2MBI600VG-170E

IGBT Modules

IGBT MODULE (V series)
1700V / 600A / 2 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 T_c=25°C unless otherwise specified)**

Items		Symbols	Conditions		Maximum ratings	Units
Collector-Emitter voltage		V_{CES}			1700	V
Gate-Emitter voltage		V_{GES}			±20	V
Collector current		I_C	Continuous	T_C=25°C	800	A
				T_C=100°C	600	
		I_{CP}	1ms		1200	
		$-I_C$			600	
		$-I_{C\ pulse}$	1ms		1200	
Collector power dissipation		P_C	1 device		4410	W
Junction temperature		T_j			175	°C
Operating junction temperature (under switching conditions)		T_{jop}			150	
Storage temperature		T_{stg}			-40 ~ +150	
Isolation voltage	between terminal and copper base (*1)	V_{iso}	AC : 1min.		4000	VAC
Screw torque (*2)	Mounting	-	M6		5.75	N m
	Main Terminals	-	M8		10	
	Sense Terminals	-	M4		2.5	

Note *1: All terminals should be connected together when isolation test will be done.
Note *2: Recommendable Value :
Mounting 4.25~5.75 Nm (M6) , Main Terminals 8~10 Nm (M8) , Sense Terminals 1.7~2.5 Nm (M4)

● **Electrical characteristics (at T_j= 25°C unless otherwise specified)**

Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 1700V		-	-	1.0	mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V		-	-	1200	nA
Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 600mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (main terminal)	V_{GE} = 15V, I_C = 600A	T_j=25°C	-	2.18	2.46	V
			T_j=125°C	-	2.58	-	
			T_j=150°C	-	2.63	-	
	$V_{CE\ (sat)}$ (chip)		T_j=25°C	-	2.00	2.25	
			T_j=125°C	-	2.40	-	
			T_j=150°C	-	2.45	-	
Internal gate resistance	I_{nt} R_G			-	2.92	-	Ω
Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	59	-	nF
Turn-on	t_{on}	V_{CC} = 900V R_{gon} = 2.4Ω		-	2.28	-	μs
	t_r	I_C = 600A R_{goff} = 0.82Ω		-	0.86	-	
Turn-off	t_{off}	L_m=75nH		-	2.07	-	
	t_f	V_{GE} = ±15V, T_j=125°C		-	0.58	-	
Forward on voltage	V_F (main terminal)	V_{GE} = 0V, I_F = 600A	T_j=25°C	-	1.98	2.36	V
			T_j=125°C	-	2.18	-	
			T_j=150°C	-	2.16	-	
	V_F (chip)		T_j=25°C	-	1.80	2.15	
			T_j=125°C	-	2.00	-	
			T_j=150°C	-	1.98	-	
Reverse recovery	t_{rr}	I_F = 600A, T_j = 125°C		-	0.31	-	μs
Lead resistance, terminal-chip	R lead			-	0.291	-	mΩ

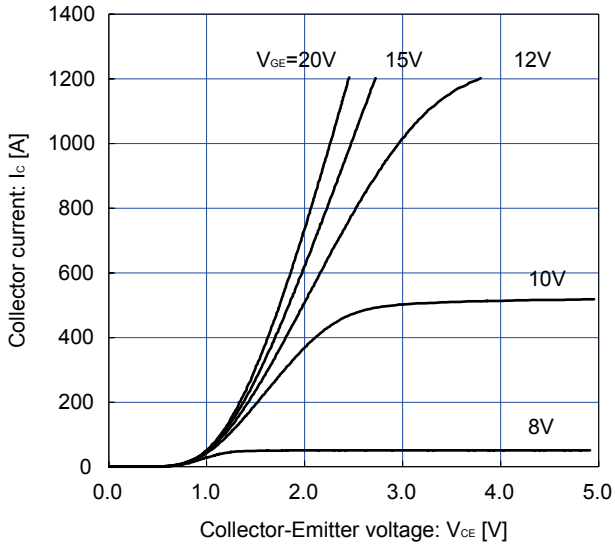
● **Thermal resistance characteristics**

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance(1device)	$R_{th(j-c)}$	IGBT	-	-	0.034	°C/W
		FWD	-	-	0.060	
Contact thermal resistance (1module) (*3)	$R_{th(c-f)}$	with Thermal Compound	-	0.006	-	

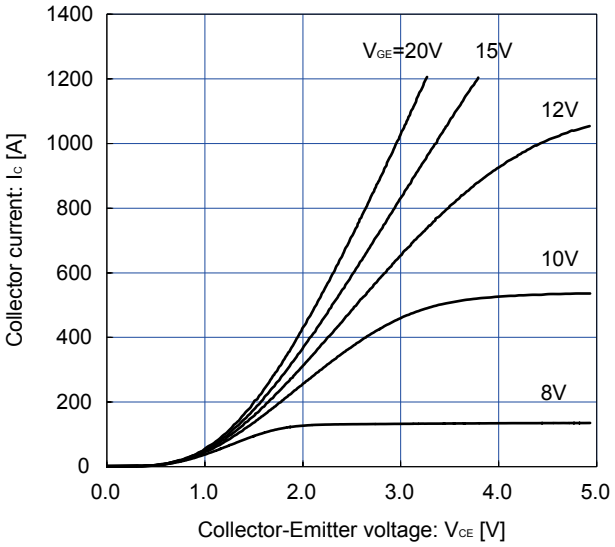
Note *3: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

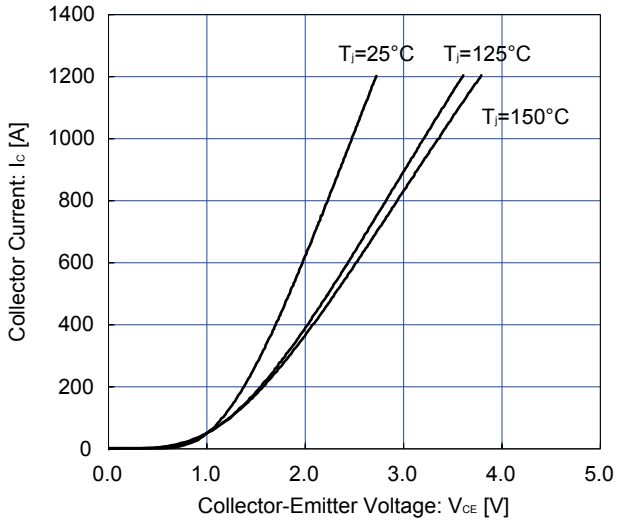
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C, chip



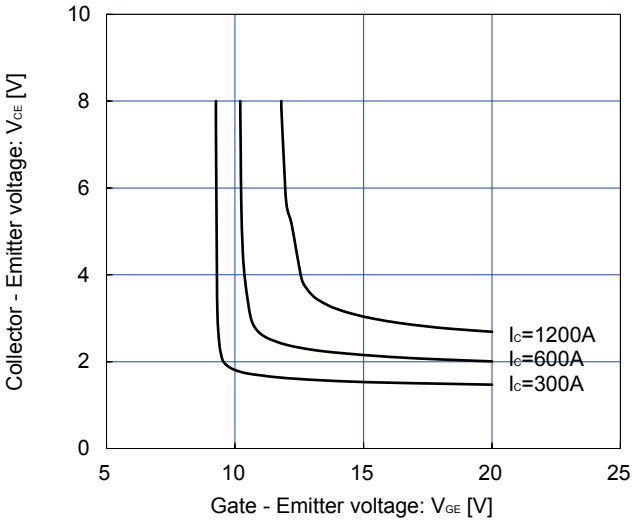
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C, chip



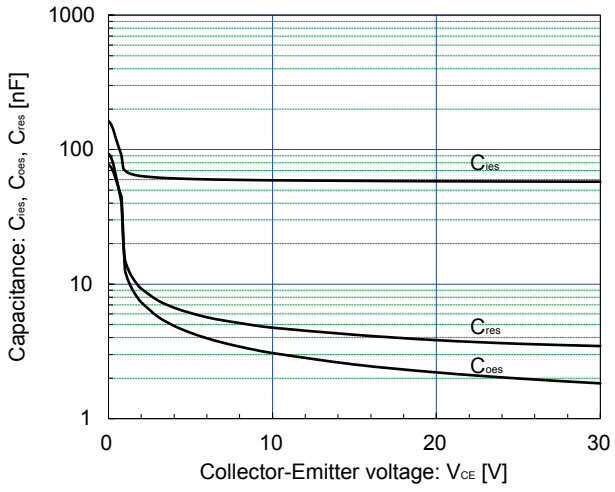
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}= +15V, chip



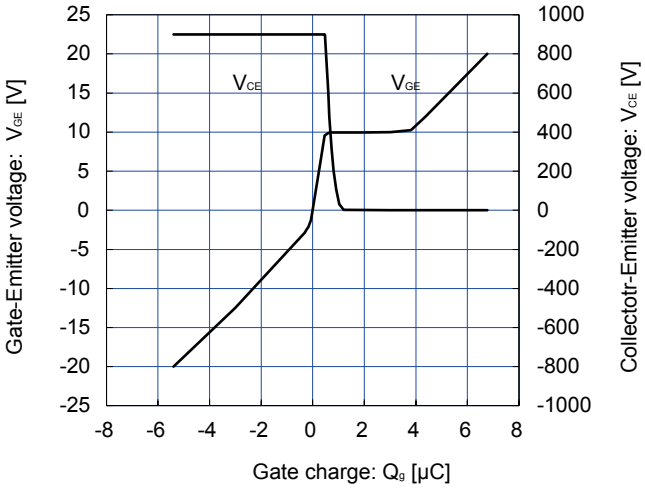
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j= 25°C, chip



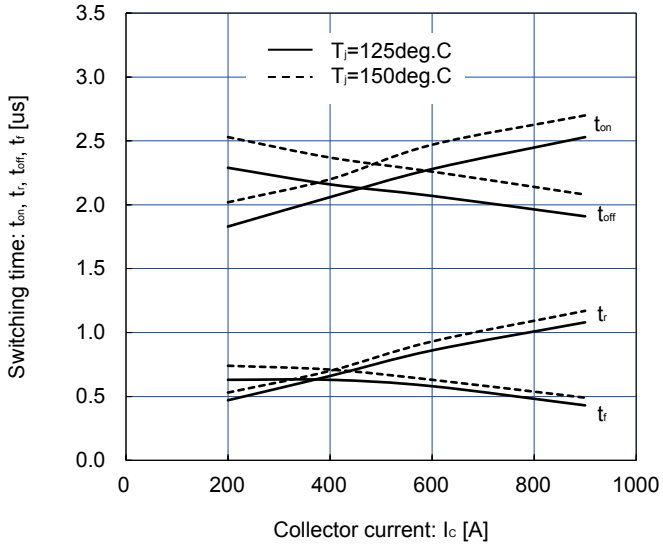
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}= 0V, f= 1MHz, T_j= 25°C



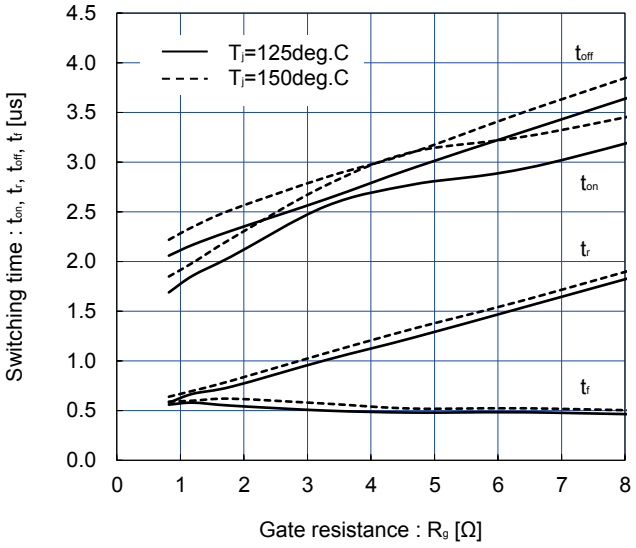
Dynamic Gate charge (typ.)
T_j= 25°C



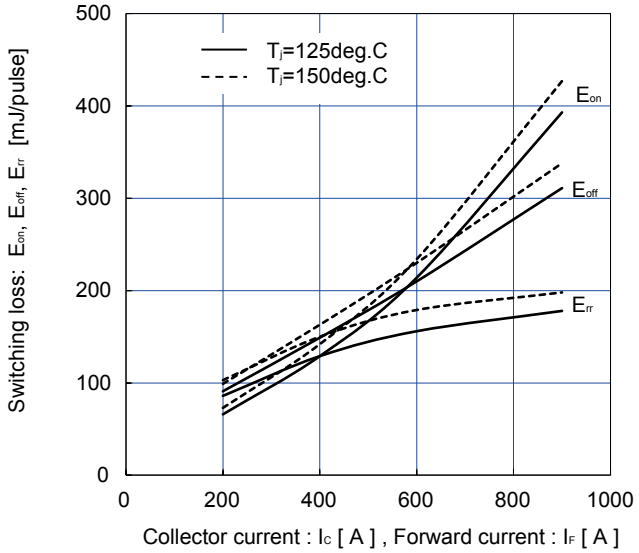
Switching time vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_{gon}=2.4Ω, R_{goff}=0.82Ω



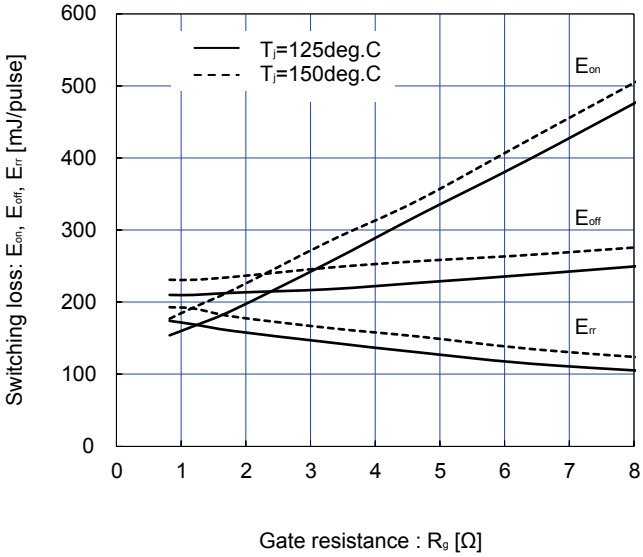
Switching time vs. Gate resistance (typ.)
V_{CC}=900V, V_C=600A, V_{GE}=±15V



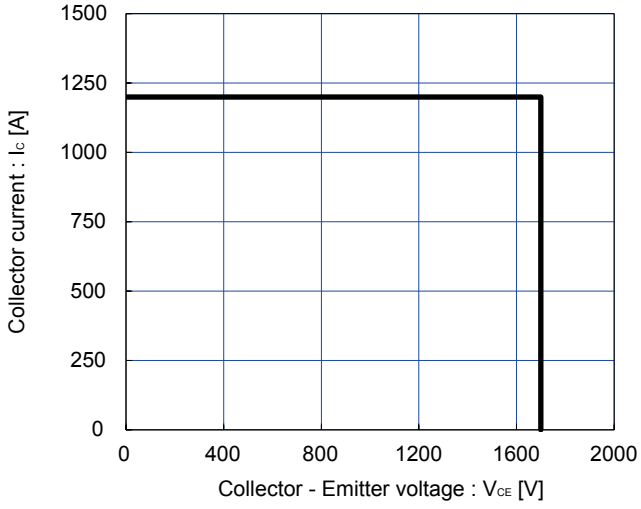
Switching loss vs. Collector current (typ.)
V_{CC}=900V, V_{GE}=±15V, R_{gon}=2.4Ω, R_{goff}=0.82Ω



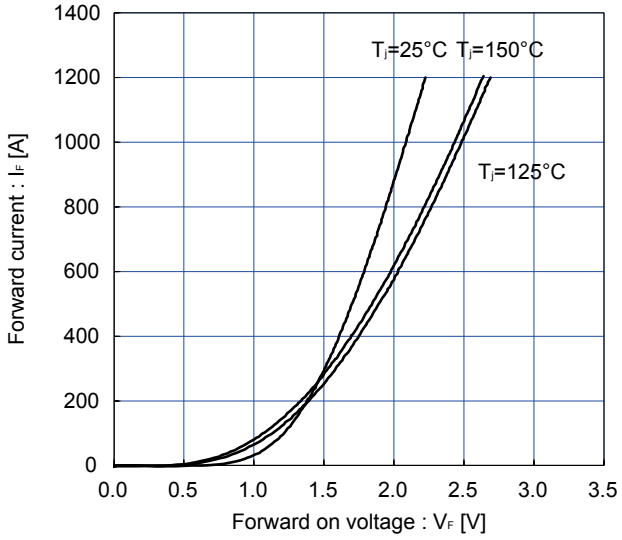
Switching loss vs. Gate resistance (typ.)
V_{CC}=900V, I_C=600A,V_{GE}=±15V



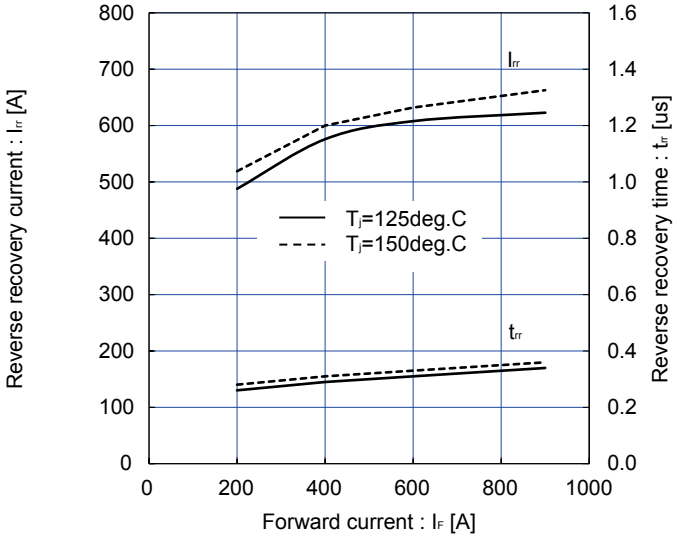
Reverse bias safe operating area (max.)
±V_{GE}=15V, T_j=150°C / chip



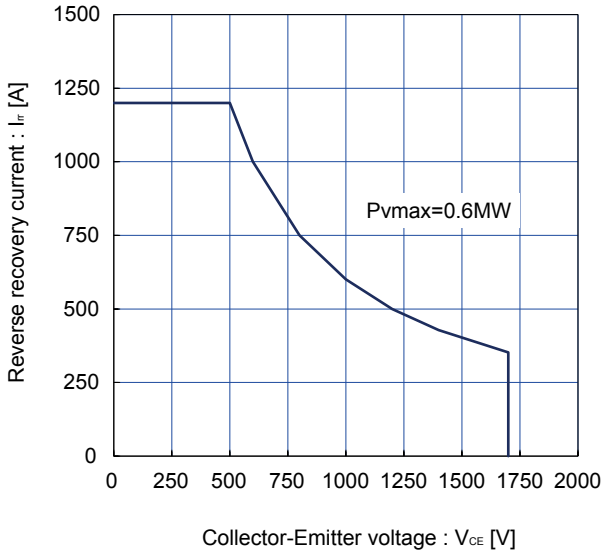
Forward current vs. Forward on voltage (typ.)
chip



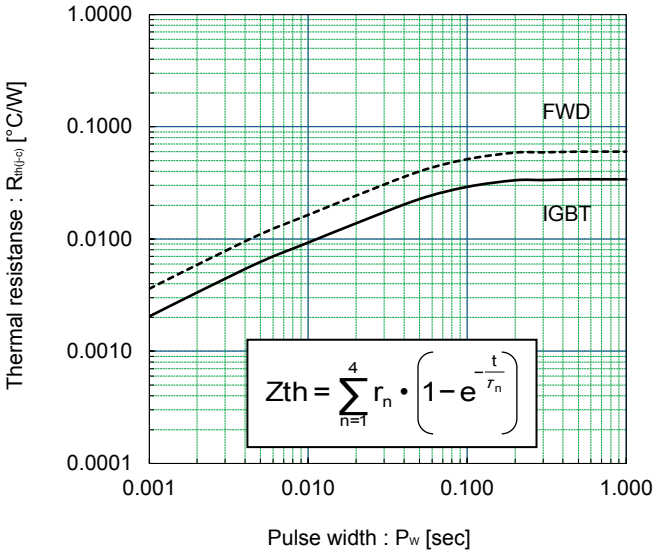
Reverse recovery characteristics (typ.)
V_{CC}=900V, V_{GE}=±15V, R_{gon}=2.4Ω



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

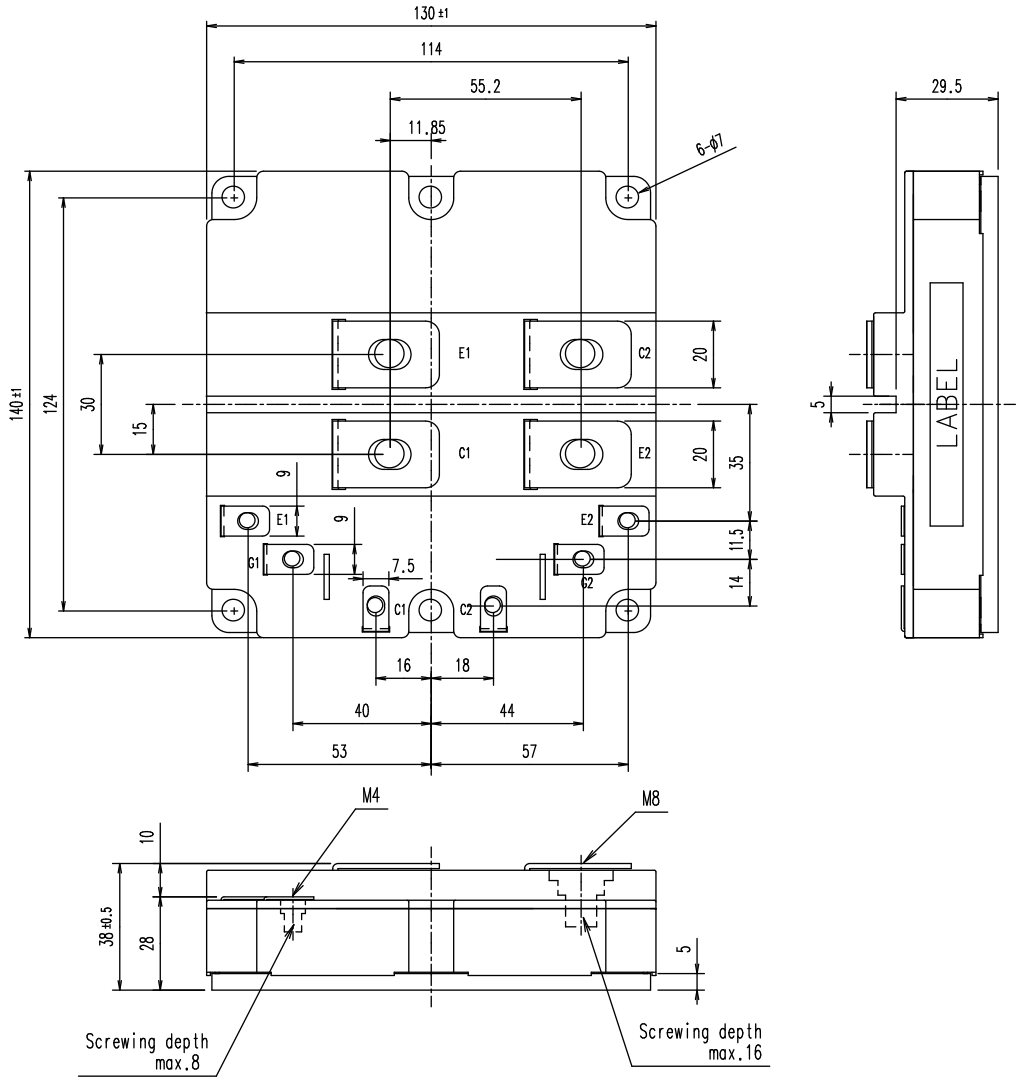


Transient thermal resistance (max.)

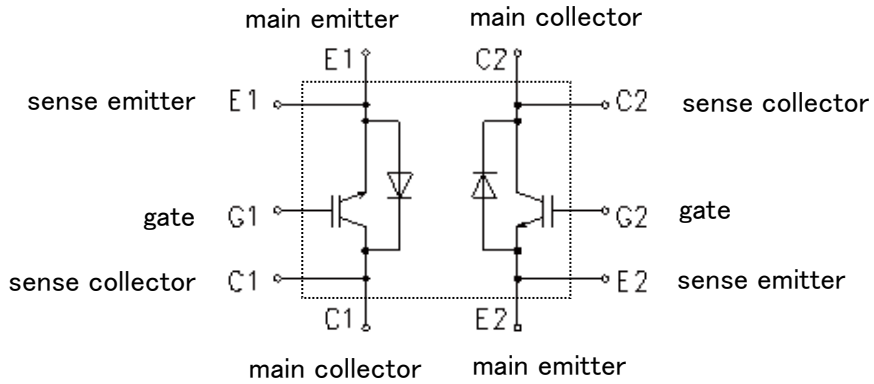


	IGBT	FWD
r1	0.00383	0.00667
r1	0.01312	0.02317
r3	0.00941	0.01659
r4	0.00764	0.01356
t1	0.0024	0.0024
t2	0.0359	0.0355
t3	0.0627	0.0638
t4	0.0743	0.0733

■ Outline Drawing (Unit : mm)



■ Equivalent circuit



WARNING

1. This Catalog contains the product specifications, characteristics, data, materials, and structures as of February 2013.
   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.

2. All applications described in this Catalog exemplify the use of Fuji's products for your reference only. No right or license, either express or implied, under any patent, copyright, trade secret or other intellectual property right owned by Fuji Electric Co., Ltd. is (or shall be deemed) granted. Fuji Electric Co., Ltd. makes no representation or warranty, whether express or implied, relating to the infringement or alleged infringement of other's intellectual property rights which may arise from the use of the applications described herein.

3. Although Fuji Electric Co., Ltd. is enhancing product quality and reliability, a small percentage of semiconductor products may become faulty. When using Fuji Electric semiconductor products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing a physical injury, fire, or other problem if any of the products become faulty. It is recommended to make your design fail-safe, flame retardant, and free of malfunction.

4. The products introduced in this Catalog are intended for use in the following electronic and electrical equipment which has normal reliability requirements.
   - Computers
   - OA equipment
   - Communications equipment (terminal devices)
   - Measurement equipment
   - Machine tools
   - Audiovisual equipment
   - Electrical home appliances
   - Personal equipment
   - Industrial robots etc.

5. If you need to use a product in this Catalog for equipment requiring higher reliability than normal, such as for the equipment listed below, it is imperative to contact Fuji Electric Co., Ltd. to obtain prior approval. When using these products for such equipment, take adequate measures such as a backup system to prevent the equipment from malfunctioning even if a Fuji's product incorporated in the equipment becomes faulty.
   - Transportation equipment (mounted on cars and ships)
   - 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

6. Do not use products in this Catalog for the equipment requiring strict reliability such as the following and equivalents to strategic equipment (without limitation).
   - Space equipment
   - Aeronautic equipment
   - Nuclear control equipment
   - Submarine repeater equipment

8. If you have any question about any portion in this Catalog, ask Fuji Electric Co., Ltd. or its sales agents before using the product.
   Neither Fuji Electric Co., Ltd. nor its agents shall be liable for any injury caused by any use of the products not in accordance with instructions set forth herein.