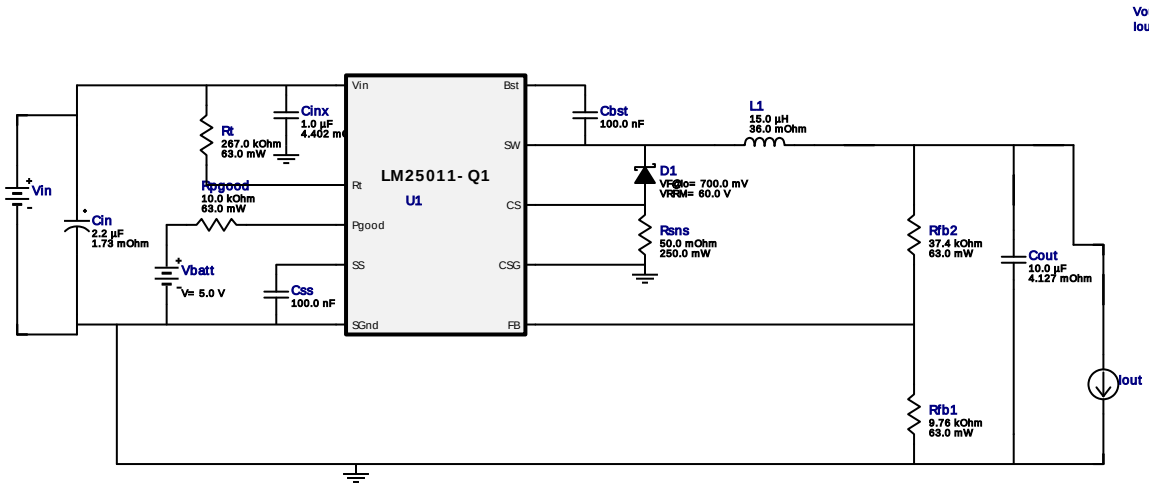
WEBENCH® Design Report

VinMin = 20.0V
VinMax = 40.0V
Vout = 12.0V
Iout = 2.0A

Device = LM25011Q1MYX/NOPB
Topology = Buck
Created = 7/17/16 8:47:02 AM
BOM Cost = $2.29
BOM Count = 13
Total Pd = 2.5W

Design : 4352199/59 LM25011Q1MYX/NOPB
LM25011Q1MYX/NOPB 20.0V-40.0V to 12.00V @ 2.0A

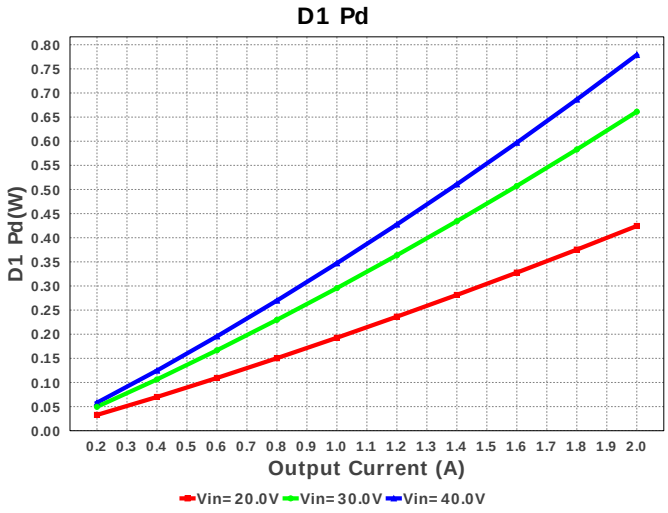


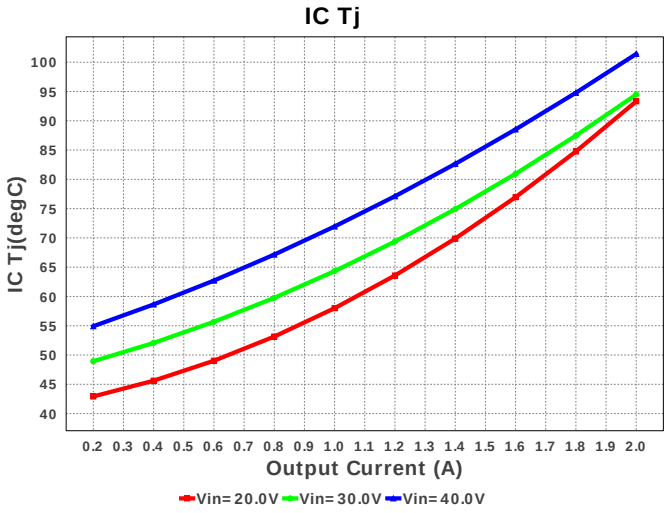
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

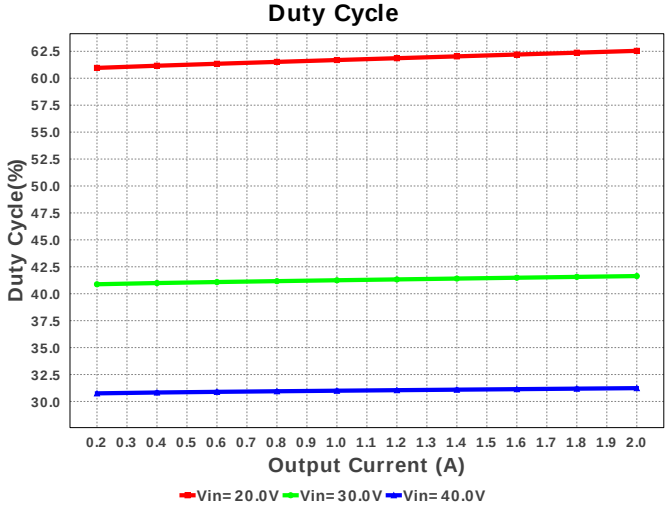
Electrical BOM

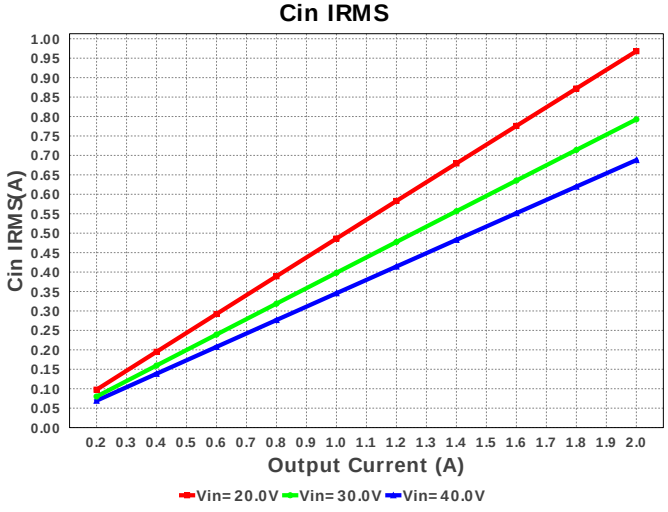
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 uF ESR= 1.73 mOhm VDC= 100.0 V IRMS= 5.5932 A	1	$0.19	1210_250 15 mm²
3.	Cinx	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 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.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.09	SMA 37 mm²
7.	L1	Bourns	SRR1208-150ML	L= 15.0 µH DCR= 36.0 mOhm	1	$0.37	SRR1208 216 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

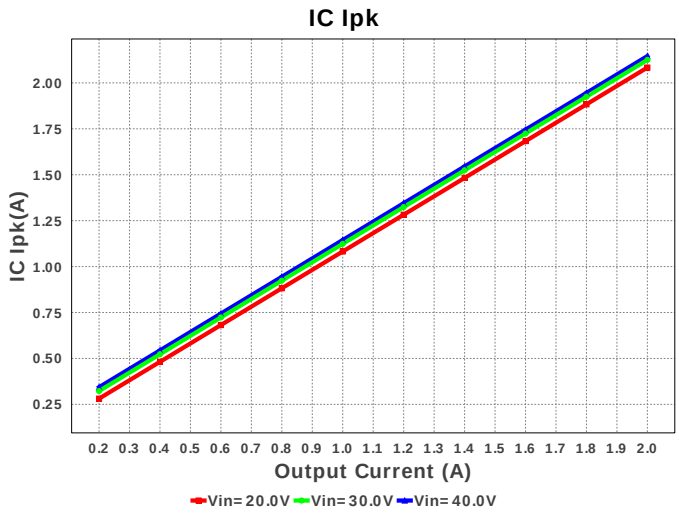
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfb2	Vishay-Dale	CRCW040237K4FKED Series= CRCW..e3	Res= 37.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rpgood	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 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	CRCW0402267KFKED Series= CRCW..e3	Res= 267.0 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

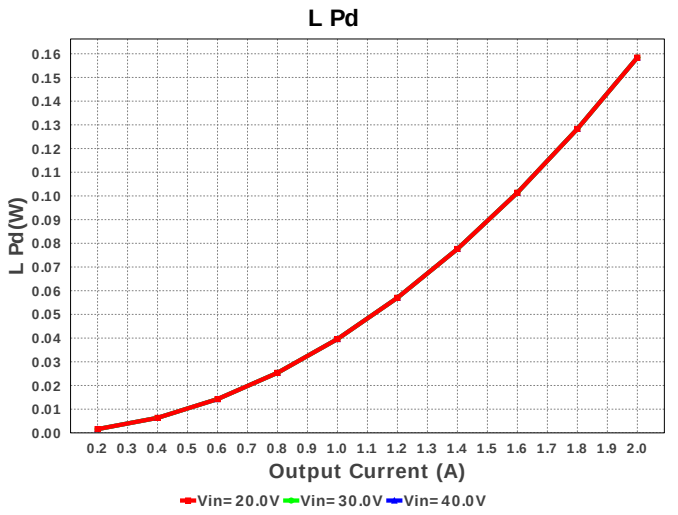


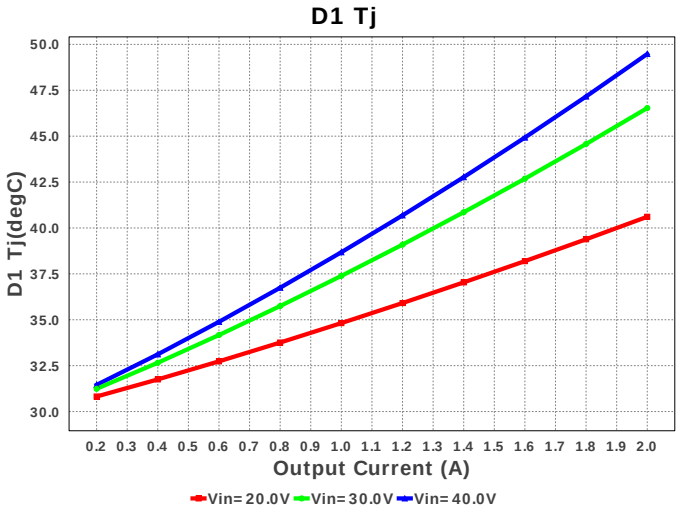


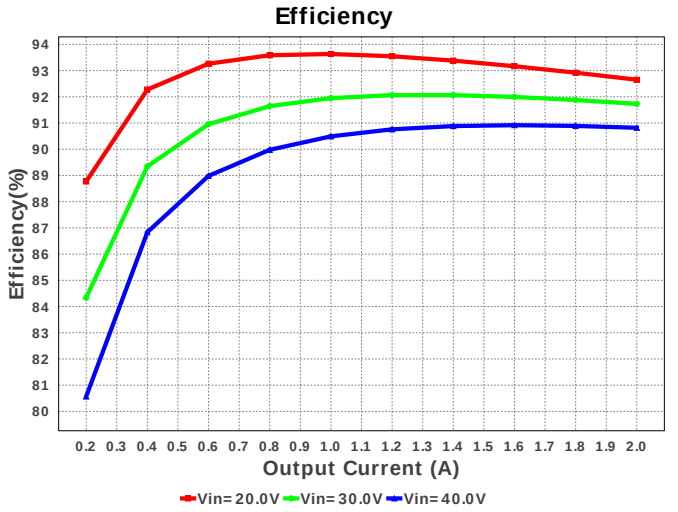


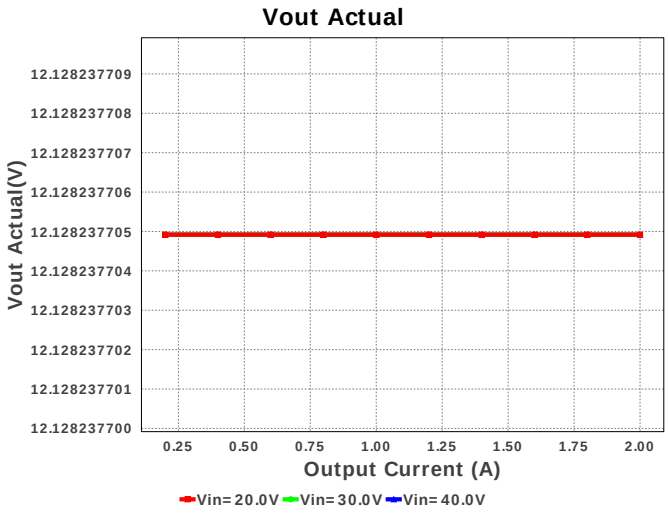


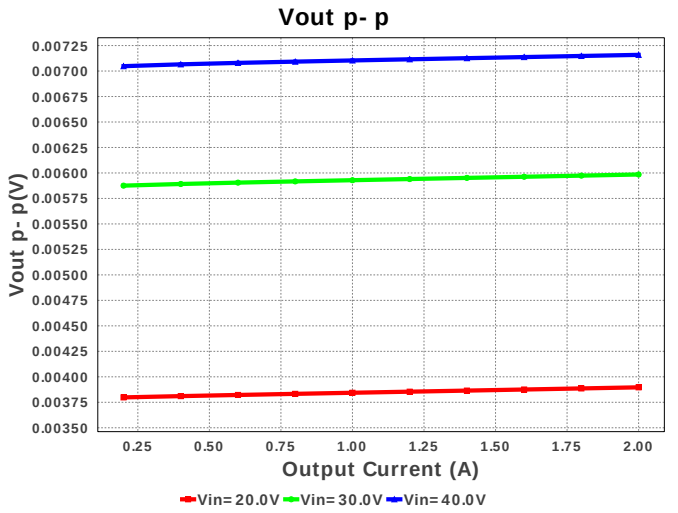


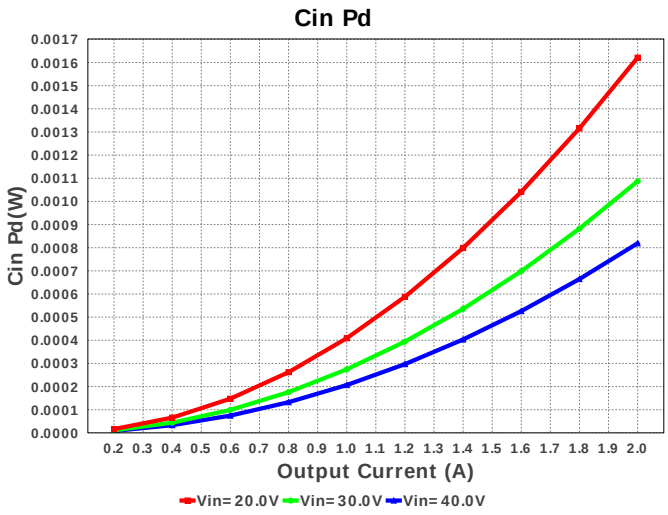


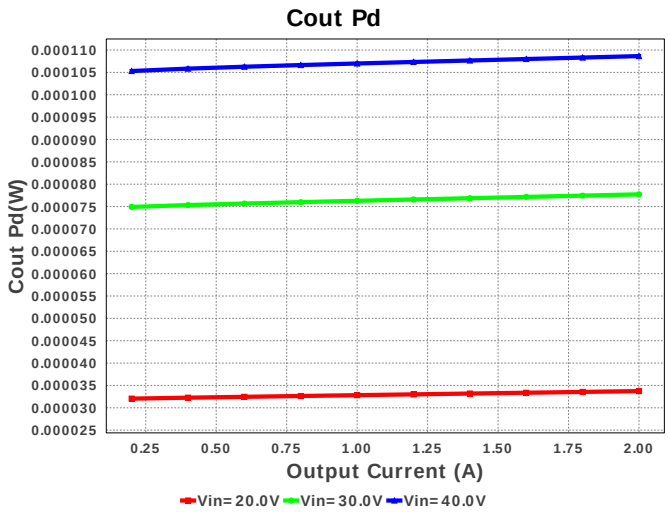


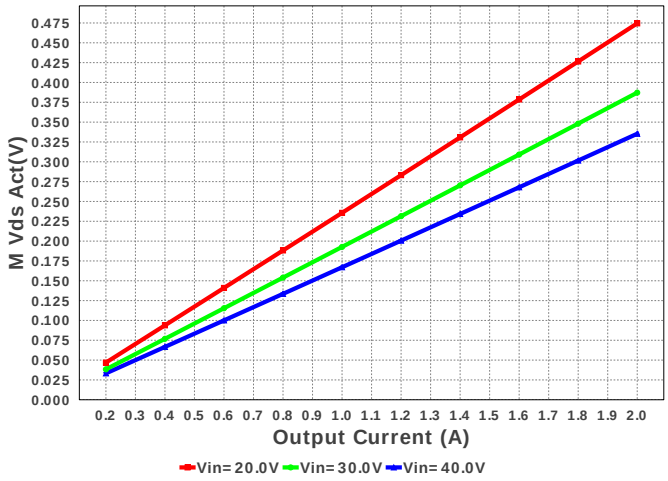


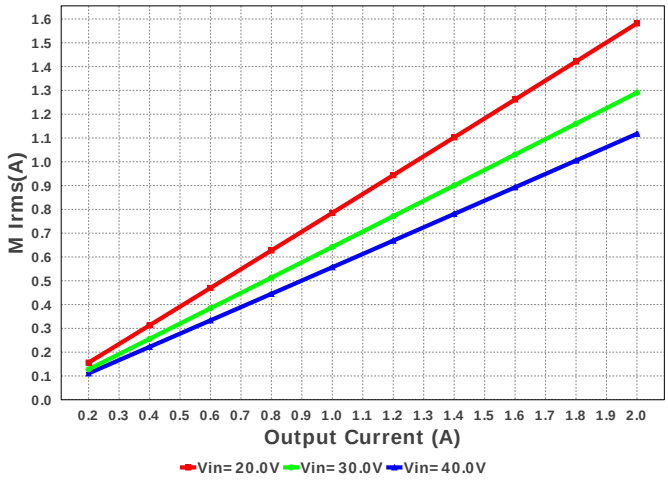


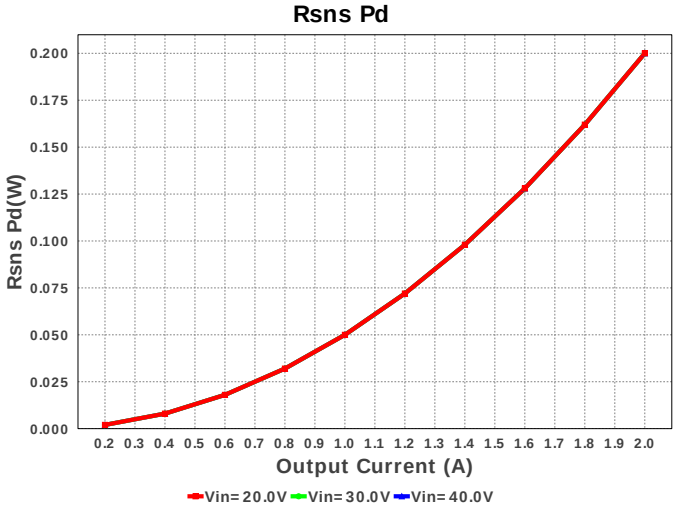


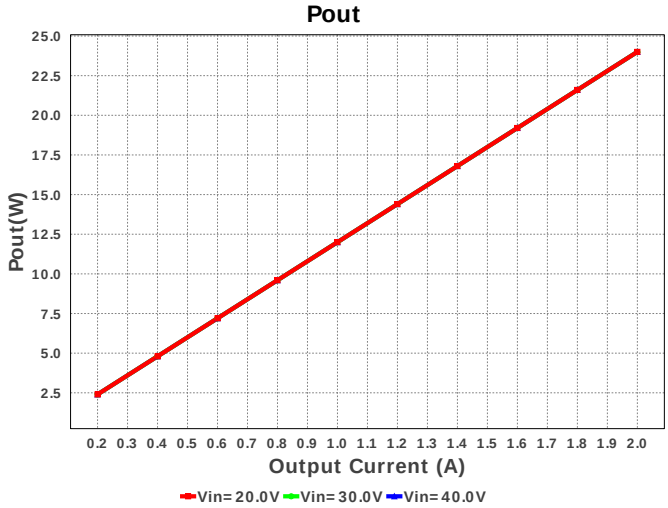


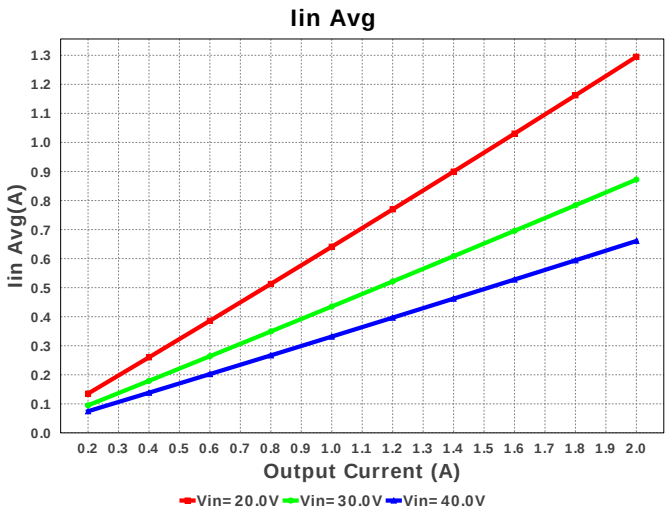


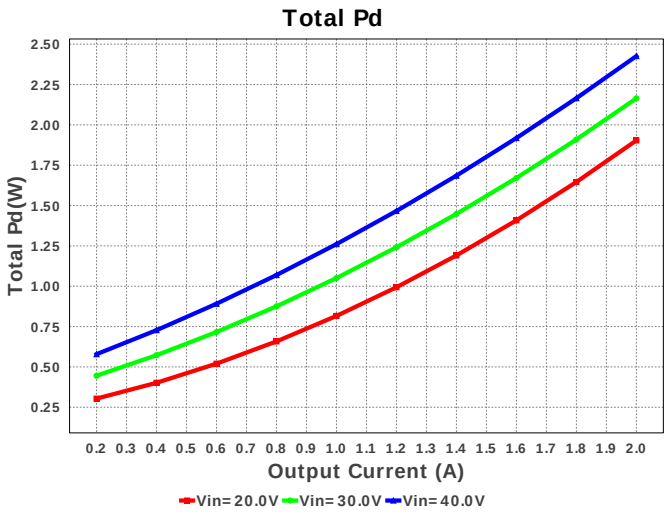


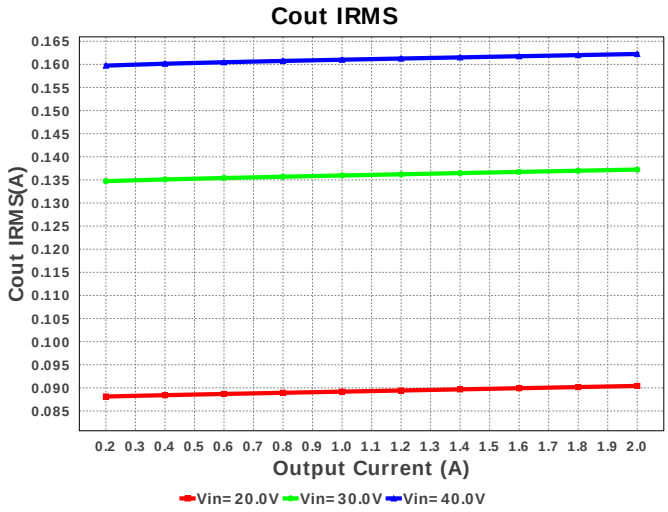


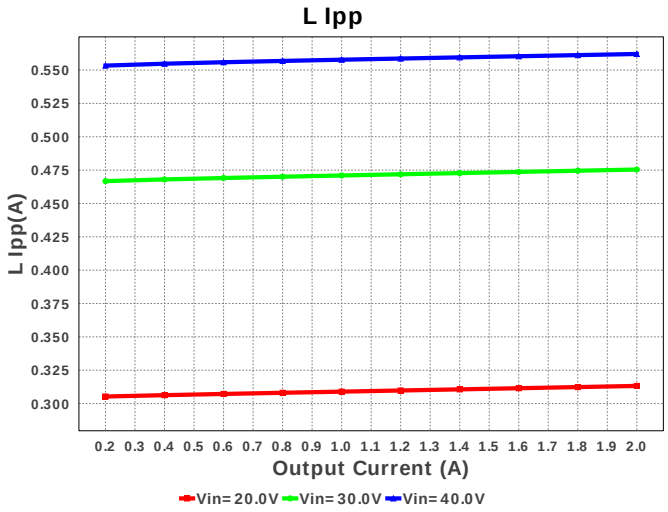


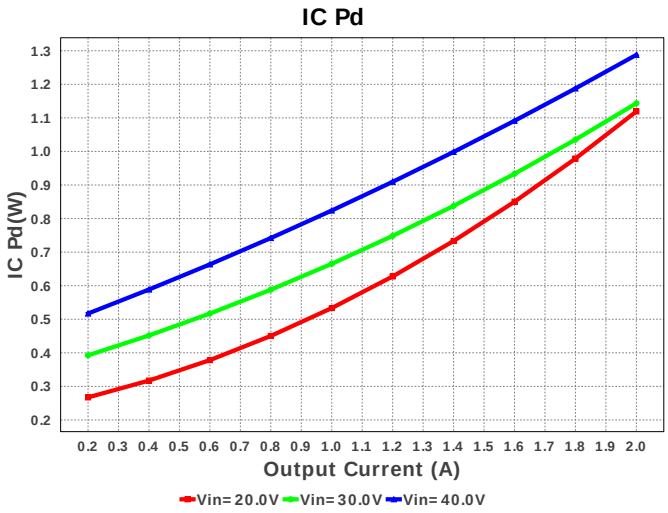


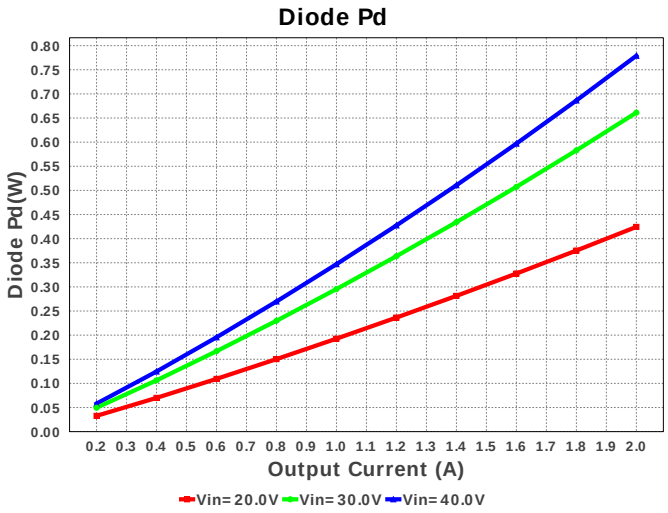












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	688.006 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	162.25 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.281 A	Current	Peak switch current in IC
4.	Iin Avg	660.65 mA	Current	Average input current
5.	L Ipp	562.05 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	1.118 A	Current	MOSFET RMS current
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	337.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.037 MHz	General	Switching frequency
10.	IC Tolerance	50.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	335.333 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	24.0 W	General	Total output power
13.	Total BOM	$2.29	General	Total BOM Cost
14.	D1 Tj	49.477 degC	Op_Point	D1 junction temperature
15.	Vout Actual	12.128 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	31.236 %	Op_point	Duty cycle
18.	Efficiency	90.819 %	Op_point	Steady state efficiency
19.	IC Tj	101.411 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	40.0 V	Op_point	Vin operating point
23.	Vout p-p	7.159 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	818.899 µW	Power	Input capacitor power dissipation
25.	Cout Pd	108.644 µW	Power	Output capacitor power dissipation
26.	D1 Pd	779.075 mW	Power	Output Diode Power Dissipation
27.	Diode Pd	779.075 mW	Power	Diode power dissipation
28.	IC Pd	1.488 W	Power	IC power dissipation
29.	L Pd	158.4 mW	Power	Inductor power dissipation
30.	Rsns Pd	74.124 mW	Power	Current Limit Sense Resistor Power Dissipation
31.	Total Pd	2.5 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.626 %		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	40.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	12.0	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.