

N-channel 100 V, 0.062 Ω typ., 4 A STripFET™ VII DeepGATE™ Power MOSFET in a PowerFLAT™ 2x2 package

Datasheet - production data

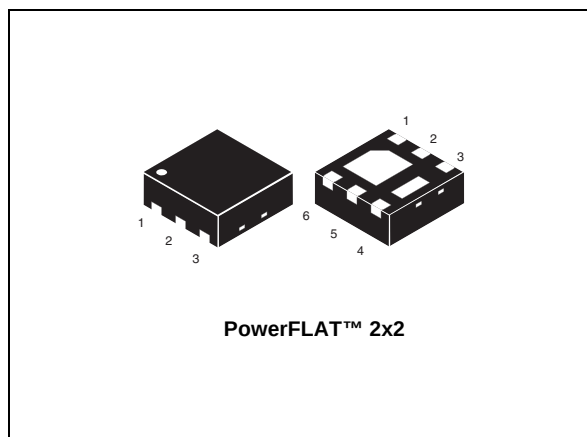
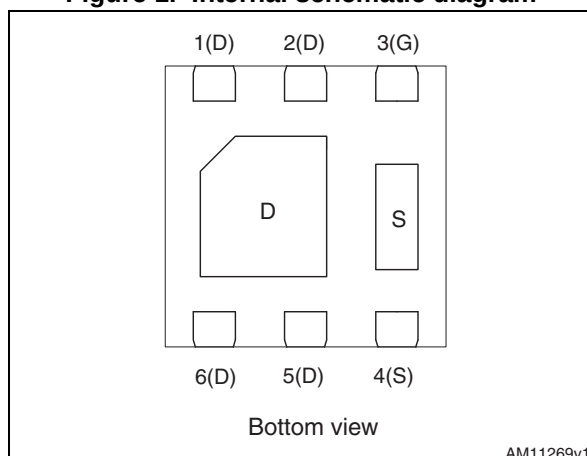


Figure 1. Internal schematic diagram



Features

Order code	V _{DS}	R _{DS(on)} max	I _D
STL3N10F7	100 V	0.07 Ω	4 A

- N-channel enhancement mode
- Low gate charge
- 100% avalanche rated

Applications

- Switching applications

Description

This device utilizes the 7th generation of design rules of ST's proprietary STripFET™ technology, with a new gate structure. The resulting Power MOSFET exhibits the lowest R_{DS(on)} in all packages.

Table 1. Device summary

Order code	Marking	Packages	Packaging
STL3N10F7	ST3N	PowerFLAT™ 2x2	Tape and reel

Contents

1 **Electrical ratings** 3

2 **Electrical characteristics** 4

 2.1 **Electrical characteristics (curves)** 6

3 **Test circuits** 8

4 **Package mechanical data** 9

5 **Revision history** 12



1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	100	V
V_{GS}	Gate-source voltage	± 20	V
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb} = 25\text{ }^{\circ}\text{C}$	4	A
$I_D^{(1)}$	Drain current (continuous) at $T_{pcb}=100\text{ }^{\circ}\text{C}$	2.5	A
$I_{DM}^{(2)}$	Drain current (pulsed)	16	A
$P_{TOT}^{(1)}$	Total dissipation at $T_{pcb} = 25\text{ }^{\circ}\text{C}$	2.4	W
T_J	Operating junction temperature	-55 to 150	$^{\circ}\text{C}$
T_{stg}	storage temperature		$^{\circ}\text{C}$

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

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	52	$^{\circ}\text{C/W}$

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

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage, $V_{GS}=0$	$I_D = 250\text{ }\mu\text{A}$	100			V
I_{DSS}	Zero gate voltage drain current ($V_{GS}=0$)	$V_{DS} = 100\text{ V}$			1	μA
		$V_{DS} = 100\text{ V}$, $T_C = 125\text{ }^{\circ}\text{C}$			100	μA
I_{GSS}	Gate body leakage current ($V_{DS}=0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$		0.062	0.07	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS}=25\text{ V}$, $f=1\text{ MHz}$, $V_{GS}=0$	-	408	-	pF
C_{oss}	Output capacitance		-	112	-	pF
C_{rss}	Reverse transfer capacitance		-	10	-	pF
Q_g	Total gate charge	$V_{DD}=50\text{ V}$, $I_D = 4\text{ A}$ $V_{GS}=10\text{ V}$ (see Figure 14)	-	7.8	-	nC
Q_{gs}	Gate-source charge		-	3	-	nC
Q_{gd}	Gate-drain charge		-	1.7	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=50\text{ V}$, $I_D = 2\text{ A}$, $R_G=4.7\text{ }\Omega$, $V_{GS}=10\text{ V}$ (see Figure 13)	-	6.3	-	ns
t_r	Rise time		-	3	-	ns
$t_{d(off)}$	Turn-off delay time		-	11	-	ns
t_f	Fall time		-	4	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		4	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		16	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 2\text{ A}$, $V_{GS} = 0$	-		1.1	V
t_{rr}	Reverse recovery time	$I_{SD} = 2\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 80\text{ V}$, $T_J = 150\text{ }^\circ\text{C}$ (see Figure 18)	-	30		ns
Q_{rr}	Reverse recovery charge		-	24		nC
I_{RRM}	Reverse recovery current		-	1.6		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

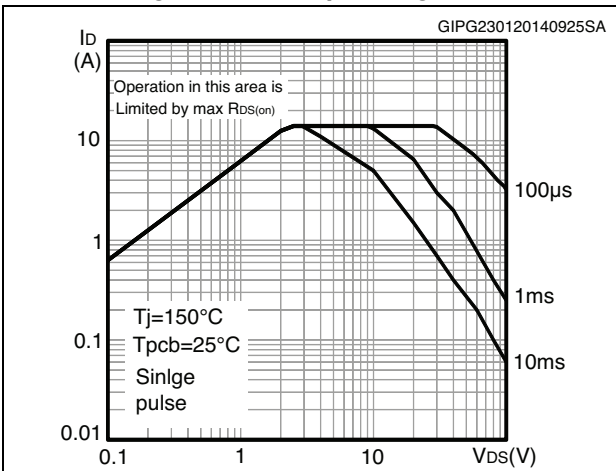


Figure 3. Thermal impedance

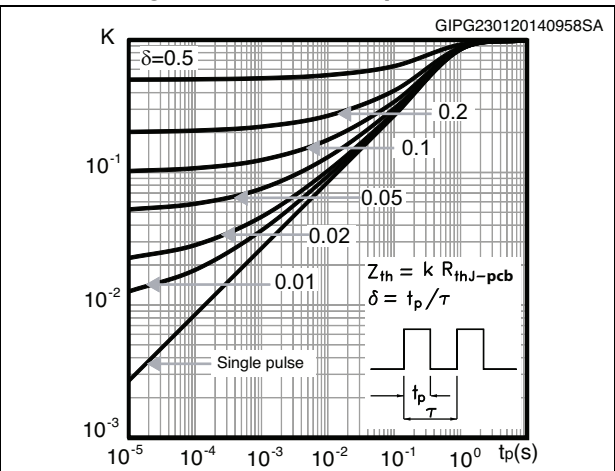


Figure 4. Output characteristics

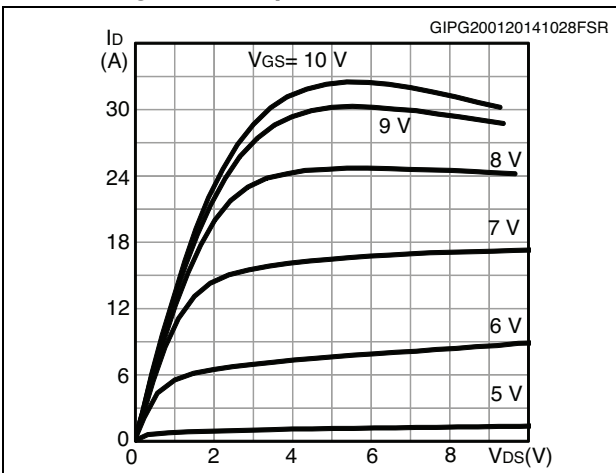


Figure 5. Transfer characteristics

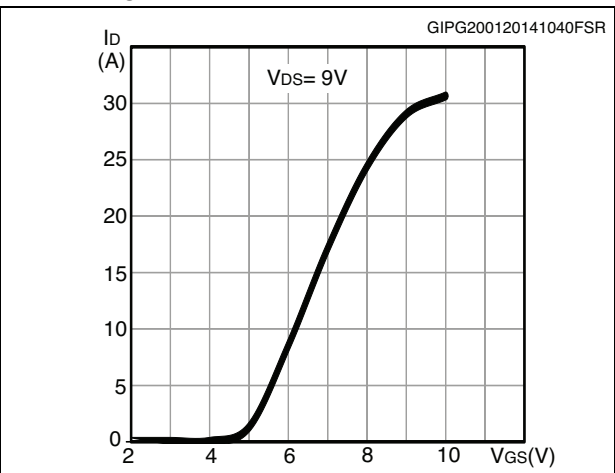


Figure 6. Gate charge vs gate-source voltage

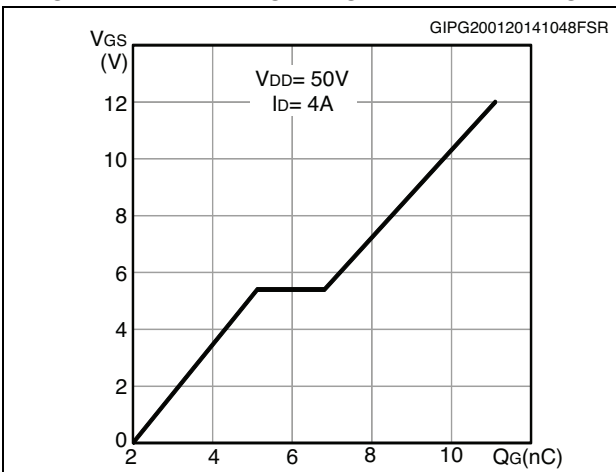


Figure 7. Static drain-source on-resistance

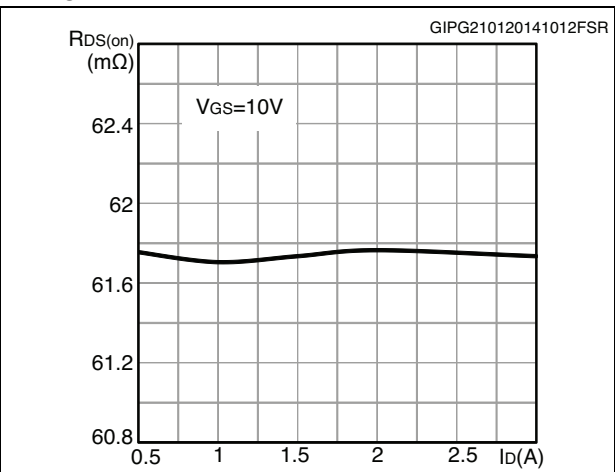


Figure 8. Capacitance variations

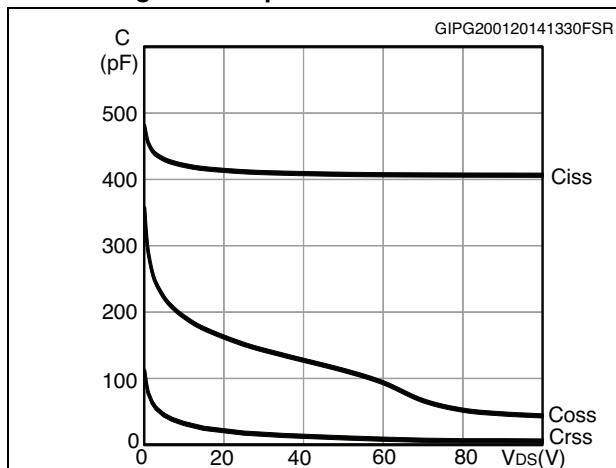
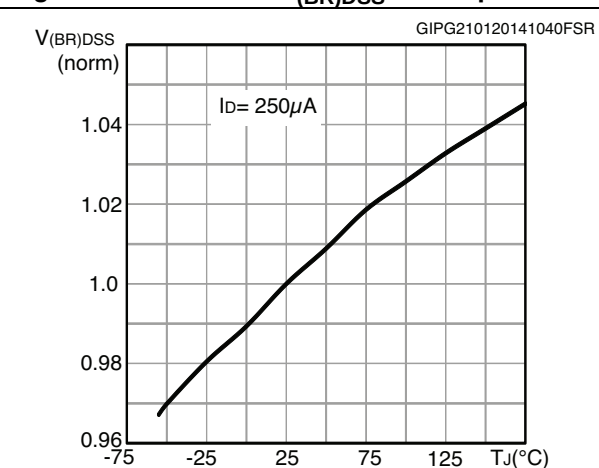
Figure 9. Normalized $V_{(BR)DSS}$ vs temperature

Figure 10. Normalized gate threshold voltage vs temperature

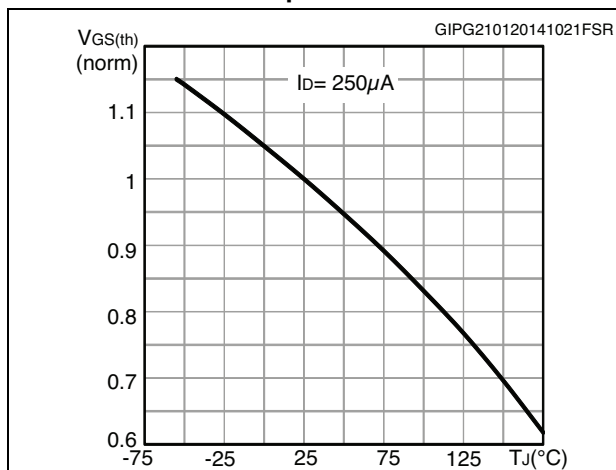


Figure 11. Normalized on-resistance vs temperature

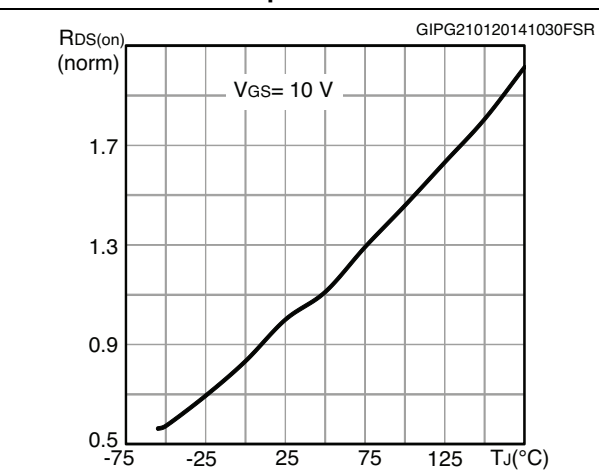
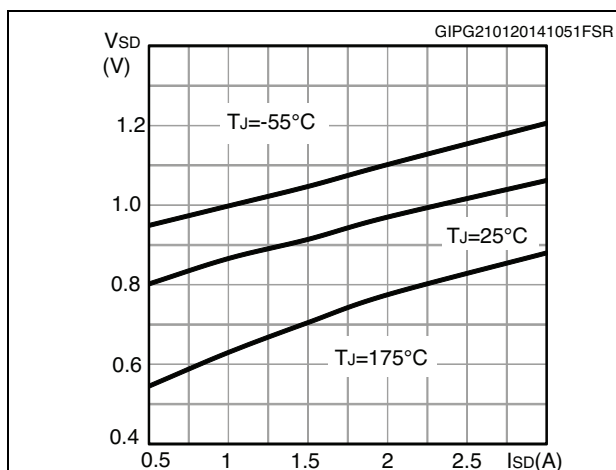


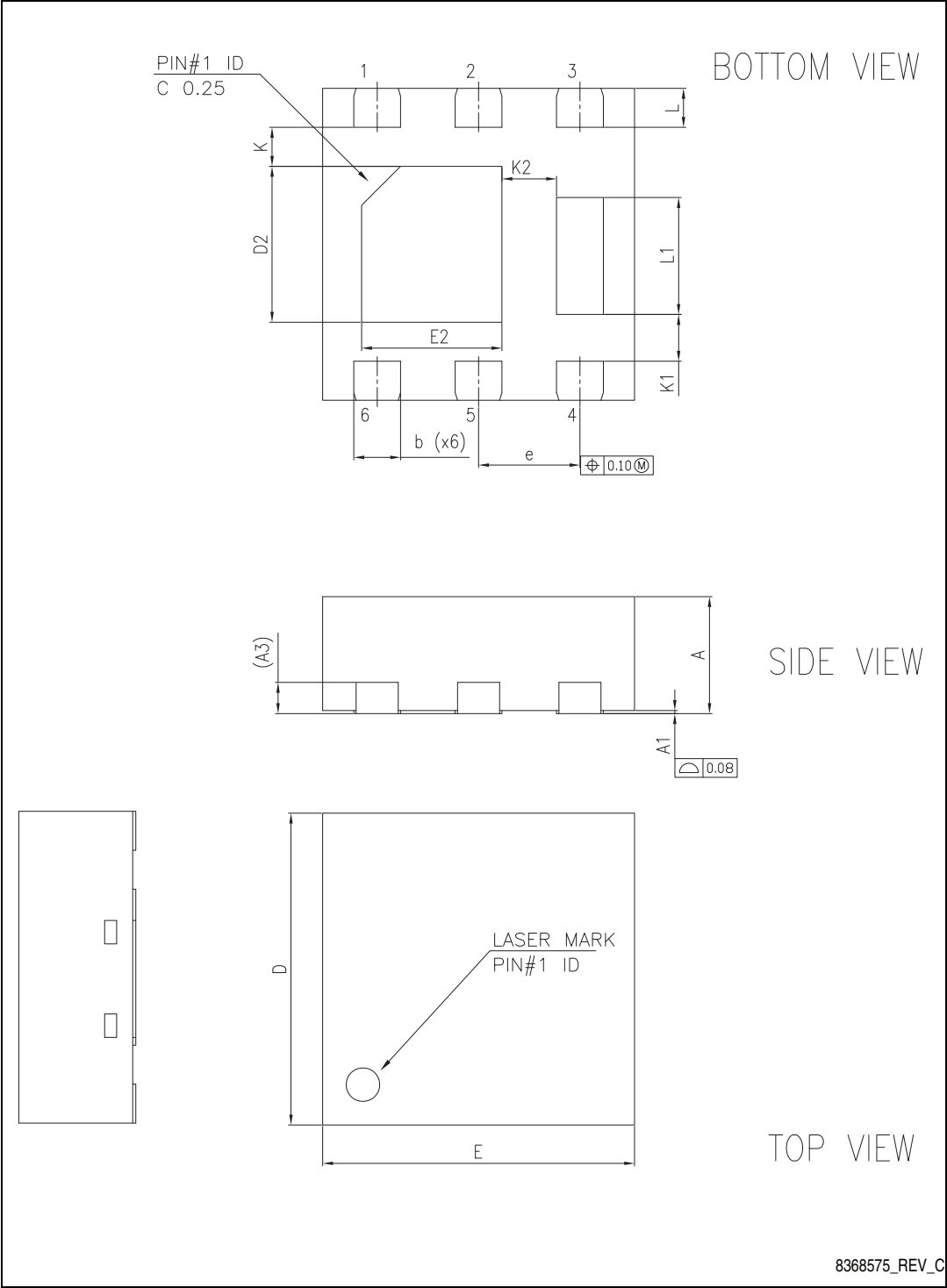
Figure 12. Source-drain diode forward characteristics



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. Drawing dimension PowerFLAT™ 2x2



8368575_REV_C

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
18-Feb-2014	1	First release.
30-Apr-2014	2	Document status promoted from preliminary to production data

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