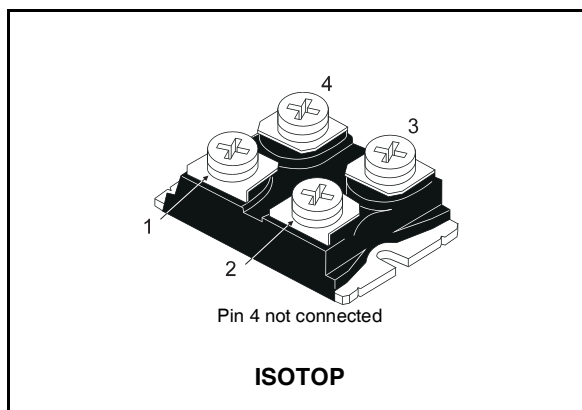


NPN transistor power module

General features

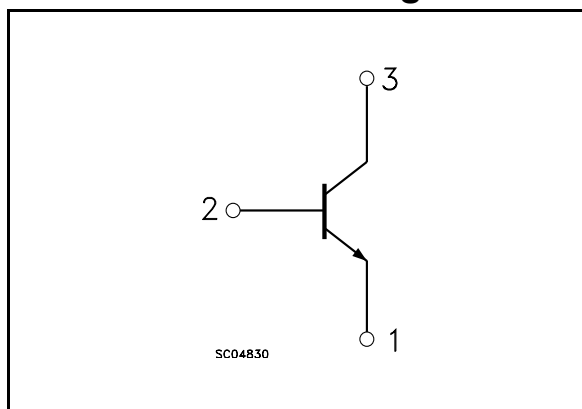
- NPN Transistor
- High current power bipolar module
- Very low R_{th} junction case
- Specific accidental overload areas
- Fully insulated package (U.L. compliant) for easy mounting
- Low internal parasitic inductance
- In compliance with the 2002/93/EC European Directive



Applications

- Motor control
- SMPS & UPS
- Welding equipment

Internal schematic diagram



Order codes

Part Number	Marking	Package	Packing
BUV298V	BUV298V	ISOTOP	Tube

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
2.1	Electrical characteristics (curves)	5
2.2	Test circuits and waveforms	7
3	Package mechanical data	9
4	Revision history	11

1 Electrical ratings

Table 1. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CEV}	Collector-emitter voltage ($V_{BE} = -5V$)	850	V
$V_{CEO(sus)}$	Collector-emitter voltage ($I_B = 0$)	450	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	7	V
I_C	Collector current	50	A
I_{CM}	Collector peak current ($t_P < 10ms$)	75	A
I_B	Base current	10	A
I_{BM}	Base peak current ($t_P < 10ms$)	16	A
P_{tot}	Total dissipation at $T_C = 25^\circ C$	250	W
V_{isol}	Insulation insulation withstand voltage (RMS) from all four leads to external heatsink	2500	V
T_{stg}	Storage temperature	-65 to 150	$^\circ C$
T_J	Max. operating junction temperature	150	$^\circ C$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	0.5	$^\circ C/W$
R_{thc-h}	Thermal resistance case heatsink with conductive grease applied max	0.05	$^\circ C/W$

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CER}	Collector cut-off current ($R_{\text{BE}} = 5\Omega$)	$V_{\text{CE}} = V_{\text{CEV}}$			0.4	mA
		$V_{\text{CE}} = V_{\text{CEV}} \quad T_{\text{J}} = 100^{\circ}\text{C}$			2	mA
I_{CEV}	Collector cut-off current ($V_{\text{BE}} = -5\text{V}$)	$V_{\text{CE}} = V_{\text{CEV}}$			0.4	mA
		$V_{\text{CE}} = V_{\text{CEV}} \quad T_{\text{J}} = 100^{\circ}\text{C}$			2	mA
I_{EBO}	Emitter cut-off current ($I_{\text{C}} = 0$)	$V_{\text{EB}} = 5\text{V}$			2	mA
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage ($I_{\text{B}} = 0$)	$I_{\text{C}} = 0.2\text{A} \quad L = 25\text{mH}$ $V_{\text{clamp}} = 450\text{V}$	450			V
h_{FE}	DC current gain	$I_{\text{C}} = 32\text{A} \quad V_{\text{CE}} = 5\text{V}$		12		
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 32\text{A} \quad I_{\text{B}} = 6.4\text{A}$		0.35	1.2	V
		$I_{\text{C}} = 32\text{A} \quad I_{\text{B}} = 6.4\text{A} \quad T_{\text{J}} = 100^{\circ}\text{C}$		0.6	2	V
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 32\text{A} \quad I_{\text{B}} = 6.4\text{A}$		1	1.5	V
		$I_{\text{C}} = 32\text{A} \quad I_{\text{B}} = 6.4\text{A} \quad T_{\text{J}} = 100^{\circ}\text{C}$		0.9	1.5	V
di_{C}/dt	Rate of rise of On-state collector	$V_{\text{CC}} = 300\text{V} \quad R_{\text{C}} = 0 \quad t_{\text{p}} = 3\mu\text{s}$ $I_{\text{B1}} = 9.6\text{A} \quad T_{\text{J}} = 100^{\circ}\text{C}$	160	210		A/ μs
$V_{\text{CE(3}\mu\text{s)}}$	Collector-emitter dynamic voltage	$V_{\text{CC}} = 300\text{V} \quad R_{\text{C}} = 9.3\Omega$ $I_{\text{B1}} = 9.6\text{A} \quad T_{\text{J}} = 100^{\circ}\text{C}$		4.5	8	V
$V_{\text{CE(5}\mu\text{s)}}$	Collector-emitter dynamic voltage	$V_{\text{CC}} = 300\text{V} \quad R_{\text{C}} = 9.3\Omega$ $I_{\text{B1}} = 9.6\text{A} \quad T_{\text{J}} = 100^{\circ}\text{C}$		2.5	4	V
t_{s} t_{f} t_{c}	Storage time	$I_{\text{C}} = 32\text{A} \quad V_{\text{CC}} = 50\text{V}$ $V_{\text{BB}} = -5\text{V} \quad R_{\text{BB}} = 0.39\Omega$		3.2	4.5	μs
	Fall time	$I_{\text{B1}} = 6.4\text{A} \quad V_{\text{clamp}} = 450\text{V}$		0.25	0.4	μs
	Cross-over time	$L = 78\mu\text{H} \quad T_{\text{J}} = 100^{\circ}\text{C}$		0.5	0.7	μs
V_{CEW}	Maximum collector-emitter voltage without snubber	$I_{\text{CWoff}} = 48\text{A} \quad I_{\text{B1}} = 6.4\text{A}$ $V_{\text{BB}} = -5\text{V} \quad V_{\text{CC}} = 50\text{V}$ $L = 52\mu\text{H} \quad R_{\text{BB}} = 0.39\Omega$ $T_{\text{J}} = 125^{\circ}\text{C}$	450			V

Note (1) Pulsed duration = 300 μs , duty cycle $\leq 1.5\%$

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

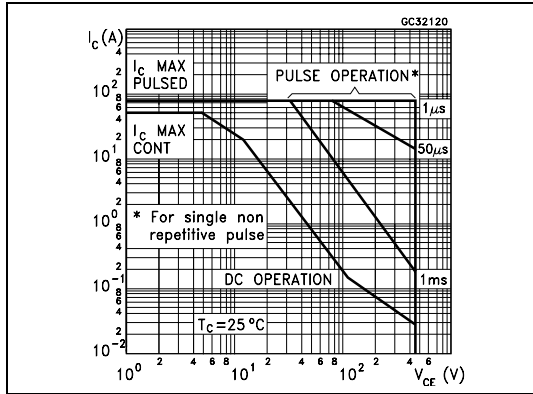


Figure 2. Thermal impedance

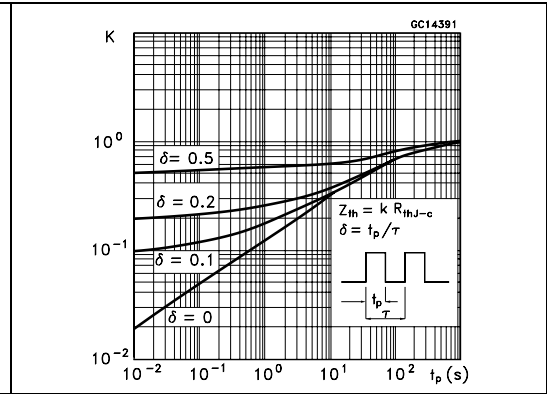


Figure 3. Derating curves

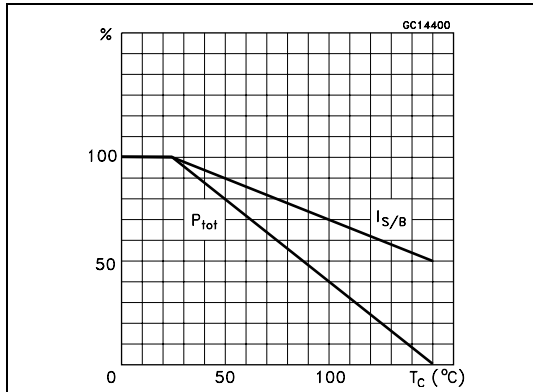


Figure 4. Collector-emitter voltage vs base-emitter resistance

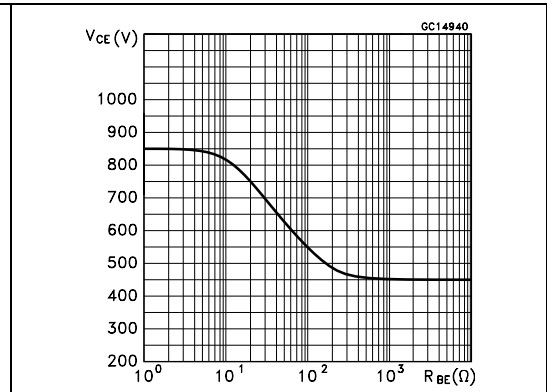


Figure 5. Collector-emitter saturation voltage

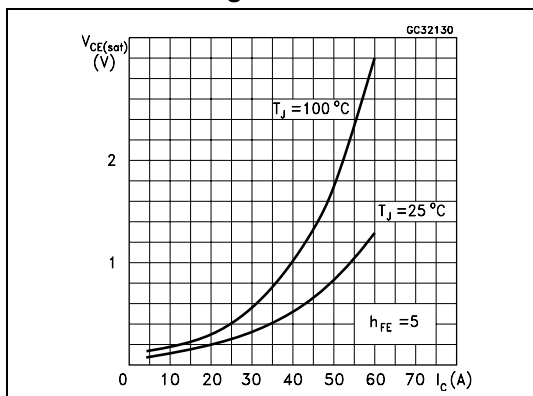


Figure 6. Base-emitter saturation voltage

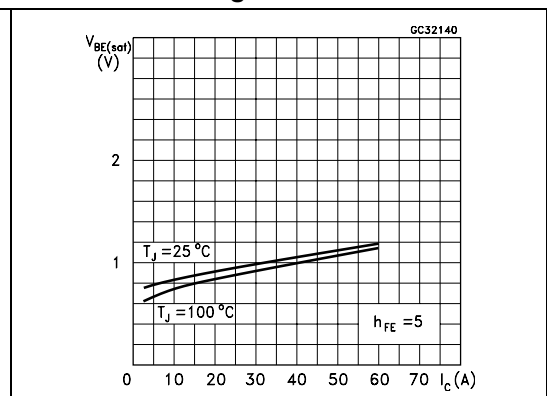


Figure 7. Reverse biased SOA

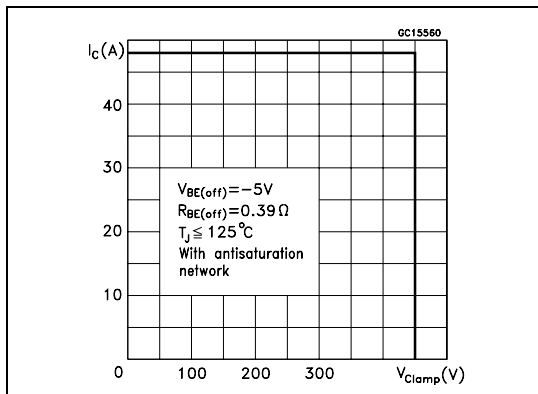


Figure 8. Forward biased SOA

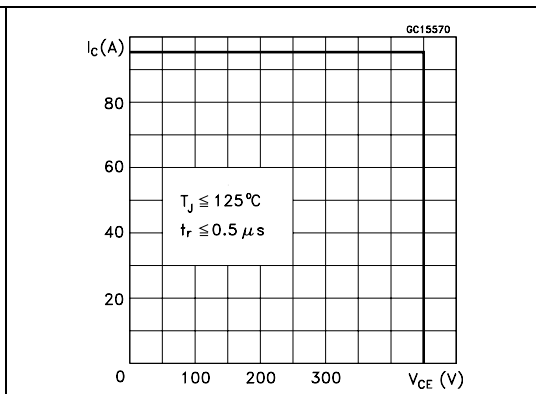


Figure 9. Reverse biased AOA

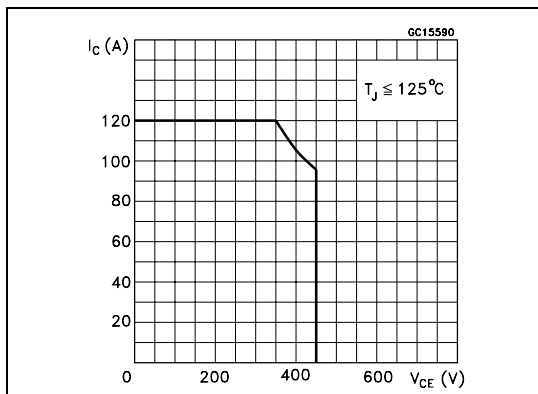


Figure 10. Forward biased AOA

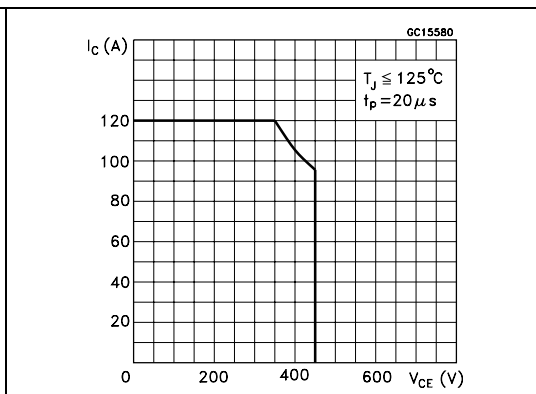


Figure 11. Switching times Inductive load

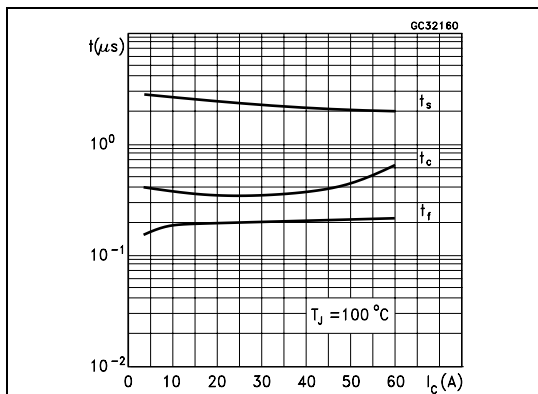


Figure 12. Switching times Inductive load vs temperature

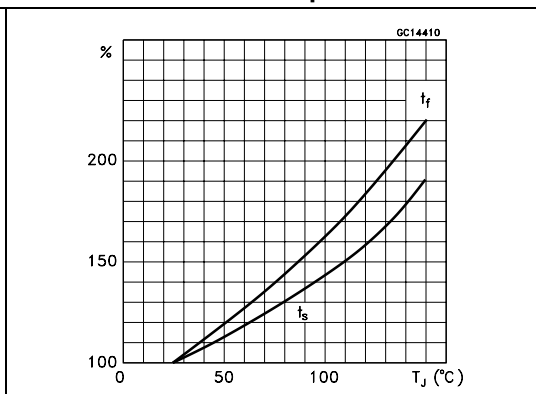
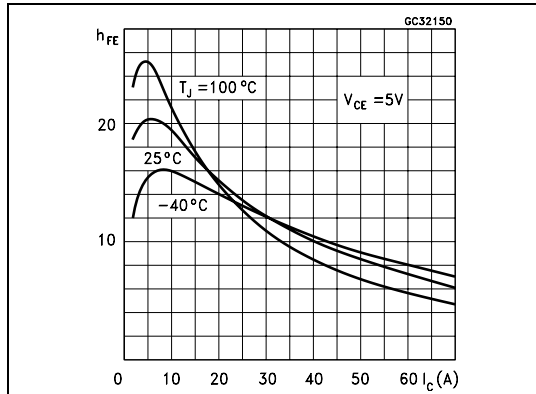


Figure 13. DC current gain



2.2 Test circuits and waveforms

Figure 14. Turn-on switching test circuit

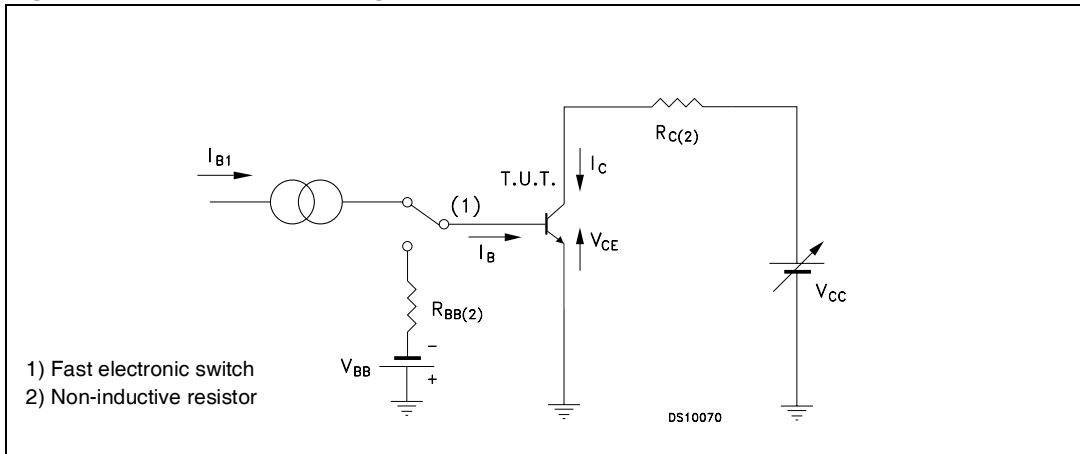


Figure 15. Turn-on switching waveforms

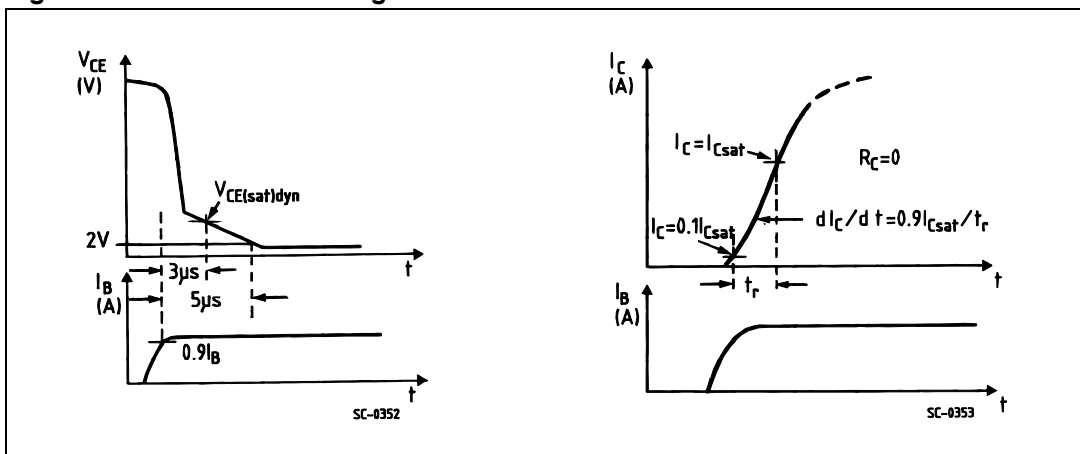


Figure 16. Turn-off switching test circuit

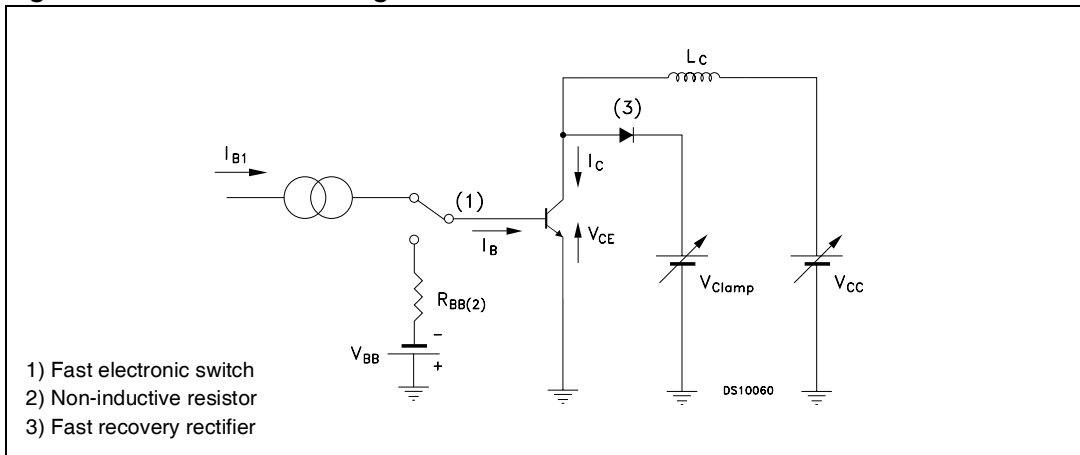
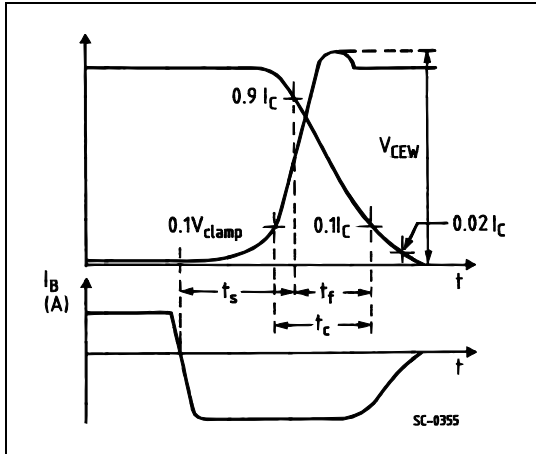


Figure 17. Turn-off switching waveforms

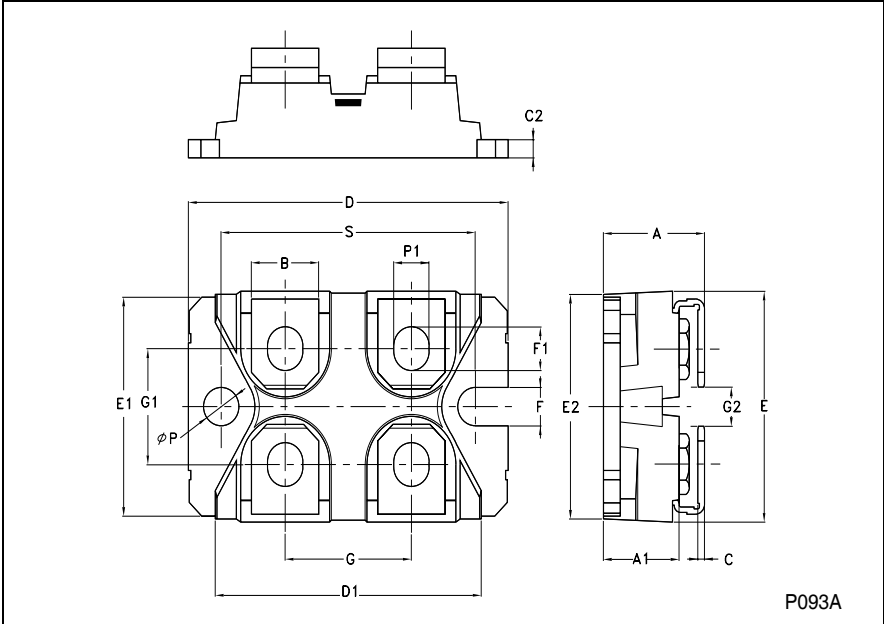


3 Package mechanical data

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

ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.465		0.480
A1	8.9		9.1	0.350		0.358
B	7.8		8.2	0.307		0.322
C	0.75		0.85	0.029		0.033
C2	1.95		2.05	0.076		0.080
D	37.8		38.2	1.488		1.503
D1	31.5		31.7	1.240		1.248
E	25.15		25.5	0.990		1.003
E1	23.85		24.15	0.938		0.950
E2		24.8			0.976	
G	14.9		15.1	0.586		0.594
G1	12.6		12.8	0.496		0.503
G2	3.5		4.3	0.137		1.169
F	4.1		4.3	0.161		0.169
F1	4.6		5	0.181		0.196
P	4		4.3	0.157		0.169
P1	4		4.4	0.157		0.173
S	30.1		30.3	1.185		1.193



4 Revision history

Table 4. Revision history

Date	Revision	Changes
01-Mar-2003	1	Initial release.
14-Jan-2004	2	Technical migration from ST-press to EDOCS
27-Nov-2006	3	The document has been reformatted

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