

1MBI2400VC-120P

IGBT Modules

IGBT MODULE (V series) 1200V / 2400A / 1 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 Tc=25°C unless otherwise specified)

Items	Symbols	Conditions	Maximum ratings	Units	
Collector-Emitter voltage	V_{CES}		1200	V	
Gate-Emitter voltage	V_{GES}		±20	V	
Collector current	I_c	Continuous	$T_c=25^\circ\text{C}$	3600	A
			$T_c=100^\circ\text{C}$	2400	
	I_{cp}	1ms	4800		
	$-I_c$		2400		
	$-I_{c\ pulse}$	1ms	4800		
Collector power dissipation	P_c	1 device	13630	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	Nm	
	Main Terminals	M8	10		
	Sense Terminals	M4	2.5		

(*1) All terminals should be connected together when isolation test will be done.

(*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			Units	
			min.	typ.	max.		
Zero gate voltage collector current	I _{CEs}	V _{GE} = 0V, V _{CE} = 1200V	-	-	1.0	mA	
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V	-	-	3200	nA	
Gate-Emitter threshold voltage	V _{GE(th)}	V _{CE} = 20V, I _c = 2400mA	6.0	6.5	7.0	V	
Collector-Emitter saturation voltage	V _{CE(sat)} (main terminal)	V _{GE} = 15V I _c = 2400A	T _j = 25°C	-	2.02	2.31	V
			T _j = 125°C	-	2.32	-	
			T _j = 150°C	-	2.42	-	
	V _{CE(sat)} (chip)		T _j = 25°C	-	1.70	1.95	
			T _j = 125°C	-	2.00	-	
			T _j = 150°C	-	2.10	-	
Internal gate resistance	Int R _g		-	0.94	-	Ω	
Input capacitance	C _{ies}	V _{CE} = 10V, V _{GE} = 0V, f = 1MHz	-	208	-	nF	
Turn-on	t _{on}	V _{CC} = 600V, I _c = 2400A	-	3.15	-	μs	
	t _r	L _m = 56nH, V _{GE} = ±15V, T _j = 125°C	-	0.97	-		
Turn-off	t _{off}	R _{gon} = 1.8 Ω	-	1.93	-		
	t _f	R _{goff} = 0.22 Ω	-	0.24	-		
Forward on voltage	V _F (main terminal)	V _{GE} = 0V I _F = 2400A	T _j = 25°C	-	2.02	2.31	V
			T _j = 125°C	-	2.17	-	
			T _j = 150°C	-	2.12	-	
	V _F (chip)		T _j = 25°C	-	1.70	1.95	
			T _j = 125°C	-	1.85	-	
			T _j = 150°C	-	1.80	-	
Reverse recovery time	t _{rr}	I _F = 2400A, T _j = 125°C	-	0.44	-	μs	
Lead resistance, terminal-chip	R _{lead}		-	0.134	-	mΩ	

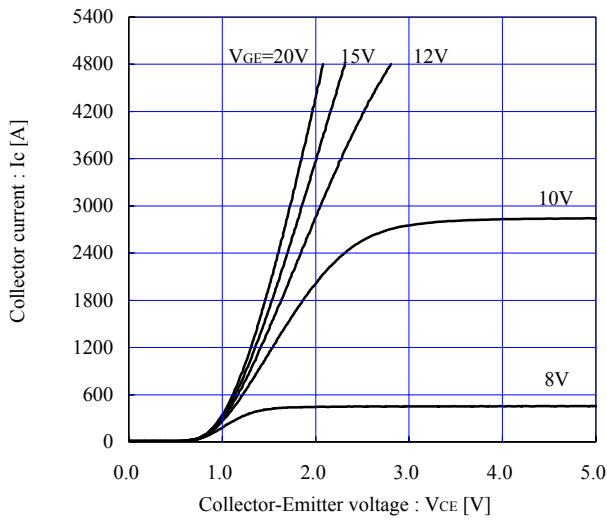
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance	R _{th(j-c)}	IGBT	-	-	0.0110	°C/W
		FWD	-	-	0.0180	
Contact Thermal resistance	R _{th(c-f)}	with Thermal Compound(*)	-	0.0060	-	

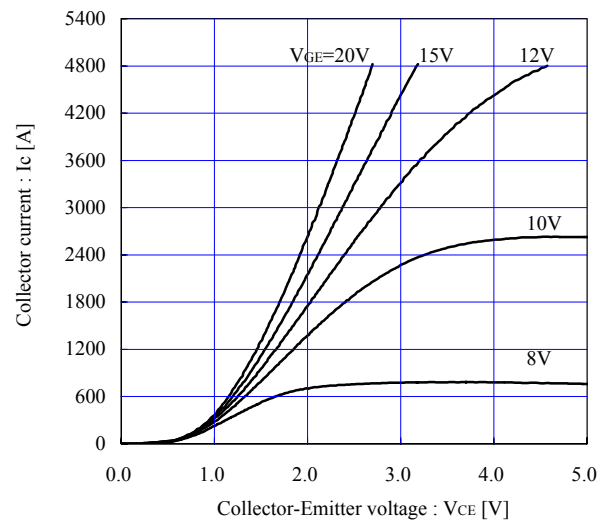
* This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

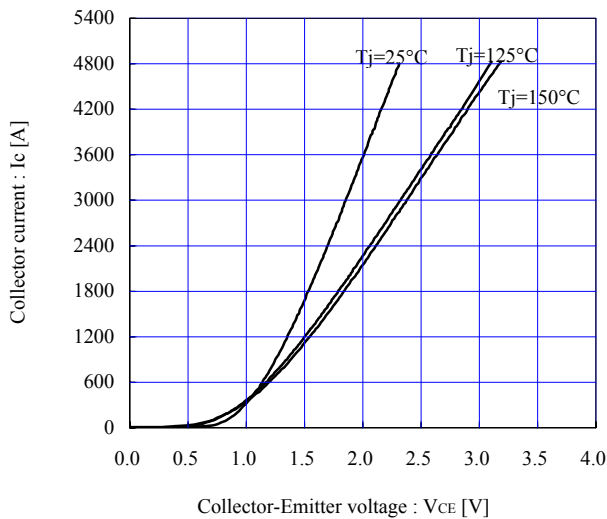
Collector current vs. Collector-Emmitter voltage (typ.)
Tj=25°C, chip



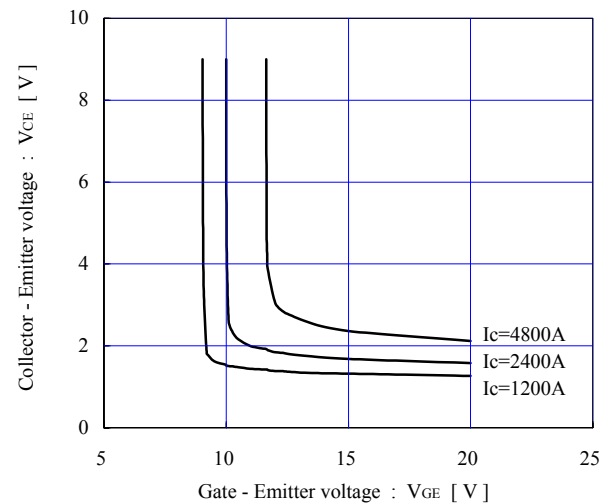
Collector current vs. Collector-Emmitter voltage (typ.)
Tj= 150°C, chip



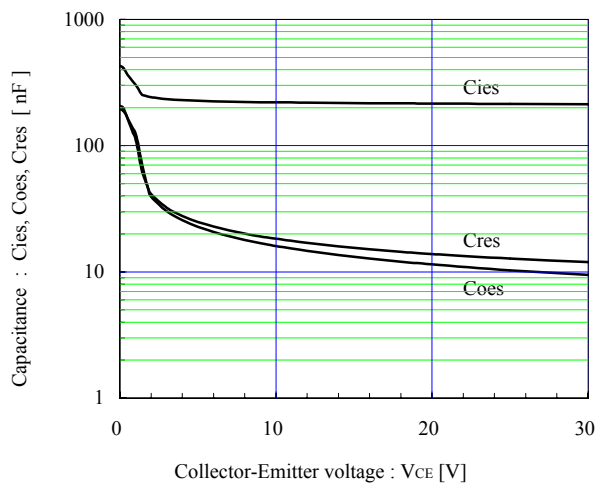
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
VGE=+15V, chip



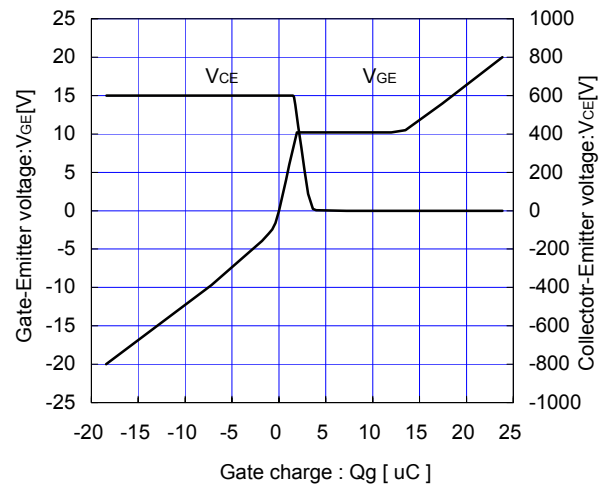
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
Tj=25°C, chip



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

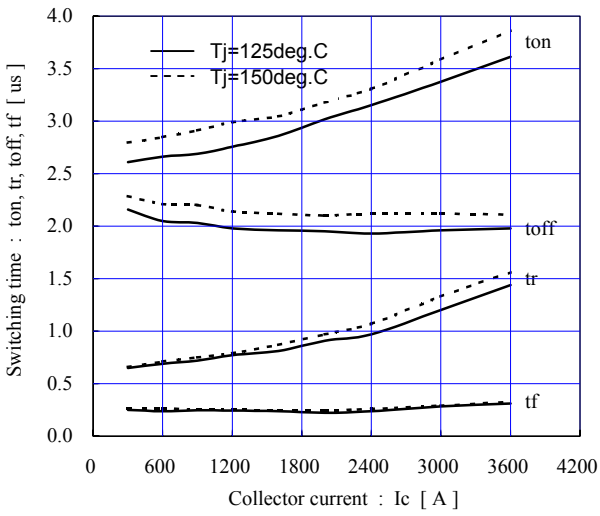


Dynamic Gate charge (typ.)
Tj= 25°C



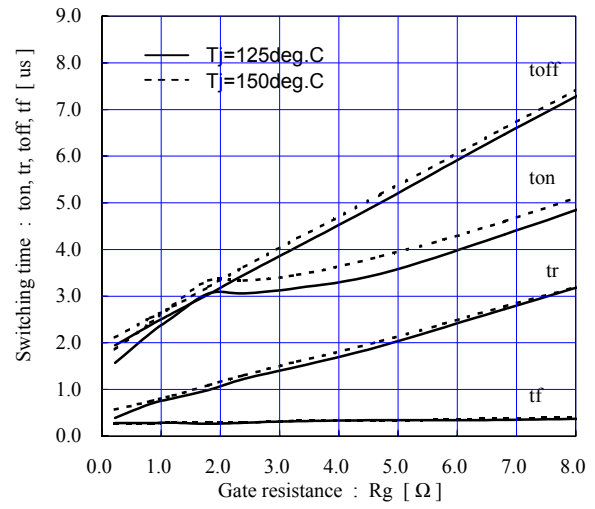
Switching time vs. Collector current (typ.)

$V_{CC}=600V, V_{GE}=\pm 15V, R_{gon}=1.8\Omega, R_{goff}=0.22\Omega$



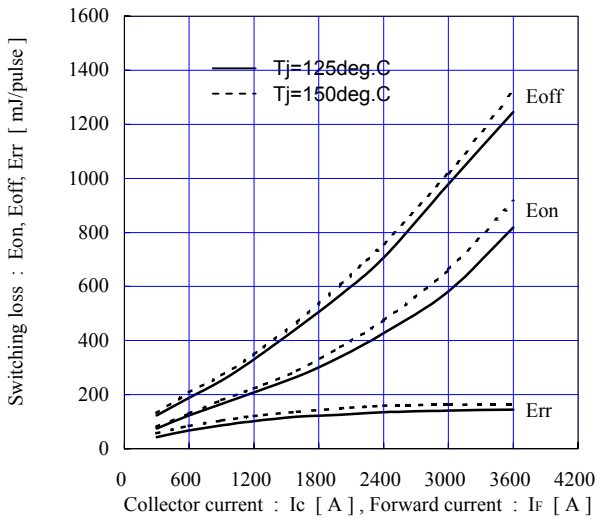
Switching time vs. Gate resistance (typ.)

$V_{CC}=600V, I_c=2400A, V_{GE}=\pm 15V$



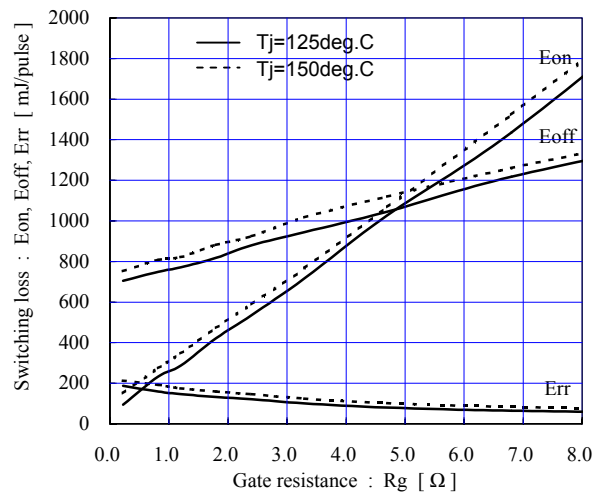
Switching loss vs. Collector current (typ.)

$V_{CC}=600V, V_{GE}=\pm 15V, R_{gon}=1.8\Omega, R_{goff}=0.22\Omega$



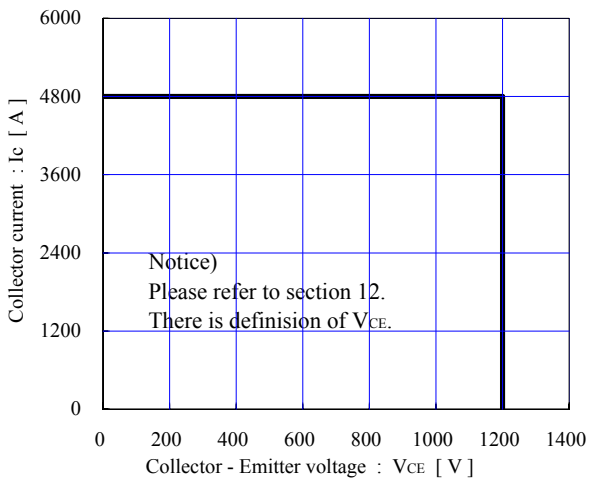
Switching loss vs. Gate resistance (typ.)

$V_{CC}=600V, I_c=2400A, V_{GE}=\pm 15V$

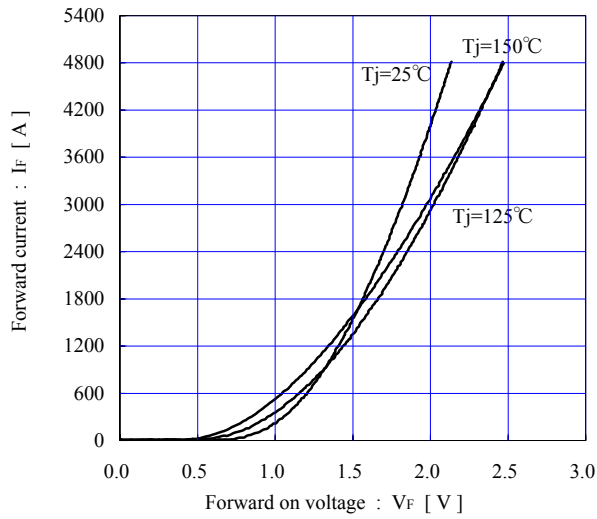


Reverse bias safe operating area (max.)

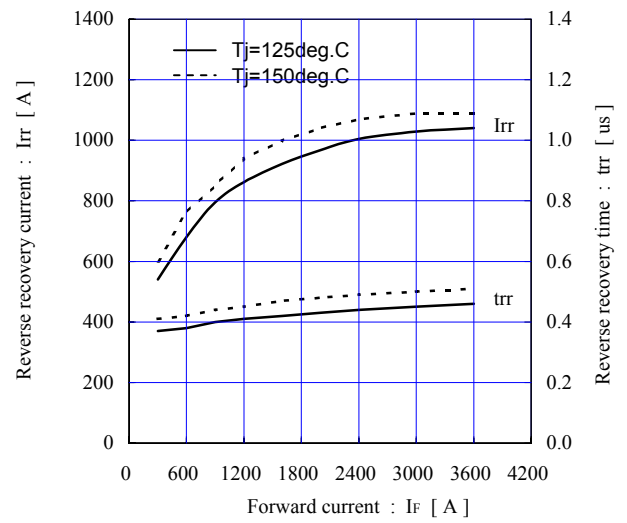
$\pm V_{GE}=15V, T_j = 150^\circ C$



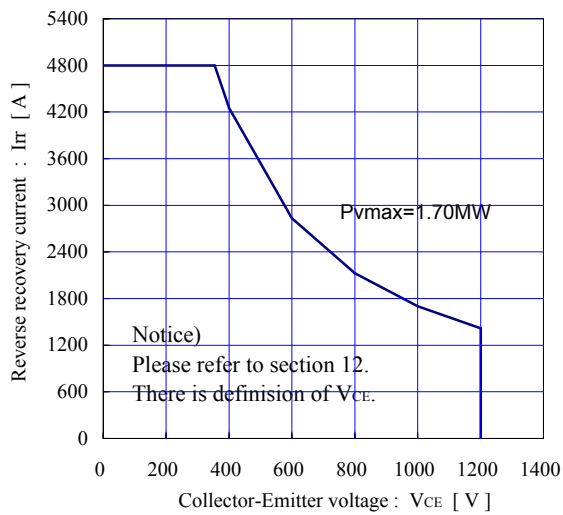
Forward current vs. Forward on voltage (typ.)
chip



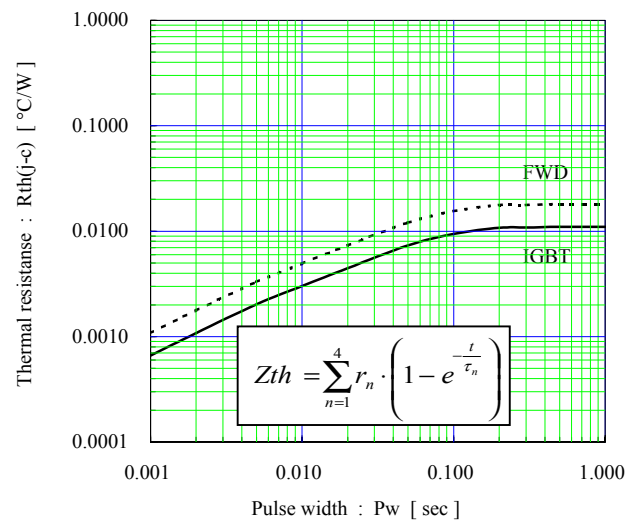
Reverse recovery characteristics (typ.)
V_{CE}=600V, V_{GE}=±15V, R_{gon}=1.8 Ω



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

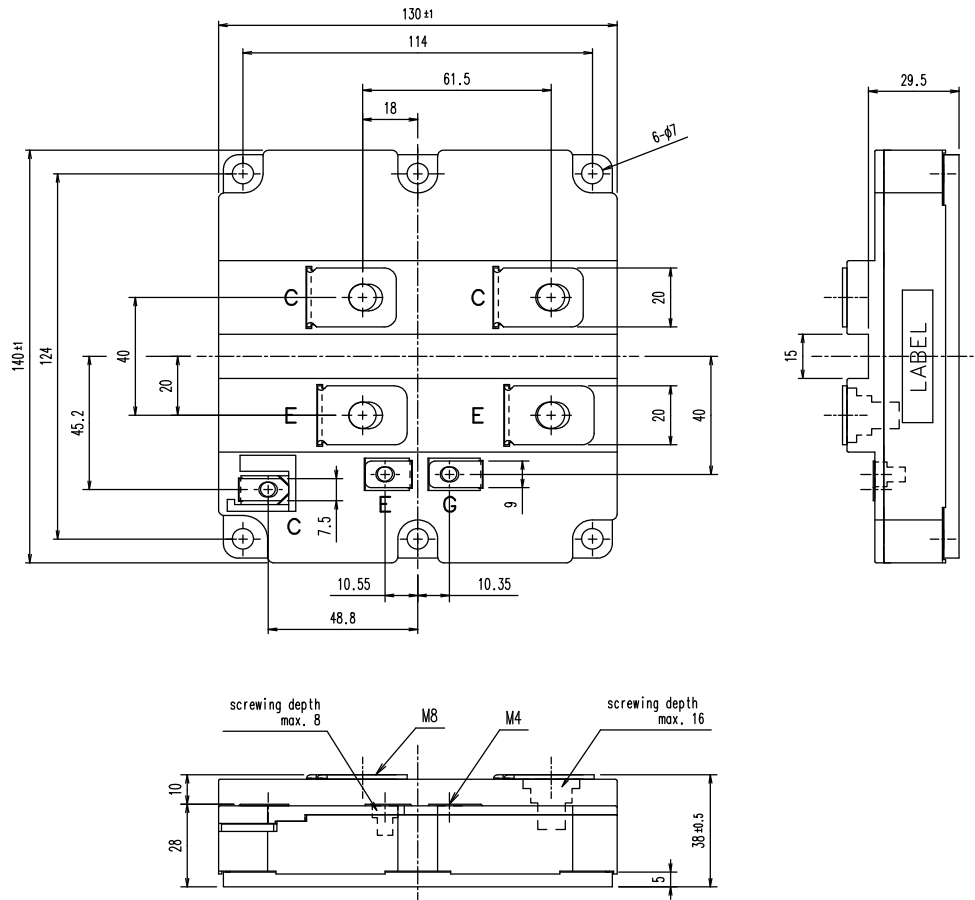


Transient thermal resistance (max.)

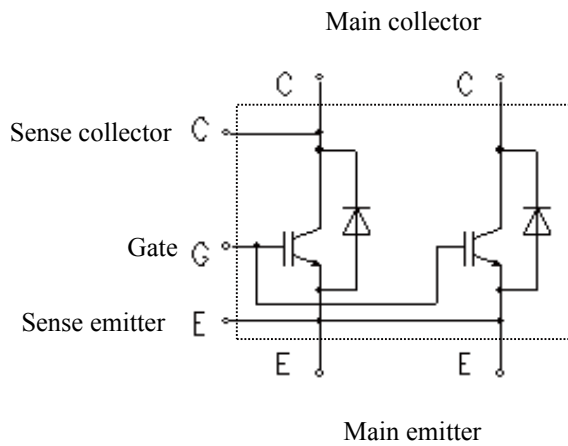


	IGBT	FWD
r1	0.00124	0.00200
r2	0.00424	0.00695
r3	0.00304	0.00498
r4	0.00247	0.00407
τ1	0.0024	0.0024
τ2	0.0359	0.0356
τ3	0.0628	0.0637
τ4	0.0742	0.0734

■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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