IBM 4614 SureOne POS Terminal Technical Reference Addendum Model A04 and A05

Version: 1.4 July 28, 2003

Please note that all of the features, functions, etc. defined in this document are subject to change without notice. Not all models, features, etc. are announced in all countries, and references in this document are not an indication that IBM will support these items in the future in every country. Consult with your IBM sales professional for assistance in identifying what is available in your country.

Contents

Please note that the power supply used on the 4614-A04 and 4614-A05 is NOT autoranging. There is a switch on the rear of the 4810 that selects the input voltage range. The correct AC supply voltage setting for the power supply must be made prior to installation. Damage requiring replacement of the power supply will result if the switch is set to the wrong voltage setting and the unit plugged into AC power.

Damage caused by an incorrect switch setting is not covered by warranty.

Introduction

The 4614-A04 and A05 are updated models of the SureOne family. This update is due in part to EOL (End of Life) issues and an effort to maintain technology currency. Much of the core logic design is similar to the 4694-2x7/3x7.

This reference manual is written as an addendum to the existing SureOne Technical Reference manual and will cover the items which have changed as a result of the update. Please refer to the SureOne Technical Reference Manual located on the Retail Store Solutions web site: http://www.ibm.com/industries/retail/ for details on components that have not changed and are not described in detail in this update.

1.1 Table of Changes

The table below describes the differences between the 1xx/Axx and the updated A04 and A05 models of SureOne.

Table 1-0 Summary of Changes	4614-1xx/Axx	4614-A04/A05
CPU	MediaGXi/GXm	VIA C3 866MHz
Memory	16/32MB-128MB	64MB-512MB
I/O ports	PS2 kyb/mouse Parallel printer 2 Standard RS232 2 15PIN Powered RS232 0 PC USB VGA Video 10Mb LAN (RPL capable) 24V Cash Drawer	Same Same **1 Standard RS232** **1 15 PIN Powered RS232** **2 PC USB** **New VGA Controller** **10/100Mb LAN (RPL/PXE)** Same
Media	floppy HDD	Same **40GB HDD**
Feature Card Slot	1 Partial Length PCI/ISA	**1 Partial Length PCI only**
Printer	Impact or Thermal	Same
Keyboard	96-key programmable	Same
MSR	T1/T2 or T2/T3	Setup (BIOS) Selectable T1/T2 or T2/T3
Keylock	3 Position	Same
Customer Display	Optional 2x20	Same
VGA Display	9" B&W CRT or 10" Color CRT	9" B&W CRT or **10" Color LCD**
Boot sources	Floppy, HDD, LAN	Floppy, HDD, LAN
Packaging/covers	Integrated CRT, Keyboard, Printer, MSR, Keylock	Same
NVRAM	32K	**None**
OS support	DOS, Windows 95/98/NT	DOS*, Windows 98/NT/**2000/XP, RH Linux 7.1**
Power Supply	AT Style with 24V output	ATX Style
Color	Quarry Grey	Pearl White

* **There are significant changes in upper memory and RS232 port configuration which will affect existing DOS applications. Device drivers for video, LAN, and Windows are also different. Details are covered in this manual.**

2.0 General Description

Please refer to the SureOne Technical Reference Manual located on the Retail Store Solutions web site for a detailed description of components not covered in this document.

2.1 System Components and Features

Model A04 and A05 include the following components and features:

- VGA interface
- Monochrome Video Display (9-inch, SVGA CRT) Model A04 Only
- Color Video Display (10-inch, 800x600 LCD) Model A05 Only
- 40GB or larger fixed disk drive
- One partial length PCI feature card slot
- VIA C3 866Mhz x86 compatible socket 370 based processor
- Up to 512MB of PC133 SDRAM
- Two RS 232 ports, 1 Standard 1 with +12 V and +5 V power, for attachment of scanners, scales, modems, and other I/O devices.
- Two PC USB Ports
- Integrated 10/100Mb Ethernet adapter similar in function to the IBM 4694-2x7 and 3x7 POS Ethernet adapter.

3.0 I/O Devices

3.1 Printers – Updated Impact Printer

The SureOne POS Terminal is available with either an impact printer, a thermal printer, or no integrated printer.

The A04 and A05 models have a new impact printer offering. The new impact printer design is a single head print mechanism which is capable of printing double byte character sets without compromising performance. The new printer will become the standard impact printer offering. A description of the changes follows.

The printer is a self-contained mechanism that satisfies most requirements of the small retailer. It can print receipts, and print on two-part forms for users who need a simple journal. Its life expectancy is suitable for many retail environments.

3.1.1 Printer Characteristics

- Star Micronics MP512MB printer mechanism
- Font support for Single Byte character sets Thai, Korean (also DBCS KIS compatible character set), and USA/Europe
- Font support for Double Byte character sets Simplified Chinese (GB2312-80 compatible character set), Japanese (JIS compatible character set), and Traditional Chinese (BIG5 compatible character set
- Bi-directional printing in both single and double byte modes
- 4.0 Lines per second print speed in text mode
- 9-pin print head
- 40 columns in default print mode
- 3 in./76.2 mm Paper (3.25 in./82mm maximum diameter roll)
- Ability to use single or two part paper
- Paper thickness: 0,07 mm to 0.10 mm for single part paper to 0.14 mm total thickness for two part paper, with each sheet 0.05 to 0.08 mm thick
- Use of the industry-standard Star command set
- Double wide, double high, emphasized logo printing
- Built-in font support for worldwide use
- Up to 10 user-defined downloadable characters
- Approximately 100 million character life expectancy
- Purple ribbon with an approximate maximum life of 6 million characters

3.1.2 Printer Comparison Table

There are some differences when comparing the new MP512 printer with the original MP312 (single head) and MP317 (double head) printers. Differences are noted in the table to the right.

Table 3-0 Printer Comparison

Feature	Original	New
Print Speed (line/sec)	3.2	4
Paper Feed Speed (in/sec)	3	5.5
Dots per line	200	210
Paper width (in)	3.25	3
Ribbon type	RC300P	RC200P
Validation printing	Yes	No

To determine the type of printer installed press and hold the form feed button when powering the system unit on and the printer will perform a self test. The version of the microcode reported will be "IBMx 2.0" or greater on the new printer.

3.1.3 Command Differences

Most commands remain the same with the exception of the following. Please refer to the SureOne Technical Reference Manual for a complete list of commands.

IBM Extended Commands

Function: Null (select paper width on the original printer), MP512 Only
Code: <ESC> "Y" *n*
1Bh 59H *n*
Outline: This command does nothing

Existing Star Commands

Function: Null (select validation printing on the original printer), MP512 Only
Code: <GS> data <LF>
1Dh Data 0AH
Outline: This command does nothing

3.2 Keyboard

Due to the unique programmable keyboard function of the SureOne there have been some issues with a few PS2 wedge devices such as bar code scanners. There is a new option in Setup which allows customization of the method by which PS2 wedge devices interface with the A04 and A05 models. The new option allows a more direct connection of the wedge device to the keyboard controller. If this option is selected, an external PS2 keyboard can not be used even if connected as a downstream device on the wedge. This option will not work with every wedge device and should only be selected when a problem is experienced with a PS2 wedge device.

This new option does not guarantee that all wedge devices will work. As with any other open system, Business Partners and System Integrators must test with all software and I/O being offered as a complete solution to end users.

Internal matrix keyboard programmability options and functions are unchanged.

3.3 MSR

The type of MSR is now a BIOS Setup selectable option. User can choose Track 2/3 or Track 1/2. Default setting for the MSR is Track 2/3.

3.4 Keylock

No changes in keylock function.

3.5 Video Display (CRT or LCD)

Color changed to Pear White

The integrated 10 inch color CRT option is replaced with a 10 inch Color LCD panel capable of up to 800x600x8bpp. The 10 inch Color LCD panel is available on the Model A05.

The AC outlet for the 9 inch monochrome integrated video display is provided through a Y-style power cord. The power button on the display must be used to turn it on or off. The 9 Inch Monochrome Display is available on the Model A04.

3.6 Customer Display (2 x 20 VFD)

Color changed to Pear White. No software interface changes.

4.0 Migration

SureOne Model A04 and A05 POS Terminals are designed to operate with many POS PC applications available in the marketplace. Additional software modifications may be required to port any existing package customized for SureOne.

5.0 System Unit Logic

The SureOne Model A04 and A05 POS Terminals use the following key logic parts:

- CPU - VIA C3 866MHz, 133MHz Front Side BUS
- VIA 8602 North Bridge with Integrated Video
- VIA 686B Super South Bridge
- One PCI feature card slot (half size)
- 10/100 Ethernet chip capable of supporting both 10baseT or 100baseTX full or half duplex Ethernet. Network management (WfM 1.1) and wake on LAN function using Magic Packet technology is implemented;
- IDE Fixed Disk Drive - Maxtor, 40GB
  Note: The only Disk Drive guaranteed to work properly in this product is that which is announced and supplied by IBM.

5.1 Video

Video function is provided by the integrated CPU chipset. No separate VGA subsystem is provided. The video subsystem uses system DRAM for video storage and allows up to 8MB of RAM to be allocated to the video subsystem.. BIOS setup allows the user to allocate a certain amount of system DRAM to the video subsystem. The video subsystem is capable of supporting modes up to 1600x1200**.**

Drivers are available for Windows and various versions of Linux from IBM's website.

5.2 LAN

Integrated 10/100Mb/s Ethernet support utilizing the National Semiconductor MacPhyter (DP83515) LAN chip. Drivers are available from IBM's website.

Depending on software, if a unit is off and AC power is available, the LAN function known as wake on LAN is enabled. This feature can be used to cause a terminal that is in either the standby or off state to "wake up" or power up on a specified LAN event.

5.3 Memory

- 2 168 Pin DIMM sockets for 168 Pin, PC133, SDRAM
  Note: The only memory guaranteed to work properly in this product is that which is announced and supplied by IBM.

5.4 Serial Port Configuration

Like previous SureOne Models the A04 and A05 implement all local I/O devices such as the display and printer through COM ports. Unlike previous SureOne models the A04 and A05 only have four COM ports, and two of the four are PCI based COM ports. The PCI based COM ports share an interrupt. **Application developers should be aware that the PCI architecture prevents assigning the IRQ levels from these ports to different dedicated IRQ levels.** Applications which use interrupt based communication may require modification to work with the new architecture. All COM port I/O assignments can be changed through the built-in setup utility.

Note that IBM PC DOS and Microsoft Windows 9x/ME assign actual COMx values in a sequential fashion. If, during the POST process, POST finds a serial device at a particular address, it assigns that I/O address the next available COMx designator. The SureOne POST searches these I/O addresses in this order: 03F8h, 02F8h, 03E8h, 02E8h, 338h, 238h, 220h and 228h.

The two PCI based serial ports may be assigned a much wider range of I/O addresses than indicated in the above list through the use of the configuration utility, or Windows NT/2000/XP. Any I/O address assignment out of this range will not be assigned a standard COMx value by POST. Windows NT/2000/XP begin assigning PCI based serial devices at COM5, so by default SureOne will have a COM1, COM2, COM5 and COM6 in these OSes.

5.4.1 Serial Port Addresses

Default I/O Address	COM Port	Interrupt Request	Device
3F8h	COM1	PCI Shared	External serial A (no power)
2F8h	COM2	PCI Shared	External serial B (Powered)
3E8h	COM3	IRQ4	Printer
2E8h	COM4	IRQ3	Customer display (optional)

All RS-232 ports are 16550 (FIFO) compatible.

5.4.2 Serial Port Pinouts

Signal description	Port A (Standard PC)	Port B (Powered)*
CD	1	1
RXD	2	2
TXD	3	3
DTR	4	4
DSR	6	12
RTS	7	13
CTS	8	14
RI	9	15
GND	5	5, 6, 11
+5V (+5%, -10% at conn.)	n/a	7, 10
+12V (+5%. -10% at conn.)	n/a	8, 9

*signals are implemented in a 15 pin female D connector

6.0 Software

SureOne Models A04 and A05 have a POST/BIOS subsystem provided by Phoenix Technologies, Ltd. The Power on self test (POST), BIOS, keyboard controller, and planar board architecture are documented in the book “System BIOS for IBM PC’s, Compatibles, and EISA Computers; 2nd Edition”, Phoenix Technologies, Ltd., Addison-Wesley Publishing Co, Inc., 1991, ISBN 0-201-57760-7. The systems do not support power on passwords, and the area in CMOS reserved for power on passwords has been used for configuration type information by POST and is not available for end user use.

LAN and video drivers are tested with Red Hat Linux and Windows 98/NT/2000/XP and follow-ons. IBM utilizes these drivers as is from the component suppliers.

No POS I/O device drivers are provided or supported for Linux. The integrated I/O devices communicate through standard interfaces.

These vendor websites should be searched for the latest level drivers:

• IBM Retail:	www.ibm.com/solutions/retail/	(Check this first.)
• VIA:	www.viatech.com	
• Star Micronics	www.star-micronics.co.jp	
• Microsoft	www.microsoft.com	
• National Semiconductor	www.nsc.com	
• Netmos	www.netmos.com	

SureOne Models A04 and A05 includes RPL support by including in the system ROM a special version of Lanworks Technologies BOOTWARE RPL boot ROM. This RPL package can support IBM, Novell, and TCP/IP (DHCP bootp+ Intel PXE) RPL protocols.

6.1 Utility programs

The SureOne Models A04 and A05 use flash memory to store the system BIOS, video BIOS and the LAN boot ROM (RIPL). Flash memory has the advantage of permitting the firmware to be updated through software alone. Applying software updates to BIOS is a customer responsibility (just like the application of any other software fix) , and is not covered by the IBM warranty or the typical IBM maintenance agreement.

Distribution of software updates, utility programs, news tips, technical info, etc is via the IBM Retail page on the Internet. All utility programs are DOS based.

Many DOS utility programs are currently available on this site. Among them are:

- LAN drivers
- Video drivers
- Chipset drivers
- Serial drivers
- diagnostics

All of the chips used in SureOne models A04 and A05 are subject to change as cost and technology changes take place. It is IBM's intention to keep BIOS and I/O driver interfaces compatible where it is possible and technology allows it. Applications that write directly to hardware are not guaranteed to work with all versions of the hardware over time.

6.2 Microcode Description

The system BIOS includes all the function calls provided by an ISA PC. It is stored in a flash read only memory located on the planar board. Due to the increased amount of function in the base BIOS, the BIOS occupies much of the 64K segment between E000h and EFFFh (the specific amount varies between different BIOS versions

The top 8K of the flash memory is being used as a “BOOT BLOCK” .The contents of this boot block cannot be changed once it is programmed during manufacturing. Any future BIOS update will not affect the contents of this boot block.

The BIOS level of a system is composed of:

- the level of the base system BIOS provided by Phoenix (identified via the phrase Phoenix BIOS Vx.xx)
- IBM extensions to BIOS identified in the phrase IBM POS Subsystem Version x.xx

Note that the overall level of the BIOS is determined by the value associated with the IBM extension level.

6.3 System configuration/setup

SureOne Models A04 and A05 contain a program within ROM called SETUP that allows for numerous options to be configured via a menu interface. Available options are different depending on model, features, and BIOS level. Use of this SETUP program requires the attachment of a PC compatible video display and keyboard.

6.4 I/O supported

SureOne Models A04 and A05 are not formally tested or supported with anything other than generic PC I/O. Testing is performed with many RS-232 type of I/O devices such as hand held bard code scanners as well as PC keyboards, mice and printer types of devices.

Support for any specific device is subject to testing and acceptance by the customer/end user.

7.0 Programming Considerations

7.1 Identification via software

In addition to the method described in the SureOne Technical Reference, a new way of detecting hardware similar to the 4694 has been provided. Software can detect SureOne Models A04 and A05 by reading memory locations as described below:

Model	Model ID string*	Pointer to BIOS version**
	F000:E000h	
A04/A05	1S1	F000:E005h

* indicates an ASCII string located at this memory location
* the "Pointer to BIOS version" is a pointer to an ASCII string that represents the BIOS level. It's a word in reverse Intel format that represents an offset within the F000 segment.

7.2 ASIC

Due to the significant changes in the Serial port configuration and other areas the following are the only control registers supported on the SureOne models A04 and A05.

"How to use" excerpt from the SureOne Technical Reference manual:

> SureOne also has a custom designed integrated circuit to manage COM port assignments, keylock reads, and cash drawer configuration. The SureOne application-specific integrated circuit (ASIC) has two I/O ports located at I/O addresses 240h and 241h. Address 240h is the index port and address 241h is the data port. A register index value is written to address 240h, then address 241h is read from or written to in order to actually pass data to or from the ASIC.
>
> For example, assume that we want to read index registers 10h and 11h.
> Write the value 10h to I/O address 240h.
> Read I/O address 241h. The read value is the value of index register 10h.
> Write the value 11h to I/O address 240h.
> Read I/O address 241h. The read value is the value of index register 11h.
> Assume we want to write the index register at 12h with 55h.
> Write the value 12h to I/O address 240h.
> Write the value 55h to I/O address 241h.
>
> Programs that access ASIC registers must insure that the index register at I/O address 240h is written to 00h at the end of any ASIC I/O operation to prevent register contents from being changed accidentally by runaway code.

7.2.1 ASIC Control Registers supported on the A04 and A05

```
Keylock Postion
INDEX 26H:
Read
7 6 5 4 3 2 1 0 Function
-----------------------------------------------------------------
x x x x x 1 1 1 Position 1 (the locked position shown on the cover)
x x x x x 1 1 0 Position 2
x x x x x 1 0 1 Position 3

Control register S
Cash drawer setup
INDEX 28H:
Read/write
7 6 5 4 3 2 1 0 Function
-----------------------------------------------------------------
x x x x x x x 1 disable C/D driver
x x x x x x x 0 enable C/D driver
x x x x x x 1 x C/D pulse = 100 mS (recommended)
x x x x x x 0 x C/D pulse = 50 mS
x x x x x 0 x x C/D controlled by prt logic
x x x x x 1 x x C/D controlled by ASIC

Control register T
Cash drawer open via ASIC
INDEX 29H:
Write only
7 6 5 4 3 2 1 0 Function
-----------------------------------------------------------------
0 0 0 0 0 0 0 1 Pulse C/D circuit (open drawer)

Control register U
Cash drawer status
INDEX 30H:
Read/write
7 6 5 4 3 2 1 0 Function
-----------------------------------------------------------------
x x x x x x 0 x IBM cash drawer connected
x x x x x x 1 x IBM cash drawer not connected
x x x x x 0 x x IBM cash drawer open
x x x x x 1 x x IBM cash drawer closed
```

7.3 PCI Serial Port Configuration

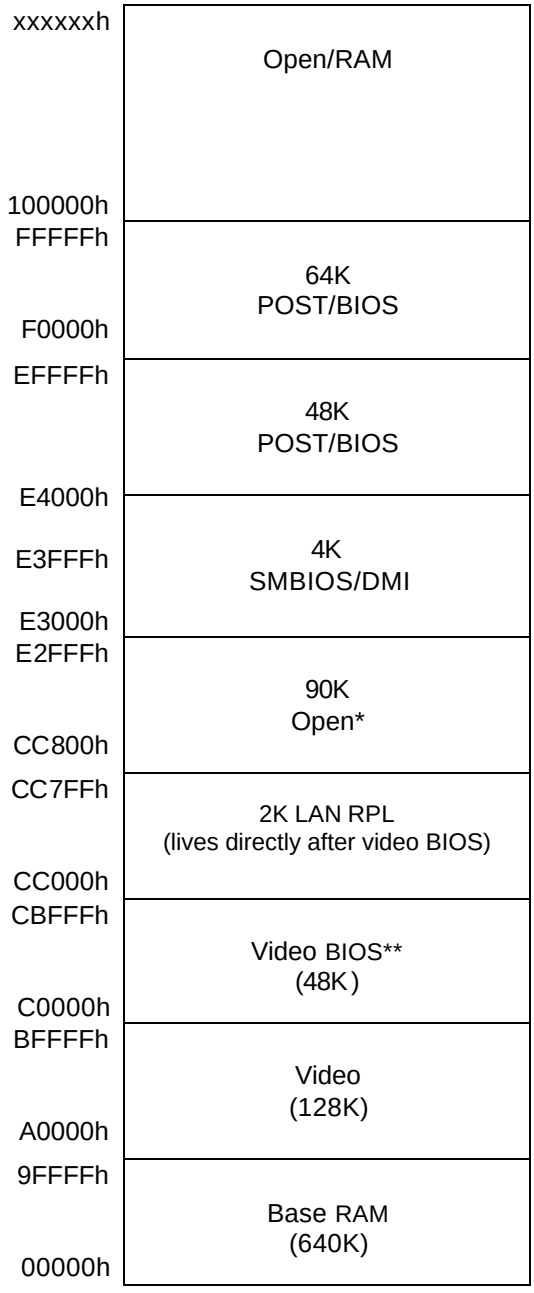
The Setup utility and drivers are the only supported way of configuring the PCI serial ports. However it is understood that there may be some circumstances in which writing directly to the configuration registers to configure the PCI serial ports may be necessary. Writing to these registers can cause unpredictable results. It is probable that the SureOne POS Terminal may require reconfiguration, reboot, or not work at all (without a reboot) after writing to these registers.

The following information is to be used by someone that clearly understands how PCI headers and PCI configuration space is accessed. This manual is not intended to describe how to access PCI configuration space.

AD31-00		Address
Device ID (9835h)	Vendor ID (9710h)	00h
PCI Device Information		04-0Fh
COMA I/O Port Base Address (000003F8h is default)		10h
COMB I/O Port Base Address (000002F8h is default)		14h

7.4 Memory Map

The system memory map is as follows:



*Default configuration. If USB legacy support is enabled from system setup, 16K of upper memory is used for the USB stack located from DC000h to DFFFFh.
**Video BIOS size may vary depending on various factors. It is currently 48K, and is guaranteed to not exceed 62K in size.

8.0 SureOne Hardware Description

8.1 Physical Specifications

Dimensions	
Height	360 mm min. And 390 mm max. (with video display)
Width	382 mm min. And 483 mm max. (with video display)
	333 mm (without video display)
Depth	502 mm
Weight	Approximately 15.9 kg (35 lb) with video display

Cooling is provided via forced air cooling blown left to right by a fan contained in the power supply. **Air vents must not be blocked and must have 2" of clearance**.

Normal service access conditions for cable routing, attachment, etc. apply to the rear of the unit. The front of the unit must be accessible to the customer so that the power switch can be used.

Machine type/model, serial number safety/regulatory labels are located behind the front door and on a label on the underside of the unit.

8.2 Power Supply

The A04 and A05 models use an ATX style power supply. The ATX standard provides for a power switch that allows software interception of power switch presses. The ability to use these features is dependant on the capabilities of the installed OS. There are no drivers provided by IBM to enable any features. A general description of power switch functions is described below:

- Momentary press - depending on the installed OS the following are typical functions that the power switch can be programmed to perform:
  - ? Power on/off
  - ? Enter Standby/Wake up
  - ? Do nothing
- Press and hold for more than 4 seconds - will initiate the hardware over-ride and the power supply will turn off.
  - ? This function can not be changed or re-programmed

System BIOS provides the ability through Setup to choose the power switch mode of operation. Configuring power switch operation is ideally done by the installed OS, as it can over-ride the system BIOS setting.

Input Voltage and Frequency - 100-127V or 200-240Volts AC, 50-60 Hz, ±3 Hz. Approximately 250W at full output (not including video display load). **Note that this supply is NOT auto ranging and the proper switch setting must be made prior to installation.**

Power consumption: A04/A05 75W typical

AC Loads

None

DC Loads

In addition to the voltages required for the system unit to support the planar card, feature card and PS/2 kyb and mouse, +12V at 1A and 5V at 1A is available for powering I/O devices through the powered RS-232 port. 5V is only guaranteed to be +/- 5% at at the rear connector. Voltage drops across cables need to be considered for any device using power from the port.

Note that the amount of +5V available for PS2 keyboard and power ports is limited to 500mA total.

Standard USB ports are limited to the standard USB +5V load of 500mA each, with a combined total of 1A max.

9.0 Safety and Regulatory Information

9.1 Electromagnetic Compatibility (EMC)

- EMI radiated/conducted (USA/Canada) - FCC/DOC Class A
- EMI radiated (EMEA) - EC CE mark (meets CISPR-22-A emission limits)
- EMI (conducted) (EMEA) - class B
- EMI radiated/conducted (Japan) - Japan VCCI class 1
- EMI radiated/conducted (Korea) - Korea MOC Class A
- ESD Class 2 (reference IBM C-S 2-0001-005)

9.2 Environmental

- Gaseous- IBM Class G1
- Particulate- IBM Class P1
- Vibration and Shock- IBM Class V2
- Acoustical Levels- IBM Class 2C

9.3 Temperature

- Operating: $+10^0$C to 40^0C with 8% to 80% relative Humidity
- Shipping: -40^0C to $+60^0$C
- Storage: 0^0C to $+60^0$C.