

SOLUM Newton

Electronic Shelf Label Datasheet

01/11/2024

V2.0

Summary

This datasheet presents the specification and general performance of SOLUM's Newton Electronic Shelf Labels (ESLs) lineup.



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Document History

Rev.	Date	Revision History	Page
1.0	14/08/2020	Initial release	-
1.1	11/04/2022	Revamp	-
1.2	26/08/2024	Revamp	
1.3	18/10/2024	Freezer Tags Battery, Pixel Color, 6.0" Model Name and Image modification	6, 8, 19 22-23
2.0	01/11/2024	Model Name (Whole Inch) 3.5" Freezer Tag Image Line up image	6,10, 16, 22, 23

1 Preface

1.1 About This Guide

This datasheet presents the specification and general performance of SOLUM's Newton Electronic Shelf Labels (ESLs) lineup.

1.2 Audience

This manual is intended for any user (IT, operations, store managers, installers, etc.) authorized to operate and install SOLUM ESLs.

1.3 Abbreviations and Acronyms

Terminology/Abbreviation	Description
GW	Gateway
ESL	Electronic Shelf Label
RF	Radio Frequency
IT	Information Technology
PoE	Power over Ethernet
TBD	To Be Decided

2 Overview

SOLUM NEWTON Electronic Shelf Labels (ESLs) are components to a total SOLUM's ESL System. The SOLUM's ESL System consists of the ESLs, Gateway(s), Server, and optional accessories (such as the Newton Remote Controller) and is used to electronically displays key information such as price and product information, that are traditionally printed or written on paper in environments like supermarkets, warehouses, and factories.

SOLUM's Newton ESLs are the industry leading solutions that provide the longest battery, fastest update speed, built in LEDs, built in buttons, IP67 rating for rough environments, multiple pages per ESL, and more to take the operation beyond just displaying information on the ESLs.

Newton ESLs come in various sizes and colors to meet all customer use cases. They are battery powered for ease of deployment and wirelessly receive updates from SOLUM Gateway for.

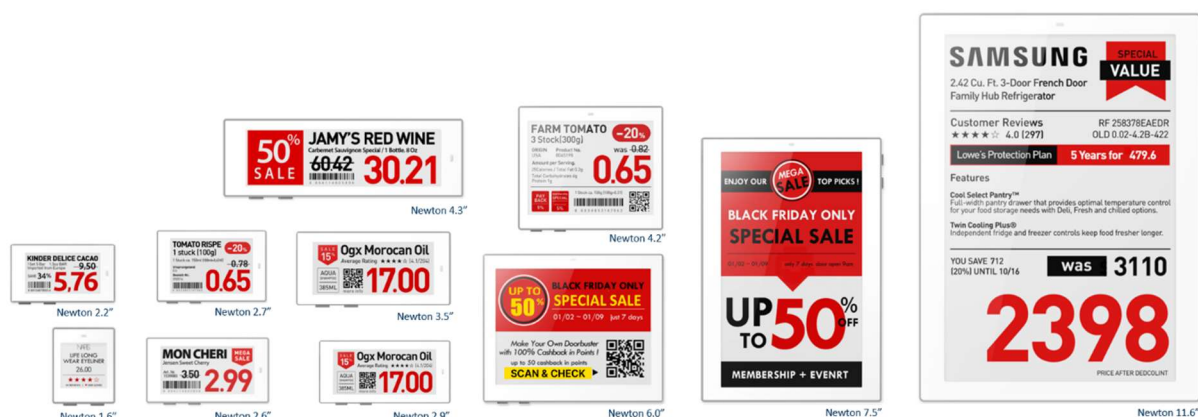


Figure 1. NEWTON PRODUCT LINE-UP

3 Specification

This section details specification of each ESL by size. ESLs are identified by the diagonal measurement of the display in inches. For example, a 2.9" ESL is referring to an ESL with the diagonal display dimension of 2.9".

3.1 Product Specification

Item	Description
Label Dimensions	1.6" : 1.44 x 1.77 x 0.51 inches (36.7 x 45.0 x 13.1 mm) 2.2" : 2.64 x 1.47 x 0.51 inches (67.1 x 37.4 x 13.1 mm) 2.6" : 3.12 x 1.66 x 0.51 inches (79.3 x 42.4 x 13.1 mm) 2.7" : 2.99 x 1.94 x 0.51 inches (76.0 x 49.5 x 13.1 mm) 2.9" : 3.38 x 1.62 x 0.51 inches (86.0 x 41.3 x 13.1 mm) 3.5" : 3.94 x 1.95 x 0.51 inches (100.2 x 49.6 x 13.1 mm) 4.2" : 3.86 x 3.29 x 0.57 inches (98.1 x 83.8 x 14.5 mm) 4.3" : 5.12 x 1.66 x 0.54 inches (130.2 x 42.4 x 13.7 mm) 6.0" : 5.23 x 4.29 x 0.57 inches (133.0 x 109.0 x 14.7 mm) 7.5" : 4.92 x 7.20 x 0.59 inches (125.0 x 183.0 x 15.2 mm) 11.6" : 7.55 x 10.60 x 0.86 inches (192.0 x 269.3 x 21.9 mm)
Display Dimensions	1.6" : 1.06 x 1.06 inches (27.0 x 27.0 mm) 2.2" : 1.89 x 1.02 inches (48.1 x 26.0 mm) 2.6" : 2.36 x 1.20 inches (60.1 x 30.7 mm) 2.7" : 2.25 x 1.50 inches (57.3 x 38.1 mm) 2.9" : 2.66 x 1.16 inches (67.6 x 29.6 mm) 3.5" : 3.19 x 1.49 inches (81.0 x 38.0 mm) 4.2" : 3.33 x 2.50 inches (84.8 x 63.6 mm) 4.3" : 4.14 x 1.20 inches (105.4 x 30.7 mm) 6.0" : 4.52 x 3.37 inches (114.9 x 85.8 mm) 7.5" : 3.85 x 6.42 inches (97.9 x 163.2 mm) 11.6" : 6.41 x 9.62 inches (163.0 x 244.5 mm)
Display Resolution	1.6" : 200 x 200 pixels (188 dpi) 2.2" : 296 x 160 pixels (156 dpi) 2.6" : 360 x 184 pixels (152 dpi) 2.7" : 300 x 200 pixels (133 dpi) 2.9" : 384 x 168 pixels (144 dpi) 3.5" : 384 x 180 pixels (120 dpi) 4.2" : 400 x 300 pixels (120 dpi) 4.3" : 522 x 152 pixels (125 dpi) 6.0" : 600 x 448 pixels (132 dpi) 7.5" : 480 x 800 pixels (126 dpi) 11.6" : 640 x 960 pixels (100 dpi)

Item	Description
Label Weight	1.6": 20.8g / 0.7oz 2.2": 33.2g / 1.1oz 2.6": 36.6g / 1.4oz 2.7": 40.6g / 1.5oz 2.9": 43.4g / 1.6oz 3.5": 49.7g / 1.8oz 4.2": 83.0g / 2.9oz 4.3": 63.5g / 2.2oz 6.0": 166.0g / 5.8oz 7.5": 239.0g / 8.4oz 11.6": 594.0g / 21oz
Viewing Angle	Nearly 180°
Display Colors	● BW (black, white) (Freezer Tags Only) ● BWR (black, white, red) ● ● BWRY (black, white, red, yellow) (6.0" Only) ** color options are not available for all sizes.
Battery	Type and quantity of batteries defer based on ESL CR2450 Lithium Battery 1pcs: 1.6" 2pcs: 2.2", 2.6", 2.7", 2.9", 3.5", 4.2", 4.3" 4pcs: 6.0", 7.5" AA Lithium Battery 4pcs: 11.6" CR2450D 2pcs: 2.2"F, 2.6"F, 2.9"F, 3.5"
Wireless Communication	2.4 GHz Unlicensed ISM band BLE physical layer with SOLUM proprietary protocol
Communication Distance	98 feet (30m) radius Line of Sight
Security	128-bit AES Encryption
Compliance	FCC, CE, RoHS
Operating Temperature	Nominal ESLs 32F ~ 104F (0C ~ 40C) @45~70% RH Freezer ESLs 13F ~ 31F (-25C ~ 0C) *freezer ESL must be used in freezer enviroments
Storage Temperature	32F ~ 104F (0C ~ 40C) @45~70% RH

3.2 Radio (RF) Specification

Item	Parameter	Specification			Unit	Condition
		Min	Typ	Max		
Tx	Tx Power	-3	0	4	dBm	
	[Carrier Frequency Offset and Drift]	-75	0	75	kHz	
	Tx Current		-	8	mA	total current at max Tx Power
Rx	Receiver Sensitivity	-85	-	-	dBm	PER < 5%

3.3 NFC Specification

Item	Parameter	Specification			Unit	Condition
		Min	Typ	Max		
NFC	Read Distance	-	0.7	-	in	
		-	20	-	mm	

NFC antenna location shown for each ESL size.

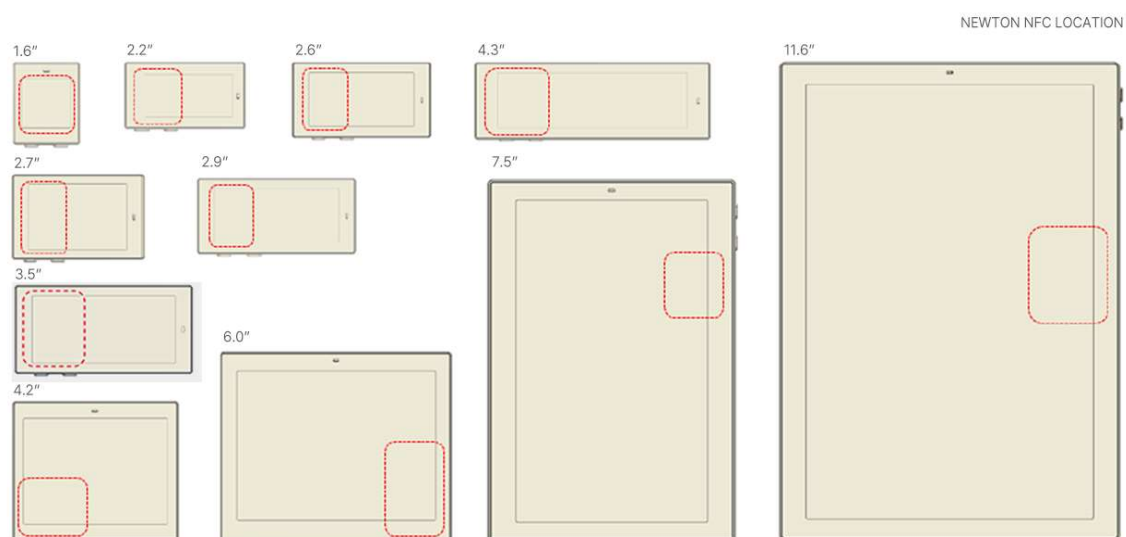


Figure 2. NFC LOCATION

3.4 Features

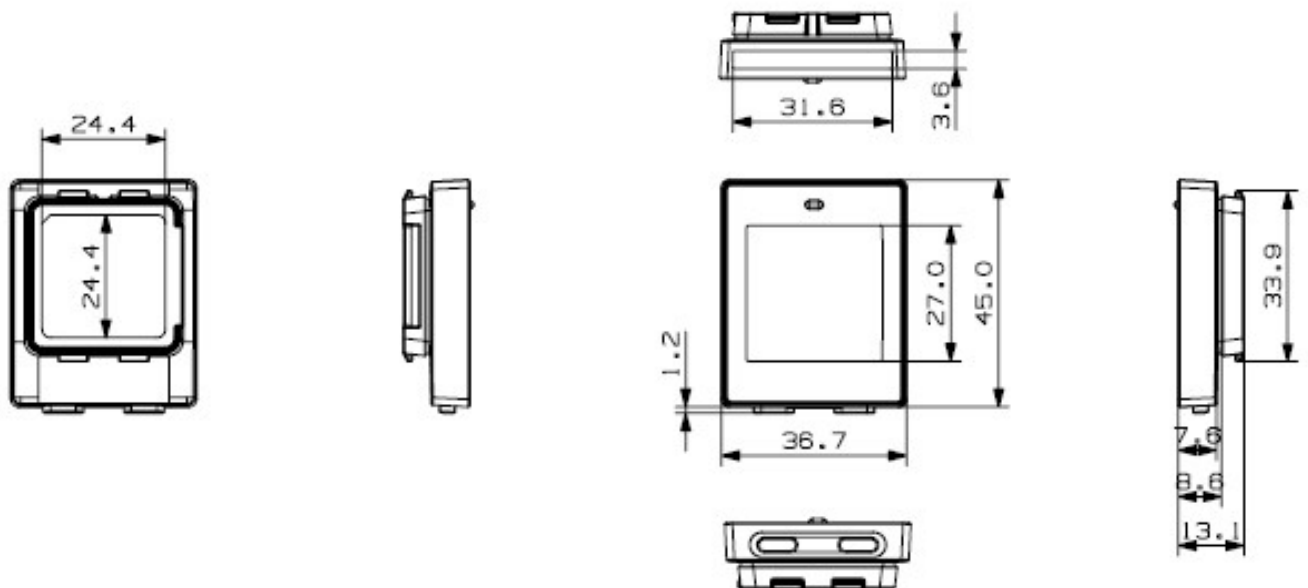
Some of the features of SOLUM ESL.

- Low power consumption
- 'Real time' update speed
- SOLUM proprietary protocol communication with SOLUM Gateway for added security

Item	Description
Functional Buttons	2 Buttons (page turn, turn off LED, out of stock, picking, alarm) * No buttons on 3.5" Freezer Tag
LED	7 colors (Red, Green, Blue, Yellow, Cyan, Magenta, White)
Usable Pages	7pages: 1.6", 2.2", 2.6", 2.7", 2.9", 3.5", 4.2", 4.3" 3pages: 6.0", 7.5", 11.6"
IP Rating	IP67 (waterproof and dustproof)
NFC	Built-in Felica NFC Forum Type 3
Housing Bezel Color	White or Black (custom color option available)

3.5 Mechanical Drawing

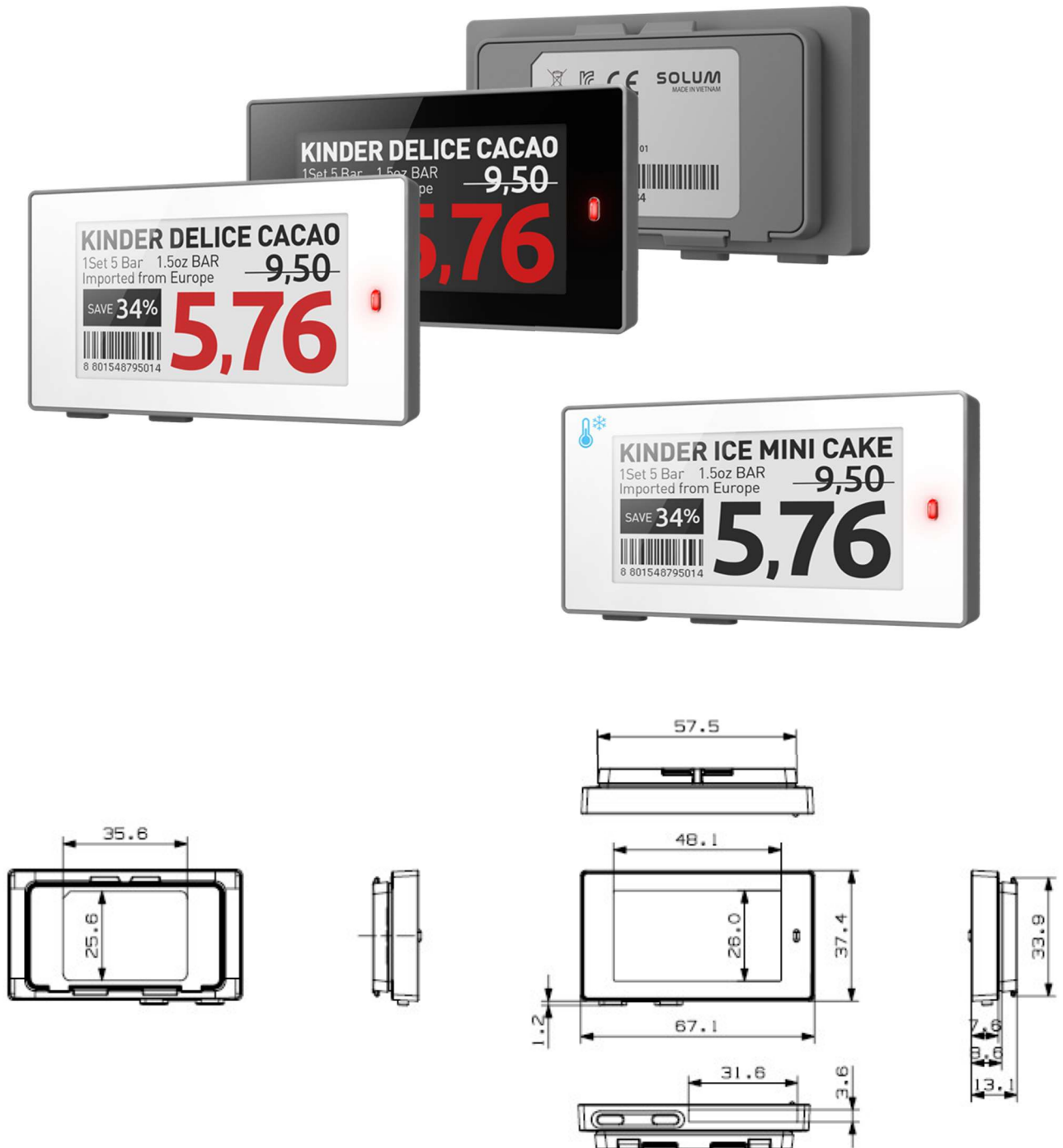
1.6"
Model



(Unit: mm)

Figure 3. 1.6" Mechanical Dimension

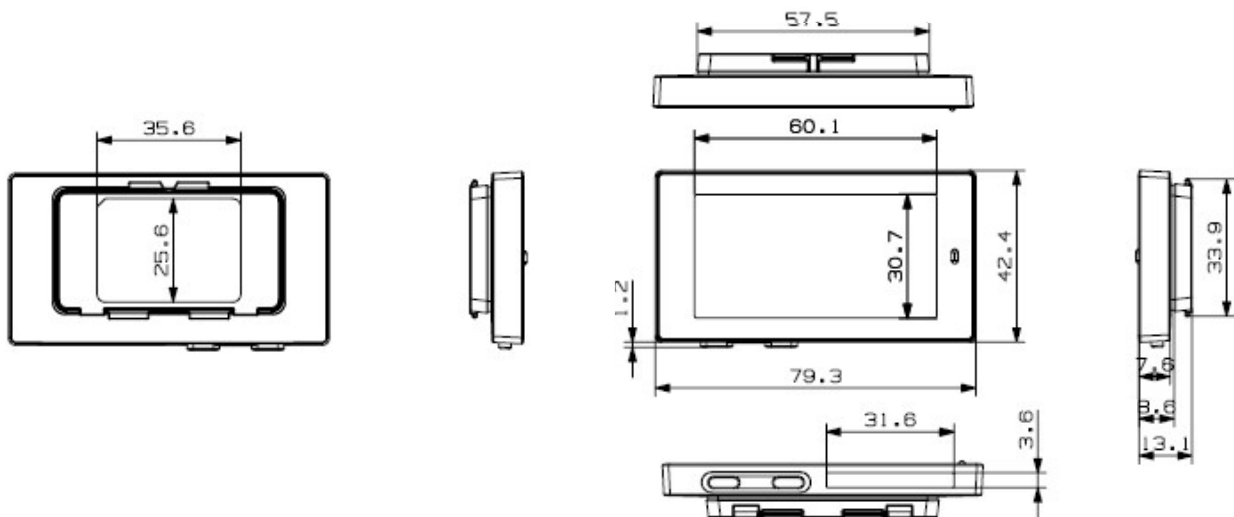
2.2"
Model



(Unit: mm)

Figure 4. 2.2" Mechanical Dimension

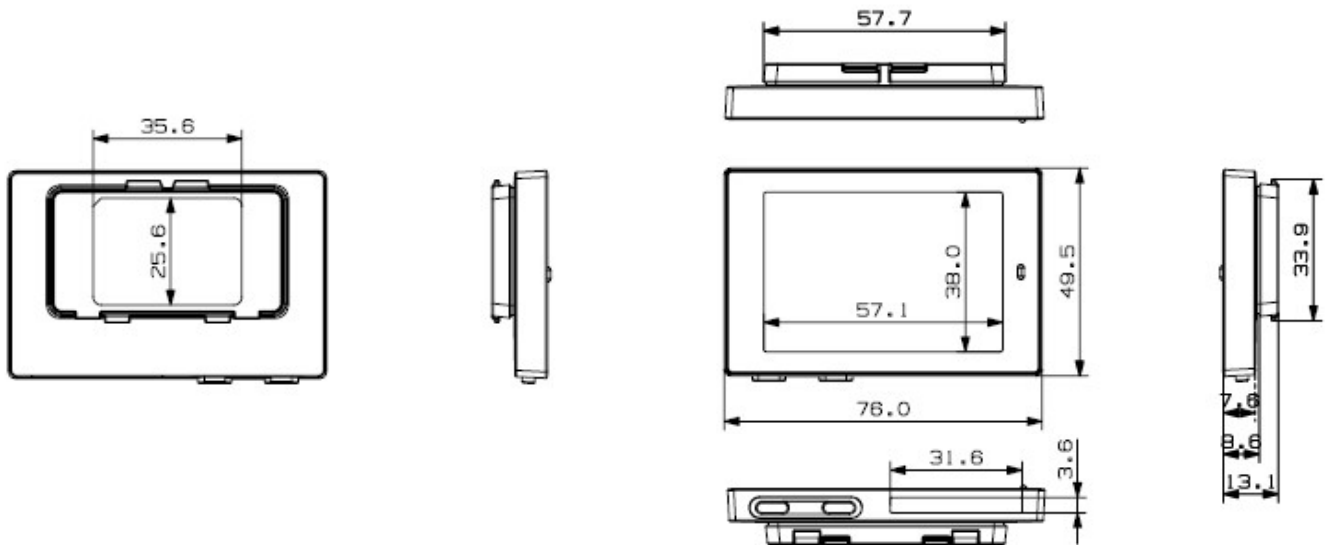
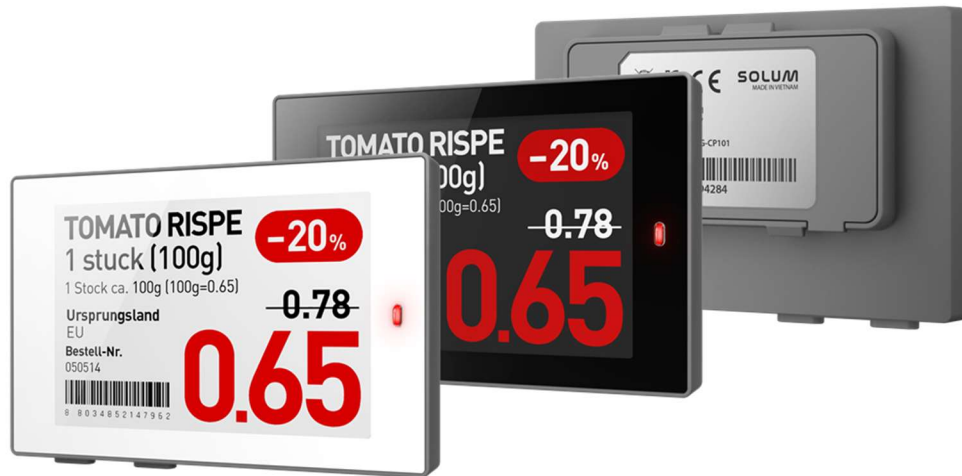
2.6"
Model



(Unit: mm)

Figure 5. 2.6" Mechanical Dimension

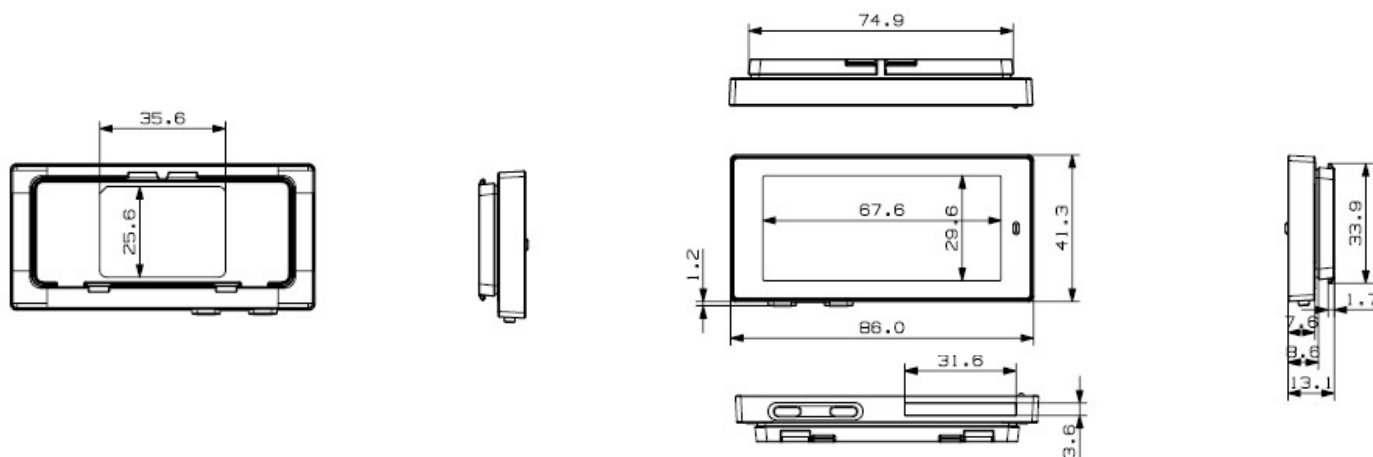
2.7"
Model



(Unit: mm)

Figure 6. 2.7" Mechanical Dimension

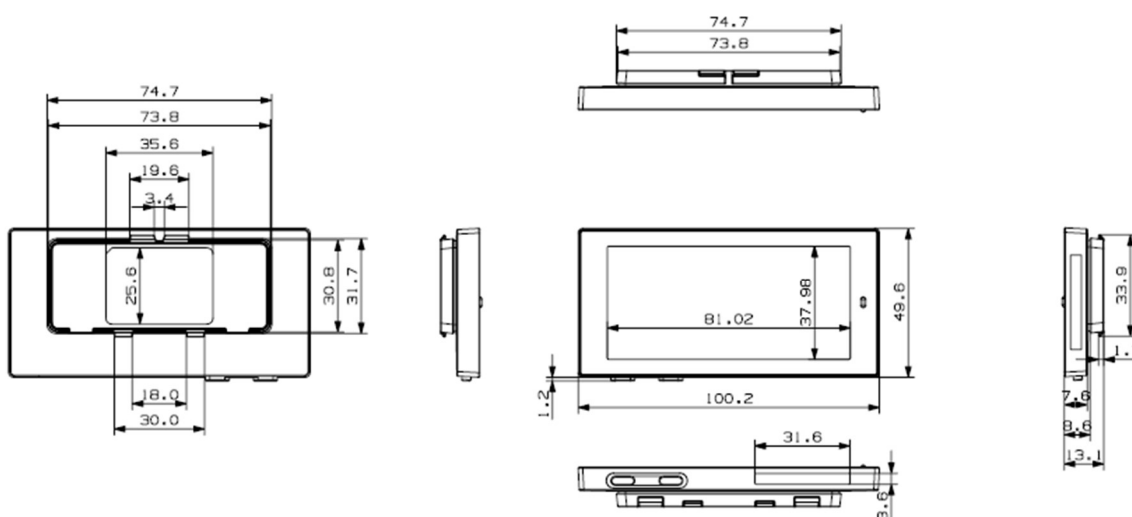
2.9"
Model



(Unit: mm)

Figure 7. 2.9" Mechanical Dimension

3.5"
Model



(Unit: mm)

Figure 8. 3.5" Mechanical Dimension

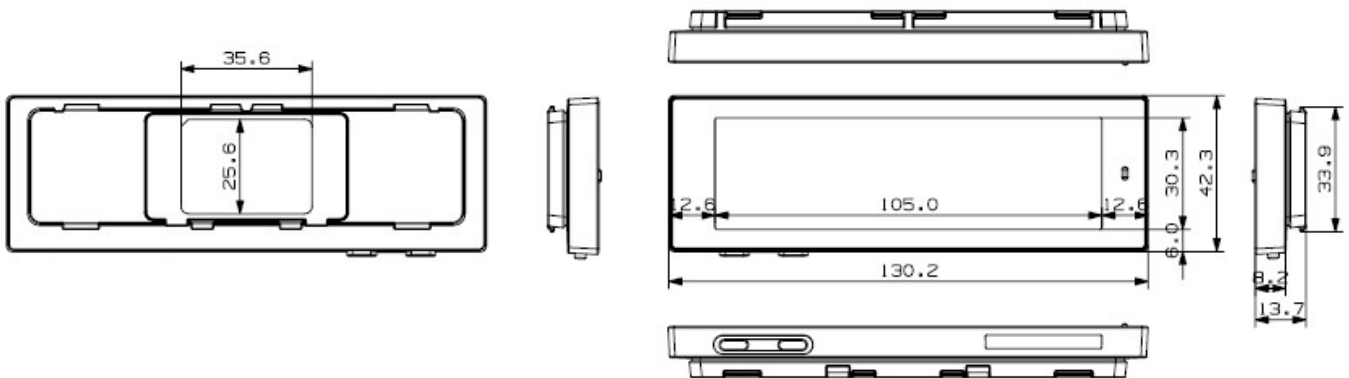
4.2"
Model



(Unit: mm)

Figure 9. 4.2" Mechanical Dimension

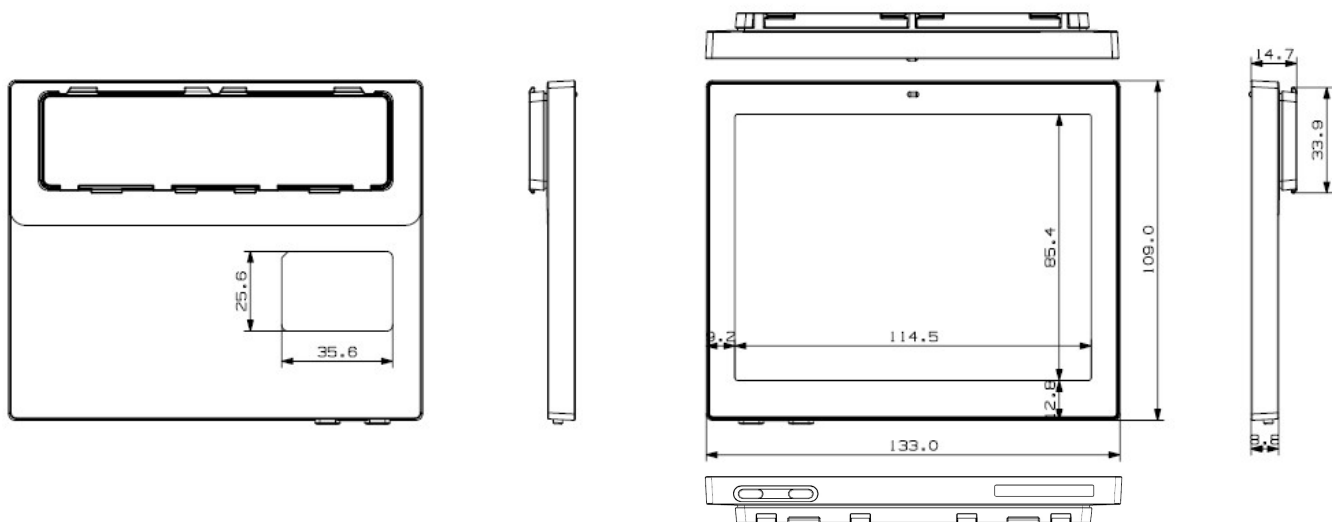
4.3"
Model



(Unit: mm)

Figure 10. 4.3" Mechanical Dimension

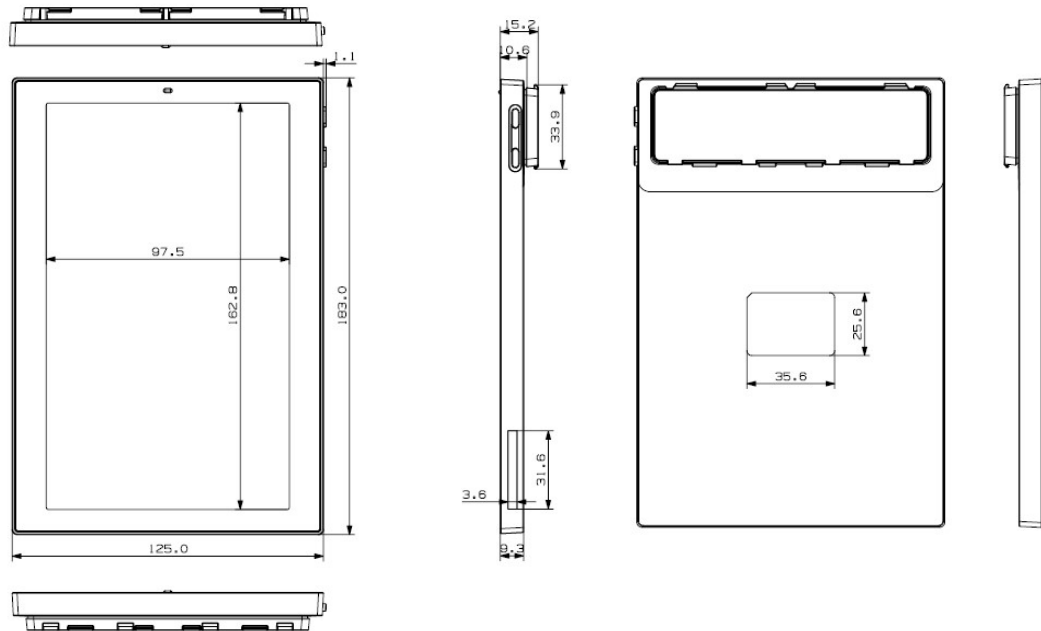
6.0"
Model



(Unit: mm)

Figure 11. 6.0" Mechanical Dimension

7.5"
Model



(Unit: mm)

Figure 12. 7.5" Mechanical Dimension

11.6"
Model

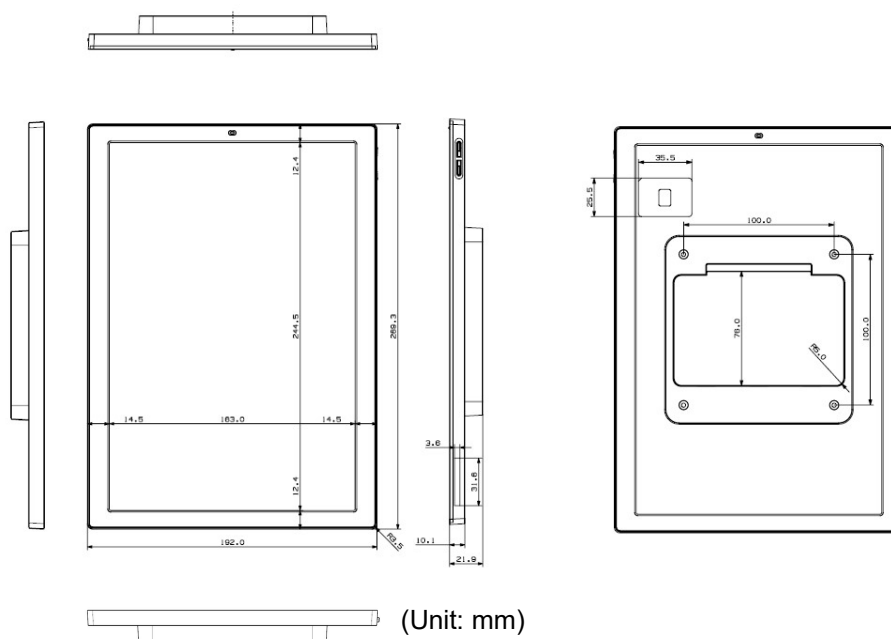


Figure 13. 11.6" Mechanical Dimension

3.6 Label Marking



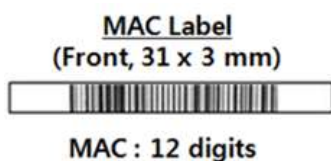
Figure 14. ESL Labels

ESL specific information can be found on the sticker label located on the back of the ESL. Information displayed are but not limited to: IC, FCC ID, Model, Manufacturing Information, ESL Media Access and Control (MAC) Address.

- 1) Model: EL①②③**H3**④⑤⑥ (i.e. EL035H3CRC)
 - ① ② ③: ESL Display Size
035=3.5"
 - ④: Housing Color
W =white, B =black, C =gray
 - ⑤: ESL Display Color
M =Mono (BW), R =Red (BWR), 4 =Red, Yellow (BWRY)
 - ⑥: ESL Tag Type
A= (Button, NFC, LED)
B= (NFC, LED, etc)
C= (NFC, LED)

- 1) MFD (Manufacturing Date): [Mon.DD.YYYY]
- 2) S/N: Serial Number Information

MAC Label stickers can be found in multiple areas of the ESL. They are to be scanned for operation. If the ESL is not assigned to a product, the MAC barcode and 12-digits code will be shown on the display. Dimensions can be found in the image below.



3.7 Certifications

3.7.1 FCC

FCC ID : 2AFWN-EL035H3CRC

FCC Information to User

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution

THE GRANTEE IS NOT RESPONSIBLE FOR ANY CHANGES OR MODIFICATIONS NOT EXPRESSLY APPROVED BY THE PARTY RESPONSIBLE FOR COMPLIANCE. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT. IMPORTANT NOTE : FCC RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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 of the device.

3.7.2 CE

We hereby declare under our sole responsibility that the electrical product above is in compliance with the essential requirements of the Radio Equipment Directive (2014/53/EU) by application of

EN IEC 62368-1:2020+A11:2020

EN 62479:2010

EN 301 489-1 V2.2.3

EN 301 489-3 V2.3.2

EN 301 489-17 V3.2.4

EN 300 328 V2.2.2

EN 300 330 V2.1.1

and the Directive (2011/65/EU) on the restriction of the use of certain hazardous substances in electrical and electronic equipment by application of EN 62321 Series

3.7.3 IC

IC : 22800-EL035H3CRC

ISED Information to User

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. Attention: Tout changement ou modification non expressément approuvé par le fabricant peut annuler le droit de l'utilisateur à utiliser l'équipement. exposition aux rayonnements radiofréquences. Pour se conformer aux exigences de conformité de l'exposition IC RF, une distance de séparation d'au moins 20 cm doit être maintenue entre l'antenne de cet appareil et toutes les personnes.

This device complies with Industry Canada NRCs applicable to licence-exempt radio devices. The operation is authorized under the following two conditions: (1) the device shall not cause interference, and (2) the user of the device shall accept any radio interference suffered, even if the interference is likely to compromise its operation.

Caution: Any change or modification not expressly approved by the manufacturer may void the user's right to use the equipment. exposure to radiofrequency radiation. To comply with the ICRF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

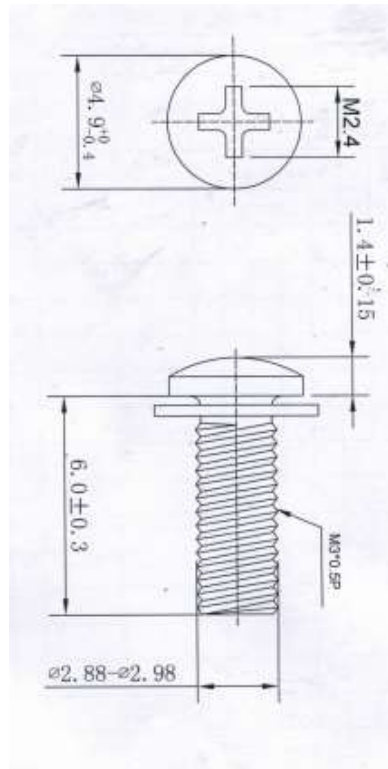
-PMN(Product Marking Name) : ESL Label

-FVIN(Firmware Version Identity Number) : V44

4 Accessories

4.1 Screw Dimensions

Mechanical dimensions for the screws included with 11.6" Newton ESLs.



5 Packaging

PRODUCT	TYPE	TAG (gr)	CARTON INFORMATION					PALLET INFORMATION					
			TAGs / CARTON	DIMENSION_OUTER (mm)			WEIGHT (kg)	CARTONS / LAYER	Number of LAYER	CARTONS / PALLET	TAGs / PALLET	WEIGHT (kg)	HEIGHT (mm)
				W	L	H							
GRAPHIC_1.6-INCH	STD	20.80	480	422.0	324.0	219.0	12.0	8	4	32	15,360	393	1,016
GRAPHIC_2.2-INCH	STD	33.20	240	350.0	324.0	201.0	10.0	9	5	45	10,800	459	1,145
GRAPHIC_2.6-INCH	STD	36.00	240	398.0	330.4	213.0	10.6	9	4	36	8,640	393	992
GRAPHIC_2.7-INCH	STD	40.00	240	386.0	330.4	234.0	11.6	9	4	36	8,640	428	1,076
GRAPHIC_2.9-INCH	STD	43.10	240	426.0	324.0	213.0	12.3	8	5	40	9,600	504	1,205
GRAPHIC_3.52-INCH	STD	49.74	120	426.0	324.0	213.0	8.0	9	7	63	7,560	512	1,631
GRAPHIC_4.2-INCH	STD	83.00	120	365.0	297.0	231.0	12.0	9	4	36	4,320	441	1,064
GRAPHIC_4.3-INCH	STD	59.30	180	461.6	338.4	210.0	12.7	6	4	24	4,320	314	980
GRAPHIC_6.0-INCH	STD	170.80	60	470.0	299.5	155.0	12.2	7	6	42	2,520	524	1,070
GRAPHIC_7.5-INCH	STD	233.50	40	426.0	309.5	171.0	11.3	8	6	48	1,920	554	1,166
GRAPHIC_11.6-INCH	STD	400.00	20	598.6	280.5	238.0	10.0	6	4	24	480	250	1,092

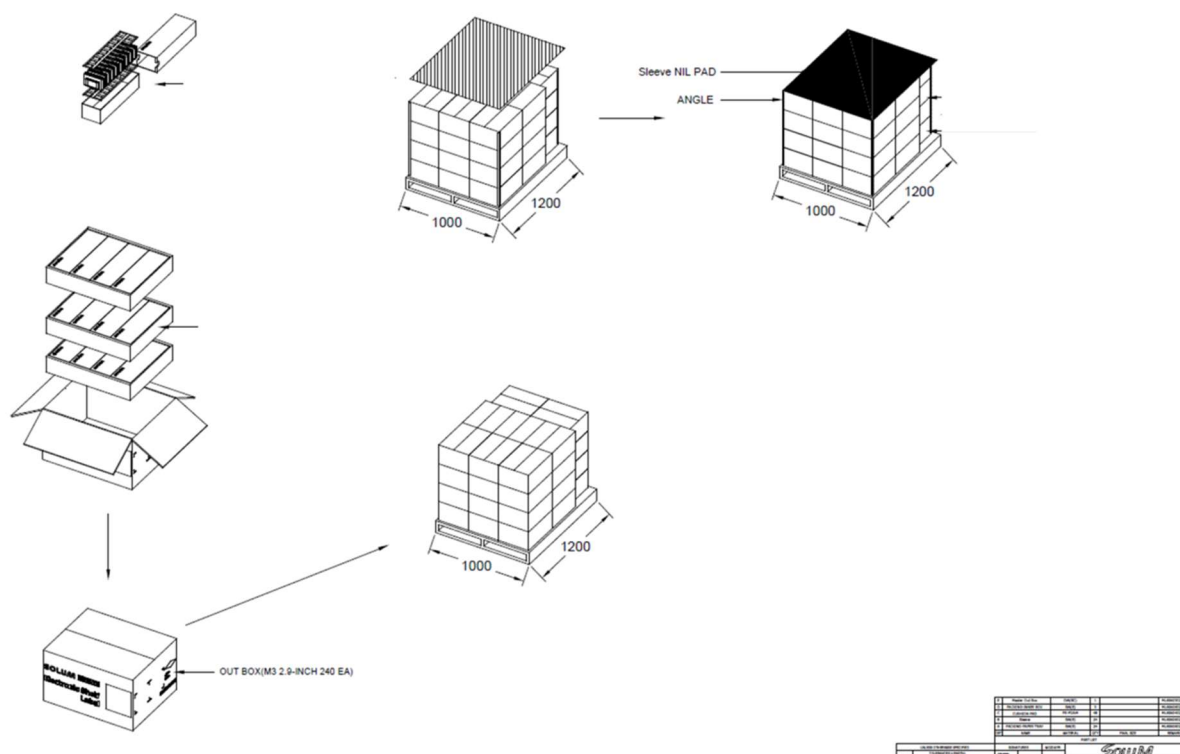


Figure 15. Package

6 Reliability Test

High Temperature Operation

Low Temperature Operation

High Temperature/Humidity Operation

High Temperature Storage

Temperature Shock (Storage)

ESD

Package Drop Test

Package Random Vibration Test

Test Item	Test Condition	Pass Criteria
High Temp Resistance	60°C / 35%, 240hrs	Normal operation after test
High Temp Operation	40°C / 35%, 240hrs	
Thermal Shock	-25°C (for 30mins) ~ 60°C (for 30mins) for 240 cycles	
High Temp & Humidity Operation	40°C / 70%, 240hrs	
Low Temp Operation	Normal ESL: 0°C (240hrs) Freezer ESL: -23°C (240hrs)	
ESD Test	Air ±10KV, 150pF, 330Ω, 10 times/Point	
Waterproof (IEC60529)	Pre-treatment: Thermal shock(240hr), Drop (10 times), High Temp & High humidity (240hr), Button press (10 times) Waterproof Test: 15cm x 15cm water tank, 1m depth of water, 30 minutes (IP67 criteria) for NEWTON tags only	No water ingress into tag
RF Sensitivity (Communication Distance)	Gateway <-> Tag distance: 100 meters	Tag receives RF signal from Gateway.

7 Product Handling Precautions

Provisions should be made to protect against any damage to the product caused by improper handling. The purchaser assumes any responsibility for damage to the product caused by improper handling.

Product should be stored in 32F ~ 104F (0C ~ 40C) @45~70% RH environment and should be installed within **90 days** of receipt.

7.1 Usage Environment

Take extra caution when using this RF device in the vicinity of other electronic devices and appliances. Most electronic devices and appliances use electromagnetic waves. Electromagnetic waves emitted by this RF device can affect other electronic devices and appliances.

If using the device in an explosion hazard area, follow all safety regulations, instructions, and signals.

7.2 Storage and Use

- Moisture and liquids can damage internal parts and circuit boards if allowed to enter into the device itself.
- Do not place or store the product on a sloped surface. The product may slide and fall off the surface and become damaged.
- Use the product in temperatures ranges of **0°C~40°C/32~104°F(BWR)**, **0°C~30°C/32~86°F (BWY)**, or **-25°C~0°C/-13~31°F(Freezer)**. Parts and circuits may be damaged if operated or stored in extreme temperature.
- The display panel needs extra care during handling.
 - Do not apply any impacts on the e-Paper display as it is fragile.
 - Continuous exposure to excessive moisture (over 70% RH) or UV shortens display lifetime.
 - Ghosting image may appear in temperature conditions of less than **15°C/59°F for normal tags** and **-25°C/ -13°F for freezer tags**. (If $\Delta L^* > 2$, we call it ghosting phenomenon)
- Avoid areas with strong magnetism or subject to magnetism.
Contact between the device and a magnetic object can lead to malfunctions.
- Do not place the product near heat-producing kitchen appliances like a stove or a microwave or in the vicinity of highly pressurized containers.
- External impact to the product, such as from being dropped, can damage the product.
- Twisting and bending the product can damage the exterior casing and the internal components.
- If this product operates abnormally while removing battery or replacing battery, it needs to be

discharged by contacting the battery terminals (+) and (-) in the product.

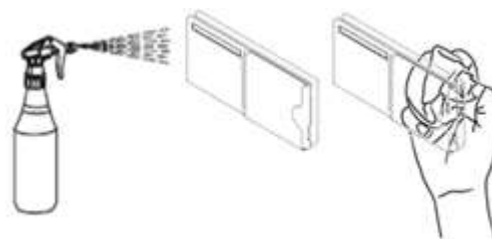
- This product uses the 2.4GHz frequency band for the wireless communication network. Radio communications can be limited or affected by other applications that share the same frequency band, such as WiFi, Bluetooth, Zigbee, etc.
- A prior investigation into the radio environment is strongly required for efficient and smooth installation.
- Frequent communications, updates and screen renewals may reduce battery life time.
- Low temperature environments may reduce battery life.
- FIFO (First In First Out)

7.3 Product Cleaning

For Spray Cleaning:

Steps

- ① Lightly spray all surfaces and wait a few seconds.
- ② Gently wipe clean using a cloth or tissue.
- ③ Let the labels dry.



Notes:

- Use mild, non-alcoholic detergents or glass cleaner.
- Recommend non-abrasive cloths: Microfiber, Cotton T-shirt, Cotton handkerchief, Cotton tea towel

For Wet Tissue Cleaning:

Steps

- ① Stand or lay down the labels.
- ② Wipe using wet tissues.
- ③ Let the labels dry.



7.4 Battery Replacement

Audience

- Authorized personnel with the following knowledge are allowed to replace the battery:
Battery / Electronic assemblies (e.g. circuit board) / Compliance with the instruction
- ※ Note: Warranty is voided if battery is replaced by unauthorized personnel.
(When batteries require replacement, please contact the authorized personnel)

Instructions

- Risk of short circuit if battery is incorrectly installed/stored.
- Check that hands are dry before and at all times during the replacement process.
- Keep batteries away from children and infants.
- Do not heat, charge, bend, drop, short-circuit and/or disassemble battery.
- Do not mix together used and new batteries or different battery types.
- ※ Note: Battery rarely has minor stain or leak.

Steps

- ① Open the battery cover.
- ② Take out the batteries.
- ③ Put in the new batteries.
- ④ Check the batteries direction.
- ⑤ Put back in the battery cover.

Battery Directional

Top: (+) Positive
Bottom: (-) Negative

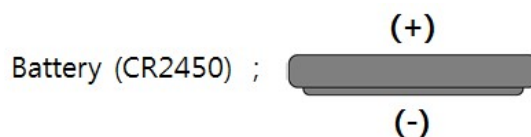


Figure 16. Battery Directional

8 Battery Handling Guide

8.1 Avoiding hazards in lithium battery handling

1. Do not short circuit (Fig. 1)

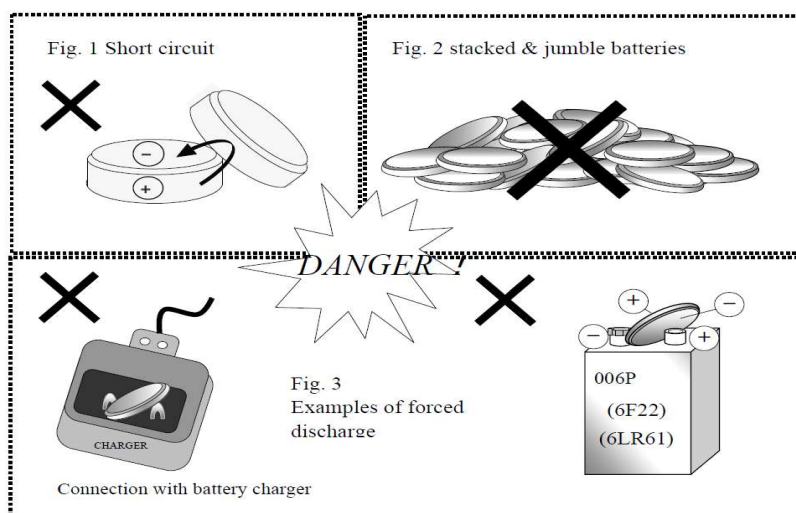
- . Direct connection of plus (+) and minus (-) poles may result in leakage, heat generation, explosion and/or fire.
- . Do not store and/or carry batteries with metallic items, such as a necklace.

2. Do not stack and/or jumble batteries (Fig. 2)

- . Stacked and/or jumbled batteries may cause a short circuit and/or forced discharge from contact with other batteries.
- . This may result in leakage, heat generation, explosion and/or fire.

3. Do not make forced discharge batteries (Fig. 3)

- . On a forced discharge by an external power source, the battery voltage goes to negative and this causes gas generation in inside of the battery.
- . This may result in leakage, heat generation, explosion and/or fire.



4. Do not dispose of batteries in fire

- . Disposal of batteries in fire is extremely dangerous with a risk of explosion and violent flaring.

5. Do not heat batteries

- . Heating batteries above 100°C/212°F may damage the resin in crimping, separator and other parts, potentially causing an electrolyte leak, internal short circuit, fire and/or explosion.

6. Do not solder directly onto batteries

- . Direct soldering onto batteries may damage the resin in crimping, separator and other parts, potentially causing an electrolyte leak, internal short circuit, fire and/or explosion.

7. Do not recharge batteries

- . Recharging of batteries may result in internal gas generation, causing electrolyte leak, battery swelling, fire and explosion.

8. Do not disassemble batteries

- . Disassembly of batteries may generate gas that may irritate your throat.
- . Lithium may also react with moisture to generate heat and fire.

9. Do not deform batteries

- . Applying extreme pressure to batteries may cause deformation of the crimping and internal short circuit, causing electrolyte leak, battery swelling, fire and explosion.

10. Do not mix different type batteries

- . For some applications, mixing different types of batteries or new and old batteries, can cause an overdischarge due to differences in voltage and discharge capacities.
- . This may lead to the risk of swelling and/or explosion.

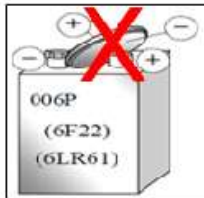
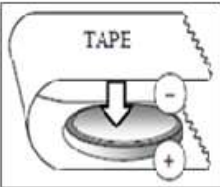
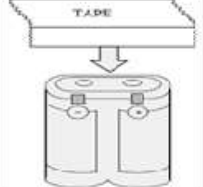
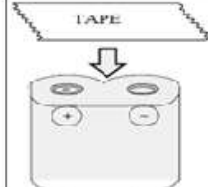
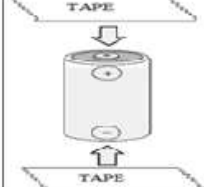
11. Do not insert batteries with opposite polarity

- . For some applications, battery insertion with opposite polarity (reverse insertion of plus and minus) may result in leakage, heat generation, explosion and/or fire.

※ **Please ensure the above precautions are strictly observed by related divisions including production, warehouse, product technology, sales, quality, customer stores, S/I companies, part-time workers, and external service companies.**

8.2 Proper Storing and Disposing of Lithium Batteries

■ To minimize risk of fire and explosion of batteries, be sure to follow the instructions below.

NG	Do not stack batteries	Do not stack batteries in a vinyl bags	Do not Short circuit	Do not make forced discharge batteries	
					
OK	Using battery tray → Tape sealing	Tape attachment to "+/- electrodes			
					

■ Proper use of battery tray is outlined below.

With batteries properly placed into each tray slot → stack the trays in the same orientation → use an empty tray on the top stack → tape the stack together to avoid falling apart.

OK	Use the battery tray	Stack on the tray	Seal the tray with tape
			

■ Follow local regulations for proper battery disposal guideline.