

N-Channel 650V (D-S) SiC MOSFET

Features

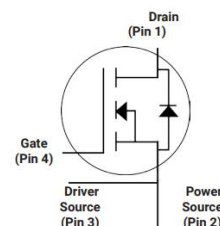
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant



TO-247-4L

Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High voltage DC/DC converters



Absolute Maximum Ratings ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain Source Voltage		V _{DS}	650	V
Gate Source Voltage		V _{GS}	-8/+22	V
Recommend Gate Source Voltage		V _{GSop}	-4/+18	V
Drain Current Continuous V _{GS} =18V	T _C =25°C	I _D	37	A
	T _C =100°C		26	
Power Dissipation	T _C =25°C	P _D	183	W
Operating Temperature and Storage Temperature Range		T _J /T _{STG}	-55 to +175	°C

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Case	R_{thJC}	0.82	$^{\circ}\text{C/W}$
Thermal Resistance Junction to Ambient	R_{thJA}	40	$^{\circ}\text{C/W}$

Electrical Characteristics (T_J=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	650	--	--	V
Gate Leakage Current	I _{GSS}	V _{GS} =18V, V _{DS} =0V	--	--	250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	1	100	μA
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =3.6mA	2	2.8	4	V
		V _{DS} =V _{GS} , I _{DS} =3.6mA, T _J =175°C	--	2.1	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =18V, I _D =13.2A	--	60	80	mΩ
		V _{GS} =18V, I _D =13.2A, T _J =175°C	--	73	--	
Drain-Source On-state Resistance	R _{DS(on)}	V _{GS} =15V, I _D =13.2A	--	80	105	mΩ
		V _{GS} =15V, I _D =13.2A, T _J =175°C	--	90	--	
Total Gate Charge	Q _g	V _{GS(off)} =-4V, V _{GS(on)} =18V V _{DD} =400V, I _D =13.2A	--	48.9	--	nC
Gate Source Charge	Q _{gs}		--	11.6	--	
Gate Drain Charge	Q _{gd}		--	20.6	--	
Turn-On Switching Energy	E _{ON}	V _{GS} =-4/+18V, V _{DD} =400V · I _D =13.2A, R _G =5Ω, L=100uH	--	42.4	--	μJ
Turn-Off Switching Energy	E _{OFF}		--	16.5	--	
Turn-on Delay Time	t _{d(on)}		--	9.3	--	ns
Turn-on Rise Time	t _r		--	3.2	--	
Turn-off Delay Time	t _{d(off)}		--	15.7	--	
Turn-off Fall Time	t _f		--	7.4	--	
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =650V, V _{AC} =25mV, f=1MHz	--	1039	--	pF
Output Capacitance	C _{oss}		--	90	--	
Reverse Transfer Capacitance	C _{rss}		--	11	--	
Gate resistance	R _G	V _{AC} = 25mV, f=1MHz	--	0.9	--	Ω

Reverse Diode Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{SD}	$I_{SD}=6.6\text{A}$, $V_{GS}=-4\text{V}$	--	3.7	--	V
		$I_{SD}=6.6\text{A}$, $V_{GS}=-4\text{V}$, $T_J=175^{\circ}\text{C}$	--	3.3	--	
Continuous Diode Forward Current	I_{SD}	$V_{GS}=-4\text{V}$	--	35	--	A
Reverse Recovery Time	t_{rr}	$V_R=400\text{V}$, $I_F=13.2\text{A}$, $V_{GS}=-4\text{V}$, $di/dt=800\text{A}/\mu\text{s}$	--	17.6	--	ns
Reverse Recovery Charge	Q_{rr}		--	82	--	nC

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

Figure 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

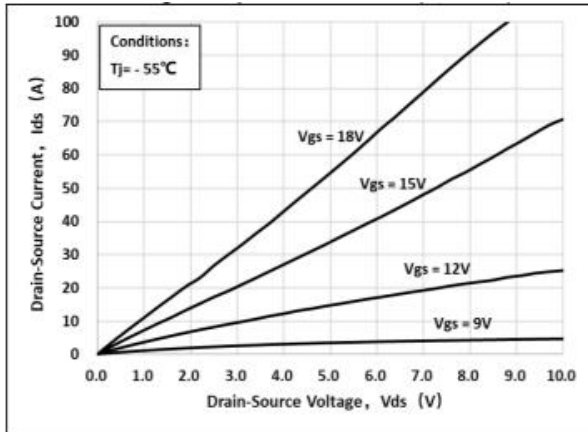


Figure 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

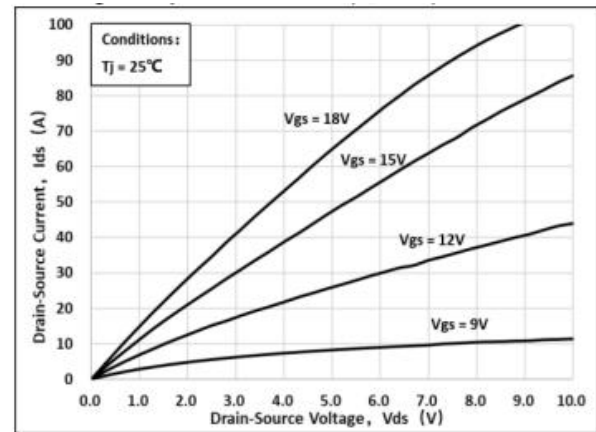


Figure 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

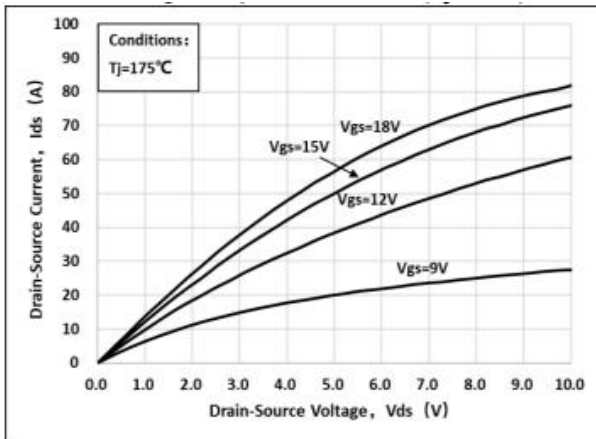


Figure 4. $R_{DS(on)}$ Vs I_{DS} Characteristic

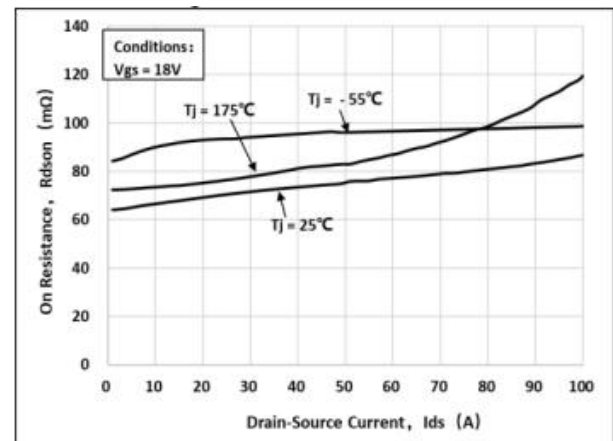


Figure 5. $R_{DS(on)}$ vs. Temperature

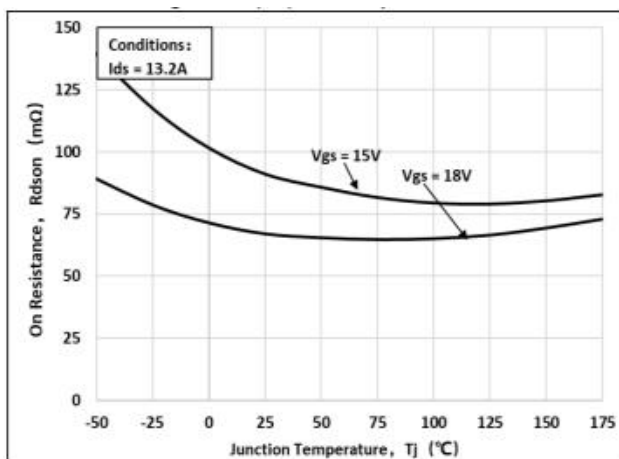
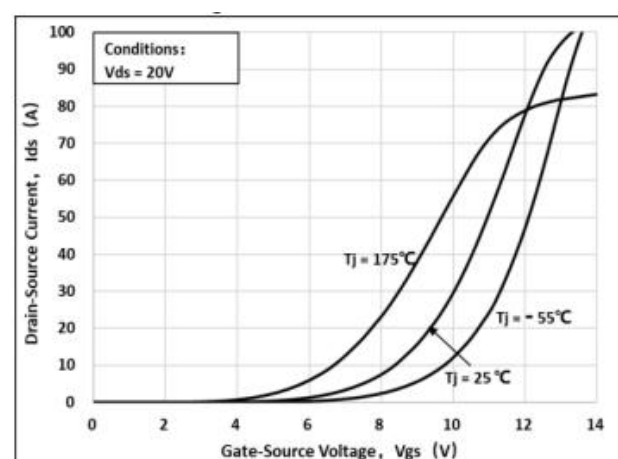


Figure 6. Transfer Characteristic



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

Figure 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

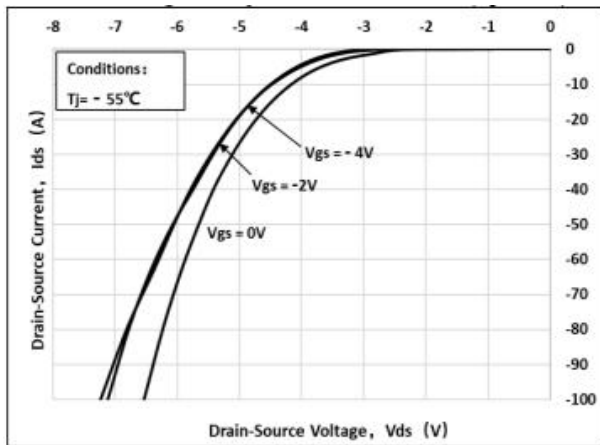


Figure 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

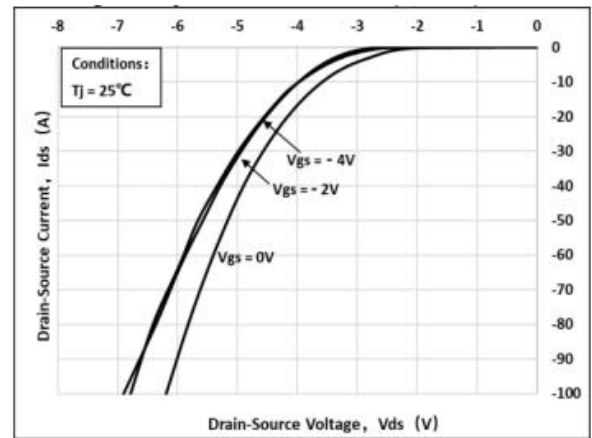


Figure 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

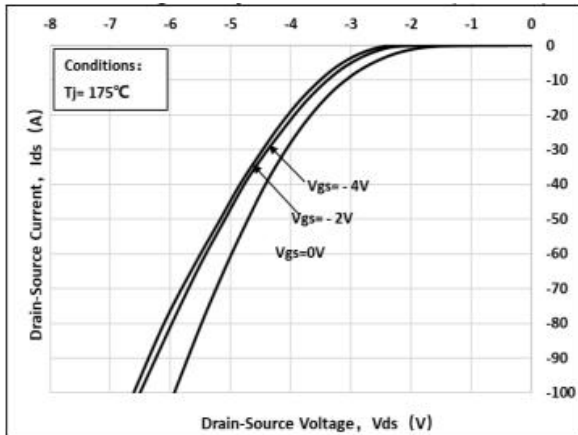


Figure 10: V_{TH} Vs T_J Temperature Characteristic

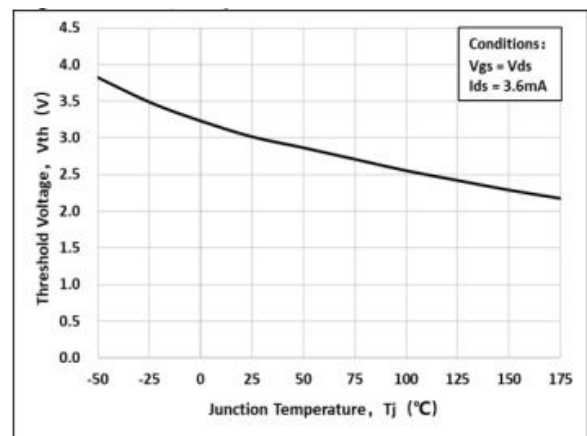


Figure 11: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

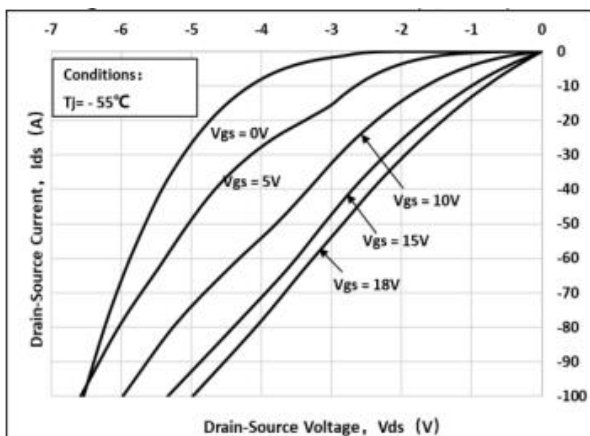
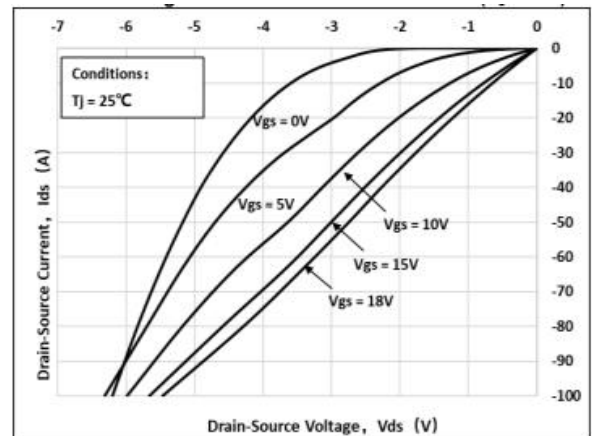


Figure 12: 3rd Quadrant Characteristic ($T_J = 25^\circ\text{C}$)



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

Figure 13: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

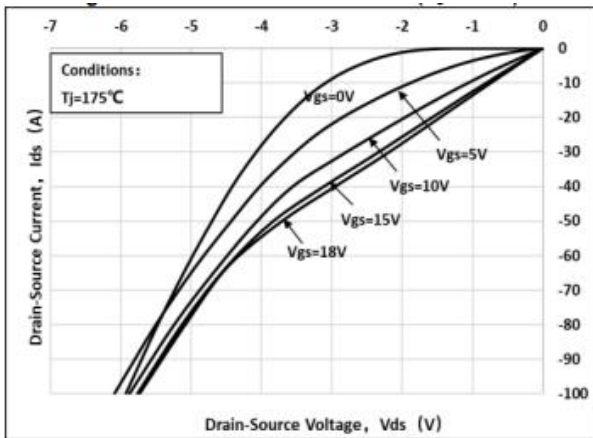


Figure 14: Gate Charge Characteristics

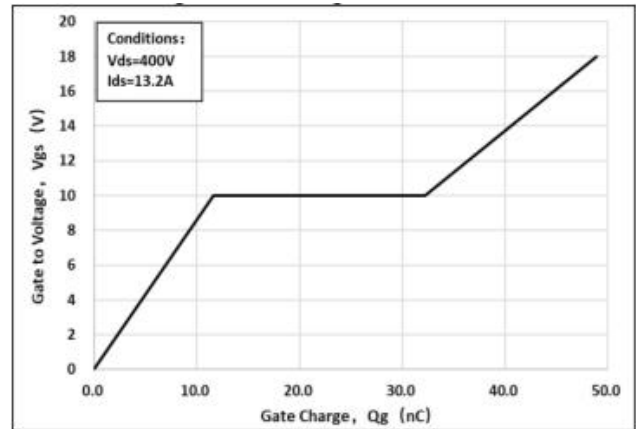


Figure 15: Capacitance Characteristic

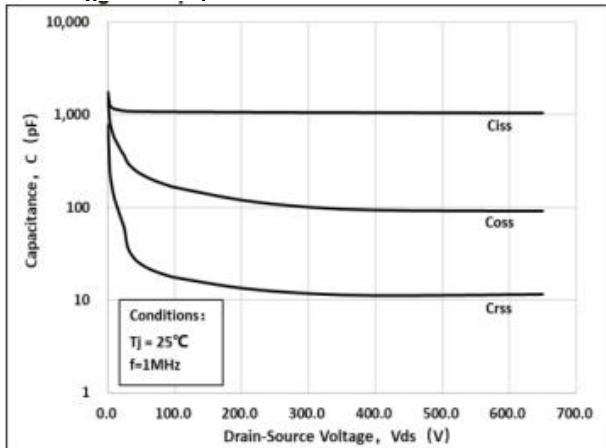


Figure 16: Safe Operating Area

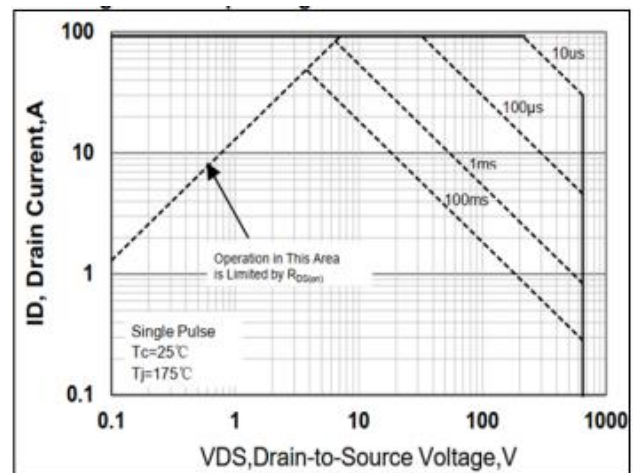
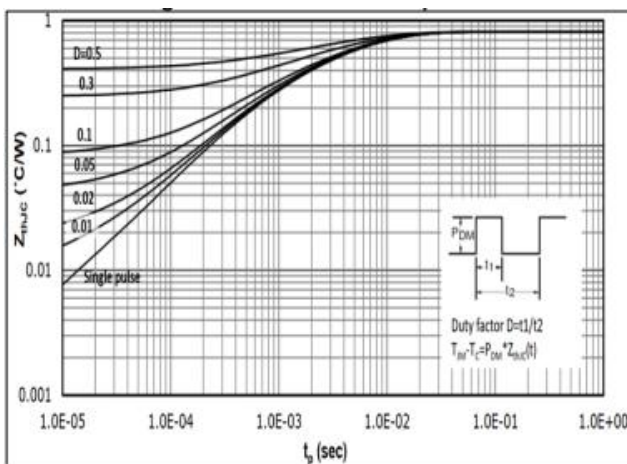
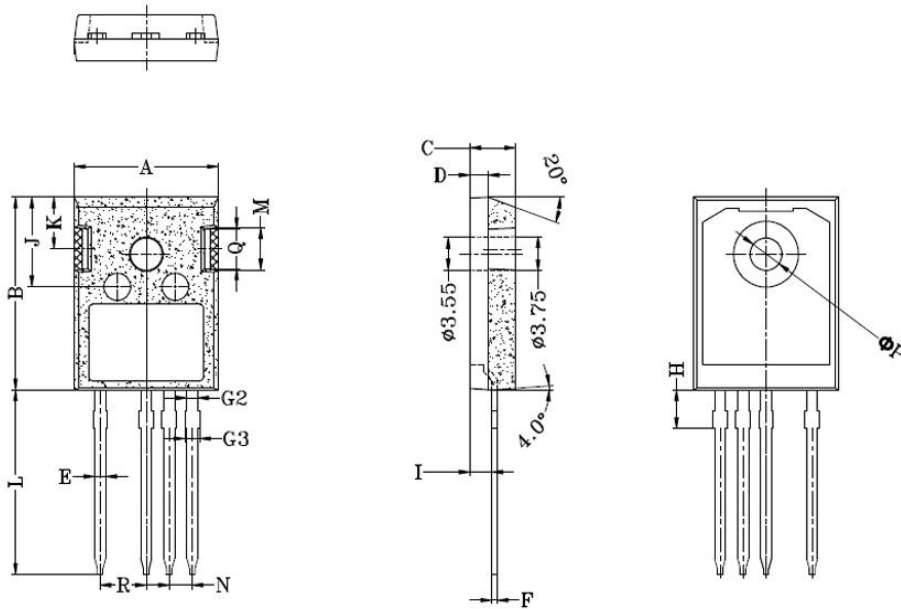


Figure 17: Transient Thermal Impedance



Package Outline Dimensions (Unit: millimeters)

TO-247-4L



项目	规范(mm)	
	MIN	MAX
A	15.80	16.00
B	20.90	21.10
C	4.90	5.10
D	1.90	2.10
E	1.10	1.30
F	0.50	0.70
G2	1.10	1.30
G3	1.18	1.38
H	4.18	4.38
I	2.30	2.50
J	9.65	9.85
K	5.54	5.74
L	19.80	20.20
M	4.50	4.70
N	2.34	2.74
Φ P	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

Disclaimers

These materials are intended as a reference to assist our customers in the selection of the Suzhou Good-Ark product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Suzhou Good-Ark Electronics Co., Ltd. or a third party.

Suzhou Good-Ark Electronics Co., Ltd. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.

All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Suzhou Good-Ark Electronics Co., Ltd. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Suzhou Good-Ark Electronics Co., Ltd. or an authorized Suzhou Good-Ark Electronics Co., Ltd. for the latest product information before purchasing a product listed herein. The information described here may contain technical inaccuracies or typographical errors. Suzhou Good-Ark Electronics Co., Ltd. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors. Please also pay attention to information published by Suzhou Good-Ark Electronics Co., Ltd. by various means, including our website home page.

(<http://www.goodark.com>)

When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Suzhou Good-Ark Electronics Co., Ltd. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.

The prior written approval of Suzhou Good-Ark Electronics Co., Ltd. is necessary to reprint or reproduce in whole or in part these materials.

Please contact Suzhou Good-Ark Electronics Co., Ltd. or an authorized distributor for further details on these materials or the products contained herein.