



IXYS
A Littelfuse Technology

Date:- 10 Oct, 2022

Data Sheet Issue:- A1

Advance Data

Insulated Gate Bi-Polar Transistor

Type T1375DF65E

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V _{CES}	Collector – emitter voltage	6500	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	Continuous DC collector current, IGBT	1375	A
I _{CRM}	Repetitive peak collector current, t _p =1ms, IGBT	2750	A
I _{ECO}	Maximum reverse emitter current, t _p =100μs, (note 2 & 3)	1375	A
P _{MAX}	Maximum power dissipation, IGBT (note 2)	16.1	kW
T _{j op}	Operating temperature range	-40 to +125	°C
T _{stg}	Storage temperature range	-40 to +125	°C

Notes: -

- 1) Unless otherwise indicated T_j = 125°C.
- 2) T_{sink} = 25°C, double side cooled.
- 3) Maximum commutation loop inductance 200nH.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
$V_{CE(sat)}$	Collector – emitter saturation voltage	-	3.75	4.05	$I_C = 1375A$, $V_{GE} = 15V$, $T_j = 25^\circ C$	V
		-	5.10	5.40	$I_C = 1375A$, $V_{GE} = 15V$	V
V_{T0}	Threshold voltage	-	-	2.403	Current range: 458A – 1375A	V
r_T	Slope resistance	-	-	2.18		m Ω
$V_{GE(TH)}$	Gate threshold voltage	-	5.4	-	$V_{CE} = V_{GE}$, $I_C = 1375mA$	V
I_{CES}	Collector – emitter cut-off current	-	9	30	$V_{CE} = V_{CES}$, $V_{GE} = 0V$	mA
I_{GES}	Gate leakage current	-	-	± 60	$V_{GE} = \pm 20V$	μA
C_{ies}	Input capacitance	-	245	-	$V_{CE} = 25V$, $V_{GE} = 0V$, $f = 100kHz$	nF
$t_{d(on)}$	Turn-on delay time	-	1.3	-	$I_C = 1375A$, $V_{CE} = 3600V$, $di/dt = 3500A/\mu s$ $V_{GE} = \pm 15V$, $L_s = 200nH$ $R_{G(ON)} = 2\Omega$, $R_{G(OFF)} = 7.3\Omega$, $C_{GE} = 100nF$ Freewheel diode type E1780TG65E at $T_j = 125^\circ C$ (Notes 3, 4 & 5)	μs
$t_r(V)$	Rise time	-	3.2	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	16	-		μC
E_{on}	Turn-on energy	-	11.6	-		J
$t_{d(off)}$	Turn-off delay time	-	4.3	-		μs
$t_f(I)$	Fall time	-	2.1	-		μs
$Q_{g(off)}$	Turn-off gate charge	-	15.5	-		μC
E_{off}	Turn-off energy	-	8.1	-		J
I_{sc}	Short circuit current	-	6200	-	$V_{GE} = +15V$, $V_{CC} = 3600V$, $V_{CEmax} \leq V_{CES}$, $t_p \leq 10\mu s$, $L_s \leq 200nH$	A

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	6.21	Double side cooled	K/kW
		-	-	9.68	Collector side cooled	K/kW
		-	-	18	Emitter side cooled	K/kW
F	Mounting force	45	-	55	Note 2	kN
W_t	Weight	-	2.2	-		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.
- 4) E_{on} integration time 15 μs from 10% rising I_C .
- 5) E_{off} integration time 15 μs from 90% falling V_{GE} .

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

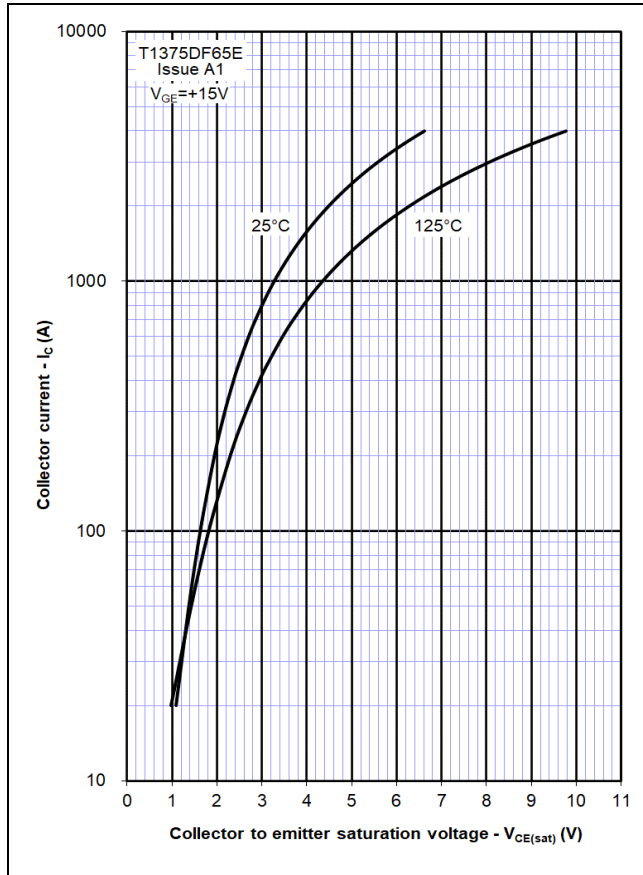


Figure 2 – Typical output characteristic

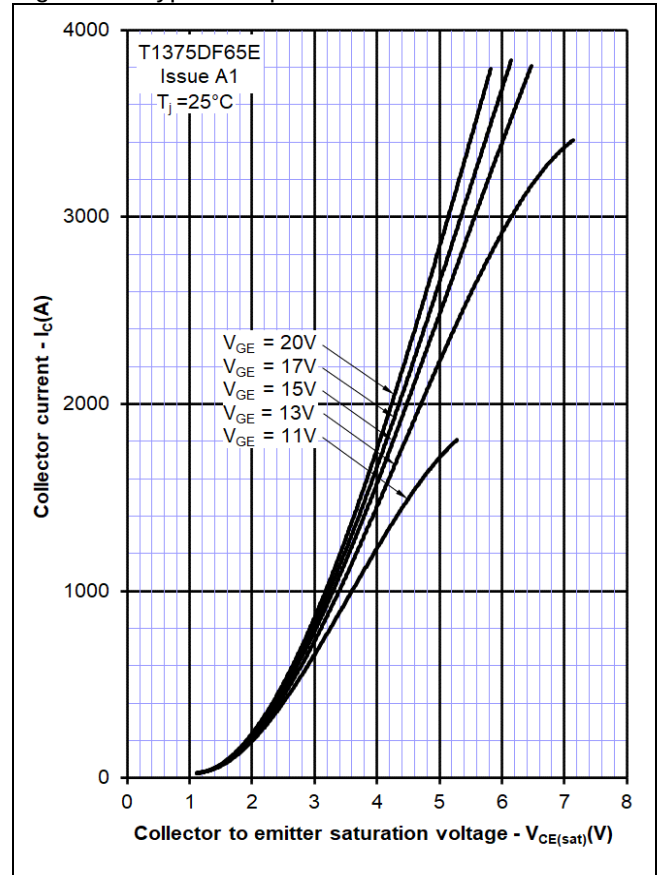


Figure 3 – Typical output characteristic

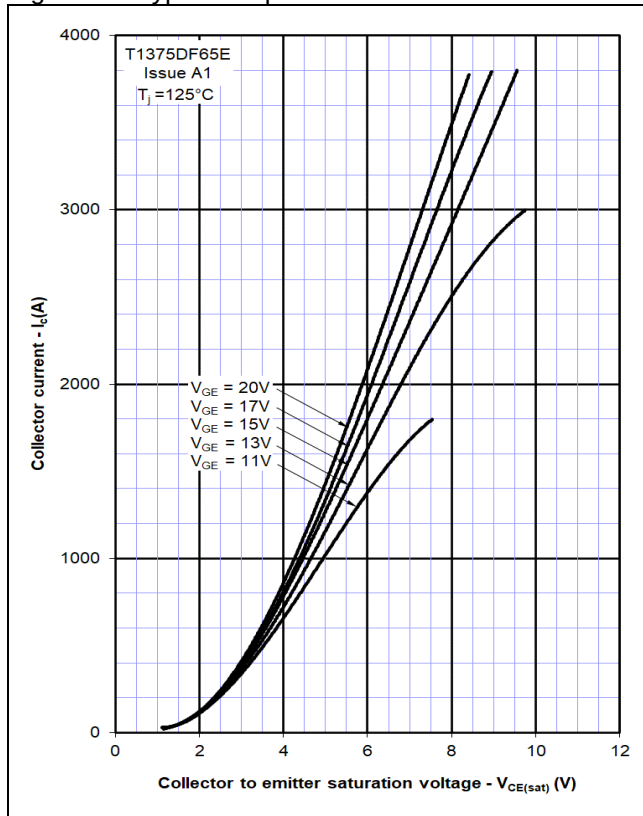


Figure 4 – Typical turn-on delay time vs gate resistance

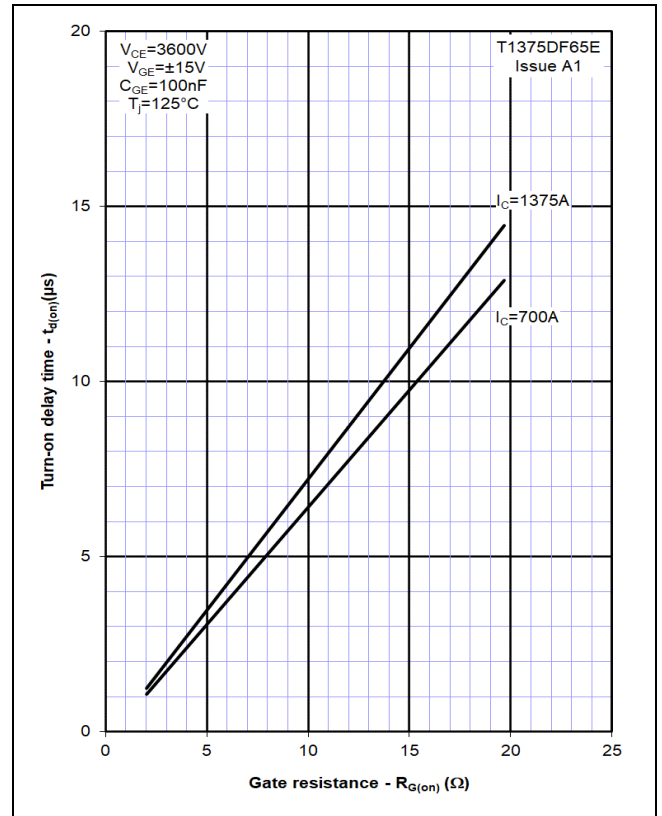


Figure 5 – Typical turn-off delay time vs. gate resistance

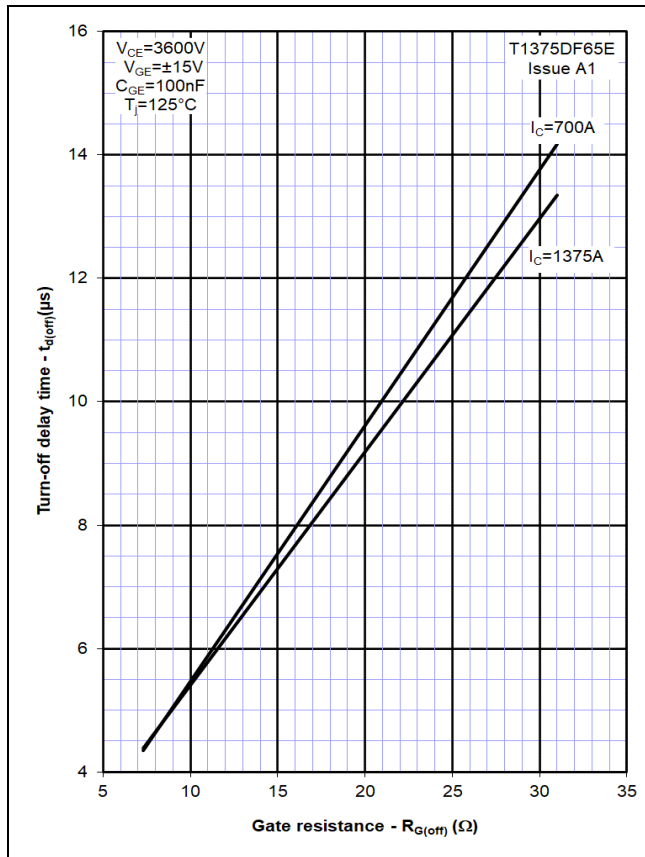


Figure 6 – Typical turn-on energy vs. collector current

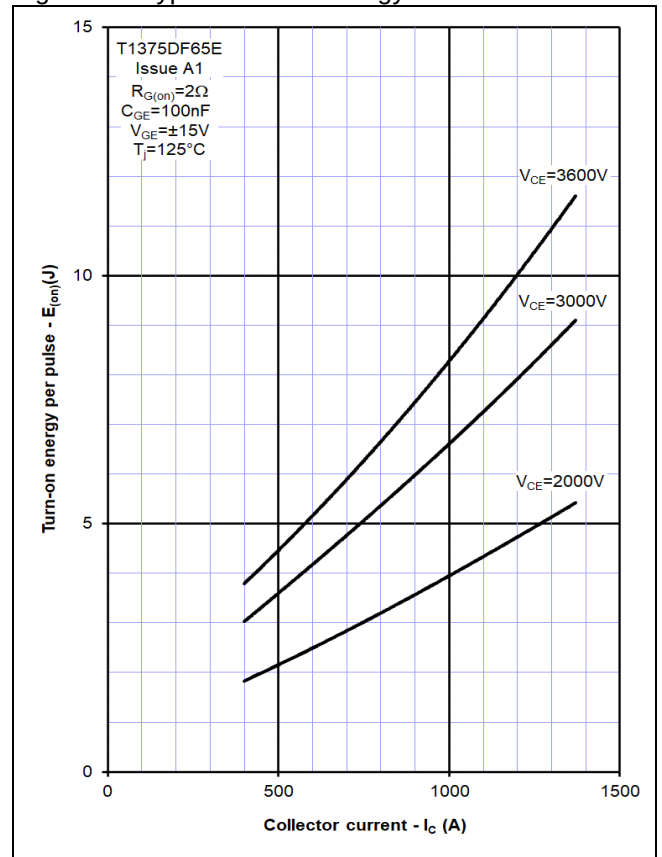


Figure 7 – Typical turn-on energy vs. di/dt

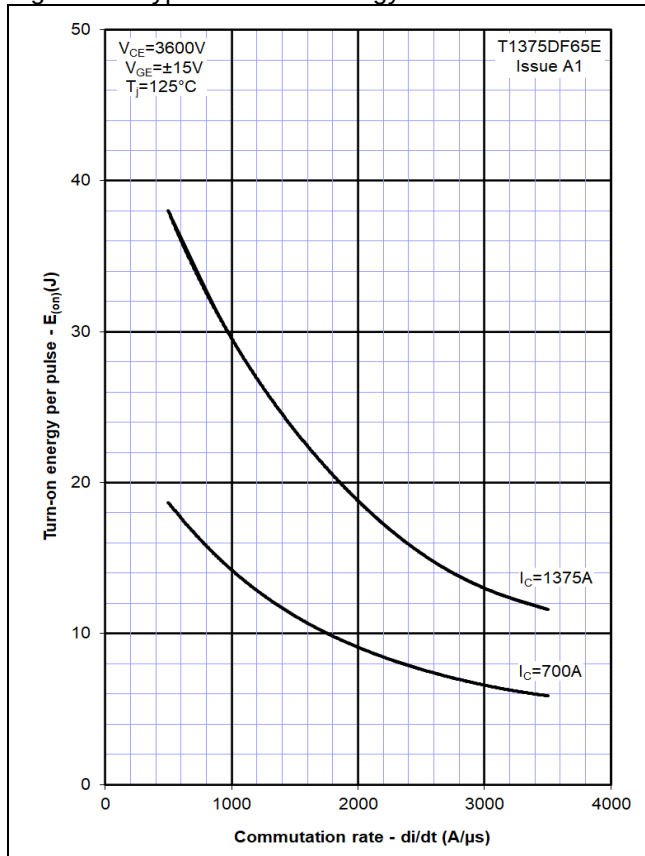


Figure 8 – Typical turn-off energy vs. collector current

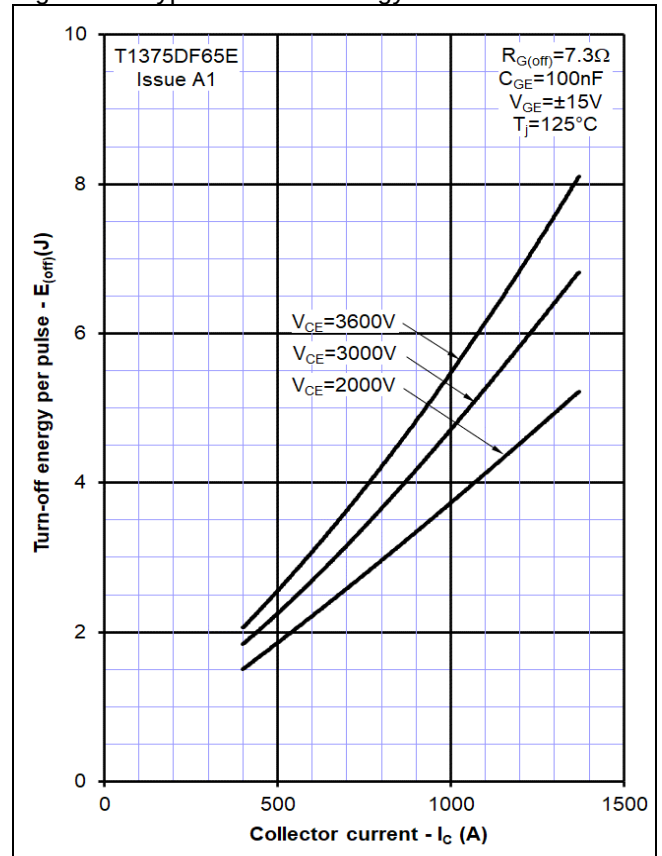


Figure 9 – Turn-off energy vs voltage

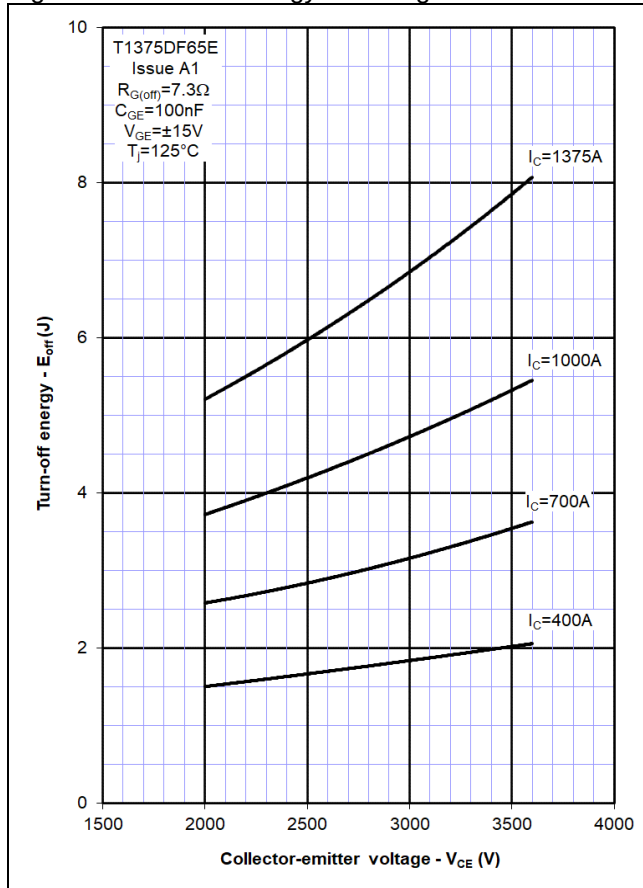


Figure 10 – Safe operating area

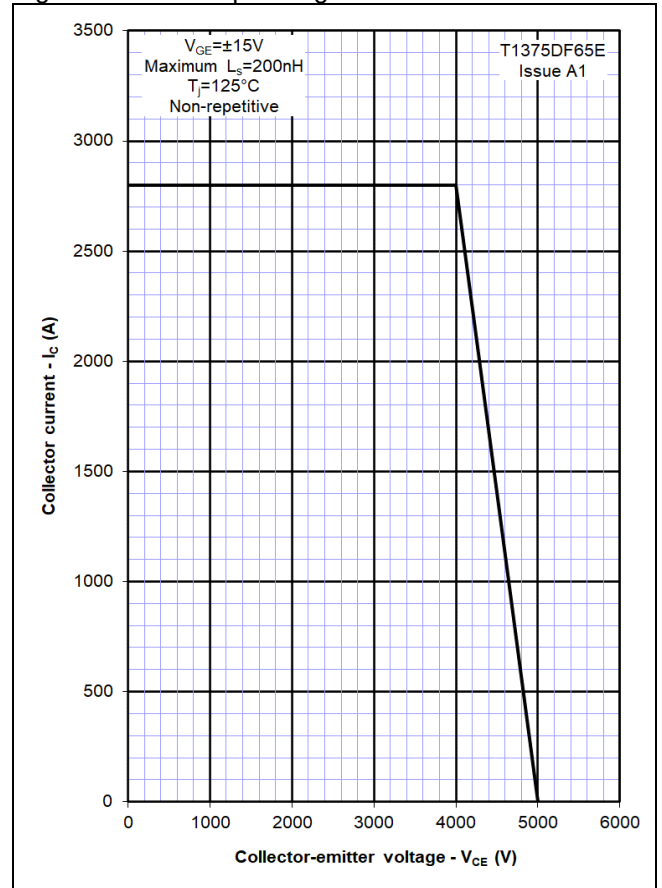
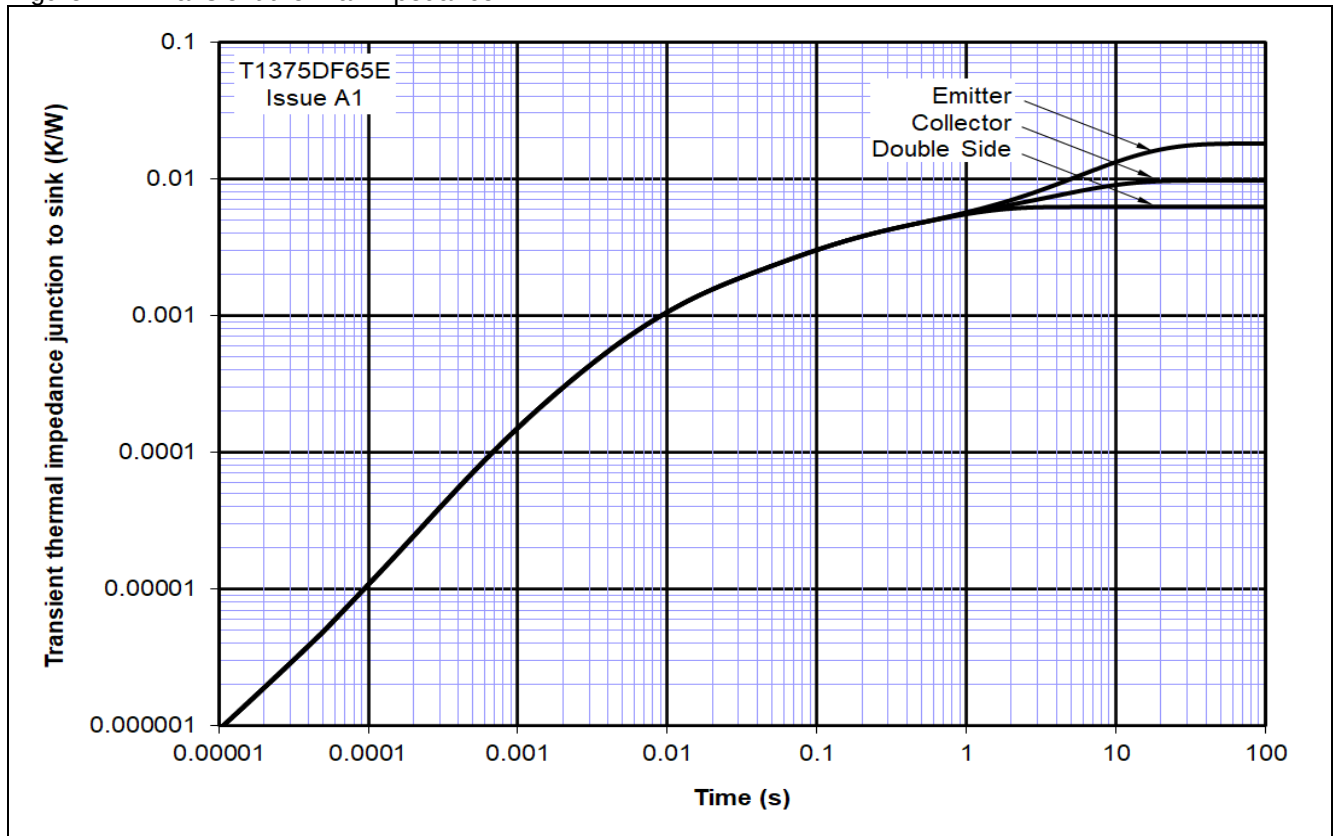
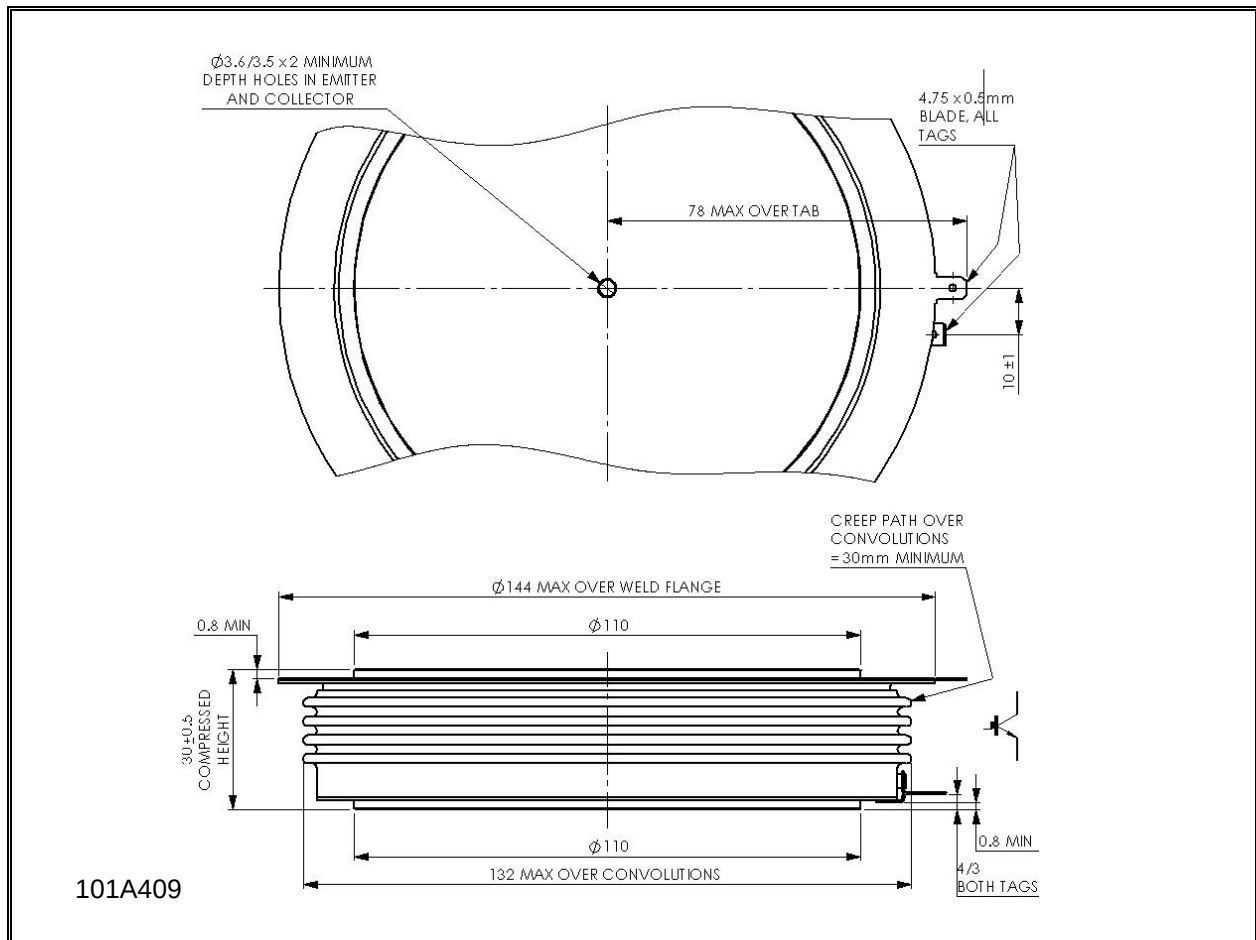


Figure 11 – Transient thermal impedance



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

T1375	DF	65	E
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 65	Fixed format code

 Typical order code: T1375DF65E ($V_{CES} = 6500V$)

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