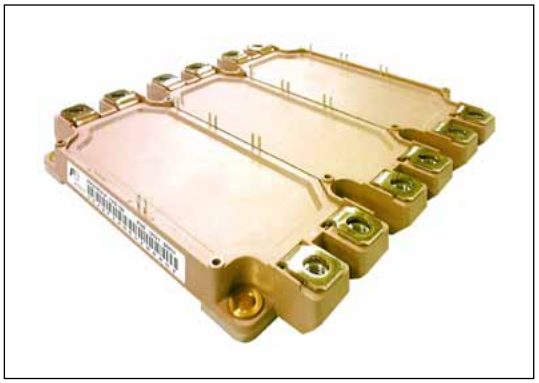
6MBI450V-170-50

IGBT Modules

IGBT MODULE (V series)
1700V / 450A / 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°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°C	600	A
				T_C=100°C	450	
		$I_{C\ pulse}$	1ms		900	
		$-I_C$			450	
		$-I_{C\ pulse}$	1ms		900	
	Collector power dissipation	P_C	1 device		2500	W
Junction temperature		T_j			175	°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°C unless otherwise specified)

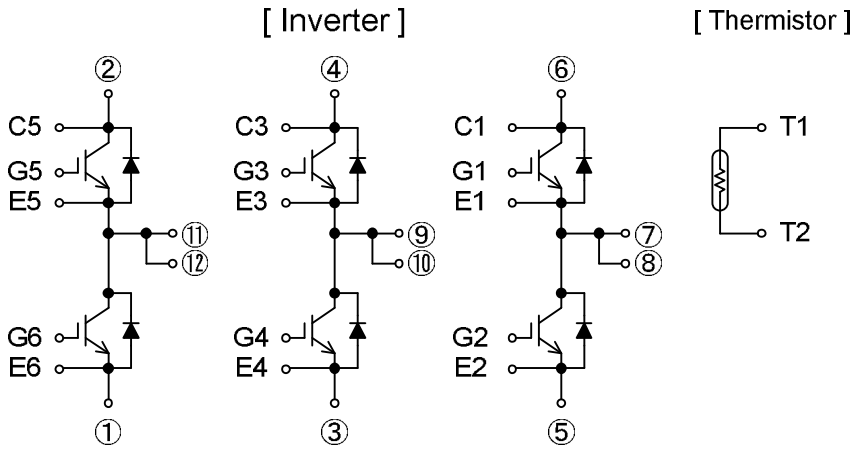
	Items	Symbols	Conditions		Characteristics min.	typ.	max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1700V		-	-	3.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V		-	-	600	nA
	Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 450mA		6.0	6.5	7.0	V
	Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V, I_C = 450A	T_j=25°C	-	2.65	3.10	V
				T_j=125°C	-	3.10	-	
				T_j=150°C	-	3.15	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V, I_C = 450A	T_j=25°C	-	2.00	2.45	
				T_j=125°C	-	2.45	-	
				T_j=150°C	-	2.50	-	
	Internal gate resistance	$R_{G\ (int)}$	-		-	1.67	-	Ω
	Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	40	-	nF
	Turn-on time	t_{on}	V_{CC} = 900V, I_C = 450A, V_{GE} = ±15V, R_G = 3.3Ω, L_S = 80nH		-	900	-	nsec
		t_r			-	400	-	
		$t_{r\ (i)}$			-	100	-	
	Turn-off time	t_{off}			-	1300	-	
		t_f			-	100	-	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 450A	T_j=25°C	-	2.45	2.90	V
				T_j=125°C	-	2.75	-	
				T_j=150°C	-	2.70	-	
		V_F (chip)	V_{GE} = 0V, I_F = 450A	T_j=25°C	-	1.80	2.25	
				T_j=125°C	-	2.10	-	
				T_j=150°C	-	2.05	-	
	Reverse recovery time	t_{rr}	I_F = 450A		-	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 min.	typ.	max.	Units
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.06	°C/W
		Inverter FWD	-	-	0.10	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

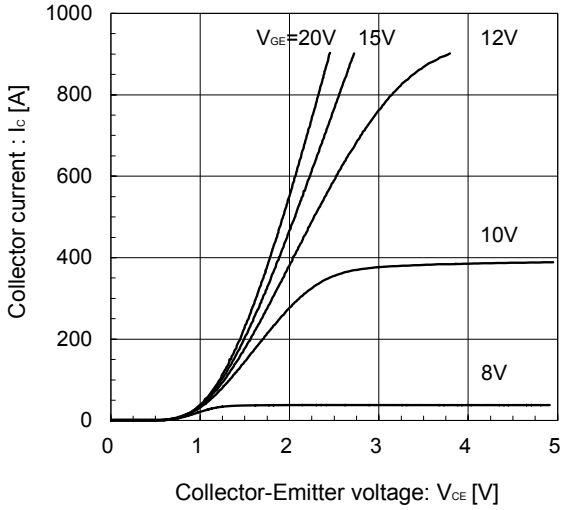
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

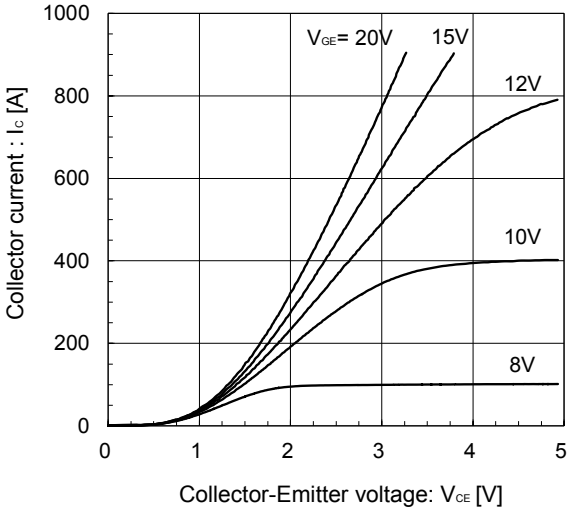


■ Characteristics (Representative)

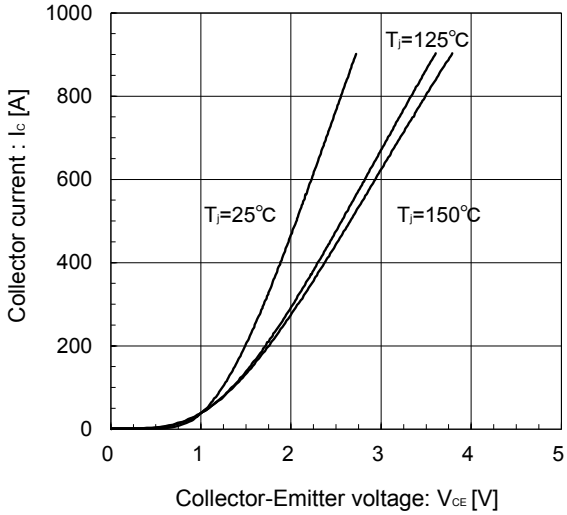
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C / chip



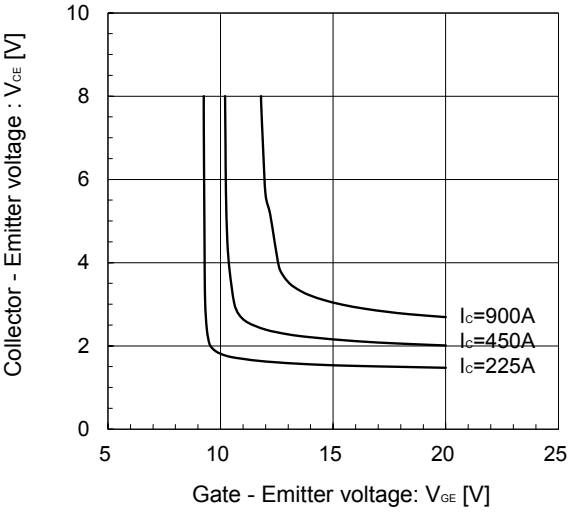
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C / chip



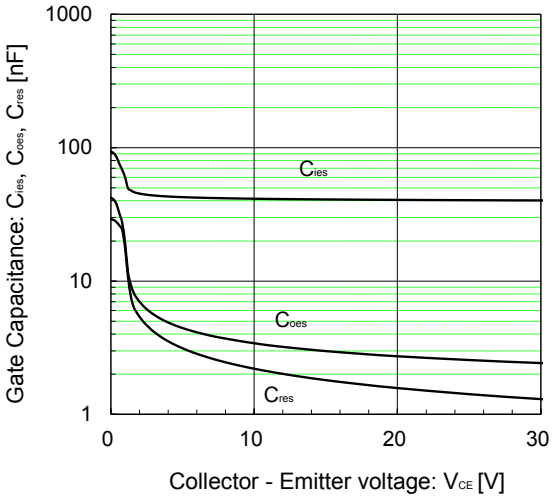
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



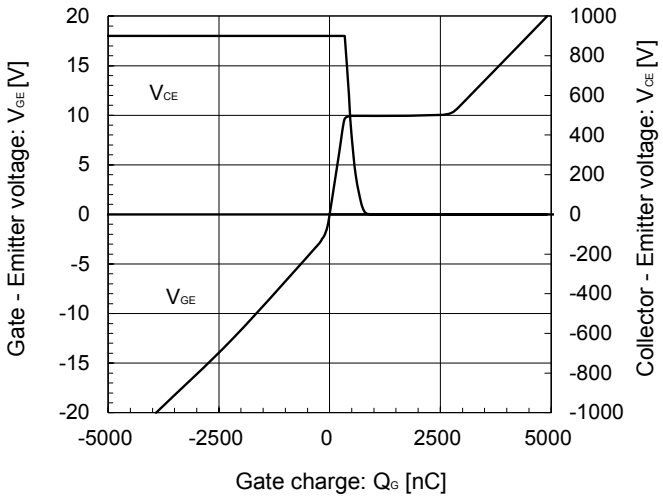
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j= 25°C / chip



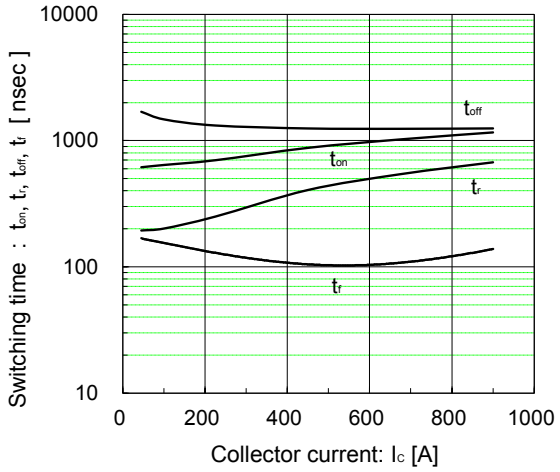
[Inverter]
Gate Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f= 1MHz, T_j= 25°C



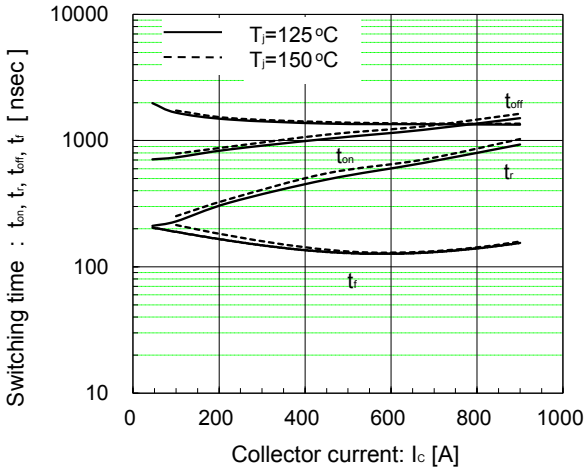
[Inverter]
Dynamic gate charge (typ.)
V_{CC}=900V, I_C=450A, T_j= 25°C



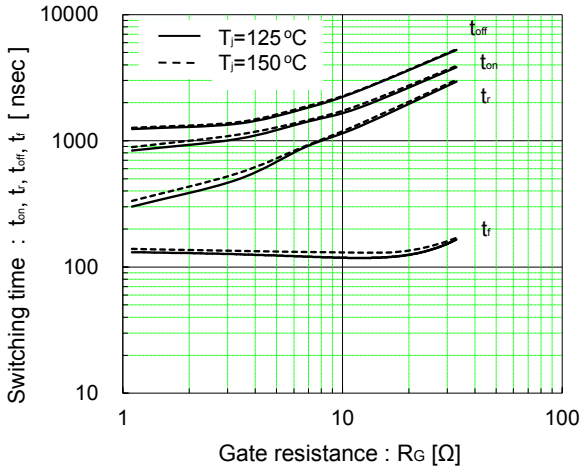
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j= 25°C



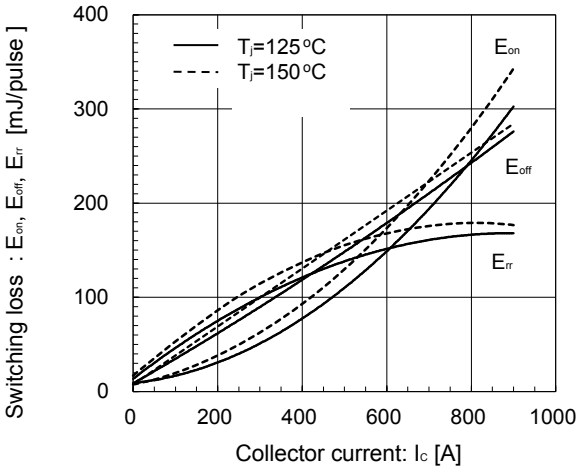
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j= 125°C, 150°C



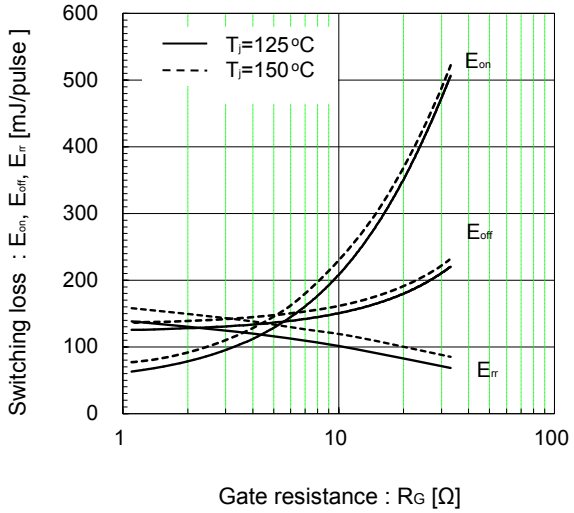
[Inverter]
Switching time vs. Gate resistance (typ.)
V_{CC}=900V, I_C=450A, V_{GE}=±15V, T_j= 125°C, 150°C



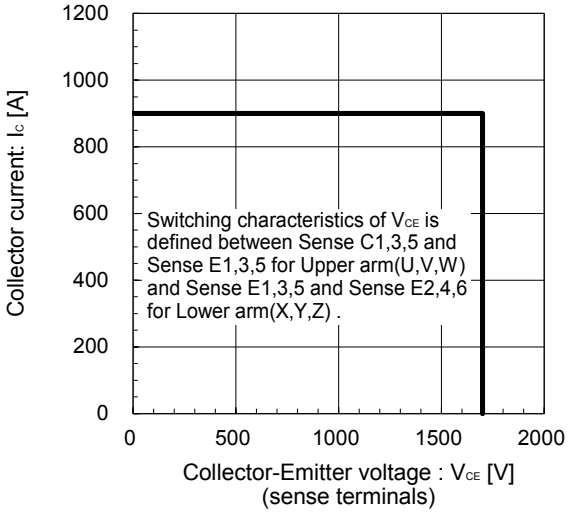
[Inverter]
Switching loss vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C, 150°C



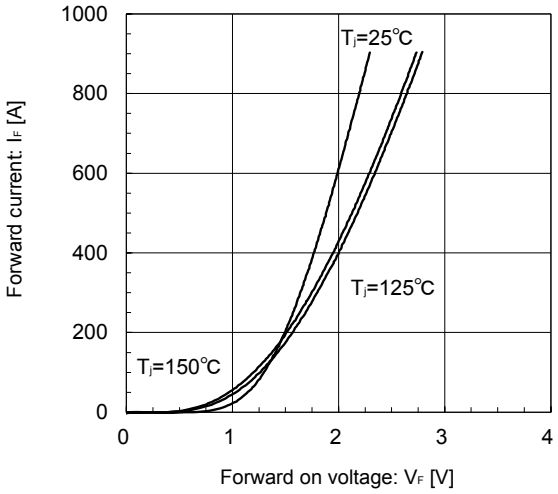
[Inverter]
Switching loss vs. Gate resistance (typ.)
V_{CC}=900V, I_C=450A, V_{GE}=±15V, T_j=125°C, 150°C



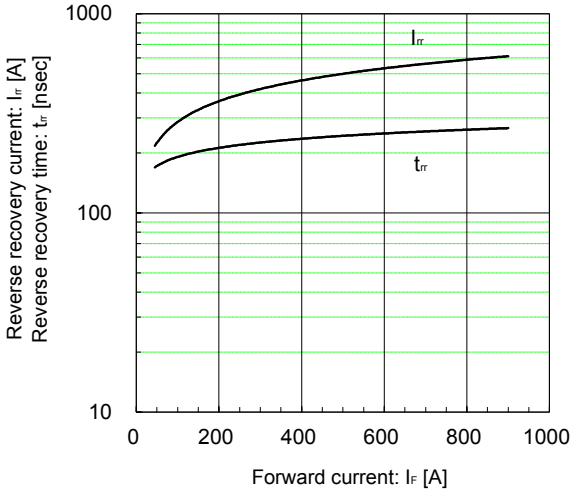
[Inverter]
Reverse bias safe operating area (max.)
$+V_{GE}$=15V,$-V_{GE}$ ≤ 15V, R_G ≥ 3.3Ω ,T_j = 150°C



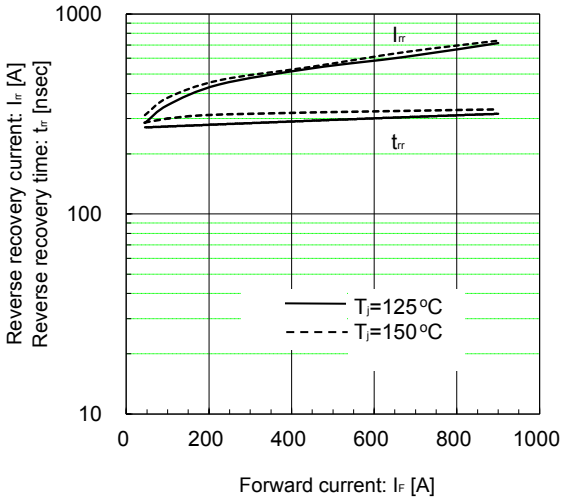
[INVERTER]
Forward Current vs. Forward Voltage (typ.)
chip



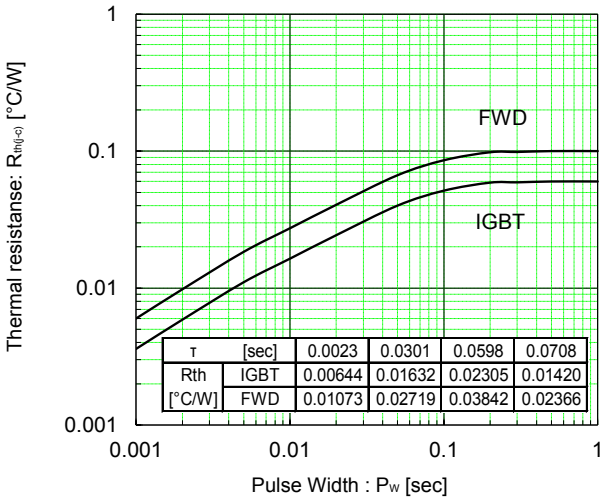
[INVERTER]
Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=25°C



[INVERTER]
Reverse Recovery Characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_G=3.3Ω, T_j=125°C, 150°C

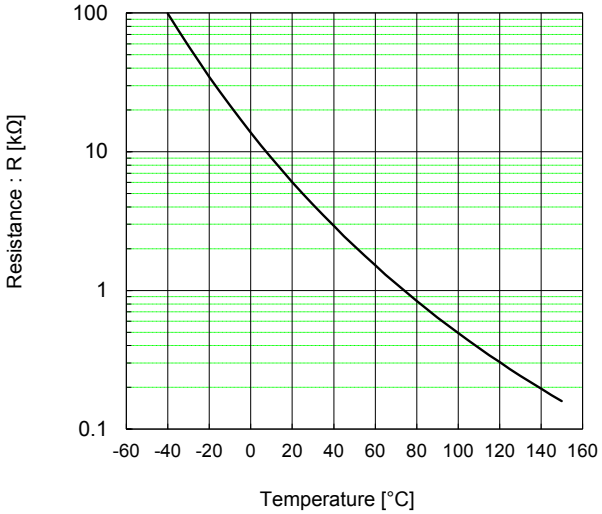


Transient Thermal Resistance (max.)

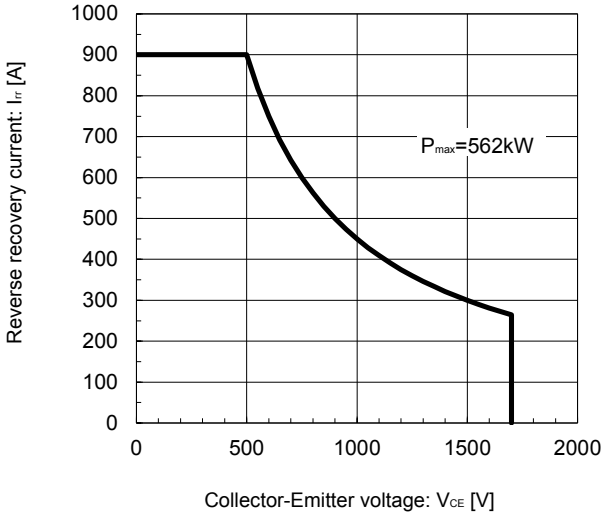


τ	[sec]	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.00644	0.01632	0.02305	0.01420
[°C/W]	FWD	0.01073	0.02719	0.03842	0.02366

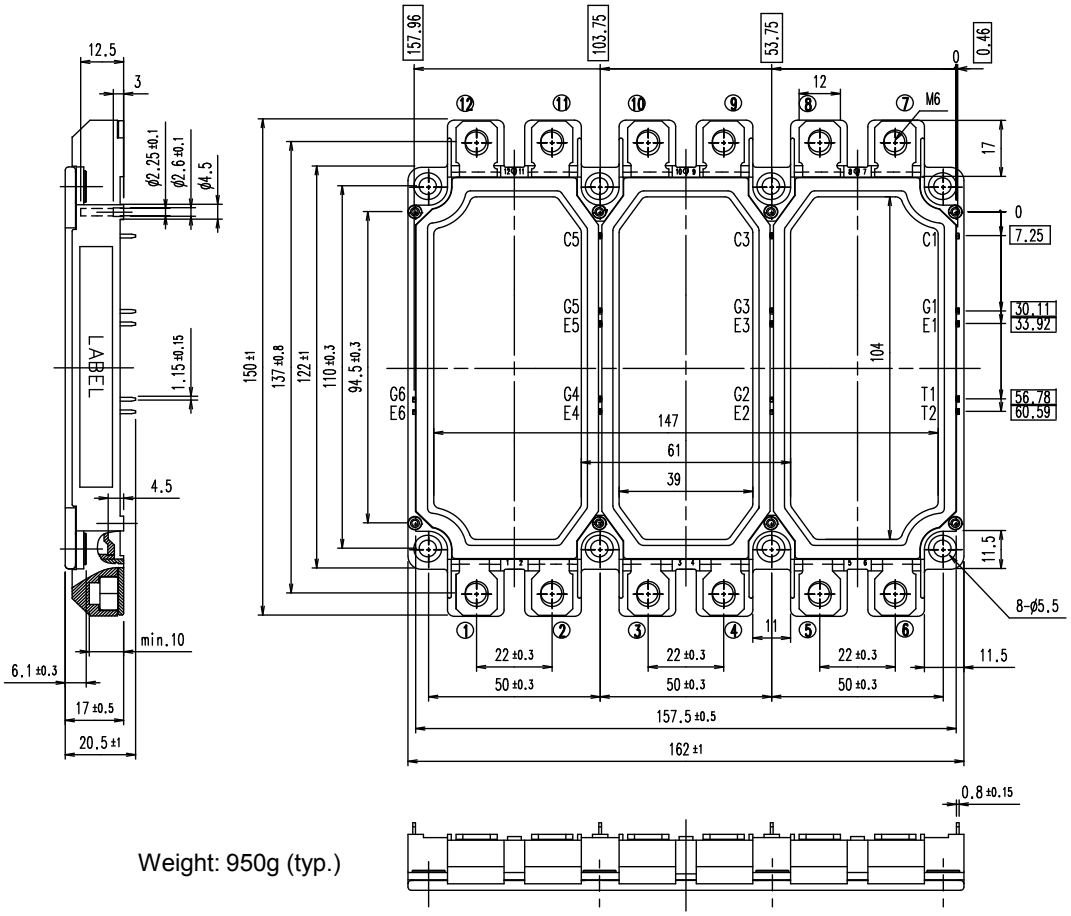
[THERMISTOR]
Temperature characteristic (typ.)



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



■ Outline Drawings, mm



Weight: 950g (typ.)

WARNING

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   The contents are subject to change without notice for specification changes or other reasons. When using a product listed in this Catalog, be sure to obtain the latest specifications.

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   - OA equipment
   - Communications equipment (terminal devices)
   - Measurement equipment
   - Machine tools
   - Audiovisual equipment
   - Electrical home appliances
   - Personal equipment
   - Industrial robots etc.

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   - Trunk communications equipment
   - Traffic-signal control equipment
   - Gas leakage detectors with an auto-shut-off feature
   - Emergency equipment for responding to disasters and anti-burglary devices
   - Safety devices
   - Medical equipment

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   - Submarine repeater equipment

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