

## General Description

The WSD2010DN25 is the highest performance trench N-Channel MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

The WSD2010DN25 meet the RoHS and Green Product requirement with full function reliability approved.

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

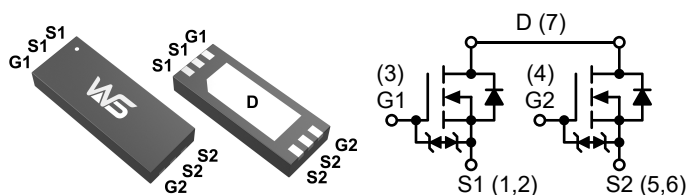
## Product Summary

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
20V	6.0mΩ	11A

## Applications

- Power management in portable and battery operated products
- DC-DC Power System
- ESD:2KV

## DFN2X5-6S Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D@T_A=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	11	A
$I_D@T_A=70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	7.5	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	38	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1.5	W
$P_D@T_A=70^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	1.0	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)	---	127	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction-ambient <sup>1</sup> (t<10S)	---	80	$^\circ\text{C/W}$

## Electrical Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to 25°C, $I_D=1mA$	---	0.022	---	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=4.5V, I_D=5.5A$	---	6.0	7.5	mΩ
		$V_{GS}=2.5V, I_D=5.5A$	---	7.3	9.9	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.5	0.7	1.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-2.32	---	mV/°C
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=16V, V_{GS}=0V, T_J=25^\circ C$	---	---	1	μA
		$V_{DS}=16V, V_{GS}=0V, T_J=55^\circ C$	---	---	5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	±10	μA
$g_{fs}$	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	30	---	S
$R_g$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1MHz$	---	11	---	Ω
$Q_g$	Total Gate Charge (4.5V)	$V_{DS}=10V, V_{GS}=4.5V, I_D=5.5A$	---	23.2	26	nC
$Q_{gs}$	Gate-Source Charge		---	1.9	5.5	
$Q_{gd}$	Gate-Drain Charge		---	4.8	9.2	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=10V, V_{GS}=10V, R_G=1\Omega, I_D=1A, R_L=10\Omega$	---	8	15	ns
$T_r$	Rise Time		---	20	36	
$T_{d(off)}$	Turn-Off Delay Time		---	935	1583	
$T_f$	Fall Time		---	410	738	
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V, f=1MHz$	---	1470	1920	pF
$C_{oss}$	Output Capacitance		---	258	---	
$C_{rss}$	Reverse Transfer Capacitance		---	202	---	

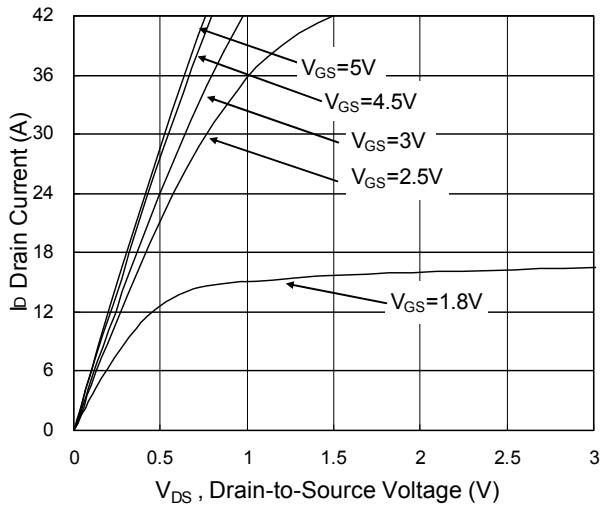
## Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current <sup>1,4</sup>	$V_G=V_D=0V$ , Force Current	---	---	2	A
$I_{SM}$	Pulsed Source Current <sup>2,4</sup>		---	---	38	A
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS}=0V, I_S=1A, T_J=25^\circ C$	---	---	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=5.5A, dI/dt=100A/\mu s, T_J=25^\circ C$	---	445	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	2175	---	nC

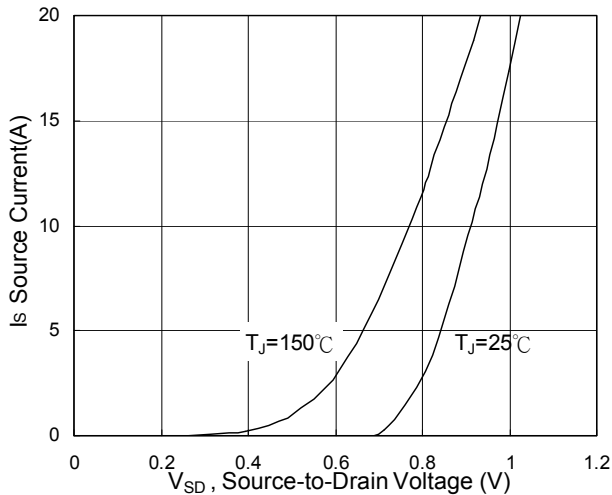
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper,  $t<10sec$ .
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

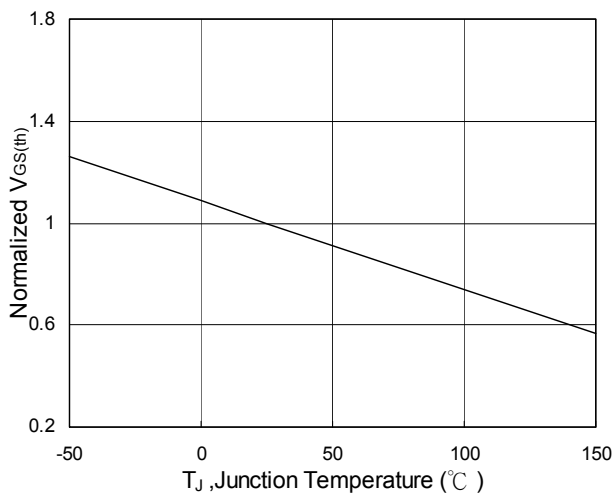
## Typical Characteristics



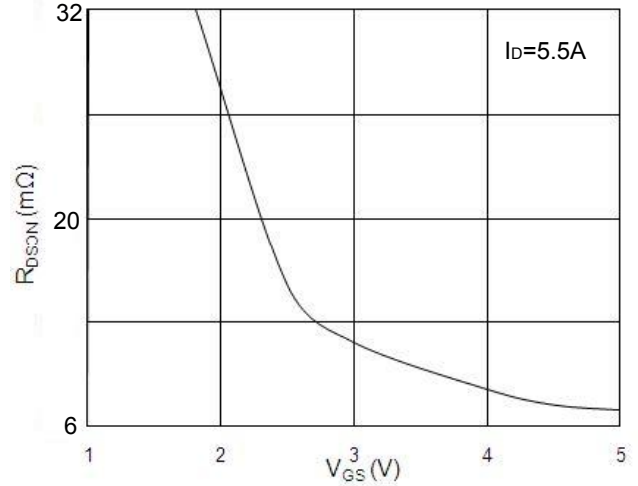
**Fig.1 Typical Output Characteristics**



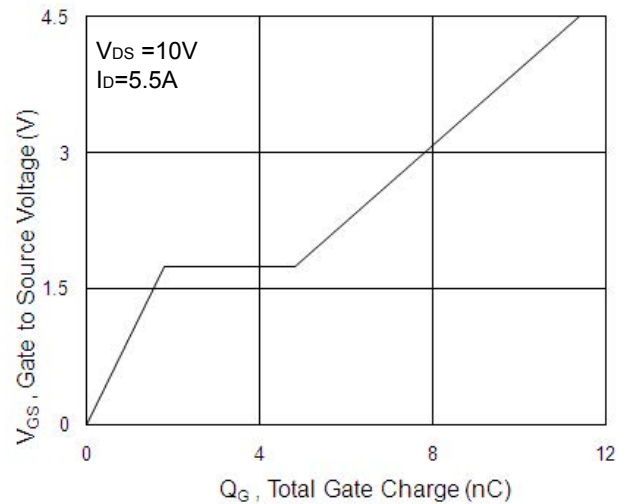
**Fig.3 Forward Characteristics Of Reverse**



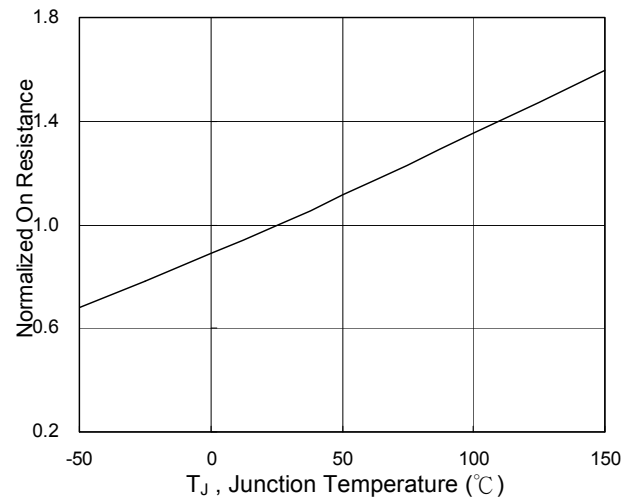
**Fig.5  $V_{GS(th)}$  vs.  $T_J$**



**Fig.2 On-Resistance vs. Gate-Source**

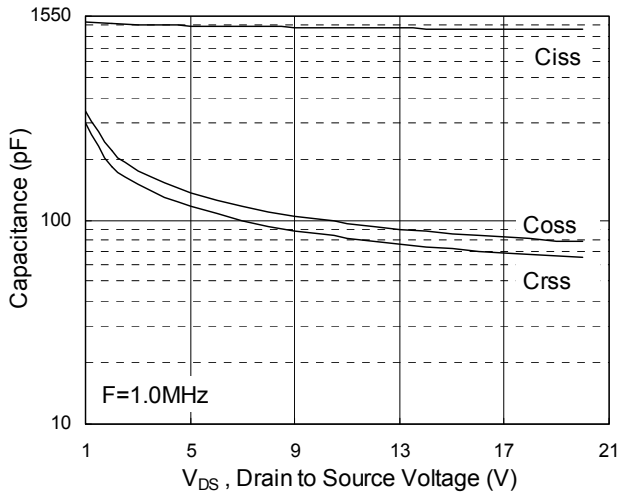
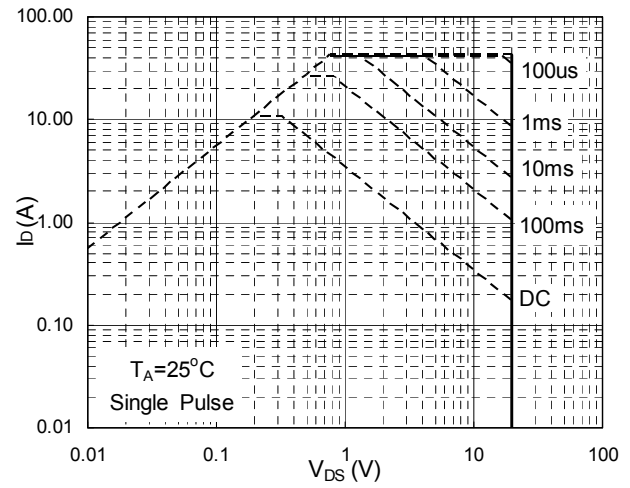
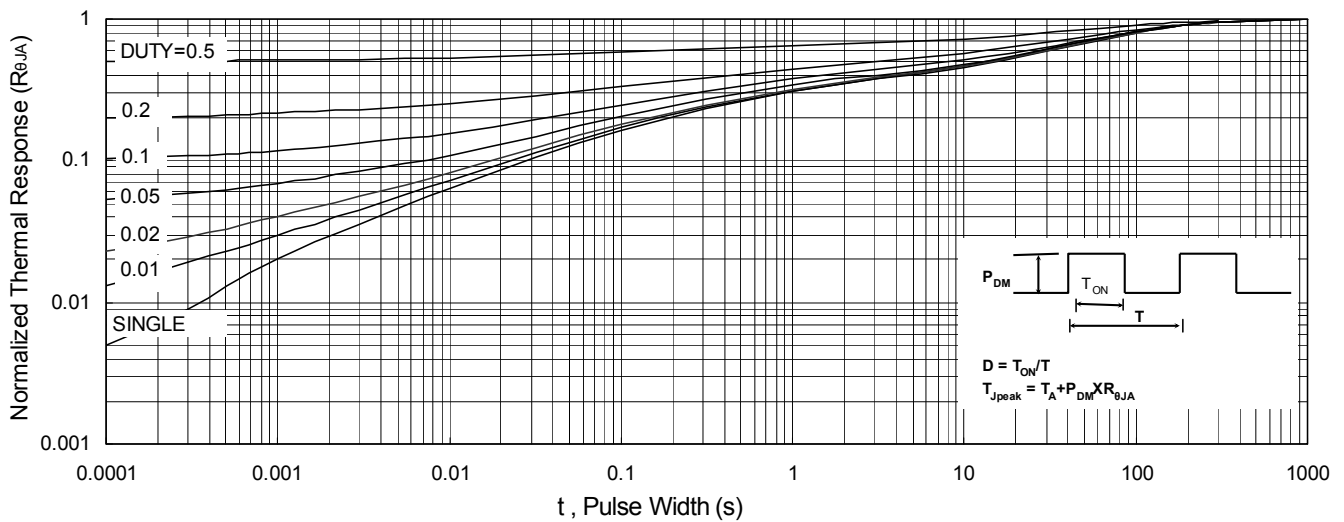
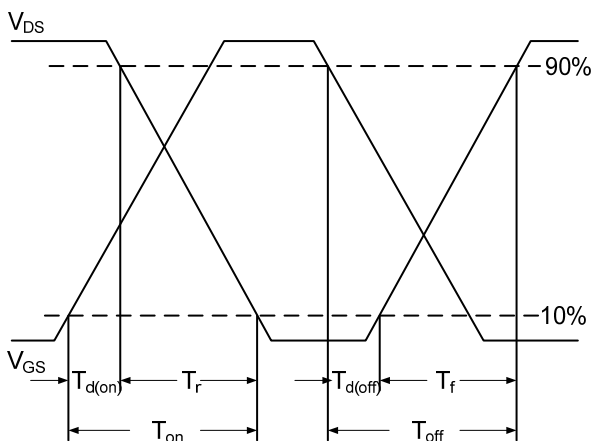
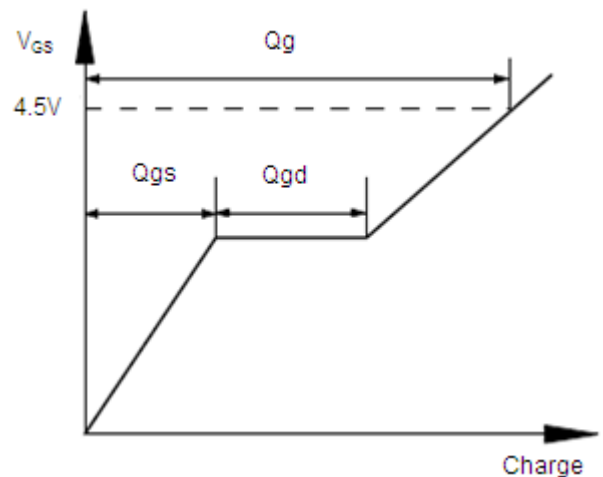


**Fig.4 Gate-Charge Characteristics**

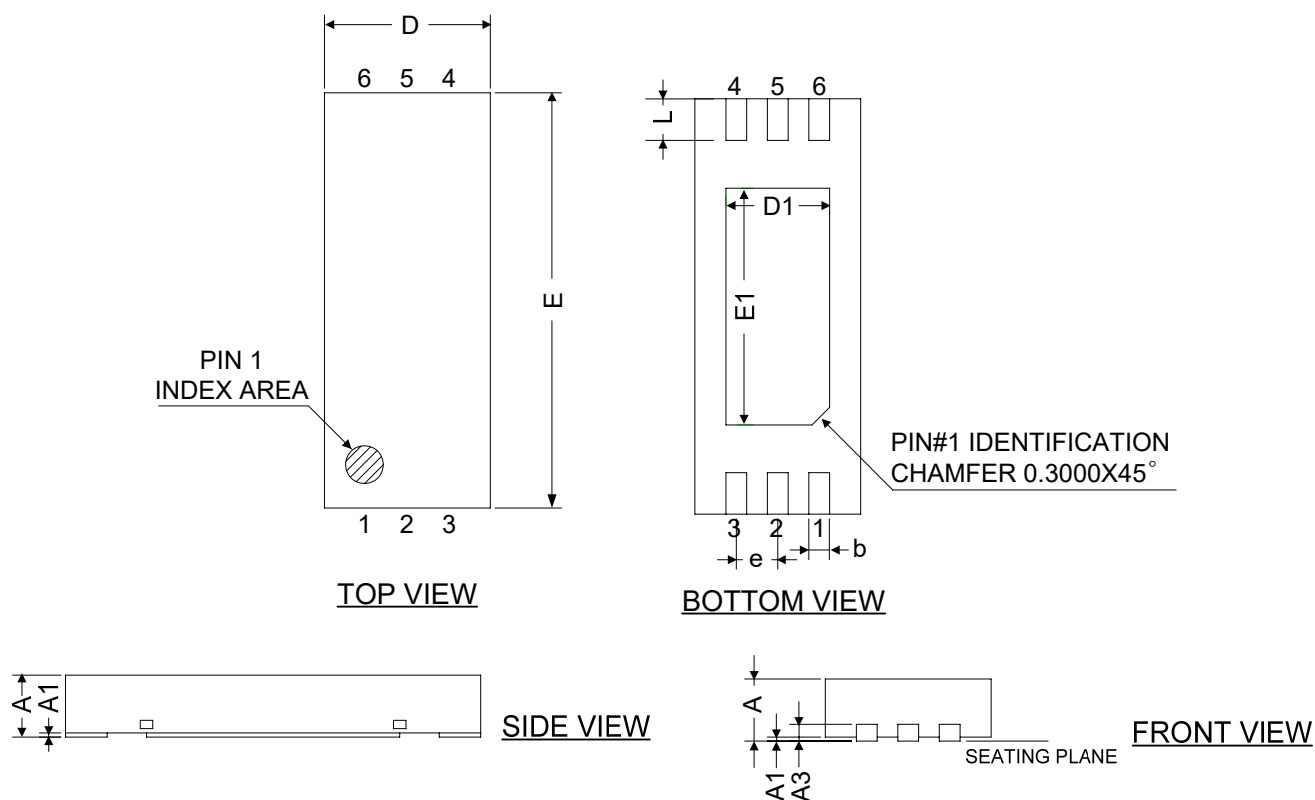


**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**

## Typical Characteristics (Cont.)

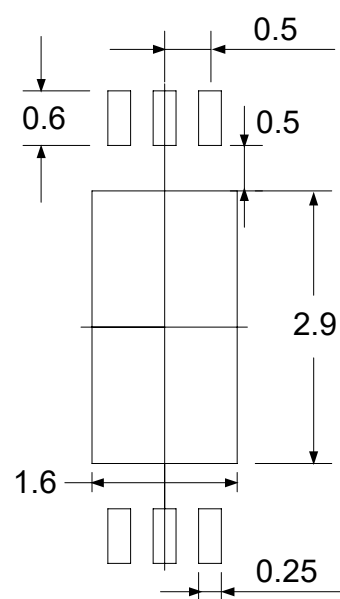

**Fig.7 Capacitance**

**Fig.8 Safe Operating Area**

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

**Fig.10 Switching Time Waveform**

**Fig.11 Gate Charge Waveform**

## Packaging information



SYMBOL	DFN2X5-6S			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
A3	0.10	0.203	0.004	0.008
b	0.20	0.30	0.008	0.012
D	1.90	2.10	0.075	0.083
D1	1.20	1.55	0.047	0.061
E	4.80	5.20	0.189	0.205
E1	2.60	2.95	0.102	0.116
e	0.50 BSC		0.020 BSC	
L	0.40	0.60	0.016	0.024

## RECOMMENDED LAND PATTERN



UNIT: mm



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