

1MBI900V-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 900A / 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	Tc=100°C 900	A
	I_c pulse	1ms	1080	
	- I_c		1800	
	- I_c pulse	1ms	900	
Collector power dissipation	P_c	1 device	1800	W
Junction temperature	T_j		4280	°C
Operating junction temperature (under switching conditions)	T_{jop}		175	
Case temperature	T_c		150	
Storage temperature	T_{stg}		125	
Isolation voltage	Between terminal and copper base (*1)	AC : 1min.	-40~+125	VAC
Screw torque	Mounting (*2)		2500	Nm
	Terminals (*3)		6.0	
			2.0	
			5.0	

Note *1: All terminals should be connected together during the test.

Note *2: Recommendable Value : 3.0-6.0 Nm (M5, M6)

Note *3: Recommendable Value : 1.1-2.0 Nm (M4)

Recommendable Value : 2.5-5.0 Nm (M6)

● Electrical characteristics (at Tj= 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		-	-	2.0	mA
Gate-Emitter leakage current	I _{GES}	V _{CE} = 0V, V _{GE} = ±20V		-	-	1600	nA
Gate-Emitter threshold voltage	V _{GE (th)}	V _{CE} = 20V, I _C = 900mA		6.0	6.5	7.0	V
Collector-Emitter saturation voltage	V _{CE (sat)} (terminal)	V _{GE} = 15V I _C = 900A	T _J =25°C	-	2.10	2.55	V
			T _J =125°C	-	2.35	-	
			T _J =150°C	-	2.40	-	
	V _{CE (sat)} (chip)		T _J =25°C	-	1.90	2.15	
			T _J =125°C	-	2.15	-	
			T _J =150°C	-	2.20	-	
Input capacitance	C _{ies}	V _{GE} = 0V, V _{CE} = 10V, f = 1MHz		-	72.8	-	nF
Turn-on time	t _{on}	V _{CC} = 600V, I _C = 900A V _{GE} = ±15V, R _G = 1.5/-0.9Ω T _J =150°C, L _s =30nH		-	0.75	-	μs
	t _r			-	0.32	-	
	t _{r(i)}			-	0.15	-	
Turn-off time	t _{off}			-	0.85	-	
	t _f			-	0.10	-	
Forward on voltage	V _F (terminal)	V _{GE} = 0V I _F = 900A	T _J =25°C	-	2.00	2.45	V
			T _J =125°C	-	2.15	-	
			T _J =150°C	-	2.10	-	
	V _F (chip)		T _J =25°C	-	1.70	2.15	
			T _J =125°C	-	1.85	-	
			T _J =150°C	-	1.80	-	
Reverse recovery time	t _{rr}	I _F = 900A		-	0.3	-	μs

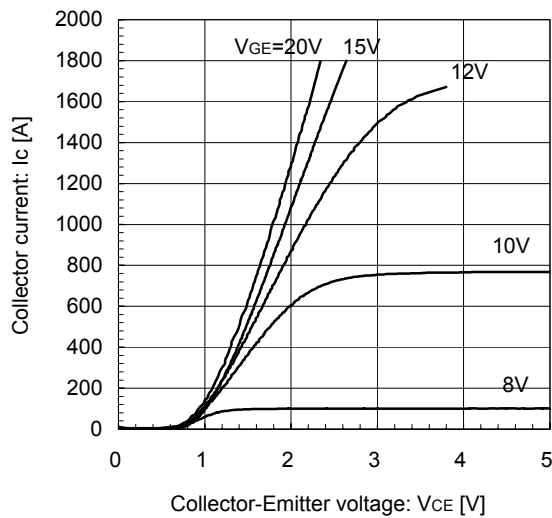
● Thermal resistance characteristics

Items	Symbols	Conditions	Characteristics			Units
			min.	typ.	max.	
Thermal resistance (1device)	Rth(j-c)	IGBT	-	-	0.035	°C/W
		FWD	-	-	0.060	
Contact thermal resistance (*4)	Rth(c-f)	with Thermal Compound	-	0.0063	-	

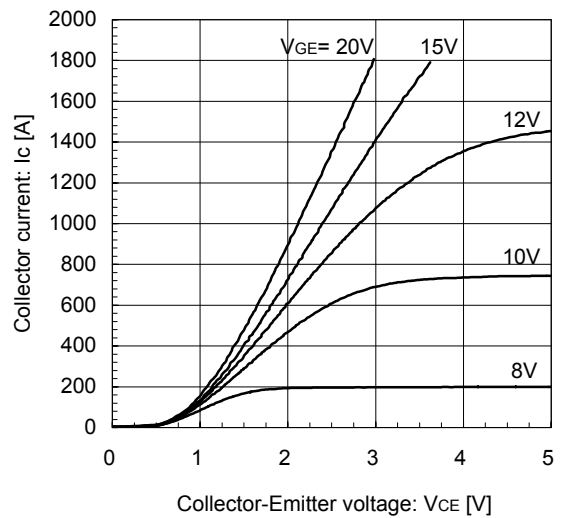
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

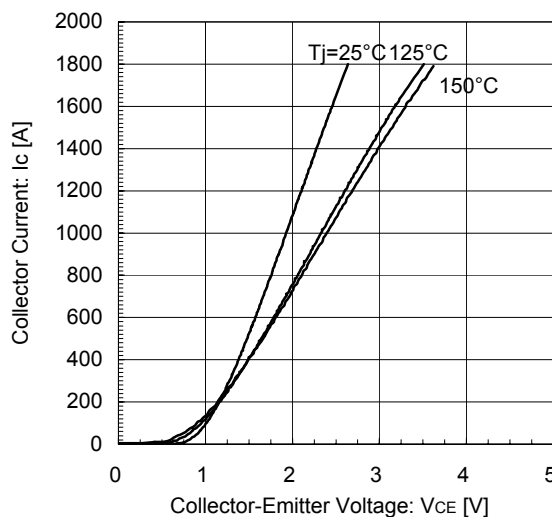
Collector current vs. Collector-Emittter voltage (typ.)
T_j = 25°C / chip



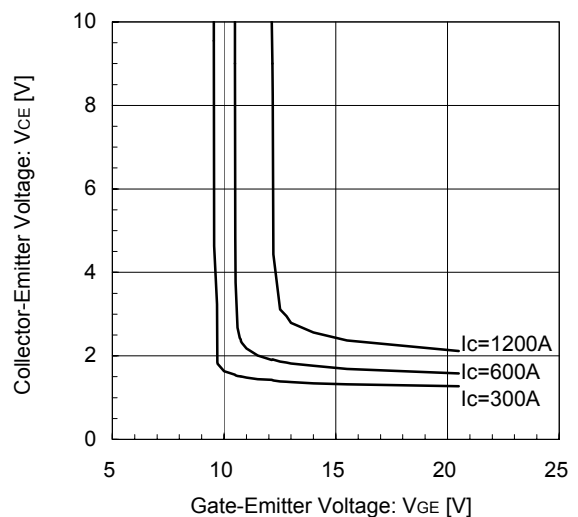
Collector current vs. Collector-Emittter voltage (typ.)
T_j = 150°C / chip



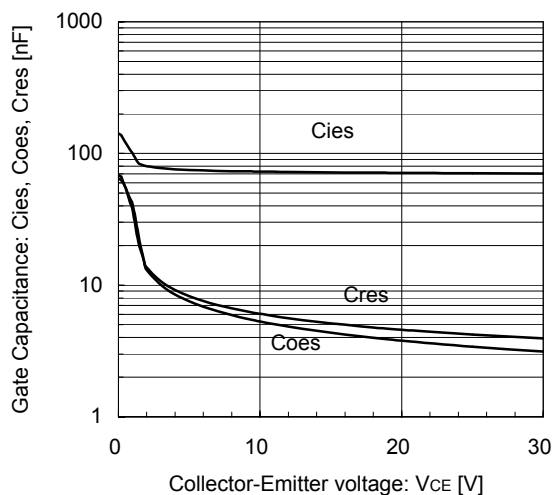
Collector current vs. Collector-Emittter voltage (typ.)
VGE = 15V / chip



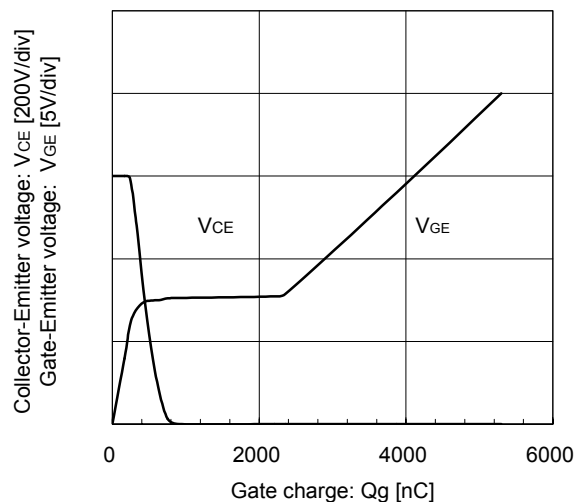
Collector-Emittter voltage vs. Gate-Emittter voltage
T_j = 25°C / chip



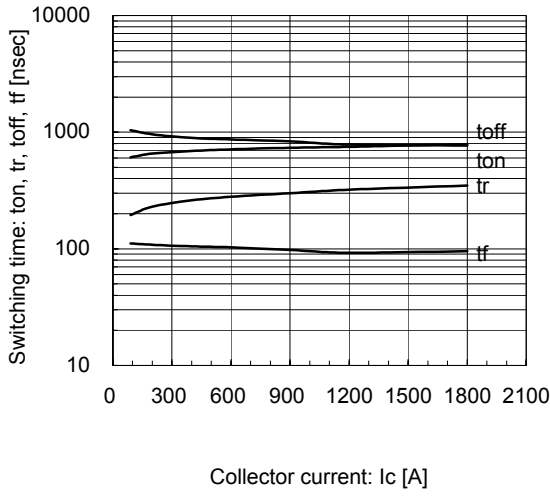
Gate Capacitance vs. Collector-Emittter Voltage
VGE = 0V, f = 1MHz, Tj = 25°C



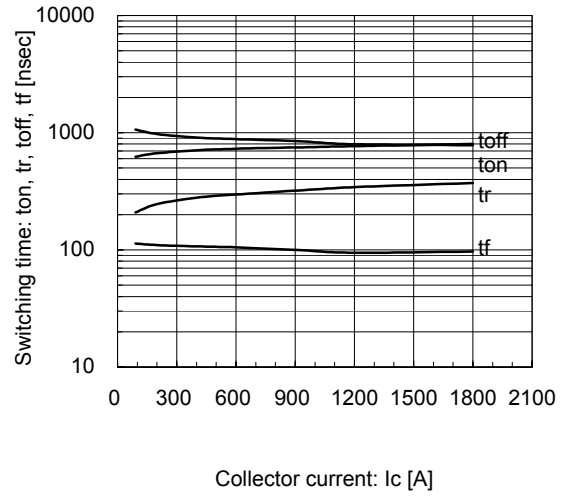
Dynamic Gate Charge (typ.)
Vcc=600V, Ic=900A, Tj = 25°C



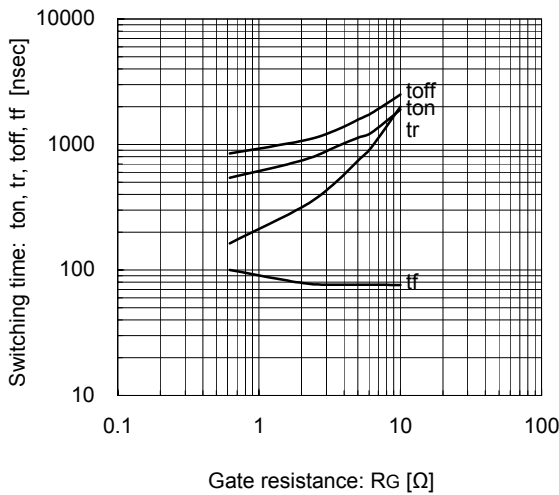
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=+1.5/-0.9\Omega$, $T_J=125^\circ C$



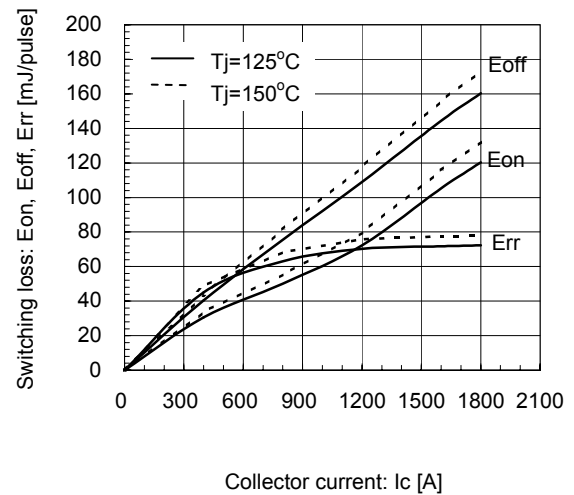
Switching time vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=+1.5/-0.9\Omega$, $T_J=150^\circ C$



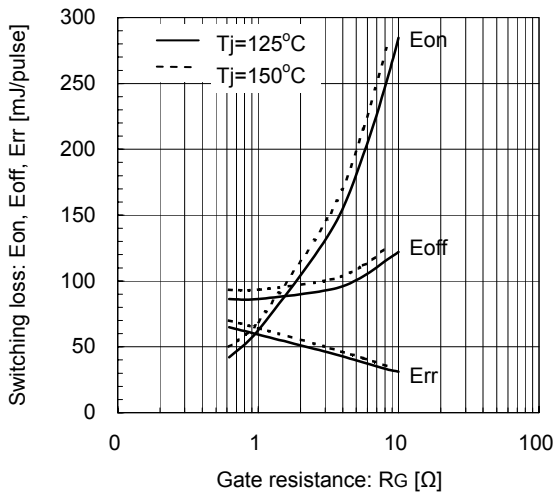
Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=900A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$



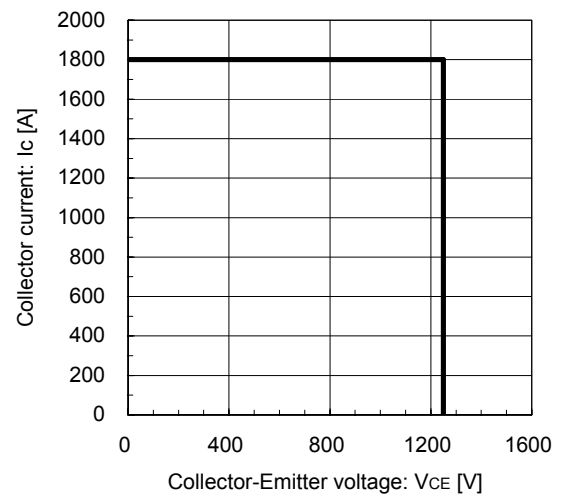
Switching loss vs. Collector current (typ.)
 $V_{CC}=600V$, $V_{GE}=\pm 15V$, $R_G=+1.5/-0.9\Omega$, $T_J=125^\circ C$, $150^\circ C$

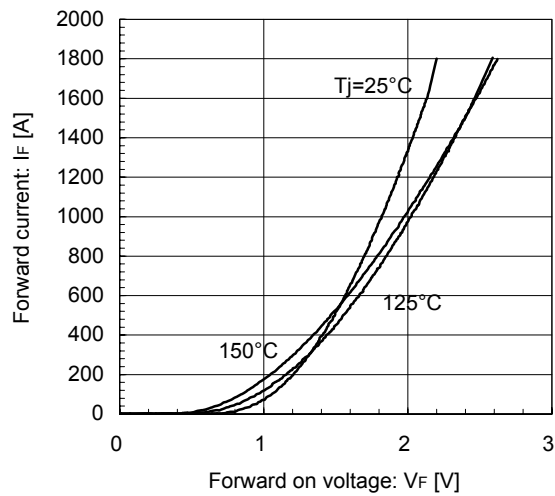
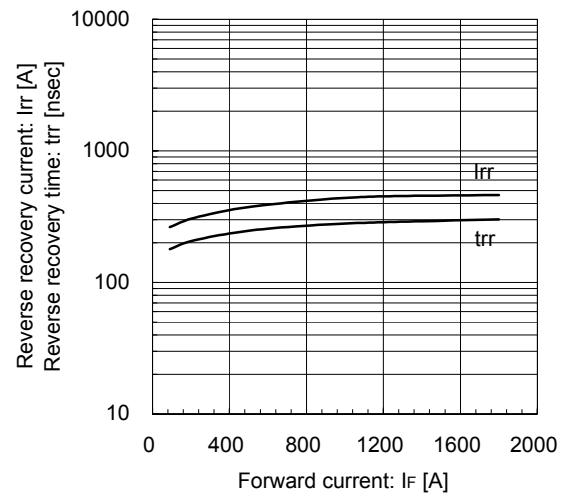
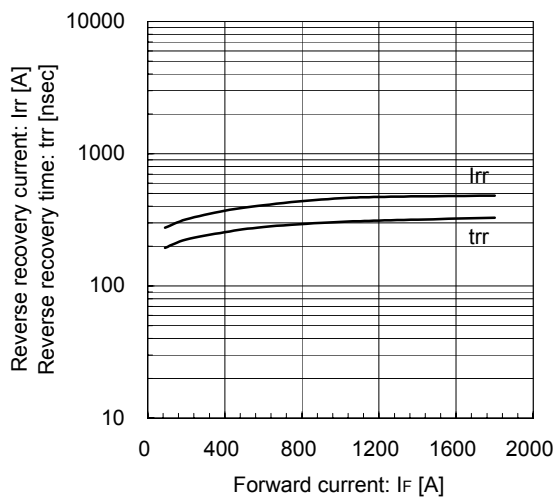


Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V$, $I_C=900A$, $V_{GE}=\pm 15V$, $T_J=125^\circ C$, $150^\circ C$

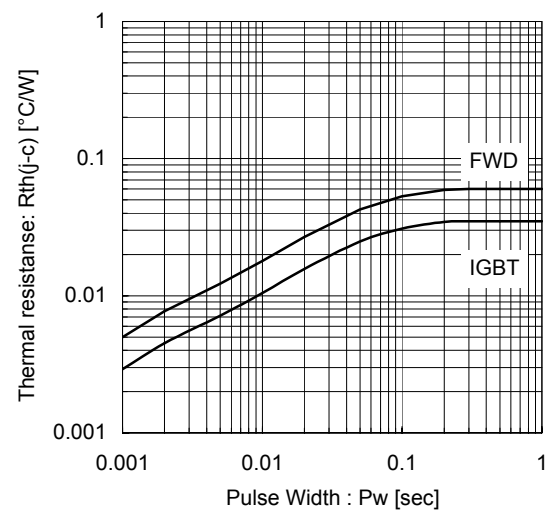
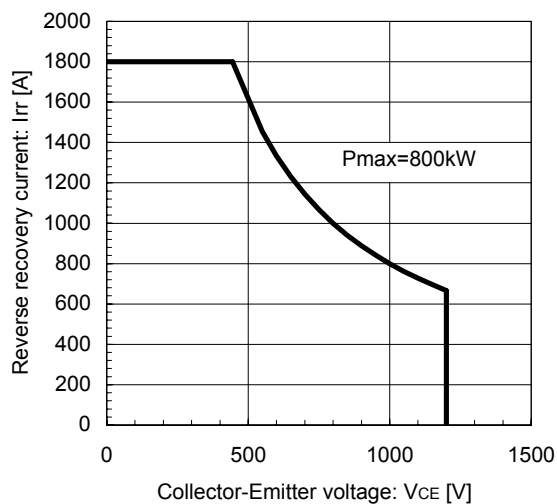


Reverse bias safe operating area (max.)
 $V_{GE}=\pm 15V$, $R_G=+1.5/-0.9\Omega$, $T_J=150^\circ C$, $L_s=35nH$

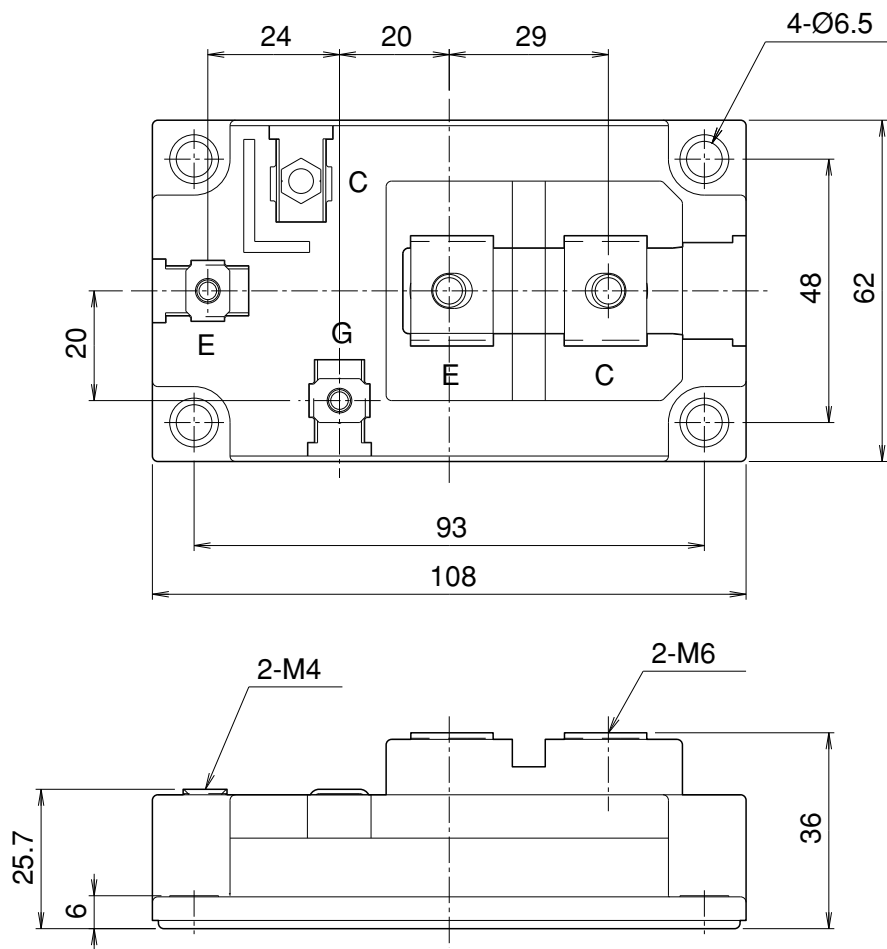


Forward Current vs. Forward Voltage (typ.)
chipReverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=+1.5/-0.9\Omega$, $T_J=125^\circ\text{C}$ Reverse Recovery Characteristics (typ.)
 $V_{CC}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_G=+1.5/-0.9\Omega$, $T_J=125^\circ\text{C}$ 

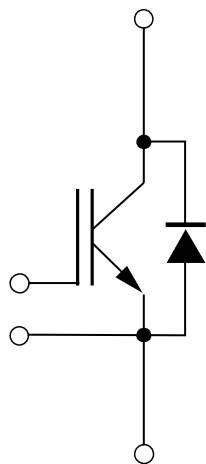
Transient Thermal Resistance (max.)

FWD safe operating area (max.)
 $T_J=150^\circ\text{C}$ 

Outline Drawings, mm



Equivalent Circuit Schematic



WARNING

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			• Industrial robots etc.
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• Traffic-signal control equipment	• Gas leakage detectors with an auto-shut-off feature
• Emergency equipment for responding to disasters and anti-burglary devices	• Safety devices
• Medical equipment	
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• Submarine repeater equipment		
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