General Description

The WSF6020 is the highest performance trench 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 WSF6020 meet the RoHS and Green Product requirement, 100% E_{AS} guaranteed with full function reliability approved.

Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
60V	36mΩ	20A

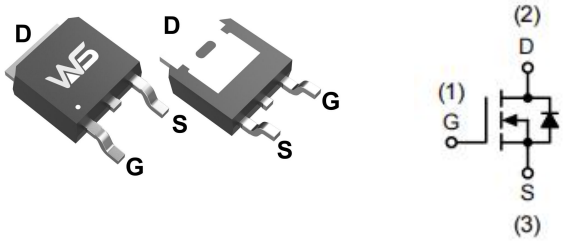
Applications

- Load Switch
- PWM Application

Features

- 100% UIS + R_g Tested.
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

TO-252-2L Pin Configuration



Absolute Maximum Ratings (T_A=25°C, Unless Otherwise Noted)

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		±20	
I_D [7]	Continuous Drain Current	T_C=25°C	20	A
		T_C=100°C	10	
I_{DM} [3]	Pulse Drain Current		38	
P_D [2]	Power Dissipation	T_C=25°C	31	W
		T_C=100°C	20	
E_{AS} [3]	Single pulse Avalanche Energy	L=0.5mH	35	mJ
T_{STG}	Storage Temperature Range		-55 to 150	°C
T_J	Operating Junction Temperature Range		-55 to 150	
$R_{\theta JA}$ [1,4]	Thermal Resistance-Junction to Ambient	t≤10s	31	°C/W
		Steady State	62.5	
$R_{\theta JC}$	Thermal Resistance-Junction to Case		2.8	

Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250μA	60	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=20A	---	36	45	mΩ
		V_{GS}=4.5V , I_D=20A	---	45	55	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=250μA	1.2	1.6	2.2	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V , V_{GS}=0V	---	---	1.0	μA
		T_J=55°C	---	---	5.0	
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V , V_{GS}=±20V	---	---	±100	nA
g_{fs}	Forward Transconductance	V_{DS}=5V , I_D=20A	---	3.5	---	S
R_G	Gate Resistance	f=1.0MHz	1.0	3.0	4.0	Ω
Q_g	Total Gate Charge (10V)	V_{DS}=30V , V_{GS}=10V , I_D=20A	---	40	---	nC
Q_g	Total Gate Charge (4.5V)		---	55	---	
Q_{gs}	Gate-Source Charge		---	15	---	
Q_{gd}	Gate-Drain Charge		---	14	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DS}=30V , V_{GS}=10V , R_L=1Ω , R_{GEN}=3Ω	---	11	---	ns
T_r	Rise Time		---	6.0	---	
$T_{d(off)}$	Turn-Off Delay Time		---	35	---	
T_f	Fall Time		---	20	---	
C_{iss}	Input Capacitance	V_{DS}=30V , V_{GS}=0V , f=1.0MHz	---	950	---	pF
C_{oss}	Output Capacitance		---	55	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S [7]	Continuous Source Current		---	---	20	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A	---	---	1.2	V
t_{rr}	Reverse Recovery Time	I_F=20A , di/dt=500A/μs	---	30	---	ns
Q_{rr}	Reverse Recovery Charge		---	40	---	nC

Note:

1. The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ t≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
2. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
3. Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of $T_{J(MAX)}$=150°C. The SOA curve provides a single pulse rating.
7. The maximum current rating is package limited.
8. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C.
9. The maximum current rating is silicon limited

Typical Characteristics

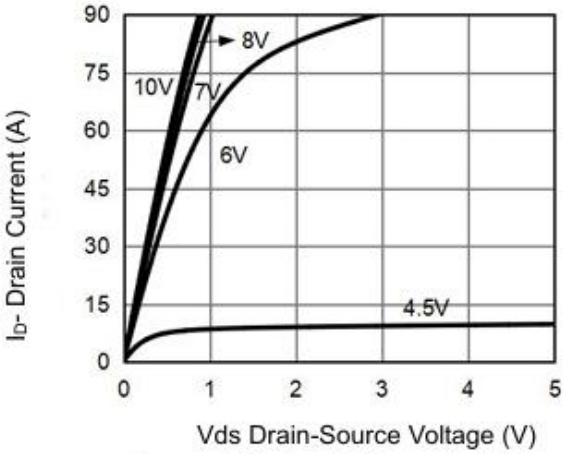


Figure 1 Output Characteristics

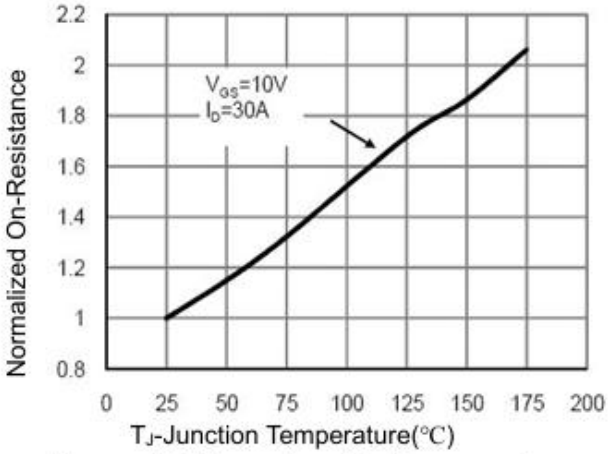


Figure 4 Rdson-JunctionTemperature

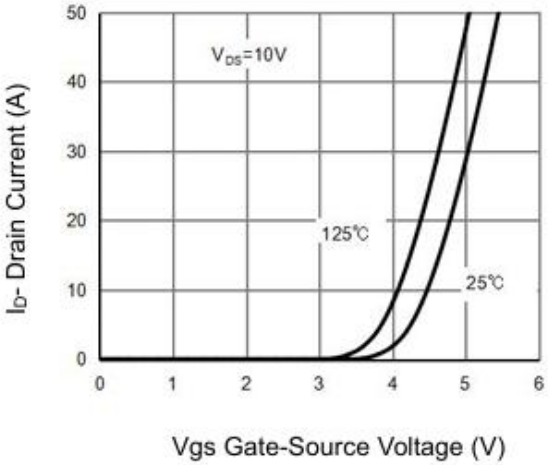


Figure 2 Transfer Characteristics

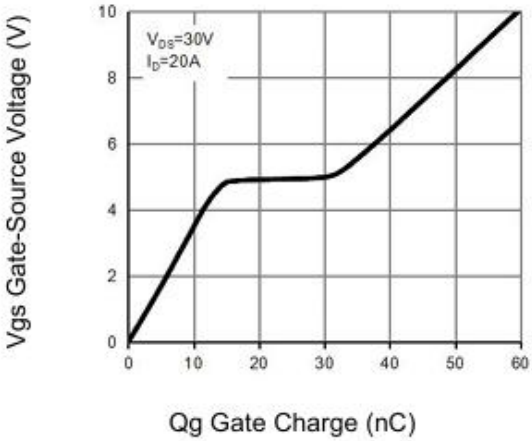


Figure 5 Gate Charge

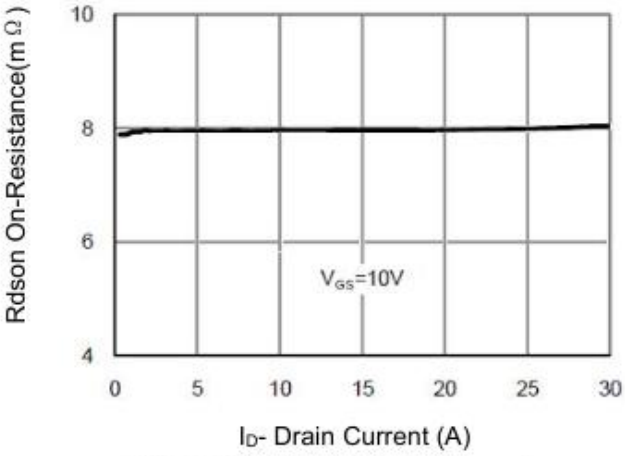


Figure 3 Rdson- Drain Current

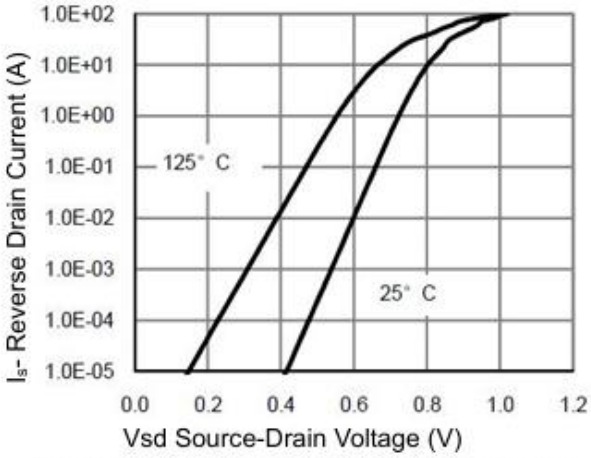


Figure 6 Source- Drain Diode Forward

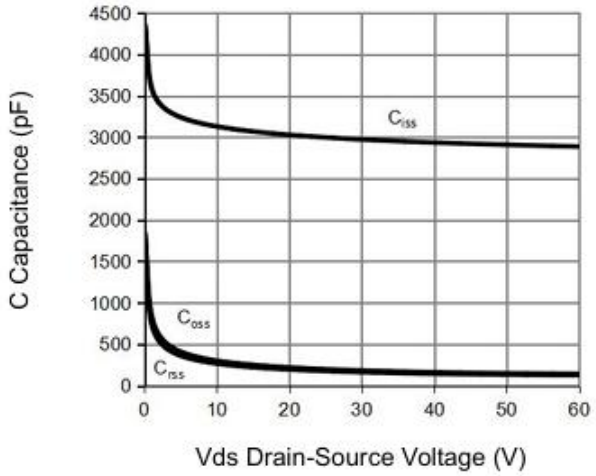


Figure 7 Capacitance vs Vds

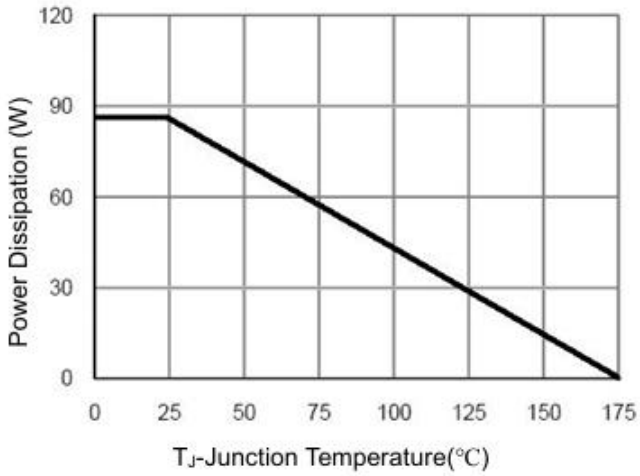


Figure 9 Power De-rating

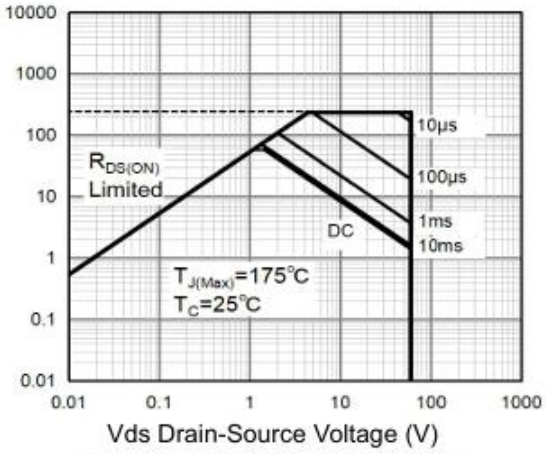


Figure 8 Safe Operation Area

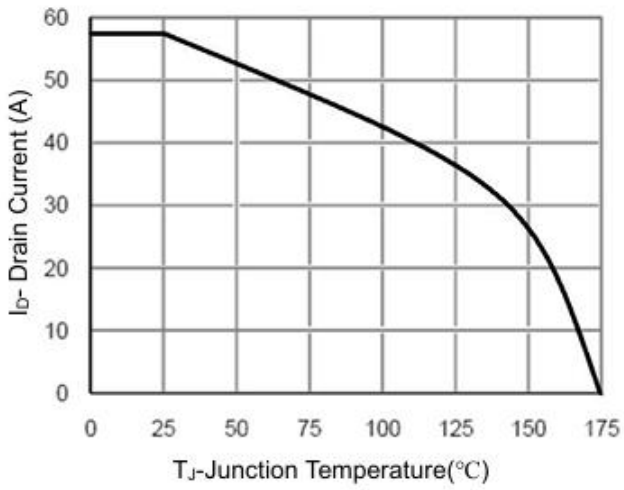


Figure 10 ID Current- JunctionTemperature

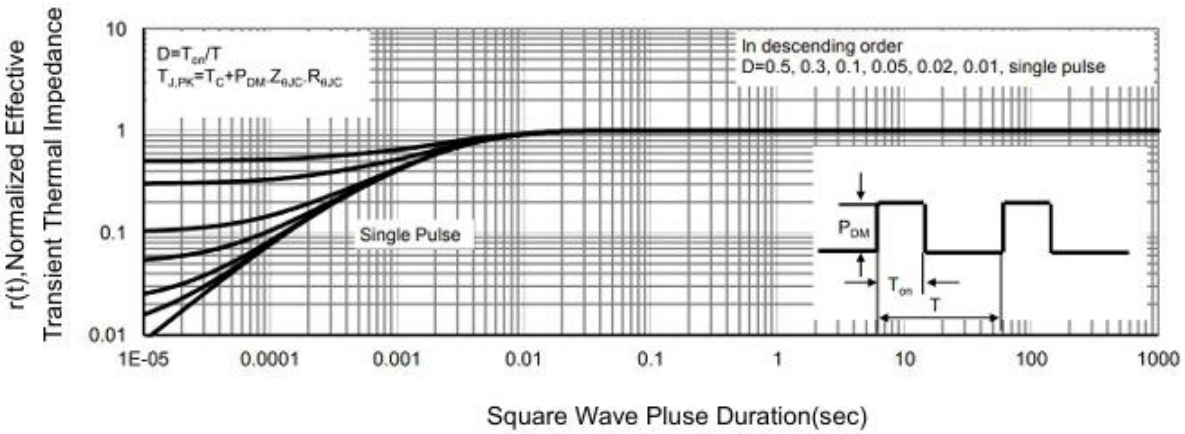
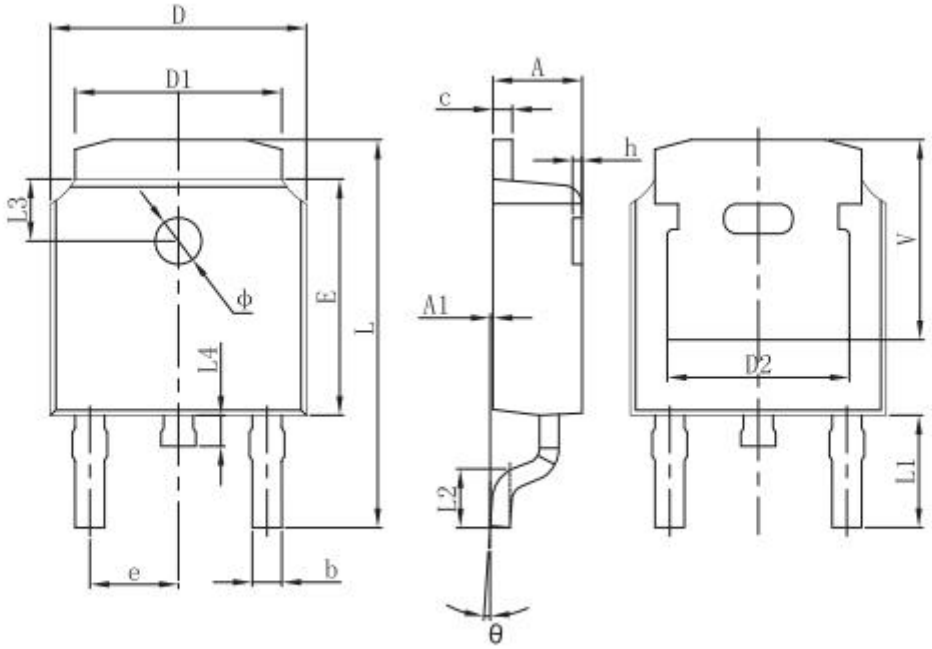


Figure 11 Normalized Maximum Transient Thermal Impedance

Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

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.