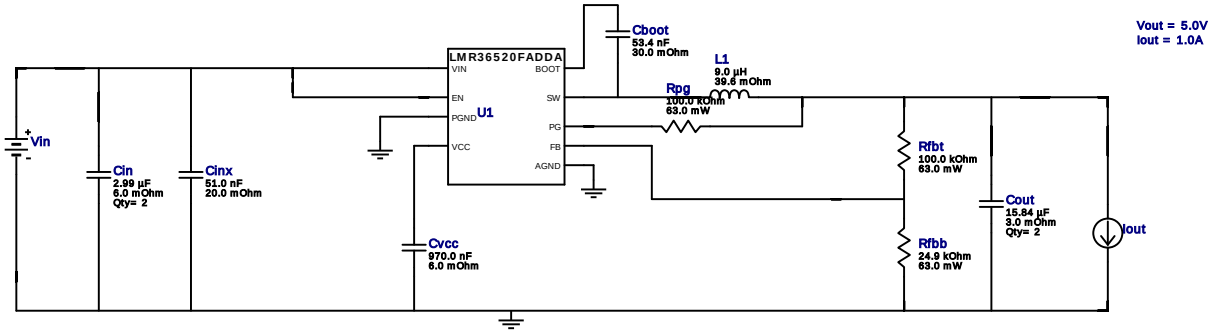
VinMin = 19.6V
VinMax = 27.5V
Vout = 5.0V
Iout = 1.0A

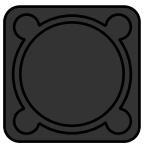
Device = LMR36520FADDAR
Topology = Buck
Created = 2021-10-06 00:11:35.574
BOM Cost = NA
BOM Count = 12
Total Pd = 0.5W

WEBENCH® Design Report

Design : 99 LMR36520FADDAR
LMR36520FADDAR 19.6V-27.5V to 5.00V @ 1A



Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MURATA	GRM033R61E104KE14D Series= X7R	Cap= 53.4 nF ESR= 30.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	NA	0402 0 mm²
Cin	MURATA	GRM31CD71H106KE11L Series= X5R	Cap= 2.99 uF ESR= 6.0 mOhm VDC= 50.0 V IRMS= 4.3 A	2	NA	0805 0 mm²
Cinx	MURATA	GRM155R61H474KE11D Series= X7R	Cap= 51.0 nF ESR= 20.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	NA	0805 0 mm²
Cout	MURATA	GRM31CC81E226KE11L Series= X5R	Cap= 15.84 uF ESR= 3.0 mOhm VDC= 16.0 V IRMS= 4.59346 A	2	NA	1210_280 0 mm²
Cvcc	MURATA	GRM21BC72A105KE01L Series= X7R	Cap= 970.0 nF ESR= 6.0 mOhm VDC= 16.0 V IRMS= 8.19 A	1	NA	0805 0 mm²
L1	MURATA	1267AY-100M=P3	L= 9.0 µH 39.6 mOhm	1	NA	 SRR1208 0 mm²
Rfbb	Vishay-Dale	CRCW040224K9FKED Series= CRCW..e3	Res= 24.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

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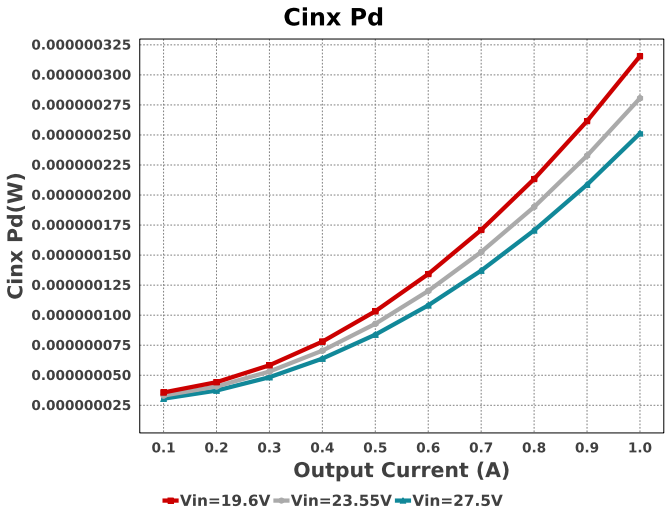
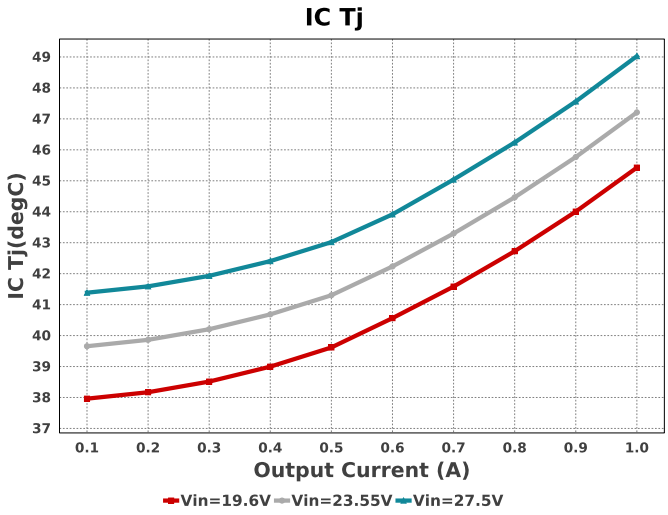
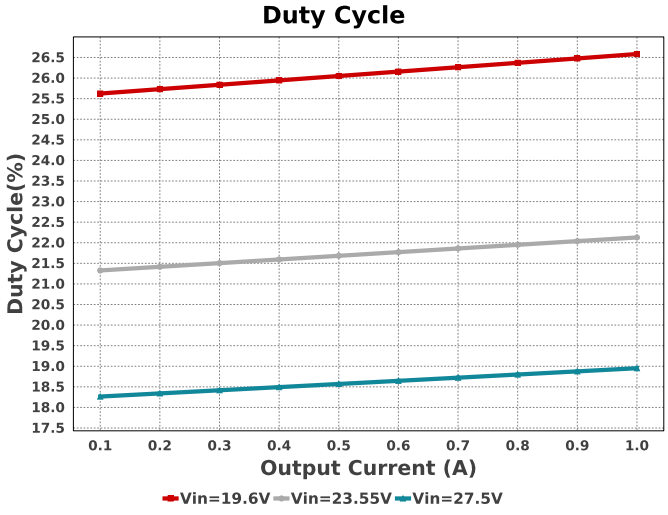
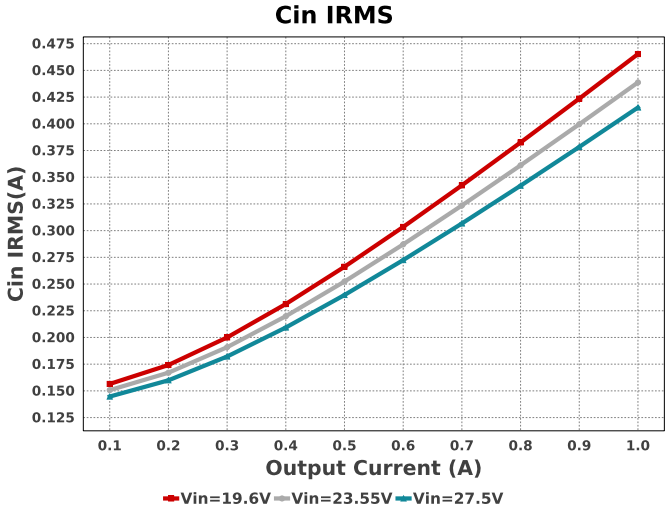
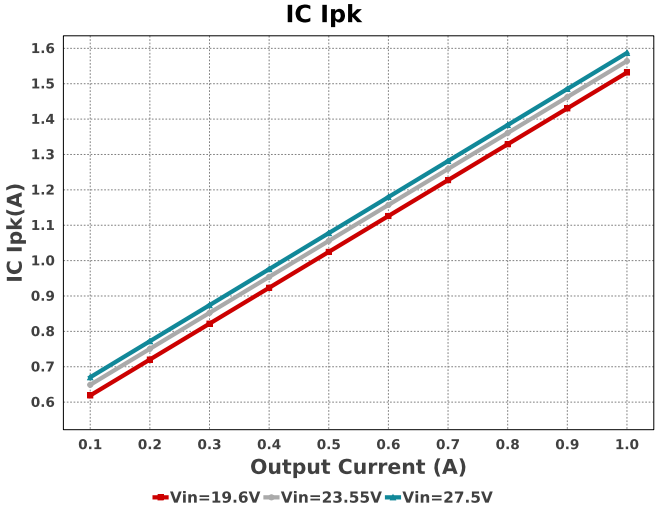
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
U1	Texas Instruments	LMR36520FADDAR	Switcher	1	$0.89	DDA0008J 55 mm²

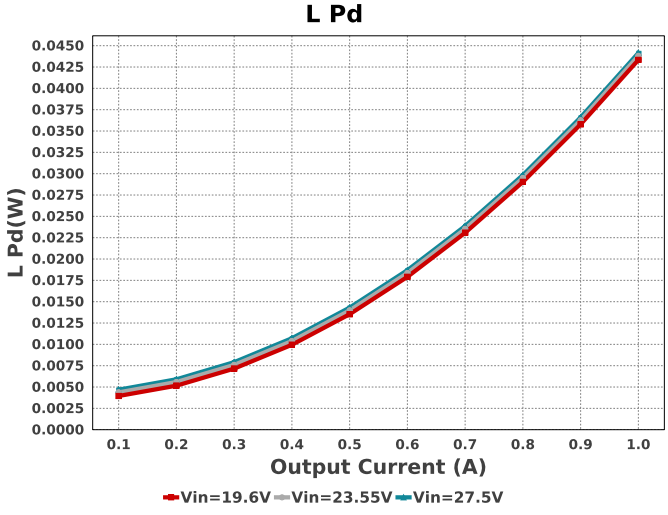












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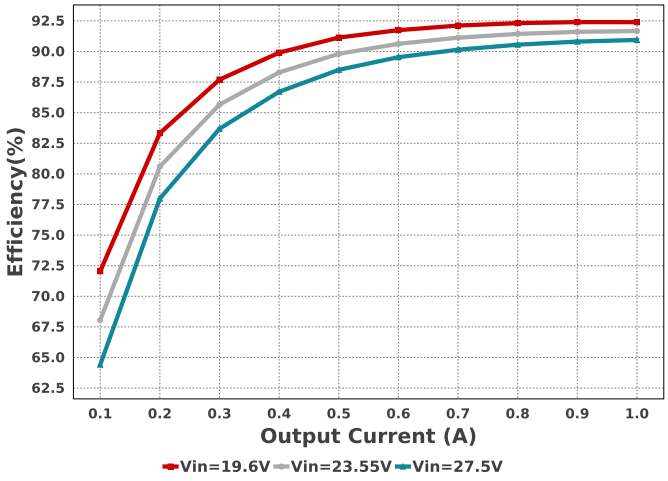
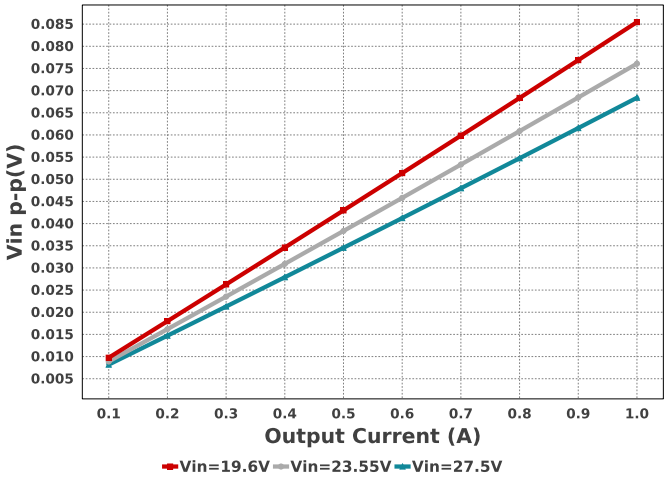
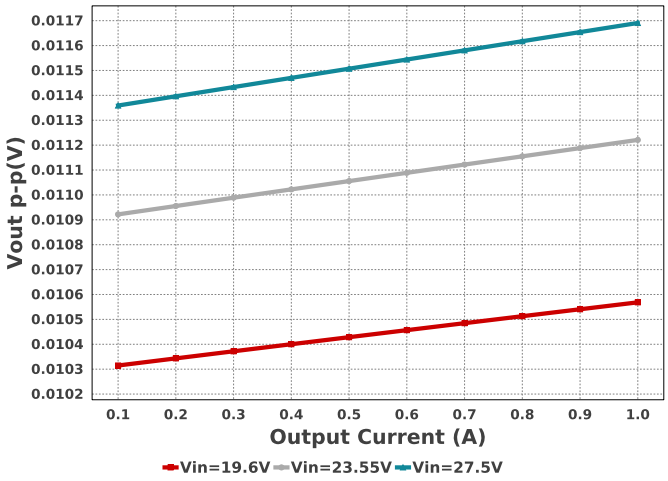
Efficiency



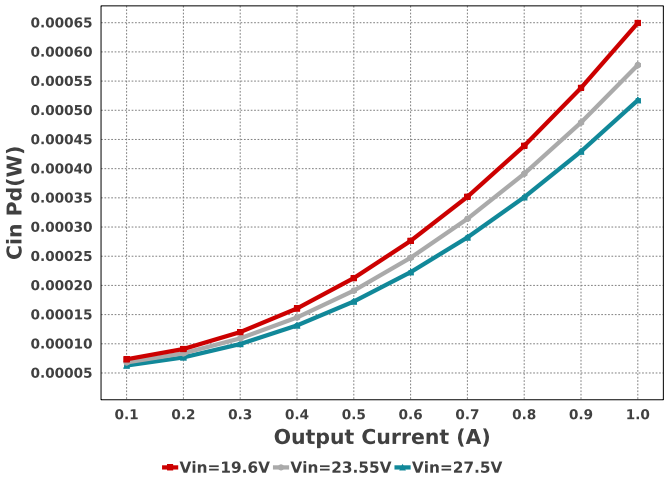
Vin p-p



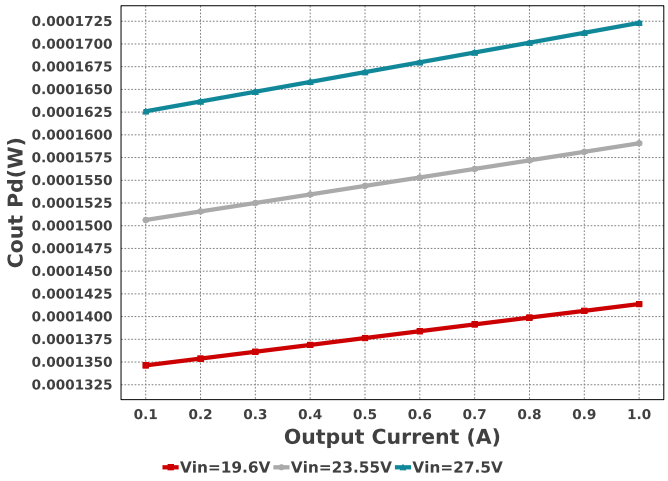
Vout p-p



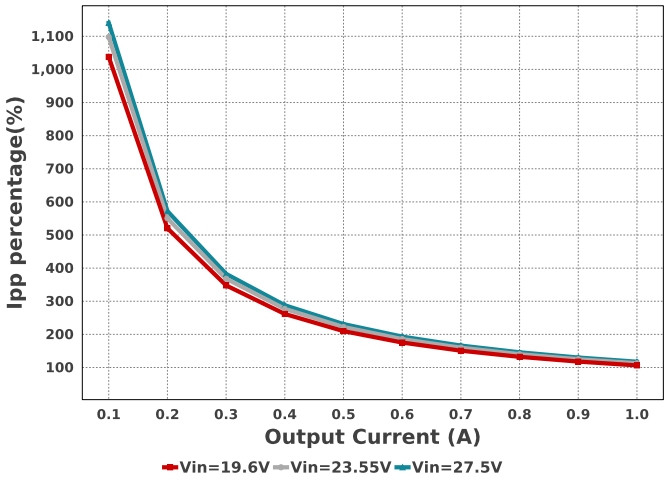
Cin Pd



Cout Pd



Ipp percentage



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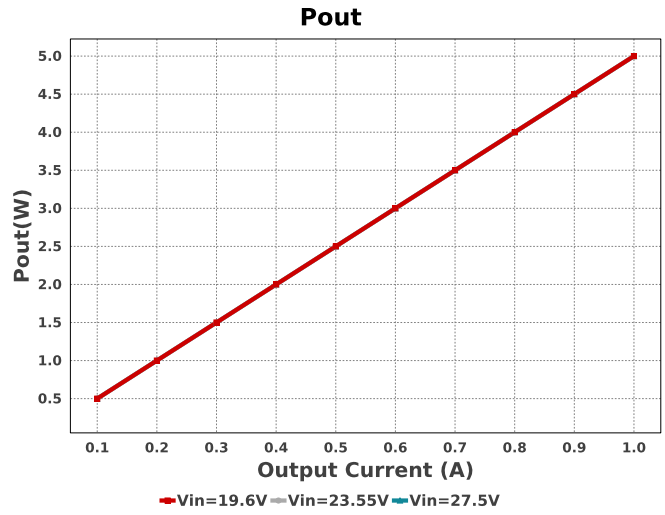

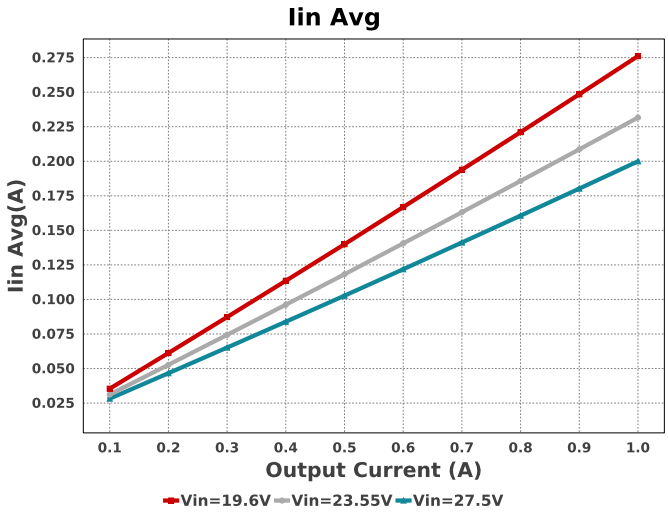

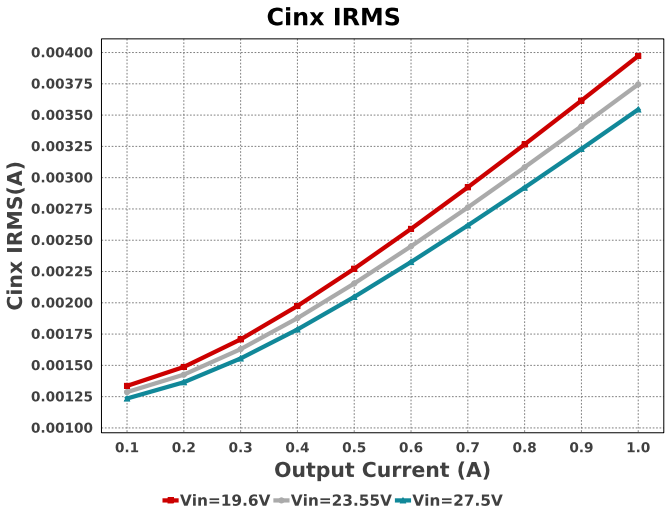

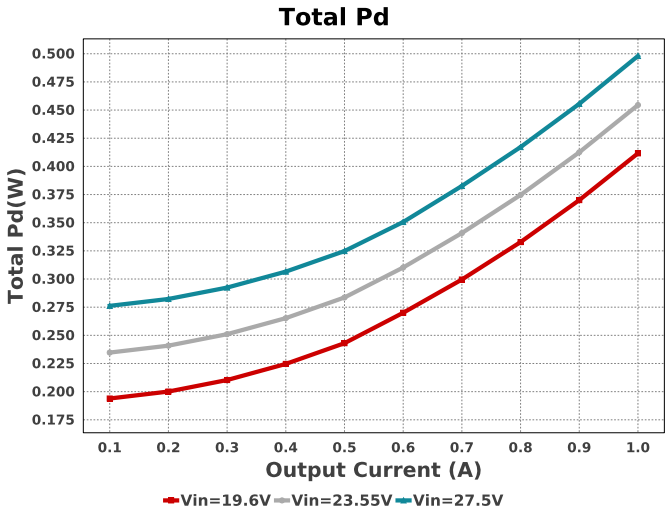

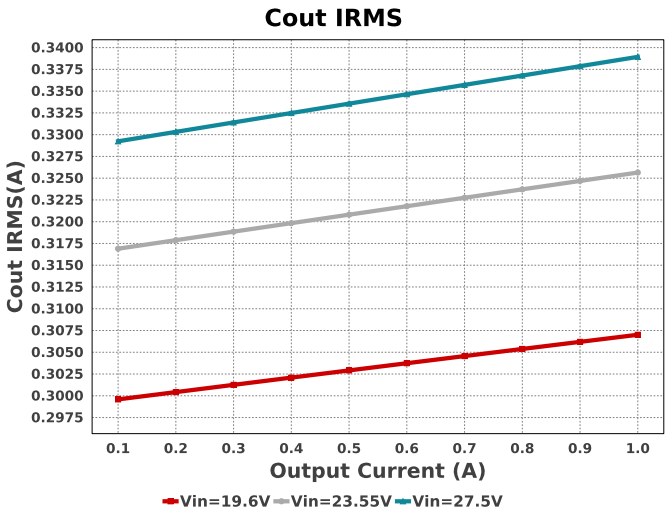

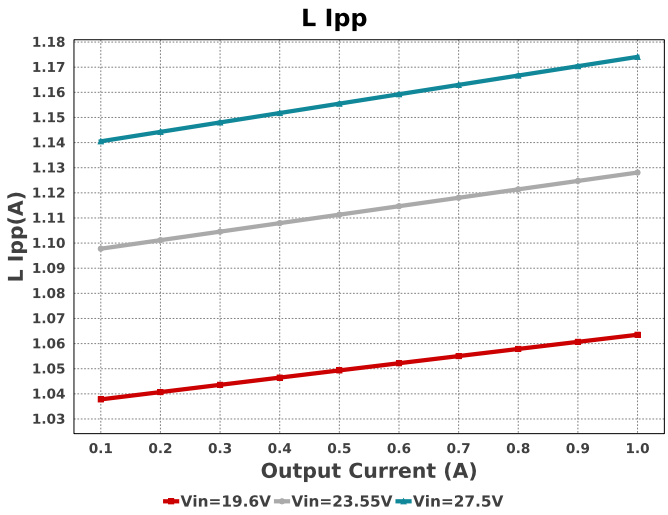

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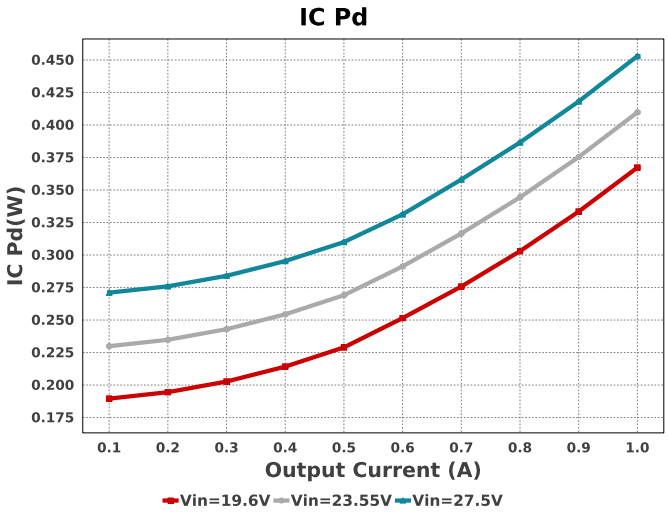

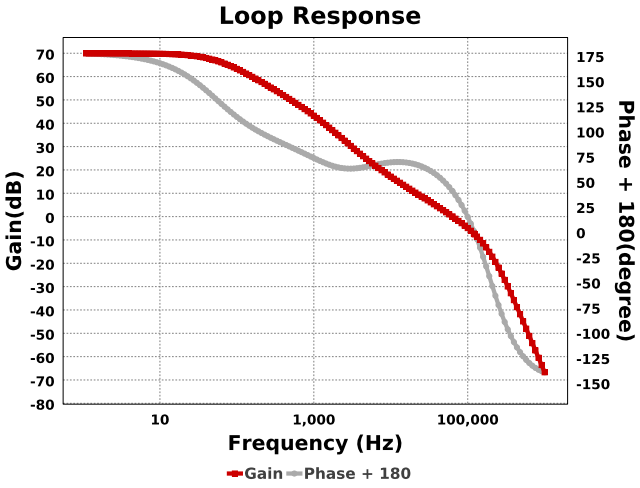

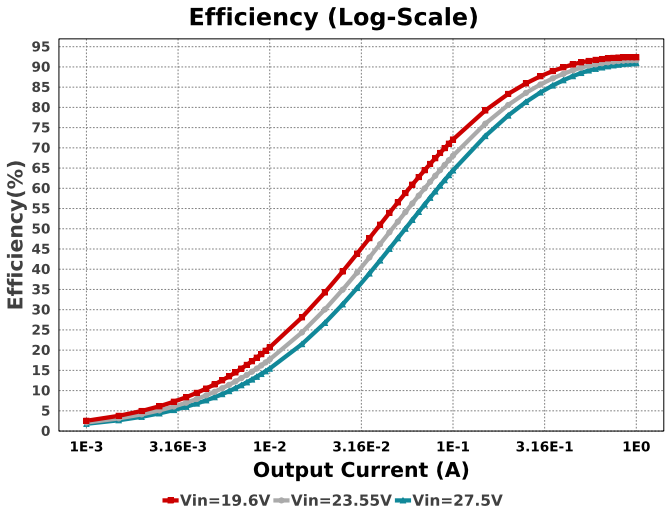

Operating Values

#	Name	Value	Category	Description
1.	BOM Count	12		Total Design BOM count
2.	Total BOM	NA		Total BOM Cost
3.	Cin IRMS	415.236 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	517.26 µW	Capacitor	Input capacitor power dissipation
5.	Cinx IRMS	3.545 mA	Capacitor	Bulk capacitor RMS ripple current
6.	Cinx Pd	251.33 nW	Capacitor	Bulk capacitor power dissipation
7.	Cout IRMS	338.936 mA	Capacitor	Output capacitor RMS ripple current
8.	Cout Pd	172.32 µW	Capacitor	Output capacitor power dissipation
9.	IC Ipk	1.587 A	IC	Peak switch current in IC
10.	IC Pd	453.0 mW	IC	IC power dissipation
11.	IC Tj	49.026 degC	IC	IC junction temperature
12.	IC Tolerance	20.0 mV	IC	IC Feedback Tolerance
13.	ICThetaJA Effective	42.0 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
14.	Iin Avg	199.93 mA	IC	Average input current
15.	Ipp percentage	117.411 %	Inductor	Inductor ripple current percentage (with respect to average inductor current)
16.	L Ipp	1.174 A	Inductor	Peak-to-peak inductor ripple current
17.	L Pd	44.149 mW	Inductor	Inductor power dissipation
18.	Cin Pd	517.26 µW	Power	Input capacitor power dissipation
19.	Cinx Pd	251.33 nW	Power	Bulk capacitor power dissipation
20.	Cout Pd	172.32 µW	Power	Output capacitor power dissipation
21.	IC Pd	453.0 mW	Power	IC power dissipation
22.	L Pd	44.149 mW	Power	Inductor power dissipation
23.	Total Pd	498.016 mW	Power	Total Power Dissipation
24.	Cross Freq	63.315 kHz	System Information	Bode plot crossover frequency
25.	Duty Cycle	18.952 %	System Information	Duty cycle
26.	Efficiency	90.942 %	System Information	Steady state efficiency
27.	FootPrint	230.0 mm^2	System Information	Total Foot Print Area of BOM components

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#	Name	Value	Category	Description
28.	Frequency	400.0 kHz	System Information	Switching frequency
29.	Gain Marg	-7.634 dB	System Information	Bode Plot Gain Margin
30.	Iout	1.0 A	System Information	Iout operating point
31.	Low Freq Gain	69.915 dB	System Information	Gain at 1Hz
32.	Mode	FCCM	System Information	Conduction Mode
33.	Phase Marg	41.994 deg	System Information	Bode Plot Phase Margin
34.	Pout	5.0 W	System Information	Total output power
35.	Vin	27.5 V	System Information	Vin operating point
36.	Vin p-p	68.394 mV	System Information	Peak-to-peak input voltage
37.	Vout	5.0 V	System Information	Operational Output Voltage
38.	Vout Actual	5.016 V	System Information	Vout Actual calculated based on selected voltage divider resistors
39.	Vout Tolerance	3.65 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
40.	Vout p-p	11.691 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
VinMax	27.5	Maximum input voltage
VinMin	19.6	Minimum input voltage
Vout	5.0	Output Voltage
base_pn	LMR36520FA	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

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WEBENCH® Assembly

Design Assistance

1. Master key : F20DB821062544F1[v1]
2. **LMR36520FA** Product Folder : http://www.ti.com/product/LMR36520 : contains the data sheet and other resources.

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