STR2P3LLH6

P-channel -30 V, 0.048 Ω typ., -2 A STripFET™ H6 Power MOSFET in a SOT-23 package

Datasheet - production data

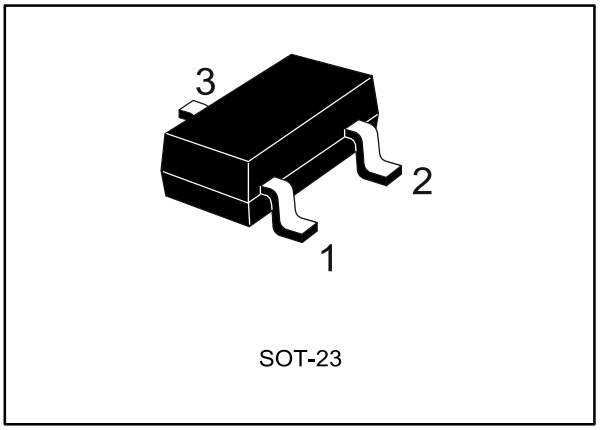
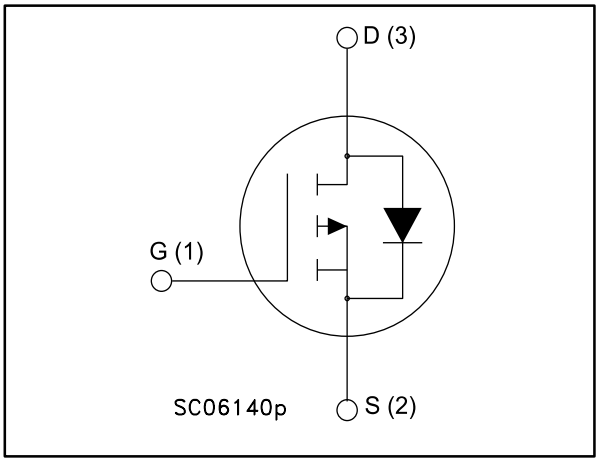


Figure 1: Internal schematic diagram



Features

Order code	V_{DS}	$R_{DS(on)}$ max	I_D
STR2P3LLH6	-30 V	0.056 Ω	-2 A

- Very low on-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

Applications

- Switching applications

Description

This device is a P-channel Power MOSFET developed using the STripFET™ H6 technology, with a new trench gate structure. The resulting Power MOSFET exhibits very low $R_{DS(on)}$ in all packages.

Table 1: Device summary

Order code	Marking	Package	Packing
STR2P3LLH6	2K3L	SOT-23	Tape and reel

Contents

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 °C	-2	A
I_D	Drain current (continuous) at T_{pcb} = 100 °C	-1.2	A
I_{DM} (1)	Drain current (pulsed)	-8	A
P_{TOT}	Total dissipation at T_{pcb} = 25 °C	0.35	W
T_J	Operating junction temperature	-55 to 150	°C
T_{stg}	Storage temperature		°C

Notes:

(1)Pulse width limited by safe operating area

Table 3: Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb, single operation	357	°C/W

Notes:

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

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	V_{GS} = 0, I_D = -250 µA	-30			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0, V_{DS} = -30 V, T_J = 125 °C			-1	µA
I_{GSS}	Gate body leakage current	V_{GS} = 0, V_{GS} = ±20 V			-100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = -250 µA	-1		-2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = -10 V, I_D = -1 A V_{GS} = -4.5 V, I_D = -1 A		0.048 0.075	0.056 0.09	Ω

Table 5: Dynamic

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
C_{iss}	Input capacitance	V_{DS} = -25 V, f=1 MHz V_{GS} = 0	-	639	-	pF
C_{oss}	Output capacitance		-	79	-	
C_{rss}	Reverse transfer capacitance		-	52	-	
Q_g	Total gate charge	V_{DD} = -15 V, I_D = -2 A V_{GS} = -4.5 V	-	6	-	nC
Q_{gs}	Gate-source charge		-	1.9	-	
Q_{gd}	Gate-drain charge		-	2.1	-	

Table 6: Switching times

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = -15 V, I_D = -2 A, R_G = 4.7 Ω, V_{GS} = -10 V	-	5.4	-	ns
t_r	Rise time		-	5	-	
$t_{d\ (off)}$	Turn-off delay time		-	19.2	-	
t_f	Fall time		-	3.4	-	

Table 7: Source drain diode

Symbol	Parameter	Test conditions	Min	Typ	Max	Unit
V_{SD} *(1)*	Forward on voltage	I_{SD} = -2 A, V_{GS} = 0	-	-	-1.1	V
t_{rr}	Reverse recovery time	I_{SD} = -2 A, di/dt = 100 A/µs, V_{DD}= -24 V, T_J = 150 °C	-	-	11.2	ns
Q_{rr}	Reverse recovery charge		-	-	3.5	nC
I_{RRM}	Reverse recovery current		-	-	-0.6	A

Notes:

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

2.1 Electrical characteristics (curves)

Figure 2: Safe operating area

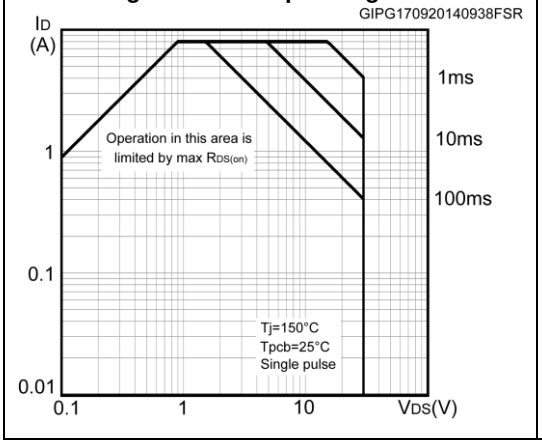


Figure 3: Thermal impedance

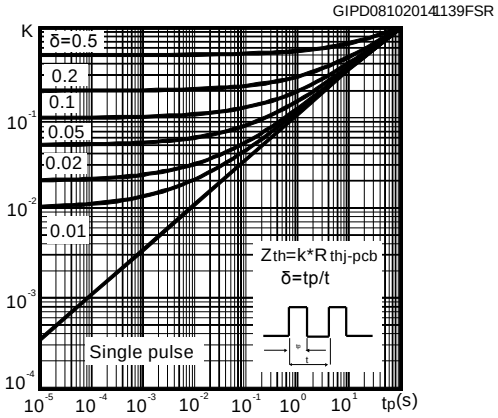


Figure 4: Output characteristics

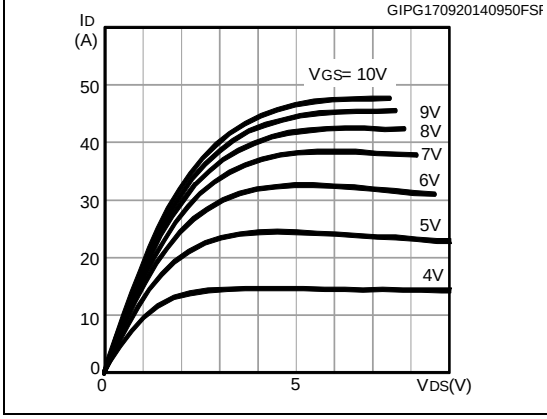


Figure 5: Transfer characteristics

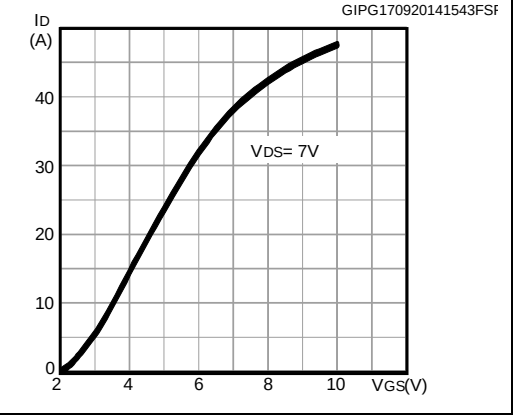


Figure 6: Gate charge vs gate-source voltage

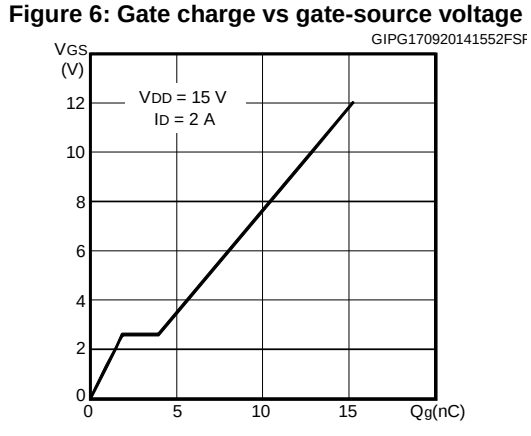


Figure 7: Static drain-source on-resistance

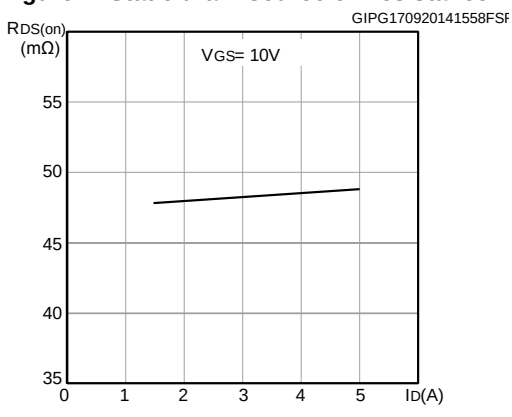


Figure 8: Normalized $V_{(BR)DSS}$ vs temperature

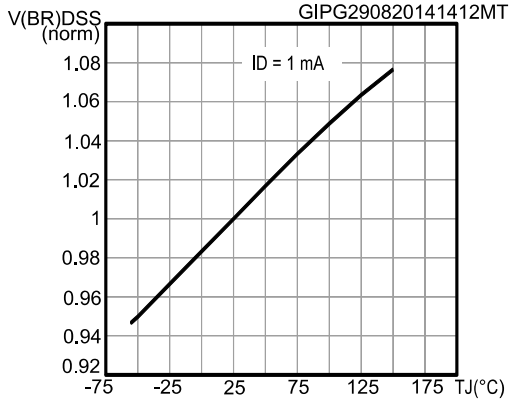


Figure 9: Capacitance variations

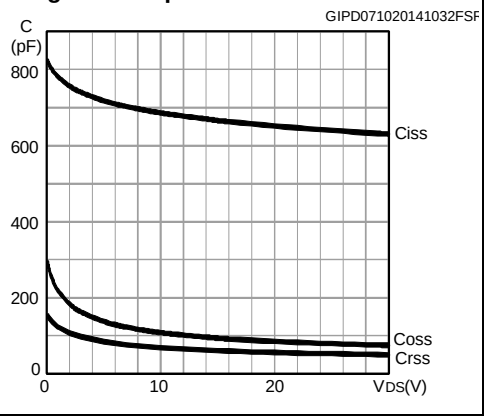


Figure 10: Normalized gate threshold voltage vs. temperature

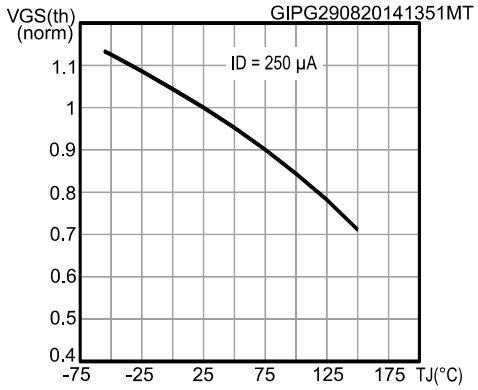


Figure 11: Normalized on-resistance vs. temperature

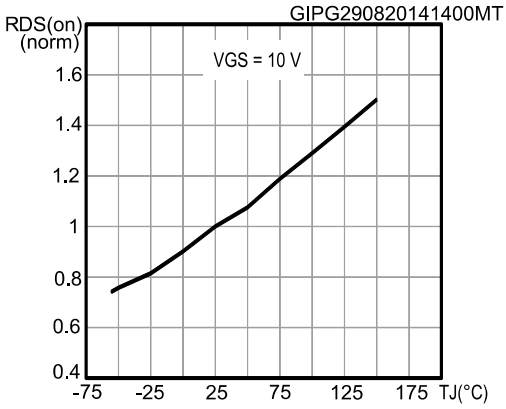
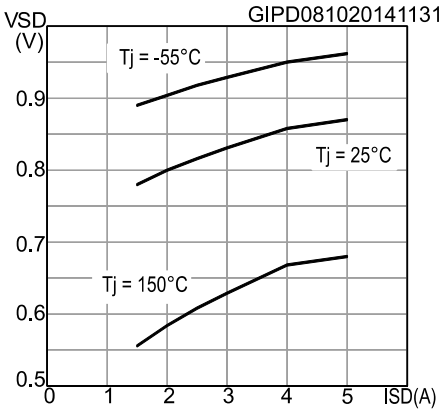


Figure 12: Source-drain diode forward characteristics



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

3 Test circuits

Figure 13: Switching times test circuit for resistive load

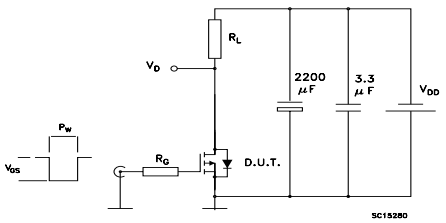


Figure 14: Gate charge test circuit

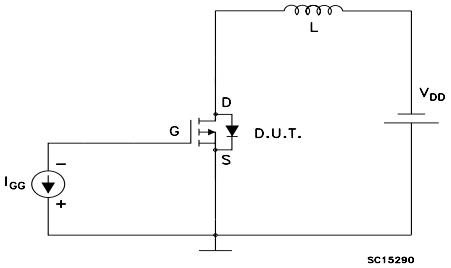
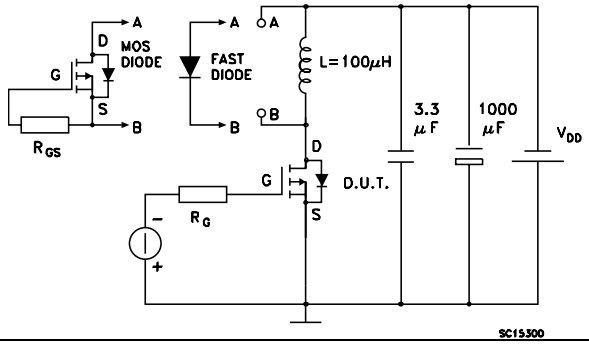


Figure 15: Test circuit for inductive load switching and diode recovery times



4 Package information

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.

4.1 SOT-23 package information

Figure 16: SOT-23 package outline

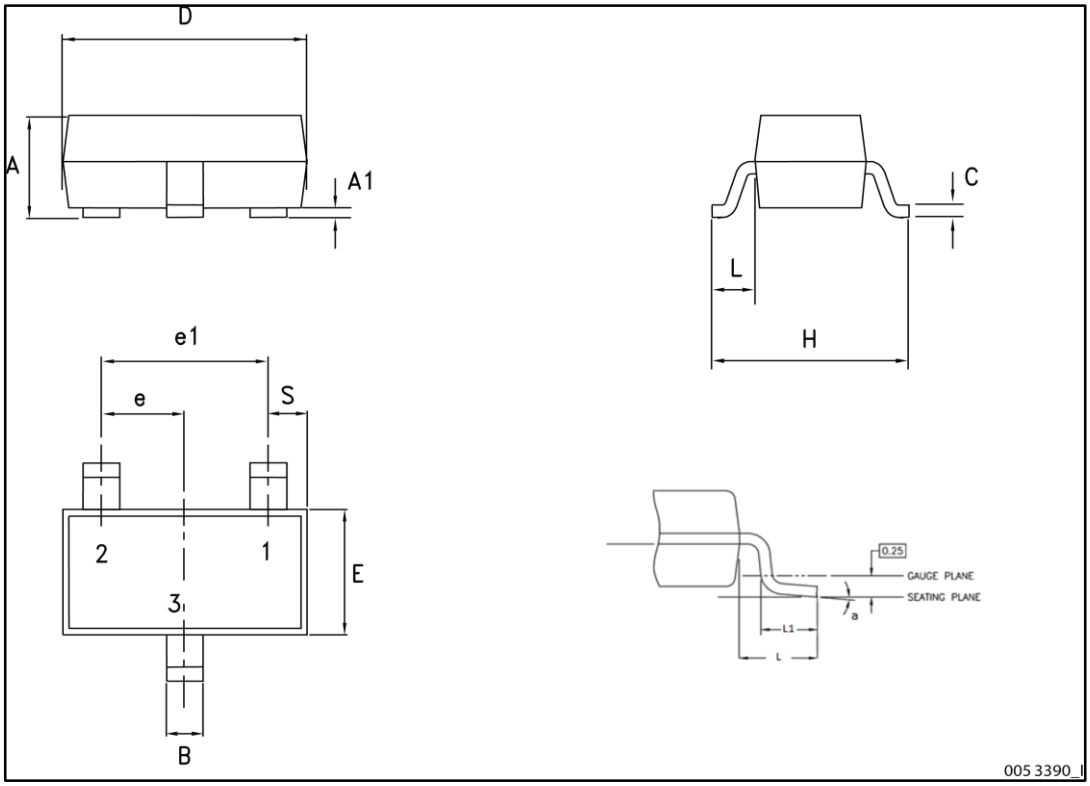
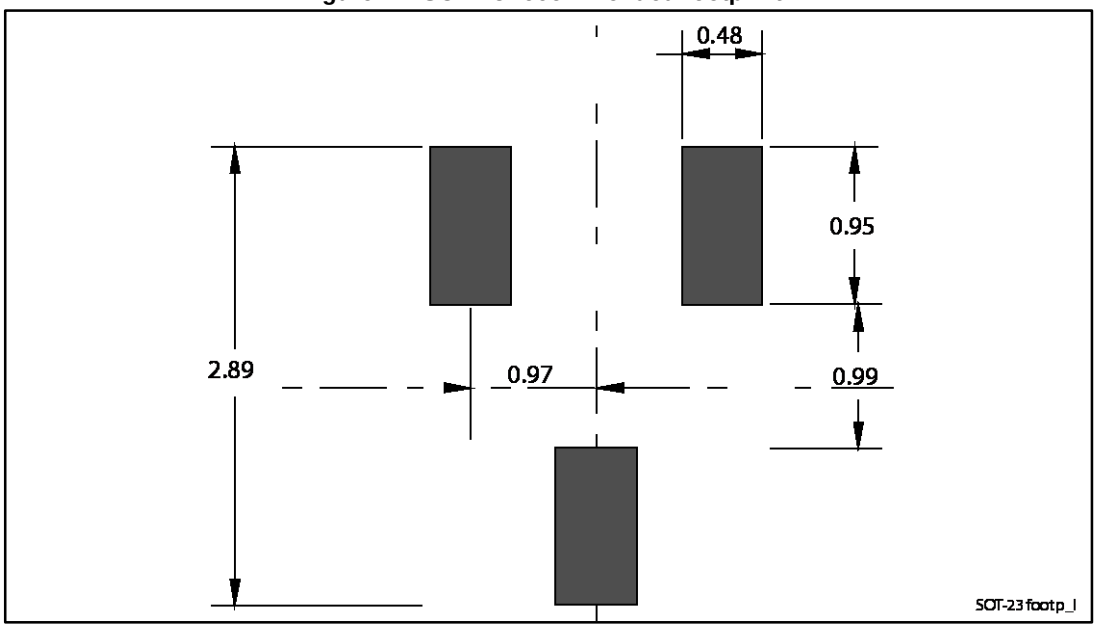


Table 8: SOT-23 mechanical data

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 17: SOT-23 recommended footprint



Dimensions are in mm

5 Revision history

Table 9: Document revision history

Date	Revision	Changes
09-May-2013	1	Initial release.
03-Nov-2014	2	Document status promoted from preliminary to production data. Added Section 2.1: "Electrical characteristics (curves)". Minor text changes.
03-Nov-2015	3	Updated title and features in cover page. Updated *Table 2: "Absolute maximum ratings"*, *Table 4: "On /off states"*, *Table 5: "Dynamic"*, *Table 6: "Switching times"*, *Table 7: "Source drain diode"* and *Section 2.1: "Electrical characteristics (curves)"*. Minor text changes.

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