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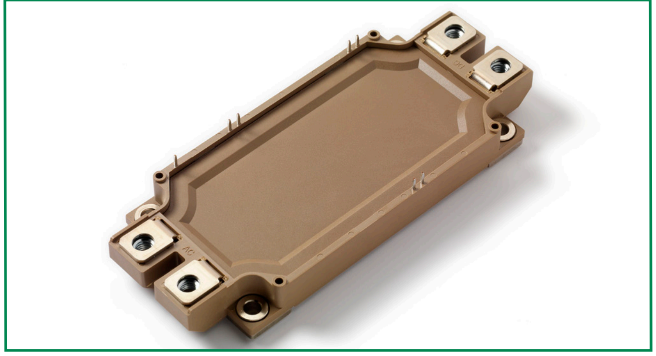
Littelfuse®
Expertise Applied | Answers Delivered

IGBT Power Module

1200 V 600 A IGBT Module

MG12600WB-BR2MM

RoHS



Features

- Trench-gate field stop IGBT technology
- Low saturation voltage and positive temperature coefficient
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- Temperature sense included
- $T_{J\ max}$ = 175 °C

Agency Approvals

AGENCY	AGENCY FILE NUMBER
UL	E71639

Applications

- Industrial and servo drives
- Solar inverters
- High-power converters
- UPS
- Welding
- RoHS compliant

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

Symbol	Parameters	Test Conditions	Values	Unit
$T_{J\ max}$	Max. Junction Temperature		175	°C
$T_{J\ op}$	Operating Temperature		-40~150	°C
T_{stg}	Storage Temperature		-40~125	°C
V_{isol}	Isolation Breakdown Voltage	AC, 50 Hz(R.M.S), t = 1 minute	3000	V
Torque	to heatsink	Recommended (M5)	2.5~5	N·m
	Iolerminal	Recommended (M6)	3~5	N·m
Weight			350	g

Absolute Maximum Ratings (T_C = 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	750	A
		T_C = 80 °C	600	A
I_{CM}	Repetitive Peak Collector Current	t_p = 1 ms	1200	A
P_{tot}	Power Dissipation Per IGBT		2500	W
Diode				
V_{RRM}	Repetitive Reverse Voltage	T_J = 25 °C	1200	V
$I_{F(AV)}$	Average Forward Current	T_C = 25 °C	600	A
I_{FRM}	Repetitive Peak Forward Current	t_p = 1ms	1200	A
I^2t		T_J = 125 °C, t = 10 ms, V_R = 0 V	45	KA^2s

Electrical and Thermal Specifications (T_C = 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 = 24 mA		5.0	5.4	6.4	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	chip	I_C = 600 A, V_{GE} = 15 V, T_J = 25 °C			1.7	2.15	V
			I_C = 600 A, V_{GE} = 15 V, T_J = 125 °C			1.9		
		terminal	I_C = 600 A, V_{GE} = 15 V, T_J = 25 °C			2.0	2.5	V
			I_C = 600 A, V_{GE} = 15 V, T_J = 125 °C			2.4		
I_{CES}	Collector Leakage Current		V_{CE} = 1200 V, V_{GE} = 0 V, T_J = 25 °C				100	µA
			V_{CE} = 1200 V, V_{GE} = 0 V, T_J = 125 °C				1	mA
I_{GES}	Gate Leakage Current		V_{CE} = 0 V, V_{GE} = ±15 V, T_J = 125 °C		-400		400	nA
R_{Gint}	Integrated Gate Resistor					0.5		Ω
Q_g	Gate Charge		V_{CE} = 600 V, I_C = 600 A , V_{GE} = ±15 V			3.4		µC
C_{ies}	Input Capacitance		V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz			60.5		nF
C_{res}	Reverse Transfer Capacitance					1.8		nF
$t_{d(on)}$	Turn-on Delay Time		V_{CC} = 600 V I_C = 600 A R_G = 5 Ω V_{GE} = ±15 V Inductive Load	T_J = 25 °C		250		ns
				T_J = 125 °C		280		ns
t_r	Rise Time			T_J = 25 °C		220		ns
				T_J = 125 °C		240		ns
$t_{d(off)}$	Turn-off Delay Time			T_J = 25 °C		1000		ns
				T_J = 125 °C		1100		ns
t_f	Fall Time			T_J = 25 °C		170		ns
				T_J = 125 °C		190		ns
E_{on}	Turn-on Energy			T_J = 25 °C		20		mJ
				T_J = 125 °C		35		mJ
E_{off}	Turn-off Energy			T_J = 25 °C		105		mJ
				T_J = 125 °C		120		mJ
I_{SC}	Short Circuit Current		t_{psc} ≤ 10 µS , V_{GE} = 15 V; T_J = 125 °C , V_{CC} = 600 V			2400		A
R_{thJC}	Junction-to-Case Thermal Resistance (Per IGBT)						0.06	K/W
Diode								
V_F	Forward Voltage	chip	I_F = 600 A, V_{GE} = 0 V, T_J = 25 °C			2.1	2.5	V
			I_F = 600 A, V_{GE} = 0 V, T_J = 125 °C			2.2		V
t_{RR}	Reverse Recovery Time		I_F = 600 A, V_R = 600 V di_F/dt = -2700 A/µs T_J = 125 °C			330		ns
I_{RRM}	Max. Reverse Recovery Current					305		A
Q_{RR}	Reverse Recovery Charge					96		µC
E_{rec}	Reverse Recovery Energy					42		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance (Per Diode)						0.1	K/W

NTC Characteristics (T_c = 25 °C, unless otherwise specified)

Symbol	Parameters	Test Conditions	Min	Typ	Max	Unit
R_{25}	Resistance	T_c = 25 °C		5		KΩ
$B_{25/50}$	$R_2 = R_{25}$ exp $[B_{25/50}$ $(1/T_2$ - 1/((298, 15 K))]			3375		K

Figure 1: Typical Output Characteristics IGBT Inverter

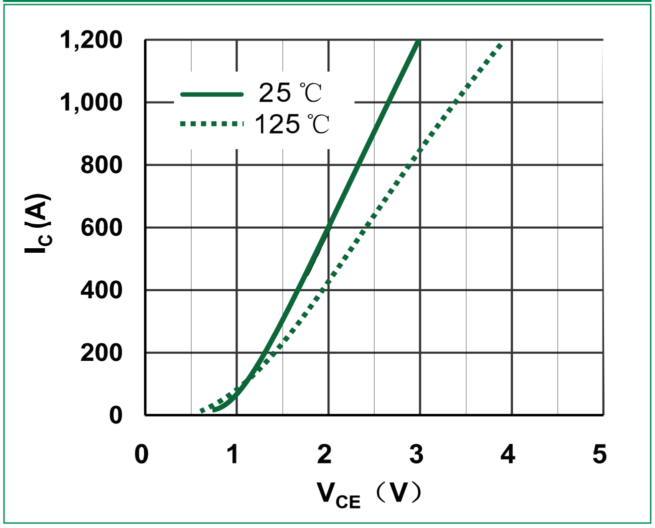


Figure 2: Typical Output Characteristics IGBT Inverter

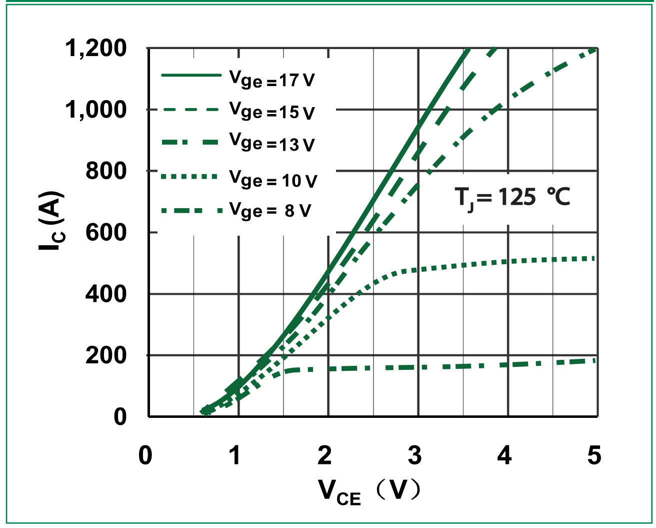


Figure 3: Typical Transfer Characteristics IGBT Inverter

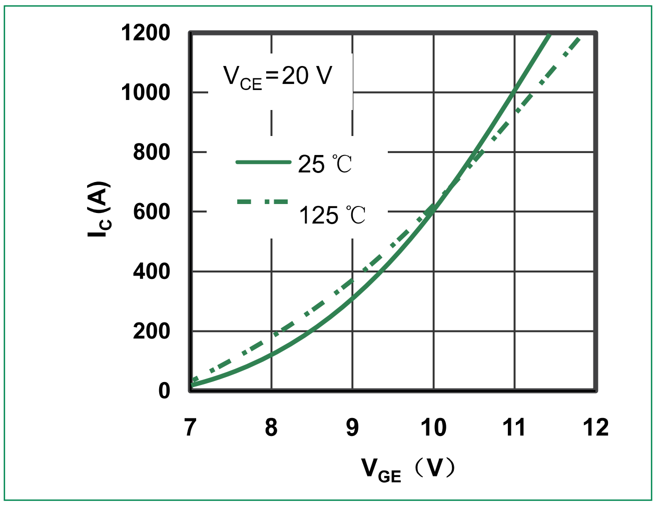


Figure 4: Switching Energy vs. Gate Resistor IGBT Inverter

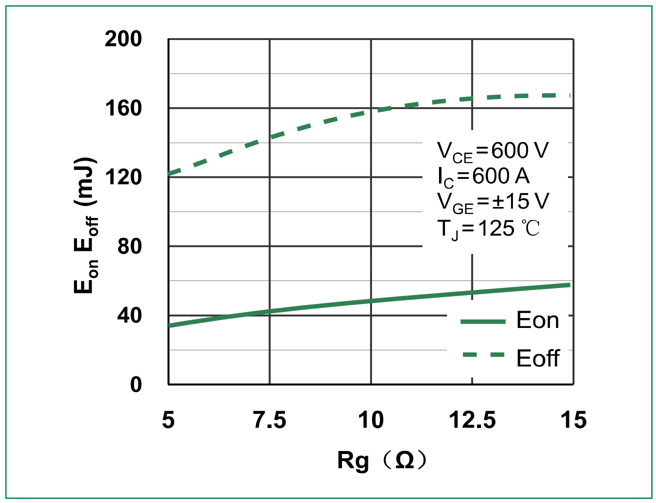


Figure 5: Switching Energy vs. Collector Current IGBT Inverter

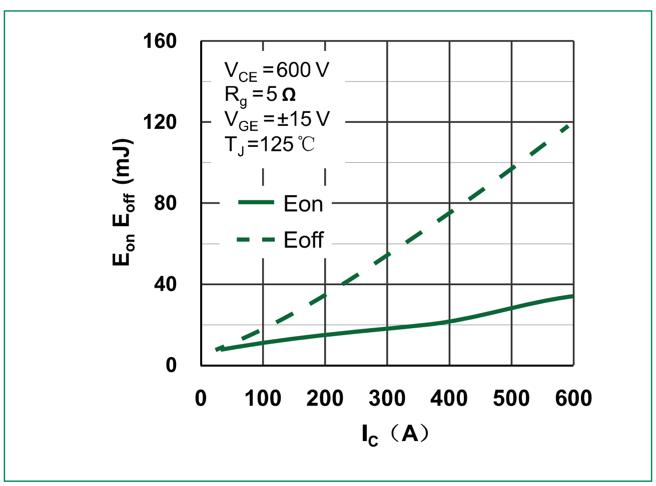


Figure 6: Reverse Biased Safe Operating Area IGBT Inverter

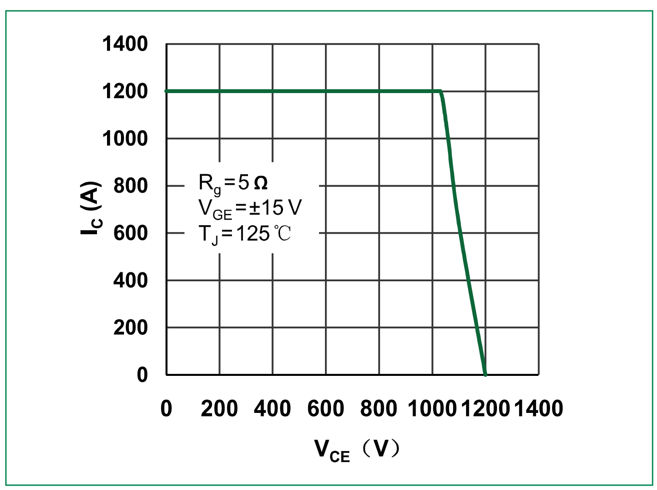


Figure 7: Collector Current vs Case temperature IGBT -inverter

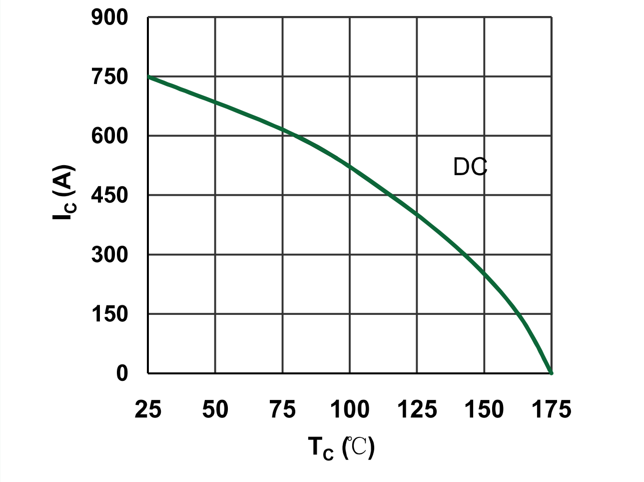


Figure 8: Forward current vs Case temperature Diode -inverter

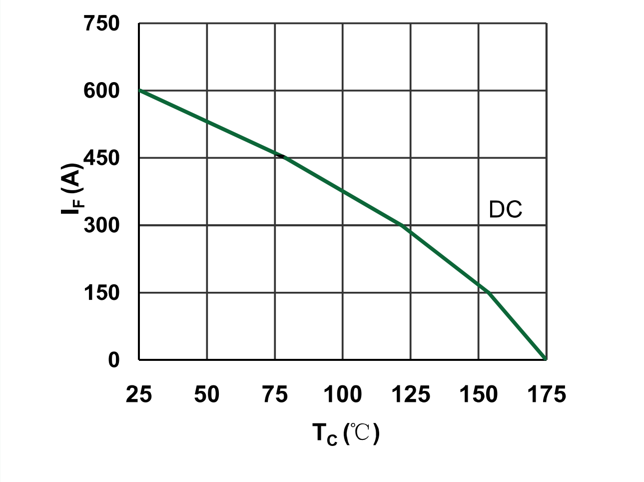


Figure 9: Diode Forward Characteristics Diode -inverter

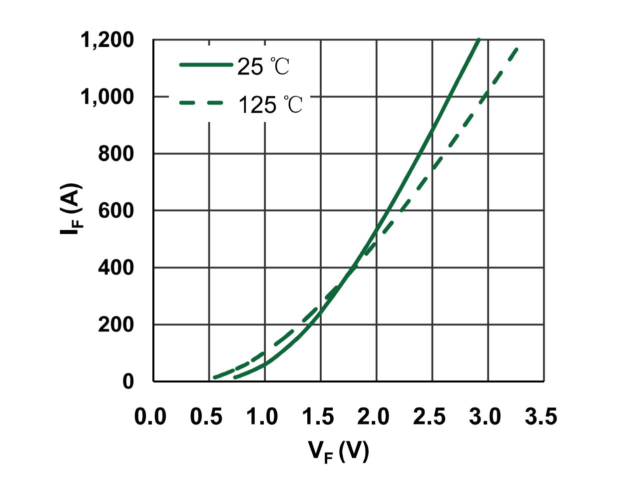


Figure 10: Switching Energy vs Gate Resistor Diode -inverter

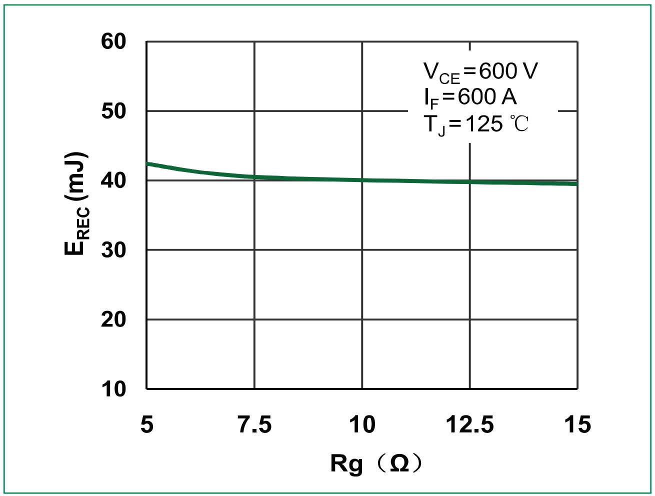


Figure 11: Switching Energy vs Forward Current Diode-inverter

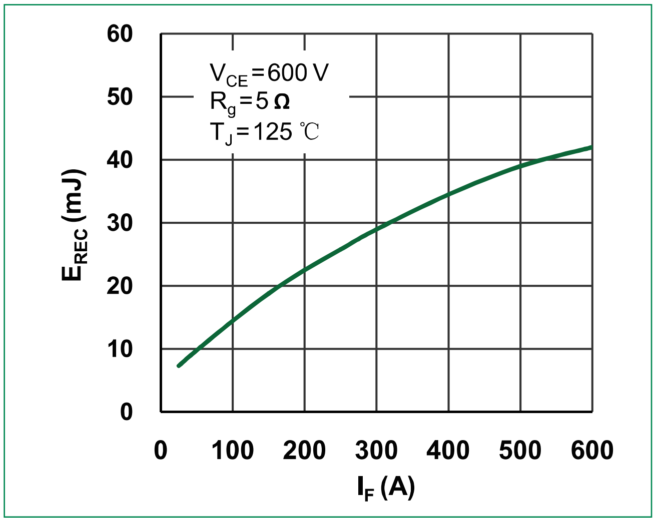


Figure 12: Transient Thermal Impedance of Diode and IGBT -inverter

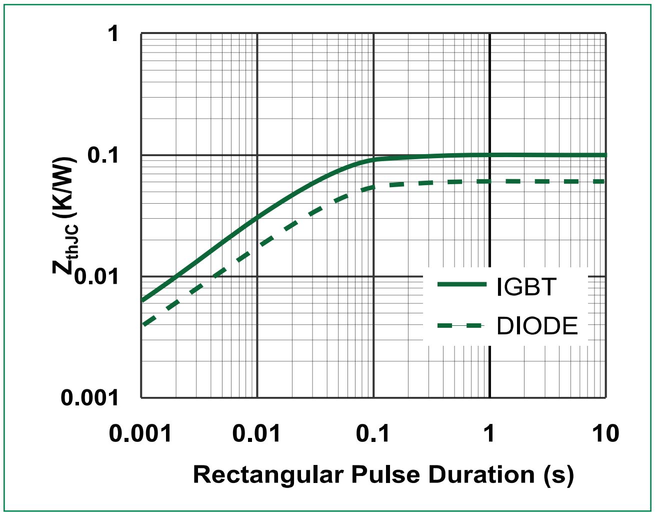
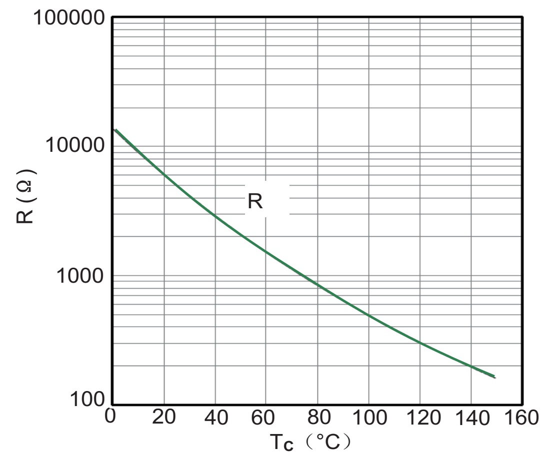
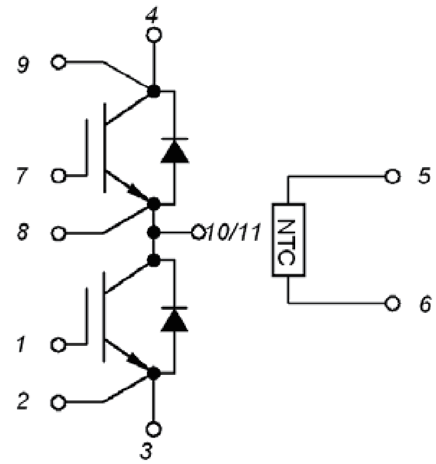


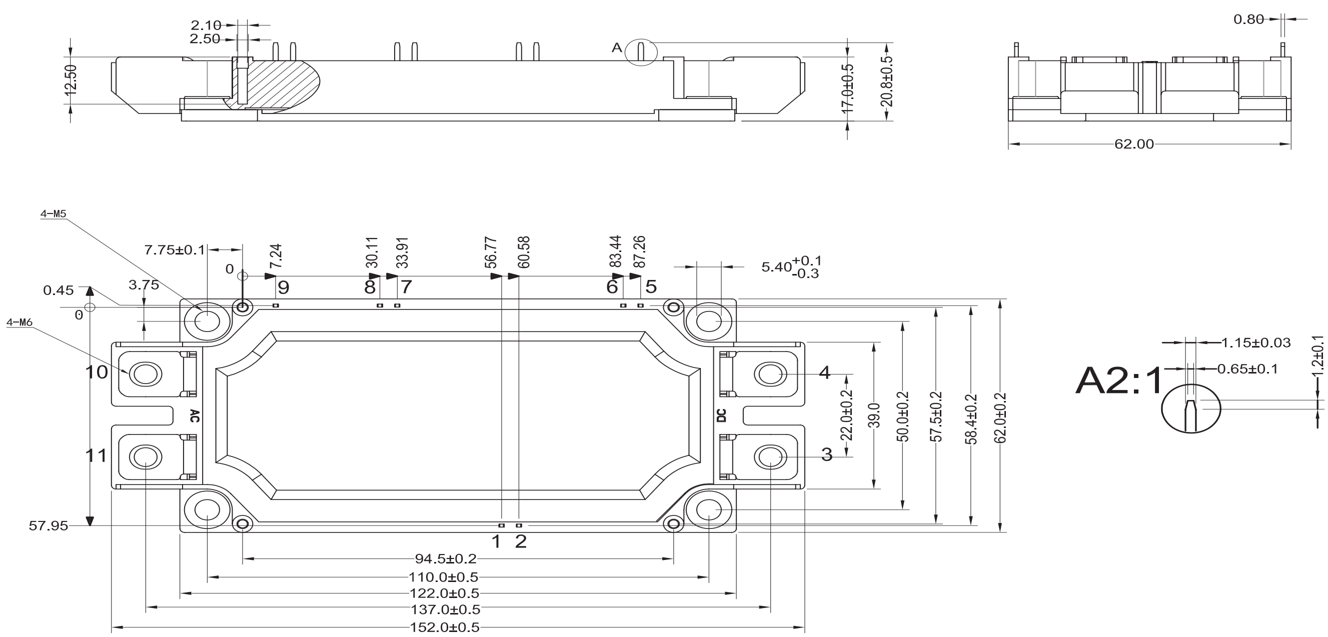
Figure 13: NTC Characteristics



Circuit Diagram



Dimensions-Package WB

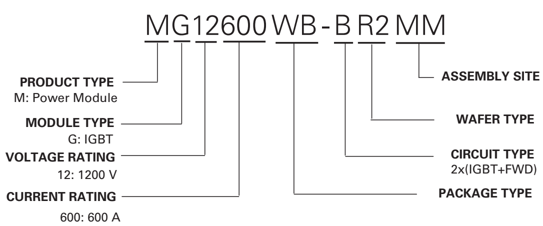


The foot pins are in gold / nickel coating

Packing Options

Part Number	Marking	Weight	Packing Mode	M.O.Q
MG12600WB-BR2MM	MG12600WB-BR2MM	350 g	Bulk Pack	60

Part Numbering System



Part Marking System