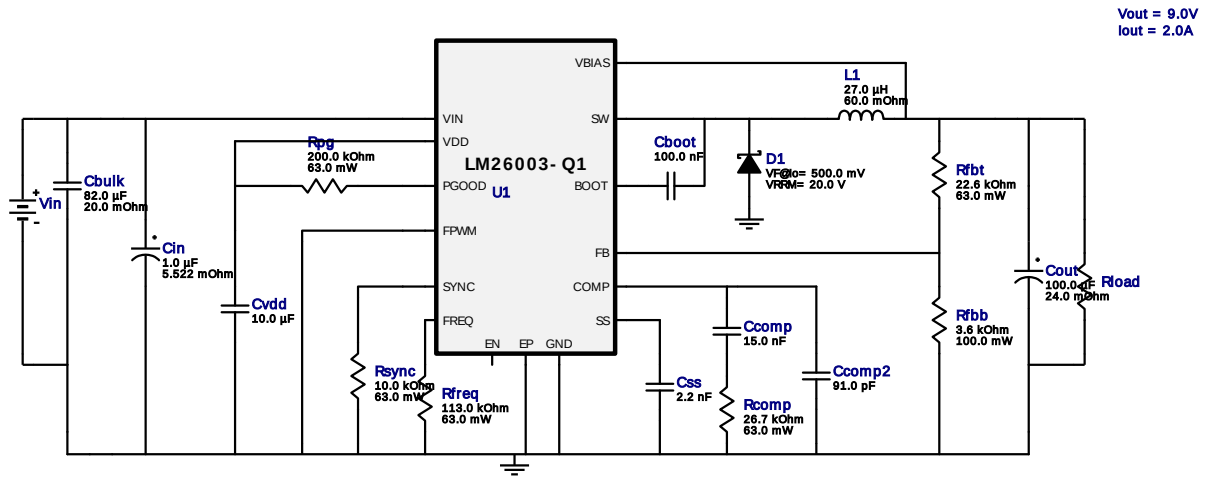
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 25.0V
Vout = 9.0V
Iout = 2.0A

Device = LM26003QMH/NOPB
Topology = Buck
Created = 7/15/16 7:39:23 PM
BOM Cost = $3.64
BOM Count = 17
Total Pd = 1.1W

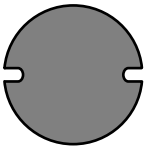
Design : 4742013/25 LM26003QMH/NOPB
LM26003QMH/NOPB 14.0V-25.0V to 9.00V @ 2.0A

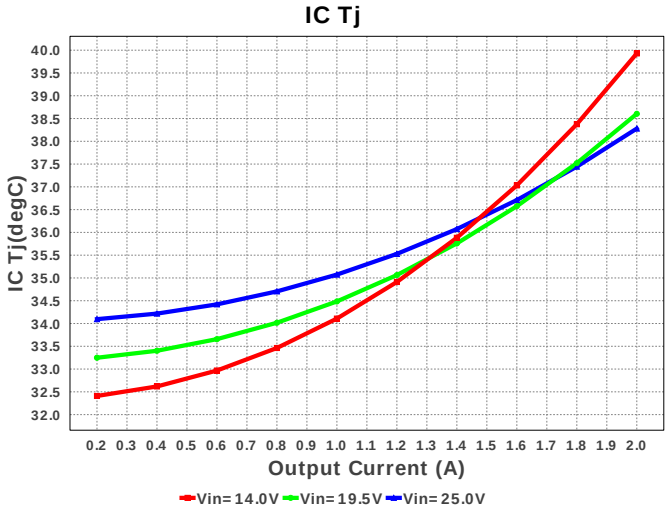


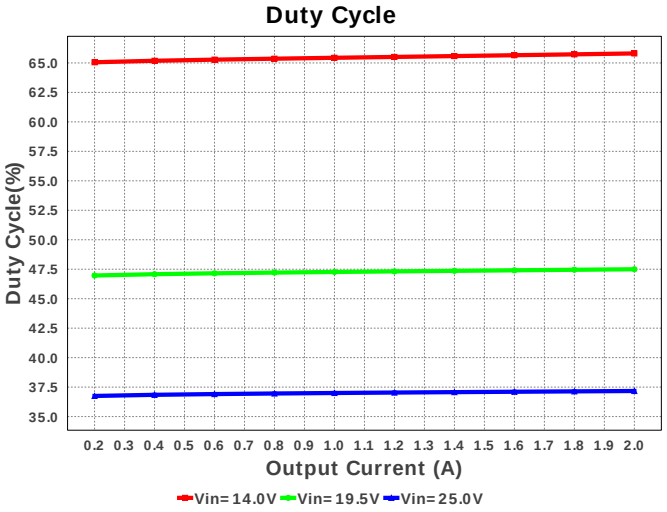
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application.View WEBENCH(R) Disclaimer.

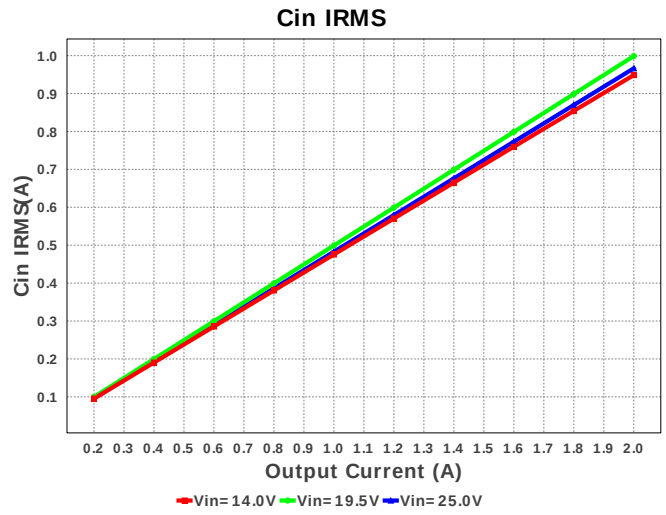
Electrical BOM

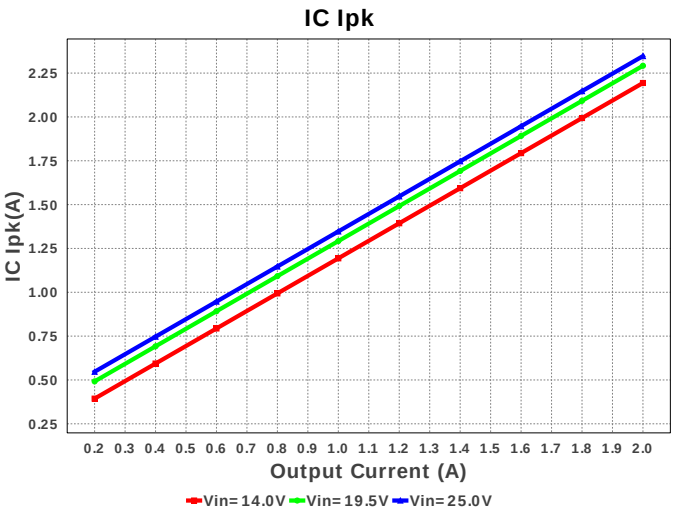
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cbulk	Panasonic	35SVPF82M Series= ?	Cap= 82.0 uF ESR= 20.0 mOhm VDC= 35.0 V IRMS= 4.0 A	1	$0.61	CAPSMT_62_E12 106 mm²
3.	Ccomp	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Ccomp2	Samsung Electro-Mechanics	CL21C910JBANNNC Series= C0G/NP0	Cap= 91.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	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
6.	Cout	Panasonic	16SVPC100M Series= SVPC	Cap= 100.0 uF ESR= 24.0 mOhm VDC= 16.0 V IRMS= 2.49 A	1	$0.29	SM_RADIAL_6.3AMM 80 mm²
7.	Css	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
8.	Cvdd	Taiyo Yuden	LMK212BJ106KG-T Series= X5R	Cap= 10.0 uF VDC= 10.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²

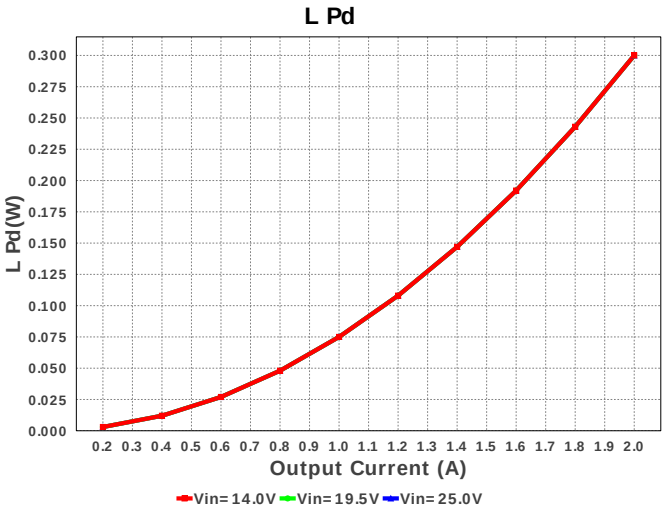
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	D1	Diodes Inc.	B220-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	 SMB 44 mm²
10.	L1	Bourns	SDR1307-270ML	L= 27.0 µH DCR= 60.0 mOhm	1	$0.35	 SDR1307 227 mm²
11.	Rcomp	Vishay-Dale	CRCW040226K7FKED Series= CRCW..e3	Res= 26.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfbb	Yageo America	RC0603FR-073K6L Series= ?	Res= 3.6 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
13.	Rfbt	Vishay-Dale	CRCW040222K6FKED Series= CRCW..e3	Res= 22.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rfreq	Vishay-Dale	CRCW0402113KFKED Series= CRCW..e3	Res= 113.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rpg	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rsync	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	U1	Texas Instruments	LM26003QMH/NOPB	Switcher	1	$2.13	 MXA20A 71 mm²

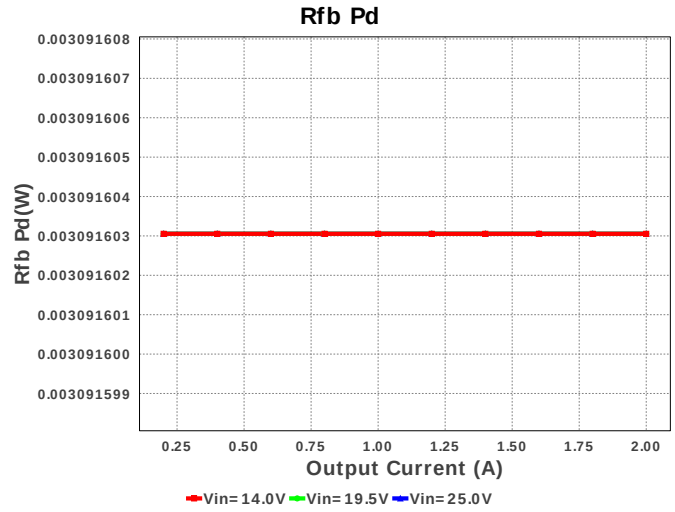


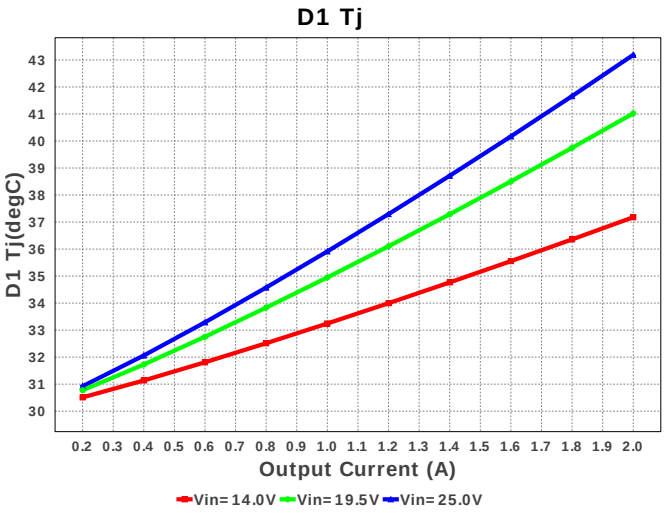


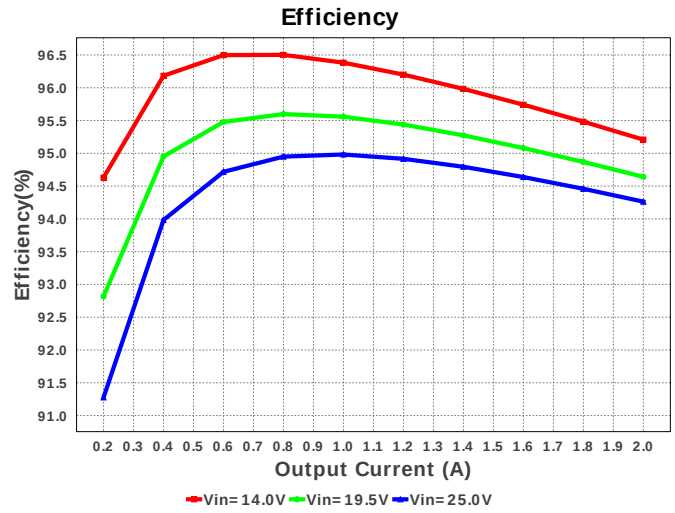


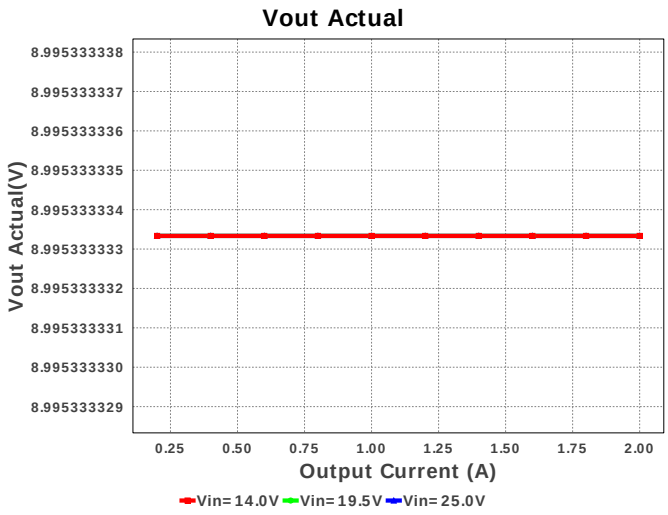


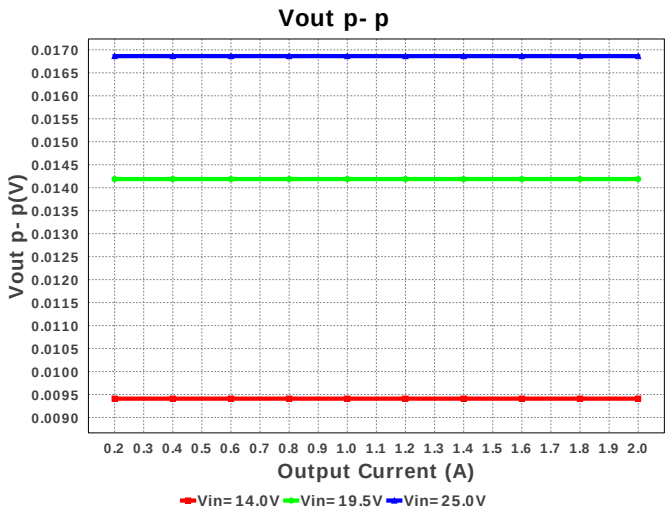


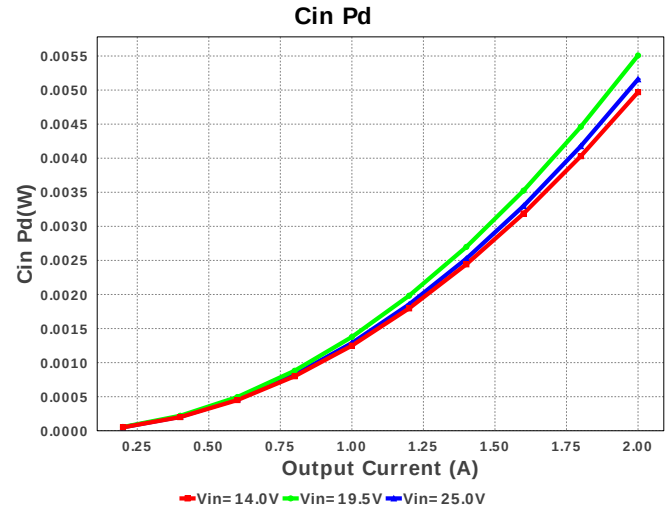


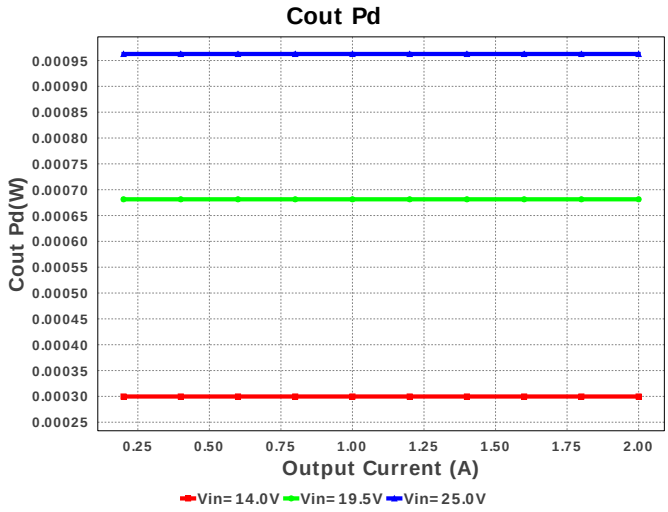


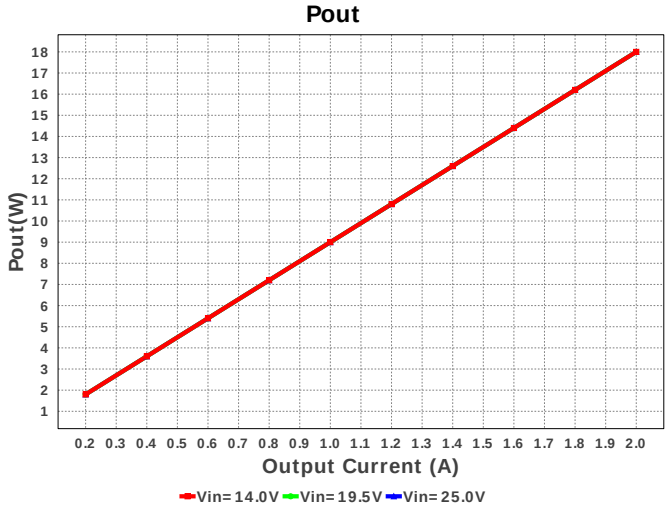


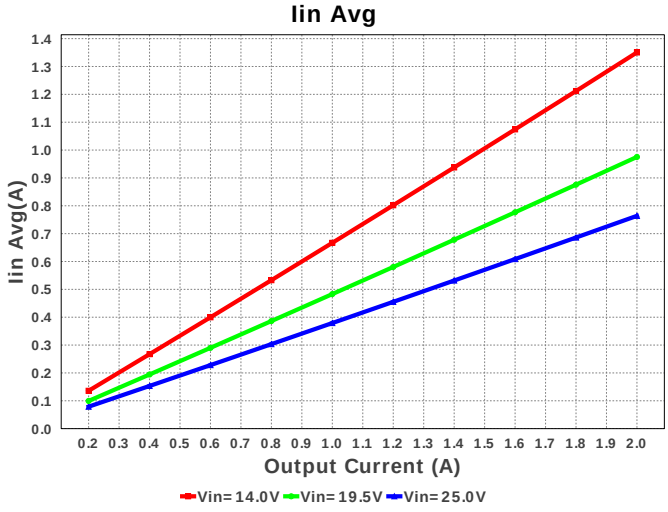


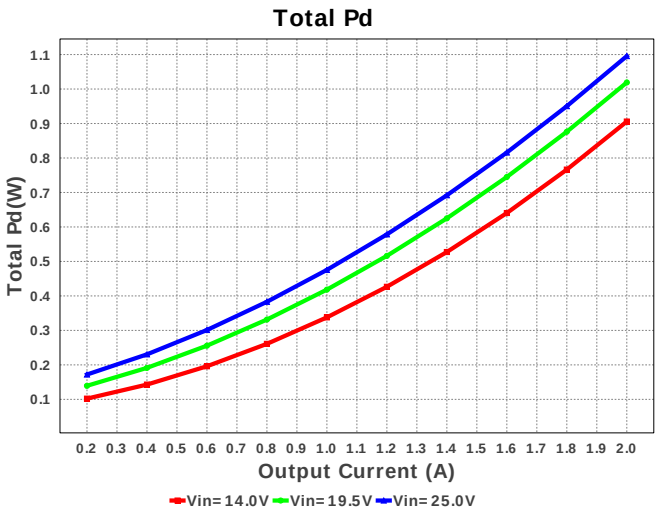


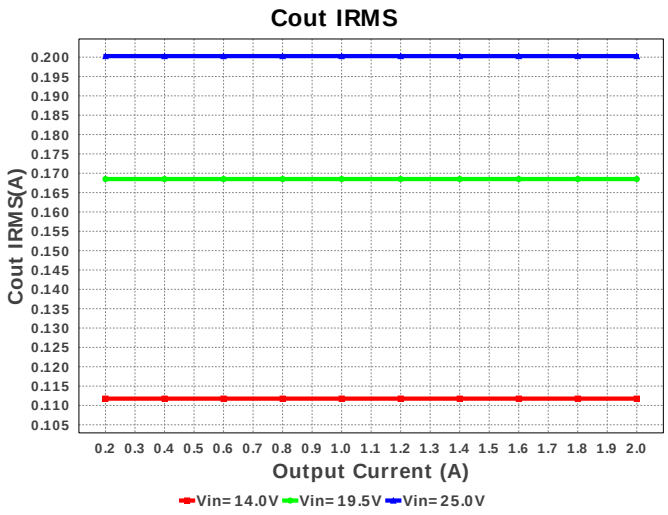


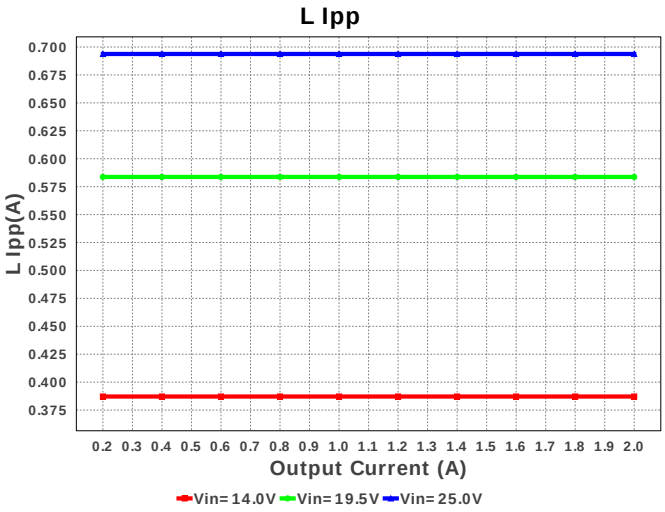


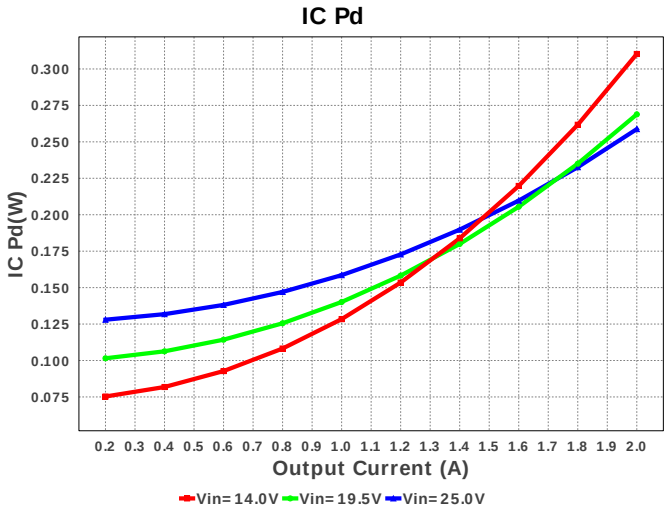


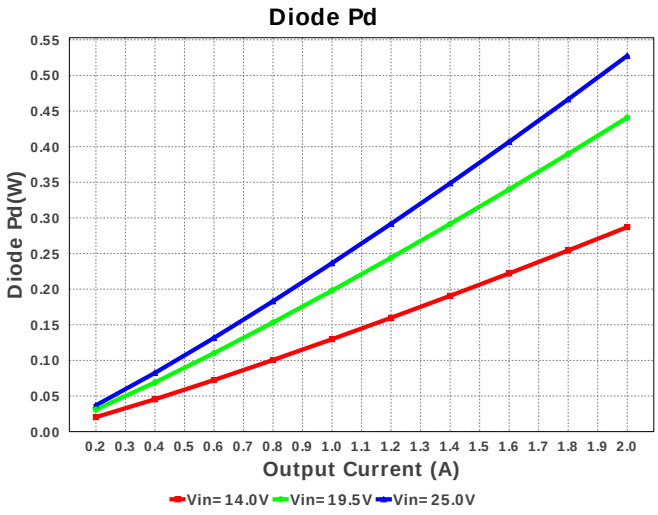


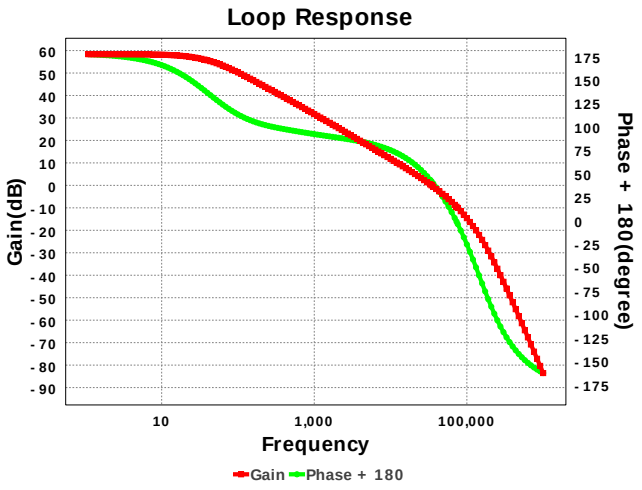












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	966.517 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	200.273 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.347 A	Current	Peak switch current in IC
4.	Iin Avg	763.82 mA	Current	Average input current
5.	L Ipp	693.77 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	17	General	Total Design BOM count
7.	FootPrint	586.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	324.583 kHz	General	Switching frequency
9.	Pout	18.0 W	General	Total output power

#	Name	Value	Category	Description
10.	Total BOM	$3.64	General	Total BOM Cost
11.	D1 Tj	43.188 degC	Op_Point	D1 junction temperature
12.	Low Freq Gain	58.377 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	8.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
15.	Cross Freq	34.416 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	37.17 %	Op_point	Duty cycle
17.	Efficiency	94.263 %	Op_point	Steady state efficiency
18.	Gain Marg	-9.5 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	38.279 degC	Op_point	IC junction temperature
20.	ICThetaJA	32.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	Phase Marg	42.914 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	25.0 V	Op_point	Vin operating point
24.	Vout p-p	16.863 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	5.158 mW	Power	Input capacitor power dissipation
26.	Cout Pd	962.627 µW	Power	Output capacitor power dissipation
27.	Diode Pd	527.531 mW	Power	Diode power dissipation
28.	IC Pd	258.728 mW	Power	IC power dissipation
29.	L Pd	300.0 mW	Power	Inductor power dissipation
30.	Rfb Pd	3.092 mW	Power	Rfb Power Dissipation
31.	Total Pd	1.096 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.307 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	25.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	9.0	Output Voltage
5.	base_pn	LM26003-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. The LM26003-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application

2. **LM26003-Q1** Product Folder : http://www.ti.com/product/LM26003%2DQ1 : contains the data sheet and other resources.