

# 3MBI150U-120



## IGBT Module U-Series 1200V / 150A 3 in one-package

### ■ Features

- High speed switching
- Voltage drive
- Low inductance module structure

### ■ 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 Tc=25°C unless otherwise specified)

Item	Symbol	Conditions	Rating	Unit	
Collector-Emitter voltage	V <sub>CES</sub>		1200	V	
Gate-Emitter voltage	V <sub>GES</sub>		±20	V	
Collector current	I <sub>c</sub>	Continuous	T <sub>c</sub> =25°C	200	A
			T <sub>c</sub> =80°C	150	
	I <sub>cp</sub>	1ms	T <sub>c</sub> =25°C	400	
			T <sub>c</sub> =80°C	300	
-I <sub>c</sub>			150		
-I <sub>c</sub> pulse			300		
Collector Power Dissipation	P <sub>c</sub>	1 device	735	W	
Junction temperature	T <sub>j</sub>		+150	°C	
Storage temperature	T <sub>stg</sub>		-40 to +125		
Isolation voltage	V <sub>iso</sub>	AC:1min.	2500	VAC	
Screw Torque	Mounting *2		3.5	N·m	

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\*1 : All terminals should be connected together when isolation test will be done.

\*2 : Recommendable value : 2.5 to 3.5 N·m(M5)

#### ● Electrical characteristics (at Tj=25°C unless otherwise specified)

Item	Symbols	Conditions	Characteristics			Unit	
			Min.	Typ.	Max.		
Zero gate voltage collector current	I <sub>CEs</sub>	V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V	–	–	1.0	mA	
Gate-Emitter leakage current	I <sub>GES</sub>	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V	–	–	200	nA	
Gate-Emitter threshold voltage	V <sub>GE(th)</sub>	V <sub>CE</sub> =20V, I <sub>c</sub> =150mA	4.5	6.5	8.5	V	
Collector-Emitter saturation voltage	V <sub>CE(sat)</sub> (terminal)	V <sub>GE</sub> =15V, I <sub>c</sub> =150A	T <sub>j</sub> =25°C	–	2.15	2.50	V
			T <sub>j</sub> =125°C	–	2.40	–	
	V <sub>CE(sat)</sub> (chip)		T <sub>j</sub> =25°C	–	1.75	2.10	
			T <sub>j</sub> =125°C	–	2.00	–	
Input capacitance	C <sub>ies</sub>	V <sub>CE</sub> =10V, V <sub>GE</sub> =0V, f=1MHz	–	17	–	nF	
Turn-on time	t <sub>on</sub>	V <sub>CC</sub> =600V	–	0.36	1.20	μs	
	t <sub>r</sub>	I <sub>c</sub> =150A	–	0.21	0.60		
	t <sub>r(i)</sub>	V <sub>GE</sub> =±15V	–	0.03	–		
Turn-off time	t <sub>off</sub>	R <sub>G</sub> =2.2 Ω	–	0.37	1.00	μs	
	t <sub>f</sub>		–	0.07	0.30		
Forward on voltage	V <sub>F</sub> (terminal)	V <sub>GE</sub> =0V I <sub>F</sub> =150A	T <sub>j</sub> =25°C	–	2.00	2.30	V
			T <sub>j</sub> =125°C	–	2.10	–	
	V <sub>F</sub> (chip)		T <sub>j</sub> =25°C	–	1.60	1.90	
			T <sub>j</sub> =125°C	–	1.70	–	
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> =150A	–	–	0.35	μs	
Lead resistance, terminal-chip*3	R <sub>lead</sub>		–	2.4	–	mΩ	

\*3:Biggest internal terminal resistance among arm.

#### ● Thermal resistance characteristics

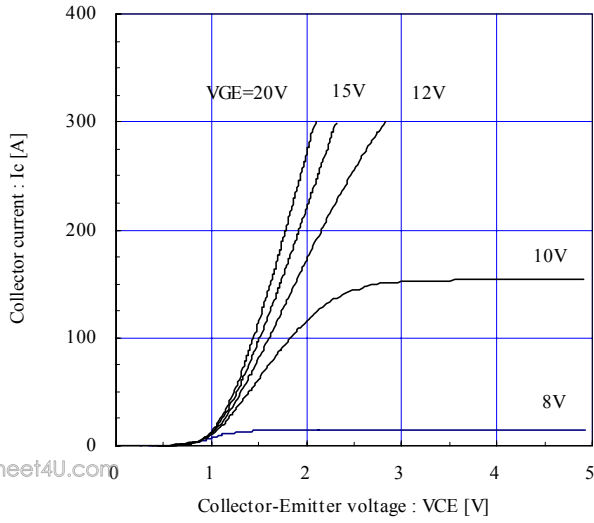
Items	Symbols	Conditions	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance	R <sub>th(j-c)</sub>	IGBT	–	–	0.17	°C/W
	R <sub>th(j-c)</sub>	FWD	–	–	0.28	°C/W
Contact Thermal resistance	R <sub>th(c-f)</sub> *4	With thermal compound	–	0.05	–	°C/W

\*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

Characteristics (Representative)

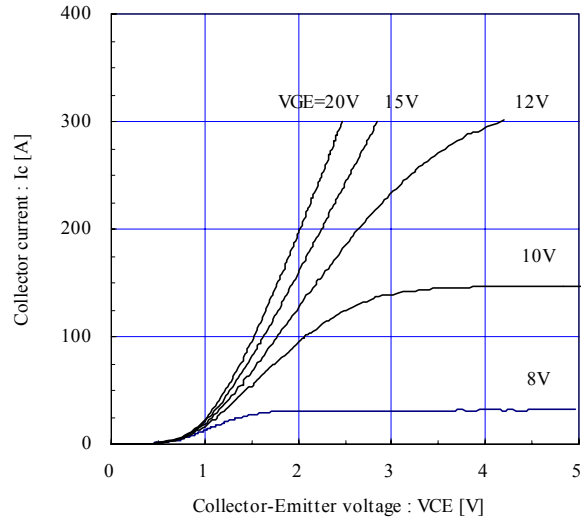
Collector current vs. Collector-Emitter voltage (typ.)

T<sub>j</sub>= 25°C / chip



Collector current vs. Collector-Emitter voltage (typ.)

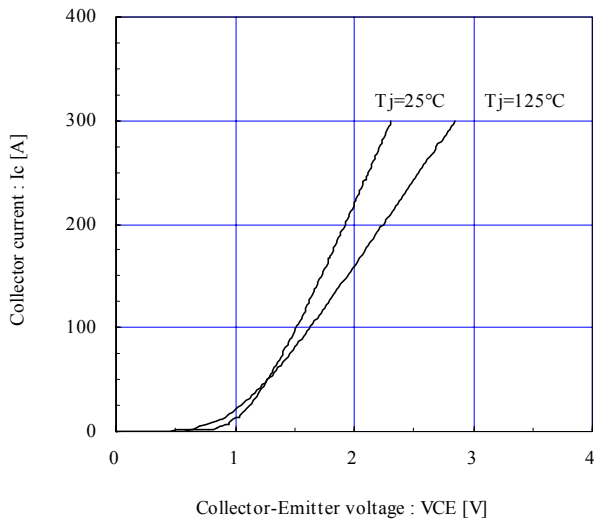
T<sub>j</sub>= 125°C / chip



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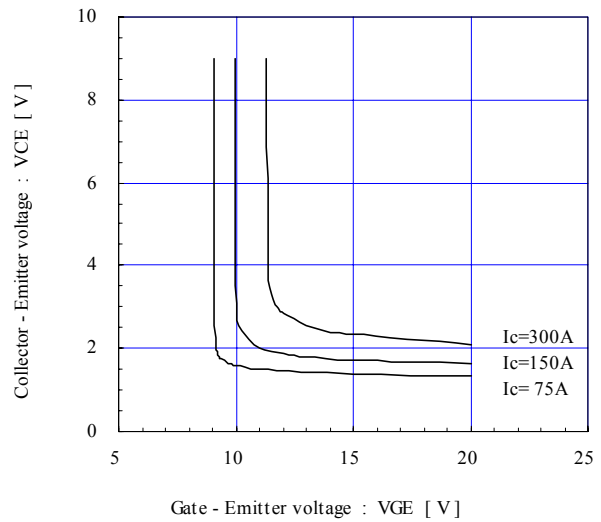
Collector current vs. Collector-Emitter voltage (typ.)

VGE=15V / chip



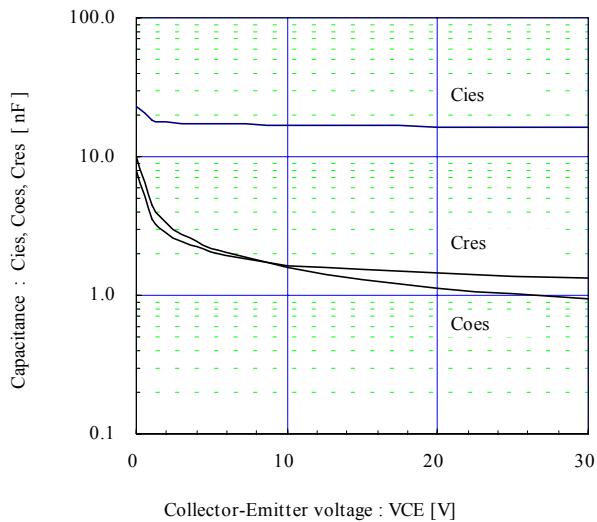
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

T<sub>j</sub>=25°C / chip



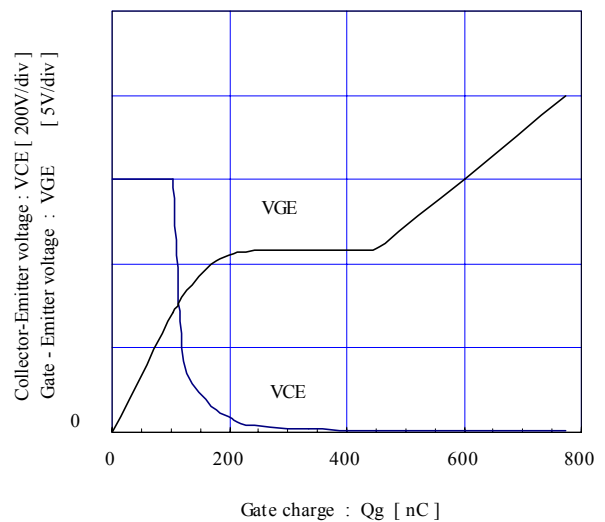
Capacitance vs. Collector-Emitter voltage (typ.)

VGE=0V, f= 1MHz, Tj= 25°C

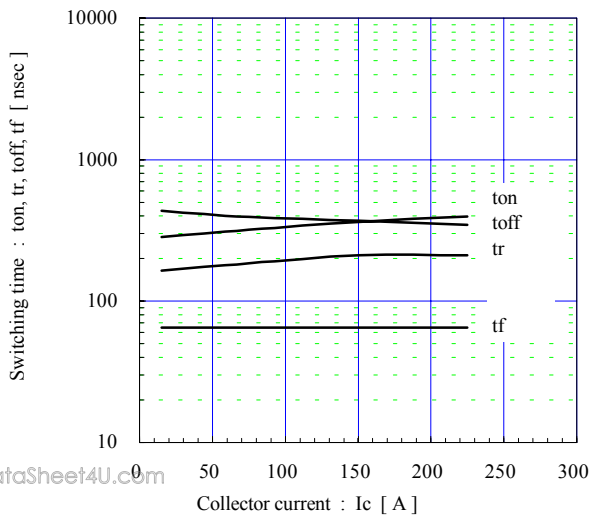


Dynamic Gate charge (typ.)

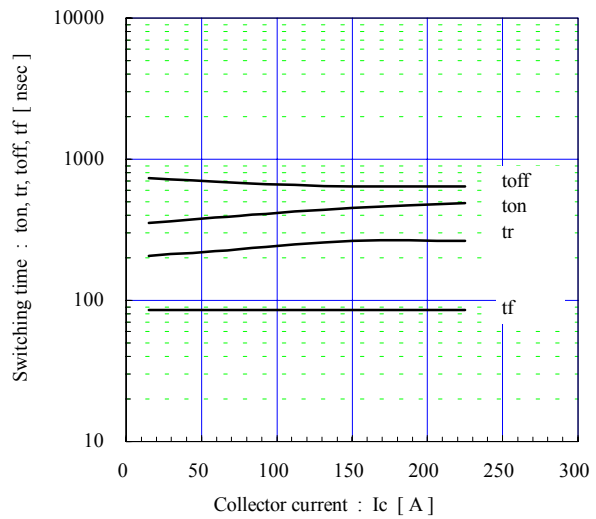
Vce=600V, Ic=150A, Tj= 25°C



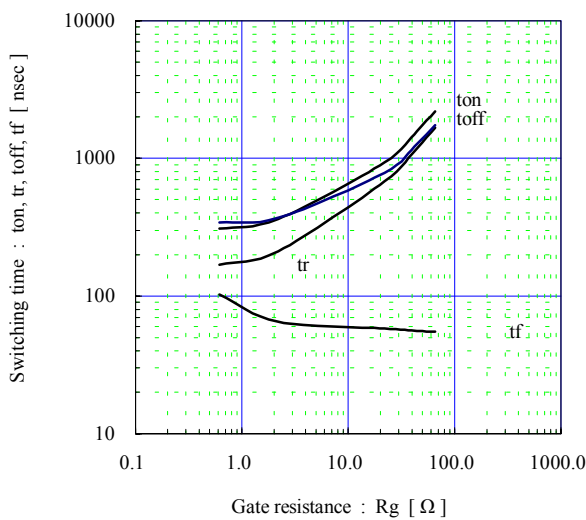
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=2.2\Omega, T_j=25^\circ C$



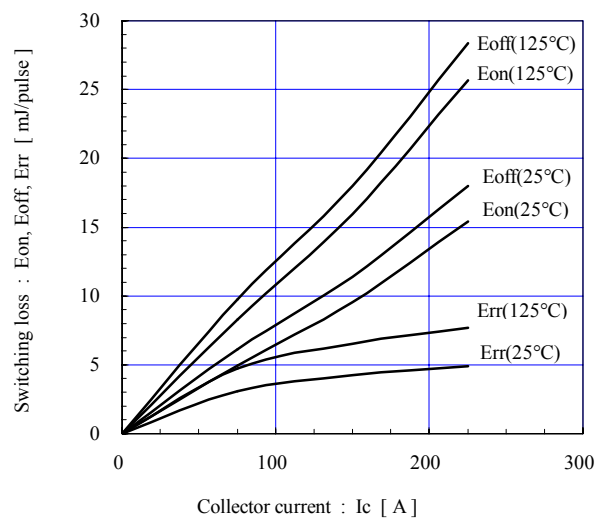
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=2.2\Omega, T_j=125^\circ C$



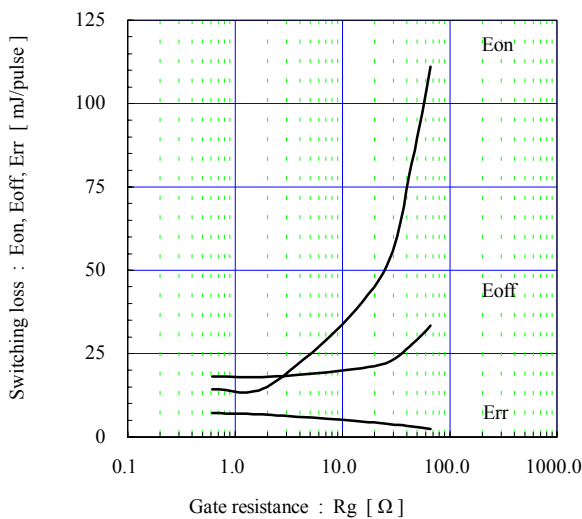
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=600V, I_c=150A, V_{GE}=\pm 15V, T_j=25^\circ C$



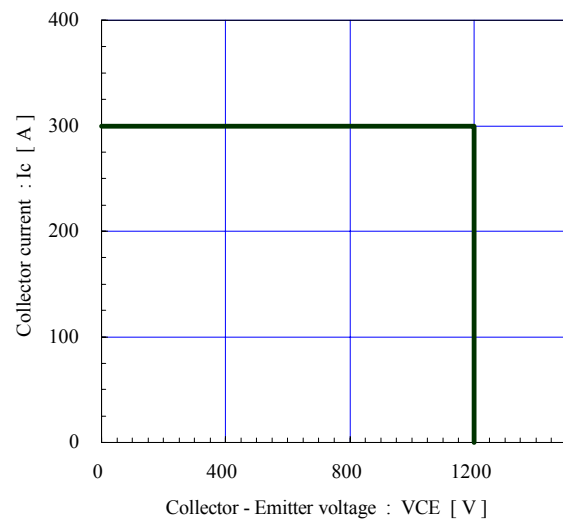
Switching loss vs. Collector current (typ.)  
 $V_{cc}=600V, V_{GE}=\pm 15V, R_g=2.2\Omega$



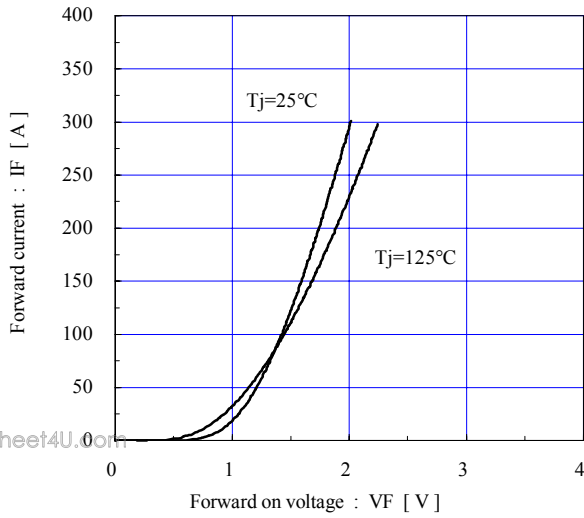
Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=600V, I_c=150A, V_{GE}=\pm 15V, T_j=125^\circ C$



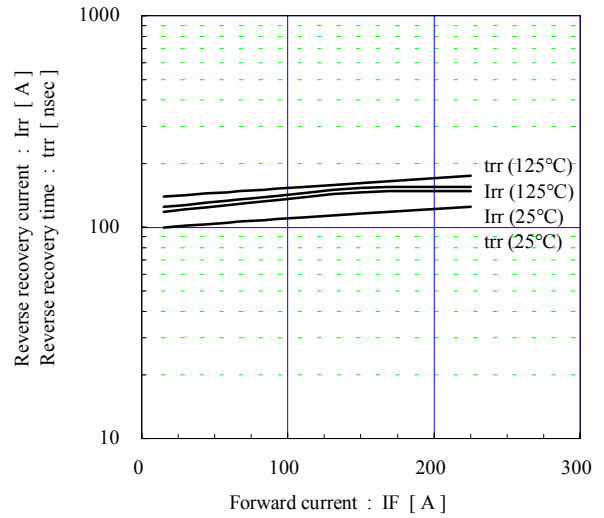
Reverse bias safe operating area (max.)  
 $+V_{GE}=15V, -V_{GE} \le 15V, R_g \ge 2.2\Omega, T_j \le 125^\circ C$



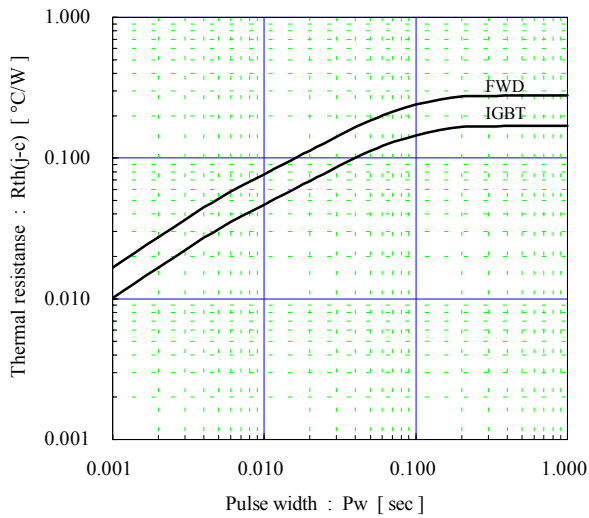
Forward current vs. Forward on voltage (typ.)  
chip



Reverse recovery characteristics (typ.)  
 $V_{cc}=600\text{V}$ ,  $V_{GE}=\pm 15\text{V}$ ,  $R_g=2.2\Omega$

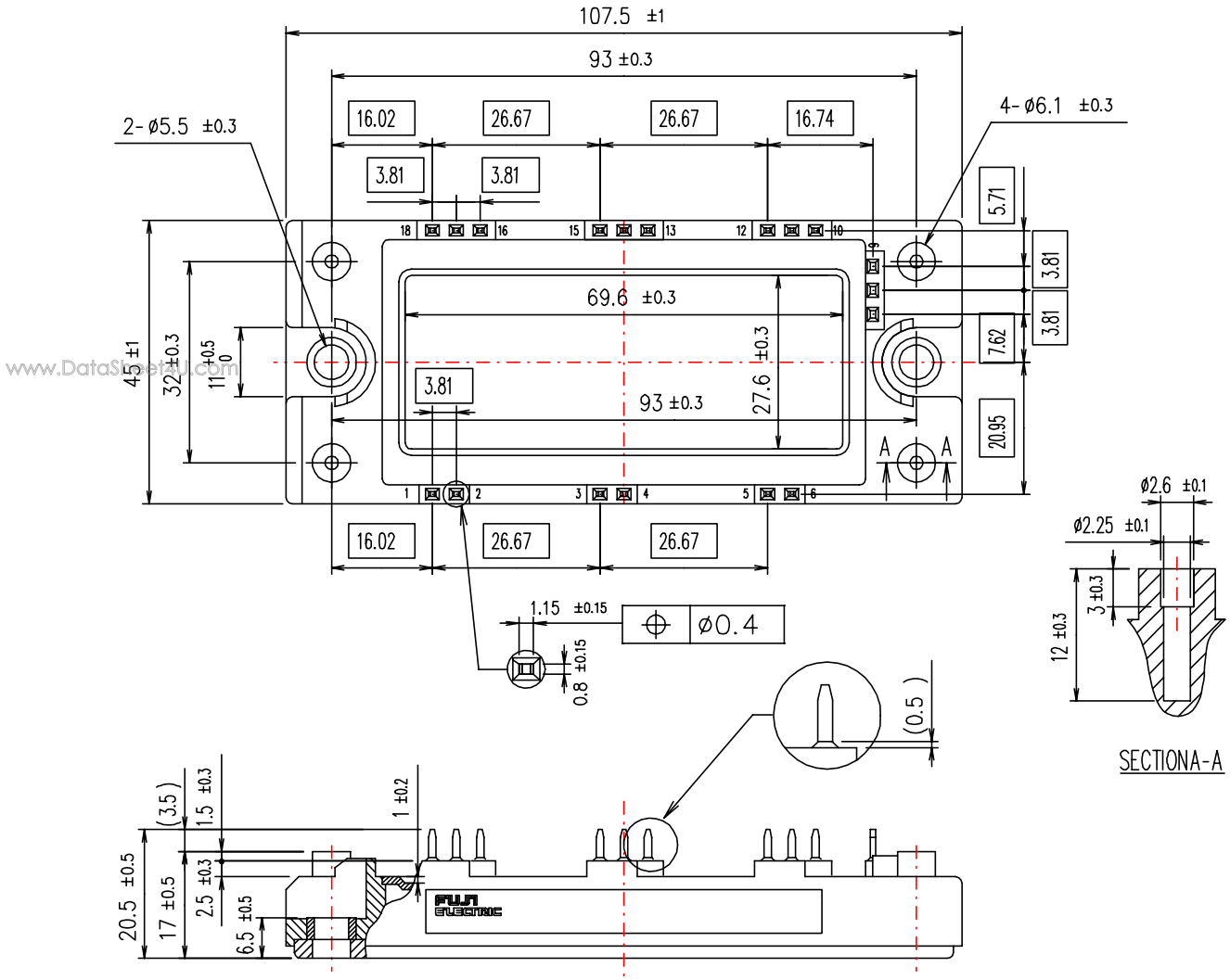


Transient thermal resistance (max.)



Outline Drawings, mm

M634



□ shows theoretical dimension.  
 ( ) shows reference dimension.

Equivalent Circuit Schematic

