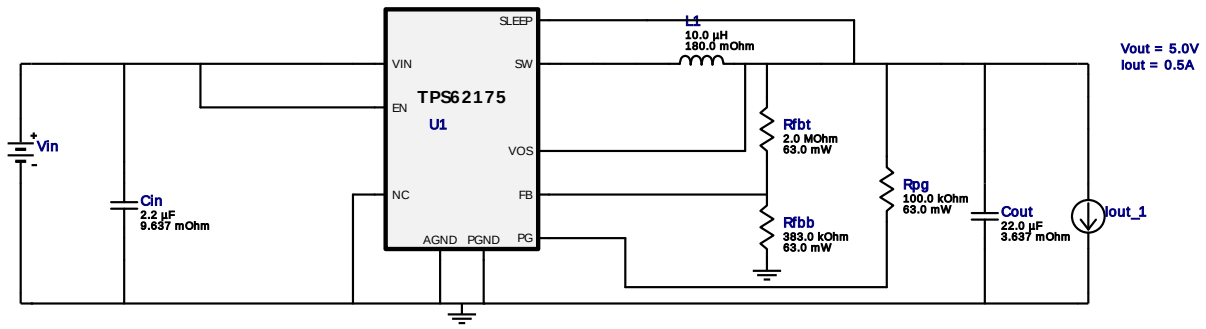
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 12.0V
Vout = 5.0V
Iout = 0.5A

Device = TPS62175DQCR
Topology = Buck
Created = 7/21/16 2:02:36 AM
BOM Cost = $1.07
BOM Count = 7
Total Pd = 0.29W

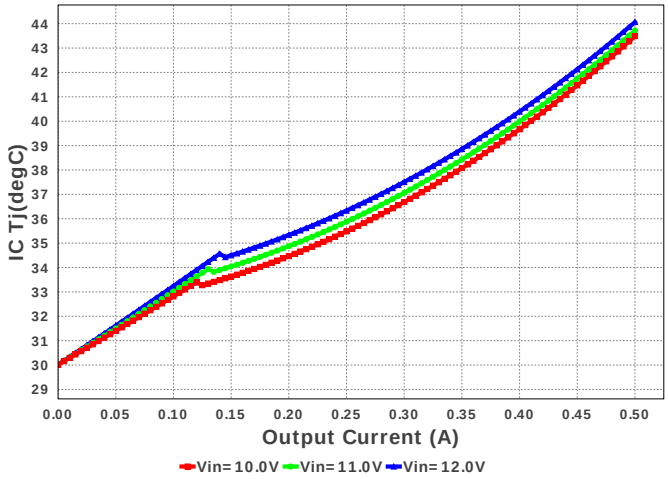
Design : 4742013/212 TPS62175DQCR
TPS62175DQCR 10.0V-12.0V to 5.00V @ 0.5A



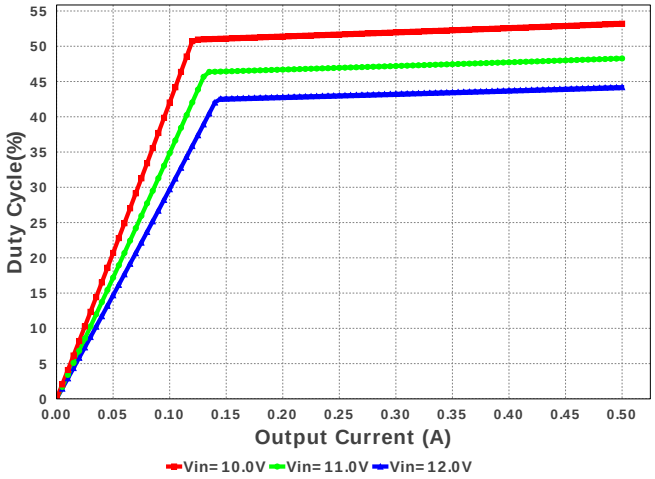
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM188R61C225KE15D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 16.0 V IRMS= 1.20373 A	1	$0.02	0603 5 mm²
2.	Cout	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	$0.07	1206_190 11 mm²
3.	L1	Coilcraft	LPS4018-103MRB	L= 10.0 µH DCR= 180.0 mOhm	1	$0.35	LPS4018 24 mm²
4.	Rfbb	Vishay-Dale	CRCW0402383KFKED Series= CRCW..e3	Res= 383.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
5.	Rfbt	Vishay-Dale	CRCW04022M00FKED Series= CRCW..e3	Res= 2.0 MOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
6.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
7.	U1	Texas Instruments	TPS62175DQCR	Switcher	1	$0.60	R-PWSON-N10 12 mm²

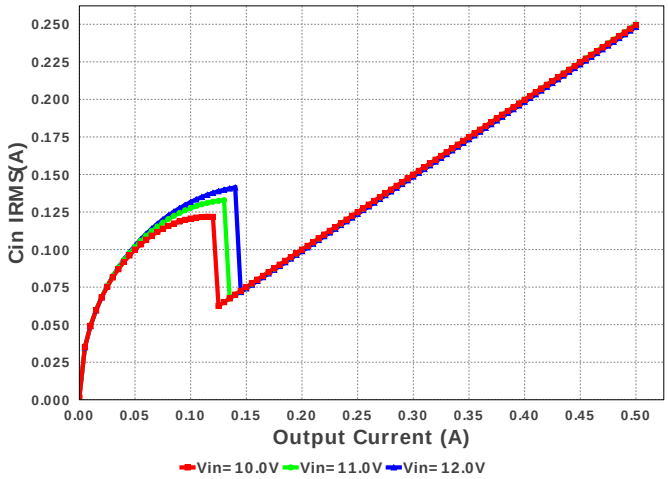
IC Tj



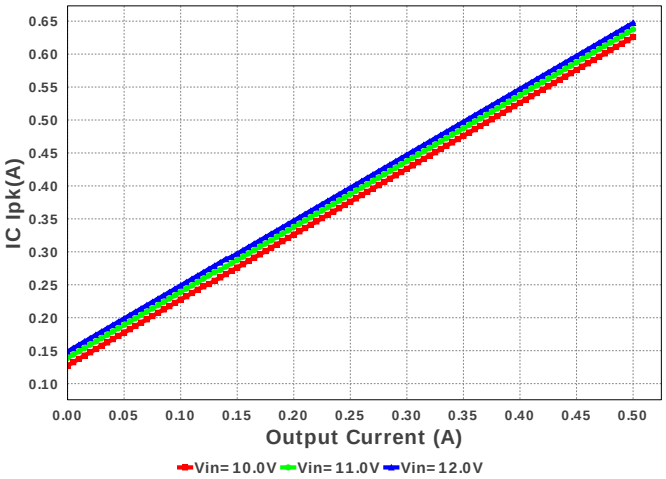
Duty Cycle



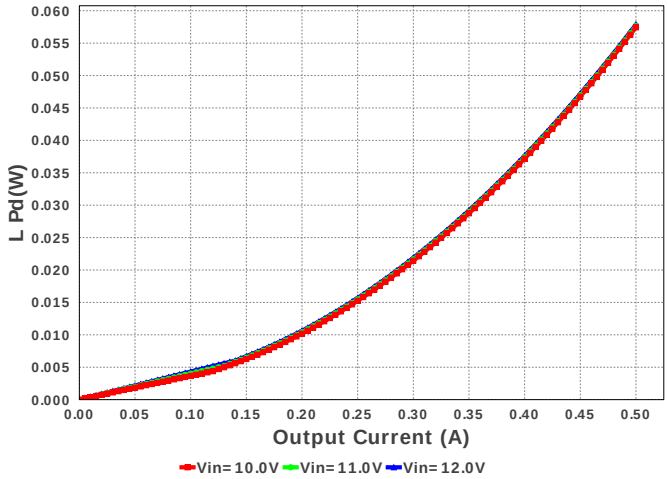
Cin IRMS



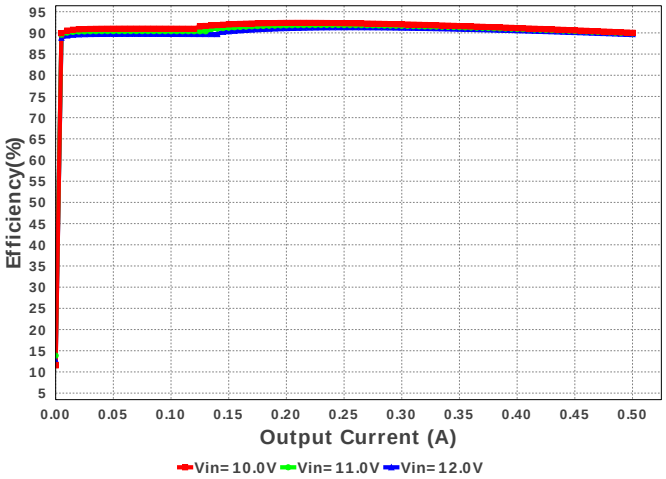
IC Ipk

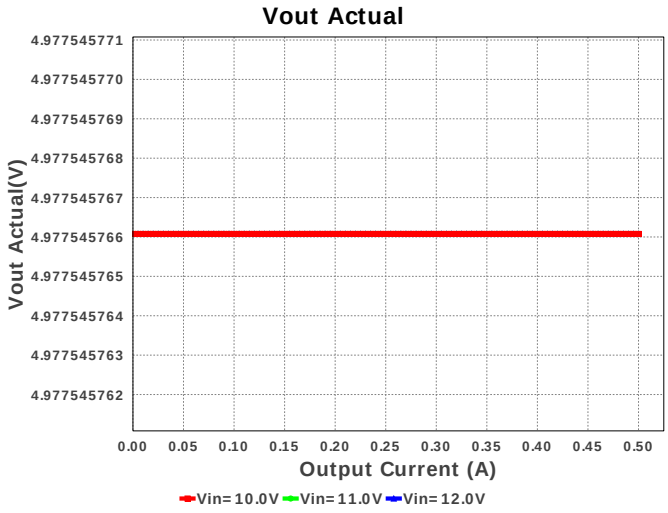


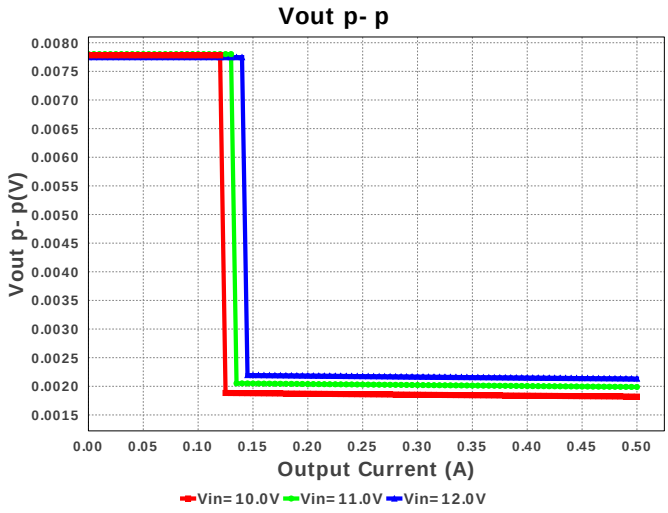
L Pd

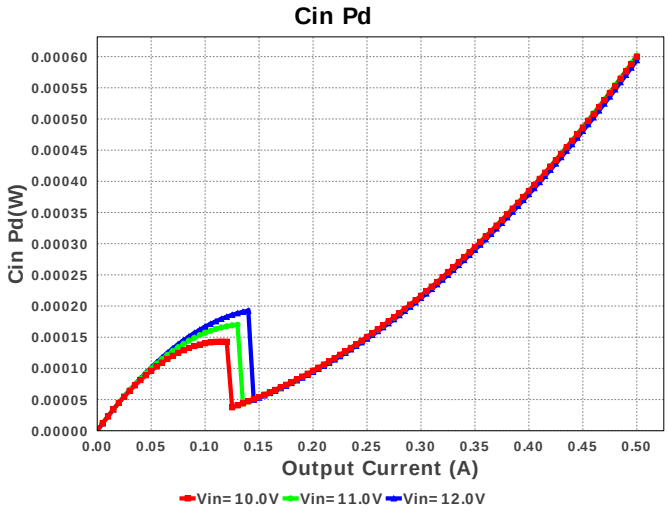


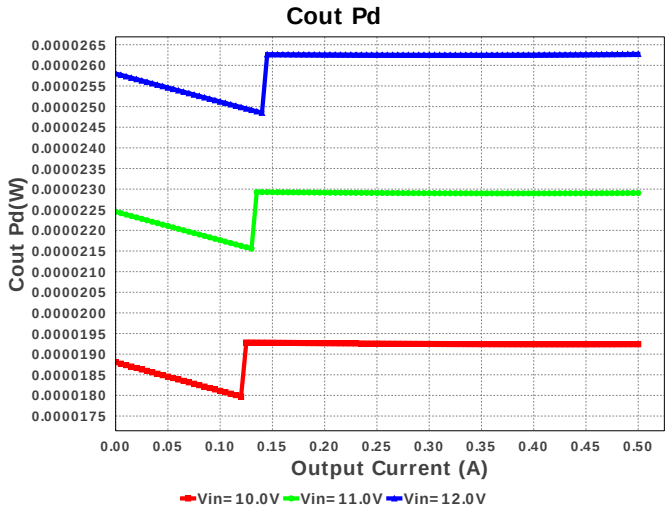
Efficiency

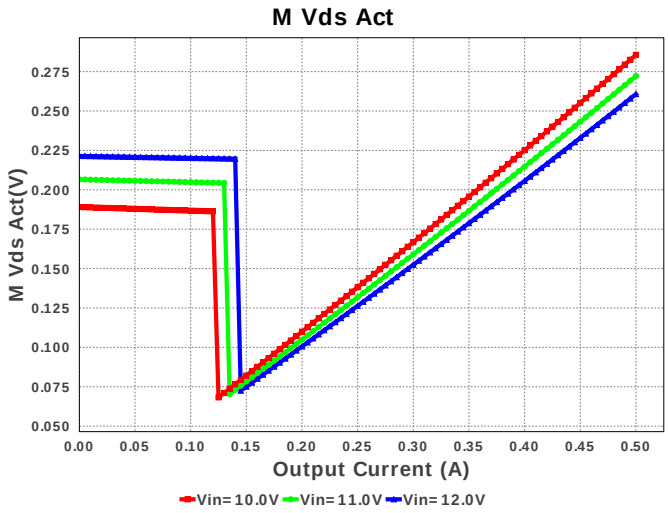


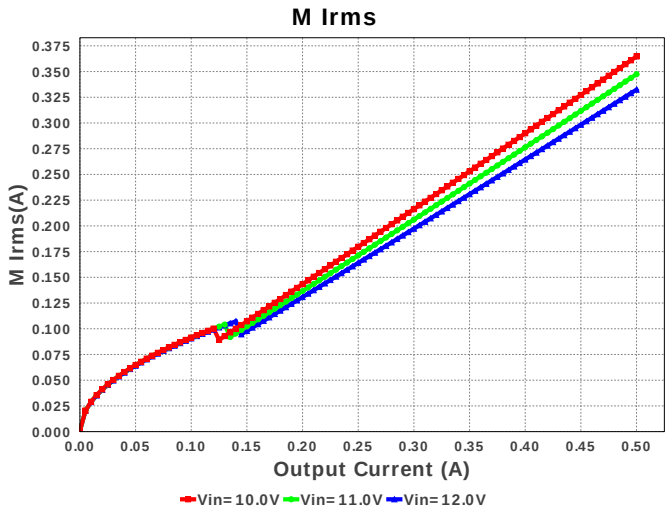


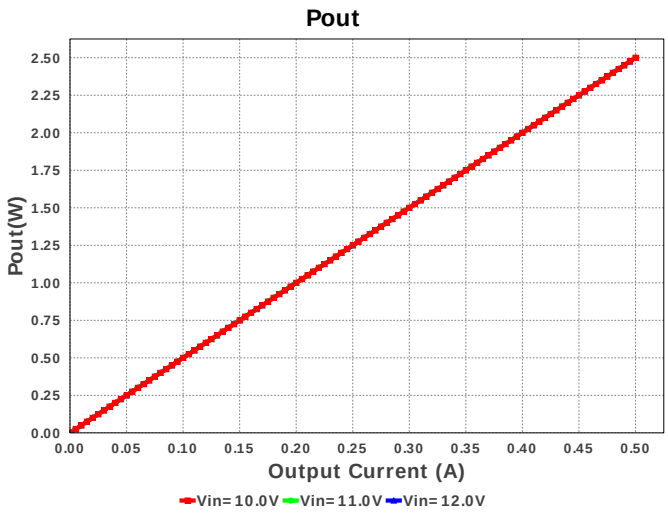


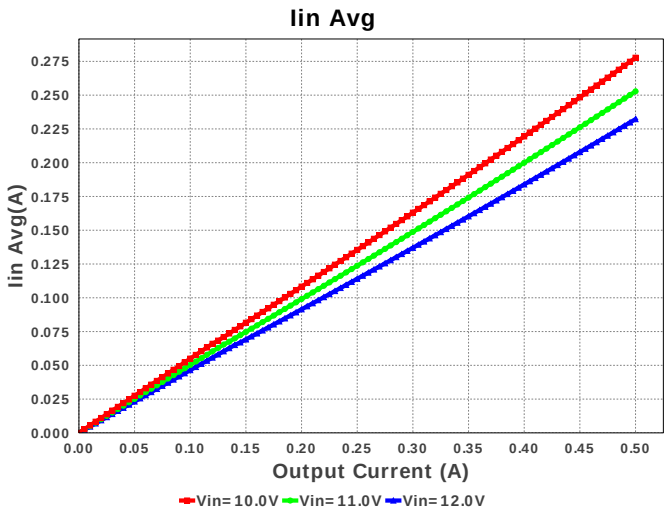


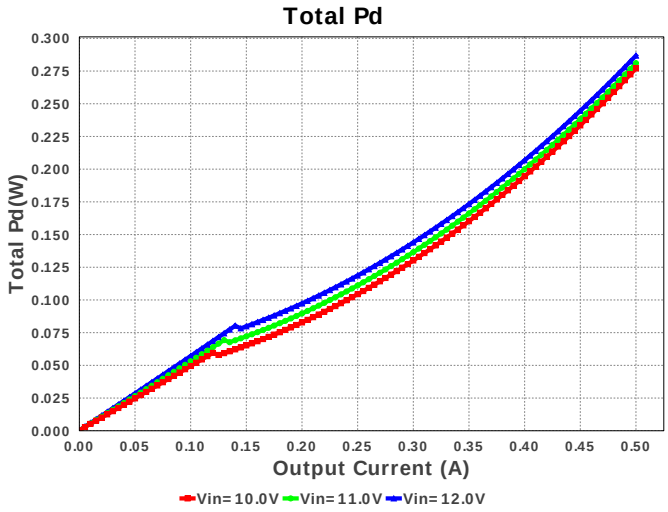


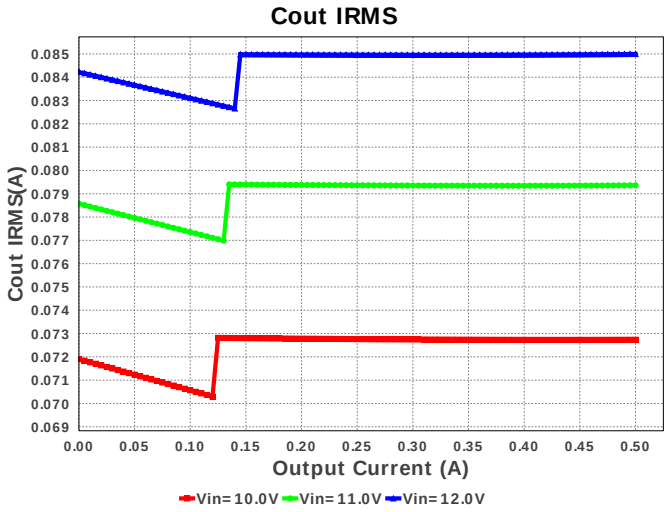


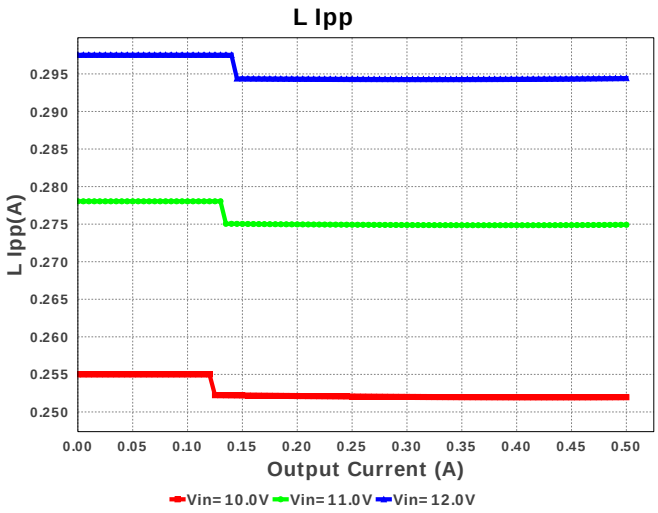


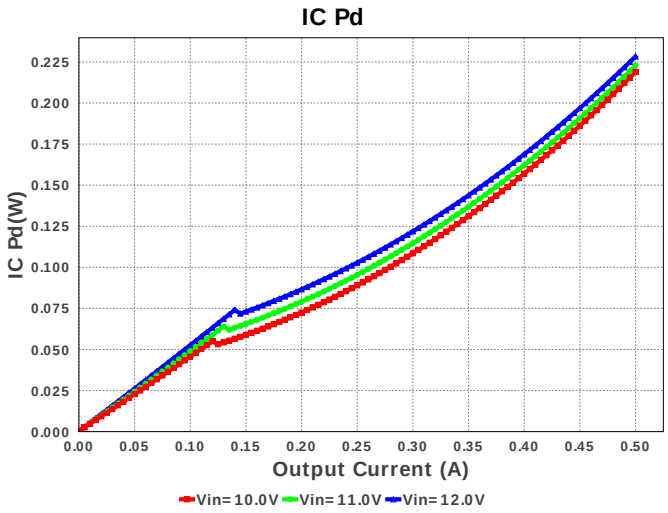


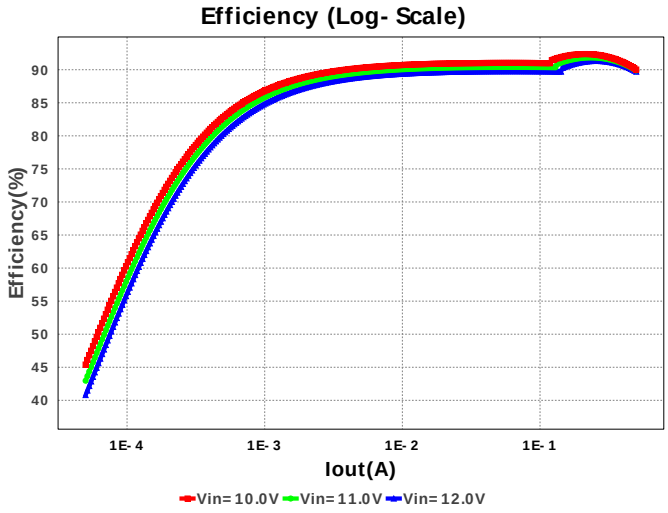












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	248.31 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	84.997 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	647.219 mA	Current	Peak switch current in IC
4.	Iin Avg	232.23 mA	Current	Average input current
5.	L Ipp	294.44 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	332.401 mA	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	61.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.051 MHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	260.706 mV	General	Voltage drop across the MosFET
12.	Pout	2.5 W	General	Total output power
13.	Total BOM	$1.07	General	Total BOM Cost
14.	Vout Actual	4.978 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	44.196 %	Op_point	Duty cycle
17.	Efficiency	89.708 %	Op_point	Steady state efficiency
18.	IC Tj	44.064 degC	Op_point	IC junction temperature
19.	ICThetaJA	61.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	500.0 mA	Op_point	Iout operating point
21.	VIN_OP	12.0 V	Op_point	Vin operating point
22.	Vout p-p	2.134 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	594.197 µW	Power	Input capacitor power dissipation
24.	Cout Pd	26.275 µW	Power	Output capacitor power dissipation
25.	IC Pd	228.314 mW	Power	IC power dissipation
26.	L Pd	57.876 mW	Power	Inductor power dissipation
27.	Total Pd	286.813 mW	Power	Total Power Dissipation
28.	Vout Tolerance	4.746 %		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	12.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS62175	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS62175** Product Folder : http://www.ti.com/product/TPS62175 : contains the data sheet and other resources.