF30 | |
| 9 | SDA_DF30 | Serial data for camera module | 24 | GND | Ground |
| 10 | SCL_DF30 | Serial clock for camera module | 25 | MIPI_RXD_P3_DF30 | Differential MIPI receiver lane 3 |
| 11 | RST_DF30 | Reset camera module | 26 | MIPI_RXD_N3_DF30 | |
| 12 | GPIO_DF30 | GPIO for camera module | 27 | GND | Ground |
| 13 | GND | Ground | 28 | MIPI_RXD_P4_DF30 | Differential MIPI receiver lane 4 |
| 14 | REFCLK_DF30 | Reference clock for camera module | 29 | MIPI_RXD_N4_DF30 | |
| 15 | GND | Ground | 30 | GND | Ground |

### Header J2 (Optional Camera Signals)

The J2 header has optional pins (SCL and SDA) that are used for MIPI Camera Command Set (CSS) transactions. When shunts are connected, the Trion® T20 MIPI Development Board controls these pins. Alternatively, you can control these pins with an external device by removing the shunt.

*Table 4: Optional Camera Signals (J2)*

| Pin Number | Pin Name | Description | Pin Number | Pin Name | Description |
|---|---|---|---|---|---|
| 1 | GPIOL_69_1V8_SCL_DF30 | 1.8 V I/O from development board | 2 | SCL_DF30 | Camera serial clock |
| 3 | GPIOL_70_1V8_SDA_DF30 | | 4 | SDA_DF30 | Camera data |
| 5 | GPIOL_71_1V8_DF30 | | 6 | RST_DF30 | Camera reset |
| 7 | GPIOL_72_1V8_DF30 | | 8 | GPIO_DF30 | Camera GPIO |
| 9 | GPIOL_73_1V8_REFCLK_DF30 | | 10 | REFCLK_DF30 | Camera reference clock |
| 11 | GND | Ground | 12 | GND | Ground |

# Installing Standoffs

Before using the board, attach the standoffs with the screws provided in the kit.

⚠️ **Warning:** The board can be damaged if you over tighten the screws. Tighten all screws to a torque between 4 ± 0.5 kgf/cm and 5 ± 0.5 kgf/cm.

# Attaching Camera Connector Daughter Cards

The camera connector daughter card attaches to the high-speed MIPI TX or RX headers.

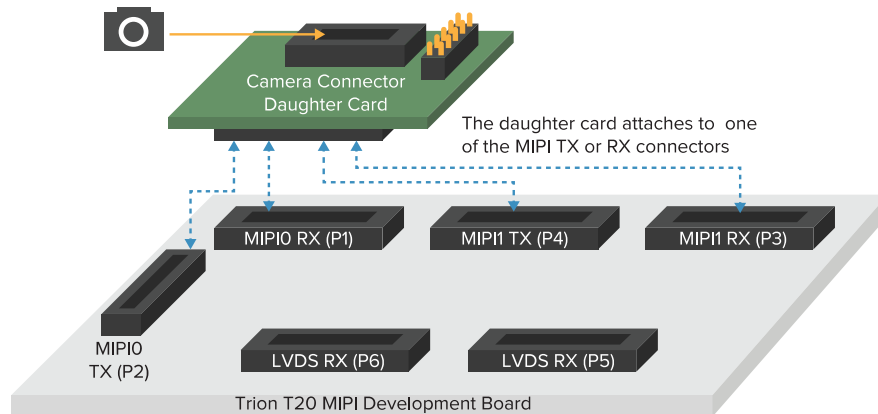*Figure 2: Attaching Camera Connector Daughter Cards (T20 MIPI Board)*
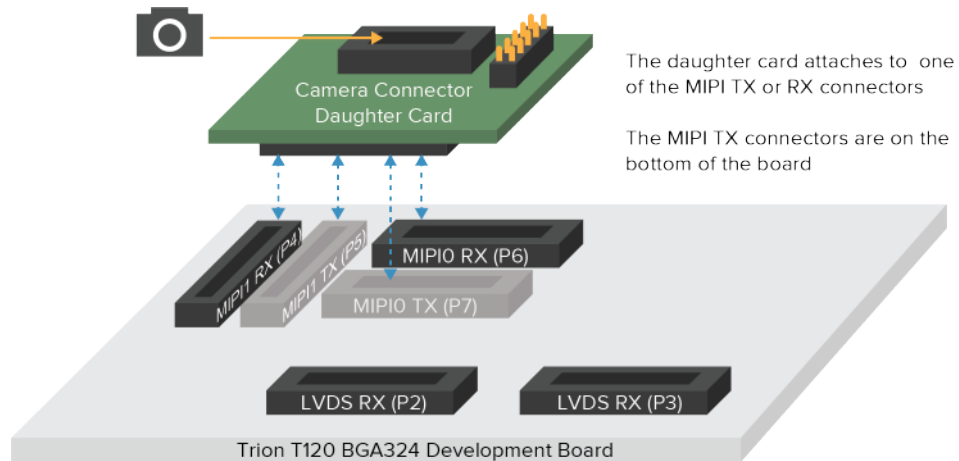


*Figure 3: Attaching Camera Connector Daughter Cards (T120 BGA324 Board)*



To connect a daughter card:

1. Remove power from the Trion® T20 MIPI Development Board.
2. Attach standoffs to the daughter card.
3. Attach the daughter card to the 40-pin header on the board.
4. Connect the camera module or computer to the daughter card using a ribbon cable.
5. Power up the board.

# Revision History

*Table 5: Revision History*

| Date | Version | Description |
|---|---|---|
| April 2020 | 2.0 | Updated daughter card photo and header numbering. Added figure for connecting to the T120 BGS324 development board. |
| January 2020 | 1.0 | Initial release. |