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_a = 25°C)

Characteristic	Symbol	Value	Unit
Terminal Voltage	V_{DD}	- 0.3 ~ + 2.0	V
	V_{IN}	- 0.3 ~ V_{DD} + 0.3	V
Operating Temperature	T_a	0 ~ + 40	°C
Storage Temperature	T_{stg}	- 55 ~ + 125	°C

ELECTRICAL CHARACTERISTICS (T_a = 25°C, V_{DD} = 1.5V, V_{SS} = 0V unless otherwise specified)

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

INTEGRAL

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
COM)						
OSC Frequency	F_{dis}	Stand-by	5.4	9.0	12.6	KHz
	F_{opr}	Operating	28.8	48	67.2	
Frame Frequency	F_f	Stand-by	56.3	93.8	131	Hz
Operating Voltage	V_{DD}		1.2	1.5	2.0	V
Supply Current	I_{OFF}	Display is off			1	μA
	I_{DIS}	Display is on		4.4	6.5	
	I_{OP}	Operating		7.0	15	

FUNCTIONAL DESCRIPTION

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**

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

- **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^{-12} (10^{-10}) 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 then 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_2 mode are selection by rounding switch.

The rounding switch should be so composed that either one ‘ 4, 3, 2, 0, ADD_2 ‘ 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.

KEY DESCRIPTION

	0 ~ 9		00	Numerals input key
			.	Decimal point key
	ON/AC	AC	CE	Clear key
+	-	x	:	Four standard function key
			%	Percent key
			GT	Grand total memory key
		M+	M-	Memory add and memory subtract key
			MRC	Recall and clear memory
		MR	MC	Recall memory, clear memory
			√	Extraction of square root key
			=	Enter key
			+/-	Sign change key
				Shift Right key
			MU	Mark-up and mark-down key
			OFF	Power off key

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