Date:- 20 Feb, 2019

Data Sheet Issue:- A1

Advance data

Insulated Gate Bi-Polar Transistor
Type T0425VC33G

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	425	A
I_{CRM}	Repetitive peak collector current, t_p=1ms, IGBT	850	A
$I_{F(DC)}$	Continuous DC forward current, Diode	425	A
I_{FRM}	Repetitive peak forward current, t_p=1ms, Diode	850	A
I_{FSM}	Peak non-repetitive surge t_p=10ms, V_{RM}=60%V_{RRM}, Diode (Note 4)	2545	A
I_{FSM2}	Peak non-repetitive surge t_p=10ms, V_{RM}≤10V, Diode (Note 4)	2800	A
P_{MAX}	Maximum power dissipation, IGBT (Note 2)	2.75	kW
P_D	Maximum power dissipation, Diode (Note 2)	1.74	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	1000	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 = 125ºC.
2) T_{sink} = 25°C, double side cooled.
3) Maximum commutation loop inductance 1000nH.
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	-	2.65	2.95	I_C = 425A, V_{GE} = 15V, T_j = 25°C	V
		-	3.4	3.7	I_C = 425A, V_{GE} = 15V	V
V_{T0}	Threshold voltage	-	-	1.69	Current range: 142 – 425A	V
r_T	Slope resistance	-	-	4.74		mΩ
$V_{GE(TH)}$	Gate threshold voltage	-	5.2	-	V_{CE} = V_{GE}, I_C = 36mA	V
I_{CES}	Collector – emitter cut-off current		4	11	V_{CE} = V_{CES}, V_{GE} = 0V	mA
I_{GES}	Gate leakage current	-	-	±7	V_{GE} = ±20V	μA
C_{ies}	Input capacitance	-	58	-	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	nF
$t_{d(on)}$	Turn-on delay time	-	1.6	-	I_C =425A, V_{CE} =1800V, di/dt=850A/μs V_{GE} = ±15V, L_s=500nH $R_{G(ON)}$= 5.1Ω, $R_{G(OFF)}$=33Ω, C_{GE}=183nF Integral diode used as freewheel diode (Note 3, 4 & 5)	μs
$t_r(V)$	Rise time	-	2	-		μs
$Q_{g(on)}$	Turn-on gate charge	-	8.1	-		μC
E_{on}	Turn-on energy	-	1.1	-		J
$t_{d(off)}$	Turn-off delay time	-	4.9	-		μs
$t_f(I)$	Fall time	-	1.2	-		μs
$Q_{g(off)}$	Turn-off gate charge	-	6	-		μC
E_{off}	Turn-off energy	-	1.12	-		J
I_{SC}	Short circuit current	-	1600	-	V_{GE}=+15V, V_{CC}=1800V, $V_{CEmax} \leq V_{CES}$, $t_p \leq$10μs	A

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V_F	Forward voltage	-	2.65	2.95	I_F = 425A, T_j =25°C	V
		-	3.0	3.3	I_F = 425A	V
V_{To}	Threshold voltage	-	-	1.72	Current range 142 - 425A	V
r_T	Slope resistance	-	-	3.72		mΩ
I_{rm}	Peak reverse recovery current	-	305	-	I_F = 425A, V_{GE} = ±15V, di/dt=850A/μs	A
Q_{rr}	Recovered charge	-	440	-		μC
t_{rr}	Reverse recovery time, 50% chord	-	1.7	-		μs
E_r	Reverse recovery energy	-	0.48	-		J

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R_{thJK}	Thermal resistance junction to sink, IGBT	-	-	36.4	Double side cooled	K/kW
		-	-	59.4	Collector side cooled	K/kW
		-	-	94.3	Emitter side cooled	K/kW
R_{thJK}	Thermal resistance junction to sink, Diode	-	-	57.6	Double side cooled	K/kW
		-	-	88.2	Cathode side cooled	K/kW
		-	-	166	Anode side cooled	K/kW
F	Mounting force	12	-	16	Note 2	kN
W_t	Weight	-	0.65	-		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_G.
5) E_{off} integration time 15μs from 90% falling V_{GE} .

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

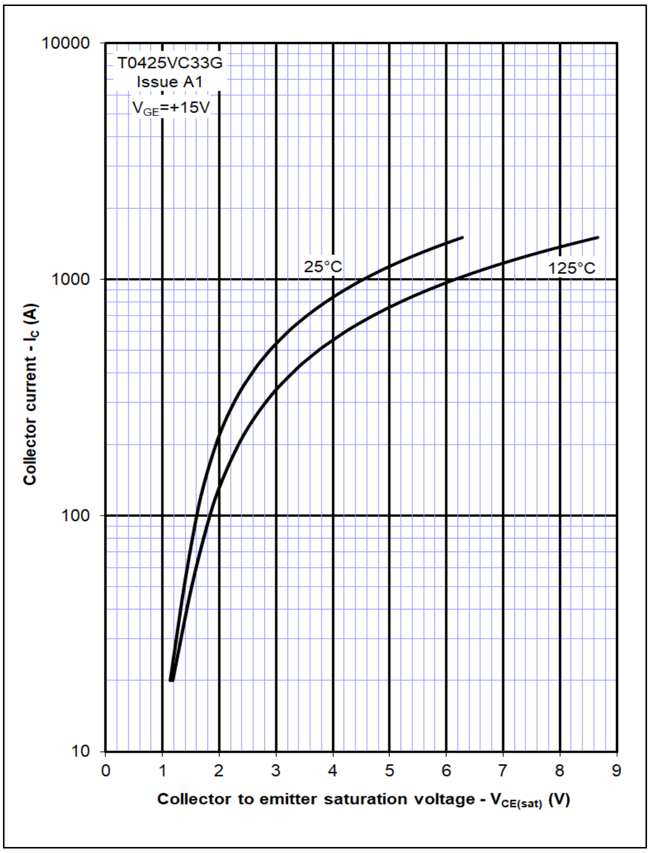


Figure 2 – Typical output characteristic

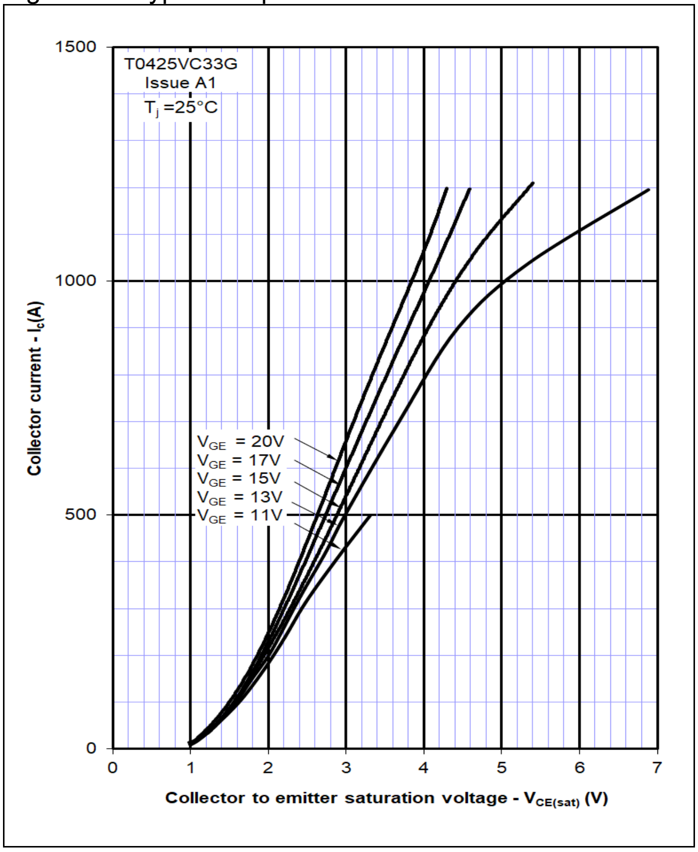


Figure 3 – Typical output characteristic

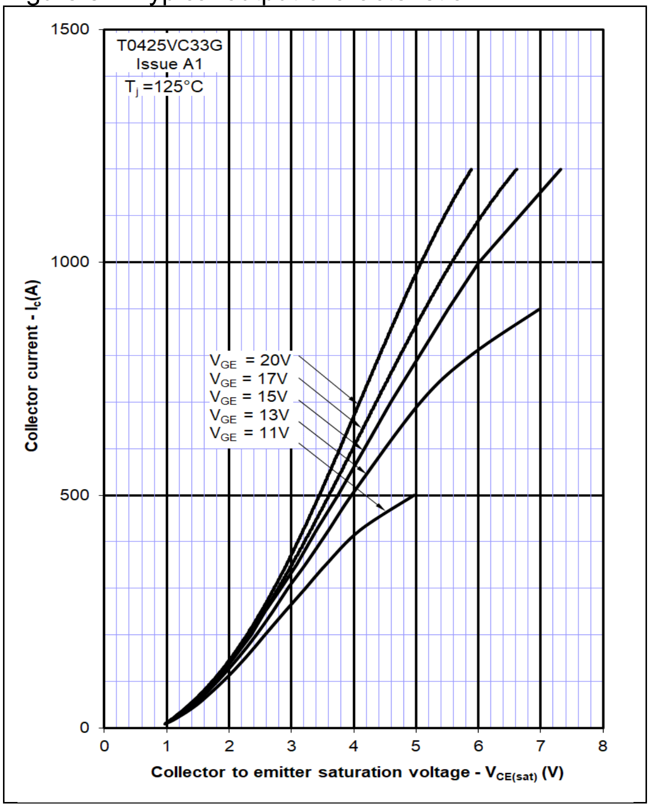


Figure 4 – Typical turn-on delay time vs gate resistance

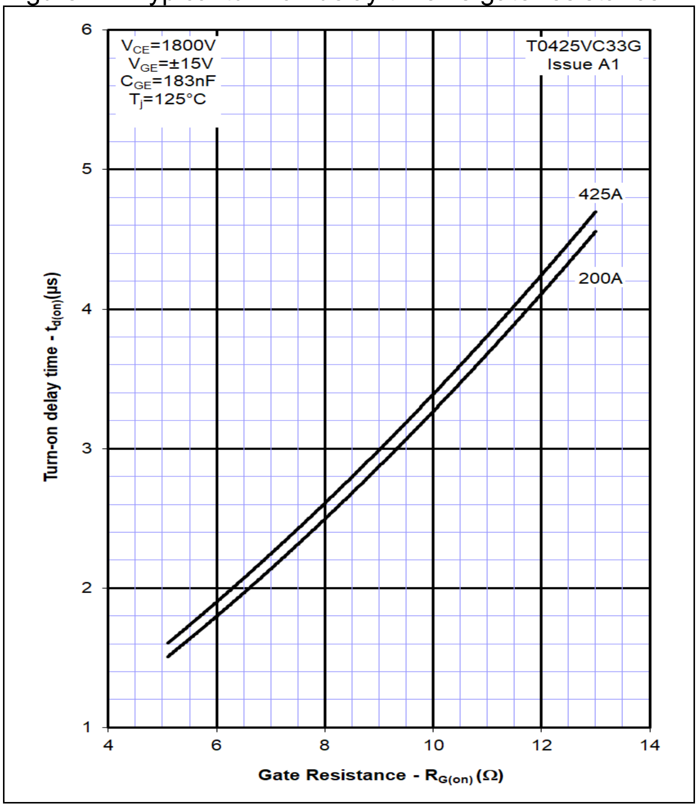


Figure 5 – Typical turn-off delay time vs. gate resistance

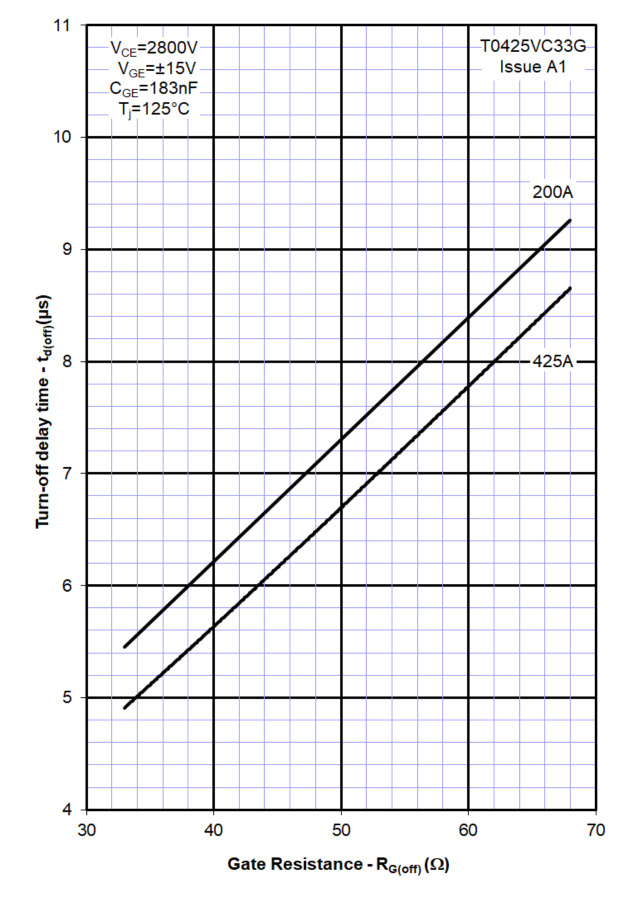


Figure 6 – Typical turn-on energy vs. collector current

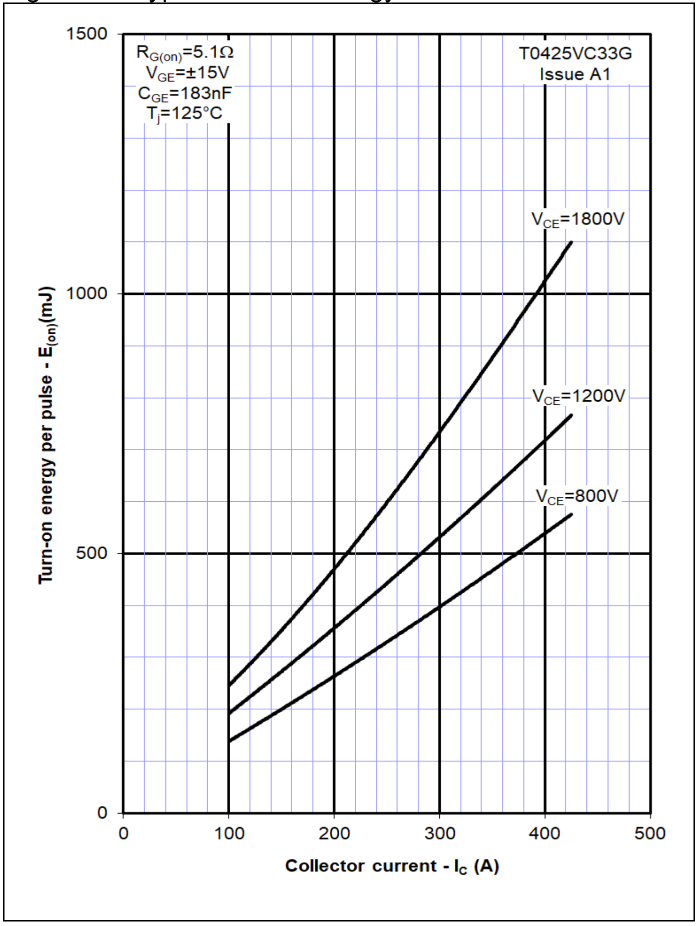


Figure 7 – Typical turn-on energy vs. di/dt

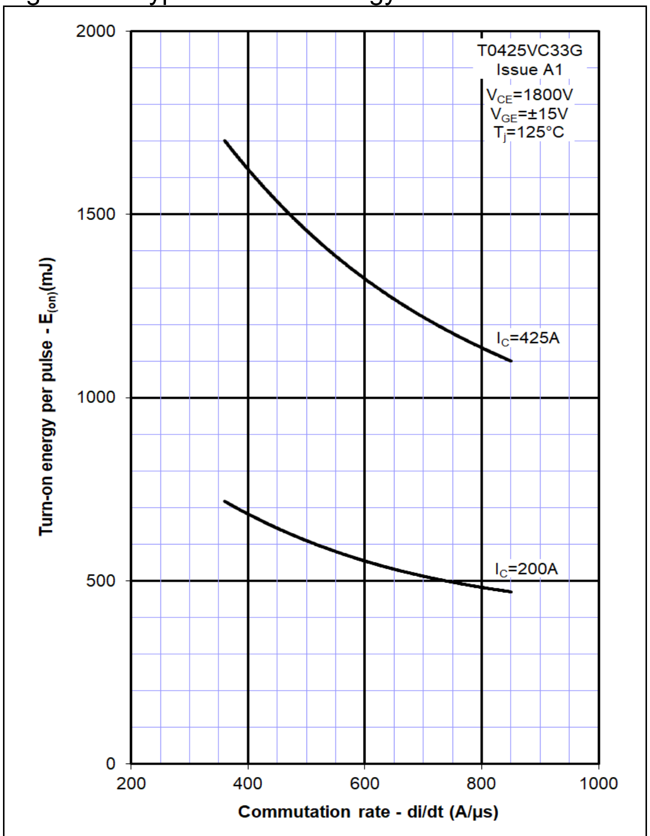


Figure 8 – Typical turn-off energy vs. collector current

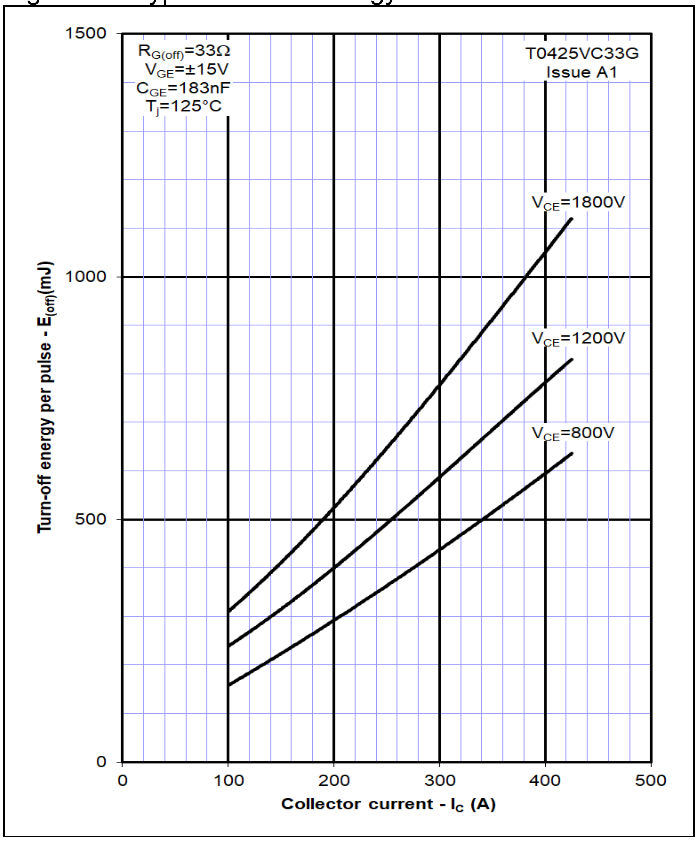


Figure 9 – Turn-off energy vs voltage

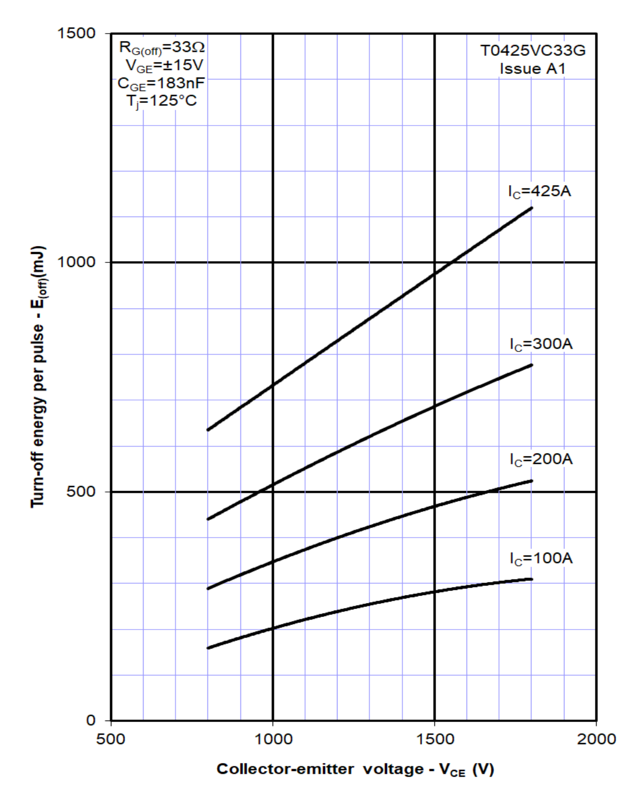


Figure 10 – Safe operating area (IGBT)

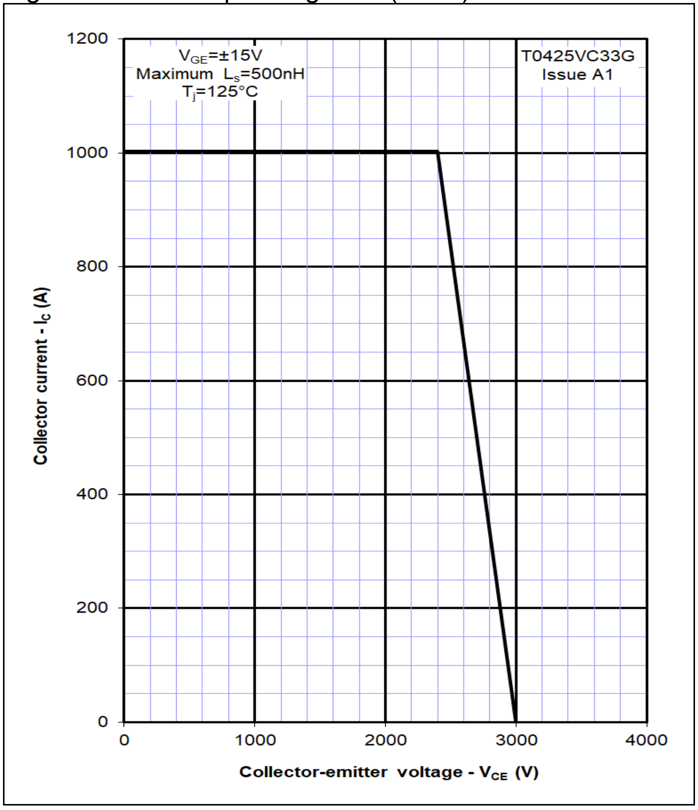


Figure 11 – Typical diode forward characteristics

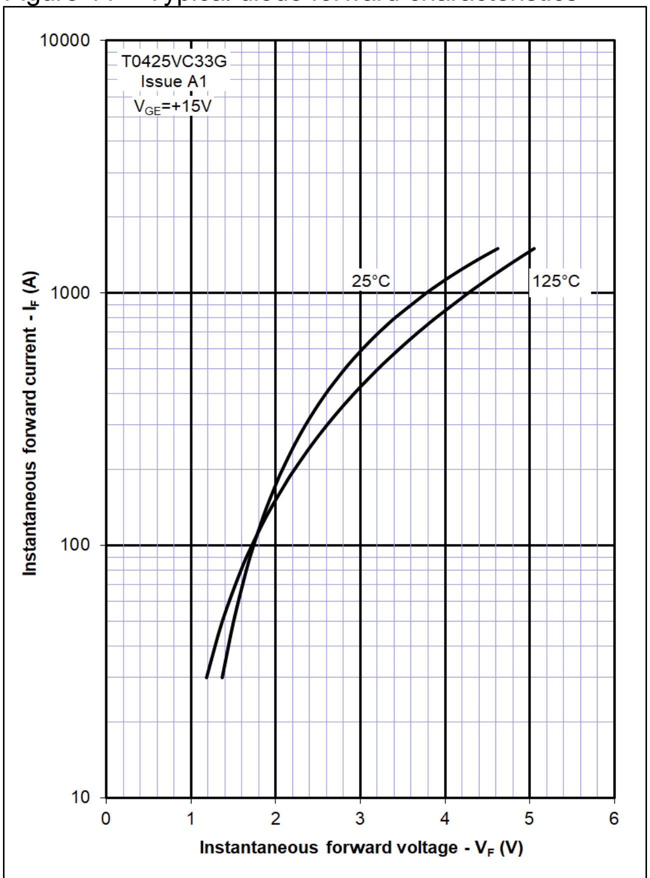


Figure 12 – Typical recovered charge

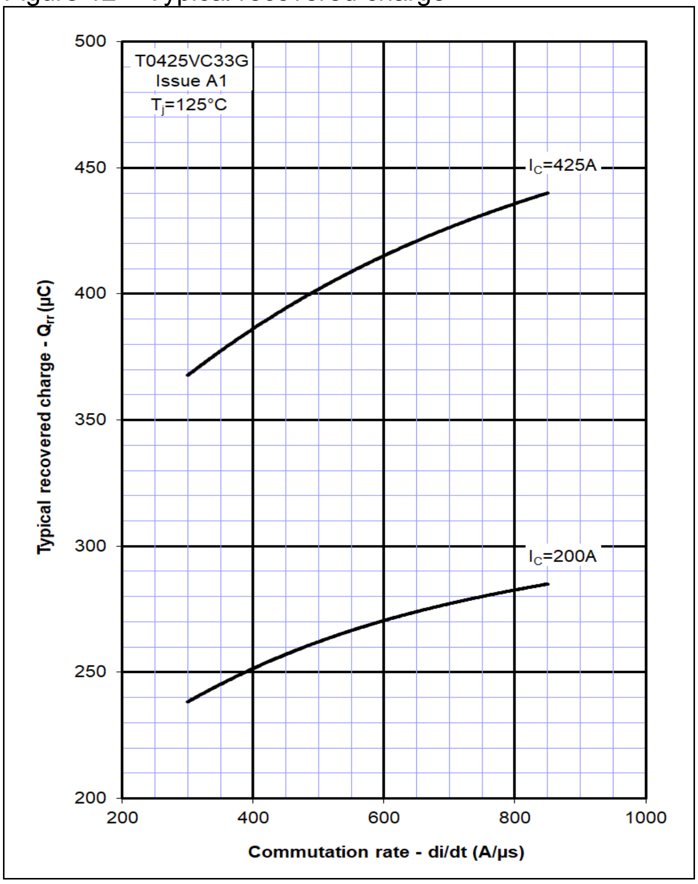


Figure 13 – Typical reverse recovery current

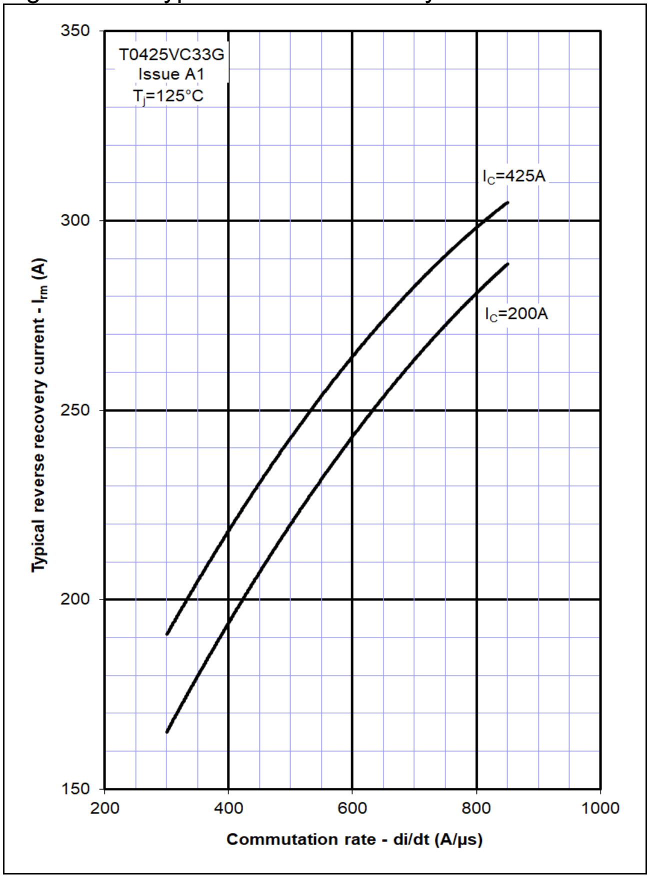


Figure 14 – Typical reverse recovery time

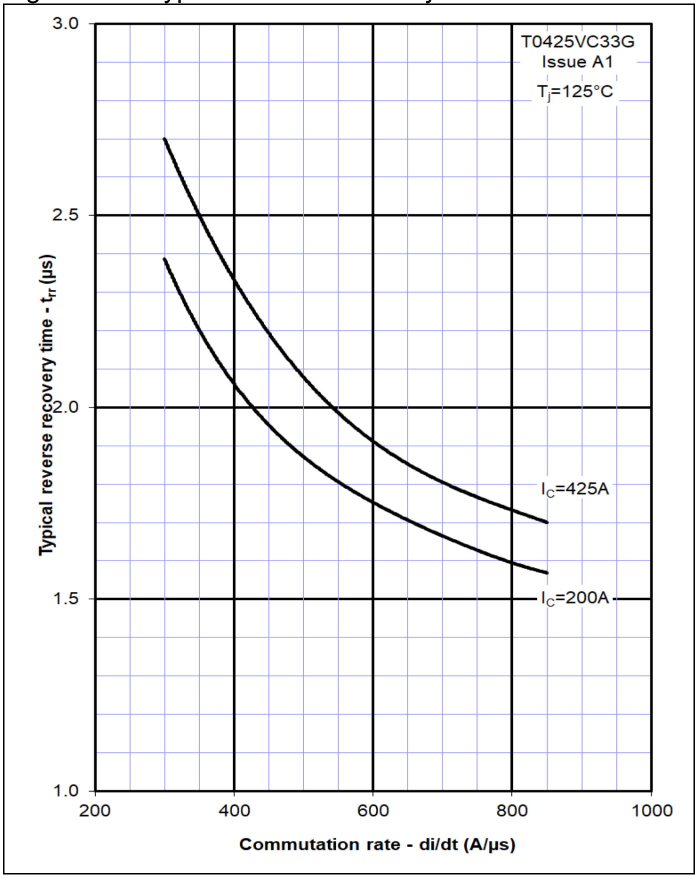


Figure 15 – Typical reverse recovery energy

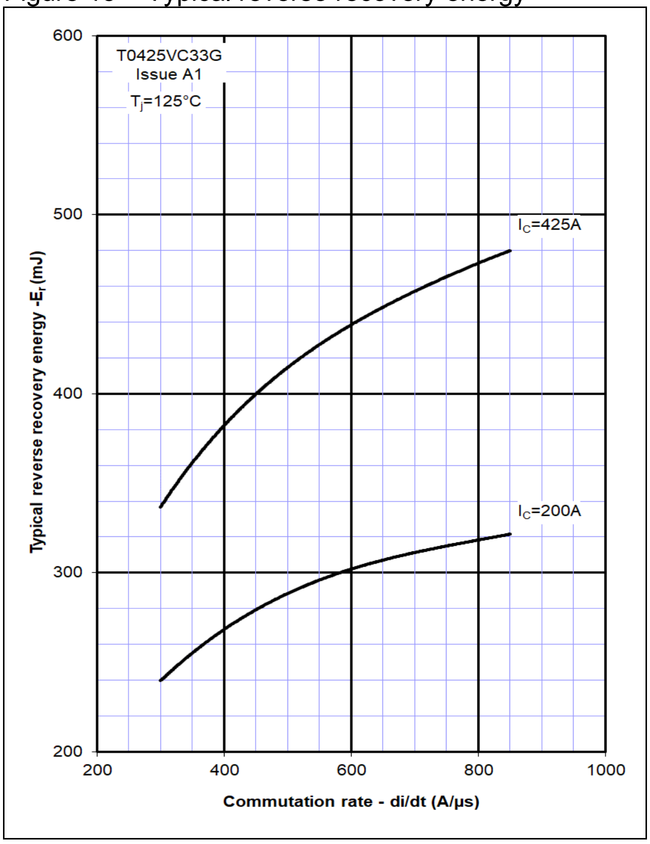


Figure 16 – Safe operating area (Diode)

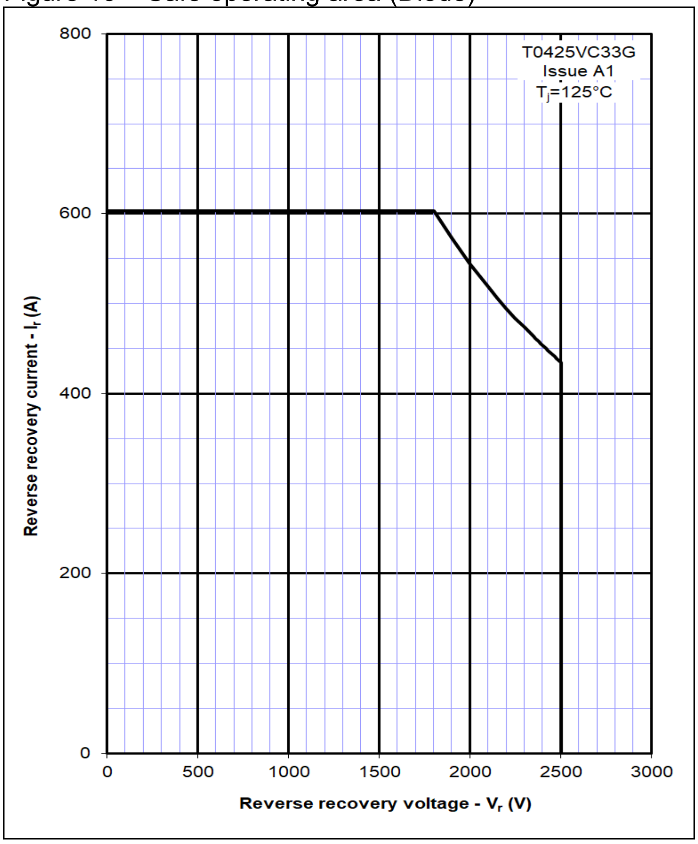


Figure 17 – Transient thermal impedance (IGBT)

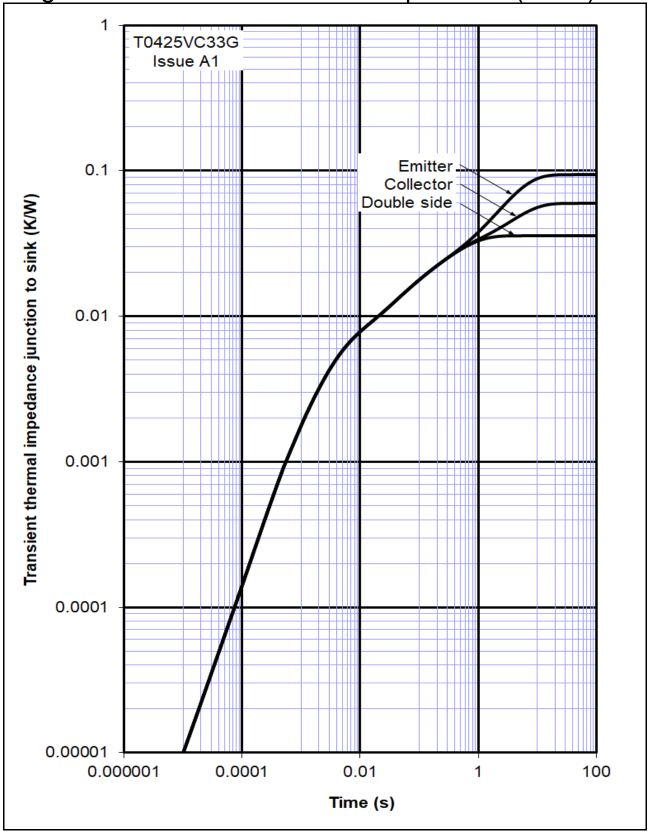
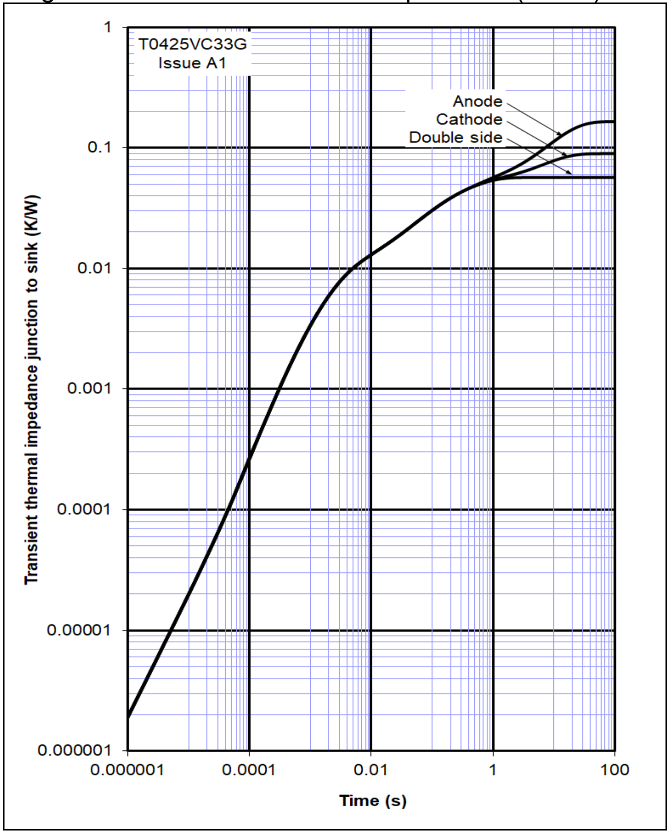
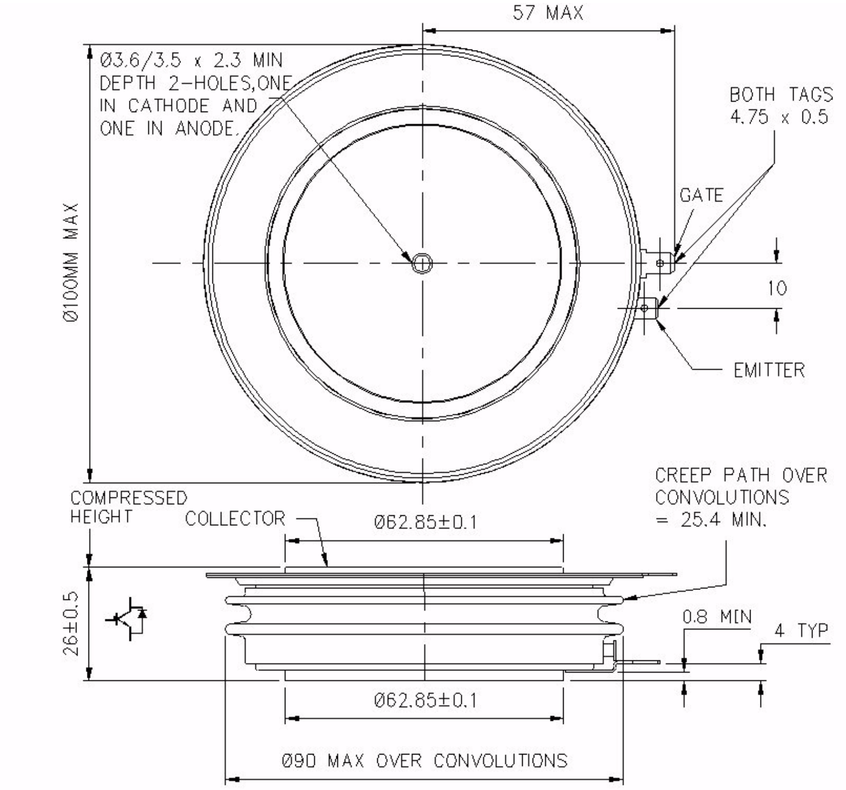


Figure 18 – Transient thermal impedance (Diode)



Outline Drawing & Ordering Information



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ORDERING INFORMATION (Please quote 10 digit code as below)			
T0425	**VC**	**33**	**G**
Fixed type Code	Fixed Outline Code	Voltage Grade V_{CES}/100 33	Fixed format code
Typical order code: T0425VC33G (V_{CES} = 3300V)			

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