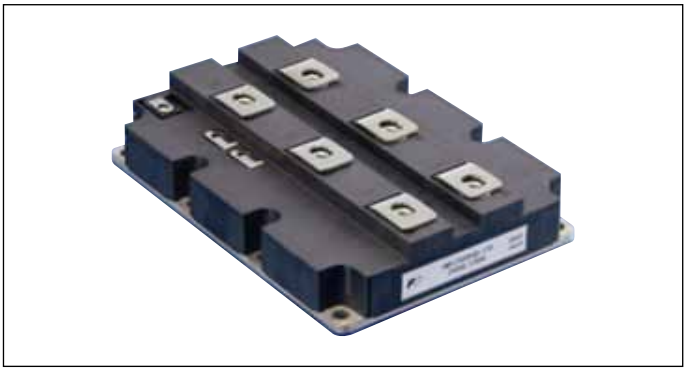
1MBI1500UE-330

IGBT Modules

IGBT MODULE (U series)
3300V / 1500A / 1 in one package

Features

AlSiC Baseplate
AIN DCB substrate
CTI ≥ 600
V_{iso} 6000 Vac
Low Inductance module structure



Applications

Traction drives
Industrial motor drives
Wind power
Chopper

Maximum Ratings and Characteristics

● **Absolute Maximum Ratings (at Tc=25°C unless otherwise specified)**

Items		Symbols	Conditions	Maximum ratings	Units
Collector-Emitter voltage		V_{CES}		3300	V
Gate-Emitter voltage		V_{GES}		±20	V
Collector current		I_c	T_C=95°C	1500	A
		$I_{c\ pulse}$	1ms	3000	
		$-I_c$		1500	
		$-I_{c\ pulse}$	1ms	3000	
Collector power dissipation		P_C	1 device	15.6	kW
Junction temperature		T_j		150	°C
Storage temperature		T_{stg}		-40 ~ +125	
Isolation voltage	Between terminal and copper base (*1)	V_{iso}	AC : 1min.	6.0	kVAC
Partial discharge extinction voltage		V_e	AC, Q≤10pC (acc. To IEC 1287)	2.6	kVAC
Screw torque (*2)		Mounting		5.75	N·m
		Main Terminals		10	
		Sense Terminals		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 N·m (M6), Main Terminal : 8-10 N·m (M8), Sense Terminal : 1.7-2.5 N·m (M4)

● Electrical characteristics (at Tj= 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} = 3300V		-	-	1.0	mA
Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V		-	-	4800	nA
Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 1500mA		6.0	6.75	7.5	V
Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (main terminal)	V_{GE} = 15V, I_C = 1500A	T_j=25°C	-	2.59	3.09	V
			T_j=125°C	-	3.37	-	
			T_j=150°C	-	3.56	-	
	$V_{CE\ (sat)}$ (chip)		T_j=25°C	-	2.46	2.96	
			T_j=125°C	-	3.24	-	
			T_j=150°C	-	3.43	-	
Internal gate resistance	Int Rg			-	0.56	-	Ω
Input capacitance	C_{ies}	V_{GE} = 0V, V_{CE} = 10V, f = 1MHz		-	300	-	nF
Turn-on time	t_{on}	V_{CC} = 1800V, I_C = 1500A, V_{GE} = ±15V, T_j = 125°C, R_g = 1.6Ω, Lm = 160nH		-	3.1	-	μs
	t_r			-	2.2	-	
Turn-off time	t_{off}			-	2.6	-	
	t_f			-	0.5	-	
Forward on voltage	V_F (main terminal)	V_{GE} = 0V, I_F = 1500A	T_j=25°C	-	2.51	3.11	V
			T_j=125°C	-	2.81	-	
			T_j=150°C	-	2.77	-	
	V_F (chip)		T_j=25°C	-	2.35	2.95	
			T_j=125°C	-	2.65	-	
			T_j=150°C	-	2.61	-	
Reverse recovery time	t_{rr}	I_F = 1500A, T_j=150°C		-	1.0	-	μs
Lead resistance, terminal-chip	R lead			-	0.104	-	mΩ

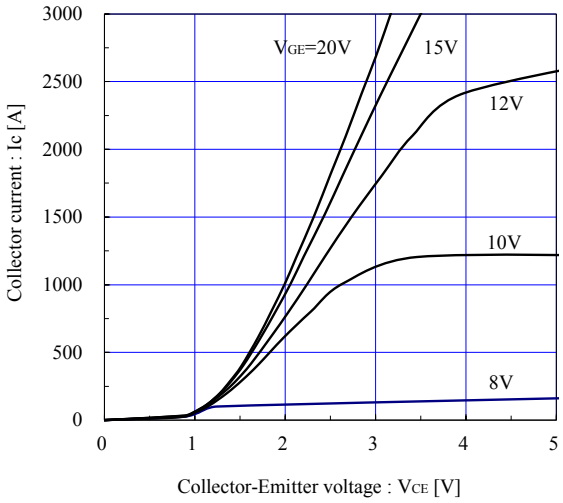
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	$R_{th(j-c)}$	IGBT	-	-	8.0	°C/kW
		FWD	-	-	15.0	
Contact thermal resistance (1device)	$R_{th(c-f)}$	with Thermal Compound (*3)	-	5.2	-	

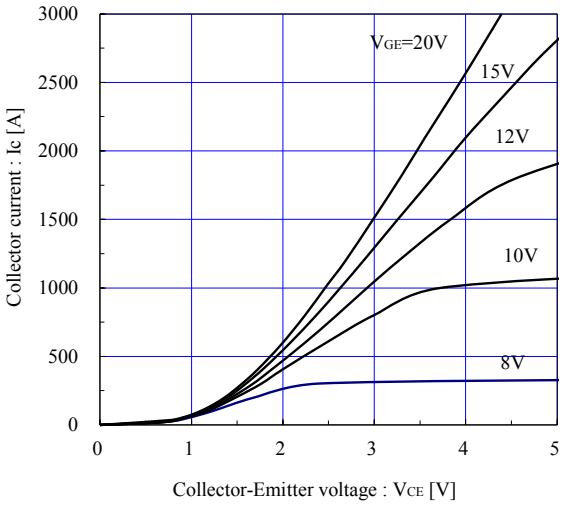
Note *3: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

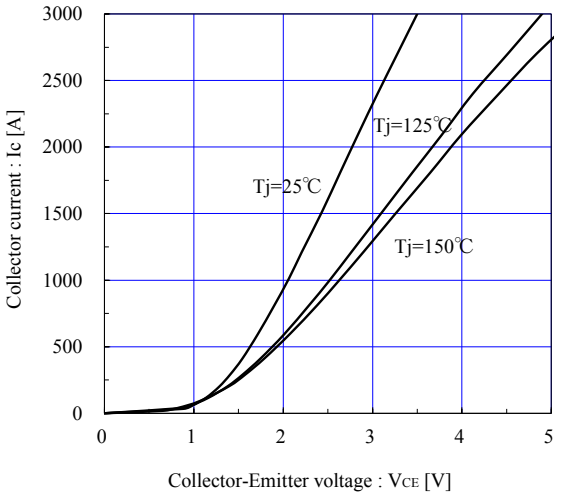
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25℃ / chip



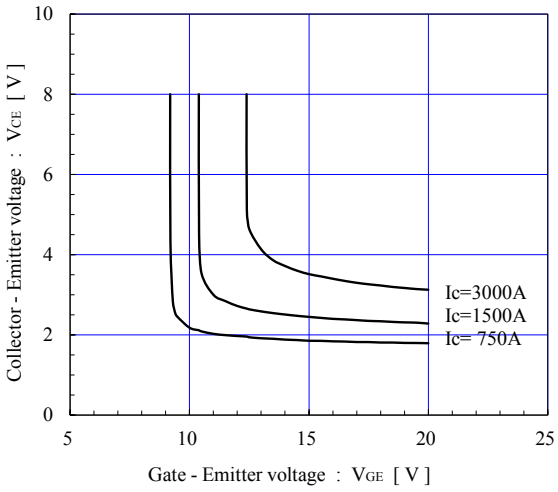
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



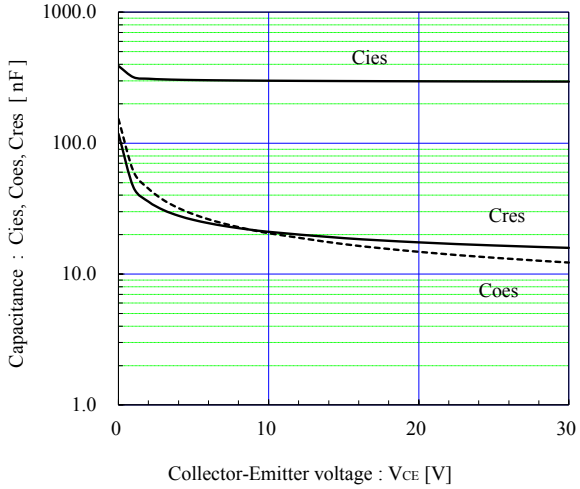
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



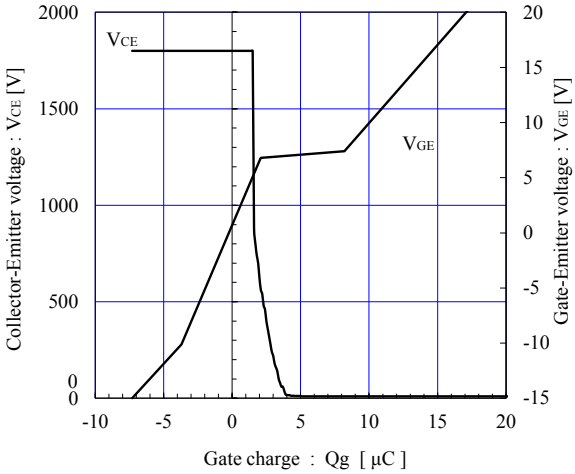
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C

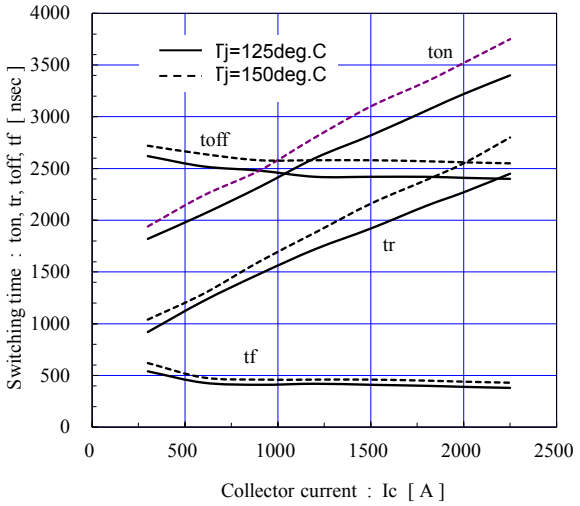


Dynamic Gate charge (typ.)
Vcc=1800V, Tj= 25°C



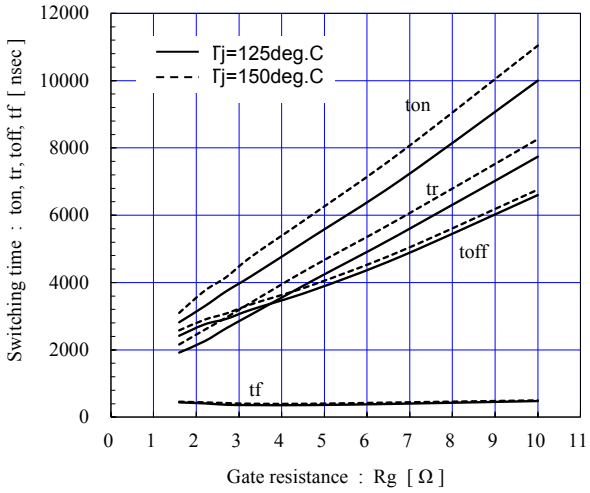
Switching time vs. Collector current (typ.)

Vcc=1800V, V_{GE}=±15V, Rg=±1.6Ω, Lm=160nH



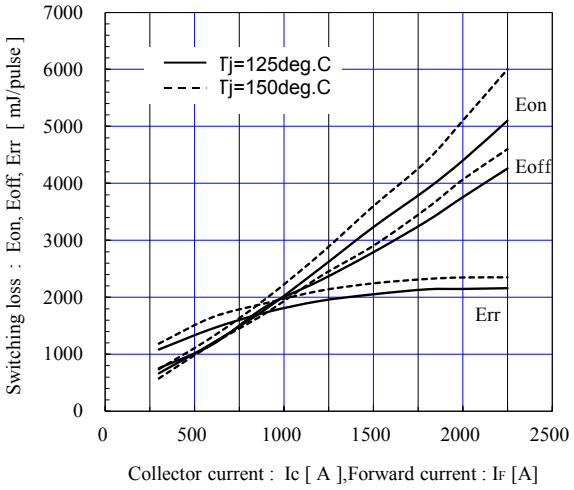
Switching time vs. Gate resistance (typ.)

Vcc=1800V, Ic=1500A, V_{GE}=±15V, Lm=160nH



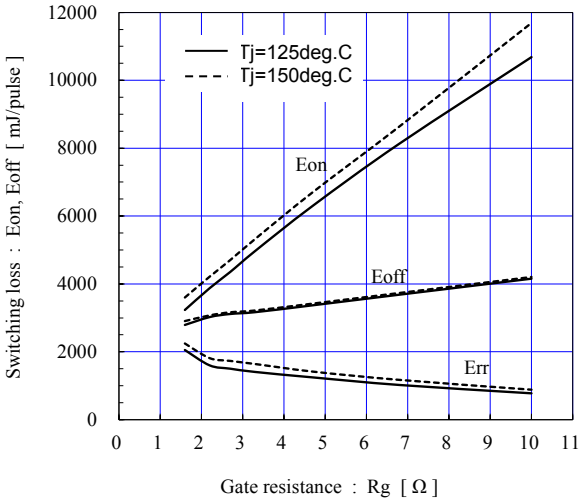
Switching loss vs. Collector current (typ.)

Vcc=1800V, V_{GE}=±15V, Rg=±1.6Ω, Lm=160nH



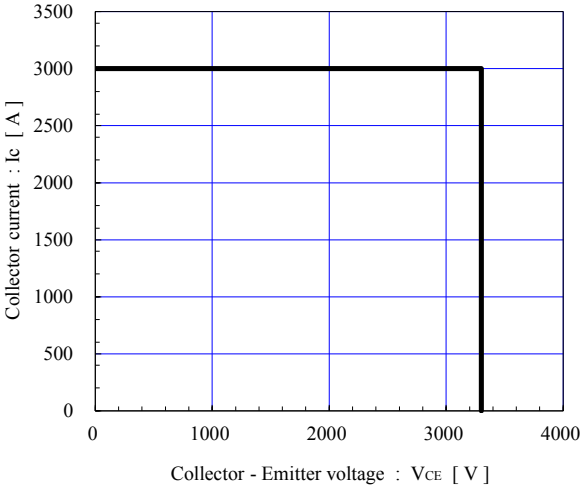
Switching loss vs. Gate resistance (typ.)

Vcc=1800V, V_{GE}=±15V, Ic=1500A, Lm=160nH



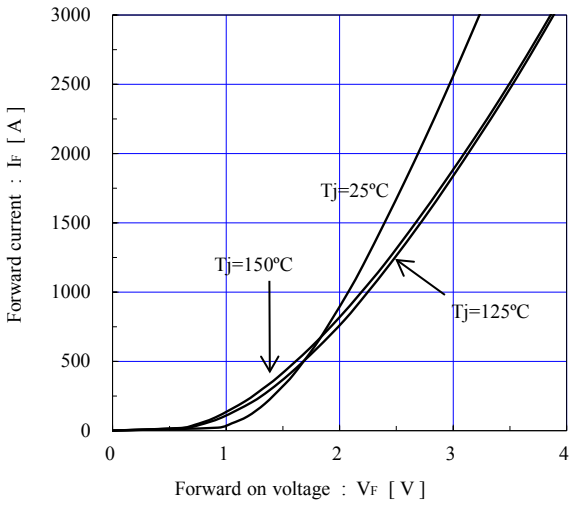
Reverse bias safe operating area (max.)

±V_{GE}=15V, Tj=150 °C / chip



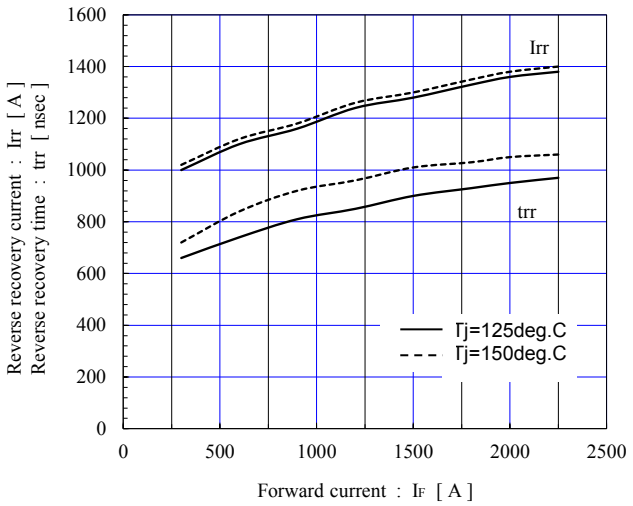
Forward current vs. Forward on voltage (typ.)

chip



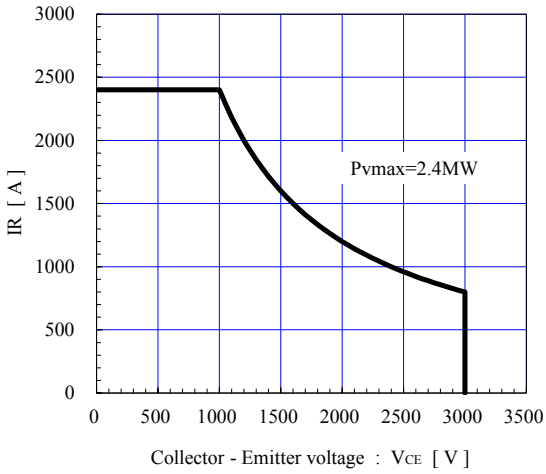
Reverse recovery characteristics (typ.)

Vcc=1800V, VGE=±15V, Rg=±1.6Ω, Lm=160nH

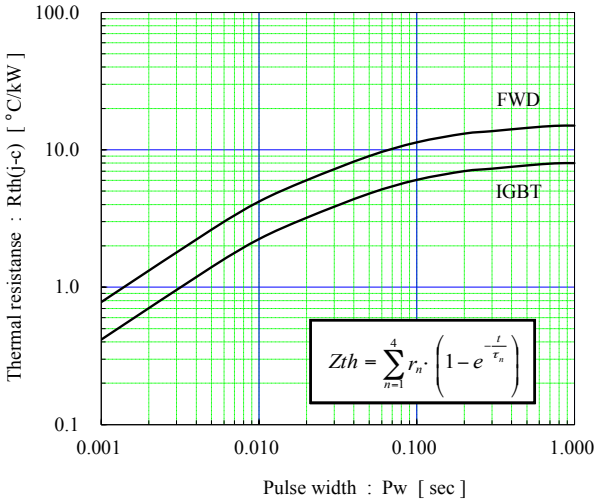


FWD safe operating area (max.)

Tj=150°C / sense terminals

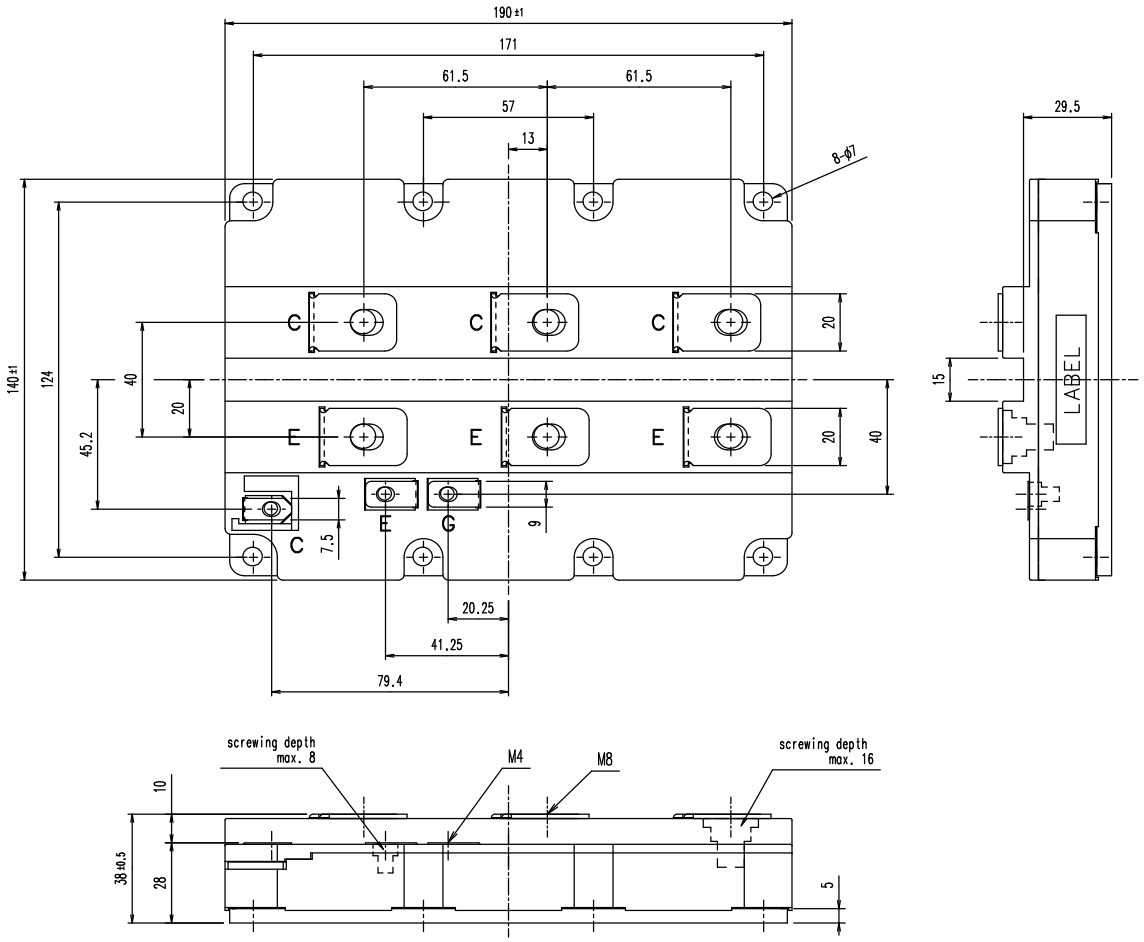


Transient thermal resistance (max.)

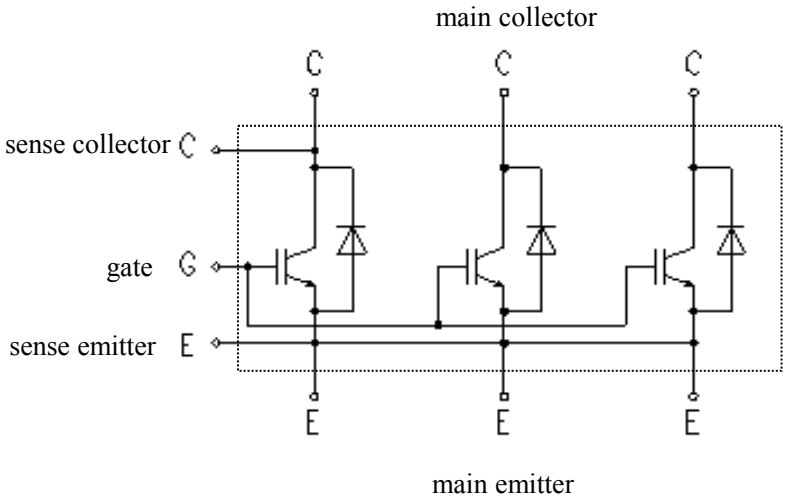


	IGBT	FWD
r1	0.00142	0.00266
r2	0.00206	0.00387
r3	0.00203	0.00381
r4	0.00248	0.00466
τ1	0.0050	0.0050
τ2	0.0404	0.0404
τ3	0.0410	0.0410
τ4	0.2271	0.2271

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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