TEXAS INSTRUMENTS

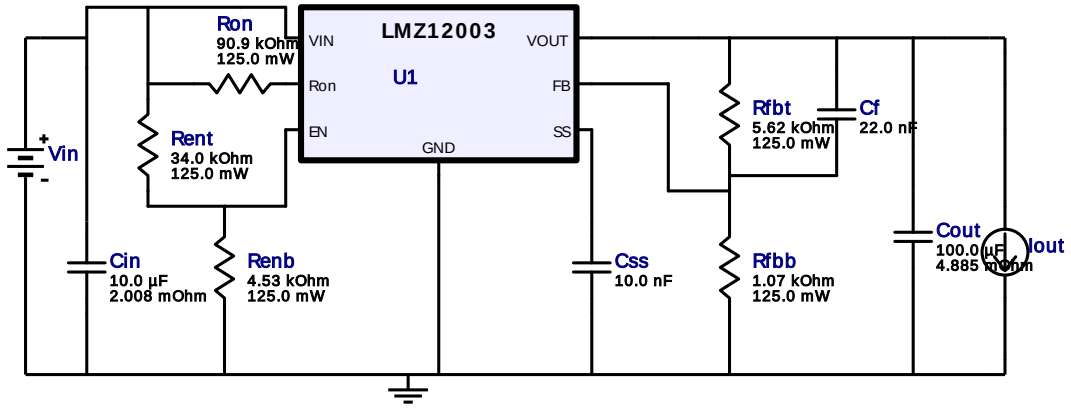
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 20.0V
Vout = 5.0V
Iout = 3.0A

Device = LMZ12003TZ-ADJ/NOPB
Topology = Buck
Created = 7/13/16 8:07:24 PM
BOM Cost = $6.35
BOM Count = 10
Total Pd = 1.35W

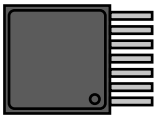
Design : 4739804/3 LMZ12003TZ-ADJ/NOPB
LMZ12003TZ-ADJ/NOPB 10.0V-20.0V to 5.00V @ 3.0A

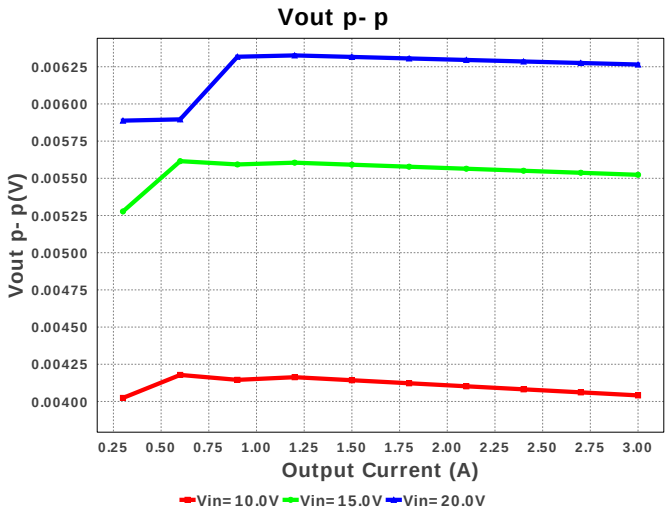
Vout = 5.0V
Iout = 3.0A

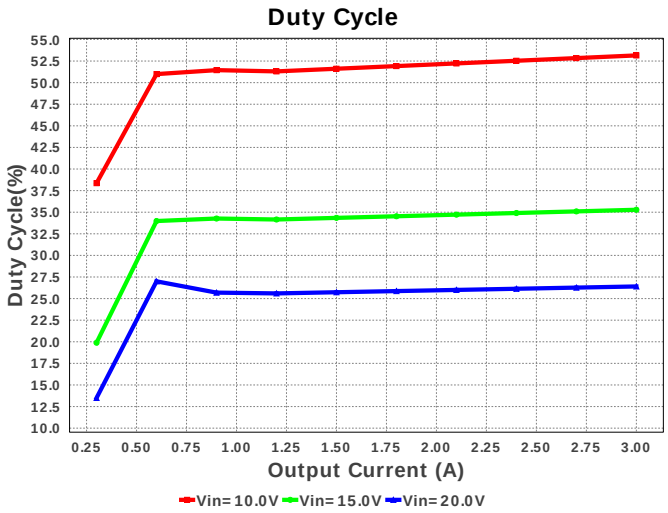


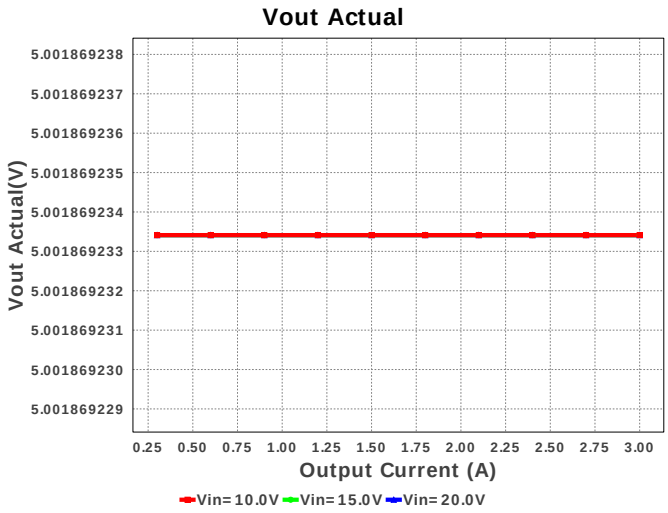
Electrical BOM

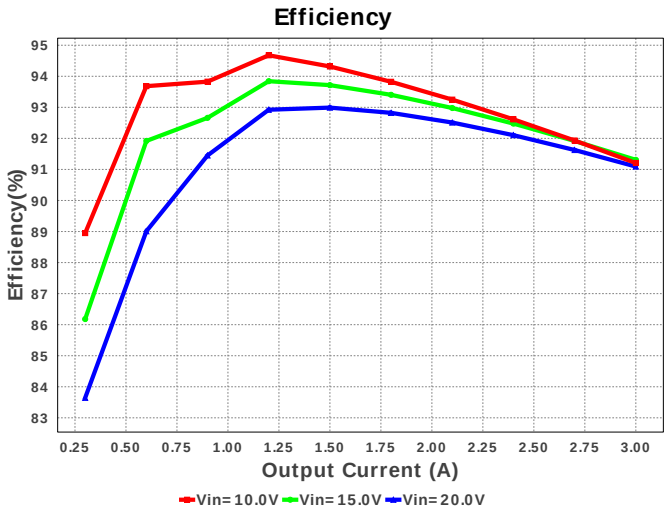
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cf	Yageo America	CC0805KRX7R9BB223 Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	$0.22	1210_280 15 mm²
3.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	1	$0.14	1206_190 11 mm²
4.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Renb	Panasonic	ERJ-6ENF4531V Series= ERJ-6E	Res= 4.53 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
6.	Rent	Panasonic	ERJ-6ENF3402V Series= ERJ-6E	Res= 34.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
7.	Rfbb	Panasonic	ERJ-6ENF1071V Series= ERJ-6E	Res= 1.07 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
8.	Rfbt	Panasonic	ERJ-6ENF5621V Series= ERJ-6E	Res= 5.62 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
9.	Ron	Panasonic	ERJ-6ENF9092V Series= ERJ-6E	Res= 90.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²

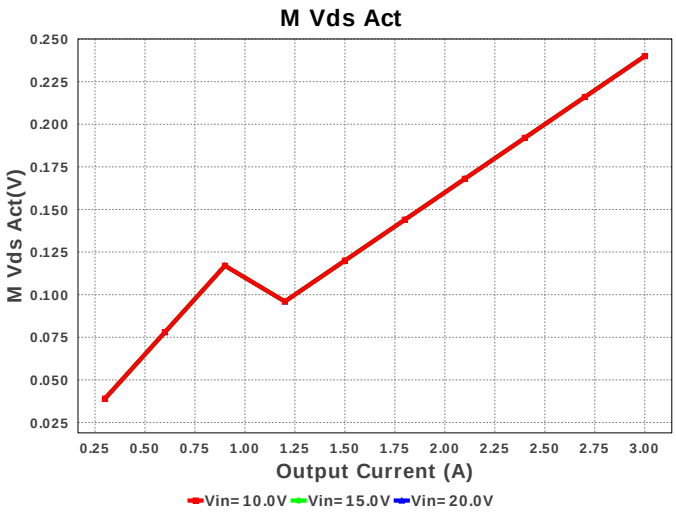
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMZ12003TZ-ADJ/NOPB	Switcher	1	$5.92	 TZA07A 199 mm^2

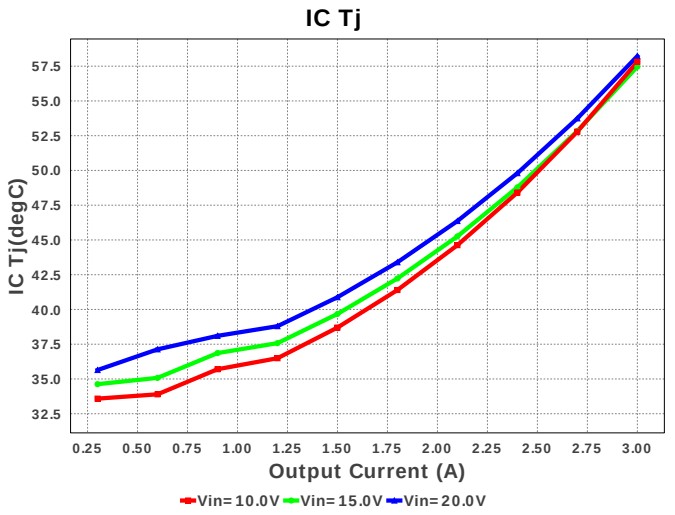


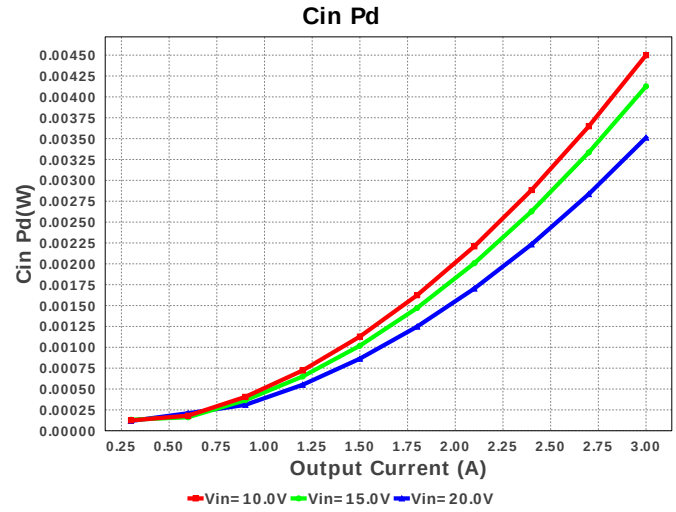


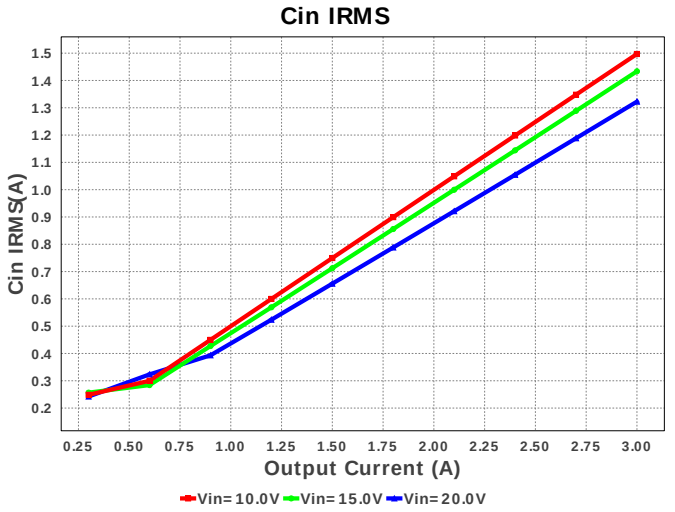


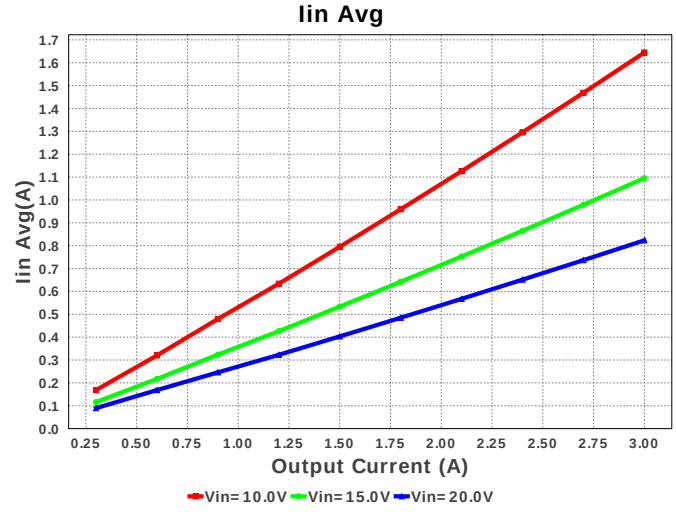


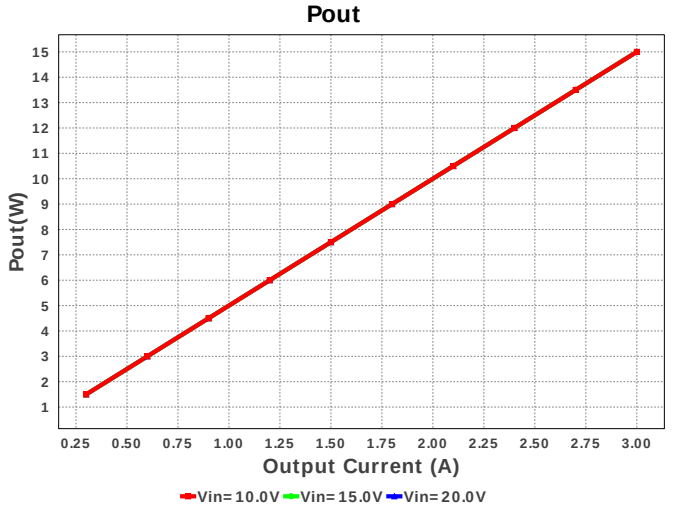


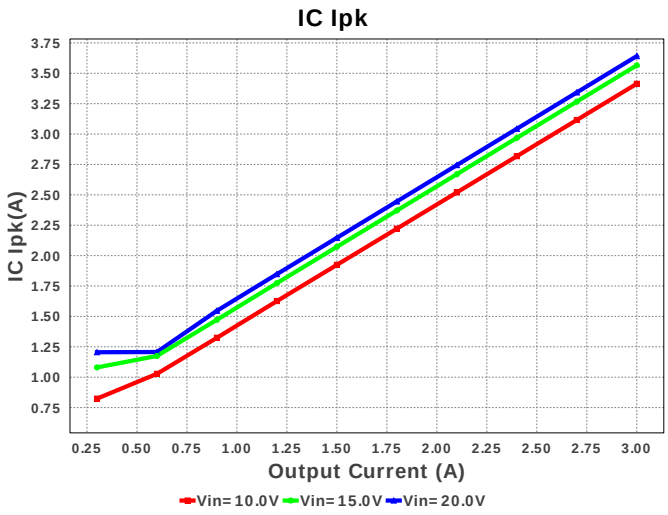


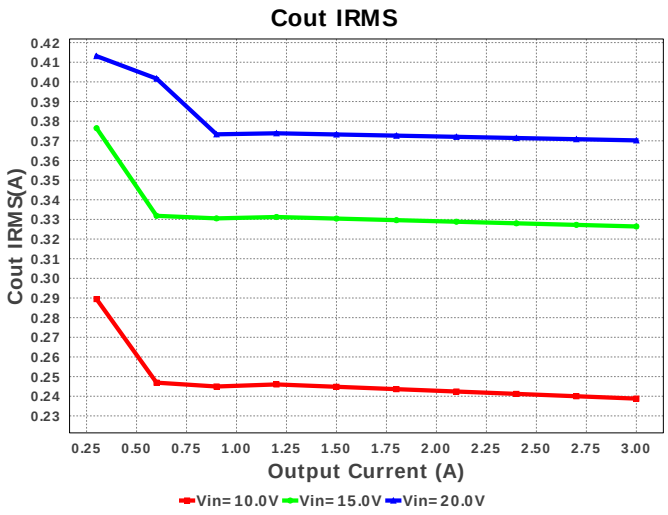


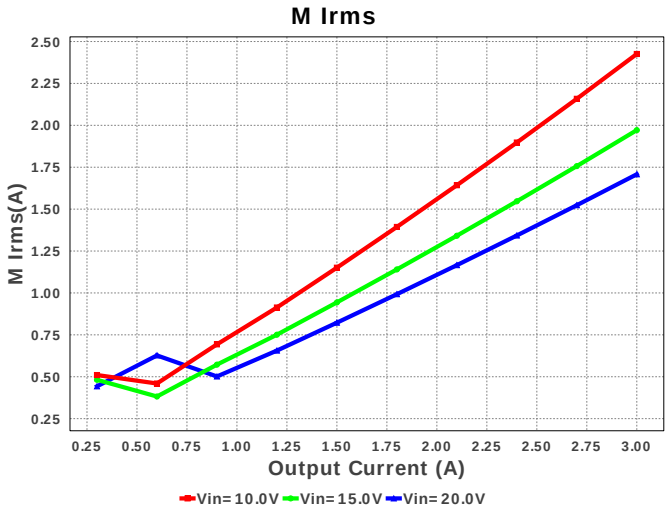


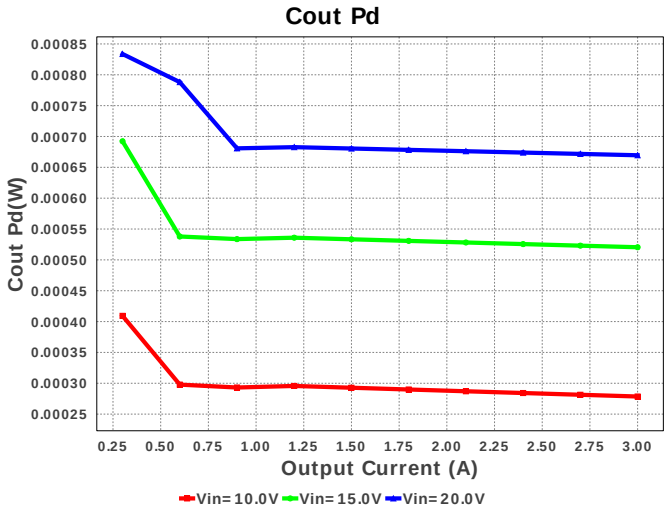


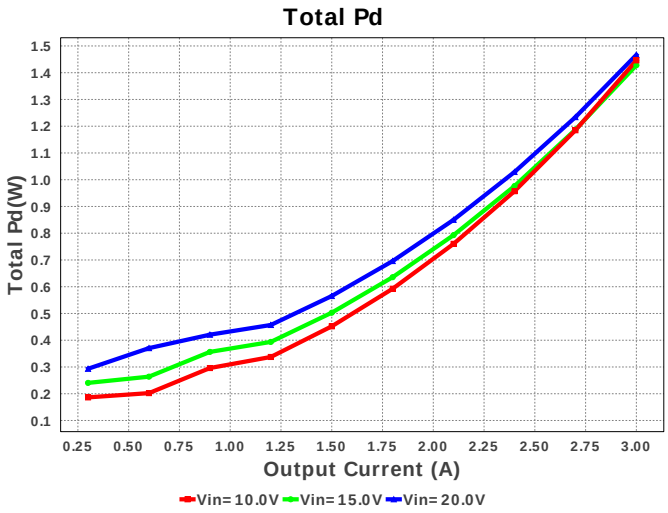


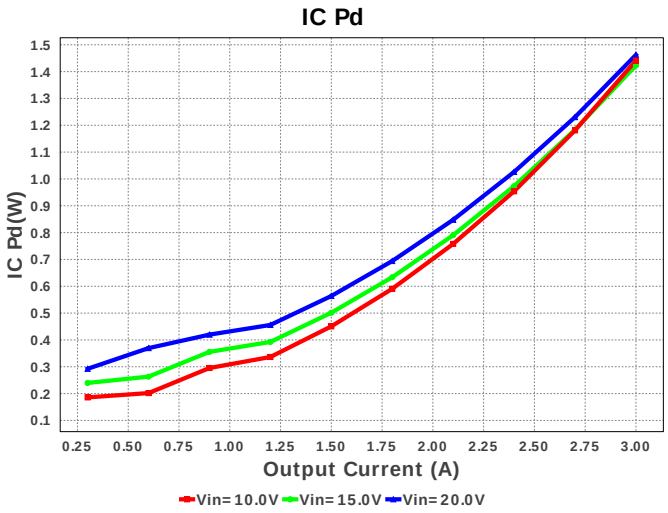












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.322 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	370.224 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.641 A	Current	Peak switch current in IC
4.	Iin Avg	817.65 mA	Current	Average input current
5.	M1 Irms	1.697 A	Current	Q Iavg
6.	BOM Count	10	General	Total Design BOM count
7.	FootPrint	272.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	423.119 kHz	General	Switching frequency
9.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
10.	M Vds Act	240.0 mV	General	Voltage drop across the MosFET
11.	Pout	15.0 W	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	$6.35	General	Total BOM Cost
13.	Vout Actual	5.002 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	26.405 %	Op_point	Duty cycle
16.	Efficiency	91.726 %	Op_point	Steady state efficiency
17.	IC Tj	56.034 degC	Op_point	IC junction temperature
18.	ICThetaJA	19.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	3.0 A	Op_point	Iout operating point
20.	VIN_OP	20.0 V	Op_point	Vin operating point
21.	Vout p-p	6.265 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	3.512 mW	Power	Input capacitor power dissipation
23.	Cout Pd	669.565 µW	Power	Output capacitor power dissipation
24.	IC Pd	1.349 W	Power	IC power dissipation
25.	Total Pd	1.353 W	Power	Total Power Dissipation
26.	Vout Tolerance	4.24 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	VinMax	20.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMZ12003	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMZ12003** Product Folder : http://www.ti.com/product/LMZ12003 : contains the data sheet and other resources.