

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

### Thermal Characteristics

R <sub>thJK</sub>	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 <sub>t</sub>	Weight	-	3.2	-		kg

#### Notes:-

- 1) Unless otherwise indicated T<sub>j</sub> = 125°C.
- 2) Consult application note 2008AN01 for detailed mounting requirements
- 3) C<sub>GE</sub> is additional gate – emitter capacitance added to output of gate drive
- 4) E<sub>on</sub> integration time 15μs from 10% rising I<sub>C</sub>.
- 5) E<sub>off</sub> integration time 15μs from 90% falling V<sub>GE</sub>.

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

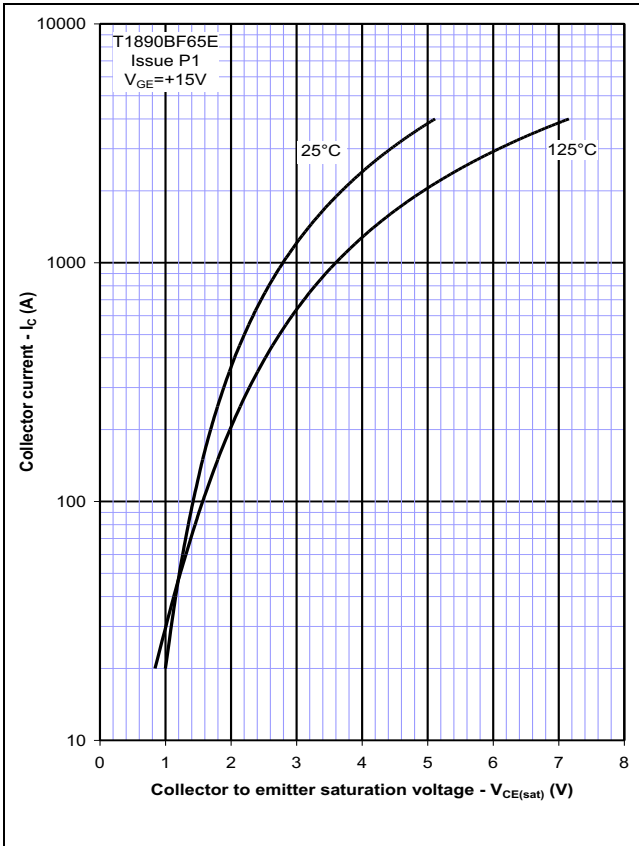


Figure 2 – Typical output characteristic

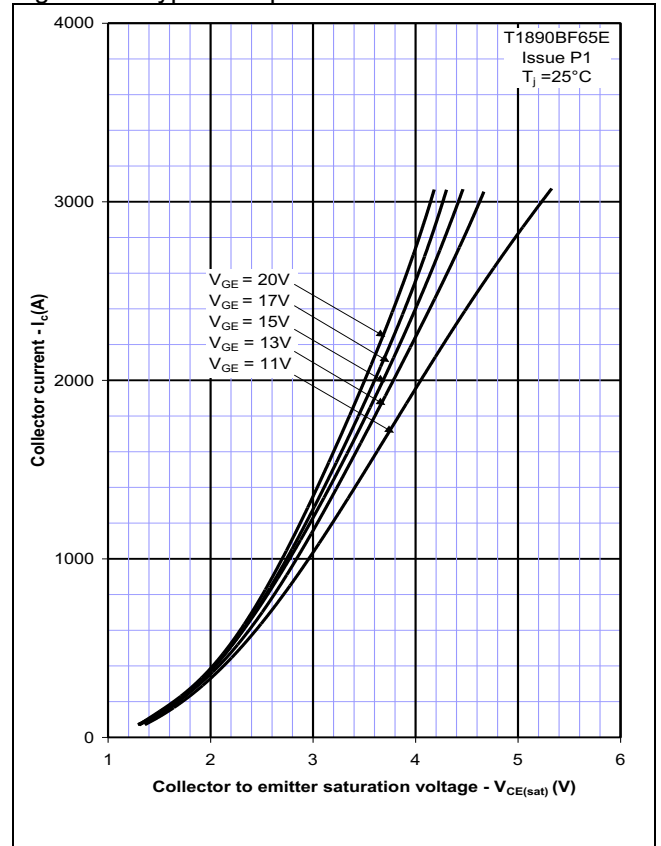


Figure 3 – Typical output characteristic

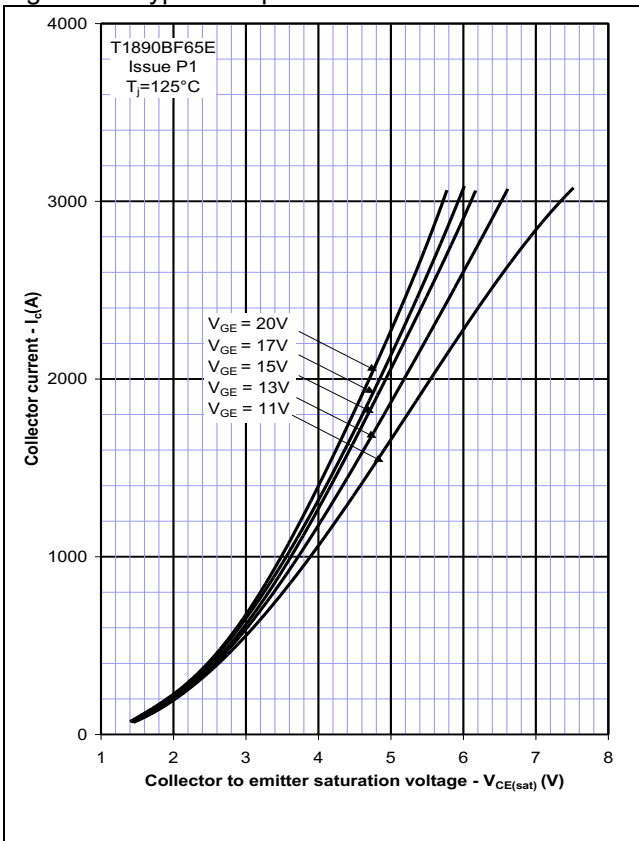


Figure 4 – Typical turn-on delay time vs gate resistance

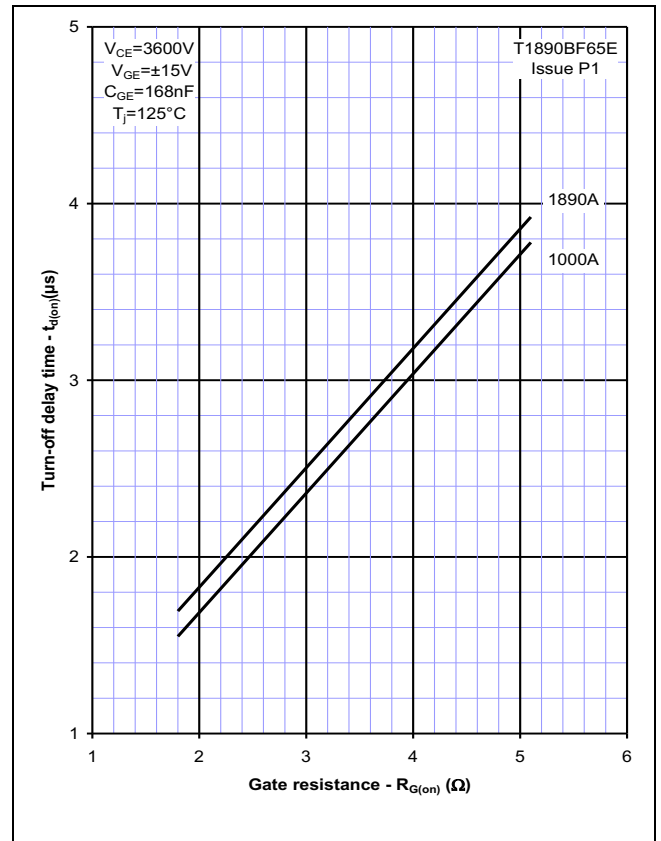


Figure 5 – Typical turn-off delay time vs. gate resistance

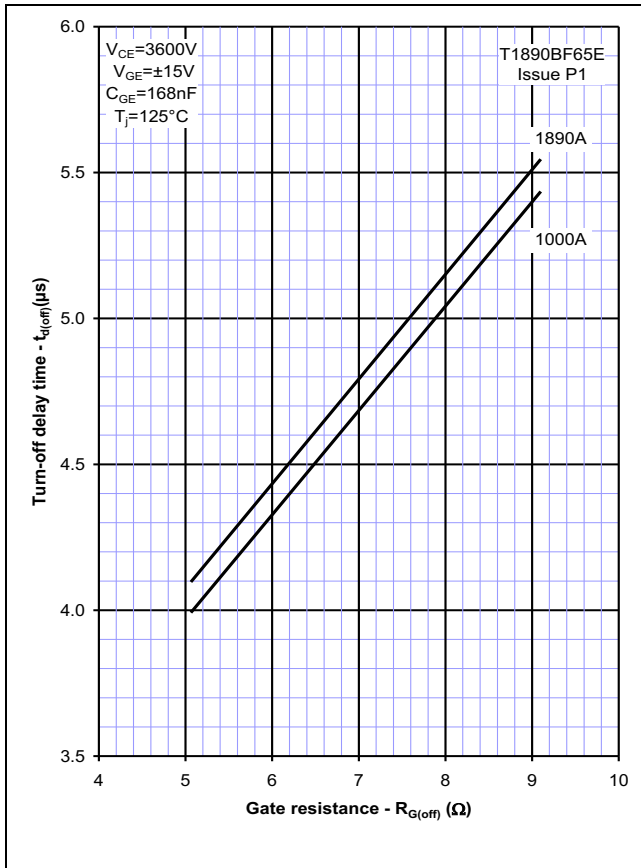


Figure 6 – Typical turn-on energy vs. collector current

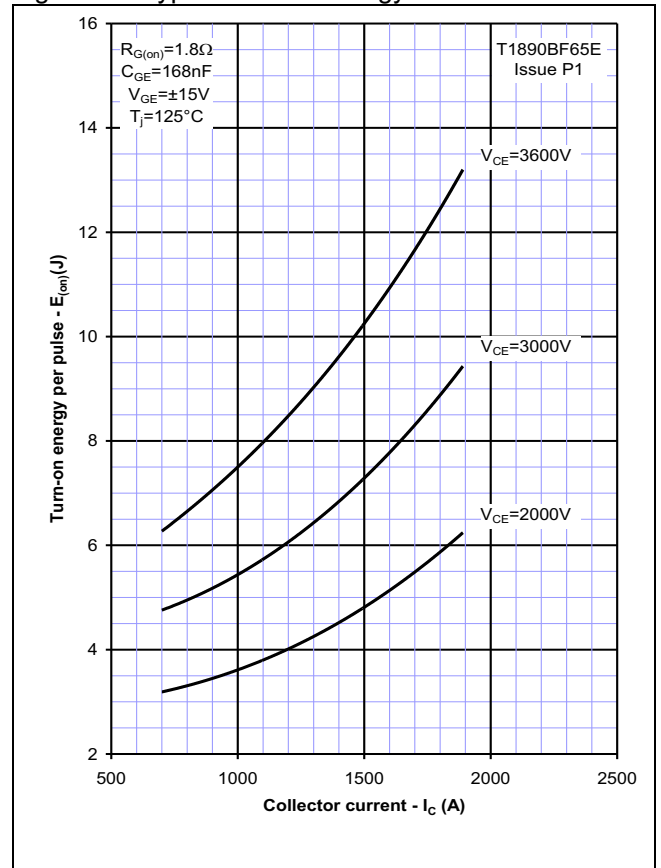


Figure 7 – Typical turn-on energy vs. di/dt

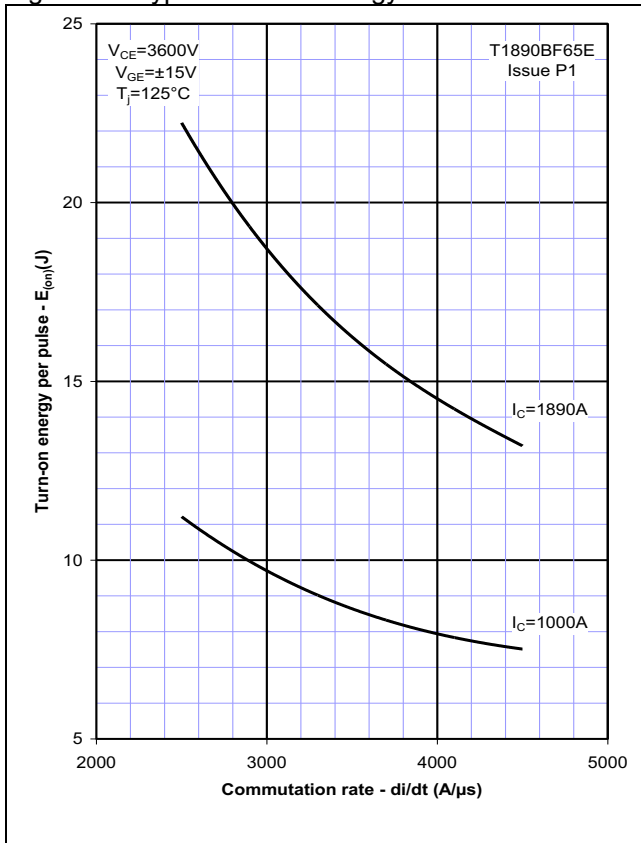


Figure 8 – Typical turn-off energy vs. collector current

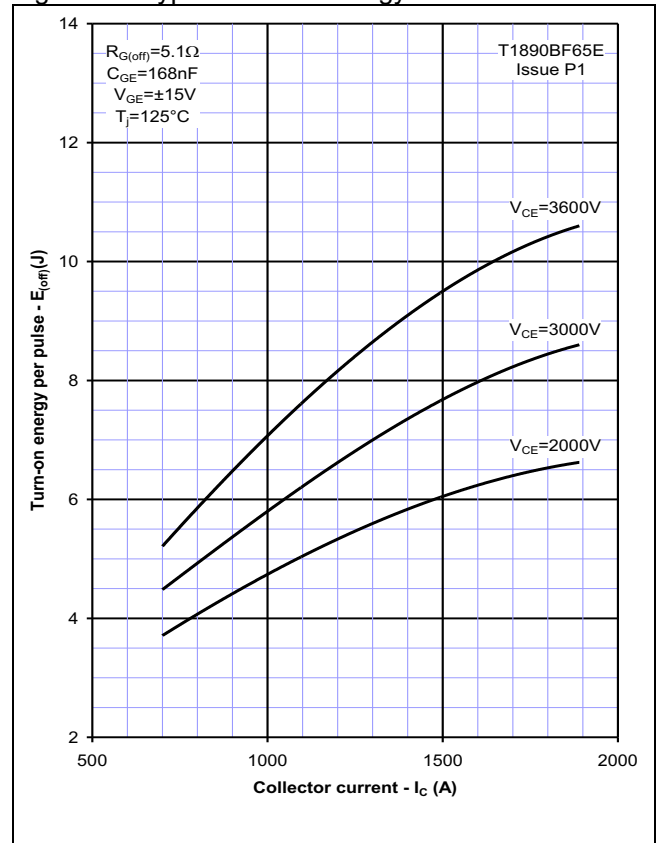


Figure 9 – Turn-off energy vs voltage

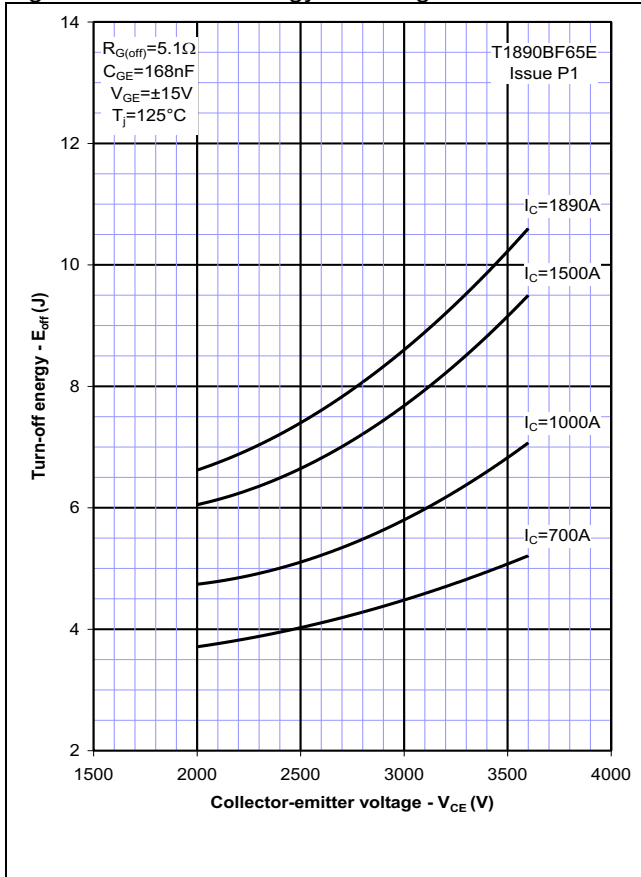


Figure 10 – Safe operating area

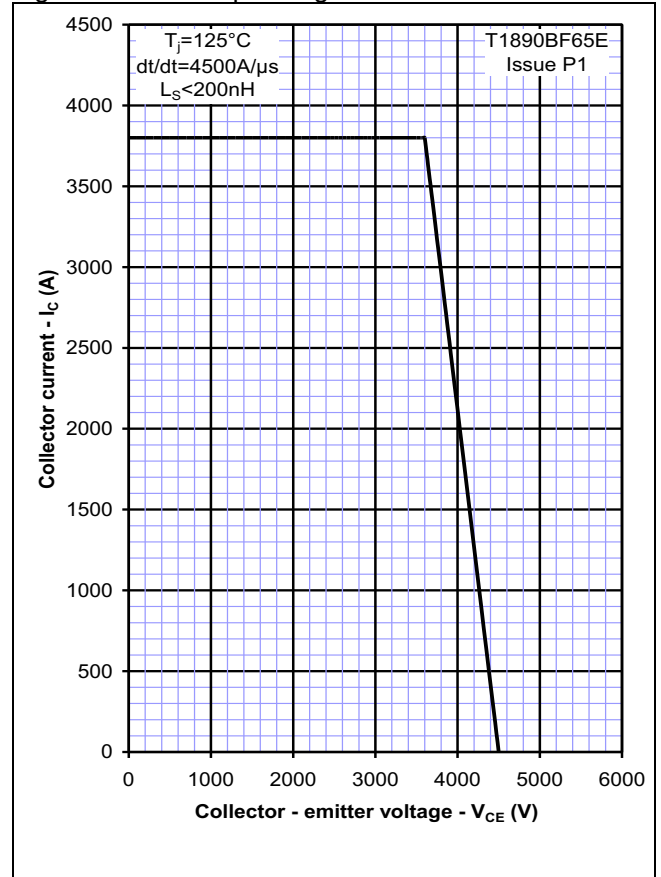
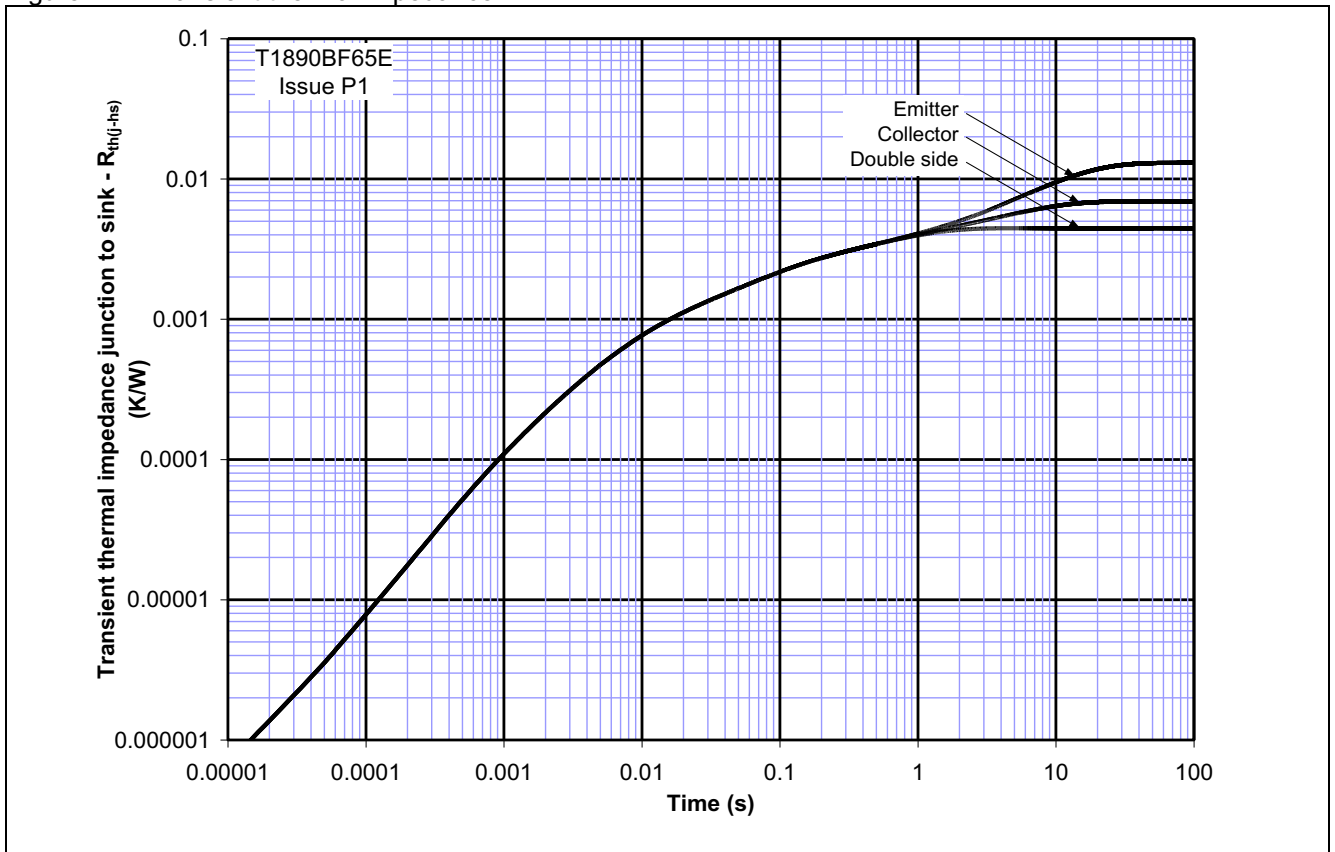
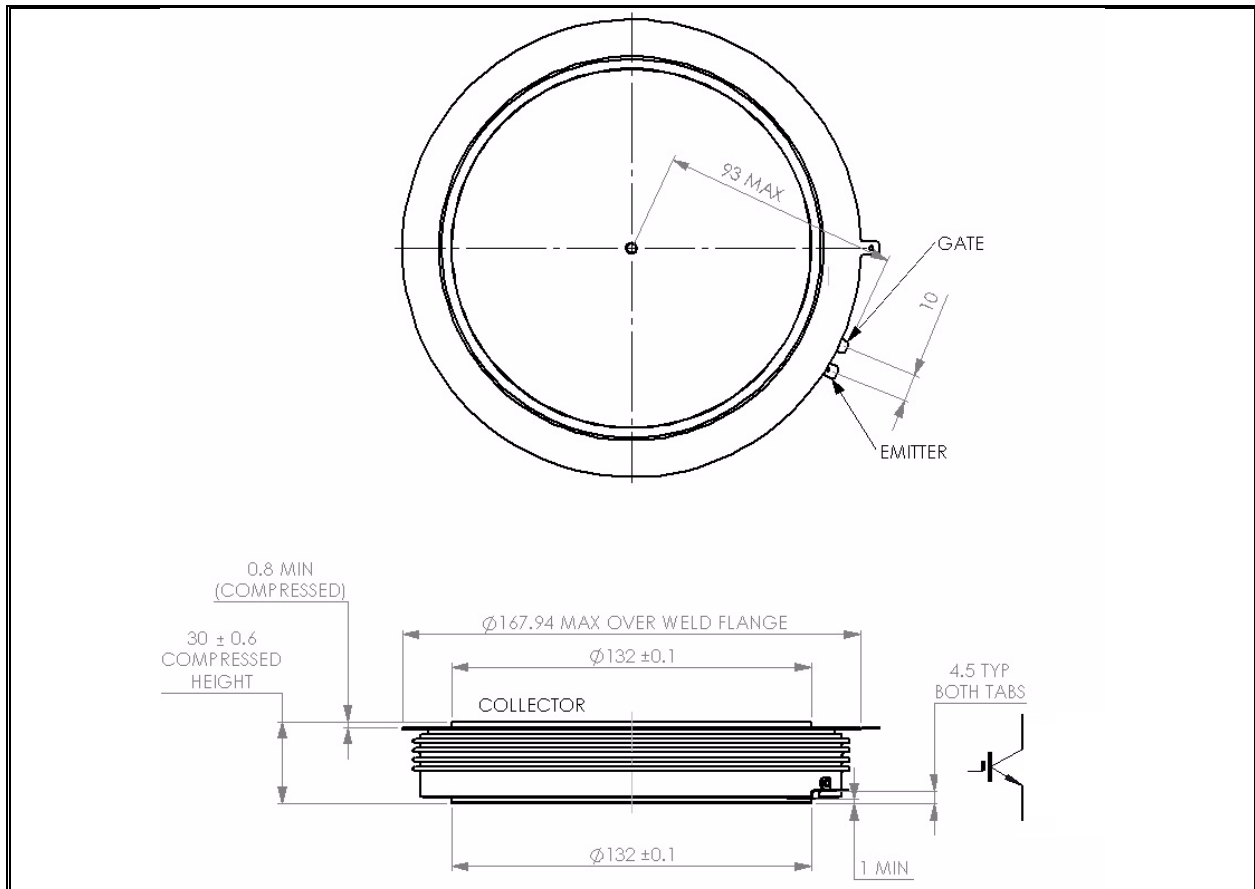


Figure 11 – Transient thermal impedance



**Outline Drawing & Ordering Information**



**101A401**

<b>ORDERING INFORMATION</b>			
(Please quote 10 digit code as below)			
<b>T1890</b>	<b>BF</b>	<b>65</b>	<b>E</b>
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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