MIC5159

Programmable Current Limit µCap LDO Regulator Controller

Features

- Fast Transient Response
- Input Voltage Range: V_{IN} 1.65V to 5.5V
- ±1.0% Initial Output Tolerance
- Fixed 1.8V or Adjustable Output Voltage down to 1.25V
- Stable with Ceramic Output Capacitor
- Capable up to 10A
- Excellent Line and Load Regulation Specifications
- Logic-Controlled Shutdown
- Programmable Current Limit
- Current-Limit Protection
- 6-Lead SOT-23 Package
- Available Temperature Range:–40°C to +125°C

Applications

- Ultra-High Current, Ultra-Low Dropout Voltage Regulator
- High-Efficiency Linear Power Supplies
- Low-Voltage Distributed Power
- Fixed Telecom
- Multimedia and PC Power Supplies
- Battery Chargers
- Low-Voltage DSP, Microprocessor and Microcontroller Power Supplies

General Description

Microchip’s MIC5159 is a precision-voltage regulator controller. Used with an external P-Channel MOSFET, the MIC5159 forms a two-chip low-dropout regulator capable of driving a wide range of output currents.

The MIC5159 operates from an input of 1.65V to 5.5V. The low input voltage allows the MIC5159 to operate off of high power 1.8V rails to generate lower voltages, such as 1.5V.

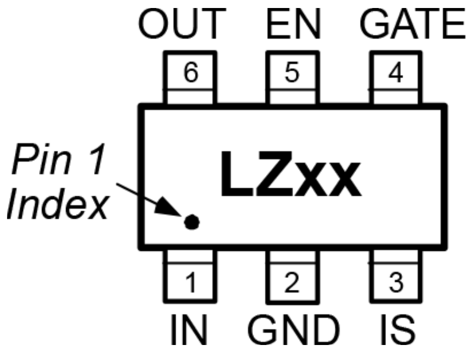
Features of the MIC5159 include enable input and current limit protection. As a µCap design, the MIC5159 is stable with ceramic output capacitors.

The MIC5159 comes in a 6-Lead SOT-23 package, and is offered in either fixed and adjustable output voltages. The junction temperature range for the MIC5159 ranges from –40°C to +125°C.

Package Types

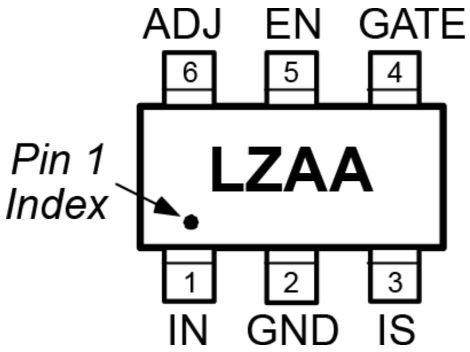
MIC5159

6-Lead SOT-23 | Fixed Voltages



MIC5159

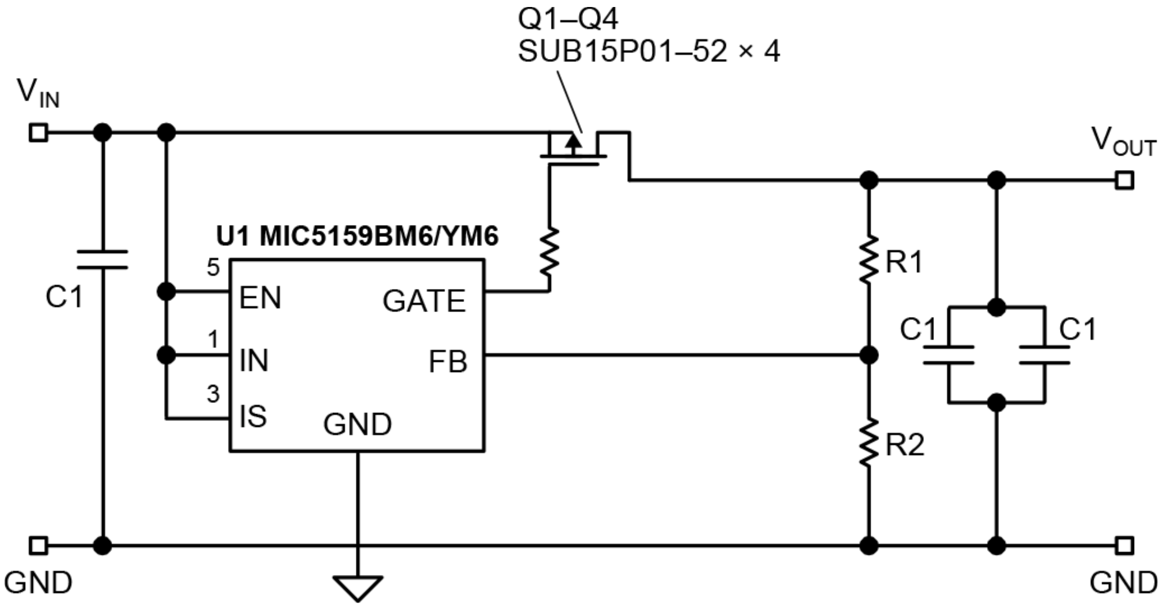
6-Lead SOT-23 | Adjustable Voltages

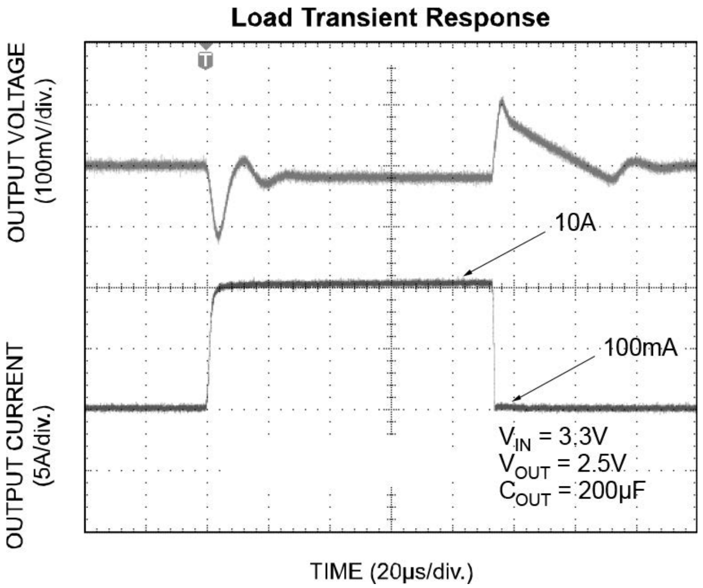


Typical Application Circuits

MIC5159

Adjustable Voltage

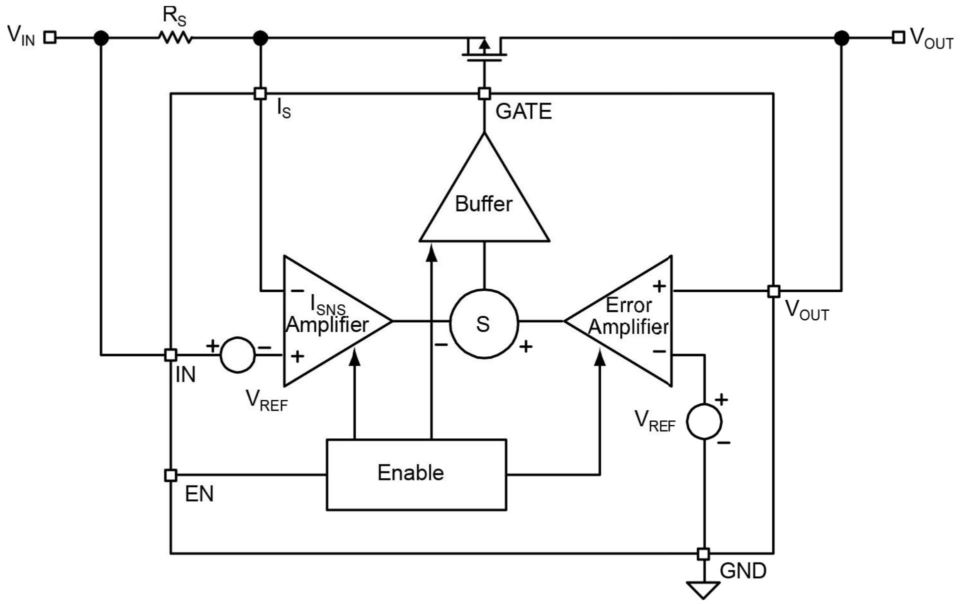




Functional Block Diagram

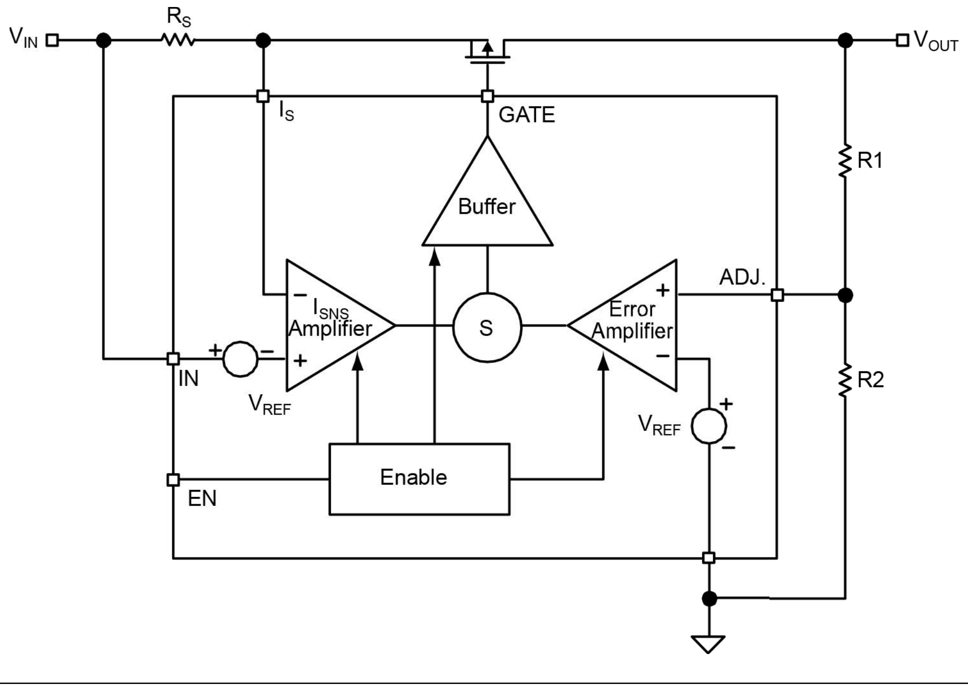
MIC5159

Fixed Voltage



MIC5159

Adjustable Voltage



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage (V_{IN})	+6.0V
Enable Input Voltage (V_{EN})	+6.0V
Power Dissipation ($P_{D(MAX)}$)	Note 1
EDS Rating (Note 2)	2 kV

Operating Ratings ‡

Supply Voltage (V_{IN})	+1.65V to +5.5V
Enable Input Voltage (V_{EN})	0V to +5.5V

† Notice: Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

‡ Notice: The device is not guaranteed to function outside its operating ratings.

Note 1: Devices are ESD sensitive. Handling precautions recommended. Human body model, 1.5k in series with 100 pF.

2: $P_{D(MAX)} = (T_{J(MAX)} – T_A) ÷ θ_{JA}$, where $θ_{JA}$ depends upon the printed circuit layout.

ELECTRICAL CHARACTERISTICS (Note 1)

T_A = 25°C with $V_{IN} = V_{OUT}$ + 1V; V_{EN} = 1.2V, $C_{IN} = C_{OUT}$ = 10 µF, ceramic, I_{OUT} = 10 mA; **bold** values indicate –40°C < T_J < +125°C; unless otherwise specified (Note 3).

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Output Voltage Accuracy	V_O	–1	—	+1	%	At 25°C
		–2	—	**+2**	%	Over temperature range
Output Voltage Line Regulation	$ΔV_{OUT}/(V_{OUT}×ΔV_{IN})$	–0.1	0.007	+0.1	%/V	$V_{IN} = V_{OUT}$ + 1.0V to 5.5V
Output Voltage Load Regulation	$ΔV_{OUT}/V_{OUT}$	—	0.2	1.0	%	I_L = 10 mA to 1.0A
Ground Pin Current (Note 2)	I_{GND}	—	15	**30**	µA	V_{EN} ≤ 0.2V (MIC5159 OFF)
		—	10	20	mA	V_{EN} ≥ 1.2V (MIC5159 ON)
Adjust Pin Bias Current	I_{BIAS}	—	—	1	µA	—
Maximum V_{GS}	$V_{GS(MAX)}$	4.5	—	—	V	(PFET fully ON); V_{IN} = 5.0V
		3.1	—	—	V	(PFET fully ON); V_{IN} = 3.3V
		2.3	—	—	V	(PFET fully ON); V_{IN} = 2.5V
Current-Limit Threshold	I_{LIM_TH}	40	50	65	mV	$V_{IN} – V_{IS}$
Start-up Time	$t_{START-UP}$	—	30	**150**	µs	$V_{EN} = V_{IN}$
Enable Input						
Enable Input Threshold	V_{EN}	**1.2**	—	—	V	Regulator enabled
		—	—	**0.2**	V	Regulator shutdown
		20	50	**250**	mV	Enable hysteresis

Note 1: Specification for packaged product only.

2: I_{GND} is the quiescent current. $I_{IN} = I_{GND} + I_{OUT}$.

3: $P_{D(MAX)} = (T_{J(MAX)} – T_A) ÷ θ_{JA}$, where $θ_{JA}$ depends upon the printed circuit layout.

ELECTRICAL CHARACTERISTICS (CONTINUED)(Note 1)

T_A = 25°C with $V_{IN} = V_{OUT}$ + 1V; V_{EN} = 1.2V, $C_{IN} = C_{OUT}$ = 10 µF, ceramic, I_{OUT} = 10 mA; **bold** values indicate –40°C < T_J < +125°C; unless otherwise specified (Note 3).

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Enable Pin Input Current	I_{EN}	—	0.01	—	nA	Independent of state
		—	—	1	µA	—

Note 1: Specification for packaged product only.

2: I_{GND} is the quiescent current. $I_{IN} = I_{GND} + I_{OUT}$.

3: $P_{D(MAX)} = (T_{J(MAX)} – T_A) \div \theta_{JA}$, where θ_{JA} depends upon the printed circuit layout.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Operating Junction Temperature Range	T_J	–40	—	+125	°C	—
Storage Temperature Range	T_S	–65	—	+150	°C	—
Lead Temperature	—	—	—	+260	°C	Soldering, 5 seconds
Package Thermal Resistance SOT-23-6	θ_{JA}	—	+235	—	°C/W	Note 1

Note 1: The maximum allowable power dissipation at any T_A (ambient temperature) is $P_{D(MAX)}$ = $(T_{J(MAX)} – T_A) / \theta_{JA}$. Exceeding the maximum allowable power dissipation results in excessive die temperature, and causes the regulator to enter thermal shutdown.

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

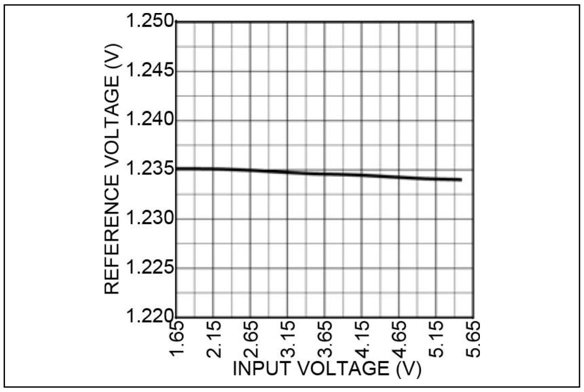


FIGURE 2-1: *Reference Voltage vs. Input Voltage.*

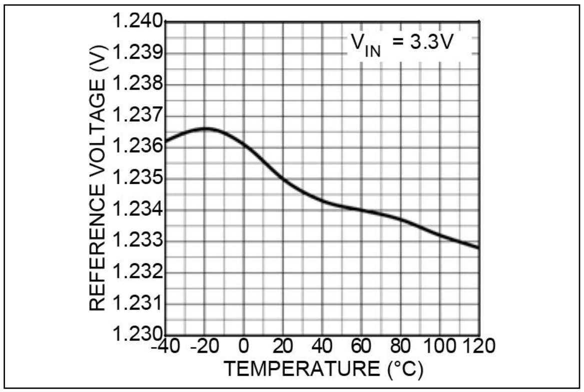


FIGURE 2-2: *Reference Voltage vs. Temperature.*

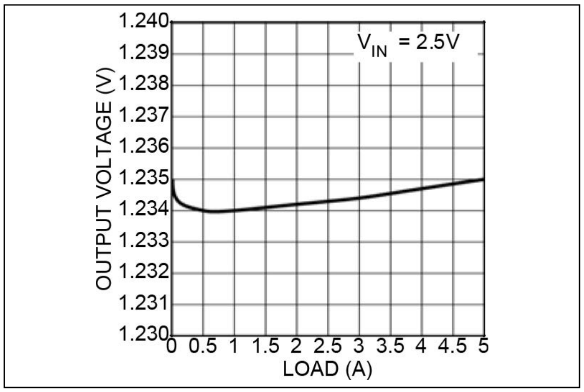


FIGURE 2-3: *Output Voltage vs. Load.*

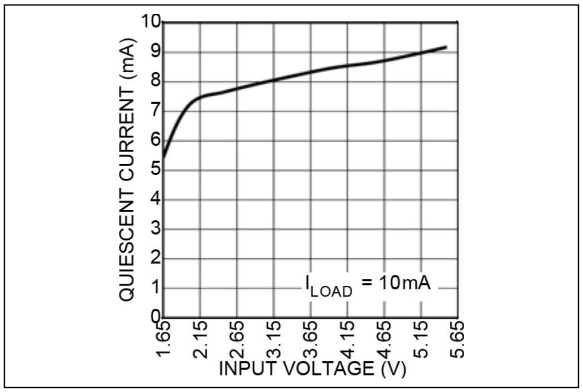


FIGURE 2-4: *Quiescent Current vs. Input Voltage.*

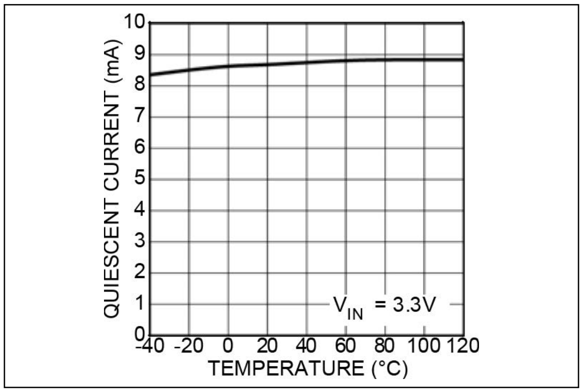


FIGURE 2-5: *Quiescent Current vs. Temperature.*

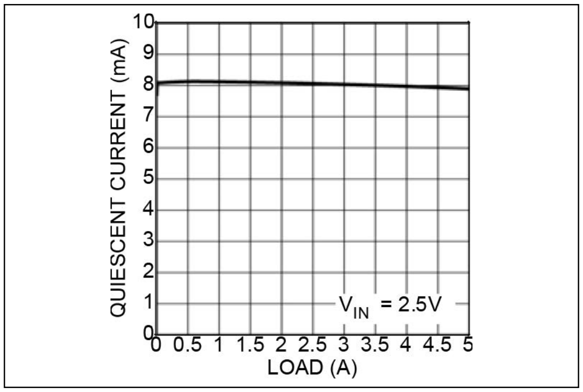


FIGURE 2-6: *Quiescent Current vs. Load.*

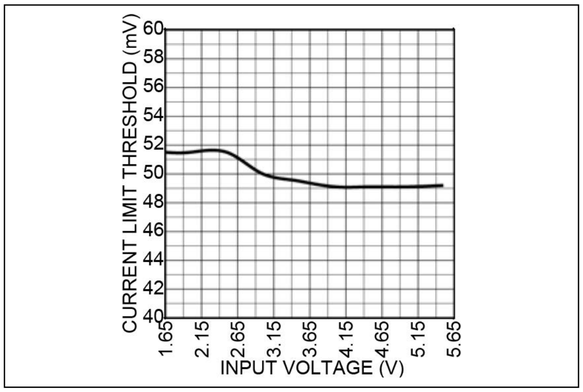


FIGURE 2-7: *Current Limit Threshold vs. Input Voltage.*

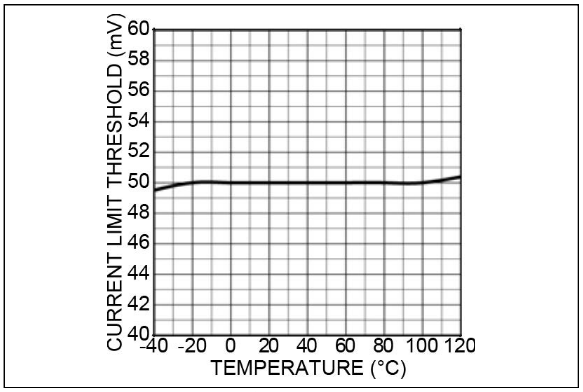


FIGURE 2-8: *Current Limit Threshold vs. Temperature.*

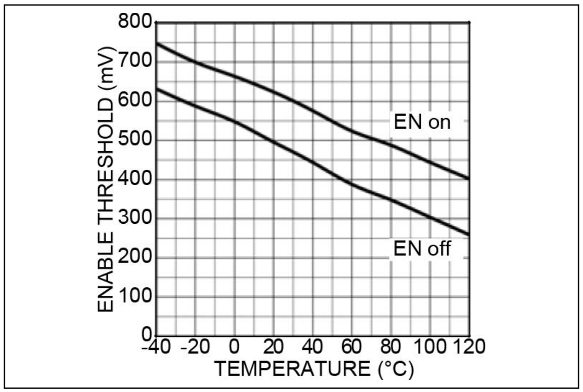


FIGURE 2-9: *Enable Threshold vs. Temperature.*

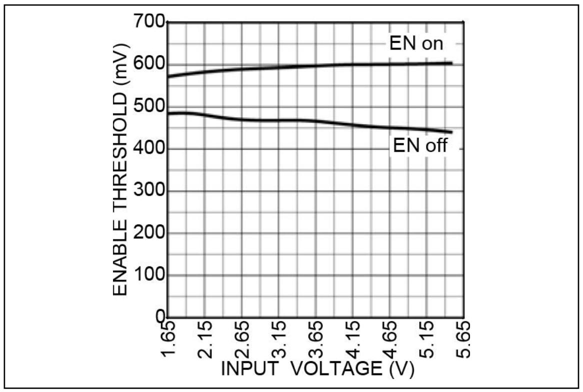


FIGURE 2-10: *Enable Threshold vs. Input Voltage.*

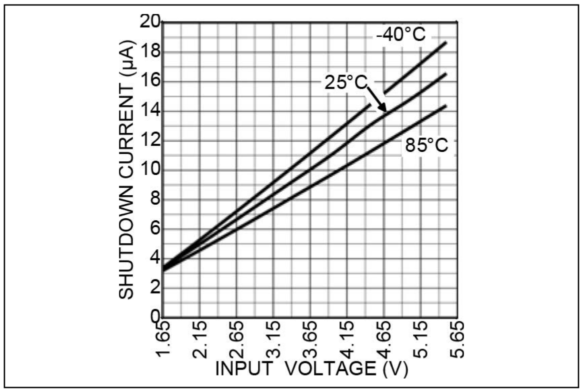


FIGURE 2-11: *Shutdown Current vs. Input Voltage.*

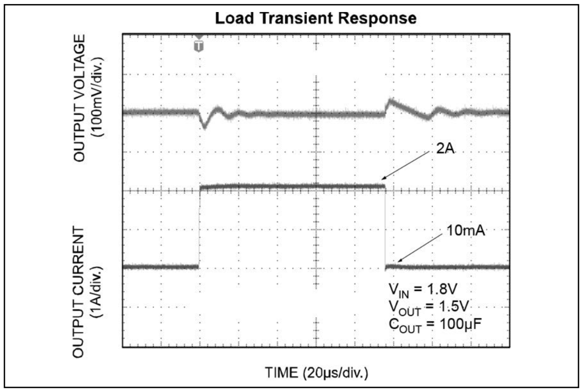


FIGURE 2-12: *Load Transient Response.*

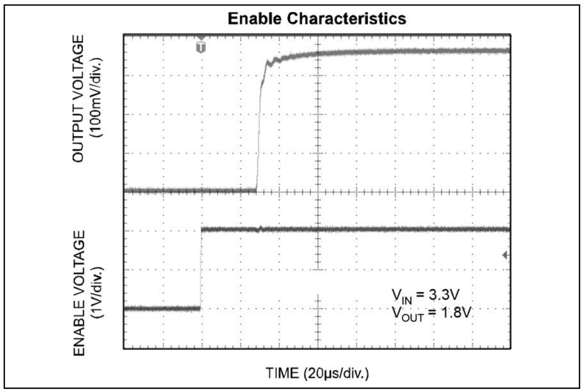


FIGURE 2-13: *Enable Characteristics.*

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	VIN	Input Voltage.
2	GND	Ground.
3	IS	Current Sense: IS must be tied to VIN pin if the current limit feature is not used.
4	GATE	Gate drive of the external P-Channel MOSFET.
5	EN	Enable Input: Logic Level ON/OFF control. Logic high = ON; logic low = OFF.
6	ADJ	Adjustable Regulator Feedback Input: Connect to resistor Voltage divider.
	OUT	Output Voltage: Connect to drain of P-Channel MOSFET to regulate output to proper voltage.

4.0 APPLICATION INFORMATION

The MIC5159 is a high performance voltage regulator controller. When used with an external P-Channel MOSFET and a tiny ceramic output capacitor, it forms a wide variety of simple, inexpensive ultra-low-dropout voltage regulators.

4.1 Current Sense Resistor Selection

A current sense resistor placed between the input and the current sense pin (IS) allows for programmability of the current limit. This resistor can simply be calculated by:

EQUATION 4-1:

$$R_{SENSE} = \left(\frac{50mV}{I_{OUT}}\right)$$

Where I_{OUT} is the maximum output current.

For example, the current sense resistor for a 2.5V_{IN} to 1.8V_{OUT}, 5A, linear regulator calculates as follows:

EQUATION 4-2:

$$R_{SENSE} = \left(\frac{50mV}{I_{OUT}}\right)$$
$$R_{SENSE} = 10m\Omega$$

4.2 P-Channel MOSFET Selection

The P-Channel MOSFET selected for use with the MIC5159 must satisfy the following requirements:

- Input voltage
- Gate threshold
- Load current
- Dropout voltage (input-to-output differential)
- Thermal performance

To prevent damage to the P-Channel MOSFET, the maximum input voltage ($V_{IN(MAX)}$) must be less than its drain-source breakdown voltage (BV_{DS}). In addition, the minimum input voltage ($V_{IN(MIN)}$) must be greater than or equal to the gate threshold voltage (V_{GS}) of the P-Channel MOSFET.

For a given output current and dropout requirement, the ON-resistance ($R_{DS(ON)}$) of the P-Channel MOSFET must also be determined. The minimum $R_{DS(ON)}$ of the P-Channel MOSFET is calculated as follows:

EQUATION 4-3:

$$R_{DS(ON)} = \left(\frac{(V_{IN(MIN)} - V_{OUT})}{I_{OUT(MAX)}}\right) - R_{SENSE}$$

Where $I_{OUT(MAX)}$ is the maximum output current and R_{SENSE} is the current sense resistor.

For example, the MIC5159-1.8BM6 is used with an external MOSFET to form a 5A LDO with an input of 2.5V. Either a 2.5V or 1.8V gate threshold MOSFET can be selected. The minimum $R_{DS(ON)}$ is calculated as:

EQUATION 4-4:

$$R_{DS(ON)} = \left(\frac{(2.5V - 1.8V)}{5A}\right) - 10m\Omega$$
$$R_{DS(ON)} = 130m\Omega$$

According to the above calculation, the minimum $R_{DS(ON)}$ is 130 mΩ for a 2.5V to 1.8V LDO with 5A of output current. For this design, the $R_{DS(ON)}$ for the FETs should maintain better than 130 mΩ over the required temperature, current, and voltage conditions.

Placing two or more P-Channel FETs in parallel can reduce the total $R_{DS(ON)}$ of the regulator. This also aids thermal dissipation by sharing the current and heat between the multiple FETs.

4.3 Thermal Considerations

Linear regulators are simple to use. The most complicated design parameters to consider are thermal characteristics. Since the MIC5159 offers no thermal protection, thermal design requires the following application-specific parameters:

- Maximum ambient temperature (T_A)
- Output current (I_{OUT})
- Output voltage (V_{OUT})
- Input voltage (V_{IN})

First, calculate the maximum power dissipation of the regulator:

EQUATION 4-5:

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$$

Ground current can generally be ignored. The amount of power dissipated by ground current and input voltage is minimal. Minimum θ_{JA} for the MOSFET can be calculated using the following formula:

EQUATION 4-6:

$$\theta_{JA} = \left(\frac{(T_{J(MAX)} - T_A)}{P_D}\right)$$

Where $T_{J(MAX)}$ is equal to the maximum die temperature of the P-Channel.

EQUATION 4-7:

$$\theta_{JA} = \theta_{JC} + \theta_{CS} + \theta_{SA}$$

4.4 Example

For the same regulator, $2.5V_{IN}$ to $1.8V_{OUT}$ at 5A with an ambient temperature of 60°C:

EQUATION 4-8:

$$P_D = (2.5V - 1.8V) \times 5A$$
$$P_D = 3.5W$$

The P-Channel MOSFET must be able to dissipate 3.5W. The minimum θ_{JA} to maintain a maximum T_J of 150°C (max.) T_J according to a typical MOSFET data sheet is as follows:

EQUATION 4-9:

$$\theta_{JA} = \frac{(150°C - 60°C)}{3.5W}$$
$$\theta_{JA} = 25.71°C/W$$

The heatsink and MOSFET must have a combined thermal resistance to meet the above criteria. The typical thermal resistance from the junction to the case (θ_{JC}) of a TO-263 (D2 pack) is 6°C/W. Adding 0.2°C/W for case to sink thermal resistance (θ_{CS}), the heatsink must have a sink to ambient thermal resistance (θ_{SA}) of:

EQUATION 4-10:

$$\theta_{SA} = \theta_{JA} - (\theta_{JC} + \theta_{CS})$$
$$\theta_{SA} = 25.71°C/W - (6°C/W + 0.2°C/W)$$
$$\theta_{SA} = 19.51°C/W$$

According to the calculations, the heatsink must have a θ_{SA} of 19.51°C/W or better.

For a full discussion of heat sinking and thermal effects on voltage regulators, refer to the “Regulator Thermals” section of the Micrel Guide to Designing with Low-Dropout Voltage Regulators handbook.

4.5 Short-Circuit Current Limit

The above thermal design calculations apply to normal operation. In the case where the P-Channel MOSFET must survive extended periods of short-circuit current, another approach for thermal design must be considered. Due to the fact that the MIC5159 delivers constant current limiting, power dissipated by the MOSFET is equal to the input voltage multiplied by the maximum output current.

Figure 4-1 shows a simple, inexpensive circuit that allows the current limiting to be re-entrant.

This reduces power dissipation in current limited conditions. As the output voltage begins to drop, the differential voltage across the input and output increases.

This pulls the current sense voltage lower, reducing the amount of output current to maintain 50 mV across the sense resistor. This reduction in output current equates to a reduction in power dissipation in the MOSFET. Figure 4-2 and Figure 4-3 show a comparison of linear current limiting versus the reentrant current limiting scheme implemented in Figure 4-1.

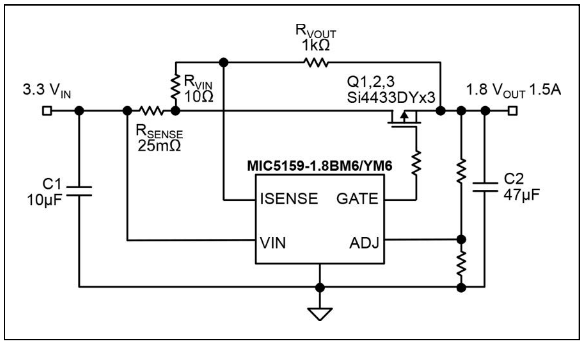


FIGURE 4-1: *Re-Entrant Current Limit.*

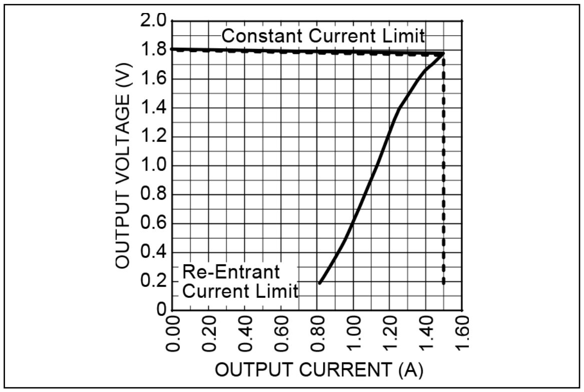


FIGURE 4-2: *Output Voltage Characteristics Re-Entrant Current Limit.*

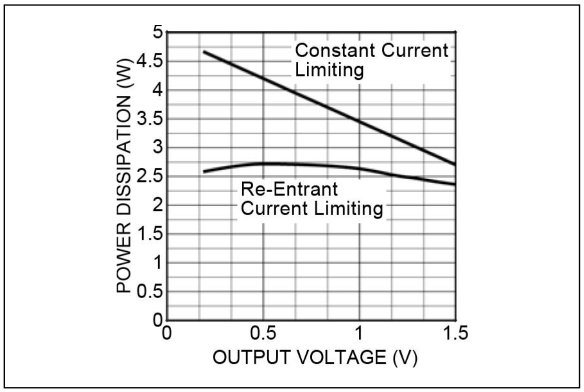


FIGURE 4-3: *Power Dissipation vs. Output Voltage.*

4.6 Enable/Shutdown

The MIC5159 comes with an active-high enable pin that allows the regulator to be disabled. Forcing the enable pin low disables the regulator and sends it into a low off-mode current state. Forcing the enable pin high enables the output voltage. This part is CMOS and the enable pin cannot be left floating; a floating enable pin may cause an indeterminate state on the output.

4.7 Output Capacitor

The MIC5159 requires an output capacitor to maintain stability and improve transient response. Proper selection is important to ensure proper operation. The MIC5159 output capacitor selection is highly dependent upon the components and the application.

With a very high gate charge (gate capacitance) MOSFET, the output requires a much larger valued ceramic capacitor for stability. As an alternative to a large valued ceramic capacitor, a smaller-valued tantalum capacitor can be used to provide stability. At higher load currents, lower $R_{DS(ON)}$ MOSFETs are used; these MOSFETs typically having much larger gate charge. If the application does not require ultra-low-dropout voltage, smaller values of ceramic capacitance may be used.

4.8 Input Capacitor

An input capacitor of 1.0 µF or greater is recommended when the device is more than 4 inches away from the bulk AC supply capacitance or when the supply is a battery. Small, surface mount, ceramic capacitors can be used for bypassing the input to the regulator, further improving the integrity of the output voltage. Larger input capacitors may be required depending on the impedance of the source and the output load requirements.

4.9 Layout Considerations

Input and output capacitor placement should be as close as possible to the input and output, respectively. Trace resistance between the current sense and the MOSFET source should be minimized. Trace resistance will increase dropout voltage. This is more of a factor at higher output currents.

Also, a minimum amount of distance between the gate pin, on the MIC5159, and the P-Channel MOSFET gate is recommended. A long trace can create a small parasitic inductor. This, coupled to the gate capacitance of the MOSFET, can create a high frequency tank circuit. A small 50Ω resistor in series with the gate may be required to eliminate high-frequency noise.

4.10 Adjustable Regulator Design

The MIC5159 allows programming the output voltage anywhere between 1.235V to V_{IN}. Two resistors are used. See Figure 4-4. The resistor values are calculated by:

EQUATION 4-11:

$$R1 = R2 \times \left(\left(\frac{V_{OUT}}{1.235}\right) - 1\right)$$

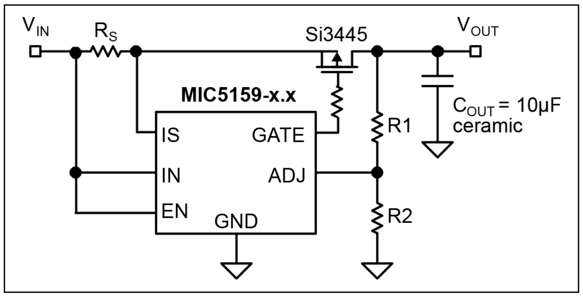


FIGURE 4-4: Adjustable Regulator Design.

5.0 DESIGNING WITH MIC5159

The following section details:

- Application examples of possible input/output configurations with related schematics designator.
- Schematics with “Bill of Materials” recommendation, dropout performance, and maximum output current for each FET combination.
- Further advice on MOSFET selection.

In the tables in this section, Pkg. stands for package and Sch. stands for schematic.

TABLE 5-1: 3.3V_{IN} TO 2.5V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
1.0A	10 µF	Si4433DY	SO-8	C
2.5A	22 µF	Si4433DY ×2	SO-8	D
2.5A	10 µF	SUB-15P01-52	D2PAK	H
3.5A	44 µF	Si4433DY ×3	SO-8	E
5.0A	44 µF	Si4433DY ×4	SO-8	F
5.0A	22 µF	SUB15P01-52 ×2	D2PAK	I
7.5A	44 µF	SUB15P01-52 ×3	D2PAK	J
10.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-2: 3.3V_{IN} TO 1.8V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
0.6A	10 µF	Si4433DY	SO-8	C
1.25A	22 µF	Si4433DY ×2	SO-8	D
1.25A	10 µF	SUB-15P01-52	D2PAK	H
2.0A	44 µF	Si4433DY ×3	SO-8	E
2.5A	44 µF	Si4433DY ×4	SO-8	F
2.5A	22 µF	SUB15P01-52 ×2	D2PAK	I
3.75A	44 µF	SUB15P01-52 ×3	D2PAK	J
5.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-3: 3.3V_{IN} TO 1.5V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
0.5A	10 µF	Si4433DY	SO-8	C
1.0A	22 µF	Si4433DY ×2	SO-8	D
1.0A	10 µF	SUB-15P01-52	D2PAK	H
1.5A	44 µF	Si4433DY ×3	SO-8	E
2.0A	44 µF	Si4433DY ×4	SO-8	F
2.0A	22 µF	SUB15P01-52 ×2	D2PAK	I
3.0A	44 µF	SUB15P01-52 ×3	D2PAK	J
4.25A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-4: 3.3V_{IN} TO 1.25V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
0.4A	10 µF	Si4433DY	SO-8	C
0.75A	22 µF	Si4433DY ×2	SO-8	D
0.75A	10 µF	SUB-15P01-52	D2PAK	H
1.25A	44 µF	Si4433DY ×3	SO-8	E
1.75A	44 µF	Si4433DY ×4	SO-8	F
1.75A	22 µF	SUB15P01-52 ×2	D2PAK	I
2.75A	44 µF	SUB15P01-52 ×3	D2PAK	J
3.75A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-5: 2.5V_{IN} TO 1.8V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
1.25A	10 µF	Si4433DY	SO-8	C
2.5A	22 µF	Si4433DY ×2	SO-8	D
2.5A	10 µF	SUB-15P01-52	D2PAK	H
4.0A	44 µF	Si4433DY ×3	SO-8	E
5.5A	44 µF	Si4433DY ×4	SO-8	F
5.5A	22 µF	SUB15P01-52 ×2	D2PAK	I
8.0A	44 µF	SUB15P01-52 ×3	D2PAK	J
11.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-6: 2.5V_{IN} TO 1.5V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
1.0A	10 µF	Si4433DY	SO-8	C
2.0A	22 µF	Si4433DY ×2	SO-8	D
2.0A	10 µF	SUB-15P01-52	D2PAK	H
3.0A	44 µF	Si4433DY ×3	SO-8	E
4.0A	44 µF	Si4433DY ×4	SO-8	F
4.0A	22 µF	SUB15P01-52 ×2	D2PAK	I
6.0A	44 µF	SUB15P01-52 ×3	D2PAK	J
8.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-7: 2.5V_{IN} TO 1.25V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
0.75A	10 µF	Si4433DY	SO-8	C
1.5A	22 µF	Si4433DY ×2	SO-8	D
1.5A	10 µF	SUB-15P01-52	D2PAK	H
2.0A	44 µF	Si4433DY ×3	SO-8	E
3.0A	44 µF	Si4433DY ×4	SO-8	F
3.0A	22 µF	SUB15P01-52 ×2	D2PAK	I
4.5A	44 µF	SUB15P01-52 ×3	D2PAK	J
6.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

TABLE 5-8: 1.8V_{IN} TO 1.5V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
2.0A	10 µF	Si3445DV	TSOP-6	A
4.0A	22 µF	Si3445DV ×2	TSOP-6	B
6.0A	200 µF	Si4403DY ×2	SO-8	G
7.0A	44 µF	SUB15P01-52 ×4	D2PAK	K

Note: For space constrained designs, a DPAK equivalent can be used in this application (SUD15P01-52). This is due to RDS(ON) limitation NOT power dissipation.

TABLE 5-9: 1.8V_{IN} TO 1.25V_{OUT} CONVERSION

I_{OUT}	C_{OUT}	MOSFET	Pkg.	Sch.
1.0A	10 µF	Si3445DV	TSOP-6	A
1.5A	10 µF	Si4433DY	SO-8	C
3.0A	22 µF	Si4433DY ×2	SO-8	D
3.0A	10 µF	SUB-15P01-52	D2PAK	H
4.5A	44 µF	Si4433DY ×3	SO-8	E
6.0A	44 µF	Si4433DY ×4	SO-8	F
6.5A	22 µF	SUB15P01-52 ×2	D2PAK	I
9.0A	88 µF	SUB15P01-52 ×3	D2PAK	J
13.0A	88 µF	SUB15P01-52 ×4	D2PAK	K

5.1 Schematic A

TABLE 5-10: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
1.8V	1.5V	2A
1.8V	1.25V	1A

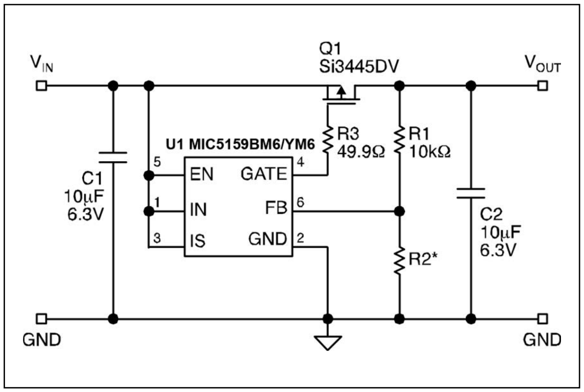


FIGURE 5-1: Application Circuit.

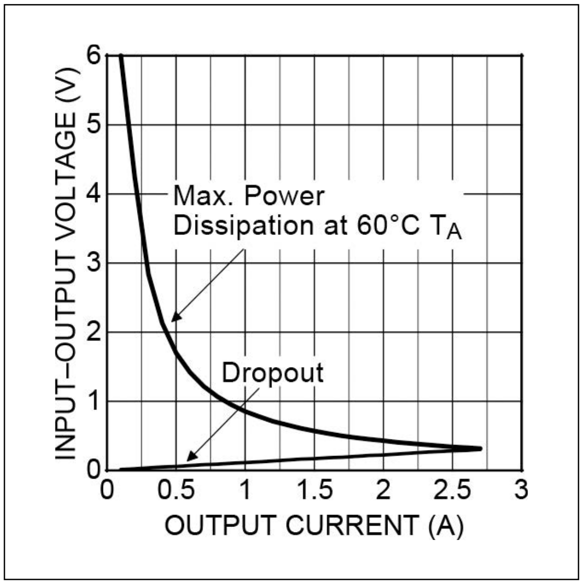


FIGURE 5-2: Si3445DV SOA.

TABLE 5-11: BILL OF MATERIALS FOR SCHEMATIC A

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
C2	C2012X5RR0J106M	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1	Si3445DV	Vishay Siliconix	P-Channel MOSFET TSOP-6	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.2 Schematic B

TABLE 5-12: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
1.8V	1.5V	4A

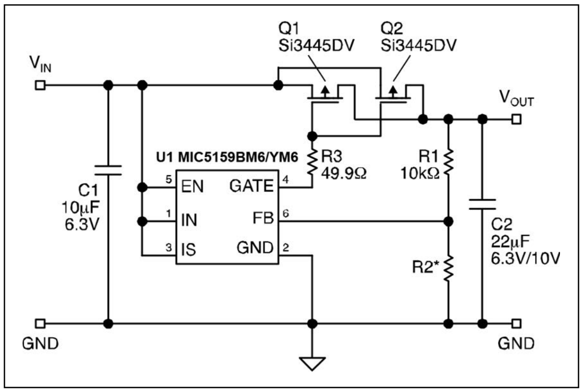


FIGURE 5-3: Application Circuit.

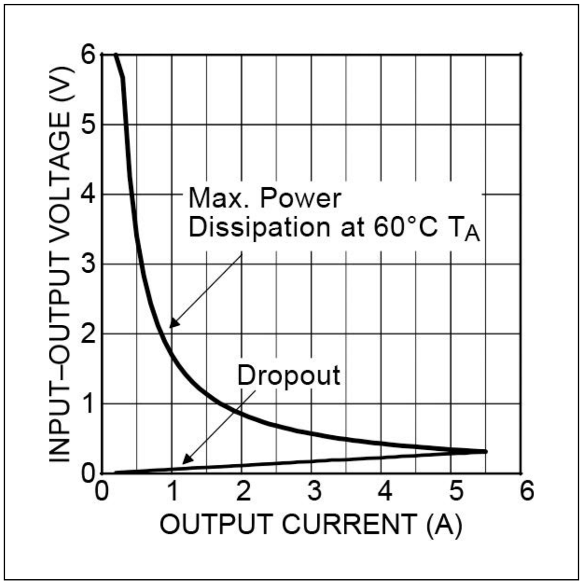


FIGURE 5-4: Si3445DV ×2 SOA.

TABLE 5-13: BILL OF MATERIALS FOR SCHEMATIC B

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C2012X5RR0J106M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2	Si3445DV	Vishay Siliconix	P-Channel MOSFET TSOP-6	2
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.3 Schematic C

TABLE 5-14: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	1A
3.3V	1.8V	0.6A
3.3V	1.5V	0.5A
3.3V	1.25V	0.4V
2.5V	1.8V	1.25A
2.5V	1.5V	1A
2/5V	1.25V	0.75A
1.8V	1.25V	1.5A

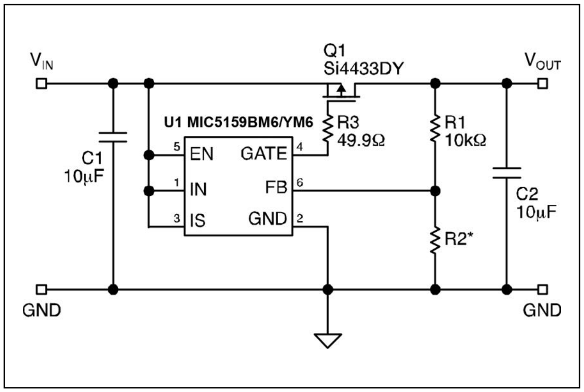


FIGURE 5-5: Application Circuit.

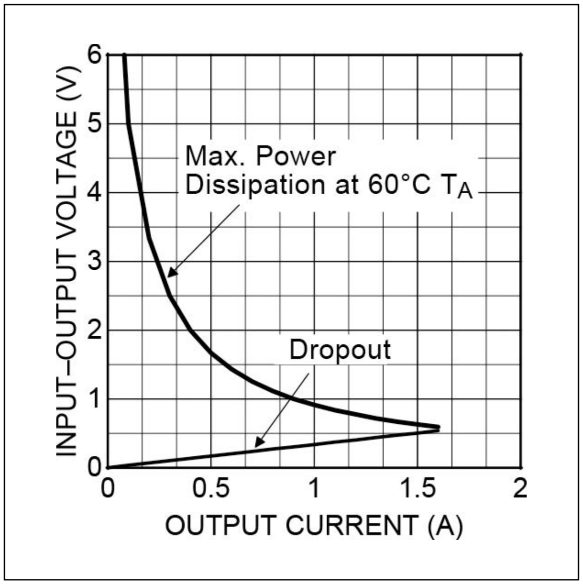


FIGURE 5-6: Si34433DY SOA.

TABLE 5-15: BILL OF MATERIALS FOR SCHEMATIC C

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
C2	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	1
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1	Si4433DY	Vishay Siliconix	P-Channel MOSFET SO-8	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.4 Schematic D

TABLE 5-16: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	2.5A
3.3V	1.8V	1.25A
3.3V	1.5V	1A
3.3V	1.25V	0.75A
2.5V	1.8V	2.5A
2.5V	1.5V	2A
2.5V	1.25V	1.5A
1.8V	1.5V	2A
1.8V	1.25V	3A

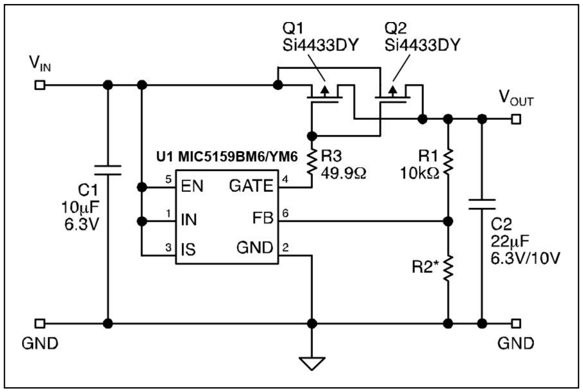


FIGURE 5-7: Application Circuit.

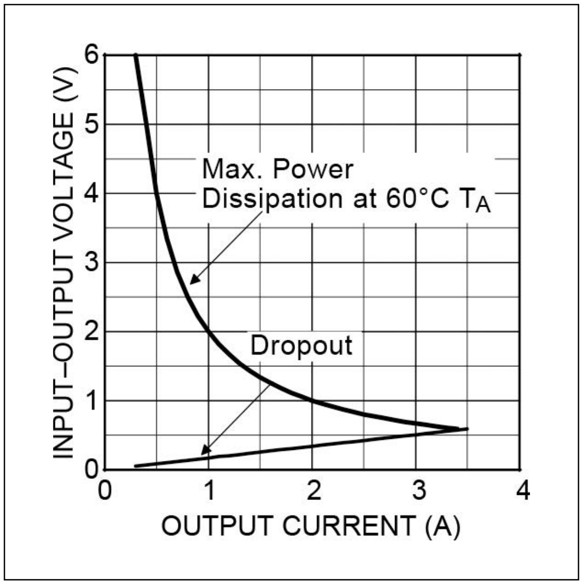


FIGURE 5-8: Si34433DY ×2 SOA.

TABLE 5-17: BILL OF MATERIALS FOR SCHEMATIC D

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.3V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2	Si4433DY	Vishay Siliconix	P-Channel MOSFET SO-8	1
U1	MIC5159BM6/YM6	MIcrochip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.5 Schematic E

TABLE 5-18: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
1.8V	1.5V	2A
1.8V	1.25V	1A

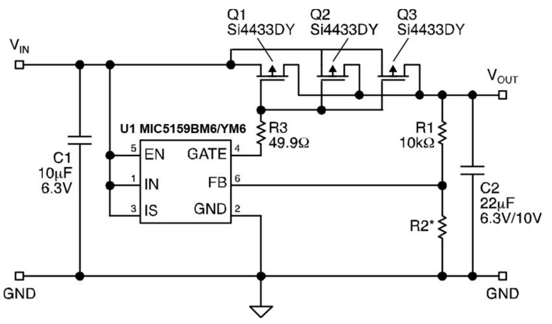


FIGURE 5-9: *Application Circuit.*

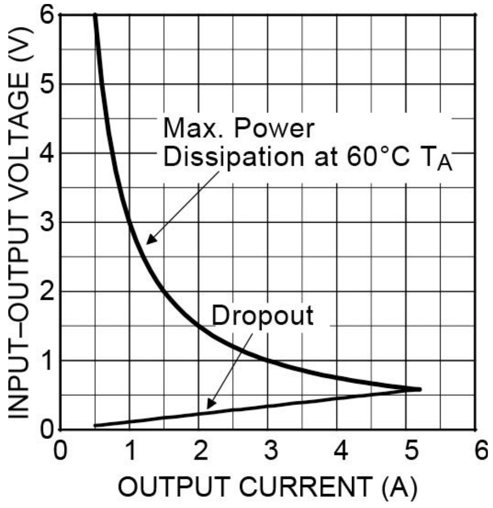


FIGURE 5-10: *Si34433DY ×3 SOA.*

TABLE 5-19: BILL OF MATERIALS FOR SCHEMATIC E

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2, Q3	Si4433DY	Vishay Siliconix	P-Channel MOSFET SO-8	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.6 Schematic F

TABLE 5-20: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	5A
3.3V	1.8V	2.5A
3.3V	1.5V	2A
3.3V	1.25V	1.75A
2.5V	1.8V	5.5A
2.5V	1.5V	4A
2.5V	1.25V	3A
1.8V	1.25V	6.5A

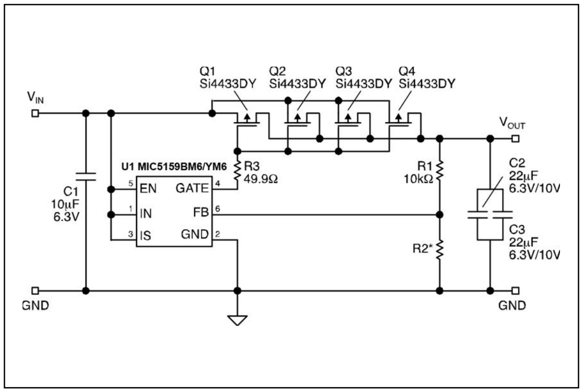


FIGURE 5-11: Application Circuit.

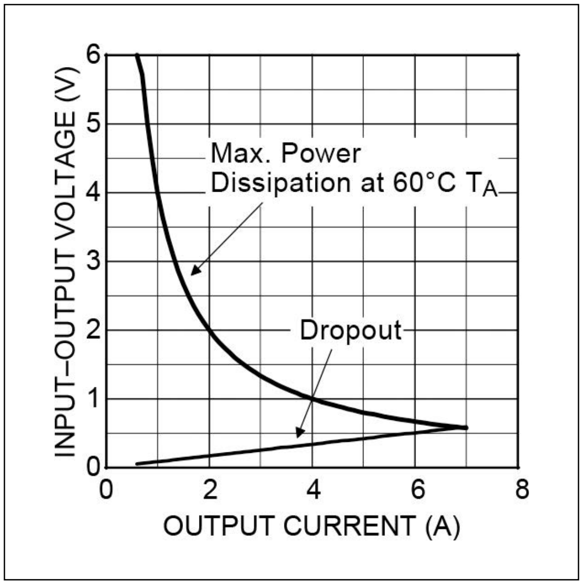


FIGURE 5-12: Si4433DY ×4 SOA.

TABLE 5-21: BILL OF MATERIALS FOR SCHEMATIC F

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2, Q3, Q4	Si4433DY	Vishay Siliconix	P-Channel MOSFET SO-8	4
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.7 Schematic G

TABLE 5-22: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
1.8V	1.5V	6A

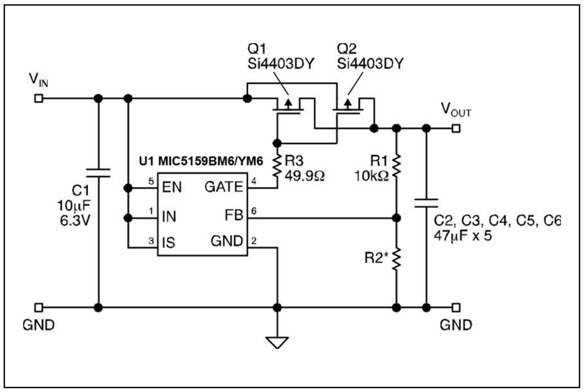


FIGURE 5-13: Application Circuit.

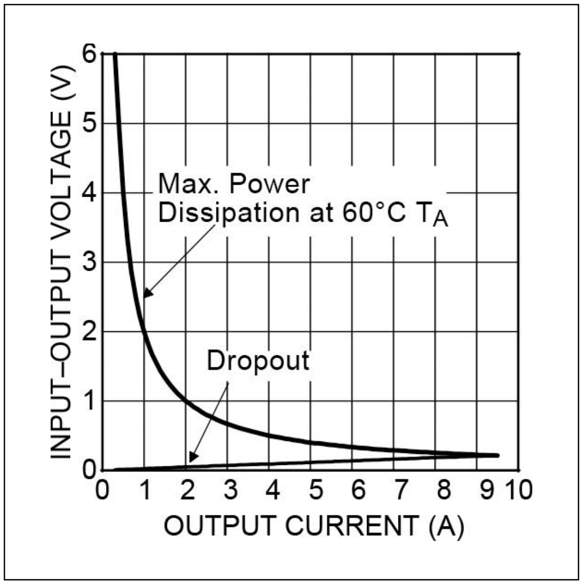


FIGURE 5-14: Si34403DY ×2 SOA.

TABLE 5-23: BILL OF MATERIALS FOR SCHEMATIC G

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM43 ER60J476K	Murata	47µF, 6.3V Ceramic MLCC, Size 1812	1
	C4532X5R0J476M	TDK	47µF, 6.3V Ceramic MLCC, Size 1812	
R1	CRCW08051002	Vishay Dale	10kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2	Si4403DY	Vishay Siliconix	P-Channel MOSFET SO-8	2
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.8 Schematic H

TABLE 5-24: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
1.8V	1.5V	2A
1.8V	1.25V	1A

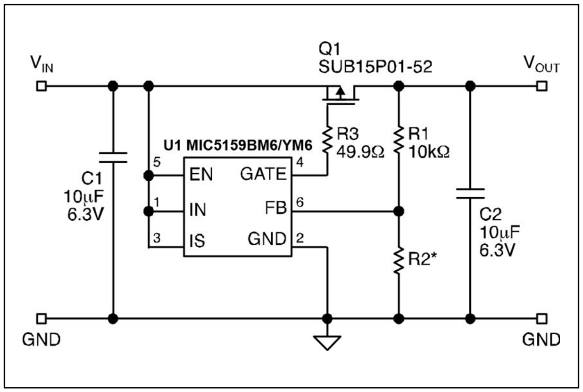


FIGURE 5-15: Application Circuit.

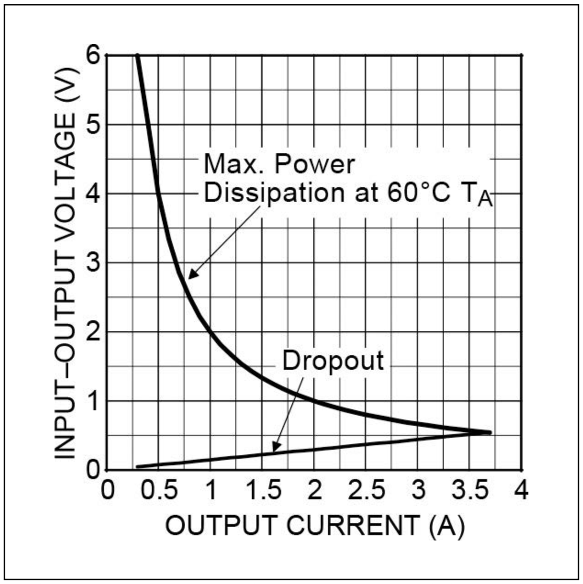


FIGURE 5-16: SUB15P01-52 SOA.

TABLE 5-25: BILL OF MATERIALS FOR SCHEMATIC H

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10µF, 6.3V Ceramic MLCC, Size 0805	1
C2	C2012X5RR0J106M	TDK	10µF, 6.3V Ceramic MLCC, Size 0805	1
R1	CRCW08051002	Vishay Dale	10kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76KΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5KΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1	SUB15P01-52	Vishay Siliconix	P-Channel MOSFET TO-263	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.9 Schematic I

TABLE 5-26: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	5A
3.3V	1.8V	2.5A
3.3V	1.5V	2A
3.3V	1.25V	1.75A
2.5V	1.8V	5.5A
2.5V	1.5V	4A
2.5V	1.25V	3A
1.8V	1.25V	6.5

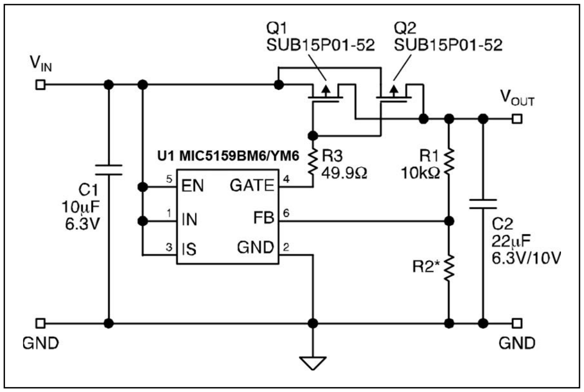


FIGURE 5-17: *Application Circuit.*

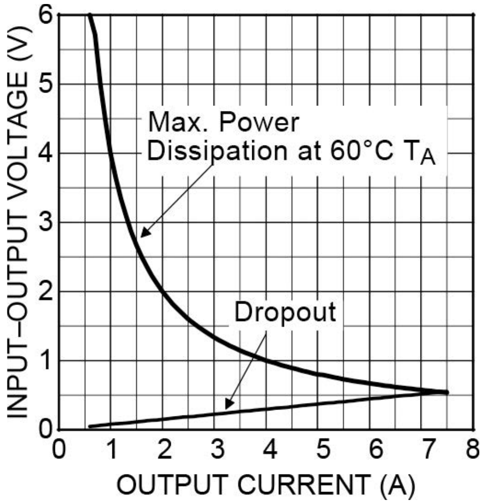


FIGURE 5-18: *SUB15P01-52 ×2 SOA.*

TABLE 5-27: BILL OF MATERIALS FOR SCHEMATIC I

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 KΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 KΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2	SUB15P01-52	Vishay Siliconix	P-Channel MOSFET TO-263	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.10 Schematic J

TABLE 5-28: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	7.5A
3.3V	1.8V	3.75A
3.3V	1.5V	3A
3.3V	1.25V	2.75A
2.5V	1.8V	8A
2.5V	1.5V	6A
2.5V	1.25V	4.5A
1.8V	1.25V	9.5A

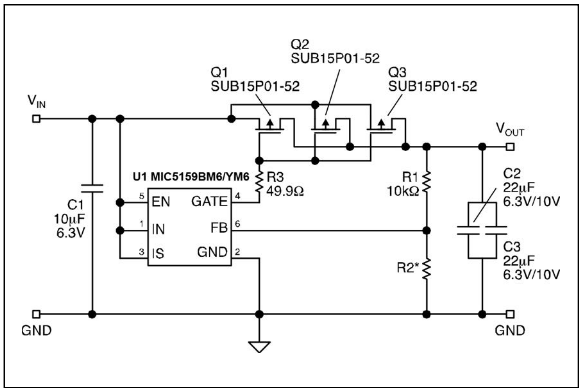


FIGURE 5-19: *Application Circuit.*

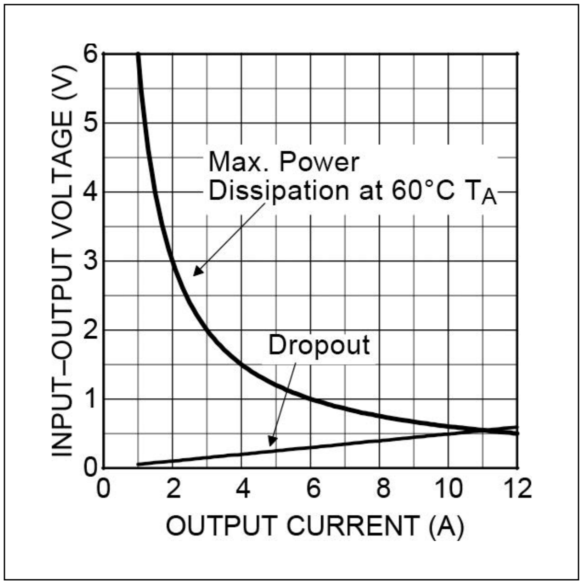


FIGURE 5-20: *SUB15P01-52 ×3 SOA.*

TABLE 5-29: BILL OF MATERIALS FOR SCHEMATIC J

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2, C3	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 82 5kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2, Q3	SUB15P01-52	Vishay Siliconix	P-Channel MOSFET TO-263	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

5.11 Schematic K

TABLE 5-30: INPUT/OUTPUT COMBINATION EXAMPLES

Input	Output	Maximum Current
3.3V	2.5V	10A
3.3V	1.8V	5A
3.3V	1.5V	4.25A
3.3V	1.25V	3.75A
2.5V	1.8V	11A
2.5V	1.5V	8A
2.5V	1.25V	6A
1.8V	1.5V	7A
1.8V	1.25V	13A

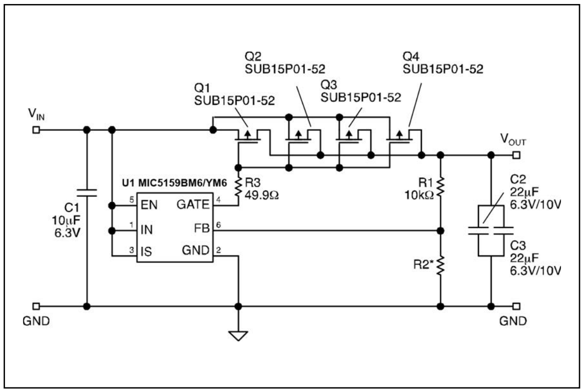


FIGURE 5-21: Application Circuit.

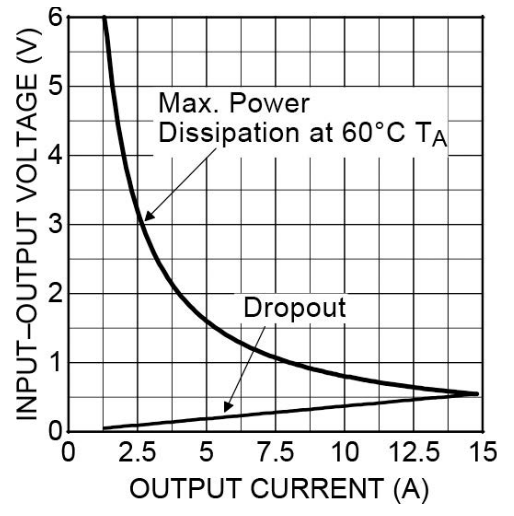


FIGURE 5-22: SUB15P01-52 ×4 SOA.

TABLE 5-31: BILL OF MATERIALS FOR SCHEMATIC K

Item	Part Number	Manufacturer	Description	Qty.
C1	GRM40 X7R 106 6.3	Murata	10 µF, 6.3V Ceramic MLCC, Size 0805	1
	C2012X5RR0J106M	TDK	10 µF, 6.3V Ceramic MLCC, Size 0805	
C2	GRM42-2 X5R 226K 6.3	Murata	22 µF, 6.3V Ceramic MLCC, Size 1210	1
	C3225X5R1A226M	TDK	22 µF, 10V Ceramic MLCC, Size 1210	
R1	CRCW08051002	Vishay Dale	10 kΩ Resistor, Size 0805	1
R2	CRCW08059761	Vishay Dale	Output Voltage:2.5V; 9.76 kΩ Resistor, Size 0805	1
	CRCW08052152	Vishay Dale	Output Voltage:1.8V; 21.5 kΩ Resistor, Size 0805	
	CRCW08054642	Vishay Dale	Output Voltage:1.5V; 46.4 kΩ Resistor, Size 0805	
	CRCW08058253	Vishay Dale	Output Voltage:1.25V; 825 kΩ Resistor, Size 0805	
R3	CRCW080549R9 F	Vishay Dale	49.9Ω Resistor, Size 0805	1
Q1, Q2, Q3, Q4	SUB15P01-52	Vishay Siliconix	P-Channel MOSFET TO-263	1
U1	MIC5159BM6/YM6	Microchip	Programmable Current Limit µCap LDO Regulator	1

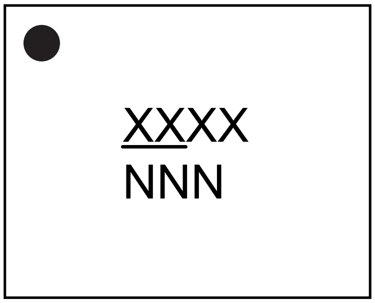
Note: To calculate other output voltage values, use this equation:

$$R2 = \frac{R1}{\left(\frac{V_{OUT}}{1.235}\right) - 1}$$

6.0 PACKAGING INFORMATION

6.1 Package Marking Information

6-Lead SOT-23



Example

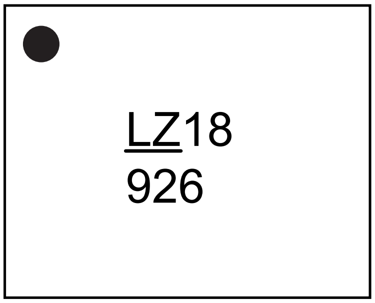


TABLE 6-1: ORDERING INFORMATION

Part Number	Marking	Voltage	Junction Temp. Range	Package
MIC5159YM6	LZAA	Adj.	–40°C to +125°C	SOT-23-6
MIC5159-1.8YM6	LZ18	1.8V	–40°C to +125°C	SOT-23-6

Note: Other voltage available. Contact your Microchip Sales Office for details.

Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.
	●, ▲, ▼	Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar (_) and/or Overbar (‾) symbol may not be to scale.

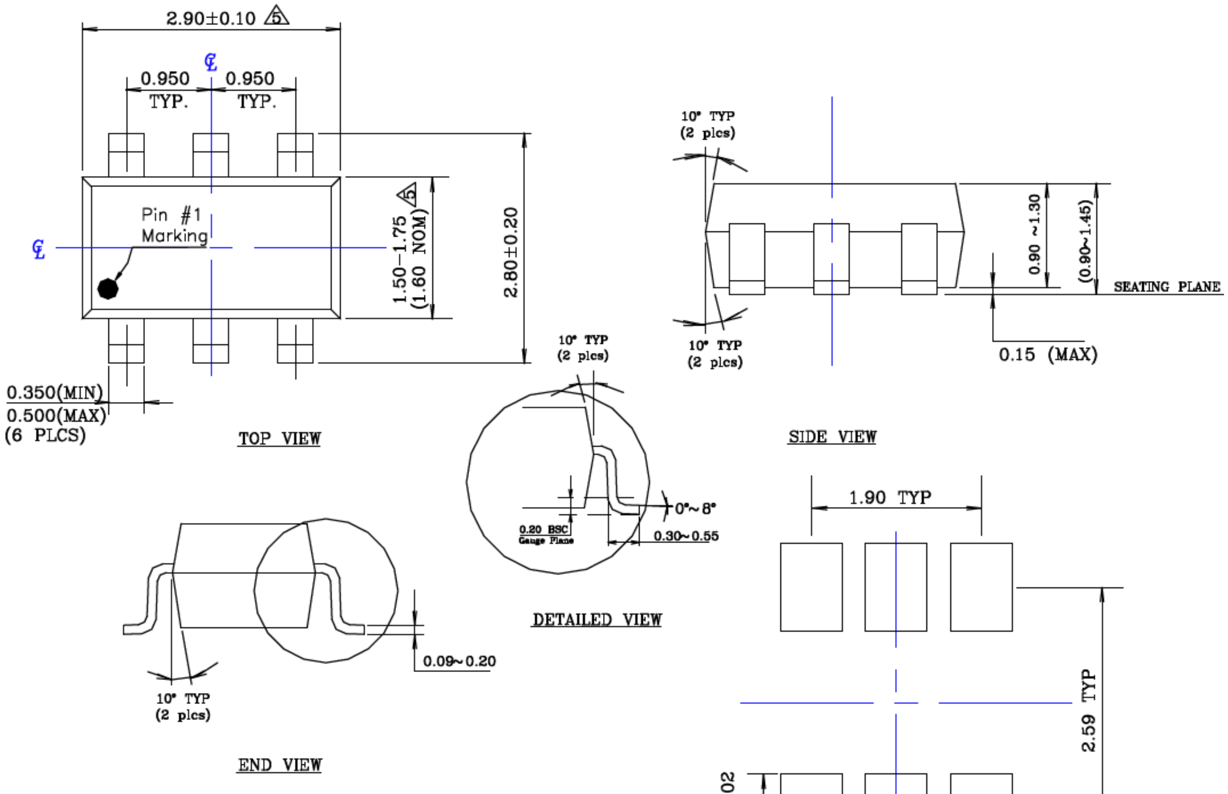
Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space: 6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN; 2 Characters = NN; 1 Character = N.

6-Lead SOT-23 Package Outline and Recommended Land Pattern

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

TITLE
6 LEAD SOT23 PACKAGE OUTLINE & RECOMMENDED LAND PATTERN

DRAWING #	SOT23-6LD-PL-1	**UNIT**	MM



NOTE:
1. Dimensions and tolerances are as per ANSI Y14.5M, 1982.
2. Package surface to be mirror finish.
3. Die is facing up for mold. Die is facing down for trim/form, ie. reverse trim/form.
4. The footlength measuring is based on the gauge plane method.
5. Dimension are exclusive of mold flash & gate burr.

APPENDIX A: REVISION HISTORY

Revision A (November 2023)

- Converted Micrel document MIC5159 to Microchip data sheet DS20006789A.
- Minor text changes throughout.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

PART No.	-X.XX	X	XX	-XX
Device	Output Voltage	Junction Temp. Range	Package	Media Type

Device: MIC5159: Programmable Current Limit μCap LDO Regulator Controller

Output Voltage:
-1.8 = Fixed 1.8V
<blank>= Adjustable (Down to 1.25V)

Junction Temperature Range: Y = –40°C to +125°C

Package: M6 = 6-Lead SOT-23

Media Type: -TR = 3000/Reel

Examples:

a) MIC5159-1.8VYM6-TR: MIC5159, Fixed 1.8V Output Voltage, –40°C to +125°C Temp. Range, 6-Lead SOT-23, 3000/Reel

b) MIC5159YM6-TR: MIC5159, Adjustable Output Voltage, –40°C to +125°C Temp. Range, 6-Lead SOT-23, 3000/Reel

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip

NOTES:

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