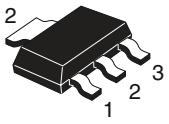
STN2NF10

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



SOT-223

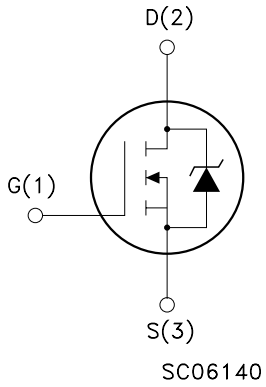
Description

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

Contents

1 Electrical ratings 3

2 Electrical characteristics 4

2.1 Electrical characteristics (curves) 6

3 Test circuit 9

4 Package mechanical data 10

5 Revision history 12

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°C	2.4	A
I_D	Drain current (continuous) at T_C = 100°C	1.5	A
I_{DM} (1)	Drain current (pulsed)	17	A
	Derating factor	0.026	W/°C
P_{TOT} (2)	Total dissipation at T_C = 25°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	°C

1. Pulse width limited by safe operating area
2. This value is rated according to Rthj-amb, t ≤ 10sec
3. I_{AS} = 2.4A, V_{DD} = 30V, Rg=4.7Ω, starting Tj = 25°C
4. I_{SD} ≤ 6A, di/dt ≤ 500A/µs, V_{DD}= 80% $V_{(BR)DSS}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
Rthj-amb (1)	Thermal resistance junction-amb	38	°C/W
Rthj-amb (2)	Thermal resistance junction-amb	62.5	°C/W

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

2 Electrical characteristics

(T_{CASE}=25°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 = 250µA, V_{GS}= 0	100			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating,Tc=125°C V_{DS} = 30V, Tc=125°C			1 10 1	µA µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 1.2A		0.23	0.26	Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward transconductance	V_{DS} =15V, I_D=1.2A		2.5		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25V, f=1MHz, V_{GS}=0		280 45 20		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=80V, I_D = 6A V_{GS} =10V *(see Figure 15)*		10 2.5 4	14	nC nC 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=4.7Ω *(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=4.7Ω *(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/µs,Tj=150°C *(see Figure 19)*		70 175 5		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

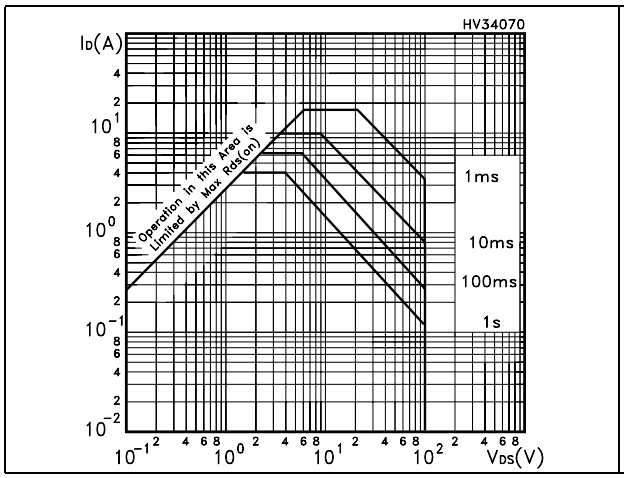


Figure 2. Thermal impedance

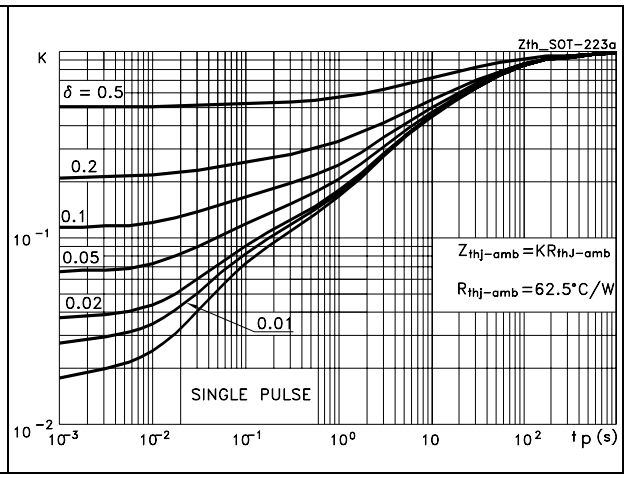


Figure 3. Output characteristics

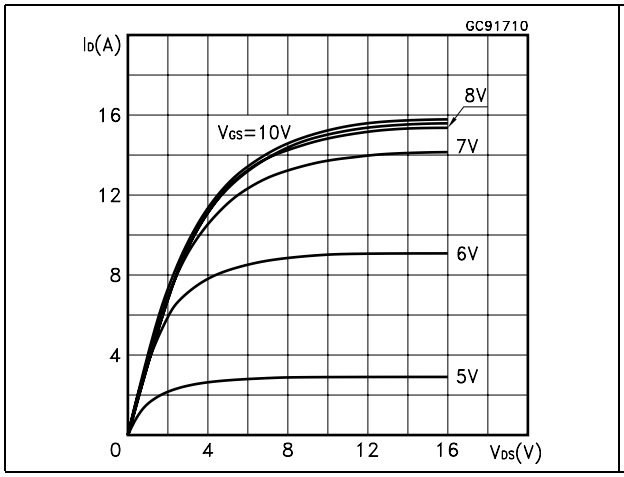


Figure 4. Transfer characteristics

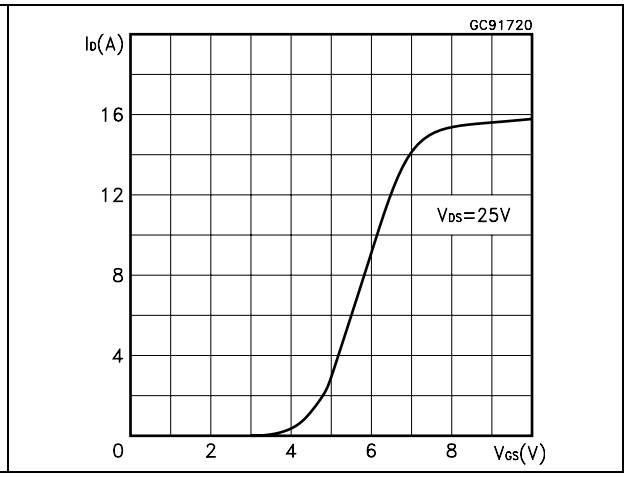


Figure 5. Transconductance

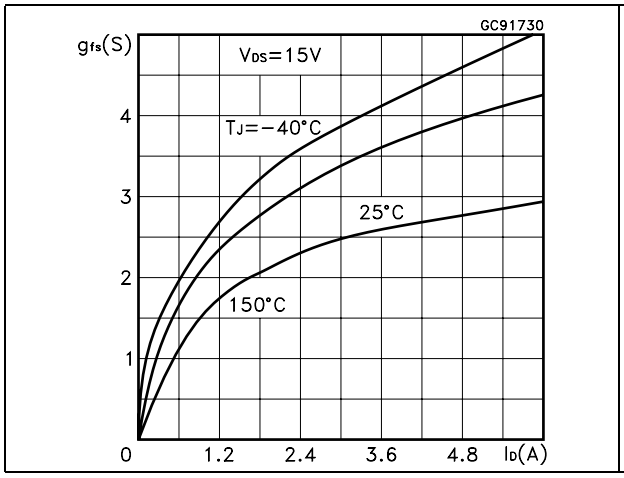


Figure 6. Static drain-source on resistance

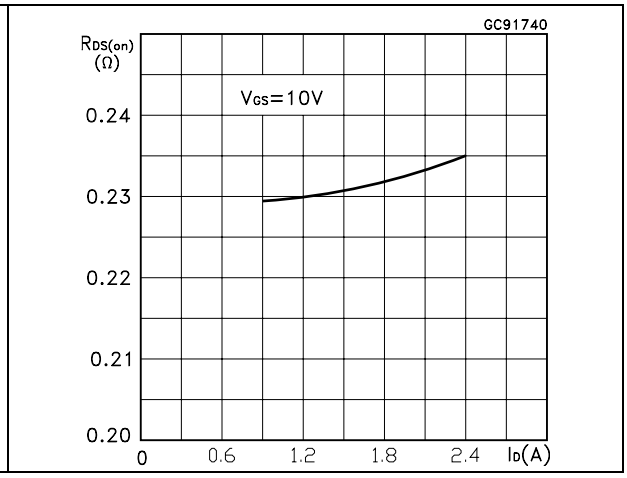


Figure 7. Gate charge vs. gate-source voltage

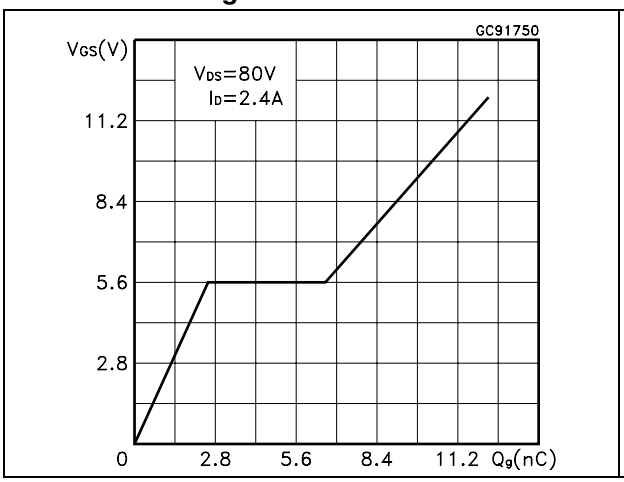


Figure 8. Capacitance variations

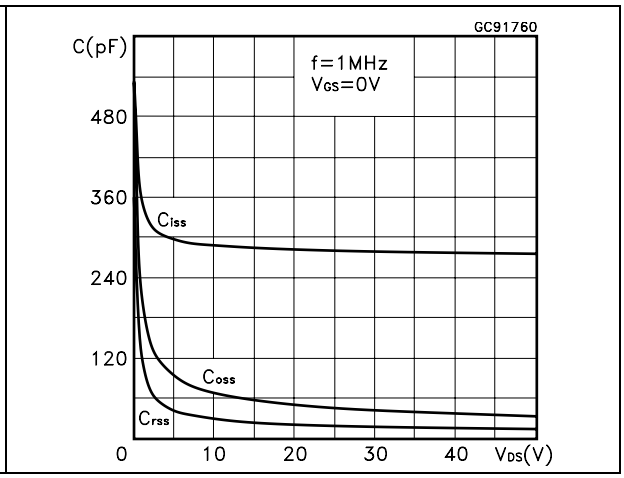


Figure 9. Normalized gate threshold voltage vs. temperature

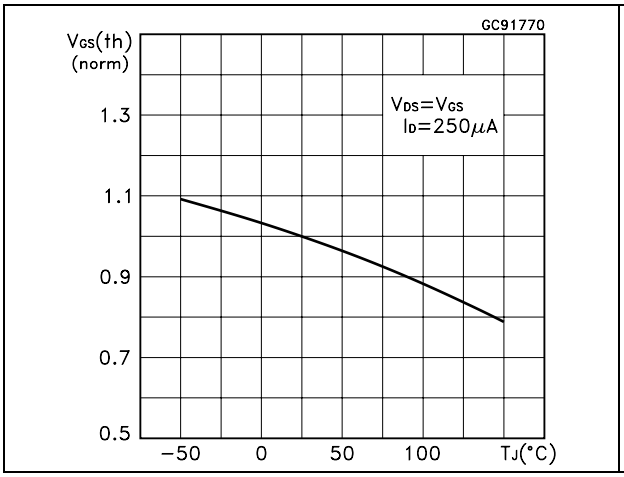


Figure 10. Normalized on resistance vs. temperature

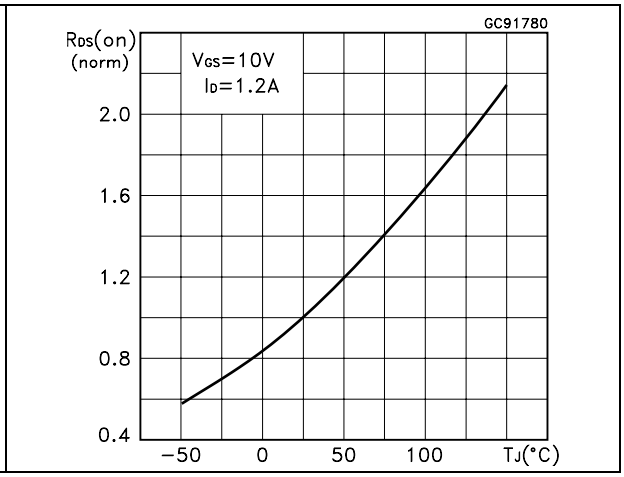


Figure 11. Source-drain diode forward characteristics

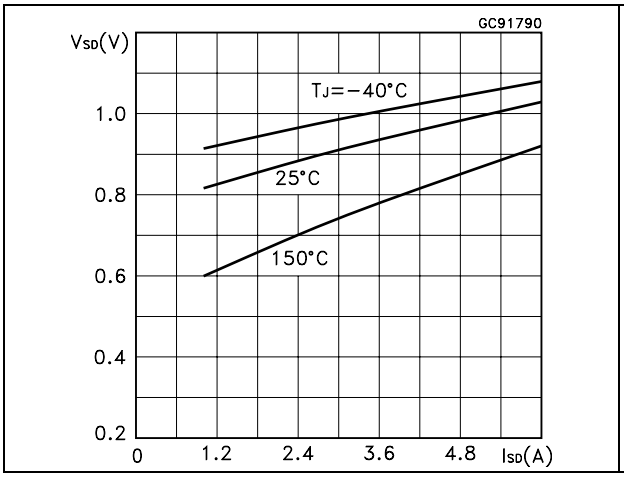


Figure 12. Normalized BV_{DSS} vs. temperature

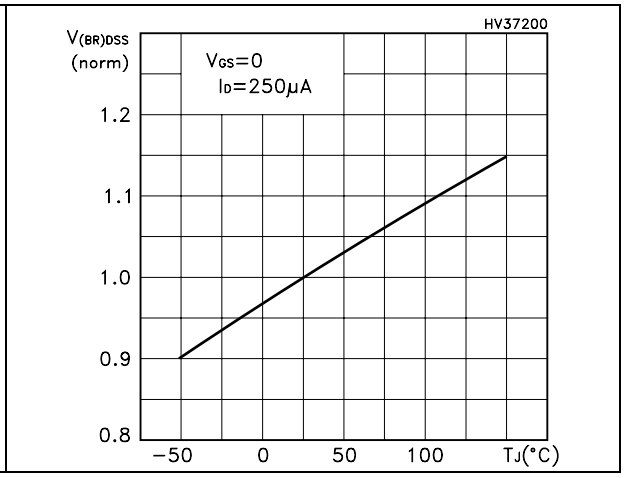
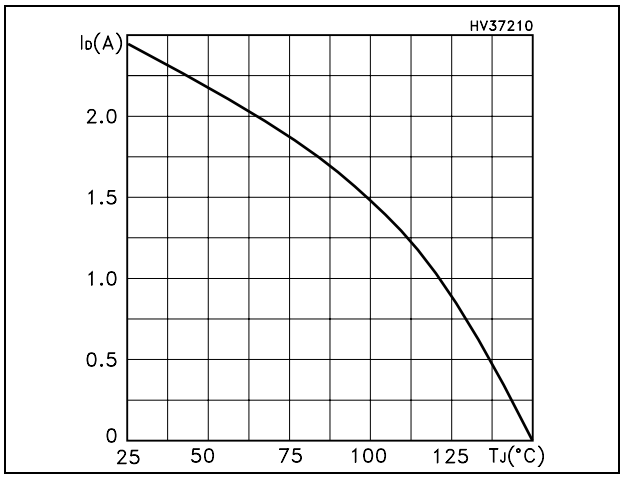


Figure 13. Max drain current vs. temperature



3 Test circuit

Figure 14. Switching times test circuit for resistive load

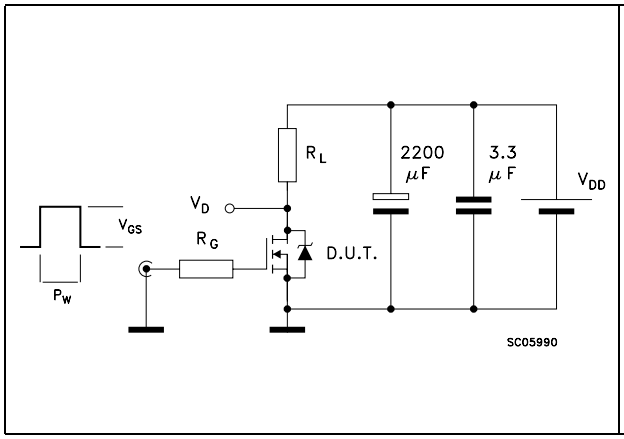


Figure 15. Gate charge test circuit

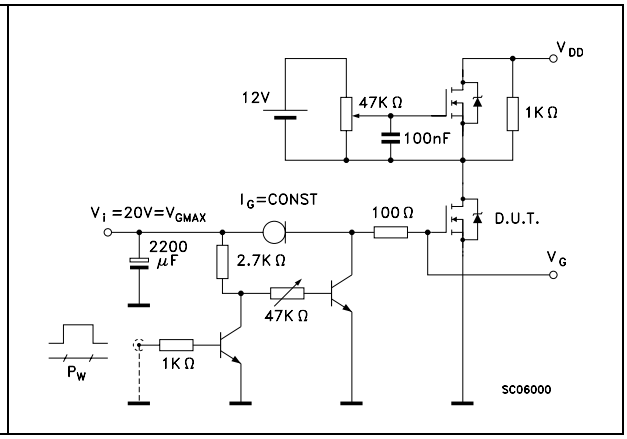


Figure 16. Test circuit for inductive load switching and diode recovery times

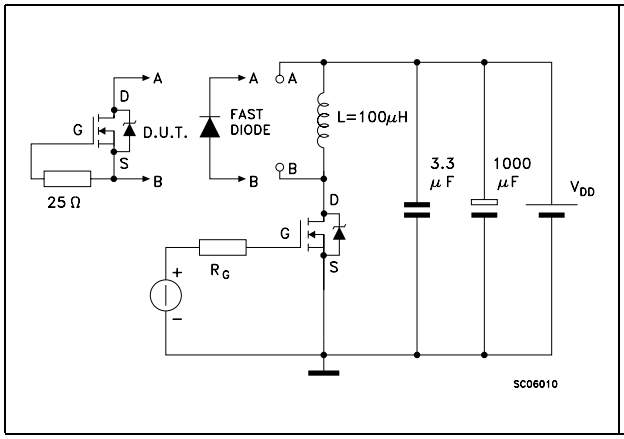


Figure 17. Unclamped inductive load test circuit

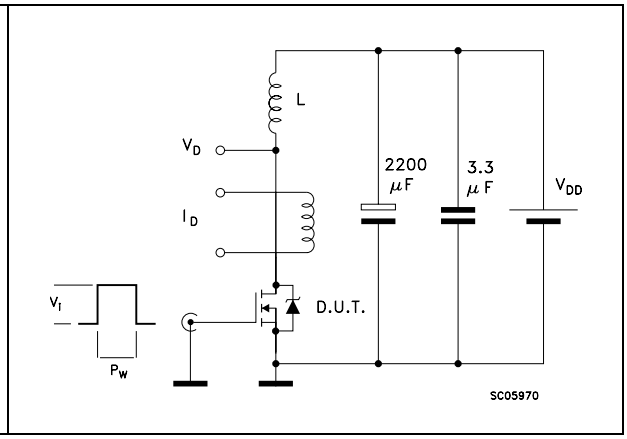


Figure 18. Unclamped inductive waveform

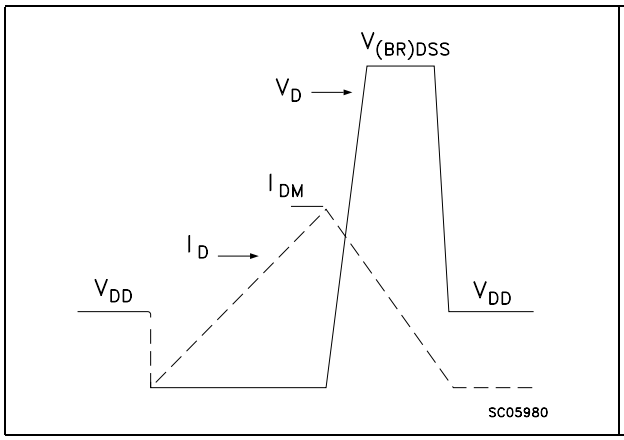
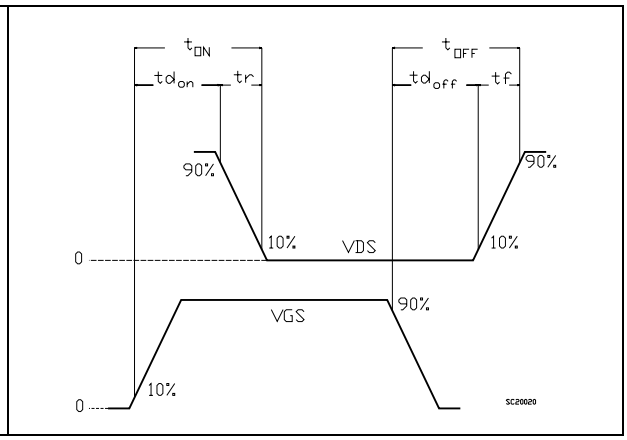


Figure 19. Switching time waveform

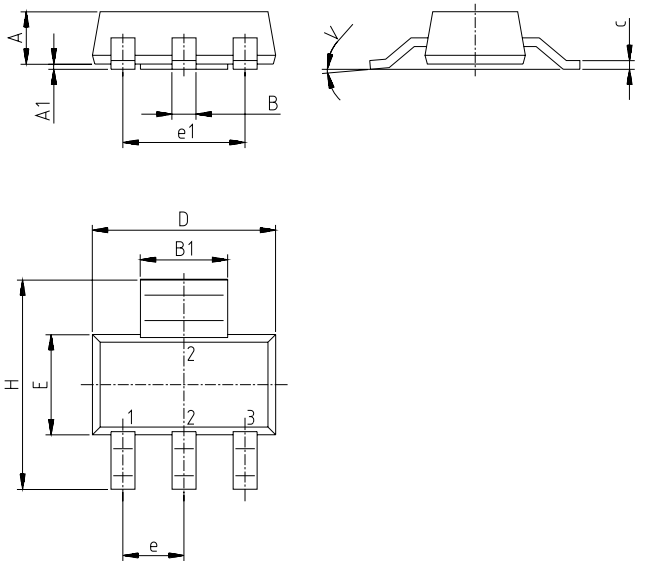


4 Package mechanical data

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				



P008B

5 Revision history

Table 7. Revision history

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

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