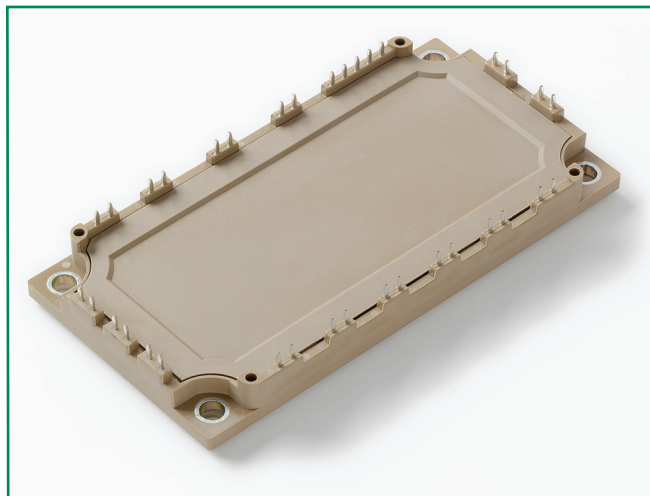


Power Module

1200V 50A IGBT Module

MG1250W-XBN2MM

RoHS



Features

- High level of integration—only one power semiconductor module required for the whole drive
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Industry standard package with insulated copper base plate and soldering pins for PCB mounting
- Temperature sense included

Applications

- AC motor control
- Motion/servo control
- Inverter and power supplies

Module Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$T_{J\max}$	Max. Junction Temperature				150	$^\circ\text{C}$
$T_{J\text{op}}$	Operating Temperature		-40		125	$^\circ\text{C}$
T_{stg}	Storage Temperature		-40		125	$^\circ\text{C}$
V_{isol}	Insulation Test Voltage	AC, $t=1\text{min}$		3000		V
CTI	Comparative Tracking Index		250			
M_d	Mounting Torque	Recommended (M5)	2.5		5	N·m
Weight				300		g

Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$T_J=25^\circ\text{C}$	1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current	$T_C=25^\circ\text{C}$	75	A
		$T_C=80^\circ\text{C}$	50	A
I_{CM}	Repetitive Peak Collector Current	$t_p=1\text{ms}$	100	A
P_{tot}	Power Dissipation Per IGBT		260	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^\circ\text{C}$	1200	V
$I_{\text{F(AV)}}$	Average Forward Current	$T_C=25^\circ\text{C}$	75	A
		$T_C=80^\circ\text{C}$	50	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	100	A
I^2t		$T_J=125^\circ\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	680	A^2s

Power Module

1200V 50A IGBT Module

Electrical and Thermal Specifications ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions		Min	Typ	Max	Unit
IGBT							
V _{GE(th)}	Gate - Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =2.0mA		5.0	5.8	6.5	V
V _{CE(sat)}	Collector - Emitter	I _C =50A, V _{GE} =15V, T _J =25°C			1.7		V
	Saturation Voltage	I _C =50A, V _{GE} =15V, T _J =125°C			1.9		V
I _{ICES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25°C				1	mA
		V _{CE} =1200V, V _{GE} =0V, T _J =125°C				10	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _J =125°C		-400		400	nA
R _{Gint}	Integrated Gate Resistor				4.0		Ω
Q _{ge}	Gate Charge	V _{CE} =600V, I _C =50A , V _{GE} =±15V			0.47		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz			3.6		nF
C _{RES}	Reverse Transfer Capacitance				0.16		nF
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V I _C =50A R _G =18Ω V _{GE} =±15V Inductive Load	T _J =25°C		90		ns
			T _J =125°C		90		ns
t _r	Rise Time		T _J =25°C		30		ns
			T _J =125°C		50		ns
t _{d(off)}	Turn - off Delay Time		T _J =25°C		420		ns
			T _J =125°C		520		ns
t _f	Fall Time		T _J =25°C		70		ns
			T _J =125°C		90		ns
E _{on}	Turn - on Energy		T _J =25°C		4.9		mJ
			T _J =125°C		6.6		mJ
E _{off}	Turn - off Energy		T _J =25°C		4.0		mJ
			T _J =125°C		4.9		mJ
I _{SC}	Short Circuit Current	t _{pSC} ≤10μS , V _{GE} =15V; T _J =125°C , V _{CC} =900V			200		A
R _{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)					0.48	K/W
Diode							
V _F	Forward Voltage	I _F =50A, V _{GE} =0V, T _J =25°C			1.65		V
		I _F =50A, V _{GE} =0V, T _J =125°C			1.65		V
t _{RR}	Reverse Recovery Time	I _F =50A, V _R =600V di _F /dt=1200A/μs T _J =125°C			275		ns
I _{RRM}	Max. Reverse Recovery Current				50		A
E _{rec}	Reverse Recovery Energy				4.4		mJ
R _{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)					0.78	K/W

Power Module

1200V 50A IGBT Module

Diode-Rectifier Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
V_{RRM}	Repetitive Reverse Voltage	$T_J = 25^\circ\text{C}$	1600	V
$I_{F(AV)}$	Average Forward Current	$T_C = 80^\circ\text{C}$	50	A
I_{FRM}	Non-Repetitive Surge Forward Current	$T_J = 45^\circ\text{C}$, $t = 10\text{ms}$, 50Hz	350	A
		$T_J = 45^\circ\text{C}$, $t = 8.3\text{ms}$, 60Hz	385	
I^2t		$T_J = 45^\circ\text{C}$, $t = 10\text{ms}$, 50Hz	612	A^2s
		$T_J = 45^\circ\text{C}$, $t = 8.3\text{ms}$, 60Hz	741	

Diode-Rectifier Electrical and Thermal Specifications ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
V_F	Forward Voltage	$I_F = 50\text{A}$, $T_J = 25^\circ\text{C}$		1.1		V
		$I_F = 50\text{A}$, $T_J = 125^\circ\text{C}$		1.05		V
I_R	Reverse Leakage Current	$V_R = 1600\text{V}$, $T_J = 25^\circ\text{C}$			50	μA
		$V_R = 1600\text{V}$, $T_J = 125^\circ\text{C}$			1	mA
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				0.68	K/W

Brake-Chopper Absolute Maximum Ratings ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$T_J = 25^\circ\text{C}$	1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current	$T_C = 25^\circ\text{C}$	55	A
		$T_C = 80^\circ\text{C}$	40	A
I_{CM}	Repetitive Peak Collector Current	$t_p = 1\text{ms}$	80	A
P_{tot}	Power Dissipation Per IGBT		195	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	$T_J = 25^\circ\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current	$T_C = 25^\circ\text{C}$	25	A
		$T_C = 80^\circ\text{C}$	15	A
I_{FRM}	Repetitive Peak Forward Current	$t_p = 1\text{ms}$	30	A
I^2t		$T_J = 125^\circ\text{C}$, $t = 10\text{ms}$, $V_R = 0\text{V}$	60	A^2s

Power Module

1200V 50A IGBT Module

Brake-Chopper Electrical and Thermal Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit	
IGBT							
V _{GE(th)}	Gate - Emitter Threshold Voltage	V _{CE} =V _{GE} , I _C =1.5mA	5.0	5.8	6.5	V	
V _{CE(sat)}	Collector - Emitter	I _C =40A, V _{GE} =15V, T _J =25°C		1.8		V	
	Saturation Voltage	I _C =40A, V _{GE} =15V, T _J =125°C		2.05		V	
I _{ICES}	Collector Leakage Current	V _{CE} =1200V, V _{GE} =0V, T _J =25°C			0.25	μA	
		V _{CE} =1200V, V _{GE} =0V, T _J =125°C			2	mA	
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _J =125°C	-400		400	nA	
R _{Gint}	Integrated Gate Resistor			6		Ω	
Q _{ge}	Gate Charge	V _{CE} =600V, I _C =40A , V _{GE} =±15V		0.33		μC	
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f = 1MHz		2.5		nF	
C _{RES}	Reverse Transfer Capacitance			0.11		nF	
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V I _C =40A R _G =27Ω V _{GE} =±15V Inductive Load	T _J =25°C		90		ns
			T _J =125°C		90		ns
t _r	Rise Time		T _J =25°C		30		ns
			T _J =125°C		50		ns
t _{d(off)}	Turn - off Delay Time		T _J =25°C		420		ns
			T _J =125°C		520		ns
t _f	Fall Time		T _J =25°C		70		ns
			T _J =125°C		90		ns
E _{on}	Turn - on Energy		T _J =25°C		4.1		mJ
			T _J =125°C		6.0		mJ
E _{off}	Turn - off Energy		T _J =25°C		3.1		mJ
			T _J =125°C		3.6		mJ
I _{SC}	Short Circuit Current	t _{pSC} ≤10μS, V _{GE} =15V; T _J =125°C, V _{CC} =900V		160		A	
R _{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)				0.62	K/W	
Diode							
V _F	Forward Voltage	I _F =15A , V _{GE} =0V, T _J =25°C		1.65		V	
		I _F =15A , V _{GE} =0V, T _J = 125°C		1.75		V	
t _{RR}	Reverse Recovery Time	I _F =15A, V _R =600V di _F /dt=-400A/μs T _J =125°C		150		ns	
I _{RRM}	Max. Reverse Recovery Current			15		A	
E _{rec}	Reverse Recovery Energy			1.15		mJ	
R _{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.55	K/W	

NTC Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
R_{25}	Resistance	$T_c=25^\circ\text{C}$		5		K Ω
$B_{25/50}$				3375		K

Figure 1: Typical Output Characteristics for IGBT Inverter

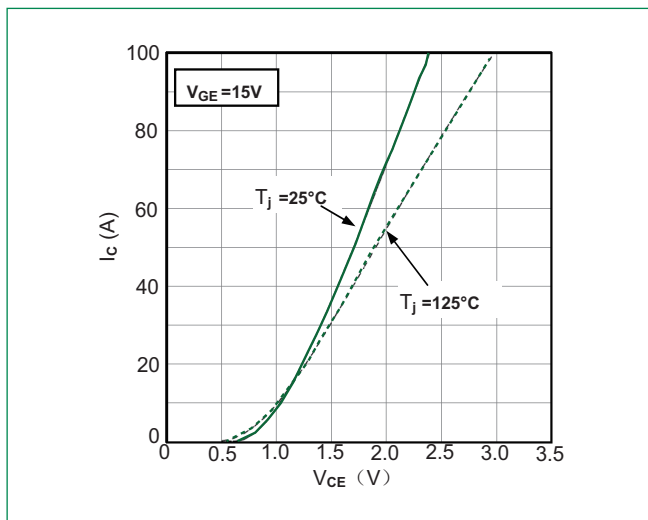


Figure 2: Typical Output Characteristics for IGBT Inverter

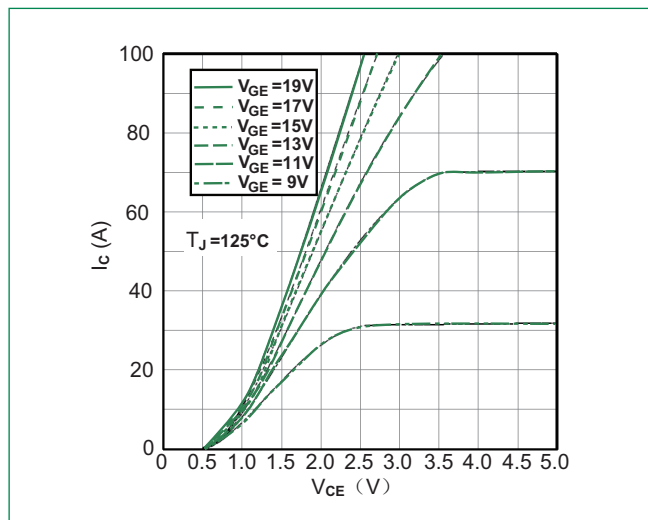


Figure 3: Typical Transfer Characteristics for IGBT Inverter

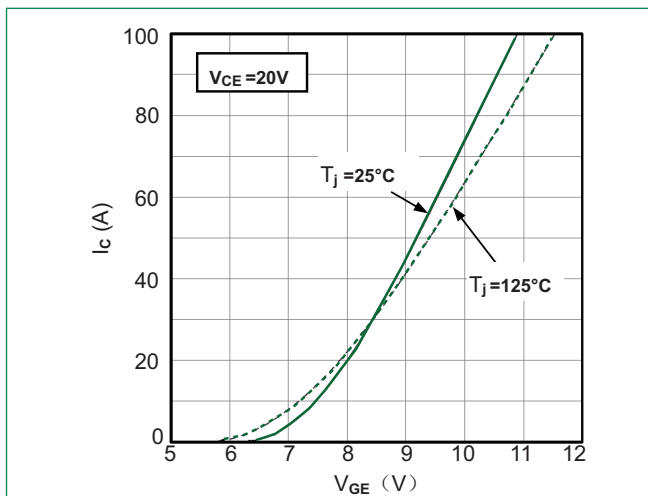


Figure 4: Switching Energy vs. Gate Resistor for IGBT Inverter

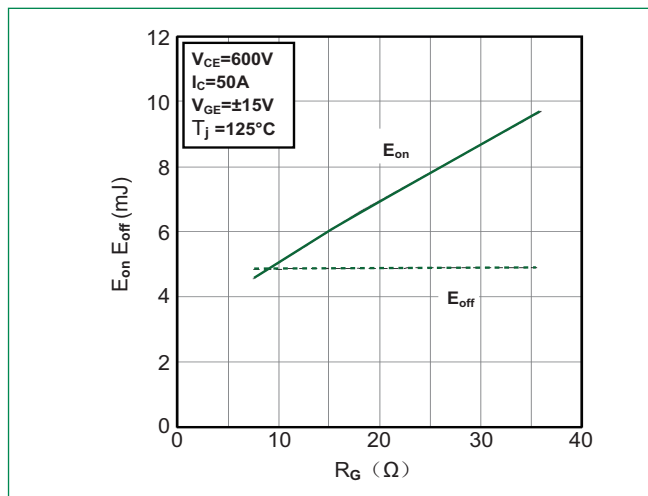


Figure 5: Switching Energy vs. Collector Current for IGBT Inverter

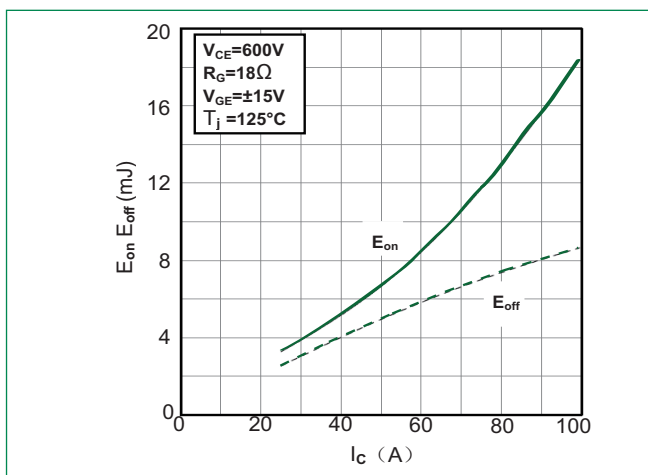


Figure 6: Reverse Biased Safe Operating Area for IGBT Inverter

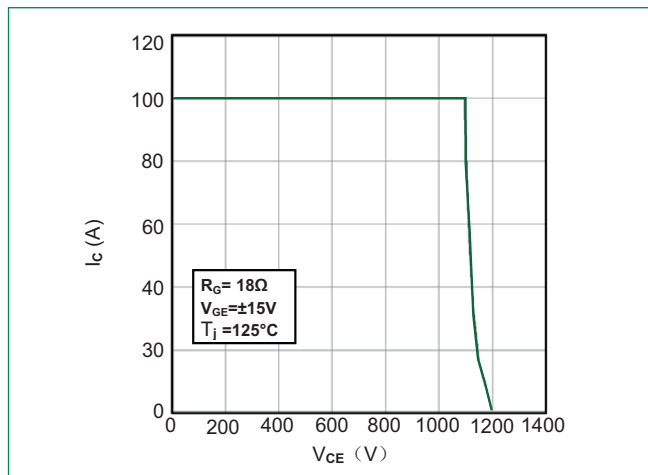


Figure 7: Diode Forward Characteristics for Diode Inverter

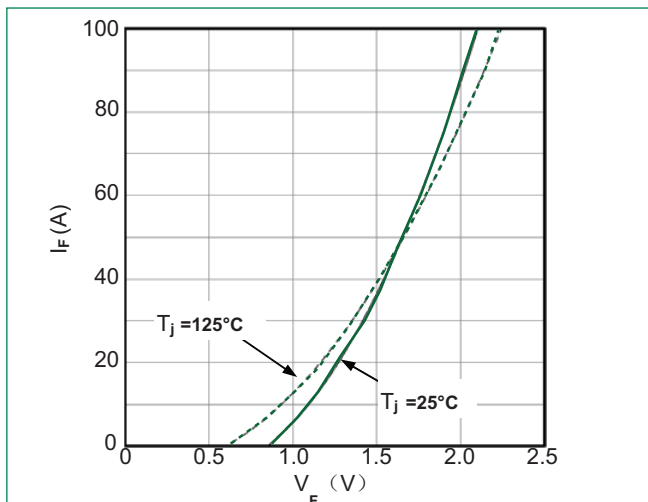


Figure 8: Switching Energy vs. Gate Resistort for Diode Inverter

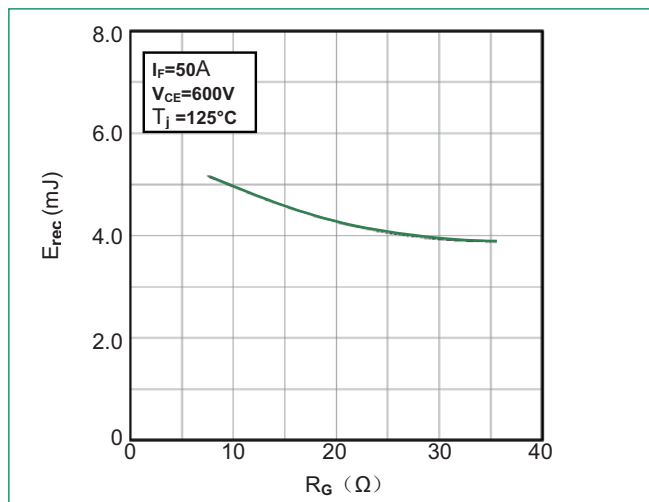


Figure 9: Switching Energy vs. Forward Current for Diode Inverter

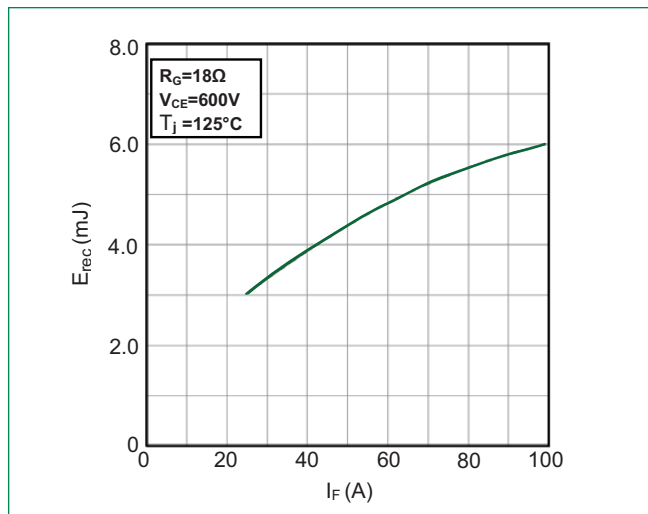


Figure 10: Transient Thermal Impedance of Diode and IGBT Inverter

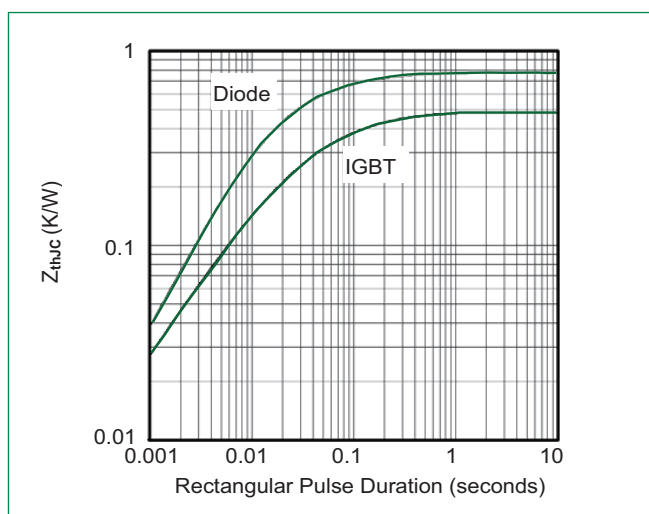


Figure 11: Diode Forward Characteristics for IGBT Inverter

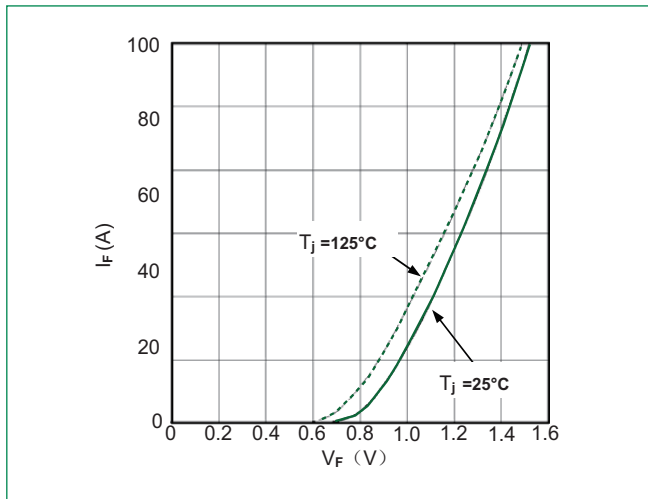
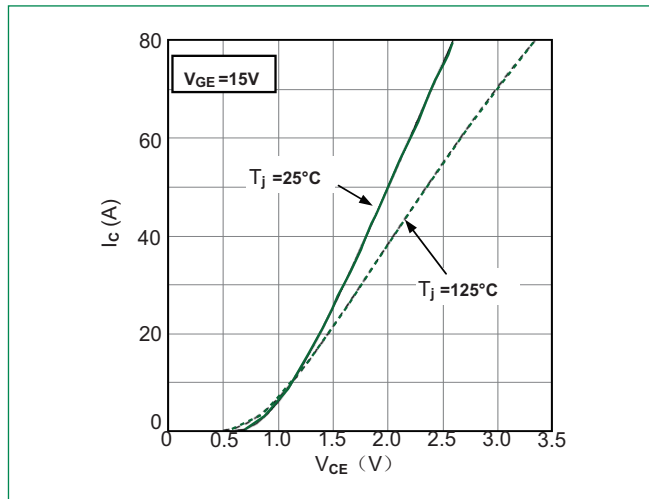


Figure 12: Typical Output Characteristics for IGBT Brake Chopper



Power Module

1200V 50A IGBT Module

Figure 13: Diode Forward Characteristics for Diode Brake Chopper

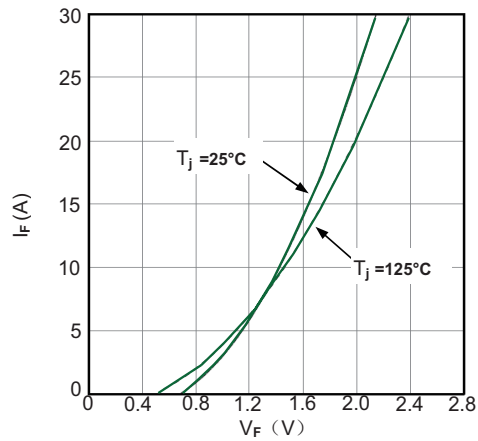
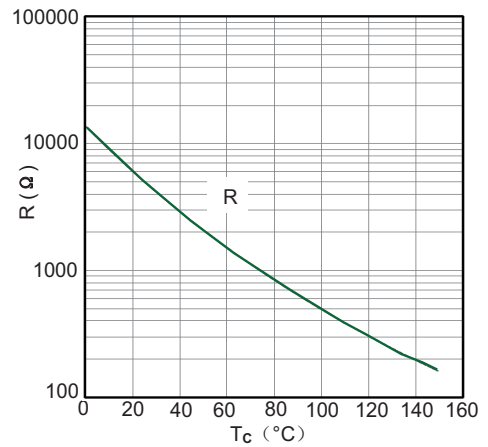
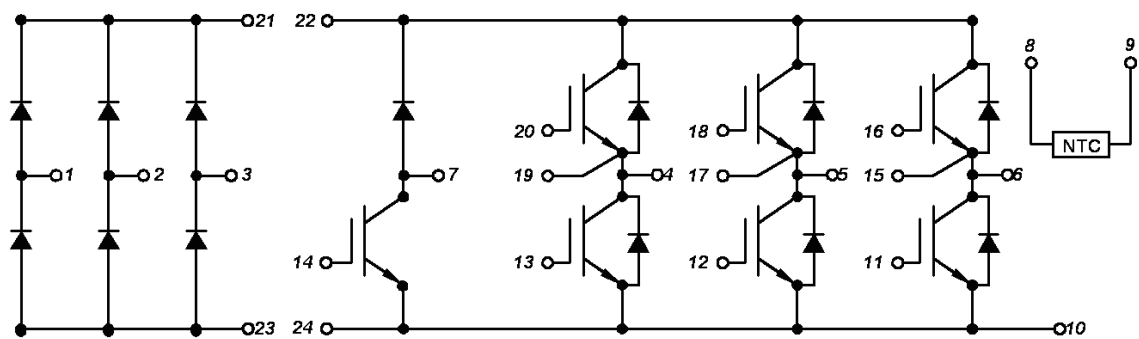


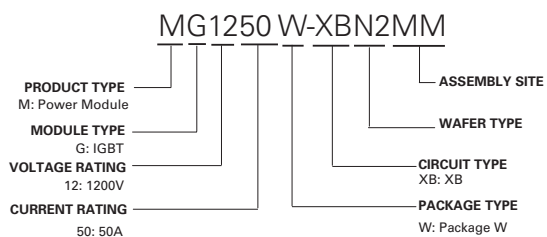
Figure 14: NTC Characteristics



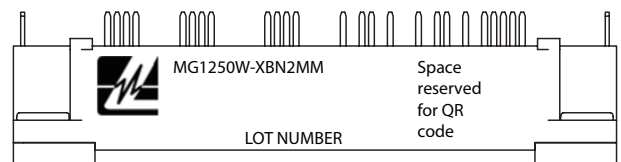
Circuit Diagram



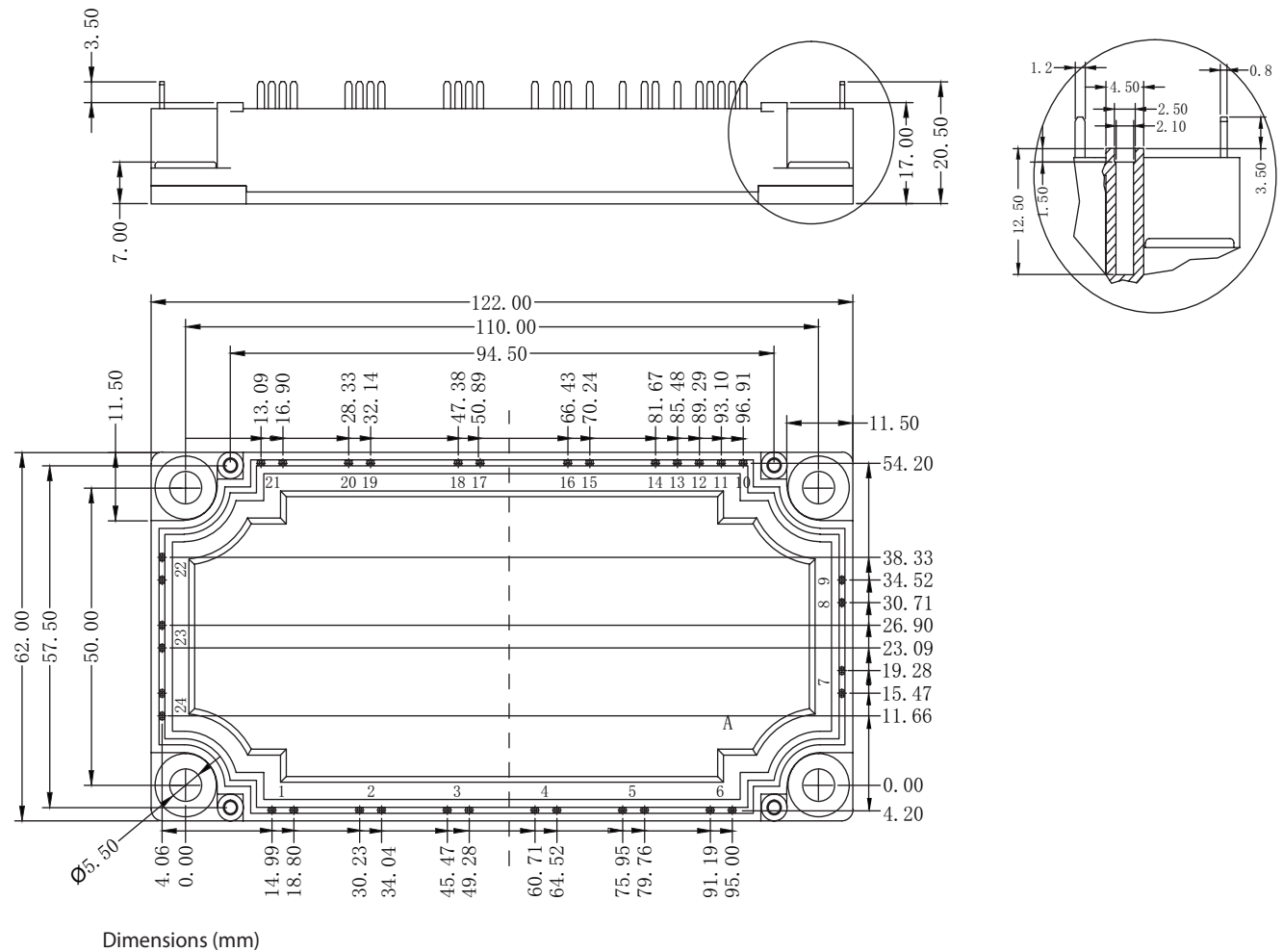
Part Numbering System



Part Marking System



Part Number	Marking	Weight	Packing Mode	M.O.Q
MG1250W-XBN2MM	MG1250W-XBN2MM	300g	Bulk Pack	20



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