

## High voltage fast switching NPN power transistor

Datasheet — production data

### Features

- High voltage capability
- Fast switching speed

### Applications

- Lighting
- Switch mode power supply

### Description

This device is a high voltage fast-switching NPN power transistor. It is manufactured using high voltage multi epitaxial planar technology for high switching speeds and medium voltage capability.

It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA. The device is designed for use in lighting applications and low cost switch-mode power supplies.

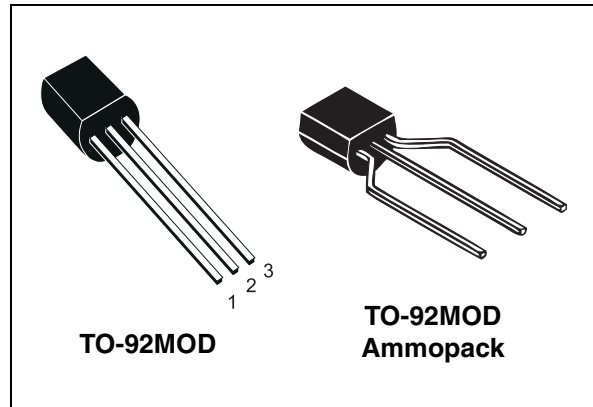


Figure 1. Internal schematic diagram

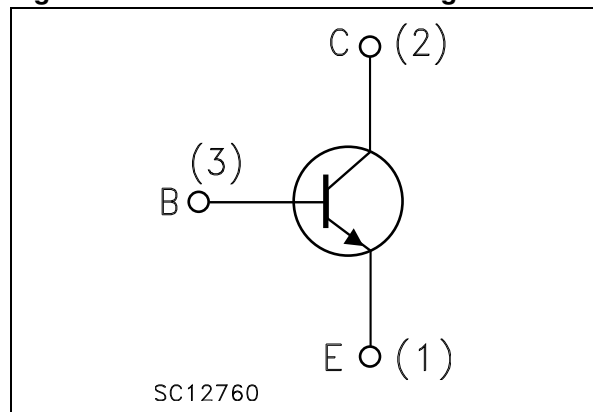


Table 1. Device summary

Order codes	Marking	Package	Packaging
2STL2580	2STL2580	TO-92MOD	Bag
2STL2580-AP	2STL2580	TO-92MOD	Ammopack

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# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{CES}$	Collector-emitter voltage ( $V_{BE} = 0$ )	800	V
$V_{CEO}$	Collector-emitter voltage ( $I_B = 0$ )	400	V
$V_{EBO}$	Emitter-base voltage ( $I_C = 0$ )	9	V
$I_C$	Collector current	1	A
$I_{CM}$	Collector peak current ( $t_P < 5$ ms)	2	A
$I_B$	Base current	0.5	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
$R_{thJA}$	Thermal resistance junction-ambient max	83	°C/W

## 2 Electrical characteristics

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

**Table 4. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CBO}}$	Collector cut-off current ( $I_{\text{E}} = 0$ )	$V_{\text{CB}} = 800\text{ V}$			10	$\mu\text{A}$
$I_{\text{EBO}}$	Emitter cut-off current ( $I_{\text{C}} = 0$ )	$V_{\text{EB}} = 8\text{ V}$			100	$\mu\text{A}$
$V_{(\text{BR})\text{CEO}}^{(1)}$	Collector-emitter breakdown voltage ( $I_{\text{B}} = 0$ )	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ( $I_{\text{C}} = 0$ )	$I_{\text{E}} = 100\text{ }\mu\text{A}$	9			V
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 250\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$	60	100		
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$			1	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 0.2\text{ A}$			1.1	V
$t_{\text{r}}$	Resistive load Rise time	$V_{\text{CC}}=200\text{ V}$ , $I_{\text{C}}=0.3\text{ A}$		140		ns
$t_{\text{s}}$	Storage time	$I_{\text{B1}}=20\text{ mA}$ , $I_{\text{B2}}=-50\text{ mA}$		4		$\mu\text{s}$
$t_{\text{f}}$	Fall time	$T_{\text{p}}=30\text{ }\mu\text{s}$		90		ns

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

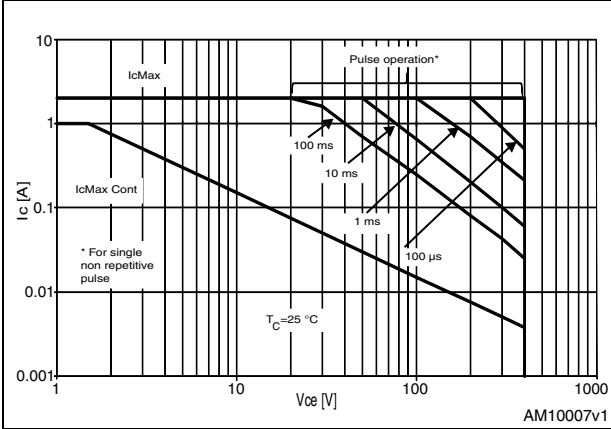


Figure 3. Derating curve

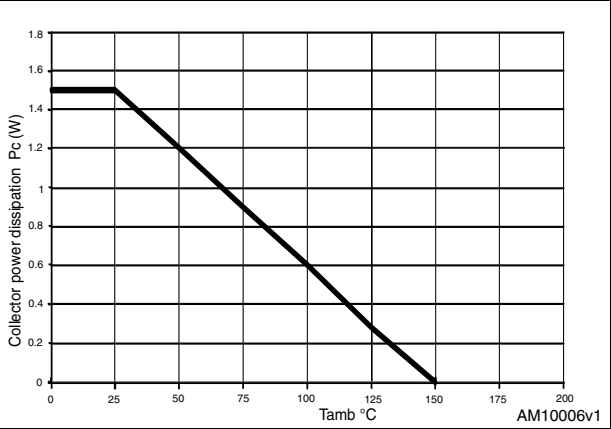


Figure 4. Output curves up to  $V_{CE}=2\text{ V}$

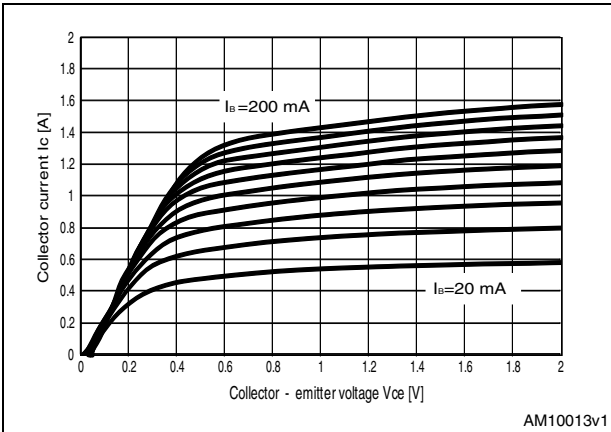


Figure 5. Output curves up to  $V_{CE}=10\text{ V}$

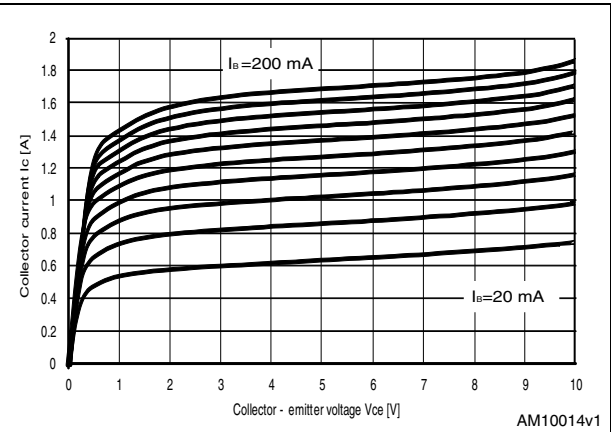


Figure 6. DC current gain ( $V_{CE} = 1\text{ V}$ )

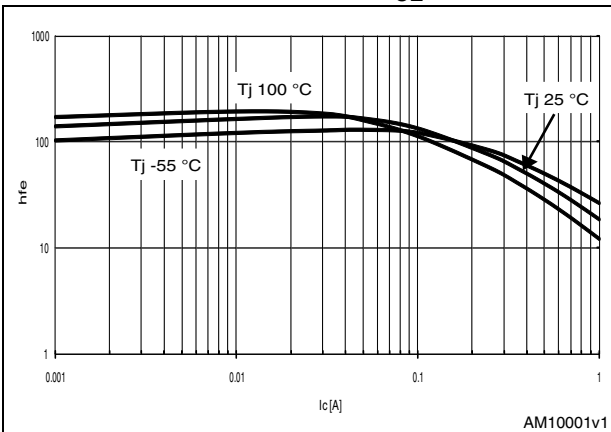


Figure 7. DC current gain ( $V_{CE} = 5\text{ V}$ )

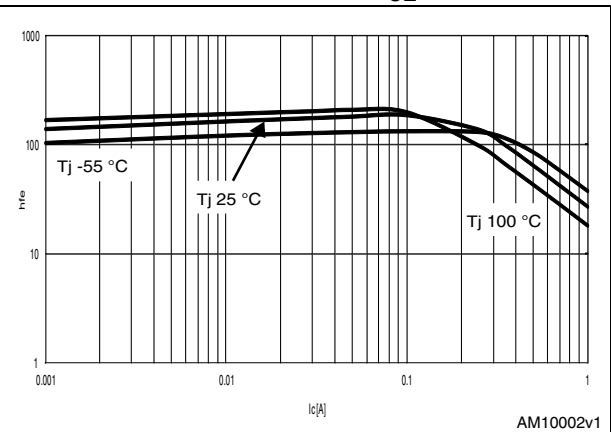


Figure 8. Collector-emitter saturation voltage      Figure 9. Base-emitter saturation voltage

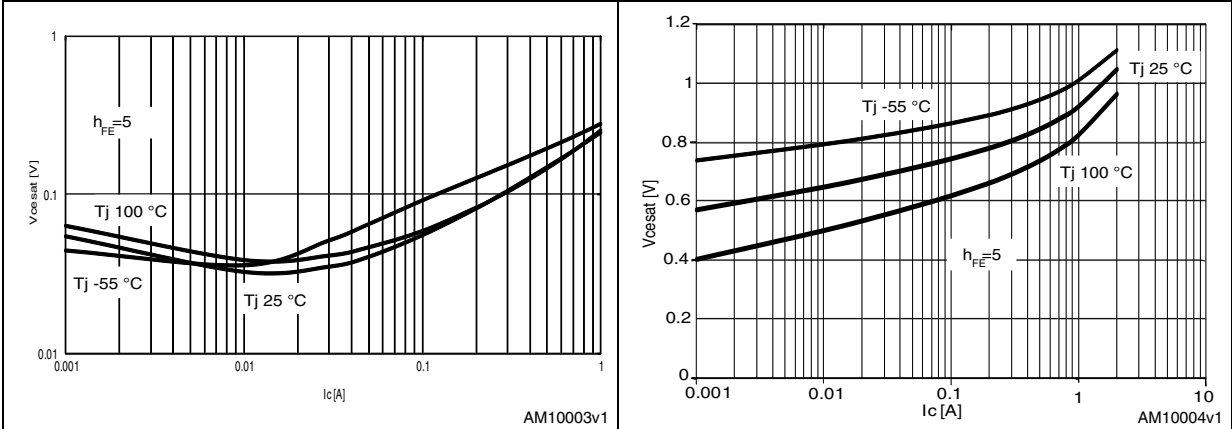


Figure 10. Base-emitter on voltage      Figure 11. Capacitance variation

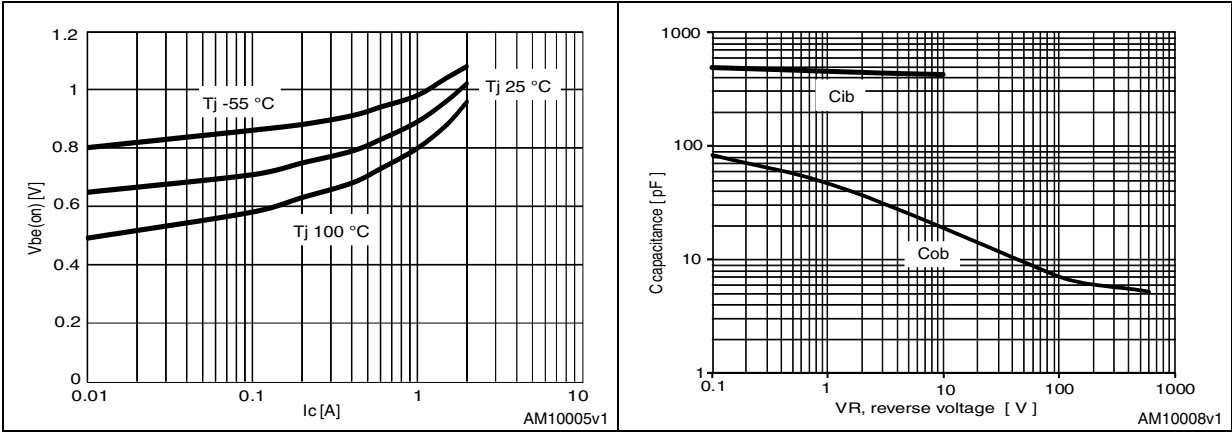


Figure 12. Resistive switching time      Figure 13.  $V_{BE(sat)}$  vs.  $I_C$

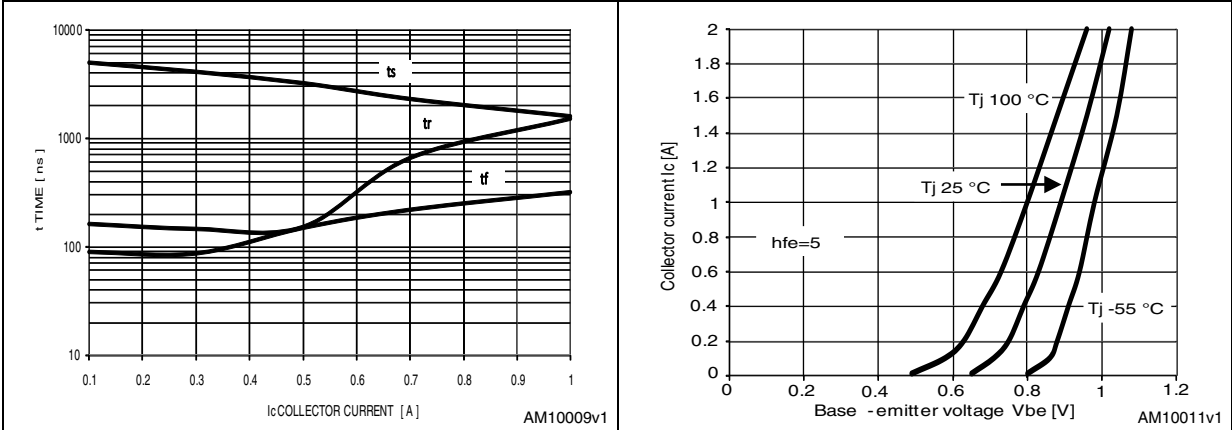
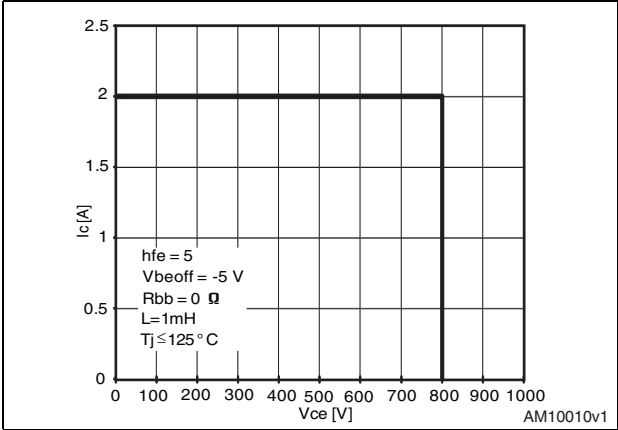


Figure 14. Reverse biased operating area



### 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. TO-92MOD mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.7		5.1
A1	1.730		2.030
b	0.4		0.6
b1	0.9		1.1
c	0.4		0.5
D	5.8		6.2
D1	4.0		
E	8.4		8.8
e		1.5	
e1	2.9		3.1
L	13.8		14.2
K			1.6
h	0.0		0.380

Figure 15. TO-92MOD drawing mechanical data

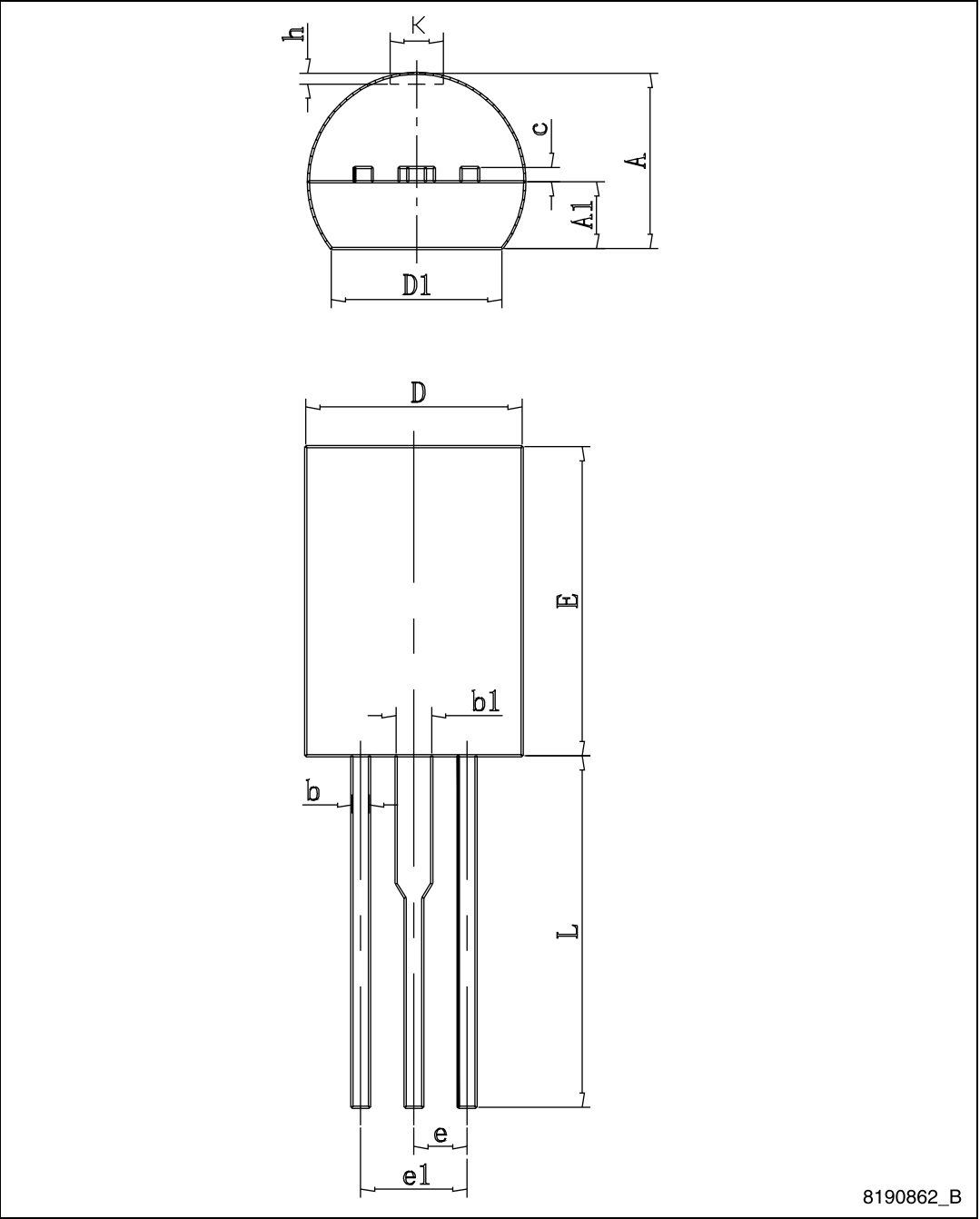
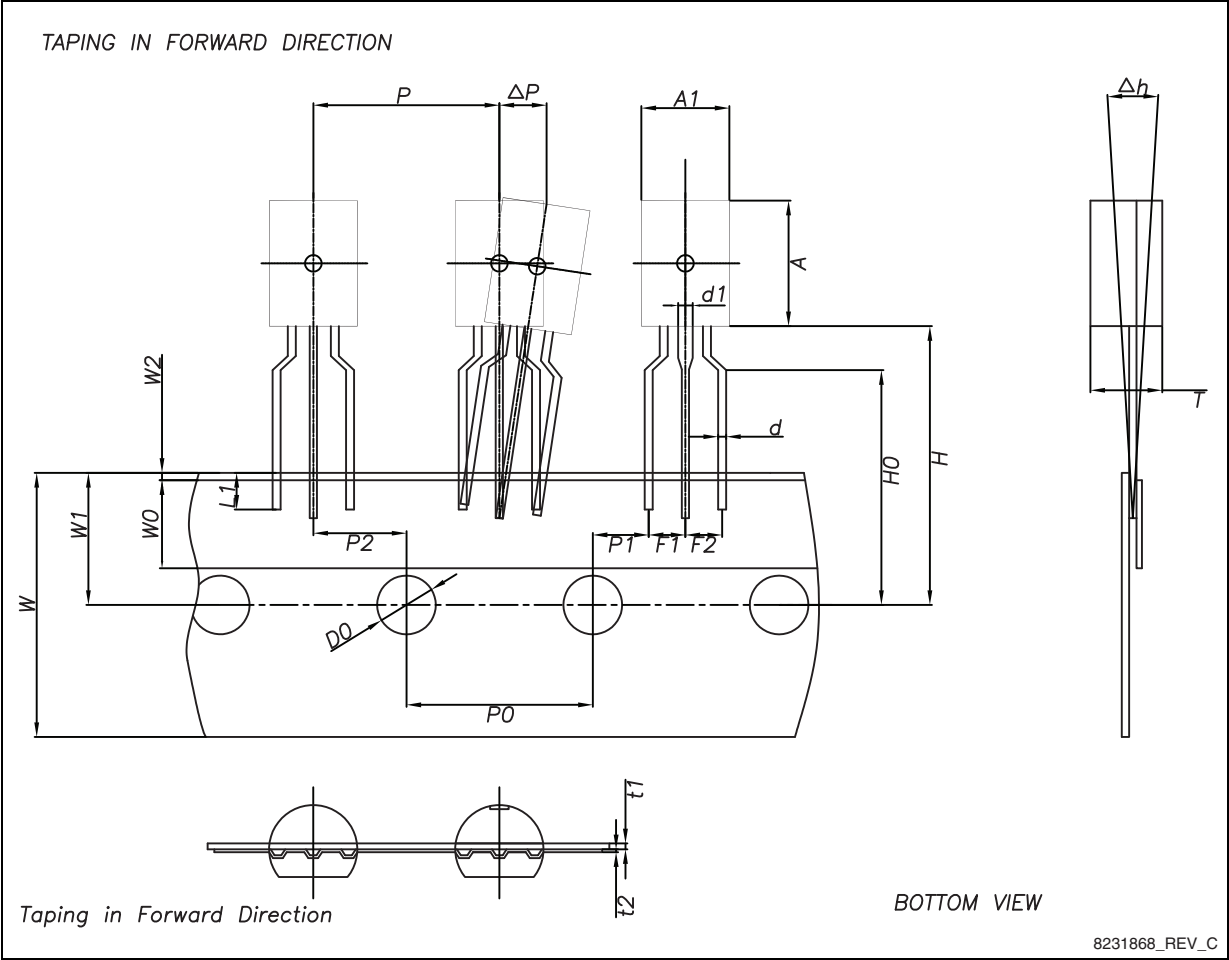


Table 6. TO-92MOD ammpack mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A1	5.8	6.0	6.2
A	8.4	8.6	8.8
T	4.7	4.9	5.1
d	0.4	0.5	0.6
d1	0.9	1.0	1.1
P	12.4	12.7	13.0
P0	12.5	12.7	12.9
P2	6.05	6.35	6.65
F1, F2	2.2	2.5	2.8
$\Delta h$	-1.0	0	1.0
W	17.5	18.0	19.0
W0	5.5	6.0	6.5
W1	8.5	9.0	9.5
W2			1.0
H	18.0	19.0	20.0
H0	15.5	16.0	16.5
L1	2.5		
D0	3.8	4.0	4.2
t1	0.35	0.4	0.45
t2	0.15	0.2	0.25
P1	3.82	3.85	3.88
$\Delta P$	-1.0	0	1.0

Figure 16. TO-92MOD ammopack dimension



## 4 Revision history

**Table 7. Document revision history**

Date	Revision	Changes
30-Nov-2010	1	Initial release.
08-Jul-2011	2	Curves inserted
26-Jun-2012	3	Added STL2580-AP order code in TO-92MOD ammopack package

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