

UP TO 4 CHANNEL LED DRIVER WITH ENABLE LED CURRENT PROGRAMMABLE W/EXTERNAL RESISTOR

A8242

Description

The A8242 is a LED driver providing matched current source bias for any color LED, including white and blue. LED current is programmable using an external resistor. The A8242-2 (2diode control) LED current is typical $460 \times I_{SET}$ (per LED) at and LED cathode voltage of 150mV and typical $650 \times I_{SET}$ at an LED cathode voltage of 1V. The A8242-3 & A8242-4 (3 & 4 diode control) currents are typical $230 \times I_{SET}$ (per LED) at an LED cathode voltage of 150mV and typical $325 \times I_{SET}$ at an LED cathode voltage of 1V where I_{SET} is the current through the external resistor connected to the CTRL pin. The A8242 can drive up to 4 high-current LEDs and incorporate a chip-enable feature via pin ON. When the A8242 is disable, the supply current drops to less than 1uA. The A8242-2 & A8242-3 are available 6pin SC70 and A8242-4 is available in 8pin MSOP Package.

Ordering Information

| Diode Control | Part Number |
|---------------|-------------|
| 2 | A8242C6-2 |
| 3 | A8242C6-3 |
| 4 | A8242MS8-4 |

C6= 6pin SC-70 package

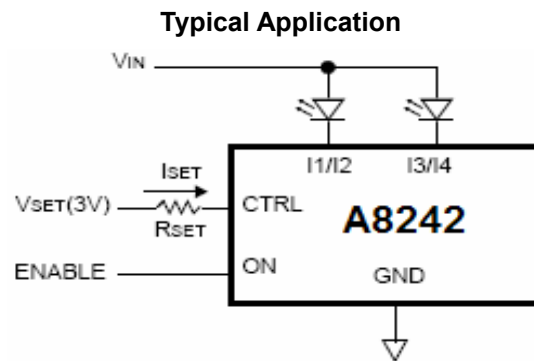
MS8= 8pin MSOP package

Features

- Ultra-Low Voltage Drop: Less than 150mV(for Li-ion Battery Support)
- LED Driver for Parallel-Connected LEDs
- Up to 40mA per LED (A8242-3 & 4)
- Up to 80mA per LED (A8242-2)
- Current-Matching Requires w/o External Components
- Analog and PWM Brightness Control
- < 1uA Low Shutdown-Current
- No Electromagnetic Interference, No Switching Noise
- The A8242-2 & A8242-3 are available 6pin SC70 Package.
- The A8242-4 is available in 8pin MSOP Package.

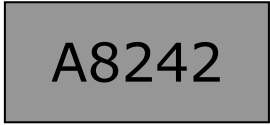
Application

- LED Display
- Keyboard Backlight
- Portable DVD Player
- MP3, CD Player, Mobile, PDA
- Cordless Displays
- Consumer Electronics.

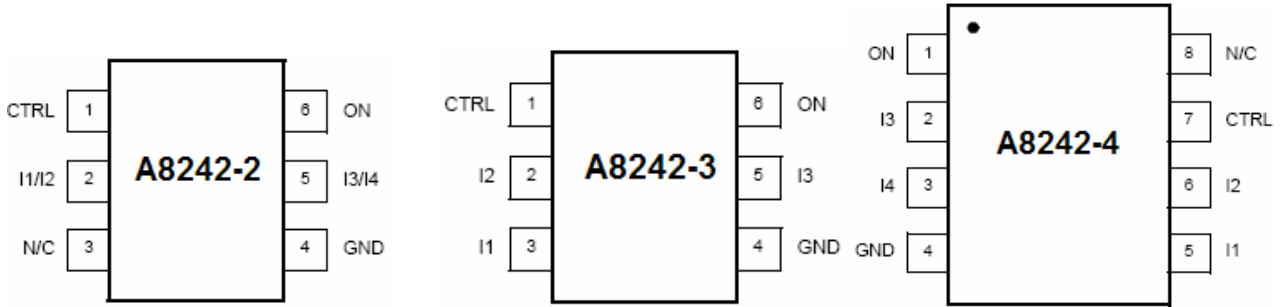


A8242-2 (2 Diode Control with On/Off)

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Pin Description



| Pin # | | | Name | Description |
|---------|---------|---------|------|--|
| A8242-2 | A8242-3 | A8242-4 | | |
| 1 | 1 | 7 | CTRL | Set LED Current, Connect to External Resistor. |
| 2 | 1 | 5 | I1 | Connect to Cathode of LED. |
| 2 | 2 | 6 | I2 | Connect to Cathode of LED. |
| 5 | - | 2 | I3 | Connect to Cathode of LED. |
| 5 | 5 | 3 | I4 | Connect to Cathode of LED. |
| 4 | 4 | 4 | GND | Ground Pin. |
| 6 | 6 | 1 | ON | Enable Input Pin. |
| 3 | - | 8 | NC | No Connection. |

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Absolute Maximum Ratings

| | |
|--|----------------|
| V _{I1} , V _{I2} , V _{I3} , V _{I4} , CTRL and On Voltage to GND | -0.3~5V |
| Power Dissipation T _A =85°C | |
| SC-70-6 | 200mW |
| MSOP8 | 250mW |
| I ₁ , I ₂ , I ₃ , I ₄ Steady State Current | 100mA |
| Lead Temperature (Soldering, 10s) | 260°C |
| Junction Temperature | 150°C |
| Storage Temperature | -65°C ~ +150°C |
| Electrostatic Discharge Protection (ESD) Level | 2KV |

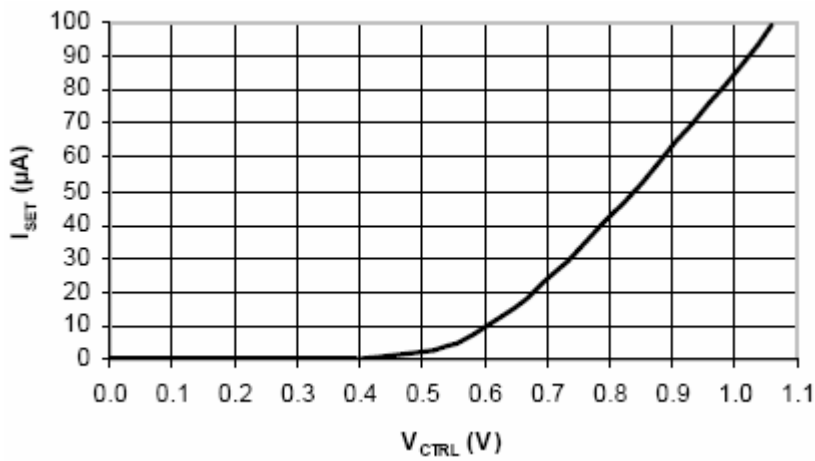
Electrical Characteristics (T_A=25°C)

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit | |
|-------------------------------------|----------------------|--|------------------------|------------|------------|------------|----|
| I _{SET} Range | I _{SET} | V _{ON} =3V | 25 | | 150 | uA | |
| LED-to-LED Current Matching | Match | V _{ON} =3V | -3 | | 3 | % | |
| I _{SET} in OFF Mode | I _{SET,OFF} | V _{CTRL} =3V, V _{SAT} =3V, V _{ON} =0V, T _A =25°C | | 0.1 | 1 | uA | |
| I _{IN} in OFF Mode | I _{IN,OFF} | V _{CTRL} =3V, V _{SAT} =3V, V _{ON} =0V | | 0.1 | 14 | uA | |
| Peak Efficiency* | EFF | V _{IN} =3V, V _{ON} =3V | 95 | | | % | |
| Output Current Multiplication Ratio | OCMR | I _{SAT} =25uA, V _{SAT} =150mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 350 175 | 505 250 | 650 325 | uA |
| | | I _{SAT} =40uA, V _{SAT} =150mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 315 170 | 450 240 | 585 310 | |
| | | I _{SAT} =75uA, V _{SAT} =150mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 295 145 | 420 210 | 545 275 | |
| | | I _{SAT} =25uA, V _{SAT} =600mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 435 215 | 620 310 | 805 405 | |
| | | I _{SAT} =40uA, V _{SAT} =600mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 425 215 | 610 305 | 795 395 | |
| | | I _{SAT} =75uA, V _{SAT} =600mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 415 205 | 590 295 | 765 385 | |
| | | I _{SAT} =25uA, V _{SAT} =1000mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 470 235 | 670 335 | 870 435 | |
| | | I _{SAT} =40uA, V _{SAT} =1000mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 460 230 | 660 330 | 860 430 | |
| | | I _{SAT} =75uA, V _{SAT} =1000mV V _{ON} =3V | A8242-2 A8242-3 & 4 | 440 220 | 630 315 | 820 410 | |

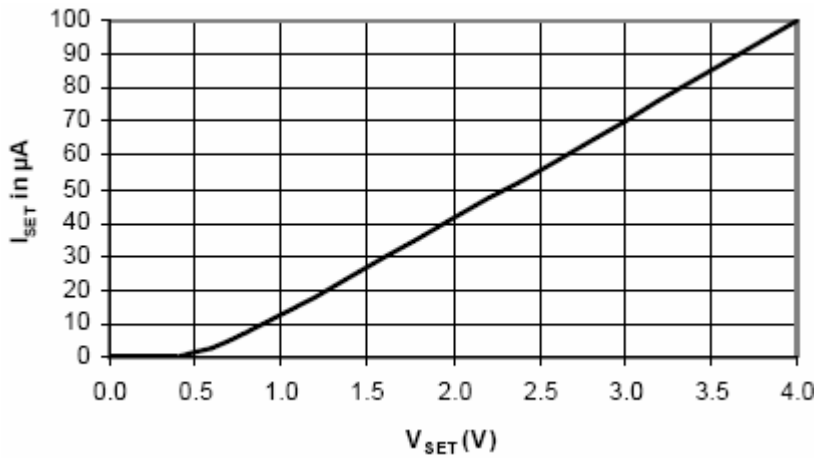
*Efficiency=(V_{IN}-V_{SAT})/V_{IN}.

Typical Characteristics

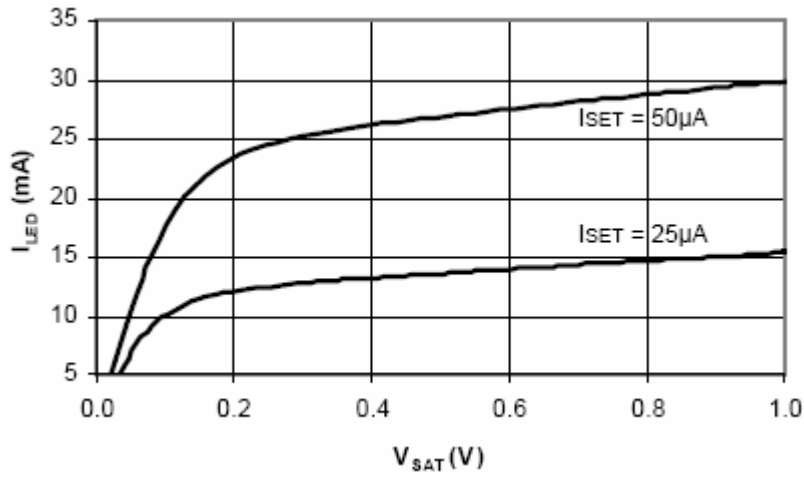
1. I_{SET} VS V_{CTRL}



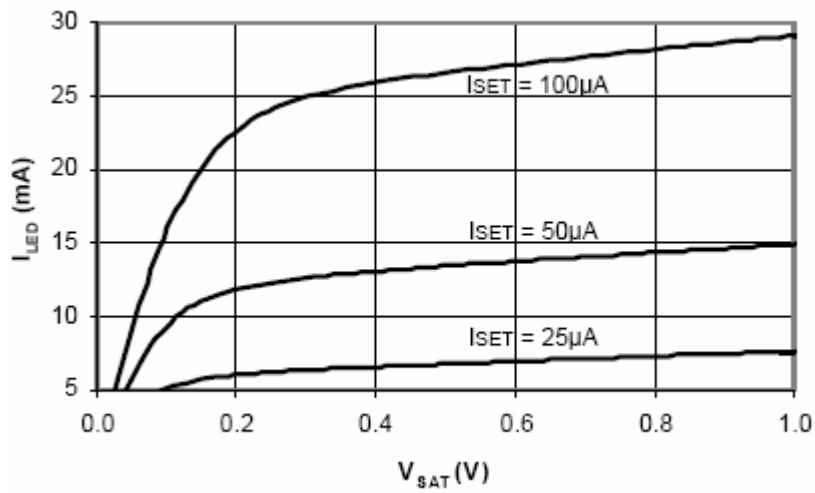
2. I_{SET} VS V_{SAT} ($R_{SET}=30K\Omega$)



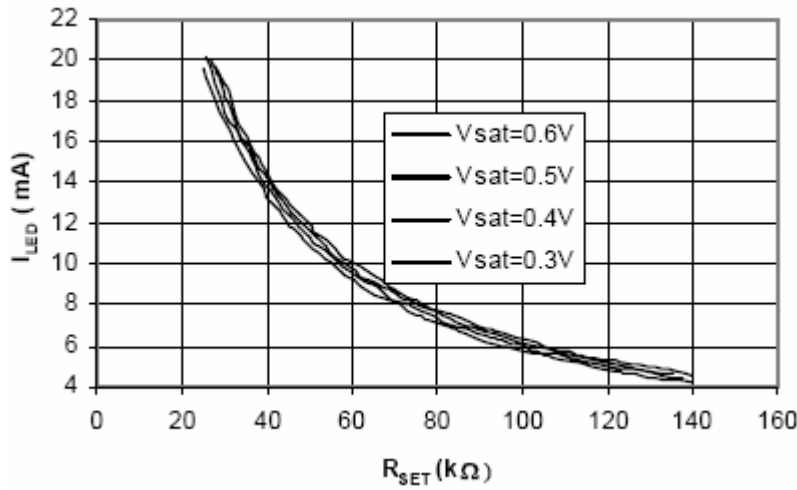
3. A8242-2 I_{LED} VSX V_{SAT}



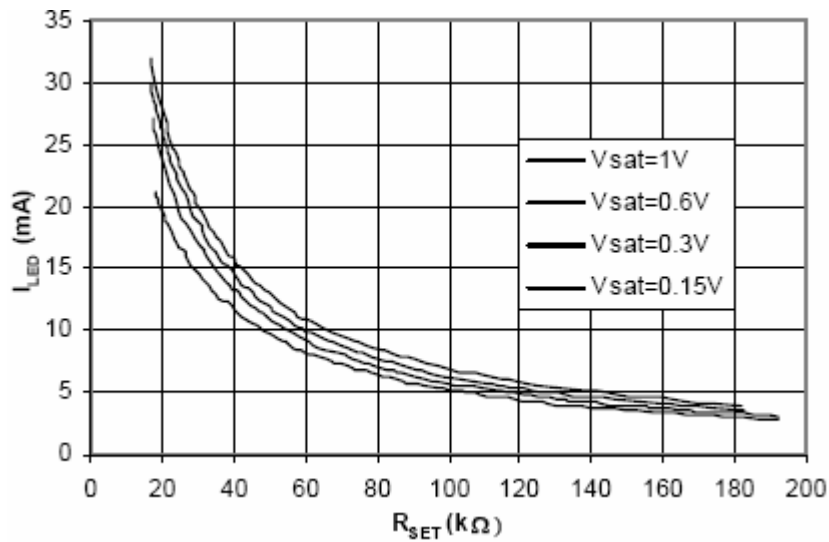
4. A8242-3 & 4 I_{LED} VS V_{SAT}



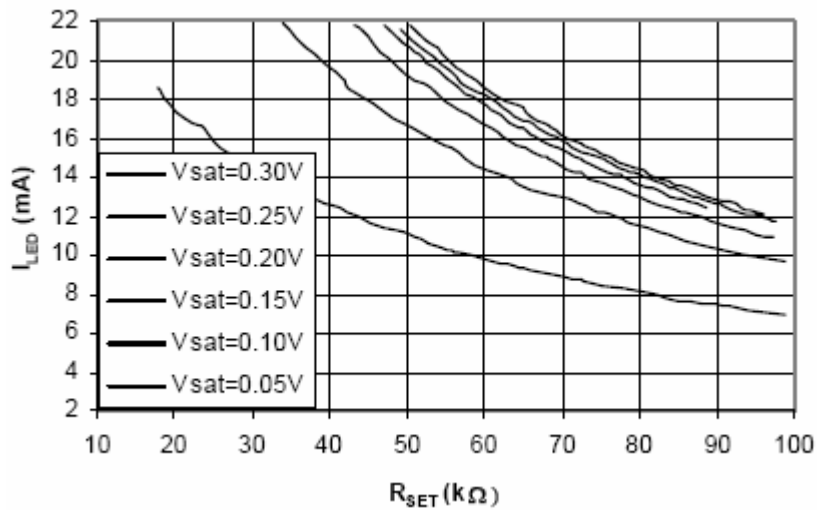
5. A8242-3 & 4 I_{LED} VS R_{SET}



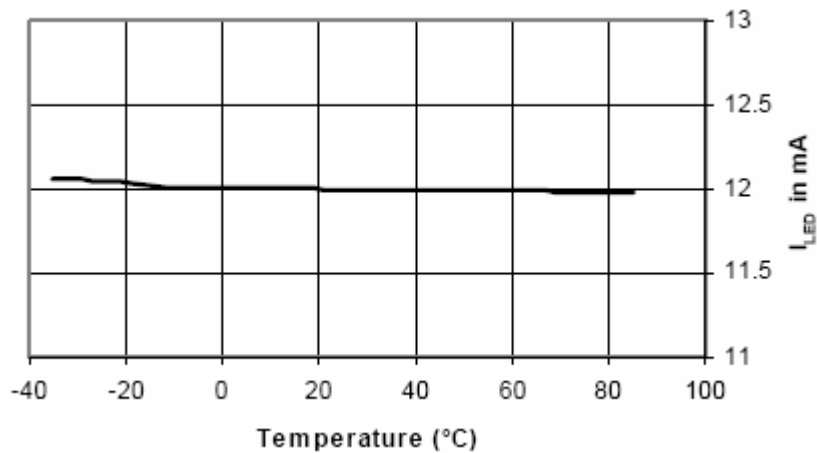
6. A8242-3 & 4 I_{LED} VS R_{SET}



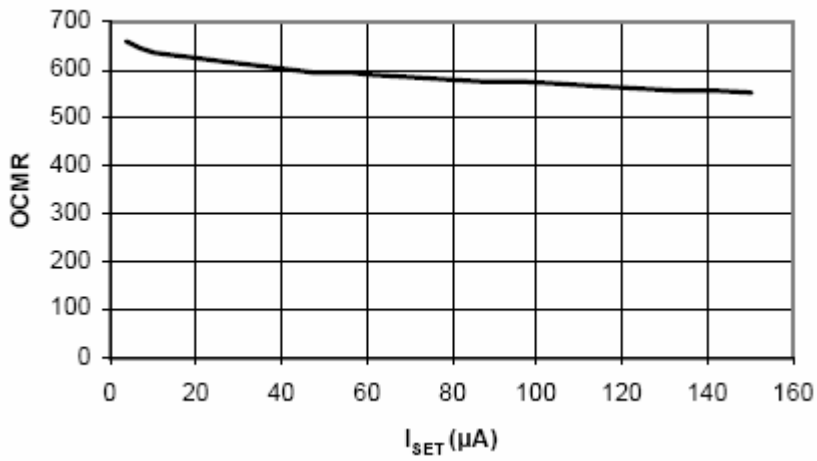
7. A8242-2 I_{LED} vs R_{SET}



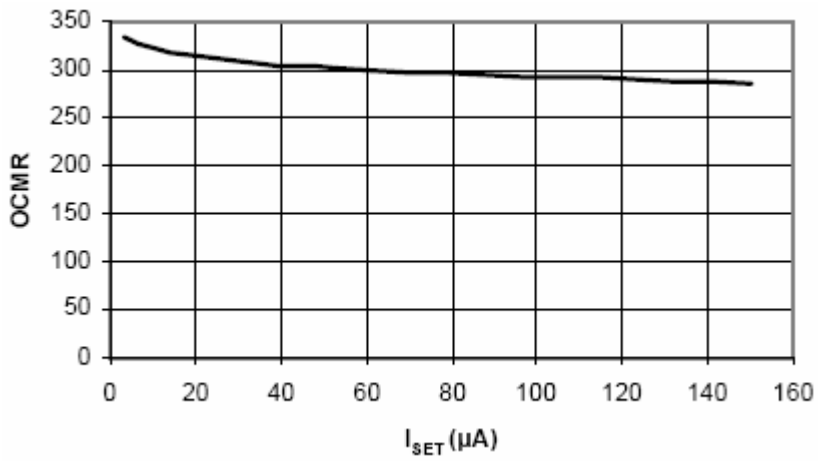
8. I_{LED} vs Temperature ($V_{LED} = 0.25V$, $I_{SET} = 50\mu A$)



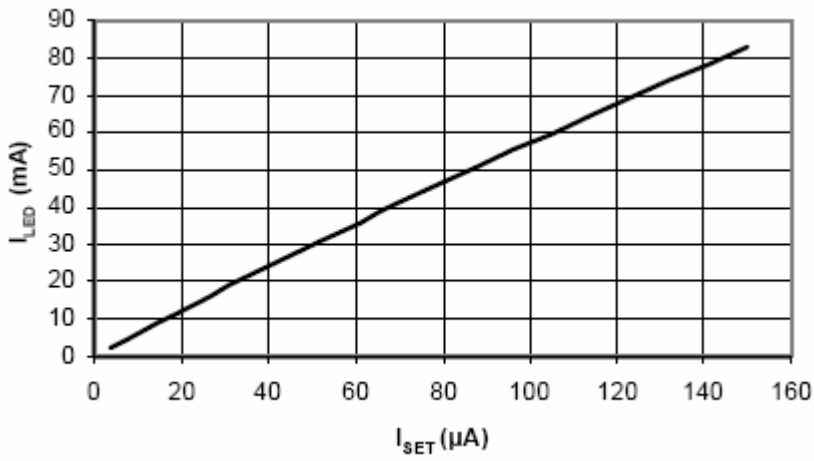
9. A8242-2 OCMR vs. I_{SET}



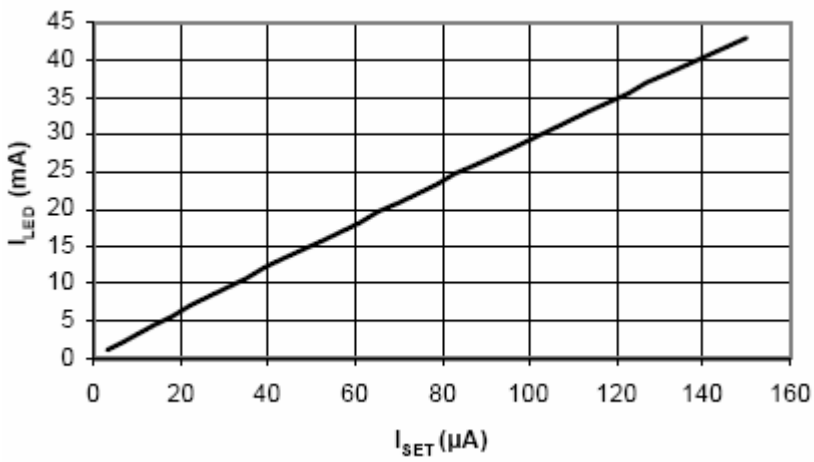
10. A8242-3 & 4 OCMR vs. I_{SET}



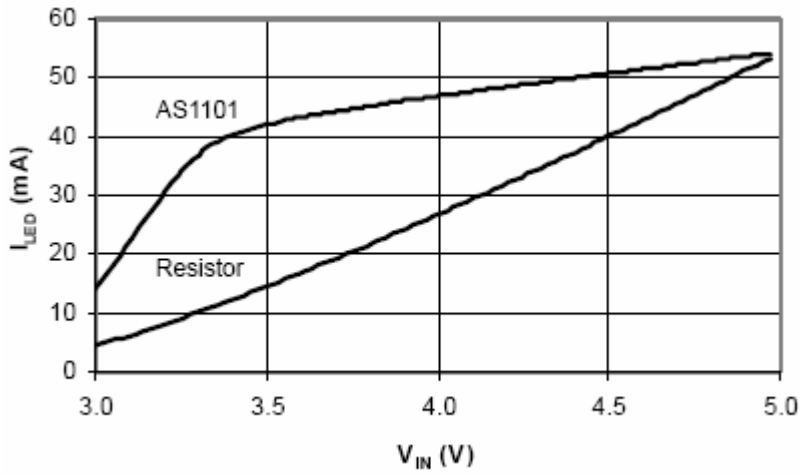
11. A8242-2 I_{LED} VS. I_{SET}



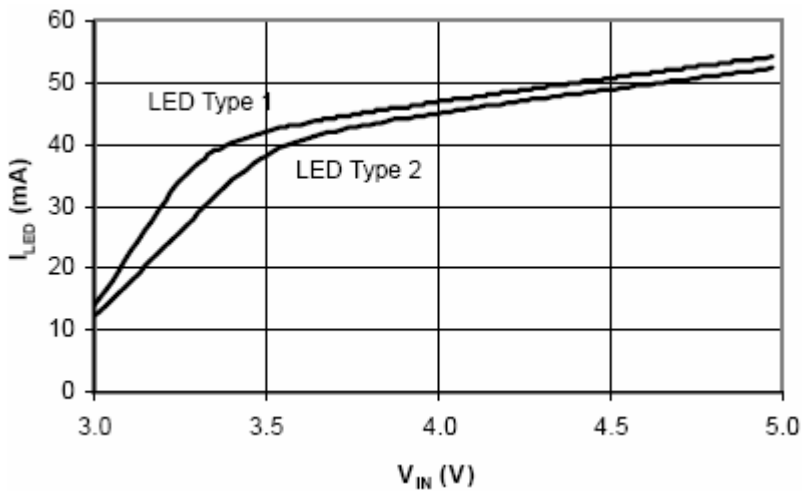
12. A8242-3 & 4 I_{LED} VS. I_{SET}



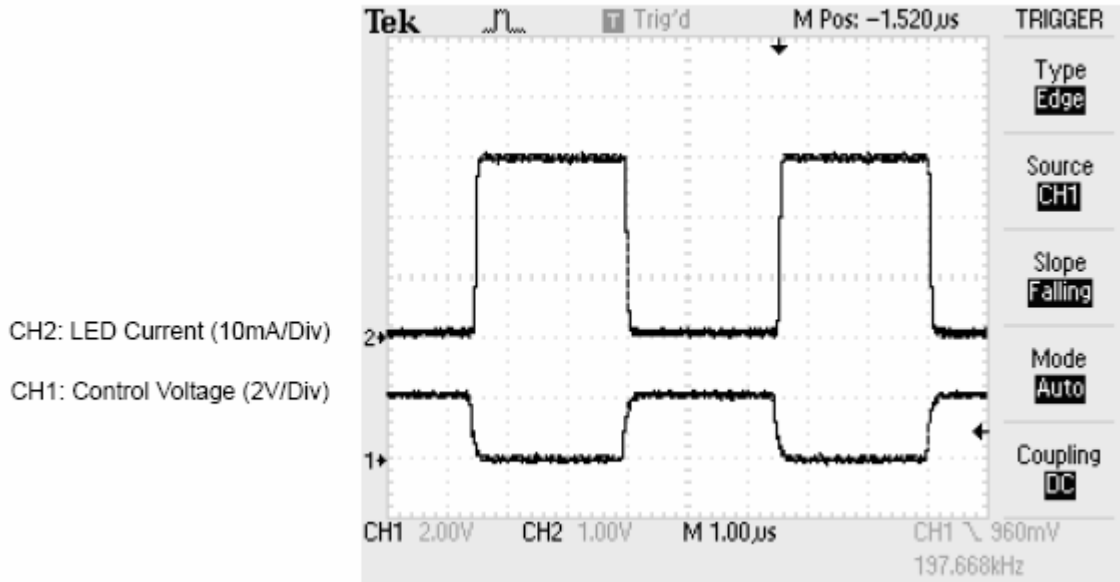
13. A8242-2 vs. Resistor



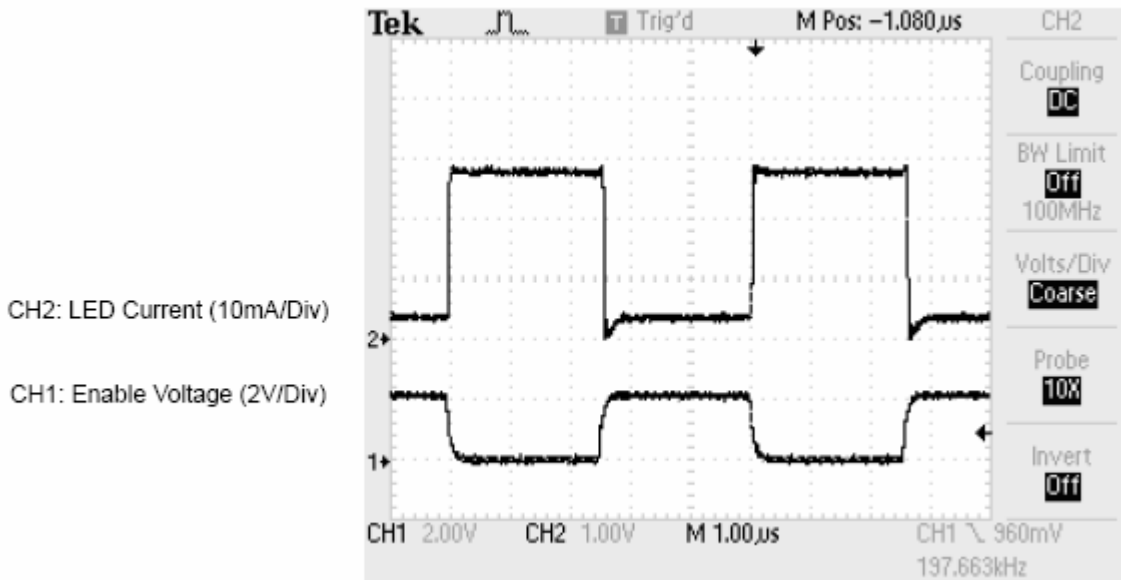
14. A8242-3 & 4 I_{LED} vs. V_{IN}



15. Control Voltage Transient Response



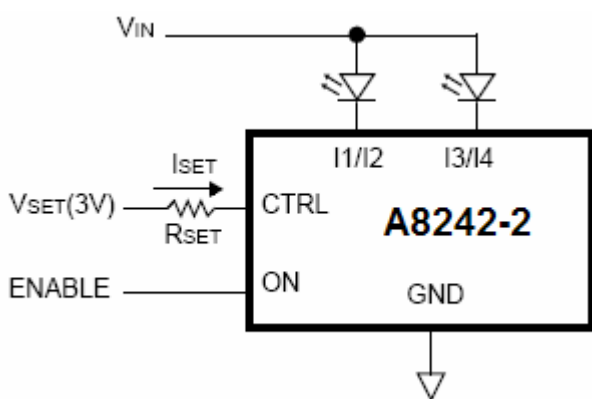
16. Enable Voltage Transient Response



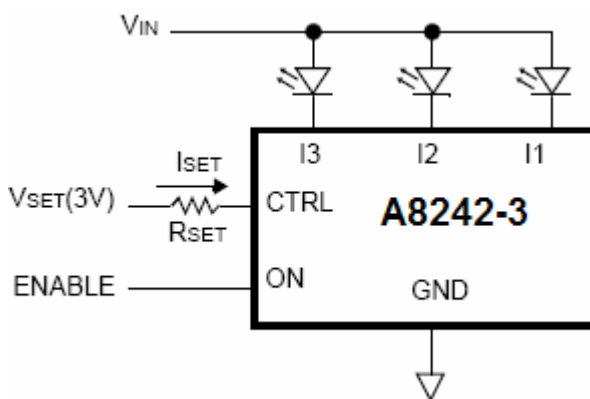
Application Information

Typical Application Diagram

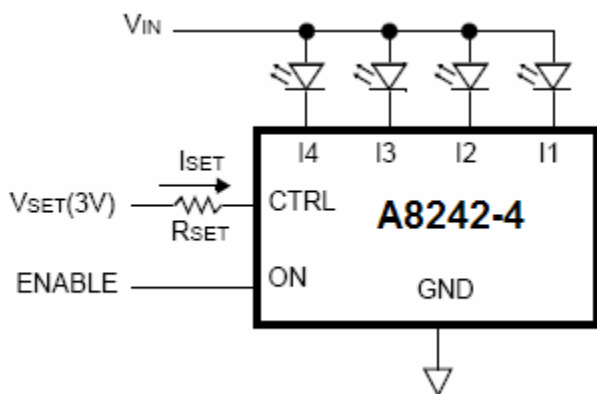
A8242-2: 2 Diode Control With On/Off



A8242-3: 3 Diode Control with On/Off



A8242-4: 4 Diode Control with On/Off



Setting the LED Current

The current going into the LEDs is approximately OCMR times greater than the current I_{SET} . LED current is controlled by V_{SET} and R_{SET} according to the formula:

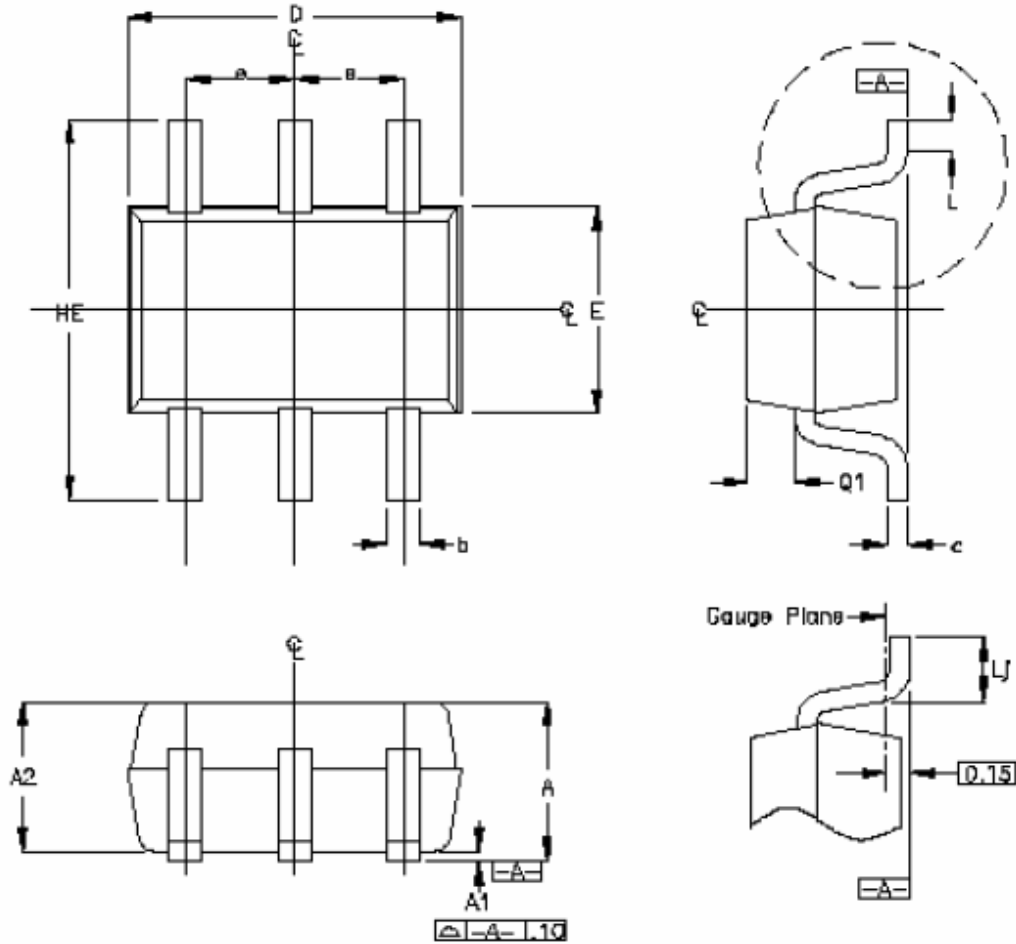
$$I_{LED} = OCMR \times (V_{SET} - V_{CTRL}) / R_{SET}$$

For $V_{SET} = 3V$ and a specific LED current, the R_{SET} value can be determined using the diagram shown in previous Typical Performance Characteristics. For any other option, the value of I_{SET} can be determined using the graph “ I_{SET} vs. V_{CTRL} ”.

LED Brightness be adjusted by driving pin Enable or pin CTRL with a PWM signal.

Package Information

Dimension in 6-pin SC-70 Package (Unit: mm)

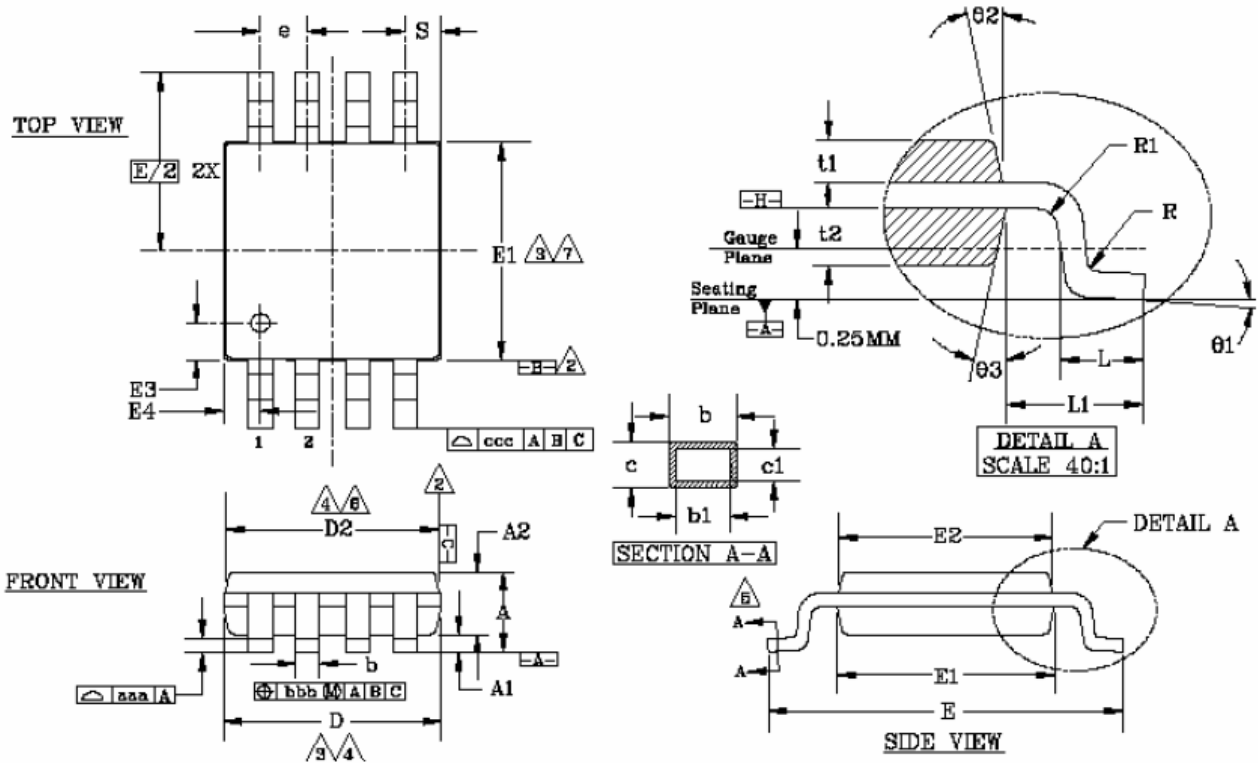


| Symbol | Min | Max |
|--------|----------|------|
| e | 0.65 BSC | |
| D | 1.80 | 2.20 |
| b | 0.15 | 0.30 |
| E | 1.15 | 1.35 |
| HE | 1.80 | 2.40 |
| Q1 | 0.10 | 0.40 |
| A2 | 0.80 | 1.00 |
| A1 | 0.00 | 0.10 |
| A | 0.80 | 1.10 |
| c | 0.10 | 0.18 |
| L | 0.10 | 0.30 |
| L1 | 0.26 | 0.46 |

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Dimension in MSOP-8 Package (Unit: mm)



| MSOP-8 Package Outline | | | | | |
|------------------------|-------------|----------------|--------|-------------|----------------|
| Symbol | Millimeters | ± Tolerance | Symbol | Millimeters | ± Tolerance |
| A | 1.10 | Max | b | 0.33 | +0.07 to -0.08 |
| A1 | 0.10 | ±0.05 | b1 | 0.30 | ±0.05 |
| A2 | 0.86 | ±0.05 | c | 0.18 | ±0.05 |
| D | 3.00 | ±0.10 | c1 | 0.15 | +0.03 to -0.02 |
| D2 | 2.95 | ±0.10 | θ1 | 3.0 | ±3.0 |
| E | 4.90 | ±0.15 | θ2 | 12.0 | ±3.0 |
| E1 | 3.00 | ±0.10 | θ3 | 12.0 | ±3.0 |
| E2 | 2.95 | ±0.10 | L | 0.55 | ±0.15 |
| E3 | 0.51 | ±0.13 | L1 | 0.96 BSC | - |
| E4 | 0.51 | ±0.18 | aaa | 0.10 | - |
| R | 0.15 | +0.15 to -0.08 | bbb | 0.08 | - |
| R1 | 0.15 | +0.15 to -0.08 | ccc | 0.25 | - |
| t1 | 0.31 | ±0.08 | e | .5 BSC | - |
| t2 | 0.41 | ±0.08 | S | .525 BSC | - |

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