LITEON

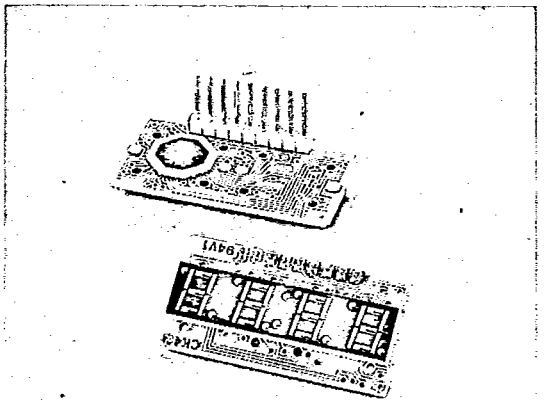
LTM-8328XKR SERIES

0.3" FOUR DIGIT 7-SEGMENT NUMERIC DISPLAY WITH MOS IC DRIVER

T-41-37

FEATURES

- 0.3 INCH (7.62mm) DIGIT HEIGHT.
- FOUR-DIGIT, RIGHT HAND DECIMAL.
- WIDE SUPPLY VOLTAGE OPERATION.
- SERIAL DATA INPUT.
- CONSTANT CURRENT DRIVERS.
- CONTINUOUS BRIGHTNESS CONTROL
- OUTPUT AVAILABLE FOR TWO EXTERNAL LEDS.
- WIDE VIEWING ANGLE.
- CHOICE OF TWO BRIGHT COLORS – BRIGHT RED/GREEN
- TTL COMPATIBLE.



DESCRIPTION

The LTM-8328KR series are 0.3 inch (7.62mm) height numeric display modules, having a built-in M5450 MOS integrated circuits. The integrated circuit contains serial data input, 35 bit shift registers. 34 LED driver outputs and a brightness control. The bright red and green devices utilized LED chips which are made from GaP on a transparent GaP substrate. The MOS integrated circuits produced with N-channel silicon gate technology.

All the displays have black face with white diffused film.

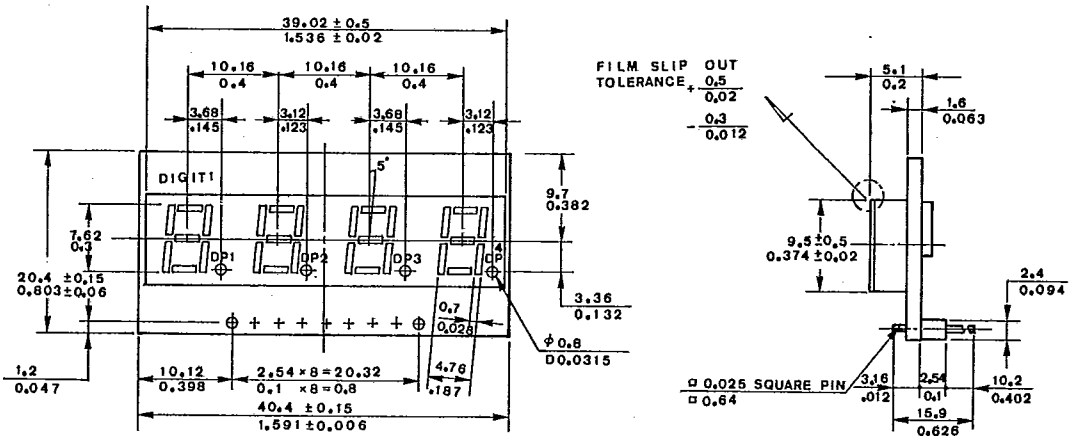
APPLICATIONS

- MICROPROCESSOR DISPLAY.
- DIGITAL CLOCK, THERMOMETER, COUNTER, VOLTMETER.
- INSTRUMENTATION READOUTS.

DEVICES

PART NO. LTM–		DESCRIPTION
BRIGHT RED	GREEN	
8328PKR-04	8328GKR-04	Four Digit R.H.D.P., With I.C. Driver

PACKAGE DIMENSIONS



NOTE: All dimensions are in millimeters (inches), tolerance is 0.25mm (0.010") unless otherwise noted.

PIN CONNECTION

PIN NO.	DESCRIPTION
1	EXT LED 1
2	EXT LED 2
3	$\overline{\text{DATA ENABLE}}$
4	DATA SERIAL
5	CLOCK
6	VDD
7	DIMMER
8	GND
9	VLED

BLOCK DIAGRAM

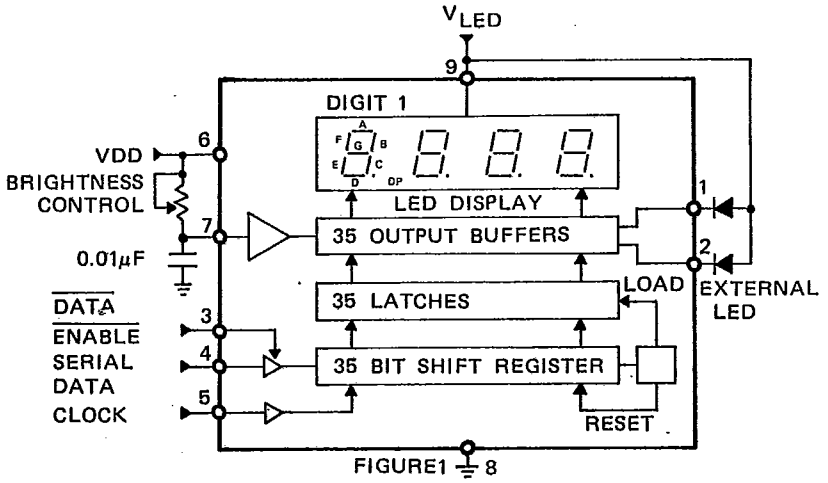


FIGURE1

ABSOLUTE MAXIMUM RATING AT T_A = 25°C

PARAMETER	SYMBOL	MIN.	MAX.	UNITS
Supply Voltage *1	V_{DD}	−0.3	15	V
Input Voltage	V_I	−0.3	15	V
Off State Output Voltage	Vo (off)		15	V
LED Supply Voltage	V_{LED}	2.8	3.5	V
Power Dissipation of IC *2	P_D (IC)		660	mW
Supply Current	I_{DD}		7	mA
Operating Temperature Range	Top	−20	+60	°C
Storage Temperature Range	Tstg	−20	+60	°C
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260°C				

NOTES: 1. All voltages are with respect to Vss (GND)
2. Power dissipation of IC is given by $P_D = (V_{LED} - V_F) \bullet (I_F) \bullet$ (No. of Segments) + (7mA) $\bullet V_{DD}$)
*V_F is LED forward voltage.

RECOMMENDED OPERATING CONDITION AT T_A = 25°C

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Supply Voltage	V_{DD}	4.75		13.2	V	
Input Voltage						
Logical "0" Level		−0.3		0.8	V	±10μA Input Bias
Logical "1" Level	V_I	2.2		V_{DD}	V	4.75V < V_{DD} < 5.25V
Logical "1" Level		V_{DD} -2		V_{DD}	V	V_{DD} > 5.25V
Brightness Input Current	I_B	0		0.75	mA	
Brightness Input Voltage	V_B	3		4.3	V	Input Current = 750 μA
Off State Voltage	Vo (off)			13.2	V	
Output Sink Current						
Segment Off				10	μA	I_B = 0 μA
Segment On			3		mA	I_B = 100 μA
			6		mA	I_B = 200 μA
Input Clock Frequency	F_{CLOCK}	0		0.5	MHZ	
Output Matching	Io			±20	%	

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTM-8328PKR-04

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	120	250		μcd	I_B = 0.4 mA
Peak Emission Wavelength	λp		697		nm	I_B = 0.4 mA
Spectral Line Half-Width	Δλ		90		nm	I_B = 0.4 mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B = 0.4 mA

LTM-8328GKR-04

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	200	400		μcd	I_B = 0.4 mA
Peak Emission Wavelength	λp		565		nm	I_B = 0.4 mA
Spectral Line Half-Width	Δλ		30		nm	I_B = 0.4 mA
Luminous Intensity Matching Ratio	Iv-m			2:1		I_B = 0.4 mA

FUNCTIONAL DESCRIPTION

Serial data transfer from the data source to the display driver is accomplished with 2 signals serial data and clock. Using a format of a leading "1" followed by the 35 data bits allows data transfer without an additional load signal. The 35 data bits are latched after the 36th bit is complet, thus providing nonmultiplexed, direct drive to the display. Outputs change only if the serial data bits differ from the previous time.

Brightness of display is determined by control the output current of LED display. A InF capacitor should be connected to brightness control, Pin 7 to prevent possible oscillations. The output current is typically 25 times greater than the current into Pin 7 which is set by an external variable resistor. There is an internal limiting resistor of 400Ω nominal value.

Figure 1 shows the input data format. A start bit of logical "1" preceed the 35 bits of data. At the 36th clock, a LOAD signal is generated synchronously with the high state of the clock, which loads the 35 bits of the shift registers into the latches. At the low state of the clock a RESET signal is generaled which clears all the shift registers for the next set of data. The shift registers are static master-slave configuration. There is no clear for master portion of the first register, thus allowing continous operation.

There must be a complete set of 36 clocks or the shift registers won't clear. When power is first applied to the chip an internal power ON reset signal is generated which reset all registers and all latches. The START bit and first clock return the chip on its normal operation. Bit 1 is the first following the start bit and it will appear on the segment A of the digit 1. A logical "1" at the input will turn on the appropriate LED. Figure 2 shows the timing relationship between data, clock, and DATA ENABLE. A max. clock frequency of 0.5 MHz is assumed.

FIGURE 1 Input Data Format.

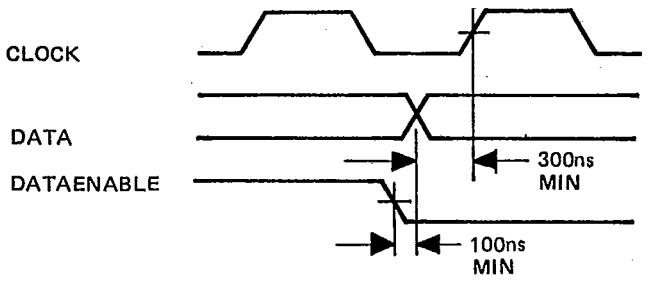
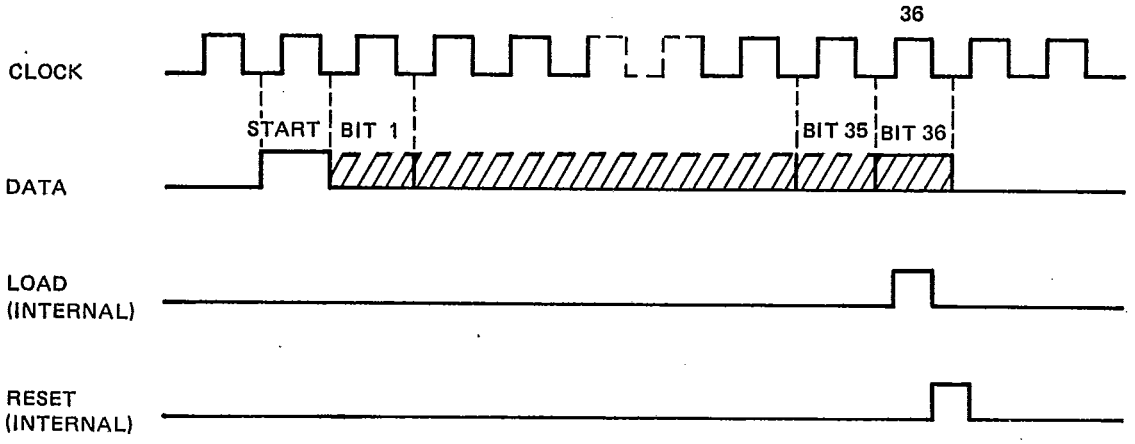
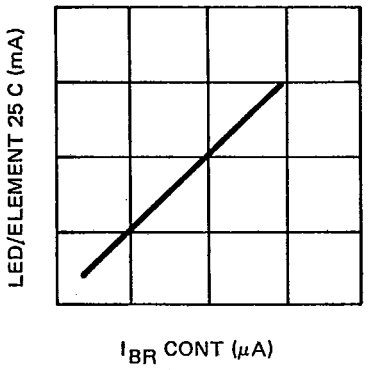


FIGURE 2 Timing Relationship.



Typical LED Element Current Vs Applied Brightness Control Current



LED Supply Voltage Range

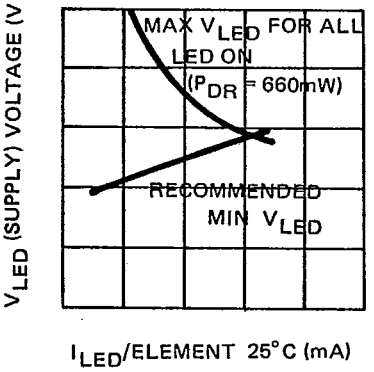


TABLE I SERIAL DATA INPUT SEQUENCE

BIT	DIGIT	SEGMENT	BIT	DIGIT	SEGMENT
1	1	A	18	3	B
2	1	B	19	3	C
3	1	C	20	3	D
4	1	D	21	3	E
5	1	E	22	3	F
6	1	F	23	3	G
7	1	G	24	3	DP
8	1	DP	25	4	A
9	2	A	26	4	B
10	2	B	27	4	C
11	2	C	28	4	D
12	2	D	29	4	E
13	2	E	30	4	E
14	2	F	31	4	G
15	2	G	32	4	DP
16	2	DP	33		LED 1
17	3	A	34		LED 2

PACKAGING

T-90-20

Reel Packaging (Axial Lead Units)

DEVICE TYPE	COMPONENT SPACE (MM) "A"	TAPE SPACE (MM) "B"	REEL DIA (MM) "D"	QUANTITY (EA)		CARTON	
				REEL	CARTON	SIZE (MM)	WEIGHT (KG)
DO-41 / DO-41L	5±0.5	52.4±1.5	326~336	5000	20K	355 x 355 x 355	10.5
DO-201AD	10 ±0.5	52.4±1.5	326~336	1200	4.8K	355 x 355 x 355	9.0
P6(Aleg)	10 ±0.5	52.4±1.5	326~336	700	2.8K	355 x 355 x 355	8.8

The C dimension of Fig. 3 is between 3.17m.m. and 635mm greater than the length of the component involved.

FIG. 1

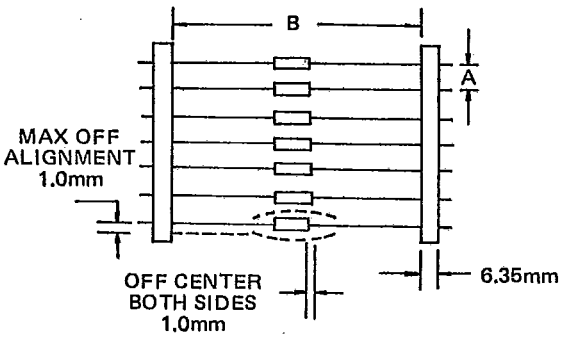


FIG.2

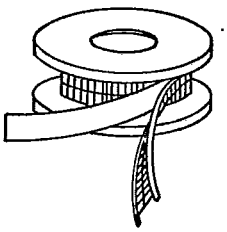
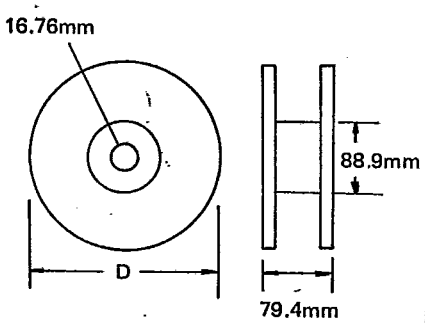


FIG. 3

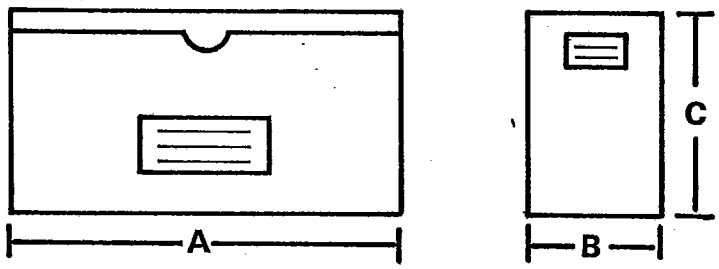


Bulk Packaging (Axial Lead Devices and Bridge Rectifiers)

DEVICE TYPE	PACKAGING SIZE (MM)		QUANTITY (EA)		APPROX GROSS WEIGHT (KG)	
	BOX	CARTON	BOX	CARTON	BOX	CARTON
DO-41 / DO-41L	196 x 84 x 20	450 x 210 x 250	1000	50K	0.38	20
DO-201AD	305 x 93 x 59	355 x 355 x 355	1000	20K	1.35	28
P6(Aleg)	305 x 93 x 59	355 x 355 x 355	500	10K	1.2	24.5
PBM	357 x 125 x 60	530 x 360 x 340	1000	20K	1.5	32.3
PBDF	495 x 155 x 145	500 x 325 x 305	5000	20K	5.1	21.5
PBP	357 x 125 x 60	530 x 360 x 340	500	10K	1.5	31.5
PBL	375 x 220 x 155	470 x 385 x 455	1000	5K	5.7	30.5
PBPC-6	357 x 125 x 60	560 x 360 x 340	250	5K	1.1	22
PBPC-8	357 x 125 x 60	560 x 360 x 340	250	5K	1.7	35
KBPC	375 x 220 x 365	470 x 390 x 385	500	1K	15.1	31.5
KBPC-W	375 x 220 x 365	470 x 390 x 385	500	1K	14.5	30.0

AMMO BOX PACKAGING

BOX SIZE



Unit:m. m.

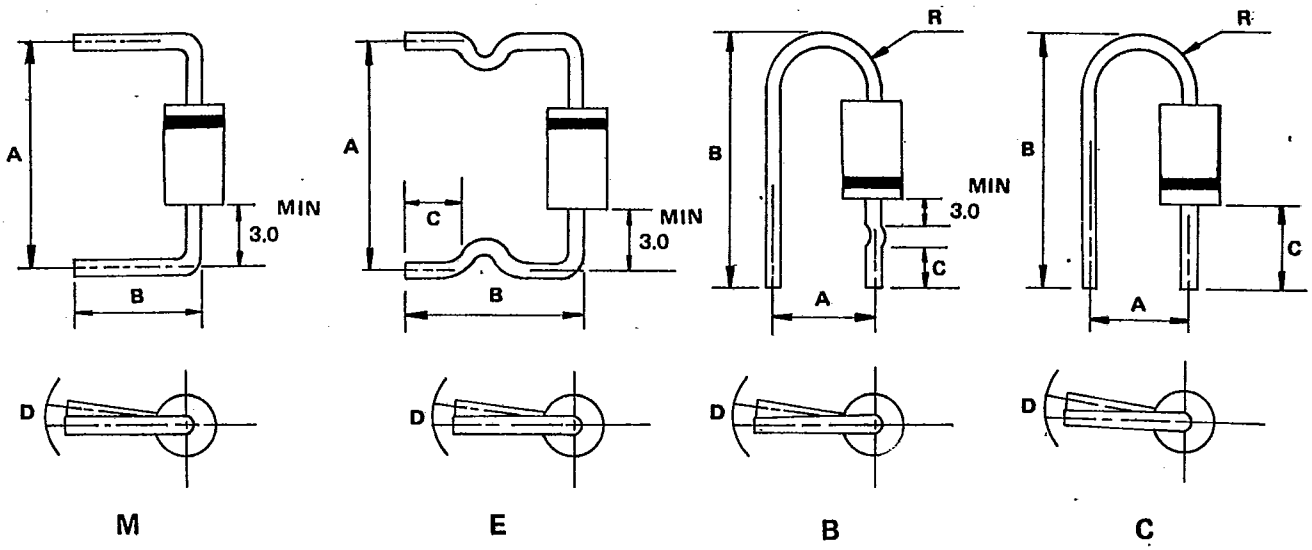
Packaging	Products Outline	Dimension "A"	Dimension "B"	Dimension "C"	Q'ty per BOX
26MM Horizontal Ammo Pack	DO-41	255	50	95	3K
	DO-41L(0.6mm Lead)				3K
52MM Horizontal Ammo Pack	DO-41and DO-41L	250	75	92	3K
	DO 201AD				0.8K

CARTON SIZE

Unit:m. m.

Packaging	Products Outline	length	Width	High	Q'ty Per Carton
26MM Horizontal Ammo Pack	DO-41	330	310	268	42K
	DO-41L(0.6mm Lead)				
52MM Horizontal Ammo Pack	DO-41and DO-41L	355	355	340	48K
	DO 201AD				12K

PREFORMED LEAD DRAWING



Case type	Preformed type	A (mm)		B (mm)		C (mm)		D (mm)		R (mm)	
		range	tolerance	range	tolerance	range	tolerance	range	tolerance	range	tolerance
D041	M	9.0—20.0	1.0	8.0-22.0	±0.5	—	—	1.5	max	—	—
	E	11.0-20.0	±1.0	11.0-16.0	±1.0	4.0-5.0	±0.5	1.5	max	—	—
	B	7.5	±0.5	19.0-22.0	±0.5	7.5	±0.5	1.5	max	2.5-4.0	Typ
	C	4.5	±0.8	18.0-19.0	±0.5	9 0	±0.5	1.5	max	2.5-4.0	Typ
DO201AD	M	15.0-20.0	±1.0	8.0-22.0	±1.0	—	—	2.0	max	—	—
	E	15.0-20.0	±1.0	10.0-22.0	±1.0	3.0-15.0	±0.5	2.0	max	—	—
P6(Aleg)	M	15.0-20.0	±1.0	8.0-22.0	±1.0	—	—	2.0	max	—	—