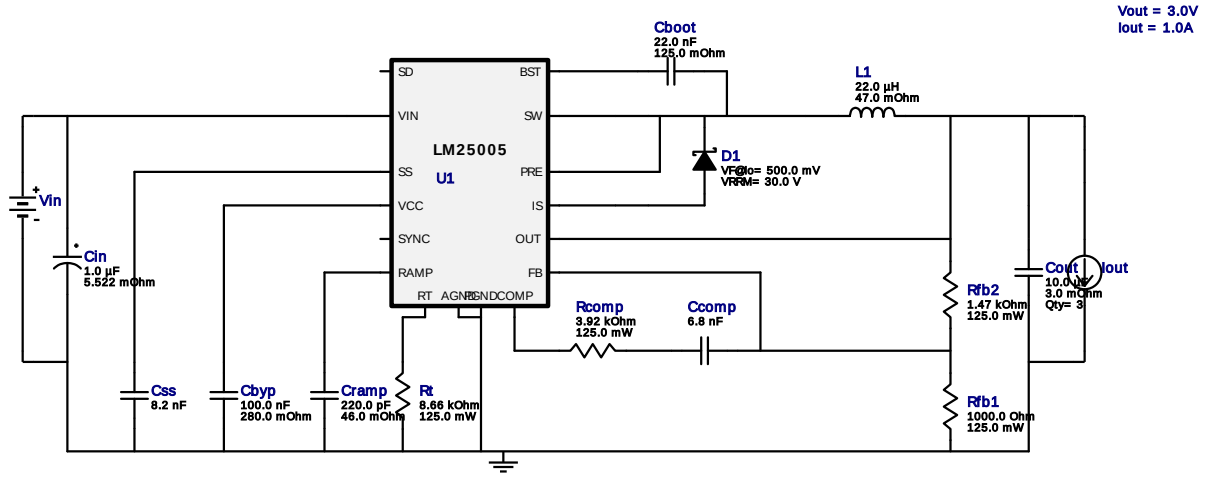
WEBENCH® Design Report

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

Device = LM25005MHX/NOPB
Topology = Buck
Created = 7/19/16 6:07:11 AM
BOM Cost = $2.04
BOM Count = 16
Total Pd = 0.58W

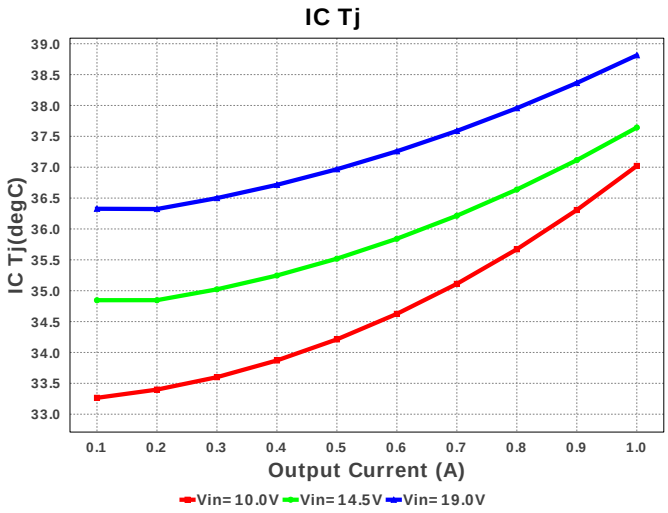
Design : 4728729/34 LM25005MHX/NOPB
LM25005MHX/NOPB 10.0V-19.0V to 3.00V @ 1.0A

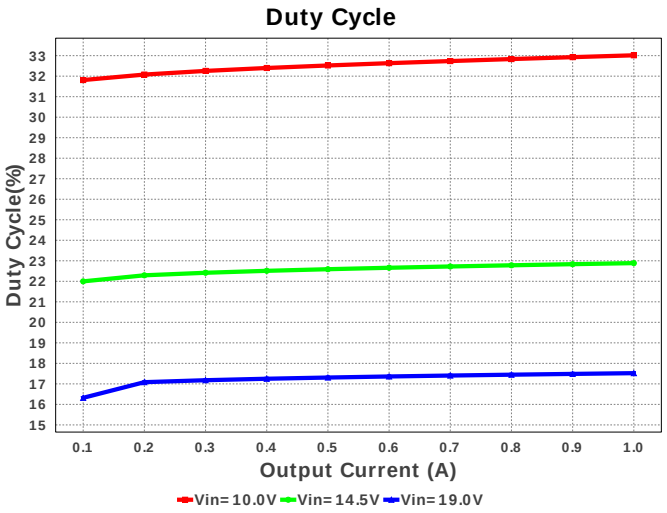


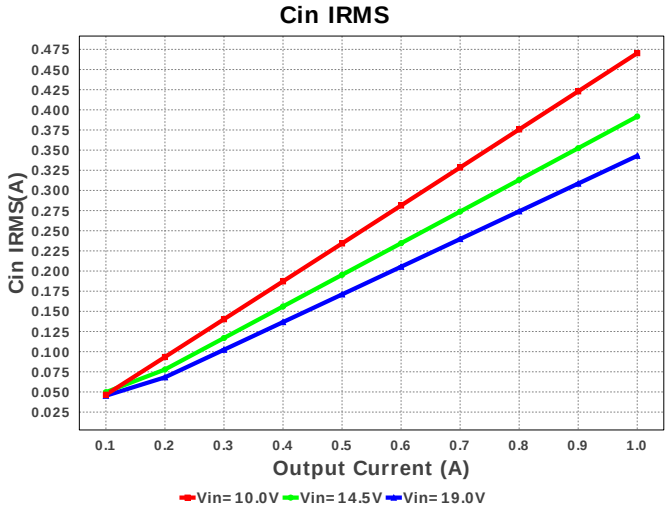
Electrical BOM

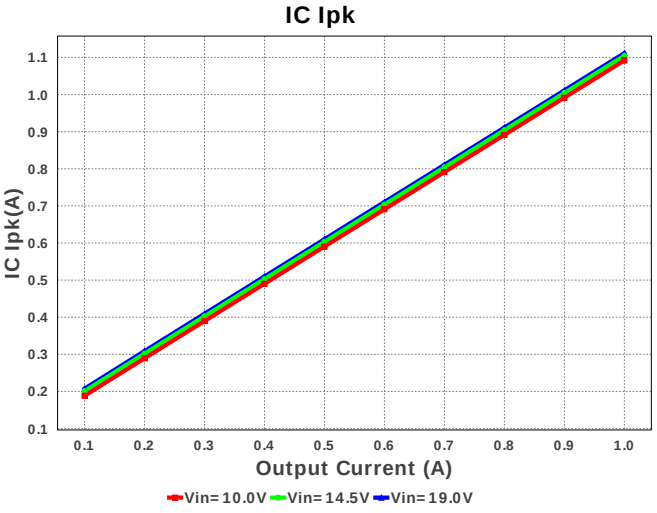
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C223K5RACTU Series= X7R	Cap= 22.0 nF ESR= 125.0 mOhm VDC= 50.0 V IRMS= 645.0 mA	1	$0.01	0805 7 mm²
2.	Cbyp	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp	MuRata	GRM155R71E682KA01D Series= X7R	Cap= 6.8 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
4.	Cin	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	$0.05	0603 5 mm²
5.	Cout	MuRata	GRM188R60G106ME47D Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 4.0 V IRMS= 3.0 A	3	$0.02	0603 5 mm²
6.	Cramp	Kemet	C0805C221J5GACTU Series= C0G/NP0	Cap= 220.0 pF ESR= 46.0 mOhm VDC= 50.0 V IRMS= 888.0 mA	1	$0.01	0805 7 mm²
7.	Css	MuRata	GRM155R71E822KA01D Series= X7R	Cap= 8.2 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
8.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	$0.09	SMA 37 mm²
9.	L1	Bourns	SDR1307-220ML	L= 22.0 µH DCR= 47.0 mOhm	1	$0.35	SDR1307 227 mm²

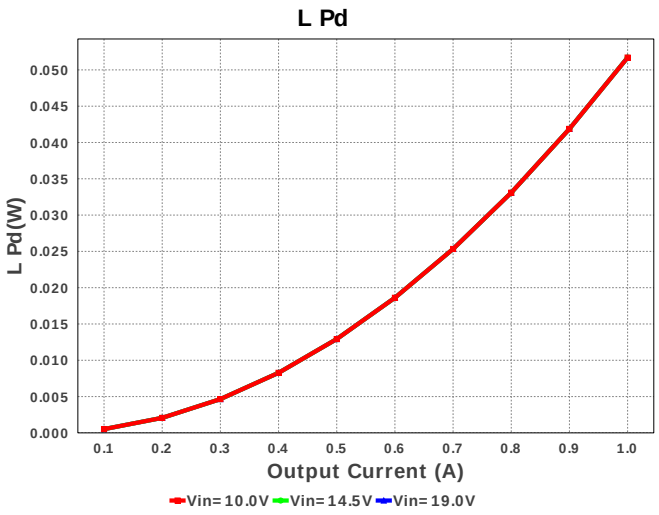
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rcomp	Panasonic	ERJ-6ENF3921V Series= ERJ-6E	Res= 3.92 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
11.	Rfb1	Panasonic	ERJ-6ENF1001V Series= ERJ-6E	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
12.	Rfb2	Panasonic	ERJ-6ENF1471V Series= ERJ-6E	Res= 1.47 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
13.	Rt	Panasonic	ERJ-6ENF8661V Series= ERJ-6E	Res= 8.66 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm^2
14.	U1	Texas Instruments	LM25005MHX/NOPB	Switcher	1	$1.40	 MXA20A 71 mm^2

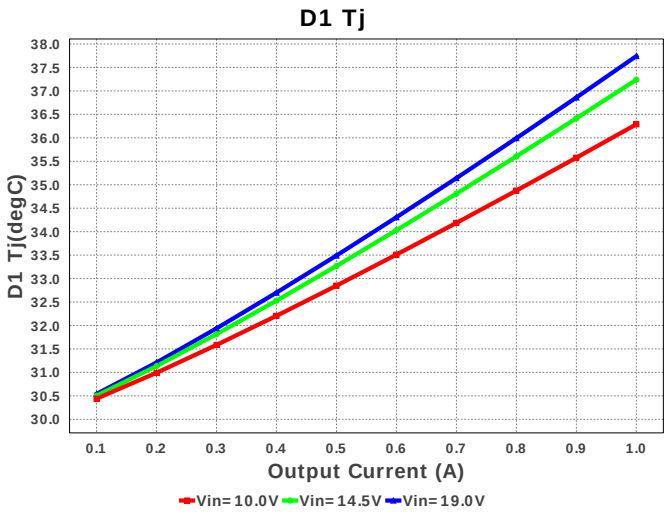


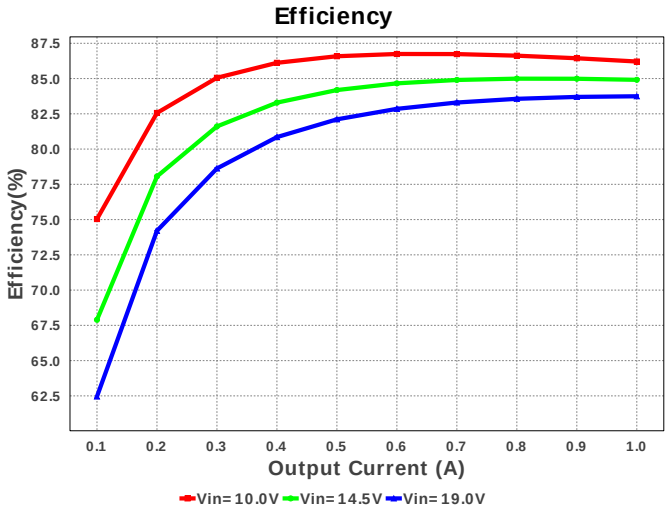


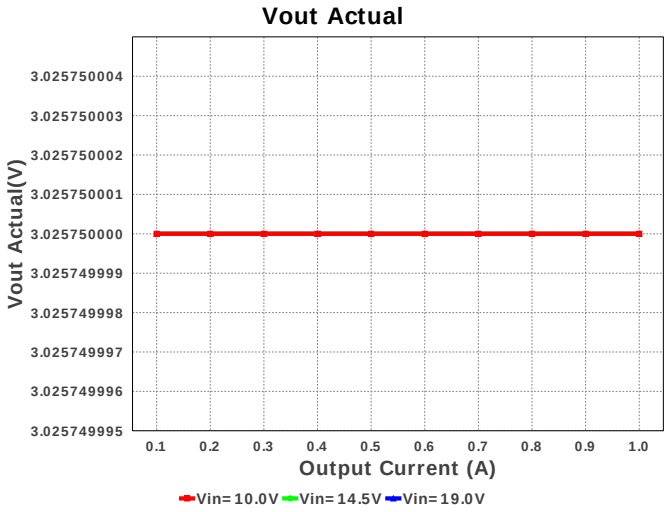


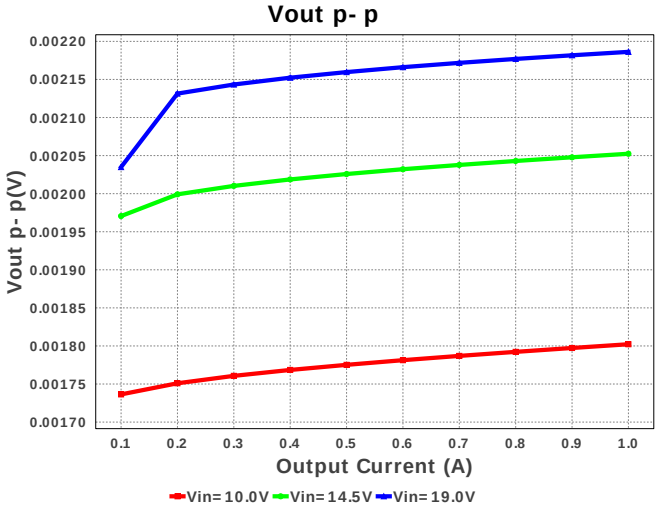


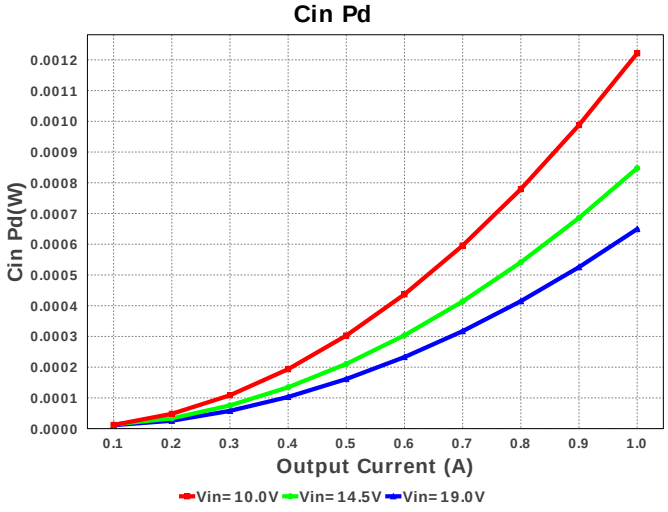


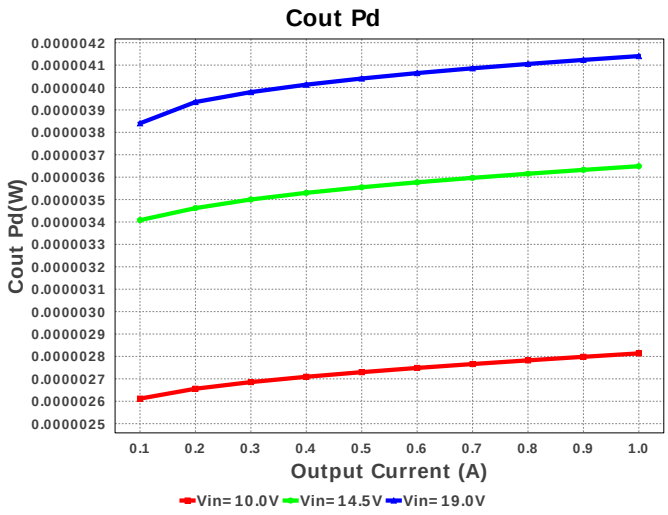


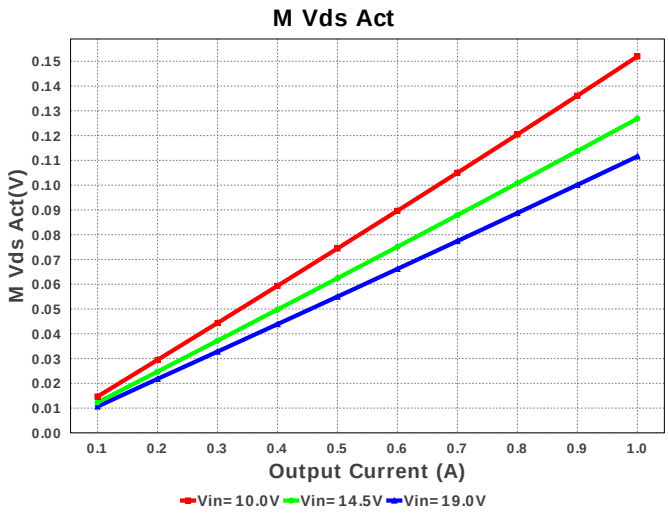


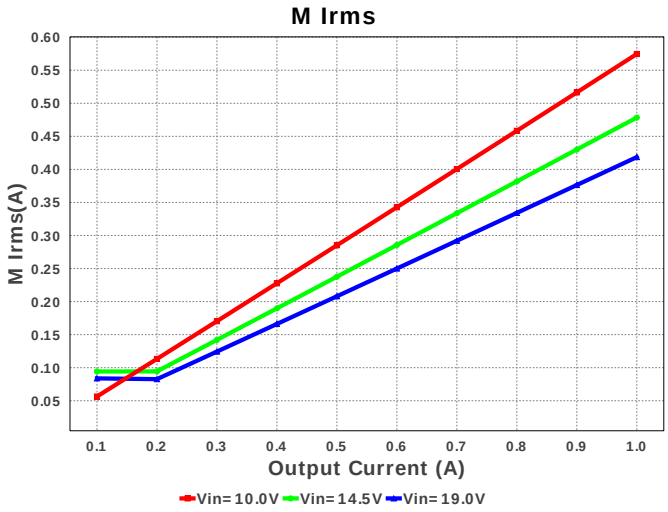


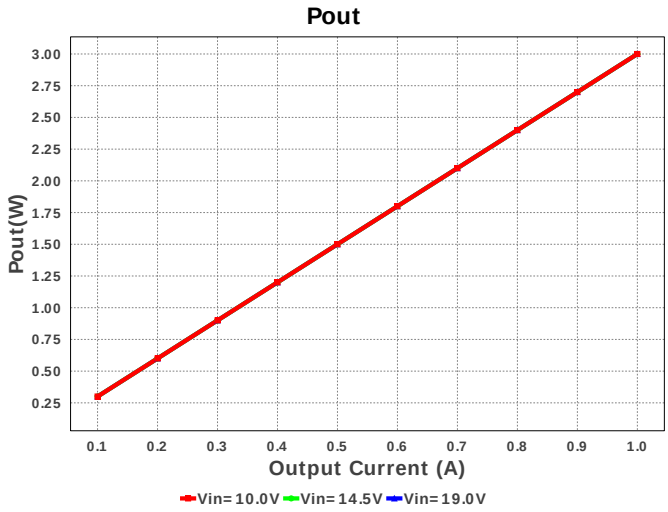


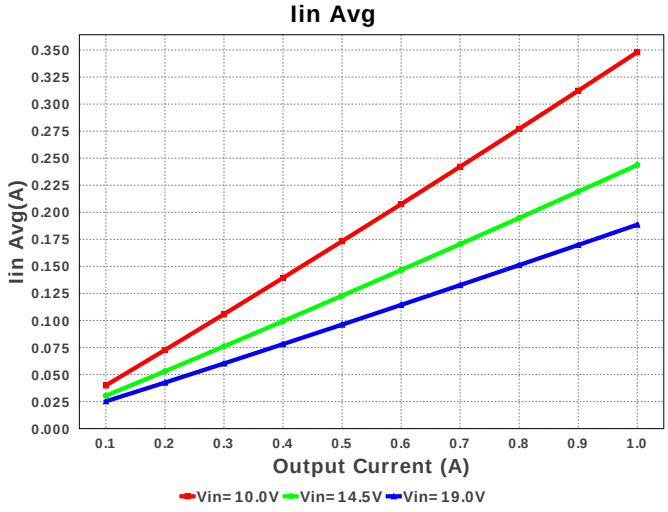


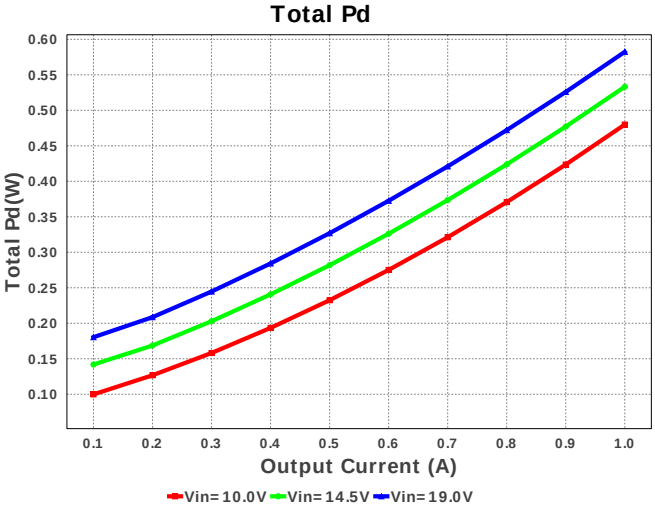


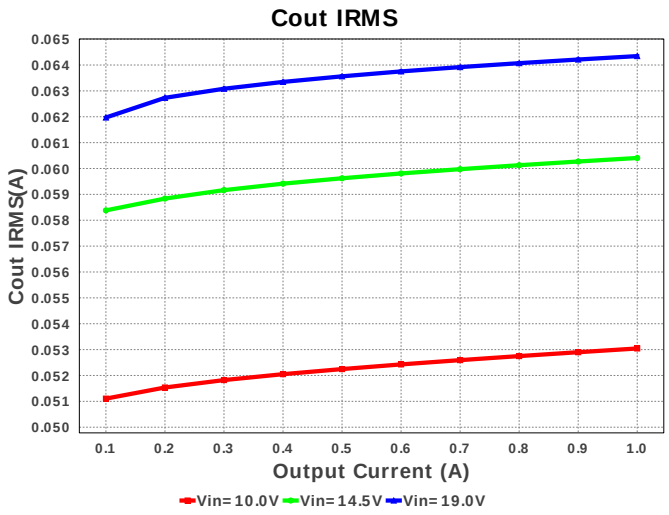


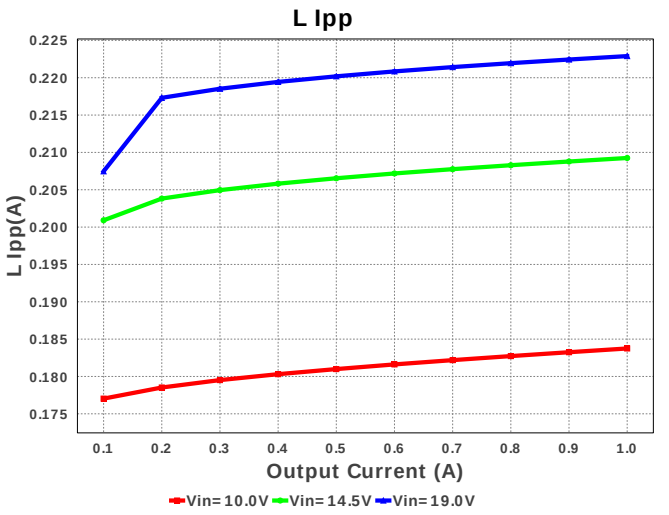


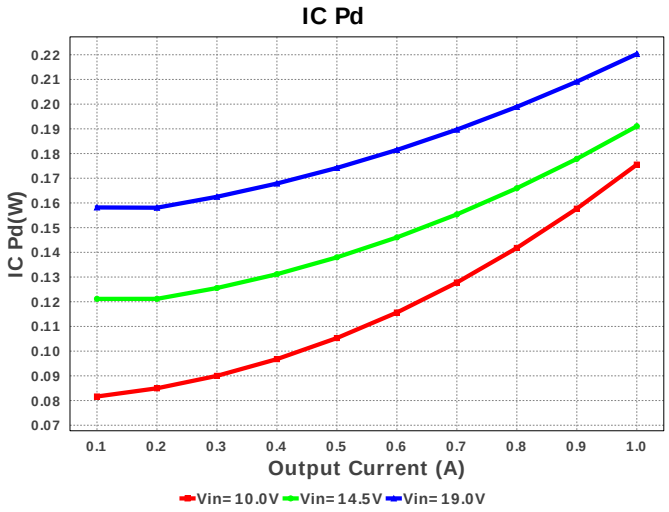


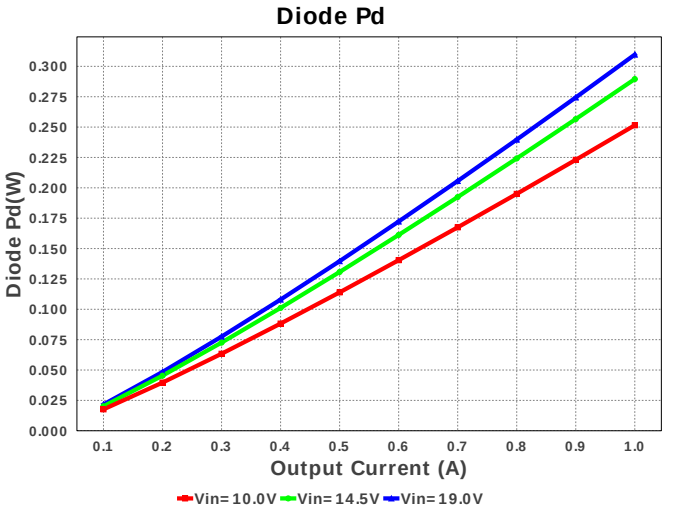












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	342.925 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	64.345 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.111 A	Current	Peak switch current in IC
4.	Iin Avg	188.54 mA	Current	Average input current
5.	L Ipp	222.9 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	418.596 mA	Current	MOSFET RMS current
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	407.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	571.723 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	111.587 mV	General	Voltage drop across the MosFET
12.	Pout	3.0 W	General	Total output power
13.	Total BOM	$2.04	General	Total BOM Cost
14.	D1 Tj	37.742 degC	Op_Point	D1 junction temperature
15.	Vout Actual	3.026 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	17.522 %	Op_point	Duty cycle
18.	Efficiency	83.744 %	Op_point	Steady state efficiency
19.	IC Tj	38.812 degC	Op_point	IC junction temperature
20.	ICThetaJA	40.0 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	2.186 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	649.373 µW	Power	Input capacitor power dissipation
25.	Cout Pd	4.14 µW	Power	Output capacitor power dissipation
26.	Diode Pd	309.679 mW	Power	Diode power dissipation
27.	IC Pd	220.309 mW	Power	IC power dissipation
28.	L Pd	51.7 mW	Power	Inductor power dissipation
29.	Total Pd	582.332 mW	Power	Total Power Dissipation
30.	Vout Tolerance	2.689 %		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	LM25005	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM25005 Product Folder : http://www.ti.com/product/LM25005 : contains the data sheet and other resources.