LED Optimized Drivers
Triac & ELV Dimmable

96 Watt LD96W –TLXXX

CONSTANT CURRENT TRIAC & ELV DIMMABLE LED DRIVERS

96W
LD96W –TL XXX
PHASE DIMMING

Model: LD96W –TL Series

- Designed for use with Triac and ELV Dimmers 120Vac or 230Vac/240Vac or 277Vac.
- Drive Mode: Constant Current with CCR Dimming
- Output Power: 96W Max.
- Input Voltage: 120Vac or 230Vac/240Vac or 277Vac.
- Number of Outputs: One
- Output Voltages: 14VDC - 274VDC
- Output Currents: 350mA - 4000mA

Environmental

1. Operating temperature: Tc 90C Maximum. Reference -30 to +60°C ambient
2. Storage temperature range: -40 to +85°C
3. Humidity (non-condensing): 5% - 95%RH
4. Cooling: Convection
5. Vibration Frequency: 5-55Hz/2g, 30 minutes
6. Impact resistance: 1g/s
7. MTBF@ 40^{O}C: 375,000 hours @ Full Load per MIL-217F Notice 2.

Safety and Compliance

1. UL8750, EN61347, CSA 22.2 safety recognized, UL Type HL
2. FCC, 47CFR Part 15 Class A & EN61000-6-4 compliant
3. Water resistant and Dust Proof Design: IP66, NEMA4, for Dry, Damp Locations.
4. Compact, Lightweight Design.
5. Safety Isolation between Primary and Secondary
6. Meets EN61000-3-2 & EN61000-3-3 Class C
7. Protection: output over-voltage, output over-current, output short circuit, auto-recovery
8. EN61000-4-5: 2kV/4kV 8/20 µsec surge protection.

Electrical Specifications at 25^{O}C

- Input Voltage: -TL**XXX** where **XXX**=120, 230, or 277Vac, see notes below table
- Frequency: 50/60HZ
- Power Factor: ≥ 0.90 at ≥ 60% Load, 120Vac/230Vac/277Vac
- THD%: ≤ 20% at ≥ 60% Load, 120Vac/230Vac/277Vac
- Inrush current: <20A at 25C, 277Vac, cold start, Max. Load
- Input current: 0.94A max. at 120Vac, 60Hz, Maximum Load
- Efficiency: 90% typical at 230Vac 50Hz
- Line regulation accuracy: ± 4%
- Load regulation accuracy: ± 5%
- Dimming Range: CCR Mode refer to Dimming Curves on page 2.

c UL us E325626 · TYPE HL · CE · FC · IP66 · RoHS Compliant

Constant Current Versions

Part Number [1]	US Class 2 Type HL	CN Class 2	Output Voltage Range	Output Constant Current	Current Accuracy	Output Power Maximum	Typical Efficiency [2]	DIMMER[3]
LD96W-274-C0350-TL**XXX**	NO	NO	162 - 274 VDC	350 mA	± 5%	96W	92%	Incan & ELV
LD96W-137-C0700-TL**XXX**	NO	NO	81 - 137 VDC	700 mA	± 5%	96W	92%	Incan & ELV
LD96W-92-C1050-TL**XXX**	NO	NO	54 - 92 VDC	1050 mA	± 5%	96W	92%	Incan & ELV
LD96W-69-C1400-TL**XXX**	NO	NO	41 - 69 VDC	1400 mA	± 5%	96W	91%	Incan & ELV
LD96W-54-C1750-TL**XXX**	YES	YES	32 - 54 VDC	1750 mA	± 5%	96W	91%	Incan & ELV
LD96W-48-C2000-TL**XXX**	YES	YES	28 - 48 VDC	2000 mA	± 5%	96W	90%	Incan & ELV
LD96W-39-C2450-TL**XXX**	YES	YES	23 - 39 VDC	2450 mA	± 5%	96W	90%	Incan & ELV
LD96W-30-C3150-TL**XXX**	YES	YES	18 - 30 VDC	3150 mA	± 5%	96W	90%	Incan & ELV
LD96W-24-C4000-TL**XXX**	YES	YES	14 - 24 VDC	4000 mA	± 5%	96W	89%	Incan & ELV

Notes

1. **XXX** is 120 or 230 or 277
   120 = 108-132Vac, 120Vac AC Phase Dimmer, rated ≤600W
   230 = 208-265Vac, 230/240Vac AC Phase Dimmer
   277 = 208-277Vac, 277Vac AC Phase Dimmer
2. Typical efficiency measured at 230Vac input, full load, no dimmer.
3. All versions are ≤10% to ~100% CCR Dimmable with any good quality properly rate AC phase dimmer.
4. -TL**120** use any good quality 120VAC ≤600W Incandescent (Triac) or ELV (Electronic Low Voltage) dimmer. Refer to page 2 for dimming curves.
5. -TL**230** or -TL**277** use very good quality 230/240/277VAC Incandescent (Triac) or ELV (Electronic Low Voltage) dimmer. Please note that dimmer must be properly loaded to operate. Many 230/277Vac dimmers require a minimum load of proper type to operate. Refer to page 2 for dimming curves.

Example: 230-277Vac dimmers

Leviton AWSMG-MAW 120Vac to 277Vac Incan type, forward phase magnetic low voltage dimmer will not work properly unless loaded to ~ 0.09A constant load. This dimmer is not recommended for use unless loaded properly.

Leviton AWSMG-EAW 120Vac to 277Vac ELV type, reverse phase electronic low voltage dimmer will work properly and is recommended for use.

Custom designs available. Please consult the factory.

Specifications subject to change without notice

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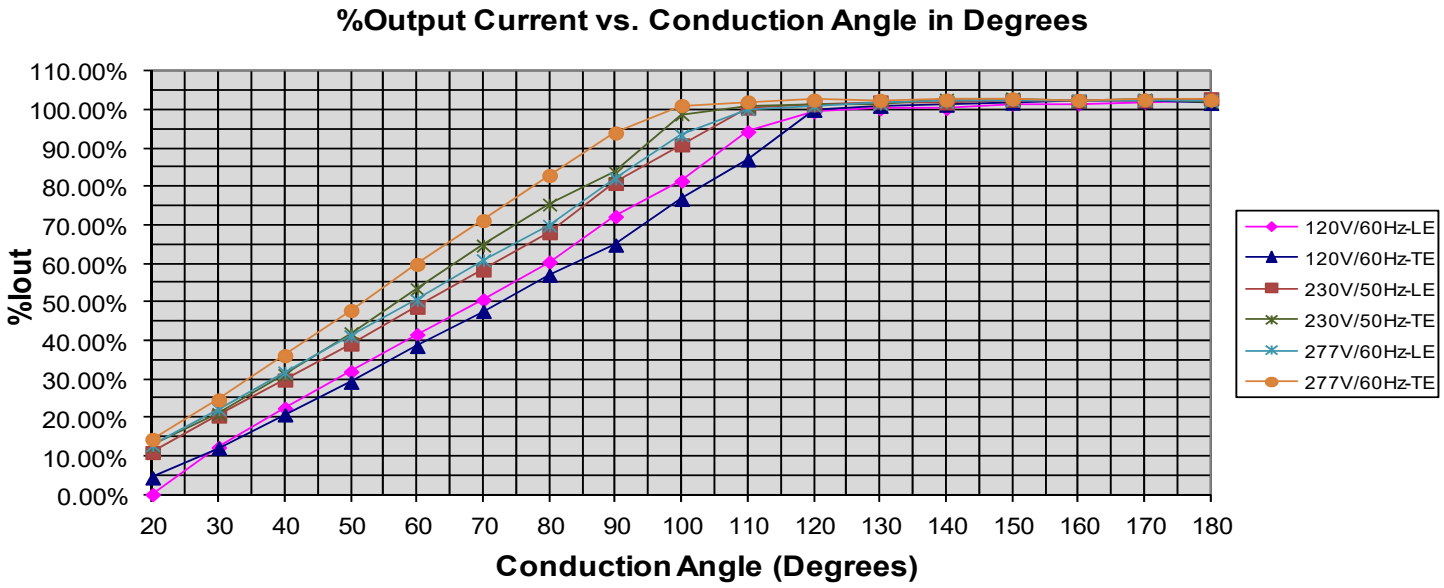
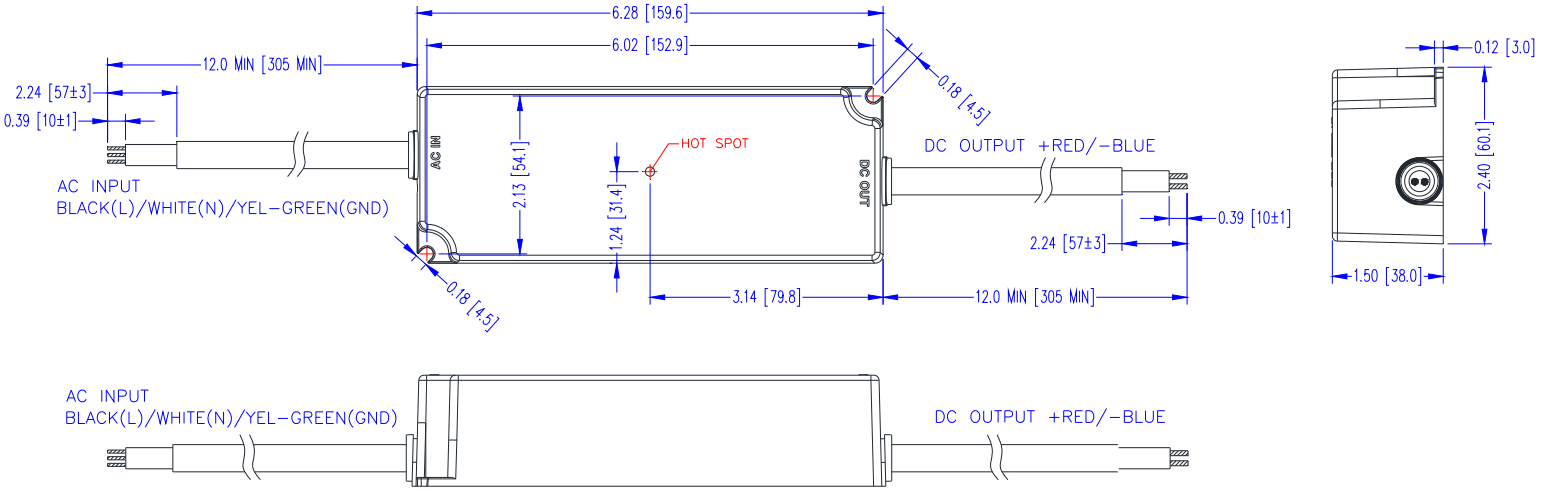
Typical Dimming Curve:



Mechanical Dimensions: Inches [mm]

Material: Black PC ABS Plastic Case
Fully Encapsulated
Weight: 311 grams (11.0 oz) Typical

Labeling Example



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Input Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
AC Input Voltage: -TL120	108	120	132	120Vac Phase Dimmer
AC Input Voltage: -TL230	208	230	265	230/240Vac Phase Dimmer
AC Input Voltage: -TL277	220	277	305	277Vac Phase Dimmer
Input Frequency	47 Hz	——	63 Hz	50/60Hz Nominal
Input AC Current	——	——	1.14 A	Measured at 100Vac/60Hz Input, Output Full load.
	——	——	0.94 A	Measured at 120Vac/60Hz Input, Output Full load.
	——	——	0.49 A	Measured at 230Vac/60Hz Input, Output Full load.
Inrush Current (Peak)	——	14A	20A	Measured at 277Vac/60Hz Input, Output Full Load, Ta 25^{O}C, Cold Start 50% Ipeak duration ~750 µsec (1/2*Ip^{2}*t)
Inrush Current (I^{2}t)	——	——	0.15 A^{2}s	
Leakage Current	——	——	0.28mA	Measured at 120Vac/60Hz Input, Output Full load.
	——	——	0.75mA	Measured at 277Vac/60Hz Input, Output Full load.
THD	——	——	20%	Measured at 120, 230, 277Vac Input, Output ≥60% Load
Power Factor (PF)	0.90	——	——	Measured at 120, 230, 277Vac Input, Output ≥60% Load

Output Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
DC Output Voltage	Per Table	——	Per Table	Per Tables on Page 1
DC Output Constant Current	-5%	Per Table	+5%	Per Tables on Page 1
Output Power	——	——	Per Table	Per Tables on Page 1
Ripple & Noise (Vpk-pk)	——	——	20% Vo	20 MHz BW, Full load output in parallel with 0.1 µF ceramic & 10 µF Electrolytic.
Ripple (Ipk-pk)	——	——	50% Io	20 MHz BW, Full load output in parallel with 0.1 µF ceramic & 10 µF Electrolytic. 120 Hz component
Start-up Time	——	700 mS	1000 mS	Measured at 120Vac/60Hz Input, Output Full load.
Hold-up Time	——	30 mS	——	Typical @ 277Vac Input, Output Full load.

Environmental Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Case Temperature (Tc)	-30 ^{O}C	——	+90 ^{O}C	Measured at location specified on case.
Operating Temperature (Ta)	-30 ^{O}C	——	+60 ^{O}C	This is a reference range. Tc controls temperature range.
Storage Temperature (Ts)	-40 ^{O}C	——	+85 ^{O}C	Non operating temperature range.
Operating Humidity	——	——	95% RH	Relative Humidity, non-condensing.
Vibration	5 Hz	——	55 Hz	2G, 10 minutes/1 cycle, period 30 minutes, each along X, Y, Z axis.
MTBF	342,000 Hours	——	——	MIL-HDBK-217F Notice 2, Ta = 25C, Output Full Load.

Protection Specifications

Parameter	Min.	Typ.	Max.	Notes/Conditions
Output Short Circuit (SCP)	——	——	——	No Damage, Auto recovery after short is removed.
Output Over Current (OCP)	——	——	+8% Io	Constant Current Limiting circuit.
Output Over Voltage (OVP)	——	——	120% Vo	No Damage, Auto recovery after fault is removed.

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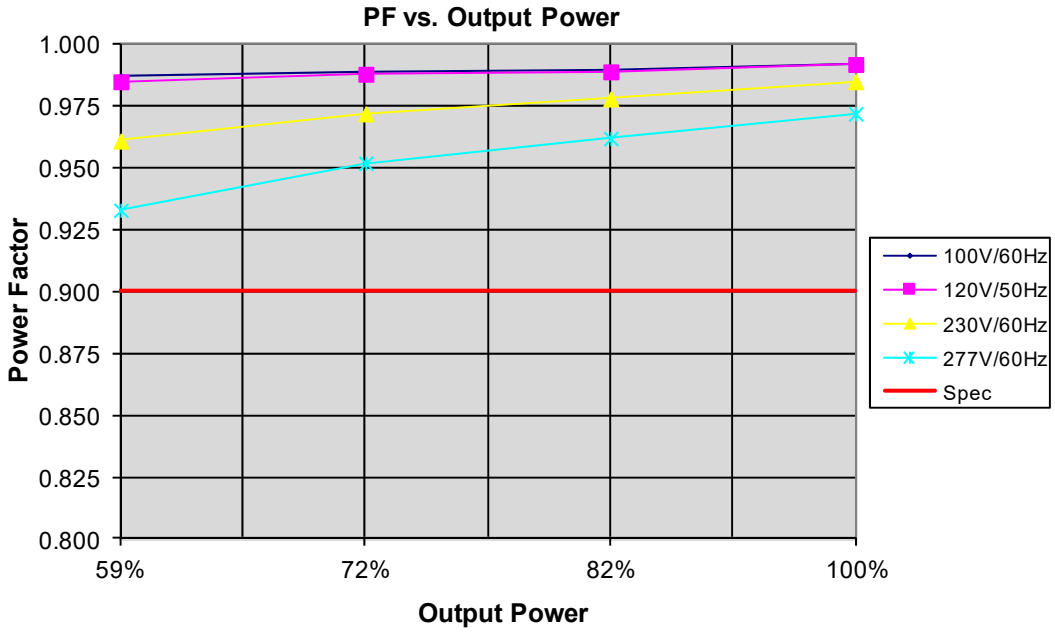
Safety Compliance

Safety	Notes/Standards
UL/CUL	UL8750, UL1310 for UL Class 2 & CAN/CSA C22.2 No. 250.13, UL Type HL
Withstand Voltage	Input to Output: 3750 Vac
Isolation Resistance	Input to Output: >100 MΩ, 500VDC @ 25 ^{O}C, 70 % RH
Dimming Circuit	Dimmable by Forward Phase (Incan) or Reverse Phase (ELV) dimmers. Dimmer must be properly loaded.

EMC Compliance

Standard	Notes/Conditions
FCC, 47CFR Part 15	Class A
EN 61000-6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
EN 61000-3-2	Part 3-2: Limits for harmonic current emissions Class C, ≥80% Rated Power
EN 61000-3-3	Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker.
EN 61000-4-5	Part 4-5: Surge Immunity test, 2 kV L-N, 4 kV L-FG & N-FG
Energy Star	Energy Star transient protection: Ballast or driver shall comply with ANSI/IEEE C62.41.1-2002 and ANSI/IEEE C62.41.2-2002, Category A operation. The line transient shall consist of seven strikes of a 100 kHz ring wave, 2.5 kV level, for both common mode and differential mode.

Power Factor Curves (Typical) - Direct Connect to AC (No Dimmer)



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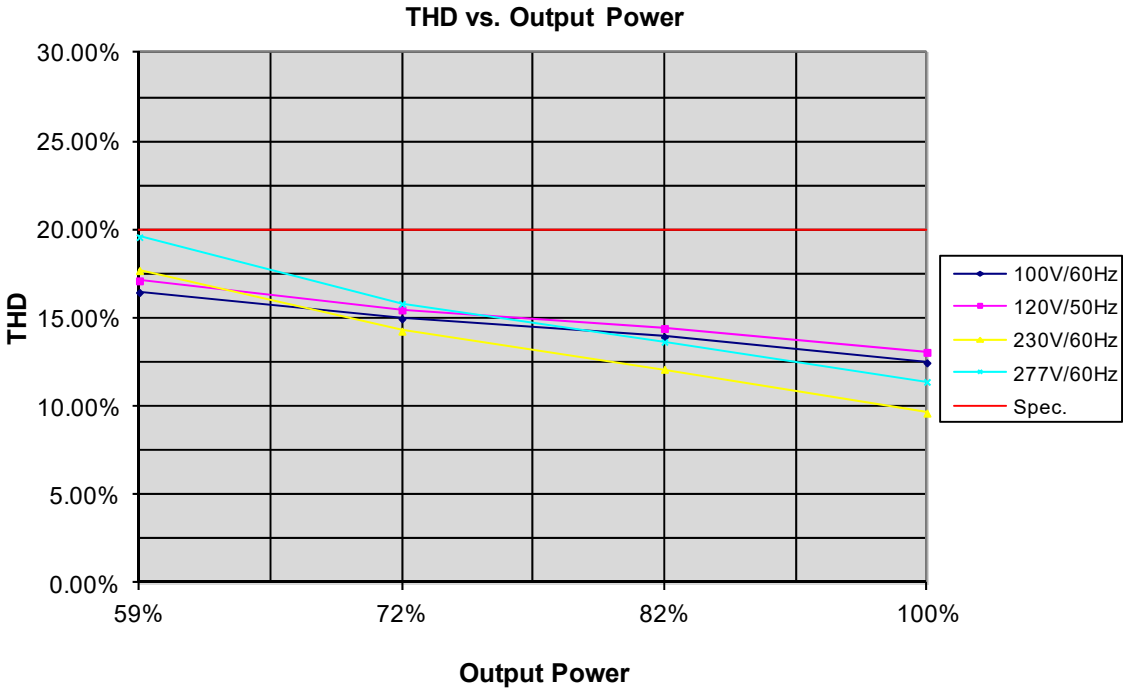
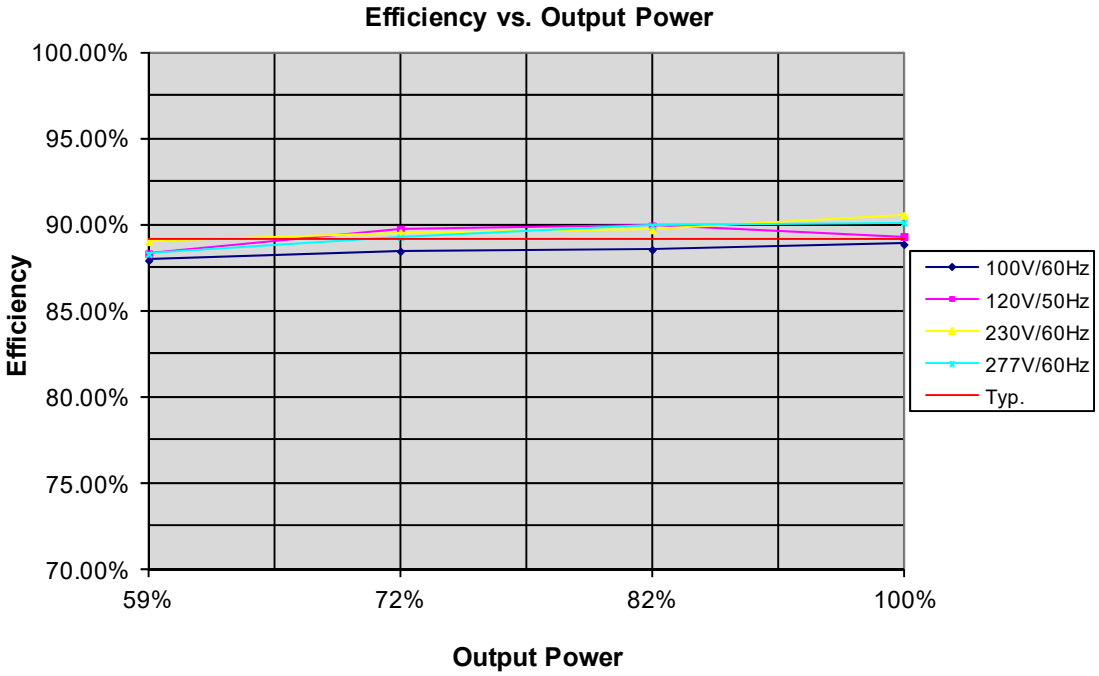
THD Curves (Typical) - Direct Connect to AC (No Dimmer)



Efficiency Curve (Typical) - Direct Connect to AC (No Dimmer)



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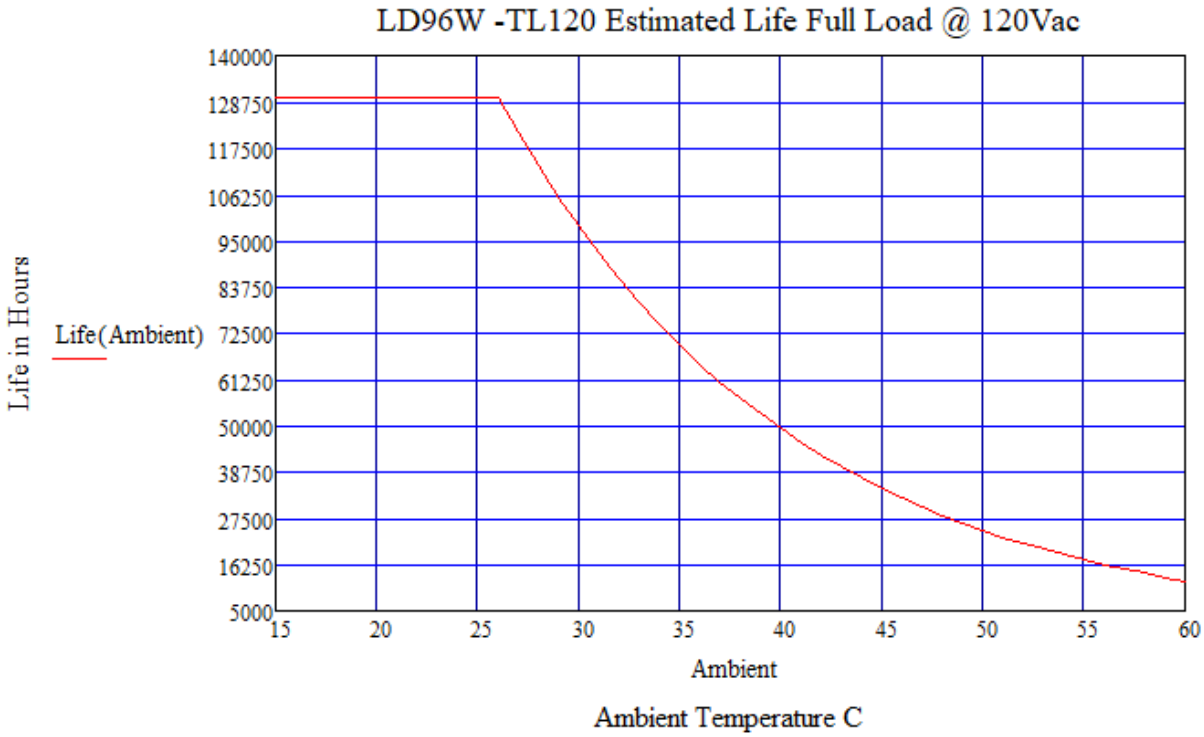
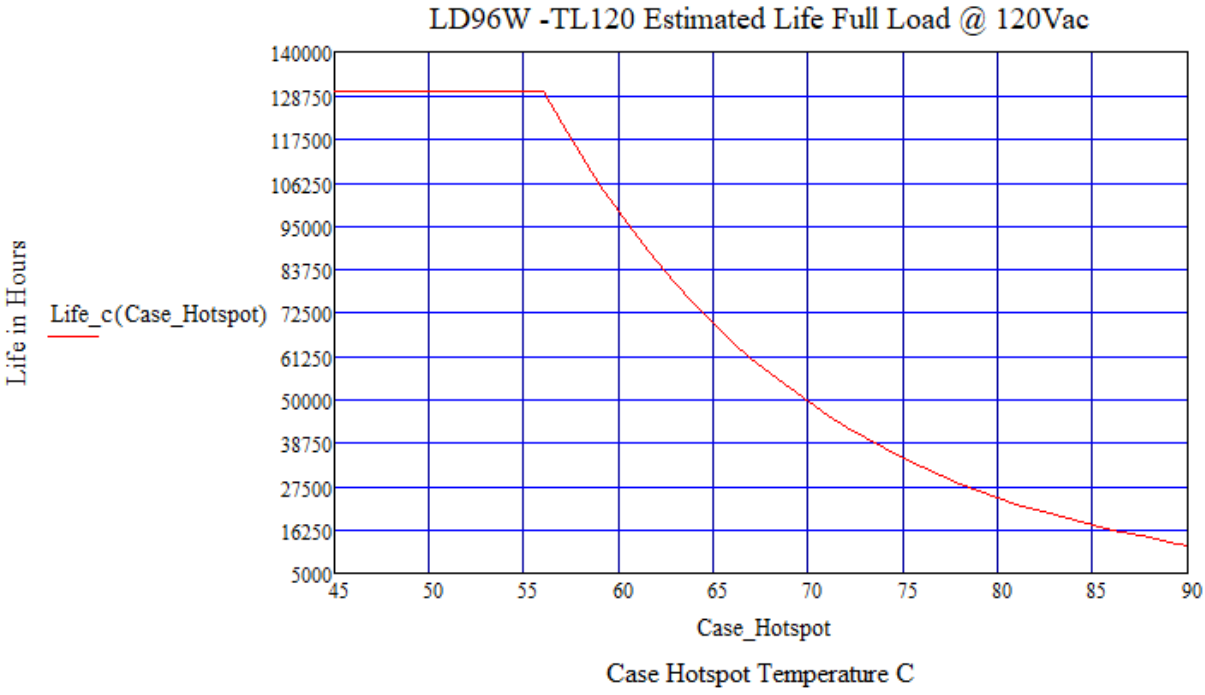
Life vs. Ambient Temperature



Life vs. Case (Tc) Temperature



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