Dot Matrix LEDs/Alphanumeric LEDs

Sharp dot matrix LEDs and alphanumeric LEDs are produced in the start-to-finish production system, from the semiconductor material growth to the final assembly. They provide clear, bright, highly reliable displays in various types of unit, including stackable dot matrix LEDs and multiple digit alphanumeric LEDs.

■ Dot Matrix LEDs/Alphanumeric LEDs Line-up

Type / Radiation color / Common pins*1 / No. of digits / Character height (inch)			R Red	P Red	D Red	S Sunset orange	H Yellow	Y Lemon yellow	E Yellow-green (HL)*2	N Yellow-green	K Green (HL)*2	E+D Yellow-green (HL)*2+Red	Outline dimensions (Fig.)
			Anode	Anode	Anode	Anode	Anode	Anode	Anode	Anode	Anode	Anode	
			Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	Cathode	
5×7 dot matrix	Dot matrix	0.33		LT5001P				LT5001Y		LT5001N	LT5001K		1
				LT5002P				LT5002Y		LT5002N	LT5002K		
		1.08		LT5101P	LT5101D								2
				LT5102P	LT5102D								
		1.8			LT5103D								3
					LT5104D								
8×8 dot matrix		1.05			LT5105D				LT5105E				4
					LT5106D	LT5106S	LT5106H		LT5106E				
4×4 dot matrix		0.9			LT5107D		LT5107H		LT5107E			LT5107ED	5, 6*3
					LT5108D		LT5108H		LT5108E			LT5108ED	
16×16 dot matrix		1.48				LT5005S							7
Alpha-numeric	1-digit	0.6		GL9P06A	GL9D06A				GL9E06A	GL9N06A			8
				GL8P06A	GL8D06A				GL8E06A	GL8N06A			
	4-digit	0.15	LT2510										9
	8-digit		LT2500										10

■ Dot Matrix LED Units Line-up

No. of dots / Dot size / Radiation material / Radiation color		Yellow-green (HL)*2+Red	Yellow-green (HL)*2+Red (HL)*2
		GaP+GaAsP on GaP	GaP+GaAlAs on GaAs
16×16	φ3.0	LT1460ED (under development)	
	φ5.0	LT1450ED (under development)	
	φ7.5		LT1441M

Dot Matrix LEDs

■ Absolute Maximum Ratings

(Ta=25°C)

Model No.		Type	Character height (mm)	Continuous forward current I_F/dot (mA)	Peak forward current*4 I_{FM}/dot (mA)	Derating factor		Reverse voltage V_R/dot (V)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)
Anode common	Cathode common					DC/dot (mA/°C)	Pulse/dot (mA/°C)			
LT5001P	LT5002P	5×7 dot matrix	8.4	10	50	0.18	0.91	5	−20 ~ +60	−40 ~ +80
LT5001Y	LT5002Y		8.4	10	50	0.18	0.91	5	−20 ~ +60	−40 ~ +80
LT5001N	LT5002N		8.4	10	50	0.18	0.91	5	−20 ~ +60	−40 ~ +80
LT5001K	LT5002K		8.4	10	50	0.18	0.91	5	−20 ~ +60	−40 ~ +80
LT5101P	LT5102P		27.42	20	50	0.18	0.91	5	−20 ~ +70	−20 ~ +80
LT5101D	LT5102D		27.42	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5103D	LT5104D		45.6	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5105D	LT5106D	8×8 dot matrix	26.67	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
—	LT5106S		26.67	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
—	LT5106H		26.67	15	50	0.27	0.91	5	−20 ~ +70	−20 ~ +80
LT5105E	LT5106E		26.67	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5107D	LT5108D	4×4 dot matrix	22.8	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5107H	LT5108H		22.8	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5107E	LT5108E		22.8	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5107ED	LT5108ED		22.8	20	50	0.36	0.91	5	−20 ~ +70	−20 ~ +80
LT5005S	—	16×16 dot matrix	37.5	15	80	—	1.45	5	−20 ~ +60	−20 ~ +80

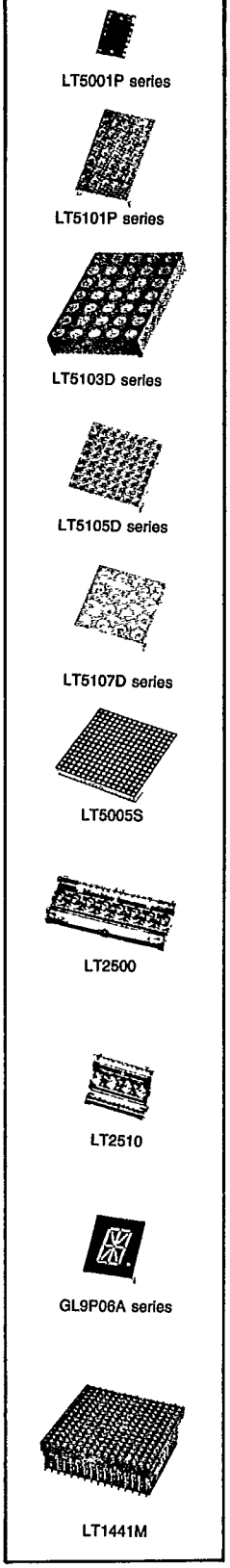
*1 Common pins of dot matrix mean a column.
*2 HL: High-luminosity
*3 Fig. 6: LT5107ED · LT5108ED
*4 Duty ratio 1/10, Pulse width 0.1ms

Dot Matrix LEDs/Alphanumeric LEDs

■ Electro-optical Characteristics (Per Dot)

(Ta=25°C)

Model No.		Forward voltage V_F (V)		Luminous intensity I_V (mcd)		Peak emission wavelength λ_P (nm)	Spectrum radiation bandwidth $\Delta\lambda$ (nm)	Condition I_F (mA)	Reverse current I_R (μA)	Condition V_R (V)
Anode common	Cathode common	TYP	MAX	MIN	TYP	TYP	TYP		MAX	
LT5001P	LT5002P	1.85	2.3	0.04	0.1	695	100	2	10	4
LT5001Y	LT5002Y	1.9	2.5	0.64	1.28	568	30	5	10	4
LT5001N	LT5002N	1.9	2.5	0.05	0.1	565	30	5	10	4
LT5001K	LT5002K	2.0	2.5	0.20	0.53	555	30	5	10	4
LT5101P	LT5102P	1.9	2.5	0.4	0.8	695	100	5	10	4
LT5101D	LT5102D	1.8	2.2	0.5	1.0	635	35	10	10	4
LT5103D	LT5104D	1.8	2.2	0.5	1.0	635	35	10	10	4
LT5105D	LT5106D	1.9	2.5	0.5	—	635	35	10	10	4
—	LT5106S	1.9	2.5	0.65	—	610	35	10	10	4
—	LT5106H	1.9	2.5	0.5	—	585	30	10	10	4
LT5105E	LT5106E	2.0	2.5	1.0	—	565	30	10	10	4
LT5107D	LT5108D	1.9	2.5	19.2*1	—	635	35	10	10	4
LT5107H	LT5108H	1.9	2.5	19.2*1	—	585	30	10	10	4
LT5107E	LT5108E	2.0	2.5	27.2*1	—	565	30	10	10	4
LT5107ED Red	LT5108ED Red	1.9	2.5	19.2*1	—	635	35	10	10	4
LT5107ED Yellow-green	LT5108ED Yellow-green	2.0	2.5	27.2*1	—	565	30	10	10	4
LT5005S	—	1.9	—	—	—	610	35	50	10	4



Alphanumeric LEDs

■ Absolute Maximum Ratings

(Ta=25°C)

Model No.		Character height (mm)	Continuous forward current I_F/seg (mA)	Peak forward current*2 I_{FM}/seg (mA)	Derating factor		Reverse voltage V_R/seg (V)	Operating temperature Topr (°C)	Storage temperature Tstg (°C)
Anode common	Cathode common				DC/seg (mA/°C)	Pulse/seg (mA/°C)			
GL9P06A	GL8P06A	16.0	10	50	0.18	0.91	5	−30 ~ +70	−40 ~ +80
GL9D06A	GL8D06A	16.0	20	50	0.36	0.91	5	−30 ~ +70	−40 ~ +80
GL9E06A	GL8E06A	16.0	15	50	0.27	0.91	5	−30 ~ +70	−40 ~ +80
GL9N06A	GL8N06A	16.0	15	50	0.27	0.91	5	−30 ~ +70	−40 ~ +80
—	LT2510	3.81	7	200	0.093	—	5	−20 ~ +60	−20 ~ +70
—	LT2500	3.81	7	200	0.093	—	5	−20 ~ +85	−20 ~ +100

■ Electro-optical Characteristics

(Ta=25°C)

Model No.		Radiation shape	Forward voltage V_F (V)		Luminous intensity I_V (mcd)		Peak emission wavelength λ_P (nm)	Spectrum radiation bandwidth $\Delta\lambda$ (nm)	Condition I_F (mA)	Reverse current I_R (μA)	Condition V_R (V)	Terminal capacitance*3 Ct (pF)
Anode common	Cathode common		TYP	MAX	MIN	TYP	TYP	TYP		MAX		TYP
GL9P06A	GL8P06A		1.9	2.5	0.15	0.3	695	100	5	10	4	55
GL9D06A	GL8D06A		1.8	2.3	0.3	0.8	635	35	10	10	4	40
GL9E06A	GL8E06A		2.0	2.5	0.7	1.4	565	30	10	10	4	35
GL9N06A	GL8N06A		2.0	2.5	0.2	0.5	565	30	10	10	4	35
—	LT2510		1.6*4	1.9*4	0.003*4	—	655	20	2	10	4	40
—	LT2500		1.6*4	1.9*4	0.003*4	—	655	20	2	10	4	40

*1 When all dots are lit
*2 Duty ratio 1/10, Pulse width 0.1ms
*3 V = 0V, f = 1MHz
*4 Duty ratio 1/10, Pulse width 0.1ms, I_{FM} = 5mA/seg

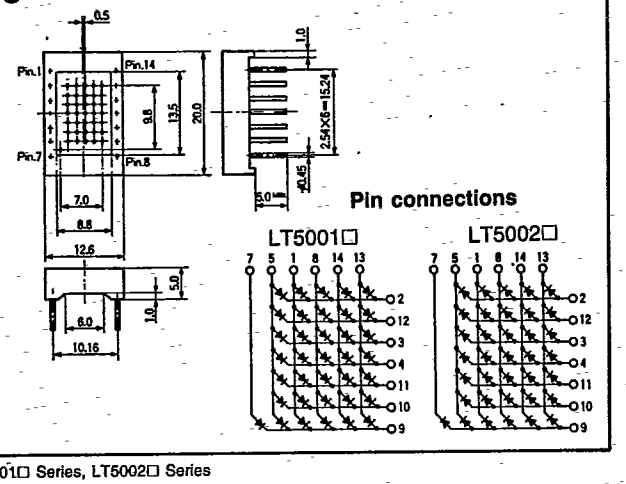
Dot Matrix LEDs/Alphanumeric LEDs

(Unit: mm)

■ Outline Dimensions

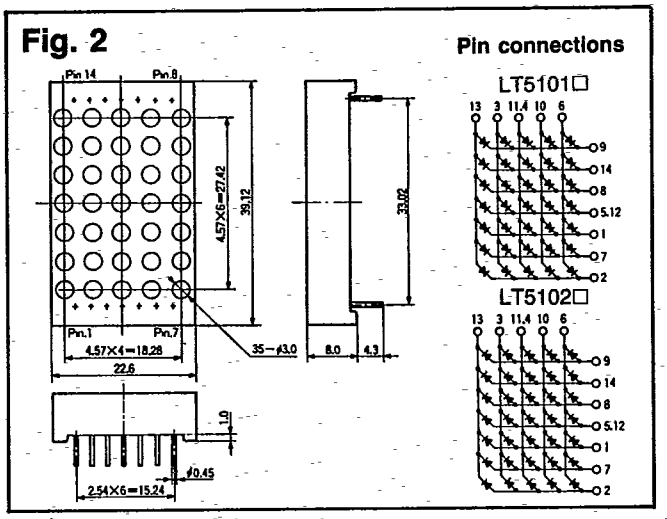
Note) □ indicates radiation color symbol.

Fig. 1



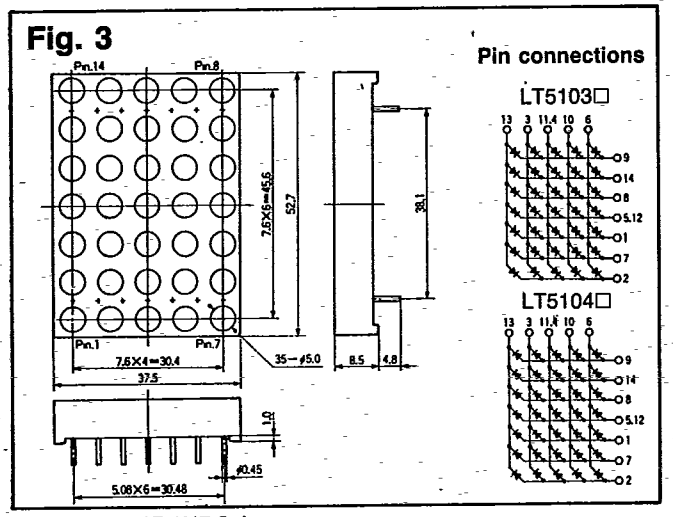
LT5001□ Series, LT5002□ Series

Fig. 2



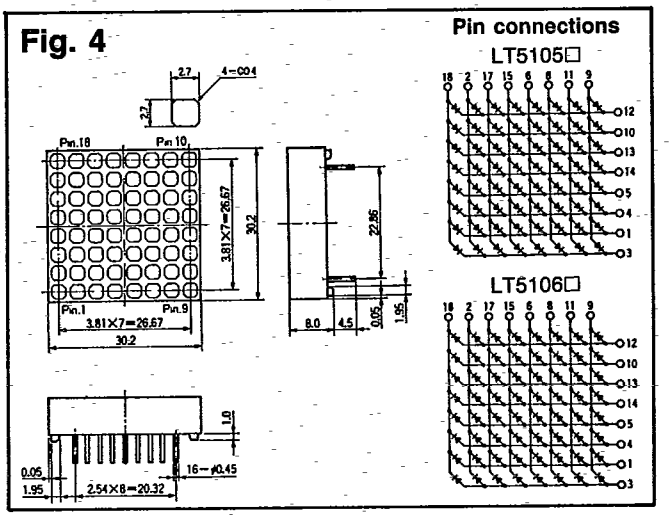
LT5101□ Series, LT5102□ Series

Fig. 3



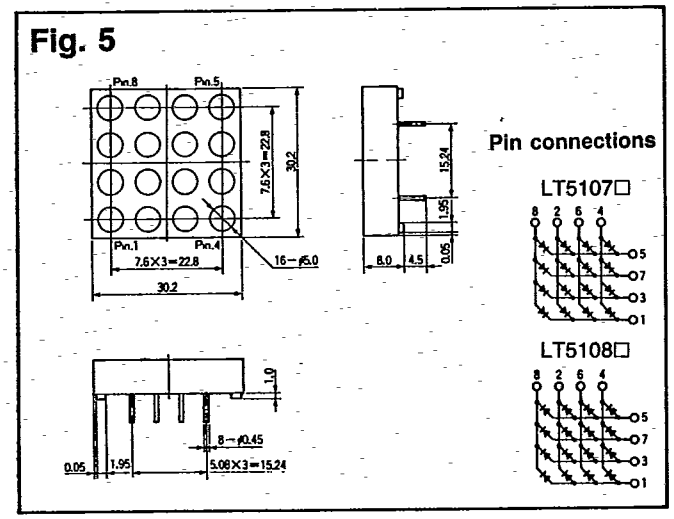
LT5103□ Series, LT5104□ Series

Fig. 4



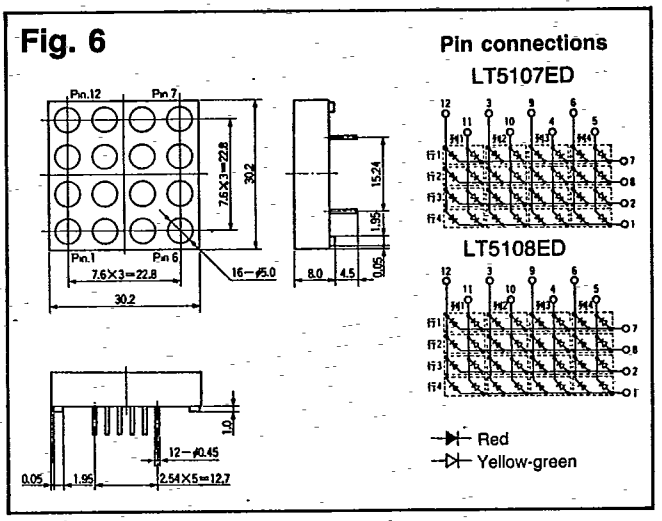
LT5105□ Series, LT5106□ Series

Fig. 5



LT5107□ Series, LT5108□ Series

Fig. 6

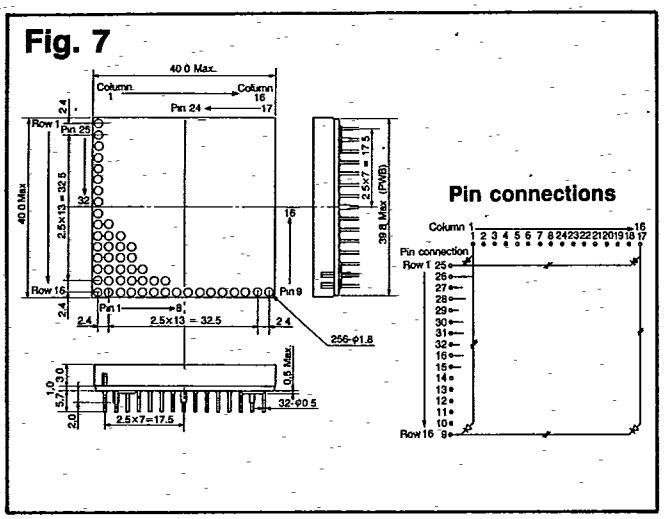


LT5107ED, LT5108ED

Dot Matrix LEDs/Alphanumeric LEDs

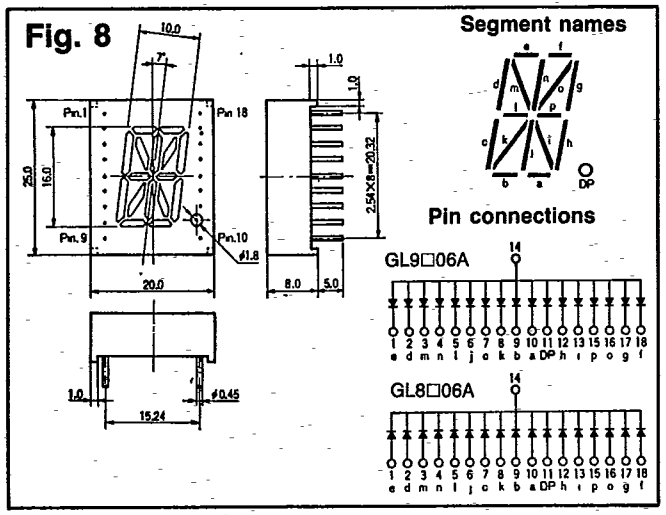
(Unit: mm)

Fig. 7



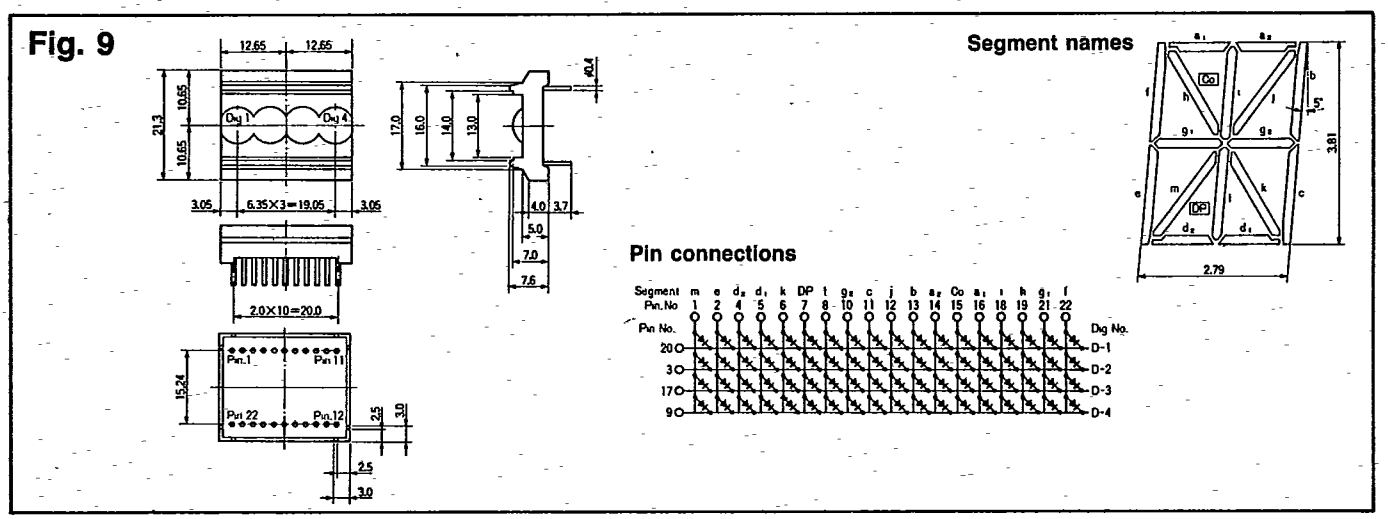
LT5005S

Fig. 8



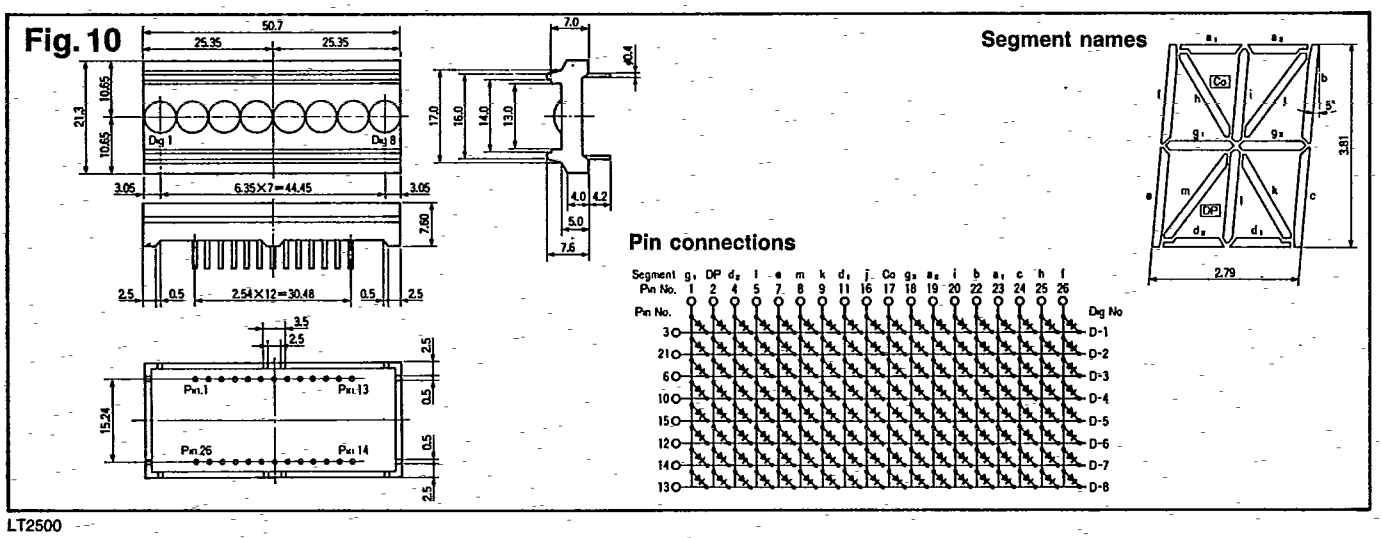
GL9□06A Series, GL8□06A Series

Fig. 9



LT2510

Fig. 10



LT2500

Dot Matrix LEDs/Alphanumeric LEDs

Dot Matrix LED Unit, LT1441M

■ Description

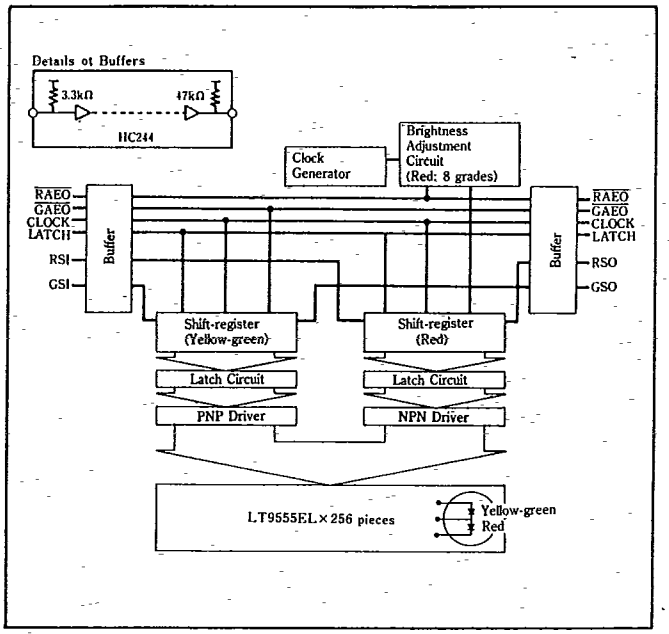
Sharp 16×16 dot matrix LED unit, LT1441M is constructed with ϕ7.5 high-luminosity dichromatic LED lamps.

It is stackable both horizontally and vertically for larger display systems.

Incorporating high-luminosity GaAlAs LED lamps, it provides displays that are clearly viewable even under direct sunlight and is most suitable for outdoor information boards, advertisement displays, etc. Shift registers, latch circuits, and driver ICs are contained in this unit.

(LEDs are driven by static methods.)

■ Block Diagram



■ Absolute Maximum Ratings

(Ta=25°C)

Parameter	Symbol	Rating	Unit
IC supply voltage	V_{DD}	5.5	V
LED supply voltage (Red)	V_1	5.5	V
LED supply voltage (Yellow-green)	V_2	5.5	V
Input voltage	V_I	−0.3 ~ V_{DD} +0.3	V
LED current dissipation (Red)	I_1	7.68	A
LED current dissipation (Yellow-green)	I_2	7.68	A
Operating temperature range	Topr	−10 ~ +75	°C
Storage temperature range	Tstg	−20 ~ +100	°C

■ Electro-optical Characteristics

(V_{DD}=5V, V_1=5V, V_2=5V, Ta=25°C)

Parameter		Symbol	Min	Typ	Max	Unit	Remark
Input voltage		V_{IH}	3.5	—	—	V	
		V_{IL}	—	—	1.5	V	
Input current		I_{IL}	—	—	1.7	mA	V_I=0V
Output voltage (SO)		V_{OH}	4.0	—	—	V	
		V_{OL}	—	—	0.4	V	
Output current (SO)		I_{OL}	5.0	—	—	mA	
IC current dissipation		I_{DD}	—	70	—	mA	f_{CLK}=3MHz
LED current	Red	I_{LED}	—	20	—	mA	Per chip
	Yellow-green		—	25	—	mA	
Luminous intensity	Red	I_V	50	120	—	mcd	Per chip
	Yellow-green		50	130	—	mcd	
Peak emission wavelength	Red	λ_P	—	660	—	nm	
	Yellow-green		—	565	—	nm	
Spectrum radiation bandwidth	Red	$\Delta\lambda$	—	20	—	nm	
	Yellow-green		—	30	—	nm	

■ Operating Conditions

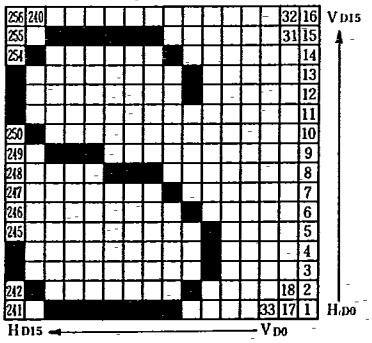
(V_{DD}=5V, Ta=25°C)

Parameter	Symbol	Min	Typ	Max	Unit	Remark
IC supply voltage	V_{DD}	4.75	5.0	5.25	V	
LED supply voltage (Red)	V_1	—	5.0	—	V	
LED supply voltage (Yellow-green)	V_2	—	5.0	—	V	
Clock frequency	f_{CLK}	—	—	3	MHz	
Clock pulse width	t_{WCLK}	100	—	—	ns	
Set up time	t_{setup}	80	—	—	ns	SI–CLK
Set up time	t_{CL}	150	—	—	ns	CLK–LATCH
Hold time	t_{hold}	20	—	—	ns	SI–CLK
Latch pulse width	t_{WLATCH}	80	—	—	ns	
Enable pulse width	t_{WAEO}	3	—	—	ms	

■ Interface Signal Input

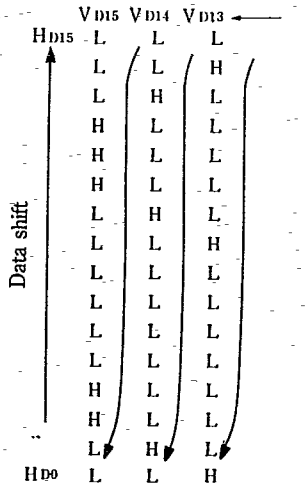
1. Input the display data ("H"=LED on, "L"=LED off) corresponding to the dot pattern, in order, from right bottom to left top, as serial data signals (RSI for red, GSI for yellow-green) synchronized with the clock signals (CLOCK).

The front of the unit

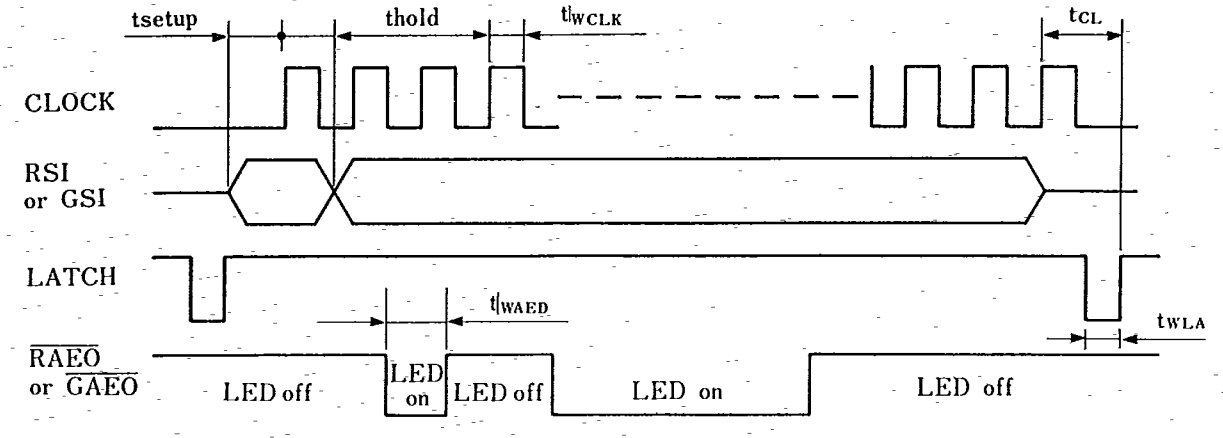


The data shift to the higher number in the above figure (1~256).
e.g. 1 → 2, 2 → 3, ····· 255 → 256, 256 → 1 of the next unit

The order to input serial data signal



2. When the serial data input for all dots in the entire display face is complete, input the latch signal (LATCH), and transfer the display data to the shift-register on signal line drivers. (This register will hold the data until the next latch signal arrives.)
This procedure will generate a whole screen display.



Timing Chart

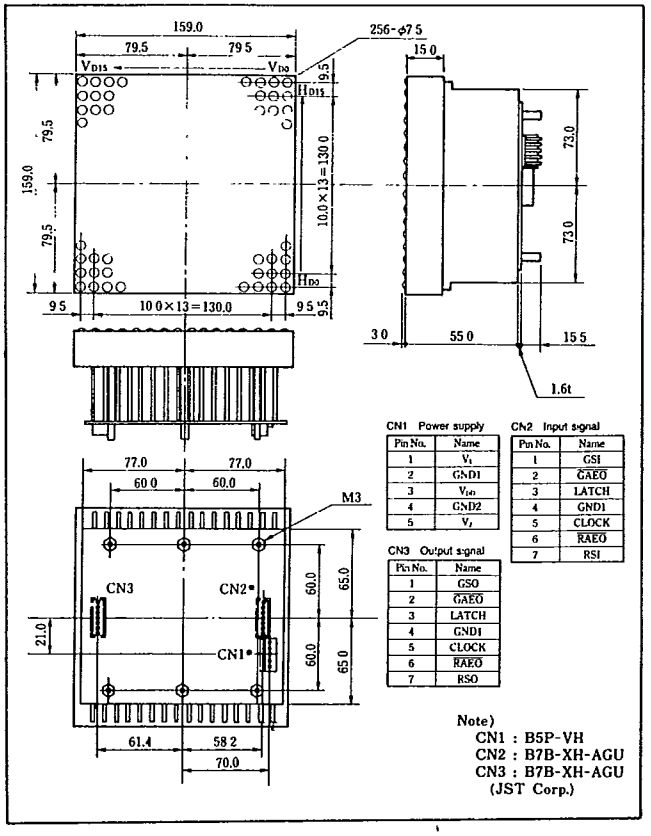
Dot Matrix LEDs/Alphanumeric LEDs

■ Terminal Functions

Connector	Pin No.	Name	Function
CN1 (Power supply)	1	V_1	Power supply for LED (red)
	2	GND1	Ground for IC
	3	V_{DD}	Power supply for IC
	4	GND2	Ground for LED
	5	V_2	Power supply for LED (yellow-green)
CN2 (Input signal)	1	GSI	Serial data input for yellow-green (H=lit, L=no lit)
	2	$\overline{GAEO}$	Output enable for yellow-green H=Outputs are all off L=Outputs are lited by data
	3	LATCH	Latch signal for the contents of shift-register H=The contents are latched
	4	GND1	Ground for IC
	5	CLOCK	Clock signal for data transmission in the shift-register. (L→H: The data are shifted)
	6	$\overline{RAEO}$	Output enable for red H=Outputs are all off L=Output are lited by data
	7	RSI	Serial data input for red
CN3 (Output signal)	1	GSO	Input signal for yellow-green is generated through 256 bit shift-register in the unit
	2	$\overline{GAEO}$	Buffered the input signal $\overline{GAEO}$
	3	LATCH	Buffered the input signal LATCH
	4	GND1	Ground for IC
	5	CLOCK	Buffered the input signal CLOCK
	6	$\overline{RAEO}$	Buffered the input signal $\overline{RAEO}$
	7	RSO	Input signal for red is generated through 256 bit shift-register in the unit

■ Outline Dimensions

(Unit: mm)



CN1 Power supply

Pin No.	Name
1	V_1
2	GND1
3	V_{DD}
4	GND2
5	V_2

CN2 Input signal

Pin No.	Name
1	GSI
2	$\overline{GAEO}$
3	LATCH
4	GND1
5	CLOCK
6	$\overline{RAEO}$
7	RSI

CN3 Output signal

Pin No.	Name
1	GSO
2	$\overline{GAEO}$
3	LATCH
4	GND1
5	CLOCK
6	$\overline{RAEO}$
7	RSO

■ Connections Methed