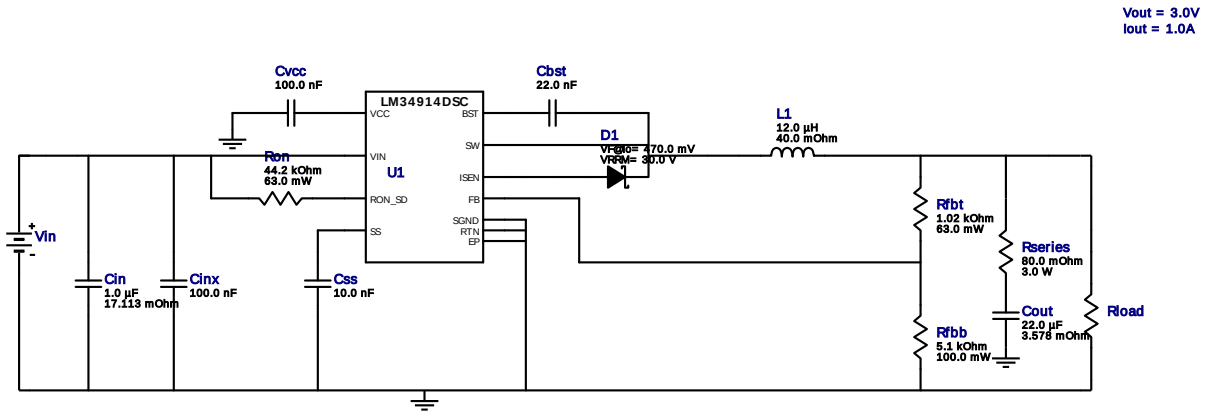
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 10.0V
VinMax = 19.0V
Vout = 3.0V
Iout = 1.0A

Device = LM34914SD/NOPB
Topology = Buck
Created = 7/19/16 5:59:45 AM
BOM Cost = $2.23
BOM Count = 13
Total Pd = 0.52W

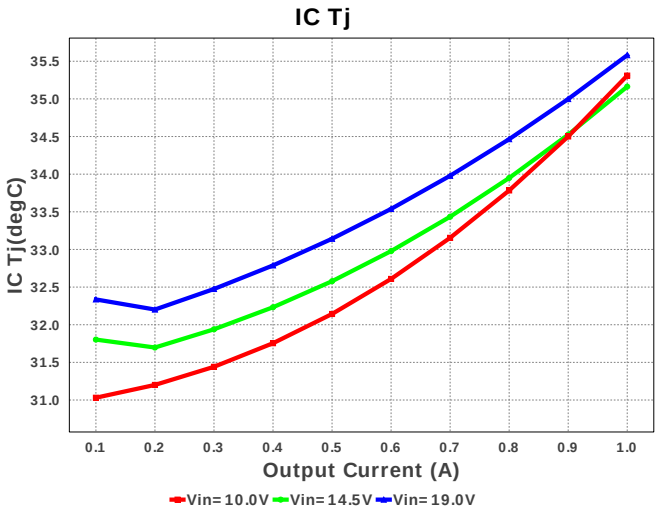
Design : 4728729/23 LM34914SD/NOPB
LM34914SD/NOPB 10.0V-19.0V to 3.00V @ 1.0A

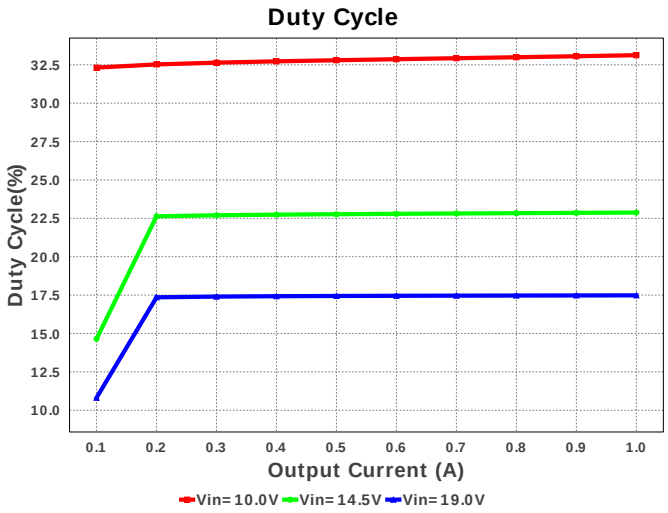


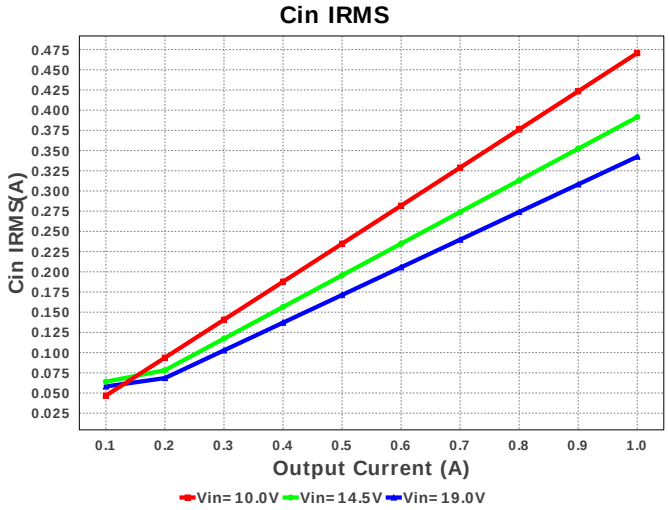
Electrical BOM

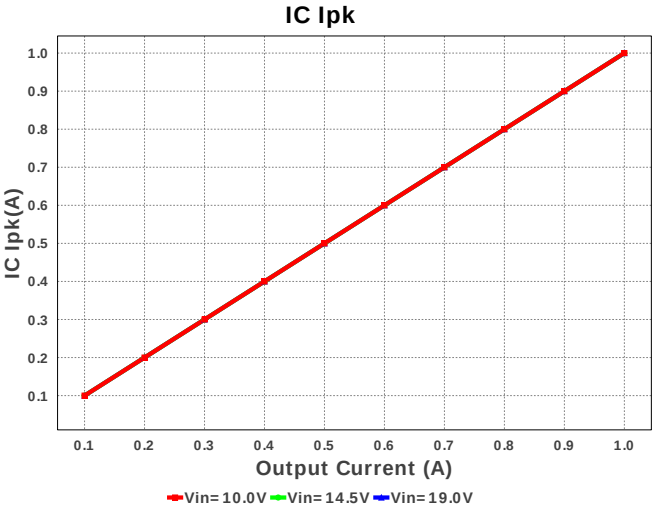
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	MuRata	GRM033C80J223KE01D Series= X6S	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
2.	Cin	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	$0.01	0603 5 mm²
3.	Cinx	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cout	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	1	$0.04	0805 7 mm²
5.	Css	MuRata	GRM155R61C103KA01D Series= X5R	Cap= 10.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
6.	Cvcc	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
7.	D1	ON Semiconductor	MBR130T1G	VF@Io= 470.0 mV VRRM= 30.0 V	1	$0.09	SOD-123 13 mm²
8.	L1	Coilcraft	MSS7341T-123MLB	L= 12.0 µH DCR= 40.0 mOhm	1	$0.50	MSS7341T 83 mm²
9.	Rfbb	Yageo America	RC0603FR-075K1L Series= ?	Res= 5.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
10.	Rfbt	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	Ron	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	Rseries	Bourns	CRA2512-FZ-R080ELF Series= ?	Res= 80.0 mOhm Power= 3.0 W Tolerance= 1.0%	1	$0.17	2512 43 mm²

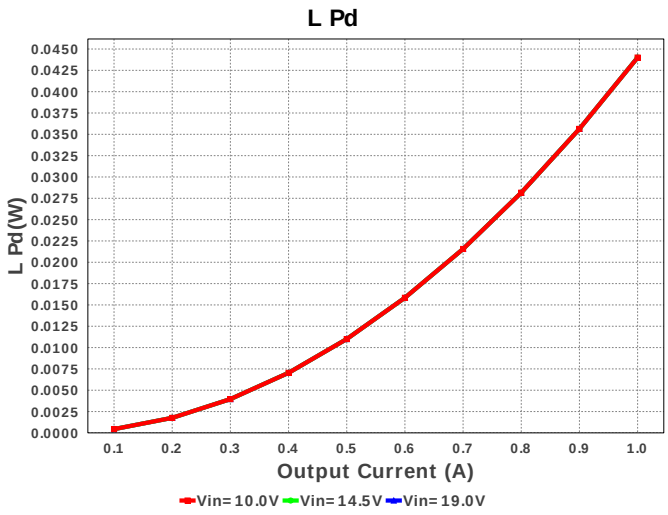
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	U1	Texas Instruments	LM34914SD/NOPB	Switcher	1	$1.35	DSC0010B 16 mm^2

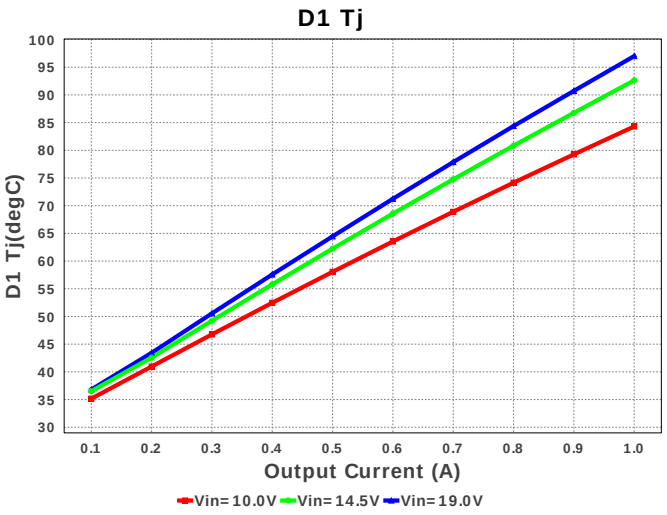


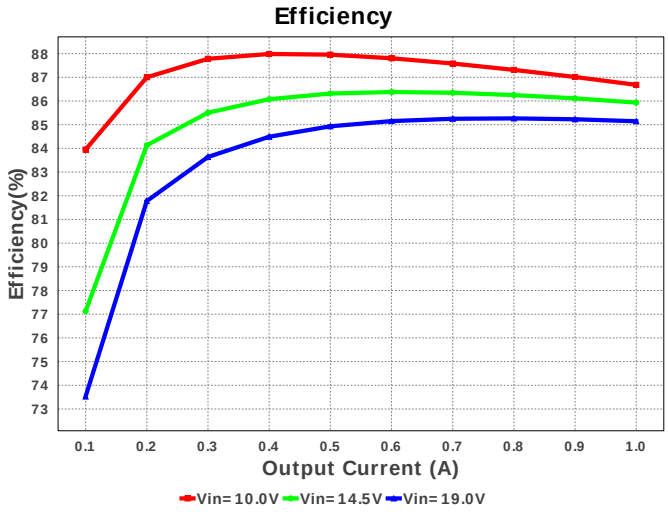


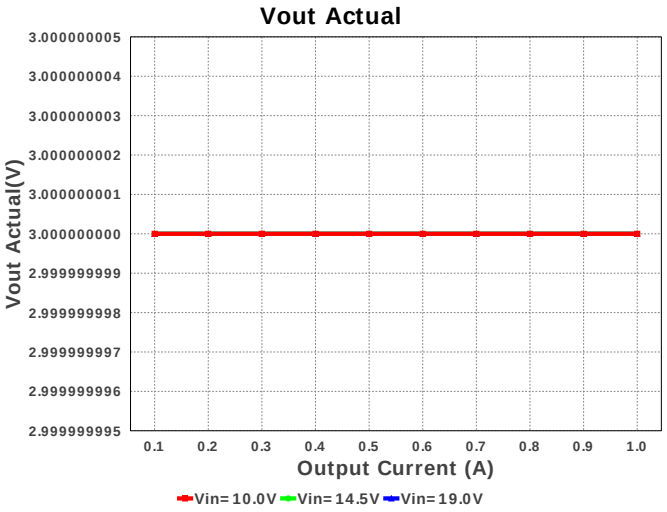


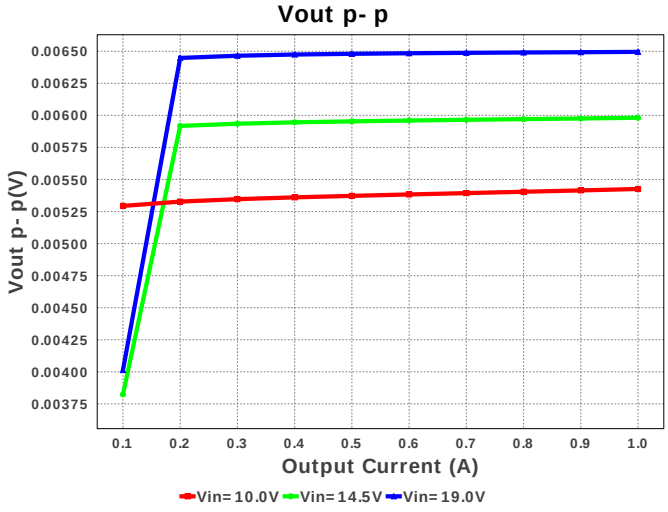


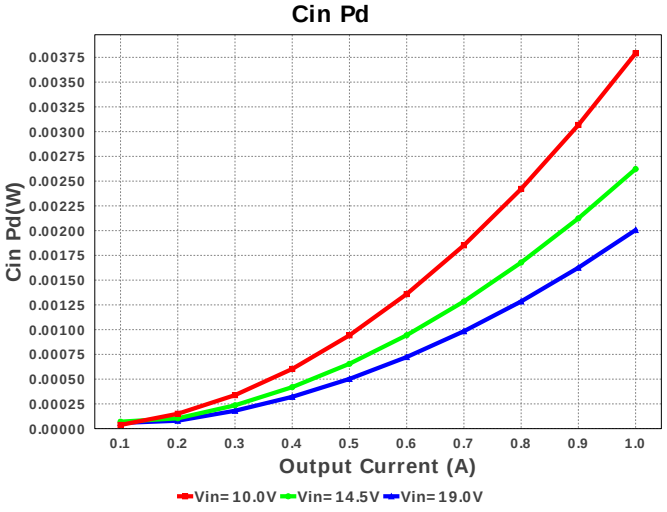


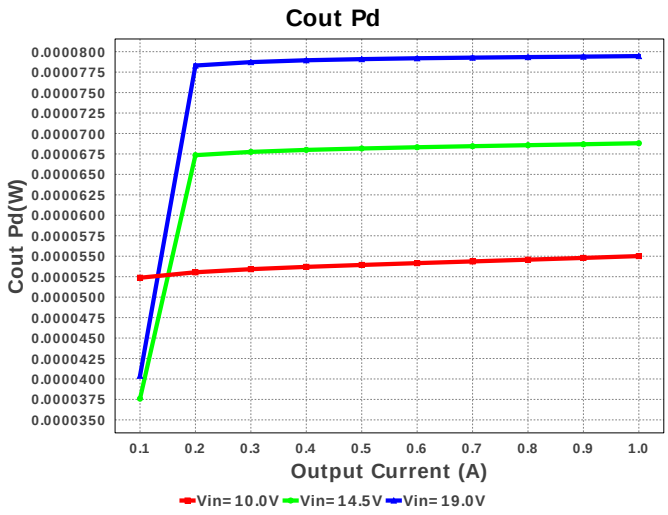


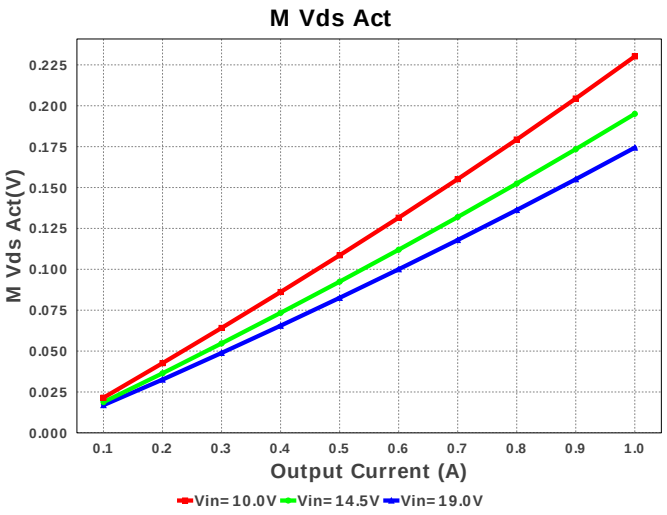


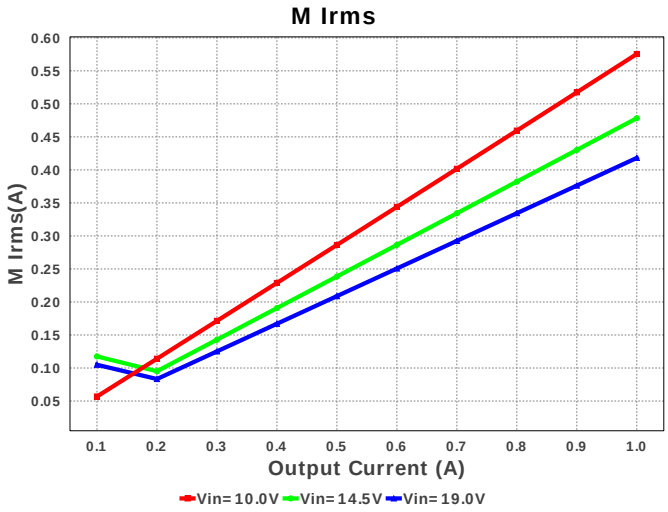


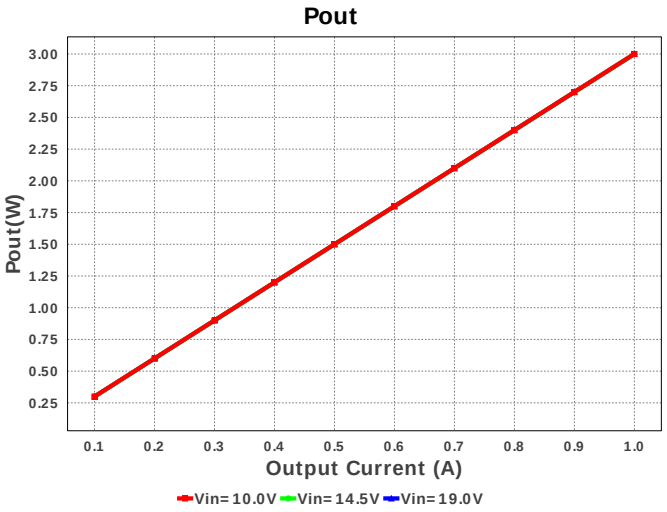


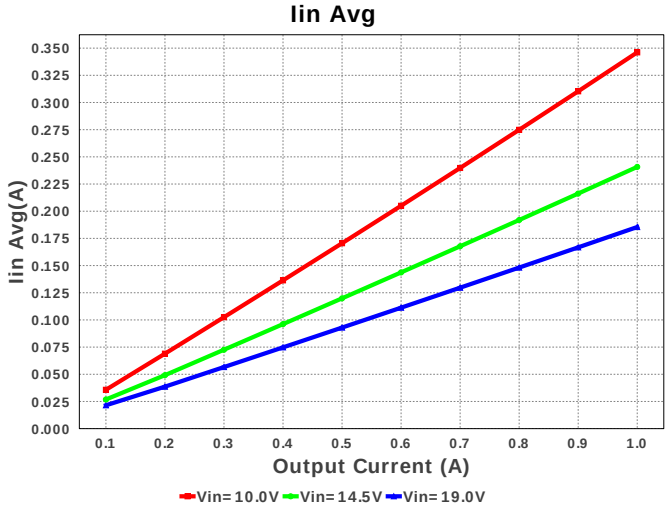


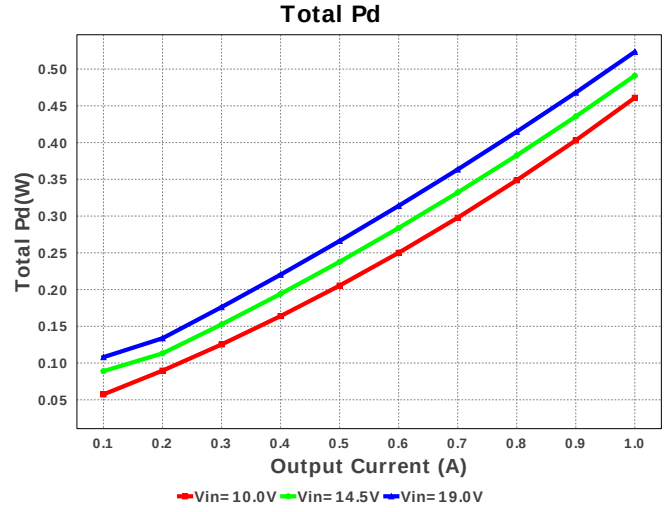


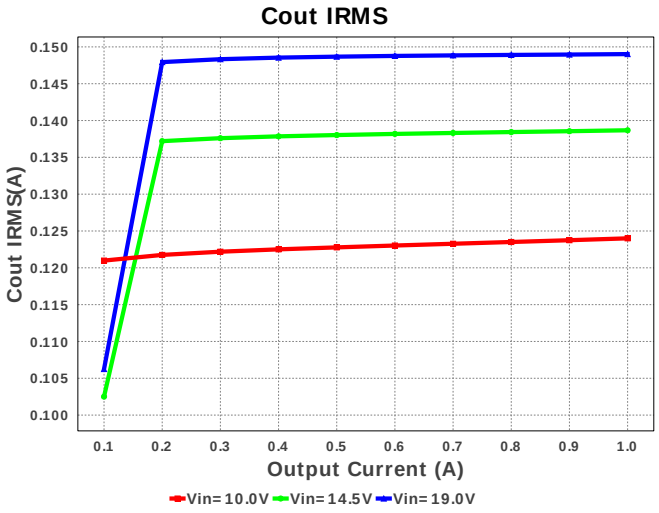


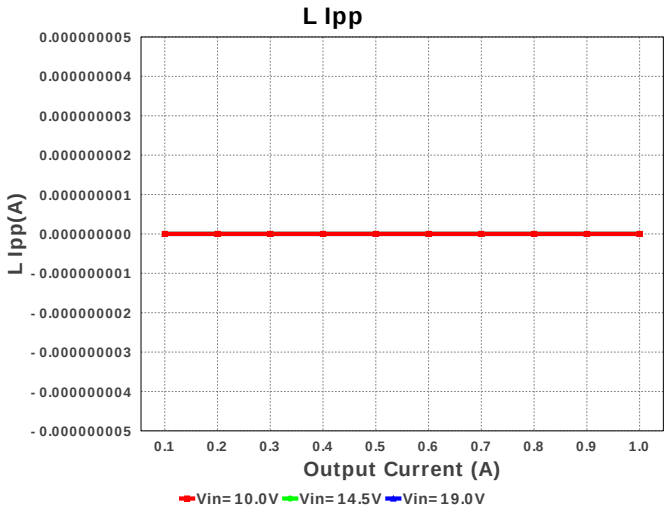


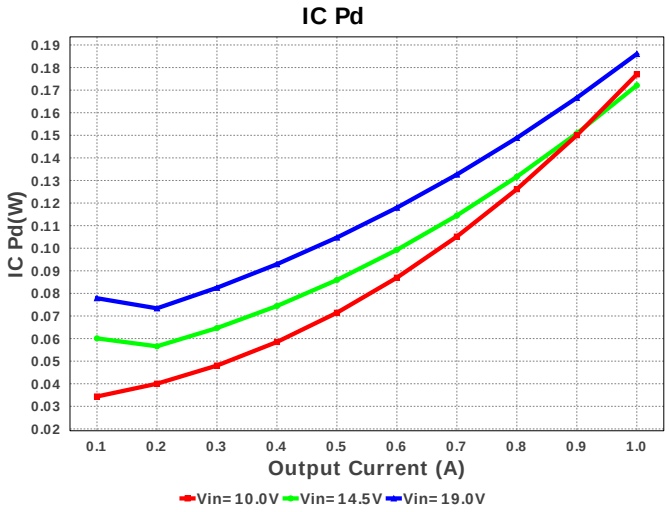


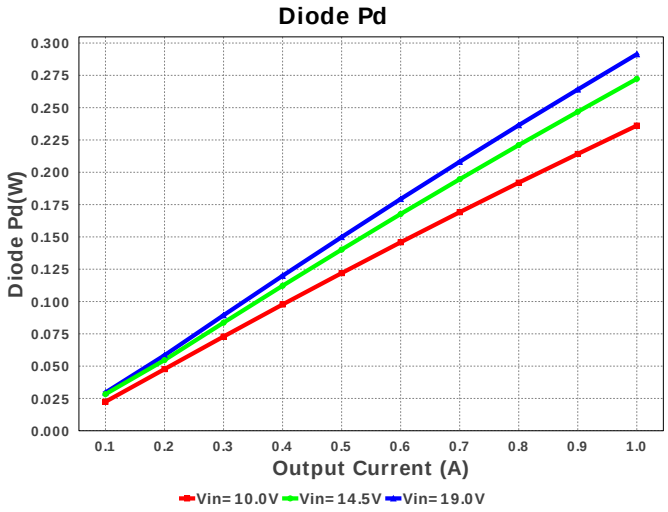












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	342.402 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	149.021 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.231 A	Current	Peak switch current in IC
4.	Iin Avg	185.44 mA	Current	Average input current
5.	L Ipp	461.52 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	418.131 mA	Current	MOSFET RMS current
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	196.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	451.57 kHz	General	Switching frequency
10.	IC Tolerance	5.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	174.403 mV	General	Voltage drop across the MosFET
12.	Pout	3.0 W	General	Total output power
13.	Total BOM	$2.23	General	Total BOM Cost
14.	D1 Tj	97.008 degC	Op_Point	D1 junction temperature
15.	Vout Actual	3.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	17.483 %	Op_point	Duty cycle
18.	Efficiency	85.144 %	Op_point	Steady state efficiency
19.	IC Tj	35.58 degC	Op_point	IC junction temperature
20.	ICThetaJA	30.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	1.0 A	Op_point	Iout operating point
22.	VIN_OP	19.0 V	Op_point	Vin operating point
23.	Vout p-p	43.417 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	2.006 mW	Power	Input capacitor power dissipation
25.	Cout Pd	79.457 µW	Power	Output capacitor power dissipation
26.	Diode Pd	291.34 mW	Power	Diode power dissipation
27.	IC Pd	186.008 mW	Power	IC power dissipation
28.	L Pd	44.0 mW	Power	Inductor power dissipation
29.	Total Pd	523.43 mW	Power	Total Power Dissipation
30.	Vout Tolerance	537.374 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	19.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	base_pn	LM34914	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. For a Constant On Time device to be stable, we need to provide a ripple at the feedback comparator. There are various methods to implement the ripple. Depending on the circuit complexity vs. the allowable ripple, we have three options to choose from. The simplest option, 'Low Complexity', would require only a high ESR cap at the output. This means that the BOM count will be small, but the output voltage ripple will be quite large. The 'Optimal Solution' would require a feed-forward cap in parallel with the upper feedback resistor to AC couple the ripple to the feedback node. This increases the BOM count slightly, but now we have more control over the output voltage ripple. If the output voltage requirement is very tight, then the best option is to go for the 'Low Output Ripple' solution. In this option we can go with very low ESR output caps and have very good control over the output voltage ripple.

2. LM34914 Product Folder : http://www.ti.com/product/LM34914 : contains the data sheet and other resources.