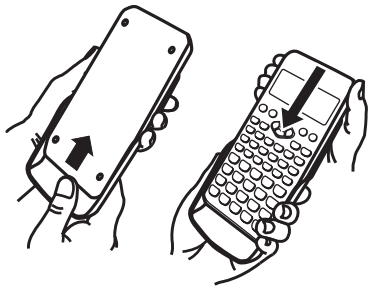
●项目代号：DL5598

●项目名称：点阵计算器（192*64 点英文菜单显示）

Getting Started

Before using the calculator, slide its hard case downwards to remove it, and then affix the hard case to the back of the calculator as shown in the illustration nearby.



Turning Power On and Off

Press [ON] to turn on the calculator. Press [SHIFT] [AC] (OFF) to turn off the calculator.

Note: The calculator also will turn off automatically after approximately 10 minutes of non-use. Press the [ON] key to turn the calculator back on.

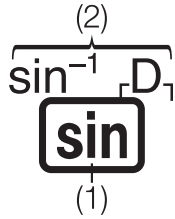
Adjusting Display Contrast

Display the Contrast screen by performing the key operation below: [SHIFT] [MENU] (SETUP) ▲ [3] (Contrast). Next, use ◀ and ▶ to adjust contrast. After the setting is the way you want, press [AC].

Important: If adjusting display contrast does not improve display readability, it probably means that battery power is low. Replace the battery.

Key Markings

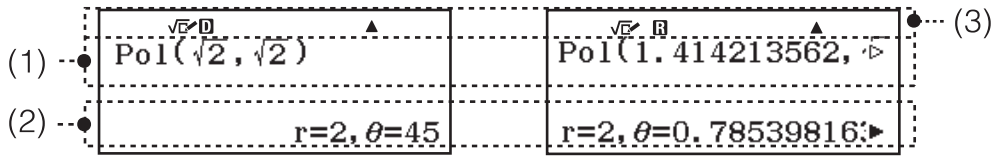
Pressing the [SHIFT] or [ALPHA] key followed by a second key performs the alternate function of the second key. The alternate function is indicated by the text printed above the key.



(1) Keycap function (2) Alternate function

This color:	Means this:
Yellow	Press [SHIFT] and then the key to access the applicable function.
Red	Press [ALPHA] and then the key to input the applicable variable, constant, function, or symbol.
Purple (or enclosed in purple ⌜⌝ brackets)	Enter the Complex Mode to access the function.
Blue (or enclosed in blue ⌜⌝ brackets)	Enter the Base-N Mode to access the function.

Reading the Display



(1) Input expression (2) Calculation result (3) Indicators

- If a ▶ or ▷ indicator appears on the right side of either the input expression line or calculation result line, it means the displayed line continues to the right. Use ▶ and ◀ to scroll the line display. Note that if you want to scroll the input expression while both the ▶ and ▷ indicators are displayed, you will need to press [AC] first and then use ▶ and ◀ to scroll.

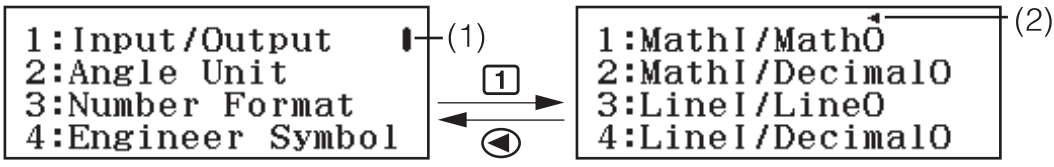
• The table below describes some of the typical indicators that appear at the top of the screen.

S	The keypad has been shifted by pressing the [SHIFT] key. The keypad will unshift and this indicator will disappear when you press a key.
A	The alpha input mode has been entered by pressing the [ALPHA] key. The alpha input mode will be exited and this indicator will disappear when you press a key.
D/R/G	Indicates the current setting of Angle Unit (D: Degree, R: Radian, or G: Gradian) on the setup menu.
FIX	A fixed number of decimal places is in effect.
SCI	A fixed number of significant digits is in effect.
M	There is a value stored in independent memory.
→x	The calculator is standing by for input of a variable name to assign a value to the variable. This indicator appears after you press [STO].
√▭	Indicates that MathI/MathO or MathI/DecimalO is selected for Input/Output on the setup menu.
II	The display currently shows an intermediate result of a multi-statement calculation.
☼	This indicator is displayed while the calculator is being powered directly by its solar cells, either entirely or in some combination with the battery. (fx-991EX only)

Using Menus

Some of the operations of this calculator are performed using menus. Menus are displayed by pressing [OPTN] or [SHIFT] and then [MENU] (SETUP). General menu operation operations are described below.

• You can select a menu item by pressing the number key that corresponds to the number to its left on the menu screen.



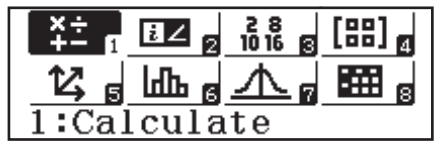
• A vertical scroll bar (1) indicates that the menu runs off the screen. In this case, you can use ▼ and ▲ to scroll the menu up and down. A left arrow (2) indicates that the currently displayed menu is a sub-menu. To return from a sub-menu to its parent menu, press ◀.

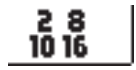
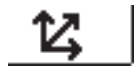
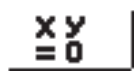
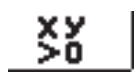
• To close a menu without selecting anything, press [AC].

Calculation Mode

Specify the calculation mode that is suitable for the type of calculation you want to perform.

1. Press [MENU] to display the Main Menu.
2. Use the cursor keys to move the highlighting to the icon you want.



For this:	Select this icon:
General calculations	 (Calculate)
Complex number calculations	 (Complex)
Calculations involving specific number systems (binary, octal, decimal, hexadecimal)	 (Base-N)
Matrix calculations	 (Matrix)
Vector calculations	 (Vector)
Statistical and regression calculations	 (Statistics)
Distribution calculations	 (Distribution)
Spreadsheet calculations	 (Spreadsheet)
Generate a number table based on one or two functions	 (Table)
Equation and function calculations	 (Equation/Func)
Inequality calculations	 (Inequality)
Ratio calculations	 (Ratio)

3. Press [=] to display the initial screen of the mode whose icon you selected.

Note: The initial default calculation mode is the Calculate Mode.

Input and Output Formats

Before starting a calculation on the calculator, you should first use the operations in the table below to specify the formats that should be applied for calculation formula input and calculation result output.

To specify this type of input and output:	Press [SHIFT] [MENU] (SETUP) [1] (Input/Output) and then press:
Input: Natural Textbook; Output: Format that includes a fraction, $\sqrt{}$, or π*1	[1] (MathI/MathO)
Input: Natural Textbook; Output: Converted to decimal value	[2] (MathI/DecimalO)
Input: Linear*2; Output: Decimal or fraction	[3] (LineI/LineO)

Input: Linear*2; Output: Converted to decimal value	4(LineI/DecimalO)

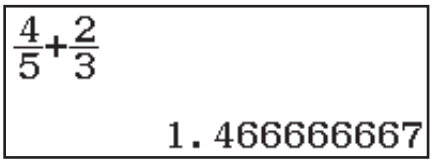
*1 Decimal output is applied when these formats cannot be output for some reason.

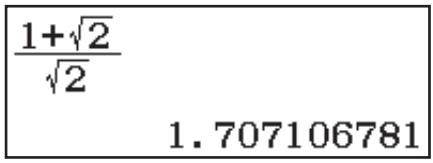
*2 All calculations, including fractions and functions are input in a single line. Same output format as that for models without Natural Textbook Display (S-V.P.A.M. models, etc.)

Input/Output Format Display Examples

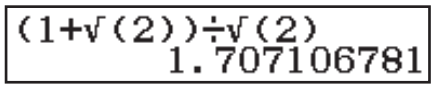
MathI/MathO

MathI/DecimalO

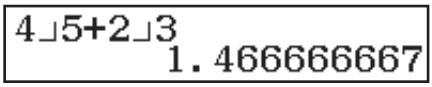


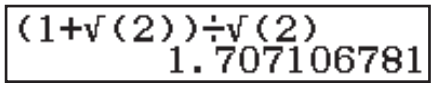


LineI/LineO



LineI/DecimalO





Note: The initial default input/output format setting is MathI/MathO.

Configuring the Calculator Setup

To change the calculator setup

1. Press SHIFT MENU(SETUP) to display the setup menu.
2. Use ▼ and ▲ to scroll the setup menu, and then input the number displayed to the left of the item whose setting you want to change.

Items and Available Setting Options

"◆" indicates the initial default setting.

Input/Output **1Mathl/MathO◆; 2Mathl/DecimalO; 3Linel/LineO; 4Linel/DecimalO** Specifies the format to be used by the calculator for formula input and calculation result output.

Angle Unit **1Degree◆; 2Radian; 3Gradian** Specifies degree, radian or gradian as the angle unit for value input and calculation result display.

Number Format Specifies the number of digits for display of a calculation result.

1Fix: The value you specify (from 0 to 9) controls the number of decimal places for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.

Example: 100÷7 SHIFT =(≈)* 14.286 (Fix 3)

2Sci: The value you specify (from 0 to 9) controls the number of significant digits for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed.

Example: 1 ÷ 7 SHIFT = (≈)* 1.4286×10^{-1} (Sci 5)

3 Norm: Displays calculation results in exponential format when they fall within the ranges below.

1 Norm 1◆: $10^{-2} > |x|, |x| \geqq 10^{10}$, **2 Norm 2:** $10^{-9} > |x|, |x| \geqq 10^{10}$

Example: 1 ÷ 200 SHIFT = (≈)* 5×10^{-3} (Norm 1), 0.005 (Norm 2)

* Pressing SHIFT = (≈) instead of = after inputting a calculation will display the calculation result in decimal form.

Engineer Symbol 1 On; 2 Off◆ Specifies whether or not to display calculation results using engineering symbols.

Note: An indicator (E) is displayed at the top of the screen while On is selected for this setting.

Fraction Result 1 ab/c; 2 d/c◆ Specifies either mixed fraction or improper fraction for display of fractions in calculation results.

Complex 1 $a+bi$◆; 2 $r\angle\theta$ Specifies either rectangular coordinates or polar coordinates for Complex Mode calculation results and Equation/Func Mode solutions.

Note: An i indicator is displayed at the top of the screen while $a+bi$ is selected for the Complex setting. $\angle$ is displayed while $r\angle\theta$ is selected.

Statistics 1 On; 2 Off◆ Specifies whether or not to display a Freq (frequency) column in the Statistics Mode Statistics Editor.

Spreadsheet For configuring Spreadsheet Mode settings.

1 Auto Calc: Specifies whether or not formulas should be re-calculated automatically.

1 On◆; 2 Off Enables or disables auto re-calculation.

2 Show Cell: Specifies whether a formula in the edit box should be displayed as it is or as its calculation result value.

1 Formula◆: Displays the formula as it is.

2 Value: Displays the calculation result value of the formula.

Equation/Func 1 On◆; 2 Off Specifies whether or not to use complex numbers in solutions output in the Equation/Func Mode.

Table 1 $f(x)$; 2 $f(x)$,$g(x)$◆ Specifies whether to use function $f(x)$ only or the two functions $f(x)$ and $g(x)$ in the Table Mode.

Decimal Mark 1 Dot◆; 2 Comma Specifies whether to display a dot or a comma for the calculation result decimal mark. A dot is always displayed during input.

Note: When dot is selected as the decimal mark, the separator for multiple results is a comma (,). When comma is selected, the separator is a semicolon (;).

Digit Separator 1 On; 2 Off◆ Specifies whether or not a separator character should be used in calculation results.

MultiLine Font 1 Normal Font◆; 2 Small Font Specifies the display font size when LineI/LineO or LineI/DecimalO is selected for Input/Output. Up to four lines can be displayed while Normal Font is selected, and up to six lines can be displayed with Small Font.

QR Code Specifies the version of the QR code displayed when SHIFT OPTN (QR) is pressed.

1 Version 3: Indicates QR code Version 3.

2 Version 11◆: Indicates QR code Version 11.

To initialize calculator settings (except the Contrast setting)

SHIFT 9 (RESET) 1 (Setup Data) = (Yes)

Inputting Expressions and Values

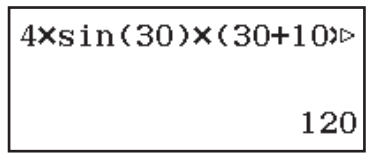
Basic Input Rules

When you press [=] the priority sequence of the input calculation will be evaluated automatically and the result will appear on the display.

$4 \times \sin 30 \times (30 + 10 \times 3) = 120$

4 [×] [sin] 30 [)] [×] [(] 30 [+] 10 [×] 3 [)] [=]

*1 *2 *3



*1 Input of the closing parenthesis is required for sin and other functions that include parentheses.

*2 These multiplication symbols (×) can be omitted.

*3 The closing parenthesis immediately before the [=] operation can be omitted.

Note

- The cursor will change shape to ■ when there are 10 bytes or less of allowed input remaining. If this happens, end calculation input and then press [=].
- If you execute a calculation that includes both division and multiplication operations in which a multiplication sign has been omitted, parentheses will be inserted automatically as shown in the examples below.
  - When a multiplication sign is omitted immediately before an open parenthesis or after a closed parenthesis.
    Example: $6 \div 2(1 + 2) \rightarrow 6 \div (2(1 + 2))$
  - When a multiplication sign is omitted immediately before a variable, a constant, etc.
    Example: $2 \div 2\sqrt{2} \rightarrow 2 \div (2\sqrt{2})$

Calculation Priority Sequence

The priority sequence of input calculations is evaluated in accordance with the rules below. When the priority of two expressions is the same, the calculation is performed from left to right.

1	Parenthetical expressions
2	Functions that have parentheses (sin(, log(, etc., functions that take an argument to the right, functions that require a closing parenthesis after the argument)
3	Functions that come after the input value (x^2, x^3, x^{-1}, $x!$, °′″, °, r, g, %, ►t), engineering symbols (m, μ, n, p, f, k, M, G, T, P, E), powers ($x^{\blacksquare}$), roots ($\sqrt[\blacksquare]{\square}$)
4	Fractions
5	Negative sign ((-)), base-n symbols (d, h, b, o)
6	Metric conversion commands (cm►in, etc.), Statistics Mode estimated values ($\hat{x}$, $\hat{y}$, $\hat{x}_1$, $\hat{x}_2$)
7	Multiplication where the multiplication sign is omitted
8	Permutation (nPr), combination (nCr), complex number polar coordinate symbol ($\angle$)

9	Dot product (•)
10	Multiplication (×), division (÷)
11	Addition (+), subtraction (–)
12	and (logical operator)
13	or, xor, xnor (logical operators)

Note: When squaring a negative value (such as -2), the value being squared must be enclosed in parentheses ((−)2)x^2=). Since x^2 has a higher priority than the negative sign, inputting (−)2x^2= would result in the squaring of 2 and then appending a negative sign to the result. Always keep the priority sequence in mind, and enclose negative values in parentheses when required.

Inputting an Expression Using Natural Textbook Format (MathI/MathO or MathI/DecimalO Only)

Formulas and expressions that include fractions and/or special functions such as $\sqrt{}$ can be input in natural textbook format by using templates that appear when certain keys are pressed.

Example: $3\frac{1}{2}+5\frac{3}{2}$

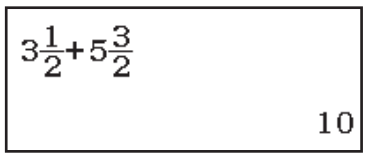
1. Press SHIFT (■帛).
   • This inputs a mixed fraction template.

2. Input values into the integer, numerator, and denominator areas of the template.

3▶1▶2

3. Do the same to input the remainder of the expression.

▶+SHIFT(■帛)5▶3▶2=



Tip: While the input cursor is located within the input area of a template (mixed fractions, integration (∫), and sum (Σ)), pressing SHIFT ▶ jumps to the position immediately following (to the right) of the template, while pressing SHIFT ◀ jumps to the position immediate before (to the left of) it.

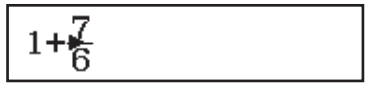
Note

- When you press = and obtain a calculation result, part of the expression you input may be cut off. If you need to view the entire input expression again, press AC and then use ◀ and ▶ to scroll the input expression.
- Nesting of functions and parentheses is allowed. Further input will become impossible if you nest too many functions and/or parentheses.

To undo operations (MathI/MathO or MathI/DecimalO only): To undo the last key operation, press ALPHA DEL(UNDO). To redo a key operation you have just undone, press ALPHA DEL(UNDO) again.

Using Values and Expressions as Arguments (MathI/MathO or MathI/DecimalO only)

Example: To input $1+\frac{7}{6}$ and then change it to $1+\sqrt{\frac{7}{6}}$

1 + 7 ▤ 6 ◀ ◀ ◀ ◀ SHIFT DEL(INS) 

√■ 

Pressing SHIFT DEL(INS) in the above example causes $\frac{7}{6}$ to be the argument of the function input by the next key operation ($\sqrt{\ }$).

Overwrite Input Mode (LineI/LineO or LineI/DecimalO only)

In the overwrite mode, text you input replaces the text at the current cursor location. You can toggle between the insert and overwrite modes by performing the operations: SHIFT DEL(INS). The cursor appears as "I" in the insert mode and as "_" in the overwrite mode.

Toggling Calculation Results

While MathI/MathO or MathI/DecimalO is selected for Input/Output on the setup menu, each press of S⇔D will toggle the currently displayed calculation result between its fraction form and decimal form, its $\sqrt{\ }$ form and decimal form, or its π form and decimal form.

$\pi \div 6 = \frac{1}{6}\pi = 0.5235987756$ (MathI/MathO)

SHIFT x10ˣ(π) ÷ 6 = $\frac{1}{6}\pi$ ←S⇔D→ 0.5235987756

$(\sqrt{2}+2)\times\sqrt{3} = 5.913591358 = \sqrt{6}+2\sqrt{3}$ (MathI/DecimalO)

(√■ 2 ▶ + 2) × √■ 3 = 5.913591358 ←S⇔D→ $\sqrt{6}+2\sqrt{3}$

Regardless of what is selected for Input/Output on the setup menu, each press of S⇔D will toggle the currently displayed calculation result between its decimal form and fraction form.

Important

- With certain calculation results, pressing the S⇔D key will not convert the displayed value.
- You cannot switch from decimal form to mixed fraction form if the total number of digits used in the mixed fraction (including integer, numerator, denominator, and separator symbol) is greater than 10.

To obtain a decimal value calculation result while MathI/MathO or LineI/LineO is selected

Press SHIFT =(≈) instead of = after inputting a calculation.

Basic Calculations

Fraction Calculations

Note that the input method for fractions depends on the current Input/Output setting on the setup menu.

$\frac{2}{3}+1\frac{1}{2}=\frac{13}{6}$ (MathI/MathO)

2 ▤ 3 ▶ + SHIFT ▤(■⌸) 1 ▶ 1 ▼ 2 = $\frac{13}{6}$

(LineI/LineO)	2 ▤ 3 + 1 ▤ 1 ▤ 2 =	13⌟6

Note

- Mixing fractions and decimal values in a calculation while something other than MathI/MathO is selected will cause the result to be displayed as a decimal value.
- Fractions in calculation results are displayed after being reduced to their lowest terms.
- To switch a calculation result between improper fraction and mixed fraction form, press SHIFT S⇔D ($a\frac{b}{c} \leftrightarrow \frac{d}{c}$).

Percent Calculations

Inputting a value and pressing SHIFT Ans (%) causes the input value to become a percent.

150 × 20% = 30	150 × 20 SHIFT Ans (%) =	30
Calculate what percentage of 880 is 660. (75%)		
	660 ÷ 880 SHIFT Ans (%) =	75
Discount 3500 by 25%. (2625)		
	3500 − 3500 × 25 SHIFT Ans (%) =	2625

Degree, Minute, Second (Sexagesimal) Calculations

The syntax below is for inputting a sexagesimal value: {degrees} °’” {minutes} °’” {seconds} °’”. Note that you must always input something for the degrees and minutes, even if they are zero.

2°20’30” + 9’30” = 2°30’00”		
	2 °’” 20 °’” 30 °’” + 0 °’” 9 °’” 30 °’” =	2°30’0”
Convert 2°30’0” to its decimal equivalent.	°’”	2.5
(Converts decimal to sexagesimal.)	°’”	2°30’0”

Multi-Statements

You can use the colon character (:) to connect two or more expressions and execute them in sequence from left to right when you press =.

3 + 3 : 3 × 3	3 + 3 ALPHA ▶ (:) 3 × 3 =	6
	=	9

Note: Inputting a colon (:) while LineI/LineO or LineI/DecimalO is selected for the Input/Output setting on the setup menu causes a newline operation to be performed.

Using Engineering Notation

Transform the value 1234 to engineering notation, shifting the decimal mark to the right, and then to the left.	1234 =	1234
	ENG	1.234×10^{3}
	ENG	1234×10^{0}
	SHIFT ENG (←)	1.234×10^{3}
	SHIFT ENG (←)	0.001234×10^{6}

Note: The calculation result shown above is what appears when Off is selected for the Engineer Symbol setting on the setup menu.

Using Engineering Symbols

Your calculator supports the use of 11 engineering symbols (m, μ, n, p, f, k, M, G, T, P, E) that you can use for input of value or for calculation result display.

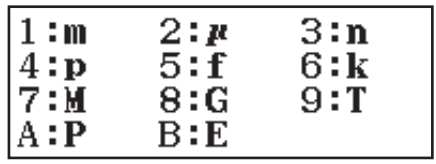
To display calculation results with engineering symbols

On the setup menu, change the Engineer Symbol setting to On.

Example Input and Calculations Using Engineering Symbols

To input 500k

500 [OPTN] [3] (Engineer Symbol)



[6] (k) [=] 500k

To calculate 999k (kilo) + 25k (kilo) = 1.024M (Mega) = 1024k (kilo) = 1024000

999 [OPTN] [3] (Engineer Symbol) [6] (k) [+]	
25 [OPTN] [3] (Engineer Symbol) [6] (k) [=]	1.024M
[ENG]	1024k
[ENG]	1024000
[SHIFT] [ENG] (←)	1024k

Prime Factorization

In the Calculate Mode, a positive integer no more than 10 digits long can be factored to prime factors.

To perform prime factorization on 1014

1014 [=]	1014
[SHIFT] [°’’’] (FACT)	$2\times3\times13^2$

To re-display the unfactored value, press [SHIFT] [°’’’] (FACT) or [=].

Note: The types of values described below cannot be factored, even if they have 10 or fewer digits.

- One of the prime factors of the value is 1,018,081 or greater.
- Two or more of the prime factors of the value have more than three digits.

The part that cannot be factored will be enclosed in parentheses on the display.

Calculation History and Replay

Calculation History

An ▲ and/or ▼ at the top of the display indicates that there is more calculation history content above and/or below. You can scroll through calculation history contents using ▲ and ▼.

2 + 2 = 4	2 [+] 2 [=]	4
3 + 3 = 6	3 [+] 3 [=]	6
	(Scrolls back.) ▲	4

Note: Calculation history data is all cleared whenever you press [ON], when you change to a different calculation mode, when you change the Input/Output setting, or whenever you perform a RESET operation (“Initialize All” or “Setup Data”).

Replay

While a calculation result is on the display, you can press ◀ or ▶ to edit the expression you used for the previous calculation.

4 × 3 + 2 = 14	4 [×] 3 [+] 2 [=]	14
4 × 3 – 7 = 5	(Continuing) ◀ [DEL] [DEL] [−] 7 [=]	5

Using Memory Functions

Answer Memory (Ans)

The last calculation result obtained is stored in Ans (answer) memory.

To divide the result of 14 × 13 by 7

14 [×] 13 [=] → 182

(Continuing) [÷] 7 [=]

123 + 456 = 579

123 [+] 456 [=] → 579

789 – 579 = 210

(Continuing) 789 [−] [Ans] [=] → 210

Variables (A, B, C, D, E, F, M, x, y)

You can assign values to variables and use the variables in calculations.

To assign the result of 3 + 5 to variable A

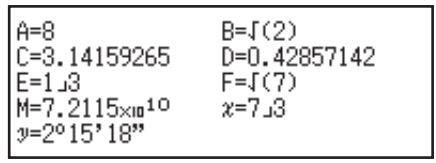
3 [+] 5 [STO] [(−)] (A) → 8

To multiply the contents of variable A by 10

(Continuing) [ALPHA] [(−)] (A) [×] 10 [=] *1 → 80

To recall the contents of variable A

(Continuing) [SHIFT] [STO] (RECALL)*2



[(−)] (A) [=] → 8

To clear the contents of variable A

0 [STO] [(−)] (A) → 0

*1 Input a variable as shown here: press [ALPHA] and then press the key that corresponds to the desired variable name. To input x as the variable name, you can press [ALPHA] [)] (x) or [x].

*2 Pressing [SHIFT] [STO] (RECALL) displays a screen that shows the values currently assigned to variables A, B, C, D, E, F, M, x, and y. On this screen, values are always displayed using the "Norm 1" Number Format. To close the screen without recalling a variable value, press [AC].

Independent Memory (M)

You can add calculation results to or subtract results from independent memory. The "M" appears on the display when there is any value other than zero stored in independent memory.

To clear the contents of M

0 [STO] [M+] (M) → 0

To add the result of 10 × 5 to M

(Continuing) 10 [×] 5 [M+] → 50

To subtract the result of 10 + 5 from M

(Continuing) 10 [+] 5 [SHIFT] [M+] (M−) → 15

To recall the contents of M

(Continuing) [SHIFT] [STO] (RECALL) [M+] (M) [=] → 35

Note: Variable M is used for independent memory. You also can call M and use it in a calculation you are inputting.

Clearing the Contents of All Memories

Ans memory, independent memory, and variable contents are retained even if you press [AC], change the calculation mode, or turn off the calculator. Perform the procedure below when you want to clear the contents of all memories.

[SHIFT] [9] (RESET) [2] (Memory) [=] (Yes)

Function Calculations

Note: To interrupt an ongoing calculation before its result appears, press [AC].

Pi π: π is displayed as 3.141592654, but π = 3.14159265358980 is used for internal calculations.

Natural Logarithm Base *e*: *e* is displayed as 2.718281828, but *e* = 2.71828182845904 is used for internal calculations.

sin, cos, tan, sin^{-1}, cos^{-1}, tan^{-1}: Specify the angle unit before performing calculations.

sin 30° = $\frac{1}{2}$ (Angle Unit: Degree) [sin] 30 [)] [=] $\frac{1}{2}$

sinh, cosh, tanh, sinh^{-1}, cosh^{-1}, tanh^{-1}: Input a function from the menu that appears when you press [OPTN] [1] (Hyperbolic Func)*1. The angle unit setting does not affect calculations.

*1 Depending on the calculation mode, you should press [OPTN] [▲] [1].

°, ^{r}, ^{g}: These functions specify the angle unit. ° specifies degree, ^{r} radian, and ^{g} gradian. Input a function from the menu that appears when you perform the following key operation: [OPTN] [2] (Angle Unit)*2.

π/2 radians = 90° (Angle Unit: Degree)

[(] [SHIFT] [x10^{x}] (π) [÷] 2 [)] [OPTN] [2] (Angle Unit) [2] (^{r}) [=] 90

*2 Depending on the calculation mode, you should press [OPTN] [▲] [2].

10$^{■}$, $e^{■}$: Exponential functions.

$e^5 \times 2 = 296.8263182$

(MathI/MathO) [SHIFT] [ln] ($e^{■}$) 5 [▶] [×] 2 [=] 296.8263182

(LineI/LineO) [SHIFT] [ln] ($e^{■}$) 5 [)] [×] 2 [=] 296.8263182

log: Logarithmic function. Use [SHIFT] [(−)] (log) to input $\log_a b$ as log (a, b). Base 10 is the default setting if you do not input anything for a.

$\log_{10}1000 = \log 1000 = 3$ [SHIFT] [(−)] (log) 1000 [)] [=] 3

$\log_2 16 = 4$ [SHIFT] [(−)] (log) 2 [SHIFT] [)] (,) 16 [)] [=] 4

The [log$_{■}$□] key also can be used for input, but only while MathI/MathO or MathI/DecimalO is selected for Input/Output on the setup menu. In this case, you must input a value for the base.

$\log_2 16 = 4$ [log$_{■}$□] 2 [▶] 16 [=] 4

ln: Natural logarithm to base *e*.

ln 90 (= $\log_e 90$) = 4.49980967 [ln] 90 [)] [=] 4.49980967

x^2, x^3, $x^{■}$, $\sqrt{■}$, $\sqrt[3]{■}$, $\sqrt[■]{□}$, x^{-1}: Powers, power roots, and reciprocals.

$(1 + 1)^{2+2} = 16$ [(] 1 [+] 1 [)] [$x^{■}$] 2 [+] 2 [=] 16

$(5^2)^3 = 15625$ [(] 5 [x^2] [)] [SHIFT] [x^2] (x^3) [=] 15625

$\sqrt[5]{32} = 2$

(MathI/MathO) [SHIFT] [$x^{■}$] ($\sqrt[■]{□}$) 5 [▶] 32 [=] 2

(LineI/LineO) 5 SHIFT x^2 ($\sqrt{\square}$) 32) = 2

$\sqrt{2} \times 3 = 3\sqrt{2} = 4.242640687...$

(MathI/MathO) $\sqrt{\square}$ 2 ▶ × 3 = $3\sqrt{2}$

(LineI/LineO) $\sqrt{\square}$ 2) × 3 = 4.242640687

$\int\square$, $\frac{d}{dx}\square$, $\sum\square$: These functions use Gauss-Kronrod methods to perform numerical integration, approximation of the derivative based on central difference method, and calculation of the sum of a specific range of $f(x)$.

Input Syntax

(1) When MathI/MathO or MathI/DecimalO is selected

(2) When LineI/LineO or LineI/DecimalO is selected

	$\int\square$ *1	$\frac{d}{dx}\square$ *2	$\sum\square$ *3
(1)	$\int_a^b f(x)dx$	$\frac{d}{dx}(f(x))\Big\|_{x=a}$	$\sum_{x=a}^{b}(f(x))$
(2)	$\int(f(x),\ a,\ b,\ tol)$	$\frac{d}{dx}\left(f(x),\ a,\ tol\right)$	$\sum(f(x), a, b)$

*1 *tol* specifies tolerance, which becomes 1×10^{-5} when nothing is input for *tol*.

*2 *tol* specifies tolerance, which becomes 1×10^{-10} when nothing is input for *tol*.

*3 a and b are integers that can be specified within the range of $-1 \times 10^{10} < a \leqq b < 1 \times 10^{10}$.

Integration and Differential Calculation Precautions

- When using a trigonometric function in $f(x)$, specify "Radian" as the angle unit.
- A smaller *tol* value increases precision, but it also increases calculation time. When specifying *tol*, use value that is 1×10^{-14} or greater.
- Integration normally requires considerable time to perform.
- Depending on the content of $f(x)$, positive and negative values within the region of integration, or the region of integration, calculation error that exceeds the allowable range may be generated, causing the calculator to display an error message.
- With derivative calculations, non-consecutive points, abrupt fluctuation, extremely large or small points, inflection points, and the inclusion of points that cannot be differentiated, or a differential point or a differential calculation result that approaches zero can cause poor precision or error.

$$\int_1^e \ln(x)dx$$

(MathI/MathO) $\int\square$ ln ALPHA) (x)) ▶ 1 ▶ ALPHA $\times 10^x$ (e) = 1

(LineI/LineO) $\int\square$ ln ALPHA) (x)) SHIFT) $(,)$
1 SHIFT) $(,)$ ALPHA $\times 10^x$ (e)) = 1

To obtain the derivative at point $x = \pi/2$ for the function $y = \sin(x)$ (Angle Unit: Radian)

SHIFT $\int\square$ ($\frac{d}{dx}\square$) sin ALPHA) (x)) ...(1)

(MathI/MathO)

(Continued following (1)) ▶ ▤ SHIFT $\times 10^x$ (π) ▶ 2 = 0

(LineI/LineO)

(Continued following (1)) SHIFT) $(,)$ SHIFT $\times 10^x$ (π) ▤ 2) = 0

$$\sum_{x=1}^{5}(x+1) = 20$$

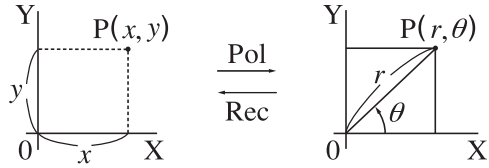
(MathI/MathO) SHIFT x (Σ−) ALPHA) (x) + 1 ▶ 1 ▶ 5 = 20

(LineI/LineO) SHIFT x (Σ−) ALPHA) (x) + 1
SHIFT) (,) 1 SHIFT) (,) 5) = 20

Pol, Rec: Pol converts rectangular coordinates to polar coordinates, while Rec converts polar coordinates to rectangular coordinates.

- Specify the angle unit before performing calculations.
- The calculation result for r and θ and for x and y are each assigned respectively to variables x and y.
- Calculation result θ is displayed in the range of $-180° < \theta \leqq 180°$.

$\mathrm{Pol}(x, y) = (r, \theta)$ $\mathrm{Rec}(r, \theta) = (x, y)$



To convert rectangular coordinates $(\sqrt{2}, \sqrt{2})$ to polar coordinates (Angle Unit: Degree)

(MathI/MathO) SHIFT + (Pol) √ 2 ▶ SHIFT) (,) √ 2 ▶) = $r=2, \theta=45$

To convert polar coordinates $(\sqrt{2}, 45°)$ to rectangular coordinates (Angle Unit: Degree)

(MathI/MathO) SHIFT − (Rec) √ 2 ▶ SHIFT) (,) 45) = $x=1, y=1$

x!: Factorial function.

(5 + 3) ! = 40320 (5 + 3) SHIFT x^{-1} (x!) = 40320

Abs: Absolute value function.

$|2 - 7| \times 2 = 10$

(MathI/MathO) SHIFT ((Abs) 2 − 7 ▶ × 2 = 10

(LineI/LineO) SHIFT ((Abs) 2 − 7) × 2 = 10

Ran#: Function that generates a pseudo random number in the range of 0.000 to 0.999. The result is displayed as a fraction when MathI/MathO is selected for Input/Output on the setup menu.

To obtain random three-digit integers

1000 SHIFT • (Ran#) = 459

(The result differs with each execution.)

RanInt#: Function that generates a pseudo random integer between a specified start value and end value.

To generate random integers in the range of 1 to 6

ALPHA • (RanInt) 1 SHIFT) (,) 6) = 2

(The result differs with each execution.)

***n*Pr, *n*Cr:** Permutation (nPr) and combination (nCr) functions.

To determine the number of permutations and combinations possible when selecting four people from a group of 10

Permutations: 10 SHIFT × (nPr) 4 = 5040

Combinations: 10 SHIFT ÷ (nCr) 4 = 210

Rnd: Using the Rnd function causes decimal fraction values of the argument to be rounded in accordance with the current Number Format setting. For example, the internal and displayed result of Rnd(10 ÷ 3) is 3.333 when the Number Format setting is Fix 3. Using the Norm 1 or Norm 2 setting cause the argument to be rounded off at the 11th digit of the mantissa part.

To perform the following calculations when Fix 3 is selected for the number of display digits: 10 ÷ 3 × 3 and Rnd(10 ÷ 3) × 3 (MathI/DecimalO)

SHIFT MENU (SETUP) 3 (Number Format) 1 (Fix) 3

10÷3×3=	10.000
SHIFT 0 (Rnd) 10÷3)×3=	9.999

QR Code Function

Your calculator can display QR codes* that can be read by a smart device.

* QR Code is a registered trademark of DENSO WAVE INCORPORATED in Japan and in other countries.

Important

- The operations in this section assume that the smart device being used has a QR code reader that can read multiple QR codes installed, and it can connect to the Internet.
- Reading a QR code displayed by this calculator with a smart device will cause the smart device to access the CASIO website.

Note: A QR code can be displayed by pressing SHIFT OPTN (QR) while the setup screen, a menu screen, an error screen, a calculation result screen in any calculation mode, or a table screen is displayed. For details, visit the CASIO website (wes.casio.com).

Displaying a QR Code

Example: To display the QR code for a calculation result in the calculator's Calculate Mode and read it with a smart device

1. In the Calculate Mode, execute some calculation.
2. Press SHIFT OPTN (QR) to display the QR code.
   - The numbers in the lower right corner of the display shows the current QR code number and the total number of QR codes. To display the next QR code, press ▼ or =.

   Note
   - A ▮▮ indicator is displayed at the top of the screen while the calculator is generating a QR code.
   - To return to a previous QR code, press ▼ or = as many times as required to scroll forward until it appears.
3. Use a smart device to read the QR code on the calculator display.
   - For information about how to read a QR code, refer to the user documentation of the QR code reader you are using.

If you experience difficulty reading a QR code: While the QR code is displayed use ◀ and ▶ to adjust the display contrast of the QR code. This contrast adjustment affects QR code displays only.

Important

- Depending on the smart device and/or QR reader app being used, you may experience problems reading the QR codes produced by this calculator.
- When the setup "QR Code" setting is "Version 3", the calculator modes that can display QR codes are limited. If you try to display a QR code in a mode that does not support QR code display, the message "Not Supported (Version 3)" will appear. However, the QR code produced by this setting is easier to read with a smart device.
- For more information, visit the CASIO website (wes.casio.com).

To exit the QR code display: Press AC or SHIFT OPTN (QR).

Complex Number Calculations

To perform complex number calculations, first enter the Complex Mode. You can use either rectangular coordinates ($a+b\boldsymbol{i}$) or polar coordinates ($r\angle\theta$) to input complex numbers. Complex number calculation results are displayed in accordance with the Complex setting on the setup menu.

$(1 + \boldsymbol{i})^4 + (1 - \boldsymbol{i})^2 = -4 - 2\boldsymbol{i}$ (Complex: $a+b\boldsymbol{i}$)*

(1 + ENG ($\boldsymbol{i}$)) $x^{\square}$ 4 ▶ + (1 − ENG ($\boldsymbol{i}$)) x^2 = $-4 - 2\boldsymbol{i}$

$2\angle 45 = \sqrt{2} + \sqrt{2}\boldsymbol{i}$ (Angle Unit: Degree, Complex: $a+b\boldsymbol{i}$)

2 SHIFT ENG ($\angle$) 45 = $\sqrt{2} + \sqrt{2}\boldsymbol{i}$

$\sqrt{2} + \sqrt{2}\boldsymbol{i} = 2\angle 45$ (Angle Unit: Degree, Complex: $r\angle\theta$)

$\sqrt{\square}$ 2 ▶ + $\sqrt{\square}$ 2 ▶ ENG ($\boldsymbol{i}$) = $2\angle 45$

* When raising a complex number to an integer power using the syntax $(a+b\boldsymbol{i})^n$, the power value can be within the following range: $-1 \times 10^{10} < n < 1 \times 10^{10}$.

Note

- If you are planning to perform input and display of the calculation result in polar coordinate format, specify the angle unit before starting the calculation.
- The θ value of the calculation result is displayed in the range of $-180° < \theta \leqq 180°$.
- Display of the calculation result while LineI/LineO or LineI/DecimalO is selected will show a and $b\boldsymbol{i}$ (or r and θ) on separate lines.

Complex Mode Calculation Examples

To obtain the conjugate complex number of $2 + 3\boldsymbol{i}$ (Complex: $a+b\boldsymbol{i}$)

OPTN 2 (Conjugate) 2 + 3 ENG ($\boldsymbol{i}$) = $2-3\boldsymbol{i}$

To obtain the absolute value and argument of $1 + \boldsymbol{i}$ (Angle Unit: Degree)

SHIFT ((Abs) 1 + ENG ($\boldsymbol{i}$) = $\sqrt{2}$

OPTN 1 (Argument) 1 + ENG ($\boldsymbol{i}$) = 45

To extract the real part and imaginary part of $2 + 3\boldsymbol{i}$

OPTN 3 (Real Part) 2 + 3 ENG ($\boldsymbol{i}$) = 2

OPTN 4 (Imaginary Part) 2 + 3 ENG ($\boldsymbol{i}$) = 3

Using a Command to Specify the Calculation Output Format

$\sqrt{2} + \sqrt{2}\boldsymbol{i} = 2\angle 45,\ 2\angle 45 = \sqrt{2} + \sqrt{2}\boldsymbol{i}$ (Angle Unit: Degree)

$\sqrt{\square}$ 2 ▶ + $\sqrt{\square}$ 2 ▶ ENG ($\boldsymbol{i}$) OPTN ▼ 1 ($\blacktriangleright r\angle\theta$) = $2\angle 45$

2 SHIFT ENG ($\angle$) 45 OPTN ▼ 2 ($\blacktriangleright a+b\boldsymbol{i}$) = $\sqrt{2} + \sqrt{2}\boldsymbol{i}$

Using CALC

CALC lets you input calculation expressions that include one or more variable, assign values to the variables, and calculate the result. CALC can be used in the Calculate Mode and Complex Mode.

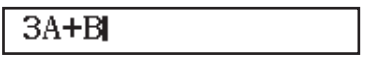
You can use CALC to save the types of expressions below.

- $2x + 3y$, $2Ax + 3By + C$, $A + B\boldsymbol{i}$, etc.
- $x + y : x\ (x + y)$, etc.
- $y = x^2 + x + 3$, etc.

Note: During the time from when you press CALC until you exit CALC by pressing AC, you should use Linear input procedures for input.

To store 3A + B and then substitute the following values to perform the calculation: A = 5, B = 10

3 [ALPHA] [(−)] (A) [+] [ALPHA] [°‘‘‘] (B)



[CALC] 5 [=] 10 [=] [=]

→

Using SOLVE

SOLVE uses Newton's method to approximate the solution of equations. Note that SOLVE can be used in the Calculate Mode only. SOLVE supports input of equations of the following formats.

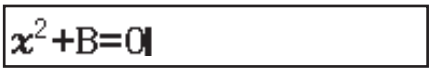
Examples: $y = x + 5$, x = sin(M), xy + C (Treated as xy + C = 0)

Note

- If an equation contains input functions that include an open parenthesis (such as sin and log), do not omit the closing parenthesis.
- During the time from when you press [SHIFT] [CALC] (SOLVE) until you exit SOLVE by pressing [AC], you should use Linear input procedures for input.

To solve $x^2 + b = 0$ for x when $b = -2$

[ALPHA] [)] (x) [x^2] [+] [ALPHA] [°‘‘‘] (B) [ALPHA] [CALC] (=) 0



[SHIFT] [CALC] (SOLVE)

Input an initial value for x (Here, input 1): 1 [=]

Assign -2 to B: [(−)] 2 [=]

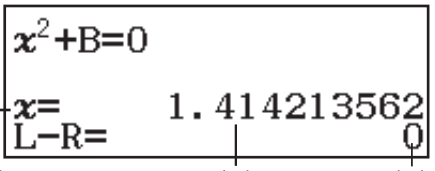
Specify the variable you want to solve for (Here we want to solve for x, so move the highlighting to x.):

[▲]

Solve the equation:

[=]

(1) Variable solved for
(2) Solution
(3) (Left Side) – (Right Side) result



(1) (2) (3)

- Solutions are always displayed in decimal form.
- The closer the (Left Side) – (Right Side) result is to zero, the higher the accuracy of the solution.

Important

- SOLVE performs convergence a preset number of times. If it cannot find a solution, it displays a confirmation screen that shows "Continue:[=]", asking if you want to continue. Press [=] to continue or [AC] to cancel the SOLVE operation.
- Depending on what you input for the initial value for x (solution variable), SOLVE may not be able to obtain solutions. If this happens, try changing the initial value so they are closer to the solution.
- SOLVE may not be able to determine the correct solution, even when one exists.

- SOLVE uses Newton's method, so even if there are multiple solutions, only one of them will be returned.
- Due to limitations in Newton's method, solutions tend to be difficult to obtain for equations like the following: $y = \sin x$, $y = e^x$, $y = \sqrt{x}$.

Statistical Calculations

Perform the steps below to start a statistical calculation.

1. Press [MENU], select the Statistics Mode icon, and then press [=].
2. On the Select Type screen that appears, select a statistical calculation type.

To select this type of statistical calculation:	Press this key:
Single-variable (x)	[1](1-Variable)
Paired-variable (x, y), linear regression	[2](y=a+bx)
Paired-variable (x, y), quadratic regression	[3](y=a+bx+cx^2)
Paired-variable (x, y), logarithmic regression	[4](y=a+b·ln(x))
Paired-variable (x, y), e exponential regression	▼ [1](y=a·e^(bx))
Paired-variable (x, y), ab exponential regression	▼ [2](y=a·b^x)
Paired-variable (x, y), power regression	▼ [3](y=a·x^b)
Paired-variable (x, y), inverse regression	▼ [4](y=a+b/x)

- Performing any of the above key operations displays the Statistics Editor.

Note: When you want to change the calculation type after entering the Statistics Mode, perform the key operation [OPTN] [1](Select Type) to display the calculation type selection screen.

Inputting Data with Statistics Editor

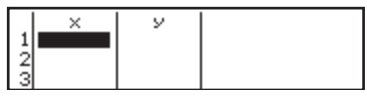
Statistics Editor displays one, two, or three columns: single-variable (x), single variable and frequency (x, Freq), paired-variable (x, y), paired-variable and frequency (x, y, Freq). The number of data rows that can be input depends on the number of columns: 160 rows for one column, 80 rows for two columns, 53 rows for three columns.

Note

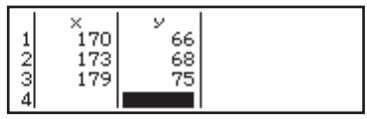
- Use the Freq (frequency) column to input the quantity (frequency) of identical data items. Display of the Freq column can be turned on (displayed) or off (not displayed) using the Statistics setting on the setup menu.
- Pressing the [AC] key while the Statistics Editor is on the screen will display a statistical calculation screen for performing calculations based on the input data. What you need to do to return to the Statistics Editor from the statistical calculation screen depends on the calculation type you selected. Press [OPTN] [3](Data) if you selected single-variable or [OPTN] [4](Data) if you selected paired-variable.

Ex 1: To select logarithmic regression and input the following data: (170, 66), (173, 68), (179, 75)

[OPTN] [1](Select Type) [4](y=a+b·ln(x))



170 = 173 = 179 = ▼ ▶
66 = 68 = 75 =



Important: All data currently input in the Statistics Editor is deleted whenever you exit the Statistics Mode, switch between the single-variable and a paired-variable statistical calculation type, or change the Statistics setting on the setup menu.

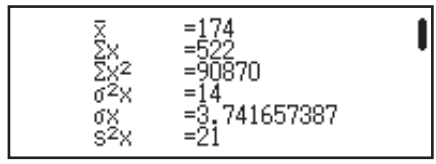
To delete a line: In the Statistics Editor, move the cursor to the line that you want to delete and then press DEL.

To insert a line: In the Statistics Editor, move the cursor to the location where you want to insert the line and then perform the following key operation: OPTN 2 (Editor) 1 (Insert Row).

To delete all Statistics Editor contents: In the Statistics Editor, perform the following key operation: OPTN 2 (Editor) 2 (Delete All).

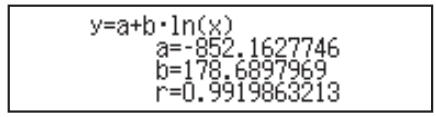
Displaying Statistical Values Based On Input Data

From the Statistics Editor:
OPTN 3 (1-Variable Calc or 2-Variable Calc)
From the statistical calculation screen:
OPTN 2 (1-Variable Calc or 2-Variable Calc)



Displaying Regression Calculation Results Based On Input Data (Paired-Variable Data Only)

From the Statistics Editor:
OPTN 4 (Regression Calc)
From the statistical calculation screen:
OPTN 3 (Regression Calc)



Obtaining Statistical Values from Input Data

You can use the operations in this section to recall statistical values assigned to variables (σ_x, Σx^2, etc.) based on the data you input with the Statistics Editor. You can also use the variables in calculations. The operations in this section are performed on the statistical calculation screen that appears when you press AC while the Statistics Editor is displayed. Supported statistical variables and the keys you should press to recall them are shown below. For single-variable statistical calculations, the variables marked with an asterisk (*) are available.

Summation: Σx^*, Σx^{2*}, Σy, Σy^2, Σxy, Σx^3, $\Sigma x^2 y$, Σx^4

OPTN ▼ 1 (Summation) 1 to 8

Number of Items: n^* / **Mean:** $\overline{x}^*$, $\overline{y}$ / **Population Variance:** $\sigma^2{}_x{}^*$, $\sigma^2{}_y$ /
Population Standard Deviation: $\sigma_x{}^*$, σ_y / **Sample Variance:** $s^2{}_x{}^*$, $s^2{}_y$ /
Sample Standard Deviation: $s_x{}^*$, s_y

OPTN ▼ 2 (Variable) 1 to 8, ▼ 1 to ▼ 3

Minimum Value: min(x)*, min(y) / **Maximum Value:** max(x)*, max(y)

When the single-variable statistical calculation is selected:
OPTN ▼ 3 (Min/Max) 1, 5

When a paired-variable statistical calculation is selected:
OPTN ▼ 3 (Min/Max) 1 to 4

First Quartile: $Q_1{}^*$ / **Median:** Med* / **Third Quartile:** $Q_3{}^*$ (For single-variable statistical calculations only)

OPTN ▼ 3 (Min/Max) 2 to 4

Regression Coefficients: a, b / **Correlation Coefficient:** r / **Estimated Values:** $\hat{x}$, $\hat{y}$

OPTN ▼ 4 (Regression) 1 to 5

Regression Coefficients for Quadratic Regression: a, b, c / **Estimated Values:** $\hat{x}_1$, $\hat{x}_2$, $\hat{y}$

OPTN ▼ 4 (Regression) 1 to 6

- $\hat{x}$, $\hat{x}_1$, $\hat{x}_2$ and $\hat{y}$ are commands of the type that take an argument immediately before them.

Ex 2: To input the single-variable data x = {1, 2, 2, 3, 3, 3, 4, 4, 5}, using the Freq column to specify the number of repeats for each items {x_n; freq$_n$} = {1;1, 2;2, 3;3, 4;2, 5;1}, and calculate the mean.

SHIFT MENU (SETUP) ▼ 3 (Statistics) 1 (On)

OPTN 1 (Select Type) 1 (1-Variable)

1 = 2 = 3 = 4 = 5 = ▼ ▶
1 = 2 = 3 = 2 =

AC OPTN ▼ 2 (Variable) 1 ($\bar{x}$) = 3

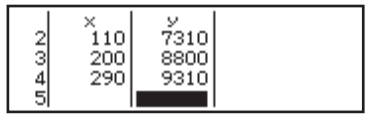
Ex 3: To calculate the logarithmic regression correlation coefficients for the following paired-variable data and determine the regression formula: (x, y) = (20, 3150), (110, 7310), (200, 8800), (290, 9310). Specify Fix 3 (three decimal places) for results.

SHIFT MENU (SETUP) ▼ 3 (Statistics) 2 (Off)

SHIFT MENU (SETUP) 3 (Number Format) 1 (Fix) 3

OPTN 1 (Select Type) 4 (y=a+b·ln(x))

20 = 110 = 200 = 290 = ▼ ▶
3150 = 7310 = 8800 = 9310 =



AC OPTN ▼ 4 (Regression) 3 (r) = 0.998

AC OPTN ▼ 4 (Regression) 1 (a) = -3857.984

AC OPTN ▼ 4 (Regression) 2 (b) = 2357.532

Calculating Estimated Values

Based on the regression formula obtained by paired-variable statistical calculation, the estimated value of y can be calculated for a given x-value. The corresponding x-value (two values, x_1 and x_2, in the case of quadratic regression) also can be calculated for a value of y in the regression formula.

Ex 4: To determine the estimate value for y when x = 160 in the regression formula produced by logarithmic regression of the data in Ex 3. Specify Fix 3 for the result. (Perform the following operation after completing the operations in Ex 3.)

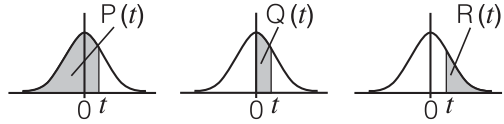
AC 160 OPTN ▼ 4 (Regression) 5 ($\hat{y}$) = 8106.898

Important: Regression coefficient, correlation coefficient, and estimated value calculations can take considerable time when there are a large number of data items.

Performing Normal Distribution Calculations

While single-variable statistical calculation is selected, you can perform normal distribution calculation using the functions shown below from the menu that appears when you perform the following key operation:
OPTN ▼ 4 (Norm Dist).

P, Q, R: These functions take the argument t and determine a probability of standard normal distribution as illustrated nearby.



►*t*: This function is preceded by the argument x. It calculates the standard variate for data value x using the mean value ($\overline{x}$) and population standard deviation (σ_x) of data input with Statistics Editor.

$$x \blacktriangleright t = \frac{x - \overline{x}}{\sigma_x}$$

Ex 5: For the single variable data in Ex 2, to determine the normalized variate when x = 2, and P(t) at that point.

[AC] 2 [OPTN] [▼] [4] (Norm Dist) [4] (►t) [=]

```
2►t
          -0.8660254038
```

[OPTN] [▼] [4] (Norm Dist) [1] (P() [Ans] [)] [=]

```
P(Ans)
           0.19324
```

Base-*n* Calculations

When you want to perform calculations using decimal, hexadecimal, binary, and/or octal values, enter the Base-N Mode. After entering the Base-N Mode, press one of the following keys to switch number modes: [x^2] (DEC) for decimal, [$x^{\blacksquare}$] (HEX) for hexadecimal, [log$_{\blacksquare}$□] (BIN) for binary, or [ln] (OCT) for octal.

To calculate $11_2 + 1_2$

[log$_{\blacksquare}$□] (BIN) 11 [+] 1 [=]

```
[Bin]
11+1
0000 0000 0000 0000
0000 0000 0000 0100
```

Note

- Use the following keys to input the letters A through F for hexadecimal values: [(–)] (A), [°’”] (B), [x^{-1}] (C), [sin] (D), [cos] (E), [tan] (F).
- In the Base-N Mode, input of fractional (decimal) values and exponents is not supported. If a calculation result has a fractional part, it is cut off.
- Details about input and output ranges (32 bits) are shown below.

Binary	Positive:	00000000000000000000000000000000 ≦ x ≦ 01111111111111111111111111111111
	Negative:	10000000000000000000000000000000 ≦ x ≦ 11111111111111111111111111111111
Octal	Positive:	00000000000 ≦ x ≦ 17777777777
	Negative:	20000000000 ≦ x ≦ 37777777777
Decimal	-2147483648 ≦ x ≦ 2147483647	
Hexadecimal	Positive:	00000000 ≦ x ≦ 7FFFFFFF
	Negative:	80000000 ≦ x ≦ FFFFFFFF

Specifying the Number Mode of a Particular Input Value

You can input a special command immediately following a value to specify the number mode of that value. The special commands are: d (decimal), h (hexadecimal), b (binary), and o (octal).

To calculate $10_{10} + 10_{16} + 10_2 + 10_8$ and display the result as a decimal value

[AC] [x^2] (DEC) [OPTN] [▼] [1] (d) 10 [+] [OPTN] [▼] [2] (h) 10 [+]

Converting a Calculation Result to another Type of Value

You can use any one of the following key operations to convert the currently displayed calculation result to another type of value: x^2(DEC), $x^{\blacksquare}$(HEX), $\log_{\square}$(BIN), ln(OCT).

To calculate $15_{10} \times 37_{10}$ in the decimal mode, and then convert the result to hexadecimal

AC x^2(DEC) 15 × 37 =	555
$x^{\blacksquare}$(HEX)	0000022B

Logical and Negation Operations

Logical and negation operations are performed by pressing OPTN and then selecting the desired command (and, or, xor, xnor, Not, Neg) from the menu that appears. All of the examples below are performed in the binary mode ($\log_{\square}$(BIN)).

To determine the logical AND of 1010_2 and 1100_2 (1010_2 and 1100_2)

AC 1010 OPTN 3(and) 1100 =	0000 0000 0000 0000 0000 0000 0000 1000

To determine the bitwise complement of 1010_2 (Not(1010_2))

AC OPTN 2(Not) 1010) =	1111 1111 1111 1111 1111 1111 1111 0101

Note: In the case of a negative binary, octal or hexadecimal value, the calculator converts the value to binary, takes the two's complement, and then converts back to the original number base. For decimal values, the calculator merely adds a minus sign.

Equation Calculations

Perform the steps below to solve an equation in the Equation/Func Mode.

1. Press MENU, select the Equation/Func Mode icon, and then press =.
2. Select the type of calculation you want to perform.

To select this calculation type:	Do this:
Simultaneous linear equations with two, three, or four unknowns	Press 1(Simul Equation), and then use a number key (2 to 4) to specify the number of unknowns.
Quadratic equations, cubic equations, or quartic equations	Press 2(Polynomial), and then use a number key (2 to 4) to specify the polynomial degree.

3. Use the Coefficient Editor that appears to input coefficient values.
   - To solve $2x^2 + x - 3 = 0$, for example, press 2(Polynomial)2 in step 2. Use the Coefficient Editor that appears to input 2 = 1 = (−) 3 =.
   - Pressing AC will clear all of the coefficients to zero.
4. After all the values are the way you want, press =.

- This will display a solution. Each press of [=] will display another solution. Pressing [=] while the final solution is displayed will return to the Coefficient Editor.
- A message appears to let you know when there is no solution or when there are infinite solutions. Pressing [AC] or [=] will return to the Coefficient Editor.
- You can assign the currently displayed solution to a variable. While the solution is displayed, press [STO] and then the key that corresponds to the name of the variable to which you want to assign it.
- To return to the Coefficient Editor while any solution is displayed, press [AC].

Note: Solutions that include $\sqrt{\ }$ are displayed only when the selected calculation type is Polynomial.

To change the current equation type setting: Press [OPTN] [1] (Simul Equation) or [OPTN] [2] (Polynomial), and then press [2], [3], or [4]. Changing the equation type causes the values of all Coefficient Editor coefficients to change to zero.

Equation/Func Mode Calculation Examples

$x + 2y = 3,\ 2x + 3y = 4$

[OPTN] [1] (Simul Equation) [2]

1 [=] 2 [=] 3 [=] 2 [=] 3 [=] 4 [=]

[=] (x=) -1

[▼] (y=) 2

$x^2 + 2x - 2 = 0$

[OPTN] [2] (Polynomial) [2]

1 [=] 2 [=] [(−)] 2 [=] [=] (x_1=) $-1 + \sqrt{3}$

[▼] (x_2=) $-1 - \sqrt{3}$

(Displays x-coordinate of local minimum of $y = x^2 + 2x - 2$.*)

[▼] (x=) -1

(Displays y-coordinate of local minimum of $y = x^2 + 2x - 2$.*)

[▼] (y=) -3

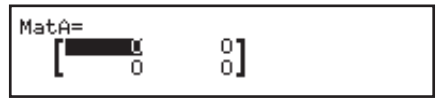
* The x- and y-coordinates of the local minimum (or local maximum) of the function $y = ax^2 + bx + c$ are also displayed, but only when a quadratic equation is selected for the calculation type.

Matrix Calculations

Use the Matrix Mode to perform calculations involving matrices of up to 4 rows by 4 columns. To perform a matrix calculation, use the special matrix variables (MatA, MatB, MatC, MatD) as shown in the example below.

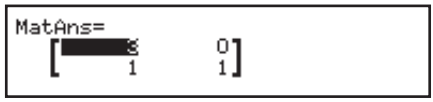
Example: $\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$

1. Press [MENU], select the Matrix Mode icon, and then press [=].
2. Press [1] (MatA) [2] (2 rows) [2] (2 columns).
   - This will display the Matrix Editor for input of the elements of the 2 × 2 matrix you specified for MatA.



3. Input the elements of MatA: 2 [=] 1 [=] 1 [=] 1 [=].

4. Perform the following key operation: OPTN 1 (Define Matrix) 2 (MatB) 2 (2 rows) 2 (2 columns).
5. Input the elements of MatB: 2 = (−) 1 = (−) 1 = 2 = .
6. Press AC to advance to the calculation screen, and perform the calculation (MatA × MatB): OPTN 3 (MatA) × OPTN 4 (MatB) = .
   - This will display the MatAns (Matrix Answer Memory) screen with the calculation results.



Matrix Answer Memory (MatAns)

Whenever the result of a calculation executed in the Matrix Mode is a matrix, the MatAns screen will appear with the result. The result also will be assigned to a variable named "MatAns".

The MatAns variable can be used in calculations as described below.

- To insert the MatAns variable into a calculation, perform the following key operation: OPTN ▼ 1 (MatAns).
- Pressing any one of the following keys while the MatAns screen is displayed will switch automatically to the calculation screen: +, −, ×, ÷, x^{-1}, x^2, SHIFT x^2 (x^3).

Assigning and Editing Matrix Variable Data

To assign new data to a matrix variable

1. Press OPTN 1 (Define Matrix), and then, on the menu that appears, select the matrix variable to which you want to assign data.
2. On the dialog box that appears, use a number key (1 to 4) to specify the number of rows.
3. On the next dialog box that appears, use a number key (1 to 4) to specify the number of columns.
4. Use the Matrix Editor that appears to input the elements of the matrix.

To edit the elements of a matrix variable

Press OPTN 2 (Edit Matrix), and then, on the menu that appears, select the matrix variable you want to edit.

To copy matrix variable (or MatAns) contents

1. Use the Matrix Editor to display the matrix you want to copy.
   - If you want to copy MatAns contents, perform the following to display the MatAns screen: OPTN ▼ 1 (MatAns) = .
2. Press STO, and then perform one of the following key operations to specify the copy destination: (−) (MatA), , (MatB), x^{-1} (MatC), or sin (MatD).
   - This will display the Matrix Editor with the contents of the copy destination.

Matrix Calculation Examples

The following examples use MatA = $\begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$, MatB = $\begin{bmatrix} 1 & 0 & -1 \\ 0 & -1 & 1 \end{bmatrix}$.

To obtain the determinant of MatA (Det(MatA))

AC OPTN ▼ 2 (Determinant) **MatA**) = 1

To create a 2 × 2 identity matrix and add it to MatA (Identity(2) + MatA)

AC OPTN ▼ 4 (Identity) 2) + **MatA** = $\begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$

Note: You can specify a value from 1 to 4 as the Identity command argument (number of dimensions).

To obtain the transposition of MatB (Trn(MatB))

[AC] [OPTN] [▼] [3] (Transposition) **MatB** [)] [=] $\begin{bmatrix} 1 & 0 \\ 0 & -1 \\ -1 & 1 \end{bmatrix}$

To invert, square, and cube MatA (MatA^{-1}, MatA^2, MatA^3)

Note: You cannot use [$x^{\blacksquare}$] for this input. Use [x^{-1}] to input "$^{-1}$", [x^2] to specify squaring, and [SHIFT] [x^2] (x^3) to specify cubing.

[AC] **MatA** [x^{-1}] [=] $\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$

[AC] **MatA** [x^2] [=] $\begin{bmatrix} 3 & 3 \\ 3 & 2 \end{bmatrix}$

[AC] **MatA** [SHIFT] [x^2] (x^3) [=] $\begin{bmatrix} 13 & 8 \\ 8 & 5 \end{bmatrix}$

To obtain the absolute value of each element of MatB (Abs(MatB))

[AC] [SHIFT] [(] (Abs) **MatB** [)] [=] $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}$

Creating a Number Table

The Table Mode generates a number table based on one or two functions.

Example: To generate a number table for the functions $f(x) = x^2 + \frac{1}{2}$ and $g(x) = x^2 - \frac{1}{2}$ for the range $-1 \leqq x \leqq 1$, incremented in steps of 0.5

1. Press [MENU], select the Table Mode icon, and then press [=].
2. Configure settings to generate a number table from two functions.
   [SHIFT] [MENU] (SETUP) [▼] [▼] [2] (Table) [2] ($f(x)$,$g(x)$)
3. Input $x^2 + \frac{1}{2}$.

   [ALPHA] [)] (x) [x^2] [+] 1 [▤] 2

   $f(x)=x^2+\frac{1}{2}$

4. Input $x^2 - \frac{1}{2}$.

   [=] [ALPHA] [)] (x) [x^2] [−] 1 [▤] 2

   $g(x)=x^2-\frac{1}{2}$

5. Press [=]. On the Table Range dialog box that appears, input values for Start (Default: 1), End (Default: 5), and Step (Default: 1).

   [(−)] 1 [=] 1 [=] 0.5 [=]

   Table Range
   Start:-1
   End :1
   Step :0.5

6. Press [=] to generate the number table.
   - Press [AC] to return to the screen in step 3.

	x	f(x)	g(x)
1	-1	1.5	0.5
2	-0.5	0.75	-0.25
3	0	0.5	-0.5
4	0.5	0.75	-0.25

Tip

- In the number table shown in step 6, you can change the value in the currently highlighted x cell. Changing the x value causes the $f(x)$ and $g(x)$ values in the same line to be updated accordingly.
- If there is value in the x cell above the currently highlighted x cell, pressing [+] or [=] automatically inputs into the highlighted cell the value equal to the value of the cell above it plus the step value. So also,

pressing [−] automatically inputs the value equal to the value of the cell above less the step value. The $f(x)$ and $g(x)$ values in the same line are also updated accordingly.

Note

- After pressing [=] in step 4 above, proceeding from step 5 onwards without inputting anything for $g(x)$ will generate a number table for $f(x)$ only.
- The maximum number of rows in the generated number table depends on the setup menu table setting. Up to 45 rows are supported for the "$f(x)$" setting, while 30 rows are supported for the "$f(x)$,$g(x)$" setting.
- The number table generation operation causes the contents of variable x to be changed.

Important: Functions input in this mode are deleted whenever the Input/Output settings are changed in the Table Mode.

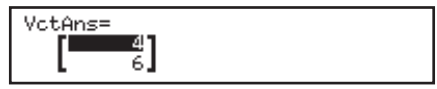
Vector Calculations

Use the Vector Mode to perform 2-dimensional and 3-dimensional vector calculations. To perform a vector calculation, use the special vector variables (VctA, VctB, VctC, VctD) as shown in the example below.

Example: (1, 2) + (3, 4)

1. Press [MENU], select the Vector Mode icon, and then press [=].
2. Press [1](VctA)[2](2 dimensions).
   - This will display the Vector Editor for input of the 2-dimensional vector for VctA.

3. Input the elements of VctA: 1[=]2[=].
4. Perform the following key operation: [OPTN][1](Define Vector)[2](VctB)[2](2 dimensions).
5. Input the elements of VctB: 3[=]4[=].
6. Press [AC] to advance to the calculation screen, and perform the calculation (VctA + VctB): [OPTN][3](VctA)[+][OPTN][4](VctB)[=].
   - This will display the VctAns (Vector Answer Memory) screen with the calculation results.



Vector Answer Memory

Whenever the result of a calculation executed in the Vector Mode is a vector, the VctAns screen will appear with the result. The result also will be assigned to a variable named "VctAns".

The VctAns variable can be used in calculations as described below.

- To insert the VctAns variable into a calculation, perform the following key operation: [OPTN][▼][1](VctAns).
- Pressing any one of the following keys while the VctAns screen is displayed will switch automatically to the calculation screen: [+], [−], [×], [÷].

Assigning and Editing Vector Variable Data

To assign new data to a vector variable

1. Press [OPTN][1](Define Vector), and then, on the menu that appears, select the vector variable to which you want to assign data.
2. On the dialog box that appears, press [2] or [3] to specify the vector dimension.

3. Use the Vector Editor that appears to input the elements of the vector.

To edit the elements of a vector variable

Press [OPTN] [2] (Edit Vector), and then, on the menu that appears, select the vector variable you want to edit.

To copy vector variable (or VctAns) contents

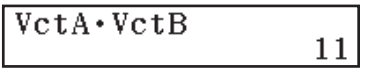
1. Use the Vector Editor to display the vector you want to copy.
   - If you want to copy VctAns contents, perform the following to display the VctAns screen: [OPTN] [▼] [1] (VctAns) [=].
2. Press [STO], and then perform one of the following key operations to specify the copy destination: [(−)] (VctA), [,,,] (VctB), [x^{-1}] (VctC), or [sin] (VctD).
   - This will display the Vector Editor with the contents of the copy destination.

Vector Calculation Examples

The examples below use VctA = (1, 2) and VctB = (3, 4), and VctC = (2, -1, 2).

VctA • VctB (Vector dot product)

[AC] **VctA** [OPTN] [▼] [2] (Dot Product) **VctB** [=]

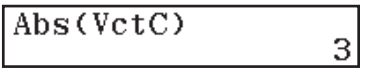


VctA × VctB (Vector cross product)

[AC] **VctA** [×] **VctB** [=]

To obtain the absolute values of VctC

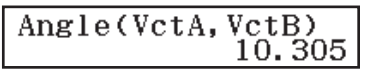
[AC] [SHIFT] [(] (Abs) **VctC** [)] [=]



To determine the angle formed by VctA and VctB to three decimal places (Fix 3). (Angle Unit: Degree)

[SHIFT] [MENU] (SETUP) [3] (Number Format) [1] (Fix) [3]

[AC] [OPTN] [▼] [3] (Angle) **VctA** [SHIFT] [)] (,) **VctB** [)] [=]



To normalize VctB

[AC] [OPTN] [▼] [4] (Unit Vector) **VctB** [)] [=]

Inequality Calculations

You can use the procedure below to solve a 2nd, 3rd, or 4th degree inequality.

1. Press [MENU], select the Inequality Mode icon, and then press [=].
2. On the dialog box that appears, use a number key ([2] to [4]) to specify the degree of the inequality.
3. On the menu that appears, use keys [1] through [4] to select the inequality symbol type and orientation.
4. Use the Coefficient Editor that appears to input coefficient values.
   - To solve $x^2 + 2x - 3 < 0$, for example, input the following for the coefficients (a = 1, b = 2, c = -3): 1 [=] 2 [=] [(−)] 3 [=].
   - Pressing [AC] will clear all of the coefficients to zero.
5. After all the values are the way you want, press [=].
   - This will display the solutions.

- To return to the Coefficient Editor while the solutions are displayed, press [AC].

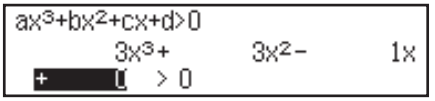
To change the Inequality Type: Pressing [OPTN] [1] (Polynomial) displays a dialog box that you can use to select an inequality degree. Changing the degree of an inequality causes the values of all Coefficient Editor coefficients to become zero.

Inequality Mode Calculation Examples

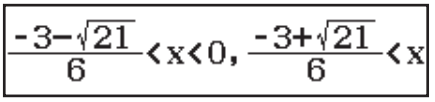
$3x^3 + 3x^2 - x > 0$

[OPTN] [1] (Polynomial) [3] (3rd degree inequality) [1] ($ax^3+bx^2+cx+d>0$)

3 [=] 3 [=] [(−)] 1 [=]

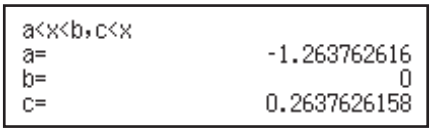


[=]
[▶] [▶] [▶] [▶]



Note

- Solutions are displayed as shown in the screen shot nearby when something other than MathI/MathO is selected for the Input/Output setting on the setup menu.



- "All Real Numbers" appears on the solution screen when the solution of an inequality is all numbers (such as $x^2 \geqq 0$).
- "No Solution" appears on the solution screen when no solution exists for an inequality (such as $x^2 < 0$).

Ratio Calculations

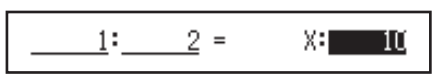
The Ratio Mode lets you determine the value of X in the ratio expression A : B = X : D (or A : B = C : X) when the values of A, B, C and D are known. The following shows the general procedure for using Ratio.

1. Press [MENU], select the Ratio Mode icon, and then press [=].
2. On the menu that appears, select [1] (A:B=X:D) or [2] (A:B=C:X).
3. On the Coefficient Editor screen that appears, input up to 10 digits for each of the required values (A, B, C, D).
   - To solve 3 : 8 = X : 12 for X, for example, press [1] in step 1, and then input the following for the coefficients (A = 3, B = 8, D = 12): 3 [=] 8 [=] 12 [=].
   - Pressing [AC] will reset all of the coefficients to one.
4. After all the values are the way you want, press [=].
   - This displays the solution (value of X). Pressing [=] again will return to the Coefficient Editor.

Important: A Math ERROR will occur if you perform a calculation while 0 is input for a coefficient.

To calculate X in the ratio 1 : 2 = X : 10

[OPTN] [1] (Select Type) [1] (A:B=X:D)
1 [=] 2 [=] 10 [=]



[=]

(X=) 5

Changing the Ratio Expression Type

Press [OPTN] [1] (Select Type) and then select the ratio expression type you want from the menu that appears.

Distribution Calculations

You can use the procedures below to perform seven different types of distribution calculations.

1. Press [MENU], select the Distribution Mode icon, and then press [=].
2. On the menu that appears, select a distribution calculation type.

To select this calculation type:	Press this key:
Normal probability density	[1](Normal PD)
Normal cumulative distribution	[2](Normal CD)
Inverse normal cumulative distribution	[3](Inverse Normal)
Binomial probability	[4](Binomial PD)
Binomial cumulative distribution	[▼][1](Binomial CD)
Poisson probability	[▼][2](Poisson PD)
Poisson cumulative distribution	[▼][3](Poisson CD)

   - If you selected Normal PD, Normal CD, or Inverse Normal as the calculation type, go to step 4 of this procedure. For any other calculation type, go to step 3.
3. On the dialog box that appears, select a data (x) input method.
   - To input multiple x data items at the same time, press [1](List). To input a single data item, press [2](Variable).
   - If you selected [1](List) above, a list screen will appear at this time so you can input the x data items.
4. Input values for the variables.
   - The variables that require data input depend on the calculation type you selected in step 2 of this procedure.
5. After inputting values for all of the variables, press [=].
   - This displays the calculation results.
   - Pressing [=] while a calculation result is displayed will return to the variable input screen.

Note

- If you selected something other than "List" in step 3 of this procedure the calculation result will be stored in Ans memory.
- Distribution calculation accuracy is up to six significant digits.

To change the distribution calculation type: Press [OPTN][1](Select Type) and then select the distribution type you want.

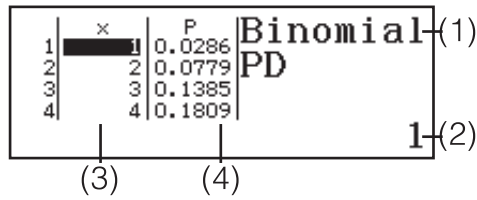
Variables that Accept Input

Distribution calculation variables that accept input values are those below.
Normal PD: x, σ, μ
Normal CD: Lower, Upper, σ, μ
Inverse Normal: Area, σ, μ (Tail setting always left.)
Binomial PD, Binomial CD: x, N, p
Poisson PD, Poisson CD: x, λ
x: data, σ: standard deviation ($\sigma > 0$), μ, λ: mean, Lower: lower boundary, Upper: upper boundary, Area: probability value ($0 \leqq \text{Area} \leqq 1$), N: number of trials, p: success probability ($0 \leqq p \leqq 1$)

List Screen

You can input up to 45 data samples for each variable. Calculation results are also displayed on the List Screen.

(1) Distribution calculation type
(2) Value at current cursor position
(3) Data (x)
(4) Calculation results (P)



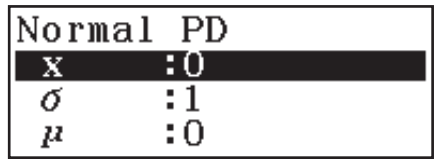
To edit data: Move the cursor to the cell that contains the data you want to edit, input the new data, and then press [=].
To delete data: Move the cursor to the data you want to delete and then press [DEL].
To insert data: Move the cursor to the position where you want to insert the data, press [OPTN] [2](Editor)[1](Insert Row), and then input the data.
To delete all data: Press [OPTN] [2](Editor)[2](Delete All).

Distribution Mode Calculation Examples

To calculate the normal probability density when x = 36, σ = 2, μ = 35

1. Perform the key operation below to select Normal PD.

   [OPTN] [1](Select Type)[1](Normal PD)
   - This displays the variable input screen.

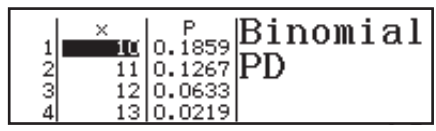


2. Input values for x, σ, and μ. 36[=]2[=]35[=]
3. Press [=].
   - This displays the calculation results. (p=) 0.1760326634
   - Pressing [=] again or pressing [AC] returns to the variable input screen in step 1 of this procedure.

Note: You can assign the currently displayed solution to a variable. While the solution is displayed, press [STO] and then the key that corresponds to the name of the variable to which you want to assign it.

To calculate binomial probability for the data {10, 11, 12, 13} when N = 15 and p = 0.6

1. Perform the key operation below to select Binomial PD.
   [OPTN] [1](Select Type)[4](Binomial PD)
2. Because you want to input four data (x) values, press [1](List) here.
   - This displays the List Screen.
3. Input a value for x. 10[=]11[=]12[=]13[=]
4. After inputting all of the values, press [=].
   - This displays the variable input screen.
5. Input values for N and p. 15[=]0.6[=]
6. Press [=].
   - This returns to the List Screen, with the calculation result for each x value shown in the P column.



Pressing [=] returns to the variable input screen in step 4 of this procedure.

Note

- Changing any x value in step 6 of the above procedure will clear all calculation results and return to step 2. In this case, all of the other x values (except for the one you changed), and the values assigned to

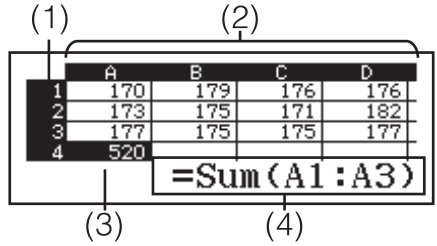
variables N and p remain the same. This means you can repeat a calculation changing only one specific value.

- On the List Screen, you can assign the value in a cell to a variable. Move the cell cursor to cell that contains the value you want to assign, press [STO], and then press the key that corresponds to the desired variable name.
- An error message appears if the input value is outside the allowable range. “ERROR” will appear in the P column of the Result Screen when the value input for the corresponding data is outside the allowable range.

Using Spreadsheet

To perform the operations in this section, first enter the Spreadsheet Mode.

The Spreadsheet Mode makes it possible to perform calculations using a 45-row × 5-column (cell A1 to E45) spreadsheet.
(1) Row numbers (1 to 45)
(2) Column letters (A to E)
(3) Cell cursor: Indicates the currently selected cell.
(4) Edit box: Shows the contents of the cell where the cell cursor is currently located.



Important: Any time you exit the Spreadsheet Mode, turn off the calculator or press the [ON] key, every input into the spreadsheet is cleared.

Inputting and Editing Cell Contents

You can input a constant or a formula into each cell.

Constants: A constant is something whose value is fixed as soon as you finalize its input. A constant can be either a numeric value, or a calculation formula (such as 7+3, sin30, A1×2, etc.) that does not have an equal sign (=) in front of it.

Formula: A formula that starts out with an equal sign (=), such as =A1×2, is executed as it is written.

Note: Up to 10 bytes can be input into each cell in the case of a constant. In the case of a formula, you can input up to 49 bytes into each cell. Inputting a formula into a cell requires 11 bytes in addition to the number of bytes for the actual formula data.

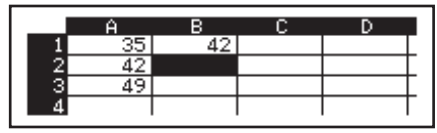
To display the remaining input capacity: Press [OPTN] [4] (Free Space).

To input a constant and/or formula into a cell

Ex 1: Into cells A1, A2, and A3, input constants 7×5, 7×6, and A2+7 respectively. And then, input the following formula into cell B1: =A1+7.

1. Move the cell cursor to cell A1.
2. Perform the key operation below.
   7 [×] 5 [=] 7 [×] 6 [=] [ALPHA] [(−)] (A) [2] [+] 7 [=]
3. Move the cell cursor to cell B1, and then perform the key operation below.

[ALPHA] [CALC] (=) [ALPHA] [(−)] (A) [1] [+] 7 [=]



Note: You can specify whether a formula in the edit box should be displayed as it is or as its calculation result value.

To edit existing cell data

1. Move the cell cursor to the cell whose contents you want to edit, and then press [OPTN] [3] (Edit Cell).
   - Cell contents in the edit box will change from align right to align left. A text cursor will appear in the edit box so you can edit its contents.
2. Use [▶] and [◀] to move the cursor around the contents of the cell, and edit them as required.
3. To finalize and apply your edits, press [=].

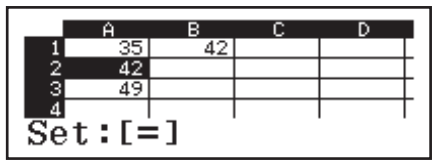
To input a cell reference name using the Grab command

The Grab command can be used in place of manual reference name (such as A1) input using a key operation to select and input a cell you want to reference.

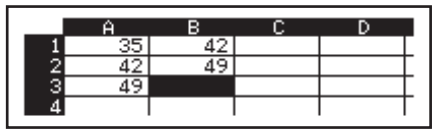
Ex 2: Continuing from Ex 1, input the following formula into cell B2: =A2+7.

1. Move the cell cursor to cell B2.
2. Perform the key operation below.

[ALPHA] [CALC] (=) [OPTN] [2] (Grab) [◀]



[=] [+] 7 [=]



Cell Relative and Absolute References

There are two types of cell reference: relative and absolute.

Relative cell reference: The cell reference (A1) in a formula like =A1+7 is a relative reference, which means that it changes depending on the cell where the formula is located. If the formula =A1+7 is originally located in cell B1, for example, copying and then pasting to cell C3 will result in =B3+7 being input into cell C3. Since the copy and paste operation moves the formula one column (B to C) and two rows (1 to 3) causes the A1 relative cell reference in the formula to change to B3. If the result of a copy and paste operation causes a relative cell reference name to change to something that is outside the range of the spreadsheet cells, the applicable column letter and/or row number will be replaced by a question mark (?), and "ERROR" will be displayed as the cell's data.

Absolute cell reference: If you want the row or the column, or both the row and the column parts of a cell reference name to remain the same no matter where you paste them, you need to create an absolute cell reference name. To create an absolute cell reference put a dollar sign ($) in front of the column name and/or row number. You can use one of three different absolute cell references: absolute column with relative row ($A1), relative column with absolute row (A$1), or absolute row and column (A1).

To input the absolute cell reference symbol ($)

While inputting a formula into a cell, press [OPTN] [1] ($).

To cut and paste spreadsheet data

1. Move the cursor to the cell whose data you want to cut and then press [OPTN] [▼] [1] (Cut & Paste).
   - This enters paste standby. To cancel paste standby, press [AC].
2. Move the cursor to the cell into which you want to paste the data you just cut, and then press [=].

- Pasting data simultaneously deletes the data from the cell where you performed the cut operation, and automatically cancels paste standby.

Note: In the case of a cut and paste operation, cell references do not change when pasted, regardless of whether they are relative or absolute.

To copy and paste spreadsheet data

1. Move the cursor to the cell whose data you want to copy and then press [OPTN] [▼] [2] (Copy & Paste).
   - This enters paste standby. To cancel paste standby, press [AC].
2. Move the cursor to the cell into which you want to paste the data you just copied, and then press [=].
   - Paste standby remains enabled until you press [AC], so you can paste the copied data to other cells, if you want.

Note: When you copy the contents of a cell that contains a formula with a relative reference, the relative reference will change in accordance with the location of the cell where the contents are pasted.

To delete input data from a specific cell

Move the cell cursor to the cell whose contents you want to delete and then press [DEL].

To delete the contents of all the cells in a spreadsheet

Press [OPTN] [▼] [3] (Delete All).

Using Variables (A, B, C, D, E, F, M, *x*, *y*)

You can use [STO] to assign the value of a cell to a variable. You can also use [SHIFT] [STO] (RECALL) to input the value assigned to a variable into a cell.

Using Spreadsheet Mode Special Commands

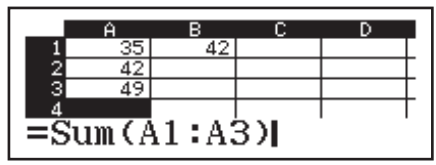
In the Spreadsheet Mode, the commands below can be used inside formulas or constants. These command are on the menu that appears when you press [OPTN].

Min(	Returns the minimum of the values in a specified range of cells. Syntax: Min(start cell:end cell)
Max(	Returns the maximum of the values in a specified range of cells. Syntax: Max(start cell:end cell)
Mean(	Returns the mean of the values in a specified range of cells. Syntax: Mean(start cell:end cell)
Sum(	Returns the sum of the values in a specified range of cells. Syntax: Sum(start cell:end cell)

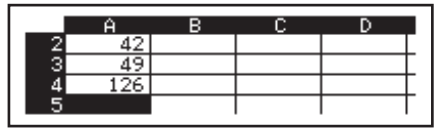
Ex 3: Continuing from Ex 1, input the formula =Sum(A1:A3), which calculates the sum of cells A1, A2, and A3, into cell A4.

1. Move the cell cursor to cell A4.
2. Input =Sum(A1:A3).

[ALPHA] [CALC] (=) [OPTN] [▼] [4] (Sum)
[ALPHA] [(−)] (A) [1] [ALPHA] [.] (:) [ALPHA] [(−)] (A) [3] [)]



3. Press [=].



Batch Inputting the Same Formula or Constant into Multiple Cells

You can use the procedures in this section to input the same formula or constant into a specific series of cells. Use the Fill Formula command to batch input a formula, or Fill Value to batch input a constant.

Note: If the input formula or constant includes a relative reference, the relative reference will be input in accordance with the upper left cell of the specified range. If the input formula or constant includes an absolute reference, the absolute reference will be input into all of the cells in the specified range.

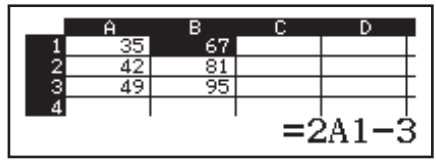
To batch input the same formula into a series of cells

Ex 4: Continuing from Ex 1, batch input into cells B1, B2, and B3 a formula that doubles the value of the cell to the left and then subtracts 3.

1. Move the cell cursor to cell B1.
2. Press [OPTN] [1] (Fill Formula).
   - This displays a Fill Formula dialog box.
3. In the "Form" row, input the formula "=2A1–3": 2 [ALPHA] [(–)] (A) [1] [−] 3 [=].
   - Input of the equals symbol (=) at the beginning is not required.
4. Move the highlighting to the "Range" line and specify B1:B3 as the range of the batch input.

[▶] [▶] [▶] [▶] [▶] [▶] [DEL] [3] [=]

5. To apply the input, press [=].
   - This inputs =2A1–3 into cell B1, =2A2–3 into cell B2, and =2A3–3 into cell B3.



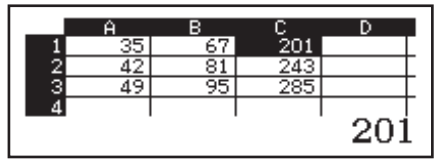
To batch input the same constant into a series of cells

Ex 5: Continuing from Ex 4, batch input into cells C1, C2, and C3 the values that are triple those of the cells to the left.

1. Move the cell cursor to cell C1.
2. Press [OPTN] [2] (Fill Value).
   - This displays a Fill Value dialog box.
3. In the "Value" line, input the constant B1×3: [ALPHA] [,,,] (B) [1] [×] 3 [=].
4. Move the highlighting to the "Range" line and specify C1:C3 as the range of the batch input.

[▶] [▶] [▶] [▶] [▶] [▶] [DEL] [3] [=]

5. To apply the input, press [=].
   - This inputs the values of each calculation result into cells C1, C2, and C3.



Recalculation

Auto Calc is a setup item. Depending on the content of the spreadsheet, auto recalculation can take a long time to complete. When Auto Calc is disabled (Off), you need to execute recalculation manually as required.

To perform recalculation manually: Press [OPTN] [▼] [4] (Recalculate).

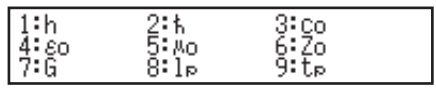
Scientific Constants

Your calculator comes with 47 built-in scientific constants.

Example: To input the scientific constant c_0 (speed of light in a vacuum), and display its value

1. Press AC SHIFT 7 (CONST) to display a menu of scientific constant categories.

2. Press 1 (Universal) to display a menu of scientific constants in the Universal category.



3. Press 3 (c_0) =.

299792458

- The values are based on CODATA (2010) recommended values.

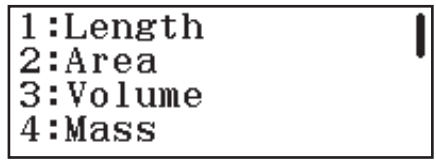
Metric Conversion

You can use the metric conversion commands to convert from one unit of measurement to another.

Example: To convert 5 cm into inches (Linel/LineO)

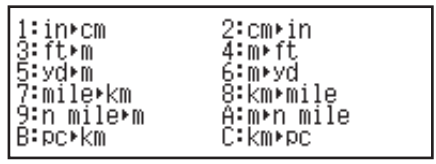
1. Input the value to be converted and display the metric conversion menu.

AC 5 SHIFT 8 (CONV)



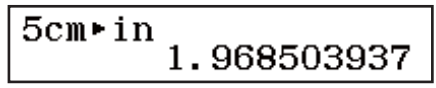
2. On the conversion category menu that appears, select “Length”.

1 (Length)



3. Select the centimeters-to-inches conversion command and then perform the conversion.

2 (cm▸in) =



Note

- Conversion formula data is based on the “NIST Special Publication 811 (2008)”.
- The J▸cal command performs conversion for values at a temperature of 15°C.

Errors

The calculator will display an error message whenever an error occurs for any reason during a calculation. While an error message is displayed, press ◀ or ▶ to return to the calculation screen. The cursor will be positioned at the location where the error occurred, ready for input.

To clear the error message: While an error message is displayed, press AC to return to the calculation screen. Note that this also clears the calculation that contained the error.

Error Messages

Math ERROR

- The intermediate or final result of the calculation you are performing exceeds the allowable calculation range.
- Your input exceeds the allowable input range (particularly when using functions).
- The calculation you are performing contains an illegal mathematical operation (such as division by zero).

→ Check the input values, reduce the number of digits, and try again.
→ When using independent memory or a variable as the argument of a function, make sure that the memory or variable value is within the allowable range for the function.

Stack ERROR

- The calculation you are performing has caused the capacity of the numeric stack or the command stack to be exceeded.
- The calculation you are performing has caused the capacity of the matrix or vector stack to be exceeded.

→ Simplify the calculation expression so it does not exceed the capacity of the stack.
→ Try splitting the calculation into two or more parts.

Syntax ERROR

- There is a problem with the format of the calculation you are performing.

Argument ERROR

- There is a problem with the argument of the calculation you are performing.

Dimension ERROR (Matrix and Vector Modes only)

- The matrix or vector you are trying to use in a calculation was input without specifying its dimension.
- You are trying to perform a calculation with matrices or vectors whose dimensions do not allow that type of calculation.

→ Specify the dimension of the matrix or vector and then perform the calculation again.
→ Check the dimensions specified for the matrices or vectors to see if they are compatible with the calculation.

Variable ERROR (SOLVE feature only)

- An attempt to execute SOLVE for an expression input without any variable included.

→ Input an expression that includes a variable.

Cannot Solve (SOLVE feature only)

- The calculator could not obtain a solution.

→ Check for errors in the equation that you input.
→ Input a value for the solution variable that is close to the expected solution and try again.

Range ERROR

- An attempt to generate a number table in the Table Mode whose conditions cause it to exceed the maximum number of allowable rows.
- During batch input in the Spreadsheet Mode, input for Range is outside the allowable range or is a cell name that does not exist.

→ Narrow the table calculation range by changing the Start, End, and Step values, and try again.
→ For Range, input a cell name within the range of A1 through E45, using the syntax: “A1:A1”.

Time Out

• The current differential or integration calculation ends without the ending condition being fulfilled.

→ Try increasing the *tol* value. Note that this also decreases solution precision.

Circular ERROR (Spreadsheet Mode only)

• There is a circular reference (such as “=A1” in cell A1) in the spreadsheet.

→ Change cell contents to remove the circular references.

Memory ERROR (Spreadsheet Mode only)

• You are attempting to input data that exceeds the allowable input capacity (1,700 bytes).

• You are attempting to input data that results in a chain of consecutive cell references (such as cell A2 referenced from cell A1, cell A3 referenced from cell A2…, etc.) This type of input always causes this error to be generated, even if memory capacity (1,700 bytes) is not exceeded.

• Memory capacity was exceeded because a formula that includes a relative cell reference was copied, or because of batch input of formulas that use relative cell references.

→ Delete unneeded data and input data again.

→ Minimize input that results in a chain of consecutive cell references.

→ Shorten the formula being copied or the formulas being batch input.

技术信息

计算范围、位数和精确度

内部计算所使用的计算范围、位数和精确度取决于您所执行的计算类型。

计算范围和精确度

计算范围	$\pm 1 \times 10^{-99}$ 至 $\pm 9.999999999 \times 10^{99}$ 或者 0
内部计算所使用的位数	15 位
精确度	一般来说，对于单个计算，在第 10 位有 ±1 的误差。指数显示的精确度为有效位数最后一位 ±1。在连续计算的情况下，误差会累积。

函数计算的输入范围和精确度

函数	输入范围	
$\sin x$ $\cos x$	DEG	$0 \leqq \lvert x \rvert < 9 \times 10^{9}$
	RAD	$0 \leqq \lvert x \rvert < 157079632.7$
	GRA	$0 \leqq \lvert x \rvert < 1 \times 10^{10}$
$\tan x$	DEG	与 $\sin x$ 相同，但当 $\lvert x \rvert = (2n-1) \times 90$ 时除外。
	RAD	与 $\sin x$ 相同，但当 $\lvert x \rvert = (2n-1) \times \pi/2$ 时除外。
	GRA	与 $\sin x$ 相同，但当 $\lvert x \rvert = (2n-1) \times 100$ 时除外。
$\sin^{-1} x$ $\cos^{-1} x$	$0 \leqq \lvert x \rvert \leqq 1$	
$\tan^{-1} x$	$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{99}$	
$\sinh x$ $\cosh x$	$0 \leqq \lvert x \rvert \leqq 230.2585092$	
$\sinh^{-1} x$	$0 \leqq \lvert x \rvert \leqq 4.999999999 \times 10^{99}$	

$\cosh^{-1}x$	$1 \leqq x \leqq 4.999999999 \times 10^{99}$
$\tanh x$	$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{99}$
$\tanh^{-1}x$	$0 \leqq \lvert x \rvert \leqq 9.999999999 \times 10^{-1}$
$\log x/\ln x$	$0 < x \leqq 9.999999999 \times 10^{99}$
10^x	$-9.999999999 \times 10^{99} \leqq x \leqq 99.99999999$
e^x	$-9.999999999 \times 10^{99} \leqq x \leqq 230.2585092$
$\sqrt{x}$	$0 \leqq x < 1 \times 10^{100}$
x^2	$\lvert x \rvert < 1 \times 10^{50}$
x^{-1}	$\lvert x \rvert < 1 \times 10^{100}$; $x \neq 0$
$\sqrt[3]{x}$	$\lvert x \rvert < 1 \times 10^{100}$
$x!$	$0 \leqq x \leqq 69$ (x 为整数)
$n\mathrm{P}r$	$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n、r 为整数) $1 \leqq \{n!/(n-r)!\} < 1 \times 10^{100}$
$n\mathrm{C}r$	$0 \leqq n < 1 \times 10^{10}$, $0 \leqq r \leqq n$ (n、r 为整数) $1 \leqq n!/r! < 1 \times 10^{100}$ 或 $1 \leqq n!/(n-r)! < 1 \times 10^{100}$
$\mathrm{Pol}(x, y)$	$\lvert x \rvert, \lvert y \rvert \leqq 9.999999999 \times 10^{99}$ $\sqrt{x^2+y^2} \leqq 9.999999999 \times 10^{99}$
$\mathrm{Rec}(r, \theta)$	$0 \leqq r \leqq 9.999999999 \times 10^{99}$ θ: 与 $\sin x$ 相同
°’ ”	$\lvert a \rvert, b, c < 1 \times 10^{100}$; $0 \leqq b, c$ 显示的第二个数值在第二个小数位中出现误差 ±1。
$\overleftarrow{\text{°’ ”}}$	$\lvert x \rvert < 1 \times 10^{100}$ 10进制$\leftrightarrow$60进制转换 $0^\circ 0' 0'' \leqq \lvert x \rvert \leqq 9999999^\circ 59' 59''$

x^y	$x > 0$: $-1 \times 10^{100} < y\log x < 100$ $x = 0$: $y > 0$ $x < 0$: $y = n, \frac{m}{2n+1}$ (m、n 为整数) 但是：$-1 \times 10^{100} < y\log \lvert x\rvert < 100$
$\sqrt[x]{y}$	$y > 0$: $x \neq 0, -1 \times 10^{100} < 1/x \log y < 100$ $y = 0$: $x > 0$ $y < 0$: $x = 2n+1, \frac{2n+1}{m}$ ($m \neq 0$; m、n 为整数) 但是：$-1 \times 10^{100} < 1/x \log \lvert y\rvert < 100$
$a^b/_c$	整数、分子和分母的总位数必须等于或小于 10(包括分隔符)。
RanInt#(a, b)	$a < b$; $\lvert a\rvert, \lvert b\rvert < 1 \times 10^{10}$; $b - a < 1 \times 10^{10}$

- 精确度基本上与上面“计算范围和精确度”中的描述相同。
- x^y、$\sqrt[x]{y}$、$\sqrt[3]{}$、$x!$、$n\mathrm{P}r$、$n\mathrm{C}r$ 类型函数需要连续的内部计算，可能会引起每次计算中发生误差累积。
- 误差是累积的，在靠近函数的连点和拐点处可能误差很大。
- 当设置菜单上的输入/输出选择为数学输入/数学输出时，π 格式可以显示的计算结果范围是 $\lvert x\rvert < 10^6$。不过，请注意，内部计算错误可能造成无法以 π 格式显示某些计算结果，还可能造成本来应该以小数格式显示的计算结果却以 π 格式显示。

Reference Sheet

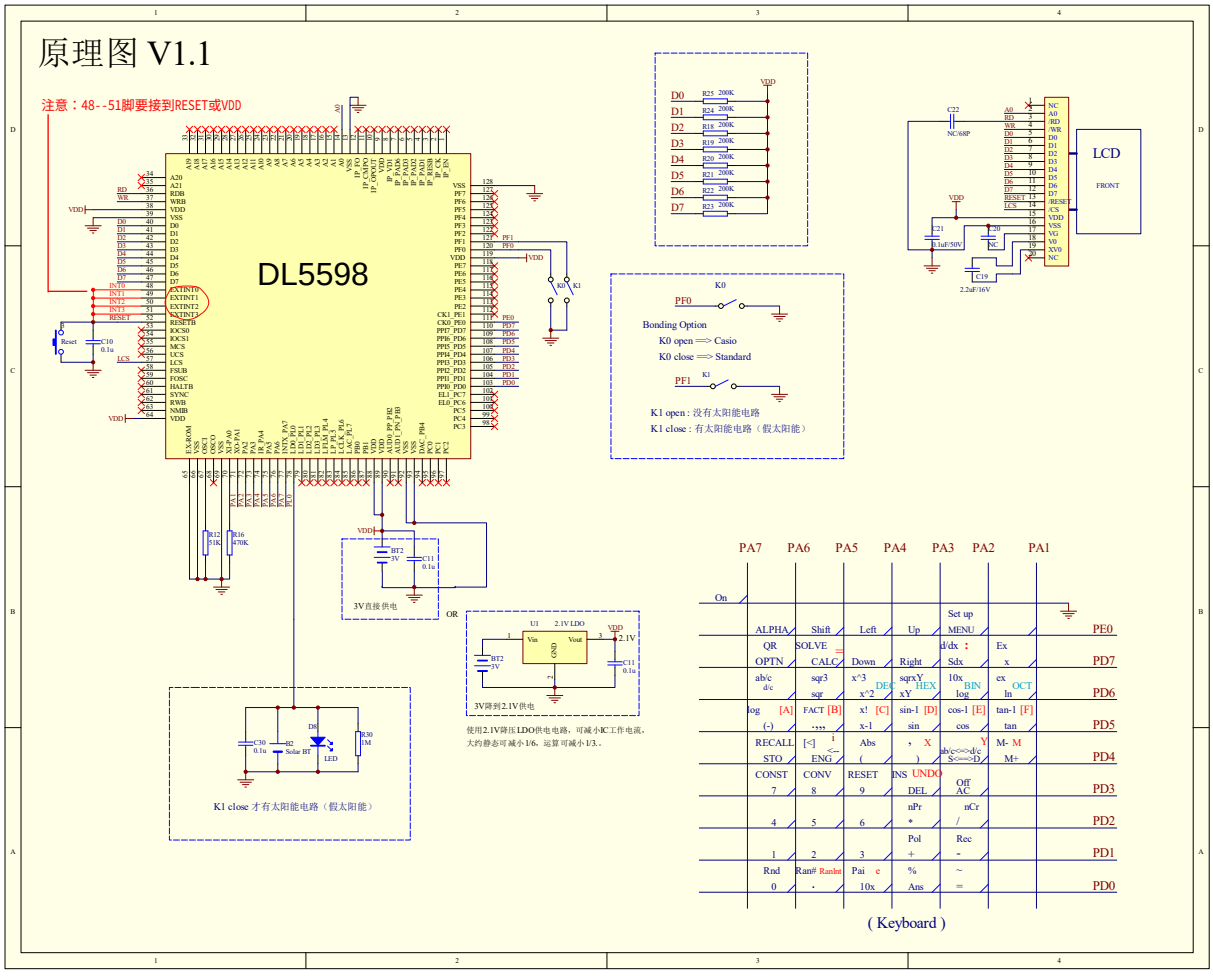
Scientific Constants SHIFT 7 (CONST)

1 (Universal)	1 : h	2 : $\hbar$	3 : c_0
	4 : ε_0	5 : μ_0	6 : Z_0
	7 : G	8 : l_P	9 : t_P
2 (Electromagnetic)	1 : μ_N	2 : μ_B	3 : e
	4 : Φ_0	5 : G_0	6 : K_J
	7 : R_K		
3 (Atomic&Nuclear)	1 : m_p	2 : m_n	3 : m_e
	4 : m_μ	5 : a_0	6 : α
	7 : r_e	8 : λ_C	9 : γ_p
	A : λ_{Cp}	B : λ_{Cn}	C : R_∞
	D : μ_p	E : μ_e	F : μ_n
	M : μ_μ	X : m_τ	
4 (Physico-Chem)	1 : u	2 : F	3 : N_A
	4 : k	5 : V_m	6 : R
	7 : c_1	8 : c_2	9 : σ
▼ 1 (Adopted Values)	1 : g	2 : atm	3 : $R_{K\text{-}90}$
	4 : $K_{J\text{-}90}$		
▼ 2 (Other)	1 : t		

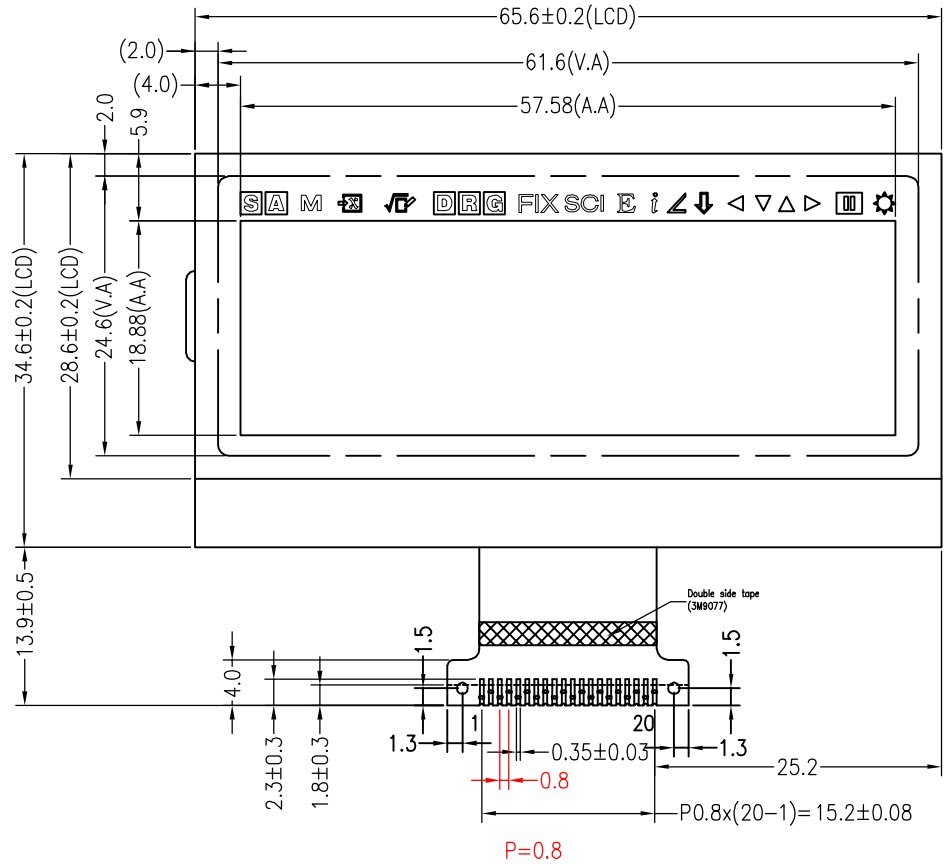
Metric Conversion SHIFT 8 (CONV)

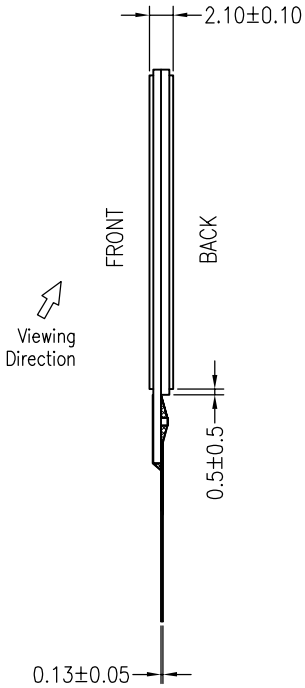
1 (Length)	1 : in►cm	2 : cm►in
	3 : ft►m	4 : m►ft
	5 : yd►m	6 : m►yd
	7 : mile►km	8 : km►mile
	9 : n mile►m	A : m►n mile
	B : pc►km	C : km►pc
2 (Area)	1 : acre►m^2	2 : m^2►acre
3 (Volume)	1 : gal(US)►L	2 : L►gal(US)
	3 : gal(UK)►L	4 : L►gal(UK)
4 (Mass)	1 : oz►g	2 : g►oz
	3 : lb►kg	4 : kg►lb
▼ 1 (Velocity)	1 : km/h►m/s	2 : m/s►km/h
▼ 2 (Pressure)	1 : atm►Pa	2 : Pa►atm
	3 : mmHg►Pa	4 : Pa►mmHg
	5 : kgf/cm^2►Pa	6 : Pa►kgf/cm^2
	7 : lbf/in^2►kPa	8 : kPa►lbf/in^2
▼ 3 (Energy)	1 : kgf・m►J	2 : J►kgf・m
	3 : J►cal	4 : cal►J
▼ 4 (Power)	1 : hp►kW	2 : kW►hp
▼ ▼ 1 (Temperature)	1 : °F►°C	2 : °C►°F

原理图：


原理图 V1.1
注意：48--51脚要接到RESET或VDD
DL5598
LCD
FRONT
Bonding Option
K0 open ==> Casio
K0 close ==> Standard
K1 open : 没有太阳能电路
K1 close : 有太阳能电路（假太阳能）
3V直接供电
OR
3V降到2.1V供电
使用2.1V降压LDO供电电路，可减小IC工作电流，大约静态可减小1/6，运算可减小1/3。
K1 close 才有太阳能电路（假太阳能）
PA7 PA6 PA5 PA4 PA3 PA2 PA1
On
Set up
(Keyboard)

REV 版本	DESCRIPTION 描述	DATE 日期
A00	First issue	May-01-2005



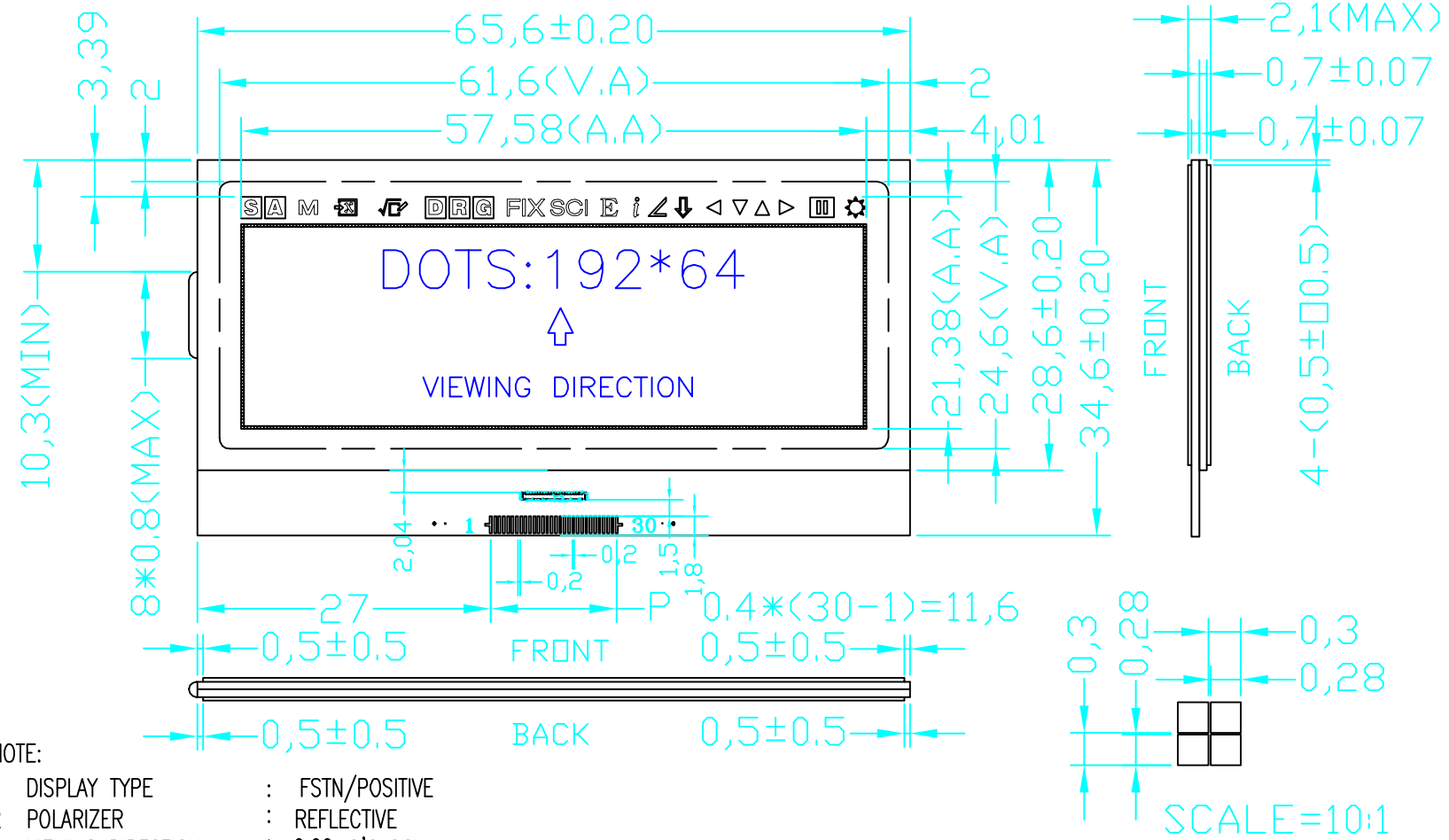


PIN	Explanation
1	NC
2	A0
3	/RD
4	/WR
5	D0
6	D1
7	D2
8	D3
9	D4
10	D5
11	D6
12	D7
13	/RESET
14	/CS
15	VDD
16	VSS
17	VG
18	V0
19	XV0
20	NC

Specification:

1).Driving: Duty: 1/65, Bias: 1/9, VLCD: 8.5V
2). Viewing angle: 6 O'clock
3). Display mode: FSTN/Positive/Reflective
4). Operating temp.: −10°C~+60°C
Storage temp.: −20°C~+70°C
5). IC: ST7525
6). All the raw material are Rohs complicant
7). Dimensions with mark "*" are important,with mark "()" are referenced

SCALE: FIT				
SHEET: 1 OF 1				
GENERAL TOL: ±0.3	UNIT mm			
APPROVALS	DATE	MODEL NUMBER	PROJECTION	PART NO: C/D
APP: APP	APP DATA			
CHK: CHK	CHK DATA			
DWN: DWN	DWN DATA	DO NOT SCALE THIS DRAWING.		



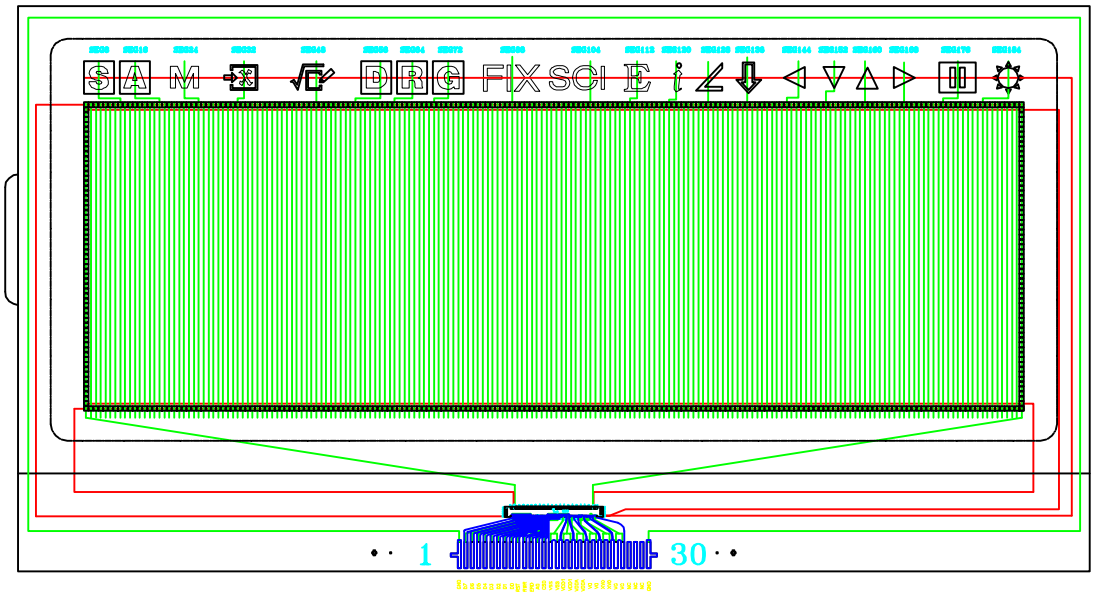
PIN	SYMBOL
1	GND
2	D7
3	D6
4	D5
5	D4
6	D3
7	D2
8	D1
9	D0
10	RST
11	RWR
12	ERD
13	A0
14	CS0
15	VSS
16	VSS
17	VDD1
18	VDD1
19	VDDA
20	VDDA
21	V0
22	V0
23	XV0
24	XV0
25	VG
26	VG
27	NC
28	NC
29	NC
30	GND

NOTE:

1	DISPLAY TYPE	:	FSTN/POSITIVE
2	POLARIZER	:	REFLECTIVE
3	VIEWING DIRECTION	:	6:00 O'CLOCK
4	DRIVE METHOD	:	1/65 DUTY, 1/9 BIAS
5	OPERATING VOLTAGE	:	VDD=3.3V VLCD=8.5 V
6	OPERATING TEMP	:	−20°C TO +70 °C
7	STORAGE TEMP	:	−30°C TO +80 °C
8	CONNECTOR	:	COG (ST7525)
9	UNSIGNED TOLERANCE	:	±0.20
10	CUSTOMER NO.	:	MSGF013451

NO.	REVISION RECORD	NAME	DATE
1	A-B IC版本升级		
2			
3			
4			
5			

UNIT	mm	TITLE	OUTLINE DIMENSIONS	
SCALE	N:1	MODEL	LP19264C1-FR11	
REV	B	DESIGNED	CHECKED	APPROVED
PAGE	1/3			

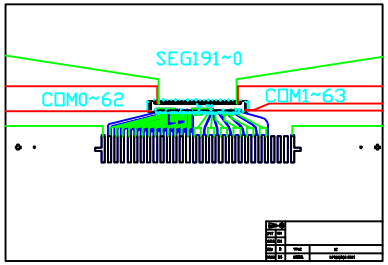


SEG

COM

此图仅供参考逻辑

UNIT	mm		
SCALE	N:1		
REV	B	TITLE	LAYOUT
PAGE	2/3	MODEL	LP19264C1-FR11



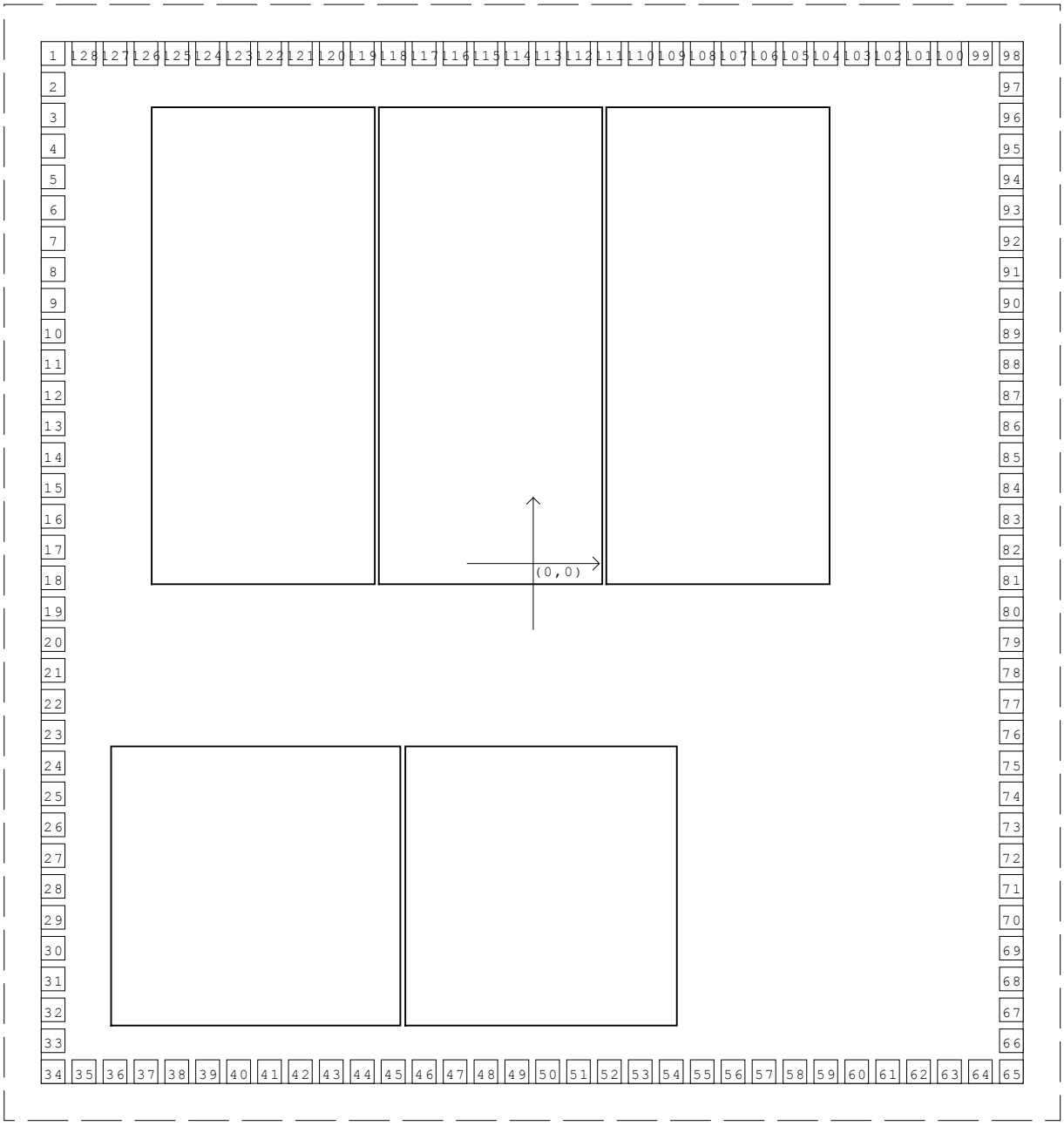
PAD

Pads Assignment:

No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y	No.	Name	X	Y
1	IP_EN	-1674	1782	33	A19	-1674	-1674	65	EX_ROM	1674	-1782	97	PC2	1674	1674
2	IP_CK	-1674	1674	34	A20	-1674	-1782	66	VSS	1674	-1674	98	PC3	1674	1782
3	IP_RESB	-1674	1566	35	A21	-1566	-1782	67	OSCI	1674	-1566	99	PC4	1566	1782
4	IP_PAD1	-1674	1458	36	RDB	-1458	-1782	68	OSCO	1674	-1458	100	PC5	1458	1782
5	IP_PAD2	-1674	1350	37	WRB	-1350	-1782	69	VSS	1674	-1350	101	EL0_PC6	1350	1782
6	IP_PAD3	-1674	1242	38	VDD	-1242	-1782	70	XI_PA0	1674	-1242	102	EL1_PC7	1242	1782
7	IP_PAD6	-1674	1134	39	VSS	-1134	-1782	71	XO_PA1	1674	-1134	103	PPI0_PD0	1134	1782
8	IP_VD1	-1674	1026	40	D0	-1026	-1782	72	PA2	1674	-1026	104	PPI1_PD1	1026	1782
9	VDD	-1674	918	41	D1	-918	-1782	73	PA3	1674	-918	105	PPI2_PD2	918	1782
10	IP_OPOUT	-1674	810	42	D2	-810	-1782	74	IR_PA4	1674	-810	106	PPI3_PD3	810	1782
11	IP_CMPO	-1674	702	43	D3	-702	-1782	75	PA5	1674	-702	107	PPI4_PD4	702	1782
12	IP_FO	-1674	594	44	D4	-594	-1782	76	PA6	1674	-594	108	PPI5_PD5	594	1782
13	VSS	-1674	486	45	D5	-486	-1782	77	INTX_PA7	1674	-486	109	PPI6_PD6	486	1782
14	A0	-1674	378	46	D6	-378	-1782	78	LD0_PL0	1674	-378	110	PPI7_PD7	378	1782
15	A1	-1674	270	47	D7	-270	-1782	79	LD1_PL1	1674	-270	111	CK0_PE0	270	1782
16	A2	-1674	162	48	EXTINT0	-162	-1782	80	LD2_PL2	1674	-162	112	CK1_PE1	162	1782
17	A3	-1674	54	49	EXTINT1	-54	-1782	81	LD3_PL3	1674	-54	113	PE2	54	1782
18	A4	-1674	-54	50	EXTINT2	54	-1782	82	LFLM_PL4	1674	54	114	PE3	-54	1782
19	A5	-1674	-162	51	EXTINT3	162	-1782	83	LP_PL5	1674	162	115	PE4	-162	1782
20	A6	-1674	-270	52	RESETB	270	-1782	84	LCLK_PL6	1674	270	116	PE5	-270	1782
21	A7	-1674	-378	53	IOCS0	378	-1782	85	LAC_PL7	1674	378	117	PE6	-378	1782
22	A8	-1674	-486	54	IOCS1	486	-1782	86	PB0	1674	486	118	PE7	-486	1782
23	A9	-1674	-594	55	MCS	594	-1782	87	PB1	1674	594	119	VDD	-594	1782
24	A10	-1674	-702	56	UCS	702	-1782	88	VDD	1674	702	120	PF0	-702	1782
25	A11	-1674	-810	57	LCS	810	-1782	89	VDD	1674	810	121	PF1	-810	1782
26	A12	-1674	-918	58	FSUB	918	-1782	90	AUD0_PP_PB2	1674	918	122	PF2	-918	1782
27	A13	-1674	-1026	59	FOSC	1026	-1782	91	AUD1_PN_PB3	1674	1026	123	PF3	-1026	1782
28	A14	-1674	-1134	60	HALTB	1134	-1782	92	VSS	1674	1134	124	PF4	-1134	1782
29	A15	-1674	-1242	61	SYNC	1242	-1782	93	VSS	1674	1242	125	PF5	-1242	1782
30	A16	-1674	-1350	62	RWB	1350	-1782	94	DAC_PB4	1674	1350	126	PF6	-1350	1782
31	A17	-1674	-1458	63	NMIB	1458	-1782	95	PC0	1674	1458	127	PF7	-1458	1782
32	A18	-1674	-1566	64	VDD	1566	-1782	96	PC1	1674	1566	128	VSS	-1566	1782

*The IC substrate should be connected to Vss in the PCB layout artwork.

PAD


1 128 127 126 125 124 123 122 121 120 119 118 117 116 115 114 113 112 111 110 109 108 107 106 105 104 103 102 101 100 99 98
2 97
3 96
4 95
5 94
6 93
7 92
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9 90
10 89
11 88
12 87
13 86
14 85
15 84
16 83
17 82
18 81
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28 71
29 70
30 69
31 68
32 67
33 66
34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
(0,0)