



LITE-ON INC 09E D 5536367 0001188 4

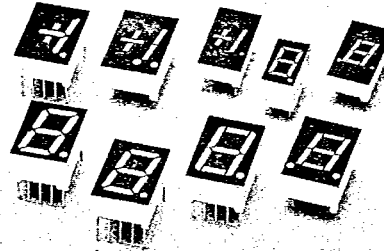
LTS- 310WE 540WE 360WE 5550WE 3350WE 6100WE & LTD- 5520WE 6100WE SERIES

**HIGH EFFICIENCY RED
LOW CURRENT SEVEN-SEGMENT DISPLAYS**

T-41-33

FEATURES

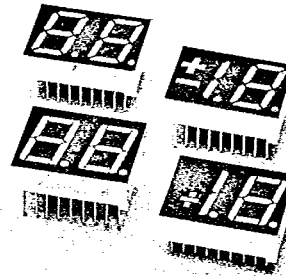
- CHOICE OF SIX DIGIT HEIGHT —
0.3 INCH (7.62mm), 0.36 INCH (9.20mm)
0.43 INCH (10.9mm), 0.52 INCH (13.2mm)
0.56 INCH (14.2mm).
- LOW POWER REQUIREMENT.
- EXCELLENT CHARACTERS APPEARANCE.
- WIDE VIEWING ANGLE.
- GRAY BODY FOR OPTIMUM CONTRAST.
- CATEGORIZED FOR LUMINOUS INTENSITY.
- CAPABLE OF HIGH CURRENT DRIVE.
- COMPATIBLE WITH MONOLITHIC LED DISPLAY DRIVE.
- TYPICAL INTENSITY OF 300 μ cd/seg AT 2mA DRIVE.
- CMOS/MOS/TTL COMPATIBLE.
- EASY MOUNTING ON P.C. BOARD OR SOCKETS.



DESCRIPTION

These LED displays were designed and optimized specially for low current operation. Luminous intensity and forward voltage are tested at 2mA to assure constant brightness at the applications such as low power DC circuit, telecommunications indicator, portable equipment and keyboard indicator.

The low current LED chips are made from GaAsP on a transparent GaP substrate. All the displays have gray face and white segment color.



DEVICE

PART NO.	DIGIT HEIGHT	DESCRIPTION	PACKAGE DIMENSION	INTERNAL CIRCUIT DIAGRAM
LTS-311WE	3"	Universal, ± 1 Overflow	A	A-1
LTS-312WE		Common Anode, Rt. and Lt. Hand Decimal	A	A-2
LTS-313WE		Common Cathode, Rt. Hand Decimal	A	A-3
LTS-315WE		Common Cathode, Rt. Hand Decimal	A	A-4
LTS-316WE		Common Anode, ± 1 Overflow	A	A-5

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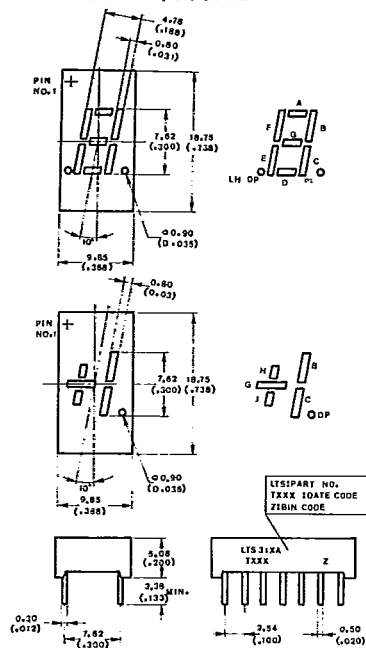
DEVICE

PART NO.	DIGIT HEIGHT	DESCRIPTION	PACKAGE DIMENSION	INTERNAL CIRCUIT DIAGRAM
LTS-360WE	.36"	Common Anode, Rt. Hand Decimal	B	B-1
LTS-367WE		Common Cathode, Rt. Hand Decimal	B	B-2
LTS-368WE		Common Cathode, ± 1 Overflow	B	B-3
LTS-3351WE	.43"	Common Anode, Rt. and Lt. Hand Decimal	C	C-1
LTS-3353WE		Common Cathode, Rt. Hand Decimal	C	C-2
LTS-3356WE		Universal, ± 1 Overflow	C	C-3
LTS-546WE	.52"	Common Anode, Rt. Hand Decimal	D	D-1
LTS-547WE		Common Cathode, Rt. Hand Decimal	D	D-2
LTS-548WE		Common Anode, ± 1 Overflow	D	D-3
LTS-549WE		Common Cathode, ± 1 Overflow	D	D-4
LTS-5551WE	.56"	Common Anode, Rt. Hand Decimal	E	E-1
LTS-5553WE		Common Cathode, Rt. Hand Decimal	E	E-2
LTD-5521WE		Common Anode, Rt. Hand Decimal	F	F-1
LTD-5523WE		Common Cathode, Rt. Hand Decimal	F	F-2
LTD-5527WE		Common Anode, Rt. Hand Decimal	F	F-3
LTD-5528WE		Common Cathode, Rt. Hand Decimal	F	F-4
LTS-6160WE	.56"	Common Anode, Rt. Hand Decimal	G	G-1
LTS-6180WE		Common Cathode, Rt. Hand Decimal	G	G-2
LTS-6175WE		Common Anode, ± 1 Overflow	G	G-3
LTS-6195WE		Common Cathode, ± 1 Overflow	G	G-4
LTS-6110WE		Common Anode, Rt. Hand Decimal	H	H-1
LTD-6140WE		Common Cathode, Rt. Hand Decimal	H	H-2
LTD-6130WE		Common Anode, ± 1.8 Overflow	H	H-3
LTD-6150WE		Common Cathode, ± 1.8 Overflow	H	H-4

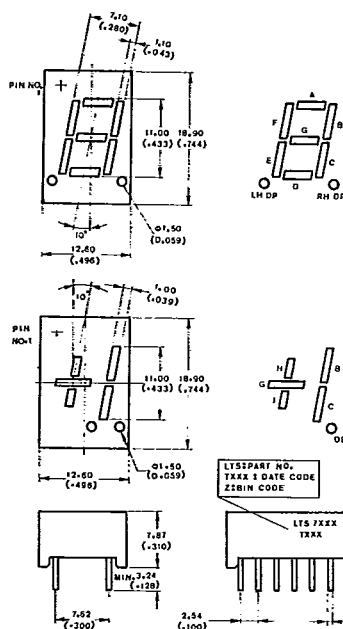


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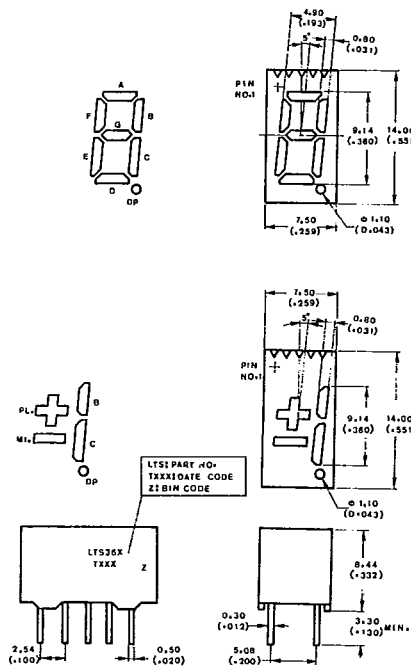
PACKAGE DIMENSIONS

A. LTS-311WE/312WE/313WE
LTS-315WE/316WE

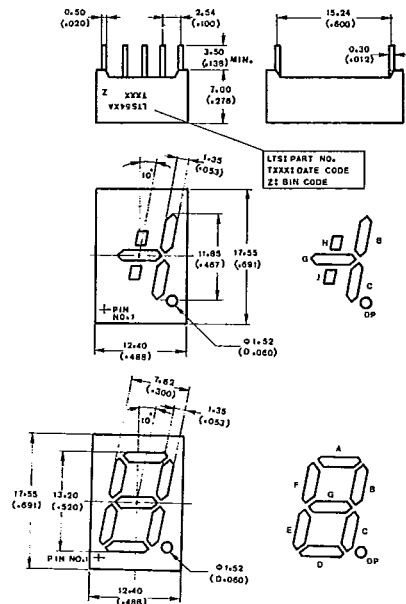
C. LTS-3351WE/3353WE/3356WE



B. LTS-360WE/367WE/368WE



D. LTS-546WE/547WE/548WE/549WE

6-37
512

NOTE: All dimensions are in $\frac{\text{millimeters}}{(\text{inches})}$ tolerance is $\frac{0.25\text{mm}}{(0.010")}$ unless otherwise noted.

PIN CONNECTION

PIN NO.	CONNECTION				
	LTS-311WE	LTS-312WE	LTS-313WE	LTS-315WE	LTS-316WE
1	Anode H	Cathode A	Common Cathode*2	Anode F	Anode G,H. & J*4
2	No Pin	Cathode F	Anode F	Anode G	No Pin
3	Cathode H	Common Anode*1	Anode G	No Pin	Anode G H & J*4
4	Cathode G	No Pin	Anode E	Common Cathode*3	No Pin
5	Cathode J	No Pin	Anode D	No Pin	No Pin
6	Anode J	Cathode L.D.P.	Common Cathode*2	Anode E	No Pin
7	Anode G	Cathode E	Anode D.P.	Anode D	Cathode H & J
8	Anode D.P.	Cathode D	Anode C	Anode C	Cathode G
9	No Pin	Cathode R.D.P.	Anode B	Anode D.P.	No Connection
10	Cathode D.P.	Cathode C	Anode A	No Pin	Cathode C
11	Cathode C	Cathode G	—	No Pin	Cathode B
12	Cathode B	No Pin	—	Common Cathode *3	No Pin
13	Anode B	Cathode B	—	Anode B	No Pin
14	Anode C	Common Anode*1	—	Anode A	Anode B & C

NOTES: 1. Pin 3 & 14 are internally connected.
2. Pin 1 & 6 are internally connected.

3. Pin 4 & 12 are internally connected.
4. Pin 1 & 3 are internally connected.

PIN NO.	CONNECTION		
	LTS-360WE	LTS-367WE	LTS-368WE
1	Common Anode *1	Common Cathode *1	Cathode Pl. & Mi. *
2	Cathode F	Anode F	Anode Plus Sign
3	Cathode G	Anode G	Anode Minus Sign
4	Cathode E	Anode E	Cathode Pl. & Mi. *2
5	Cathode D	Anode D	No Pin
6	Common Anode *1	Common Cathode *1	Cathode B,C & D.P. *3
7	Cathode D.P.	Anode D.P.	Anode D.P.
8	Cathode C	Anode C	Anode C
9	Cathode B	Anode B	Anode B
10	Cathode A	Anode A	Cathode B,C & D.P. *3

NOTES: 1. Pin 1 & 6 are internally connected.
2. Pin 1 & 4 are internally connected.
3. Pin 6 & 10 are internally connected.

PIN NO.	CONNECTION		
	LTS-3351WE	LTS-3353WE	LTS-3356WE
1	Cathode A	Anode A	Cathode H
2	Cathode F	Anode F	Anode H
3	Common Anode*	Common Cathode*	No Pin
4	No Pin	No Pin	Cathode G
5	No Pin	No Pin	Cathode J
6	Cathode L.H.D.P.	No Connection	Anode J
7	Cathode E	Anode E	Anode G
8	Cathode D	Anode D	Anode D.P.
9	Cathode R.H.D.P.	Anode R.H.D.P.	Cathode D.P.
10	Cathode C	Anode C	Cathode C
11	Cathode G	Anode G	Cathode B
12	No Pin	No Pin	No Pin
13	Cathode B	Anode B	Anode B
14	Common Anode*	Common Cathode*	Anode C

NOTE: Pin 3 & 14 are internally connected.

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PIN NO.	CONNECTION			
	LTS-546WE	LTS-549WE	LTS-548WE	LTS-549WE
1	Cathode E	Anode E	Cathode J	Anode J
2	Cathode D	Anode D	No Connection	No Connection
3	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
4	Cathode C	Anode C	Cathode C	Anode C
5	Cathode D.P.	Anode D.P.	Cathode D.P.	Anode D.P.
6	Cathode B	Anode B	Cathode B	Anode B
7	Cathode A	Anode A	No Connection	No Connection
8	Common Anode*	Common Cathode*	Common Anode*	Common Cathode*
9	Cathode F	Anode F	Cathode H	Anode H
10	Cathode G	Anode G	Cathode G	Anode G

NOTES: 1. Pin 3 & 8 are internally connected.
2. Pin 5 & 6 are internally connected.

PIN NO.	CONNECTION	
	LTS-5551WE	LTS-5553WE
1	Cathode E	Anode E
2	Cathode D	Anode D
3	Common Anode*1	Common Cathode*1
4	Cathode C	Anode C
5	Cathode D.P.	Anode D.P.
6	Cathode B	Anode B
7	Cathode A	Anode A
8	Common Anode*1	Common Cathode*1
9	Cathode F	Anode F
10	Cathode G	Anode G

NOTES: Pin 3 & 8 are internally connected.

PIN NO.	CONNECTION			
	LTD-5521WE	LTD-5523WE	LTD-5527WE	LTD-5528WE
1	Cathode E (Digit 1)	Anode E (Digit 1)	Cathode HI (Digit 1)	Anode HI (Digit 1)
2	Cathode D (Digit 1)	Anode D (Digit 1)	Cathode PL (Digit 1)	Anode PL (Digit 1)
3	Cathode C (Digit 1)	Anode C (Digit 1)	Cathode C (Digit 10)	Anode C (Digit 1)
4	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)
5	Cathode E (Digit 2)	Anode E (Digit 2)	Cathode E (Digit 2)	Anode E (Digit 2)
6	Cathode D (Digit 2)	Anode D (Digit 2)	Cathode D (Digit 2)	Anode D (Digit 2)
7	Cathode G (Digit 2)	Anode G (Digit 2)	Cathode G (Digit 2)	Anode G (Digit 2)
8	Cathode C (Digit 2)	Anode C (Digit 2)	Cathode C (Digit 2)	Anode C (Digit 2)
9	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)	Cathode D.P. (Digit 2)	Anode D. P. (Digit 2)
10	Cathode B (Digit 2)	Anode B (Digit 2)	Cathode B (Digit 2)	Anode B (Digit 2)
11	Cathode A (Digit 2)	Anode A (Digit 2)	Cathode A (Digit 2)	Anode A (Digit 2)
12	Cathode F (Digit 2)	Anode F (Digit 2)	Cathode F (Digit 2)	Anode F (Digit 2)
13	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 2)
14	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Anode (Digit 1)	Common Cathode (Digit 1)
15	Cathode B (Digit 1)	Anode B (Digit 1)	Cathode B (Digit 1)	Anode B (Digit 1)
16	Cathode A (Digit 1)	Anode A (Digit 1)	No Connection	No Connection
17	Cathode G (Digit 1)	Anode G (Digit 1)	No Connection	No Connection
18	Cathode F (Digit 1)	Anode F (Digit 1)	No Connection	No Connection



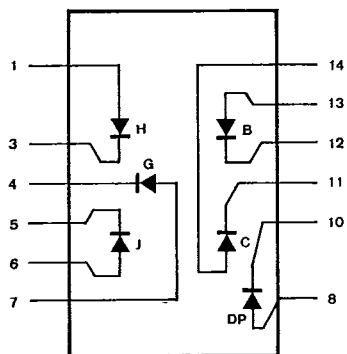
6-40
515

PIN NO.	CONNECTION			
	LTS-6160WE	LTS-6180WE	LTS-6175WE	LTS-6195WE
1	Cathode E	Anode E	Cathode Minus Sign	Anode Minus Sign
2	Cathode D	Anode D	Anode Pl., Mi. *2	Cathode Pl., Mi. *2
3	Common Anode *1	Common Cathode *1	Cathode C	Anode C
4	Cathode C	Anode C	Anode B,C, Dp *3	Cathode B,C, Dp *3
5	Cathode D.P.	Anode D.P.	Cathode Dp	Anode Dp
6	Cathode B	Anode B	Cathode B	Anode B
7	Cathode A	Anode A	Anode B,C, Dp *3	Cathode B,C, Dp *3
8	Common Anode *1	Common Cathode *1	Anode Pl., Mi. *2	Cathode Pl., Mi. *2
9	Cathode F	Anode F	Cathode Plus Sign	Anode Plus Sign
10	Cathode G	Anode G	No Connection	No Connection

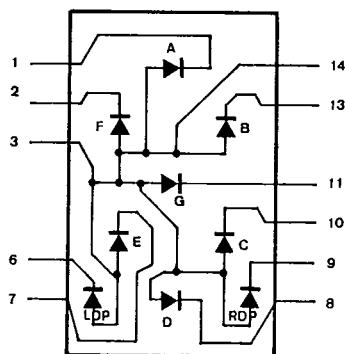
NOTES: 1. Pin 3 & 8 are internally connected.
 2. Pin 2 & 8 are internally connected.
 3. Pin 4 & 7 are internally connected.

PIN NO.	CONNECTION			
	LTD-6110WE	LTD-6130WE	LTD-6140WE	LTD-6150WE
1	Cathode E (Digit 1)	Cathode G (Digit 1)	Anode E (Digit 1)	Anode G (Digit 1)
2	Cathode D (Digit 1)	Cathode J, H (Digit 1)	Anode D (Digit 1)	Anode J, H (Digit 1)
3	Cathode C (Digit 1)	Cathode C (Digit 1)	Anode C (Digit 1)	Anode C (Digit 1)
4	Cathode D.P. (Digit 1)	Cathode D.P. (Digit 1)	Anode D.P. (Digit 1)	Anode D.P. (Digit 1)
5	Cathode E (Digit 2)	Cathode E (Digit 2)	Anode E (Digit 2)	Anode E (Digit 2)
6	Cathode D (Digit 2)	Cathode D (Digit 2)	Anode D (Digit 2)	Anode D (Digit 2)
7	Cathode G (Digit 2)	Cathode G (Digit 2)	Anode G (Digit 2)	Anode G (Digit 2)
8	Cathode C (Digit 2)	Cathode C (Digit 2)	Anode (Digit 2)	Anode C (Digit 2)
9	Cathode D.P. (Digit 2)	Cathode D.P. (Digit 2)	Anode D.P. (Digit 2)	Anode D.P. (Digit 2)
10	Cathode B (Digit 2)	Cathode B (Digit 2)	Anode B (Digit 2)	Anode B (Digit 2)
11	Cathode A (Digit 2)	Cathode A (Digit 2)	Anode A (Digit 2)	Anode A (Digit 2)
12	Cathode F (Digit 2)	Cathode F (Digit 2)	Anode F (Digit 2)	Anode F (Digit 2)
13	Common Anode (Digit 2)	Common Anode (Digit 2)	Common Cathode (Digit 2)	Common Cathode (Digit 2)
14	Common Anode (Digit 1)	Common Anode (Digit 1)	Common Cathode (Digit 1)	Common Cathode (Digit 1)
15	Cathode B (Digit 1)	Cathode B (Digit 1)	Anode B (Digit 1)	Anode B (Digit 1)
16	Cathode A (Digit 1)	No Connection	Anode A (Digit 1)	No Connection
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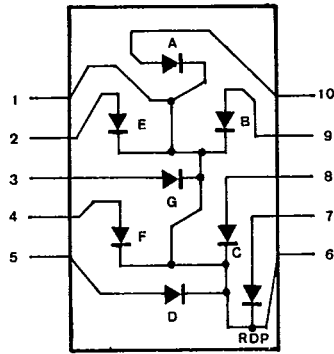
A-1 LTS-311WE



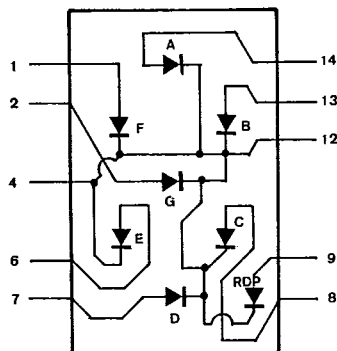
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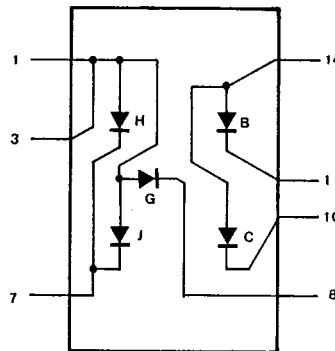
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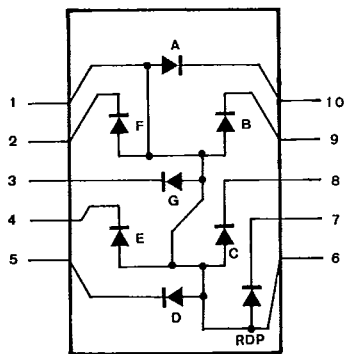
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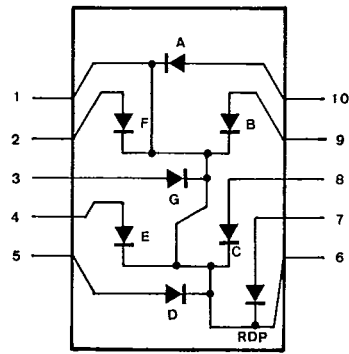
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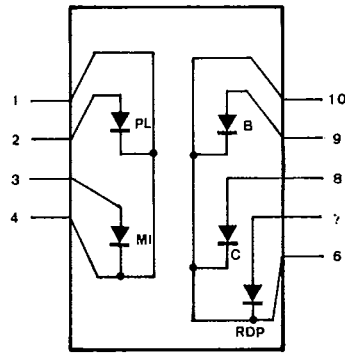
B-1 LTS-360WE



B-2 LTS-367WE

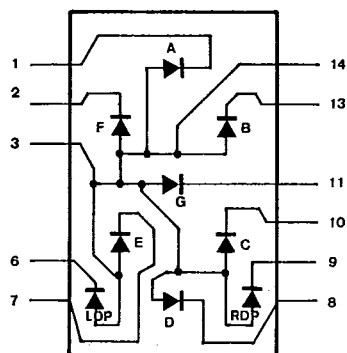


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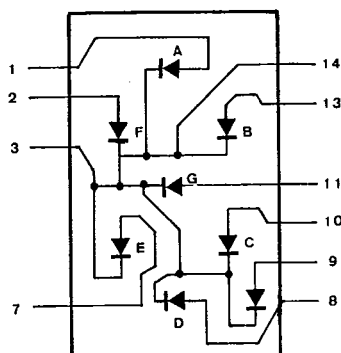


SEVEN-SEGMENT
LED DISPLAYS

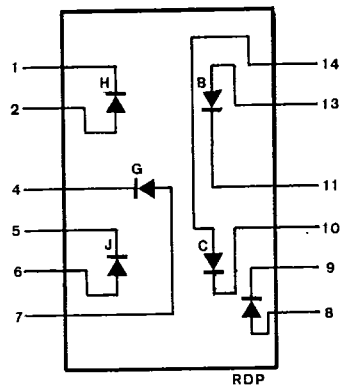
C-1 LTS-3351WE



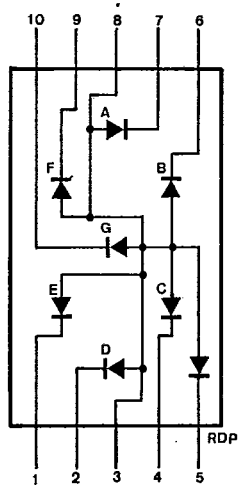
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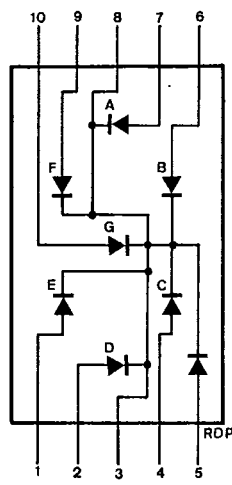
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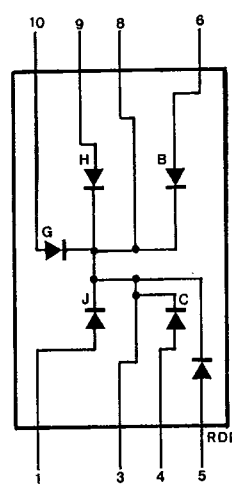
D-1 LTS-546WE



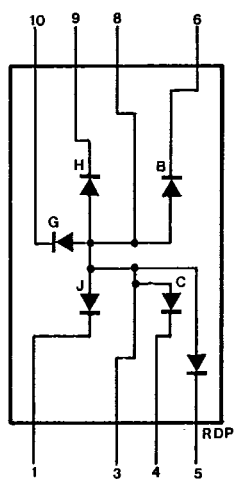
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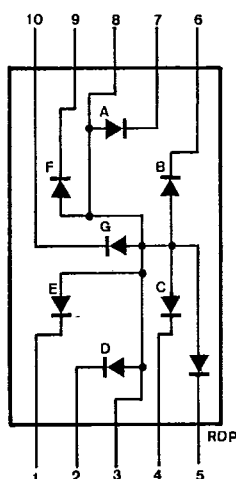
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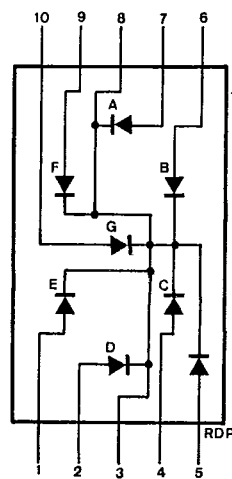
D-4 LTS-549WE



E-1 LTS-5551WE

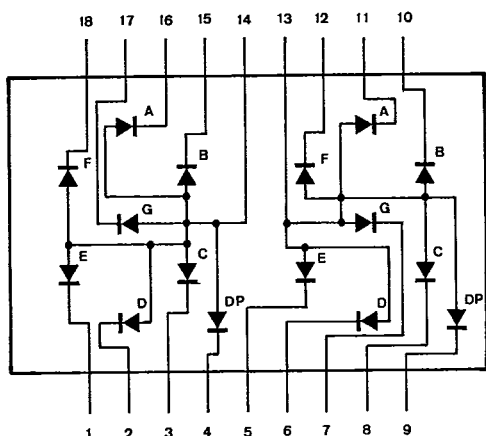


E-2 LTS-5553WE

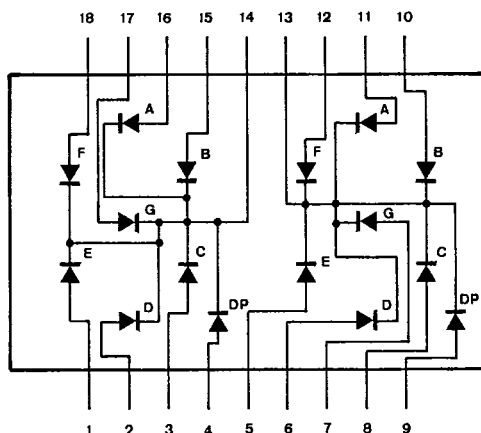


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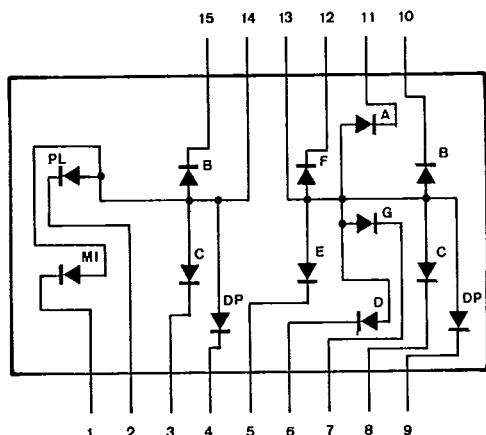
F-1 LTD-5521WE



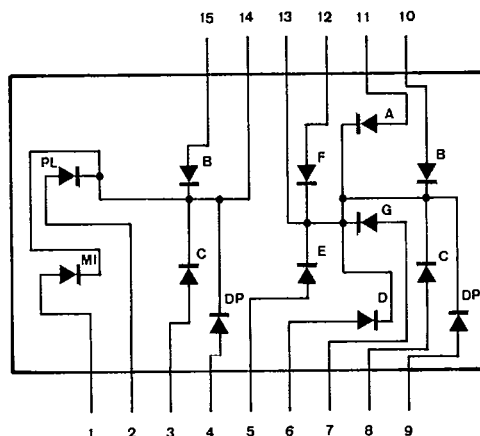
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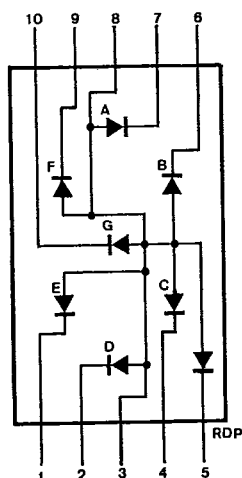
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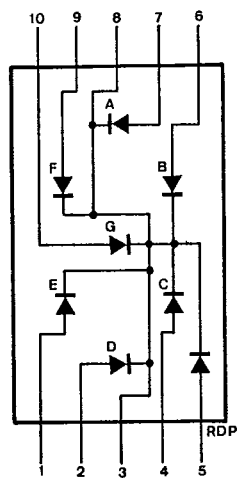
F-4 LTD-5528WE



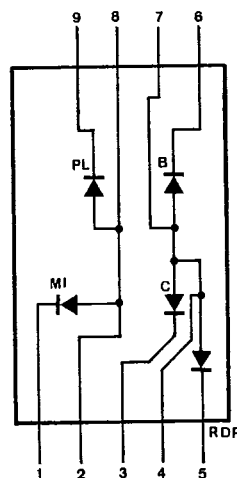
G-1 LTS-6160WE



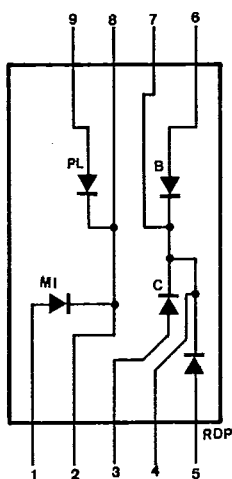
G-2 LTS-6180WE



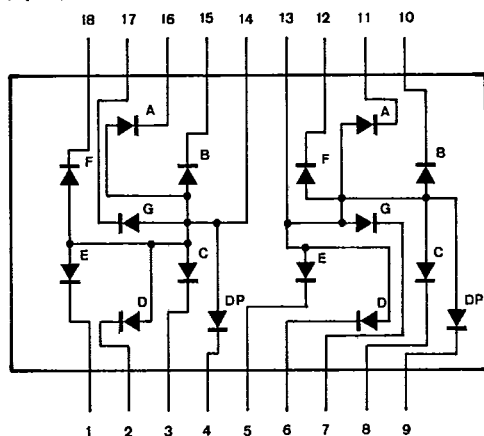
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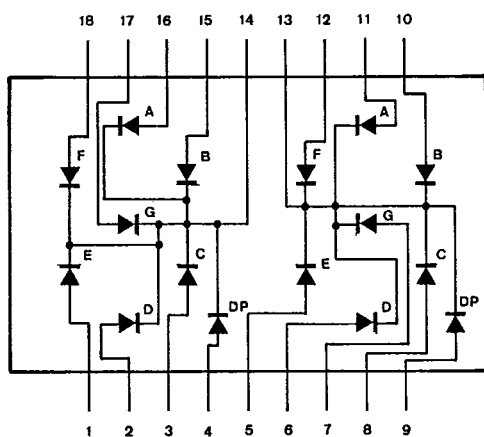
G-4 LTS-6195WE



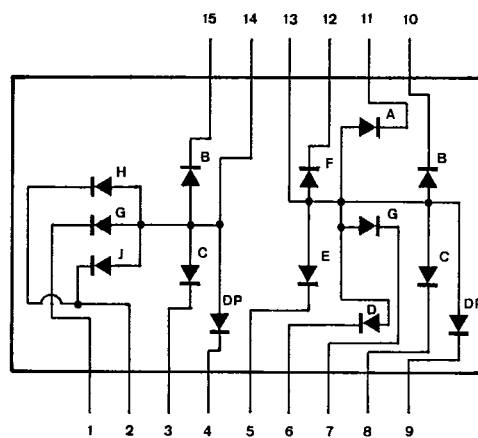
H-1 LTD-6110WE



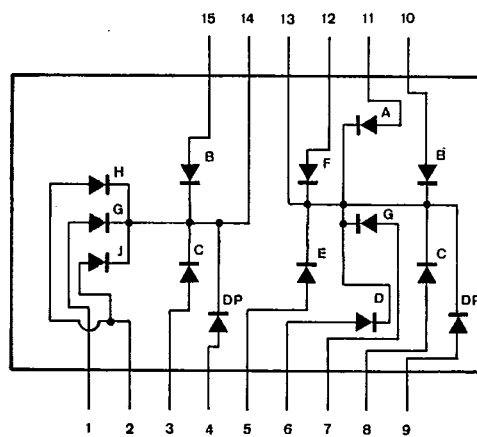
H-3 LTD-6140WE



H-2 LTD-6130WE



H-4 LTD-6150WE



ABSOLUTE MAXIMUM RATINGS AT $T_A = 25^\circ\text{C}$

PARAMETER	ORANGE	UNIT
Power Dissipation Per Segment	52	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	45	mA
Continuous Forward Current Per Segment	15	mA
Derating Linear From 25°C Per Segment	0.17	mA/°C
Reverse Voltage Per Segment	3.0	V
Operating Temperature Range	-25°C to +85°C	
Solder Temperature Range	-25°C to +85°C	
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260°C		

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

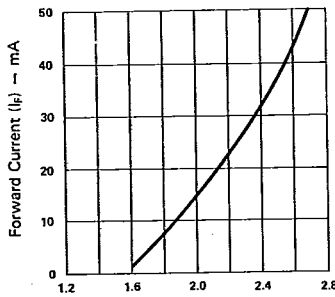


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

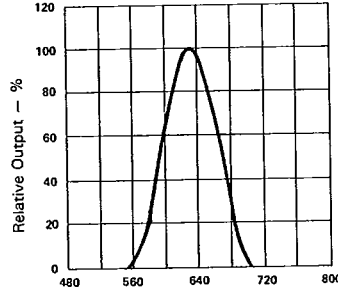


Fig. 2 SPECTRAL RESPONSE.

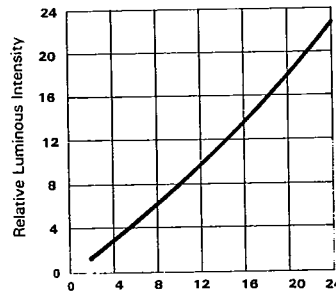


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

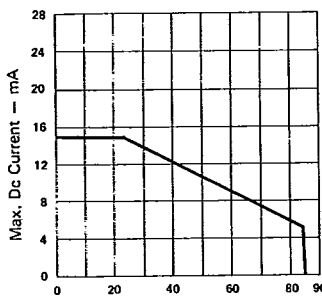


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

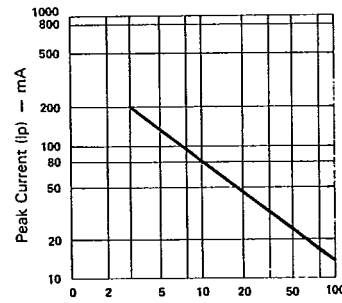
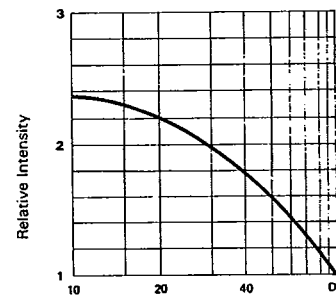


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE. (REFRESH RATE - F = 1 KHz)

Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE (AVERAGE $I_f = 10\text{mA}$ PER SEG.)

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ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ **LTS-311WE/312WE/313WE/315WE/316WE**

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		270		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

LTS-360WE/367WE/368WE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		270		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B-1

LTS-3351WE/3353WE/3356WE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		300		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B-1

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$
LTS-546WE/547WE/548WE/549WE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		370		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

LTS-5551WE/5553WE
LTD-5521WE/5523WE/5527WE/5528WE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		370		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

LTS-6160WE/6180WE/6175WE/6195WE
LTD-6110WE/6140WE/6130WE/6150WE

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	I_v		370		μcd	$I_F = 2\text{ mA}$
Peak Emission Wavelength	λ_p		635		nm	$I_F = 2\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 2\text{ mA}$
Forward Voltage, any Segment or D.P.	V_F		1.6		V	$I_F = 2\text{ mA}$
Reverse Current, any Segment or D.P.	I_R			100	μA	$V_R = 3\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 2\text{ mA}$

Note: The BIN brightness classification see page 6-160, category A

