

Advance data

# Insulated Gate Bi-Polar Transistor

## Type T1290BF65A

### 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	1290	A
$I_{CRM}$	Repetitive peak collector current, $t_p=1ms$ , IGBT	2580	A
$I_{F(DC)}$	Continuous DC forward current, Diode	1290	A
$I_{FRM}$	Repetitive peak forward current, $t_p=1ms$ , Diode	2580	A
$I_{FSM}$	Peak non-repetitive surge $t_p=10ms$ , $V_{RM}=60\%V_{RRM}$ , Diode (Note 4)	10.9	kA
$I_{FSM2}$	Peak non-repetitive surge $t_p=10ms$ , $V_{RM}\leq 10V$ , Diode (Note 4)	12	kA
$P_{MAX}$	Maximum power dissipation, IGBT (Note 2)	15.2	KW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	4500	A/ $\mu s$
$T_j$	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 230nH.
- 4) Half-sinewave, 125°C  $T_j$  initial.

## Characteristics

### IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>CE(sat)</sub>	Collector – emitter saturation voltage	-	3.6	4.0	I <sub>C</sub> = 1290A, V <sub>GE</sub> = 15V, T <sub>j</sub> = 25°C	V
		-	4.8	5.2	I <sub>C</sub> = 1290A, V <sub>GE</sub> = 15V	V
V <sub>T0</sub>	Threshold voltage	-		2.48	Current range: 430A – 1290A	V
r <sub>T</sub>	Slope resistance	-		2.11		mΩ
V <sub>GE(TH)</sub>	Gate threshold voltage	-	5.4	-	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 800mA	V
I <sub>CES</sub>	Collector – emitter cut-off current	-	12	45	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V	mA
I <sub>GES</sub>	Gate leakage current	-40	-	+40	V <sub>GE</sub> = ±20V	µA
C <sub>ies</sub>	Input capacitance	-	225	-	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	-	1.9	-	I <sub>C</sub> = 1290A, V <sub>CE</sub> = 3600V, di/dt = 3500A/µs V <sub>GE</sub> = ±15V, L <sub>S</sub> = 230nH R <sub>g(ON)</sub> = 2.4Ω, R <sub>g(OFF)</sub> = 7.5Ω, C <sub>GE</sub> = 100nF Integral diode used as freewheel diode (Note 3)	µs
t <sub>r(V)</sub>	Rise time	-	2.8	-		µs
Q <sub>g(on)</sub>	Turn-on gate charge	-	7.5	-		µC
E <sub>on</sub>	Turn-on energy	-	9	-		J
t <sub>d(off)</sub>	Turn-off delay time	-	4.2	-		µs
t <sub>f(l)</sub>	Fall time	-	2.2	-		µs
Q <sub>g(off)</sub>	Turn-off gate charge	-	8	-		µC
E <sub>off</sub>	Turn-off energy	-	7.3	-		J
I <sub>SC</sub>	Short circuit current	-	7000	-		V <sub>GE</sub> = +15V, V <sub>CC</sub> = 3600V, V <sub>CEmax</sub> ≤ V <sub>CES</sub> , t <sub>p</sub> ≤ 10µs

### Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V <sub>F</sub>	Forward voltage	-	3.2	3.6	I <sub>F</sub> = 1290A, T <sub>j</sub> = 25°C	V
		-	3.6	4.0	I <sub>F</sub> = 1290A	V
V <sub>To</sub>	Threshold voltage	-	-	1.56	Current range 430A – 1290A	V
r <sub>T</sub>	Slope resistance	-	-	1.58		mΩ
I <sub>rm</sub>	Peak reverse recovery current	-	1400	-	V <sub>i</sub> = 3600V, I <sub>F</sub> = 1290A, V <sub>GE</sub> = -15V, di/dt = 3500A/µs	A
Q <sub>rr</sub>	Recovered charge	-	1900	-		µC
t <sub>rr</sub>	Reverse recovery time, 50% chord	-	1.1	-		µs
E <sub>r</sub>	Reverse recovery energy	-	2.8	-		J

### Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R <sub>thJK</sub>	Thermal resistance junction to sink, IGBT	-	-	6.56	Double side cooled	K/kW
		-	-	9.9	Collector side cooled	K/kW
		-	-	19.5	Emitter side cooled	K/kW
R <sub>thJK</sub>	Thermal resistance junction to sink, Diode	-	-	12.2	Double side cooled	K/kW
		-	-	17.6	Cathode side cooled	K/kW
		-	-	39.3	Anode side cooled	K/kW
F	Mounting force	55	-	75	Note 2	kN
W <sub>t</sub>	Weight	-	3.2	-		g

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

**Curves**

Figure 1 – Typical collector-emitter saturation voltage characteristics

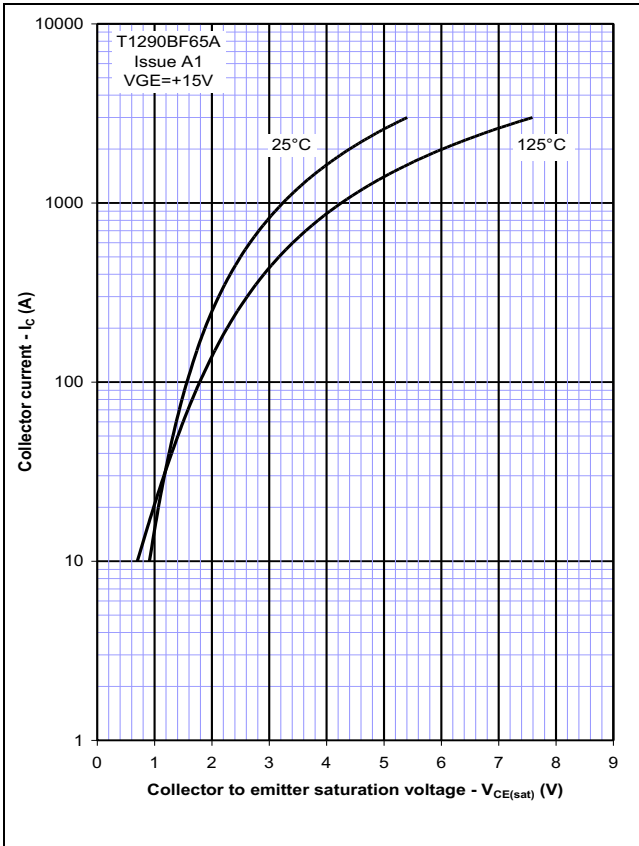


Figure 2 – Typical output characteristic

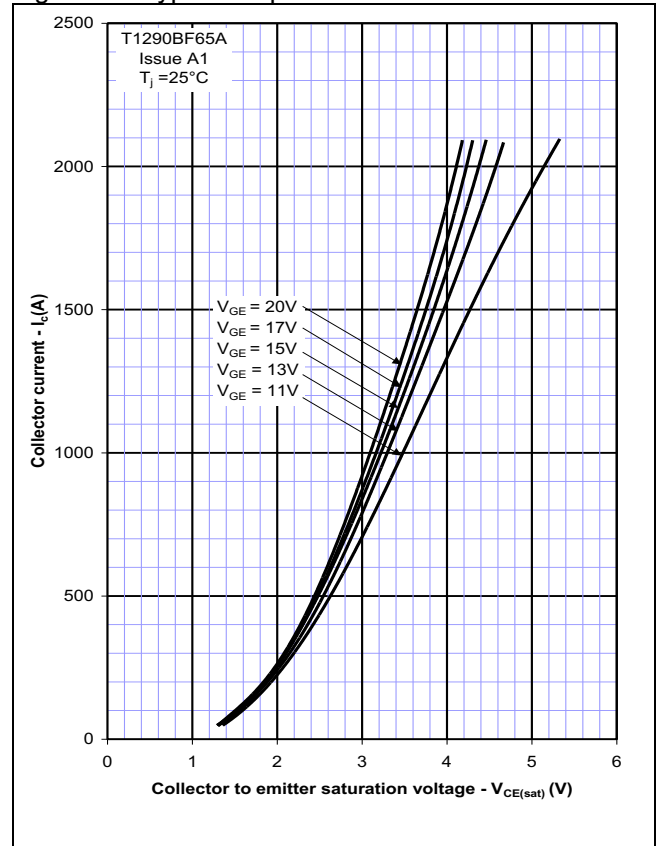


Figure 3 – Typical output characteristic

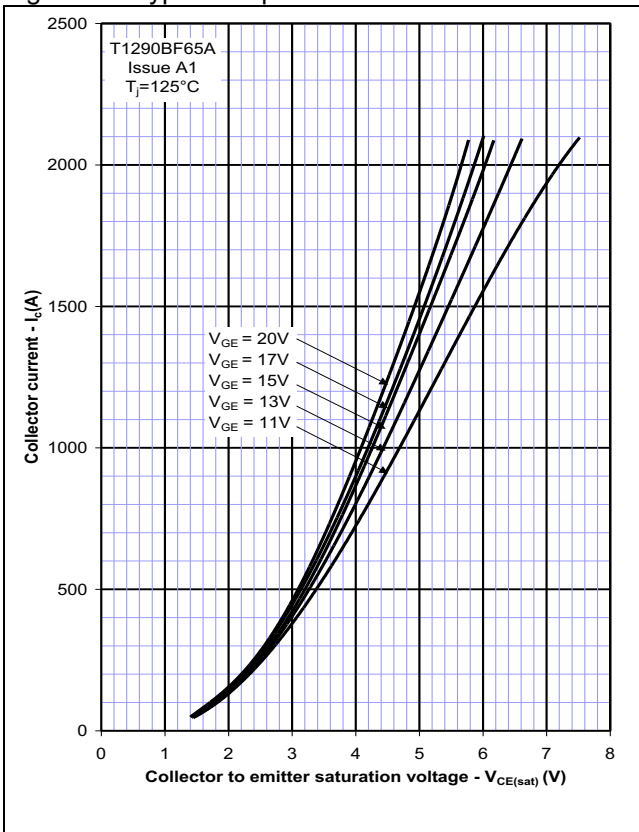


Figure 4 – Safe operating area (IGBT)

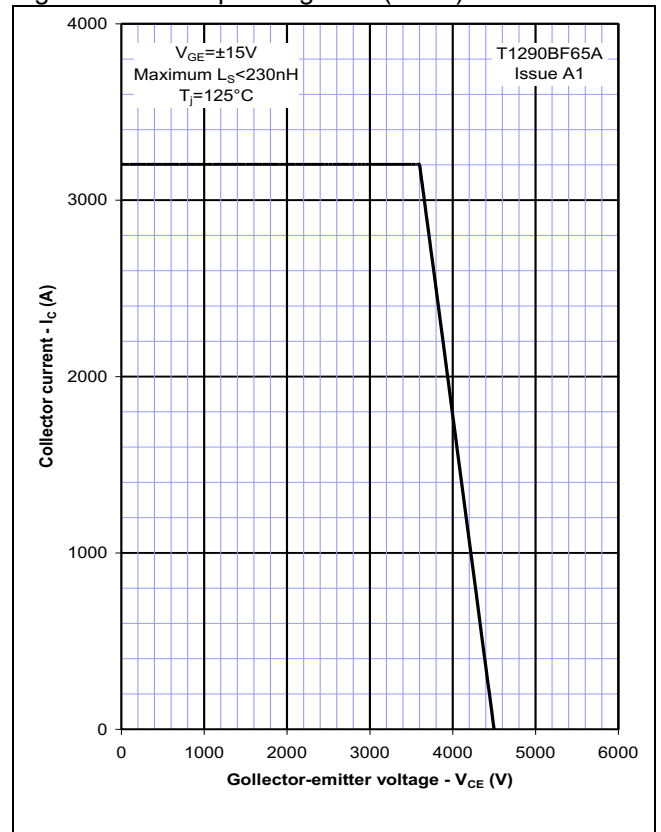


Figure 5 – Typical diode forward characteristics

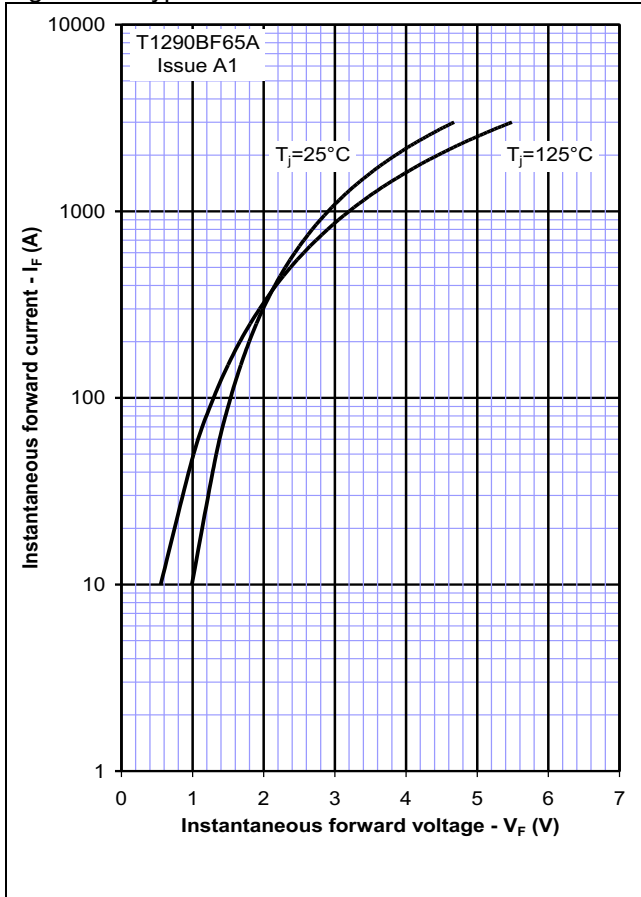


Figure 6 – Safe operating area (Diode)

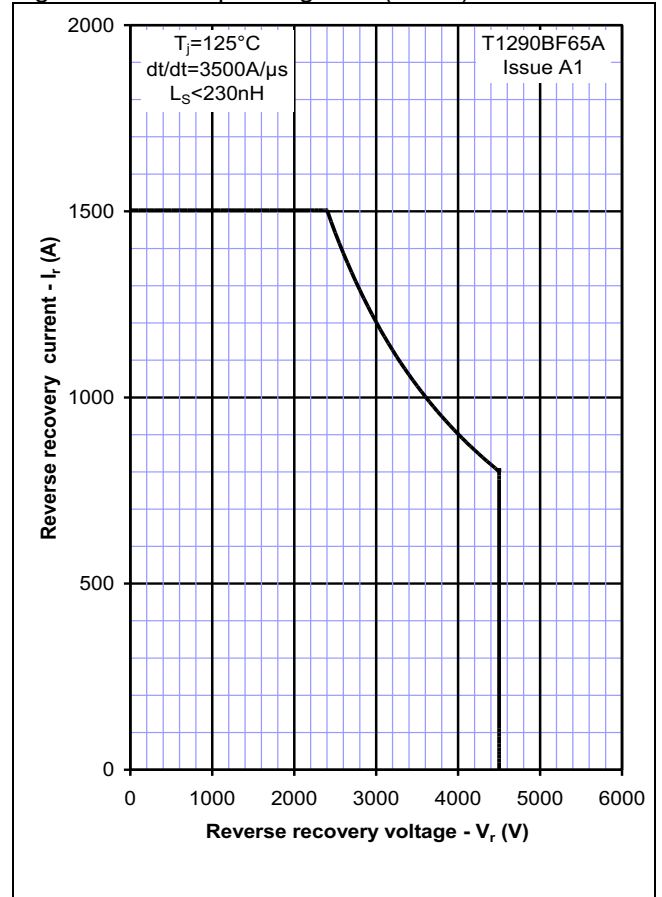


Figure 7 – Transient thermal impedance (IGBT)

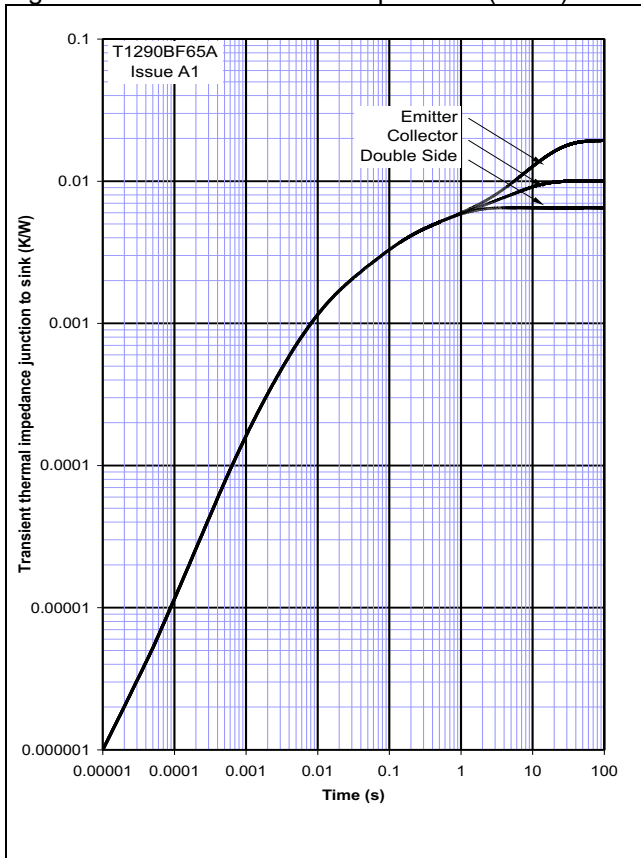
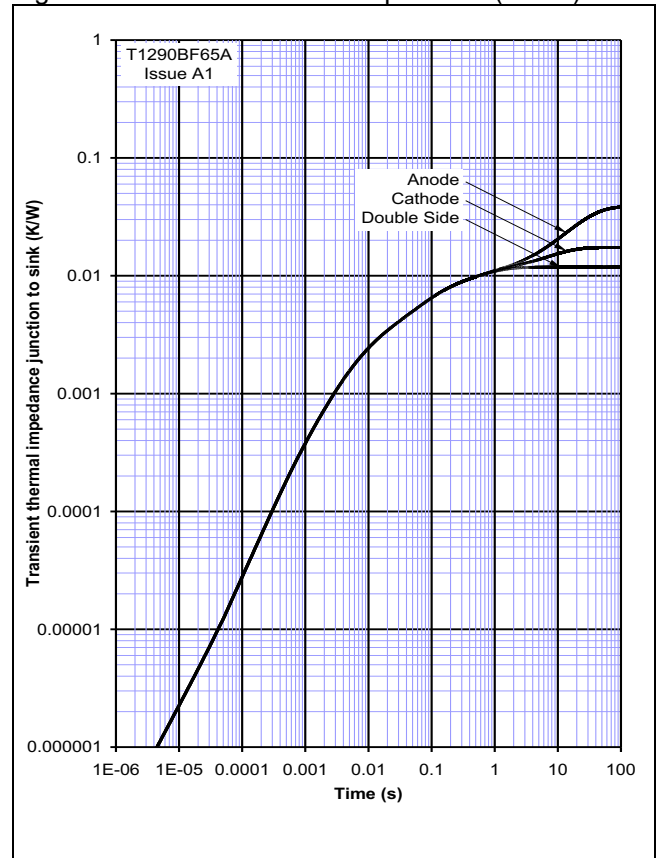
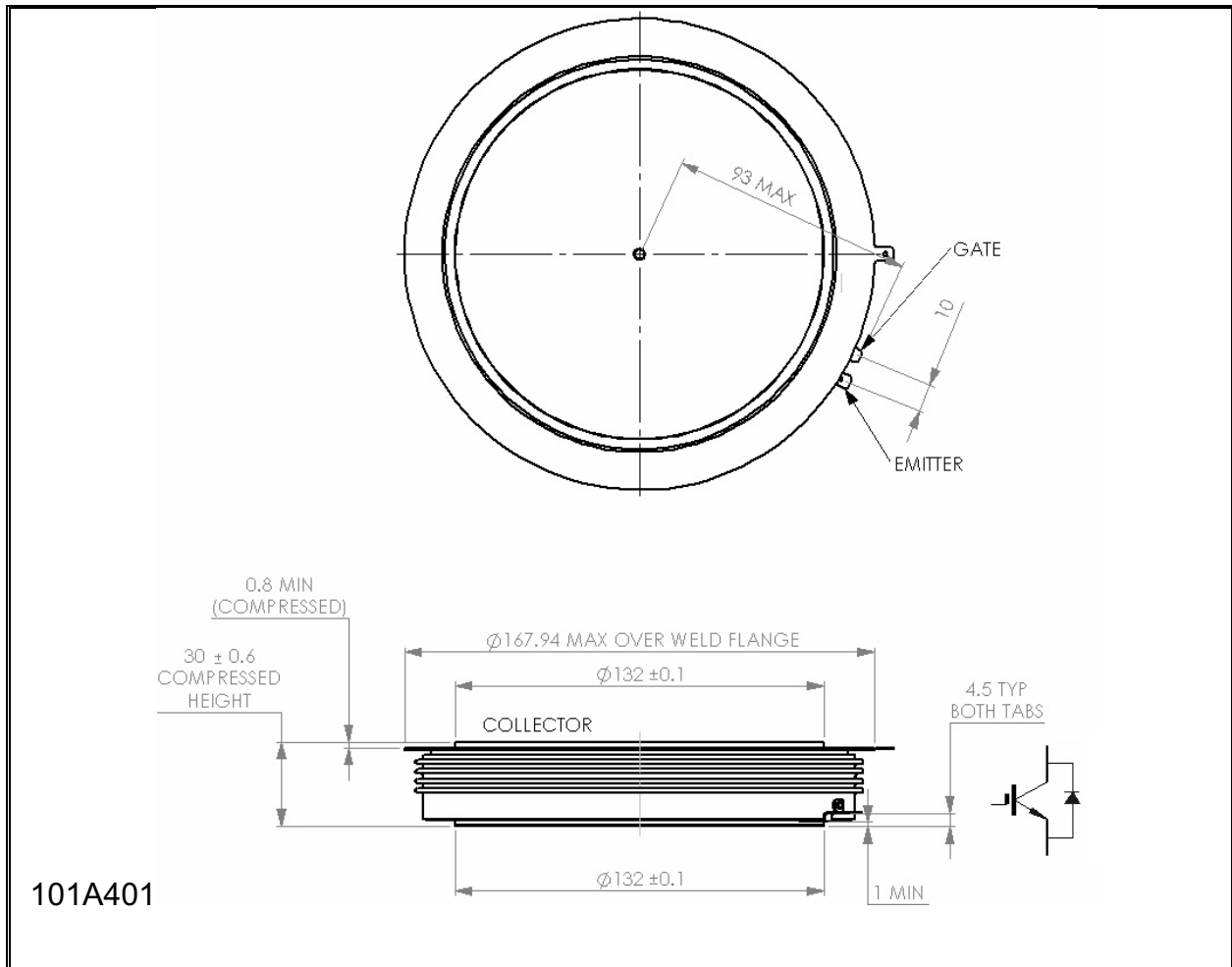


Figure 8 – Transient thermal impedance (Diode)



**Outline Drawing & Ordering Information**



**ORDERING INFORMATION**

(Please quote 10 digit code as below)

<b>T1290</b>	<b>BF</b>	<b>65</b>	<b>A</b>
Fixed type Code	Fixed Outline Code	Voltage Grade V <sub>CES</sub> /100 65	Fixed format code

Typical order code: T1290BF65A (V<sub>CES</sub> = 6500V)

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