



Tentative Data

Insulated Gate Bi-Polar Transistor

Type T0640VC33E

Absolute Maximum Ratings

| | VOLTAGE RATINGS | MAXIMUM LIMITS | UNITS |
|----------------|--|----------------|-------|
| V_{CES} | Collector – emitter voltage | 3300 | V |
| $V_{DC\ link}$ | Permanent DC voltage for 100 FIT failure rate. | 1800 | V |
| V_{GES} | Peak gate – emitter voltage | ± 20 | V |

| | RATINGS | MAXIMUM LIMITS | UNITS |
|-------------|--|----------------|-------------|
| I_C | Continuous DC collector current, IGBT | 640 | A |
| I_{CRM} | Repetitive peak collector current, $t_p=1ms$, IGBT | 1280 | A |
| I_{ECO} | Maximum reverse emitter current, $t_p=100\mu s$, (note 2 & 3) | 640 | A |
| P_{MAX} | Maximum power dissipation, IGBT (note 2) | 4.1 | kW |
| $T_{j\ op}$ | Operating temperature range | -40 to +125 | $^{\circ}C$ |
| T_{stg} | Storage temperature range | -40 to +125 | $^{\circ}C$ |

Notes: -

- 1) Unless otherwise indicated $T_j = 125^{\circ}C$.
- 2) $T_{sink} = 25^{\circ}C$, double side cooled.
- 3) Maximum commutation loop inductance 650nH.

Characteristics

IGBT Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS | |
|----------------------|--|-----|------|------|---|--|---|
| V _{CE(sat)} | Collector – emitter saturation voltage | - | 2.57 | 2.97 | I _C = 640A, V _{GE} = 15V, T _j = 25°C | V | |
| | | - | 3.40 | 3.80 | I _C = 640A, V _{GE} = 15V | V | |
| V _{T0} | Threshold voltage | - | - | 1.36 | Current range: 213A – 640A | V | |
| r _T | Slope resistance | - | - | 3.18 | | mΩ | |
| V _{GE(TH)} | Gate threshold voltage | - | 5.3 | - | V _{CE} = V _{GE} , I _C = 55mA | V | |
| I _{CES} | Collector – emitter cut-off current | - | 5.5 | 18 | V _{CE} = V _{CES} , V _{GE} = 0V | mA | |
| I _{GES} | Gate leakage current | - | - | ±15 | V _{GE} = ±20V | μA | |
| C _{ies} | Input capacitance | - | 90 | - | V _{CE} = 25V, V _{GE} = 0V, f = 1MHz | nF | |
| t _{d(on)} | Turn-on delay time | - | 1.6 | - | I _C = 640A, V _{CE} = 1800V, di/dt = 1350A/μs V _{GE} = ±15V, L _S = 650nH R _{G(ON)} = 3.3Ω, R _{G(OFF)} = 24Ω, C _{GE} = 270nF Freewheel diode type TBC at T _j = 125°C (Notes 3, 4 & 5) | μs | |
| t _{r(V)} | Rise time | - | 1.8 | - | | μs | |
| Q _{g(on)} | Turn-on gate charge | - | 13 | - | | μC | |
| E _{on} | Turn-on energy | - | 1.65 | - | | J | |
| t _{d(off)} | Turn-off delay time | - | 5 | - | | μs | |
| t _{f(l)} | Fall time | - | 1.4 | - | | μs | |
| Q _{g(off)} | Turn-off gate charge | - | 8.5 | - | | μC | |
| E _{off} | Turn-off energy | - | 1.68 | - | | J | |
| I _{sc} | Short circuit current | - | 2000 | - | | V _{GE} = +15V, V _{CC} = 1800V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10μs | A |

Thermal Characteristics

| | PARAMETER | MIN | TYP | MAX | TEST CONDITIONS | UNITS |
|-------------------|---|-----|------|------|-----------------------|-------|
| R _{thJK} | Thermal resistance junction to sink, IGBT | - | - | 24.3 | Double side cooled | K/kW |
| | | - | - | 40.1 | Collector side cooled | K/kW |
| | | - | - | 62.3 | Emitter side cooled | K/kW |
| F | Mounting force | 12 | - | 16 | Note 2 | kN |
| W _t | Weight | - | 0.65 | - | | 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 circuit.
- 4) E_{on} integration time 15μs from 10% rising I_G.
- 5) E_{off} integration time 15μs from 90% falling V_{GE}.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

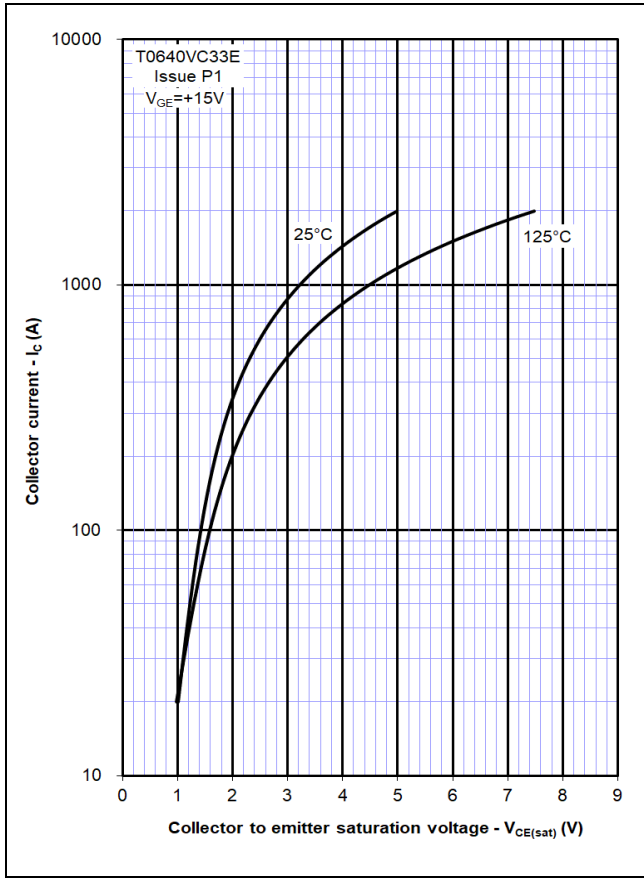


Figure 2 – Typical output characteristic

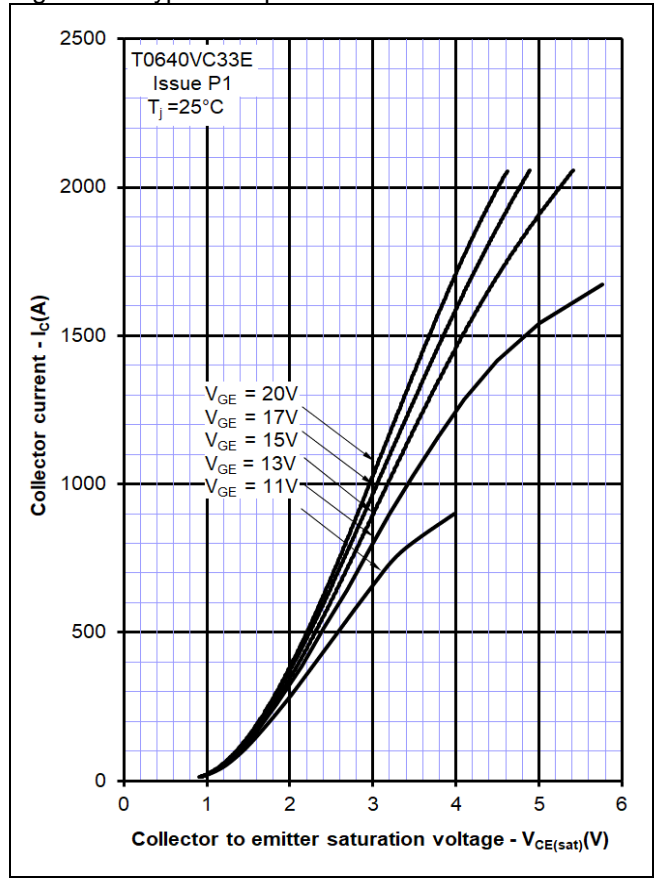


Figure 3 – Typical output characteristic

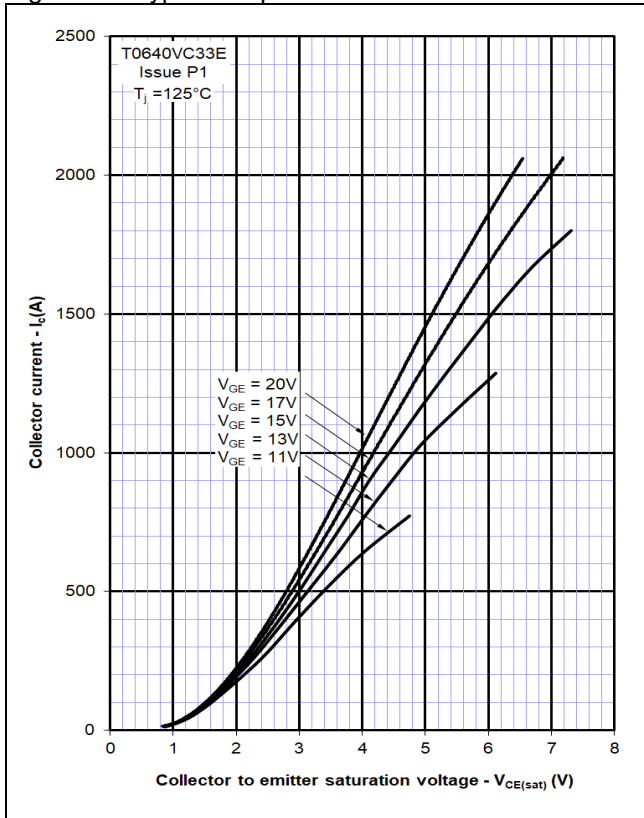


Figure 4 – Typical turn-on delay time vs gate resistance

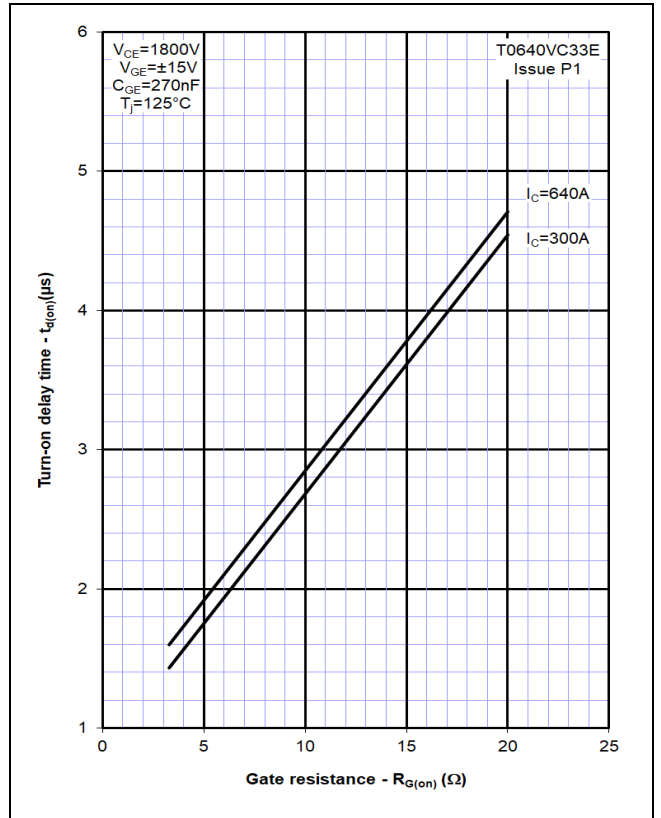


Figure 5 – Typical turn-off delay time vs. gate resistance

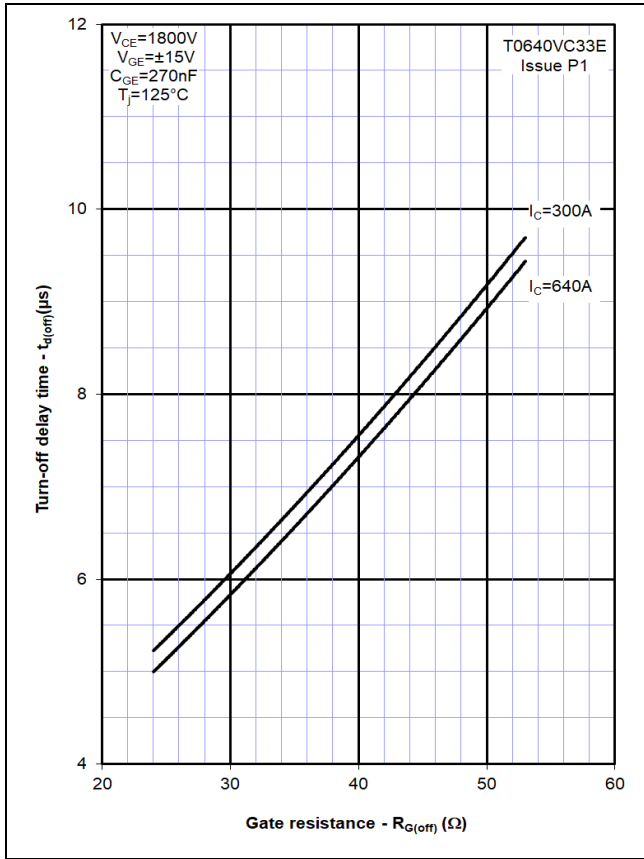


Figure 6 – Typical turn-on energy vs. collector current

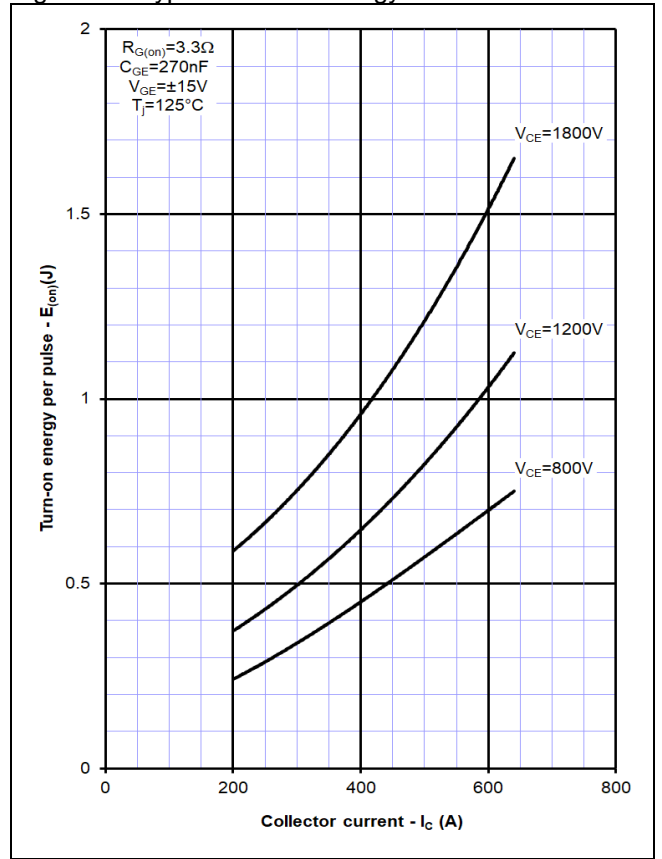


Figure 7 – Typical turn-on energy vs. di/dt

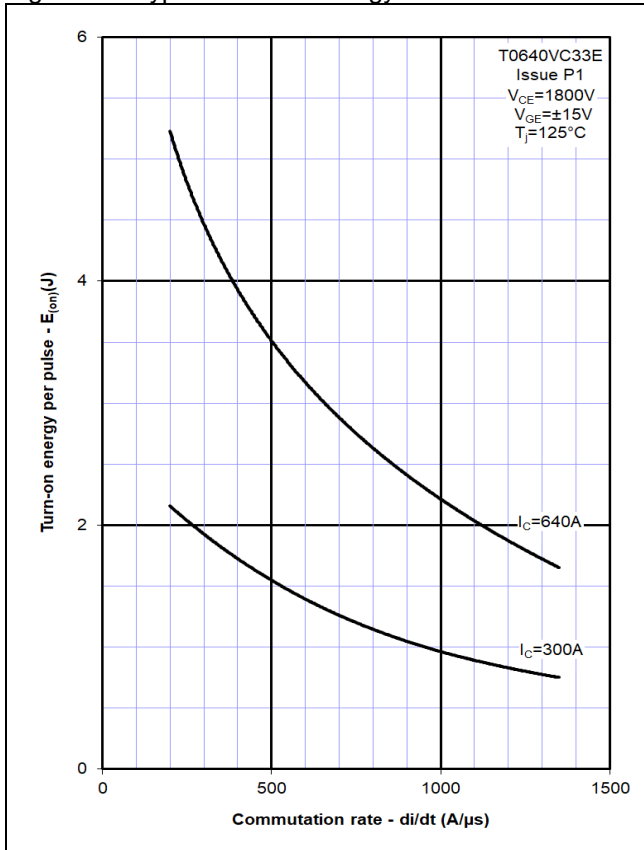


Figure 8 – Typical turn-off energy vs. collector current

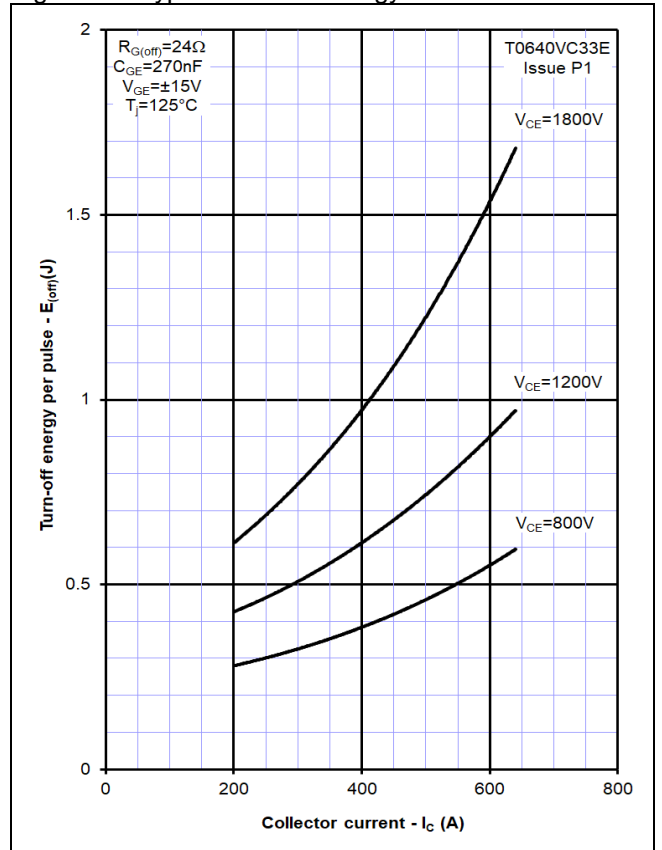


Figure 9 – Turn-off energy vs voltage

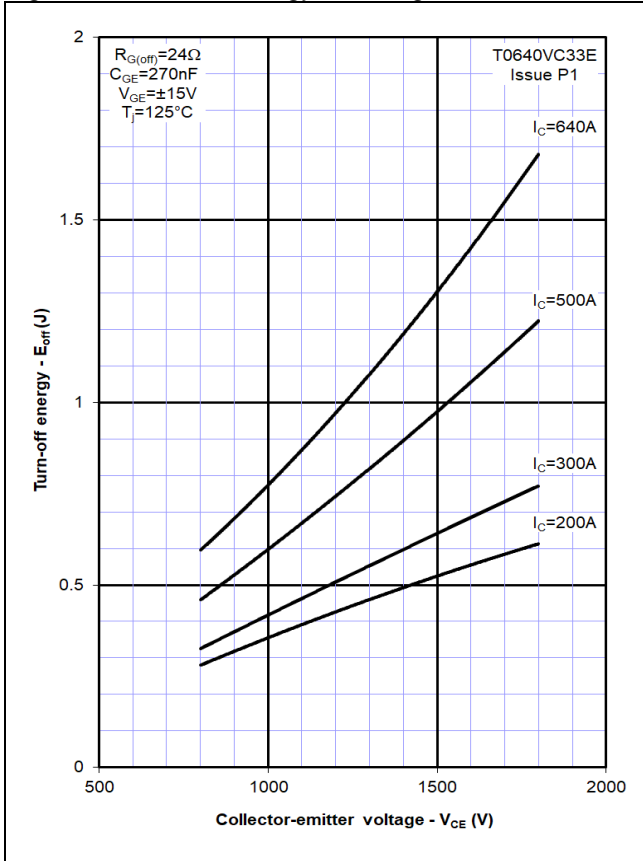


Figure 10 – Safe operating area

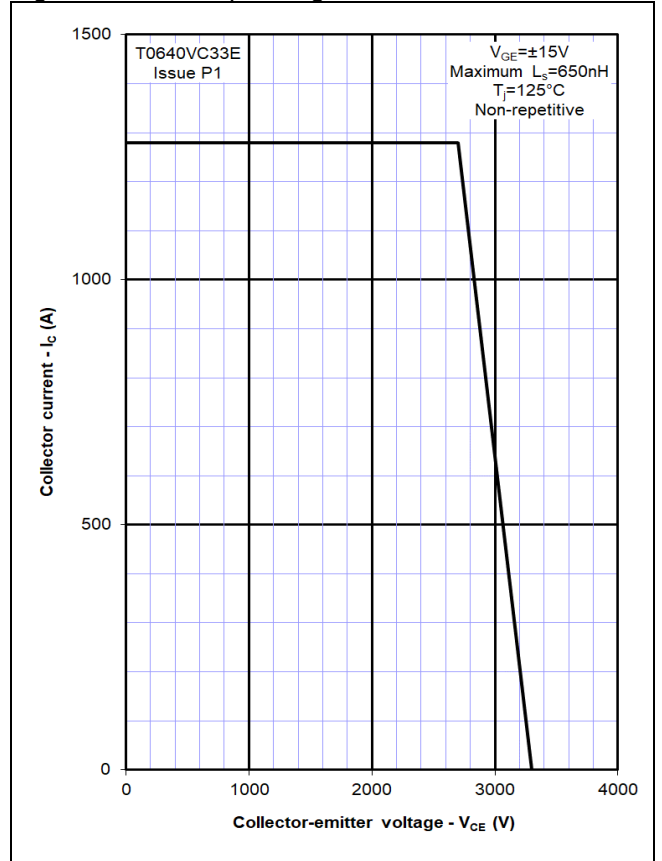
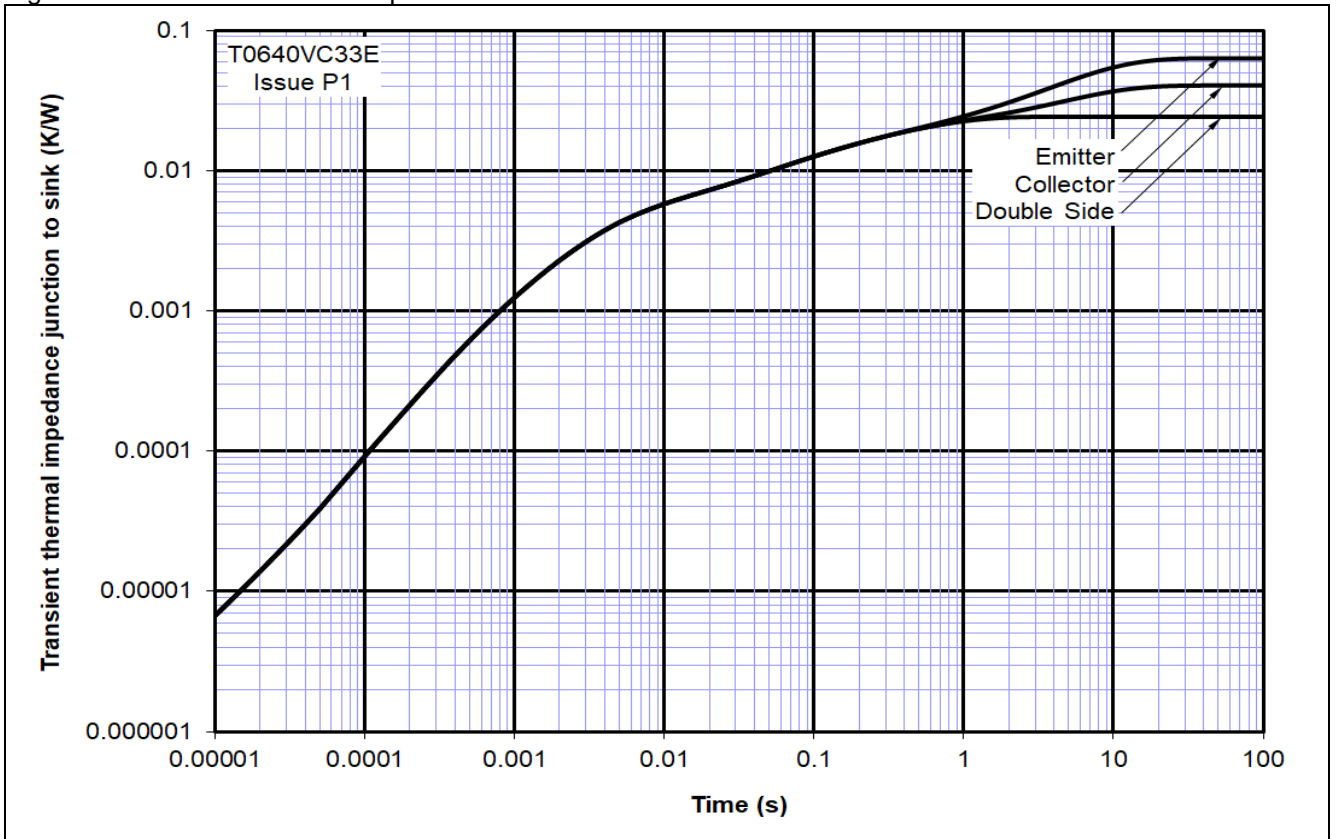
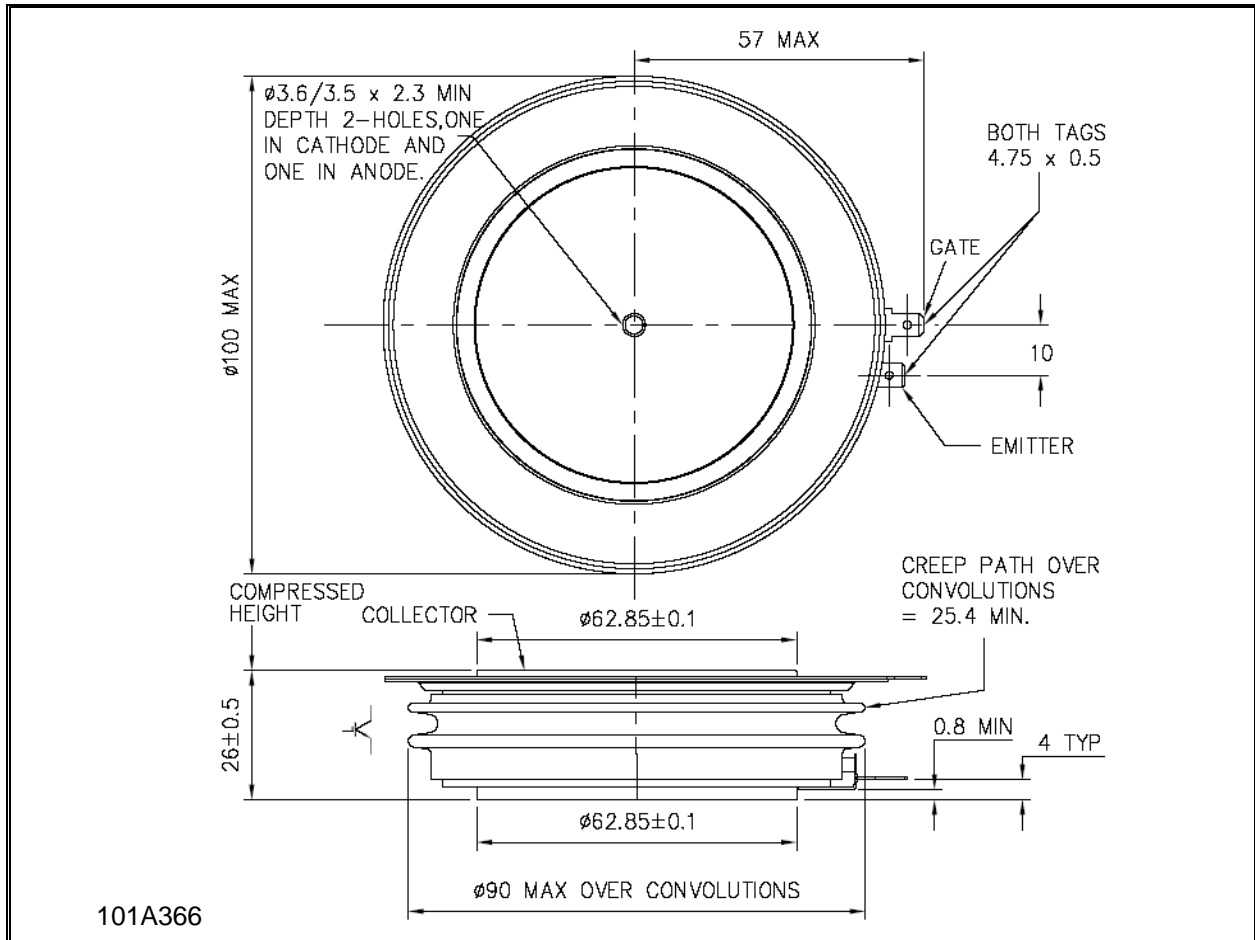


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

| T0640 | VC | 33 | E |
|-----------------|--------------------|--------------------------------------|-------------------|
| Fixed type Code | Fixed Outline Code | Voltage Grade $V_{CES}/100$ 33 | Fixed format code |

 Typical order code: T0640VC33E ($V_{CES} = 3300V$)

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