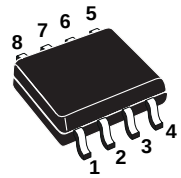
STS3P6F6

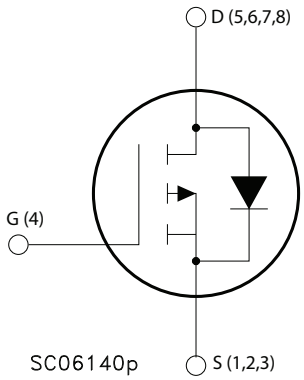
P-channel 60 V, 0.13 Ω typ., 3 A STripFET™ VI DeepGATE™ Power MOSFET in a SO-8 package

Datasheet - production data



SO-8

Figure 1. Internal schematic diagram



Features

Order code	V_{DSS}	$R_{DS(on)max}$	I_D
STN3P6F6	60 V	0.16 Ω @ 10 V	3 A

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

Applications

- Switching applications

Description

This device is a P-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.

Table 1. Device summary

Order code	Marking	Package	Packaging
STS3P6F6	3K60	SO-8	Tape and reel

Note: For the P-channel Power MOSFET the actual polarity of the voltages and the current must be reversed.

This is information on a product in full production. www.st.com

Contents

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	60	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at T_{pcb} = 25 °C	3	A
I_D	Drain current (continuous) at T_{pcb} = 100 °C	2	A
I_{DM}	Drain current (pulsed)	12	A
P_{TOT} (1)	Total dissipation at T_{pcb} = 25 °C	2.7	W
T_j P_{stg}	Operating junction temperature Storage temperature	-55 to 150	°C

1. Pulse width is limited by safe operating area.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb max	47	°C/W

1. When mounted on FR-4 board of 15 mm^2, 2 Oz Cu, t<10 sec

Note: For the P-channel Power MOSFET actual polarity of voltages and current has to be reversed.

2 Electrical characteristics

(Tcase = 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	60			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 60 V V_{DS} = 60 V, T_C=125 °C			1 10	µA µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ± 20 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 1.5 A		0.13	0.16	Ω

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 48 V, f = 1 MHz, V_{GS} = 0	-	340 40 20	-	pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 48 V, I_D = 3 A, V_{GS} = 10 V (see *Figure 3*)	-	6.4 1.7 1.7	-	nC nC nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Turn-off delay time Fall time	V_{DD} = 48 V, I_D = 1.5 A, R_G = 4.7 Ω, V_{GS} = 10 V (see *Figure 2*)	-	6.4 5.3 14 3.7	-	ns ns ns ns

Note: For the P-channel Power MOSFET actual polarity of voltages and current has to be reversed.

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)		-		3 12	A A
V_{SD} (2)	Forward on voltage	I_{SD} = 3 A, V_{GS} = 0	-		1.1	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 5 A, di/dt = 100 A/µs V_{DD} = 16 V, T_j = 150 °C (see *Figure 4*)	-	20 17.8 1.8		ns nC A

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

Note: For the P-channel Power MOSFET actual polarity of voltages and current has to be reversed.

3 Test circuits

Figure 2. Switching times test circuit for resistive load

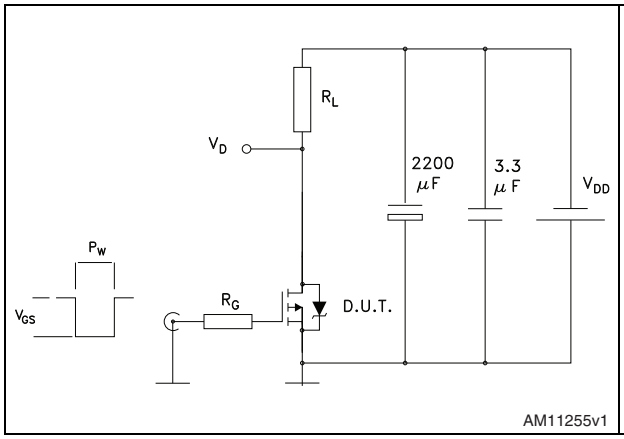


Figure 3. Gate charge test circuit

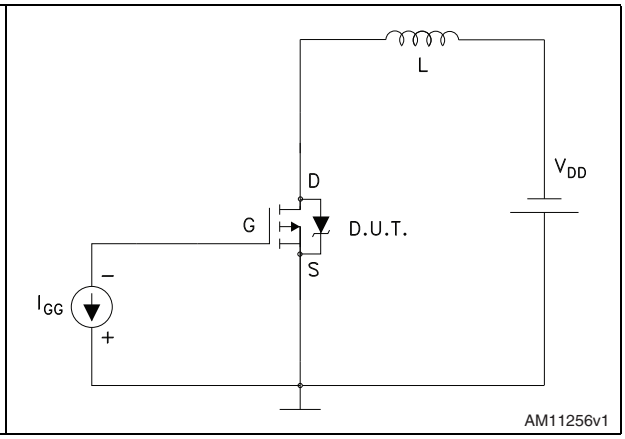
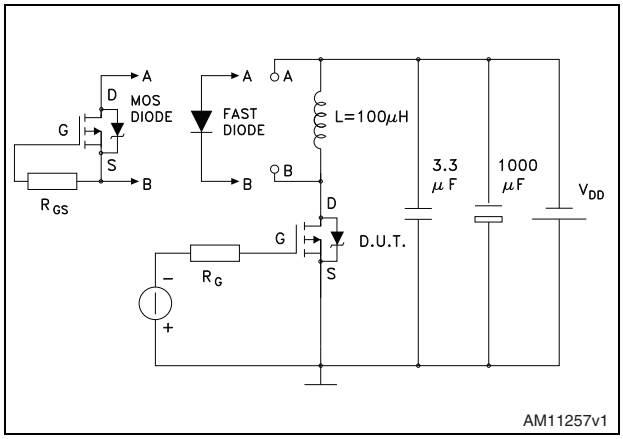


Figure 4. Test circuit for inductive load switching and diode recovery times



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. SO-8 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		
b	0.31		0.51
b1	0.28		0.48
c	0.10		0.25
c1	0.10		0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e		1.27	
h	0.25		0.50
L	0.40		1.27
L1		1.04	
L2		0.25	
k	0°		8°
ccc			0.10

Figure 5. SO-8 drawing

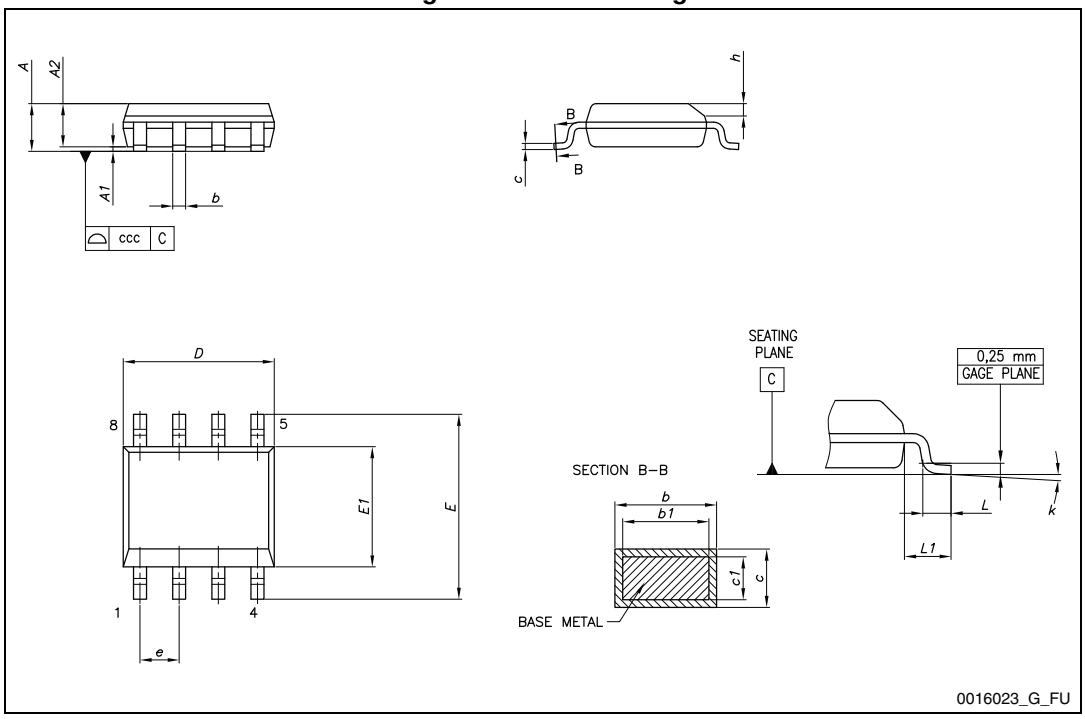
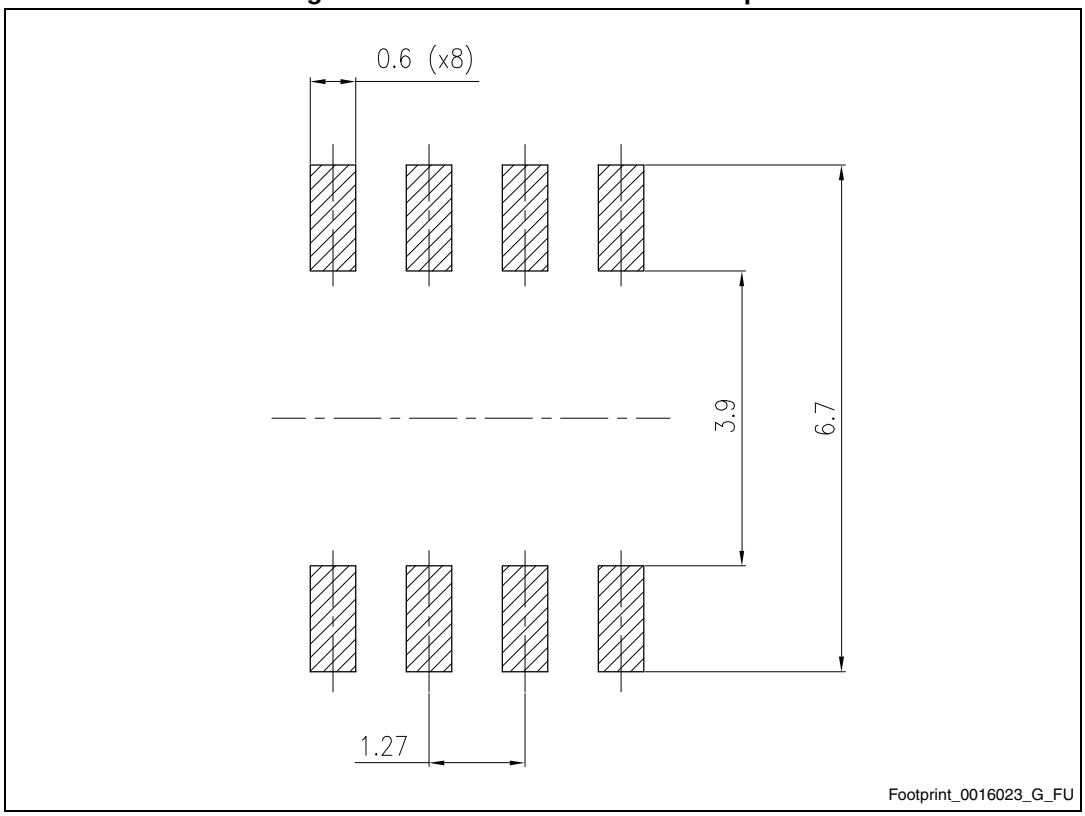


Figure 6. [(a)] SO-8 recommended footprint



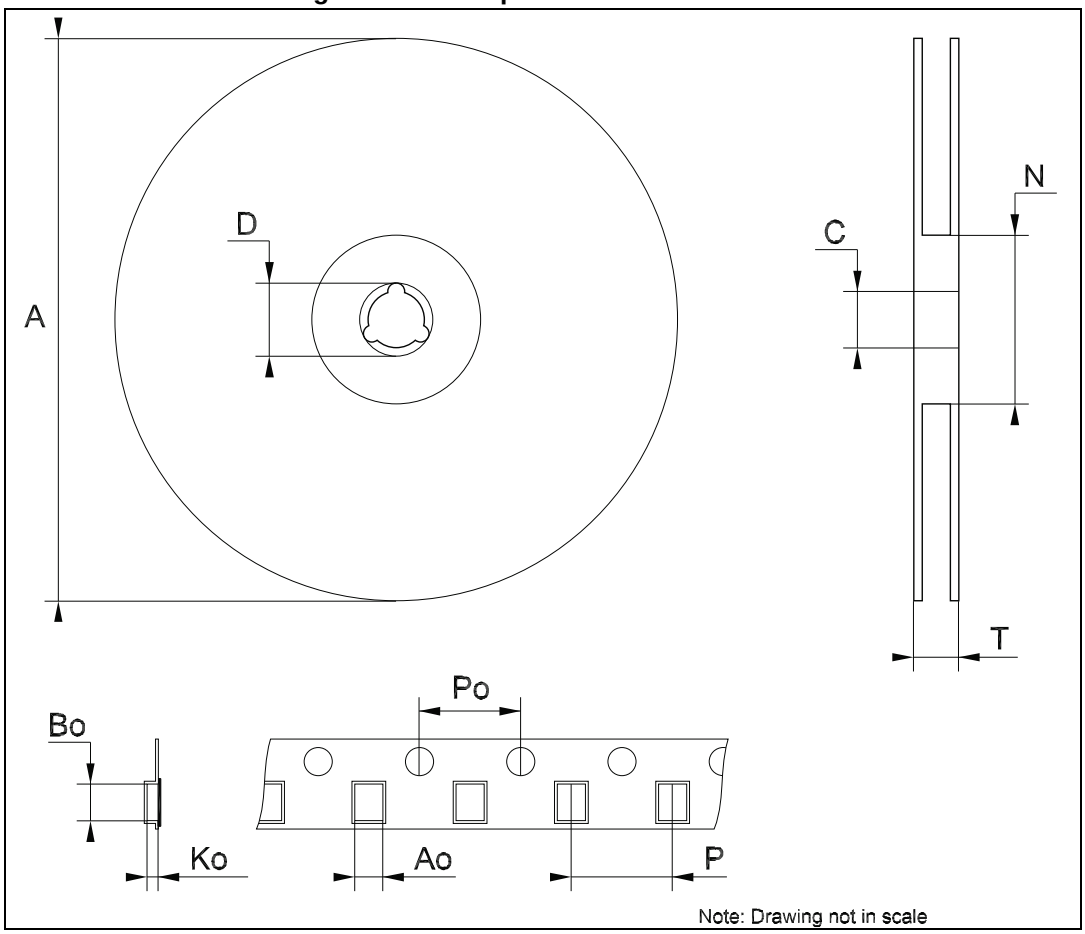
a. All dimensions are in millimeters.

5 Packaging mechanical data

Table 9. SO-8 tape and reel mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			330
C	12.8		13.2
D	20.2		
N	60		
T			22.4
Ao	8.1		8.5
Bo	5.5		5.9
Ko	2.1		2.3
Po	3.9		4.1
P	7.9		8.1

Figure 7. SO-8 tape and reel dimensions



6 Revision history

Table 10. Document revision history

Date	Revision	Changes
22-Mar-2013	1	First release.

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