

TX6221 Series High PSRR LDO

Features

- Low power consumption:8uA (Typ.)
- Low voltage drop:0.4V@100mA(Typ.)
- Standby Mode: 0.1uA
- Low temperature coefficient
- Output Voltage Range: 0.9V~5V
- Good line Regulation:0.05%/V
- High Ripple Rejection: 60dB@100Hz(Typ.)
- Output voltage accuracy: tolerance $\pm 2\%$
- Build-in Enable/Output Current Limit circuit
- SOT23, SOT23-5 and SOT89 package

Applications

- Cellular phones
- Wireless Communication equipment
- Cordless phones
- Portable games
- Cameras, Video cameras
- Reference voltage sources

General Description

The TX6221 series is a high accuracy, low noise, high speed, low dropout CMOS regulator with high ripple rejection. The series includes a reference voltage source, an error amplifier, and a phase compensation circuit. The CE function enables the entire circuit to be in stand-by state by inputting low level signal. Output voltage is selectable in 0.05V increments within a range of 0.80V~5.00V, using the laser

trimming technology set in factory. The current limiter's fold-back circuit also operates as a short circuit protection and an output current limiter at the output pin. The series achieves a fast response with only 8uA of low power consumption. Also the series has low dropout voltage characteristics, which is 330mV at $I_{OUT}=100mA$ and $V_{out}=5.0V$.

Order Information

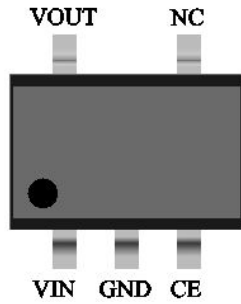
TX6221-①②③④

| Designator | Symbol | Description |
|------------|---------|--------------------------|
| ① ② | Integer | Output Voltage(0.9~5.0V) |
| ③ | M | Package:SOT23-3 |
| | M5 | Package:SOT23-5 |
| | P | Package:SOT89 |
| ④ | R | RoHS / Pb Free |
| | G | Halogen Free |

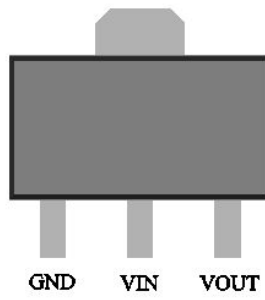
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Package and Pin assignment

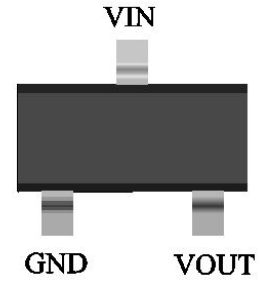
SOT23-5(Top view)



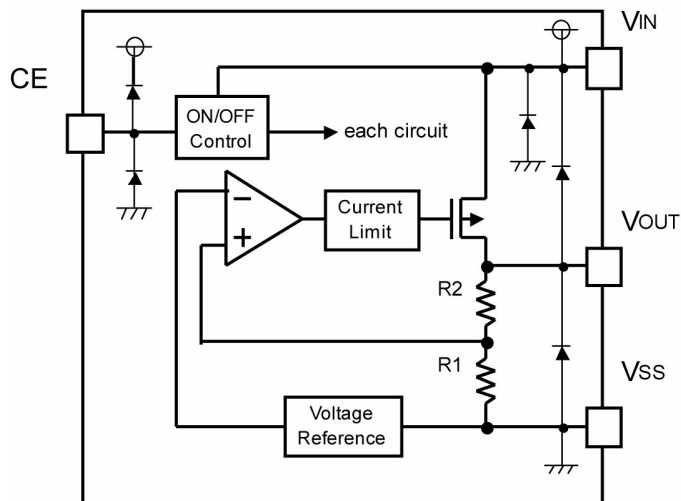
SOT89 (Top view)



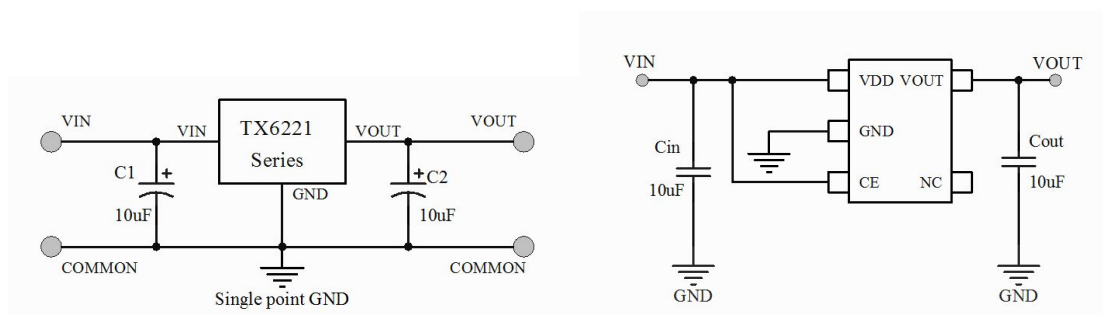
SOT23 (Top view)



Block Diagram



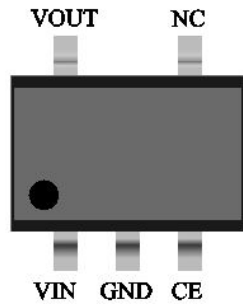
Typical Application Circuit



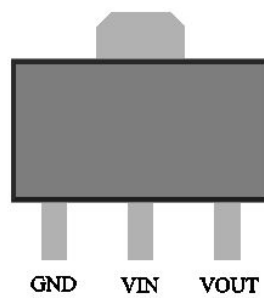
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Marking Rule

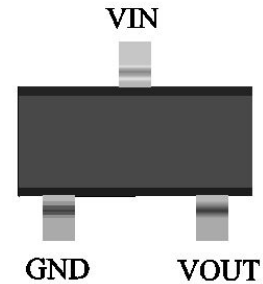
SOT23-5(Top view)



SOT89 (Top view)



SOT23 (Top view)



① Represents product series

| | |
|------|----------------|
| Mark | Product Series |
| 9 | TX6221xxxxxx |

② Represents type of regulator

| | | |
|---------------|---------------|----------------|
| Mark | | Product series |
| Vout:0.1~3.0V | Vout:3.1~6.0V | |
| X | B | TX6221xxxxx |

③ Represents output Voltage

| Mark | Output Voltage(V) | | | | Mark | Output Voltage(V) | | | |
|------|-------------------|-----|------|------|------|-------------------|-----|------|------|
| 0 | - | 3.1 | - | 3.15 | F | 1.6 | 4.6 | 1.65 | 4.65 |
| 1 | - | 3.2 | - | 3.25 | H | 1.7 | 4.7 | 1.75 | 4.75 |
| 2 | - | 3.3 | - | 3.35 | K | 1.8 | 4.8 | 1.85 | 4.85 |
| 3 | - | 3.4 | - | 3.45 | L | 1.9 | 4.9 | 1.95 | 4.95 |
| 4 | - | 3.5 | - | 3.55 | M | 2.0 | 5.0 | 2.05 | - |
| 5 | - | 3.6 | - | 3.65 | N | 2.1 | - | 2.15 | - |
| 6 | - | 3.7 | - | 3.75 | P | 2.2 | - | 2.25 | - |
| 7 | - | 3.8 | - | 3.85 | R | 2.3 | - | 2.35 | -- |
| 8 | 0.9 | 3.9 | 0.95 | 3.95 | S | 2.4 | - | 2.45 | - |
| 9 | 1.0 | 4.0 | 1.05 | 4.05 | T | 2.5 | - | 2.55 | - |
| A | 1.1 | 4.1 | 1.15 | 4.15 | U | 2.6 | - | 2.65 | - |
| B | 1.2 | 4.2 | 1.25 | 4.25 | V | 2.7 | - | 2.75 | - |
| C | 1.3 | 4.3 | 1.35 | 4.35 | X | 2.8 | - | 2.85 | - |
| D | 1.4 | 4.4 | 1.45 | 4.45 | Y | 2.9 | - | 2.95 | - |
| E | 1.5 | 4.5 | 1.55 | 4.55 | Z | 3.0 | - | 3.05 | - |

④ Represents production lot number

X

TX6221 Series

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Absolute Maximum Ratings

Supply Voltage-0.3V to 15V Storage Temperature-50°C to 125°C
 Operating Temperature-40°C to 85°C

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Thermal Information

| Symbol | Parameter | Package | Max. | Unit |
|---------------|--|---------|------|------|
| θ_{JA} | Thermal Resistance (Junction to Ambient) (Assume no ambient airflow, no heat sink) | SOT23-3 | 500 | °C/W |
| | | SOT23-5 | 500 | °C/W |
| | | SOT89 | 200 | °C/W |
| P_D | Power Dissipation | SOT23-3 | 0.20 | W |
| | | SOT23-5 | 0.20 | W |
| | | SOT89 | 0.50 | W |

Note: P_D is measured at $T_a = 25^\circ\text{C}$

Electrical Characteristics

TX6221 for any output voltage

($T_a = 25^\circ\text{C}$)

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|--|---|-----------------------|-----------|-----------------------|--------|
| Output Voltage | V_{out} | $V_{in} = V_{out} + 1V$ $1.0\text{mA} \leq I_{out} \leq 30\text{mA}$ | $V_{out} \times 0.98$ | -- | $V_{out} \times 1.02$ | V |
| Output Current | I_{out} | $V_{in} - V_{out} = 1V$ | -- | 350 | -- | mA |
| Low dropout | V_{drop} | Refer to the next table | | | | |
| Line Regulation | $\Delta V_{out1} / (V_{in} - V_{out})$ | $1.6V \leq V_{in} \leq 8V$ $I_{out} = 40\text{mA}$ | -- | 0.05 | 0.2 | %/V |
| Load Regulation | $\Delta V_{out} / \Delta I_{out}$ | $V_{in} = V_{out} + 1V$ $1.0\text{mA} \leq I_{out} \leq 80\text{mA}$ | -- | 12 | 30 | mV |
| Output voltage Temperature Coefficiency | $\Delta V_{out} / (T_a \cdot V_{out})$ | $I_{out} = 30\text{mA}$ $0^\circ\text{C} \leq T_a \leq 70^\circ\text{C}$ | -- | ± 100 | -- | Ppm/°C |
| Supply Current | I_{ss1} | -- | -- | 8 | 10 | uA |
| Input Voltage | V_{in} | -- | -- | -- | 12 | V |
| PSRR | PSRR | $F = 100\text{Hz}$ $V_{in} = V_{out} + 1V$ | -- | 60 | -- | dB |
| Output Noise | EN | $BW = 10\text{Hz} \sim 100\text{KHz}$ | -- | 27 | -- | uVrms |

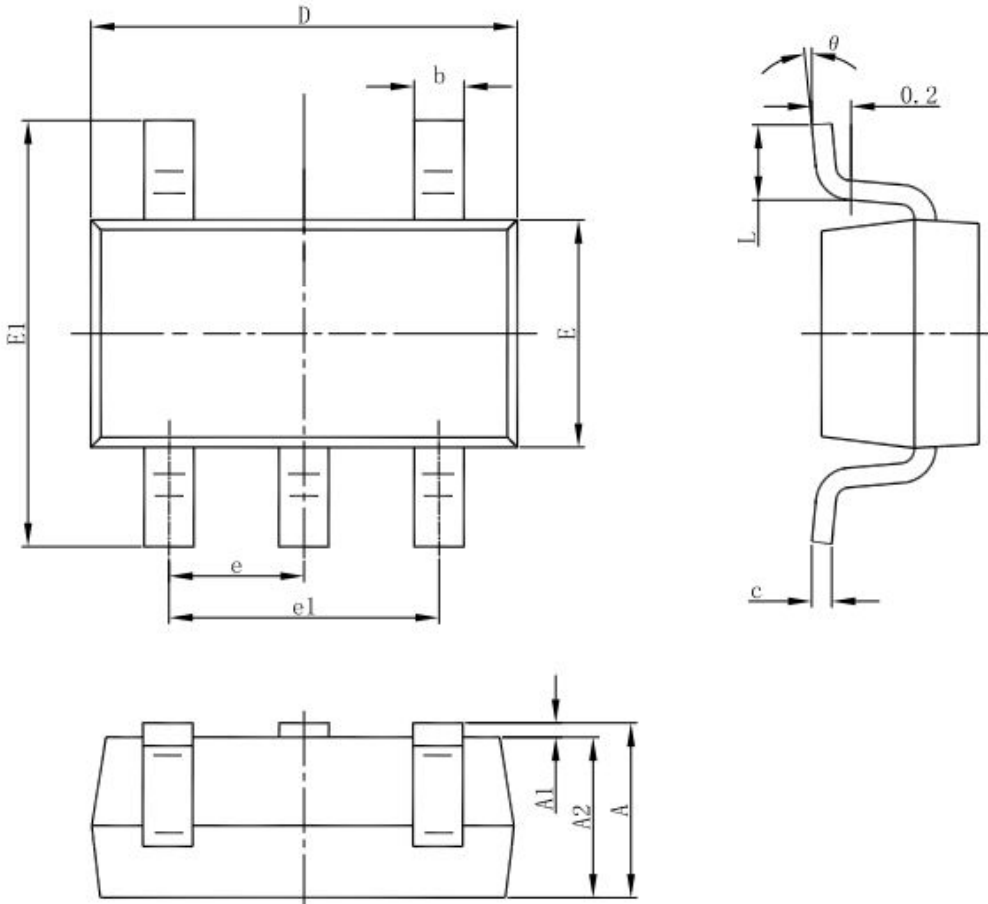
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| Output Voltage Vout(V) | Dropout Voltage Vdif (V) | | |
|------------------------|--------------------------|------|------|
| | Conditions | Typ. | Max. |
| 2.0 < Vout ≤ 3.0 | Iout=80 mA | 0.35 | 0.40 |
| 3.0 < Vout ≤ 4.0 | Iout=100 mA | 0.40 | 0.45 |
| 4.0 < Vout ≤ 5.0 | | 0.30 | 0.35 |
| 3.0 < Vout ≤ 4.0 | Iout=200 mA | 0.70 | 0.75 |
| 4.0 < Vout ≤ 14.0 | | 0.60 | 0.65 |
| 3.0 < Vout ≤ 4.0 | Iout=300 mA | 1.15 | 1.20 |
| 4.0 < Vout ≤ 14.0 | | 1.00 | 1.05 |

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Packaging Information

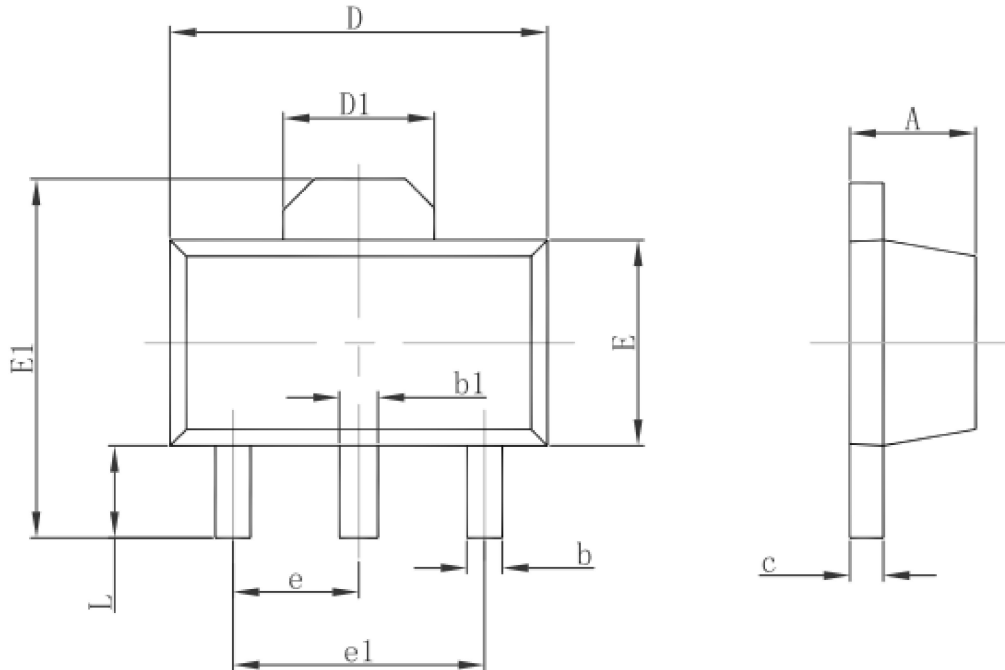
SOT23-5 Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| theta | 0° | 8° | 0° | 8° |

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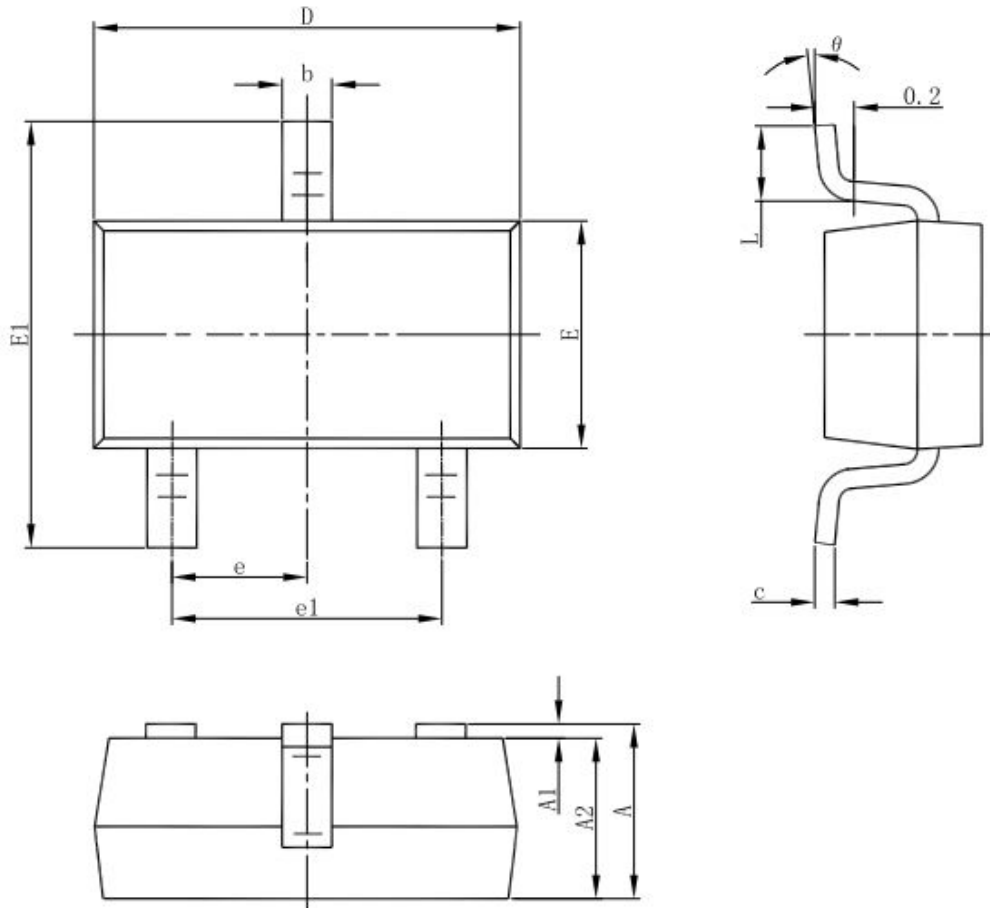
SOT89-3 Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min. | Max. | Min. | Max. |
| A | 1.400 | 1.600 | 0.055 | 0.063 |
| b | 0.320 | 0.520 | 0.013 | 0.020 |
| b1 | 0.400 | 0.580 | 0.016 | 0.023 |
| c | 0.350 | 0.440 | 0.014 | 0.017 |
| D | 4.400 | 4.600 | 0.173 | 0.181 |
| D1 | 1.550 REF. | | 0.061 REF. | |
| 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 | 3.000 TYP. | | 0.118 TYP. | |
| L | 0.900 | 1.200 | 0.035 | 0.047 |

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SOT23 Outline Dimensions



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|---------------------------|-------|----------------------|-------|
| | Min | Max | Min | Max |
| A | 1.050 | 1.250 | 0.041 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.050 | 1.150 | 0.041 | 0.045 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.100 | 0.200 | 0.004 | 0.008 |
| D | 2.820 | 3.020 | 0.111 | 0.119 |
| E | 1.500 | 1.700 | 0.059 | 0.067 |
| E1 | 2.650 | 2.950 | 0.104 | 0.116 |
| e | 0.950(BSC) | | 0.037(BSC) | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.600 | 0.012 | 0.024 |
| θ | 0° | 8° | 0° | 8° |

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