



Specification
for
LCD Module
TS1620-1



TS1620-1 LCD MODULE

1. FEATURES

- Display Mode: STN, Negative, Reflective, Olivine
- Display Formate: 16 Character x 2 Line
- Viewing Direction: 6 O'Clock
- Input Data: 4-Bits or 8-Bits interface available
- Display Font : 5 x 8 Dots
- Power Supply : Single Power Supply (5V±10%)
- Driving Scheme : 1/16Duty,1/5Bias
- BACKLIGHT (SIDE) : LED (WHITE)

2. ABSOLUTE MAXIMUM

Item	Symbol	Min.	Max.	Unit
Power Supply for logic	Vdd	-0.3	+7.0	V
Power supply for LCD Drive	Vlcd	Vdd-11.5	Vdd+0.3	V
Input Voltage	Vi	-0.3	Vdd+0.3	V
Operating Temperature	Ta	0	+50	
Storage Temperature	Tstg	-10	+60	

3. ELECTRICAL CHARACTERISTICS

(Ta=25 ;Vdd=3.0V±10%,otherwise specified)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	Vdd	--	4.7	5.0	5.5	V
Operating Voltage for LCD	Vdd-Vo	--	--	5.0	--	V
Input High voltage	Vih	--	2.2	--	Vdd	V
Input Low voltage	Vil	--	-0.3	--	0.6	V
Output High voltage	Voh	-Ioh=0.2mA	2.4	--	--	V
Output Low voltage	Vol	Iol=1.2mA	--	--	0.4	V
Power supply current	Idd	Vdd=3.0v	--	1.1	--	mA

4. MECHANICAL PARAMETERS

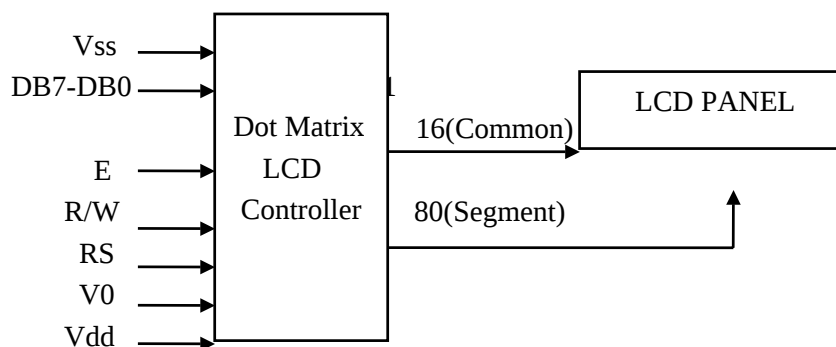
Item	Description	Unit
PCB Dimension	80.0*36.0*1.6	mm
View Dimension	65.00*14.00	mm



5. PIN ASSIGNMENT

No.	Symbol	Level	Function	
1	Vss	--	0V	Power Supply
2	Vdd	--	+5V	
3	V0	--	for LCD	
4	RS	H/L	Register Select: H:Data Input L:Instruction Input	
5	R/W	H/L	H--Read L--Write	
6	E	H,H-L	Enable Signal	
7	DB0	H/L	Data bus used in 8 bit transfer	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L	Data bus for both 4 and 8 bit transfer	
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	BLA	--	BLACKLIGHT +5V	
16	BLK	--	BLACKLIGHT 0V-	

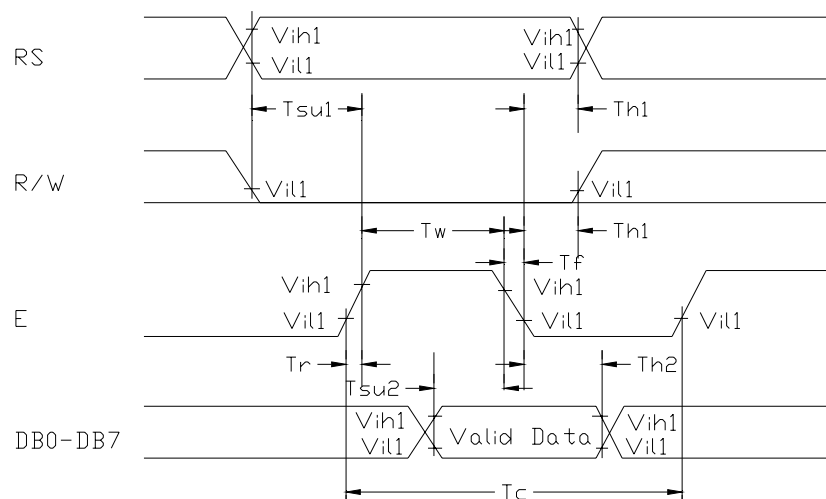
6. SYSTEM BLOCK DIAGRAM



7. AC characteristics (Vdd=5V±10%,Vss=0V Ta=25)

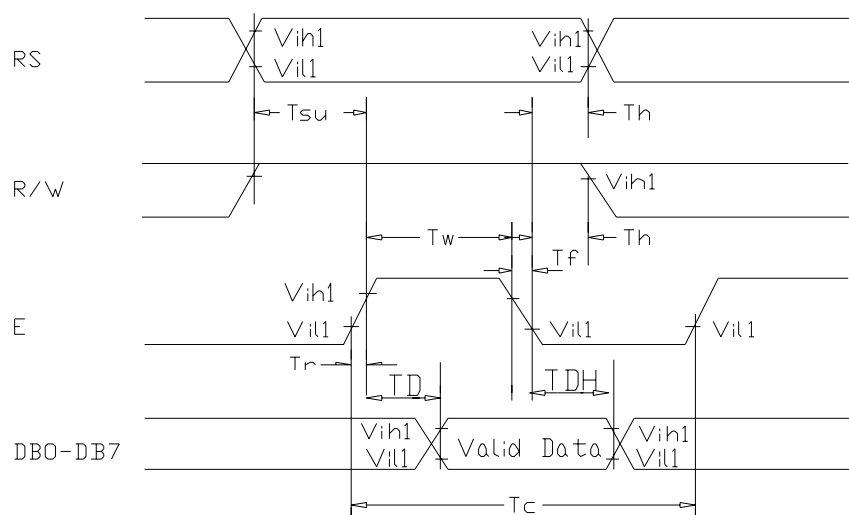
(1)Write mode(writing data from Micom to KS0070B)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test pin
E cycle time	t_c	500	--	--	ns	E
E rise time	t_r	--	--	25	ns	E
E fall time	t_f	--	--	25	ns	E
E pulse width (High,Low)	t_w	220	--	--	ns	E
R/W and RS set-up time	t_{su1}	40	--	--	ns	R/W,RS
R/w and RS hold time	t_{h1}	10	--	--	ns	R/W,RS
Data set-up time	t_{su2}	60	--	--	ns	DB0~DB7
Data hold time	t_{h2}	10	--	--	ns	DB0~DB7



(2) Read mode (Reading data from KS0066 to Micom)

Characteristic	Symbol	Min.	Typ.	Max.	Unit	Test pin
E cycle time	t_c	500	--	--	ns	E
E rise time	t_r	--	--	25	ns	E
E fall time	t_f	--	--	25	ns	E
E pulse width (High, Low)	t_w	220	--	--	ns	E
R/W and RS set-up time	t_{su1}	40	--	--	ns	R/W, RS
R/w and RS hold time	t_{h1}	10	--	--	ns	R/W, RS
Data set-up time	t_{su2}	--	--	120	ns	DB0~DB7
Data hold time	t_{h2}	20	--	--	ns	DB0~DB7





8. CONTROL and DISPLAY COMMAND

Command	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Remark	TIME (270KHZ)
Display Clear	L	L	L	L	L	L	L	L	L	H		1.52ms
Return Home	L	L	L	L	L	L	L	L	H	X	cursor move to first digit	1.52ms
Entry Mode Set	L	L	L	L	L	L	L	H	I/D	SH	I/D:set cursor move direction H-Increase L-Decrease SH:Specifies shift of display H-display is shifted L-Display is not shifted	37um
Display On/Off	L	L	L	L	L	L	H	D	C	B	D:Display(H-on,L-off) C:Cursor(H-on,L-off) B:Blinking(H-on,L-off)	37um
Shift	L	L	L	L	L	H	S/C	R/L	X	X	SC:(H-Display shift,L-Cursir move) R/L:(H-Right shift,L-Left shift)	37um
Set Function	L	L	L	L	H	DL	N	F	X	X	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)	37um
Set CG RAM Address	L	L	L	H	CG RAM address (corresponds to address)						CG RAM Data is sent and received after this setting	37um
Set DD RAM Address	L	L	H	DD RAM address							DD RAM Data is sent and received after this setting	37um
Read Busy Flag & Address	L	H	BF	Address Counter used for Both DD & CG RAM address							BF:(H-Busy ,L-Ready) --Reads BF indication internal operating is being performed --reads address counter contents	0ms
Write Data	H	L	Write Data								Write data into DD or CG RAM	37um
Read Data	H	H	Read Data								Read data from DD or CGRAM	37um



NO.7066-0A

b7-b4 b3-b0	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
CG RAM (1)				0	0	P	\	P				—	タ	ミ	×	P
0001 (2)			!	1	A	Q	a	q			。	フ	チ	△	△	q
0010 (3)			"	2	B	R	b	r			「	イ	ツ	×	P	θ
0011 (4)			#	3	C	S	c	s			」	ウ	テ	E	ε	ε
0100 (5)			\$	4	D	T	d	t			√	エ	ト	ト	μ	Ω
0101 (6)			%	5	E	U	e	u			。	オ	ナ	コ	δ	Ω
0110 (7)			&	6	F	V	f	v			ヲ	カ	ニ	ヨ	P	Σ
0111 (8)			'	7	G	W	g	w			ア	キ	ヌ	ウ	g	π
1000 (1)			(	8	H	X	h	x			イ	ク	ホ	リ	フ	×
1001 (2)			)	9	I	Y	i	y			ウ	ケ	ノ	ル	リ	y
1010 (3)			*	:	J	Z	j	z			エ	コ	ロ	レ	j	≠
1011 (4)			+	;	K	[	k	{			オ	サ	ヒ	ロ	×	π
1100 (5)			,	<	L	¥	l				カ	シ	フ	ワ	≠	π
1101 (6)			—	=	M	]	m	}			ユ	ズ	ハ	ン	ト	÷
1110 (7)			.	>	N	^	n	→			ヨ	セ	ホ	ハ	ン	
1111 (8)			/	?	O	_	o	←			ウ	リ	マ	"	ろ	■



NO.7066-DB

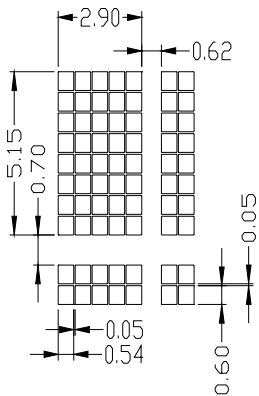
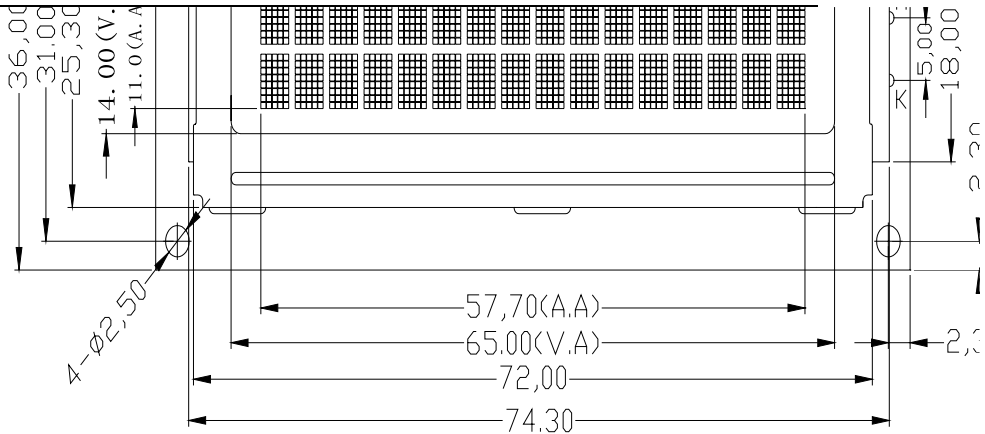
k7-k4 k3-k0	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)	±		0	@	P	°	F	G	E	Δ		∫	∞	β	τ
0001	(2)	=	!	1	A	Q	a	9	Q	×	i		J	†	y	U
0010	(3)	7	"	2	B	R	b	r	e	E	ó	°	∞	§	δ	χ
0011	(4)	Δ	#	3	C	S	c	ε	Δ	ó	Q	°	∫	∞	e	φ
0100	(5)	/	\$	4	D	T	d	t	Δ	ó	Q	°	∫	∞	ζ	ω
0101	(6)		%	5	E	U	e	u	Δ	ó	E	°	∫	∞	η	¶
0110	(7)		&	6	F	V	f	v	Δ	ó	¶	°	∫	∞	θ	≡
0111	(8)		'	7	G	W	g	w	Q	ó	R	×	÷	Δ	∫	≡
1000	(1)		(	8	H	X	h	x	e	Q	ó	÷	÷	Δ	κ	≡
1001	(2)		)	9	I	Y	i	y	e	Q	ó	÷	÷	Δ	λ	≡
1010	(3)	×	*	:	J	Z	j	z	e	Q	ó	÷	÷	Δ	μ	F
1011	(4)		+	:	K	[	k	[	i	Q	ó	÷	÷	Δ	ν	≡
1100	(5)	=	,	<	L	\	l	l	i	Q	ó	÷	÷	Δ	ξ	□
1101	(6)	∞	-	=	M	]m	]i	∞	∞	ó	÷	÷	Δ	ψ	π	≡
1110	(7)	∞	.	>	N	^	n	^	∞	ó	÷	÷	Δ	Ω	ρ	≡
1111	(8)	∞	/	?	O	_	o	Δ	∞	ó	÷	÷	Δ	α	σ	≡



NO.7066-DE

b7-b4 b3-b0	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
CG RAM (1)				0	a	P	`	P	O	E	E	S	e		e	P
0001 (2)			!	1	A	Q	a	q	O	E	i	±	E	~	%	q
0010 (3)			"	2	B	R	b	r	O	E	i	U	D	^	%	e
0011 (4)			#	3	C	S	c	s	O	E	i	↑	B	^	%	%
0100 (5)			\$	4	D	T	d	t	O	E	i	↓	C	^	%	e
0101 (6)			%	5	E	U	e	u	O	E	i	+	e	~	%	P
0110 (7)			&	6	F	V	f	v	O	E	N	f	x	÷	P	E
0111 (8)			'	7	G	W	g	w	O	E	N	E	C	*	g	^
1000 (1)			(	8	H	X	h	x	O	E	N	X	μ	*	↑	Φ
1001 (2)			)	9	I	Y	i	y	O	E	N	±	Ø	↑	↓	Y
1010 (3)			*	:	J	Z	j	z	O	E	N	±	9	\	j	B
1011 (4)			+	;	K	L	k	l	O	E	N	±	A	×	□	Π
1100 (5)			,	<	L	¥	l	l	O	E	N	±	¶	Φ	¥	¥
1101 (6)			-	=	M	I	m	>	O	E	N	±	W	¥	±	Ø
1110 (7)			.	>	N	^	n	÷	O	E	N	±	W	¥	±	Ø
1111 (8)			/	?	O	_	o	÷	O	E	N	±	W	¥	±	Ø

9.EXTERNAL DIMENSIONS



DISPLAY TYPE: STN/ Olivine
VIEWING DIRECTION: 6:00
DISPLAY MODE: REFLECTIVE/NEGATIVE
DRIVING METHOD: 1/16DUTY 1/5BIAS
OPERATING VOLTAGE: 4.7V
OPERATING TEMPERATURE: 0° ~ 50°C
STORAGE TEMPERATURE: -20°~60°C
CONNECTOR: ZEBRA
BACKLIGHT: LED(WHITE)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VSS	VDD	V0	RS	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	BL	BLK