

HIGH-VOLTAGE ANALOG-SIGNAL IC

UC5702

20mA Constant Current Regulator

RoHS compliant Green Product

MP Specifications
Datasheet Revision: 0.0

IC Version: c_A
August 26, 2011

ULTRACHIP

The Coolest Current Regulator, Ever!!

UC5702

20mA Constant Current Regulator

INTRODUCTION

UC5702c is designed for current regulation. It lets LEDs work under stable current and avoid brightness unstable caused by current change, while its low voltage can reduce power consumption.

The connection of the V_{DD} power pin may also be used for brightness control of LEDs via PWM signals; therefore suitable for applications that need brightness adjustment.

To achieve operations with I_P current over 20mA, connect the ICs in parallel.

MAIN APPLICATIONS

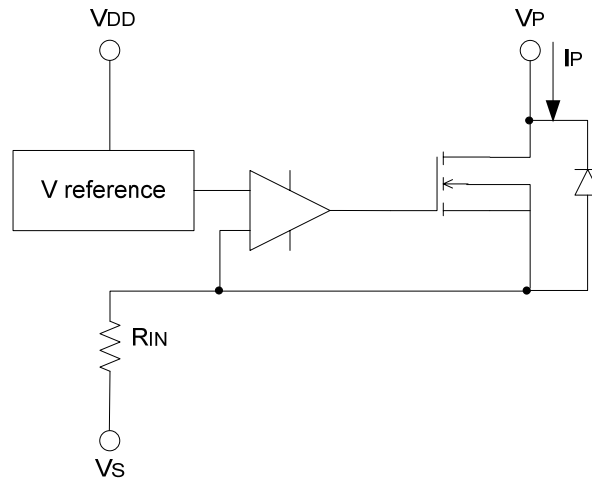
- LED Light Bars
- LED Bulbs
- LED Fluorescent Lights
- LED Backlight

FEATURE HIGHLIGHTS

- Wide operation supply voltage range: 1.7V ~ 18V
- Wide output voltage range: 0.5V~18V
- V_{DD} pin as OE function: 100KHz PWM (200Hz, 500:1)
- Temperature compensation
- $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$ operation temperature range
- High temperature protection: $95^{\circ}\text{C} \sim 135^{\circ}\text{C}$
- Less than 0.5%/V load regulation

Pb-free and green package, SOT23

BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	I ² C	Package	Eco	Description
UC5702cA-UST23	No	SOT23	RoHS compliant	Pb-free

General Notes**APPLICATION INFORMATION**

For improved readability, the specification contains many application data points. When application information is given, it is advisory and does not form part of the specification for the device.

BARE DIE DISCLAIMER

All die are tested and are guaranteed to comply with all data sheet limits up to the point of wafer sawing. There is no post wafer saw/pack testing performed on individual die. Although the latest modern processes are utilized for wafer sawing and die pick-&-place into wafer pack carriers, UltraChip has no control of third party procedures in the handling, packing or assembly of the die. Accordingly, it is the responsibility of the customer to test and qualify their application in which the die is to be used. UltraChip assumes no liability for device functionality or performance of the die or systems after handling, packing or assembly of the die.

LIFE SUPPORT APPLICATIONS

These devices are not designed for use in life support appliances, or systems where malfunction of these products can reasonably be expected to result in personal injuries. Customer using or selling these products for use in such applications do so at their own risk.

CONTENT DISCLAIMER

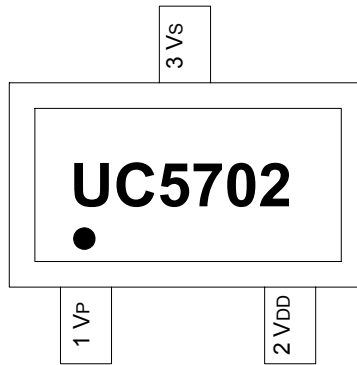
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PIN DESCRIPTION



No	Pin	Type	Description
1	V _P	I	Current In
2	V _{DD}	PWR	Power Supply
3	V _S	O	Current Out

MAXIMUM RATING

Symbol	Parameter	Range	Unit
V _{PP}	Peak-to-peak Voltage	20	V
V _{DD}	Supply Voltage	20	V
I _S	Output Saturation Current	22	mA
I _P	Peak Current	22	mA
T _J	Junction Temperature	135	°C
T _{STG}	Storage Temperature	-65 ~ +150	°C
R _{TH(j-a)}	Thermal Resistance (junction to ambient) SOT23	150	°C/W
R _{TH(j-c)}	Thermal Resistance (junction to case) SOT23	50	°C/W
P _D	Power Dissipation at T _A = 25°C	0.55	W

RECOMMENDED OPERATING CONDITION

Symbol	Parameter	Range	Unit
T _J	Junction Temperature	-40~120	°C

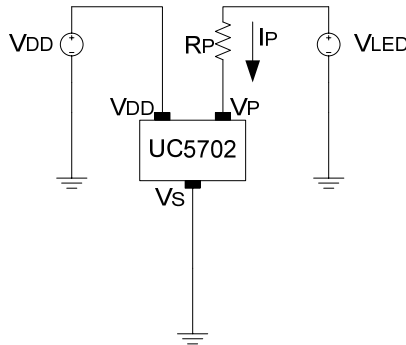
DC CHARACTERISTICS

$V_{DD}=3.0V$, $V_P=1.0V$, $C_{DD} = 0.1\mu F$, $C_P = 10nF$, $T_A=25^\circ C$ unless otherwise specified.

Symbol	Characteristics	Condition	Min.	Typical	Max.	Unit
V_{DD}	Supply Voltage		1.7	–	18	V
V_P	Output Voltage	$V_{DD}>5V$, $I_P=20mA$ (Note)	0.5	–	18	V
		$V_{DD}=3V$, $I_P=20mA$ (Note)	0.7	–	18	V
		$V_{DD}=1.7V$, $I_P=20mA$ (Note)	1.0	–	18	V
I_{DD}	Supply Current	$V_{DD}=3V$	–	400	600	μA
I_S	Output Saturation Current		–	20	–	mA
I_P	Peak Current		–	20	–	mA
I_{AC}	Output Current Accuracy		–5	–	+5	%
R_{IN}	Internal Resistor Accuracy		–10	–	+10	%
$\%/V_{DD}$	Line Regulation	$V_{DD}=1.7\sim 18V$, $V_P=1V$	–0.5	–	+0.5	%/V
$\%/V_P$	Load Regulation	$V_{DD}=3V$, $V_P=0.7\sim 18V$	–0.5	–	+0.5	%/V

Note: The condition can be achieved with the TEST circuit only.

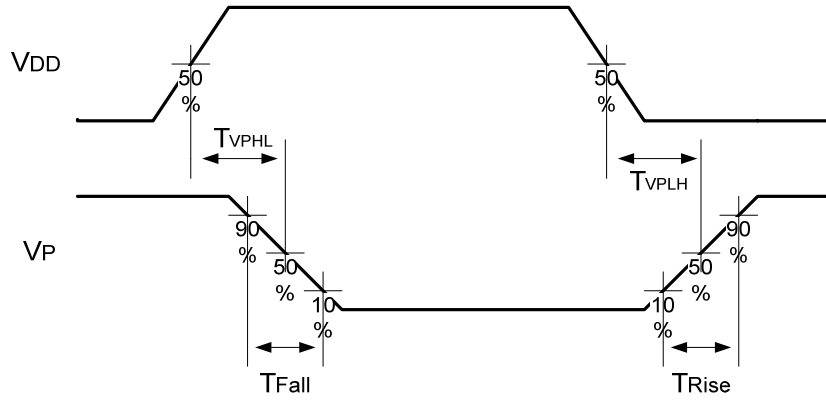
TEST CIRCUIT



Symbol	Condition	Min.	Typical	Max.	Unit
V_{PS}	$V_{DD}>5V$, $I_P=20mA$ (Note)	0.5	–	18	V
	$V_{DD}=3V$, $I_P=20mA$ (Note)	0.7	–	18	V
	$V_{DD}=1.7V$, $I_P=20mA$ (Note)	1.0	–	18	V

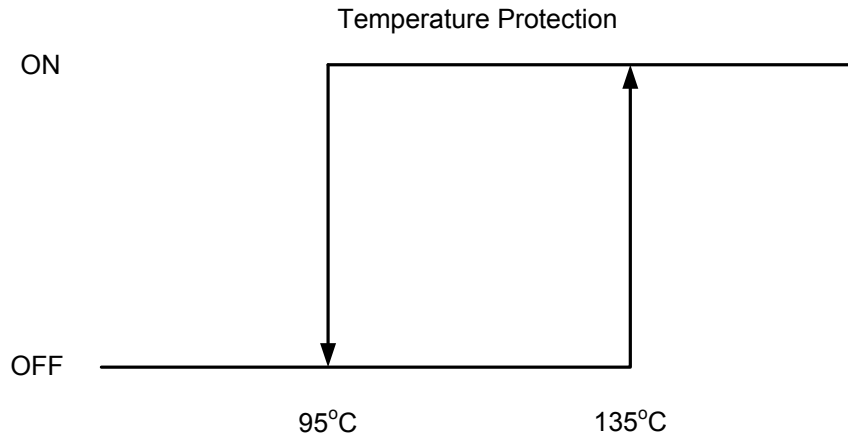
Note: The condition can be achieved with the TEST circuit only.

VDD TIMING



Symbol	Parameter	Condition	Min.	Typical	Max.	Unit
T _{VPHL}	I _p Current Rise, V _P Fall	V _P =1V, V _{DD} =0V to 3V	-	2.5	-	uS
T _{VPLH}	I _p Current Fall, V _P Rise	V _P =1V, V _{DD} =3V to 0V	-	2.5	-	uS
T _{Fall}	I _p Current Rise, V _P Fall	V _P =1V, V _{DD} =0V to 3V	-	3	5	uS
T _{Rise}	I _p Current Fall, V _P Rise	V _P =1V, V _{DD} =3V to 0V	-	3	5	uS

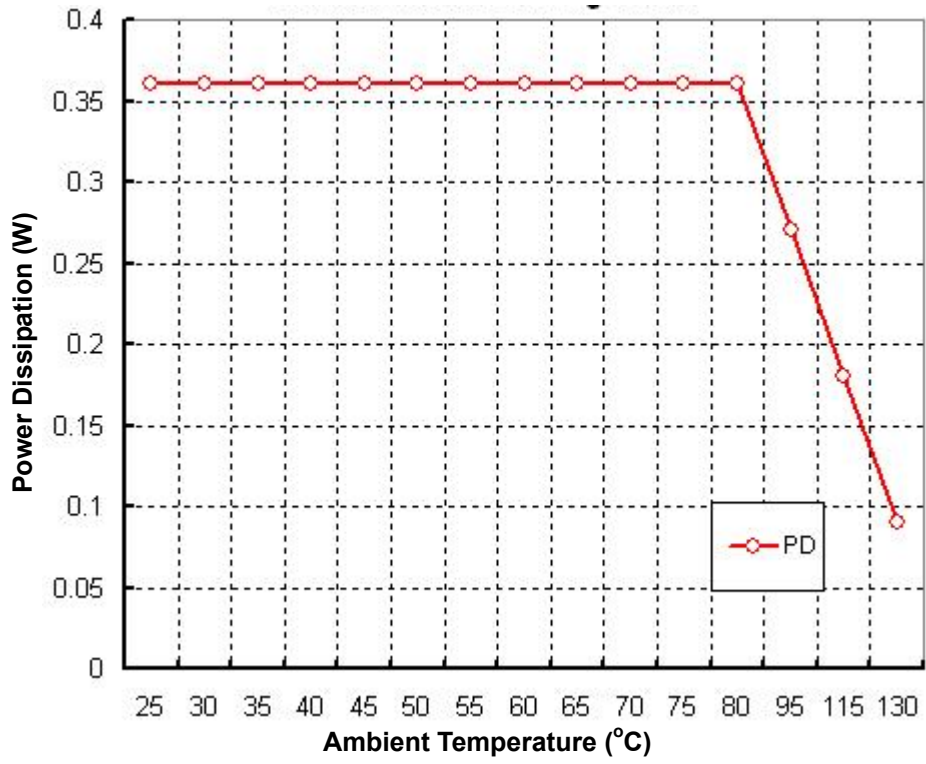
TEMPERATURE PROTECTION



Temperature Protection	Rating	Unit
Active	135	°C
Inactive	95	°C

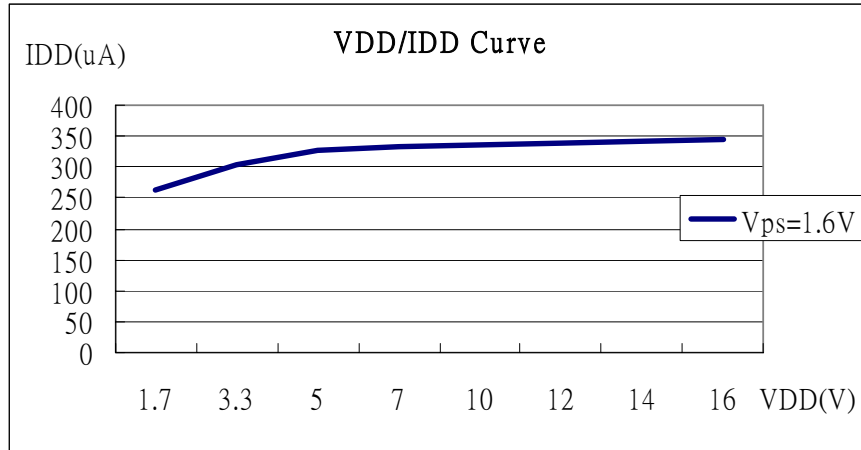
Remark: The temperature detection is done by the chip.

POWER DERATING CURVE

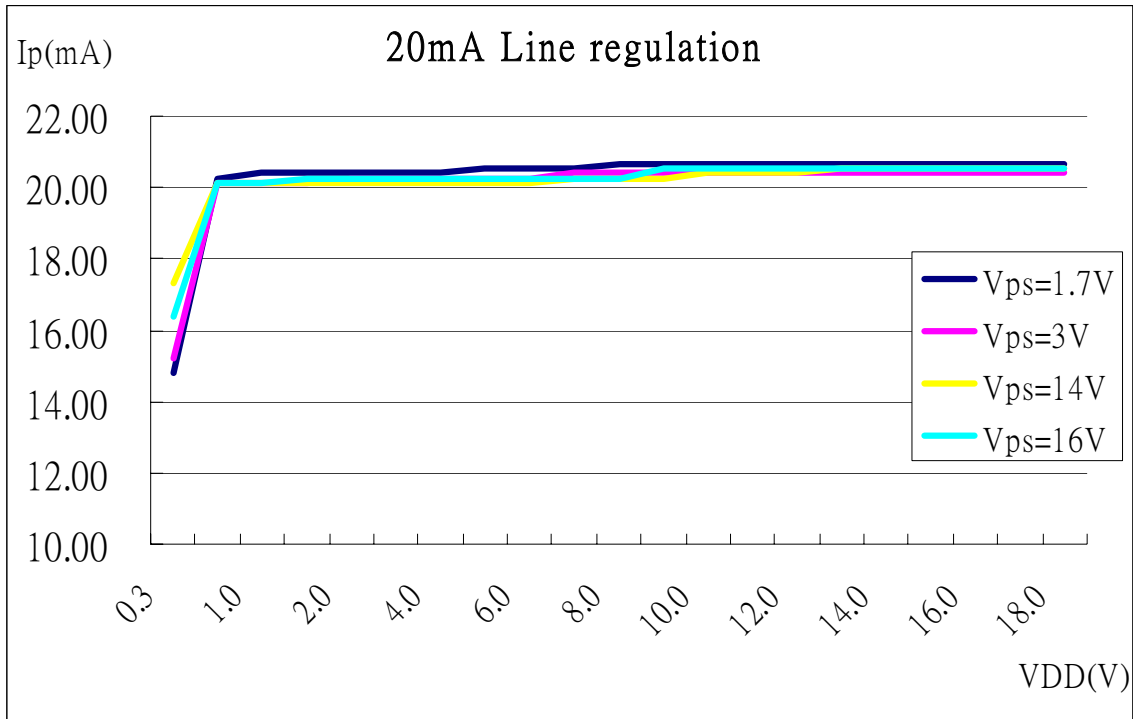


I-V CURVE

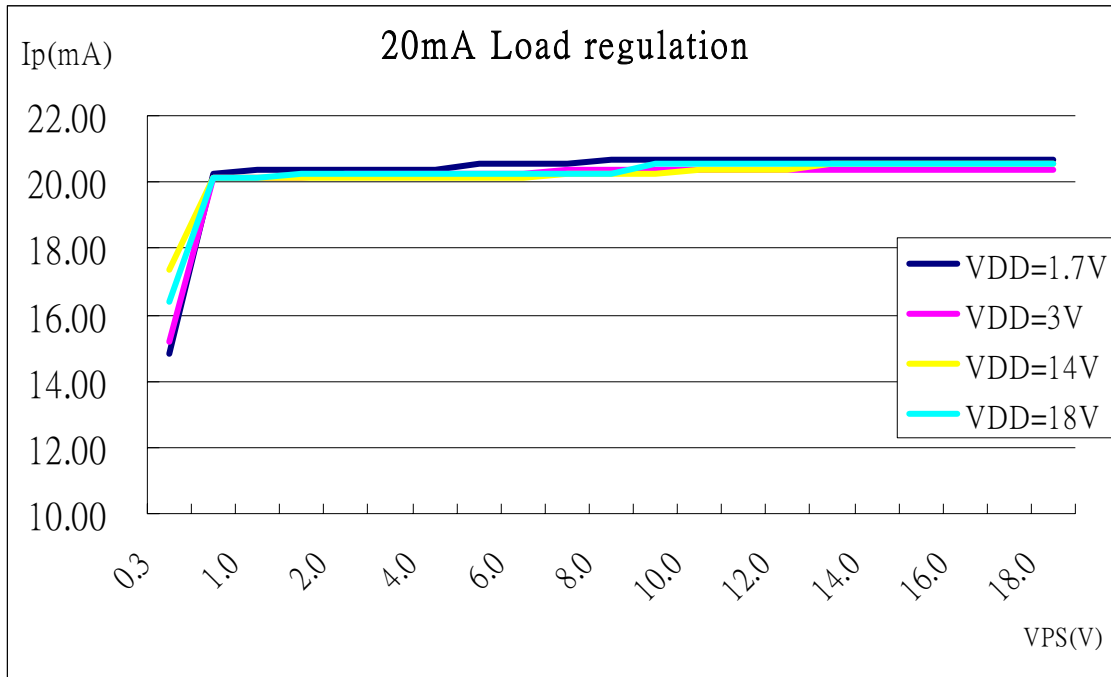
(1) IDD/VDD Curve:



(2) Line Regulation Curve:

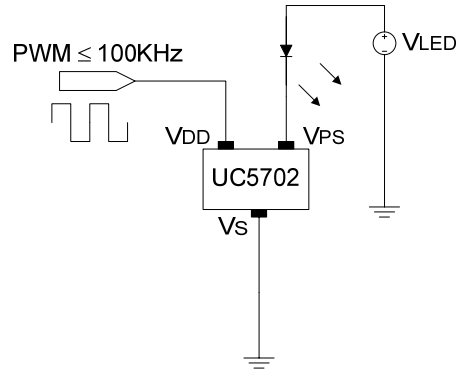


(3) Load Regulation Curve:



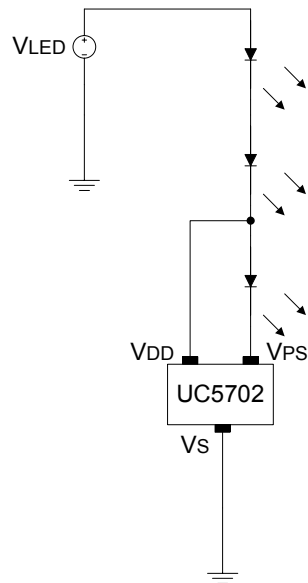
APPLICATION SCHEMATIC

PWM 5V LED control circuit

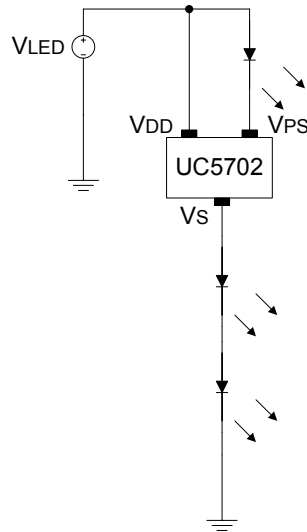


20mA constant current circuit

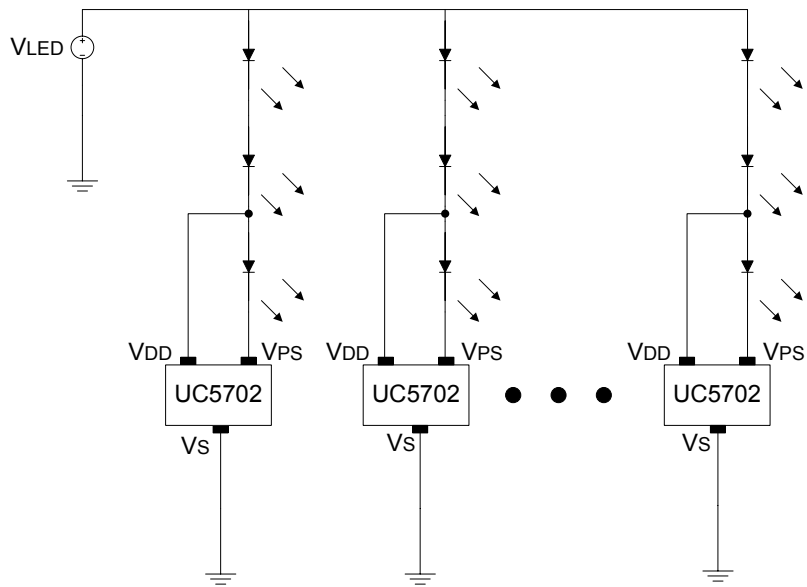
(Low Side)



(High Side)

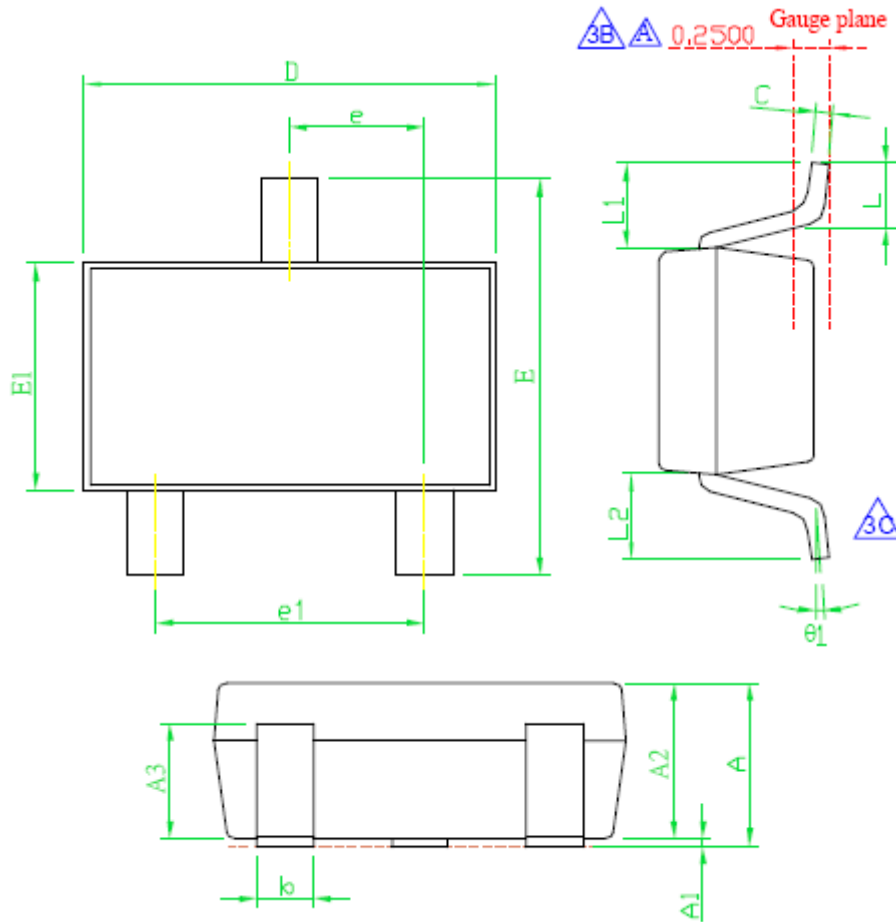


Multi-channelled 20mA constant current circuit



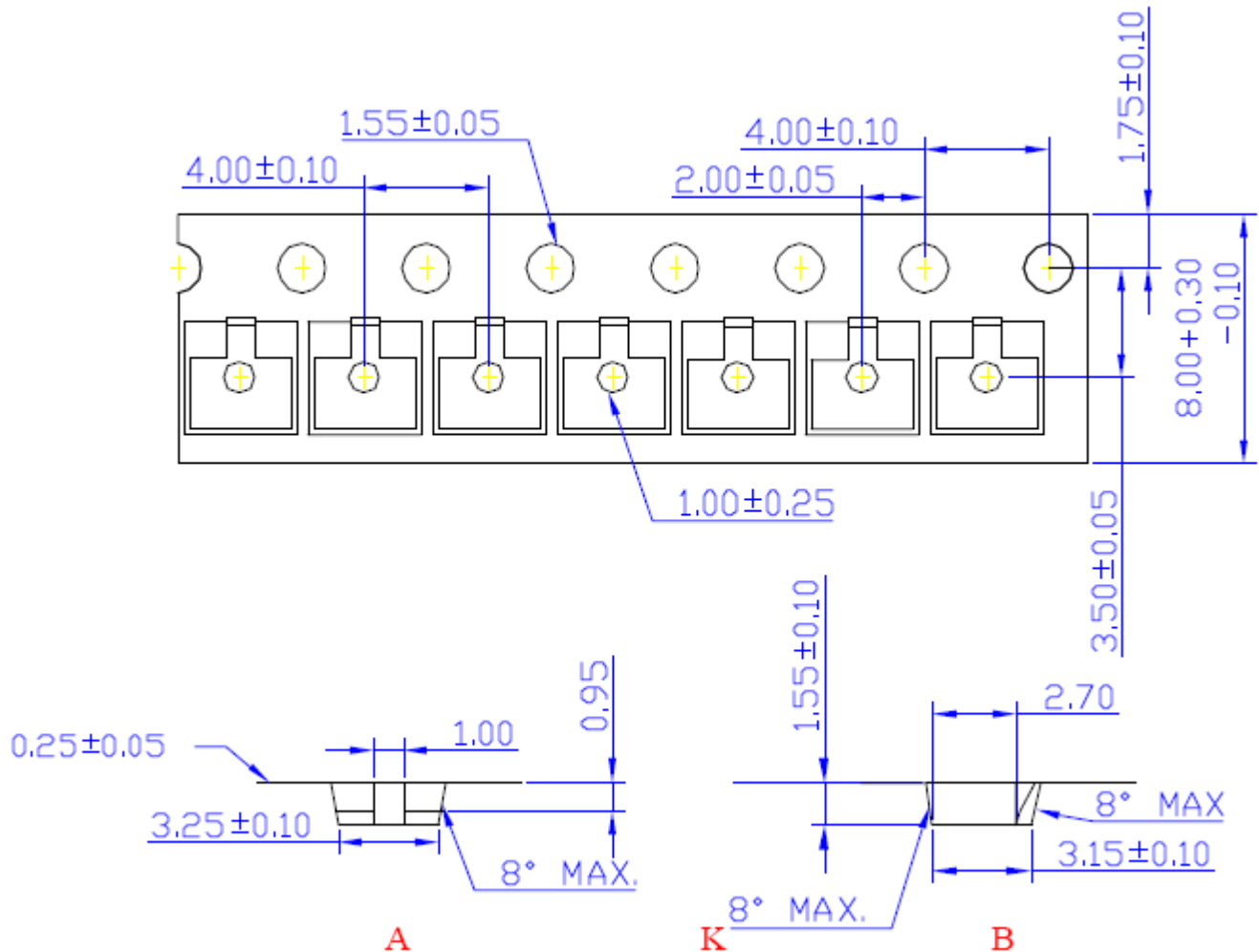
PACKAGE INFORMATION

SOT23 Package Outline Drawing



Dimension	Unit: mm			Dimension	Unit: mm		
	Min.	Nom	Max.		Min.	Nom	Max.
A	1.00	1.10	1.40	E1	1.40	1.60	1.80
A1	0.00	0.05	0.10	e	—	0.95 (Typ.)	—
A2	1.00	1.10	1.30	e1	—	1.90 (Typ.)	—
A3	0.70	0.80	0.90	θ1	1°	5°	9°
B	0.35	0.40	0.50	L	0.37	—	—
C	0.12	0.125	0.225	L1	—	0.6REF	—
D	2.70	2.90	3.10	L1-L2	—	—	0.12
E	2.60	2.80	3.00	—	—	—	—

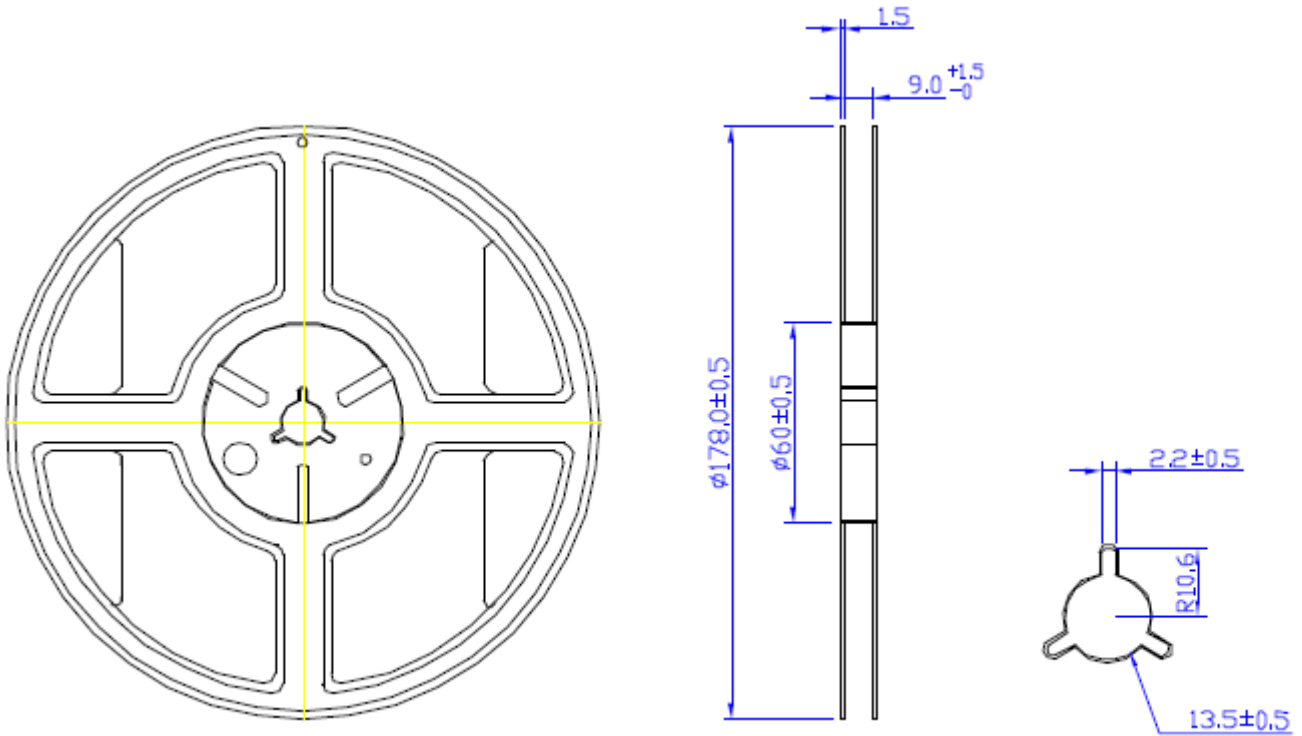
SOT 23 – R Carrier Tape Drawing



Note:

1. Material: Black Advantek Polystyrene.
2. Dimension: in mm.
3. 10 sprocket holes' Pitch Cumulative Tolerance: ± 0.2 .
4. Camber NOT to exceed 1mm in 100mm.
5. Pocket Position relative to Sprocket Hole: measured as true position of pocket, NOT pocket hole.
6. Surface resistivity $\leq 1.0 \times 10^3 \sim 10 \ \Omega/\text{Sq}$.
7. A and B: measure on A plane 0.3mm above the bottom of the pocket.
8. K: measured from A plane on the inside bottom of the pocket to the top surface of the carrier.

SOT 23 – Reel Drawing



Note:

Surface resistivity: $10^{5-11} \Omega/\text{Sq.}$

REVISION HISTORY

Revision	Contents	Date
	N/A	