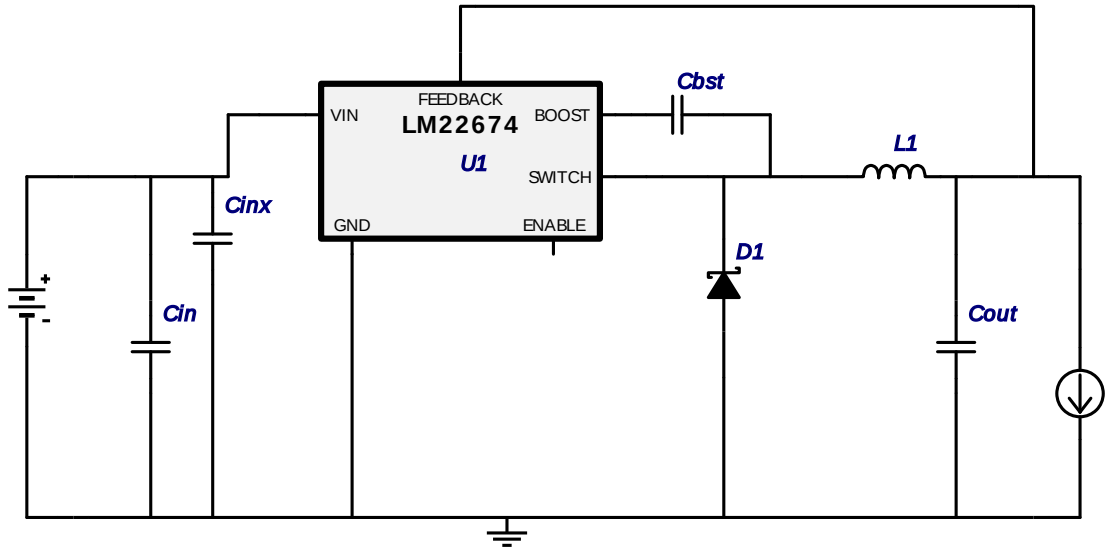
WEBENCH® Design Report

VinMin = 16.0V
VinMax = 10.0V
Vout = 5.0V
Iout = 0.5A

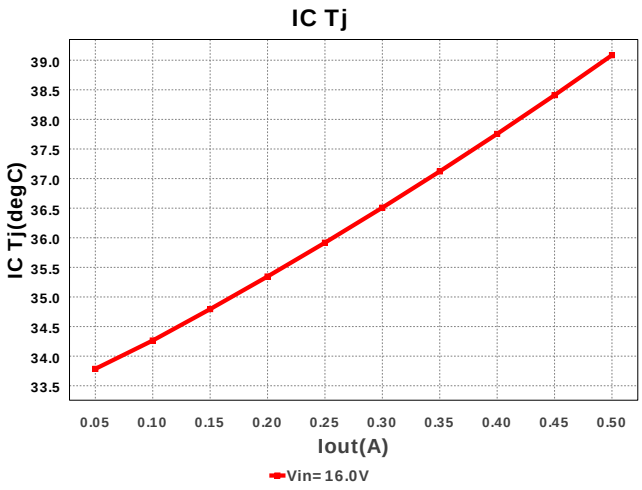
Device = LM22674MR-5.0/NOPB
Topology = Buck
Created = 2/26/13 10:57:08 AM
BOM Cost = $1.68
Total Pd = 0.3W
Footprint = 206.0mm2
BOM Count = 7

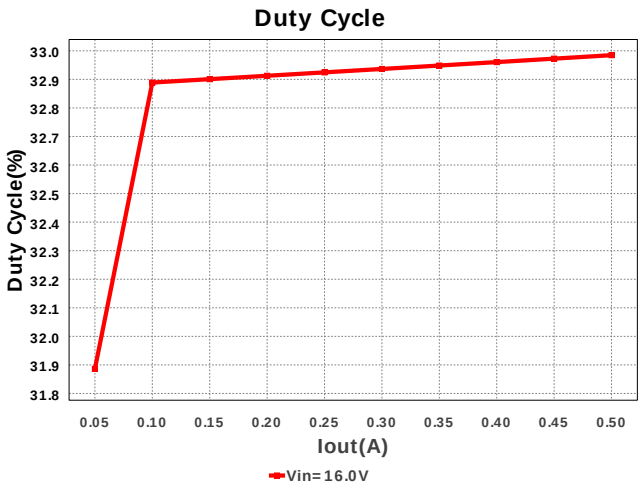
Design : 3663732/5 LM22674MR-5.0/NOPB
LM22674MR-5.0/NOPB 16.0V-10.0V to 5.0V @ 0.5A

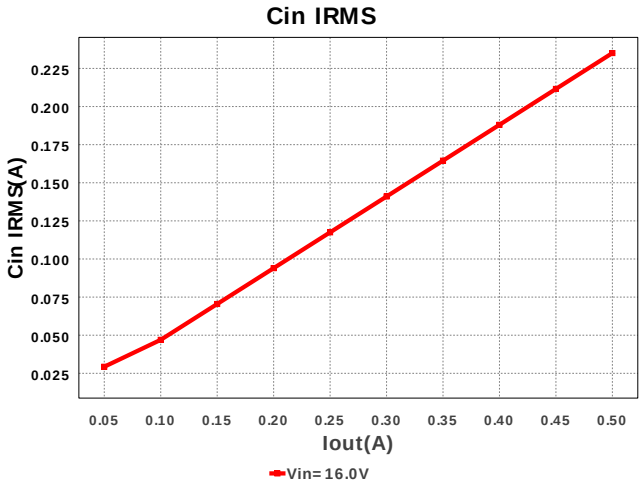


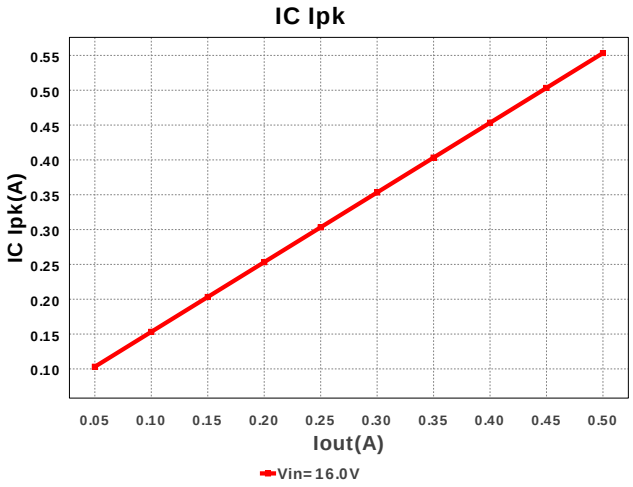
Electrical BOM

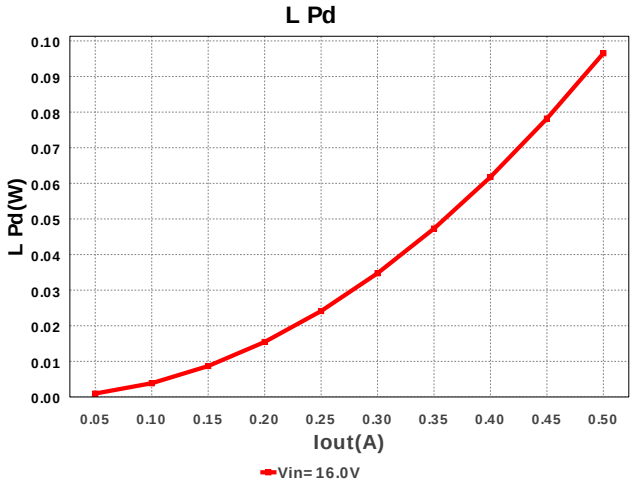
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	$0.01	0805 13mm2
2.	Cin	Kemet	C1206C475K4PACTU Series= X5R	Cap= 4.7 µF ESR= 13.0 mOhm VDC= 16.0 V IRMS= 4.9 A	1	$0.04	1206 19mm2
3.	Cinx	TDK	C1608X5R1C105K Series= X5R	Cap= 1.0 µF ESR= 5.7 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 10mm2
4.	Cout	TDK	C3225X5R1E106K Series= X5R	Cap= 10.0 µF ESR= 15.0 mOhm VDC= 25.0 V IRMS= 3.0 A	1	$0.15	1210 23mm2
5.	D1	ON Semiconductor	MBR0520LT1G	VF@Io= 385.0 mV VRRM= 20.0 V	1	$0.06	SOD-123 22mm2
6.	L1	Bourns	SRN6045-680M	L= 68.0 µH DCR= 351.0 mOhm	1	$0.16	SRN6045 64mm2
7.	U1	Texas Instruments	LM22674MR-5.0/NOPB	Switcher	1	$1.25	MRA08B 56mm2

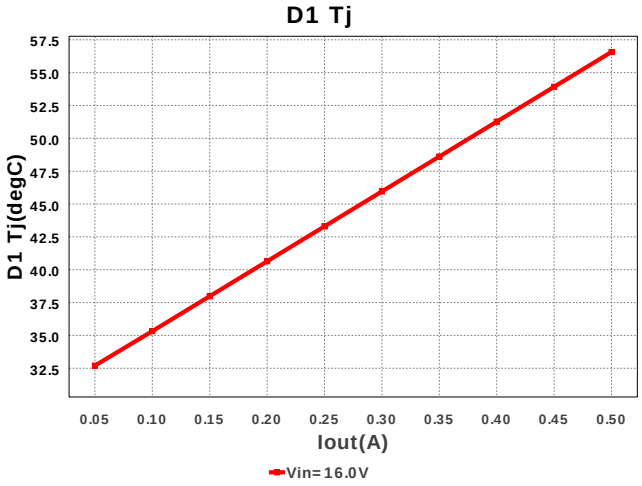




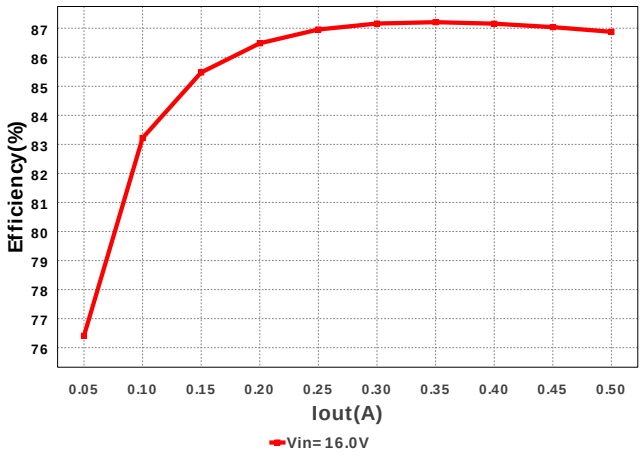




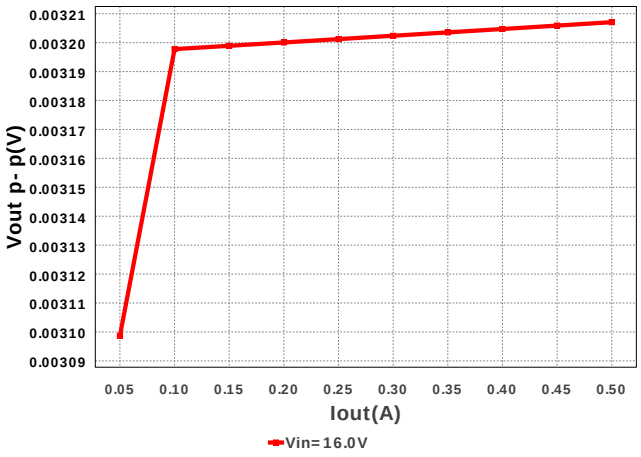




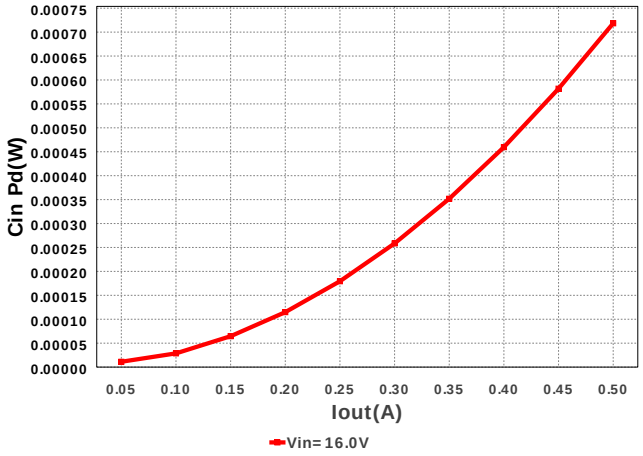
Efficiency



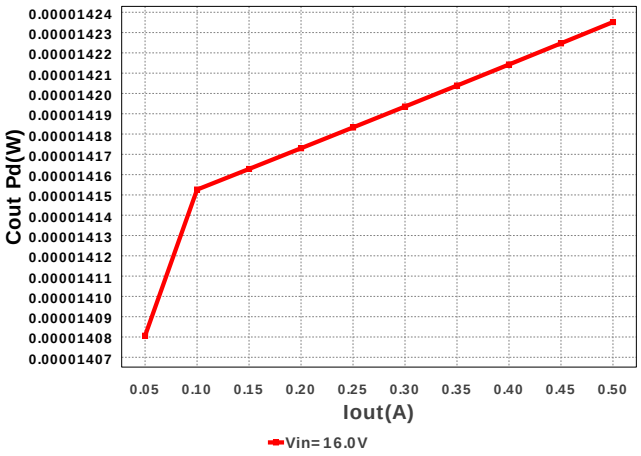
Vout p- p



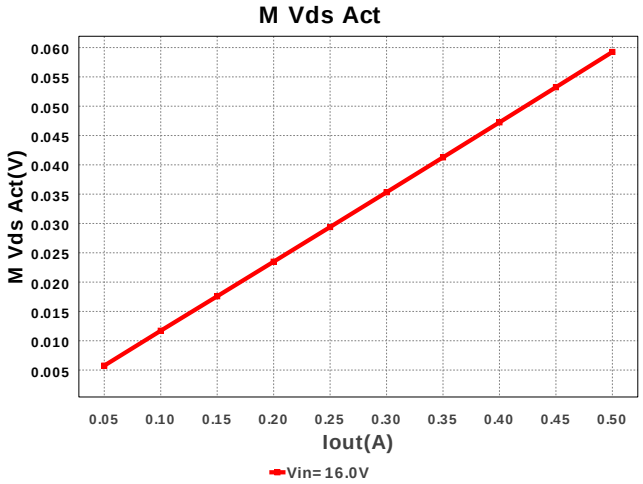
Cin Pd



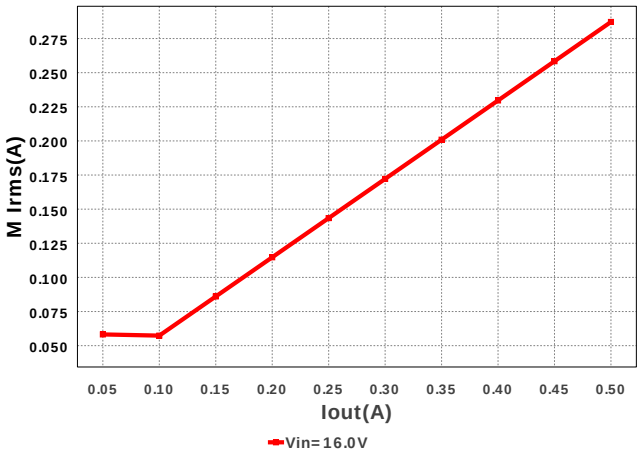
Cout Pd



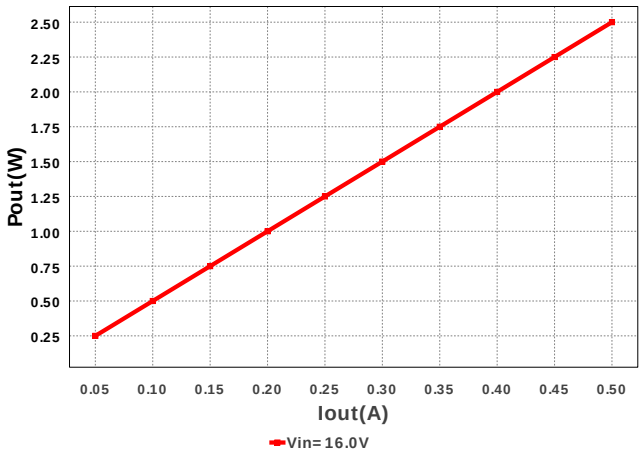
M Vds Act



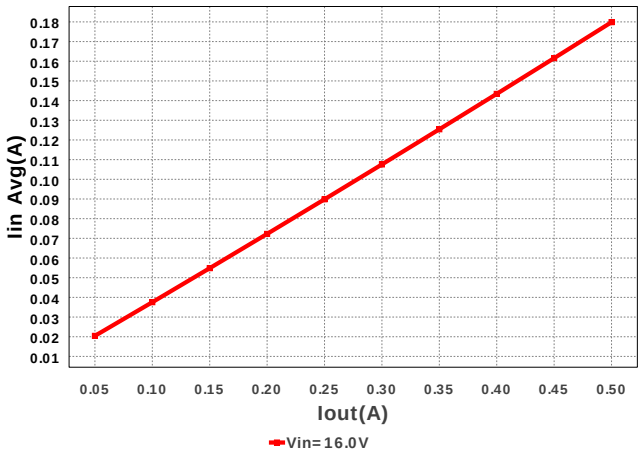
M Irms



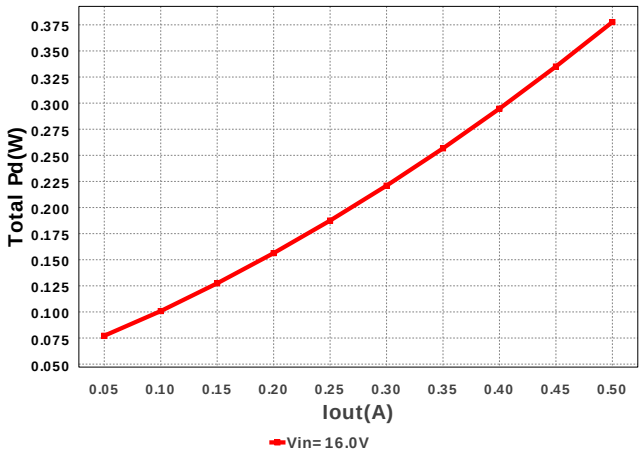
Pout



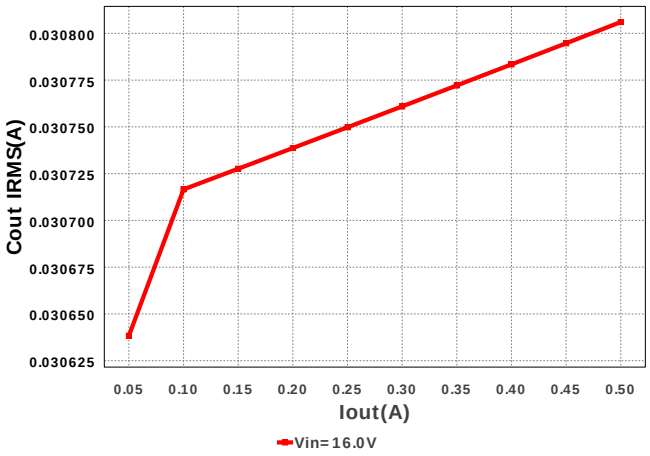
Iin Avg



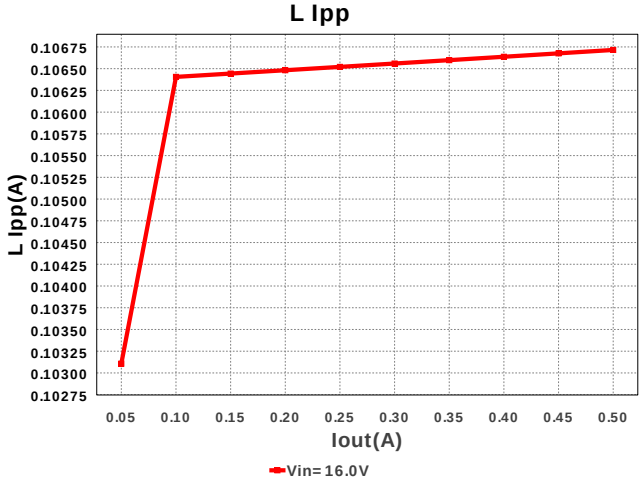
Total Pd



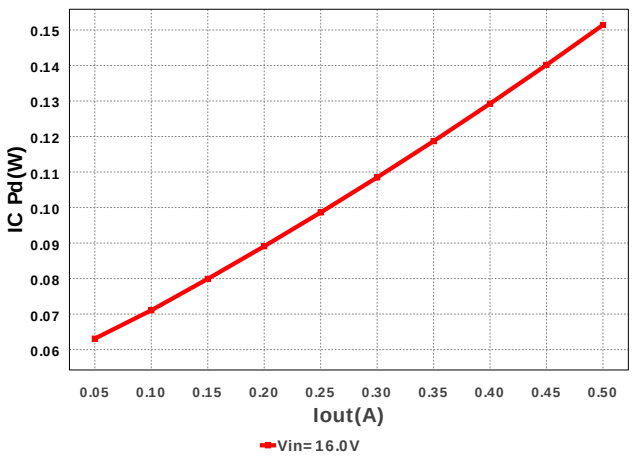
Cout IRMS

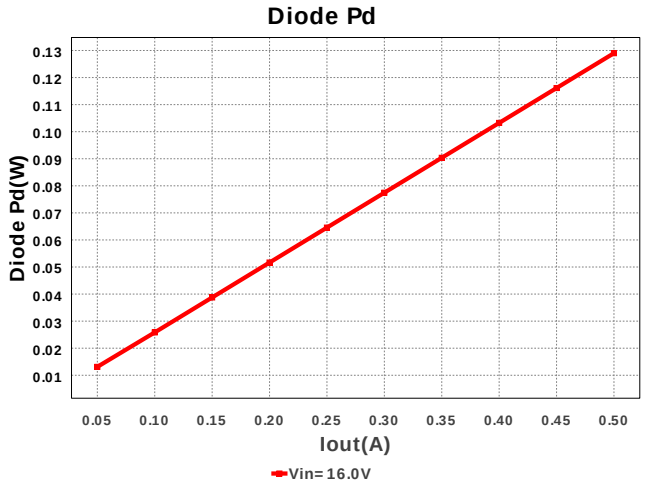


L Ipp



IC Pd





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	295.737 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	22.171 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	538.402 mA	Current	Peak switch current in IC
4.	Iin Avg	280.04 mA	Current	Average input current
5.	L Ipp	76.804 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	361.34 mA	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	206.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	75.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	74.162 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	$1.68	General	Total BOM Cost
15.	D1 Tj	48.945 degC	Op_Point	D1 junction temperature
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	59.87 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	52.227 %	Op_point	Duty cycle
19.	Efficiency	89.272 %	Op_point	Steady state efficiency
20.	IC Tj	36.648 degC	Op_point	IC junction temperature
21.	ICThetaJA	60.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	500.0 mA	Op_point	Iout operating point
23.	Phase Marg	45.148 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	10.0 V	Op_point	Vin operating point
25.	Vout p-p	2.308 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.137 mW	Power	Input capacitor power dissipation
27.	Cout Pd	7.374 µW	Power	Output capacitor power dissipation
28.	Diode Pd	91.964 mW	Power	Diode power dissipation
29.	IC Pd	110.798 mW	Power	IC power dissipation
30.	L Pd	96.525 mW	Power	Inductor power dissipation
31.	Total Pd	300.427 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 mA	Maximum Output Current
2.	Iout1	500.0 mAmps	Output Current #1
3.	VinMax	10.0 V	Maximum input voltage
4.	VinMin	16.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LM22674	National Based Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. Part Description The LM22674 is a monolithic integrated circuit that provides all of the active functions for a step-down (buck) switching regulator capable of driving up to 0.5A loads with excellent line and load regulation characteristics. High efficiency (>90%) is obtained through the use of a low ON-resistance N-channel MOSFET.

2. **LM22674** Product Folder : http://www.ti.com/product/lm22674 : contains the data sheet and other resources.