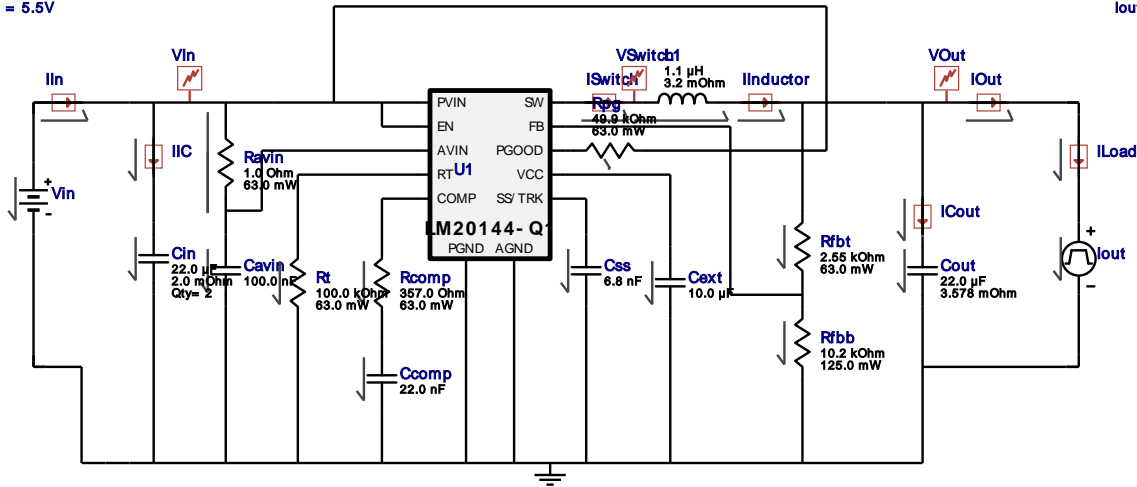


WEBENCH® Electrical Simulation Report

VinMin = 4.5V
 VinMax = 5.5V

Vout = 1.0V
 Iout = 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.

My Comments

No comments

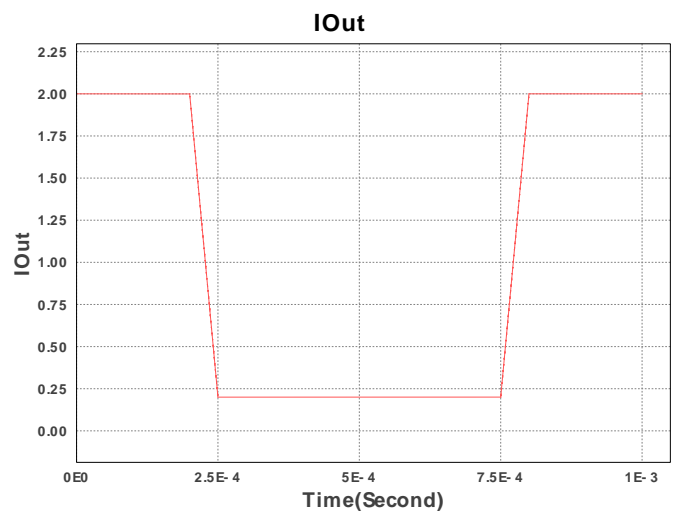
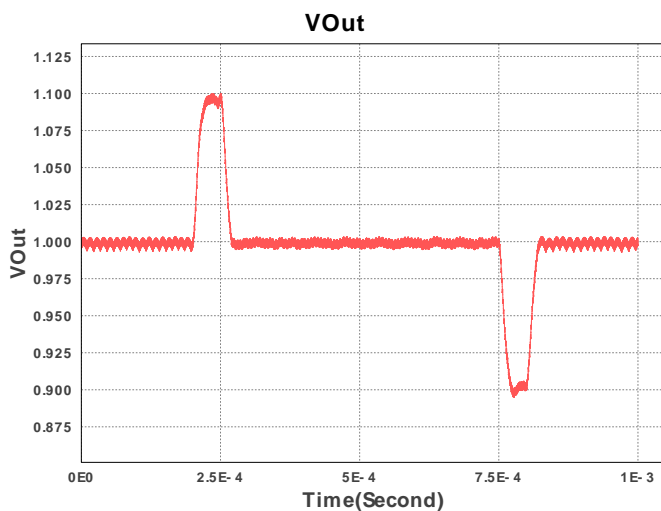
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cavin	AVX	08053C104JAZ2A Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.09	0805 7 mm ²
2.	Ccomp	MuRata	GCM21B5C1H223JA16L Series= C0G/NP0	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.07	0805 7 mm ²
3.	Cext	Samsung Electro-Mechanics	CL10A106MQ8NNNC Series= X5R	Cap= 10.0 µF VDC= 6.3 V IRMS= 0.0 A	1	\$0.03	0603 5 mm ²
4.	Cin	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 µF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	2	\$0.14	1210 15 mm ²
5.	Cout	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 µF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.296 A	1	\$0.04	0805 7 mm ²
6.	Css	TDK	C2012C0G1H682J060AA Series= C0G/NP0	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	0805 7 mm ²
7.	L1	Würth Elektronik	744314110	L= 1.1 µH DCR= 3.2 mOhm	1	\$2.55	 WE-HC3 80 mm ²
8.	Ravin	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rcomp	Vishay-Dale	CRCW0402357RFKED Series= CRCW..e3	Res= 357.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfbb	Panasonic	ERJ-6ENF1022V Series= ERJ-6E	Res= 10.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
11.	Rfbt	Vishay-Dale	CRCW04022K55FKED Series= CRCW..e3	Res= 2.55 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
12.	Rpg	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
13.	Rt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
14.	U1	Texas Instruments	LM20144QMH/NOPB	Switcher	1	\$2.17	 MXA16A 59 mm ²

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	lout	signal_type	Signal Type	PULSE
		I1	Initial Current	2.0 A
		I2	Peak Current	0.2 A
		Td	Initial Delay Time	200u Sec
		Tr	Rise Time	50u Sec
		Tf	Fall Time	50u Sec
		Pw	Pulse Width	500u Sec



Design Inputs

#	Name	Value	Description
1.	lout	2.0 A	Maximum Output Current
2.	VinMax	5.5 V	Maximum input voltage
3.	VinMin	4.5 V	Minimum input voltage
4.	Vout	1.0 V	Output Voltage
5.	base_pn	LM20144-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0 degC	Ambient temperature

Operating Values

#	Name	Value	Category	Description
1.	BOM Count	15		Total Design BOM count
2.	Total BOM	\$5.33		Total BOM Cost
3.	Cin IRMS	792.014 mA	Current	Input capacitor RMS ripple current

#	Name	Value	Category	Description
4.	Cout IRMS	230.358 mA	Current	Output capacitor RMS ripple current
5.	IC Ipk	2.399 A	Current	Peak switch current in IC
6.	Iin Avg	419.56 mA	Current	Average input current
7.	L Ipp	797.985 mA	Current	Peak-to-peak inductor ripple current
8.	M1 Irms	882.606 mA	Current	Q Iavg
9.	FootPrint	222.0 mm ²	General	Total Foot Print Area of BOM components
10.	Frequency	998.387 kHz	General	Switching frequency
11.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	33.389 mV	General	Voltage drop across the MosFET
13.	Mode	CCM	General	Conduction Mode
14.	Pout	2.0 W	General	Total output power
15.	Cross Freq	27.839 kHz	Op Point	Bode plot crossover frequency
16.	Duty Cycle	19.475 %	Op Point	Duty cycle
17.	Efficiency	86.672 %	Op Point	Steady state efficiency
18.	Gain Marg	-41.587 dB	Op Point	Bode Plot Gain Margin
19.	IC Tj	41.048 degC	Op Point	IC junction temperature
20.	ICThetaJA	38.0 degC/W	Op Point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op Point	Iout operating point
22.	Low Freq Gain	68.85 dB	Op Point	Gain at 1Hz
23.	Phase Marg	97.676 deg	Op Point	Bode Plot Phase Margin
24.	VIN_OP	5.5 V	Op Point	Vin operating point
25.	Vout Actual	1.0 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
26.	Vout OP	1.0 V	Op Point	Operational Output Voltage
27.	Vout Tolerance	1.91 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
28.	Vout p-p	7.741 mV	Op Point	Peak-to-peak output ripple voltage
29.	Cin Pd	627.286 μW	Power	Input capacitor power dissipation
30.	Cout Pd	189.866 μW	Power	Output capacitor power dissipation
31.	IC Drive Pd	21.965 mW	Power	Driver power dissipation
32.	IC Iq Pd	19.25 mW	Power	IC Iq Pd
33.	IC Pd	290.744 mW	Power	IC power dissipation
34.	L Pd	16.0 mW	Power	Inductor power dissipation
35.	M1 PdCond	29.469 mW	Power	M1 MOSFET switching losses
36.	M1 PdSw	109.823 mW	Power	M1 MOSFET switching losses
37.	M1 PdCond	108.241 mW	Power	M2 MOSFET switching losses
38.	M2 Pdbody	23.961 mW	Power	Power dissipation through lower FET
39.	Total Pd	307.554 mW	Power	Total Power Dissipation

Design Assistance

1. Tip: The external sync feature can be enabled by checking the 'User Sync Frequency' check box. Please note that the default frequency internal to the device is below the external sync frequency range. (For example, LM20333 default frequency is 200KHz, but the synchable frequency range is from 250KHz to 1.5MHz)
2. Tip: The external sync feature can be enabled by checking the 'User Sync Frequency' check box. Please note that the default frequency internal to the device is below the external sync frequency range. (For example, LM20333 default frequency is 200KHz, but the synchable frequency range is from 250KHz to 1.5MHz)
3. The LM20144-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
4. **LM20144-Q1** Product Folder : <http://www.ti.com/product/LM20144%2DQ1> : contains the data sheet and other resources.

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You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

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