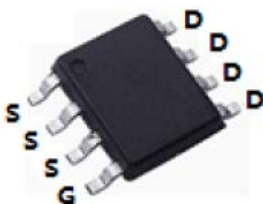
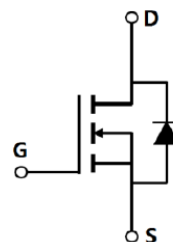


Main Product Characteristics

V_{DSS}	60V
$R_{DS(on)}$	6m Ω (typ.)
I_D	12A ①



SOP8



Schematic diagram

Features and Benefits

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Fast switching and reverse body recovery
- 150°C operating temperature



Applications

- Consumer electronic power supply
- Motor control
- Synchronous-rectification
- Isolated DC/DC convertor

Description

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute max Rating

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V ①	12	A
I_{DM}	Pulsed Drain Current ②	48	
P_D @TC = 25°C	Power Dissipation ③	4	W
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy @ L=0.3mH	100	mJ
I_{AS}	Avalanche Current @ L=0.3mH	26	A
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

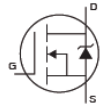
Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-ambient ($t \leq 10s$) ④	—	31	°C/W

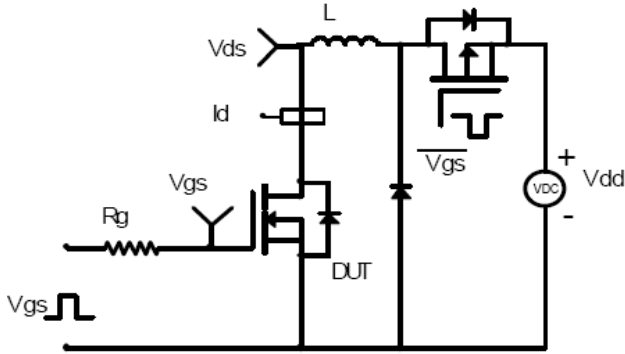
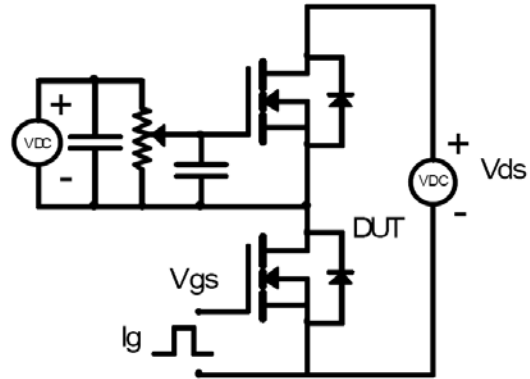
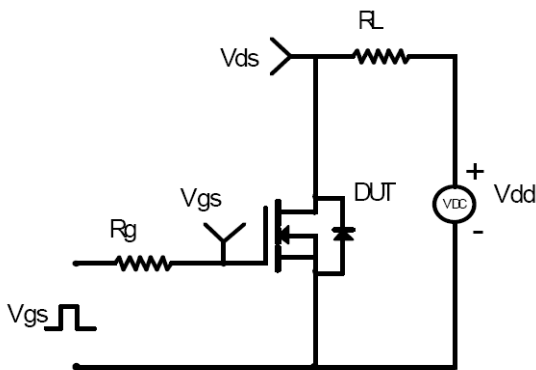
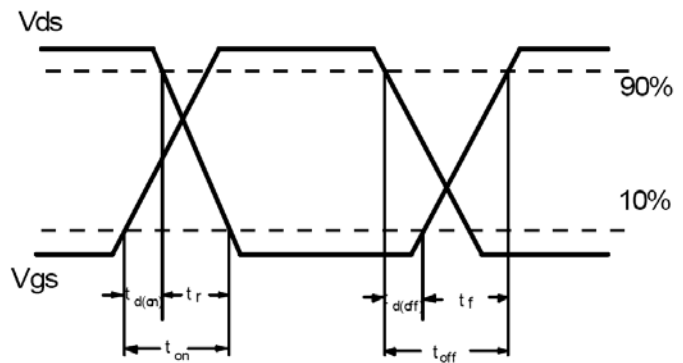
Electrical Characterizes @ $T_A=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	60	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	6	7.5	m Ω	$V_{GS}=10V, I_D=12A$
		—	8	10		$V_{GS}=4.5V, I_D=9A$
$V_{GS(th)}$	Gate threshold voltage	1	—	2.5	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source leakage current	—	—	1	μA	$V_{DS} = 60V, V_{GS} = 0V$
I_{GSS}	Gate-to-Source forward leakage	—	—	100	nA	$V_{GS} = 20V$
		—	—	-100		$V_{GS} = -20V$
Q_g	Total gate charge	—	54.7	—	nC	$I_D = 12A,$ $V_{DS}=30V,$ $V_{GS} = 10V$
Q_{gs}	Gate-to-Source charge	—	6.38	—		
Q_{gd}	Gate-to-Drain("Miller") charge	—	14.3	—		
$t_{d(on)}$	Turn-on delay time	—	22.2	—	nS	$V_{GS}=10V, V_{DD}=30V,$ $R_{GEN}=2\Omega$ $I_D=12A$
t_r	Rise time	—	5.6	—		
$t_{d(off)}$	Turn-Off delay time	—	57.8	—		
t_f	Fall time	—	12	—		
C_{iss}	Input capacitance	—	1039	—	pF	$V_{GS} = 0V$ $V_{DS} = 25V$ $f = 1MHz$
C_{oss}	Output capacitance	—	1425	—		
C_{rss}	Reverse transfer capacitance	—	162	—		

Source-Drain Ratings and Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode) ①	—	—	12	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode)	—	—	48	A	
V_{SD}	Diode Forward Voltage	—	—	1.3	V	$I_S=12A, V_{GS}=0V, T_J = 25^\circ\text{C}$
t_{rr}	Reverse Recovery Time	—	54.4	—	ns	$T_J = 25^\circ\text{C}, I_F = 12A, di/dt = 100A/\mu s$
Q_{rr}	Reverse Recovery Charge	—	93	—	nC	

Test circuits and Waveforms

EAS Test Circuit:

Gate charge test circuit:

Switching Time Test Circuit:

Switching Waveforms:


Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$

Typical electrical and thermal characteristics

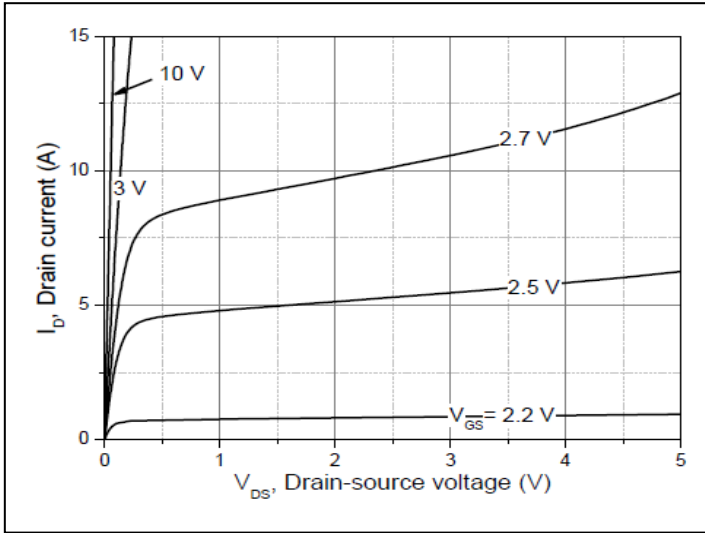


Figure 1: Typical Output Characteristics

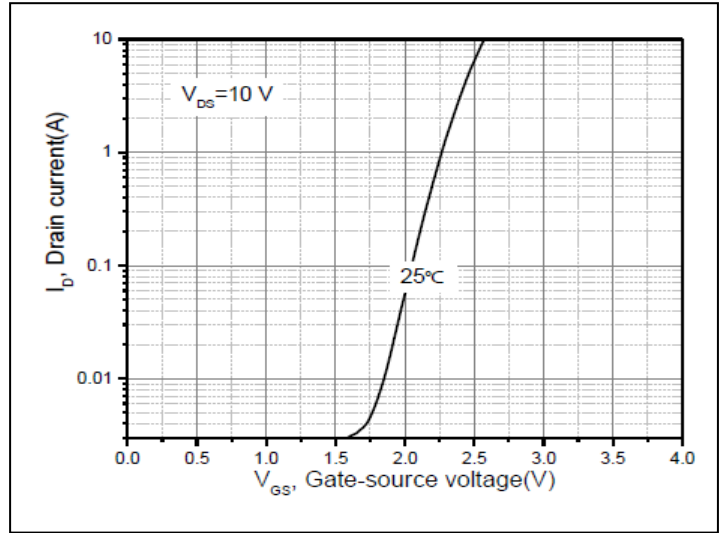


Figure 2: Typical Transfer Characteristics

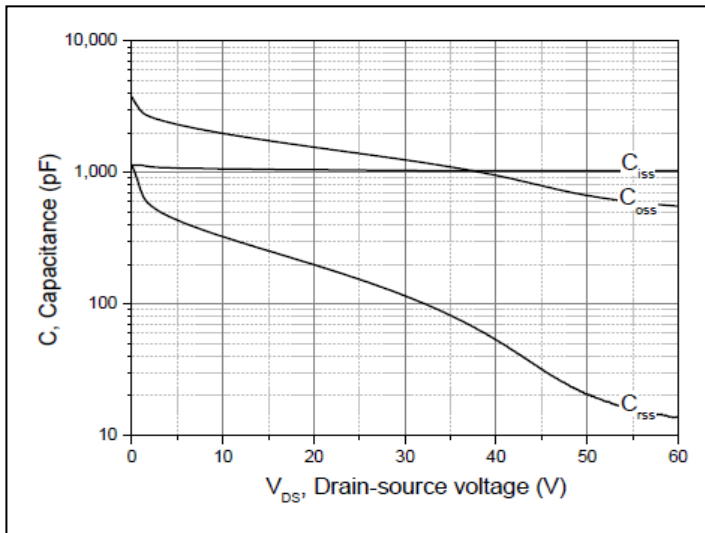


Figure 3: Typical Capacitances

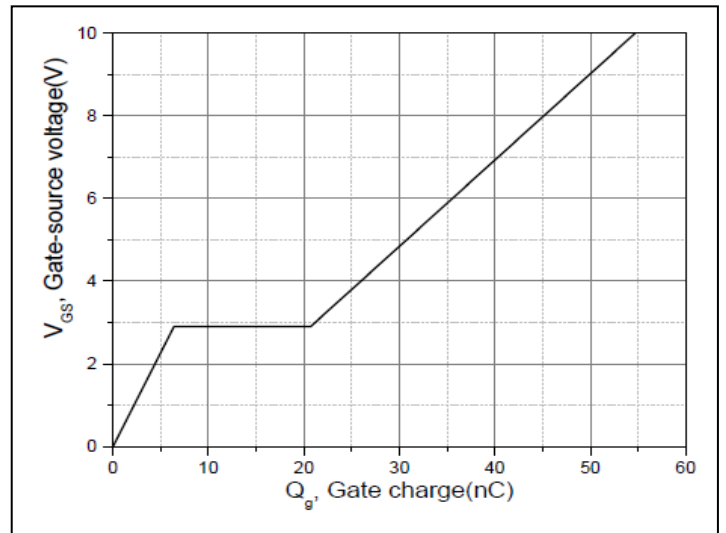


Figure 4: Typical Gate Charge

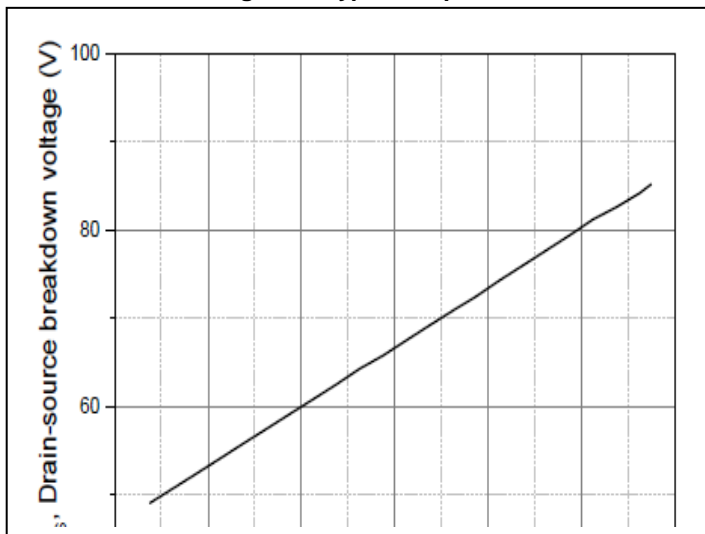


Figure 5: Drain-to-Source Breakdown Voltage

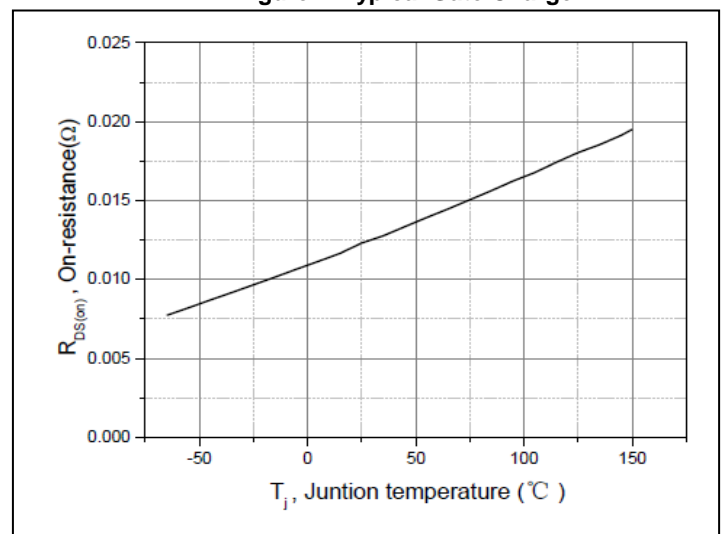


Figure 6: Drain-to-Source On-state Resistance

Typical electrical and thermal characteristics

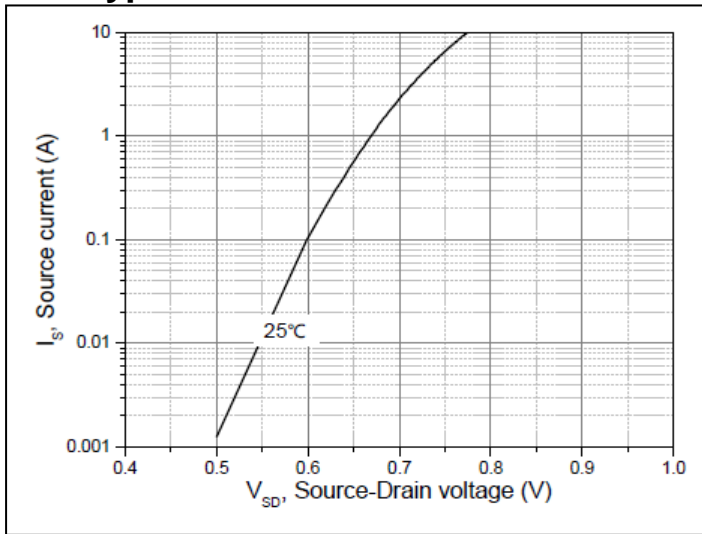


Figure7. Forward Characteristic Of Body Diode

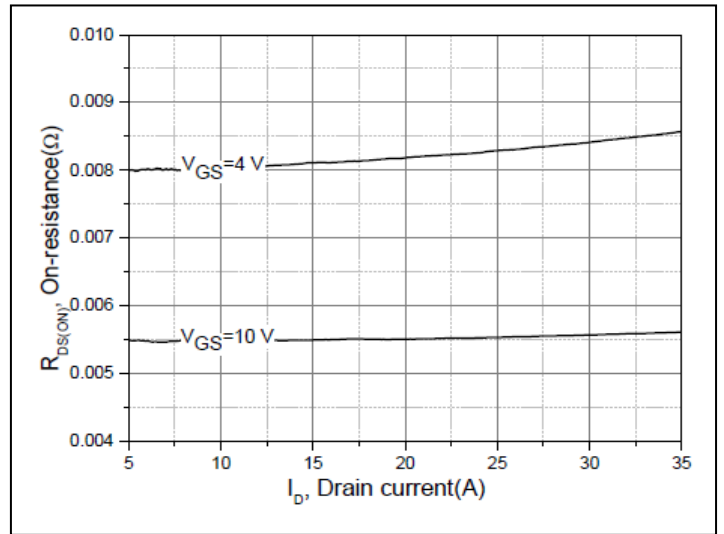


Figure8. Drain-to-Source On-state Resistance

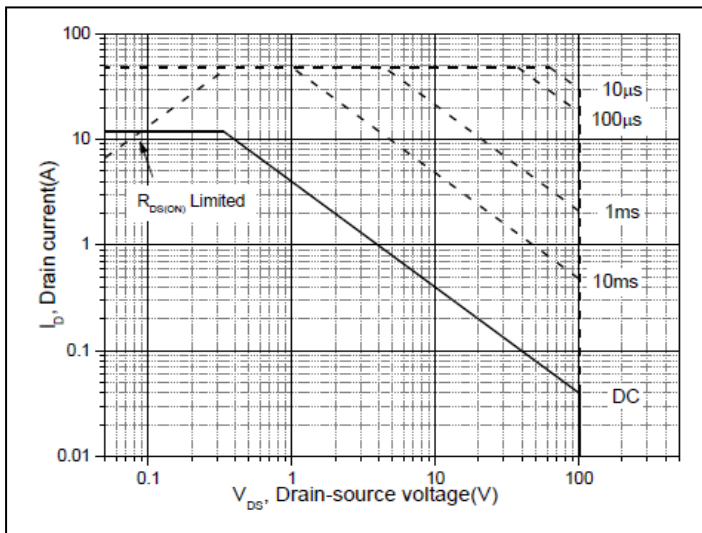
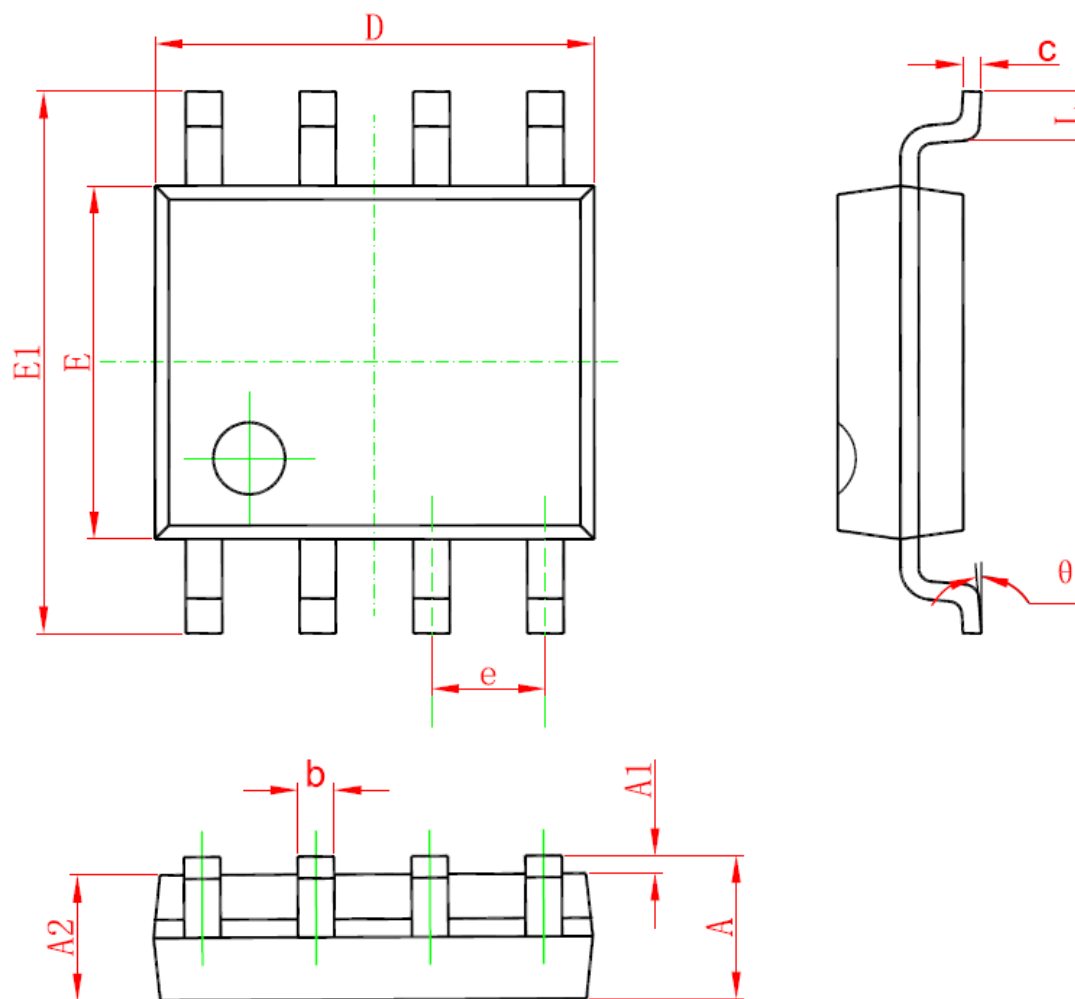


Figure9. Safe Operation Area($T_C=25^\circ\text{C}$)

Mechanical Data:


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Ordering

Package (Available) SOP8 Operating Temperature Range C : -55 to 150 °C

Devices per Unit

Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
SOP8	2500	2	500	8	40000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	$T_j=125^{\circ}\text{C}$ to 175°C @ 80% of Max $V_{DSS}/V_{CES}/VR$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	$T_j=125^{\circ}\text{C}$ or 175°C @ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices

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Suzhou Silikron Semiconductor Corp.

501, NW-20, Nanopolis, 99th Jinjihu Avenue, Industrial Park, Suzhou, P.R, China

TEL: (86-512) 62560688

FAX: (86-512) 62560688-8093

E-mail: Sales@silikron.com