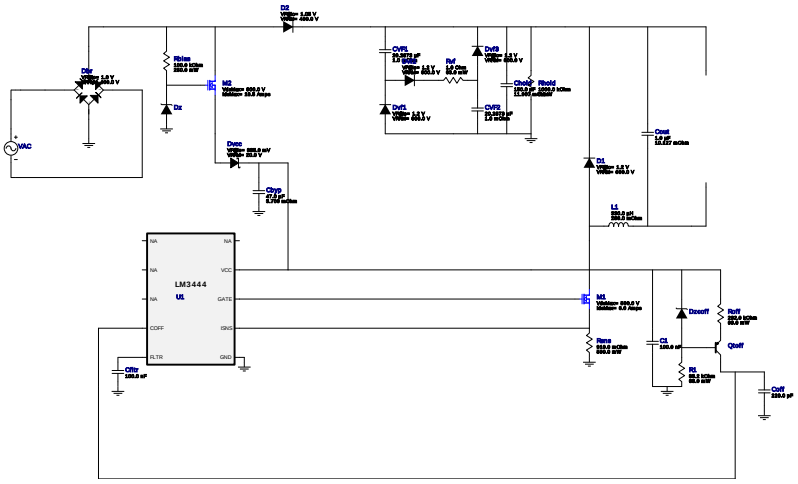
WEBENCH® Design Report

VinMin = 110.0V
VinMax = 230.0V
Vout = 11.5V
Iout = 0.7A

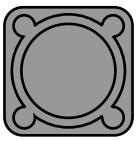
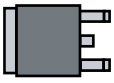
Device = LM3444MM/NOPB
Topology = Buck
Created = 9/8/16 5:19:10 PM
BOM Cost = $0.00
BOM Count = 29
Total Pd = 0.0W

Design : 3876120/8 LM3444MM/NOPB
LM3444MM/NOPB 110.0V-230.0V to 20.95V @ 0.7A

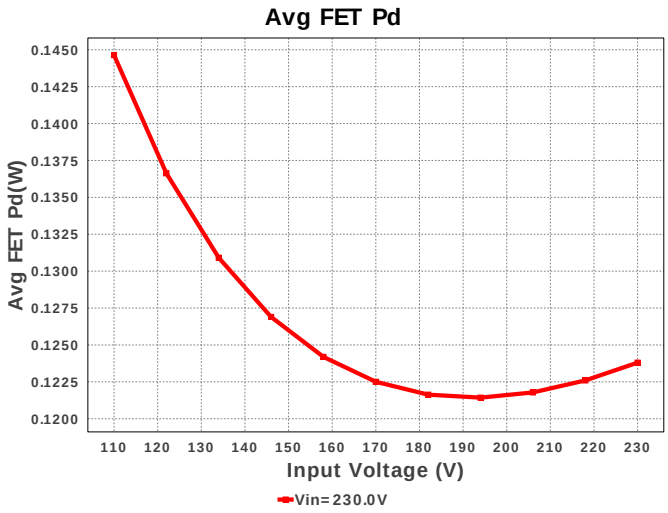


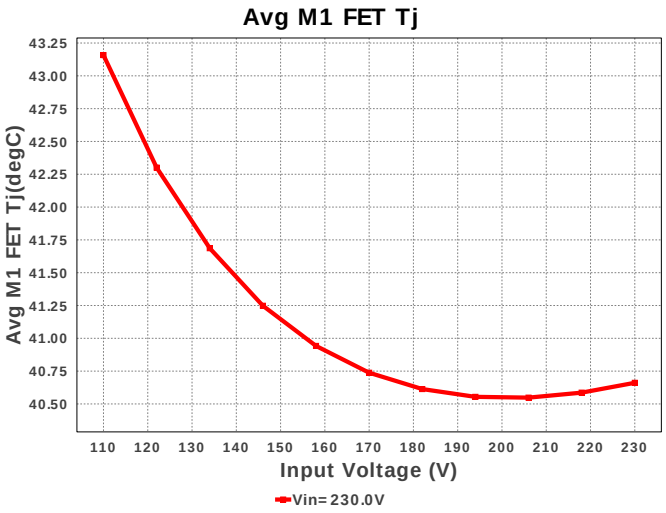
Electrical BOM

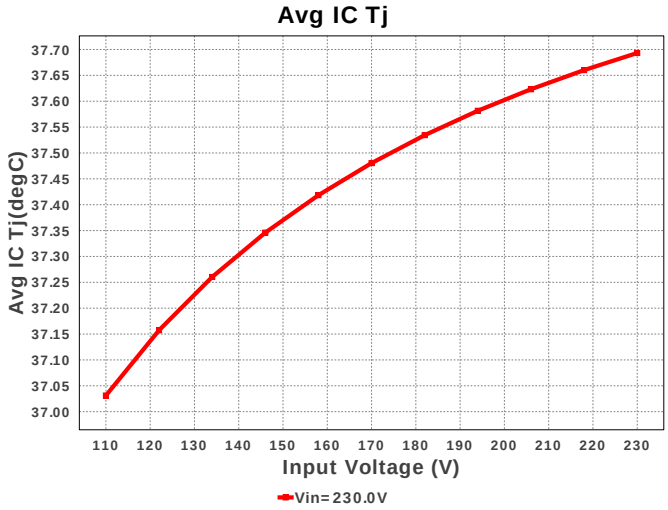
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	C1	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	CVF1	CUSTOM	CUSTOM Series= ?	Cap= 20.2873 uF ESR= 1.0 mOhm VDC= 260.22 V IRMS= 1.72134 A	1	NA	CUSTOM 0 mm²
3.	CVF2	CUSTOM	CUSTOM Series= ?	Cap= 20.2873 uF ESR= 1.0 mOhm VDC= 260.22 V IRMS= 1.72134 A	1	NA	CUSTOM 0 mm²
4.	Cbyp	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	1	$0.15	1206_190 11 mm²
5.	Cfltr	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
6.	Chold	TDK	C3225X7T2J154K Series= X7T	Cap= 150.0 nF ESR= 11.907 mOhm VDC= 630.0 V IRMS= 0.0 A	1	$0.19	1210 15 mm²
7.	Coff	Yageo America	CC0805JRNPO9BN221 Series= C0G/NP0	Cap= 220.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

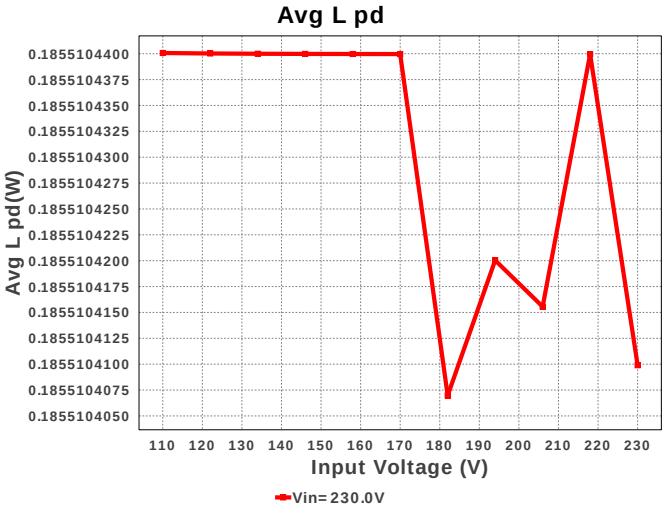
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Cout	MuRata	GRM188R61C105KA93D Series= X5R	Cap= 1.0 uF ESR= 10.127 mOhm VDC= 16.0 V IRMS= 994.63 mA	1	$0.01	 0603 5 mm²
9.	D1	Bourns	CD214B-F3600	VF@Io= 1.2 V VRRM= 600.0 V	1	$0.14	 SMB 44 mm²
10.	D2	Bourns	CD1408-FU1400	VF@Io= 1.05 V VRRM= 400.0 V	1	$0.13	 Diode_1408 13 mm²
11.	D_LED	Cree	XHP50A-00-0000-0D0BJ40CB	LED	1	$5.18	 xlampxhp 0 mm²
12.	Dbr	Diodes Inc.	HD04-T	VF@Io= 1.0 V VRRM= 400.0 V	1	$0.12	 MiniDIP 62 mm²
13.	Dvcc	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	 SOD-123 13 mm²
14.	Dvf1	Bourns	CD214B-F3600	VF@Io= 1.2 V VRRM= 600.0 V	1	$0.14	 SMB 44 mm²
15.	Dvf2	Bourns	CD214B-F3600	VF@Io= 1.2 V VRRM= 600.0 V	1	$0.14	 SMB 44 mm²
16.	Dvf3	Bourns	CD214B-F3600	VF@Io= 1.2 V VRRM= 600.0 V	1	$0.14	 SMB 44 mm²
17.	Dz	ON Semiconductor	BZX84C15LT1G	Zener	1	$0.02	 SOT-23 14 mm²
18.	Dzcoff	ON Semiconductor	BZX84C5V1LT1G	Zener	1	$0.02	 SOT-23 14 mm²
19.	L1	Coilcraft	MSS1210-334KEB	L= 330.0 µH DCR= 289.0 mOhm	1	$0.81	 MSS1210 204 mm²
20.	M1	Fairchild Semiconductor	FDD6N50TM	VdsMax= 500.0 V IdsMax= 6.0 Amps	1	$0.47	 DPAK 102 mm²
21.	M2	STMicroelectronics	STW21N90K5	VdsMax= 900.0 V IdsMax= 18.5 Amps	1	$3.94	 TO-247 123 mm²
22.	Qtoff	Fairchild Semiconductor	MMBT4403	Bipolar Transistor	1	$0.03	 SOT-23 14 mm²
23.	R1	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
24.	Rbias	Panasonic	ERJ-8ENF1003V Series= ERJ-8E	Res= 100.0 kOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.01	 1206 11 mm²
25.	Rhold	CUSTOM	CUSTOM Series= ?	Res= 1000.0 kOhm Power= 0.0 W Tolerance= 0.0%	1	NA	CUSTOM 0 mm²
26.	Roff	Vishay-Dale	CRCW0402232KFKED Series= CRCW..e3	Res= 232.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²

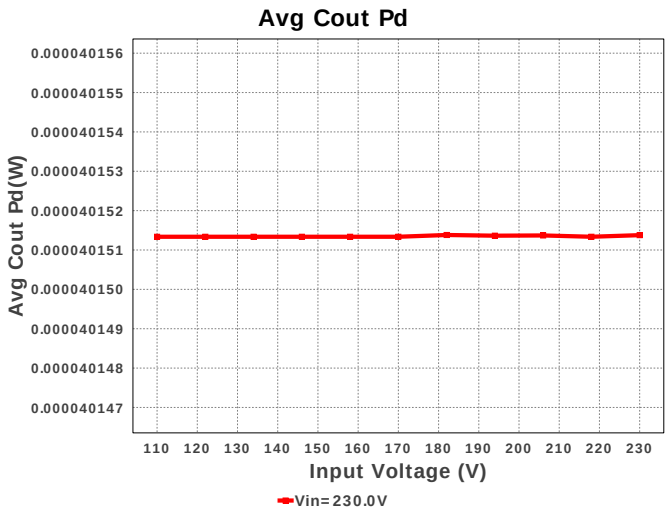
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
27.	Rsns	Bourns	CRM1206-FX-R910ELF Series= ?	Res= 910.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1206 11 mm^2
28.	Rvf	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
29.	U1	Texas Instruments	LM3444MM/NOPB	Switcher	1	$0.35	0 mm^2

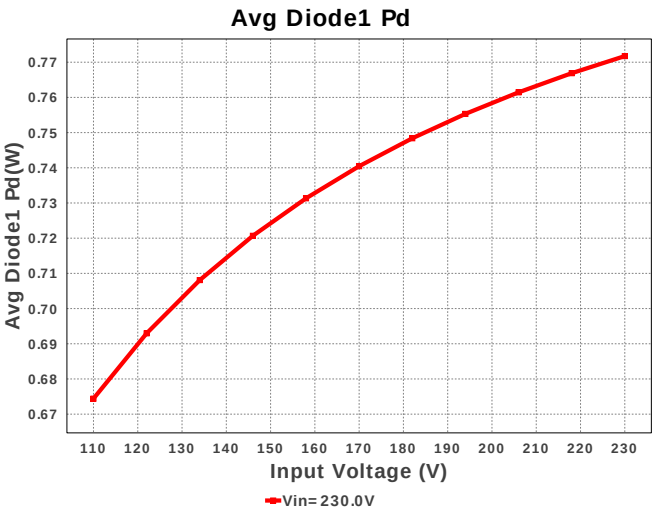


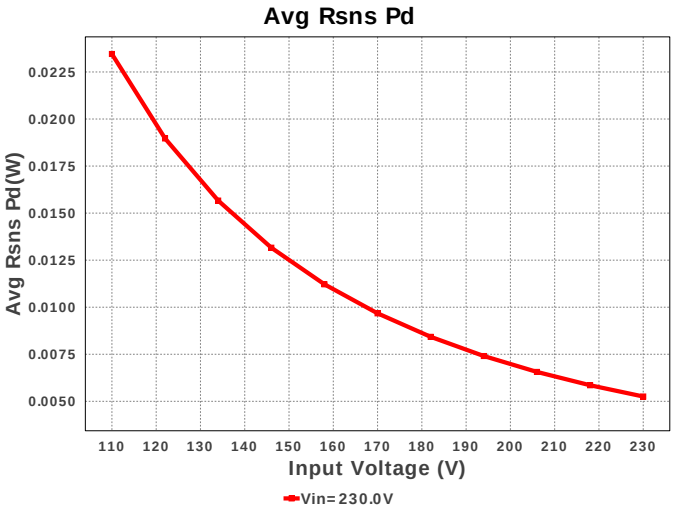


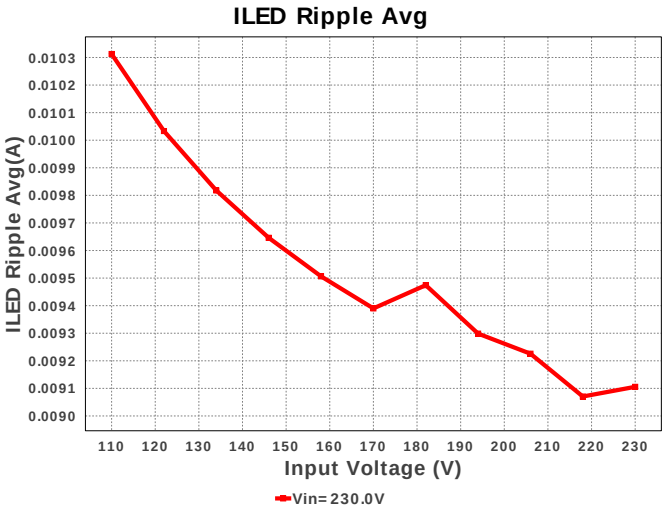


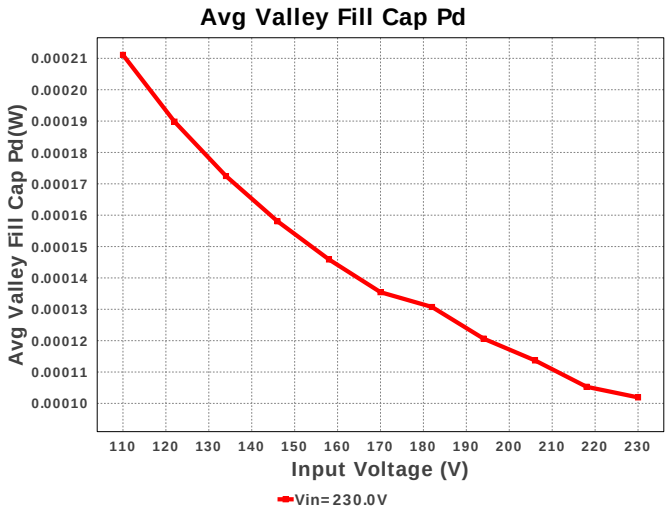


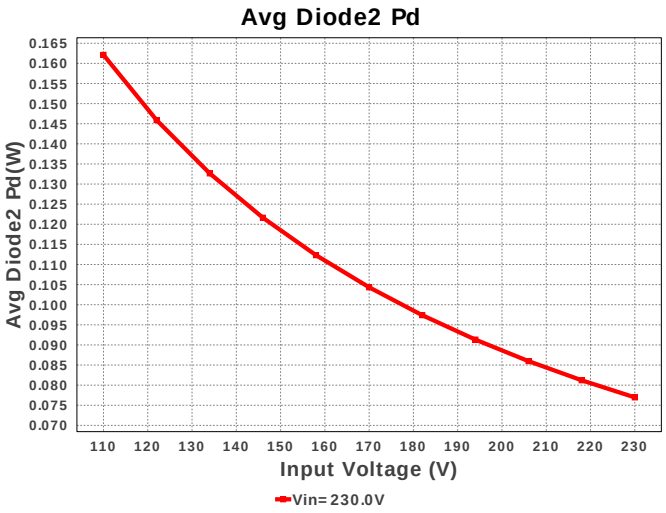


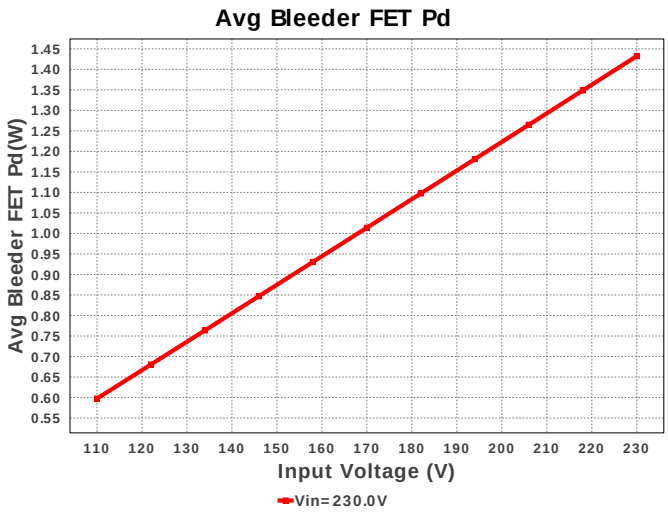


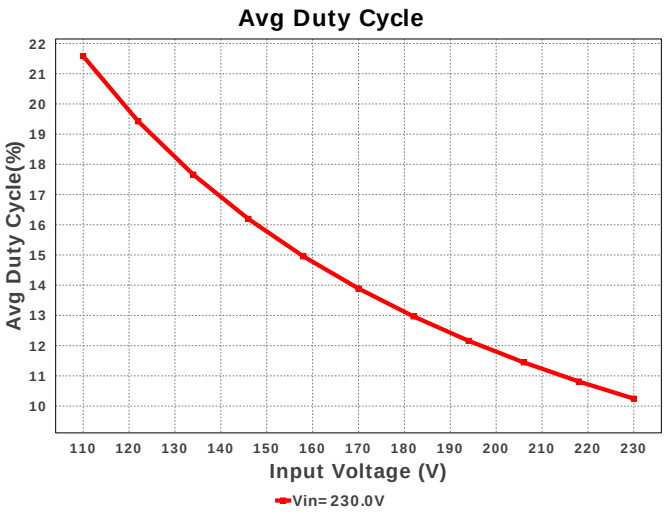


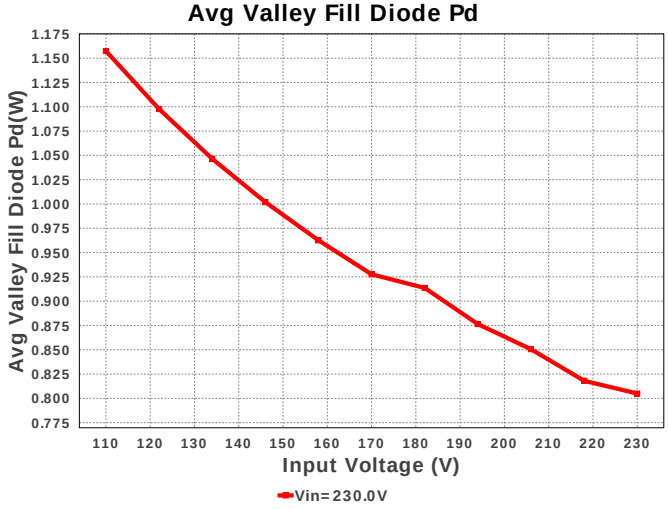


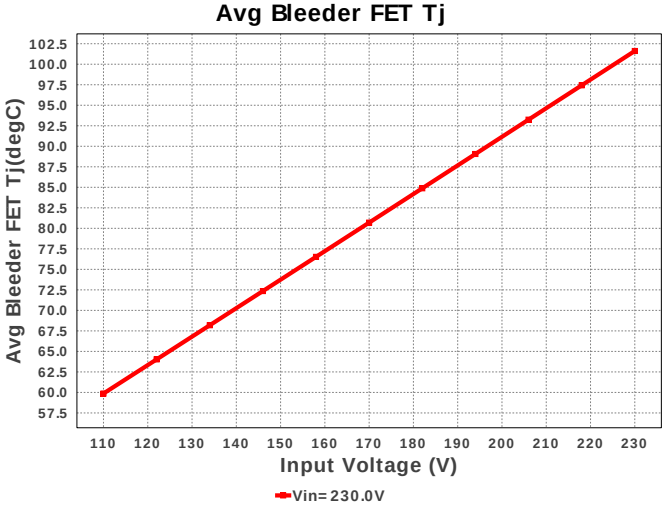


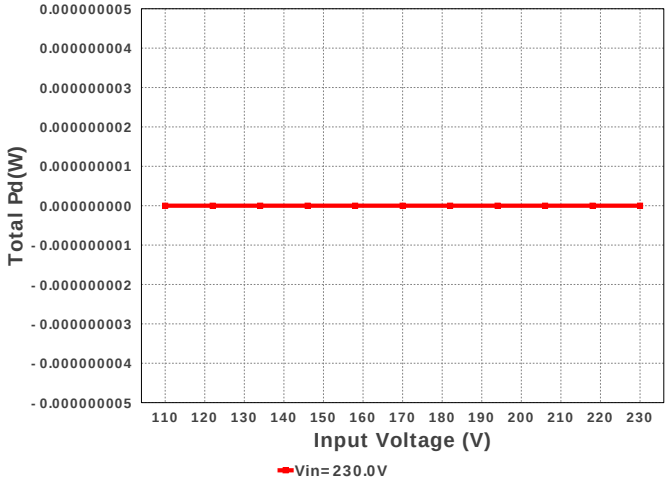


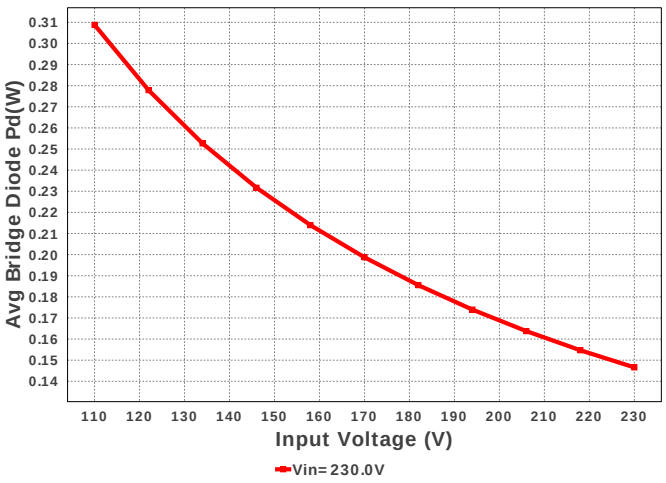


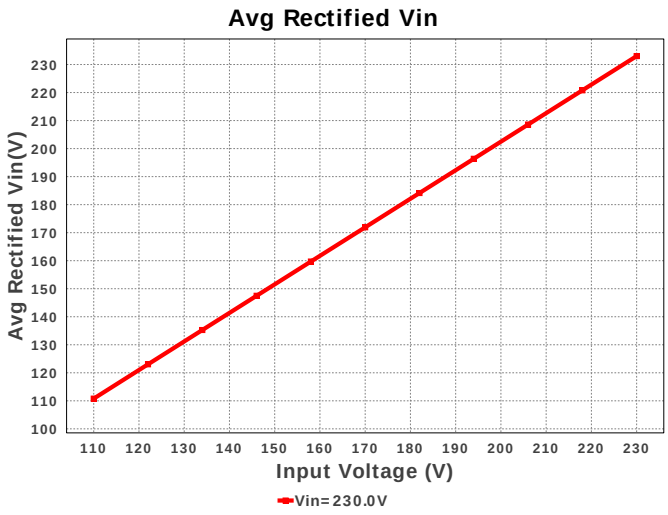


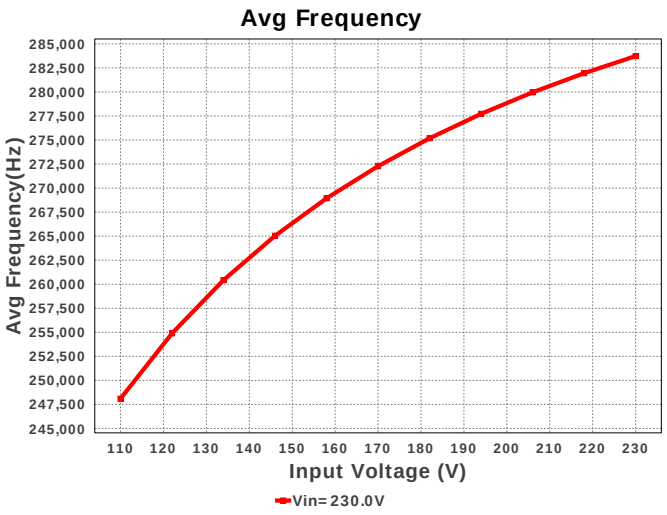


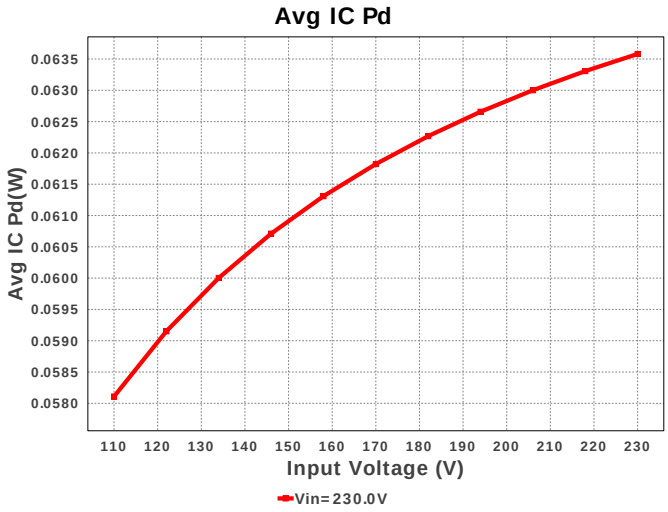


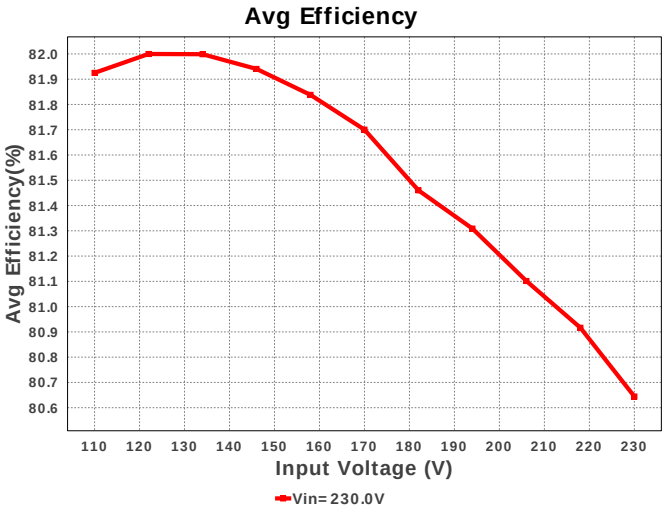


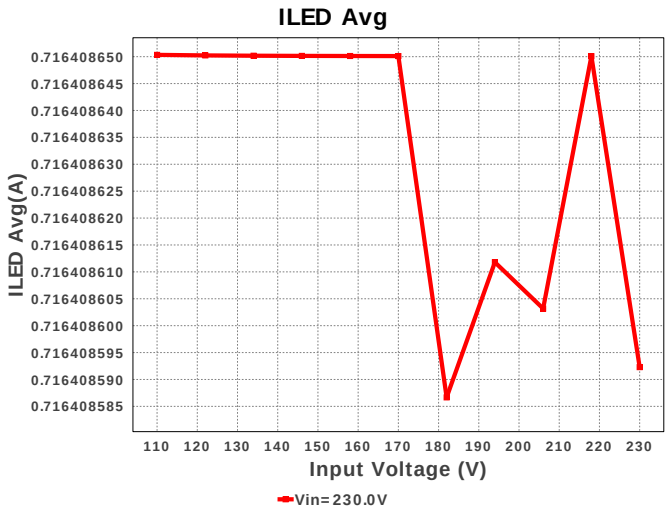












Operating Values

#	Name	Value	Category	Description
1.	ILED Avg	716.409 mA	Current	Average Current per LED for the AC line period
2.	ILED Ripple Avg	9.014 mA	Current	Average LED Ripple Current for the AC line period
3.	Avg Rectified Vin	233.002 V	General	Average Rectified Voltage for the AC Line Period
4.	BOM Count	29	General	Total Design BOM count
5.	FootPrint	857.0 mm^2	General	Total Foot Print Area of BOM components
6.	Total BOM	$0.0	General	Total BOM Cost
7.	Avg Bleeder FET Tj	101.615 degC	Op_Point	Bleeder MOSFET average junction temperature over the AC Line Period
8.	Avg M1 FET Tj	40.661 degC	Op_Point	M1 MOSFET average junction temperature over the AC Line Period
9.	Avg Duty Cycle	10.246 %	Op_point	Average Duty Cycle over the AC Line Period
10.	Avg Efficiency	80.889 %	Op_point	Average Efficiency over the AC Line Period

#	Name	Value	Category	Description
11.	Avg Frequency	283.727 kHz	Op_point	Average Switching Frequency over the AC Line Period
12.	Avg IC Tj	37.693 degC	Op_point	Average IC junction temperature for the AC line period
13.	VIN_OP	230.0 V	Op_point	AC Input RMS Voltage
14.	Avg Bleeder FET Pd	1.432 W	Power	Average power dissipation in the bleeder FET over the AC line period
15.	Avg Bridge Diode Pd	100.676 mW	Power	Average Power Dissipation in the Bridge Diode over the AC Line Period
16.	Avg Cout Pd	40.151 µW	Power	Average Power Dissipation in the Output Capacitor over the AC Line Period
17.	Avg Diode1 Pd	771.738 mW	Power	Average Power Dissipation in D1 over the AC Line Period
18.	Avg Diode2 Pd	76.958 mW	Power	Average Power Dissipation in D1 over the AC Line Period
19.	Avg FET Pd	122.471 mW	Power	Average power dissipation in the switching FET over the AC line period
20.	Avg IC Pd	63.581 mW	Power	Average Power Dissipation in the IC over the AC line period
21.	Avg L pd	185.51 mW	Power	Average Inductor power disspation over the AC line period
22.	Avg Rsns Pd	5.255 mW	Power	Average power dissipation in the Current limit resistor over the AC line period
23.	Avg Valley Fill Cap Pd	99.763 µW	Power	Average Power Dissipation in the Valley Fill Capacitors over the AC Line Period
24.	Avg Valley Fill Diode Pd	796.32 mW	Power	Average Power Dissipation in the Valley Fill Diodes over the AC Line Period
25.	Total Pd	0.0 W	Power	Total Power Dissipation
26.	Vout Tolerance	143.18 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 m	Maximum Output Current
2.	VinMax	230.0	Maximum input voltage
3.	VinMin	110.0	Minimum input voltage
4.	Vout	11.5	Output Voltage
5.	line_fsw	60.0	Light Output in Lumen
6.	application	LED_DRIVER	LED Application
7.	base_pn	LM3444	Base Product Number
8.	LED_Architect	N	LED Architect Project
9.	ledparallel	1.0	Number of LED in parallel
10.	ledpartnumber	XHP50A-00-0000-0D0BL40CB	LED part number
11.	ledseries	1.0	Number of LED in series
12.	line_fsw	60.0	AC Line Frequency
13.	source	AC	Input Source Type
14.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3444** Product Folder : http://www.ti.com/product/LM3444 : contains the data sheet and other resources.