

1MBI1500UE-330

IGBT Modules

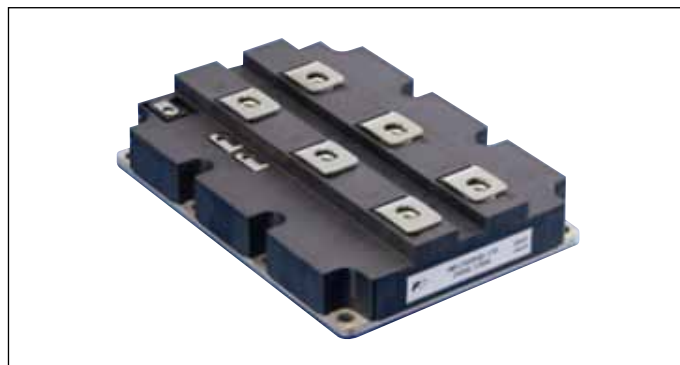
IGBT MODULE (U series) 3300V / 1500A / 1 in one package

■ 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 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 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		-	3.1	-	μs
	t _r			-	2.2	-	
Turn-off time	t _{off}	R _g = 1.6Ω, L _m = 160nH		-	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

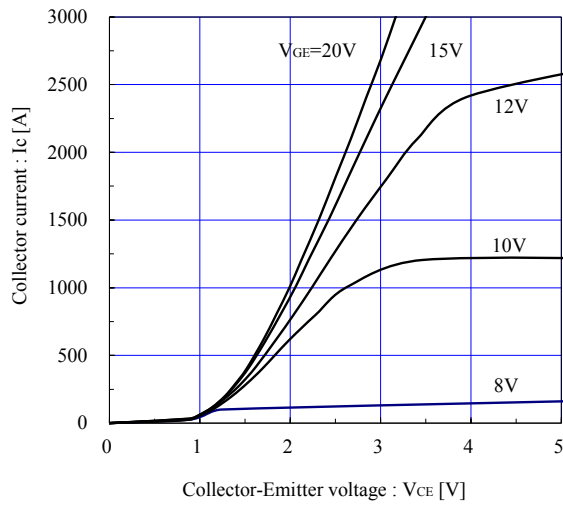
Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	R _{th(j-c)}	IGBT	-	-	8.0	°C/kW
		FWD	-	-	15.0	
Contact thermal resistance (1device)	R _{th(c-f)}	with Thermal Compound (*3)	-	5.2	-	

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

■ Characteristics (Representative)

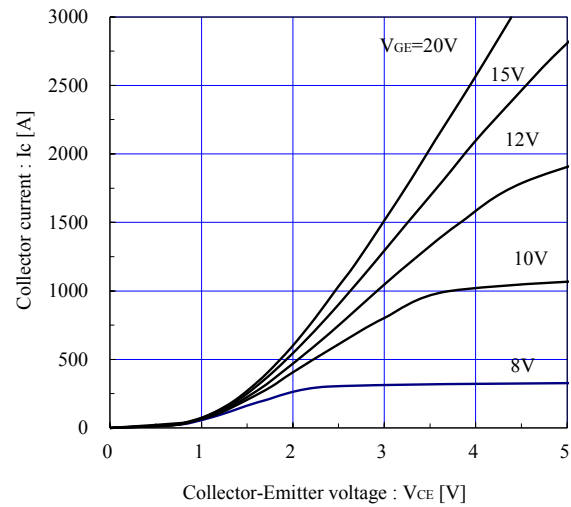
Collector current vs. Collector-Emmitter voltage (typ.)

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



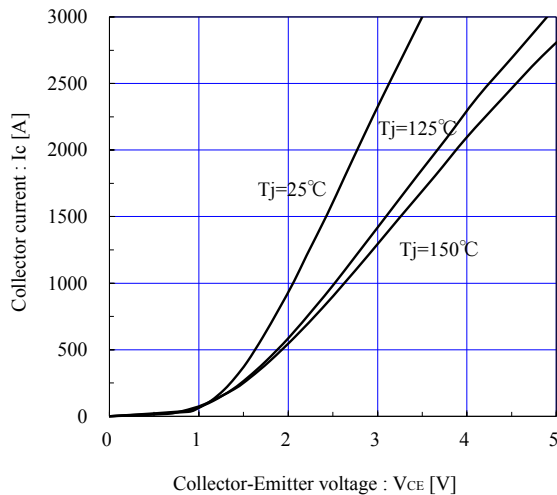
Collector current vs. Collector-Emmitter voltage (typ.)

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



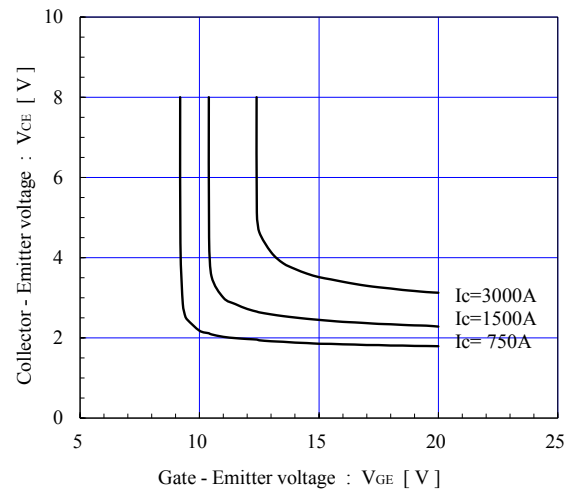
Collector current vs. Collector-Emmitter voltage (typ.)

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



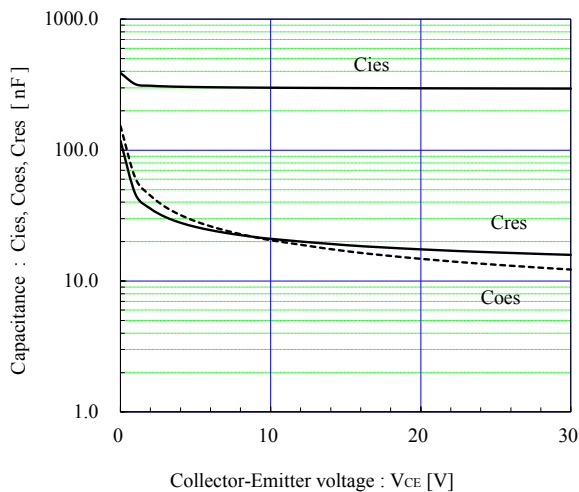
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)

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



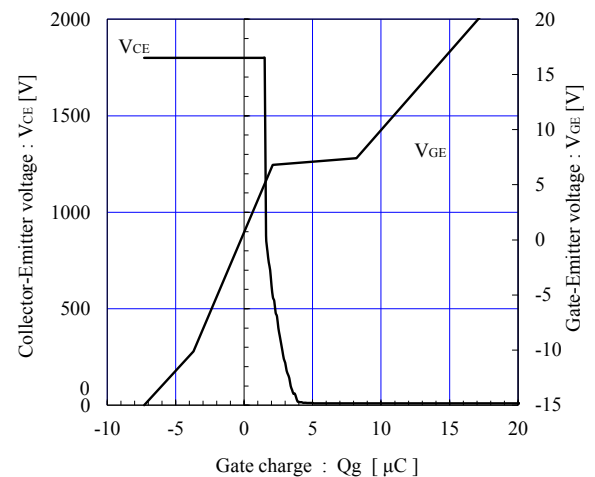
Capacitance vs. Collector-Emmitter voltage (typ.)

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



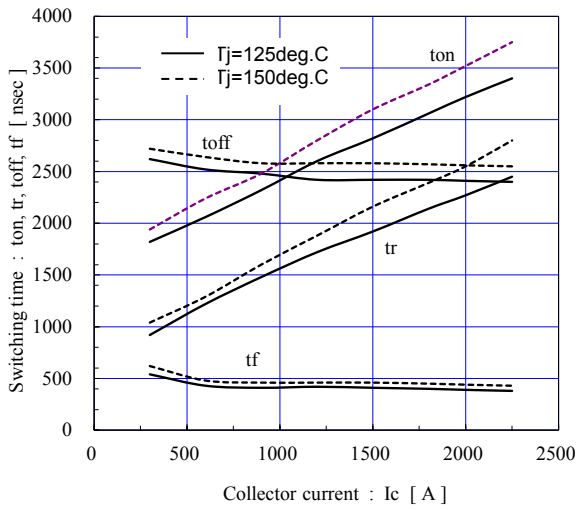
Dynamic Gate charge (typ.)

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



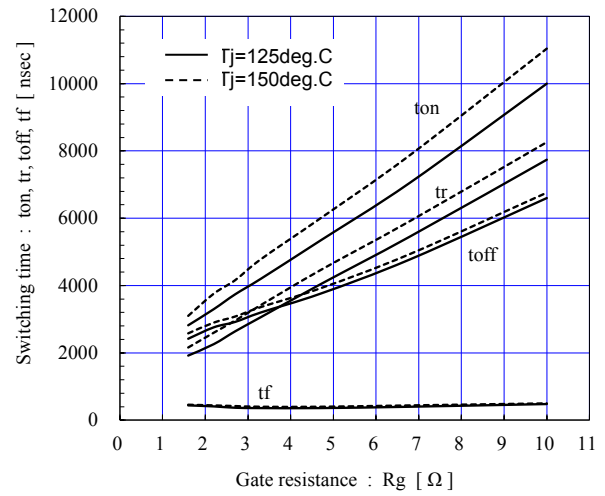
Switching time vs. Collector current (typ.)

$V_{CE}=1800V$, $V_{GE}=\pm 15V$, $R_g=\pm 1.6\Omega$, $L_m=160nH$



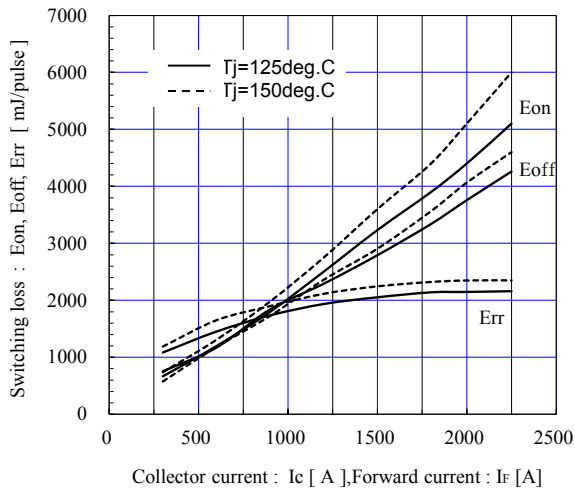
Switching time vs. Gate resistance (typ.)

$V_{CE}=1800V$, $I_c=1500A$, $V_{GE}=\pm 15V$, $L_m=160nH$



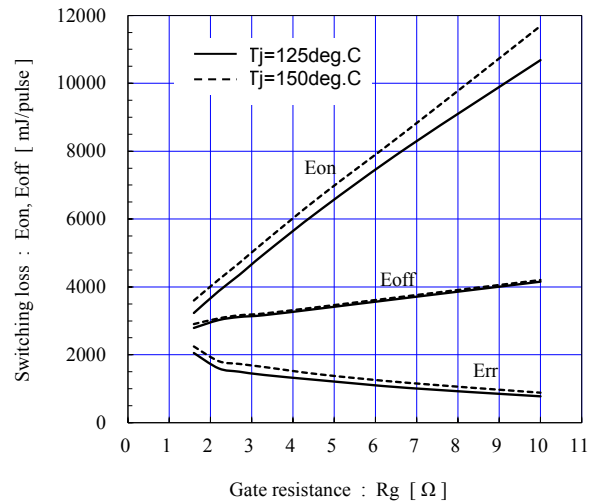
Switching loss vs. Collector current (typ.)

$V_{CE}=1800V$, $V_{GE}=\pm 15V$, $R_g=\pm 1.6\Omega$, $L_m=160nH$



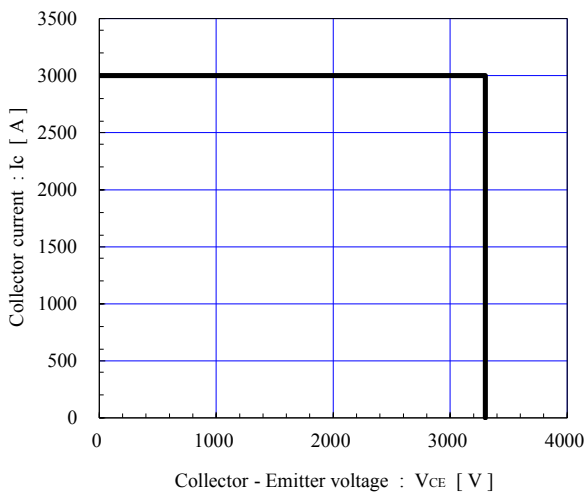
Switching loss vs. Gate resistance (typ.)

$V_{CE}=1800V$, $V_{GE}=\pm 15V$, $I_c=1500A$, $L_m=160nH$

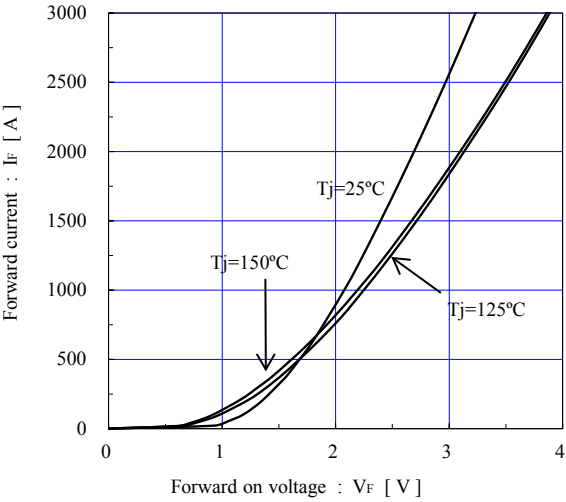


Reverse bias safe operating area (max.)

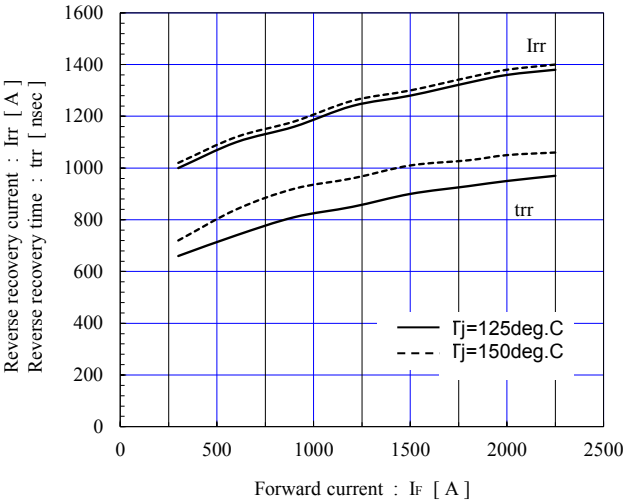
$\pm V_{GE}=15V$, $T_j=150^\circ C / \text{chip}$



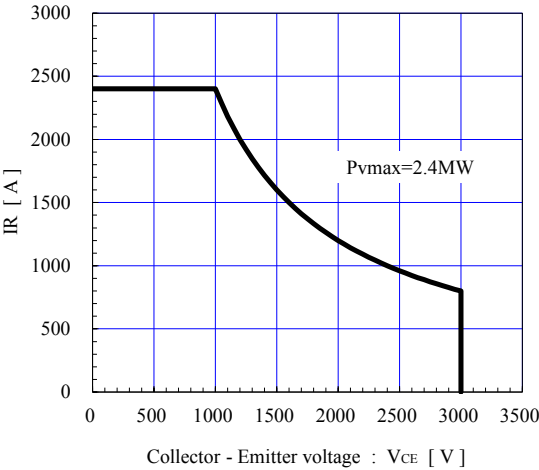
Forward current vs. Forward on voltage (typ.)
chip



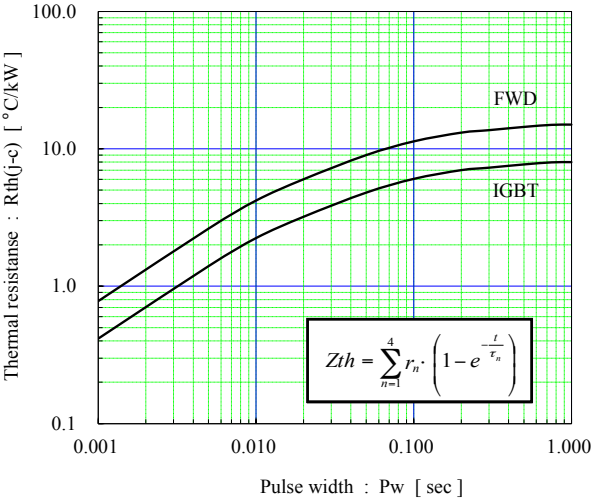
Reverse recovery characteristics (typ.)
 $V_{cc}=1800\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_g=\pm 1.6\Omega$, $L_m=160\text{nH}$



FWD safe operating area (max.)
 $T_j=150^{\circ}\text{C}$ / sense terminals

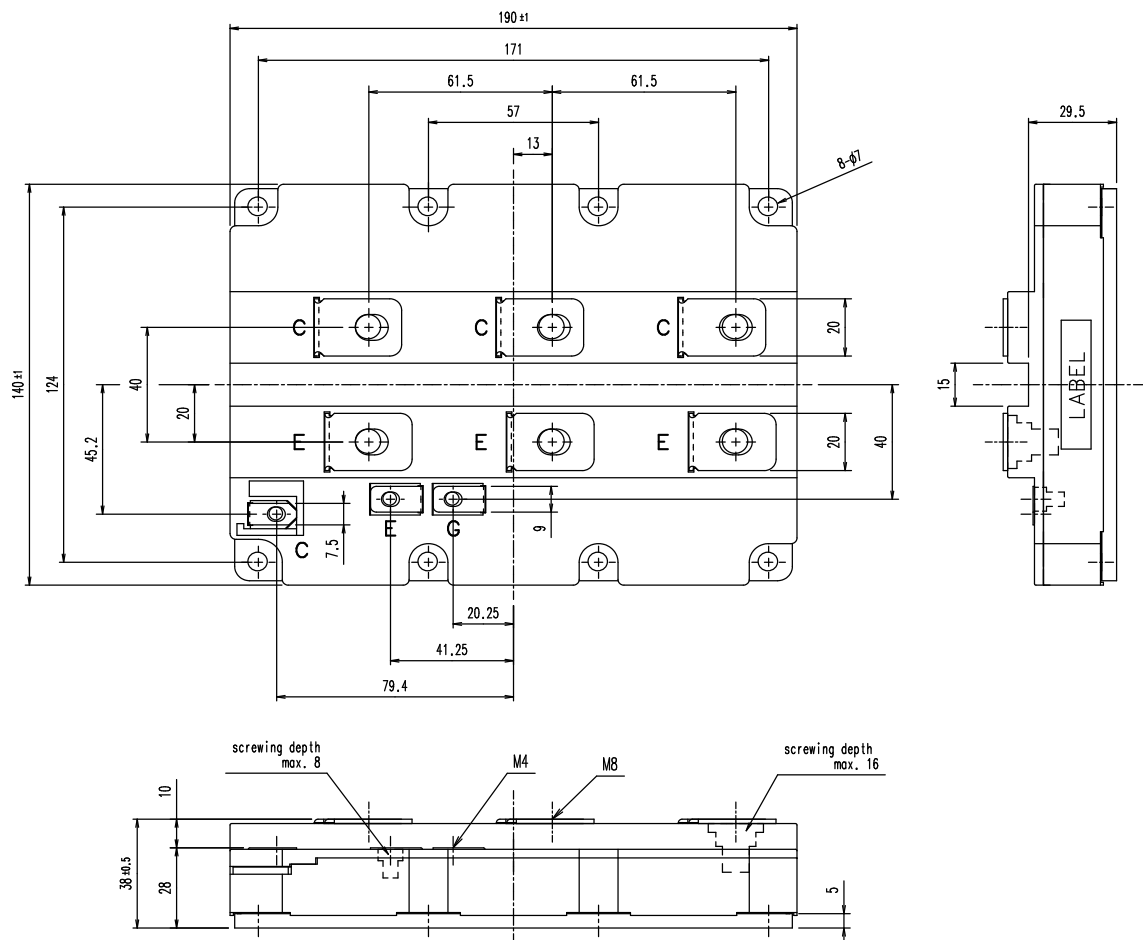


Transient thermal resistance (max.)

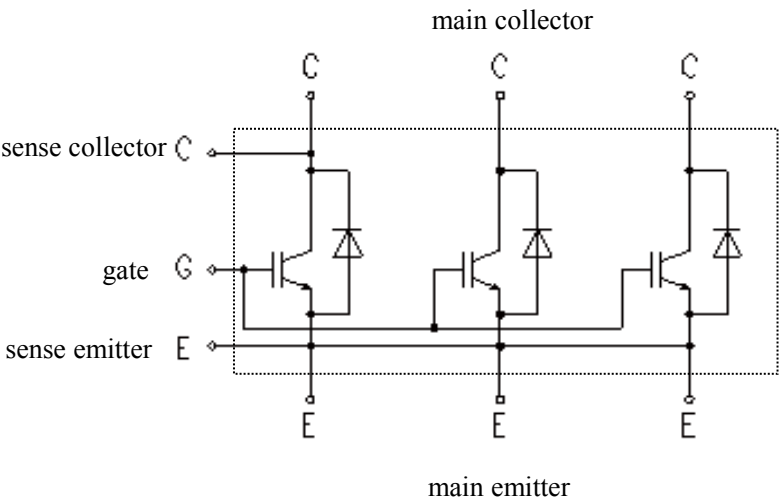


	IGBT	FWD
r1	0.00142	0.00266
r2	0.00206	0.00387
r3	0.00203	0.00381
r4	0.00248	0.00466
τ_1	0.0050	0.0050
τ_2	0.0404	0.0404
τ_3	0.0410	0.0410
τ_4	0.2271	0.2271

Outline Drawings, mm



Equivalent Circuit Schematic



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