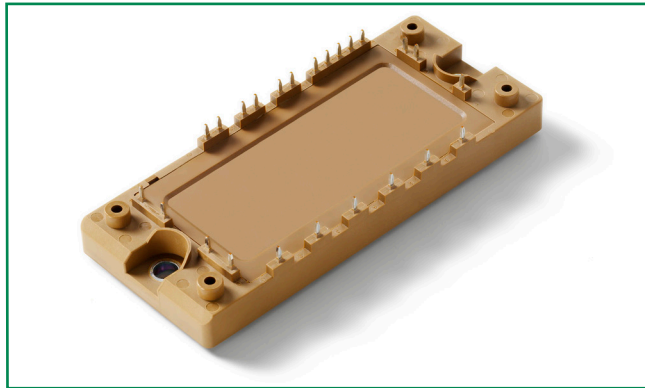


MG1240H-XBN2MM

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				180		g

Inverter Sector

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
$I_{\text{F(AV)}}$	Average Forward Current	$T_C=25^\circ\text{C}$	55	A
		$T_C=80^\circ\text{C}$	40	A
I_{FRM}	Repetitive Peak Forward Current	$t_p=1\text{ms}$	80	A
I^2t		$T_J=125^\circ\text{C}$, $t=10\text{ms}$, $V_R=0\text{V}$	300	A^2s

Power Module

1200V 40A 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 =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	mA
		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			6.0		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		5.8	mJ
E _{off}	Turn - off Energy		T _J =25°C		3.6	mJ
			T _J =125°C		4.2	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)				0.64	K/W
Diode						
V _F	Forward Voltage	I _F =40A, V _{GE} =0V, T _J =25°C		1.80		V
		I _F =40A, V _{GE} =0V, T _J =125°C		1.85		V
t _{RR}	Reverse Recovery Time	I _F =40A, V _R =600V di _F /dt=-400A/μs T _J =125°C		240		ns
I _{RRM}	Max. Reverse Recovery Current			35		A
E _{rec}	Reverse Recovery Energy			2.8		mJ
R _{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.0	K/W

Power Module

1200V 40A 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
$I_{F(RMS)}$	R.M.S. Forward Current Per Diode	$T_C = 80^\circ\text{C}$	40	A
I_{FSM}	Non-Repetitive Surge Forward Current	$T_J = 45^\circ\text{C}$, $t = 10\text{ms}$, 50Hz	320	A
		$T_J = 45^\circ\text{C}$, $t = 8.3\text{ms}$, 60Hz	350	A
I^2t		$T_J = 45^\circ\text{C}$, $t = 10\text{ms}$, 50Hz	512	A^2s
		$T_J = 45^\circ\text{C}$, $t = 8.3\text{ms}$, 60Hz	612	A^2s

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	$I_F = 40\text{A}$, $V_{GE} = 0\text{V}$, $T_J = 25^\circ\text{C}$		1.2		V
		$I_F = 40\text{A}$, $V_{GE} = 0\text{V}$, $T_J = 125^\circ\text{C}$		1.15		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_{thJC}	Junction-to-Case Thermal Resistance (Per Diode)				1.0	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	$T_C = 25^\circ\text{C}$	25	A
		$T_C = 80^\circ\text{C}$	15	A
I_{CM}	Repetitive Peak Collector Current	$t_p = 1\text{ms}$	30	A
P_{tot}	Power Dissipation Per IGBT		105	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 40A IGBT Module

Brake-Chopper 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 =0.5mA	5.0	5.8	6.5	V
V _{CE(sat)}	Collector - Emitter	I _C =15A, V _{GE} =15V, T _J =25°C		1.7		V
	Saturation Voltage	I _C =15A, 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			50	μA
		V _{CE} =1200V, V _{GE} =0V, T _J =125°C			1	mA
I _{GES}	Gate Leakage Current	V _{CE} =0V, V _{GE} =±15V, T _J =125°C	-400		400	nA
R _{Gint}	Integrated Gate Resistor			0		Ω
Q _{ge}	Gate Charge	V _{CE} =600V, I _C =15A , V _{GE} =±15V		0.15		μC
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f =1MHz		1.1		nF
C _{res}	Reverse Transfer Capacitance			0.05		nF
t _{d(on)}	Turn - on Delay Time	V _{CC} =600V I _C =15A R _G =62Ω 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	25		ns
			T _J =125°C	30		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	90		ns
			T _J =125°C	120		ns
E _{on}	Turn - on Energy		T _J =25°C	1.4		mJ
			T _J =125°C	2.0		mJ
E _{off}	Turn - off Energy		T _J =25°C	1.0		mJ
			T _J =125°C	1.2		mJ
I _{SC}	Short Circuit Current	t _{pse} ≤10μS , V _{GE} =15V; T _J =125°C , V _{CC} =900V		55		A
R _{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)				1.2	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			0.6		mJ
R _{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				2.1	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

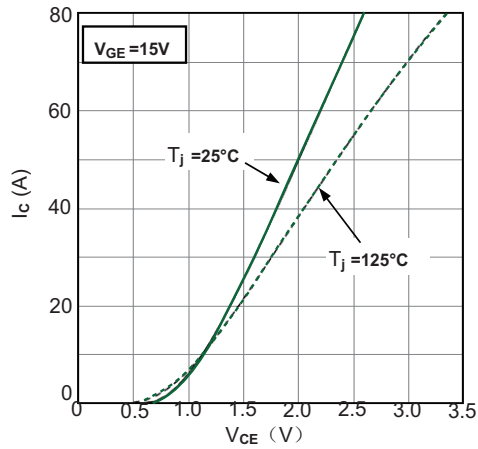


Figure 2: Typical Output Characteristics for IGBT Inverter

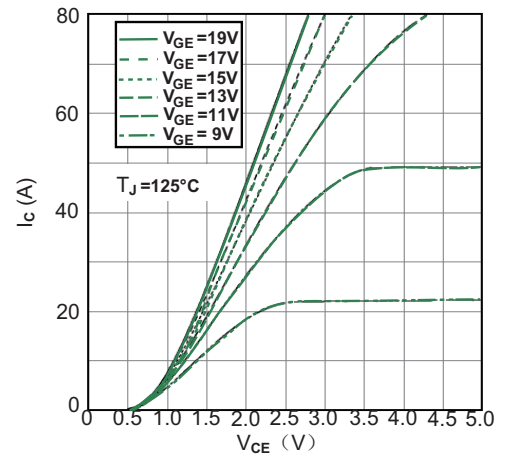


Figure 3: Typical Transfer Characteristics for IGBT Inverter

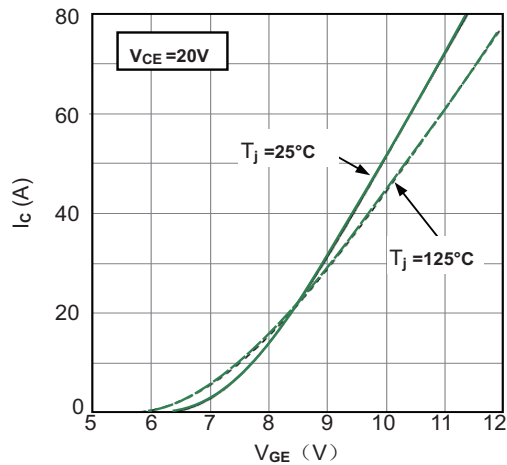


Figure 4: Switching Energy vs. Gate Resistor for IGBT Inverter

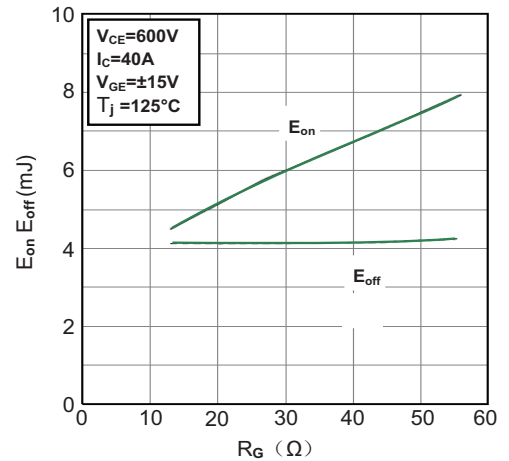


Figure 5: Switching Energy vs. Collector Current for IGBT Inverter

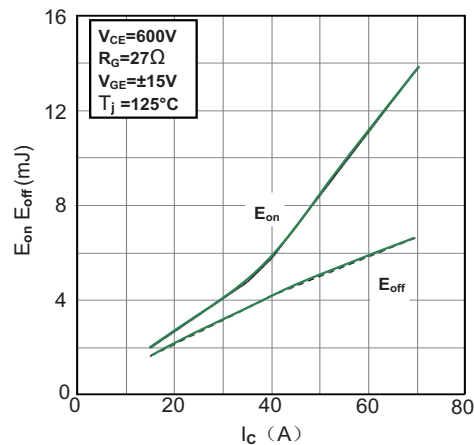


Figure 6: Reverse Biased Safe Operating Area for IGBT Inverter

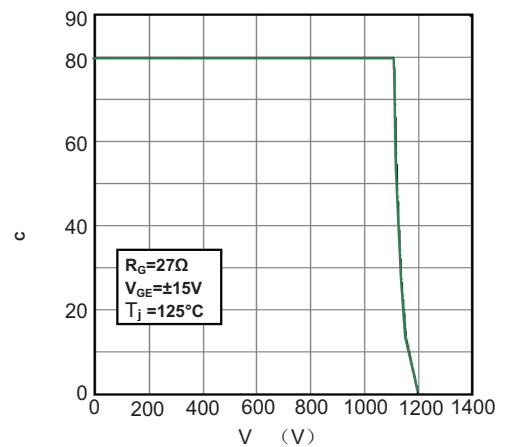


Figure 7: Diode Forward Characteristics for Diode Inverter

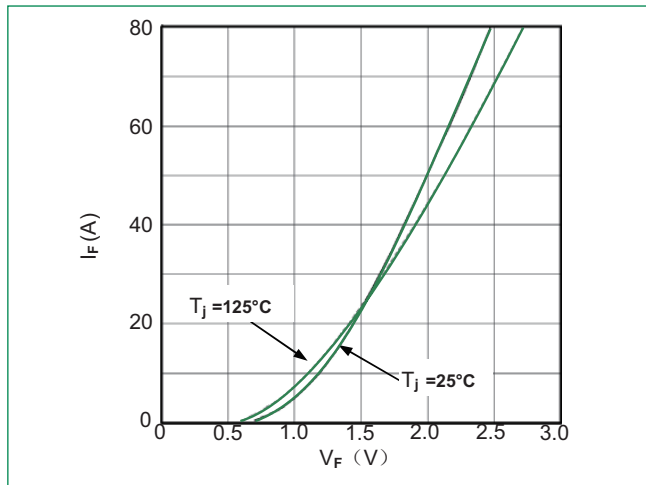


Figure 8: Switching Energy vs. Gate Resistort for Diode Inverter

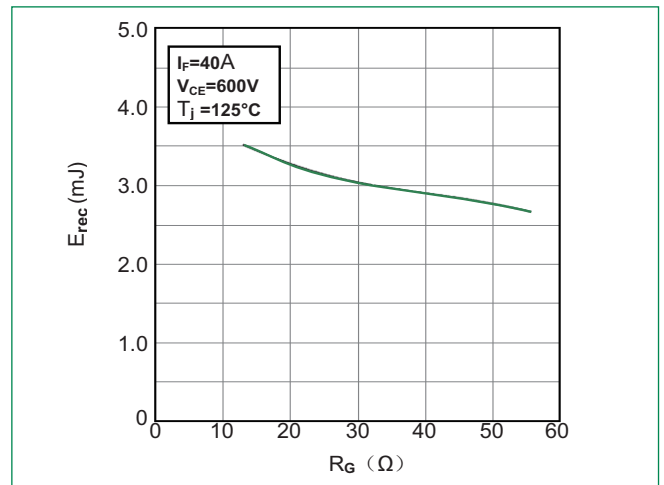


Figure 9: Switching Energy vs. Forward Current Diode-inverter

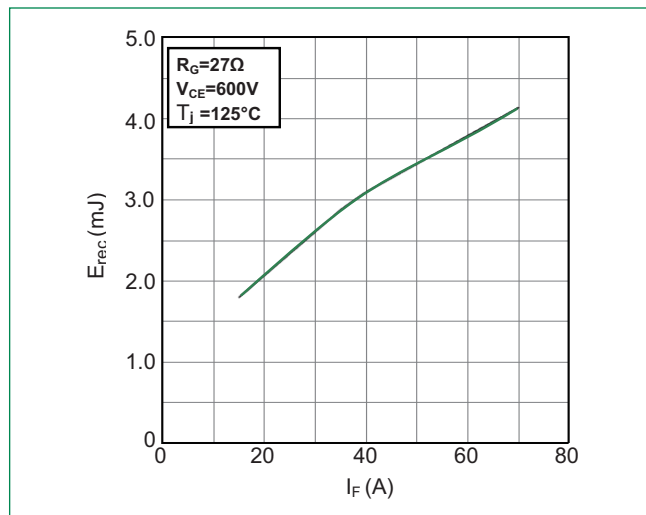


Figure 10: Transient Thermal Impedance of Diode and IGBT-inverter

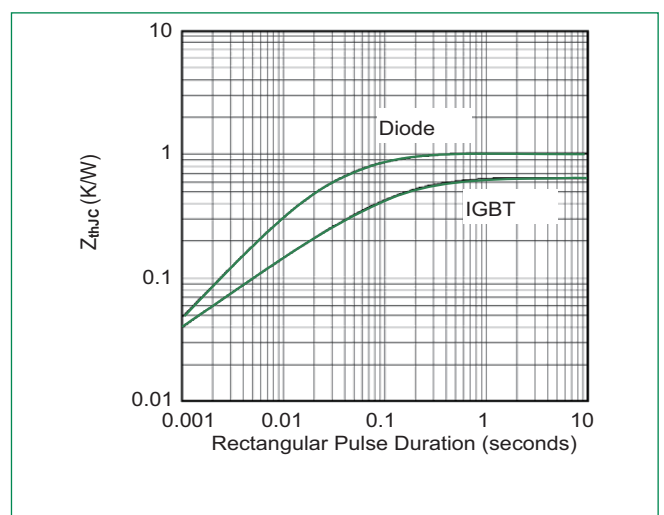


Figure 11: Diode Forward Characteristics Diode- rectifier

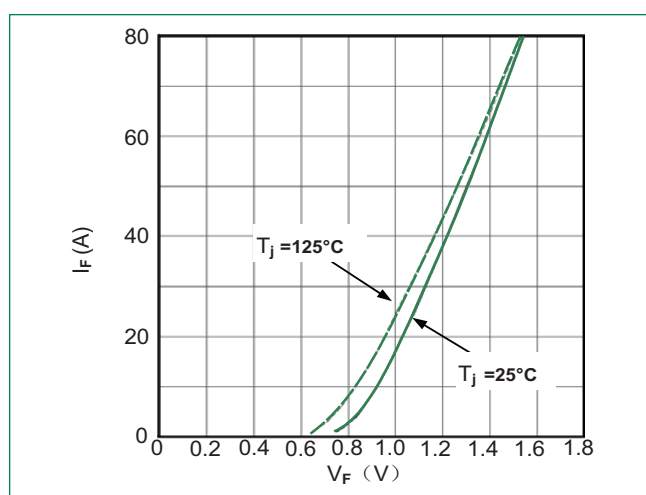


Figure 12: Typical Output Characteristics IGBT- brake chopper

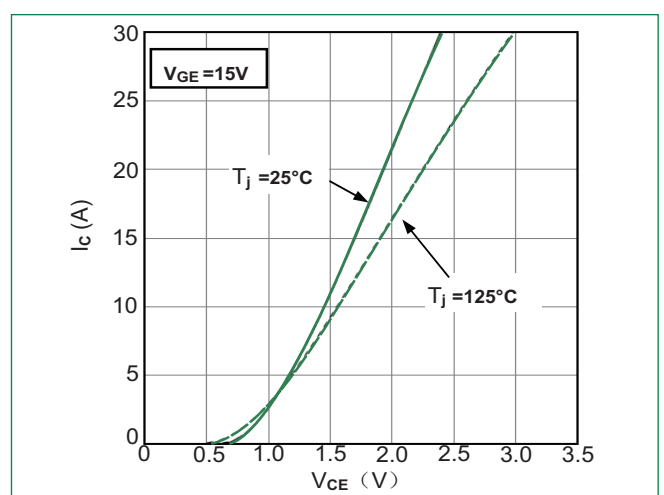


Figure 13: Diode Forward Characteristics
Diode - brake chopper

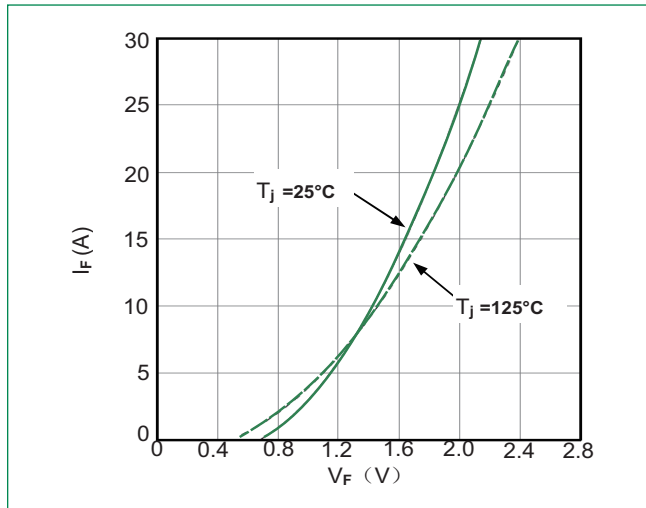
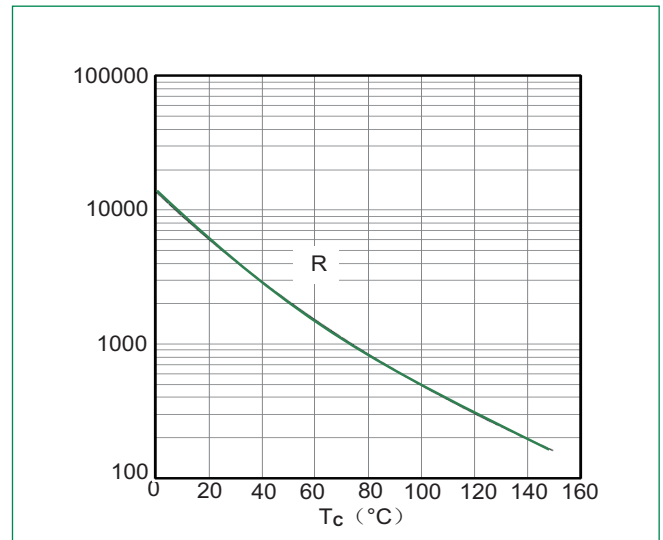
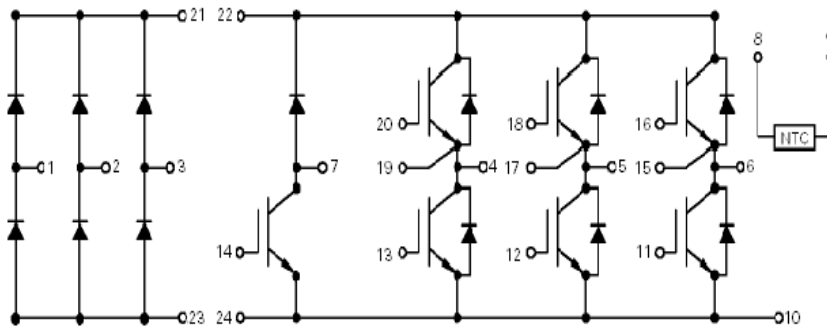


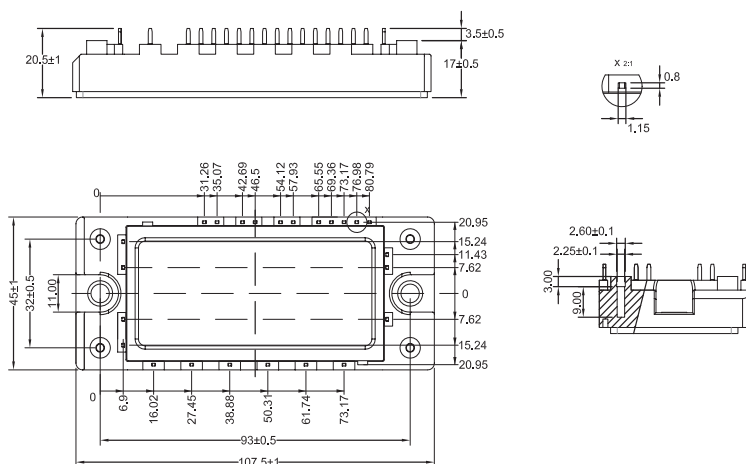
Figure 14: NTC Characteristics



Circuit Diagram



Dimensions-Package H



The foot pins are in gold / nickel coating

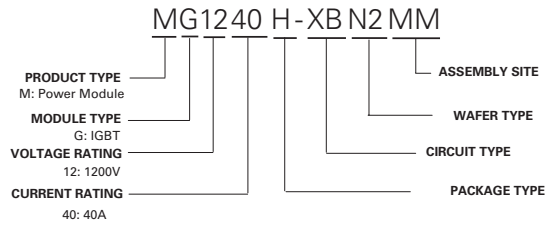
Power Module

1200V 40A IGBT Module

Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG1240H-XBN2MM	MG1240H-XBN2MM	180g	Bulk Pack	40

Part Numbering System



Part Marking System

