

## General Description

The WSD3072DN33 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

The WSD3072DN33 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

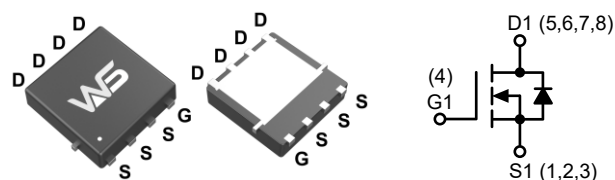
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30V	3.5m $\Omega$	72A

## Applications

- Battery protection
- Load switch
- Uninterruptible power supply

## DFN3X3-8L Pin Configuration



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

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	
$I_D@T_C=25^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$ <sup>1</sup>	72	A
$I_D@T_C=100^{\circ}\text{C}$	Continuous Drain Current, $V_{GS} @ 10V$ <sup>1</sup>	48	
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	160	
$E_{AS}$	Single Pulse Avalanche Energy <sup>3</sup>	315	mJ
$I_{AS}$	Avalanche Current	38	A
$P_D@T_C=25^{\circ}\text{C}$	Total Power Dissipation <sup>4</sup>	59	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^{\circ}\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	

## Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient <sup>1</sup>	---	62	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case <sup>1</sup>	---	2.1	

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$ , $I_D=250\mu A$	30	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V$ , $I_D=30A$	---	3.5	4.5	m $\Omega$
		$V_{GS}=4.5V$ , $I_D=15A$	---	6.5	8.5	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$ , $I_D=250\mu A$	1.0	1.6	2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-6.16	---	mV/ $^{\circ}\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=25^{\circ}\text{C}$	---	---	1.0	$\mu A$
		$V_{DS}=24V$ , $V_{GS}=0V$ , $T_J=55^{\circ}\text{C}$	---	---	5.0	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA
$g_{fs}$	Forward Transconductance	$V_{DS}=5V$ , $I_D=30A$	---	22	---	S
$R_g$	Gate Resistance	$V_{DS}=0V$ , $V_{GS}=0V$ , $f=1.0\text{MHz}$	---	1.7	3.4	$\Omega$
$Q_g$	Total Gate Charge (4.5V)	$V_{DS}=15V$ , $V_{GS}=4.5V$ , $I_D=15A$	---	20	---	nC
$Q_{gs}$	Gate-Source Charge		---	7.6	---	
$Q_{gd}$	Gate-Drain Charge		---	7.2	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V$ , $V_{GS}=10V$ , $R_G=3.3\Omega$ , $I_D=15A$	---	7.8	---	ns
$T_r$	Rise Time		---	15	---	
$T_{d(off)}$	Turn-Off Delay Time		---	37.3	---	
$T_f$	Fall Time		---	10.5	---	
$C_{iss}$	Input Capacitance	$V_{DS}=15V$ , $V_{GS}=0V$ , $f=1.0\text{MHz}$	---	2295	---	pF
$C_{oss}$	Output Capacitance		---	267	---	
$C_{rss}$	Reverse Transfer Capacitance		---	210	---	

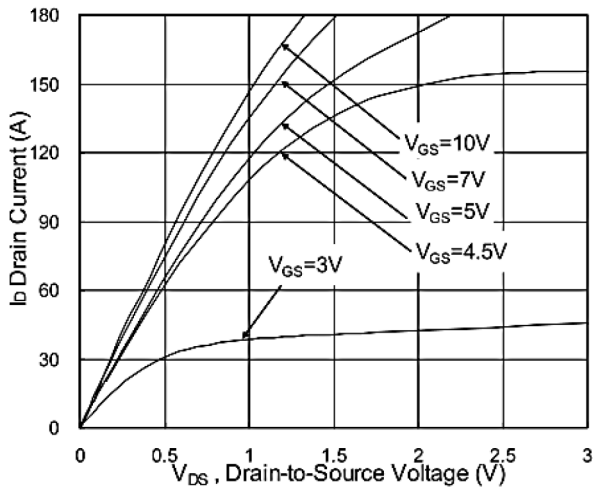
**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current <sup>1,6</sup>	$V_G=V_D=0V$ , Force Current	---	---	80	A
$I_{SM}$	Pulsed Source Current <sup>2,6</sup>		---	---	160	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V$ , $I_S=1A$ , $T_J=25^{\circ}\text{C}$	---	---	1.0	V
$t_{rr}$	Reverse Recovery Time	$I_F=30A$ , $dI/dt=100A/\mu s$ , $T_J=25^{\circ}\text{C}$	---	14	---	ns
$Q_{rr}$	Reverse Recovery Charge		---	5	---	nC

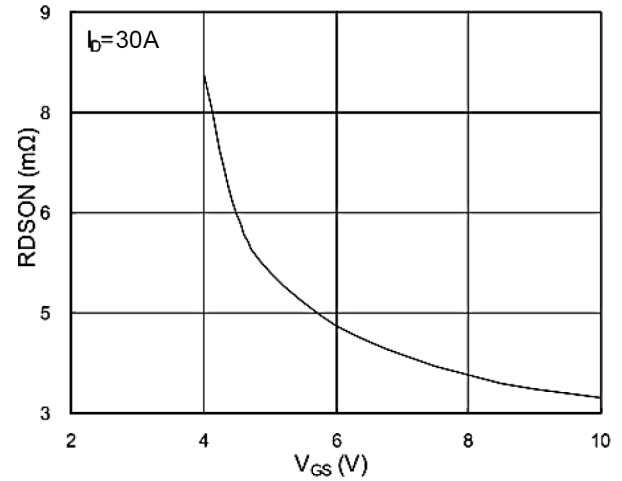
Note:

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The  $E_{AS}$  data shows Max. rating. The test condition is  $V_{DD}=24V$ ,  $V_{GS}=10V$ ,  $L=0.5mH$ ,  $I_{AS}=38A$
4. The power dissipation is limited by  $150^{\circ}\text{C}$  junction temperature.
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

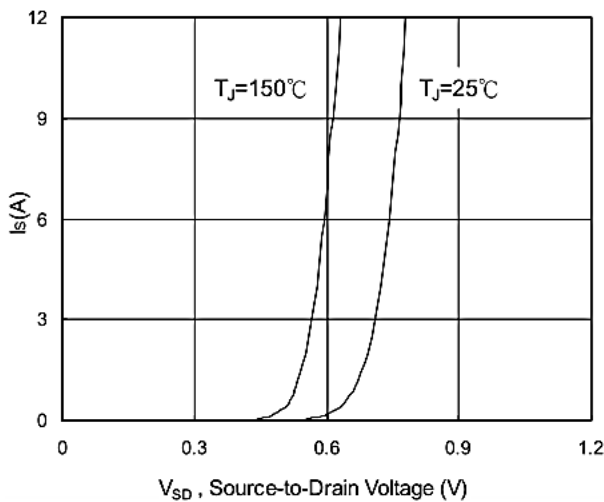
## Typical Characteristics



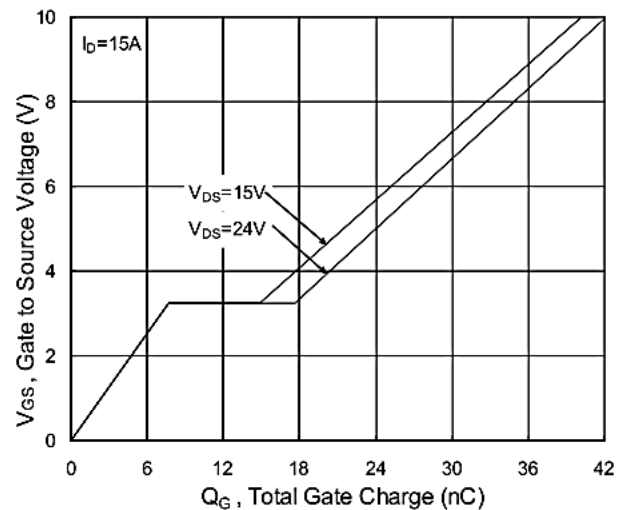
**Fig.1 Typical Output Characteristics**



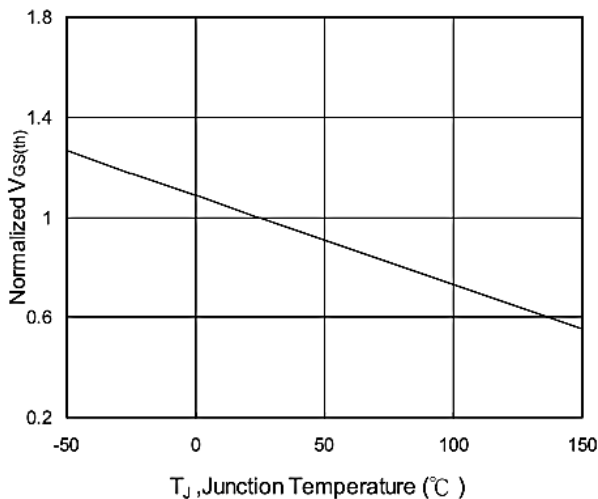
**Fig.2 On-Resistance vs. G-S Voltage**



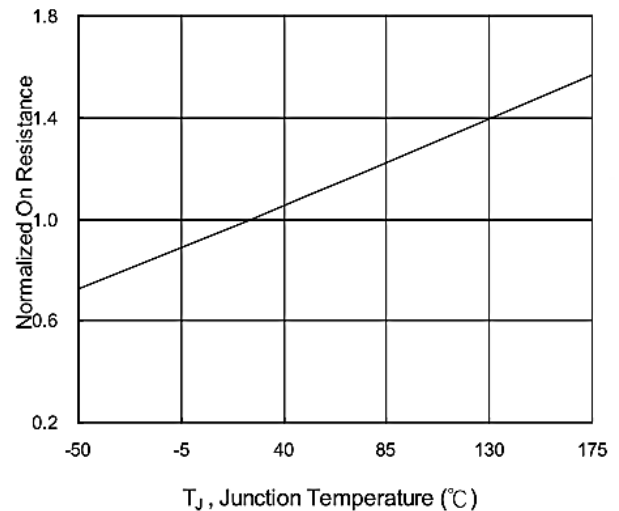
**Fig.3 Forward Characteristics of Reverse**



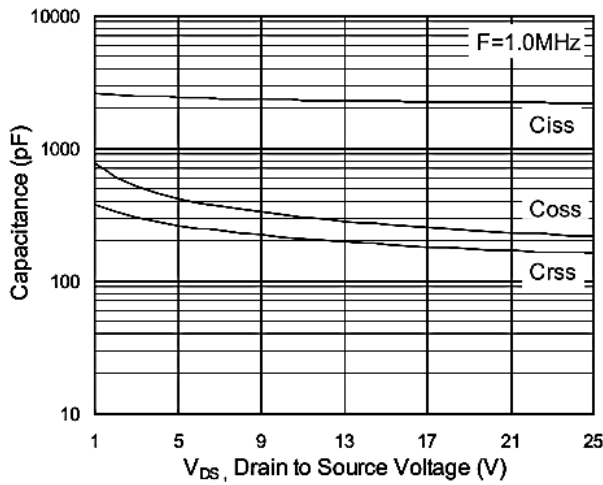
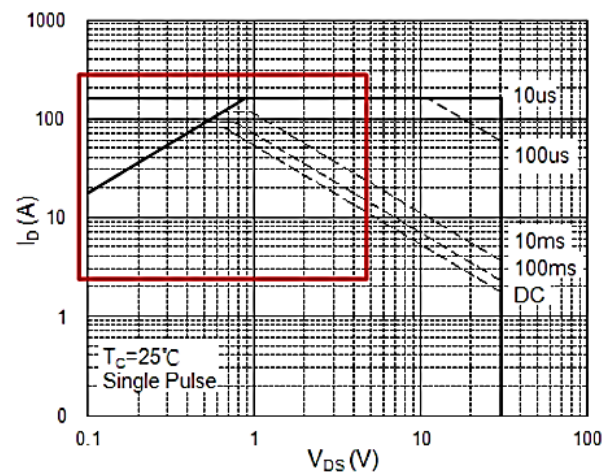
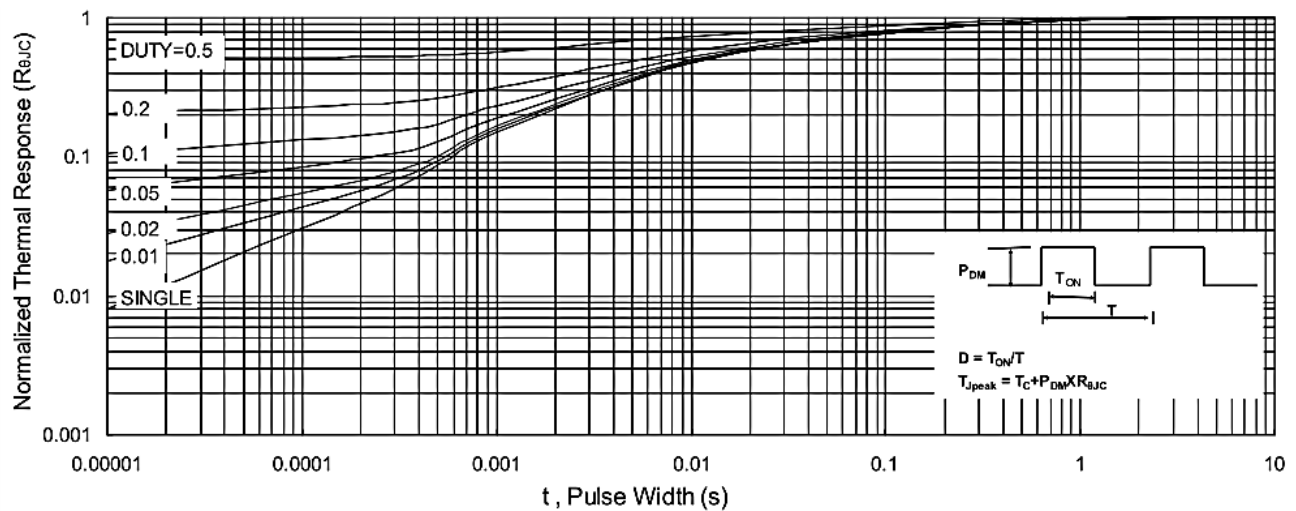
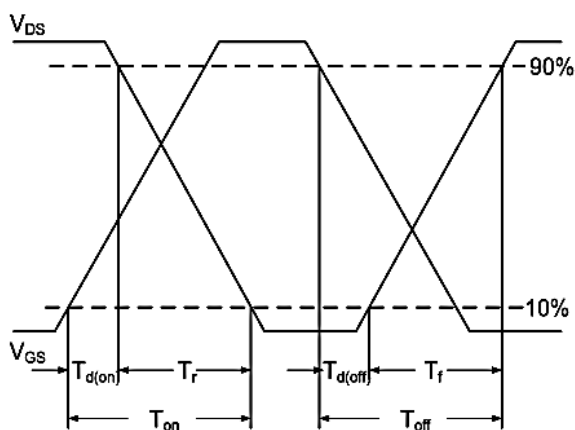
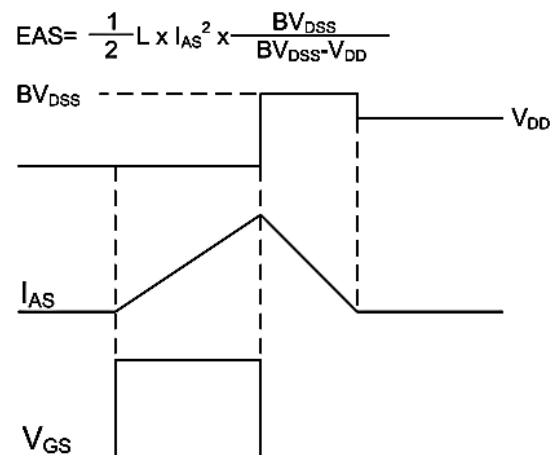
**Fig.4 Gate-Charge Characteristics**



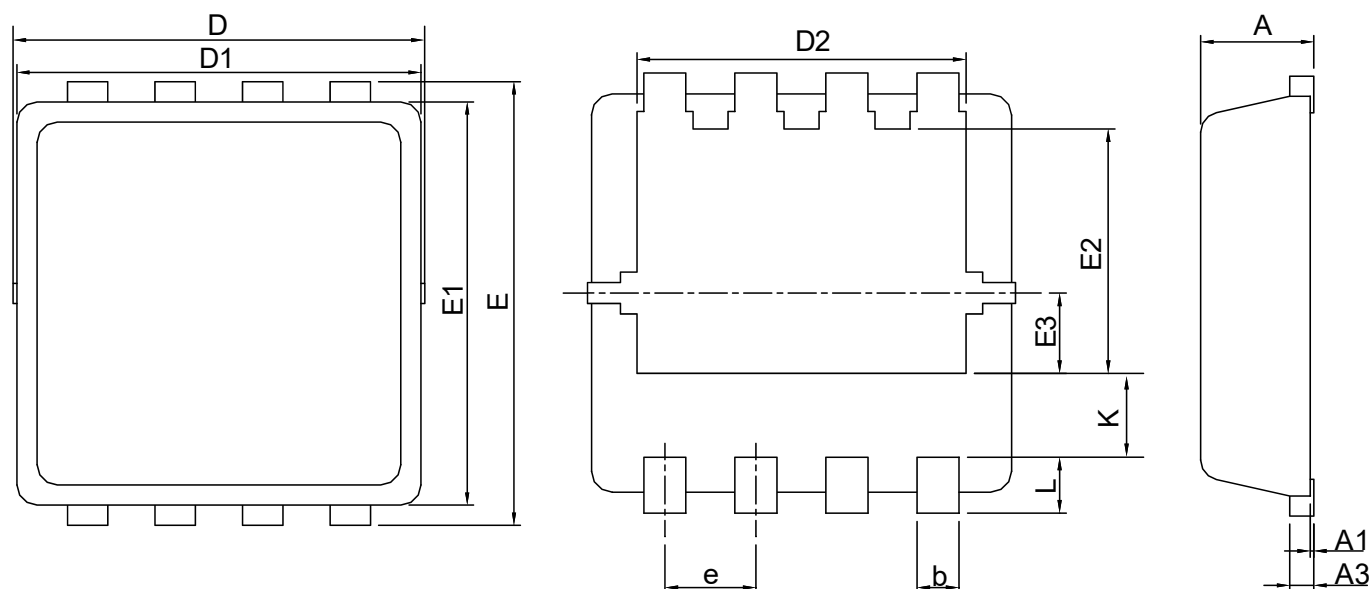
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

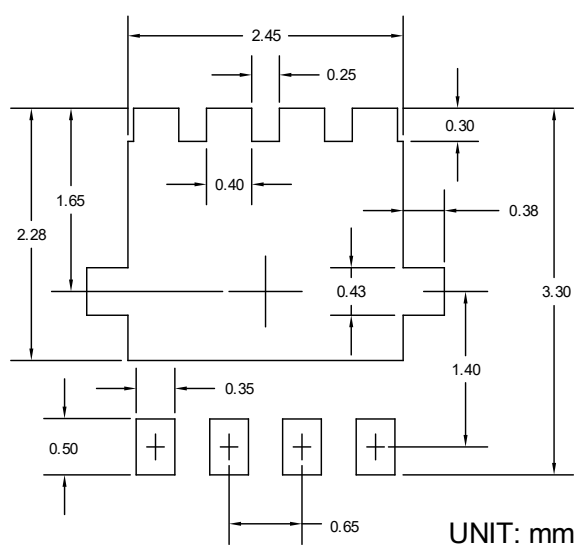
**Typical Characteristics (Cont.)**

**Fig.7 Capacitance**

**Fig.8 Safe Operating Area**

**Fig.9 Normalized Maximum Transient Thermal Impedance**

**Fig.10 Switching Time Waveform**

**Fig.11 Unclamped Inductive Switching Waveform**

## Packaging information



SYMBOL	DFN3X3-8L			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039
A1	0.00	0.05	0.000	0.002
A3	0.10	0.25	0.004	0.010
b	0.24	0.35	0.009	0.014
D	2.90	3.30	0.114	0.130
D1	2.90	3.10	0.114	0.122
D2	2.25	2.45	0.089	0.096
E	3.10	3.30	0.122	0.130
E1	2.90	3.10	0.114	0.122
E2	1.65	1.85	0.065	0.073
E3	0.56	0.58	0.022	0.023
e	0.65 BSC		0.026 BSC	
K	0.475	0.775	0.019	0.031
L	0.30	0.50	0.012	0.020

## RECOMMENDED LAND PATTERN



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