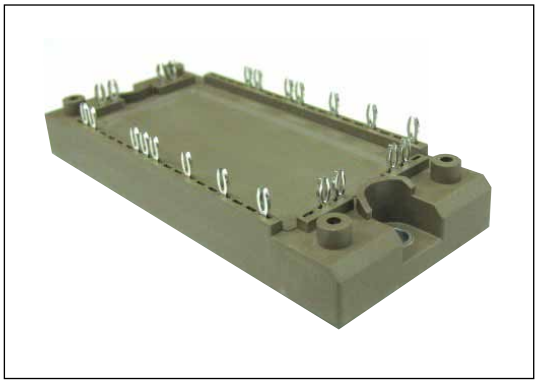
6MBI50VW-060-50

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 Tc=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	Ic	Continuous	Tc=80°C	50	A
		Icp	1ms	Tc=80°C	100	
		-Ic			50	
		-Ic pulse	1ms		100	
	Collector power dissipation	Pc	1 device		215	W
Junction temperature		Tj			175	°C
Operating junciton temperature (under switching conditions)		Tjop			150	
Case temperature		Tc			125	
Storage temperature		Tstg			-40 to +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 Tj= 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_{GE} = 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	Rg(int)	-		-	0	-	Ω
	Input capacitance	Cies	V_{CE} = 10V, V_{GE} = 0V, f = 1MHz		-	3.3	-	nF
	Turn-on time	ton	V_{CC} = 300V, I_C = 50A, V_{GE} = +15 / -15V, R_G = 43Ω		-	0.36	1.20	μs
		tr			-	0.25	0.60	
		tr (i)			-	0.07	-	
	Turn-off time	toff			-	0.52	1.20	
		tf			-	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	trr	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

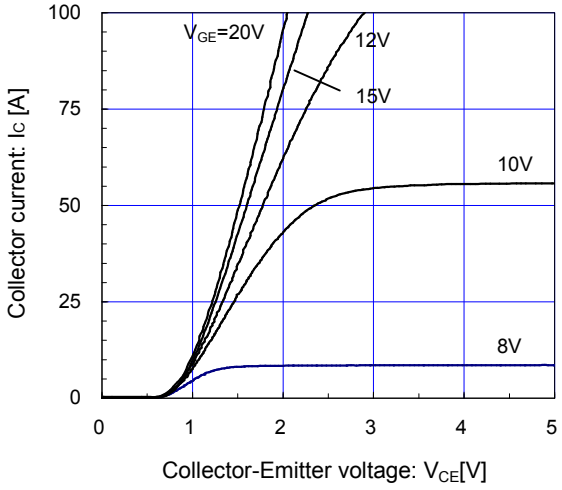
● Thermal resistance characteristics

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

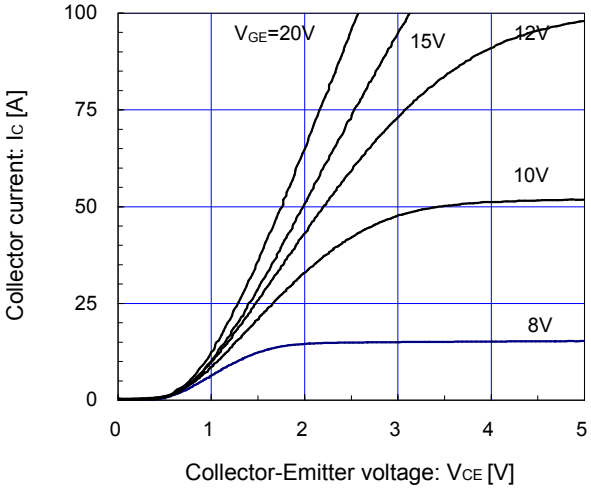
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

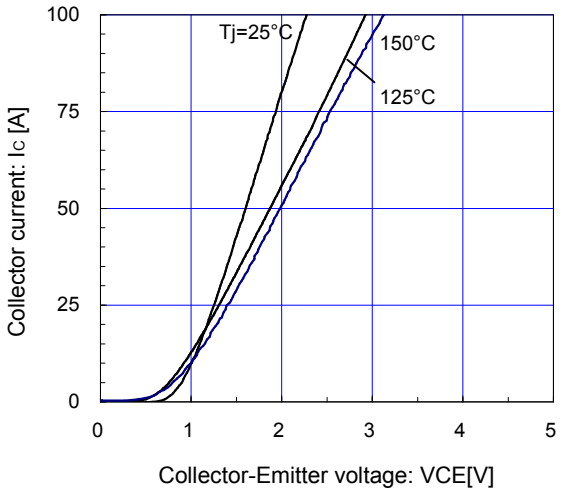
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



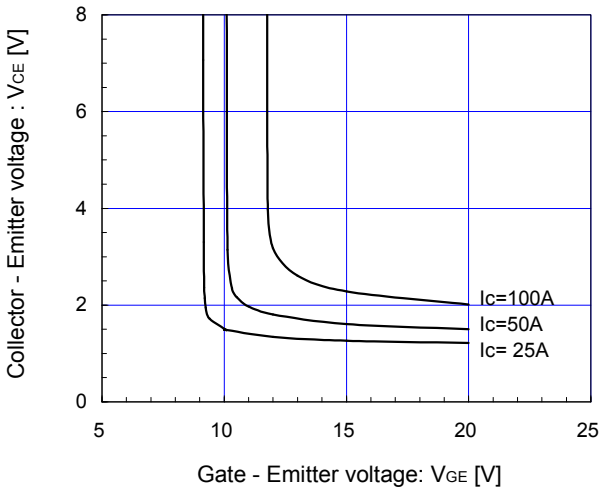
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



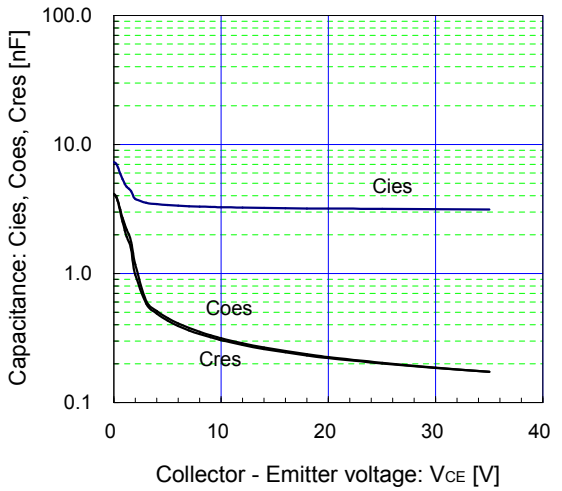
[Inverter]
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



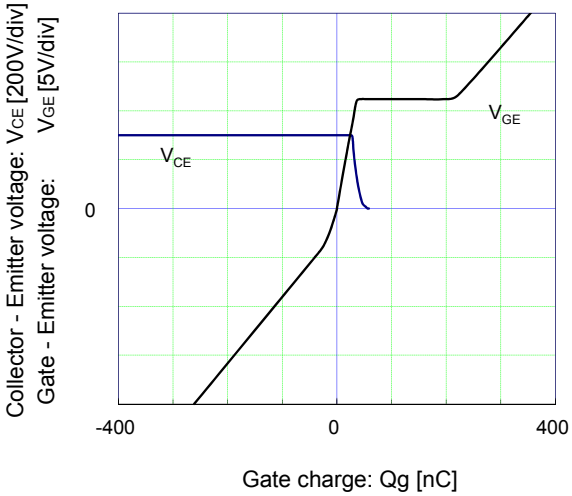
[Inverter]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



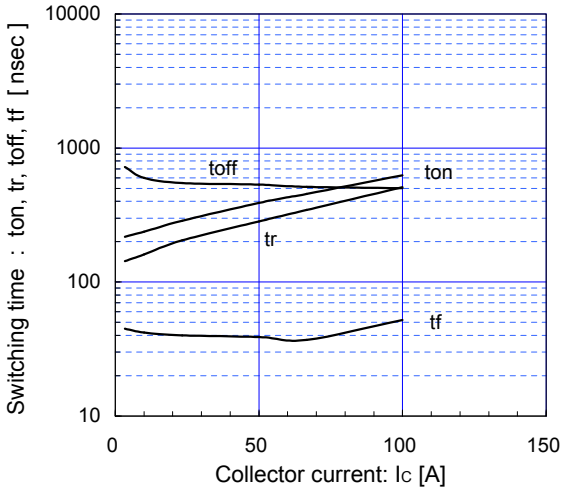
[Inverter]
Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



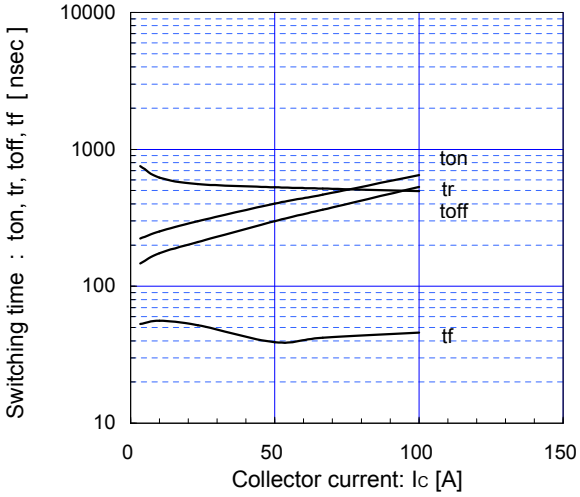
[Inverter]
Dynamic gate charge (typ.)
Vcc=300V, Ic=50A, Tj= 25°C



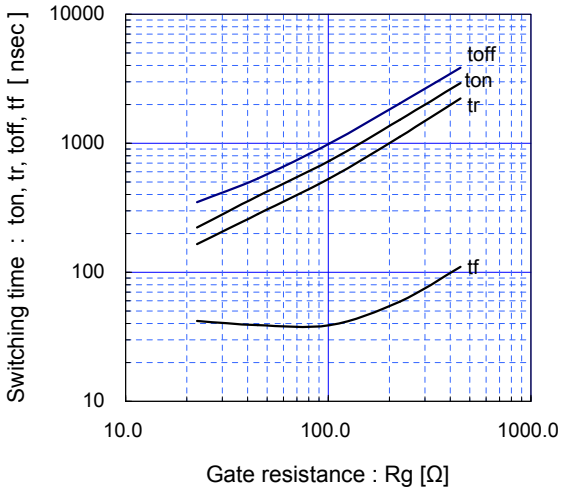
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=43Ω, Tj= 125°C



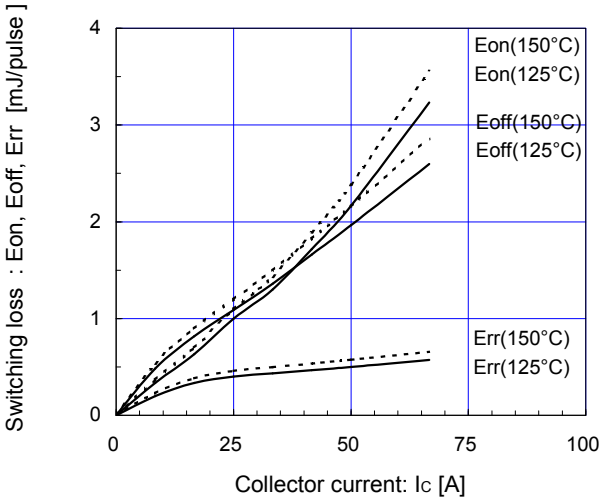
[Inverter]
Switching time vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=43Ω, Tj= 150°C



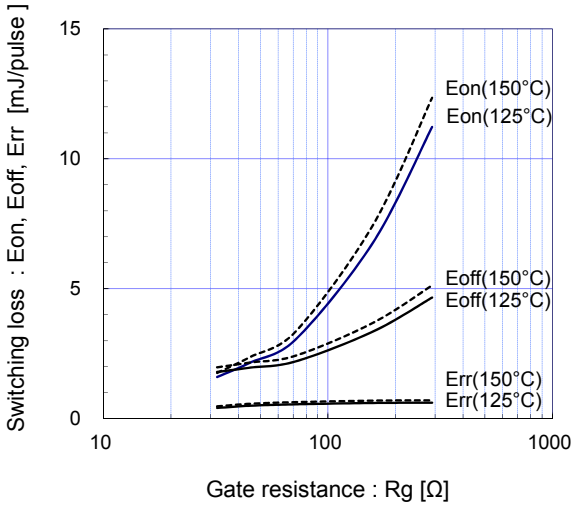
[Inverter]
Switching time vs. gate resistance (typ.)
Vcc=300V, Ic=50A, VGE=±15V, Tj= 125°C



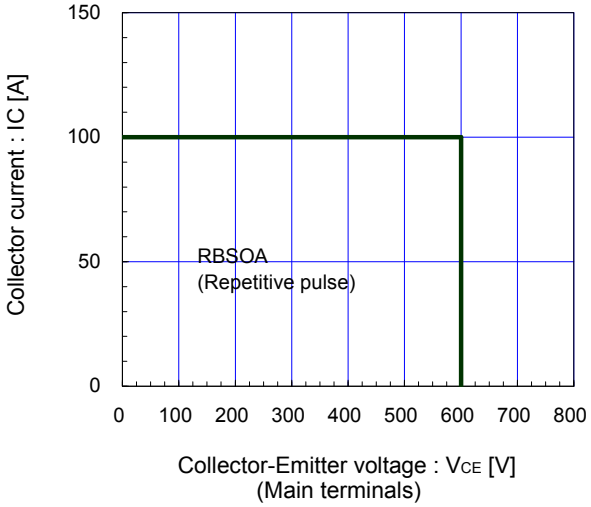
[Inverter]
Switching loss vs. Collector current (typ.)
Vcc=300V, VGE=±15V, Rg=43Ω



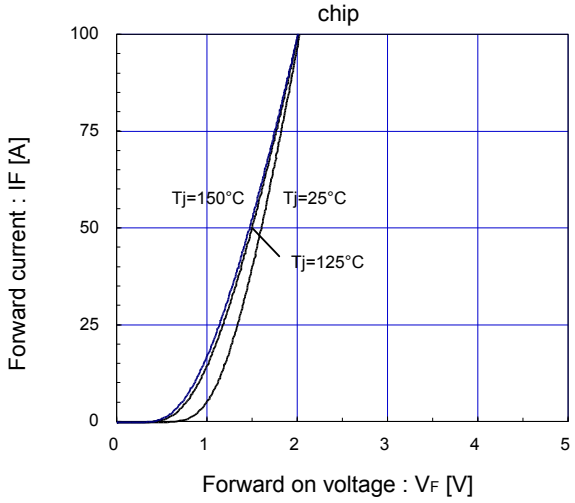
[Inverter]
Switching loss vs. gate resistance (typ.)
Vcc=300V, Ic=50A, VGE=±15V



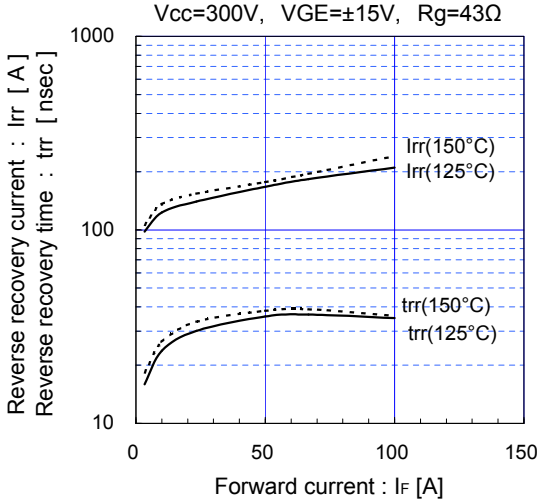
[Inverter]
Reverse bias safe operating area (max.)
+VGE=15V,-VGE <= 15V, RG >= 43Ω ,Tj = 150°C



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



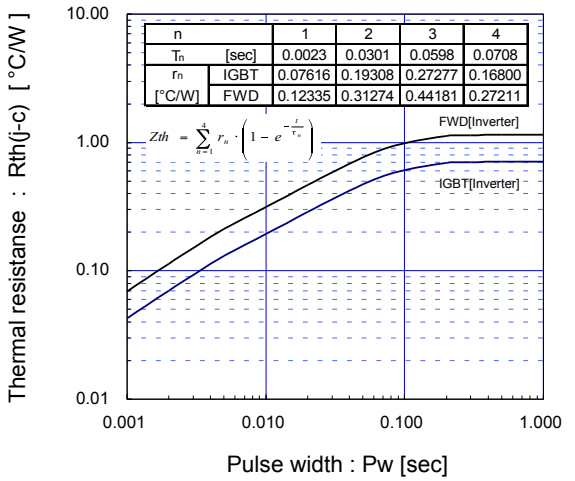
[Inverter]
Reverse recovery characteristics (typ.)
Vcc=300V, VGE=±15V, Rg=43Ω



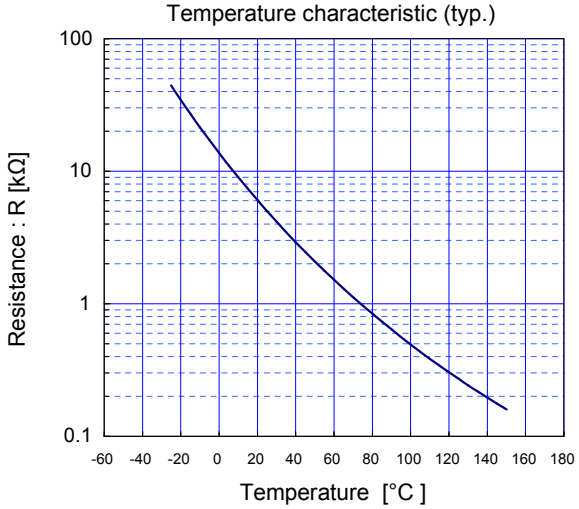
Transient thermal resistance (max.)

n		1	2	3	4
T_n	[sec]	0.0023	0.0301	0.0598	0.0708
r_n	IGBT	0.07616	0.19308	0.27277	0.16800
[°C/W]	FWD	0.12335	0.31274	0.44181	0.27211

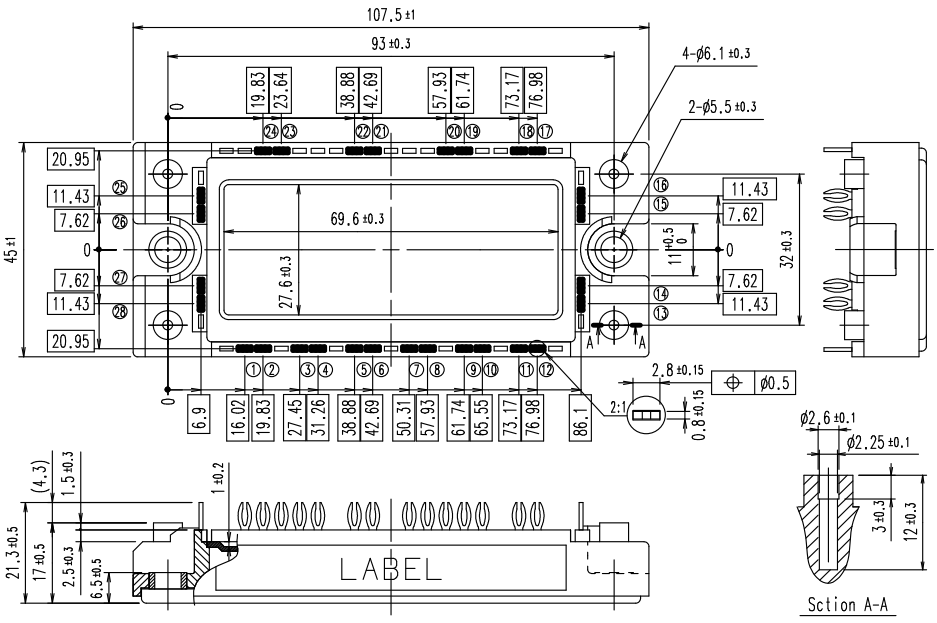
$$Zth = \sum_{n=1}^{4} r_n \cdot \left(1 - e^{-\frac{t}{T_n}}\right)$$



[Thermistor]
Temperature characteristic (typ.)



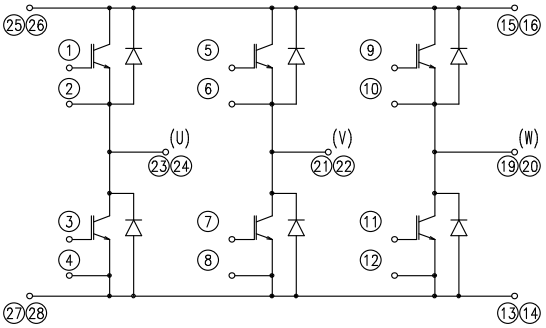
■ Outline Drawings(Unit:mm)



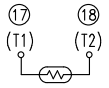
Weight: 200g(typ.)

■ Equivalent Circuit

[Inverter]



[Thermistor]



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Innovating Energy Technology

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IGBT Modules

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