

## Low voltage fast-switching PNP power transistors

### Features

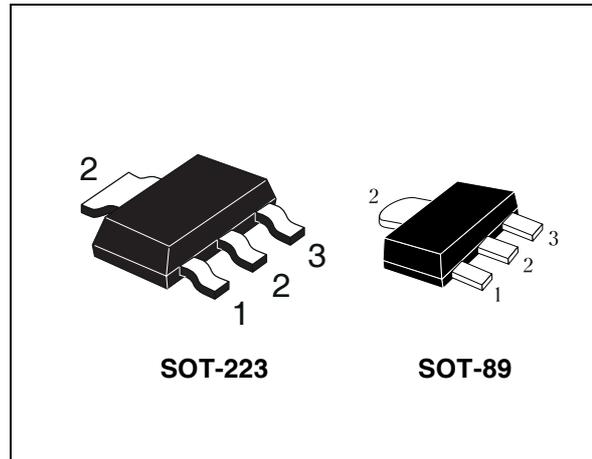
- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast-switching speed
- In Compliance with the 2002/93/EC European Directive
- Surface mounting devices in medium power SOT-223 and SOT-89 packages
- Available in tape & reel packing

### Applications

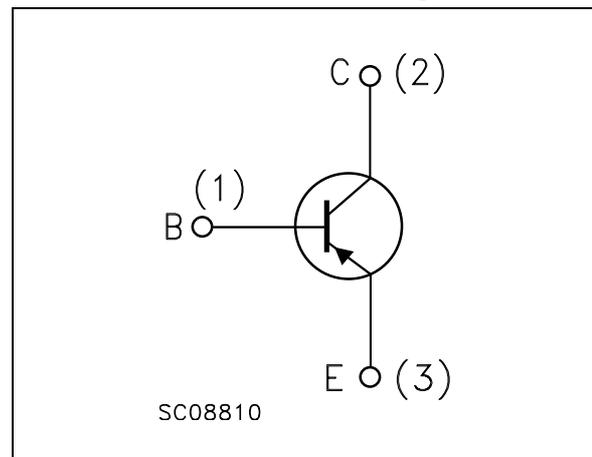
- Emergency lighting
- Led
- CCFL drivers (back lighting)
- Voltage regulation
- Relay driver

### Description

The 2STF2360 and 2STN2360 are PNP transistors manufactured using new "PB-HDC" (Power Bipolar High Density Current) technology. The resulting transistor shows exceptional high gain performances coupled with very low saturation voltage.



### Internal Schematic Diagram



### Order Codes

Part Number	Marking	Package	Packaging
2STF2360	2360	SOT-89	Tape & Reel
2STN2360	N2360	SOT-223	Tape & Reel

# 1 Absolute Maximum Ratings

**Table 1. Absolute Maximum Rating**

Symbol	Parameter	Value		Unit
		2STF2360	2STN2360	
		SOT-89	SOT-223	
$V_{CBO}$	Collector-Base Voltage ( $I_E = 0$ )	-60		V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	-60		V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	-6		V
$I_C$	Collector Current	-3		A
$I_{CM}$	Collector Peak Current ( $t_p < 5\text{ms}$ )	-5		A
$I_B$	Base Current	-0.2		A
$I_{BM}$	Base Peak Current ( $t_p < 5\text{ms}$ )	-0.4		A
$P_{TOT}$	Total dissipation at $T_{amb} = 25^\circ\text{C}$	1.4	1.6	W
$T_{stg}$	Storage Temperature	-65 to 150		$^\circ\text{C}$
$T_J$	Max. Operating Junction Temperature	150		$^\circ\text{C}$

**Table 2. Thermal Data**

Symbol	Parameter	SOT-89	SOT-223	
$R_{thJ-amb}^{\#}$	Thermal Resistance Junction-Ambient Max	89	78	$^\circ\text{C}/\text{W}$

Note:  $\#$  Device mounted on a PCB area of  $1\text{ cm}^2$ .

## 2 Electrical Characteristics

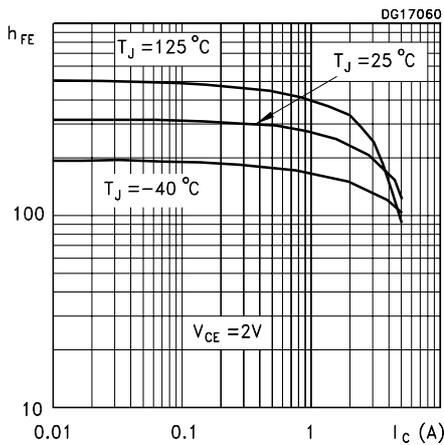
**Table 3. Electrical Characteristics** ( $T_{CASE} = 25^{\circ}C$ ; unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CBO}$	Collector Cut-off Current ( $I_E = 0$ )	$V_{CB} = -60V$			-100	nA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = -6V$			-100	nA
$V_{BE(on)}$	Base-Emitter Voltage	$V_{CE} = -2V$ $I_C = -100mA$	-630	-670	-730	mV
$V_{CE(sat)}$ <i>Note: 1</i>	Collector-Emitter Saturation Voltage	$I_C = -2A$ $I_B = -100mA$ $I_C = -3A$ $I_B = -150mA$		-250 -350	-320 -500	mV
$V_{BE(sat)}$ <i>Note: 1</i>	Base-Emitter Saturation Voltage	$I_C = -2A$ $I_B = -100mA$		-0.89	-1.2	V
$h_{FE}$ <i>Note: 1</i>	DC Current Gain	$I_C = -100mA$ $V_{CE} = -2V$ $I_C = -1A$ $V_{CE} = -2V$	80 160	280	400	
$t_d$ $t_r$ $t_s$ $t_f$	RESISTIVE LOAD Delay Time Rise Time Storage Time Fall Time	$I_C = -3A$ $V_{CC} = -10V$		10 75 250 35	15 100 350 50	ns
$f_T$	Transition Frequency	$I_C = -0.1A$ $V_{CE} = -10V$		130		MHz

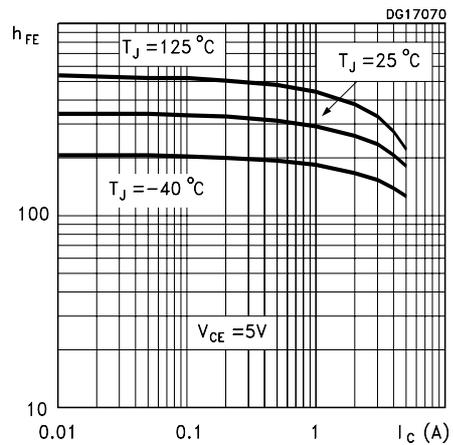
*Note: 1 Pulsed duration = 300  $\mu s$ , duty cycle  $\leq 1.5\%$ .*

### 2.1 Typical Characteristics (curves)

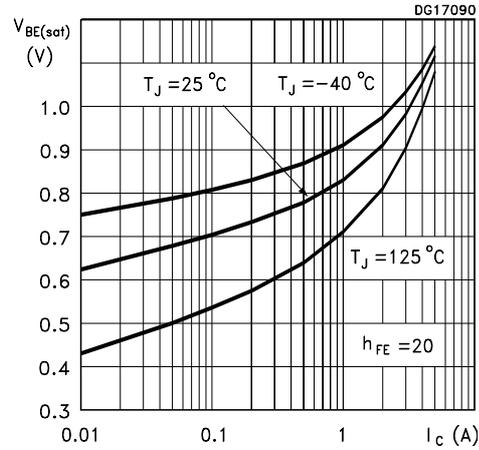
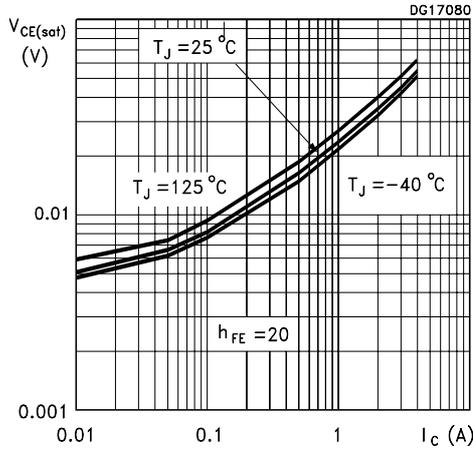
**Figure 1. DC Current Gain**



**Figure 2. DC Current Gain**

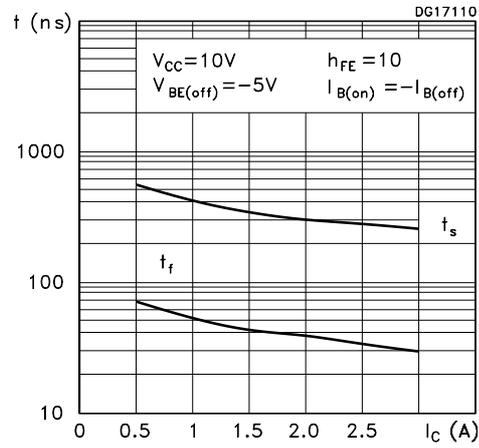
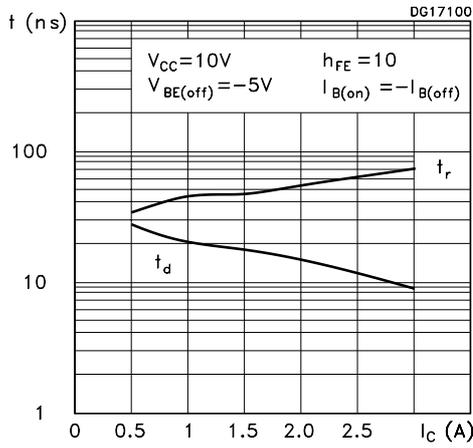


**Figure 3. Collector Emitter Saturation Voltage** **Figure 4. Base Emitter Saturation Voltage**

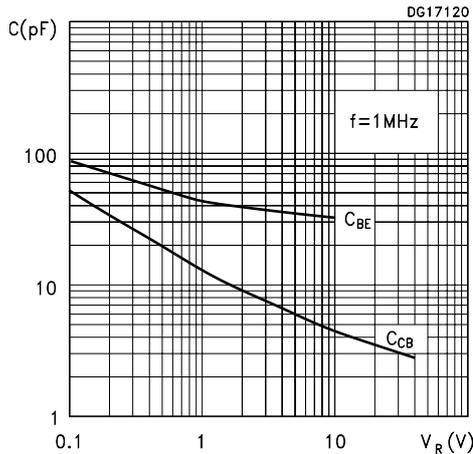


**Figure 5. Resistive Load Switching Times**

**Figure 6. Resistive Load Switching Times**



**Figure 7. Capacitance**

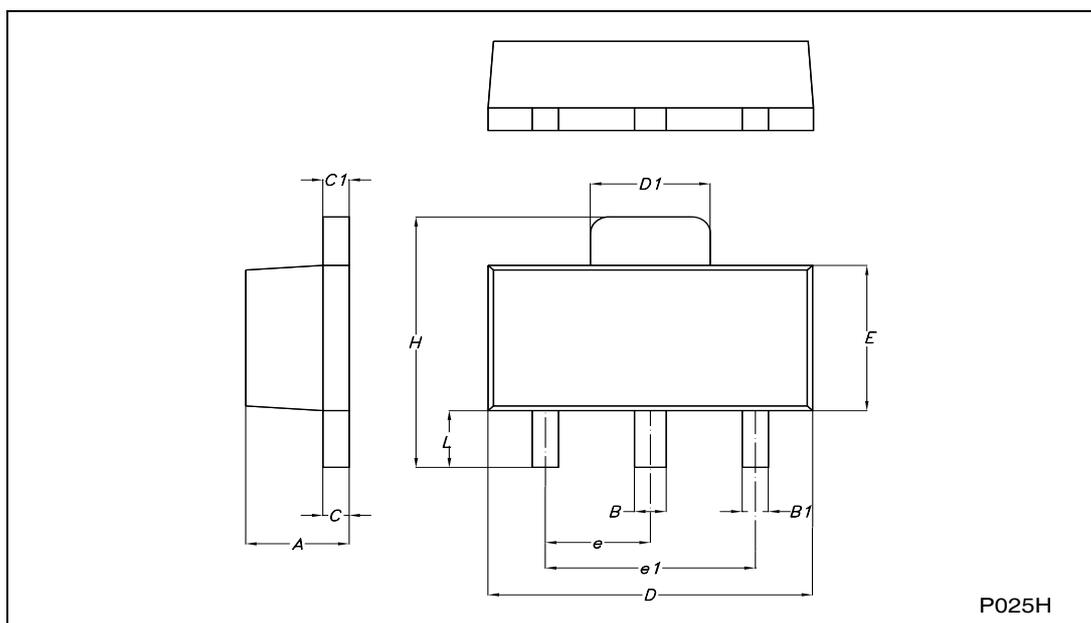


### 3 Package Mechanical Data

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)

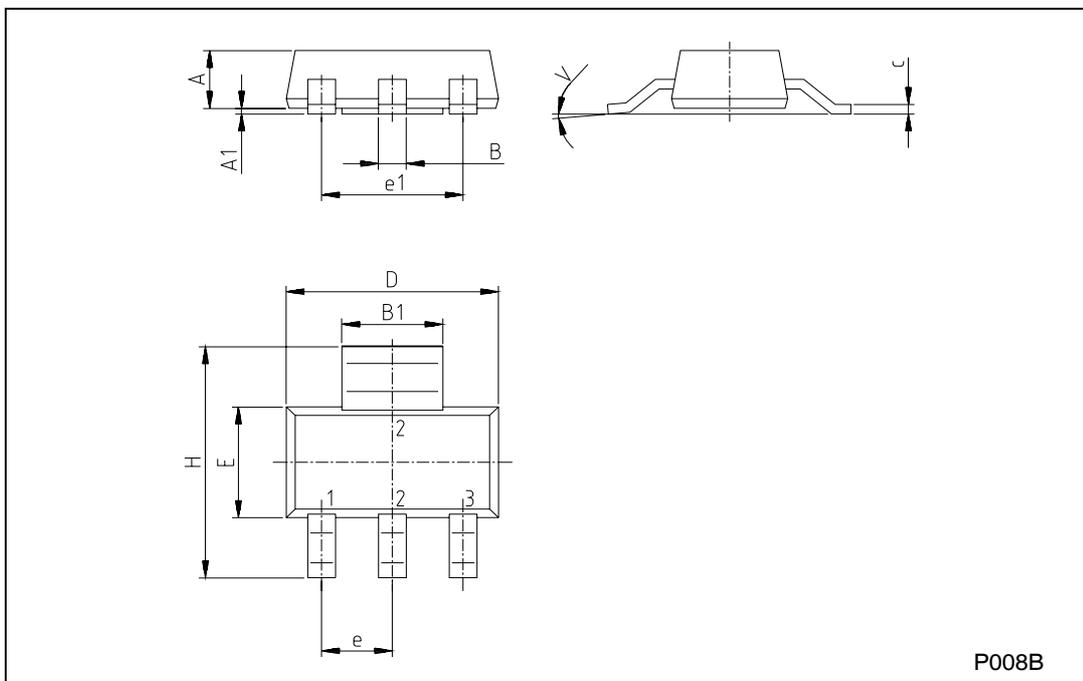
**SOT-89 MECHANICAL DATA**

DIM.	mm			mils		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	1.4		1.6	55.1		63.0
B	0.44		0.56	17.3		22.0
B1	0.36		0.48	14.2		18.9
C	0.35		0.44	13.8		17.3
C1	0.35		0.44	13.8		17.3
D	4.4		4.6	173.2		181.1
D1	1.62		1.83	63.8		72.0
E	2.29		2.6	90.2		102.4
e	1.42		1.57	55.9		61.8
e1	2.92		3.07	115.0		120.9
H	3.94		4.25	155.1		167.3
L	0.89		1.2	35.0		47.2



**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



## 4 Revision History

Date	Revision	Changes
13-Sep-2006	1	Initial Release
02-Mar-2007	2	New graphics have been added

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