



Tentative Data

Insulated Gate Bi-Polar Transistor

Type T0640VC33E

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	Continuous DC collector current, IGBT	640	A
I_{CRM}	Repetitive peak collector current, $t_p=1ms$, IGBT	1280	A
I_{ECO}	Maximum reverse emitter current, $t_p=100\mu s$, (note 2 & 3)	640	A
P_{MAX}	Maximum power dissipation, IGBT (note 2)	4.1	kW
$T_{j\ op}$	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 650nH.

Characteristics

IGBT Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS	
V _{CE(sat)}	Collector – emitter saturation voltage	-	2.57	2.97	I _C = 640A, V _{GE} = 15V, T _j = 25°C	V	
		-	3.40	3.80	I _C = 640A, V _{GE} = 15V	V	
V _{T0}	Threshold voltage	-	-	1.36	Current range: 213A – 640A	V	
r _T	Slope resistance	-	-	3.18		mΩ	
V _{GE(TH)}	Gate threshold voltage	-	5.3	-	V _{CE} = V _{GE} , I _C = 55mA	V	
I _{CES}	Collector – emitter cut-off current	-	5.5	18	V _{CE} = V _{CES} , V _{GE} = 0V	mA	
I _{GES}	Gate leakage current	-	-	±15	V _{GE} = ±20V	μA	
C _{ies}	Input capacitance	-	90	-	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz	nF	
t _{d(on)}	Turn-on delay time	-	1.6	-	I _C = 640A, V _{CE} = 1800V, di/dt = 1350A/μs V _{GE} = ±15V, L _S = 650nH R _{G(ON)} = 3.3Ω, R _{G(OFF)} = 24Ω, C _{GE} = 270nF Freewheel diode type TBC at T _j = 125°C (Notes 3, 4 & 5)	μs	
t _{r(V)}	Rise time	-	1.8	-		μs	
Q _{g(on)}	Turn-on gate charge	-	13	-		μC	
E _{on}	Turn-on energy	-	1.65	-		J	
t _{d(off)}	Turn-off delay time	-	5	-		μs	
t _{f(l)}	Fall time	-	1.4	-		μs	
Q _{g(off)}	Turn-off gate charge	-	8.5	-		μC	
E _{off}	Turn-off energy	-	1.68	-		J	
I _{sc}	Short circuit current	-	2000	-		V _{GE} = +15V, V _{CC} = 1800V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10μs	A

Thermal Characteristics

	PARAMETER	MIN	TYP	MAX	TEST CONDITIONS	UNITS
R _{thJK}	Thermal resistance junction to sink, IGBT	-	-	24.3	Double side cooled	K/kW
		-	-	40.1	Collector side cooled	K/kW
		-	-	62.3	Emitter 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 circuit.
- 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

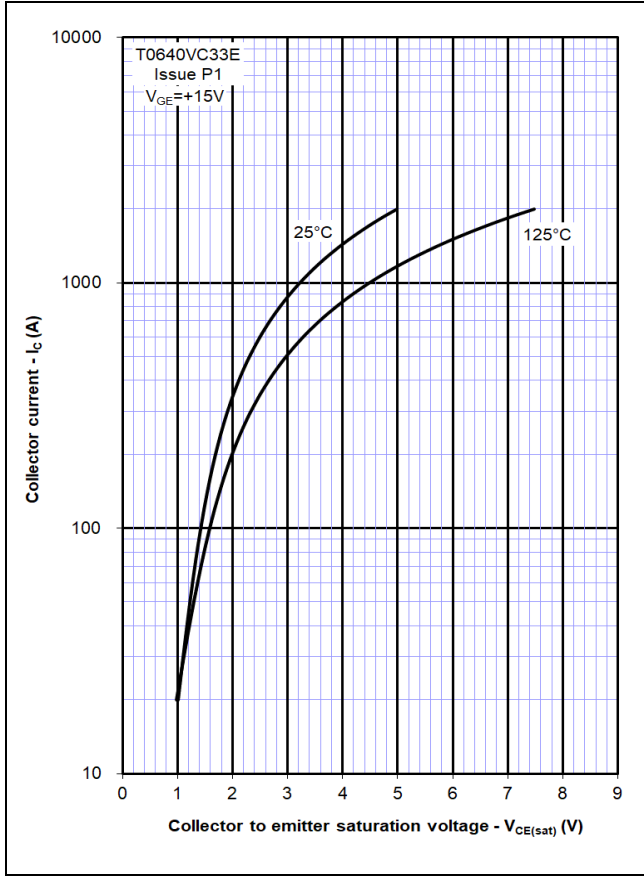


Figure 2 – Typical output characteristic

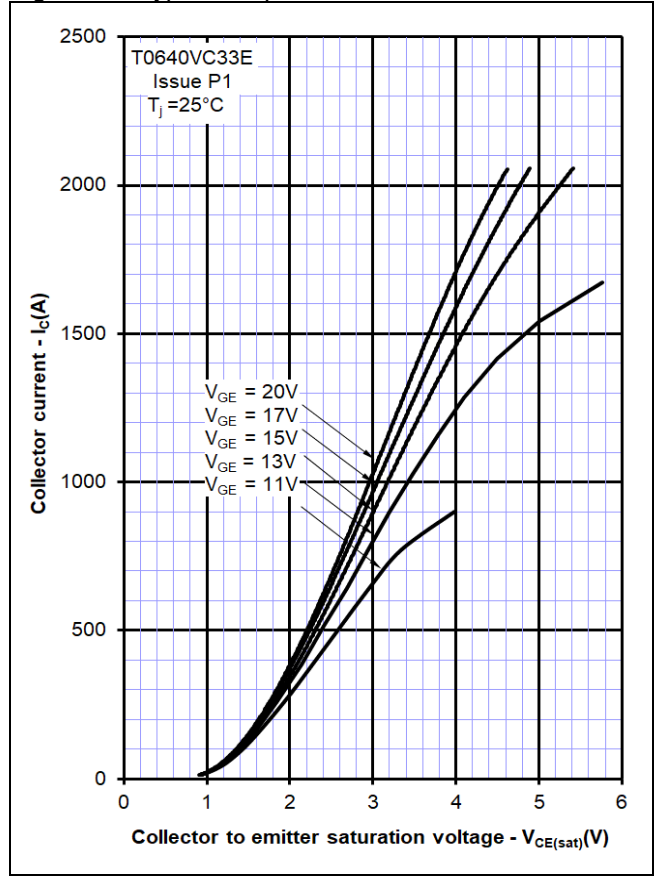


Figure 3 – Typical output characteristic

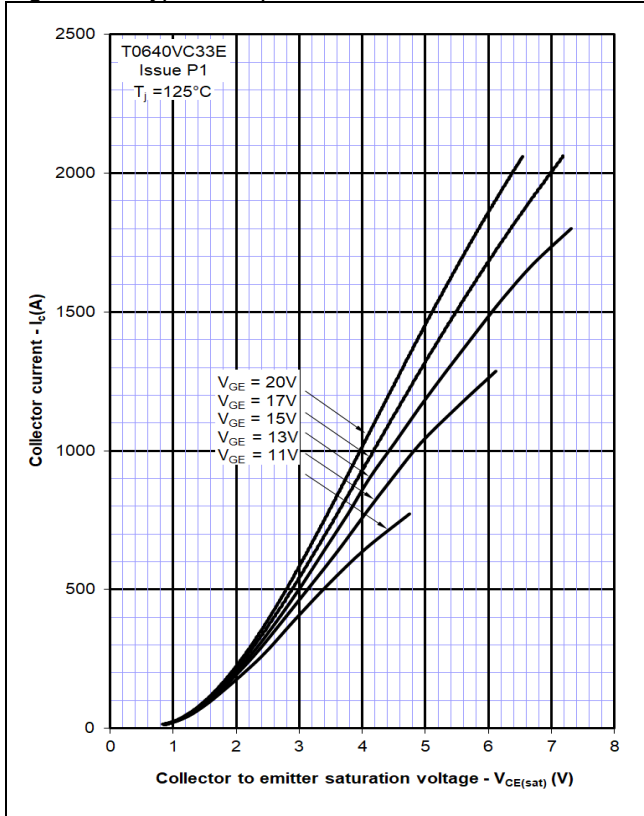


Figure 4 – Typical turn-on delay time vs gate resistance

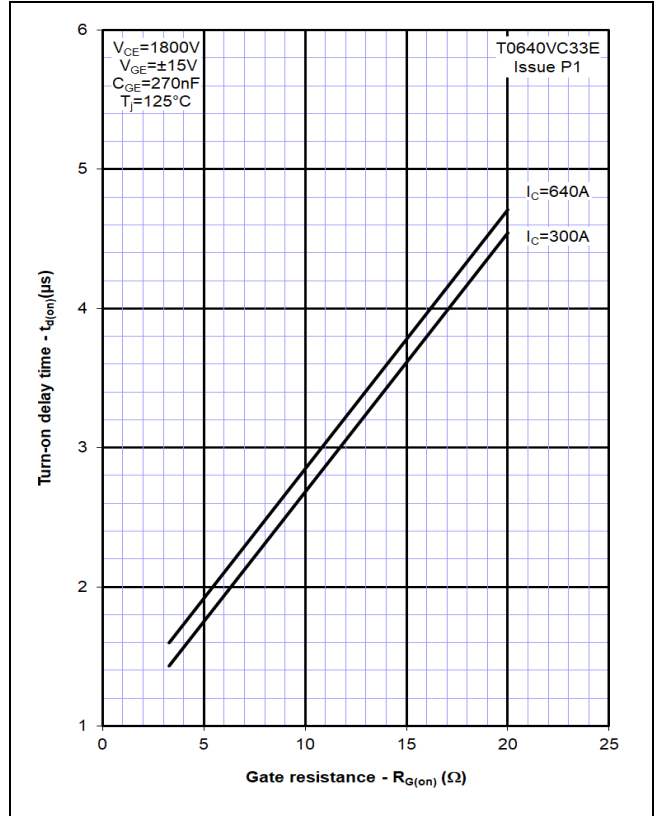


Figure 5 – Typical turn-off delay time vs. gate resistance

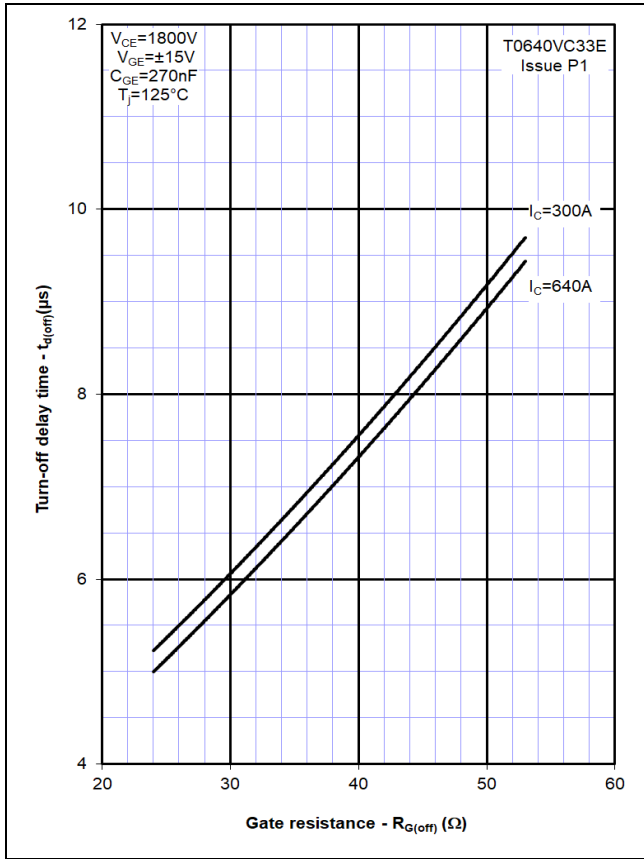


Figure 6 – Typical turn-on energy vs. collector current

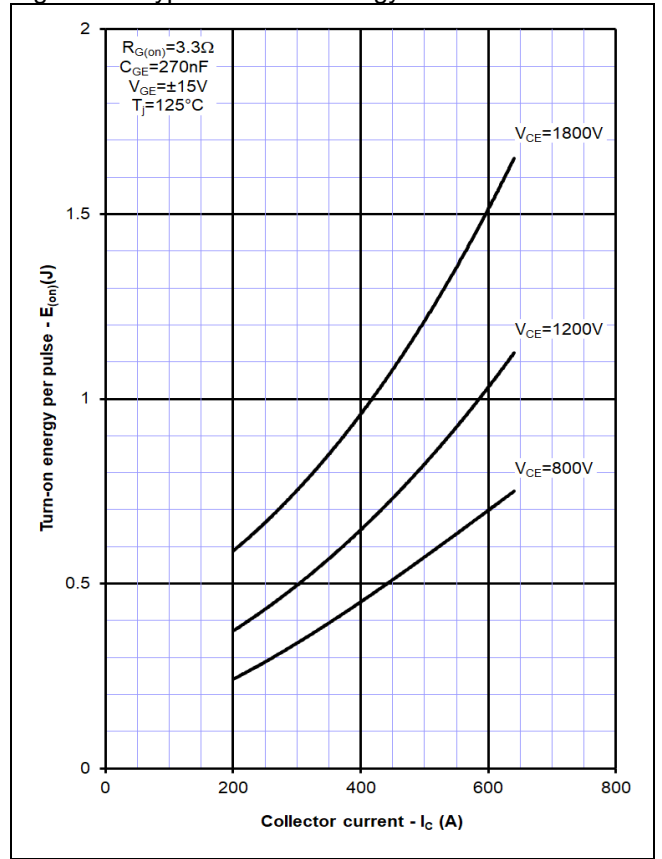


Figure 7 – Typical turn-on energy vs. di/dt

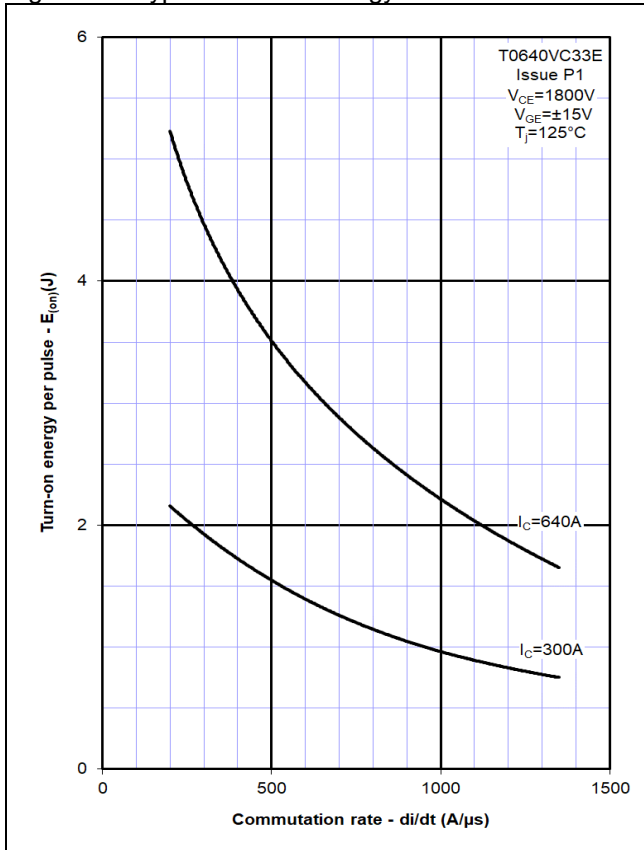


Figure 8 – Typical turn-off energy vs. collector current

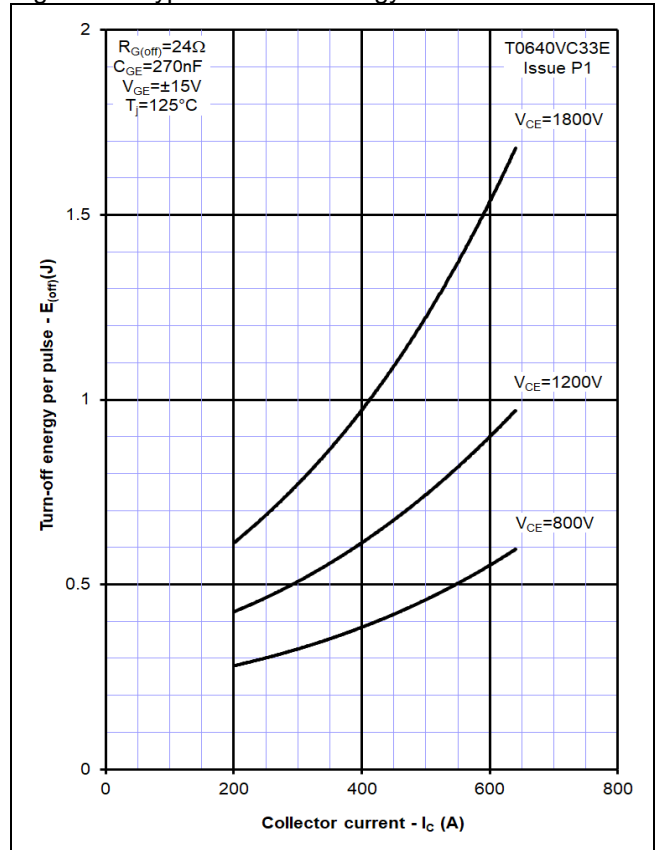


Figure 9 – Turn-off energy vs voltage

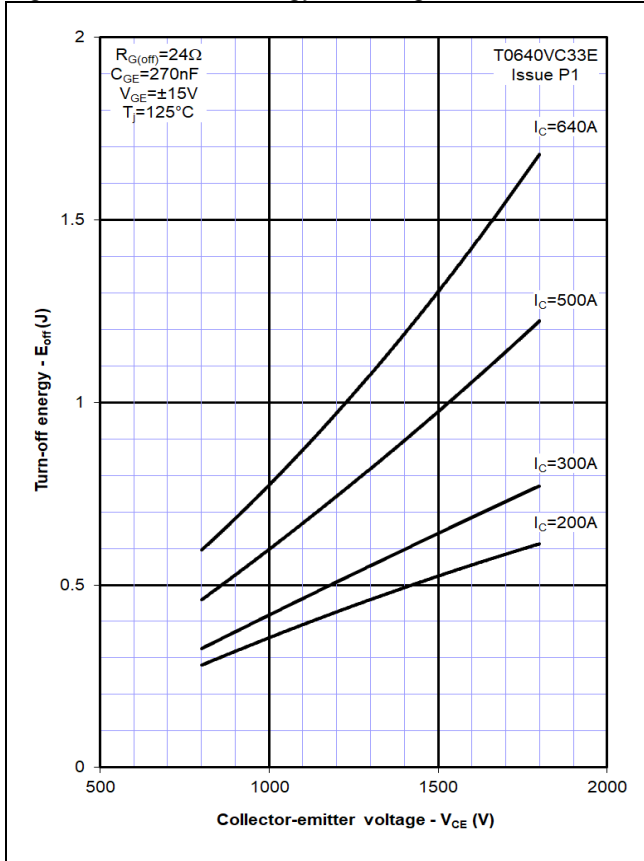


Figure 10 – Safe operating area

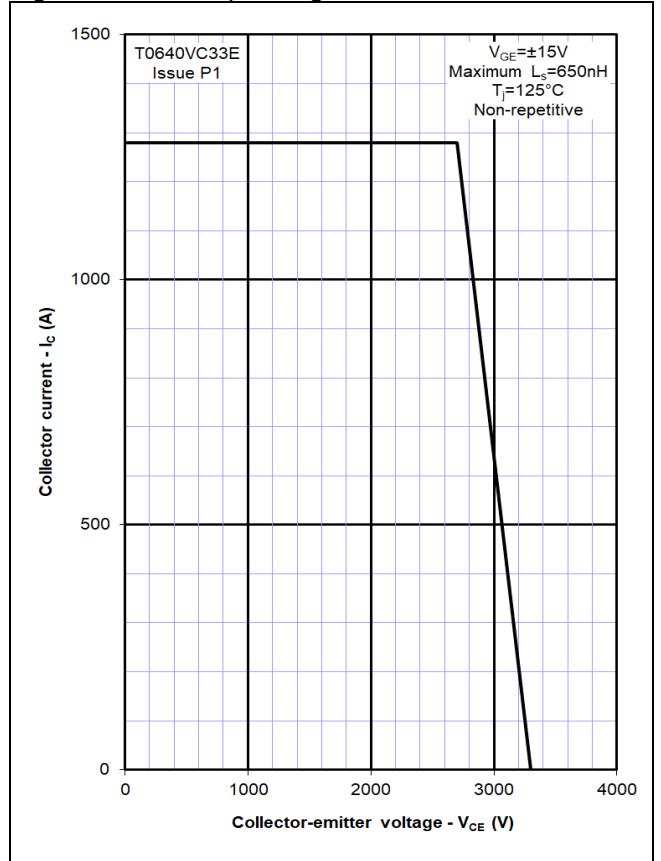
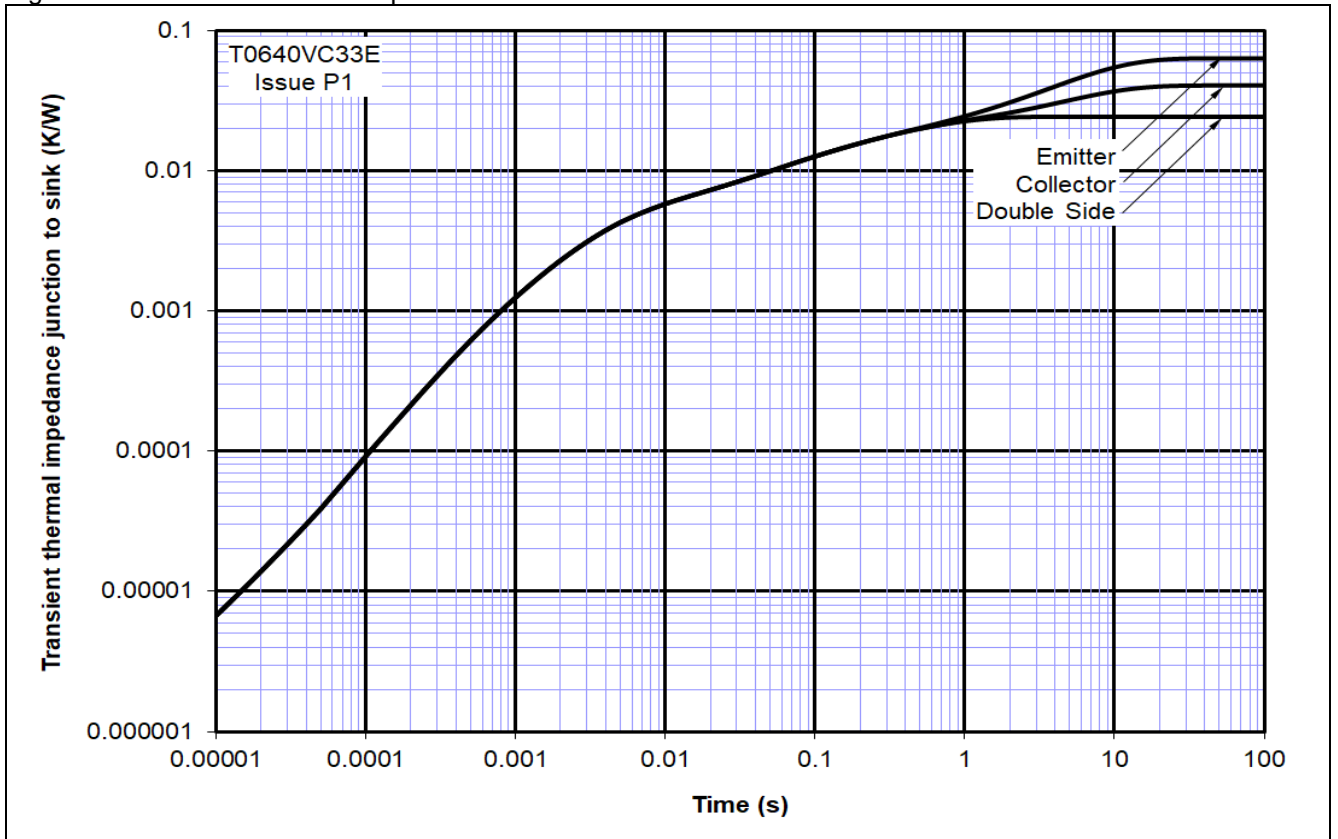


Figure 11 – Transient thermal impedance



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