



## STC5DNF30V

Dual N-channel 30V - 0.032Ω - 4.5A - TSSOP8  
2.7V-Driver STripFET™ Power MOSFET

### General features

Type	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STC5DNF30V	30V	< 0.035Ω (@4.5V) < 0.040Ω (@2.7V)	4.5A

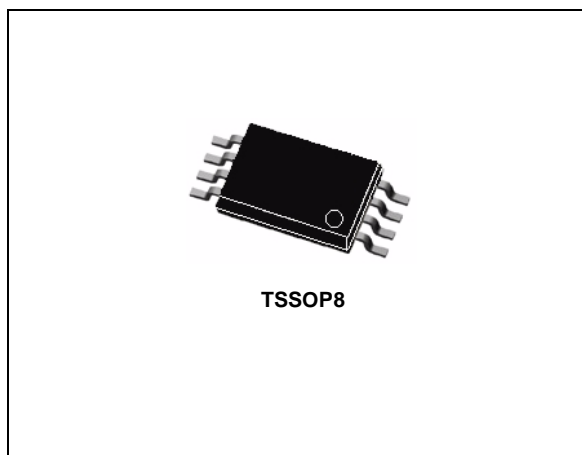
- Standard outline for easy automated surface mount assembly
- Ultra low threshold gate drive (2.7V)

### Description

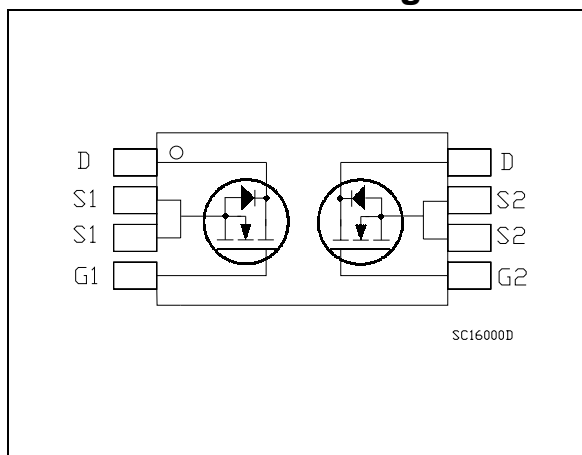
This Power MOSFET is the latest development of STMicroelectronics unique “Single Feature Size™” strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility. No electrical connections are shared between mosfets.

### Applications

- Switching application



### Internal schematic diagram



### Order codes

Part number	Marking	Package	Packaging
STC5DNF30V	C5DNF30V	TSSOP8	Tape & reel

# Contents

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# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0$ )	30	V
$V_{GS}$	Gate- source voltage	$\pm 8$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	4.5	A
$I_D^{(1)}$	Drain current (continuous) at $T_C = 100^\circ\text{C}$	2.8	A
$I_{DM}^{(2)}$	Drain current (pulsed)	18	A
$P_{TOT}^{(1)}$	Total dissipation at $t_c = 25^\circ\text{C}$	1.3	W

1. When mounted on FR-4 board with 1inch<sup>2</sup> pad, 2 Oz of Cu and  $t < 10\text{sec}$ .
2. Pulse width limited by safe operating area

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	120	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(2)}$	Thermal resistance junction-pcb max	97.5	$^\circ\text{C}/\text{W}$
$T_j$	Operating junction temperature	-55 to 150	$^\circ\text{C}$
$T_{stg}$	Storage temperature	-55 to 150	$^\circ\text{C}$

1. When mounted on minimum recommended footprint.
2. When mounted on FR-4 board with 1inch<sup>2</sup> pad, 2 Oz of Cu and  $t < 10\text{sec}$ .

## 2 Electrical characteristics

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

**Table 3. On/off**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\mu\text{A}$ , $V_{GS} = 0$	30			V
$I_{DSS}$	Zero gate voltage drain current ( $V_{GS} = 0$ )	$V_{DS} = \text{Max rating}$ $V_{DS} = \text{Max rating}, T_C = 125^\circ\text{C}$			1 10	$\mu\text{A}$ $\mu\text{A}$
$I_{GSS}$	Gate-body leakage current ( $V_{DS} = 0$ )	$V_{GS} = \pm 8\text{V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	0.6			V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 4.5\text{V}$ , $I_D = 2.3\text{A}$ $V_{GS} = 2.7\text{V}$ , $I_D = 2.3\text{A}$		0.032 0.036	0.035 0.040	$\Omega$ $\Omega$

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}$	Forward transconductance	$V_{DS} = 25\text{V}$ ; $I_D = 2.3\text{A}$		9.5		S
$C_{iss}$ $C_{oss}$ $C_{rss}$	Input capacitance Output capacitance Reverse transfer capacitance	$V_{DS} = 25\text{V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$		460 200 50		pF pF pF
$Q_g$ $Q_{gs}$ $Q_{gd}$	Total gate charge Gate-source charge Gate-drain charge	$V_{DD} = 16\text{V}$ , $I_D = 4.5\text{A}$ , $V_{GS} = 4.5\text{V}$ (see Figure 14)		8.5 1.8 2.4	11.5	ns ns ns

**Table 5. 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	$V_{DD} = 10\text{V}$ , $I_D = 2.3\text{A}$ , $R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{V}$ (see Figure 13)		7 33 27 10		ns ns ns ns
$t_{r(Voff)}$ $t_f$ $t_c$	Off-voltage rise time Fall time Cross-over time	$V_{DD} = 16\text{V}$ , $I_D = 2.3\text{A}$ , $R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{V}$ (see Figure 17)		26 11 21		ns ns ns

**Table 6. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current				4.5	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				18	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 4.5A, V_{GS} = 0$			1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 4.5A, di/dt = 100A/\mu s,$		26		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 10V, T_j = 150^\circ C$		13		nC
$I_{RRM}$	Reverse recovery current	(see Figure 15)		1		A

1. Pulse width limited by safe operating area.
2. Pulsed: Pulse duration = 300  $\mu s$ , duty cycle 1.5 %.

## 2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

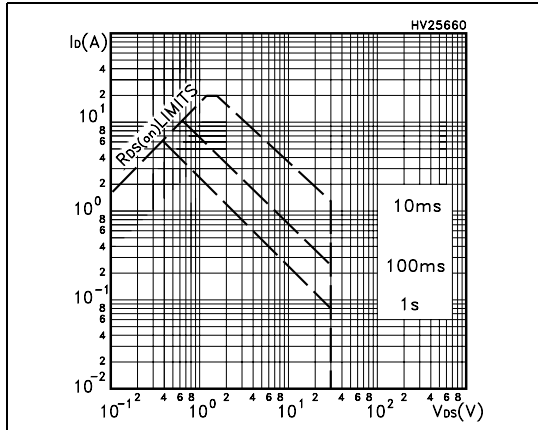


Figure 2. Thermal impedance

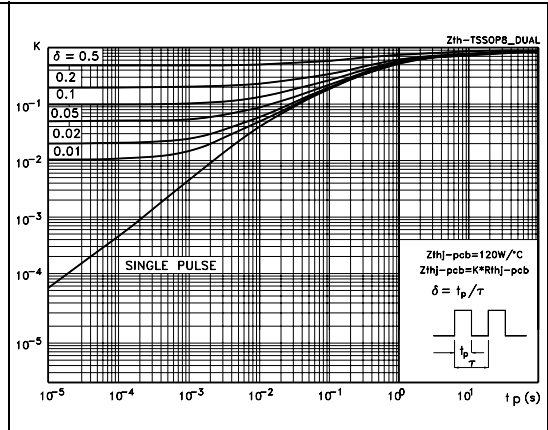


Figure 3. Output characteristics

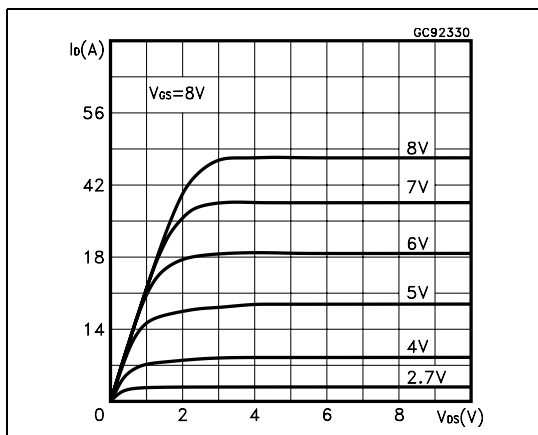


Figure 4. Transfer characteristics

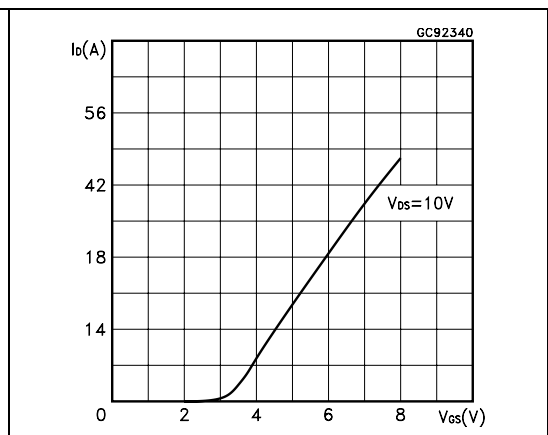


Figure 5. Transconductance

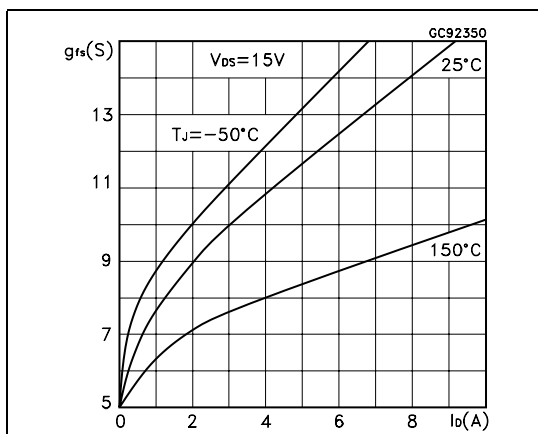


Figure 6. Static drain-source on resistance

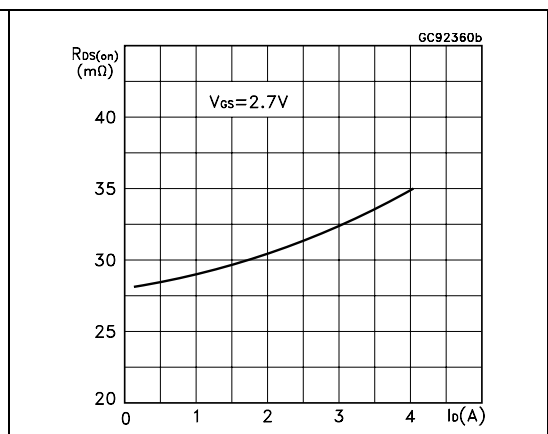


Figure 7. Gate charge vs gate-source voltage

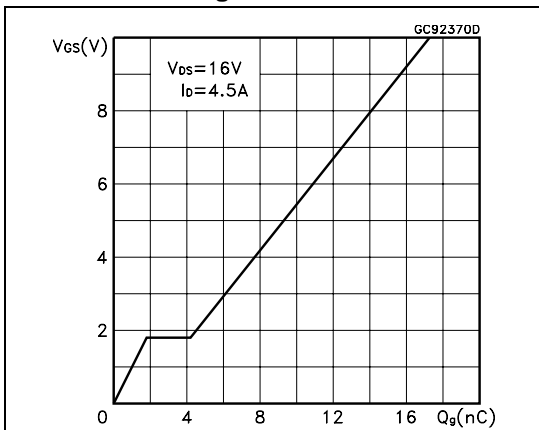


Figure 8. Capacitance variations

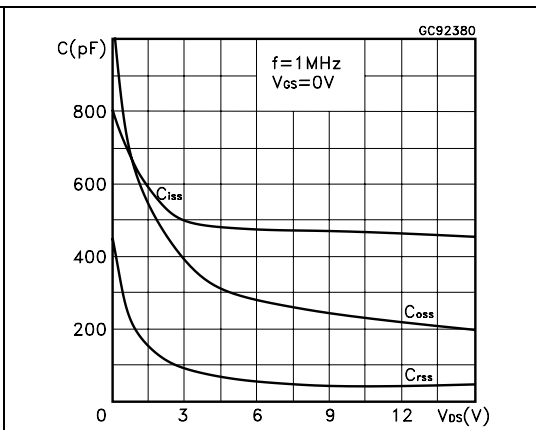


Figure 9. Normalized gate threshold voltage vs temperature

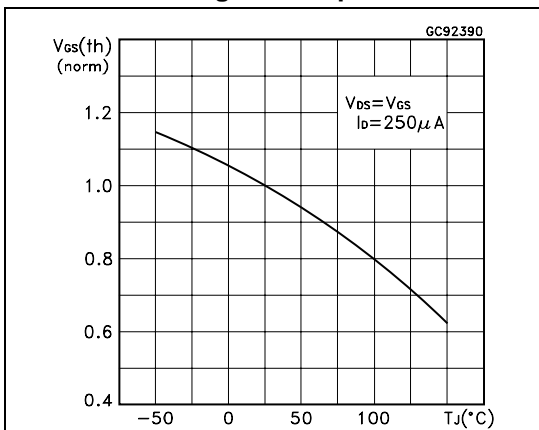


Figure 10. Normalized on resistance vs temperature

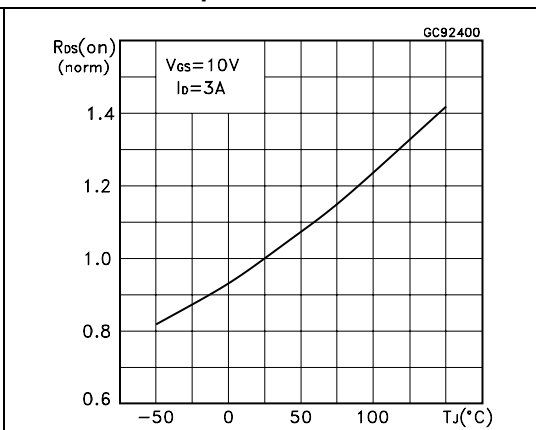


Figure 11. Source-drain diode forward characteristics

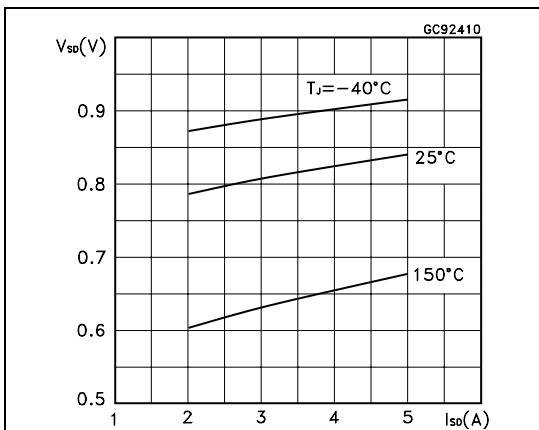
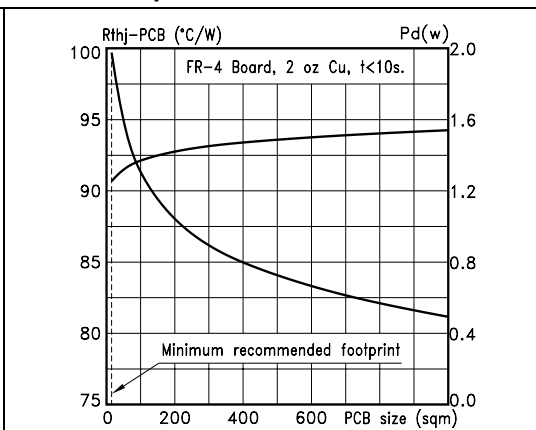
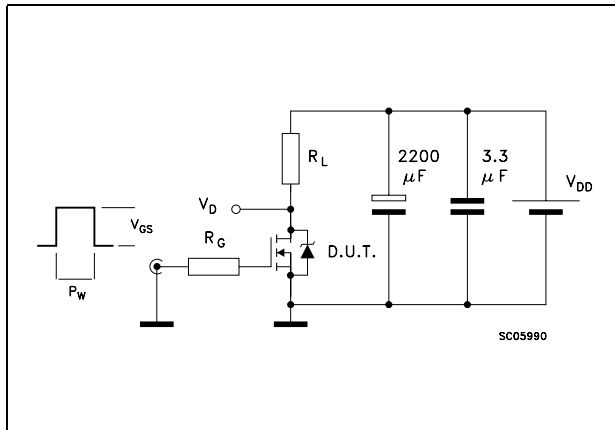


Figure 12. Thermal resistance and max power

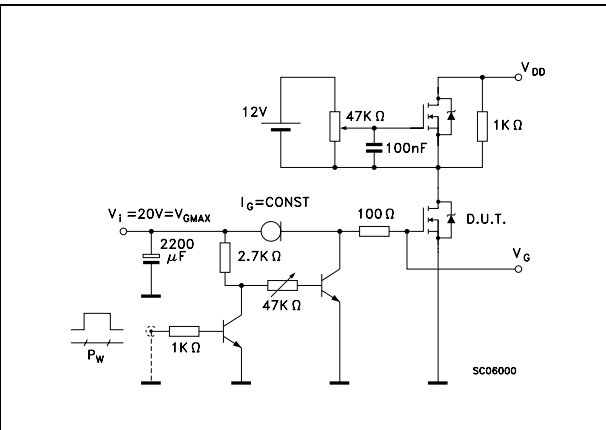


### 3 Test circuits

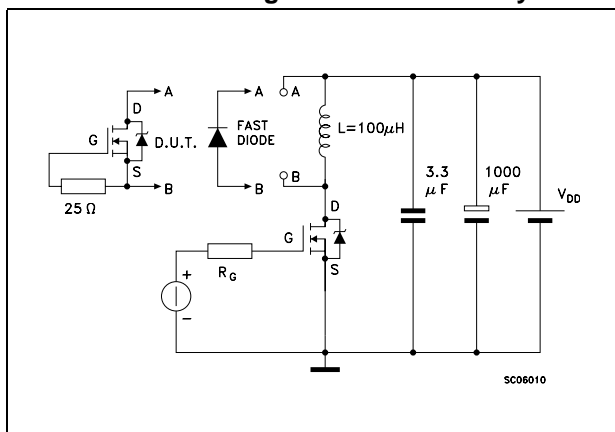
**Figure 13. Switching times test circuit for resistive load**



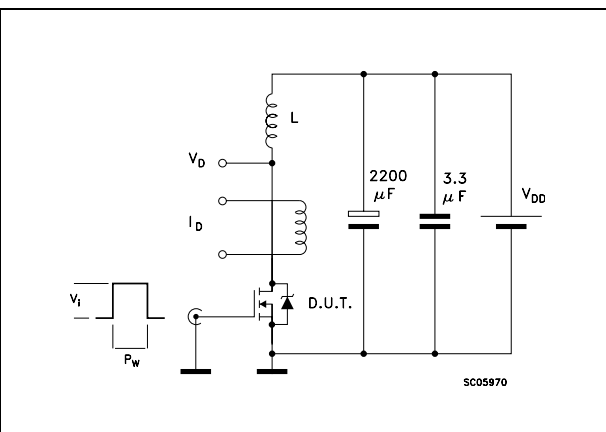
**Figure 14. Gate charge test circuit**



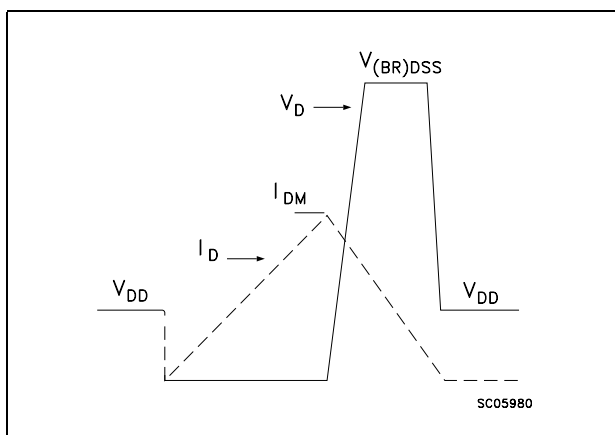
**Figure 15. Test circuit for inductive load switching and diode recovery times**



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



**Figure 17. Unclamped inductive waveform**

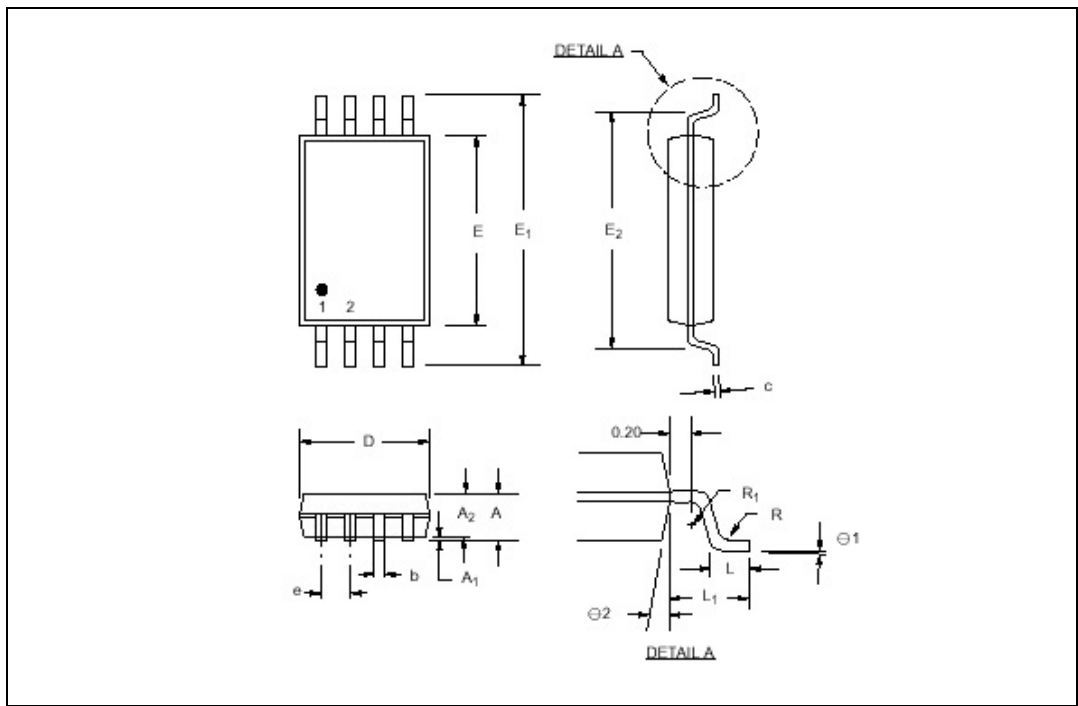


## 4 Package mechanical data

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](http://www.st.com)

**TSSOP8 MECHANICAL DATA**

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.05		1.20	0.041		0.047
A1	0.05		0.15	0.002		0.006
A2	0.80		1.05	0.032		0.041
b	0.19		0.30	0.008		0.012
c		0.127			0.005	
D	2.90		3.10	0.114		0.122
E	4.30		4.50	0.170		0.177
E1	6.20		6.60	0.240		0.260
E2	5.14		5.24	0.202		0.206
e		0.65			0.025	
L	0.45		0.75	0.018		0.030
L1	0.90		1.10	0.0355		0.0433
R	0.09			0.004		
R1	0.09			0.004		
θ1	0°		8°	0°		8°
θ2			12°			



## 5 Revision history

Table 7.

Date	Revision	Changes
11-Apr-2006	1	First release

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