

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 T_c=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°C 3600	A
	I _{cp}	1ms	T _c =100°C 2400	
	-I _c		4800	
	-I _c pulse	1ms	2400	
Collector power dissipation	P _C	1 device	4800	W
Junction temperature	T _j		13630	°C
Operating junction temperature (under switching conditions)	T _{jop}		175	
Storage temperature	T _{stg}		150	
Isolation voltage	V _{iso}	AC : 1min.	-40 ~ +150	VAC
Screw torque *2	Mounting	M6	4000	Nm
	Main Terminals	M8	5.75	
	Sense Terminals	M4	10	
			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 L _m = 56nH, V _{GE} =±15V ,T _J =125°C		-	3.15	-	μs
	t _r			-	0.97	-	
Turn-off	t _{off}	R _{gon} = 1.8 Ω R _{goff} = 0.22 Ω		-	1.93	-	
	t _f			-	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

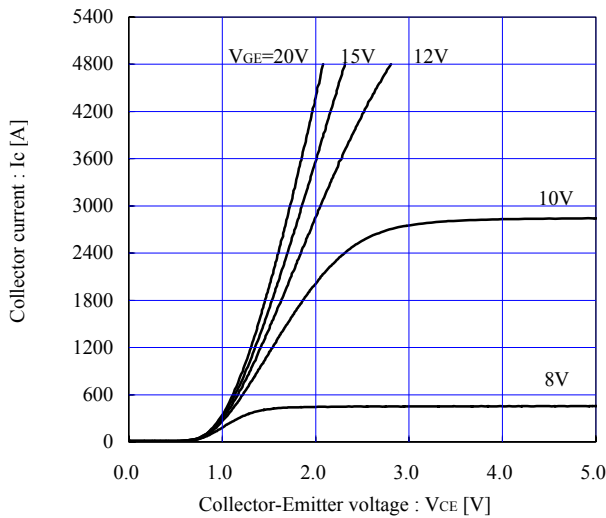
● Thermal resistance characteristics

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

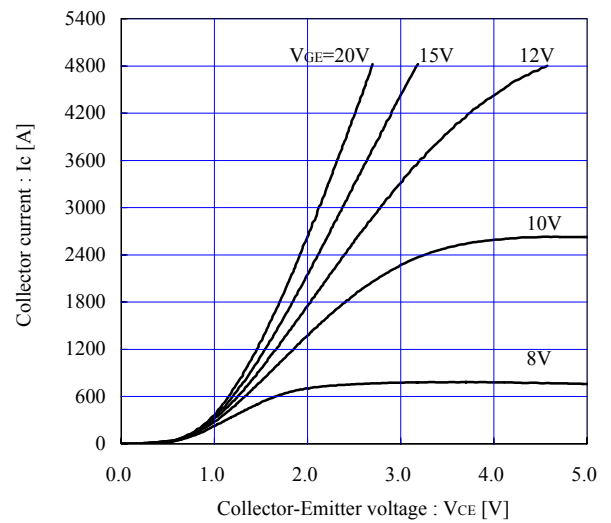
* This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

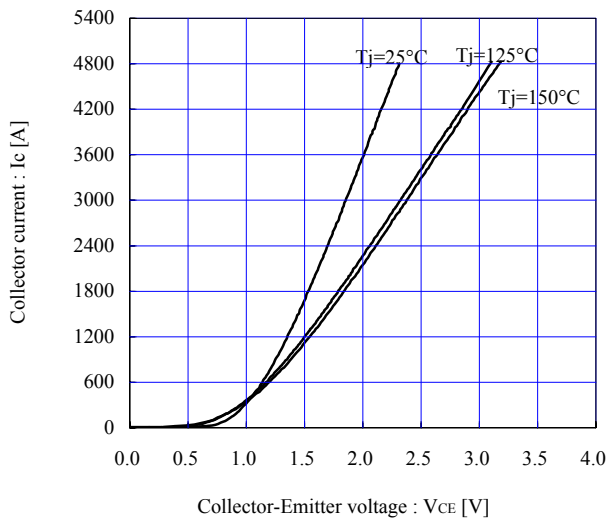
Collector current vs. Collector-Emmitter voltage (typ.)

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

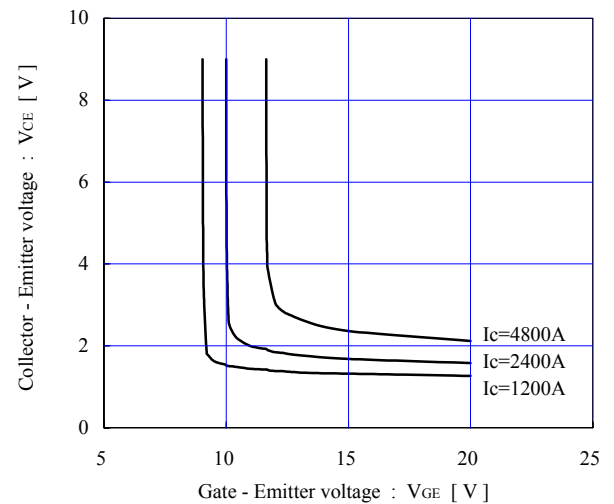
Collector current vs. Collector-Emmitter voltage (typ.)

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

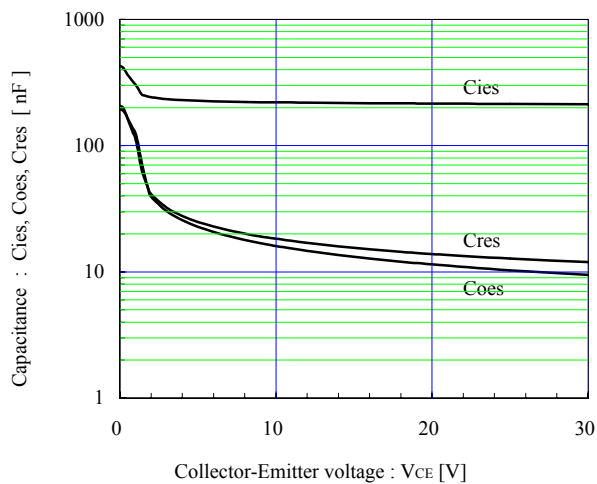
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)

 $V_{GE} = +15\text{V}$, chip

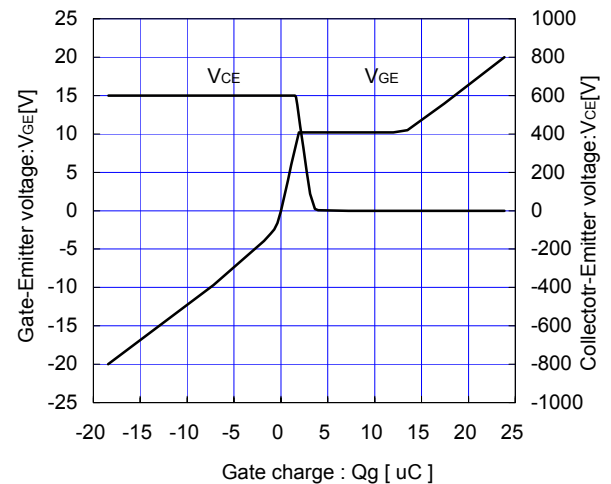
Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)

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

Capacitance vs. Collector-Emmitter voltage (typ.)

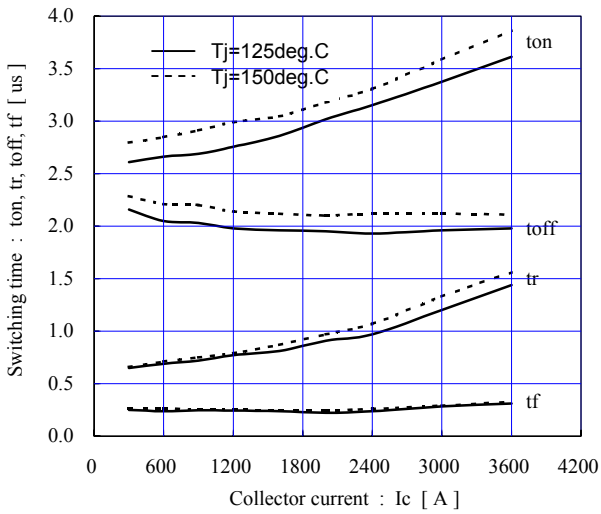
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$ 

Dynamic Gate charge (typ.)

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

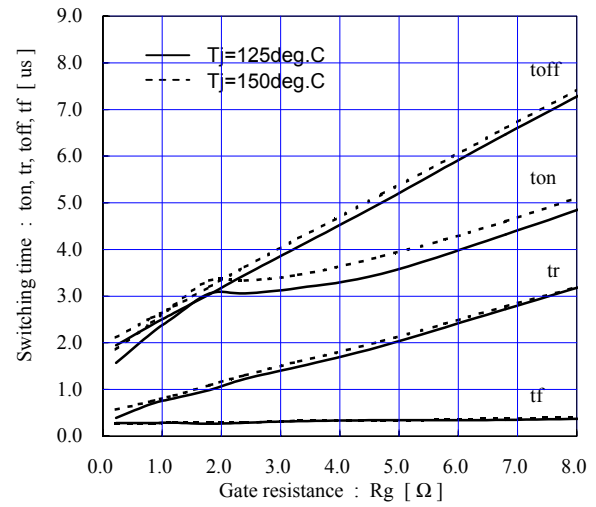
Switching time vs. Collector current (typ.)

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



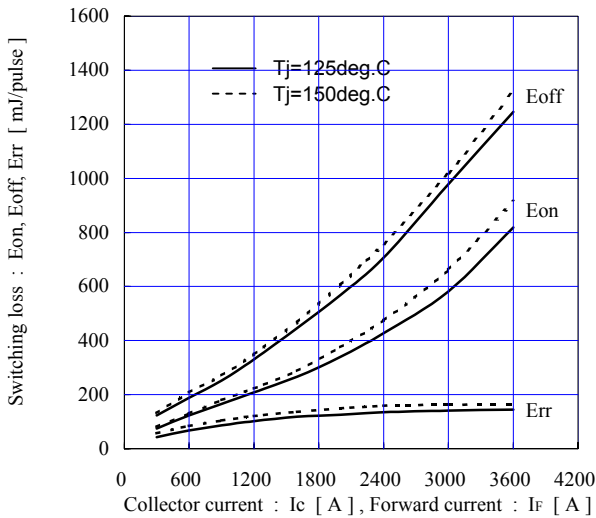
Switching time vs. Gate resistance (typ.)

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



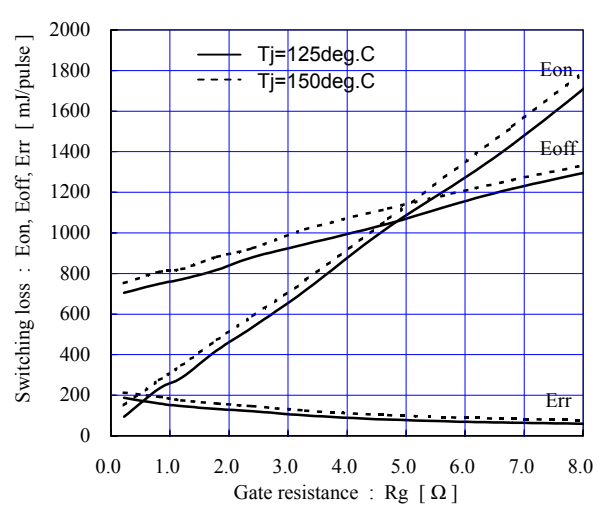
Switching loss vs. Collector current (typ.)

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



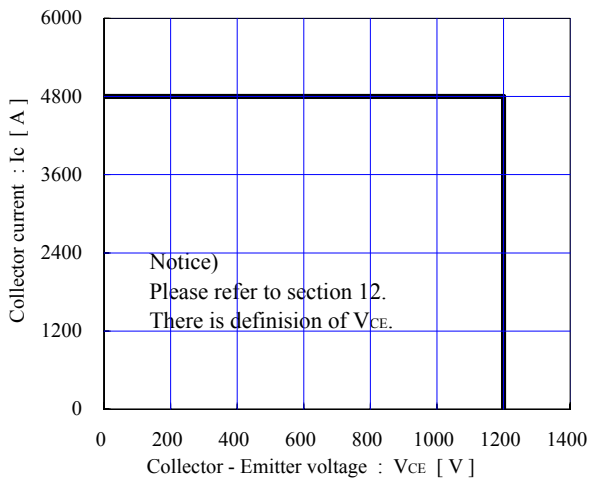
Switching loss vs. Gate resistance (typ.)

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

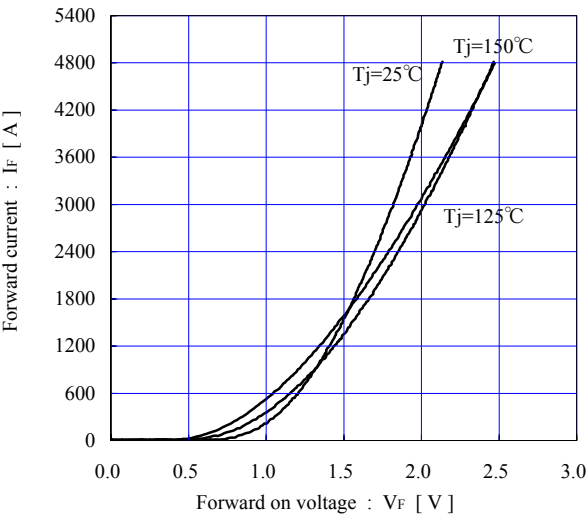


Reverse bias safe operating area (max.)

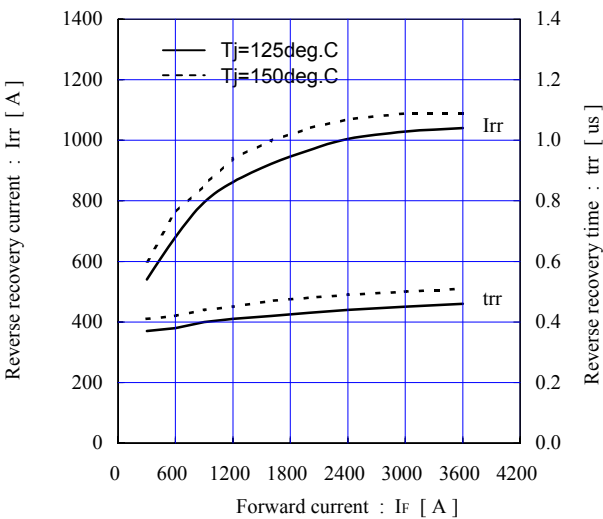
$\pm V_{GE}=15V$, $T_j = 150^\circ C$



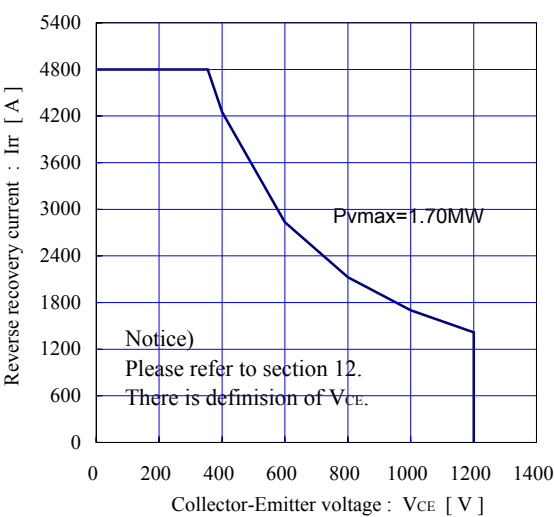
Forward current vs. Forward on voltage (typ.)
chip



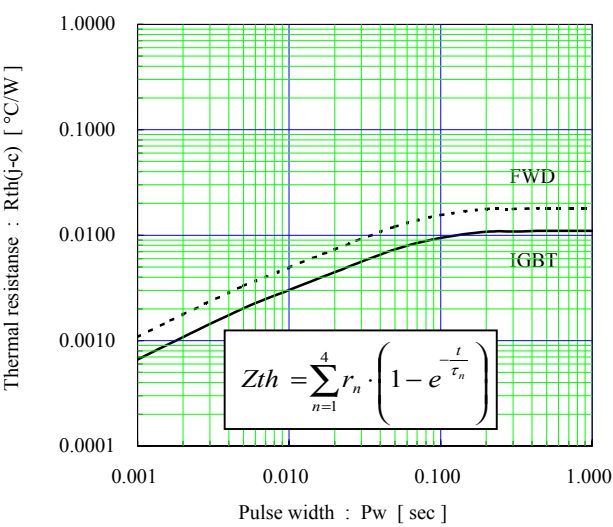
Reverse recovery characteristics (typ.)
V_{CC}=600V, V_{GE}=±15V, R_{gon}=1.8 Ω



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

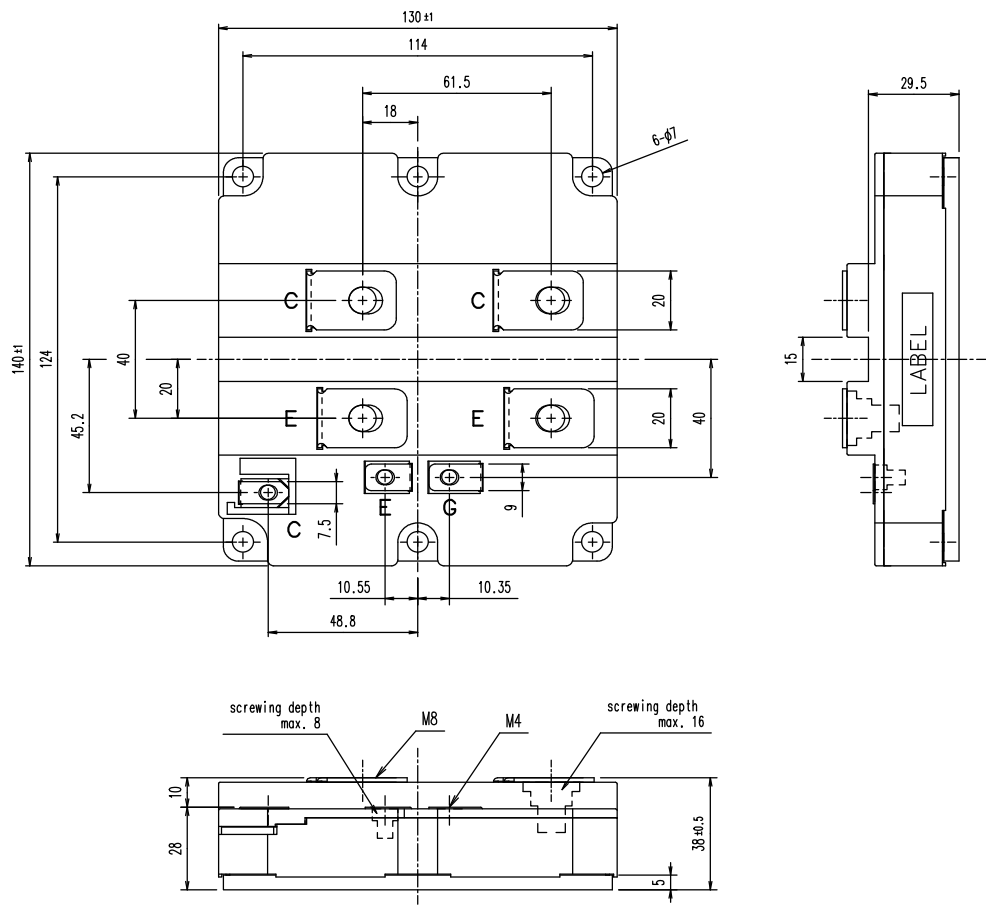


Transient thermal resistance (max.)

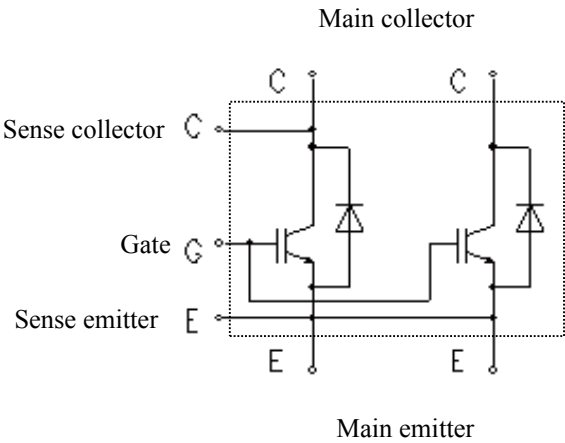


	IGBT	FWD
r1	0.00124	0.00200
r2	0.00424	0.00695
r3	0.00304	0.00498
r4	0.00247	0.00407
τ1	0.0024	0.0024
τ2	0.0359	0.0356
τ3	0.0628	0.0637
τ4	0.0742	0.0734

Outline Drawings, mm



Equivalent Circuit Schematic



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