LITEON

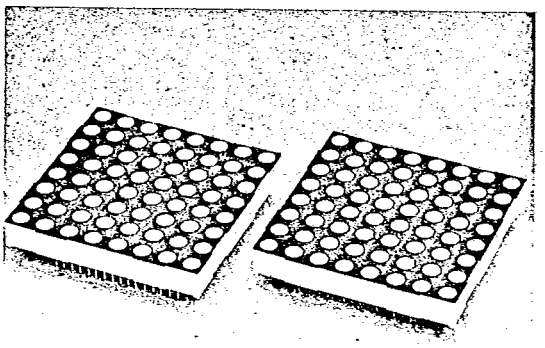
LTP-2088A 2188AA SERIES

T-41-35

2.3" 8 x 8 SINGLE COLOR & MULTICOLOR DOT MATRIX DISPLAYS

FEATURES

- 2.3" INCH (58.42mm) MATRIX HEIGHT.
- LOW POWER REQUIREMENT.
- HIGH CONTRAST.
- HIGH BRIGHTNESS.
- SINGLE PLANE, WIDE VIEWING ANGLE.
- 8 x 8 ARRAY WITH X-Y SELECT.
- COMPATIBLE WITH USASCII AND EBCDIC CODES.
- STACKABLE VERTICALLY AND HORIZONTALLY.
- CHOICE OF TWO MATRIX ORIENTATION CATHODE ROW OR CATHODE COLUMN.
- EASY MOUNTING ON P.C. BOARD.
- CATEGORIZED FOR LUMINOUS INTENSITY.
- SINGLE COLOR DISPLAYS HAVE THE CHOICE OF FOUR BRIGHT COLORS-GREEN / YELLOW / ORANGE / HIGH EFFICIENCY RED.
- MULTICOLOR DISPLAYS ARE APPLICABLE TO THREE BRIGHT COLORS: GREEN, ORANGE AND YELLOW (GREEN AND ORANGE MIXED)



DOT MATRIX DISPLAYS

DESCRIPTION

The LTP-2x88A series are 1.2 inch (30.48mm) matrix-height 5 x 7 dot matrix displays.

The LTP-2188AA are multicolor applicable displays. The multicolor displays have gray face and white dot color.

The LTP-2088A series are single color displays. The green, yellow and orange displays have gray face and white dot color. The high efficiency red displays have red face and red dot color.

The green series devices utilize LED chips which are made from GaP on a transparent GaP substrate.

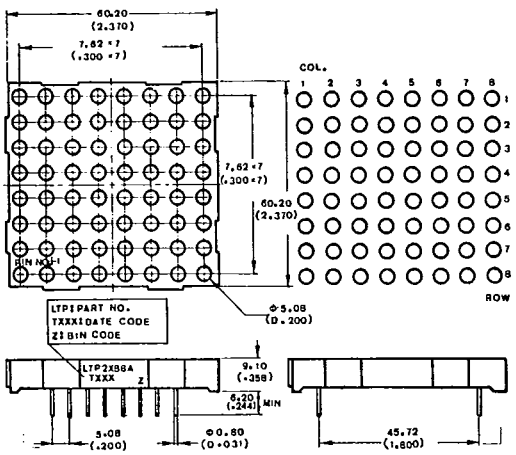
The yellow, orange and high efficiency red series devices utilize LED chips which are made from $GaAs_xP$ on a transparent GaP substrate.

DEVICES

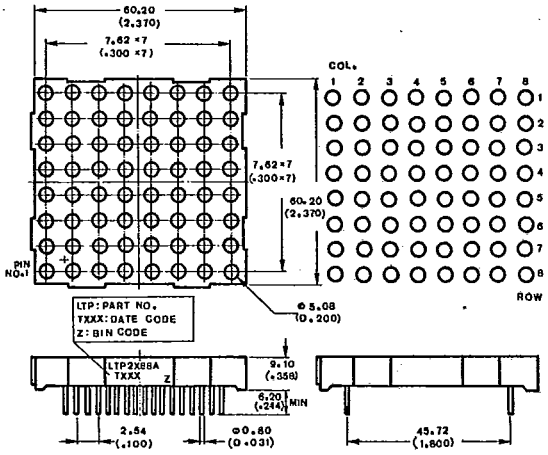
PART NO. LTP-					DESCRIPTION	PACKAGE DIMENSION	INTERNAL CIRCUIT DIAGRAM
GREEN	YELLOW	ORANGE	HI.-EFF. RED	MULTI-COLOR			
2088AG	2088AY	2088AE	2088AHR	—	Anode Column, Cathode Row	A	A
—	—	—	—	2188AA	Anode Column, Cathode Row	B	B

PACKAGE DIMENSIONS

A. LTP-2088A



B. LTP-2188AA

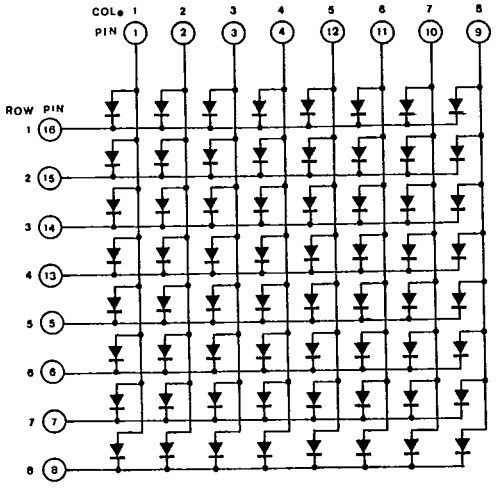


NOTE: All dimensions are in $\frac{\text{millimeters}}{(\text{inches})}$ tolerance are:

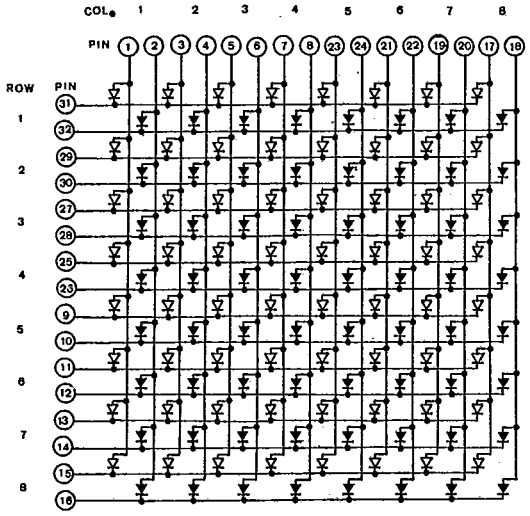
1. Lead length (from seating plane): minimum value $\frac{+1.00}{-0.000}$ mm $\left(\frac{+0.040''}{-0.000''}\right)$ 2. $\frac{\pm 0.25\text{mm}}{(0.010'')}$ unless otherwise noted.

INTERNAL CIRCUIT DIAGRAM

A. LTP-2088A



B. LTP-2188AA



NOTES: 1. The Sign " ⊣▷⊢ " stands for GREEN color dice.
2. The Sign " ⊣▶⊢ " stands for ORANGE color dice.

PIN CONNECTION

PIN NO.	CONNECTION	
	A. LTP-2088A	B. LTP-2188AA
1	Anode Col. 1	A., Col., 1, Green
2	Anode Col. 2	A., Col. 1, Orange
3	Anode Col. 3	A., Col. 2, Green
4	Anode Col. 4	A., Col. 2, Orange
5	Cathode Row 5	A., Col. 3, Green
6	Cathode Row 6	A., Col. 3, Orange
7	Cathode Row 7	A., Col. 4, Green
8	Cathode Row 8	A., Col. 4, Orange
9	Anode Col. 8	C., Row 5, Green
10	Anode Col. 7	C., Row 5, Orange
11	Anode Col. 6	C., Row 6, Green
12	Anode Col. 5	C., Row 6, Orange
13	Cathode Row 4	C., Row 7, Green
14	Cathode Row 3	C., Row 7, Orange
15	Cathode Row 2	C., Row 8, Green
16	Cathode Row 1	C., Row 8, Orange
17		A., Col. 8, Green
18		A., Col. 8, Orange
19		A., Col. 7, Green
20		A., Col. 6, Green
21		A., Col. 6, Green
22		A., Col. 6, Orange
23		A., Col. 5, Green
24		A., Col. 5, Orange
25		C., Row 4, Green
26		C., Row 4, Orange
27		C., Row 3, Green
28		C., Row 3, Orange
29		C., Row 2, Green
30		C., Row 2, Orange
31		C., Row 1, Green
32		C., Row 1, Orange

DOT MATRIX DISPLAYS

ABSOLUTE MAXIMUM RATINGS AT $T_A = 25°C$

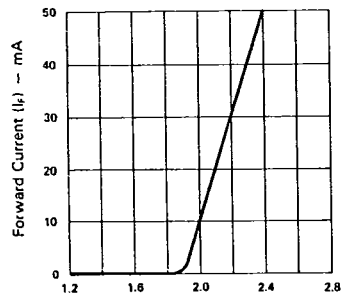
PARAMETER	GREEN	YELLOW	ORANGE	HI-EFF RED	UNIT
Power Dissipation Per Segment	75	60	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1mS Pulse Width)	100	80	100	100	mA
Continuous Forward Current Per Segment	25	20	25	25	mA
Derating Linear From 25°C Per Segment	0.3	0.24	0.3	0.3	mA/°C
Reverse Voltage Per Segment	5	5	5	5	V
Operating Temperature Range	−25°C to + 85°C				
Storage Temperature Range	−25°C to + 85°C				
Solder Temperature 1/16 inch Below Seating Plane for 3 Sec. at 260°C					

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTP-2088AG/2188AA (GREEN)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	1500	4000		μcd	Ip = 48 mA 1/8 DUTY
Peak Emission Wavelength	λp		565		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		30		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

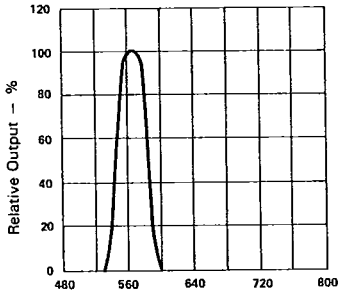
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25° C Ambient Temperature Unless Otherwise Noted)



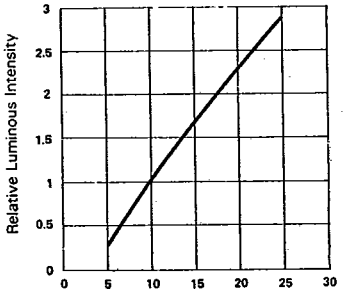
Forward Voltage (V_F) – Volts

Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.



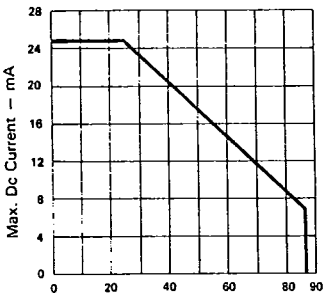
Wavelength (λ) – nm.

Fig. 2 SPECTRAL RESPONSE.



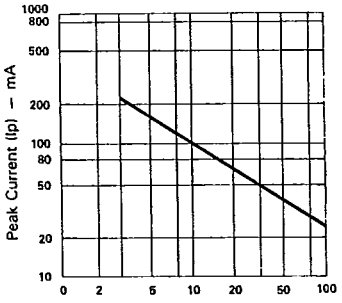
Forward Current (I_F) – mA

Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).



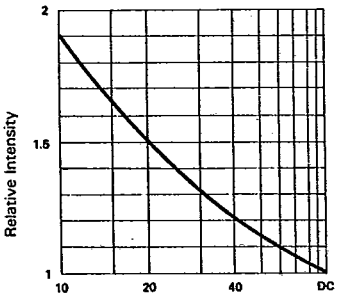
Ambient Temperature (Ta) – °C

Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.



Duty Cycle %

Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE – F = 1 KHz)



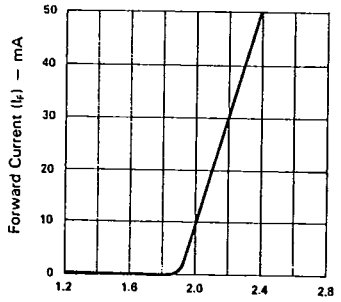
Duty Cycle %

Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

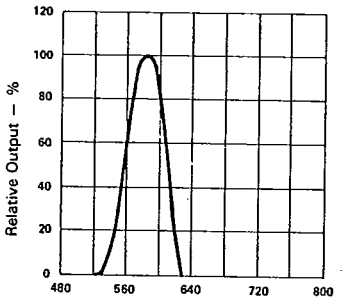
ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTP-2088AY

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	900	4000		µcd	IP = 160 mA 1/16 DUTY
Peak Emission Wavelength	λp		585		nm	IF = 20 mA
Spectral Line Half-Width	Δλ		35		nm	IF = 20 mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF = 20 mA
Reverse Current, any Segment or D.P.	IR			100	µA	VR = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF = 20 mA

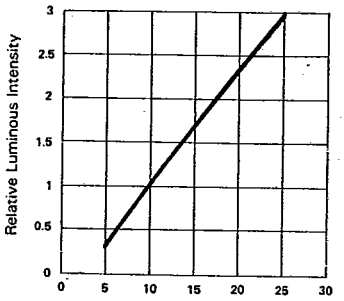
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES
(25°C Ambient Temperature Unless Otherwise Noted)



Forward Voltage (V_F) — Volts
Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

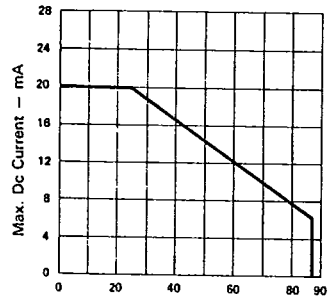


Wavelength (λ) — nm.
Fig. 2 SPECTRAL RESPONSE.

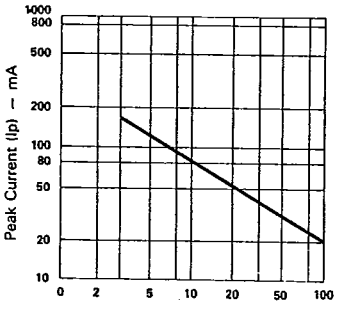


Forward Current (I_F) — mA
Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

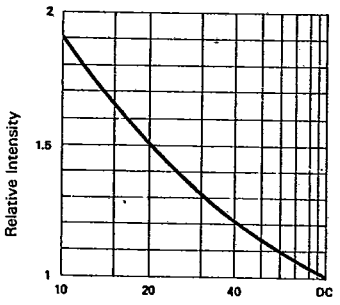
DOT MATRIX DISPLAYS



Ambient Temperature (Ta) — °C
Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.



Duty Cycle %
Fig.5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE — F = 1 KHz)



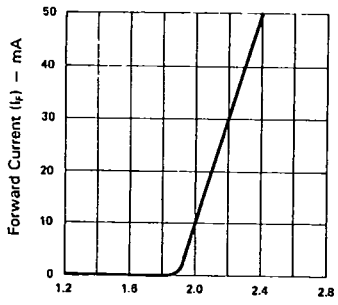
Duty Cycle %
Fig.6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTP-2088AE/2188AA (ORANGE)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	1500	4000		μcd	Ip = 160 mA 1/16 DUTY
Peak Emission Wavelength	λp		630		nm	IF = 20 mA
Spectral Line Half-Width	Δλ		40		nm	IF = 20 mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF = 20 mA
Reverse Current, any Segment or D.P.	IR			100	μA	V = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF = 20 mA

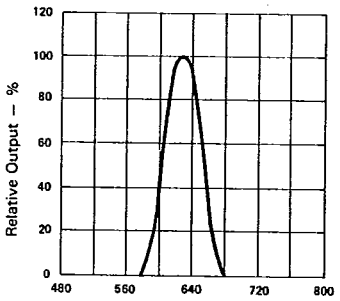
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



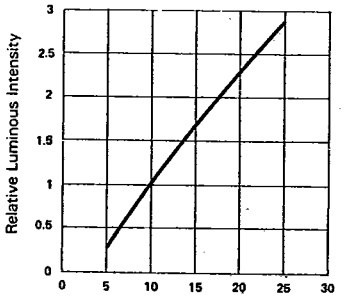
Forward Voltage (V_F) — Volts

Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.



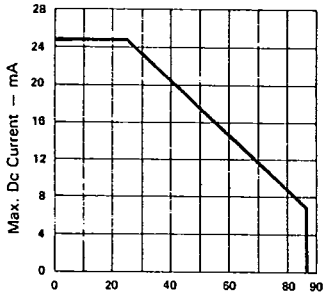
Wavelength (λ) — nm.

Fig. 2 SPECTRAL RESPONSE.



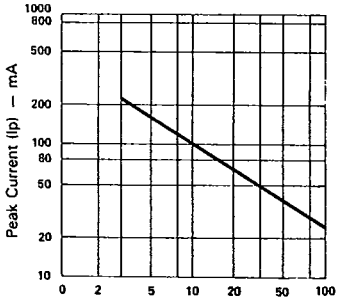
Forward Current (I_F) — mA

Fig. 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).



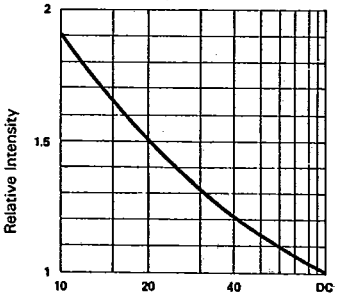
Ambient Temperature (Ta) — °C

Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.



Duty Cycle %

Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE - F = 1 KHz)



Duty Cycle %

Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTP-2088AHR

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	1500	4000		µcd	Ip = 160 mA 1/16 DUTY
Peak Emission Wavelength	λp		635		nm	IF = 20 mA
Spectral Line Half-Width	Δλ		40		nm	IF = 20 mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	IF = 20 mA
Reverse Current, any Segment or D.P.	IR			100	µA	VR = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		IF = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

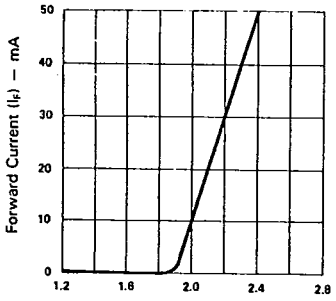


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

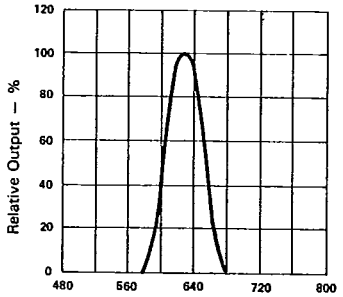


Fig. 2 SPECTRAL RESPONSE.

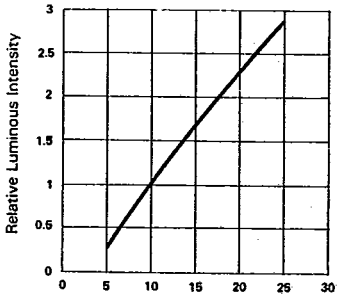


Fig. 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT)

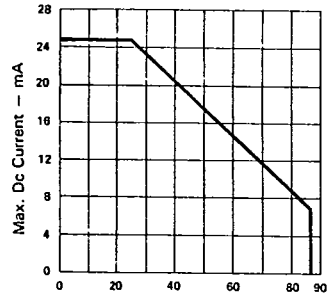


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

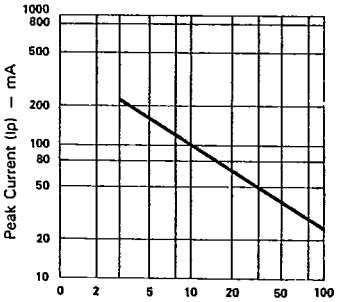


Fig.5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE – F = 1 KHz)

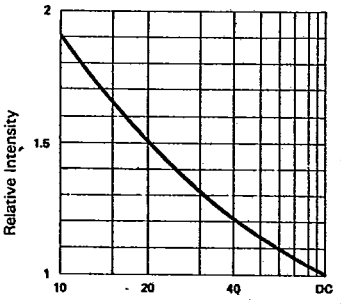


Fig.6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

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

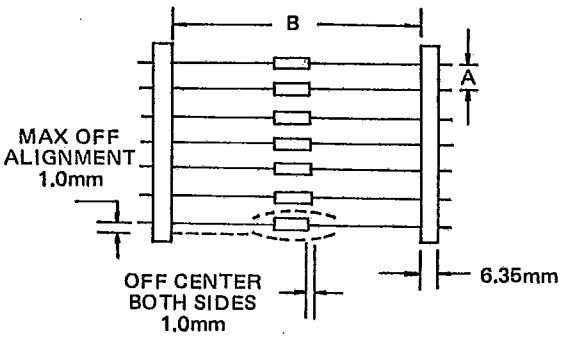


FIG.2

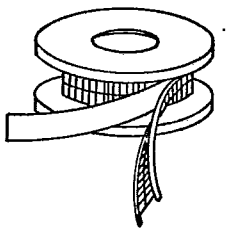
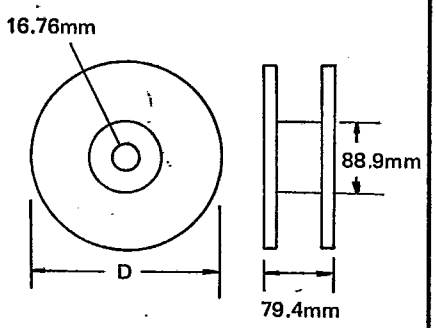


FIG. 3

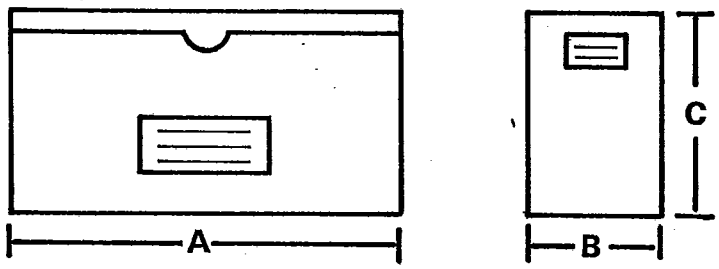


Bulk Packaging (Axial Lead Devices and Bridge Rectifiers)

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.

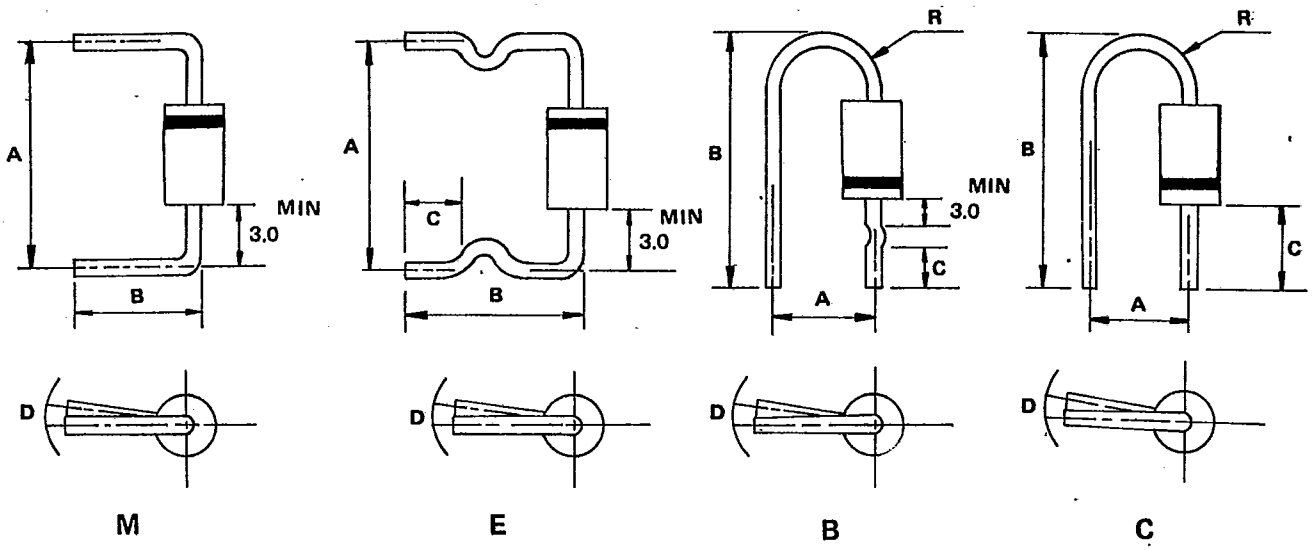
Packaging	Products Outline	Dimension "A"	Dimension "B"	Dimension "C"	Q'ty per BOX
26MM Horizontal Ammo Pack	DO-41	255	50	95	3K
	DO-41L(0.6mm Lead)				3K
52MM Horizontal Ammo Pack	DO-41and DO-41L	250	75	92	3K
	DO 201AD				0.8K

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	—	—