## DESCRIPTION

A6500A series is a group of positive voltage output, low power consumption, low dropout voltage regulator.

A6500A can provide output value in the range of 1.0V~4.5V every 0.1V step. It also can be customized on command.

A6500A includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

A6500A has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2%.

A6500A is available in SOT-25 package.

## ORDERING INFORMATION

| Package Type | Part Number | |
|---|---|---|
| SOT-25 | E5 | A6500AE5R-XXZ |
| | | A6500AE5VR-XXZ |
| Note | XX: Output Voltage<br>25=2.5V, 33=3.3V<br>Z: A, B (Pin Description)<br>R: Tape & Reel<br>V: Halogen free Package | |
| AiT provides all RoHS products<br>Suffix " V " means Halogen free Package | | |

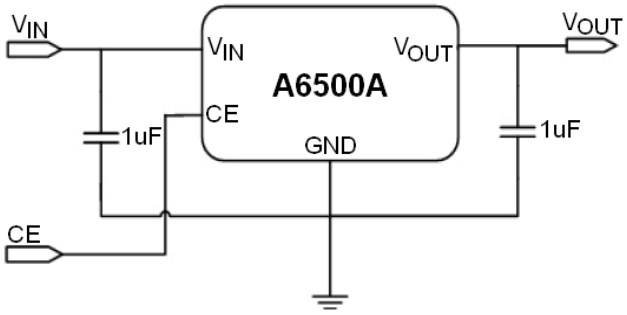
## FEATURES

- Low Power Consumption: 30uA (Typ.)
- Low Output Noise (50uV$_{RMS}$)
- Standby Mode: 0.1uA
- Low Dropout Voltage: 0.08V@ 150mA (Typ.)
- High Ripple Rejection: 72dB@ 1KHz (Typ.)
- Low Temperature Coefficient: ±100ppm/℃
- Excellent Line Regulation: 0.05%/V
- Build-In chip enable and discharge circuit
- Output Voltage Range: 1.0V~4.5V (customized on command every 0.1V Step
- Highly accurate: ±2%
- Output Current Limit
- Available in SOT-25 Package

## APPLICATION

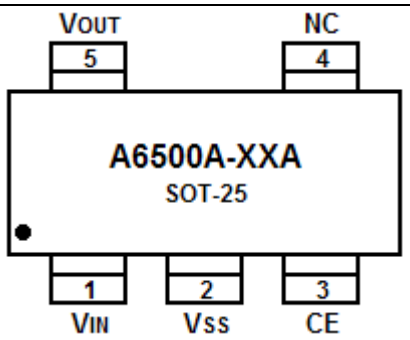
- Power Source for Cellular Phones and various kind of PCSs
- Battery Powered Equipment
- Power Management of MP3, PDA, DSC, Mouse, PS2 Games
- Reference Voltage Source
- Regulation after Switching Power

## TYPICAL APPLICATION CIRCUIT

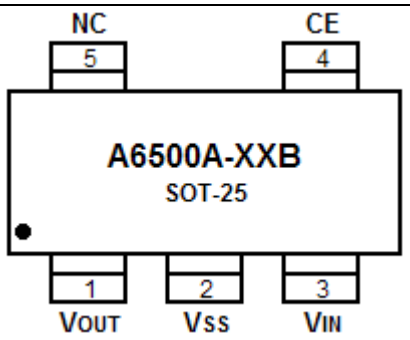



NOTE: Input capacitor ($C_{IN}$ = 1uF) and Output capacitor ($C_{OUT}$ ≥ 1uF) are recommended in all application circuit.

## PIN DESCRIPTION




Top View




Top View

| Pin # | | Symbol | Function |
|---|---|---|---|
| SOT-25-XXA | SOT-25-XXB | | |
| 1 | 3 | $V_{IN}$ | Input voltage supply |
| 2 | 2 | $V_{SS}$ | Ground |
| 3 | 4 | CE | Chip enable |
| 4 | 5 | NC | No connection |
| 5 | 1 | $V_{OUT}$ | Output voltage |

## ABSOLUTE MAXIMUM RATINGS

| | | |
|---|---|---|
| Input Voltage | | 2V ~ 6V |
| $T_J$, Operation Junction Temperature | | 150℃ |
| Output Current | | 600mA |
| Storage Temperature | | -65℃ ~ 150℃ |
| Power Dissipation | SOT-25 | 360mW |
| IR Reflow Lead Temperature and Time | | 260℃, 10s |
| ESD Rating, Human Body Mode | | 3000V |

Stresses above may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated in the Electrical Characteristics are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## RECOMMENDED OPERATION RANGE

| Parameters | Value |
|---|---|
| Input Voltage | 2V ~ 6V |
| Operation Ambient Temperature | -40℃ ~ 85℃ |

## THERMAL RESISTANCE

| Package | $\theta_{JA}$ | $\theta_{JC}$ |
|---|---|---|
| SOT-25 | 250°C/W | 130°C/W |

NOTE: Thermal Resistance is specified with approximately 1 square of 1 oz copper.

## ELECTRICAL CHARACTERISTICS

Test Condition: $C_{IN}$ = 1uF, $C_{OUT}$ = 1uF, $T_A$ = 25°C, unless otherwise specified.

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Voltage | $V_{IN}$ | | 2 | - | 6 | V |
| Output Voltage | $V_{OUT}$ | $V_{IN}$ = $V_{OUTset}$ + 1V<br>1mA ≦ $I_{OUT}$ ≦ 30mA | $V_{OUTset}$ x 0.98 | $V_{OUTset}$ | $V_{OUTset}$ x 1.02 | V |
| Maximum Output Current | $I_{OUTMAX}$ | | 600 | - | - | mA |
| Dropout Voltage<br>$V_{OUT}$ ≧ 2.8V | $V_{DROP}$ | $I_{OUT}$ = 50mA | - | 25 | 40 | mV |
| | | $I_{OUT}$ = 100mA | - | 50 | 75 | |
| | | $I_{OUT}$ = 150mA | - | 75 | 115 | |
| | | $I_{OUT}$ = 400mA | - | 220 | 280 | |
| Line Regulation | $\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$ | $I_{OUT}$ = 40mA<br>2.8V ≦ $V_{IN}$ ≦ 6V | - | 0.05 | 0.1 | %/V |
| Load Regulation | $\Delta V_{OUT}/\Delta I_{OUT}$ | $V_{IN}$ = $V_{OUTset}$ + 1V<br>1mA ≦ $I_{OUT}$ ≦ 500mA | - | 100 | 150 | mV |
| Supply Current when Operation | $I_{SS}$ | $V_{IN}$ = $V_{OUTset}$ + 1V | - | 30 | 50 | uA |
| Supply Current when Shut Down | Ishutdown | $V_{IN}$ = $V_{OUTset}$ + 1V<br>$V_{CE}$ = 0V | - | 0.1 | 1 | uA |
| Output Voltage Temperature Coefficient | $\frac{\Delta V_{OUT}}{\Delta T \times V_{OUT}}$ | $V_{IN}$ = Set $V_{OUT}$ + 1V<br>$I_{OUT}$ = 30mA | - | ±50 | - | ppm/°C |
| Power Supply Ripple Rejection Rate | PSRR | F = 1KHz<br>Ripple = 0.5Vpp<br>$V_{IN}$ = $V_{OUTset}$ + 1V | - | 72 | - | dB |
| Output Short Current Limit | $I_{LIMIT}$ | $V_{OUT}$ = 0V | - | 500 | - | mA |
| CE Input Voltage "H" | $V_{CEH}$ | | 1.4 | - | - | V |
| CE Input Voltage "L" | $V_{CEL}$ | | - | - | 0.25 | V |
| Output Noise | $e_n$ | Bandwith=10Hz~100KHz | - | 50 | - | $uV_{RMS}$ |

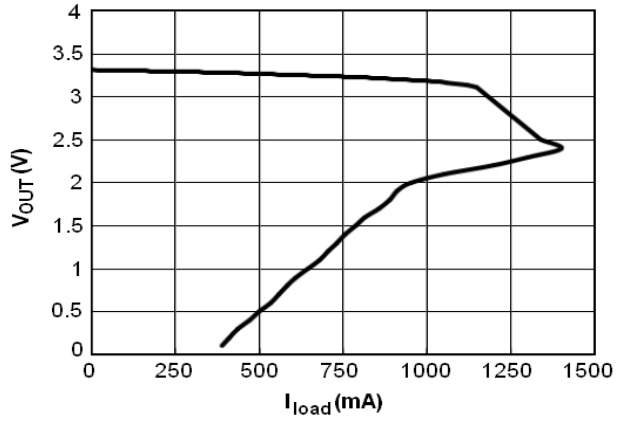
NOTE: $V_{OUT}$set is the nominal output voltage that A6500A is set to, for example, 3.3V.

$V_{DROP}$ = $V_{IN}$ - ($V_{OUT}$ * 0.98), in which $V_{OUT}$ is the output voltage when $V_{IN}$ = $V_{OUT}$set + 1.0V at different output current, and $V_{IN}$ is the input voltage at which the output voltage becomes 98% of $V_{OUT}$ after gradually decreasing the input voltage.

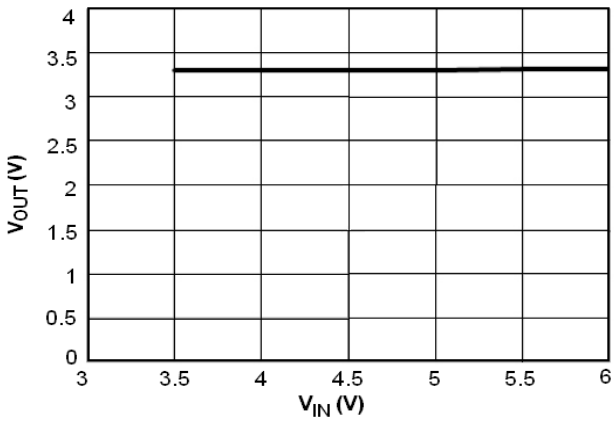
## TYPICAL PERFORMANCE CHARACTERISTICS

Test Condition: $C_{IN}$=1uF, $C_{OUT}$=1uF, $T_A$=25°C, CE pin is tied to $V_{IN}$, $V_{OUTset}$=3.3V, unless otherwise specified.

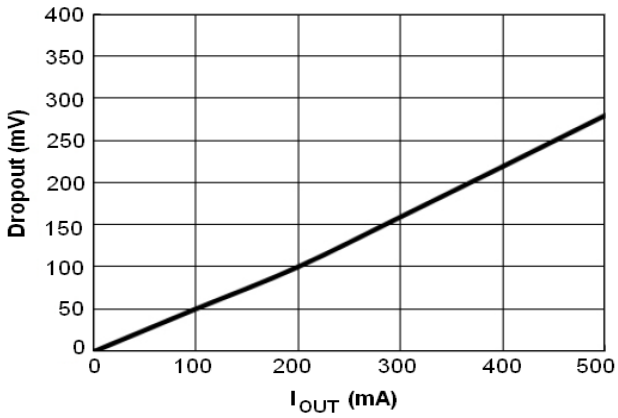
1. Output Voltage vs. Output Current



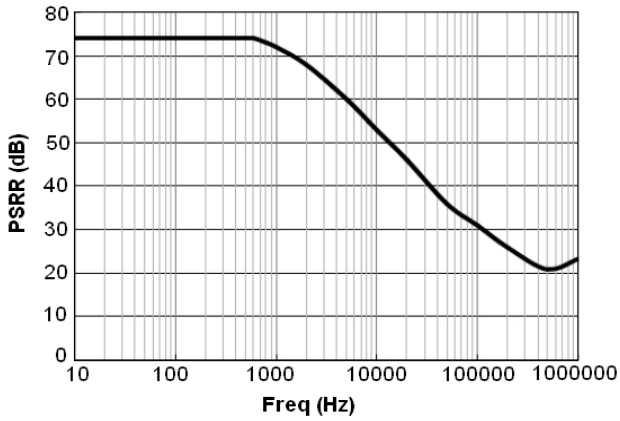

2. Output Voltage vs. Input Voltage



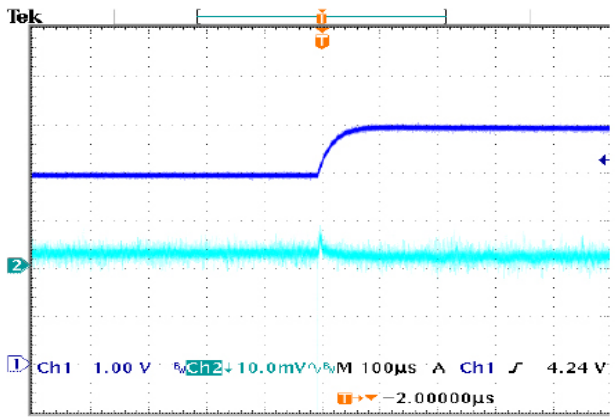

3. Dropout Voltage vs. Output Current

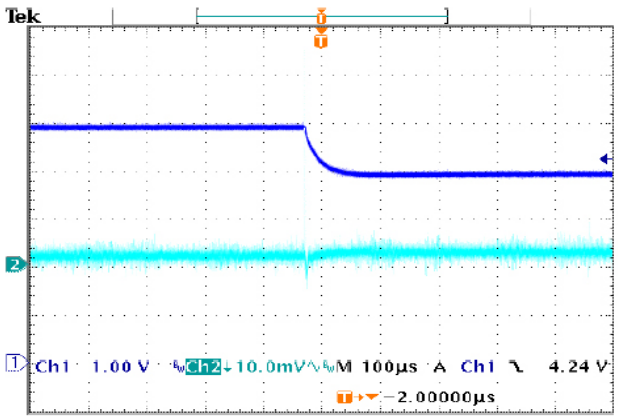



4. Ripple Rejection vs. Frequency

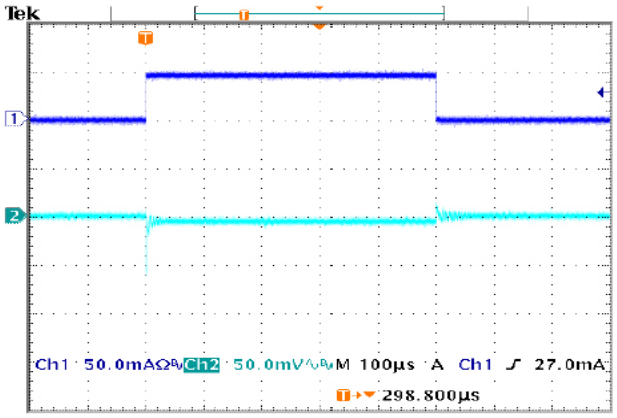


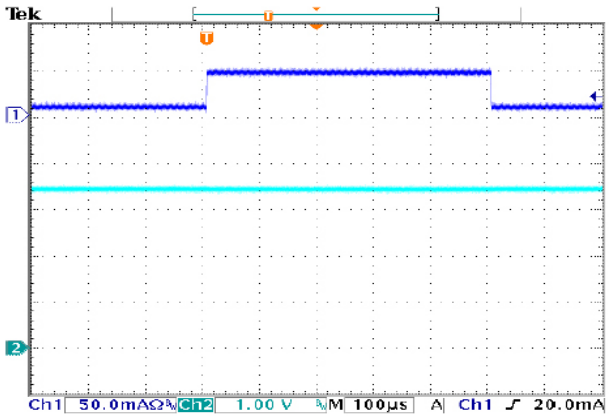

5. Line Transient Response (Ch1: $V_{IN}$ 4↔5V; Ch2: $V_{OUT}$)



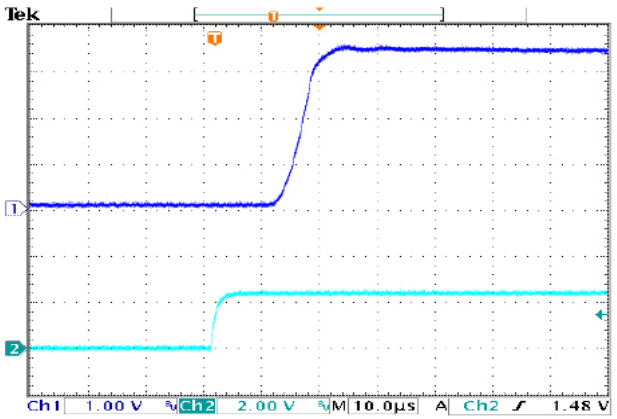



6. Load Transient Response (Ch1: $I_{OUT}$ 1↔50mA; Ch2: $V_{OUT}$)

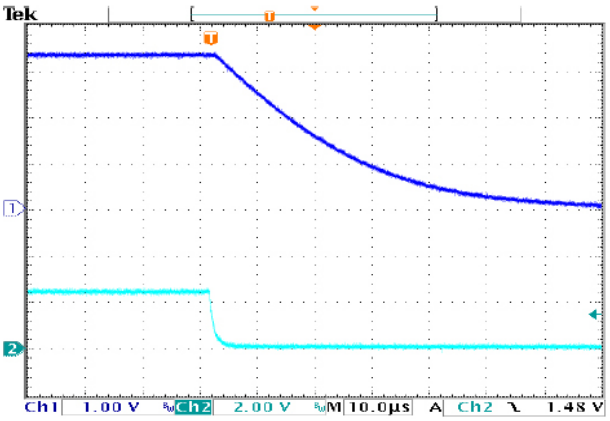


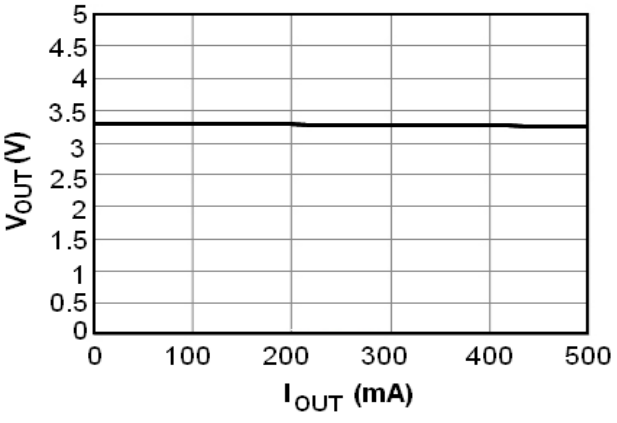

7. Startup by CE (Ch1: $V_{OUT}$; Ch2: CE)



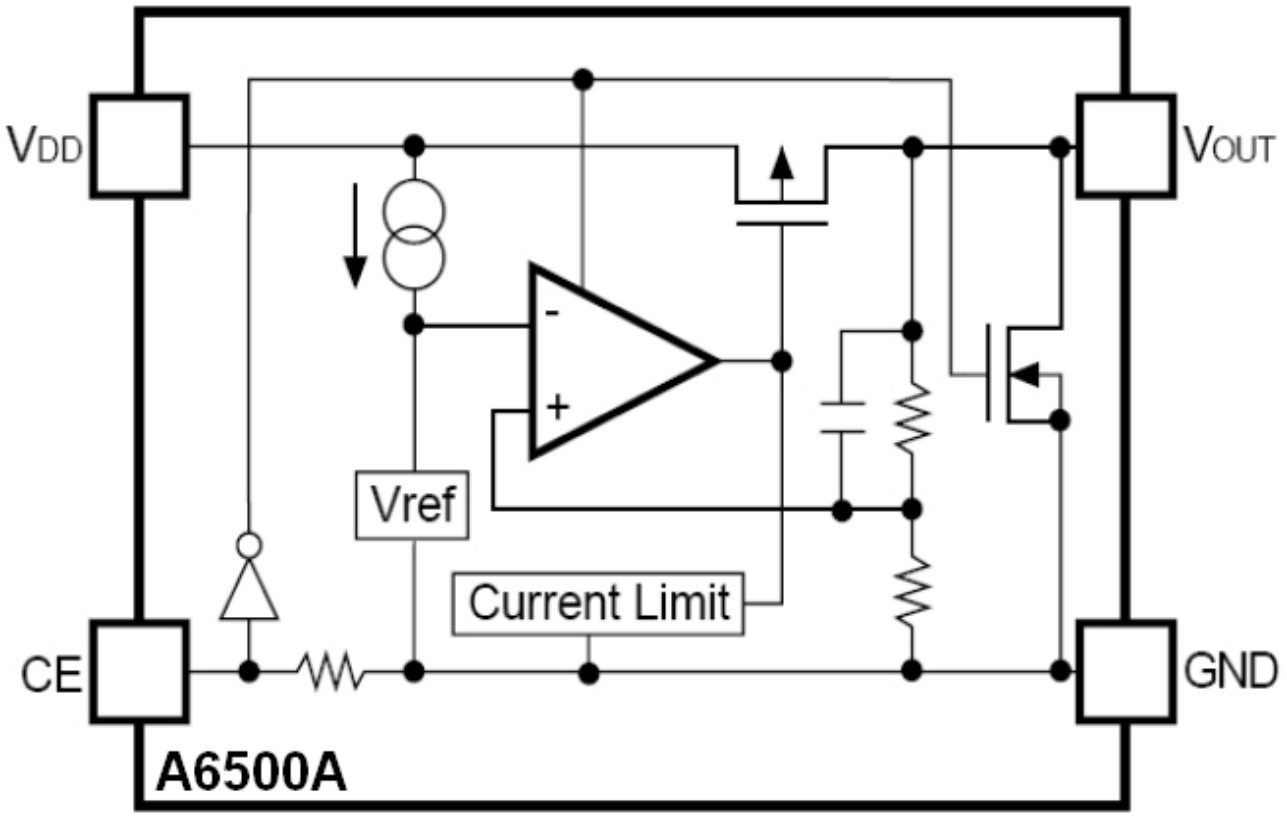

8. Shutdown by CE (Ch1: $V_{OUT}$; Ch2: CE)




9. Load Regulation ($V_{IN}$ = 4.5V, $V_{OUT}$ = 3.3V)



## BLOCK DIAGRAM



## DETAILED INFORMATION

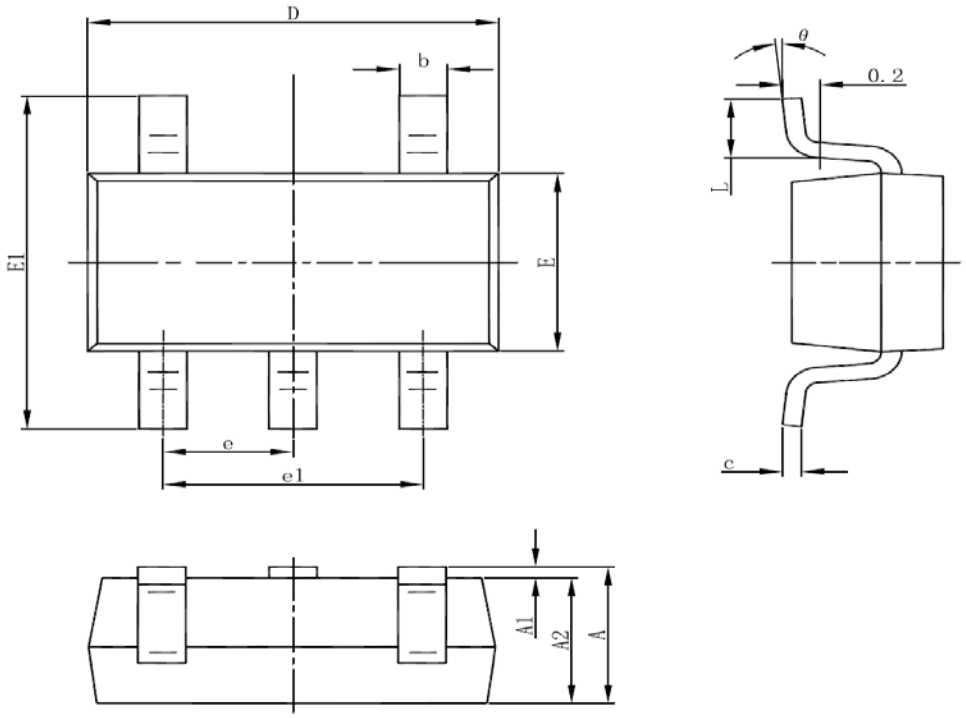
A6500A includes high accuracy voltage reference, error amplifier, current limit circuit and output driver module with discharge capability.

A6500A has excellent load and line transient response and good temperature characteristics, which can assure the stability of chip and power system. And it uses trimming technique to guarantee output voltage accuracy within ±2%.

Low ESR ceramic capacitor can be used for A6500A for both input and output ends. Both 1uF can keep A6500A work stable. However, a larger output capacitor, such as 3.3uF/4.7uF is always recommended to compensate dynamic load current change.

## PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)




| Symbol | Min | Max |
|---|---|---|
| A | 1.000 | 1.300 |
| A1 | 0.000 | 0.100 |
| A2 | 1.000 | 1.200 |
| b | 0.300 | 0.500 |
| c | 0.100 | 0.250 |
| D | 2.700 | 3.100 |
| E | 1.500 | 1.800 |
| E1 | 2.500 | 3.100 |
| e | 0.950(BSC) | |
| e1 | 1.700 | 2.100 |
| L | 0.200 | - |
| θ | 0° | 8° |

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