GT50FB60A1H

IGBT Module

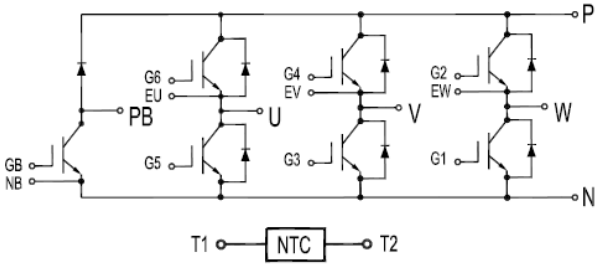
Preliminary Date

Features:

- Short Circuit Rated ＞5μs
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.90V @ I_C = 50A , T_C=25℃
- Low Switching Loss
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications:

- Industrial Inverters
- Servo Applications
- UPS Systems



IGBT, Inverter

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

V_{CES}	Collector-Emitter Blocking Voltage		600	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 100℃	50	A
		T_C = 25℃	75	A
I_{CM}	Peak Collector Current Repetitive	T_J = 175℃	100	A
t_{SC}	Short Circuit Withstand Time		>5	μs
P_D	Maximum Power Dissipation (IGBT)	T_C = 25℃ T_{Jmax}=175℃	280	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 = 1 mA, V_{CE} = V_{GE}		5.0	6.0	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 50 A, V_{GE} = 15V	T_J = 25℃		1.90	2.10	V
			T_J = 125℃		2.05		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℃				200	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f =1MHz			3.0		nF
C_{oes}	Output Capacitance				0.2		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 300V,I_C = 50A, R_G = 15 Ω,V_{GE} = ±15V, Inductive Load	T_J = 25℃		102		ns
			T_J = 125℃		101		
t_r	Rise Time		T_J = 25℃		71		ns
			T_J = 125℃		64		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25℃		85		ns
			T_J = 125℃		86		
t_f	Fall Time		T_J = 25℃		84		ns
			T_J = 125℃		94		
E_{on}	Turn-on Switching Loss		T_J = 25℃		0.50		mJ
			T_J = 125℃		0.95		
E_{off}	Turn-off Switching Loss		T_J = 25℃		0.42		mJ
			T_J = 125℃		0.60		
Q_g	Total Gate Charge		T_J = 25℃		135		nC
			T_J = 125℃		145		
RBSOA	RBSOA	I_C=100A,V_{CC}=480V,Vp=600V, Rg = 15Ω, V_{GE}=+15V to 0V, T_J =150°C		Trapezoid			
SCSOA	SCSOA	V_{CC} = 300V, V_{GE} = 15V, T_J = 150℃		5			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case (Per Leg)				0.532		℃/W

Diode, Inverter

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

V_{RRM}	Repetitive Peak Reverse Voltage	600	V
I_F	Diode Continuous Forward Current	50	A
I_{FM}	Peak FWD Current Repetitive	100	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F = 50A	T_J = 25℃		1.50		V
			T_J = 125℃		1.55		
t_{rr}	Reverse Recovery Time	I_F = 50A, di/dt = 835A/μs, V_{rr} = 300V, V_{GE} = -15V	T_J = 25℃		85		ns
			T_J = 125℃		125		
I_{rr}	Peak Reverse Recovery Current		T_J = 25℃		32		A
			T_J = 125℃		35		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		1.82		μC
			T_J = 125℃		2.70		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		0.47		mJ
			T_J = 125℃		0.45		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (Per Leg)				0.719		℃/W

IGBT, Brake-Chopper

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

V_{CES}	Collector-Emitter Blocking Voltage		600	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 100℃,	35	A
		T_C = 25℃	60	A
I_{CM}	Peak Collector Current Repetitive	T_J = 175℃	70	A
t_{SC}	Short Circuit Withstand Time		>5	μs
P_D	Maximum Power Dissipation (IGBT)	T_C = 25℃ T_{Jmax}=175℃	190	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 = 1 mA, V_{CE} = V_{GE}		3.5	5.0	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 35A, V_{GE} = 15V	T_J = 25℃		1.60	1.90	V
			T_J = 125℃		1.85		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℃				200	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f =1MHz			2.11		nF
C_{oes}	Output Capacitance				0.20		nF
C_{res}	Reverse Transfer Capacitance				0.06		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 300V,I_C = 35A, R_G = 30Ω,V_{GE} = ±15V, Inductive Load	T_J = 25℃		130		ns
			T_J = 125℃		120		
t_r	Rise Time		T_J = 25℃		60		ns
			T_J = 125℃		65		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25℃		120		ns
			T_J = 125℃		125		
t_f	Fall Time		T_J = 25℃		90		ns
			T_J = 125℃		100		
E_{on}	Turn-on Switching Loss		T_J = 25℃		0.42		mJ
			T_J = 125℃		0.51		
E_{off}	Turn-off Switching Loss		T_J = 25℃		0.31		mJ
			T_J = 125℃		0.54		
Q_g	Total Gate Charge		T_J = 25℃		80		nC
RBSOA	RBSOA	I_C=70A,V_{CC}=480V,Vp=600V, Rg = 30Ω, V_{GE}=+15V to 0V, T_J =150°C		Trapezoid			
SCSOA	SCSOA	V_{CC} = 300V, V_{GE} = 15V, T_J = 150℃		5			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(Per Leg)				0.678		℃/W

Diode, Brake-Chopper

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

V_{RRM}	Repetitive Peak Reverse Voltage	600	V
I_F	Diode Continuous Forward Current	15	A
I_{FM}	Peak FWD Current Repetitive	30	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F = 15A	T_J = 25℃		1.20		V
			T_J = 125℃		1.15		
I_{rr}	Peak Reverse Recovery Current	I_F = 15A, di/dt =550A/μs, V_{rr} = 300V, V_{GE} = -15V	T_J = 25℃		15		A
			T_J = 125℃		30		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		1.50		μC
			T_J = 125℃		2.20		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		0.10		mJ
			T_J = 125℃		0.18		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (Per Leg)				1.56		℃/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				150	℃
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)			0.1		℃/W
M	Mounting Screw:M3		1.5		2.0	N·m
G	Weight			30		g

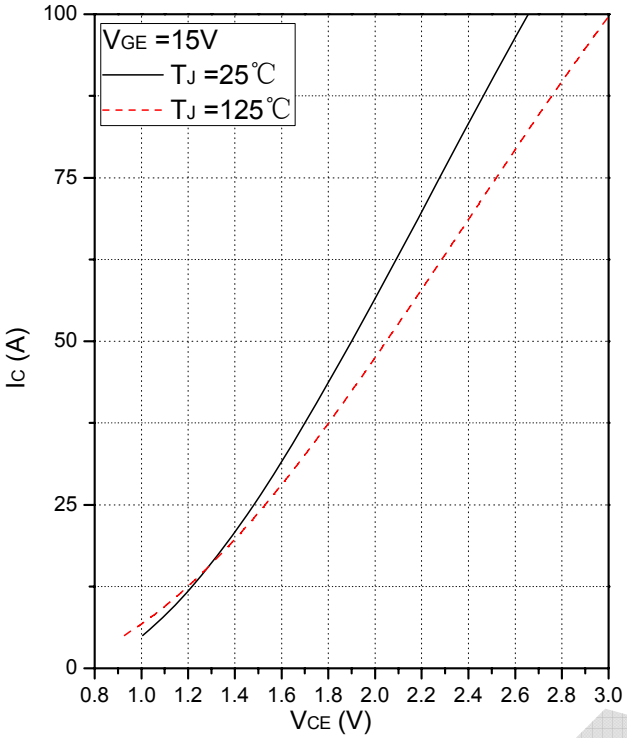


Fig.1 Typical Saturation Voltage Characteristics (Inverter)

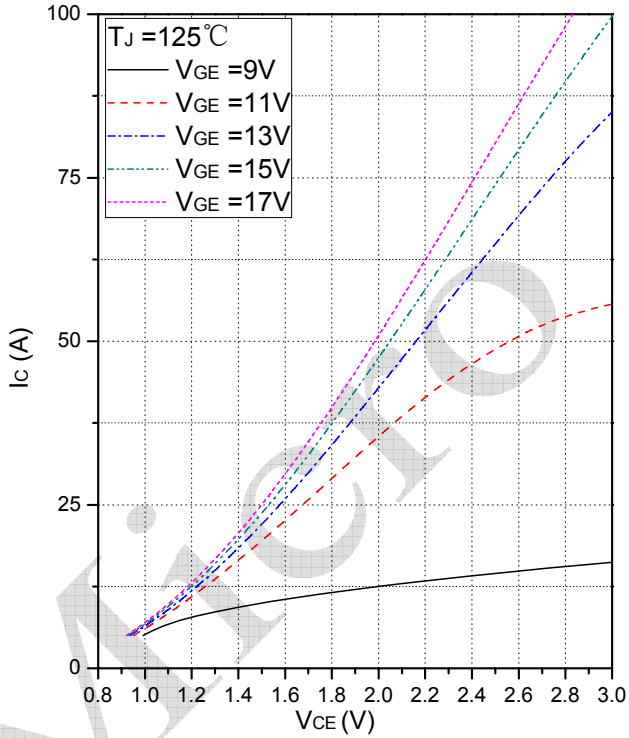


Fig.2 Typical Output Characteristics (Inverter)

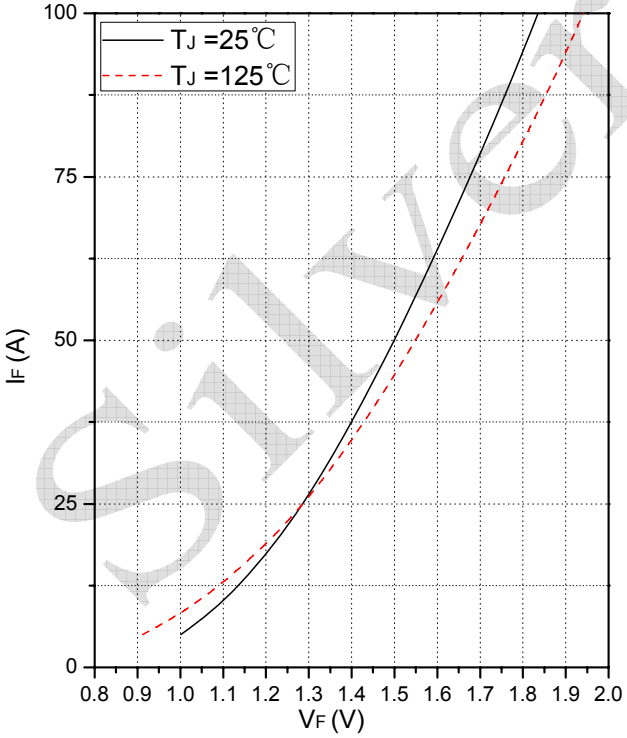


Fig.3 Forward Characteristics of FWD (Inverter)

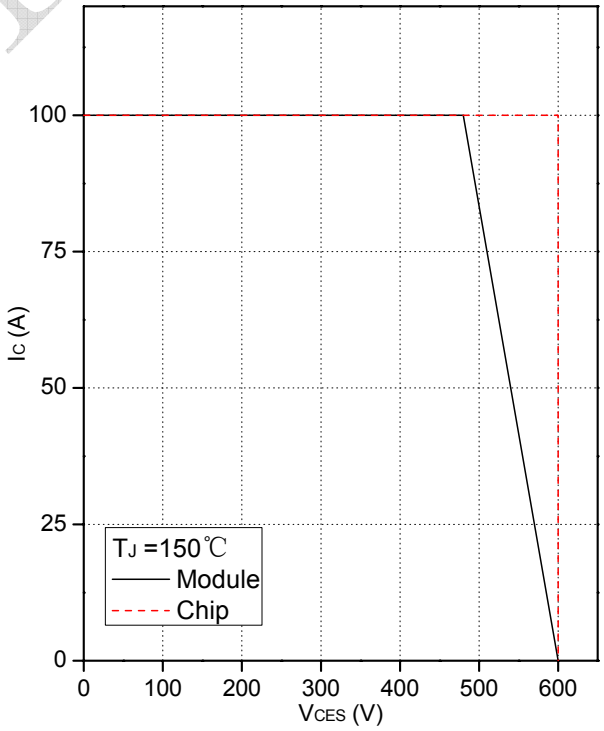


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

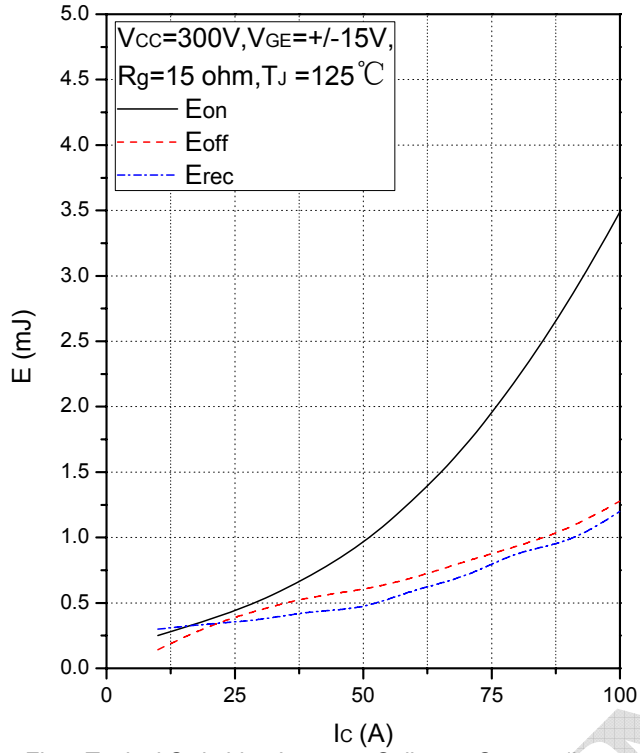


Fig.5 Typical Switching Loss vs. Collector Current (Inverter)

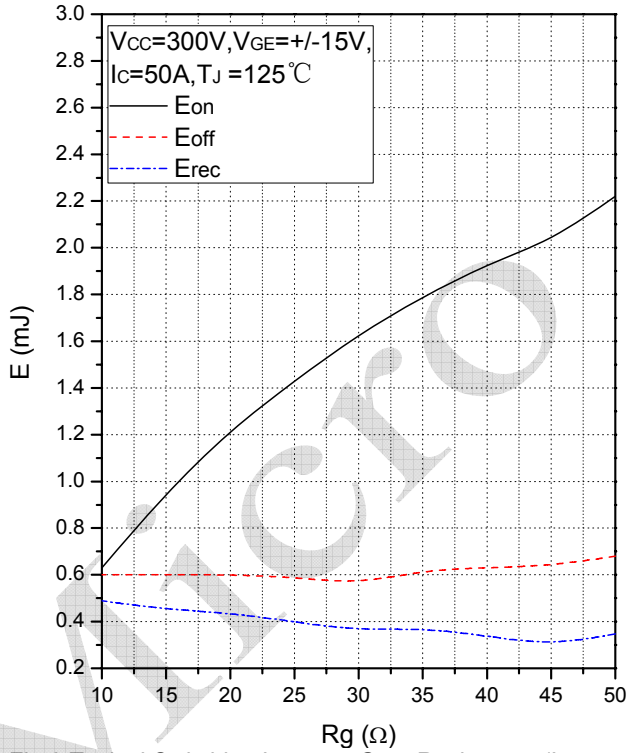


Fig.6 Typical Switching Loss vs. Gate Resistance (Inverter)

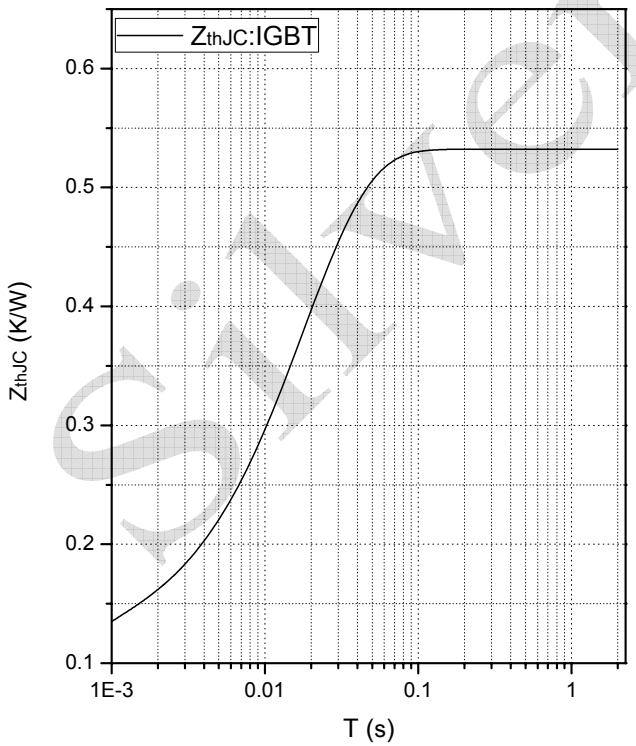


Fig.7 Transient Thermal Impedance IGBT (Inverter)

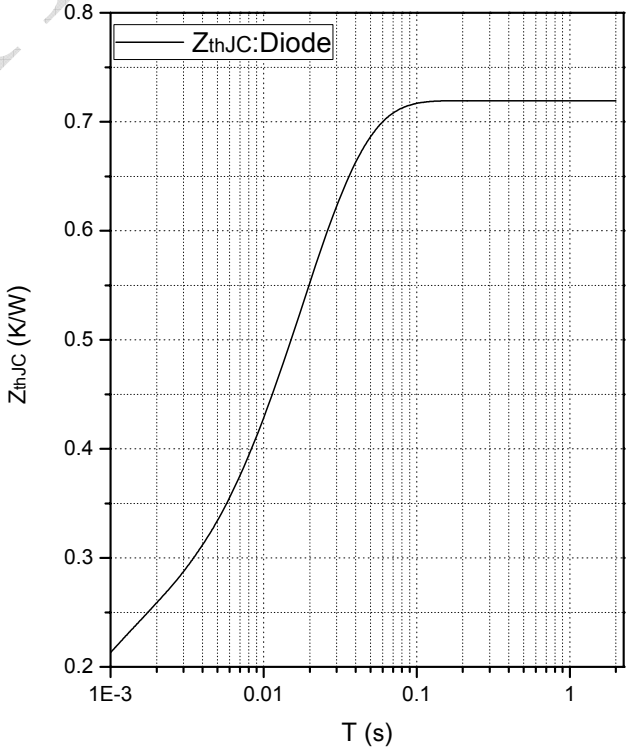


Fig.8 Transient Thermal Impedance Diode(Inverter)

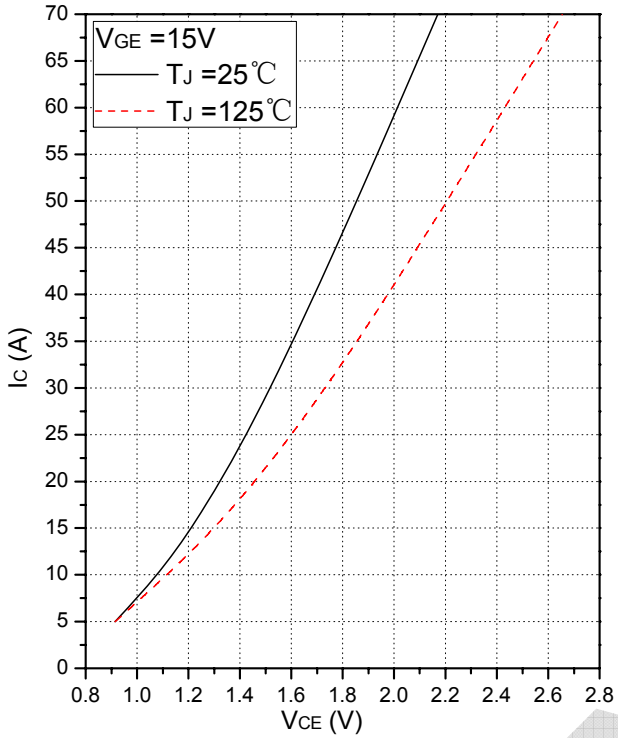


Fig.9 Typical Saturation Voltage Characteristics(Chopper)

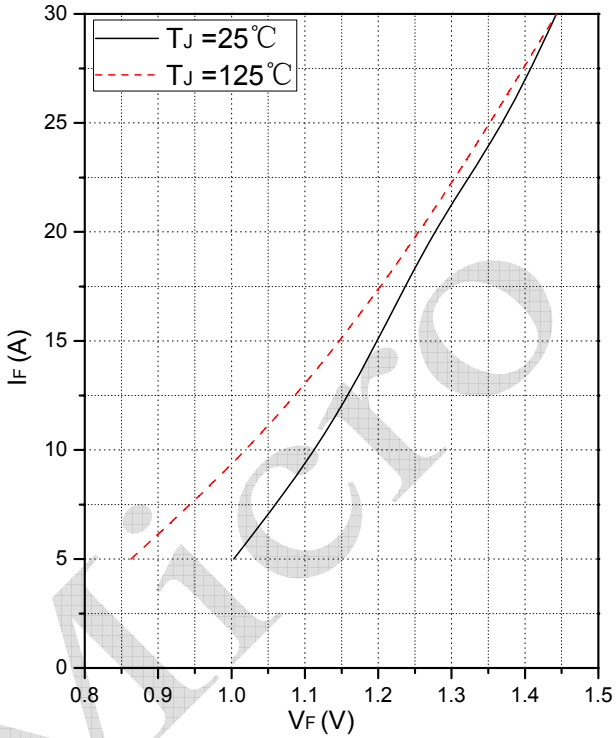


Fig.10 Forward Characteristics of FWD (Chopper)

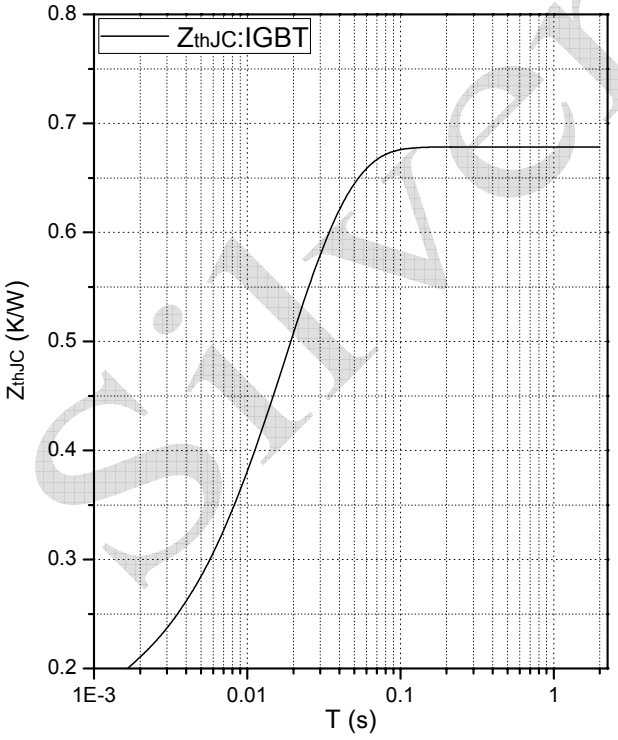


Fig.11 Transient Thermal Impedance IGBT (Chopper)

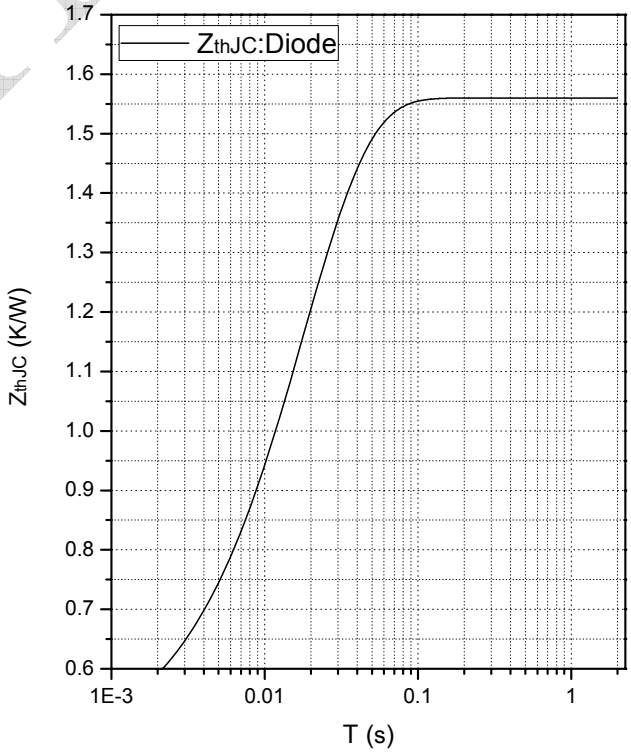


Fig.12 Transient Thermal Impedance Diode(Chopper)

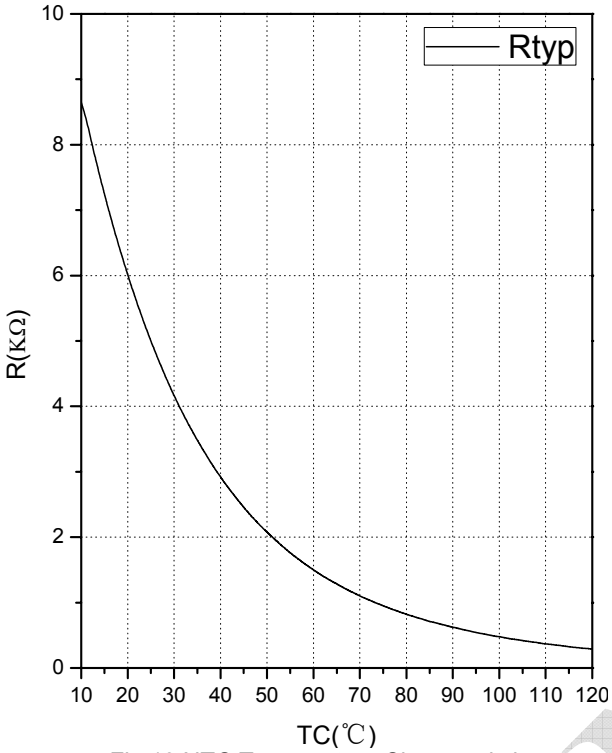


Fig.13 NTC Temperature Characteristics

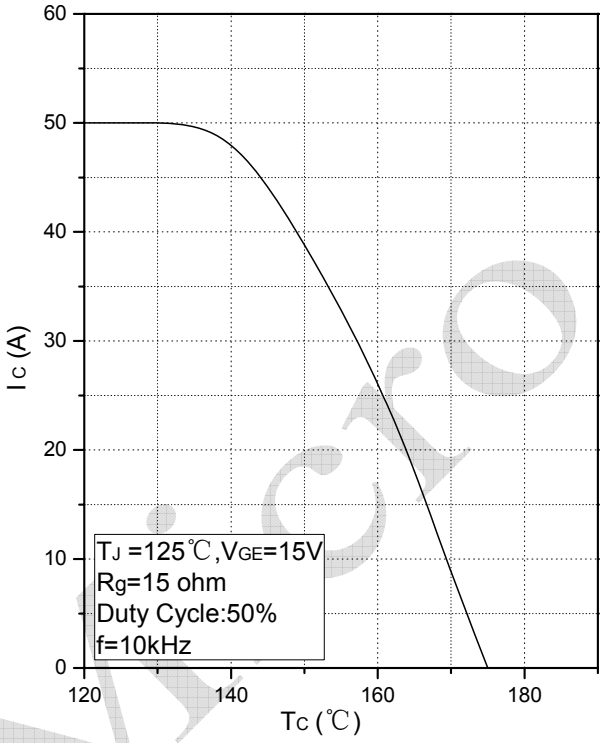
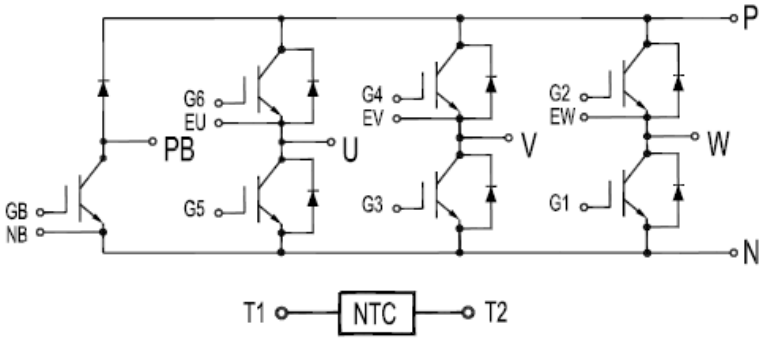
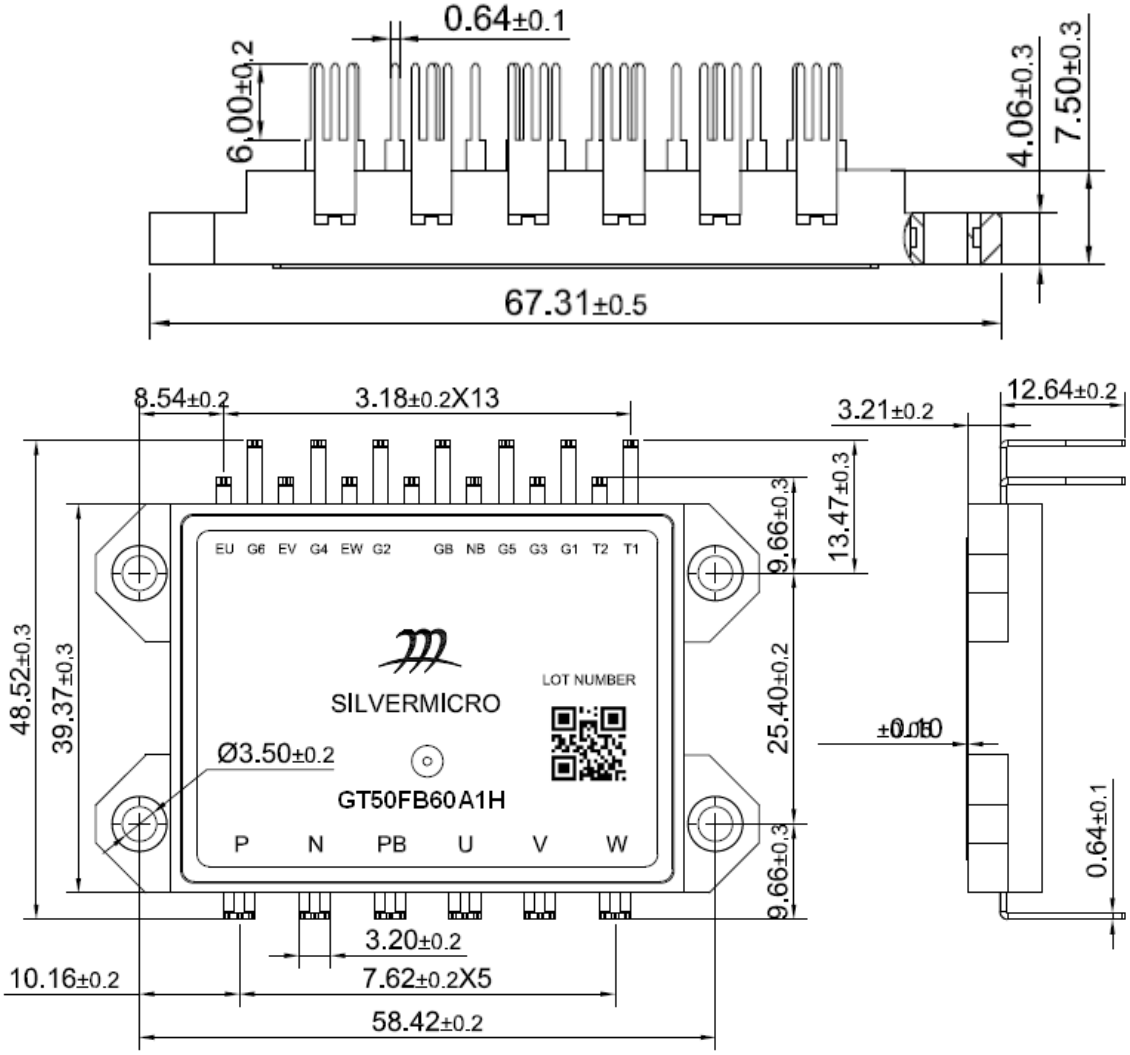


Fig.14 Rated Current vs. Temperature

Internal Circuit:



Package Outline (Unit: mm):



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