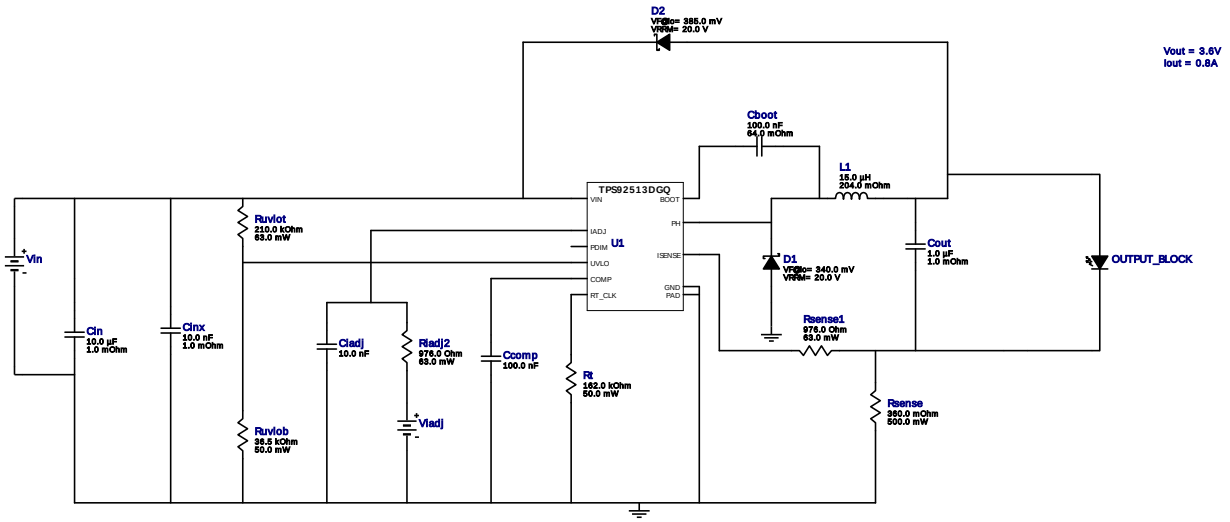
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 11.0V
Vout = 3.6V
Iout = 0.8A

Device = TPS92513DGQR
Topology = Buck
Created = 2018-08-09 00:58:06.771
BOM Cost = $1.92
BOM Count = 18
Total Pd = 0.62W

Design : TPS92513DGQR
TPS92513DGQR 9.0V-11.0V to 3.60V @ 0.8A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	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
2.	Ccomp	TDK	C3216C0G1H104J160AA Series= C0G/NP0	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.20	1206 11 mm²
3.	Ciadj	TDK	CGA4C2C0G1H103J060AA Series= C0G/NP0	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.07	0805 7 mm²
4.	Cin	MuRata	GRM219R61E106KA12 Series= X5R	Cap= 10.0 uF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
5.	Cinx	MuRata	GRM155R71E103KA01D Series= X7R	Cap= 10.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
6.	Cout	Kemet	C0603C105Z8VACTU Series= Y5V	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
7.	D1	Fairchild Semiconductor	MBR1020VL	VF@Io= 340.0 mV VRRM= 20.0 V	1	$0.07	SOD-123F 12 mm²
8.	D2	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 13 mm²
9.	D_LED	CUSTOM	CUSTOM	LED	2	NA	CUSTOM 0 mm²
10.	L1	Wurth Elektronik	744773115	L= 15.0 µH DCR= 204.0 mOhm	1	$1.08	WE-PD2-S 28 mm²

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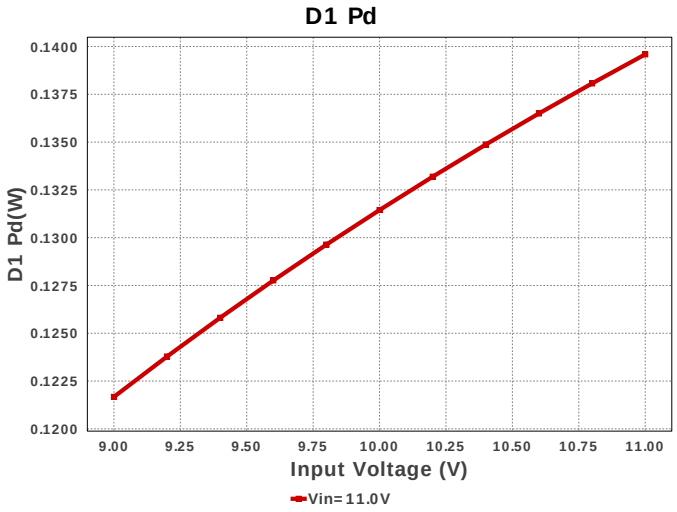
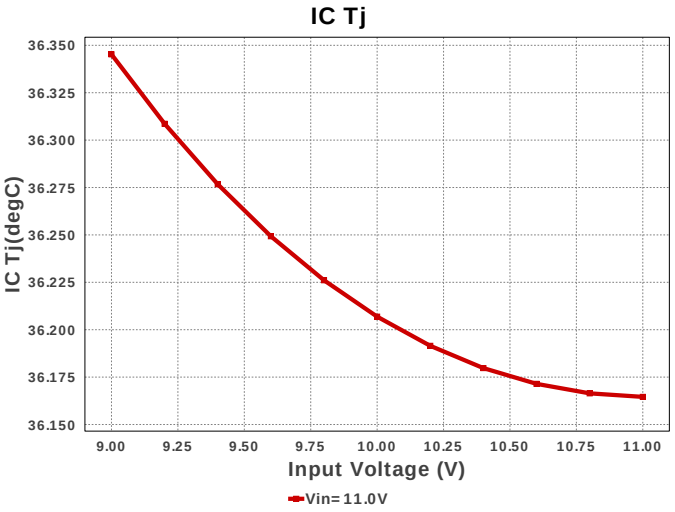
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Riadj2	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	Rsense	Rohm	MCR25JZHFLR360 Series= MCR25	Res= 360.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1210 15 mm^2
13.	Rsense1	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	Rt	Yageo	RC0201FR-07162KL Series= ?	Res= 162.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
15.	Ruvlob	Yageo	RC0201FR-0736K5L Series= ?	Res= 36.5 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm^2
16.	Ruvlot	Vishay-Dale	CRCW0402210KFKED Series= CRCW..e3	Res= 210.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
17.	U1	Texas Instruments	TPS92513DGQR	Switcher	1	$0.28	DGQ0010D_NV_N 24 mm^2





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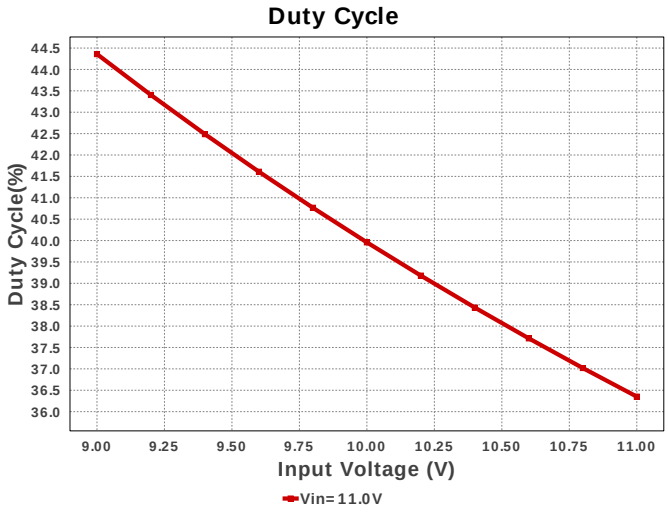

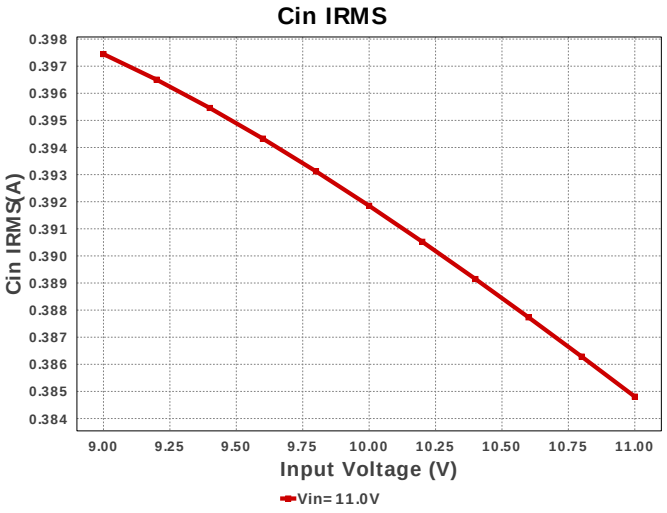

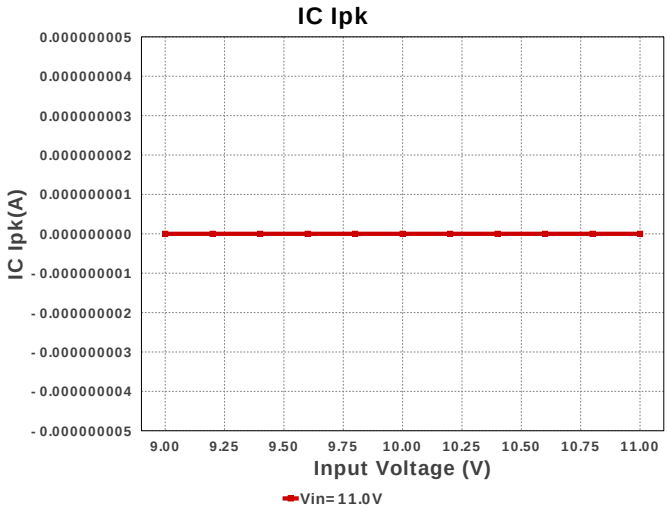

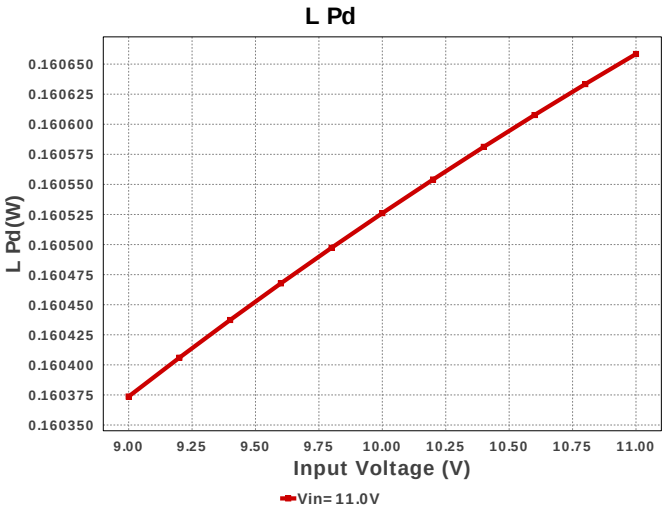

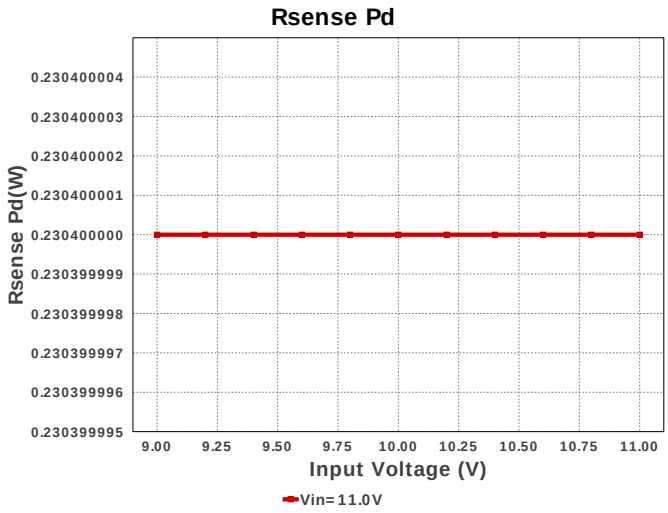

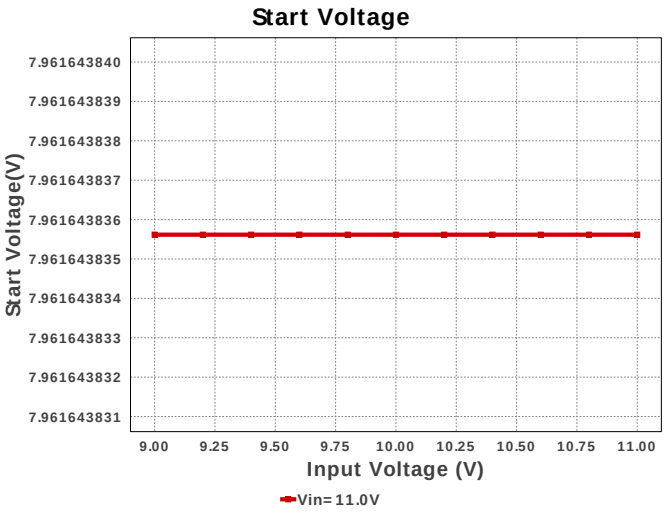

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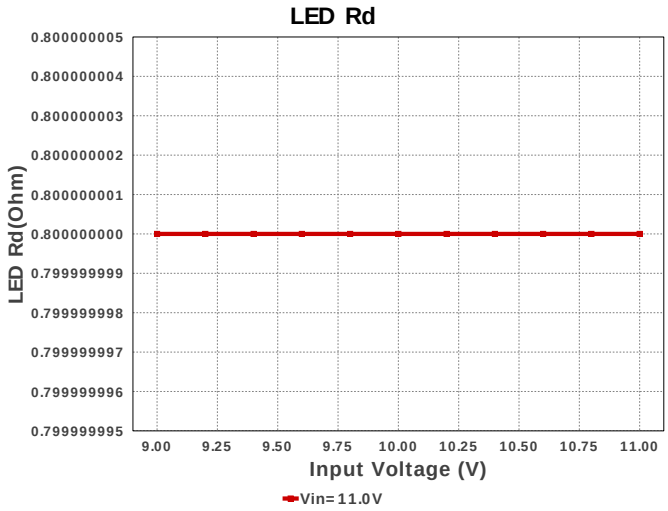

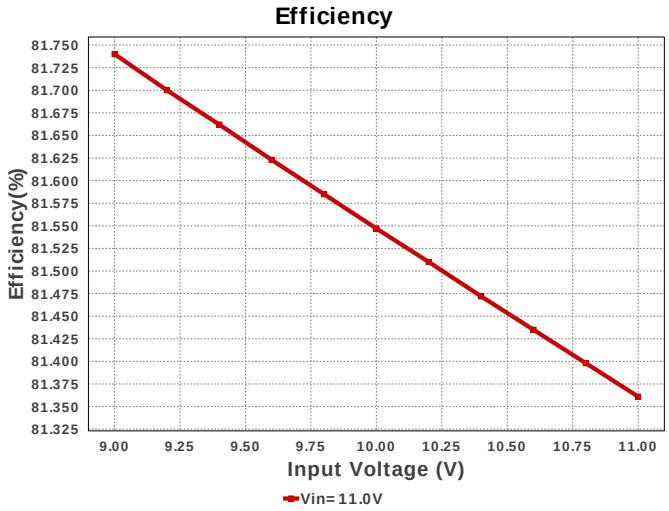

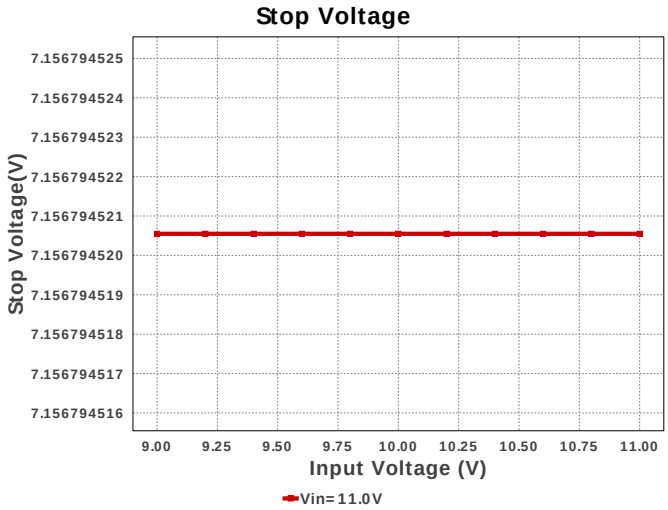

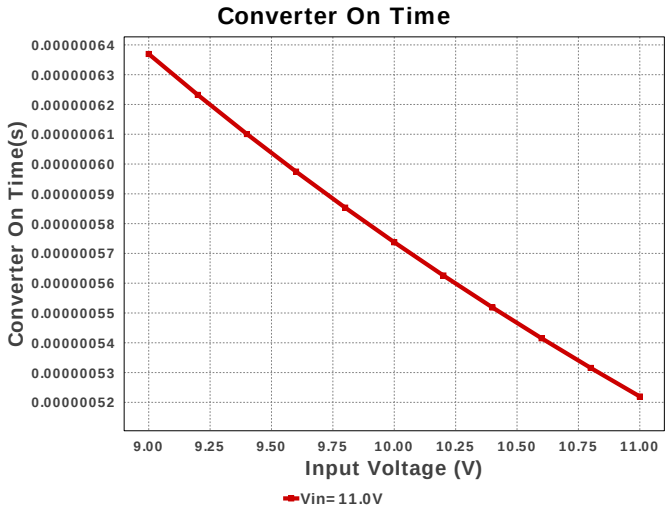

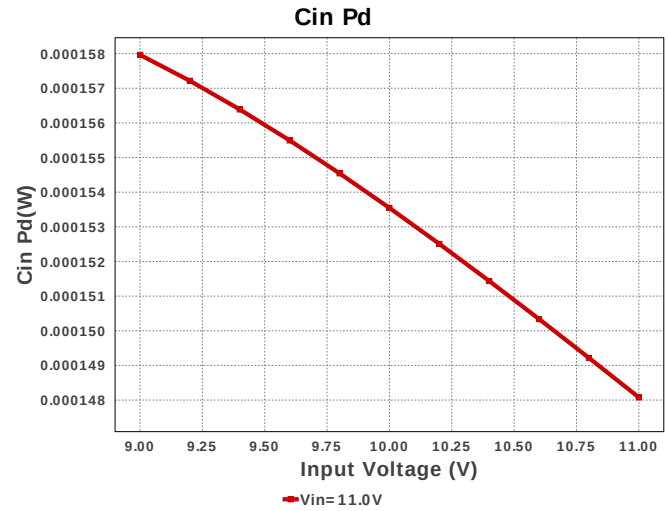

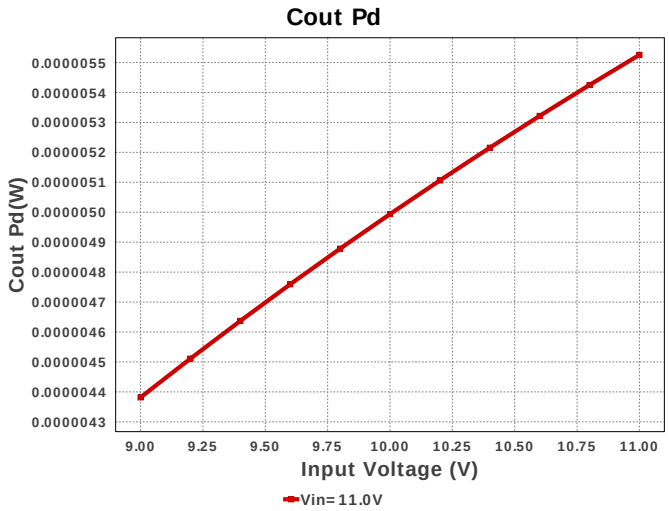

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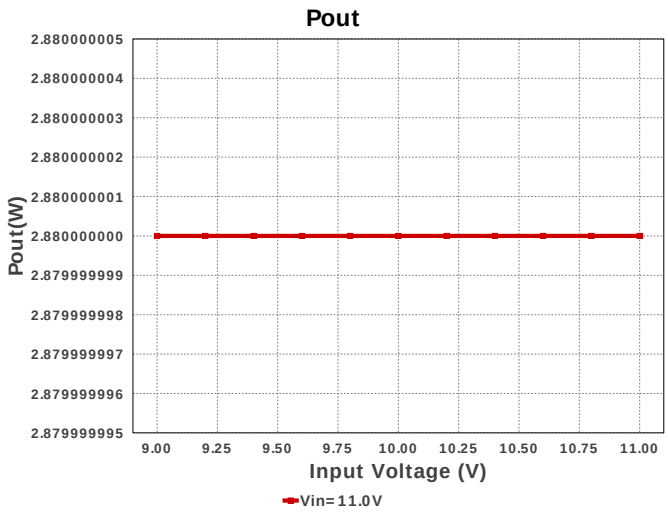

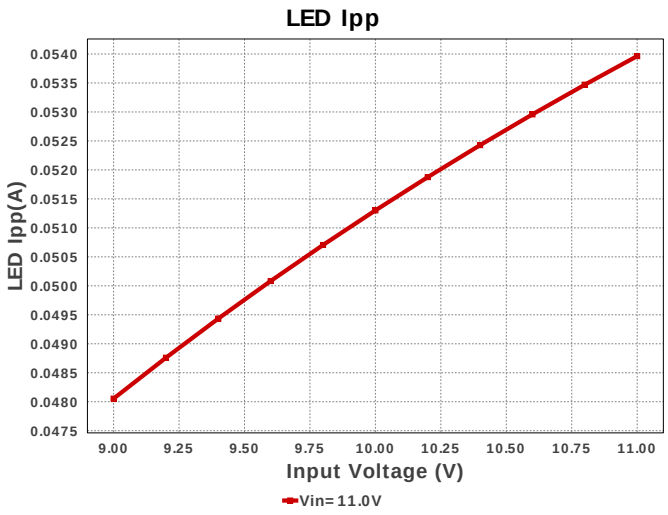

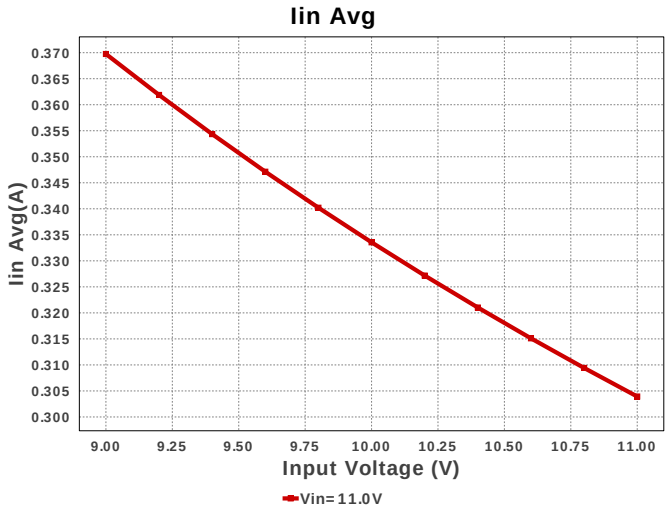

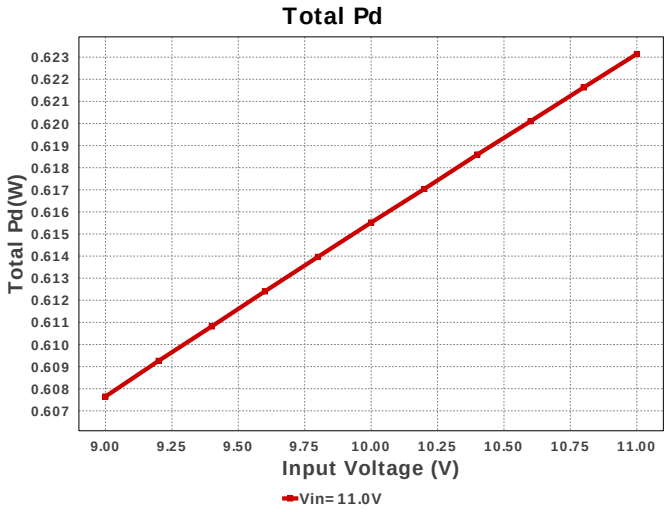

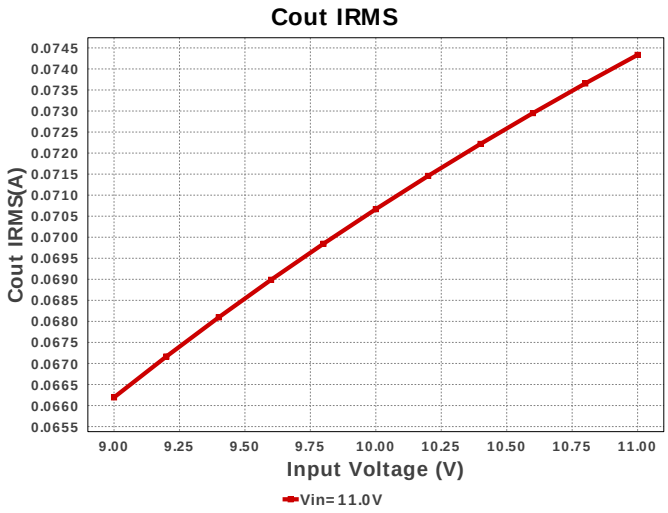

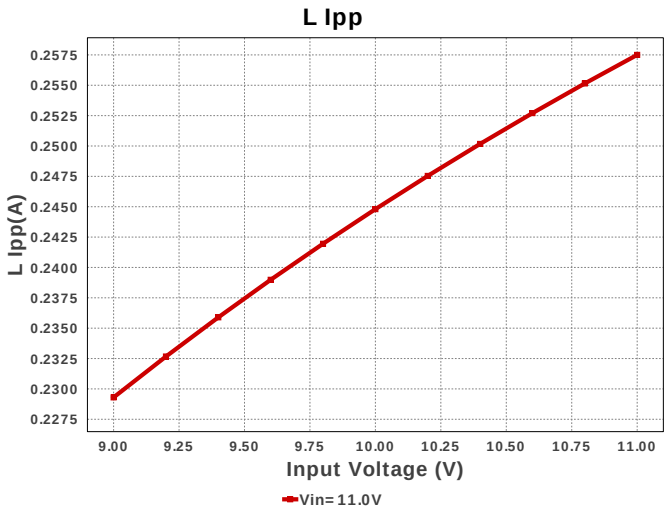

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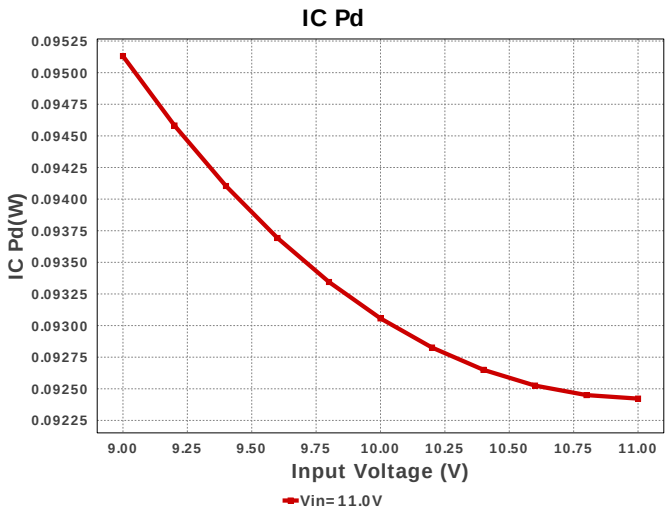

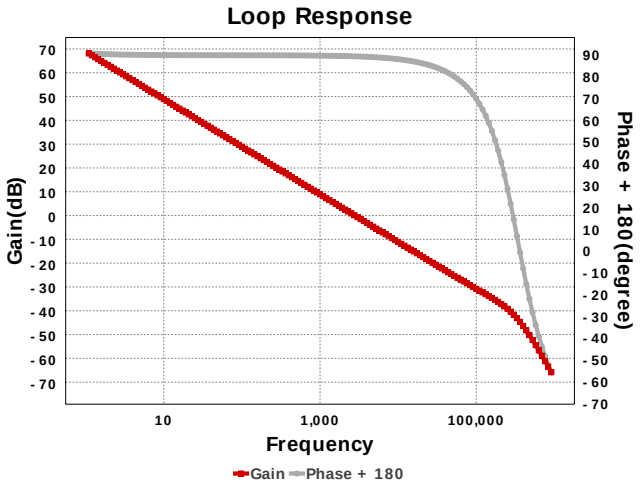

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	384.808 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	74.335 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	0.0 A	Current	Peak switch current in IC
4.	Iin Avg	303.93 mA	Current	Average input current
5.	L Ipp	257.5 mA	Current	Peak-to-peak inductor ripple current
6.	LED Ipp	53.964 mA	Current	LED Ripple Current
7.	BOM Count	18	General	Total Design BOM count
8.	FootPrint	143.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	696.429 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Mode	CCM	General	Conduction Mode
12.	Pout	2.88 W	General	Total output power
13.	Total BOM	$1.92	General	Total BOM Cost
14.	Cross Freq	2.79 kHz	Op Point	Bode plot crossover frequency
15.	Duty Cycle	36.351 %	Op Point	Duty cycle
16.	Efficiency	81.361 %	Op Point	Steady state efficiency
17.	IC Tj	36.165 degC	Op Point	IC junction temperature
18.	ICThetaJA	66.7 degC/W	Op Point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	800.0 mA	Op Point	Iout operating point
20.	LED Rd	800.0 mOhm	Op Point	LED DynamicResistance
21.	Phase Marg	89.436 deg	Op Point	Bode Plot Phase Margin
22.	VIN_OP	11.0 V	Op Point	Vin operating point
23.	Vout OP	3.6 V	Op Point	Operational Output Voltage
24.	Cin Pd	148.077 µW	Power	Input capacitor power dissipation
25.	Cout Pd	5.526 µW	Power	Output capacitor power dissipation
26.	D1 Pd	139.59 mW	Power	Output Diode Power Dissipation
27.	IC Pd	92.422 mW	Power	IC power dissipation
28.	L Pd	160.658 mW	Power	Inductor power dissipation
29.	Rsense Pd	230.4 mW	Power	LED Current Rsns Power Dissipation
30.	Total Pd	623.145 mW	Power	Total Power Dissipation
31.	Start Voltage	7.962 V	UVLO	Start Voltage with External UVLO Resistors
32.	Stop Voltage	7.157 V	UVLO	Stop Voltage with External UVLO Resistors
33.	Converter On Time	521.965 ns		Approximate Converter On Time

Design Inputs

#	Name	Value	Description
1.	Iout	800.0 m	Maximum Output Current
2.	VinMax	11.0	Maximum input voltage
3.	VinMin	9.0	Minimum input voltage
4.	Vout	3.6	Output Voltage
5.	acFrequency	60.0	AC Frequency
6.	application	LED_DRIVER	LED Application
7.	base_pn	TPS92513	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	2.0	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

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Design Assistance

1. **TPS92513** Product Folder : http://www.ti.com/product/TPS92513 : contains the data sheet and other resources.

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