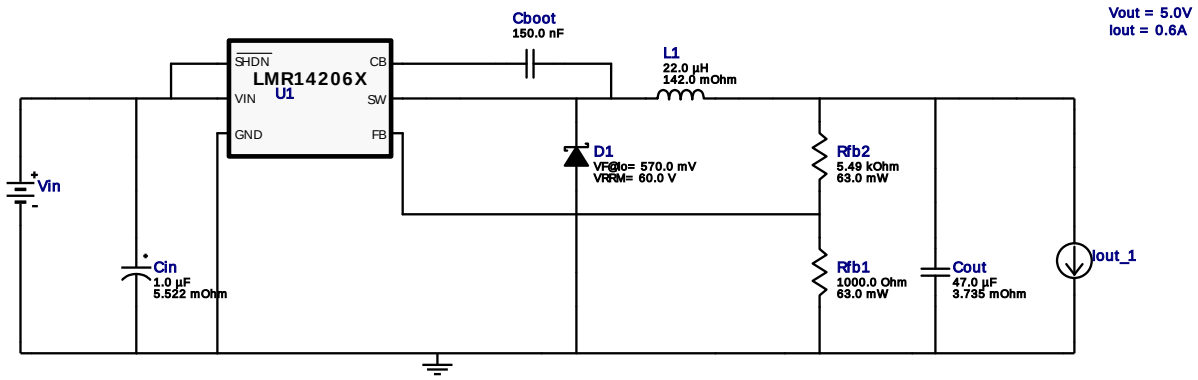
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 0.6A

Device = LMR14206XMKE/NOPB
Topology = Buck
Created = 8/4/16 1:22:04 AM
BOM Cost = $1.52
BOM Count = 8
Total Pd = 0.71W

Design : 4743458/24 LMR14206XMKE/NOPB
LMR14206XMKE/NOPB 14.0V-22.0V to 5.00V @ 0.6A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	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
3.	Cout	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	$0.10	1206_190 11 mm²
4.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
5.	L1	Bourns	SRN6045-220M	L= 22.0 µH DCR= 142.0 mOhm	1	$0.16	SRN6045 64 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
7.	Rfb2	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	U1	Texas Instruments	LMR14206XMKE/NOPB	Switcher	1	$1.14	MK06A 11 mm²

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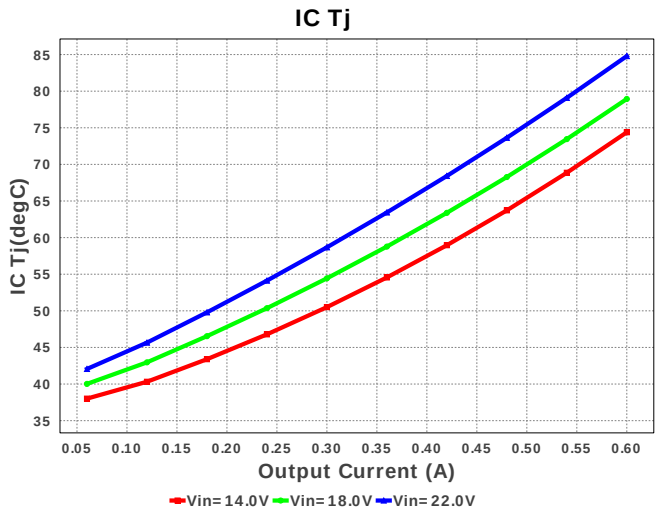

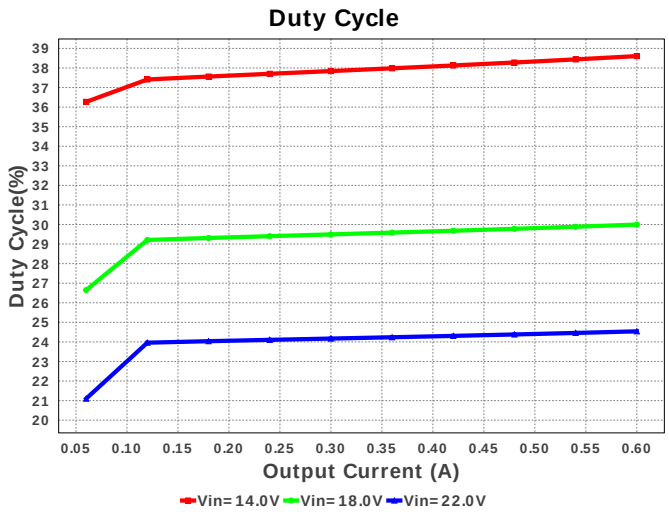

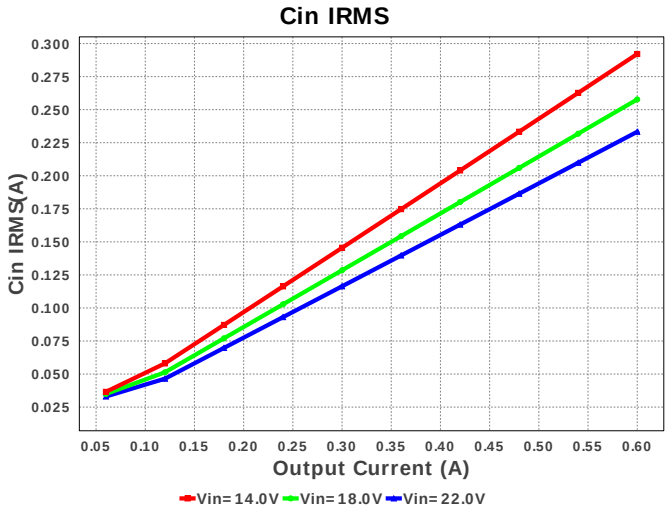

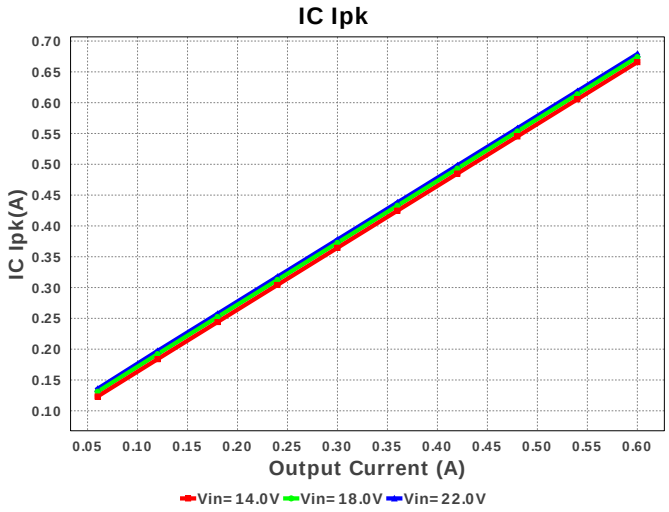

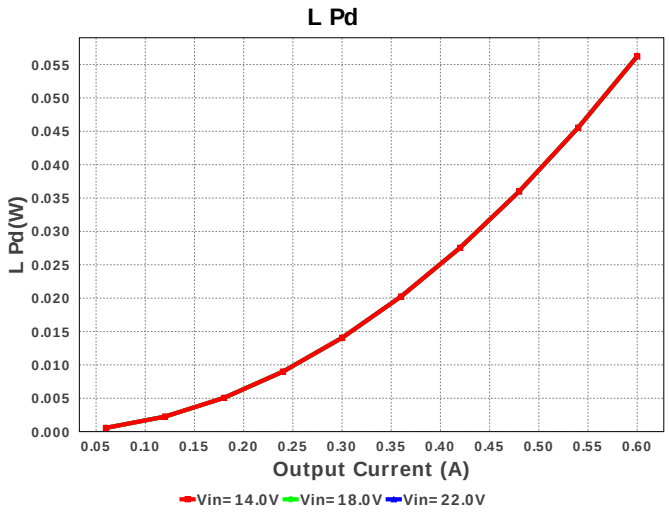

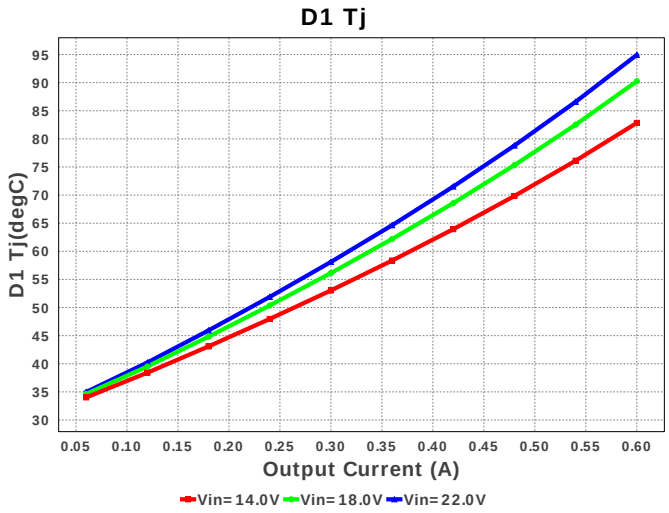

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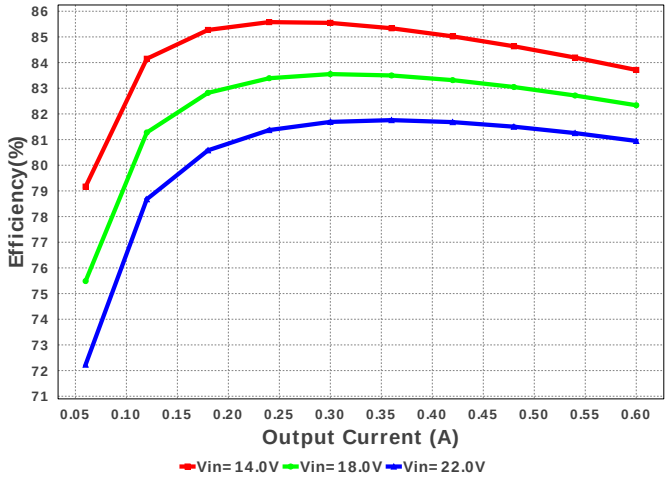
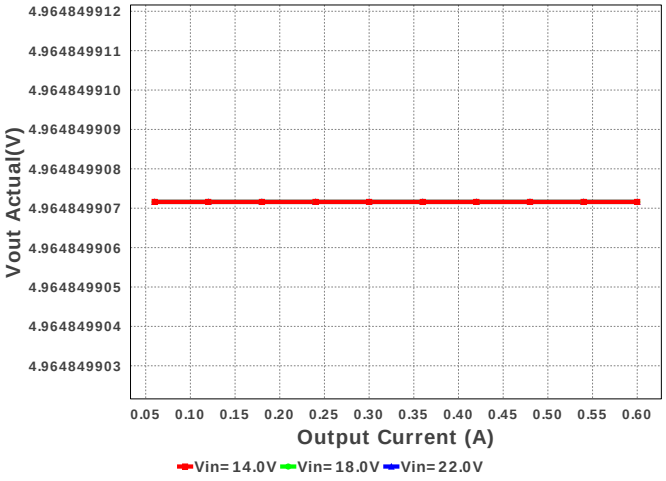
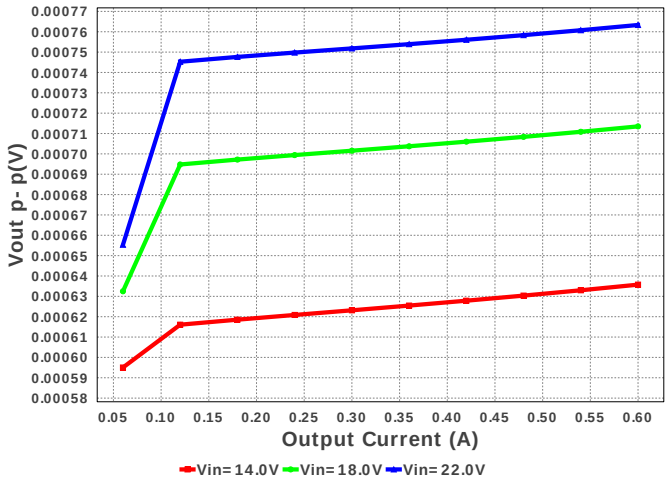
Efficiency



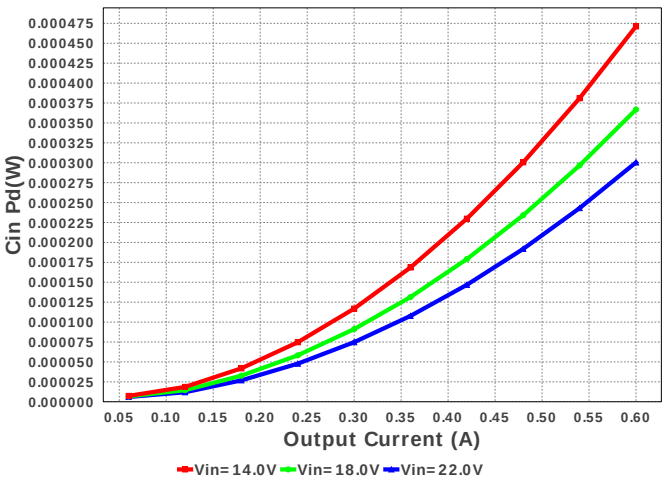
Vout Actual



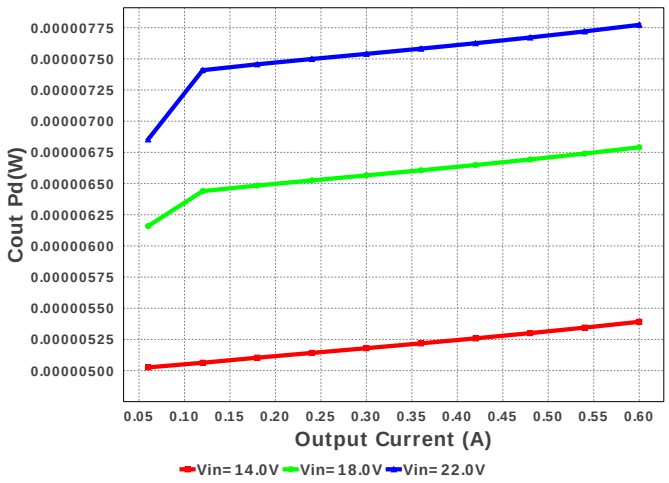
Vout p- p



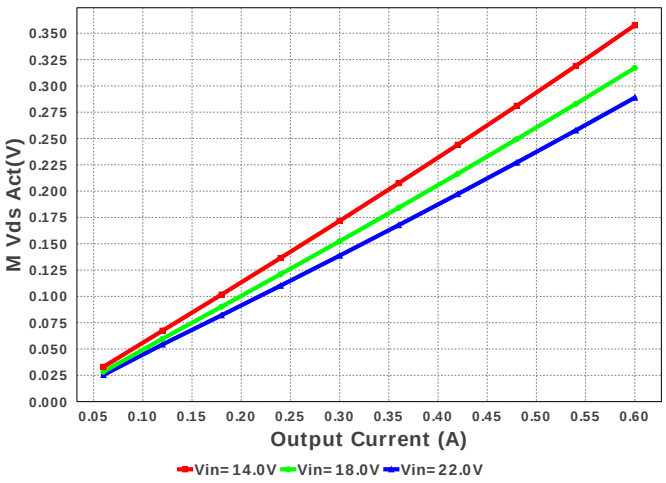
Cin Pd



Cout Pd



M Vds Act



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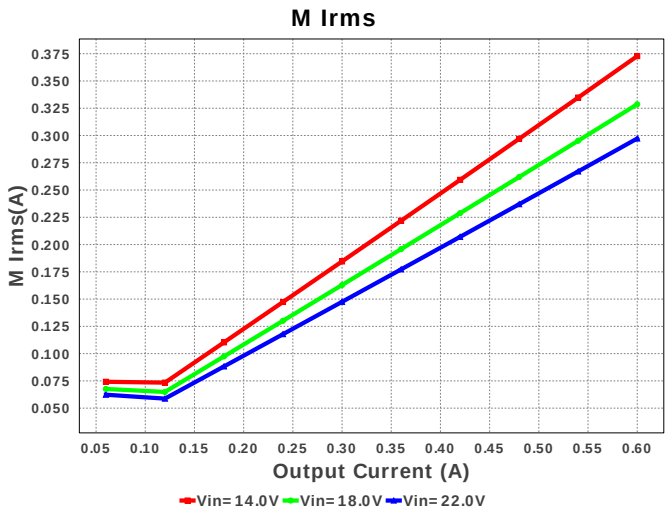

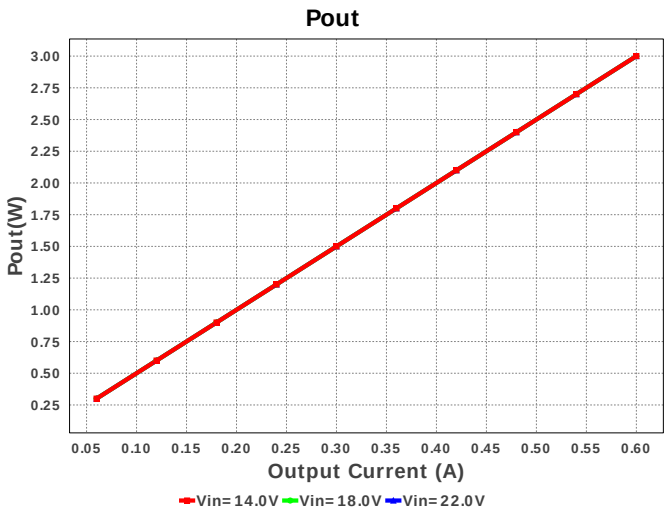

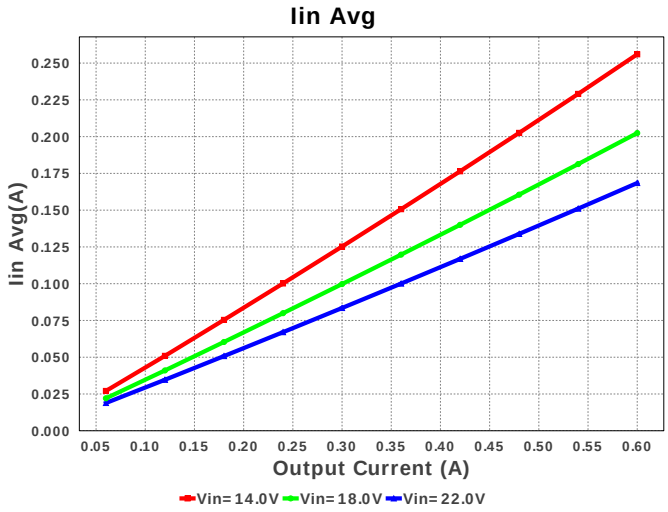

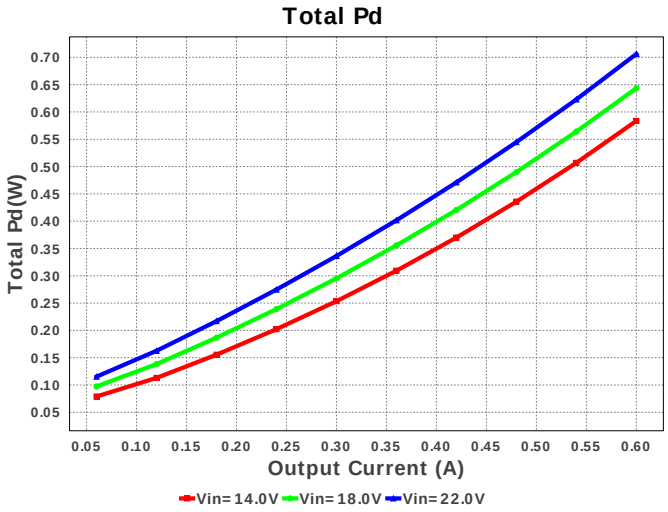

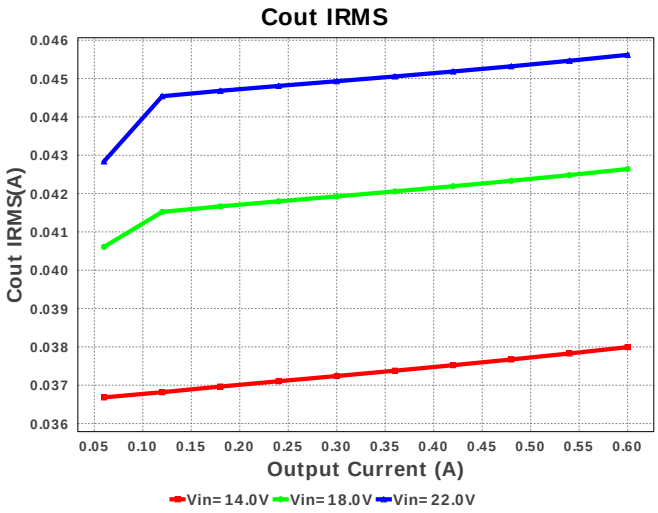

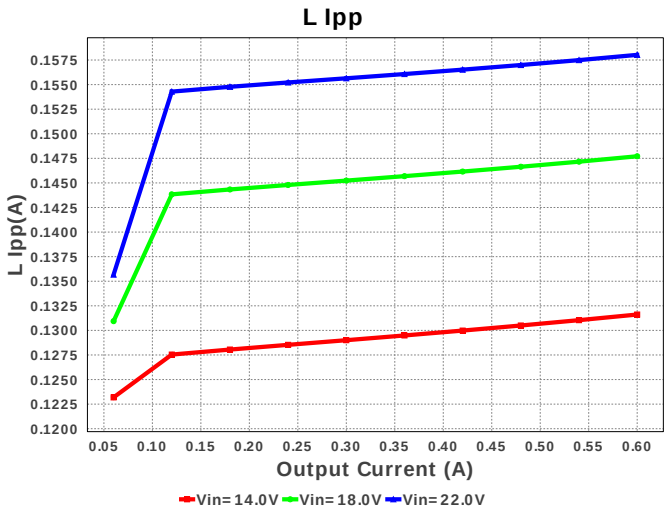

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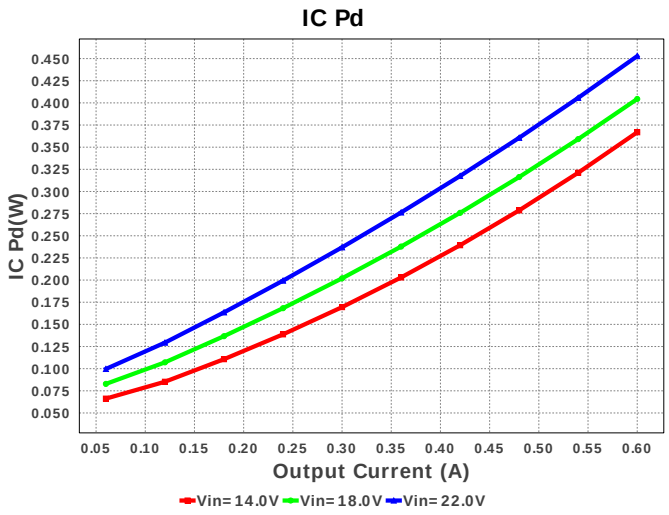

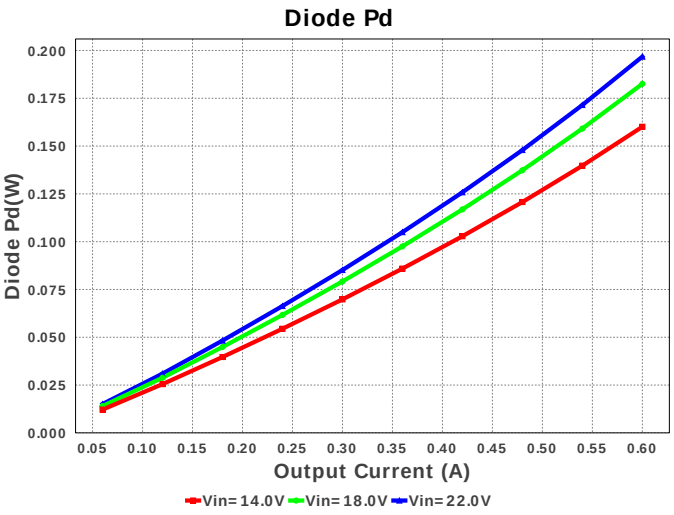

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	233.246 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	45.618 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	679.012 mA	Current	Peak switch current in IC
4.	Iin Avg	168.46 mA	Current	Average input current
5.	L Ipp	158.02 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	297.229 mA	Current	Q Iavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	111.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.2 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	288.83 mV	General	Voltage drop across the MosFET
12.	Pout	3.0 W	General	Total output power
13.	Total BOM	$1.52	General	Total BOM Cost
14.	D1 Tj	94.939 degC	Op_Point	D1 junction temperature
15.	Vout Actual	4.965 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	15.734 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	24.54 %	Op_point	Duty cycle
19.	Efficiency	80.947 %	Op_point	Steady state efficiency
20.	IC Tj	84.79 degC	Op_point	IC junction temperature
21.	ICThetaJA	121.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	600.0 mA	Op_point	Iout operating point
23.	Phase Marg	59.75 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	22.0 V	Op_point	Vin operating point
25.	Vout p-p	763.323 µV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	300.418 µW	Power	Input capacitor power dissipation
27.	Cout Pd	7.772 µW	Power	Output capacitor power dissipation
28.	Diode Pd	196.783 mW	Power	Diode power dissipation
29.	IC Pd	452.809 mW	Power	IC power dissipation
30.	L Pd	56.232 mW	Power	Inductor power dissipation
31.	Total Pd	706.127 mW	Power	Total Power Dissipation
32.	Vout Tolerance	4.102 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	600.0 m	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMR14206X	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14206X** Product Folder : http://www.ti.com/product/LMR14206 : contains the data sheet and other resources.

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