

650V N-Channel MOSFET

FEATURES

- ① Fast switching
- ② 100% avalanche tested
- ③ Improved dv/dt capability

APPLICATIONS

- ① Switch Mode Power Supply (SMPS)
- ② Uninterruptible Power Supply (UPS)
- ③ Power Factor Correction (PFC)



Device Marking and Package Information

Device	Package	Marking
MPF5N65	TO-220F	MPF5N65
MP5N65	TO-220C	5N65
MDP5N65	TO-251	5N65
MDT5N65	TO-252	5N65

Absolute Maximum Ratings TC = 25°C, unless otherwise noted

Parameter	Symbol	Value				Unit
		TO-220F	TO-220	TO-251	TO-252	
Drain-Source Voltage (V _{GS} = 0V)	V _{DSS}	650				V
Continuous Drain Current	I _D	5				A
Pulsed Drain Current(note1)	I _{DM}	28				A
Gate-Source Voltage	V _{GSS}	±30				V
Single Pulse Avalanche Energy (note2)	E _{AS}	165				mJ
Avalanche Current (note1)	I _{AS}	5.76				A
Repetitive Avalanche Energy (note1)	E _{AR}	100				mJ
Power Dissipation (TC = 25°C)	P _D	63	97			W
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-55~+150				℃

Thermal Resistance

Parameter	Symbol	Value				Unit
		TO-220F	TO-220	TO-251	TO-252	
Thermal Resistance, Junction-to-Case	R _{thJC}	1.98	1.29			K/W
Thermal Resistance, Junction-to-Ambient	R _{thJA}	62.5	60			

Specifications TJ = 25℃, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	650	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V, T _J = 25℃	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.0	--	4.0	V
Drain-Source On-Resistance (Note3)	R _{DS(on)}	V _{GS} = 10V, I _D = 3.5A	--	1.1	1.35	Ω
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz	--	891	--	pF
Output Capacitance	C _{oss}		--	87	--	
Reverse Transfer Capacitance	C _{rss}		--	10	--	
Total Gate Charge	Q _g	V _{DD} = 520V, I _D = 7A, V _{GS} = 10V	--	32	--	nC
Gate-Source Charge	Q _{gs}		--	4.6	--	
Gate-Drain Charge	Q _{gd}		--	14	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 325V, I _D = 7A, R _G = 25 Ω	--	39	--	ns
Turn-on Rise Time	t _r		--	23	--	
Turn-off Delay Time	t _{d(off)}		--	137	--	
Turn-off Fall Time	t _f		--	60	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25℃	--	--	7.0	A
Pulsed Diode Forward Current	I _{SM}		--	--	28	
Body Diode Voltage	V _{SD}	T _J = 25℃, I _{SD} = 3.5A, V _{GS} = 0V	--	--	1.4	V
Reverse Recovery Time	t _{rr}	V _{GS} = 0V, I _S =7A, diF/dt =100A /μs	--	575	--	ns
Reverse Recovery Charge	Q _{rr}		--	1.9	--	μC

Notes

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature
- 2.L=10mH, $V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^{\circ}\text{C}$
- 3.Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 1\%$

Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

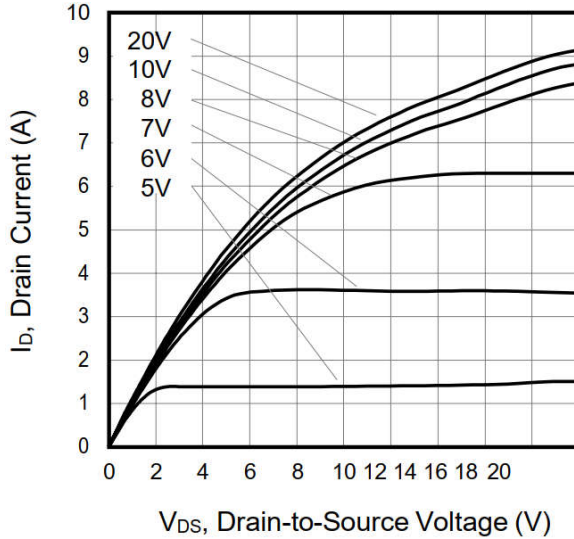


Figure 1. Output Characteristics ($T_J = 25^\circ\text{C}$)

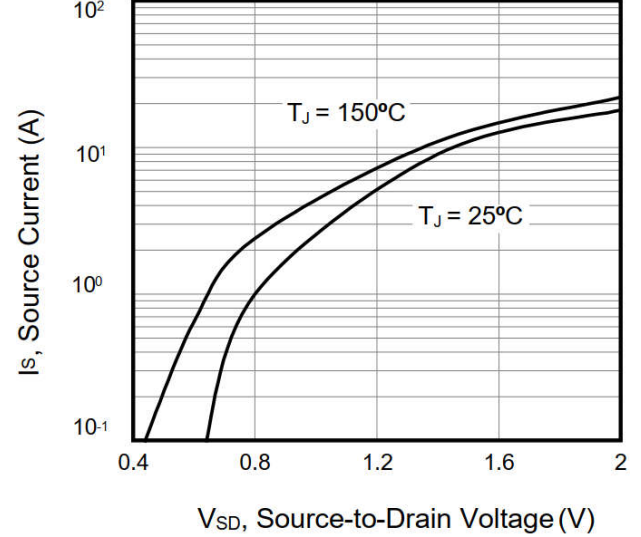


Figure 3. Drain Current vs. Temperature

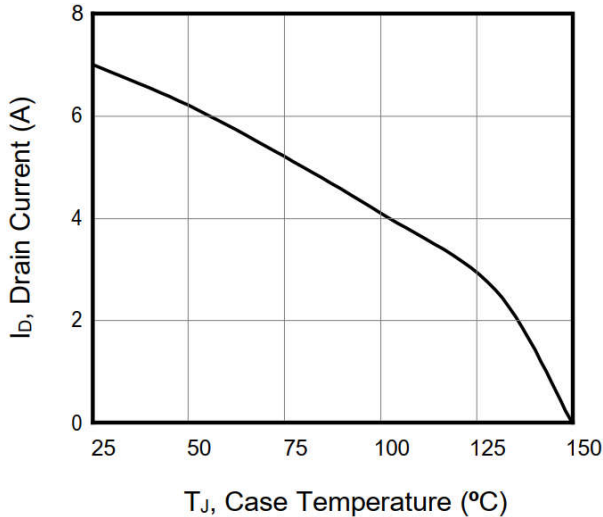


Figure 3. Drain Current vs. Temperature

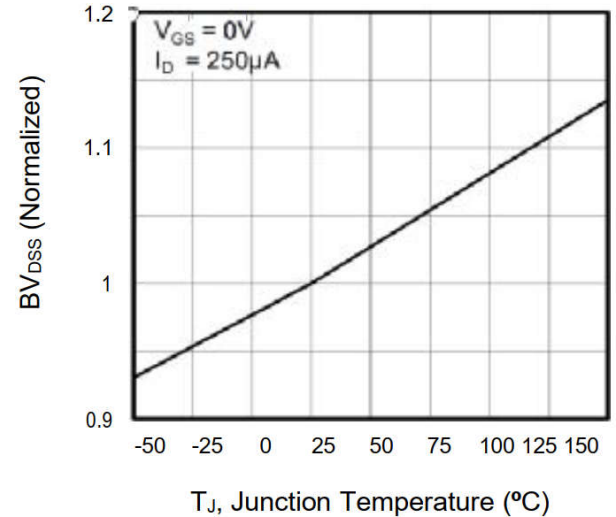


Figure 5. Transfer Characteristics

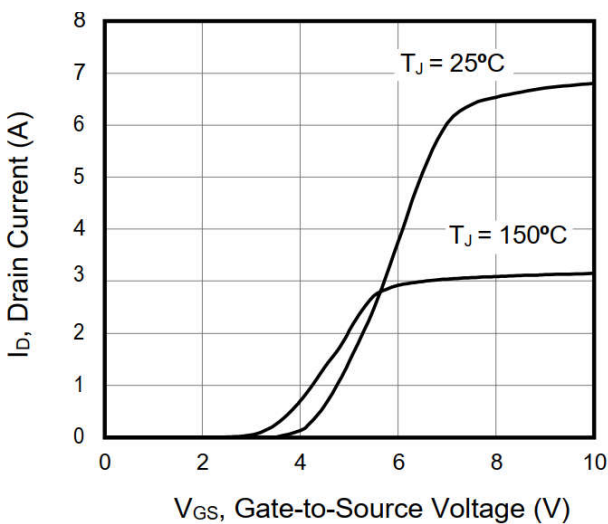
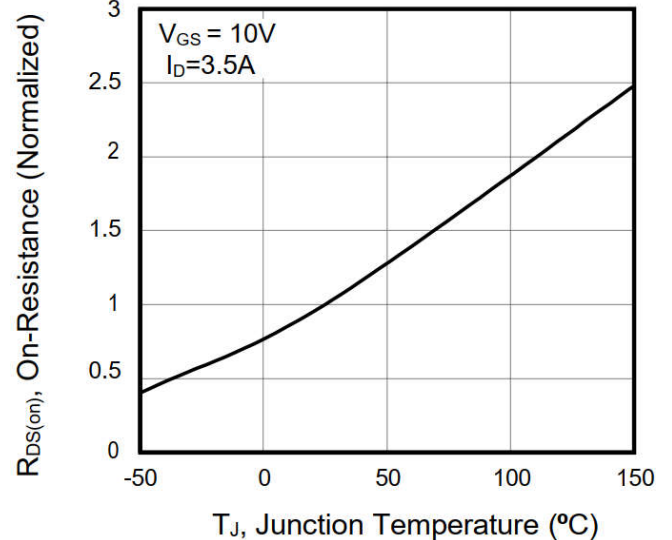


Figure 6. On-Resistance vs. Temperature



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Capacitance

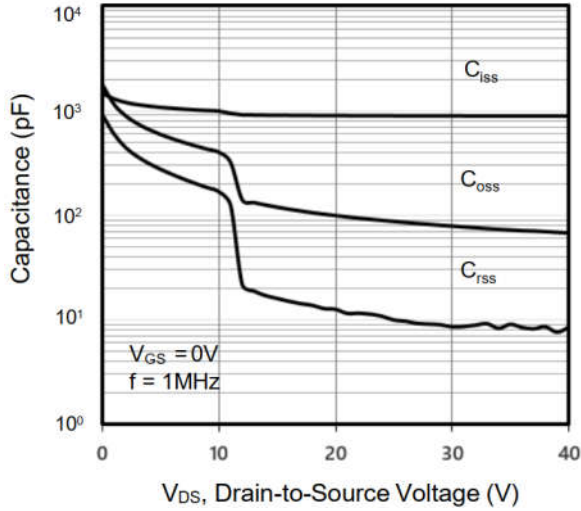


Figure 8. Gate Charge

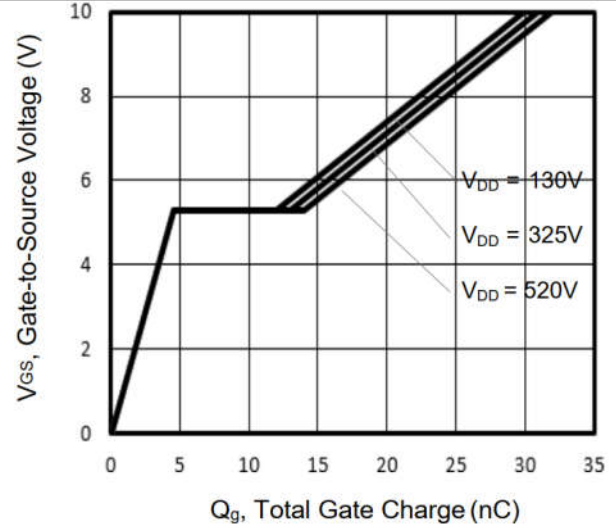


Figure 9. Transient Thermal Impedance
TO-220, TO-251, TO-252

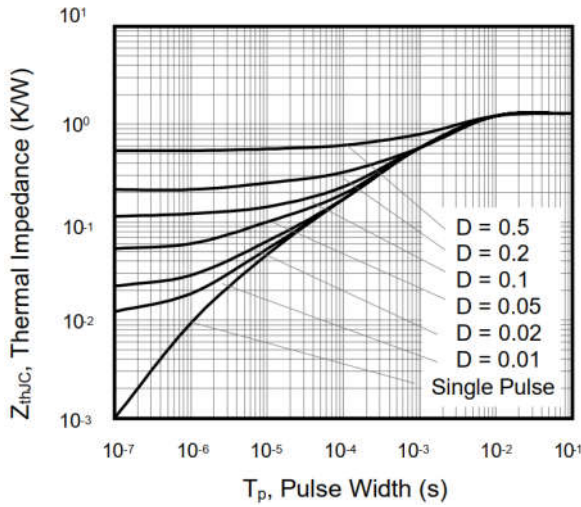


Figure 10. Transient Thermal Impedance
TO-220F

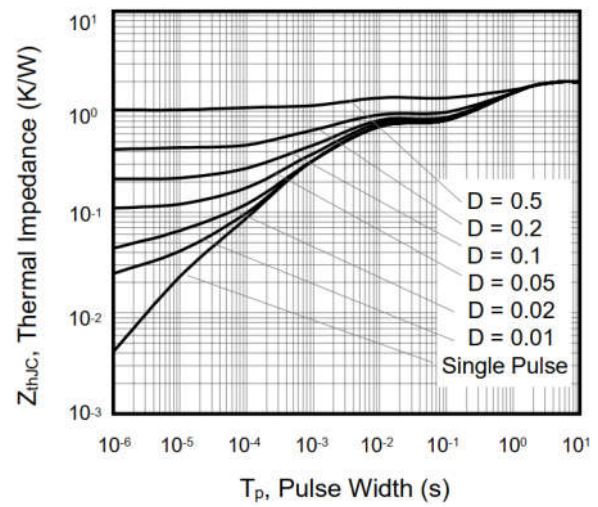


Figure A: Gate Charge Test Circuit and Waveform

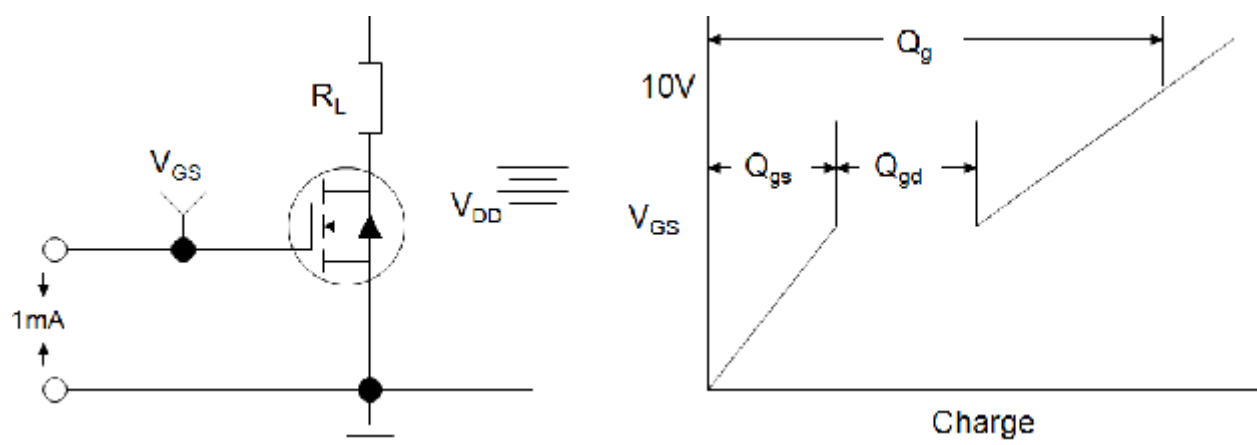


Figure B: Resistive Switching Test Circuit and Waveform

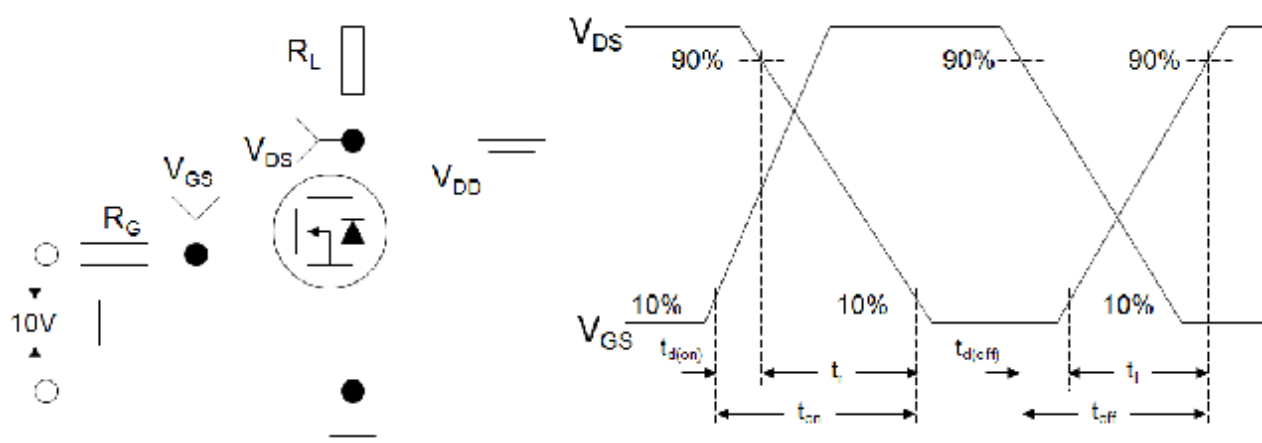
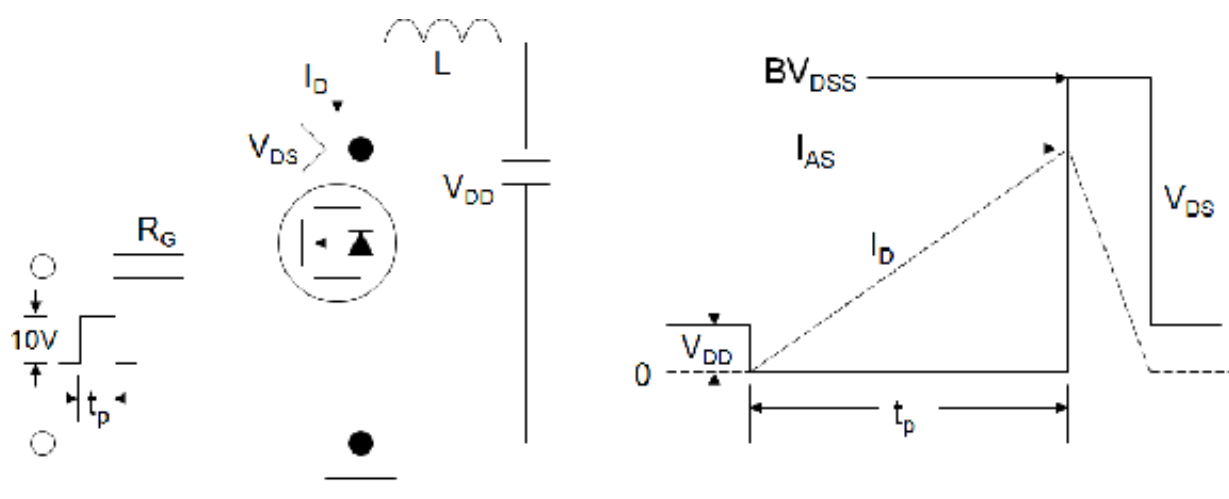
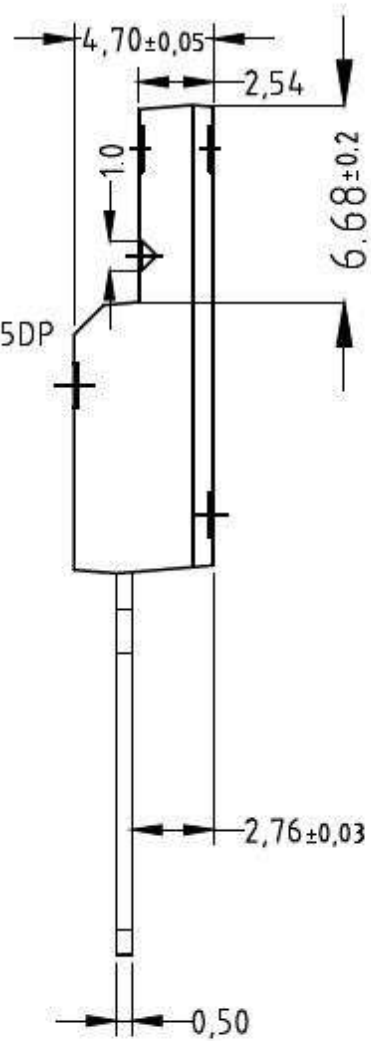
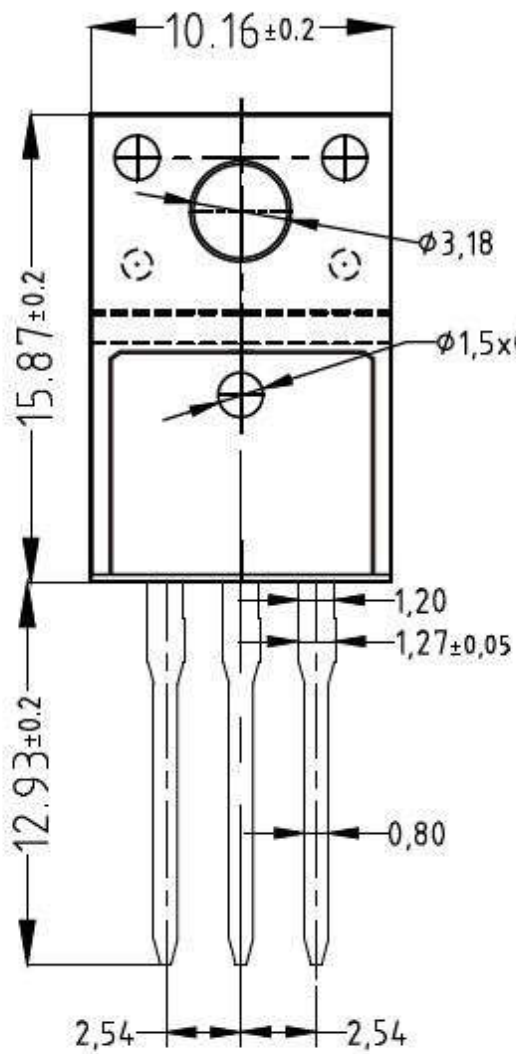
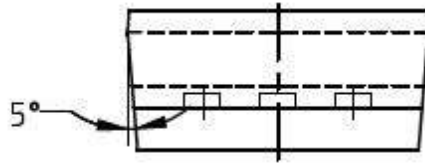


Figure C: Unclamped Inductive Switching Test Circuit and Waveform





TO-220F



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MPF5N65

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

CONTACT:

深圳市迈诺斯科技有限公司（总部）

地址：深圳市福田区华富街道田面社区深南中路4026号田面城市大厦22B-22C

邮编：518025

电话：0755-83273777