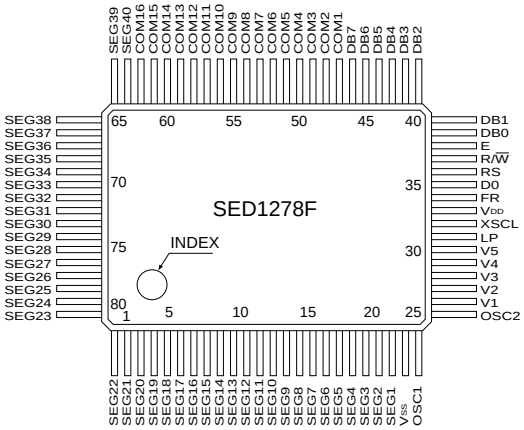
■PIN CONFIGURATION

QFP5-80pin



Unit: mm

■PIN DESCRIPTION

Symbol	No. of signals	Function	
RS	1	Register select signal	∗1
R/$\overline{W}$	1	Read/write select signal	
E	1	Read/write execute signal	
DB0 to DB7	8	Data bus	
LP	1	Data latching pulse	
XSCL	1	Data transfer clock	
FR	1	LCD AC driving signal	
DO	1	Serial data	
COM 1 to COM16	16	Common outputs COM9 to COM16: non-select for 1/8 duty COM12 to COM16: non-select for 1/11 duty	
SEG1 to SEG40	40	Segment outputs	
V1 to V5	5	LCD driving power ($V_5 \geqq V_{SS}$)	
V_{DD}	1	+5V	
V_{SS}	1	0V (GND)	
OSC1		Used to connect resistor (typ. 91K-ohms) for oscillation;	
OSC2	2	OSC1 is for external clock input.	

∗1

RS	R/W	E	Operation
0	0	⎍	Instruction write cycle
0	1	1	Busy flag read cycle Address counter read cycle
1	0	⎍	DD RAM or CG RAM data write cycle
1	1	1	DD RAM or CG RAM data read cycle

■ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V, Ta=25˚C)

Rating	Symbol	Value	Unit
Supply voltage (1)	V_{DD}	-0.3 to 7.0	V
Supply voltage (2)	V_1 to V_5	-0.3 to V_{DD}+0.3	V
Input voltage	V_I	-0.3 to V_{DD}+0.3	V
Output voltage	V_O	-0.3 to V_{DD}+0.3	V
Power dissipation	P_D	300	mW
Operating temperature	T_{opr}	-20 to 75	˚C
Storage temperature	T_{stg}	-65 to 150	˚C
Soldering temperature and time	T_{sol}	260˚C・10s (at lead)	—

Note: The following condition must always hold true: $V_{DD} \geqq V_1 \geqq V_2 \geqq V_3 \geqq V_4 \geqq V_5$

■ELECTRICAL CHARACTERISTICS

●DC Characteristics

(V_{DD}=5.0V±10%, V_{SS}=0V, Ta=-20 to 75˚C)

Characteristic	Symbol	Condition	Applicable Pin	Min.	Typ.	Max.	Unit
"H" level input voltage (1)	V_{IH1}		DB0~DB7 RS, R/W, E	2.0	—	V_{DD}	V
"L" level input voltage (1)	V_{IL1}			V_{SS}	—	0.8	V
"H" level input voltage (2)	V_{IH2}		OSC1	V_{DD}-1.0	—	V_{DD}	V
"L" level input voltage (2)	V_{IL2}			V_{SS}	—	1.0	V
"H" level output voltage (1)	V_{OH1}	I_{OH}=-0.205mA	DB0~DB7	2.4	—	—	V
"L" level output voltage (1)	V_{OL1}	I_{OL}=1.6mA		—	—	0.4	V
"H" level output voltage (2)	V_{OH2}	I_{OH}=-0.04mA	XSCL LP DO	0.9V_{DD}	—	—	V
"L" level output voltage (2)	V_{OL2}	I_{OL}=0.04mA		—	—	0.1V_{DD}	V
Driver-on resistor (COM)	R_{COM}	$\|V_{COM}-V_n\|$=0.5V	COM1~16	—	2	10	kΩ
Driver-on resistor (SEG)	R_{SEG}	$\|V_{SEG}-V_n\|$=0.5V	SEG1~40	—	2.5	10	kΩ
I/O leakage current	I_{IL}	V_I=0 to V_{DD}		—	—	1	μA
Pull-up MOS current	$-I_P$	V_{DD}=5V		50	125	250	μA
Supply current	I_{OP}	Rf oscillation, from external clock V_{DD}=5V, fosc=f_{CP}=270kHz	V_{DD}	—	0.5	0.8	mA
External clock operation							
External clock operating frequency	f_{EXTCL}			125	250	350	kHz
External clock duty	Duty			45	50	55	%
External clock rise time	tr_{EXTCL}			-	—	0.2	μS
External clock fall time	tf_{EXTCL}			-	—	0.2	μS
Internal clock operation (Rf oscillation)							
Oscillation frequency	f_{OSC}	R_f=91KΩ ±2%		190	270	350	kHz
Internal clock operation (Ceramic filter oscillation)							
Oscillation frequency	f_{OSC}	Ceramic filter		245	250	255	kHz
LCD driving voltage	V_{LCD}	V_{DD}-V_5		3.0	—	V_{DD}	V

●AC Characteristics

○Read Cycle

(V_{DD}=5.0V±10%, V_{SS}=0V, Ta=-20 to 75˚C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cycE}		500	—	—	ns
Enable "H" level pulse width	t_{WEH}		220	—	—	ns
Enable rise/fall time	t_{rE}, t_{fE}		—	—	25	ns
RS, R/$\overline{W}$ setup time	t_{AS}		40	—	—	ns
RS, R/$\overline{W}$ address hold time	t_{AH}		10	—	—	ns
Read data output delay	t_{RD}	C_L=100pF	—	—	120	ns
Read data hold time	t_{DHR}		20	—	—	ns

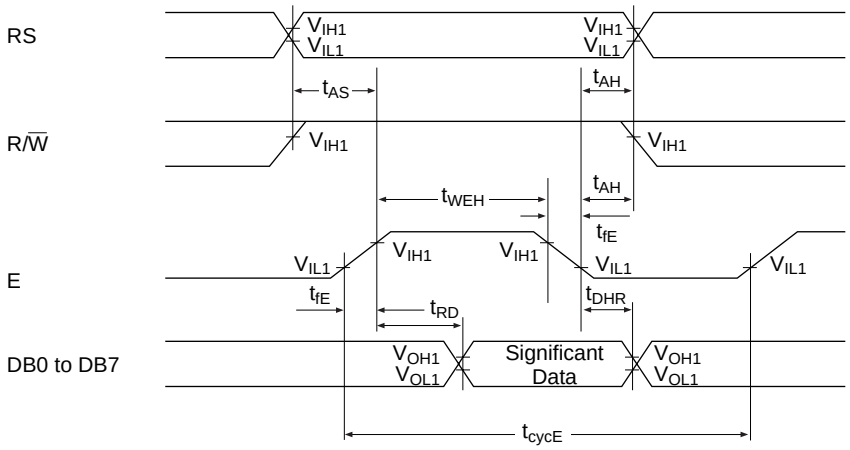
●Write Cycle

(V_{DD}=5.0V±10%, V_{SS}=0V, Ta=-20 to 75˚C)

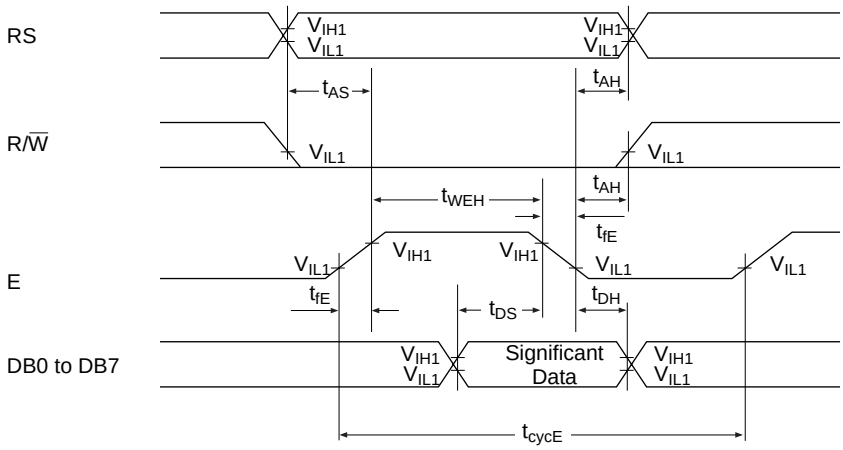
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cycE}		500	—	—	ns
Enable "H" level pulse width	t_{WEH}		220	—	—	ns
Enable rise/fall time	t_{rE}, t_{fE}		—	—	25	ns
RS, R/$\overline{W}$ setup time	t_{AS}		40	—	—	ns
RS, R/$\overline{W}$ address hold time	t_{AH}		10	—	—	ns
Data setup time	t_{DS}		60	—	—	ns
Write data hold time	t_{DH}		10	—	—	ns

●Timing Chart

○ Read Cycle



○ Write Cycle



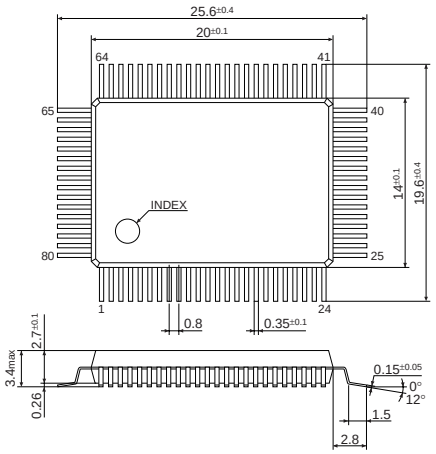
■DISPLAY COMMAND

Parameter	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Note
CLEAR DISPLAY	0	0	0	0	0	0	0	0	0	1	
CURSOR HOME	0	0	0	0	0	0	0	0	1	1	
ENTRY MODE SET	0	0	0	0	0	0	0	1	I/D	I/D	DB1=1: Increment, DB1=0: Decrement DB0=1: The display is shifted. DB0=0: The display is not shifted.
DISPLAY ON/OFF	0	0	0	0	0	0	1	D	C	C	DB2=1: Display on DB2=0: Display off DB1=1: Cursor on DB1=0: Cursor off DB0=1: Brinking on DB0=0: Brinking off
CURSOR/DISPLAY SHIFT	0	0	0	0	0	1	S/C	R/L	*	*	DB3=1: Shifts display one character DB2=1: Right shift, DB2=0: Left shift
SYSTEM SET	0	0	0	0	1	DL	N	F	*	*	DB4=1: 8 bits, DB4=0: 4 bits DB3=1: 2 lines display (1/16 duty), DB3=0: 1 line display (DB2=1: 5×10 dots, 1/11 duty DB2=0: 5×7 dots, 1/8 duty)
SET CGRAM ADDRESS	0	0	0	1	A_{CG}						The address length that can be set is 64 addresses.
SET DDRAM ADDRESS	0	0	1	A_{DD}							The address length that can be set is 80 addresses.
READ BUSY FLUG/ ADDRESS COUNTER	0	1	BF	AC							DB7=1: Busy (instruction not accepted) DB7=0: Ready (instruction accepted)
WRITE DATA	1	0	Write Data								
READ DATA	1	1	Read Data								

* Don't care

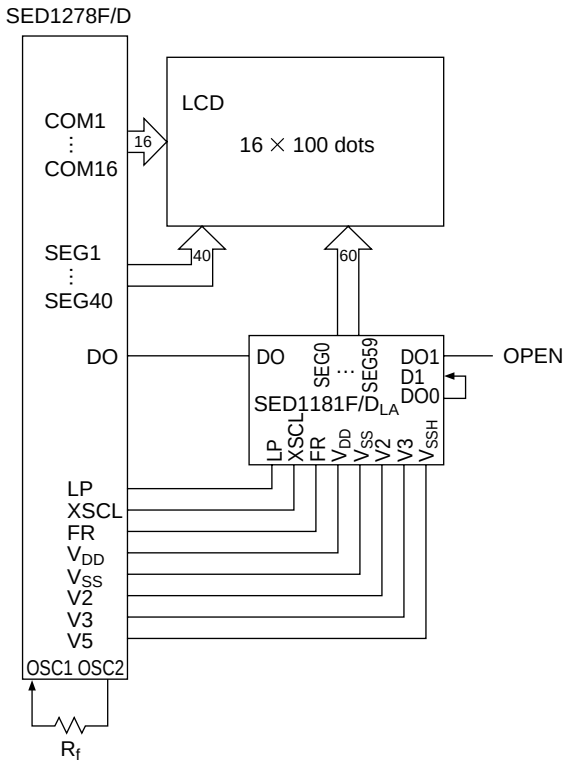
■PACKAGE DIMENSIONS

Plastic QFP5-80pin



Unit: mm

■LCD PANEL INTERFACE EXAMPLE (2 lines × 20 characters)

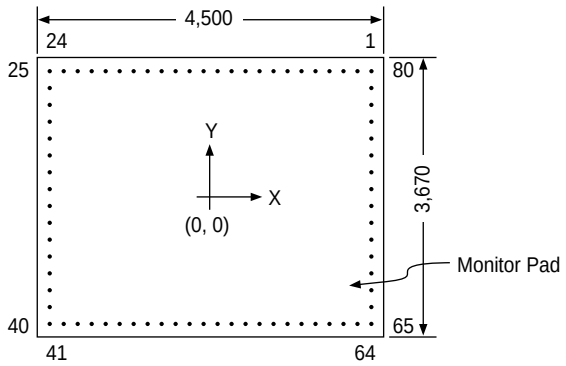


SED1278F/D is usually connected to 8-bit MPU via I/O ports.

■SED1278D

●PAD LAYOUT

Unit: μm



Pad size: 109×109

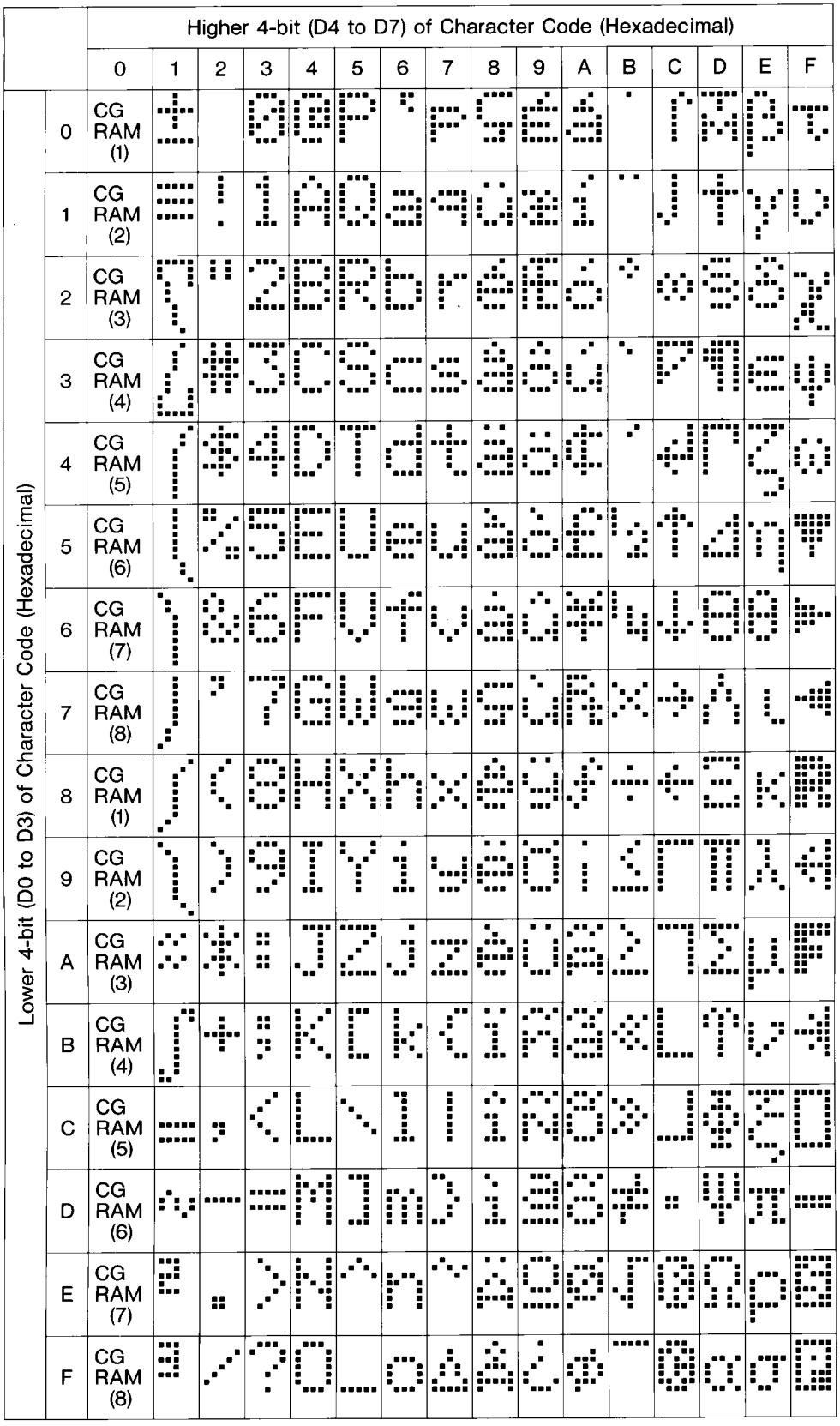
●PAD COORDINATION

Unit: μm

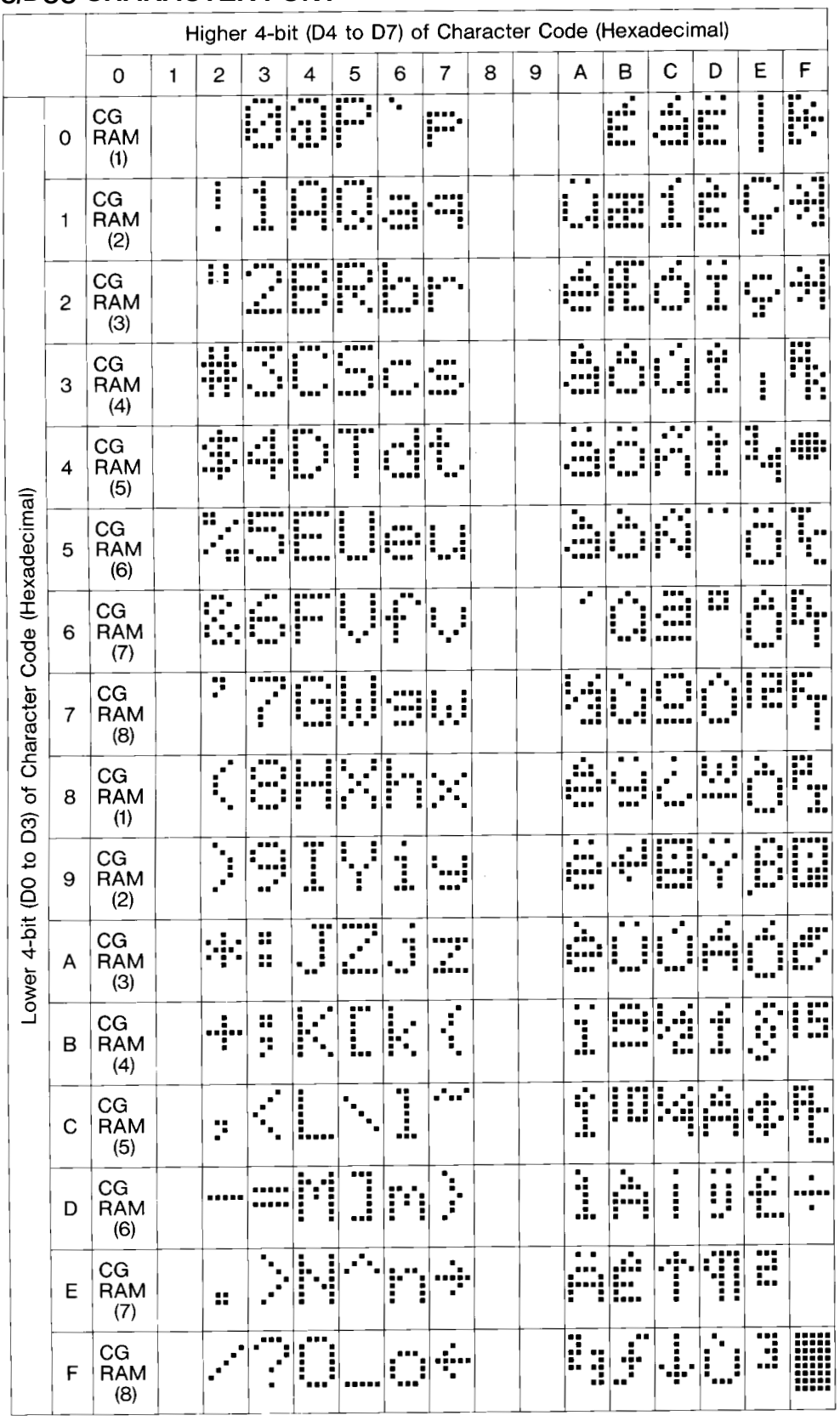
Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y	Pad No.	Pad Name	X	Y
1	SEG22	2,087	1,671	28	V_3	-2,087	819	55	COM9	452	-1,671
2	SEG21	1,905	↓	29	V_4	↓	637	56	COM10	633	↓
3	SEG20	1,723	↓	30	V_5	↓	455	57	COM11	814	↓
4	SEG19	1,541	↓	31	LP	↓	273	58	COM12	995	↓
5	SEG18	1,359	↓	32	XSCL	↓	91	59	COM13	1,177	↓
6	SEG17	1,177	↓	33	V_{CC}	↓	-91	60	COM14	1,359	↓
7	SEG16	995	↓	34	FR	↓	-273	61	COM15	1,541	↓
8	SEG15	814	↓	35	DO	↓	-455	62	COM16	1,723	↓
9	SEG14	633	↓	36	RS	↓	-637	63	SEG40	1,905	↓
10	SEG13	452	↓	37	R/W	↓	-819	64	SEG39	2,087	↓
11	SEG12	272	↓	38	E	↓	-1,001	65	SEG38	↓	-1,365
12	SEG11	91	↓	39	DB0	↓	-1,183	66	SEG37	↓	-1,183
13	SEG10	-91	↓	40	DB1	↓	-1,365	67	SEG36	↓	-1,001
14	SEG9	-272	↓	41	DB2	↓	-1,671	68	SEG35	↓	-819
15	SEG8	-452	↓	42	DB3	-1,905	↓	69	SEG34	↓	-637
16	SEG7	-633	↓	43	DB4	-1,723	↓	70	SEG33	↓	-455
17	SEG6	-814	↓	44	DB5	-1,541	↓	71	SEG32	↓	-273
18	SEG5	-995	↓	45	DB6	-1,359	↓	72	SEG31	↓	-91
19	SEG4	-1,177	↓	46	DB7	-1,177	↓	73	SEG30	↓	91
20	SEG3	-1,359	↓	47	COM1	-995	↓	74	SEG29	↓	273
21	SEG2	-1,541	↓	48	COM2	-814	↓	75	SEG28	↓	455
22	SEG1	-1,723	↓	49	COM3	-633	↓	76	SEG27	↓	637
23	GND	-1,905	↓	50	COM4	-452	↓	77	SEG26	↓	819
24	OSC1	-2,087	↓	51	COM5	-272	↓	78	SEG25	↓	1,001
25	OSC2	↓	1,365	52	COM6	-91	↓	79	SEG24	↓	1,183
26	V_1	↓	1,183	53	COM7	91	↓	80	SEG23	↓	1,365
27	V_2	↓	1,001	54	COM8	272	↓				

■SED1278D$_{OA}$ CHARACTER FONT

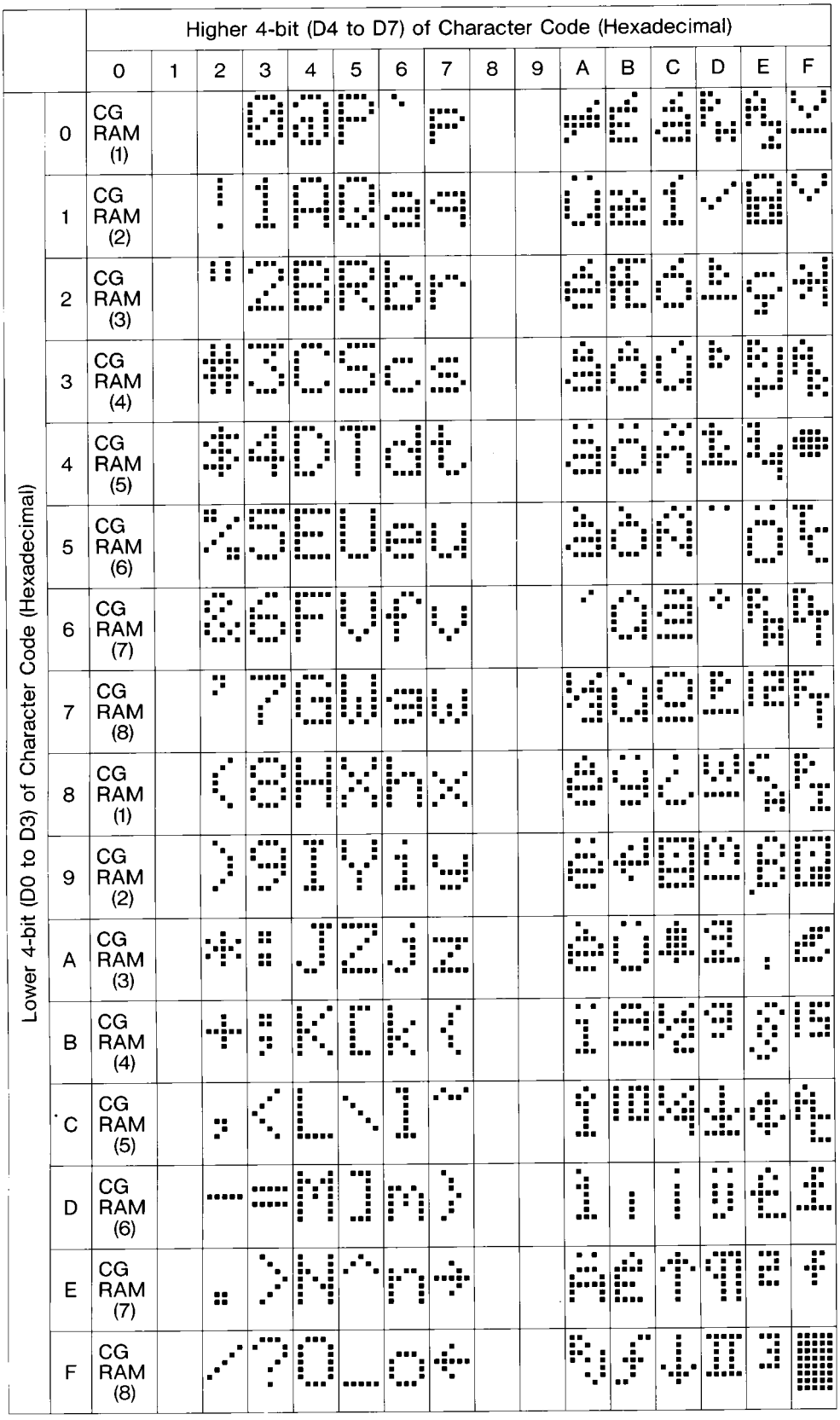
SED1278F$_{OB}$/D$_{OB}$ CHARACTER FONT



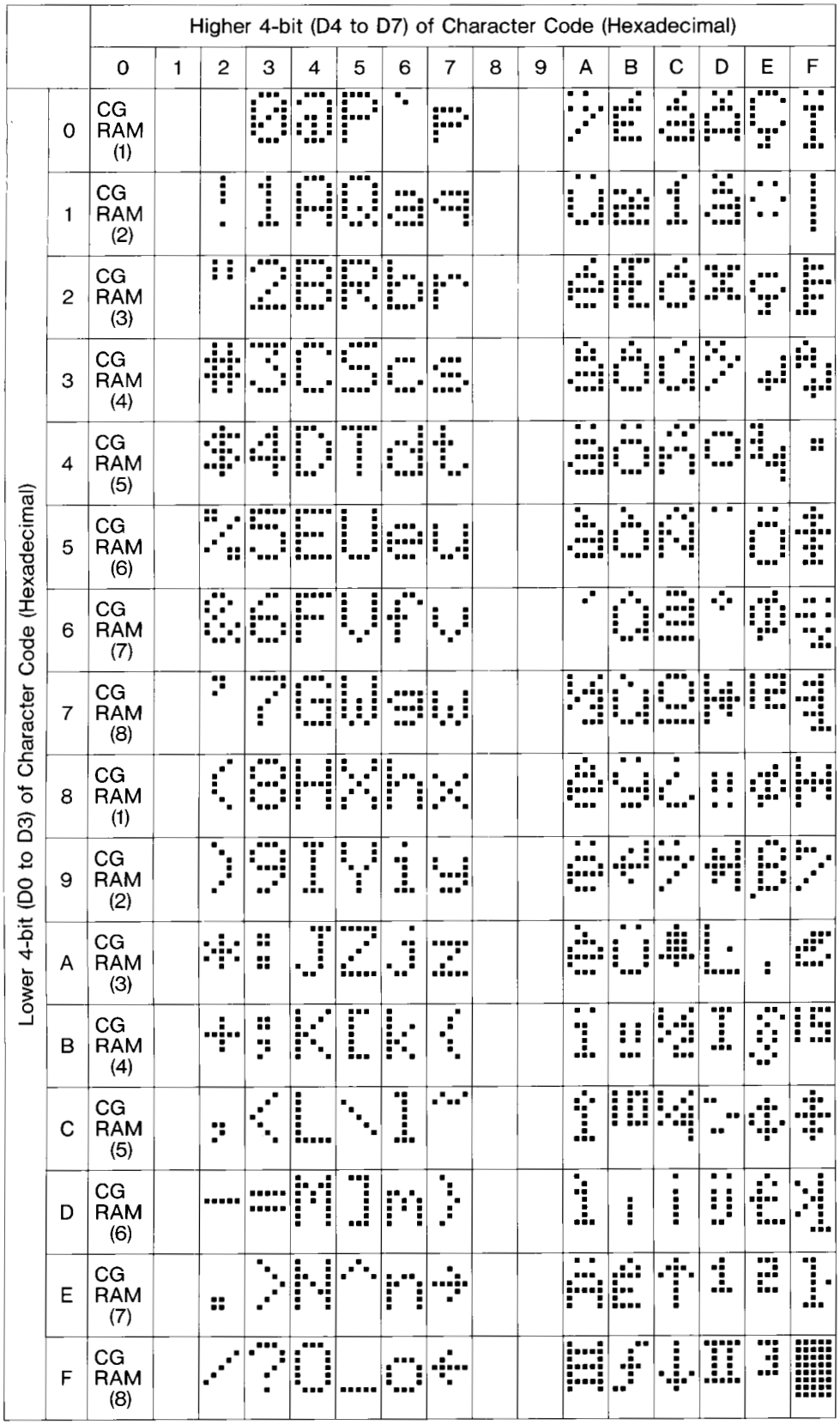
SED1278Foc/Doc CHARACTER FONT



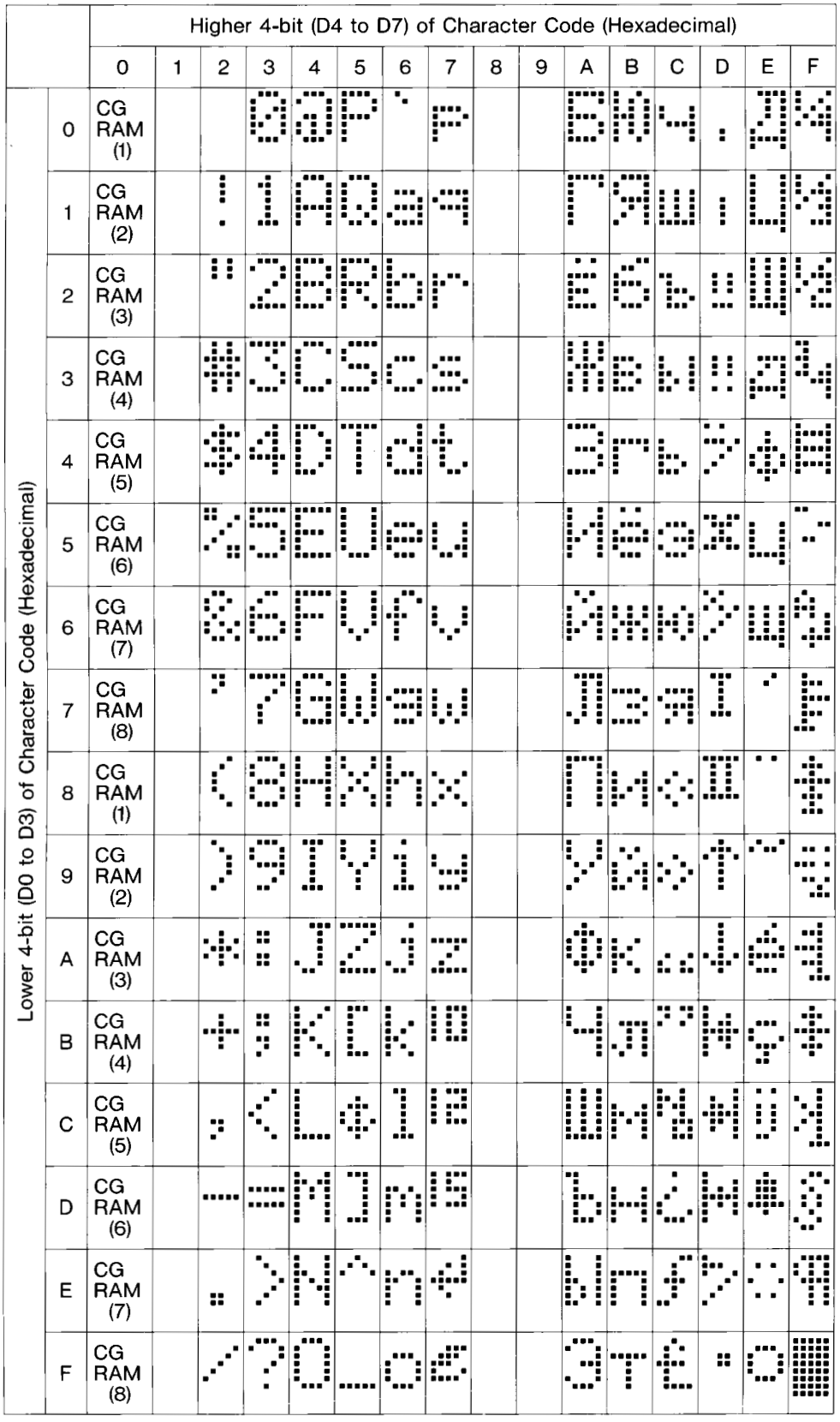
■SED1278F$_{OD}$/D$_{OE}$ CHARACTER FONT



SED1278FOG/DOG CHARACTER FONT



SED1278F$_{OH}$/D$_{OH}$ CHARACTER FONT



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