

ĐỀ THI LẮP RÁP

NGHỀ: ĐIỆN TỬ

(Thời gian làm bài: 180 phút)

Họ và tên thí sinh:.....

Trường:.....

ASSEMBLY

NỘI DUNG ĐỀ THI

Đề thi bao gồm 5 phần:

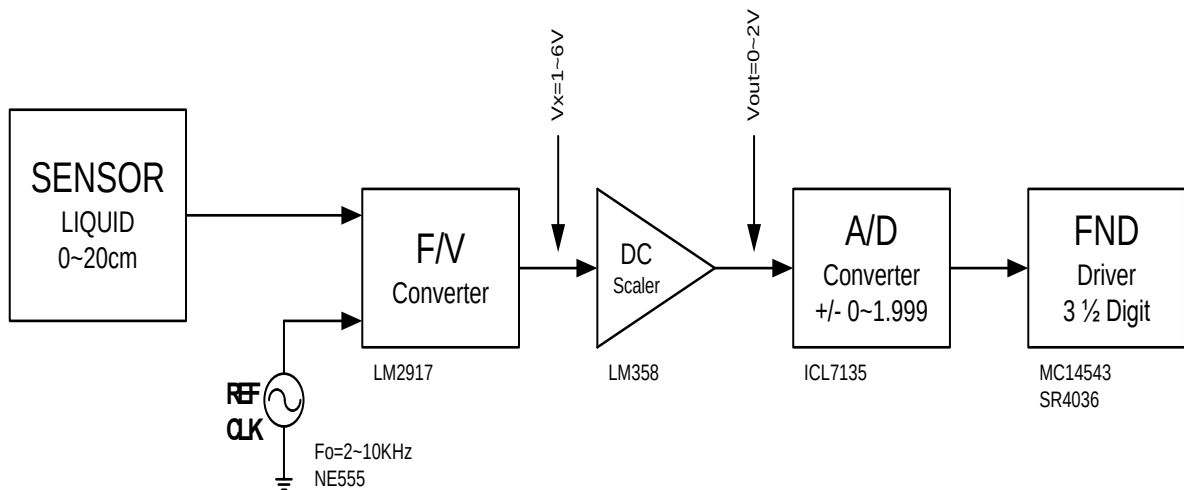
1. Giới thiệu về đề thi và yêu cầu của đề thi lắp ráp.
2. Sơ đồ nguyên lý (Có file pdf độ phân giải cao kèm theo trên máy tính).
3. Sơ đồ mạch in (Có file pdf độ phân giải cao kèm theo trên máy tính).
4. Danh sách linh kiện cung cấp cho đề thi.
5. Thang điểm đề thi.

1. GIỚI THIỆU ĐỀ THI LẮP RÁP.

1.1 Chức năng mạch đề thi.

Đề thi lắp ráp là một bộ đo mức chất lỏng trong bình thí nghiệm. Bo mạch đề thi và linh kiện cho phần thi lắp ráp được sử dụng từ phần thi thiết kế phần cứng. Những thí sinh không xin mạch của ban tổ chức thì sử dụng chính bo mạch của mình đã thiết kế được ban tổ chức phay cho để lắp ráp. Những thí sinh xin mạch ban tổ chức thì sẽ lắp ráp trên một bo mạch mẫu được ban tổ chức phay sẵn để lắp ráp.

Sơ đồ khối của bộ nguồn như hình bên dưới:



Hình 1: Sơ đồ khối mạch đo mức chất lỏng

1.2 Yêu cầu đối với thí sinh.

Trong thời gian 180 phút thí sinh dựa vào đề thi, sơ đồ nguyên lý, sơ đồ mạch in do thí sinh tự thiết kế hoặc xin bo mạch của ban tổ chức và các nguyên vật liệu được cung cấp bởi ban tổ chức lắp ráp hoàn chỉnh sản phẩm. Sau khi lắp ráp xong thí sinh vận hành và kiểm tra các tính năng của sản phẩm.

Quy trình lắp ráp được thực hiện như sau:

Bước 1: Chuẩn bị dụng cụ, thiết bị cần thiết để lắp ráp theo bảng bên dưới:

STT	SỐ LƯỢNG	THIẾT BỊ	MÔ TẢ	GHI CHÚ
1	1	Mỏ hàn		
2	1	Đế gác mỏ hàn		
3	1	Dây (thiếc)		
4	1	Lead Bender (thiết bị tạo chân cho linh kiện)		
5	1	Kìm kẹp		
6	1	Kìm cắt chân linh kiện		
7	1	Kìm tước dây		
8	1	Kéo		
9	1	Nhíp		
10	1	Cây hút IC		
11	1	Kẹp board		
12	1	Hộp đựng linh kiện		
13	1	Tua vít dẹt	Để điều chỉnh biến trở trimmer	
14	1	Tua vít 4 cạnh		
15	1	Tua vít dẹt		
16	1	Khóa (mỏ lết)		
17	1	Box wrench (cờ lê)	5mm, for M3 nut	
18	1	Thước đo	300mm	
19	1	Kính bảo vệ		
20	1	Găng tay		
21	1	Bàn chải		

Bước 2: Lắp ráp linh kiện điện tử

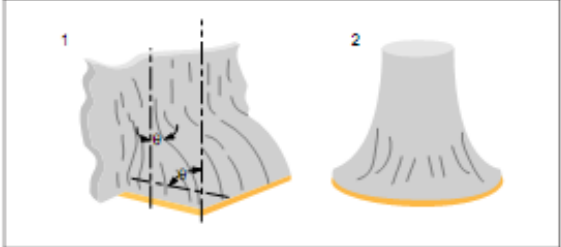
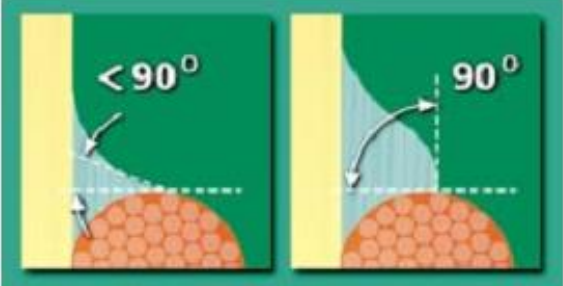
Bước 3: Vận hành và kiểm tra chức năng mạch

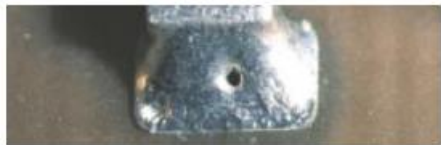
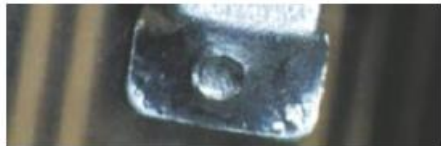
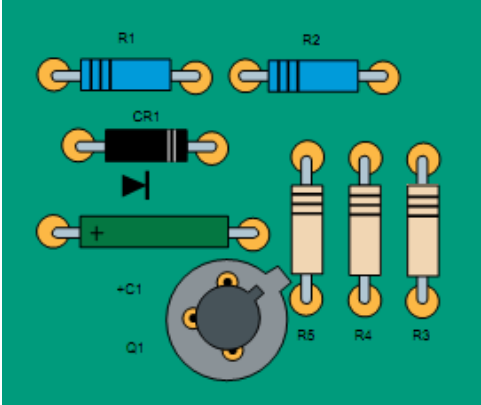
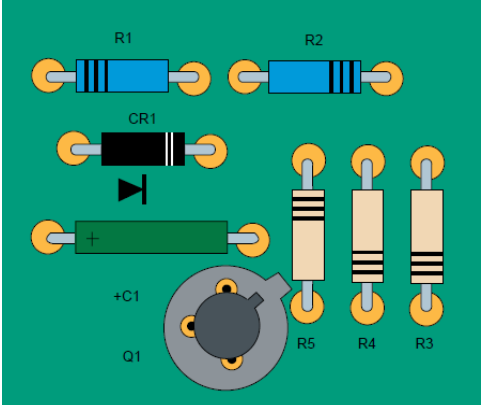
Trước khi cắm nguồn để kiểm tra chức năng mạch thí sinh phải được sự cho phép và kiểm tra sơ bộ trước của đội ngũ chuyên gia kỹ thuật.

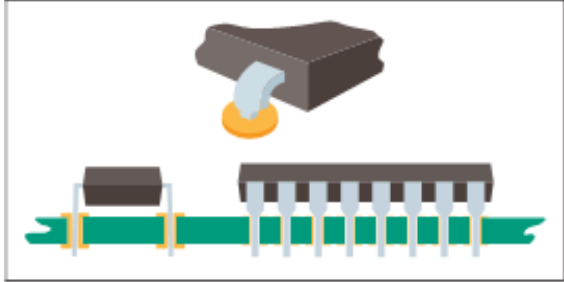
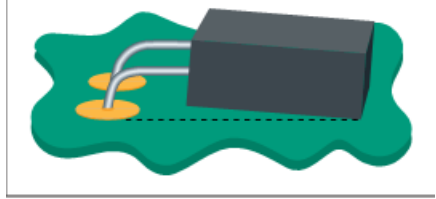
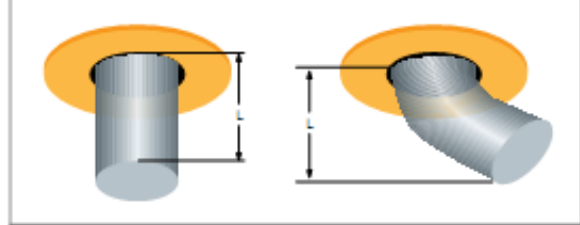
Sau khi được cho phép thí sinh tiến hành kiểm tra mạch và điều chỉnh chức năng hoạt động của mạch

2. TIÊU CHUẨN LẮP RÁP

- Toàn bộ tiêu chuẩn lắp ráp được căn cứ theo tiêu chuẩn thế giới về lắp ráp mạch điện tử IPC-610-D.

Target - Class 1,2,3 • Solder fillet appears generally smooth and exhibits good wetting of the solder to the parts being joined. • Outline of the lead is easily determined. • Solder at the part being joined creates a feathered edge. • Fillet is concave in shape.	 Figure 5-2
Acceptable - Class 1,2,3 • There are materials and processes, e.g., lead free alloys and slow cooling with large mass PCBs, that may produce dull matte, gray, or grainy appearing solders that are normal for the material or process involved. These solder connections are acceptable. • The solder connection wetting angle (solder to component and solder to PCB termination do not exceed 90° (Figure 5-1 A, B). • As an exception, the solder connection to a termination may exhibit a wetting angle exceeding 90° (Figure 5-1 C, D) when it is created by the solder contour extending over the edge of the solderable termination area or solder resist.	 Figure 5-3

Defect - Class 2,3 Solder connections where pin holes, blow holes, voids, etc. reduce the connections below minimum requirements (not shown).	 Figure 5-31  Figure 5-32  Figure 5-33
Target - Class 1,2,3 - Components are centered between their lands. - Component markings are discernible. - Nonpolarized components are oriented so that markings all read the same way (left-to-right or top-to-bottom). Acceptable - Class 1,2,3 - Polarized and multilead components are oriented correctly. - When hand formed and hand-inserted, polarization symbols are discernible. - All components are as specified and terminate to correct lands. - Nonpolarized components are not oriented so that markings all read the same way (left-to-right or top-to-bottom).	7.1.1.1, S. 137  Figure 7-1 

Target - Class 1,2,3 • Standoff step on all leads rests on the land. • Lead protrusion meets requirements, see 7.4.3 and 7.5.3.	 Figure 7-24
Acceptable - Class 1,2,3 • Amount of tilt is limited by minimum lead protrusion and height requirements.	 Figure 7-26
Target - Class 1,2,3 • The component body is in flat contact with the board's surface. • Bonding material is present, if required. See 7.3.2.	 Figure 7-39
Acceptable - Class 1,2,3 • Component in contact with board on at least one side and/or surface.	 Figure 7-40
Defect - Class 1,2,3 • Unbonded component body not in contact with mounting surface. • Bonding material not present if required.	 Figure 7-41
Target - Class 1,2,3 • The protrusion of leads and wires beyond the conductive surface is (L) or as specified on the specification or drawing. Acceptable - Class 1,2,3 • The leads protrude beyond the land within the specified minimum and maximum (L) of Table 7-2, provided there is no danger of violating minimum electrical clearance.	 Figure 7-75

Defect - Class 1,2,3

- Lead protrusion does not meet Table 7-2 requirements.
- Lead protrusion violates minimum electrical clearance.
- Lead protrusion exceeds maximum design height requirements.

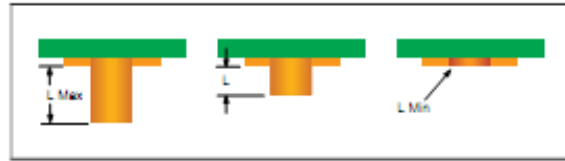


Figure 7-76

Table 7-2 Protrusion of Leads in Unsupported Holes

	Class 1	Class 2	Class 3
(L) min	End is discernible in solder		Sufficient to clinch
(L) max	No danger of shorts	2.5 mm [0.0984 in]	No danger of shorts

Target - Class 1,2,3

- There is 100% fill.

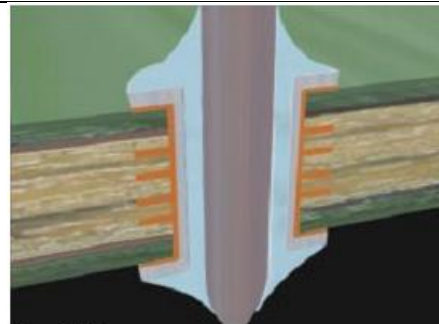


Figure 7-108

Acceptable - Class 1,2,3

- Minimum 75% fill. A maximum of 25% total depression, including both secondary and primary sides is permitted.

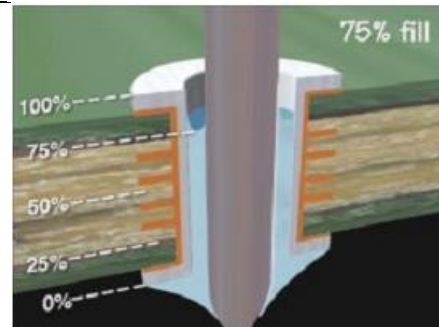


Figure 7-109

Defect - Class 2,3

- Vertical fill of hole is less than 75%.

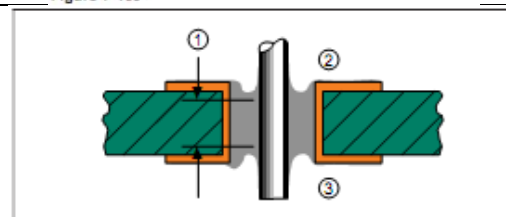
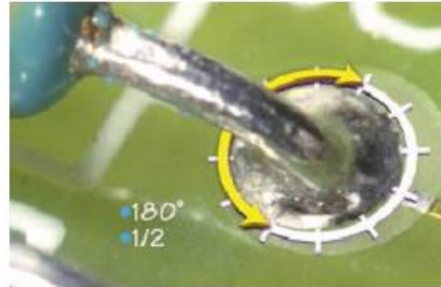
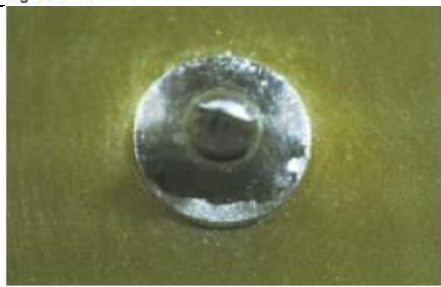
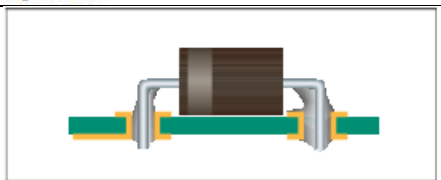
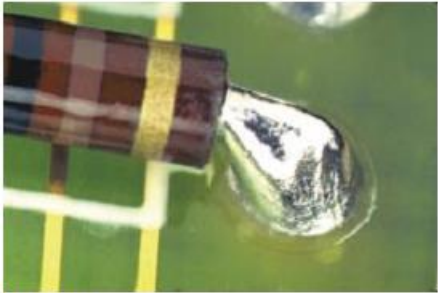
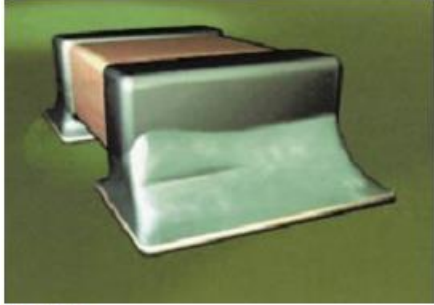
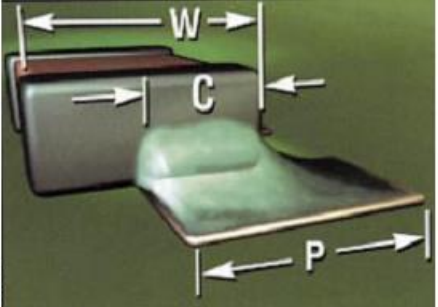
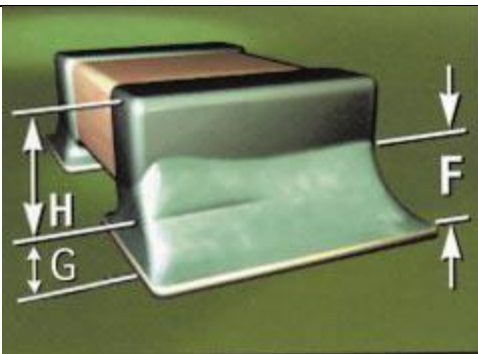
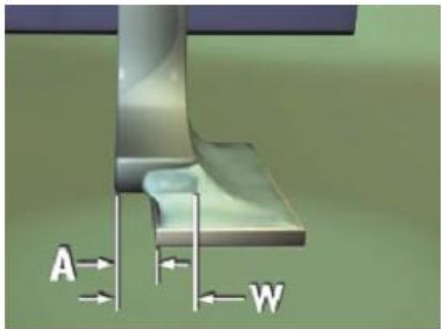
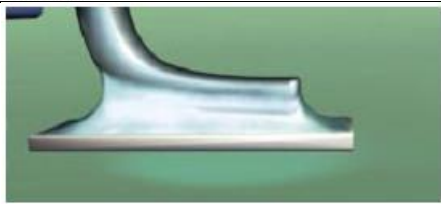
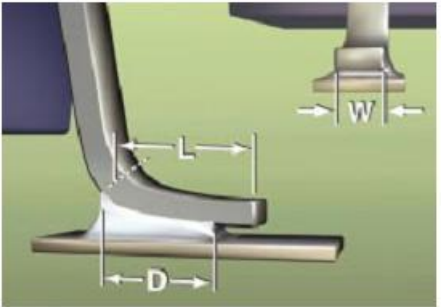


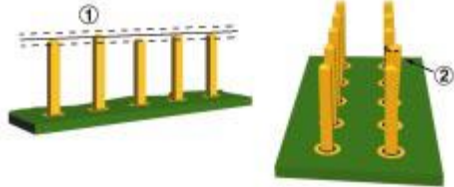
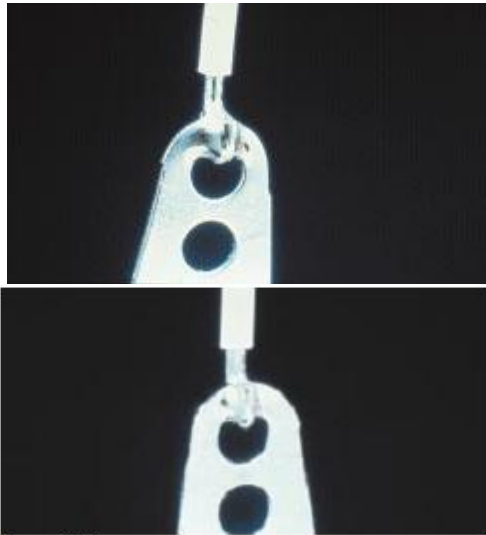
Figure 7-110

1. Vertical fill meets requirements of Table 7-6
2. Solder destination side
3. Solder source side

Target - Class 1,2,3 • 360° wetting present on lead and barrel.	 Figure 7-112
Not Specified - Class 1 Acceptable - Class 2 • Minimum 180° wetting present on lead and barrel, Figure 7-113. Acceptable - Class 3 • Minimum 270° wetting present on lead and barrel, Figure 7-114.	 Figure 7-113
Target - Class 1,2,3 • Land area completely covered on the secondary side.	 Figure 7-120
Acceptable - Class 1,2,3 • Minimum 75% of land area covered with wetted solder on the secondary side.	 Figure 7-122
Acceptable - Class 1,2,3 • Solder in lead bend area does not contact the component body.	 Figure 7-123

Defect - Class 1,2,3 Solder in bend area comes in contact with the component body or end seal.	 Figure 7-125
Target Condition - Class 1,2,3 End joint width is equal to component termination width or width of land, whichever is less.	 Figure 8-18
Acceptable - Class 1,2 End joint width (C) is minimum 50% of component termination width (W) or 50% land width (P), whichever is less.	 Figure 8-19
Side overhang (A) is less than or equal to 25% width of component termination area (W) or 25% width of land (P), whichever is less.	8.2.2.1, S. 208 
Acceptable - Class 1,2,3 - Maximum fillet height (E) may overhang the land and/or extend onto the top of the end cap metallization, but not extend further onto the top of component body. Defect - Class 1,2,3 - Solder fillet extends onto the top of the component body.	8.2.2.5, S. 214 
Acceptable - Class 1,2 Wetting is evident on the vertical surface(s) of the compo-	8.2.2.6, S. 215

nent termination.	
Target Condition - Class 1,2,3 • No side overhang	 Figure 8-68
Acceptable - Class 1,2 • Maximum overhang (A) is not greater than 50% lead width (W) or 0.5 mm [0.02 in], whichever is less.	 Figure 8-69
Target - Class 1,2,3 • Evidence of wetted fillet along full length of lead.	 Figure 8-80
Acceptable - Class 1 • Minimum side joint length (D) is equal to lead width (W) or 0.5 mm [0.02 in], whichever is less (not shown). Acceptable - Class 2,3 • When foot length (L) is greater than three (W), minimum side joint length (D) is equal to or greater than three lead widths	 Figure 8-84

(W), Figure 8-83. • When foot length (L) is less than three (W), (D) is equal to 75% (L), Figure 8-84.	
- Pins are slightly bent off center by 50% pin thickness or less - Pin height varies within tolerance.	4.3.2 S. 46 
Target - Class 1,2,3 • Wire passes through the eye of the terminal. • Wire wrapped to contact two sides of the terminal. Acceptable - Class 1 Defect - Class 2,3 • Wire wrap less than 90° and wire does not contact two nonadjacent sides of the terminal. • Wire does not pass through the eye of the terminal.	6.7.5, S. 109 
Target - Class 1,2,3 • Lead outline is discernible; smooth flow of solder on wire and terminal. • Solder fillets at all points of wire/lead and terminal interface. Acceptable - Class 1,2,3 • Solder fillet joins the wire to the terminal for at least 75% of the wire and terminal interface for wraps of 180° or more. • Solder fillet joins the wire to the terminal for 100% of the wire and terminal interface for wraps <180° or more.	6.10.4, S. 130  Figure 6-103

3. THANG ĐIỂM

STT	Yêu cầu	Mô tả	Điểm
1	Lắp ráp PCB	Lắp ráp theo tiêu chuẩn IPC 610-D	10
2	Chức năng mạch	Hoạt động đầy đủ chức năng mạch	15
Tổng			25