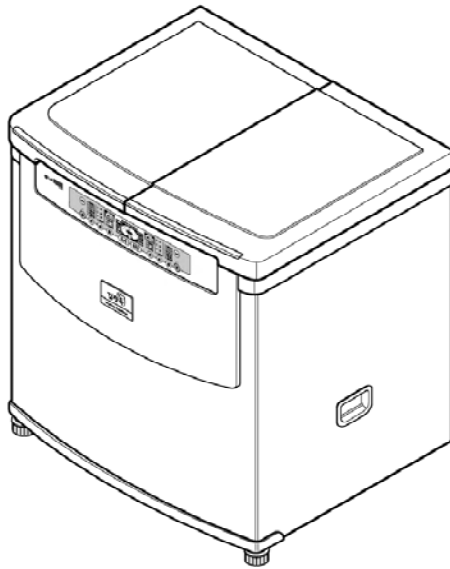




LG Kimchi Storage

SVC Technical Manual

CAUTION! Before evaluating or servicing this product, read the safety and operation rules in this manual.



MODEL: GR-K16SLQ
GR-K18SLQ
GR-K20SVZ

Safety Regulations

1. Make certain the storage does not present and electrical hazard.
2. Always unplug the storage before repairing it.
3. When testing the storage with the power on, use insulated gloves for safety.
4. Make certain instruments, such as a volt meter, are set for the appropriate voltage range.
5. Do not allow water or moisture to get into the mechanical or electrical parts of the storage.
6. Remove all foods, dishes, racks, etc. from the refrigerator before tilting it during repairs to avoid spills.
7. Refer all repairs of the sealed system to an Authorized servicer who has the appropriate refrigerant recovery equipment. Escaping refrigerant could cause injury, pollute the air, or cause other environmental concern.



Contents

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Safety Warnings and Cautions

Chapter 1 Safety Warnings and Cautions

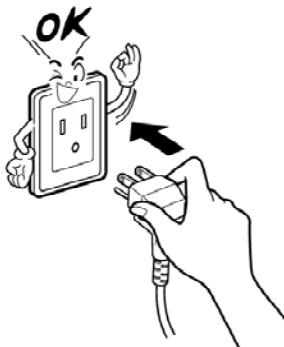
- Always observe SAFETY WARNINGS and CAUTIONS, which are intended to ensure safety while repairing or operating the product.
- Hazards are separated into **Warnings** and **Cautions**, as explained below.

 Warning	WARNING means a dangerous condition which could result in significant damage, injury, or death if the instructions are NOT followed.
 Caution	CAUTION means condition which could result in damage or injury if instructions are not followed.

Warning

Use Caution to prevent electric shock.

- The control board (Main PCB) uses 310 V. When replacing PCB parts, wait at least 3 minutes after unplugging. Always unplug the storage before repairing.



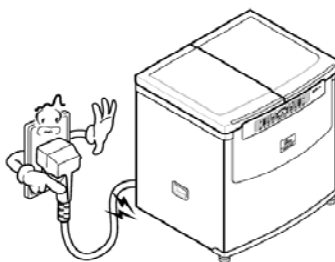
Make sure that the power plug is not pressed by the back of the storage.

- Power plug may be damaged and cause a fire or electric shock.



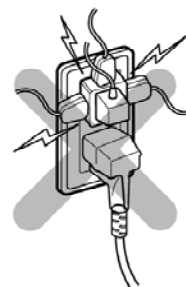
Do not allow the consumer to repair, disassemble, or modify the storage.

- There is a risk of damage, injury, electric shock, or death.



Use a dedicated circuit.

- This storage should be installed on a dedicated circuit. Overloading circuits or outlets could cause a fire.



Safety Warnings and Cautions

Warning

This product should always be grounded.

- The product is equipped with a 3-wire grounding cord which should be plugged into a properly wired outlet. If you don't have the proper outlet or are in doubt of the voltage or grounding, we recommend consulting a qualified electrician.

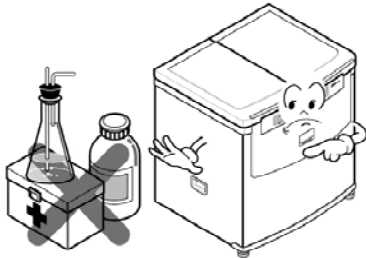
Do not store flammable liquids or gases in the storage.

- Storing gasoline, ether, benzene, alcohol, etc. can create the possibility of fire or explosion.



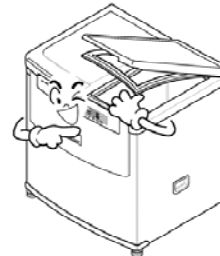
Use this product for its intended purpose.

- This storage is for making and storing kimchi. Do not use it as a substitute for a precisely controlled environment (as for storing medications, documents, etc.) or for any other purpose.



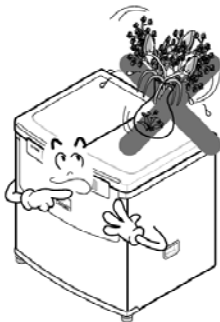
Use caution when disposing of a storage.

- Remove the door and do not leave it where children may play in or around it. There is a risk of child entrapment.



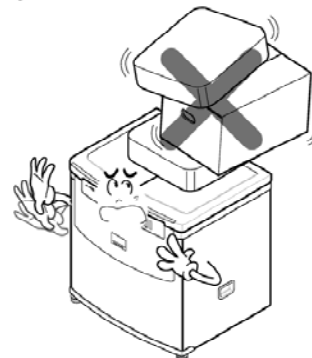
Do not set items, particularly flowers or containers of liquid, on top of the storage.

- Spillage could result in safety, slippage, or electrical shock hazards.



Do not store items on the storage. Use the containers and racks included with your storage.

- Items stored on the storage could fall and cause injury.

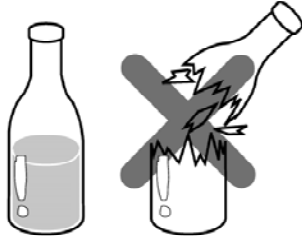


Safety Warnings and Cautions

⚠ Caution

Do not place bottles or cans in the storage.

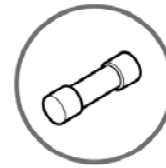
- There is a possibility they could freeze, causing the container to burst. This could present a hazard in the form of broken glass or sharp edges.



Always use exact replacement parts.

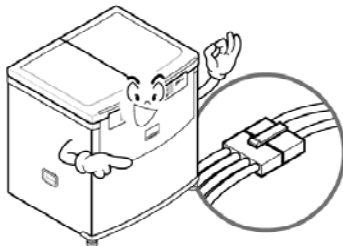
- Make certain replacement parts are the correct part by part number and model number. Ensure that voltage, current, and temperature ratings are correct for the application.

Rated Parts



During repairs, be sure all connectors are tight and wires are properly routed.

- Loose wires could be damaged, causing shock or fire hazards.



Be sure the power cord is undamaged.

- Do not bend, twist, pull, or damage the cord. It could result in fire or electrical shock.



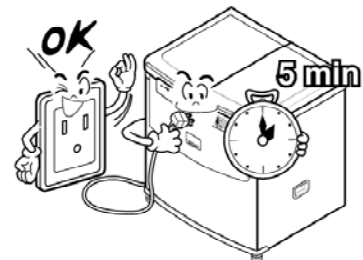
During repairs, remove all dust and foreign materials from the work area.

- Keeping these areas clean makes work easier and will prevent problems like overheating, fire, and short circuits.



Allow time for resetting if you unplug the storage.

- If you unplug the storage during repair, wait 5 minutes before plugging it in and restarting it. Otherwise, you might cause compressor failure.



Specifications

Chapter 2 Product Specifications

1. GR-K16SLQ

ITEM		SPEC
Volume	Usable Volume	158 l (5.58 ft ³ .)
	Left compartment	92 l (3.25 ft ³ .)
	Right compartment	66 l (2.33 ft ³ .)
Outside Dimensions	Width	817 mm (32.2 inches)
	Depth	694 mm (27.3 inches)
	Height	878 mm (34.6 inches)
Total weight		62 kg (137 lbs.)
Motor power consumption		210 W
Cooling method		Direct cooling
Defrost method		Manual Defrost
Insulation material		Polyurethane Foam
BASKET		1
Kimchi storage container		6 pcs.
Low crystal deodorant system		2 pcs.
Cold Cycle	Compressor	KX56LACH
	Evaporator	PIPE ON SHEET
	Refrigerant	R134a (135 g)
	Oil	FREOL @15 G (280 cc)
Electrical Part Rating	PTC	P6R8MB
	Overload protection device	4TM314TFB
	Fan motor for compressor cooling	Ø110 fan adhesion
	Left compartment ripening heater	115 V 80 W
	Right compartment ripening heater	115 V 60 W
	Condensation heater	115 V 17 W
	Capacitor (running)	250 Vac 10µF
	Capacitor (starting)	160 Vac 100µF

Specifications

2. GR-K18SLQ

ITEM		SPEC
Volume	Usable Volume	184 l (6.50 ft ³ .)
	Left compartment	92 l (3.25 ft ³ .)
	Right compartment	92 l (3.25 ft ³ .)
Outside Dimensions	Width	921 mm (36.3 inches)
	Depth	694 mm (27.3 inches)
	Height	878 mm (34.6 inches)
Total weight		67 kg (148 lbs.)
Motor power consumption		285 W
Cooling method		Direct cooling
Defrost method		Manual Defrost
Insulation material		Polyurethane Foam
BASKET		1
Kimchi storage container		6 pcs.
Low crystal deodorant system		2 pcs.
Cold Cycle	Compressor	KX56LACH
	Evaporator	PIPE ON SHEET
	Refrigerant	R134a (140 g)
	Oil	FREOL @15 G (280 cc)
Electrical Part Rating	PTC	P6R8MB
	Overload protection device	4TM314TFB
	Fan motor for compressor cooling	Ø110 fan adhesion
	Left compartment ripening heater	115 V 80 W
	Right compartment ripening heater	115 V 80 W
	Condensation heater	115 V 18 W
	Capacitor (running)	250 Vac 10µF
	Capacitor (starting)	160 Vac 100µF

Specifications

3. GR-K20SVZ

ITEM		SPEC
Volume	Usable Volume	198 l (6.99 ft ³ .)
	Left compartment	132 l (4.66 ft ³ .)
	Right compartment	66 l (2.33 ft ³ .)
Outside Dimensions	Width	970 mm (36.2 inches)
	Depth	698 mm (27.5 inches)
	Height	879 mm (34.61 inches)
Total weight		70 kg (154 lbs.)
Motor power consumption		285 W
Cooling method		Direct cooling
Defrost method		Manual Defrost
Insulation material		Polyurethane Foam
BASKET		1
Kimchi storage container		10 pcs.
Low crystal deodorant system		2 pcs.
Cold Cycle	Compressor	KX56LACH
	Evaporator	PIPE ON SHEET
	Refrigerant	R134a (145 g)
	Oil	FREOL @15 G (280 cc)
Electrical Part Rating	PTC	P6R8MB
	Overload protection device	4TM314TFB
	Fan motor for compressor cooling	Ø110 fan adhesion
	Left compartment ripening heater	115 V 100 W
	Right compartment ripening heater	115 V 60 W
	Condensation heater	115 V 19 W
	Capacitor (running)	250 Vac 10µF
	Capacitor (starting)	160 Vac 100µF

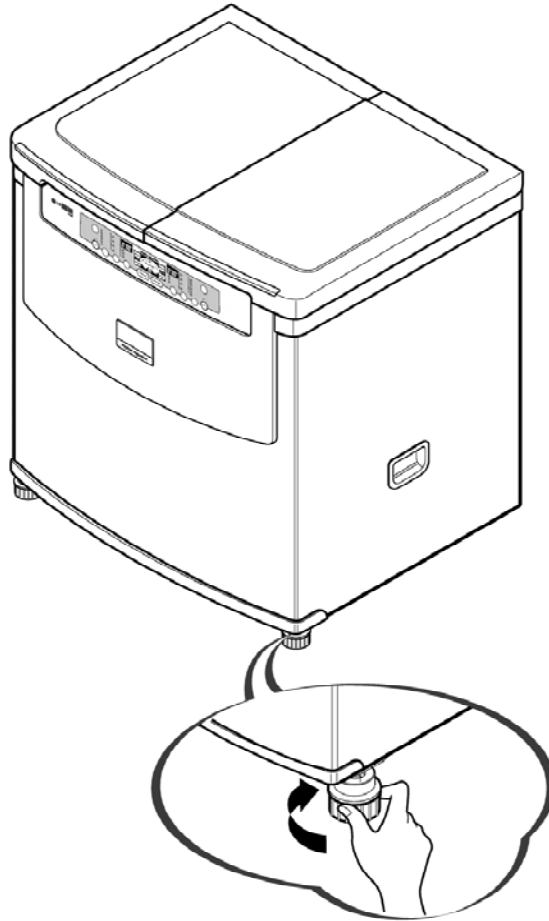
Product Installation Method

Chapter 3 Product Installation Method

1. Method to adjust height of storage

■ Adjust the level of storage.

(If the floor is uneven, the storage may vibrate or cause noise.)



▷ Adjust the front to be level by turning the height adjustment screws under the front corners. Tilting the unit backward slightly to take the weight off the adjusting screws may make this task easier.

2. Grounding method

Plug the cord into a 115 V grounded outlet. If you are unsure of the voltage or grounding integrity, consult a qualified electrician.

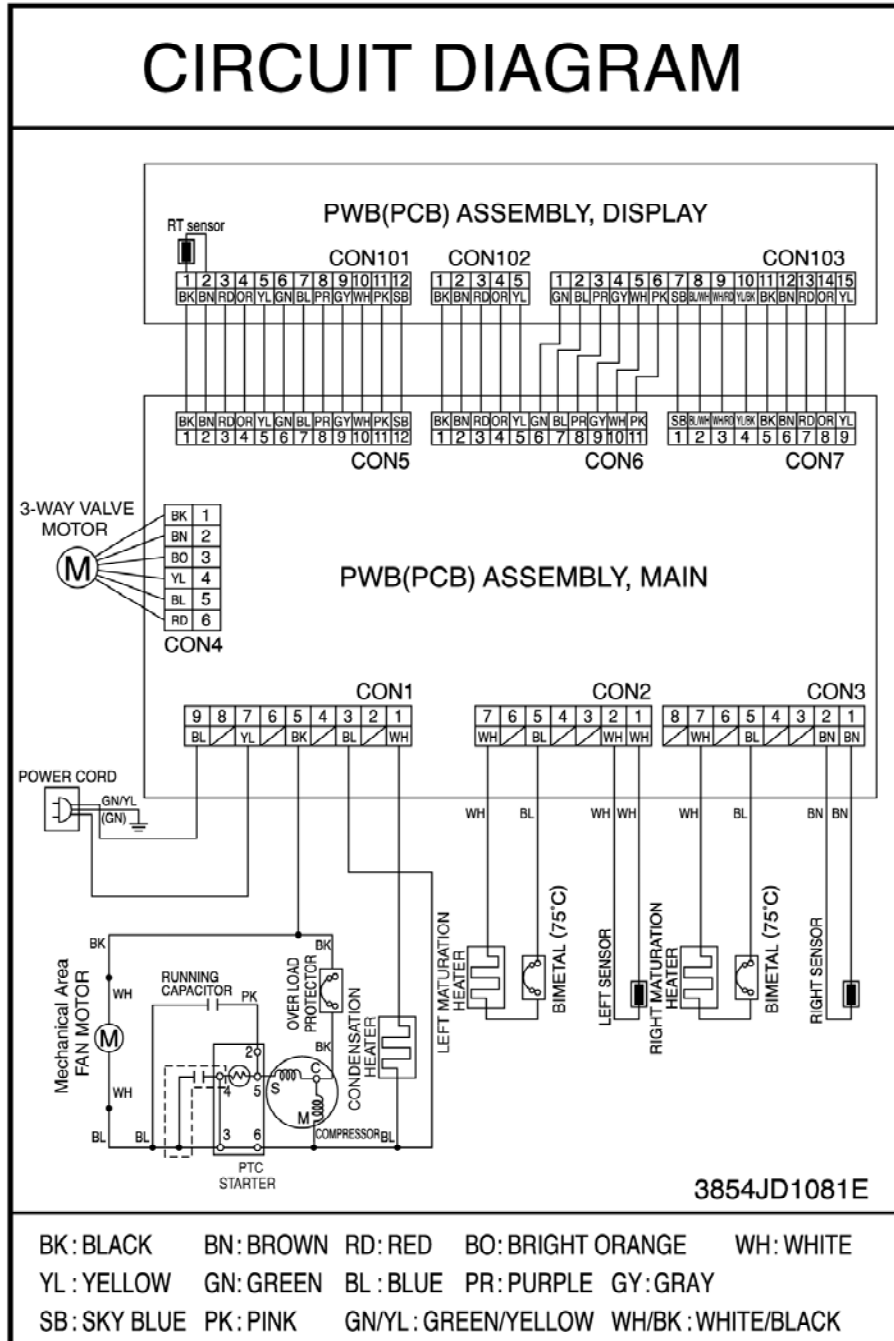
CAUTION! ▷ Take care not to ground the circuit at one of the following places:

1. **Water pipe:** If there is plastic piping within the system, the ground may not be valid.
2. **Gas pipe:** There is the danger of fire or explosion.
3. **Phone line or lightning rod:** If lightning strikes, dangerous voltage may be induced in the circuit.

Circuit Diagram

Chapter 4 Circuit Diagram

1. GR-K16, K18SLQ (LED MODULE TYPE)



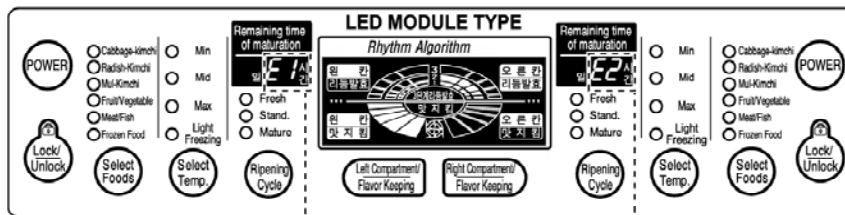
FUNCTION TEST METHOD

■ NOTICE BEFORE TESTING.

- 1) When it fails, it does not execute any function even by pressing any button and the buzzer does not sound. (Only the POWER OFF function is available.)
- 2) When the failure is resolved during displaying the failure code, it returns to the normal condition. (RESET)
- 3) The failure code displays the segment for the remaining maturation time of the said compartment, and all of LEDs are turned off except the failure code.
- 4) The LED of the normal compartment is normally displayed, and it runs the normal function.

(1) TROUBLE DIAGNOSIS FUNCTIONS

NO.	FAILURE	FAILURE CODE DISPLAY	FAILURE CAUSE
1	Left sensor failure	E1 is displayed at the left display segment	Left sensor is cut or shorted
2	Right sensor failure	E2 is displayed at the right display segment	Right sensor is cut or shorted
3	RT sensor failure(at the left display section)	Press and hold the FOOD button and the STORAGE TEMPERATURE button simultaneously. If everything is correct, all LEDs will turn on. If there is a failure, all LEDs EXCEPT the Remaining Maturation Time LED will turn on.	



FAILURE CODE DISPLAY

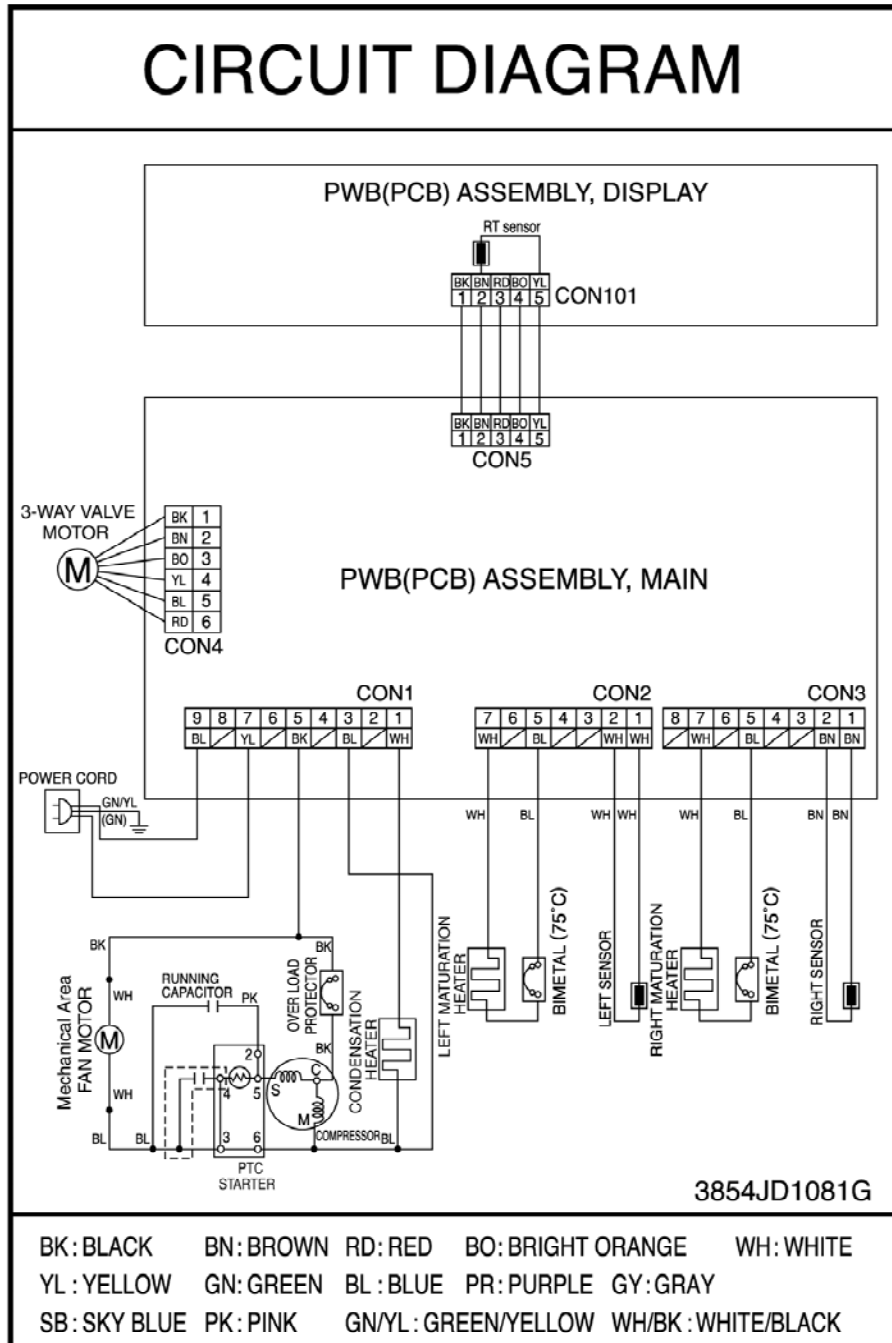
(2) TEST FUNCTION

- The TEST SWITCH is located at MAIN of PWB ASSEMBLY.

MODE	OPERATION	COMP FAN MOTOR	VALVE	LEFT MATURATION HEATER, RIGHT MATURATION HEATER	DEW HEATER	DISPLAY LED	REMARKS
TEST1	Press TEST SWITCH once	ON	20 min for Left compartment / 20 min for Right compartment	OFF	OFF	Remaining time display 111	For checking the freezing component of Left/Right compartment
TEST2	Press TEST SWITCH at TEST1 once	ON	Open Right valve	OFF	OFF	Remaining time display 222	For checking the freezing component of Right compartment
TEST3	Press TEST SWITCH at TEST2 once	ON	Open Left valve	OFF	OFF	Remaining time display 333	For checking the freezing component of Left compartment
TEST4	Press TEST SWITCH at TEST3 once	OFF	✘	ON	ON	Remaining time display 444	For checking Heater
Normal return	Press TEST SWITCH at TEST4 once	Return to the initial condition if it has passed 30 minutes at TEST4 at maximum or the temperature of each compartment is over 40°C. When returning to TEST MODE, it is driven after 7 minutes of COMP.					

Circuit Diagram

2. GR-K20SVZ (LCD TYPE)



FUNCTION TEST METHOD

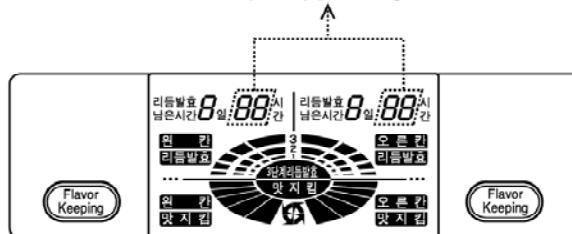
■ NOTICE BEFORE TESTING.

- 1) When it fails, it does not execute any function even by pressing any button and the buzzer does not sound. (Only the POWER OFF function is available.)
- 2) When the failure is resolved during displaying the failure code, it returns to the normal condition. (RESET)
- 3) The failure code displays the segment for the remaining maturation time of the said compartment, and all of LEDs are turned off except the failure code.
- 4) The LED of the normal compartment is normally displayed, and it runs the normal function.

(1) TROUBLE DIAGNOSIS FUNCTIONS

NO.	FAILURE	FAILURE CODE DISPLAY	FAILURE CAUSE
1	Left sensor failure	E1 is displayed at the left display segment	Left sensor is cut or shorted
2	Right sensor failure	E2 is displayed at the right display segment	Right sensor is cut or shorted
3	RT sensor failure(at the left display section)	Press and hold the FOOD button and the STORAGE TEMPERATURE button simultaneously. If everything is correct, all LEDs will turn on. If there is a failure, all LEDs EXCEPT the Remaining Maturation Time LED will turn on.	
4	Communication error	CO is displayed at the left, right display segment	When it does not consecutive communication for 30 seconds (be missing connector and communication part TR defect)

FAILURE CODE DISPLAY



(2) TEST FUNCTION

- The TEST SWITCH(S/W) is located at MAIN of PWB ASSEMBLY.

MODE	OPERATION	COMP FAN MOTOR	VALVE	LEFT MATURATION HEATER, RIGHT MATURATION HEATER	DEW HEATER	DISPLAY LED	REMARKS
TEST1	Press TEST SWITCH once	ON	20 min for Left compartment / 20 min for Right compartment	OFF	OFF	Remaining time display 111	For checking the freezing component of Left/Right compartment
TEST2	Press TEST SWITCH at TEST1 once	ON	Open Right valve	OFF	OFF	Remaining time display 222	For checking the freezing component of Right compartment
TEST3	Press TEST SWITCH at TEST2 once	ON	Open Left valve	OFF	OFF	Remaining time display 333	For checking the freezing component of Left compartment
TEST4	Press TEST SWITCH at TEST3 once	OFF	✘	ON	ON	Remaining time display 444	For checking Heater
Normal return	Press TEST SWITCH at TEST4 once	Return to the initial condition if it has passed 30 minutes at TEST4 at maximum or the temperature of each compartment is over 40°C. When returning to TEST MODE, it is driven after 7 minutes of COMP.					

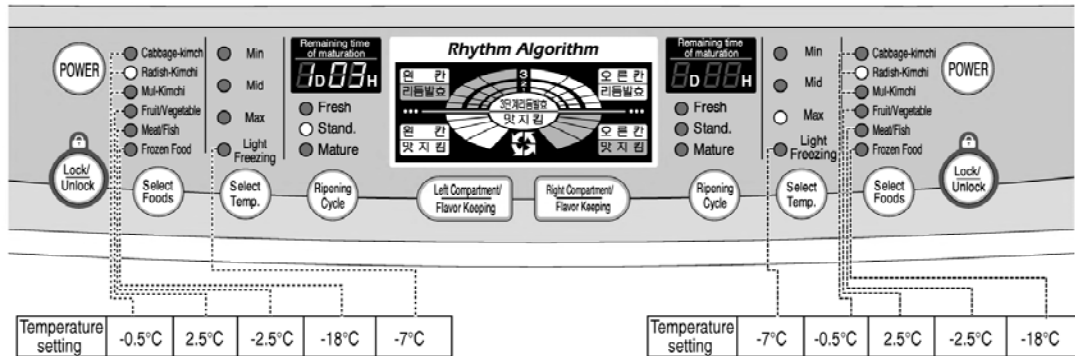
MICOM Function and Description of Circuit

Chapter 5 MICOM Function and Description of Circuit

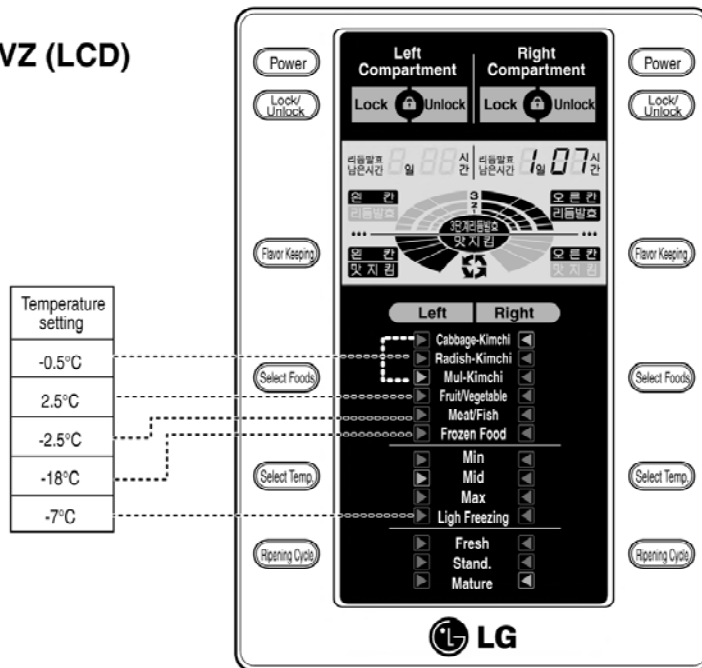
1. Description of Function

1) Display

■ GR-K16, K18SLQ (LED MODULE)



■ GR-K20SVZ (LCD)

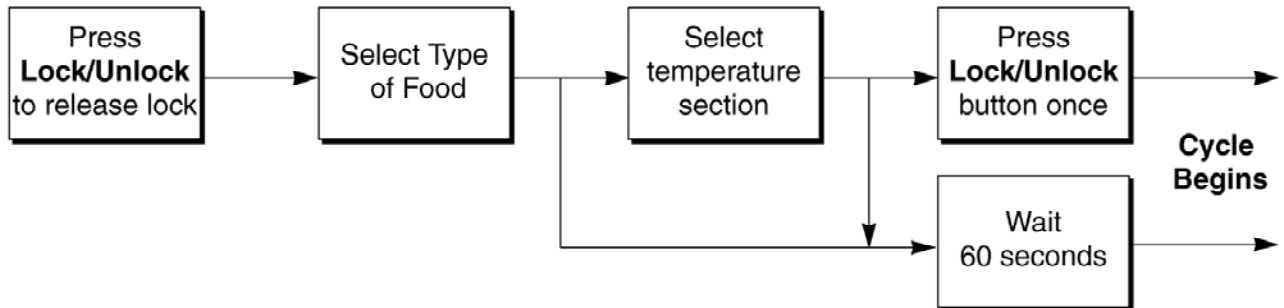


1. On power-up, the display lights **Cabbage Kimchi** for both compartments and the temperature state is **Mid**.
2. Press **Lock/Unlock** before using the other buttons on the control panel. If the keypad is locked, the buttons will not operate nor will the buzzer sound.
3. In the event of a power interruption, the displayed settings are maintained. However, when a power interruption occurs during the ripening process, the unit defaults to its original status; that is **Kimchi (Cabbage/radish/Mul-Kimchi) / Mid**.
4. Press the **Select Foods** button to cycle through the choices of **Cabbage Kimchi** → **Radish Kimchi** → **Mul Kimchi** → **Fruit&Vegetable** → **Meat&Fish** → **Frozen Food**.
5. Press the **Select Temperature** button to cycle through the selections of **Mid** → **Max** → **Light Freezing** → **Min** → **Mid**. **Light Freezing** can be selected **ONLY** if the storage is set for **Meat&Fish**.

MICOM Function and Description of Circuit

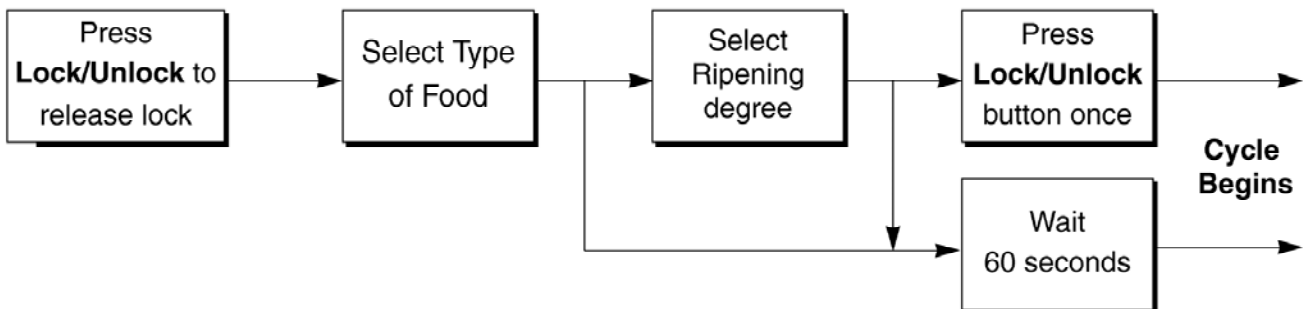
2) Food Storage/Maturation Function

(1) Selection of Food Storage Function



1. Press **Lock/Unlock** to release the lock.
2. Select Type of Food to keep and temperature.
3. If you wait more than 60 seconds, the Food Storage cycle begins by default.
4. **Cabbage-Kimchi/Stand** is the default unless you change it during the Keeping of Food process.

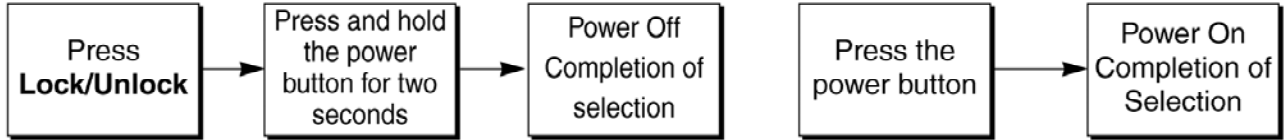
(2) Selection of Maturation Function



1. Press **Lock/Unlock** to release the lock.
2. Select a type of Kimchi and a Ripening degree by pressing the appropriate buttons and cycling through the choices.
3. If you press **Lock/Unlock** once or wait more than 60 seconds, the **Ripening Cycle** begins.
4. The display counts down the time remaining in the cycle as ripening progresses.
5. The compressor switches on or off depending on the ambient temperature and the temperature in the compartments of the storage. Additionally, the 3-way valve operates and the ripening heater turns on and off.
6. As the ripening process completes (45~102 hours,) the setting defaults to the **Kimchi/Mid** status and the kimchi is kept in cold storage.
7. At the end of the ripening process, the display shown **0 Day/00 Time** Remaining Ripening Time. Press the **Lock/Unlock** button once to turn the display off.
8. When switching from ripening to storage, the default temperature is set to **Mid**.
9. A ripening cycle cannot be selected when Fruits&Vegetables, Meats& Fish, or Frozen Food is selected. These are Storage Cycles.

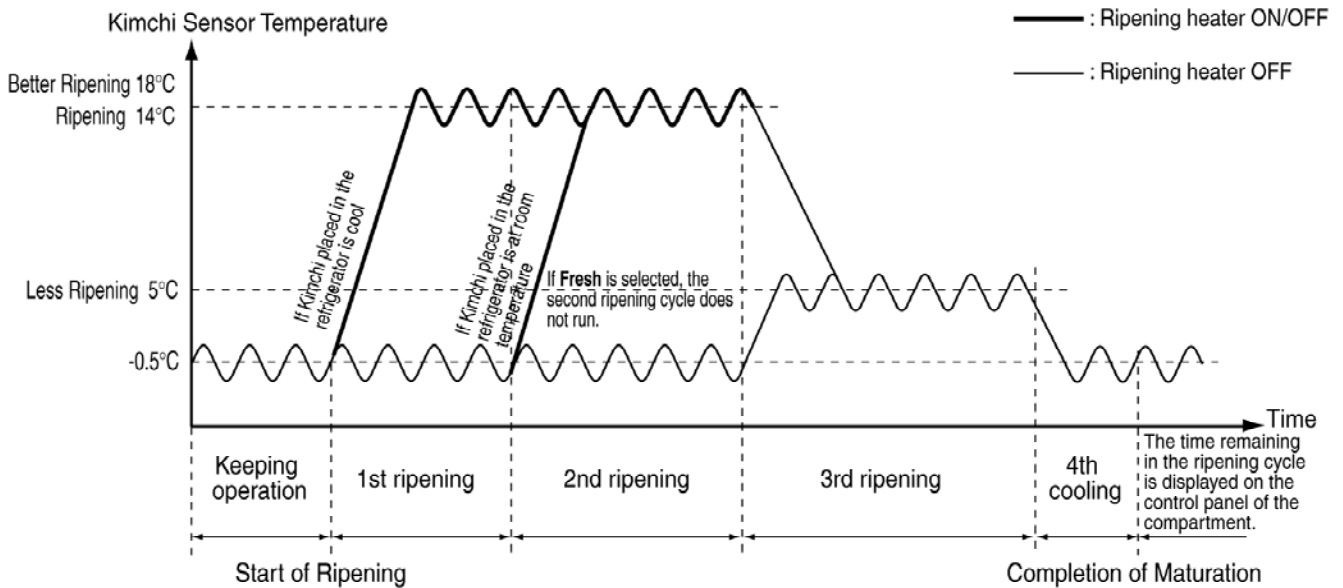
MICOM Function and Description of Circuit

(3) Selection of Power On/Off Function



1. Press **Lock/Unlock** to release lock.
2. If you press and hold the **Power** button for two seconds, all functions of the affected compartment stop and the LED displays **OFF**.
3. When the power of one compartment is off, the heater of the affected compartment is turned off and 3-way valve is closed, while the 3-way valve of the opposite compartment is opened.
4. When the power of both compartments is off, the ripening heaters of both compartments, the condensation heater, and compressor are also turned off.
5. If you wish to use a compartment that is not currently in use, press the **Power** button, which will default the compartment to **Cabbage Kimchi/Mid** status.

(4) Control Pattern Drawing for Kimchi Ripening



1. The ripening control pattern varies, depending upon the temperature of the kimchi when it is placed into the storage, the type of kimchi being made, and the degree of ripening selected.
2. In the 1st ripening cycle, if the Kimchi is at room temperature, the cold control operates.
3. During the ripening cycle, if Kimchi is cold, the ripening heater is turned on; if Kimchi is warm, the ripening heater is turned off.
4. If a failure occurs, such as a sensor error during ripening, the storage will default to **Kimchi/Mid** status.

3) Temperature Control Method

1. The compressor runs or stops and the 3-way valve opens or closes depending on the temperature sensed in the left and right compartments.


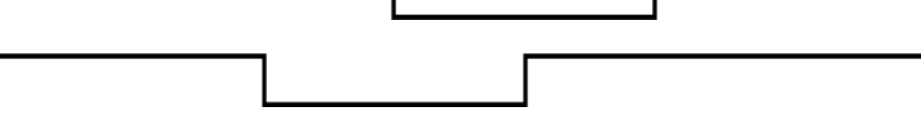
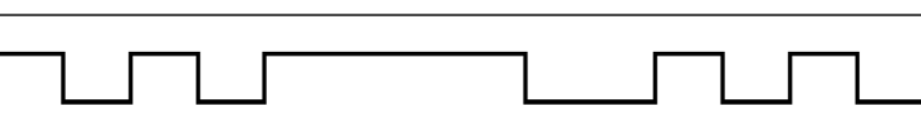
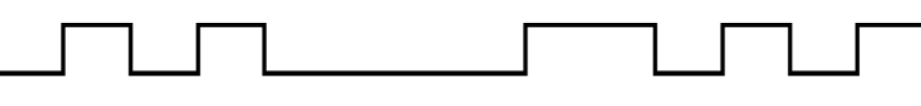
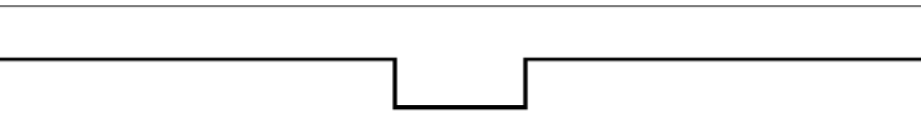
MICOM Function and Description of Circuit

- If the temperature in **either** compartment is unsatisfactory, the compressor is turned on and the 3-way valve is opened to the affected compartment.
- If the temperature in both compartments is unsatisfactory, the compressor is turned on and runs until both compartments become satisfactory. The 3-way valve is opened and closed to each compartment alternatively until the temperature is satisfactory.
- During the ripening cycle, if the temperature is LOW, the heater is turned ON; if the temperature is HIGH, the compressor is turned on and the 3-way valve is opened.

Left temperature	Right temperature	3way valve position	COMP
Satisfactory	Satisfactory	NOTE *	OFF
Satisfactory	Unsatisfactory	Right compartment	ON
Unsatisfactory	Satisfactory	Left compartment	ON
Unsatisfactory	Unsatisfactory	Left 20min/Right 20min	ON

NOTE) When the temperature is satisfactory in both compartments, the 3-way valve is open to whichever compartment that has had a satisfactory temperature most recently.

■ Summary Operation Chart of COMP and 3way Valve

Left Compartment sensor		Temperature unsatisfactory Temperature satisfactory
Right Compartment sensor		Temperature unsatisfactory Temperature satisfactory
3-way Valve LEFT		OPEN CLOSE
3-way Valve RIGHT		OPEN CLOSE
COMP.		ON OFF

4) Condensation Heater Control

- At the top of the storage around the gasket, the condensation heater is always **ON**.
- If you turn both compartments OFF, the condensation heater is also turned OFF; if you turn either compartment on, the condensation heater is turned on.

5) Buzzer Sound

- If you press a button on the control panel, the buzzer sounds **Ding-Dong**. (See Buzzer Operation circuit, page 23, section 2.)
- If you begin entering a program by pressing buttons but don't complete the program, the buzzer sounds **Ding**.

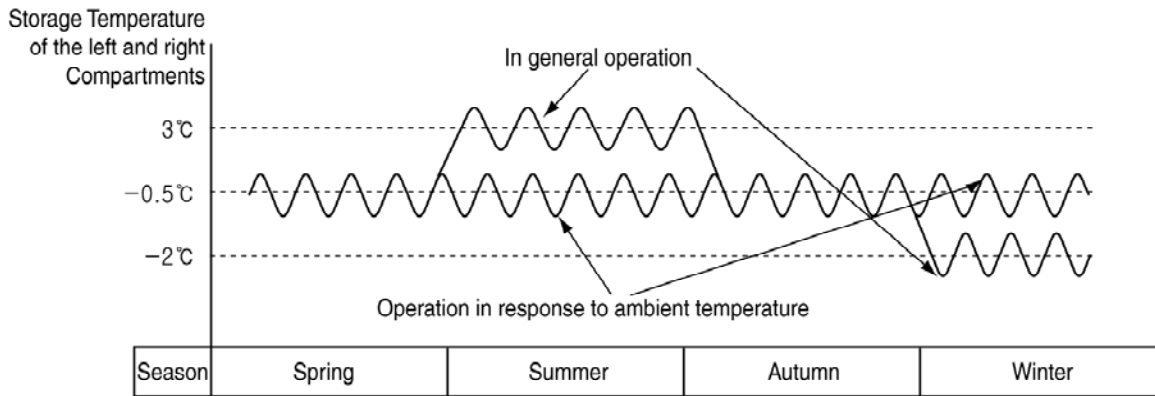
6) Power Failure Compensation Function

- When the power is restored after an outage, the storage performs the setting originally programmed except for **Failure Status** and **Test Mode**.
- If the power fails during the ripening process, there is no power outage compensation function and the storage defaults to **Kimchi/Mid** status to protect against excessive ripening.

MICOM Function and Description of Circuit

7) Operation in Response to Ambient Temperature

The storage senses the ambient temperature and adjusts the temperature in the compartments accordingly. This keeps the storage from being too cold or too warm because of seasonal variations and maintains exact temperatures in the compartments.



8) Sequential Operation of Components

Components (Compressor, 3-way Valve, Left/ Right Ripening Heater and Condensation Heater) are operated in a specific order to prevent damage, noise, and electrical overload caused by simultaneous operation of all parts when the unit is started and after completing the self-test routine.

Operation Status	Operation Order	Remarks
Initial Power-up	Temperature of Left or Right sensor is $>10^{\circ}\text{C}$ (at purchase, after moving or after a long period of no use.) 	Condensation heater is set for always ON, but if the left and right compartment are simultaneously turned off, condensation heater is turned off, too.
	Temperature of Left and Right sensor is $<10^{\circ}\text{C}$. (In Power failure or Service) 	
When returning normal status in test mode		The 3-way valve is opened to both compartments for 3 minutes; then it is opened to either the left or the right compartment, depending on the temperature in the compartments.

* Operation order may slightly vary depending on temperature setting.

MICOM Function and Description of Circuit

10) Test Mode

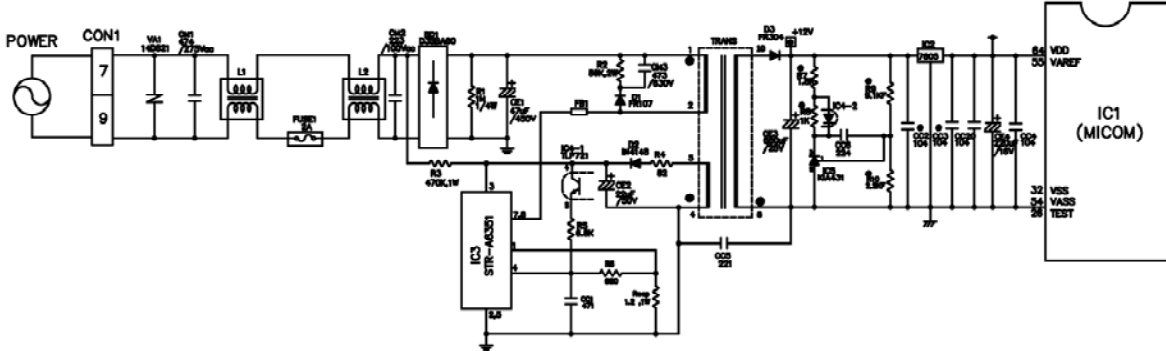
1. The test function checks the functions of the PCB and the storage, searching for failure indications.
2. The test switch on the PCB operates the **test mode**. The storage reverts to the **normal mode** after 2 hours if you forget to end it manually.
3. When the **test mode** is active, the buttons on the control panel are disabled but the buzzer still sounds a **ding** if one is pressed.
4. When the **test mode** is completed, unplug the storage briefly and plug it in again to reset it and allow normal operation.
5. If a sensor failure or other failure is detected during the test mode, release the **test mode** to display the failure code.
6. During the display of the failure code, Test Mode doesn't work even if you press the Test Switch.

Mode	Operation	Contents	Remarks
TEST1	Press the test switch once.	<ol style="list-style-type: none"> 1) Compressor ON. 2) 3-way valve opens to the left and right compartments alternatively at 20-minute intervals. 3) Left and right ripening heaters OFF. 4) Condensation heater OFF. 5) LED displays 111. 	<ul style="list-style-type: none"> * This test checks the refrigeration system for the left and right compartments. * The system reverts to initial status after a maximum of 2 hours.
TEST2	Press the test switch once when Test 1 indicates it is completed.	<ol style="list-style-type: none"> 1) Compressor ON. 2) 3-Way Valve opens to the Right Compartment. 3) Left and right ripening heaters OFF. 4) Condensation heater OFF. 5) LED displays 222. 	<ul style="list-style-type: none"> * This test checks the refrigeration system for the right compartment only. * The system reverts to initial status after a maximum of 2 hours.
TEST3	Press the test switch once when Test 2 indicates it is completed.	<ol style="list-style-type: none"> 1) Compressor ON. 2) 3-Way Valve opens to the Left Compartment. 3) Left and right ripening heaters OFF. 4) Condensation heater OFF. 5) LED displays 333. 	<ul style="list-style-type: none"> * This test checks the refrigeration system for the left compartment only. * The system reverts to initial status after a maximum of 2 hours.
TEST4	Press the test switch once when Test 3 indicates it is completed.	<ol style="list-style-type: none"> 1) Compressor OFF. 2) Left and right ripening heaters ON. 3) Condensation heater ON. 4) LED displays 444. 	<ul style="list-style-type: none"> * This test checks the ripening heaters and the condensation heater. * The system reverts to initial status after a maximum of 30 minutes. When the temperature of the compartments is greater than 40°C, the storage defaults to its initial status.
Normal returning	Press the test switch once when Test 4 indicates it is completed.	Return to initial status.	<ul style="list-style-type: none"> * The compressor operates after a delay of 7 minutes.

MICOM Function and Description of Circuit

2. Description of Circuit

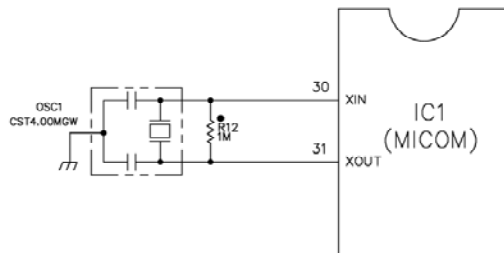
1) Power circuit



The power circuit consists of the noise attenuation part and the SMPS (switch mode power supply) part. The SMPS consists of the rectifier (BD1 & CE1) to convert AC voltage to DC voltage, switching part (IC2) to switch the converted DC voltage, transformer to transmit energy of the first side of the switching end to the second side, the secondary power to supply power to MICOM and IC, and the feedback part (IC3, ZD1) to feedback the secondary voltage to the first side of transformer in order to maintain the secondary voltage constant.

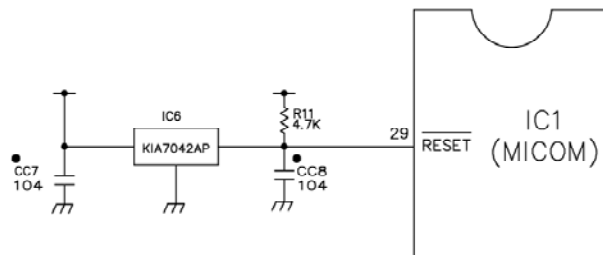
Caution : High voltage (310 V_{dc}) is maintained in this circuit. Wait at least 3 minutes after unplugging to allow the current to dissipate. There is a danger of electric shock.

2) Oscillation circuit



The oscillation circuit provides the clock signal for synchronization and calculation of time in relation to the logic elements of microprocessor IC 1. OSC 1 must always use the original rated parts, because if the specification changes, the timing generated will not be correct, causing erratic functioning of the microprocessor.

3) Reset circuit

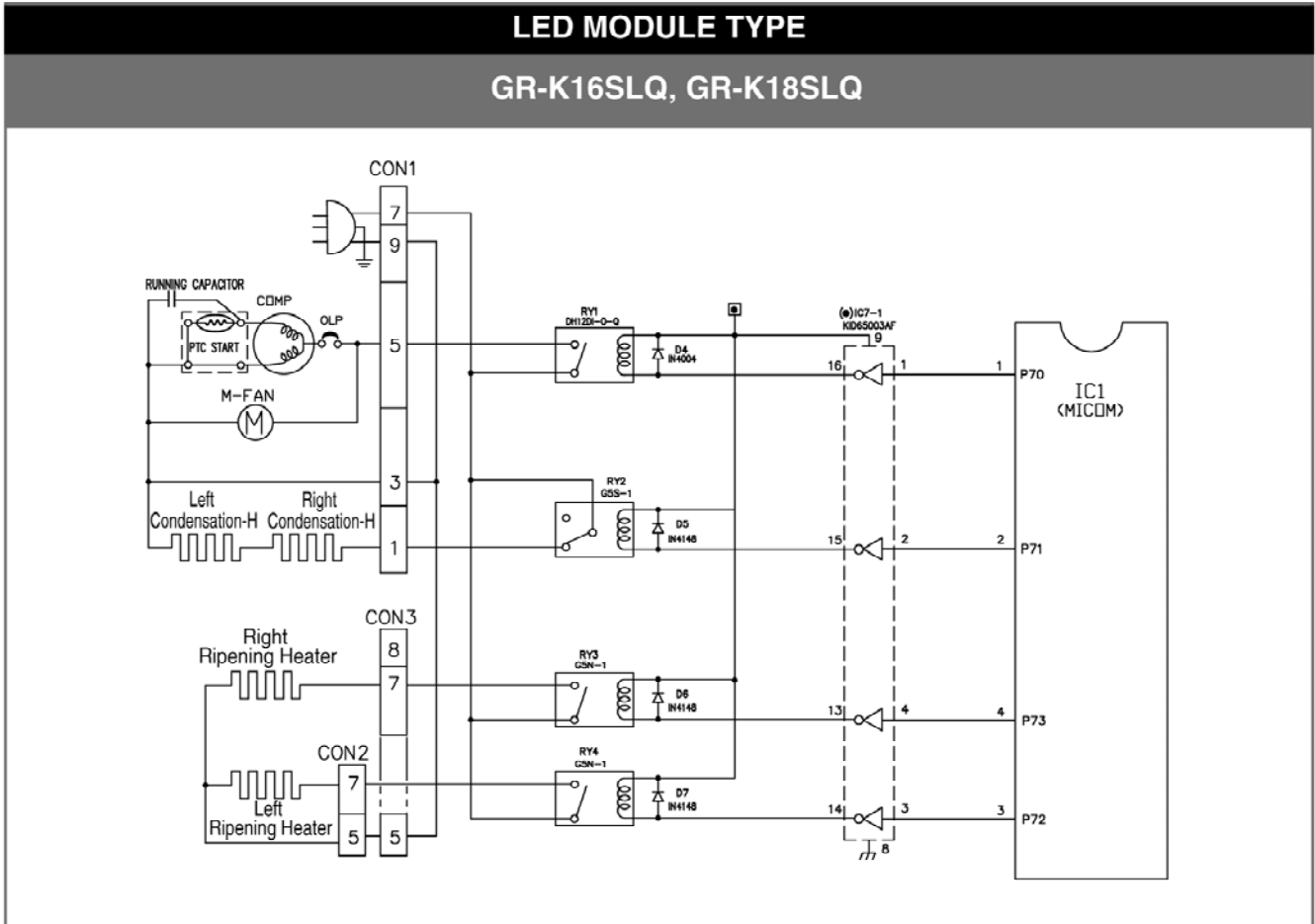


The reset circuit allows the entire process to be started from the initial status by resetting the microprocessor whenever power is applied to it at pin 29. LOW voltage is applied to the reset terminal for 10 ms at the beginning of power input. The reset terminal has a voltage of 5 V_{dc} during general operation. If the reset operation fails, the microprocessor will not operate.

MICOM Function and Description of Circuit

4) Load/buzzer driving circuit

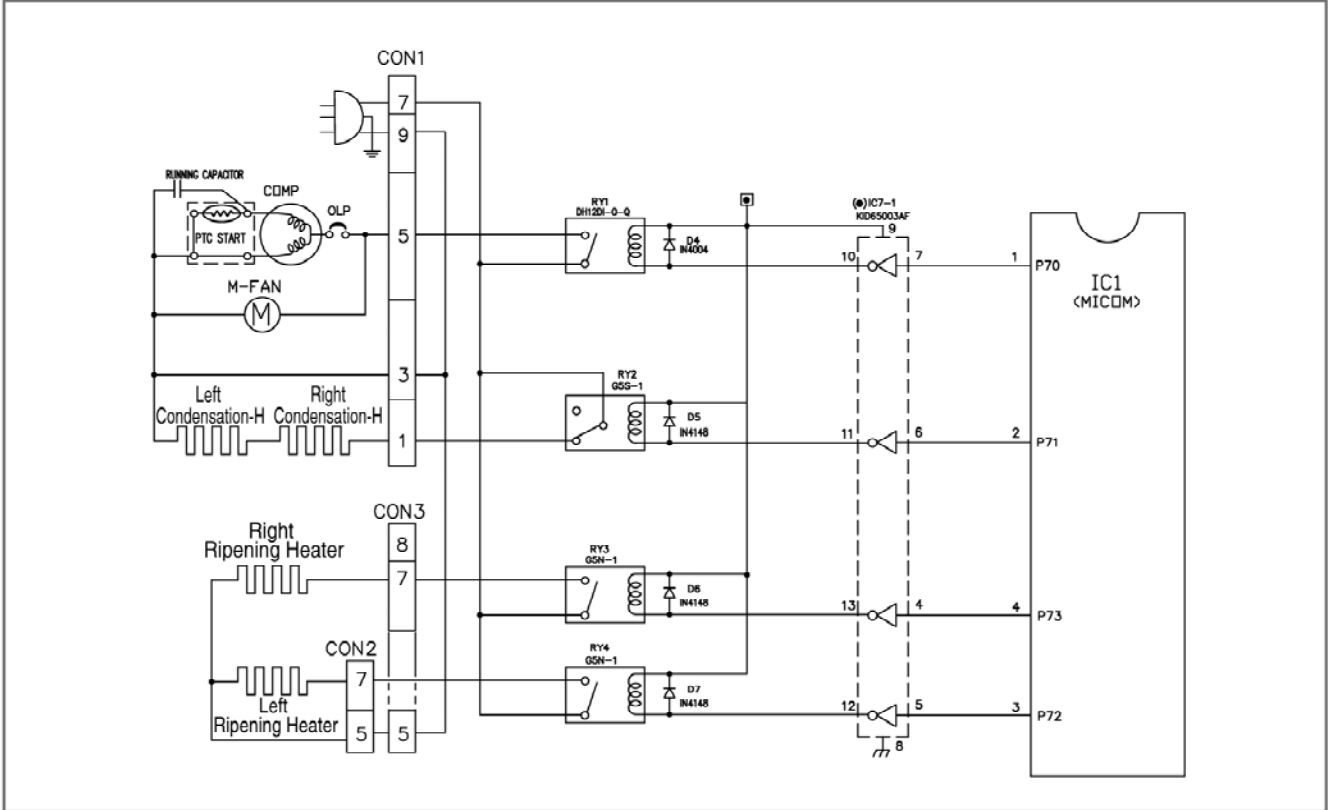
(1) Load driving circuit



Type of Load	Comp. Fan Motor	Left Ripening Heater	Right Ripening Heater	Condensation Heater
Measuring Point(IC7)	16	14	13	11
State	ON	Within 1 V		
	OFF	12V		

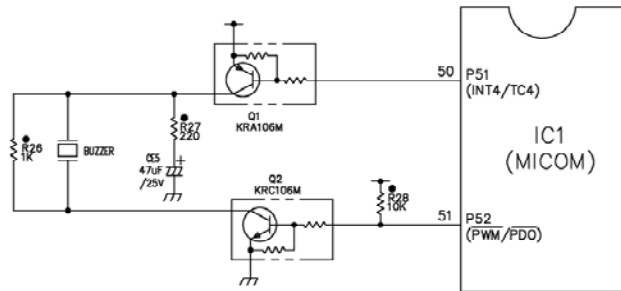
LCD TYPE

GR-K20SVZ



Type of Load	Comp. Fan Motor	Left Ripening Heater	Right Ripening Heater	Condensation Heater
Measuring Point(IC7)	10	12	13	15
State	ON	Within 1 V		
	OFF	12V		

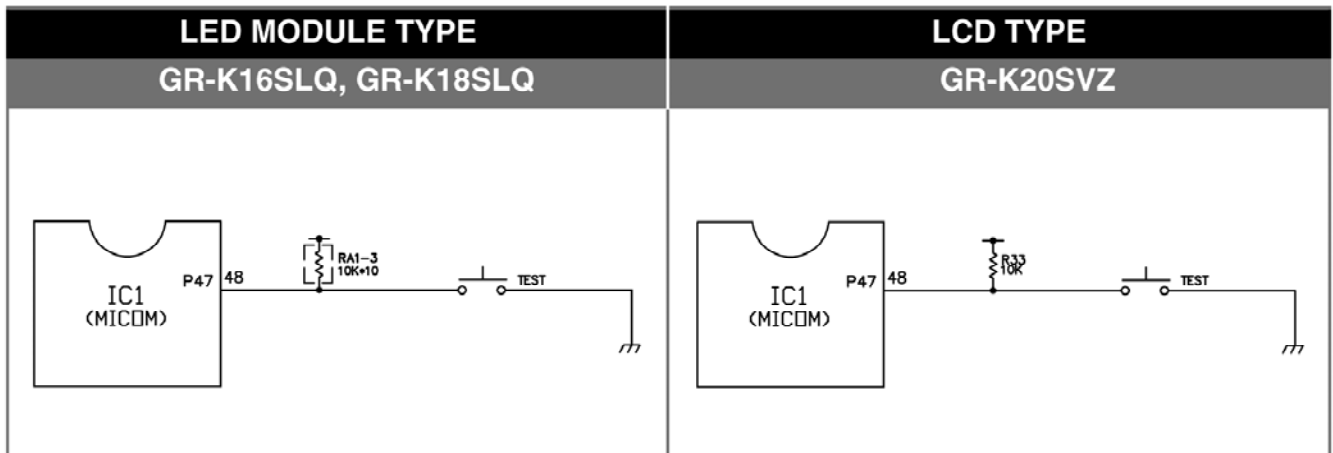
(2) Buzzer driving circuit



Measuring Part \ State	Ding-Dong sounds when a display button is pressed	Ding sounds when an incorrect button is pressed	OFF
IC1 (PIN 50)			5 V
IC1 (PIN 51)			0 V

5) Switch input circuit

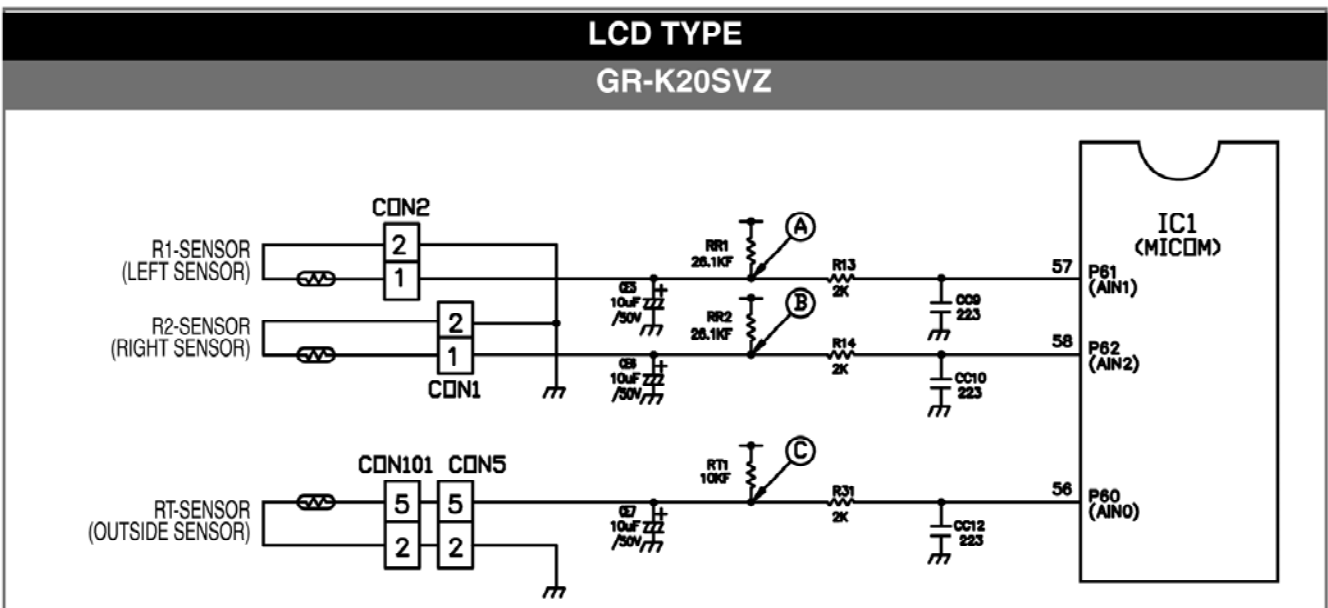
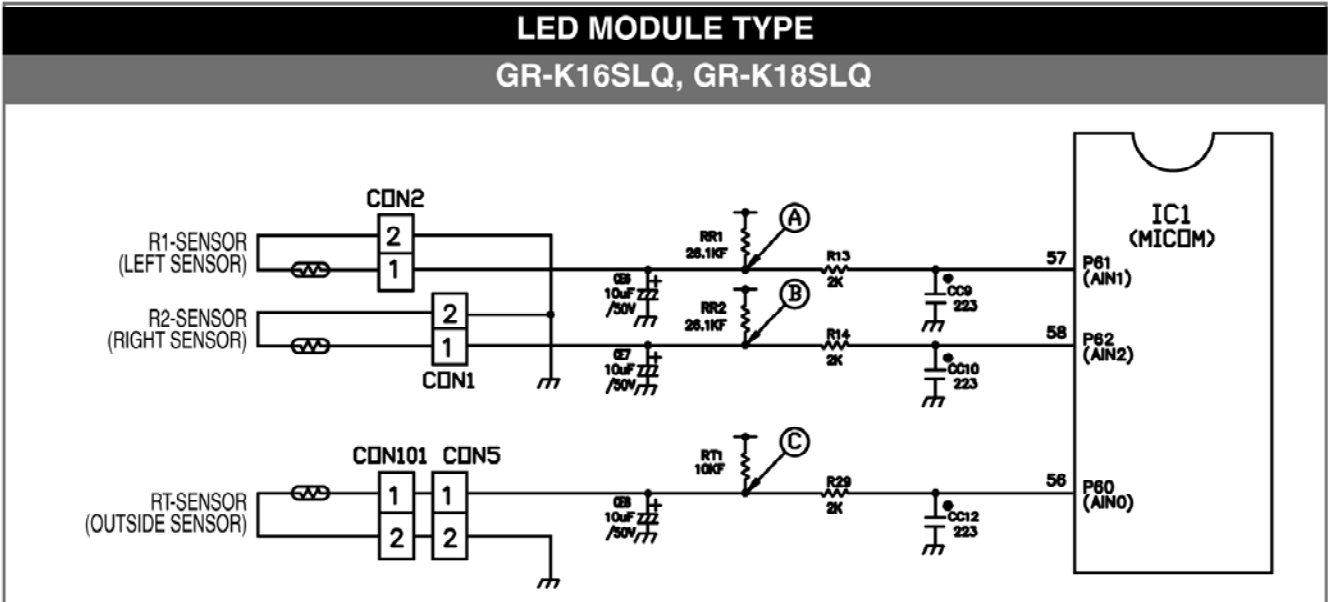
The switch input circuit detects the test switch signal.



MICOM Function and Description of Circuit

6) Temperature sense circuit

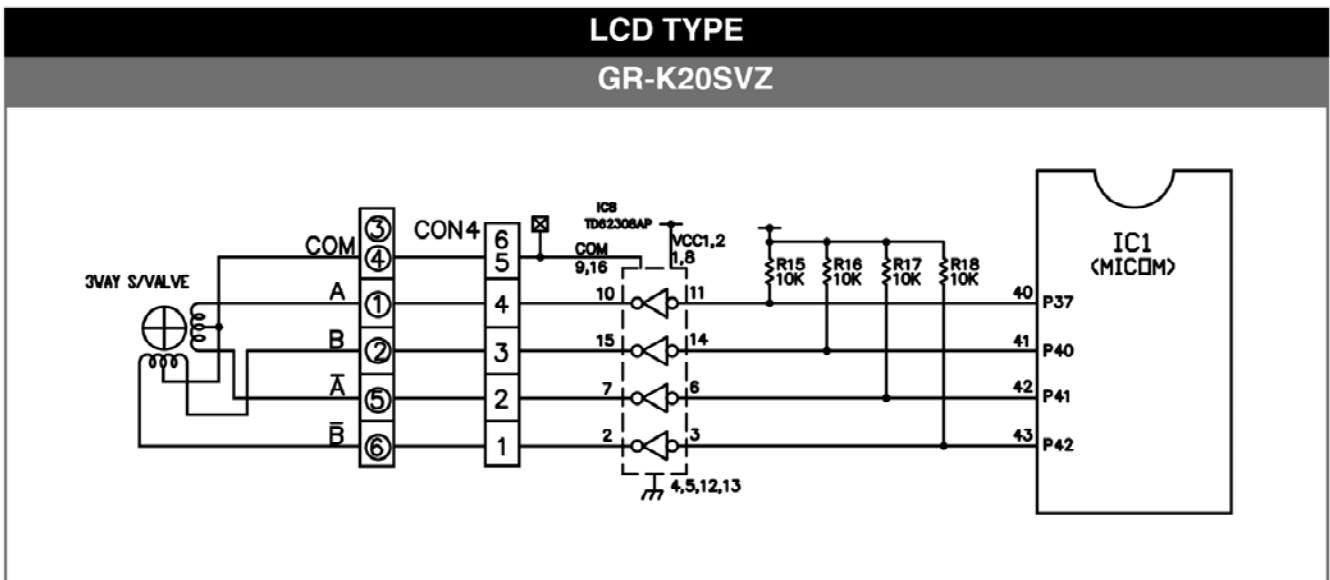
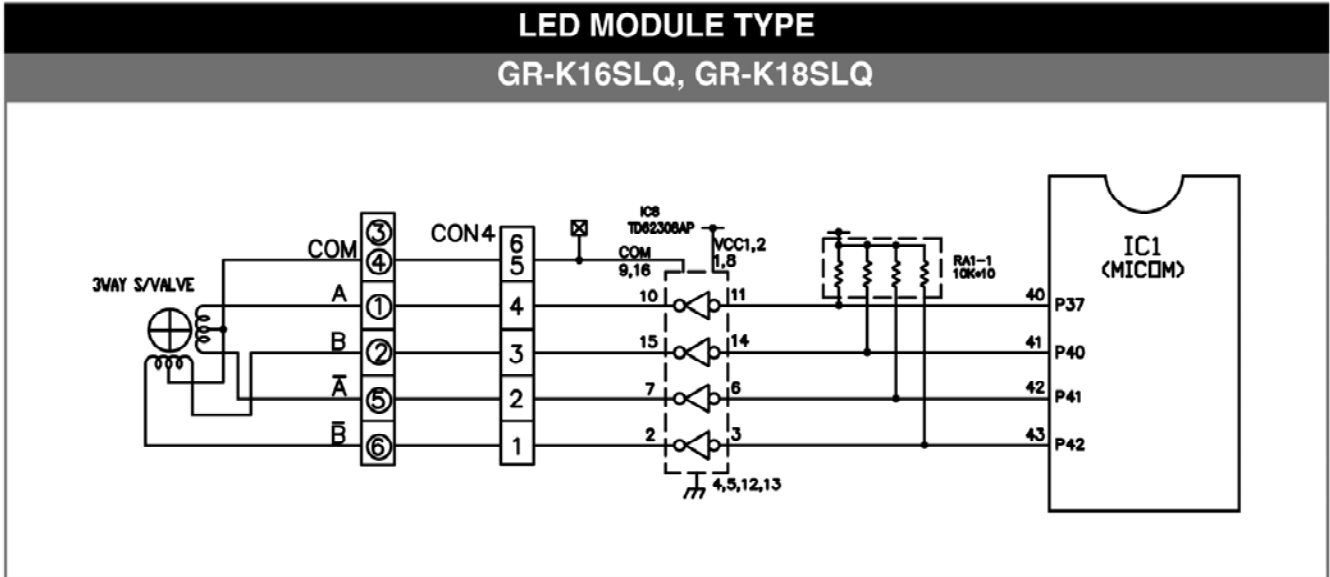
The temperature sense circuit consists of a sensor to detect the outside (ambient) temperature and sensors in the left and right compartments for storing/ripening kimchi. The status of each sensor, whether open or shorted, is shown below.



Sensor	Checkpoint	Normal (-50° C~+80° C)	Shorted	Open
Left sensor	POINT (A) Voltage	0.5 V _{dc} ~4.5 V _{dc}	0 V _{dc}	5 V _{dc}
Right sensor	POINT (B) Voltage			
Outside sensor	POINT (C) Voltage			

MICOM Function and Description of Circuit

7) Stepping Motor Operation Circuit (3-way Valve)

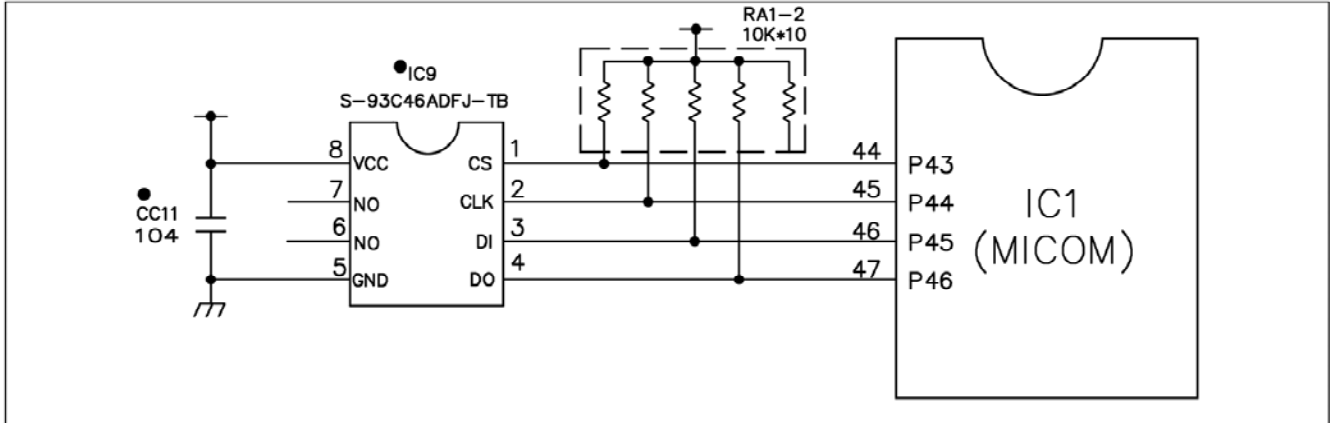


⇒ The rotation of the 3-way valve is controlled by the output of pins 40~43 of IC1.
Changes in these outputs rotate the valve.

Explanation) The stepping motor is driven by IC8. Signals are transmitted via IC8 as the motor driving IC. The motor coil wound on each phase of the stator forms the rotation magnetic field and causes the stepping rotation.

MICOM Function and Description of Circuit

8) Power Failure Compensation Circuit

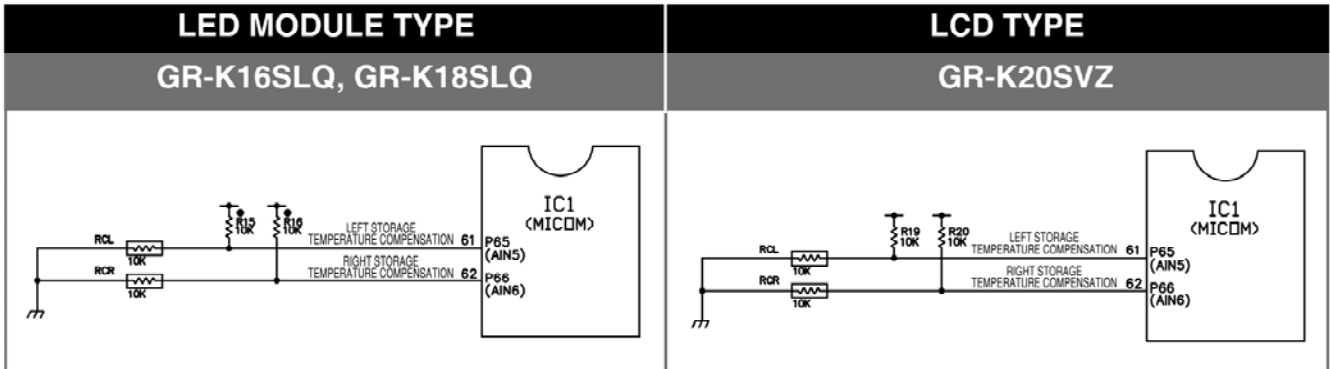


- ⇒ The power failure compensation circuit recalls the temperature range of the right and left compartments and maintains these levels if power is interrupted briefly. Temperature setting information is delivered to IC9 via its serial interface with the microprocessor IC1. If the power failure compensation does not work, replace IC9.

MICOM Function and Description of Circuit

9) Keeping temperature compensation and too cold/too warm cut compensation circuit

(1) Keeping temperature compensation



⇒ This is a circuit to input the temperature compensation level required for adjusting storage temperature at the left or right compartment.

Left Compartment (RCL)	Right Compartment (RCR)	Temperature compensation value	Remarks
180 KΩ		+2.5° C	Warmer ↑
56 KΩ		+2.0° C	
33 KΩ		+1.5° C	
18 KΩ		+1.0° C	
12 KΩ		+0.5° C	
10 KΩ		0° C	Standard temperature
8.2 KΩ		-0.5° C	↓ Cooler
5.6 KΩ		-1.0° C	
3.3 KΩ		-1.5° C	
2 KΩ		-2.0° C	
470 Ω		-2.5° C	

⇒ Temperature compensation table by adjustment of resistance value (difference value against current temperature).

MICOM Function and Description of Circuit

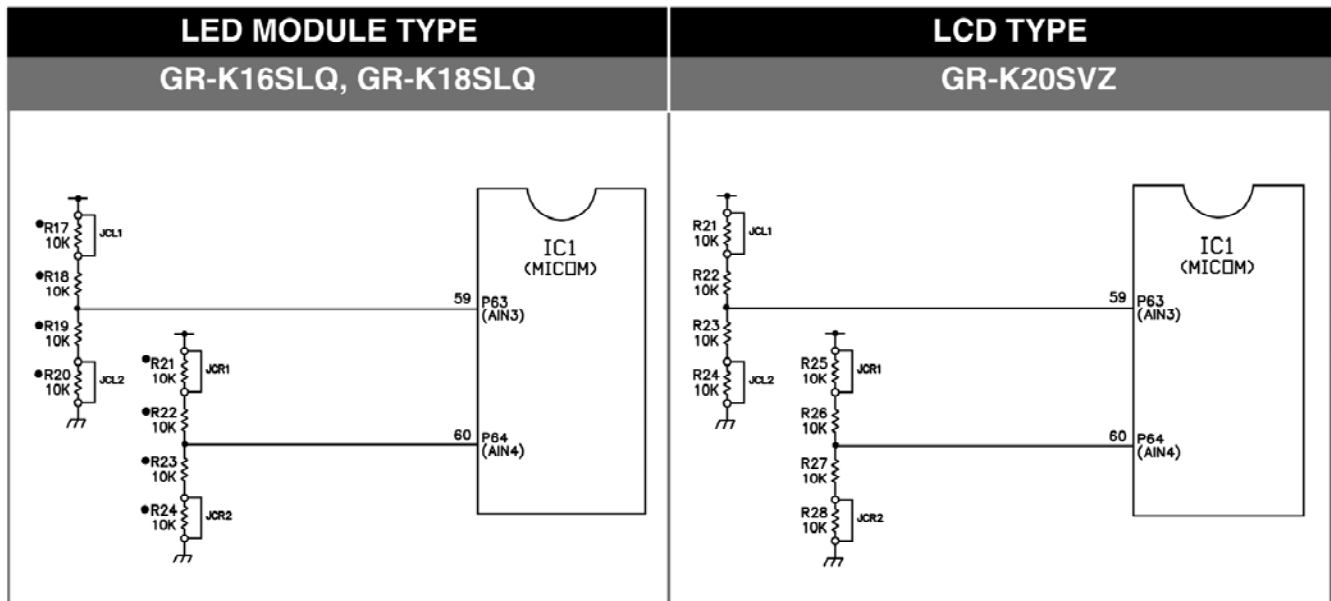
Example) If you change the resistance of compensation at the left compartment (RCL) from 10K Ω to 18K Ω , the storage temperature in the left compartment will be increased by 1°C.

Division	Modification	470 Ω	2 K Ω	3.3 K Ω	5.6 K Ω	8.2 K Ω	10 K Ω
	Current						
Left Compartment (RCL)	470 Ω	No change	0.5° C UP	1° C UP	1.5° C UP	2° C UP	2.5° C UP
	2 K Ω	0.5° C DOWN	NO CHANGE	0.5° C UP	1° C UP	1.5° C UP	2° C UP
	3.3 K Ω	1° C DOWN	0.5° C DOWN	NO CHANGE	0.5° C UP	1° C UP	1.5° C UP
	5.6 K Ω	1.5° C DOWN	1° C DOWN	0.5° C DOWN	NO CHANGE	0.5° C UP	1° C UP
	8.2 K Ω	2° C DOWN	1.5° C DOWN	1° C DOWN	0.5° C DOWN	NO CHANGE	0.5° C UP
Right Compartment (RCR)	10 K Ω	2.5° C DOWN	2° C DOWN	1.5° C DOWN	1° C DOWN	0.5° C DOWN	NO CHANGE
	12 K Ω	3° C DOWN	2.5° C DOWN	2° C DOWN	1.5° C DOWN	1° C DOWN	0.5° C DOWN
	18 K Ω	3.5° C DOWN	3° C DOWN	2.5° C DOWN	2° C DOWN	1.5° C DOWN	1° C DOWN
	33 K Ω	4° C DOWN	3.5° C DOWN	3° C DOWN	2.5° C DOWN	2° C DOWN	1.5° C DOWN
	56 K Ω	4.5° C DOWN	4° C DOWN	3.5° C DOWN	3° C DOWN	2.5° C DOWN	2° C DOWN
	180 K Ω	5° C DOWN	4.5° C DOWN	4° C DOWN	3.5° C DOWN	3° C DOWN	2.5° C DOWN

Division	Modification	12 K Ω	18 K Ω	33 K Ω	56 K Ω	180 K Ω
	Current					
Left Compartment (RCL)	470 Ω	3° C UP	3.5° C UP	4° C UP	4.5° C UP	5° C UP
	2 K Ω	2.5° C UP	3° C UP	3.5° C UP	4° C UP	4.5° C UP
	3.3 K Ω	2° C UP	2.5° C UP	3° C UP	3.5° C UP	4° C UP
	5.6 K Ω	1.5° C UP	2° C UP	2.5° C UP	3° C UP	3.5° C UP
	8.2 K Ω	1° C UP	1.5° C UP	2° C UP	2.5° C UP	3° C UP
Right Compartment (RCR)	10 K Ω	0.5° C UP	1° C UP	1.5° C UP	2° C UP	2.5° C UP
	12 K Ω	NO CHANGE	0.5° C UP	1° C UP	1.5° C UP	2° C UP
	18 K Ω	0.5° C DOWN	NO CHANGE	0.5° C UP	1° C UP	1.5° C UP
	33 K Ω	1° C DOWN	0.5° C DOWN	NO CHANGE	0.5° C UP	1° C UP
	56 K Ω	1.5° C DOWN	1° C DOWN	0.5° C DOWN	NO CHANGE	0.5° C UP
	180 K Ω	2° C DOWN	1.5° C DOWN	1° C DOWN	0.5° C DOWN	NO CHANGE

MICOM Function and Description of Circuit

(2) Too cold/too warm cut compensation



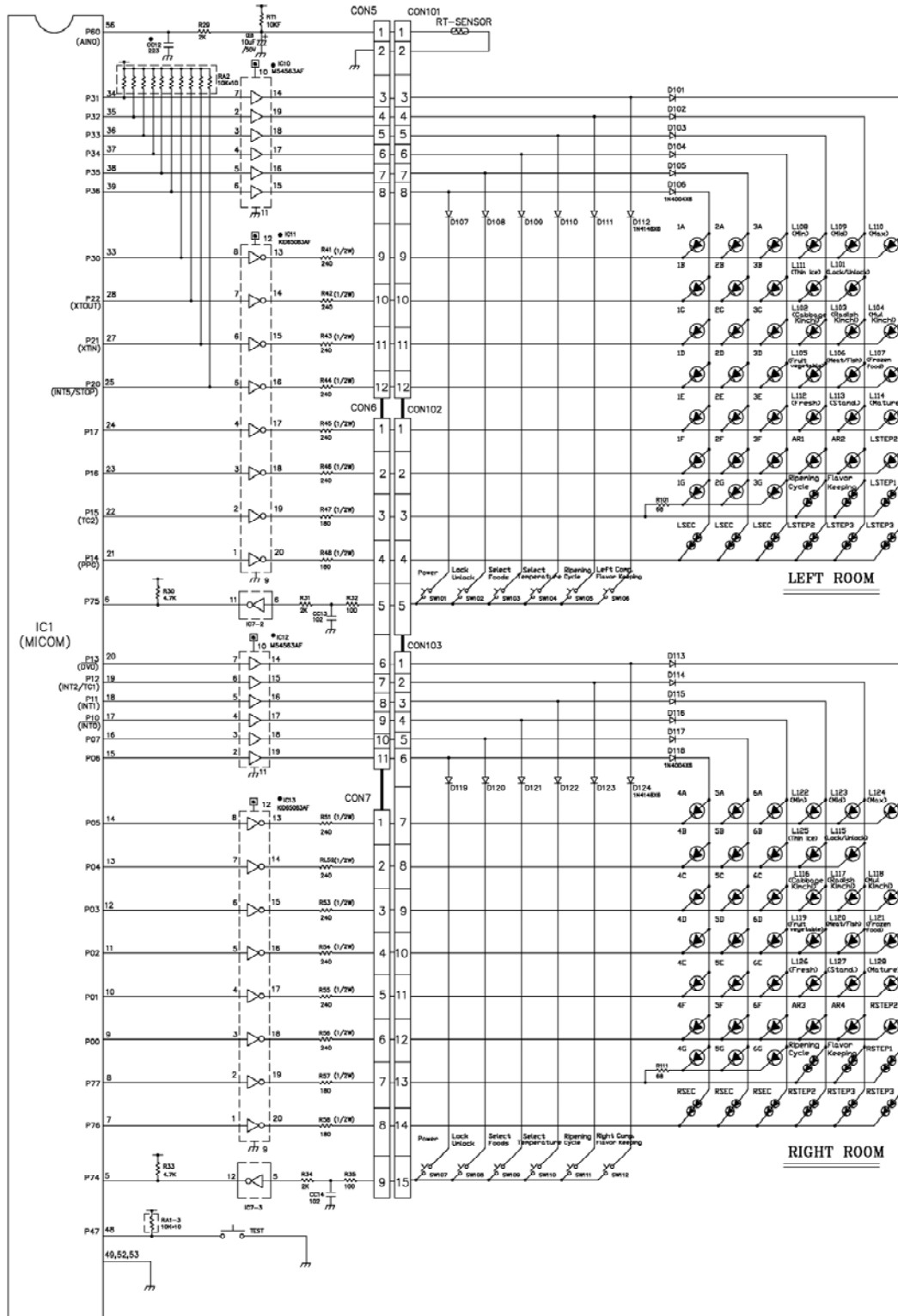
Left compartment cut compensation		Left compartment keeping temperature compensation value
Too cold compensation	Too warm compensation	
JCL1	JCL2	
CUT		+1° C
	CUT	-1° C
CUT	CUT	0° C
		0° C (When shipping from factory)

Right compartment cut compensation		Right compartment keeping temperature compensation value
Too cold compensation	Too warm compensation	
JCR1	JCR2	
CUT		+1° C
	CUT	-1° C
CUT	CUT	0° C
		0° C (When shipping from factory)

○ The cut compensation circuit compensates the keeping temperature of the left or right compartment by simply cutting it out of service for a brief period.

MICOM Function and Description of Circuit

10) Button input and display part illumination circuit (LED MODULE TYPE)

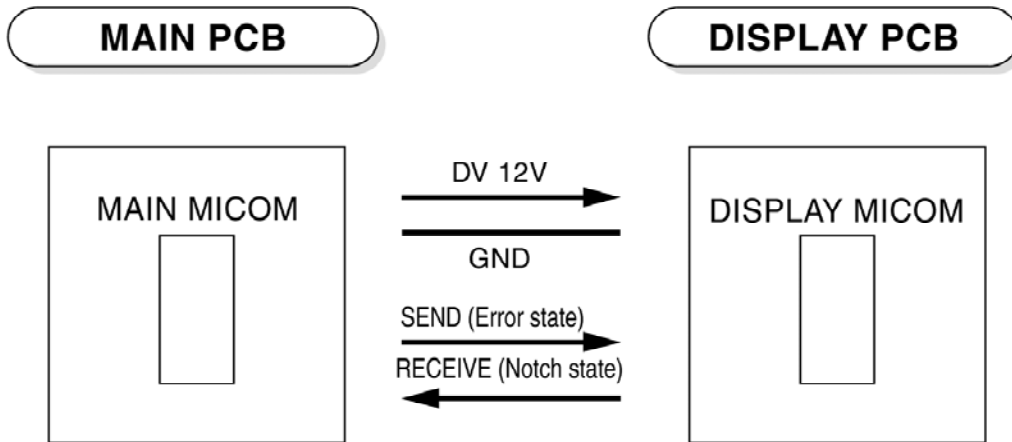


⇒ The above circuit determines which buttons are pressed and drives the LED display, whose driving method is a scan method.

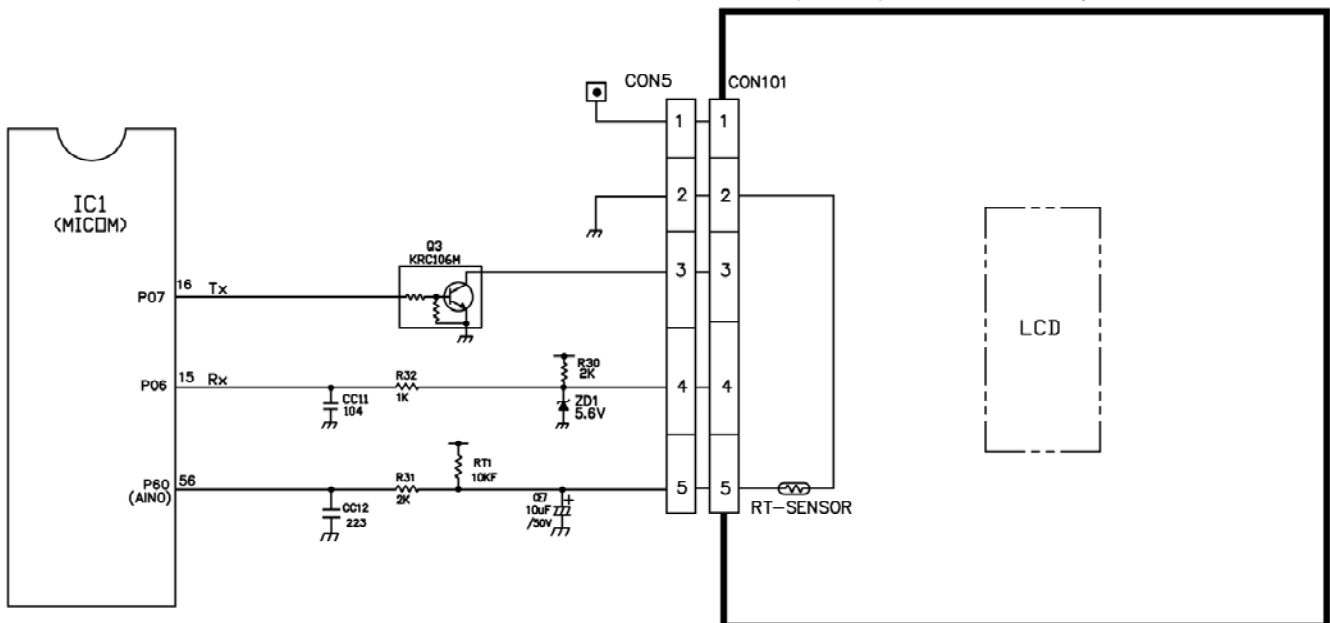
MICOM Function and Description of Circuit

11) Communication circuit between Main PCB and Display PCB (LCD type only.)

This circuit provides communication between the MICOM on the MAIN PCB and the MICOM of the DISPLAY PCB and controls the LCD. If there is no communication between these boards for 30 seconds, a communication error occurs.



PCB(PWB) ASSEMBLY, DISPLAY



MICOM Function and Description of Circuit

3. Sensor Resistance Characteristics Table

Measuring Temperature(°C)	Left Sensor, Right Sensor
-20° C	77 KΩ
-15° C	60 KΩ
-10° C	47.3 KΩ
-5° C	38.4 KΩ
0° C	30 KΩ
+5° C	24.1 KΩ
+10° C	19.5 KΩ
+15° C	15.9 KΩ
+20° C	13 KΩ
+25° C	11 KΩ
+30° C	8.9 KΩ
+40° C	6.2 KΩ
+50° C	4.3 KΩ

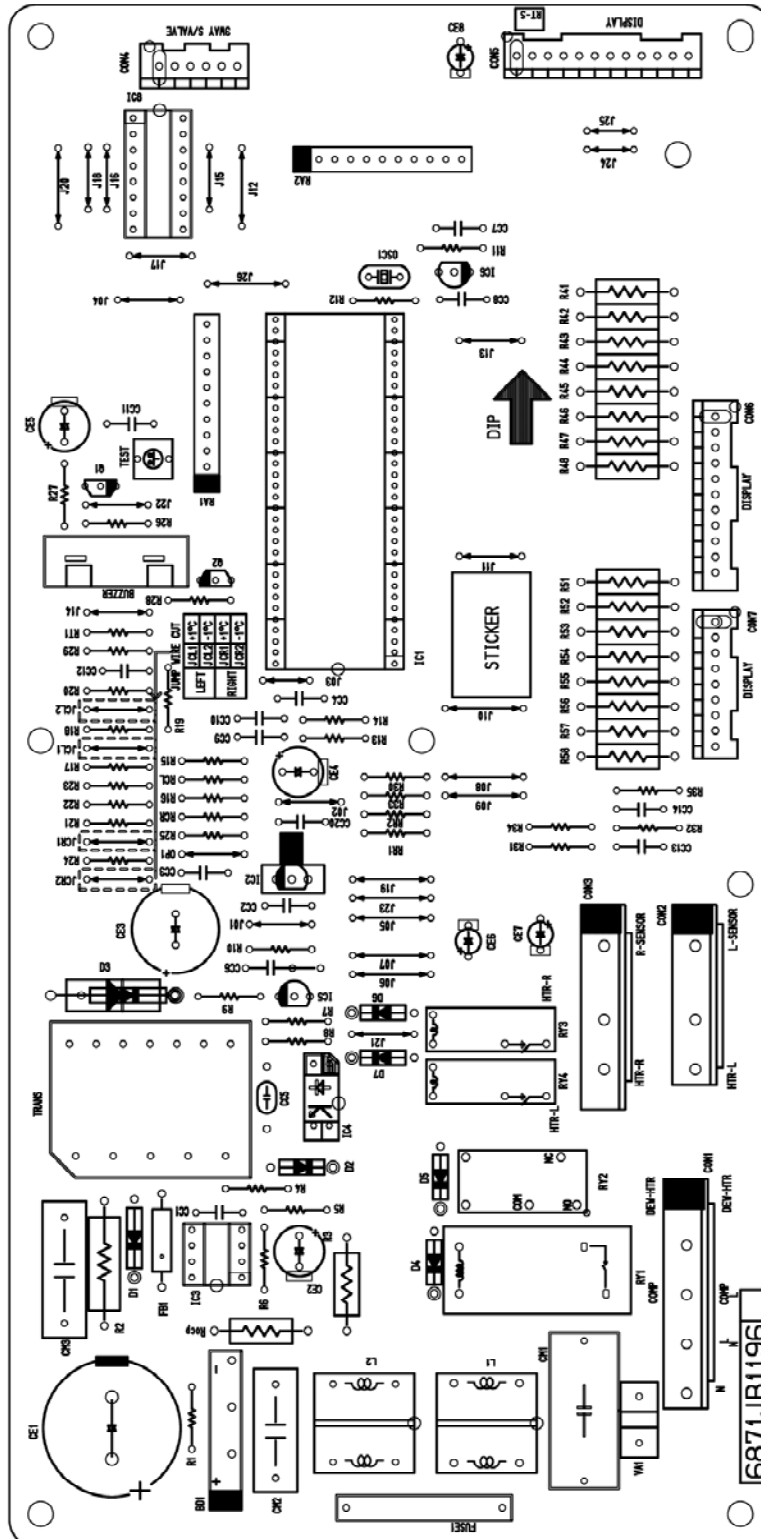
- ▷ Allowance of sensor resistance is 5%.
- ▷ Measure resistance value of sensor after leaving it for more than 3 minutes (delay is required due to sensing speed).
- ▷ Always use a digital tester! Analog testers have too great a margin of error.
- ▷ For the left compartment sensor, measure both ends of N°. 1 and N°. 2 after separating CON2 from the PCB Assembly. For the right compartment sensor, measure both ends of N°. 1 and N°. 2 of CON3. For the outside (ambient) sensor, measure both ends of N°. 1 and N°. 2 of CON5.

MICOM Function and Description of Circuit

4. PCB Parts Drawing and List

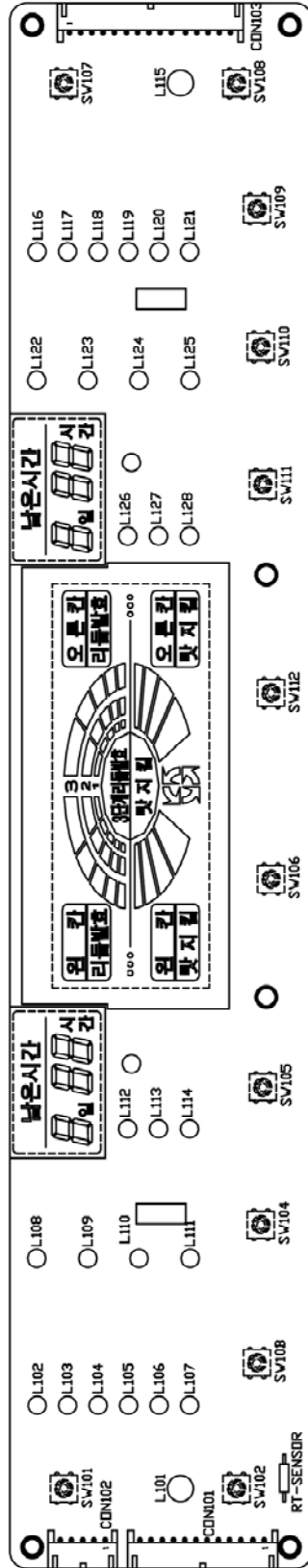
1) LED MODULE TYPE MODEL (GR-K16,18SLQ)

(1) Parts Drawing of MAIN PCB Assembly



MICOM Function and Description of Circuit

(2) Parts Drawing of DISPLAY PCB Assembly and Parts List

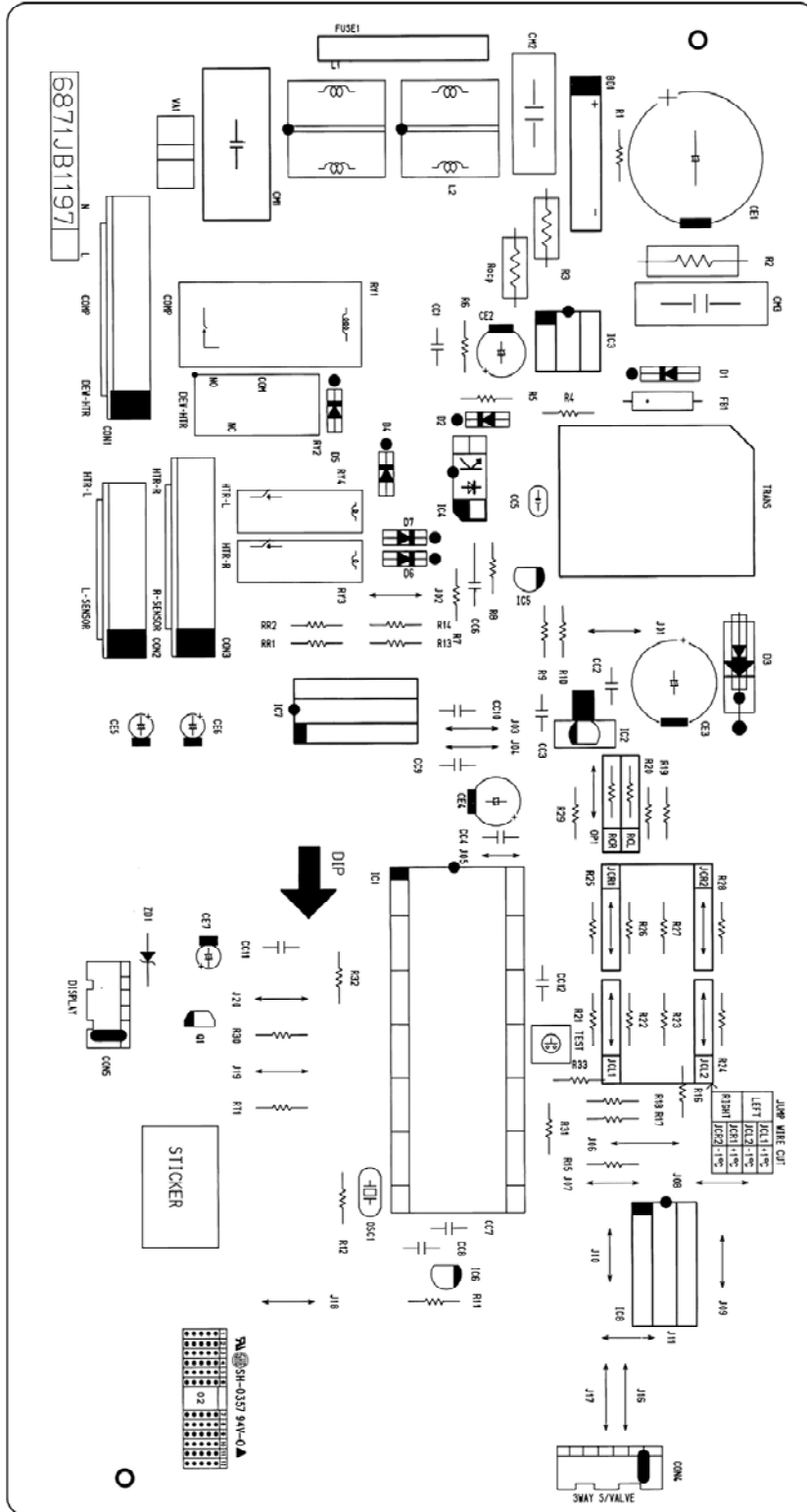


Qty	No	P/N	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6870JB8070A	PWR(PCB)	A6-PJT MD DISPLAY PCB	DOOSAN	FR4
1	2	6630JB8005E	CONNECTOR (CIRC),V	SNAW250-12 YEDNHD 12P 2.5MM ANGLE COP	YEDNHD	CON101
1	3	6630A9159D	CONNECTOR (CIRC),V	SNAW250-05	YEDNHD	CON102
1	4	6630JB8005H	CONNECTOR (CIRC),V	SNAW250-15	YEDNHD	CON103
-	5	-	-	-	-	-
1	6	-	REFLECTOR	A6-CENTER GRAPHIC	E-DAI	-
2	7	-	REFLECTOR	A6-7SEGMENT GRAPHIC	E-DAI	-
1	8	4140JB1023A	NAME PLATE(PKH)	A6-PJT RHYTHM GRAPHIC	E-DAI	-
2	9	4140JB1023B	NAME PLATE(PKH)	A6-PJT 7-SEGMENT GRAPHIC	E-DAI	-
12	10	ODRRM0028A	DIODE,RECTIFIERS	RLR4004 ROHM R/TP SOT23 400V 1A 20A	ROHM DELTA	D101~106,113~118
12	11	ODSRM0068A	DIODE,SWITCHING	RLS4148 ROHM R/TP LLS(L-L-34) 75V 450MA	ROHM	D107~112,119~124
12	12	6600RT1002J	SWITCH,TACT	JTP1138A JEIL 12V DC 50MA SWD	JEIL	SW101~112
2	13	ORJ0682G676	RESISTOR,METAL GLTZA	68 OHM 1/4W 5% 3216	SMART	R101,111
-	14	-	-	-	-	-
36	15	ODLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/	LEDTECH	1A~3G,L101,L112~114,LRHYTHML,STEP1,2,3
36	16	ODLLE0038AA	LED	LEDTECH ELECTRONICS LT8B32-UR-191T R/	LEDTECH	4A~6G,L115,L126~128,RRHYTHM,RSSTEP1,2,3
40	17	ODLLE0048AA	LED	LEDTECH ELECTRONICS LT8B22-J-190T R/TP	LEDTECH	L102~111,116~125,ARI~4L,SEC,RSECL,COOL,RCOOL
1	18	6500JB3001A	SENSOR	COMBI PCB JAMES-TEC RT_SENSOR -	JAMES-TECH	RT-SENSOR
20	19	49111001	SOLDER,SOLDERING	SULDERKROUSIN W/REKRSO	HUI SUNG	-
50	20	49111004	SOLDER,SOLDERING	H63A	HUI SUNG	-
21	21	59333105	FLUX	SGJ0825-0830 KOREA F.H-206	KOKI	-

MICOM Function and Description of Circuit

2) LCD TYPE MODEL (GR-K20SVZ)

(1) Parts Drawing of MAIN PCB Assembly



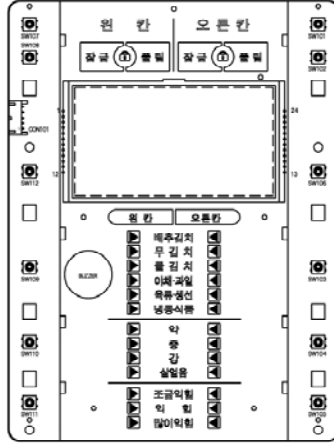
MICOM Function and Description of Circuit

Parts List

Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6870 JB068A	PWR(PCB)	A6-FJT PREMIUM LCD MAIN PCB	DOOSAN	FRI1,6T
1	2	6170 JB2010A	TRANSFORMER,SMPS(COIL)	A3-FJT 12.5V 1A	DOOSAN	TRANS
1	4	6630 JB09106D	CONNECTOR (CIRC),WAFE	YV996-09AV	YEON HO	C0N1
1	5	6630 JB09008A	CONNECTOR (CIRC),WAFE	JE202-11-047P-2,4,6J JAE EUN 4	JAE EUN	C0N2
1	6	6630 JB09008B	CONNECTOR (CIRC),WAFE	JE202-11-081P-2,5,7J JAE EUN 4P	JAE EUN	C0N3
1	7	6630 JB09007F	CONNECTOR (CIRC),WAFE	917784-1 AMP 6P 2.5MM STRAIGHT	AMP	FFN4
1	8	6630 JB09007D	CONNECTOR (CIRC),WAFE	917783-1 AMP 3P 2.5MM STRAIGHT	AMP	C0N5
1	11	0122 JB2018V	IC, DRAWING	THP87PH40AN 64P,SDIP BK A6 LCD	TOSHIBA	IC(U=V)
1	12	0122 JB2018X	IC, DRAWING	THP87PH40AN 64P,SDIP BK 200 LCD	TOSHIBA	IC(U=X)
1	13	01KE780500W	IC,KEC	K1A7805PI - - - -	KEC	IC2
1	15	01KE704200A	IC,KEC	K1A7042P 3P BK RESET	KEC	IC6
1	16	01KE650030B	IC,KEC	K1D65003AP 1BP,SDIP BK DRIVE	KEC	IC7
1	20	01T0623080C	IC, DRAWING	62308 16PIN SDIP BK DRIVE IC ST	TOSHIBA	IC8
1	22	01KF431000A	IC,KEC	K1A431 3 PIN TP - -	KEC	IC5
1	23	01T0721000A	IC,TOSHIBA	TLP721F 4P BK PHOTO COUPLER	TOSHIBA	IC4
1	26	6212A09002B	RESONATOR,CERAMIC	CST-4.00MGV,MURATA	MURATA	OSC1
1	27	6102 JB0001A	VARIABLE	SVC621D-14A SAMWHA 620V 10% V/D	SAM WHA	V/A1
1	28	6102 JB0001B	VARIABLE	INR14D621 IL JIN 620V 10% WORLD	IL JIN	V/A1
1	31	6990 JB0004D	RELAY	DH12D1-0-0 (JAPAN) DEC 250VAC 1	JAFIL	RY1
1	36	6990 JB0005A	RELAY	UW1AFHN MATSUSHITA 12V 10A 15.6	MATSUSHITA	RY1
1	38	6990 JB0009A	RELAY	GS-1 DMRN 12V 2A 297V 1C	DMRN	RY2
2	34	6990 JB0003B	RELAY	ALD112 MATSUSHITA 250VAC 3A 12V	NAIS	RY3,4
1	35	6990 JB0003A	RELAY	GSN-1A DMRN (JAPAN)DC12V 16.7	DMRN	RY3,4
1	36	01PMGSK003A	IC,POWER MANAGEMENT	STR-A6351 SANKEN 8 DIP ST SMPS	SANKEN	IC3
1	39	0TR106009AF	TRANSISTOR,BIPOLARS	KRC 106M KEC	KEC	Q1
1	41	0DB360000AA	DIODE,RECTIFIERS	D3SBA60 BK SHINDENGEN 600V 4A	SHINDENGEN	BD1
1	42	0DB3300100A	DIODE,RECTIFIERS	48 4.0 SHINDENGEN BK AX14 400V 1	SHINDENGEN	BD2
1	43	0DB107009AA	DIODE,RECTIFIERS	FR107 TP DELTA DD41 1000V 1A 3	DELTA/WWW	DI
1	45	0DB400409AC	DIODE,RECTIFIER	RECT1N4004 TP	DELTA/WWW	D4
1	46	0DB414809AD	DIODE	1N4148 PNOVENC TP5P DONGNC35 100	RDMH	D2
1	49	0CE4762V6E0	CAPACITOR,FIXED ELECT	47UF HE 450V 20% BULK SNAP IN	SAM HVA	CE1
1	50	0CK687YH6E0	CAPACITOR,FIXED ELECT	680UF RX 25V 20% BULK SNAP IN	SAM HVA	CE3
1	53	0CE227BF638	CAPACITOR,FIXED ELECT	220UF KMF TYPE 16V 20% FMS TP 3	RUBICON,SAMHWA	CE4
1	54	0CE226AK638	CAPACITOR,FIXED ELECT	220UF KME TYPE 50V 20% FMS TP 5	RUBICON,SAMHWA	CE5,6,7
1	55	0CK06AK638	CAPACITOR,FIXED ELECT	10UF KM TYPE 50V 20% FMS TP 5	RUBICON,SAMHWA	CE5,6,7
1	57	0C047418670	CAPACITOR,POLYESTER	0.47UF D 275V M H/PP NI R	PILKO	CH1
1	58	0C022418670	CAPACITOR,FIXED FILM	0.22UF D 275V M H/PP NI R	PILKO	CH2
1	59	0C047321430	CAPACITOR,POLYESTER	4.700UF S 630V 1 M/PP NI R	SAM HVA	CH3
1	60	0C022418630	CAPACITOR,POLYESTER	0.22UF D 100V M H/PE NI R	SAM HVA	CH6
1	61	0CK22102S10	CAPACITOR,CERAMIC CHI	220P PKY K B S	DOOSAN/SAM HVA	CC5
3	63	0CK220K949	CAPACITOR,FIXED CERAM	22NF 50V Z F TASE	TAE YANG	CC9,10,12
1	64	0CK1040K949	CAPACITOR,FIXED CERAM	0.1UF D 50V 80%,-20% F(Y5V) TAS	TAE YANG	CC2,3,4,7,8,11
1	66	0CK4710K519	CAPACITOR,CERAMIC CHI	470PF 50V K B TASE	TAE YANG	CC1
1	68	0DZHR00029A	DIODE,ZENERS	1N5232B MOTORORA TP D034 0.5W 5	DELTA/WWW	Z01
1	72	0RS5602K641	RESISTOR,FIXED METAL	56K OHM 2 W 5.00% TASE	SMART	R2
1	73	0RS47023609	RESISTOR,FIXED METAL	470K OHM 1 W 5% TASE	SMART	R3
1	74	0RS3021J609	RESISTOR,FIXED METAL	1.2 OHM 1 W 5% TASE	SMART	R10P
1	76	0RD08R2G609	RESISTOR,FIXED CARBON	82 OHM 1/4 W 5.00% TASE	SMART	R4
1	78	0RD6600G609	RESISTOR,FIXED CARBON	680 OHM 1/4 W 5.00% TASE	SMART	R6
4	79	0RD2001G609	RESISTOR,FIXED CARBON	2K OHM 1/4 W 5.00% TASE	SMART	R13,14,30,31
1	80	0RD4701G609	RESISTOR,FIXED CARBON	4.7K OHM 1/4 W 5.00% TASE	SMART	R11
1	81	0RD6801G609	RESISTOR,FIXED CARBON	6.8K OHM 1/4 W 5.00% TASE	SMART	R8
2	82	0RD1004G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TASE	SMART	R1,12
1	84	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TASE	SMART	RCL
1	85	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TASE	SMART	RCR
1	86	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TASE	SMART	CR1
1	87	0RN1005L409	RESISTOR,FIXED METAL	10K OHM 1/4 W 1.00% TASE	SMART	R11
2	88	0RN2612G409	RESISTOR,FIXED METAL	26.1K OHM 1/4 W 1.00% TASE	SMART	RR1,RR2
16	89	0RD1002G609	RESISTOR,FIXED CARBON	10K OHM 1/4 W 5.00% TASE	SMART	R15-29,33
1	90	0RD1001G609	RESISTOR,FIXED CARBON	1K OHM 1/4 W 5.00% TASE	SMART	R8,32
1	95	0RD1001G609	RESISTOR,FIXED CARBON	1.0K OHM 1/4 W 5.00% TASE	SMART	R7
1	99	0RN2010G409	RESISTOR,FIXED METAL	20K OHM 1/4 W 1.00% TASE	SMART	R10
1	100	0RN9101G409	RESISTOR,FIXED METAL	9.1K OHM 1/4 W 1.00% TASE	SMART	R9
1	104	6P10 JB0001A	DIODE (CIRC),BRAD	BP S31040 SAMWHA 35X10MM AXIAL	SAM HVA	F/R1
1	105	6500RT001W	SWITCH,TACT	THV502GAA POSTECH 12V DC 50MA	POSTEC	TEST
1	106	6500 JB0003A	FILTER(CIRC),NOISE	3A 3MH 250V CV430030 A345-PJT C	TNC	L1
1	107	6500 JB0007F	FILTER(CIRC),EMC	UV11-05320 TNC BK 0.5A 20MH	TNC	L3
1	110	0F27 JB3001A	FUSE	250V 2A SLOW-BLOW LITTELFUSE,1	SAMJU	FUSE1
18	112	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	10MM	J01-04,07-11,18-20
1	114	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	10MM	JCL1,2,JCR1,2
4	115	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	10MM	J05
1	117	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	7.5MM	J05
3	118	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	12.5MM	J06,16,17
1	120	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	15MM	J05
1	121	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	15MM	J05
1	123	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	15MM	J05
1	124	43607015	WIRE,JUMP	GC10 WHITE T0.6 L10 FOR A INSR	15MM	J05
1	125	49111001	SOLDER,SOLDERING	SOLDER(KRUSIN WIRE)RSO	HUISUNG,DAEJIN	
1	125	49111004	SOLDER,SOLDERING	H63A		
1	125	59333103	FLUX	IS60.825-0.830 KOREA F.H-206	KOKI	

MICOM Function and Description of Circuit

(2) Parts Drawing of DISPLAY PCB Assembly and Parts List



Parts List

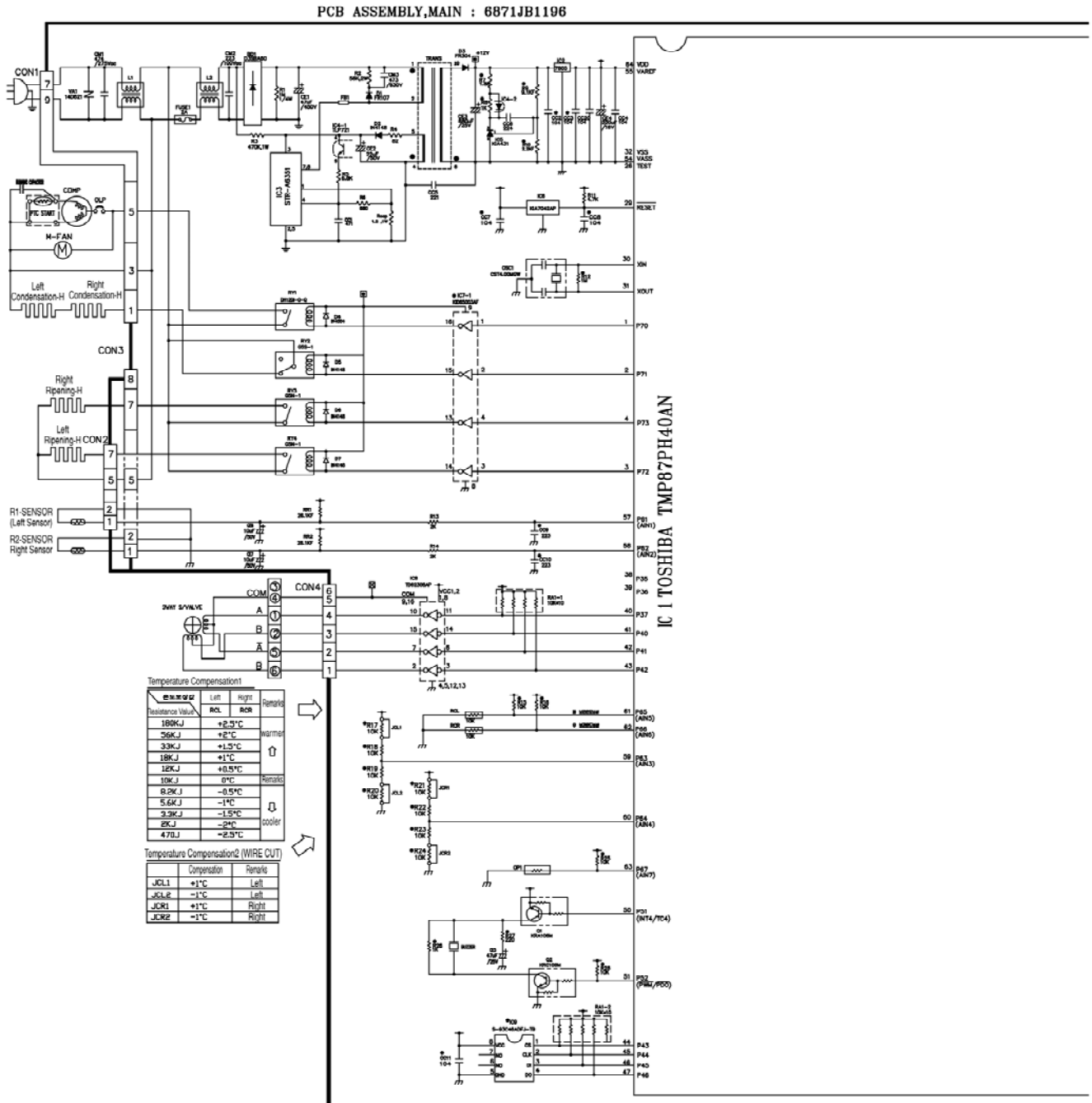
Qty	No	P/NO	DESCRIPTION	SPEC	MAKER	REMARK
1	1	6304TVD002B	LCD(LIQUID CRYSTAL DI	VTD-132TP1 VDS TN MONO A3-PJT LCD	VDS	LCD
1	2	6870UB9072A	PWB(PCB)	200(A3) LCD DISPLAY NAESU	DOOSAN	FR4
1	3	-----	REFLECTOR	PC-ABS	IDAI	--
--	4	--	--	--	--	--
1	5	-----	FILM	W5N(91*53)	KIMOTO/SAEHAN	Transparency 30%
1	6	-----	WAFER	SMAW250-05	YEON HO	CON101
--	7	--	--	--	--	--
1	8	4140JB1024A	NAME PLATE, P(H)	200(A3) LCD UPPER GRAPHIC	IDAI	--
--	9	--	--	--	--	--
1	10	Q1ZZJB2013R	IC, DRAWING	TMP87PP21E 80, QFP BK A3 200 LCD DISP	TOSHIBA	IC101 (Q-F)
2	11	Q1SLM001A	IC, STANDARD LOGIC	M54563FP MITSUBISHI 20 R/TP CONVERT	MITSUBISHI	IC105, 107
1	12	Q1KE650030C	IC, KEC	KID85003AF 16SOP BK 7CH DRIVER	KEC	IC106
1	13	Q1KER50R30B	IC, KEC	KID850R3AF 20P SOP ST LED DRIVER(TR	KEC	IC108
1	14	Q1SLKE002A	IC, STANDARD LOGIC	KIA78L05F KEC SOT-89 TP REGULATOR	KEC	IC102
1	15	Q1SLKE003A	IC, STANDARD LOGIC	KIA78L42AF KEC SOT-89 TP RESET IC	KEC	IC103
1	16	Q1RH934600D	IC, ROHM	BR93LC46RF-W 8PIN SOP BK EEPROM	ROHM	IC104
1	17	Q1SLTKF004A	IC, STANDARD LOGIC	KRA106S KEC SOT-23 TP TRANSISTOR	KEC	Q105
4	18	Q1SLTKE005A	IC, STANDARD LOGIC	KRA106S KEC SOT-23 TP TRANSISTOR	KEC	Q101, 103, 104, 106
1	19	Q1SLTKE006A	IC, STANDARD LOGIC	KTA1298 KEC SOT-23 TP TRANSISTOR	KEC	Q102
--	20	--	--	--	--	--
1	21	6212AQ9002B	RESONATOR, CERAMIC	CST-4.00MGW, MURATA	MURATA	OSC101
--	22	--	--	--	--	--
--	23	--	--	--	--	--
2	24	QCE107VF6DC	CAPACITOR, FIXED ELECT	100UF MV 16V 20% R/TP (SMD) SMD	SAM-WA	CE103, 104
1	25	QCE476VH6DC	CAPACITOR, FIXED ELECT	47UF MV 25V 20% R/TP (SMD) SMD	SAM-WA	CE105
--	26	--	--	--	--	--
--	27	--	--	--	--	--
8	28	QCK104DK94A	CAPACITOR, FIXED CERAM	100NF 2012 50V 80%, 20% R/TP F (V5V)	MURATA	CC101-108
2	29	QCK102DK96A	CAPACITOR, FIXED CERAM	1NF 2012 50V 80%, 20% R/TP X7R	SAM-WA	CC109, 110
--	30	--	--	--	--	--
2	31	QR-H100L622	RESISTOR, METAL GLAZED	100 OHM 1 / 8 W 2012 5.00% D	SMART, ROHM	R151, 171
1	32	QRD220OE672	RESISTOR, FIXED CARBON	220 OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R172
2	33	QRD1001E672	RESISTOR, FIXED CARBON	1K OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R102, 173
4	34	QRD2001E672	RESISTOR, FIXED CARBON	2K OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R101, 109, 150, 170
5	35	QRD4701E672	RESISTOR, FIXED CARBON	4.7K OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R106, 107, 110, 145, 169
--	36	--	--	--	--	--
11	37	QRD1002E672	RESISTOR, FIXED CARBON	10K OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R134-144
1	38	QRD1502E672	RESISTOR, FIXED CARBON	15K OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R108
1	39	QRD1004E672	RESISTOR, FIXED CARBON	1M OHM 1/8 W 5% 2012 R/TP	SMART, ROHM	R133
--	40	--	--	--	--	--
--	41	--	--	--	--	--
1	42	QRD1201E472	RESISTOR, FIXED CARBON	1.2K OHM 1/8 W 1% 2012 R/TP	SMART, ROHM	R132
1	43	QRN1002F472	RESISTOR, FIXED METAL	10K OHM 1/8 W 1% 2012 R/TP	SMART, ROHM	R131
--	44	--	--	--	--	--
16	45	QRD4700G676	RESISTOR, FIXED CARBON	470 OHM 1/4 W 5% 3216 R/TP	SMART, ROHM	R111-126
1	46	-----	RESISTOR, METAL GLAZED	1K OHM 1/4 W 5% 3216 R/TP	SMART, ROHM	R127
--	47	--	--	--	--	--
--	48	--	--	--	--	--
1	49	-----	RESISTOR, METAL GLAZED	70 OHM 1/4 W 5% 3216 R/TP	SMART, ROHM	R168
1	50	-----	RESISTOR, METAL GLAZED	120 OHM 1/4 W 5% 3216 R/TP	SMART, ROHM	R152
1	51	-----	RESISTOR, METAL GLAZED	80 OHM 1/2 W 5% 5025 R/TP	SMART, ROHM	R166
2	52	-----	RESISTOR, METAL GLAZED	120 OHM 1/2 W 5% 5025 R/TP	SMART, ROHM	R147, 149
3	53	-----	RESISTOR, METAL GLAZED	180 OHM 1/2 W 5% 5025 R/TP	SMART, ROHM	R148, 165, 167
5	54	-----	RESISTOR, METAL GLAZED	240 OHM 1/2 W 5% 5025 R/TP	SMART, ROHM	R146, 161-164
--	55	--	--	--	--	--
10	56	-----	DIODE, RECTIFIERS	S1G 1N4004 R/TP	DEL TA	D103-106, 113-118
12	57	QDSHM00068A	DIODE, SWITCHING	RLS4148 ROHM R/TP LLDS(LL-34) 75V 45	ROHM	D107-112, 119-124
--	58	--	--	--	--	--
1	59	QDZFM00188A	DIODE, ZENERS	RLZ ROHM R/TP LLDS(LL-34) 500MW 5.6V	DEL TA	ZD101
--	60	--	--	--	--	--
15	61	QDLE0038AA	LED	LEDTECH ELECTRONICS LT8832-UR-191 T R	LEDTECH	L41, 42, 48, 54, 91-99, 210, 211
66	62	QDLE0038AA	LED	LEDTECH ELECTRONICS LT8832-UR-191 T R	LEDTECH	LD101-166
30	63	QDLE0038AA	LED	LEDTECH ELECTRONICS LT8832-UR-191 T R	LEDTECH	L1-L30
36	64	QDLE0048AA	LED	LEDTECH ELECTRONICS LT8822J-190T R/T	LEDTECH	L31-40, 43-47, 49-53, 55-90, 200-209
1	65	6908J99002A	BUZZER, PIEZO CERAMIC	BM-15A BLUEON 4KHZ 90DB 30MA X V 10MA	BLUEON	B1Z ZFR
12	66	6500RRT002J	SWITCH, TACT	JTP1138A JEIL 12V DC 50MA SMD	JEIL	SW101-112
1	67	6500JB3001A	SENSOR, TEMPERATURE	RT SENSOR JAMES-TEC COMBI PCB	JAMES TECH	RT-SENSOR
--	68	--	--	--	--	--
20	69	49111001	SOL DFR, SOL DFRING	SOL DFR(ROBIN WIR)RSO	HUISUNG	--
50	70	49111004	SOLDER, SOLDERING	H63A	HUISUNG	--
71	71	59333105	FLUX	SG-0.825-0.830 KOREA F.H-206	KOKI	--

MICOM Function and Description of Circuit

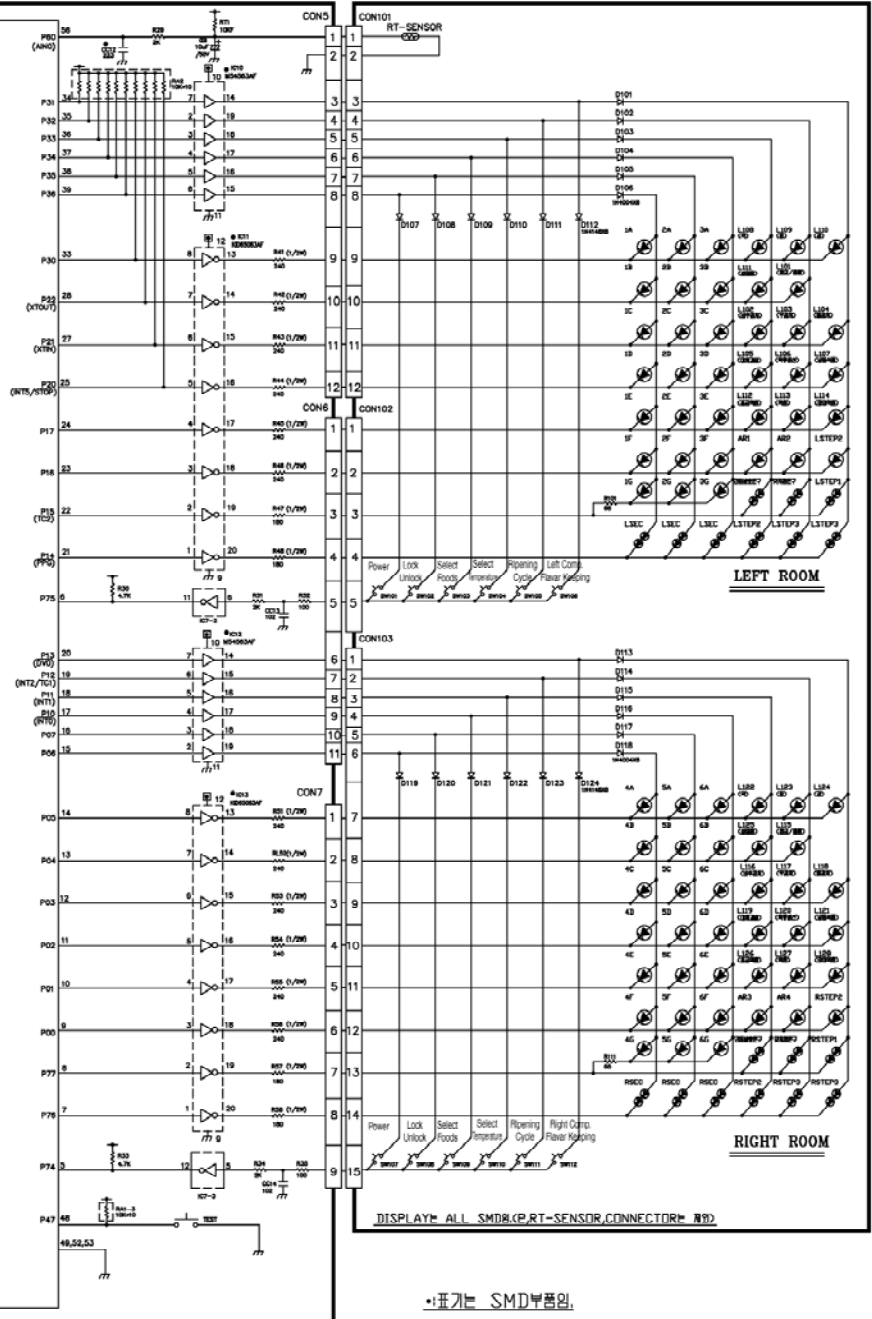
5. PCB Circuit drawing

1) LED MODULE TYPE MODEL (GR-K13,16,18SLQ)

(1) PCB Circuit Drawing



PCB ASSEMBLY, DISPLAY

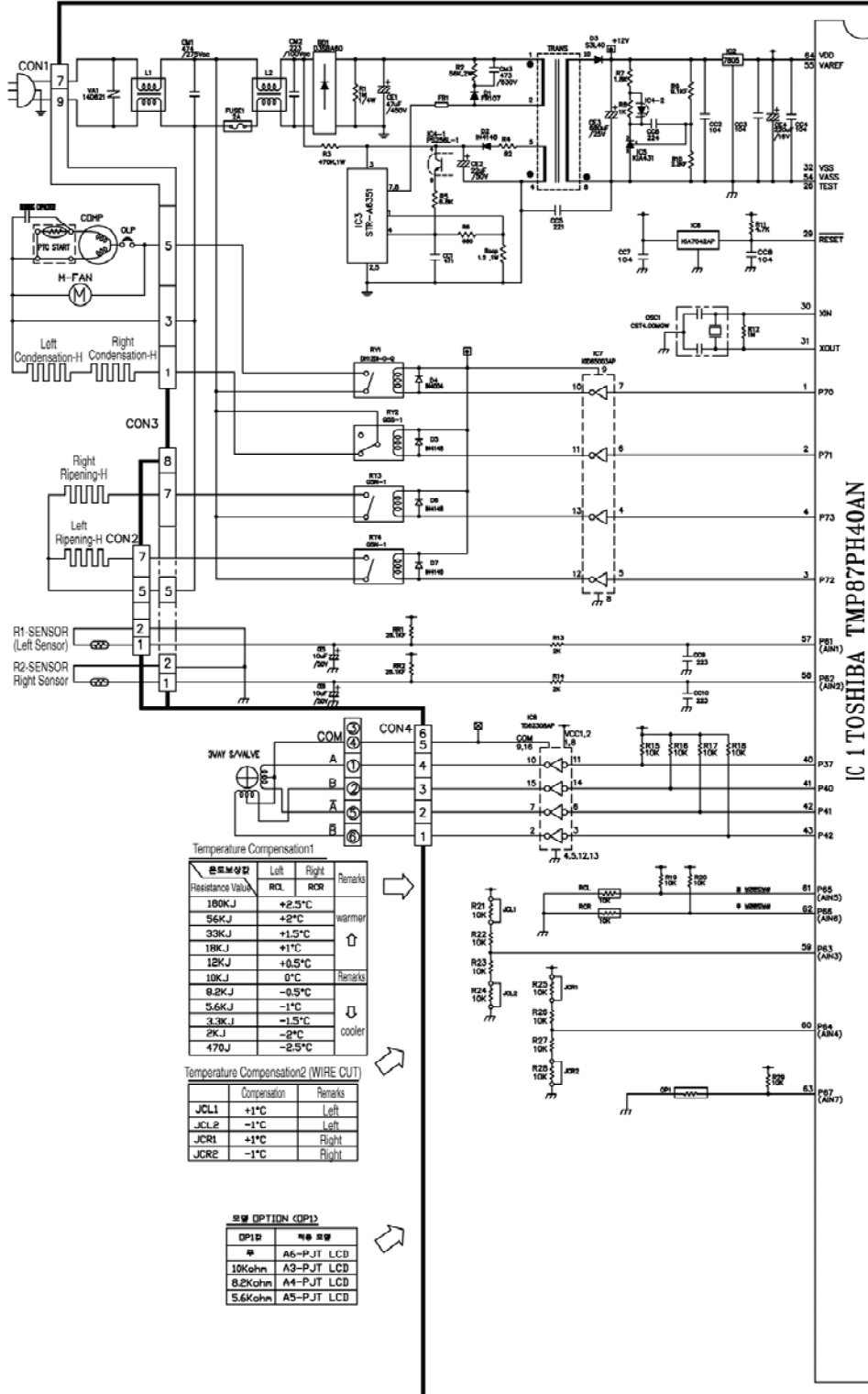


MICOM Function and Description of Circuit

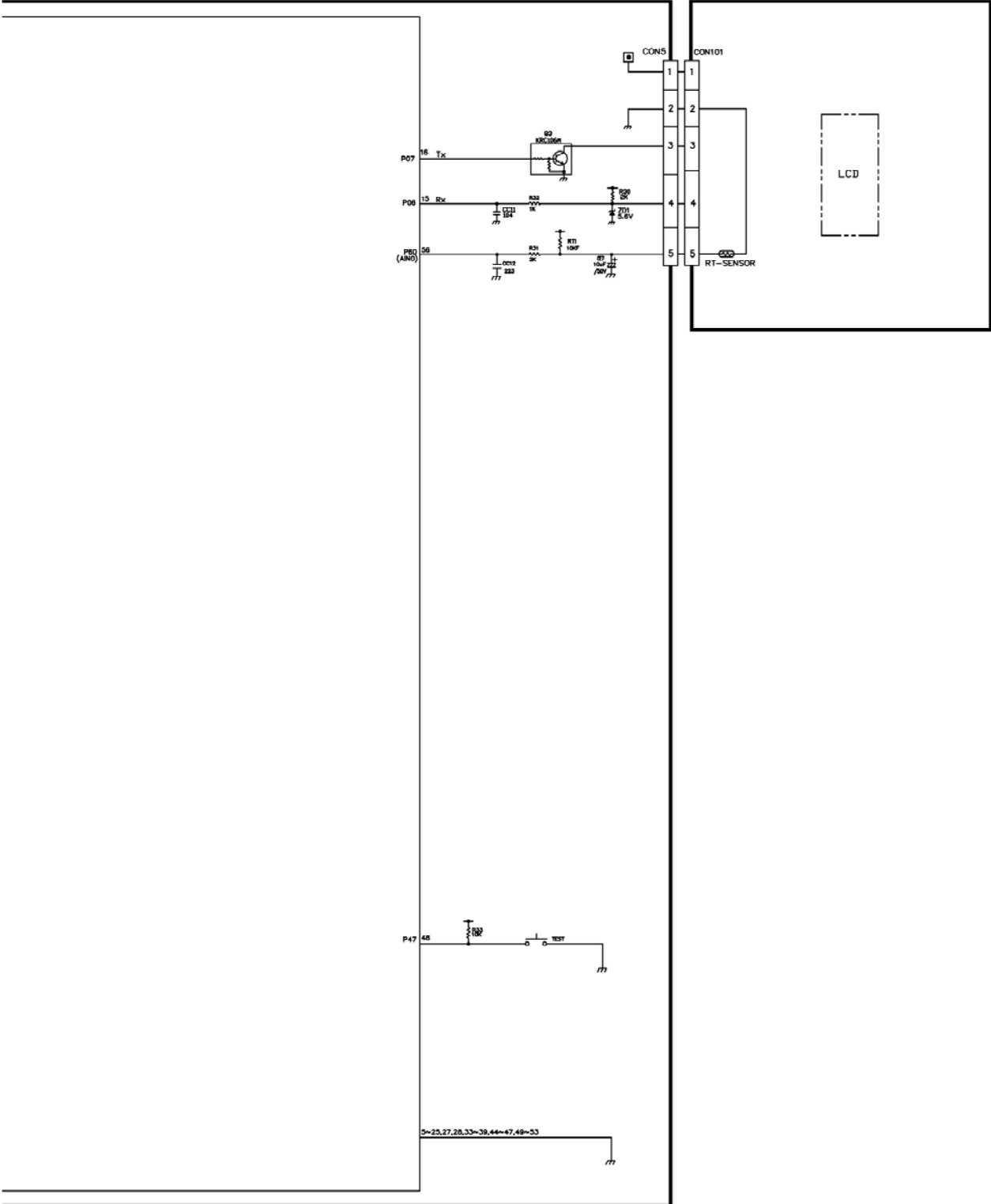
2) LCD MODULE TYPE MODEL (GR-K20SVZ)

(1) PCB Circuit Drawing

PWB ASSEMBLY, MAIN : 6871JB1197

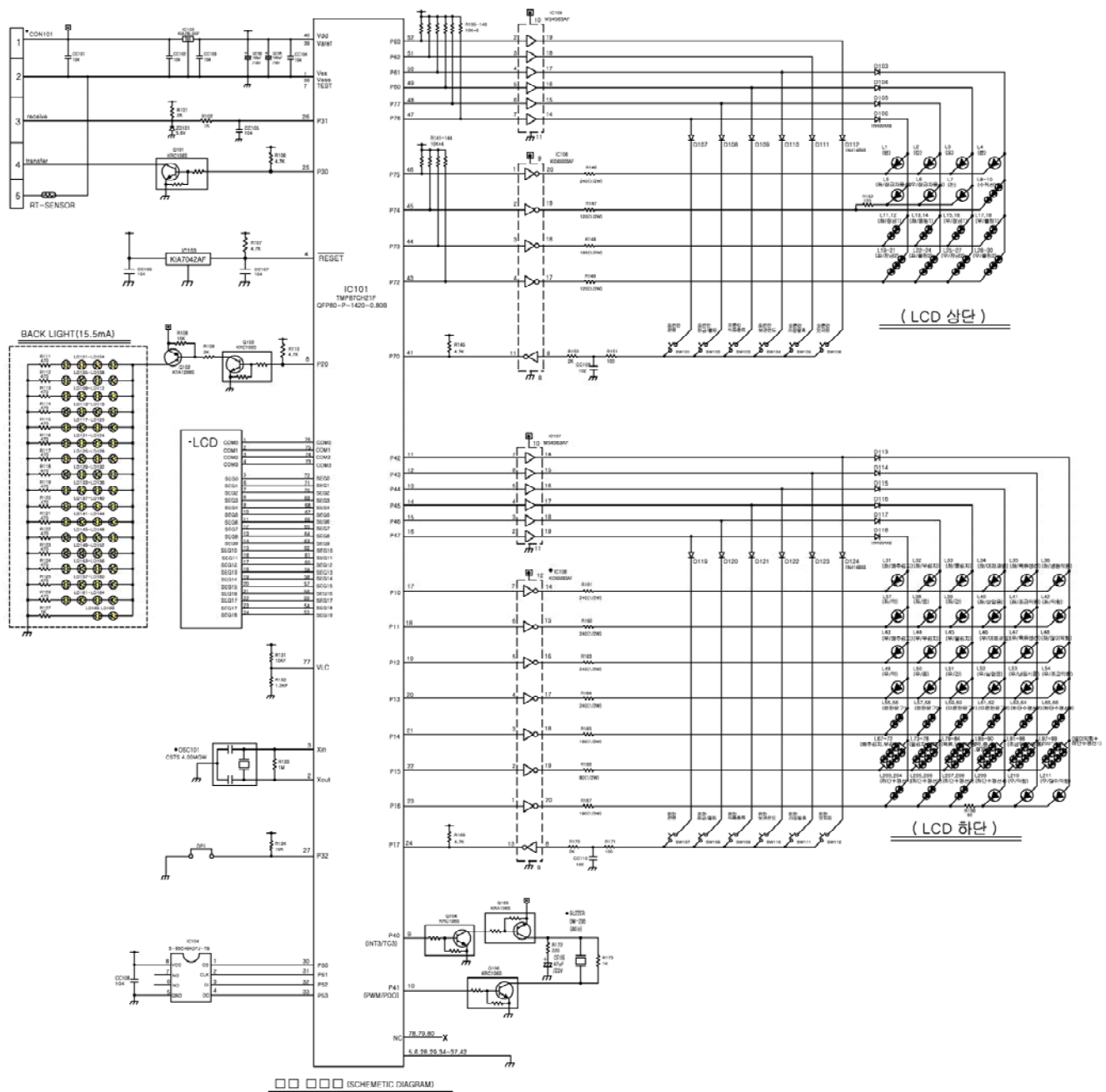


PWB ASSEMBLY,DISPLAY



MICOM Function and Description of Circuit

(2) DISPLAY PCB Assembly

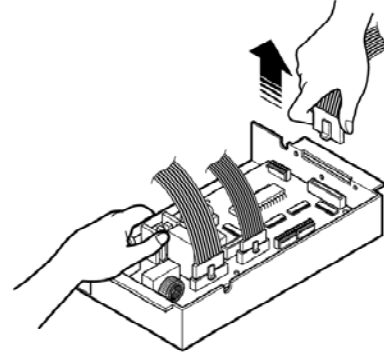


Warnings For Disassembling Product

Chapter 6 Warnings For Disassembling Product

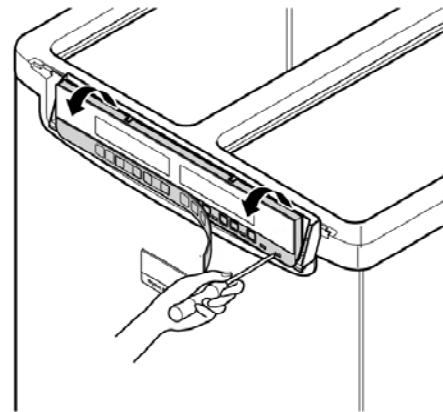
1. Main PCB Assembly

- When removing the Main PCB from the storage, disassemble it carefully and do not let the lead wires touch any part of the PCB.
- There is danger of a short as a lead wire is broken or cover is stripped.



2. Display Frame Assembly

- When replacing a display PCB, remove it using a slotted screwdriver.
 1. Peel off the right side of trim panel.
 2. Insert the end of a slotted screwdriver into the rectangular hole. (see drawing.)
 3. Push the screwdriver toward the back and remove the Driver Frame Assembly.
- Be extremely careful so the Display and the Case are not damaged.

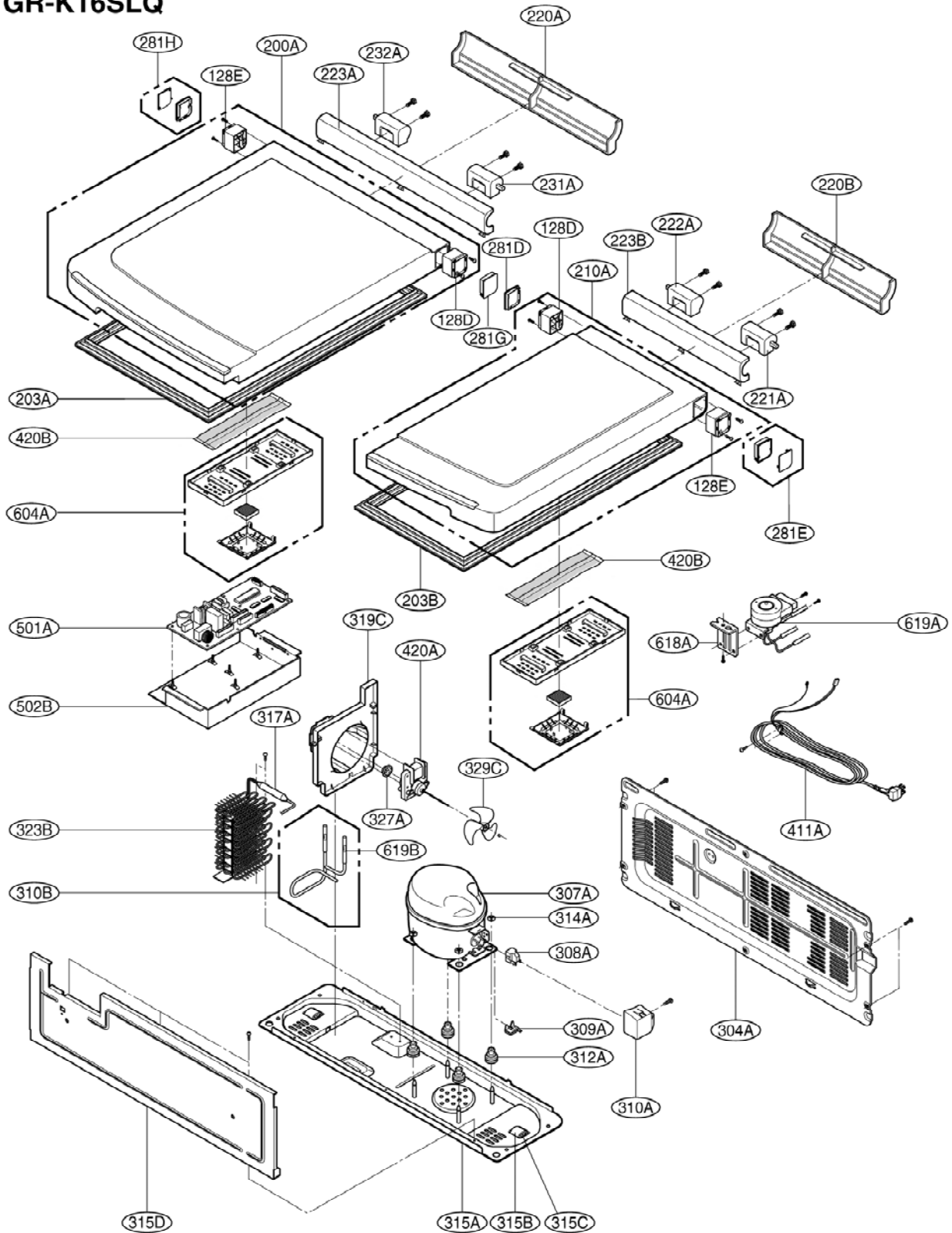


Exploded View and Parts List

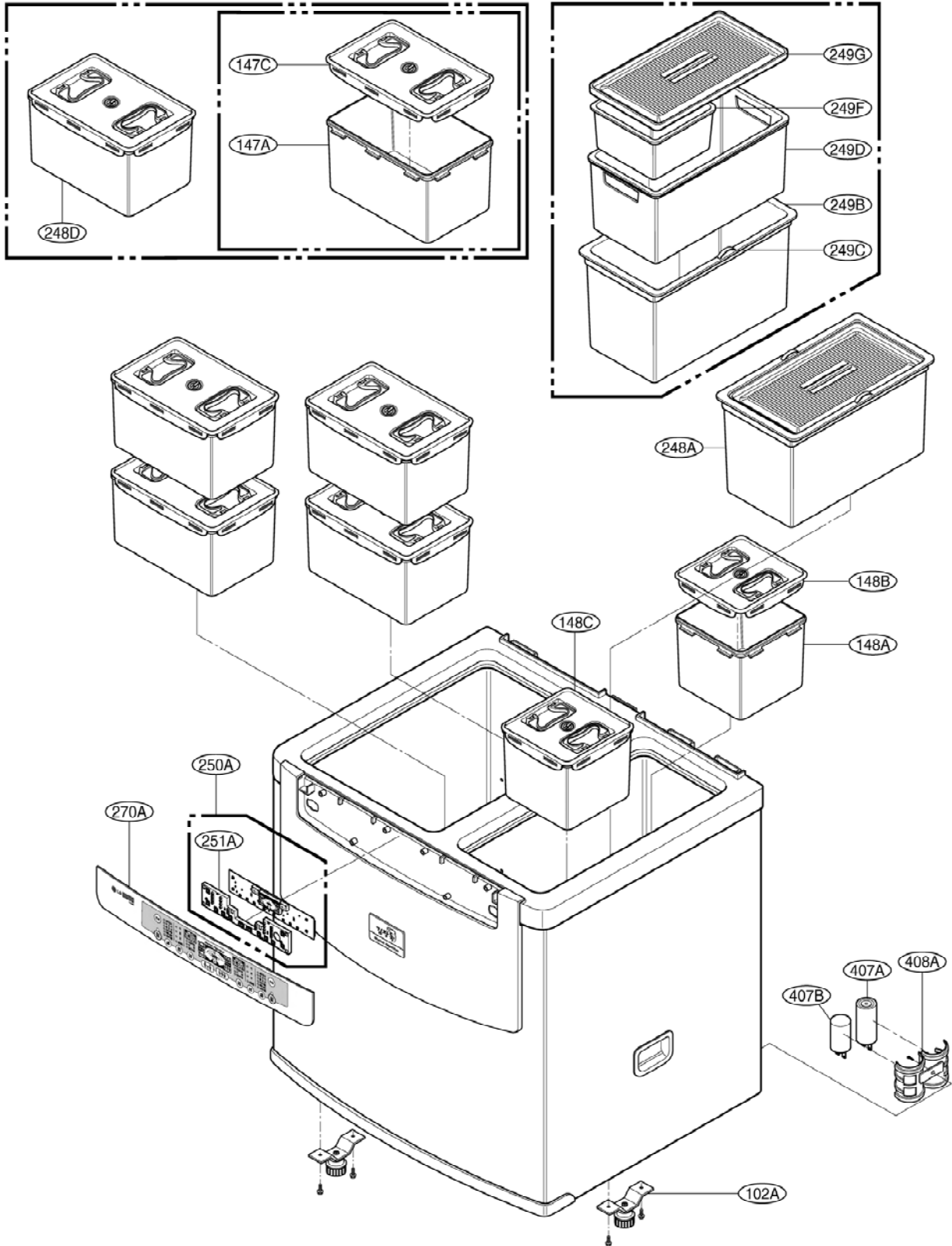
Chapter 7 Exploded View and Parts List

1) Exploded View

■ GR-K16SLQ

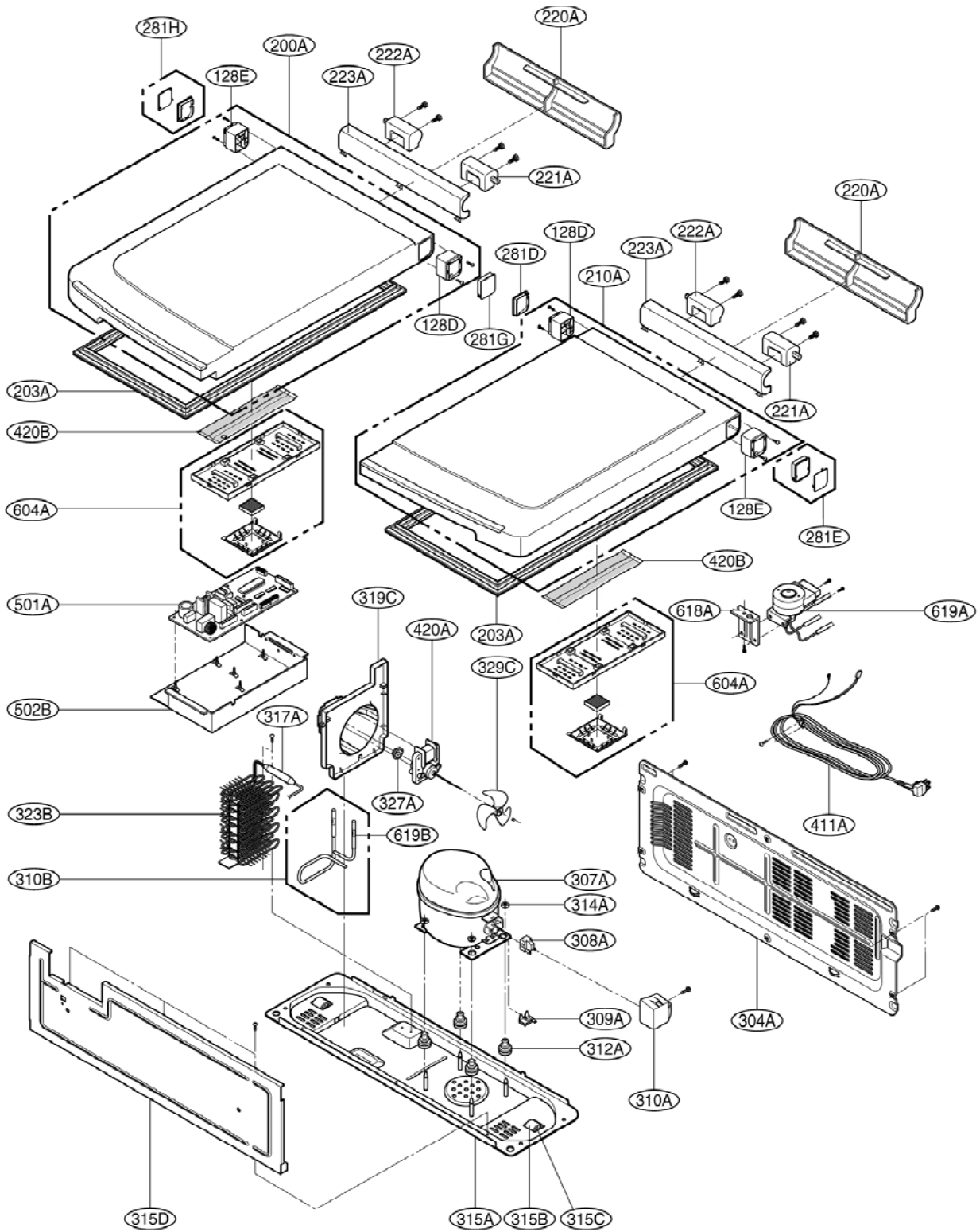


Exploded View and Parts List

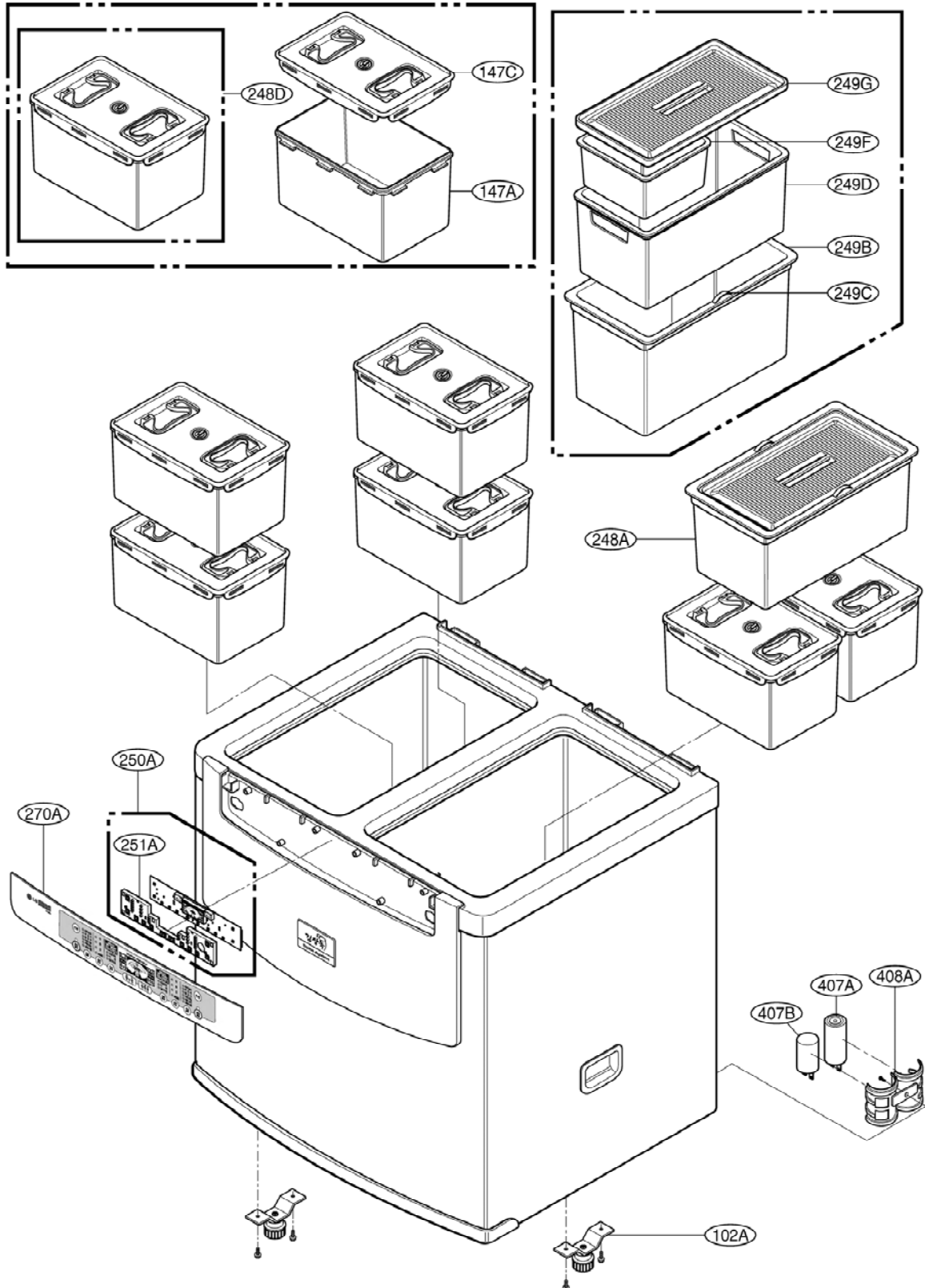


Exploded View and Parts List

■ GR-K18SLQ

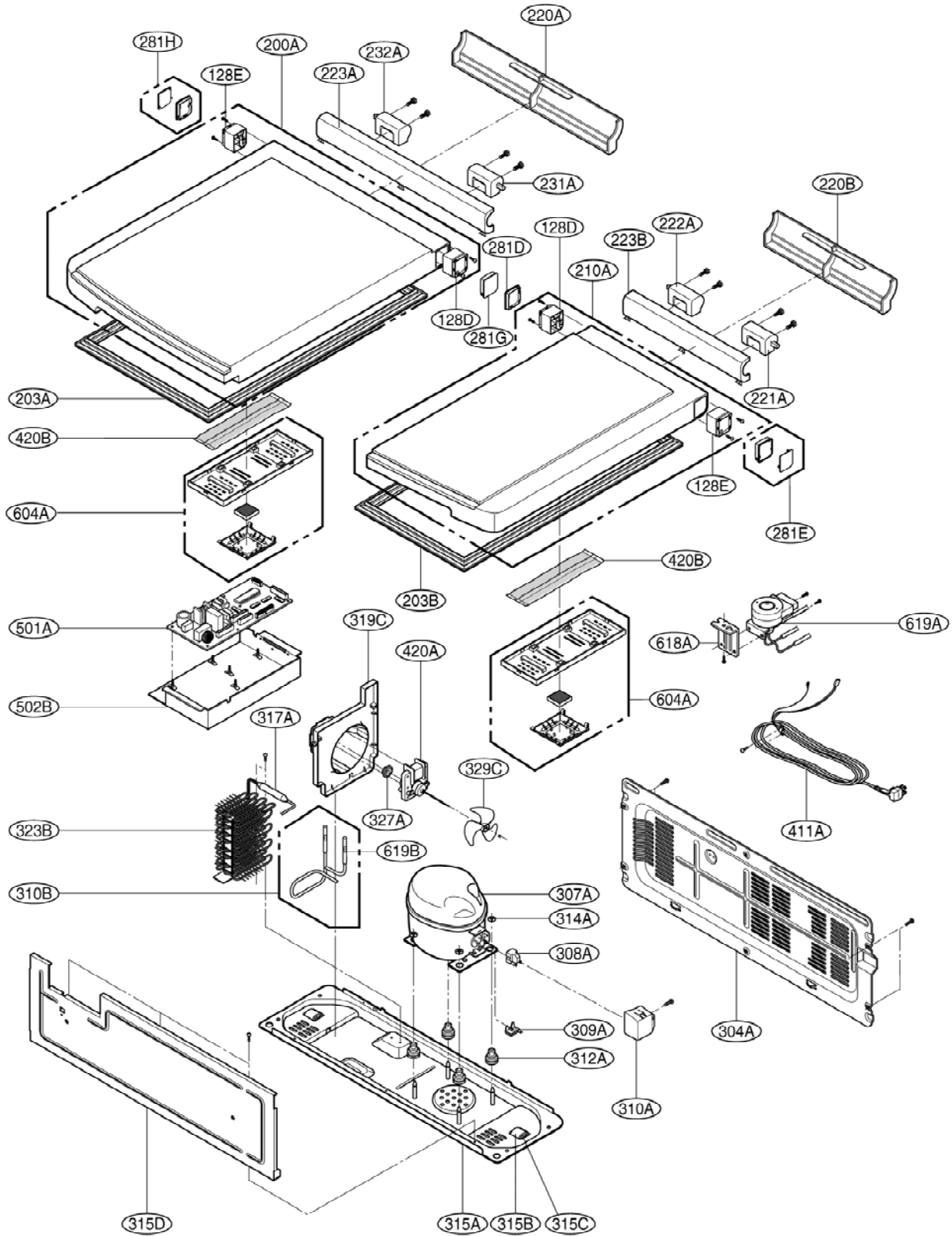


Exploded View and Parts List

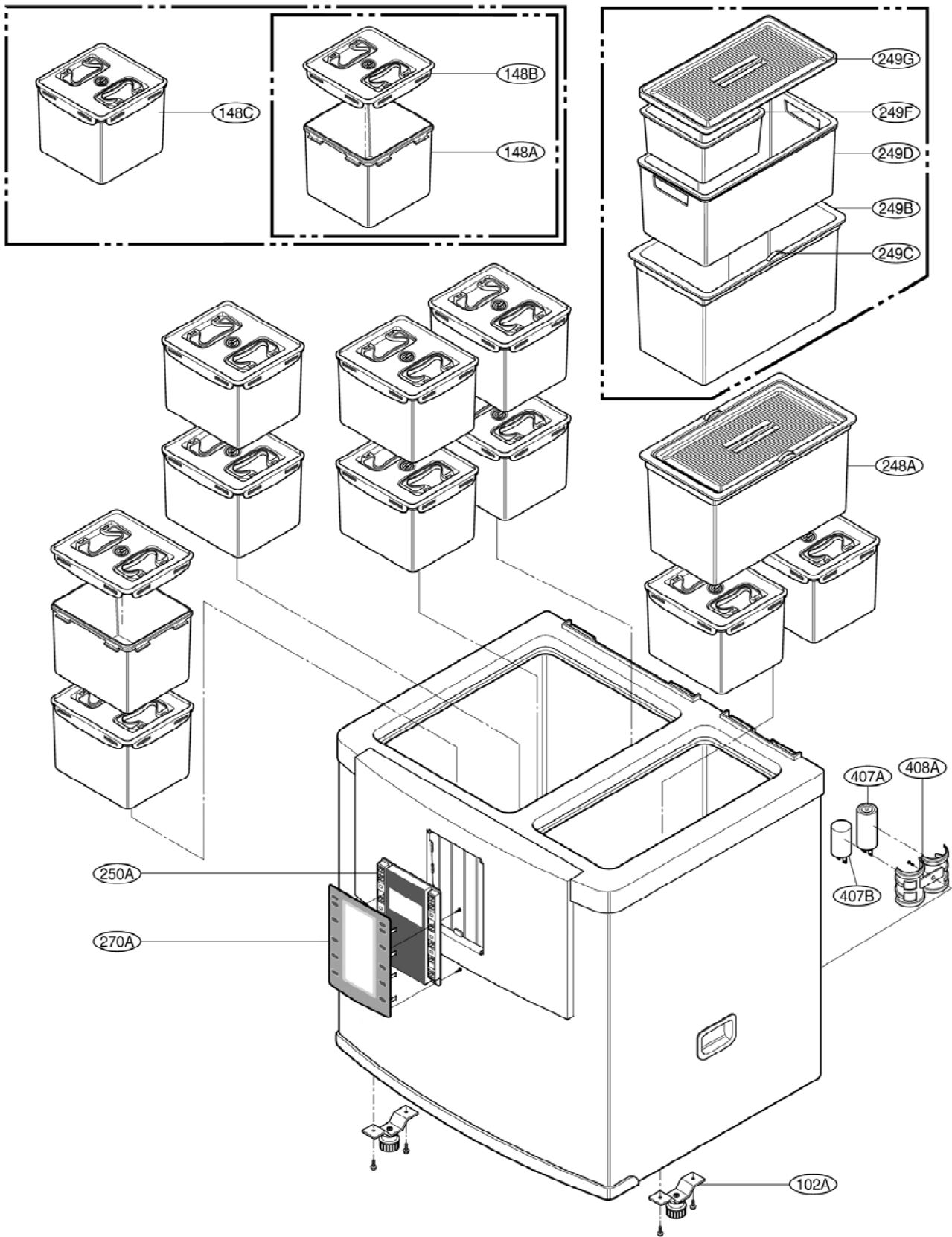


Exploded View and Parts List

■ GR-K20SVZ



Exploded View and Parts List



Exploded View and Parts List

2) Service Parts List

■ GR-K16SLQ

Location No.	Description	Part No.		Quantity
		STARION	LG	
	REF' SET	DCA00459R	-	1
102A	SUPPORTER ASSEMBLY LEG	CBA200153A	J215-00002A	2
128D	BUSH,HINGE	CBB200019B	4984JA2013B	2
128E	BUSH,HINGE	CBB200020B	4984JA2014B	2
148A	BANK	CBA100321A	5074JA1045A	1
148B	COVER ASSY, BANK	DCA100273A	3551JA1054A	1
148C	BANK ASSY	DCA100272A	5075JA1026A	2
147A	BANK	CBA100323A	5074JA1044A	1
147C	COVER ASSY, BANK	DCA100275A	3551JA1053A	1
248D	BANK ASSY	DCA100274A	5075JA1025A	4
200A	DOOR FOAM ASSY,L	DCA100345C	5433JA1104C	1
203A	GASKET ASSY,DOOR	DCA200099N	4987JA2005N	1
203B	GASKET ASSY,DOOR	DCA200099M	4987JA2005M	1
210A	DOOR FOAM ASSY,R	DCA000089D	5433JA1107D	1
220A	COVER,HINGE(BACK)	CBA100262H	3550JA1237H	1
220B	COVER,HINGE(BACK)	CBA100261H	3550JA1236H	1
221A	HINGE ASSY(R/R)	DCA200159B	4775JA2091B	1
222A	HINGE ASSY(R/L)	DCA200159A	4775JA2091A	1
231A	HINGE ASSY(L/R)	DCA200159C	4775JA2091C	1
232A	HINGE ASSY(L/L)	DCA200159D	4775JA2091D	1
223A	COVER,HINGE(FRONT)	CBA100260H	3550JA1235H	1
223B	COVER,HINGE(FRONT)	CBA100259H	3550JA1234H	1
248A	BASKET ASSY	DCA200197B	5005JA2031B	1
249B	BASKET(OUT)	CBA100337A	5004JA1147A	1
249C	HANDLE,CH	CBA200128A	3650JA2097A	2
249D	BASKET(INNER)	CBA100339B	5004JA1149B	1
249F	BASKET(SMALL)	CBA200126A	5004JA2003A	1
249G	COVER,MAGIC ROOM	CBA200129A	3550JA2198A	1
250A	PWB ASSY,DISPLAY(L)	DCA100258A	6871JB1216A	1
251A	SUPPORTER,PWB	CBA100447A	4980JA1048A	1
270A	DECO, CONTROL	CBA100405C	3806JA1108C	1
281D	CAP,HINGE(RL)	CBA300138K	5006JA3084K	1
281E	CAP HINGE ASSY	DCA300042S	-	1
281G	CAP,HINGE(LR)	CBA300136K	5006JA3082K	1
281H	CAP HINGE ASSY	DCA300042T	-	1
304A	COVER BACK ASSY, M/C	DCA100127B	3551JA1034B	1

Exploded View and Parts List

Location No.	Description	Part No.		Quantity
		STARION	LG	
307A	RE-COMPRESSOR,ASSY	DCAX00103C	2521C-A5611	1
308A	P.T.C	DCAX00094C	6748C-0002C	1
309A	OLP	CLCX00001S	6750C-0004S	1
310A	COVER, PTC	CBA200081B	3550JA2087B	1
310B	JOINT PIPE ASSY	CNB200027E	5201JA2041E	1
312A	RUBBER,SEAT	CKA300009A	5040JA3021A	4
314A	STOPPER	CAB400006A	4J03277A	4
315A	COMP BASE ASSY	DCA000033A	3103JA0008A	1
315B	ROLLER	CBA300102A	3J02312A	2
315C	PIN	CGF400001A	4J04238A	2
315D	BARRIER ASSY, BOTTOM	DCA200091B	4791JA2003B	1
317A	DRIER ASSY	DCA200098D	5851JA2005D	1
319C	BRACKET,MOTOR	CBA100135A	4810JA1030A	1
323B	WIRE COND' ASSY	DCA100155B	-	1
327A	RUBBER,MOTOR-N	CKA300001B	J756-00008B	1
329C	FAN ASSY	DCA100163A	5901JA1013A	1
407A	CAPACITOR,R	CMB200002F	0CZZJB2003F	1
407B	CAPACITOR(M/S)	CMB200001P	J513-00012P	1
408A	HOLDER CAPACITOR	CBA200004A	J580-00014A	1
411A	POWER CORD ASSY	DCA200106C	6411JB2025C	1
420A	MOTOR, COOLING	CLP100005S	4680JB1035S	1
420B	COOLING PACK	CBA200111A	3005JA3001A	2
501A	PWB ASSY, MAIN	DCA100253F	6871JB1196F	1
502B	CASE ASSY, PWB	DCA200095A	3111JA2009A	1
604A	COVER,REF'ASSY	DCA200157D	3551JA2105C	2
618A	BRACKET, 3-WAY	CAB300100A	4810JA3054A	1
619A	VALVE ASSY , 3-WAY	DCA100143A	5221JB1001A	1
619B	VALVE, CHECK	DCA300031A	5221JA3002A	2

Exploded View and Parts List

■ GR-K18SLQ

Location No.	Description	Part No.		Quantity
		STARION	LG	
	REF' SET	DCAX00462X	-	1
102A	SUPPORTER ASSEMBLY LEG	CBA200153A	J215-00002A	2
128D	BUSH,HINGE	CBB200019B	4984JA2013B	2
128E	BUSH,HINGE	CBB200020B	4984JA2014B	2
147A	BANK	CBA100323A	5074JA1044A	1
147C	COVER ASSY, BANK	DCA100275A	3551JA1053A	1
248D	BANK ASSY	DCA100274A	5075JA1025A	6
200A	DOOR FOAM ASSY,L	DCA100345C	5433JA1104C	1
203A	GASKET ASSY,DOOR	DCA200099M	4987JA2005M	2
210A	DOOR FOAM ASSY,R	DCA000089G	5433JA1106G	1
220A	COVER,HINGE(BACK)	CBA100262H	3550JA1237H	2
221A	HINGE ASSY(R/R)	DCA200159D	4775JA2091D	2
222A	HINGE ASSY(R/L)	DCA200159C	4775JA2091C	2
223A	COVER,HINGE(FRONT)	CBA100260G	3550JA1235G	2
248A	BASKET ASSY	DCA100298B	5005JA1013B	1
249B	BASKET(OUT)	CBA100338A	5004JA1148A	1
249C	HANDLE,CH	CBA200128A	3650JA2097A	2
249D	BASKET(INNER)	CBA100340B	5004JA1150B	1
249F	BASKET(SMALL)	CBA200127A	5004JA2004A	1
249G	COVER,MAGIC ROOM	CBA200130A	3550JA2199A	1
250A	PWB ASSY,DISPLAY(L)	DCA100256A	6871JB1191A	1
251A	SUPPORTER,PWB	CBA100446A	4980JA1047A	1
270A	DECO, CONTROL	CBA100405B	3806JA1107B	1
281D	CAP,HINGE(RL)	CBA300138K	5006JA3084K	1
281E	CAP HINGE ASSY	DCA300042S	-	1
281G	CAP,HINGE(LR)	CBA300136K	5006JA3082K	1
281H	CAP HINGE ASSY	DCA300042T	-	1
304A	COVER BACK ASSY, M/C	DCA100127D	3551JA1034D	1
307A	RE-COMPRESSOR,ASSY	DCAX00103C	2521C-A5611	1
308A	P.T.C	DCAX00094C	6748C-0002C	1
309A	OLP	CLCX00001S	6750C-0004S	1
310A	COVER, PTC	CBA200081B	3550JA2087B	1
310B	JOINT PIPE ASSY	DCA100240B	5201JA1084A	1
312A	RUBBER,SEAT	CKA300009A	5040JA3021A	4
314A	STOPPER	CAB400006A	4J03277A	4
315A	COMP BASE ASSY	DCA100282A	3103JA1031A	1
315B	ROLLER	CBA300102A	3J02312A	2

Exploded View and Parts List

Location No.	Description	Part No.		Quantity
		STARION	LG	
315C	PIN	CGF400001A	4J04238A	2
315D	BARRIER ASSY, BOTTOM	DCA200091D	4791JA2003D	1
317A	DRIER ASSY	DCA200098D	5851JA2005D	1
319C	BRACKET,MOTOR	CBA100135A	4810JA1030A	1
323B	WIRE COND' ASSY	DCA100346A	5403JA1051A	1
327A	RUBBER,MOTOR-N	CKA300001B	J756-00008B	1
329C	FAN ASSY	DCA100163A	5901JA1013A	1
407A	CAPACITOR,R	CMB200002F	0CZZJB2003F	1
407B	CAPACITOR (M/S)	CMB200001P	J513-00012P	1
408A	HOLDER CAPACITOR	CBA200004A	J580-00014A	1
411A	POWER CORD ASSY	DCA200106C	6411JB2025C	1
420A	MOTOR, COOLING	CLP100005S	4680JB1035S	1
420B	COOLING PACK	CBA200111A	3005JA3001A	2
501A	PWB ASSY, MAIN	DCA100253E	6871JB1196E	1
502B	CASE ASSY, PWB	DCA200095A	3111JA2009A	1
604A	COVER,REF'ASSY	DCA200157D	3551JA2105C	2
618A	BRACKET, 3-WAY	CAB300100A	4810JA3054A	1
619A	VALVE ASSY , 3-WAY	DCA100143A	5221JB1001A	1
619B	VALVE, CHECK	DCA300031A	5221JA3002A	2

Exploded View and Parts List

■ GR-K20SVZ

Location No.	Description	Part No.		Quantity
		STARION	LG	
	REF' SET	DCA000064P	-	1
102A	SUPPORTER ASSEMBLY LEG	CBA200153A	J215-00002A	2
128D	BUSH,HINGE	CBB200019B	4984JA2013B	2
128E	BUSH,HINGE	CBB200020B	4984JA2014B	2
148A	BANK,SIDE DISH	CBA100450A	5074JA1058A	1
148B	COVER ASSY BANK	DCA100405A	3551JA1079A	1
148C	BANK ASSY	DCA100406A	5075JA1031A	10
200A	DOOR FOAM ASSY,L	DCA100268F	5433JA1091F	1
203A	GASKET ASSY,DOOR	DCA200099P	4987JA2005P	1
203B	GASKET ASSY,DOOR	DCA200099N	4987JA2005N	1
210A	DOOR FOAM ASSY,R	DCA100270F	5433JA1090F	1
220A	COVER,HINGE,R(BACK)	CBA100315B	3550JA1256B	1
220B	COVER,HINGE,R(BACK)	CBA100261B	3550JA1236B	1
221A	HINGE ASSY(R/R)	DCA200159B	4775JA2091B	1
222A	HINGE ASSY(R/L)	DCA200159A	4775JA2091A	1
223A	COVER,HINGE,L(FRONT)	CBA100314B	3550JA1255B	1
223B	COVER,HINGE,R(FRONT)	CBA100259B	3550JA1234B	1
231A	HINGE ASSY(L/L)	DCA200159F	4775JA2091F	1
232A	HINGE ASSY(L/R)	DCA200159E	4775JA2091E	1
248A	BASKET ASSY	DCA200197B	5005JA2031B	1
250A	PWB ASSY,DISPLAY(L)	DCA100255B	6871JB1198B	1
249B	BASKET(OUT)	CBA100337A	5004JA1147A	1
249D	BASKET(INNER)	CBA100339B	5004JA1149B	1
249F	BASKET(SMALL)	CBA200126A	5004JA2003A	1
249G	COVER,MAGIC ROOM	CBA200129A	3550JA2198A	1
249C	HANDEL,CH	CBA200128A	3650JA2097A	2
270A	DECO,DISPLAY	CBA100312B	3550JA1254B	1
281D	CAP,HINGE(RL)	CBA300138C	5006JA3084C	1
281E	CAP HINGE ASSY	DCA300042J	-	1
281G	CAP,HINGE(LR)	CBA300136C	5006JA3082C	1
281H	CAP HINGE ASSY	DCA300042E	-	1
304A	COVER BACK ASSY, M/C	DCA100127A	3551JA1034A	1
307A	RE-COMPRESSOR,ASSY	DCAX00103C	2521C-A5611	1
308A	P.T.C	DCAX00094C	6748C-0002C	1
309A	OLP	CLCX00001S	6750C-0004S	1
310A	COVER, PTC	CBA200081B	3550JA2087B	1
310B	JOINT ASSY,PIPE	CNB200027E	5201JA2041E	1

Exploded View and Parts List

Location No.	Description	Part No.		Quantity
		STARION	LG	
312A	RUBBER,SEAT	CKA300009A	5040JA3021A	4
314A	STOPPER	CAB400006A	4J03277A	4
315A	COMP BASE ASSY	DCA000032A	3103JA0007A	1
315B	ROLLER	CBA300102A	3J02312A	2
315C	PIN	CGF400001A	4J04238A	2
315D	BARRIER ASSY, BOTTOM	DCA200091A	4791JA2003A	1
317A	DRIER ASSY	DCA200098D	5851JA2005D	1
319C	BRACKET,MOTOR	CBA100135A	4810JA1030A	1
323B	WIRE COND' ASSY	DCA100155A	-	1
327A	RUBBER,MOTOR-N	CKA300001B	J756-00008B	1
329C	FAN ASSY	DCA100163A	5901JA1013A	1
407A	CAPACITOR,R	CMB200002F	0CZZJB2003F	1
407B	CAPACITOR (M/S)	CMB200001P	J513-00012P	1
408A	HOLDER CAPACITOR	CBA200004A	J580-00014A	1
411A	POWER CORD ASSY	DCA200106C	6411JB2025C	1
420A	MOTOR, COOLING	CLP100005S	4680JB1035S	1
420B	COOLING PACK	CBA200111A	3005JA3001A	2
501A	PWB ASSY, MAIN	DCA100252F	6871JB1197F	1
502B	CASE ASSY, PWB	DCA200095A	3111JA2009A	1
604A	COVER,REF'ASSY	DCA200157D	3551JA2105C	2
618A	BRACKET, 3-WAY	CAB300100A	4810JA3054A	1
619A	VALVE ASSY , 3-WAY	DCA100143A	5221JB1001A	1
619B	VALVE, CHECK	DCA300031A	5221JA3002A	2



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