

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	-	$I_C = 1890A$, $V_{GE} = 15V$, $T_j = 25^\circ C$	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	$V_{GE} = \pm 20V$	μA
C_{ies}	Input capacitance	-	350	-	$V_{CE} = 10V$, $V_{GE} = 0V$, $f = 100kHz$, $T_j = 25^\circ C$	nF
$t_{d(on)}$	Turn-on delay time	-	1.7	-	$I_C = 1890A$, $V_{CE} = 3600V$, $di/dt = 4500A/\mu s$ $V_{GE} = \pm 15V$, $L_s = 140nH$ $R_{g(ON)} = 1.8\Omega$, $R_{g(OFF)} = 5.1\Omega$, $C_{GE} = 168nF$ Freewheeling diode E2060FF65F at $T_j = 125^\circ C$ (Note 3, 4 & 5)	μs
$t_r(V)$	Rise time	-	2.6	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	11	-		μC
E_{on}	Turn-on energy	-	13.2	-		J
$t_{d(off)}$	Turn-off delay time	-	4.1	-		μs
$t_f(I)$	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	-	$V_{GE} = +15V$, $V_{CC} = 3600V$, $V_{CEmax} \leq V_{CES}$, $t_p \leq 10\mu s$	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 $T_j = 125^\circ C$.
- 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_G .
- 5) E_{off} integration time 15μs from 90% falling V_{GE} .

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

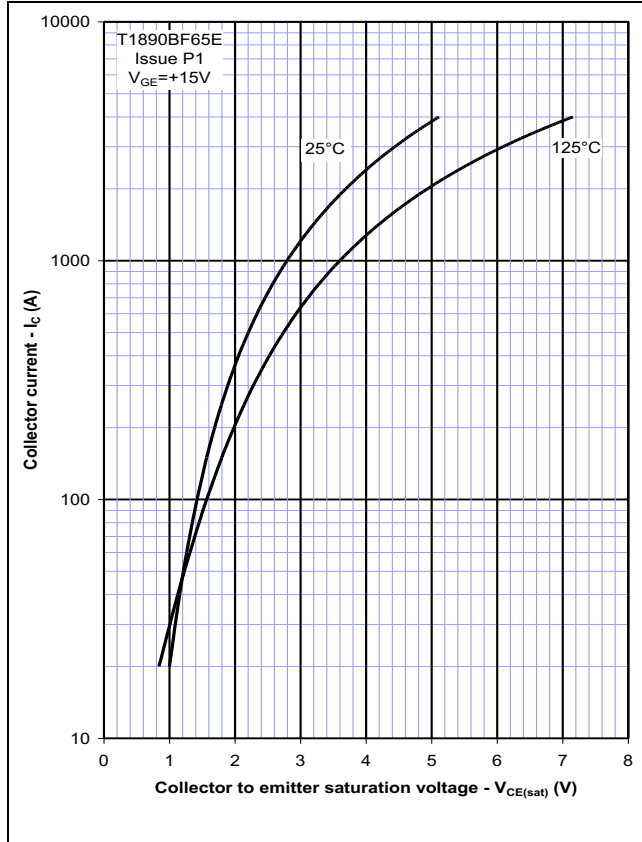


Figure 2 – Typical output characteristic

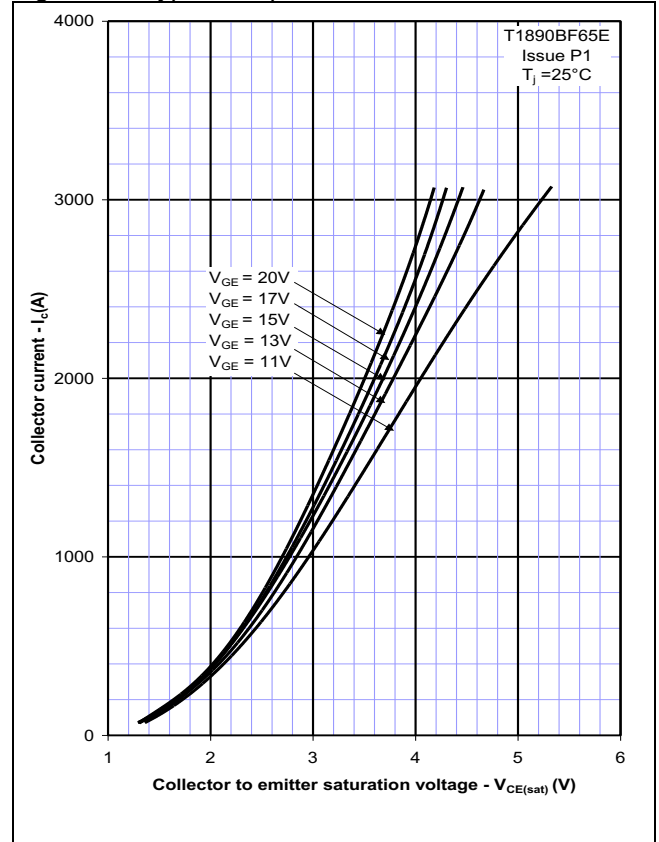


Figure 3 – Typical output characteristic

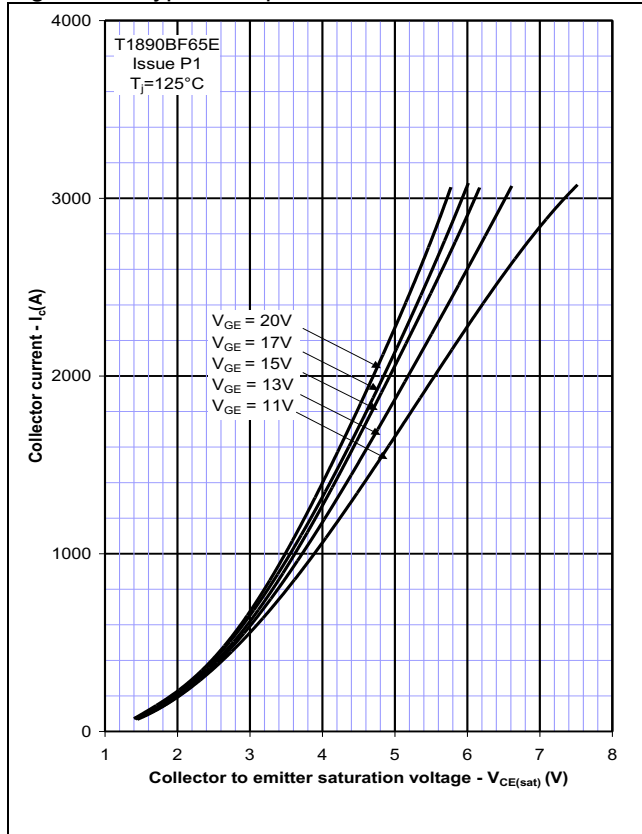


Figure 4 – Typical turn-on delay time vs gate resistance

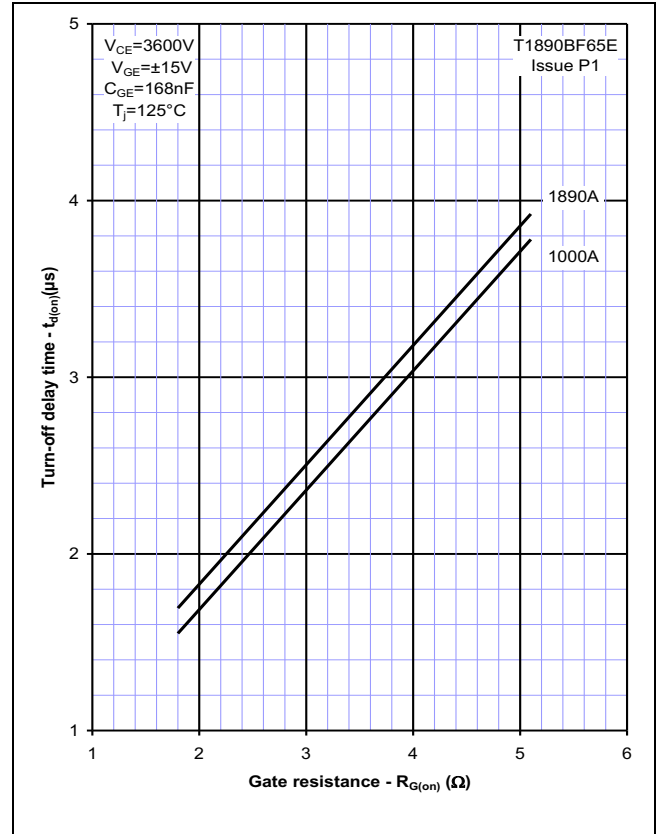


Figure 5 – Typical turn-off delay time vs. gate resistance

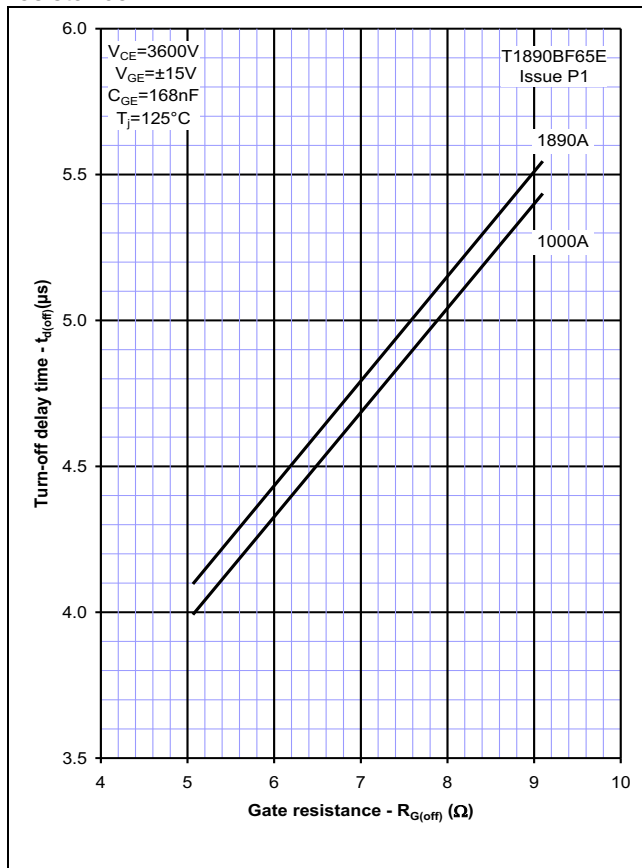


Figure 6 – Typical turn-on energy vs. collector current

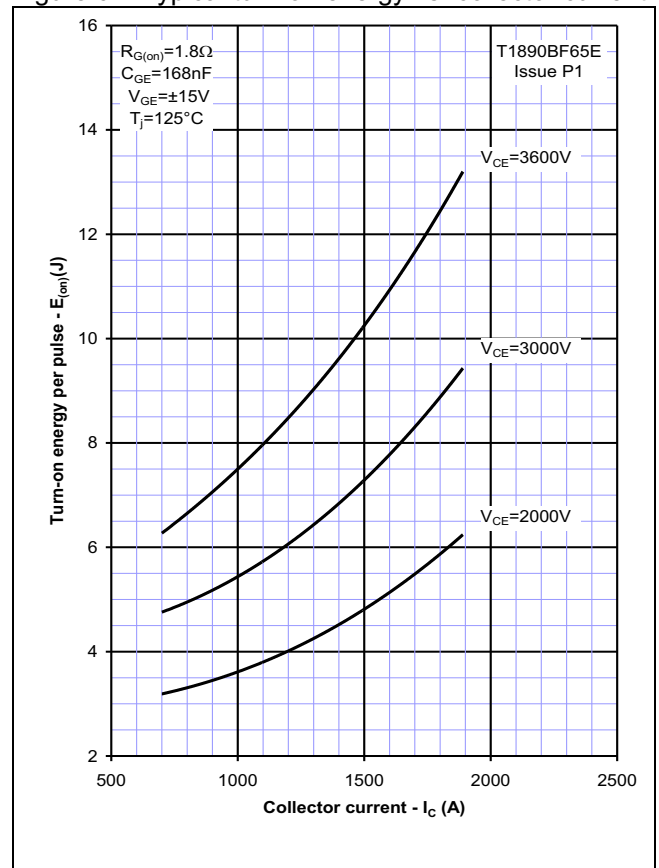


Figure 7 – Typical turn-on energy vs. di/dt

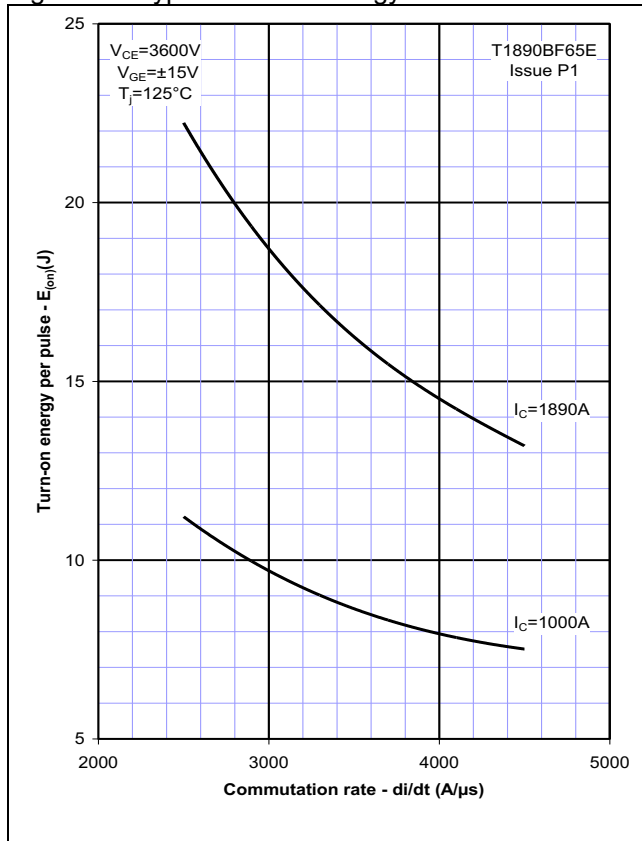


Figure 8 – Typical turn-off energy vs. collector current

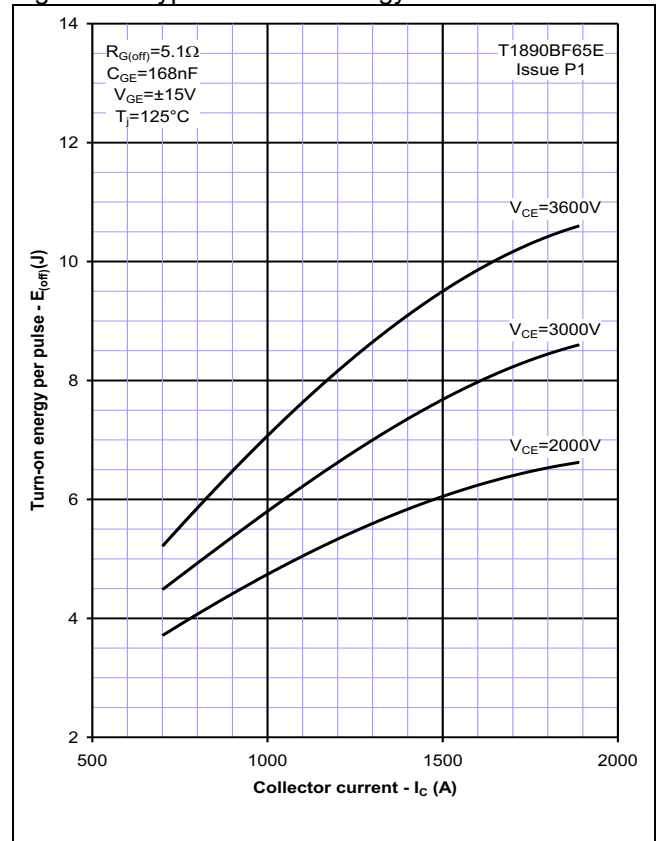


Figure 9 – Turn-off energy vs voltage

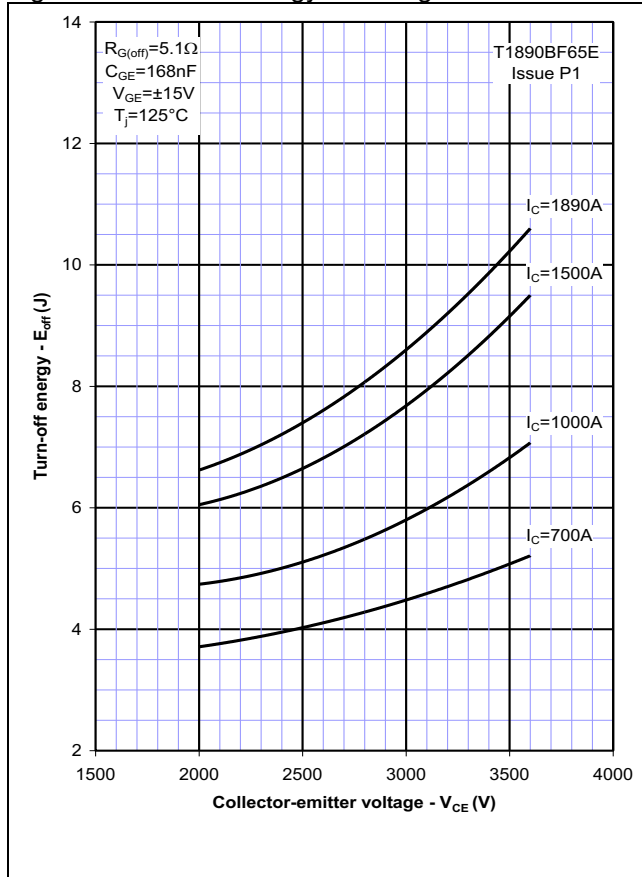


Figure 10 – Safe operating area

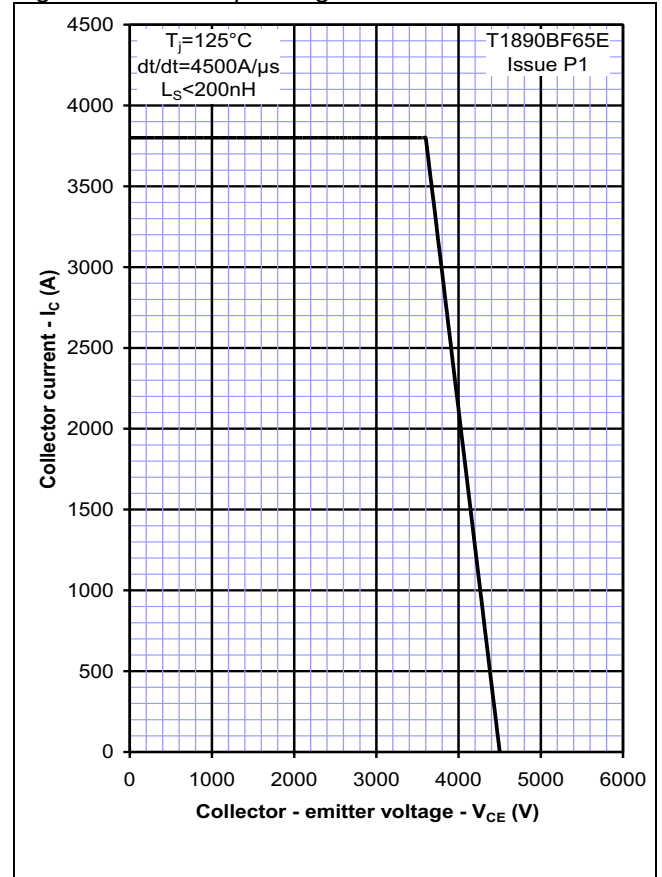
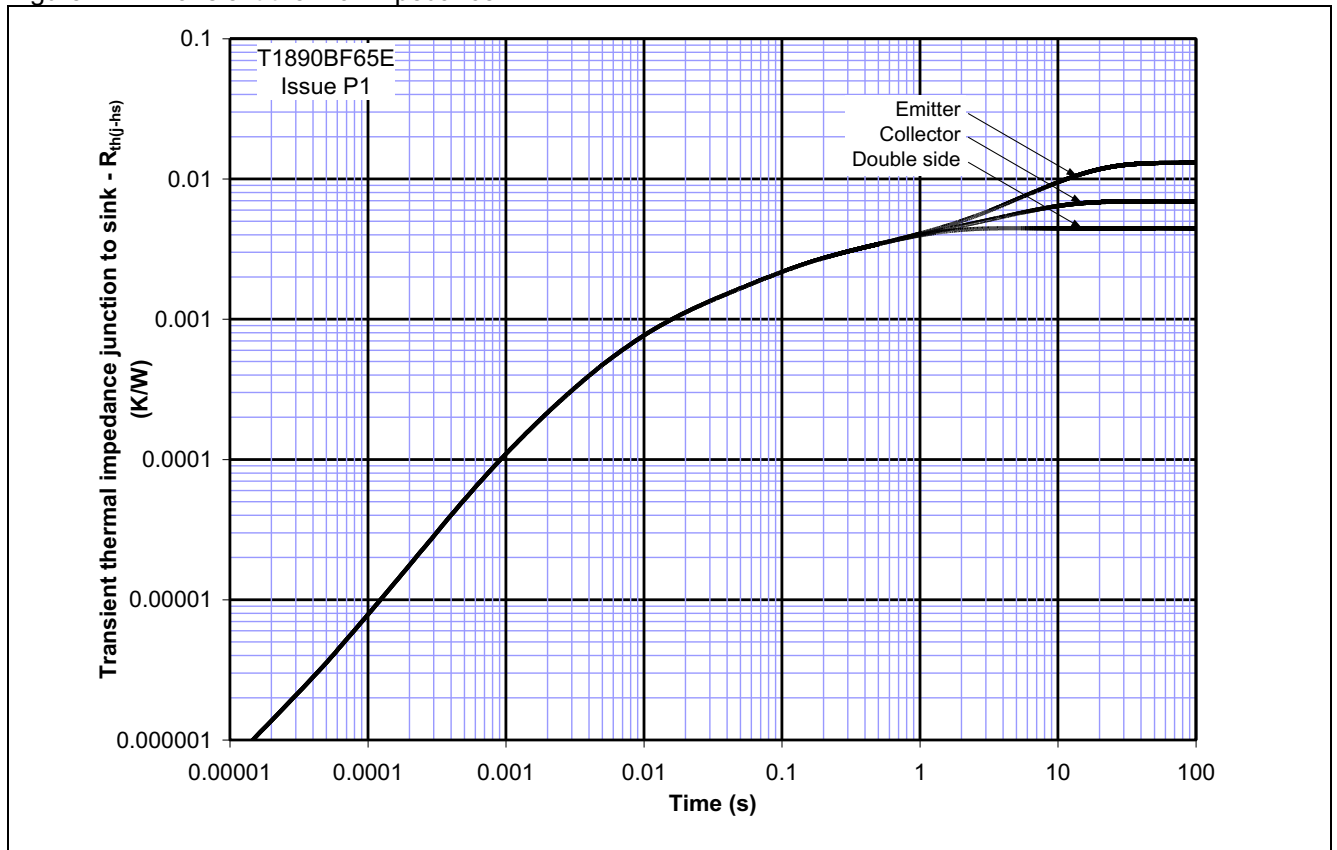
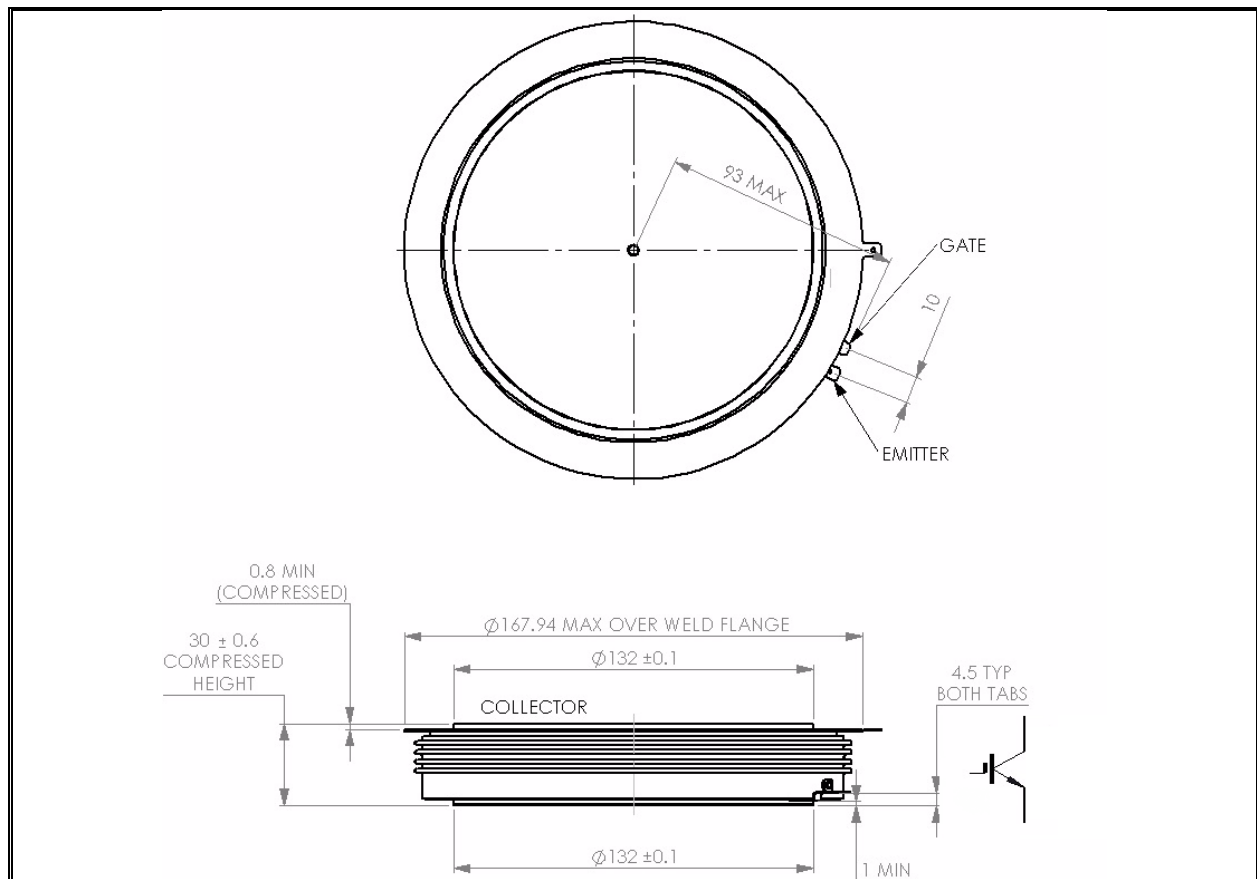


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



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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