

# IZ1278U

## 10/12-DIGIT SELECTABLE DESK TOP CALCULATOR

The IZ1278 is a single chip CMOS LSI with 10-digit or 12-digit arithmetic operation, 2-memory, extraction-of-square-root, percentage, MU calculation and auto power off function, designed for FEM LCD operation with a 1.5V power supply.

### FUNCTIONS

- 10/12 digits selectable display by diode option
- Four standard functions (+, -, ×, ÷)
- Memory, GT (grand total) memory calculations
- Auto-percentage calculations (add on, discount)
- Constant calculations
- Square root calculations
- Chain calculations
- MU calculations
- Power calculations
- Rough estimate calculations
- Change sign

### FEATURES

- Single chip CMOS construction
- Floating point or memory mode (sw selectable)
- Fixed point (0,2,3,4) and adding point mode
- Rounding switches (rounding up, down and off)
- Leading and trailing zero suppression
- Punctuation comma display for thousands
- LCD direct drive
- Over flow indication: "E"
- On-chip key board debouncing and encoding
- Wide supply voltage range (1.2V ~ 2.0V)
- Very low power consumption (7μW TYP)
- PKG type: 64 QFP and bare chip available
- Symbols: GT, M, -, E, K, +, -, ×, ÷

### ABSOLUTE MAXIMUM RATINGS ( T<sub>a</sub> = 25°C )

Characteristic	Symbol	Value	Unit
Terminal Voltage	V <sub>DD</sub>	- 0.3 ~ + 2.0	V
	V <sub>IN</sub>	- 0.3 ~ V <sub>DD</sub> + 0.3	V
Operating Temperature	T <sub>a</sub>	0 ~ + 40	°C
Storage Temperature	T <sub>stg</sub>	- 55 ~ + 125	°C

### ELECTRICAL CHARACTERISTICS ( T<sub>a</sub> = 25°C, V<sub>DD</sub> = 1.5V, V<sub>SS</sub> = 0V unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
High Input Voltage(K3~K10) (K11~K12)	V <sub>IH</sub>		V <sub>DD</sub> - 0.4		V <sub>DD</sub>	V
	V <sub>IH</sub>		V <sub>CC</sub> - 0.4		V <sub>CC</sub>	
Low Input Voltage (K1) (K3~K12)	V <sub>IL</sub>		V <sub>SS</sub>		0.4	V
High Output Voltage(K1~K8)	V <sub>OH</sub>		V <sub>DD</sub> - 0.2		V <sub>DD</sub>	V
Low Output Voltage(K1~K8)	V <sub>OL</sub>		V <sub>SS</sub>		0.2	V
Key Pull Down Resistor (K1 ~ K10)	R <sub>pd1</sub>	V <sub>out</sub> = 0.3V	0.5	1	1.5	KΩ
	R <sub>pd2</sub>		10	17	28	
Key Pull Up Resistor (K1 ~ K10) (K11 ~ K12)	R <sub>pu1</sub>	V <sub>out</sub> = 1.2V	145	170	195	KΩ
	R <sub>pu2</sub>		0.6	1.2	1.9	
	R <sub>pu3</sub>	V <sub>out</sub> = 2.7V	250	400	550	
High Output Voltage (LCD, COM)	V <sub>OH</sub>		V <sub>CC</sub> - 0.2		V <sub>CC</sub>	V
"M" Output Voltage (LCD, COM)	V <sub>OM</sub>		V <sub>DD</sub> - 0.2		V <sub>DD</sub>	V
Low Output Voltage (LCD, COM)	V <sub>OL</sub>		V <sub>SS</sub>		0.2	V

# IZ1278U

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
COM)						
OSC Frequency	F <sub>dis</sub>	Stand-by	5.4	9.0	12.6	KHz
	F <sub>opr</sub>	Operating	28.8	48	67.2	
Frame Frequency	F <sub>f</sub>	Stand-by	56.3	93.8	131	Hz
Operating Voltage	V <sub>DD</sub>		1.2	1.5	2.0	V
Supply Current	I <sub>OFF</sub>	Display is off			1	μA
	I <sub>DIS</sub>	Display is on		4.4	6.5	
	I <sub>OP</sub>	Operating		7.0	15	

## FUNCTIONAL DESCRIPTION

Zero is displayed at first-digit and "E" sign is indicated at symbol.

### Decimal point system

Floating point for momentary mode by TAB Selection.

**Integral number** : 10/12 digits leading zero suppression. Zero shift.

**Symbols**

- M** : memory display
- E** : error display
- : negative number display
- GT** : negative number display
- +, -, ×, ÷ : for rules operator
- K** : constant

**Error detections** (Parenthesis is in case of 10 digits)

#### • System errors occur when:

- 1) The division by zero.
- 2) The integral part of any memory calculation result exceeds 12(10) digits.
- 3) The integral part of GT memory contents exceeds 12 (10) digits.

#### • Rough estimate calculation error

The integral part of any calculation-four standard functions, percentage, square or power calculations result exceeds 12 digits (10 digits).

### Error indication

#### • System error

#### • Rough estimate calculation error

The high-order 12 digits (10 digits) of any calculation result is indicated together with "E" sign, and the decimal point is displayed at the position corresponding to 10<sup>-12</sup> (10<sup>-10</sup>) of the calculation result also no zero shift is performed.

### Error release

#### • System error

Released by AC, C, CE key.

#### • Rough estimate calculation error

AC, C key can release a rough estimate calculation error and can clear calculation result at once, also CE key can just only release error flag 'E' at first time and can clear calculation result at second time.

### Number entry

Numericals can be entered up to 12 digits (10 digits).

Numericals more than 13 digits (11 digits) are ignored.

### Memory protection

Under any error detection, the memory data before error detection are protected.

### Memory indication

If the memory data is not zero, "M" is indicated at symbol position.

### AUTO POWER OFF

Power turns off after about 5 minutes pass from the last key pressure.

## SELECTION MODE SWITCH FUNCTION

10-digits/12-digits mode depends on K11 pin, please refer to application circuit.

Fixed/floating decimal point mode and ADD<sub>2</sub> mode are selection by rounding switch.

The rounding switch should be so composed that either one '4, 3, 2, 0, ADD<sub>2</sub>' is selected.

### Fix 'F' mode

When TAB 'F' is selected, both entered numbers and calculation results follow to floating decimal point system.

### DP I = 0, 2, 3, 4 mode

The calculation results follow to fixed decimal point system and I+1 decimal place is counted by TAB 'CUT', TAB 'UP', TAB '5/4'.

### Fix 'CUT' mode

The number of **i +1** decimal position is counted as cutting away.

### Fix 'UP' mode

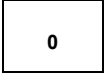

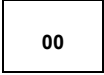

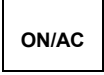
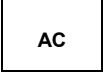
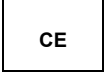


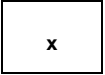
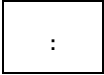
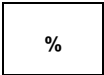
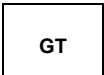
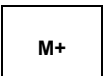
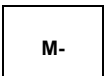
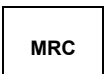
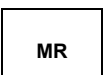
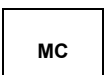
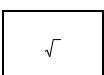
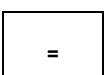
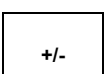
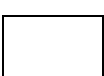
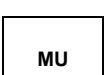
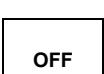
The number of **i** decimal position is counted as added to '1'.

### Fix '5/4' mode

When '+' and '-' operations are performed after a number except decimal point is entered. The calculation is executed as 1/100 value of number being entered.

# IZ1278U

## KEY DESCRIPTION

	~			<b>Numerals input key</b>
				<b>Decimal point key</b>
				<b>Clear key</b>
				<b>Four standard function key</b>
				<b>Percent key</b>
				<b>Grand total memory key</b>
				<b>Memory add and memory subtract key</b>
				<b>Recall and clear memory</b>
				<b>Recall memory, clear memory</b>
				<b>Extraction of square root key</b>
				<b>Enter key</b>
				<b>Sign change key</b>
				<b>Shift Right key</b>
				<b>Mark-up and mark-down key</b>
				<b>Power off key</b>

ON/AC: Power ON/All clear (system rest)

C: All except memory contents

CE: Entry clear such as only the entered data is cleared

\* Recall the data in GT

GT flag is released by AC or C key

\* When = key is pressed, the result of calculator is added to GT memory automatically