HM7502

2-channel Constant Current Regulator

INTRODUCTION

The HM7502 is a 2-channel LED driver, designed for current regulation. It may be used in various current regulation circuits, especially suitable for LED applications. 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.

The connection of R_{EXT} pin can be used for the control of output current, to control and drive more LEDs. When R_{EXT} is open, $V_{CH}1$, $V_{CH}2$ pins may provide 30mA of current. To achieve operations with $V_{CH}1$/$V_{CH}2$ current over 60mA, connect the ICs in parallel.

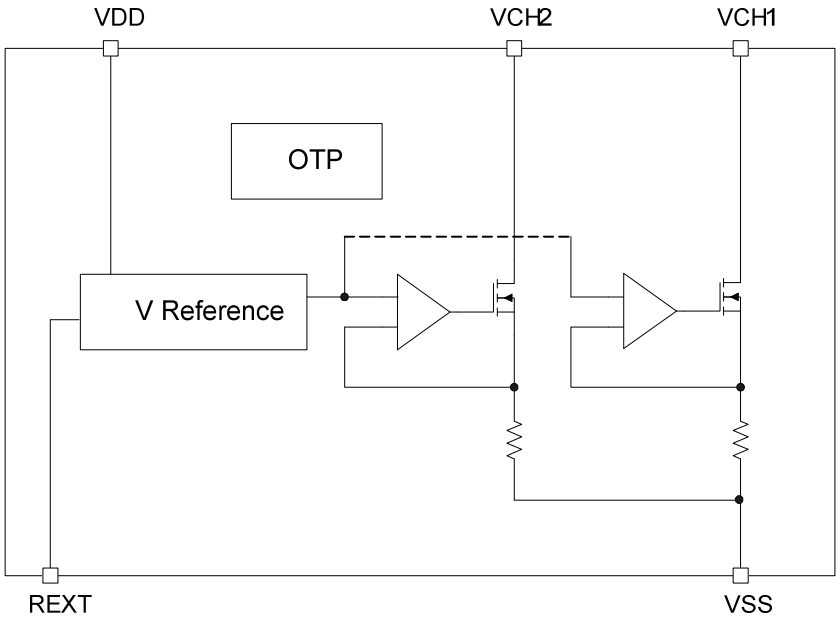
MAIN APPLICATIONS

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

FEATURE HIGHLIGHTS

- Wide operation supply voltage range: 2.5V ~ 40V
- Wide output voltage range: 2.5V~40V
- 30mA to 60mA /per channel sink current
- Accurate sink current: ± 5%
- V_{DD} pin as OE function: up to 100KHz frequency
- Negative temperature coefficient: ± 500ppm/ ^{o}C
- Less than ±0.5%/V load regulation
- –40 ^{o}C ~+85 ^{o}C operation temperature range
- High temperature protection: 95 ^{o}C ~ 155^{o}C
- Pb-free and green package: SOT89-5, SOT23-5

BLOCK DIAGRAM

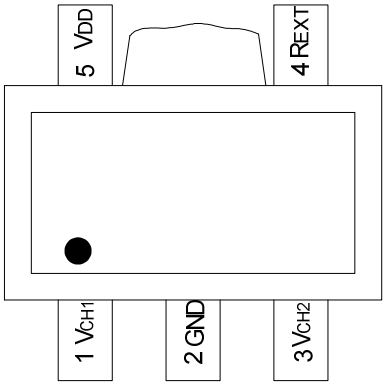


ORDERING INFORMATION

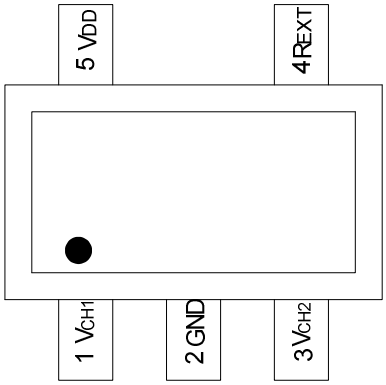
Part Number	I²C	Package	Eco	Description
HM7502PR	No	SOT89-5	RoHS compliant	Pb-free
HM7502MR	No	SOT23-5	RoHS compliant	Pb-free

PIN DESCRIPTION

SOT89-5



SOT23-5



SOT89-5

No	Pin	Type	Description
1	V_{CH1}	PWR	Current driver output.
2	GND	GND	Ground
3	V_{CH2}	PWR	Current driver output.
4	R_{EXT}	I	Connect a resistor to Ground for adjusting current
5	V_{DD}	PWR	Input supply voltage.
Thermal Pad	GND	GND	Ground

SOT23-5

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2	GND	GND	Ground
3	V_{CH2}	PWR	Current driver output.
4	R_{EXT}	I	Connect a resistor to Ground for adjusting current
5	V_{DD}	PWR	Input Supply voltage

MAXIMUM RATING

Symbol	Parameter	Range	Unit
V_{DD}	Supply Voltage	44	V
V (CH1, CH2)	Current Regulator Output Voltage	44	V
I (CH1, CH2)	Current Regulator Output Current	65	mA
I (GND)	Output Saturation Current	132	mA
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature	–40 ~ +125	°C
R_{TH} (j-a)	Thermal Resistance (junction to ambient) SOT89-5	150	°C/W
R_{TH} (j-c)	Thermal Resistance (junction to case) SOT89-5	50	°C/W
Pt-sot89-5	Power Dissipation (SOT89-5) [Note]	1000	mW
R_{TH} (j-a)	Thermal Resistance (junction to ambient) SOT23-5	215	°C/W
R_{TH} (j-c)	Thermal Resistance (junction to case) SOT23-5	50	°C/W
Pt-sot23-5	Power dissipation (SOT23-5), Ta=25 °C	550	mW

Note:

Conditions for Power Dissipation (SOT89-5) :

Double-side FR4, PCB Size 50mmx50mmx1.6mm, Copper Ratio approx. 10% for top side and approx. 100% for back side, No through-holes, and Ta=25°C.

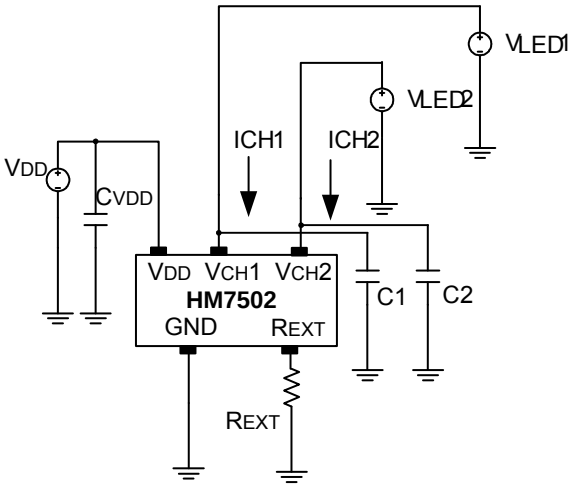
DC CHARACTERISTICS

V_{DD}=3.0V, V_{CH}1, V_{CH}2=1.0V, C_{VDD} = 0.1uF, C1=C2=10nF, T_A=25°C; unless otherwise specified.

Symbol	Characteristics	Condition	Min.	Typical	Max.	Unit
V_{DD}	Supply Voltage		2.5	–	40	V
V_{CH}1, V_{CH}2	Output Voltage (30mA)	V_{DD}>5V, I_{CH}1 or I_{CH}2= 30mA	0.45	–	40	V
		V_{DD}=2.5V, I_{CH}1 or I_{CH}2= 30mA	0.7	–	40	V
	Output Voltage (60mA)	V_{DD}>5V, I_{CH}1 or I_{CH}2= 60mA	0.85	–	40	V
		V_{DD}=3V, I_{CH}1 or I_{CH}2= 60mA	1	–	40	V
I_{DD}	Supply Current		–	400	600	uA
I_{CH}1, I_{CH}2	Peak Regulated Current		30	–	60	mA
I_{AC}	Output Current Accuracy	V_{DD}=3.0V, V_{CH}1 or V_{CH}2=1.0V	–5	–	+5	%
tcoe	Temperature Coefficient	Tj=–40 °C ~125 °C	–500	–	+500	ppm/°C
R_{EXT}	External Resistor		11250	–	Open	Ω
%/V_{DD}	Line Regulation	V_{DD}=2.5V~40V, V_{CH}1 or V_{CH}2=2.5V	–0.5	–	+0.5	%/V
%/V_{CH}	Load Regulation	V_{DD}=3.0V, V_{CH}1 or V_{CH}2=2.5V~40V	–0.6	–	+0.6	%/V
t_{OTP}	OTP Active Temperature	V_{DD}=2.5V~40V	–	155	–	°C
t_{OPT_IN}	OTP Inactive Temperature	V_{DD}=2.5V~40V	–	95	–	°C

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

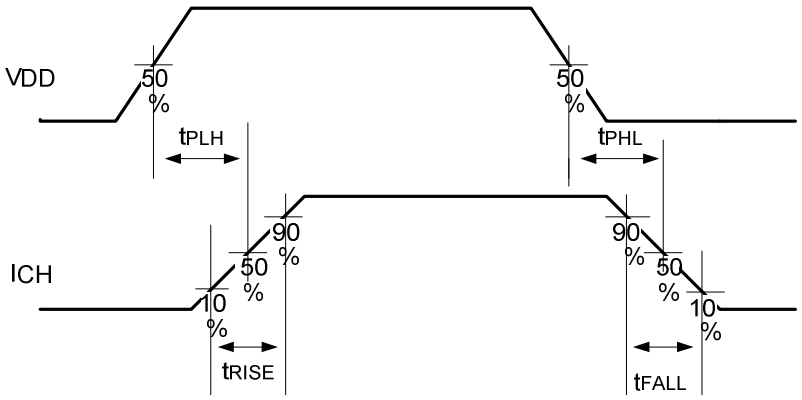
TEST CIRCUIT



$$I_{VCH(REXT)} = (1 + \frac{R_{IN}}{R_{EXT}}) \bullet I_{VCH(open)}$$

where R_{IN}=11300Ω, and I_{VCH} is reference current with R_{EXT} open.

VDD TIMING



Ta=25°C, I_{CH}=0mA~30mA

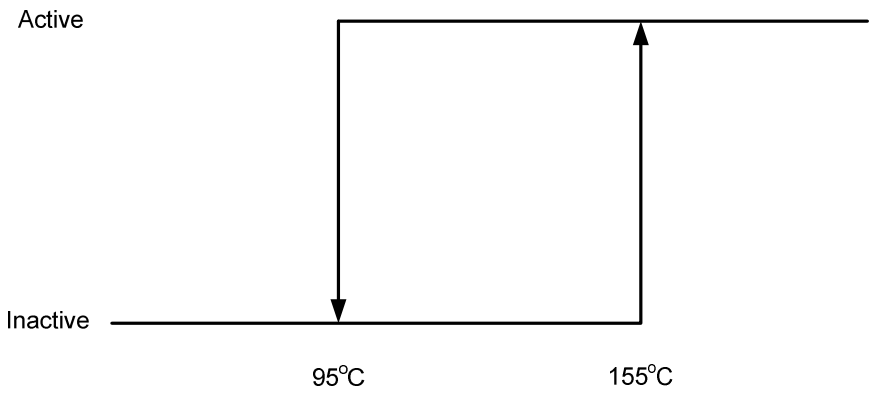
Symbol	Parameter	Condition	Min.	Typical	Max.	Unit
t_{RISE}	I_{CH} Current Rise, V_{DD} Rise	V_{CH}=1V, V_{DD}=0V to 3V, I_{CH}=0mA to 30mA	–	3	5	uS
t_{PLH}	I_{CH} Current Rise, V_{DD} Rise	V_{CH}=1V, V_{DD}=0V to 3V, I_{CH}=0mA to 30mA	–	3	5	uS
t_{FALL}	I_{CH} Current Fall, V_{DD} Fall	V_{CH}=1V, V_{DD}=3V to 0V, I_{CH}=30mA to 0mA	–	0.5	1	uS
t_{PHL}	I_{CH} Current Fall, V_{DD} Fall	V_{CH}=1V, V_{DD}= 3V to 0V, I_{CH}=30mA to 0mA	–	0.5	1	uS

Ta=25°C, I_{CH}=0mA~60mA

Symbol	Parameter	Condition	Min.	Typical	Max.	Unit
t_{RISE}	I_{CH} Current Rise, V_{DD} Rise	V_{CH}=1.5V, V_{DD}=0V to 5V, I_{CH}=0mA to 60mA	–	4	7	uS
t_{PLH}	I_{CH} Current Rise, V_{DD} Rise	V_{CH}=1.5V, V_{DD}=0V to 5V, I_{CH}=0mA to 60mA	–	4	7	uS
t_{FALL}	I_{CH} Current Fall, V_{DD} Fall	V_{CH}=1.5V, V_{DD}=5V to 0V, I_{CH}=60mA to 0mA	–	0.5	1	uS
t_{PHL}	I_{CH} Current Fall, V_{DD} Fall	V_{CH}=1.5V, V_{DD}=5V to 0V, I_{CH}=60mA to 0mA	–	0.5	1	uS

TEMPERATURE PROTECTION

Temperature Protection

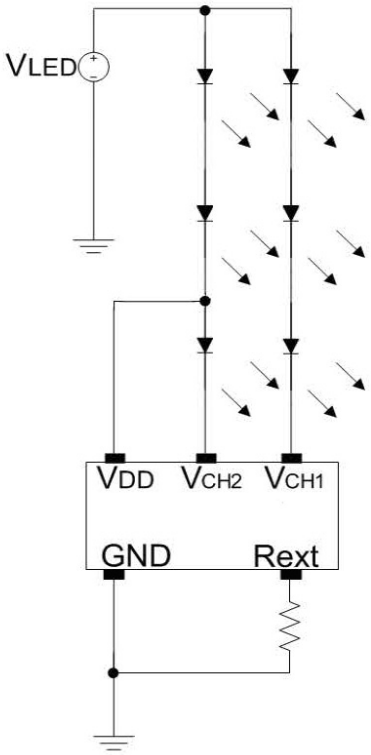


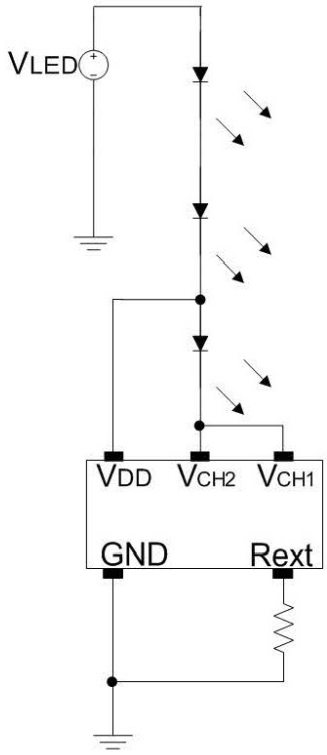
V_{DD}=2.5~40V

Protection	Typical	Unit
Active	155	°C
Inactive	95	°C

Note: The temperature detection is for the chip; not for ambience.

APPLICATION SCHEMATIC

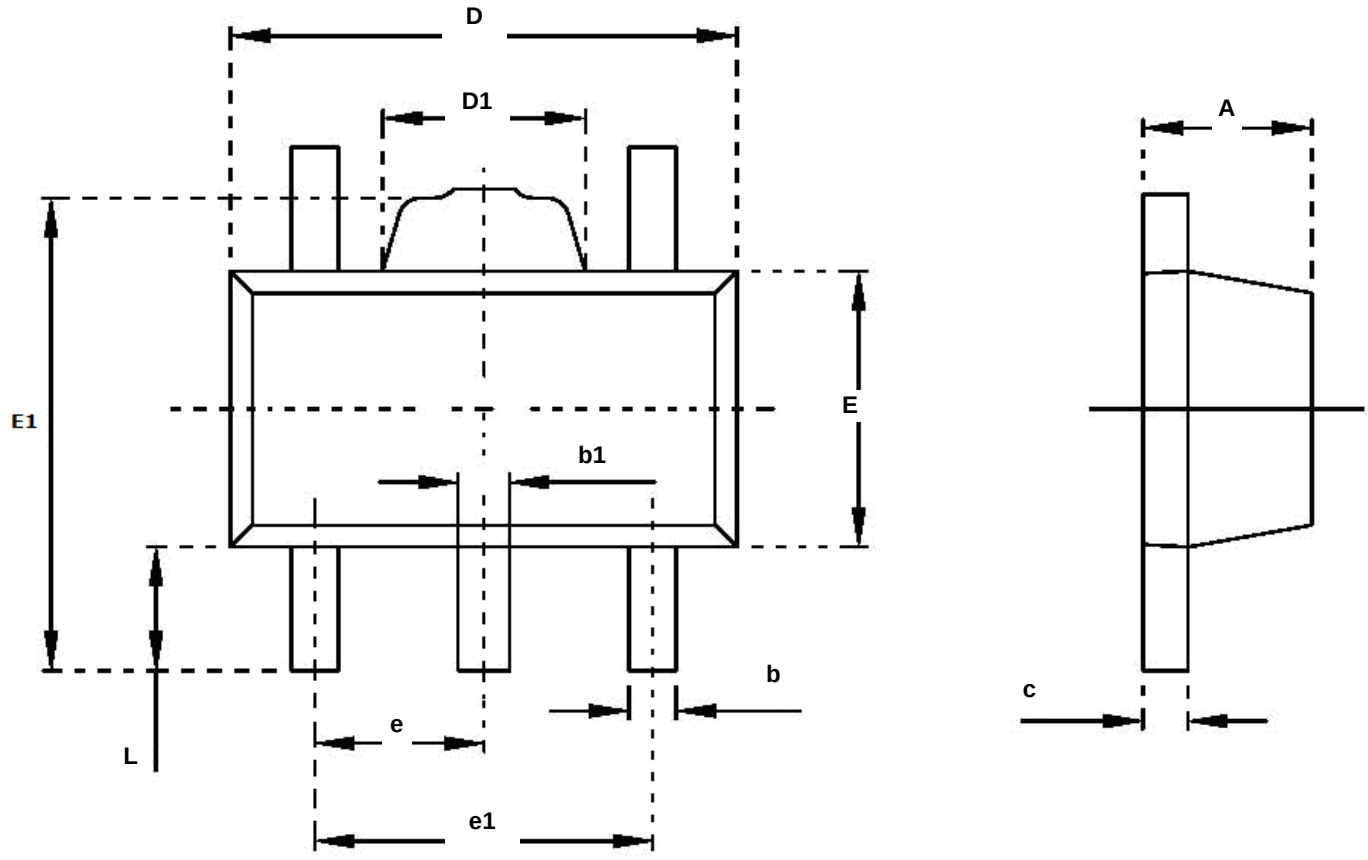




PACKAGE INFORMATION

SOT89-5

	Dimension (Unit: mm)		Dimension (Unit: inch)	
	Min.	Max.	Min.	Max.
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.020
b1	0.360	0.560	0.014	0.022
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.400	1.800	0.055	0.071
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 Typ.		0.060 Typ.	
e1	2.900	3.100	0.114	0.122
L	0.900	1.100	0.035	0.043



SOT23-5

Dimension	Unit: mm			Dimension	Unit: mm		
	Min.	Normal	Max.		Min.	Normal	Max.
A	–	0.95BSC	–	F	0.00	–	0.10
A1	–	1.9BSC	–	G	0.30	0.40	0.50
B	2.60	2.80	3.00	H	0.10	0.15	0.20
C	1.40	1.50	1.70	I	0.30	–	0.60
D	2.80	2.90	3.10	J	5*	–	10*
E	1.00	1.10	1.20*	–	–	–	–