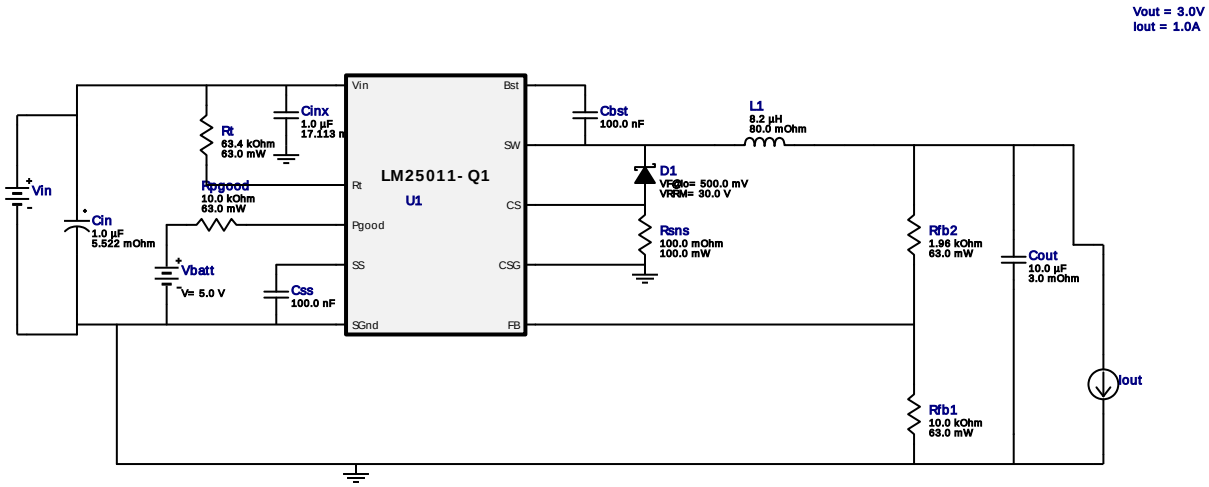
WEBENCH® Design Report

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

Device = LM25011Q1MYX/NOPB
Topology = Buck
Created = 7/19/16 5:47:54 AM
BOM Cost = $1.75
BOM Count = 13
Total Pd = 0.89W

Design : 4728729/10 LM25011Q1MYX/NOPB
LM25011Q1MYX/NOPB 10.0V-19.0V to 3.00V @ 1.0A

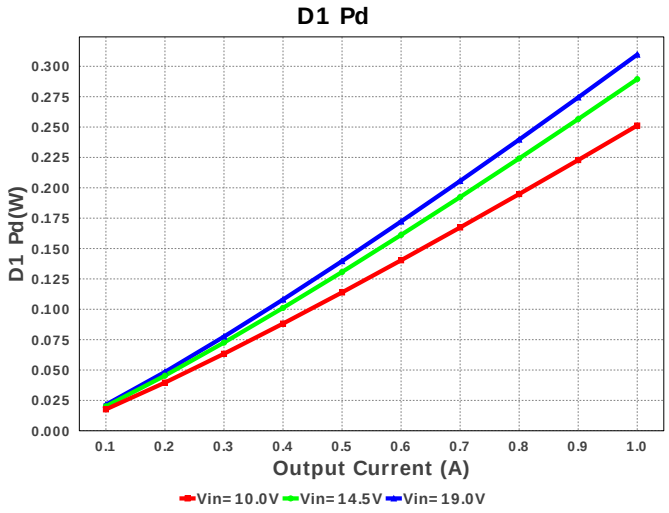


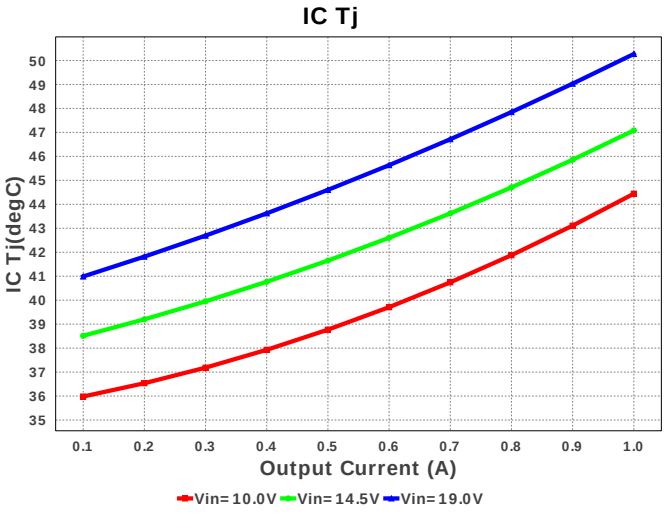
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

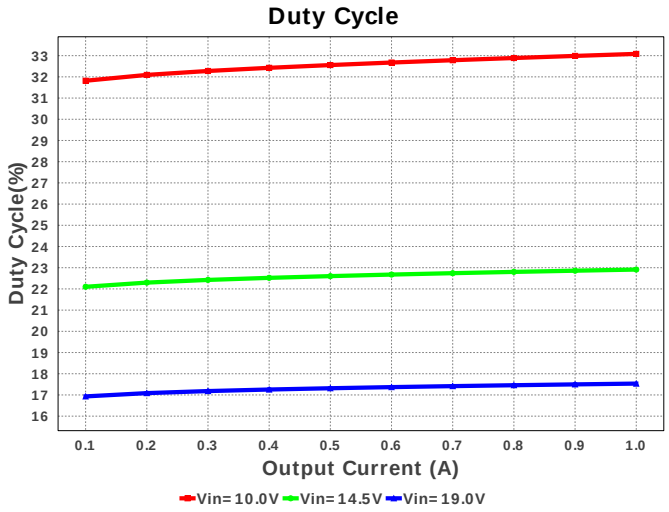
Electrical BOM

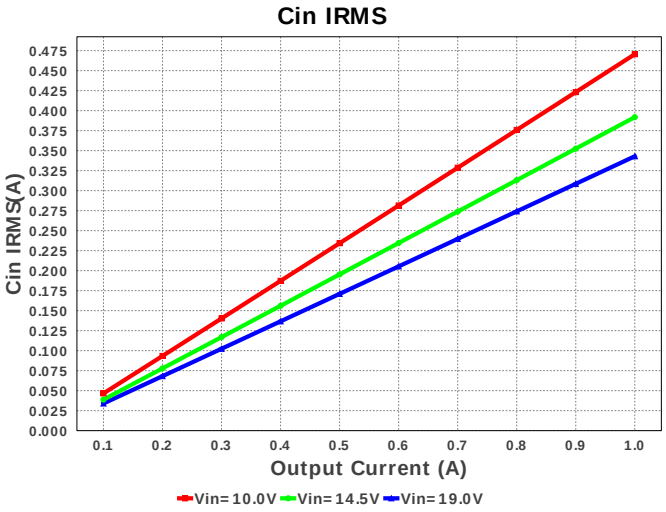
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	$0.05	0603 5 mm²
3.	Cinx	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	$0.01	0603 5 mm²
4.	Cout	MuRata	GRM188R60G106ME47D Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 4.0 V IRMS= 3.0 A	1	$0.02	0603 5 mm²
5.	Css	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
6.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	$0.09	SMA 37 mm²
7.	L1	NIC Components	NPI54C8R2MTRF	L= 8.2 µH DCR= 80.0 mOhm	1	$0.09	IND_NPI54C 61 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	CRCW04021K96FKED Series= CRCW..e3	Res= 1.96 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

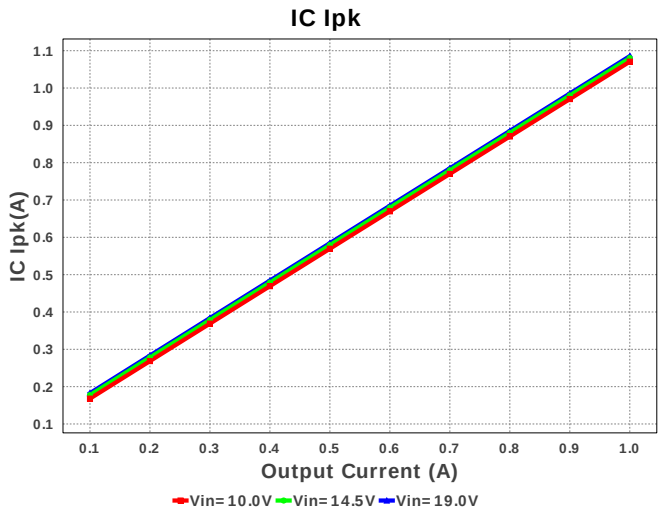
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rpgood	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	Rsns	Panasonic	ERJ-3RSFR10V Series= ERJ-3R	Res= 100.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.03	0603 5 mm^2
12.	Rt	Vishay-Dale	CRCW040263K4FKED Series= CRCW..e3	Res= 63.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	U1	Texas Instruments	LM25011Q1MYX/NOPB	Switcher	1	$1.40	MUC10A 24 mm^2

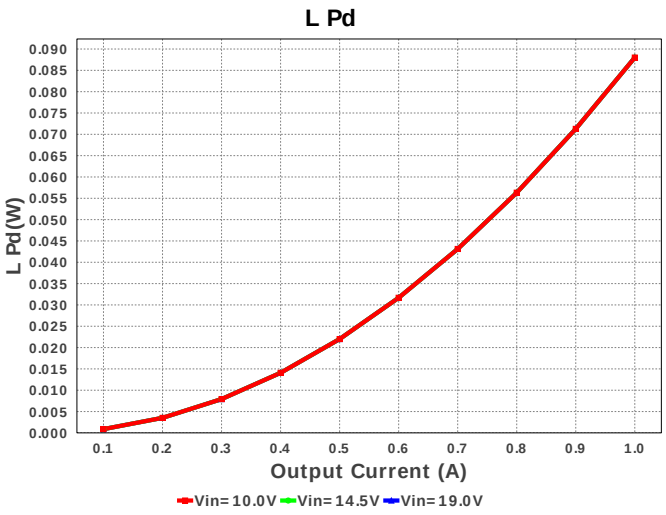


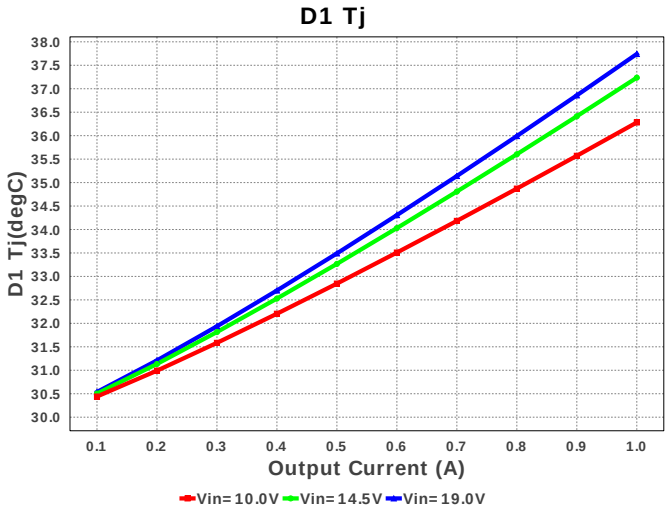


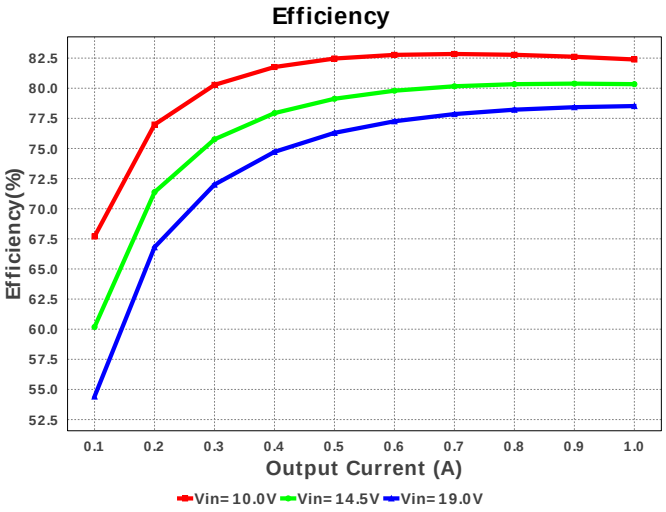


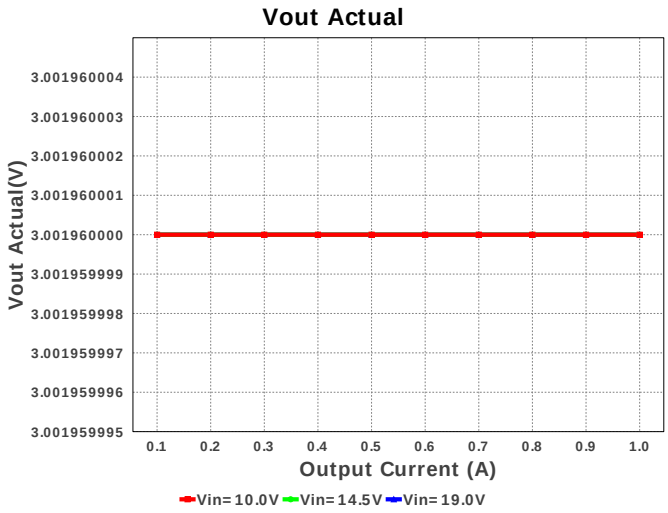


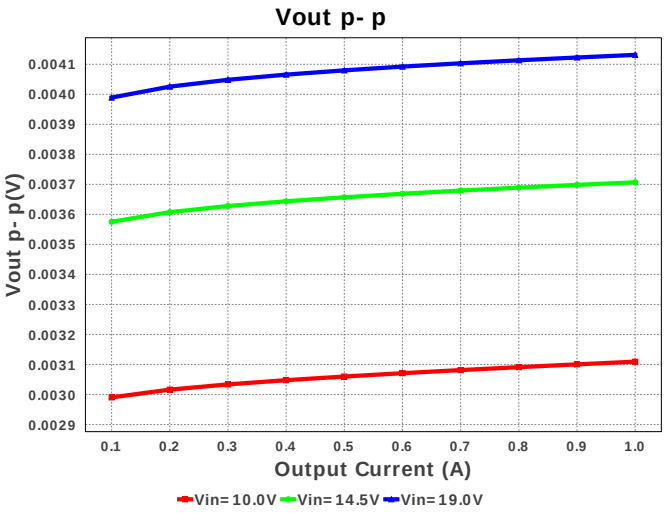


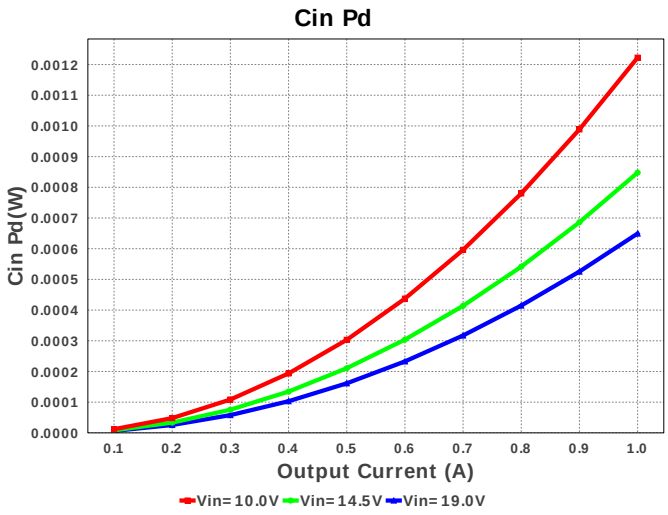


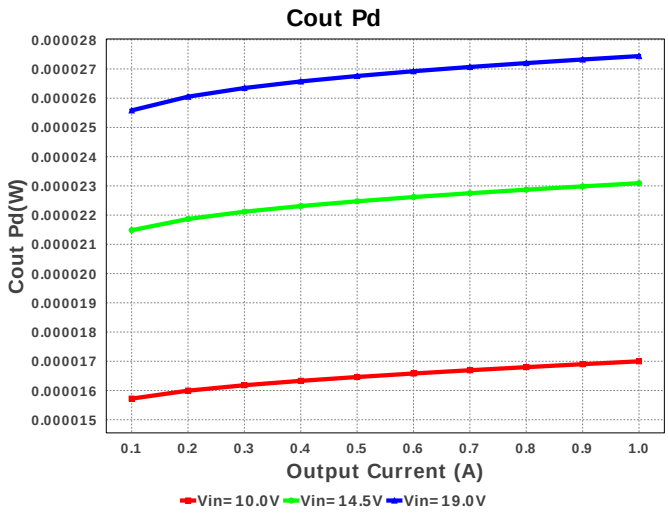


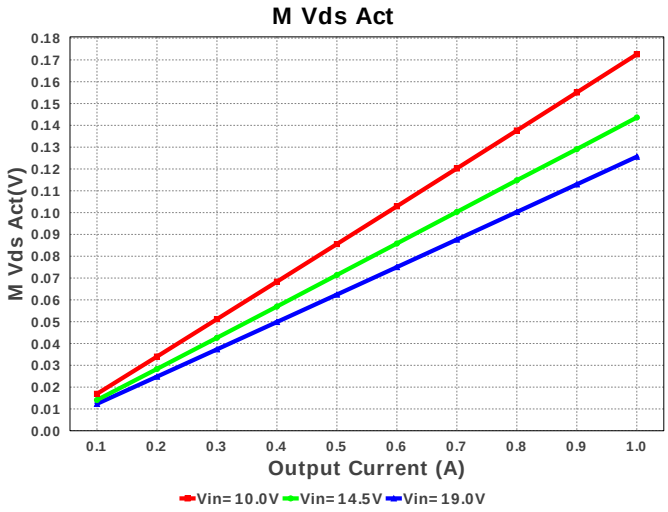


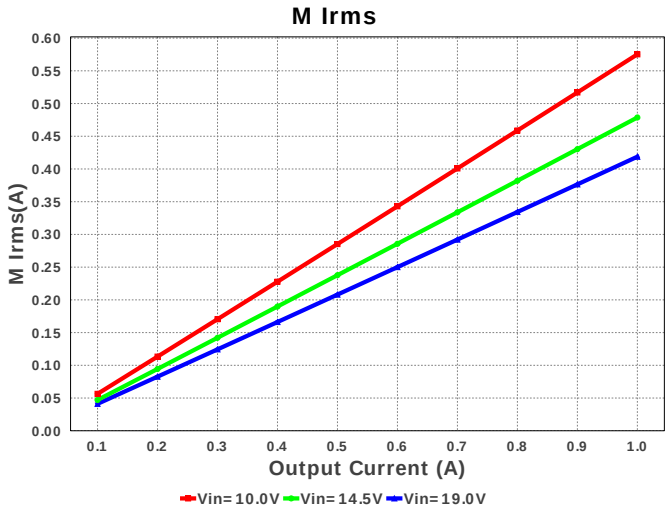


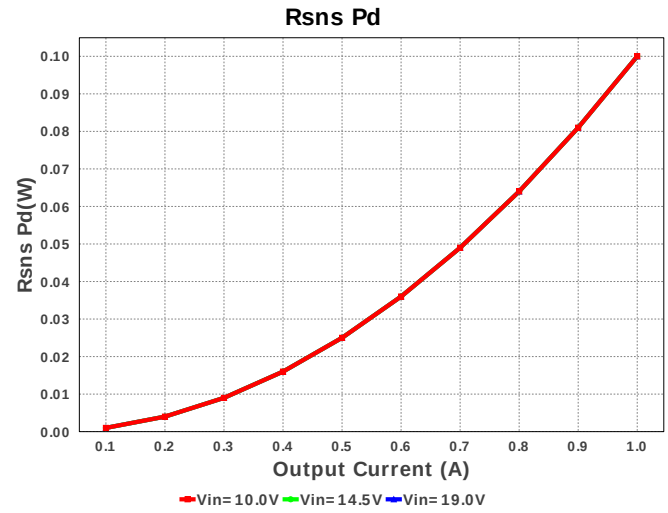


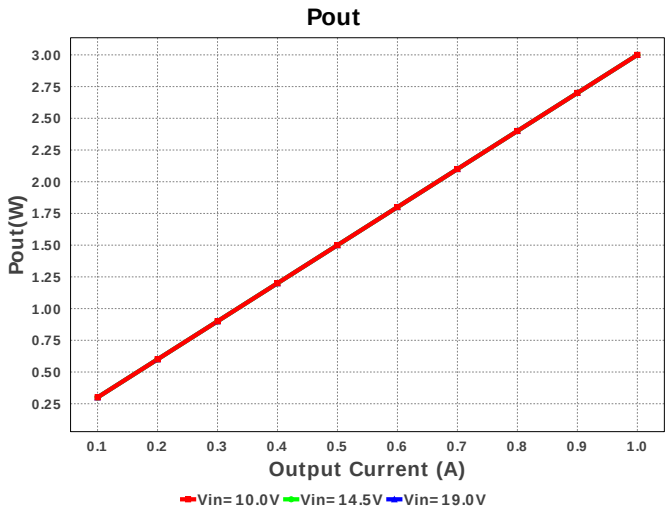


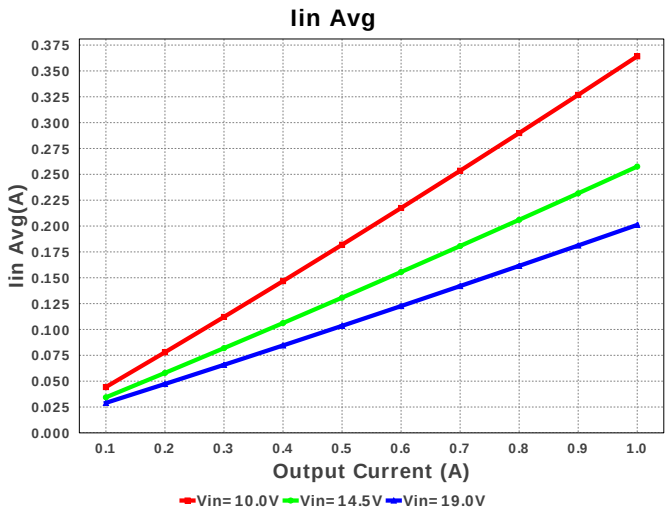


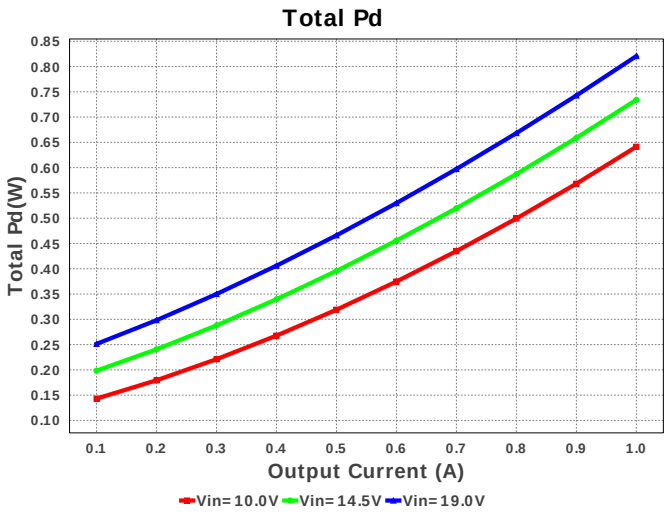


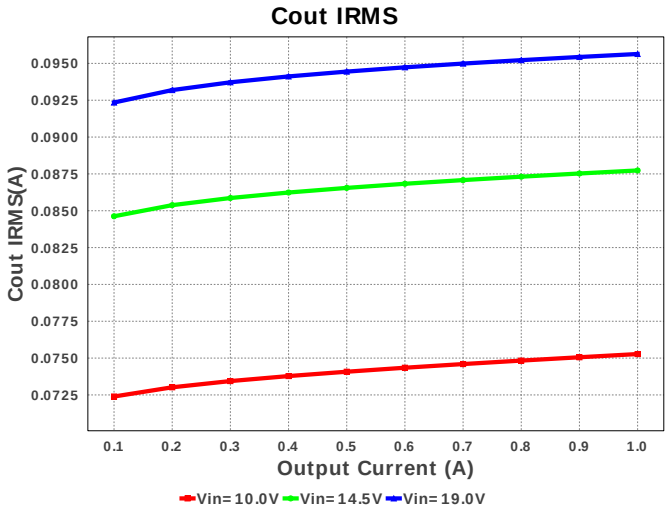


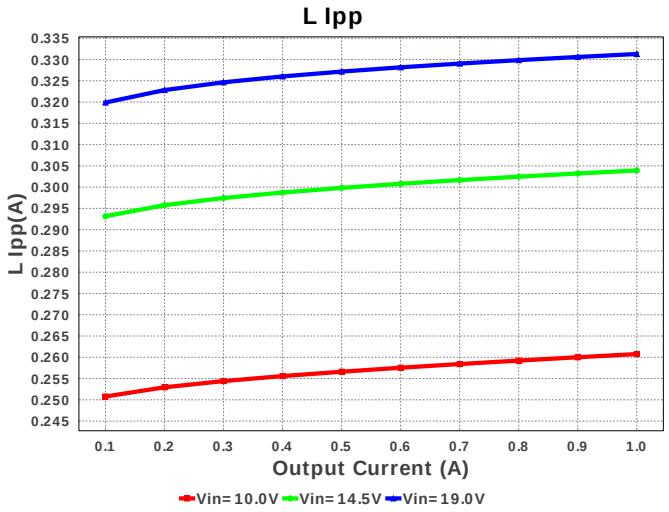


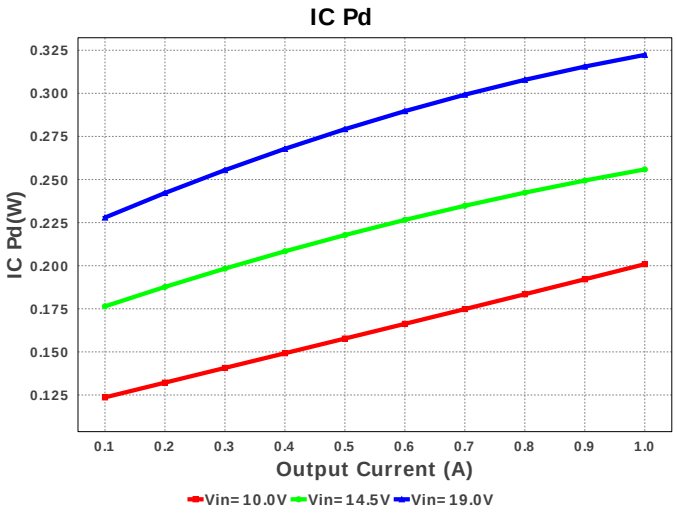


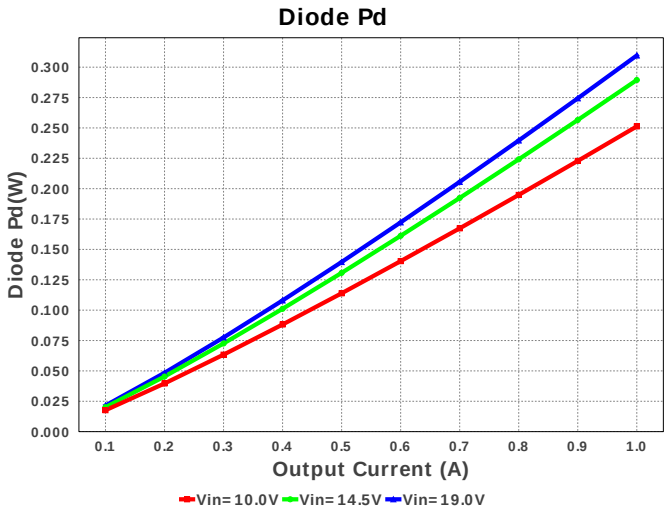












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	342.935 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	95.638 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.166 A	Current	Peak switch current in IC
4.	Iin Avg	201.09 mA	Current	Average input current
5.	L Ipp	331.3 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	418.749 mA	Current	MOSFET RMS current
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	166.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.033 MHz	General	Switching frequency
10.	IC Tolerance	50.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	125.625 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	3.0 W	General	Total output power
13.	Total BOM	$1.75	General	Total BOM Cost
14.	D1 Tj	37.741 degC	Op_Point	D1 junction temperature
15.	Vout Actual	3.002 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	17.535 %	Op_point	Duty cycle
18.	Efficiency	78.521 %	Op_point	Steady state efficiency
19.	IC Tj	50.271 degC	Op_point	IC junction temperature
20.	ICThetaJA	48.0 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	4.131 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	649.411 µW	Power	Input capacitor power dissipation
25.	Cout Pd	27.44 µW	Power	Output capacitor power dissipation
26.	D1 Pd	309.631 mW	Power	Output Diode Power Dissipation
27.	Diode Pd	309.631 mW	Power	Diode power dissipation
28.	IC Pd	422.313 mW	Power	IC power dissipation
29.	L Pd	88.0 mW	Power	Inductor power dissipation
30.	Rsns Pd	66.498 mW	Power	Current Limit Sense Resistor Power Dissipation
31.	Total Pd	887.12 mW	Power	Total Power Dissipation
32.	Vout Tolerance	2.33 %		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	LM25011-Q1	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. Feature Highlights: Automotive Qualified 12V to 14V Vin, 2A Constant On-Time Buck Regulator

2. The LM25011-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

3. LM25011-Q1 Product Folder : http://www.ti.com/product/LM25011%2DQ1 : contains the data sheet and other resources.