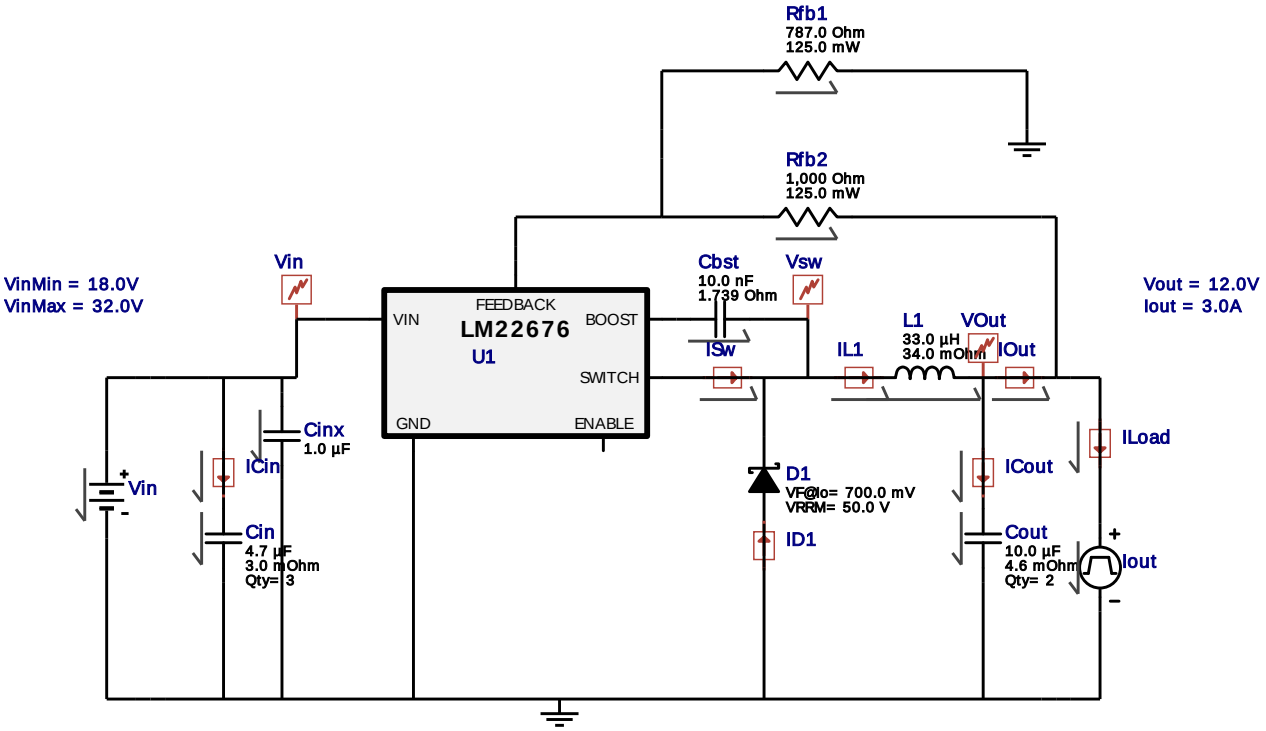
WEBENCH® Electrical Simulation Report

VinMin = 18.0V
VinMax = 32.0V
Vout = 12.0V
Iout = 3.0A

Device = LM22676TJ-5.0/NOPB
Topology = Buck
Created = 4/14/14 2:00:35 AM
User ID = 1382630
Design Id = 540
eSim Id = 4
Simulation Type = Load Transient



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	$0.01	0805 7mm2
2.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	3	$0.10	1206 11mm2
3.	Cinx	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 µF VDC= 50.0 V IRMS= 0.0 A	1	$0.10	0805 7mm2
4.	Cout	TDK	C3216X5R1C106M Series= X5R	Cap= 10.0 µF ESR= 4.6 mOhm VDC= 16.0 V IRMS= 2.7 A	2	$0.06	1206 11mm2
5.	D1	Diodes Inc.	B350A-13-F	VF@Io= 700.0 mV VRRM= 50.0 V	1	$0.14	SMA 37mm2
6.	L1	Coilcraft	MSS1210-333MEB	L= 33.0 µH DCR= 34.0 mOhm	1	$0.81	MSS1210 204mm2
7.	Rfb1	Vishay-Dale	CRCW0805787RFKEA Series= CRCW..e3	Res= 787.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2

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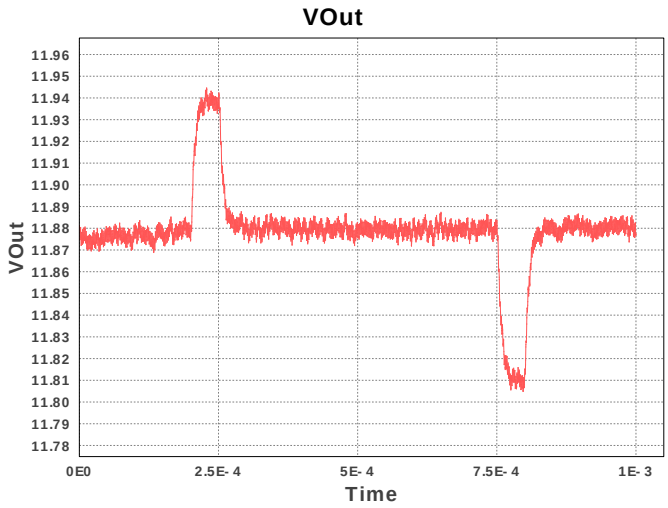
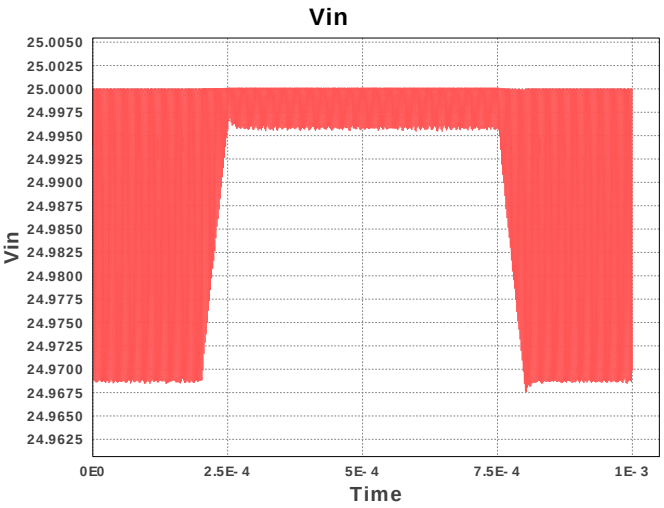
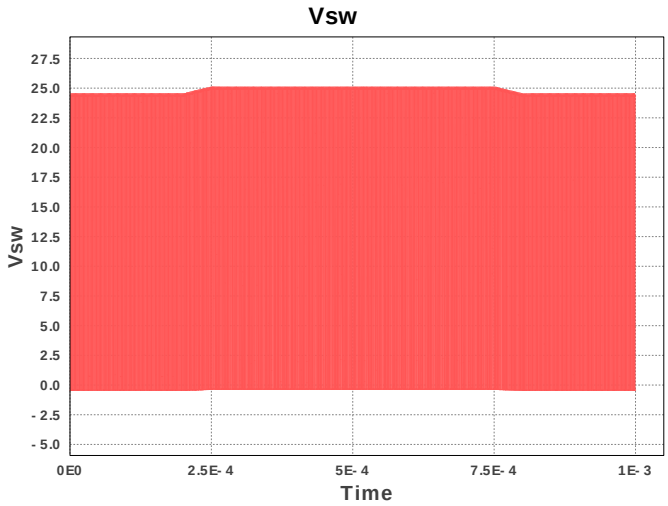
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Rfb2	Panasonic	ERJ-6ENF1001V Series= 225	Res= 1,000 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
9.	U1	Texas Instruments	LM22676TJ-5.0/NOPB	Switcher	1	$1.80	TJ7A 199mm2

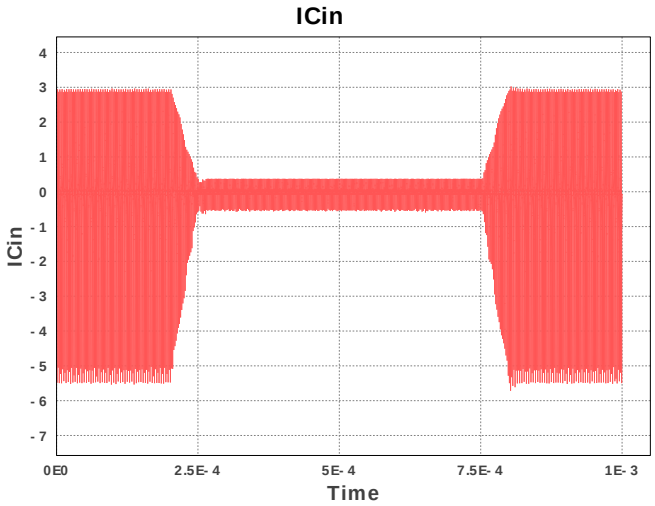
Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cin	IC	Initial Condition Across Cin	25.0 V
2.	Cout	IC	Initial Condition Across Cout	12.0 V
3.	L1	IC	Initial Condition Through L1	0 A
4.	Iout	signal_type	Signal Type	PULSE
		I1	Initial Current	3.0 A
		I2	Peak Current	0.3 A
		Td	Initial Delay Time	200u Sec
		Tr	Rise Time	50u Sec
		Tf	Fall Time	50u Sec
		Pw	Pulse Width	500u Sec









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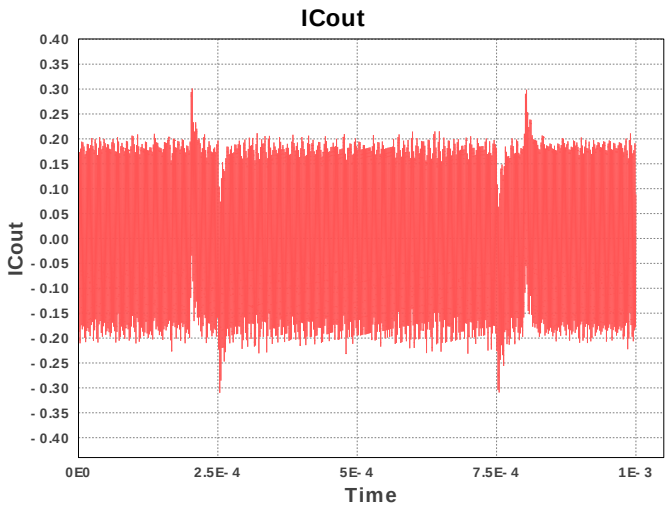

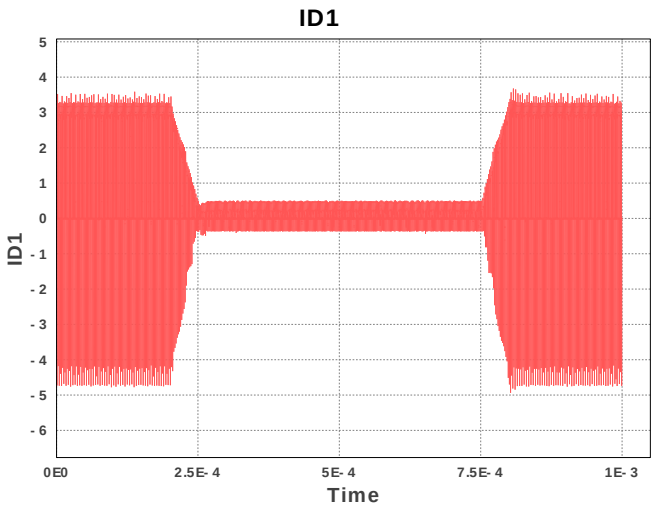

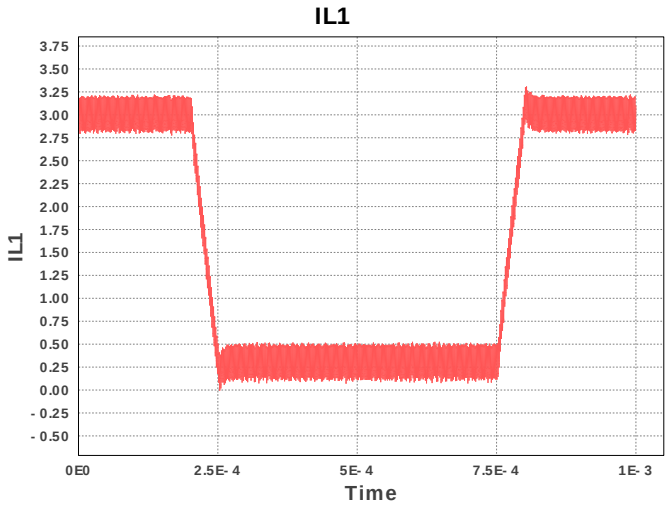

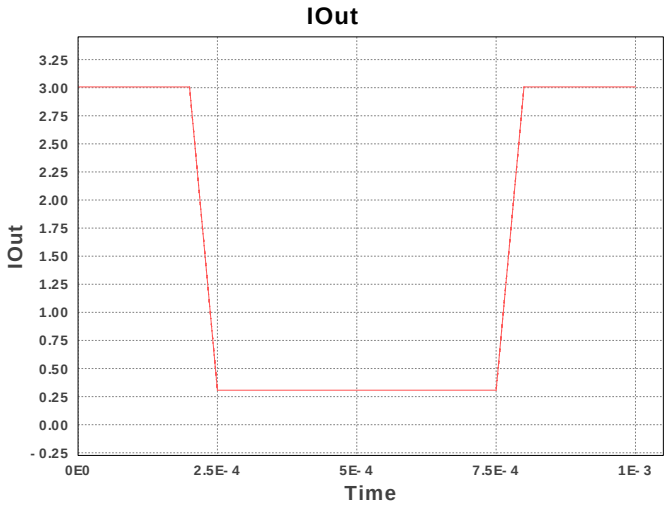

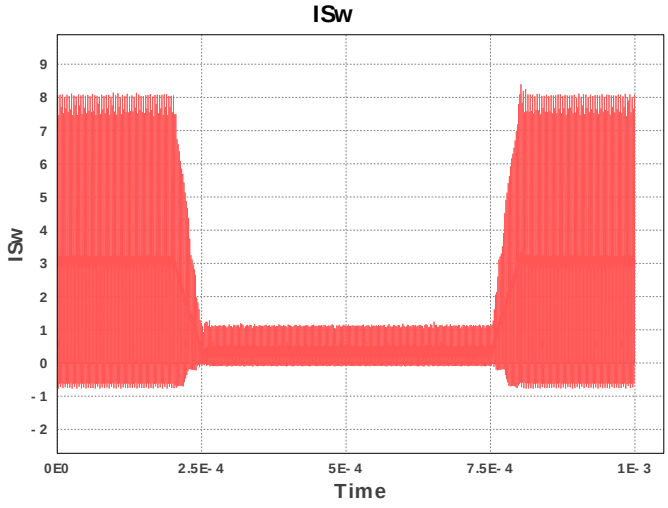

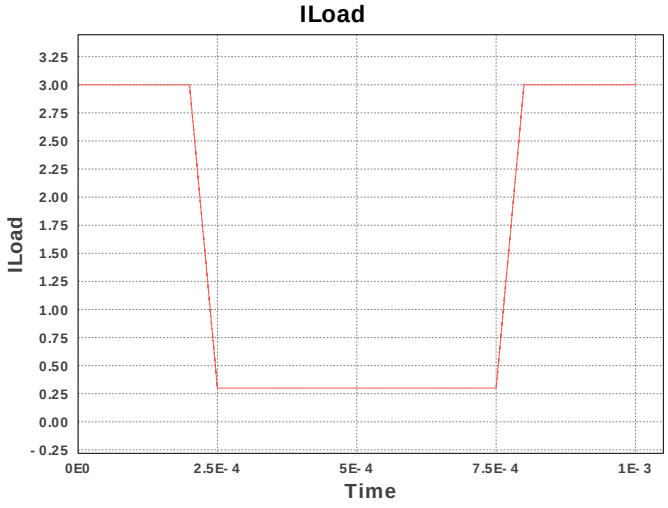

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.047 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	136.98 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.237 A	Current	Peak switch current in IC
4.	Iin Avg	1.224 A	Current	Average input current
5.	L Ipp	474.511 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.877 A	Current	Q Iavg
7.	BOM Count	12	General	Total Design BOM count
8.	FootPrint	522.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	75.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	258.339 mV	General	Voltage drop across the MosFET

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#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	36.0 W	General	Total output power
14.	Total BOM	$3.3	General	Total BOM Cost
15.	D1 Tj	157.791 degC	Op_Point	D1 junction temperature
16.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	57.432 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	39.147 %	Op_point	Duty cycle
19.	Efficiency	91.909 %	Op_point	Steady state efficiency
20.	IC Tj	64.182 degC	Op_point	IC junction temperature
21.	ICThetaJA	22.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	3.0 A	Op_point	Iout operating point
23.	Phase Marg	45.494 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	32.0 V	Op_point	Vin operating point
25.	Vout p-p	13.257 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.097 mW	Power	Input capacitor power dissipation
27.	Cout Pd	43.156 µW	Power	Output capacitor power dissipation
28.	Diode Pd	1.278 W	Power	Diode power dissipation
29.	IC Pd	1.554 W	Power	IC power dissipation
30.	L Pd	336.6 mW	Power	Inductor power dissipation
31.	Total Pd	3.169 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	3.0 A	Maximum Output Current
2.	Iout1	3.0 Amps	Output Current #1
3.	VinMax	32.0 V	Maximum input voltage
4.	VinMin	18.0 V	Minimum input voltage
5.	Vout	12.0 V	Output Voltage
6.	Vout1	12.0 Volt	Output Voltage #1
7.	base_pn	LM22676	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. Why WEBENCH recomends the 5.0 option for your 12.0V output: The internal compensation for the ADJ version of the LM22676 is optimized for output voltages below 5V. Therefore it is recommended that for outputs greater than 5V, the 5.0 option be used with an additional external resitive feedback divider. Part Description The LM22676 is a monolithic integrated circuit that provides all of the active functions for a step-down (buck) switching regulator capable of driving up to 3.0A loads with excellent line and load regulation characteristics. High efficiency (>90%) is obtained through the use of a low ON-resistance N-channel MOSFET.

2. **LM22676** Product Folder : http://www.ti.com/product/lm22676 : contains the data sheet and other resources.

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