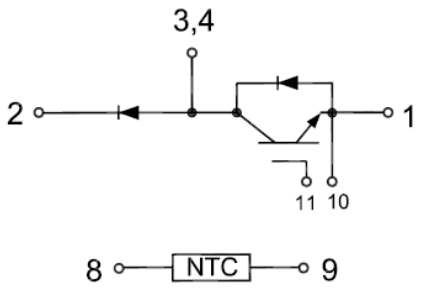
GT450CU65T9H-M

IGBT Module

Preliminary Data

Features：

- Trench & Field Stop IGBT
- Short Circuit Rated＞ 10μs
- Low Switching Loss
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Copper Wire Bonding on Power Terminal
- Lead Free, Compliant with RoHS Requirement



Applications：

- Hybrid Electrical Vehicles(H)EV
- Automotive Applications
- Commercial Agriculture Vehicles
- Motor Drives

IGBT, Brake-chopper

Maximum Rated Values(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℃	450	A
		T_C=25℃	870	A
I_{CM}	Peak Collector Current Repetitive	T_J=175℃	900	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C=25℃ T_{Jmax}=175℃	2027	W

SILVERMICRO

Electrical Characteristics of Brake-chopper 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=12mA, V_{CE}=V_{GE}		5.0	6.1	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=450A, V_{GE}=15V	T_J=25℃		1.50		V
			T_J=125℃		1.65		V
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℃				800	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V , f =1MHz			36.5		nF
C_{oes}					1.68		nF
C_{res}	Reverse Transfer Capacitance				1.20		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V,I_C=450A, R_{Gon}=3Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.61		μs
			T_J=125℃		0.61		
t_r	Rise Time		T_J=25℃		0.30		μs
			T_J=125℃		0.31		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=300V,I_C=450A, R_{Goff}=3Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.54		μs
			T_J=125℃		0.55		
t_f	Fall Time		T_J=25℃		0.15		μs
			T_J=125℃		0.18		
E_{on}	Turn-on Switching Loss	V_{CC}=300V,I_C=450A, R_{Gon}=3Ω,V_{GE}=±15V, di/dt=1850A/μs (T_J=125℃) Inductive Load	T_J=25℃		7.30		mJ
			T_J=125℃		7.95		
E_{off}	Turn-off Switching Loss	V_{CC}=300V,I_C=450A, R_{Goff} =3Ω,V_{GE}=±15V, du/dt=3800V/μs (T_J=125℃) Inductive Load	T_J=25℃		19.35		mJ
			T_J=125℃		23.25		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		2.73		uC
RBSOA	I_C=900A,V_{CC}=600V,Vp=650V, R_{Goff} = 3Ω, 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)				0.074		℃/W

Diode, Brake-chopper

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

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	450	A
I_{FM}	Diode Maximum Forward Current	900	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F=450A	T_J=25℃		1.40		V
			T_J=125℃		1.40		
t_{rr}	Reverse Recovery Time	I_F=450A, -diF/dt =2100A/μs(T_J=125℃), V_R=300V, V_{GE}=-15V I	T_J=25℃		0.21		μs
			T_J=125℃		0.29		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		155		A
			T_J=125℃		207		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		12.8		μC
			T_J=125℃		24.5		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.37		mJ
			T_J=125℃		3.29		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)				0.122		℃/W

Diode, Anti-parallel

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

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Diode Maximum Forward Current	600	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F =300A	T_J=25℃		1.90		V
			T_J=125℃		1.90		
			T_J=150℃		1.90		
t_{rr}	Reverse Recovery Time	I_F＝300A, -diF/dt =1440A/μs(T_J=125℃), V_R = 300V, V_{GE} = -15V	T_J=25℃		0.14		μs
			T_J=125℃		0.19		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		103		A
			T_J=125℃		138		
Q_{rr}	Reverse Recovery Charge		T_J=25℃		8.6		μC
			T_J=125℃		16.3		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.25		mJ
			T_J=125℃		2.19		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per leg)				0.224		℃/W

Internal NTC-Thermistor Characteristics

R_{25}	T_C =25℃	5		kΩ
△R/R	T_C =100℃，R_{100} =481Ω		±5	%
P_{25}	T_C =25℃	50		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$	3440		K

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500			V
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)			0.02		℃/W
M	Power Terminals Screw:M5		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			330		g

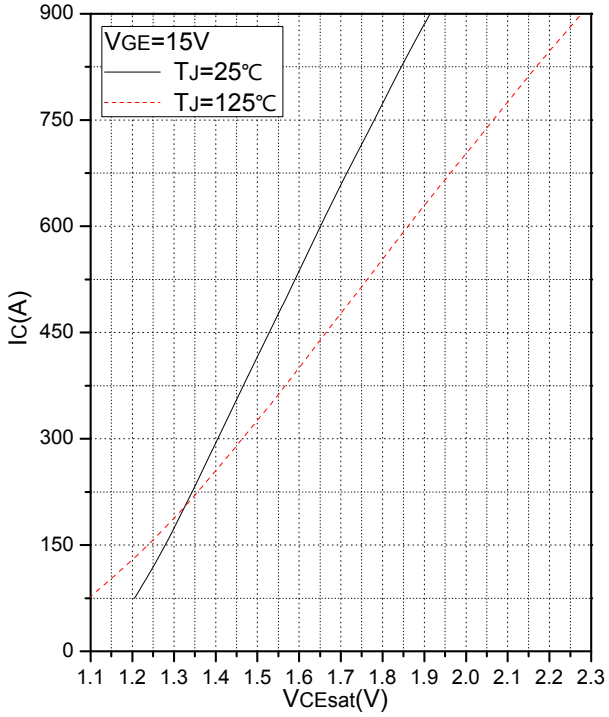


Fig.1 Typical Saturation Voltage Characteristics

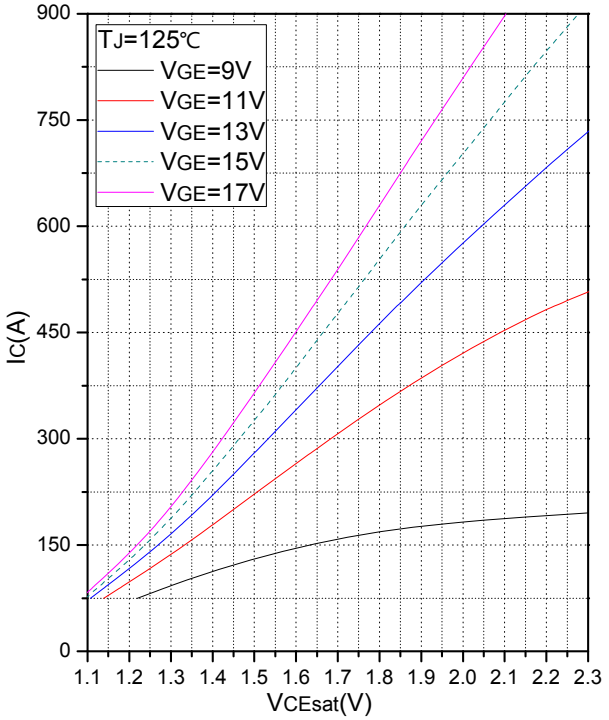


Fig.2 Typical Output Characteristics

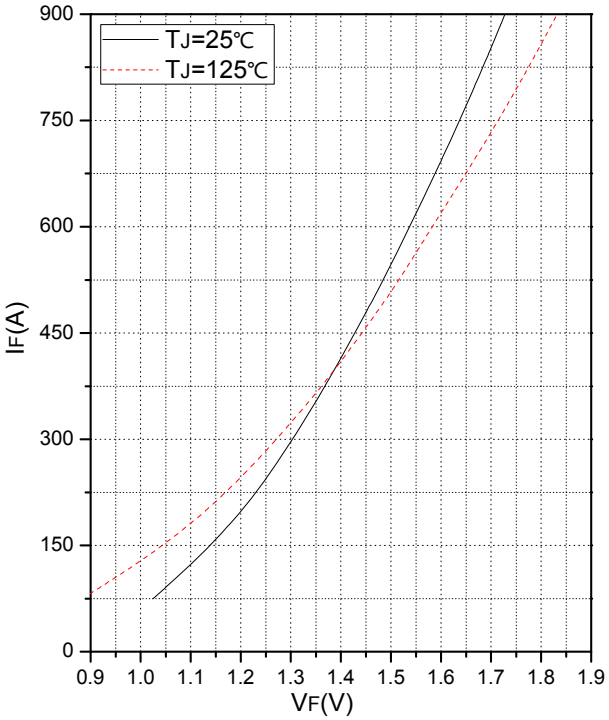


Fig.3 Forward Characteristics of Brake-chopper Diode

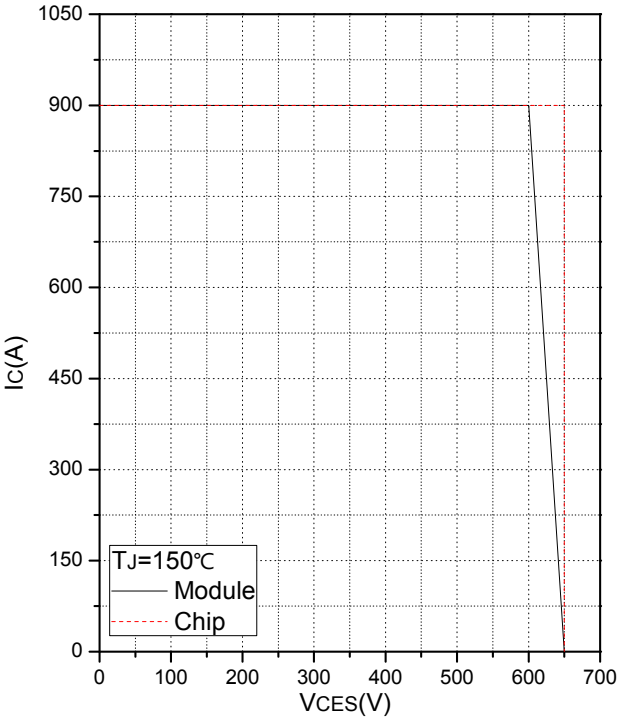


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

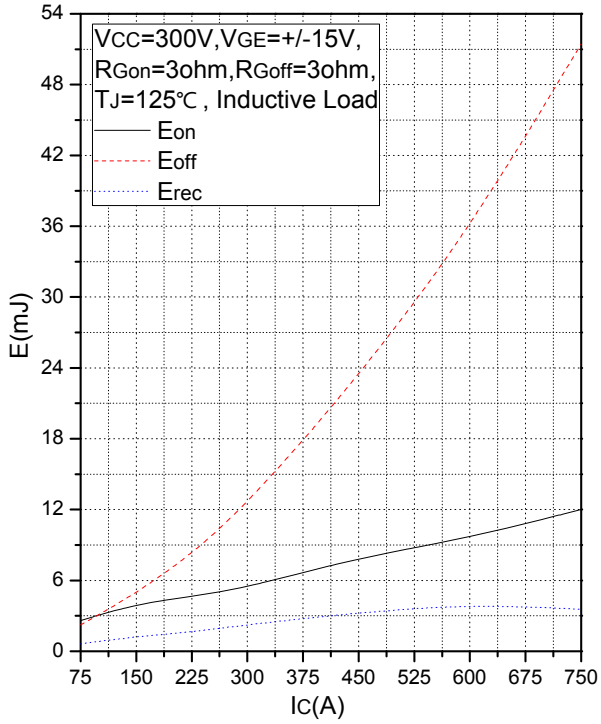


Fig.5 Typical Switching Loss vs. Collector Current

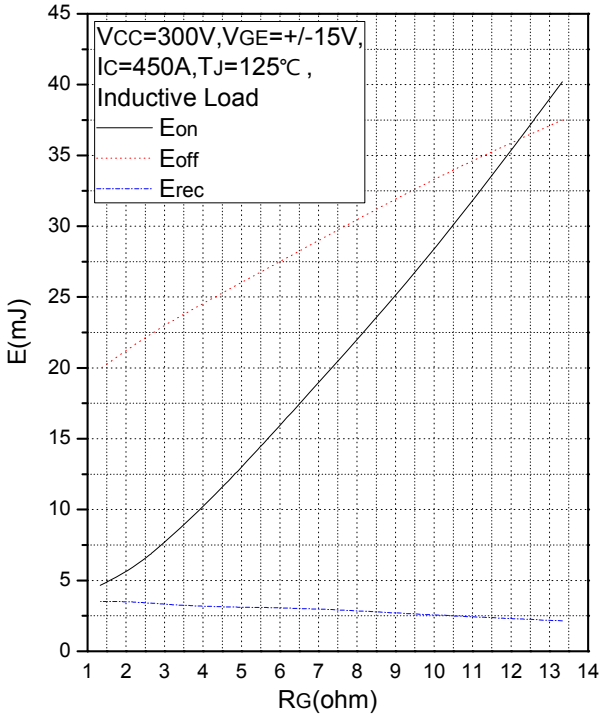


Fig.6 Typical Switching Loss vs. Gate Resistance

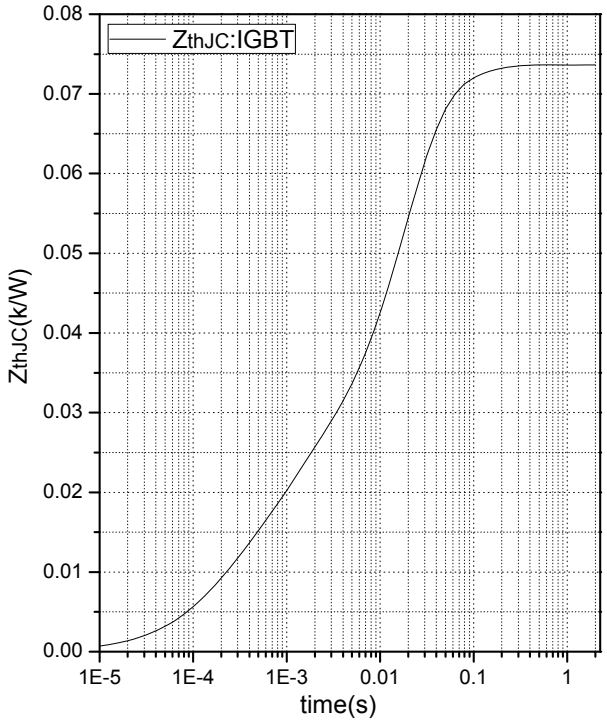


Fig.7 Transient Thermal Impedance (IGBT)

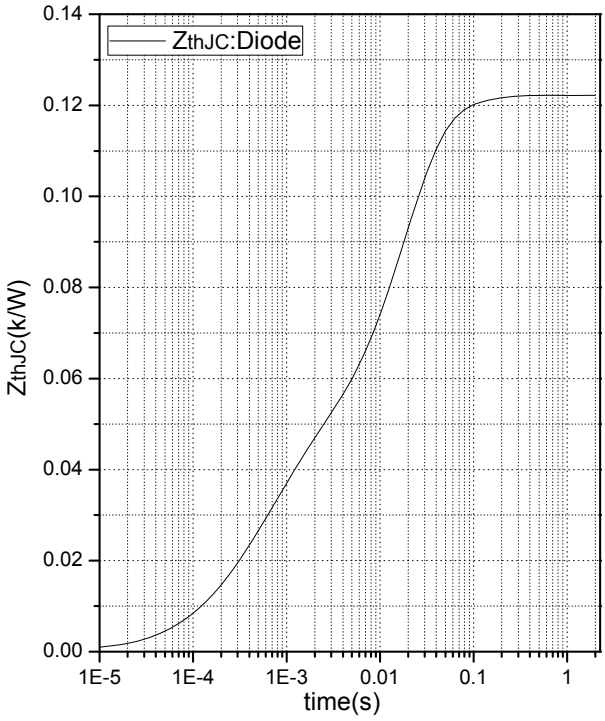


Fig.8 Transient Thermal Impedance (Diode)

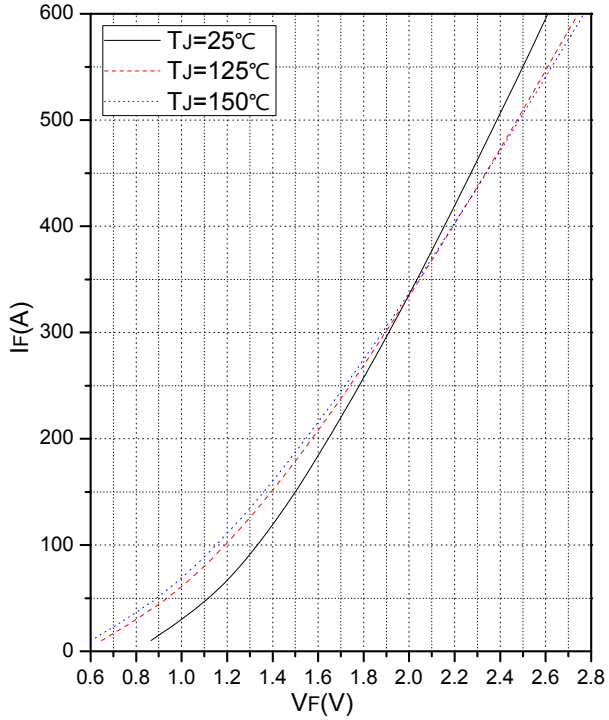


Fig.9 Forward Characteristics of Anti-parallel Diode

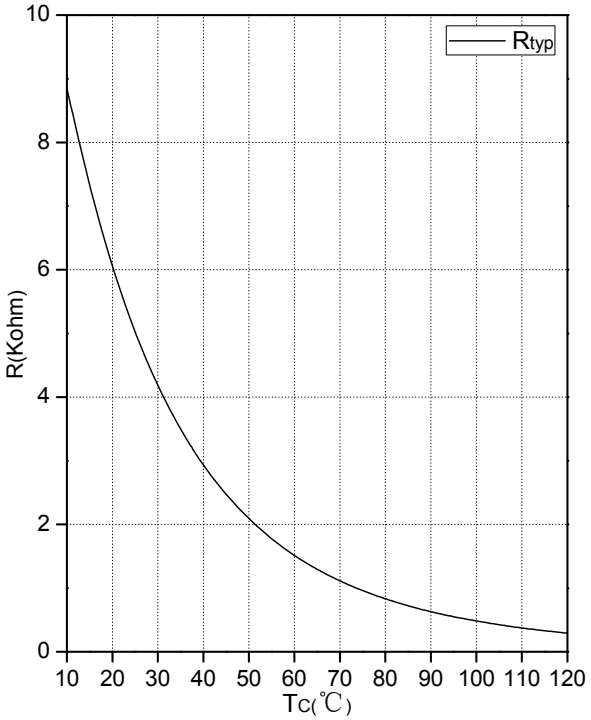
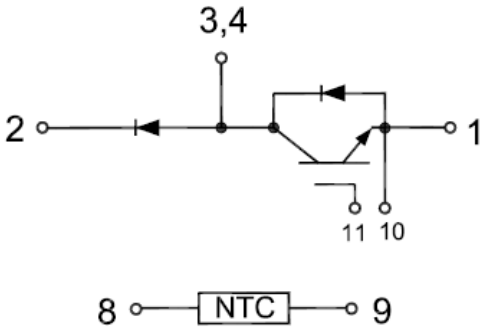
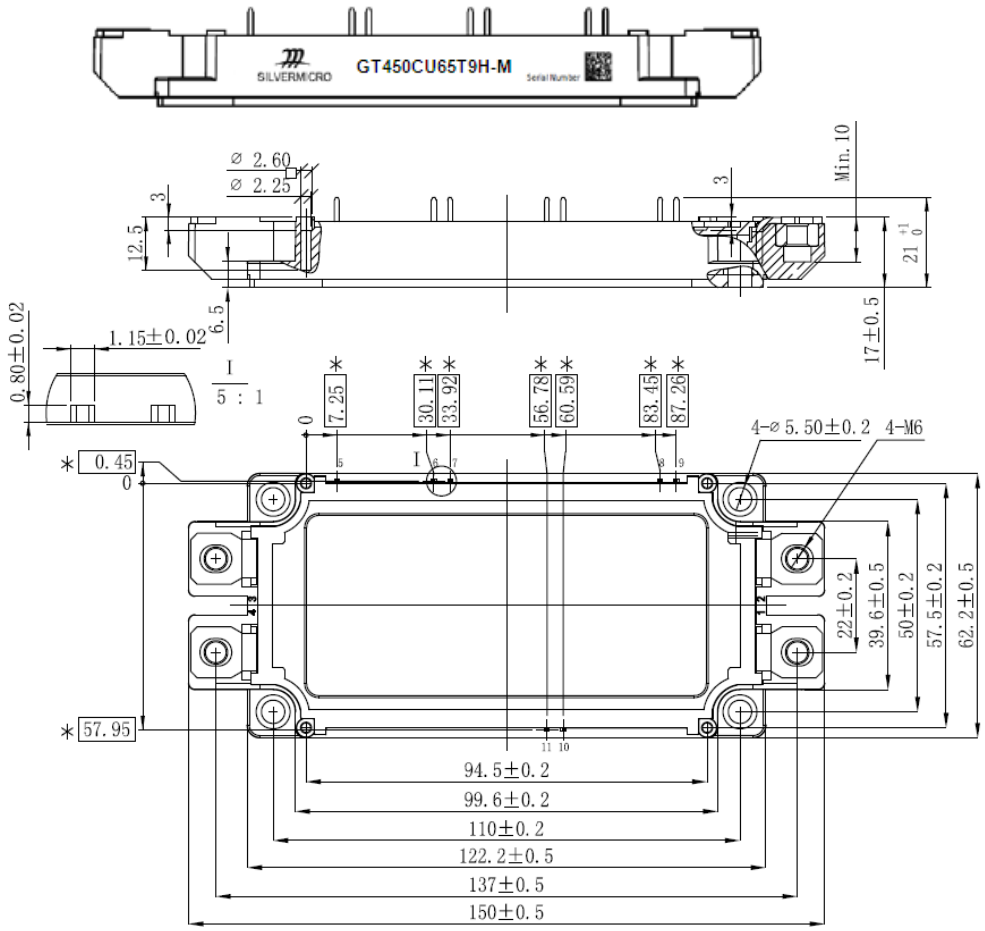


Fig.10 NTC Temperature Characteristics

Internal Circuit:



Package Outline (Unit: mm):



Date	Revision	Notes
07/30/2019	01	Initial Release

Announcement

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