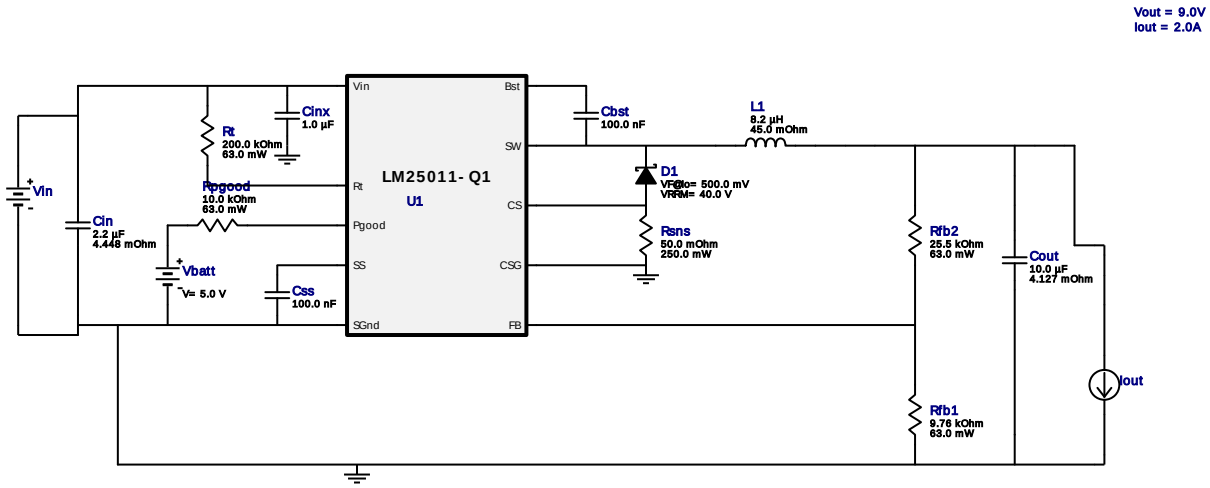
WEBENCH® Design Report

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

Device = LM25011Q1MYX/NOPB
Topology = Buck
Created = 7/15/16 6:08:25 PM
BOM Cost = $2.00
BOM Count = 13
Total Pd = 1.94W

Design : 4742013/7 LM25011Q1MYX/NOPB
LM25011Q1MYX/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.	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	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
3.	Cinx	Taiyo Yuden	GMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 35.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
4.	Cout	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	1	$0.03	0805 7 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.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.09	SMA 37 mm²
7.	L1	Bourns	SRN8040-8R2Y	L= 8.2 µH DCR= 45.0 mOhm	1	$0.22	SRN8040 100 mm²
8.	Rfb1	Vishay-Dale	CRCW04029K76FKED Series= CRCW..e3	Res= 9.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfb2	Vishay-Dale	CRCW040225K5FKED Series= CRCW..e3	Res= 25.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

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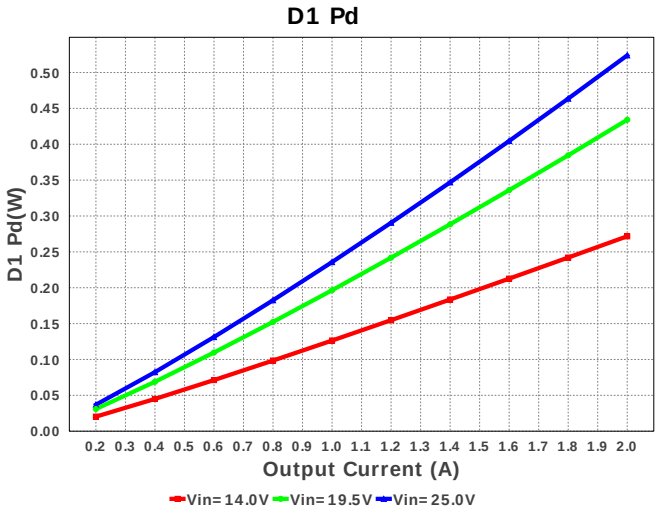
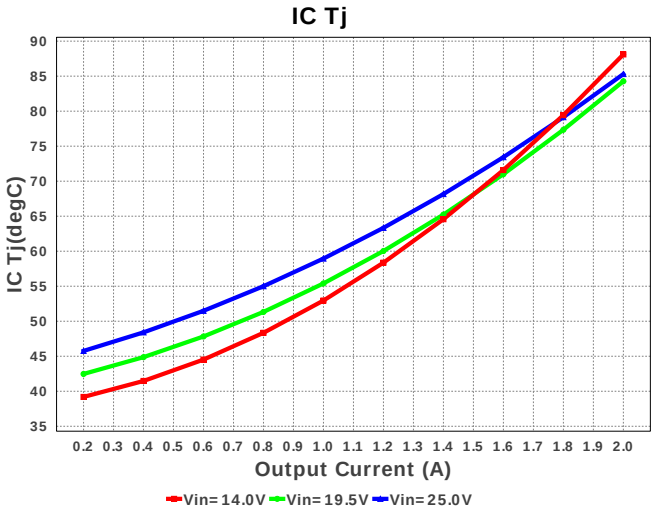
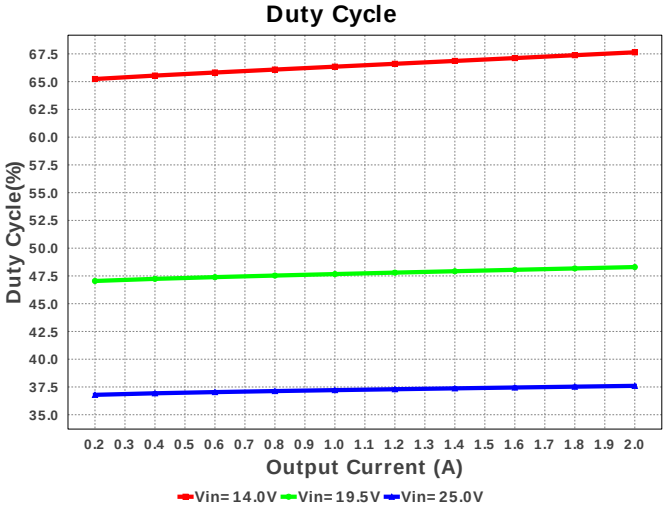
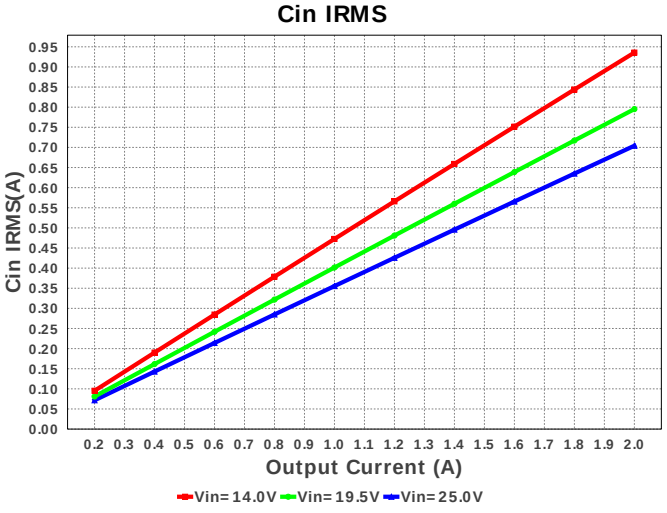
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rpgood	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	Rsns	Bourns	CRM0805-FW-R050ELF Series= ?	Res= 50.0 mOhm Power= 250.0 mW Tolerance= 1.0%	1	$0.10	0805 7 mm^2
12.	Rt	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 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









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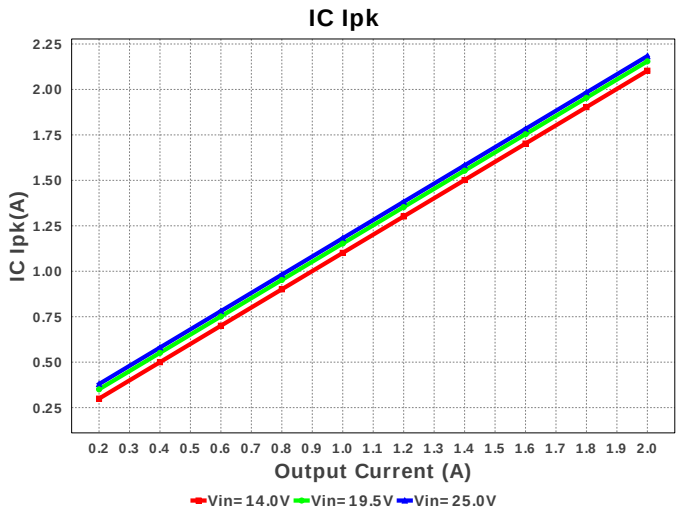

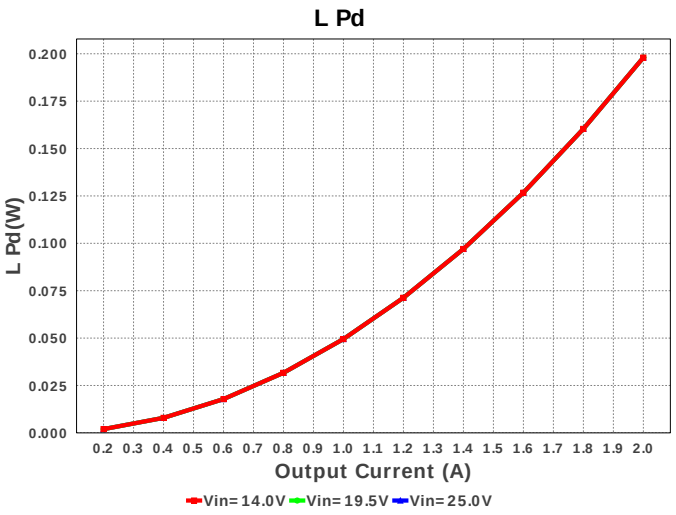

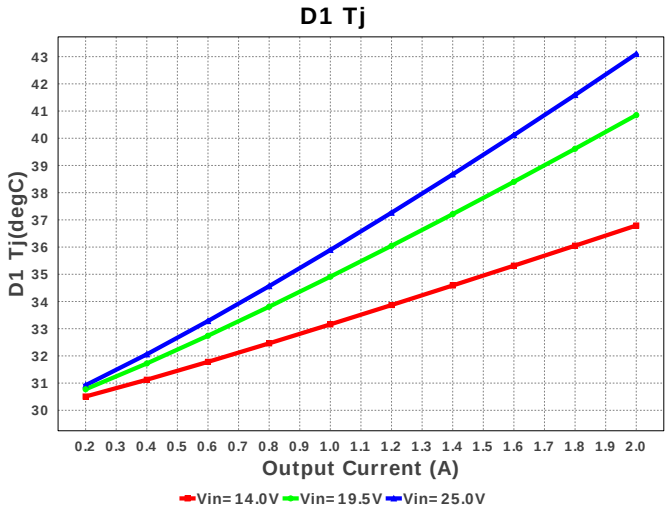

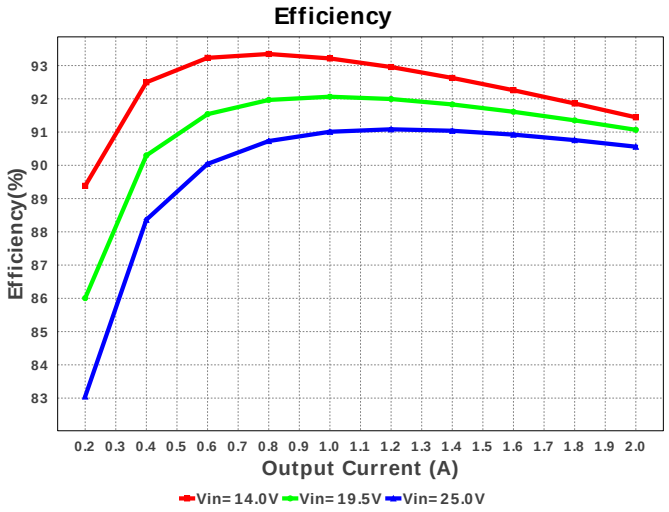

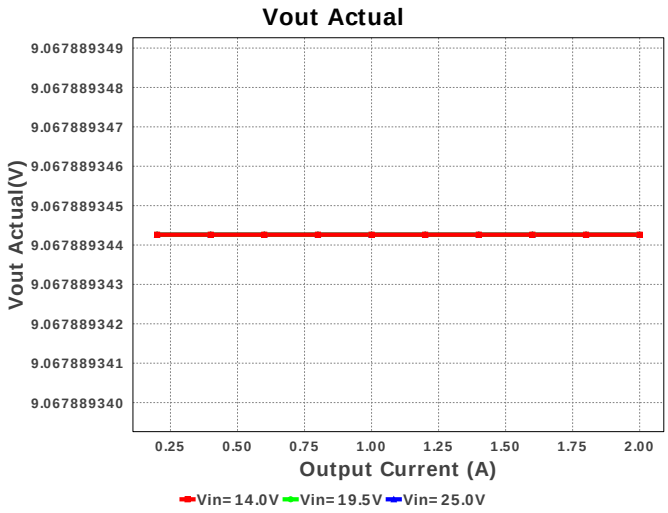

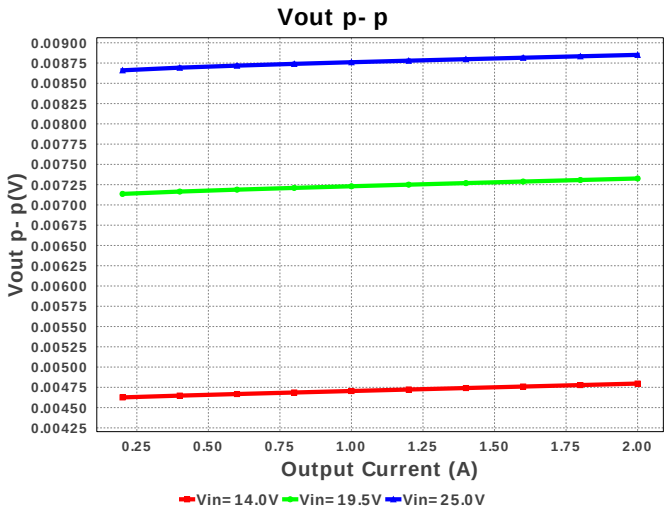

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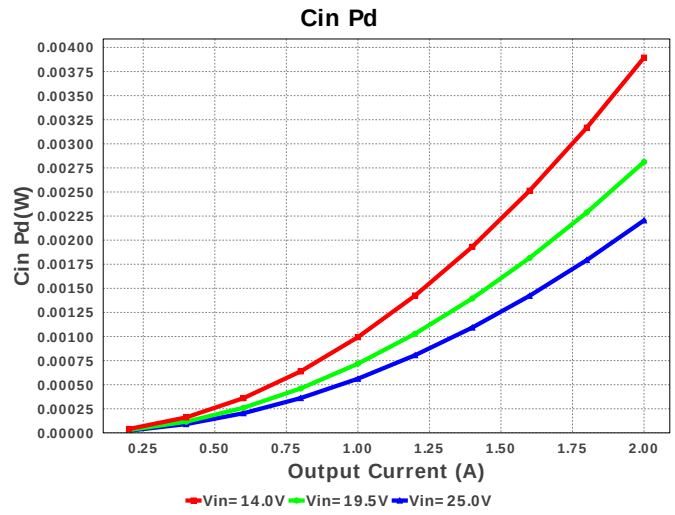

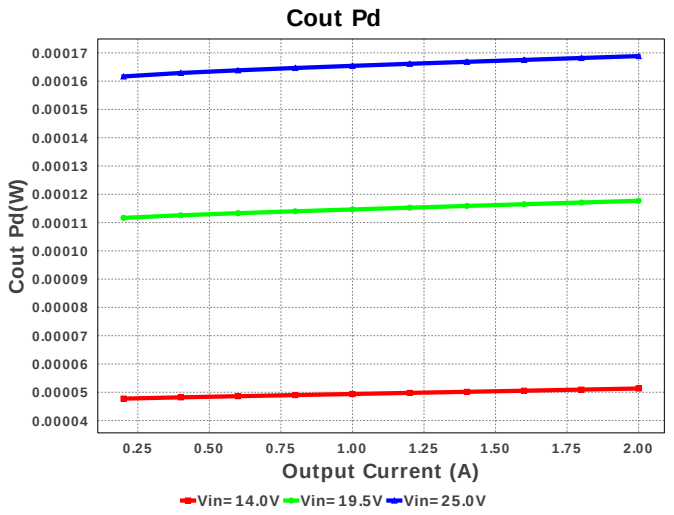

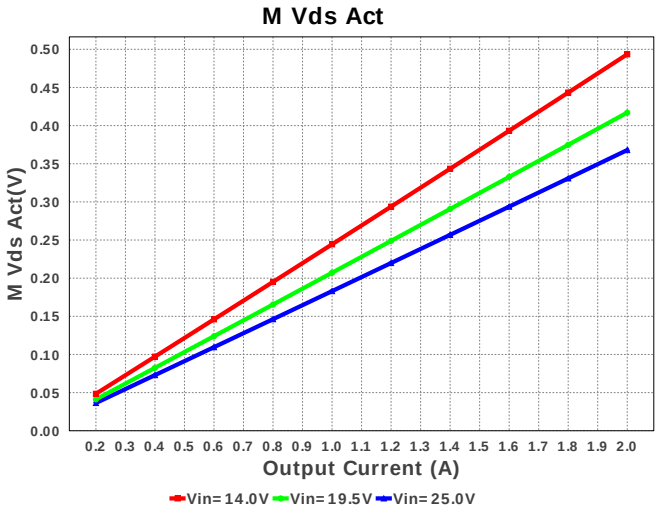

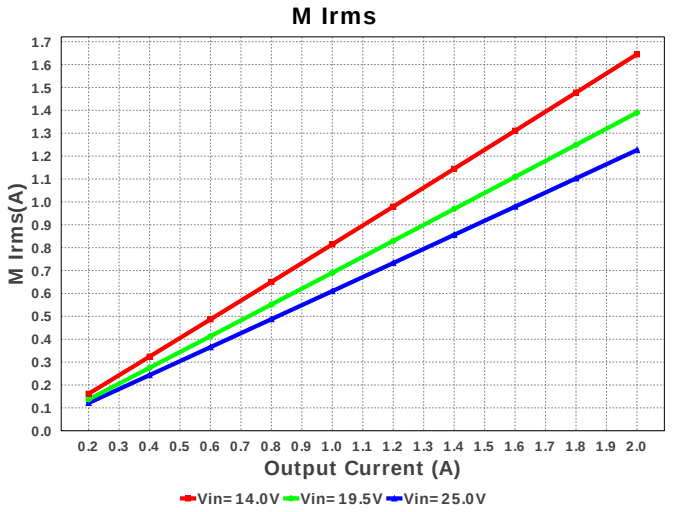

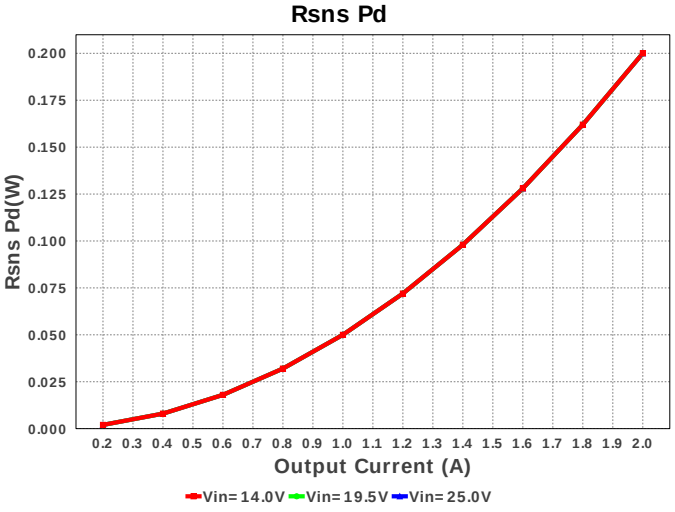

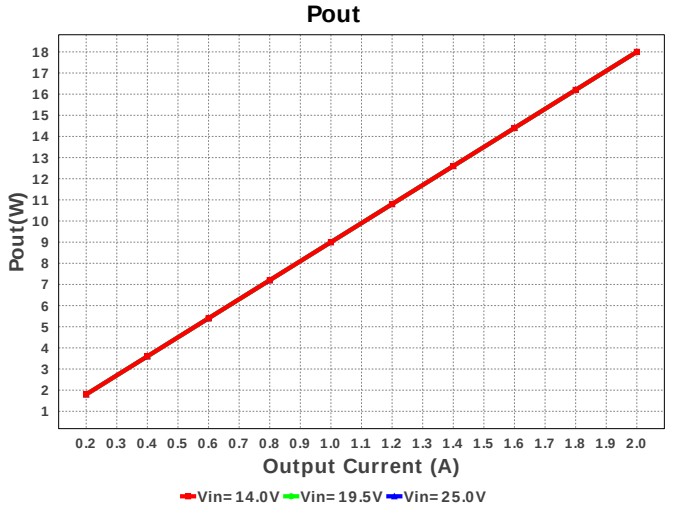

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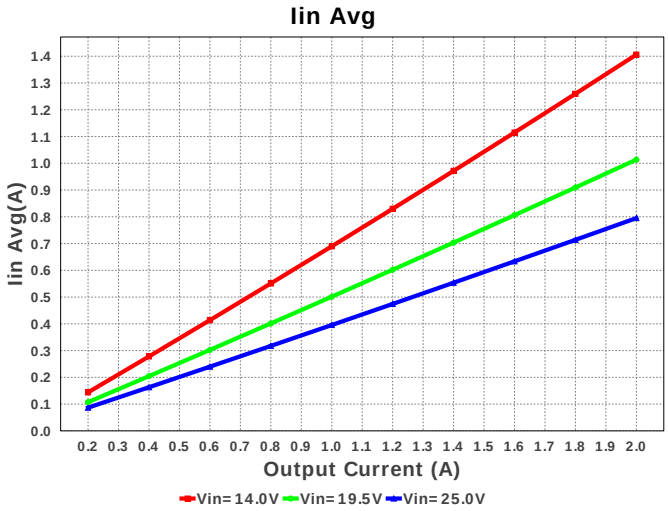

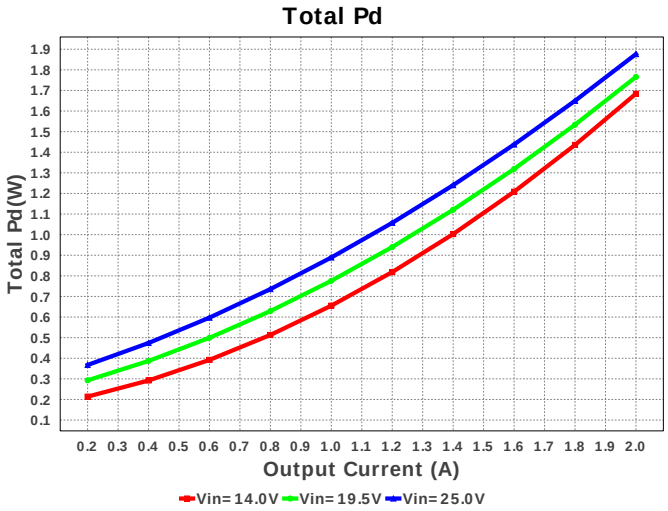

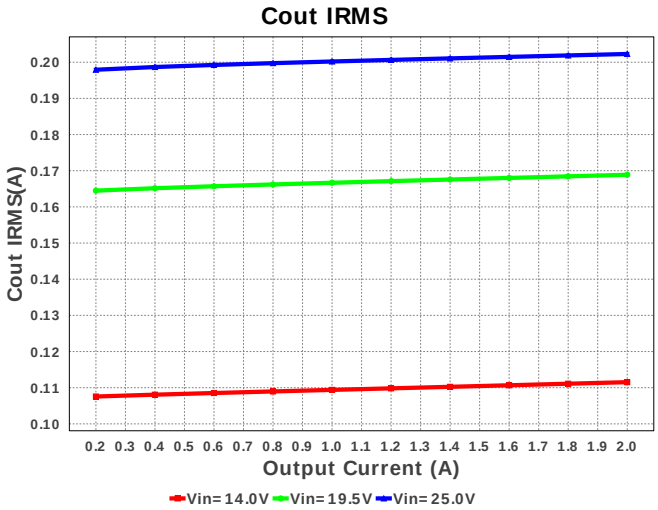

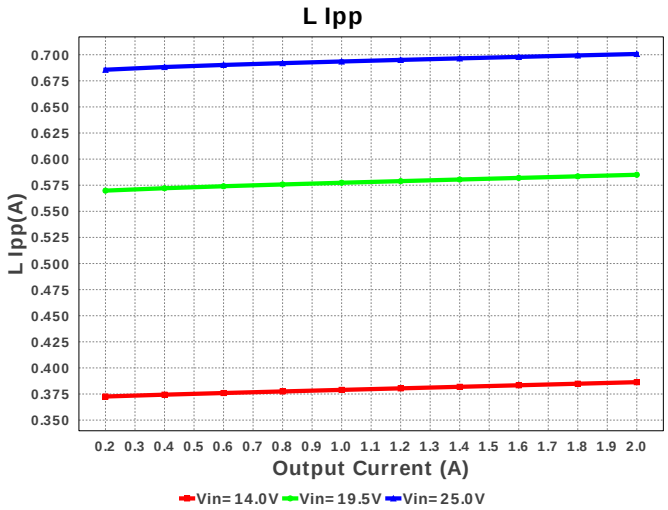

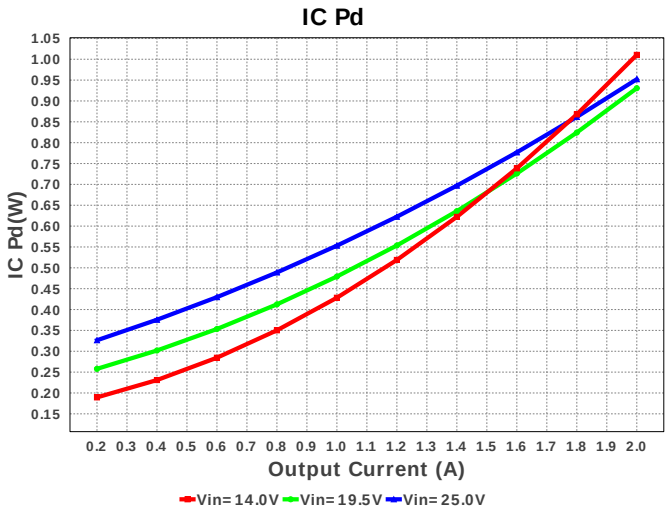

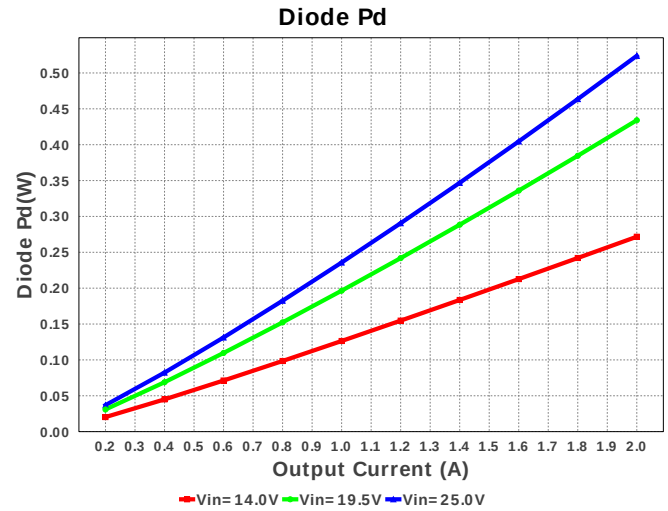

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	704.128 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	202.277 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.35 A	Current	Peak switch current in IC
4.	Iin Avg	795.06 mA	Current	Average input current
5.	L Ipp	700.71 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.226 A	Current	Q Iavg
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	218.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.047 MHz	General	Switching frequency
10.	IC Tolerance	50.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	367.919 mV	General	Voltage drop across the MosFET

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#	Name	Value	Category	Description
12.	Pout	18.0 W	General	Total output power
13.	Total BOM	$2.0	General	Total BOM Cost
14.	D1 Tj	43.098 degC	Op_Point	D1 junction temperature
15.	Vout Actual	9.068 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	37.601 %	Op_point	Duty cycle
18.	Efficiency	90.56 %	Op_point	Steady state efficiency
19.	IC Tj	85.301 degC	Op_point	IC junction temperature
20.	ICThetaJA	48.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	VIN_OP	25.0 V	Op_point	Vin operating point
23.	Vout p-p	8.851 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	2.205 mW	Power	Input capacitor power dissipation
25.	Cout Pd	168.86 µW	Power	Output capacitor power dissipation
26.	D1 Pd	523.909 mW	Power	Output Diode Power Dissipation
27.	Diode Pd	523.909 mW	Power	Diode power dissipation
28.	IC Pd	1.152 W	Power	IC power dissipation
29.	L Pd	198.0 mW	Power	Inductor power dissipation
30.	Rsns Pd	63.677 mW	Power	Current Limit Sense Resistor Power Dissipation
31.	Total Pd	1.94 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.482 %		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	LM25011-Q1	Base Product 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.

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