



RealSense™ ID Solution F450, F455

Datasheet

RealSense™ ID Solution F450, RealSense™ ID Solution F455

Dec 2025
Revision 007

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Revision History

Revision	Description	Date
001	<ul style="list-style-type: none">Initial Public Release	January 2021
002	<ul style="list-style-type: none">Table 2-4: Power ConsumptionTable 2-10: RealSense™ ID Solution F450 Temperature SpecificationsTable 2-12: RealSense™ ID Solution F450 – Component PowerTable 2-13: RealSense™ ID Solution F455 Temperature SpecificationsTable 3-1: RealSense™ ID Solution F450 Module DimensionsTable 3-2: RealSense™ ID Solution F455 Peripheral DimensionsFigure 3-2: Through Hole DesignTable 4-1: Functional MetricsTable 4-2: Face Authentication MetricsTable 4-3: Performance MetricsFigure 7-1. RealSense™ ID Solution F455Figure 7-2. RealSense™ ID Solution F450	April 2021
003	<ul style="list-style-type: none">Table 1-1: RealSense™ ID Solution F450/F455Table 2-1: RealSense™ ID Solution F450 Component List	May 2021
004	<ul style="list-style-type: none">Updated sections 2.4 and 2.5 for updating firmwareUpdated sections 4.1, 4.2, 4.3Updated Table 4.1, functional metrics	February 2024
005	<ul style="list-style-type: none">Minor corrections and edits	March 2024
006	<ul style="list-style-type: none">Update power & voltage range, UART pin layout, and minor edits	June 2025
007	<ul style="list-style-type: none">Minor update to section 2.1.2Regulatory Compliance update: EU and UK contacts	December 2025

1 Overview

The RealSense™ ID Solution F450 is an embedded face authentication module built upon a closed real-time operating system (RTOS) using neural network algorithms. The RealSense™ ID Solution F450 module integrates the optical components and processing hardware necessary to integrate high performance, local face authentication capabilities into new and existing product types. The RealSense™ ID Solution F455 is a peripheral device that incorporates the RealSense™ ID Solution F450 module.

Figure 1-1: RealSense™ ID Solution F450 Module

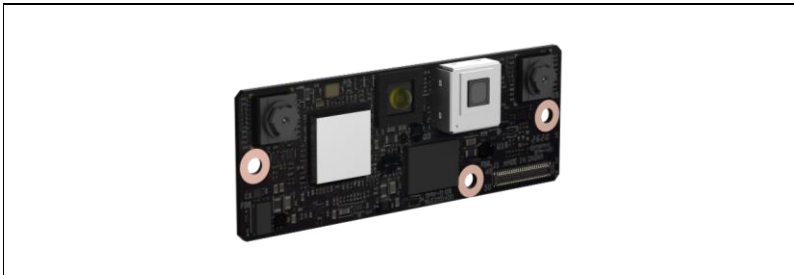
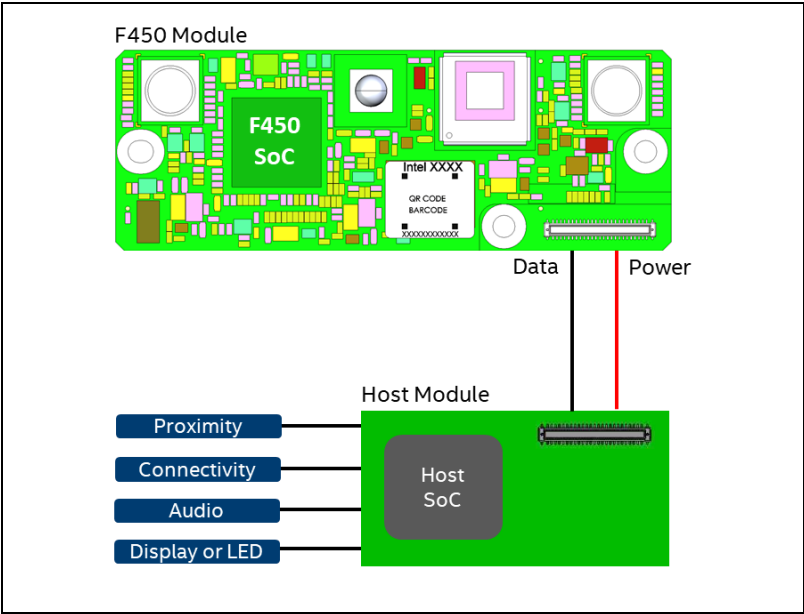


Table 1-1: RealSense™ ID Solution F450/F455

CONFIG	DESCRIPTION
Module	The RealSense™ ID Solution F450 is an embedded device. An SOC controls all boot-up and runtime flows of the RealSense™ ID Solution F450 module through an internal data link connection.
Peripheral	The RealSense™ ID Solution F450 integrated into a mechanical housing. The RealSense™ ID Solution F455 connects to an external system through an external cable, typically USB2.

Figure 1-2: RealSense™ ID Solution F450 Module System Topology



2 Hardware Details

The RealSense™ ID Solution F450 module is a single optical PCB subassembly with processing capabilities that the product will mount into a system chassis and connect to a host. The optical components consist of both image sensors and illumination components.

Figure 2-1: RealSense™ ID Solution F450 Module Front Side

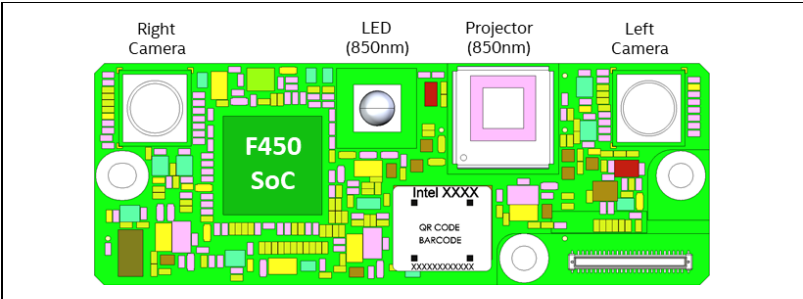
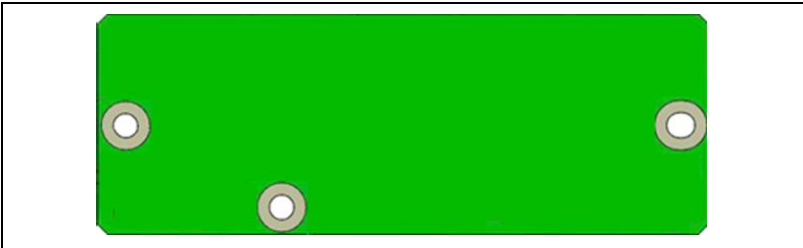


Table 2-1: RealSense™ ID Solution F450 Component List

SECTION	DESCRIPTION
SOC	System on Chip
Right Camera	Full HD Camera
Left Camera	Full HD Camera
Projector	850nm IR
LED	850nm IR
Host Connector	IPEX 20708-050E Plug (50pin)
Crystal	24MHz
Flash	512Mb Storage

Figure 2-2: RealSense™ ID Solution F450 Module Rear Side



2.1 Host Interconnect

The RealSense™ ID Solution F450 module requires external power and a serial data link for initialization and control of the Face Authentication system. Data signals and external power are both routed through the same host connector interface.

2.1.1 Data Interface

The RealSense™ ID Solution F450 supports both UART and USB2 interfaces for the data link.

Table 2-2: Data Interface

SECTION	DATA RATE	PINS
UART (3V Interface) ^(*)	115.2kbs to 4Mbps	UART_TX (Pin 47), UART_RX (Pin 49)
USB2	480Mbps	USB2_DP (Pin 46), USB2_DN (Pin 48)

(*) Digital IO Voltage spec:

- VIL Min 0.3V, Max 0.87V.
- VIH Min 1.687V, Max 3.465V
- VOL Max 0.434V
- VOH Min 2.025V

2.1.2 Power Interface

The RealSense™ ID Solution F450 module has a peak power of up to 3.6W. The host system must ensure the power supply can satisfy this peak power based on the chosen RealSense™ ID Solution F450 voltage source (VDD). If the host system supports power gate control it is the responsibility of the host system to ensure no conflicts between power sequencing and data link initialization occurs during power-up and power-down cycles.

Max Rating: 5.5Vdc/3.6W

Table 2-3: Power Interface

PIN	VOLTAGE RANGE	PEAK POWER
VDD (Pin 51/52)	3.15 to 5.5V	3.6W ⁽¹⁾⁽²⁾
GND	-	-
NOTES: (1) The power range is primarily dependent on illumination power set by the device. (2) The typical max current for a USB2 port is 450mA, USB3 port is 900mA.		

The RealSense™ ID Solution F450 supports three device states, off, standby, and operation. In the off state the RealSense™ ID Solution F450 is shut down and the power supply from the host is disabled. In the standby, the RealSense™ ID Solution F450 power supply is enabled, the SOC is in an execution loop for manageability access or FW update, but the optical components are powered down. In the operation state, the power supply is enabled, SOC is running FA enrollment or authentication usage with the optical components activated.

Commented [SB1]: Customer question: compatible with 3.3V as well? → Need to specify the accepted voltage range.
 @Lorenz, Shu response: According to V57M (icatch SOC at F460) the IO levels are : 3.0v - 3.6v , I am not sure we are declaring this. It doesn't answer the customer's question.

Table 2-4: Power Consumption

SECTION	POWER CONSUMPTION	UNITS
Off	0	mW
Operation ⁽¹⁾	1.3 – 1.5	W

(1) Operation condition is 30 % LED duty cycle at continues successful Facial Authentication runs.

2.1.3 Receptacle Pin Out

The connector plug part number is IPEX 20708-050E. The required host cable plug for connecting the RealSense™ ID Solution F450 module must use IPEX 20709-050E receptacle.

Table 2-5: RealSense™ ID Solution F450 Module Pin Out

PIN	SIGNAL	PIN	SIGNAL
2	GND	1	CPU_RXD
4	AUDGPIO_2	3	CPU_TXD
6	AUDGPIO_1	5	GND
8	GND	7	-
10	CSI_DN1	9	I2C_SDA18
12	CSI_DP1	11	I2C_SCL18
14	GND	13	HOST_ADC_In
16	AUDGPIO_0	15	EXT_RSTn (Active Low)
18	-	17	GPO_1
20	GND	19	GPO_0
22	GPIO_6	21	GND
24	GPIO_5	23	-
26	GND	25	SDO1
28	GPIO_3	27	SCK1
30	GPIO_2	29	SDI1
32	GND	31	SEN1
34	CSI_CKN	33	GPO_4
36	CSI_CKP	35	GND
38	GND	37	CSI_VSD0
40	CSI_DN0	39	SCL_3
42	CSI_DP0	41	SDA_3
44	GND	43	PWM4
46	USB_DP	45	PWM3

Commented [SB2]: Customer comment: The first table (2-3) mention peak power of 2.1 – 3.6W. Second table (2-4) mention 1.3 to 1.5W. My experience with the device (powered with 3.3V), “Standby mode” (i.e. not authentication running): $3.3V * 0.19A = 0.627W$. “Authentication running”: $3.3V * 0.98A = 3.2W$ during ~ 2 seconds
 @Livneh, Shai response: the condition of this is 30 % LED D.C. at Continues Successful FA Run
 We need to clarify what does Operation mean

PIN	SIGNAL	PIN	SIGNAL
48	USB_DM	47	CPU_TXD2
50	GND	49	CPU_RXD2
52	5V (Connector Pin)	51	5V (Connector Pin)
54	GND (Connector Pin)	53	GND (Connector Pin)

Table 2-6. F450 Module Interposer Interconnect Signal Description

Position	Signal	F450 In/Out	Interconnect Description
1	CPU_RXD	Input	3V Debug UART Rx/D or USB AUX_IN
2	GND		Ground
3	CPU_TXD	Output	3V Debug UART Tx/D or USB AUX_OUT
5	GND		Ground
8	GND		Ground
14	GND		Ground
15	EXT_RSTn	Input	External Reset, Open/GND discrete, of RealSense™ ID Solution F450 module (should be connected to open drain I/O).
20	GND		Ground
21	GND		Ground
22	GPIO_6	Input/Output	3V General Purpose I/O, defined by FW (No external PU/PD needed).
26	GND		
32	GND		
33	GPO_4	Output	GPIO Output (No external PU/PD needed).
35	GND		Ground
38	GND		Ground
44	GND		
46	USB2+		USB 2 differential pair positive
47	CPU_TxD2	Output	3V UART Tx/D (Output from the RealSense™ ID Solution F450 Module)
48	USB2-		USB 2 differential pair negative
49	CPU_RxD2	Input	3V UART Rx/D (Input into the RealSense™ ID Solution F450 Module)
50	GND		Ground
51	Vin	Power IN	F450 Power IN – 3.15V – 5.5V (Peak power consumption = 3.65W) Typical = 3.6V Maximum = 5.5V

Commented [SB3]: Customer comment: Table 2-3 mention VDD to be between 3.15V and 5V. This table states maximum to be 5.5V. Which one is correct?

Position	Signal	F450 In/Out	Interconnect Description
			Minimum = 3.15V
52	Vin	Power IN	RealSense™ ID Solution F450 Power IN – 3.15V – 5.5V (Peak power consumption = 3.65W) Typical = 3.6V Maximum = 5.5V Minimum = 3.15V
53	GND	Ground IN	Ground
54	GND	Ground IN	Ground

Figure 2-3: RealSense™ ID Solution F450 Connector Pin 1 Location

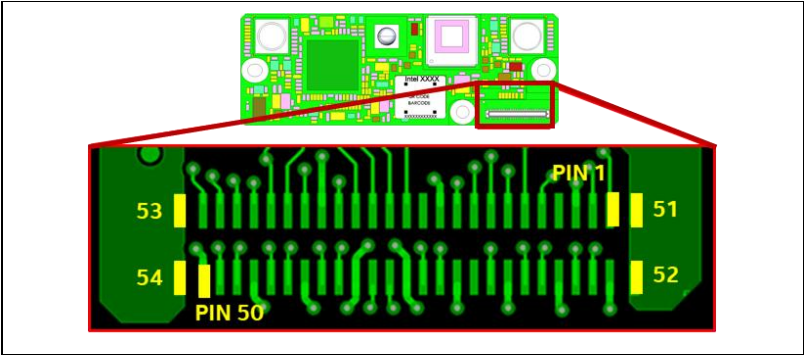


Table 2-7: RealSense™ ID Solution F455 Peripheral Pin Out

Position	Signal	F455 In/Out	Interconnect Description
1	Vin	Power IN	F450 Power IN – 3.15V – 5.5V (Peak power consumption = 3.65W) Typical = 3.6V Maximum = 5.5V Minimum = 3.15V (This should be connected only when USB power is not connected)
2	SDO	NA	SPI Data Output
3	SDI	NA	SPI Data Input
4	SCK	NA	SPI Clk
5	SEN	NA	SPI Enable (Not Connected)
6	CPU_TXD	Output	3V Debug UART TxD
7	GPO_1	Output	GPIO Output (No external PU/PD needed).

Position	Signal	F455 In/Out	Interconnect Description
8	CPU_RXD	Input	3V Debug UART Rx/D
9	GPIO_3	Input/Output	3V General Purpose I/O, defined by FW (No external PU/PD needed).
10	GND		

Figure 2-4: RealSense™ ID Solution F455 Peripheral Connector Pin 1 Location



2.2 Optical System

2.2.1 Cameras

The optical system consists of two synced semi-mechanically aligned cameras which capture images from different perspectives for the purpose of 3D triangulation to create disparity. The RealSense™ ID Solution F450 utilizes the cameras for face authentication. The right camera can provide 1080P RGB.

Note: Although face authentication utilizes RAW format from the sensor, only the processed RGB video stream can be transmitted externally to the host.

Table 2-8: Camera Parameters

DIMENSION	CAMERA 1	CAMERA 2
Position (Camera Perspective)	Left	Right
Orientation	Portrait	Portrait
RGB Support	Yes	No

Table 2-9: Lens Parameters

DIMENSION	MIN
Field of View (Mono)	HFOV = 59°, VFOV = 80°

2.2.2 IR Illuminators

The optical system consists of an IR LED for face illumination in low or non-uniform lighting conditions and an IR dot projector for 3D triangulation to create disparity. The illumination angle and placement of these components is chosen based on the field of view for both cameras.

The IR illuminators are both tested to the eye safety industry standards as defined by the IEC.

Table 2-10: IR Illuminator Parameters

DIMENSION	DOT PROJECTOR	LED
Orientation	Portrait	Portrait
Wavelength	850nm	850nm
Regulatory	Class 1 (IEC-60825-1 ED3)	RG0 (IEC-62471)

2.3 Thermal

2.3.1 RealSense™ ID Solution F450 Thermal

The RealSense™ ID Solution F450 module is designed to work indoors and outdoors across a wide temperature range.

Table 2-11: RealSense™ ID Solution F450 Temperature Specifications

DIMENSION	MIN	NOM	MAX	UNIT
Storage Temperature (Ambient), Not Powered	-30	-	+70	°C
Case (Backside PCB) Temperature, Powered ⁽¹⁾⁽²⁾⁽³⁾	0	-	+60	°C
NOTES: 1. All temperatures are calculated under the assumption of 100% duty-cycle of the device. 2. Specification is based on preliminary assessment and will continue quality and reliability to finalize in later datasheet versions. 3. Powered temperature is average across backside PCB.				

The optical properties of the camera and projector components can change based on the temperature of the component. This can range to a decrease in camera quality or decrease in the illumination power. Either of these can have an impact on face authentication performance, including the user being required to stand closer to the RealSense™ ID Solution F450 module.

Table 2-12: Temperature Component Considerations

COMPONENT	PARAMETER	DESCRIPTION
Projector	Optical Power	The distance in which can be detected by the camera.
	Field of View	The area in which covers the camera FOV.
	Wavelength	Aligned to sensitivity of the camera IR channel.
Camera	Field of View	The area in which covers the camera FOV.
	MTF	Sharpness of fuzziness of the camera FOV.
	Sensitivity	Detection of user wavelengths across the FA spectrum.
	SNR	Signal quality of the input data into the FA algorithms.
	Lag	Time delta in which photons are measured by the camera.

Table 2-13: RealSense™ ID Solution F450 – Component Power

Component	Power	Unit
Left Imager	90	mW
Right Imager	90	mW
Projector	61	mW
SOC + Flash	703	mW
LED	356	mW

2.3.2 RealSense™ ID Solution F455 Thermal

Table 2-14: RealSense™ ID Solution F455 Temperature Specifications

DIMENSION	MIN	NOM	MAX	UNIT
Storage Temperature (Ambient), Not Powered	-30	-	+70	°C
Backside Case Temperature, Powered ⁽¹⁾⁽²⁾⁽³⁾	0	-	+55	°C
NOTES: 1. All temperatures are calculated under the assumption of 100% duty-cycle of the device. 2. Specification is based on preliminary assessment and will continue quality and reliability to finalize in later datasheet versions. 3. Powered temperature is average across backside case.				

2.3.3 Power Profiling

To minimize thermal dissipation design requirements for integrating the module into a system, it is recommended to maintain a 1.5s cycle mode of work. Face authentication is designed to work within this time span, but if the module is operating continuously this will cause heating which may not be dissipated by design.

2.4 Manual Software Update

The RealSense™ ID Solution F450 implements 512Mb of local storage which will contain the OS and face authentication runtime. Intel will provide a FW image which is used for initial provisioning of the RealSense™ ID Solution F450. The FW image contains a local flash update runtime which allows the host to push new FW payloads to update the RealSense™ ID Solution F450 device.

The RealSense™ ID SDK offers an API for verifying the presence of an updated SDK version. Users can seamlessly incorporate this API into their host applications to perform manual or recurring checks for any new SDK releases. Upon detecting a new version, users have the flexibility to decide whether they wish to update their host SDK. To initiate the update process, users are required to manually retrieve the pertinent version from the open-source repository.

2.5 Manual Firmware Upgrade

The RealSense™ ID SDK offers multiple APIs for facilitating a manual firmware upgrade. One of these APIs allows users to check for the availability of a new firmware (FW) version. Once a new version is identified, the user can decide whether to proceed with the FW upgrade. The latest FW version is accessible through our open-source releases.

Manual Download and **Upgrade**:

- Download the FW binary manually from our open-source releases.
- Utilize the API to initiate the FW upgrade by specifying the location of the downloaded binary.
- In case the downloaded FW is incompatible with the current SDK version, an error message will be generated.

Table 2-15: Firmware Upgrade Parameter

PARAMETER	SUPPORT	DESCRIPTION
FW Public Key	Yes	Stored on the RealSense™ ID Solution F450 device.
Signed FW	Yes	Update tool will compare signature before update.
Rollback Protection	No	Host system checks version before initiating an update.
Local Update	No	Host system must push payload.
Update Tool	Yes	Local Storage via Intel Tool
Host Interface	Yes	USB and UART

3 Mechanical

The small form factor of the RealSense™ ID Solution F450 module enables integration flexibility. The host system will mount and tilt the RealSense™ ID Solution F450 module based on the system installation height specification, user height range, and user approach paths to the device. The placement and orientation of the system design will depend on the following factors.

1. Sensor and lens field of view.
2. User height range and approach path.
3. Detection range of the face authentication system.

3.1 Mechanical Dimensions

Table 3-1: RealSense™ ID Solution F450 Module Dimensions

DIMENSION	MIN	NOM	MAX	TOLERANCE	UNIT
X	49.70	49.80	49.90	±0.10	mm
Y	17.90	18	18.10	±0.10	mm
Z	4.23	4.38	4.53	±0.15	mm

Figure 3-1: RealSense™ ID Solution F450 Module Dimensions

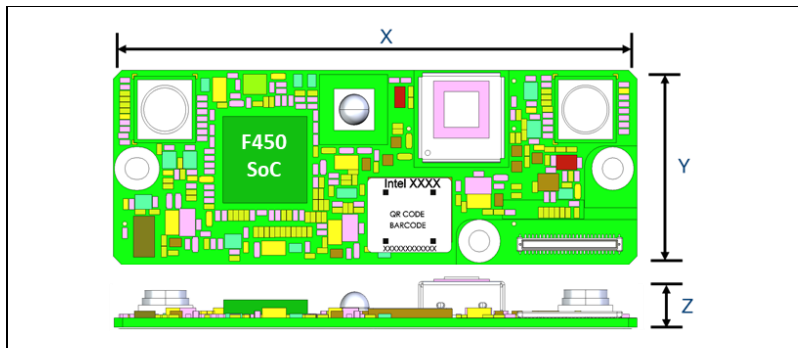


Table 3-2: RealSense™ ID Solution F455 Peripheral Dimensions

DIMENSION	MIN	NOM	MAX	TOLERANCE	UNIT
X	61.90	62	62.10	±0.10	mm
Y	32.40	32.50	32.60	±0.10	mm
Z	10.85	11	11.15	±0.15	mm

3.2 Cover Glass

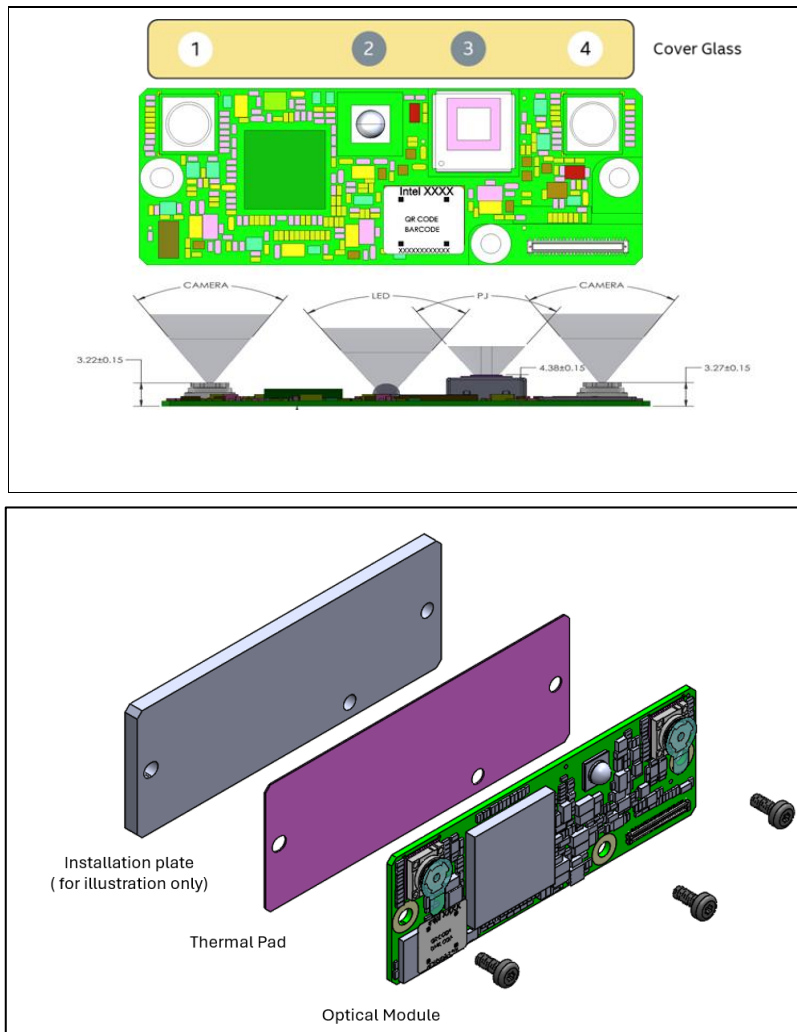
The RealSense™ ID Solution F450 module components must be covered to minimize impact of dust and humidity. The transparent cover glass material stack-up must provide acceptable transmission based on the component wavelengths. The through hole sizes of the cover glass is dependent on the optical component field of view or field of illumination as well as the cone diameter from the optical component to the cover glass.

A 3D CAD assessment should be completed to ensure no collision between the cone part of each optical component and the cover glass opening.

Table 3-3: Transmissivity Requirement

THROUGH HOLE	TRANSMISSIVITY
1, 2, 3 and 4	>98% @ 400nm to 880nm

Figure 3-2: Through Hole Design



3.3

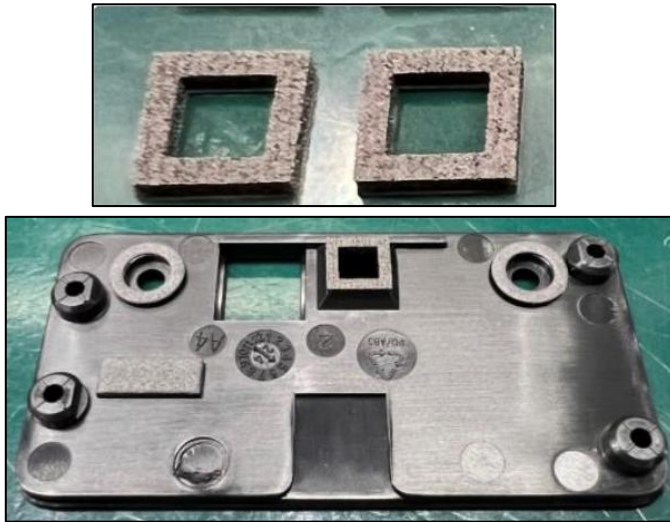
Optical Isolation

It is recommended to isolate the cameras from the illumination components to prevent reflections off the cover material. Not properly isolating the cameras can result in leakage light from the illumination components. It is recommended to use a gasket material in between the cover glass and the RealSense™ ID

Commented [SB4]: Need to explain better the module to gasket/stiffener recommendation. This is the D400 reference: "This section applies to the following SKUs: D410, D430 and D450. The stereo depth module incorporates a screw hole and a screw fork for module mounting. The stereo depth module should be mounted on a large heat sink or a heat dissipating structure element using a M1.6 screw at the screw hole and fork. The recommended torque for both screws is 1.6Kgf*cm. Thermal interface material should be used on the backside region of the IR projector and the stereo imagers, between camera module and heat sink or heat dissipating structure being used for thermal transfer."

Solution F450 module. The gasket material needs to be compliant so that it does not transmit chassis flex forces to the module.

Figure 3-3: Gasket



3.4 Module Installation guidelines

Recommendations for installing F450 module:

- Back plate flatness of 0.1 mm
- 1. Thermal interface material shall cover all the back side module area, except the holes for screws/pins
- 2. Recommended thermal interface material:
 - Thickness : 0.2-0.3 mm
 - Thermal conductivity 3-5 W/m·K, (depends on the application and ambient temperature)
 - Hardness: Shore A 40-60
 - For example: TG-ALC High Performance Thermal Pad
- The recommended torque for both screws is 1.6 KgF/cm
- 3. M1.6 screws with Loctite

Notes:

- Make sure the chassis is stiff, or the module is isolated to avoid transmitting flex forces from the chassis to the module
- Applying bending forces to the module may result in degraded performance
- Dust protection: dust particles can accumulate over the camera lenses which can be visually unappealing and degrade image quality.

Commented [SB5]: What is backing? Did you mean the rear or back plate?

Commented [MI6R5]: This is the plane on which the client plans to attach the module.

Commented [SB7R5]: Thanks Inna, changed to Back

Commented [SB8]: Should we rephrase to - The recommended torque for both screws is 1.6KgF*cm.

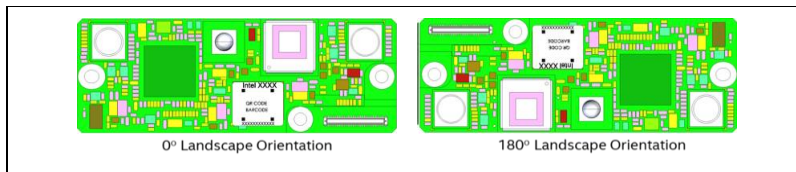
Commented [MI9R8]: Yes, you can. Michael provide the our ID spec, for the vendor we can recommend, not request

Commented [SB10R8]: Thanks Inna, Rephrasing instead "Screw **tighten** torque 1.6 KgF/cm"

3.5 Orientation

The module can be assembled in either 0° or 180° landscape rotation. The module cannot be assembled in a 90° or 270° portrait orientation.

Figure 3-4: Mount Orientation



3.6 System Tilt

Given the field of view of the cameras and illumination components, assembling the RealSense™ ID Solution F450 module parallel to a typical mounting surface may not cover the intended user height range for the product requirement. To mitigate, the RealSense™ ID Solution F450 module can be assembled at an angle to adjust the min and max user height for face authentication.

Figure 3-5: Human Height

DIMENSION	MIN	NOM	MAX	UNIT
Vertical Range @ 55cm	120	-	190	cm
System Tilt	11	16	21	deg
Height Placement ⁽¹⁾	1.1	1.2	1.25	m
NOTES: (1) The height placement is with respect to the sensor center line position.				

Figure 3-6: Tilt Profile and Field of View

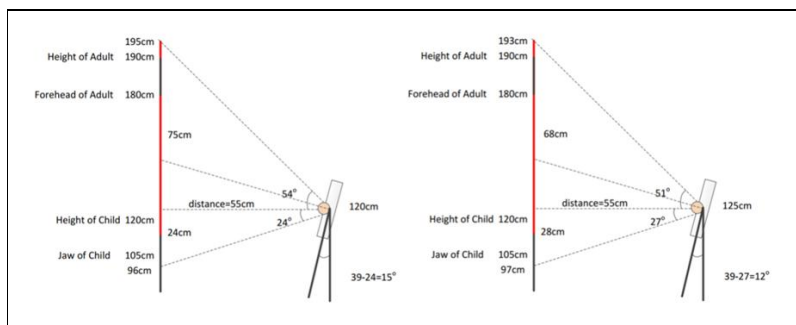
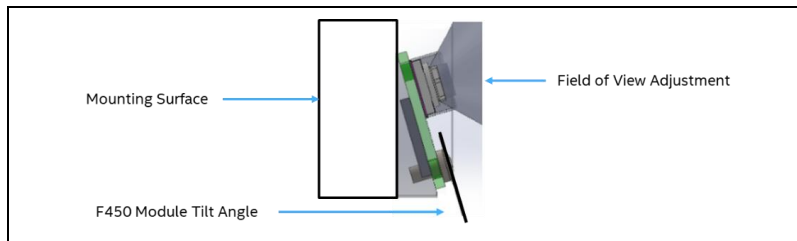


Figure 3-7: System Tilt



3.6.1 Heat Sink

Although the peak power is up to 3W, the RealSense™ ID Solution F450 module is only expected to dissipate a total of 1.3W while the optical system is activated during face authentication. This assumes a 30% duty cycle while the illumination components are active.

If needed the system design will need to include a heat sink to maintain proper operating temperatures for the RealSense™ ID Solution F450 components. Unless multiple retries are required, a typical face authentication session can continue for up to 2s.

4 Software Definition

The RealSense™ ID Solution F450 module executes in a closed system running a real time operating system. The face authentication uses image pre-processing, anti-spoofing checking, and the SOC matrix acceleration engine embedded to extract the face features of the user. These face features are then stored during enrollment of a new user or compared during authentication to determine whether the user is valid.

4.1 RealSense™ ID Software Licensing

The RealSense™ ID Anti-Spoofing and Facial Authentication Software require an active subscription to be functional. These subscriptions are separately orderable from the peripheral and module hardware. Software subscriptions can be ordered from the RealSense™ web store or your preferred distributor.

4.2 RealSense™ ID SDK for Facial Authentication

The RealSense™ ID SDK for Facial Authentication is a library providing Facial Authentication capabilities to applications using the RealSense™ ID Solution F450 or F455. It is open source and available on <https://github.com/IntelRealSense/RealSenseID>.

4.3 Face Authentication

The RealSense™ ID Solution F450 optical system and the face authentication algorithms are optimized for functional and performance profiles targeted at access control devices. In this use case, one or more users will walk up to the device in the runtime or standby state, the host will notify the RealSense™ ID Solution F450 module to perform face authentication and the RealSense™ ID Solution F450 module will respond back with the result to the host software.

Table 4-1: Functional Metrics

METRIC	VALUE	METRIC
Number of Users	500	Users
Authentication Range	30 to 100	cm
Anti-Spoofing Range	30 to 100	cm
Ambient Light	0 to 50k*	lux
(*) Reduced performance may be exhibited in semi-shade or direct sunlight.		

Table 4-2: Face Authentication Metrics

METRIC	DESCRIPTION	VALUE
False Acceptance Rate (FAR)	Recognize someone else as you.	1:1M
True Acceptance Rate (TAR)	Recognize you as you.	99.76%
Spoof Acceptance Rate (SAR)	Recognizes a recorded sample of you as you (photo or model).	<0.1%

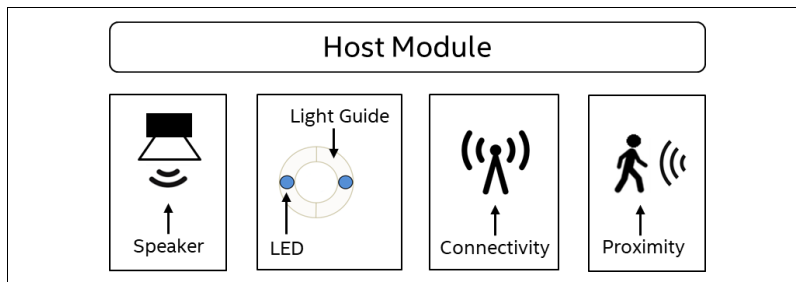
Table 4-3: Performance Metrics

METRIC	DESCRIPTION	VALUE
Cold Latency	Cold Power Up to Face Authentication Result	<3s
Warm Latency	Wake Up to Face Authentication Result	<1.5s
FA Flow	Time to Complete Face Authentication	<0.8s

5 System Integration

The system design and topology will be owned by the host system OEM with the RealSense™ ID Solution F450 module as a subassembly component. There are product assembly recommendations that Intel provides to ensure proper function of the RealSense™ ID Solution F450 module, but design parameters such as user sensing and user feedback will be defined by the OEM.

Figure 5-1: System Design Considerations



5.1 Product Assembly

The RealSense™ ID Solution F450 module is intended to be assembled into the system in a horizontal or landscape orientation. The RealSense™ ID Solution F450 module should be secured to ensure the camera and illumination extrinsic specifications are not exceeded for post assembly and throughout the thermal operating range of the product.

Table 5-1: Product Assembly Recommendation

NAME	DIMENSION	UNIT
YAW (Camera to Camera)	1	deg
PITCH (Camera to Camera)	1	deg
ROLL (Camera to Camera)	1	deg
YAW (Camera to Illumination)	1	deg
PITCH (Camera to Illumination)	1	deg
ROLL (Camera to Illumination)	1	deg

The product design and assembly recommendations for the RealSense™ ID Solution F450 module are dependent on optimizing the optical performance by minimizing moisture and dust impacts.

Table 5-2: Product Design Recommendation

NAME	DESCRIPTION
Ingress Protection	The system integrator will define ingress protection level based on the installation location of the product (e.g. indoor/outdoor). The RealSense™ ID Solution F450 optical elements should be protected from dust and moisture accumulation.
Anti-Fog Coating	If this is a design consideration based on the installation location of the product, a coating should be applied to the glass to prevent fogging from occurring. Initial testing has shown that a standard glass coating (e.g. DuPont de-icing spray) proved insufficient
Enclosure	Based on installation location of the product (e.g. indoor/outdoor), recommend designing metal enclosure and not use plastic materials that might allow humidity to pass through.
Purging	Guarantee below 5% humidity during assembly.
Pressurizing*	0.5psig with N2 (nitrogen) so no humidity will be able to enter the system.
Desiccant*	Replaceable bag/capsule - Molecular Sieve (ZEOLITE) or Activated Alumina.
* Might not be required due to the small dimensions of the enclosure, but nice to have to provide best protection against humidity.	

5.1.1 Optical Assembly Considerations

The RealSense™ ID Solution F450 module will be shipped with an easily removable protective film on the camera and illumination components. This must be removed before assembly as the RealSense™ ID Solution F450 module will not function with this film installed. It is recommended that the cover glass has similar film protection to minimize dust and fingerprints.

To ensure dust and particles are minimized on the lens and cover glass during assembly it is recommended that the assembly room maintain a clean room metric of greater than 10,000 PPM. If an operator must manually handle the components, then gloves and mask is recommended. The following steps should then be followed to during assembly and performance validation.

1. Remove the protective film on the RealSense™ ID Solution F450 module optical components.
2. Remove the protective film on the cover glass.
3. Remove the liner on the cover glass edge that protects the glue.
4. Assemble the RealSense™ ID Solution F450 module and the cover glass.
5. Validate the device.
6. Clean the cover glass, then add protective film.

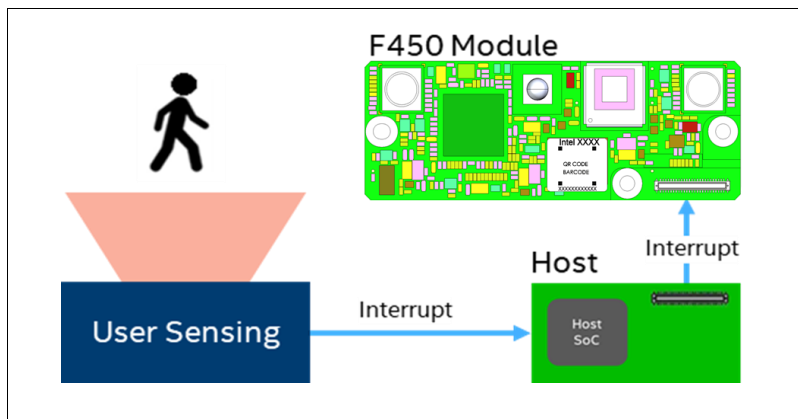
5.2 Trigger Heuristic

The RealSense™ ID Solution F450 module does not include a system for sensing user approach, but does support power management for runtime, standby, and wake. To improve the power efficiency of the RealSense™ ID Solution F450 system, it is recommended that the host system implement either motion or proximity sensing capabilities to determine when to wake and start a Face Authentication session. The host system would receive an interrupt from the user approach sensors and then propagate that request to the RealSense™ ID Solution F450 module interface which will cause a wake event.

Table 5-3: User Sensing Parameters

DESIGN PARAMETERS
Horizontal Field of View and Zone Sectioning
Vertical Field of View and Zone Sectioning
User Path (Walk-Up versus Walk-By)
Sensitivity Threshold Granularity and Control
Sensing Distance

Figure 5-2: Trigger Heuristic



- GPIO3 to wake up from Power mode
- The unit will wake up from power mode , and the host can trigger a Facial Authentication cycle.

Commented [SB11]: Customer question: Is there a way to trigger an authentication using a GPIO? Or it he "Interrupt (from host to F450 module) a UART/USB command?
 @Livneh, Shai response: We are planning to have such a feature - I am not sure if we have something specific now to declare - should also ask Eyal
 In this case, we should describe how does the interrupt work today. See section 5.2 that doesn't explain it

5.3 User Feedback

If the system design requires both audio and visual feedback the host will need to interface to both speaker and/or display/LED components. This will provide the necessary user feedback during enrollment and authentication scenarios. It is up to the host system to define each audio and visual prompt.

As the enrollment and authentication flows are initiated by the host system, the RealSense™ ID Solution F450 module can return status codes. It is up to the host system to translate those codes into respective audio or visual feedback which can cause the user to perform certain actions.

Table 5-4: Result Scenario Feedback

SCENARIO	AUDIO	VISUAL
Authentication Success	"Welcome"	GREEN (Blink)
Authentication Failed	"Authentication Failed"	RED (Blink)
Enrollment Success	"Enroll Success"	GREEN (Blink)

Table 5-5: Device Status Scenario Feedback

SCENARIO	AUDIO	VISUAL
No Face Detected	"Not Detected"	YELLOW (BLINK)
Face is Too Far Top	"Lower Head"	YELLOW (BLINK)
Face is Too Far Bottom	"Raise Head"	YELLOW (BLINK)
Face is Too Far Right	"Move Left"	YELLOW (BLINK)
Face is Too Far Left	"Move Right"	YELLOW (BLINK)
Face Tilt is Too Up	"Tilt Head Down"	YELLOW (BLINK)
Face Tilt is Too Down	"Tilt Head Up"	YELLOW (BLINK)
Face Tilt is Too Right	"Tilt Head Left"	YELLOW (BLINK)
Face Tilt is Too Left	"Tilt Head Right"	YELLOW (BLINK)
Face is Not Frontal	"Face Front"	YELLOW (BLINK)
Face is too Far from Camera	"Move Forward"	YELLOW (BLINK)
Face is too Close to the Camera	"Move Backward"	YELLOW (BLINK)
Multiple Faces Detected	"Too Man Faces"	YELLOW (BLINK)
Device Error	"Error"	RED (SOLID)

6 Regulatory Compliance

6.1 System Laser Compliance

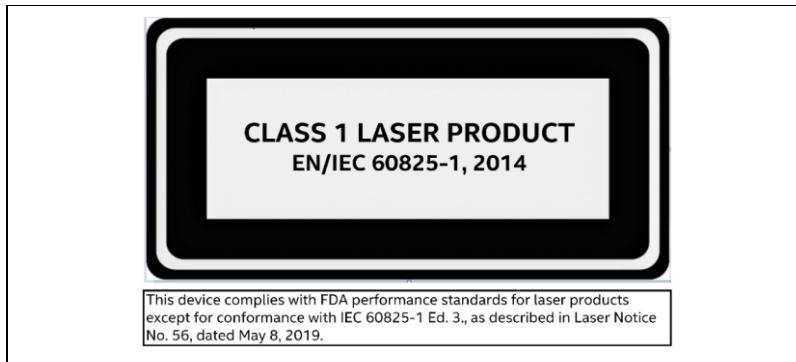
The RealSense™ ID Solution series certification is transferable to the system and no system recertification is required. However, the following statements and labels must be included in the user manual of the end product.

6.1.1 Certification Statement

This product is classified as a Class 1 Laser Product under the EN/IEC 60825-1, Edition 3 (2014) internationally.

This product complies with FDA performance standards for laser products except for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

6.1.2 Explanatory Label




6.1.3 Cautionary Statements



System integrators should refer to their respective regulatory and compliance owner to finalize regulatory requirements for a specific geography.



Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



- Do not power on the product if any external damage was observed.
- Do not attempt to open any portion of this laser product. There are no user serviceable parts.
- Invisible laser radiation when opened. Avoid direct exposure to beam.
- There are no service/maintenance, modification, or disassembly procedures for the stereo module and infrared projector. The system integrator must either notify Intel or return modules before any failure analysis is performed.
- Modification or service of the hardware, specifically the infrared projector, may cause the emissions to exceed Class 1.
- Do not try to update RealSense ID Solution F455 firmware that is not officially released for RealSense ID Solution F455 SKU and revision.

6.1.4 US FDA Accession Number

Table 6-1. U.S. FDA Accession Number

Component	U.S. FDA accession numbers
RealSense™ ID Solution F455/F450	2010525

This accession number should be entered into Box B.1 of the Food and Drug Administration (FDA) 2877 Declaration for Imported Electronic Products Subject to Radiation Control Standards.

6.2 Regulatory Compliance

6.2.1 Manufacturer’s Information

RealSense Inc.
20400 Stevens Creek Boulevard,
Suite 290,
Cupertino, CA 95014, USA

6.2.2 EU Single Place of Contact

EaseCert | GPSR Compliance
Wald str. 33, 54413 Damflos, Germany
compliance@easecert.com;
www.easecert.com
Tel: +49 170 5738 555

6.2.3 UK Single Place of Contact

RealSense, Inc.
Attn: Miro Mlejnek
16 Hallsfield Swindon SN6 6LS
United Kingdom
realsense@realsenseai.com

<https://realsenseai.com>

6.2.4 FCC Part 15 Declaration of Conformity



RealSense™ ID Solution F455

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

RealSense Inc., 20400 Stevens Creek Boulevard, Suite 290, Cupertino, CA 95014

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

CAUTION: To comply with the limits of the Class B digital device, pursuant to Part 15 of the FCC Rules, this device must be installed with computer equipment certified to comply with Class B limits. All cables used to connect to the computer and peripherals must be shielded and grounded. Operation with non-certified computers or non-shielded cables may result in interference to radio or television reception.

6.2.5 Canada

CAN ICES-3 (B)/NMB-3(B)

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Interference-Causing Equipment Standard ICES-003.

Le présent appareil numérique n'émet pas de bruits radio électriques dépassant les limites applicables aux appareils numériques de la classe B prescrites dans la présente norme sur le matériel brouilleur, NMB-003.

6.2.6 European Directives



This product complies with all applicable European directives.

CAUTION: To keep the product in compliance with the European CE requirement, the device must be installed with CE certified computer equipment which meets the Class B limits. Operation with non-certified

Regulatory Compliance

computers or incorrect cables may result in interference to other devices or undesired effect to the product.

6.2.7

Australia



Due to the very small size of the product, the marking has been placed in this datasheet.

6.2.8

Japan



この装置は、クラスB機器です。この装置は、住宅環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

This device is a Class B information technology device. This device is intended for use in a home environment, but if this device is used close to a radio or television receiver it may cause reception interference. Please handle according to the instruction manual correctly. VCCI-B

6.2.9

South Korea



인증 번호: R-R-CPU-F455C
제조사: Intel Corporation
상품명: RealSense™ ID Solution
모델: F455
제조국: 태국

인증 번호: R-R-CPU-F450
제조사: Intel Corporation
상품명: RealSense™ ID Solution
모델: F450
제조국: 중국

6.2.10

Customs Union



Наименование продукции: RealSense™ ID Solution
Модель: F455
Производитель: Intel Corporation
Сделано в Таиланде


6.3 Ecology Compliance

6.3.1 China RoHS Declaration



China RoHS Declaration

产品中有毒有害物质的名称及含量
Hazardous Substances Table

部件名称 Component Name	有毒有害物质或元素 Hazardous Substance					
	铅 Pb	汞 Hg	镉 Cd	六价铬 Cr (VI)	多溴联苯 PBB	多溴二苯醚 PBDE
解决方案 Solution	X	o	o	o	o	o
印刷电路板组件 Printed Board Assemblies	X	o	o	o	o	o
三角架 Tripod	o	o	o	o	o	o
电缆 Cable	o	o	o	o	o	o
<p>o: 表示该有毒有害物质在该部件所有均质材料中的含量均在GB/T 26572标准规定的限量要求以下。</p> <p>o: Indicates that this hazardous substance contained in all homogeneous materials of such component is within the limits specified in GB/T 26572.</p> <p>x: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572标准规定的限量要求。</p> <p>x: Indicates that the content of such hazardous substance in at least a homogeneous material of such component exceeds the limits specified in GB/T 26572.</p> <p>对销售之日的所售产品,本表显示我公司供应链的电子产品信息产品可能包含这些物质。注意:在所售产品中可能会也可能不会含有所有列出的部件。</p> <p>This table shows where these substances may be found in the supply chain of our electronic information products, as of the date of sale of the enclosed product. Note that some of the component types listed above may or may not be a part of the enclosed product.</p> <p>除非另外特别的标注,此标志为针对所涉及产品的环保使用期限标志。某些可更换的零部件可能会有一个不同的环保使用期限(例如,电池单元模块)。 此环保使用期限只适用于产品在产品手册中所规定的条件下工作。</p> <div><p>The Environment-Friendly Use Period (EFUP) for all enclosed products and their parts are per the symbol shown here, unless otherwise marked. Certain field-replaceable parts may have a different EFUP (for example, battery modules) number. The Environment-Friendly Use Period is valid only when the product is operated under the conditions defined in the product manual.</p></div>						

6.3.2 Waste Electrical and Electronic Equipment (WEEE)



“In the EU, this symbol means that this product must not be disposed of with household waste. It is your responsibility to bring it to a designated collection point for the recycling of waste electrical and electronic equipment. For more information, contact the local waste collection center or your point of purchase of this product.”

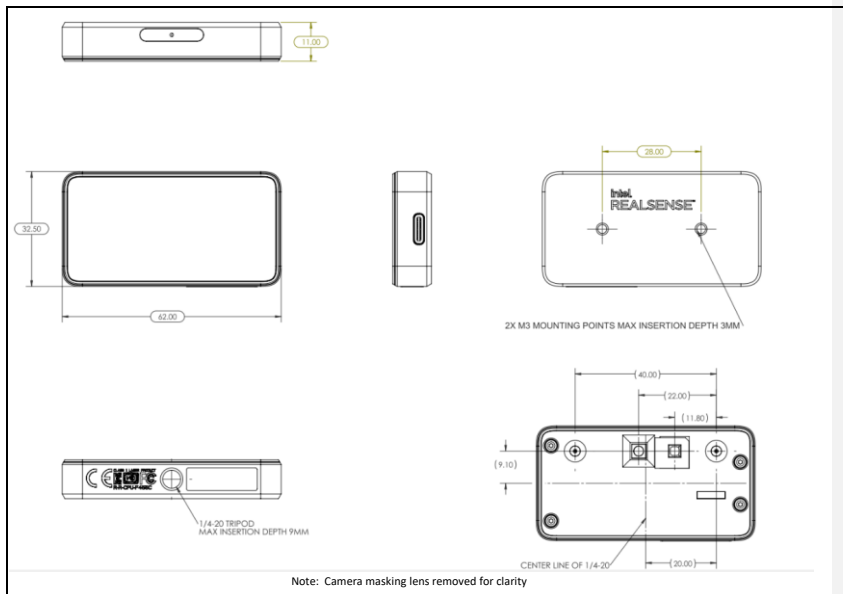
6.3.3 Turkey

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

§ §

7 Mechanical Drawings

Figure 7-1. RealSense™ ID Solution F455



Technical drawing of the Intel XMM 8000 module, showing top and side views with dimensions and callouts.

Top View Dimensions:

- Overall Width: 45.25 ± 0.15
- Overall Height: 18 ± 0.10
- Distance from Left Edge to First Camera: 2 ± 0.08 THRU ALL
- Distance from First Camera to Center Line: 0.30
- Distance from Center Line to LED: 40 ± 0.20
- Distance from LED to PRJ: 5.45 ± 0.15
- Distance from PRJ to Second Camera: 5.45 ± 0.25
- Distance from Second Camera to Right Edge: 2.60 ± 0.15
- Distance from Center Line to QR CODE BARCODE: 24.60 ± 0.15
- Distance from QR CODE BARCODE to Right Edge: 12.70 ± 0.08
- Distance from QR CODE BARCODE to Right Edge (Alternative): 14.40 ± 0.22
- Overall Width (Alternative): 49.80 ± 0.10

Top View Callouts:

- 2x 5.45 ± 0.25 LENS
- 2x Ø 2 ± 0.08 THRU ALL
- 6.70 ± 0.10
- LED
- PRJ
- QR CODE BARCODE
- CENTER LINE

Side View Dimensions:

- Distance from Bottom Edge to First Camera: 3.22 ± 0.15
- Distance from Bottom Edge to LED: 0.15
- Distance from Bottom Edge to PRJ: 4.38 ± 0.15
- Distance from Bottom Edge to Second Camera: 3.27 ± 0.15

Side View Callouts:

- CAMERA
- LED
- PRJ
- CAMERA

Legend:

- 0.15

**UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS.
TOLERANCES:
ALL UNTOLERANCED
LINEAR DIMENSIONS: ± 0.2
ANGLES: $\pm 0.5^\circ$
INTERPRET DIM AND TOL PER
ASME Y14.5M-1994.**

8 Appendix A – Interposer Reference Designs

Figure 8-1. USB Interposer Reference Design

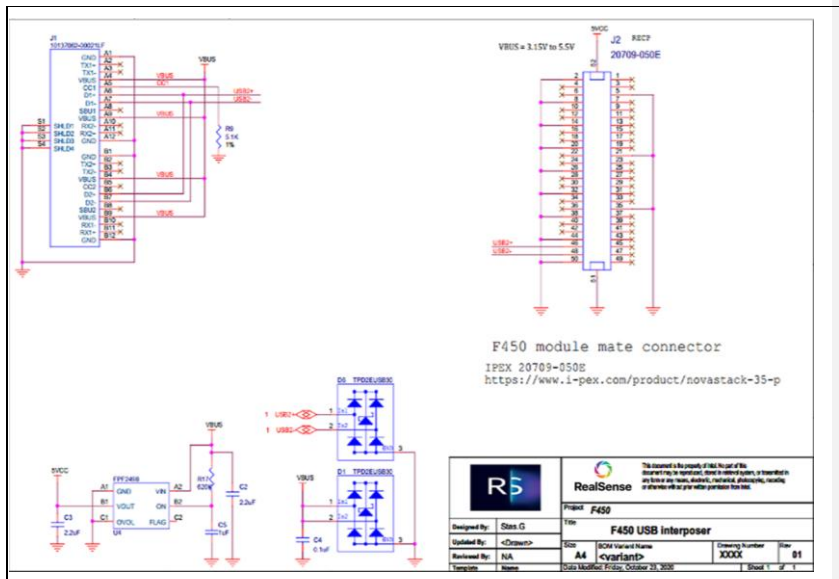
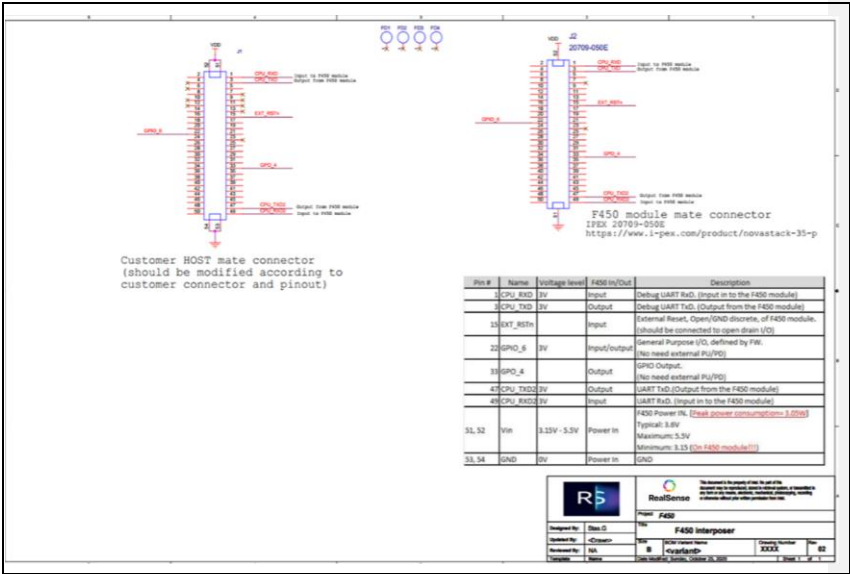


Figure 8-2. UART Interposer Reference Design



Commented [SB12]: Customer comment: - Use high resolution picture - For me, it was not clear if you need to use CPU_RXD/CPU_TXD or CPU_RXD2/CPU_TXD2 to communicate with the F450 - Need to specify the accepted voltage range for TX/RX. Is 3.3V ok? - Role of GPIO_6 / GPO_4
@Livneh, Shai comment: Regarding the GPIOs's - now it is a General GPIO's - perhaps later on we will also have more functionality on the F455/F465 Gpio's