

Prospective data

Insulated Gate Bi-Polar Transistor

Type T1890BF65E

Absolute Maximum Ratings

| | VOLTAGE RATINGS | MAXIMUM LIMITS | UNITS |
|----------------|--|----------------|-------|
| V_{CES} | Collector – emitter voltage | 6500 | V |
| V_{CES} | Collector – emitter voltage (T_j 25°C) | 6500 | V |
| V_{CES} | Collector – emitter voltage (T_j -40°C) | 6000 | V |
| $V_{DC\ link}$ | Permanent DC voltage for 100 FIT failure rate. | 3600 | V |
| V_{GES} | Peak gate – emitter voltage | ±20 | V |

| | RATINGS | MAXIMUM LIMITS | UNITS |
|-----------|--|----------------|-------|
| I_C | DC collector current, IGBT | 1890 | A |
| I_{CRM} | Repetitive peak collector current, $t_p=1ms$, IGBT | 3780 | A |
| I_{CEO} | Maximum reverse emitter current, $t_p=100\mu s$, (note 2 & 3) | 1890 | A |
| P_{MAX} | Maximum power dissipation, IGBT (Note 2) | 22.4 | KW |
| T_j | Operating temperature range. | -40 to +125 | °C |
| T_{stg} | Storage temperature range. | -40 to +125 | °C |

Notes: -

- 1) Unless otherwise indicated $T_j = 125^\circ C$.
- 2) $T_{sink} = 25^\circ C$, double side cooled.
- 3) Maximum commutation loop inductance 140nH.

Characteristics

IGBT Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS |
|----------------------|--|-----|------|------|---|-------|
| V _{CE(sat)} | Collector – emitter saturation voltage | - | 3.6 | - | I _C = 1890A, V _{GE} = 15V, T _j = 25°C | V |
| | | 4.4 | 4.8 | 5.2 | I _C = 1890A, V _{GE} = 15V | V |
| V _{T0} | Threshold voltage | - | - | 2.49 | Current range: 630A – 1890A | V |
| r _T | Slope resistance | - | - | 1.44 | | mΩ |
| V _{GE(TH)} | Gate threshold voltage | - | 5.2 | - | V _{CE} = V _{GE} , I _C = 1890A | V |
| I _{CES} | Collector – emitter cut-off current | - | 20 | 60 | V _{CE} = V _{CES} , V _{GE} = 0V | mA |
| I _{GES} | Gate leakage current | - | - | 50 | V _{GE} = ±20V | μA |
| C _{ies} | Input capacitance | - | 350 | - | V _{CE} = 10V, V _{GE} = 0V, f = 100kHz, T _j =25°C | nF |
| t _{d(on)} | Turn-on delay time | - | 1.7 | - | I _C = 1890A, V _{CE} = 3600V, di/dt = 4500A/μs V _{GE} = ±15V, L _S = 140nH | μs |
| t _{r(V)} | Rise time | - | 2.6 | - | | μs |
| Q _{g(on)} | Turn-on gate charge | - | 11 | - | R _{g(ON)} = 1.8Ω, R _{g(OFF)} = 5.1Ω, C _{GE} = 168nF Freewheeling diode E2060FF65F at T _j = 125°C | μC |
| E _{on} | Turn-on energy | - | 13.2 | - | | J |
| t _{d(off)} | Turn-off delay time | - | 4.1 | - | (Note 3, 4 & 5) | μs |
| t _{f(l)} | Fall time | - | 2.1 | - | | μs |
| Q _{g(off)} | Turn-off gate charge | - | 18 | - | | μC |
| E _{off} | Turn-off energy | - | 10.6 | - | | J |
| I _{SC} | Short circuit current | - | 10.2 | - | V _{GE} = +15V, V _{CC} = 3600V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10μs | kA |

Thermal Characteristics

| | | | | | | |
|-------------------|-------------------------------------|----|-----|------|-----------------------|------|
| R _{thJK} | Thermal resistance junction to sink | - | - | 4.47 | Double side cooled | K/kW |
| | | - | - | 6.79 | Collector side cooled | K/kW |
| | | - | - | 13.1 | Emitter side cooled | K/kW |
| F | Mounting force | 55 | - | 75 | Note 2 | kN |
| W _t | Weight | - | 3.2 | - | | kg |

Notes:-

- 1) Unless otherwise indicated T_j = 125°C.
- 2) Consult application note 2008AN01 for detailed mounting requirements
- 3) C_{GE} is additional gate – emitter capacitance added to output of gate drive
- 4) E_{on} integration time 15μs from 10% rising I_C.
- 5) E_{off} integration time 15μs from 90% falling V_{GE}.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

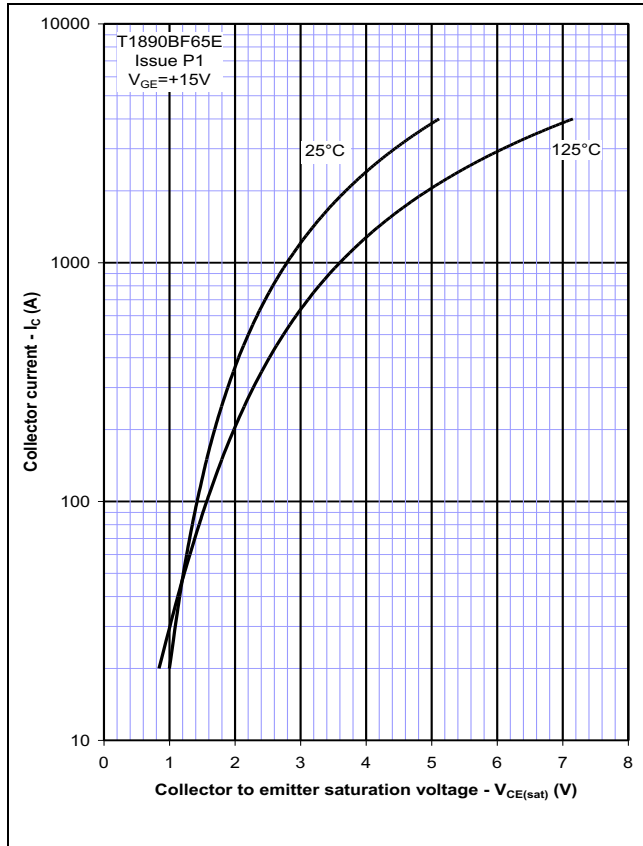


Figure 2 – Typical output characteristic

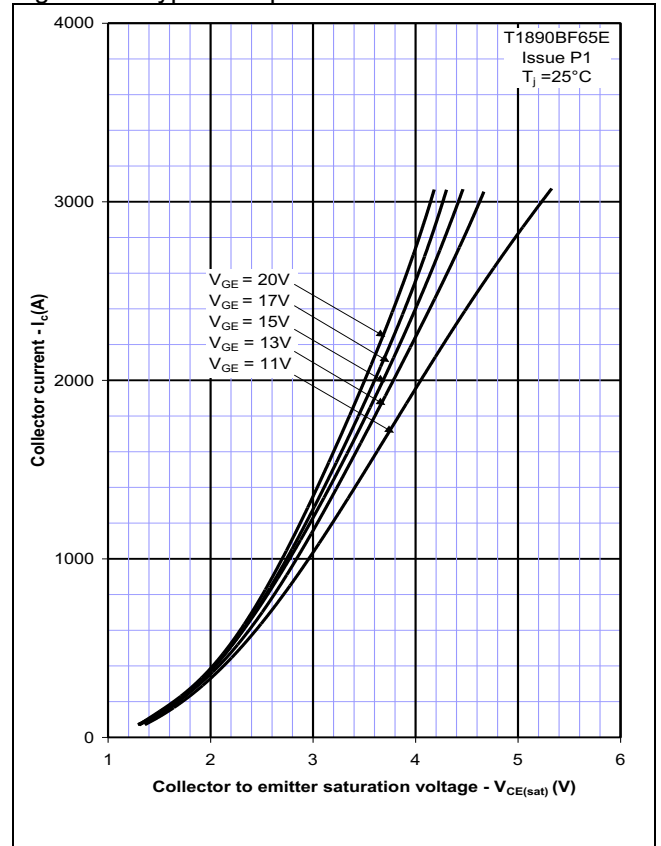


Figure 3 – Typical output characteristic

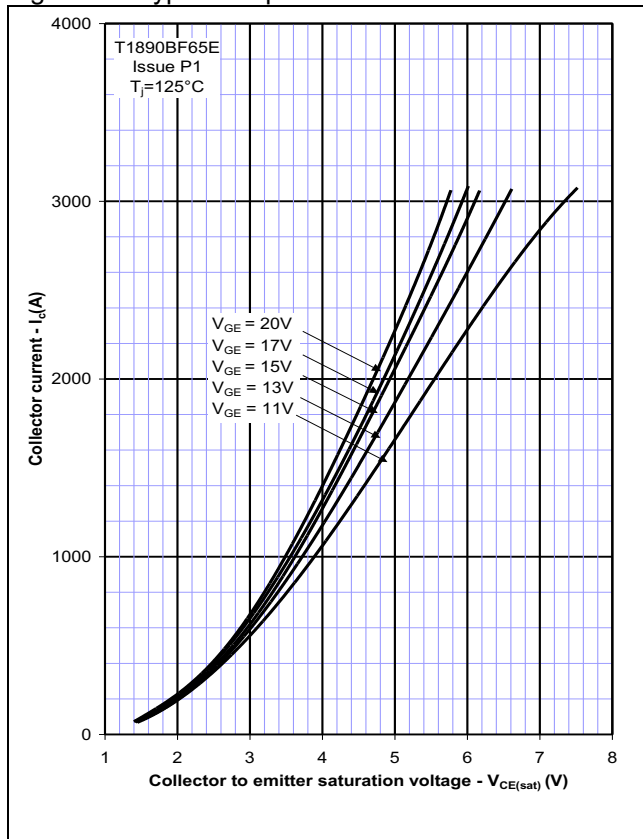


Figure 4 – Typical turn-on delay time vs gate resistance

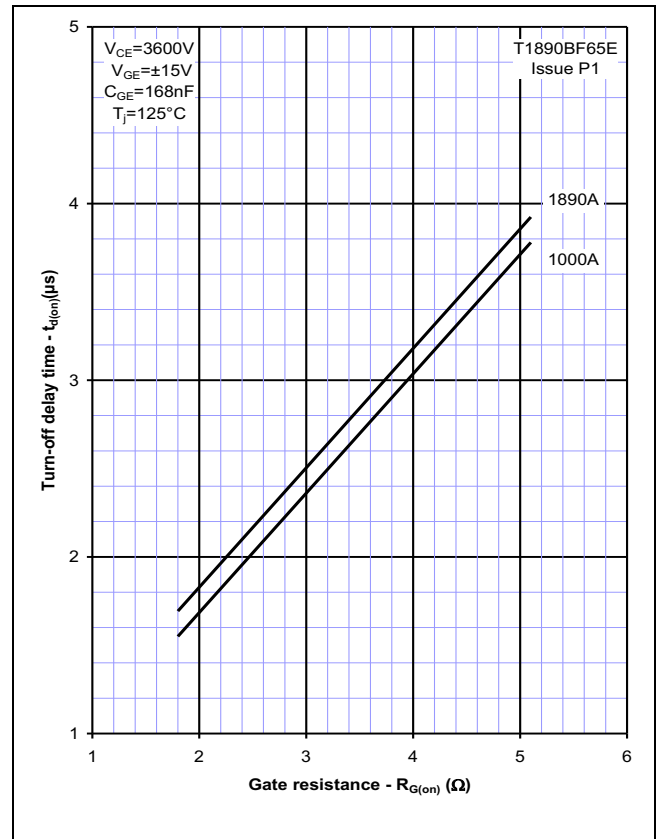


Figure 5 – Typical turn-off delay time vs. gate resistance

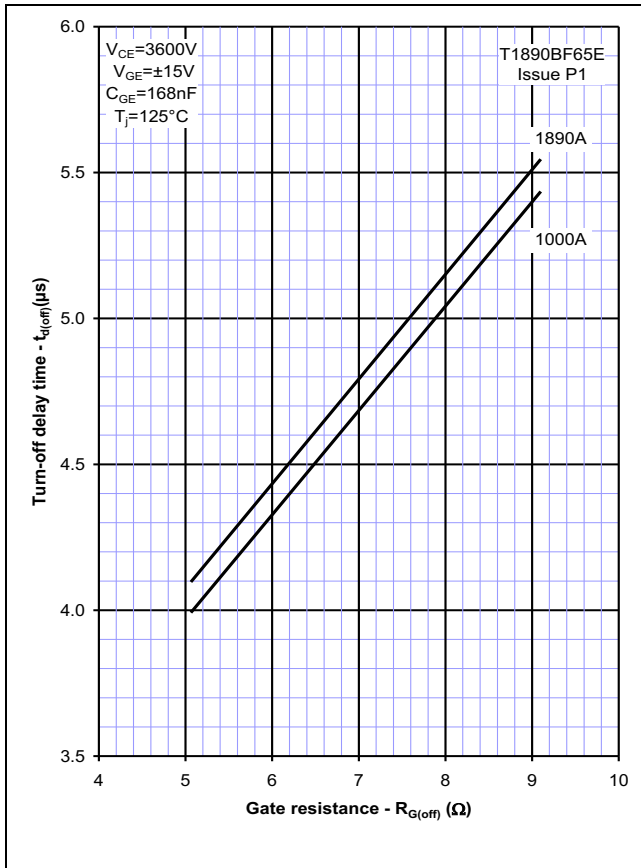


Figure 6 – Typical turn-on energy vs. collector current

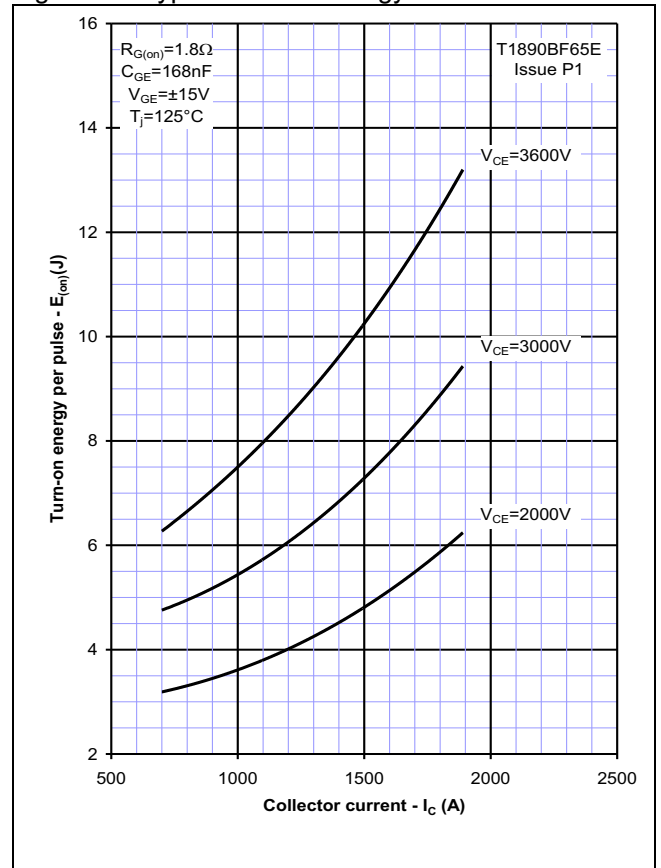


Figure 7 – Typical turn-on energy vs. di/dt

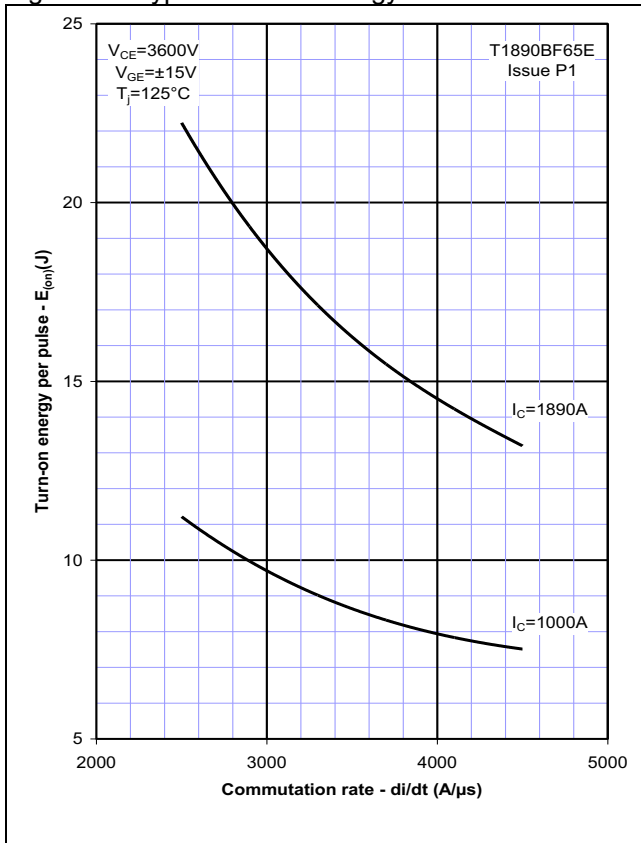


Figure 8 – Typical turn-off energy vs. collector current

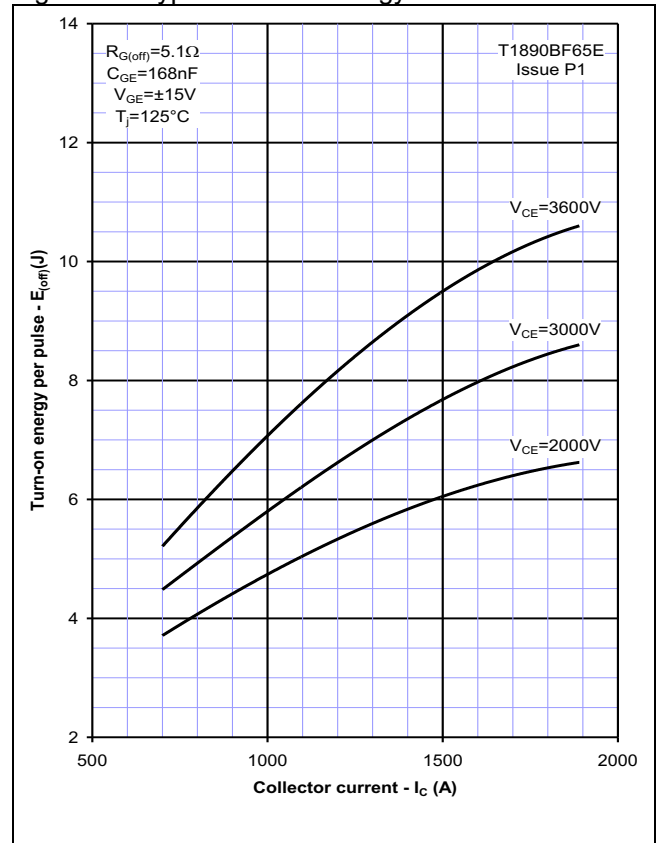


Figure 9 – Turn-off energy vs voltage

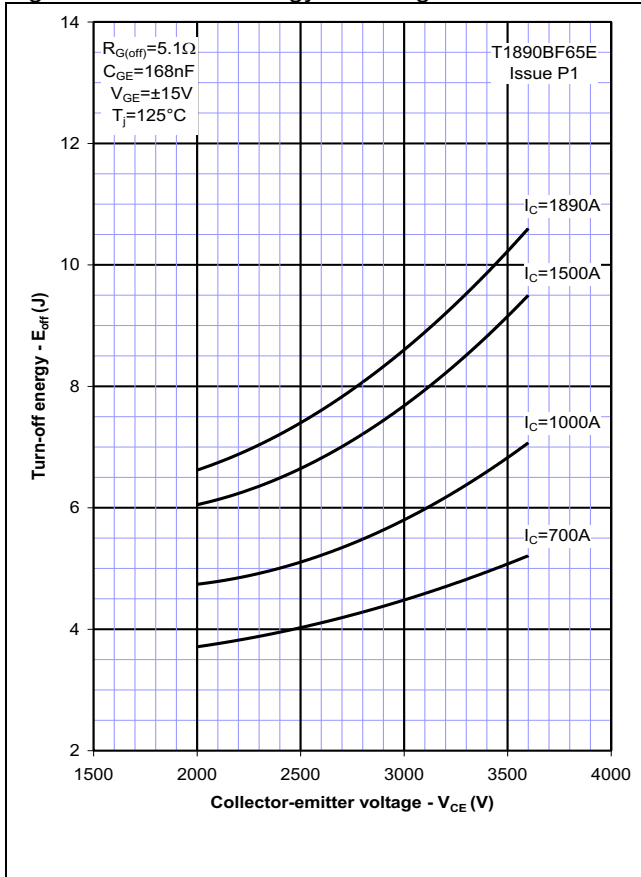


Figure 10 – Safe operating area

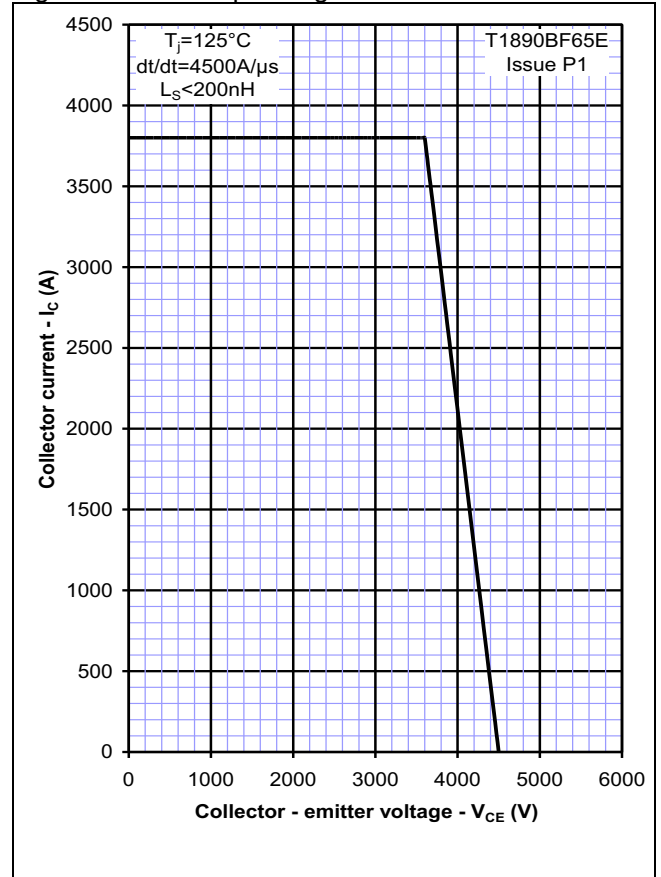
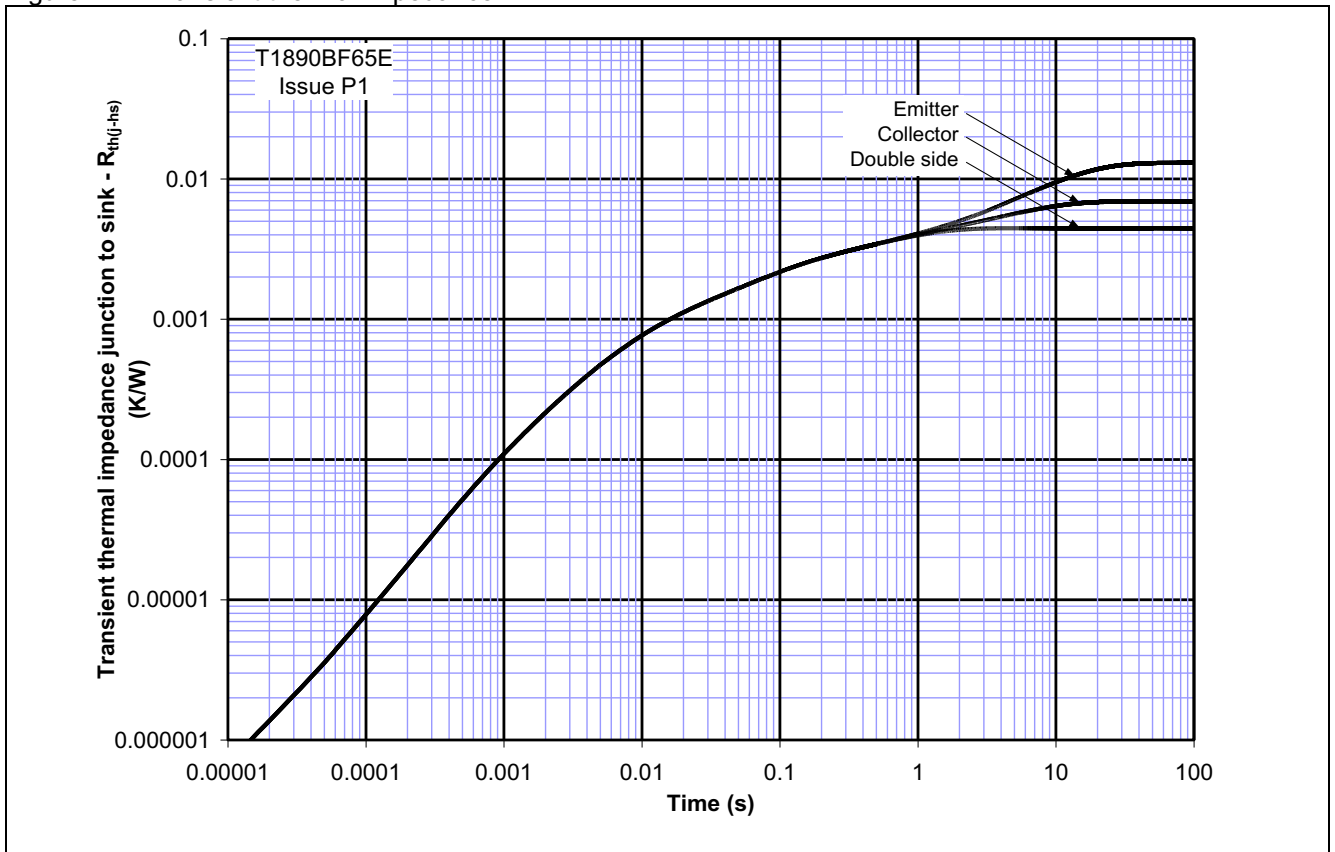
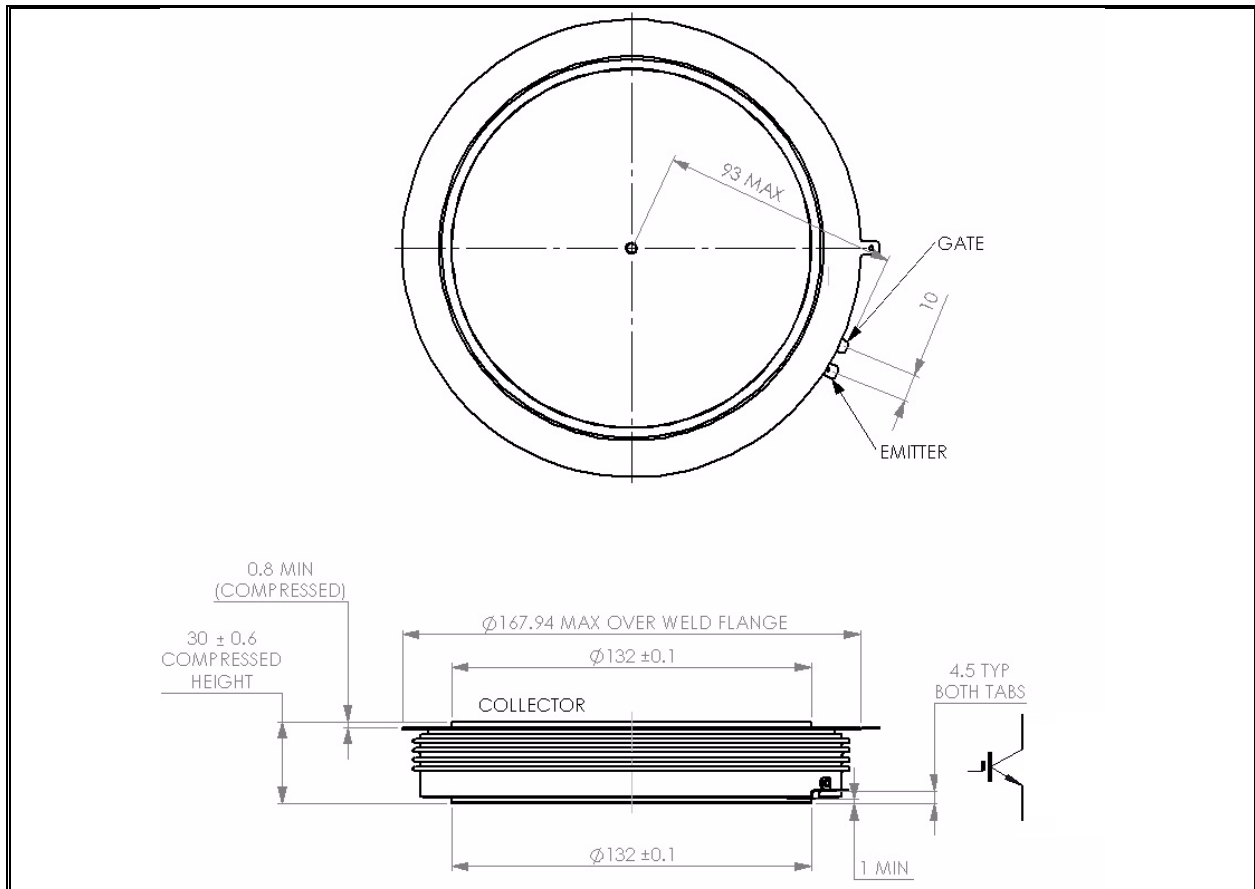


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



101A401

ORDERING INFORMATION

(Please quote 10 digit code as below)

| | | | |
|-----------------|--------------------|--|-------------------|
| T1890 | BF | 65 | E |
| Fixed type Code | Fixed Outline Code | Voltage Grade V _{CES} /100 65 | Fixed format code |

Typical order code: T1890BF65E (V_{CES} = 6500V)

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