

## General Description

The WSF30N06 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 WSF30N06 meet the RoHS and Green Product requirement, 100%  $E_{AS}$  guaranteed with full function reliability approved.

## Features

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

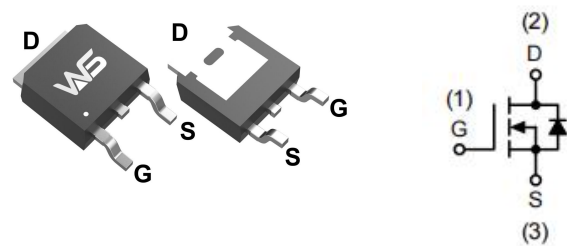
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
60V	28m $\Omega$	30A

## Applications

- Load Switch
- PWM Application

## TO-252-2L Pin Configuration



## Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ , Unless Otherwise Noted)

Symbol	Parameter	Rating	Units	
$V_{DS}$	Drain-Source Voltage	60	V	
$V_{GS}$	Gate-Source Voltage	$\pm 20$		
$I_D^7$	Continuous Drain Current	$T_C=25^\circ\text{C}$	30	A
		$T_C=100^\circ\text{C}$	15	
$I_{DM}^3$	Pulse Drain Current	45		
$P_D^2$	Power Dissipation	$T_C=25^\circ\text{C}$	31	W
		$T_C=100^\circ\text{C}$	20	
$E_{AS}^3$	Single pulse Avalanche Energy	$L=0.5\text{mH}$	39	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	$t \leq 10\text{s}$	31	°C/W
		Steady State	62.5	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	2.8		

**Electrical Characteristics (T<sub>J</sub>=25°C, Unless Otherwise Noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	60	---	---	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	28	36	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A	---	38	45	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	1.2	1.6	2.2	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V T <sub>J</sub> =55°C	---	---	1.0	μA
			---	---	5.0	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A	---	30	---	S
R <sub>G</sub>	Gate Resistance	f=1.0MHz	1.0	3.0	4.0	Ω
Q <sub>g</sub>	Total Gate Charge (10V)	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A	---	35	---	nC
Q <sub>g</sub>	Total Gate Charge (4.5V)		---	55	---	
Q <sub>gs</sub>	Gate-Source Charge		---	12	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	13	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, R <sub>L</sub> =1Ω, R <sub>GEN</sub> =3Ω	---	14	---	ns
T <sub>r</sub>	Rise Time		---	5.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	38	---	
T <sub>f</sub>	Fall Time		---	27	---	
C <sub>iSS</sub>	Input Capacitance	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, f=1.0MHz	---	1027	---	pF
C <sub>oss</sub>	Output Capacitance		---	60	---	
C <sub>rSS</sub>	Reverse Transfer Capacitance		---	40	---	

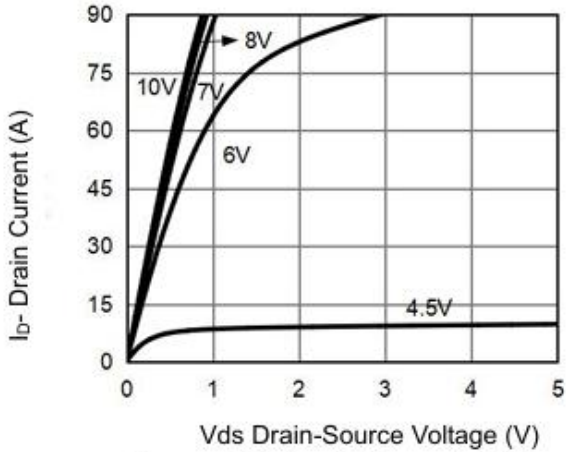
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I <sub>S</sub> <sup>7</sup>	Continuous Source Current		---	---	30	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=500A/μs	---	34	---	ns
Q <sub>rr</sub>	Reverse Recovery Charge		---	47	---	nC

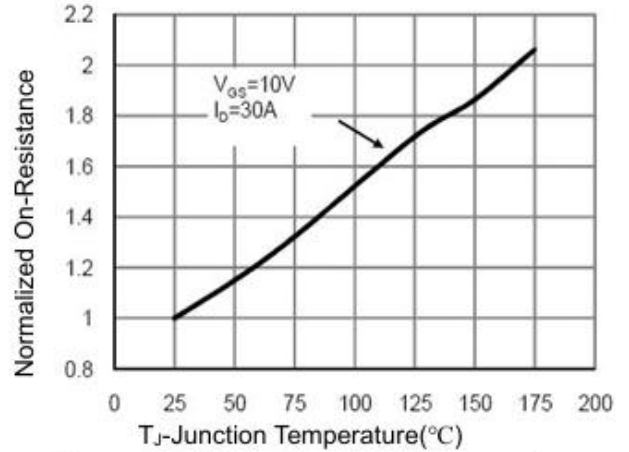
**Note:**

- The value of R<sub>θJA</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C. The Power dissipation P<sub>DSM</sub> is based on R<sub>θJA</sub> ≤ 10s and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- The power dissipation P<sub>D</sub> is based on T<sub>J(MAX)</sub>=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.
- Single pulse width limited by junction temperature T<sub>J(MAX)</sub>=150°C.
- The R<sub>θJA</sub> is the sum of the thermal impedance from junction to case R<sub>θJC</sub> and case to ambient.
- The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.
- 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<sub>J(MAX)</sub>=150°C. The SOA curve provides a single pulse rating.
- The maximum current rating is package limited.
- These tests are performed with the device mounted on 1 in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub>=25°C.
- The maximum current rating is silicon limited

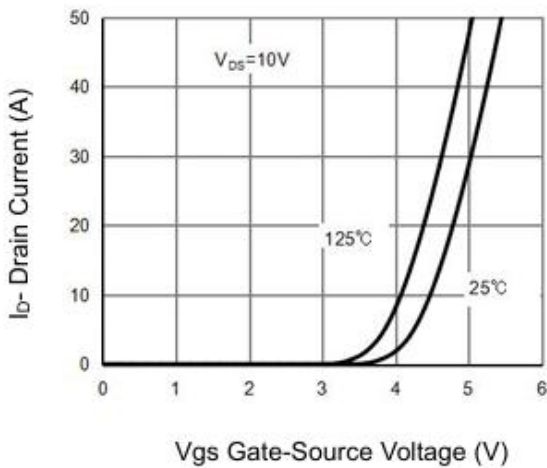
**Typical Characteristics**



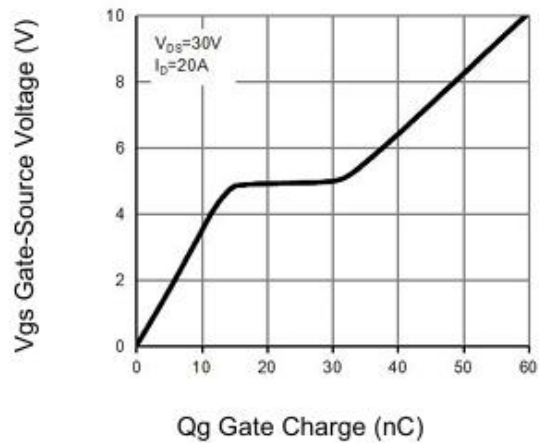
**Figure 1 Output Characteristics**



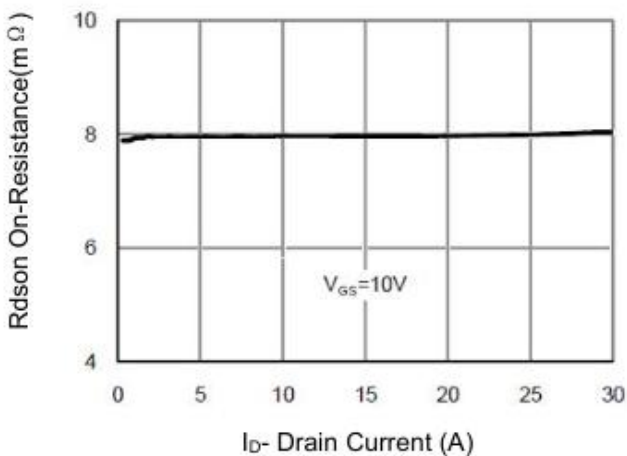
**Figure 4 Rdson-Junction Temperature**



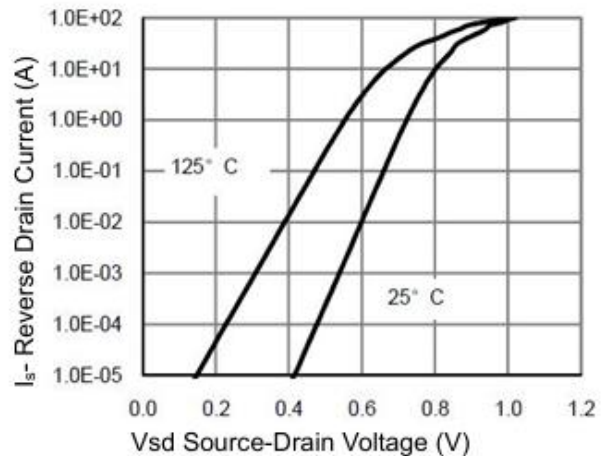
**Figure 2 Transfer Characteristics**



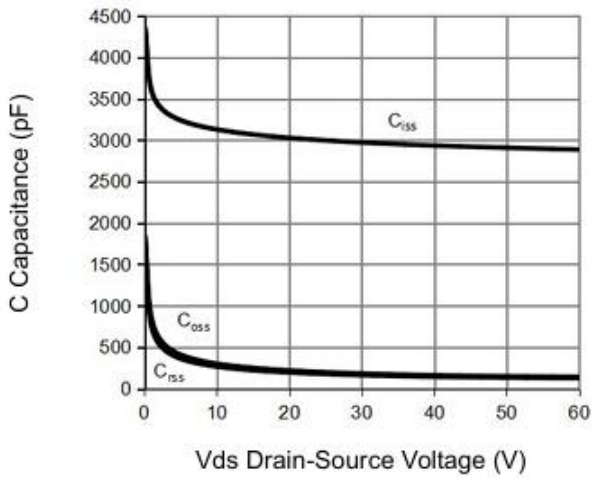
**Figure 5 Gate Charge**



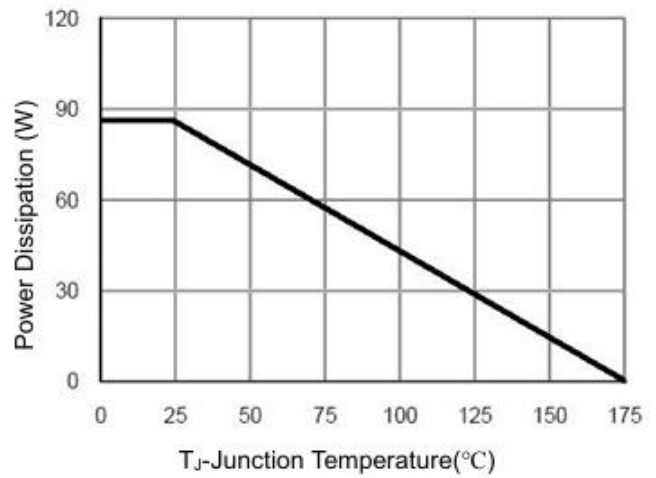
**Figure 3 Rdson- Drain Current**



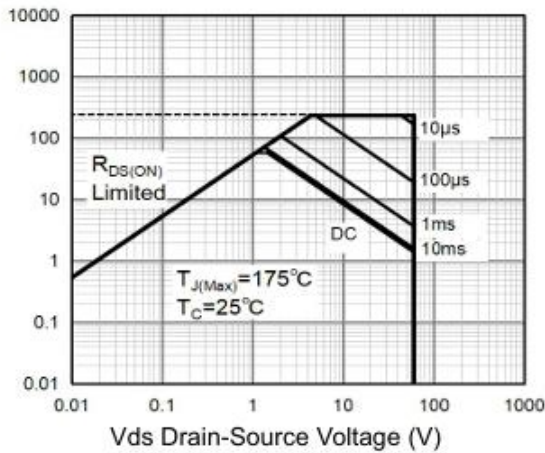
**Figure 6 Source- Drain Diode Forward**



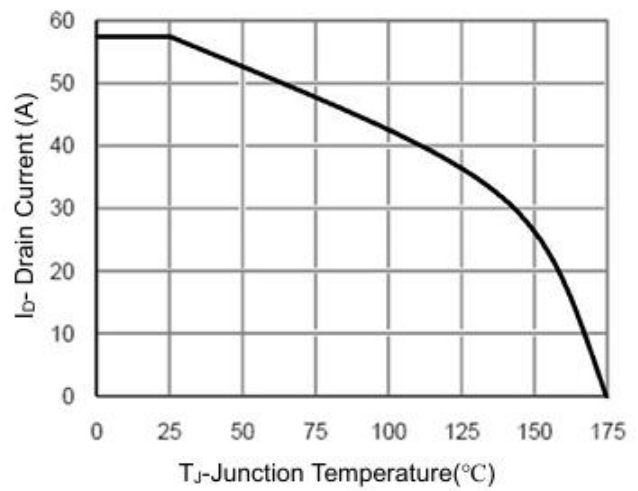
**Figure 7 Capacitance vs Vds**



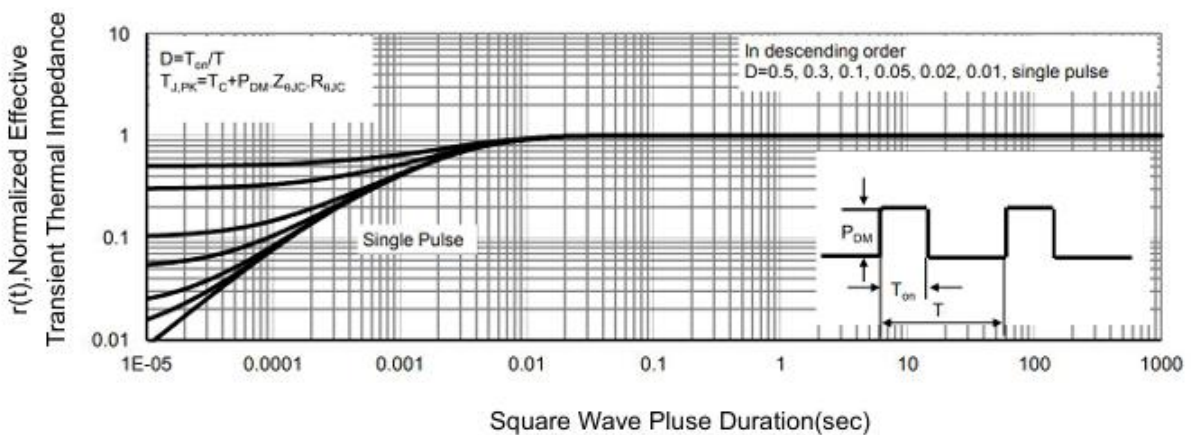
**Figure 9 Power De-rating**



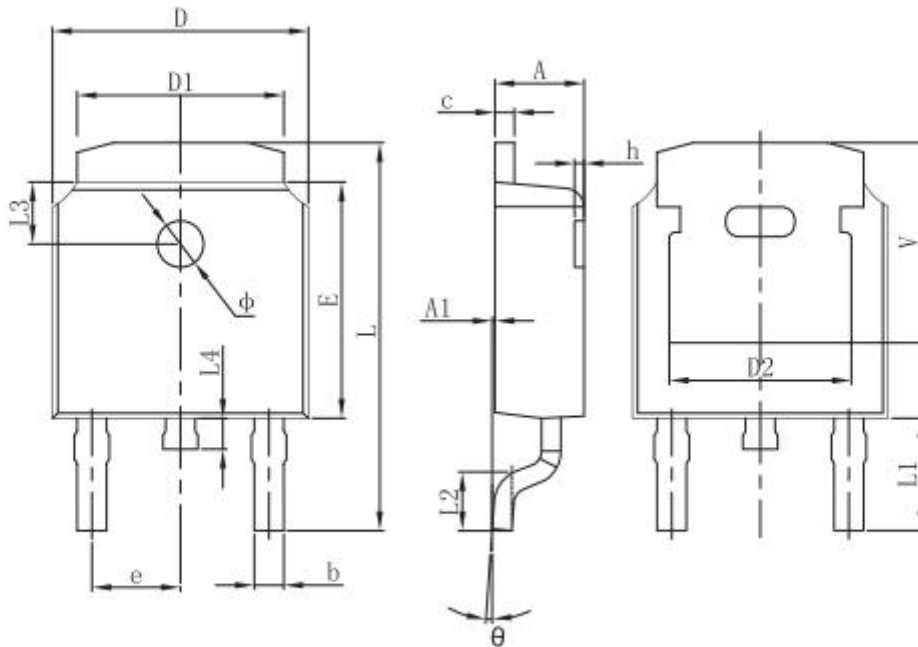
**Figure 8 Safe Operation Area**



**Figure 10 ID Current- Junction Temperature**



**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.	

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