

Prospective Data
Insulated Gate Bi-Polar Transistor
Type T0900DF65A

Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V _{CES}	Collector – emitter voltage	6500	V
V _{CES}	Collector – emitter voltage (T _j 25°C)	6500	V
V _{CES}	Collector – emitter voltage (T _j -40°C)	6000	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	DC collector current, IGBT	900	A
I _{CRM}	Repetitive peak collector current, t _p =1ms, IGBT	1800	A
I _{F(DC)}	Continuous DC forward current, Diode	900	A
I _{FRM}	Repetitive peak forward current, t _p =1ms, Diode	1800	A
I _{FSM}	Peak non-repetitive surge t _p =10ms, V _{RM} =60%V _{RRM} , Diode (Note 4)	7590	A
I _{FSM2}	Peak non-repetitive surge t _p =10ms, V _{RM} ≤10V, Diode (Note 4)	8350	A
P _{MAX}	Maximum power dissipation, IGBT (Note 2)	10.6	KW
(di/dt) _{cr}	Critical diode di/dt (note 3)	3000	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 300nH.
- 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	-	3.6	-	I _C = 900A, V _{GE} = 15V, T _j = 25°C	V
		4.4	4.8	5.2	I _C = 900A, V _{GE} = 15V	V
V _{T0}	Threshold voltage	-	-	2.49	Current range: 300A – 900A	V
r _T	Slope resistance	-	-	3.02		mΩ
V _{GE(TH)}	Gate threshold voltage	-	5.2	-	V _{CE} = V _{GE} , I _C = 900mA	V
I _{CES}	Collector – emitter cut-off current	-	10	35	V _{CE} = V _{CES} , V _{GE} = 0V	mA
I _{GES}	Gate leakage current	-	-	40	V _{GE} = ±20V	µA
C _{ies}	Input capacitance	-	160	-	V _{CE} = 10V, V _{GE} = 0V, f = 100kHz, T _j =25°C	nF
t _{d(on)}	Turn-on delay time	-	2.1	-	I _C = 900A, V _{CE} = 3600V, di/dt = 2500A/µs	µs
t _{r(V)}	Rise time	-	2.5	-		µs
Q _{g(on)}	Turn-on gate charge	-	5	-	V _{GE} = ±15V, L _s = 300nH	µC
E _{on}	Turn-on energy	-	6.3	-	R _{g(ON)} = 3.3Ω, R _{g(OFF)} = 11Ω, C _{GE} = 68nF	J
t _{d(off)}	Turn-off delay time	-	4.3	-	Integral diode used as freewheel diode (Note 3 & 4)	µs
t _{f(l)}	Fall time	-	2.3	-		µs
Q _{g(off)}	Turn-off gate charge	-	5.5	-		µC
E _{off}	Turn-off energy	-	5.1	-		J
I _{SC}	Short circuit current	-	4900	-	V _{GE} = +15V, V _{CC} = 3600V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10µs	A

Diode Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
V _F	Forward voltage	-	3	-	I _F = 900A, T _j = 25°C	V
		-	3.4	3.8	I _F = 900A	V
V _{T0}	Threshold voltage	-	-	1.89	Current range 300A – 900A	V
r _T	Slope resistance	-	-	2.12		mΩ
I _{rm}	Peak reverse recovery current	-	950	-	I _F = 900A, V _{GE} = -15V, di/dt = 2500A/µs	A
Q _{rr}	Recovered charge	-	1500	-		µC
t _{rr}	Reverse recovery time, 50% chord	-	1.2	-		µs
E _r	Reverse recovery energy	-	2.2	-		J

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R _{thJK}	Thermal resistance junction to sink, IGBT	-	-	9.4	Double side cooled	K/kW
		-	-	14.3	Collector side cooled	K/kW
		-	-	27.6	Emitter side cooled	K/kW
R _{thJK}	Thermal resistance junction to sink, Diode	-	-	16	Double side cooled	K/kW
		-	-	23.4	Cathode side cooled	K/kW
		-	-	50.6	Anode side cooled	K/kW
F	Mounting force	45	-	55	Note 2	kN
W _t	Weight	-	2.2	-		g

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

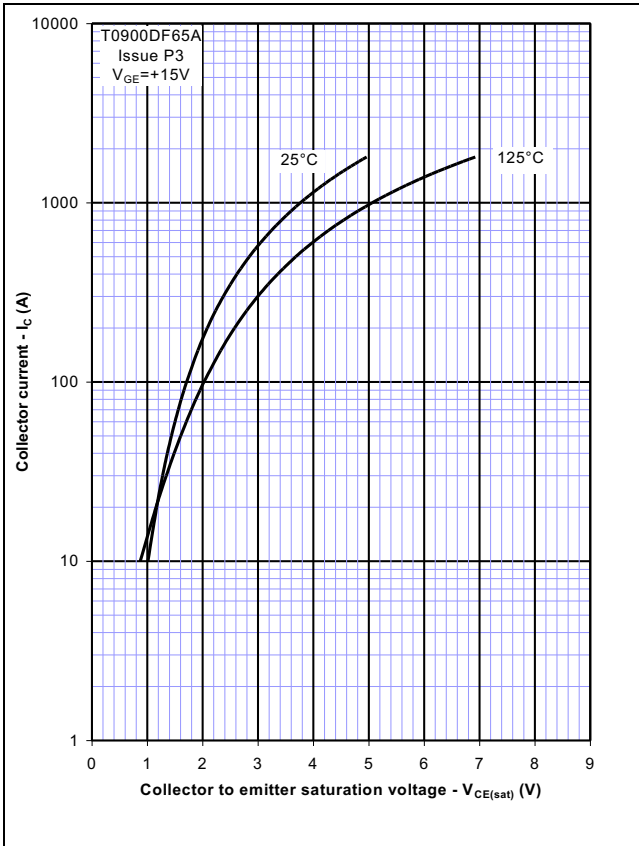


Figure 2 – Typical output characteristic

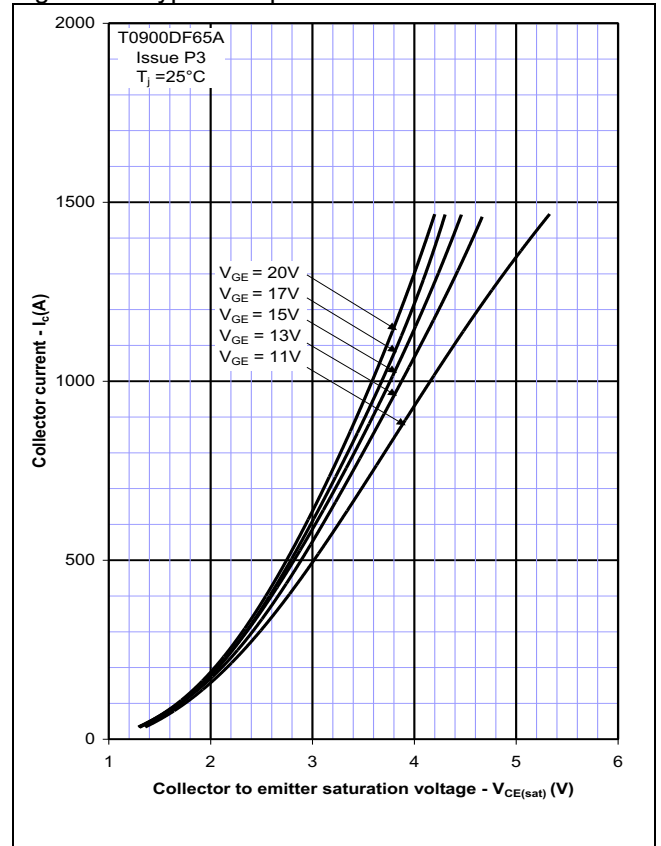


Figure 3 – Typical output characteristic

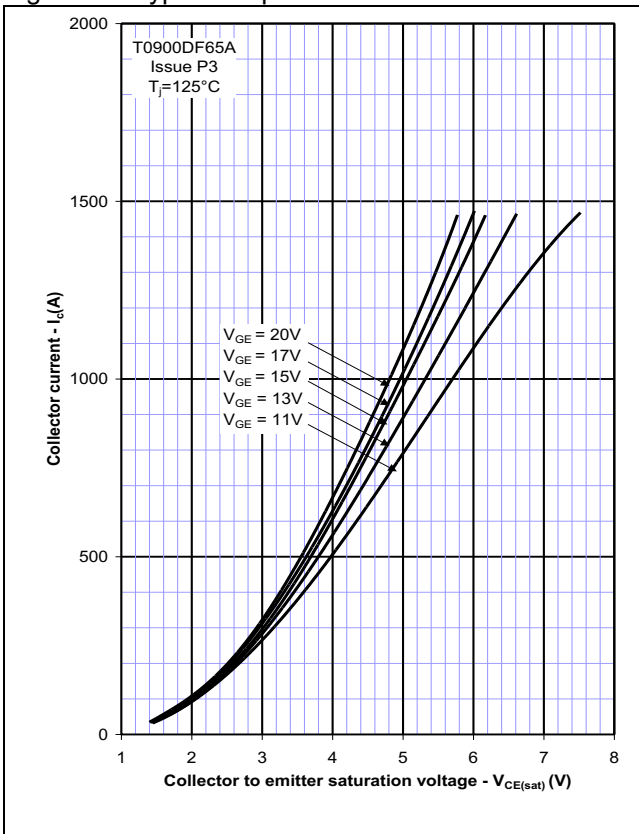


Figure 4 – Typical turn-on delay time vs gate resistance

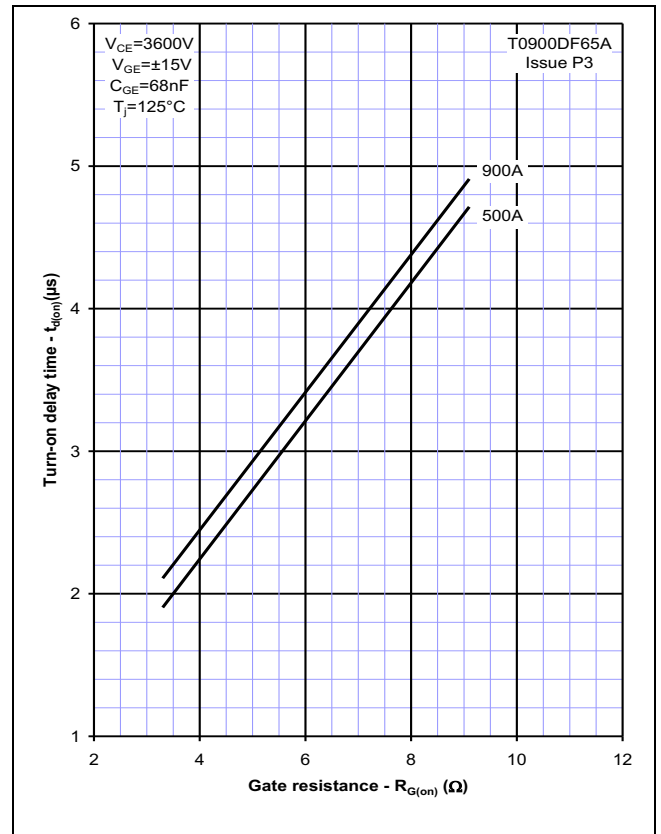


Figure 5 – Typical turn-off delay time vs. gate resistance

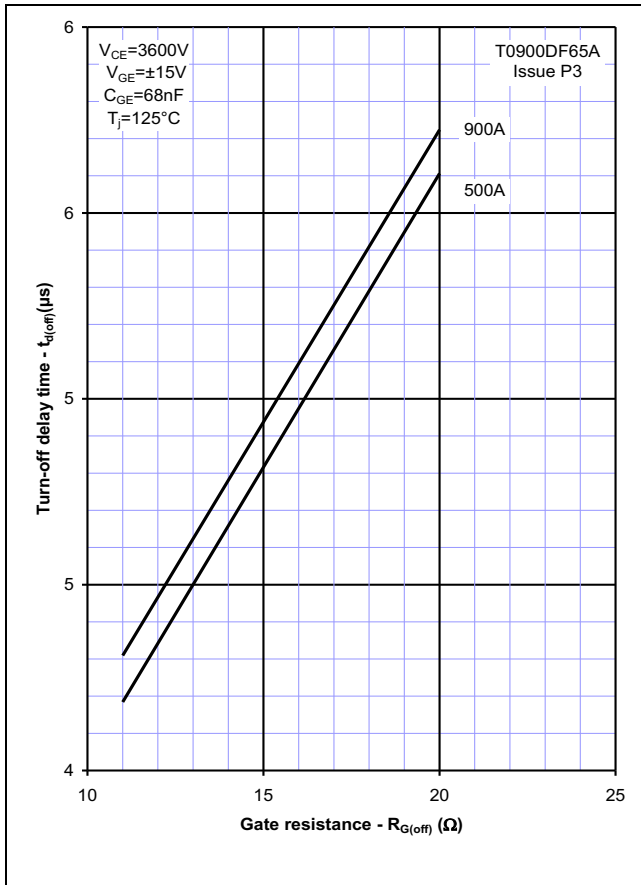


Figure 6 – Typical turn-on energy vs. collector current

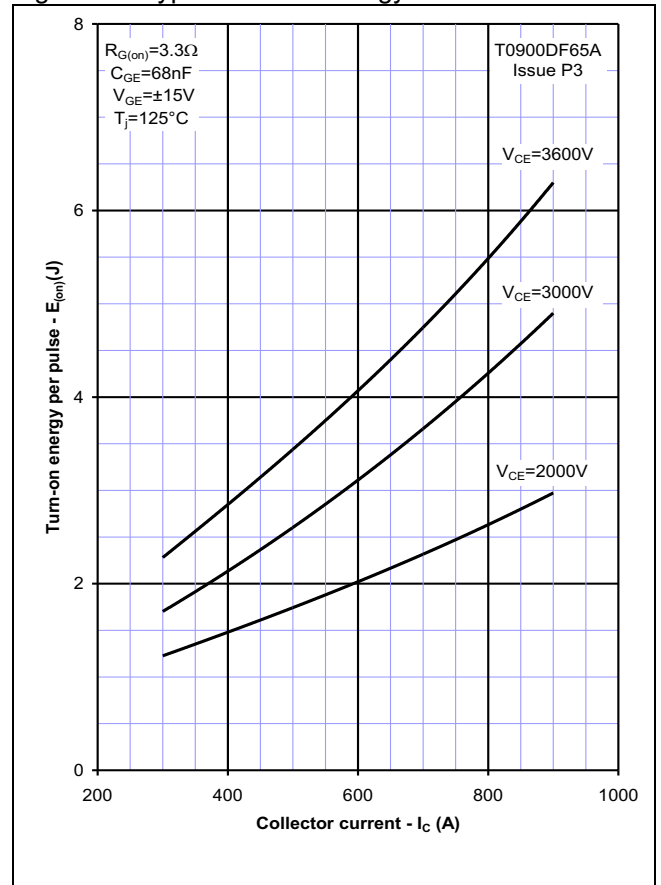


Figure 7 – Typical turn-on energy vs. di/dt

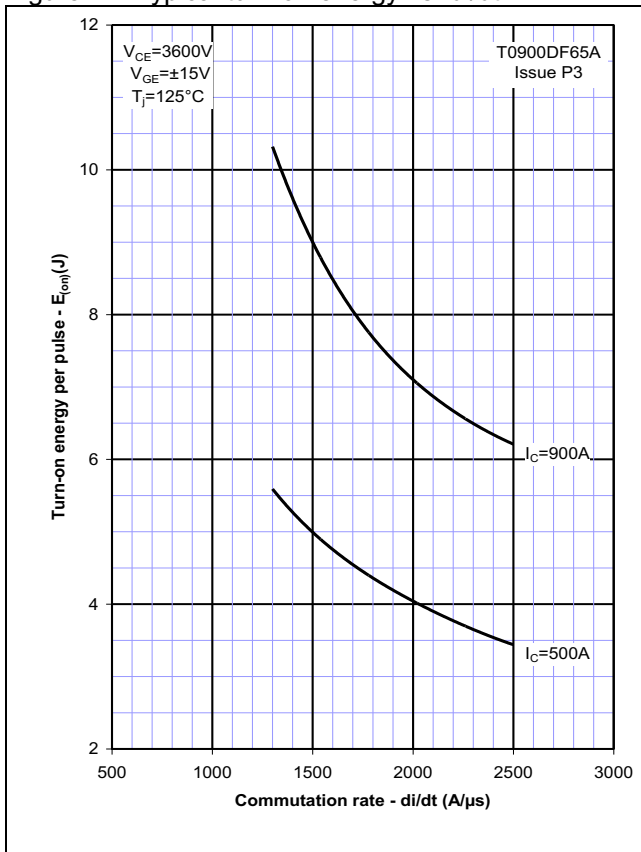


Figure 8 – Typical turn-off energy vs. collector current

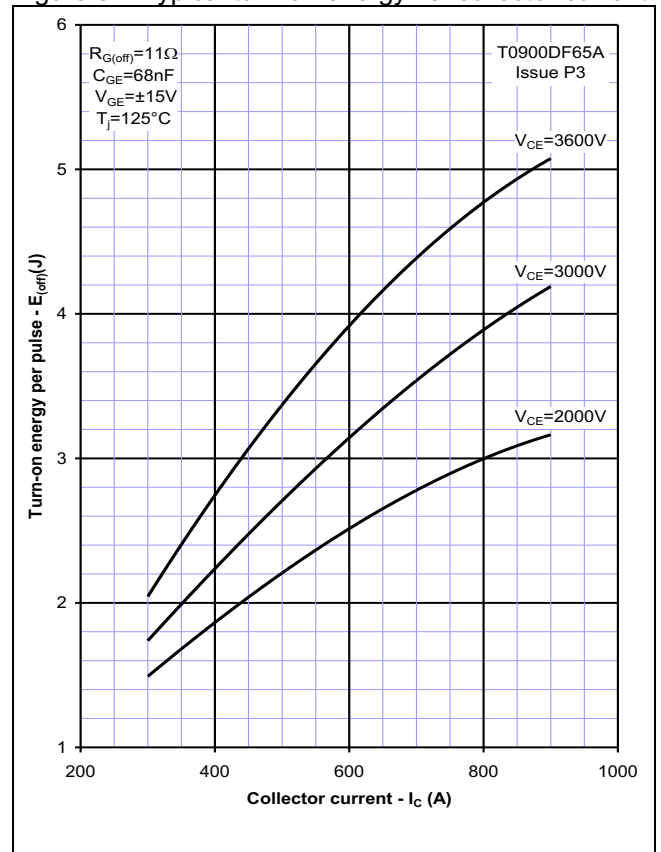


Figure 9 – Turn-off energy vs voltage

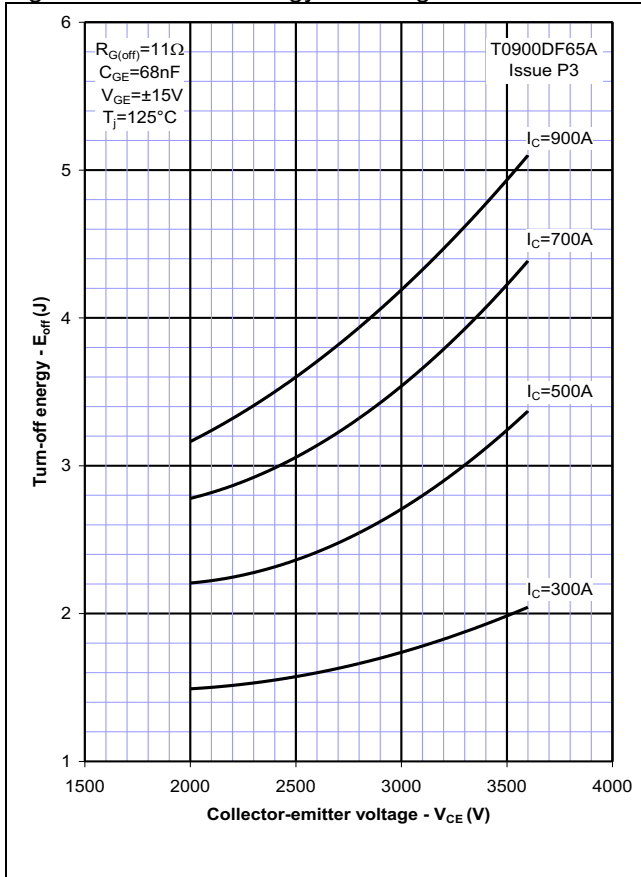


Figure 10 – Safe operating area (IGBT)

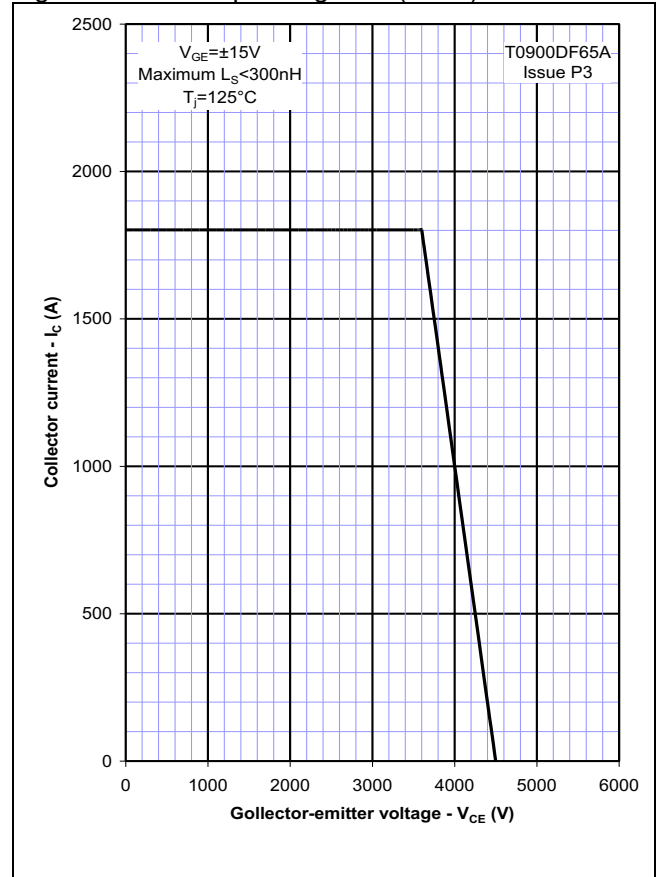


Figure 11 – Typical diode forward characteristics

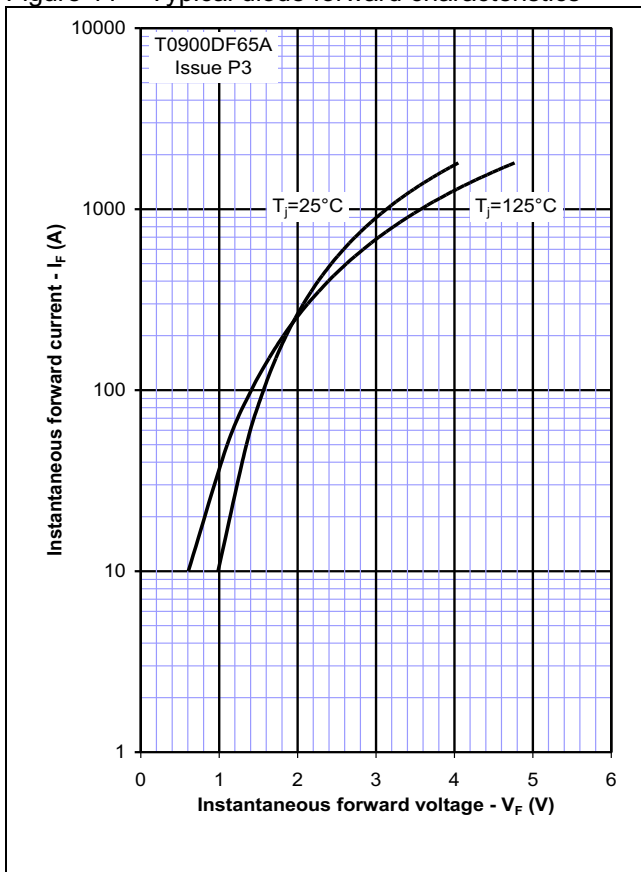


Figure 12 – Typical recovered charge

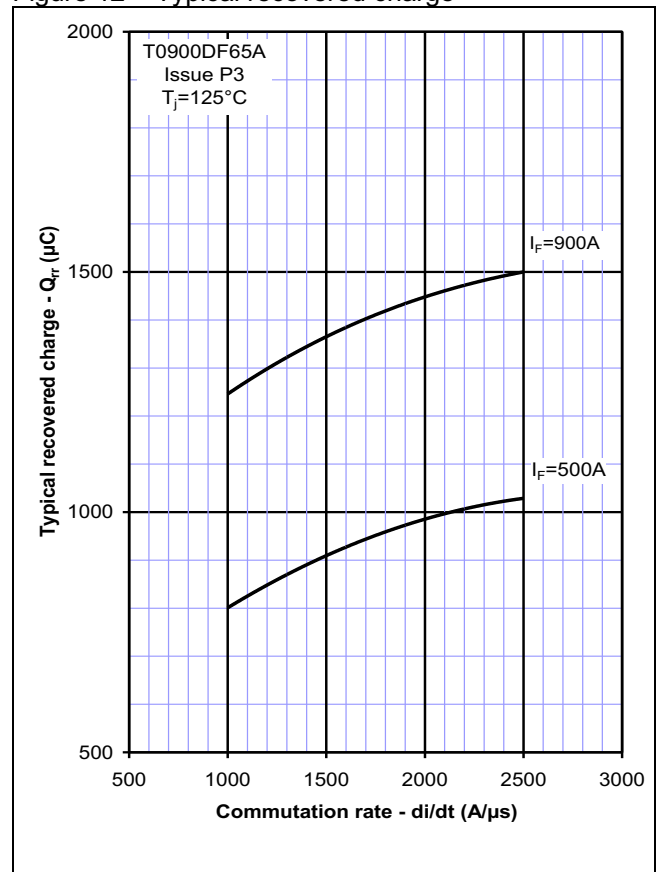


Figure 13 – Typical reverse recovery current

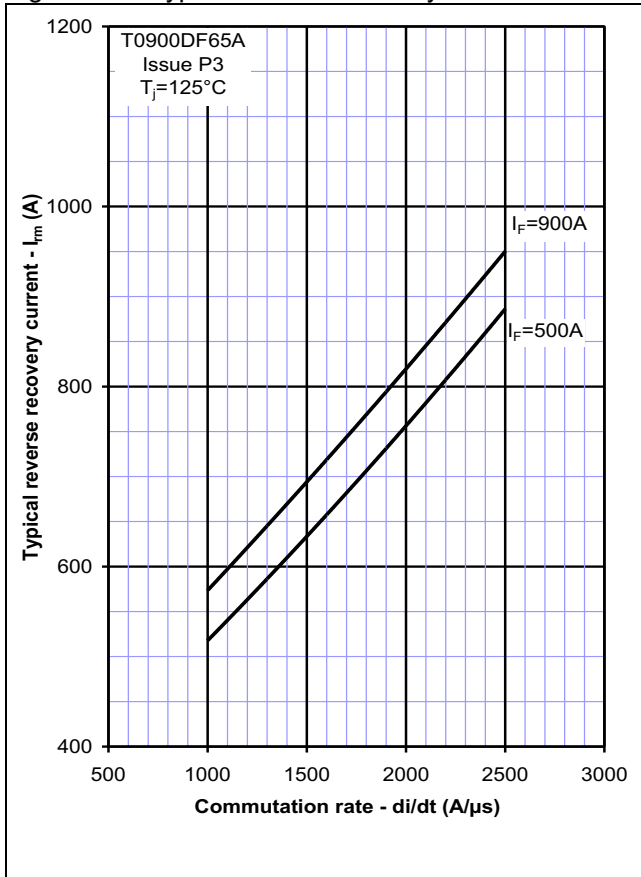


Figure 14 – Typical reverse recovery time

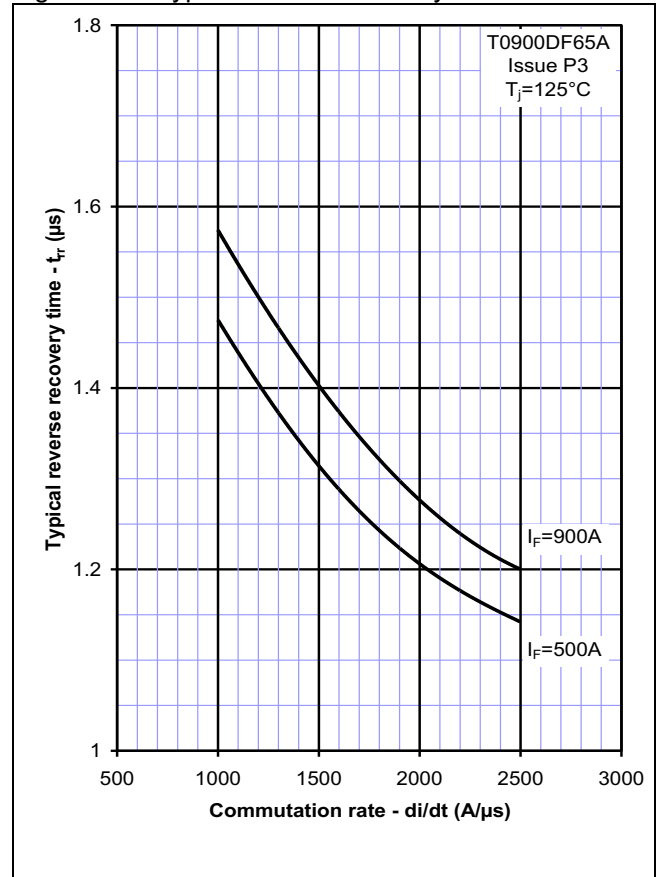


Figure 15 – Typical reverse recovery energy

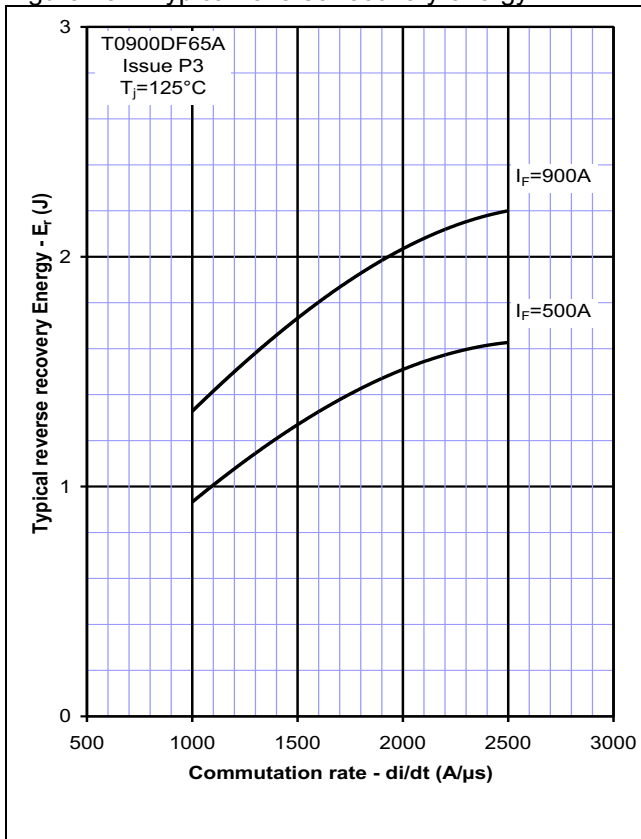


Figure 16 – Safe operating area (Diode)

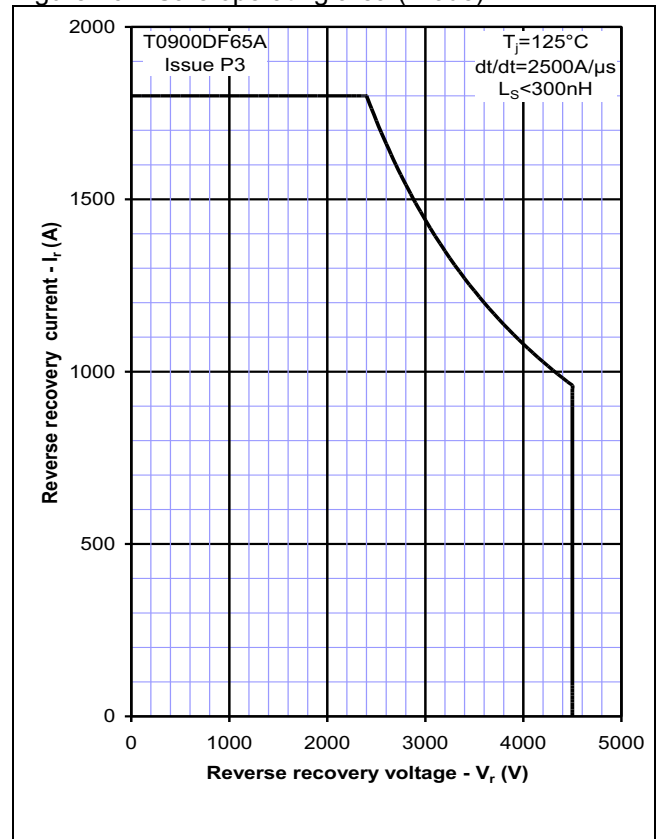


Figure 17 – Transient thermal impedance (IGBT)

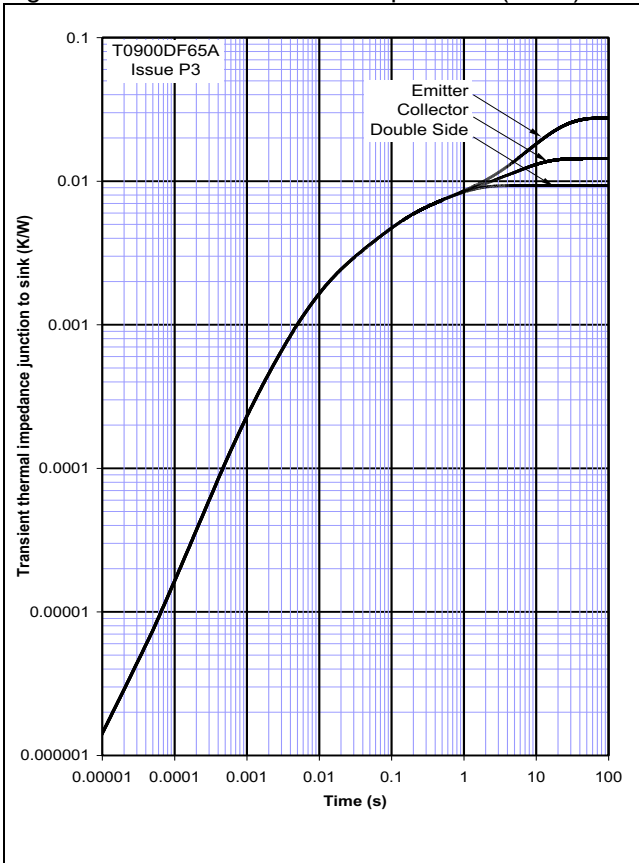
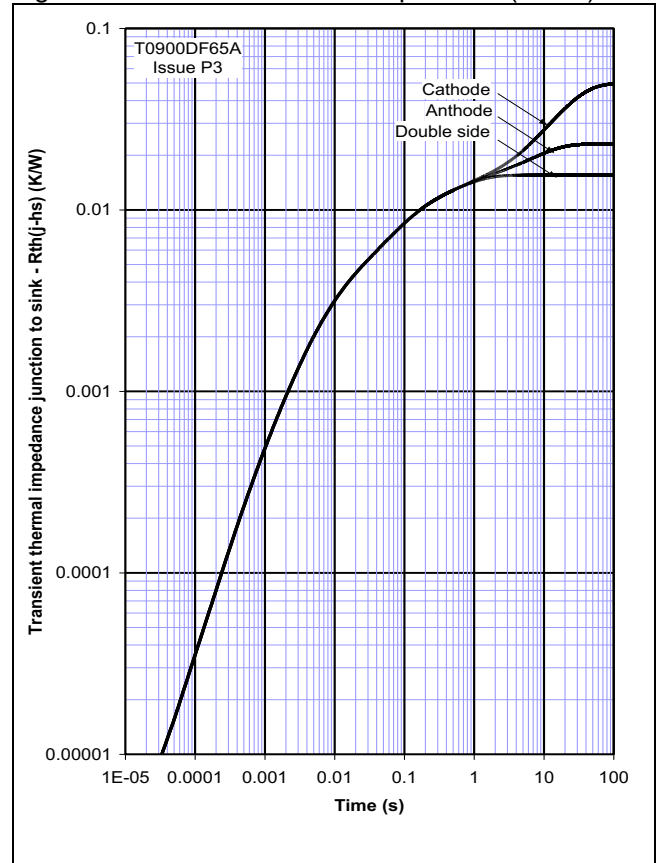


Figure 18 – Transient thermal impedance (Diode)





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