

High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Very high switching speed

Applications

- Compact fluorescent lamps (CFLs)
- SMPS for battery charger

Description

This device is manufactured using high voltage multi epitaxial planar technology for high switching speeds and high voltage capability. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a wide RBSOA.

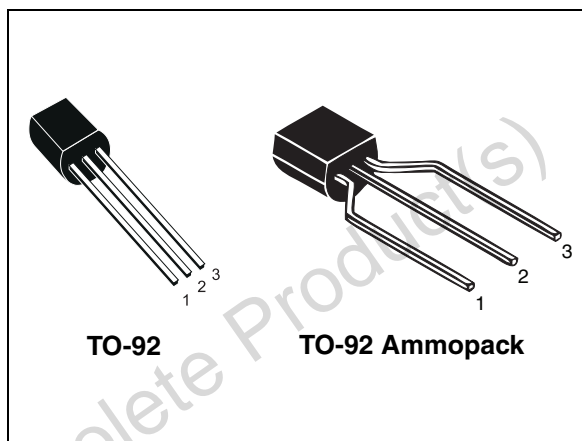


Figure 1. Internal schematic diagram

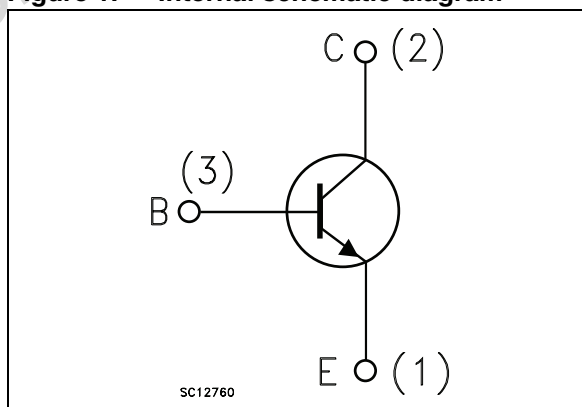


Table 1. Device summary

Order codes	Marking	Package	Packaging
STX0560	X0560	TO-92	Bag
STX0560-AP	X0560	TO-92AP	Ammopack

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 ($I_B = 0$)	600	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	7	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
I_{BM}	Base peak current ($t_P < 5$ ms)	1	A
P_{TOT}	Total dissipation at $T_a = 25$ °C	1.5	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	

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_{CES}	Collector cut-off current ($V_{\text{BE}} = 0$)	$V_{\text{CE}} = 800\text{ V}$			10	μA
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = 10\text{ mA}$	7			V
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	600			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 100\text{ mA}$			1	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.5\text{ A}$ $I_{\text{B}} = 100\text{ mA}$			1	V
h_{FE}	DC current gain	$I_{\text{C}} = 5\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$ $I_{\text{C}} = 20\text{ mA}$ $V_{\text{CE}} = 5\text{ V}$	70	90		
t_{r}	Resistive load Rise time	$V_{\text{CC}}=200\text{ V}$, $I_{\text{C}}=0.3\text{ A}$		140		ns
t_{s}	Storage time	$I_{\text{B1}}=60\text{ mA}$, $I_{\text{B2}}=-120\text{ mA}$		4.4		μs
t_{f}	Fall time	$T_{\text{p}}=30\text{ }\mu\text{s}$		220		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

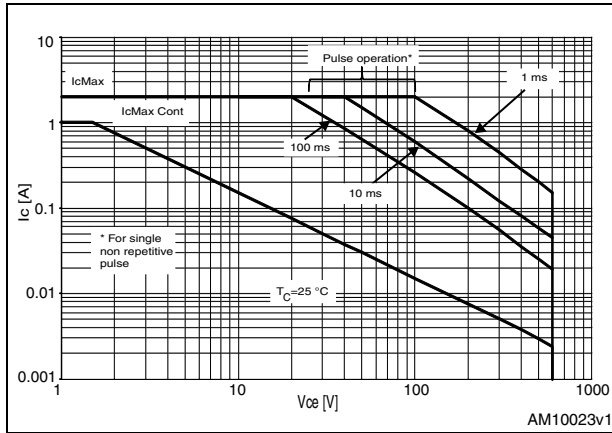


Figure 3. Derating curve

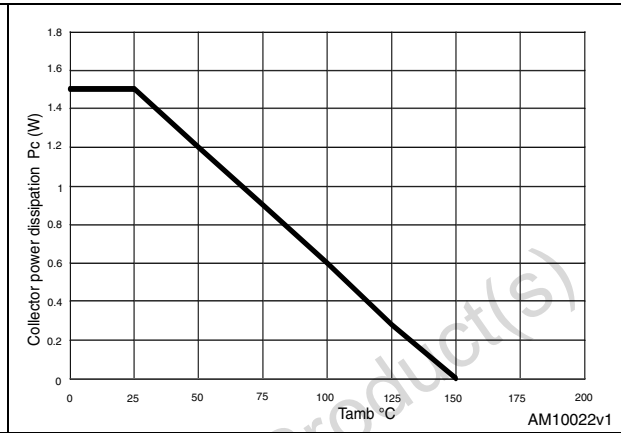


Figure 4. Output curves up to $V_{CE} = 2\ V$

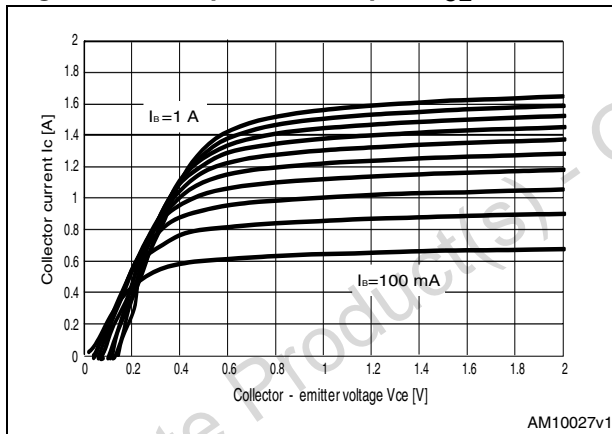


Figure 5. Output curves up to $V_{CE} = 10\ V$

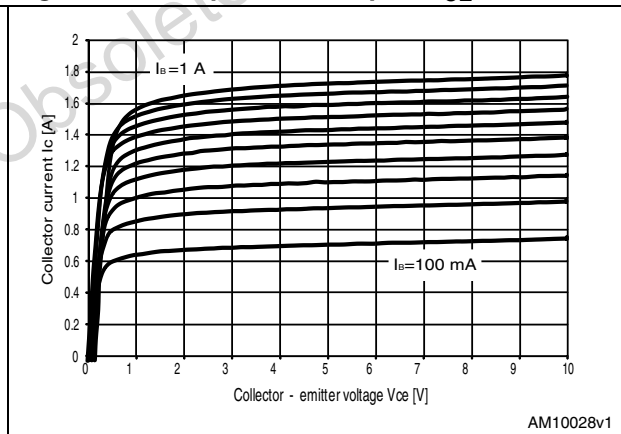


Figure 6. DC current gain ($V_{CE} = 1\ V$)

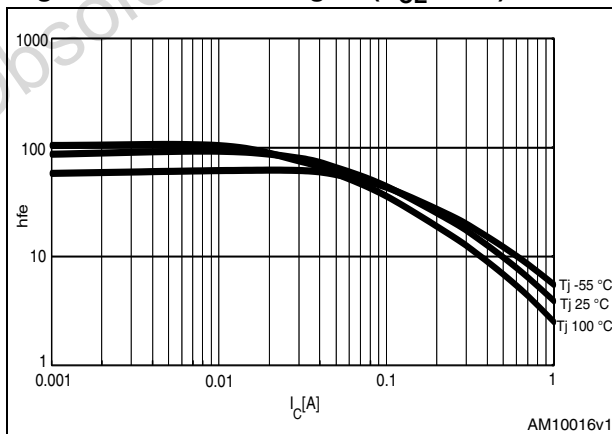


Figure 7. DC current gain ($V_{CE} = 5\ V$)

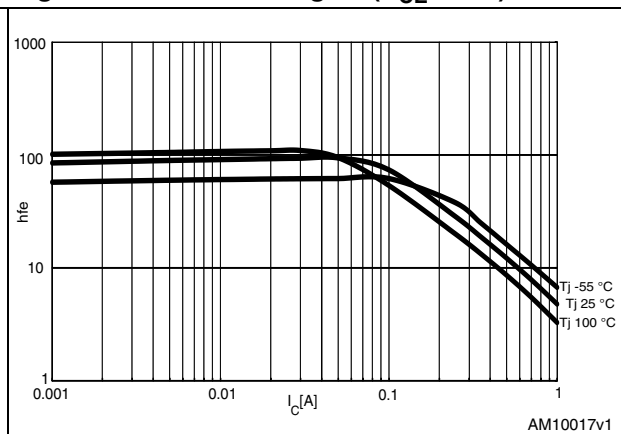


Figure 8. Collector-emitter saturation voltage Figure 9. Base-emitter saturation voltage

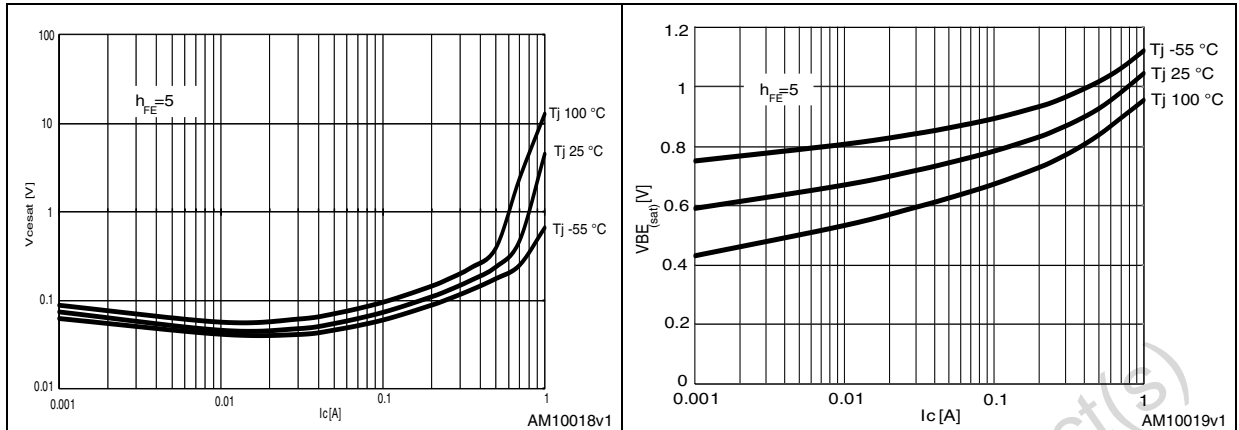


Figure 10. Base-emitter on voltage

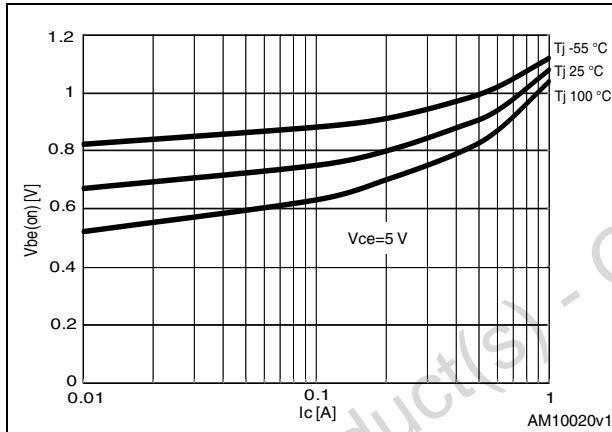


Figure 11. Capacitance variation

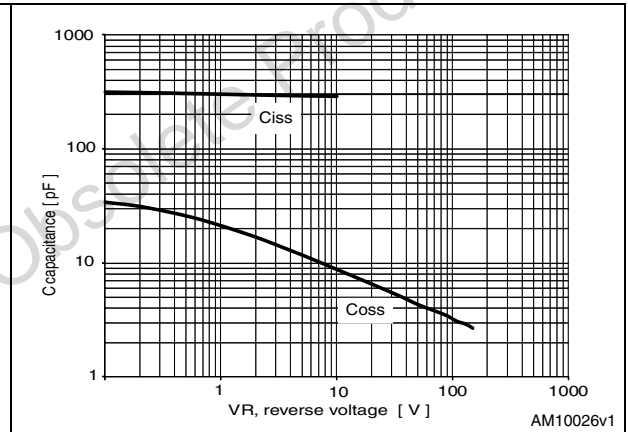


Figure 12. Resistive switching time

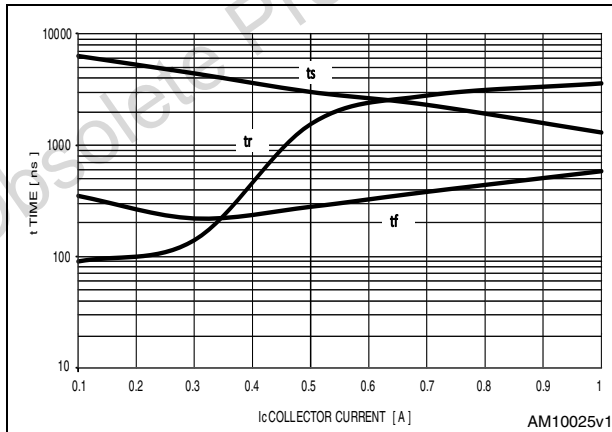


Figure 13. Vbe(sat) vs. Ic

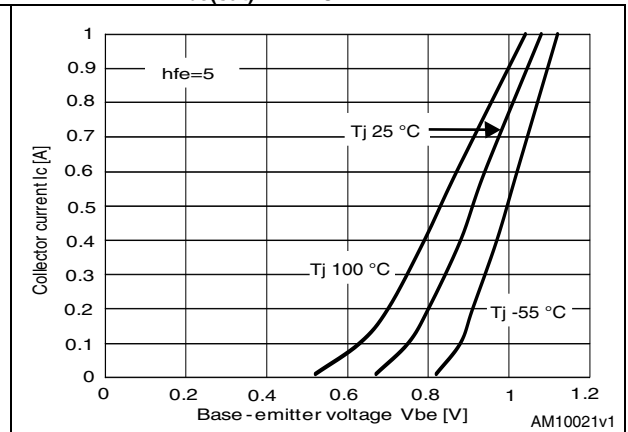
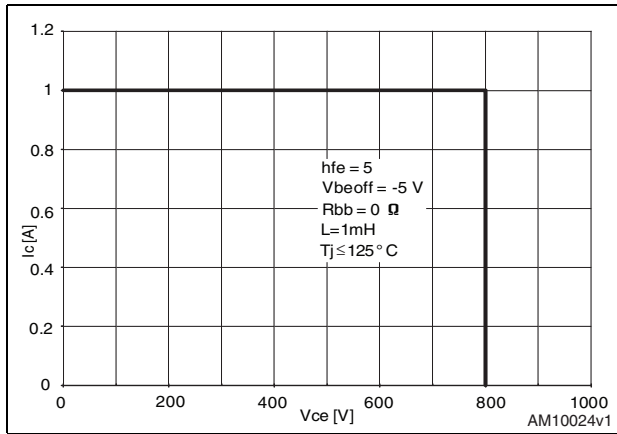


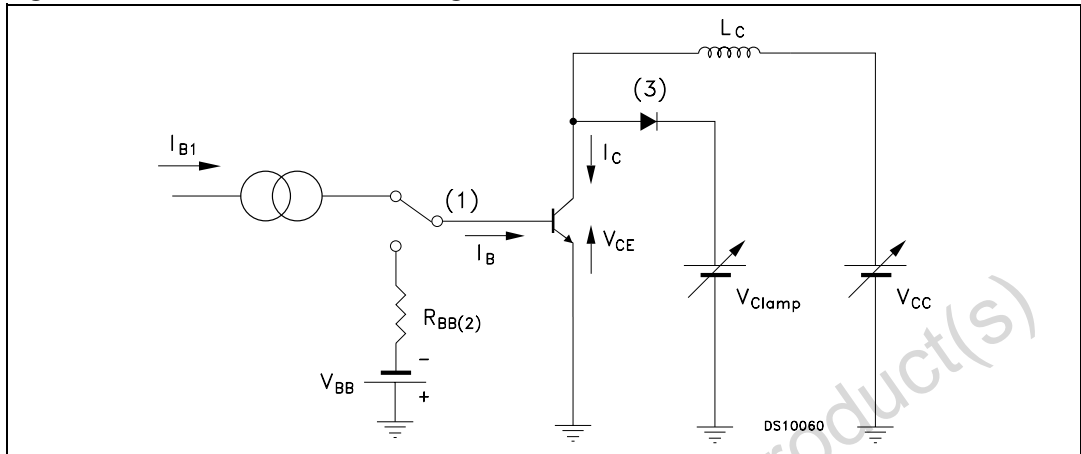
Figure 14. Reverse biased operating area



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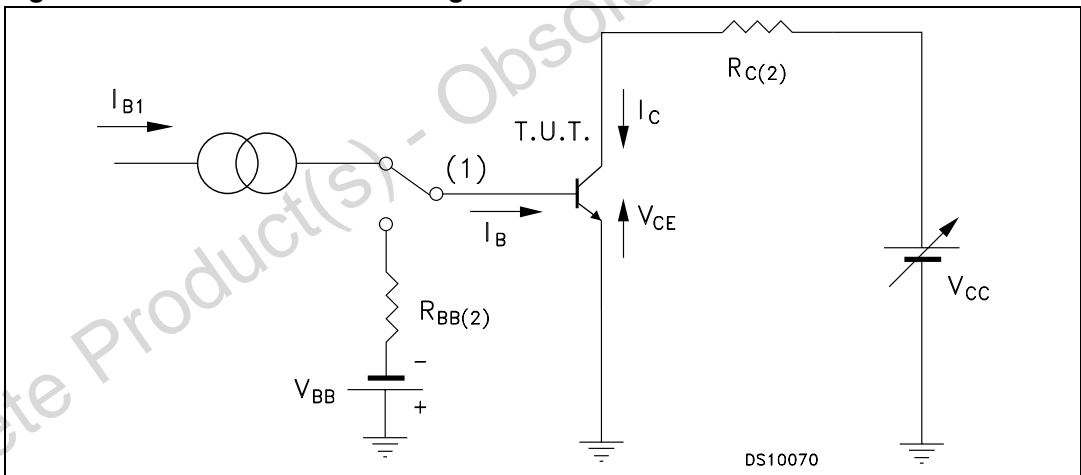
2.2 Test circuits

Figure 15. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Figure 16. Inductive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

3 Package mechanical data

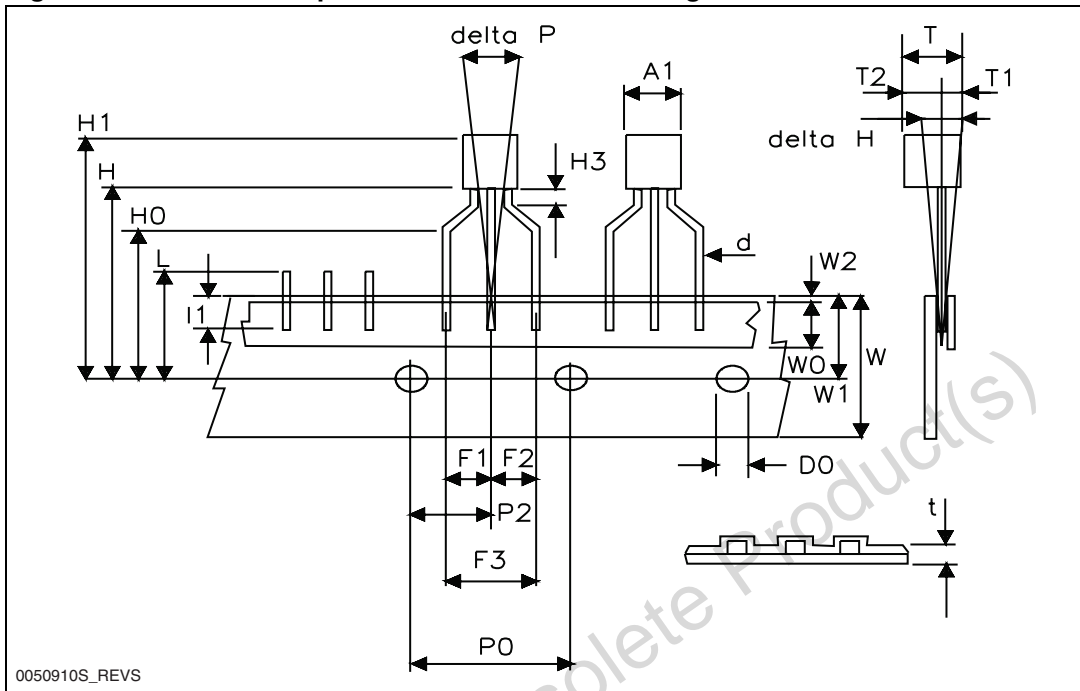
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Table 6. TO-92 ammopack mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A1			4.80
T			3.80
T1			1.60
T2			2.30
d			0.48
P0	12.50	12.70	12.90
P2	5.65	6.35	7.05
F1, F2	2.44	2.54	2.94
F3	4.98	5.08	5.48
delta H	-2.00		2.00
W	17.50	18.00	19.00
W0	5.70	6.00	6.30
W1	8.50	9.00	9.25
W2			0.50
H	18.50		20.50
H3	0.5	1	1.5
H0	15.50	16.00	16.50
H1			25.00
D0	3.80	4.00	4.20
t			0.90
L			11.00
l1	3.00		
delta P	-1.00		1.00

Figure 18. TO-92 ammopack mechanical data drawing



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4 Revision history

Table 7. Document revision history

Date	Revision	Changes
15-Dec-2010	1	Initial release.
20-Jul-2011	2	Removed: TO-92 Ammopak package
13-Feb-2012	3	Added: TO-92 Ammopak package

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