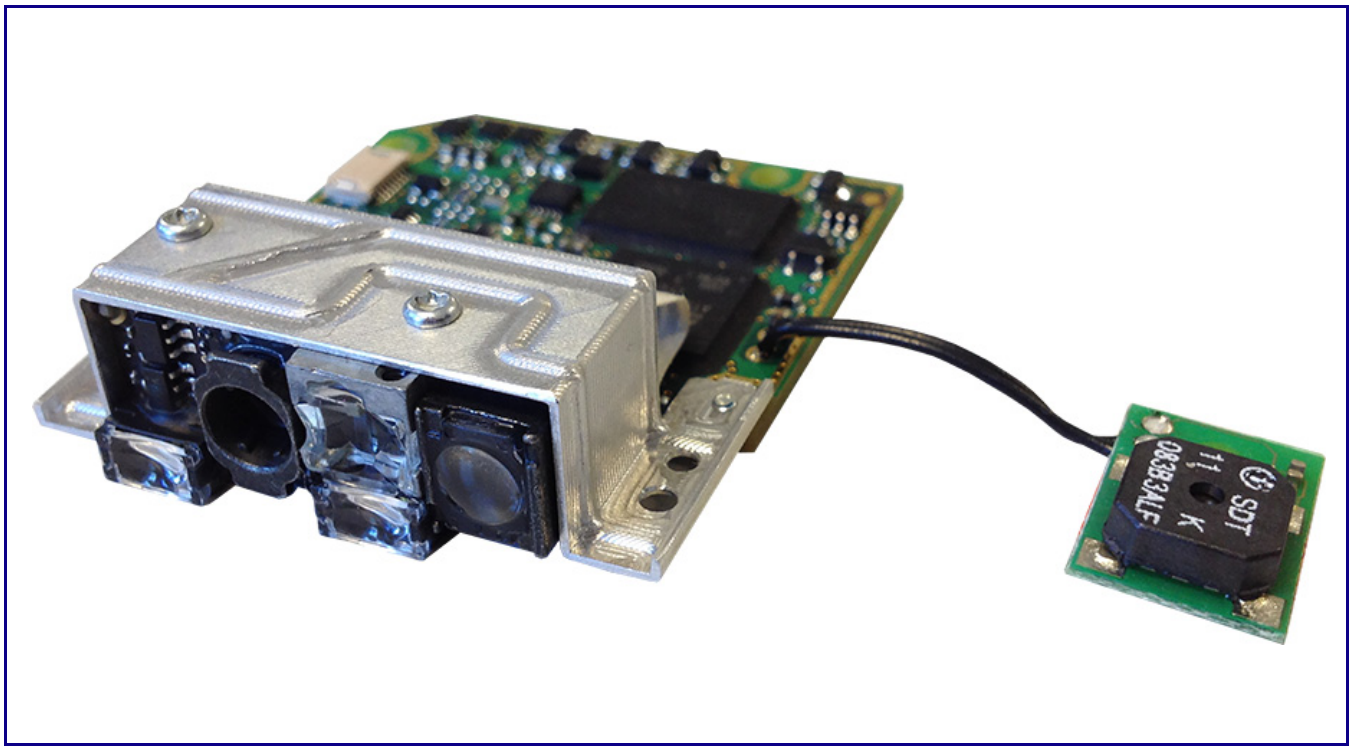
DSE0420

OEM Area Imager Decoded Scan Engine



Integration Guide

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- END -

Preface

About this Manual

This Integration Guide is provided to give instruction, opto-mechanical details, and design considerations to integrate the DSE0420 model (designated as “scan engine” or “OEM scan engine” in this manual) specifically into equipment-integrated scanning applications.

Manual Conventions

The following conventions are used in this document:

The symbols listed below are used in this manual to notify the reader of key issues or procedures that must be observed when using the reader:



Notes contain information necessary for properly diagnosing, repairing and operating the reader.


CAUTION

The CAUTION symbol advises you of actions that could damage equipment or property.

Outline

Preface (this chapter) presents information about manual conventions and contact data.

Chapter 1. Mechanical Characteristics provides information about physical and performance characteristics.

Chapter 2. Optical Characteristics.

Chapter 3. Electrical Integration offers information about electrical components.

Chapter 4. Software Features describes software commands.

Chapter 5. Quality and Reliability

Chapter 6. Regulatory & Safety environmental and regulatory specifications.

Appendix A, MTBF Prediction (Calculated) lists as well as environmental and regulatory specifications.

Appendix B, Mechanical Drawings

Support Through The Website

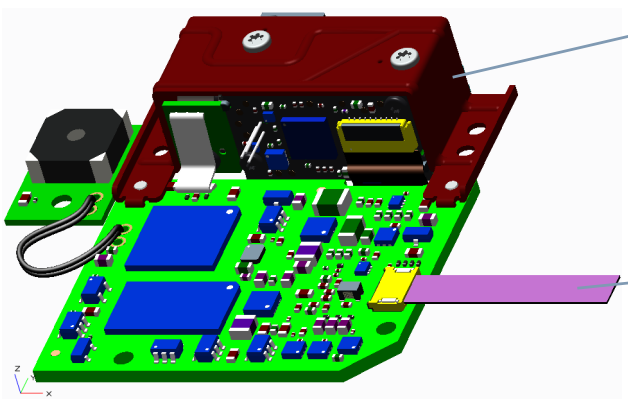
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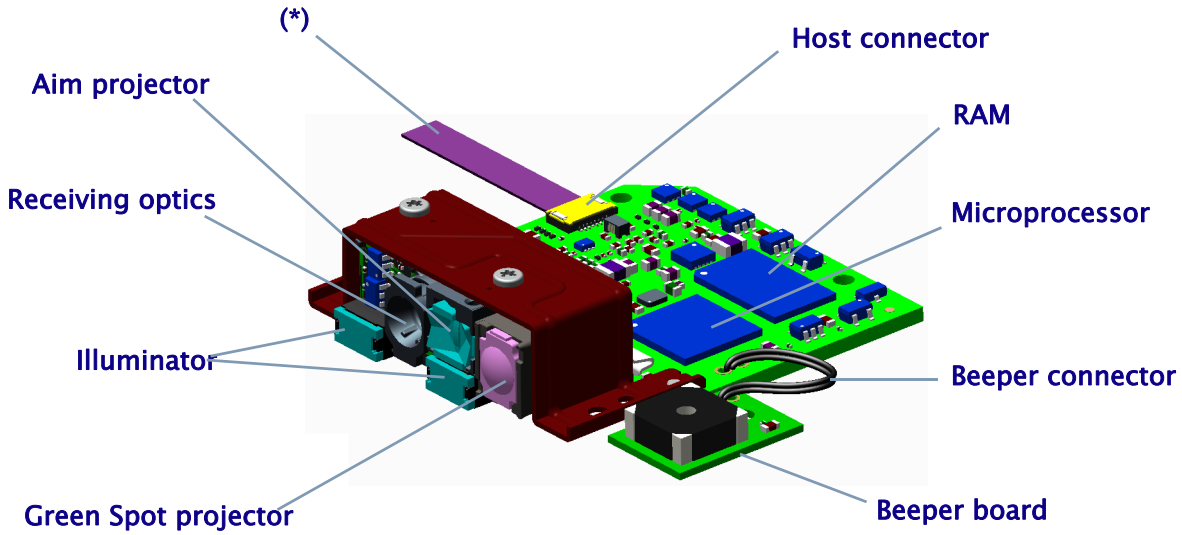
- **Downloads** by selecting your product model from the dropdown list in the Search by Product field for specific Data Sheets, Manuals, Software & Utilities, and Drawings;
- **Repair Program** for On-Line Return Material Authorizations (RMAs) plus Repair Center contact information;
- **Customer Service** containing details about Maintenance Agreements;
- **Technical Support** through email or phone.

Chapter 1
Mechanical Characteristics

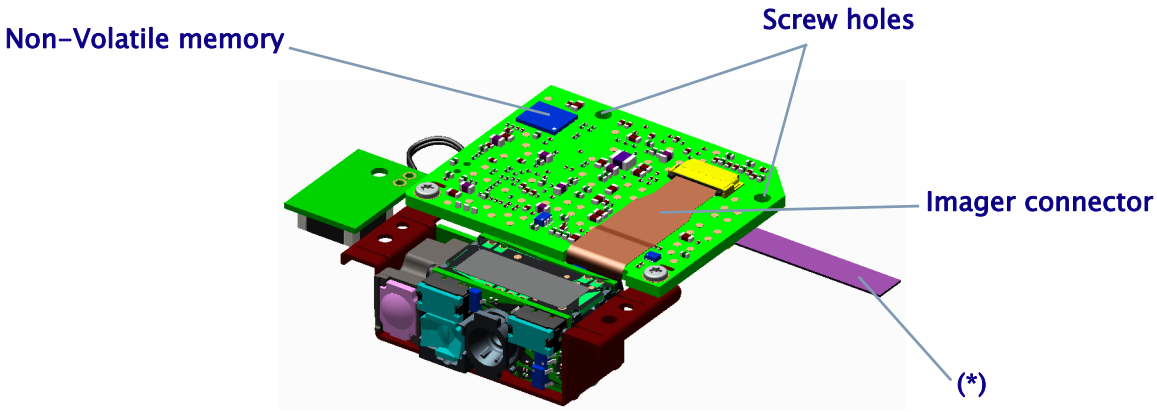
Overview

DSE0420 SCAN ENGINE





(*) cable is shown for reference only, it is not included in the assembly and must be provided by the integrator



(*) cable is shown for reference only, it is not included in the assembly and must be provided by the integrator

Key Parameters

Parameter	Value
Weight (DSE0420)	20 g
Max Height (Beeper board not included)	13.65 mm
Max Width (Beeper board not included)	40.10 mm
Max Length (Beeper board not included)	47.86 mm

Dimensions

See Mechanical Drawings, starting on page 23 for further details on mechanical features.

Chapter 2
Optical Characteristics

Key Parameters

Parameter	Value
Optical Format	1/3-inch
Active Imager Size	4.51mm(H) x 2.88mm(V) 5.35mm diagonal
Active Pixels	752H x 480V
Illumination System	LED source White emission (wavelength = 400–750 nm) IEC 62471 – EXEMPT RISK GROUP
Aiming System	Laser source Red emission (wavelength = 630–680 nm) Pulsed source: maximum lamp duration 15ms, repetition rate 16.6 ms Maximum emitted power: 1 mW IEC 60825 – CLASS 2 LASER PRODUCT
Tilt Tolerance	Up to ± 360°
Pitch Tolerance	± 65°
Skew Tolerance	± 60°
Field of View	40° H x 26° V

Illumination System

The Illumination System is comprised of two white LEDs and non-imaging optics designed to provide first-class reading performances, even in total darkness.

Regulatory

- EN/IEC 62471 (exempt)

Aiming System

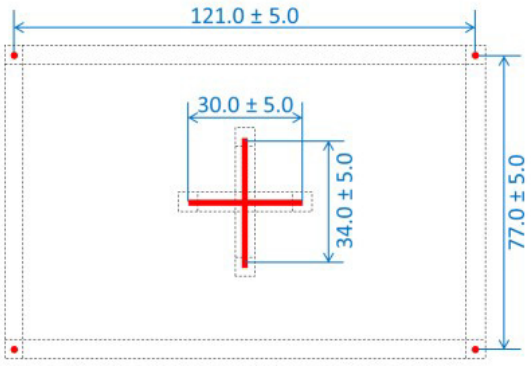
The aiming system is based on a 650nm laser diode and related optics. It projects a highly visible 4-Dot aimer with center-cross for targeted scanning.



Aiming Pattern

The central cross represents the center of the field of view, while the four dots show the boundaries of the field of view.

Figure 1. Projected pattern at 200 mm



Aiming System Parameters

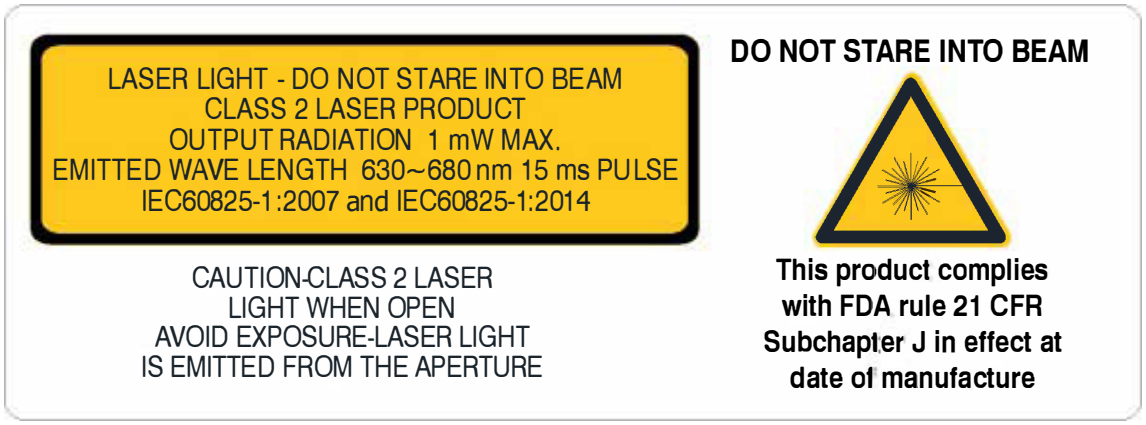
Wavelength	630-680 nm
Beam Divergence	35° (horizontal) x 25° (vertical) – see drawings on page 25
Maximum pulse duration	15ms
Repetition rate	16.6ms
Maximum output power	1mW
Laser aperture	See drawings on page 25

Regulatory

- EN/IEC 60825-1:2007 and EN/IEC 60825-1:2014 (class 2)
- 21 CFR 1040 (CDRH) (class II)

WARNING	Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100mm may pose an eye hazard.

Figure 2. Regulatory label



WARNING	STANDARD LASER SAFETY REGULATIONS This product conforms to the applicable requirements of both CDRH 21 CFR 1040 and EN 60825-1 at the date of manufacture. For installation, use and maintenance, it is not necessary to open the device. Use of controls or adjustments or performance of procedures other than those specified herein may result in exposure to hazardous visible laser light. The product utilizes a low-power laser diode. Although staring directly at the laser beam momentarily causes no known biological damage, avoid staring at the beam as one would with any very strong light source, such as the sun. Avoid that the laser beam hits the eye of an observer, even through reflective surfaces such as mirrors, etc.
ATTENTION	NORMES DE SECURITE LASER Ce produit est conforme aux normes de sécurité laser en vigueur à sa date de fabrication: CDRH 21 CFR 1040 et EN60825-1. Il n'est pas nécessaire d'ouvrir l'appareil pour l'installation, l'utilisation ou l'entretien. L'utilisation de procédures ou réglages différents de ceux donnés ici peut entraîner une dangereuse exposition à lumière laser visible. Le produit utilise une diode laser. Aucun dommage aux yeux humains n'a été constaté à la suite d'une exposition au rayon laser. Eviter de regarder fixement le rayon, comme toute autre source lumineuse intense telle que le soleil. Eviter aussi de diriger le rayon vers les yeux d'un observateur, même à travers des surfaces réfléchissantes (miroirs, par exemple).

Reading Performances

Symbology	Resolution [mils]	Distance			
		Guaranteed		Typical	
		min [mm]	max [mm]	min [mm]	max [mm]
Code 39	3	Maximum resolution (test at 105 mm)			
Code 39	5	70	190	65	210
EAN13	13	55	360	55	390
Datamatrix	15	45	230	40	250
Code 39	20	FOV limited	470	FOV limited	500

Note 1: see Test Conditions below

Note 2: for additional information on exit window disposal, see Appendix B of this document.

Test Conditions

All distances are taken on axis from the illumination lenses at the following typical conditions:

- "in open air" means without any interposed transparent or semi-transparent material
- environmental light = 300 lux
- Pitch angle = 10°
- Skew angle = 0°
- Tilt angle = 10° (1D labels) - 0° (2D labels)

Figure 3. Side view

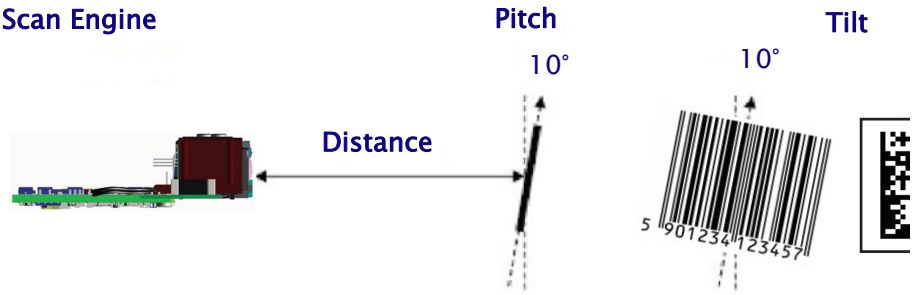
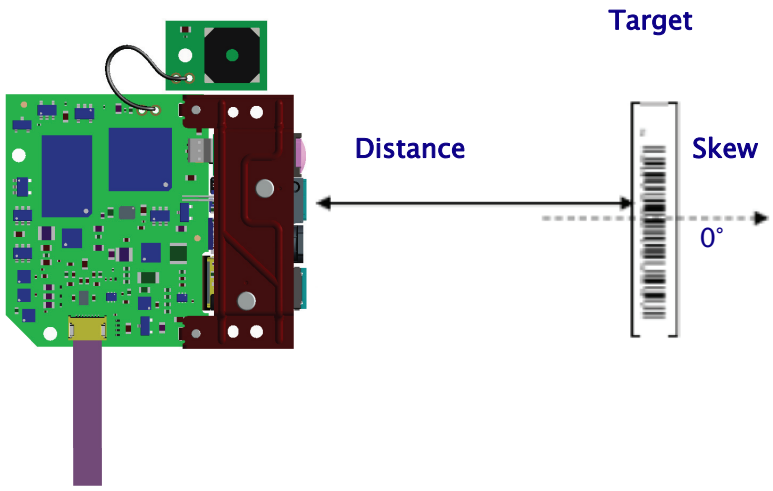


Figure 4. Top view



Exit Window Recommendations



The use of a double-sided AR coated exit window is strongly recommended.

Avoiding scratched windows

Scratches on the exit window can strongly affect the reading performance. It is recommended to use an exit window having a scratch-resistant coating and to position the engine window in a recessed position.

Window material

The exit window is an integral part of the imaging system and should be designed and selected to preserve the optical quality of the system. It is recommended to use only cell-cast plastics or optical glass.

Common materials and their characteristics are shown in Table 1 below.

Table 1. Exit window materials

Properties	PMMA (cell cast acrylic or polymethyl methacrylic)	CR39 (Allyl Diglycol Carbonate)
Optical Quality	Very good	Very good
Surface Hardness	Hard coating required	Hard coating required
Impact Resistance	Good	Good
Chemical / UV Resistance	Susceptible	Susceptible
Ultrasonically Welding	Compatible	Compatible

Exit window properties

Recommended properties/performance of the exit window are reported in Table 2.

Table 2. Exit Window Properties

Characteristics	Requirement
Material	PMMA or CR39 or equivalent
Thickness	1.5mm
Wavefront distortion	0.2 wavelengths peak-to-valley maximum and 0,04λ maximum rms over any 2.0mm diameter within the clear aperture
Clear aperture	To extend to within 1.0mm of edges all around
Surface quality	60/20 scratch/dig
AR coating	• double sided • transmittance > 97% minimum within spectrum range 400nm-750nm. • reflections max 0,4% per side in the range 620nm-640nm

NOTES

Chapter 3
Electrical Integration

Overview

T_A = 25° C (unless otherwise noted)

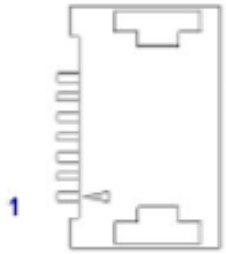
PARA-METER	TEST CONDITIONS		MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		4.5	5.0	5.5	V
I_{IN}	V_{IN} = 5 V	Shut down V_{POWER_ON} = 0 V		240	400	µA
		In-rush current at Start-up First peak after plug-in		3.25		A
		Duration of In-rush current at Start-up		20		µs
		In-rush charge at Start-up Measured at first cold plug-in		35		µC
		Stand-by Scan Mode = Trigger Single		12		mA
		Operative - Acquiring w/o Beeping Scan Mode = Trigger Single / Flashing	80	150	200	mA
		Operative - Object Detection Scan Mode = Stand Mode	70	90	110	mA
		Operative - Acquiring w/o Beeping Scan Mode = Stand Mode	60	150	230	mA
		Operative - while Beeping Scan Mode = Trigger Single	40	150	260	mA
		Operative - while Beeping Scan Mode = Flashing / Stand Mode	90	255	415	mA
		USB Suspend		5.5		mA
T_{SDN}	V_{IN} = 5 V	Shut-Down Time Measured from V_{POWER_ON} negative edge to I_{IN} = 0 mA		300		ms

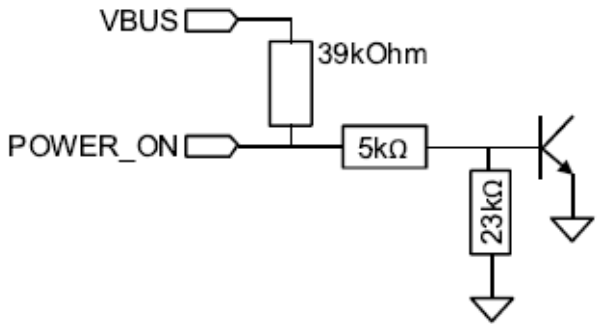
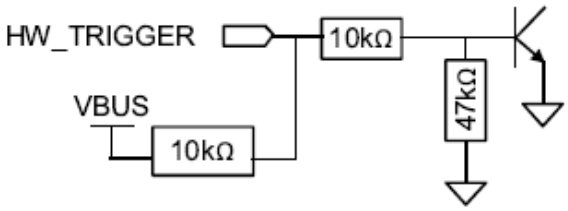
Host Connector Configuration

The connector used to interface the Scan Engine to the Host's USB hub has the following p/n:

MOLEX 51281-0894
http://www.molex.com/molex/products/datasheet.jsp?part=active/0512810894_FFC_FPC_CONNECTORS.xml

TOP VIEW



Pin	Direction		Signal Name	Notes about Decoder side connector pinout
	USB Hub	Decoder		
8	→		POWER_ON	Connected to BJT-Base with the following net:  Leave unconnected if not used
7	→		HW_TRIGGER	Connected to BJT-Base with the following net:  Leave unconnected if not used
6	→		VBUS	External power supply 5V +/- 5%, electrically shorted to Pin #5
5	→		VBUS	External power supply 5V +/- 5%, electrically shorted to Pin #6
4	---		GND	0V reference, electrically shorted to Pin #1
3	↔		USB D-	Data N, USB differential pair
2	↔		USB D+	Data P, USB differential pair
1	---		GND	0V reference, electrically shorted to Pin #4

Description:

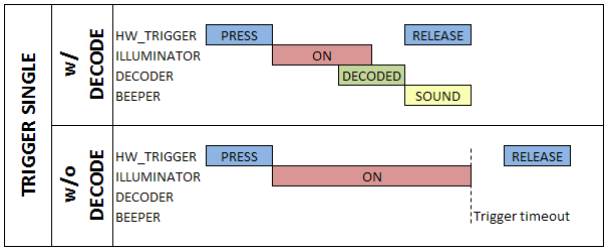
- POWER_ON signal can be used by host to switch-on/off the whole Scan Engine: leave it unconnected if not used
- HW_TRIGGER signal can be used to physically
- issue a “trigger pressure” event to the Scan Engine: leave it unconnected if not used
- VBUS, D+, D- and GND are the standard USB interface lines

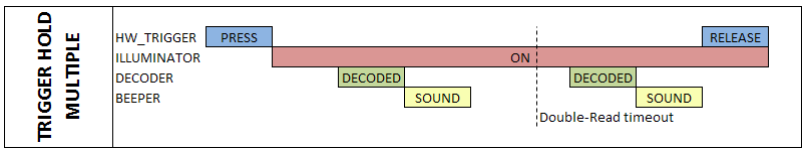
HW_TRIGGER Signal

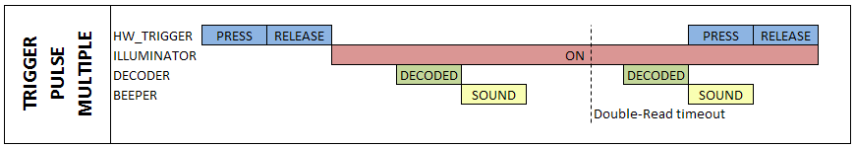
This paragraph describes different ways to drive the HW_TRIGGER signal in order to instruct the Decoder to start acquisition & decode process. Each of these Scan Modes must be first issued (programmed) to the Decoder before to use it. The current default configuration is “Trigger Single”.

In the following pictures, “PRESS” and “RELEASE” words refer to the common meaning of pressing a push button and releasing it in order to obtain a specific behavior. The current release of the Decoder board has the HW_TRIGGER signal with the following level meaning:

Level	Meaning
n/c or ‘0’ = GND	PRESS
‘1’ = VBUS	RELEASE







Software TRIGGER Commands

The “PRESS” and “RELEASE” events can be issued also by way of the USB communication port (COM emulation only) and the corresponding commands are listed here below:

Command	ASCII Code	Meaning
X	88 (58h)	PRESS
T	84 (54h)	RELEASE

The behavioral description of the Scan Engine is the same as that shown above for HW_TRIGGER Signal.

NOTES

Chapter 4
Software Features

The DSE0420 supports the following set of host interfaces:

- USB-KBD (Default)
- USB-COM
- USB-Composite
- USB keyboard emulation
- USB serial port emulation
- USB-KBD + USB-COM

Please refer to the Product Reference Guide for all configuration labels.

USB KB interface:

1. Basic operation – In the USB KB interface (the default interface for the Beta version), the scanner emulates a USB Keyboard. The device enumerates as a keyboard, and subsequently delivers all barcode data to the PC as if it were actually a keyboard. This means that data is delivered to the application which has the “focus” on the PC.
2. Limitations:
   - No host command support – Keyboard devices are “uni-directional”; that is they send data to the PC, but do not accept commands from the PC. This limits the ability to control the module from any application running on the PC.
   - No ability for module updates – given the uni-directional interface, the USB KB interface provides no capability to upgrade firmware or configuration through the host interface.

USB-COM driver and how it relates to the two interfaces:

The DL USB-COM driver is supplied by Datalogic, and provides legacy applications the ability to connect to a ‘virtual’ COM port enumerated by the device during connection to the PC. The driver also provides certain configuration capabilities when used with other Datalogic software. When used with the Composite USB interface, where the device enumerates a ‘virtual’ COM port along with the USB KB interface, the USB-COM driver provides the connection between special configuration applications and the device. Driver selection upon enumeration is controlled by the USB-COM driver’s “.inf” file, which contains a list of accepted VID/PID values. The .inf file is NOT user-mutable; the USB-COM driver has been certified through the Microsoft HCK process and cannot be altered by a user.

1. USB-COM interface (interface 47) – When this interface is selected, the device communicates through a ‘virtual’ COM port via the DL USB-COM driver. All barcodes are passed to applications through this interface.

The applications must thus handle COM port communication. This may be an approach used for any legacy applications that were originally developed for use with RS232 Communication ports.

2. Composite USB interface (interface 4D) – When this interface is selected, the device enumerates a 'virtual' COM port along with the USB KB interface. Barcode data is sent to the PC through the USB KB interface, while the USB-COM interface will automatically connect through the DL USB-COM driver. This port is then available for any configuration or updates to F/W that may be required for specific customers, or for the general case of providing new firmware with enhanced capabilities. This process is further described below.

3. VID/PID table for both – the following table contains the Vendor ID (VID) and Product ID (PID) for each interface:

Interface	I/F number	VID	PID
USB OEM	45h	05F9h	121Fh
USB HID Keyboard	35h	05F9h	221Fh
USB-COM (Microsoft)	47h	05F9h	4204h
USB COM / USB HID Keyboard Composite	4Dh	05F9h	4005h
USB HID Firmware Update with Aladdin	4Bh	05F9h	5204h

4. The Datalogic USB-COM driver will be provided for inclusion in the host's image; there will be no need for users to install the driver on the host. Any subsequent updates that may become available will be handled through the software update process, if needed.

Firmware and configuration updates:

Firmware and configuration files can be updated on the scanner module when the module is in the USB-COM or Composite interface. Updating firmware or configuration is not a common operation and will only be performed upon occasions where new firmware is required, or a specific customer requires special configuration of the module.

When an update is needed, the tablet image will come pre-loaded with software utilities that provide a method for easy update of the unit. In most cases, the update will be accomplished by the customer's IT department using a batch file or other similar process that can be remotely invoked on the tablet. Such a process will utilize the command line interface available through the Datalogic Remote Management software.

1. Brief description of the software stack – The update of either firmware or configuration for the module uses the same process. The update itself is performed by Datalogic's Remote Management software layer, which provides an interface to the device through the USB-COM driver. The remote management software is always resident on the tablet but is only executed when an update is invoked.

2. Instructions for invoking the update(s) – To perform an update, the following instruction is executed from the command line:

   C:\<path> cfirmwareupdate <scanner_name> <"path:filename">

   Where:

   <path> = the location on the tablet where the Datalogic utilities are installed
   <scanner_name> = IntegratedImagingBarcodeScanner
   <"path:filename"> = the path to the update file+update file name

3. Limitations

   - The module must be in USB-COM or Composite interface; updates are not possible when the module is in the USB KB interface.
   - The module should not be in use by any application. Performing an update to the scan module should only be done when the module is not actively being used by an application.
   - The module should be in an idle state.

NOTES

Chapter 5
Quality and Reliability

Test ID	Test	Description
1	Shock	**Dynamic Shock**: 2000 G ± 5% applied via any mounting surface at -30° C and 70° C for a period of 0.85 ± 0.05 msec. 2500 G ± 5% applied via any mounting surface at 23° C for a period of 0.85 ± 0.05 msec **Vibration**: 20 to 80 Hz — Ramp up at 0.04 G^2/Hz at 3 dB/octave 80 to 350 Hz — 0.4 G^2/Hz 350 Hz to 2 kHz — Ramp down at 0.04 G^2/Hz at 3 dB/octave
2	Environmental	Storage Temperature: -40° C to +70° C Operating Temperature: -15° C to +55° C Humidity (non-condensing) ≤ 95%
4	ESD	The Scan Engine must be shielded from ESD strikes up to ±15KV with the enclosure. To date, testing on the Imager Module has been performed at level of 2,5KV on the connector. The module was tested inside another host product up to 4Kv direct and 8KV air.
5	MTBF	An MTBF calculation has been completed and is shown in Appendix A

NOTES

Chapter 6
Regulatory & Safety

Item	Description
Laser Classification	IEC 60825 – CLASS 2 LASER PRODUCT Maximum emitted power: 1 mW, Emitted wavelength 630–680 nm Pulsed source: maximum lamp duration 15ms, repetition rate 16.6 ms
Lamp Standard	IEC 62471 Exempt
Radiated Emissions	EN55032
Support Documentation	Support documentation is available on request to assist the ODM in their system submittal to Regulatory and Safety Agencies. Some examples of support documentation are: Laser Safety Classification Calculation Lamp Standard Calculation RoHS documentation

NOTES

Appendix A
MTBF Prediction (Calculated)

Product: DSE0420

System MTBF:

DSE0420 MTBF		
Duty Cycle	Operating Temperature 25°C	Operating Temperature 55°C
100%	218,412 hrs.	60,125 hrs.
50%	399,416 hrs.	109,785 hrs.

DSE0420 RAMM		
Duty Cycle	Operating Temperature 25°C	Operating Temperature 55°C
100%	0.00334	0.01214
50%	0.00183	0.00665

Prediction Parameters:

Software: Relex Reliability Studio 2008 (Telcordia Method II Case L1)

Environmental Conditions:

- GM – Ground Mobile
- Maximum Ambient Temperature: 55 oC
- Internal Temperature rise 7 oC

System Model:

- All assemblies in serial mode. All assemblies must function for the system to work.

Assembly Calculation Criteria:

- All Electronic assembly failure rates calculated from BOM listing using Telcordia model.

DATALOGIC HAS DEMONSTRATED A 99% SUCCESS RATE OF MEETING OR EXCEEDING OUR PREDICTION BASED ON ACTUAL PRODUCT DEMONSTRATED LIFE TEST RESULTS AND ACTUAL FIELD DATA.

Any requests for reliability information on our products are granted with a clear understanding that MTBF/RAMM numbers are design targets. They are based on all available reliability data from preceding product demonstrated life testing and calculated semiconductor failure rates. They do not represent an implied warranty. As with all reliability numbers, infant mortality, early wear-out failures and variations in operating environment are not included.

Date: 5-June-2013

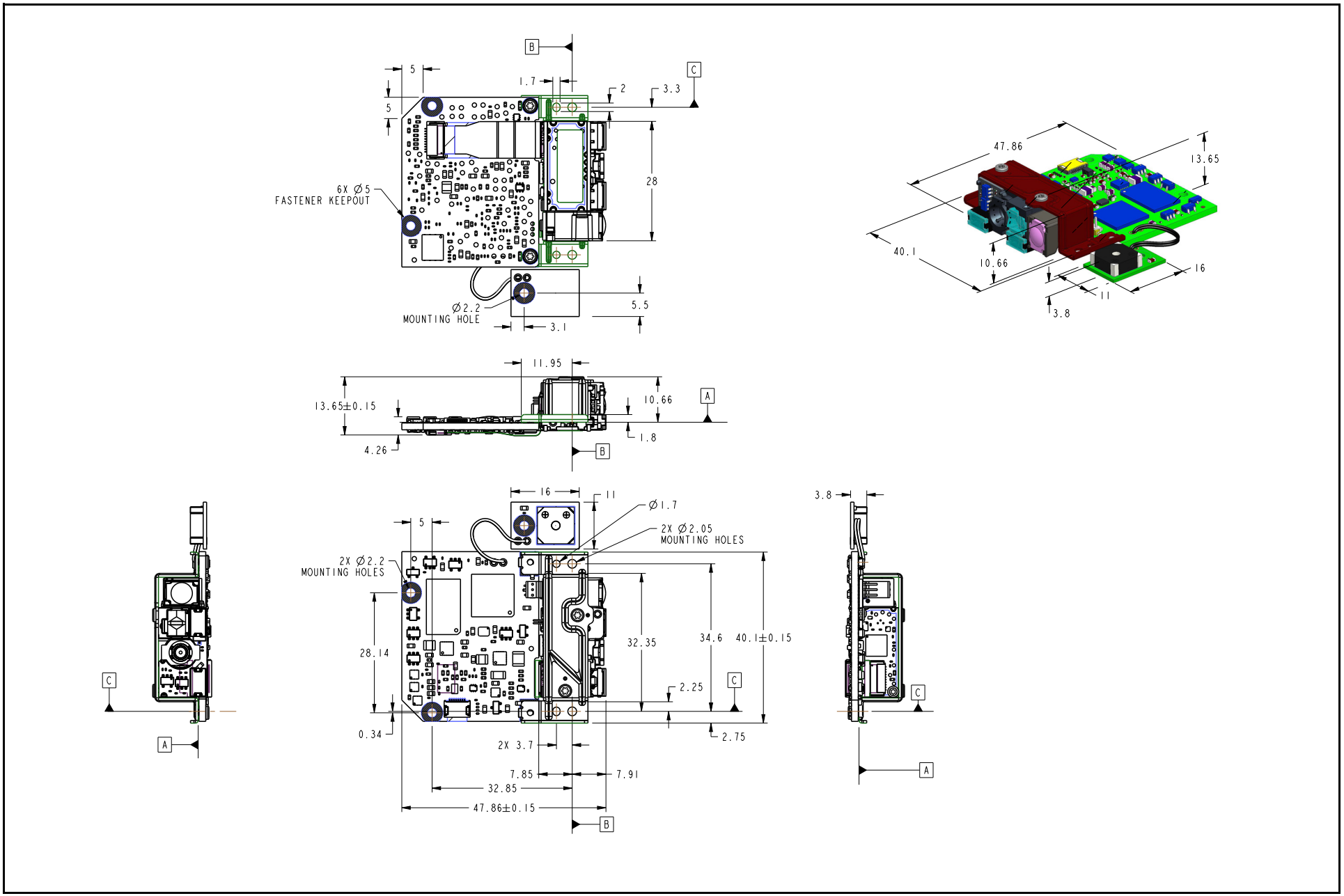
Reliability Engineer: D.A. Hershberger

Appendix B
Mechanical Drawings

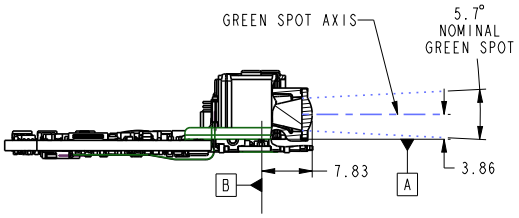
This section describes the main mechanical features related to the following key points:

- Overall Dimensions
- Optical features
- Exit Window Positioning
- Interface Connector Characteristics & Requirements

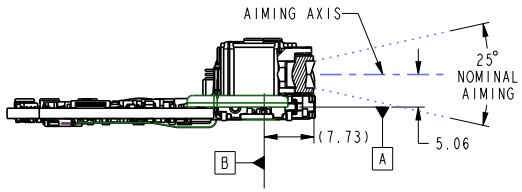
Overall Dimensions



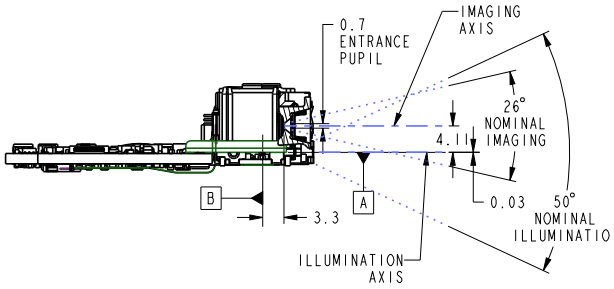
Optical features



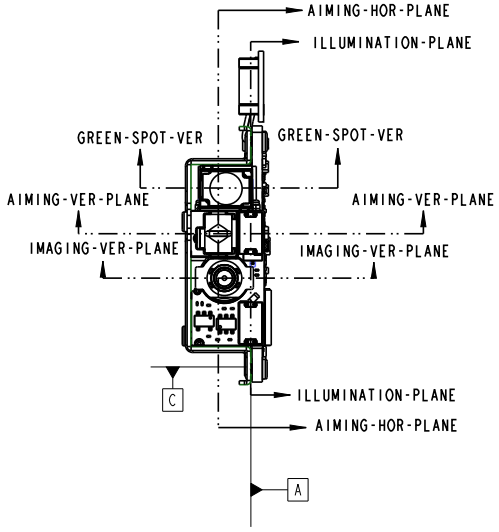
SECTION GREEN-SPOT-VER-GREEN-SPOT-VER

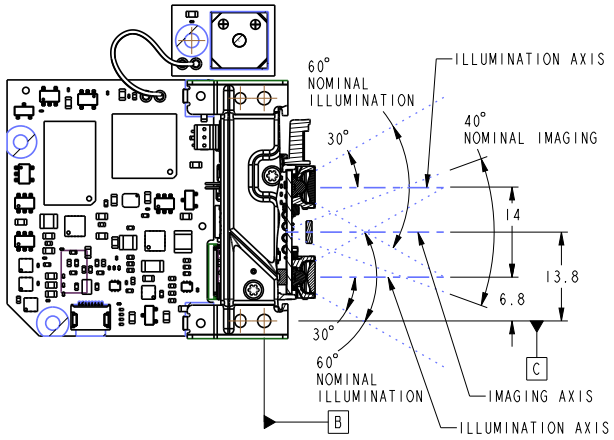


SECTION AIMING-VER-PLANE-AIMING-VER-PLANE

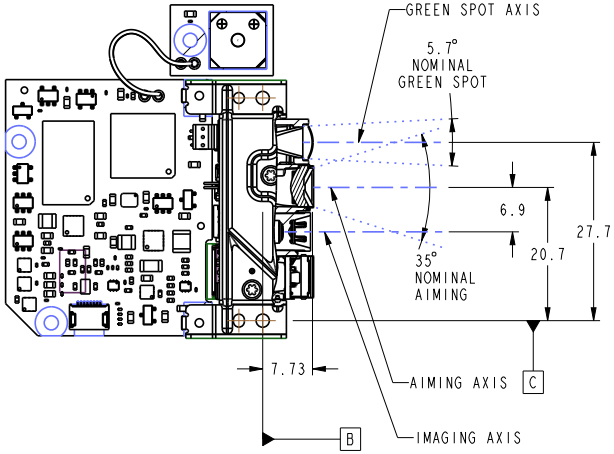


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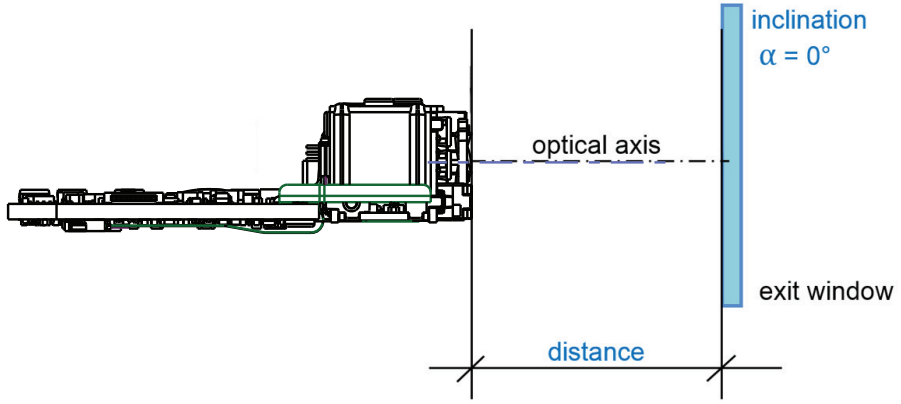


SECTION ILLUMINATION-PLANE-ILLUMINATION-PLANE

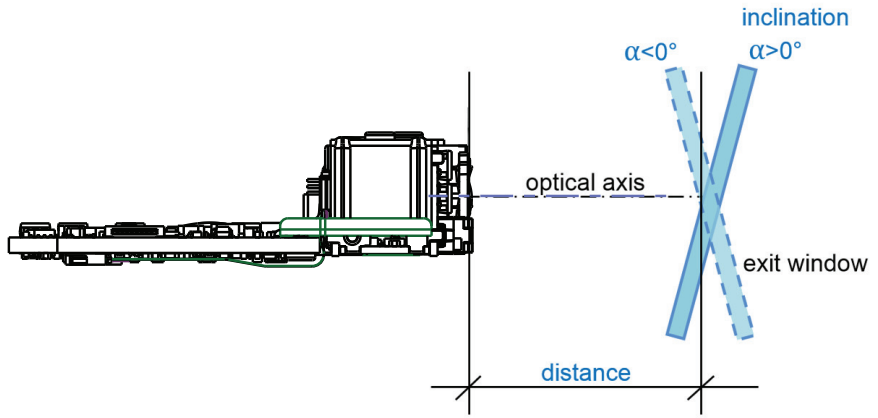


SECTION AIMING-HOR-PLANE-AIMING-HOR-PLANE

Exit Window Positioning



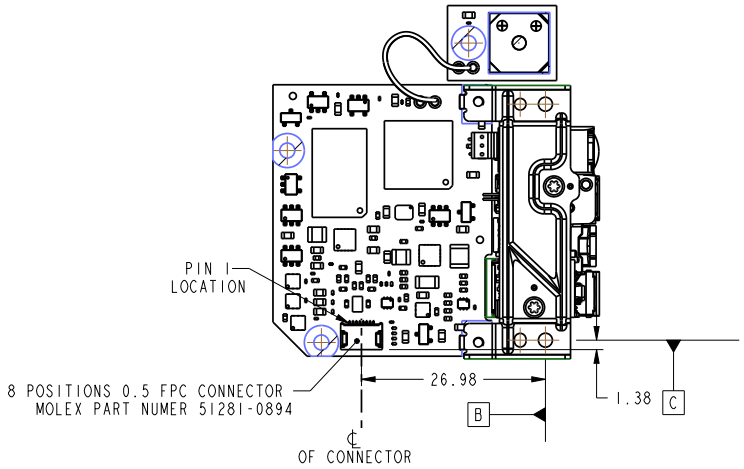
	Distance [mm]
No Coating	< 1 mm
AR coating (2 sides)	< 1 mm



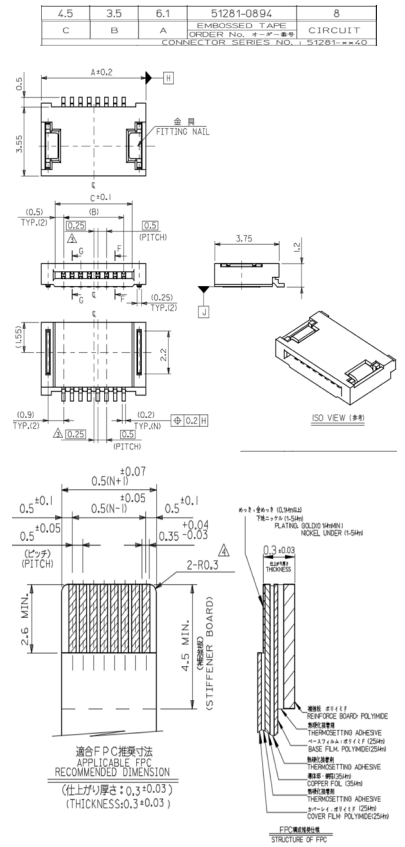
		Distance [mm]					
		5	10	15	20	25	30
No Coating	+α	42°	42°	40°	35°	30°	25°
	−α	30°	30°	30°	30°	30°	30°
AR coating (2 sides)	+α	42°	32°	26°	24°	22°	22°
	−α	20°	24°	24°	24°	24°	24°

For additional information about the Scan Engine, please refer to the DE2011-DL Integration Guide

Interface Connector Characteristics & Requirements



MOLEX CONNECTOR SPECIFICATION - DOCUMENT NUMBER SD-51281-011
(FOR DETAILED CONNECTOR INFORMATION, REFER TO THE MANUFACTURERS SPECIFICATIONS)



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