

Provisional Data

Insulated Gate Bi-Polar Transistor Type T1200EB45E

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{CES}	Collector – emitter voltage	4500	V
$V_{DC \text{ link}}$	Permanent DC voltage for 100 FIT failure rate	2800	V
V_{GES}	Peak gate – emitter voltage	± 20	V

	RATINGS	MAXIMUM LIMITS	UNITS
$I_{C(DC)}$	Continuous DC collector current, IGBT	1200	A
I_{CRM}	Repetitive peak collector current, $t_p=1\text{ms}$, IGBT	2400	A
I_{ECO}	Maximum reverse emitter current, $t_p=100\mu\text{s}$, (note 2 & 3)	1200	A
P_{MAX}	Maximum power dissipation, IGBT (note 2)	12.5	kW
$T_{j \text{ op}}$	Operating temperature range	-40 to +125	$^{\circ}\text{C}$
T_{stg}	Storage temperature range	-40 to +125	$^{\circ}\text{C}$

Notes: -

- 1) Unless otherwise indicated $T_j = 125^{\circ}\text{C}$
- 2) $T_{\text{sink}} = 25^{\circ}\text{C}$, double side cooled
- 3) The use of an anti-parallel diode is recommended

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	2.8	3.2	$I_C = 1200A$, $V_{GE} = 15V$, $T_j = 25^\circ C$	V
		-	3.6	4.1	$I_C = 1200A$, $V_{GE} = 15V$	V
V_{T0}	Threshold voltage	-	-	1.69	Current range: 500 – 1500A	V
r_T	Slope resistance	-	-	1.97		m Ω
$V_{GE(TH)}$	Gate threshold voltage	-	5.3	-	$V_{CE} = V_{GE}$, $I_C = 125mA$	V
I_{CES}	Collector – emitter cut-off current	-	20	50	$V_{CE} = V_{CES}$, $V_{GE} = 0V$	mA
I_{GES}	Gate leakage current	-	-	± 15	$V_{GE} = \pm 20V$	μA
C_{ies}	Input capacitance	-	200	-	$V_{CE} = 25V$, $V_{GE} = 0V$, $f = 1MHz$	nF
$t_{d(on)}$	Turn-on delay time	-	1.8	-	$I_C = 1200A$, $V_{CE} = 2800V$ $V_{GE} = \pm 15V$, $L_s = 250nH$ $R_{g(ON)} = 3.3\Omega$, $R_{g(OFF)} = 3.3\Omega$, $C_{GE} = 133nF$. Freewheel diode type E1500VF450. (Note 3)	μs
$t_r(V)$	Rise time	-	3.0	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	12	-		μC
E_{on}	Turn-on energy	-	5.7	-		J
$t_{d(off)}$	Turn-off delay time	-	1.6	-		μs
t_f	Fall time	-	2.2	-		μs
$Q_{g(off)}$	Turn-off gate charge	-	10	-		μC
E_{off}	Turn-off energy	-	5.1	-		J
I_{SC}	Short circuit current	-	4750	-	$V_{GE} = +15V$, $V_{CC} = 2800V$, $V_{CEmax} \leq V_{CES}$, $t_p \leq 10\mu s$	A

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	8.0	Double side cooled	K/kW
		-	-	12.5	Collector side cooled	K/kW
		-	-	23.3	Emitter side cooled	K/kW
F	Mounting force	25	-	35	Note 2	kN
W_t	Weight	-	1.2	-		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 circuit.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

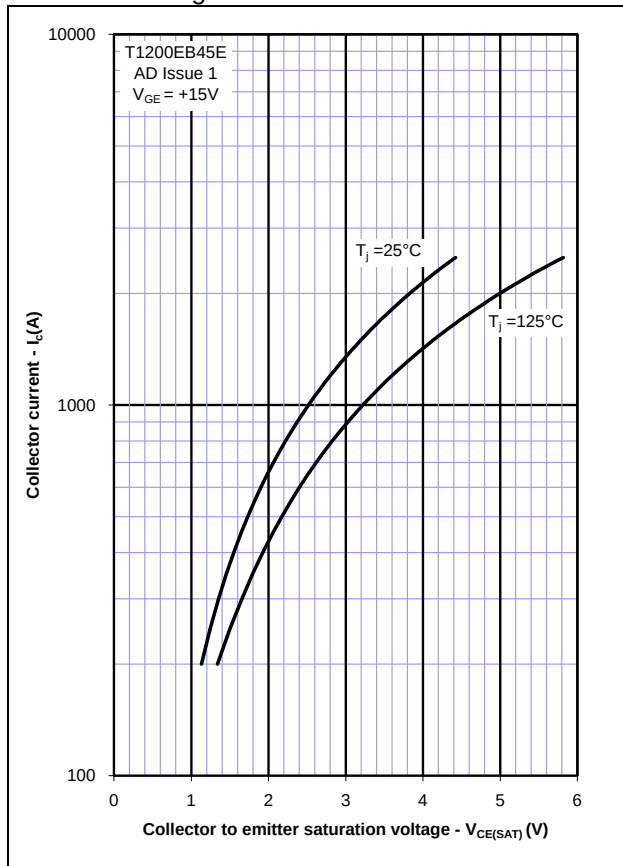


Figure 2 – Typical output characteristic

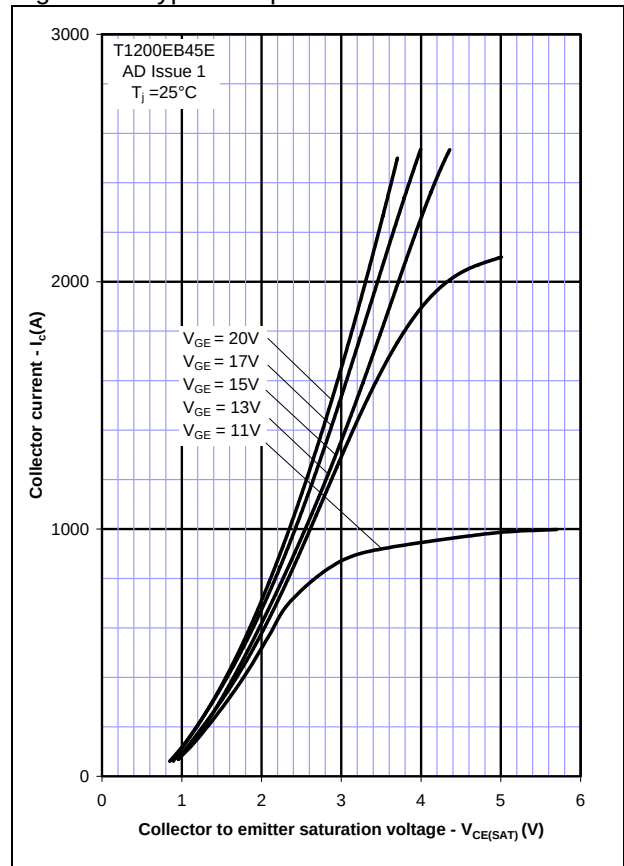


Figure 3 – Typical output characteristic

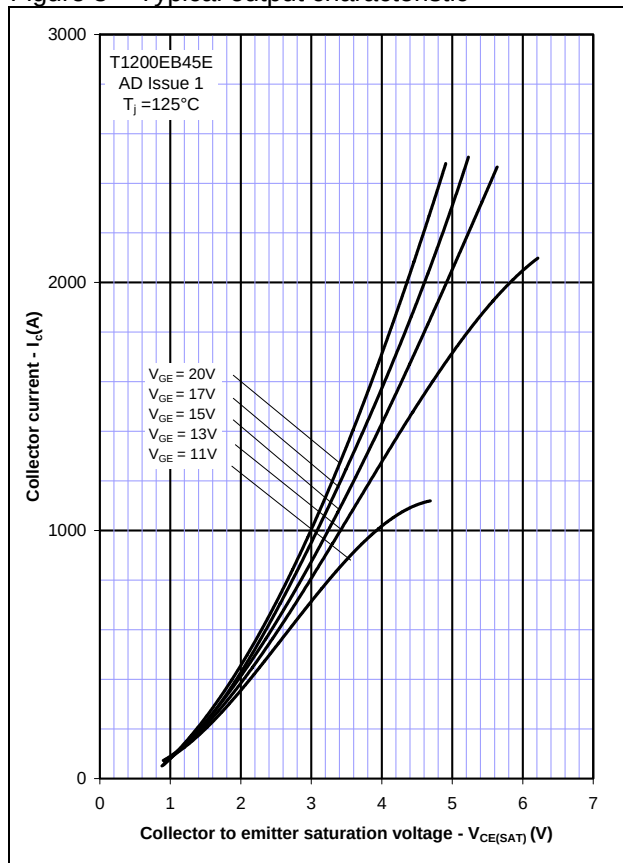


Figure 4 – Typical turn-on delay time vs gate resistance

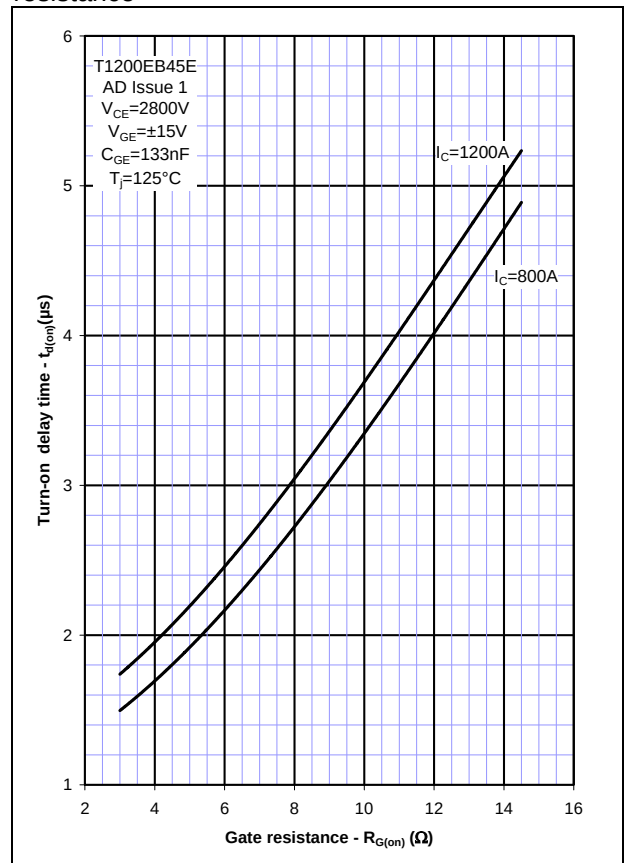


Figure 5 – Typical turn-off delay time vs. gate resistance

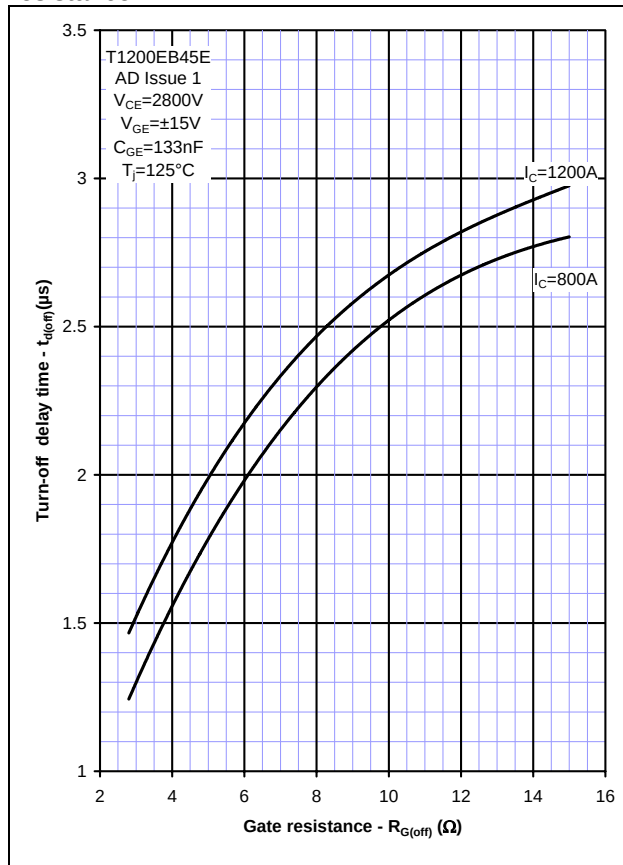


Figure 6 – Typical turn-on energy vs. collector current

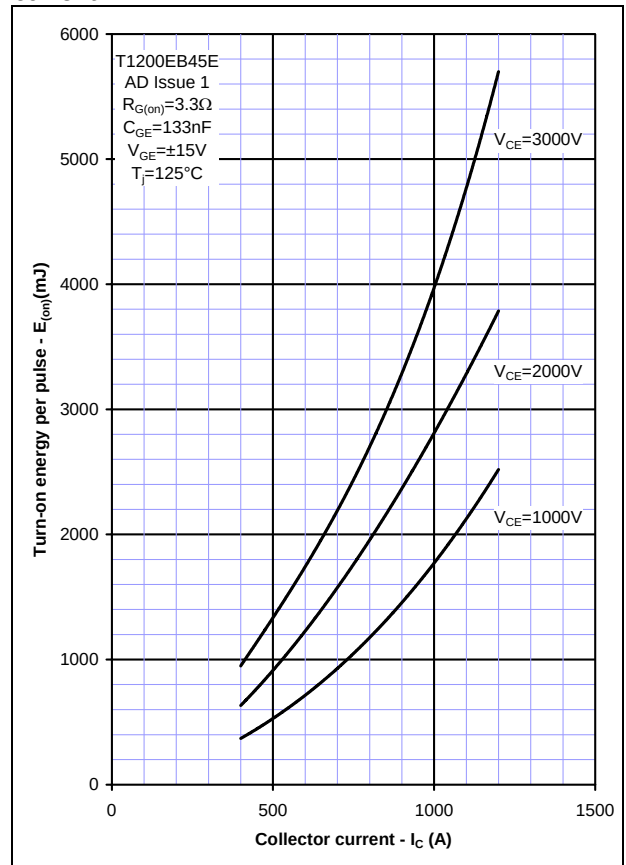


Figure 7 – Typical turn-on energy vs. di/dt

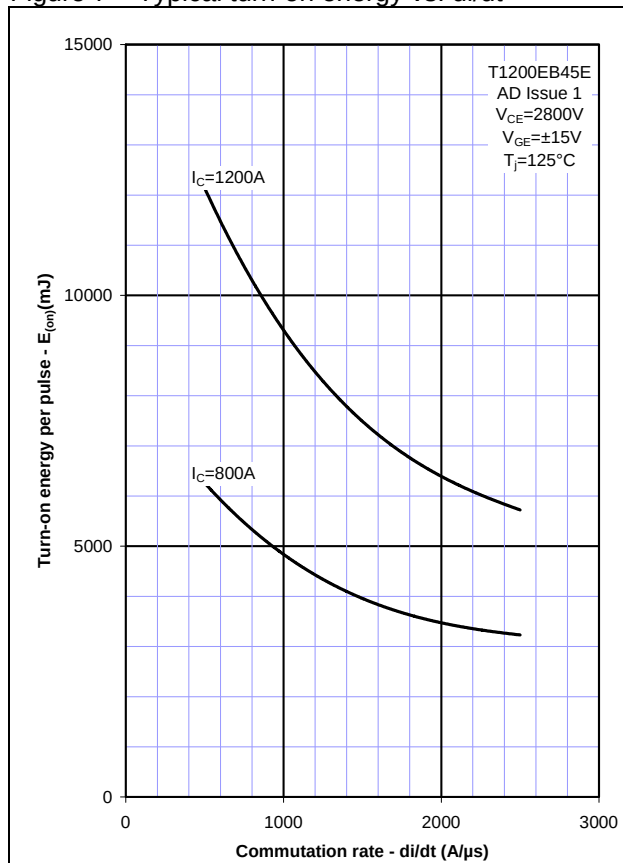


Figure 8 – Typical turn-off energy vs. collector current

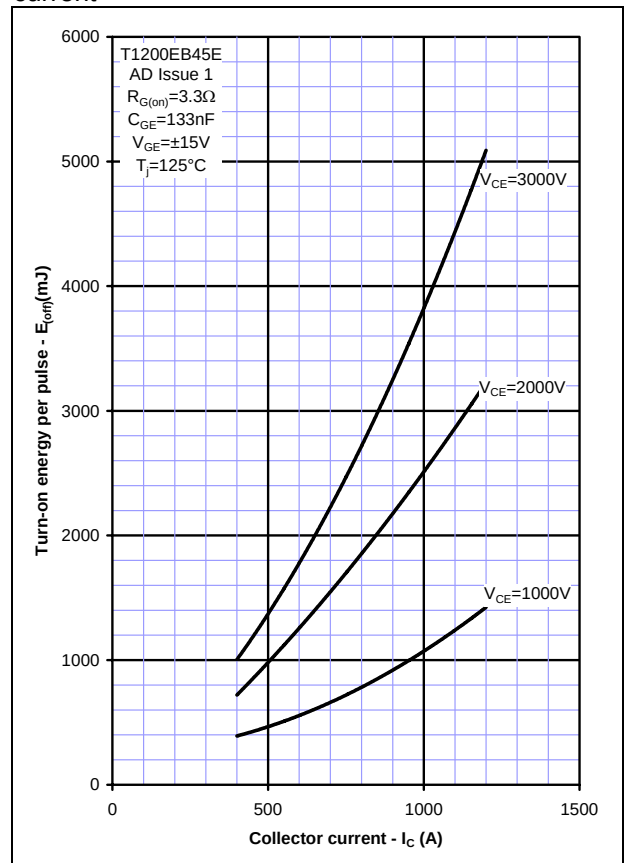


Figure 9 – Turn-off energy vs voltage

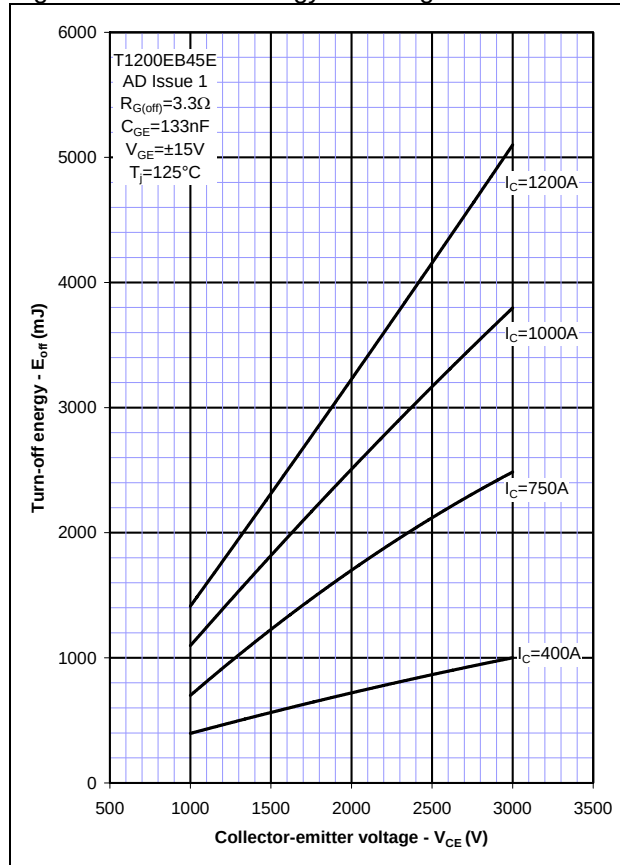


Figure 10 – Safe operating area

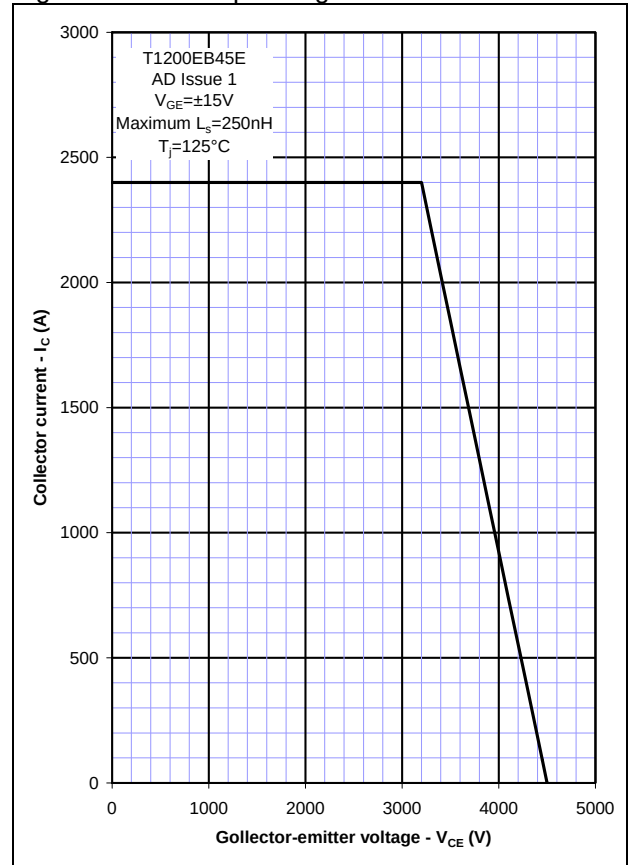
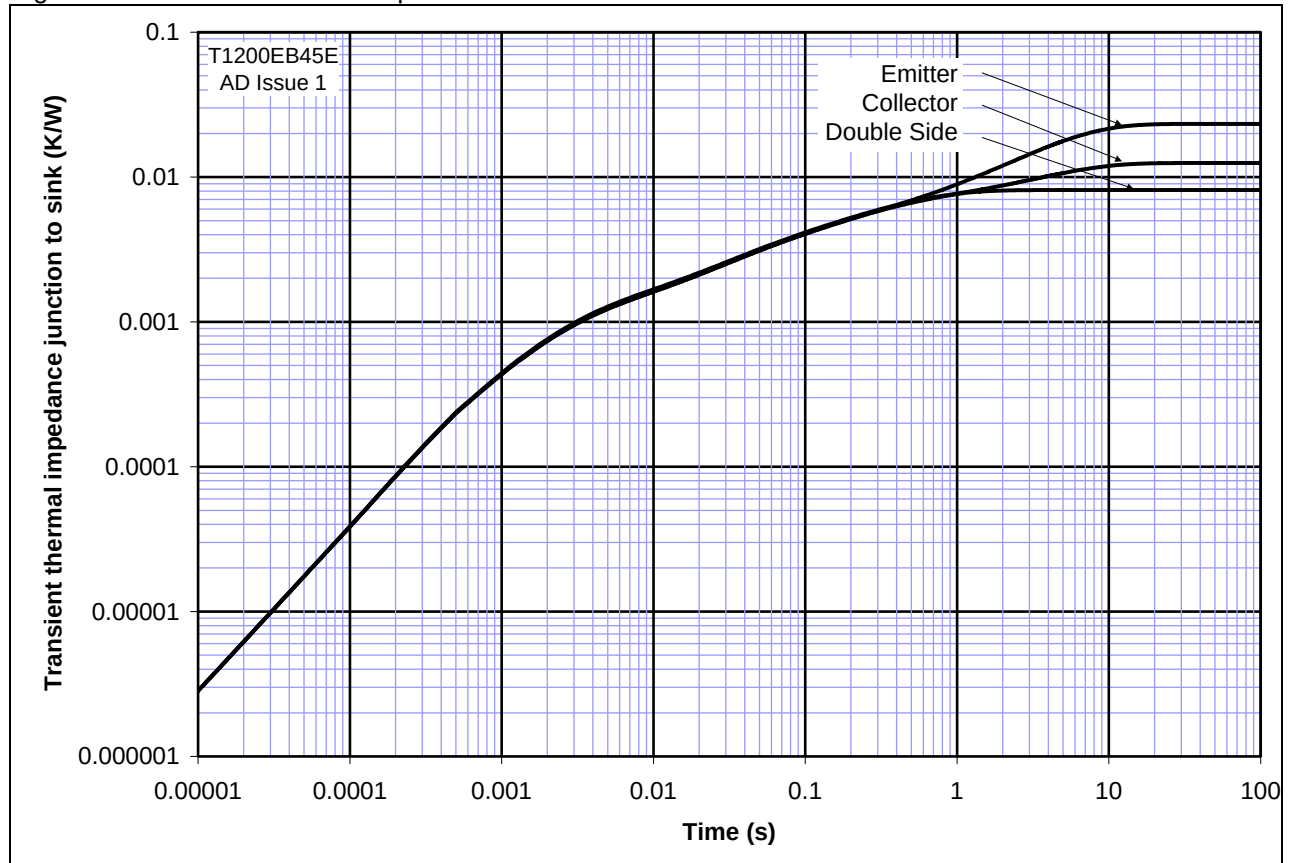


Figure 11 – Transient thermal impedance



Technical drawing of a vacuum tube, model 101A340. The drawing includes a top view and a side view.

Top View Dimensions:

- Overall diameter: $\varnothing 124$ MAX
- Central pin diameter: $\varnothing 3.6/3.5 \times 2$ MIN. DEPTH 2-HOLES, ONE IN CATHODE & ONE IN ANODE.
- Gate diameter: $\varnothing 69$ MAX
- Both tabs: 4.75×0.5
- Emitter: 10
- Both tags: 69 MAX

Side View Dimensions:

- Collector diameter: $\varnothing 85.1$ MAX
- Compressed height: 26.5/25.5
- Gate height: 0.8 MIN
- Creep path over convolutions: = 35 MIN.
- 4 TYP
- 0.8 MIN

Model Number: 101A340

(Please quote 10 digit code as below)\

T1200	EB	45	E
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 45	Fixed format code

Typical order code: T1200EB45E ($V_{CES} = 4500V$)

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