



# STR2N2VH5, STT5N2VH5

N-channel 20 V, 0.025  $\Omega$  typ., 5 A STripFET™ V Power MOSFET  
in SOT-23 and SOT23-6L packages

Datasheet – preliminary data

## Features

Order codes	V <sub>DS</sub>	R <sub>DS(on)</sub> max	I <sub>D</sub>	P <sub>TOT</sub>
STR2N2VH5	20 V	0.03 $\Omega$ (V <sub>GS</sub> =4.5 V)	2.3 A	0.35 W
STT5N2VH5		0.04 $\Omega$ (V <sub>GS</sub> =2.5 V)	5 A	1.6 W

- Very low profile package
- Conduction losses reduced
- Switching losses reduced
- 2.5 V gate drive
- Very low threshold device

## Applications

- Switching applications

## Description

These devices are N-channel Power MOSFETs developed using STMicroelectronics' STripFET™V technology. The device has been optimized to achieve very low on-state resistance, contributing to a FOM that is among the best in its class.

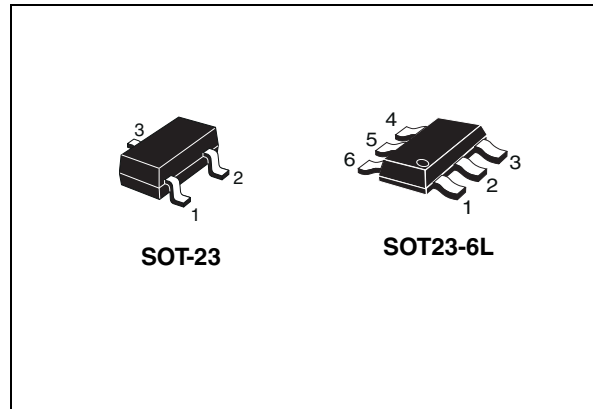


Figure 1. Internal schematic diagram

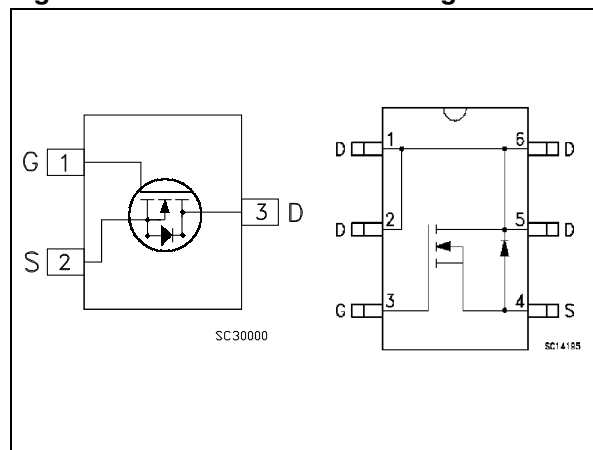


Table 1. Device summary

Order codes	Marking	Package	Packaging
STR2N2VH5	STD1	SOT-23	Tape and reel
STT5N2VH5		SOT23-6L	

# Contents

1	Electrical ratings .....	3
2	Electrical characteristics .....	4
3	Test circuits .....	6
4	Package mechanical data .....	7
5	Revision history .....	13

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value		Unit
		SOT-23	SOT23-6L	
$V_{DS}$	Drain-source voltage	20		V
$V_{GS}$	Gate-source voltage	$\pm 8$		V
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	2.3	5	A
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	1.4	3.1	A
$I_{DM}^{(1)(2)}$	Drain current (pulsed)	9.2	20	A
$P_{TOT}^{(1)}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	0.35	1.6	W
$T_{stg}$	Storage temperature	- 55 to 150		$^\circ\text{C}$
$T_j$	Max. operating junction temperature			$^\circ\text{C}$

1. This value is rated according to  $R_{thj-pcb}$
2. Pulse width is limited by safe operating area

**Table 3. Thermal data**

Symbol	Parameter	Value		Unit
		SOT-23	SOT23-6L	
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	357	78	$^\circ\text{C}/\text{W}$

1. When mounted on 1 inch<sup>2</sup> FR-4, 2 Oz Cu, t < 10 sec.

## 2 Electrical characteristics

( $T_C = 25\text{ °C}$  unless otherwise specified)

**Table 4. On /off states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 1\text{ mA}, V_{GS} = 0$	20			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = 20\text{ V}$ $V_{DS} = 20\text{ V}, T_C = 125\text{ °C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.7			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 4.5\text{ V}, I_D = 2\text{ A}$ $V_{GS} = 2.5\text{ V}, I_D = 2\text{ A}$		0.025 0.031	0.03 0.04	$\Omega$ $\Omega$

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 16\text{ V}, f = 1\text{ MHz},$ $V_{GS} = 0$	-	550	-	pF
$C_{oss}$	Output capacitance			110		pF
$C_{rss}$	Reverse transfer capacitance			16		pF
$Q_g$	Total gate charge	$V_{DD} = 16\text{ V}, I_D = 2\text{ A},$	-	6	-	nC
$Q_{gs}$	Gate-source charge	$V_{GS} = 4.5\text{ V}$		TBD		nC
$Q_{gd}$	Gate-drain charge	(see <a href="#">Figure 3</a> )		TBD		nC

**Table 6. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Voltage delay time	$V_{DD} = 16\text{ V}, I_D = 2\text{ A},$ $R_G = 4.7\text{ }\Omega, V_{GS} = 4.5\text{ V}$ (see <a href="#">Figure 4</a> and <a href="#">Figure 7</a> )	-	TDB	-	ns
$t_r(v)$	Voltage rise time			TBD		ns
$t_{d(off)}$	Current fall time			TBD		ns
$t_f$	Crossing time			TBD		ns

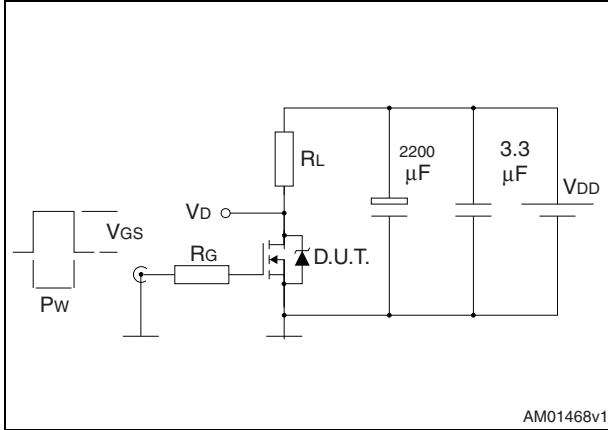
**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		2.3	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		9.2	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 2 \text{ A}$ , $V_{GS} = 0$	-		1.1	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 2 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$	-	TBD		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 16 \text{ V}$ , $T_j = 150 \text{ }^\circ\text{C}$	-	TBD		$\mu\text{C}$
$I_{RRM}$	Reverse recovery current	(see <a href="#">Figure 7</a> )	-	TBD		A

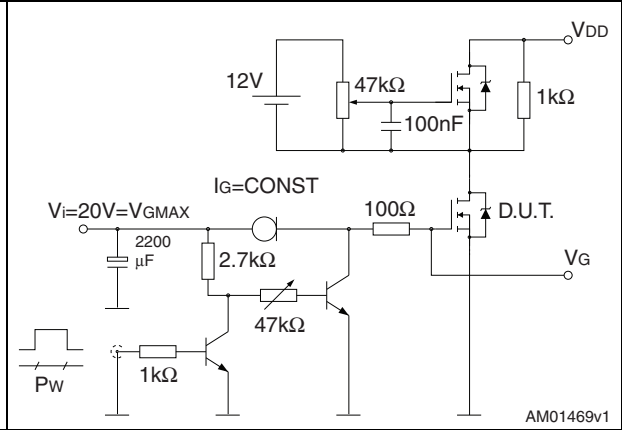
1. Pulse width limited by safe operating area.
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

### 3 Test circuits

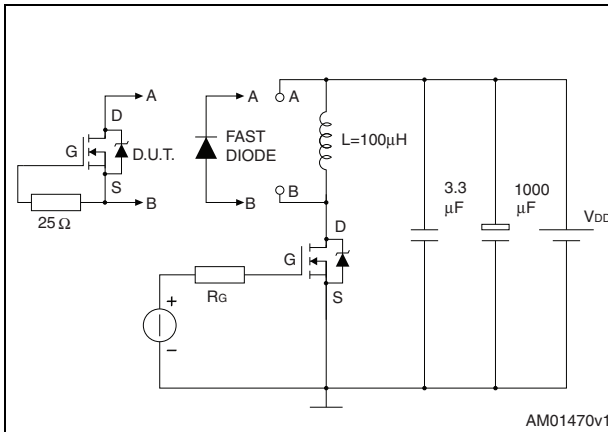
**Figure 2. Switching times test circuit for resistive load**



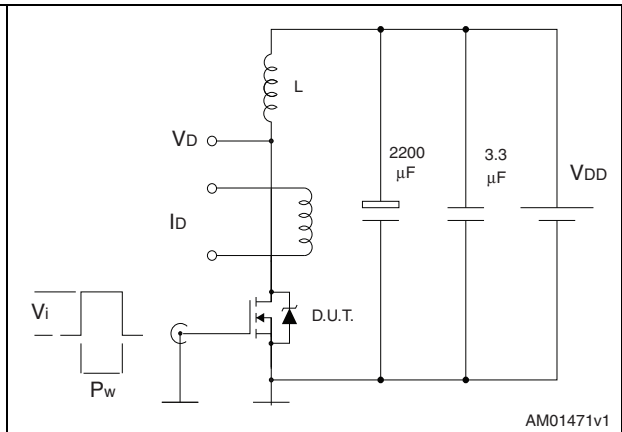
**Figure 3. Gate charge test circuit**



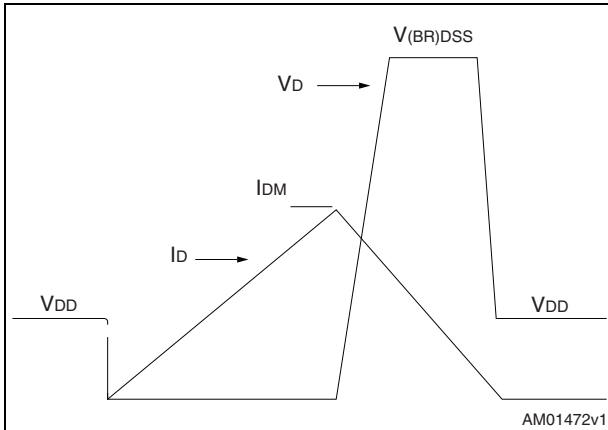
**Figure 4. Test circuit for inductive load switching and diode recovery times**



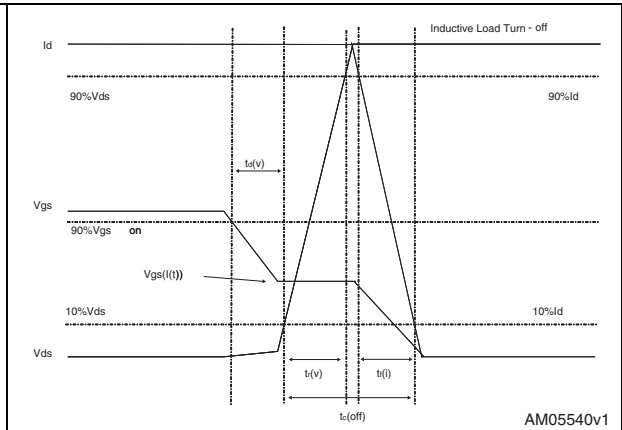
**Figure 5. Unclamped inductive load test circuit**



**Figure 6. Unclamped inductive waveform**



**Figure 7. Switching time waveform**



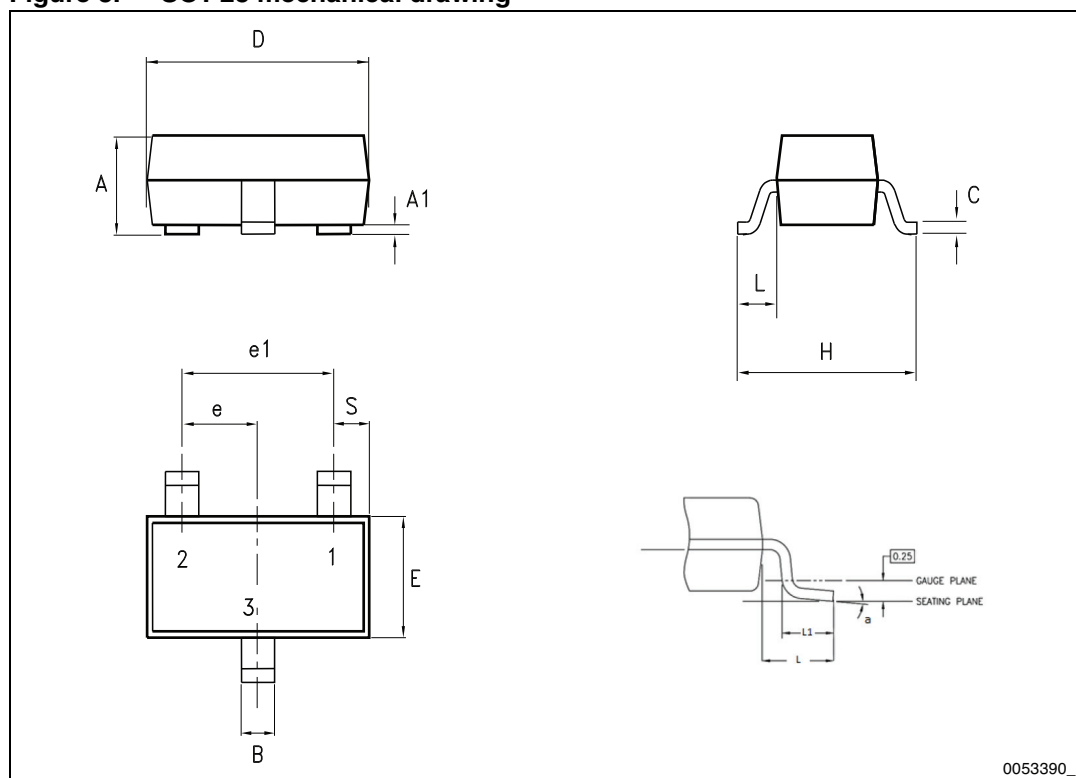
## 4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

Table 8. SOT-23 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.89		1.40
A1	0		0.10
B	0.30		0.51
C	0.085		0.18
D	2.75		3.04
e	0.85		1.05
e1	1.70		2.10
E	1.20		1.75
H	2.10		3.00
L		0.60	
S	0.35		0.65
L1	0.25		0.55
a	0°		8°

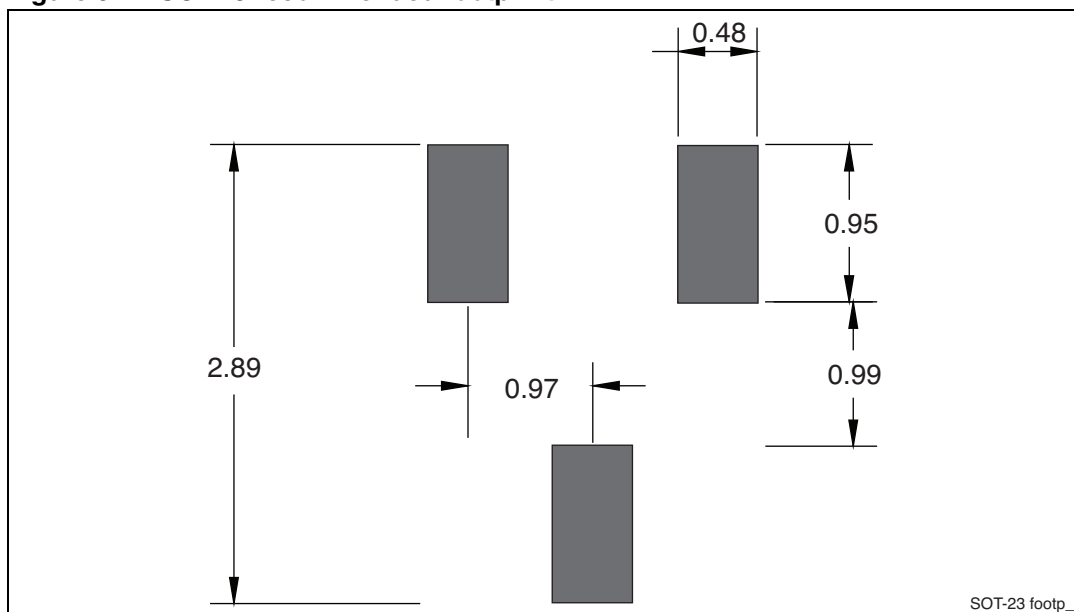
Figure 8. SOT-23 mechanical drawing



0053390\_1



Figure 9. SOT-23 recommended footprint (a)



a. Dimensions are in mm.

Table 9. SOT23-6L package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	0.90		1.45
A1	0.00		0.15
A2	0.90		1.30
b	0.30		0.50
C	0.09		0.20
D	2.80		3.05
E	1.50		1.75
e		0.95	
H	2.60		3.00
L	0.30		0.60
$\phi$	0°		10°

Figure 10. SOT23-6L package drawing

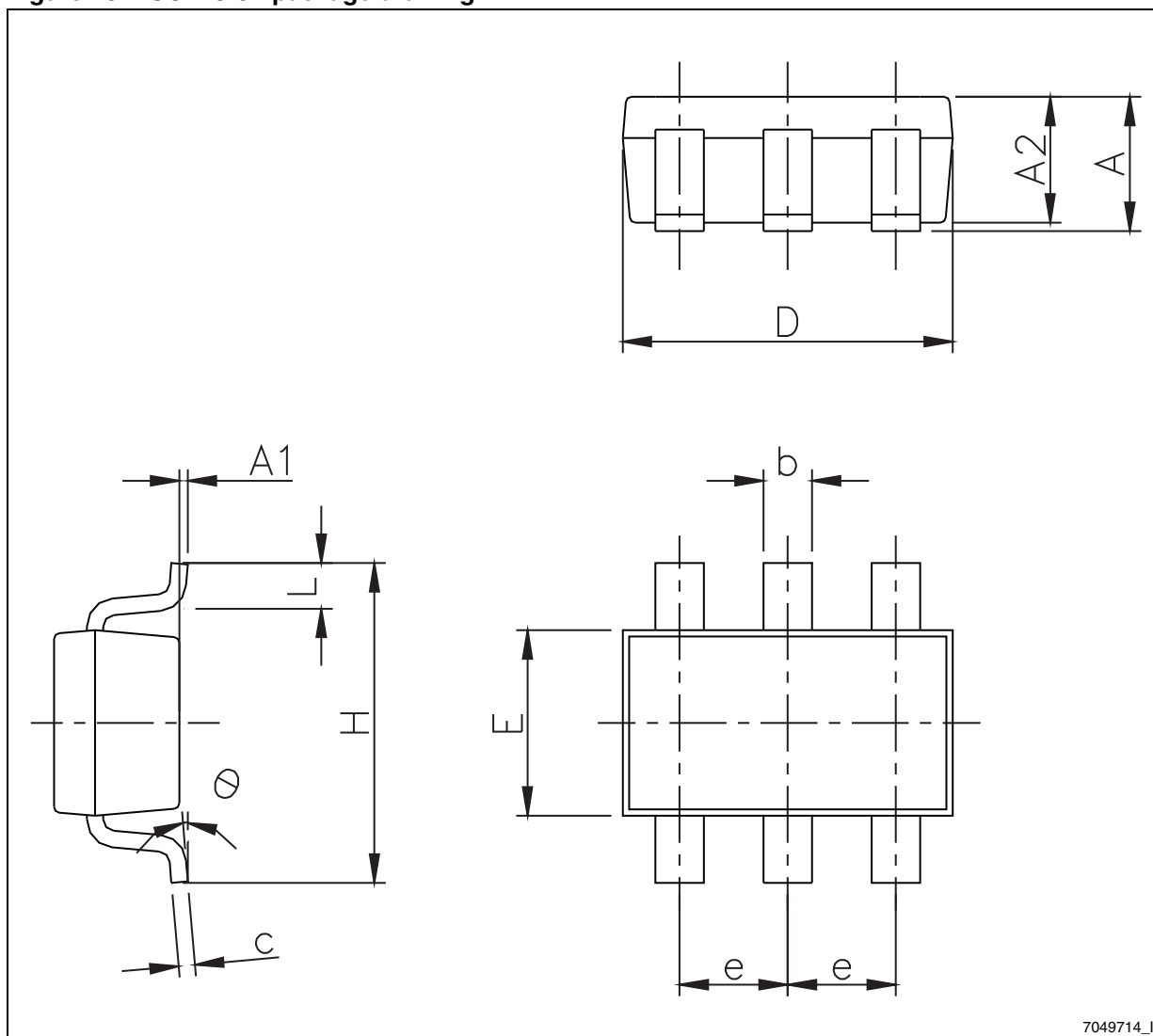
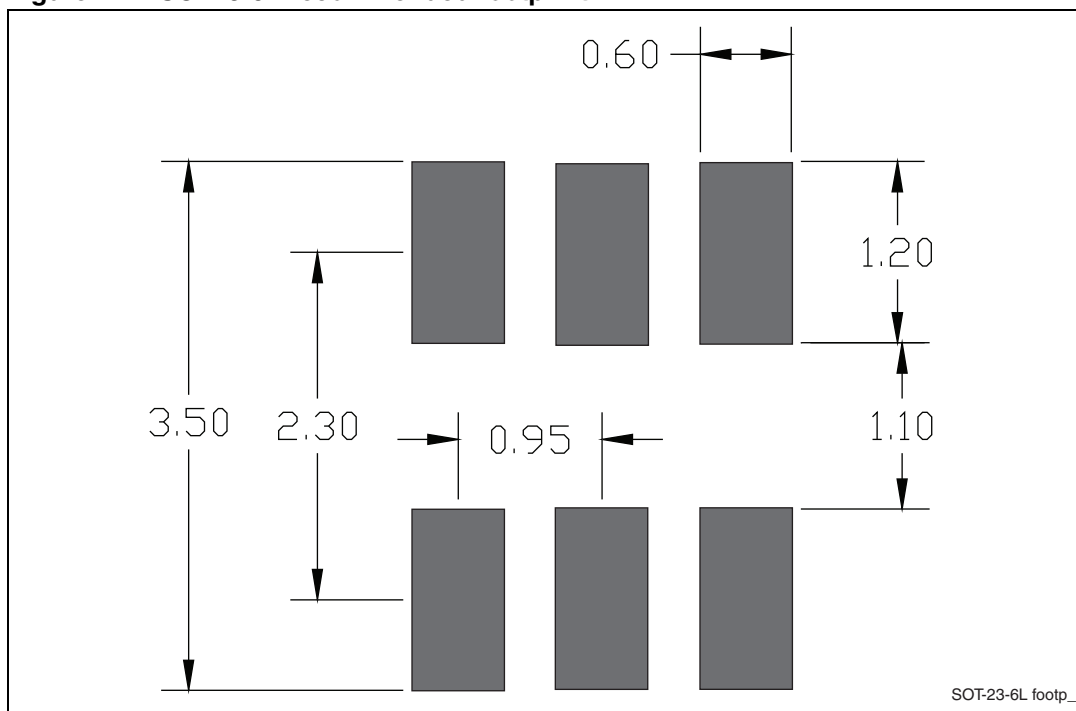


Figure 11. SOT23-6L recommended footprint<sup>(b)</sup>



b. All dimensions are in millimeters

## 5 Revision history

Table 10. Document revision history

Date	Revision	Changes
19-Oct-2012	1	First release.
14-Jan-2013	2	Modified: $R_{DS(on)}$ values

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