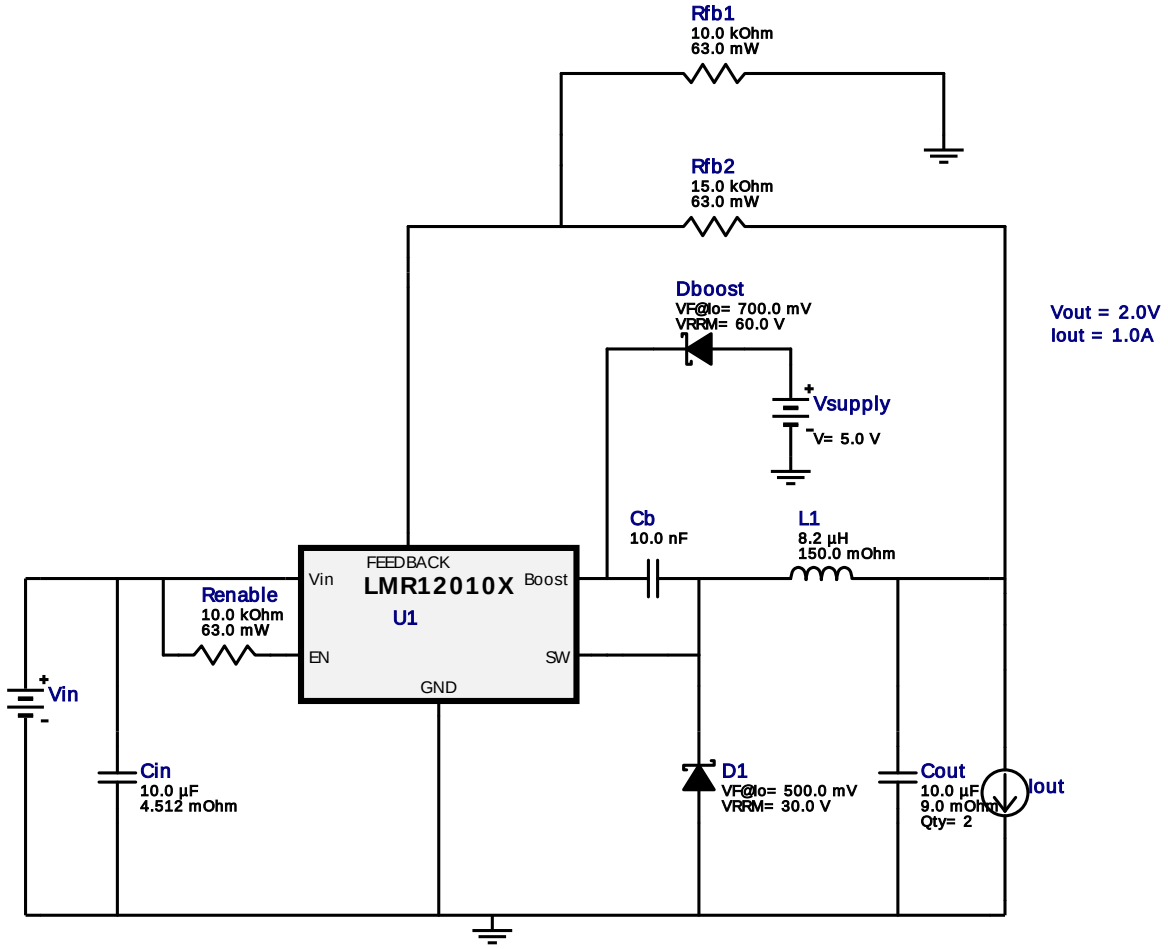
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 20.0V
Vout = 2.0V
Iout = 1.0A

Device = LMR12010XMK/NOPB
Topology = Buck
Created = 7/19/16 7:16:49 AM
BOM Cost = $1.15
BOM Count = 11
Total Pd = 1.22W

Design : 4728750/6 LMR12010XMK/NOPB
LMR12010XMK/NOPB 10.0V-20.0V to 2.00V @ 1.0A

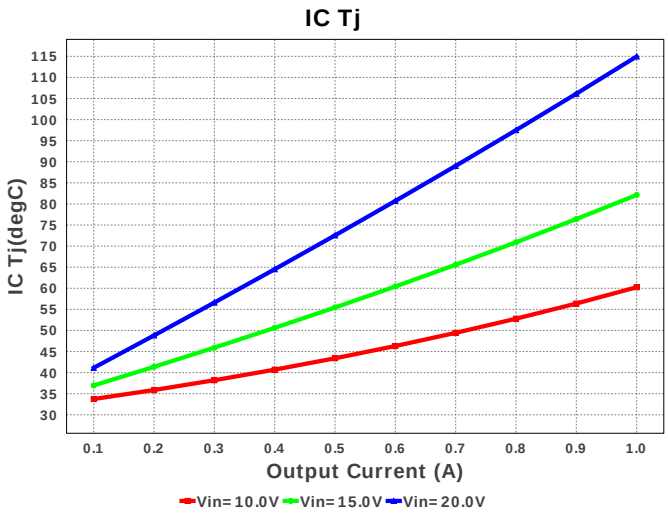


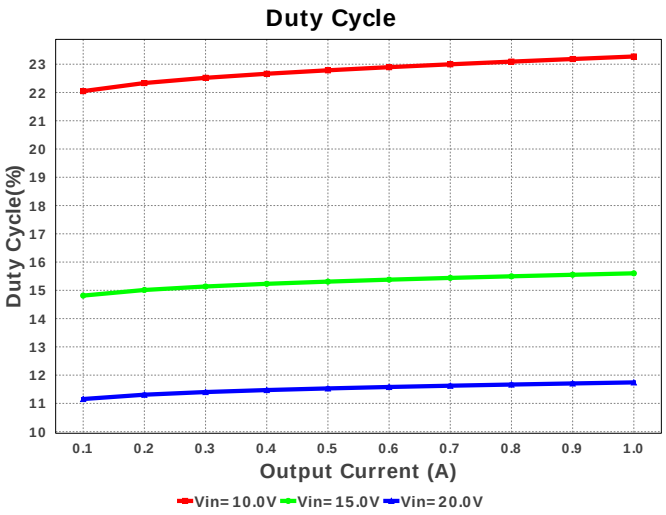
1. The Boost pin voltage must be supplied from a source of less than 5.5V. Recommended methods are described in the LM2734 datasheet Application Information.

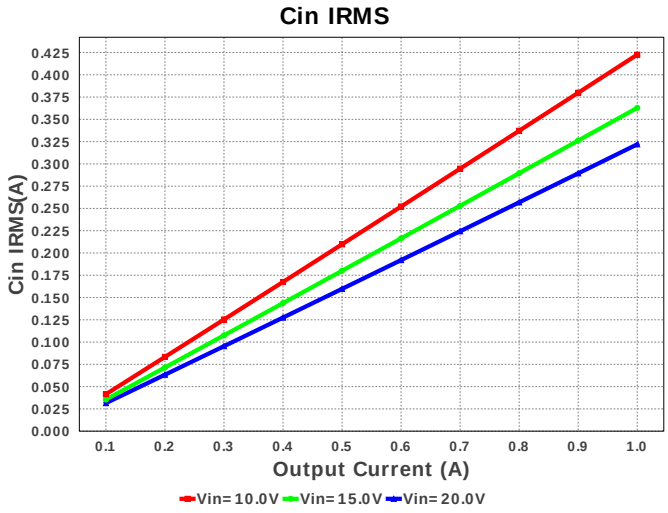
Electrical BOM

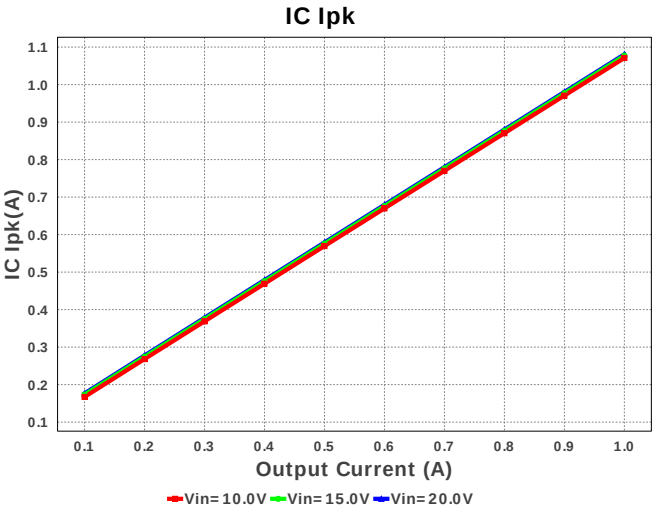
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 uF ESR= 4.512 mOhm VDC= 25.0 V IRMS= 2.447 A	1	$0.05	1206_190 11 mm²
3.	Cout	MuRata	GRM188R60J106ME47D Series= X5R	Cap= 10.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 2.74 A	2	$0.02	0603 5 mm²
4.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	$0.09	SMA 37 mm²
5.	Dboost	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.06	SMA 37 mm²

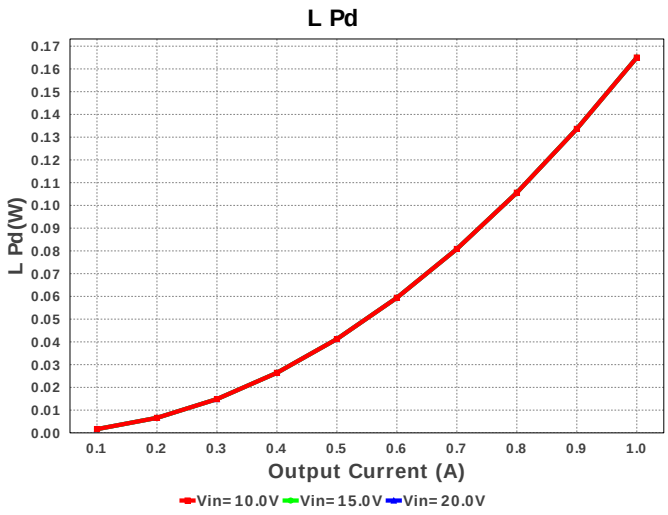
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
6.	L1	NIC Components	NPI43C8R2MTRF	L= 8.2 µH DCR= 150.0 mOhm	1	$0.07	IND_NPI43C 31 mm²
7.	Renable	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfb2	Vishay-Dale	CRCW040215K0FKED Series= CRCW..e3	Res= 15.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	U1	Texas Instruments	LMR12010XMK/NOPB	Switcher	1	$0.80	MK06A 11 mm²

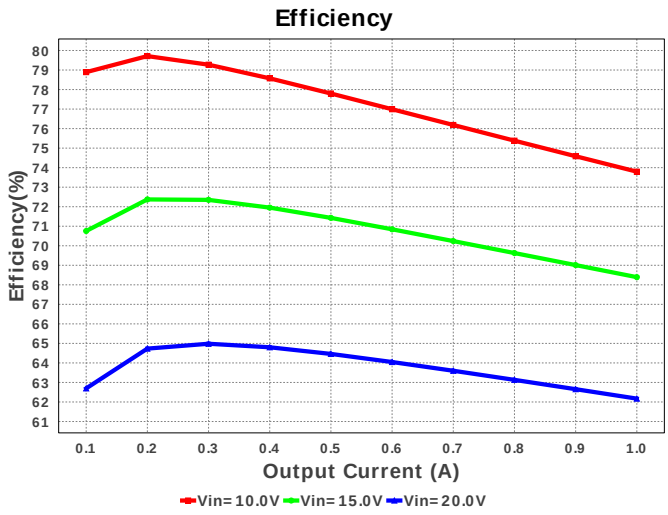


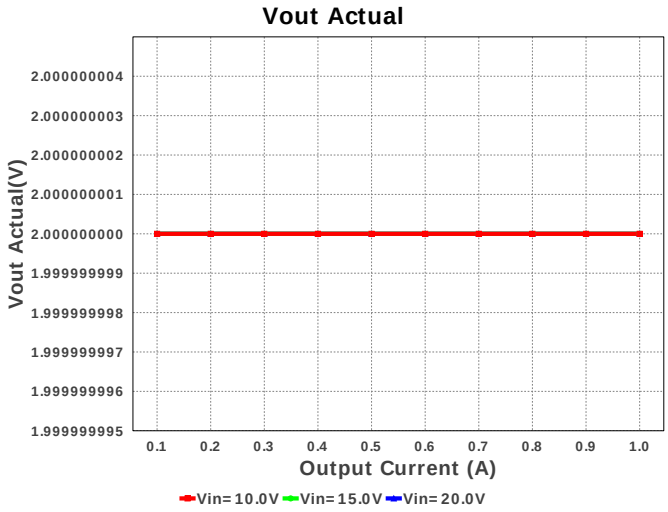


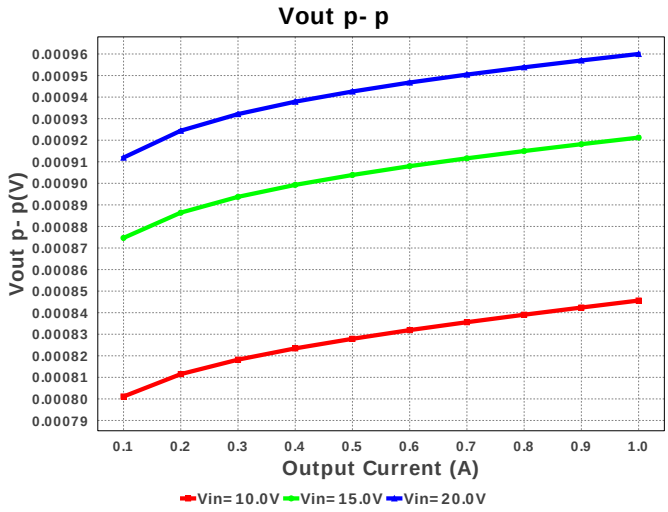


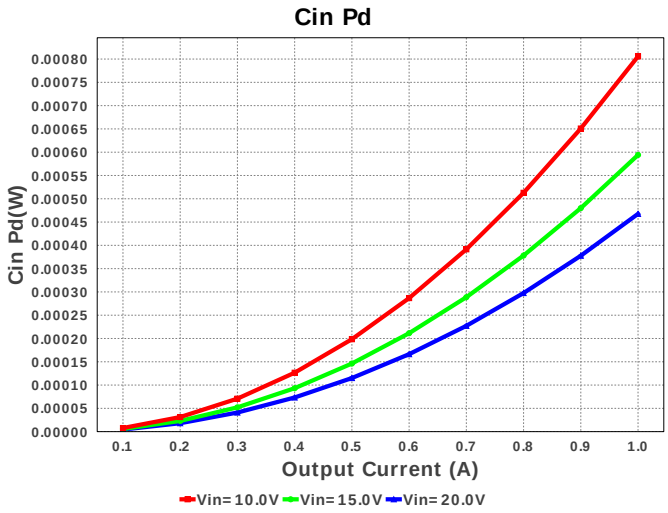


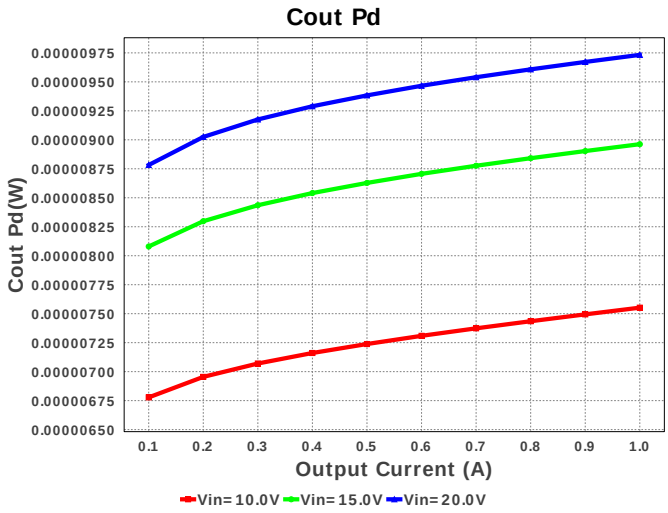


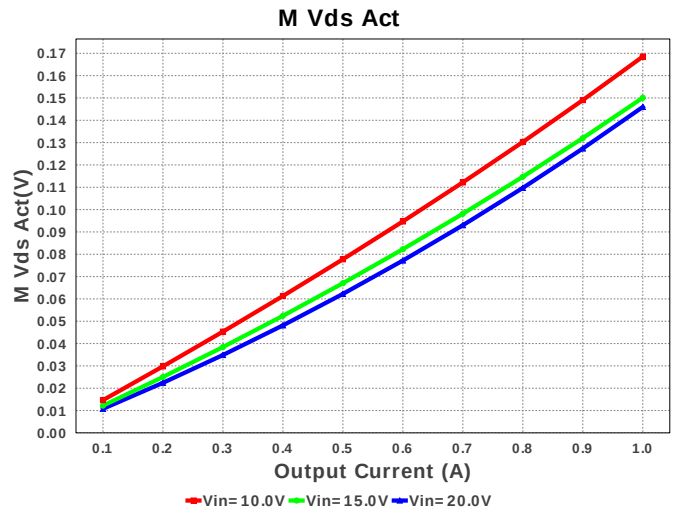


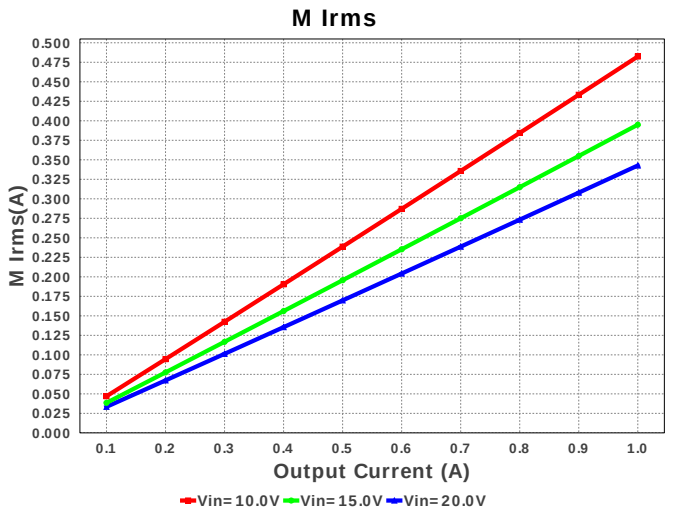


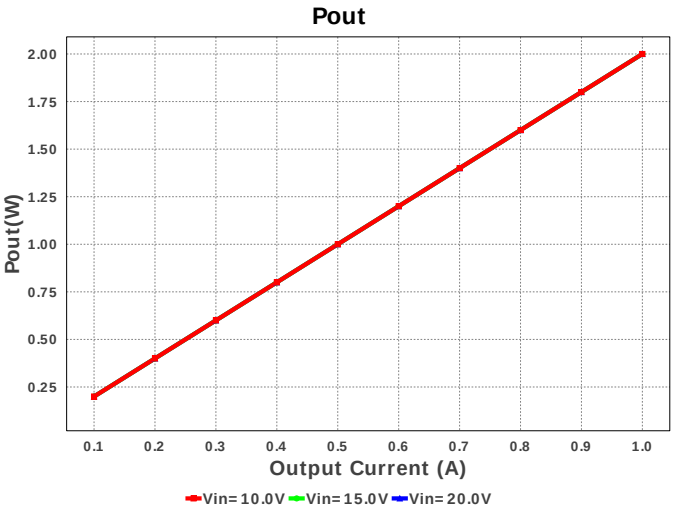


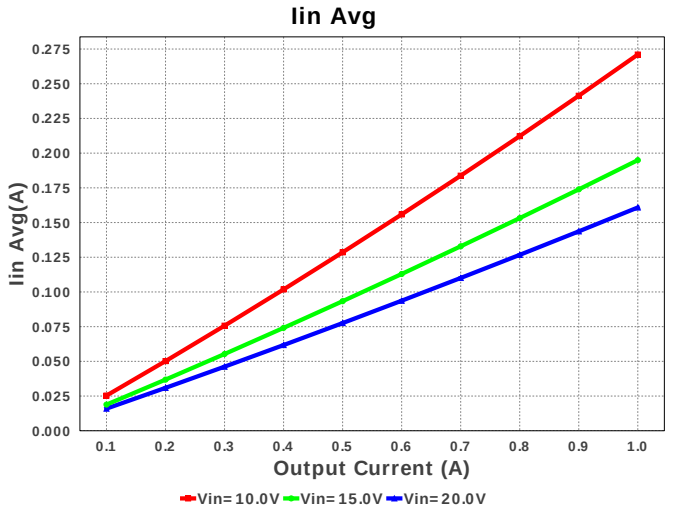


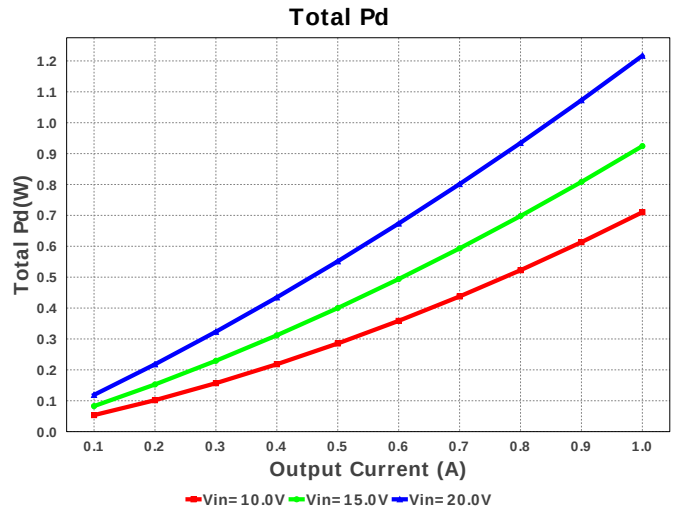


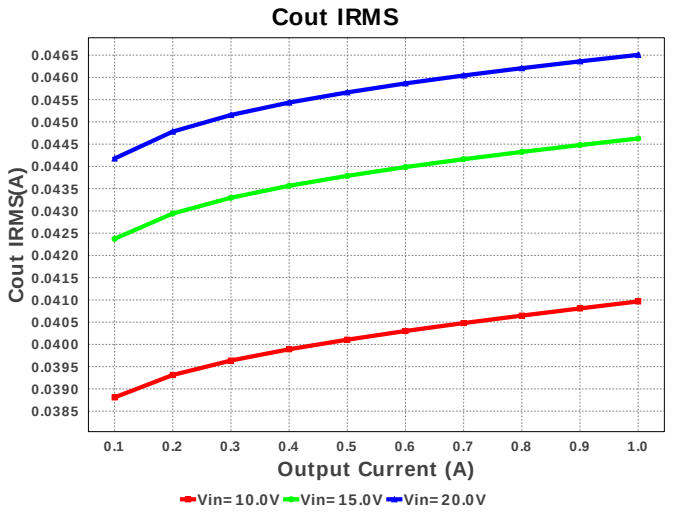


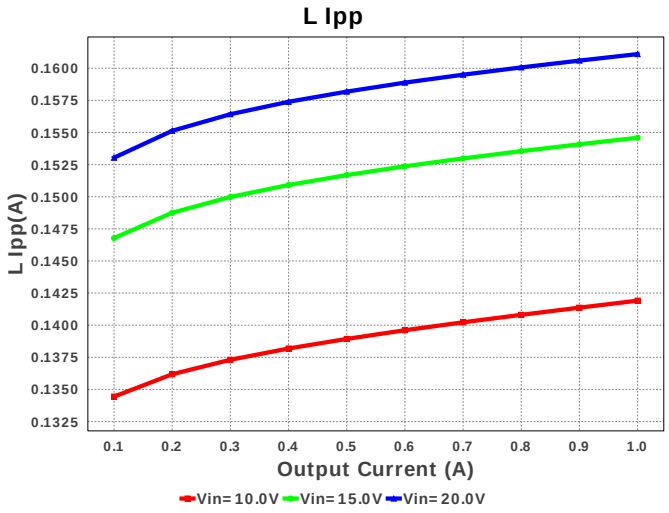


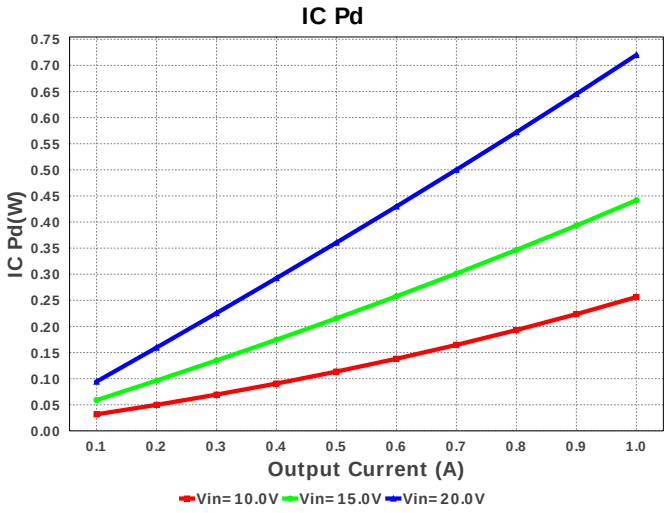


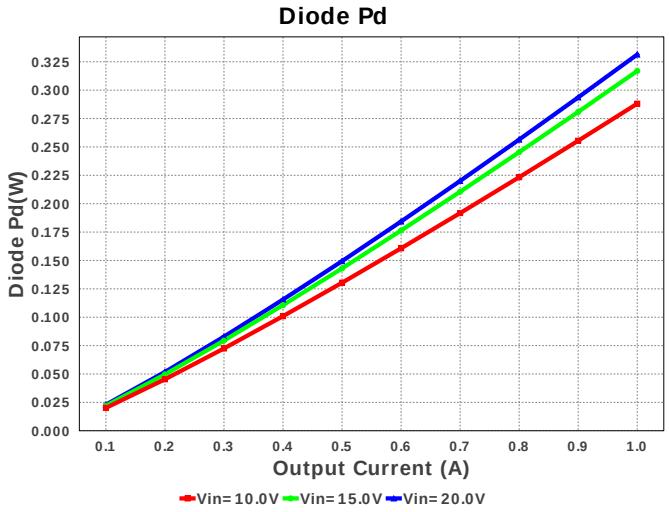












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	322.283 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	46.625 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.081 A	Current	Peak switch current in IC
4.	Iin Avg	161.15 mA	Current	Average input current
5.	L Ipp	161.51 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	343.112 mA	Current	Q Iavg
7.	BOM Count	11	General	Total Design BOM count
8.	FootPrint	152.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.6 MHz	General	Switching frequency
10.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	146.155 mV	General	
12.	Pout	2.0 W	General	Total output power
13.	Total BOM	$1.15	General	Total BOM Cost
14.	Vout Actual	2.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Duty Cycle	11.773 %	Op_point	Duty cycle
16.	Efficiency	62.055 %	Op_point	Steady state efficiency
17.	IC Tj	114.977 degC	Op_point	IC junction temperature
18.	ICThetaJA	118.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	1.0 A	Op_point	Iout operating point
20.	VIN_OP	20.0 V	Op_point	Vin operating point
21.	Vout p-p	962.452 µV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	468.646 µW	Power	Input capacitor power dissipation
23.	Cout Pd	9.783 µW	Power	Output capacitor power dissipation
24.	Diode Pd	337.314 mW	Power	Diode power dissipation
25.	IC Pd	720.148 mW	Power	IC power dissipation
26.	L Pd	165.0 mW	Power	Inductor power dissipation
27.	Total Pd	1.223 W	Power	Total Power Dissipation
28.	Vout Tolerance	3.236 %		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	20.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	2.0	Output Voltage
5.	base_pn	LMR12010X	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR12010X** Product Folder : http://www.ti.com/product/LMR12010 : contains the data sheet and other resources.