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# Silicon Diffused Power Transistor BU2507AX

## GENERAL DESCRIPTION

Enhanced performance, new generation, high-voltage, high-speed switching npn transistor in a plastic full-pack envelope intended for use in horizontal deflection circuits of colour television receivers and computer monitors. Features exceptional tolerance to base drive and collector current load variations resulting in a very low worst case dissipation.

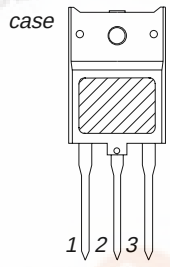
## QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{CESM}$ | Collector-emitter voltage peak value | $V_{BE}$ = 0 V | - | 1500 | V |
| $V_{CEO}$ | Collector-emitter voltage (open base) | | - | 700 | V |
| $I_C$ | Collector current (DC) | | - | 8 | A |
| $I_{CM}$ | Collector current peak value | | - | 15 | A |
| $P_{tot}$ | Total power dissipation | $T_{hs} \leq 25$ ˚C | - | 45 | W |
| $V_{CEsat}$ | Collector-emitter saturation voltage | $I_C$ = 4 A; $I_B$ = 0.8 A | - | 5.0 | V |
| $I_{Csat}$ | Collector saturation current | f = 16kHz | 4 | - | A |
| $t_f$ | Fall time | $I_{Csat}$ = 4 A; f = 16kHz | 0.25 | 0.5 | µs |

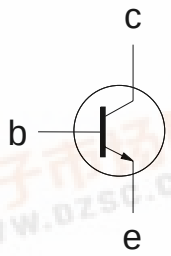
## PINNING - SOT399

| PIN | DESCRIPTION |
|---|---|
| 1 | base |
| 2 | collector |
| 3 | emitter |
| case | isolated |

## PIN CONFIGURATION




## SYMBOL




## LIMITING VALUES

Limiting values in accordance with the Absolute Maximum Rating System (IEC 134)

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{CESM}$ | Collector-emitter voltage peak value | $V_{BE}$ = 0 V | - | 1500 | V |
| $V_{CEO}$ | Collector-emitter voltage (open base) | | - | 700 | V |
| $I_C$ | Collector current (DC) | | - | 8 | A |
| $I_{CM}$ | Collector current peak value | | - | 15 | A |
| $I_B$ | Base current (DC) | | - | 4 | A |
| $I_{BM}$ | Base current peak value | | - | 6 | A |
| $-I_{B(AV)}$ | Reverse base current | average over any 20 ms period | - | 100 | mA |
| $-I_{BM}$ | Reverse base current peak value [1] | | - | 5 | A |
| $P_{tot}$ | Total power dissipation | $T_{hs} \leq$ 25 ˚C | - | 45 | W |
| $T_{stg}$ | Storage temperature | | -65 | 150 | ˚C |
| $T_j$ | Junction temperature | | - | 150 | ˚C |

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| $R_{th\ j\text{-}hs}$ | Junction to heatsink | without heatsink compound | - | 3.7 | K/W |
| $R_{th\ j\text{-}hs}$ | Junction to heatsink | with heatsink compound | - | 2.8 | K/W |
| $R_{th\ j\text{-}a}$ | Junction to ambient | in free air | 35 | - | K/W |

1 Turn-off current.

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## ISOLATION LIMITING VALUE & CHARACTERISTIC

$T_{hs}$ = 25 ˚C unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_{isol}$ | Repetitive peak voltage from all three terminals to external heatsink | R.H. ≤ 65 % ; clean and dustfree | - | | 2500 | V |
| $C_{isol}$ | Capacitance from T2 to external heatsink | f = 1 MHz | - | 22 | - | pF |

## STATIC CHARACTERISTICS

$T_{hs}$ = 25 ˚C unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector cut-off current [2] | $V_{BE}$ = 0 V; $V_{CE}$ = $V_{CESMmax}$ | - | - | 1.0 | mA |
| $I_{CES}$ | | $V_{BE}$ = 0 V; $V_{CE}$ = $V_{CESMmax}$ $T_j$ = 125 ˚C | - | - | 2.0 | mA |
| $I_{EBO}$ | Emitter cut-off current | $V_{EB}$ = 7.5 V; $I_C$ = 0 A | - | - | 1.0 | mA |
| $V_{CEOsust}$ | Collector-emitter sustaining voltage | $I_B$ = 0 A; $I_C$ = 100 mA; L = 25 mH | 700 | - | - | V |
| $BV_{EBO}$ | Emitter-base breakdown voltage | $I_B$ = 1 mA | 7.5 | 13.5 | - | V |
| $V_{CEsat}$ | Collector-emitter saturation voltages | $I_C$ = 4 A; $I_B$ = 0.8 A | - | - | 5.0 | V |
| $V_{BEsat}$ | Base-emitter saturation voltage | $I_C$ = 4 A; $I_B$ = 0.8 A | - | - | 1.1 | V |
| $h_{FE}$ | DC current gain | $I_C$ = 100 mA; $V_{CE}$ = 5 V | - | 17 | - | |
| $h_{FE}$ | | $I_C$ = 4 A; $V_{CE}$ = 5 V | 5.0 | 7.0 | 9.0 | |

## DYNAMIC CHARACTERISTICS

$T_{hs}$ = 25 ˚C unless otherwise specified

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| $C_c$ | Collector capacitance | $I_E$ = 0 A; $V_{CB}$ = 10 V; f = 1 MHz | 68 | - | pF |
| | Switching times (16 kHz line deflection circuit) | $I_{Csat}$ = 4 A; $I_{B(end)}$ = 0.7 A; $L_B$ = 6 µH; $-V_{BB}$ = 4 V | | | |
| $t_s$ | Turn-off storage time | | 5.0 | 6.0 | µs |
| $t_f$ | Turn-off fall time | | 0.25 | 0.5 | µs |

**2** Measured with half sine-wave voltage (curve tracer).

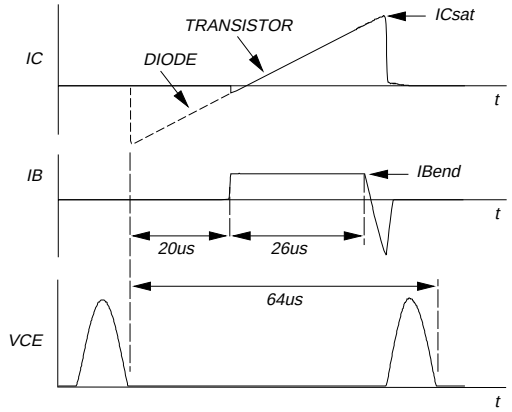


*Fig.1. Switching times waveforms.*

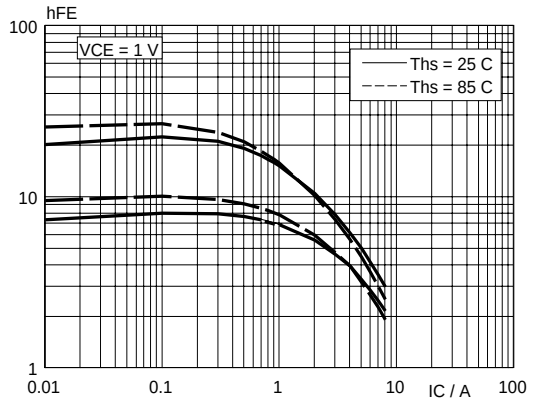


*Fig.4. High and low DC current gain. $h_{FE} = f(I_C)$ $V_{CE} = 1$ V*

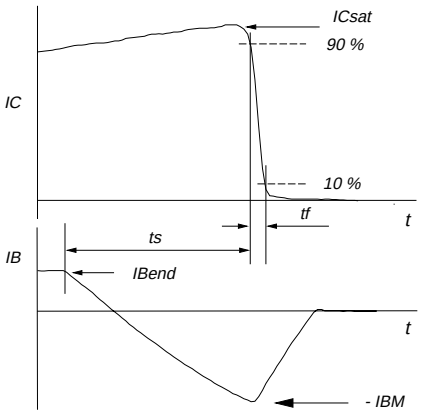


*Fig.2. Switching times definitions.*

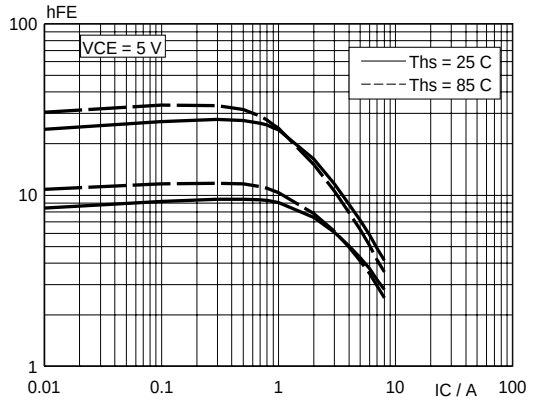


*Fig.5. High and low DC current gain. $h_{FE} = f(I_C)$ $V_{CE} = 5$ V*

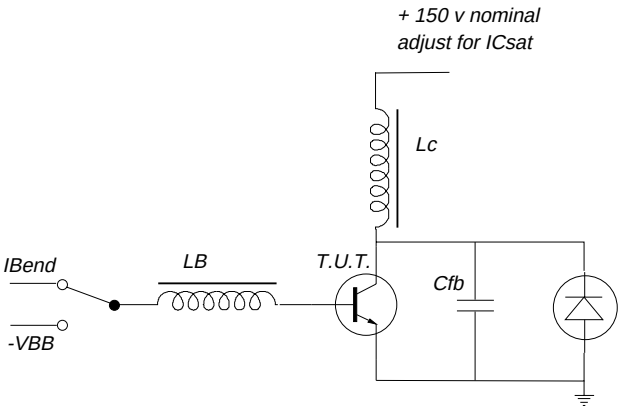


*Fig.3. Switching times test circuit.*

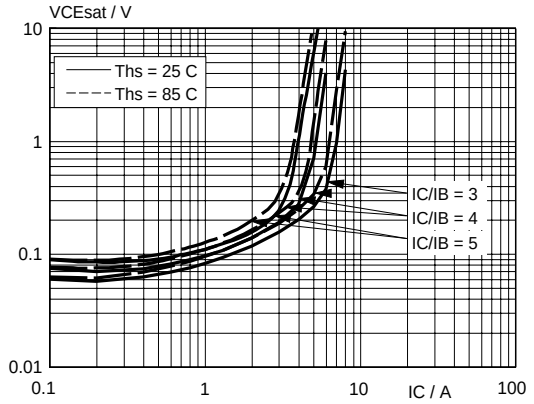


*Fig.6. Typical collector-emitter saturation voltage. $V_{CE}sat = f(I_C)$; parameter $I_C/I_B$*

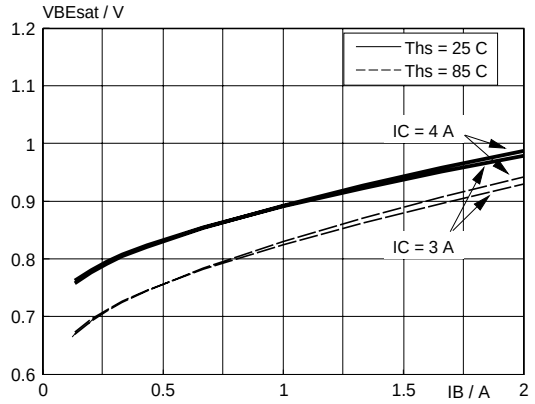


*Fig.7. Typical base-emitter saturation voltage.*
*$V_{BE}sat = f(I_B)$; parameter $I_C$*

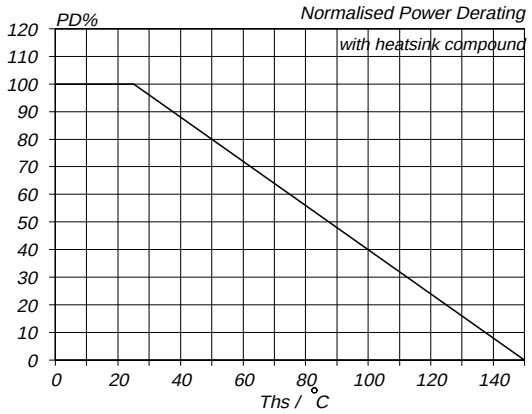


*Fig.10. Normalised power dissipation.*
*$PD\% = 100 \cdot P_D/P_{D\ 25^\circ C} = f(T_{mb})$*

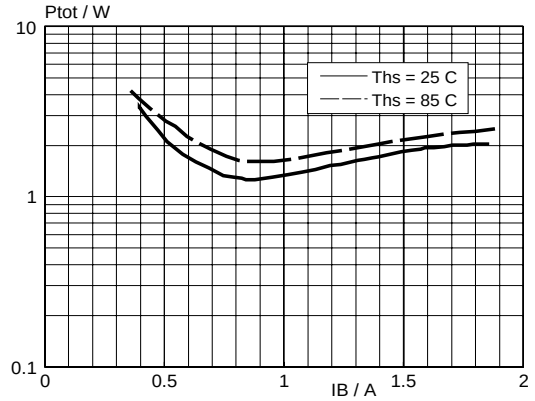


*Fig.8. Typical losses.*
*$P_{TOT} = f(I_B)$; $I_C = 4$ A; f = 16 kHz*

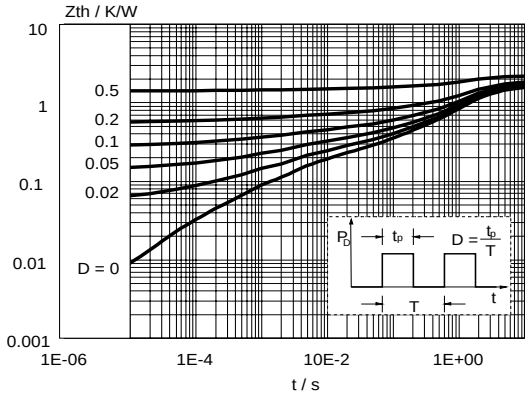


*Fig.11. Transient thermal impedance.*
*$Z_{th\ j\text{-}hs} = f(t)$; parameter $D = t_p/T$*

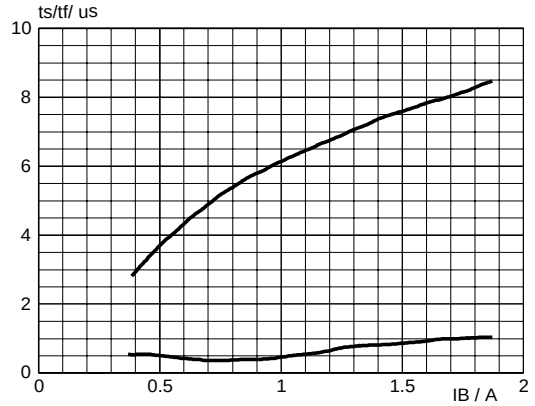


*Fig.9. Typical collector storage and fall time.*
*$ts = f(I_B)$; $tf = f(I_B)$; $I_C = 4.0$ A; $T_j = 85^\circ C$; f = 16 kHz*

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 5.88 g*

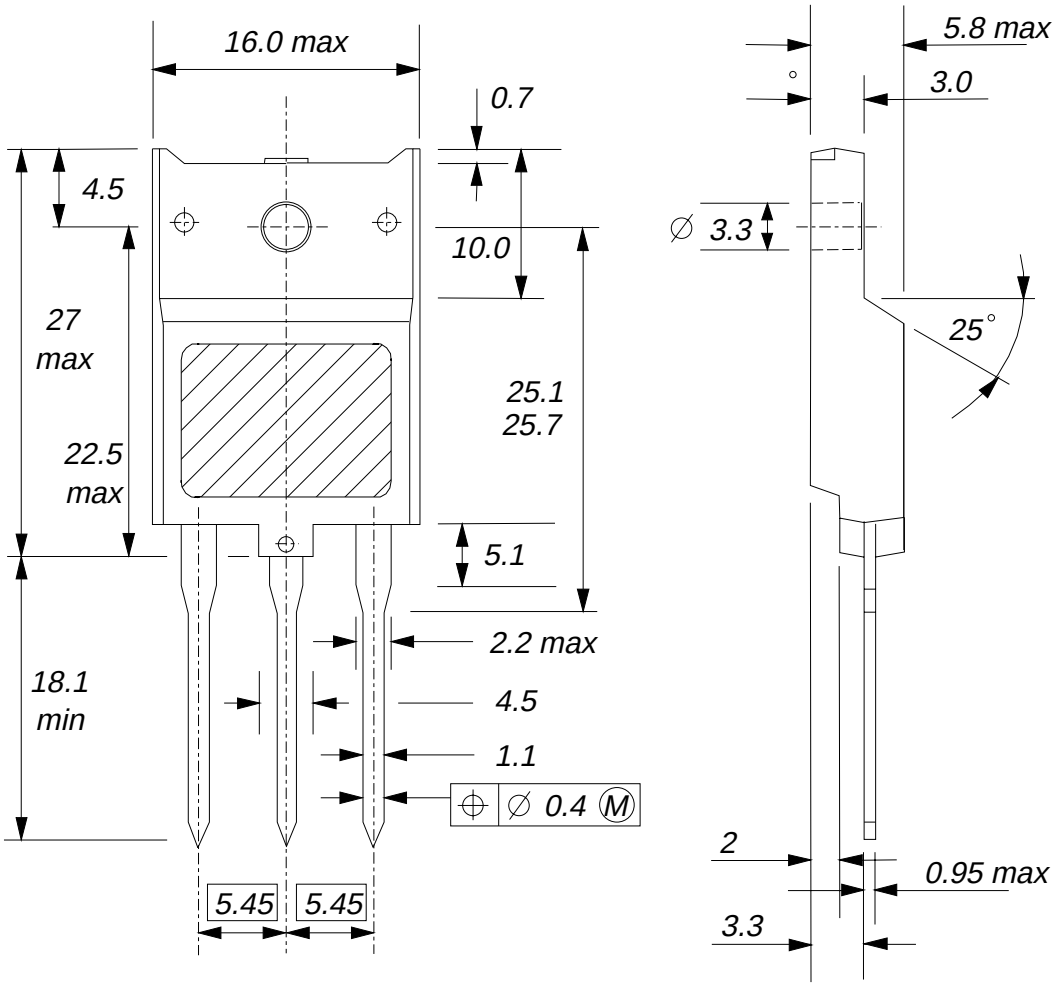


*Fig.12. SOT399; The seating plane is electrically isolated from all terminals.*

**Notes**

1. Refer to mounting instructions for F-pack envelopes.
2. Epoxy meets UL94 V0 at 1/8".

## DEFINITIONS

| **Data sheet status** | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| **Limiting values** | |
| Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| **Application information** | |
| Where application information is given, it is advisory and does not form part of the specification. | |
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