

## 6 CHANNELS ADJUSTABLE CONSTANT CURRENT LED DRIVER

### DESCRIPTION

A701/2 are adjustable constant current drivers for LED applications. Six regulated current ports are designed to provide uniform and pure DC constant current sinks for driving LEDs within a large range  $V_F$  variations.

A701/2 provide users 6-channel constant current ports to match LEDs with equal current. Users may adjust the output current from 5mA to 40mA through an external resistor,  $R_{SET}$ , which gives user flexibility in controlling the light intensity of LEDs. It also could precisely adjust LED brightness from 0% to 100% via output enable pin ( $\overline{OE}$ ) with Pulse Width Modulation signal.

The thermal protection function protects IC from over temperature (150°C). Also, the thermal pad enhances the package power dissipation.

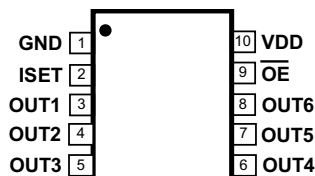
### FEATURES

- 6 constant-current output channels
- Output current deviation  $\pm 3\%$  between channels,  $\pm 7\%$  between ICs.
- Output current adjustable through external resistor
- Constant output current range: 5mA~40mA
- Schmitter trigger input
- Wide supply voltage range: 6V~50V (A702)
- 75V output sustaining voltage
- 20ms Watch-dog for chip shut-down
- 1uA Shut-down current
- Lead free Package

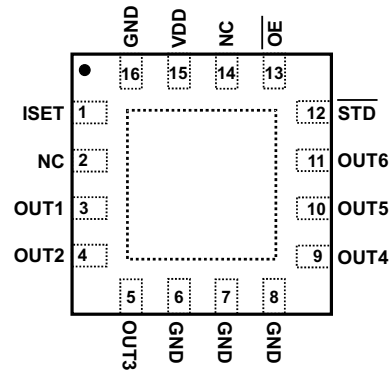
### APPLICATIONS

- Automotive interior lighting
- Channel letter
- LCD Backlight

### PACKAGE PIN OUT



MSOP-10  
With Thermal Pad  
(Top View)



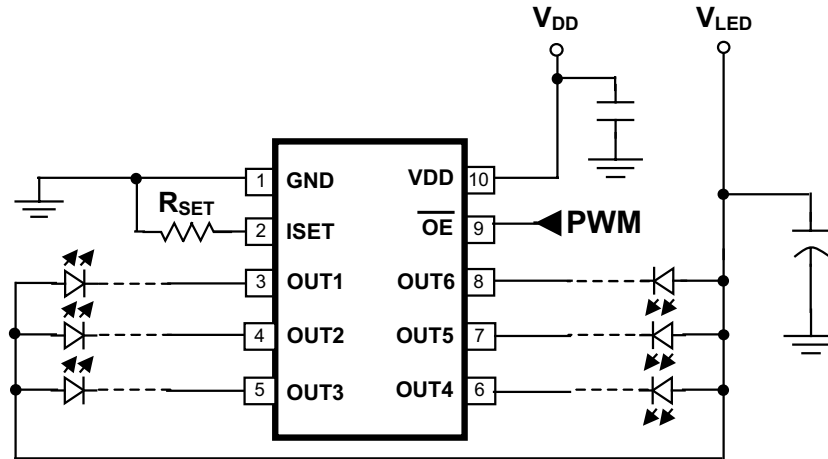
QFN 3mm x 3mm  
(Top View)

### ORDER INFORMATION

	<b>G</b>	MSOP-10 10 pin	<b>J</b>	QFN 3x3 16 pin
$V_{DD} = 4V \sim 6V$		A701G (Lead Free)		A701J (Green)
$V_{DD} = 6V \sim 50V$		A702G (Lead Free)		A702J (Green)

Note: All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e. A701GT).

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**TYPICAL APPLICATION CIRCUIT**

**PIN DESCRIPTION**

Pin Name	Pin Descriptions
GND	Ground terminal for control logic and current sink.
OUT1~OUT6	Constant current output terminals
$\overline{\text{OE}}$	Output Enable terminal, "Low" active. When the pin pull to "high," all output pins are turn-off (blanked).
ISET	Output current set input. 1.20V is used to connect an external resistor ( $R_{\text{SET}}$ ) for setting up output current for all output channels. $I_{\text{OUTn}} = (V_{\text{SET}} / R_{\text{SET}}) \times 60$
$\overline{\text{STD}}$	Chip shutdown pin, Low active. The supply current less than 1uA when shutdown. Internal pull-high.
$V_{\text{DD}}$	6V/50V supply voltage terminal

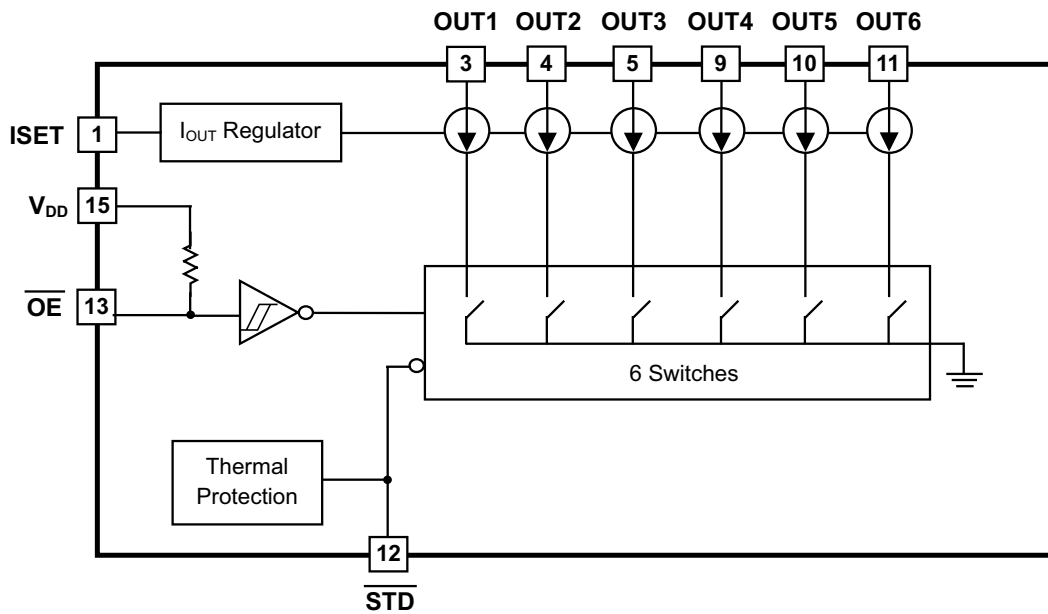
Note: The thermal pad is suggested connect to GND on PCB. And thermal conductivity will be improved, if a copper foil on PCB is soldered with thermal pad.

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**ABSOLUTE MAXIMUM RATINGS (Note)**

Supply Voltage, $V_{DD}$	0V to 50V
Output Current, $I_{OUTn}$	40mA
Sustaining Voltage, $V_{DS}$	-0.4V to 75V
Maximum Operating Junction Temperature, $T_J$	125°C
Operating Temperature, $T_{opr}$	-40°C to 85°C
Storage Temperature Range	-55°C to 150°C
Lead Temperature (Soldering, 10 seconds)	260°C

Note: Exceeding these ratings could cause damage to the device. All voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

**BLOCK DIAGRAM**


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**ELECTRICAL CHARACTERISTICS**

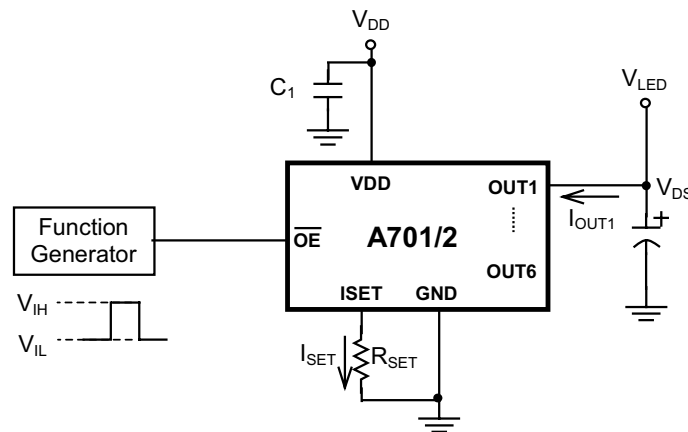
$V_{DD}=5V$  for A701 and  $V_{DD}=12V$  for A702,  $T_A=25^{\circ}C$ . (Unless otherwise noted)

Parameter		Symbol	Conditions	Min	Typ	Max	Unit	
Supply Voltage		$V_{DD}$	A701	4	5	6	V	
			A702	6	12	50		
Sustaining Voltage		$V_{DS}$	OUT1 ~ OUT 6			75	V	
Output Current		$I_{OUTn}$	DC Test Circuit	5		40	mA	
Input Voltage	“H” level	$V_{IH}$		2		12	V	
	“L” level	$V_{IL}$		GND		0.8	V	
$\overline{OE}$ Input Hysteresis				200			mV	
Output Leakage Current		$I_{OH}$	$V_{OH}=60V$			0.5	uA	
Output Current		$I_{OUT}$	$V_{DS}=0.6V$ , $R_{SET}=2.2k\ \Omega$	Rank A	31.6	32.7	33.8	mA
					30.4	32.7	35.0	
			$V_{DS}=0.6V$ , $R_{SET}=4.7k\ \Omega$	Rank A	14.7	15.3	15.9	
					14.1	15.3	16.6	
Output Current Deviation		$\Delta I_{OUTn}$	$V_{DS}=0.6V$ , $R_{SET}=2.2k\ \Omega$		$\pm 1$	$\pm 3$	%	
			$V_{DS}=0.6V$ , $R_{SET}=4.7k\ \Omega$		$\pm 1$	$\pm 3$		
Regulation of Output Current vs. Sustaining Voltage		$\%/\Delta V_{DS}$	$V_{DS}=0.5V \sim 3.0V$		$\pm 0.1$	-	$\%/V$	
Regulation of Output Current vs. Supply Voltage		$\%/\Delta V_{DD}$	A701, $V_{DD}=4V \sim 6V$		$\pm 1$	-	%	
			A702, $V_{DD}=6V \sim 40V$		$\pm 1$			
Pull-up Resistor, $\overline{OE}$ , STD		$R_{IN}(\text{up})$		0.5	1	1.5	$M\ \Omega$	
Thermal Protection Temperature		$T_X$	When $T_J$ approaches $T_X$ and OUT is shut off		160		$^{\circ}C$	
Thermal Protection Temperature Hysteresis					25			
Supply Current	“ON”	$I_{DD(ON)}$	$R_{SET}=2.4k\ \Omega$ ; $\overline{OE}$ = “Low”		4	7	mA	
	“OFF”	$I_{DD(OFF)}$	$R_{SET}=\text{Open}$ ; $\overline{OE}$ = “High”		6	9		
			$R_{SET}=2.4k\ \Omega$ ; $\overline{OE}$ = “High”		4	7		
	Shutdown	$I_{DD(SD)}$	A701, STD = “Low”		4	7	uA	
A702, STD = “Low”				40	70			

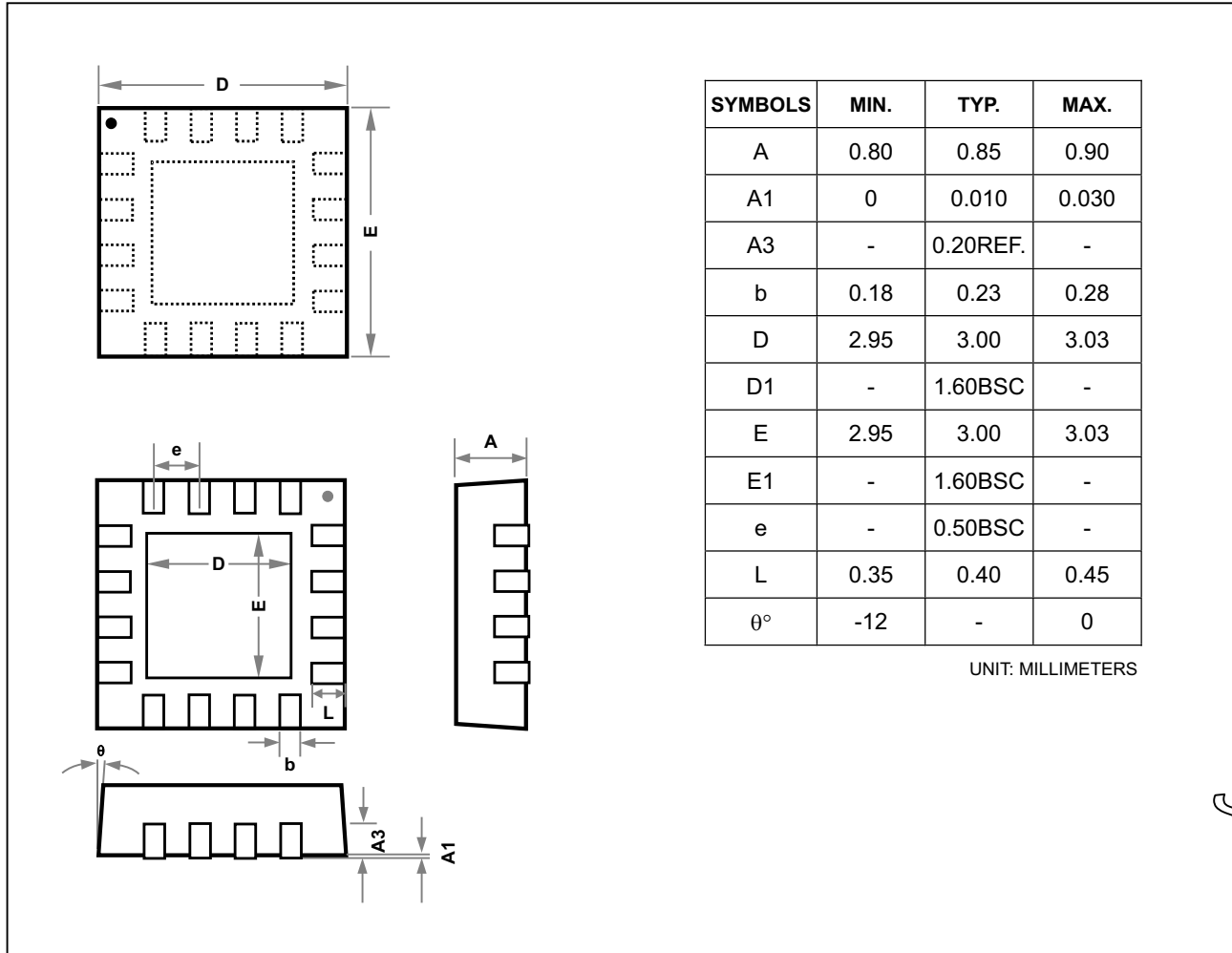
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**SWITCHING CHARACTERISTICS**

Characteristic	Symbol	Conditions	Min	Typ	Max	Unit
Propagation Delay Time (Output Current “L” to “H”)	$t_{pLH}$	$V_{DD}=5.0V(A701)$ $V_{DD}=12.0V(A702)$  $V_{DS}=1.0V$ $V_{IH}=5.0V$ $V_{IL}=GND$ $R_{SET}=2.2k\Omega$	0.1	0.3	0.6	us
Propagation Delay Time (Output Current “H” to “L”)	$t_{pHL}$		0.05	0.1	0.4	us
Shutdown Recover Delay Time			50			us
OE Minimum Pulse Width	$t_{W(OE)}$		5	-	-	us
Output Current Rising Time (Turn ON)	$t_{ON}$		0.5	1	2	us
Output Current falling Time (Turn OFF)	$t_{OFF}$		0.5	1	2	us

**TEST CIRCUIT FOR SWITCHING CHARACTERISTICS**


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**PACKAGE**
**16-Pin QFN 3mmx3mm**


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