VTGA060N02TA

Datasheet

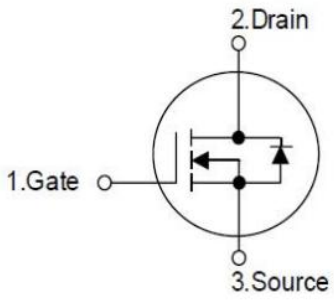
14mΩ, 18V, N-Channel Power MOSFET

VTGA060N02TA

General Description

VTGA060N02TA N-Channel MOSFET is based on unique device design to achieve low $RDS_{(ON)}$, low gate charge, fast switching and excellent avalanche characteristics.

Symbol

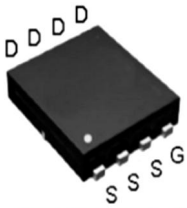


Symbol of VTGA060N02TA

Features

- Low RDS(ON) & FOM
- $R_{DS(ON)\_max}$ = 14mΩ@V_{GS} = 4.5V
- Extremely low switching loss
- Fast switching and soft recovery

Package Type



Package Type of VTGA060N02TA

Application

- Charging Circuit
- Battery Applications
- Synchronous Rectification
- High Frequency Switching

Ordering Information

Product Name	Package	Marking
VTGA060N02TA	DFN3*3	60N02

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	18	V
Gate-Source Voltage	V_{GS}	±8	V
Continuous Drain Current[Note 1], T_C=25ºC	I_D	22	A
Pulsed Drain Current[Note 2]	I_{DM}	66	A
Max Power Dissipation [Note 3], T_C=25ºC	P_D	19.4	W
Avalanche Current, Single Pulse [Note 5]	I_{AS}	28.49	A
Avalanche Energy, Single Pulse [Note 5]	E_{AS}	121.7	mJ
Operation Junction temperature	T_J	-55 to 150	ºC

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		6.45		ºC/W
Thermal Resistance, Junction-to-Ambient[Note4]	$R_{\theta JA}$		62		

Notes:

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) P_D is based on max. junction temperature, using junction-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 Ta=25 °C.
5) V_{DS}=15V,V_{GS}=4.5V, L=0.3mH, Rg=25Ω, starting T_J=25 °C.

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Statistic Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	18			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=18V, V_{GS}=0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±8V, V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250uA	0.35	0.55	0.85	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=5A		10.8	14	mΩ
		V_{GS}=4.5V, I_D=15A		11.4	14	mΩ
Gate Resistance	R_G	f=1MHz, open drain		0.79		Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V		1207		pF
Output Capacitance	C_{oss}	V_{DS}=10V		855.5		pF
Reverse Transfer Capacitance	C_{rss}	f=1MHz		90		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=15V		10		ns
Rise Time	t_r	V_{GS}=4.5V		3.2		
Turn-off Delay Time	$t_{d(off)}$	I_D=6A		35.8		
Fall Time	t_f	R_G=3Ω		11		
Switching Characteristics						
Total Gate Charge (@VGS=8V)	Q_g	V_{GS}=0 to 8V		27.7		nC
Total Gate Charge (@VGS=4.5V)	Q_g	V_{DS}=10V		16.1		
Gate to Source Charge	Q_{gs}	I_D=15A		2.44		
Gate to Drain Charge	Q_{gd}			4.35		
Reverse Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=12A		0.82	1.2	V
Reverse Recovery Time	t_{rr}	V_{DS}=10V		34.02		ns
Reverse Recovery Charge	Q_{rr}	I_F=12A		16.26		nC
Peak Reverse Recovery Current	I_{rrm}	di/dt=100A/us		0.7		A

Typical Performance Characteristics

Figure 1: Typ. Output Characteristics

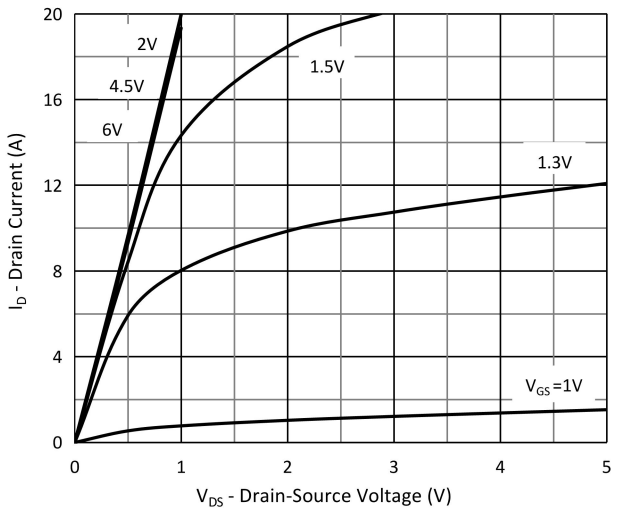


Figure 2: Typ. Transfer Characteristics

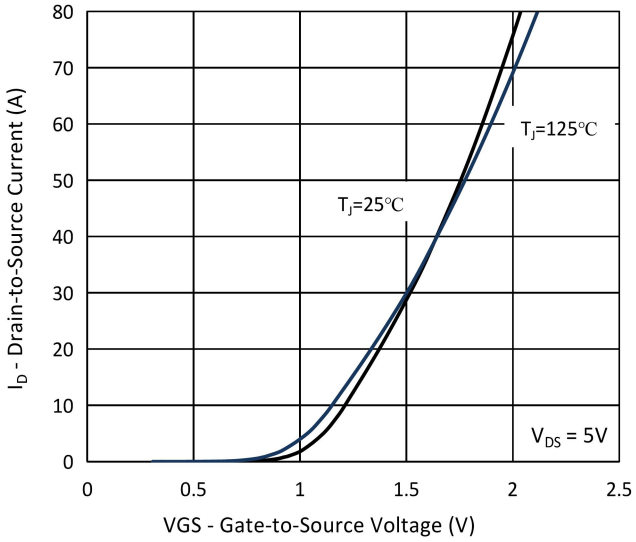


Figure 3: Drain-Source On-State Resistance

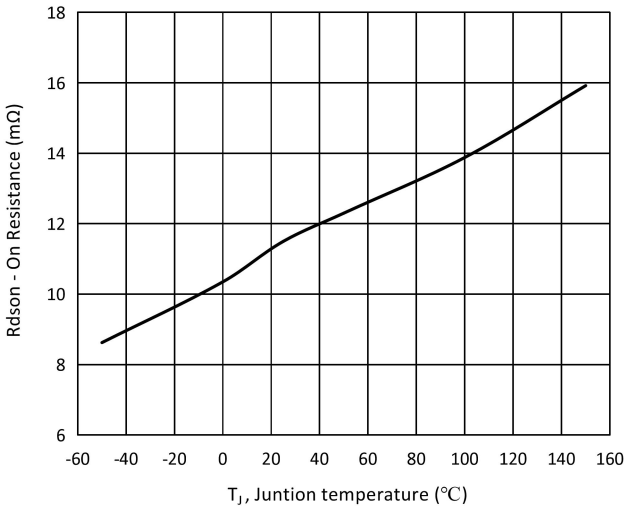


Figure 4: On-Resistance vs. Gate-source voltage

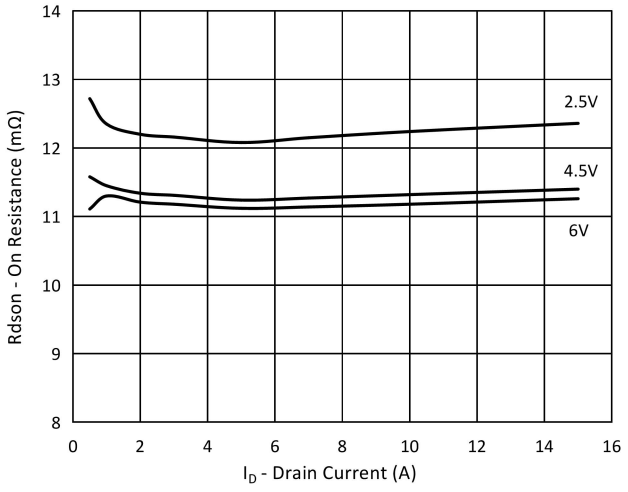


Figure 5: Typ. Capacitances

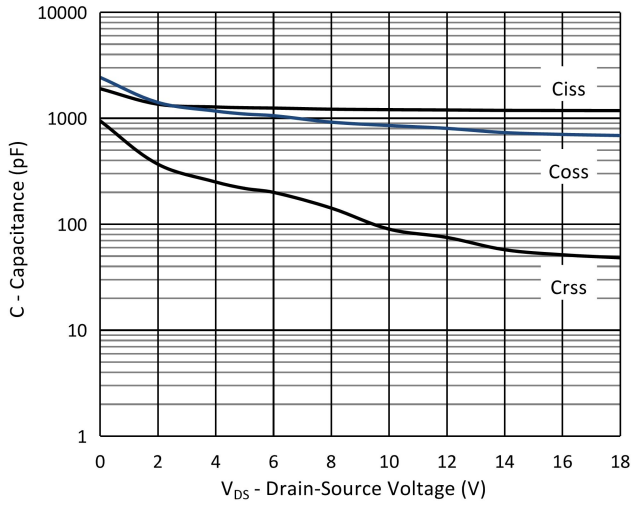


Figure 6: Gate Charge Characteristics

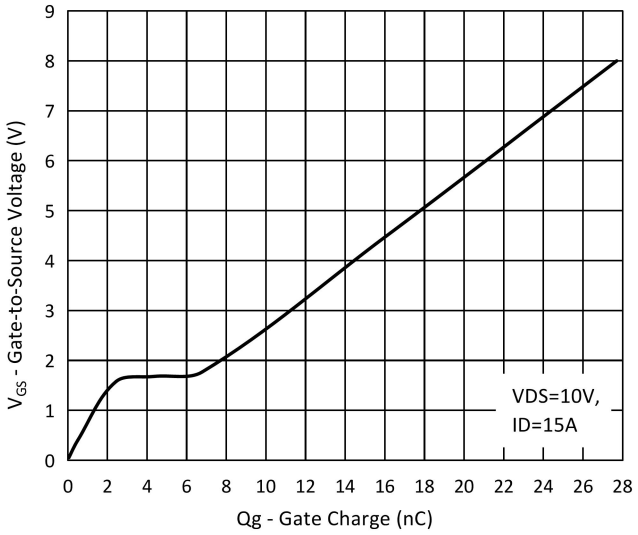


Figure 7: Forward Characteristics of Body Diode

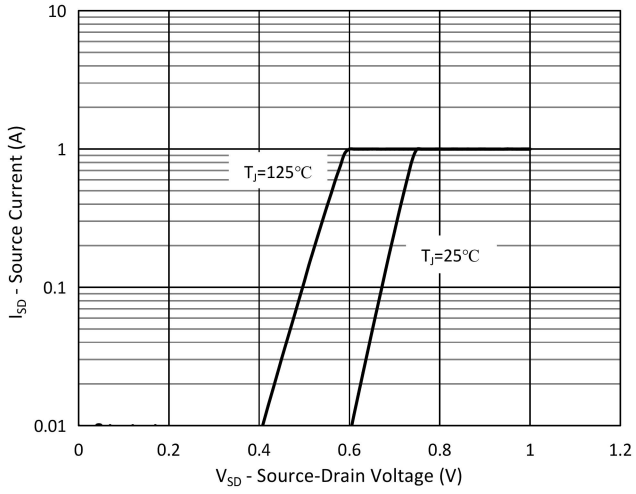


Figure 8: Safe Operating Area T_C=25°C

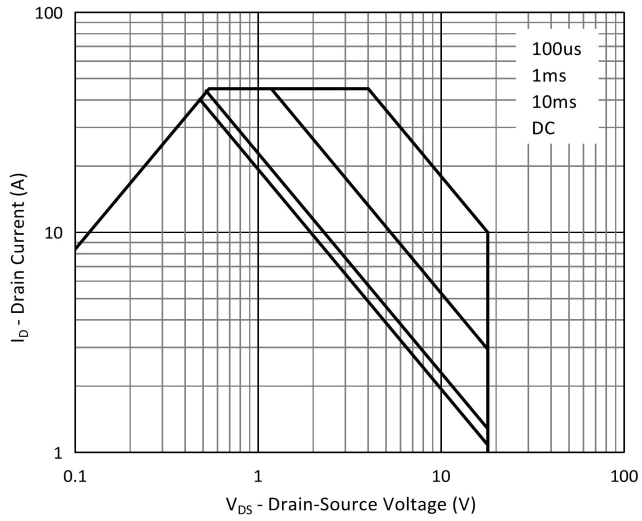


Figure 9: Power De-rating

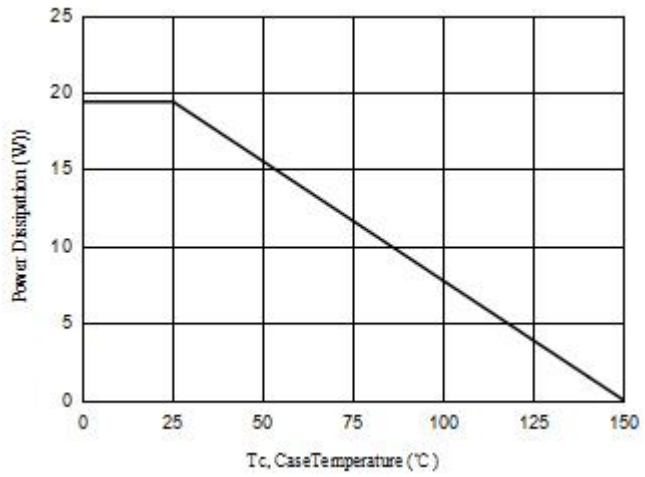


Figure 10: Current De-rating

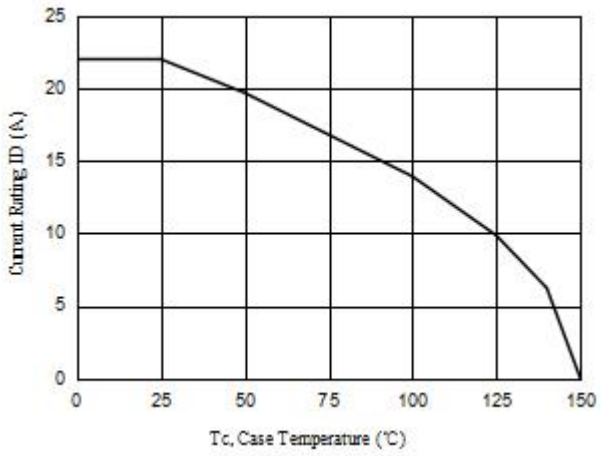


Figure 11: Single pulse power rating, Junction to case

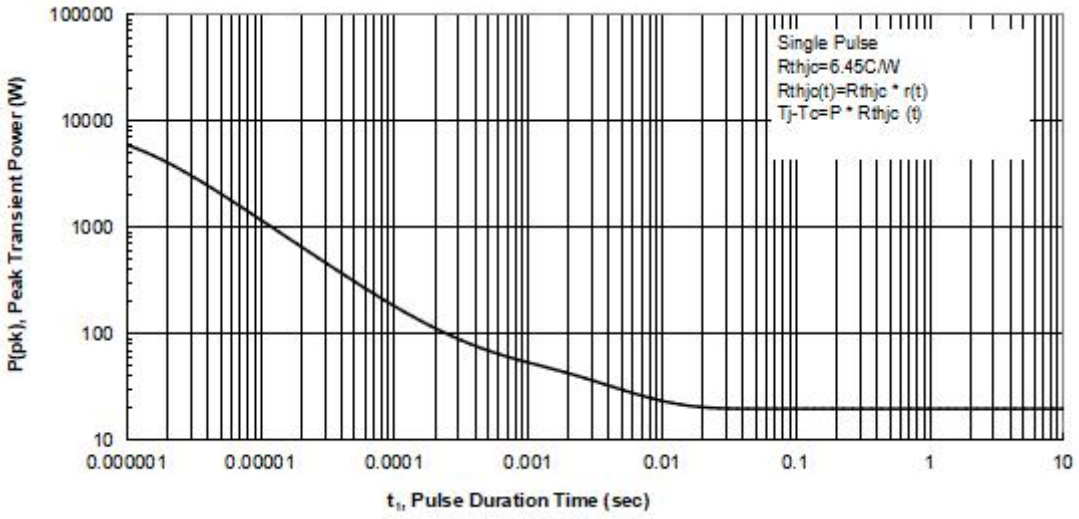
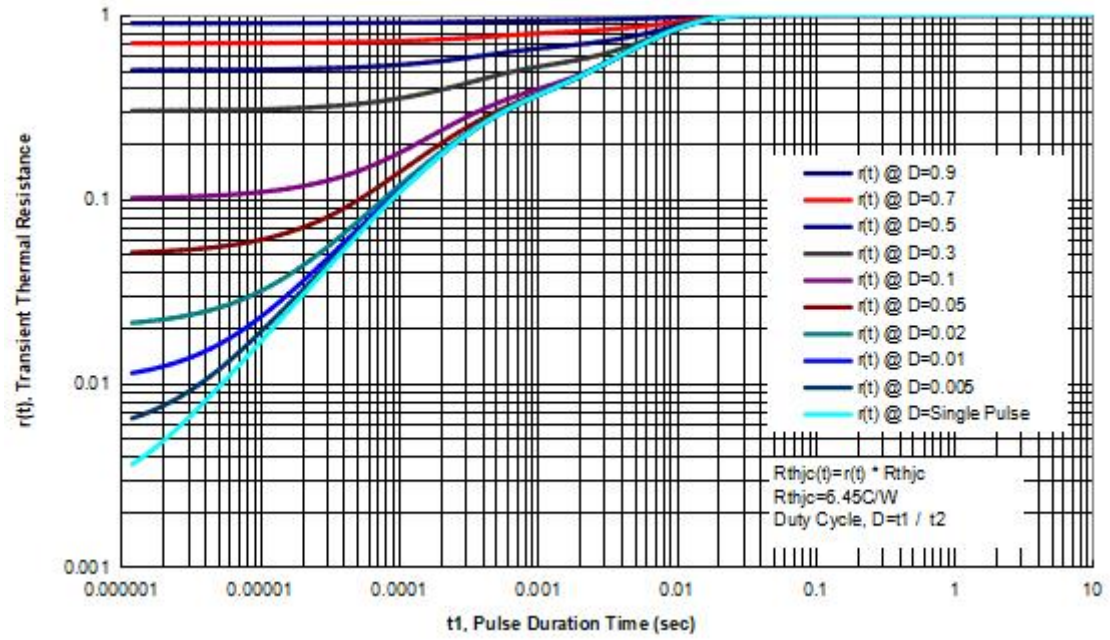
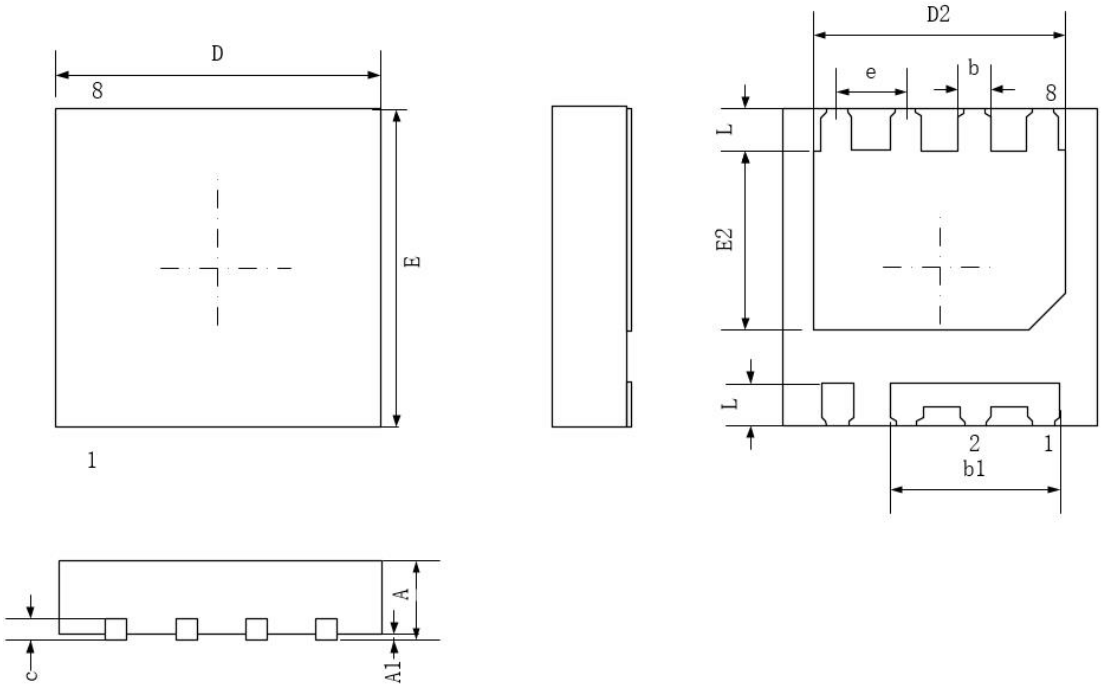


Figure 12: Max transient thermal impedance



Mechanical Dimensions (DFN3*3 Unit:mm)



SYMBOL	MILLMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	1.55	1.60	1.65
c	0.19	0.20	0.21
D	2.90	3.00	3.10
D2	2.30	2.40	2.50
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65BSC		
L	0.35	0.40	0.45

NOTICE

Chengdu WH Semiconductor Co., Ltd (WH) reserves the right to make changes without notice in order to improve reliability, function or design and to discontinue any product or service without notice. Customers should obtain the latest relevant information before orders and should verify that such information is current and complete. All products are sold subject to WH's terms and conditions supplied at the time of order acknowledgement.

WH, its affiliates, agents, and employees, and all persons acting on its or their behalf, disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

WH disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify WH's terms and conditions of purchase, including but not limited to the warranty expressed therein, which apply to these products.

WH warrants performance of its hardware products to the specifications at the time of sale, testing, reliability and quality control are used to the extent WH deems necessary to support this warrantee. Except where agreed upon by contractual agreement, testing of all parameters of each product is not necessarily performed.

WH does not assume any liability arising from the use of any product or circuit designs described herein. Customers are responsible for their products and applications using WH's components. To minimize risk, customers must provide adequate design and operating safeguards.

WH does not warrant or convey any license to any intellectual property rights either expressed or implied under its patent rights, nor the rights of others. Reproduction of information in WH's data sheets or data books is permissible only if reproduction is without modification or alteration. Reproduction of this information with any alteration is an unfair and deceptive business practice.

WH is not responsible or liable for such altered documentation. Resale of WH's products with statements different from or beyond the parameters stated by WH for that product or service voids all express or implied warrantees for the associated WH product or service and is an unfair and deceptive business practice.

Chengdu Winhi Semiconductor Co., LTD

Main Sites:

- **Headquarters**

Hangzhou Via-Media Semiconductor Co., LTD.
1305-1306, Building 71, No. 90, Wensan Road, Xihu District, Hangzhou, Zhejiang Province, P.R. China
Tel: +86-0571-8515 0563

- **Chengdu Office**

Chengdu Winhi Semiconductor Co., LTD.
Floor 15, Building 5, No. 171, Hele 2nd Street, Chengdu, Sichuan Province, P.R. China
Tel: +86-028-8505 0771

- **Shanghai**

Shanghai R&D Center.
1506~1508, Xinyin Building, 888 Yishan Road, Shanghai, P.R of China
Tel: +86-021-54201999

- **Shenzhen**

Shenzhen Sales Center.
17B, No.1 Phoenix Building, 2008 Shennan Road, Shenzhen, P.R of China
Tel: +86-0755-82570682

- **Xi'an**

Xi'an R&D Center
1703B, Building A, Greenland Center, Jinye Road, High-Tech Zone, Xi'an, Shaanxi, P.R of China