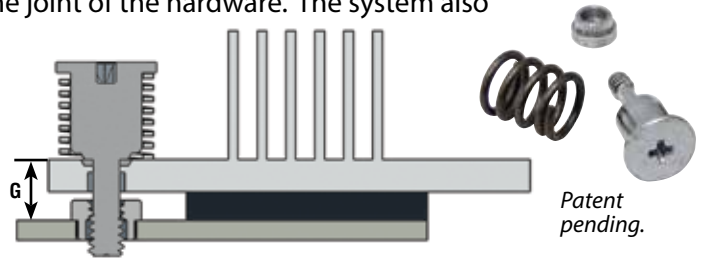




Heat Sink Mounting System

The new HSCB engineered mounting system provides secure attachment of a heat sink to the circuit board while providing firm contact to the chip component allowing optimum heat dissipation. The three-piece fastening system, sold individually, includes the screw, spring and receptacle nut. The clamp load created is determined by the spring rate and the amount of deflection that is designed into the joint of the hardware. The system also allows for slight expansion and contraction of the joint components without stress to the delicate circuitry. The unique "click" feature lets the user know when the fastener is completely installed.



Features and Benefits

- Screw can not be overtightened. Audible "click" when fully engaged.
- Screw and spring mount together permanently into the heat sink.
- Spring determines clamp force.
- Receptacle nut mounts permanently to the PC board.
- Provides even, constant contact of heat sink to chip component.
- Allows removal of heat sink if desired.

To select proper length code of nut/standoff:

- 1) Determine "G", the distance from the top surface of the heat sink to the top of the P.C. Board.
- 2) Find the combination of Screw (HSCB) and Nut (HSR) whose sum of Screw Factor (SF) plus Nut Factor (NF) are closest to G.
- 3) Find $D = G - SF - NF$. The D value must be a negative number between zero and 1mm or 1/32" (1 dash length of HSR nut).
- 4) The actual working load is equal to the Spring (HSL) Working Load + (D x spring rate k). Lower D value results in lower force.

If this does not meet your application needs, contact our PEM Technical Support group at techsupport@pemnet.com to develop a special product that matches your specific application.

TYPE HSCB™ SELF-CAPTIVATING SCREW

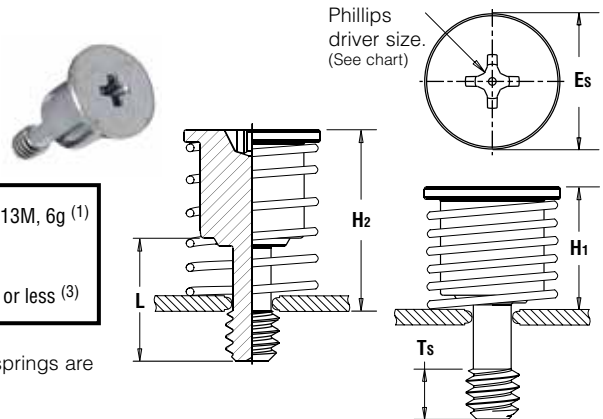
Part Number Designation

HSCB - 440 - 4 ZI

Type Thread Size Code Length Code Finish

Threads: External, ASME B1.1, 2A / ASME B1.13M, 6g ⁽¹⁾
Material: Hardened Carbon Steel
Finish: ZI - Zinc plated, 5µm, colorless ⁽²⁾
For Use In Sheet Hardness: HRB 80 / HB 150 or less ⁽³⁾

NOTE: HSCB screws, HSR nuts and HSL springs are sold separately.



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code "L" ±0.015	Min. Sheet Thickness	Hole Size in Sheet +.003 - .000	Es ±.010	H1 Ref.	H2 Ref.	Ts Min.	Screw Factor (SF)	Driver Size	Min. Dist Hole ⌀ To Edge
				.320									
	.112-40 (#4-40)	HSCB	440	4	.040	.112	.312	.300	.470	.130	.170	#1	.156
	.138-32 (#6-32)	HSCB	632	4	.040	.138	.352	.300	.470	.130	.170	#2	.178

All dimensions are in millimeters.

METRIC	Thread Size x Pitch	Type	Thread Code	Length Code "L" ±0.4	Min. Sheet Thickness	Hole Size in Sheet +0.08	Es ±0.25	H1 Ref.	H2 Ref.	Ts Min.	Screw Factor (SF)	Driver Size	Min. Dist Hole ⌀ To Edge
				8.13									
	M3 x 0.5	HSCB	M3	3	1	3	8.18	7.67	12	3.3	4.32	#1	4.13

(1) As with all Class 2A/6g external threads with an additive finish, the maximum major and pitch, after plating, may equal basic sizes and be gauged to Class 3A/4h, per ANSI B1.1, Section 8, Table 3A and ANSI B1.13M, Section 8, Paragraph 8.2.

(2) See PEM Technical Support section of our web site (www.pemnet.com) for related plating standards and specifications.

(3) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.



Heat Sink Mounting System

TYPE HSR™ BROACHING NUT/STANDOFF

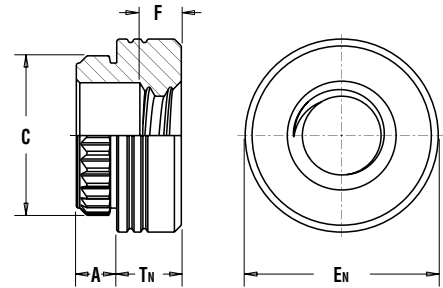
Part Number Designation

HSR - **440** - **2** **ET**

↓ ↓ ↓ ↓

Type **Thread Size Code** **Length Code** **Finish**

Threads: Internal, ASME B1.1, 2B / ASME B1.13M, 6H
Material: Carbon Steel
Finish: ET - Electro-plated Bright Tin ASTM B 545, Class B With Clear Preservative Coating (1)
For Use In Sheet Hardness: HRB 60 / HB 107 or less (2)



All dimensions are in inches.

UNIFIED	Thread Size	Type	Thread Code	Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +.003 -.000	C ±.003	EN ±.005	F ±.010	TN ±.005	Nut Factor (NF)	Min. Dist. Hole To Edge
	.112-40 (#4-40)	HSR	440	2	.060	.060	.166	.184	.219	.060	.065	.000	.017
3	.093												
.138-32 (#6-32)	HSR	632	2	.060	.060	.213	.231	.281	.060	.065	.000	.022	
			3										.093

All dimensions are in millimeters.

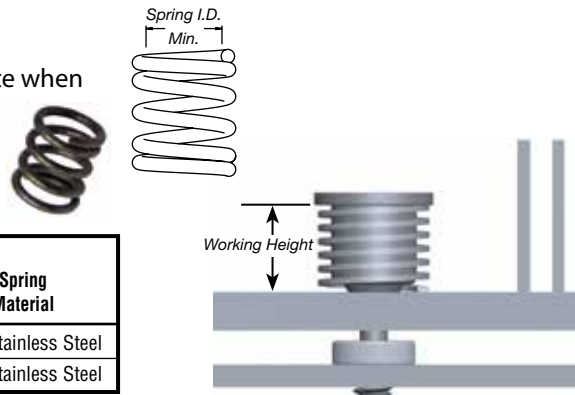
METRIC	Thread Size x Pitch	Type	Thread Code	Length Code	A (Shank) Max.	Min. Sheet Thickness	Hole Size In Sheet +0.08	C ±0.08	EN ±0.13	F ±0.25	TN ±0.13	Nut Factor (NF)	Min. Dist. Hole To Edge
	M3 x 0.5	HSR	M3	2	1.53	1.53	4.22	4.68	5.56	1.3	2	.75	4.4
3				1.75									

NOTE: HSCB screws, HSR nuts and HSL springs are sold separately.

- (1) See PEM Technical Support section of our web site (www.pemnet.com) for related plating standards and specifications.
 (2) HRB - Hardness Rockwell "B" Scale. HB - Hardness Brinell.

TYPE HSL™ SPRINGS

HSL springs are engineered to provide a reliable and repeatable spring rate when assembled with mating PEM hardware. The spring rate is critical to the successful assembly of your heat sink. Clamp load will be determined by the spring rate and deflection that is designed into the joint.



Part Number	Minimum Inside Dia.		Load at Working Height ±10%		Working Height Ref.		Spring Rate k		Spring Material
	(in.)	(mm)	(lbs.)	(N)	(in.)	(mm)	(lb/in)	(N/mm)	
HSL-574-35	.226	5.74	7.87	35	.270	6.86	74	12.96	17-7 Stainless Steel
HSL-701-35	.276	7.01	7.87	35	.270	6.86	39	6.84	17-7 Stainless Steel

NOTE: HSCB screws, HSR nuts and HSL springs are sold separately. HSL-574-35 spring fits screw thread sizes #4-40 and M3 and HSL-701-35 spring fits screw thread size #6-32.

Part Number Designation

HSL - **574** - **35**

↓ ↓ ↓

Type **Inside Dia. Code** **Load Code**

The HSL **Inside Diameter Code** is expressed in hundredths of millimeters. Example "574" indicates a minimum inside diameter of 5.74mm or .226".

The HSL **Load Code** is expressed in Newtons developed at the working height of the spring once the joint is assembled. Example "35" indicates working load of 35 Newtons, or approximately 8 lbs.

For designs requiring a specific spring rate, contact our PEM Technical Support group at techsupport@pemnet.com

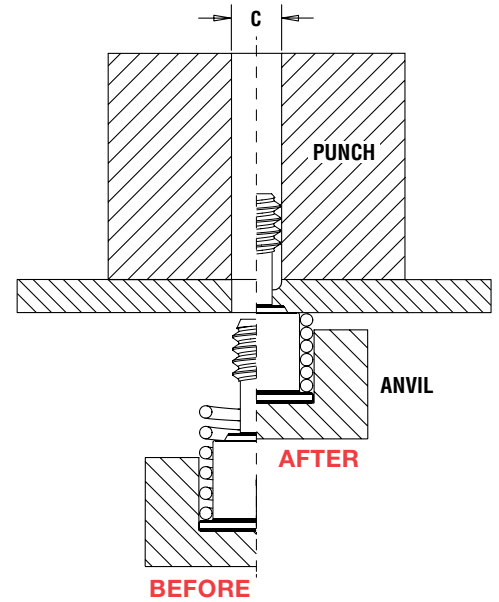


Heat Sink Mounting System

INSTALLATION

Type HSCB fastener into heat sink

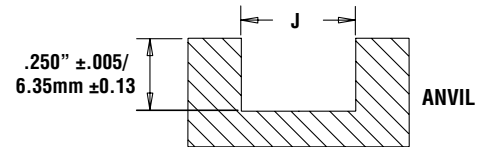
1. Prepare properly sized mounting hole in heat sink. Do not perform any secondary operations such as deburring. If the hole is punched, be sure to install the fastener into the punch side of the hole.
2. Place the head of the screw into the recess of the installation anvil.
3. Place the spring over the shoulder of the screw, maintaining concentricity.
4. Position the heat sink mounting hole over the screw.
5. Bring the heat sink down over the screw and onto the shoulder of the screw.
6. With the punch and anvil surfaces parallel, apply a squeezing force to the heatsink and the head of the screw. The squeezing action forces the displacer of the screw into the heatsink, causing it to reduce the mounting hole diameter and captivate the screw and spring.



PEMSERTER® Installation Tooling For HSCB Screw

UNIFIED	Thread Code	Installation Tooling Dimensions (in.)		Anvil Part Number	Punch Part Number
		C	J		
	440	.113 - .116	.322 - .324	8018043	970200006300
	632	.139 - .142	.362 - .364	8018044	970200007300

METRIC	Thread Code	Installation Tooling Dimensions (mm)		Anvil Part Number	Punch Part Number
		C	J		
	M3	3.03 - 3.11	8.43 - 8.48	801845	970200229300



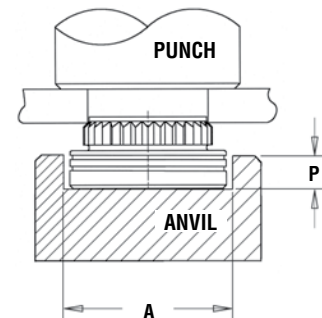
Type HSR nut/standoff

- 1) Prepare properly sized mounting hole in board.
- 2) Place fastener into the anvil hole and place the mounting hole over the shank of the fastener as shown in drawing.
- 3) With installation punch and anvil surfaces parallel, apply squeezing force until shoulder contacts the board.

PEMSERTER® Installation Tooling For HSR Nut

UNIFIED	Thread Code	Anvil Dimensions (in.)		Anvil Part Number	Punch Part Number
		A	P ±.005		
	HSR-440	.228 - .231	.115	975200846300	9752000048
	HSR-632	.290 - .293	.115	975200849300	9752000048

METRIC	Thread Code	Anvil Dimensions (mm)		Anvil Part Number	Punch Part Number
		A	P ±0.13		
	HSR-M3	5.8 - 5.86	2.92	975200846300	9752000048



Final assembly

Once the screw and spring are captivated, assemble the heat sink to the circuit board by tightening the screw into the receptacle nut or standoff until the audible "click" is heard. The screw will continue to rotate, but will no longer be engaged in the threads or continue to actively tighten.



Heat Sink Mounting System

PERFORMANCE DATA⁽¹⁾

Type HSCB (screw)

UNIFIED	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-rolled Steel	
			Installation (lbs.)	Pushout (lbs.)	Installation (lbs.)	Pushout (lbs.)
	HSCB	440	1900	60	2600	80
	HSCB	632	2000	90	3500	120

METRIC	Type	Thread Code	Test Sheet Material			
			Aluminum		Cold-rolled Steel	
			Installation (kN)	Pushout (N)	Installation (kN)	Pushout (N)
	HSCB	M3	8	265	12	355

Type HSR (nut)

UNIFIED	Type	Thread Code	Test Sheet Material	
			.060" FR-4 Panel	
			Installation (lbs.)	Pushout (lbs.)
	HSR	440	400	65
	HSR	632	500	80

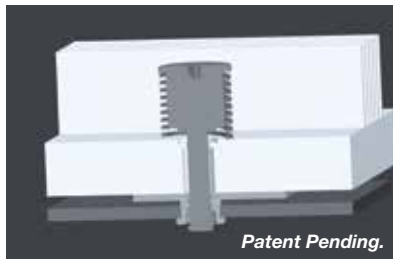
METRIC	Type	Thread Code	Test Sheet Material	
			1.5mm FR-4 Panel	
			Installation (kN)	Pushout (N)
	HSR	M3	2.2	290

(1) Unless specified, performance values reported are averages when all installation specifications and procedures are followed. Variations in mounting hole size, sheet material and installation force will affect results. Performance testing of this product in your application is recommended. We will be happy to provide samples for this purpose.

(2) Torque values shown will produce a preload of 70% minimum tensile (125 ksi / 935 MPa) with nut factor "k" equal to .1

VALUE-ADDED CAPABILITIES

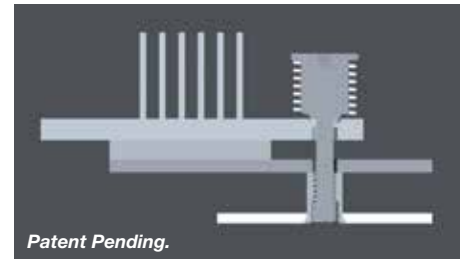
Low-profile Designs



For low-profile designs, install a custom PennEngineering broaching or surface mounted nut on the bottom of the circuit board.

Patent Pending.

Using a Standoff as the Receptacle



Variations in design can include using a custom PennEngineering standoff as the receptacle for the screw.

Patent Pending.



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