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High voltage fast-switching NPN power transistor

Features

- High voltage capability
- Low spread of dynamic parameters
- Very high switching speed
- Integrated antiparallel collector-emitter diode

Application

- Electronic ballast for fluorescent lighting

Description

The 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 the wide RBSOA.

The STL series is designed for use in compact fluorescent lamps.

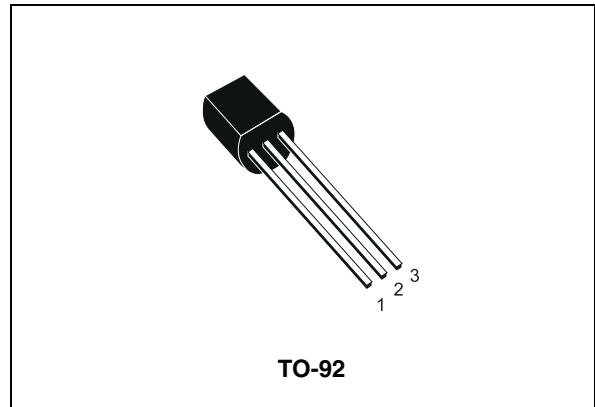


Figure 1. Internal schematic diagram

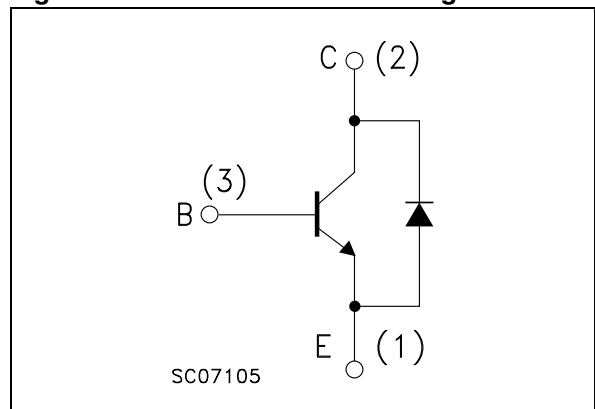


Table 1. Device summary

Order codes	Marking ⁽¹⁾	Package	Packaging
STL73D	L73DL	TO-92	Bag
	L73DH		
STL73D-AP	L73DL	TO-92	Ammopack
	L73DH		

1. The product is classified in DC current gain group L and group H, see [Table 5: hFE classification](#). STMicroelectronics reserves the right to ship from any group according to production availability.

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{BE} = 0$)	700	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	400	V
V_{EBO}	Emitter-base voltage ($I_C = 0$, $I_B = 0.5$ A, $t_P < 10$ μ s)	$V_{(BR)EBO}$	V
I_C	Collector current	1.5	A
I_{CM}	Collector peak current ($t_P < 5$ ms)	3	A
I_B	Base current	0.5	A
I_{BM}	Base peak current ($t_P < 5$ ms)	1.5	A
P_{TOT}	Total dissipation at $T_C = 25$ °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_{thJC}	Thermal resistance junction-case max	83	°C/W

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_{CEV}	Collector cut-off current ($V_{\text{BE}} = -1.5\text{ V}$)	$V_{\text{CE}} = 700\text{ V}$ $V_{\text{CE}} = 700\text{ V}$ $T_{\text{C}} = 125\text{ °C}$			1 5	mA mA
$V_{(\text{BR})\text{EBO}}$	Emitter-base breakdown voltage ($I_{\text{C}} = 0$)	$I_{\text{E}} = 10\text{ mA}$	9		18	V
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 10\text{ mA}$	400			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 0.3\text{ A}$ $I_{\text{B}} = 60\text{ mA}$ $I_{\text{C}} = 0.6\text{ A}$ $I_{\text{B}} = 120\text{ mA}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B}} = 250\text{ mA}$		0.15 0.25 0.4	0.4 0.6 1	V V V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 0.6\text{ A}$ $I_{\text{B}} = 120\text{ mA}$		0.95	1.1	V
h_{FE}	DC current gain	$I_{\text{C}} = 0.6\text{ A}$ $V_{\text{CE}} = 3\text{ V}$ $I_{\text{C}} = 1.2\text{ A}$ $V_{\text{CE}} = 5\text{ V}$	10 4		21 10	
t_{r} t_{s} t_{f}	Resistive load Rise time Storage time Fall time	$V_{\text{CC}} = 125\text{ V}$ $I_{\text{C}} = 1\text{ A}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 200\text{ mA}$ $T_{\text{P}} = 25\text{ }\mu\text{s}$			1 4 0.7	μs μs μs
t_{s}	Inductive load Storage time	$I_{\text{C}} = 0.3\text{ A}$ $V_{\text{Clamp}} = 300\text{ V}$ $I_{\text{B(on)}} = -I_{\text{B(off)}} = 60\text{ mA}$ $L = 3\text{ mH}$		0.3		μs
V_{F}	Diode forward voltage	$I_{\text{F}} = 0.5\text{ A}$			1.5	V

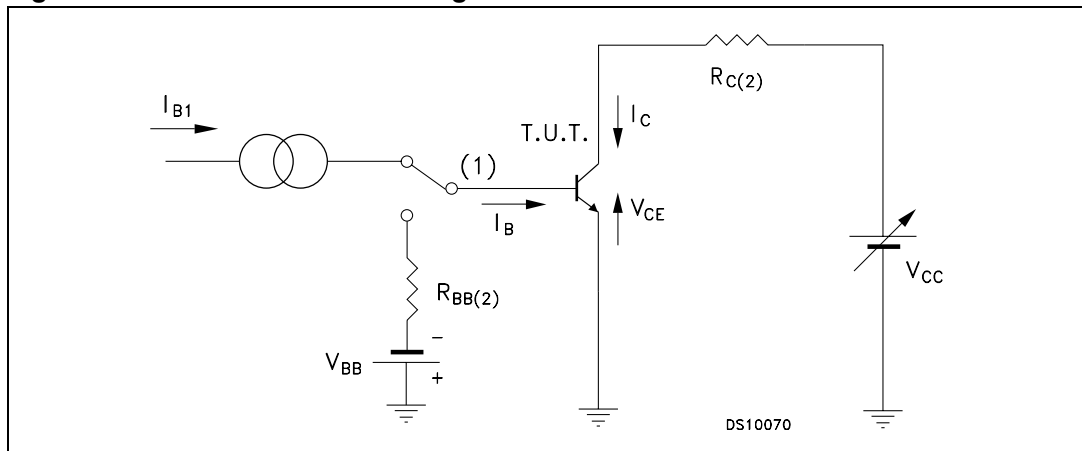
1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

Table 5. h_{FE} classification

Symbol	Parameter	Group	Value		
			Min.	Max.	Unit
h_{FE}	DC current gain $V_{\text{CE}} = 3\text{ V}$, $I_{\text{C}} = 0.6\text{ A}$	L	10	16	
		H	15	21	

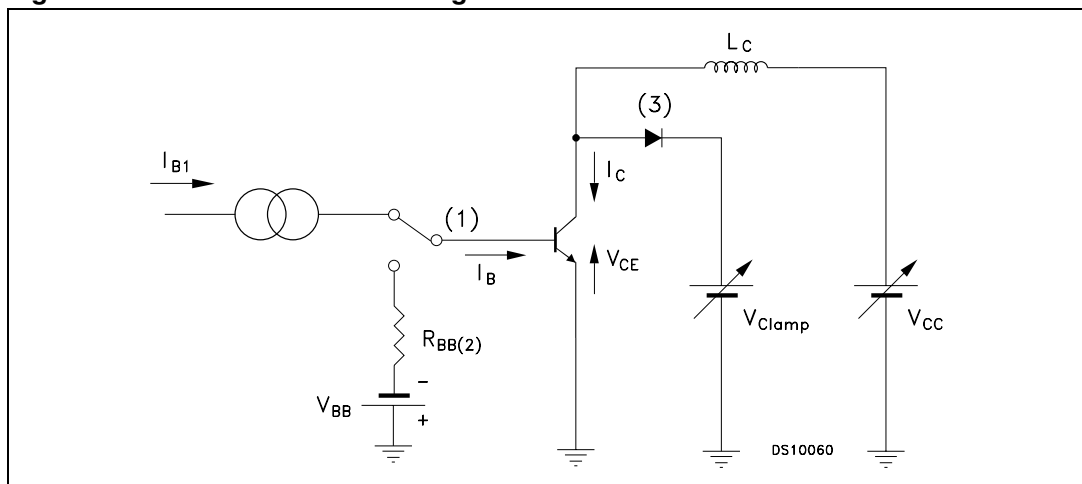
2.1 Test circuits

Figure 2. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

Figure 3. Inductive load switching test circuit



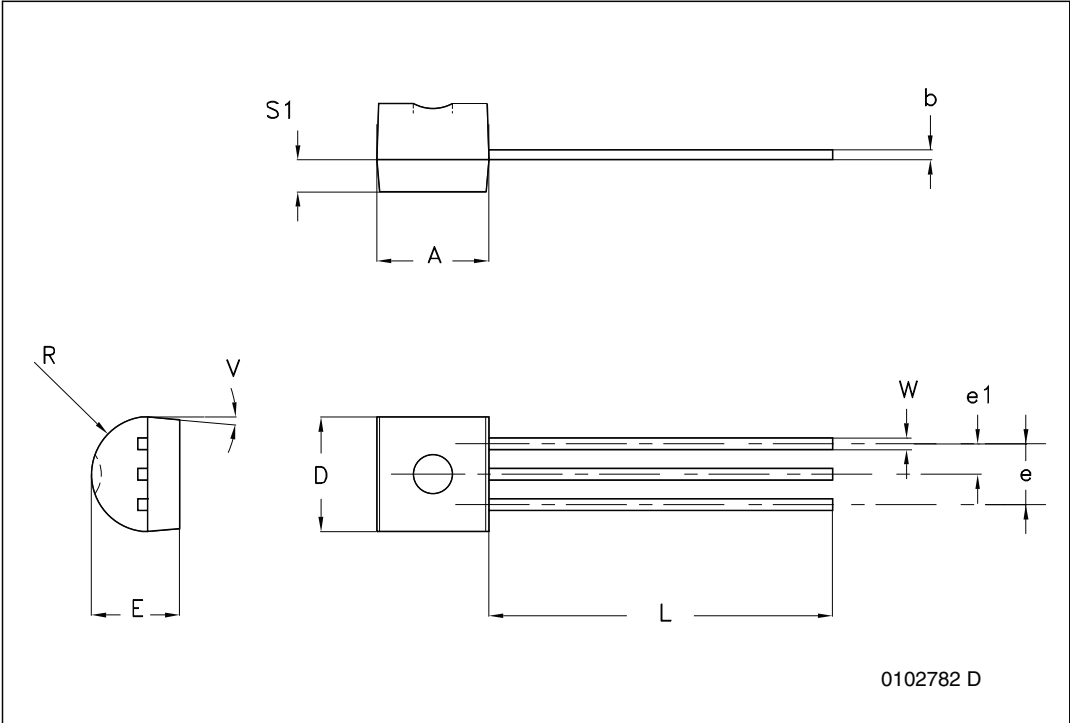
1. Fast electronic switch
2. Non-inductive resistor
3. Fast recovery rectifier

3 **Package mechanical data**

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

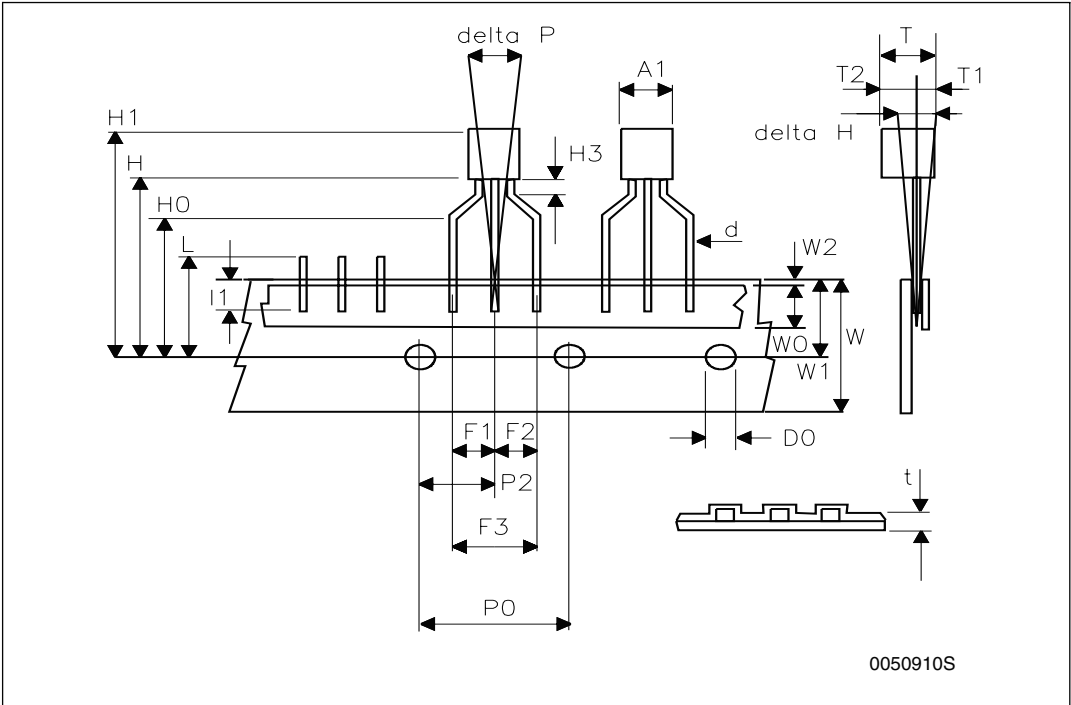
TO-92 bulk shipment mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A	4.32		4.95
b	0.36		0.51
D	4.45		4.95
E	3.30		3.94
e	2.41		2.67
e1	1.14		1.40
L	12.70		15.49
R	2.16		2.41
S1	0.92		1.52
W	0.41		0.56
V		5°	



TO-92 ammopack shipment (suffix"-AP") 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
I1	3.00		
delta P	-1.00		1.00



4 Revision history

Table 6. Document revision history

Date	Revision	Changes
12-Nov-2008	1	Initial release.
25-Nov-2009	2	Added order code STL73D-AP Table 1 on page 1 .

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