

### General Description

The WSD4064DN33 is the highest performance trench Dual N-Channel MOSFET with extreme high cell density, which provide excellent  $R_{DS(ON)}$  and gate charge for most of the synchronous buck converter applications.

The WSD4064DN33 meet the RoHS and Green Product requirement 100%  $E_{AS}$  guaranteed with full function reliability approved.

### Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100%  $E_{AS}$  Guaranteed
- Green Device Available

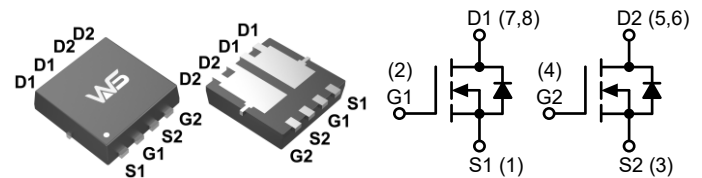
### Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
40V	19m $\Omega$	13A

### Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

### DFN3X3-8L Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	
$I_S$	Diode Continuous Forward Current	$T_A=25^\circ\text{C}$ 4	A
$I_D$	Continuous Drain Current	$T_A=25^\circ\text{C}$ 13	
		$T_A=70^\circ\text{C}$ 9.5	
$I_{DM}^1$	Pulse Drain Current Tested	$T_A=25^\circ\text{C}$ 25	
$P_D$	Maximum Power Dissipation	$T_A=25^\circ\text{C}$ 2.5	W
		$T_A=70^\circ\text{C}$ 1.68	
$R_{\theta JL}$	Thermal Resistance-Junction to Lead	Steady State 10	$^\circ\text{C/W}$
		$t \leq 10\text{s}$ 42.5	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	Steady State <sup>2</sup> 50	$^\circ\text{C/W}$
$I_{AS}^3$	Avalanche Current, Single pulse	$L=0.5\text{mH}$ 10	A
$E_{AS}^3$	Avalanche Energy, Single pulse	$L=0.5\text{mH}$ 25	mJ
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Maximum Junction Temperature	150	

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$ , Unless Otherwise Noted)

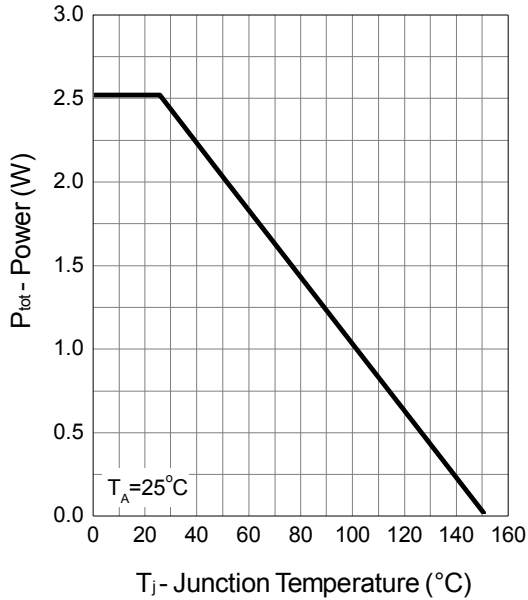
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=32V, V_{GS}=0V$	---	---	1.0	$\mu A$
		$T_J=85^\circ\text{C}$	---	---	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_{DS}=250\mu A$	1.0	1.5	2.0	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_{DS(on)}^4$	Drain-Source On-state Resistance	$V_{GS}=10V, I_D=6A$	---	19	25	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	---	25	35	
<b>Diode Characteristics</b>						
$V_{SD}^4$	Diode Forward Voltage	$I_{SD}=1A, V_{GS}=0V$	---	0.75	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_{DS}=6A, di_{SD}/dt=100A/\mu s$	---	12	---	ns
$Q_{rr}$	Reverse Recovery Charge		---	8.5	---	nC
<b>Dynamic Characteristics</b> <sup>5</sup>						
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, F=1.0\text{MHz}$	---	2.4	---	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=20V, \text{Frequency}=1.0\text{MHz}$	---	800	---	pF
$C_{oss}$	Output Capacitance		---	90	---	
$C_{rss}$	Reverse Transfer Capacitance		---	55	---	
$T_{d(on)}$	Turn-on Delay Time	$V_{DD}=20V, R_L=20\Omega, I_{DS}=1A, V_{GEN}=10V, R_G=6\Omega$	---	7.2	---	ns
$T_r$	Turn-on Rise Time		---	6.5	---	
$T_{d(off)}$	Turn-off Delay Time		---	24	---	
$T_f$	Turn-off Fall Time		---	4.5	---	
<b>Gate Charge Characteristics</b> <sup>5</sup>						
$Q_g$	Total Gate Charge	$V_{DS}=20V, V_{GS}=10V, I_{DS}=6A$	---	15	21	nC
$Q_g$	Total Gate Charge	$V_{DS}=20V, V_{GS}=4.5V, I_{DS}=6A$	---	8.2	10	
$Q_{gth}$	Threshold Gate Charge		---	1.7	---	
$Q_{gs}$	Gate-Source Charge		---	3.1	---	
$Q_{gd}$	Gate-Drain Charge		---	2.5	---	

**Note:**

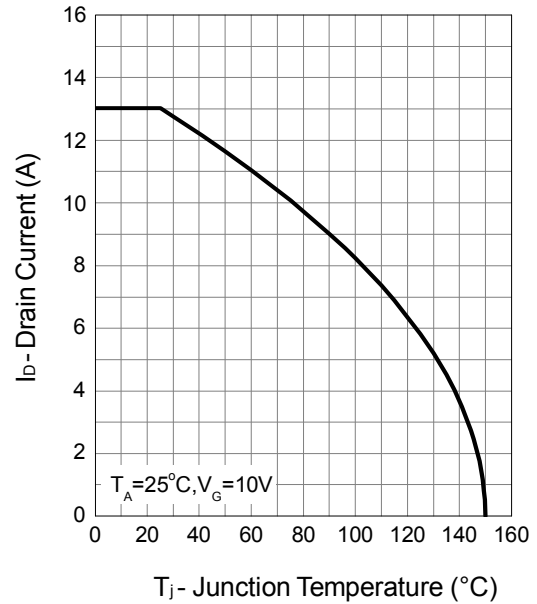
- Pulse width limited by max. junction temperature.
- Surface Mounted on 1in<sup>2</sup> pad area, t=999sec.
- UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature  $T_J=25^\circ\text{C}$ ).
- Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

**Typical Characteristics**

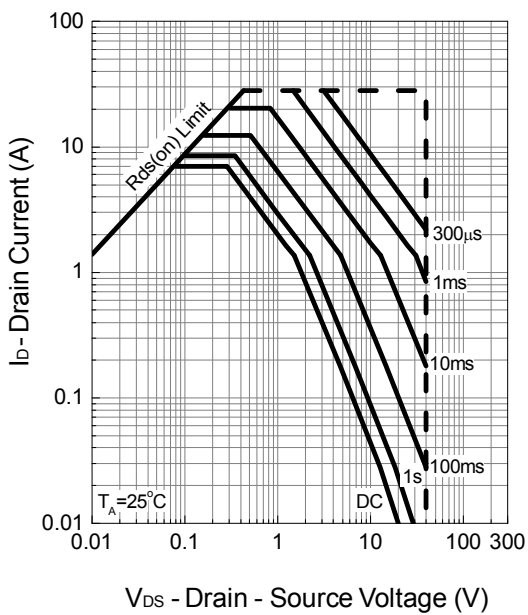
**Power Dissipation**



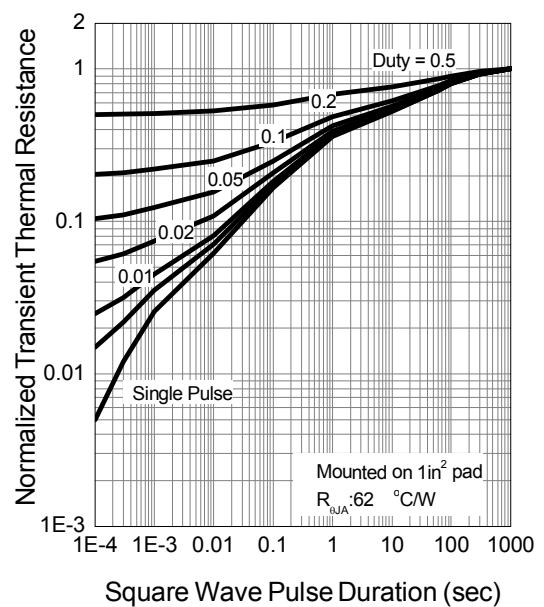
**Drain Current**



**Safe Operation Area**

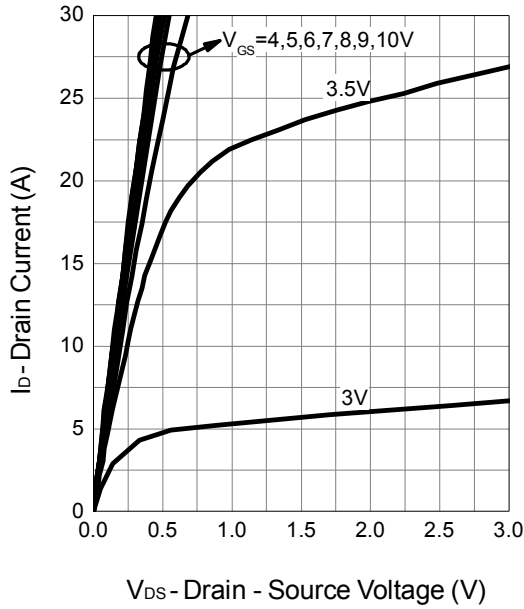


**Thermal Transient Impedance**

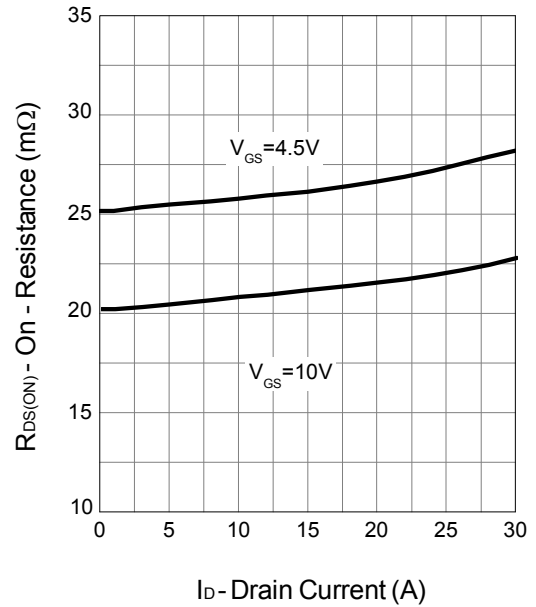


Typical Characteristics (Cont.)

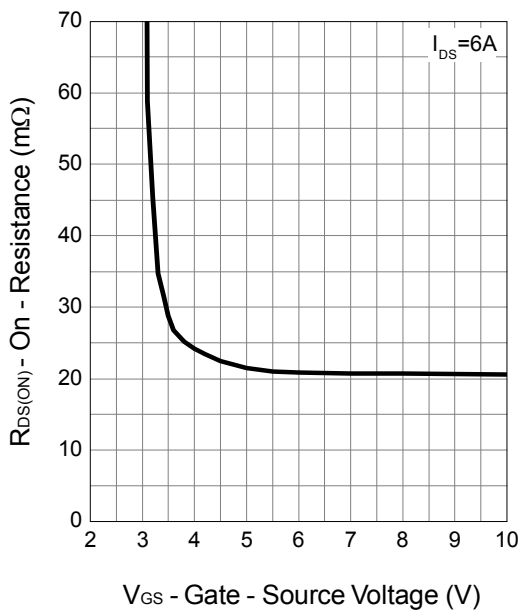
Output Characteristics



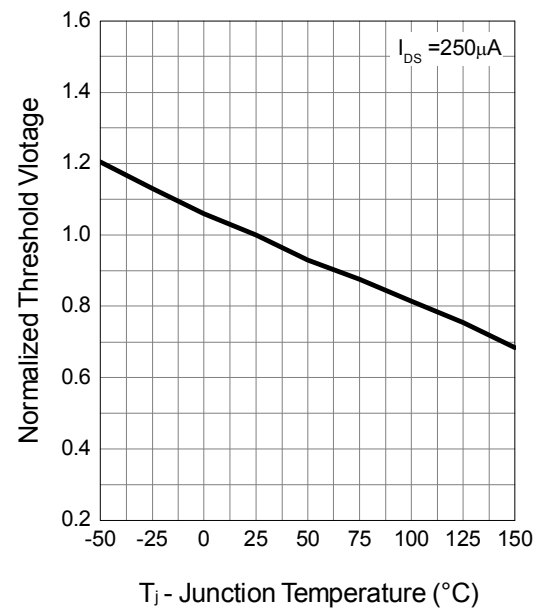
Drain-Source On Resistance



Gate-Source On Resistance

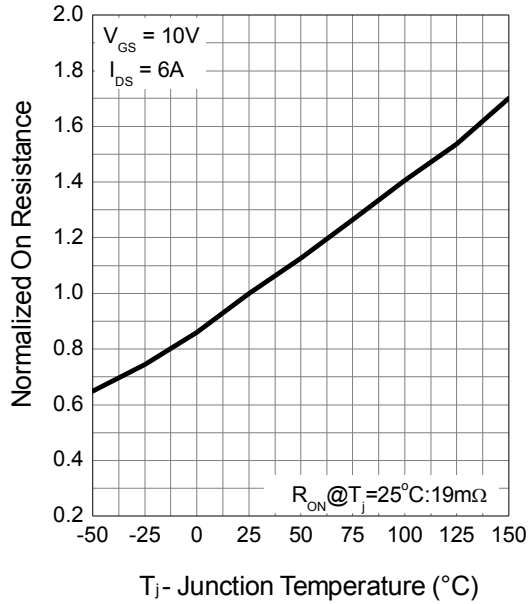


Gate Threshold Voltage

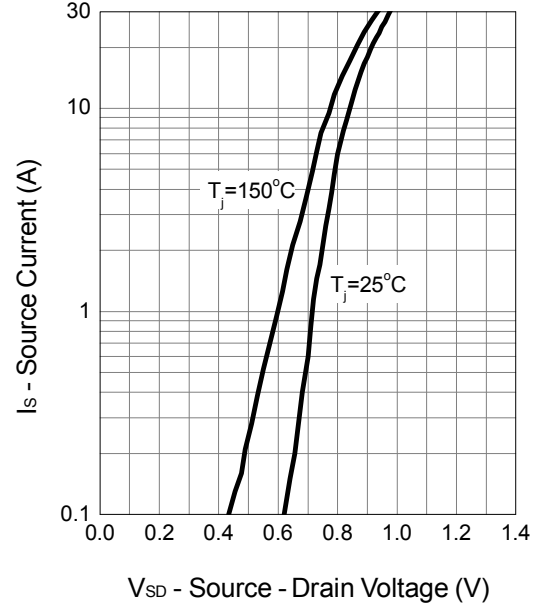


**Typical Characteristics (Cont.)**

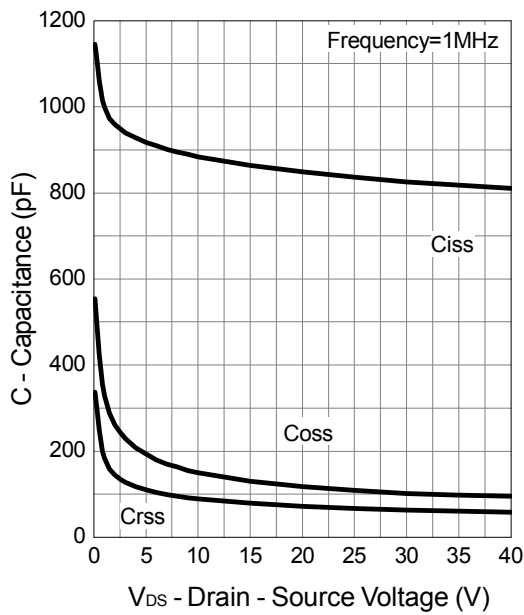
**Drain-Source On Resistance**



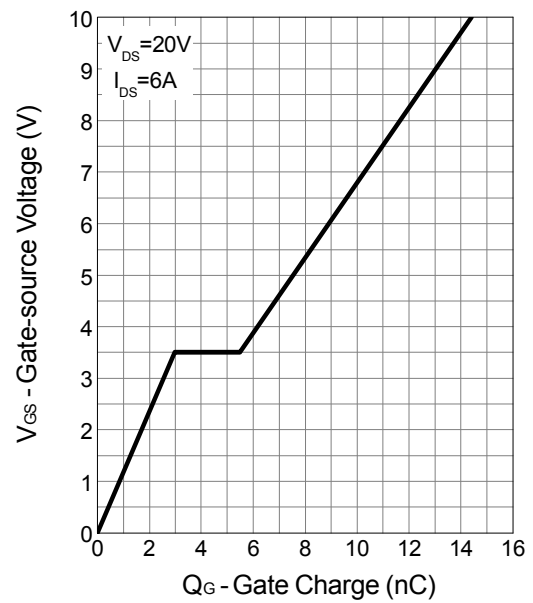
**Source-Drain Diode Forward**

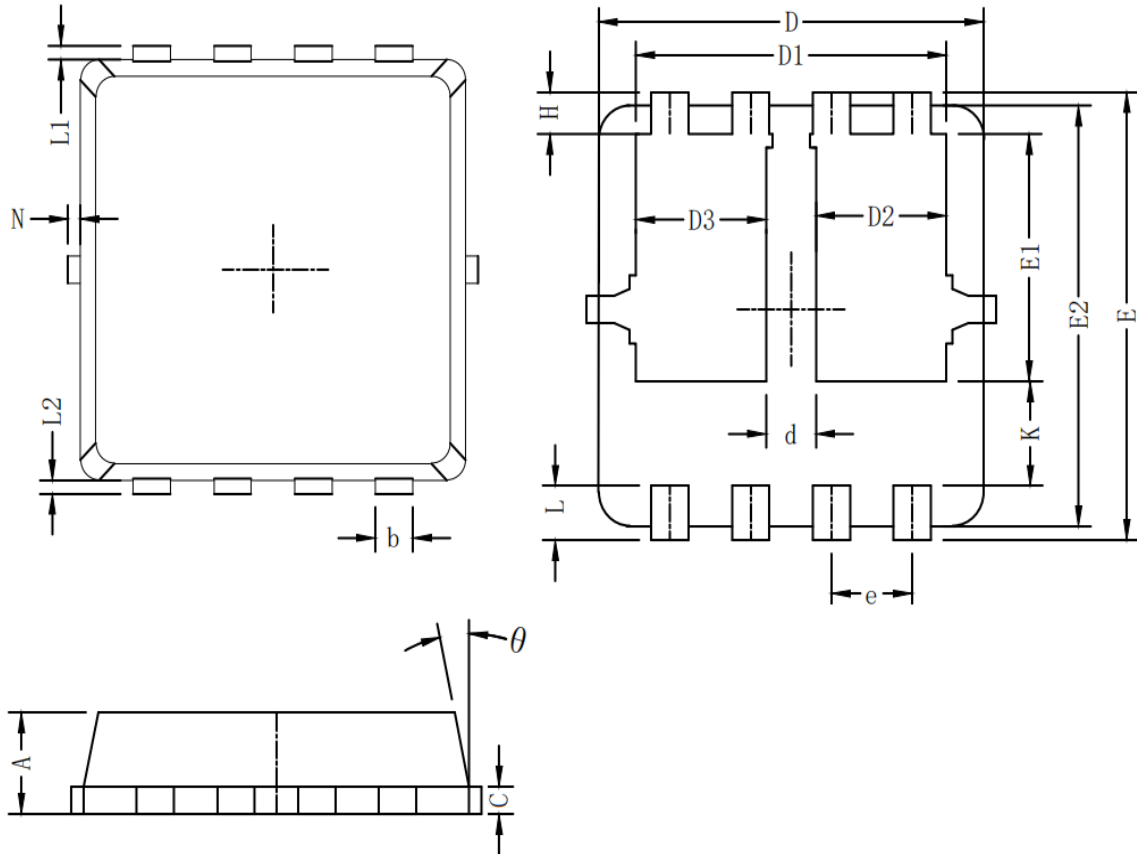


**Capacitance**



**Gate Charge**



**Packaging information**


Symbol	Dim in mm		
	min	typ	max
A	0.6	0.75	0.9
b	0.2	0.3	0.4
C	0.15	0.2	0.25
D	3	3.1	3.2
D1	2.3	2.45	2.6
D2/D3	0.8	1	1.2
E	3.15	3.3	3.45
E1	1.43	1.73	1.93
E2	2.9	3.05	3.2
e	0.65BSC		
H	0.2	0.35	0.5
K	0.57	0.77	0.87
L	0.3	0.4	0.5
L1/L2	0.1REF		
$\theta$	8°	10°	13°
N	0		0.15
d	0.3	0.4	0.5

## Attention

1, Any and all Winsok power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Winsok power representative nearest you before using any Winsok power products described or contained herein in such applications.

2, Winsok power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Winsok power products described or contained herein.

3, Specifications of any and all Winsok power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.

4, Winsok power Semiconductor CO., LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.

5, In the event that any or all Winsok power products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.

6, No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of Winsok power Semiconductor CO., LTD.

7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Winsok power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.

8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement,etc. When designing equipment, refer to the "Delivery Specification" for the Winsok power product that you intend to use.

9, this catalog provides information as of Sep.2014. Specifications and information herein are subject to change without notice.