

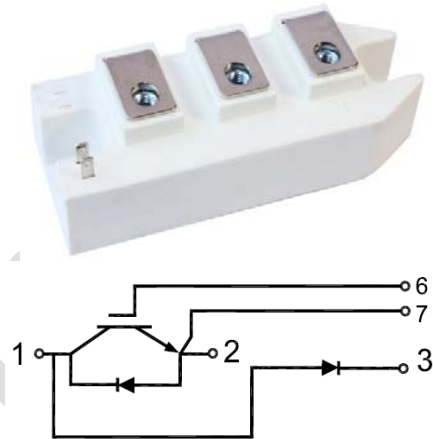
# GT75CU120T1VH-M

## IGBT Module

Preliminary Data

### Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated > 10 $\mu$ s
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested (2 $\times$ I<sub>c</sub>)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



### Applications:

- Welding Machine, Cutting Machine
- Plating Power Supply, Induction Heating
- SMPS, UPS

### IGBT, Brake-Chopper

Maximum Rated Values of IGBT (T<sub>C</sub>=25 $^{\circ}$ C unless otherwise specified)

V <sub>CES</sub>	Collector-Emitter Blocking Voltage		1200	V
V <sub>GES</sub>	Gate-Emitter Voltage		$\pm$ 20	V
I <sub>C</sub>	Continuous Collector Current	T <sub>C</sub> = 100 $^{\circ}$ C	75	A
		T <sub>C</sub> = 25 $^{\circ}$ C	150	A
I <sub>CM</sub>	Repetitive Peak Collector Current	T <sub>J</sub> = 175 $^{\circ}$ C	150	A
t <sub>SC</sub>	Short Circuit Withstand Time		>10	$\mu$ s
P <sub>D</sub>	Maximum Power Dissipation per IGBT	T <sub>C</sub> = 25 $^{\circ}$ C T <sub>Jmax</sub> = 175 $^{\circ}$ C	540	W

## Electrical Characteristics of IGBT ( $T_C=25^\circ\text{C}$ unless otherwise specified)

### Static Characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 2.6\text{mA}, V_{CE} = V_{GE}$	5.0	5.5	6.6	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 75\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	1.60	1.90	V
			$T_J = 125^\circ\text{C}$	1.80		V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			1	mA
$I_{GES}$	Gate-Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}, T_J = 25^\circ\text{C}$			400	nA
$C_{ies}$	Input Capacitance			5.62		nF
$C_{oes}$	Output Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		0.49		nF
$C_{res}$	Reverse Transfer Capacitance			0.38		nF

### Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Gon} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		158		ns
			$T_J = 125^\circ\text{C}$		163		
$t_r$	Rise Time	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Gon} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		49		ns
			$T_J = 125^\circ\text{C}$		53		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Goff} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		193		ns
			$T_J = 125^\circ\text{C}$		211		
$t_f$	Fall Time	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Goff} = 2\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		203		ns
			$T_J = 125^\circ\text{C}$		370		
$E_{on}$	Turn-on Switching Loss	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Gon} = 2\Omega, V_{GE} = \pm 15\text{V},$ $di/dt = 1203\text{A}/\mu\text{s} (T_J = 125^\circ\text{C}),$ Inductive Load	$T_J = 25^\circ\text{C}$		3.22		mJ
			$T_J = 125^\circ\text{C}$		4.35		
$E_{off}$	Turn-off Switching Loss	$V_{CC} = 600\text{V}, I_C = 75\text{A}, R_{Goff} = 2\Omega, V_{GE} = \pm 15\text{V},$ $du/dt = 4109\text{A}/\mu\text{s} (T_J = 125^\circ\text{C}),$ Inductive Load	$T_J = 25^\circ\text{C}$		3.40		mJ
			$T_J = 125^\circ\text{C}$		5.91		
$Q_g$	Total Gate Charge	$V_{GE} = +15\text{V} \dots -15\text{V}$	$T_J = 25^\circ\text{C}$		374		nC
$R_{gint}$	Internal Gate Resistor		$T_J = 25^\circ\text{C}$		10		$\Omega$
RBSOA	Reverse Bias Safe Operation Area	$I_C = 150\text{A}, V_{CC} = 1050\text{V}, V_p = 1200\text{V},$ $R_{Goff} = 2\Omega, V_{GE} = +15\text{V to } 0\text{V}, T_J = 150^\circ\text{C}$	Trapezoid				
SC Data	$V_{CC} = 800\text{V}, t_p = 10\mu\text{s}, V_{GE} = \pm 15\text{V}, R_{Gon} = 10\text{ohm}, R_{Goff} = 10\text{ohm}, T_J = 25^\circ\text{C}$				469		A
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.277		$^\circ\text{C}/\text{W}$

**Diode, Reverse**  
**Maximum Rated Values of Diode** ( $T_C = 25^\circ\text{C}$  unless otherwise specified)

$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V
$I_F$	Diode Continuous Forward Current	50	A
$I_{FM}$	Peak FWD Current Repetitive	100	A

**Electrical Characteristics of Diode** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{FM}$	Forward Voltage	$I_F=50\text{A}$	$T_J=25^\circ\text{C}$	1.60		V
			$T_J=125^\circ\text{C}$	1.60		
$t_{rr}$	Reverse Recovery Time		$T_J=25^\circ\text{C}$	318		ns
			$T_J=125^\circ\text{C}$	539		
$I_{rr}$	Peak Reverse Recovery Current	$I_F=50\text{A}$ , $-diF/dt = 1190\text{A}/\mu\text{s}(T_J=125^\circ\text{C})$ , $V_R=600\text{V}$ , $V_{GE}=-15\text{V}$	$T_J=25^\circ\text{C}$	57		A
			$T_J=125^\circ\text{C}$	60		
$Q_{rr}$	Reverse Recovery Charge		$T_J=25^\circ\text{C}$	7.95		$\mu\text{C}$
			$T_J=125^\circ\text{C}$	12.78		
$E_{rec}$	Reverse Recovery Energy		$T_J=25^\circ\text{C}$	3.15		mJ
			$T_J=125^\circ\text{C}$	5.21		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case			0.51		$^\circ\text{C}/\text{W}$

**Diode-Chopper**  
**Maximum Rated Values of Diode** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V
$I_F$	Diode Continuous Forward Current	75	A
$I_{FM}$	Diode Maximum Forward Current	150	A

**Electrical Characteristics of Diode ( $T_C=25^\circ\text{C}$  unless otherwise specified)**

Symbol	Description	Conditions	Min	Typ	Max	Unit	
$V_{FM}$	Forward Voltage	$I_F = 75\text{A}$	$T_J=25^\circ\text{C}$	2.10		V	
			$T_J=125^\circ\text{C}$	2.20			
$t_{rr}$	Reverse Recovery Time	$I_F = 75\text{A}$ , $-di_F/dt = 1738\text{A}/\mu\text{s}(T_J=125^\circ\text{C})$ , $V_R = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J=25^\circ\text{C}$	204		ns	
			$T_J=125^\circ\text{C}$	388			
$I_{rr}$	Peak Reverse Recovery Current		$T_J=25^\circ\text{C}$	47		A	
			$T_J=125^\circ\text{C}$	64			
$Q_{rr}$	Reverse Recovery Charge		$T_J=25^\circ\text{C}$	4.56		$\mu\text{C}$	
			$T_J=125^\circ\text{C}$	9.42			
$E_{rec}$	Reverse Recovery Energy		$T_J=25^\circ\text{C}$	1.67		mJ	
			$T_J=125^\circ\text{C}$	3.60			
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case			0.425		$^\circ\text{C}/\text{W}$	

**Module**

Symbol	Description	Min	Typ	Max	Unit
$V_{iso}$	Isolation Voltage (All Terminals Shorted)	$f = 50\text{Hz}$ , 1minute	2500		V
$T_J$	Maximum Junction Temperature			175	$^\circ\text{C}$
$T_{JOP}$	Maximum Operating Junction Temperature Range		-40	+150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature		-40	+125	$^\circ\text{C}$
CTI	Comparative Tracking Index		200		V
$R_{\theta CS}$	Case-To-Sink Thermally (Conductive Grease Applied)			0.1	$^\circ\text{C}/\text{W}$
T	Power Terminals Screw:M5		3.0	5.0	N·m
T	Mounting Screw:M6		4.0	6.0	N·m
G	Weight			165	g

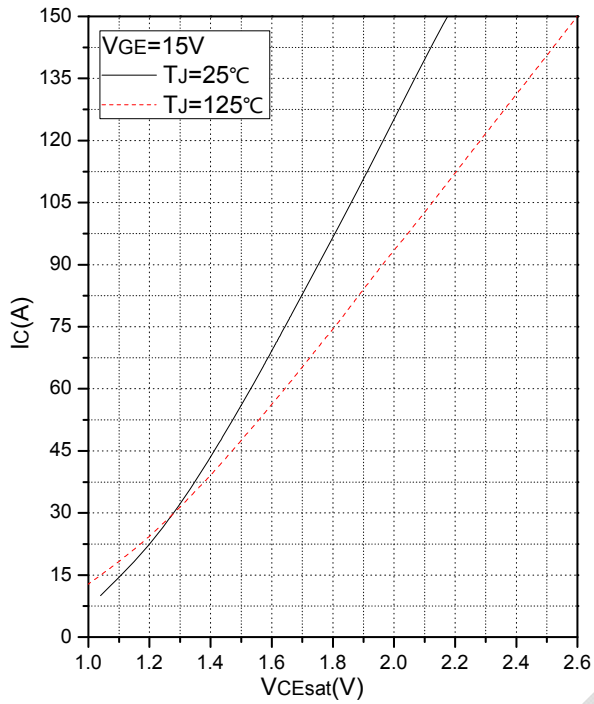


Fig.1 Typical Saturation Voltage Characteristics

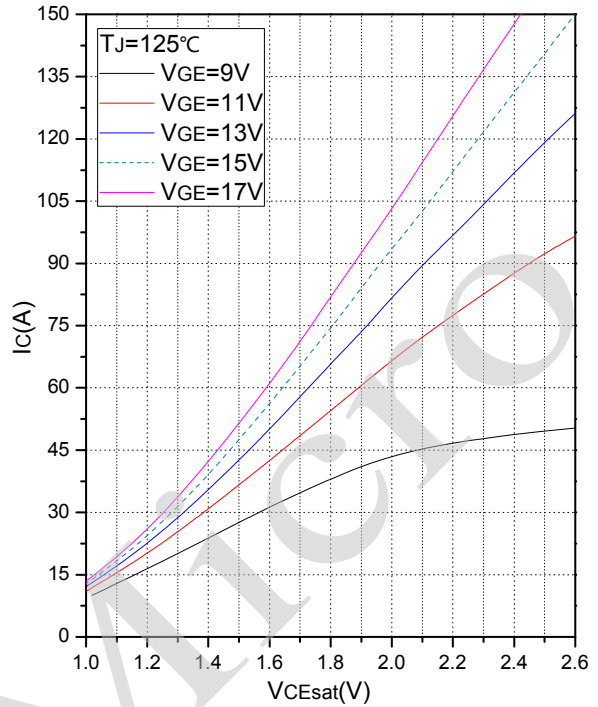


Fig.2 Typical Output Characteristics

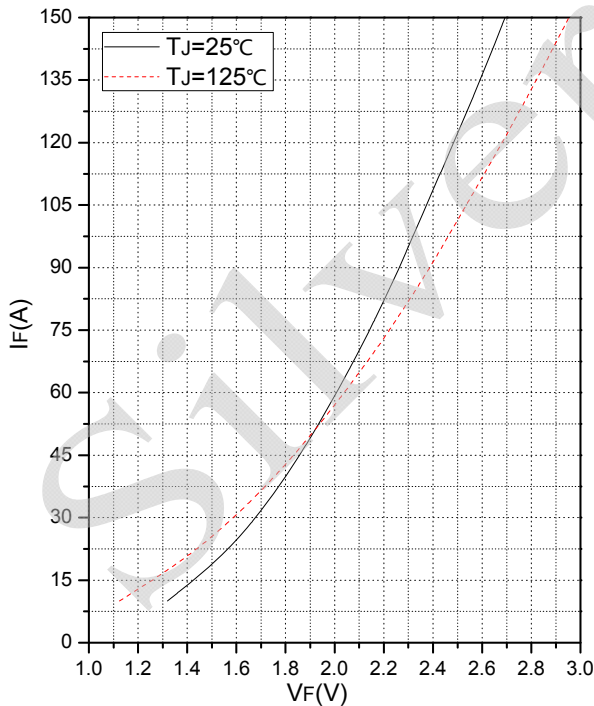


Fig.3 Forward Characteristics of Diode-Chopper

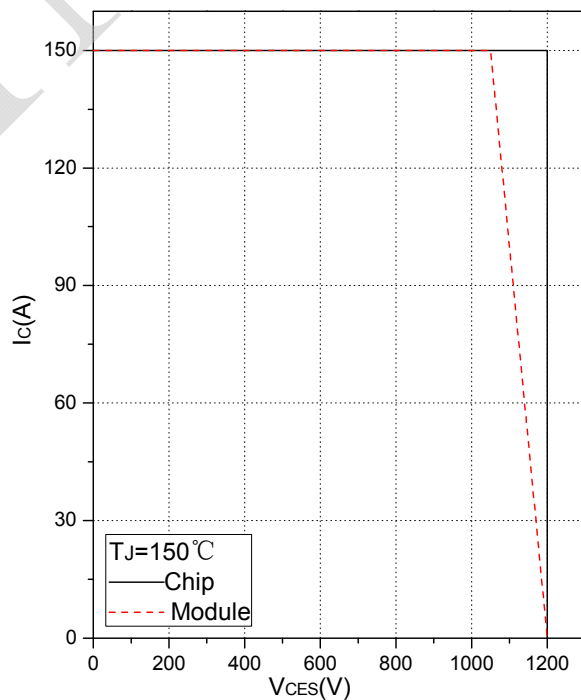


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

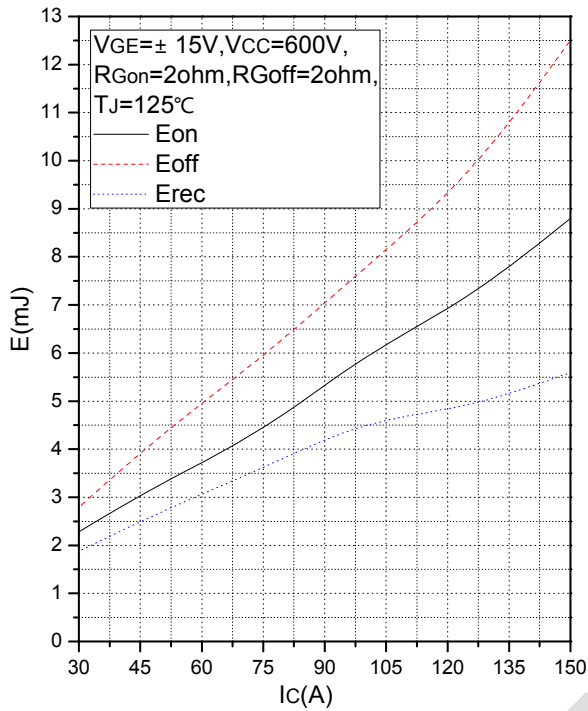


Fig.5 Typical Switching Loss vs. Collector Current

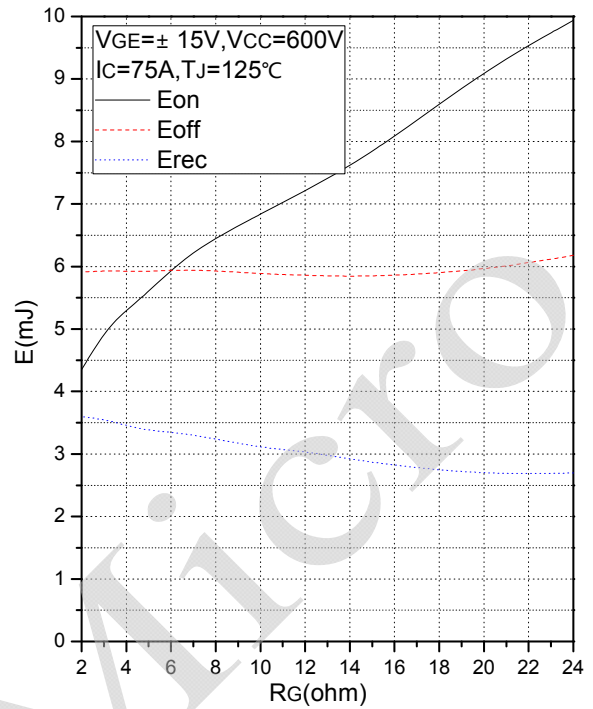


Fig.6 Typical Switching Loss vs. Gate Resistance

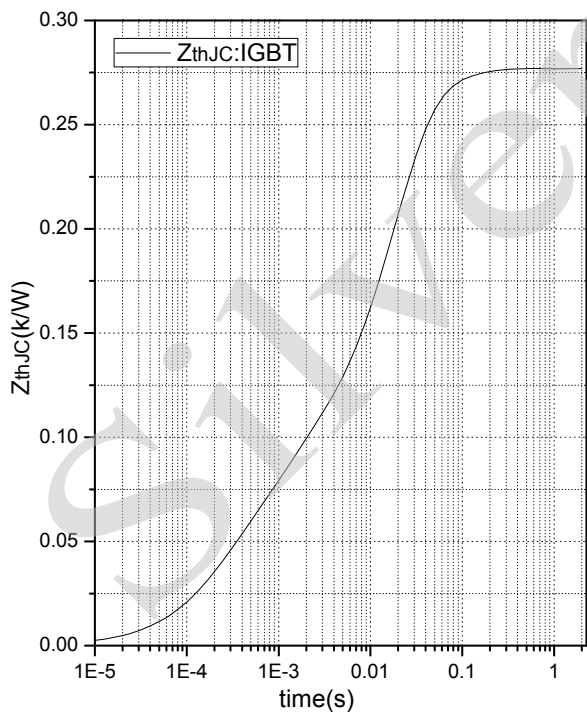


Fig.7 Transient Thermal Impedance (IGBT)

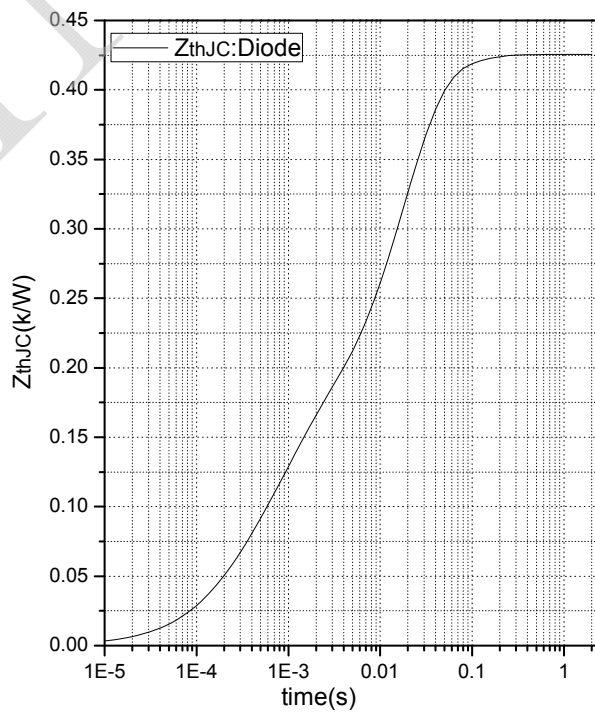


Fig.8 Transient Thermal Impedance (Diode-Chopper)

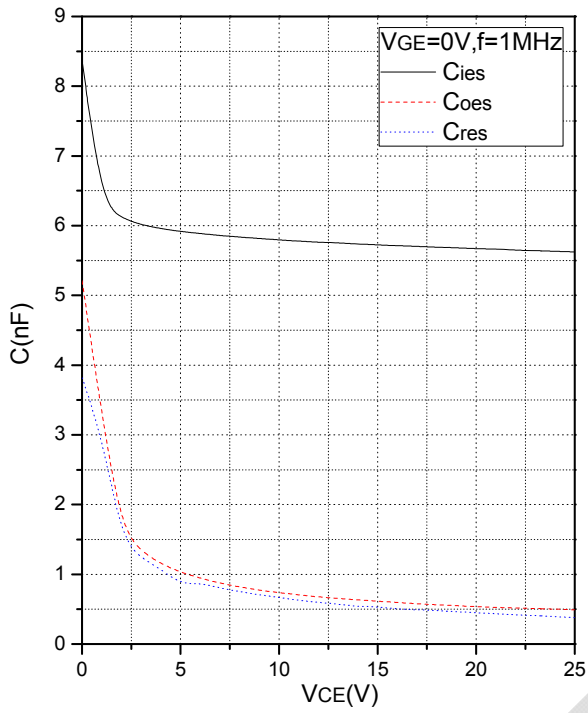


Fig.9 Capacitance Characteristics

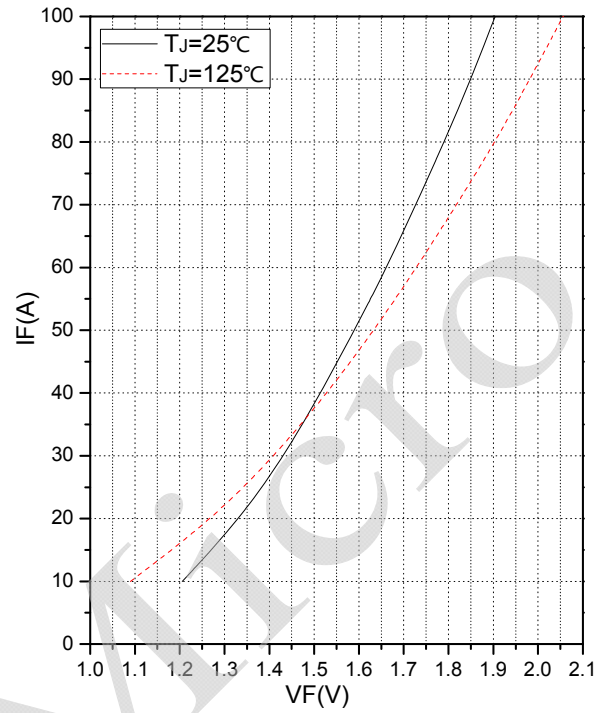
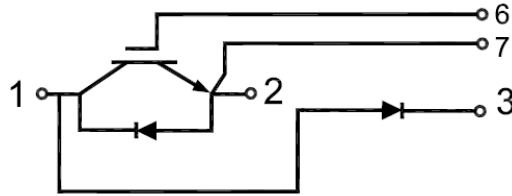
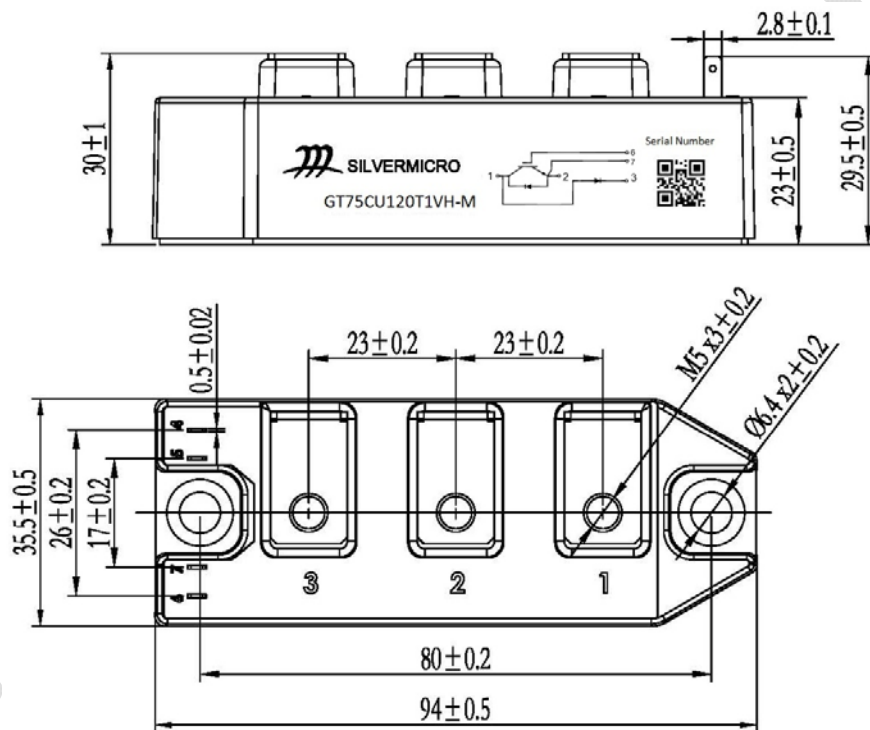


Fig.10 Forward Characteristics of Reverse Diode

**Internal Circuit**



**Package Outline (Unit: mm):**







Date	Revision	Notes
08/16/2019	01	Initial Release

## Announcements

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