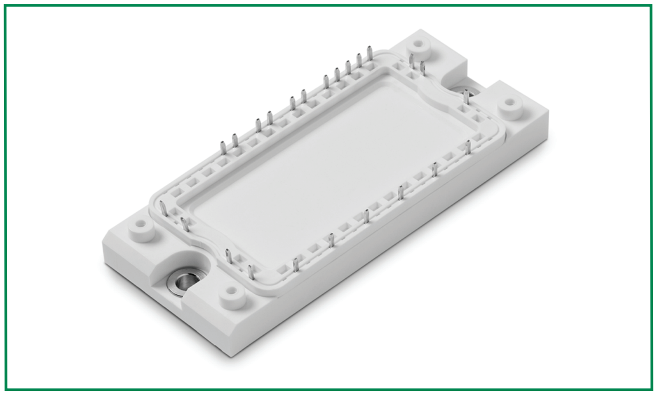
Power Module
1200V 40A IGBT Module

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 plateand soldering pins for PCB mounting
- Temperature sense included

Applications

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

Module Characteristics (T_J = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
$T_{J\ max}$	Max. Junction Temperature				150	°C
$T_{J\ op}$	Operating Temperature		-40		125	°C
T_{stg}	Storage Temperature		-40		125	°C
V_{isol}	Insulation Test Voltage	AC, t=1min		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°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	T_J=25°C	1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	55	A
		T_C=80°C	40	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	80	A
P_{tot}	Power Dissipation Per IGBT		195	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	55	A
		T_C=80°C	40	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	80	A
I^2t		T_J =125°C, t=10ms, V_R=0V	300	A^2s

Revised:11/20/14

Electrical and Thermal Specifications (T_J = 25°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 Saturation Voltage	I_C=40A, V_{GE}=15V, T_J=25°C			1.8		V
		I_C=40A, V_{GE}=15V, T_J=125°C			2.05		V
I_{CES}	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

Diode-Rectifier Absolute Maximum Ratings (T_J = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	1600	V
$I_{F(RMS)}$	R.M.S. Forward Current Per Diode	T_C=80°C	40	A
I_{FSM}	Non-Repetitive Surge Forward Current	T_J =45°C, t=10ms, 50Hz	320	A
		T_J =45°C, t=8.3ms, 60Hz	350	A
I^2t		T_J =45°C, t=10ms, 50Hz	512	A^2s
		T_J =45°C, t=8.3ms, 60Hz	612	A^2s

Diode-Rectifier Electrical and Thermal Specifications (T_J = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
V_F	Forward Voltage	I_F=40A, V_{GE}=0V, T_J =25°C		1.2		V
		I_F=40A, V_{GE}=0V, T_J =125°C		1.15		V
I_R	Reverse Leakage Current	V_R=1600V, T_J=25°C			50	μA
		V_R=1600V, T_J=125°C			1	mA
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)				1.0	K/W

Brake-Chopper Absolute Maximum Ratings (T_J = 25°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	T_J=25°C	1200	V
V_{GES}	Gate - Emitter Voltage		±20	V
I_C	DC Collector Current	T_C=25°C	25	A
		T_C=80°C	15	A
I_{CM}	Repetitive Peak Collector Current	t_p=1ms	30	A
P_{tot}	Power Dissipation Per IGBT		105	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_J=25°C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C=25°C	25	A
		T_C=80°C	15	A
I_{FRM}	Repetitive Peak Forward Current	t_p=1ms	30	A
I^2t		T_J =125°C, t=10ms, V_R=0V	60	A^2s

Brake-Chopper Electrical and Thermal Specifications (T_J = 25°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 Saturation Voltage	I_C=15A, V_{GE}=15V, T_J=25°C			1.7		V
		I_C=15A, V_{GE}=15V, T_J=125°C			1.9		V
I_{CES}	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_{psc}≤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°C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
R_{25}	Resistance	T_c=25°C		5		KΩ
$B_{25/50}$				3375		K

Figure 1: Typical Output Characteristics for IGBT Inverter

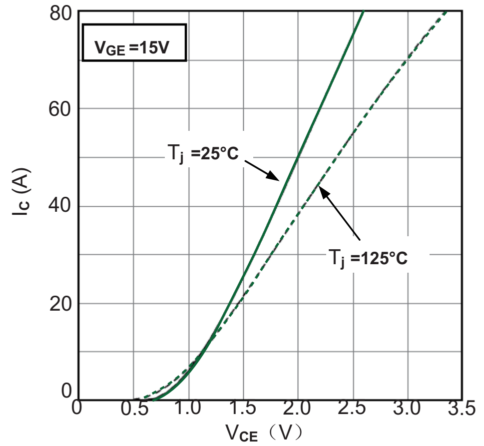


Figure 2: Typical Output Characteristics for IGBT Inverter

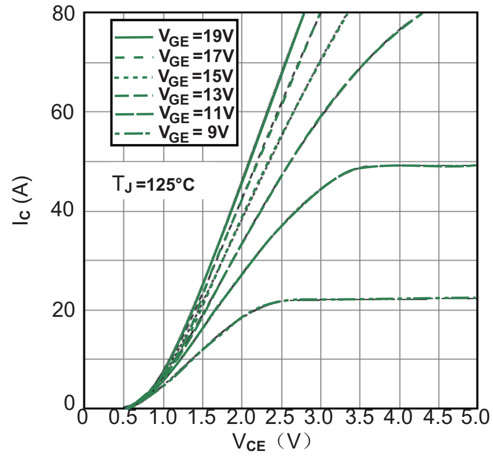


Figure 3: Typical Transfer Characteristics for IGBT Inverter

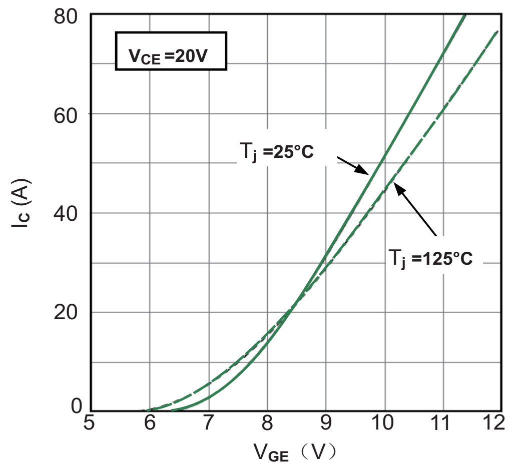


Figure 4: Switching Energy vs. Gate Resistor for IGBT Inverter

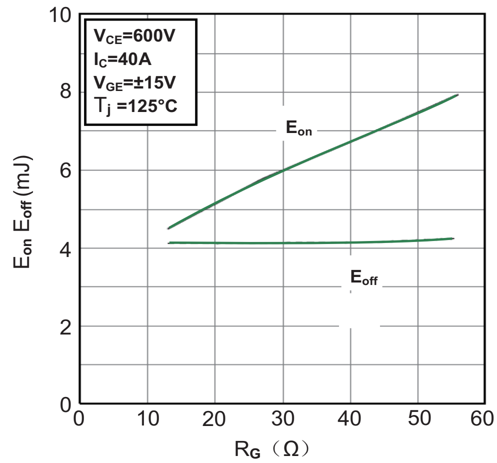


Figure 5: Switching Energy vs. Collector Current for IGBT Inverter

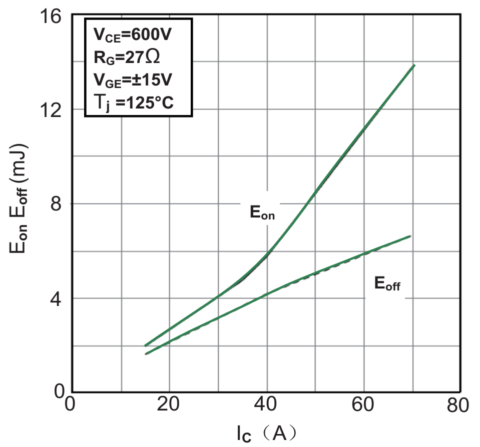


Figure 6: Reverse Biased Safe Operating Area for IGBT Inverter

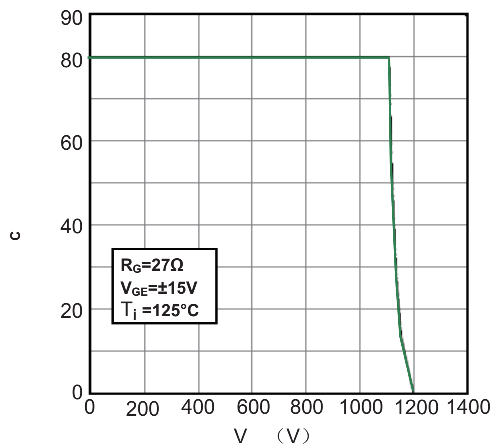


Figure 7: Diode Forward Characteristics for Diode Inverter

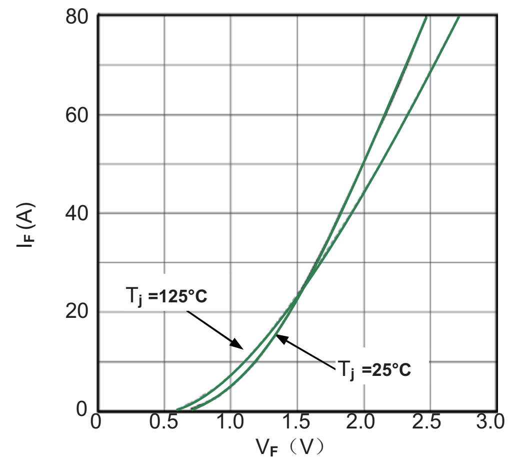


Figure 8: Switching Energy vs. Gate Resistort for Diode Inverter

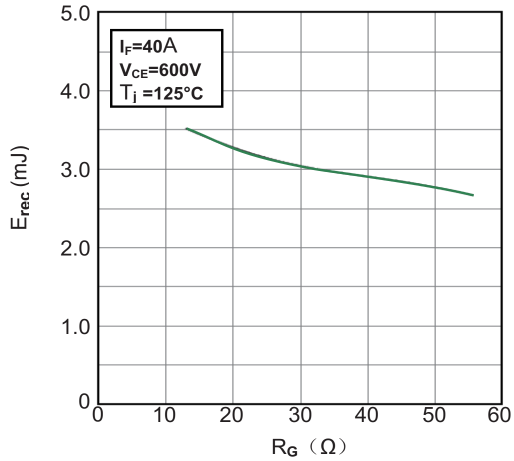


Figure 9: Switching Energy vs. Forward Current Diode-inverter

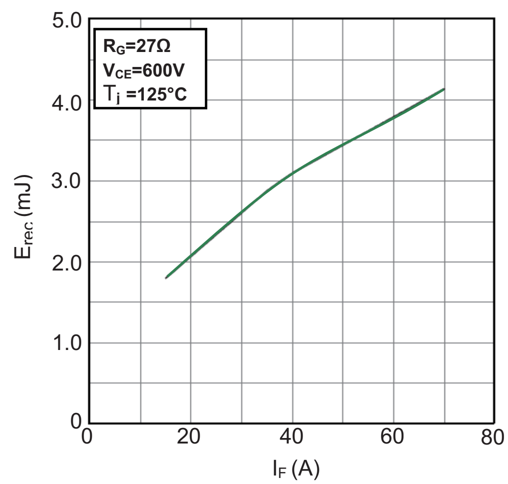


Figure 10: Transient Thermal Impedance of Diode and IGBT-inverter

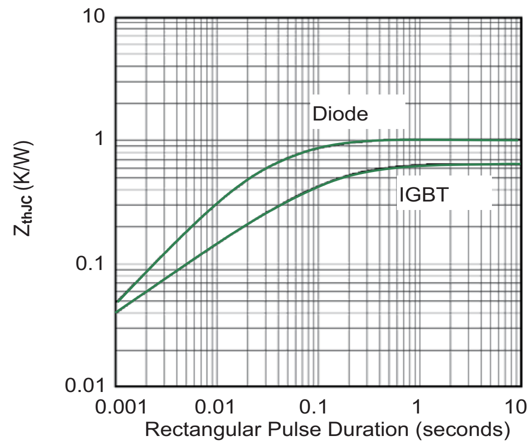


Figure 11: Diode Forward Characteristics Diode- rectifier

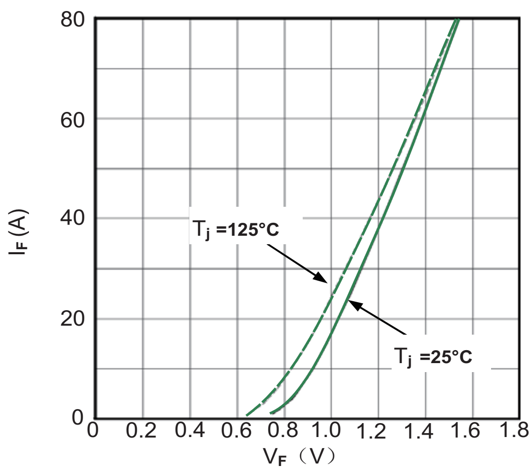


Figure 12: Typical Output Characteristics IGBT- brake chopper

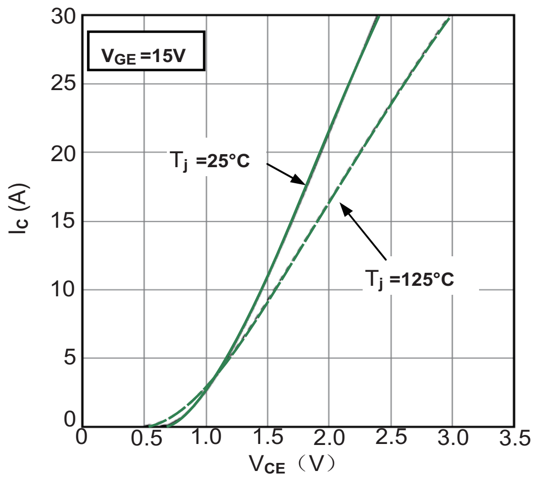


Figure 13: Diode Forward Characteristics Diode - brake chopper

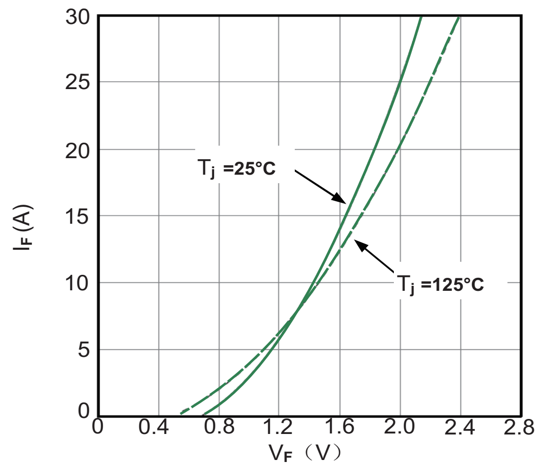
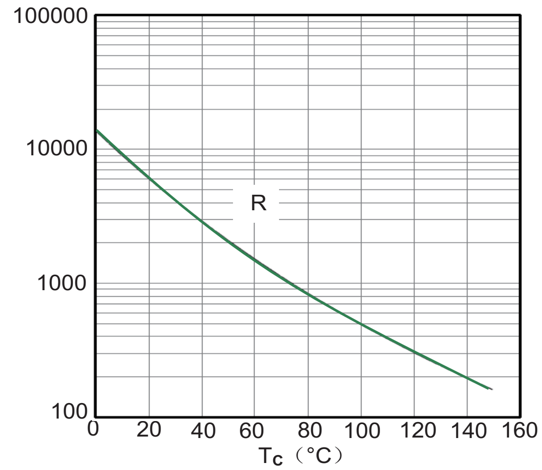
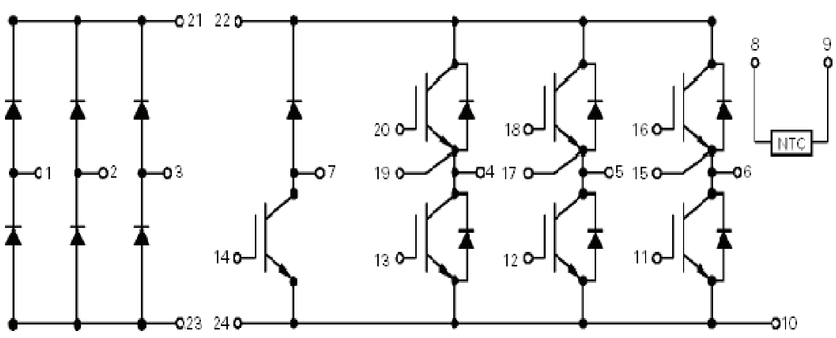


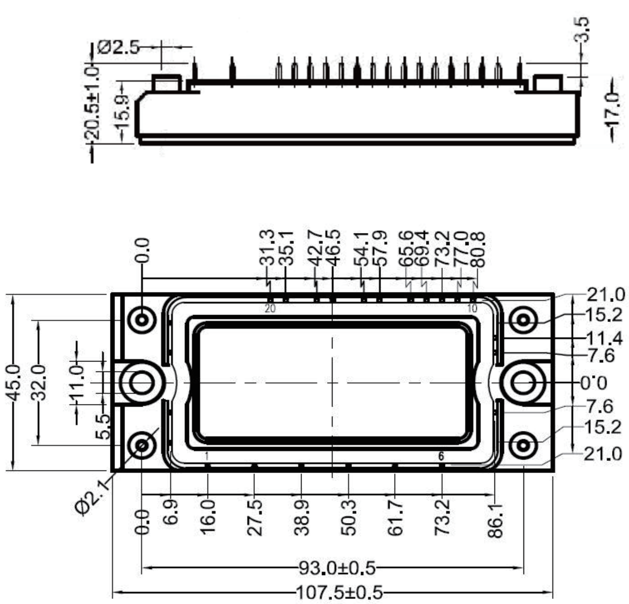
Figure 14: NTC Characteristics



Circuit Diagram



Dimensions-Package H

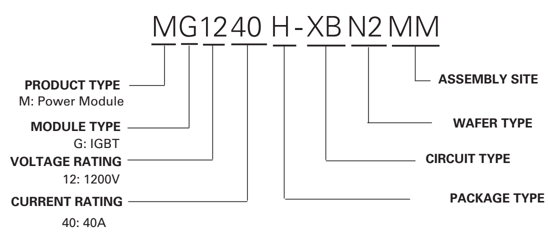


The foot pins are in gold / nickel coating

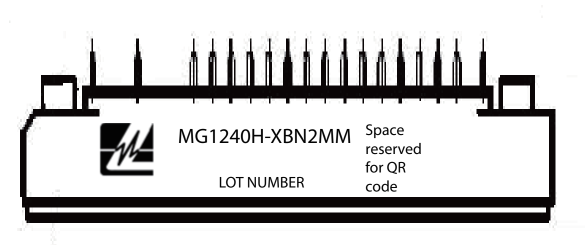
Packing Options

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

Part Numbering System



Part Marking System



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