

## FEATURES

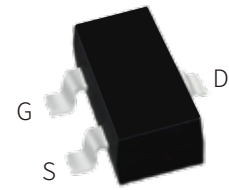
Ultra low on-resistance:  $V_{DS}=40V, R_{DS(ON)} \leq 56m\Omega$

@  $V_{GS}=10V, I_D=3.6A$

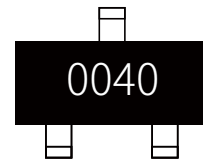
For Low power DC to DC converter application

For Load switch application

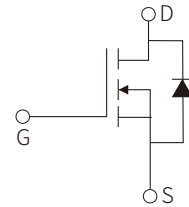
Surface Mount device



SOT-23



Marking



Schematic Symbol

## APPLICATION

Case: SOT-23

Case Material: Molded Plastic. UL flammability

Classification Rating: 94V-0

## APPROVALS


**RoHS** Compliance with 2011/65/EU

**HF** Compliance with IEC61249-2-21:2003

## ABSOLUTE MAXIMUM RATINGS( $T_a=25^\circ\text{C}$ )

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Drain Current-Continuous	$I_D$	3.6	A
Drain Current-Continuous	$I_D$	2.9	A
Pulsed Drain Voltage	$I_{DM}$	15	A
Gate-Source Voltage	$V_{GS}$	$\pm 16$	V
Total Power Dissipation	$P_D$	1.3	W
Total Power Dissipation	$P_D$	0.8	W
Linear Derating Factor		0.01	W/°C
Junction-to-Ambient(note 3)	$R_{\theta JA}$	100	°C/W
Junction-to-Ambient ( $t < 10s$ )	$R_{\theta JA}$	99	°C/W
Storage temperature	$T_{STG}$	-55 to 150	°C

## ELECTRICAL CHARACTERISTICS(T<sub>a</sub> =25°C)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40			V
Breakdown Voltage Temp. Coefficient	$\Delta V_{(BR)DSS} / \Delta T_J$	Reference to 25, I <sub>D</sub> =1mA		0.04		V/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			20	μA
		V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			250	μA
Gate-to-Source Forward Leakag	I <sub>GSS</sub>	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±100	nA
Gate Threshold Voltage (Note1)	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =25μA	1.0	1.8	2.5	V
Static Drain-Source On-Resistance(Note2)	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =3.6A		44	56	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.9A		62	78	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =3.6A	6.2			S
Gate resistance	R <sub>g</sub>			1.1		Ω
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0MHz		266		pF
Output Capacitance	C <sub>oss</sub>			49		
Reverse Transfer Capacitance	C <sub>rss</sub>			29		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =4.5V, R <sub>G</sub> =6.8Ω V <sub>DD</sub> =20V, I <sub>D</sub> =1.0A		5.1		ns
Turn-On Rise Time	t <sub>r</sub>			5.4		
Turn-Off Delay Time	t <sub>d(off)</sub>			6.4		
Turn-Off Fall Time	t <sub>f</sub>			4.3		
Diode forward voltage (note 2)	V <sub>SD</sub>	I <sub>S</sub> =1.3A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C			1.2	V
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =4.5V, V <sub>DS</sub> =20V, I <sub>D</sub> =3.6A		2.6	3.9	nC
Gate Source Charge	Q <sub>gs</sub>			0.7		
Gate Drain Charge(note 2)	Q <sub>gd</sub>			1.4		
Diode forward current(Body Diode)	I <sub>S</sub>	MOSFET symb showing the integral rever p-n junction diod 			1.3	A
Pulsed Source Curren (Body Diode)(note 1)	I <sub>SM</sub>				15	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =1.3A, V <sub>R</sub> =32V dI/dt=100A/us, T <sub>J</sub> =25°C		10		ns
Reverse Recovery Charge(note 2)	Q <sub>rr</sub>				9.3	nC

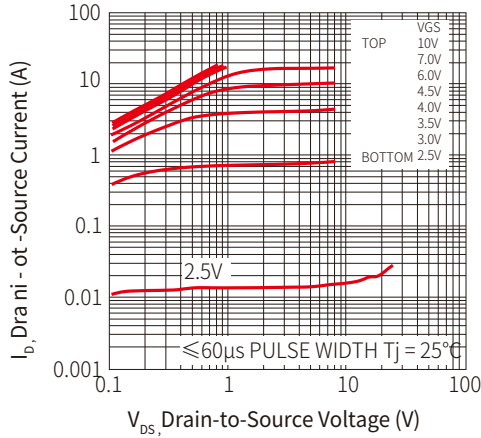
Note:1. Repetitive rating; pulse width limited by max. junction temperature

Note:2. Pulse width ≤400μs, Duty cycle ≤ 2%

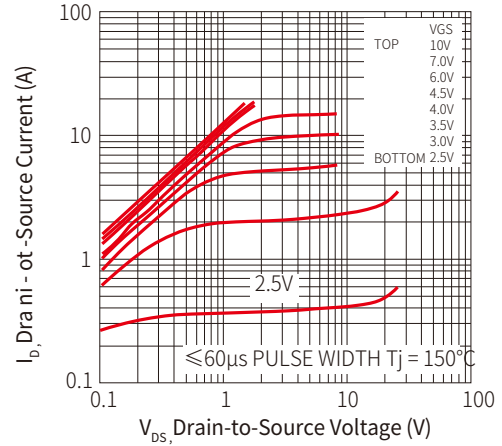
Note:3. Surface mounted on 1 in square Cu board

# PARAMETER CHARACTERISTIC CURVE

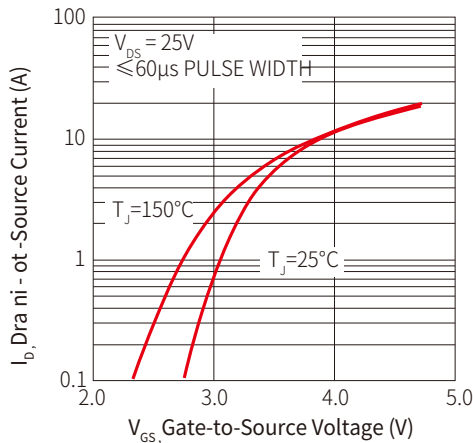
**Fig 1: Typical Output Characteristics**



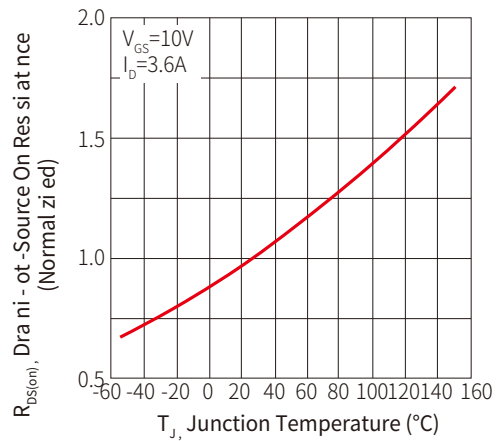
**Figure 2: Typical Output Characteristics**



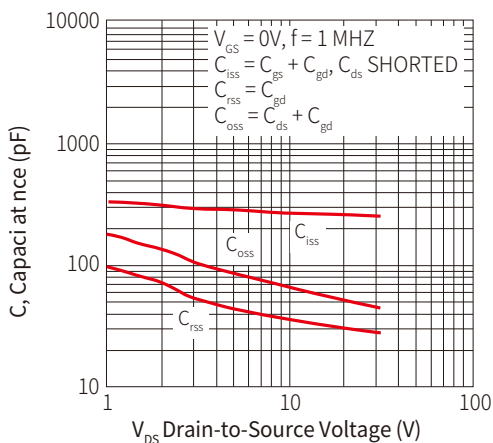
**Figure 3: Typical Transfer Characteristics**



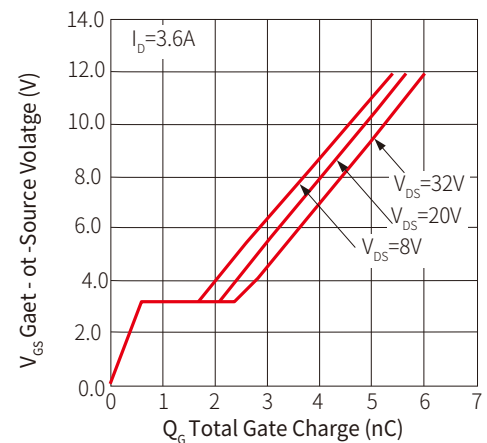
**Figure 4: Normalized On-Resistance Vs. Temperature**



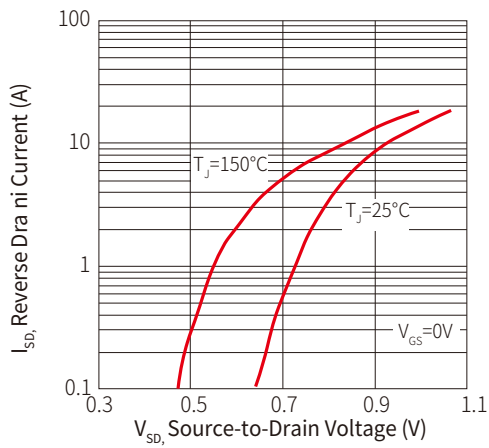
**Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage**



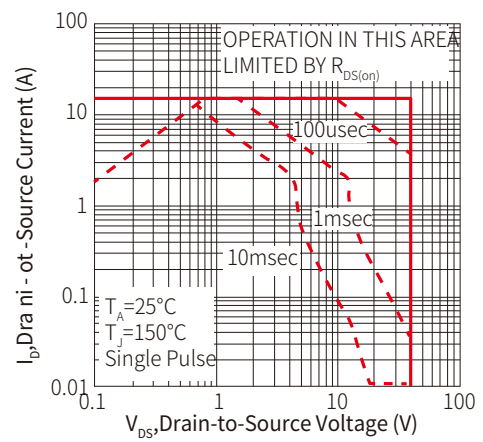
**Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage**



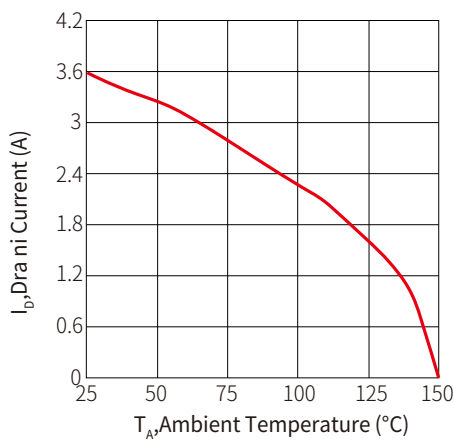
**Figure 7: Typical Source-Drain Diode Forward Voltage**



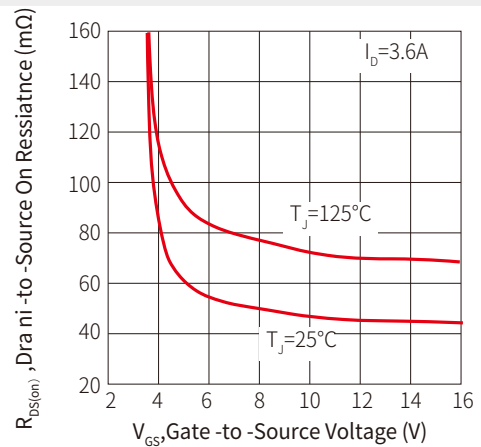
**Figure 8: Maximum Safe Operating Area**



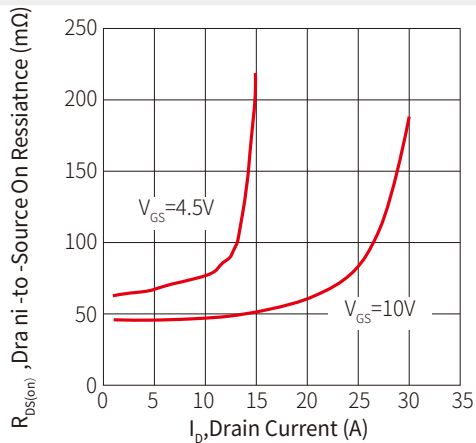
**Figure 9: Maximum Drain Current Vs. Ambient Temperature**



**Figure 10: Typical On-Resistance Vs. Gate Voltage**



**Figure 11: Typical On-Resistance Vs. Drain Current**



**Figure 12: Typical Threshold Voltage Vs. Junction Temperature**

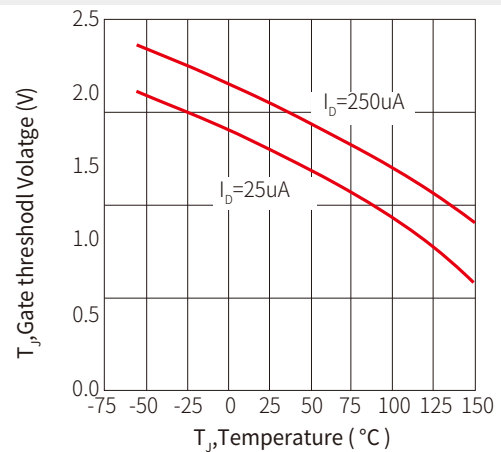


Figure 13: Typical Power Vs. Time

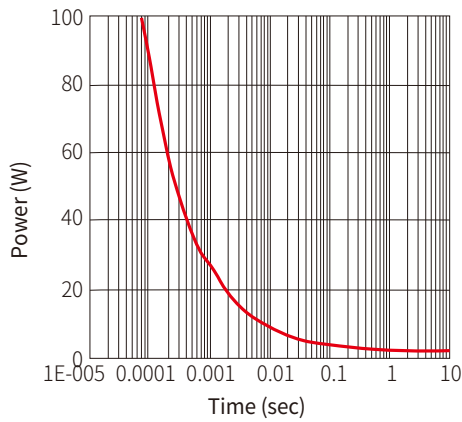


Figure 14: Typical Effective Transient Thermal Impedance, Junction-to-Ambient

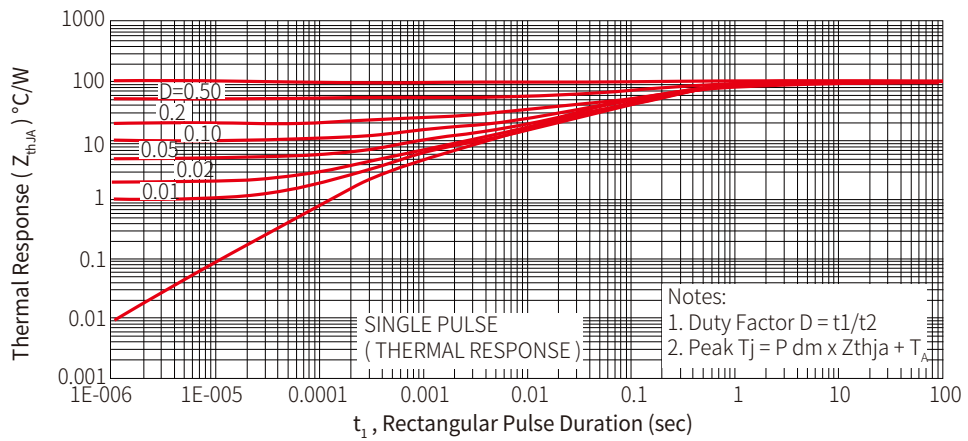
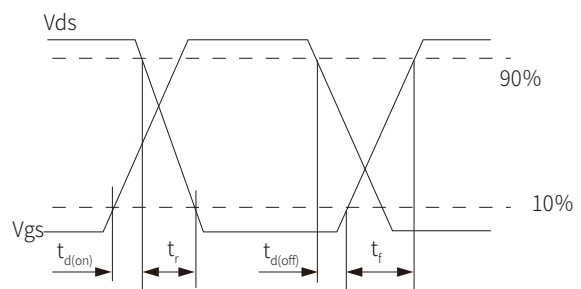
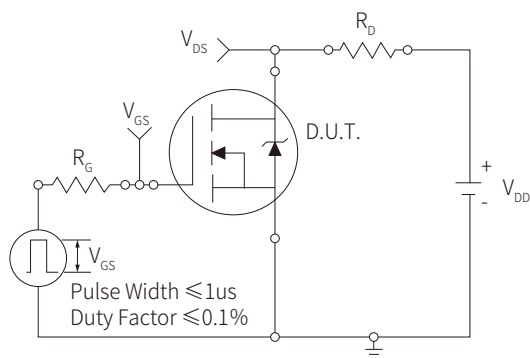
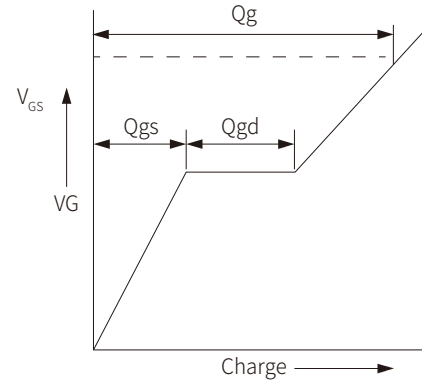
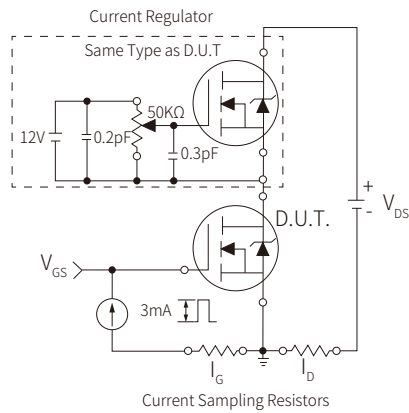


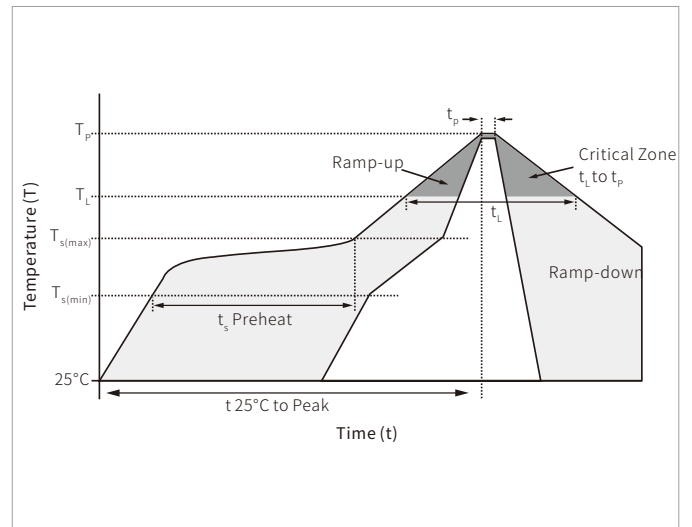
Figure 15: Switching Time Test Circuit & Waveforms



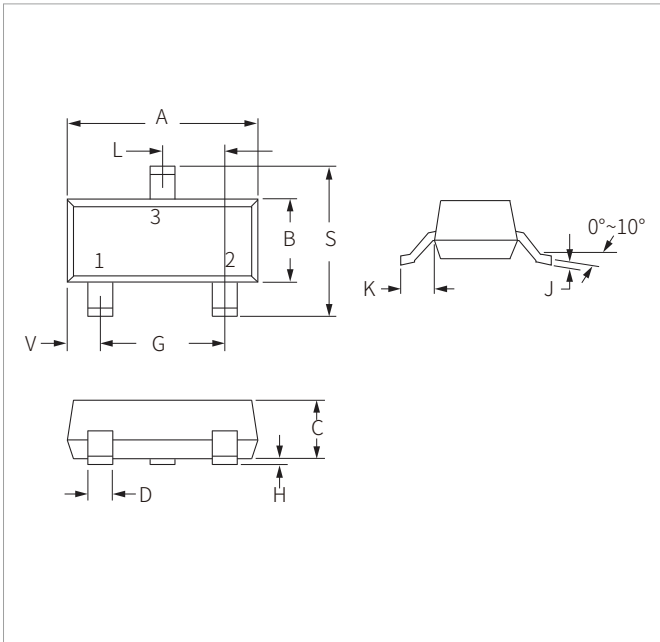
**Figure 16: Basic Gate Charge Waveform & Test Circuit**


## SOLDERING PARAMETERS

Reflow Condition		Lead-free assembly
Pre Heat	Temperature Max ( $T_{s(min)}$ )	150°C
	Temperature Max ( $T_{s(max)}$ )	200°C
	Time (min to max) ( $t_s$ )	60 – 180 secs
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/second max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/second max
Reflow	Temperature ( $T_L$ ) (Liquidus)	217°C
	Time (min to max) ( $t_r$ )	60 – 150 seconds
Peak Temperature ( $T_p$ )		260°C
Time within 5°C of actual peak Temperature ( $t_p$ )		20 – 40 seconds
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature ( $T_p$ )		8 minutes max.
Do not exceed		260°C

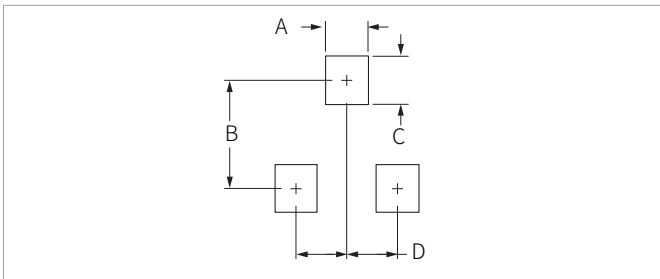


## SOT-23 PACKAGE INFORMATION



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.80	3.05	0.110	0.120
B	1.20	1.40	0.047	0.055
C	0.90	1.15	0.035	0.045
D	0.37	0.50	0.015	0.020
G	1.75	2.05	0.069	0.081
H	0.01	0.100	0.001	0.004
J	0.085	0.180	0.003	0.007
K	0.35	0.69	0.014	0.029
L	0.89	1.02	0.035	0.040
S	2.10	2.65	0.083	0.104
V	0.45	0.60	0.018	0.024

## RECOMMENDED PAD LAYOUT DIMENSIONS



Ref.	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.71	0.97	0.028	0.038
B	1.88	2.13	0.074	0.084
C	0.71	0.97	0.028	0.038
D	0.81	1.07	0.032	0.042

## ORDERING INFORMATION

Part Number	Component Package	QTY/Reel	Reel Size
SNM0040S	SOT-23	3000PCS	7"

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

**By QR Code**

Website



Wechat

To find your local partner within Semiware' s global website: [www.semiware.com](http://www.semiware.com)

© 2022 Semiware Semiconductor Inc.

The content of this document has been carefully checked and understood. However, neither Semiware nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Semiware does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Chinese law and resulting disputes shall be settled by the courts at the place of business of Semiware. Latest publications and a complete disclaimer can be downloaded from the Semiware website. All trademarks recognized.