Agamem Microelectronics Inc.

AA1704

PRELIMINARY　　　　　　　　　　　　**HIGH　POWER　LED　DRIVER**

■ DESCRIPTION

The AA1704 is a constant current driver to be applied on LED applications. It provides four regulated current ports for maximum output current up to 360mA. Users may decide the output current by external resistor. In addition, the LED brightness can be adjusted via $\overline{OE}$. Build-in thermal protection can prevent the chip over heat damage.
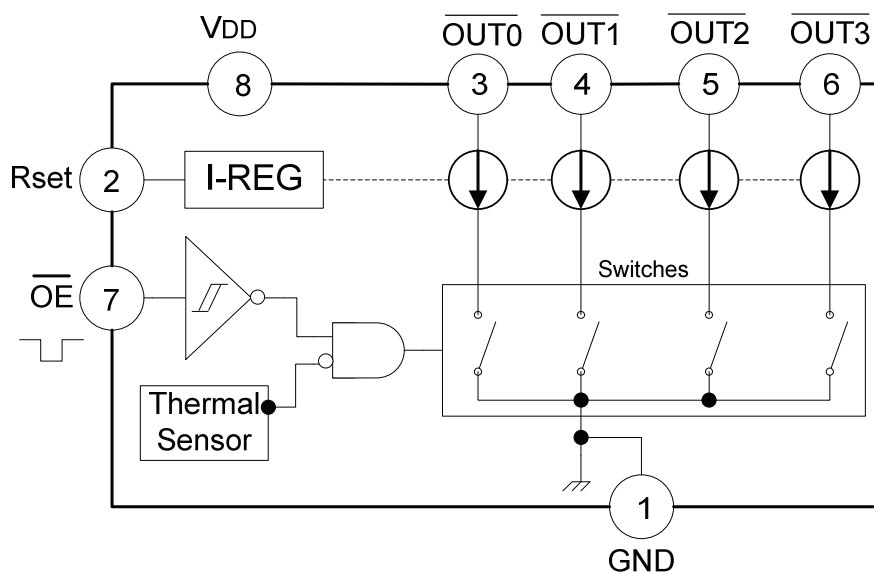
■ FEATURES

• Constant output current sink for driving LEDs.

• Adjustable output current controlled by external resistor.

• Build-in thermal protection.

• Schmitt trigger input.

• Supply voltage - 5V.
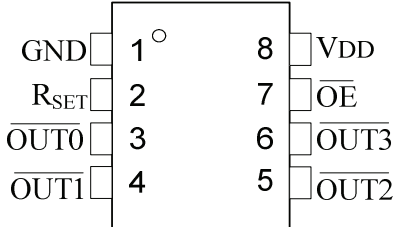
• SOP8 package with thermal pad.

■ APPLICATIONS

• High power LED driver.

• RGB full color power LED driver.

• LED table lamp.

■ BLOCK DIAGRAM

■ PIN DESCRIPTION

	PIN NO.	PIN NAME	PIN FUNCTION
GND ▢ 1° ... 8 ▢ VDD R$_{SET}$ ▢ 2 ... 7 ▢ $\overline{OE}$ $\overline{OUT0}$ ▢ 3 ... 6 ▢ $\overline{OUT3}$ $\overline{OUT1}$ ▢ 4 ... 5 ▢ $\overline{OUT2}$ TOP VIEW	1	GND	Ground
	2	R$_{SET}$	Output current set input. Connect a resistor from R$_{SET}$ pin to GND to set the LED current. $I_{LED} = (1.22V/ R_{SET})*240$.
	3,4,5,6	$\overline{OUT0} \sim \overline{OUT3}$	Output pin. Sink current is decided by the current on R$_{SET}$ connected to R$_{SET}$ pin.
	7	$\overline{OE}$	Output stage enable control pin. Low enable the OUT pin.
	8	V$_{DD}$	Power supply pin
	---	Thermal Pad	Power dissipation terminal connected to GND.

■ ABSOLUTE MAXIMUM RATINGS

Ta=25℃

Characteristics	Symbol	Rating	Unit
Supply Voltage	V$_{DD}$	+7	V
Input Voltage	V$_{IN}$	-0.4 to V$_{DD}$+0.4	
Output Current	I$_{OUT}$	360	mA/ch
Output Voltage	V$_{OUT}$	-0.5 to 24	V
Power Dissipation	Pd	0.8	W
Operating Temperature	Topr	-40 to 85	℃
Storage Temperature	Tstg	-55 to 150	

■ Electrical Characteristics (Topr = 25 ℃, VDD=5V unless otherwise noted.)

Characteristics	Symbol	Condition		Min	Typ	Max	Unit
Supply voltage	V_{DD}	Normal operation		4.5	5	5.5	V
Output current	I_{OUT1}	$V_{OUT}=0.4V, V_{DD}=5V$	$R_{SET}=2.4K\Omega$	118	-	126	mA
	I_{OUT2}	$V_{OUT}=0.7V, V_{DD}=5V$	$R_{SET}=1.3K\Omega$	218	-	232	
Output current	dI_{OUT1}	$V_{OUT}=0.4V, R_{SET}=2.4K\Omega$	All output ON	-	+/-1.5	+/-3	%
error between bits	dI_{OUT2}	$V_{OUT}=0.7V, R_{SET}=1.3K\Omega$					
Output leakage Current	I_{OZ}	$V_{OH}=17V$		-	-	1	uA
Input voltage	V_{IN}	-		$0.7V_{DD}$	-	V_{DD}	V
		-		GND	-	$0.3V_{DD}$	
Pull up resistor	$R_{(UP)}$	$\overline{OE}$ terminal		200	300	500	KΩ
Supply current	$I_{DD\,(OFF)}1$	$R_{SET}=$Open, All output OFF		-	-	1.2	mA
	$I_{DD\,(OFF)}2$	$R_{SET}=2.4K\Omega$	All output OFF,	-	-	3	
	$I_{DD\,(OFF)}3$	$R_{SET}=1.3K\Omega$	All output OFF,	-	-	4	
	$I_{DD\,(ON)}1$	$R_{SET}=2.4K\Omega$	All output ON, $V_{out}=0.7V$	-	-	4	
	$I_{DD\,(ON)}2$	$R_{SET}=1.3K\Omega$	All output ON, $V_{out}=0.7V$	-	-	5	

■ Switching Characteristics (Topr = 25 ℃ unless otherwise noted.)

Characteristics	Symbol	Condition		Min	Typ	Max	Unit
Propagation Delay Time(L to H)	t_{pLH}	$\overline{OE}$-OUTn		-	-	3	uS
Propagation Delay Time(H to L)	t_{pHL}	$\overline{OE}$-OUTn		-	-	3	
Pulse Width	$t_{w(OE)}$			1	-	-	
Output rise time	t_{or}	Voltage waveform 10%~90%		-	-	1	
Output fall time	t_{of}	Voltage waveform 90%~10%		-	-	1	

■ Test Circuit for Electrical Characteristics
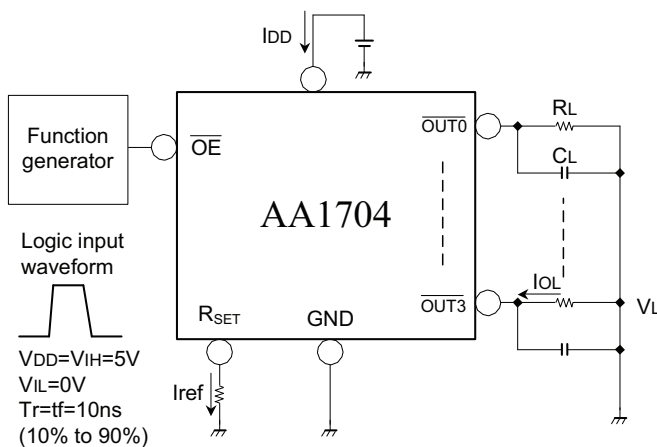
■ **APPLICATION CIRCUIT**
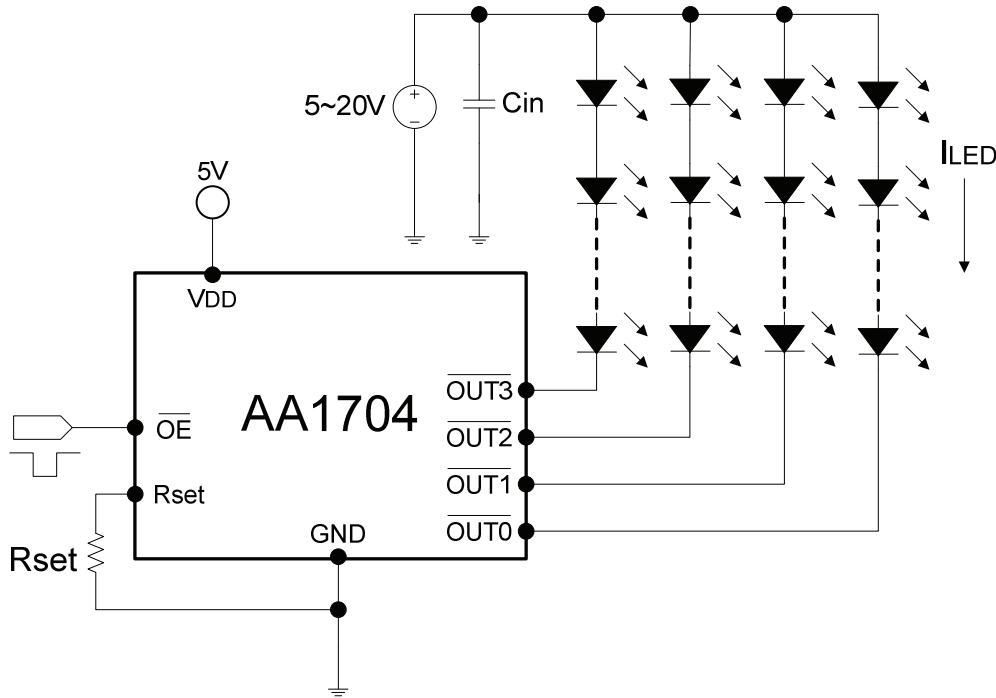
■**FUNCTIONAL DESCRIPTION**

(1) Voltage Regulator

This circuit is composed of a band gap circuit, and outputs a 1.22-volt temperature compensated reference voltage. This reference voltage is stabilized when the supply voltage is variable.

(2) Output on/off control

Dimming control can be achieved by applying a PWM control signal to the $\overline{OE}$ pin. Increasing and decreasing the duty cycle of the PWM signal control the brightness of the LEDs. A 0% duty cycle corresponds to zero LED current and a 100% duty cycle corresponds to full load current. While the operating frequency range of the PWM control is from 60Hz to 1KHz, the recommended maximum brightness frequency range of the PWM signal is from 60Hz to 200Hz. A repetition rate of at least 60Hz is required to prevent flicker. The build-in Schmitt trigger can provide greater stability on noise immunity.

(3) LED Current Setting

In the LEDs application, the AA1704 is generally programmed as a current source. The bias resistor R_{SET}, as shown in the typical application circuit is used to set the operating current of the LED using the equation:

$$I_{LED} = \frac{Vref}{R_{SET}} * 240$$

Where Vref is the reference voltage (1.22V), I_{LED} is the operating current of the LEDs. In order to achieve accurate LED current, 1% precision resistors are recommended.

(4) Thermal Protection

When the junction temperature exceeds 150℃, the output will be turned off. When the temperature is below 130℃, the output will be turned on again.

■ NOTES ON USE

• The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.

• The application circuit examples explain typical applications of the products, and do not guarantee the success of any specific mass-production design.

• Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.

• Take account of common impedance when designing the earth line on a printed wiring board.

■ ORDERING INFORMATION

ORDER NO.	PACKAGE	PACKING	Q'TY	MARK CHART
AA1704S	SOP 8L	Tape & Reel	3,000ea	AA1704 XXXX S

■PACKAGE DIMENSIONS

SOP 8L
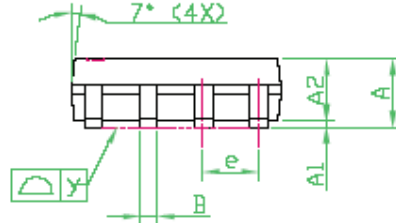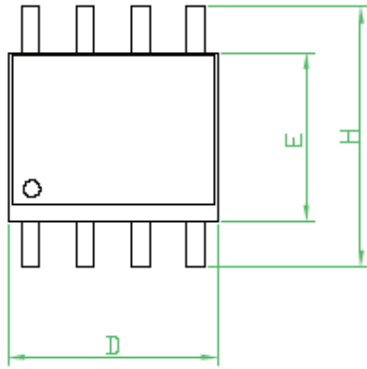
SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.35	1.60	1.75	0.053	0.063	0.069
A1	0.10	- - -	0.25	0.004	- - -	0.010
A2	- - -	1.45	- - -	- - -	0.057	- - -
b	0.33	- - -	0.51	0.013	- - -	0.020
C	0.19	- - -	0.25	0.007	- - -	0.010
D	4.80	- - -	5.00	0.189	- - -	0.197
E	3.80	- - -	4.00	0.150	- - -	0.157
e	- - -	1.27	- - -	- - -	0.050	- - -
H	5.80	- - -	6.20	0.228	- - -	0.244
L	0.40	- - -	1.27	0.016	- - -	0.050
y	- - -	- - -	0.10	- - -	- - -	0.004
θ	0°	- - -	8°	0°	- - -	8°

NOTES:

1. Package body sizes exclude mold flash protrusions or gate burns.
2. Tolerance $\pm$ 0.1 ㎜ (4 mil) unless otherwise specified
3. Coplanarity: 0.1 mm
4. Controlling dimension is millimeter converted inch dimensions are not necessarily exact
5. Followed from JEDEC MS-012

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