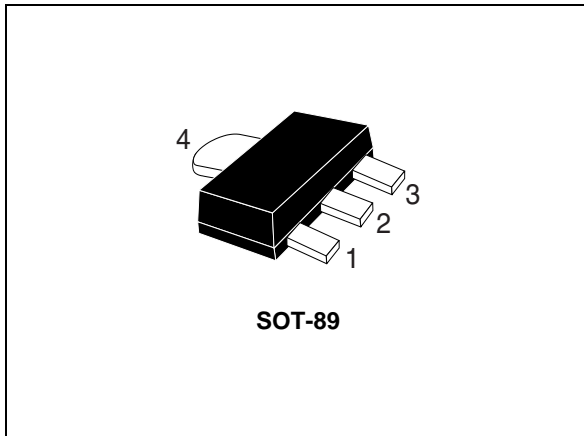
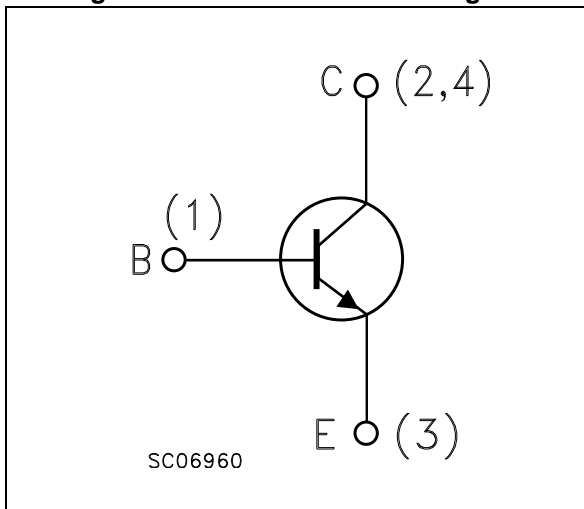


## Low voltage high performance NPN power transistor

Datasheet - preliminary data



**Figure 1. Internal schematic diagram**



### Features

- Very low collector-emitter saturation voltage
- High current gain characteristic
- Fast switching speed

### Applications

- Power management
- DC-DC converters
- Automotive

### Description

This device is a NPN transistor manufactured using new low voltage planar technology with double metal process. The result is a transistor which boasts exceptionally high gain performance coupled with very low saturation voltage.

**Table 1. Device summary**

Order codes	Marking	Package	Packaging
3STF1640	1640	SOT-89	Tape and reel

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	40	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	40	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	7	V
$I_C$	Collector current	6	A
$I_{CM}$	Collector peak current ( $t_P < 1$ ms)	20	A
$P_{tot}$	Total dissipation at $T_{amb} = 25$ °C	1.5	W
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_J$	Max. operating junction temperature	150	°C

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thJA}^{(1)}$	Thermal resistance junction-ambient max	83	°C/W

1. Device mounted on PCB area of 1 cm<sup>2</sup>

## 2 Electrical characteristics

$T_{\text{case}} = 25\text{ °C}$  unless otherwise specified.

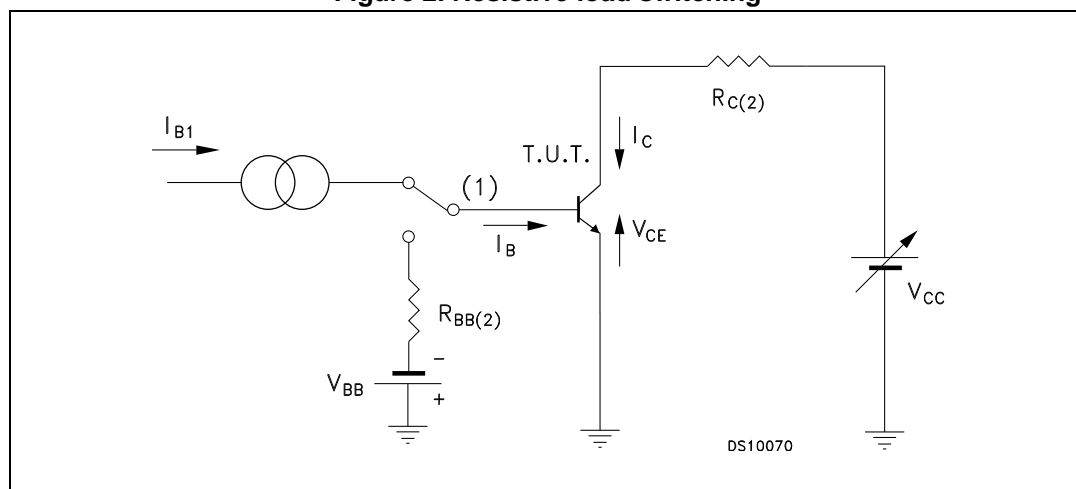
**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 40\text{ V}$			0.1	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 5\text{ V}$			0.1	$\mu\text{A}$
$V_{(\text{BR})\text{CBO}}$	Collector-base breakdown voltage ( $I_{\text{E}} = 0$ )	$I_{\text{C}} = 100\text{ }\mu\text{A}$	40			V
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10\text{ mA}$	40			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100\text{ }\mu\text{A}$	7			V
$V_{\text{CE}(\text{sat})}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 1\text{ A}, I_{\text{B}} = 20\text{ mA}$		50		mV
		$I_{\text{C}} = 1\text{ A}, I_{\text{B}} = 100\text{ mA}$		40		mV
		$I_{\text{C}} = 6\text{ A}, I_{\text{B}} = 300\text{ mA}$		170		mV
$V_{\text{BE}(\text{sat})}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 6\text{ A}, I_{\text{B}} = 6\text{ mA}$			1.1	V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1\text{ A}, V_{\text{CE}} = 1\text{ V}$		350		
		$I_{\text{C}} = 6\text{ A}, V_{\text{CE}} = 1\text{ V}$		100		
		$I_{\text{C}} = 20\text{ A}, V_{\text{CE}} = 1\text{ V}$		20		
$f_{\text{T}}$	Transition frequency	$I_{\text{C}} = 0.1\text{ A}$ $V_{\text{CE}} = 10\text{ V}$ $f = 100\text{ MHz}$		100		MHz
$C_{\text{CBO}}$	Collector-base capacitance ( $I_{\text{E}} = 0$ )	$f = 1\text{ MHz}$ $V_{\text{CB}} = 10\text{ V}$		30		pF
$t_{\text{on}}$	Resistive load Turn-on time	$I_{\text{C}} = 1.5\text{ A}$ $V_{\text{CC}} = 10\text{ V}$		TBD		ns
$t_{\text{off}}$	Turn-off time	$I_{\text{B}(\text{on})} = - I_{\text{B}(\text{off})} = 150\text{ mA}$ $V_{\text{BB}(\text{off})} = - 5\text{ V}$		TBD		ns

1. Pulse test: pulse duration  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

## 2.1 Test circuits

Figure 2. Resistive load switching



1. Fast electronic switch
2. Non-inductive resistor

### 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK<sup>®</sup> is an ST trademark.

**Table 5. SOT-89 mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	1.40		1.60
B	0.44		0.56
B1	0.36		0.48
C	0.35		0.44
C1	0.35		0.44
D	4.40		4.60
D1	1.62		1.83
D3		0.90	
E	2.29		2.60
e	1.42		1.57
e1	2.92		3.07
H	3.94		4.25
H1	2.70		3.10
K	1°		8°
L	0.89		1.20
R		0.25	
β		90°	

Figure 3. SOT-89 drawings

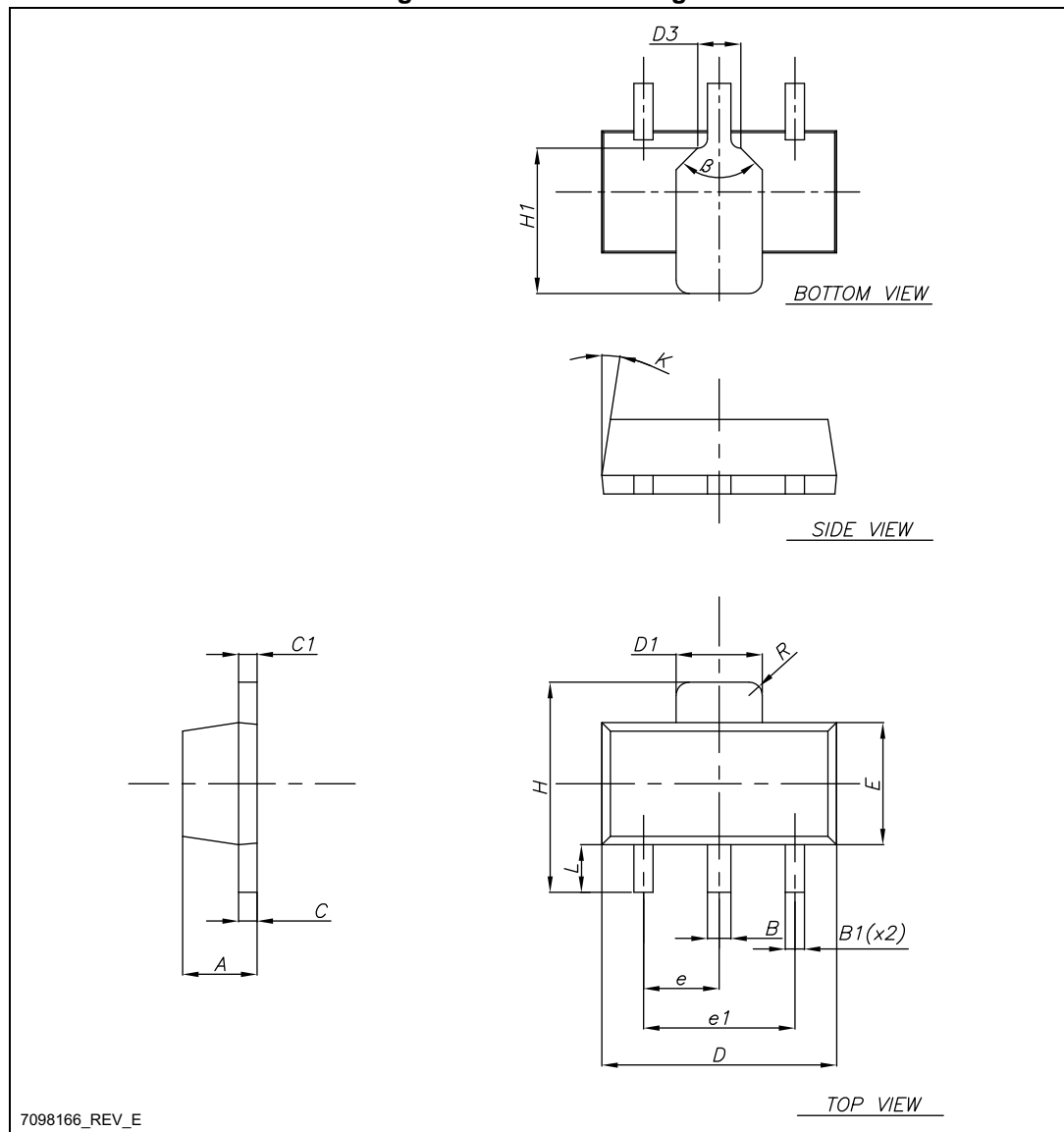
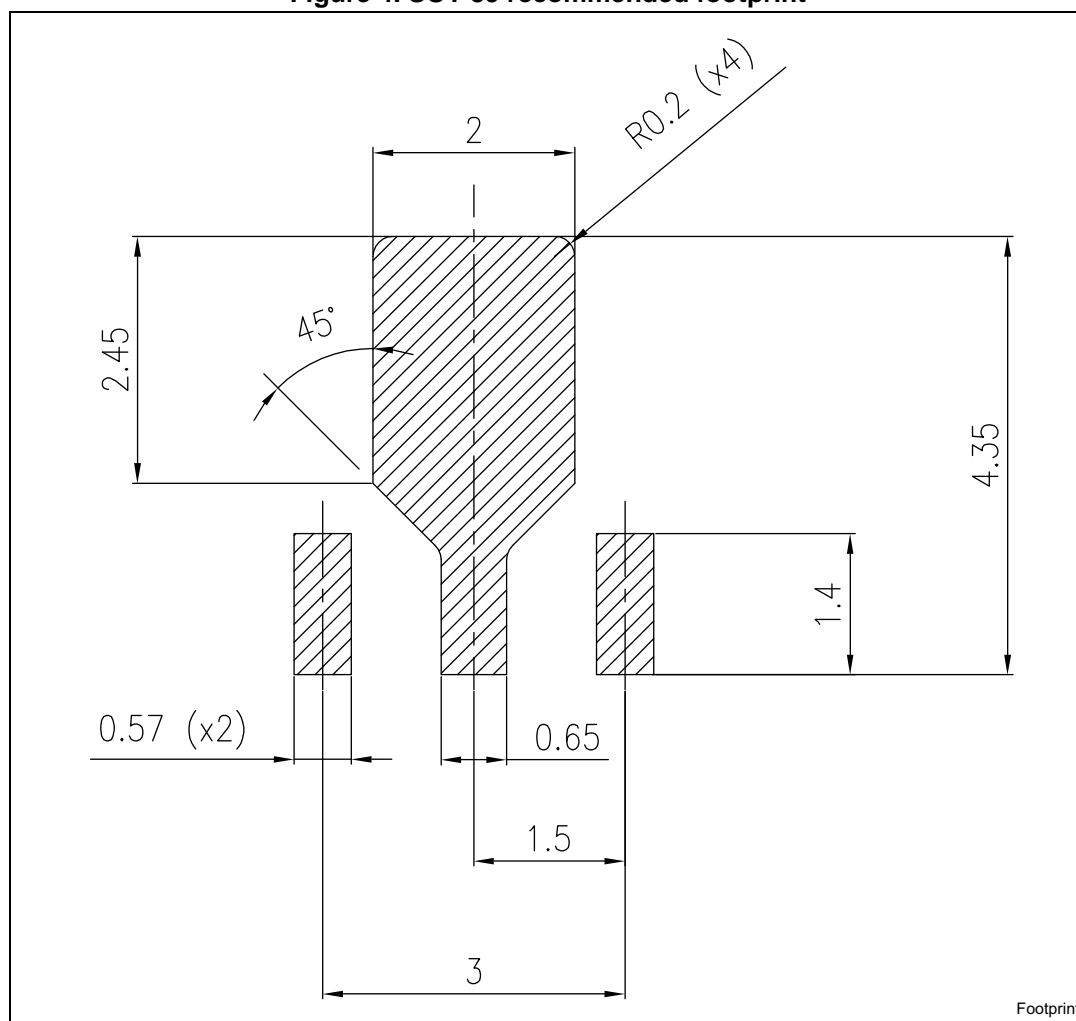


Figure 4. SOT-89 recommended footprint



Footprint



## 4 Packaging mechanical data

Table 6. SOT-89 carrier tape dimensions

Dim.	mm.	
	Values	Tolerance
Ao	4.52	± 0.10
Bo	4.91	± 0.10
Ko	1.90	± 0.10
F	5.50	± 0.10
E	1.75	± 0.10
W	12	± 0.30
P2	2	± 0.10
Po	4	± 0.10
P1	8	± 0.10
T	0.30	± 0.10
D	∅ 1.55	± 0.05
D1	∅ 1.60	± 0.10

Figure 5. SOT-89 carrier tape drawing

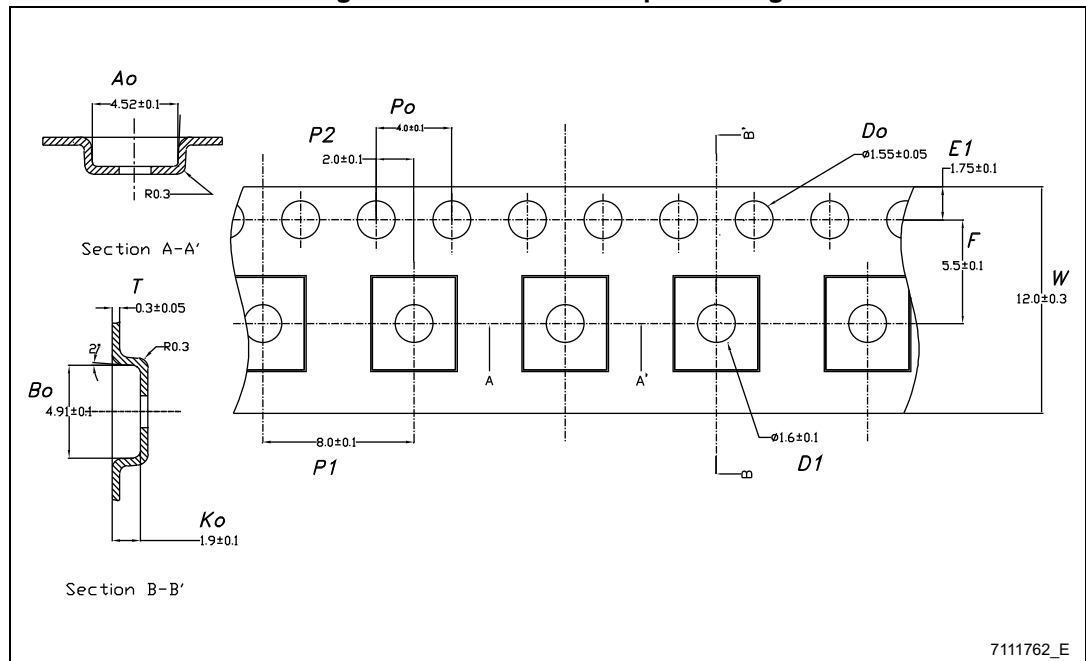
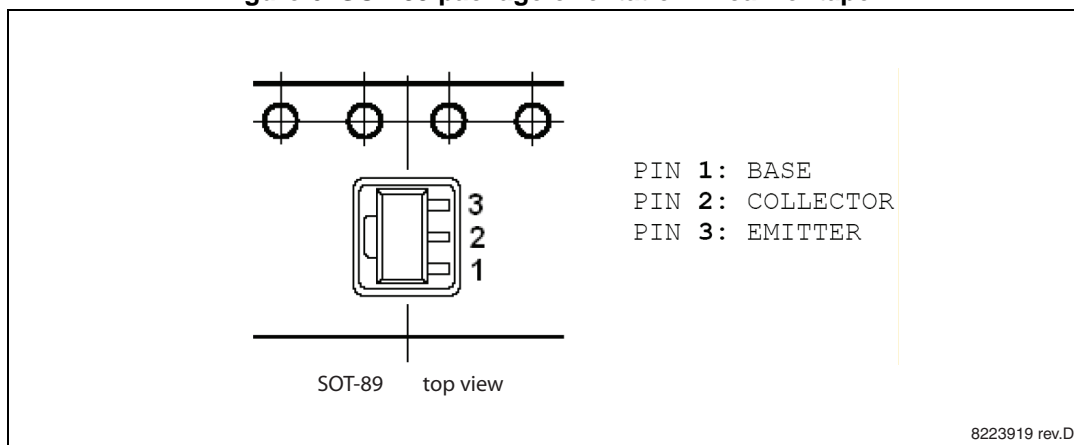


Figure 6. SOT-89 package orientation in carrier tape



## 5 Revision history

Table 7. Document revision history

Date	Revision	Changes
11-Sep-2012	1	Initial release.
31-Oct-2012	2	Updated title and description on the cover page. Document status promoted from target to preliminary data.
10-Apr-2013	3	<i>Applications</i> and <i>Description</i> have been modified in cover page.

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