



STC08DE150

HYBRID EMITTER SWITCHED BIPOLAR TRANSISTOR ESBT™ 1500 V - 8 A - 0.075 Ω

PRELIMINARY DATA

Table 1: General Features

| $V_{CS(ON)}$ | I_C | $R_{CS(ON)}$ |
|--------------|-------|--------------|
| 0.6 V | 8 A | 0.075 Ω |

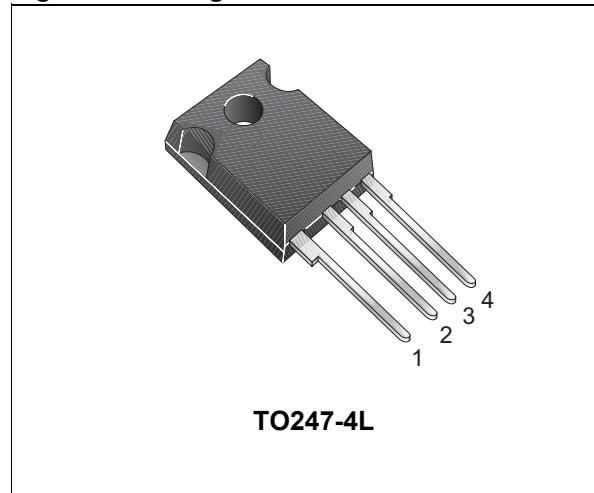
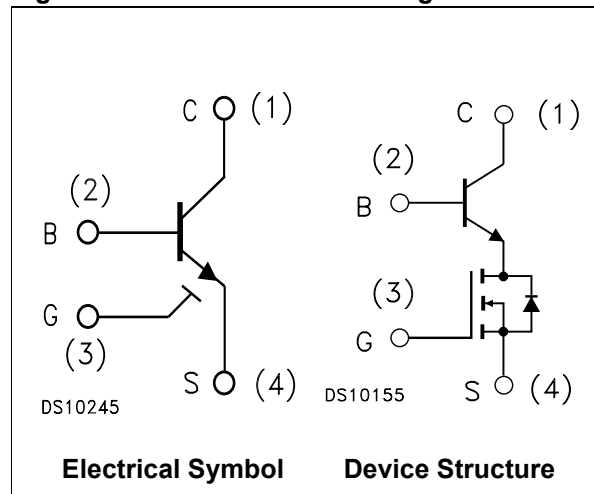
- n LOW EQUIVALENT ON RESISTANCE
- n VERY FAST-SWITCH, UP TO 150 kHz
- n SQUARED RBSOA, UP TO 1500 V
- n VERY LOW C_{ISS} DRIVEN BY $R_G = 47 \Omega$

APPLICATION

- n SINGLE SWITCH SMPS BASED ON THREE PHASE MAINS

DESCRIPTION

The STC08DE150 is manufactured in a hybrid structure, using dedicated high voltage Bipolar and low voltage MOSFET technologies, aimed at providing the best performance in ESBT topology. The STC08DE150 is designed for use in aux flyback smps for any three phase application.

Figure 1: Package

Figure 2: Internal Schematic Diagram

Table 2: Order Code

| Part Number | Marking | Package | Packaging |
|-------------|----------|----------|-----------|
| STC08DE150 | C08DE150 | TO247-4L | TUBE |

Table 3: Absolute Maximum Ratings

| Symbol | Parameter | Value | Unit |
|--------------|---|------------|------|
| $V_{CS(SS)}$ | Collector-Source Voltage ($V_{BS} = V_{GS} = 0\text{ V}$) | 1500 | V |
| $V_{BS(OS)}$ | Base-Source Voltage ($I_C = 0, V_{GS} = 0\text{ V}$) | 30 | V |
| $V_{SB(OS)}$ | Source-Base Voltage ($I_C = 0, V_{GS} = 0\text{ V}$) | 9 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_C | Collector Current | 8 | A |
| I_{CM} | Collector Peak Current ($t_p < 5\text{ ms}$) | 15 | A |
| I_B | Base Current | 4 | A |
| I_{BM} | Base Peak Current ($t_p < 1\text{ ms}$) | 8 | A |
| P_{tot} | Total Dissipation at $T_C = 25\text{ °C}$ | 155 | W |
| T_{stg} | Storage Temperature | -65 to 125 | °C |
| T_J | Max. Operating Junction Temperature | 125 | °C |

Table 4: Thermal Data

| Symbol | Parameter | Unit |
|----------------|--------------------------------------|-----------|
| $R_{thj-case}$ | Thermal Resistance Junction-Case Max | 0.64 °C/W |

Table 5: Electrical Characteristics ($T_{case} = 25\text{ °C}$ unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------------|---|---|----------|------------|------|---------------|
| $I_{CS(SS)}$ | Collector-Source Current ($V_{BS} = V_{GS} = 0\text{ V}$) | $V_{CS(SS)} = 1500\text{ V}$ | | | 100 | μA |
| $I_{BS(OS)}$ | Base-Source Current ($I_C = 0, V_{GS} = 0\text{ V}$) | $V_{BS(OS)} = 30\text{ V}$ | | | 10 | μA |
| $I_{SB(OS)}$ | Source-Base Current ($I_C = 0, V_{GS} = 0\text{ V}$) | $V_{SB(OS)} = 9\text{ V}$ | | | 100 | μA |
| $I_{GS(OS)}$ | Gate-Source Leakage ($V_{BS} = 0\text{ V}$) | $V_{GS} = \pm 20\text{ V}$ | | | 500 | nA |
| $V_{CS(ON)}$ | Collector-Source ON Voltage | $V_{GS} = 10\text{ V } I_C = 8\text{ A } I_B = 1.6\text{ A}$ $V_{GS} = 10\text{ V } I_C = 5\text{ A } I_B = 0.5\text{ A}$ | | 0.6 0.6 | 1.4 | V V |
| h_{FE} | DC Current Gain | $I_C = 8\text{ A } V_{CS} = 1\text{ V } V_{GS} = 10\text{ V}$ $I_C = 5\text{ A } V_{CS} = 1\text{ V } V_{GS} = 10\text{ V}$ | 4.5 8 | 7.5 10 | | |
| $V_{BS(ON)}$ | Base-Source ON Voltage | $V_{GS} = 10\text{ V } I_C = 8\text{ A } I_B = 1.6\text{ A}$ $V_{GS} = 10\text{ V } I_C = 5\text{ A } I_B = 0.5\text{ A}$ | | 1.5 1 | 2 | V V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{BS} = V_{GS} I_B = 250\text{ }\mu\text{A}$ | 1.5 | 2.2 | 3 | V |
| C_{iss} | Input Capacitance | $V_{CS} = 25\text{ V } f = 1\text{ MHz } V_{GS} = V_{CB} = 0$ | | 750 | | pF |
| $Q_{GS(tot)}$ | Gate-Source Charge | $I_C = 8\text{ A } V_{CS} = 25\text{ V } V_{GS} = 10\text{ V } V_{CB} = 0$ | | 12.5 | | nC |
| t_s t_f | INDUCTIVE LOAD Storage Time Fall Time | $V_{GS} = 10\text{ V } R_G = 47\text{ }\Omega$ $V_{Clamp} = 1200\text{ V } t_p = 4\text{ }\mu\text{s}$ $I_C = 5\text{ A } I_B = 0.5\text{ A}$ | | 526 8.5 | | ns ns |
| V_{CSW} | Maximum Collector-Source Voltage Switched Without Snubber | $R_G = 47\text{ }\Omega h_{FE} = 5\text{ A } I_C = 8\text{ A}$ | 15 | | | V |

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------|---|---|------|------|------|------|
| $V_{CS(dyn)}$ | Collector-Source Dynamic Voltage (500 ns) | $V_{CC} = V_{Clamp} = 300\text{ V}$ $V_{GS} = 10\text{ V}$ $R_G = 47\ \Omega$ $I_C = 4\text{ A}$ $I_B = 0.8\text{ A}$ $t_{peak} = 500\text{ ns}$ $I_{Bpeak} = 8\text{ A (2 } I_C)$ | | 6 | | V |
| $V_{CS(dyn)}$ | Collector-Source Dynamic Voltage (1 μ s) | $V_{CC} = V_{Clamp} = 300\text{ V}$ $V_{GS} = 10\text{ V}$ $R_G = 47\ \Omega$ $I_C = 4\text{ A}$ $I_B = 0.8\text{ A}$ $t_{peak} = 500\text{ ns}$ $I_{Bpeak} = 8\text{ A (2 } I_C)$ | | 2.2 | | V |

Figure 3: Output Characteristics

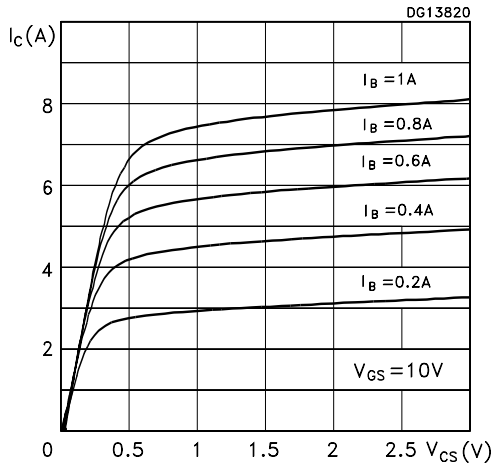


Figure 4: Reverse Biased Safe Operating Area

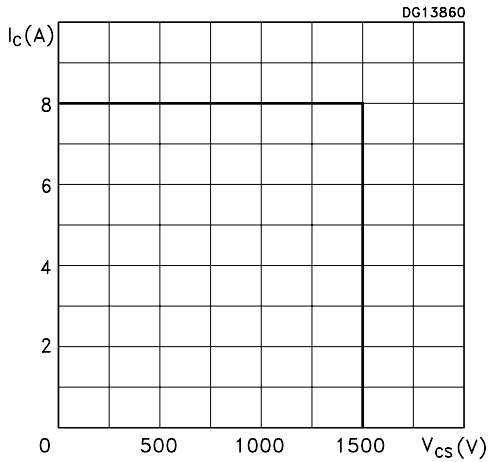


Figure 5: DC Current Gain

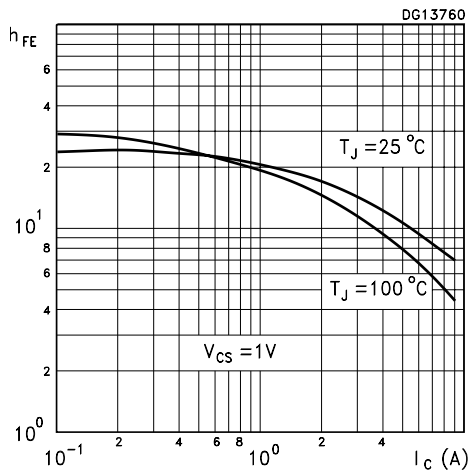


Figure 6: Dynamic Collector-Emitter Saturation Voltage

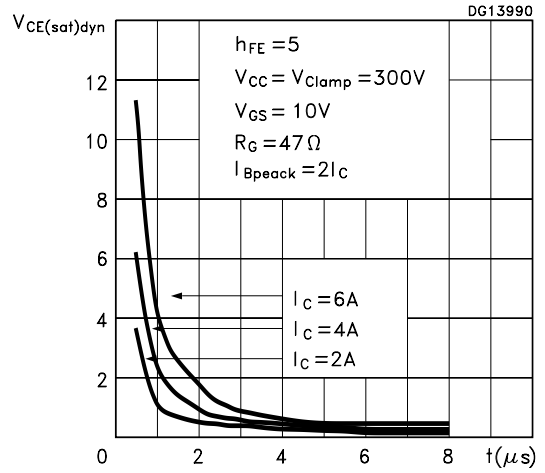


Figure 7: Gate Threshold Voltage vs Temperature

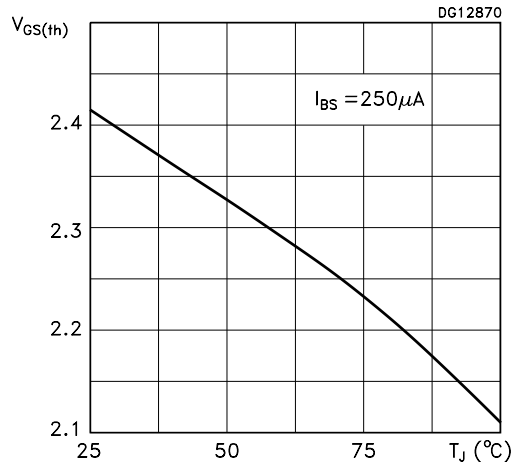


Figure 8: Collector-Source On Voltage

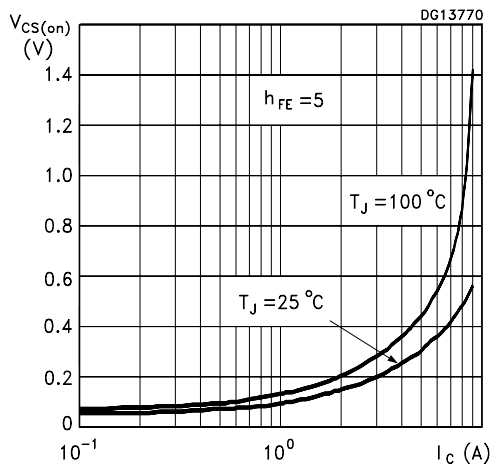


Figure 9: Base-Source On Voltage

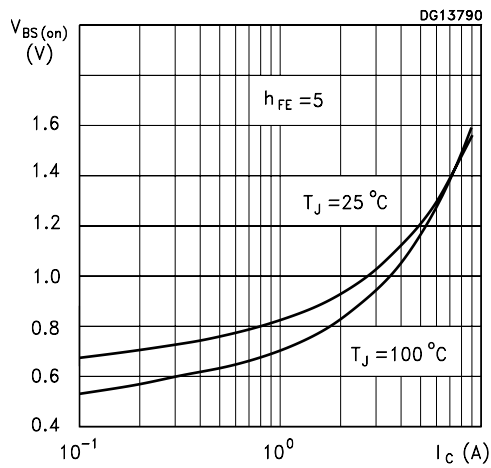


Figure 10: Inductive Load Switching Time

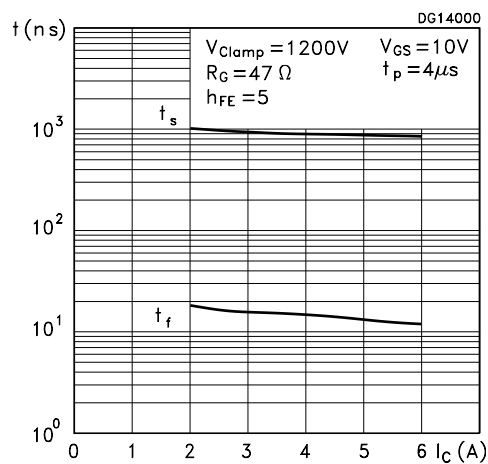


Figure 11: Collector-Source On Voltage

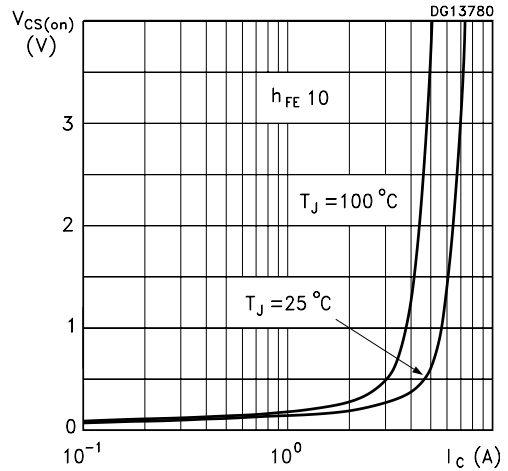


Figure 12: Base-Source On Voltage

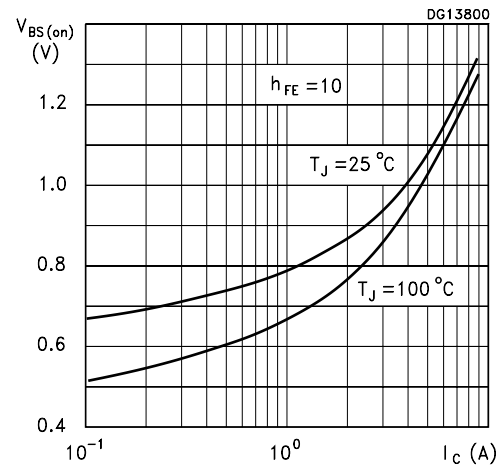


Figure 13: Inductive Load Switching Time

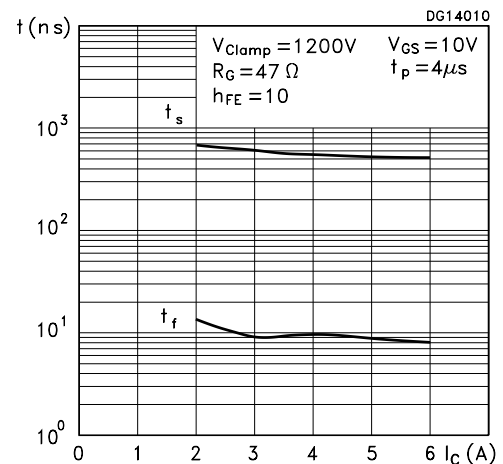


Figure 14: Enlargement FBSOA Circuit

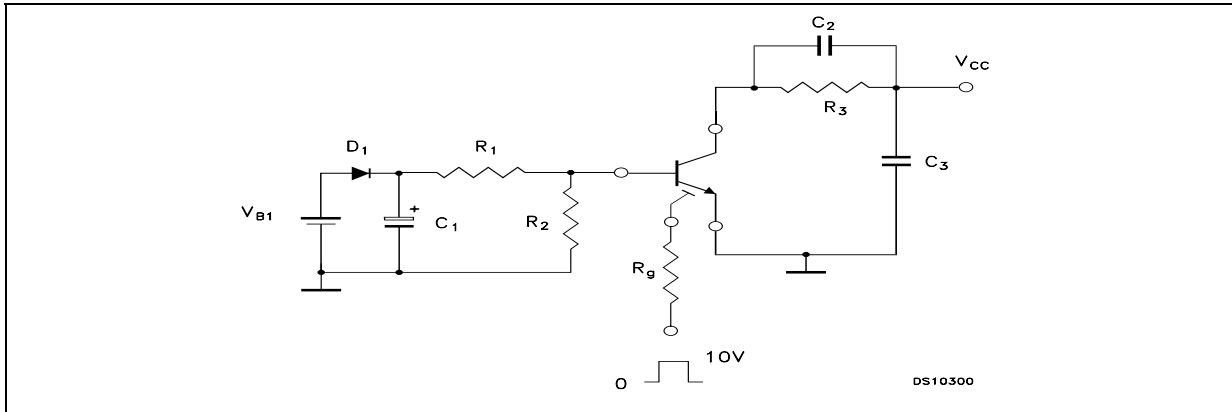


Table 6: Components, Values

| | |
|---------------------------|------------------------------|
| $V_{B1} = 4.16 \text{ V}$ | $C_1 = 4700 \mu\text{F}$ |
| $D_1 = \text{BA157}$ | $C_2 \leq 1000 \text{ pF}$ |
| $R_1 = 1 \Omega$ | $V_{CC} = 1500 \text{ V}$ |
| $R_2 = 100 \Omega$ | $V_g = 10 \text{ V}$ |
| $R_3 = 180 \Omega$ | Pulse Time = 5 μs |
| $R_g = 47 \Omega$ | |

TO247-4L MECHANICAL DATA

| DIM. | mm | | |
|------|-------|-------|-------|
| | MIN. | TYP. | MAX. |
| A | 4.85 | | 5.15 |
| A1 | 2.20 | | 2.60 |
| b | 0.95 | 1.10 | 1.30 |
| b1 | 1.30 | | 1.70 |
| b2 | 2.50 | | 2.90 |
| c | 0.40 | | 0.80 |
| D | 19.85 | | 20.15 |
| E | 15.45 | | 15.75 |
| e | | 2.54 | |
| e1 | | 5.08 | |
| L | 14.20 | | 14.80 |
| L1 | 3.70 | | 4.30 |
| L2 | | 18.50 | |
| ØP | 3.55 | | 3.65 |
| ØR | 4.50 | | 5.50 |
| S | | 5.50 | |

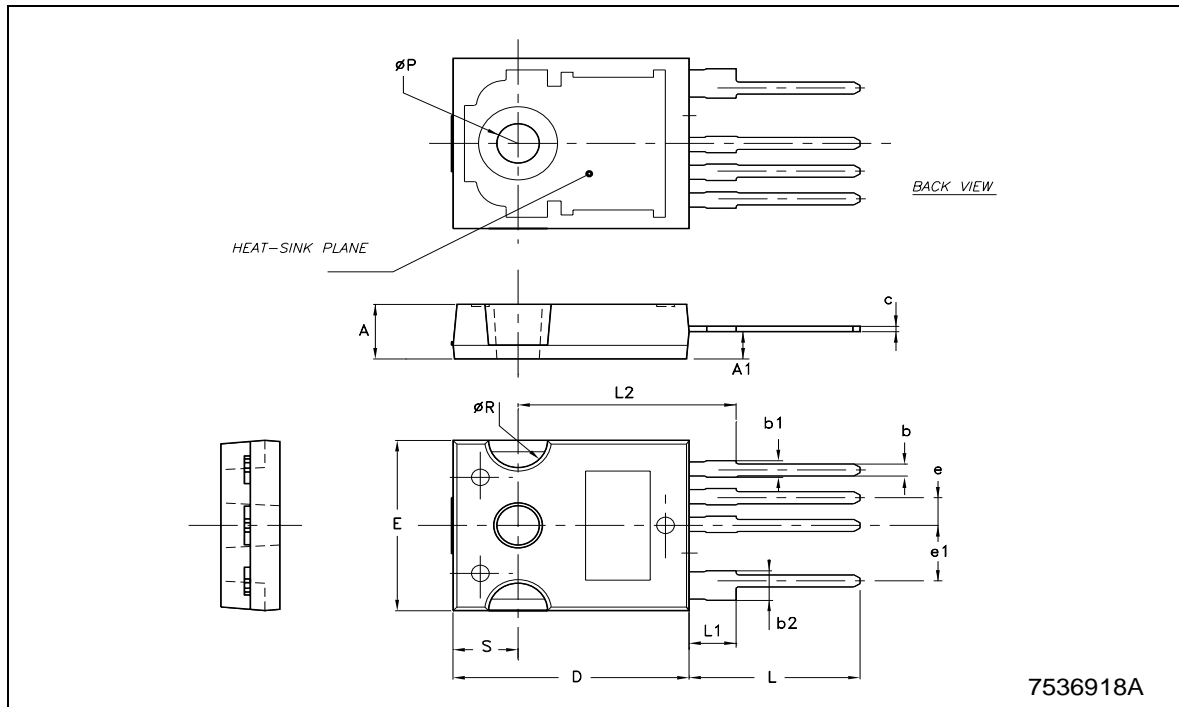


Table 7: Revision History

| Date | Release | Change Designator |
|-------------|----------------|--------------------------|
| 20-Jan-2005 | 1 | First Release. |

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