1. 特性

- 单芯片过流保护解决方案
- 提供三种增益选项：
  - CSA315L = 20V/V
  - CSA315M = 50V/V
  - CSA315P = 100V/V
- 双比较器：
  - 比较器 1：带闩锁功能
  - 比较器 2：可配置延迟
- 输入共模范围：–6V 至 80V
- 共模抑制比：160dB (typ)
- 高精度：
  - 最大偏移电压：±20μV (max)
  - 最大增益误差：±0.1% (max)
- 带宽：420kHz (typ)
- 静态电流：1.8mA (typ)
- 封装：TSSOP-14

2. 应用

- 笔记本电脑
- 电信器件
- 汽车
- 电源系统
- 电池充电器
- 焊接器件

3. 说明

CSA315 是一款单向电流分流器检测放大器，其特点包括具有模拟电压输出、双比较器和集成电压参考电压。CSA315 可以在共模电压从–6V 到 80V 范围内对分流电阻上的电压进行检测。其中 CSA315L、CSA315M 和 CSA315P 分别对应三种不同的增益选择: 20V/V、50V/V 和 100V/V，带宽典型值为 420kHz。

CSA315 还集成有两路开漏比较器，内置 0.6V 参考电压。比较器的内部参考可以被外部输入所覆盖。比较器 1 具有闭锁功能，而比较器 2 的延迟可以通过外部电容进行编程设定。此外，还提供 1.2V 参考电压输出。

CSA315 供电电压范围为 2.7V 至 5.5V，其工作范围为 –40°C 至 125°C。有关订购信息，请参见 Table 1。

Simplified Schematic

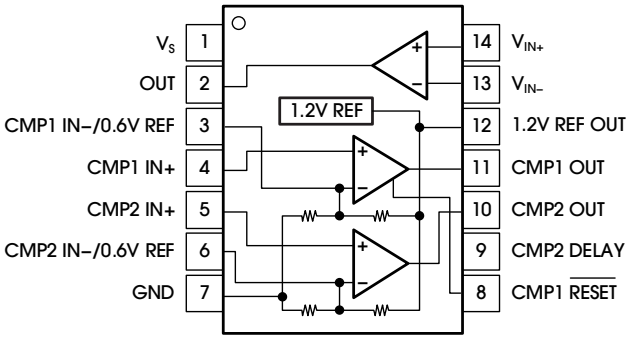


Table 1 lists the order information.

Table 1. Order Information

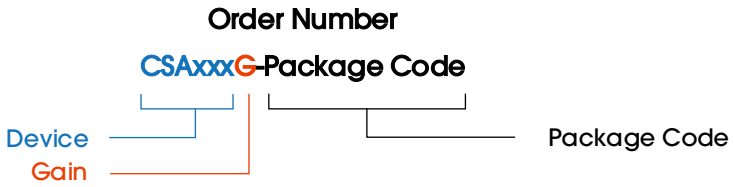
ORDER NUMBER(1)	MARK	CH (#)	PACKAGE	V_{CM} (V)	I_Q PER CH (TYP) (mA)	GBW (kHz)	GAIN (TYP) (V/V)	OPERATING TEMP (°C)	RATING	PACKAGE OPTION	MSL
CSA315LATSSOP14	CSA315L XXXXXX	1	TSSOP-14	–6-80	1.7	420	20	–40-125	Industrial	T/R-4000	MSL2
CSA315MATSSOP14	CSA315M XXXXXX	1	TSSOP-14	–6-80	1.7	420	50	–40-125	Industrial	T/R-4000	MSL2
CSA315PATSSOP14	CSA315P XXXXXX	1	TSSOP-14	–6-80	1.7	420	100	–40-125	Industrial	T/R-4000	MSL2

Table 2. Family Selection Guide

ORDER NUMBER(1)	MARK	CH (#)	PACKAGE	V_{CM} (V)	I_Q PER CH (TYP) (mA)	GBW (kHz)	GAIN (TYP) (V/V)	OPERATING TEMP (°C)	RATING	PACKAGE OPTION	MSL
CSA314LAMSOP8	CSA314L XXXXXX	1	MSOP-8	–6-80	Normal	420	20	–40-125	Industrial	T/R-4000	MSL2
CSA314MAMSOP8	CSA314M XXXXXX	1	MSOP-8	–6-80	Normal	420	50	–40-125	Industrial	T/R-4000	MSL2
CSA314PAMSOP8	CSA314P XXXXXX	1	MSOP-8	–6-80	Normal	420	100	–40-125	Industrial	T/R-4000	MSL2
CSA311LAMSOP8	CSA311L XXXXXX	1	MSOP-8	–6-80	Normal	420	20	–40-125	Industrial	T/R-4000	MSL2
CSA311MAMSOP8	CSA311M XXXXXX	1	MSOP-8	–6-80	Normal	420	50	–40-125	Industrial	T/R-4000	MSL2
CSA311PAMSOP8	CSA311P XXXXXX	1	MSOP-8	–6-80	Normal	420	100	–40-125	Industrial	T/R-4000	MSL2

Devices can be ordered via the following two ways:
1. Place orders directly on our website (www.analogysemi.com), or;
2. Contact our sales team by mailing to sales@analogysemi.com.

Note 1:



Note 2: “XXXXX”: For internal use.

4. PIN CONFIGURATION AND FUNCTIONS

Figure 1 illustrates the pin configuration.

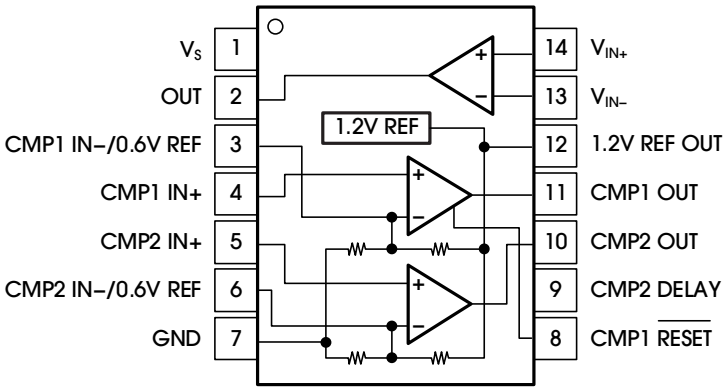


Figure 1. Pin Configuration

Table 3 lists the pin functions.

Table 3. Pin Functions

POSITION	NAME	TYPE	DESCRIPTION
1	V_S	Input	Power supply
2	OUT	Output	Output voltage
3	CMP1 IN–/0.6V REF	Input	Comparator 1 negative input, can be used to override the internal 0.6V reference.
4	CMP1 IN+	Input	Comparator 1 positive input
5	CMP2 IN+	Input	Comparator 2 positive input
6	CMP2 IN–/0.6V REF	Input	Comparator 2 negative input, can be used to override the internal 0.6V reference.
7	GND	Input	Ground
8	CMP1 $\overline{\text{RESET}}$	Input	Comparator 1 output reset, active low. Do NOT leave it floating.
9	CMP2 DELAY	Input	Connect an optional capacitor to adjust comparator 2 delay
10	CMP2 OUT	Output	Comparator 2 output
11	CMP1 OUT	Output	Comparator 1 output
12	1.2V REF OUT	Output	1.2V reference output
13	V_{IN-}	Input	Connect to shunt low side
14	V_{IN+}	Input	Connect to shunt high side

5. SPECIFICATIONS

5.1 ABSOLUTE MAXIMUM RATINGS

Table 4 lists the absolute maximum ratings of the CSA315.

Table 4. Absolute Maximum Ratings

PARAMETER	DESCRIPTION	MIN	MAX	UNITS
Voltage	Supply, V_S		6	V
	Current-shunt monitor analog inputs, V_{IN+} and V_{IN-}, Differential (V_{IN+}) – (V_{IN-})	–80	80	V
	Current-shunt monitor analog inputs, V_{IN+} and V_{IN-}, common-mode	–6	82	V
	Comparator analog input and reset pins	GND – 0.3	V_S + 0.3	V
	Analog output, out pin	GND – 0.3	V_S + 0.3	V
	Comparator output, out pin	GND – 0.3	6	V
	V_{REF} and CMP2 delay pin	GND – 0.3	6	V
Input Current Into Any Pin			5	mA
Temperature	Operating, T_A	–40	125	°C
	Junction, T_J	–40	150	°C
	Storage, T_{stg}	–65	150	°C

Note: Stresses beyond those listed under Table 4 may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Table 6. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

5.2 ESD RATINGS

Table 5 lists the ESD ratings of the CSA315.

Table 5. ESD Ratings

PARAMETER	SYMBOL	DESCRIPTION	VALUE	UNITS
Electrostatic Discharge	$V_{(ESD)}$	Human-body model (HBM), per ANSI/ESDA/JEDEC JS-001(1)	±6000	V
		Charged-device model (CDM), per JEDEC specification JS-002(2)	±2000	

Note 1: The JEDEC document JEP155 indicates that 500V HBM allows safe manufacturing with a standard ESD control process.

Note 2: The JEDEC document JEP157 indicates that 250V CDM allows safe manufacturing with a standard ESD control process.

5.3 RECOMMENDED OPERATING CONDITIONS

Table 6 lists the recommended operating conditions for the CSA315.

Table 6. Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	NOM	MAX	UNITS
Common-Mode Input Voltage	V_{CM}	–6	12	80	V
Operating Supply Voltage	V_S	2.7	3.3	5.5	V
Operating Free-Air Temperature	T_A	–40	25	125	°C

5.4 THERMAL INFORMATION

Table 7 lists the thermal information for the CSA315.

Table 7. Thermal Information

PARAMETER	SYMBOL	TSSOP-14	UNITS
Junction-to-Ambient Thermal Resistance	$R_{\theta JA}$	104.2	°C/W
Junction-to-Board Thermal Resistance	$R_{\theta JB}$	67	°C/W
Junction-to-Top Characterization Parameter	ψ_{JT}	2.8	°C/W
Junction-to-Board Characterization Parameter	ψ_{JB}	65.7	°C/W
Junction-to-Case (Top) Thermal Resistance	$R_{\theta JC(top)}$	37.6	°C/W

5.5 ELECTRICAL CHARACTERISTICS

5.5.1 CURRENT-SHUNT MONITOR

Table 8 lists the electrical characteristics of CSA315 (current-shunt monitor). At T_A = 25°C, V_S = 5V, V_{CM} = 12V, V_{SENSE} = 100mV, R_L = 10kΩ to GND, R_{PULLUP} = 5.1kΩ each connected from CMP1 OUT and CMP2 OUT to V_S, and CMP1 IN+ = 1V and CMP2 IN– = GND, unless otherwise noted.

Table 8. Electrical Characteristics (Current-Shunt Monitor)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
INPUT						
Full-Scale Sense Input Voltage	V_{SENSE}	$V_{SENSE} = V_{IN+} - V_{IN-}$		0.15	(V_S – 0.25) / Gain	V
Common-Mode Input Range	V_{CM}	T_A = –40°C to 125°C	–6		80	V
Common-Mode Rejection Ratio	CMRR	V_{CM} = –6V to 80V	145	160		dB
		V_{CM} = –6V to 80V, T_A = –40°C to 125°C	132	160		dB
Offset Voltage, RTI(1)	V_{OS}			±2	±20	µV
		–40°C to 125°C			±90	µV
Offset Voltage, RTI(1) vs. Temperature		–40°C to 125°C		200	750	nV/°C
Offset Voltage, RTI(1) vs. Power Supply	PSR	V_{OUT} = 2V, V_{CM} = 5V, 2.7V, T_A = –40°C to 125°C		0.2	6.31	µV/V
Input Bias Current, V_{IN-} Pin	I_B	T_A = –40°C to 125°C		±10	±20	nA
OUTPUT						
Gain	G	CSA315L		20		V/V
		CSA315M		50		V/V
		CSA315P		100		V/V
Gain Error		CSA315L, V_{OUT} = 0.5V to V_S – 2.5V		±0.01		%
		CSA315L, V_{OUT} = 0.5V to V_S – 0.5V		±0.15		%
		CSA315M, V_{OUT} = 0.5V to V_S – 0.5V		±0.01		%
		CSA315P, V_{OUT} = 0.5V to V_S – 0.5V		±0.01	±0.15	%
Gain Error Over Temperature		T_A = –40°C to 125°C			30	ppm/°C
Nonlinearity Error(2)		V_{SENSE} = 20mV to 100mV		±0.0035		%
Output Impedance, Pin 2	R_O			1.2		Ω
Maximum Capacitive Load		No sustained oscillation		1		nF
VOLTAGE OUTPUT						
Output Swing to the Positive Rail		V_{IN-} = 11V, V_{IN+} = 12V, T_A = –40°C to 125°C	V_S – 0.015	V_S – 0.005		V
Output Swing to GND(3)		V_{IN-} = 0V, V_{IN+} = –0.5V, T_A = –40°C to 125°C		V_{GND} + 1	V_{GND} + 15	mV
FREQUENCY RESPONSE						
Bandwidth	BW	CSA315L, C_{LOAD} = 5pF		420		kHz
		CSA315M, C_{LOAD} = 5pF		420		kHz
		CSA315P, C_{LOAD} = 5pF		420		kHz
Slew Rate	SR			2		V/µs
Settling Time (1%)		V_{SENSE} = 10mV$_{PP}$ to 100mV$_{PP}$, C_{LOAD} = 5pF		4		µs
NOISE, RTI						
Output Voltage Noise Density				90		nV/√Hz

Note 1: Offset is extrapolated from measurements of the output at 20mV and 100mV V_{SENSE}.
Note 2: Linearity is best fit to a straight line.
Note 3: Specified by design; not production tested.

5.5.2 COMPARATOR

Table 9 lists the electrical characteristics of CSA315 (comparator). At T_A = 25°C, V_S = 5V, V_{CM} = 12V, V_{SENSE} = 100mV, R_L = 10kΩ to GND, R_{PULLUP} = 5.1kΩ each connected from CMP1 OUT and CMP2 OUT to V_S, unless otherwise noted.

Table 9. Electrical Characteristics (Comparator)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
OFFSET VOLTAGE						
Offset Voltage, CMP1		Comparator common-mode voltage = threshold voltage		1		mV
Offset Voltage, CMP2		Comparator common-mode voltage = threshold voltage		0.5		mV
Offset Voltage Drift, CMP1		T_A = –40°C to 125°C		±4		µV/°C
Offset Voltage Drift, CMP2		T_A = –40°C to 125°C		±4		µV/°C
Threshold, CMP1		T_A = 25°C	598	608	616	mV
Threshold Over Temperature, CMP1		T_A = –40°C to 125°C	591		623	mV
Threshold, CMP2		T_A = 25°C	598	608	616	mV
Threshold Over Temperature, CMP2		T_A = –40°C to 125°C	591		623	mV
Hysteresis(1), CMP1		T_A = –40°C to 125°C		–21		mV
Hysteresis(1), CMP2		T_A = –40°C to 125°C		21		mV
INPUT BIAS CURRENT(2)						
CMP1 IN+, CMP2 IN+				0.5	10	nA
CMP1 IN+, CMP2 IN+ vs. Temperature		T_A = –40°C to 125°C			15	nA
INPUT IMPEDANCE						
Pins 3 and 6				10		kΩ
INPUT RANGE						
CMP1 IN+ and CMP2 IN+			0		V_S	V
Pins 3 and 6(3)			0		V_S	V
OUTPUT						
High-Level Output Current		V_{ID} = 0.4V, V_{OH} = V_S		0.002	0.2	µA
Low-Level Output Voltage		V_{ID} = –0.6V, I_{OL} = 2.35mA		15	30	mV
RESPONSE TIME(4)						
CMP1(7)		R_L to 5V, C_L = 15pF, 100mV input step with 5mV overdrive		1		µs
CMP2(7)		R_L to 5V, C_L = 15pF, 100mV input step with 5mV overdrive, C_{DELAY} pin open		1		µs
RESET						
RESET Threshold(5)				1		V
Logic Input Impedance				> 1		GΩ
Minimum RESET Pulse Width				< 2		ns
RESET Propagation Delay				0.03		µs
CMP2 Delay Equation(6)				C_{DELAY} = t_D/5		µF
CMP2 Delay	t_D	C_{DELAY} = 0.1µF		0.5		s

Note 1: Hysteresis refers to the threshold (the threshold specification applies to a rising edge of a noninverting input) of a falling edge on the noninverting input of the comparator; refer to Figure 2.
Note 2: Specified by design; not production tested.
Note 3: See the COMPARATOR MAXIMUM INPUT VOLTAGE RANGE section.
Note 4: The comparator response time specified is the interval between the input step function and the instant when the output crosses 1.4V.
Note 5: The CMP1 $\overline{\text{RESET}}$ input has an internal 2MΩ (typical) pulldown. Leaving the CMP1 $\overline{\text{RESET}}$ open results in a LOW state, with transparent comparator operation.
Note 6: The Comparator 2 delay applies to both rising and falling edges of the comparator output.
Note 7: Simulation data, not production tested.

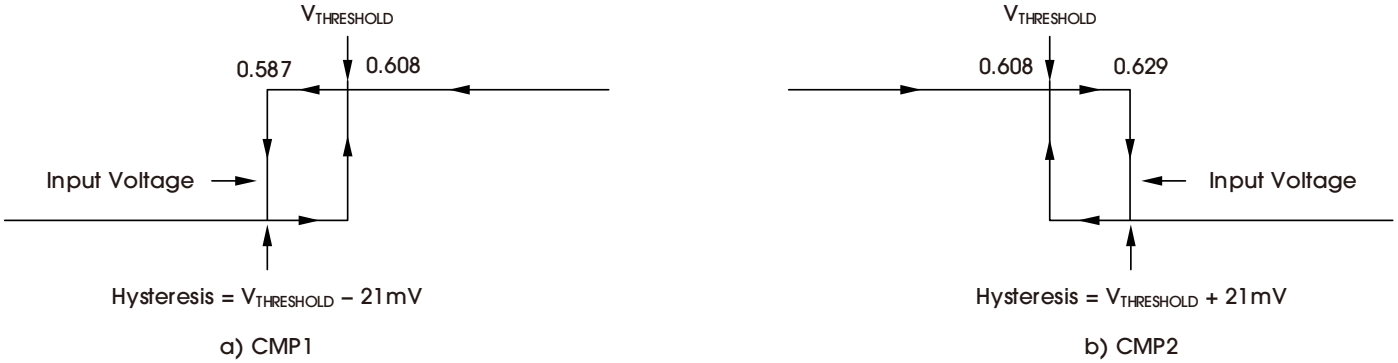


Figure 2. Comparator Hysteresis

5.5.3 REFERENCE

Table 10 lists the electrical characteristics of CSA315 (reference). At T_A = 25°C, V_S = 5V, V_{CM} = 12V, V_{SENSE} = 100mV, R_L = 10kΩ to GND, R_{PULLUP} = 5.1kΩ each connected from CMP1 OUT and CMP2 OUT to V_S, unless otherwise noted.

Table 10. Electrical Characteristics (Reference)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
REFERENCE VOLTAGE						
1.2 V_{REFOUT} Output Voltage			1.188	1.2	1.212	V
Reference Drift	dV_{OUT}/dT	T_A = –40°C to 125°C, CSA315P		20	100	ppm/°C
	dV_{OUT}/dT	T_A = –40°C to 125°C, CSA315L and CSA315M		20	120	ppm/°C
0.6-V_{REF} Output Voltage		Pins 3 and 6		607		mV
Reference Drift	dV_{OUT}/dT	T_A = –40°C to 125°C, CSA315P		20	100	ppm/°C
	dV_{OUT}/dT	T_A = –40°C to 125°C, CSA315L and CSA315M		20	120	ppm/°C
LOAD REGULATION						
Sourcing		0mA < I_{SOURCE} < 10mA		0.1	2	mV/mA
Sinking		0mA < I_{SINK} < 2mA		0.98		mV/mA
Load Current	I_{LOAD}	Source		10		mA
		Sink		2		mA
Line Regulation	dV_{OUT}/dV_S	2.7V < V_S < 5.5V		±100		μV/V
CAPACITIVE LOAD						
Reference Output Maximum Capacitive Load		No sustained oscillations		100		μF
OUTPUT IMPEDANCE						
Output Impedance		Pins 3 and 6		10		kΩ

5.5.4 GENERAL

Table 11 lists the electrical characteristics of CSA315 (general). At T_A = 25°C, V_S = 5V, V_{CM} = 12V, V_{SENSE} = 100mV, R_L = 10kΩ to GND, R_{pullup} = 5.1kΩ each connected from CMP1 OUT and CMP2 OUT to V_S, and CMP1 IN+ = 1V and CMP2 IN– = GND, unless otherwise noted.

Table 11. Electrical Characteristics (General)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
POWER SUPPLY						
Operating Power Supply	V_S	T_A = –40°C to 125°C	2.7		5.5	V
Quiescent Current	I_Q	V_{OUT} = 2V		1.7	2	mA
Quiescent Current Over Temperature		V_{SENSE} = 0mV			2.2	mA
Comparator Power-On Reset Threshold(1)				1.8		V
TEMPERATURE						
Specified Temperature			–40		125	°C
Operating Temperature			–55		150	°C

Note: The CSA315 is designed to power up with the comparator in a defined reset state as long as CMP1 $\overline{\text{RESET}}$ is open or grounded. The comparator will be in reset as long as the power supply is below the voltage shown here. The comparator assumes a state based on the comparator input above this supply voltage. If CMP1 $\overline{\text{RESET}}$ is high at power-up, the comparator output comes up high and requires a reset to assume a low state, if appropriate.

6. TYPICAL CHARACTERISTICS

V_S = 5V, V_{CM} = V_S / 2, R_{LOAD} = 10kΩ connected to V_S / 2, and C_L = 100pF, unless otherwise noted.

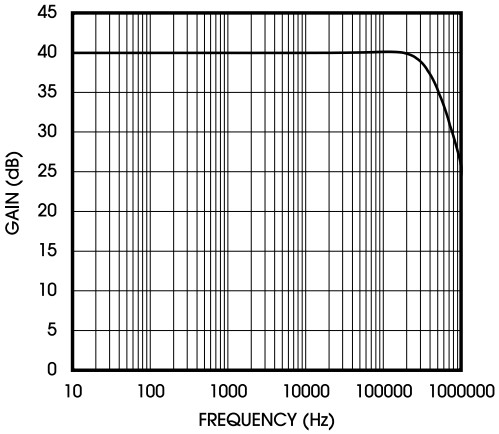


Figure 3. Bandwidth vs. Frequency

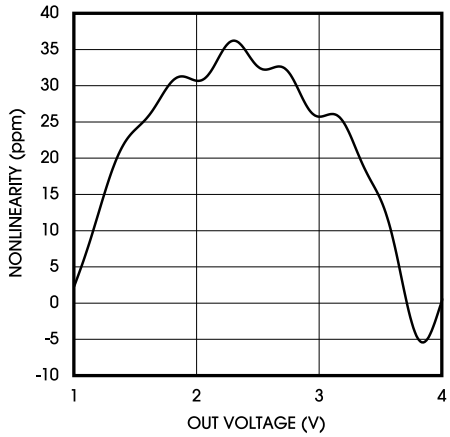


Figure 4. Gain Error vs. Out Voltage

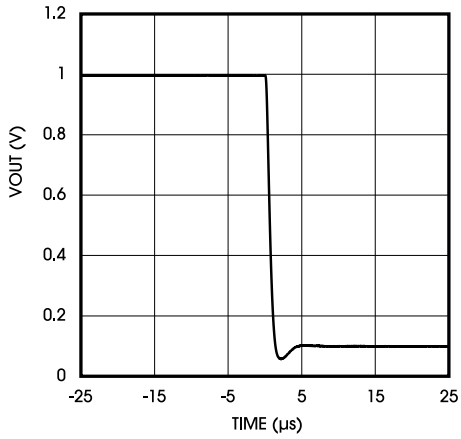


Figure 5. Settling Time Tf

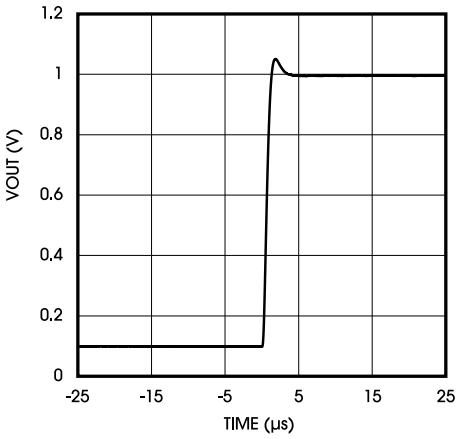


Figure 6. Settling Time Tr

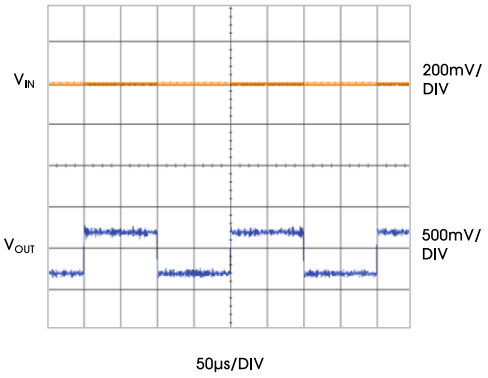


Figure 7. Small Signal Transient

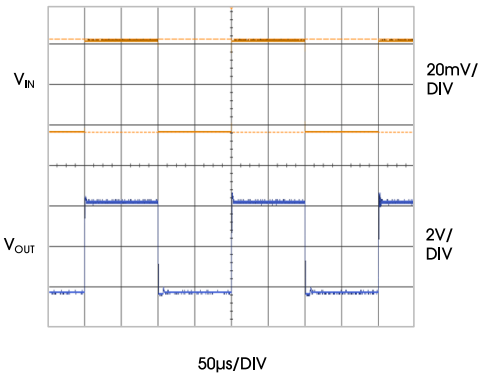


Figure 8. Large Signal Transient

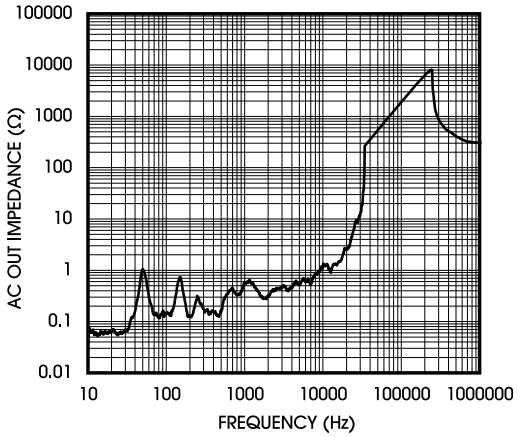


Figure 9. AC Out Impedance

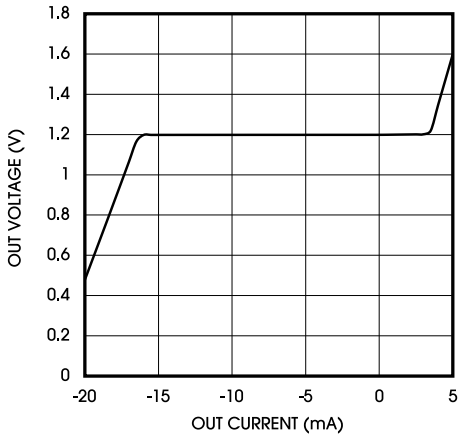


Figure 10. Load Regulation

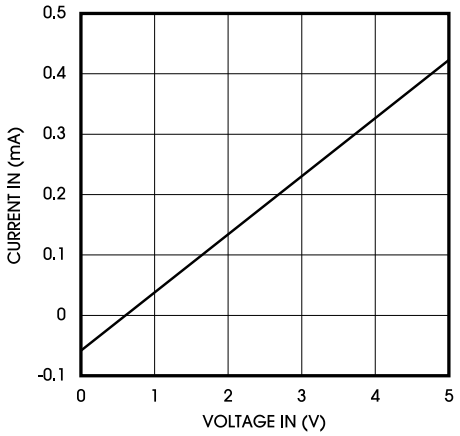


Figure 11. Impedance of Comparator In–

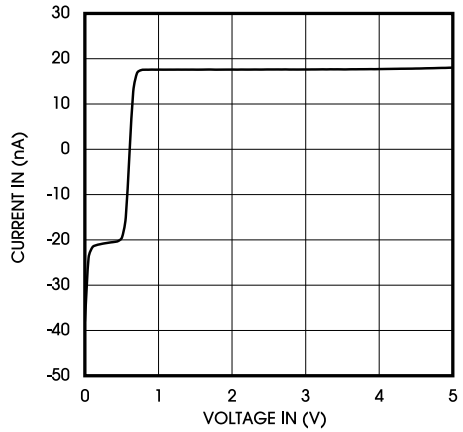


Figure 12. Impedance of Comparator In+

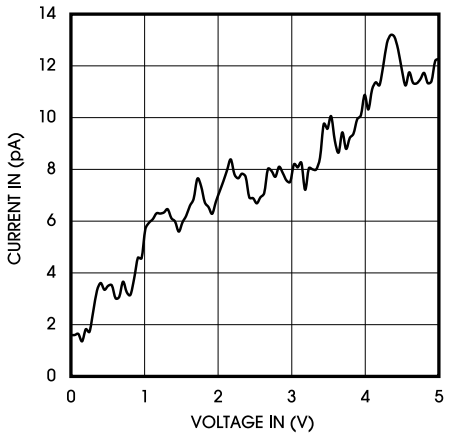


Figure 13. Impedance of Reset Pin

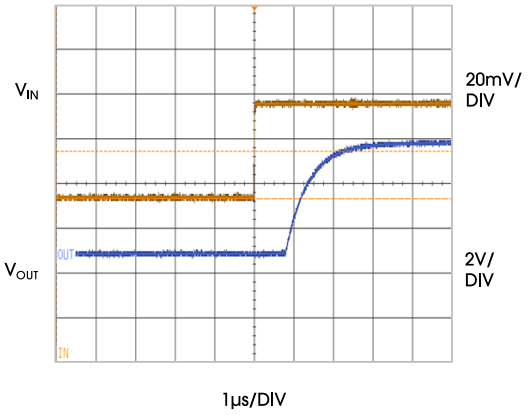


Figure 14. Comparator Propagation Delay Tr

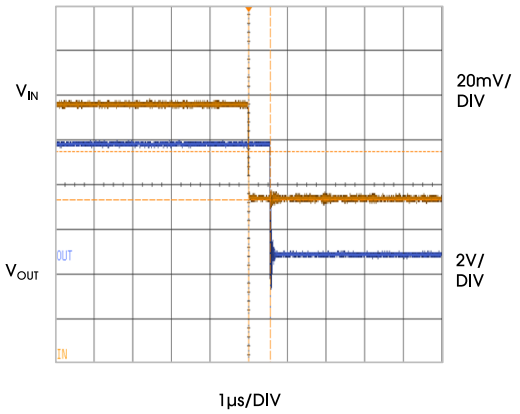


Figure 15. Comparator Propagation Delay Tf

7. 详细说明

7.1 概述

CSA315 是一种单向电流分流监视器，具有电压输出、双比较器和电压参考。CSA315 可以测量共模式电压从–6V 至 80V 的分流器电压。CSA315 提供三种输出电压比例—20V/V，50V/V 和 100V/V，典型带宽为 420kHz。CSA315 还包含两个开漏比较器，具有内部 0.6V 参考。比较器参考可以由外部输入。比较器 1 具有闭锁能力，比较器 2 具有可编程延迟功能。CSA315 还提供 1.2V 参考电压输出。CSA315 从单电源 2.7V 至 5.5V 供电，在–40°C 至 125°C 的扩展操作温度使用。

7.2 功能模块框图

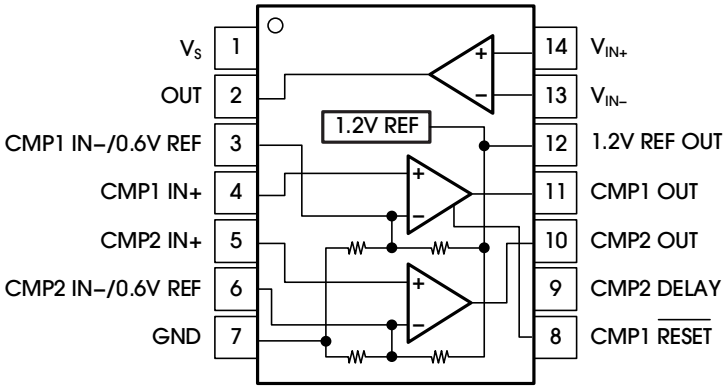


Figure 16. Functional Block Diagram

7.3 特性描述

7.3.1 基本连接

Figure 17 示出了 CSA315 的基本连接。输入引脚 V_{IN+}和 V_{IN-}应尽可能接近分流电阻，以最小化与分流电阻串联的任何电阻。

电源旁路电容器是稳定性所必需的。具有噪声或高阻抗电源的应用可能需要额外的滤波电容来抑制电源噪声。将旁路电容置于器件引脚接近处。

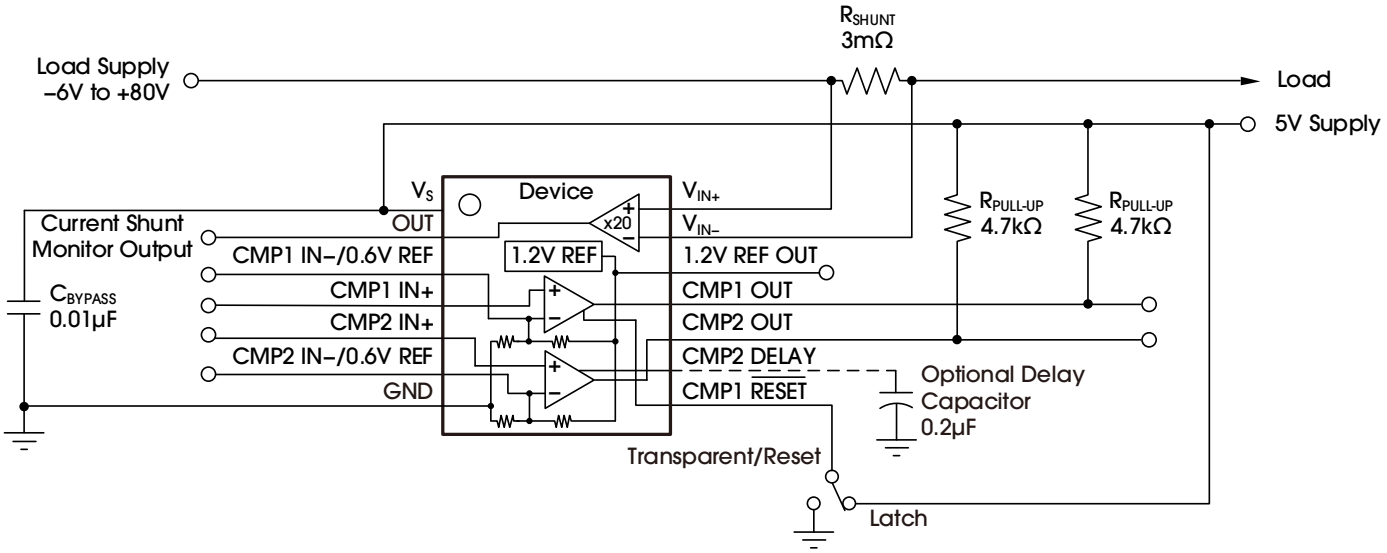


Figure 17. CSA315 Basic Connection

7.3.2 选择分流电阻

选择分流电阻 R_{SHUNT} 的值取决于应用，并且是在小信号精度和测量线路中允许的最大电压损耗之间进行折衷。R_{SHUNT} 的高值可以通过最小化偏移的影响，从而在较低的电流下提供更好的精度，而 R_{SHUNT} 的低值可以最小化供应线路中的电压损失。对于大多数应用，最佳性能是在提供 50mV 到 100mV 的全量程分流电压范围的 R_{SHUNT} 值上获得的。准确测量的最大输入电压为(V_{OUT} – 0.25) / Gain。

7.3.3 比较器

CSA315 器件包含两个开漏比较器。这些比较器通常具有 21mV 的偏移和 1µs (typ)的响应时间。比较器 1 的输出被锁存，并通过 CMP1 $\overline{RESET}$引脚重置。Figure 18 显示比较器延迟。

CSA315 器件包括用于比较器功能的其他功能。比较器 1 和比较器 2 的比较器参考电压可以通过外部输入覆盖，以提供更高的设计灵活性。比较器 2 具有可编程延迟。

7.3.4 比较器延迟

比较器 2 可编程延迟由连接到 CMP2 延迟引脚的电容器控制；请参见 Figure 17。电容器值(以 µF 为单位)通过使用 Equation 1 选择：

$$C_{DELAY}\ (\text{in } \mu F) = \frac{t_D}{5} \quad (1)$$

Figure 18 显示了比较器 2 延迟电路的简化版本。延迟比较器由两个比较器级联，其之间有延迟。I1 和 I2 不能同时打开；I1 对应 U1 低输出，I2 对应 U1 高输出。假设 U1 输出为低，则 I1 处于打开状态，则 U2 +IN 为零。如果 U1 变为高，则 I2 向 C_{DELAY} 提供 120nA。U2 +IN 的电压开始向 0.6V 的阈值转换。当电压穿过这个阈值时，U2 的输出变为高，而 U2 +IN 的电压继续升至在足够的时间(两倍于 C_{DELAY} 指定的延迟值)时的最大值 1.2V。当比较器输出变为低时，整个序列将反向，以便返回到低电平显示相同的延迟。

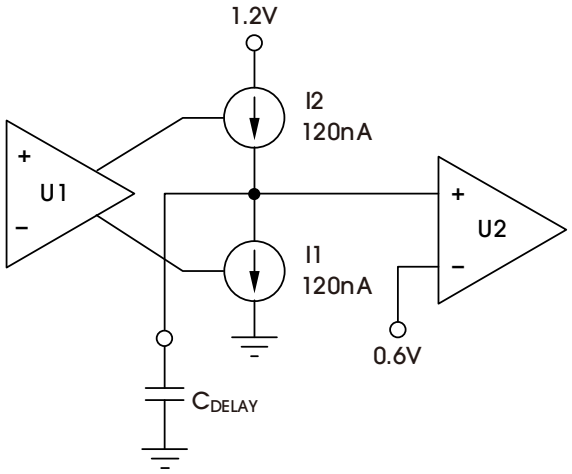


Figure 18. Simplified Model of the Comparator 2 Delay Circuit

7.3.5 比较器最大输入电压范围

在正常运行时，比较器输入端的最大电压高达(V_S – 1.5V)。特别要注意过度驱动参考输入(引脚 3 和 6)，将任一输入或两个输入驱动到足以使 1mA 电流流入参考时，会给参考引入误差。Figure 19 演示了基本的输入结构。通常情况下，将两个输入端的电压总和限制在 20V 以下是安全的。但是，具体的限制取决于可用的电压，以及是否一个或两个输入都受到大电压的影响。在做出这一决定时，请考虑从每个输入返回到比较器的 20kΩ 电阻。Figure 19 显示了在驱动两个输入时避免产生参考误差的最大输入电压(等效电阻回到 10kΩ 的参考)。

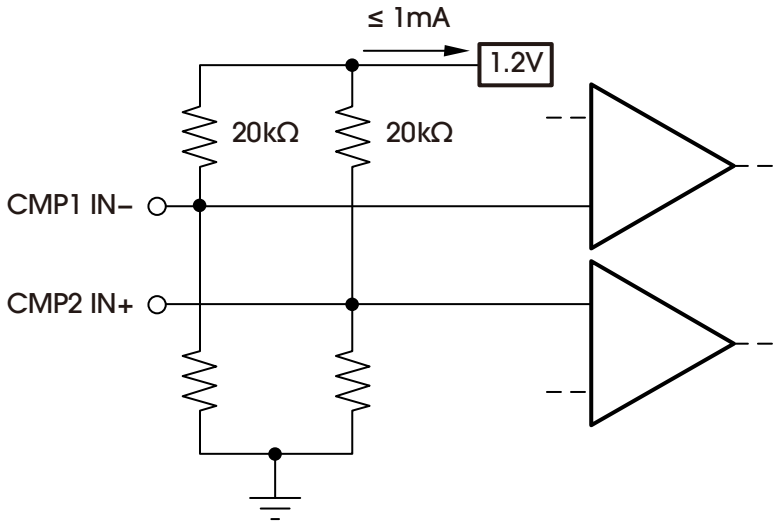


Figure 19. Limit Current Into Reference ≤ 1mA

8. 应用与实现

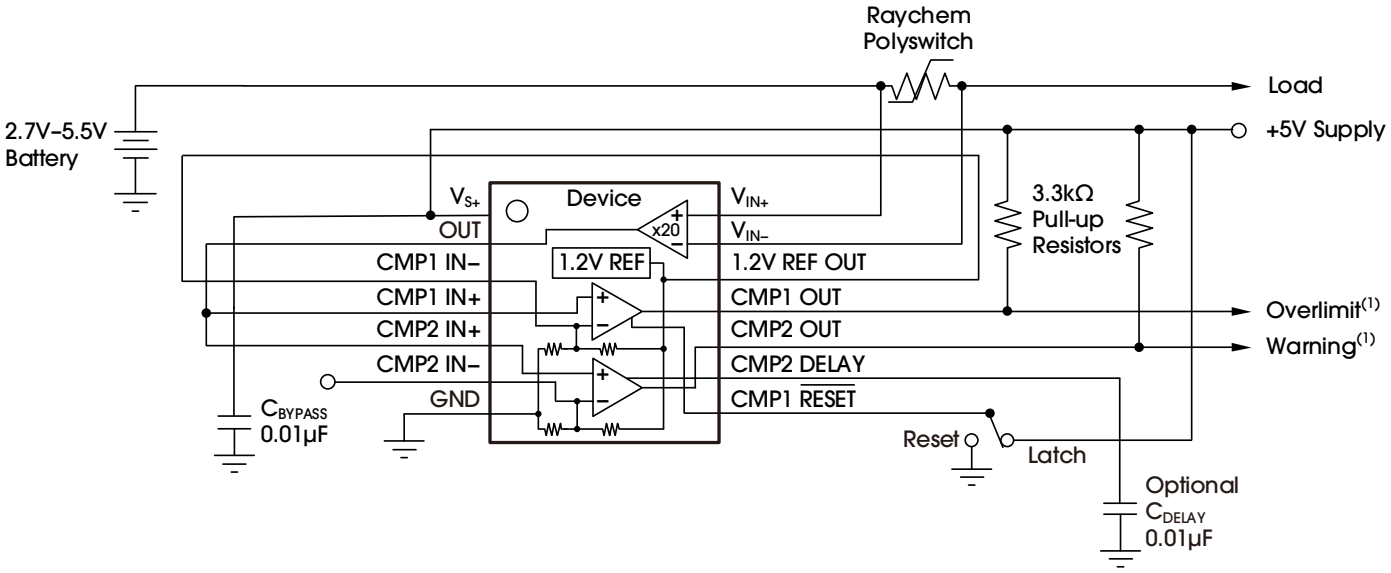
注

以下应用部分中的信息不是公司组件规范的一部分，公司不保证其准确性或完整性。公司的客户有责任确定组件是否适合他们的用途。客户应验证和测试他们的设计实施以确认系统功能。

8.1 应用信息

CSA315 系列旨在使应用环境中检测过电流及电流监测变得更容易配置。这种器件还内置了两个带内部 0.6V 参考的开漏比较器。比较器参考可以被外部输入覆盖。比较器 1 具备复位保持功能，比较器 2 具有可用户编程设置的延时。还提供 1.2V 参考输出。该器件还可以搭配最少的其他器件，从而构建更复杂的监测功能块。

8.2 典型应用



NOTE: Warning at half current (with optional delay). Overlimit latches When Polyswitch opens.

Figure 20. Polyswitch Warning and Fault Detection Circuit

8.3 设计需求

该器件通过电阻分流器测量单向流动电流，从而实现检测时差输入电压超过相应阈值限制时的超限或警告事件。当电流达到 0.6V 的警告限制时，CMP2 的输出将转换为高，表示警告状态。当电流进一步增加到或超过 1.2V 的超限限制时，CMP1 的输出将转换为高，表示超限状态。可以对 C_{DELAY} 进行调整以为 CMP1 添加延迟。

8.3.1 详细设计步骤

Figure 20 显示了该器件的基本连接方式。输入端 IN+和 IN–应尽可能接近电流传感电阻或聚合物开关，以最小化与分流电阻并联的任何电阻。电流传感电阻和输入端之间的额外电阻可能会导致测量误差。当输入电流流过外部输入电阻时，分流电阻上产生的电压可能与到达输入端的电压有所不同。

9. 电源供电推荐

CSA315 的输入电路可以准确地测量超出电源电压 V_S 的电压。例如，V_S 电源可以为 5V，而负载电源电压可高达 80V。然而，OUT 端口的输出电压范围受到电源引脚上的电压的限制。

10. 布局

10.1 布局指南

- 将输入引脚与感测电阻用凯尔文连接或 4 线连接进行连接。此连接技术确保仅检测输入引脚间的电流感测电阻阻抗。当前感测电阻的路由不良通常会导致输入引脚之间存在额外的电阻。由于电流电阻的电阻值非常低，任何额外的高电流传输阻抗都会导致显着的测量误差。
- 电源旁路电容应尽可能靠近电源和接地引脚放置。 该旁路电容的推荐值为 0.1μF。可以添加额外的去耦电容来补偿噪声或高阻抗电源。

10.2 布局示例

请参考 EVM 或者咨询公司销售支持。

11. PACKAGE INFORMATION

The CSA315 is available in the TSSOP-14 package. Figure 21 shows the package view.

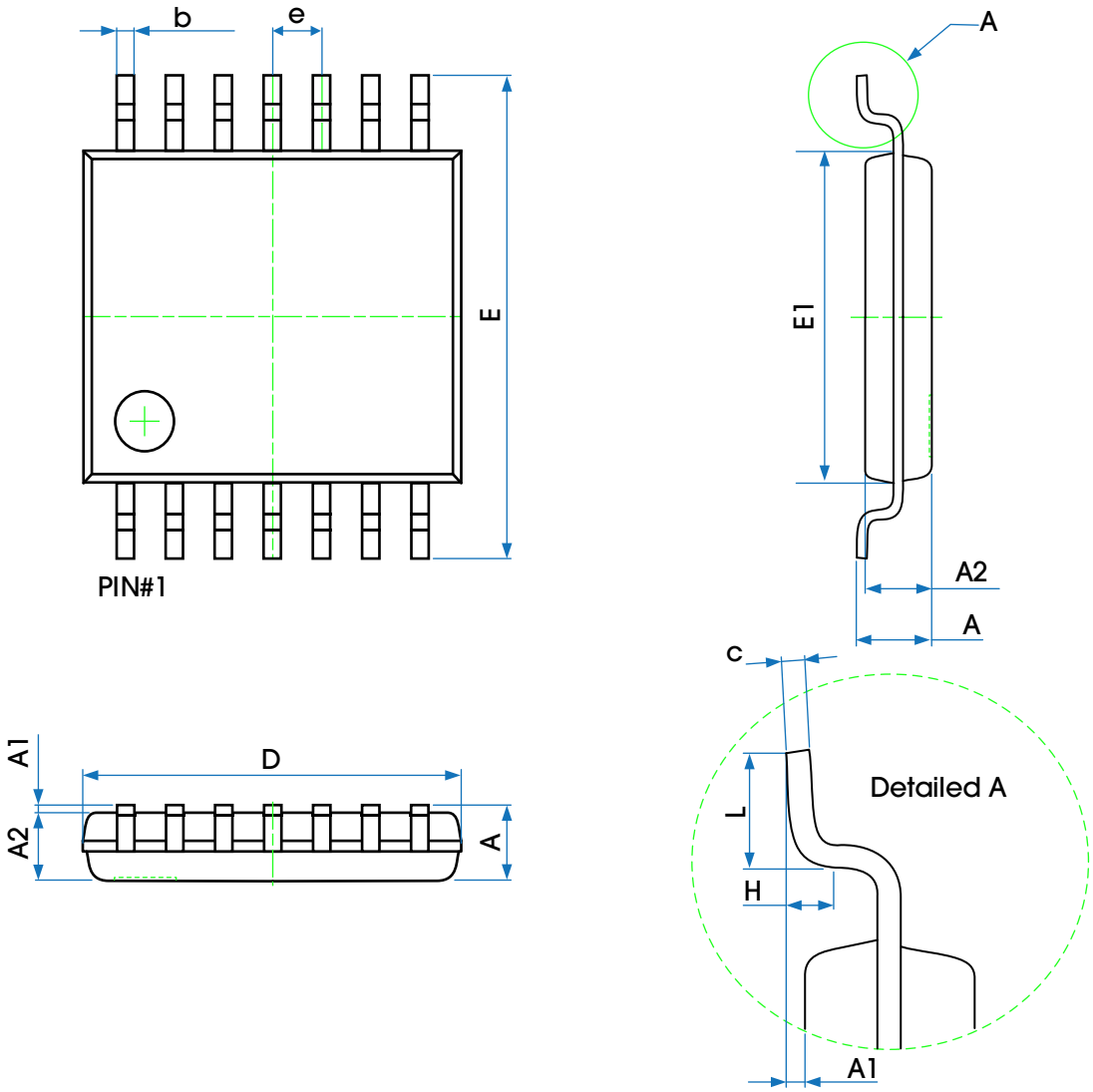


Figure 21. Package View

Table 12 provides detailed information about the dimensions.

Table 12. Dimensions

SYMBOL	DIMENSIONS IN MILLIMETERS		DIMENSIONS IN INCHES	
	MIN	MAX	MIN	MAX
A	—	1.200	—	0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	4.900	5.100	0.193	0.201
E	6.250	6.550	0.246	0.258
E1	4.300	4.500	0.169	0.177
e	0.650 (BSC)		0.026 (BSC)	
L	0.500	0.700	0.020	0.028
H	0.250 (TYP)		0.010 (TYP)	
θ	1°	7°	1°	7°

12. TAPE AND REEL INFORMATION

Figure 22 illustrates the carrier tape.

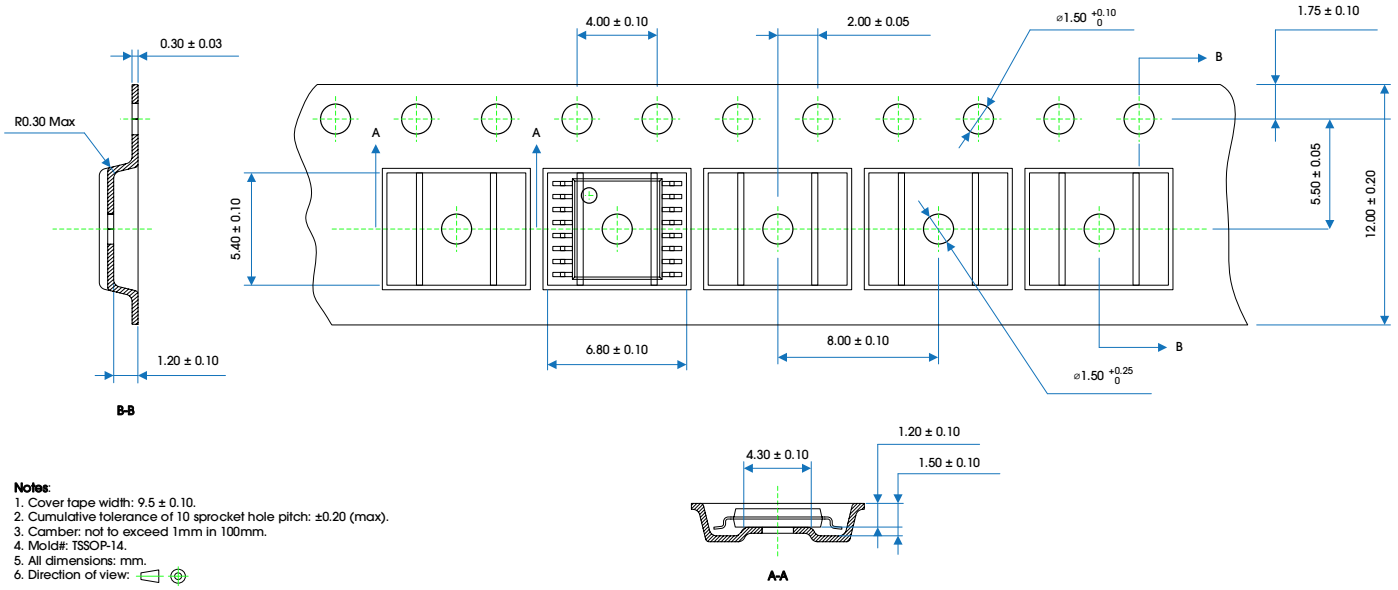


Figure 22. Carrier Tape Drawing

Table 13 provides information about tape and reel.

Table 13. Tape and Reel Information

PACKAGE TYPE	REEL	QTY/REEL	REEL/ INNER BOX	INNER BOX/ CARTON	QTY/CARTON	INNER BOX SIZE (MM)	CARTON SIZE (MM)
TSSOP-14	13''	4000	1	8	32000	358*340*50	430*380*390

Figure 23 shows the product loading orientation—pin 1 is assigned at Q1.

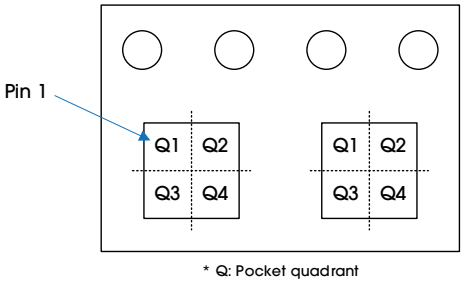


Figure 23. Product Loading Orientation

REVISION HISTORY

REVISION	DATE	DESCRIPTION
Rev A	20 November 2023	Rev A release.
Rev B	08 May 2024	Updated the order information, Table 5, Table 8 through Table 10.