

Advance data

Insulated Gate Bi-Polar Transistor

Type T0570VD25G

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{CES}	Collector – emitter voltage	2500	V
$V_{DC\ link}$	Permanent DC voltage for 100 FIT failure rate.	1250	V
V_{GES}	Peak gate – emitter voltage	± 20	V

	RATINGS	MAXIMUM LIMITS	UNITS
I_C	DC collector current, IGBT	570	A
I_{CRM}	Repetitive peak collector current, $t_p=1ms$, IGBT	1140	A
$I_{F(DC)}$	Continuous DC forward current, Diode	570	A
I_{FRM}	Repetitive peak forward current, $t_p=1ms$, Diode	1140	A
I_{FSM}	Peak non-repetitive surge $t_p=10ms$, $V_{RM}=60\%V_{RRM}$, Diode (Note 4)	5180	A
I_{FSM2}	Peak non-repetitive surge $t_p=10ms$, $V_{RM}\leq 10V$, Diode (Note 4)	5700	A
P_{MAX}	Maximum power dissipation, IGBT (Note 2)	2.96	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	1250	A/ μs
T_j	Operating temperature range.	-40 to +125	$^{\circ}C$
T_{stg}	Storage temperature range.	-40 to +125	$^{\circ}C$

Notes: -

- 1) Unless otherwise indicated $T_j = 125^{\circ}C$.
- 2) $T_{sink} = 25^{\circ}C$, double side cooled.
- 3) Maximum commutation loop inductance 750nH.
- 4) Half-sinewave, $125^{\circ}C$ T_j initial.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V _{CE(sat)}	Collector – emitter saturation voltage	-	2.40	2.70	I _C = 570A, V _{GE} = 15V, T _j = 25°C	V
		-	3.05	3.35	I _C = 570A, V _{GE} = 15V	V
V _{T0}	Threshold voltage	-	-	1.42	Current range: 190A – 570A	V
r _T	Slope resistance	-	-	3.39		mΩ
V _{GE(TH)}	Gate threshold voltage	-	5.8	-	V _E = V _{GE} , I _C = 50mA	V
I _{CES}	Collector – emitter cut-off current	-	8	20	V _{CE} = V _{CES} , V _{GE} = 0V	mA
I _{GES}	Gate leakage current	-	-	±10	V _{GE} = ±20V	µA
C _{ies}	Input capacitance	-	75	-	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz	nF
t _{d(on)}	Turn-on delay time	-	0.7	-	I _C = 570A, V _{CE} = 1250V, di/dt = 1000A/µs	µs
t _{r(V)}	Rise time	-	1.6	-		µs
Q _{g(on)}	Turn-on gate charge	-	2.4	-	V _{GE} = ±15V, L _s = 750nH	µC
E _{on}	Turn-on energy	-	0.44	-	R _{g(ON)} = 6.2Ω, R _{g(OFF)} = 13Ω, C _{GE} = 15nF	J
t _{d(off)}	Turn-off delay time	-	1.8	-	Integral diode used as freewheel diode (Note 3 & 4)	µs
t _{f(l)}	Fall time	-	1.9	-		µs
Q _{g(off)}	Turn-off gate charge	-	4.5	-		µC
E _{off}	Turn-off energy	-	1.05	-		J
I _{SC}	Short circuit current	-	1750	-	V _{GE} = +15V, V _{CC} = 1250V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10µs	A

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V _F	Forward voltage	-	2.1	2.4	I _F = 570A, T _j = 25°C	V
		-	2.07	2.37	I _F = 570A	V
V _{To}	Threshold voltage	-	-	1.41	Current range 190A - 570A	V
r _T	Slope resistance	-	-	1.69		mΩ
I _{rm}	Peak reverse recovery current	-	400	-	I _F = 570A, V _r = 1250V, V _{GE} = -15V, di/dt = 1000A/µs	A
Q _{rr}	Recovered charge	-	420	-		µC
t _{rr}	Reverse recovery time, 50% chord	-	1.2	-	µs	
E _r	Reverse recovery energy	-	0.37	-	J	

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R _{thJK}	Thermal resistance junction to sink, IGBT	-	-	33.8	Double side cooled	K/kW
		-	-	53	Collector side cooled	K/kW
		-	-	98	Emitter side cooled	K/kW
R _{thJK}	Thermal resistance junction to sink, Diode	-	-	36.5	Double side cooled	K/kW
		-	-	56.5	Cathode side cooled	K/kW
		-	-	105	Anode side cooled	K/kW
F	Mounting force	11	-	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) Figures 6 to 9 are obtained using integral diode as freewheeling diode

Curves

Figure 1 – Typical collector-emitter saturation voltage characteristics

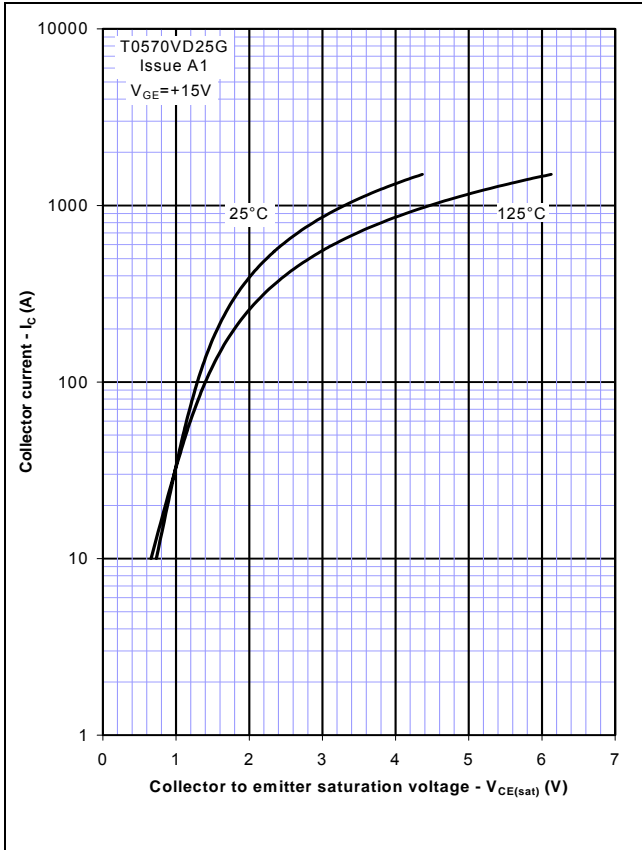


Figure 2 – Typical output characteristic

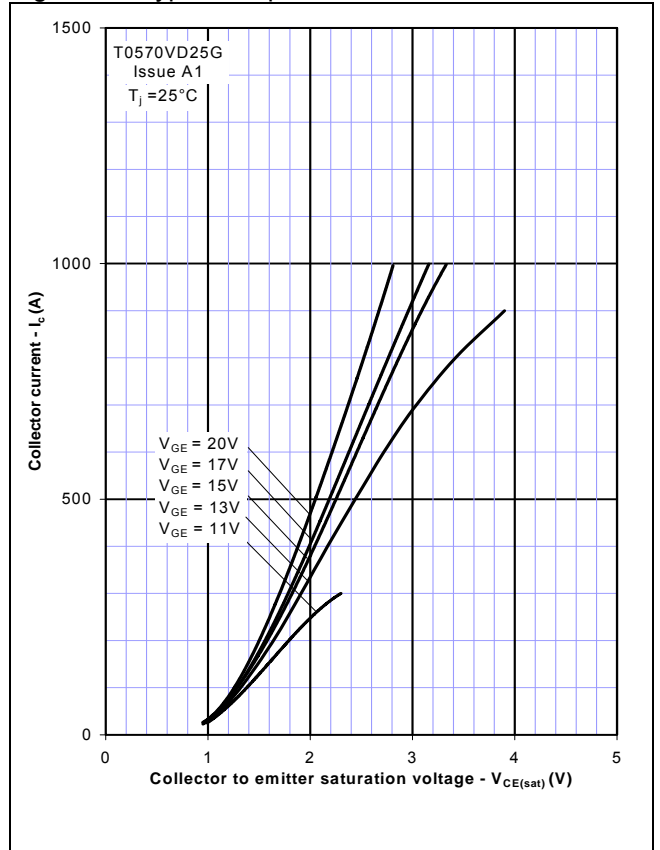


Figure 3 – Typical output characteristic

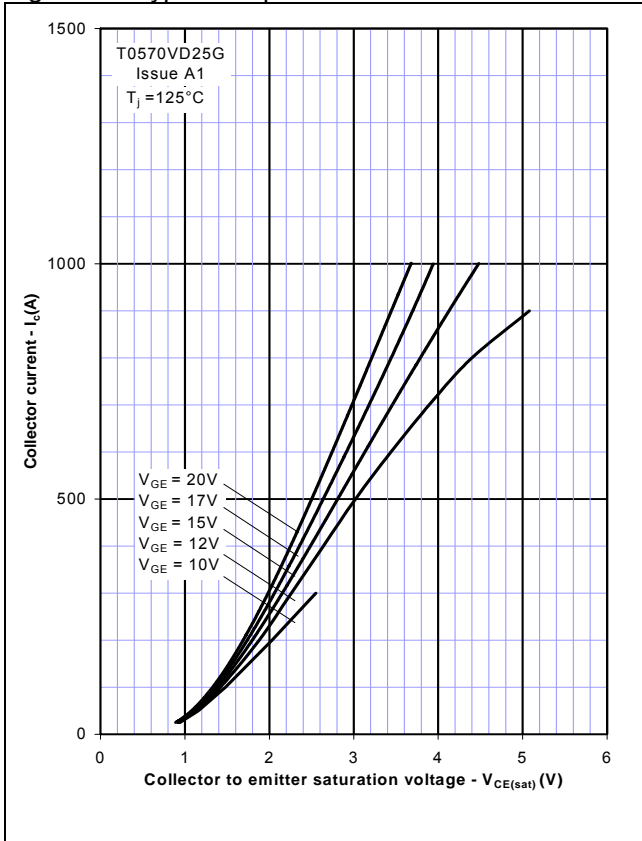


Figure 4 – Typical turn-on delay time vs gate resistance

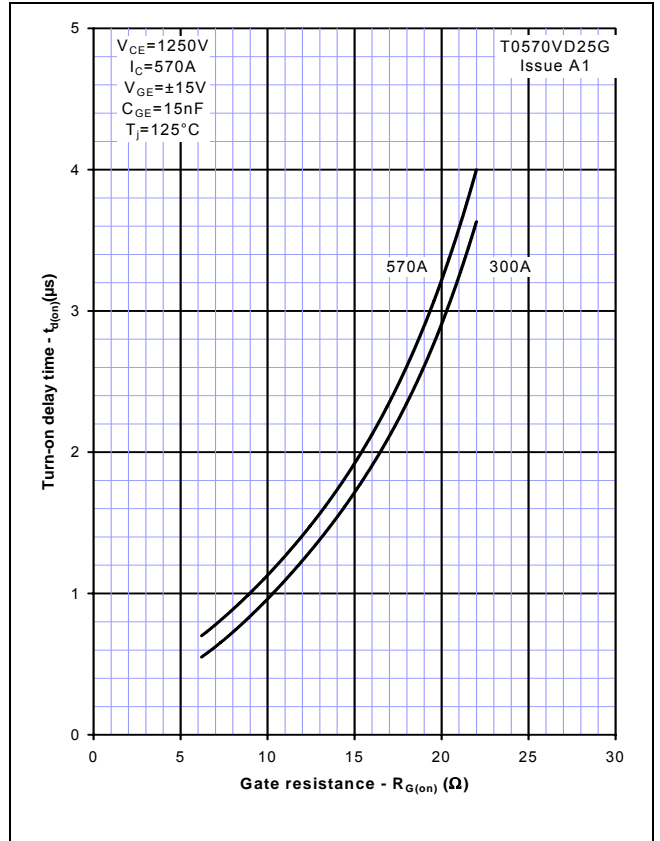


Figure 5 – Typical turn-off delay time vs. gate resistance

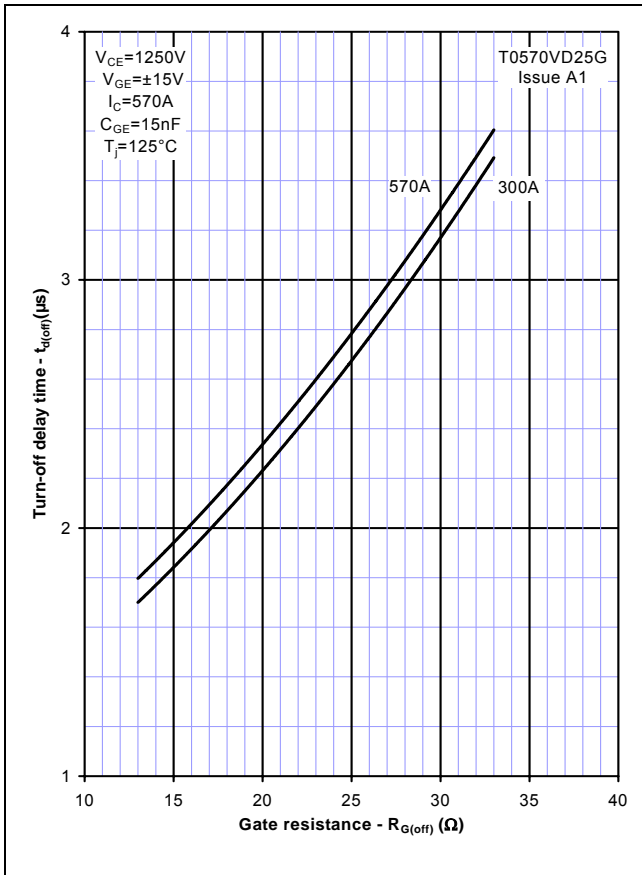


Figure 6 – Typical turn-on energy vs. collector current

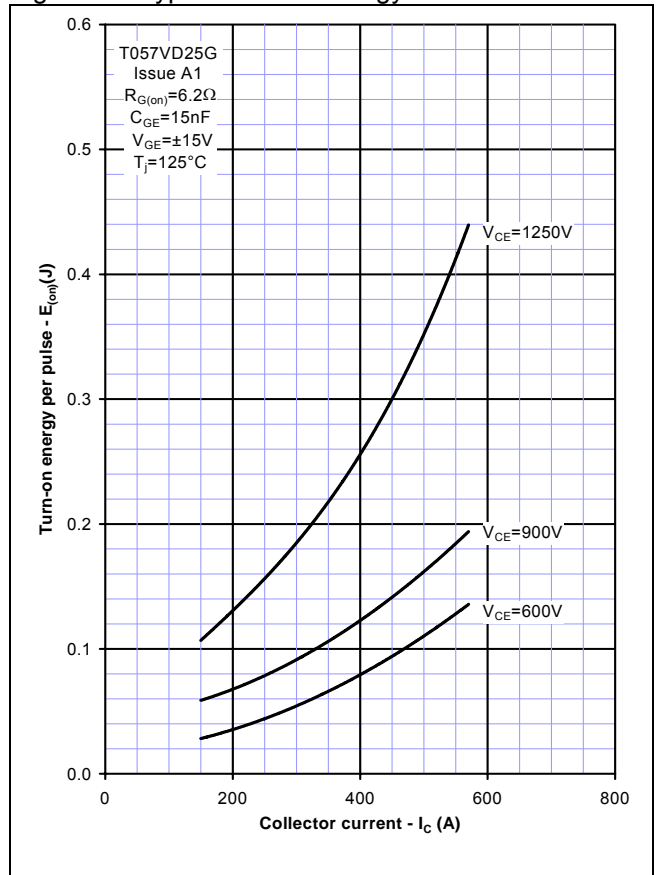


Figure 7 – Typical turn-on energy vs. di/dt

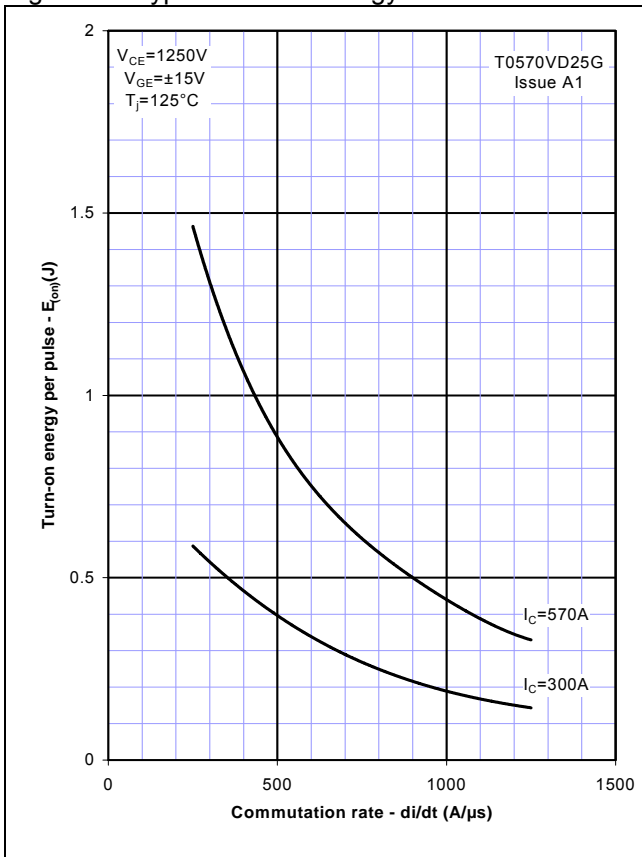


Figure 8 – Typical turn-off energy vs. collector current

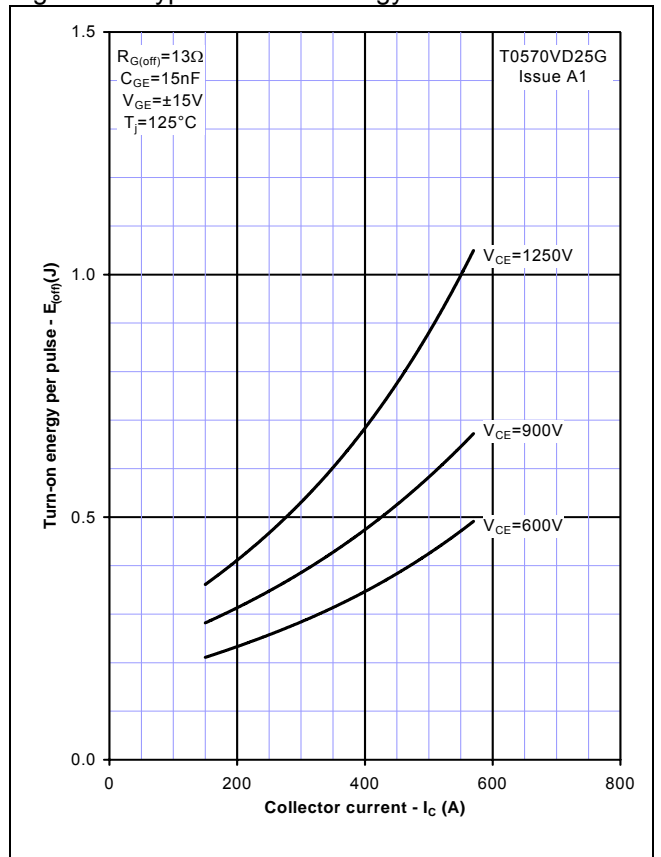


Figure 9 – Turn-off energy vs voltage

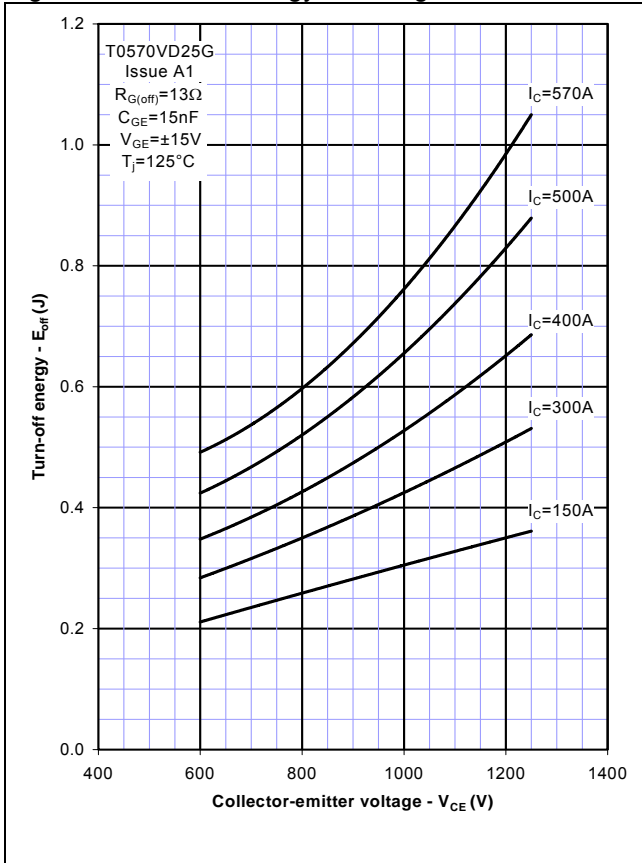


Figure 10 – Safe operating area (IGBT)

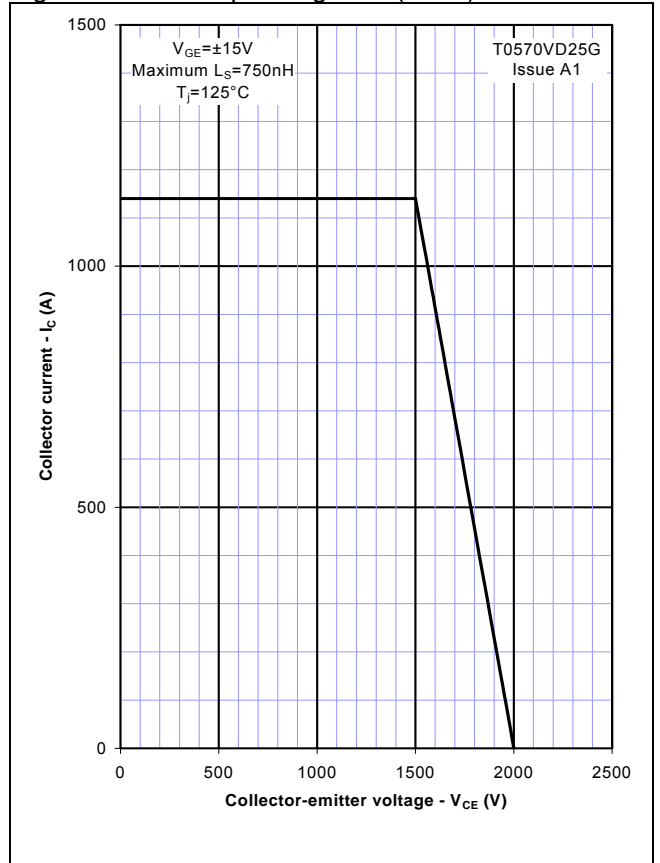


Figure 11 – Typical diode forward characteristics

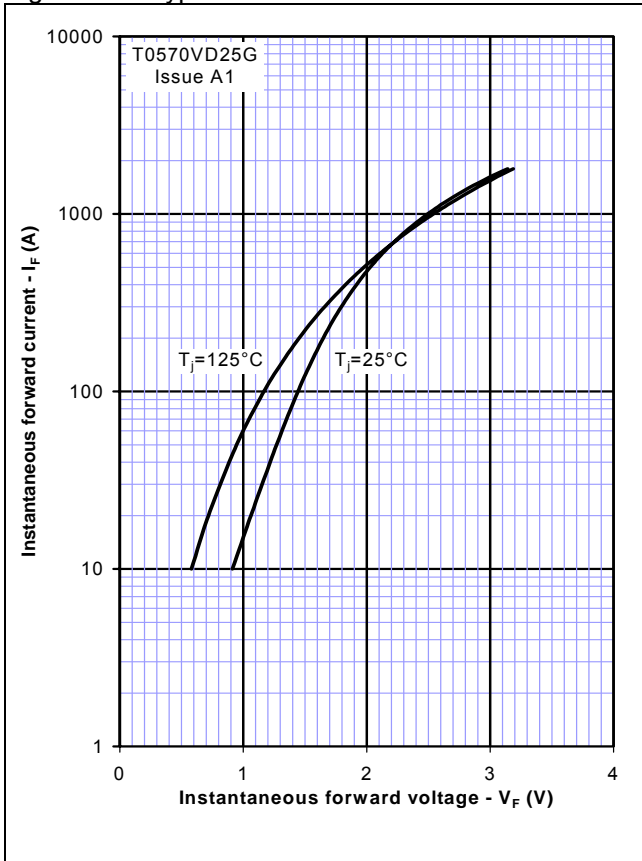


Figure 12 – Typical recovered charge

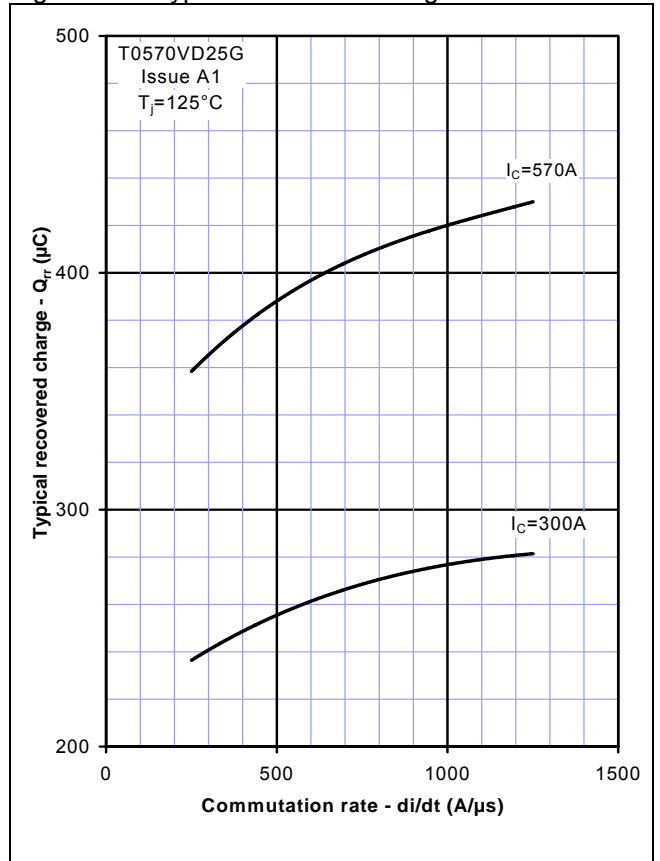


Figure 13 – Typical reverse recovery current

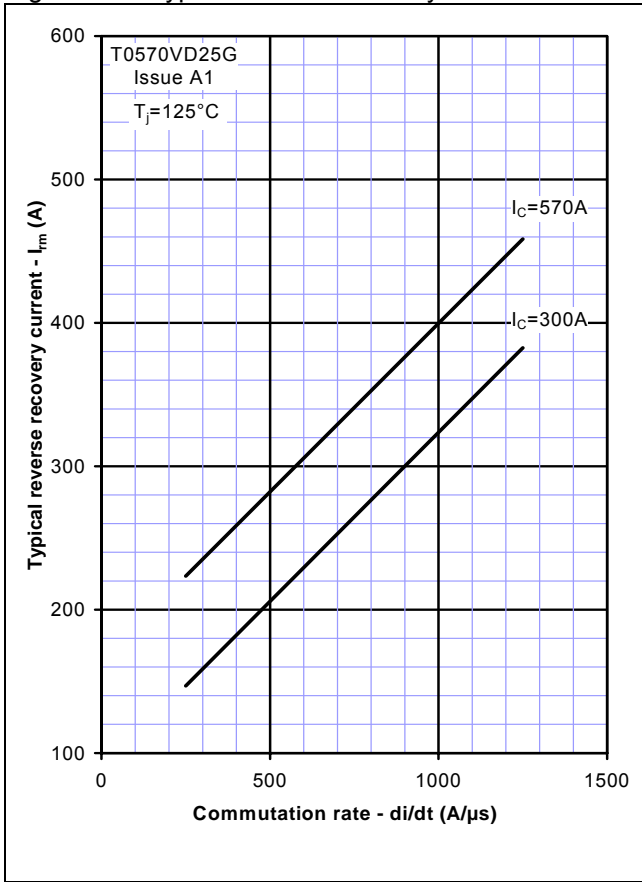


Figure 14 – Typical reverse recovery time

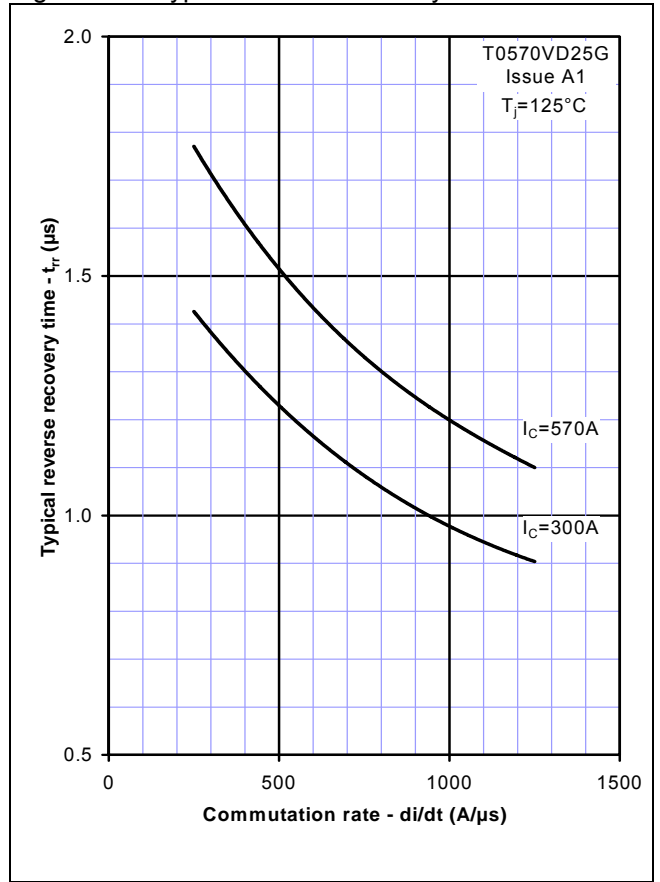


Figure 15 – Typical reverse recovery energy

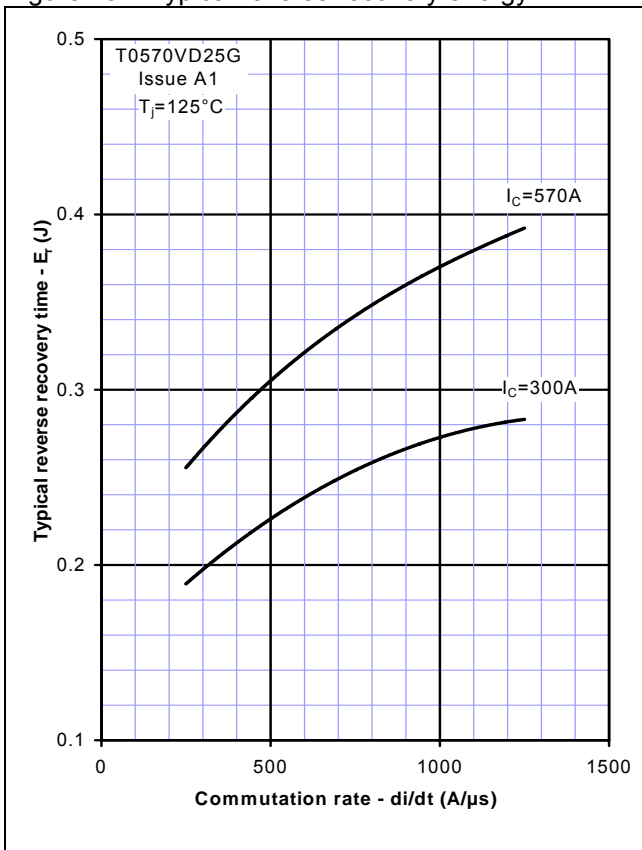


Figure 16 – Safe operating area (Diode)

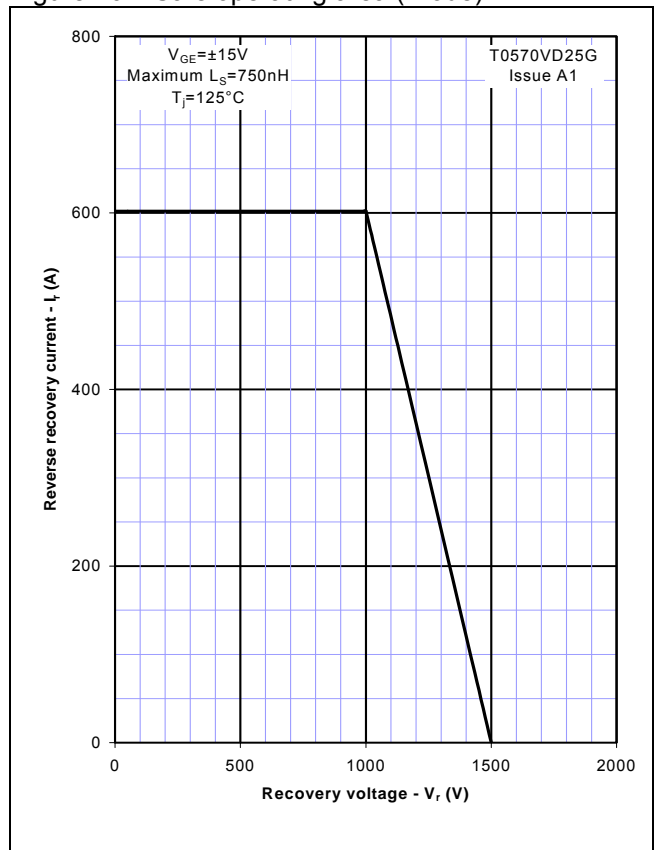


Figure 17 – Transient thermal impedance (IGBT)

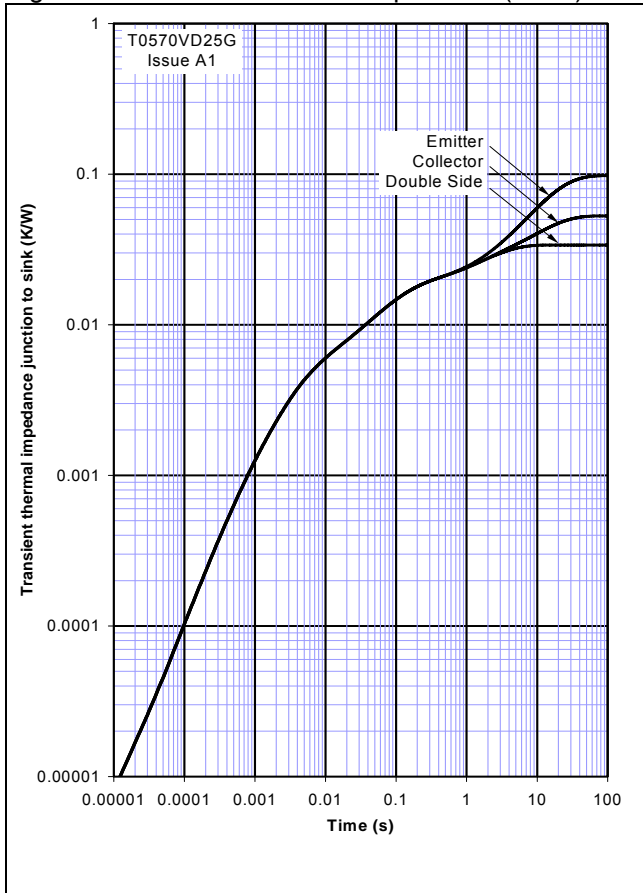
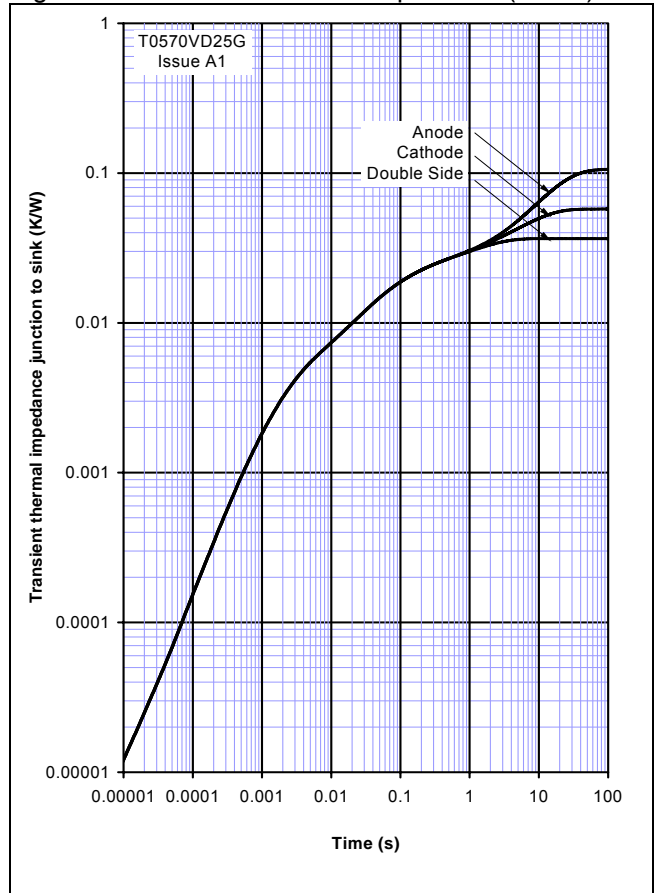
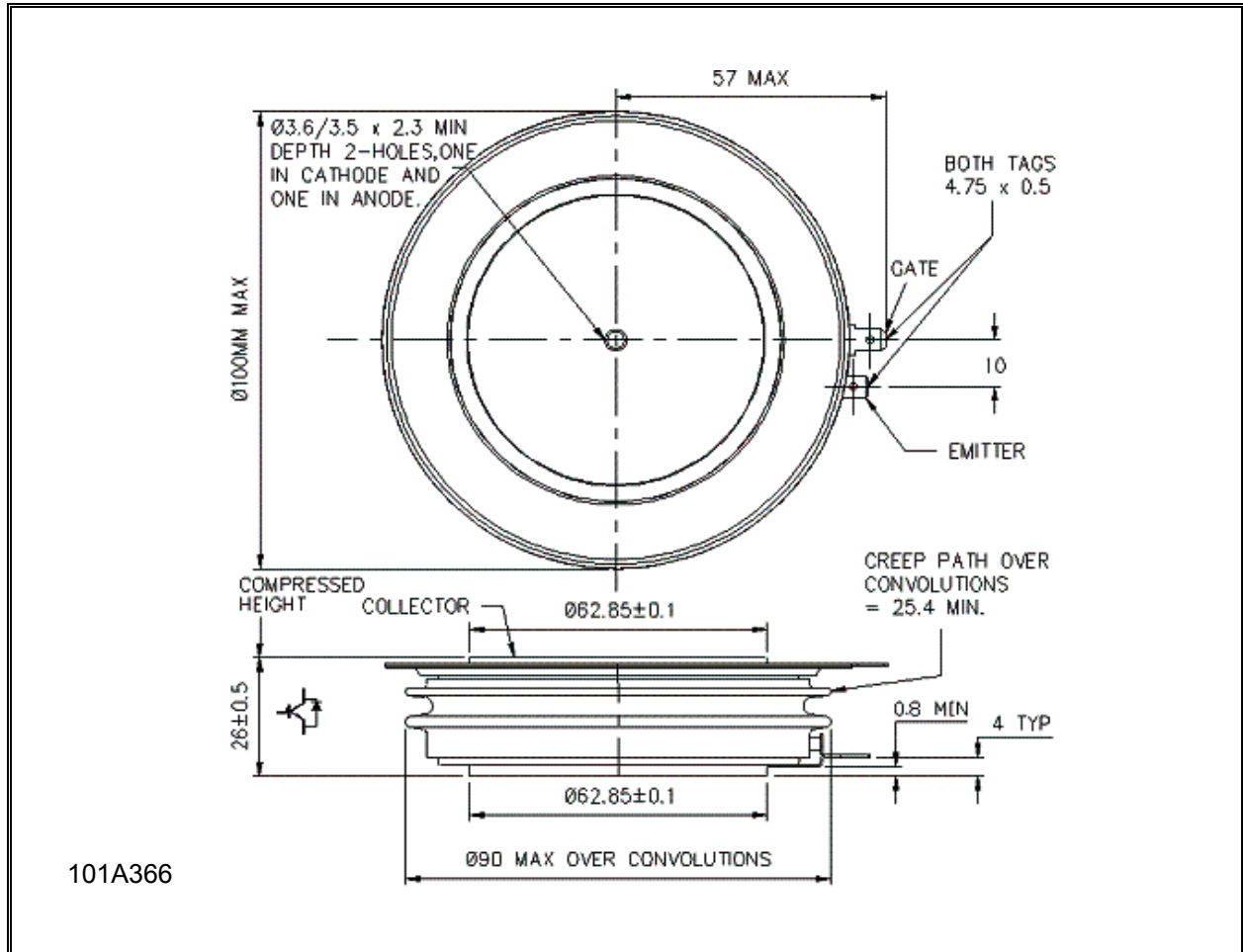


Figure 18 – Transient thermal impedance (Diode)



Outline Drawing & Ordering Information



ORDERING INFORMATION

(Please quote 10 digit code as below)

T0570 Fixed type Code	VD Fixed Outline Code	25 Voltage Grade $V_{CES}/100$ 25	G Fixed format code
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Typical order code: T0570VD25G ($V_{CES} = 2500V$)

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