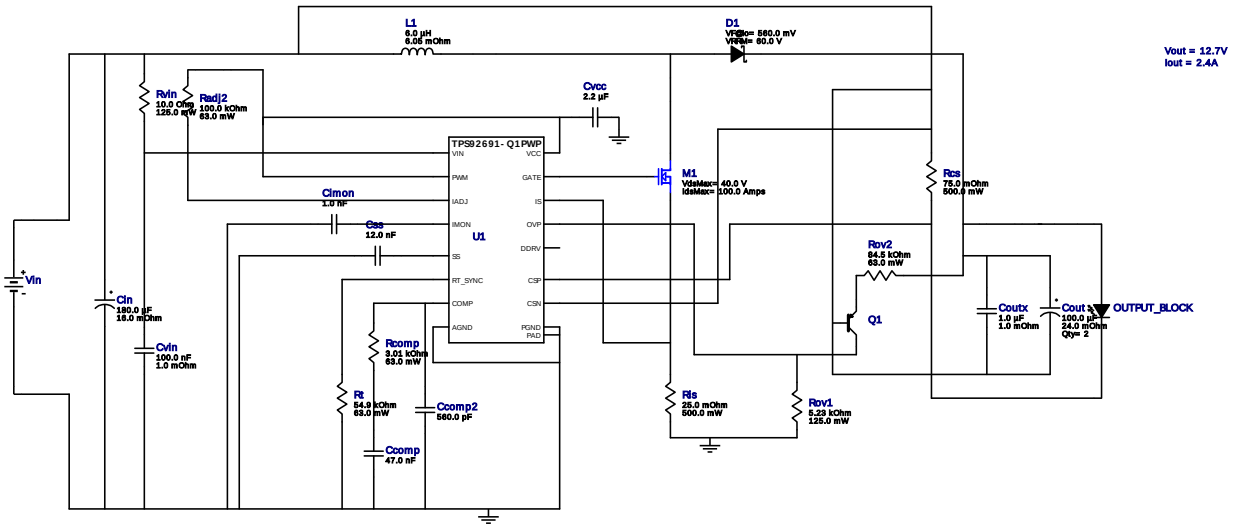
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 17.0V
Vout = 12.7V
Iout = 2.4A

Device = TPS92691QPWPRQ1
Topology = Buck_Boost
Created = 2017-11-11 07:41:41.952
BOM Cost = $0.00
BOM Count = 27
Total Pd = 2.41W

Design : 1040516/353 TPS92691QPWPRQ1
TPS92691QPWPRQ1 10.0V-17.0V to 12.70V @ 2.4A



My Comments

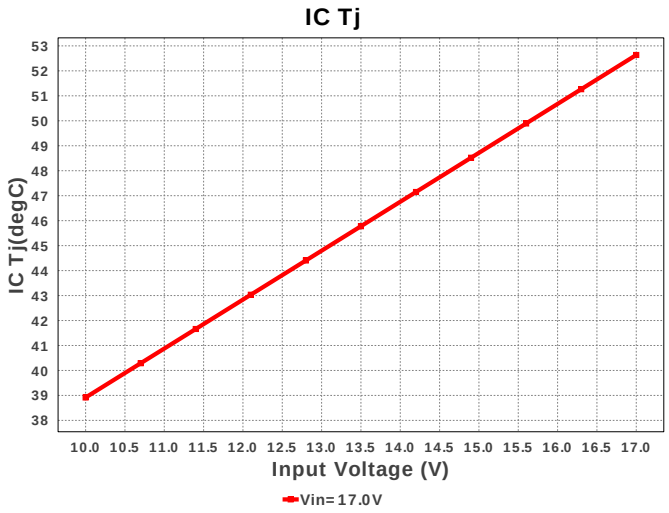
No comments

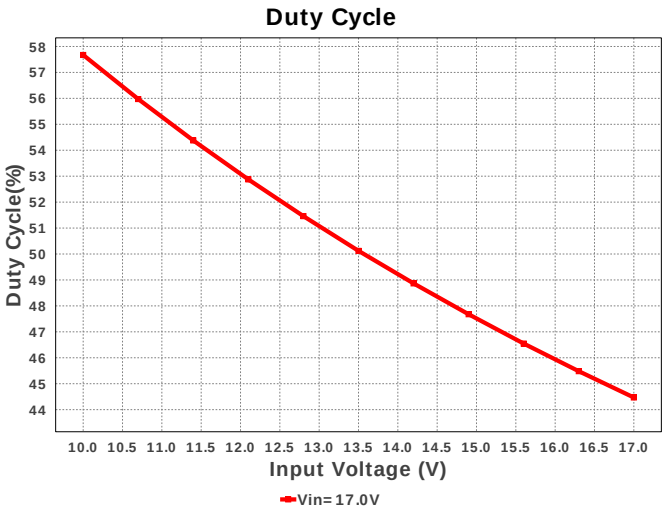
Electrical BOM

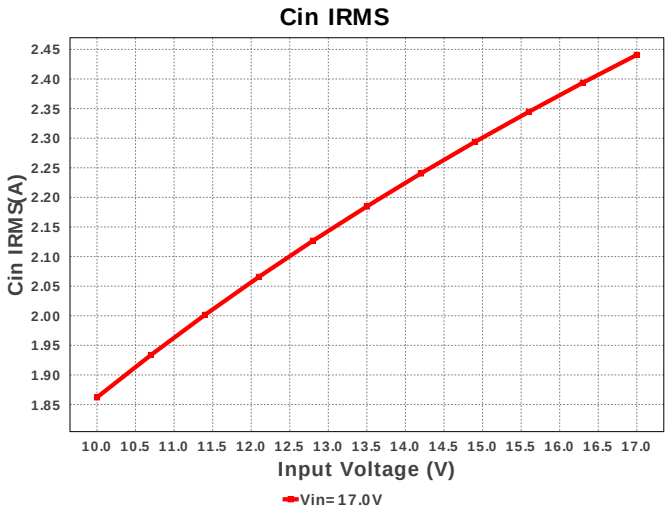
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	Kemet	C0805C473J3GACTU Series= C0G/NP0	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.19	0805 7 mm²
2.	Ccomp2	Samsung Electro-Mechanics	CL21C561JBANFNC Series= C0G/NP0	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Cimon	AVX	04025A101JAT2A Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
4.	Cin	Panasonic	25SVPF180M Series= SVPF	Cap= 180.0 uF ESR= 16.0 mOhm VDC= 25.0 V IRMS= 4.65 A	1	$0.64	CAPSMT_62_E12 106 mm²
5.	Cnr	TDK	C1608X5R1H474K080AB Series= X5R	Cap= 470.0 nF ESR= 10.974 mOhm VDC= 50.0 V IRMS= 1.57483 A	1	$0.03	0603 5 mm²
6.	Cout	Panasonic	16SVPC100M Series= SVPC	Cap= 100.0 uF ESR= 24.0 mOhm VDC= 16.0 V IRMS= 2.49 A	2	$0.31	SM_RADIAL_6.3AMM 80 mm²
7.	Coutx	Taiyo Yuden	EMK107B7105KA-T Series= X7R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²

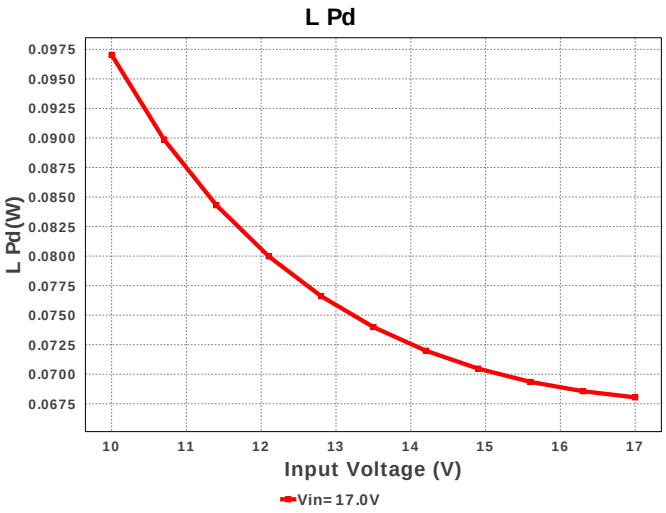
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Covp	AVX	04025A101JAT2A Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0402 3 mm²
9.	Csd	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
10.	Css	Kemet	C0603C123J3GACTU Series= C0G/NP0	Cap= 12.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.09	 0603 5 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	Diodes Inc.	PDS760-13	VF@Io= 560.0 mV VRRM= 60.0 V	1	$0.66	 PowerDI5 50 mm²
14.	D_LED	CUSTOM	CUSTOM	LED	1	NA	CUSTOM 0 mm²
15.	L1	Coilcraft	SER1360-602KLB	L= 6.0 µH DCR= 6.05 mOhm	1	$0.74	 SER1360 225 mm²
16.	M1	Texas Instruments	CSD18511Q5A	VdsMax= 40.0 V IdsMax= 100.0 Amps	1	$0.44	 TRANS_NexFET_Q5A 55 mm²
17.	Q1	Diodes Inc.	MMBT3906-7-F	Bipolar Transistor	1	$0.02	 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	CRCW04023K01FKED Series= CRCW..e3	Res= 3.01 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rcs	Stackpole Electronics Inc	CSR1206FK75L0 Series= ?	Res= 75.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm²
21.	Ris	Stackpole Electronics Inc	CSR1206FK25L0 Series= ?	Res= 25.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm²
22.	Rov1	Panasonic	ERJ-6ENF5231V Series= ERJ-6E	Res= 5.23 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 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	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
25.	Rvin	Yageo America	RC0805FR-0710RL Series= ?	Res= 10.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²

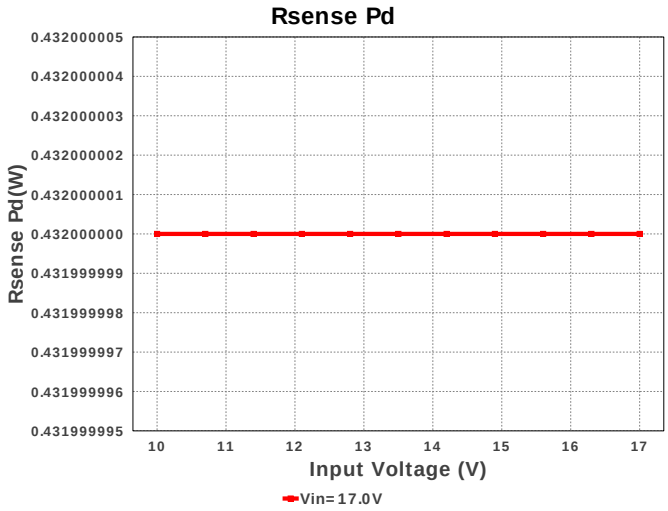
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
26.	U1	Texas Instruments	TPS92691QPWPRQ1	Switcher	1	$0.97	PWP0016J 59 mm^2

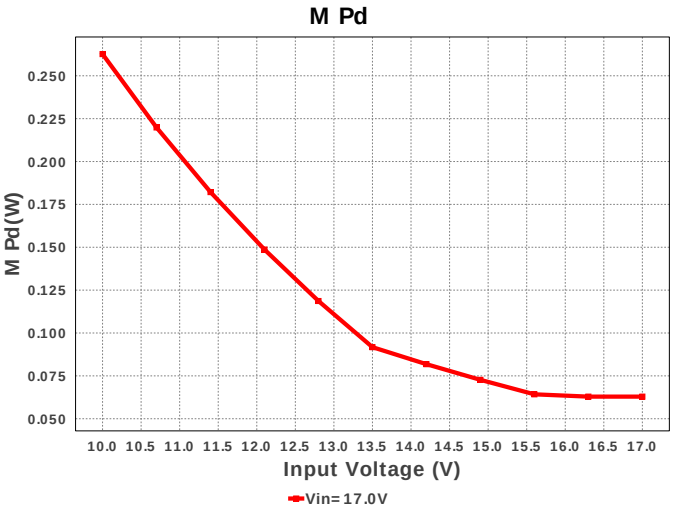


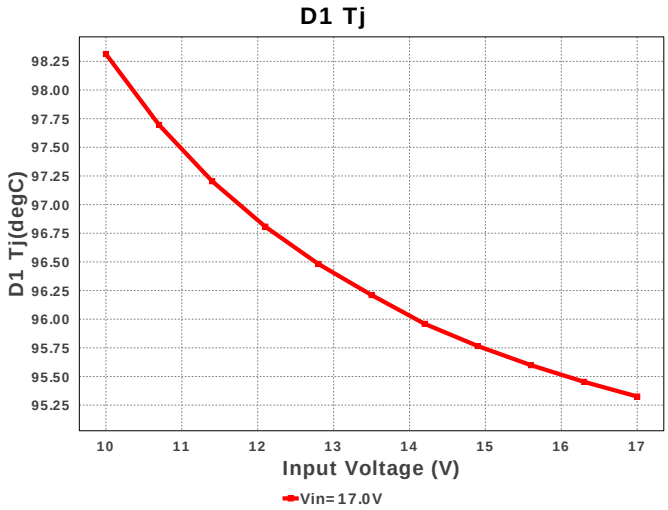


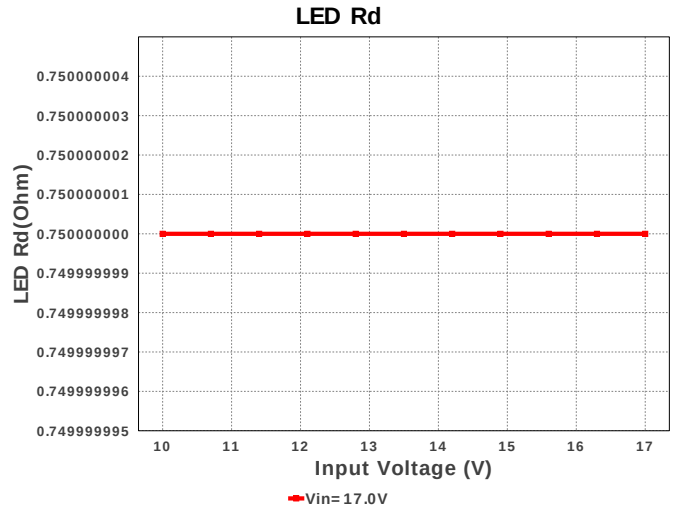


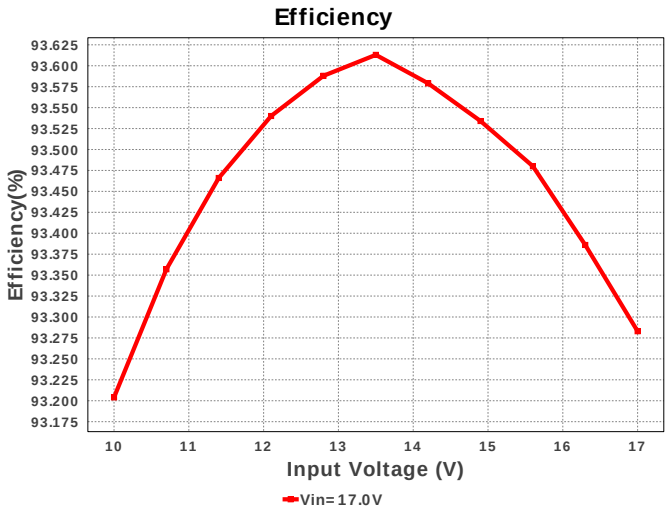


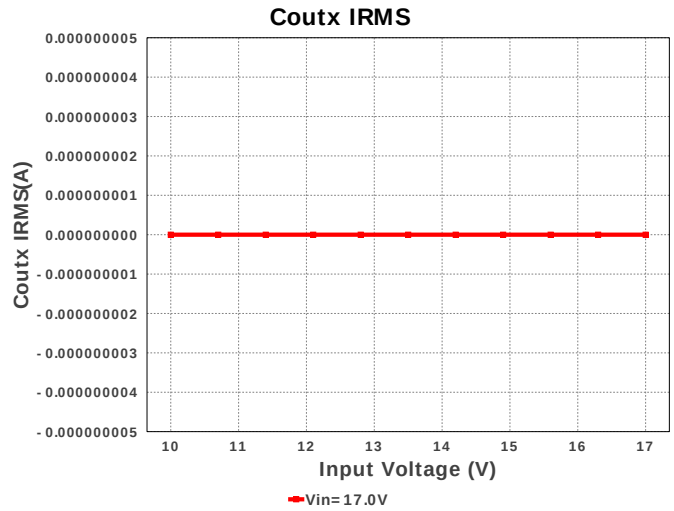


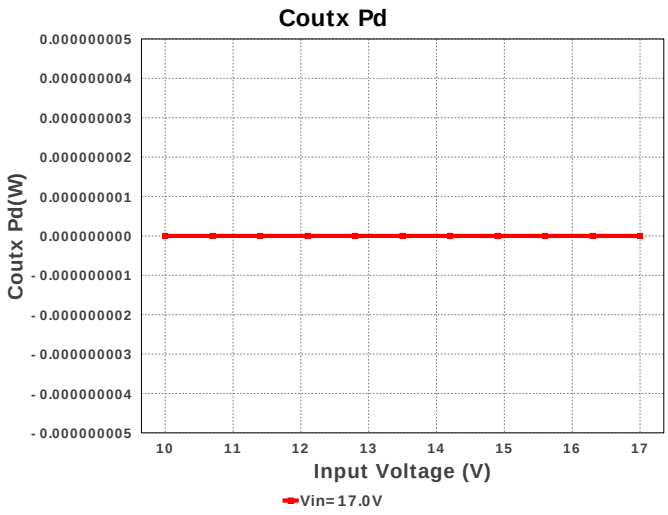


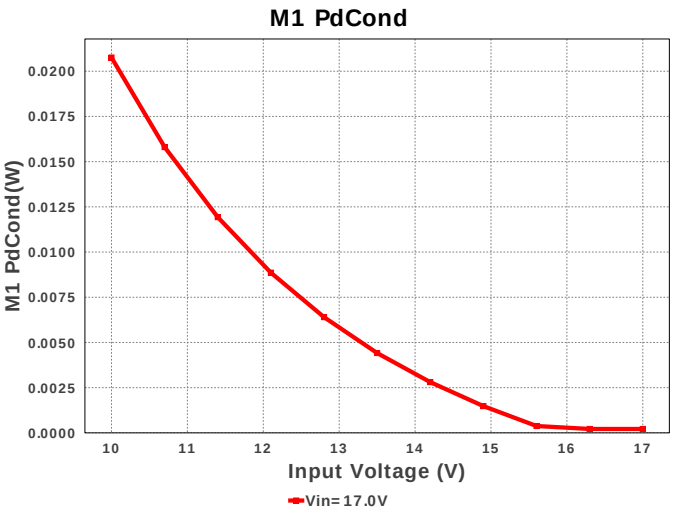


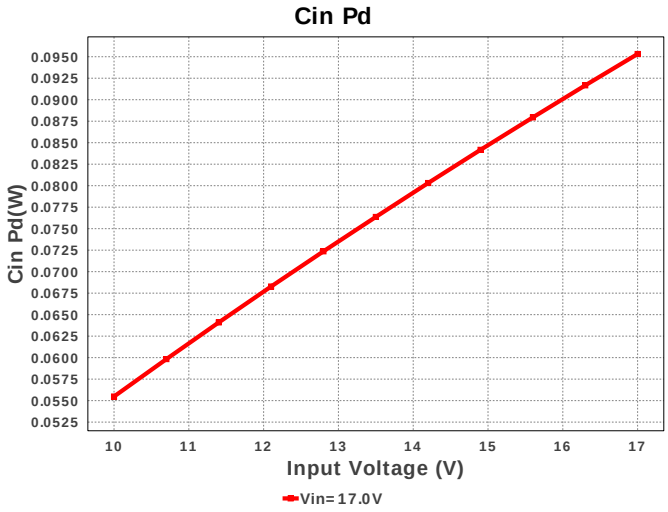


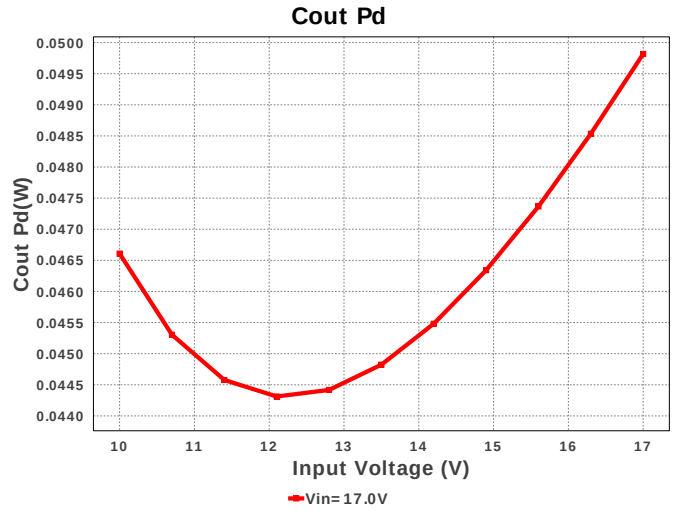


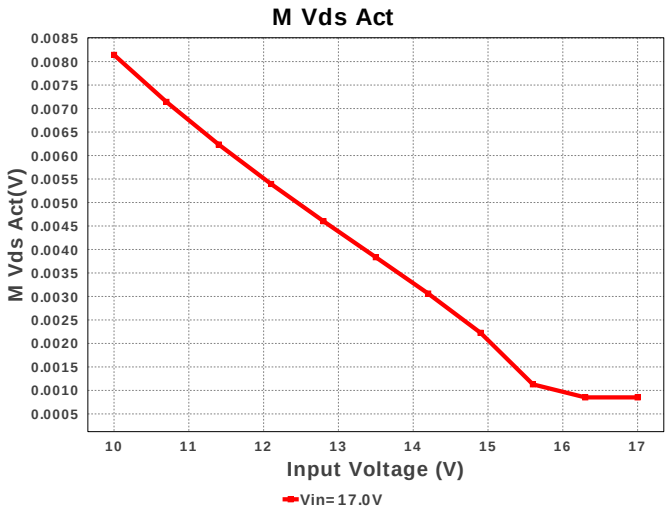


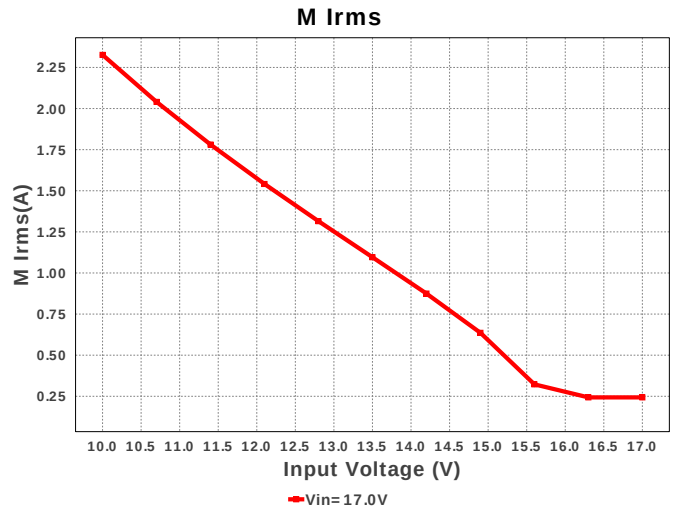


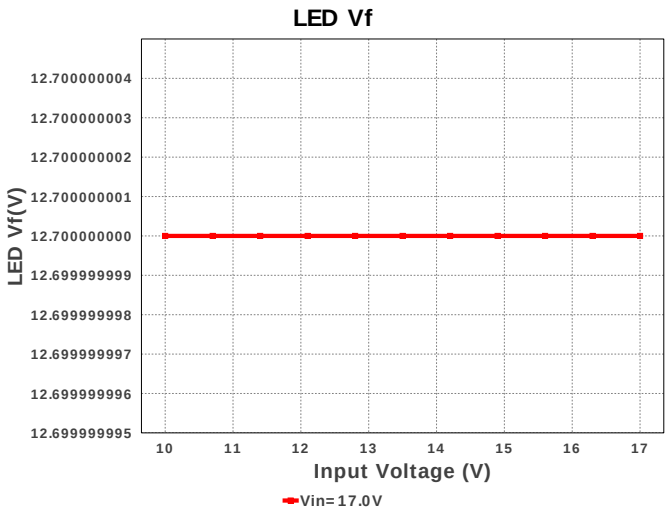


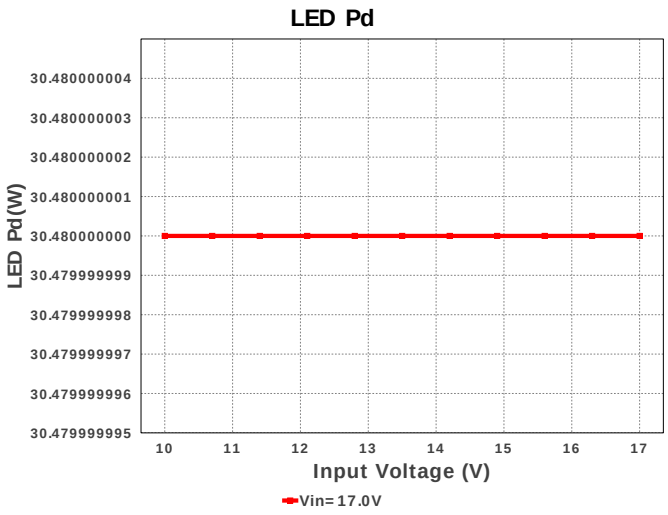


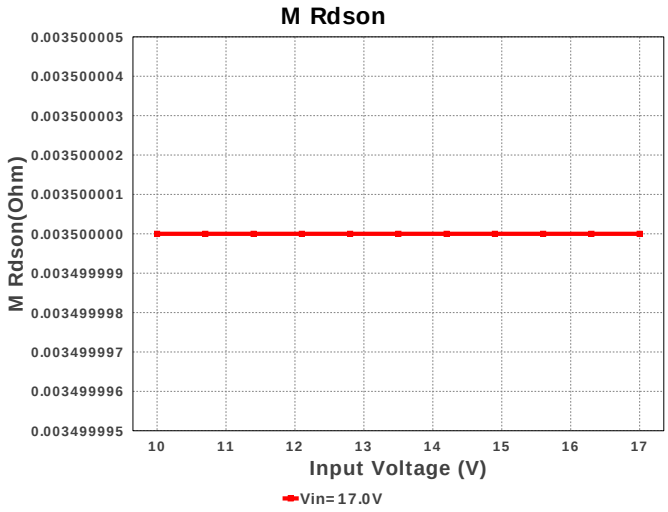


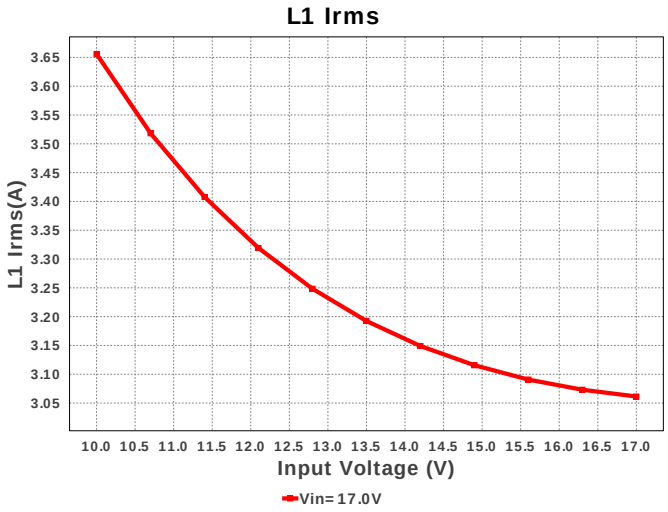


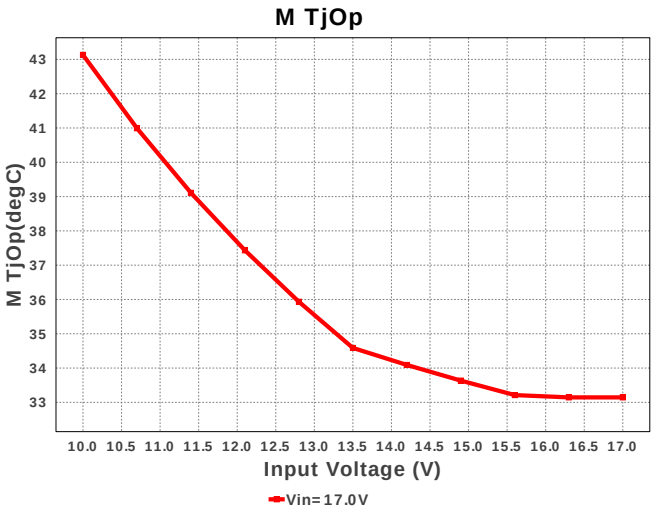


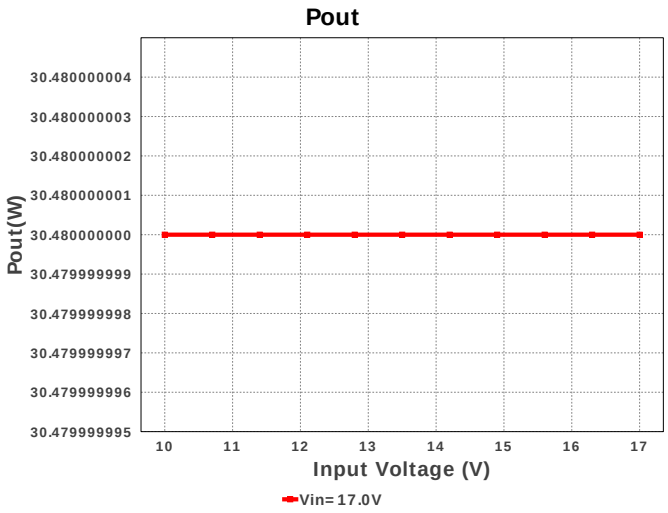


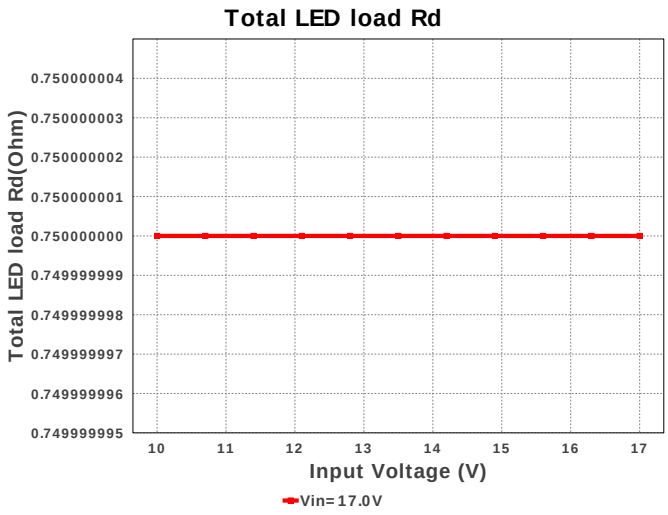


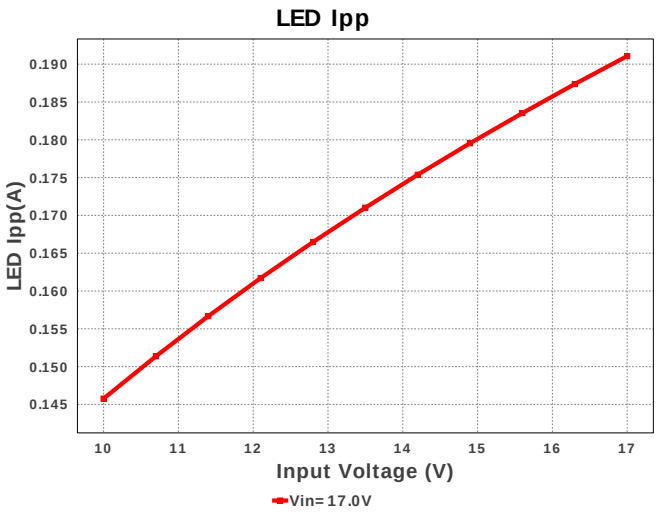


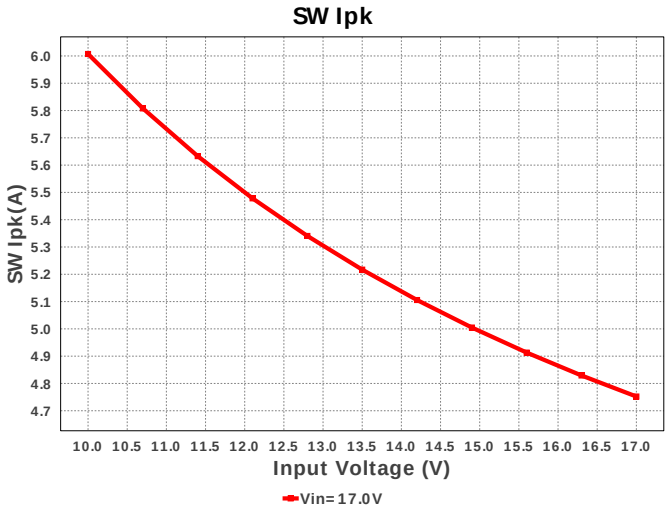


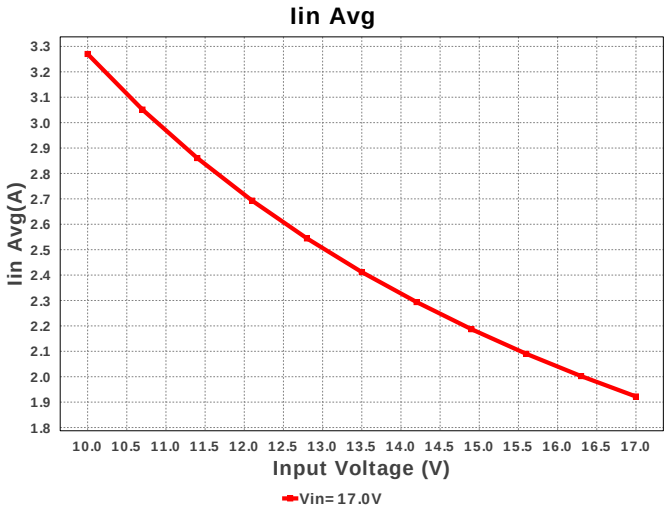


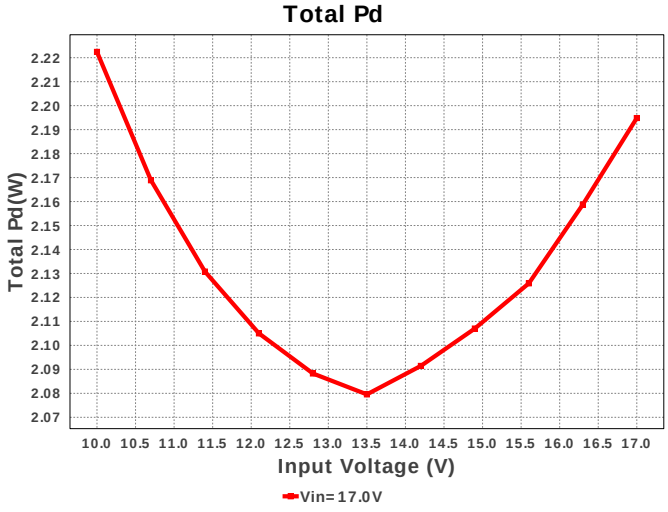


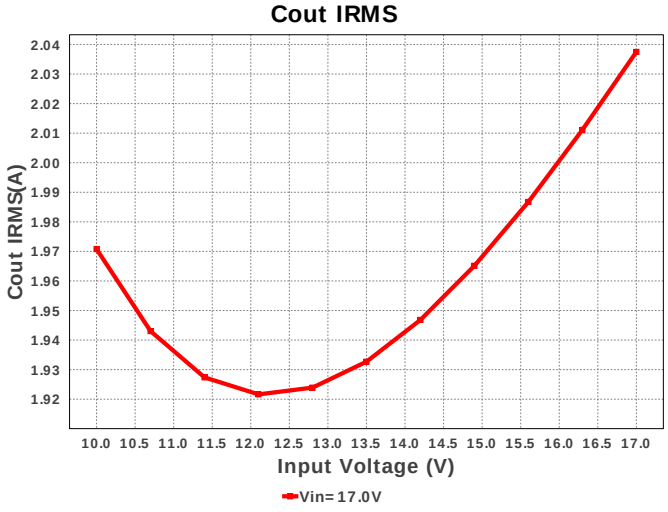


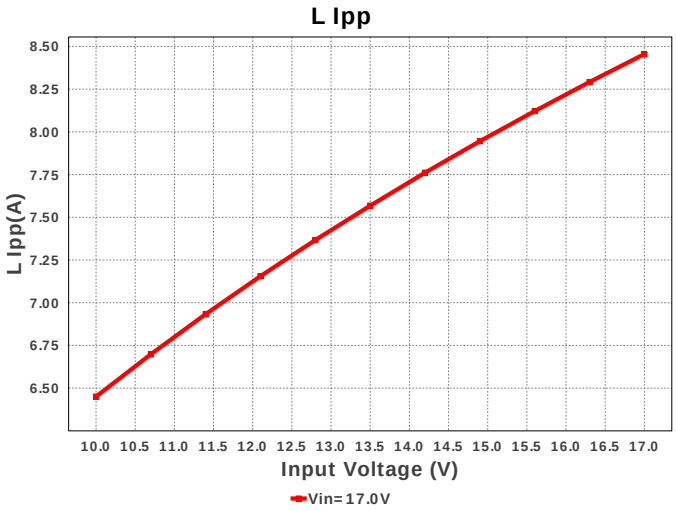


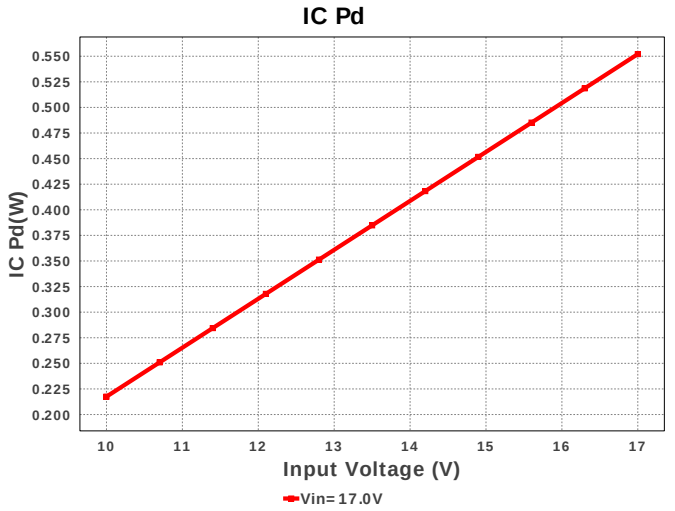


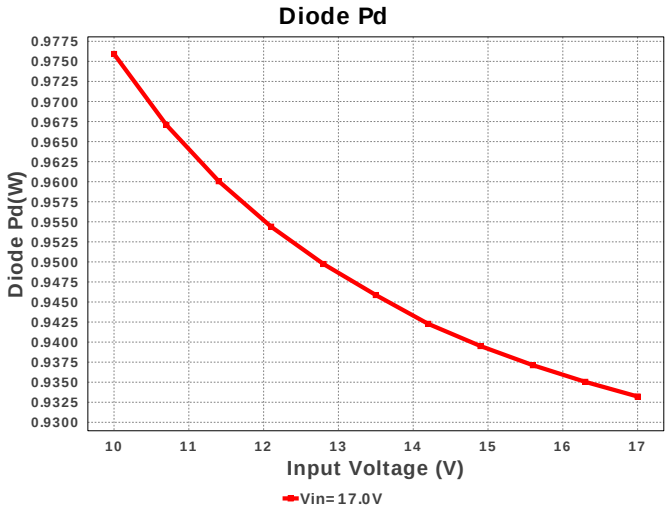


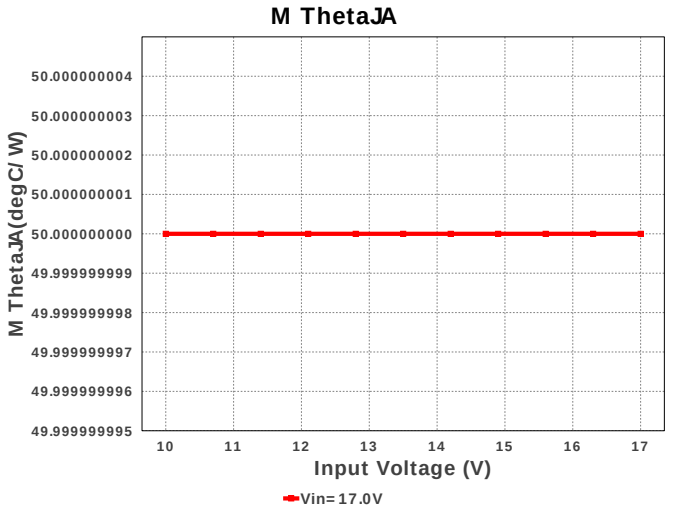


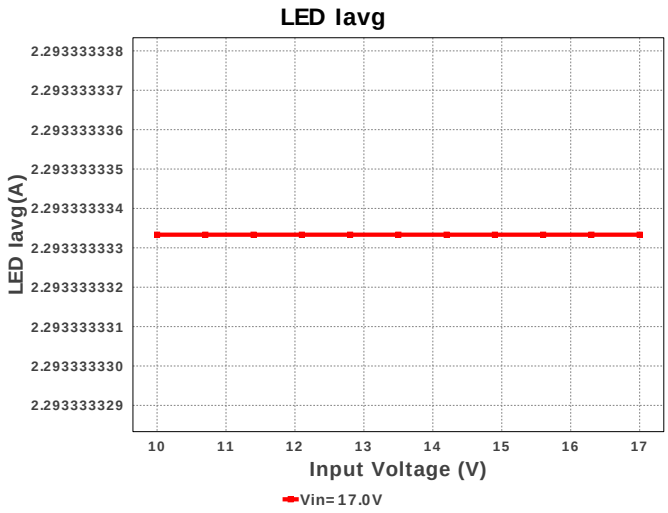


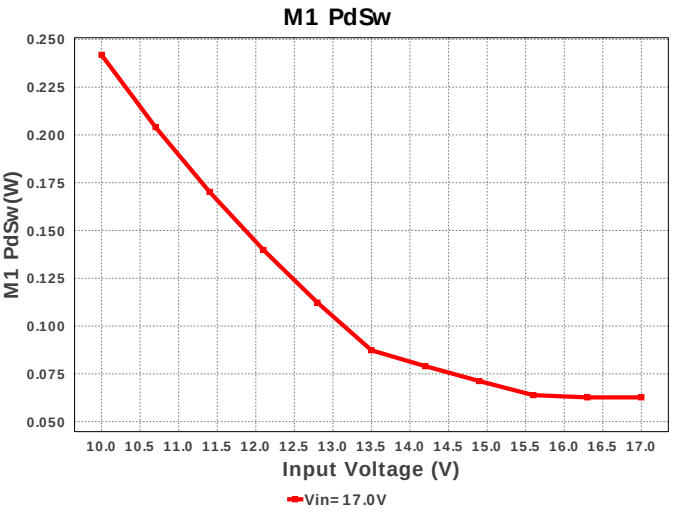












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	27		Total Design BOM count
2.	Total BOM	$0.0		Total BOM Cost
3.	Cin IRMS	3.173 A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	2.581 A	Current	Output capacitor RMS ripple current
5.	Coutx IRMS	0.0 A	Current	Output capacitor_x RMS ripple current
6.	Iin Avg	3.289 A	Current	Average input current
7.	L Ipp	10.992 A	Current	Peak-to-peak inductor ripple current
8.	L1 Irms	4.468 A	Current	Inductor ripple current
9.	LED Iavg	2.293 A	Current	LED Average Current
10.	LED Ipp	248.389 mA	Current	LED Ripple Current
11.	M Irms	2.326 A	Current	MOSFET RMS ripple current

#	Name	Value	Category	Description
12.	SW Ipk	6.007 A	Current	Peak switch current
13.	FootPrint	764.0 mm^2	General	Total Foot Print Area of BOM components
14.	Frequency	149.015 kHz	General	Switching frequency
15.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
16.	M Rdson	3.5 mOhm	General	Drain-Source On-resistance
17.	M Vds Act	8.143 mV	General	M Vds
18.	Mode	CCM	General	Conduction Mode
19.	Pout	30.48 W	General	Total output power
20.	D1 Tj	98.315 degC	Op_Point	D1 junction temperature
21.	Vout OP	12.7 V	Op_Point	Operational Output Voltage
22.	Duty Cycle	57.809 %	Op_point	Duty cycle
23.	Efficiency	92.674 %	Op_point	Steady state efficiency
24.	IC Tj	38.917 degC	Op_point	IC junction temperature
25.	ICThetaJA	41.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
26.	IOUT_OP	2.4 A	Op_point	Iout operating point
27.	LED Rd	750.0 mOhm	Op_point	LED DynamicResistance
28.	LED Vf	12.7 V	Op_point	Total LED Forward Calculated Voltage
29.	M ThetaJA	50.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
30.	M TjOp	43.132 degC	Op_point	MOSFET junction temperature
31.	VIN_OP	10.0 V	Op_point	Vin operating point
32.	Cin Pd	161.09 mW	Power	Input capacitor power dissipation
33.	Cout Pd	79.945 mW	Power	Output capacitor power dissipation
34.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
35.	Diode Pd	975.922 mW	Power	Diode power dissipation
36.	IC Pd	217.491 mW	Power	IC power dissipation
37.	L Pd	144.958 mW	Power	Inductor power dissipation
38.	LED Pd	30.48 W	Power	LED Power Dissipation
39.	M Pd	262.643 mW	Power	MOSFET power dissipation
40.	M1 PdCond	20.757 mW	Power	M1 MOSFET conduction losses
41.	M1 PdSw	241.886 mW	Power	M1 MOSFET switching losses
42.	Rsense Pd	432.0 mW	Power	LED Current Rsns Power Dissipation
43.	Total Pd	2.409 W	Power	Total Power Dissipation
44.	Total LED load Rd	750.0 mOhm		Total LED Load DynamicResistance
45.	Vout Tolerance	196.85 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.4	Maximum Output Current
2.	SoftStart	2.0 ms	Soft Start Time (ms)
3.	VinMax	17.0	Maximum input voltage
4.	VinMin	10.0	Minimum input voltage
5.	Vout	12.7	Output Voltage
6.	application	LED_DRIVER	LED Application
7.	base_pn	TPS92691-Q1	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
15.	UserFsw	150.0 k	Customer Selected Frequency

Design Assistance

1. **TPS92691-Q1** Product Folder : http://www.ti.com/product/TPS92691%2DQ1 : contains the data sheet and other resources.