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## HIGH POWER NPN SILICON TRANSISTOR

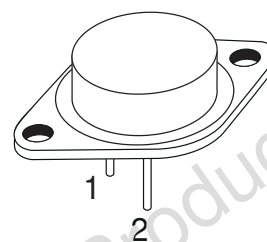
- NPN TRANSISTOR
- HIGH CURRENT CAPABILITY
- FAST SWITCHING SPEED
- HIGH RUGGEDNESS
- LOW COLLECTOR EMITTER SATURATION

### APPLICATIONS

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

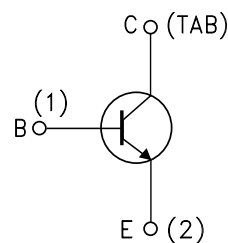
### DESCRIPTION

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.



**TO-3**  
(version "S")

### INTERNAL SCHEMATIC DIAGRAM



SC08820

### ABSOLUTE MAXIMUM RATINGS

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

## BUT90

### THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.7	$^{\circ}C/W$
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### ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{CER}$	Collector Cut-off Current ( $R_{BE} = 10 \Omega$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_c = 100^{\circ}C$			0.4 4	mA mA
$I_{CEV}$	Collector Cut-off Current ( $V_{BE} = -1.5V$ )	$V_{CE} = V_{CEV}$ $V_{CE} = V_{CEV}$ $T_c = 100^{\circ}C$			0.2 2	mA mA
$I_{EBO}$	Emitter Cut-off Current ( $I_C = 0$ )	$V_{EB} = 7 V$			1	mA
$V_{CEO(sus)}^*$	Collector-Emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 0.2 A$ $L = 25 mH$	125			V
$V_{EBO}$	Emitter-Base Voltage ( $I_C = 0$ )	$I_E = 50 mA$	10			V
$V_{CE(sat)}^*$	Collector-Emitter Saturation Voltage	$I_C = 35 A$ $I_B = 1.75 A$		0.55	0.9	V
		$I_C = 70 A$ $I_B = 7 A$		0.8	0.9	V
		$I_C = 35 A$ $I_B = 1.75 A$ $T_c = 100^{\circ}C$		0.75	1.2	V
		$I_C = 70 A$ $I_B = 7 A$ $T_c = 100^{\circ}C$		1.2	1.5	V
$V_{BE(sat)}^*$	Base-Emitter Saturation Voltage	$I_C = 35 A$ $I_B = 1.75 A$		1	1.3	V
		$I_C = 70 A$ $I_B = 7 A$		1.45	1.8	V
		$I_C = 35 A$ $I_B = 1.75 A$ $T_c = 100^{\circ}C$		1	1.4	V
		$I_C = 70 A$ $I_B = 7 A$ $T_c = 100^{\circ}C$		1.65	2	V

### RESISTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r$	Rise Time	$V_{CC} = 100 V$ $I_C = 70 A$		0.8	1.2	$\mu s$
$t_s$	Storage Time	$I_{B1} = - I_{B2} = 7 A$ $t_p = 30 \mu s$		0.9	1.5	$\mu s$
$t_f$	Fall Time			0.2	0.4	$\mu s$
$t_r$	Rise Time	$V_{CC} = 100 V$ $I_C = 70 A$		1.1	1.6	$\mu s$
$t_s$	Storage Time	$I_{B1} = - I_{B2} = 7 A$ $t_p = 30 \mu s$		1.2	2	$\mu s$
$t_f$	Fall Time	$T_j = 100^{\circ}C$		0.3	0.6	$\mu s$

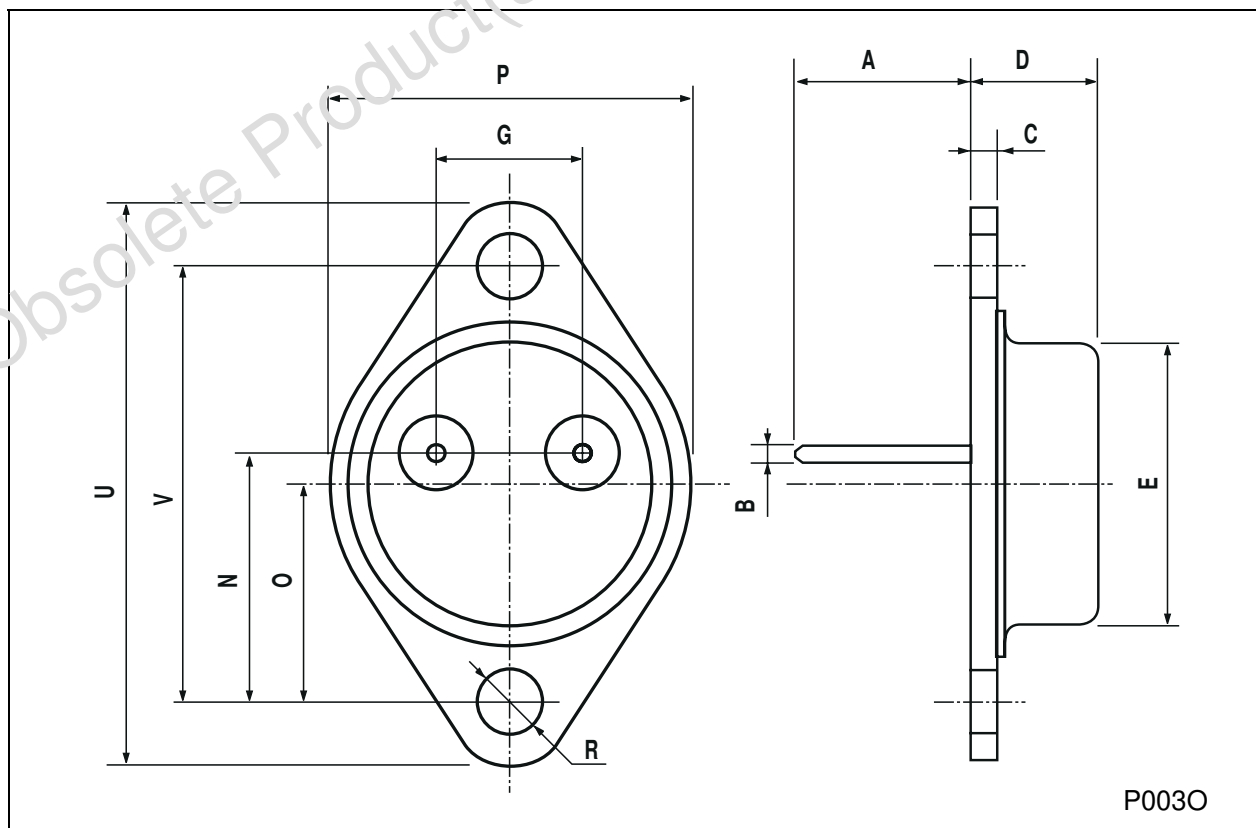
### INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_s$	Storage Time	$V_{CC} = 100 V$ $V_{Clamp} = 125 V$		1.25	2	ms
$t_f$	Fall Time	$I_C = 70 A$ $I_{B1} = - I_{B2} = 7 A$ $L_C = 70 \mu H$		0.16	0.3	$\mu s$
$t_s$	Storage Time	$V_{CC} = 100 V$ $V_{Clamp} = 125 V$		1.5	2.3	$\mu s$
$t_f$	Fall Time	$I_C = 70 A$ $I_{B1} = - I_{B2} = 7 A$ $L_C = 70 \mu H$ $T_j = 100^{\circ}C$		0.25	0.5	$\mu s$

\* Pulsed : Pulse duration = 300  $\mu s$ , 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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