

## HIGH POWER NPN SILICON TRANSISTOR

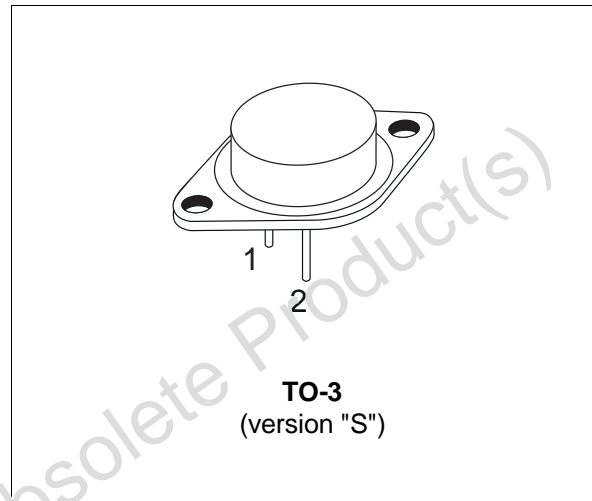
- NPN TRANSISTOR
- HIGH CURRENT CAPABILITY
- FAST SWITCHING SPEED
- HIGH RUGGEDNESS
- LOW COLLECTOR EMITTER SATURATION

### APPLICATIONS

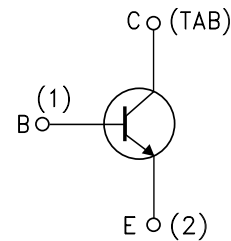
- UNINTERRUPTABLE POWER SUPPLY
- MOTOR CONTROL
- LINEAR AND SWITCHING INDUSTRIAL EQUIPMENT

### DESCRIPTION

The BUT90 is a Multiepitaxial Planar NPN Transistor in TO-3 package. It is intended for use in high frequency and efficiency converters, switching regulators and motor control.



### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CEV}$	Collector-Emitter Voltage ( $V_{BE} = -1.5\text{ V}$ )	200	V
$V_{CEO}$	Collector-Emitter Voltage ( $I_B = 0$ )	125	V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	10	V
$I_C$	Collector Current	50	A
$I_{CM}$	Collector Peak Current ( $t_p = 10\text{ ms}$ )	120	A
$I_B$	Base Current	12	A
$I_{BM}$	Base Peak Current ( $t_p = 10\text{ ms}$ )	32	A
$P_{tot}$	Total Power Dissipation at $T_{case} \leq 25\text{ °C}$	250	W
$T_{stg}$	Storage Temperature	-65 to 200	°C
$T_j$	Max Operating Junction Temperature	200	°C

# BUT90

## THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-case	Max	0.7	°C/W
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## ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I <sub>CEr</sub>	Collector Cut-off Current (R <sub>BE</sub> = 10 Ω)	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>CE</sub> = V <sub>CEV</sub> T <sub>c</sub> = 100 °C			0.4 4	mA mA
I <sub>CEV</sub>	Collector Cut-off Current (V <sub>BE</sub> = -1.5V)	V <sub>CE</sub> = V <sub>CEV</sub> V <sub>CE</sub> = V <sub>CEV</sub> T <sub>c</sub> = 100 °C			0.2 2	mA mA
I <sub>EBO</sub>	Emitter Cut-off Current (I <sub>C</sub> = 0)	V <sub>EB</sub> = 7 V			1	mA
V <sub>CEO(sus)*</sub>	Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 0.2 A L = 25 mH	125			V
V <sub>EBO</sub>	Emitter-Base Voltage (I <sub>C</sub> = 0)	I <sub>E</sub> = 50 mA	10			V
V <sub>CE(sat)*</sub>	Collector-Emitter Saturation Voltage	I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A T <sub>c</sub> = 100 °C I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A T <sub>c</sub> = 100 °C		0.55 0.8 0.75 1.2	0.9 0.9 1.2 1.5	V V V V
V <sub>BE(sat)*</sub>	Base-Emitter Saturation Voltage	I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A I <sub>C</sub> = 35 A I <sub>B</sub> = 1.75 A T <sub>c</sub> = 100 °C I <sub>C</sub> = 70 A I <sub>B</sub> = 7 A T <sub>c</sub> = 100 °C		1 1.45 1 1.65	1.3 1.8 1.4 2	V V V V

## RESISTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>r</sub>	Rise Time	V <sub>CC</sub> = 100 V I <sub>C</sub> = 70 A		0.8	1.2	μs
t <sub>s</sub>	Storage Time	I <sub>B1</sub> = - I <sub>B2</sub> = 7 A t <sub>p</sub> = 30 μs		0.9	1.5	μs
t <sub>f</sub>	Fall Time			0.2	0.4	μs
t <sub>r</sub>	Rise Time	V <sub>CC</sub> = 100 V I <sub>C</sub> = 70 A		1.1	1.6	μs
t <sub>s</sub>	Storage Time	I <sub>B1</sub> = - I <sub>B2</sub> = 7 A t <sub>p</sub> = 30 μs		1.2	2	μs
t <sub>f</sub>	Fall Time	T <sub>j</sub> = 100 °C		0.3	0.6	μs

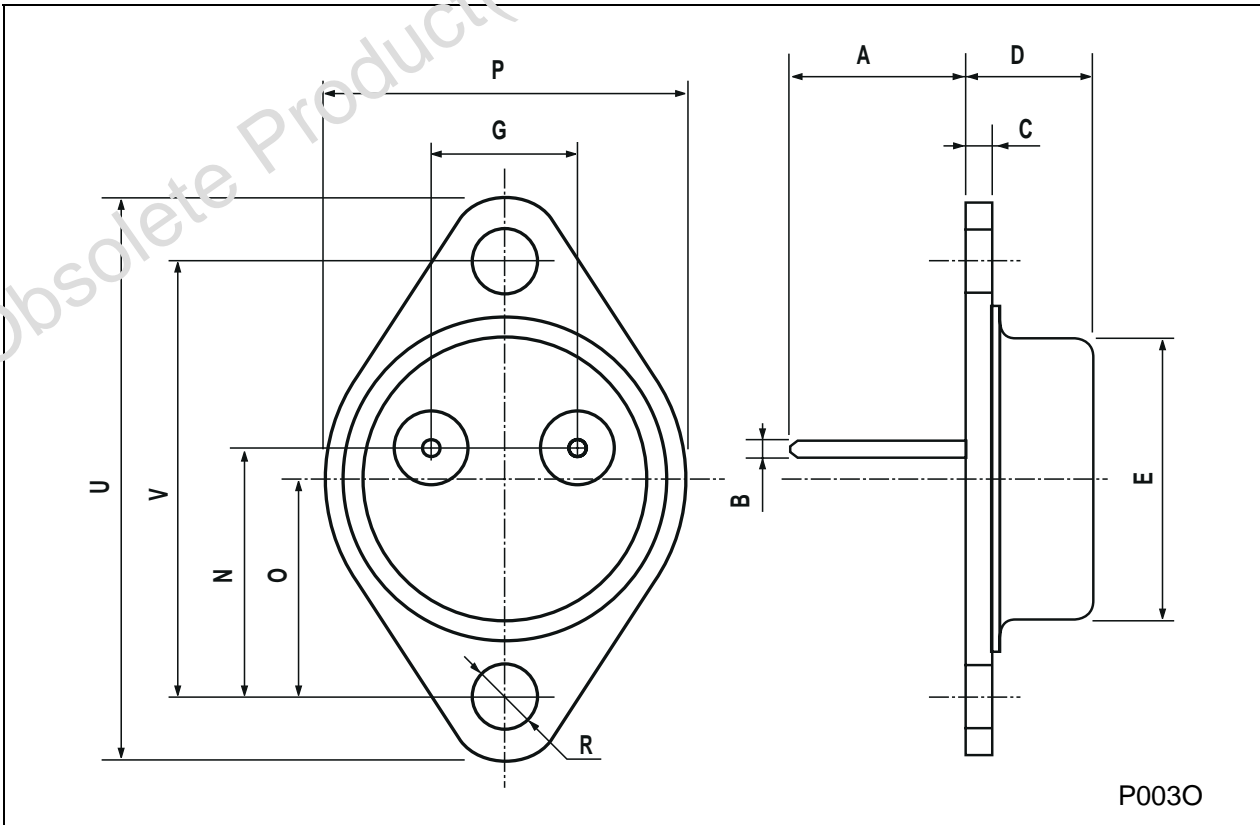
## INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>s</sub>	Storage Time	V <sub>CC</sub> = 100 V V <sub>Clamp</sub> = 125 V		1.25	2	ms
t <sub>f</sub>	Fall Time	I <sub>C</sub> = 70 A I <sub>B1</sub> = - I <sub>B2</sub> = 7 A L <sub>C</sub> = 70 μH		0.16	0.3	μs
t <sub>s</sub>	Storage Time	V <sub>CC</sub> = 100 V V <sub>Clamp</sub> = 125 V		1.5	2.3	μs
t <sub>f</sub>	Fall Time	I <sub>C</sub> = 70 A I <sub>B1</sub> = - I <sub>B2</sub> = 7 A L <sub>C</sub> = 70 μH T <sub>j</sub> = 100 °C		0.25	0.5	μs

\* Pulsed : Pulse duration = 300 μs, duty cycle = 2%

**TO-3 (version S) MECHANICAL DATA**

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.00		13.10	0.433		0.516
B	1.47		1.60	0.058		0.063
C	1.50		1.65	0.059		0.065
D	8.32		8.92	0.327		0.351
E	19.00		20.00	0.748		0.787
G	10.70		11.10	0.421		0.437
N	16.50		17.20	0.649		0.677
P	25.00		26.00	0.984		1.023
R	4.00		4.09	0.157		0.161
U	38.50		39.30	1.515		1.547
V	30.00		30.30	1.187		1.193



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