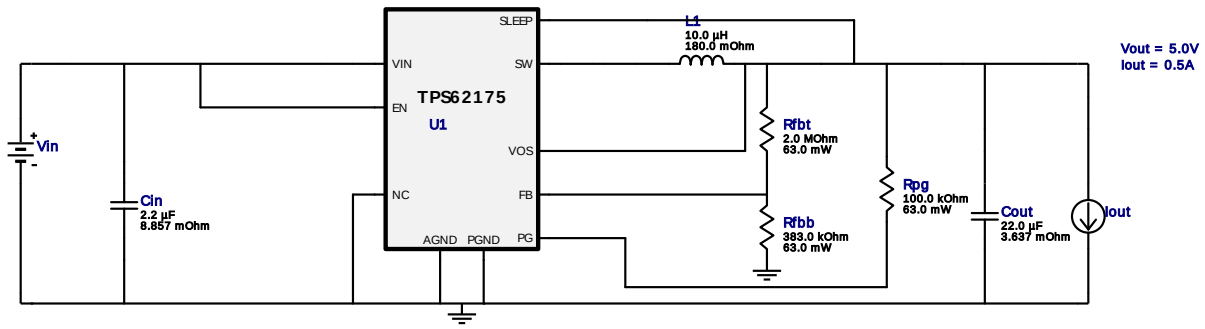
WEBENCH® Design Report

VinMin = 12.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 0.5A

Device = TPS62175DQCR
Topology = Buck
Created = 10/19/16 6:45:29 AM
BOM Cost = $1.08
BOM Count = 7
Total Pd = 0.41W

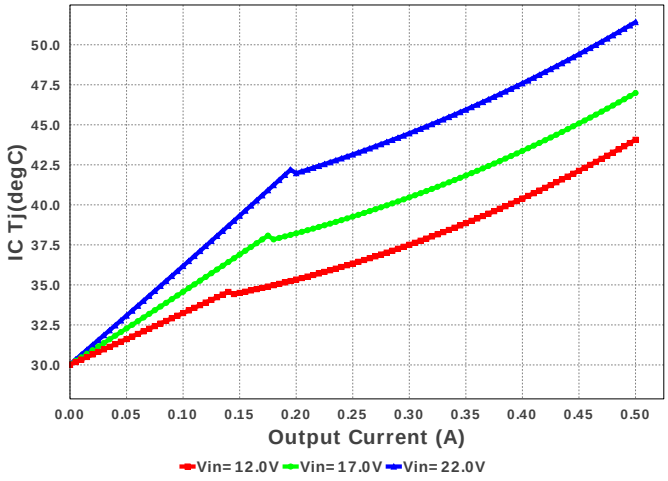
Design : 3962751/10 TPS62175DQCR
TPS62175DQCR 12.0V-22.0V to 5.00V @ 0.5A



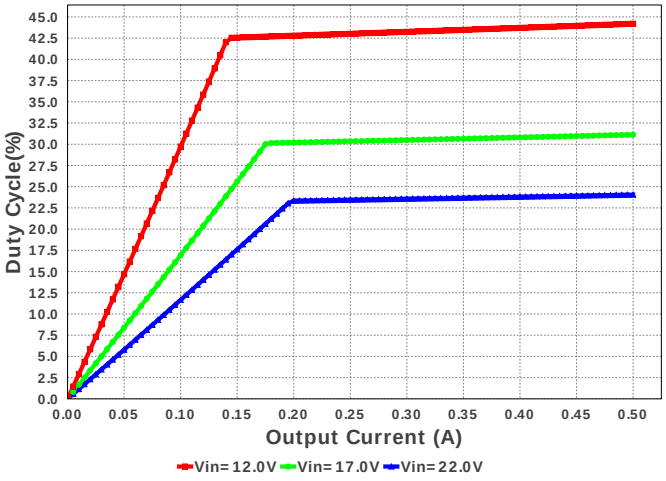
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM21BR61E225KA12L Series= X5R	Cap= 2.2 uF ESR= 8.857 mOhm VDC= 25.0 V IRMS= 1.3111 A	1	$0.04	0805 7 mm²
2.	Cout	MuRata	GRM31CR61A226ME19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	$0.08	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	$0.58	R-PWSON-N10 12 mm²

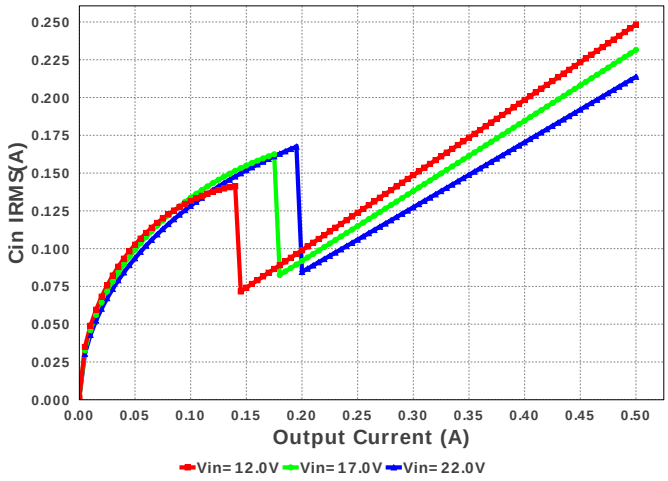
IC Tj



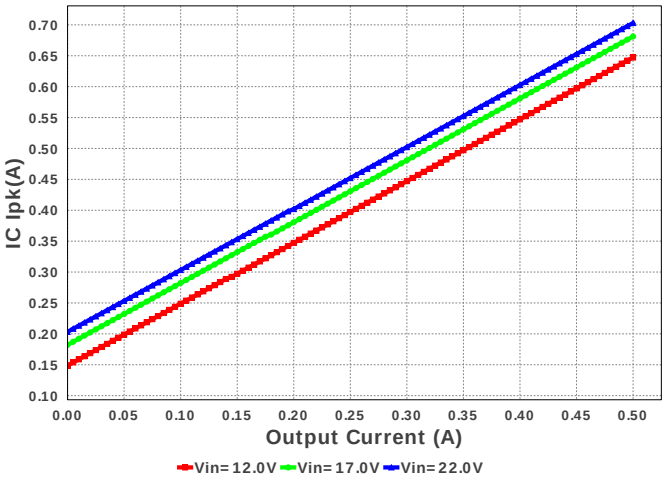
Duty Cycle



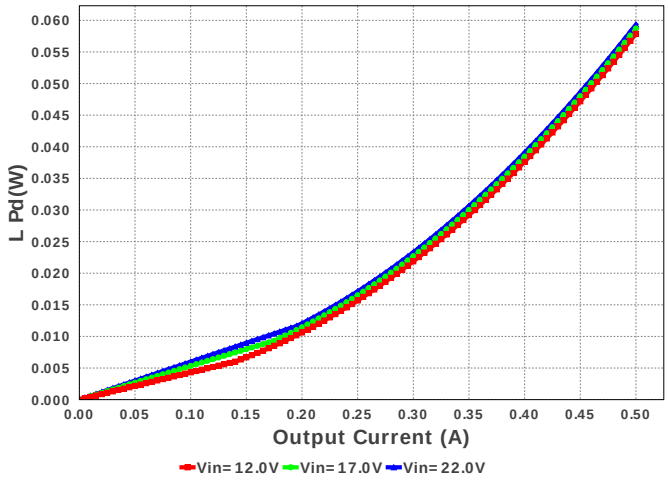
Cin IRMS



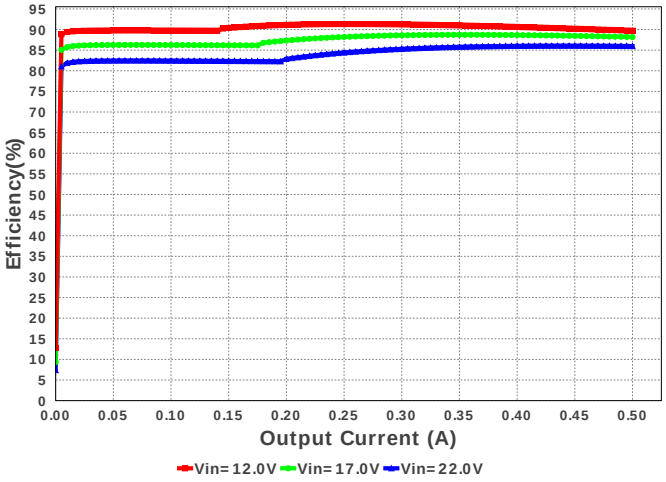
IC Ipk

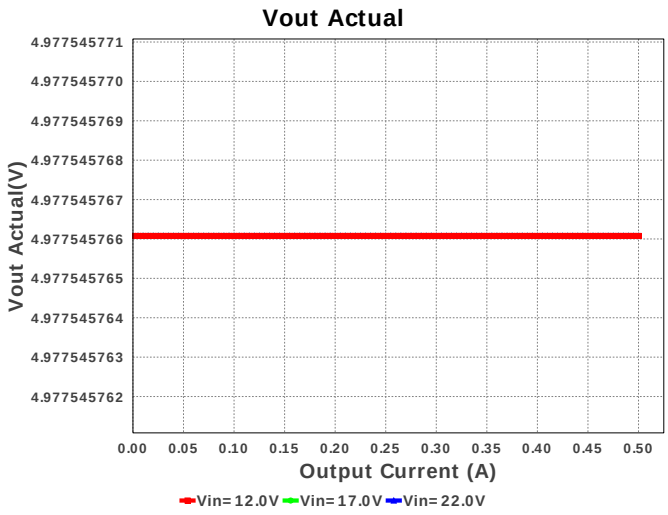


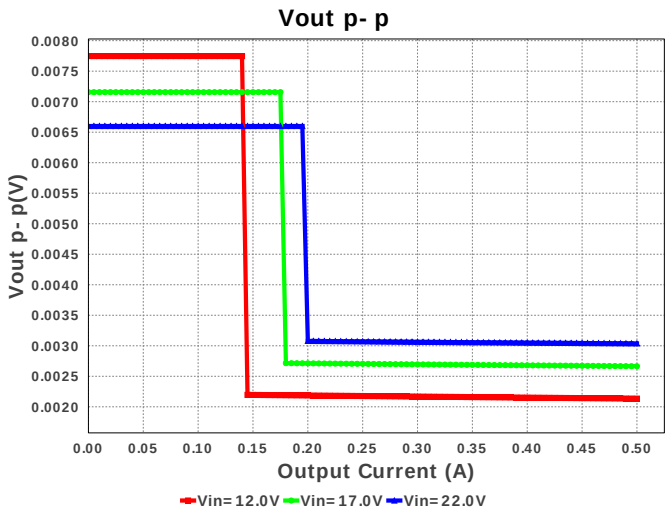
L Pd

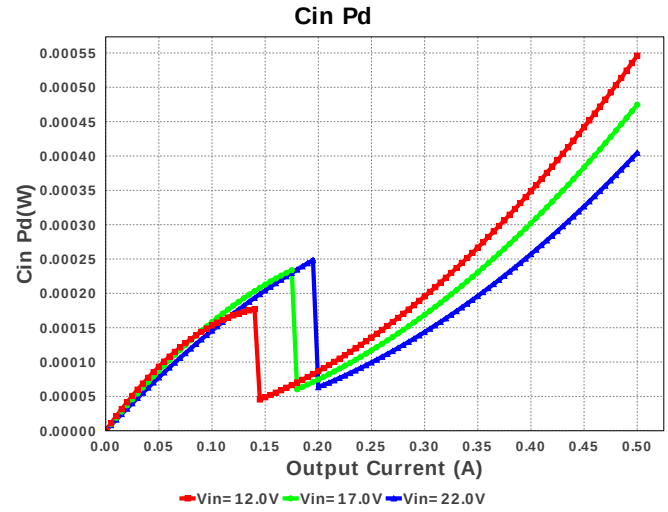


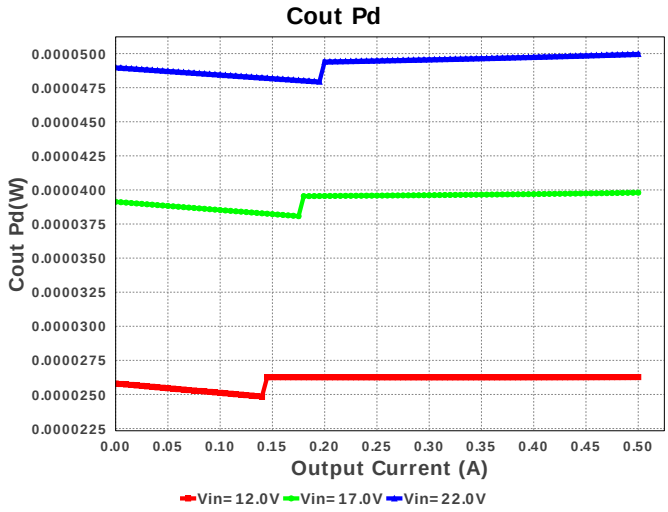
Efficiency

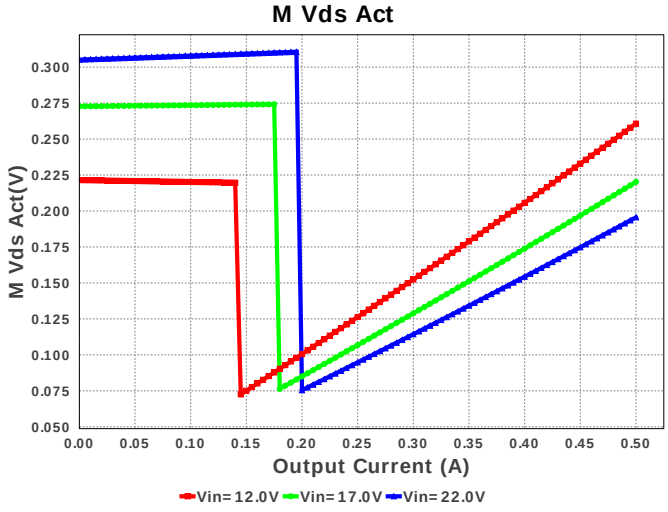


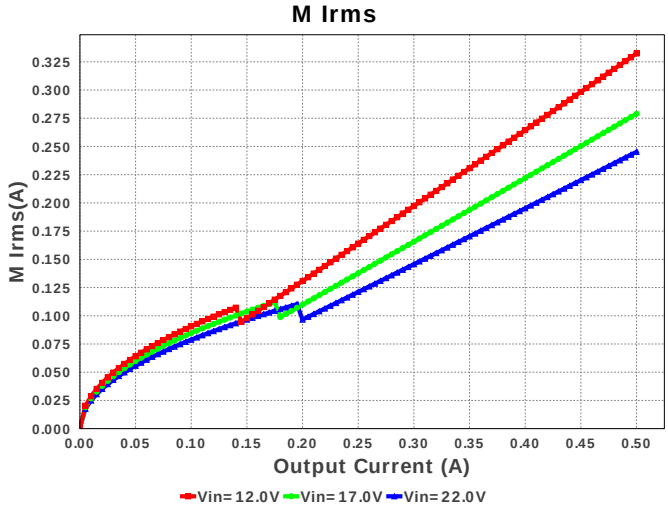


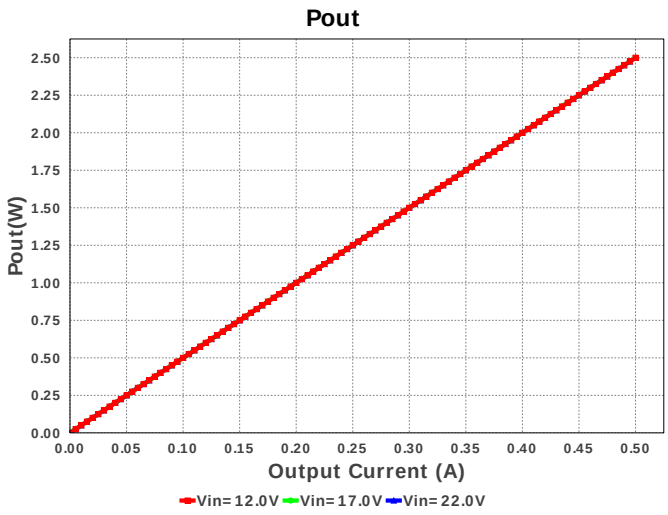


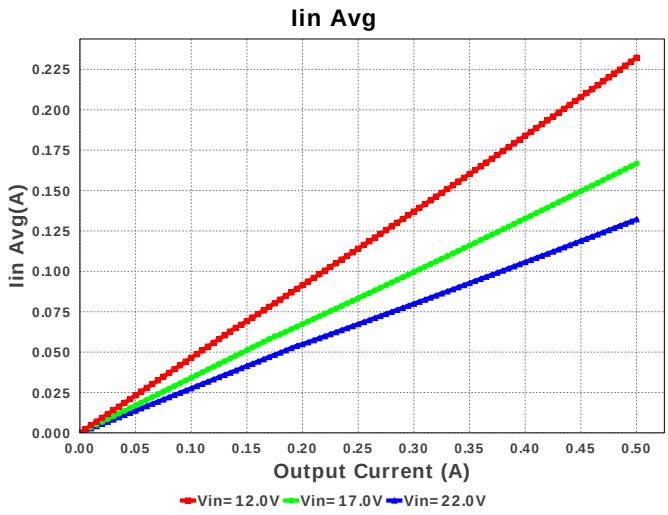


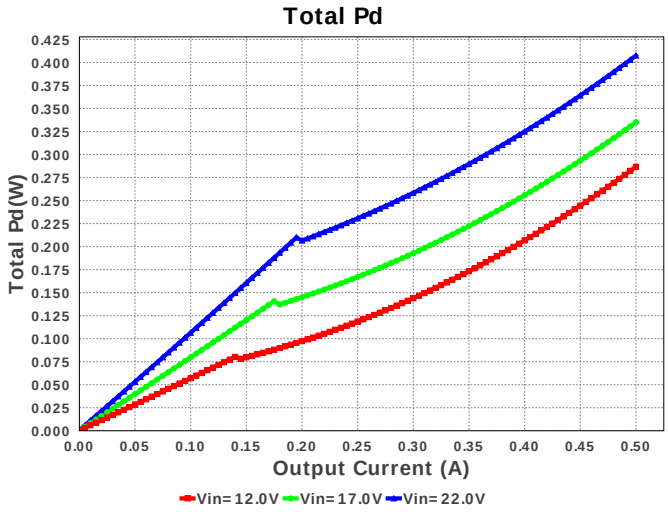


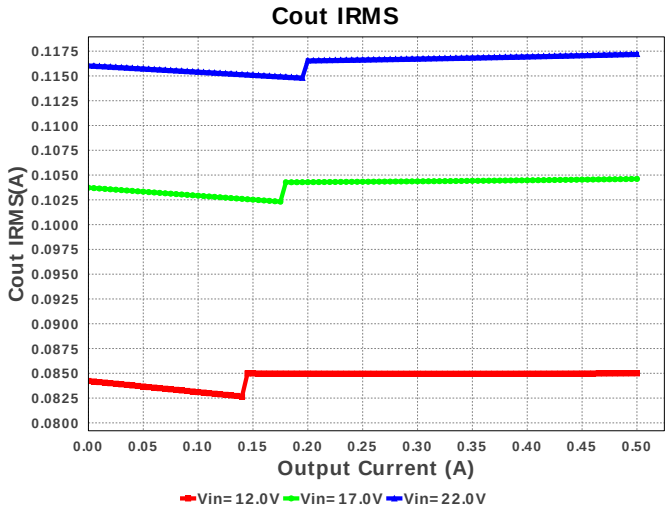


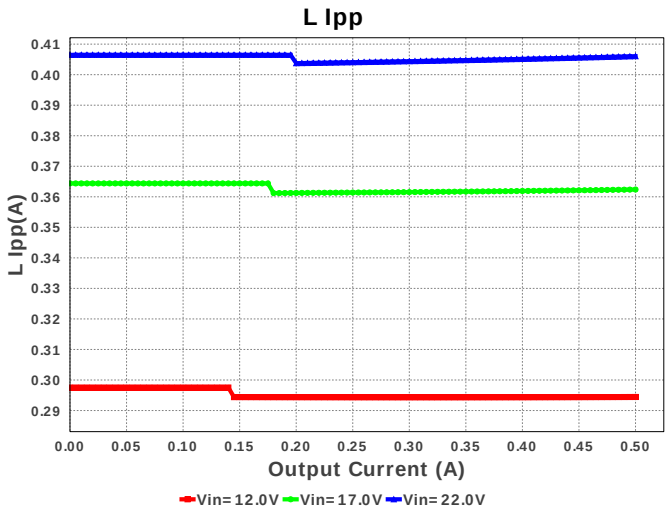


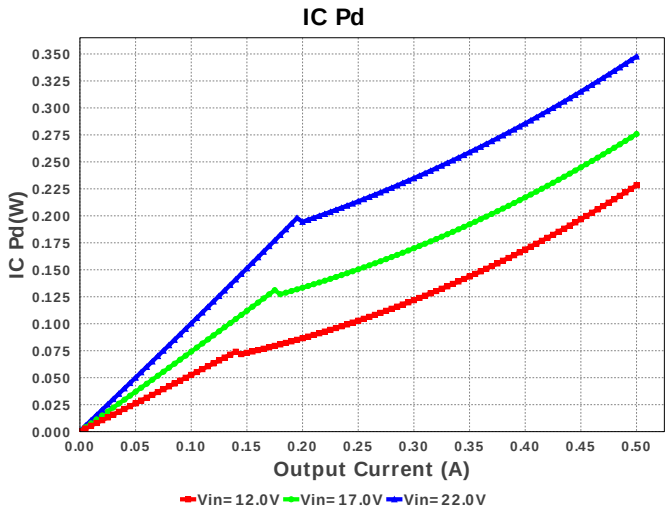


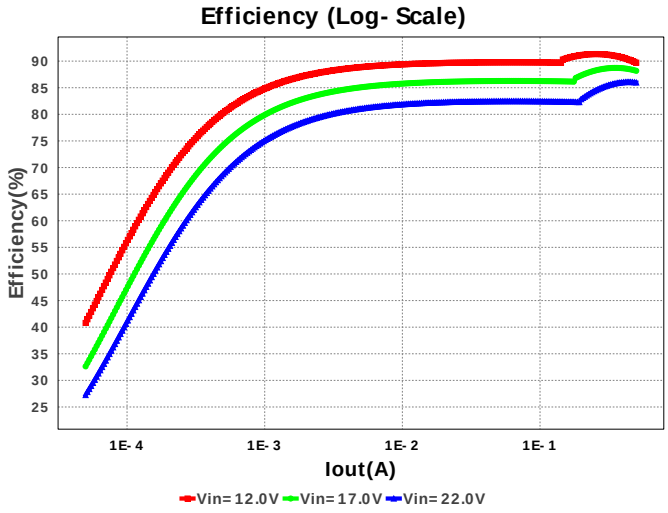












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	213.716 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	117.215 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	703.022 mA	Current	Peak switch current in IC
4.	Iin Avg	132.16 mA	Current	Average input current
5.	L Ipp	406.04 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	245.241 mA	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	63.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.007 MHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	195.585 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	2.5 W	General	Total output power
14.	Total BOM	$1.08	General	Total BOM Cost
15.	Vout Actual	4.978 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	24.057 %	Op_point	Duty cycle
18.	Efficiency	85.986 %	Op_point	Steady state efficiency
19.	IC Tj	51.416 degC	Op_point	IC junction temperature
20.	ICThetaJA	61.6 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	500.0 mA	Op_point	Iout operating point
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	3.039 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	404.538 µW	Power	Input capacitor power dissipation
25.	Cout Pd	49.97 µW	Power	Output capacitor power dissipation
26.	IC Pd	347.661 mW	Power	IC power dissipation
27.	L Pd	59.341 mW	Power	Inductor power dissipation
28.	Total Pd	407.46 mW	Power	Total Power Dissipation
29.	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	22.0	Maximum input voltage
3.	VinMin	12.0	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.