



Key Parameters

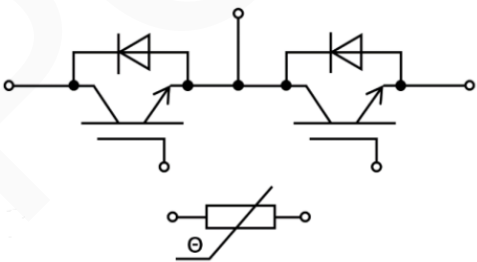
V_{CE}	= 1700V
I_C	= 650A

Features

- 1700V Trench Gate & Field Stop Structure
- Integrated Temperature Sensor
- V_{CEsat} with Positive Temperature Coefficient
- Low Thermal Resistance Package
- High Power Density
- Isolated Base Plate

Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS
- Static Var Generator



Equivalent Circuit Schematic

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Absolute Maximum Ratings						
Symbol	Characteristic	Value			Unit	
V _{CES}	Collector-Emitter Voltage	1700			V	
I _{CDC}	Continuous DC Collector Current (T _c =110°C, T _j =175°C)	650			A	
I _{CRM}	Peak Collector Current (tp=1ms)	1300			A	
V _{GES}	Gate-Emitter Voltage	±20			V	
P _{tot}	Total Power Dissipation (T _c =25°C, T _j =175°C)	3900			W	
IGBT Characteristics						
Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =650A, V _{GE} =15V, T _{Vj} =25°C		1.80		V
		I _C =650A, V _{GE} =15V, T _{Vj} =125°C		2.10		
		I _C =650A, V _{GE} =15V, T _{Vj} =150°C		2.20		V
V _{GE(th)}	Gate-emitter Threshold Voltage	V _{GE} =V _{CE} , I _C =24mA, T _{Vj} =25°C			5.8	V
I _{CES}	Collector-Emitter leakage Current	V _{CE} =1700V, V _{GE} =0V, T _{Vj} =25°C			1.0	mA
I _{GES}	Gate-Emitter leakage Current	V _{CE} =0V, V _{GE} =±20V, T _{Vj} =25°C	-100		100	nA
R _{gint}	Internal Gate Resistance			1.0		Ω
Q _G	Gate Charge	V _{GE} =±15V, T _{Vj} =25°C		6.4		μC
R _{gint}	Internal Gate Resistance			1.0		Ω
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V,		74		nF
C _{res}	Reverse Transfer Capacitance	f=100KHz, T _{Vj} =25°C		0.9		nF
t _{d(on)}	Turn-on Delay Time	I _C =650A V _{CE} = 900 V V _{GE} = ±15V R _{Gon} = 1.0Ω R _{Goff} = 1.0Ω di/dt _{on} =6800A/μs (T _{Vj} =150° C), dv/dt _{off} =4000V/μs (T _{Vj} =150° C), Inductive Load	T _{Vj} =25°C	210		ns
			T _{Vj} =125°C	225		
			T _{Vj} =150°C	230		
t _r	Rise Time		T _{Vj} =25°C	60		ns
			T _{Vj} =125°C	75		
			T _{Vj} =150°C	80		
t _{d(off)}	Turn-off Delay Time		T _{Vj} =25°C	700		ns
			T _{Vj} =125°C	825		
			T _{Vj} =150°C	830		
t _f	Fall Time		T _{Vj} =25°C	470		ns
			T _{Vj} =125°C	640		
			T _{Vj} =150°C	685		
E _{on}	Energy Dissipation During Turn-on Time		T _{Vj} =25°C	245		mJ
			T _{Vj} =125°C	310		
			T _{Vj} =150°C	330		
E _{off}	Energy Dissipation During Turn-off Time		T _{Vj} =25°C	170		mJ
			T _{Vj} =125°C	230		
			T _{Vj} =150°C	240		
I _{SC}	SC Data	t _{sc} ≤10μs, V _{GE} =15V, T _{Vj} =150°C, V _{cc} ≤1000V		2700		A

Diode Characteristics

Symbol	Characteristic	Conditions		Value			Unit
				Min.	Typ.	Max.	
I _F	Diode DC Forward Current				650		A
I _{FRM}	Diode Peak Forward Current	tp=1ms			1700		A
V _F	Forward Voltage	I _F =650A,T _{vj} =25°C			1.90		V
		I _F =650A,T _{vj} =125°C			2.00		V
		I _F =650A,T _{vj} =150°C			2.05		V
I _{rr}	Peak Reverse Recovery Current	I _F =650A V _R =900V -di _F /dt =6800A/μs, (T _{vj} =150°C), Inductive Load	T _{vj} =25°C		350		A
			T _{vj} =125°C		365		
			T _{vj} =150°C		370		
Q _{rr}	Recovered Charge		T _{vj} =25°C		130		μC
			T _{vj} =125°C		205		
			T _{vj} =150°C		235		
E _{rec}	Reverse Recovery Energy		T _{vj} =25°C		60		mJ
			T _{vj} =125°C		105		
			T _{vj} =150°C		125		

Module Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{isol}	Isolation voltage	$t=1min, f=50Hz$	3400			V
T_{jmax}	Maximum Junction Temperature				175	$^{\circ}C$
$T_{vj op}$	Operating Junction Temperature		-40		150	$^{\circ}C$
T_{stg}	Storage Temperature		-40		125	$^{\circ}C$
$R_{CC'+EE'}$	Module lead resistance terminal to chip			1.1		m Ω
L_{SCE}	Stray Inductance, Module			20		nH
$R_{\theta jc}$	Junction-to Case	per IGBT-inverter		0.038		$^{\circ}C/W$
		per Diode-inverter		0.070		$^{\circ}C/W$
$R_{\theta cs}$	Case to Sink	per IGBT-inverter		0.033		$^{\circ}C/W$
		per Diode-inverter		0.038		$^{\circ}C/W$
M_t	Module Electrodes Torque	Recommended(M6)	3.0		6.0	N·m
M_s	Module-to-Sink Torque	Recommended(M5)	3.0		6.0	N·m
G	Weight of Module			345		g

NTC thermistors Characteristics

Symbol	Characteristic	Conditions	Min.	Typ.	Max.	Unit
R_{25}	Rated resistance			5.0		k Ω
P_{25}	Power Dissipation				10.0	mW
$B_{25/50}$	B-value	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3375		K
$B_{25/80}$	B-value	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3414		K
$B_{25/100}$	B-value	$R_2=R_{25}\exp[B_{25/100}(1/T_2-1/(298.15K))]$		3436		K

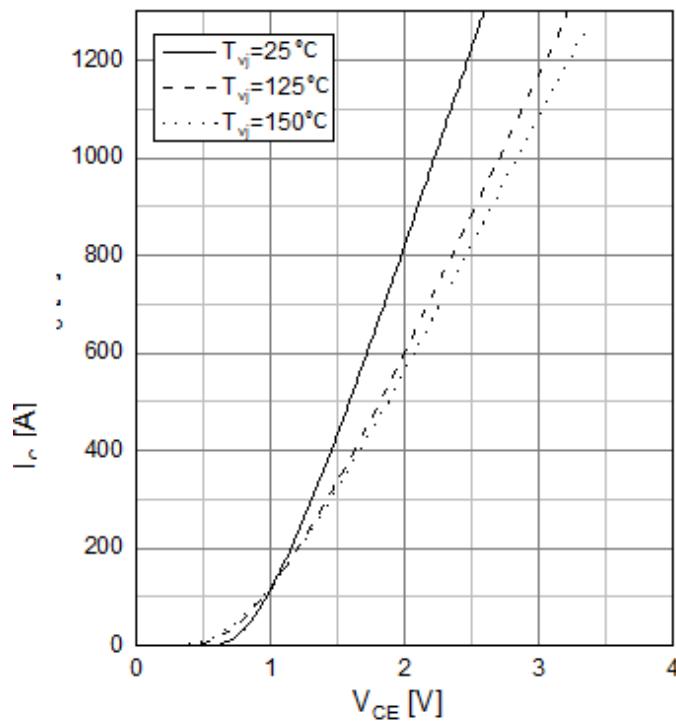
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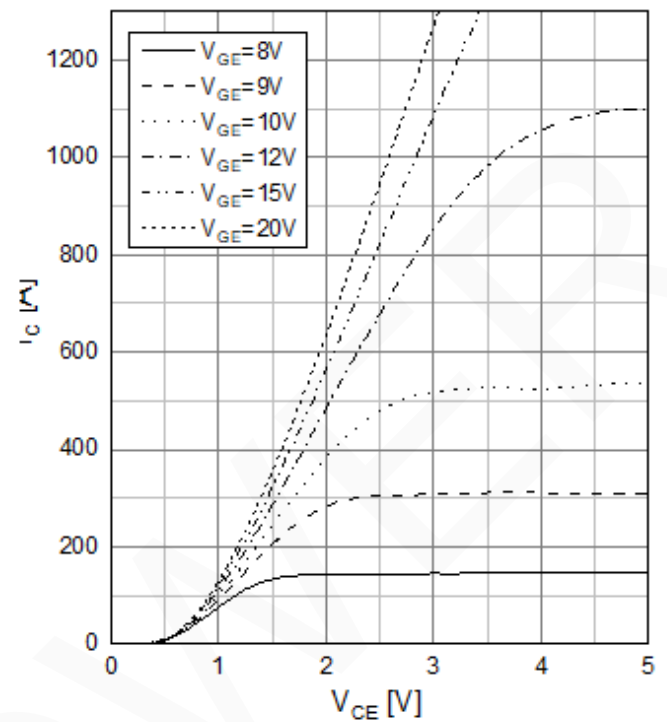
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Revision : 0

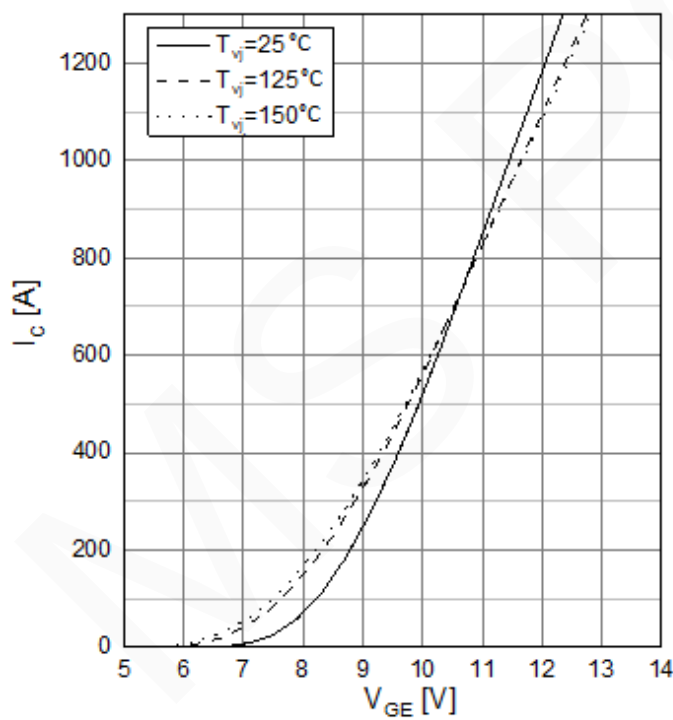
IGBT
Output Characteristic IGBT
 $I_C = f(V_{CE}), V_{GE} = 15V$



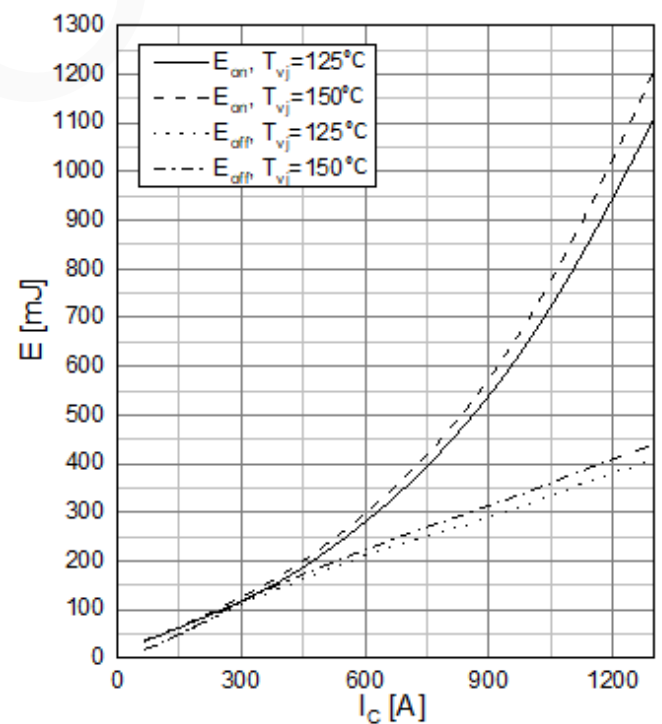
IGBT
Output Characteristic IGBT
 $I_C = f(V_{CE}), T_{vj} = 150^\circ C$



IGBT
Transfer Characteristic IGBT
 $I_C = f(V_{GE}), V_{CE} = 20V$

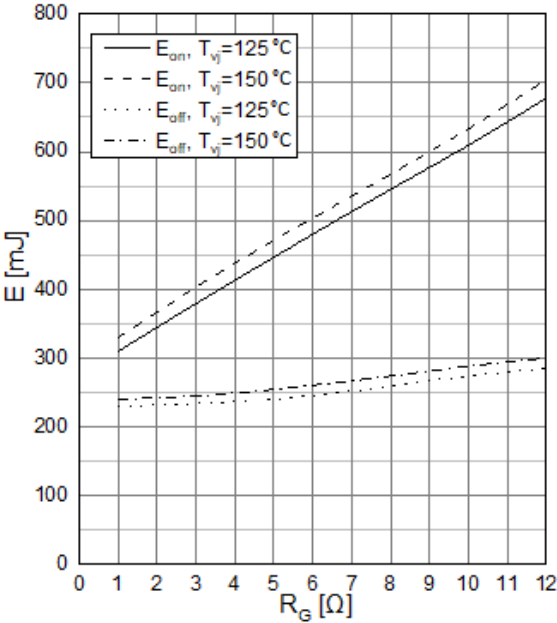


IGBT
Switching Losses IGBT
 $E = f(I_C), V_{GE} = \pm 15V, R_{Qon} = R_{Qoff} = 10, V_{CE} = 900V$

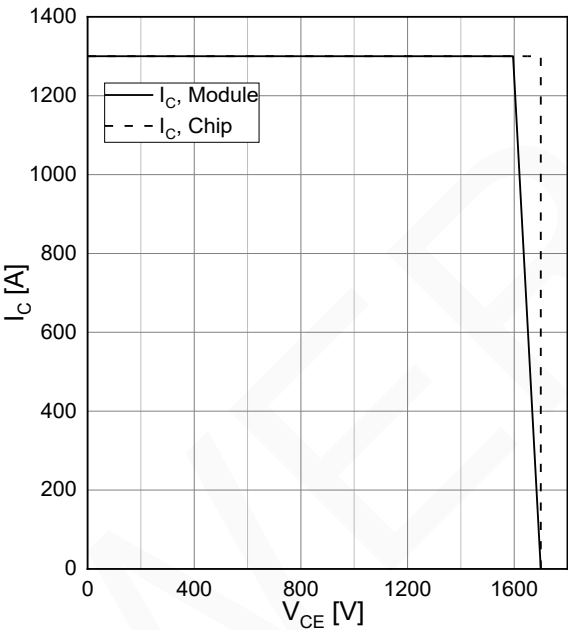


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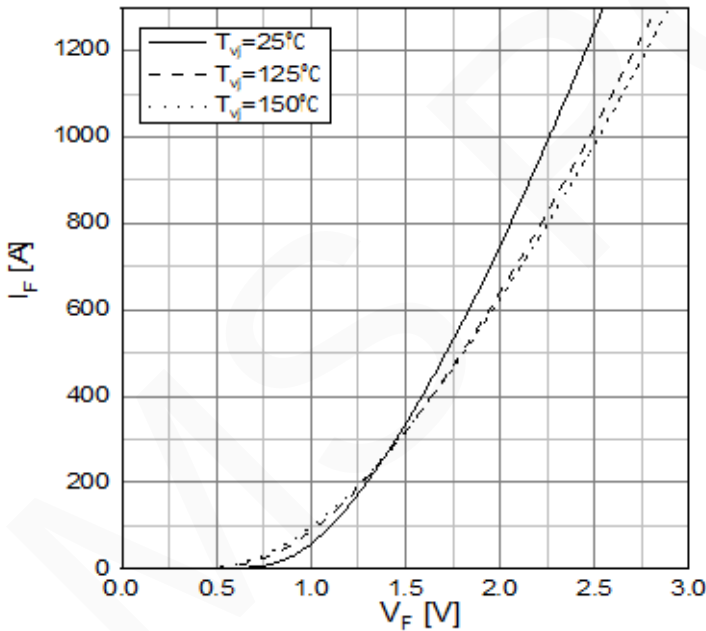
IGBT
Switching Losses IGBT
 $E=f(R_g), V_{GE}=\pm 15V, I_c=650A, V_{CE}=900V$



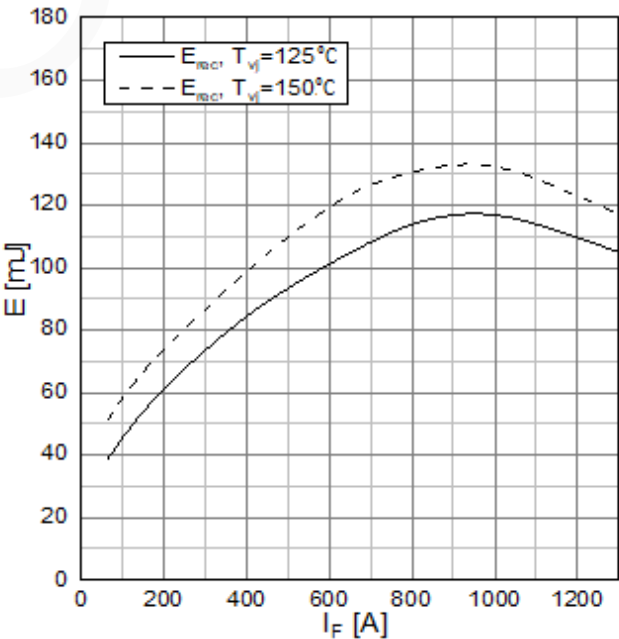
IGBT
Reverse Bias Safe Operating Area IGBT
 $V_{GE}=\pm 15V, R_{goff}=1\Omega, T_{vj}=150^\circ C$



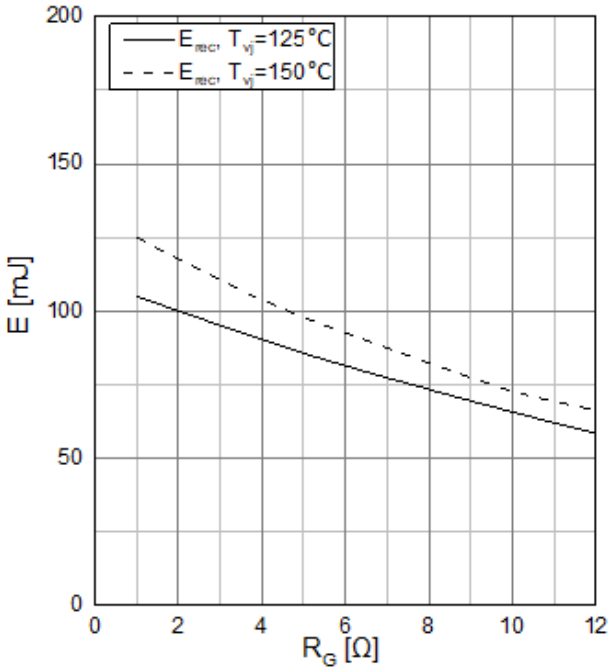
Diode
Forward Characteristic Diode
 $I_F=f(V_F)$



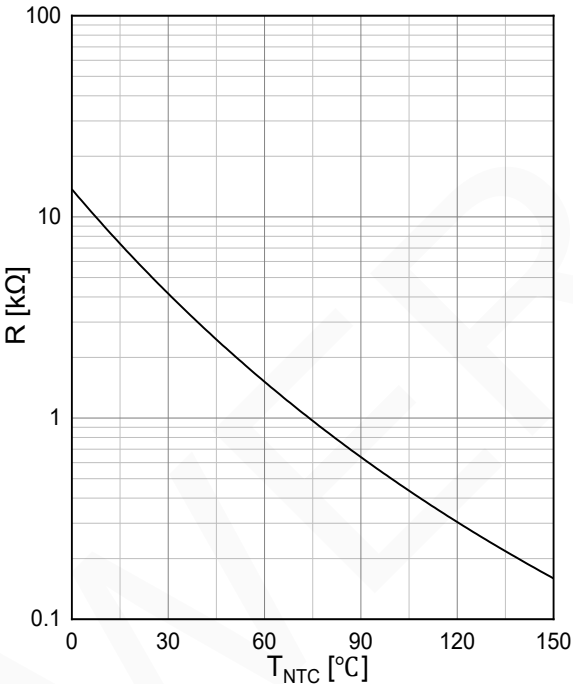
Diode
Switching Losses Diode
 $E_{rec}=f(I_F), R_{gon}=1\Omega, V_{CE}=900V$



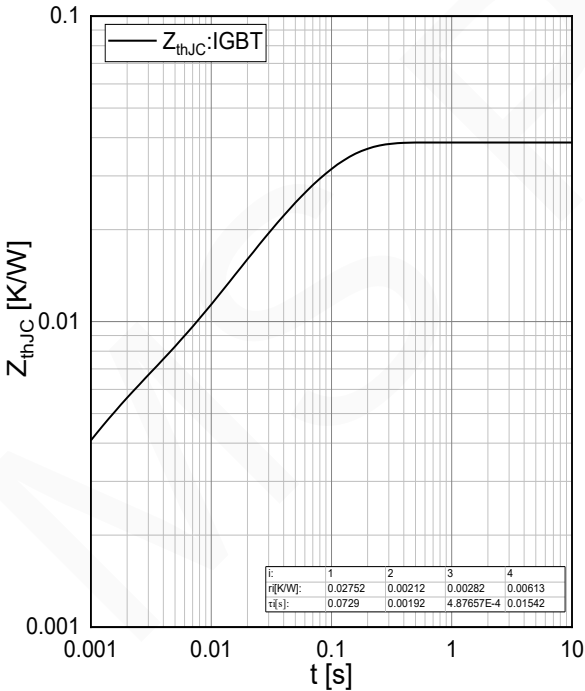
Diode
Switching Losses Diode
 $E_{rec}=f(R_G), I_F=650A, V_{CE}=900V$



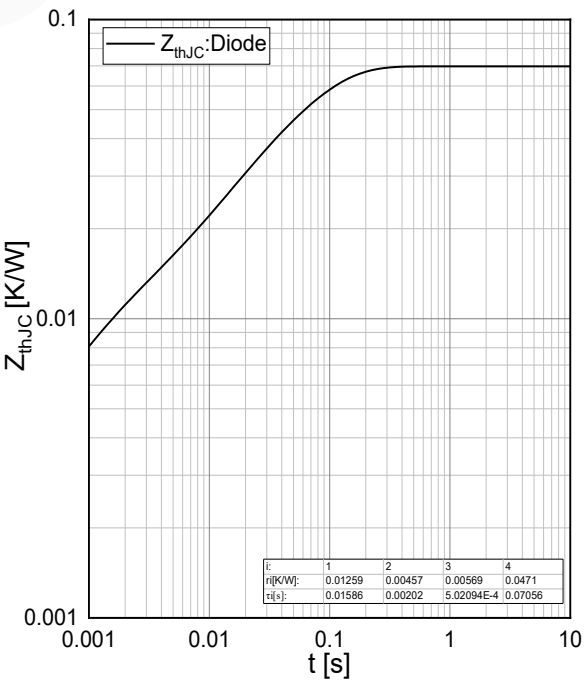
NTC Temperature Characteristic



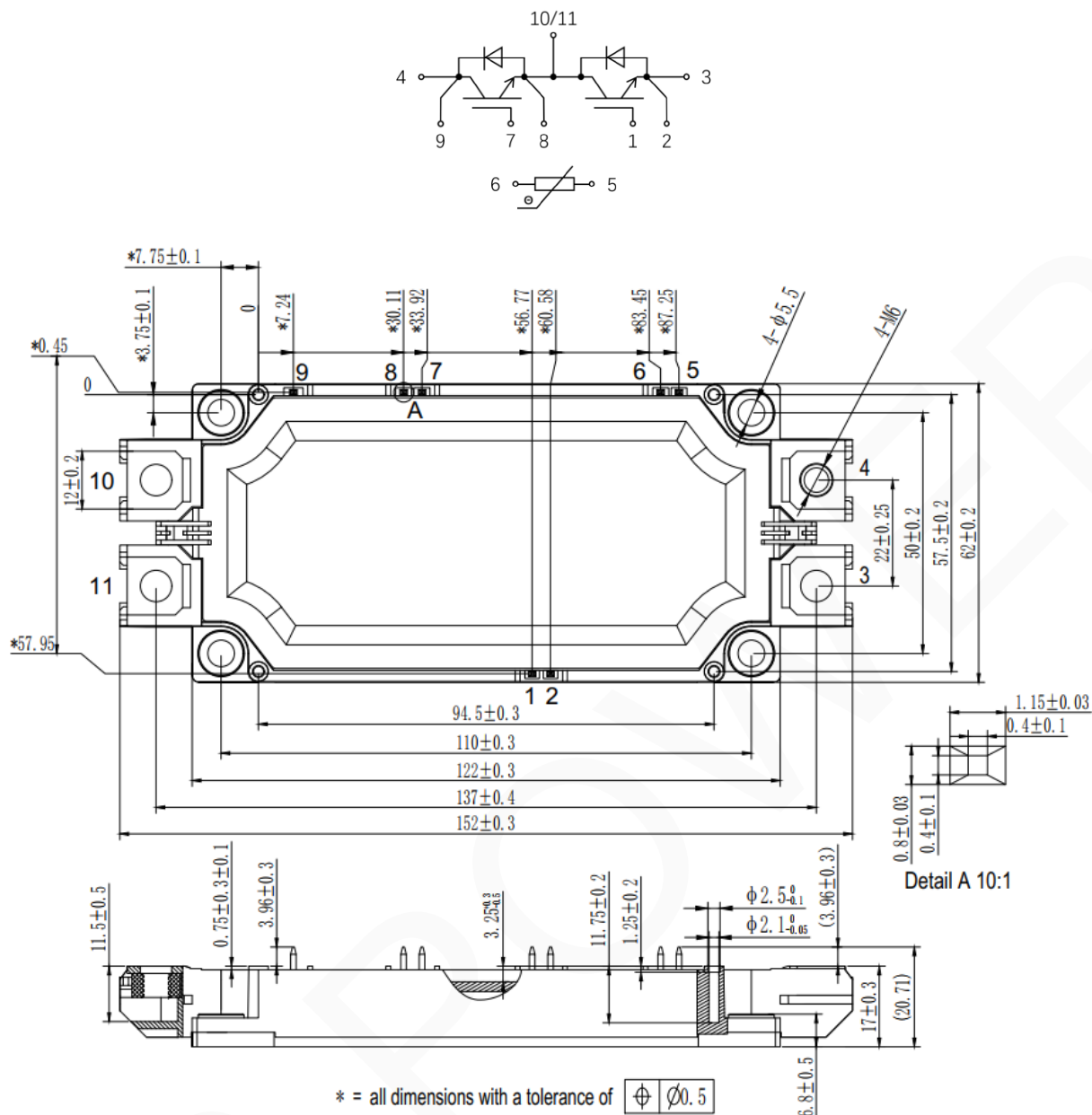
IGBT
Transient Thermal Impedance IGBT
 $Z_{thJC}=f(t)$



Diode
Transient Thermal Impedance Diode
 $Z_{thJC}=f(t)$



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