

1MBI1500UE-330

IGBT Modules

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

■ Features

- AlSiC Baseplate
- AlN 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 T_c=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	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 T_j= 25°C unless otherwise specified)

Items	Symbols	Conditions	Characteristics			Units	
			min.	typ.	max.		
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 R _g		-	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, L _m = 160nH	-	3.1	-	μs	
	t _r		-	2.2	-		
Turn-off time	t _{off}		-	2.6	-		
	t _r		-	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

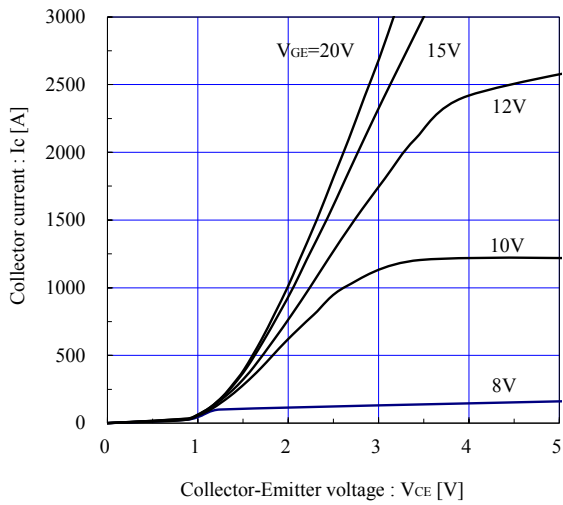
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	8.0	°C/kW
		FWD	-	-	15.0	
Contact thermal resistance (1device)	R _{th(c-f)}	with Thermal Compound (*3)	-	5.2	-	

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

■ Characteristics (Representative)

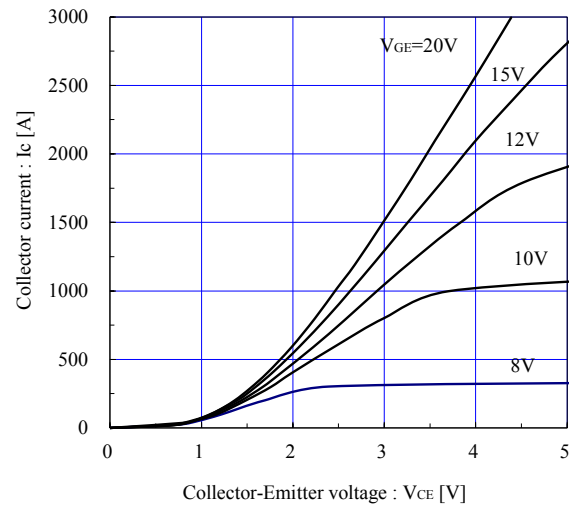
Collector current vs. Collector-Emittor voltage (typ.)

$T_j = 25^\circ\text{C}$ / chip



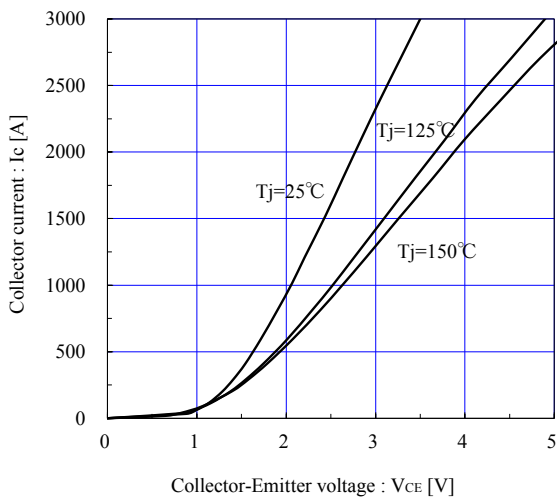
Collector current vs. Collector-Emittor voltage (typ.)

$T_j = 150^\circ\text{C}$ / chip



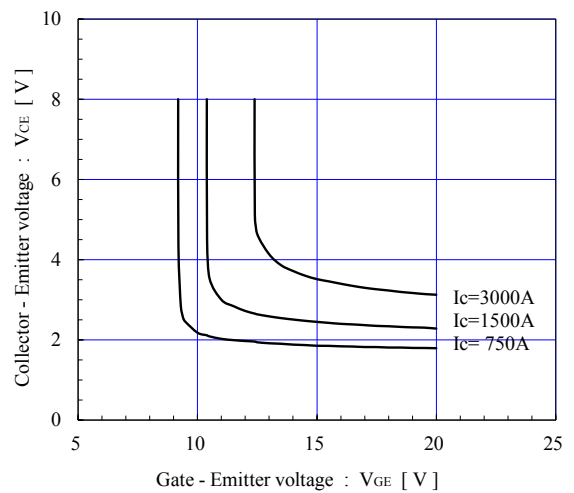
Collector current vs. Collector-Emittor voltage (typ.)

$V_{GE} = 15\text{V}$ / chip



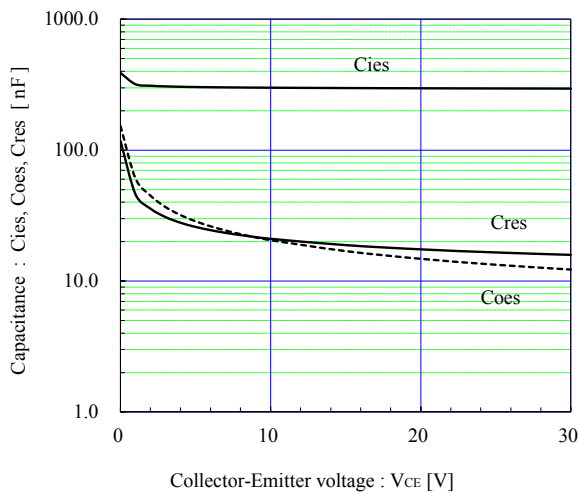
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)

$T_j = 25^\circ\text{C}$ / chip



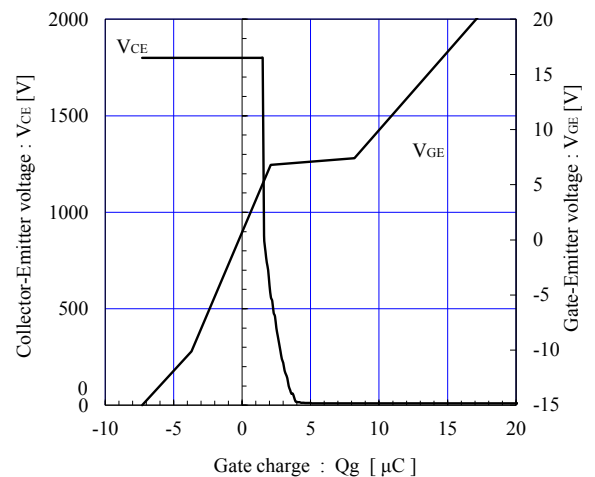
Capacitance vs. Collector-Emittor voltage (typ.)

$V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$



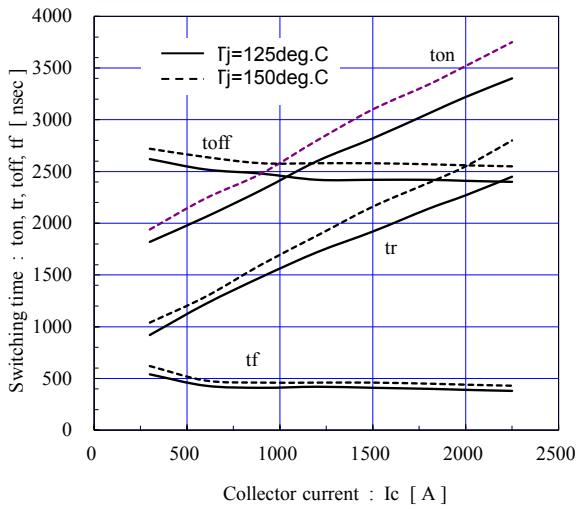
Dynamic Gate charge (typ.)

$V_{CC} = 1800\text{V}$, $T_j = 25^\circ\text{C}$



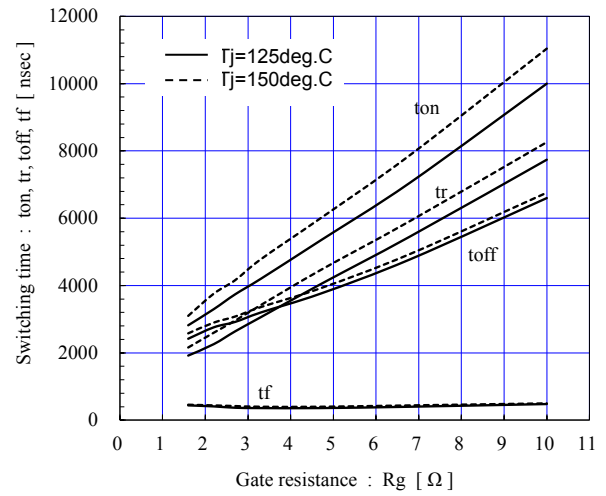
Switching time vs. Collector current (typ.)

V_{CE}=1800V, V_{GE}=±15V, R_g=±1.6Ω, L_m=160nH



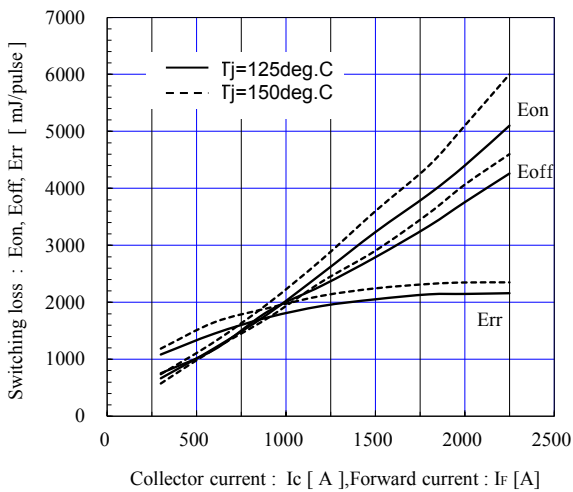
Switching time vs. Gate resistance (typ.)

V_{CE}=1800V, Ic=1500A, V_{GE}=±15V, L_m=160nH



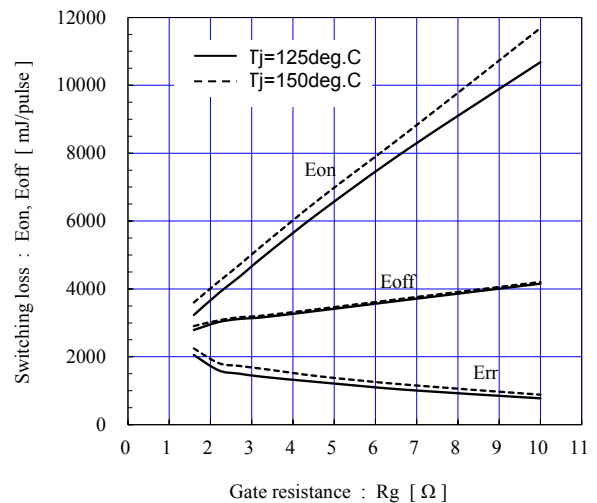
Switching loss vs. Collector current (typ.)

V_{CE}=1800V, V_{GE}=±15V, R_g=±1.6Ω, L_m=160nH



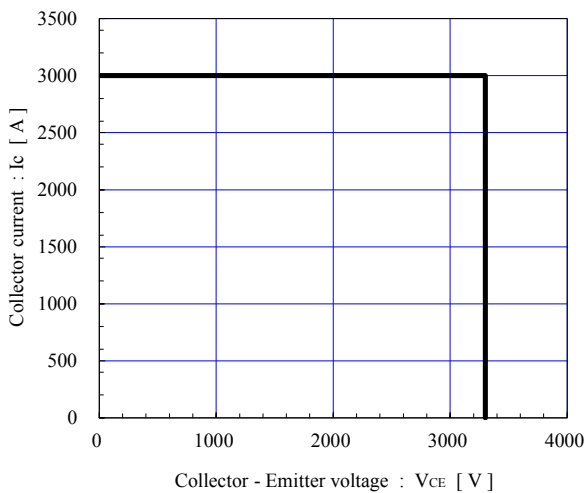
Switching loss vs. Gate resistance (typ.)

V_{CE}=1800V, V_{GE}=±15V, Ic=1500A, L_m=160nH

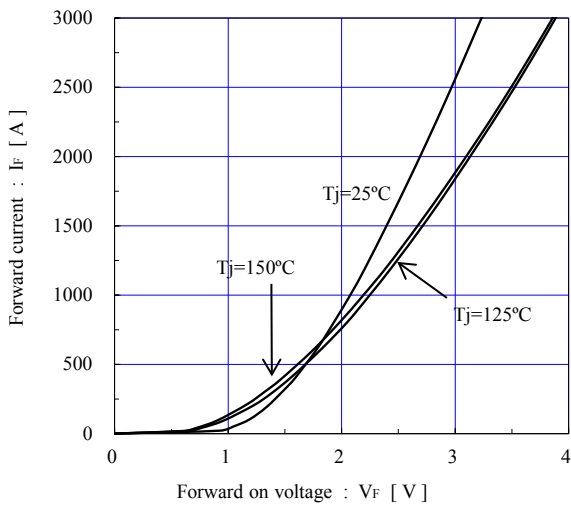


Reverse bias safe operating area (max.)

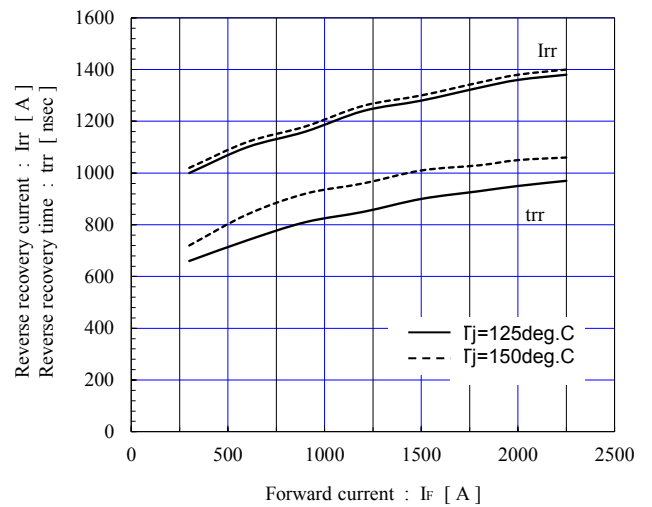
±V_{GE}=15V, T_j=150 °C / chip



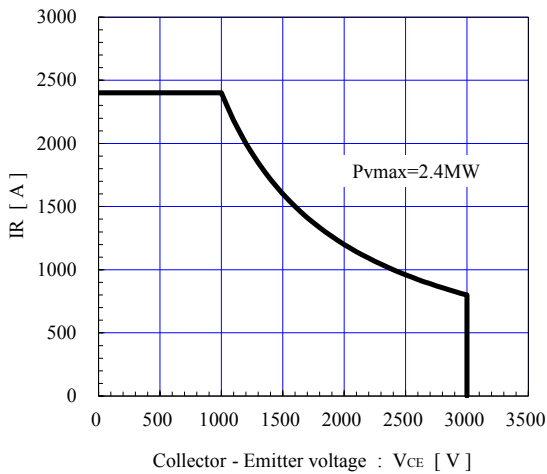
Forward current vs. Forward on voltage (typ.)
chip



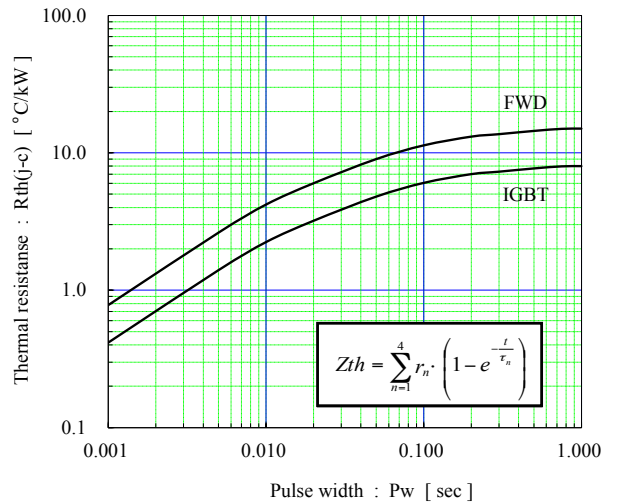
Reverse recovery characteristics (typ.)
V_{CC}=1800V, V_{GE}=±15V, R_g=±1.6Ω, L_m=160nH



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

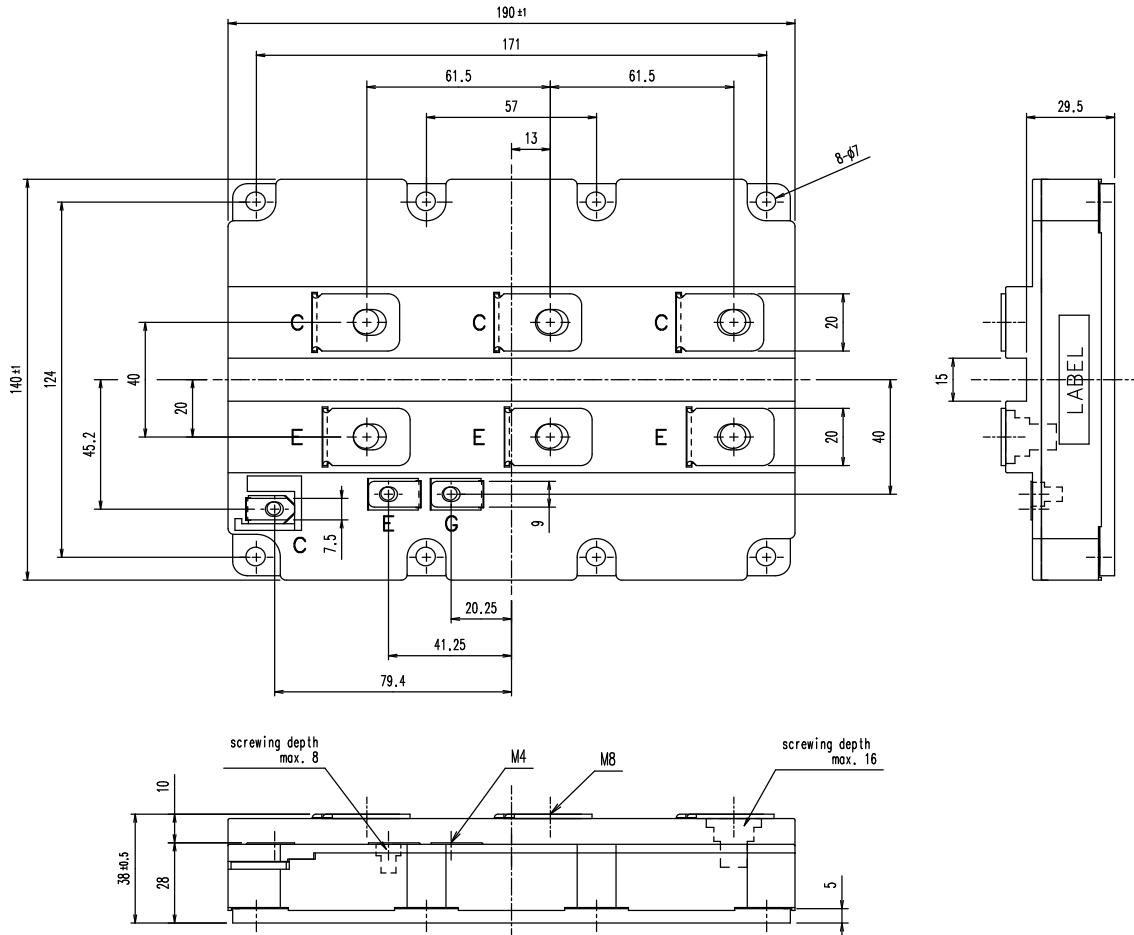


Transient thermal resistance (max.)

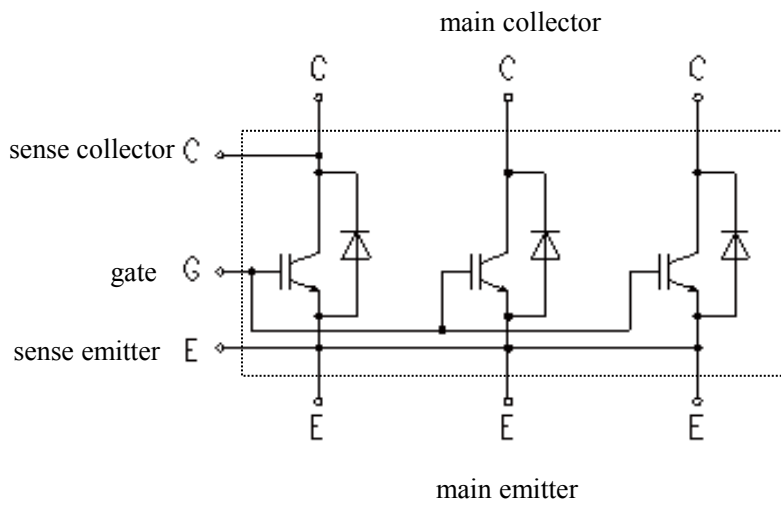


	IGBT	FWD
r1	0.00142	0.00266
r2	0.00206	0.00387
r3	0.00203	0.00381
r4	0.00248	0.00466
τ1	0.0050	0.0050
τ2	0.0404	0.0404
τ3	0.0410	0.0410
τ4	0.2271	0.2271

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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