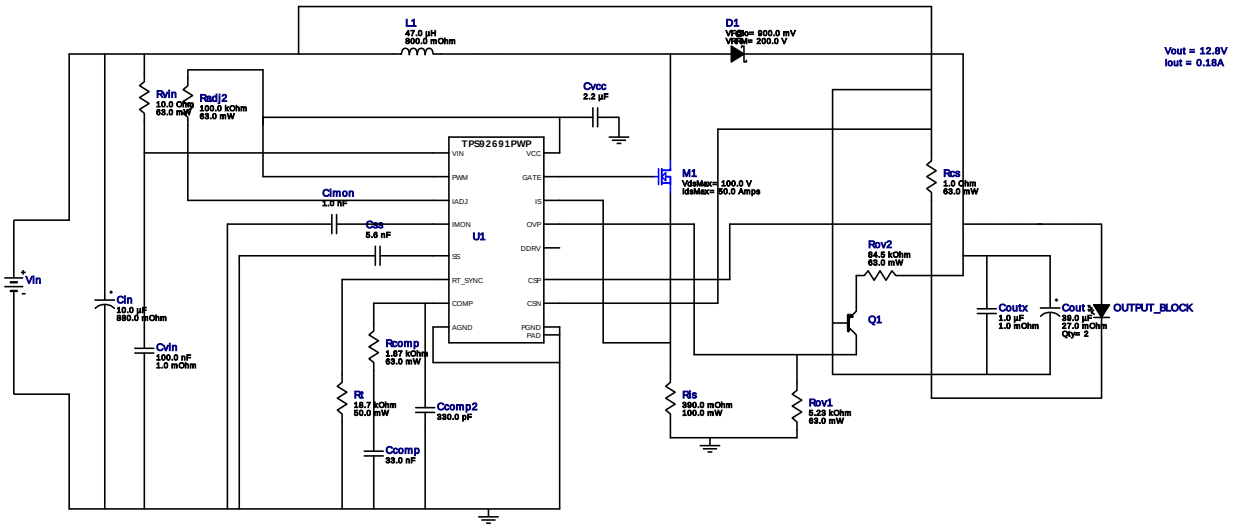
WEBENCH® Design Report

VinMin = 6.0V
VinMax = 36.0V
Vout = 12.8V
Iout = 0.18A

Device = TPS92691PWPR
Topology = Buck_Boost
Created = 2018-06-04 07:03:35.093
BOM Cost = $0.00
BOM Count = 27
Total Pd = 2.3W

Design : 4464737/123 TPS92691PWPR
TPS92691PWPR 6.0V-36.0V to 12.80V @ 0.18A



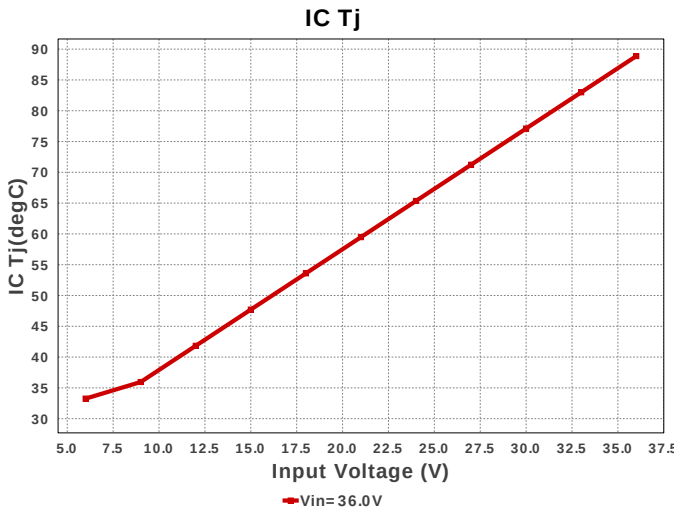
My Comments

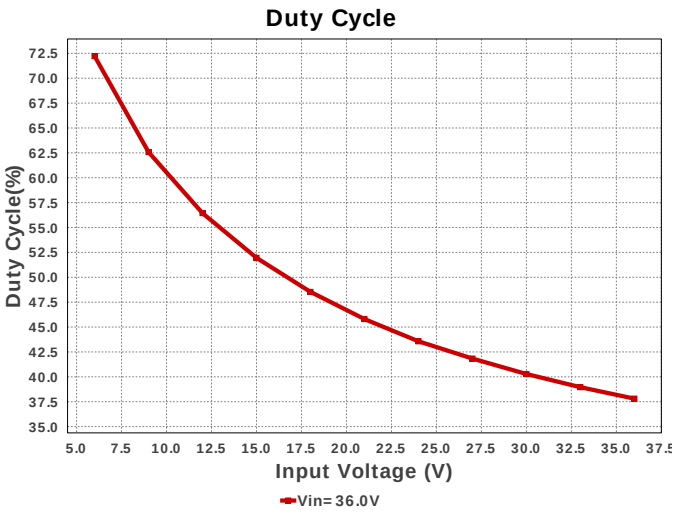
No comments

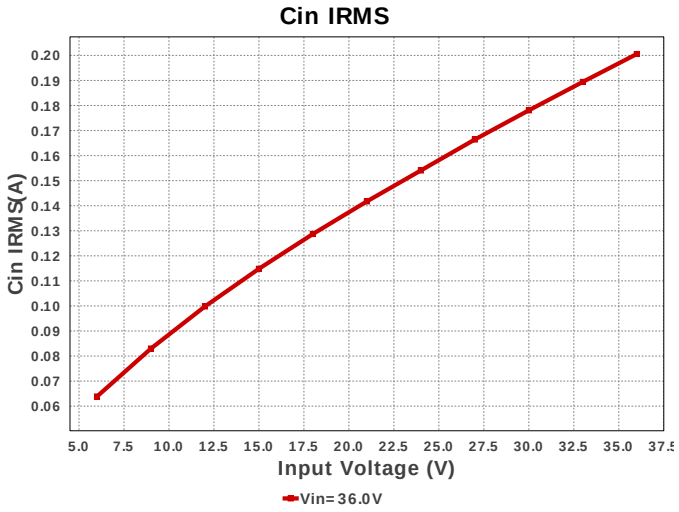
Electrical BOM

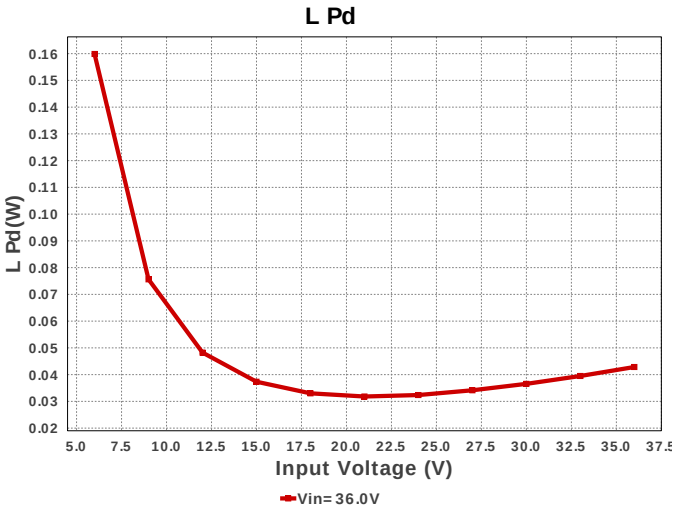
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	TDK	CGA4J2C0G1H333J125AA Series= C0G/NP0	Cap= 33.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.10	0805 7 mm²
2.	Ccomp2	Samsung Electro-Mechanics	CL21C331JBANNNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cimon	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
4.	Cin	Nichicon	UUD1H100MCL1GS Series= uD	Cap= 10.0 uF ESR= 880.0 mOhm VDC= 50.0 V IRMS= 165.0 mA	1	$0.10	SM_RADIAL_6.3AMM 80 mm²
5.	Cnr	TDK	C2012X7S2A474K125AB Series= X7S	Cap= 470.0 nF ESR= 17.152 mOhm VDC= 100.0 V IRMS= 1.58068 A	1	$0.12	0805 7 mm²
6.	Cout	Panasonic	16SVPC39MV Series= SVPC	Cap= 39.0 uF ESR= 27.0 mOhm VDC= 16.0 V IRMS= 2.35 A	2	$0.30	SM_RADIAL_5MM 58 mm²
7.	Coutx	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
8.	Covp	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²

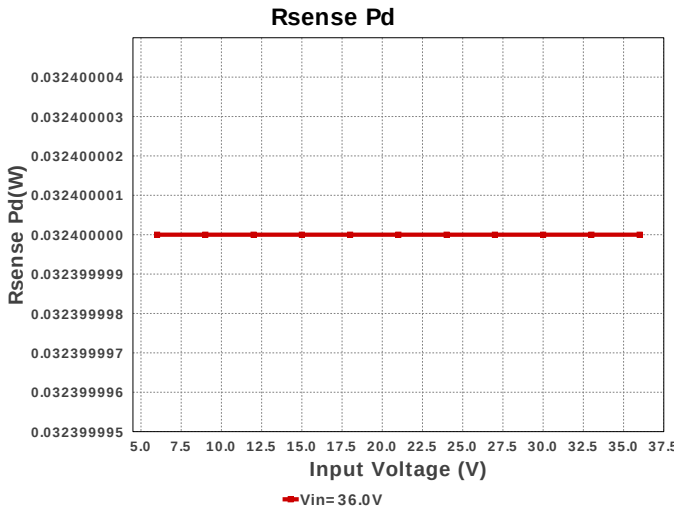
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Csd	Kemet	C0805C104M5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm²
10.	Css	TDK	CGA4C2C0G1H562J060AA Series= C0G/NP0	Cap= 5.6 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.06	 0805 7 mm²
11.	Cvcc	CUSTOM	CUSTOM Series= ?	Cap= 2.2 uF VDC= 0.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 mm²
12.	Cvin	MuRata	GRM155R60J104KA01D Series= X5R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
13.	D1	SMC Diode Solutions	SK220ATR	VF@Io= 900.0 mV VRRM= 200.0 V	1	$0.04	 SMA 37 mm²
14.	D_LED	CUSTOM	CUSTOM	LED	1	NA	CUSTOM 0 mm²
15.	L1	NIC Components	NPI43C470MTRF	L= 47.0 µH DCR= 800.0 mOhm	1	$0.09	 IND_NPI43C 31 mm²
16.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	$0.41	 DQG0008A 18 mm²
17.	Q1	Diodes Inc.	MMBTA92-7-F	Bipolar Transistor	1	$0.04	 SOT-23 14 mm²
18.	Radj2	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	Rcomp	Vishay-Dale	CRCW04021K87FKED Series= CRCW..e3	Res= 1.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rcs	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
21.	Ris	Panasonic	ERJ-3RQFR39V Series= ERJ-3R	Res= 390.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.02	 0603 5 mm²
22.	Rov1	Vishay-Dale	CRCW04025K23FKED Series= CRCW..e3	Res= 5.23 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
23.	Rov2	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
24.	Rt	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	 0201 2 mm²
25.	Rvin	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
26.	U1	Texas Instruments	TPS92691PWPR	Switcher	1	$0.80	 PWP0016J 59 mm²

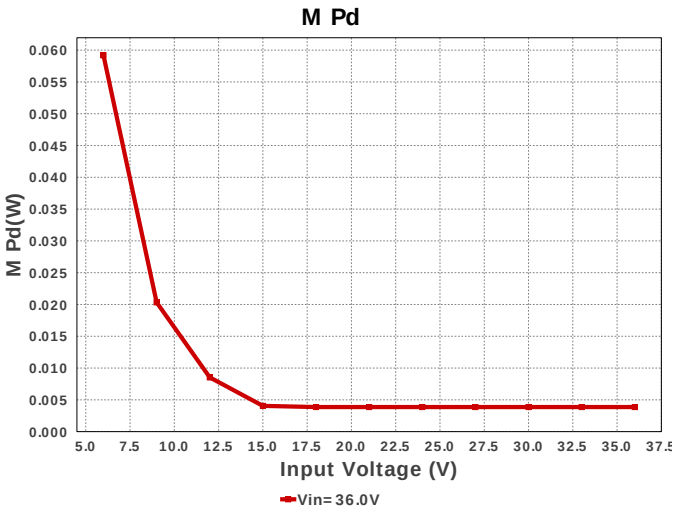


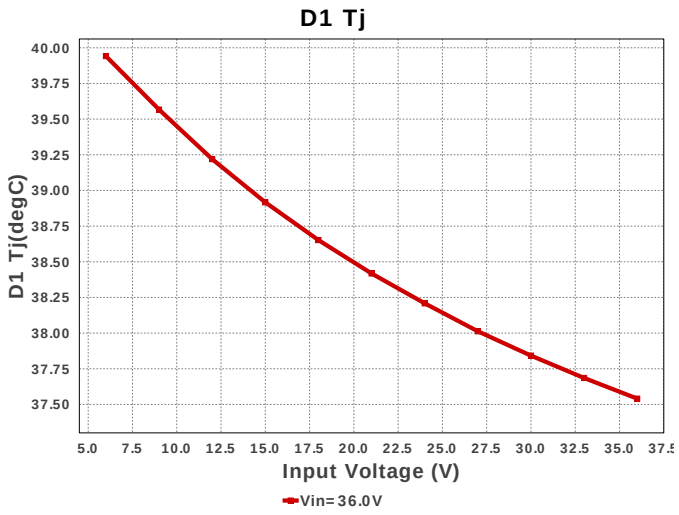


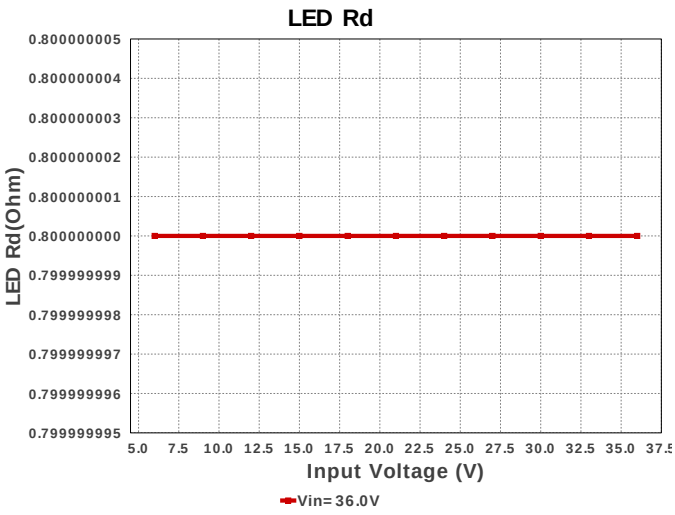


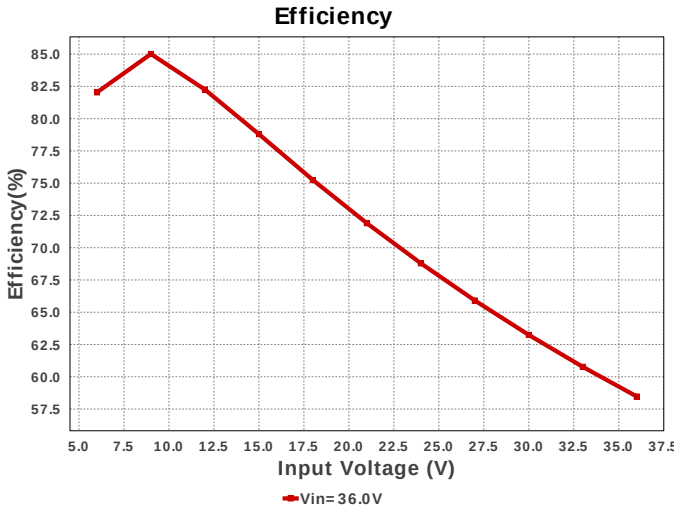


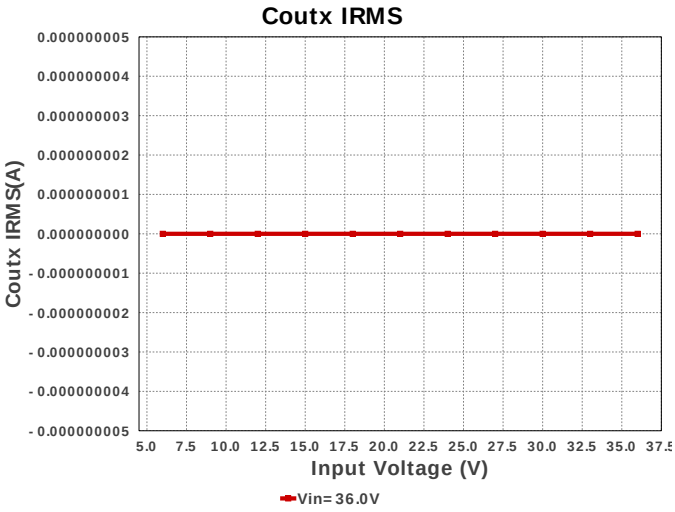


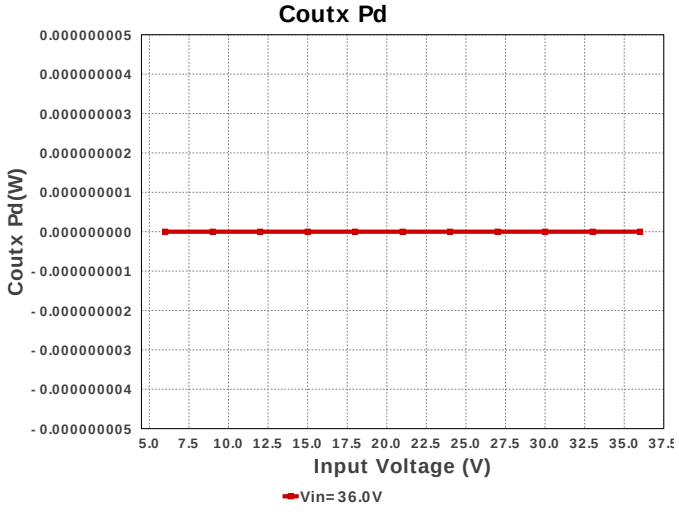


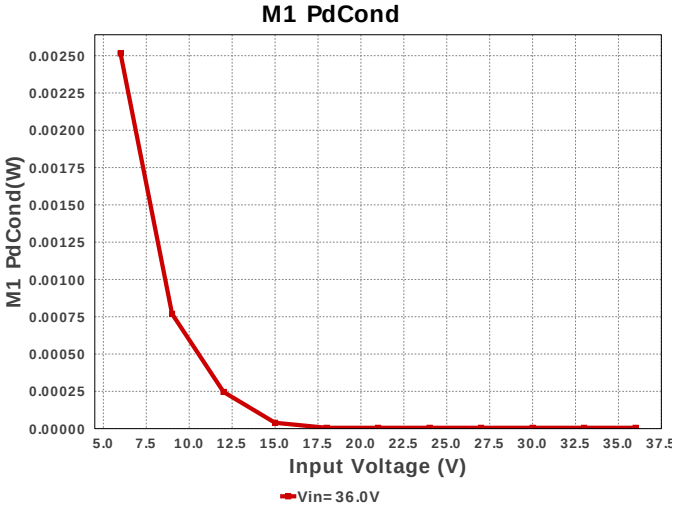


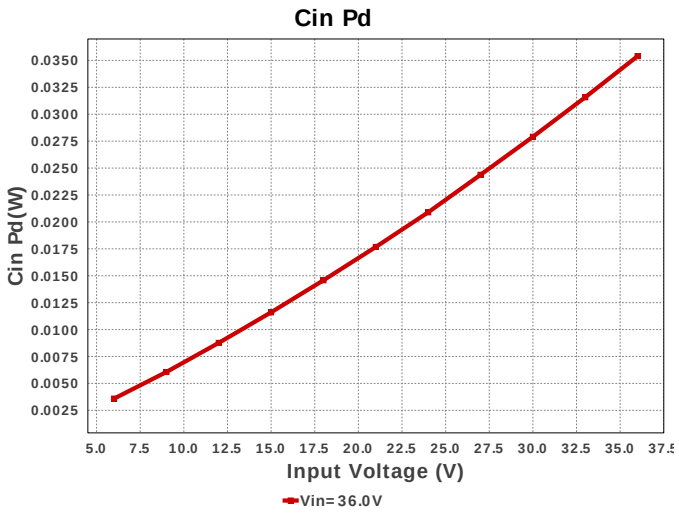


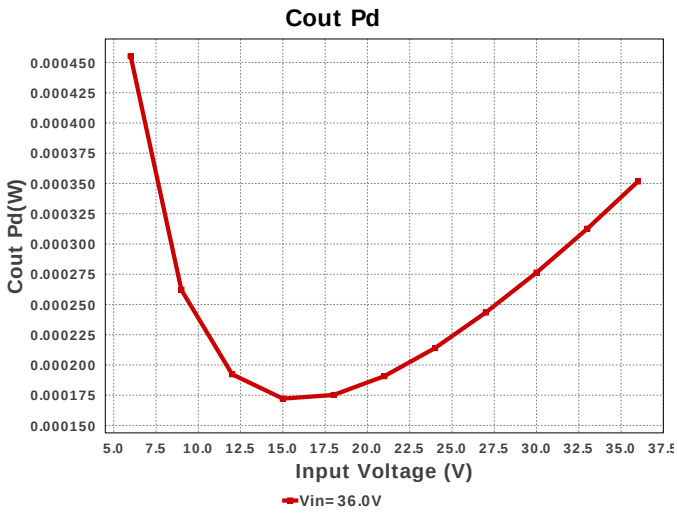


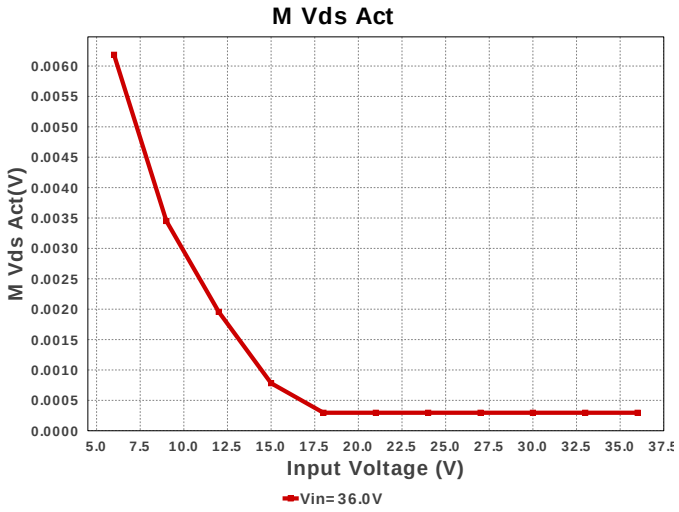


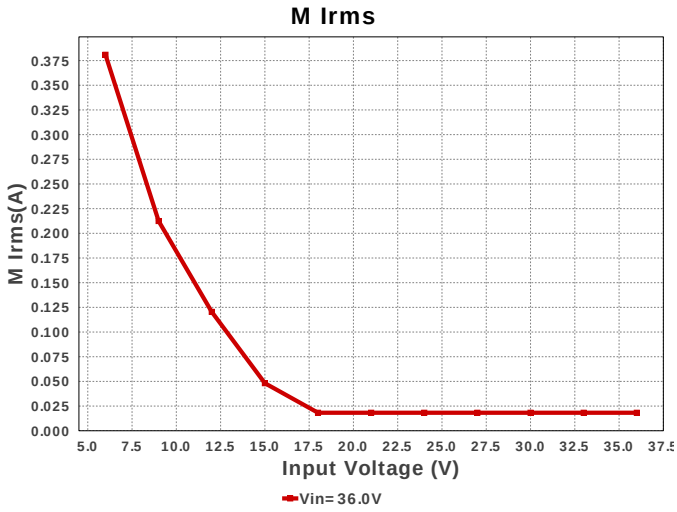


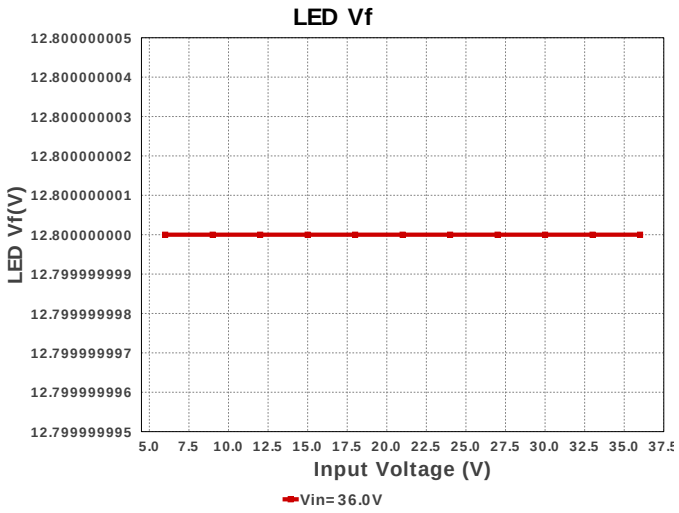


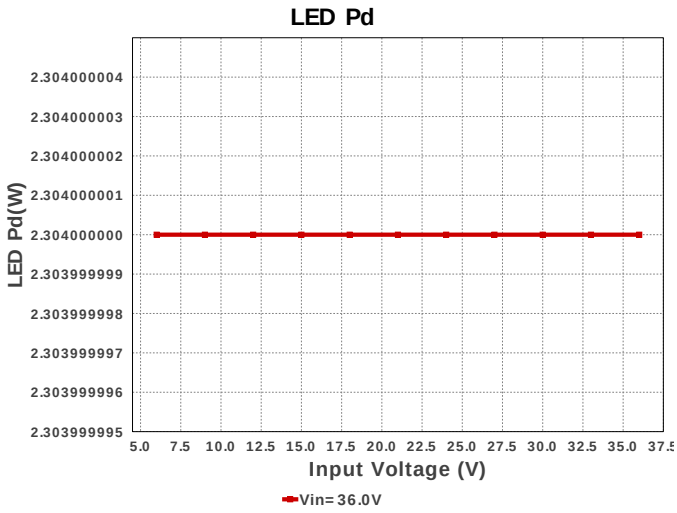


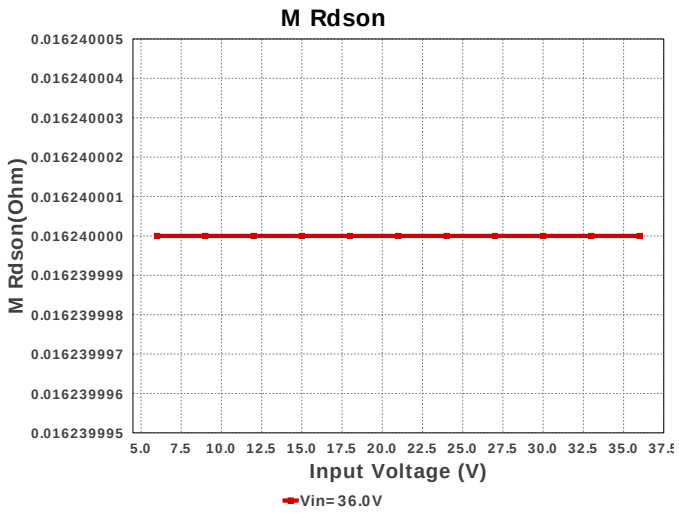


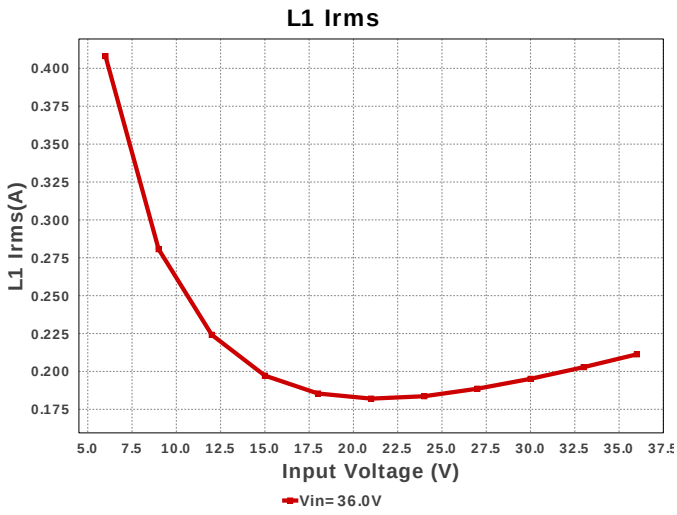


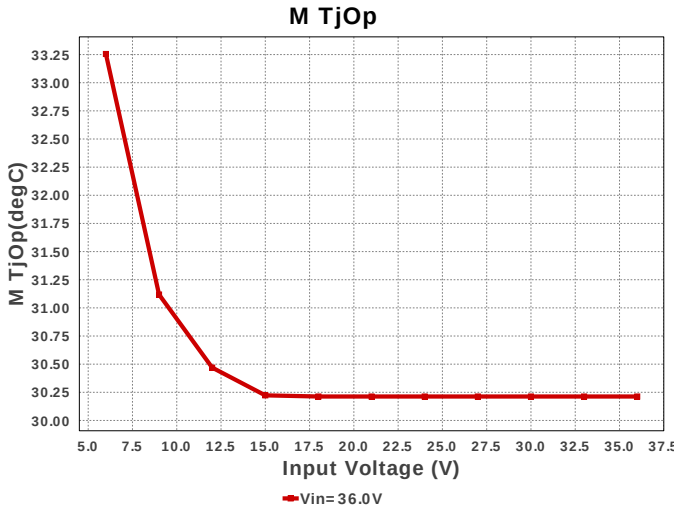


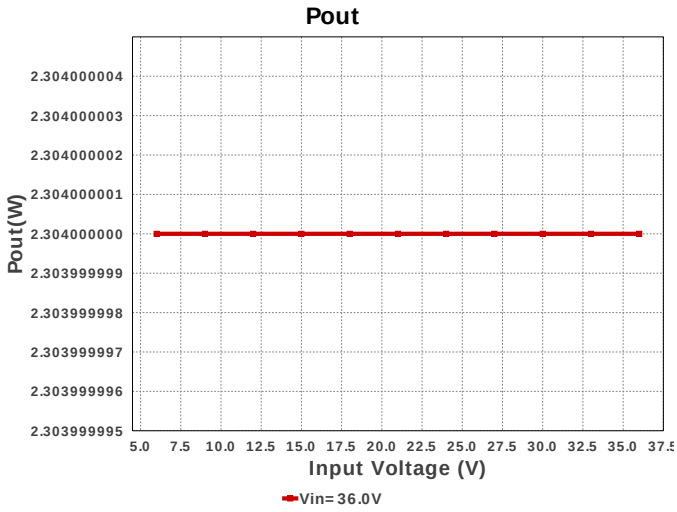


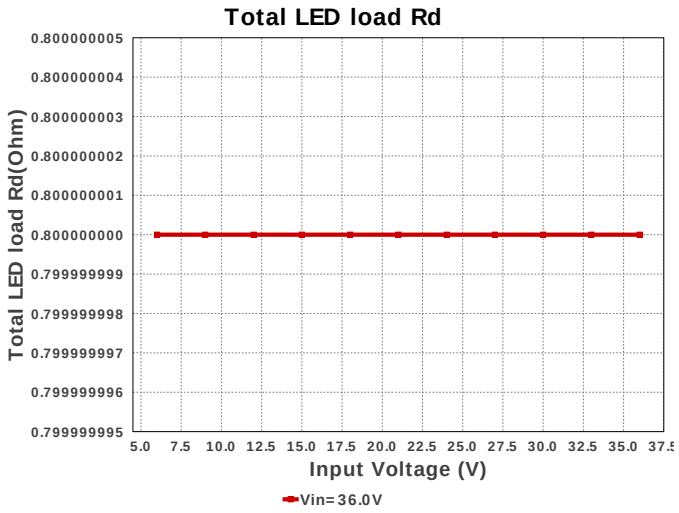


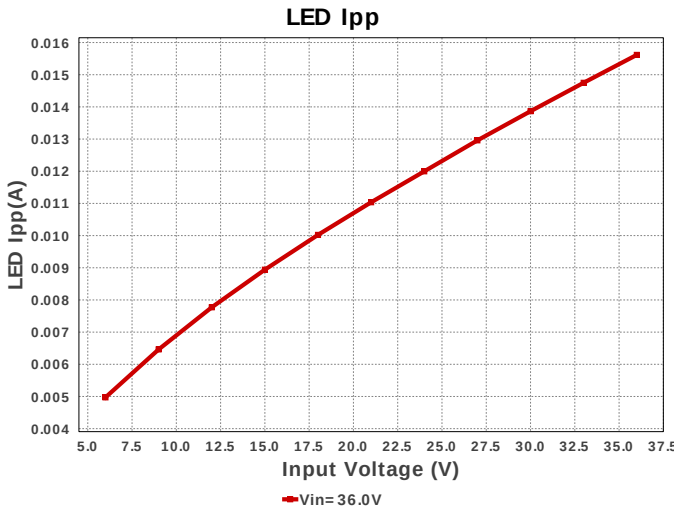


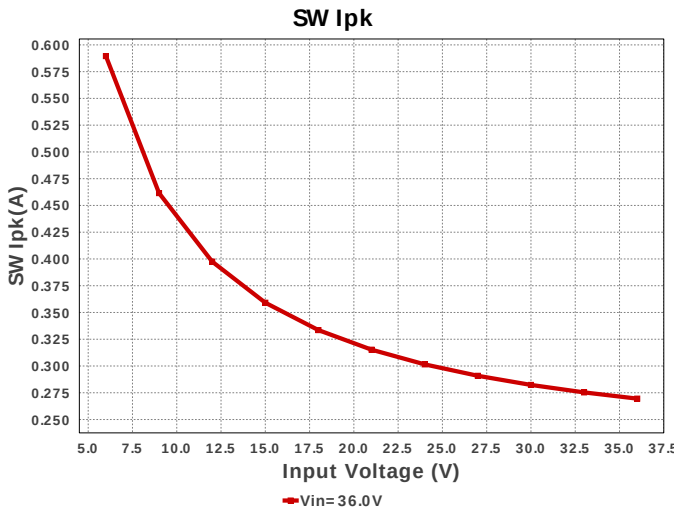


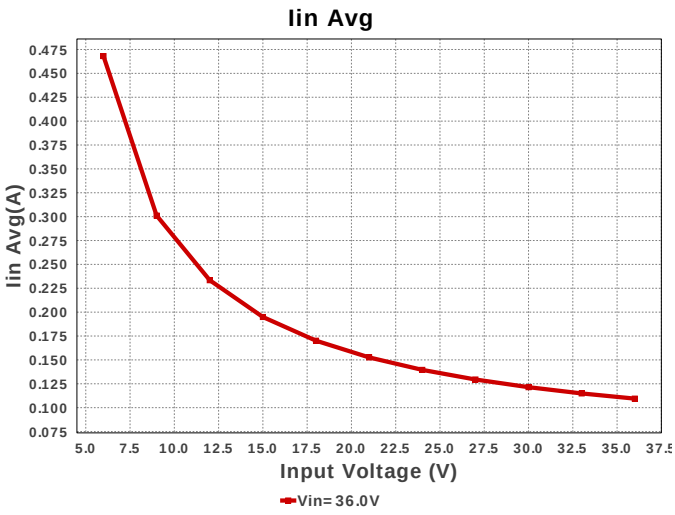


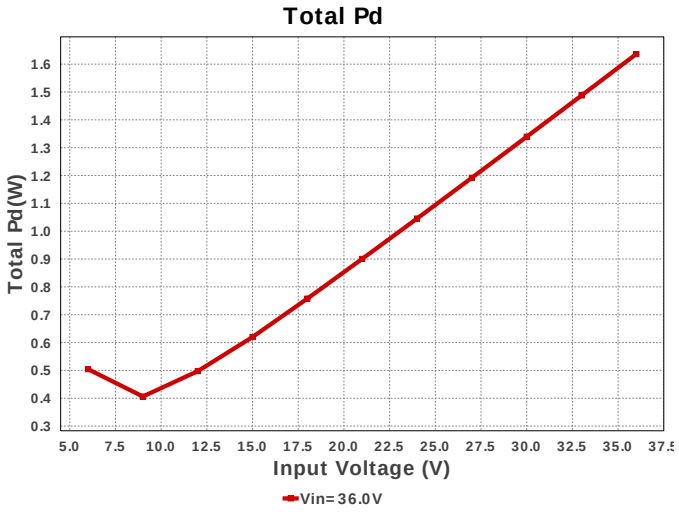


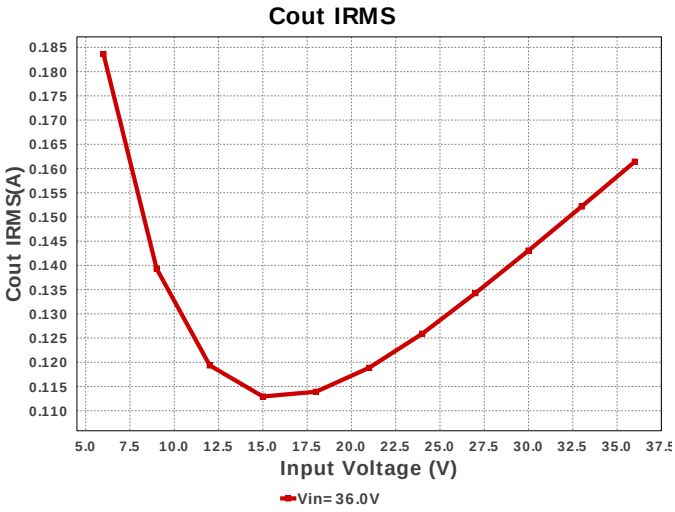


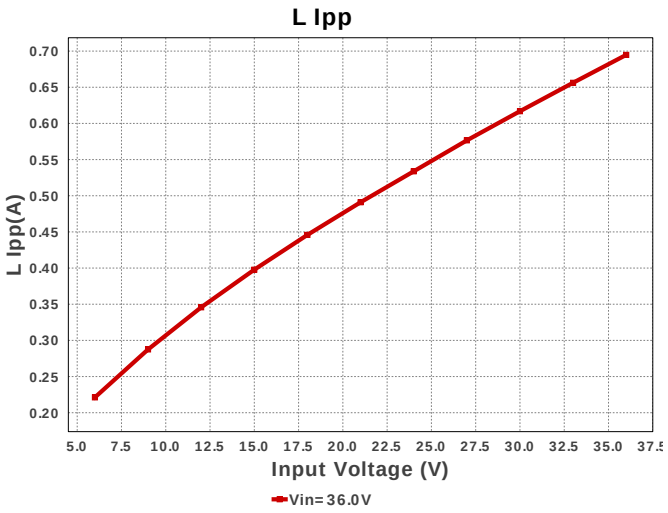


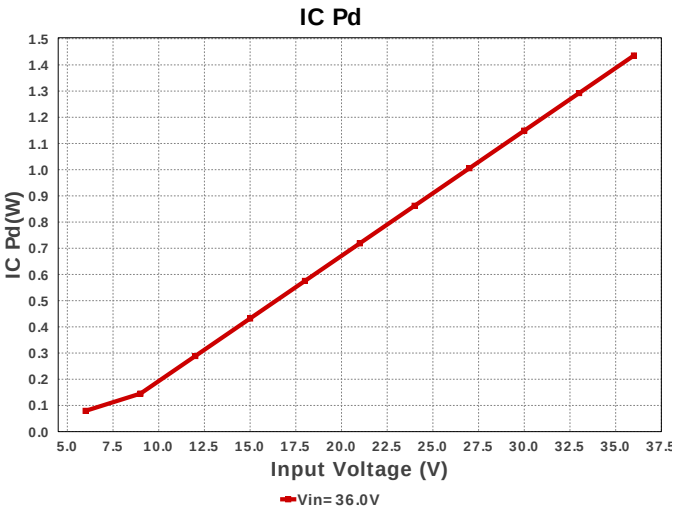


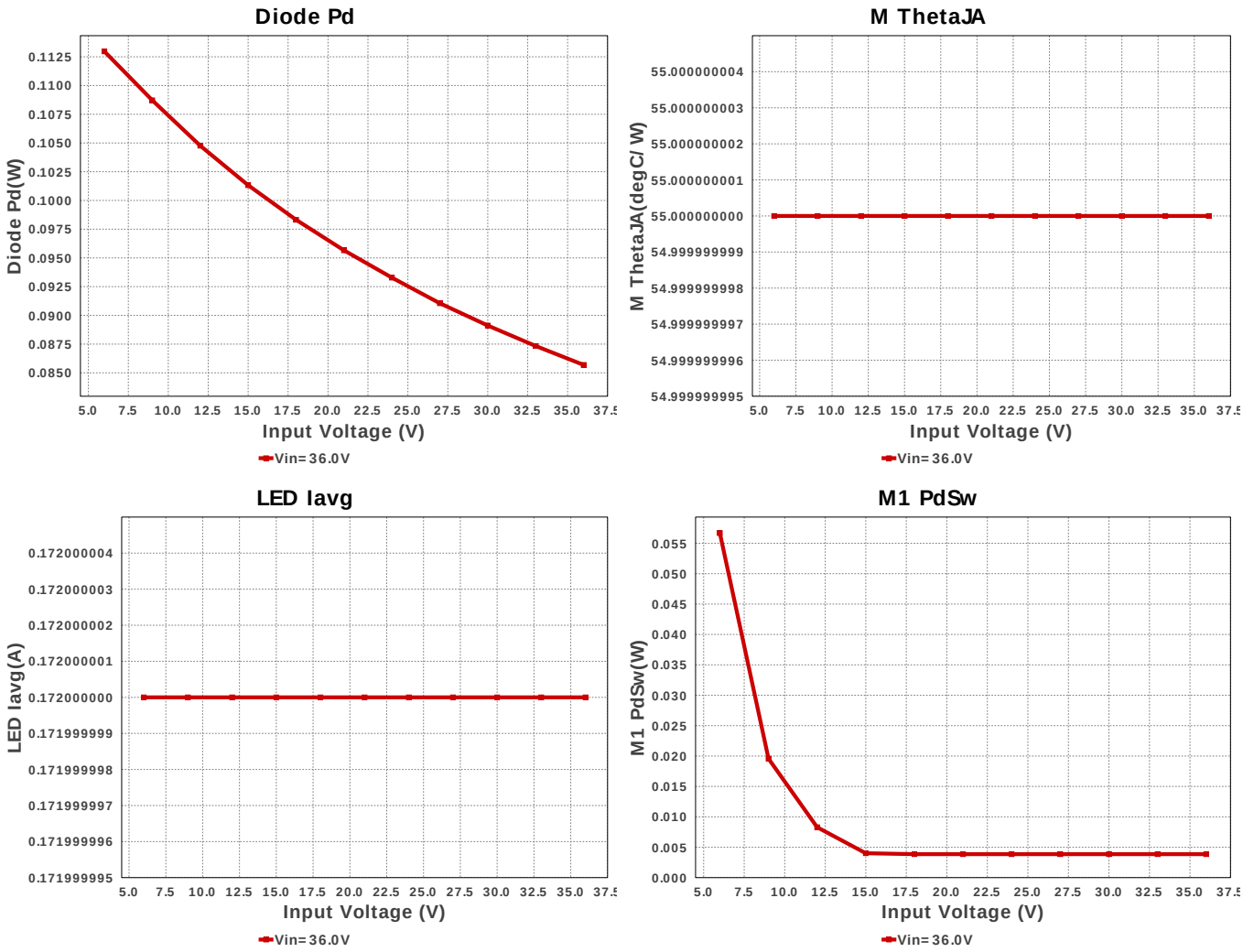












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	429.586 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	245.117 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	767.0 mA	Current	Average input current
4.	L Ipp	1.488 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	588.911 mA	Current	Inductor ripple current
6.	LED Iavg	172.0 mA	Current	LED Average Current
7.	LED Ipp	33.449 mA	Current	LED Ripple Current
8.	M Irms	1.741 A	Current	MOSFET RMS ripple current
9.	SW Ipk	589.522 mA	Current	Peak switch current
10.	BOM Count	27	General	Total Design BOM count
11.	FootPrint	443.0 mm^2	General	Total Foot Print Area of BOM components
12.	Frequency	416.834 kHz	General	Switching frequency
13.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
14.	M Rdson	16.24 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	28.267 mV	General	M Vds
16.	Mode	CCM	General	Conduction Mode
17.	Pout	2.304 W	General	Total output power
18.	Total BOM	$0.0	General	Total BOM Cost
19.	D1 Tj	39.942 degC	Op Point	D1 junction temperature
20.	Duty Cycle	80.984 %	Op Point	Duty cycle
21.	Efficiency	50.065 %	Op Point	Steady state efficiency
22.	IC Tj	33.256 degC	Op Point	IC junction temperature
23.	ICThetaJA	41.0 degC/W	Op Point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	180.0 mA	Op Point	Iout operating point
25.	LED Rd	800.0 mOhm	Op Point	LED DynamicResistance
26.	LED Vf	12.8 V	Op Point	Total LED Forward Calculated Voltage
27.	M ThetaJA	55.0 degC/W	Op Point	MOSFET junction-to-ambient thermal resistance
28.	M TjOp	51.753 degC	Op Point	MOSFET junction temperature
29.	VIN_OP	6.0 V	Op Point	Vin operating point
30.	Vout OP	12.8 V	Op Point	Operational Output Voltage

#	Name	Value	Category	Description
31.	Vout Tolerance	195.31 m%	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
32.	Cin Pd	162.399 mW	Power	Input capacitor power dissipation
33.	Cout Pd	811.112 µW	Power	Output capacitor power dissipation
34.	Diode Pd	112.974 mW	Power	Diode power dissipation
35.	IC Pd	79.418 mW	Power	IC power dissipation
36.	L Pd	332.943 mW	Power	Inductor power dissipation
37.	LED Pd	2.304 W	Power	LED Power Dissipation
38.	M Pd	395.505 mW	Power	MOSFET power dissipation
39.	M1 PdCond	59.941 mW	Power	M1 MOSFET conduction losses
40.	M1 PdSw	335.564 mW	Power	M1 MOSFET switching losses
41.	Rsense Pd	32.4 mW	Power	LED Current Rsns Power Dissipation
42.	Total Pd	2.298 W	Power	Total Power Dissipation
43.	Total LED load Rd	800.0 mOhm		Total LED Load DynamicResistance

Design Inputs

#	Name	Value	Description
1.	Iout	180.0 m	Maximum Output Current
2.	VinMax	36.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	12.8	Output Voltage
5.	acFrequency	60.0	AC Frequency
6.	application	LED_DRIVER	LED Application
7.	base_pn	TPS92691	Base Product Number
8.	LED_Architect	N	LED Architect Project
9.	ledparallel	1.0	Number of LED in parallel
10.	ledpartnumber	Custom	LED Part number
11.	ledseries	1.0	Number of LED in series
12.	line_fsw	60.0	AC Line Frequency
13.	source	DC	Input Source Type
14.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS92691** Product Folder : http://www.ti.com/product/TPS92691 : contains the data sheet and other resources.