

## General Description

The WSK160N15 is the highest performance trench N-ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSK160N15 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## Features

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

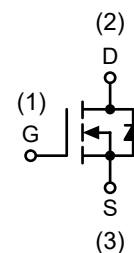
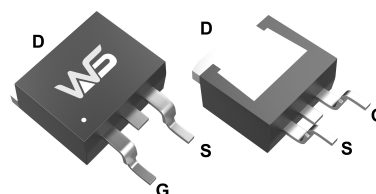
## Product Summary

BVDSS	RDSON	ID
150V	6.6mΩ	160A

## Applications

- High Frequency Point-of-Load Synchronous Buck Converter
- Networking DC-DC Power System

## TO-263-2L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	150	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current, $V_{GS} @ 10V (T_C=25^\circ C)$	160	A
$I_{DM}$	Pulsed Drain Current	550	A
EAS	Single Pulse Avalanche Energy	506	mJ
$P_D$	Total Power Dissipation... $T_C=25^\circ C$	210	W
$R_{\theta JA}$	Thermal resistance, junction-ambient	62	$^\circ C/W$
$R_{\theta JC}$	Thermal resistance, junction-case	0.84	$^\circ C/W$
$T_{STG}$	Storage Temperature Range	-55 to 155	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 155	$^\circ C$

**Electrical Characteristics ( $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$ , $I_D=250\mu A$	150	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V$ , $I_D=30A$	---	6.6	7.5	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=250\mu A$	2.0	2.9	4.0	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=100V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA
$Q_g$	Total Gate Charge	$V_{DS}=50V$ , $V_{GS}=10V$ , $I_D=20A$	---	72	---	nC
$Q_{gs}$	Gate-Source Charge		---	18	---	
$Q_{gd}$	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V$ , $V_{GS}=10V$ $R_G=3\Omega$ , $I_D=20A$	---	22	---	ns
$T_r$	Rise Time		---	115	---	
$T_{d(off)}$	Turn-Off Delay Time		---	44	---	
$T_f$	Fall Time		---	105	---	
$C_{iss}$	Input Capacitance	$V_{DS}=50V$ , $V_{GS}=0V$ , $f=1\text{MHz}$	---	5240	---	pF
$C_{oss}$	Output Capacitance		---	412	---	
$C_{rss}$	Reverse Transfer Capacitance		---	30	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,5</sup>	$V_G=V_D=0V$ , Force Current	---	---	150	A
$I_{SM}$	Pulsed Source Current <sup>2</sup>		---	---	500	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V$ , $I_S=20A$ , $T_J=25^{\circ}\text{C}$	---	---	1.3	V

**■ Note**

- 1 ) Repetitive rating; pulse width limited by max. junction temperature.
- 2 )  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
- 3 ) 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  $T_a=25^{\circ}\text{C}$ .
- 4 )  $V_{DD}=50V$ ,  $R_G=50\Omega$ ,  $L=0.5\text{mH}$ , starting  $T_J=25^{\circ}\text{C}$ .
- 5 ) Calculated continuous current based on maximum allowable junction temperature.

## Typical Characteristics

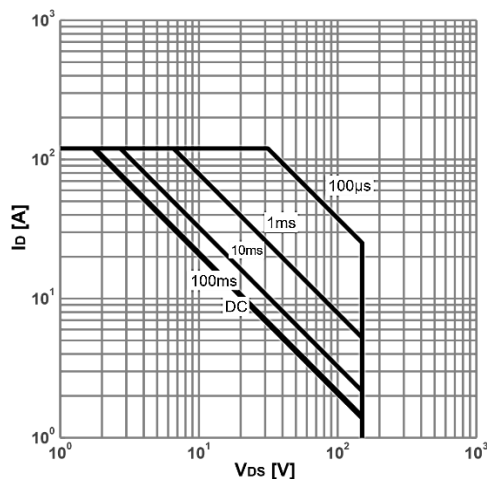


Figure 1. Power dissipation

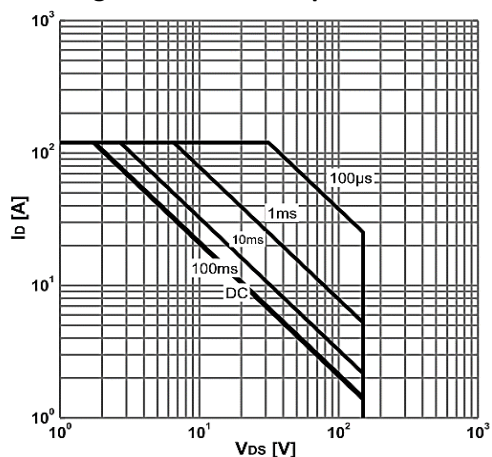


Figure 3. Safe operating area

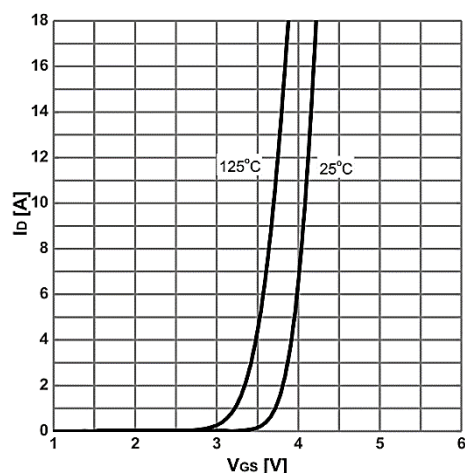


Figure 5. Typ. transfer characteristics

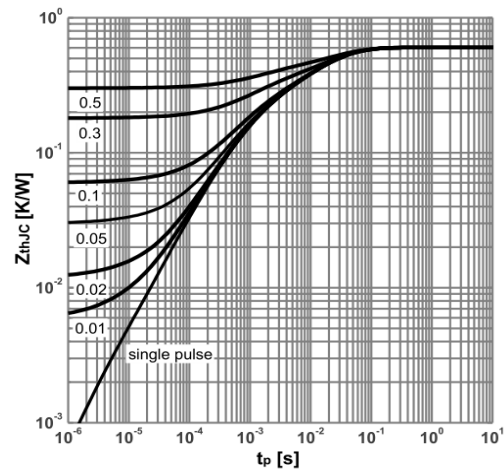


Figure 2. Max. transient thermal impedance

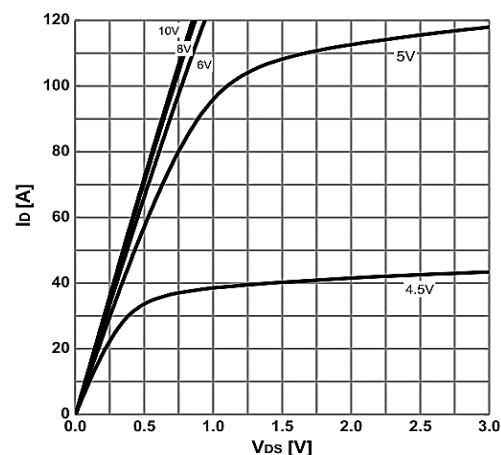


Figure 4. Typ. output characteristics

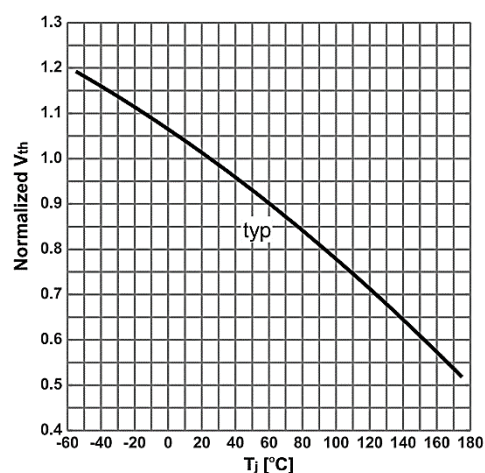


Figure 6. Gate threshold voltage vs. Junction Temperature

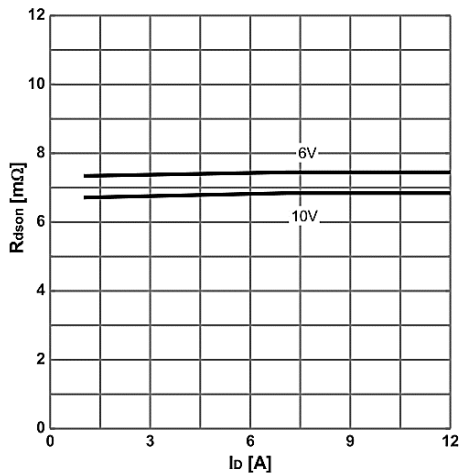


Figure 7. On-state resistance vs. Drain current

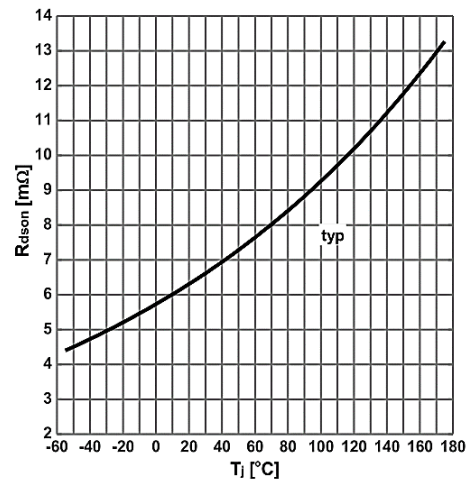


Figure 8. On-state resistance vs. Junction temperature

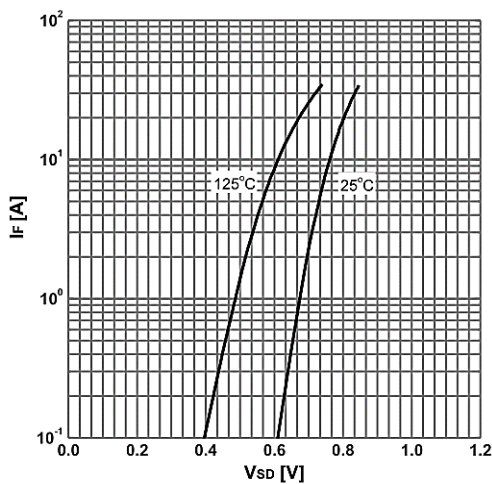


Figure 9. Forward characteristics of reverse diode

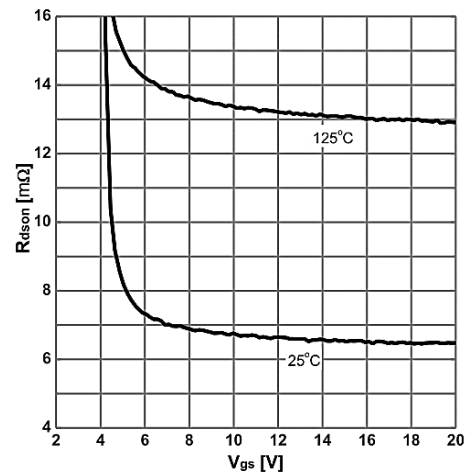


Figure 10. On-state resistance vs. Vgs characteristics

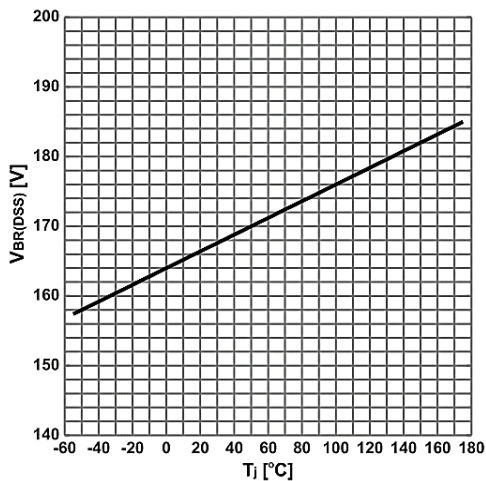


Figure 11: Breakdown Voltage Variation vs. Temperature

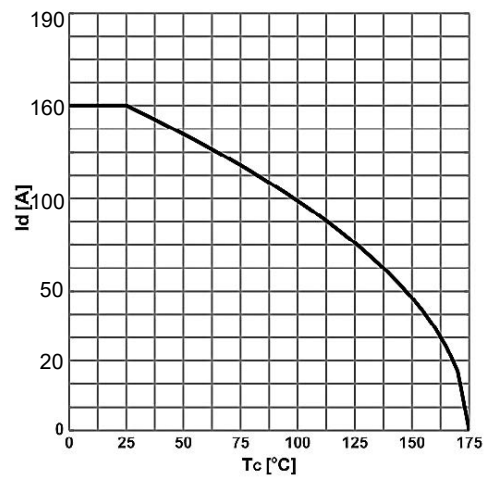
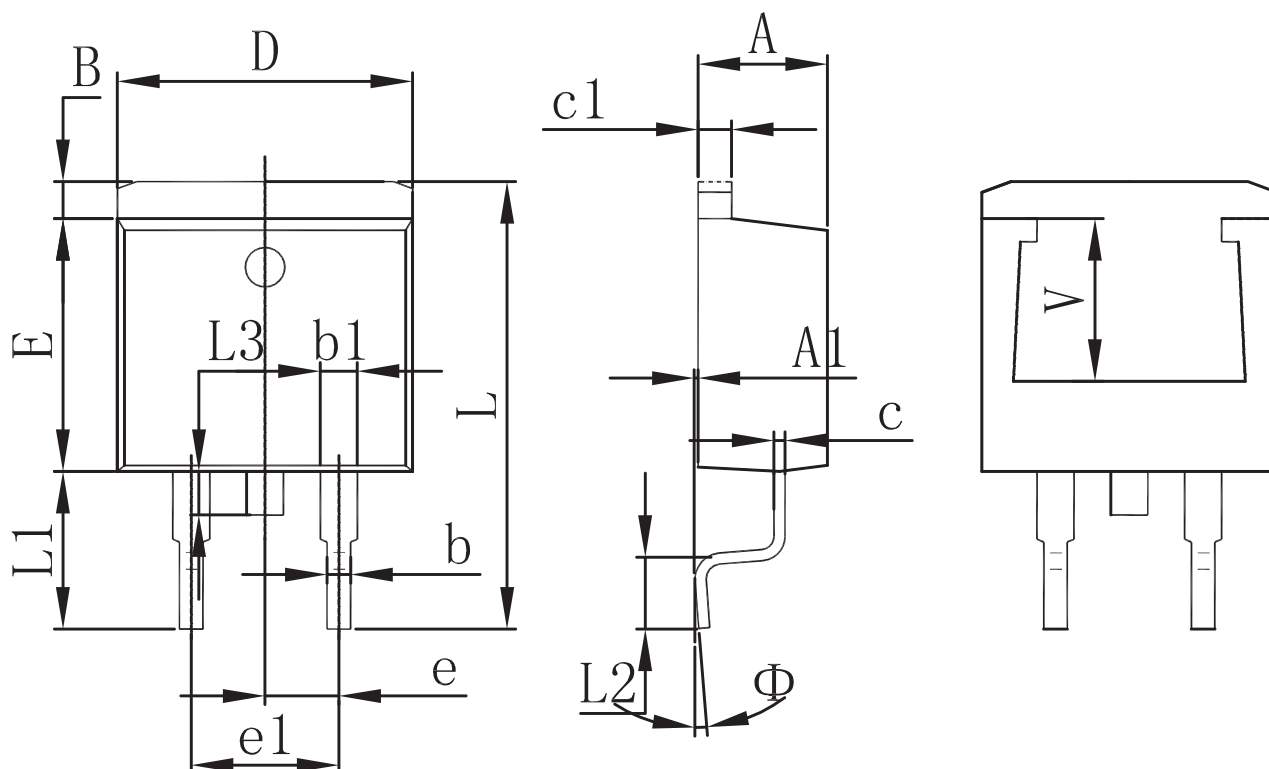


Figure 12: Maximum Drain Current

# Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	

## 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.