



Date:- 12 May, 2022

Data Sheet Issue:- A1

Advance data

Insulated Gate Bi-Polar Transistor

Type T0710TC33A

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V _{CES}	Collector – emitter voltage	3300	V
V _{DC link}	Permanent DC voltage for 100 FIT failure rate.	1800	V
V _{GES}	Peak gate – emitter voltage	±20	V

	RATINGS	MAXIMUM LIMITS	UNITS
I _{C(DC)}	DC collector current, IGBT	710	A
I _{CRM}	Repetitive peak collector current, t _p =1ms, IGBT	1420	A
I _{F(DC)}	Continuous DC forward current, Diode	710	A
I _{FRM}	Repetitive peak forward current, t _p =1ms, Diode	1420	A
I _{FSM}	Peak non-repetitive surge t _p =10ms, V _{RM} =60%V _{RRM} , Diode (Note 4)	3736	A
I _{FSM2}	Peak non-repetitive surge t _p =10ms, V _{RM} ≤10V, Diode (Note 4)	4110	A
P _{MAX}	Maximum power dissipation, IGBT (Note 2)	4.59	kW
P _D	Maximum power dissipation, Diode (Note 2)	2.31	kW
(di/dt) _{cr}	Critical diode di/dt (note 3)	1500	A/μs
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°C.
- 2) T_{sink} = 25°C, double side cooled.
- 3) Maximum commutation loop inductance 600nH.
- 4) Half-sinewave, 125°C T_j initial.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V _{CE(sat)}	Collector – emitter saturation voltage	-	2.55	2.85	I _C = 710A, V _{GE} = 15V, T _j = 25°C	V
		-	3.30	3.60	I _C = 710A, V _{GE} = 15V	V
V _{T0}	Threshold voltage	-	-	1.71	Current range: 237 – 710A	V
r _T	Slope resistance	-	-	2.67		mΩ
V _{GE(TH)}	Gate threshold voltage	-	5.2	-	V _{CE} = V _{GE} , I _C = 60mA	V
I _{CES}	Collector – emitter cut-off current	-	4	18	V _{CE} = V _{CES} , V _{GE} = 0V	mA
I _{GES}	Gate leakage current	-	-	±10	V _{GE} = ±20V	μA
C _{ies}	Input capacitance	-	97	-	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz	nF
t _{d(on)}	Turn-on delay time	-	1.4	-	I _C = 710A, V _{CE} = 1800V, di/dt = 1400A/μs V _{GE} = ±15V, L _S = 600nH R _{G(ON)} = 2.7Ω, R _{G(OFF)} = 21Ω, C _{GE} = 300nF Integral diode used as freewheel diode (Note 3, 4 & 5)	μs
t _{r(V)}	Rise time	-	1.6	-		μs
Q _{g(on)}	Turn-on gate charge	-	13.5	-		μC
E _{on}	Turn-on energy	-	1.5	-		J
t _{d(off)}	Turn-off delay time	-	5.1	-		μs
t _{f(I)}	Fall time	-	1.3	-		μs
Q _{g(off)}	Turn-off gate charge	-	9	-		μC
E _{off}	Turn-off energy	-	2	-		J
I _{SC}	Short circuit current	-	2800	-		V _{GE} = +15V, V _{CC} = 1800V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10μs, L _S < 150nH

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V _F	Forward voltage	-	2.95	3.25	I _F = 710A, T _j = 25°C	V
		-	2.90	3.20	I _F = 710A	V
V _{T0}	Threshold voltage	-	-	1.61	Current range 237 - 710A	V
r _T	Slope resistance	-	-	2.24		mΩ
I _{rm}	Peak reverse recovery current	-	420	-	I _F = 710A, V _r = 1800V, V _{GE} = -15V, di/dt = 1400A/μs	A
Q _{rr}	Recovered charge	-	570	-		μC
t _{rr}	Reverse recovery time, 50% chord	-	1.65	-		μs
E _r	Reverse recovery energy	-	0.6	-		J

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R _{thJK}	Thermal resistance junction to sink, IGBT	-	-	21.8	Double side cooled	K/kW
		-	-	36.8	Collector side cooled	K/kW
		-	-	53.5	Emitter side cooled	K/kW
R _{thJK}	Thermal resistance junction to sink, Diode	-	-	43.2	Double side cooled	K/kW
		-	-	68	Cathode side cooled	K/kW
		-	-	118	Anode side cooled	K/kW
F	Mounting force	15	20	25	Note 2	kN
W _t	Weight	-	1.2	-		kg

Notes:-

- 1) Unless otherwise indicated T_j = 125°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_C.
- 5) E_{off} integration time 15μs from 90% falling V_{GE}.

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

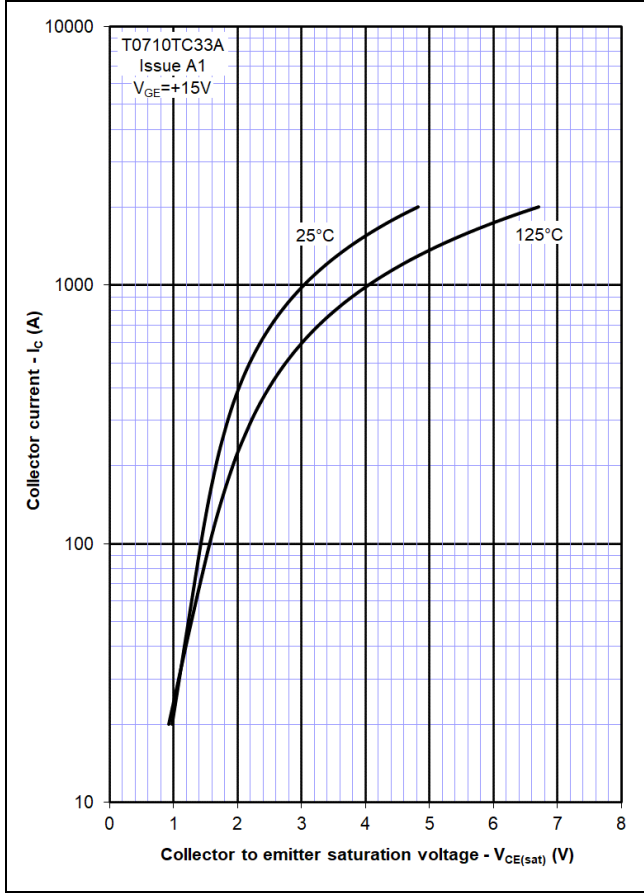


Figure 2 – Typical output characteristic

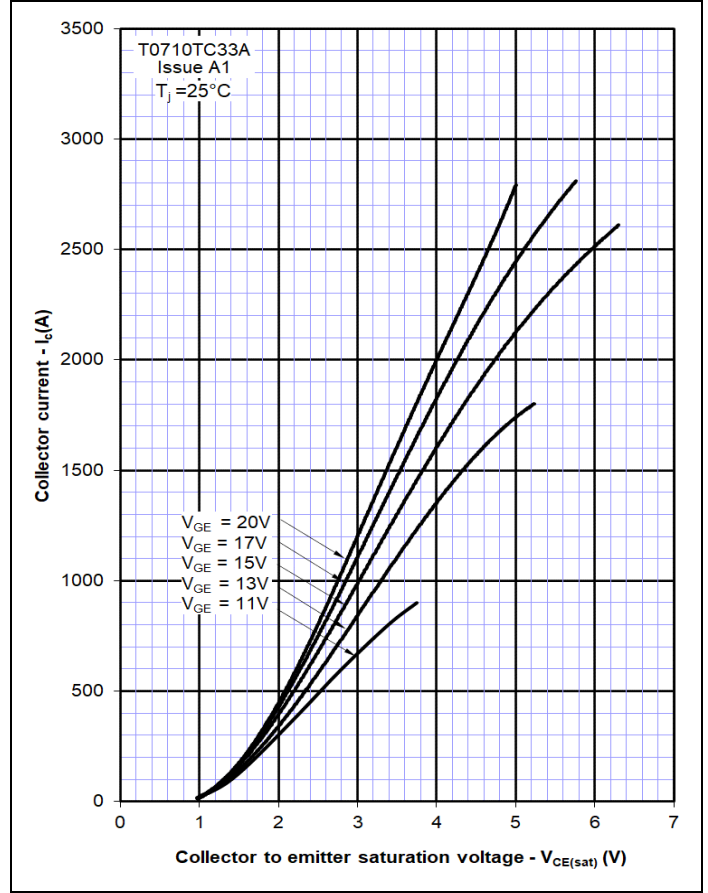


Figure 3 – Typical output characteristic

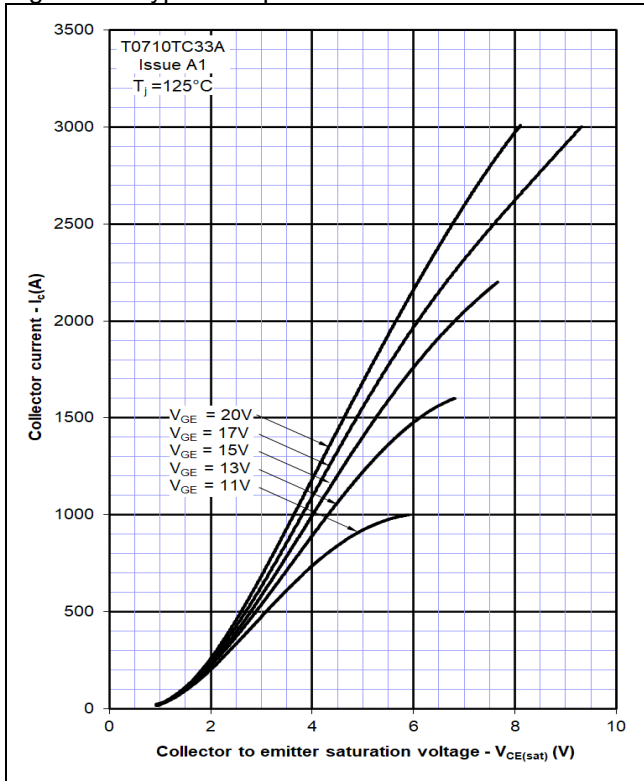


Figure 4 – Typical turn-on delay time vs gate resistance

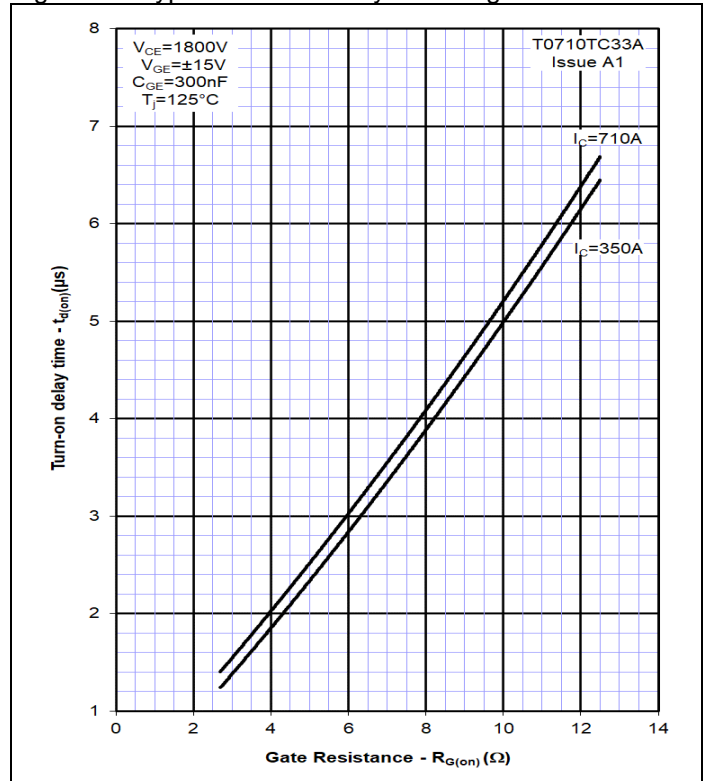


Figure 5 – Typical turn-off delay time vs. gate resistance

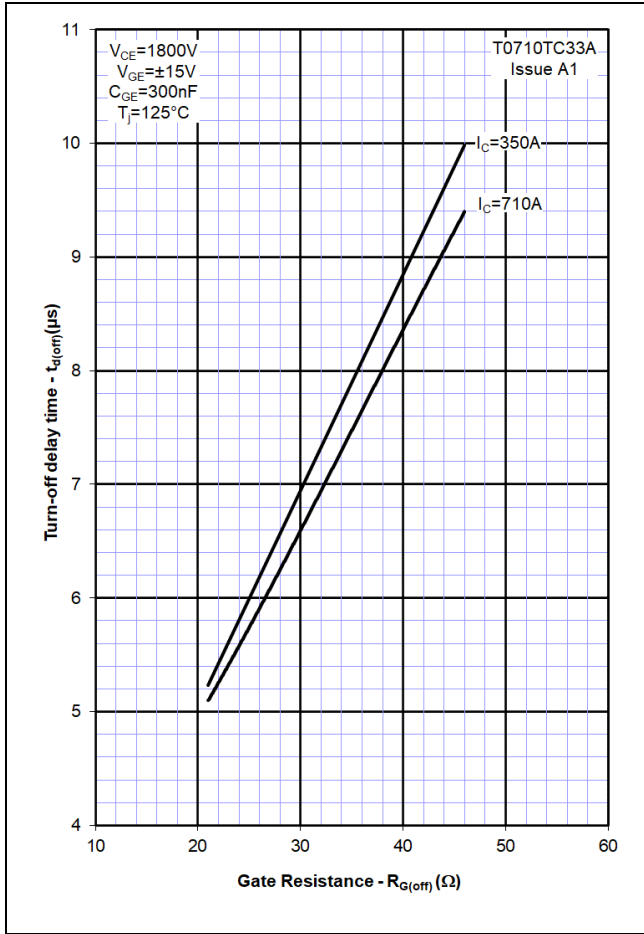


Figure 6 – Typical turn-on energy vs. collector current

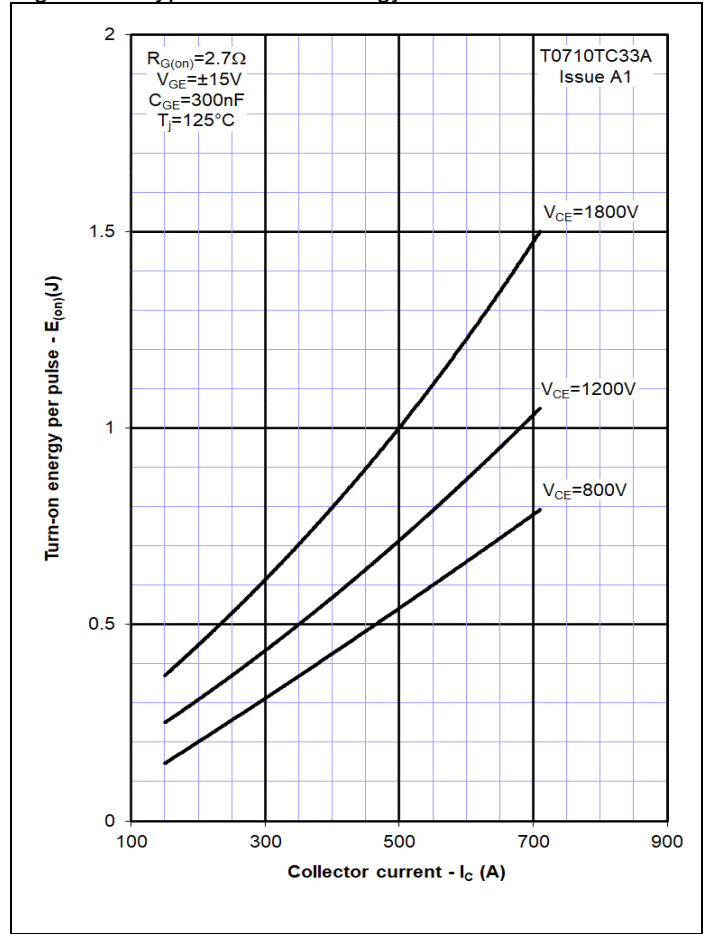


Figure 7 – Typical turn-on energy vs. di/dt

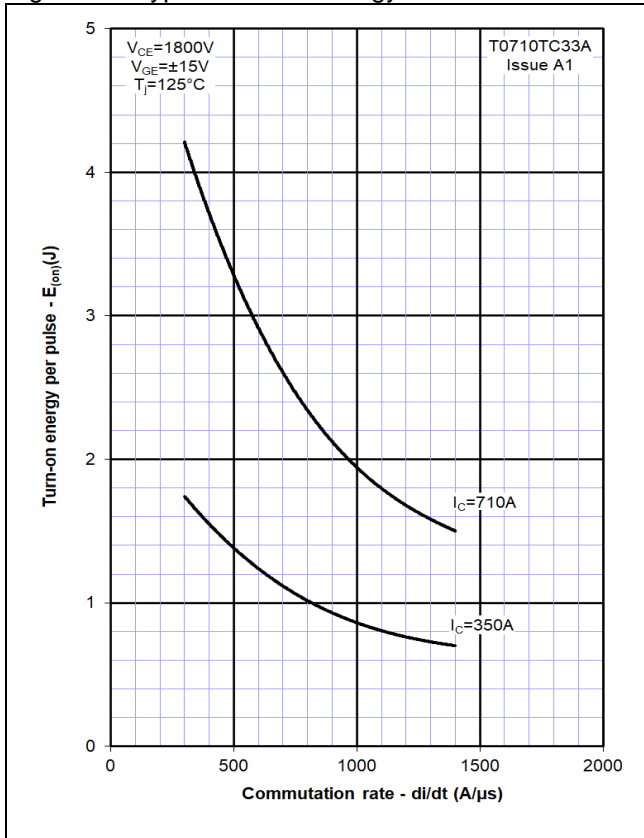


Figure 8 – Typical turn-off energy vs. collector current

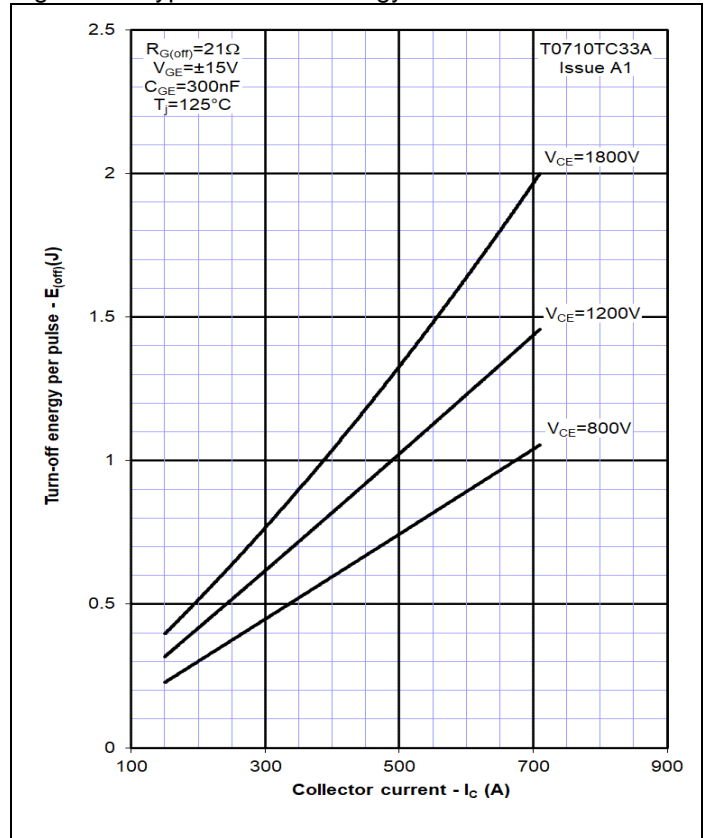


Figure 9 – Turn-off energy vs voltage

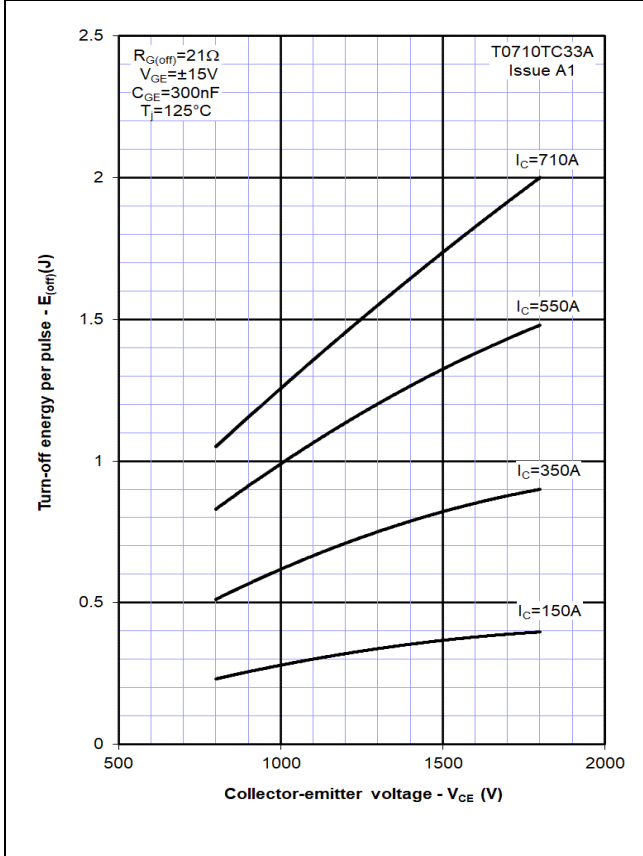


Figure 10 – Safe operating area (IGBT)

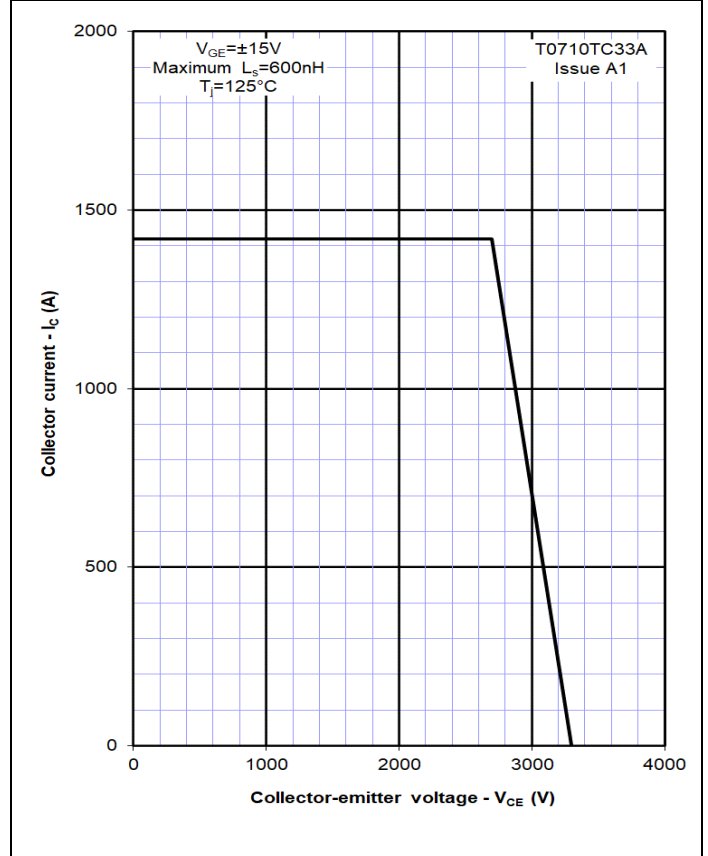


Figure 11 – Typical diode forward characteristics

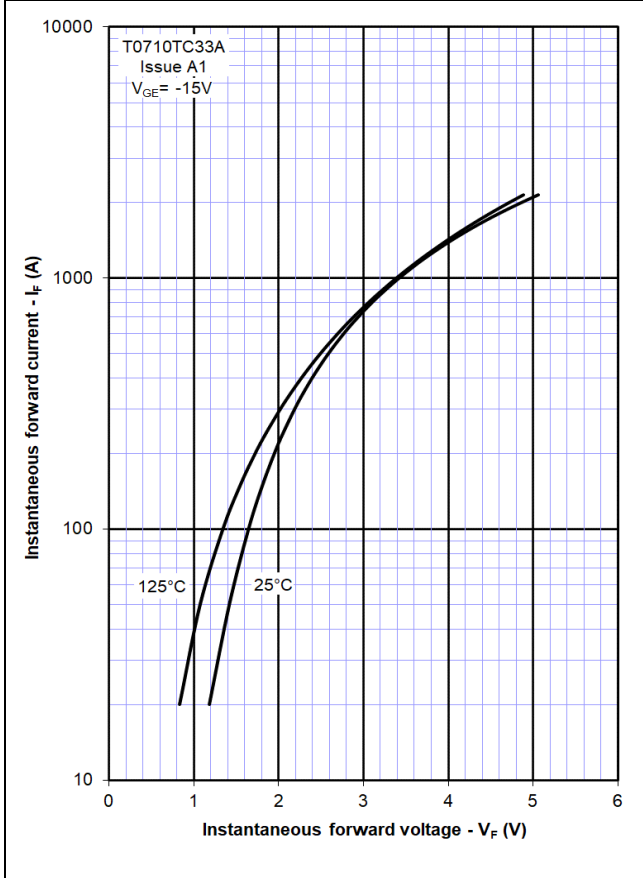


Figure 12 – Typical recovered charge

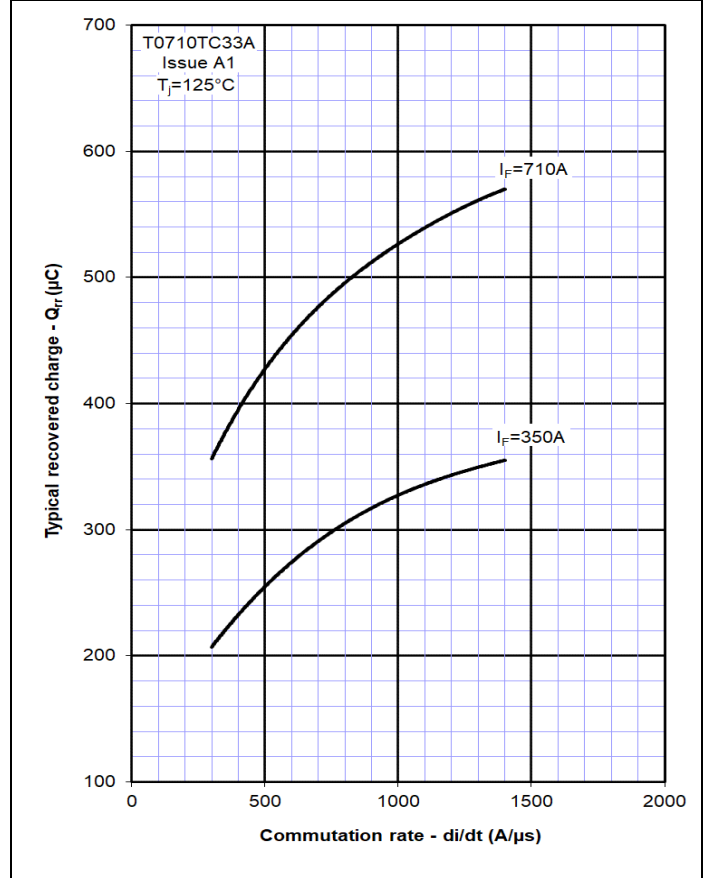


Figure 13 – Typical reverse recovery current

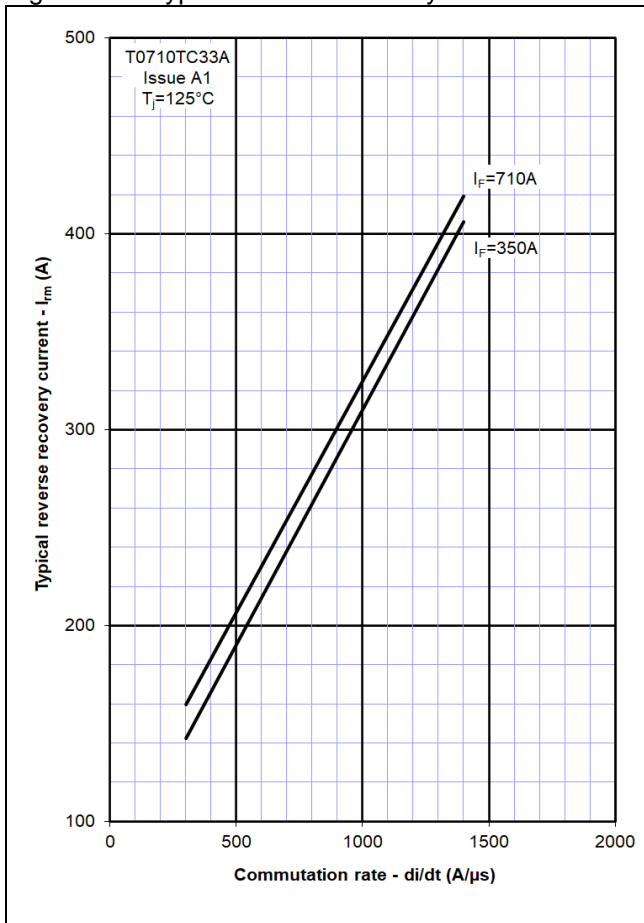


Figure 14 – Typical reverse recovery time

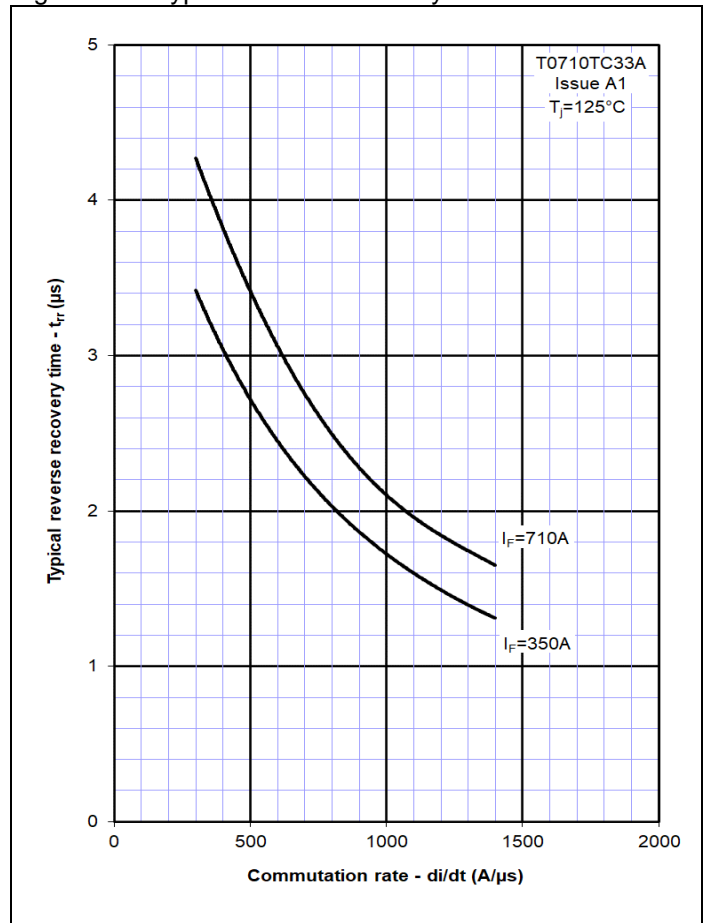


Figure 15 – Typical reverse recovery energy

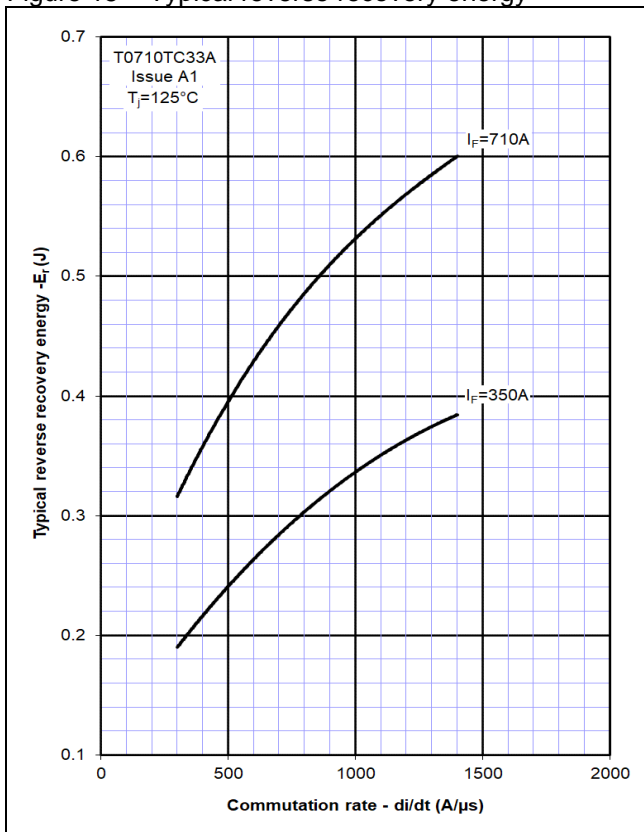


Figure 16 – Safe operating area (Diode)

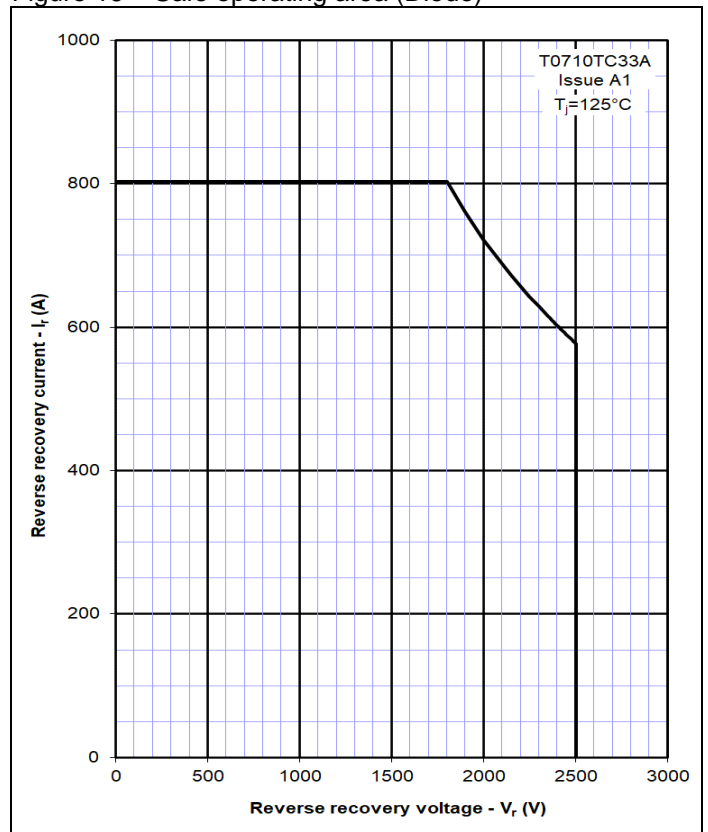


Figure 17 – Transient thermal impedance (IGBT)

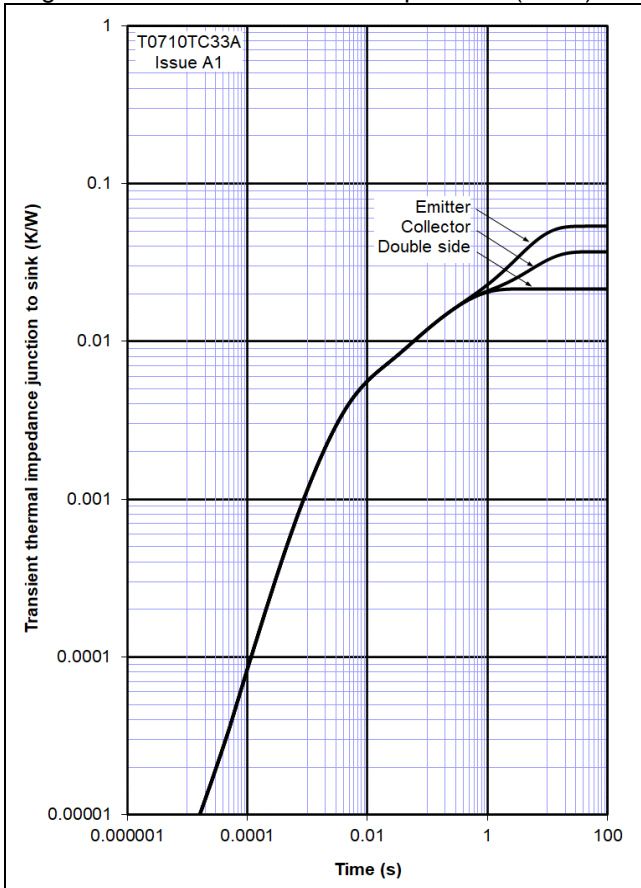
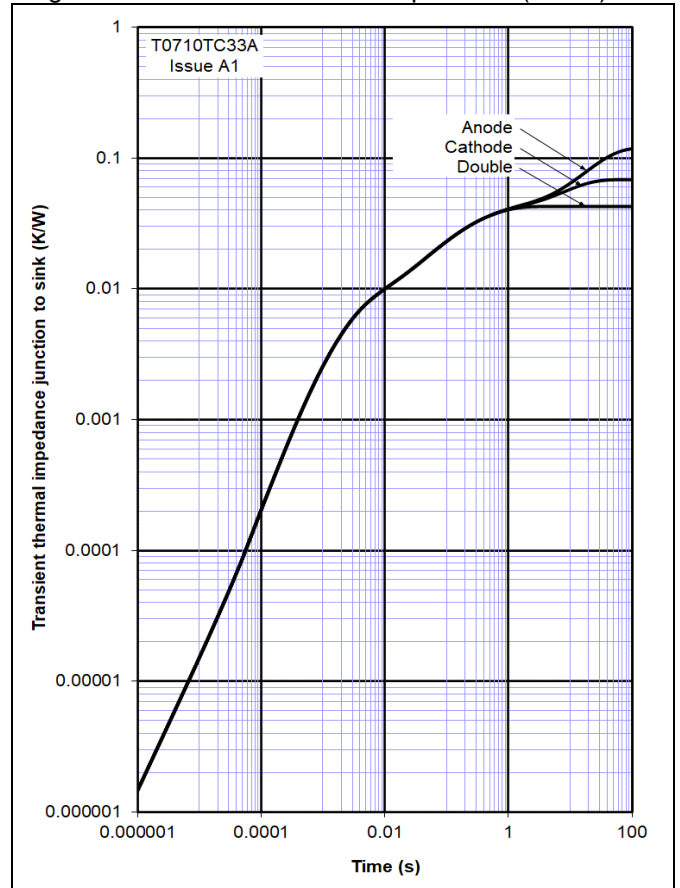
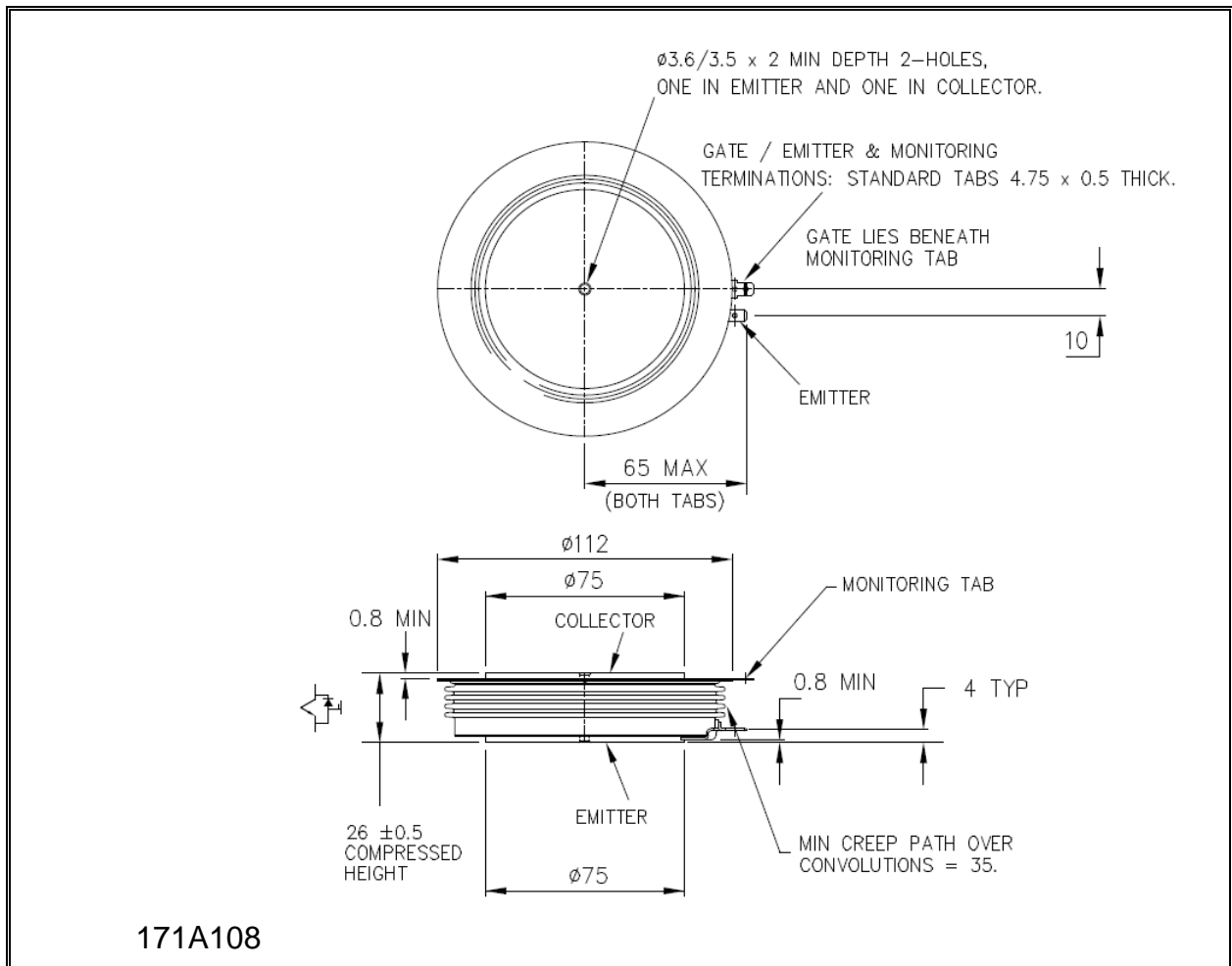


Figure 18 – Transient thermal impedance (Diode)



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

T0710	TC	33	A
Fixed type Code	Fixed Outline Code	Voltage Grade $V_{CES}/100$ 33	Fixed format code

 Typical order code: T0710TC33A ($V_{CES} = 3300V$)

IXYS UK Westcode Ltd
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 Park,
 Chippenham, Wiltshire,
 SN15 1GE
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