

■ Notice (Soldering and Mounting)

1. PCB Design

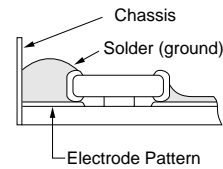
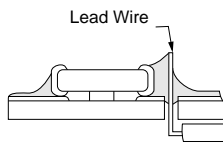
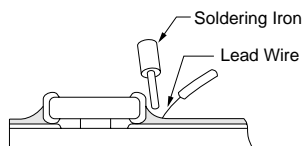

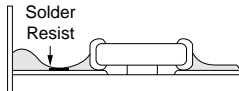
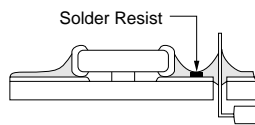
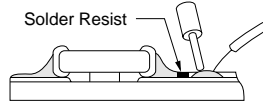
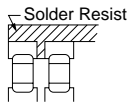
(1) Notice for Pattern Forms

Unlike leaded components, chip components are susceptible to flexing stresses since they are mounted directly on the substrate.

They are also more sensitive to mechanical and thermal stresses than leaded components.

Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet height.

Pattern Forms

	Placing Close to Chassis	Placing of Chip Components and Leaded Components	Placing of Leaded Components after Chip Component	Lateral Mounting
Prohibited				
Correct				

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(2) Land Dimensions

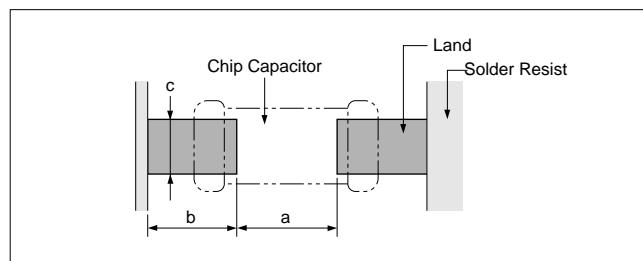


Table 1 Flow Soldering Method

Part Number	Dimensions (L×W)	a	b	c
GRM18 GQM18	1.6×0.8	0.6–1.0	0.8–0.9	0.6–0.8
GRM21 GQM21	2.0×1.25	1.0–1.2	0.9–1.0	0.8–1.1
GRM31	3.2×1.6	2.2–2.6	1.0–1.1	1.0–1.4
LLL21	1.25×2.0	0.4–0.7	0.5–0.7	1.4–1.8
LLL31	1.6×3.2	0.6–1.0	0.8–0.9	2.6–2.8
ERB18	1.6×0.8	0.6–1.0	0.8–0.9	0.6–0.8
ERB21	2.0×1.25	1.0–1.2	0.9–1.0	0.8–1.1

(in mm)

Table 2 Reflow Soldering Method

Part Number	Dimensions (L×W)	a	b	c
GRM02	0.4×0.2	0.16–0.2	0.12–0.18	0.2–0.23
GRM03 GJM03	0.6×0.3	0.2–0.3	0.2–0.35	0.2–0.4
GRM15 GJM15	1.0×0.5	0.3–0.5	0.35–0.45	0.4–0.6
GRM18 GQM18	1.6×0.8	0.6–0.8	0.6–0.7	0.6–0.8
GRM21 GQM21	2.0×1.25	1.0–1.2	0.6–0.7	0.8–1.1
GRM31	3.2×1.6	2.2–2.4	0.8–0.9	1.0–1.4
GRM32	3.2×2.5	2.0–2.4	1.0–1.2	1.8–2.3
GRM43	4.5×3.2	3.0–3.5	1.2–1.4	2.3–3.0
GRM55	5.7×5.0	4.0–4.6	1.4–1.6	3.5–4.8
LLL15	0.5×1.0	0.15–0.2	0.2–0.3	0.7–1.0
LLL18	0.8×1.6	0.2–0.4	0.3–0.4	1.0–1.4
LLL21	1.25×2.0	0.4–0.6	0.3–0.5	1.4–1.8
LLL31	1.6×3.2	0.6–0.8	0.6–0.7	2.6–2.8
ERB18	1.6×0.8	0.6–0.8	0.6–0.7	0.6–0.8
ERB21	2.0×1.25	1.0–1.2	0.6–0.7	0.8–1.1
ERB32	3.2×2.5	2.0–2.4	1.0–1.2	1.8–2.3

(in mm)

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● GNM, LLA Series for Reflow Soldering Method

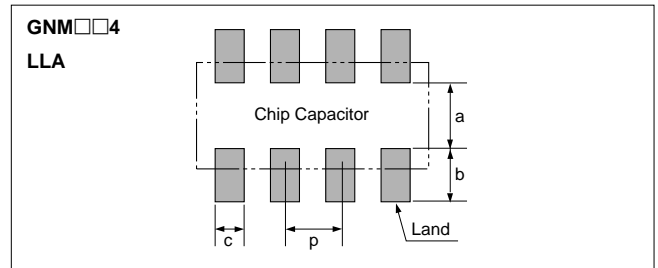
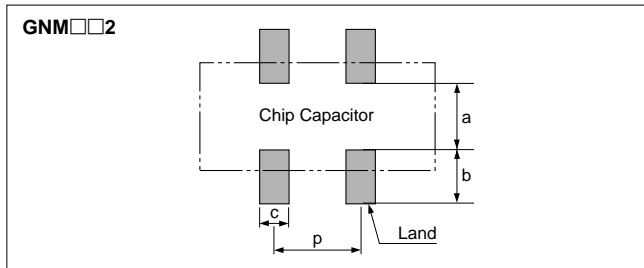


Table 3 GNM, LLA Series for Reflow Soldering Land Dimensions

Part Number	Dimensions (mm)					
	L	W	a	b	c	p
GNM1M2	1.37	1.0	0.4 to 0.5	0.35 to 0.45	0.3 to 0.35	0.64
GNM212	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.4 to 0.5	1.0
GNM214	2.0	1.25	0.6 to 0.7	0.5 to 0.7	0.25 to 0.35	0.5
GNM314	3.2	1.6	0.8 to 1.0	0.7 to 0.9	0.3 to 0.4	0.8
LLA18	1.6	0.8	0.45 to 0.55	0.25 to 0.35	0.15 to 0.25	0.4
LLA21	2.0	1.25	0.7 to 0.8	0.4 to 0.6	0.2 to 0.3	0.5
LLA31	3.2	1.6	0.8 to 1.0	0.7 to 0.9	0.3 to 0.4	0.8

● LLM Series for Reflow Soldering Method

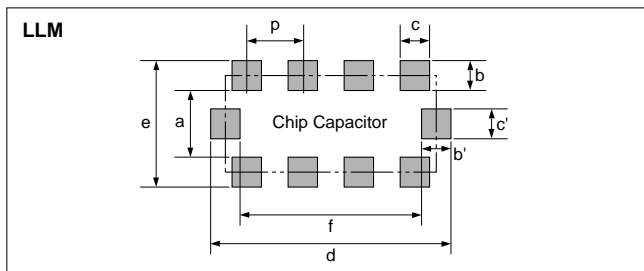


Table 4 LLM Series for Reflow Soldering Land Dimensions

Part Number	Dimensions (mm)						
	a	b, b'	c, c'	d	e	f	p
LLM21	0.6 to 0.8	(0.3 to 0.5)	0.3	2.0 to 2.6	1.3 to 1.8	1.4 to 1.6	0.5
LLM31	1.0	(0.3 to 0.5)	0.4	3.2 to 3.6	1.6 to 2.0	2.6	0.8

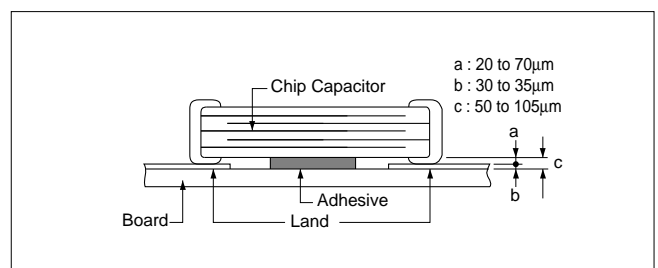
$$b=(c-e)/2, b'=(d-f)/2$$

2. Adhesive Application

- Thin or insufficient adhesive causes chips to loosen or become disconnected when flow soldered. The amount of adhesive must be more than dimension c shown in the drawing below to obtain enough bonding strength. The chip's electrode thickness and land thickness must be taken into consideration.
- Low viscosity adhesive causes chips to slip after mounting. Adhesive must have a viscosity of 5000Pa·s (500ps) min. (at 25°C)
- Adhesive Coverage*

Part Number	Adhesive Coverage*
GRM18, GQM18	0.05mg min.
GRM21, LLL21, GQM21	0.1mg min.
GRM31, LLL31	0.15mg min.

*Nominal Value



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3. Adhesive Curing

Insufficient curing of the adhesive causes chips to disconnect during flow soldering and causes deteriorated insulation resistance between outer electrodes due to moisture absorption.

Control curing temperature and time in order to prevent insufficient hardening.

Inverting the PCB

Make sure not to impose an abnormal mechanical shock on the PCB.

4. Flux Application

- An excessive amount of flux generates a large quantity of flux gas, causing deteriorated solderability. So apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering).
- Flux containing too high a percentage of halide may cause corrosion of the outer electrodes unless sufficiently

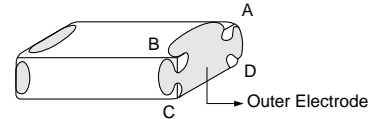
cleaned. Use flux with a halide content of 0.2wt% max. But do not use strong acidic flux.

Wash thoroughly because water soluble flux causes deteriorated insulation resistance between outer electrodes unless sufficiently cleaned.

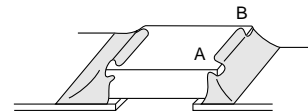
5. Flow Soldering

- Set temperature and time to ensure that leaching of the outer electrode does not exceed 25% of the chip end area as a single chip (full length of the edge A-B-C-D shown below) and 25% of the length A-B shown below as mounted on substrate.

[As a Single Chip]



[As Mounted on Substrate]



(Reference Data 6. Thermal shock)

(Reference Data 7. Solder heat resistance)