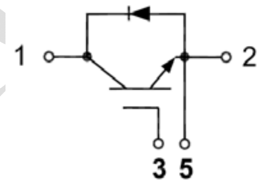
GT400SD65T2ZH-M

IGBT Module

Preliminary Data

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated >10μs
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested(2×Ic)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- High Power Converters
- Induction Heating
- UPS Systems

IGBT, Inverter
Maximum Rated Values of IGBT(T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 100℃	400	A
		T_C = 25℃	800	A
I_{CM}	Repetitive Peak Collector Current	T_J = 175℃	800	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C = 25℃ T_{Jmax}=175℃	3260	W

Electrical Characteristics of IGBT (T_C=25℃ unless otherwise specified)

Static Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C= 6.4mA, V_{CE}=V_{GE}		5.0	5.9	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=400A, V_{GE}= 15V	T_J=25℃		1.70	2.00	V
			T_J=125℃		2.00		V
			T_J=150℃		2.00		
I_{CES}	Collector-Emitter Leakage Current	V_{GE}=0V, V_{CE}= V_{CES}, T_J = 25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE}= ±20V, V_{CE}= 0V, T_J=25℃				300	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V , f =1MHz			32.6		nF
C_{oes}	Output Capacitance				1.82		nF
C_{res}	Reverse Transfer Capacitance				0.50		nF

Switching Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V,I_C=400A, R_{Gon} =1Ω,V_{GE}=±15V Inductive Load	T_J=25℃		284		ns
			T_J=125℃		275		
			T_J=150℃		269		
t_r	Rise Time		T_J=25℃		285		ns
			T_J=125℃		285		
			T_J=150℃		284		
$t_{d(off)}$	Turn-off Delay Time	V_{CC} = 300V,I_C = 400A, R_{Goff} =1Ω,V_{GE}=±15V Inductive Load	T_J=25℃		366		ns
			T_J=125℃		371		
			T_J=150℃		375		
t_f	Fall Time		T_J=25℃		142		ns
			T_J=125℃		152		
			T_J=150℃		156		
E_{on}	Turn-on Switching Loss	V_{CC} = 300V,I_C = 400A, R_{Gon} =1Ω,V_{GE}=±15V di/dt=1211A/μs(T_J=150℃), Inductive Load	T_J=25℃		4.1		mJ
			T_J=125℃		5.3		
			T_J=150℃		5.8		

E_{off}	Turn-off Switching Loss	V_{CC} = 300V, I_C = 400A, R_{Goff} = 1Ω, V_{GE} = ±15V du/dt=2678V/μs(T_J=150℃), Inductive Load	T_J=25℃		27.5		mJ
			T_J=125℃		29.2		
			T_J=150℃		30		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		1.72		μC
RBSOA	I_C=800A, V_{CC}=600V, Vp=650V, R_{Goff} = 1Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
SCSOA	V_{CC} = 300V, V_{GE}=±15V, T_J = 150℃			10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(per leg)				0.046		℃/W

Diode, Inverter

Maximum Rated Values of Diode (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	400	A
I_{FM}	Diode Maximum Forward Current	800	A

Electrical Characteristics of Diode (T_C=25℃ unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F =400A	T_J=25℃		2.00		V
			T_J=125℃		2.00		
			T_J=150℃		2.10		
t_{rr}	Reverse Recovery Time	I_F=400A, $-di_F/dt$ =1271A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		184		ns
			T_J=125℃		249		
			T_J=150℃		277		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		69		A
			T_J=125℃		119		
			T_J=150℃		131		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		7.8		μC
			T_J=125℃		18.3		
			T_J=150℃		22.5		

E_{rec}	Reverse Recovery Energy	I_F=400A, -di_F/dt =1271A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		0.86		mJ
			T_J=125℃		3.17		
			T_J=150℃		4.37		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)				0.074		℃/W

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
Internal Isolation				Al2O3		
Material of Module Baseplate				Copper		
d_{creep}	Terminal to Heatsink			25		mm
	Terminal to Terminal			19		mm
d_{clear}	Terminal to Heatsink			25		mm
	Terminal to Terminal			10		mm
L_{sCE}	Stray Inductance Module			16		nH
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
CTI	Comparative Tracking Index		200			
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.03		℃/W
T	Signal Terminals Screw:M4		1.1		2.0	N·m
	Power Terminals Screw:M6		3.0		5.0	N·m
T	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			320		g

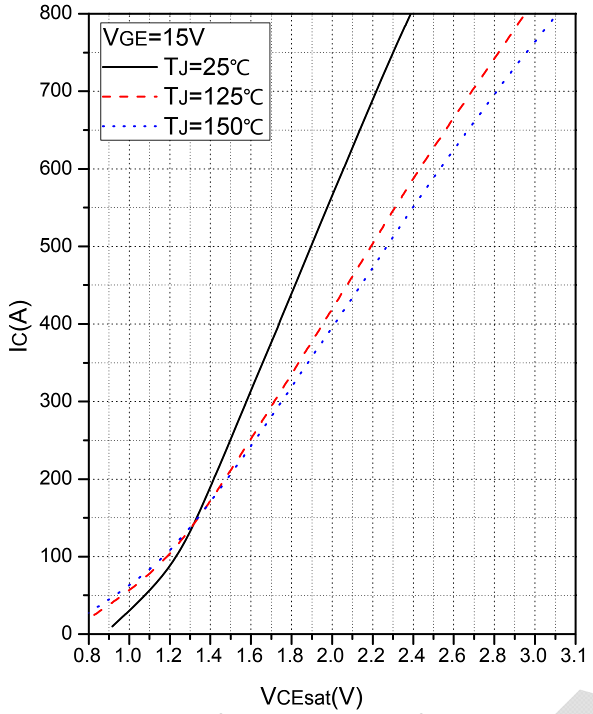


Fig.1 Typical Saturation Voltage Characteristics

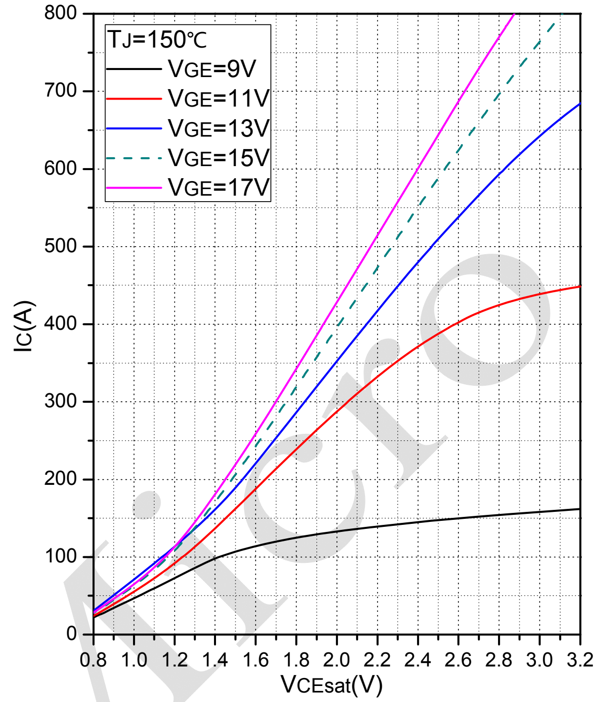


Fig.2 Typical Output Characteristics

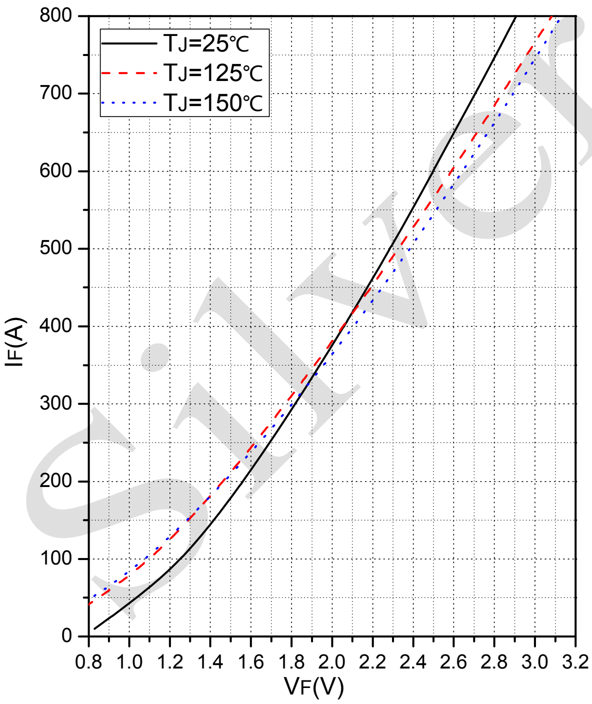


Fig.3 Forward Characteristics of Diode

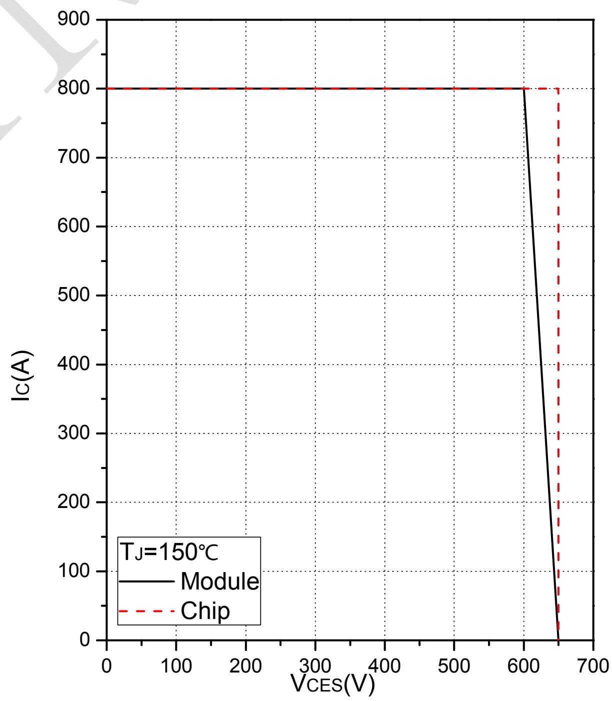


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

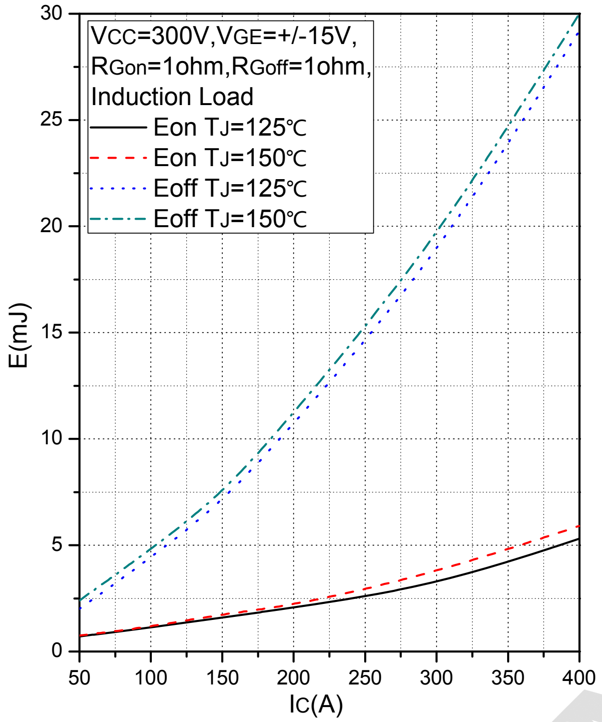


Fig.5 Typical Switching Loss vs. Collector Current

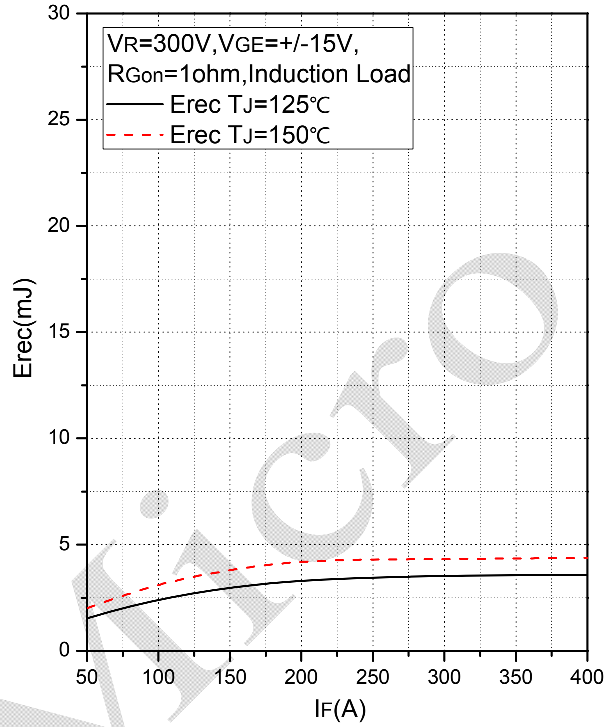


Fig.6 Typical Switching Loss vs. Forward Current

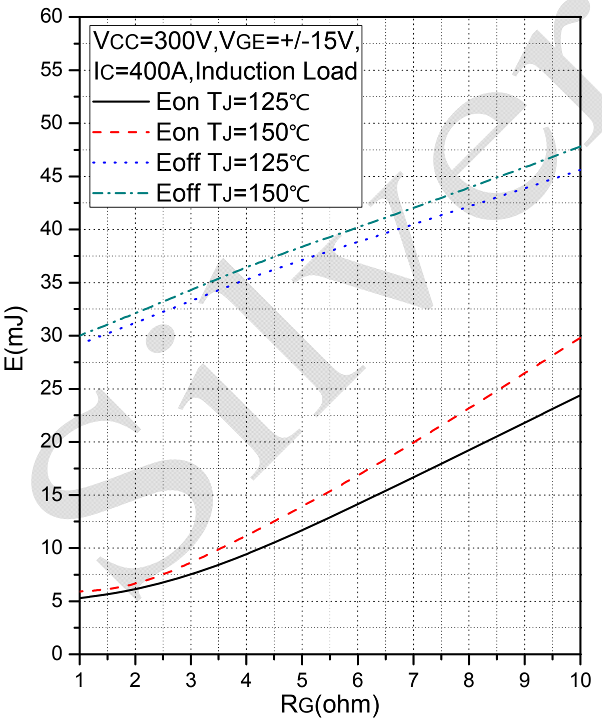


Fig.7 Typical Switching Loss vs. Gate Resistance

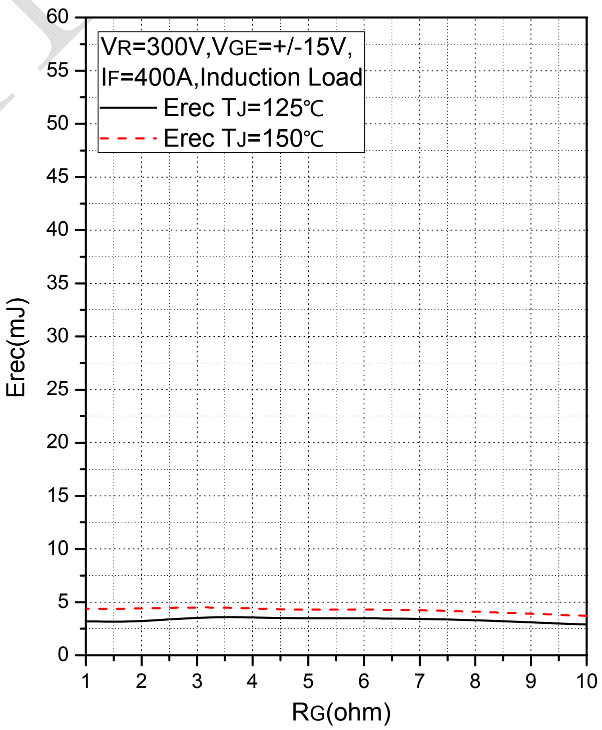


Fig.8 Typical Switching Loss vs. Gate Resistance

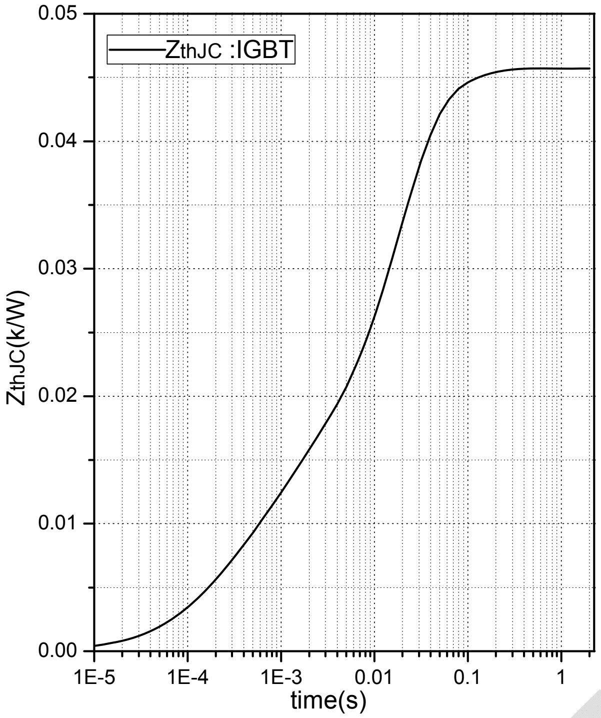


Fig.9 Transient Thermal Impedance (IGBT)

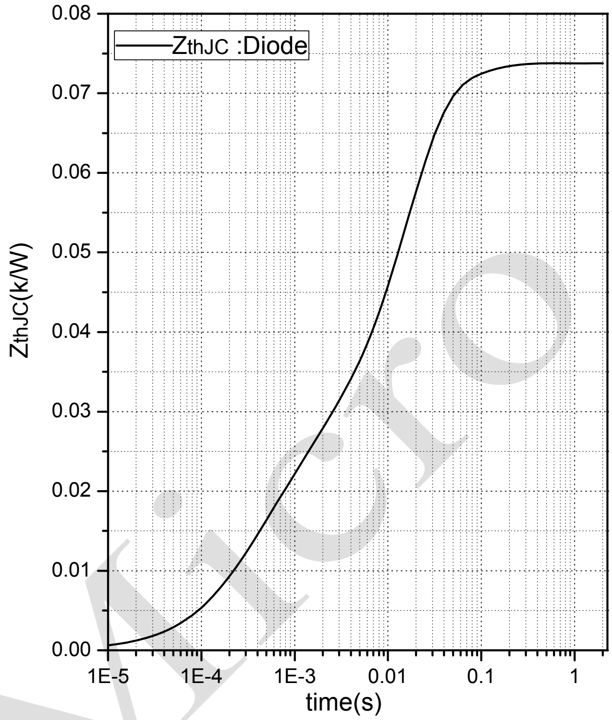
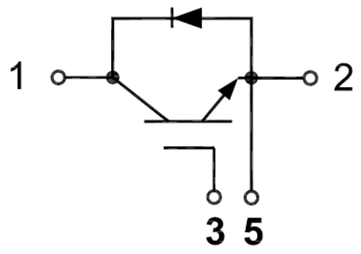
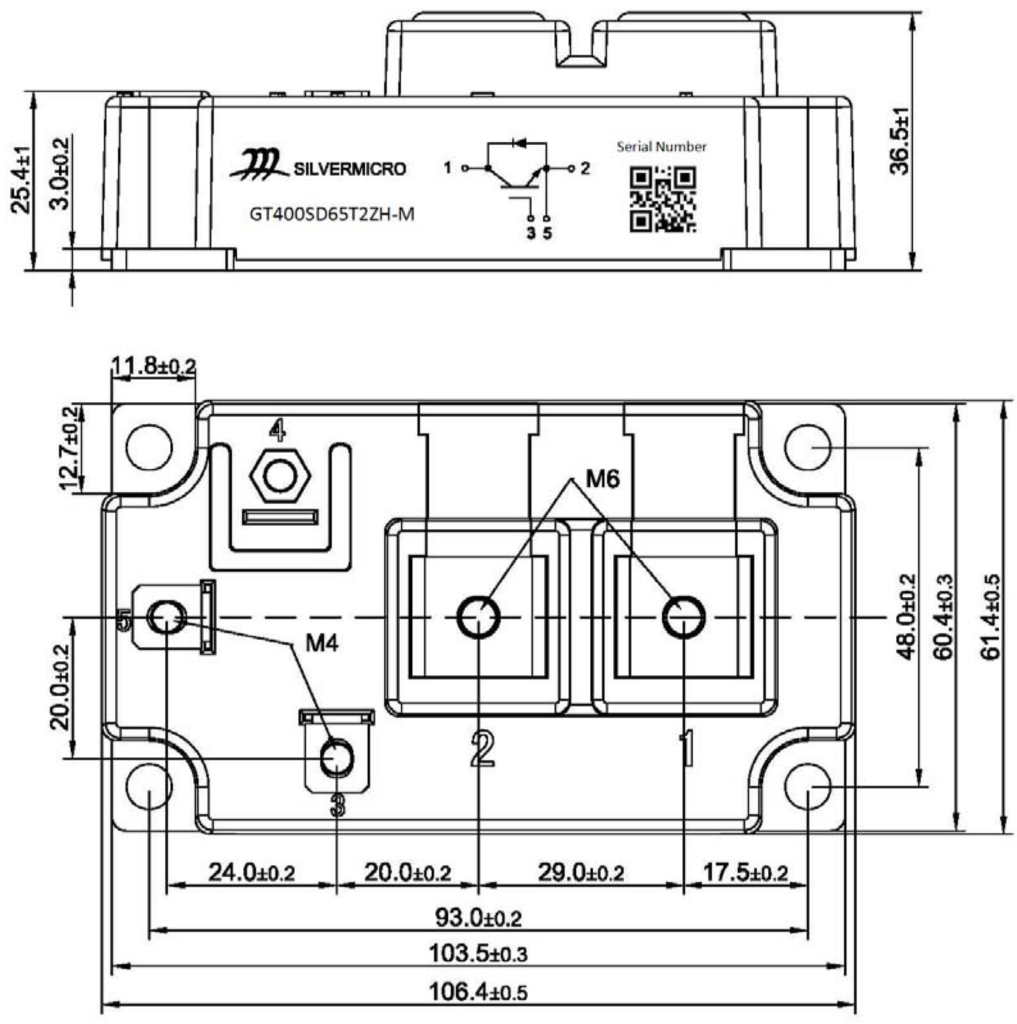


Fig.10 Transient Thermal Impedance (Diode)

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
03/06/2020	01	Initial release

Announcement

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