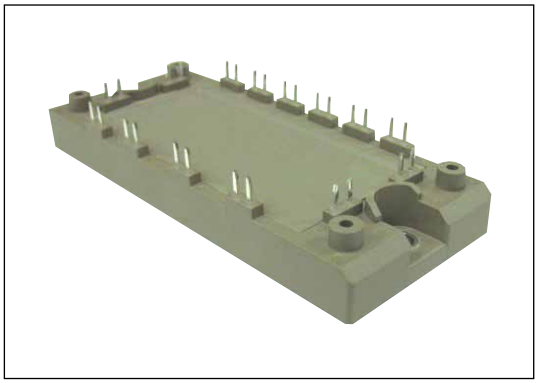
6MBI50VA-060-50

IGBT Modules

IGBT MODULE (V series)
600V / 50A / 6 in one package

Features

Compact Package
P.C.Board Mount
Low V_{CE} (sat)



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
Inverter	Collector-Emitter voltage	V_{CES}			600	V
	Gate-Emitter voltage	V_{GES}			±20	V
	Collector current	I_C	Continuous	T_C=80°C	50	A
		$I_{C\ pulse}$	1ms	T_C=80°C	100	
		$-I_C$			50	
		$-I_{C\ pulse}$	1ms		100	
	Collector power dissipation	P_C	1 device		200	W
Junction temperature		T_j			175	°C
Operating junciton temperature (under switching conditions)		T_{jop}			150	
Case temperature		T_C			125	
Storage temperature		T_{stg}			-40 ~ +125	
Isolation voltage	Between terminal and copper base (*1) Between thermistor and others (*2)	V_{iso}	AC : 1min.		2500	VAC
Screw torque	Mounting (*3)	-	M5		3.5	N m

Note *1: All terminals should be connected together during the test.
Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.
Note *3: Recommendable value : 2.5-3.5 Nm (M5)

● Electrical characteristics (at T_j= 25°C unless otherwise specified)

	Items	Symbols	Conditions		Characteristics min.	Characteristics typ.	Characteristics max.	Units
Inverter	Zero gate voltage collector current	I_{CES}	V_{GE} = 0V, V_{CE} = 600V		-	-	1.0	mA
	Gate-Emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = ±20V		-	-	200	nA
	Gate-Emitter threshold voltage	$V_{GE\ (th)}$	V_{CE} = 20V, I_C = 50mA		6.2	6.7	7.2	V
	Collector-Emitter saturation voltage	$V_{CE\ (sat)}$ (terminal)	V_{GE} = 15V, I_C = 50A	Tj=25°C	-	1.90	2.35	V
				Tj=125°C	-	2.20	-	
				Tj=150°C	-	2.40	-	
		$V_{CE\ (sat)}$ (chip)	V_{GE} = 15V, I_C = 50A	Tj=25°C	-	1.60	2.05	
				Tj=125°C	-	1.90	-	
				Tj=150°C	-	2.10	-	
	Internal gate resistance	$R_{G\ (int)}$	-			0	-	Ω
	Input capacitance	C_{ies}	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	3.3	-	nF
	Turn-on time	t_{on}	V_{CC} = 300V, I_C = 50A, V_{GE} = +15 / -15V, R_G = 43Ω		-	0.36	1.20	μs
		t_r			-	0.25	0.60	
		$t_{r\ (i)}$			-	0.07	-	
	Turn-off time	t_{off}			-	0.52	1.20	
		t_f			-	0.03	0.45	
	Forward on voltage	V_F (terminal)	I_F = 50A	Tj=25°C	-	1.90	2.35	V
				Tj=125°C	-	1.80	-	
				Tj=150°C	-	1.75	-	
		V_F (chip)	I_F = 50A	Tj=25°C	-	1.60	2.05	
				Tj=125°C	-	1.50	-	
				Tj=150°C	-	1.45	-	
	Reverse recovery time	t_{rr}	I_F = 50A		-	-	0.35	μs
Thermistor	Resistance	R	T = 25°C		-	5000	-	Ω
			T = 100°C		465	495	520	
	B value	B	T = 25 / 50°C		3305	3375	3450	K

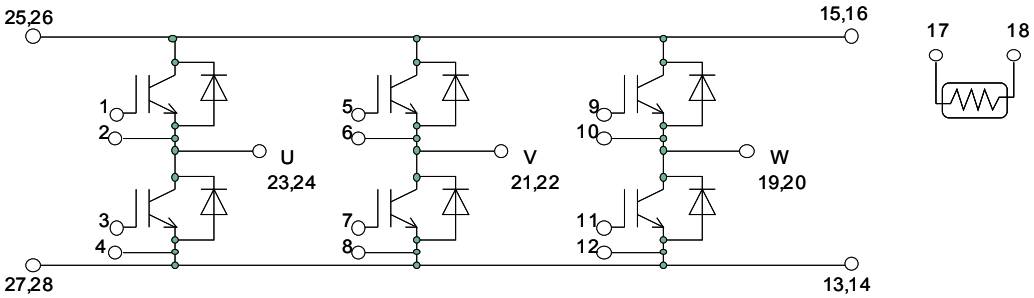
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics min.	Characteristics typ.	Characteristics max.	Units
Thermal resistance (1device)	$R_{th(j-c)}$	Inverter IGBT	-	-	0.71	°C/W
		Inverter FWD	-	-	1.15	
Contact thermal resistance (1device) (*4)	$R_{th(c-f)}$	with Thermal Compound	-	0.05	-	

Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

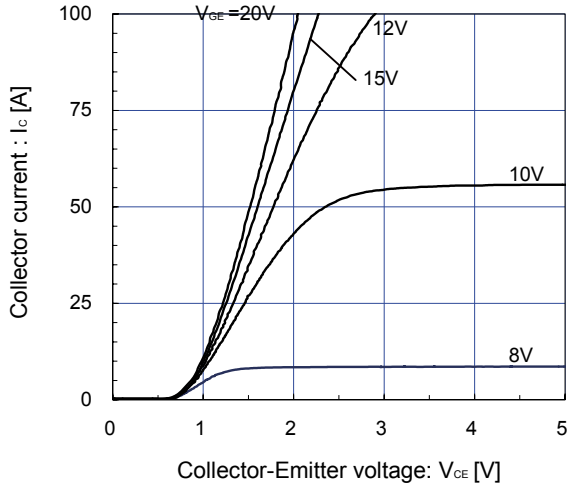
■ Equivalent Circuit Schematic

[Inverter] [Thermistor]

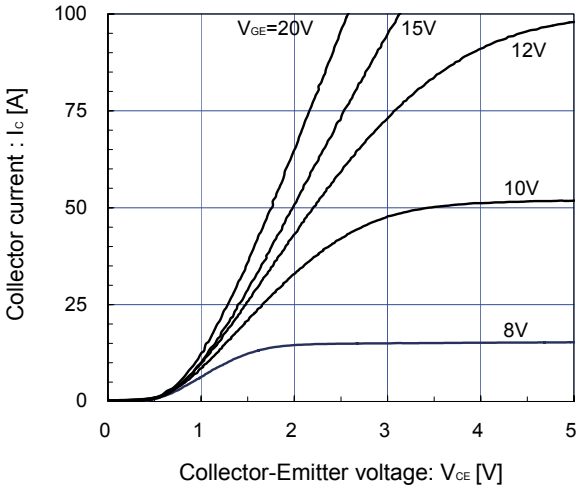


■ Characteristics (Representative)

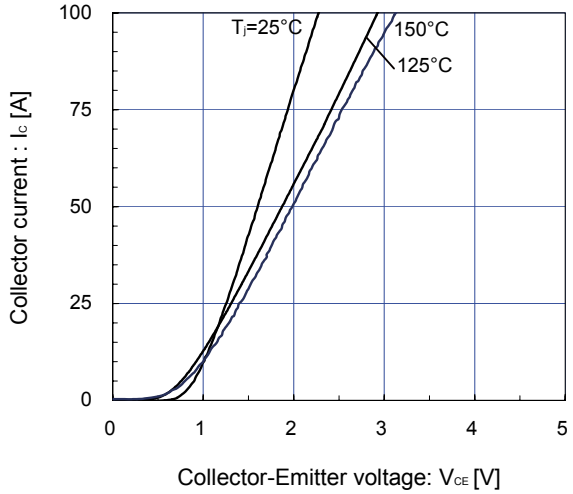
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 25°C / chip



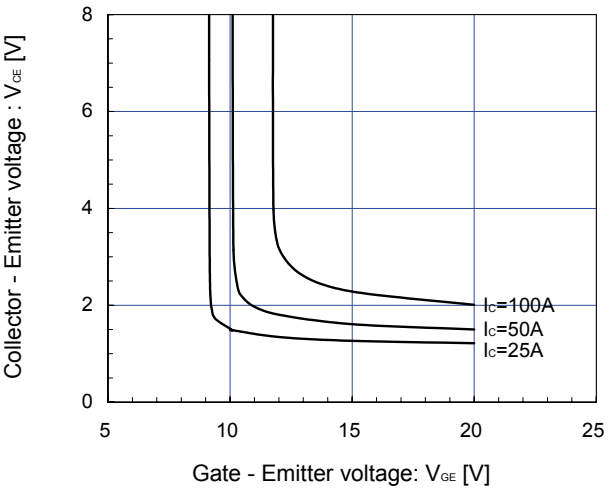
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
T_j= 150°C / chip



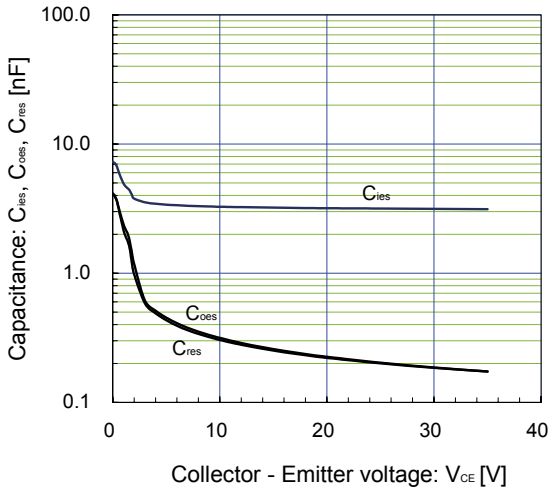
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
V_{GE}=15V / chip



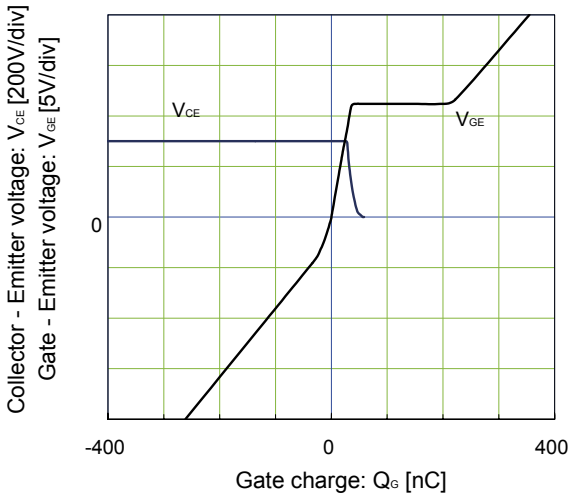
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
T_j= 25°C / chip



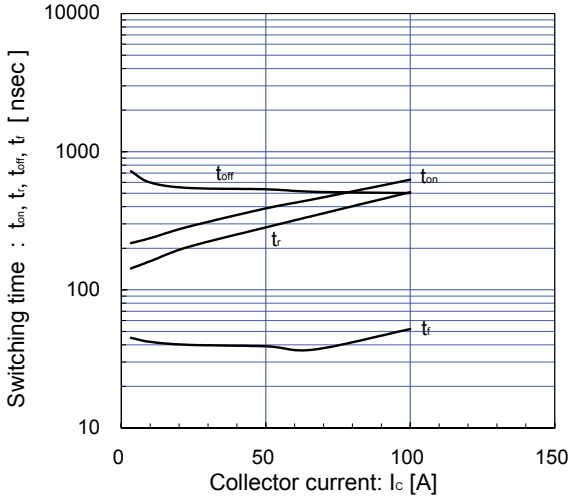
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
V_{GE}=0V, f= 1MHz, T_j= 25°C



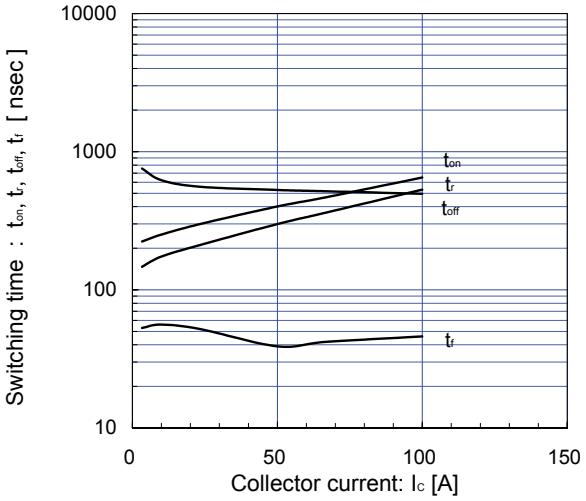
[Inverter]
Dynamic gate charge (typ.)
V_{CC}=300V, I_C=50A, T_j= 25°C



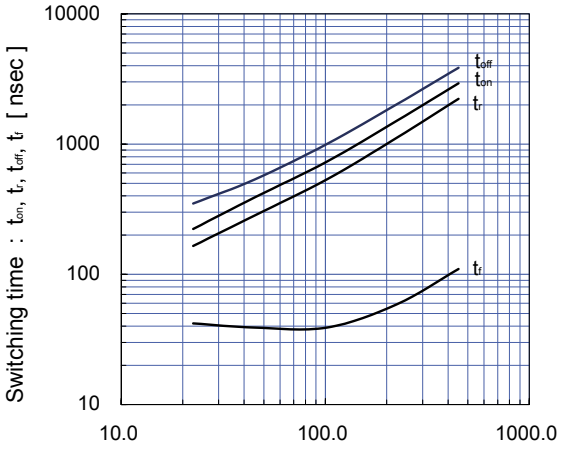
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=43Ω, T_j= 125°C



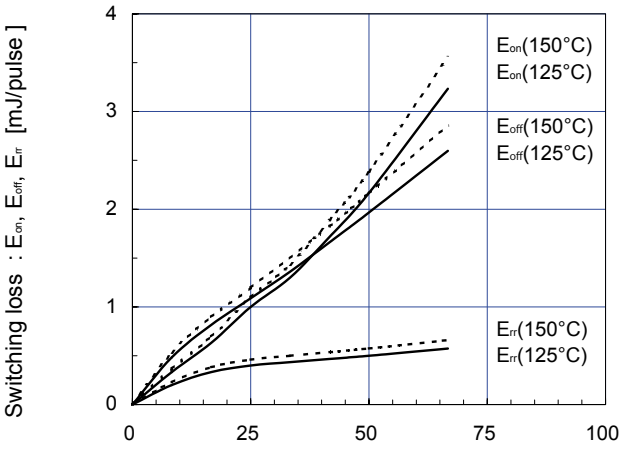
[Inverter]
Switching time vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=43Ω, T_j= 150°C



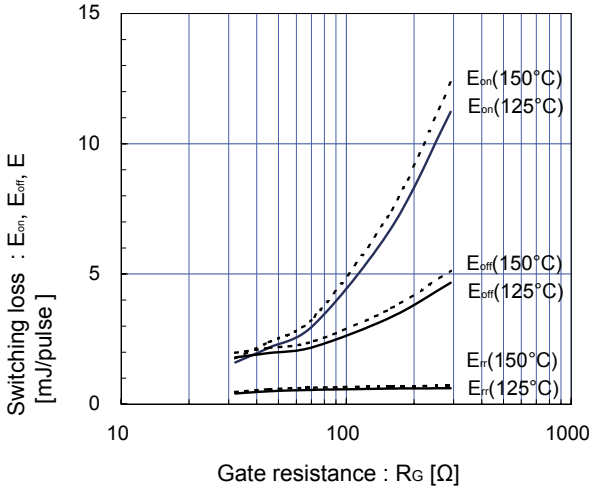
[Inverter]
Switching time vs. gate resistance (typ.)
V_{CC}=300V, I_C=50A, V_{GE}=±15V, T_j= 125°C



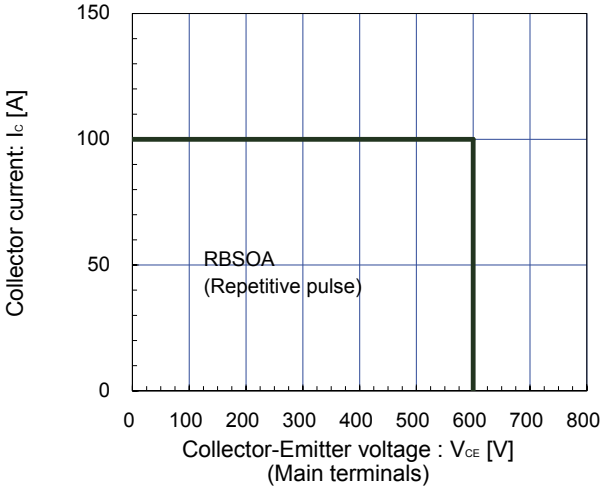
[Inverter]
Switching loss vs. Collector current (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=43Ω



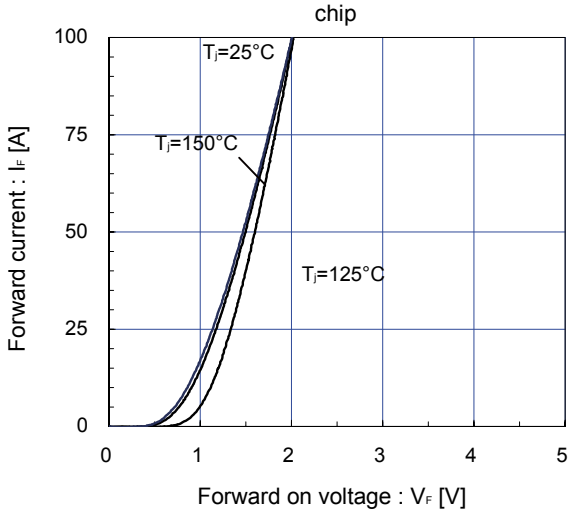
[Inverter]
Switching loss vs. gate resistance (typ.)
V_{CC}=300V, I_C=50A, V_{GE}=±15V



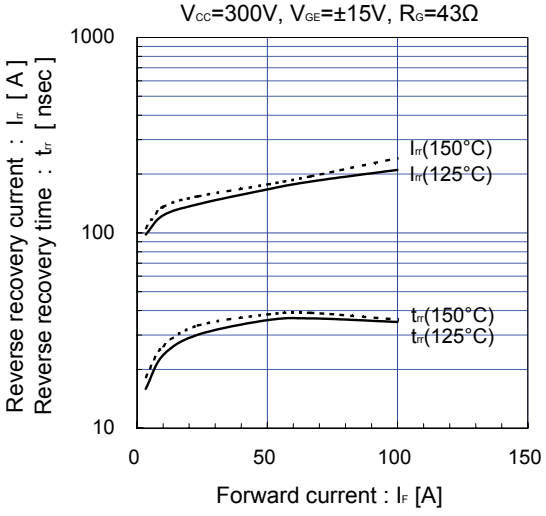
[Inverter]
Reverse bias safe operating area (max.)
+V_{GE}=15V,-V_{GE} <= 15V, R_G >= 43Ω ,Tj <= 150°C



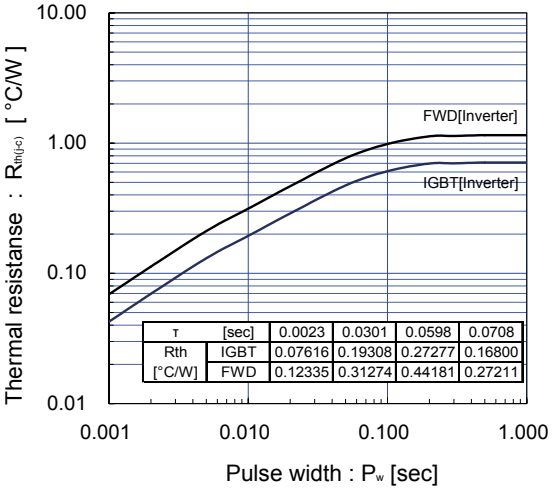
[Inverter]
Forward current vs. forward on voltage (typ.)
chip



[Inverter]
Reverse recovery characteristics (typ.)
V_{CC}=300V, V_{GE}=±15V, R_G=43Ω

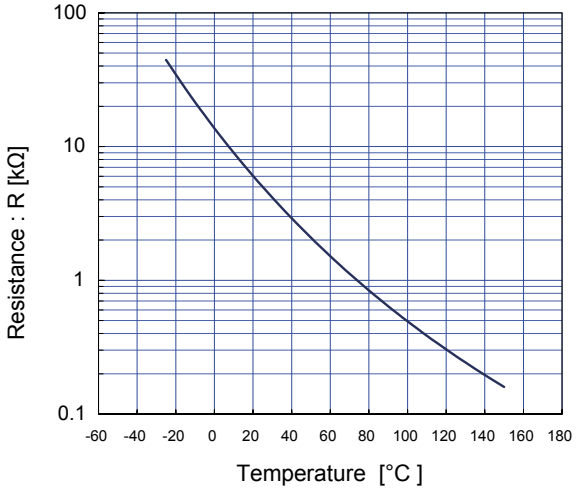


Transient thermal resistance (max.)

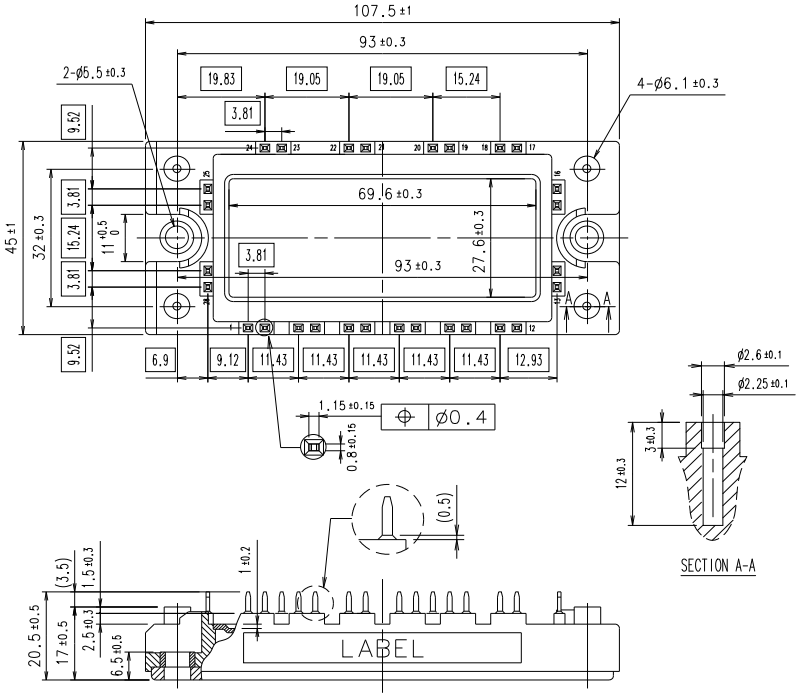


τ	[sec]	0.0023	0.0301	0.0598	0.0708
Rth	IGBT	0.07616	0.19308	0.27277	0.16800
[°C/W]	FWD	0.12335	0.31274	0.44181	0.27211

[Thermistor]
Temperature characteristic (typ.)



■ Outline Drawings, mm



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- Safety devices
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