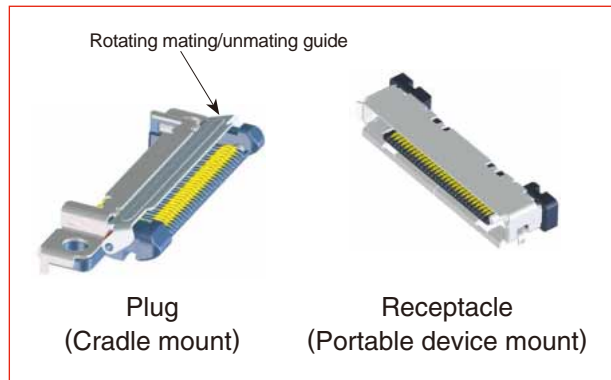
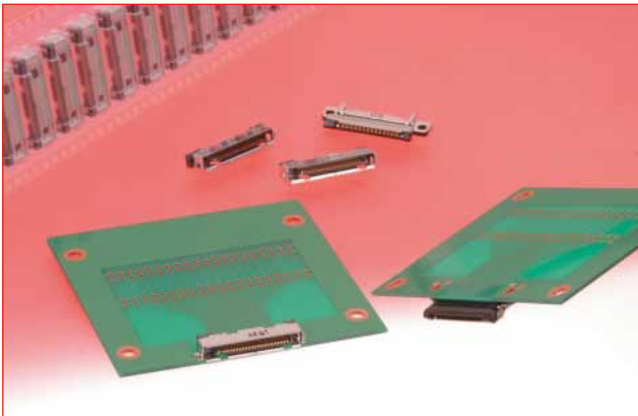


# Low-Angle Mating / Unmating Interface Connectors

## EX60B Series



### ■ Features

#### 1. Angle Mating / Unmating

The cradle mount plug incorporates a unique rotating mating/unmating guide allowing the portable device to be placed or removed at an angle, up to 20° max. In addition, the angle mating force is approximately 3N(29 pos.), with extremely low unmating forces.

#### 2. High durability

Bellow configuration of the contacts guarantees 10,000 angle mating/unmating cycles, without any degradation of electrical and mechanical performance.

#### 3. High-Speed Data Transfer

A full eye pattern is maintained at a speed of 2.5 Gbps, making it applicable for high-speed differential signals of the USB 2.0 and PCI-EXPRESS.

#### 4. Secure attachment

Standard or extended flange versions of the receptacle can be mounted directly to the portable device's case. The cradle mount plug is attached using screws.

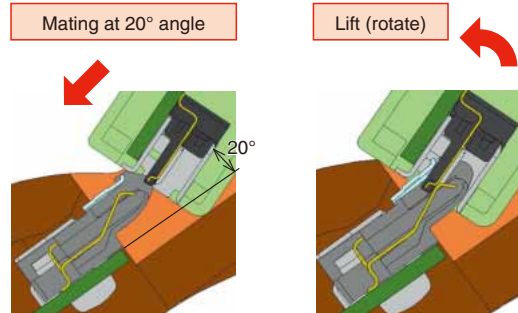
#### 5. Low profile - Space-Saving

Small size (4 mm high × 6.8 mm deep) of the Receptacle allows efficient use of space in a portable device.

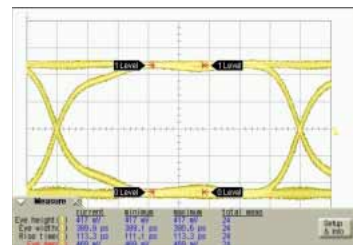
### ■ Applications

PDA and POS terminals, electronic books, tablet PCs, mobile TVs, media players, digital cameras and other devices requiring high durability angle mating/unmating connectors.

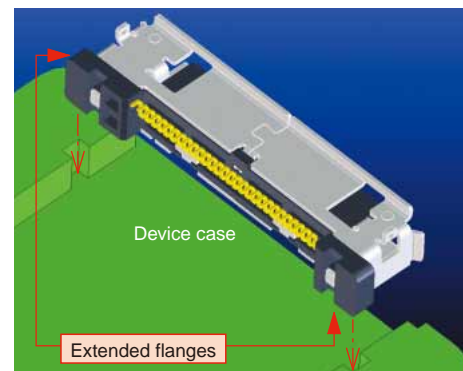
### Angle mating/unmating



### High speed data transfer 2.5 Gbps Eye Pattern Output Waveform



### Extended flange mounting



## ■ Specifications

Rating	Current rating 0.5A	Operating temperature range -55°C to +85°C
	Voltage rating 125V AC	

Characteristic	Specification	Conditions
1. Insulation resistance	1000MΩ min.	250V DC
2. Dielectric withstanding voltage	No flashover or insulation breakdown.	250V AC/ one minute
3. Contact resistance	60mΩ max.	100mA DC
4. Vibration	No electrical discontinuity of 1μ sec. max. Contact resistance: 100mΩ max.	Frequency: 10 to 55 Hz, single amplitude of 0.75mm, for 2 hours in 6 axis.
5. Shock	No electrical discontinuity of 1μ sec. max. Contact resistance: 100mΩ max.	Acceleration of 490 m/s <sup>2</sup> , 11 ms duration, sine half-wave waveform, 3 cycles in each of the 6 axis.
6. Mating/un-mating forces	Mating: 10N max. (Horizontal), 5N max. (At 20° angle) Un-mating: 10N max. (Horizontal), 2N max. (At 20° angle)	With corresponding connector.
7. Durability (mating/un-mating)	Contact resistance: 100mΩ max.	5000 cycles (Straight mating) 10000 cycles (At 20° angle)
8. Temperature cycle	Contact resistance: 100mΩ max. Insulation resistance: 1000M Ω min.	Temperature : -55°C → +15°C to +35°C → +85°C → +15°C to +35°C Time (Minutes) : 30 → 2 to 3 → 30 → 2 to 3 5 cycles
9. Humidity	Contact resistance: 100mΩ max. Insulation resistance: 5MΩ min. (Dry state)	96 hours at temperature of 60°C and humidity of 90% to 95%.
10. Salt spray	No corrosions	5% salt water solution for 48 hours

Note: Includes temperature rise caused by the current flow.

## ■ Materials/ Finish

### ● Receptacles (Portable device mount)

Component	Material	Finish	Remarks
Insulator	LCP	Color: Black	UL94V-0
Contacts	Copper alloy	Contact area: Gold plated	—
Metal shield	Stainless steel	Tin plated	—

### ● Plugs (Cradle mount)

Component	Material	Finish	Remarks
Insulator	Polyamide	Color: Black	UL94V-0
Contacts	Copper alloy	Contact area: Gold plated	—
Metal shield	Stainless steel	Tin-plated	—
Guide	Stainless steel	—	—
Spring	Stainless steel	—	—

## ■ Ordering information

### ● Receptacles (Portable device mount)

**EX 60 B - 29 P - FL**  
① ② ① ③ ④ ⑤

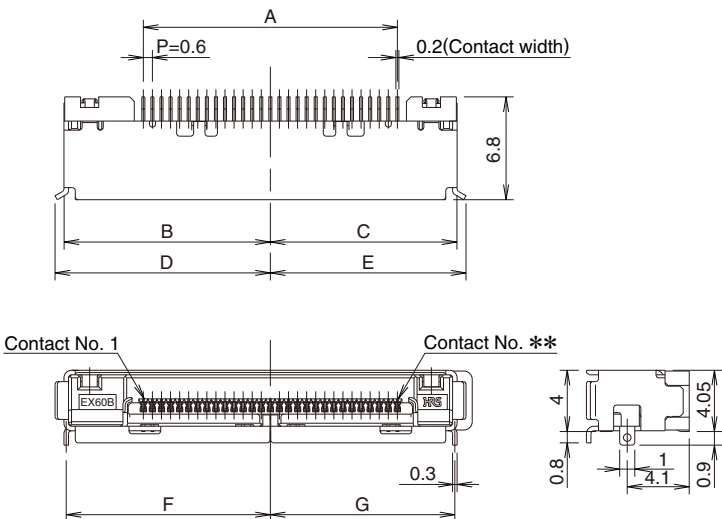
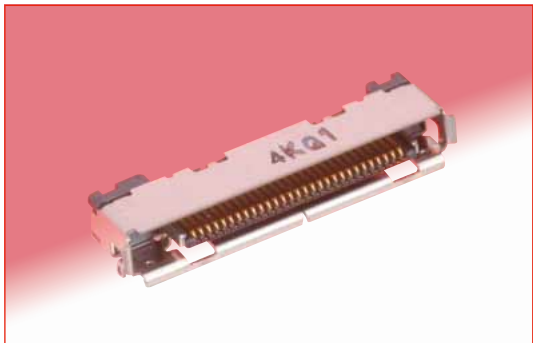
### ● Plugs (Cradle mount)

**EX 60 B - 29 S**  
① ② ① ③ ④

① Series name	: EXB
② Termination type	: 60 : Right angle SMT
③ Number of contacts	: 15, 29
④ Contact type	P : Male contact (Receptacle = device mount) S : Female contact (Plug = cradle mount)
⑤ Option	FL : Extended flanges

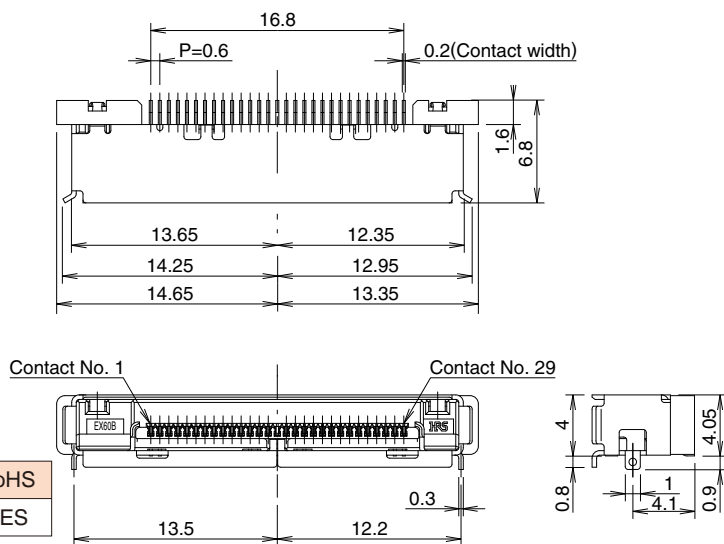
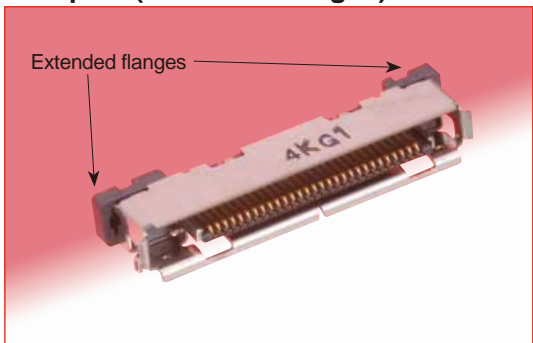
## ■ Receptacles

### ● 15 pos., 29 pos. (Standard)



Part number	CL No.	HRS No.	A	B	C	D	E	F	G	RoHS
EX60B-29P	29	CL232-0611-5	16.8	13.65	12.35	14.25	12.95	13.5	12.2	YES
EX60B-15P	15	CL232-0621-9	8.4	9.45	8.15	10.05	8.75	9.3	8.0	

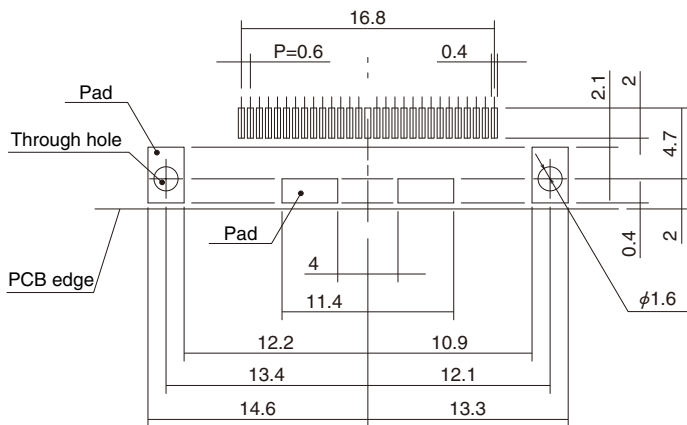
### ● 29 pos. (Extended flanges)



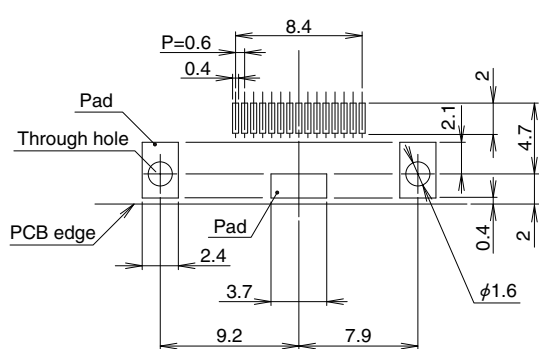
Part number	CL No.	RoHS
EX60B-29P-FL	232-0612-8	YES

### ◆ Recommended PCB mounting pattern

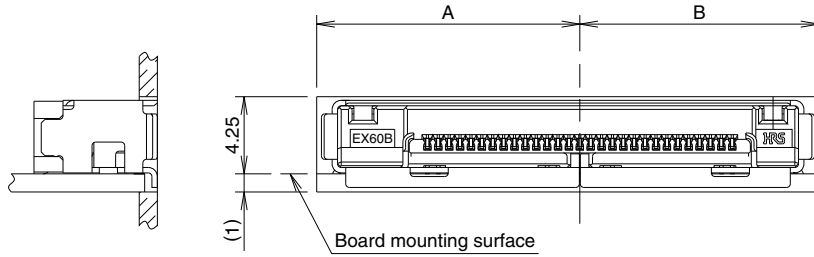
#### ● EX60B-29P and EX60B-29P-FL



#### ● EX60B-15P

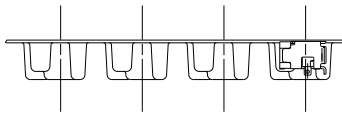
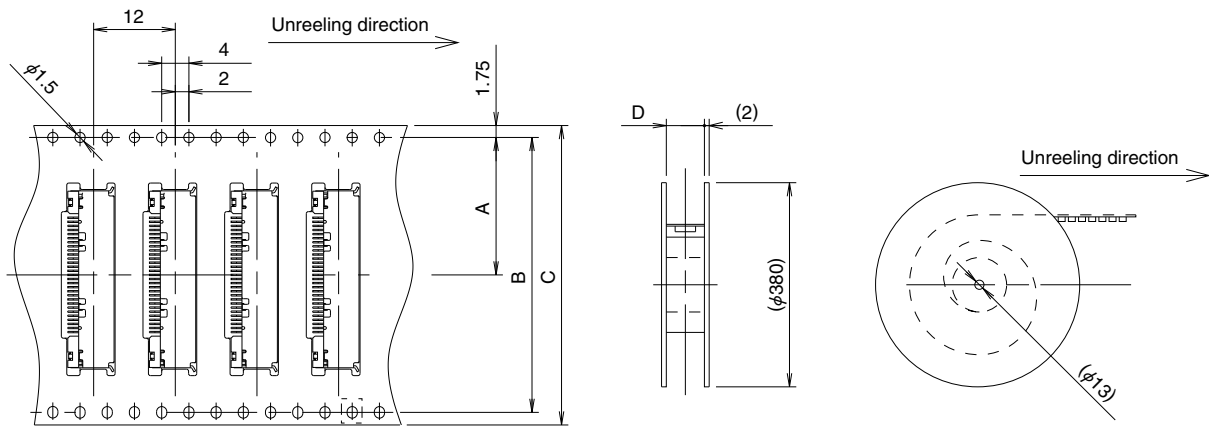


### Portable device case cutout



Part number	A	B
EX60B-29P	14.5	13.2
EX60B-29P-FL		
EX60B-15P	10.3	9

### Packaging specifications

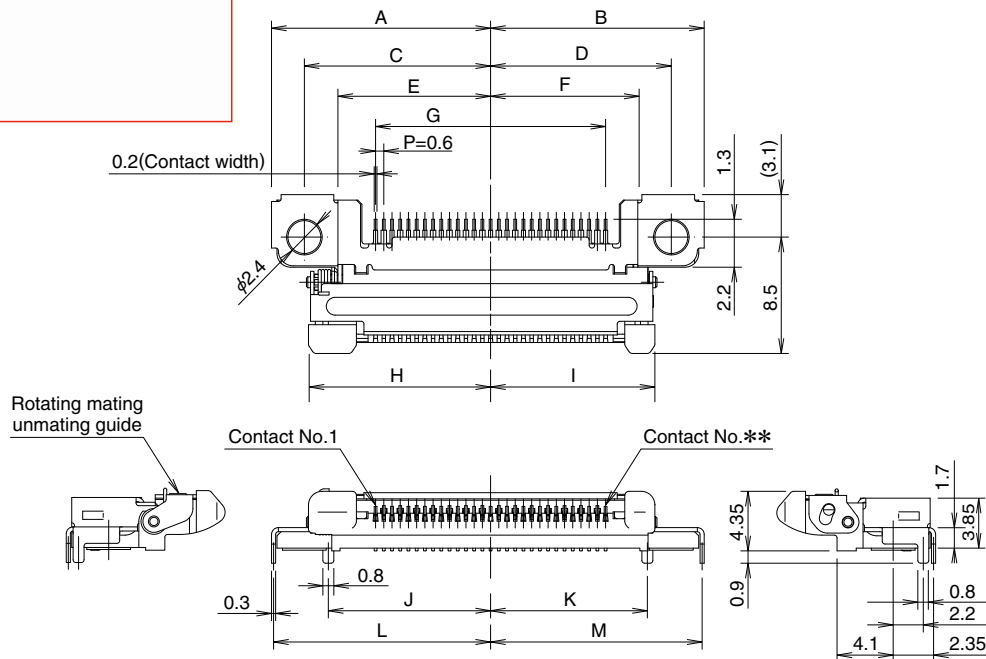
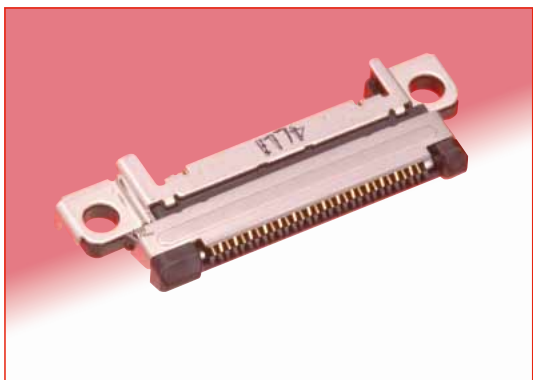


Part number	A	B	C	D
EX60B-29P	20.2	40.4	44.0	44.4
EX60B-29P-FL				
EX60B-15P	14.2	28.4	32.0	32.4

Note: 1,200 pieces per reel.

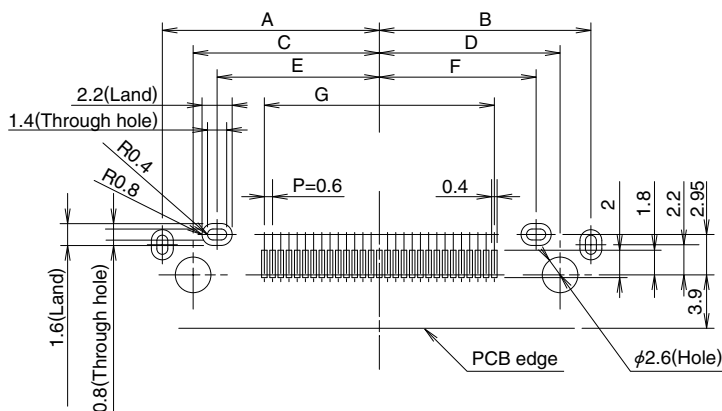
### ■ Plug (Cradle mount)

● 15 pos., 29 pos.



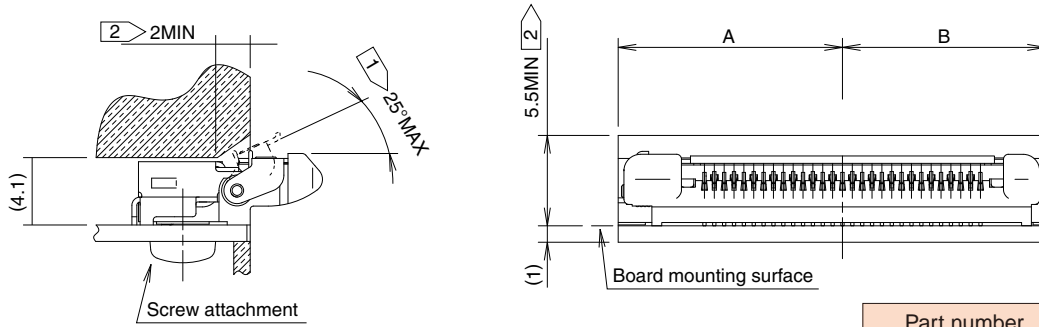
Part number	Number of contacts	HRS No.	A	B	C	D	E	F	G	H	I	J	K	L	M	RoHS
EX60B-29S	29	CL232-0613-0	(16.0)	(15.6)	13.6	13.2	11.15	10.75	16.8	13.3	12.0	11.85	11.45	15.85	15.45	YES
EX60B-15S	15	CL232-0622-1	(11.8)	(11.4)	9.4	9.0	6.95	6.55	8.4	9.1	7.8	7.65	7.25	11.65	11.25	

### ■ Recommended PCB mounting pattern



Part number	A	B	C	D	E	F	G
EX60B-29S	15.85	15.45	13.6	13.2	11.85	11.45	16.8
EX60B-15S	11.65	11.25	9.4	9.0	7.65	7.25	8.4

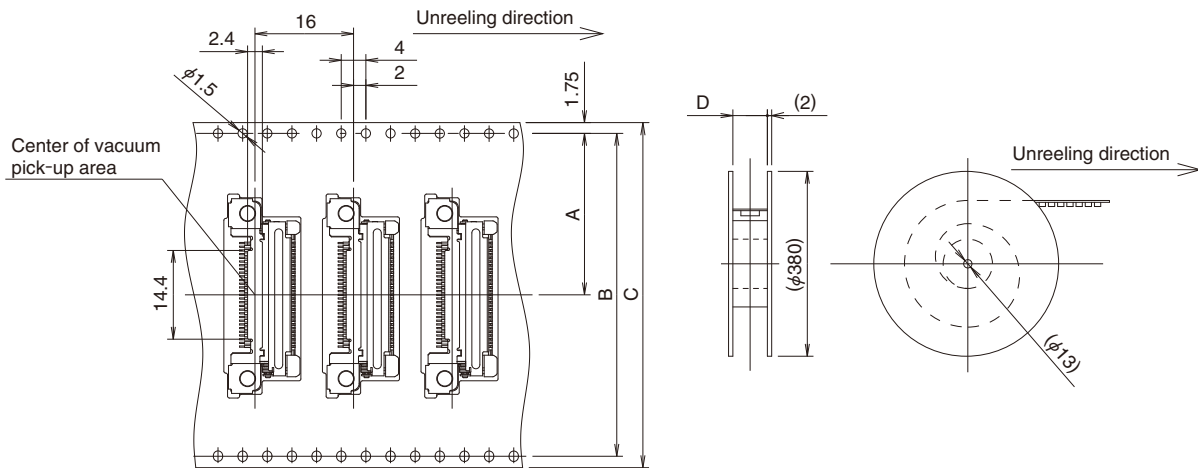
### ■ Cradle case mounting recommendations - Plug



Part number	A	B
EX60B-29S	13.65	12.35
EX60B-15S	9.45	8.15

- Notes 1 The maximum opening angle of the rotating mating/unmating guide is 25°. Do not exceed this angle.  
 Notes 2 Device's case must have the recommended cutout dimensions.  
 Assume that there is no interference with the free movement and operation of the mating/unmating guide.  
 Notes 3 Use screw (not supplied) to attach the receptacle to the case.

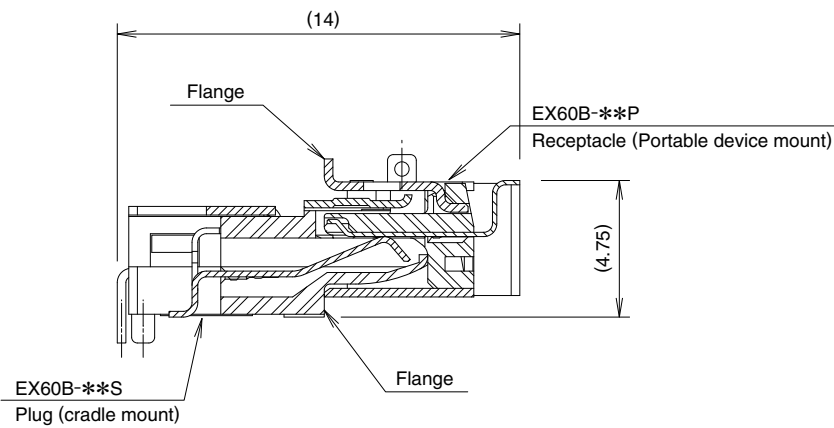
### ■ Packaging Specifications (Plug, EX60B-29S)



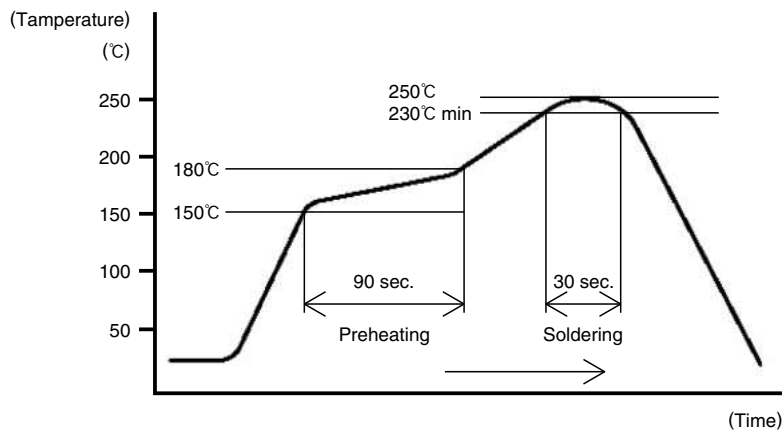
Part number	A	B	C	D
EX60B-29S	26.2	52.4	56.0	56.4
EX60B-15S	20.2	40.4	44.0	44.4

Note: 800 pieces per reel.

## ■ Mating cross-section



## ■ Recommended Temperature Profile



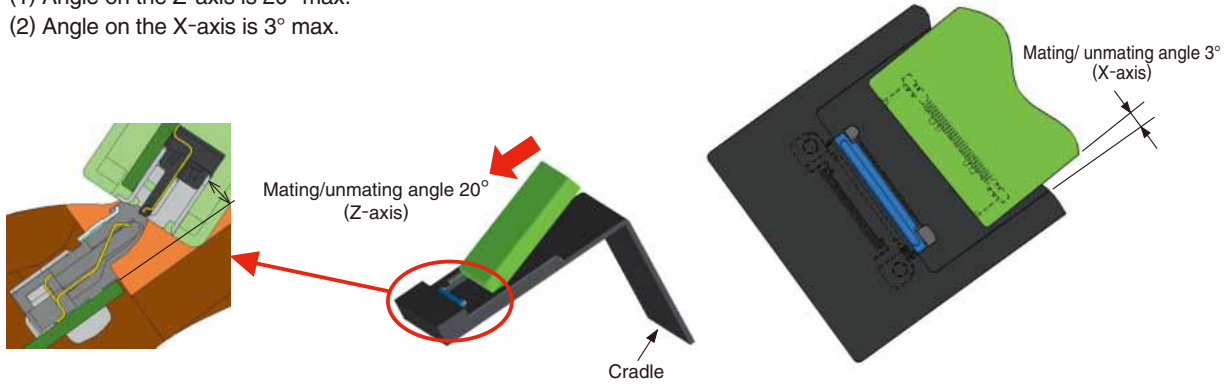
Note 1: Up to 2 cycles of Reflow soldering are possible under the same conditions, provided that there is a return to normal temperature between the first and second cycle.

Note 2: The temperature profile indicates the board surface temperature at the point of contacts with the connector terminals.

## Portable device case and cradle design requirements

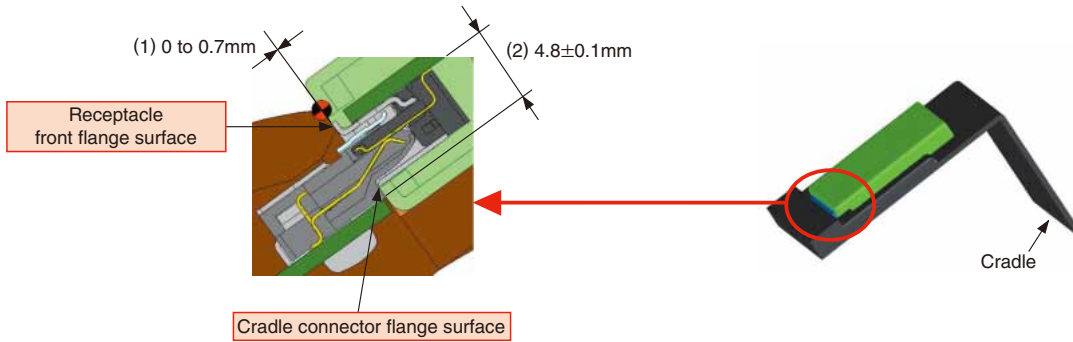
### 1. Mating/unmating angles (see illustrations below)

- (1) Angle on the Z-axis is 20° max.
- (2) Angle on the X-axis is 3° max.



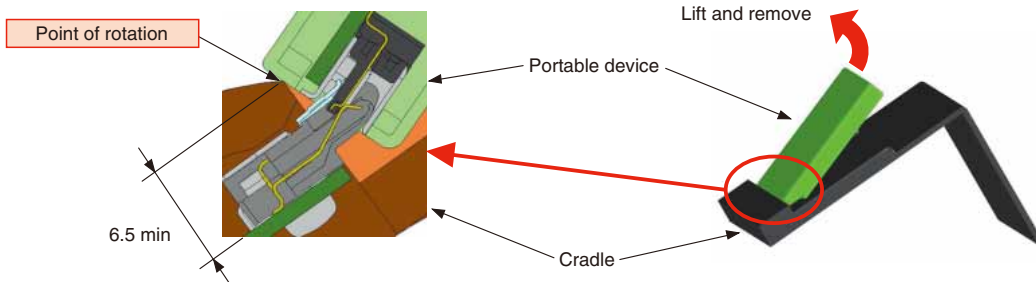
### 2. Dimensional requirements

- (1) Distance between the flanges of the receptacle and plug: 0 to 0.7 mm.
- (2) Distance between the PCB mounting surface of the plug (cradle) and the PCB surface of the receptacle (portable device): 4.8±0.1 mm.



### 3. Portable device removal

The point of the rotation of the portable device during it's removal from the cradle should be at the distance of 6.5 mm min. as illustrated below.



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