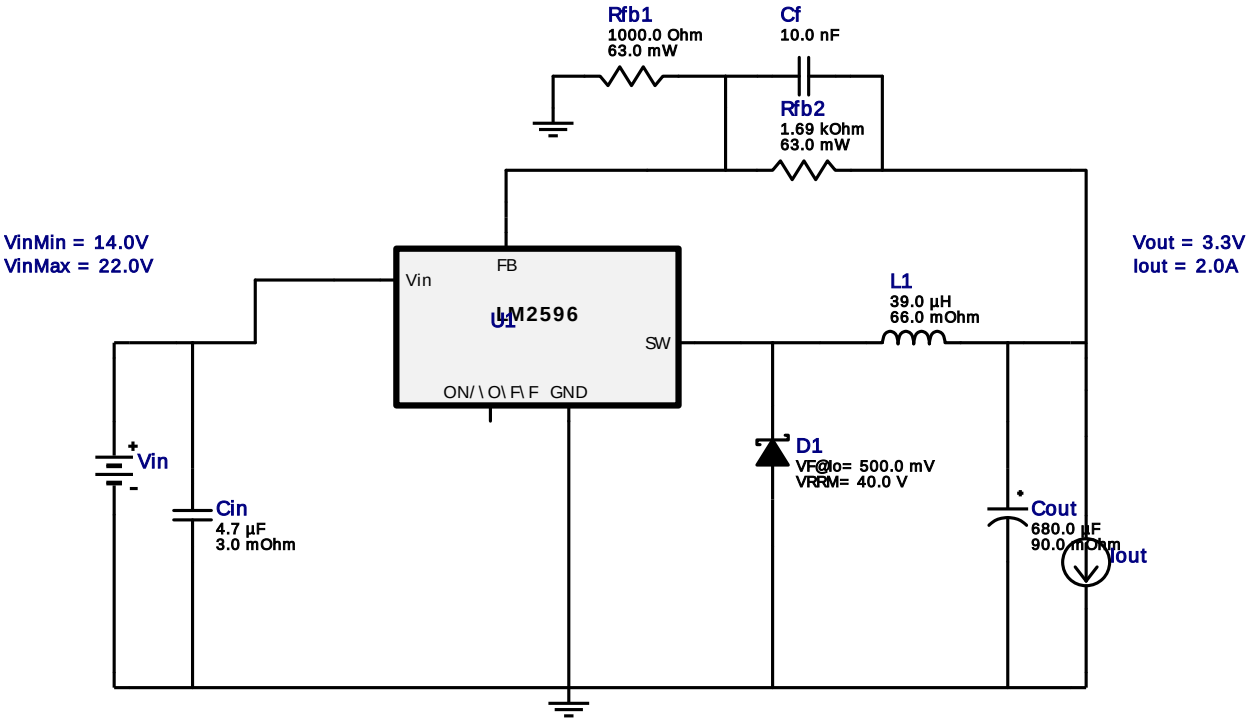
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = LM2596SX-ADJ/NOPB
Topology = Buck
Created = 3/5/15 11:54:41 PM
BOM Cost = $2.86
Footprint = 616.0 mm²
BOM Count = 8
Total Pd = 2.0W

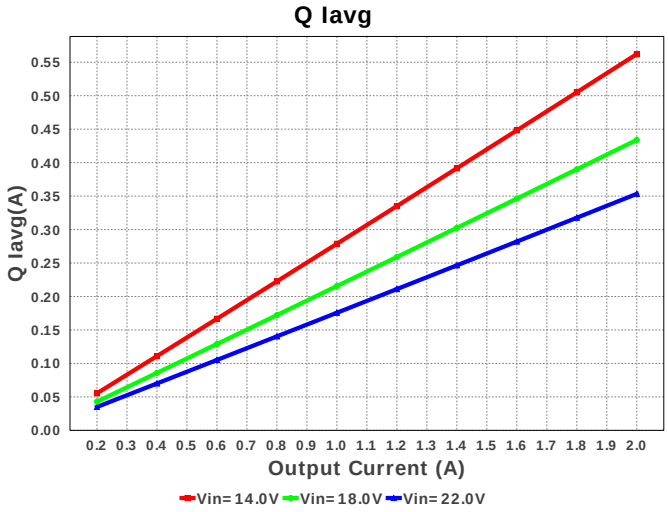
Design : 3839279/380 LM2596SX-ADJ/NOPB
LM2596SX-ADJ/NOPB 14.0V-22.0V to 3.30V @ 2.0A

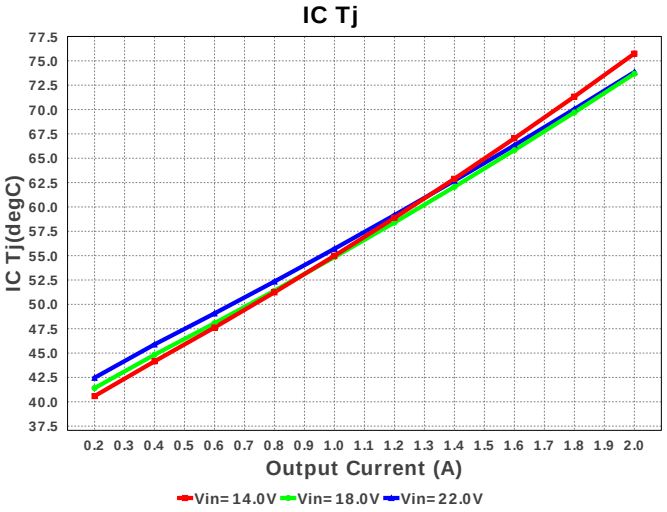


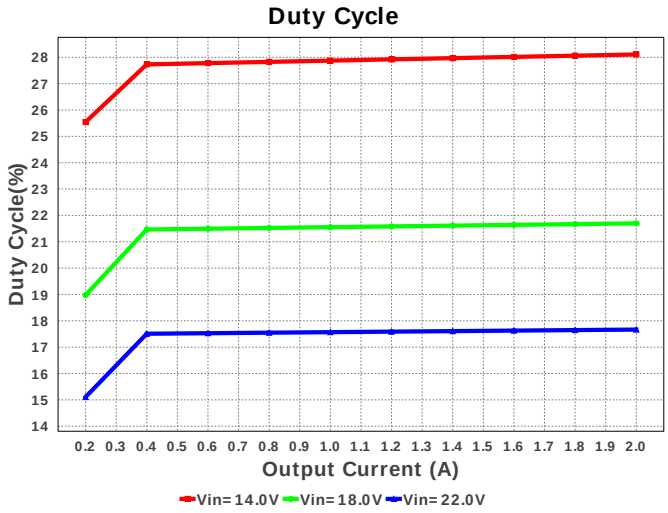
Electrical BOM

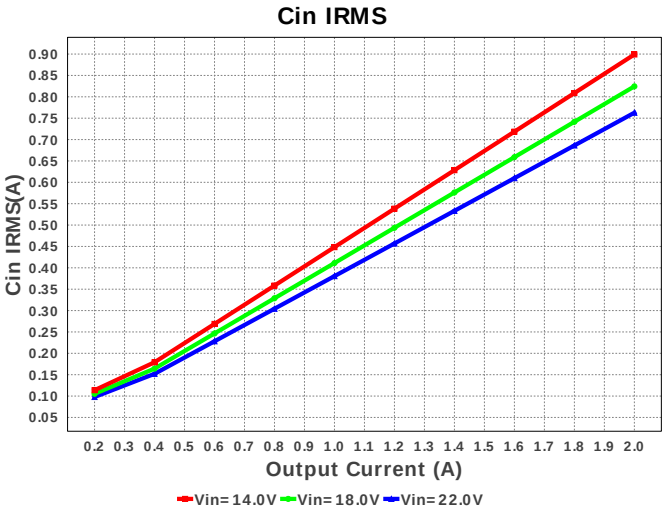
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cf	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.22	1206 11 mm²
3.	Cout	Nichicon	UUD1A681MNL1GS Series= uD	Cap= 680.0 uF ESR= 90.0 mOhm VDC= 10.0 V IRMS= 670.0 mA	1	$0.26	SM_RADIAL_10BMM 160 mm²
4.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
5.	L1	Bourns	SRR1210-390M	L= 39.0 µH DCR= 66.0 mOhm	1	$0.44	SRR1210 196 mm²
6.	Rfb1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

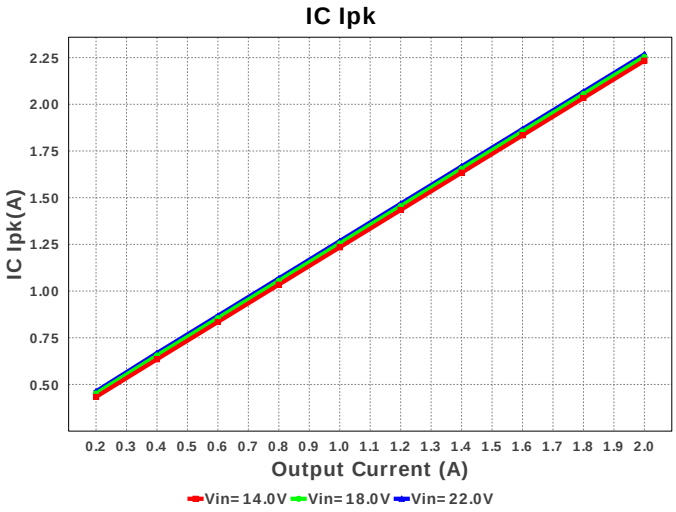
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Rfb2	Vishay-Dale	CRCW04021K69FKED Series= CRCW..e3	Res= 1.69 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
8.	U1	Texas Instruments	LM2596SX-ADJ/NOPB	Switcher	1	$1.80	TS5B 199 mm^2

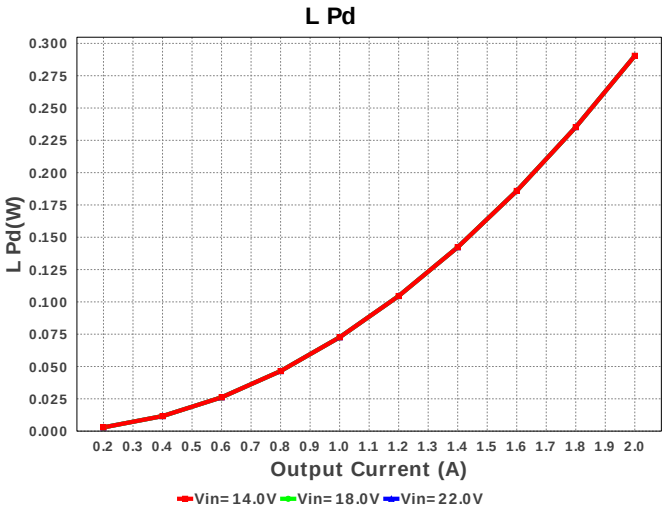




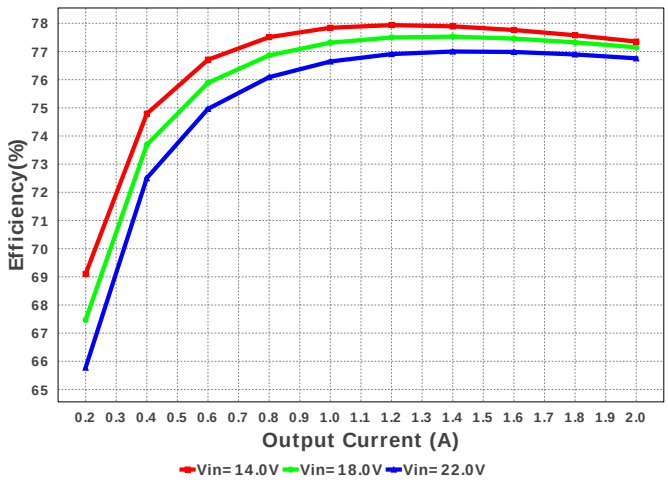




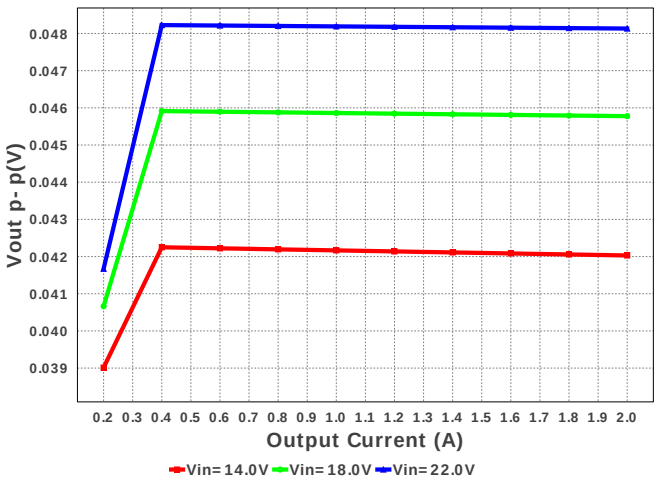




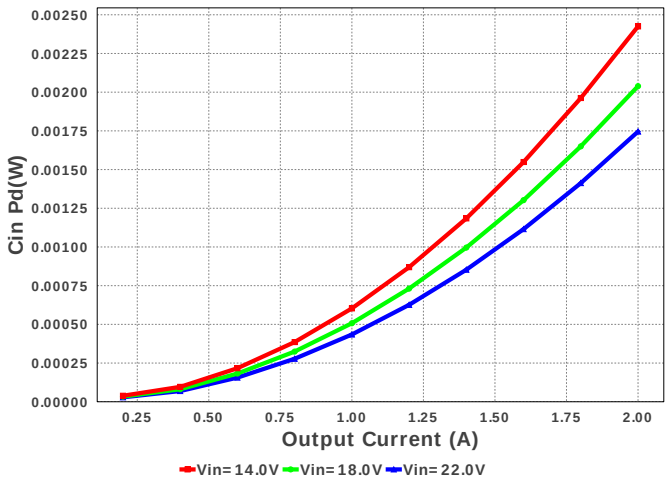
Efficiency



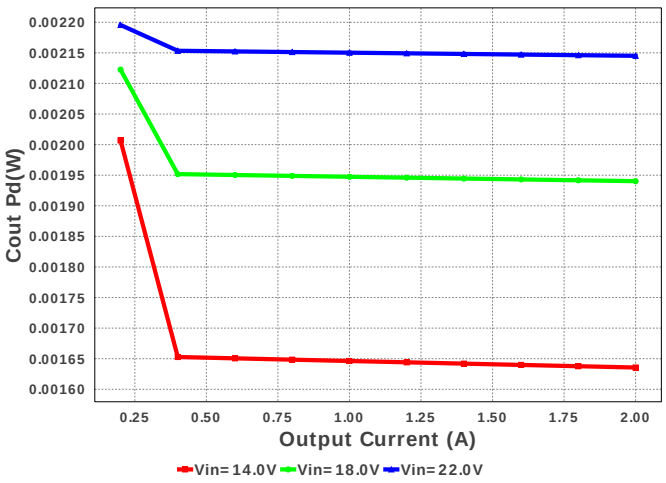
Vout p- p



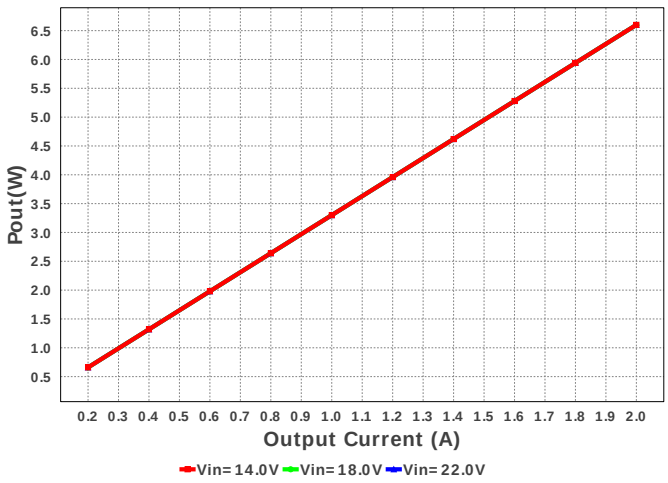
Cin Pd



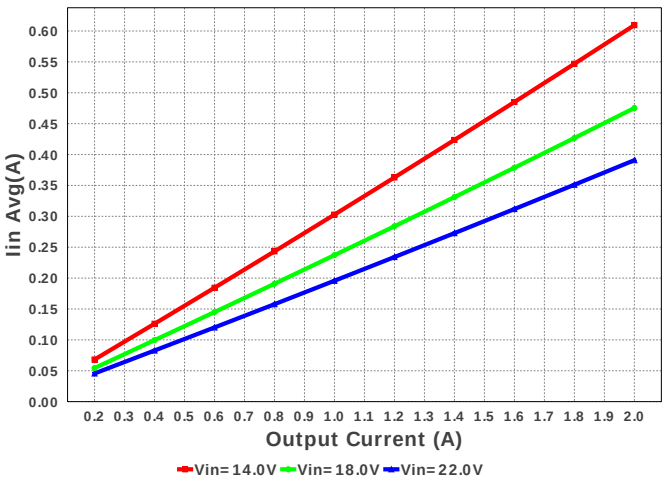
Cout Pd

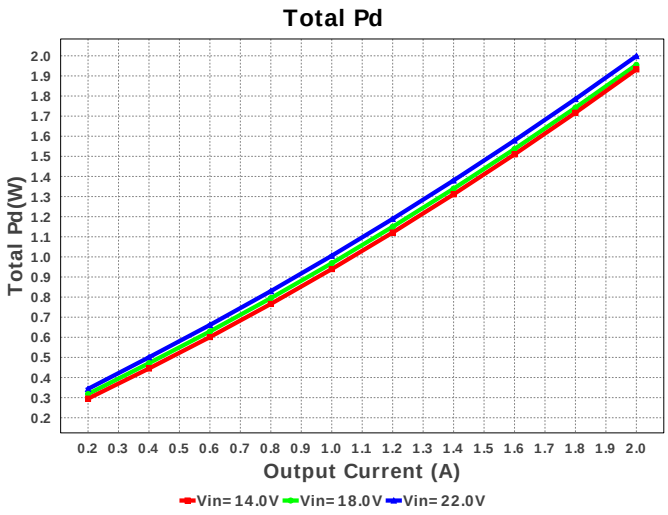


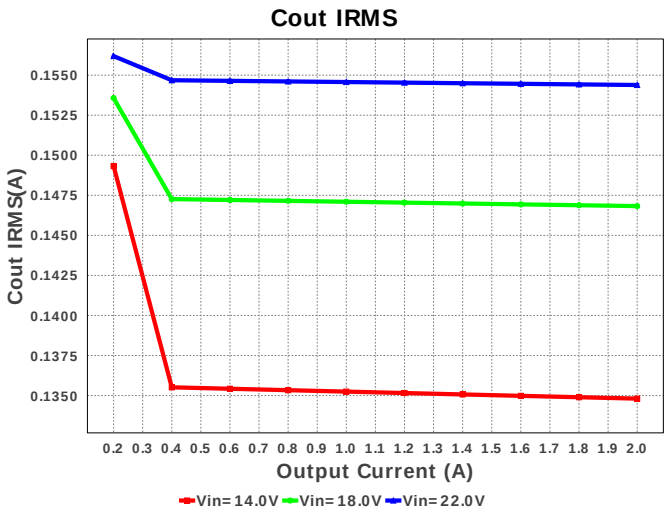
Pout

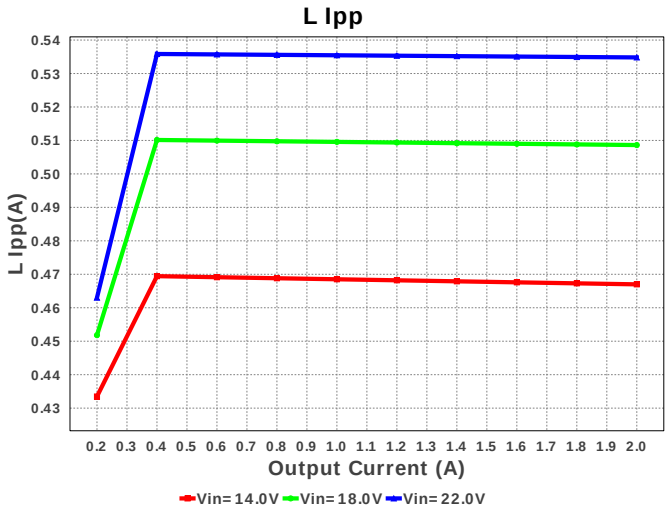


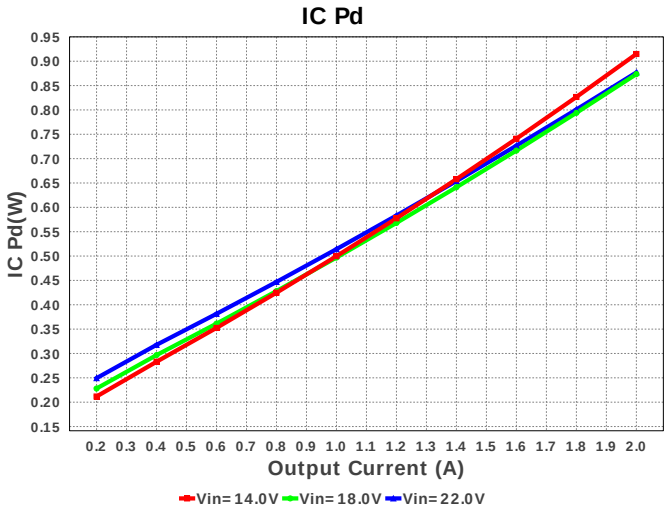
Iin Avg

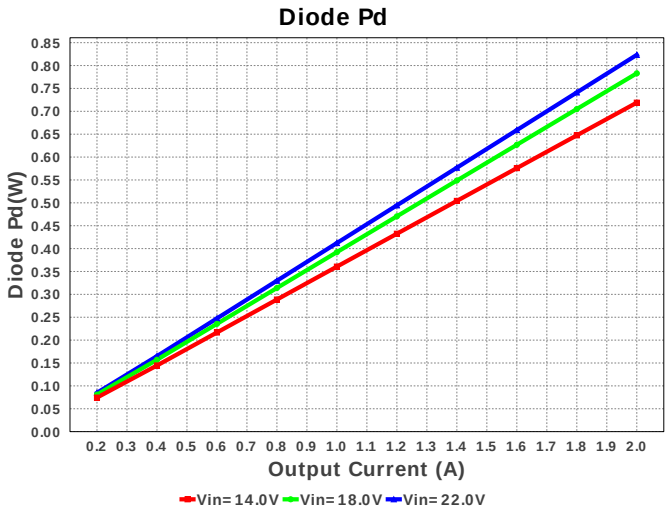


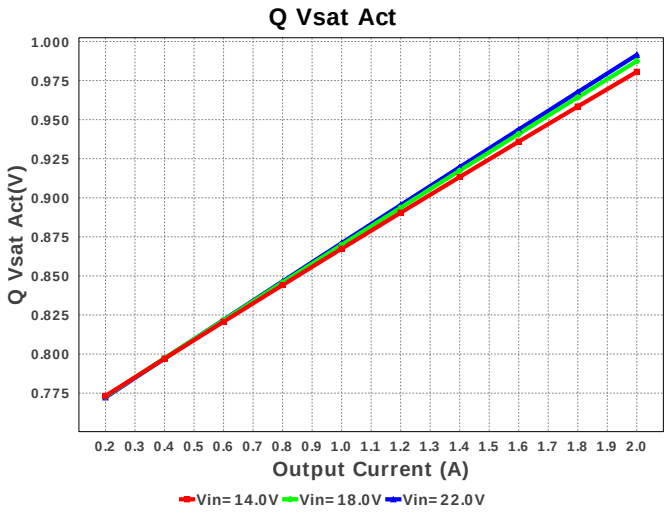












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	762.785 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	154.386 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.267 A	Current	Peak switch current in IC
4.	Iin Avg	390.84 mA	Current	Average input current
5.	L Ipp	534.81 mA	Current	Peak-to-peak inductor ripple current
6.	Q Iavg	353.348 mA	Current	MOSFET RMS current
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	616.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	150.0 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Pout	6.6 W	General	Total output power

#	Name	Value	Category	Description
12.	Q Vsat Act	991.436 mV	General	Q Vsat
13.	Total BOM	$2.86	General	Total BOM Cost
14.	Cross Freq	43.652 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	17.667 %	Op_point	Duty cycle
16.	Efficiency	76.757 %	Op_point	Steady state efficiency
17.	IC Tj	73.844 degC	Op_point	IC junction temperature
18.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	2.0 A	Op_point	Iout operating point
20.	Phase Marg	101.49 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	22.0 V	Op_point	Vin operating point
22.	Vout p-p	48.133 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	1.746 mW	Power	Input capacitor power dissipation
24.	Cout Pd	2.145 mW	Power	Output capacitor power dissipation
25.	Diode Pd	823.326 mW	Power	Diode power dissipation
26.	IC Pd	876.883 mW	Power	IC power dissipation
27.	L Pd	290.4 mW	Power	Inductor power dissipation
28.	Total Pd	1.999 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	22.0	Maximum input voltage
4.	VinMin	14.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	LM2596	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

Design Assistance

1. LM2596 Product Folder : http://www.ti.com/product/lm2596 : contains the data sheet and other resources.