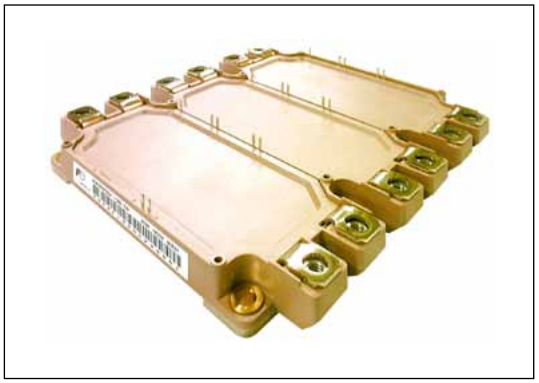
6MBI300V-120-50

IGBT Modules

IGBT MODULE (V series)
1200V / 300A / 6 in one package

Features

Compact Package
P.C.Board Mount
Low V_{CE} (sat)
RoHS Compliant product



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)

Items			Symbols	Conditions		Maximum ratings	Units
Inverter	Collector-Emitter voltage		V_{CES}			1200	V
	Gate-Emitter voltage		V_{GES}			±20	V
	Collector current		I_C	Continuous	Tc=25°C	450	A
			I_{cp}		Tc=100°C	300	
			$I_{C\ pulse}$	1ms		600	
			$-I_C$			300	
			$-I_{C\ pulse}$	1ms		600	
	Collector power dissipation		Pc	1 device		1600	W
Junction temperature			T_j			175	°C
Operation temperature (under switching conditions)			T_{jop}			150	
Case temperature			T_C			125	
Storage temperature			T_{stg}			-40 to +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 Tj= 25°C unless otherwise specified)

	Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1200V		-	-	3.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{GE} = 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	-	2.20	2.65	V
				T_j=125°C	-	2.50	-	
				T_j=150°C	-	2.55	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V, I_C = 300A	T_j=25°C	-	1.75	2.20	
				T_j=125°C	-	2.05	-	
				T_j=150°C	-	2.10	-	
	Internal gate resistance	$R_{G(int)}$	-		-	2.50	-	Ω
	Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	27	-	nF
	Turn-on time	t_{on}	V_{CC} = 600V, I_C = 300A, V_{GE} = ±15V, R_G = 0.93Ω, L_S=80nH		-	550	-	nsec
		t_r			-	180	-	
		$t_{r\ (i)}$			-	120	-	
	Turn-off time	t_{off}			-	1050	-	
		t_f			-	110	-	
	Forward on voltage	V_F (terminal)	V_{GE} = 0V, I_F = 300A	T_j=25°C	-	2.15	2.60	V
				T_j=125°C	-	2.30	-	
				T_j=150°C	-	2.25	-	
		V_F (chip)	V_{GE} = 0V, I_F = 300A	T_j=25°C	-	1.70	2.15	
				T_j=125°C	-	1.85	-	
				T_j=150°C	-	1.80	-	
	Reverse recovery time	t_{rr}	I_F = 300A		-	200	-	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

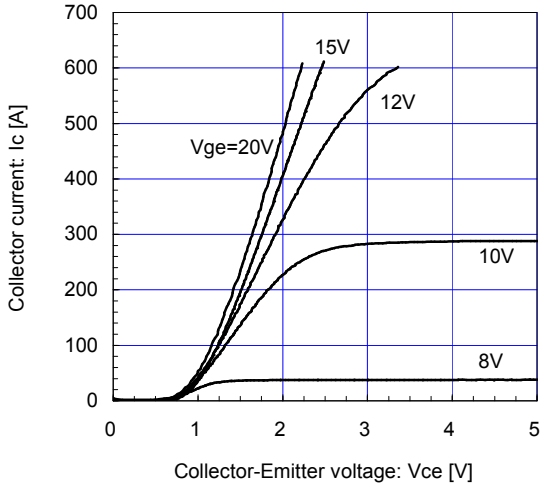
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.094	°C/W
		Inverter FWD	-	-	0.150	
Contact thermal resistance (1device) (*5)	$R_{th(c-f)}$	with Thermal Compound	-	0.0167	-	

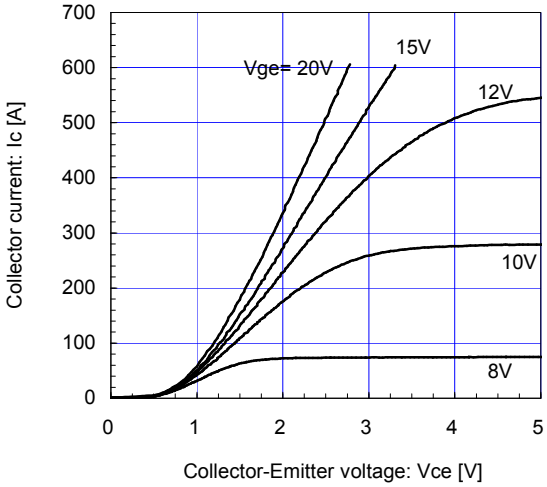
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

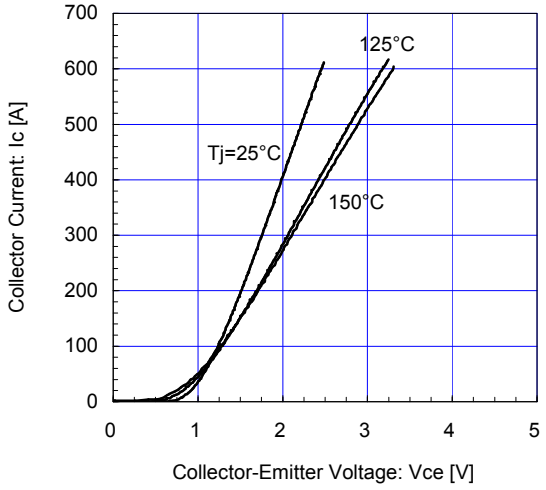
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



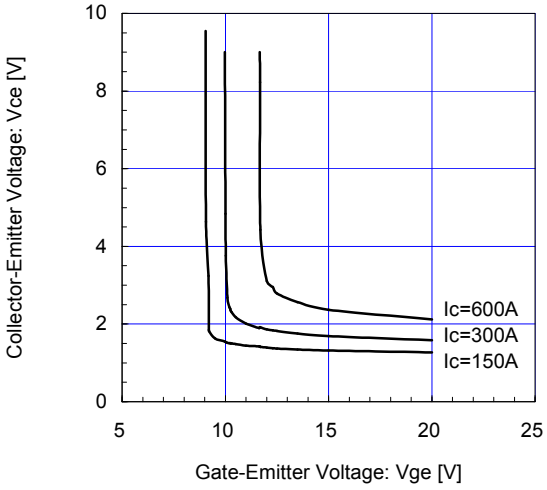
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



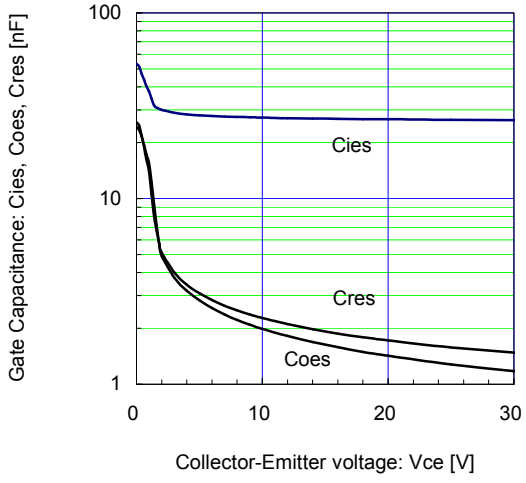
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Vge= 15V / chip



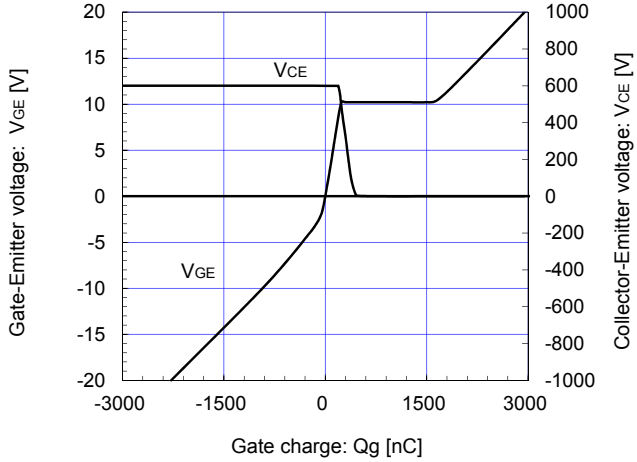
[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



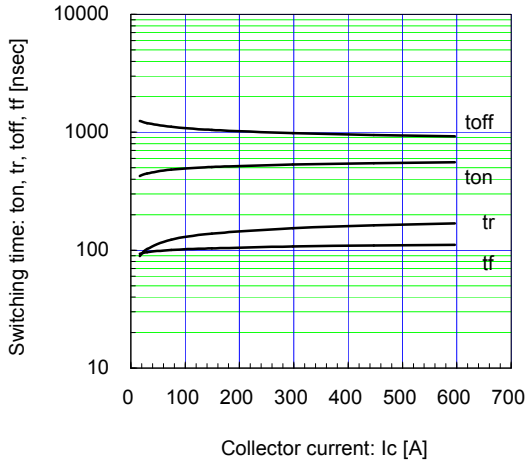
[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
Vge= 0V, *f*= 1MHz, Tj= 25°C



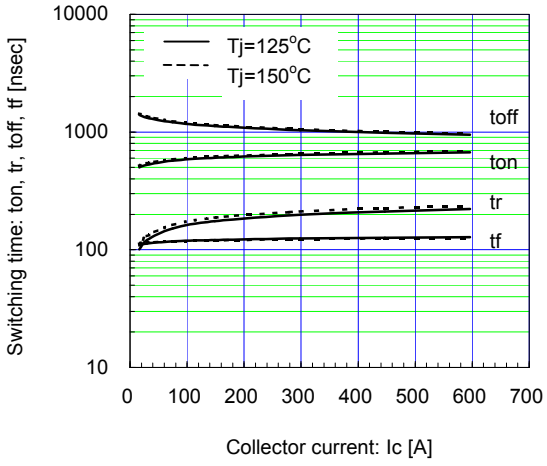
[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=300A, Tj= 25°C



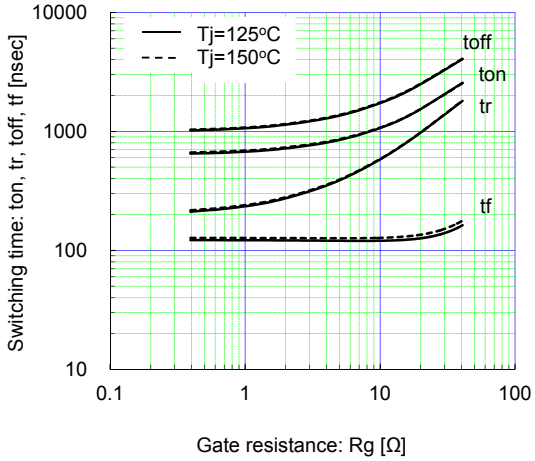
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=25°C



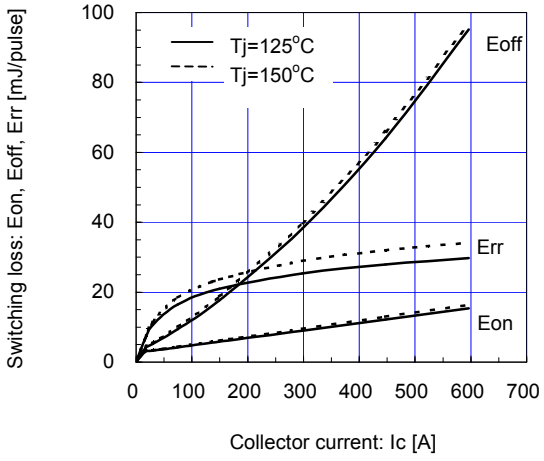
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=125°C, 150°C



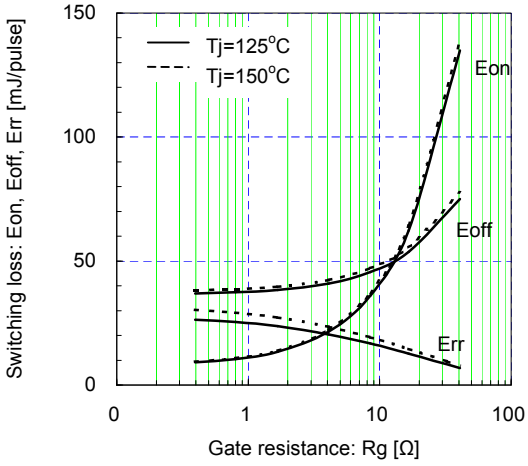
[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=300A, Vge=±15V, Tj=125°C, 150°C



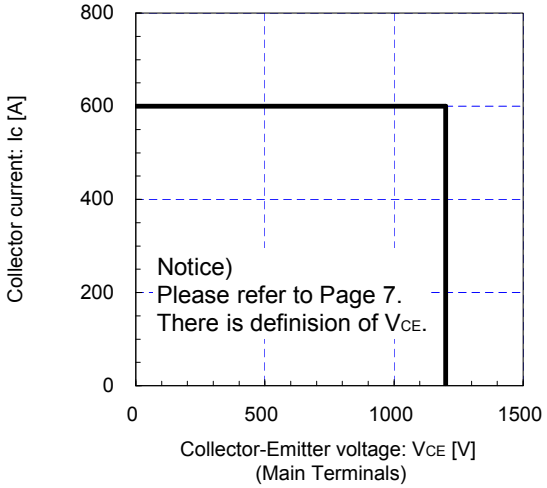
[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=600V Vge=±15V, Rg=0.93Ω, Tj=125°C, 150°C



[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=300A, Vge=±15V, Tj=125°C, 150°C

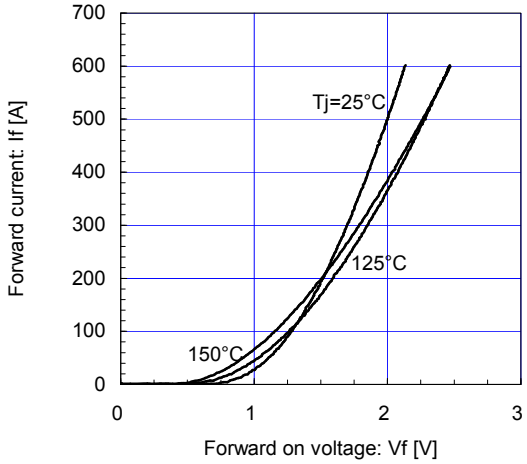


[INVERTER]
Reverse bias safe operating area (max.)
+Vge=15V, -Vge≤15V, Rg≥0.93Ω, Tj=150°C



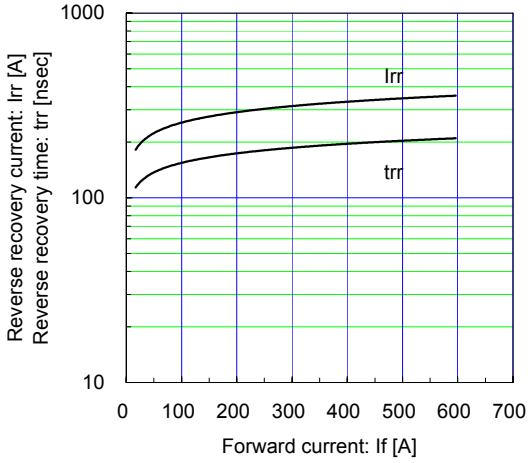
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



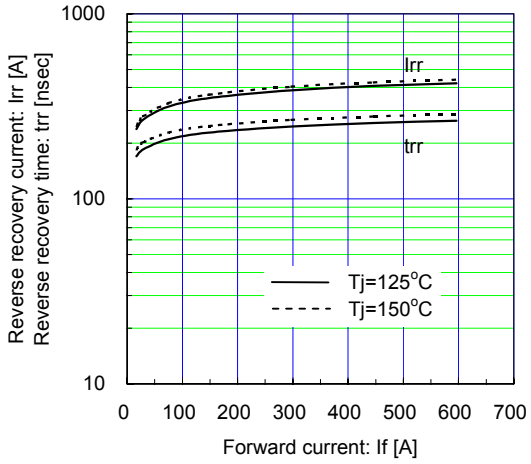
[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=25°C

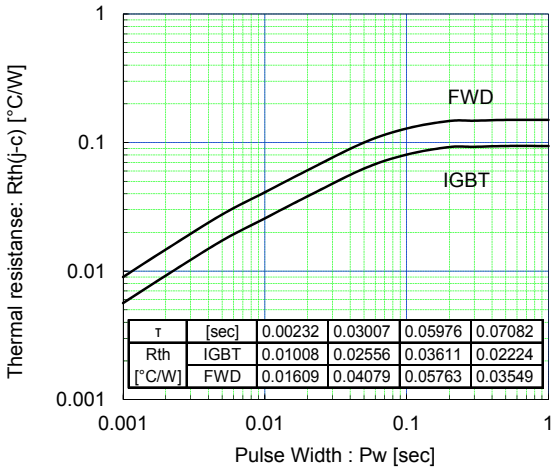


[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=600V, Vge=±15V, Rg=0.93Ω, Tj=125°C, 150°C



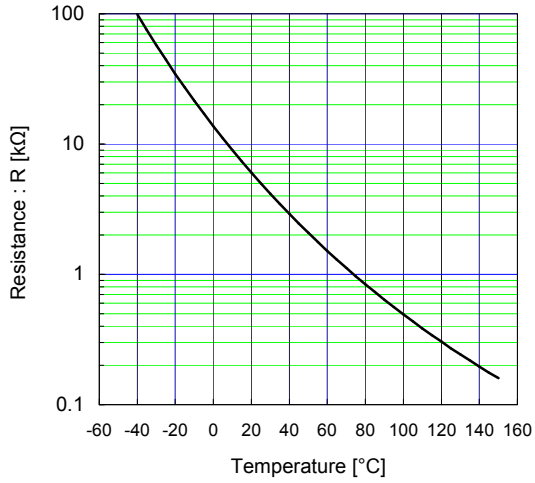
Transient Thermal Resistance (max.)



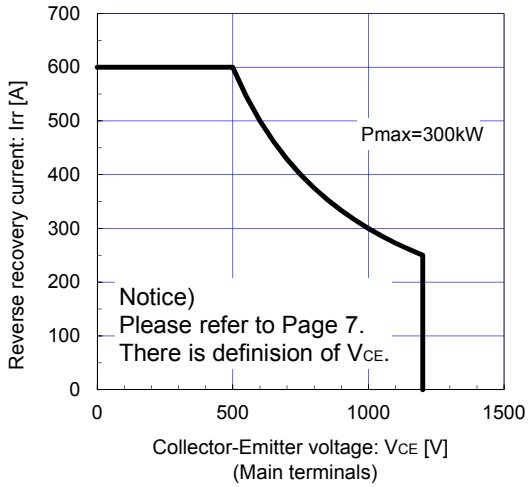
τ	[sec]	0.00232	0.03007	0.05976	0.07082
Rth	IGBT	0.01008	0.02556	0.03611	0.02224
[°C/W]	FWD	0.01609	0.04079	0.05763	0.03549

[THERMISTOR]

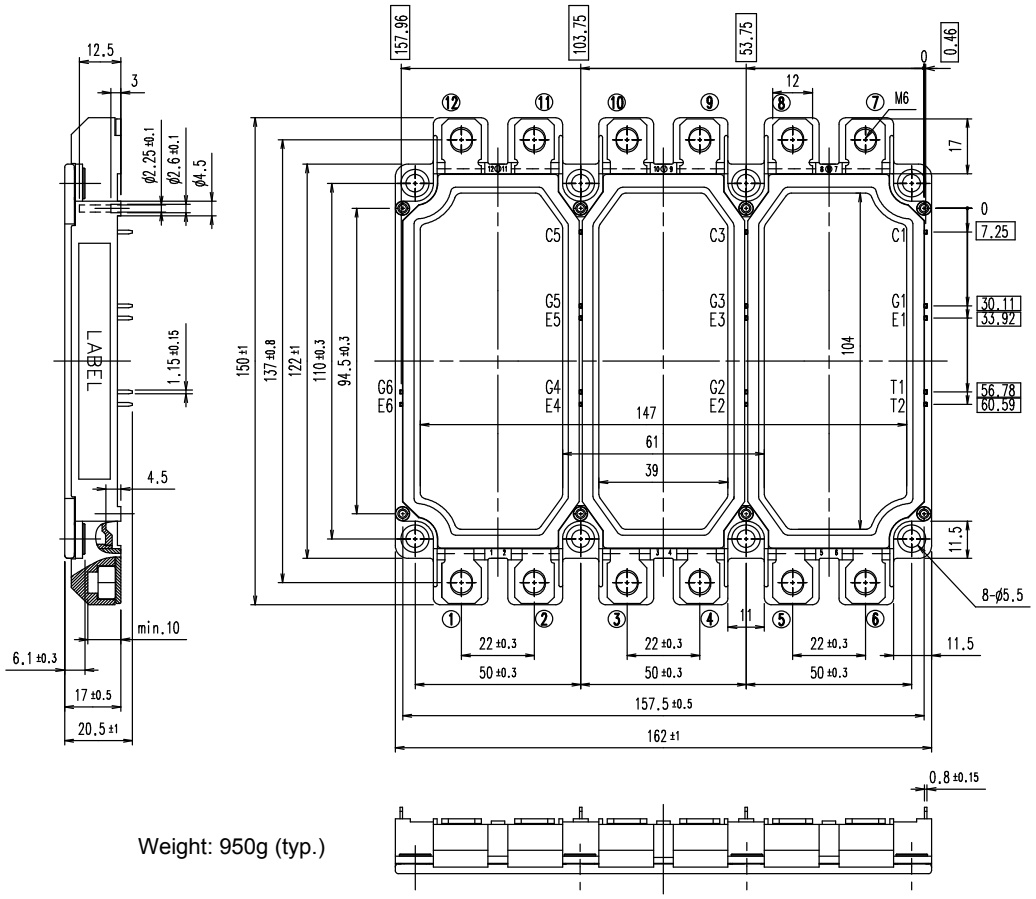
Temperature characteristic (typ.)



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



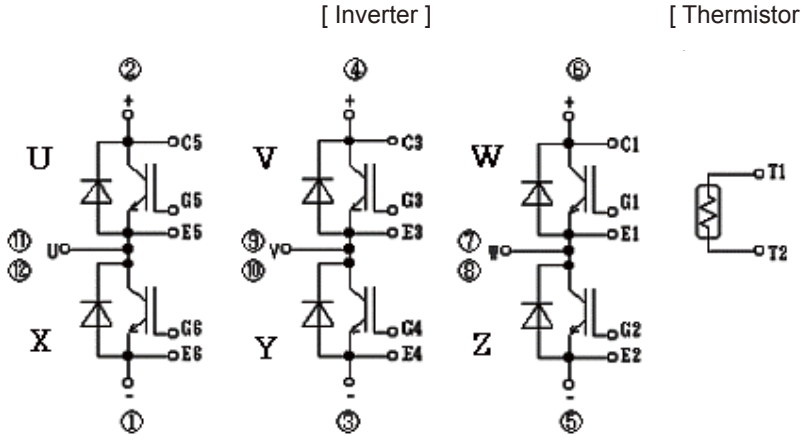
■ Outline Drawings(Unit:mm)



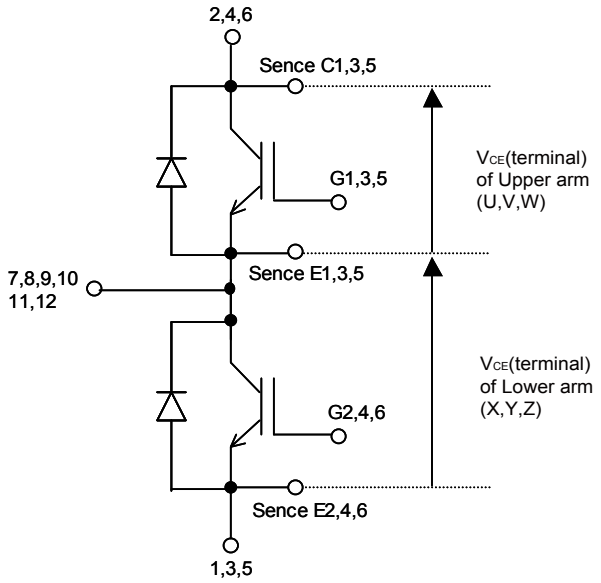
Weight: 950g (typ.)

NOTE) ☐ shows theoretical dimension and tolerance is ⌖ ø0.5 .

■ Equivalent Circuit



■ Definition of switching characteristics



Switching characteristics of V_{CE} is defined between Sense C1,3,5 and Sense E1,3,5 for Upper arm(U,V,W) and Sense E1,3,5 and Sense E2,4,6 for Lower arm(X,Y,Z) .

Please use these terminals whenever measure spike voltage.

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