



STN2NF10

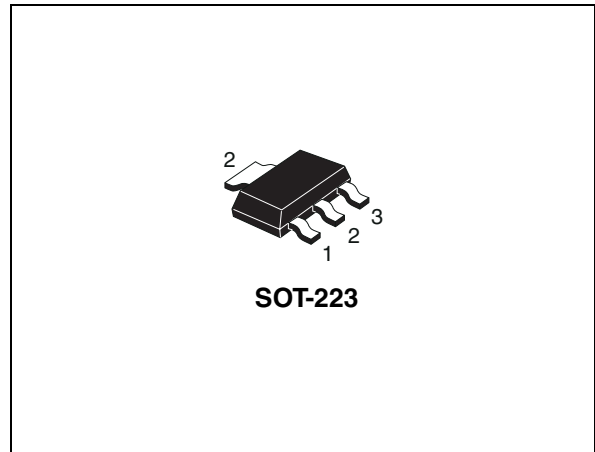
N-channel 100V - 0.23Ω - 2.4A - SOT-223
STripFET™ II Power MOSFET

Features

Type	V _{DSS}	R _{DS(on)}	I _D
STN2NF10	100V	< 0.26Ω	2.4A

Description

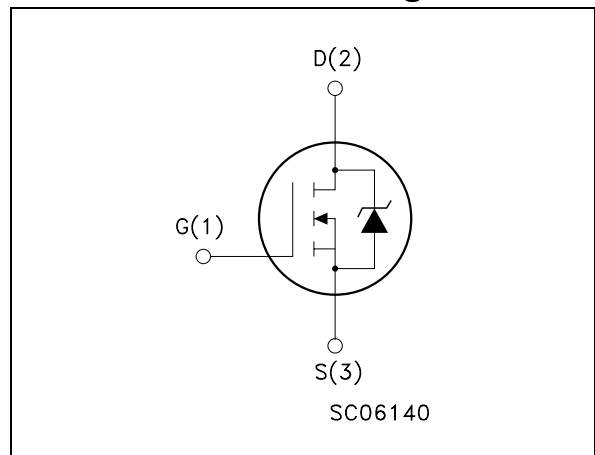
This Power MOSFET is the latest development of STMicroelectronics unique “single feature size” strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.



Application

- Switching application
 - DC-DC converters

Internal schematic diagram



Order code

Part number	Marking	Package	Packaging
STN2NF10	N2NF10	SOT-223	Tape & reel

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1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS}=0$)	100	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$	2.4	A
I_D	Drain current (continuous) at $T_C = 100^\circ\text{C}$	1.5	A
$I_{DM}^{(1)}$	Drain current (pulsed)	17	A
	Derating factor	0.026	W/ $^\circ\text{C}$
$P_{TOT}^{(2)}$	Total dissipation at $T_C = 25^\circ\text{C}$	3.3	W
$E_{AS}^{(3)}$	Single pulse avalanche energy	200	mJ
$dv/dt^{(4)}$	Peak diode recovery voltage slope	30	V/ns
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 150	$^\circ\text{C}$

1. Pulse width limited by safe operating area
2. This value is rated according to $R_{thj-amb}$, $t \leq 10\text{sec}$
3. $I_{AS} = 2.4\text{A}$, $V_{DD} = 30\text{V}$, $R_g = 4.7\Omega$, starting $T_j = 25^\circ\text{C}$
4. $I_{SD} \leq 6\text{A}$, $di/dt \leq 500\text{A}/\mu\text{s}$, $V_{DD} = 80\% V_{(BR)DSS}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-amb}^{(1)}$	Thermal resistance junction-amb	38	$^\circ\text{C}/\text{W}$
$R_{thj-amb}^{(2)}$	Thermal resistance junction-amb	62.5	$^\circ\text{C}/\text{W}$

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

2 Electrical characteristics

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

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0$	100			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$, $V_{DS} = \text{Max rating}$, $T_c=125^{\circ}\text{C}$ $V_{DS} = 30\text{V}$, $T_c=125^{\circ}\text{C}$			1 10 1	μA μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{V}$, $I_D = 1.2\text{A}$		0.23	0.26	Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward transconductance	$V_{DS} = 15\text{V}$, $I_D = 1.2\text{A}$		2.5		S
C_{iss}	Input capacitance	$V_{DS} = 25\text{V}$, $f = 1\text{MHz}$, $V_{GS} = 0$		280		pF
C_{oss}	Output capacitance			45		pF
C_{rss}	Reverse transfer capacitance			20		pF
Q_g	Total gate charge	$V_{DD} = 80\text{V}$, $I_D = 6\text{A}$		10	14	nC
Q_{gs}	Gate-source charge	$V_{GS} = 10\text{V}$		2.5		nC
Q_{gd}	Gate-drain charge	(see Figure 15)		4		nC

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	$V_{DD}=50V$, $I_D = 2.4A$ $V_{GS}=10V$, $R_G=4.7\Omega$ (see Figure 14)		6 10		ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	$V_{DD}=50V$, $I_D = 2.4A$ $V_{GS}=10V$, $R_G=4.7\Omega$ (see Figure 14)		20 3		ns ns

Table 6. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
I_{SD} $I_{SDM}^{(1)}$	Source-drain current Source-drain current (pulsed)				2.4 17	A A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD}= 2.4A$, $V_{GS}=0$			1.2	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	$I_{SD}= 6A$, $V_{DD}=10V$ $di/dt=100A/\mu s$, $T_j=150^\circ C$ (see Figure 19)		70 175 5		ns nC 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 1. Safe operating area

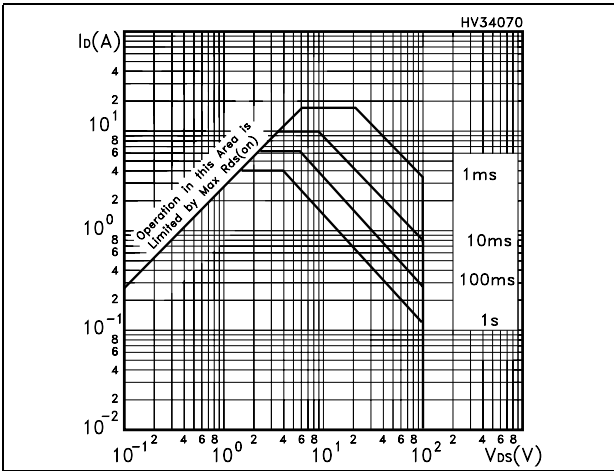


Figure 2. Thermal impedance

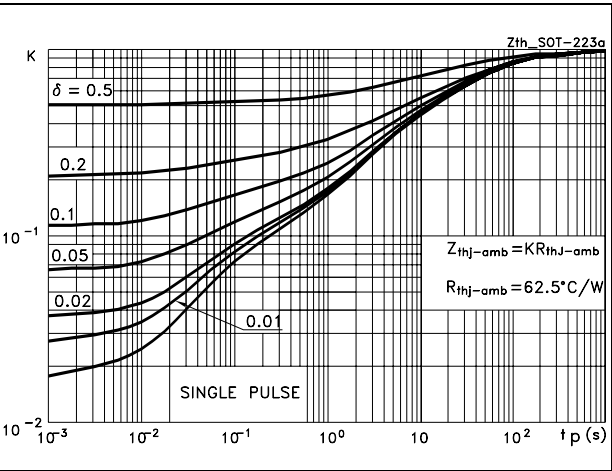


Figure 3. Output characteristics

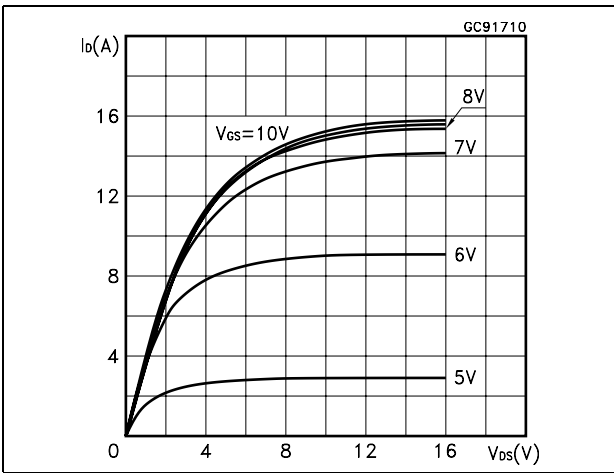


Figure 4. Transfer characteristics

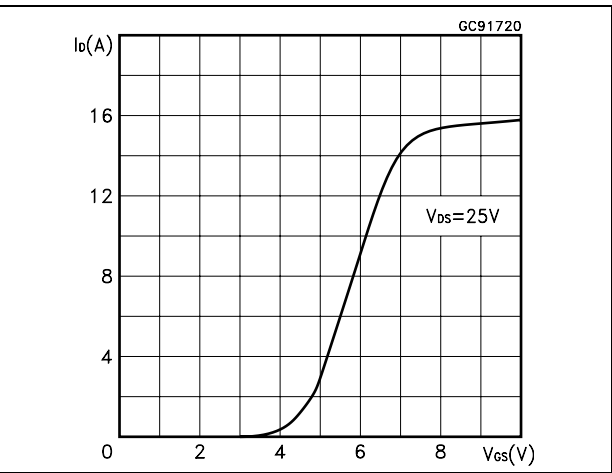


Figure 5. Transconductance

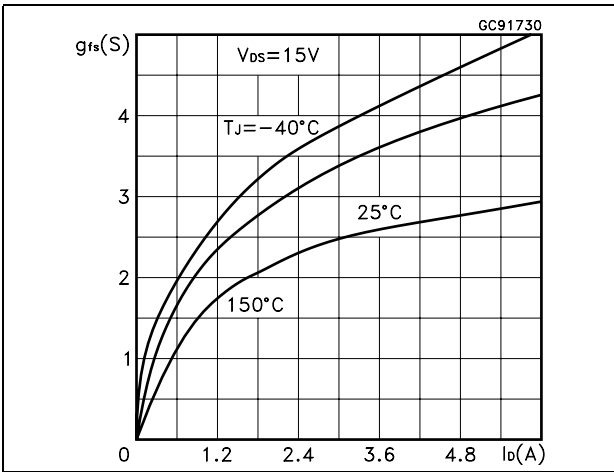


Figure 6. Static drain-source on resistance

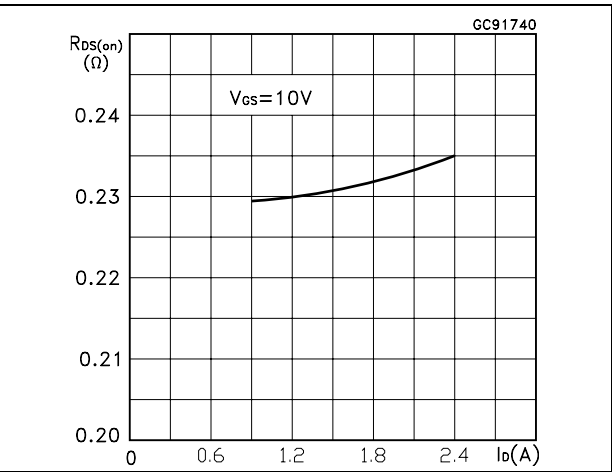


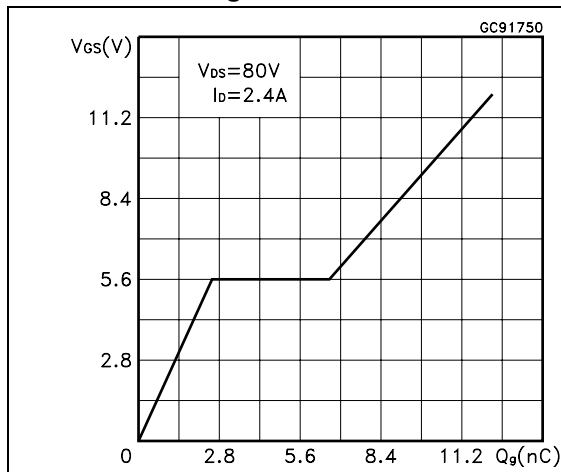
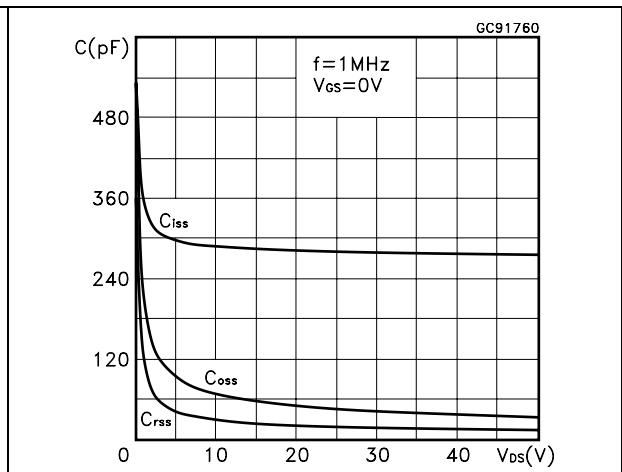
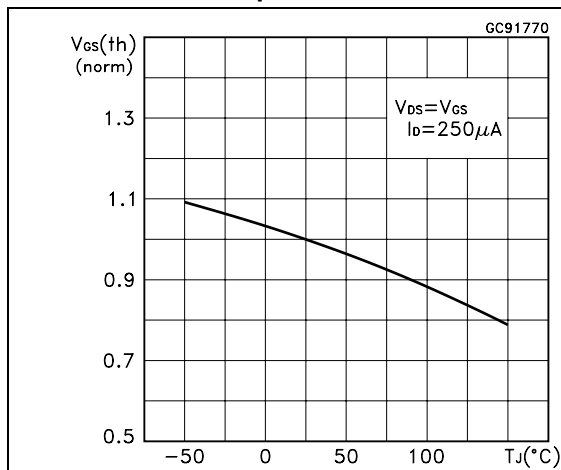
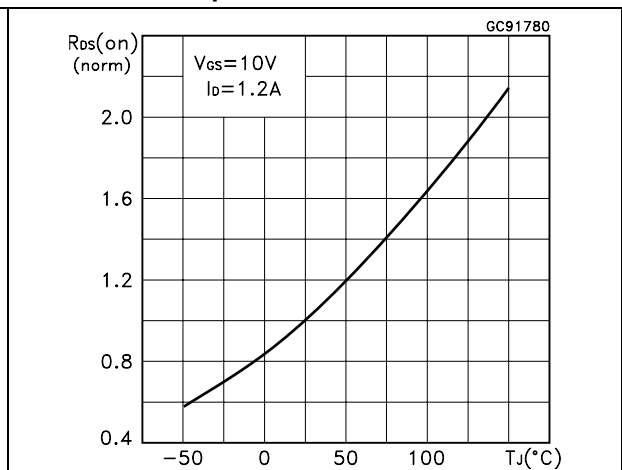
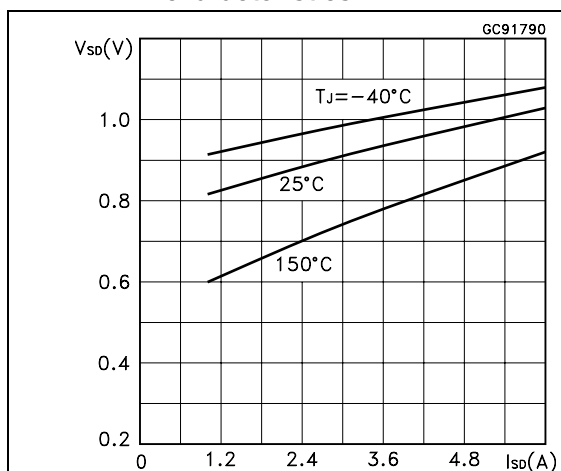
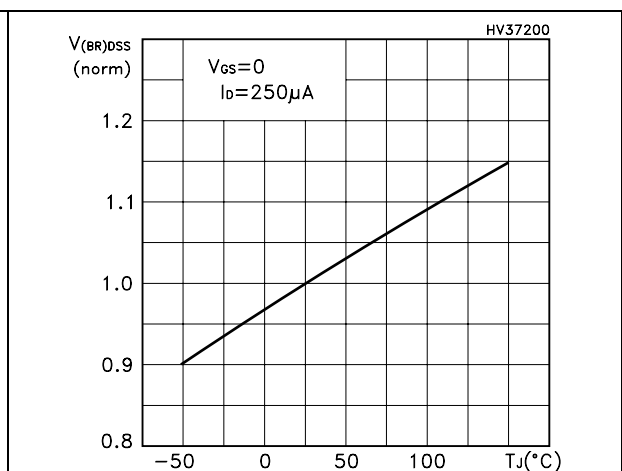
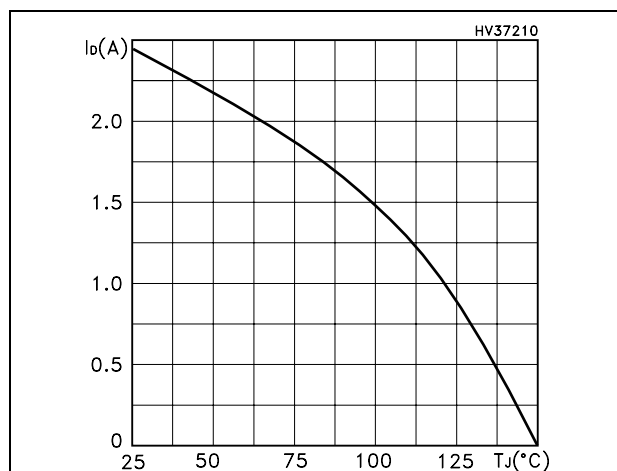
Figure 7. Gate charge vs. gate-source voltage**Figure 8. Capacitance variations****Figure 9. Normalized gate threshold voltage vs. temperature****Figure 10. Normalized on resistance vs. temperature****Figure 11. Source-drain diode forward characteristics****Figure 12. Normalized BV_{DSS} vs. temperature**

Figure 13. Max drain current vs. temperature

3 Test circuit

Figure 14. Switching times test circuit for resistive load

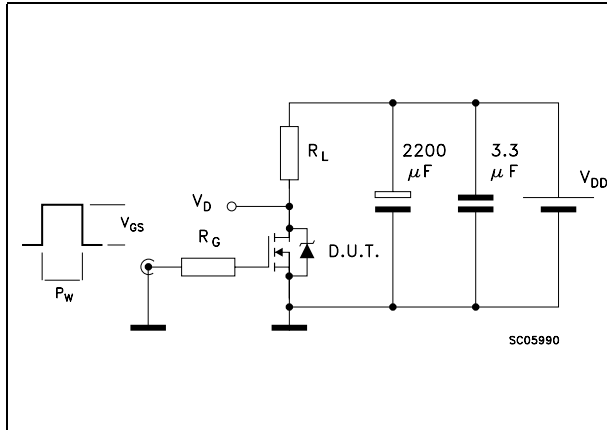


Figure 15. Gate charge test circuit

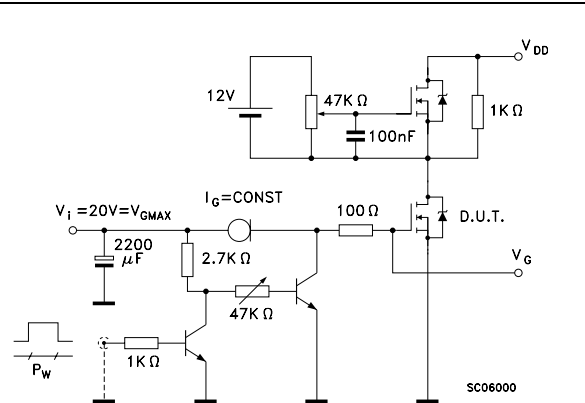


Figure 16. Test circuit for inductive load switching and diode recovery times

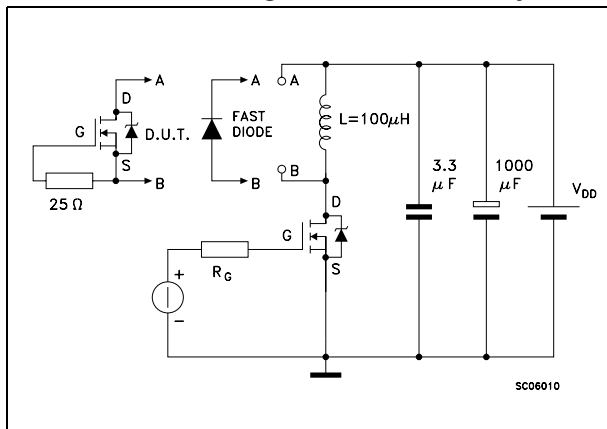


Figure 17. Unclamped inductive load test circuit

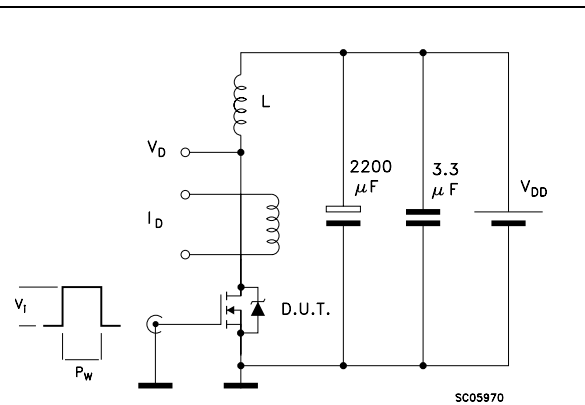


Figure 18. Unclamped inductive waveform

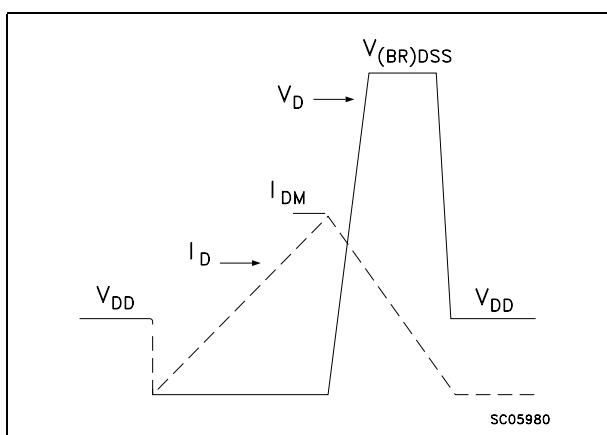
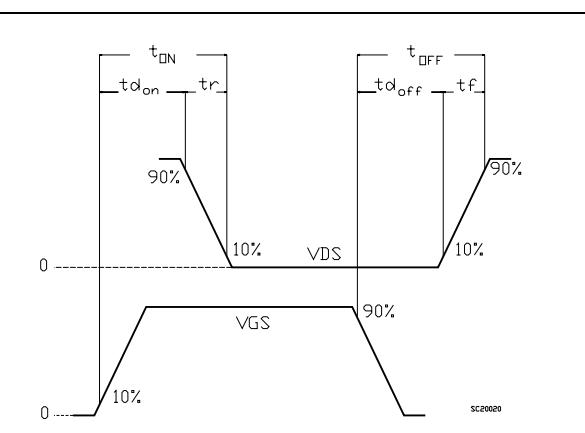


Figure 19. Switching time waveform



4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com

SOT-223 MECHANICAL DATA						
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10°			10°
A1		0.02				

The mechanical drawing illustrates the SOT-223 package in three views: top, side, and bottom. The top view shows dimensions A (height of the top flange), A1 (thickness of the top flange), B (width of the top flange), B1 (width of the main body), c (width of the top flange base), D (width of the main body), e (pitch of the leads), e1 (width of the lead base), and H (height of the main body). The side view shows the profile of the package with a 10-degree lead angle V. The bottom view shows the lead configuration with dimensions 1, 2, and 3 indicating the lead positions, and e indicating the pitch. The drawing is labeled P008B.

5 Revision history

Table 7. Revision history

Date	Revision	Changes
14-Sep-2006	4	The document has been reformatted
29-Mar-2007	5	<i>Figure 1</i> has been updated
04-Apr-2007	6	New test condition for I_{DSS} on <i>Table 3</i>

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