■ OPERATING PRINCIPLES & METHODS

Control and Display Command

Command	RS	R/W	DB_7	DB_6	DB_5	DB_4	DB_3	DB_2	DB_1	DB_0	Execution Time (f_{osc} = 250kHz)	Remark
DISPLAY CLEAR	L	L	L	L	L	L	L	L	L	H	1.64ms	
RETURN HOME	L	L	L	L	L	L	L	L	H	X	1.64ms	Cursor move to first digit
ENTRY MODE SET	L	L	L	L	L	L	L	H	I/D	SH	42µs	• I/D : Set cursor move direction I/D: H = Increase; L = Decrease • SH : Specifies shift of display SH: H = Display is shifted; L = Display is not shifted
DISPLAY ON/OFF	L	L	L	L	L	L	H	D	C	B	42µs	• Display D: H = Display on; L = Display off • Cursor C: H = Cursor on; L = Cursor off • Blinking B: H = Blinking on; L = Blinking off
SHIFT	L	L	L	L	L	H	S/C	R/L	X	X	42µs	S/C: H = Display shift; L = Cursor move R/L: H = Right shift; L = Left shift
SET FUNCTION	L	L	L	L	H	DL	N	F	X	X	42µs	DL: H = 8 bits interface; L = 4 bits interface N: H = 2 line display; L = 1 line display F: H = 5 X 10 dots; L = 5 X 7 dots
SET CG RAM ADDRESS	L	L	L	H	CG RAM address (corresponds to cursor address)						42µs	CG RAM Data is sent and received after this setting
SET DD RAM ADDRESS	L	L	H	DD RAM address							42µs	DD RAM Data is sent and received after this setting
READ BUSY FLAG & ADDRESS	L	H	BF	Address Counter used for both DD & CG RAM address							0µs	BF: H = Busy; L = Ready – Reads BF indication internal operating is being performed – Reads address counter contents
WRITE DATA	H	L	Write Data								46µs	Write data into DD or CG RAM
READ DATA	H	H	Read Data								46µs	Read data from DD or CG RAM

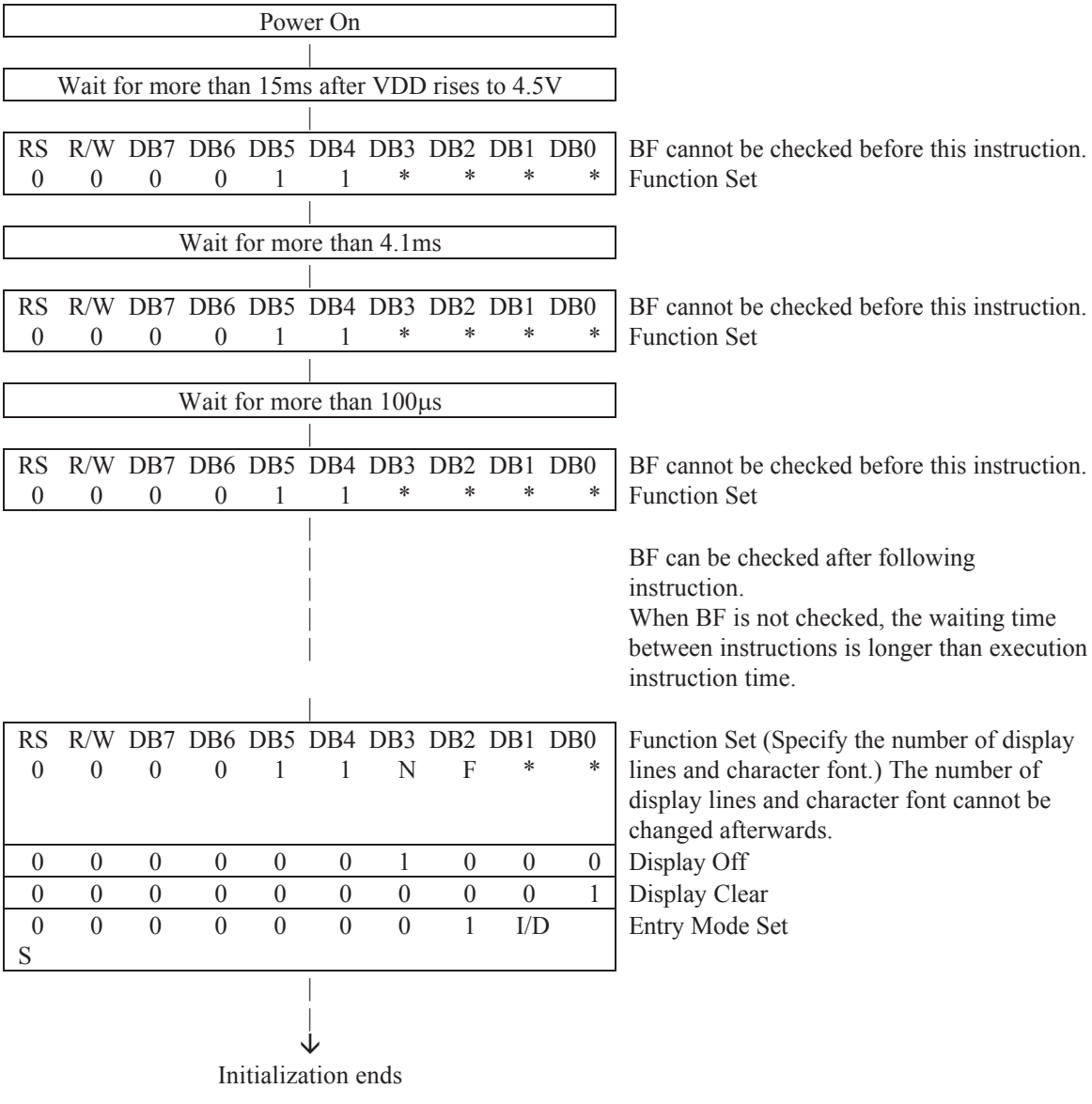
X : Don't care

Initializing by Internal Reset Circuit

The KS0070B automatically initializes (resets) when the power is on using the internal reset circuit. The following instruction are executed in initialization. The busy flag is kept in busy state (BF=1) until initialization ends. The busy state is 10ms after VDD rises to 4.5V.

(1) Display Clear
(2) Function Set
DL = 1 : 8-bit interface data
N = 0 : 1-line display
F = 0 : 5x7-dot character font
(3) Display On/Off Control
D = 0 : Display Off
C = 0 : Cursor Off
B = 0 : Blink Off
(4) Entry Mode Set
I/D = 1 : +1 (Increment)
S = 0 : No Shift

Initializing by Instruction



Standard Character Pattern

■ DISPLAY DATA RAM ADDRESS MAP

Characters	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
First line	00H	01H	02H	03H	04H	05H	06H	07H	08H	09H	0AH	0BH	0CH	0DH	0EH	0FH
Second line	40H	41H	42H	43H	44H	45H	46H	47H	48H	49H	4AH	4BH	4CH	4DH	4EH	4FH