

## N-channel 60 V, 0.07 $\Omega$ typ., 4 A STripFET™ II Power MOSFET in a SOT-223 package

Datasheet - production data

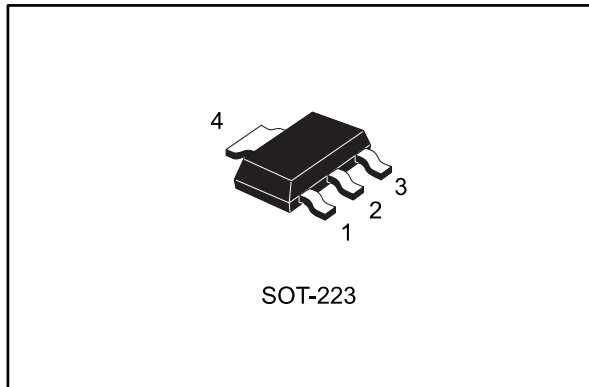
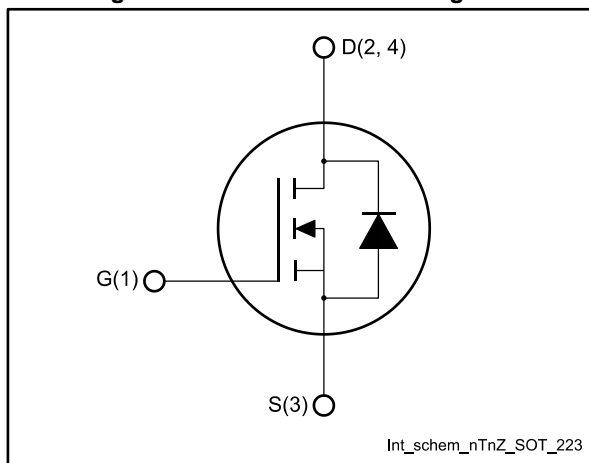


Figure 1: Internal schematic diagram



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STN3NF06L	60 V	0.1 $\Omega$	4 A

- Exceptional dv/dt capability
- 100% avalanche tested
- Low threshold drive

### Applications

- Switching applications

### Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process is specifically designed to minimize input capacitance and gate charge. It is therefore ideal as a primary switch in advanced high-efficiency isolated DC-DC converters for Telecom and Computer applications. It is also suitable for any application with low gate charge drive requirements.

Table 1: Device summary

Order code	Marking	Package	Packing
STN3NF06L	3NF06L	SOT-223	Tape and reel

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# 1 Electrical ratings

**Table 2: Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	60	V
$V_{GS}$	Gate-source voltage	$\pm 16$	V
$I_D^{(1)}$	Drain current (continuous) at $T_c = 25\text{ }^\circ\text{C}$	4	A
$I_D$	Drain current (continuous) at $T_c = 100\text{ }^\circ\text{C}$	2.9	A
$I_{DM}^{(2)}$	Drain current (pulsed)	16	A
$P_{TOT}$	Total dissipation at $T_{pcb} = 25\text{ }^\circ\text{C}$	3.3	W
$dv/dt^{(3)}$	Peak diode recovery voltage slope	10	V/ns
$E_{AS}^{(4)}$	Single pulse avalanche energy	200	mJ
$T_j$	Operating junction temperature range	- 55 to 150	$^\circ\text{C}$
$T_{stg}$	Storage temperature range		

**Notes:**

(1)Current limited by the package.

(2)Pulse width limited by safe operating area.

(3) $I_{SD} \leq 3\text{ A}$ ,  $di/dt \leq 150\text{ A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$

(4)Starting  $T_j = 25\text{ }^\circ\text{C}$ ,  $I_D = 4\text{ A}$ ,  $V_{DD} = 30\text{ V}$

**Table 3: Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}$	Thermal resistance junction-pcb <sup>(1)</sup>	38	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}$	Thermal resistance junction-pcb <sup>(2)</sup>	100	$^\circ\text{C}/\text{W}$

**Notes:**

(1)When Mounted on FR-4 board 1 inch<sup>2</sup> pad, 2 oz. of Cu and  $t < 10\text{ s}$ .

(2)When mounted on minimum recommended footprint.

## 2 Electrical characteristics

$T_C = 25\text{ °C}$  unless otherwise specified

**Table 4: On/off-state**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	60			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = 60\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = 60\text{ V}$ $T_C = 125\text{ °C}^{(1)}$			10	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 16\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1		2.8	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 1.5\text{ A}$		0.07	0.10	$\Omega$
		$V_{GS} = 5\text{ V}$ , $I_D = 1.5\text{ A}$		0.085	0.12	$\Omega$

**Notes:**

<sup>(1)</sup>Defined by design, not subject to production test.

**Table 5: Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	340		pF
$C_{oss}$	Output capacitance		-	63		pF
$C_{riss}$	Reverse transfer capacitance		-	30		pF
$Q_g$	Total gate charge	$V_{DD} = 48\text{ V}$ , $I_D = 3\text{ A}$ $V_{GS} = 0\text{ to }5\text{ V}$ (see <a href="#">Figure 14: "Test circuit for gate charge behavior"</a> )	-	7	9	nC
$Q_{gs}$	Gate-source charge		-	1.5		nC
$Q_{gd}$	Gate-drain charge		-	2.8		nC

**Table 6: Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 30\text{ V}$ , $I_D = 1.5\text{ A}$ , $R_G = 4.7\text{ }\Omega$ $V_{GS} = 5\text{ V}$ (see <a href="#">Figure 13: "Test circuit for resistive load switching times"</a> and <a href="#">Figure 18: "Switching time waveform"</a> )	-	9	-	ns
$t_r$	Rise time		-	25	-	ns
$t_{d(off)}$	Turn-off delay time		-	20	-	ns
$t_f$	Fall time		-	10	-	ns

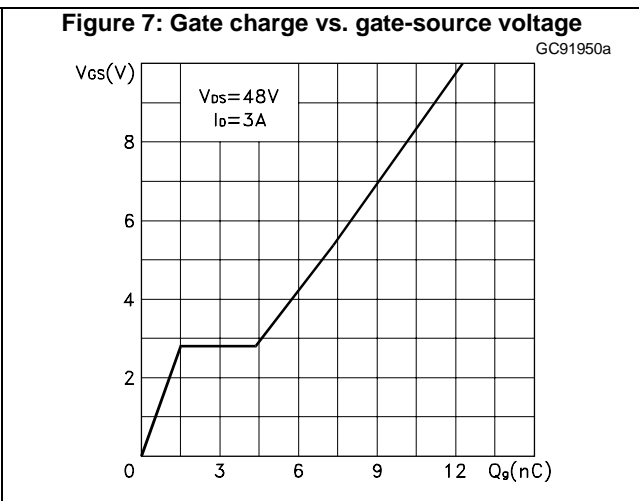
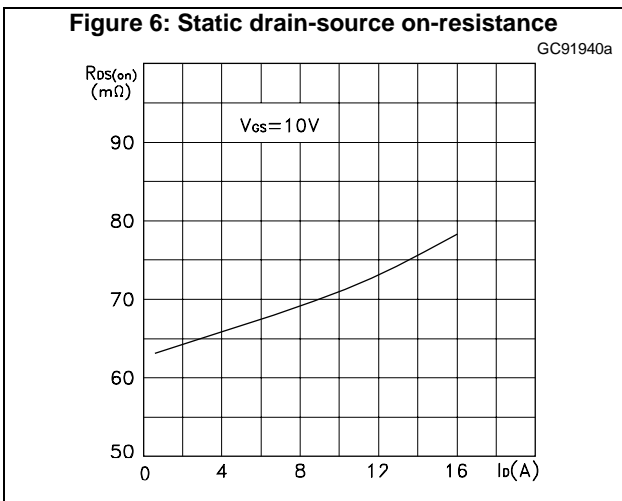
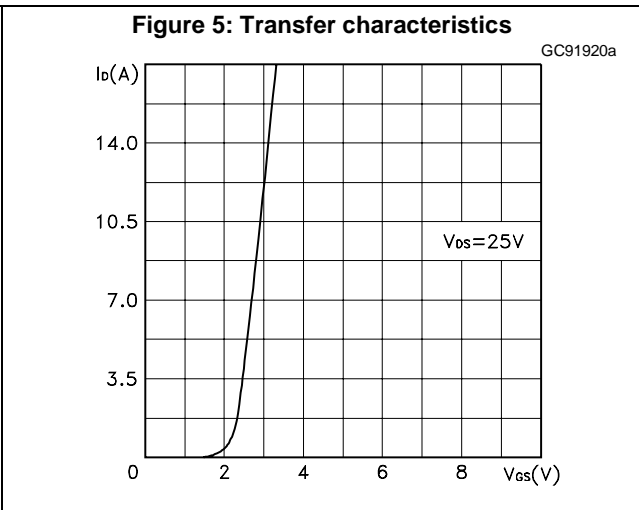
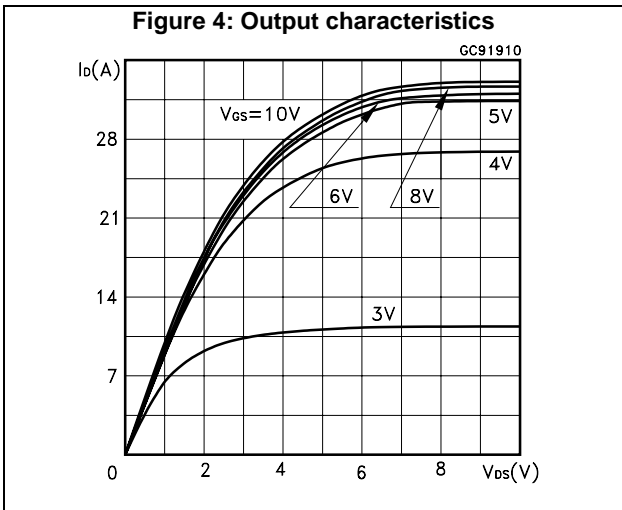
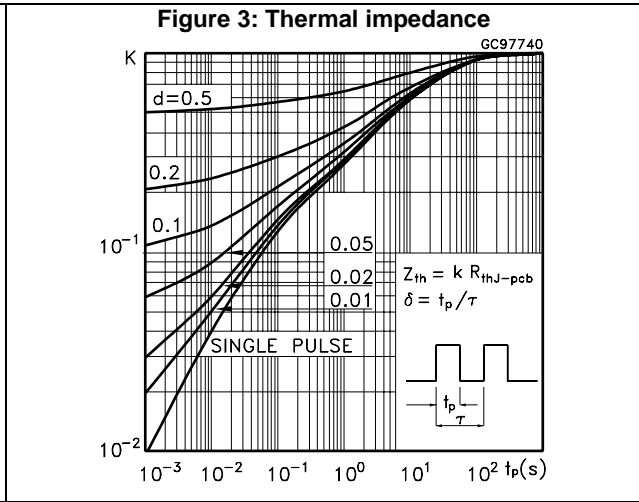
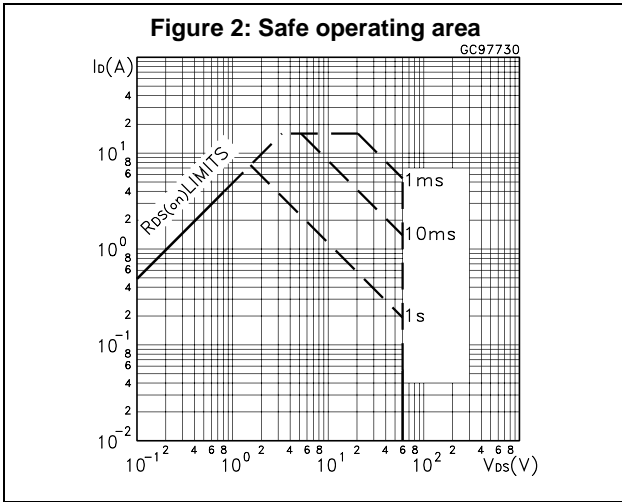
Table 7: Source-drain diode

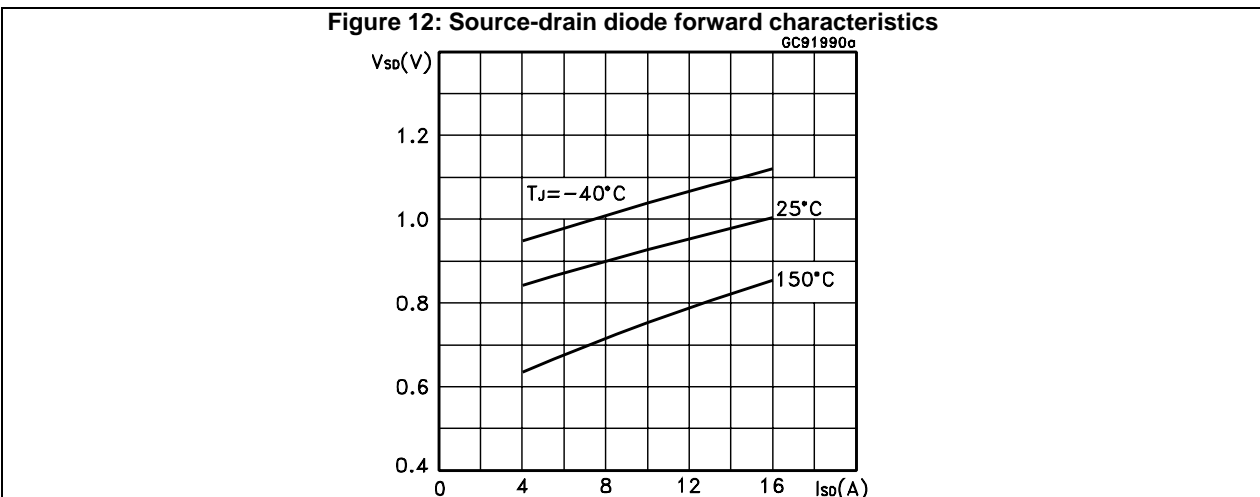
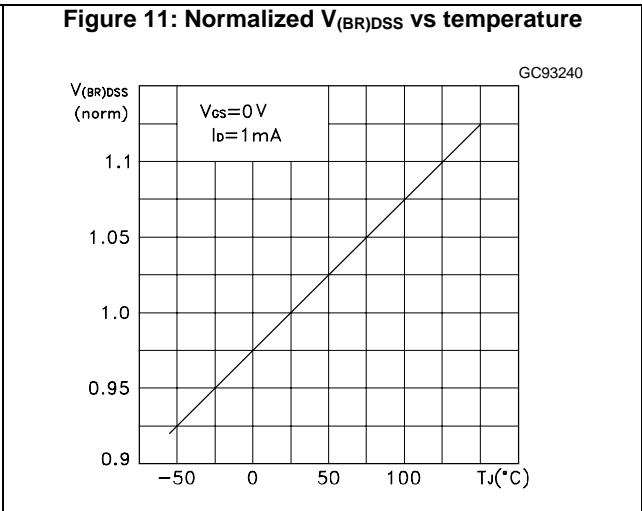
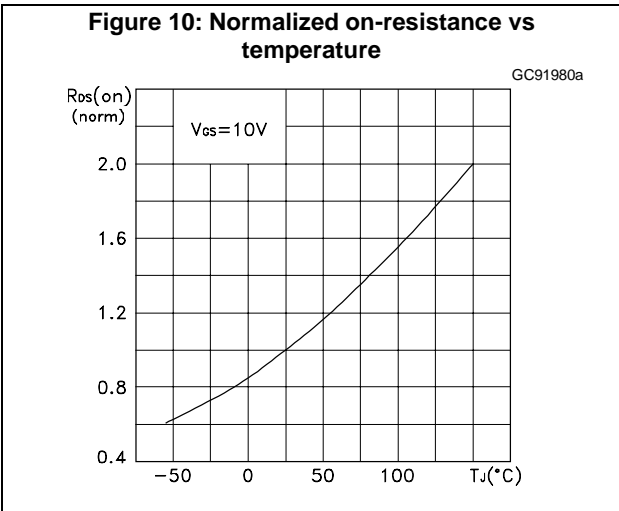
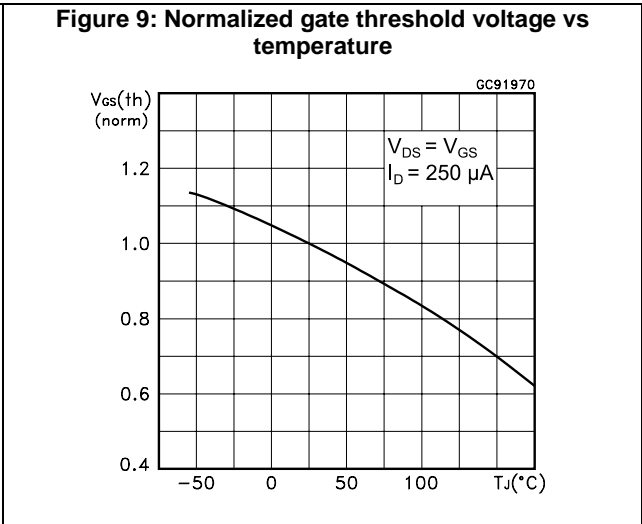
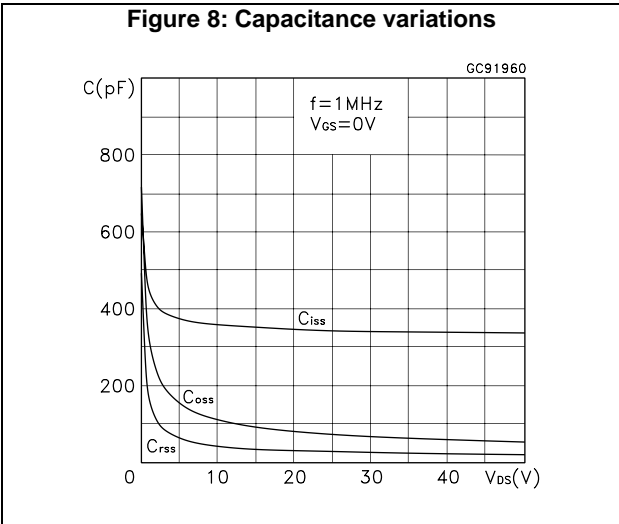
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 4 \text{ A}$ , $V_{GS} = 0 \text{ V}$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 4 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$ , $V_{DD} = 25 \text{ V}$ , $T_j = 150 \text{ }^\circ\text{C}$ (see <a href="#">Figure 15: "Test circuit for inductive load switching and diode recovery times"</a> )	-	50		ns
$Q_{rr}$	Reverse recovery charge		-	88		nC
$I_{RRM}$	Reverse recovery current		-	3.5		A

**Notes:**

<sup>(1)</sup>Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

2.1 Electrical characteristics (curves)





### 3 Test circuits

**Figure 13: Test circuit for resistive load switching times**



AM01468v1

**Figure 14: Test circuit for gate charge behavior**



AM01469v1

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



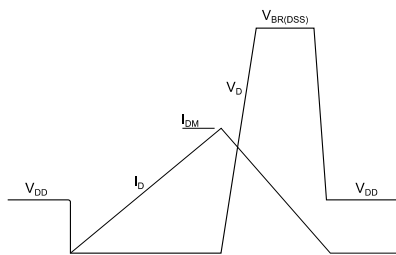
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**Figure 16: Unclamped inductive load test circuit**



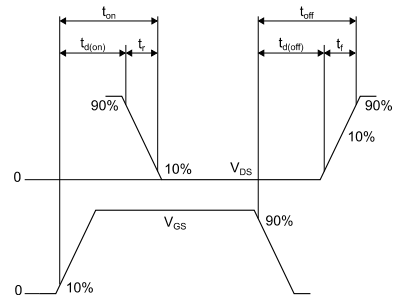
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**Figure 17: Unclamped inductive waveform**



AM01472v1

**Figure 18: Switching time waveform**



AM01473v1



## 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](http://www.st.com). ECOPACK® is an ST trademark.

### 4.1 SOT-223 package information

Figure 19: SOT-223 package outline

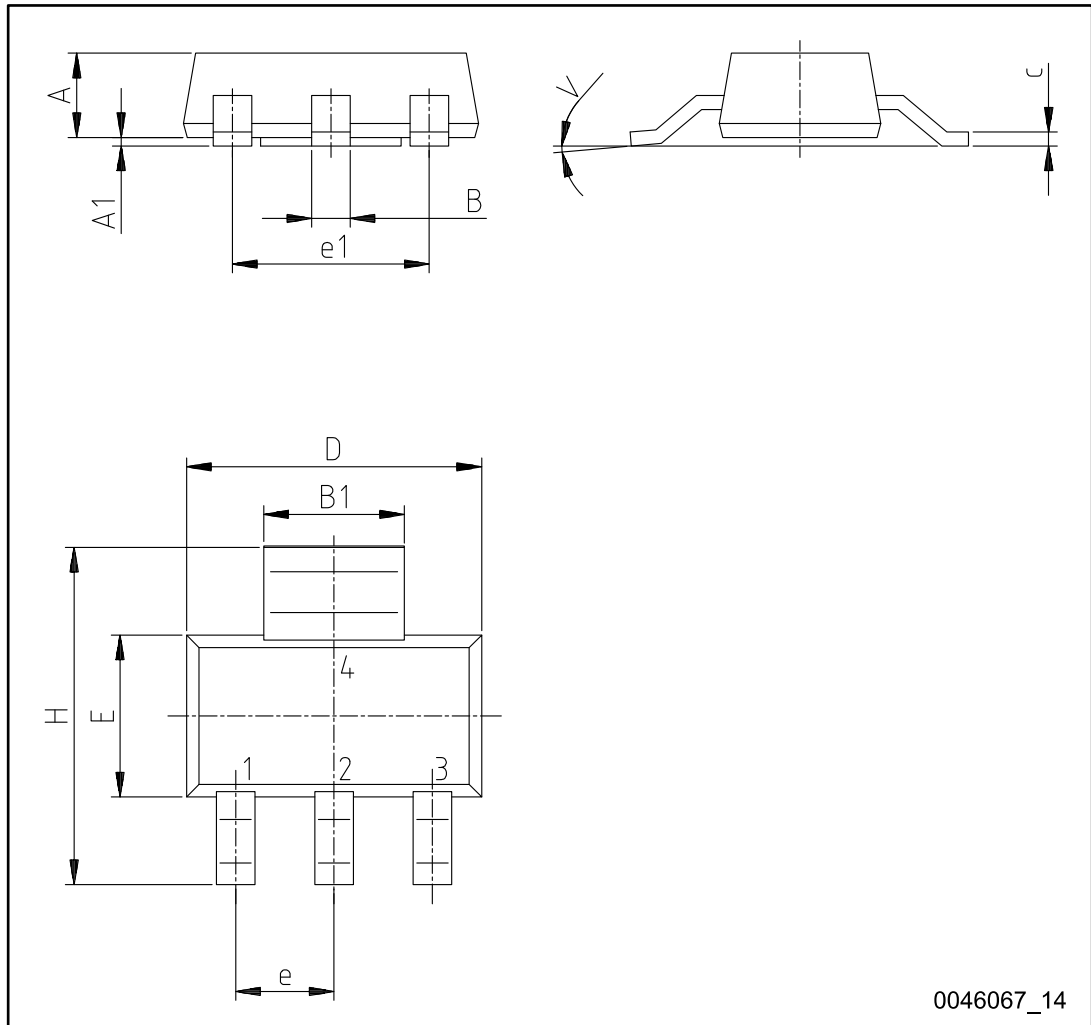
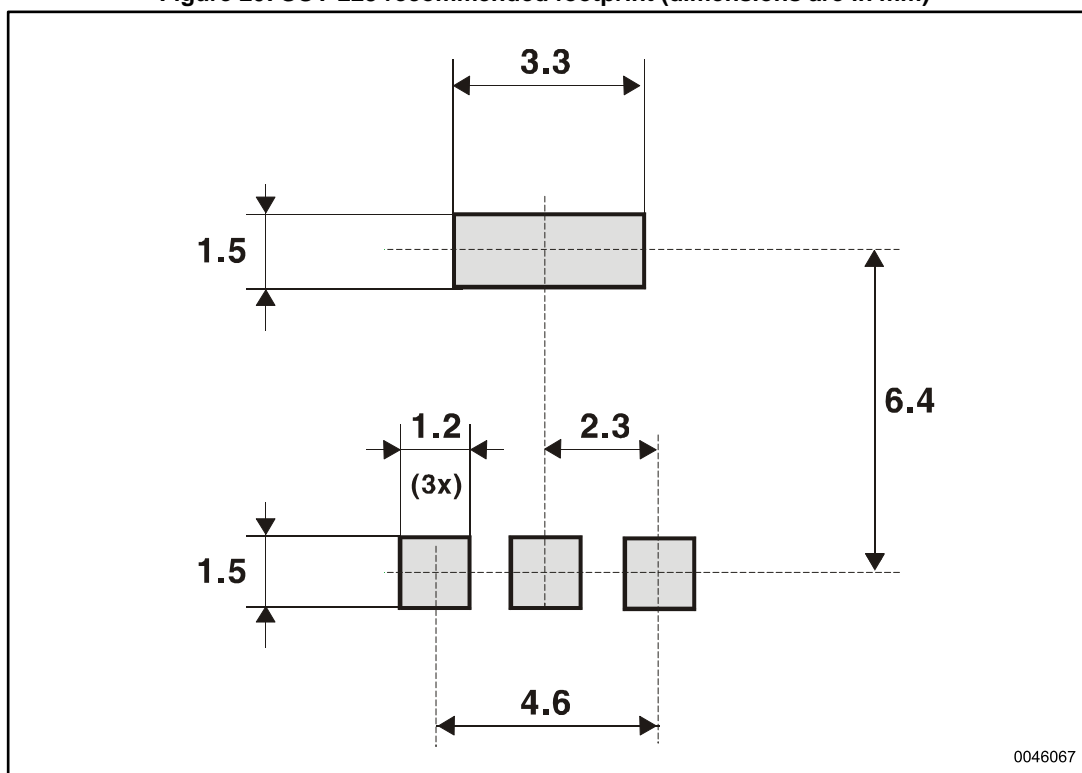


Table 8: SOT-223 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.8
A1	0.02		0.1
B	0.6	0.7	0.85
B1	2.9	3	3.15
c	0.24	0.26	0.35
D	6.3	6.5	6.7
e		2.3	
e1		4.6	
E	3.3	3.5	3.7
H	6.7	7.0	7.3
V			10°

Figure 20: SOT-223 recommended footprint (dimensions are in mm)



## 5 Revision history

Table 9: Document revision history

Date	Revision	Changes
21-Jun-2004	5	Complete version.
04-Oct-2006	6	New template, no content change.
01-Feb-2007	7	Typo mistake on Table 2.
12-Jun-2008	8	Corrected marking on Table 1
03-Jul-2017	9	Modified internal schematic diagram on cover page. Updated <a href="#">Section 4: "Package information"</a> . Minor text changes.

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