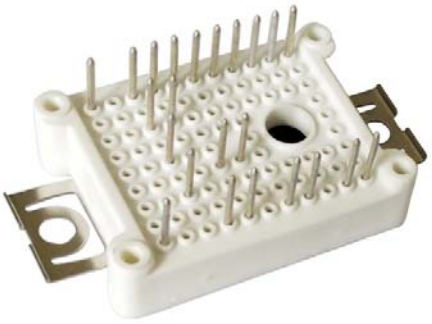
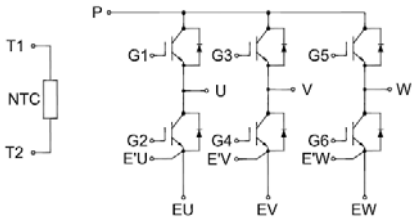
GTS40FF120B3H

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
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Applications：

- Industrial Inverter
- Servo Applications

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

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80℃	40	A
		T_C = 25℃	80	A
I_{CM}	Peak Collector Current Repetitive	T_J = 150℃	80	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation (IGBT)	T_C = 25℃ T_{Jmax}=150℃	320	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 = 1mA, V_{CE} = V_{GE}		5.0	6.0	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =40A, V_{GE} = 15V	T_J = 25℃		1.90	2.10	V
			T_J = 125℃		2.00		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			4.2		nF
C_{oes}	Output Capacitance				0.14		nF
C_{res}	Reveres Transfer Capacitance				0.06		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V,I_C=40A, R_{Gon} =15Ω,V_{GE}=±15V, Inductive Load	T_J=25℃		190		ns
			T_J=125℃		195		
t_r	Rise Time		T_J=25℃		70		ns
			T_J=125℃		60		
$t_{d(off)}$	Turn-off Delay Time	V_{CC}=600V,I_C=40A, R_{Goff} =15Ω,V_{GE}= ±15V, Inductive Load	T_J=25℃		250		ns
			T_J=125℃		270		
t_f	Fall Time		T_J=25℃		210		ns
			T_J=125℃		330		
E_{on}	Turn-on Switching Loss	V_{CC} = 600V,I_C =40A, R_{Gon} =15Ω,V_{GE} = ±15V, di/dt=1103A/μs (T_J=125℃) Inductive Load	T_J=25℃		4.58		mJ
			T_J=125℃		4.86		
E_{off}	Turn-off Switching Loss	V_{CC} = 600V,I_C =40A, R_{Goff} = 15Ω,V_{GE} = ±15V, du/dt=2206V/μs (T_J=125℃) Inductive Load	T_J=25℃		1.38		mJ
			T_J=125℃		2.78		
Q_g	Total Gate Charge	V_{GE}=+15V…-15V			490		nC
RBSOA	I_C=50A,V_{CC}=1050V,Vp=1200V, R_{Goff} = 15Ω, V_{GE}=+15V to 0V, T_J =150°C			Trapezoid			
SCSOA	V_{CC}=600V, V_{GE}=15V, T_J =150°C			10			us
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(per leg)				0.395		℃/W

Diode, Inverter

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

V_{RRM}	Repetitive peak reverse voltage	1200	V
I_F	Diode Continuous Forward Current	40	A
I_{FM}	Peak FWD Current Repetitive	80	A

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

V_{FM}	Forward Voltage	I_F = 40 A , V_{GE} = 0V	T_J = 25℃		1.80		V
			T_J = 125℃		2.00		
I_{rr}	Peak Reverse Recovery Current	I_F=40A, -diF/dt =610A/μs, V_{rr} = 600V, V_{GE} = -15V	T_J = 25℃		20		A
			T_J = 125℃		30		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		3.6		μC
			T_J = 125℃		6.1		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		1.00		mJ
			T_J = 125℃		2.00		
$R_{\theta JC}$	Junction-To-Case Diode				0.699		℃/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	℃
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.1		℃/W
T	Power Terminals Screw:M4		2.0		2.3	N·m
G	Weight			24		g

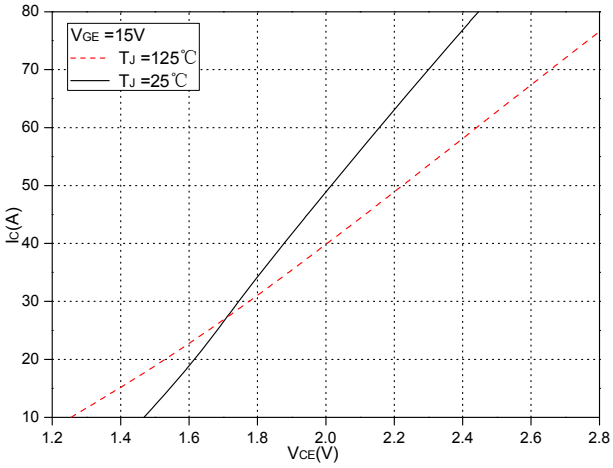


Fig.1Typical Saturation Voltage Characteristics

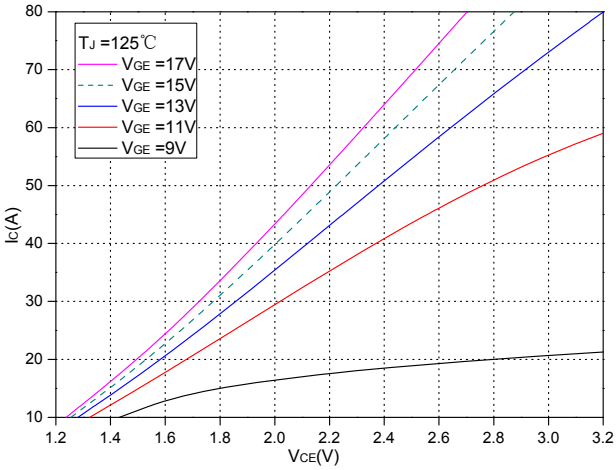


Fig.2Typical Output Characteristics

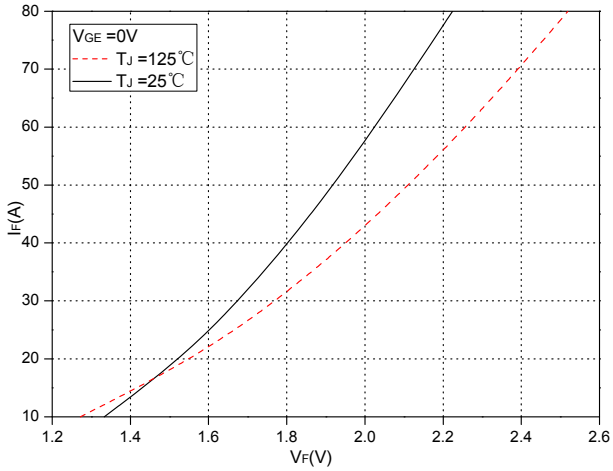


Fig.3 Forward Characteristics of FWD

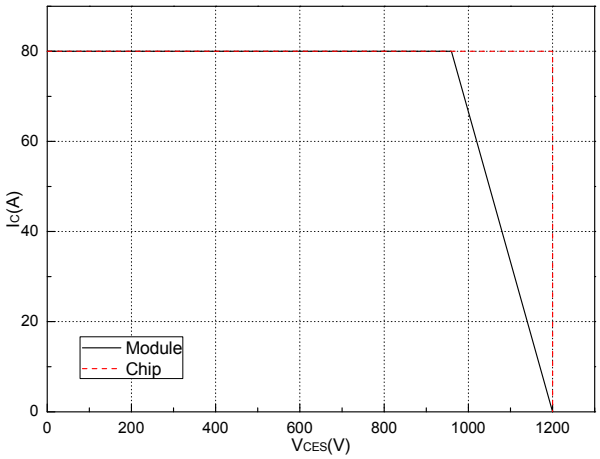


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

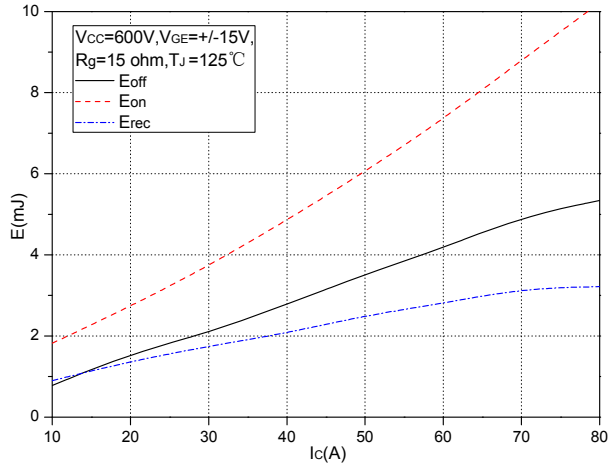


Fig.5 Typical Switching Loss vs. Collector Current

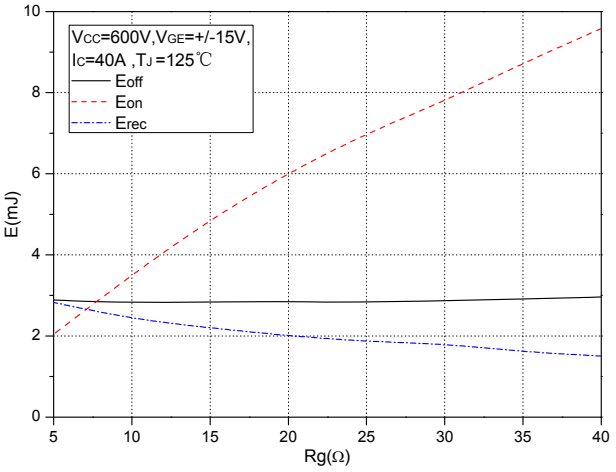


Fig.6Typical Switching Loss vs. Gate Resistance

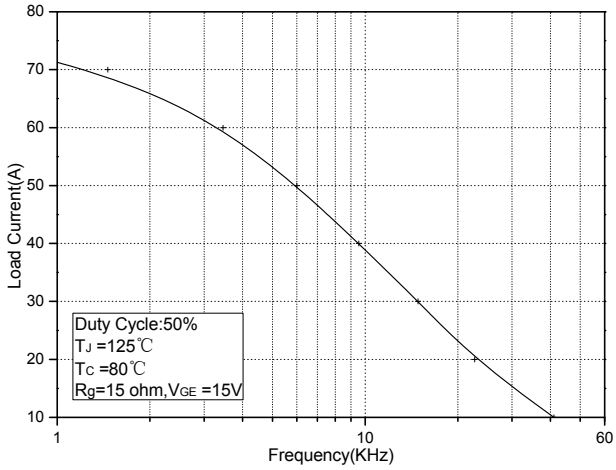


Fig.7Typical Load Current vs. Frequency

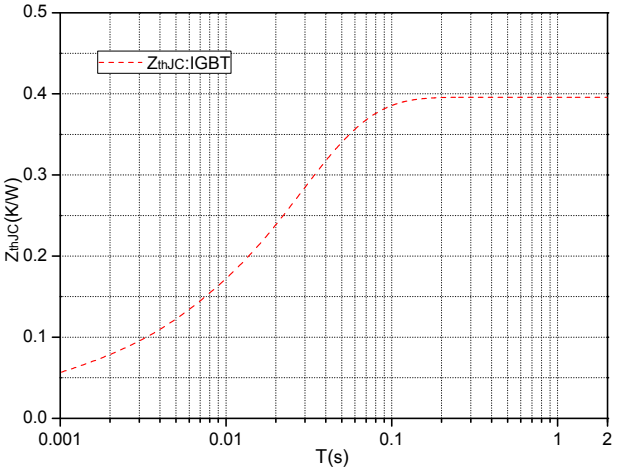


Fig.8 Transient Thermal Impedance （IGBT）

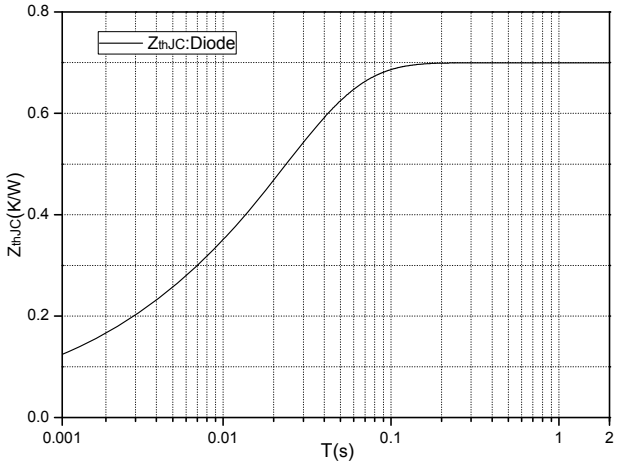


Fig.9 Transient Thermal Impedance（Diode ）

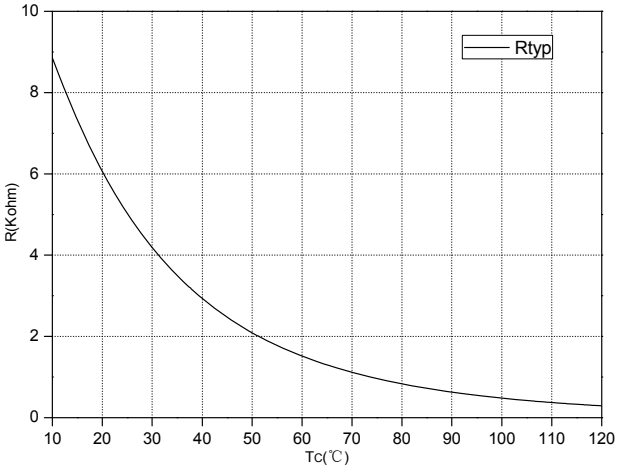
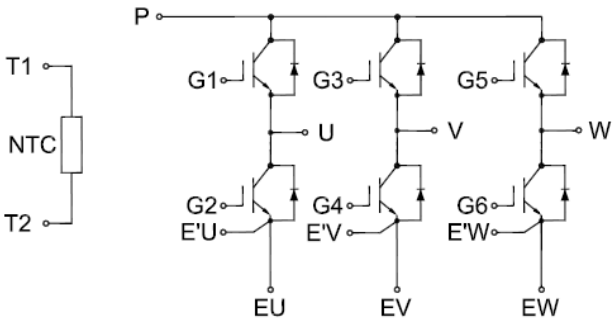
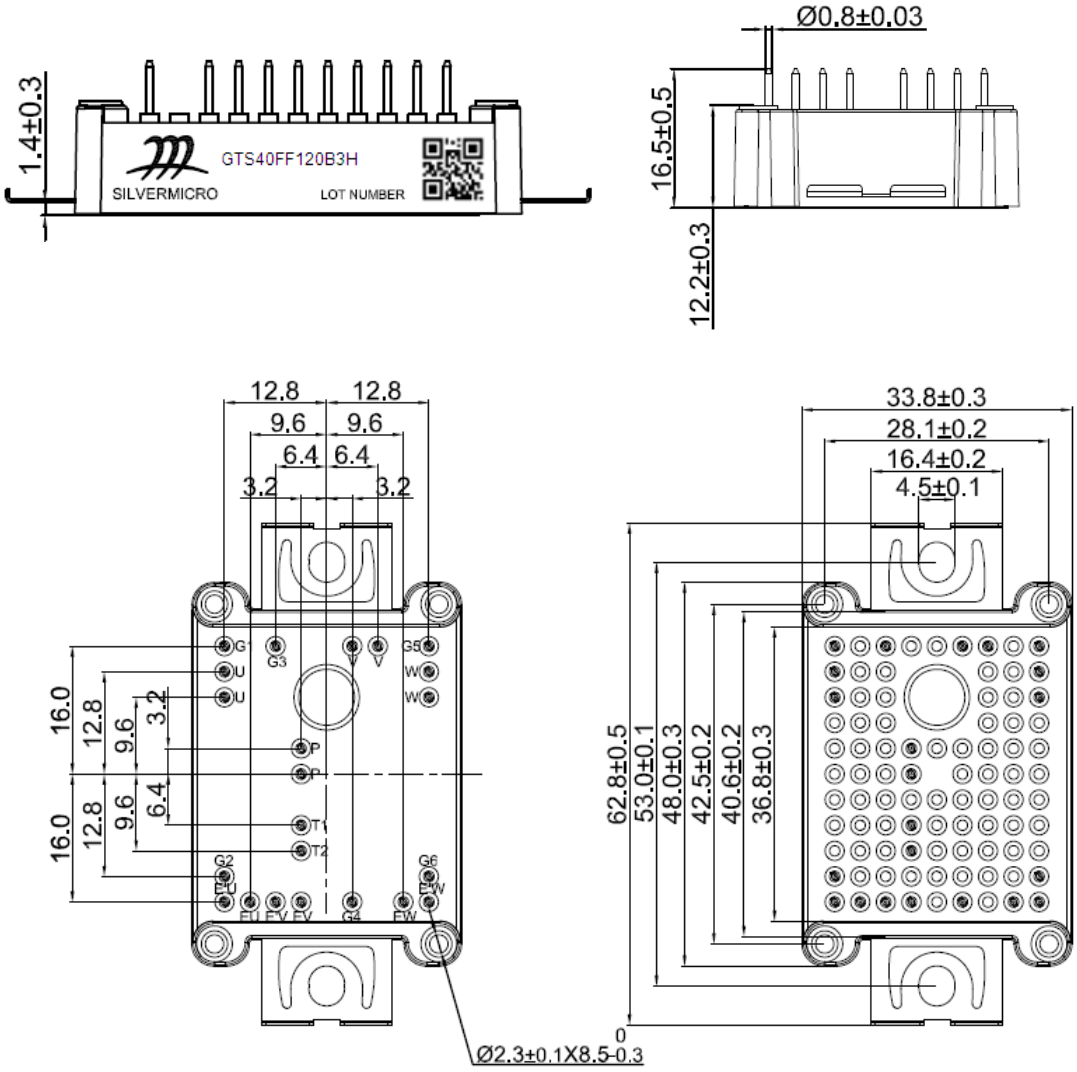


Fig.10 NTC Temperature Characteristics

Internal Circuit



Package Outline (Unit: mm):



Date	Revision	Notes
11/25/2019	01	Initial Release

Announcement

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