

# GT100CU120T1VH

## IGBT Module

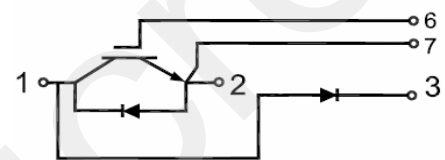
### Features:

- Short Circuit Rated 10 $\mu$ s
- Low Switching Loss
- Low Saturation Voltage:  $V_{CE(sat)} = 1.9V @ I_C = 100A, T_C = 25^\circ C$
- Low Stray Inductance
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement



### Applications:

- Industrial Inverters
- Servo Applications
- EV And EHV
- Induction Heating



**Internal Circuit Diagram**

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise specified)

Symbol	Description	Value	Units	
$V_{CES}$	Collector-Emitter Blocking Voltage	1200	V	
$V_{GES}$	Gate-Emitter Voltage	$\pm 20$	V	
$I_C$	Continuous Collector Current	$T_C = 80^\circ C$	100	A
		$T_C = 25^\circ C$	200	A
$I_{CM(1)}$	Peak Collector Current Repetitive	$T_J = 175^\circ C$	200	A
$I_F$	Diode Continuous Forward Current	$T_J = 150^\circ C$	100	A
$I_{FM}$	Peak FWD Current Repetitive		200	A
$P_D$	Maximum Power Dissipation(IGBT)	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	415	W
$T_J$	Maximum Junction Temperature		175	$^\circ C$
$T_{J op}$	Operation Temperature		-40 +150	$^\circ C$
$T_{stg}$	Storage Temperature		-40 +125	$^\circ C$
$V_{iso}$	Isolation Voltage(All Terminals Shorted)	$f = 50Hz, 1minute$	2500	V
Mounting Torque	Power Terminals Screw:M5		5.0	N·m
	Mounting Screw:M6		6.0	N·m
<b>Notes :</b>				
(1) Repetitive Rating: Pulse width limited by max. junction temperature				

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

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
<b>OFF Characteristics</b>						
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	1200			V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{GE} = 0V,$ $V_{CE} = V_{CES}$	$T_J = 25^\circ\text{C}$		400	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		1	mA
$I_{GES}$	Gate-Emitter Leakage Current	$V_{GE} = V_{GES},$ $V_{CE} = 0V$	$T_J = 25^\circ\text{C}$		300	nA
			$T_J = 125^\circ\text{C}$		600	nA
<b>ON Characteristics</b>						
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 1\text{ mA}, V_{CE} = V_{GE}$		5.0	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 100A,$ $V_{GE} = 15V$	$T_J = 25^\circ\text{C}$	1.9	2.2	V
			$T_J = 125^\circ\text{C}$	2.3	2.5	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1\text{MHz}$		13.7		nF
$C_{oes}$	Output Capacitance			0.78		nF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 100A,$ $R_G = 15\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 25^\circ\text{C}$		240		ns
$t_r$	Rise Time			140		ns
$t_{d(off)}$	Turn-off Delay Time			420		ns
$t_f$	Fall Time			170		ns
$E_{on}$	Turn-on Switching Loss			9.1		mJ
$E_{off}$	Turn-off Switching Loss			5.5		mJ
$E_{ts}$	Total Switching Loss			14.6		mJ
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 100A,$ $R_G = 15\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 125^\circ\text{C}$		225		ns
$t_r$	Rise Time			145		ns
$t_{d(off)}$	Turn-off Delay Time			450		ns
$t_f$	Fall Time			230		ns
$E_{on}$	Turn-on Switching Loss			11.7		mJ
$E_{off}$	Turn-off Switching Loss			7.9		mJ
$E_{ts}$	Total Switching Loss			19.6		mJ
$Q_g$	Total Gate Charge	$V_{CE} = 600V, I_C = 100A,$ $V_{GE} = -15V \sim +15V$		950		nC
RBSOA	Reverse Bias Safe Operating Area	$I_C = 200A, V_{CC} = 600V,$ $V_p = 1200V, R_g = 15\Omega,$ $V_{GE} = +15V \text{ to } 0V, T_J = 150^\circ\text{C}$	Trapezoid			
SCSOA	Short Circuit Safe Operating Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 150^\circ\text{C}$	10			$\mu\text{s}$

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

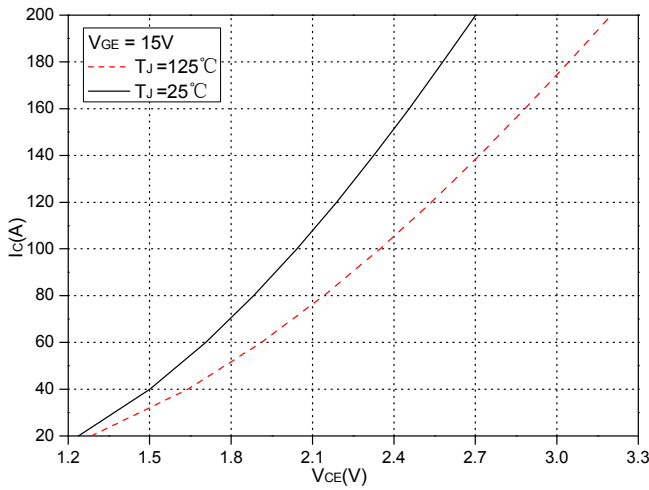
Symbol	Description	Test conditions		Min.	Typ.	Max.	Units
$V_{FM}$	Forward Voltage	$I_F = 100\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$		2.0	2.2	V
			$T_J = 125^\circ\text{C}$		2.2		
$t_{rr}$	Reverse Recovery Time	$I_F = 100\text{A}$ , $di/dt = 650\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		270		ns
			$T_J = 125^\circ\text{C}$		420		
$I_{rr}$	Peak Reverse Recovery Current	$I_F = 100\text{A}$ , $di/dt = 650\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		40		A
			$T_J = 125^\circ\text{C}$		50		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 100\text{A}$ , $di/dt = 650\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		4.7		$\mu\text{C}$
			$T_J = 125^\circ\text{C}$		10.6		

**Diode-Brake-chopper**
**Absolute Maximum Ratings** ( $T_C = 25^\circ\text{C}$  unless otherwise specified)

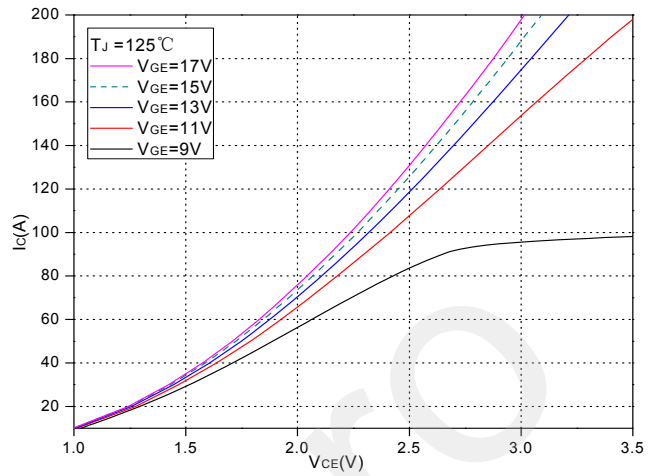
Symbol	Description	Test conditions		Min.	Typ.	Max.	Units
$V_{FM}$	Forward Voltage	$I_F = 100\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$		1.8	2.0	V
			$T_J = 125^\circ\text{C}$		2.0		
$t_{rr}$	Reverse Recovery Time	$I_F = 100\text{A}$ , $di/dt = 700\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		250		ns
			$T_J = 125^\circ\text{C}$		400		
$I_{rr}$	Peak Reverse Recovery Current	$I_F = 100\text{A}$ , $di/dt = 700\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		36		A
			$T_J = 125^\circ\text{C}$		45		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 100\text{A}$ , $di/dt = 700\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$		6.0		$\mu\text{C}$
			$T_J = 125^\circ\text{C}$		13.7		

**Thermal Resistance Characteristics**

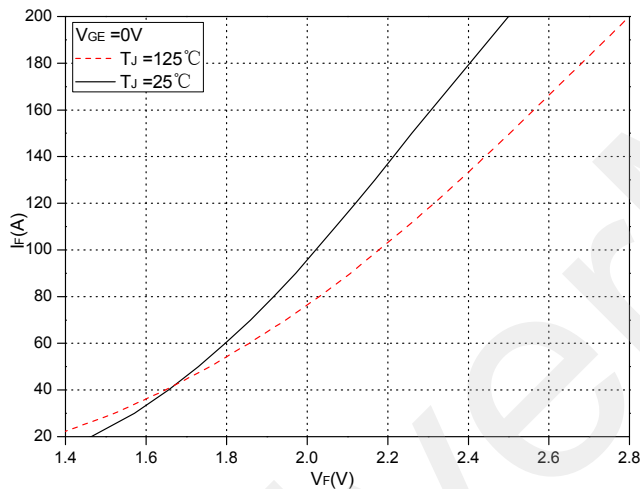
Symbol	Description	Typ.	Max.	Units
$R_{\theta JC}$	Junction-To-Case (IGBT Part, Per Leg)		0.26	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-To-Case (Diode Part, Per Leg)		0.38	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Junction-To-Case (Diode-Brake Part, Per Leg)		0.25	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)		0.10	$^\circ\text{C}/\text{W}$
Mounting Torque	Power Terminals Screw:M5	2.5	5.0	N·m
	Mounting Screw:M6	3.0	6.0	N·m
Weight	Weight Of Module		180	g



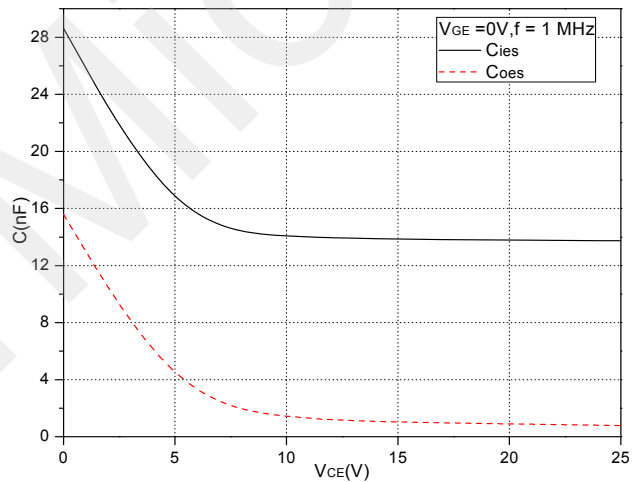
**Fig.1 Typical Saturation Voltage Characteristics**



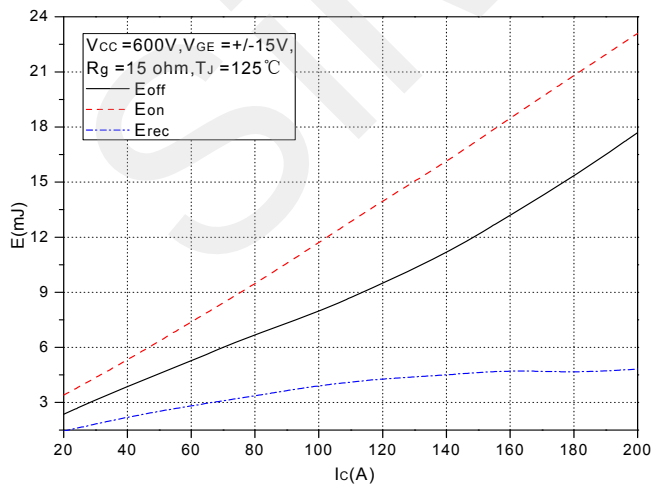
**Fig.2 Typical Output Characteristics**



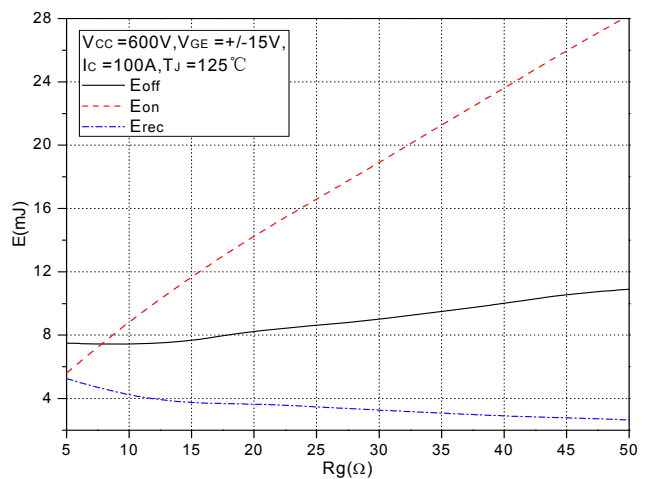
**Fig.3 Forward Characteristics of FWD**



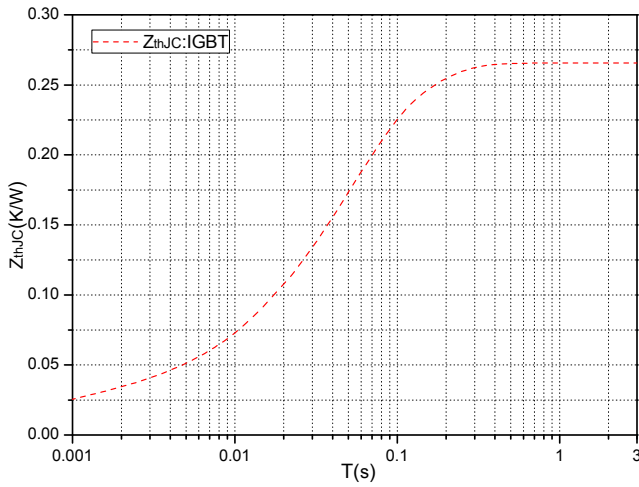
**Fig.4 Capacitance Characteristics**



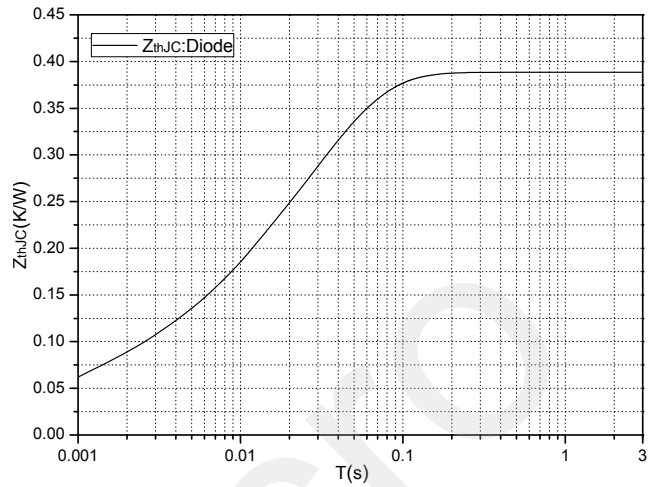
**Fig.5 Typical Switching Loss vs. Collector Current (T<sub>J</sub>=125°C)**



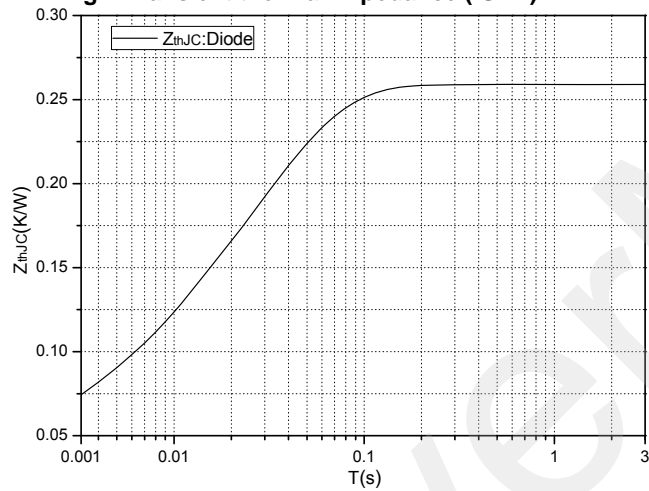
**Fig.6 Typical Switching Loss vs. Gate Resistance (T<sub>J</sub>=125°C)**



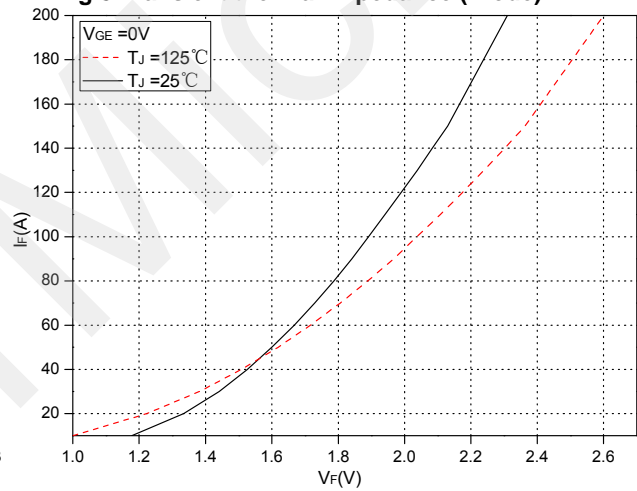
**Fig.7 Transient thermal impedance (IGBT)**



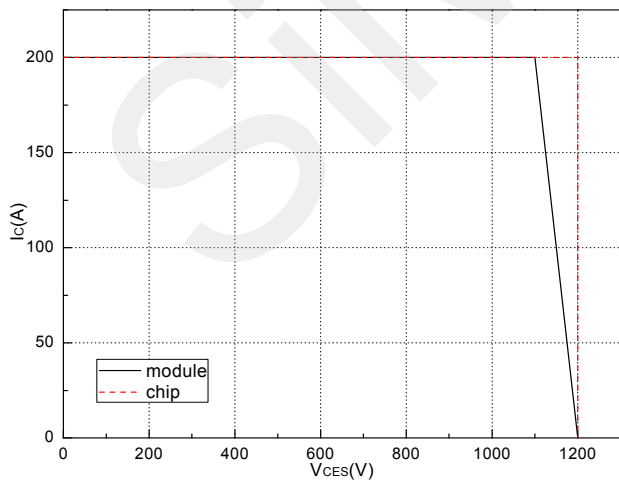
**Fig.8 Transient thermal impedance (Diode)**



**Fig.9 Transient thermal impedance (Brake)**

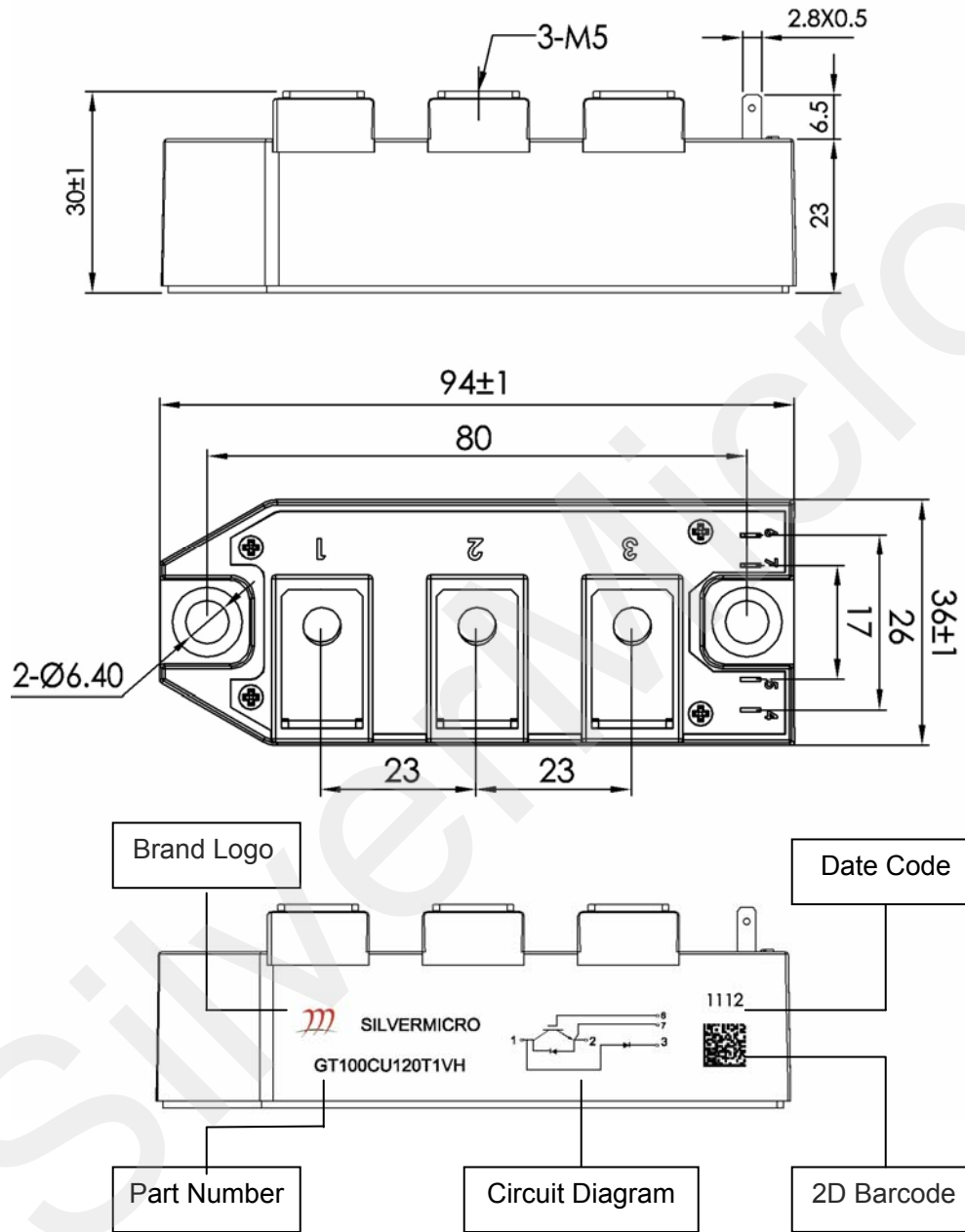


**Fig.10 Forward Characteristics of FWD (Diode-Brake-Chopper)**



**Fig.10 Reverse Bias Safe Operation Area (RBSOA)**

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



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