

GT15FB120A1H

IGBT Module

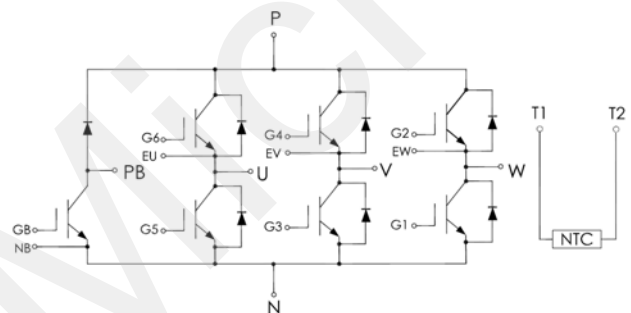
Features:

- IGBT Inverter Short Circuit Rated 10 μ s
- IGBT Inverter Low Saturation Voltage
- 100% RBSOA Test (2 \times I_c)
- Low Stray Inductance
- HI-REL Power Terminals
- Lead Free, Compliant With RoHS Requirement



Applications:

- Industrial Inverters
- Servo Applications
- Motor Control



IGBT-Inverter

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	15
		T _C = 25 $^{\circ}$ C	25
I _{CM(1)}	Peak Collector Current Repetitive	T _J = 125 $^{\circ}$ C	30
t _{SC}	Short Circuit Withstand Time	T _J = 150 $^{\circ}$ C	>10
P _D	Maximum Power Dissipation Per Leg	T _C = 25 $^{\circ}$ C T _{Jmax} = 150 $^{\circ}$ C	275

Characteristic Values (T_J = 25 $^{\circ}$ C unless otherwise specified)

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
I _{CES}	Collector-Emitter Leakage Current	V _{GE} = 0V, V _{CE} = V _{CES}	T _J = 25 $^{\circ}$ C		500	μ A
			T _J = 125 $^{\circ}$ C		1	mA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0V	T _J = 25 $^{\circ}$ C		400	nA
			T _J = 125 $^{\circ}$ C		800	nA
V _{GE(th)}	Gate-Emitter Threshold Voltage	I _C = 1 mA, V _{CE} = V _{GE}	4.5	5.3	6.5	V
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C = 15A, V _{GE} = 15V (tested on top ofterminals)	T _J = 25 $^{\circ}$ C	2.41	2.61	V
			T _J = 125 $^{\circ}$ C	2.65	2.85	V
C _{ies}	Input Capacitance	V _{CE} = 25V, V _{GE} = 0V, f = 1MHz		1.5		nF
C _{oes}	Output Capacitance			0.13		nF

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 15A,$ $V_{CC} = 600V, I_C = 15A,$ $R_G = 68\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 25^\circ C$	105		ns
t_r	Rise Time		50		ns
$t_{d(off)}$	Turn-off Delay Time		260		ns
t_f	Fall Time		240		ns
E_{on}	Turn-on Switching Loss		1.6		mJ
E_{off}	Turn-off Switching Loss		0.6		mJ
E_{is}	Total Switching Loss		2.2		mJ
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600V, I_C = 15A,$ $R_G = 68\Omega, V_{GE} = \pm 15V,$ Inductive Load, $T_J = 125^\circ C$	90		ns
t_r	Rise Time		50		ns
$t_{d(off)}$	Turn-off Delay Time		275		ns
t_f	Fall Time		360		ns
E_{on}	Turn-on Switching Loss		2.0		mJ
E_{off}	Turn-off Switching Loss		1.1		mJ
E_{is}	Total Switching Loss		3.1		mJ
Q_g	Total Gate Charge	$V_{GE} = 600V, I_C = 15A,$ $V_{GE} = -15V \sim +15V$	145		nC
RBSOA	Reverse Bias Safe Operating Area	$I_C = 30A, V_{CC} = 960V,$ $V_p = 1200V, R_g = 68\Omega,$ $V_{GE} = +15V \text{ to } 0V, T_J = 125^\circ C$	Trapezoid		
SCSOA	Short Circuit Safe Operating Area	$V_{CC} = 600V, V_{GE} = 15V,$ $T_J = 125^\circ C$	10		μs

Diode-Inverter

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

Symbol	Description	Value	Units
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	DC Forward Current	15	A
I_{FRM}	Repetitive Peak Forward Current	30	A

Characteristic Values

Symbol	Description	Conditions	Min.	Typ.	Max.	Units	
V_F	Forward Voltage	$I_F = 15A,$ $V_{GE} = 0V$ (tested on top of terminals)	$T_J = 25^\circ C$		1.9	2.1	V
		$T_J = 125^\circ C$		2.3			
t_{rr}	Reverse Recovery Time	$I_F = 15A,$ $di/dt = 328A/\mu s,$ $V_{rr} = 600V,$ $V_{GE} = -15V$	$T_J = 25^\circ C$		185		ns
			$T_J = 125^\circ C$		245		
I_{rr}	Peak Reverse Recovery Current		$T_J = 25^\circ C$		10		A
			$T_J = 125^\circ C$		15		
Q_{rr}	Recovered Charge		$T_J = 25^\circ C$		0.8		μC
			$T_J = 125^\circ C$		1.5		
E_{rec}	Reverse Recovery Energy		$T_J = 25^\circ C$		0.31		mJ
			$T_J = 125^\circ C$		0.68		

IGBT-Brake-Chopper

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

Symbol	Description	Value	Units	
V_{CES}	Collector-Emitter Blocking Voltage	1200	V	
V_{GES}	Gate-Emitter Voltage	± 20	V	
I_C	Continuous Collector Current	$T_C = 80^\circ\text{C}$	15	A
		$T_C = 25^\circ\text{C}$	25	A
$I_{CM(1)}$	Peak Collector Current Repetitive	$T_J = 125^\circ\text{C}$	30	A
P_D	Maximum Power Dissipation Per Leg	$T_C = 25^\circ\text{C}$ $T_{Jmax} = 150^\circ\text{C}$	275	W

Characteristic Values

Symbol	Description	Test Conditions	Min.	Typ.	Max.	Units
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0V$, $V_{CE} = V_{CES}$	$T_J = 25^\circ\text{C}$		500	μA
			$T_J = 125^\circ\text{C}$		1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = V_{GES}$, $V_{CE} = 0V$	$T_J = 25^\circ\text{C}$		400	nA
			$T_J = 125^\circ\text{C}$		800	nA
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 1\text{ mA}$, $V_{CE} = V_{GE}$	4.5	5.3	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 15A$, $V_{GE} = 15V$ (tested on top of terminals)	$T_J = 25^\circ\text{C}$	2.41	2.61	V
			$T_J = 125^\circ\text{C}$	2.65	2.85	V
Dynamic Characteristics And Test Conditions		See inverter in datasheet GT15FB120A1H				

Diode-Brake-chopper

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

Symbol	Description	Value	Units
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	DC Forward Current	15	A
I_{FRM}	Repetitive Peak Forward Current	30	A

Characteristic Values

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
V_F	Forward Voltage	$I_F = 15A$ (tested on top of terminals)	$T_J = 25^\circ\text{C}$	1.9	2.1	V
			$T_J = 125^\circ\text{C}$	2.3		
Dynamic Characteristics And Test Conditions		See inverter in datasheet GT15FB120A1H				

NTC Thermistor

Characteristic Values

Symbol	Condition	Typ.	Max.	Units
R_{25}	$T_C = 25^\circ\text{C}$	5		k Ω
$\Delta R/R$	$T_C = 100^\circ\text{C}$, $R_{100} = 469\Omega$		± 5	%
P_{25}	$T_C = 25^\circ\text{C}$	50		mW
$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298.15K))]$	3380		K
$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298.15K))]$	3450		K
$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298.15K))]$	3490		K

Module

Absolute Maximum Ratings

Inverter& Brake	T _J	Operating Junction Temperature of IGBT		-40 +150	°C
		Operating Junction Temperature of Diode		-40 +150	°C
	T _{stg}	Storage Temperature		-40 +125	°C
	V _{iso}	Isolation Voltage (All Terminals Shorted)	f = 50Hz, 1minute	2500	V

Thermal characteristics

	Symbol	Description	Typ.	Max.	Units
Inverter	R _{θJC}	Junction-To-Case (IGBT Part, Per Leg)		0.45	°C/W
	R _{θJC}	Junction-To-Case (Diode Part, Per Leg)		1.19	°C/W
Brake	R _{θJC}	Junction-To-Case, IGBT		0.45	°C/W
	R _{θJC}	Junction-To-Case, Diode		1.19	°C/W
Module	R _{θCS}	Case-To-Sink (Conductive Grease Applied)		0.10	°C/W
	Mounting torque	Mounting Screw:M3	2.0	3.0	N-m
Weight		Weight of Module		35	g

Notes:

(1) Repetitive Rating: Pulse width limited by max. Junction temperature

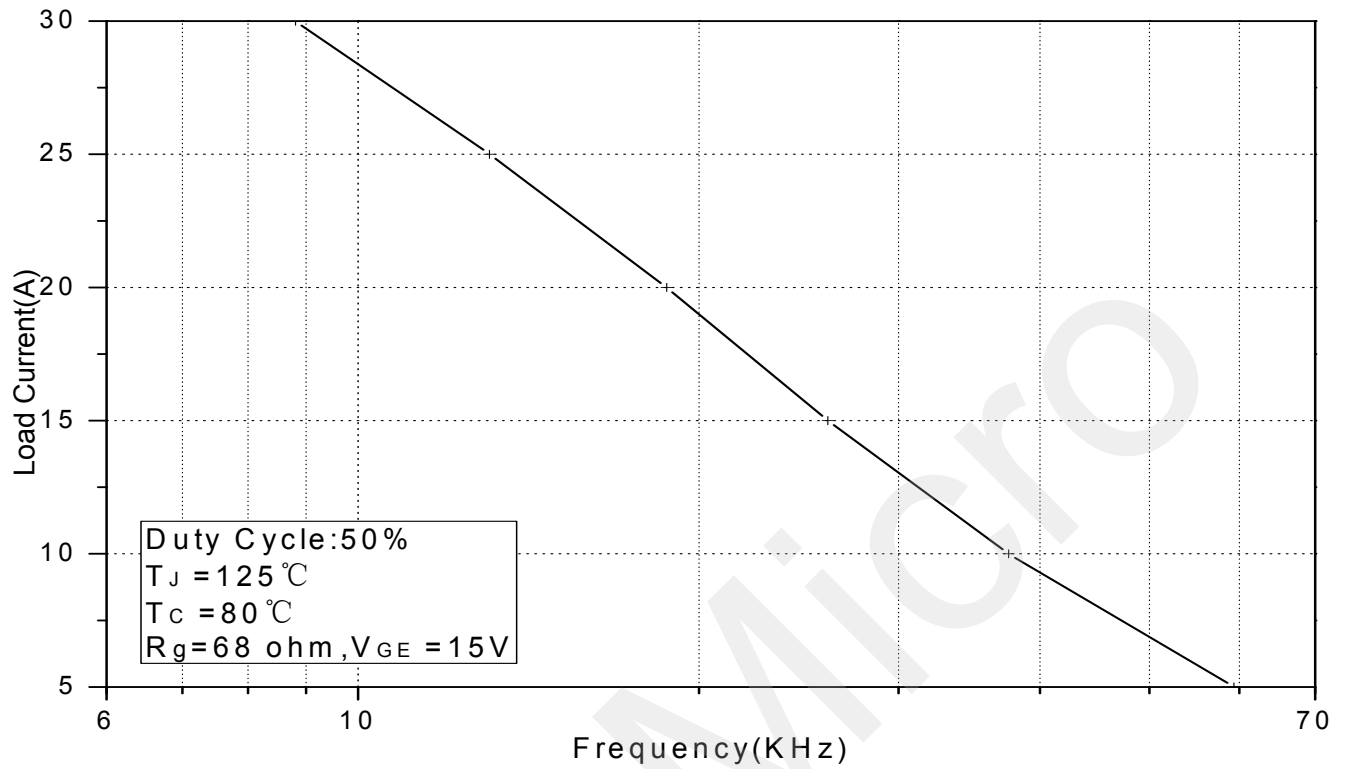


Fig.1 Typical Load Current vs. Frequency (Inverter)

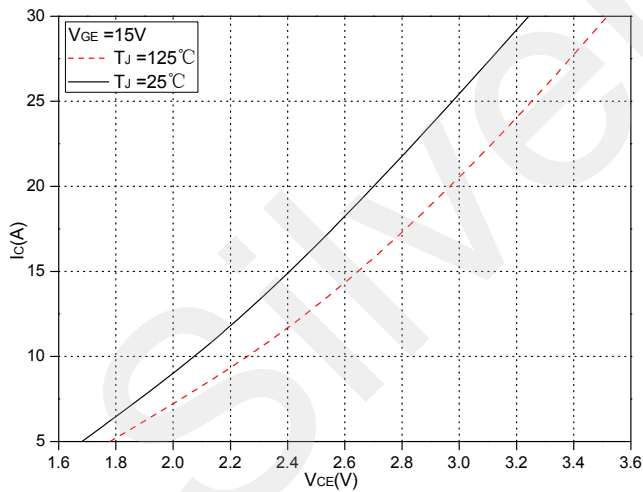


Fig.2 Typical Output Characteristics- Inverter

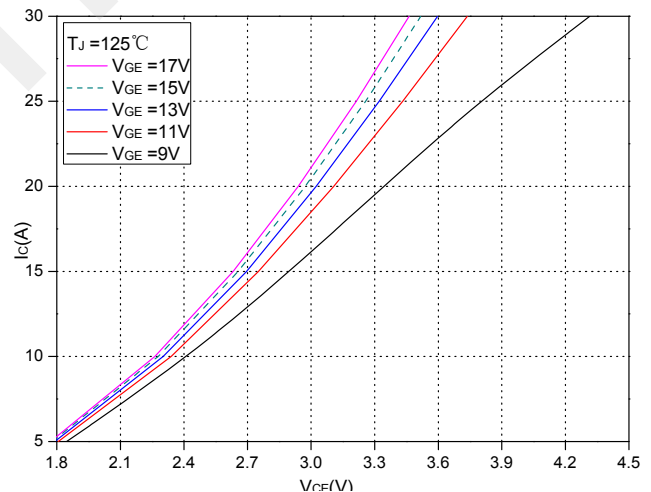


Fig.3 Output Characteristics- Inverter

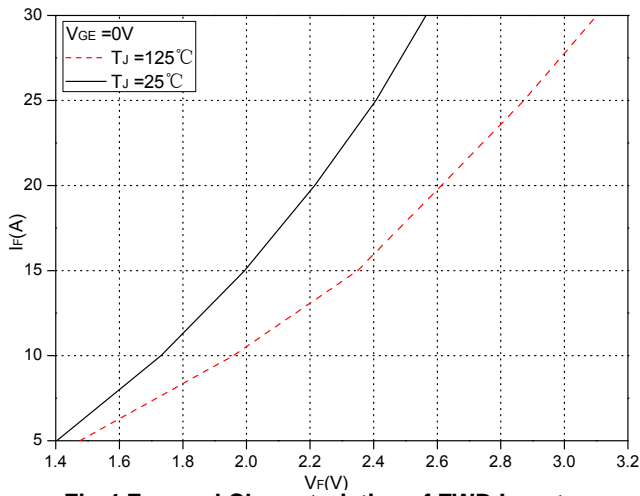


Fig.4 Forward Characteristics of FWD Inverter

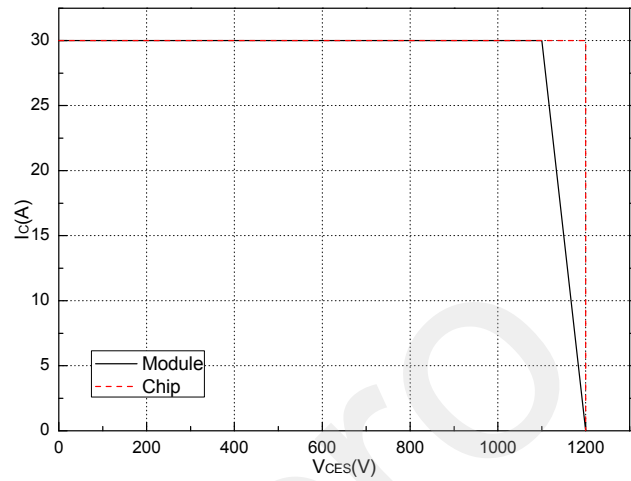


Fig.5 Reverse Bias Safe Operation Area (RBSOA)

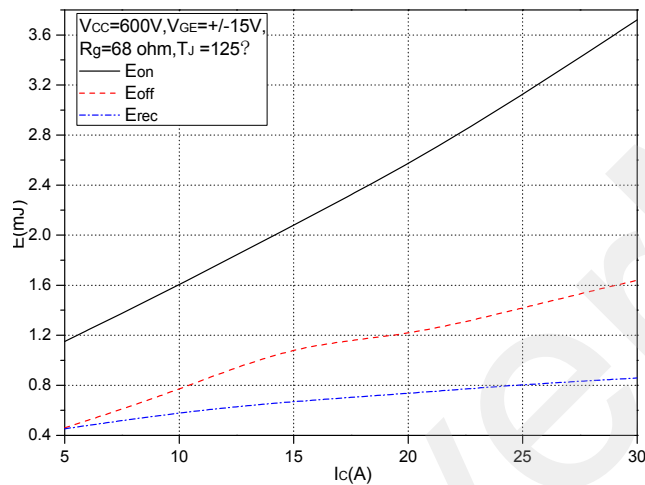


Fig.6 Typical Switching Loss vs. Collector Current (Inverter)

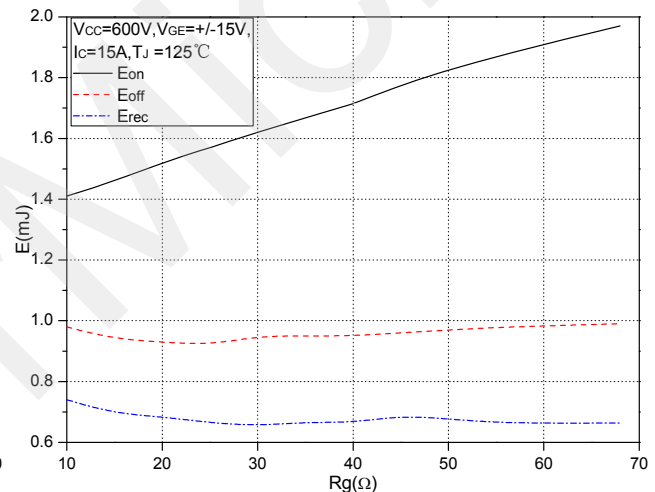


Fig.7 Typical Switching Loss vs. Gate Resistance (Inverter)

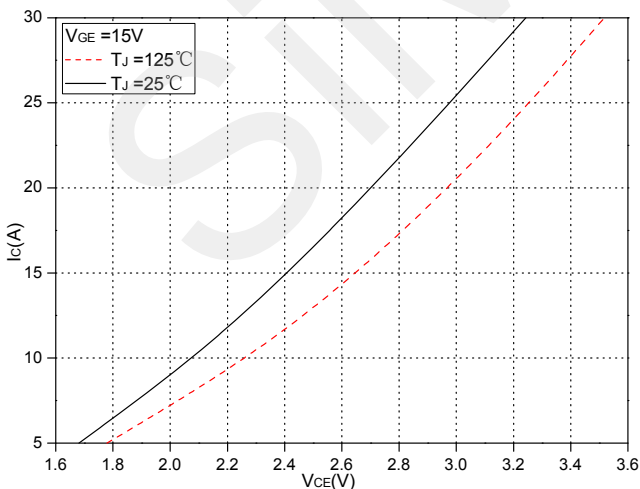


Fig.8 Typical Saturation Voltage Characteristics (Brake-Chopper- IGBT)

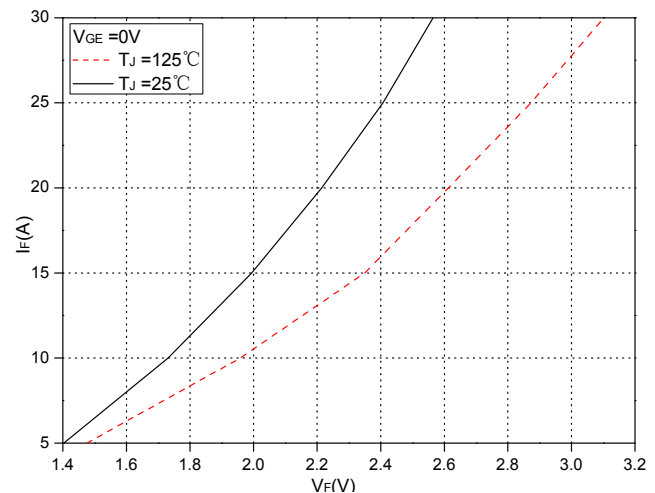
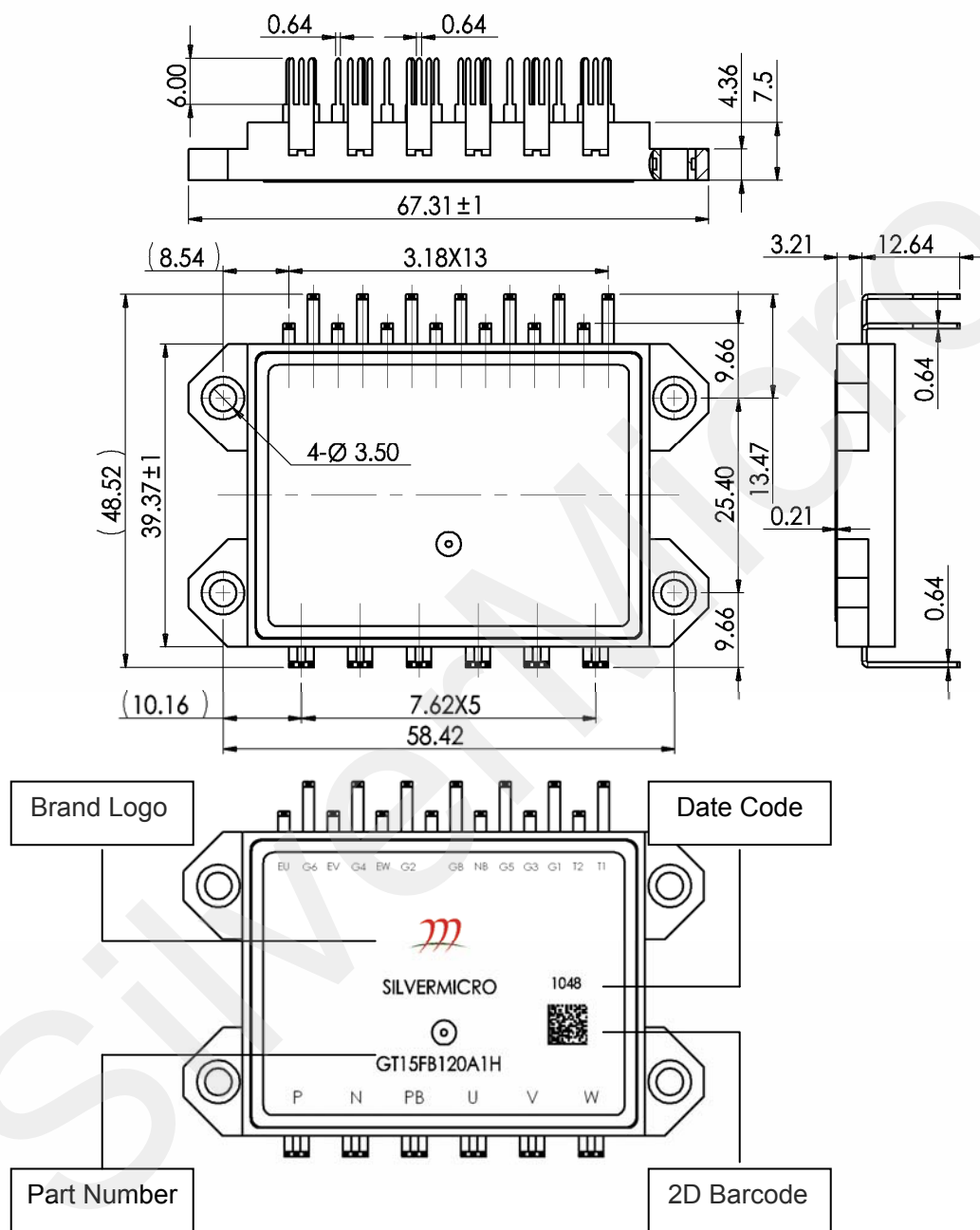


Fig.9 Forward Characteristics of Diode (Brake-Chopper- FWD)

Package Outline (Unit: mm):



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