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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

# STT3P2UH7

## P-channel 20 V, 0.087 Ω typ., 3 A STripFET™ H7 Power MOSFET in a SOT23-6L package

Datasheet - production data

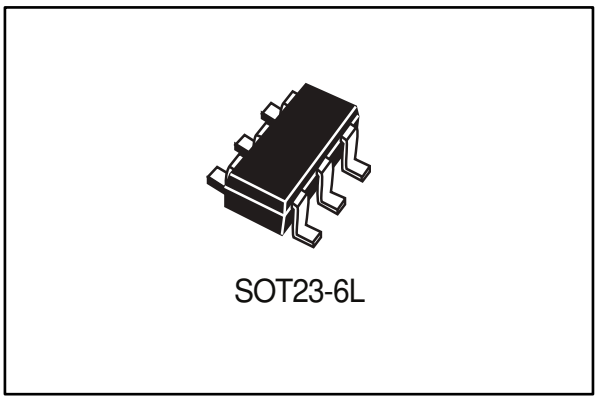
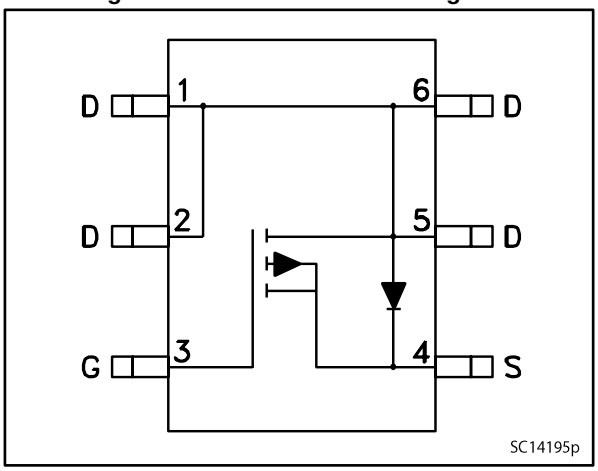



**Figure 1: Internal schematic diagram**




## Features

| Order code | $V_{DS}$ | $R_{DS(on)}$ max | $I_D$ |
|---|---|---|---|
| STT3P2UH7 | 20 V | 0.1 Ω @ 4.5 | 3 A |

- Very low on-resistance
- Very low capacitance and gate charge
- High avalanche ruggedness

## Applications

- Switching applications

## Description

This P-channel Power MOSFET utilizes the STripFET H7 technology with a trench gate structure combined with extremely low on-resistance. The device also offers ultra-low capacitances for higher switching frequency operations.

**Table 1: Device summary**

| Order code | Marking | Package | Packaging |
|---|---|---|---|
| STT3P2UH7 | 3L2U | SOT23-6L | Tape and reel |

For the P-channel Power MOSFET, current and voltage polarities are reversed.

# Contents

# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source voltage | 20 | V |
| $V_{GS}$ | Gate-source voltage | ± 8 | V |
| $I_D$ | Drain current (continuous) at $T_{pcb}$ = 25 °C | 3 | A |
| $I_D$ | Drain current (continuous) at $T_{pcb}$ = 100 °C | 1.9 | A |
| $I_{DM}$(1) | Drain current (pulsed) | 12 | A |
| $P_{TOT}$ | Total dissipation at $T_{pcb}$ = 25 °C | 1.6 | W |
| $T_{stg}$ | Storage temperature range | - 55 to 150 | °C |
| $T_j$ | Operating junction temperature range | | |

**Notes:**

(1)Pulse width limited by safe operating area

**Table 3: Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thj\text{-}pcb}$(1) | Thermal resistance junction-pcb max, single operation | 78 | °C/W |

**Notes:**

(1)When mounted on 1inch² FR-4 board, 2 oz Cu

For the P-channel Power MOSFET, current and voltage polarities are reversed.

# 2 Electrical characteristics

($T_C$ = 25 °C unless otherwise specified)

**Table 4: On /off states**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $I_D$ = 250 µA, $V_{GS}$ = 0 | 20 | | | V |
| $I_{DSS}$ | Zero gate voltage drain current | $V_{DS}$ = 20 V, $V_{GS}$ = 0 | | | 1 | µA |
| $I_{GSS}$ | Gate-body leakage current | $V_{GS}$ = ± 8 V, $V_{DS}$ = 0 | | | 10 | nA |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 0.4 | | 1 | V |
| $R_{DS(on)}$ | Static drain-source on-resistance | $V_{GS}$ = 4.5 V, $I_D$ = 1.5 A | | 0.087 | 0.1 | Ω |
| | | $V_{GS}$ = 2.5 V, $I_D$ = 1.5 A | | 0.11 | 0.13 | Ω |
| | | $V_{GS}$ = 1.8 V, $I_D$ = 1.5 A | | 0.145 | 0.18 | Ω |

**Table 5: Dynamic**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $C_{iss}$ | Input capacitance | $V_{DS}$ = 10 V, f = 1 MHz, $V_{GS}$ = 0 | - | 510 | - | pF |
| $C_{oss}$ | Output capacitance | | - | 66 | - | pF |
| $C_{rss}$ | Reverse transfer capacitance | | - | 44 | - | pF |
| $Q_g$ | Total gate charge | $V_{DD}$ = 10 V, $I_D$ = 3 A, $V_{GS}$ = 4.5 V (see *Figure 14: "Gate charge test circuit"*) | - | 4.8 | - | nC |
| $Q_{gs}$ | Gate-source charge | | - | 0.7 | - | nC |
| $Q_{gd}$ | Gate-drain charge | | - | 0.8 | - | nC |

**Table 6: Switching times**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on delay time | $V_{DD}$ = 10 V, $I_D$ = 1.5 A, $R_G$ = 4.7 Ω, $V_{GS}$ = 4.5 V (see *Figure 15: "Test circuit for inductive load switching and diode recovery times"*) | - | 9 | - | ns |
| $t_r$ | Rise time | | - | 21 | - | ns |
| $t_{d(off)}$ | Turn-off delay time | | - | 40 | - | ns |
| $t_f$ | Fall time | | - | 19 | - | ns |

For the P-channel Power MOSFET, current and voltage polarities are reversed.

**Table 7: Source drain diode**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{SD}$(1) | Forward on voltage | $I_{SD}$ = 1 A, $V_{GS}$ = 0 | - | - | 1 | V |
| $t_{rr}$ | Reverse recovery time | $V_{DD}$ = 10 V<br>di/dt = 100 A/µs, $I_{SD}$ = 1 A<br>$T_j$ = 150 °C (see *Figure 15: "Test circuit for inductive load switching and diode recovery times"*) | - | 12.5 | | ns |
| $Q_{rr}$ | Reverse recovery charge | | - | 5 | | nC |
| $I_{RRM}$ | Reverse recovery current | | - | 0.8 | | A |

**Notes:**

(1)Pulsed: pulse duration = 300 µs, duty cycle 1.5%.

For the P-channel Power MOSFET, current and voltage polarities are reversed.

## 2.1 Electrical characteristics (curves)

For the P-channel Power MOSFET, current and voltage polarities are reversed.

**Figure 2: Safe operating area**

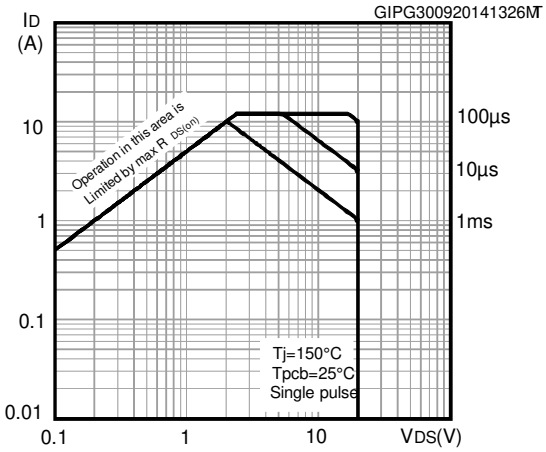



**Figure 3: Thermal impedance**

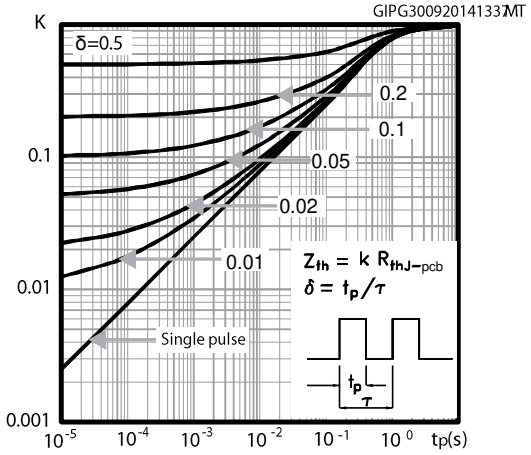



**Figure 4: Output characteristics**

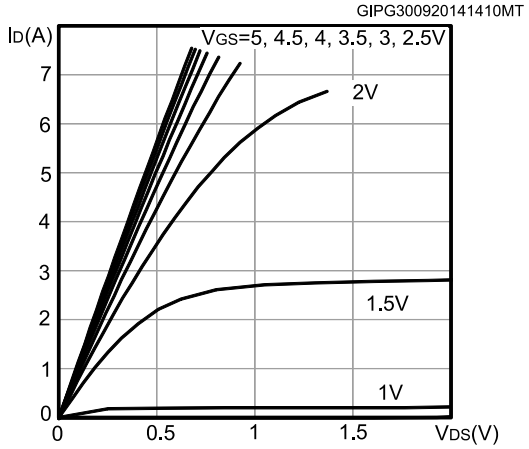



**Figure 5: Transfer characteristics**

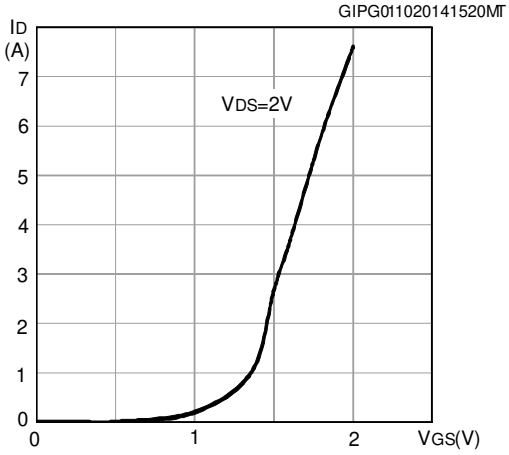


**Figure 6: Gate charge vs gate-source voltage**

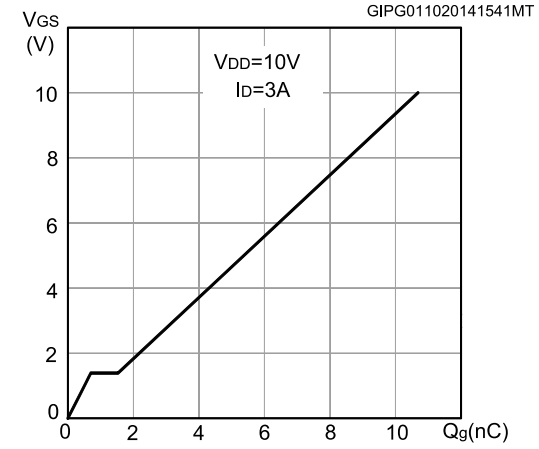



**Figure 7: Static drain-source on-resistance**

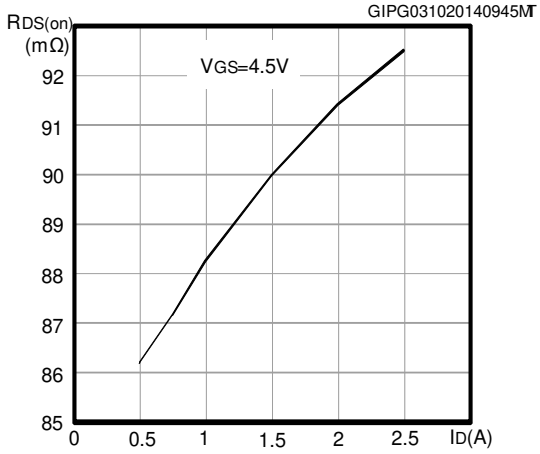



**Figure 8: Capacitance variations**

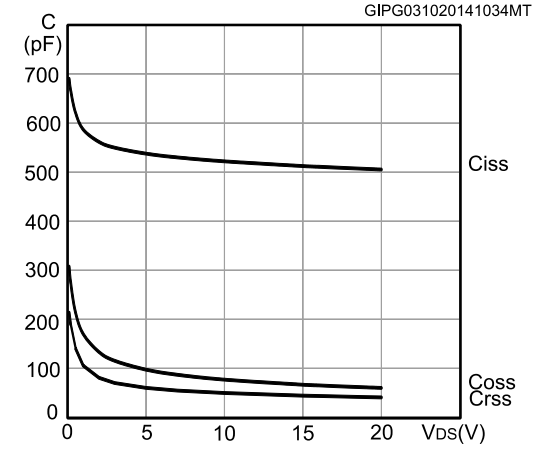



**Figure 9: Normalized gate threshold voltage vs temperature**

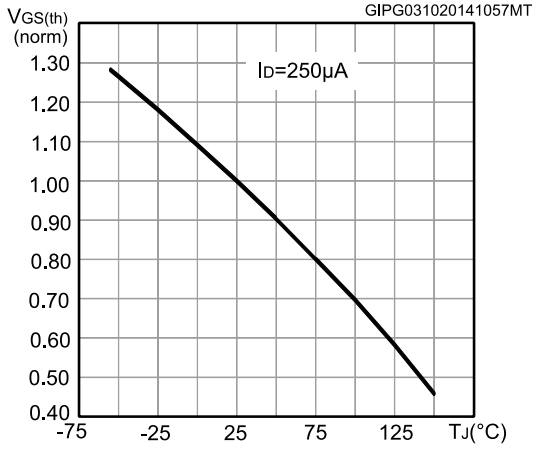



**Figure 10: Normalized on-resistance vs temperature**

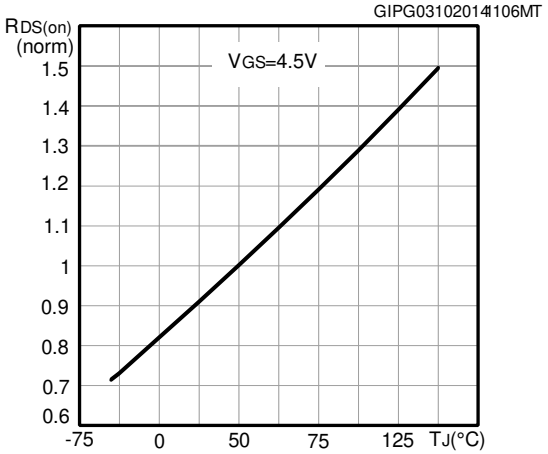



**Figure 11: Normalized V(BR)DSS vs temperature**

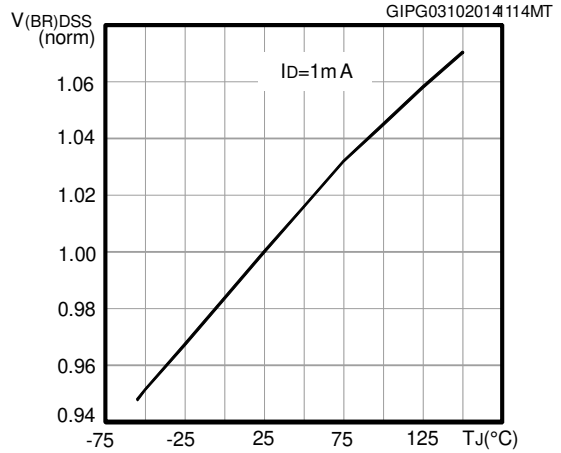
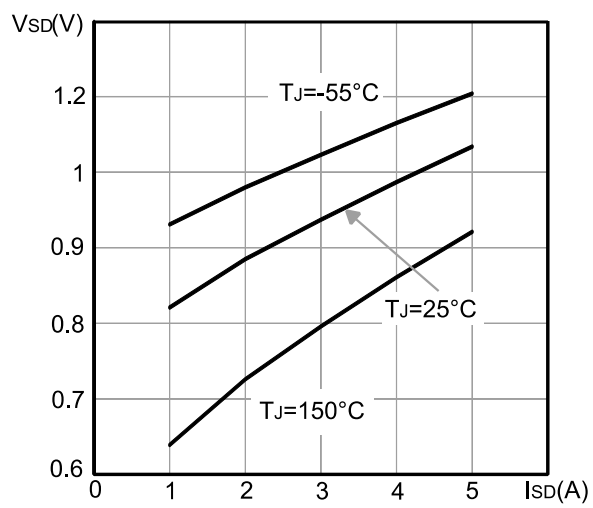


**Figure 12: Source-drain diode forward characteristics**



# 3 Test circuits

**Figure 13: Switching times test circuit for resistive load**

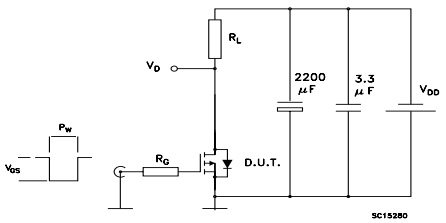



**Figure 14: Gate charge test circuit**

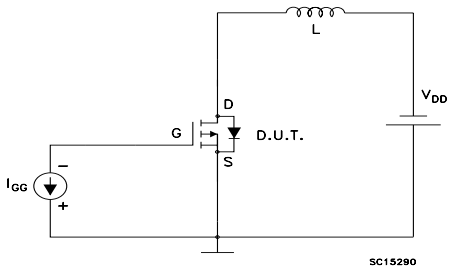
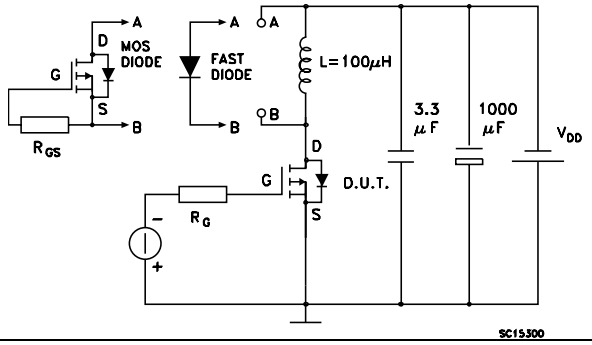



**Figure 15: Test circuit for inductive load switching and diode recovery times**



# 4 Package mechanical data

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## 4.1 SOT23-6L package mechanical data

**Figure 16: SOT23-6L package drawing**

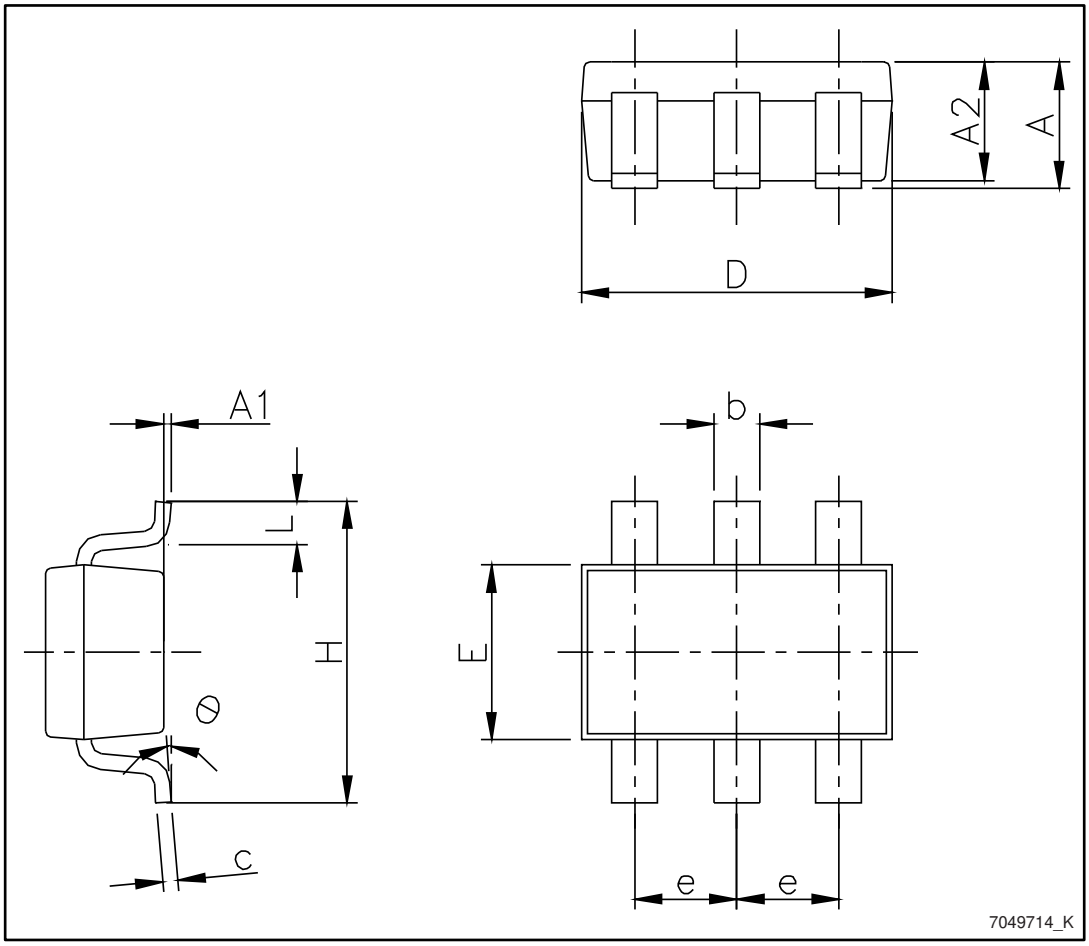
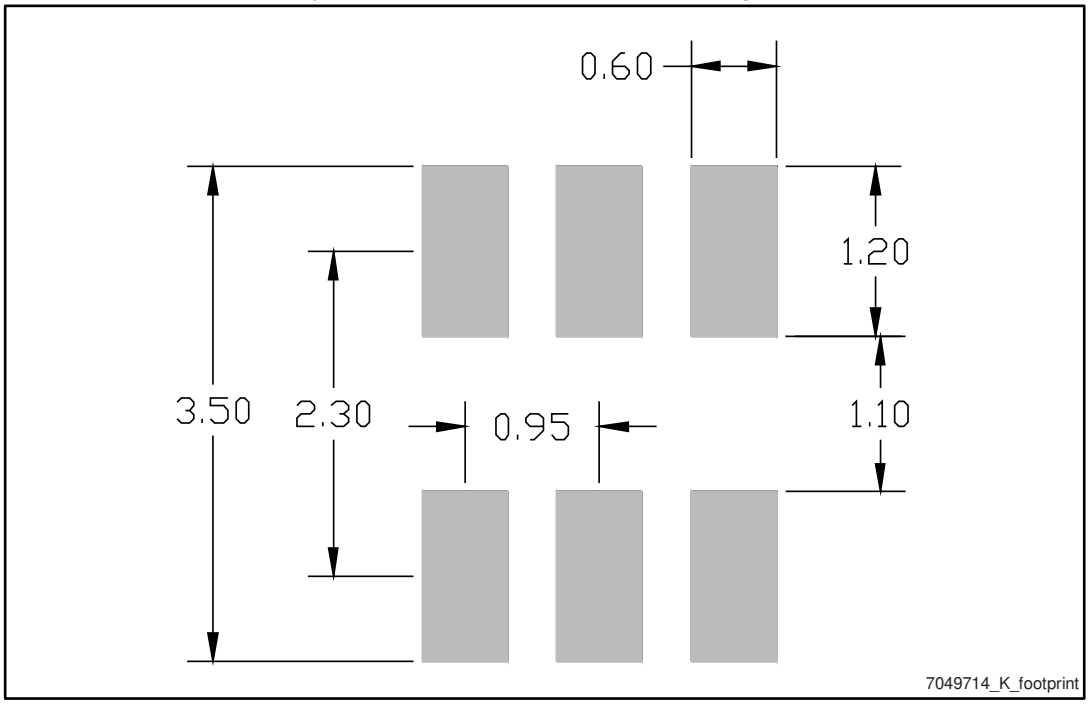


**Table 8: SOT23-6L package mechanical data**

| Dim. | mm | | |
|---|---|---|---|
| | Min. | Typ. | Max. |
| A | | | 1.25 |
| A1 | 0.00 | | 0.15 |
| A2 | 1.00 | 1.10 | 1.20 |
| b | 0.36 | | 0.50 |
| C | 0.14 | | 0.20 |
| D | 2.826 | 2.926 | 3.026 |
| E | 1.526 | 1.626 | 1.726 |
| e | 0.90 | 0.95 | 1.00 |
| H | 2.60 | 2.80 | 3.00 |
| L | 0.35 | 0.45 | 0.60 |
| θ | 0° | | 8° |

**Figure 17: SOT23-6L recommended footprint**



# 5 Revision history

Table 9: Document revision history

| Date | Revision | Changes |
|---|---|---|
| 18-Jul-2013 | 1 | First release. |
| 03-Oct-2014 | 2 | Document status promoted from target data to production data.<br>Updated title, features and description in cover page. Updated *Section 2: "Electrical characteristics"* and *Section 4.1: "SOT23-6L package mechanical data"*.<br>Minor text changes. |
| 12-Sep-2016 | 3 | Updated *Table 2: "Absolute maximum ratings"*.<br>Minor text changes. |

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