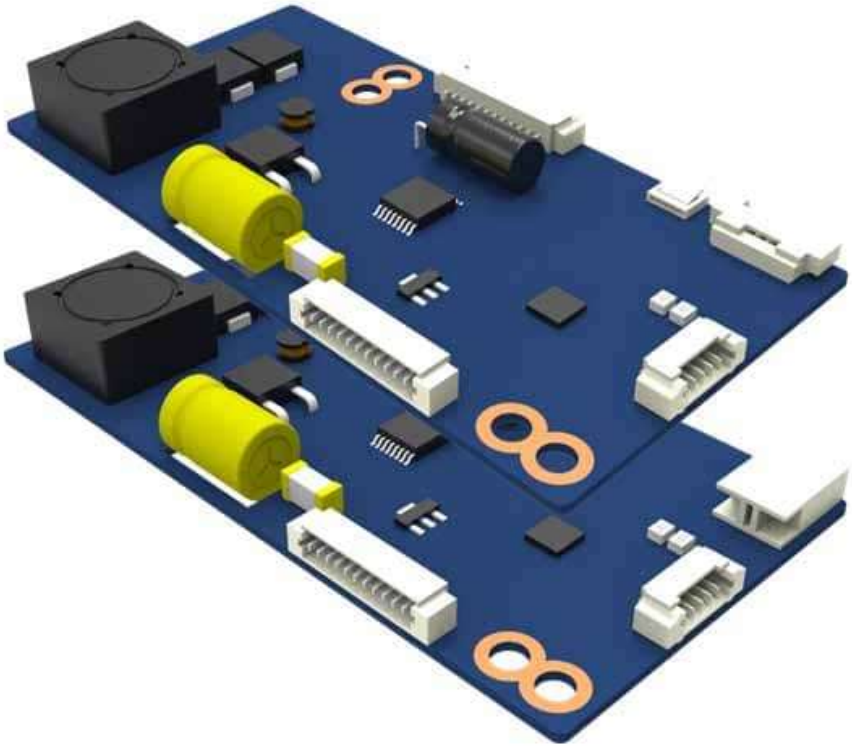
S P E C I F I C A T I O N

Product : LED Backlight Driver
Model Name : CVT230–G238HAN01.3-NEW
(for AUO 23.8", G238HAN01.3)



Dimming Control : External Analog and PWM

CONTENTS

Revision History

Rev.	Date	Revision Details	Remarks
A	Oct 16, 2018	Engineering Sample Issue	
B	Mar 18, 2019	Initial version start (the first product model)	
C	Apr 01, 2019	The second Production start	
	Apr 30, 2019	The addition of MTBF data	
D	Mar 21, 2021	Change the Analog dimming Range : from 0V(max) ~ 3.3V(min) to 0V(max) ~ 5V(min) Change the Driver Setting Port : when user resettles the driver setting points depending on their target LCD model, user needs to reprogram through the programming port. This resetting port was changed from CN100 (11 pin connector) to CN200 (5 pin connector) Addition of PCB penetration hole : making a PCB penetration hole on PCB at the position of C100 Electrolytic Condenser in order to decreasing the total height of LED Driver, then the CN100 can put into this hole at 1mm dipper. Consequently overall height is down by 1mm.	

1. Application

This specification is an users' guidance for the purpose of easy adoption this LED Driver (PWM or Analog Dimming Type / selectable) to the below mating TFT LCD Module which has not been built-in the LED driver.

AUO 23.8", G238HAN01.3, (4CH, 90mA, 62.4V)
After the production batch dated Sept. 14th, 2020

2. Electrical Characteristics

2.1 Absolute Maximum Ratings

Item	Symbol	Spec	Unit	Remarks
Operating Temperature	Top	-20 ~ 70	℃	
Storage Temperature	Tstg	-30~80	℃	
Relative Humidity	RH	80	%	

2.2 Control Signal

Pin No.	Symbol	Status	Action	Remarks
CN2 #3	STB	HIGH	LAMP-ON	2.4~5.25V
		LOW	LAMP-OFF	0.8V MAX

2.3 Output Characteristics

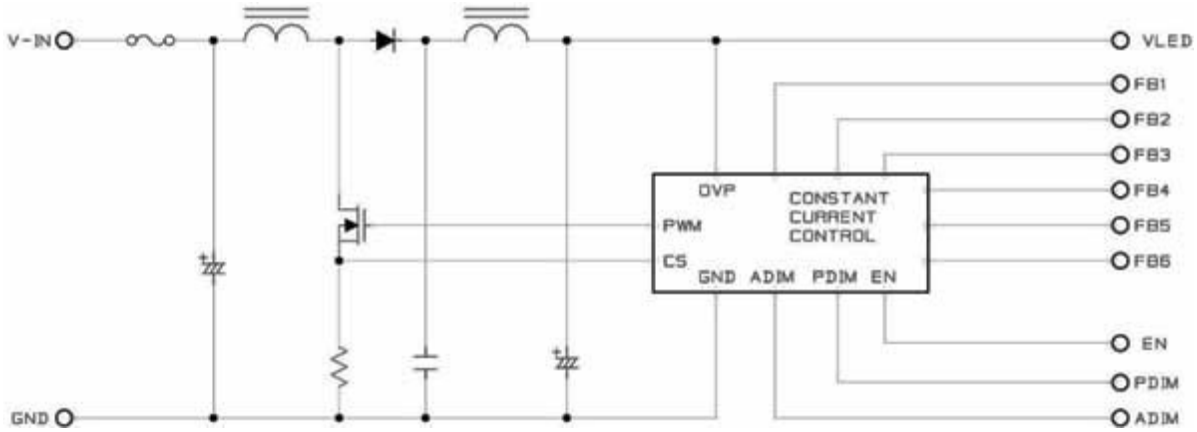
Parameter		Symbol		Values			Unit	Remark
				Min	Typ	Max		
Power Supply Input Voltage		VBL		10.8	12	18	Vdc	** 1
		VBL		18	24	29	Vdc	
Power Supply Input Current		IBL		-	-	3	A	VBL = 12V Ext VBR-B =100%
		IBL		-	-	1.5	A	VBL = 24V Ext VBR-B =100%
Output Current		Iout			90	95	mA	VBL = 12V or 24V Ext VBR-B =100%
Input Voltage for Control System	On/Off	On	V on	2.4	-	5.25	Vdc	
		Off	V off	-0.3	-	0.8	Vdc	
	Brightness Adjust	Ext VBR-B		3	-	100	%	On Duty ** 2
	Pulse Duty Level (PWM)	High Level		2.4	-	5.25	Vdc	HIGH : On duty LOW : Off duty ** 2
		Low Level		0.0	-	0.7	Vdc	
		PWM Freq.		100		240	Hz	
		Duty		2	-	100	%	
	Analog Dimming	A-DIM		0	-	5	V	0V : Min Bright 5V :Max Bright

** 1) The LED string voltage always has to be higher than the input voltage (max) and the difference must be at least 5V deviation.
** 2) To use PWM duty less than 10%, the frequency of dimming should be 120Hz or less

2.4 Summarized Table : Maximum Output Voltage and Current

Forwarding Voltage Range	Maximum Supportable Channel	Maximum Wattage	Output constant Current per Channel [mA]			Total Output constant Current [mA]		
			Min.	Typ.	Max.	Min.	Typ.	Max.
15V ~ 65V	1CH ~ 6CH	27W at 12V 32W at 24V	50	-	1000	50	-	1000

2.5 Test Circuit



2.6 Over Voltage Protection

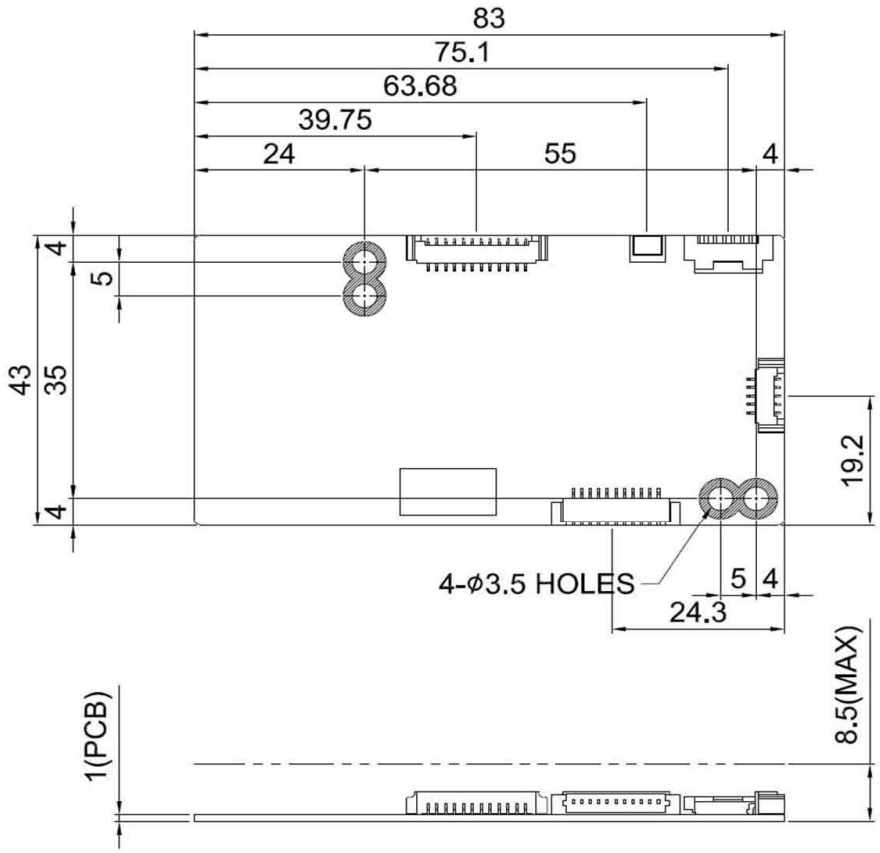
The voltage will not exceed the upper trip limit.

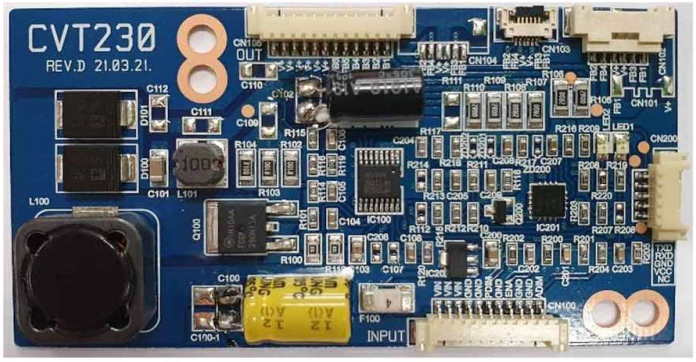
The noise spikes that exceed the lower trip limit of less than 10μs will not clamp the output voltage to zero.

Voltage	Over Voltage Protection	
	Range[V]	Protection
Output	This LED Driver was designed based on the OVP setting at 20% ~ 30% higher level than the forwarding(string) voltage of panels in use.	**Shut Down**

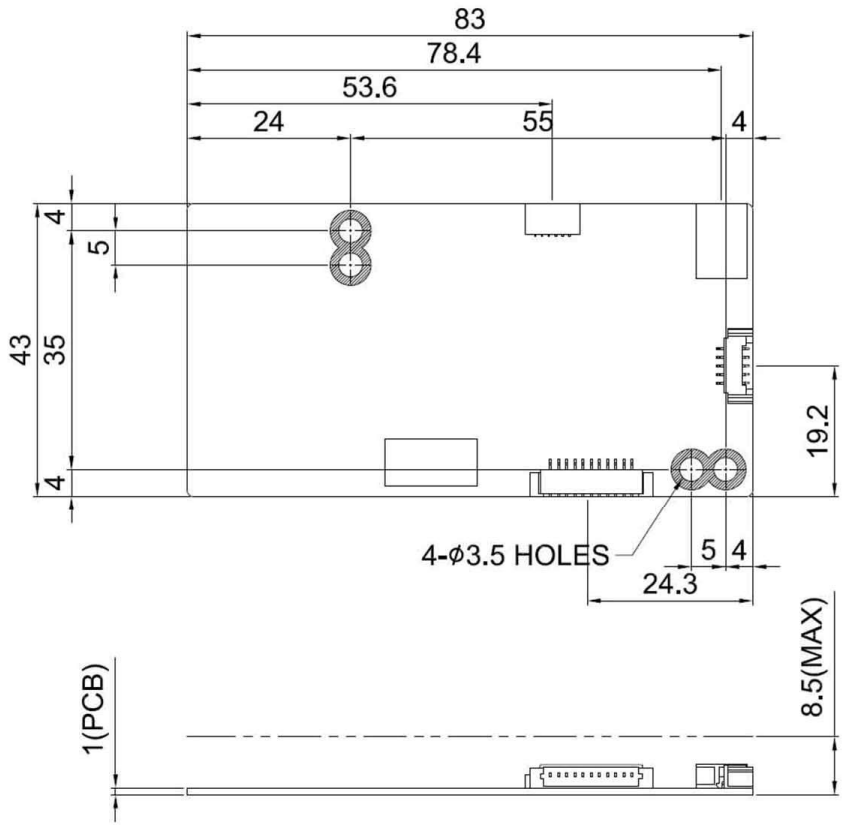
3. Dimension (83 x 43 mm x 8.5 ~ 8.8mm) and Pictures

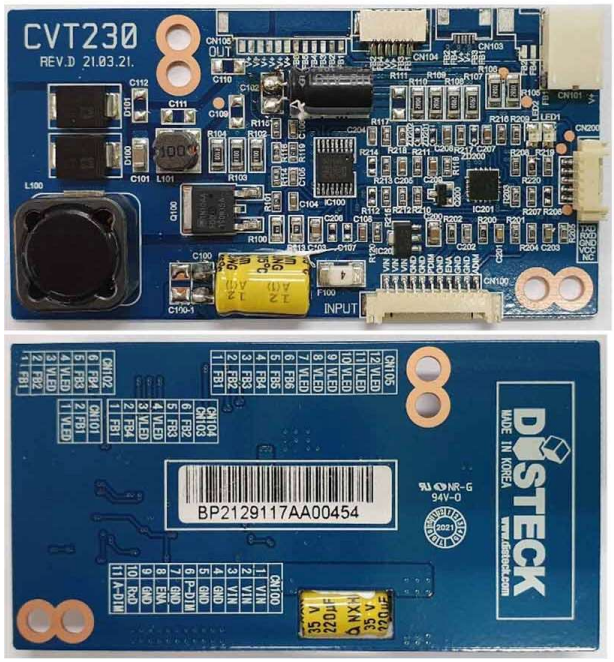
3.1 Standard version





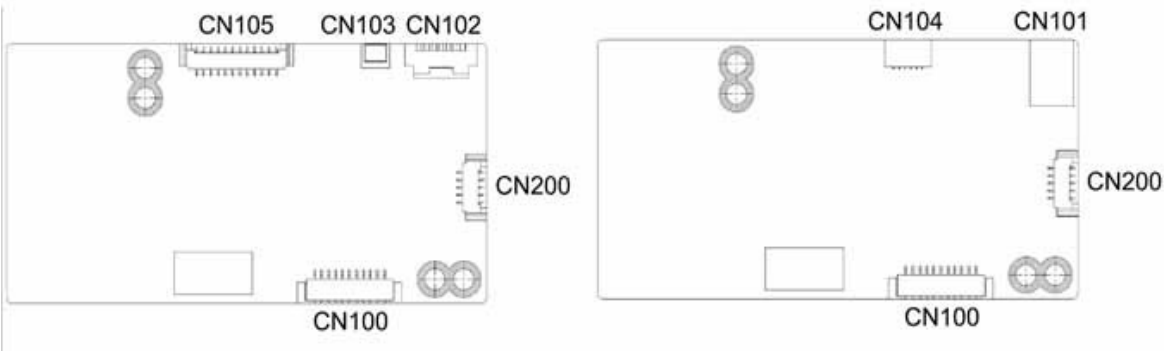
3.2 Optional version





4. Connector and Pin Information

Standard Type **Optional Type**



4.1 Input Connector

CN100 : 12505WR-11 / Yeon-Ho

Pin No	Symbol	Description
1, 2, 3	VIN	Voltage Input
4, 5, 7, 9, 10	GND	Ground
6	P-DIM	PWM Dimming
8	EN	Backlight Enable
11	A-DIM	Analog Dimming

4.2 Output Connector

CN101 : 35001WR-02A00 / Yeon-Ho

Pin No	Symbol	Description
1	FB1	LED Cathode 1
2	VLED	LED Anode

CN102 : 12507WR-06 / Yeon-Ho

Pin No	Symbol	Description
1	FB1	LED Cathode 1
2	FB2	LED Cathode 2
3, 4	VLED	LED Anode
5	FB3	LED Cathode 3
6	FB4	LED Cathode 4

CN103 : 05002HR-H06CE / Yeon-Ho

Pin No	Symbol	Description

1	FB1	LED Cathode 1
2	FB4	LED Cathode 4
3, 4	VLED	LED Anode
5	FB3	LED Cathode 3
6	FB2	LED Cathode 2

CN104 : 10019HR-H06B / Yeon-Ho

Pin No	Symbol	Description
1	FB1	LED Cathode 1
2	FB4	LED Cathode 4
3, 4	VLED	LED Anode
5	FB3	LED Cathode 3
6	FB2	LED Cathode 2

CN105 : 12505WR-12 / Yeon-Ho

Pin No	Symbol	Description
1	FB1	LED Cathode 1
2	FB2	LED Cathode 2
3	FB3	LED Cathode 3
4	FB4	LED Cathode 4
5	FB5	LED Cathode 5
6	FB6	LED Cathode 6
7, 8, 9, 10, 11, 12	VLED	LED Anode

4.3 Extra Connector (for factory use or for system integrator)

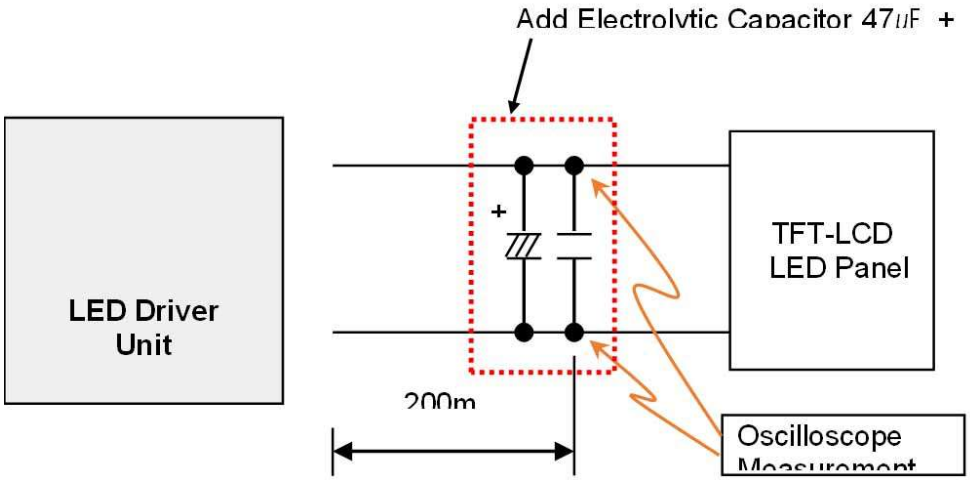
CN200 : 12505WR-05 / Yeon-Ho

Pin No	Symbol	Description
1	N. C.	No Connection
2	Vcc	USB Power (5V)
3	GND	Ground
4	RxD	Signal Receiving Data
5	TxD	Signal Transmittal Data

5. Power Characteristics and Reliability

5.1 Ripple and Noise

The ripple and noise are defined as a periodic or random signal over frequency band at the 10Hz ~ 20MHz, measuring by an oscilloscope capable 20MHz bandwidth.



※ The ripple & noise are measured at the 20MHz bandwidth by a 12" twisted pair-wire which is cut off through the 0.1uF & 47uF parallel capacitor.

☞ Test condition

- Temperature: 25℃ room temperature
- Test equipment: PWM Dimming 100%

5.2 Overshoot

The output overshoot at the boot up must not exceed 25% than ordinary operating voltage value with or without under the working load condition.

5.3 In-rush

At the moment of turning on, the rise time of output voltage has to be shorter than 200msec, which is measured from the 10% point to the 90% point at the normal state

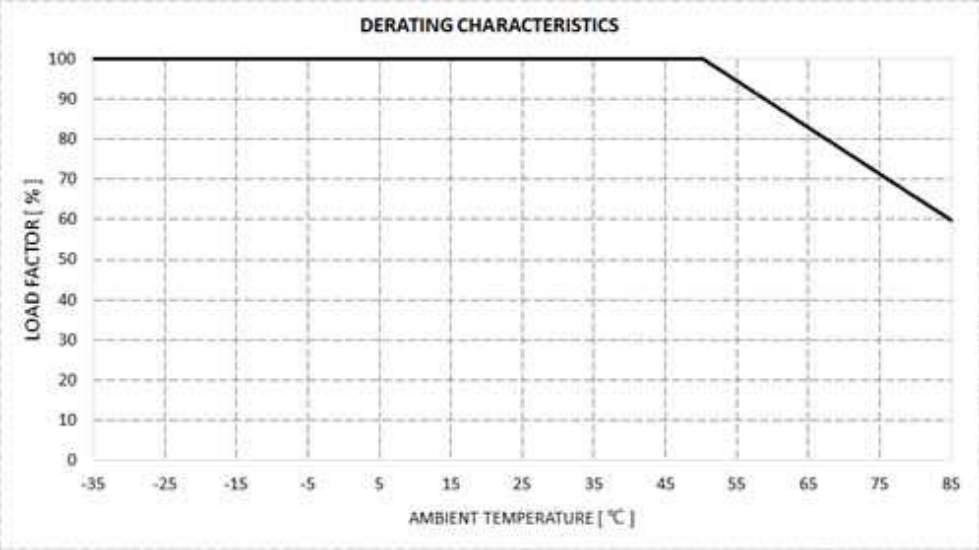
☞ Test condition

- Temperature : 25℃ room temperature
- Test equipment : Resistance load

5.4 Mean Time Between Failure (MTBF)

This LED Driver has been designed by 50,000 MTBF with 90% reliability index under below environment.

- Input voltage : 12V DC
- Duty cycle : 6hours ON, 2hours OFF
- Ambient Temp : 25 ± 2℃
- Humidity : prevailing condition



It measured by Lambda Predict Program, “Reliasoft” made. And it calculates by the Telcordia SR-332 Issue 3

The MTBF : **280,740** hours
(the calculation data refers to next page)

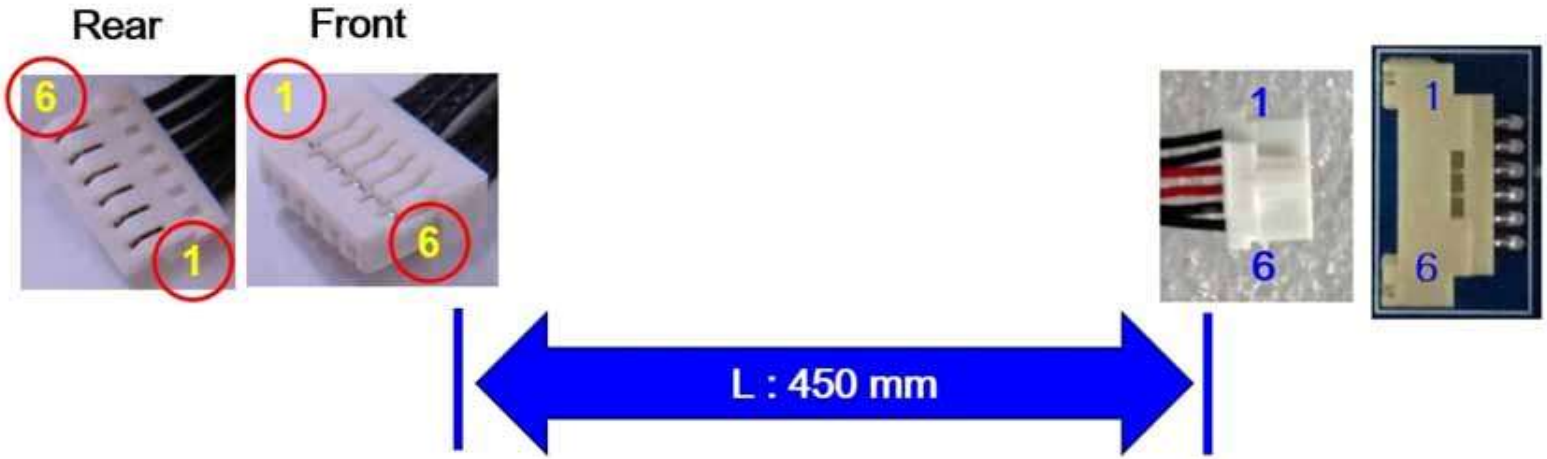
Name: LED DRIVER [CVT-230]
Failure Rate(t=INF) (FITs): 7110.2452
Category: Telcordia SR-332 Issue 3
User Name: Lee Eungak

Category	Location No.	Failure Rate(t=INF)	MTBF (hrs)	Contribution	Quantity
Capacitor	C100	123.3435	280,740	0.0354	1
Capacitor	C101	1.4578	5,144,600,000	4.00E-04	1
Capacitor	C102	108.4622	318,480	0.0311	1
Capacitor	C103	1.2373	808,190,000	4.00E-04	1
Capacitor	C104	0.5766	1,734,400,000	2.00E-04	1
Capacitor	C105	0.1266	7,898,300,000	3.63E-05	1
Capacitor	C106	0.1266	7,898,300,000	3.63E-05	1
Capacitor	C108	0.2813	3,554,300,000	8.07E-05	1
Capacitor	C200	0.9827	1,017,600,000	3.00E-04	1
Capacitor	C201	0.1729	5,783,700,000	4.96E-05	1
Capacitor	C202	0.1729	5,783,700,000	4.96E-05	1
Capacitor	C203	0.1729	5,783,700,000	4.96E-05	1
Capacitor	C204	0.1729	5,783,700,000	4.96E-05	1
Capacitor	C205	0.1271	7,866,000,000	3.65E-05	1
Capacitor	C206	0.4132	2,420,100,000	1.00E-04	1
Capacitor	C208	0.4132	2,420,100,000	1.00E-04	1
Capacitor	C209	0.4132	2,420,100,000	1.00E-04	1
Capacitor	C210	0.4132	2,420,100,000	1.00E-04	1
Connector	CN100	7.349	136,070,000	0.0021	1
Connector	CN101	7.349	136,070,000	0.0021	1
Connector	CN102	7.349	136,070,000	0.0021	1
Connector	CN103	7.349	136,070,000	0.0021	1
Connector	CN105	7.349	136,070,000	0.0021	1
Connector	CN200	7.349	136,070,000	0.0021	1
Diode	D101	609.9612	1,639,400	0.175	1
Diode	D100	609.9612	1,639,400	0.175	1
External	F100	-	-	0	1
IC, Analog/Linear	IC100	208.4981	4,796,200	0.0598	1
IC, Analog/Linear	IC200	90.4862	11,051,000	0.026	1
IC, Microcontroller	IC201	1356.6465	737,110	0.3893	1
Inductor	L100	13.2063	75,721,000	0.0038	1
Inductor	L101	13.2063	75,721,000	0.0038	1
External	LED1	-	-	0	1
External	LED2	-	-	0	1
External	PCB	-	-	0.00E+00	1
Resistor, Fixed	R104	1.1438	874,300,000	3.00E-04	1
Transistor	Q100	162.9446	6,137,100	4.68E-02	1
Transistor	Q200	92.0831	10,860,000	2.64E-02	1
Resistor, Fixed	R100	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R101	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R102	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R103	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R105	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R106	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R107	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R108	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R109	2.1347	468,450,000	6.00E-04	1
Resistor, Fixed	R110	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R113	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R114	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R115	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R116	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R117	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R118	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R119	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R120	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R200	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R201	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R202	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R203	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R204	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R205	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R206	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R207	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R208	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R209	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R210	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R211	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R212	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R214	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R215	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R216	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R217	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R218	1.1438	874,300,000	3.00E-04	1
Resistor, Fixed	R219	1.1438	874,300,000	3.00E-04	1
		Minimum	280,740		

6. Connection cable (optional accessory)

6.1 Connection between LED driver and Target LCD Panel

PN : CBL451-LED4CH-CVT230-G238HAN013



WIRE : UL1061 AWG#28

AUO", 23.8" *LED 4CH*
-. PANEL PART NO. : G238HAN01.3

W A F E R : 3707K-S06N-21R (ENTERY)
H O U S I N G : H112K-P06N-03B (ENTERY)

COLOR	SPEC	PIN
BLK	FB1	1
BLK	FB2	2
RED	VLED1	3
RED	VLED2	4
BLK	FB3	5
BLK	FB4	6

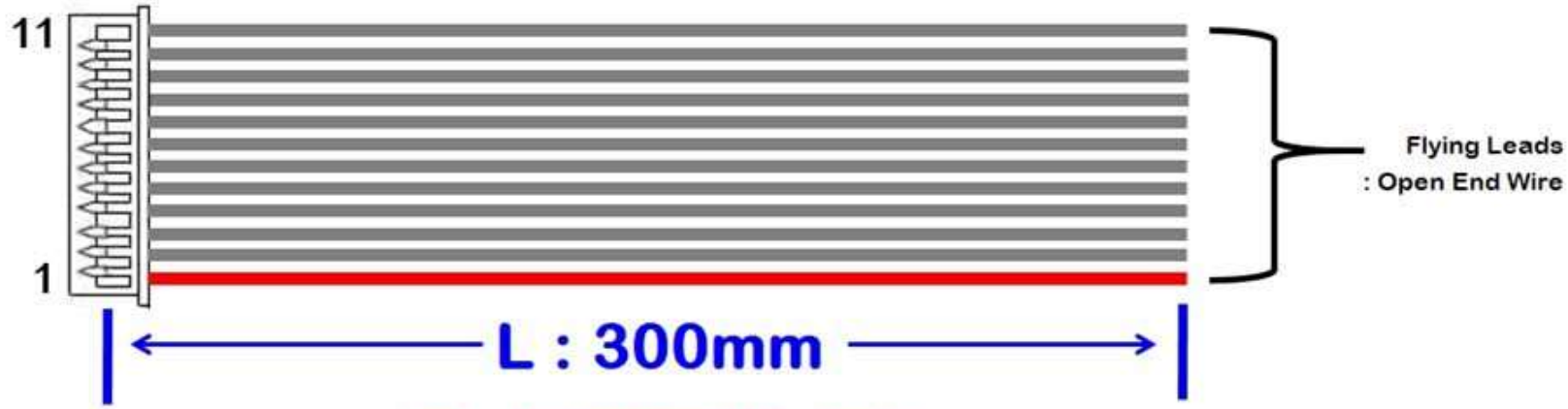
LED OUT 4CH
-. LED DRIVER OUT. : CVT230 / CN102

W A F E R : 12507WR-06L (YEONHO)
H O U S I N G : 12507HS-06L (YEONHO)

PIN	SPEC	COLOR
1	FB1	BLK
2	FB2	BLK
3	VLED1	RED
4	VLED2	RED
5	FB3	BLK
6	FB4	BLK

6.2 Connection between LED driver and mating driving board

PN : CBL301-LEDIN-CVT230-OPEN



12V or 24V INPUT CN100 for CVT230

WAFER : 12505WR-11 (YEONHO)
HOUSING : 12505HS-11 (YEONHO)

PIN	SPEC	COLOR	CONNECTION	CABLE LENGTH
1	LED INPUT VCC	RED	FLYING LEAD	
2	LED INPUT VCC	WHT	FLYING LEAD	
3	LED INPUT VCC	WHT	FLYING LEAD	
4	GND	WHT	FLYING LEAD	
5	GND	WHT	FLYING LEAD	
6	PWM	WHT	FLYING LEAD	300mm
7	GND	WHT	FLYING LEAD	
8	EN	WHT	FLYING LEAD	
9	GND	WHT	FLYING LEAD	
10	RXD	WHT	FLYING LEAD	
11	TXD.ADIM	WHT	FLYING LEAD	