



STT6N3LLH6

N-channel 30 V, 0.021 Ω typ., 6 A STripFET™ VI DeepGATE™
Power MOSFET in a SOT23-6L package

Datasheet — preliminary data

Features

Type	V _{DSS}	R _{DS(on)} max	I _D	P _{TOT}
STT6N3LLH6	30 V	0.025 Ω (V _{GS} = 10 V)	6 A	1.6 W
		0.04 Ω (V _{GS} = 4.5 V)		

- R_{DS(on)} * Q_g industry benchmark
- Extremely low on-resistance R_{DS(on)}
- High avalanche ruggedness
- Low gate drive power losses

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using the 6th generation of STripFET™ DeepGATE™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest R_{DS(on)} in all packages.

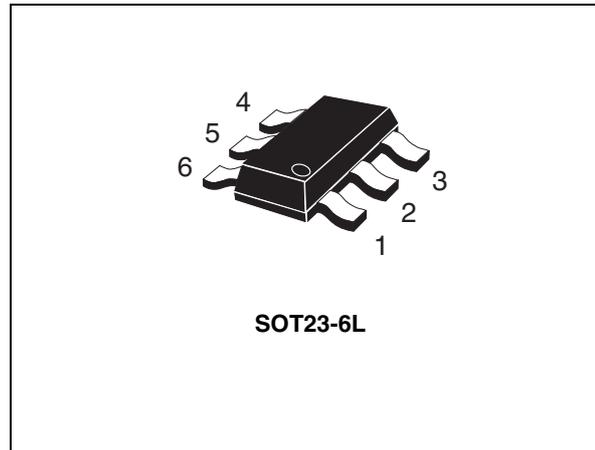


Figure 1. Internal schematic diagram

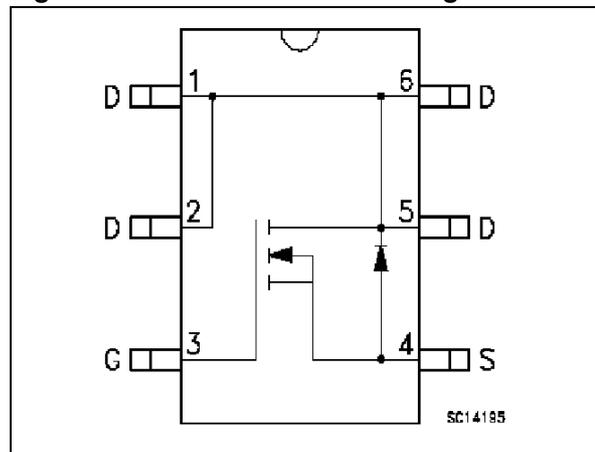


Table 1. Device summary

Order code	Marking	Package	Packaging
STT6N3LLH6	STG1	SOT23-6L	Tape and reel

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	30	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_{pcb} = 25\text{ }^\circ\text{C}$	6	A
I_D	Drain current (continuous) at $T_{pcb} = 100\text{ }^\circ\text{C}$	3.75	A
$I_{DM}^{(1)}$	Drain current (pulsed)	24	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	1.6	W
	Derating factor	0.013	W/ $^\circ\text{C}$
T_{stg}	Storage temperature	-55 to 150	$^\circ\text{C}$
T_j	Max. operating junction temperature	150	$^\circ\text{C}$

1. Pulse width limited by safe operating area

Table 3. Thermal resistance

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

1. When mounted on FR-4 board of 1 inch², 2oz Cu, t < 10 sec

2 Electrical characteristics

($T_{CASE} = 25\text{ °C}$ unless otherwise specified).

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0$	30			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = 30\text{ V}$ $V_{DS} = 30\text{ V}$, $T_c = 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	1			V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 3\text{ A}$		0.021	0.025	Ω
		$V_{GS} = 4.5\text{ V}$, $I_D = 3\text{ A}$		0.032	0.04	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 24\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$	-	283	-	μF
C_{oss}	Output capacitance			61		
C_{rss}	Reverse transfer capacitance			31		
Q_g	Total gate charge	$V_{DD} = 10\text{ V}$, $I_D = 6\text{ A}$	-	3.6	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 4.5\text{ V}$		1.5		
Q_{gd}	Gate-drain charge	Figure 14		1.1		

Table 6. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 10\text{ V}$, $I_D = 3\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 4.5\text{ V}$ Figure 13	-	4.8	-	ns
t_r	Rise time			11.2		
$t_{d(off)}$	Turn-off delay time			9.4		
t_f	Fall time			5.4		

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		6	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		24	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 6 \text{ A}, V_{GS} = 0$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD} = 6 \text{ A},$ $di/dt = 100 \text{ A}/\mu\text{s},$ $V_{DD} = 16 \text{ V}, T_J = 150 \text{ }^\circ\text{C}$ Figure 15	-	10.6		ns
Q_{rr}	Reverse recovery charge			2.8		nC
I_{RRM}	Reverse recovery current			0.5		A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

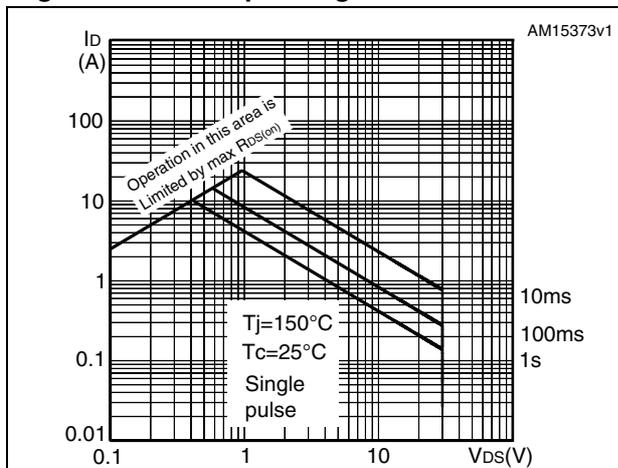


Figure 3. Thermal impedance

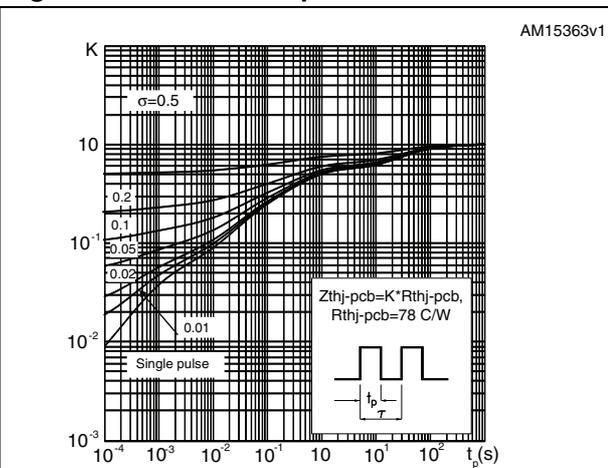


Figure 4. Output characteristics

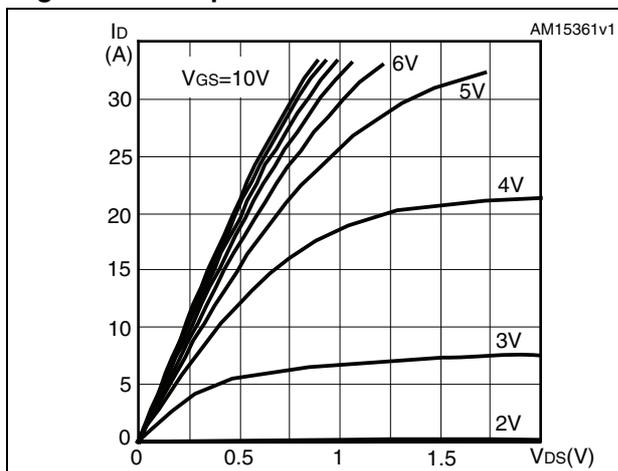


Figure 5. Transfer characteristics

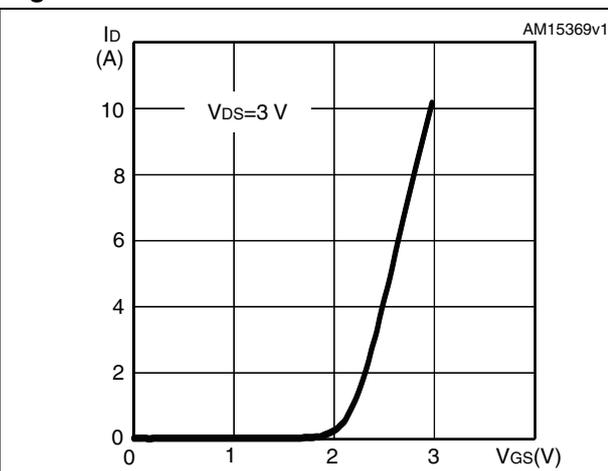


Figure 6. Gate charge vs gate-source voltage

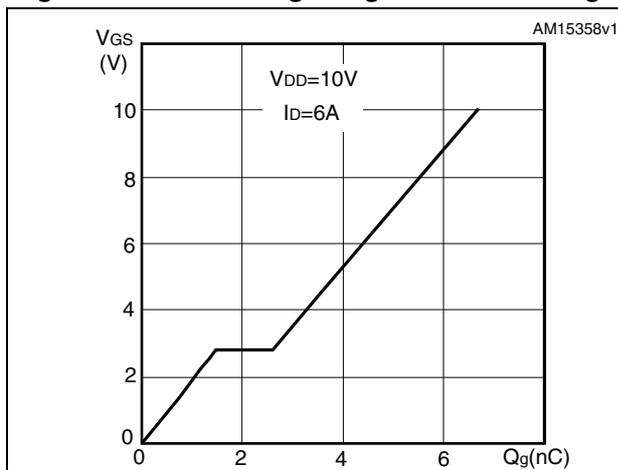


Figure 7. Static drain-source on-resistance

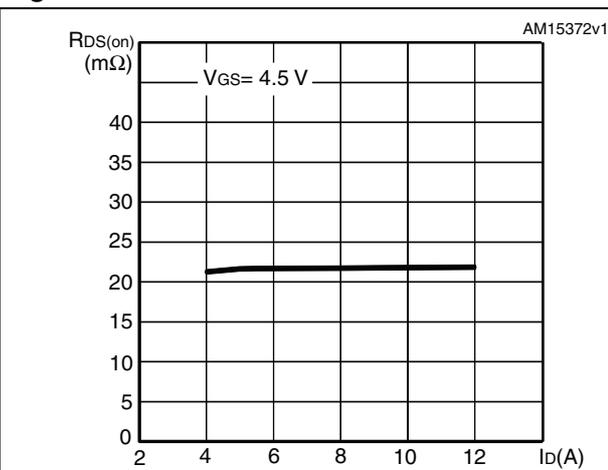


Figure 8. Capacitance variations

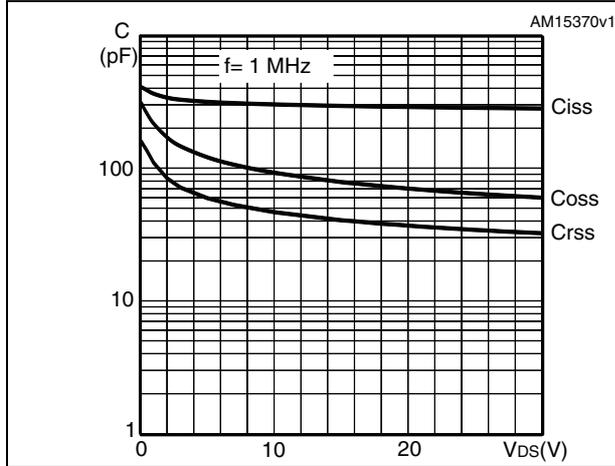


Figure 9. Normalized on-resistance vs temperature

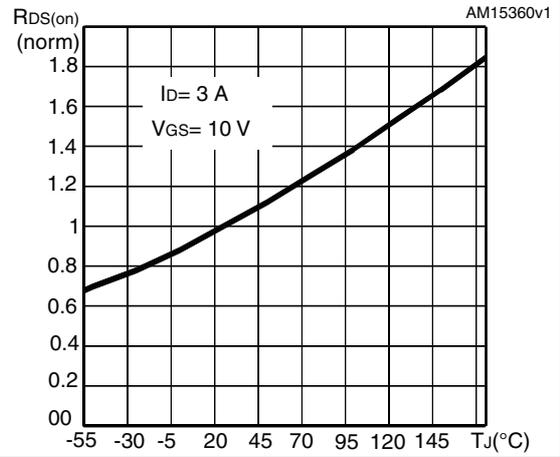


Figure 10. Normalized gate threshold voltage vs temperature

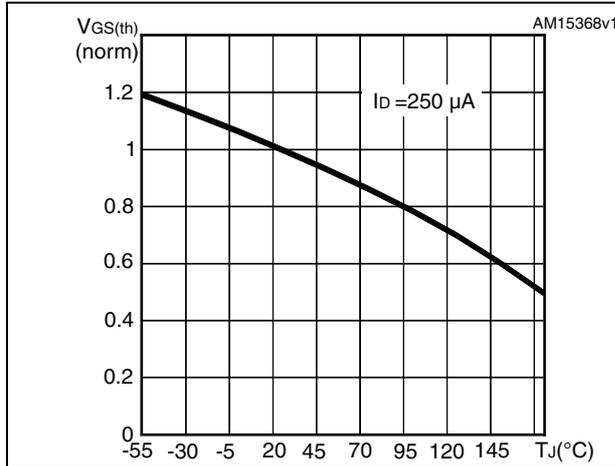


Figure 11. Normalized B_{VDS} vs temperature

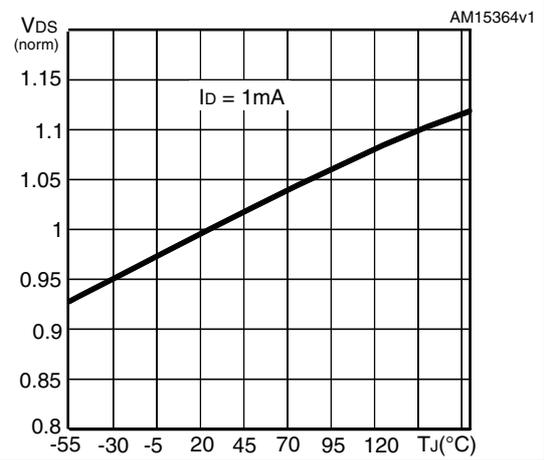
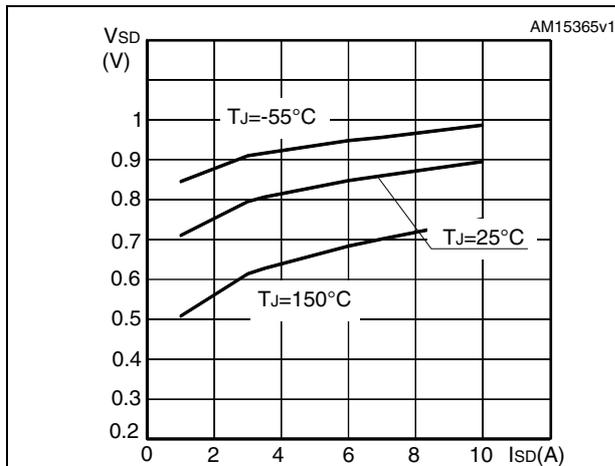
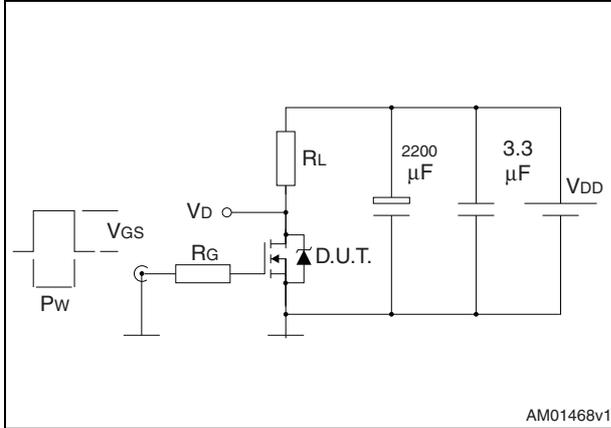


Figure 12. Source-drain diode forward characteristics



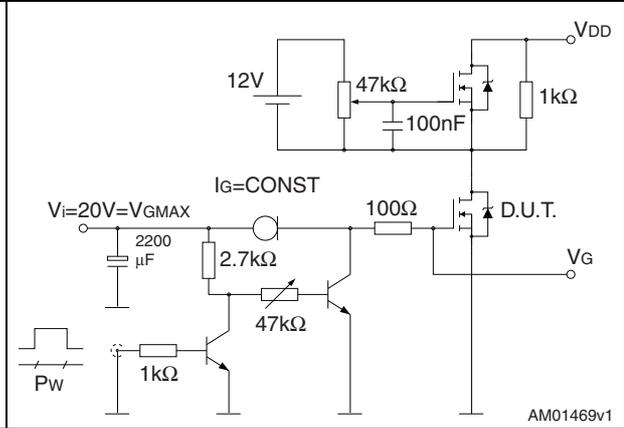
3 Test circuits

Figure 13. Switching times test circuit for resistive load



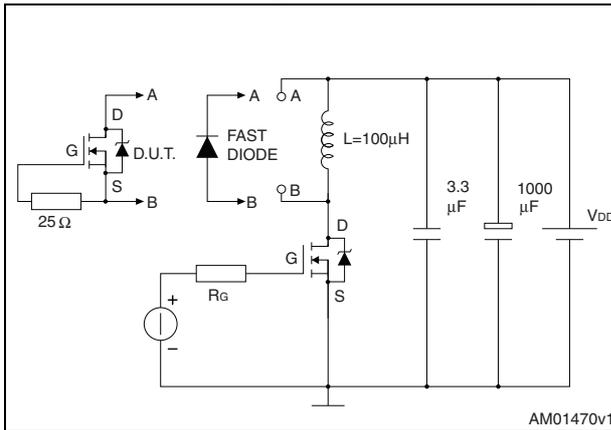
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Figure 14. Gate charge test circuit



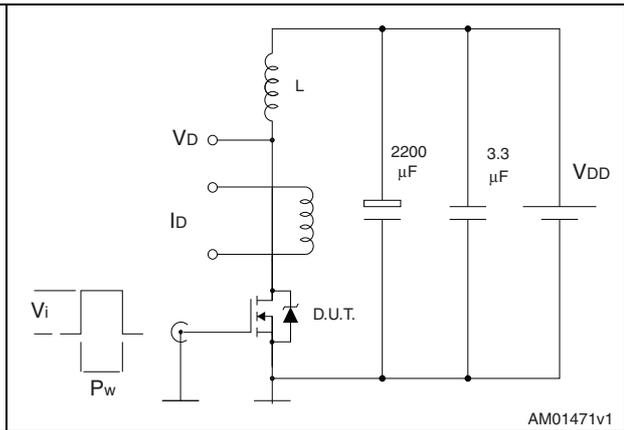
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Figure 15. Test circuit for inductive load switching and diode recovery times



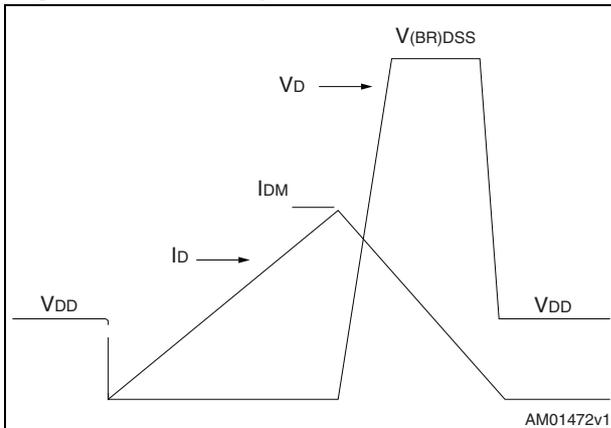
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Figure 16. Unclamped inductive load test circuit



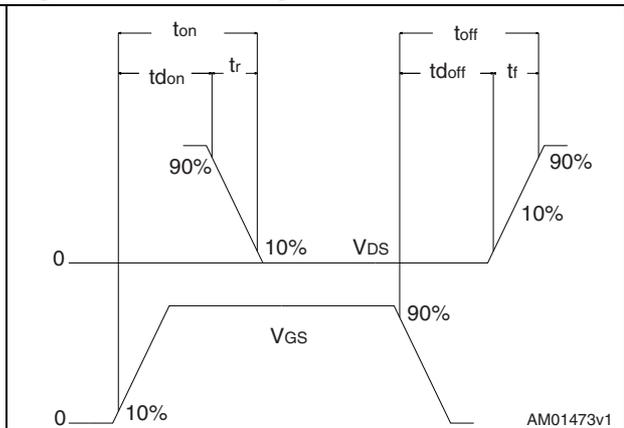
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Figure 17. Unclamped inductive waveform



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Figure 18. Switching time waveform



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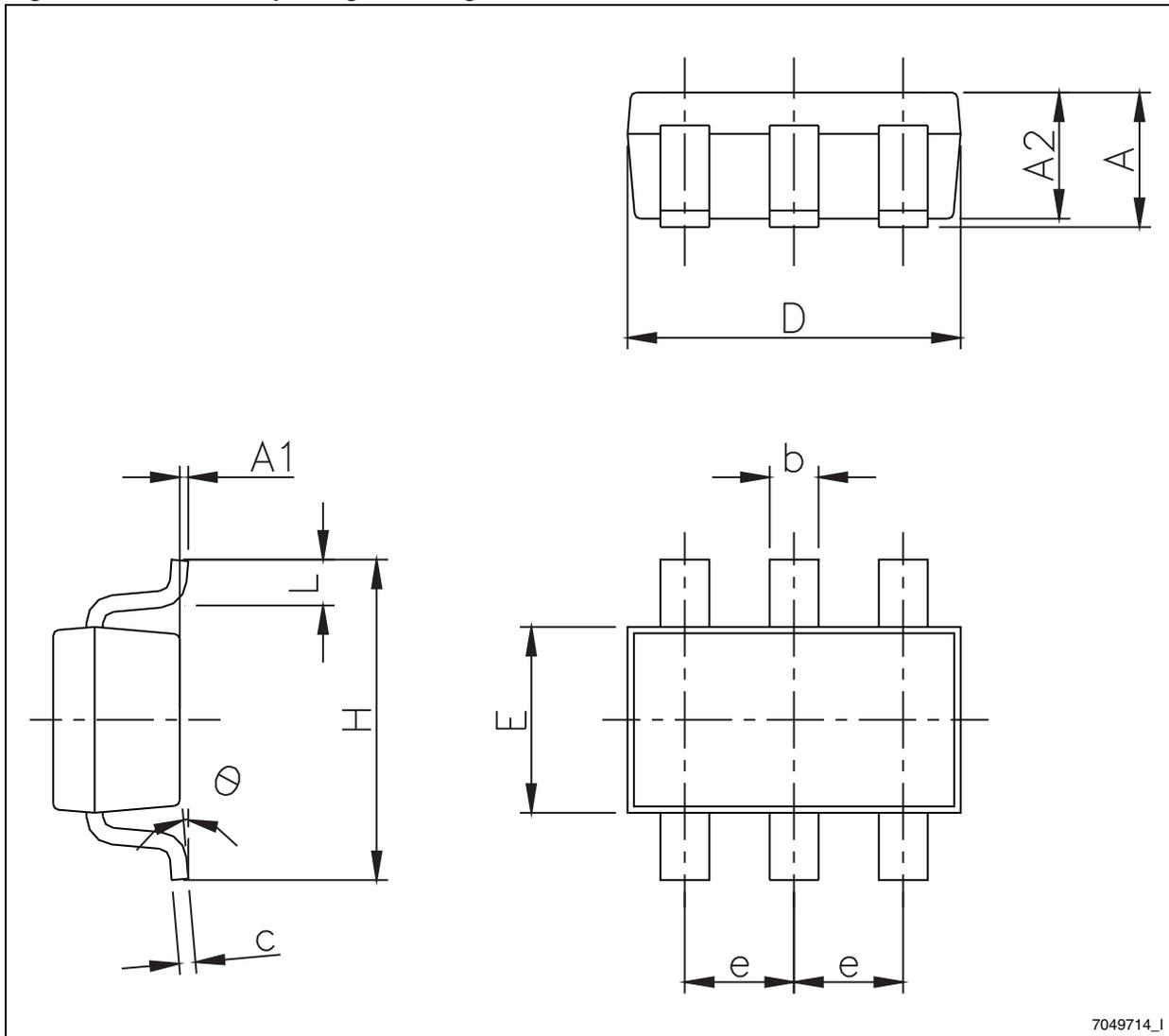
4 Package mechanical data

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

Table 8. SOT23-6L package mechanical data

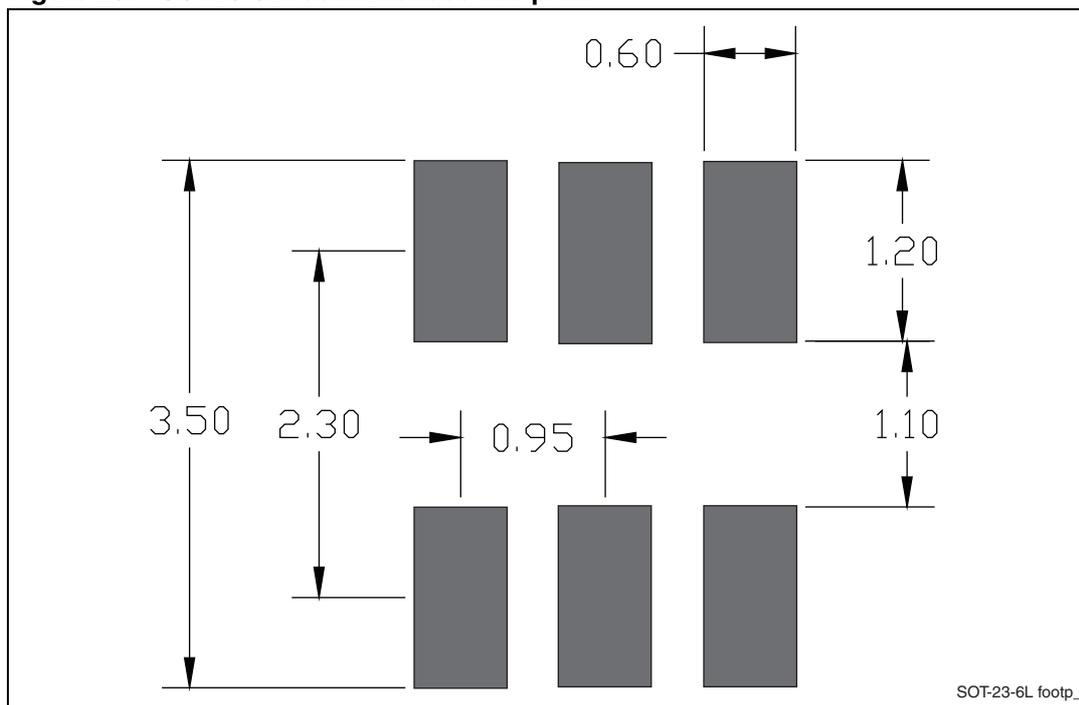
Dim.	mm		
	Min.	Typ.	Max.
A	0.90		1.45
A1	0.00		0.15
A2	0.90		1.30
b	0.30		0.50
C	0.09		0.20
D	2.80		3.05
E	1.50		1.75
e		0.95	
H	2.60		3.00
L	0.30		0.60
ϕ	0°		10°

Figure 19. SOT23-6L package drawing



7049714_1

Figure 20. SOT23-6L recommended footprint^(a)



a. All dimensions are in millimeters

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
11-Oct-2012	1	First release.

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