

N-channel 20 V, 0.025 Ω typ., 2.3 A STripFET™ H5 Power MOSFET in a SOT-23 package

Datasheet — production data

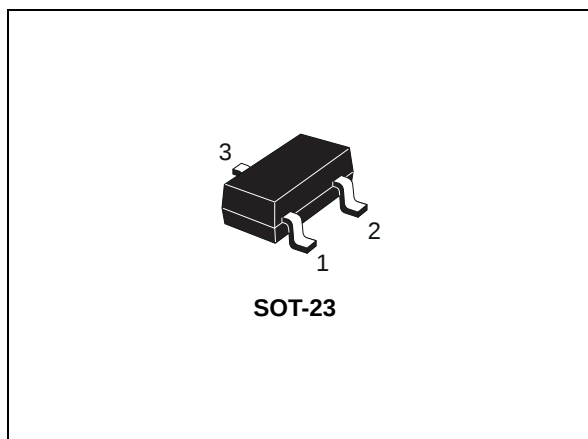
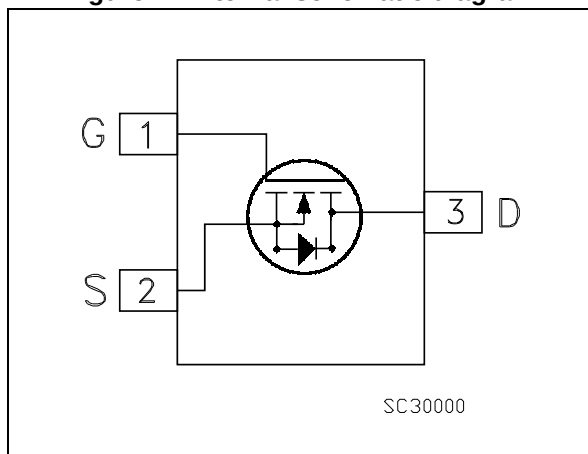


Figure 1. Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D	P_{TOT}
STR2N2VH5	20 V	0.03 Ω ($V_{GS}=4.5$ V)	2.3 A	0.35 W

- Low on-resistance $R_{DS(on)}$
- High avalanche ruggedness
- Low gate drive power loss

Applications

- Switching applications

Description

This device is an N-channel Power MOSFET developed using STMicroelectronics' STripFET™ H5 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.

Table 1. Device summary

Order code	Marking	Packages	Packaging
STR2N2VH5	STD1	SOT-23	Tape and reel

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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
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^{\circ}\text{C}$	2.3	A
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 100\text{ }^{\circ}\text{C}$	1.4	A
$I_{DM}^{(1)(2)}$	Drain current (pulsed)	9.2	A
$P_{TOT}^{(1)}$	Total dissipation at $T_{pcb} = 25\text{ }^{\circ}\text{C}$	0.35	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
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	357	$^{\circ}\text{C/W}$

1. When mounted on 1 inch² FR-4, 2 Oz Cu, $t < 10\text{ sec.}$

2 Electrical characteristics

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

Table 4. On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0, I_D = 1\text{ mA}$	20			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0, V_{DS} = 20\text{ V}$			1	μA
		$V_{GS} = 0, V_{DS} = 20\text{ V}, T_C = 125\text{ }^{\circ}\text{C}$			10	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0, V_{GS} = \pm 8\text{ V}$			± 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	$V_{GS} = 4.5\text{ V}, I_D = 2\text{ A}$		0.025	0.03	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 2\text{ A}$		0.031	0.04	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{GS} = 0, V_{DS} = 16\text{ V}, f = 1\text{ MHz}$	-	367	-	pF
C_{oss}	Output capacitance		-	92	-	pF
C_{rss}	Reverse transfer capacitance		-	16	-	pF
Q_g	Total gate charge	$V_{DD} = 16\text{ V}, I_D = 2\text{ A}, V_{GS} = 4.5\text{ V}$ (see Figure 14)	-	4.6	-	nC
Q_{gs}	Gate-source charge		-	0.9	-	nC
Q_{gd}	Gate-drain charge		-	1	-	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 Figure 15 and Figure 18)	-	4.8	-	ns
$t_r(v)$	Voltage rise time		-	14.4	-	ns
$t_d(off)$	Current fall time		-	17	-	ns
t_f	Crossing time		-	4	-	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	$V_{GS} = 0, I_{SD} = 2 \text{ A}$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD} = 2 \text{ A}, di/dt = 100 \text{ A}/\mu\text{s}$ $V_{DD} = 16 \text{ V}, T_J = 150 \text{ }^\circ\text{C}$ (see Figure 18)	-	10		ns
Q_{rr}	Reverse recovery charge		-	24		nC
I_{RRM}	Reverse recovery current		-	4.8		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

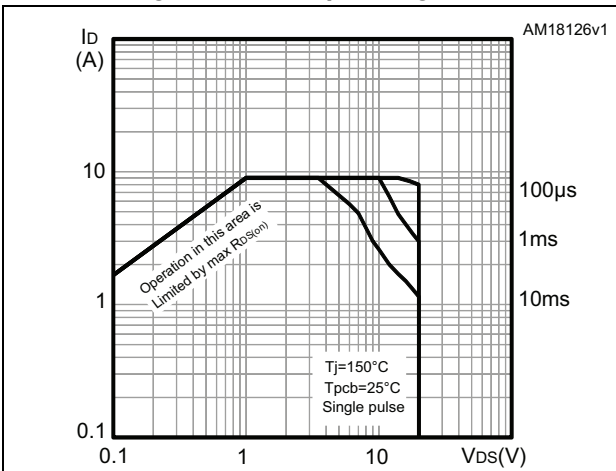


Figure 3. Thermal impedance

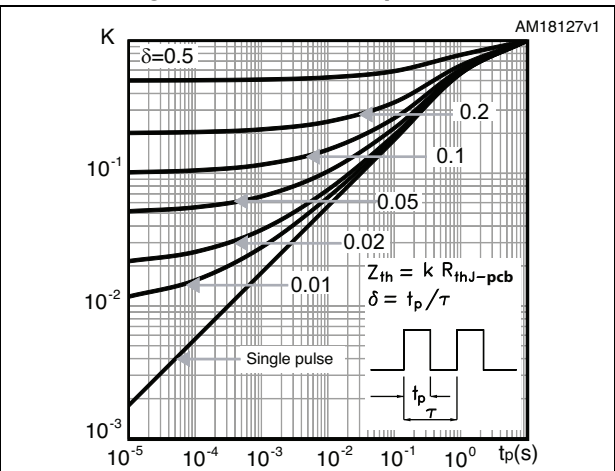


Figure 4. Output characteristics

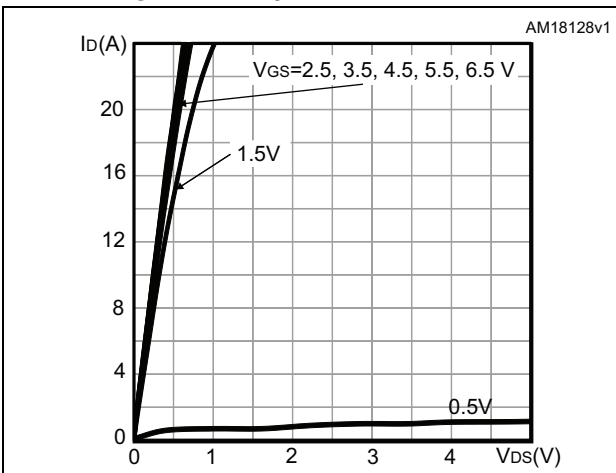


Figure 5. Transfer characteristics

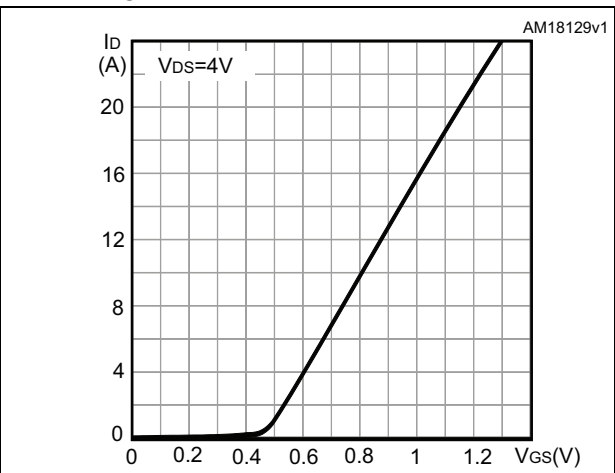


Figure 6. Gate charge vs gate-source voltage

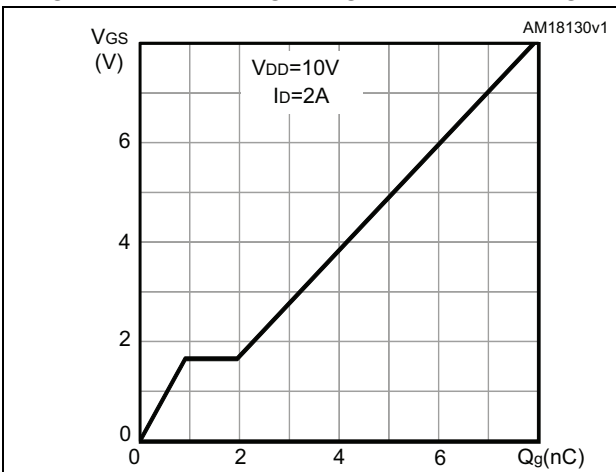


Figure 7. Static drain-source on-resistance

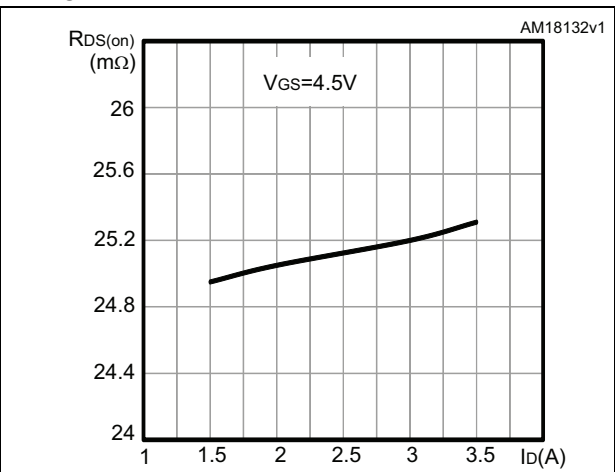


Figure 8. Capacitance variations

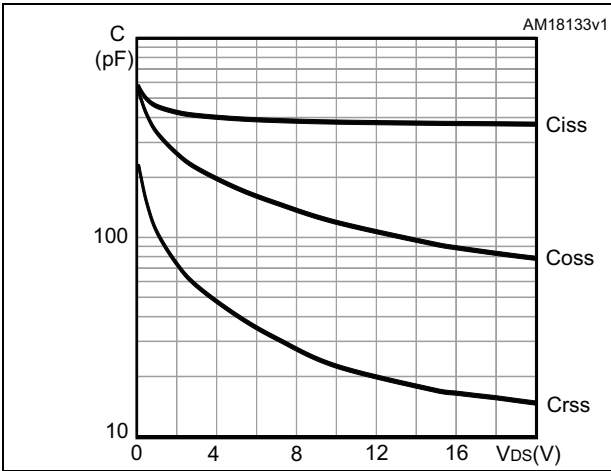


Figure 9. Normalized gate threshold voltage vs temperature

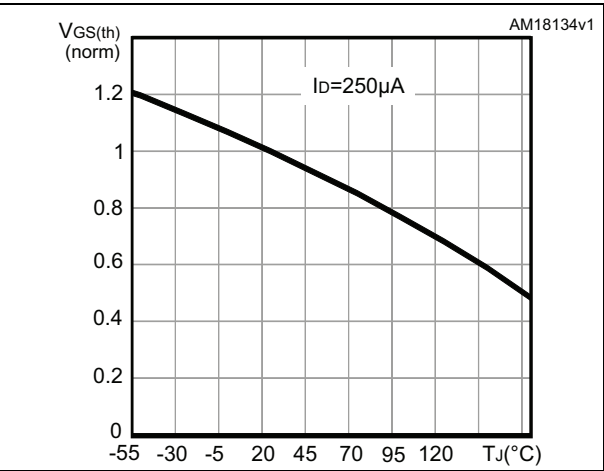


Figure 10. Normalized on-resistance vs temperature

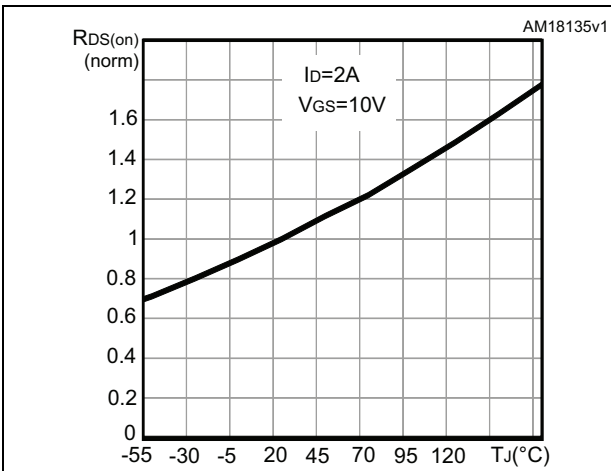


Figure 11. Normalized $V_{(BR)DSS}$ vs temperature

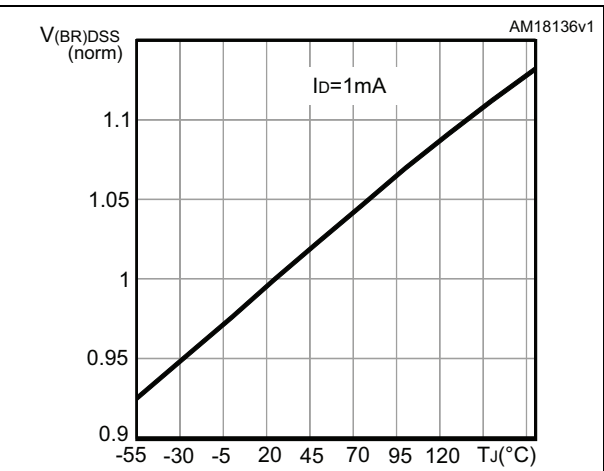
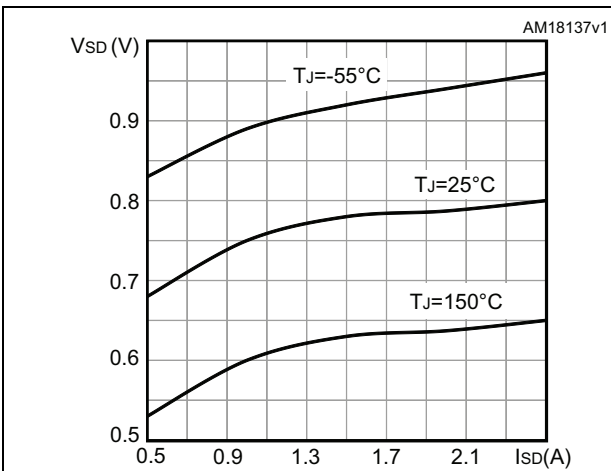


Figure 12. Source-drain diode forward characteristics



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.

Figure 19. SOT-23 mechanical drawing

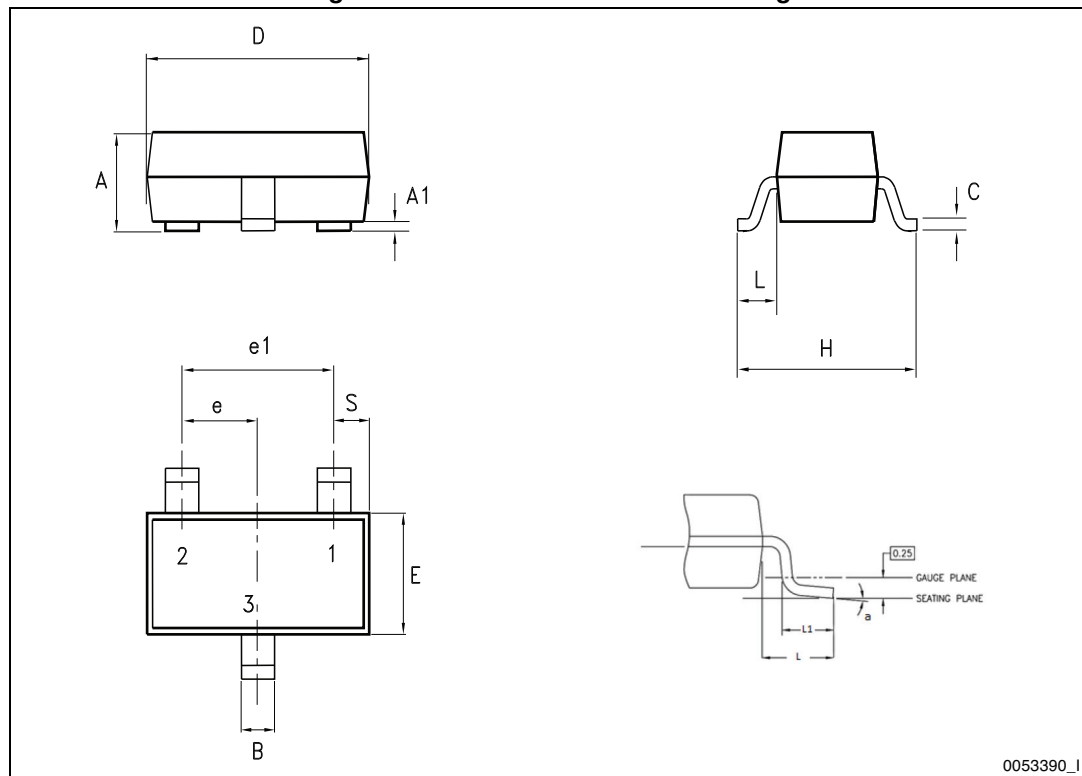
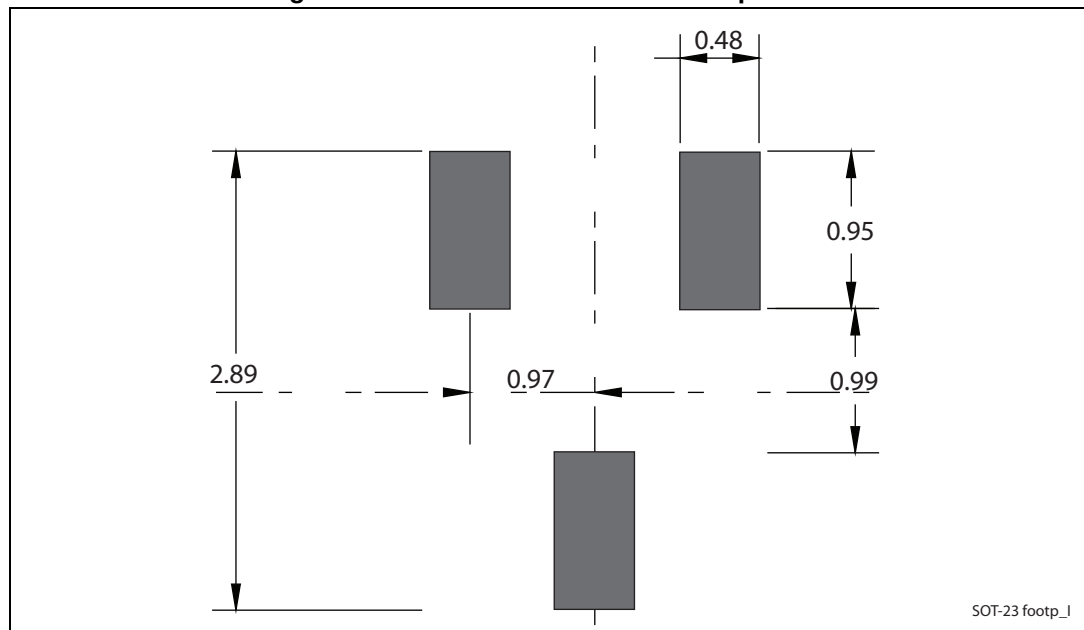


Table 8. SOT-23 mechanical data

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 20. SOT-23 recommended footprint (a)



a. Dimensions are in mm.

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
19-Oct-2012	1	First release.
14-Jan-2013	2	Modified: $R_{DS(on)}$ values
19-Mar-2014	3	– The part number STT5N2VH5 has been moved to a separate datasheet – Modified: the entire typical values in Table 5, 6 and 7 – Added: Section 2.1: Electrical characteristics (curves) – Minor text changes
25-Jul-2014	4	– Modified: title, description and features – Updated: Figure 12 – Minor text changes

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