

# 6MBI550V-120-50

IGBT Modules

## IGBT MODULE (V series) 1200V / 550A / 6 in one package

### ■ Features

- Compact Package
- P.C.Board Mount
- Low  $V_{CE(sat)}$

### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial machines, such as welding machines



### ■ Maximum Ratings and Characteristics

#### ● Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Items		Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage	$V_{CES}$			1200	V
	Gate-Emitter voltage	$V_{GES}$			$\pm 20$	V
	Collector current	$I_C$	Continuous	$T_c=25^\circ\text{C}$	750	A
		$I_{C(pulse)}$	1ms	$T_c=100^\circ\text{C}$	550	
		$-I_C$			1100	
		$-I_{C(pulse)}$	1ms		550	
Collector power dissipation	$P_C$	1 device		1100	W	
Junction temperature	$T_j$			2500		
Operating junction temperature (under switching conditions)	$T_{jop}$			150	$^\circ\text{C}$	
Case temperature	$T_c$			125		
Storage temperature	$T_{stg}$			-40 ~ +125		
Isolation voltage	Between terminal and copper base (*1)	$V_{iso}$	AC : 1min.		2500	VAC
	Between thermistor and others (*2)					
Screw torque	Mounting (*3)	-			3.5	N m
	Terminals (*4)	-			4.5	

Note \*1: All terminals should be connected together during the test.

Note \*2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note \*3: Recommendable Value : 2.5-3.5 Nm (M5)

Note \*4: Recommendable Value : 3.5-4.5 Nm (M6)

● Electrical characteristics (at T<sub>J</sub>= 25°C unless otherwise specified)

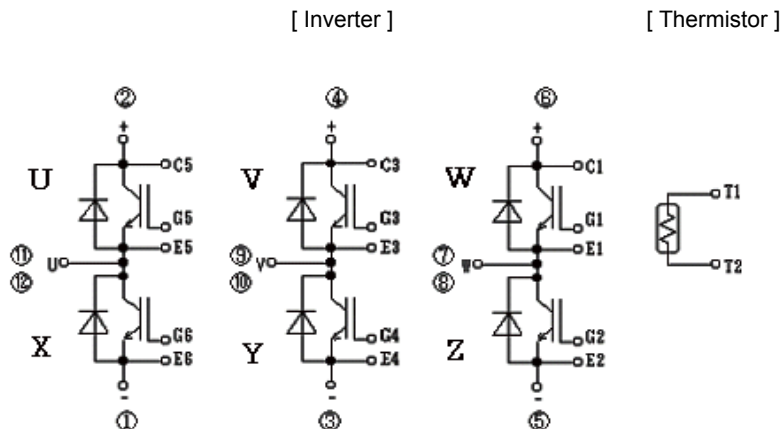
Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I <sub>CE(S)</sub>	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 1200V	-	-	3.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> = 0V, V <sub>GE</sub> = ±20V	-	-	600	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> = 20V, I <sub>C</sub> = 600mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> = 15V I <sub>C</sub> = 600A	T <sub>J</sub> =25°C	-	2.50	2.95	V
			T <sub>J</sub> =125°C	-	2.85	-	
			T <sub>J</sub> =150°C	-	2.90	-	
	V <sub>CE(sat)</sub> (chip)	V <sub>GE</sub> = 15V I <sub>C</sub> = 600A	T <sub>J</sub> =25°C	-	1.85	2.10	
			T <sub>J</sub> =125°C	-	2.20	-	
T <sub>J</sub> =150°C	-	2.25	-	-			
Internal gate resistance	R <sub>G(int)</sub>	-	-	1.10	-	Ω	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> = 10V, V <sub>GE</sub> = 0V, f = 1MHz	-	48	-	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> = 600V I <sub>C</sub> = 600A V <sub>GE</sub> = ±15V R <sub>G</sub> = 0.62Ω L <sub>S</sub> = 80nH	-	550	-	nsec	
	t <sub>r</sub>		-	180	-		
	t <sub>r(i)</sub>		-	120	-		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> = 0.62Ω L <sub>S</sub> = 80nH	-	1050	-	nsec	
	t <sub>r</sub>		-	110	-		
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> = 0V, I <sub>F</sub> = 600A	T <sub>J</sub> =25°C	-	2.40	2.85	V
			T <sub>J</sub> =125°C	-	2.55	-	
			T <sub>J</sub> =150°C	-	2.50	-	
	V <sub>F</sub> (chip)	V <sub>GE</sub> = 0V, I <sub>F</sub> = 600A	T <sub>J</sub> =25°C	-	1.75	2.20	
			T <sub>J</sub> =125°C	-	1.90	-	
T <sub>J</sub> =150°C	-	1.85	-	-			
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = 600A	-	200	-	nsec	
Thermistor	Resistance	T = 25°C	-	5000	-	Ω	
		T = 100°C	465	495	520		
	B value	B	T = 25 / 50°C	3305	3375	3450	K

● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R <sub>th(j-c)</sub>	Inverter IGBT	-	-	0.060	°C/W
		Inverter FWD	-	-	0.100	
Contact thermal resistance (1device) (*5)	R <sub>th(c-f)</sub>	with Thermal Compound	-	0.0167	-	

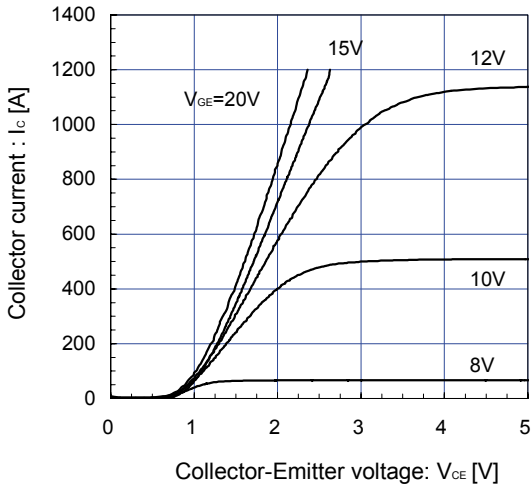
Note \*5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

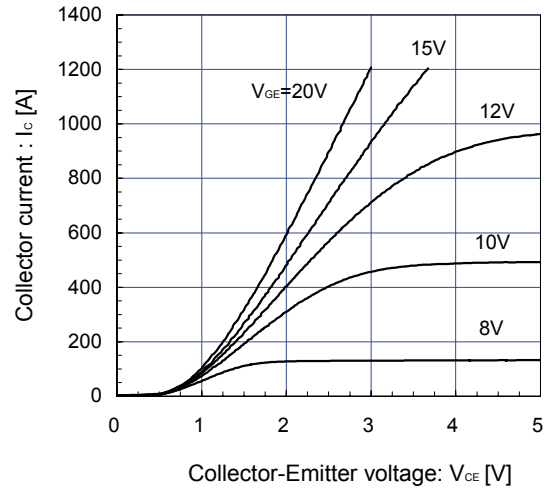


■ Characteristics (Representative)

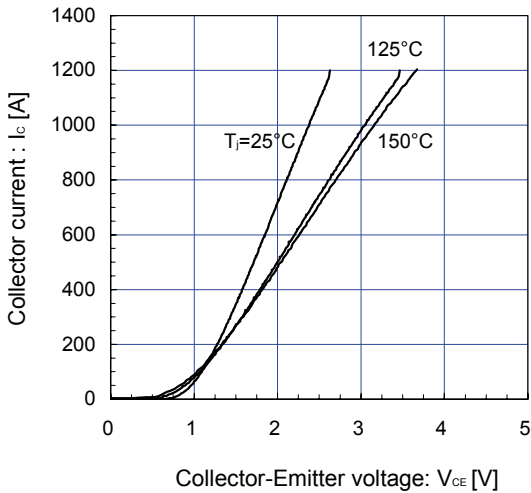
[ Inverter ]  
Collector current vs. Collector-Emitter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



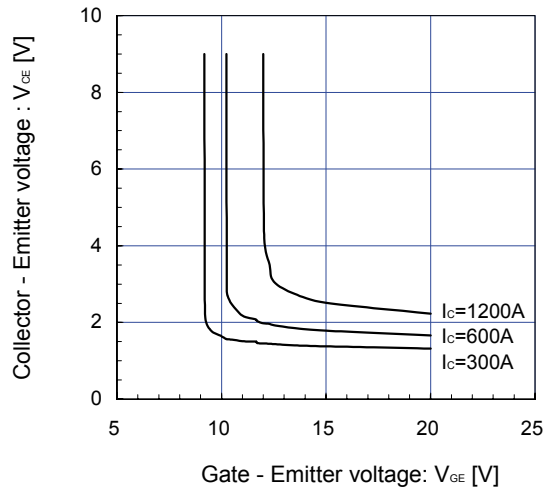
[ Inverter ]  
Collector current vs. Collector-Emitter voltage (typ.)  
 $T_j = 150^\circ\text{C}$  / chip



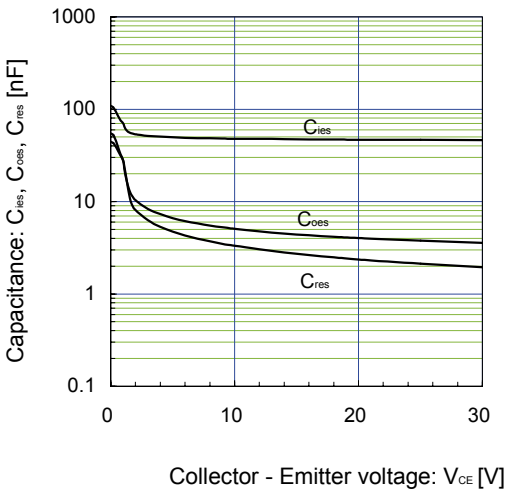
[ Inverter ]  
Collector current vs. Collector-Emitter voltage (typ.)  
 $V_{GE} = 15\text{V}$  / chip



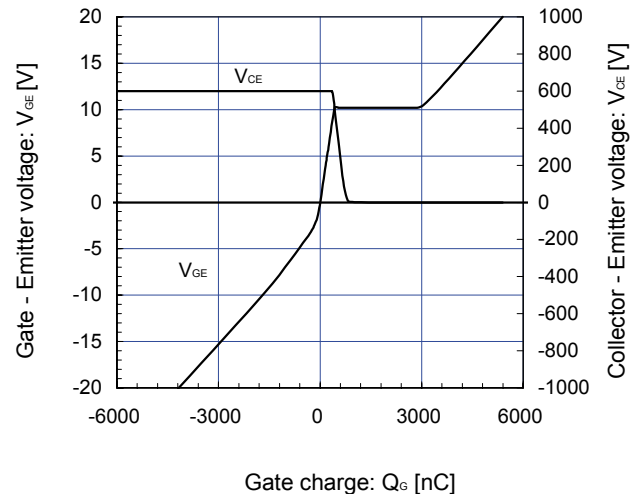
[ Inverter ]  
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)  
 $T_j = 25^\circ\text{C}$  / chip



[ Inverter ]  
Capacitance vs. Collector-Emitter voltage (typ.)  
 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_j = 25^\circ\text{C}$

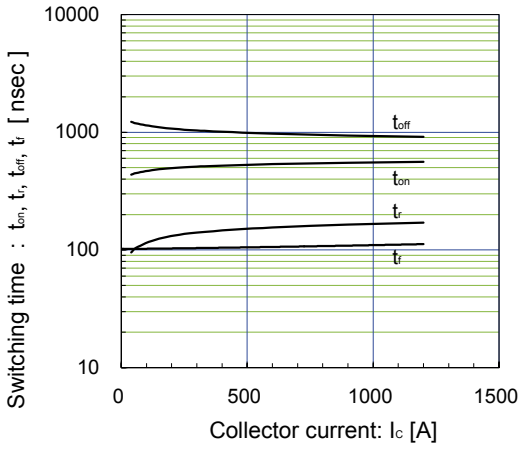


[ Inverter ]  
Dynamic gate charge (typ.)  
 $V_{CC} = 600\text{V}$ ,  $I_c = 600\text{A}$ ,  $T_j = 25^\circ\text{C}$



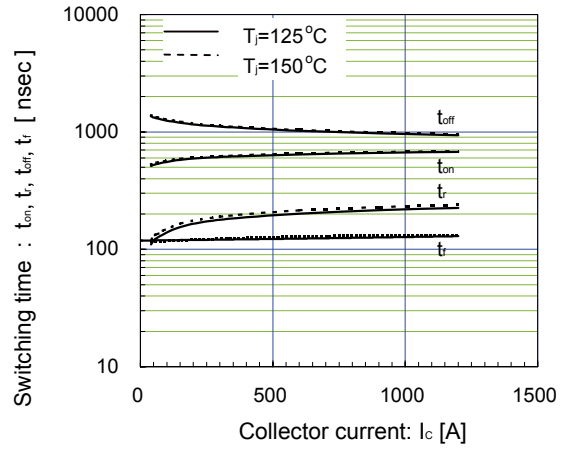
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=0.62\Omega, T_J=25^\circ C$



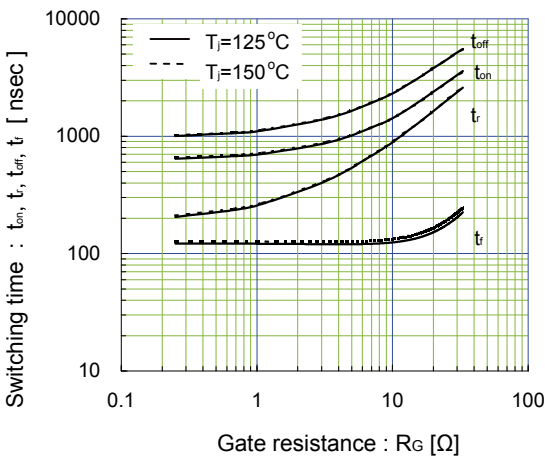
[ Inverter ]

Switching time vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=0.62\Omega, T_J=125^\circ C, 150^\circ C$



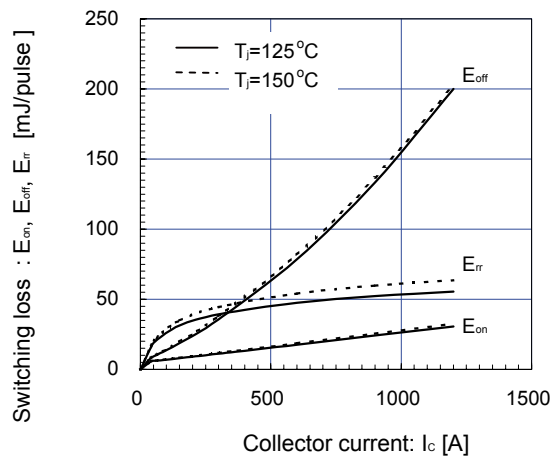
[ Inverter ]

Switching time vs. gate resistance (typ.)  
 $V_{CC}=600V, I_C=550A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



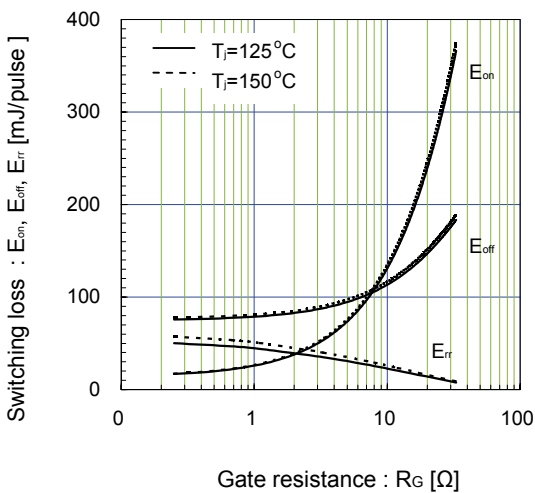
[ Inverter ]

Switching loss vs. Collector current (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=0.62\Omega, T_J=125^\circ C, 150^\circ C$



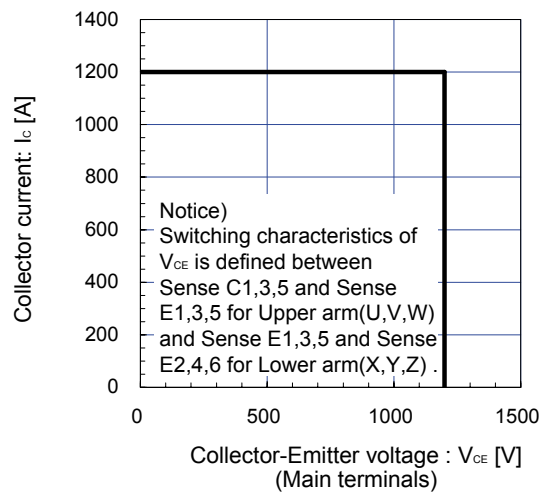
[ Inverter ]

Switching loss vs. gate resistance (typ.)  
 $V_{CC}=600V, I_C=600A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



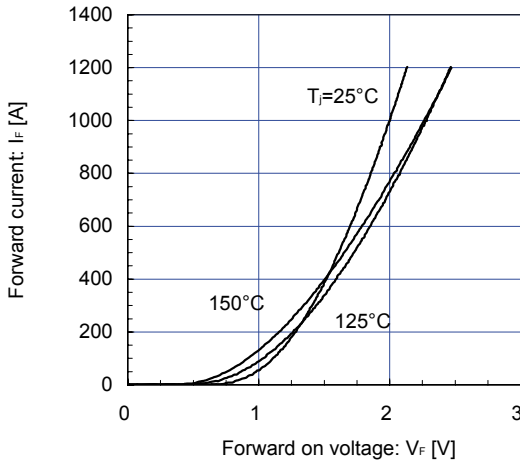
[ Inverter ]

Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \le 15V, R_G \ge 0.62\Omega, T_J=150^\circ C$



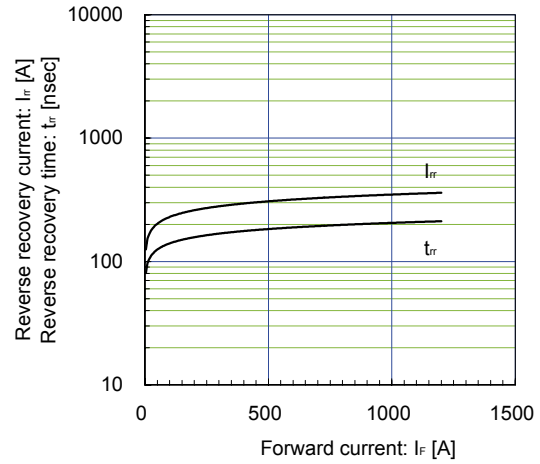
[INVERTER]

Forward Current vs. Forward Voltage (typ.)  
chip



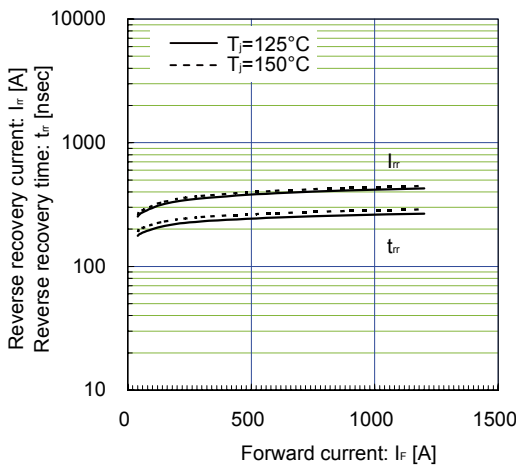
[INVERTER]

Reverse Recovery Characteristics (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=0.62\Omega, T_J=25^\circ C$

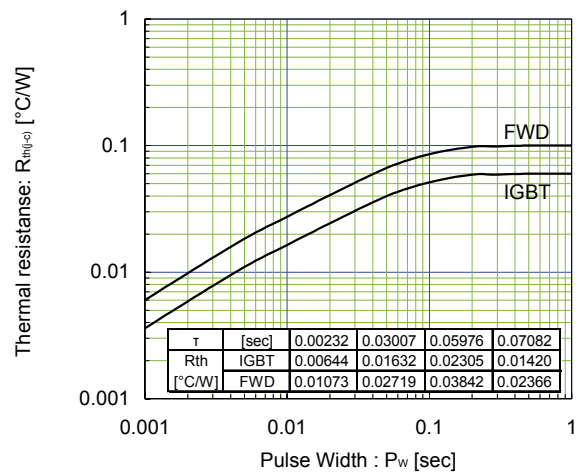


[INVERTER]

Reverse Recovery Characteristics (typ.)  
 $V_{CC}=600V, V_{GE}=\pm 15V, R_G=0.62\Omega, T_J=125^\circ C, 150^\circ C$

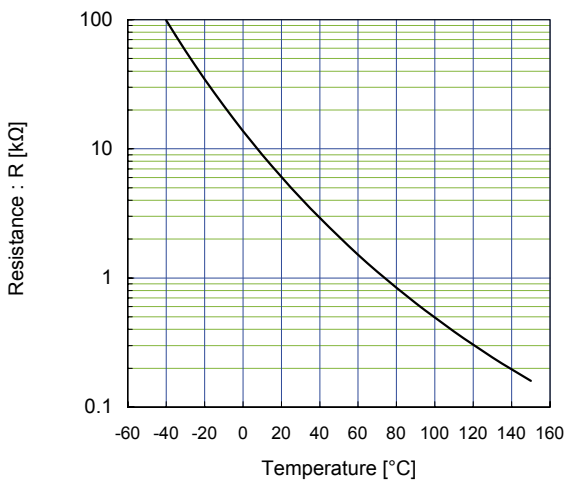


Transient Thermal Resistance (max.)



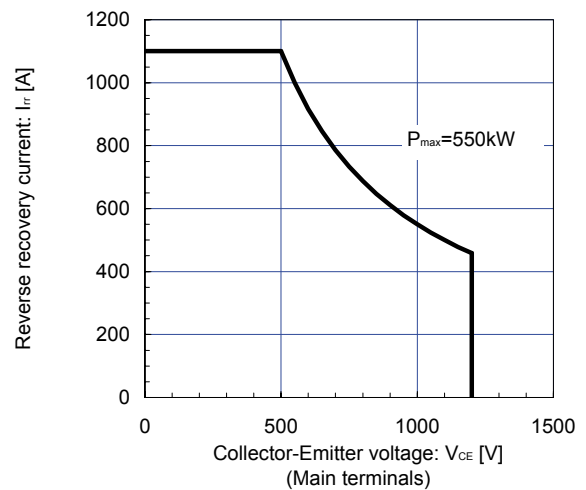
[THERMISTOR]

Temperature characteristic (typ.)

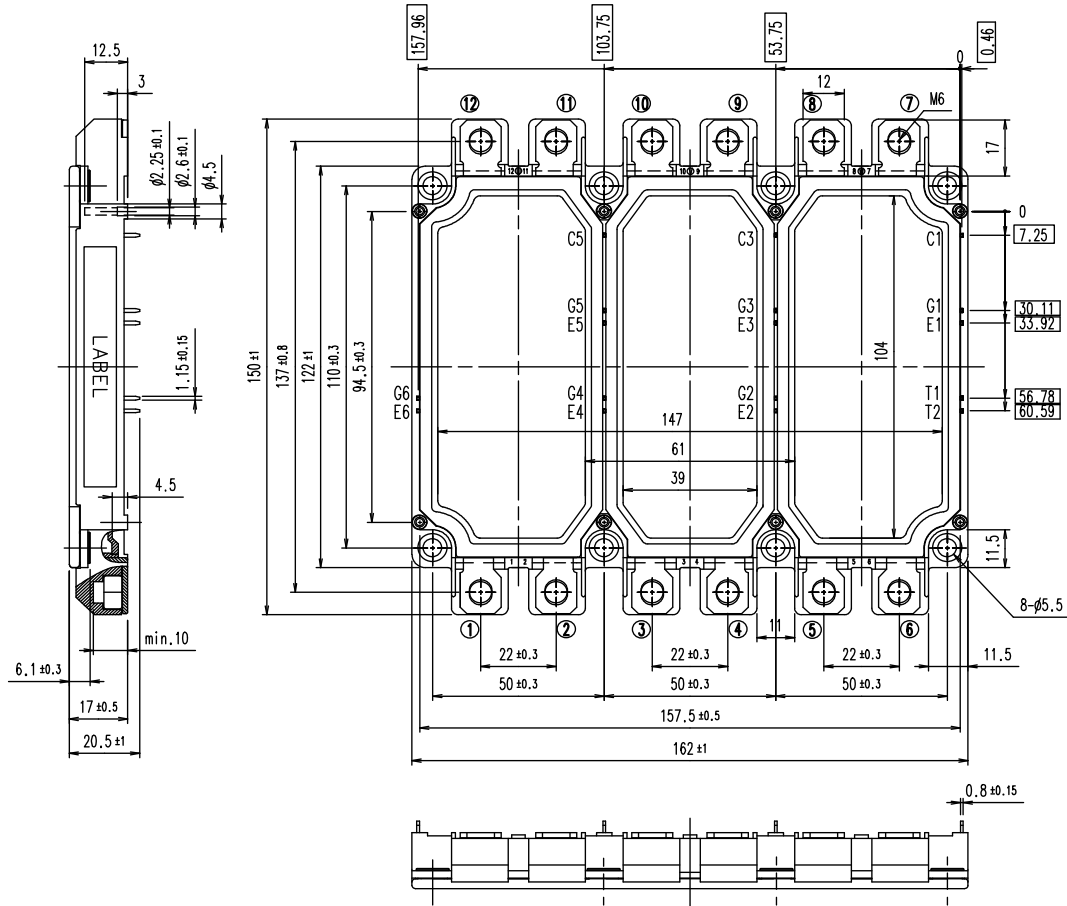


FWD safe operating area (max.)

$T_J=150^\circ C$



■ Outline Drawings, mm



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