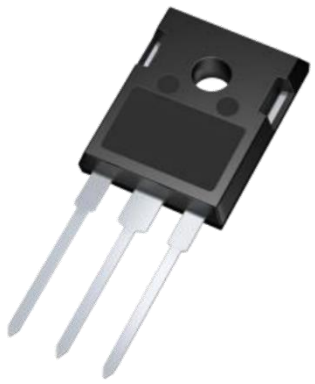


B1M160120HC

1200V ▲ 160mΩ ▲ 20A ▲ SIC MOSFET

SILICON CARBIDE SiC MOSFET ▲ THT type
N-channel enhancement mode
Low on-resistance and capacitance
TO-247-3L package ▲ Epoxy meets UL94-V0
Avalanche ruggedness
Especially for higher system efficiency

SPECIFICATION

Item (T_C = 25°C, unless otherwise noted)		Characteristics
Operating Temperature Range	T_J	-55°C to +150°C
Storage Temperature Range	T_S	-55°C to +150°C
Drain-Source Voltage	$V_{DS\ MAX}$	1200V
Continuous Drain Current	I_D	20A
Drain-Source On-State Resistance Note 1	$R_{DS(ON)TYP}$	160mΩ
Reverse Transfer Capacitance Note 2	C_{RSS}	18pF
Power Dissipation	P_D	118W

Notes

1: V_{GS} = 20V, I_D = 10A

2: V_{DS} = 800V, V_{GS} = 0V, f = 1MHz, V_{AC} = 25mV

APPLICATIONS

EV Charging	Industrial Inverters	Motors & Drives	Power Factor Correction	Renewable Energy	SMPS	UPS

PIN DESCRIPTION

Circuit Diagram	Outline ▪ Front View	Pin No.	Symbol	Description
		1	G	Gate
		2	D	Drain
		3	S	Source

ABSOLUT MAXIMUM RATINGS ▲ T_C = 25°C, unless otherwise noted

Item	Condition	Symbol		Unit
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_{DS} = 100μA	$V_{DS\ MAX}$	1200	V
Continuous Drain Current	V_{GS} = 20V, T_C = 25°C	I_D	20	A
Continuous Drain Current	V_{GS} = 20V, T_C = 100°C	I_D	13	A
Pulse Drain Current	Pulse with t_p limited by $T_{J\ MAX}$	$I_{D,\ pulse}$	40	A
Power Dissipation	T_C = 25°C	P_D	118	W
Gate Source Voltage		$V_{GS,\ MAX}$	-10/+25	V
Recommended Gate Source Voltage		$V_{GS,\ op}$	-5/+20	V
Operating Junction Temperature		T_J	-55 to +150	°C
Operating Junction Temperature		T_J	-55 to +150	°C

ELECTRICAL CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 100μA	$V_{(BR)DSS}$	1200			V
Gate-Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 2.5mA	$V_{GS(th)}$		2.7		V
Gate-Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 2.5mA, T_J = 150°C	$V_{GS(th)}$		2.1		V
Zero Gate Voltage Drain Current	V_{DS} = 1200V, V_{GS} = 0V	I_{DSS}		0.7	45	μA
Zero Gate Voltage Drain Current	V_{DS} = 1200V, V_{GS} = 0V, T_J = 150°C	I_{DSS}		5	200	μA
Gate-Source Leakage Current	V_{GS} = 20V, V_{DS} = 0V	I_{GSS}			250	nA
Drain-Source On-State Resistance	V_{GS} = 20V, I_D = 10A	$R_{DS(ON)}$		160		mΩ
Drain-Source On-State Resistance	V_{GS} = 20V, I_D = 10A, T_J = 150°C	$R_{DS(ON)}$		244		mΩ

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Dynamic Characteristics						
Input Capacitance	V_{DS} = 800V, V_{GS} = 0V, f = 1MHz, V_{AC} = 25mV	C_{ISS}		1100		pF
Output Capacitance	V_{DS} = 800V, V_{GS} = 0V, f = 1MHz, V_{AC} = 25mV	C_{OSS}		73		pF
Reverse Transfer Capacitance	V_{DS} = 800V, V_{GS} = 0V, f = 1MHz, V_{AC} = 25mV	C_{RSS}		18		pF
Internal Gate Resistance	f = 1MHz, V_{AC} = 25mV	$R_{G(INT.)}$		2.8		Ω
Turn-On Delay Time	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	$t_{D(ON)}$		15		ns
Rise Time	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	t_R		19		ns
Turn-Off Delay Time	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	$t_{D(OFF)}$		20		ns
Fall Time	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	t_F		22		ns
Turn-on Switching Energy	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	E_{ON}		63		μJ
Turn-off Switching Energy	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A, $R_{G(ext)}$ = 2.2Ω, Inductive Load	E_{OFF}		72		μJ

BUILT-IN SiC DIODE CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Source-Drain Diode						
Inverse Diode Forward Voltage	V_{GS} = -5V, I_{SD} = 5A	V_{SD}		5.1		V
Reverse Recovery Charge	V_{GS} = 5V, I_{SD} = 10A, V_{DS} = 800V, di/dt = 400A/µs	Q_{RR}		82		nC
Peak Reverse Recovery Current	V_{GS} = 5V, I_{SD} = 10A, V_{DS} = 800V, di/dt = 400A/µs	I_{RRM}		2.45		A

GATE CHARGE CHARACTERISTICS ▲ T_J = 25°C, unless otherwise noted

Item	Condition	Symbol	Min.	Typ.	Max.	Unit
Gate to Source Charge	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A	Q_{GS}		12		nC
Gate to Drain Charge	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A	Q_{GD}		31		nC
Total Gate Charge	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 10A	Q_G		60		nC

THERMAL RESISTANCE PERFORMANCE

Item	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance, Junction to Case	$R_{\theta,JC}$		1.085		K/W

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 ▪ Forward Output Characteristics I_{DS} vs. V_{DS}, T_J = 25°C

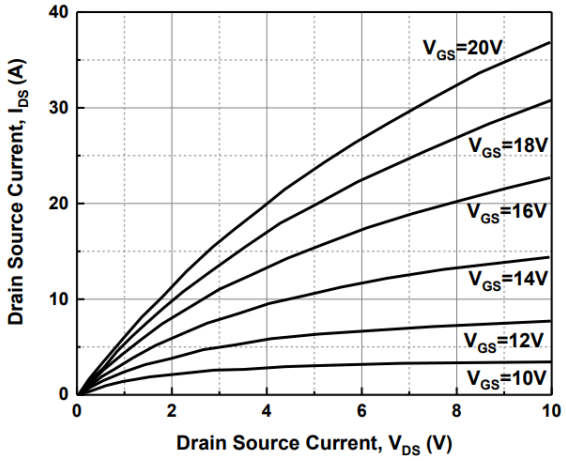


Fig. 2 ▪ Forward Output Characteristics I_{DS} vs. V_{DS}, T_C = 150°C

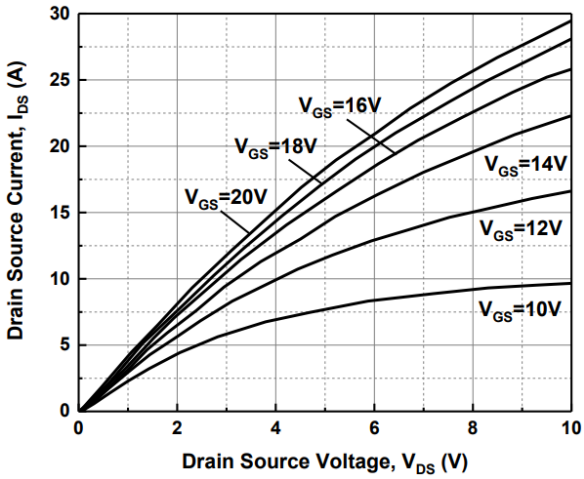


Fig. 3 ▪ Transfer Characteristics for various Junction Temperature T_J

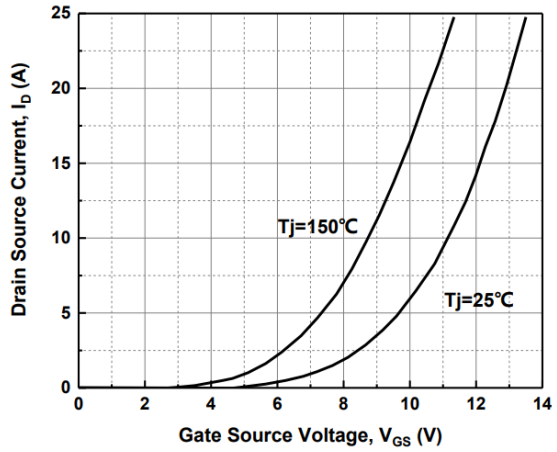


Fig. 4 ▪ On-Resistance R_{ON} vs. Gate Voltage V_{GS} for various Junction Temperature T_J

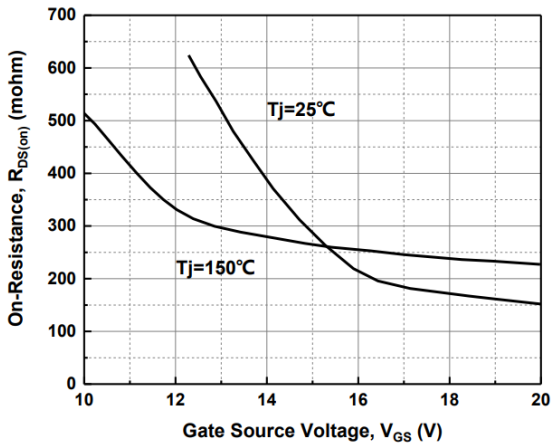


Fig. 5 ▪ On-Resistance R_{ON} vs. Junction Temperature T_J at V_{GS} =20V, I_{DS} = 10A

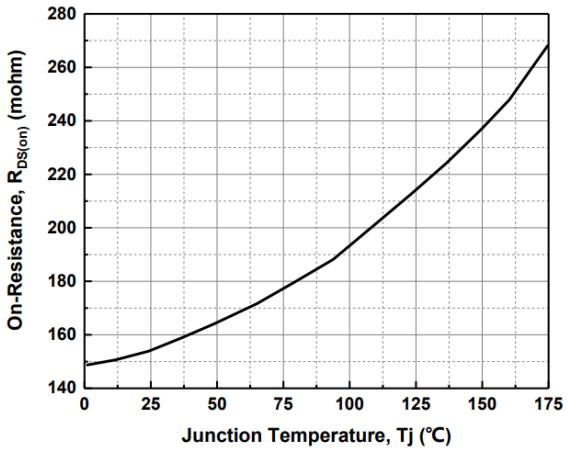
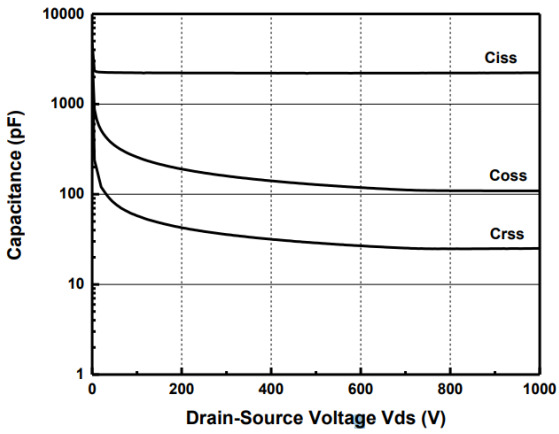


Fig. 6 ▪ Capacitances vs. Drain to Source Voltage V_{DS} (0 to 1000V)



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 ▪ Continuous Drain Current Derating I_{DS} vs. Case Temperature T_C

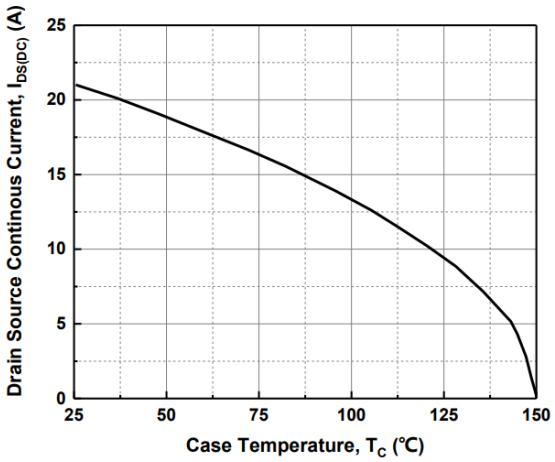


Fig. 8 ▪ Maximum Power Dissipation Derating P_D vs. Case Temperature T_C

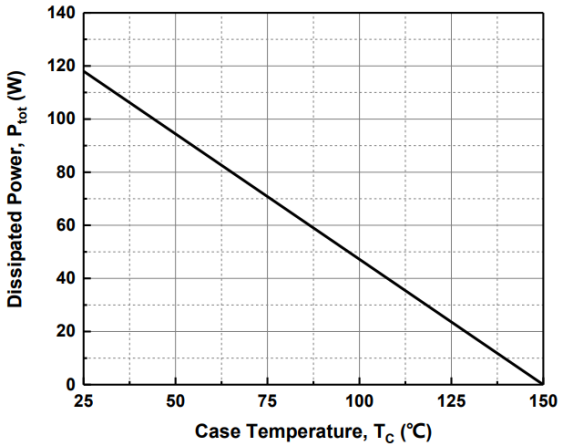


Fig. 9 ▪ Transient Thermal Impedance (Junction – Case)

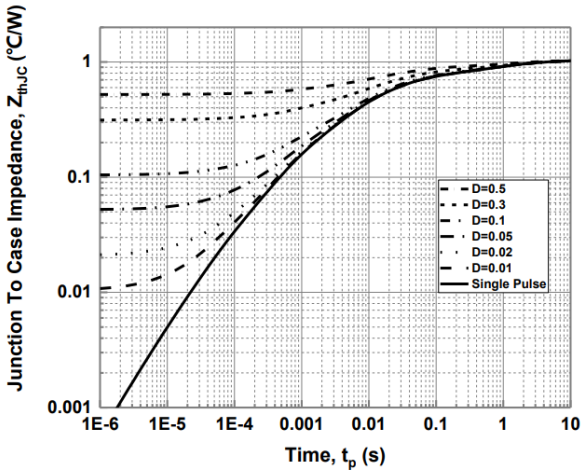
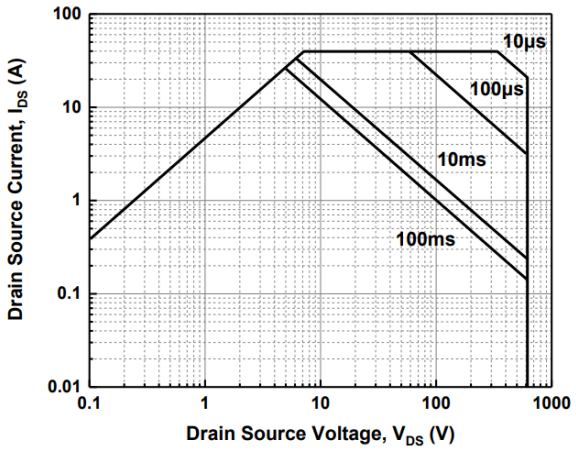
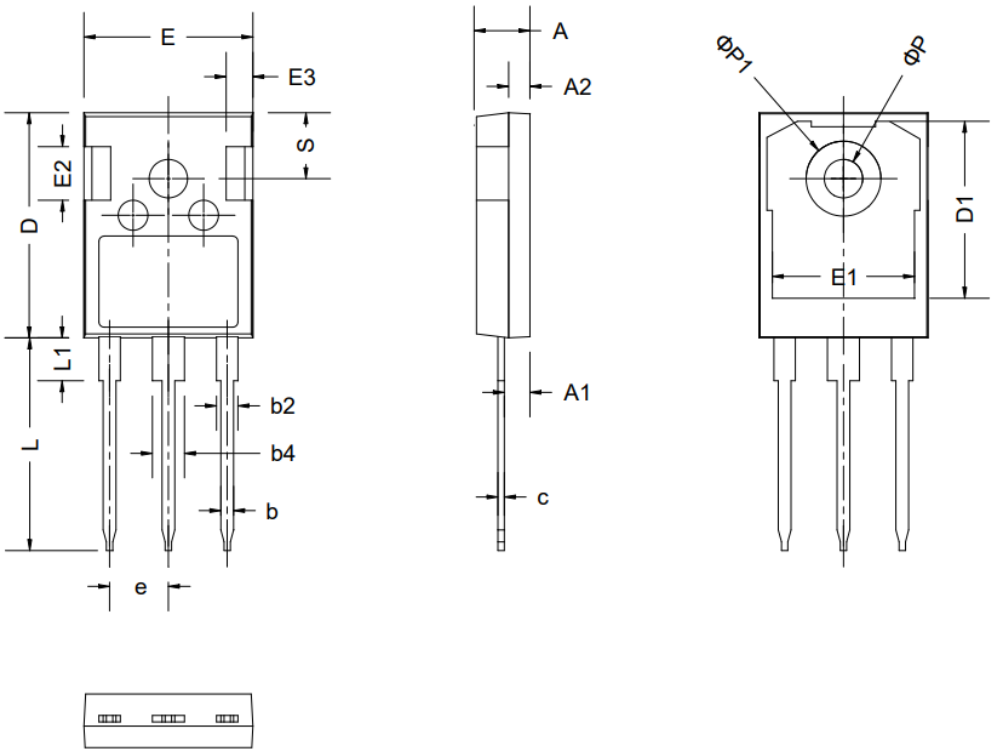


Fig. 10 ▪ Safe Operating Area



PACKAGE OUTLINE



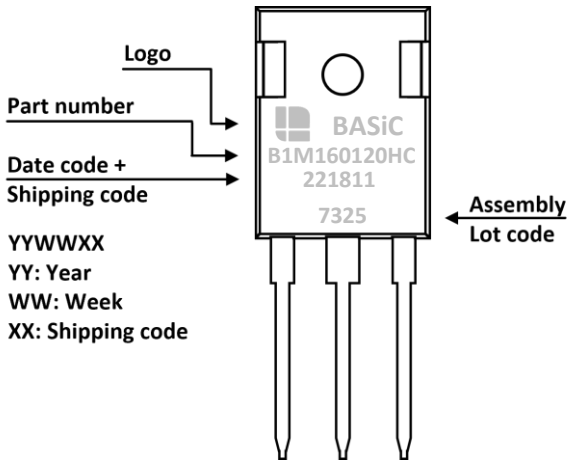
Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10

Sym	Millimeters (Min.)	Millimeters (Typ.)	Millimeters (Max.)
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e		5.44 BSC	
L	19.62	19.92	20.22
L1	-	-	4.30
ØP	3.40	3.60	3.80
ØP1	-	-	7.30
S		6.16 BSC	

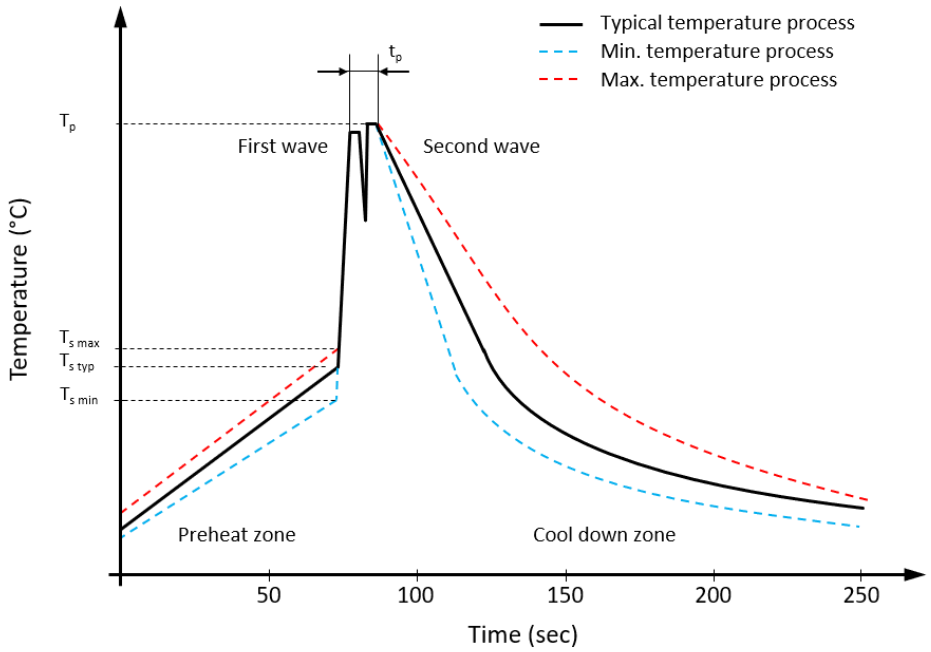
ORDERING INFORMATION

Part Number	Package	Packing	Tube Qty.	Inner Box Qty.	Outer Box Qty.
B1M160120HC	TO-247-3L	Tube	30pcs	300pcs	1,800pcs

PART MARKING



RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

Profile Features		Value ▲ Sn-Pb Assembly	Value ▲ Pb-free Assembly
Preheat temperature min.	$T_{s\,min}$	100 °C	100 °C
Preheat temperature typical	$T_{s\,typ}$	120 °C	120 °C
Preheat temperature max.	$T_{s\,max}$	130 °C	130 °C
Preheat time t_s from $T_{s\,min}$ to $T_{s\,max}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	235 °C to 260 °C	245 °C to 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down date min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second

REVISION TABLE

Revision	Date	Status	Notes
001	30/09/2022	Initial release	Initial publication

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, under-take, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.