

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

T 6 F 1 8, J T 6 F 1 8 - A S

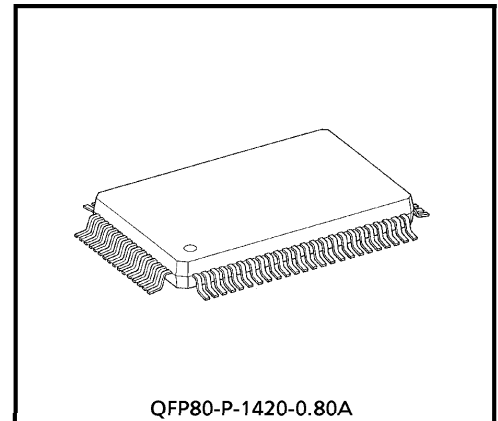
T6F18, JT6F18-AS CMOS SINGLE-CHIP LSI FOR LCD CALCULATOR

The T6F18, JT6F18-AS is a CMOS single chip microcomputer for 12-digit capacity 1-memory calculation.

T6F18, JT6F18-AS is the complete single-chip CMOS LSI for calculator with single power supply operation.

Wide operating voltage range and low power consumption make it suitable for 1.5-V solar battery operated.

Besides T6F18, JT6F18-AS can selectable with a pin-programmable to function of Power timer and Memory hold. With the following features.



QFP80-P-1420-0.80A

Weight : 1.52g (Typ.)

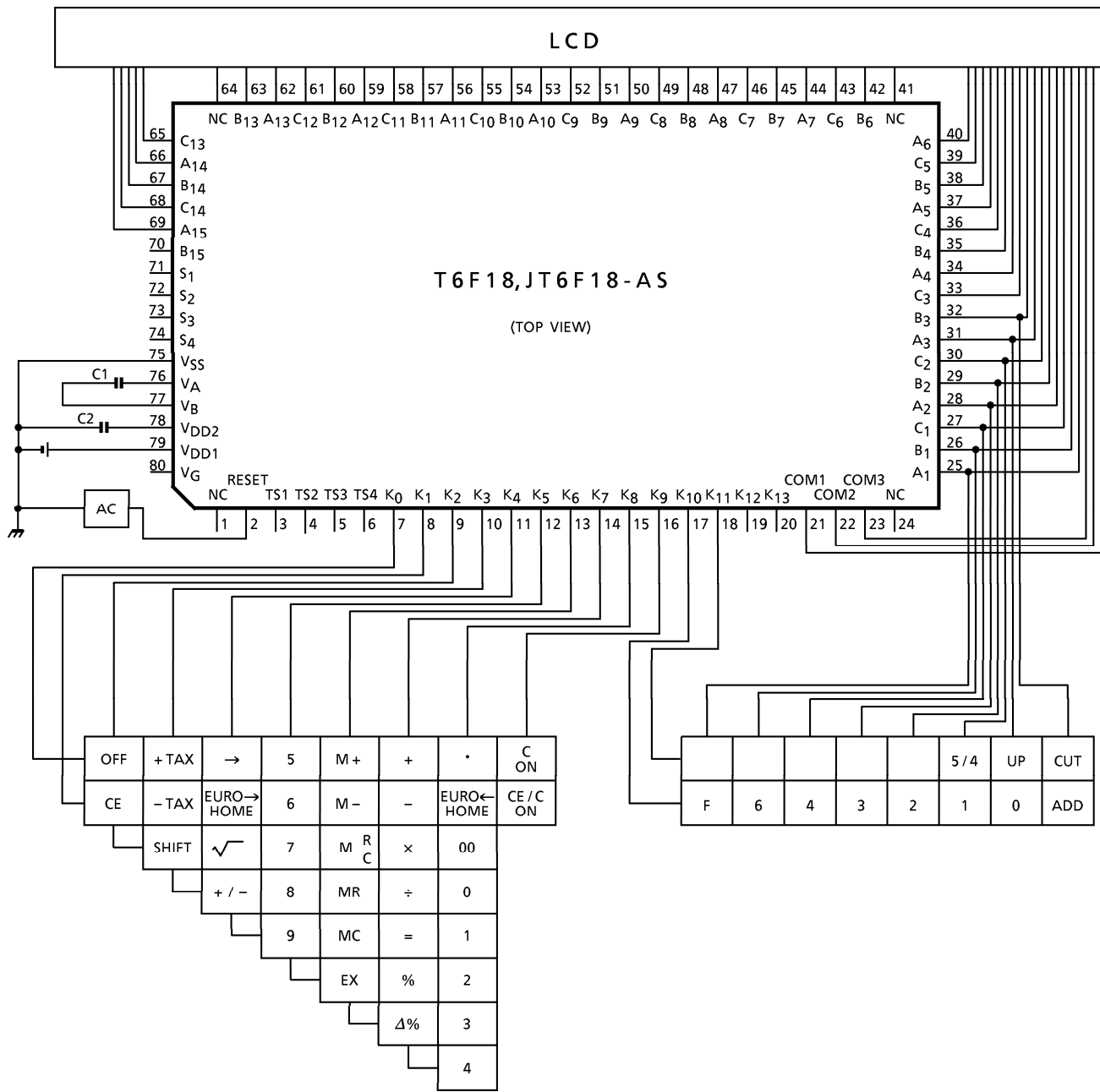
FEATURES

- Display : 12-digits (selectable with a pin-programmable) of data, 2-digits of sign, error symbol, memory load symbol.
- Algebraic mode.
- Standard 4 functions (+, -, ×, ÷)
- Rate conversion calculation
- Automatic percentage operation with add-on, discount.
- Automatic delta percentage, mark-up and markdown operations.
- Square root.
- Constant calculation.
- Chain calculation.
- Change sign.
- Floating point or momentary mode (selectable with a switch).

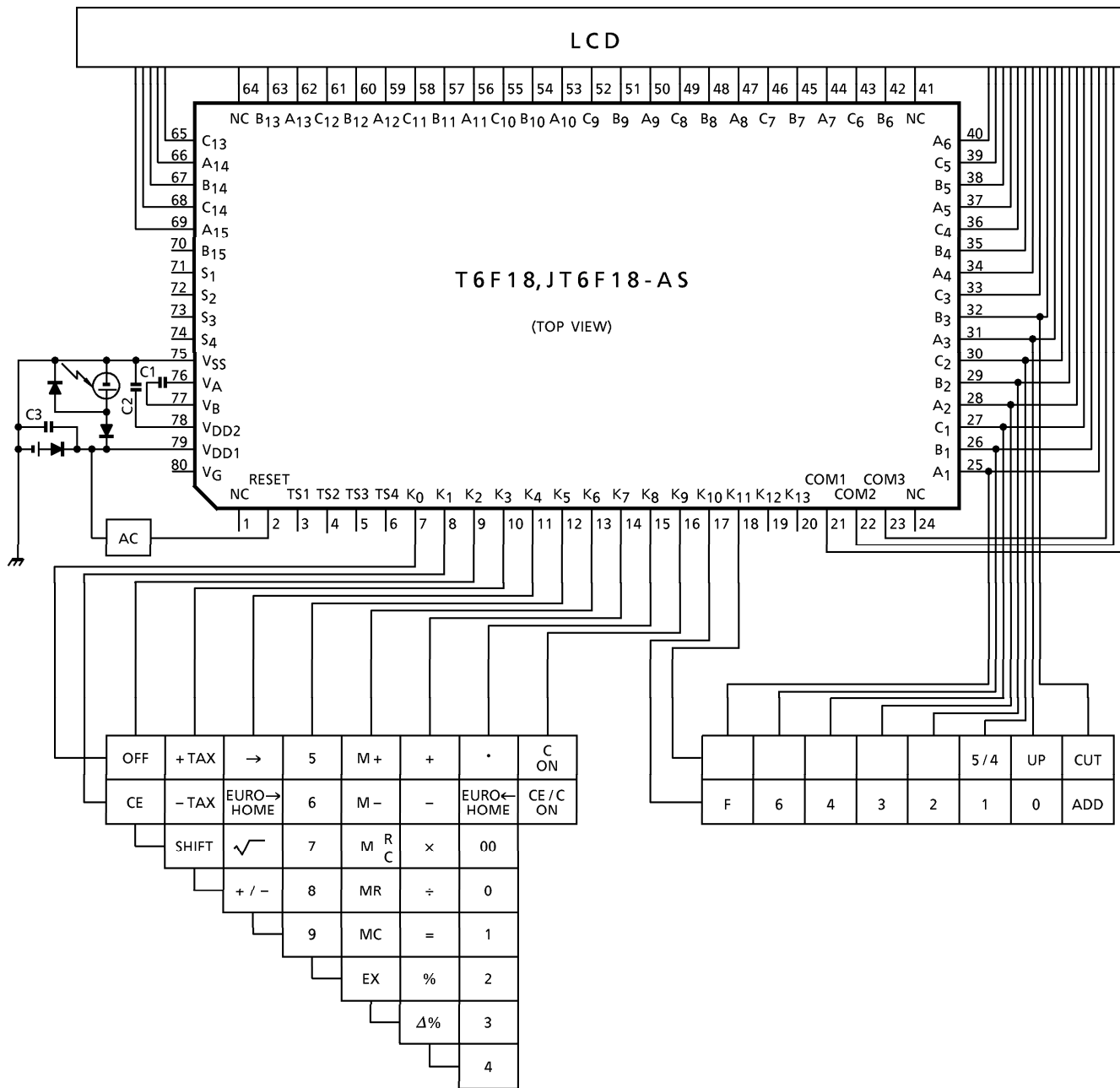
- Fixed point ("0", "1", "2", "3", "4" or "6" places) or floating point (selectable with a switch).
- Adding point mode (selectable with a switch).
- Rounding switches (rounding up, down and off).
- Leading zero suppression.
- Trailing zero suppression.
- Punctuation on display, commas for thousands.
- Memory contents indicator, turned on with non-zero in the memory.
- Registration overflow, indicating that too many digits are entered (the most significant digit are protected).
- Result overflow, indicating during calculation (most function key are locked as it happened).
- Memory overflow indicating to flashing of memory load mark.
- Key roll over function.
- Floating minus.

SYSTEM BLOCK DIAGRAM

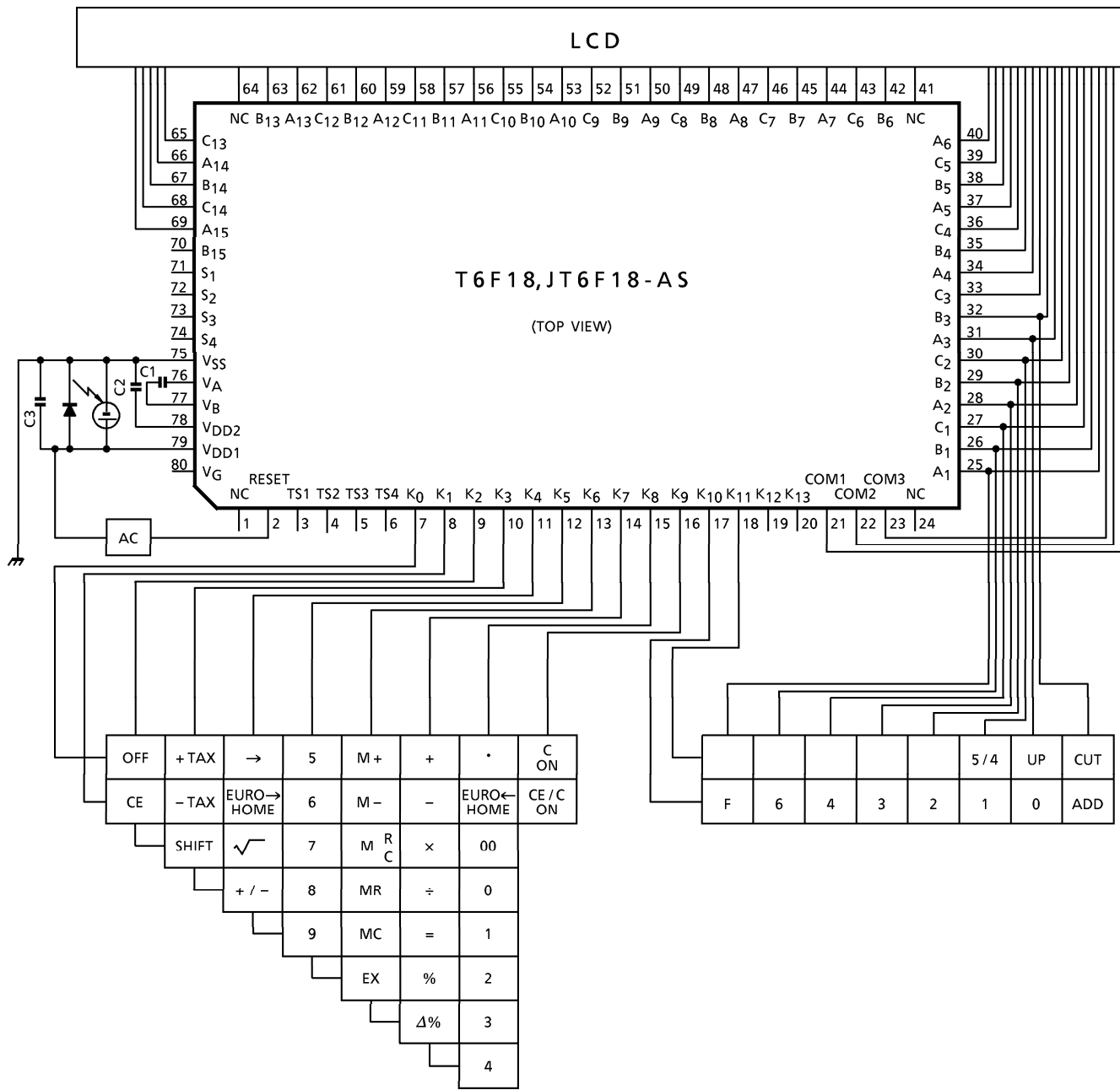
Battery Type



Dual Type

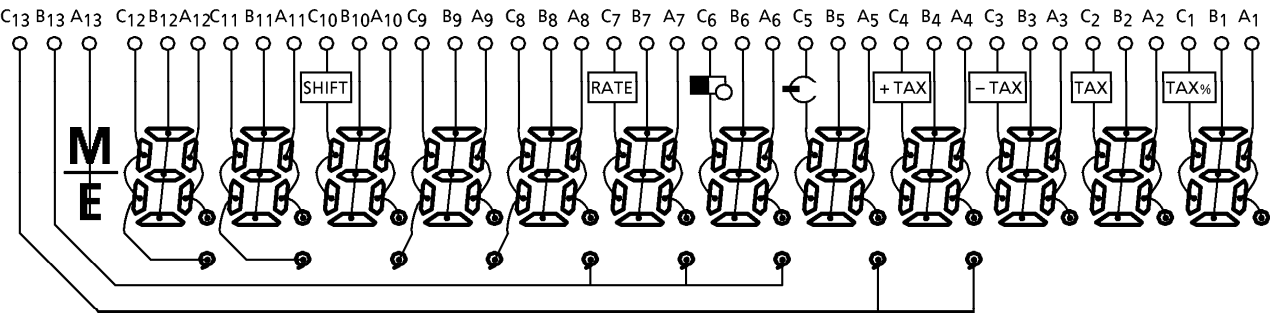


Solar Type

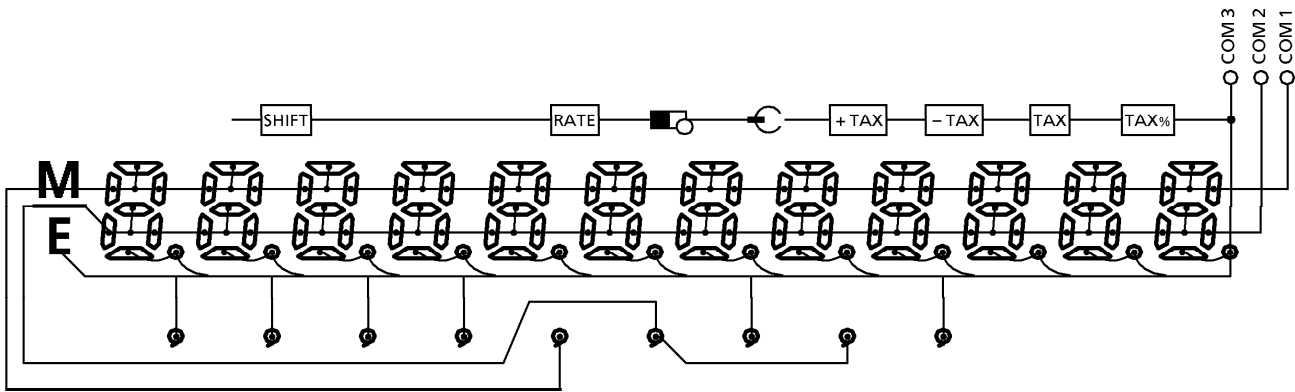


CONNECTION OF LCD

SEGMENT

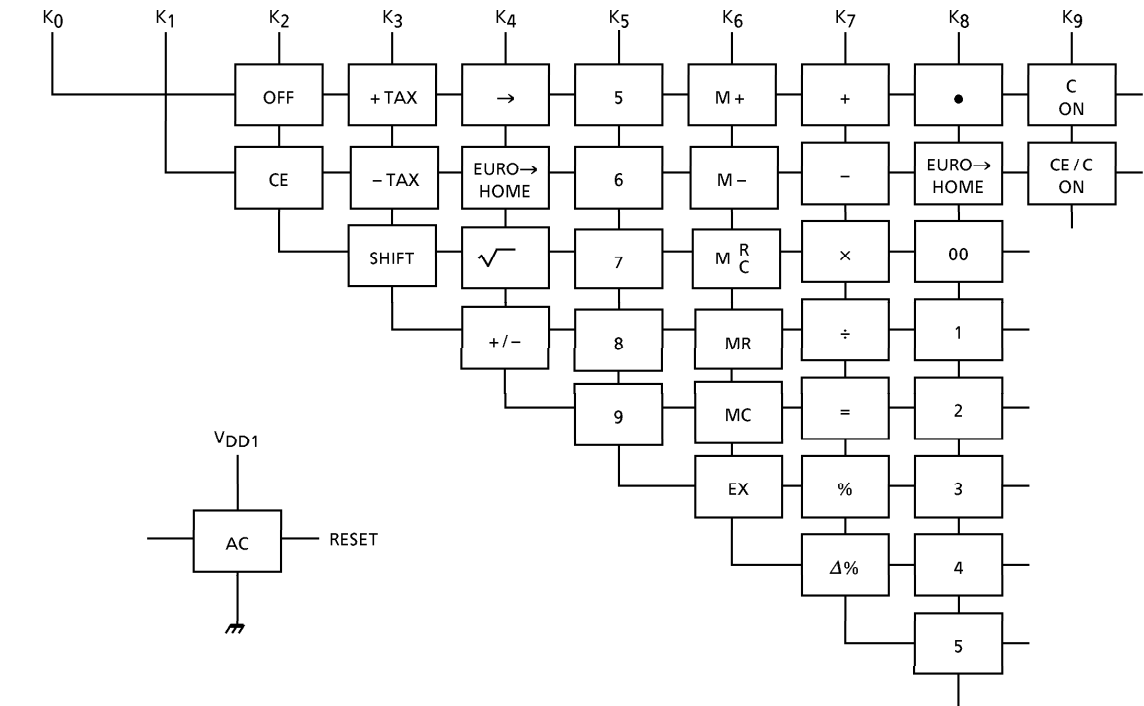


COMMON

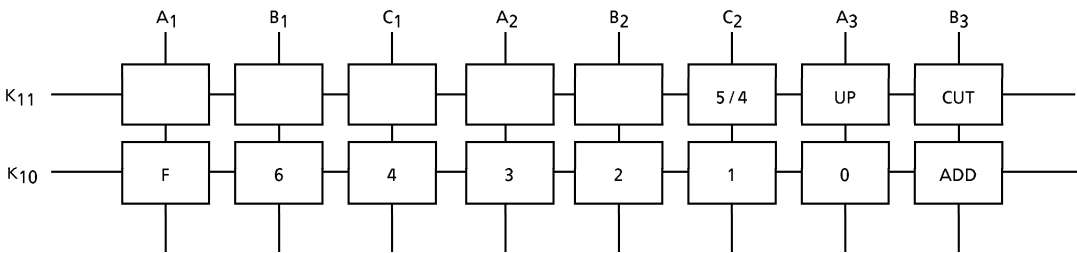


KEY CONNECTION

- Touch Key



- Lock Key



K11 ... Rounding switches.
K10 ... Selectable with Fixed point or Floating mode.

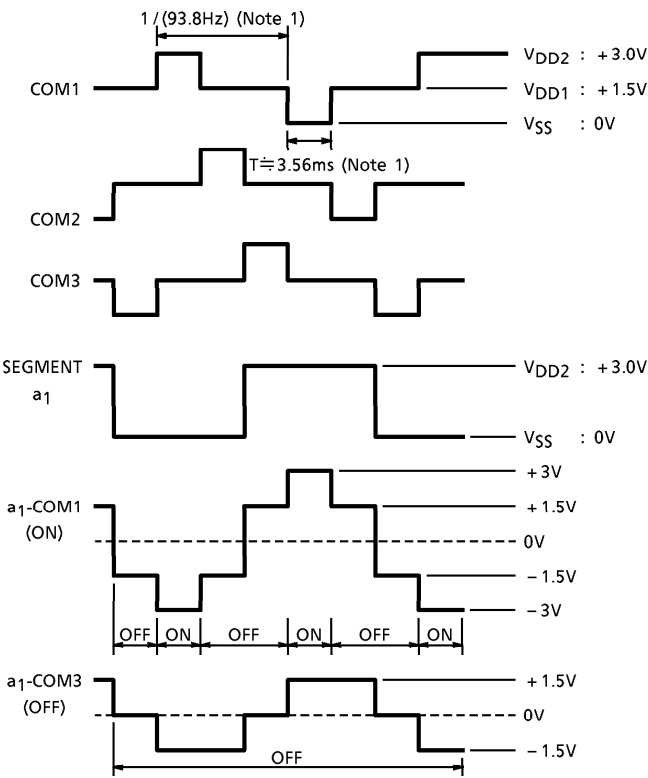
MAXIMUM RATINGS

CHARACTERISTICS	SYMBOL	RATING	UNIT
Supply Voltage	V_{DD1}	$-0.3 \sim 2.0$	V
Input Voltage	V_{IN}	$-0.3 \sim V_{DD1} + 0.3$	V
Operating Temperature	T_{opr}	$0 \sim 40$	°C
Storage Temperature	T_{stg}	$-55 \sim 125$	°C

ELECTRICAL CHARACTERISTICS ($V_{DD1} = 1.5 \pm 0.2V$, $V_{DD2} = 3.0 \pm 0.4V$, $V_{SS} = 0V$, $T_a = 25^\circ C$)

CHARACTERISTICS	SYMBOL	TEST CIR- CUIT	PIN NAME	TEST CONDITION	MIN	TYP.	MAX	UNIT
Operating Voltage	V_{DD1}	—	—	—	1.2	1.5	2.0	V
"1" Input Voltage	$V_{IH} (1)$	—	$K_2 \sim K_9$ RESET	—	$V_{DD1} - 0.4$	—	V_{DD1}	V
"1" Input Voltage	$V_{IH} (2)$	—	$K_{10} \sim K_{13}$	—	$V_{DD2} - 0.4$	—	V_{DD2}	V
"0" Input Voltage	V_{IL}	—	$K_2 \sim K_{13}$ RESET	—	0	—	0.4	V
"1" Output Voltage	$V_{OH} (1)$	—	SEGMENT COM1~3	—	$V_{DD2} - 0.2$	—	V_{DD2}	V
"0" Output Voltage	$V_{OL} (1)$	—	SEGMENT COM1~3	—	0	—	0.2	V
"M" Output Voltage	V_{OM}	—	COM1~3	—	$V_{DD1} - 0.2$	—	$V_{DD1} + 0.2$	V
"1" Output Voltage	$V_{OH} (2)$	—	$K_1 \sim K_9$	—	$V_{DD1} - 0.2$	—	V_{DD1}	V
"0" Output Voltage	$V_{OL} (2)$	—	$K_1 \sim K_{13}$	—	0	—	0.2	V
"1" Output Resistance	R_{OH}	—	SEGMENT COM1~3	$V_{OUT} = V_{DD2} - 0.5V$	—	—	70	k Ω
"0" Output Resistance	R_{OL}	—	SEGMENT COM1~3	$V_{OUT} = 0.5V$	—	—	70	k Ω
KEY Pull Up Resistance	$R_{KEYH} (1)$	—	RESET	$V_{OUT} = V_{DD1} - 0.5V$	—	—	25	k Ω
	$R_{KEYH} (2)$	—	$K_0 \sim K_9$	$V_{OUT} = V_{DD1} - 0.5V$	—	—	14	k Ω
	$R_{KEYH} (3)$	—	$K_{10} \sim K_{13}$	$V_{OUT} = 0V$	120	—	800	k Ω
KEY Pull Down Resistance	$R_{KEYL} (1)$	—	RESET (1)	$V_{OUT} = V_{DD1}$	100	—	300	k Ω
	$R_{KEYL} (2)$	—	RESET (2)	$V_{OUT} = V_{DD1}$	18	—	300	k Ω
	$R_{KEYL} (3)$	—	$K_0 \sim K_9 (1)$	$V_{OUT} = 0.5V$	—	—	50	k Ω
	$R_{KEYL} (4)$	—	$K_0 \sim K_9 (2)$	$V_{OUT} = V_{DD1}$	72	—	170	k Ω
Oscillating (WAIT)	$f_{\phi} WAIT$	—	—	$V_{DD1} = 1.5V$	5.4	9.0	15.5	kHz
Frequency (OPERATE)	$f_{\phi} OP$	—	—	$V_{DD1} = 1.5V$	20.0	34	61.3	kHz
Frame Frequency	f_F	—	SEGMENT COM1~3	$V_{DD1} = 1.5V$	56.3	93.8	161.5	Hz
Supply Current	1 (WAIT)	I_{DDWAIT}	—	$V_{DD1} = 1.5V$	—	—	3.3	μA
	2 (OPERATE)	I_{DDOP}	—	$V_{DD1} = 1.2V$	—	—	8.9	μA
	3 (OFF)	I_{DDOFF}	—	$V_{DD1} = 1.5V$	—	—	2.0	μA
Power Off Timer Times	T	—	—	$V_{DD1} = 1.5V$	429	600	1001	s

WAVEFORMS FOR DISPLAY



(Note 1) at $f_{\phi} = 9\text{kHz}$

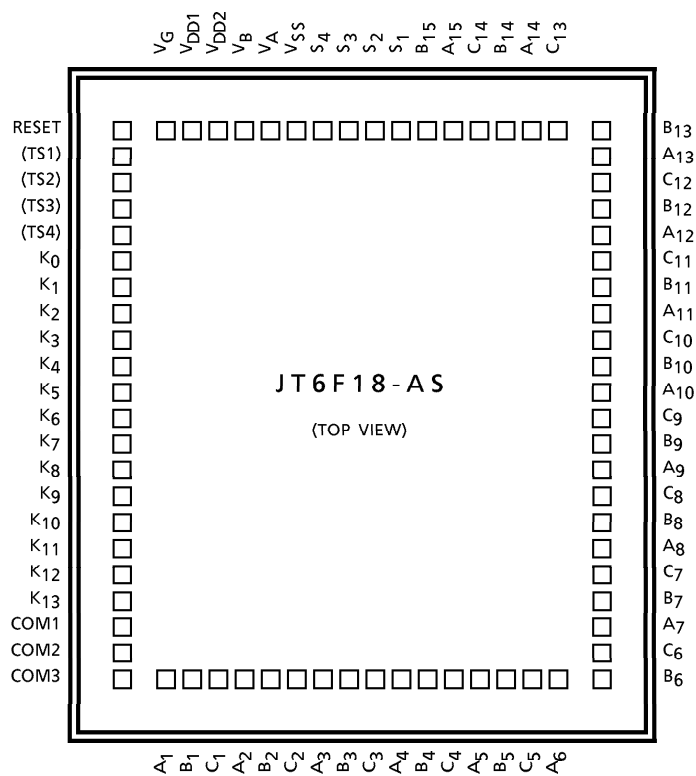
PAD LOCATION TABLE

(μm)

NAME	X POINT	X POINT	NAME	X POINT	X POINT
COM3	- 1757	- 1680	B ₁₃	1757	1680
COM2	- 1757	- 1520	A ₁₃	1757	1520
COM1	- 1757	- 1360	C ₁₂	1757	1360
K ₁₃	- 1757	- 1200	B ₁₂	1757	1200
K ₁₂	- 1757	- 1040	A ₁₂	1757	1040
K ₁₁	- 1757	- 880	C ₁₁	1757	880
K ₁₀	- 1757	- 720	B ₁₁	1757	720
K ₉	- 1757	- 560	A ₁₁	1757	560
K ₈	- 1757	- 400	C ₁₀	1757	400
K ₇	- 1757	- 240	B ₁₀	1757	240
K ₆	- 1757	- 80	A ₁₀	1757	80
K ₅	- 1757	80	C ₉	1757	- 80
K ₄	- 1757	240	B ₉	1757	- 240
K ₃	- 1757	400	A ₉	1757	- 400
K ₂	- 1757	560	C ₈	1757	- 560
K ₁	- 1757	720	B ₈	1757	- 720
K ₀	- 1757	880	A ₈	1757	- 880
(TS4)	- 1757	1040	C ₇	1757	- 1040
(TS3)	- 1757	1200	B ₇	1757	- 1200
(TS2)	- 1757	1360	A ₇	1757	- 1360
(TS1)	- 1757	1520	C ₆	1757	- 1520
RESET	- 1757	1680	B ₆	1757	- 1680
V _G	- 1388	1753	A ₆	1278	- 1752
V _{DD1}	- 1151	1753	C ₅	1118	- 1752
V _{DD2}	- 991	1753	B ₅	958	- 1752
V _B	- 831	1753	A ₅	798	- 1752
V _A	- 671	1753	C ₄	638	- 1752
V _{SS}	- 511	1753	B ₄	478	- 1752
S ₄	- 351	1753	A ₄	318	- 1752
S ₃	- 191	1753	C ₃	158	- 1752
S ₂	- 31	1753	B ₃	- 2	- 1752
S ₁	129	1753	A ₃	- 162	- 1752
B ₁₅	289	1753	C ₂	- 322	- 1752
A ₁₅	449	1753	B ₂	- 482	- 1752
C ₁₄	609	1753	C ₂	- 642	- 1752
B ₁₄	769	1753	C ₁	- 802	- 1752
A ₁₄	929	1753	B ₁	- 962	- 1752
C ₁₃	1089	1753	A ₁	- 1122	- 1752

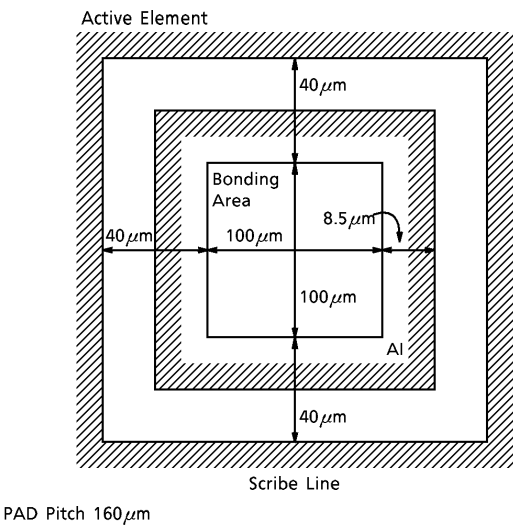
(Note): () Do not connect.

CHIP LAYOUT



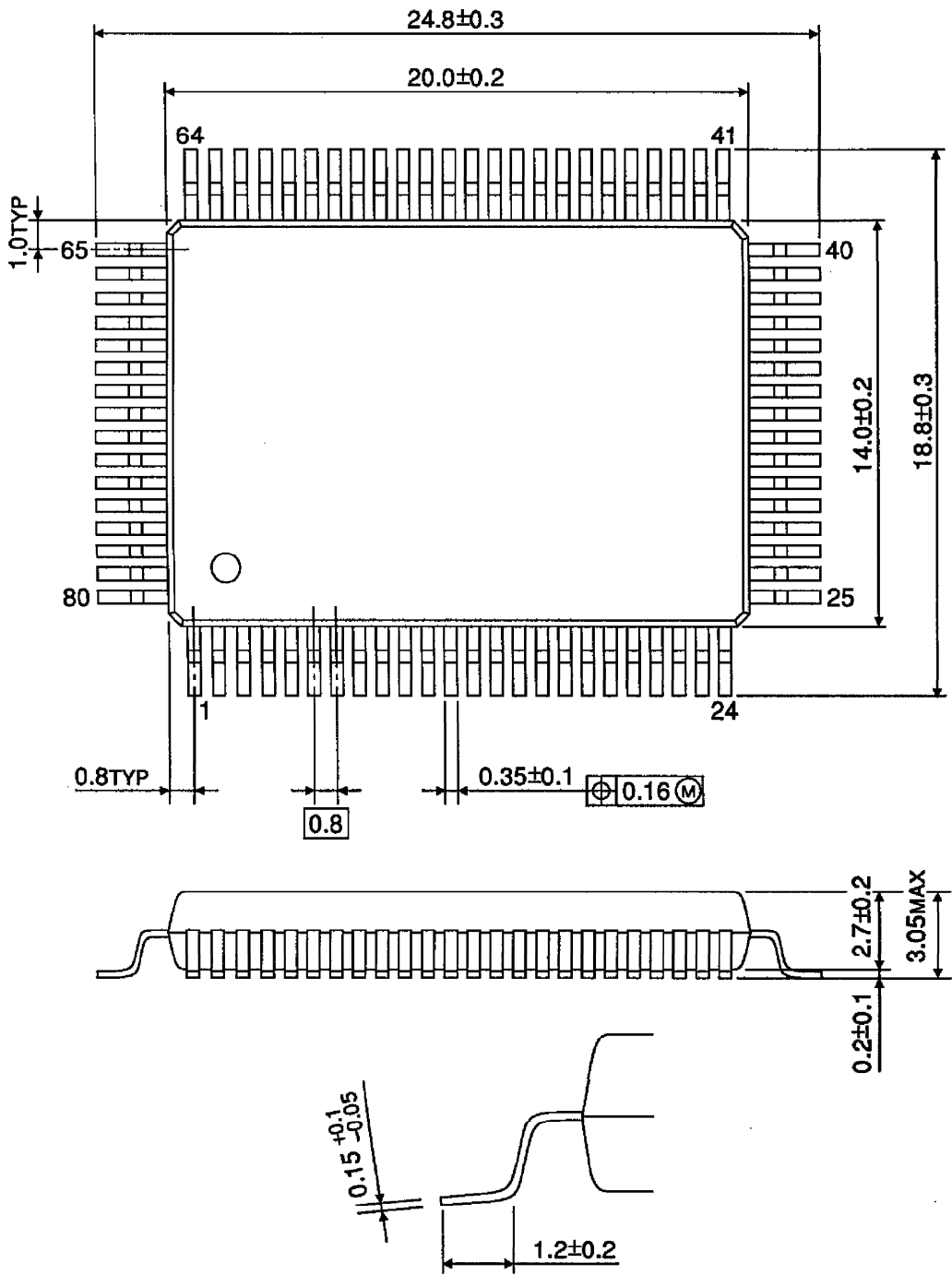
Chip size : 3.79×3.84 (mm)
Chip thickness : 440±30 (μm)
Substrate : V_{SS}

PAD LAYOUT



PACKAGE DIMENSIONS
QFP80-P-1420-0.80A

Unit : mm



Weight : 1.52g (Typ.)

RESTRICTIONS ON PRODUCT USE

000707EBA

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