# Silicon Diffused Power Transistor BU2520DW

## GENERAL DESCRIPTION

New generation, high-voltage, high-speed switching npn transistor with an integrated damper diode in a plastic envelope intended for use in horizontal deflection circuits of large screen colour television receivers.

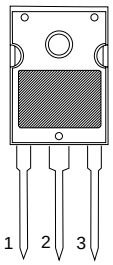
## QUICK REFERENCE DATA

| 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) | | - | 800 | V |
| $I_C$ | Collector current (DC) | | - | 10 | A |
| $I_{CM}$ | Collector current peak value | | - | 25 | A |
| $P_{tot}$ | Total power dissipation | $T_{mb} \leq 25$ ˚C | - | 125 | W |
| $V_{CEsat}$ | Collector-emitter saturation voltage | $I_C$ = 6.0 A; $I_B$ = 1.2 A | - | 5.0 | V |
| $I_{Csat}$ | Collector saturation current | | 6 | - | A |
| $V_F$ | Diode forward voltage | $I_F$ = 6.0 A | - | 2.2 | V |
| $t_f$ | Fall time | $I_{Csat}$ = 6.0 A; $I_{B(end)}$ = 1.0 A | 0.35 | 0.5 | µs |

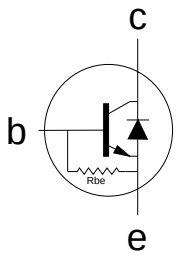
## PINNING - SOT429

| PIN | DESCRIPTION |
|---|---|
| 1 | base |
| 2 | collector |
| 3 | emitter |
| tab | collector |

## 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) | | - | 800 | V |
| $I_C$ | Collector current (DC) | | - | 10 | A |
| $I_{CM}$ | Collector current peak value | | - | 25 | A |
| $I_B$ | Base current (DC) | | - | 6 | A |
| $I_{BM}$ | Base current peak value | | - | 9 | A |
| $-I_{B(AV)}$ | Reverse base current | average over any 20 ms period | - | 150 | mA |
| $-I_{BM}$ | Reverse base current peak value [1] | | - | 6 | A |
| $P_{tot}$ | Total power dissipation | $T_{mb} \leq 25$ ˚C | - | 125 | W |
| $T_{stg}$ | Storage temperature | | -65 | 150 | ˚C |
| $T_j$ | Junction temperature | | - | 150 | ˚C |

## THERMAL RESISTANCES

| SYMBOL | PARAMETER | CONDITIONS | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|
| $R_{th\ j\text{-}mb}$ | Junction to mounting base | - | - | 1.0 | K/W |
| $R_{th\ j\text{-}a}$ | Junction to ambient | in free air | 45 | - | K/W |

**1** Turn-off current.

## STATIC CHARACTERISTICS

$T_{mb}$ = 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 | 100 | - | 300 | mA |
| $BV_{EBO}$ | Emitter-base breakdown voltage | $I_B$ = 600 mA | 7.5 | 13.5 | - | V |
| $R_{be}$ | Base-emitter resistance | $V_{EB}$ = 7.5 V | - | 50 | - | Ω |
| $V_{CEOsust}$ | Collector-emitter sustaining voltage | $I_B$ = 0 A; $I_C$ = 100 mA; L = 25 mH | 800 | - | - | V |
| $V_{CEsat}$ | Collector-emitter saturation voltage | $I_C$ = 6.0 A; $I_B$ = 1.2 A | - | - | 5.0 | V |
| $V_{BEsat}$ | Base-emitter saturation voltage | $I_C$ = 6.0 A; $I_B$ = 1.2 A | - | - | 1.1 | V |
| $h_{FE}$ | DC current gain | $I_C$ = 1.0 A; $V_{CE}$ = 5 V | - | 13 | - | |
| $h_{FE}$ | | $I_C$ = 6 A; $V_{CE}$ = 5 V | 5 | 7 | 9.5 | |
| $V_F$ | Diode forward voltage | $I_F$ = 6 A | - | - | 2.2 | V |

## DYNAMIC CHARACTERISTICS

$T_{mb}$ = 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 | 115 | - | pF |
| | Switching times (16 kHz line deflection circuit) | $I_{Csat}$ = 6.0 A; $L_C$ = 650 µH; $C_{fb}$ = 19 nF; $I_{B(end)}$ = 1.0 A; $L_B$ = 5.3 µH; $-V_{BB}$ = 4 V; ($-dI_B/dt$ = 0.8 A / µs) | | | |
| $t_s$ | Turn-off storage time | | 4.5 | 5.5 | µs |
| $t_f$ | Turn-off fall time | | 0.35 | 0.5 | µs |

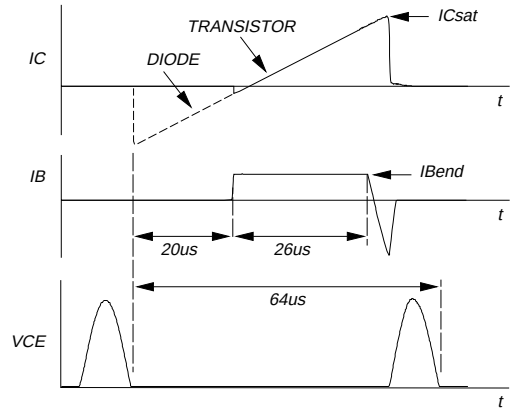



*Fig.1. Switching times waveforms (16 kHz).*

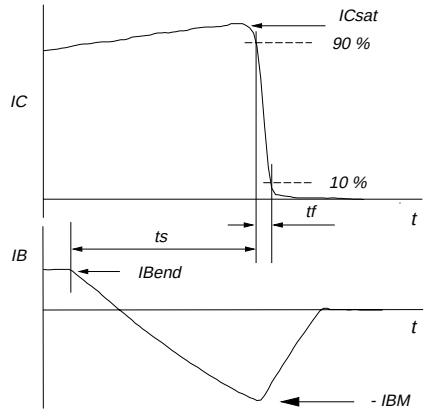



*Fig.2. Switching times definitions.*

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

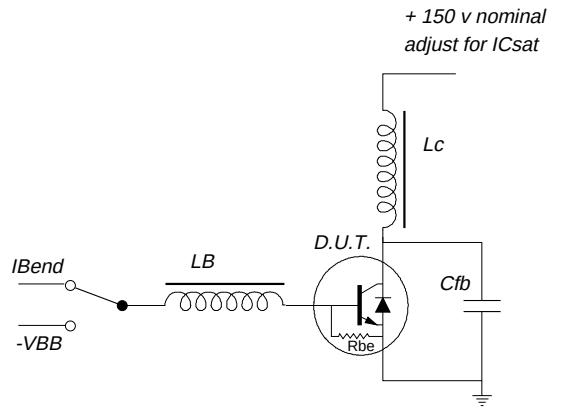



*Fig.3. Switching times test circuit.*

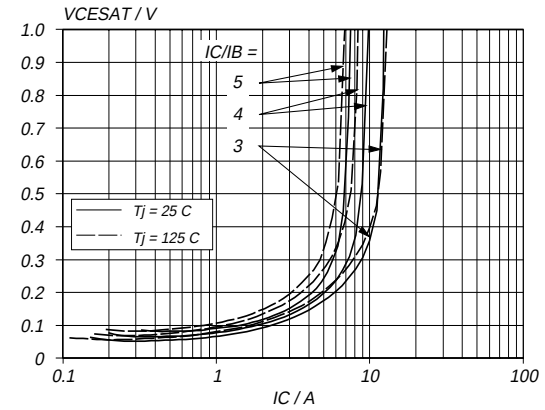



*Fig.6. Typical collector-emitter saturation voltage. $V_{CE}sat = f(I_C)$; parameter $I_C/I_B$*

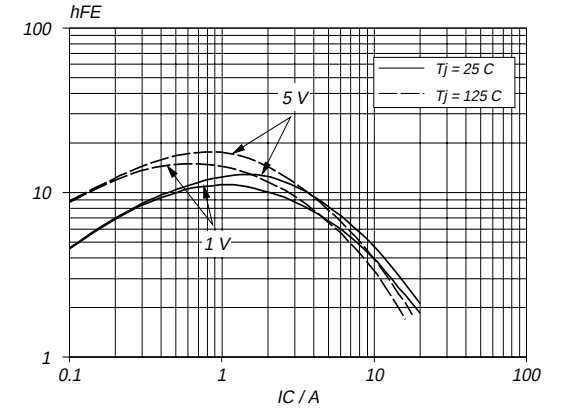



*Fig.4. Typical DC current gain. $h_{FE} = f(I_C)$ parameter $V_{CE}$*

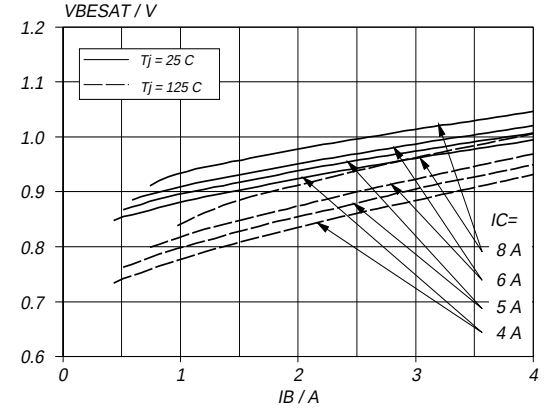



*Fig.7. Typical base-emitter saturation voltage. $V_{BE}sat = f(I_B)$; parameter $I_C$*

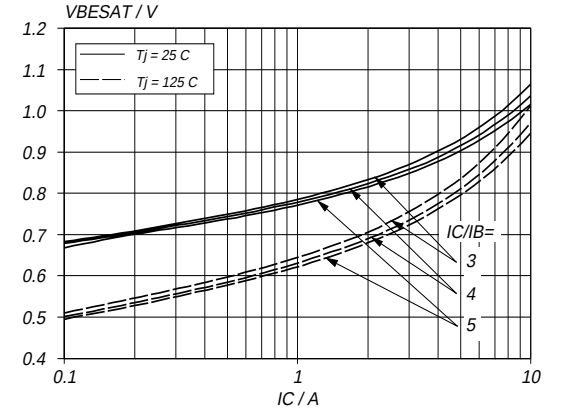



*Fig.5. Typical base-emitter saturation voltage. $V_{BE}sat = f(I_C)$; parameter $I_C/I_B$*

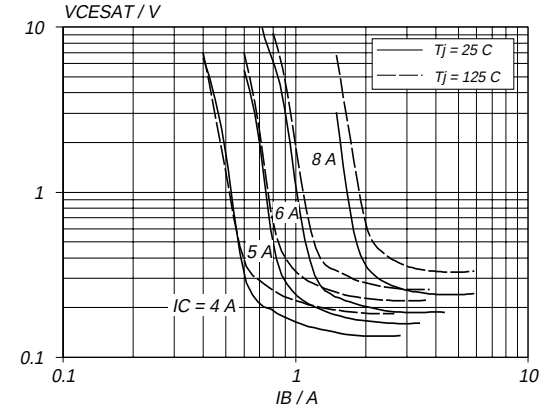



*Fig.8. Typical collector-emitter saturation voltage. $V_{CE}sat = f(I_B)$; parameter $I_C$*

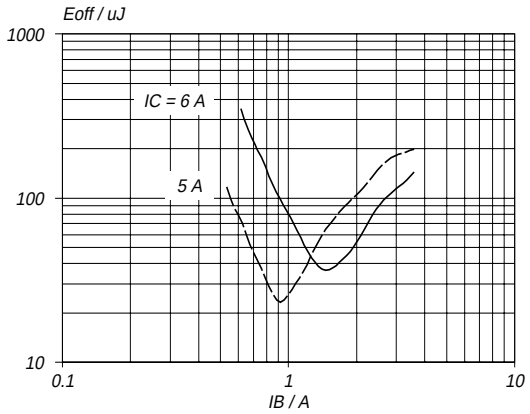



*Fig.9. Typical turn-off losses. $T_j$ = 85˚C*
*Eoff = f ($I_B$); parameter $I_C$; parameter frequency*

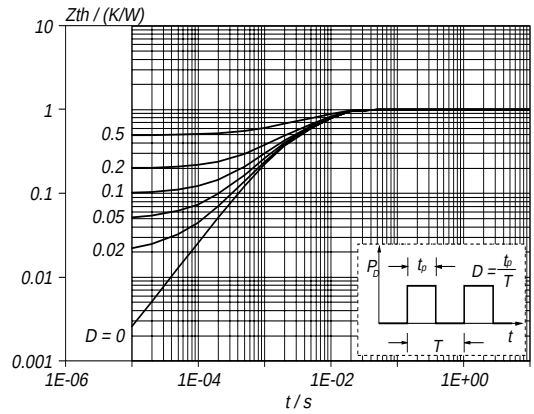



*Fig.12. Transient thermal impedance.*
*$Z_{th\ j\text{-}mb}$ = f(t); parameter D = $t_p$/T*

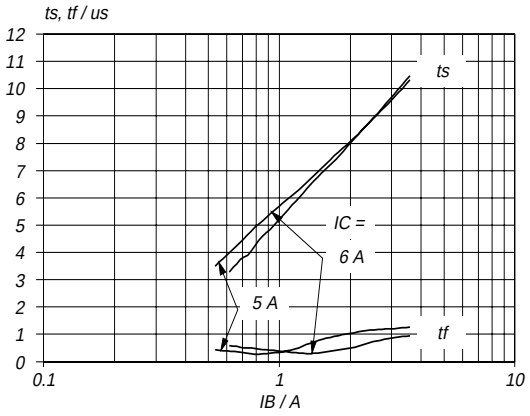



*Fig.10. Typical collector storage and fall time.*
*ts = f ($I_B$); tf = f ($I_B$); parameter $I_C$; $T_j$ = 85˚C; f = 16 kHz*

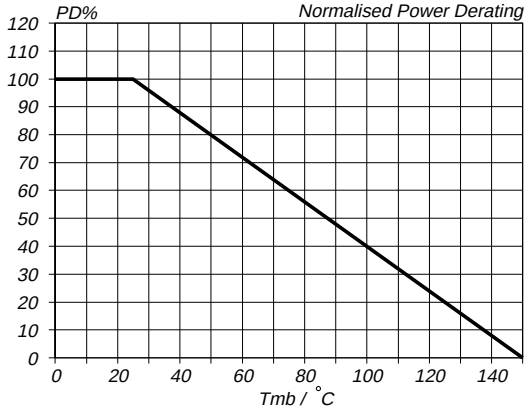



*Fig.11. Normalised power dissipation.*
*PD% = 100·$P_D$/$P_{D\ 25˚C}$ = f ($T_{mb}$)*

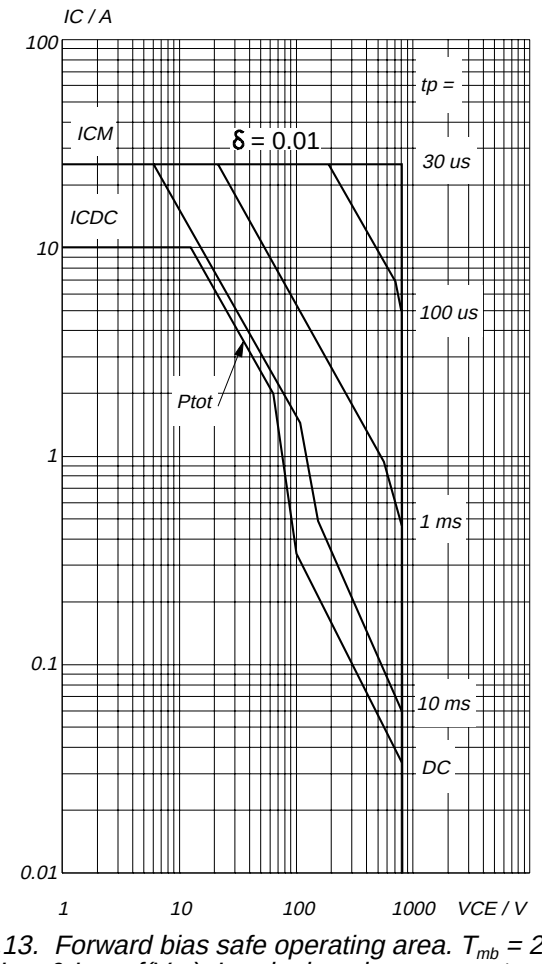



*Fig.13. Forward bias safe operating area. $T_{mb}$ = 25 ˚C*
*$I_{CDC}$ & $I_{CM}$ = f($V_{CE}$); $I_{CM}$ single pulse; parameter $t_p$*
*Second-breakdown limits independant of temperature.*

## MECHANICAL DATA

*Dimensions in mm*

*Net Mass: 5 g*

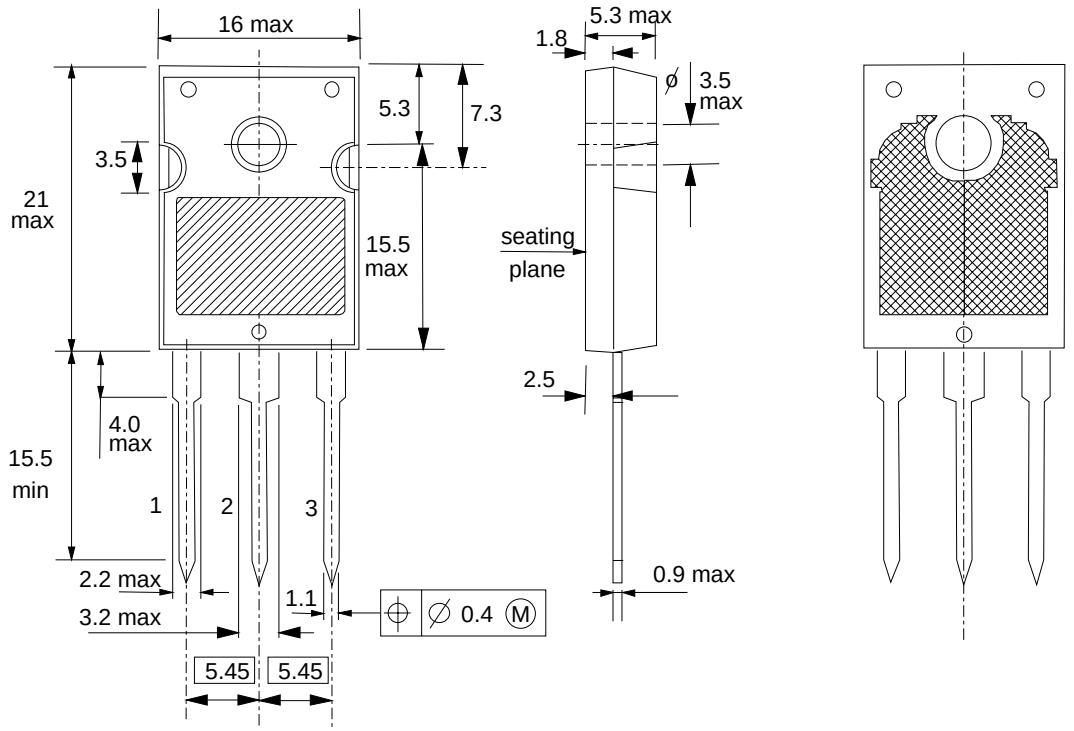



*Fig.14. SOT429; pin 2 connected to mounting base.*

**Notes**

1. Refer to mounting instructions for SOT429 envelope.
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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