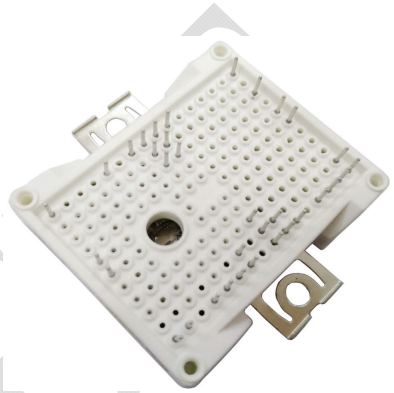
SILVERMICRO

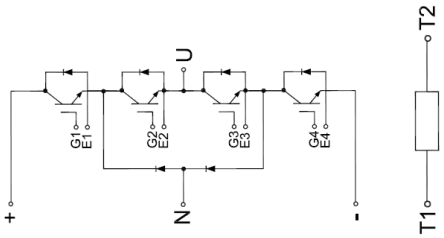
GTM150TL65B9H

IGBT Module

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





Application：

- 3-Level-Applications

IGBT, Inverter

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℃	150	A
		T_C=25℃	260	A
I_{CM}	Repetitive Peak Collector Current	T_J=175℃	300	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C=25℃ T_{Jmax}=175℃	806	W

SILVERMICRO

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=1mA, V_{CE}=V_{GE}		5.0	6.1	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C=150A, V_{GE}=15V	T_J=25℃		1.55		V
			T_J=125℃		1.70		V
			T_J=150℃		1.70		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}=0V, V_{CE}=V_{CES}, T_J=25℃				200	nA
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V , f=1MHz			12.17		nF
C_{oes}	Output Capacitance				0.56		nF
C_{res}	Reveres Transfer Capacitance				0.40		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=300V,I_C=150A, R_{Gon} =4.7Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.21		μs
			T_J=125℃		0.21		
			T_J=150℃		0.21		
t_r	Rise Time		T_J=25℃		0.10		μs
			T_J=125℃		0.10		
			T_J=150℃		0.10		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=300V,I_C=150A, R_{Goff} =4.7Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		0.22		μs
			T_J=125℃		0.22		
			T_J=150℃		0.22		
t_f	Fall Time		T_J=25℃		0.11		μs
			T_J=125℃		0.14		
			T_J=150℃		0.15		
E_{on}	Turn-on Switching Loss	V_{CC}=300V,I_C=150A, R_{Gon} =4.7Ω,V_{GE}=±15V, di/dt=1200A/us(T_J=150℃) Inductive Load	T_J=25℃		1.22		mJ
			T_J=125℃		1.64		
			T_J=150℃		1.67		

E_{off}	Turn-off Switching Loss	V_{CC}=300V,I_C=150A, R_{Goff} =4.7Ω,V_{GE}=±15V, dv/dt=3600V/us(T_J=150℃) Inductive Load	T_J=25℃		2.95		mJ
			T_J=125℃		4.35		
			T_J=150℃		4.65		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V	T_J=25℃		0.89		μC
RBSOA	I_C=300A,V_{CC}=600V,Vp=650V, R_{Goff} = 4.7Ω, V_{GE}=+15V to 0V, T_J=150°C			Trapezoid			
SC Data	V_{CC}=300V, tp=10us, V_{GE}=+/-15V, R_{Gon}=10ohm, R_{Goff}=10ohm, Tj=25℃				1012		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.186		℃/W

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

V_{RRM}	Repetitive Peak Reverse Voltage		650	V
I_F	Diode Continuous Forward Current		150	A
I_{FM}	Diode Maximum Forward Current		300	A
I^2t	I²t - Value	V_R=0V, t_P=10ms,T_J=125℃	1800	A^2s
		V_R=0V, t_P=10ms,T_J=150℃	1540	A^2s

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_C=150A	T_J=25℃		1.60		V
			T_J=125℃		1.70		
			T_J=150℃		1.70		
t_{rr}	Reverse Recovery Time	I_F=150A, -di_F/dt=1200A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		0.10		μs
			T_J=125℃		0.15		
			T_J=150℃		0.16		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		65.6		A
			T_J=125℃		78.1		
			T_J=150℃		82.8		

Q_{rr}	Reverse Recovery Charge	I_F=150A, $-di_F/dt$=1200A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		4.07		μC
			T_J=125℃		7.48		
			T_J=150℃		8.77		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.30		mJ
			T_J=125℃		1.42		
			T_J=150℃		1.72		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.308		℃/W

Diode, 3-Level

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

V_{RRM}	Repetitive Peak Reverse Voltage		650	V
I_F	Diode Continuous Forward Current		150	A
I_{FM}	Diode Maximum Forward Current		300	A
I^2t	I²t - Value	V_R=0V, t_P=10ms,T_J=125℃	1800	A^2s
		V_R=0V, t_P=10ms,T_J=150℃	1540	A^2s

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_C=150A	T_J=25℃		1.60		V
			T_J=125℃		1.70		
			T_J=150℃		1.70		
t_{rr}	Reverse Recovery Time	I_F=150A, $-di_F/dt$=1200A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		0.10		μs
			T_J=125℃		0.15		
			T_J=150℃		0.16		
I_{rr}	Peak Reverse Recovery Current		T_J=25℃		65.6		A
			T_J=125℃		78.1		
			T_J=150℃		82.8		

Q_{rr}	Reverse Recovery Charge	I_F=150A, $-di_F/dt$=1200A/μs(T_J=150℃), V_R=300V, V_{GE}=-15V	T_J=25℃		4.07		μC
			T_J=125℃		7.48		
			T_J=150℃		8.77		
E_{rec}	Reverse Recovery Energy		T_J=25℃		0.30		mJ
			T_J=125℃		1.42		
			T_J=150℃		1.72		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.308		℃/W

Internal NTC- Thermistor Characteristic

Symbol	Condition	Typ.	Max.	Units
R_{25}	T_C =25℃	5		kΩ
△R/R	T_C =100℃，R_{100} =481Ω		±5	%
P_{25}	T_C =25℃	10		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			V
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)				0.05	℃/W
T	Mounting Screw:M4		1.5		1.8	N·m
G	Weight			40		g

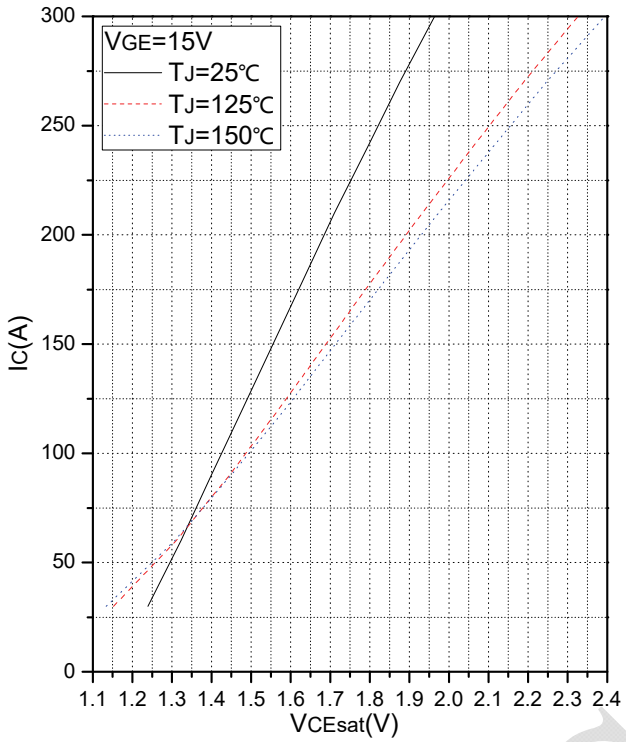


Fig.1 Typical Saturation Voltage Characteristics

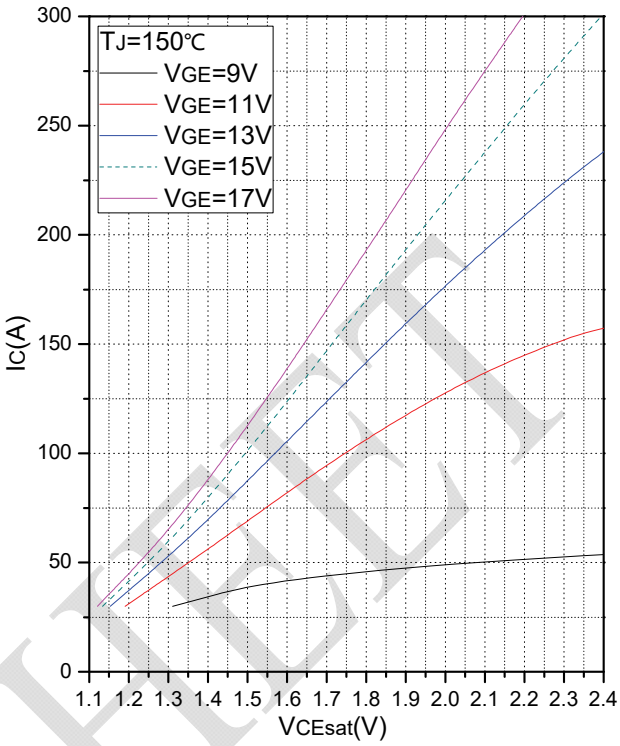


Fig.2 Typical Output Characteristics

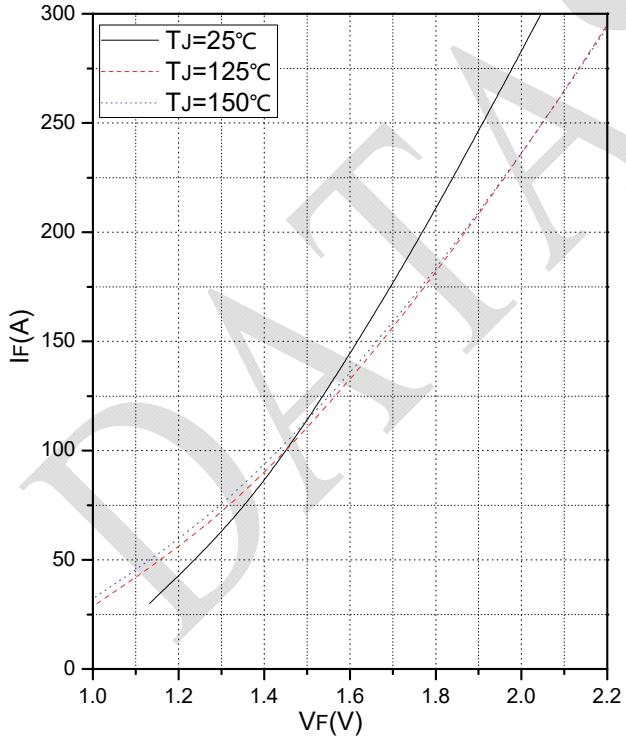


Fig.3 Forward Characteristics of Diode (Reverse)

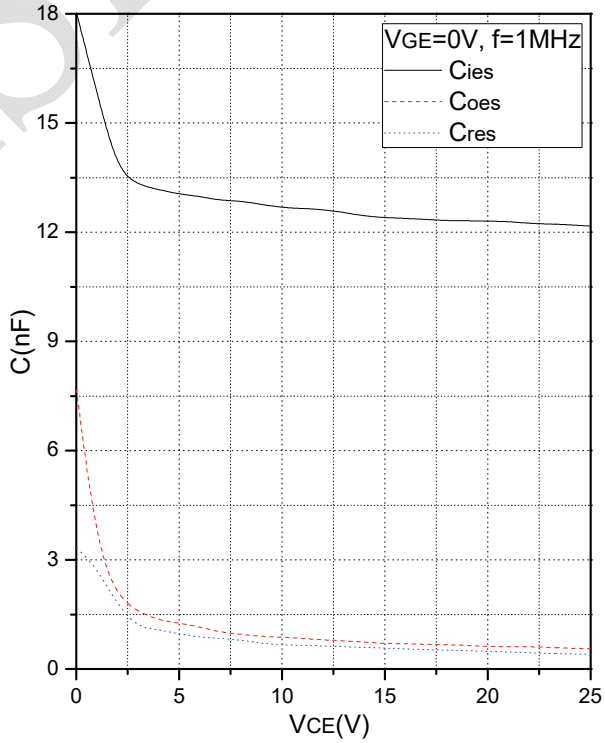


Fig.4 Capacitance Characteristics

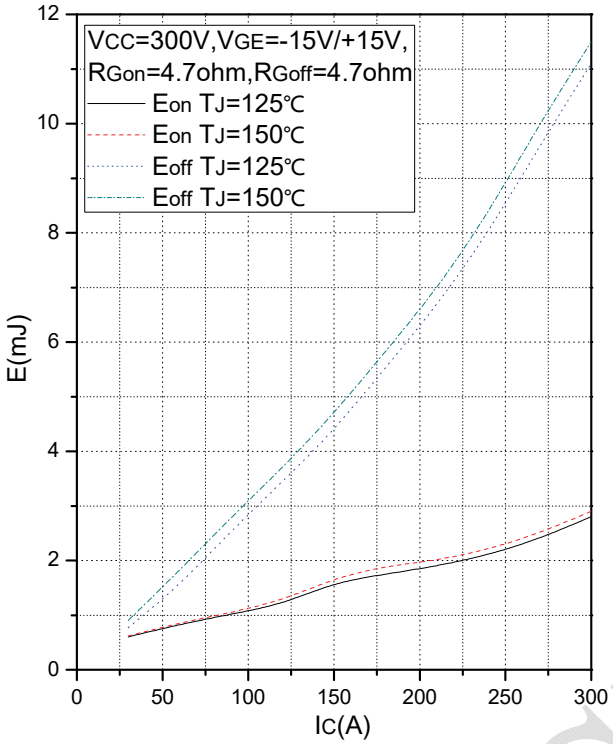


Fig.5 Typical Switching Loss vs. Collector Current

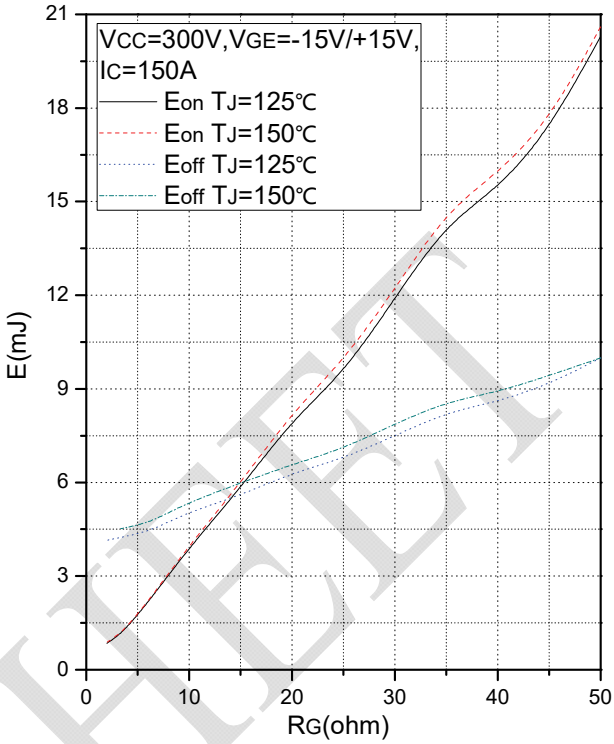


Fig.6 Typical Switching Loss vs. Gate Resistance

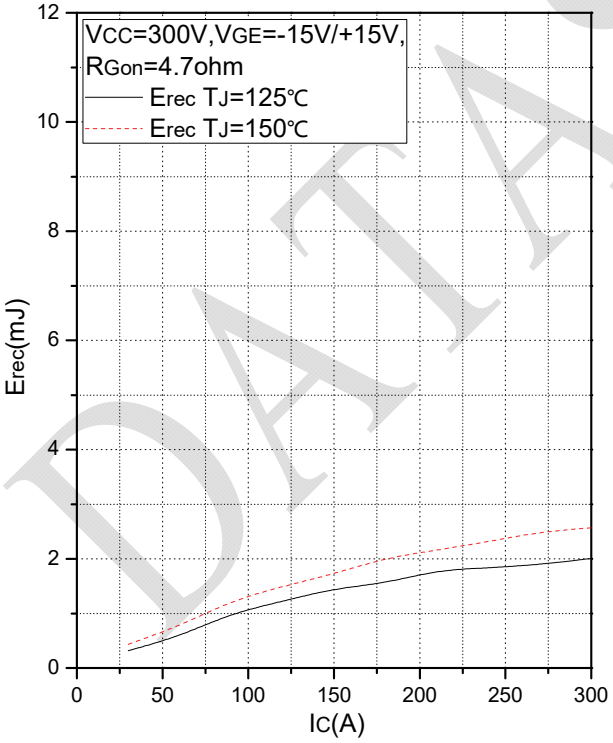


Fig.7 Typical Switching Loss vs. Collector Current

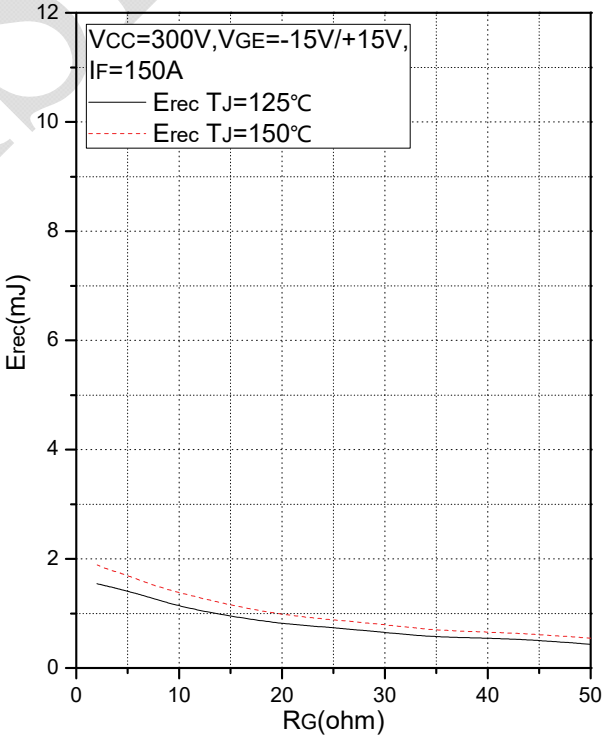


Fig.8 Typical Switching Loss vs. Gate Resistance

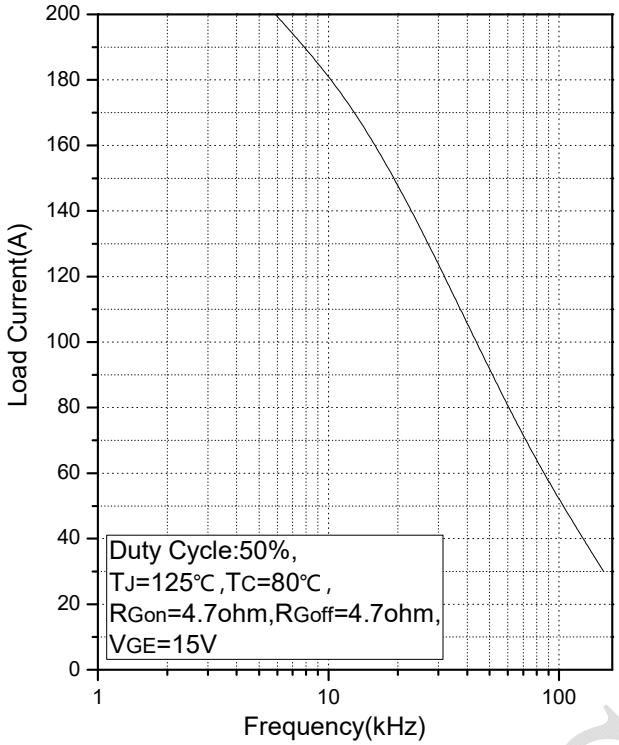


Fig.9 Typical Load Current vs. Frequency

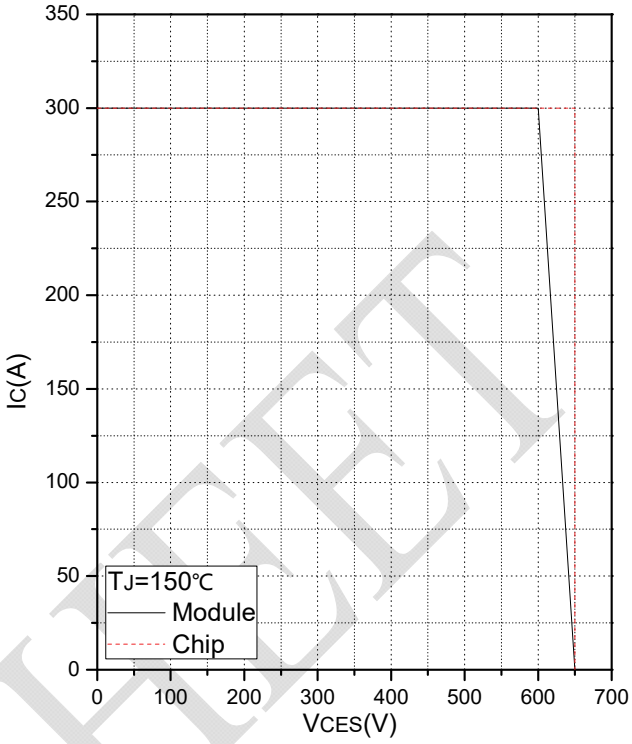


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

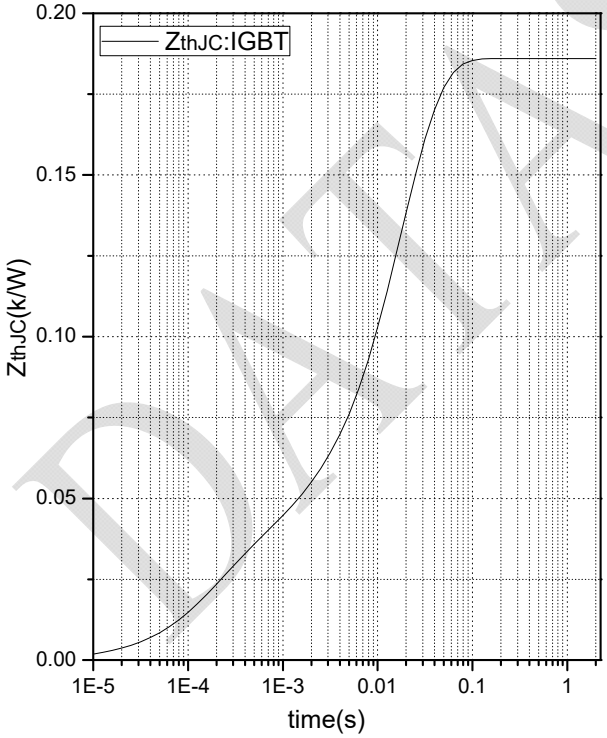


Fig.11 Transient Thermal Impedance (IGBT)

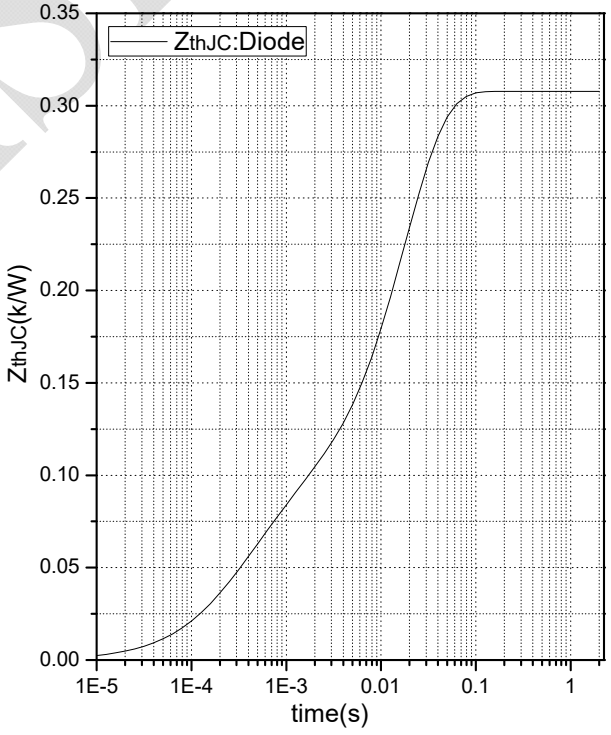


Fig.12 Transient Thermal Impedance (Diode)

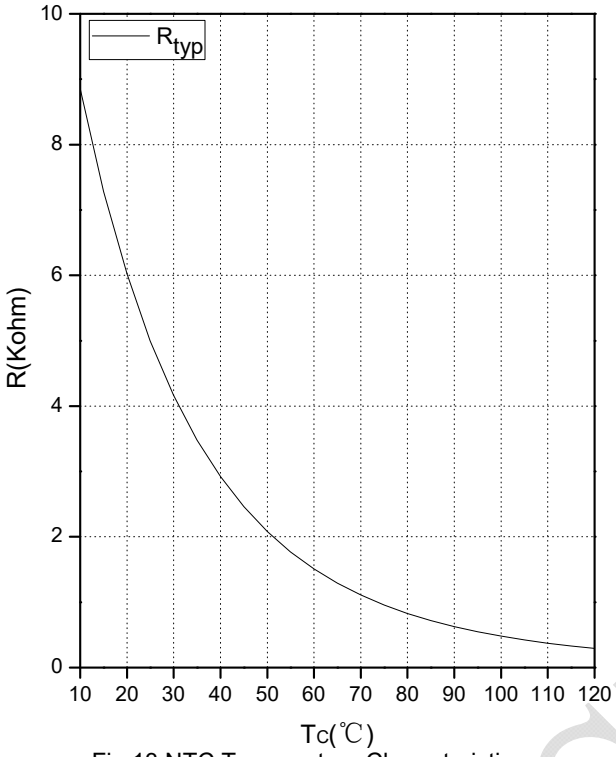


Fig.13 NTC Temperature Characteristics

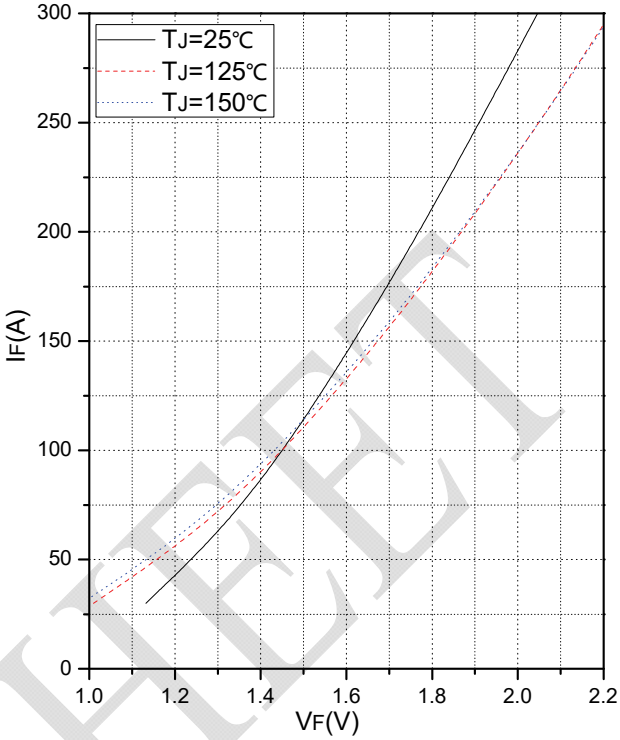


Fig.14 Forward Characteristics of Diode (3-Level)

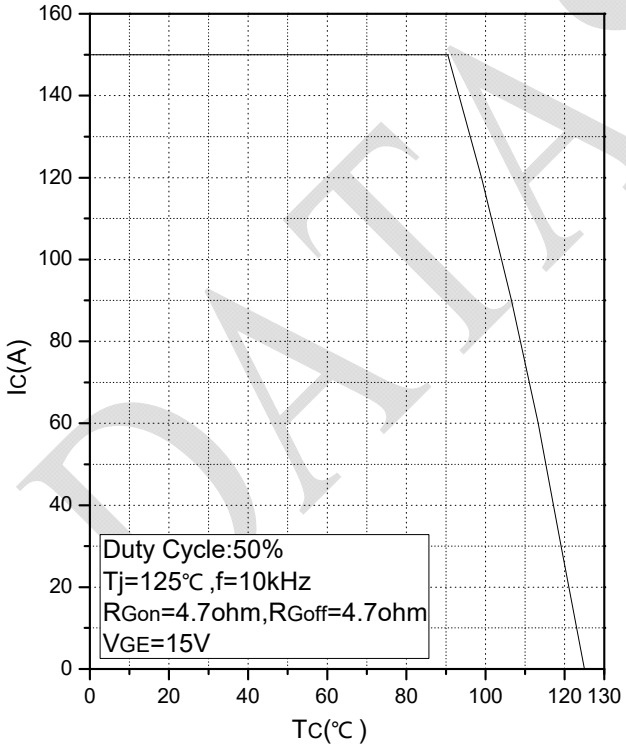
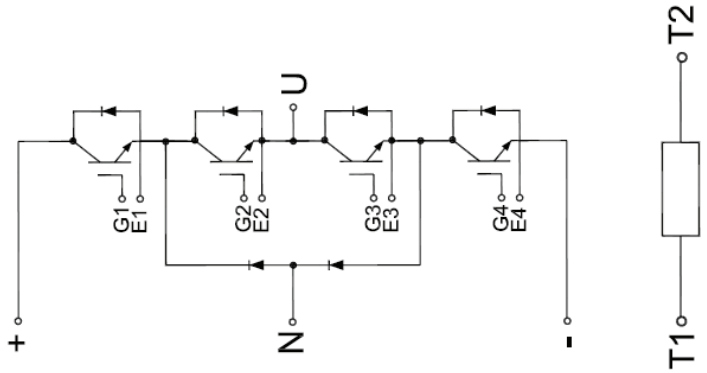
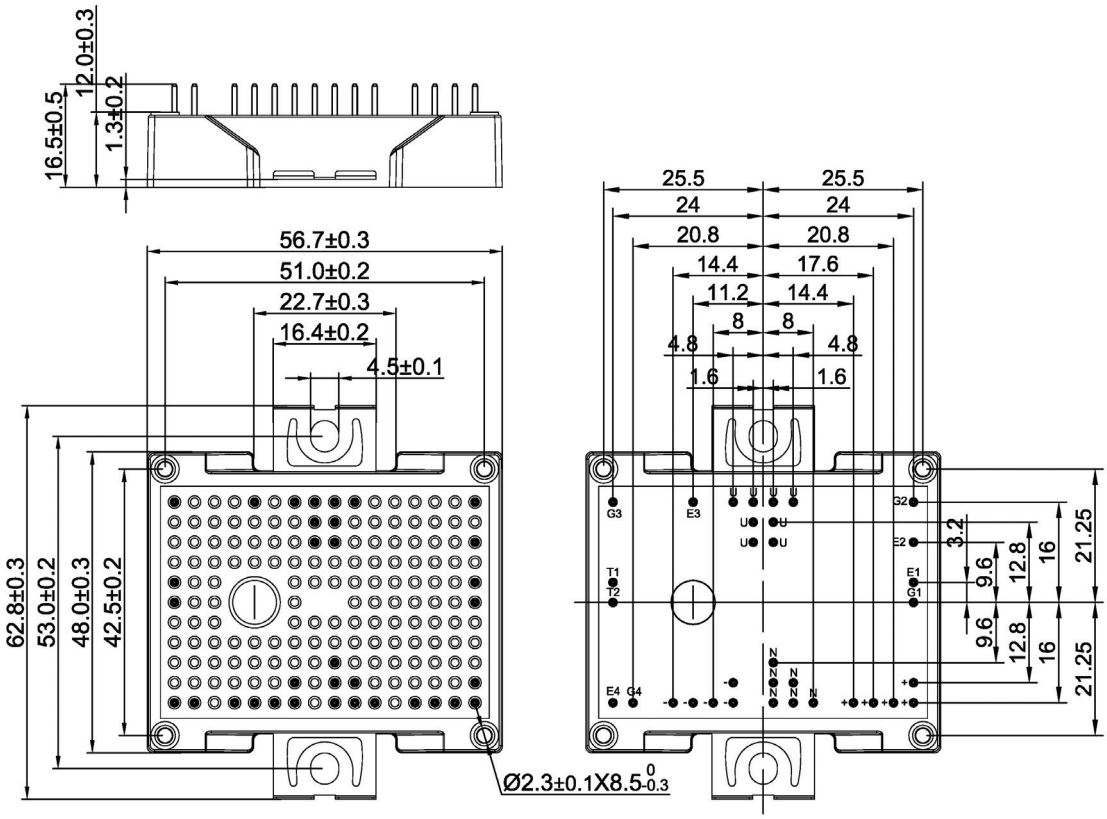


Fig.15 Rated Current vs. Temperature

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
08/28/2018	01	Initial Release
04/09/2019	02	Update Outline
02/10/2023	03	Add "I^2t" Value

Announcement

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