

6MBI300V-170-50

IGBT Modules

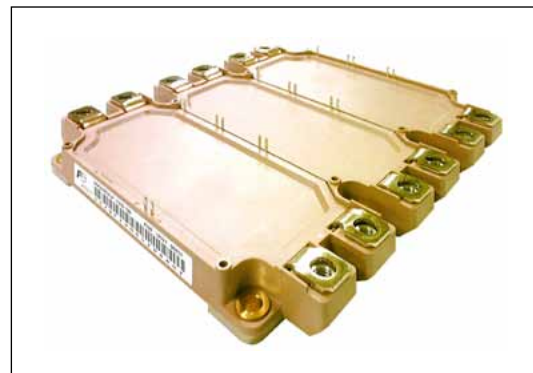
IGBT MODULE (V series) 1700V / 300A / 6 in one package

■ 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}			1700	V
	Gate-Emitter voltage	V_{GES}			± 20	V
	Collector current	I_C	Continuous	$T_c=25^\circ\text{C}$	450	A
				$T_c=100^\circ\text{C}$	300	
		$I_{C\ pulse}$	1ms		600	
		$-I_C$			300	
		$-I_{C\ pulse}$	1ms		600	
	Collector power dissipation	P_C	1 device		1665	W
Junction temperature		T_j			175	$^\circ\text{C}$
Operating junction temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_c			125	
Storage temperature		T_{stg}			-40 ~ 125	
Isolation voltage	Between terminal and copper base (*1)	V_{iso}	AC : 1min.		3400	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 $T_j = 25^\circ\text{C}$ unless otherwise specified)

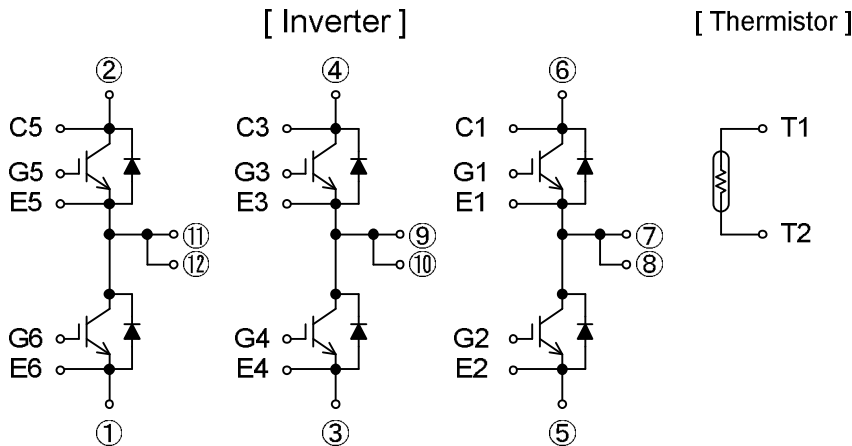
Items		Symbols	Conditions		Characteristics			Units
					min.	typ.	max.	
Inverter	Zero gate voltage collector current	I _{CES}	V _{GE} = 0V, V _{CE} = 1700V		-	-	3.0	mA
	Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 300mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 300A	T _J =25°C	-	2.45	2.90	V
				T _J =125°C	-	2.90	-	
				T _J =150°C	-	2.95	-	
		V _{CE (sat)} (chip)	V _{GE} = 15V I _C = 300A	T _J =25°C	-	2.00	2.45	
				T _J =125°C	-	2.45	-	
				T _J =150°C	-	2.50	-	
	Internal gate resistance	R _{G (int)}	-		-	2.50	-	Ω
	Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz		-	30	-	nF
	Turn-on time	t _{on}	V _{CC} = 900V I _C = 300A V _{GE} = ±15V		-	900	-	nsec
		t _r			-	400	-	
		t _{r (l)}			-	100	-	
	Turn-off time	t _{off}	R _G = 4.7Ω L _S = 80nH		-	1300	-	nsec
		t _r			-	100	-	
	Forward on voltage	V _F (terminal)	V _{GE} = 0V, I _F = 300A	T _J =25°C	-	2.25	2.70	V
				T _J =125°C	-	2.55	-	
				T _J =150°C	-	2.55	-	
V _F (chip)		V _{GE} = 0V, I _F = 300A	T _J =25°C	-	1.80	2.25		
			T _J =125°C	-	2.10	-		
			T _J =150°C	-	2.10	-		
Reverse recovery time	t _{rr}	I _F = 300A		-	250	-	nsec	
Thermistor	Resistance	R	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)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.090	$^\circ\text{C/W}$
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

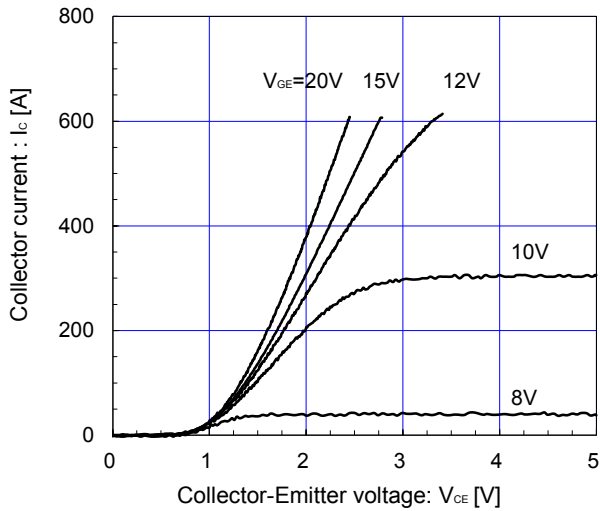
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

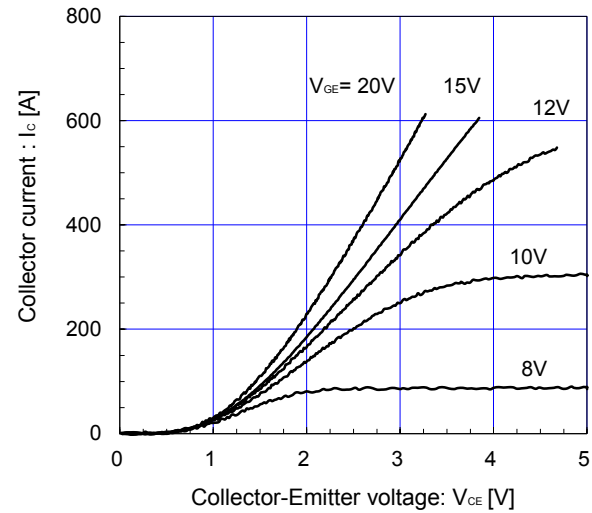


■ Characteristics (Representative)

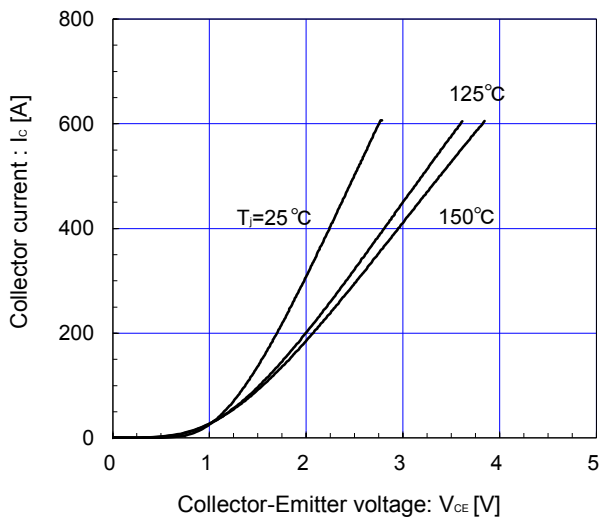
[Inverter]
Collector current vs. Collector-Emittter voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



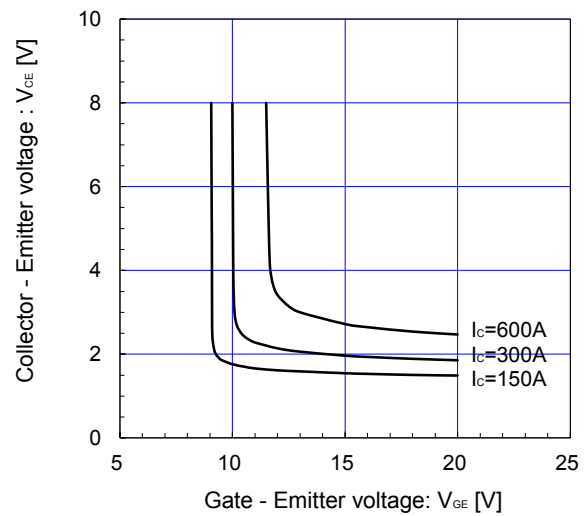
[Inverter]
Collector current vs. Collector-Emittter voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



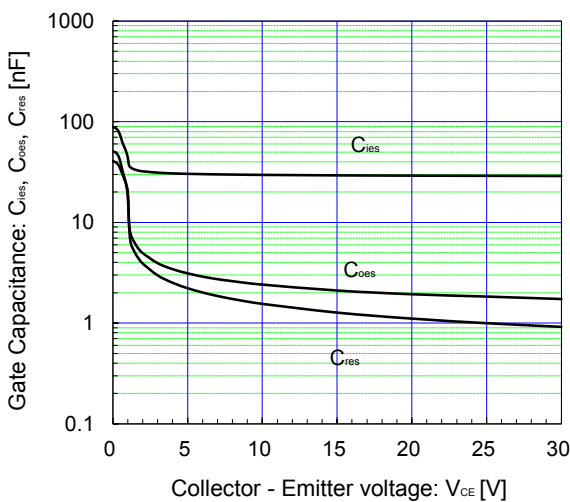
[Inverter]
Collector current vs. Collector-Emittter voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



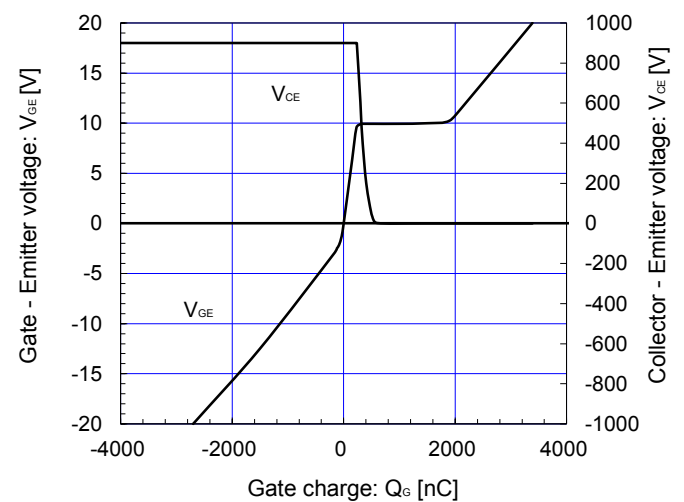
[Inverter]
Collector-Emittter voltage vs. Gate-Emittter voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



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



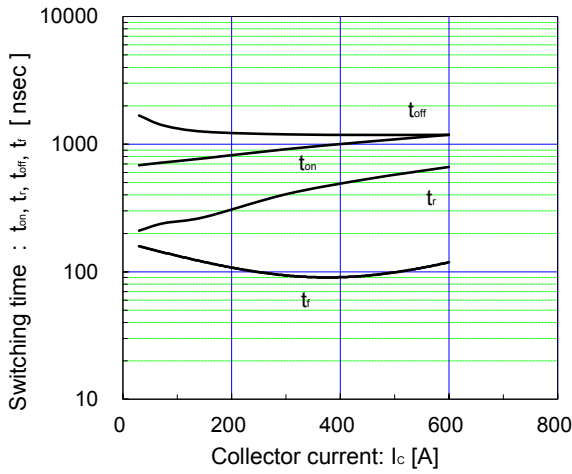
[Inverter]
Dynamic gate charge (typ.)
 $V_{CC} = 900\text{V}$, $I_C = 300\text{A}$, $T_J = 25^\circ\text{C}$



[Inverter]

Switching time vs. Collector current (typ.)

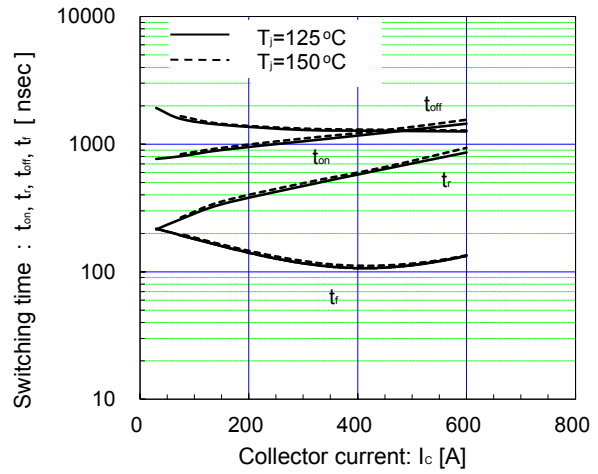
$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=4.7\Omega$, $T_J=25^\circ C$



[Inverter]

Switching time vs. Collector current (typ.)

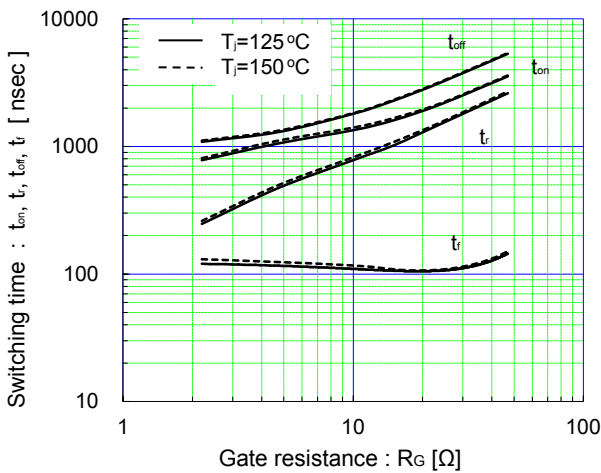
$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=4.7\Omega$, $T_J=125^\circ C, 150^\circ C$



[Inverter]

Switching time vs. Gate resistance (typ.)

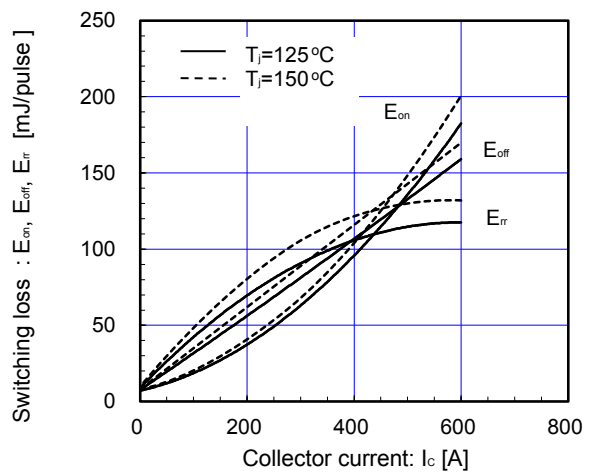
$V_{CC}=900V$, $I_C=300A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$



[Inverter]

Switching loss vs. Collector current (typ.)

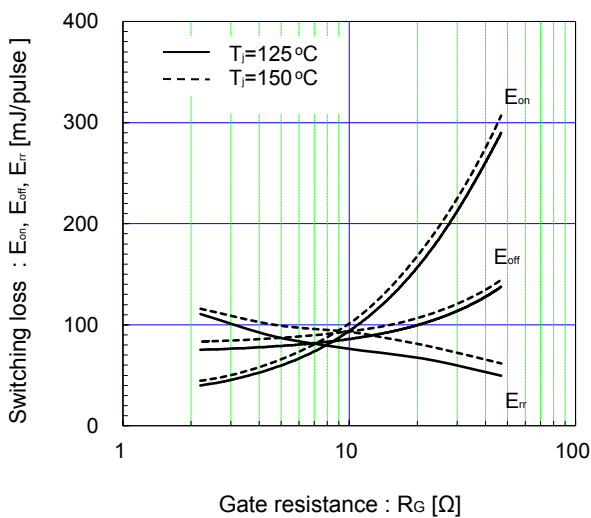
$V_{CC}=900V$, $V_{GE}=\pm 15V$, $R_G=4.7\Omega$, $T_J=125^\circ C, 150^\circ C$



[Inverter]

Switching loss vs. Gate resistance (typ.)

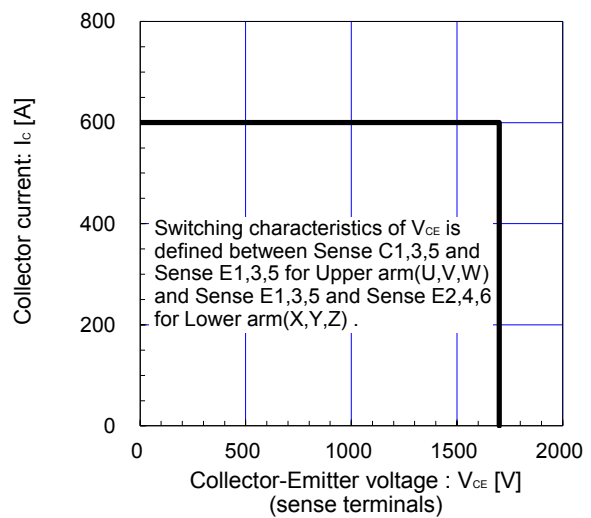
$V_{CC}=900V$, $I_C=300A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C, 150^\circ C$



[Inverter]

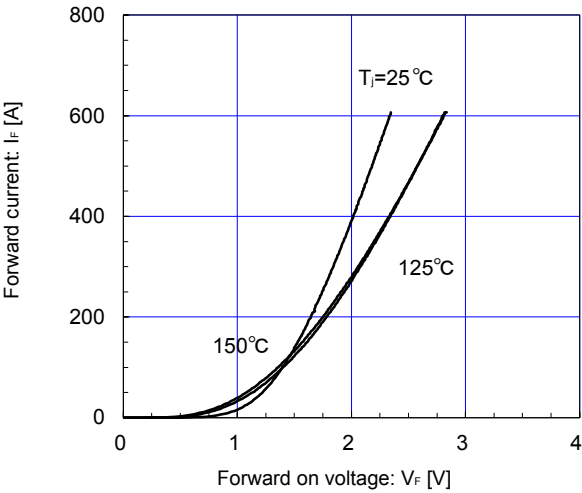
Reverse bias safe operating area (max.)

$+V_{GE}=15V, -V_{GE} \leq 15V, R_G \geq 4.7\Omega, T_J=150^\circ C$



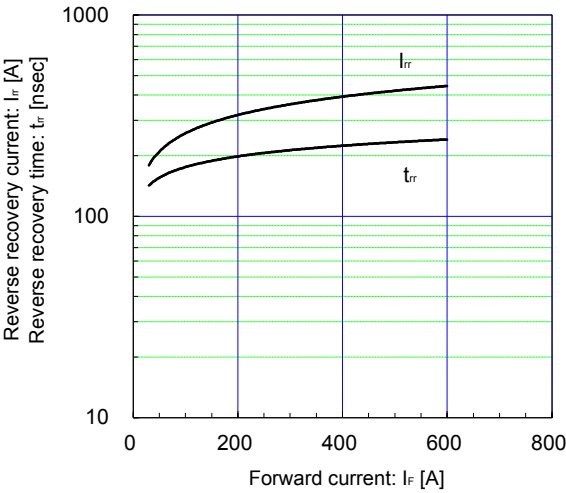
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



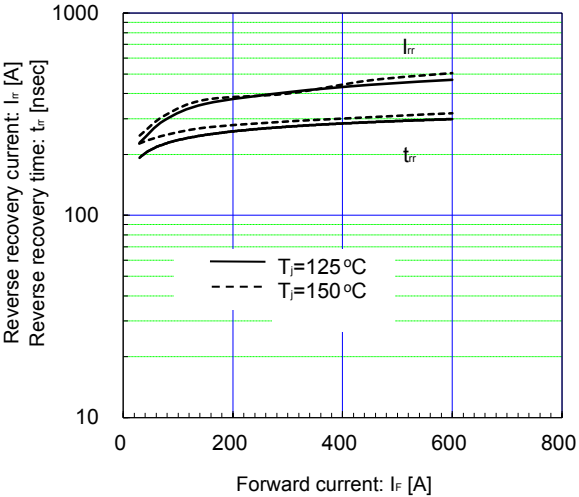
[INVERTER]

Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=4.7Ω, T_J=25°C

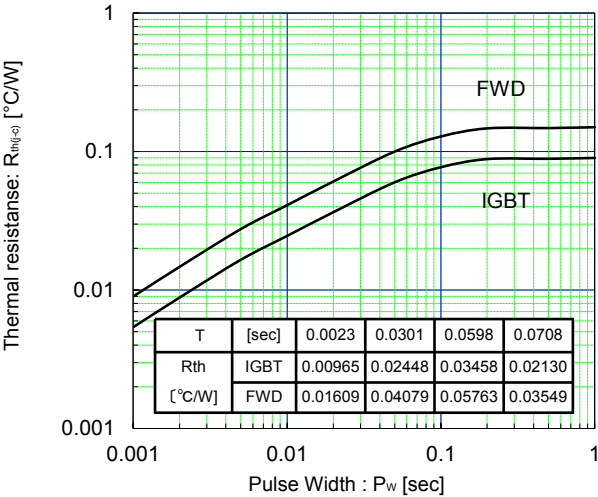


[INVERTER]

Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=4.7Ω, T_J=125°C, 150°C

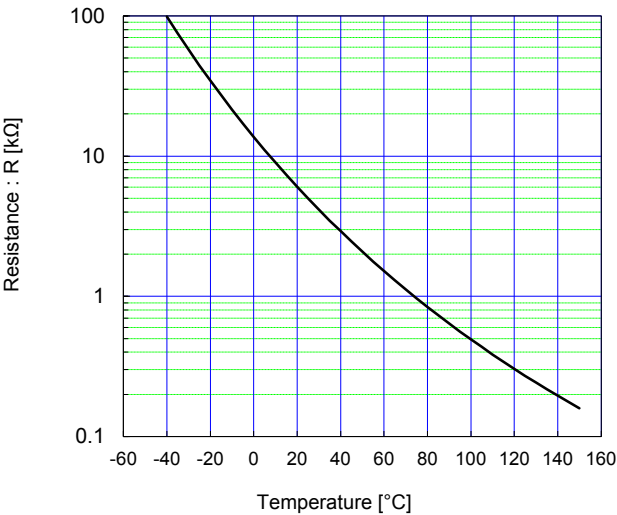


Transient Thermal Resistance (max.)

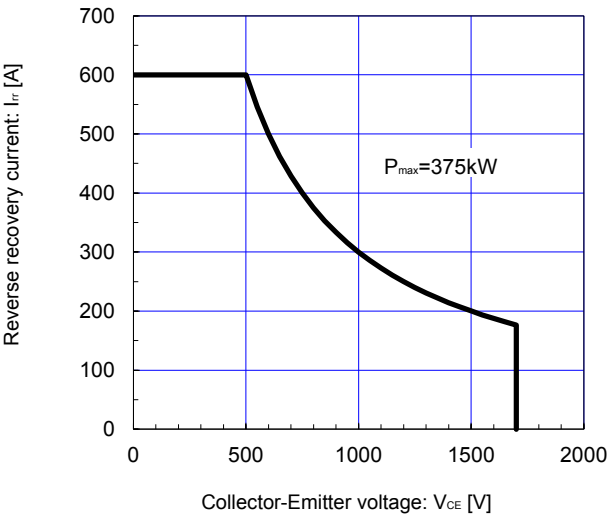


[THERMISTOR]

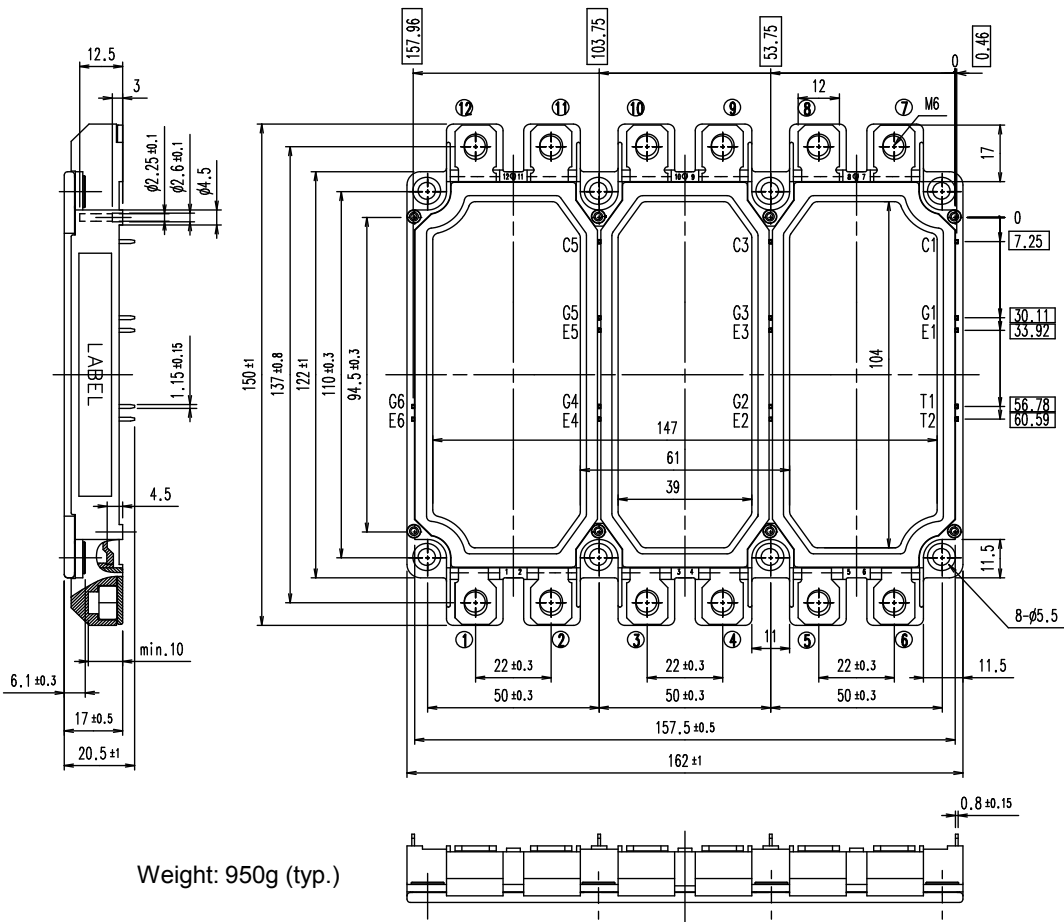
Temperature characteristic (typ.)



FWD safe operating area (max.)
T_J=150°C



■ Outline Drawings, mm



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