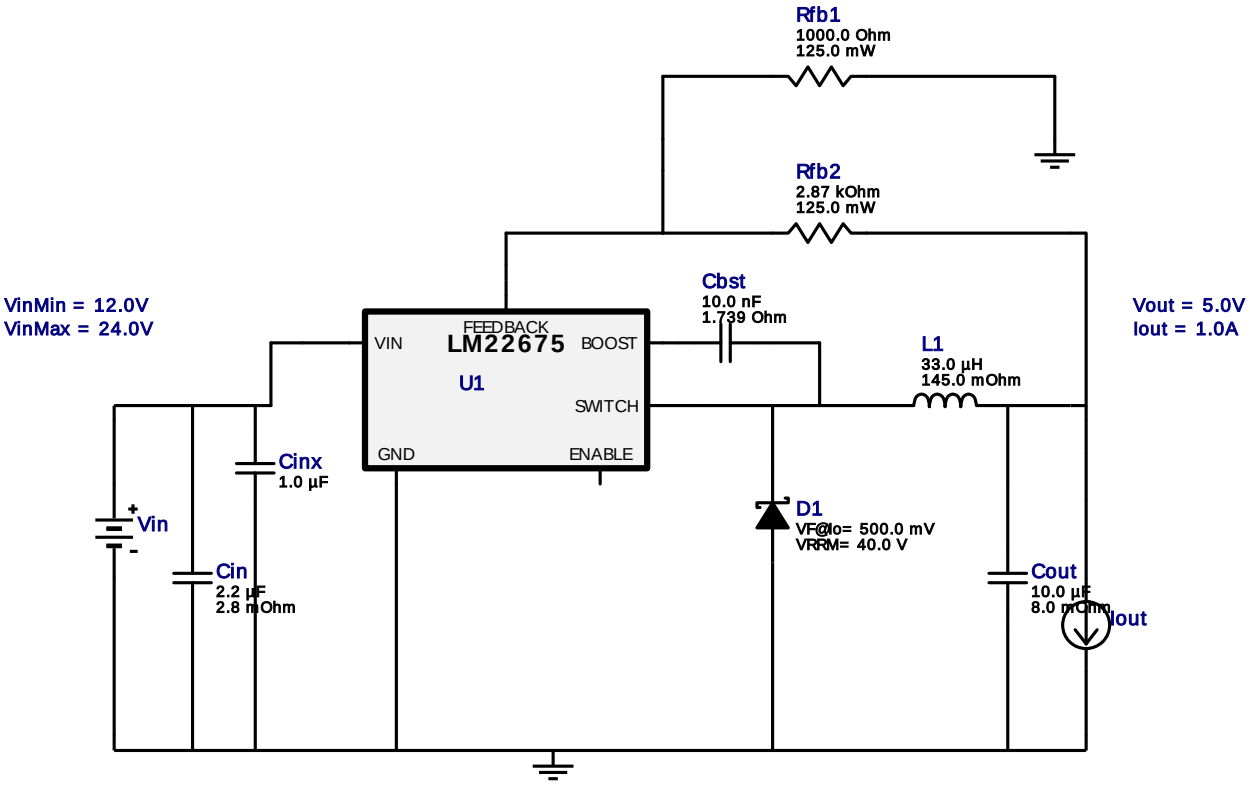
WEBENCH® Design Report

VinMin = 12.0V
VinMax = 24.0V
Vout = 5.0V
Iout = 1.0A

Device = LM22675MRE-ADJ/NOPB
Topology = Buck
Created = 1/15/15 1:00:48 PM
BOM Cost = $2.54
Footprint = 249.0 mm²
BOM Count = 9
Total Pd = 0.92W

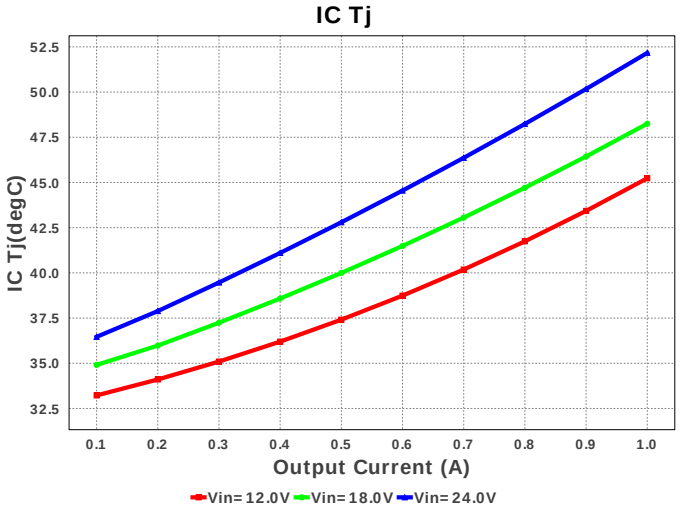
Design : 3961581/4 LM22675MRE-ADJ/NOPB
LM22675MRE-ADJ/NOPB 12.0V-24.0V to 5.00V @ 1.0A

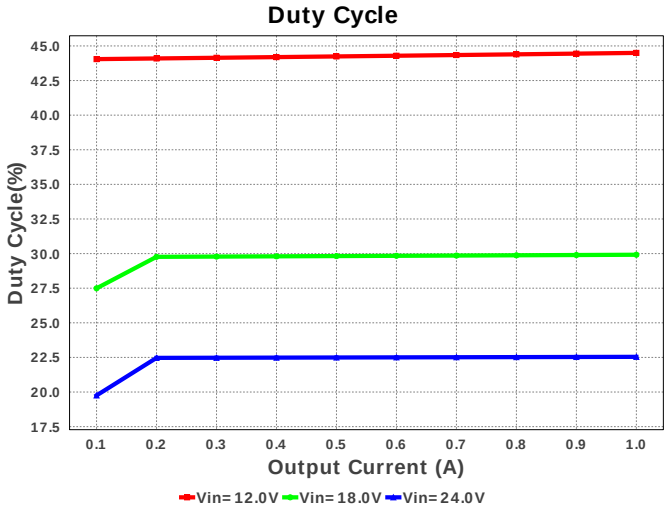


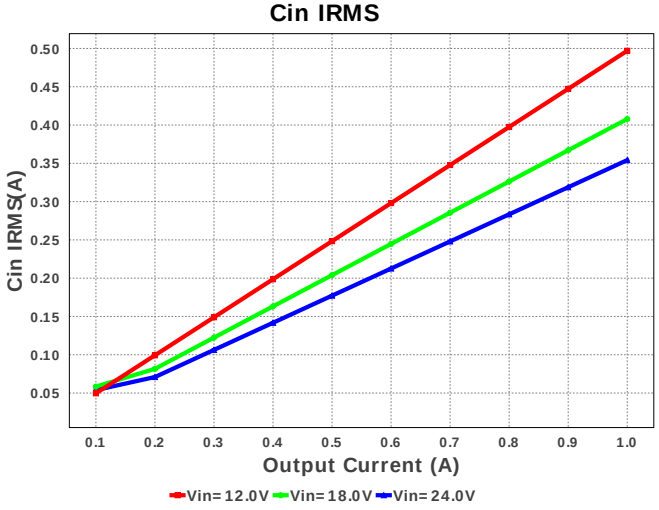
Electrical BOM

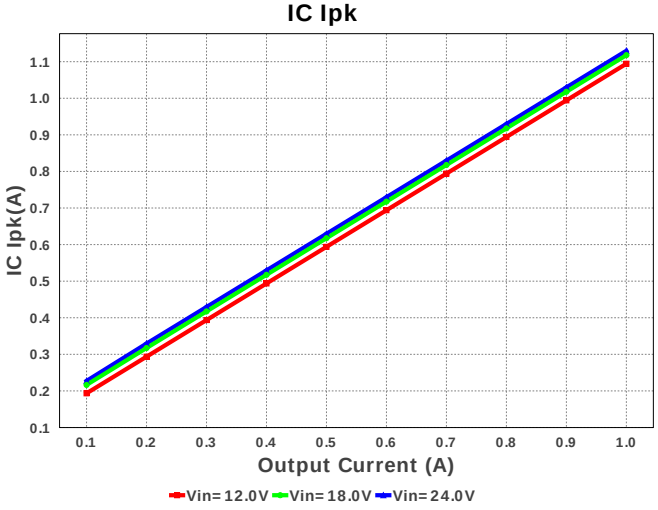
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	$0.01	0805 7 mm²
2.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 uF ESR= 2.8 mOhm VDC= 100.0 V IRMS= 9.8247 A	1	$0.19	1210 15 mm²
3.	Cinx	Taiyo Yuden	GMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 35.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
4.	Cout	Kemet	C1210C106K8PACTU Series= X5R	Cap= 10.0 uF ESR= 8.0 mOhm VDC= 10.0 V IRMS= 6.9 A	1	$0.18	1210 15 mm²
5.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.09	SMA 37 mm²
6.	L1	Bourns	SRN8040-330M	L= 33.0 µH DCR= 145.0 mOhm	1	$0.22	SRN8040 100 mm²

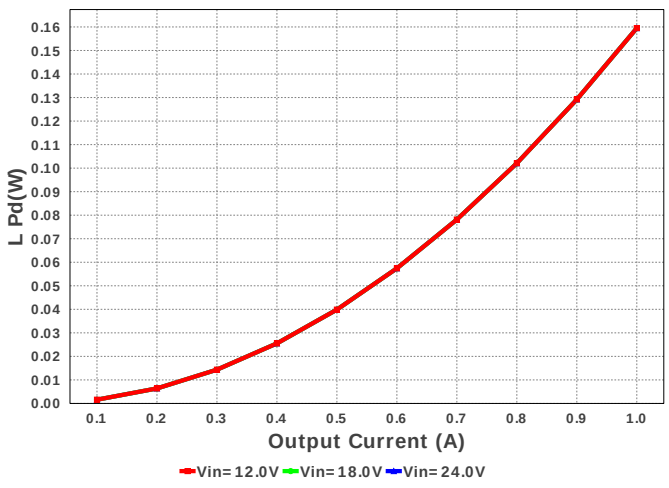
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Rfb1	Panasonic	ERJ-6ENF1001V Series= 225	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
8.	Rfb2	Panasonic	ERJ-6ENF2871V Series= 225	Res= 2.87 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
9.	U1	Texas Instruments	LM22675MRE-ADJ/NOPB	Switcher	1	$1.78	MRA08B 56 mm²

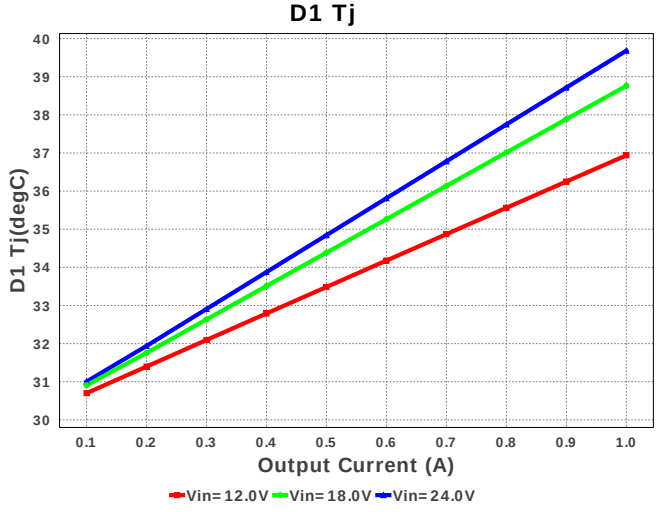


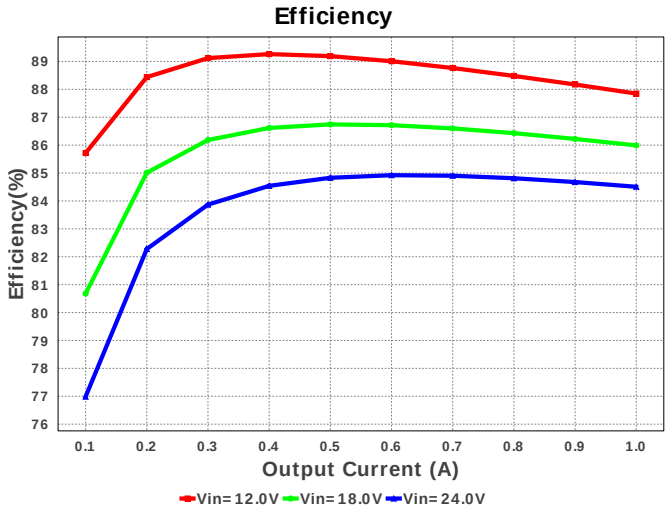


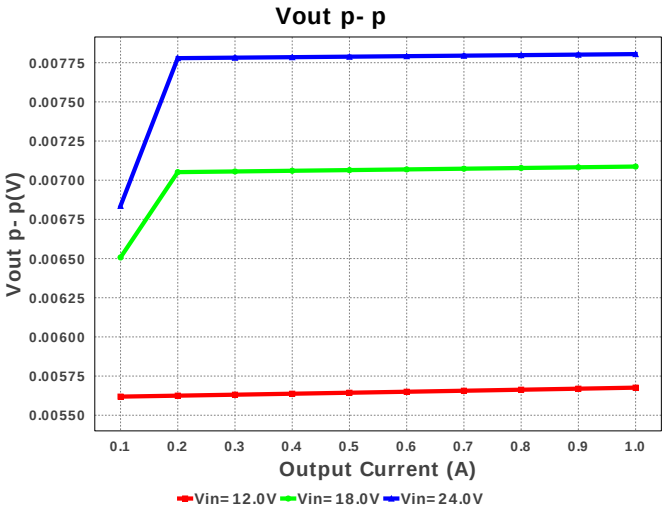


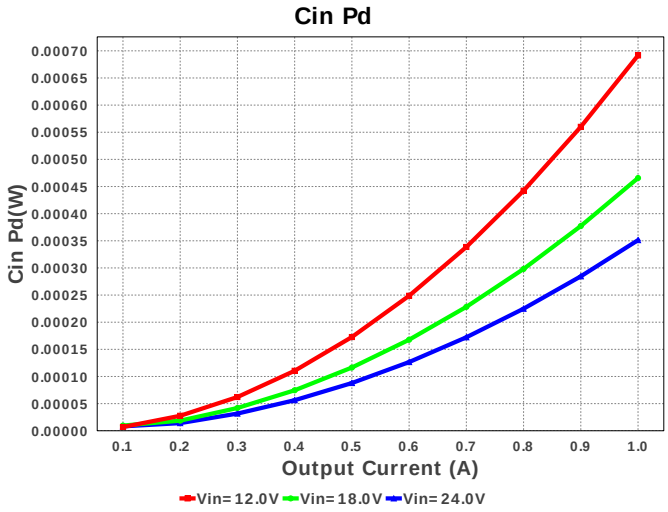


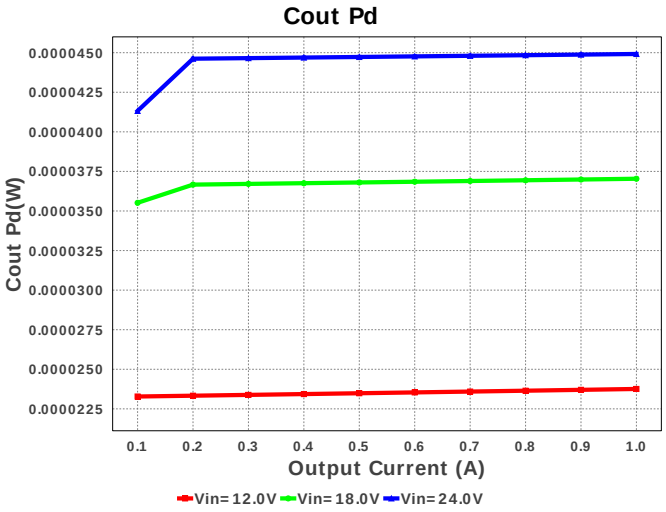


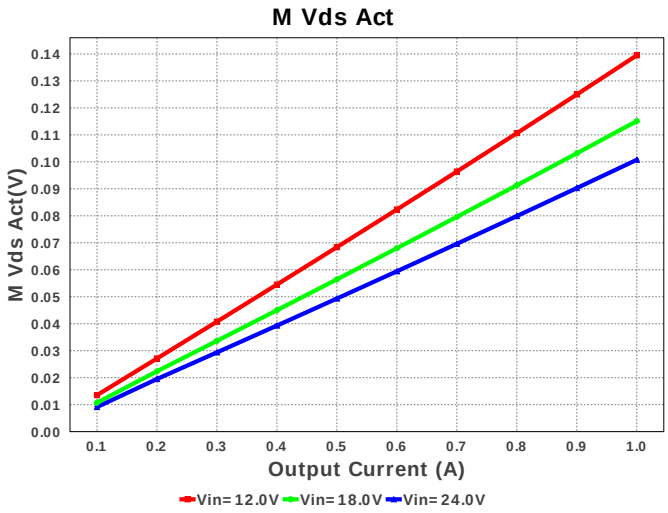


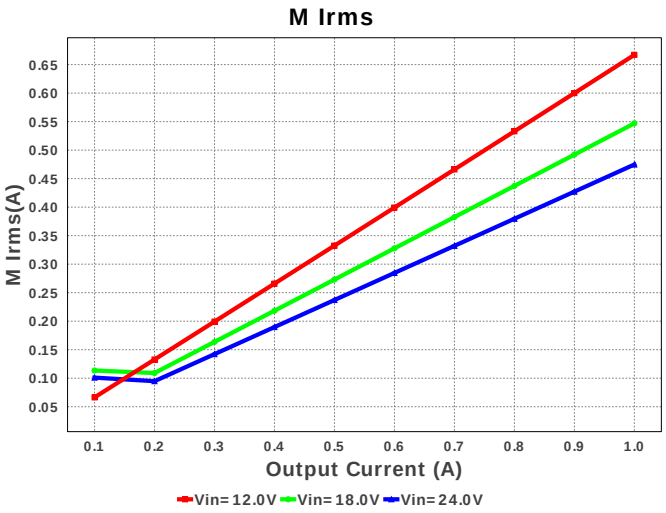


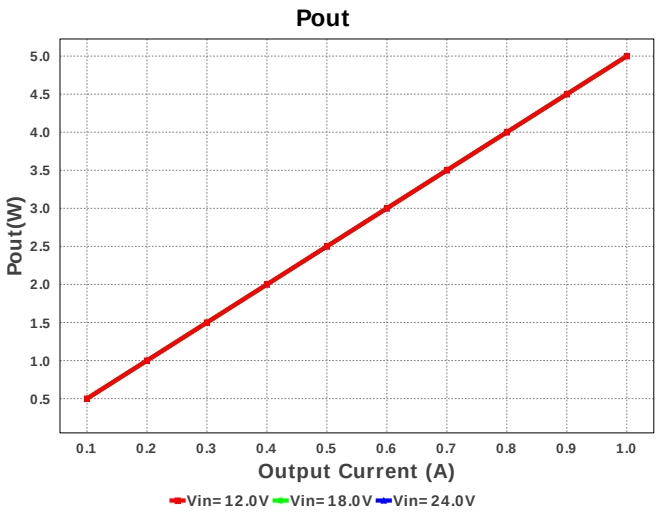


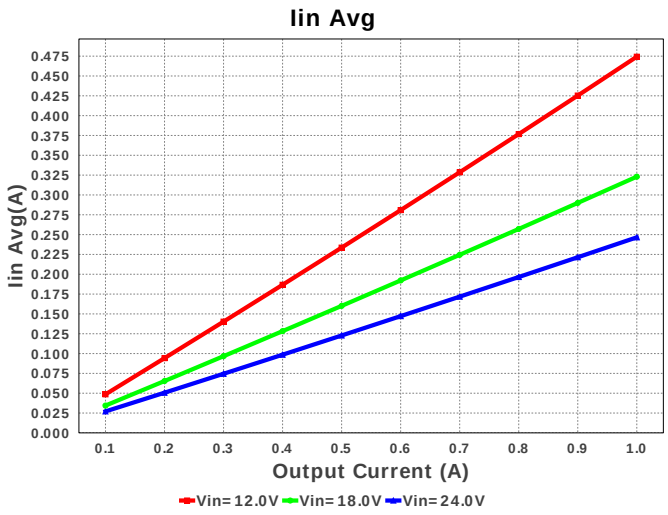


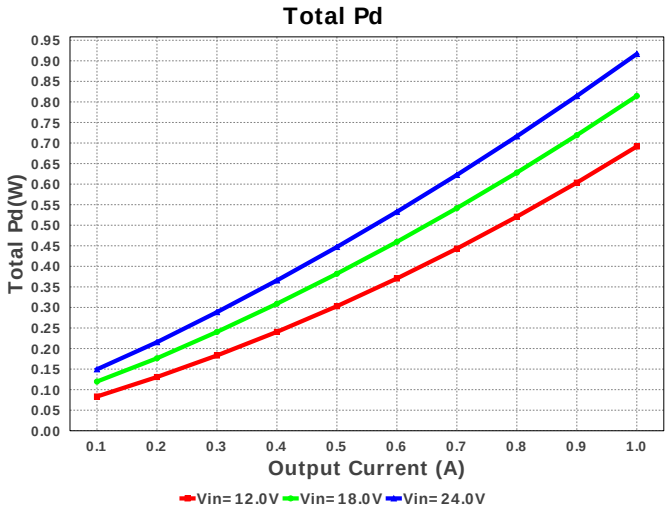


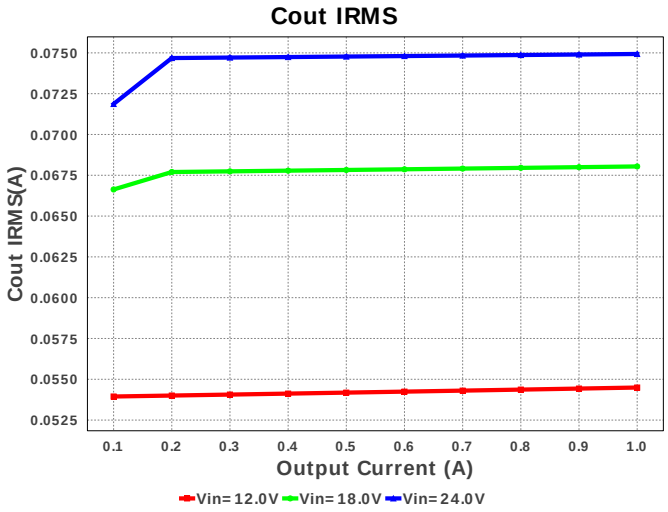


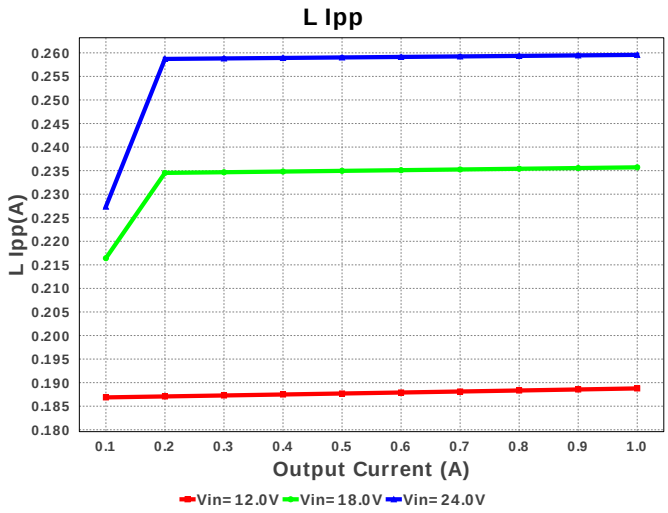


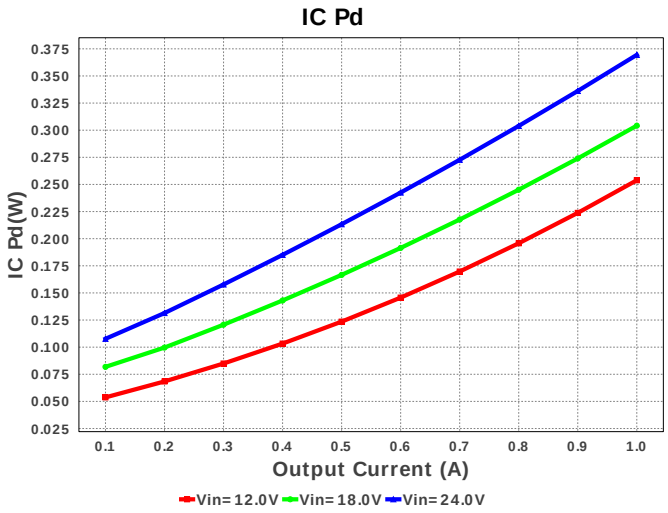


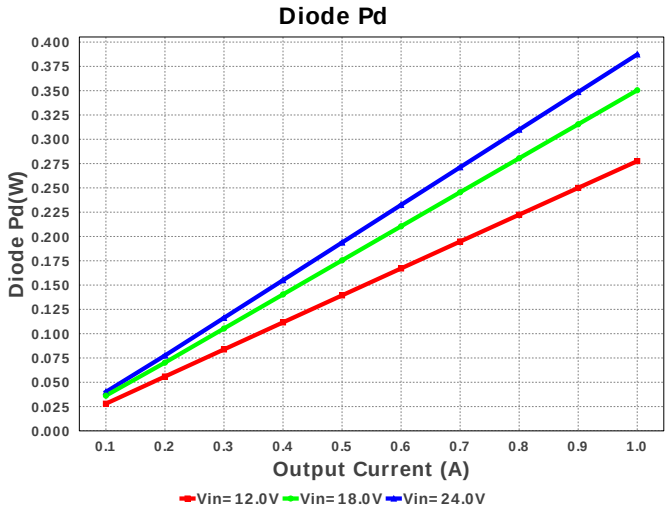












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	354.157 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	74.932 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.13 A	Current	Peak switch current in IC
4.	Iin Avg	246.53 mA	Current	Average input current
5.	L Ipp	259.57 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	474.781 mA	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	249.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	100.76 mV	General	Voltage drop across the MosFET
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	$2.54	General	Total BOM Cost
14.	D1 Tj	39.682 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	67.334 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	22.542 %	Op_point	Duty cycle
18.	Efficiency	84.508 %	Op_point	Steady state efficiency
19.	IC Tj	52.166 degC	Op_point	IC junction temperature
20.	ICThetaJA	60.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	1.0 A	Op_point	Iout operating point
22.	Phase Marg	42.749 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	24.0 V	Op_point	Vin operating point
24.	Vout p-p	7.805 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	351.197 µW	Power	Input capacitor power dissipation
26.	Cout Pd	44.918 µW	Power	Output capacitor power dissipation
27.	Diode Pd	387.292 mW	Power	Diode power dissipation
28.	IC Pd	369.439 mW	Power	IC power dissipation
29.	L Pd	159.5 mW	Power	Inductor power dissipation
30.	Total Pd	916.618 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	Iout1	1.0	Output Current #1
3.	VinMax	24.0	Maximum input voltage
4.	VinMin	12.0	Minimum input voltage
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	base_pn	LM22675	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. Part Description The LM22675 is a monolithic integrated circuit that provides all of the active functions for a step-down (buck) switching regulator capable of driving up to 1.0A 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. **LM22675** Product Folder : http://www.ti.com/product/lm22675 : contains the data sheet and other resources.