1. ELECTRICAL CHARACTERISTICS(ICB-10MM38T,Rev1,16-Sep-2010)

ABSOLUTE MAXIMUM RATINGS(Ta=25℃, VSS = 0V)

ITEMS	SYMBOL	VALUE	UNIT
Logic Supply Voltage	V_{DD1}	-0.3 ~ +7.0	Vdc
Driver Supply Voltage	V_{DD2}	-0.3 ~ +63.0	Vdc
Input Voltage	V_{IN}	-0.3~ VDD1+0.3	Vdc
Operating Temperature	Top	-40 ~ +85	℃
Storage Temperature	Tstg	-55~+85	℃

NOTE 1. Top and Tstg are a temperature surrounding the panel. (1cm approx.)

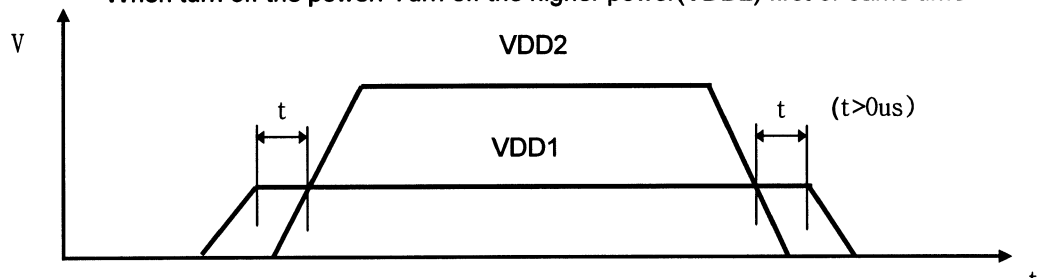
RECOMMENDABLE OPERATING CONDITIONS(Duty=1/11)

ITEMS	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	TERMINAL
Filament Voltage	Ef	-	3.2	3.5	3.9	Vdc	F+,F-
Logic Supply Voltage	V_{DD1}	-	3.0	3.3	3.6	Vdc	V_{DD1}
Driver Supply Voltage	V_{DD2}	-	24.3	27.0	29.7	Vdc	V_{DD2}
High Level Input Voltage	V_{IH}	-	0.85V_{DD1}	-	V_{DD1}	Vdc	CLK,STB,BLK
Low Level Input Voltage	V_{IL}	-	Vss	-	0.15V_{DD1}	Vdc	,DI,DO
Cut-off Voltage	Ek	-	1.0	-	2.0	Vdc	-
Operating Temperature	Top	-	-20	-	70	℃	-
Filament Current	If	Typical Ef	270	300	330	mA	F+,F-
Logic Supply Current	I_{DD1}	fCLK=3MHz	-	-	3	mA	V_{DD1}
Driver Supply Current(AVERAGE)	$I_{DD2\_D(AVE)}$	-	-	20	30	mA	DO1~96
Driver Supply Current(PEAK)	$I_{DD2\_D(PEAK)}$	-	-	60	90	mA	DO1~96
High Level Input Current1	I_{IH1}	V_{IH}=V_{DD1}	-0.1	-	0.1	μA	CLK,STB,BLK
Low Level Input Current1	I_{IL1}	V_{IL}=V_{SS}	-30	-12	-5	μA	
High Level Input Current2	I_{IH2}	V_{IH}=V_{DD1}	-0.1	-	0.1	μA	DI,DO
Low Level Input Current2	I_{IL2}	V_{IL}=V_{SS}	-0.1	-	0.1	μA	
Frame Frequency(Grid Scan)	f FRAME	tr<10ns tf<10ns	100	-	-	Hz	-

NOTE 2. Exceeding these values may damage this panel.

NOTE 3. Panel may be demaged under the scan stop.

NOTE 4. When turn on the power : Turn on the lower power(VDD1) first or same time
When turn off the power: Turn off the higher power(VDD2) first or same time

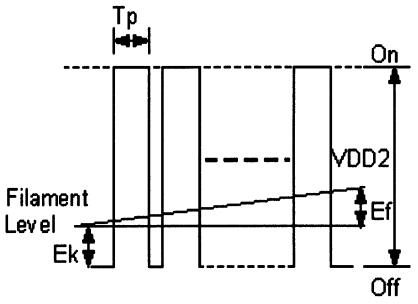


< Power Supply Sequence >

NOTE 5. Do not pull down the lower power(VDD1) under 2.7V
because the Logic HIGH level is unstable

NOTE 6. Quality can be assured only within above rated value and this value is most optimized condition for the Brightness & life time.

2. OPTICAL CHARACTERISTICS(ICB-10MM38T,Rev1,16-Sep-2010)

ITEMS	TEST CONDITION	Color	MIN.	TYP.	MAX.	UNIT
Brightness	Ef=3.5Vdc VDD1=3.3Vdc VDD2=27.0Vdc (Ek=1.0Vdc) Tp=100μs ,Tb=0μs, Duty=1/11  	GREEN	500	700	—	cd/m^2
			(146)	(204)	—	ft-L
Brightness Ratio Between Digits		$\frac{L(MAX)}{L(MIN)}$	-	-	2	
Color Coordinate		GREEN (G. :x=0.250,y=0.439)				

NOTE7. All phosphor is Cd-free phosphor.

3. PIN DESCRIPTION

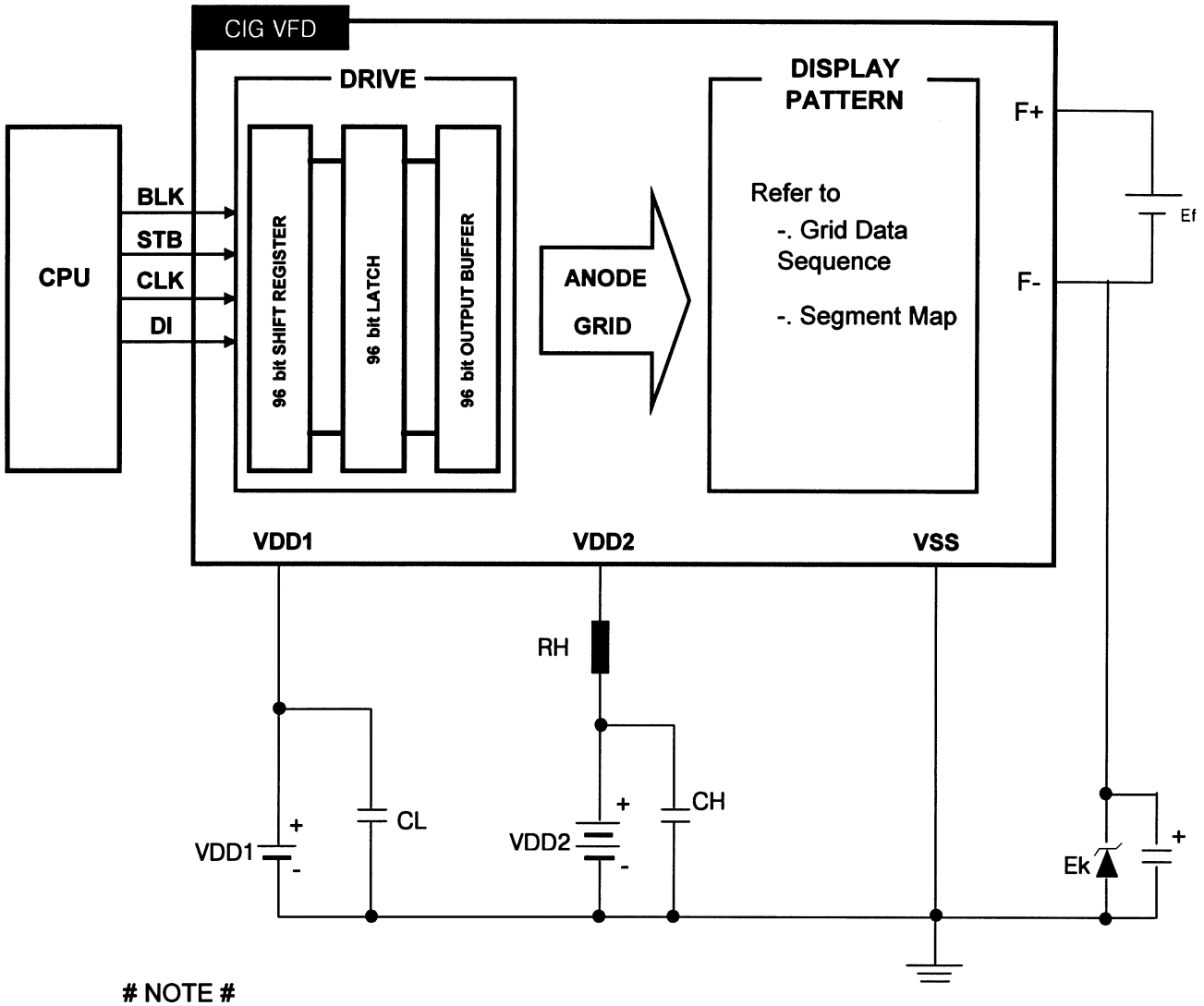
pin name	description	I/O
VDD1	Logic power supply	-
VDD2	High voltage power supply for driving VFD	-
VSS	Ground	-
CLK	Shift register clock input	I
DI	Serial data input	I
STB	Strobe input	I
BLK	Blank input	I

TRUTH TABLE

CLK	STB	shift register	latch data
↑	L	data shift	data hold
X	H	data does not change	shift register data is outputted
X	L	data does not change	data hold

NOTE8. X = H or L , H = High level , L = Low level

4.BLOCK DIAGRAM (ICB-10MM38T,Rev1,16-Sep-2010)



NOTE

RH: Current limit resistor for protecting IC.

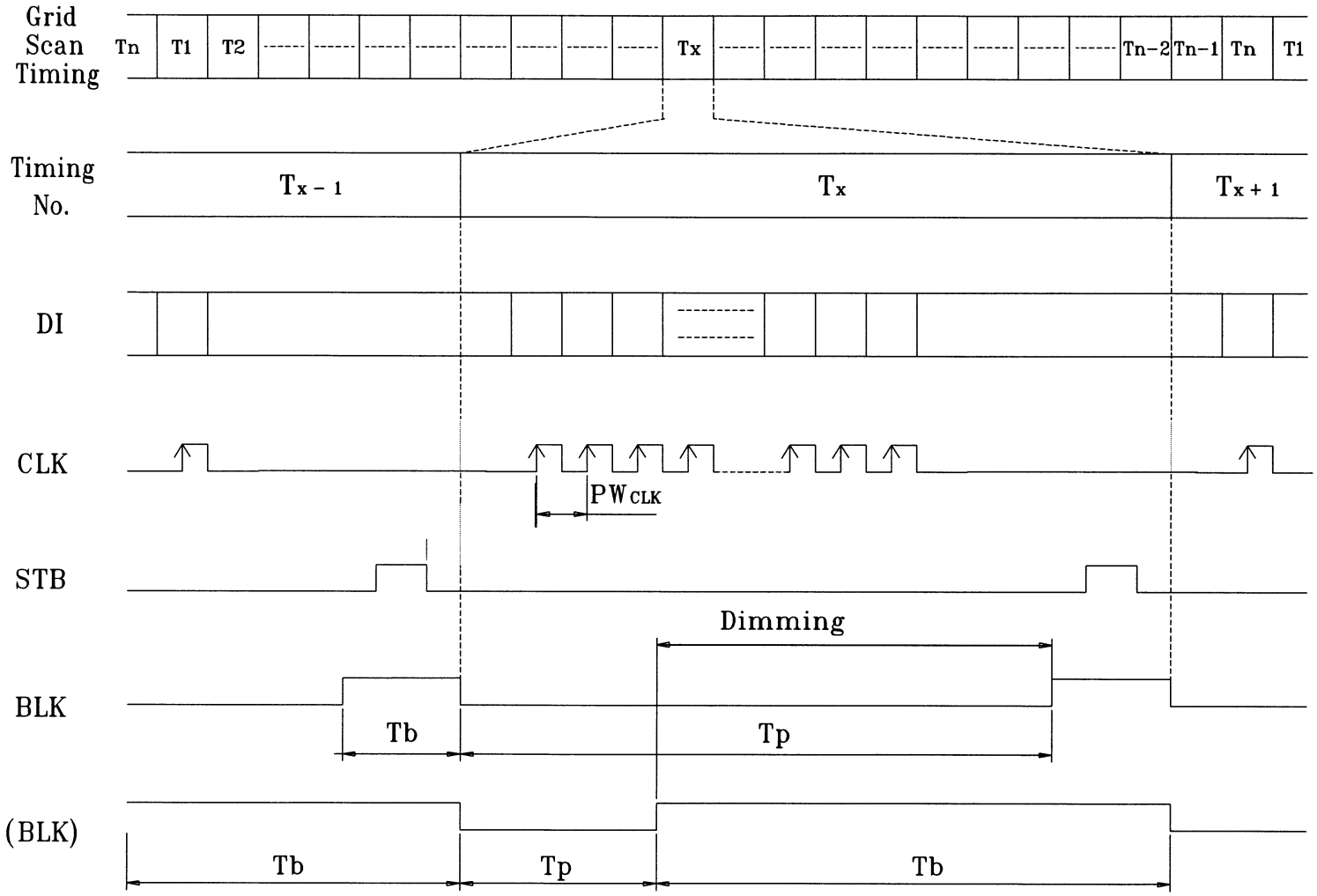
CH,CL: Low pass filter for noise filtering.

RH: 22Ω

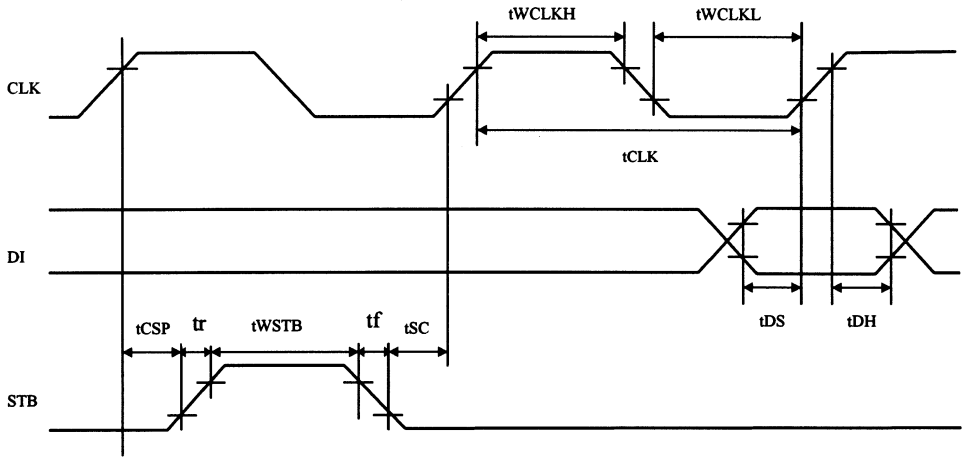
CH: 0.1μF,100V

CL: 0.1μF

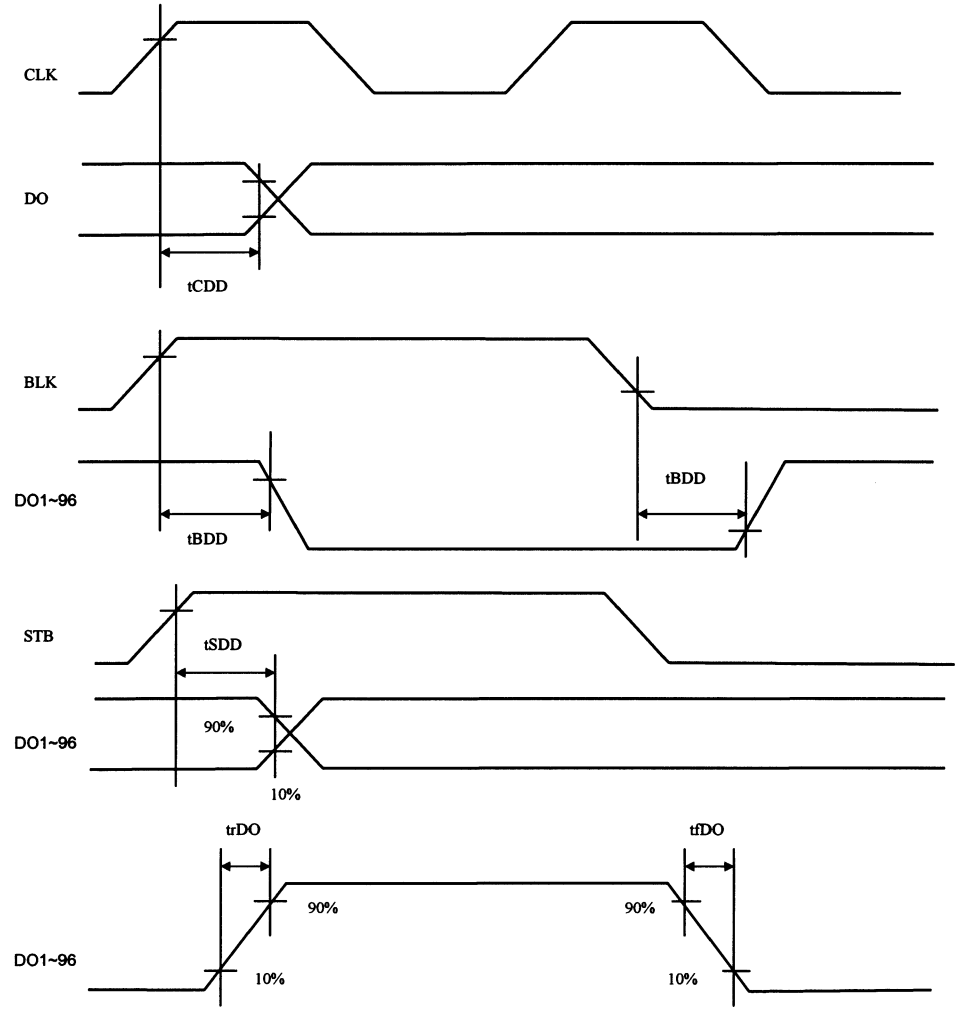
5.TIMING CHART (ICB-10MM38T,Rev1,)



6.SWITCHING WAVEFORM (ICB-10MM38T,Rev1,16-Sep-2010)

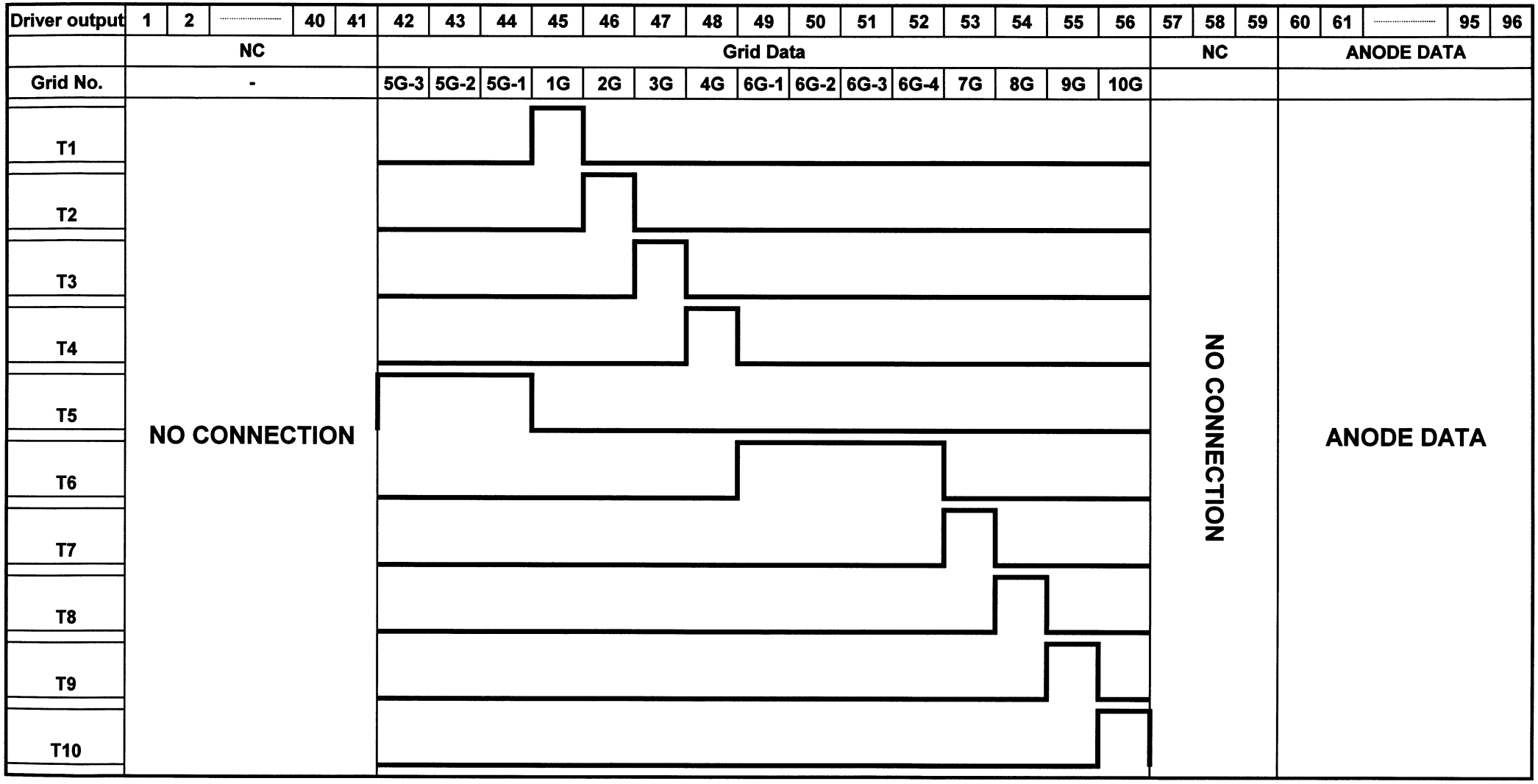


ITEMS	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Frame Frequency(Grid Scan)	f FRAME	tr<10ns tf<10ns	100	-	-	Hz
Clock Cycle	tCLK		300	-	-	ns
High Level Clock Pulse Width	tWCLKH		140	-	-	ns
Low Level Clock Pulse Width	tWCLKL		140	-	-	ns
Data Setup Time	t DS		60	-	-	ns
Data Hold Time	t DH		60	-	-	ns
High level Strobe Pulse Width	tWSTB		240	-	-	ns
Clock to Strobe Time	tCSP		100	-	-	ns
Strobe to Clock Time	tSC		90	-	-	ns
rising time & falling time	tr,tf		-	-	50	ns



ITEMS	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Clock to DO Time	tCDD	-	-	-	75	ns
BLK to DO1~96 Time	tBDD		-	-	2	μs
Strobe to DO1~96 Time	tSDD		-	-	2	μs
DO1~96 rising Time	trDO1~96	-	-	-	1	μs
DO1~96 falling Time	tfDO1~96		-	-	2	μs

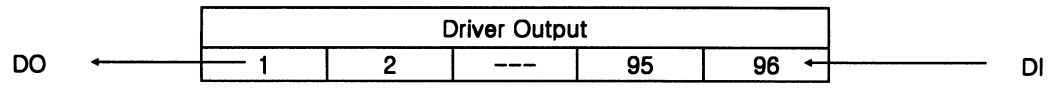
7.GRID DATA SEQUENCE (ICB-10MM38T,Rev1,16-Sep-2010)



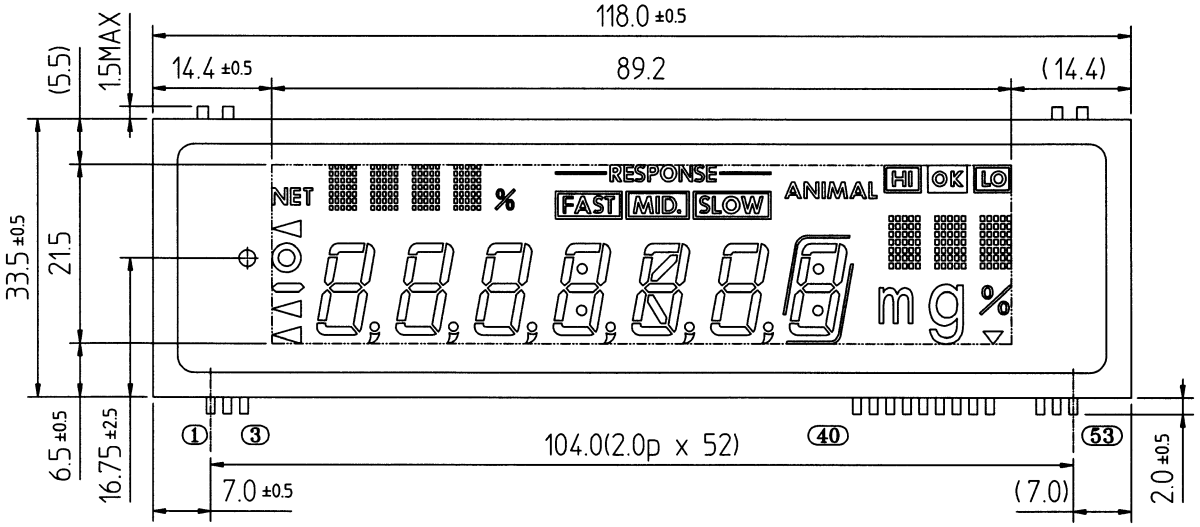
8.SEGMENT MAP (ICB-10MM38T,Rev1,16-Sep-2010)

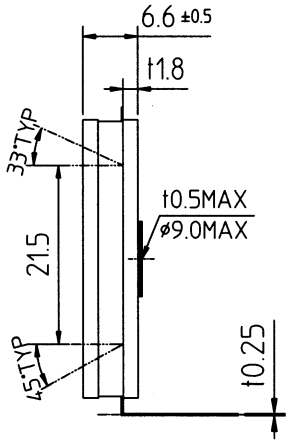
	SEGMENT									
DRIVER OUTPUT	1G	2G	3G	4G	5G-1~3	6G-1~4	7G	8G	9G	10G
1 2 ⋮ 40 41	NO CONNECTION									
42 43 ⋮ 55 56	GRID DATA									
57 58 59	NO CONNECTION									
60	1-1	1-1	1-1	1-1	1 a	1 a		1-1	1-1	1-1
61	2-1	2-1	2-1	2-1	2 a	2 a		2-1	2-1	2-1
62	3-1	3-1	3-1	3-1	3 a	3 a	3 a	3-1	3-1	3-1
63	4-1	4-1	4-1	4-1	1 b	1 b		4-1	4-1	4-1
64	5-1	5-1	5-1	5-1	2 b	2 b		5-1	5-1	5-1
65	1-2	1-2	1-2	1-2	3 b	3 b	3 b	1-2	1-2	1-2
66	2-2	2-2	2-2	2-2		2 k		2-2	2-2	2-2
67	3-2	3-2	3-2	3-2		3 k	3 k	3-2	3-2	3-2
68	4-2	4-2	4-2	4-2	1 f	1 f		4-2	4-2	4-2
69	5-2	5-2	5-2	5-2	2 f	2 f		5-2	5-2	5-2
70	1-3	1-3	1-3	1-3	3 f	3 f	3 f	1-3	1-3	1-3
71	2-3	2-3	2-3	2-3	1 g	1 g		2-3	2-3	2-3
72	3-3	3-3	3-3	3-3	2 g	2 g		3-3	3-3	3-3
73	4-3	4-3	4-3	4-3	3 g	3 g	3 g	4-3	4-3	4-3
74	5-3	5-3	5-3	5-3	4 g			5-3	5-3	5-3
75	1-4	1-4	1-4	1-4	1 c	1 c		1-4	1-4	1-4
76	2-4	2-4	2-4	2-4	2 c	2 c		2-4	2-4	2-4
77	3-4	3-4	3-4	3-4	3 c	3 c	3 c	3-4	3-4	3-4
78	4-4	4-4	4-4	4-4		2 n		4-4	4-4	4-4
79	5-4	5-4	5-4	5-4		3 n	3 n	5-4	5-4	5-4
80	1-5	1-5	1-5	1-5	1 e	1 e		1-5	1-5	1-5
81	2-5	2-5	2-5	2-5	2 e	2 e		2-5	2-5	2-5
82	3-5	3-5	3-5	3-5	3 e	3 e	3 e	3-5	3-5	3-5
83	4-5	4-5	4-5	4-5	1 d	1 d		4-5	4-5	4-5
84	5-5	5-5	5-5	5-5	2 d	2 d		5-5	5-5	5-5
85	1-6	1-6	1-6	1-6	3 d	3 d	3 d	1-6	1-6	1-6
86	2-6	2-6	2-6	2-6	Dp1	Dp1		2-6	2-6	2-6
87	3-6	3-6	3-6	3-6	Dp2	Dp2	S6	3-6	3-6	3-6
88	4-6	4-6	4-6	4-6	Dp3	Dp3	S7	4-6	4-6	4-6
89	5-6	5-6	5-6	5-6	com1	com1		5-6	5-6	5-6
90	1-7	1-7	1-7	1-7	com2	com2		1-7	1-7	1-7
91	2-7	2-7	2-7	2-7	com3	com3		2-7	2-7	2-7
92	3-7	3-7	3-7	3-7	S1	FAST	ANIMAL	3-7	3-7	3-7
93	4-7	4-7	4-7	4-7	S2	MID.	HI	4-7	4-7	4-7
94	5-7	5-7	5-7	5-7	S3	SLOW	OK	5-7	5-7	5-7
95				%	S4	S5	LO	m	g	%
96					NET					▽

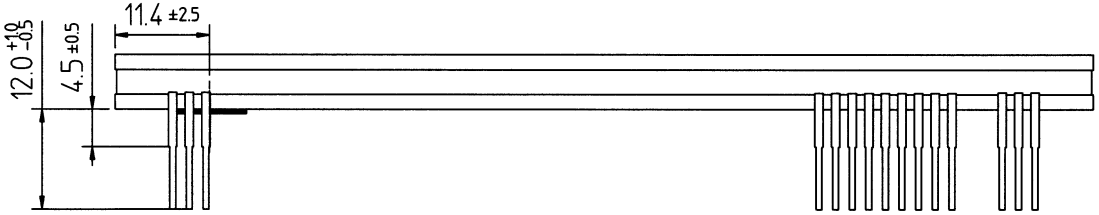
■ DATA SHIFTING DIRECTION

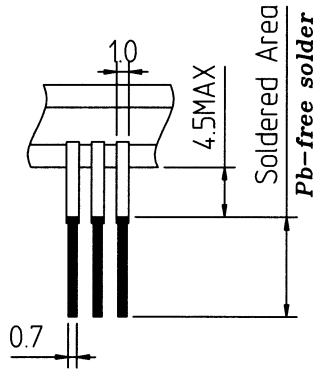


OUTER DIMENSIONS









LEAD DETAILS

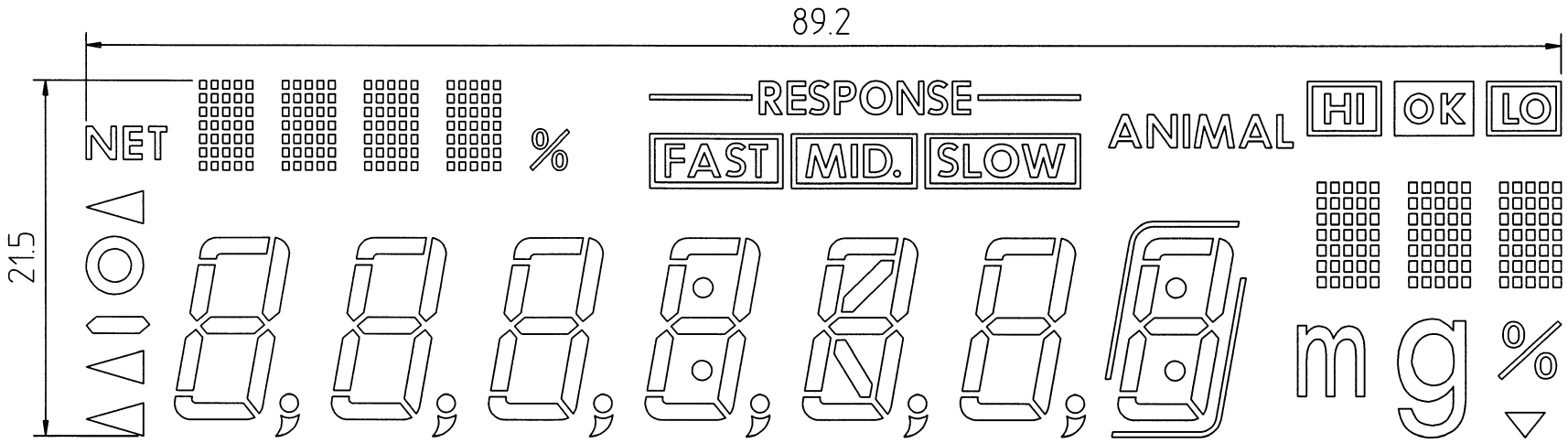
PIN CONNECTION

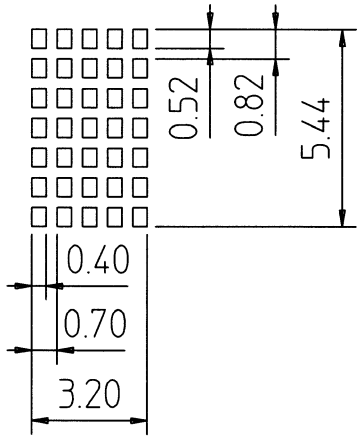
PIN NO.	1	2	3	4 – 39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
CONNECTION	F+	F+	F+	NP	DI	VDD1	DO	STB	BLK	CLK	VSS	VSS	VDD2	NP	NP	F−	F−	F−

◎ Note ◎
1) F+,− : Filament pin
2) NP : No pin

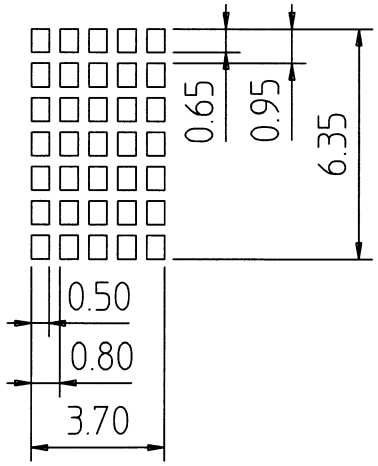
MODEL : ICB-10MM38T
OUTER DIMENSIONS
Rev. ① 16-Sep-2010

PATTERN DETAILS

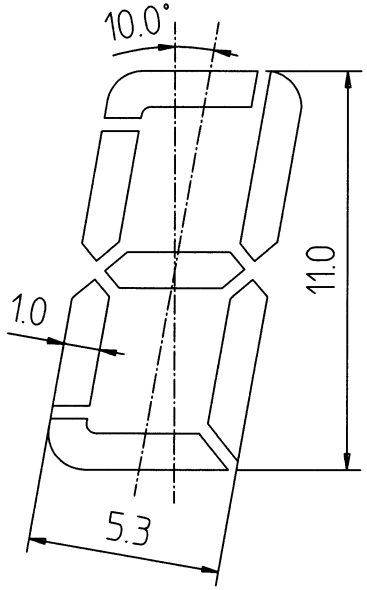




(1G~4G)



(8G~10G)



◎ *Color of Illumination* ◎

· *Green (G. x=0.250, y=0.439) --- All Patterns.*

◎ *Negative Pattern* ◎ **OK**

MODEL : ICB-10MM38T
PATTERN DETAILS
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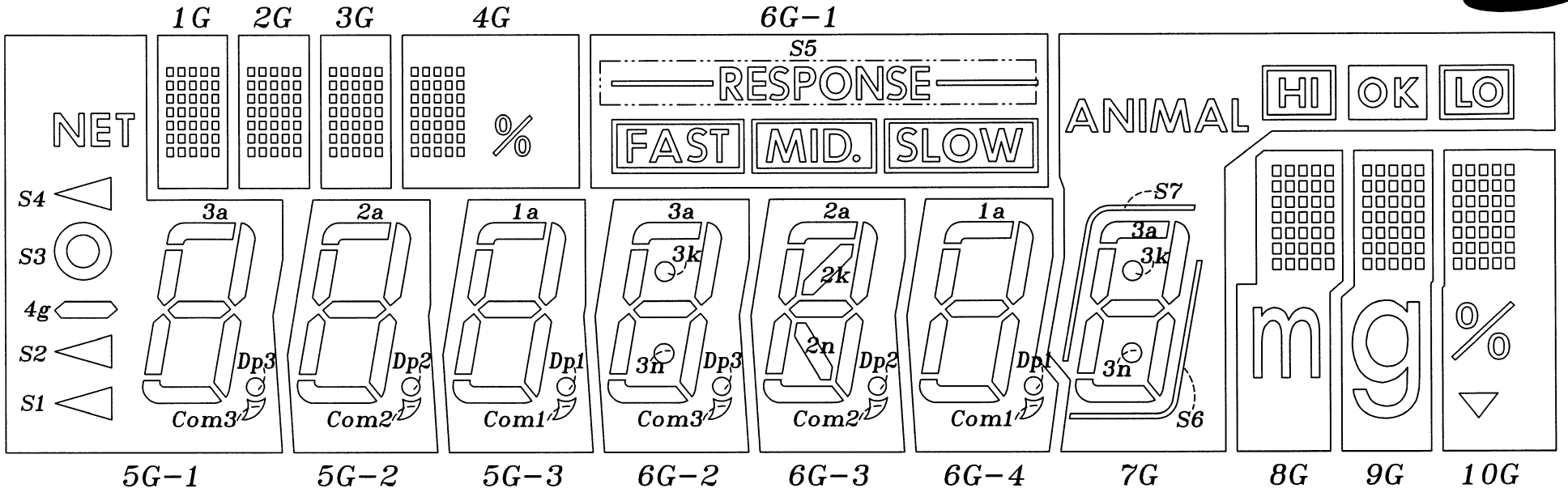
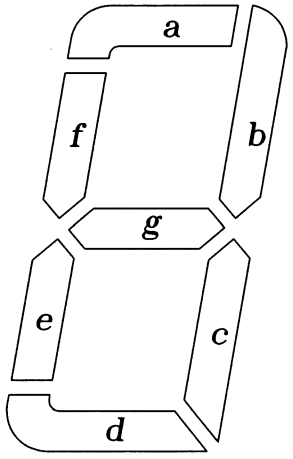
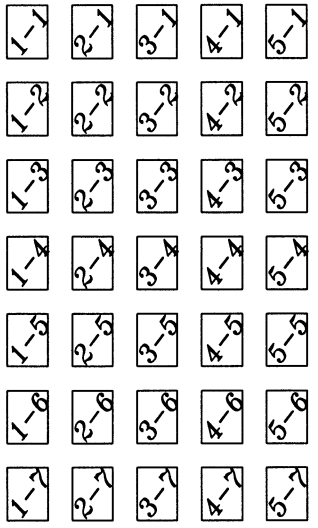
GRID ASSIGNMENT





(5G-1, 5G-2, 5G-3, 6G-2, 6G-3, 6G-4, 7G)



(1G~4G, 8G~10G)

MODEL : ICB-10MM38T
GRID ASSIGNMENT
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