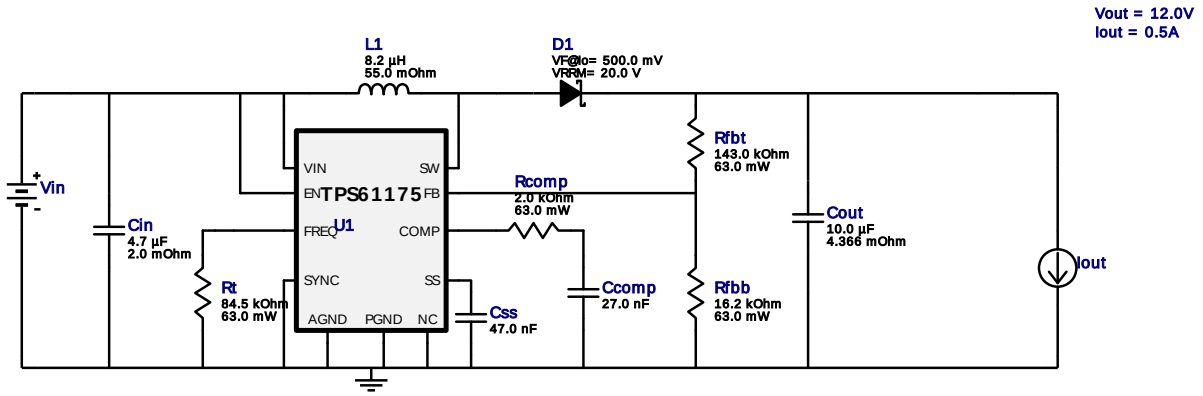
WEBENCH® Design Report

VinMin = 4.75V
VinMax = 5.25V
Vout = 12.0V
Iout = 0.5A

Device = TPS61175PWPR
Topology = Boost
Created = 10/11/16 11:33:32 PM
BOM Cost = $1.77
BOM Count = 11
Total Pd = 0.83W

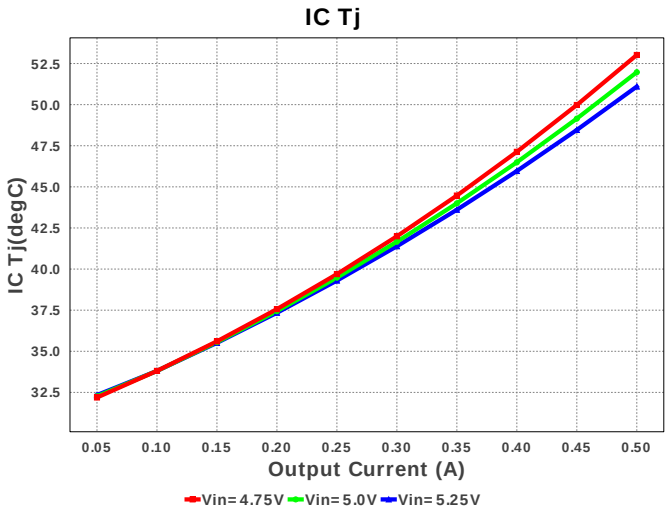
Design : 3962751/7 TPS61175PWPR
TPS61175PWPR 4.75V-5.25V to 12.00V @ 0.5A

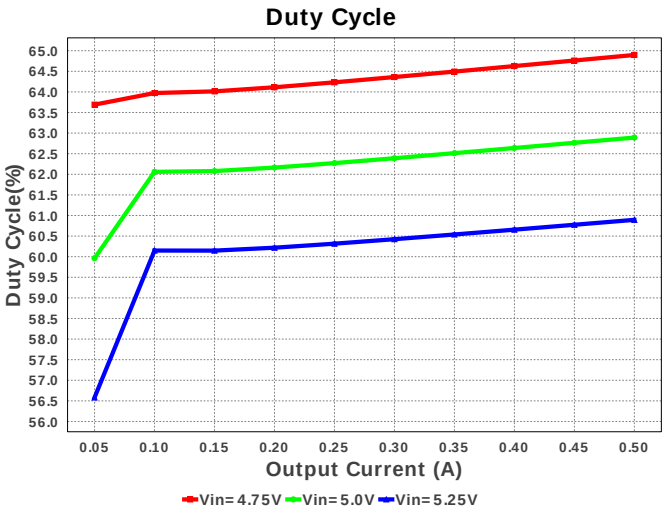


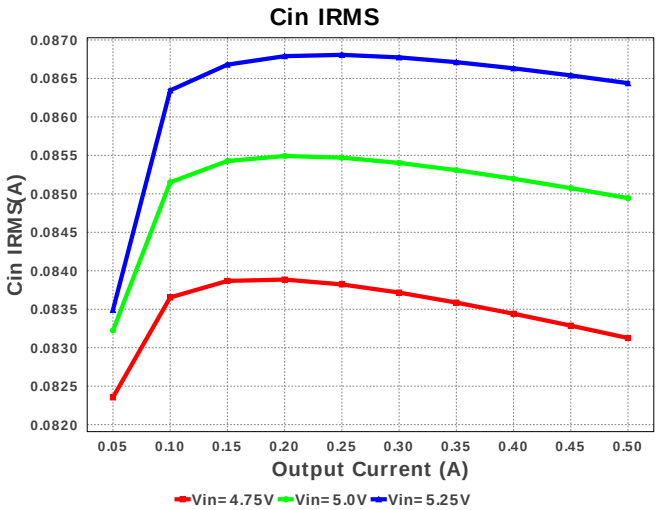
Electrical BOM

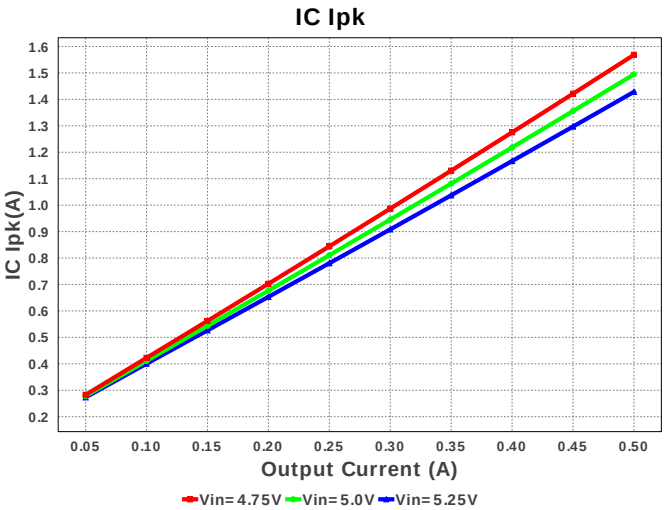
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	Yageo America	CC0805KRX7R9BB273 Series= X7R	Cap= 27.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	$0.02	0805 7 mm²
3.	Cout	MuRata	GRM31CR71E106KA12L Series= X7R	Cap= 10.0 uF ESR= 4.366 mOhm VDC= 25.0 V IRMS= 2.8022 A	1	$0.05	1206_190 11 mm²
4.	Css	Taiyo Yuden	TMK212B7473KD-T Series= X7R	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	D1	Diodes Inc.	B220-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	SMB 44 mm²
6.	L1	Bourns	SRN6045-8R2Y	L= 8.2 µH DCR= 55.0 mOhm	1	$0.16	SRN6045 64 mm²
7.	Rcomp	Vishay-Dale	CRCW04022K00FKED Series= CRCW..e3	Res= 2.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbb	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfbt	Vishay-Dale	CRCW0402143KFKED Series= CRCW..e3	Res= 143.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rt	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

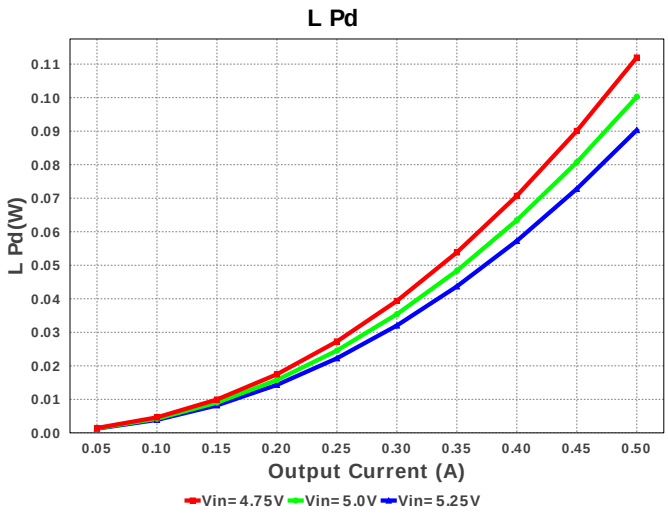
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	TPS61175PWPR	Switcher	1	$1.40	 R-PDSO-G14 61 mm^2

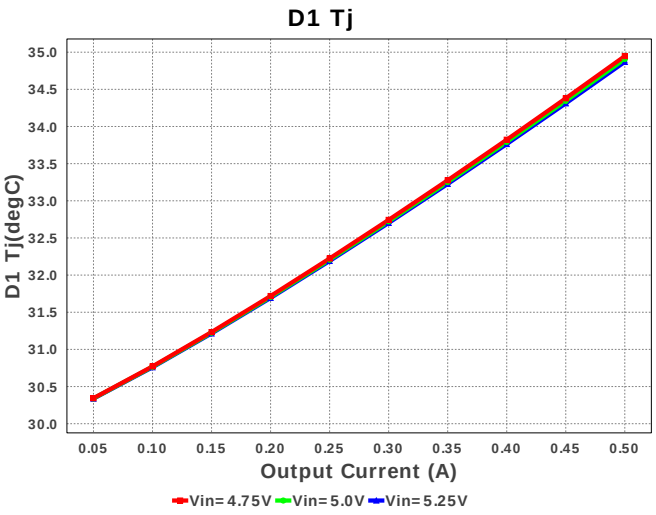


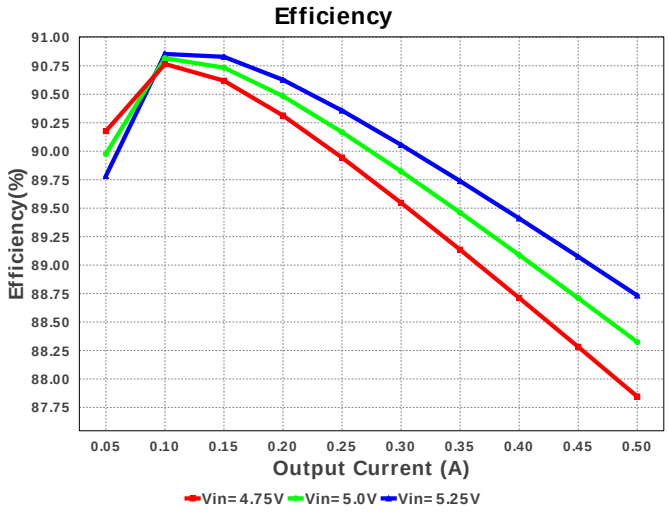


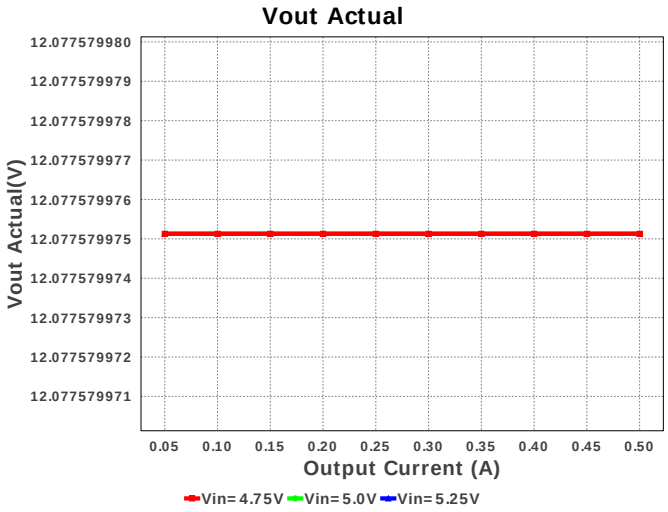


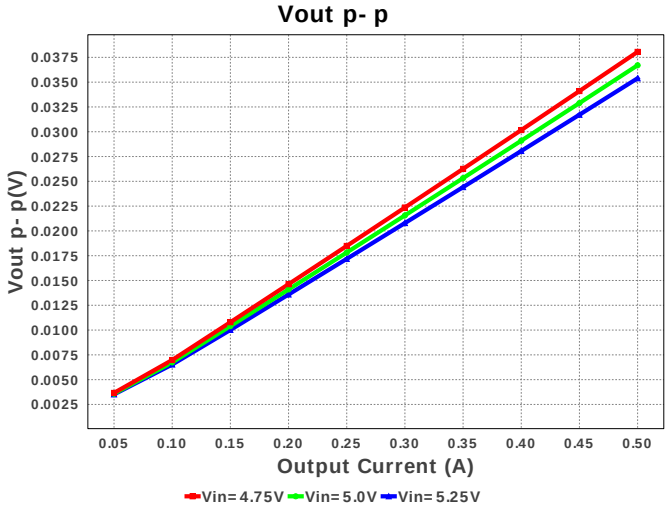


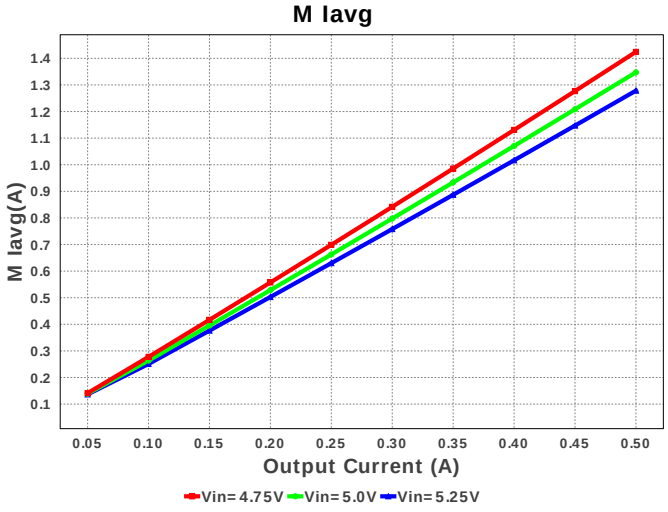


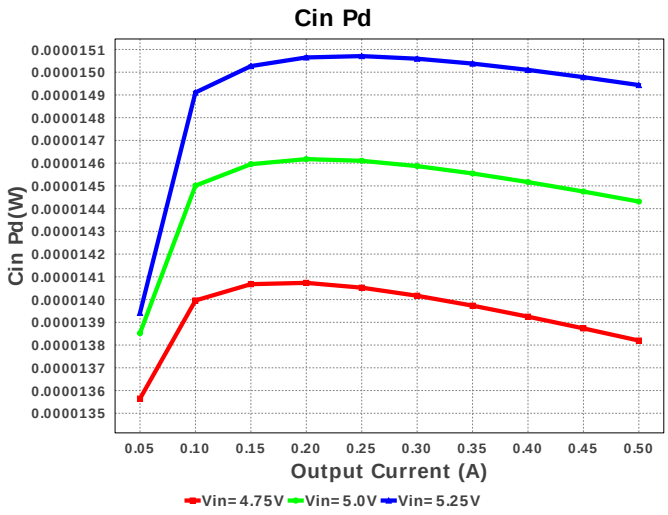


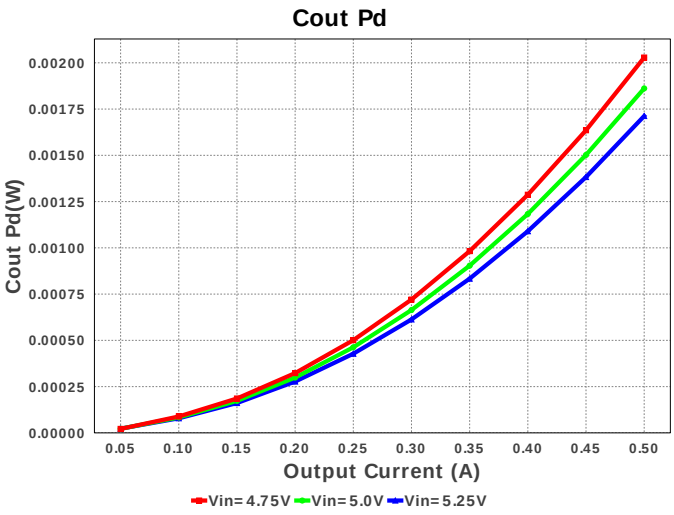


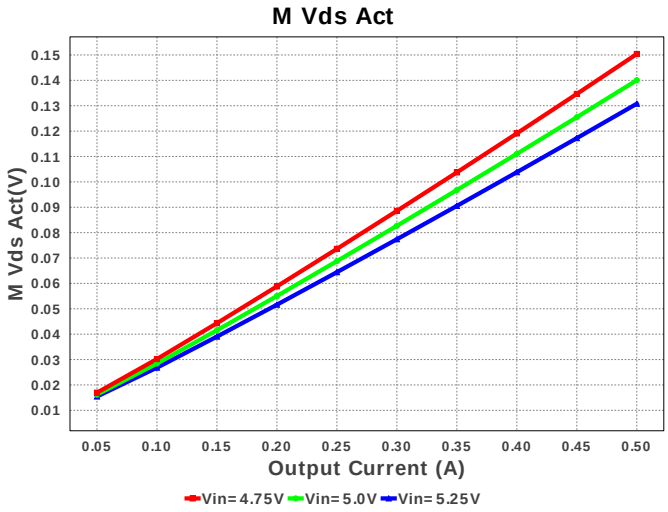


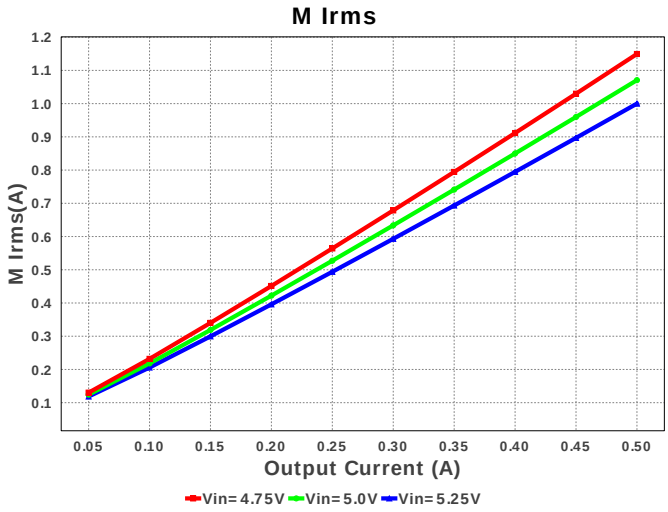


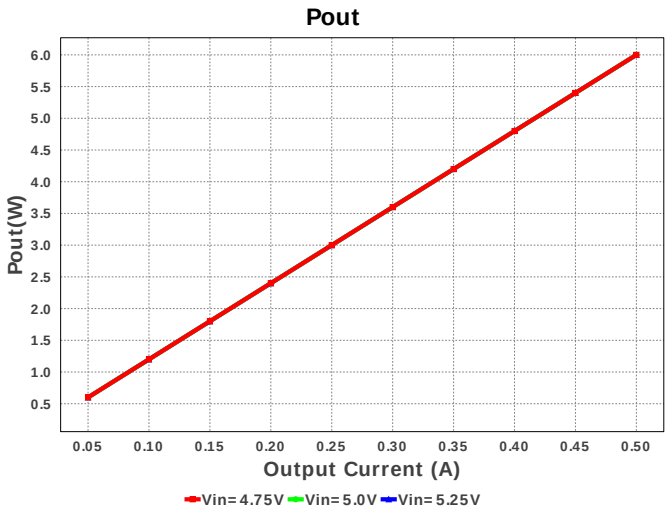


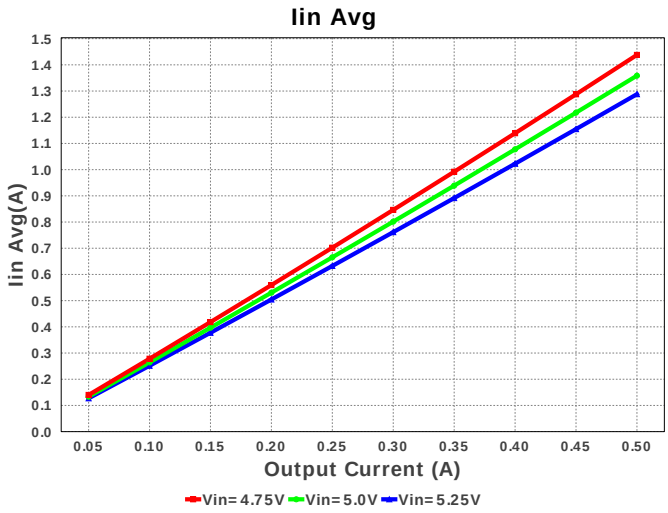


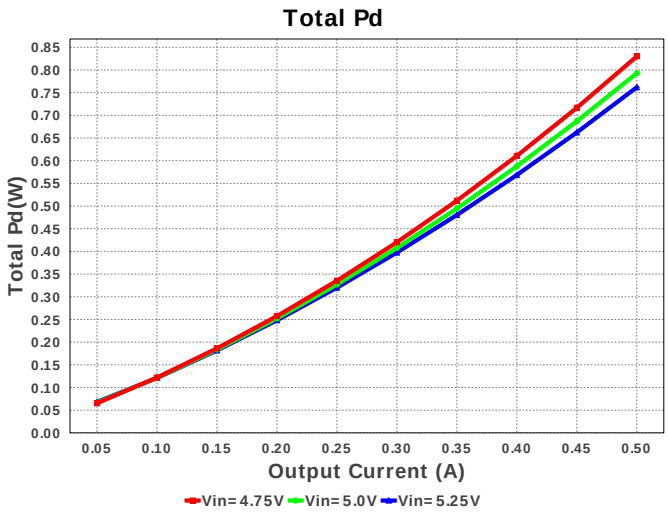


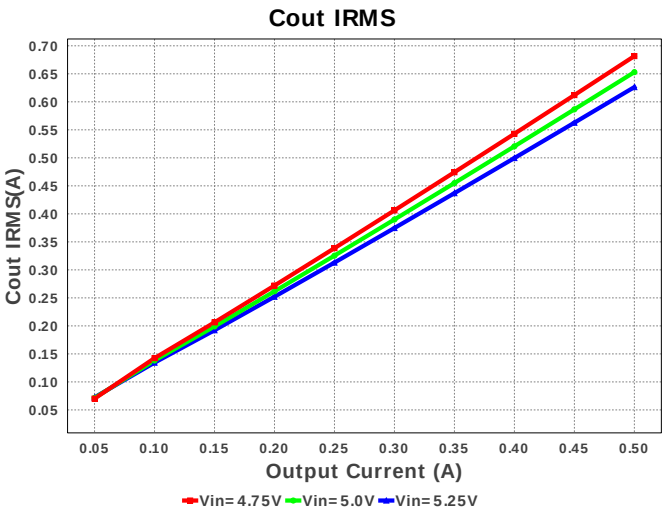


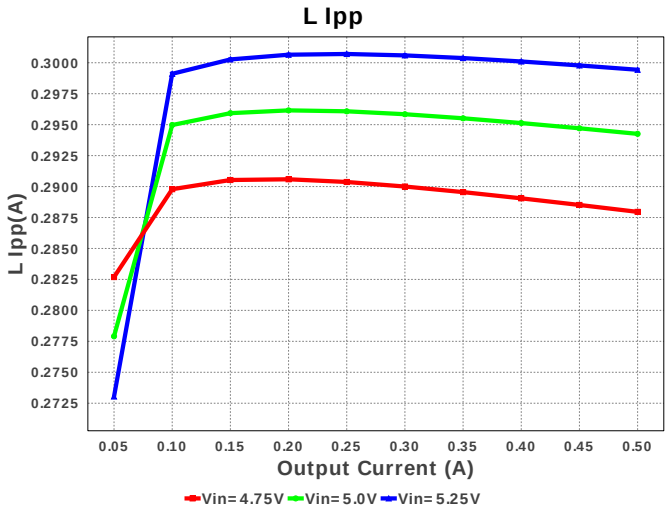


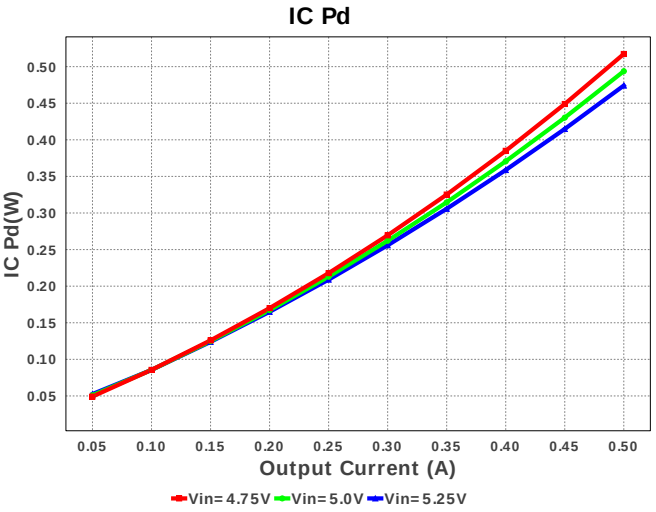


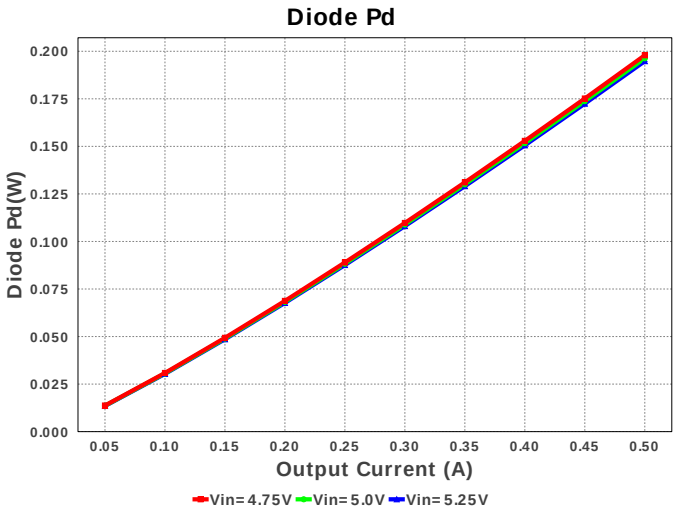


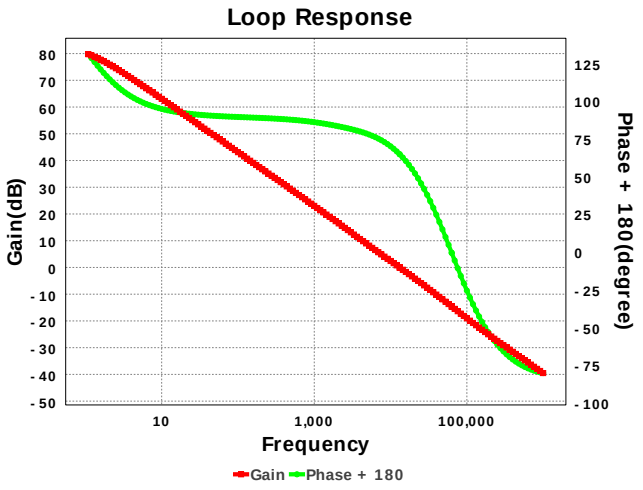












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	83.126 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	681.619 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.568 A	Current	Peak switch current in IC
4.	Iin Avg	1.438 A	Current	Average input current
5.	L Ipp	287.96 mA	Current	Peak-to-peak inductor ripple current
6.	M Iavg	1.424 A	Current	MOSFET Average current
7.	M1 Irms	1.149 A	Current	Q Iavg
8.	BOM Count	11	General	Total Design BOM count
9.	FootPrint	212.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	1.148 MHz	General	Switching frequency
11.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	150.387 mV	General	Voltage drop across the MosFET
13.	Mode	CCM	General	Conduction Mode
14.	Pout	6.0 W	General	Total output power
15.	Total BOM	$1.77	General	Total BOM Cost
16.	D1 Tj	34.947 degC	Op_Point	D1 junction temperature
17.	Low Freq Gain	79.414 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	12.078 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
20.	Cross Freq	11.933 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	64.896 %	Op_point	Duty cycle
22.	Efficiency	87.846 %	Op_point	Steady state efficiency
23.	Gain Marg	-13.657 dB	Op_point	Bode Plot Gain Margin
24.	IC Tj	53.02 degC	Op_point	IC junction temperature
25.	ICThetaJA	44.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
26.	IOUT_OP	500.0 mA	Op_point	Iout operating point
27.	Phase Marg	63.914 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	4.75 V	Op_point	Vin operating point
29.	Vout p-p	38.054 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	13.82 µW	Power	Input capacitor power dissipation
31.	Cout Pd	2.028 mW	Power	Output capacitor power dissipation
32.	Diode Pd	197.897 mW	Power	Diode power dissipation
33.	IC Pd	517.293 mW	Power	IC power dissipation
34.	L Pd	111.964 mW	Power	Inductor power dissipation
35.	Total Pd	830.121 mW	Power	Total Power Dissipation
36.	Vout Tolerance	3.472 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	5.25	Maximum input voltage
3.	VinMin	4.75	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	TPS61175	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS61175** Product Folder : http://www.ti.com/product/TPS61175 : contains the data sheet and other resources.