

### General Description

The WSD86P10DN56 is the highest performance trench P-ch MOSFET with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The WSD86P10DN56 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

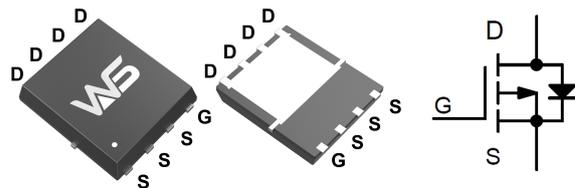
### Product Summary

BVDSS	R <sub>DS(on)</sub>	I <sub>D</sub>
-100V	17mΩ	-86A

### Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

### DFN5X6\_8L Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-100	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, -V <sub>GS</sub> @ -10V <sup>1</sup>	-86	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, -V <sub>GS</sub> @ -10V <sup>1</sup>	-55	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	-280	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	729	mJ
I <sub>AS</sub>	Avalanche Current	-54	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation <sup>4</sup>	250	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	62	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	0.5	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-100	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.021	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	17	28	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.4	-2.1	-2.8	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	4.08	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =-80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A	30	---	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	110	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	15	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	18	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-30V, V <sub>GS</sub> =-10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =-10A, R <sub>L</sub> =30Ω.	---	27	---	ns
T <sub>r</sub>	Rise Time		---	15	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	104	---	
T <sub>f</sub>	Fall Time		---	57	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V, f=1MHz	---	6105	---	pF
C <sub>oss</sub>	Output Capacitance		---	728	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	258	---	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =-30V, L=0.5mH, I <sub>AS</sub> =-54A	300	---	---	mJ

**Diode Characteristics**

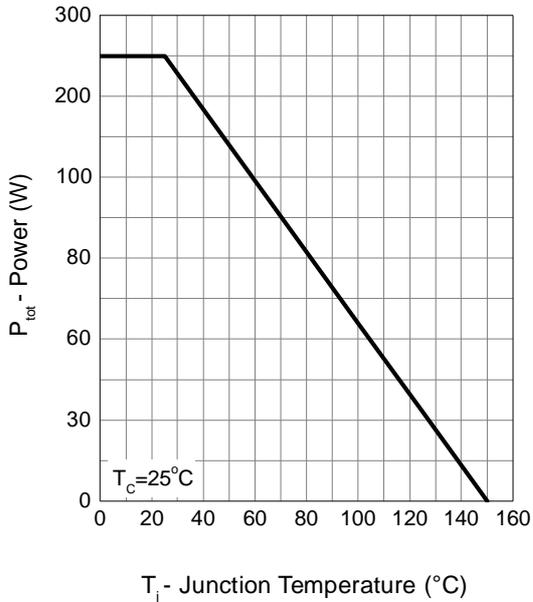
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-86	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-10A, T <sub>J</sub> =25°C	---	---	-1.2	V

Note :

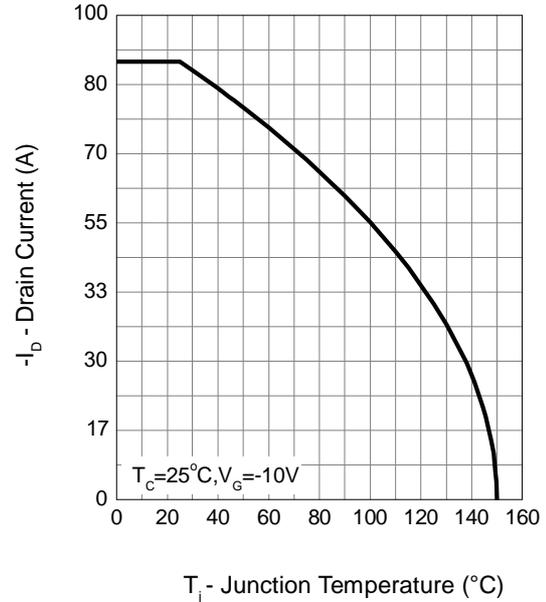
- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<sub>l</sub> ≤ 10sec.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-30V, V<sub>GS</sub>=-10V, L=0.5mH, I<sub>AS</sub>=-54A
- The power dissipation is limited by 150°C junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**Typical Operating Characteristics**

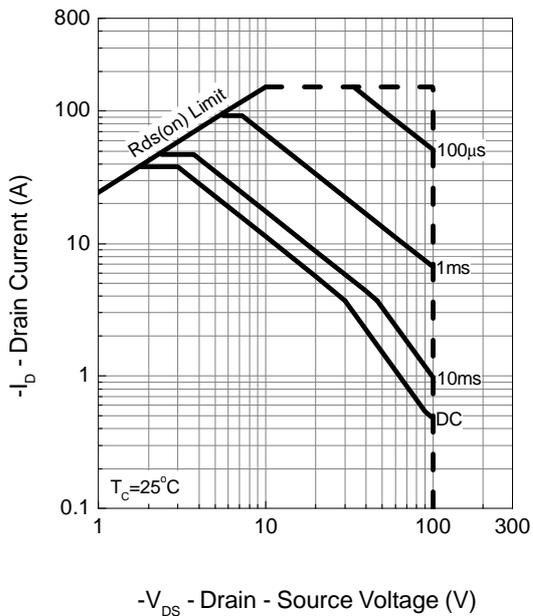
**Power Dissipation**



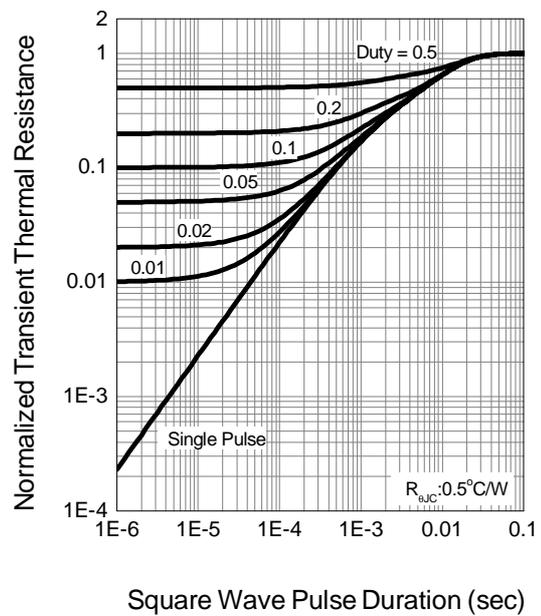
**Drain Current**



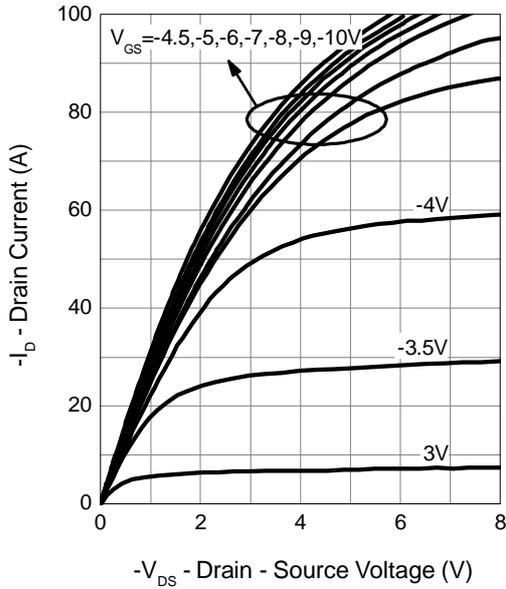
**Safe Operation Area**



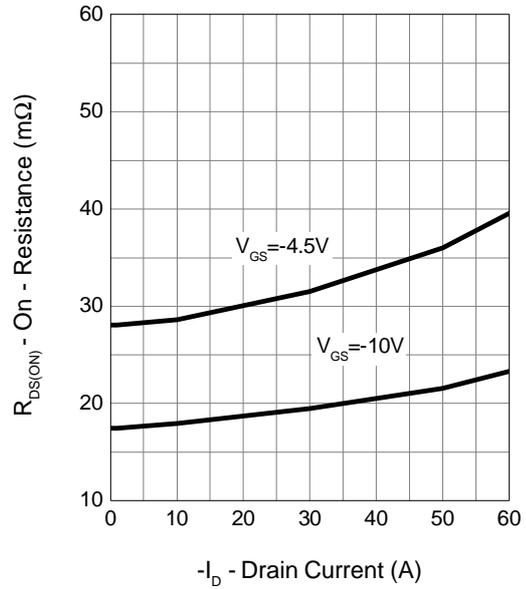
**Thermal Transient Impedance**



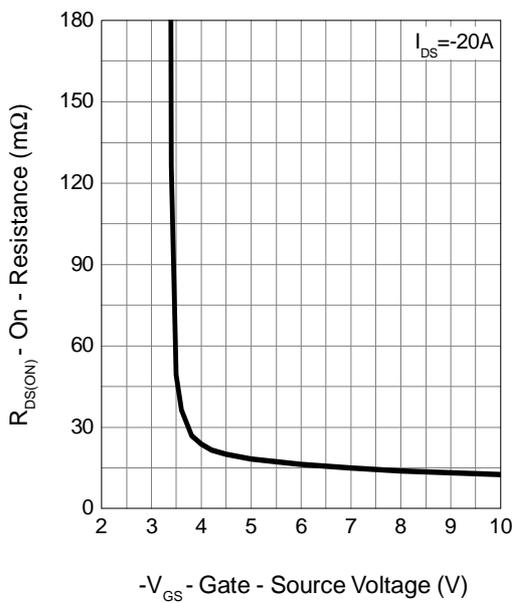
**Output Characteristics**



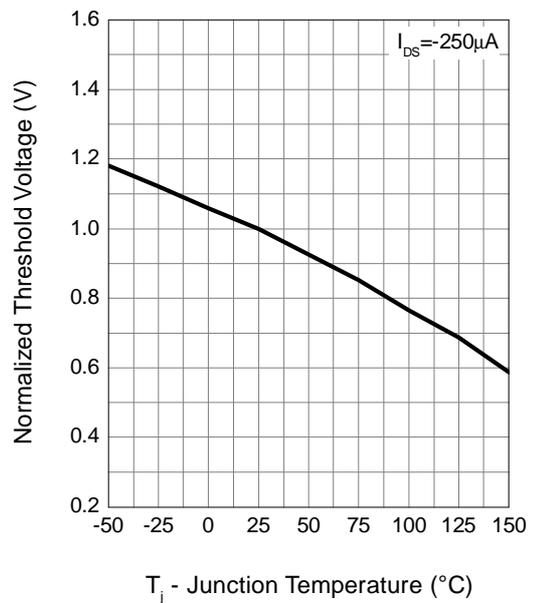
**Drain-Source On Resistance**



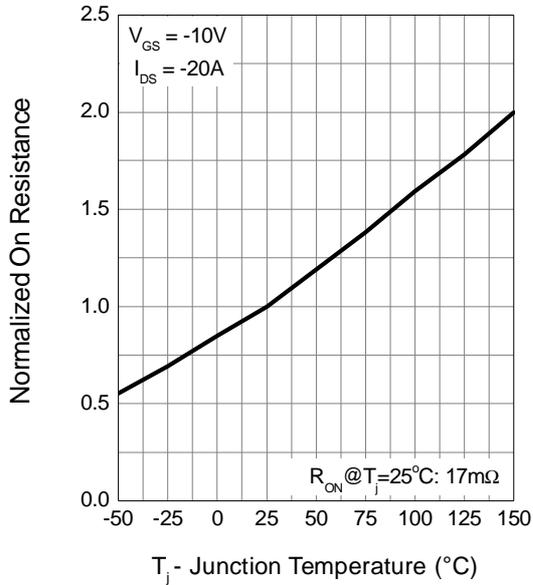
**Gate-Source On Resistance**



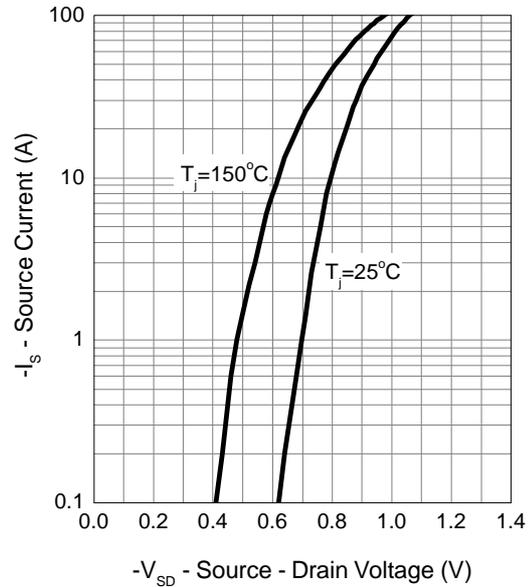
**Gate Threshold Voltage**



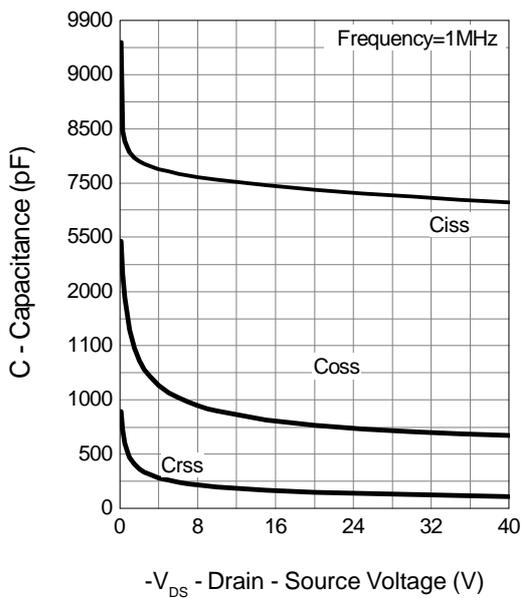
**Drain-Source On Resistance**



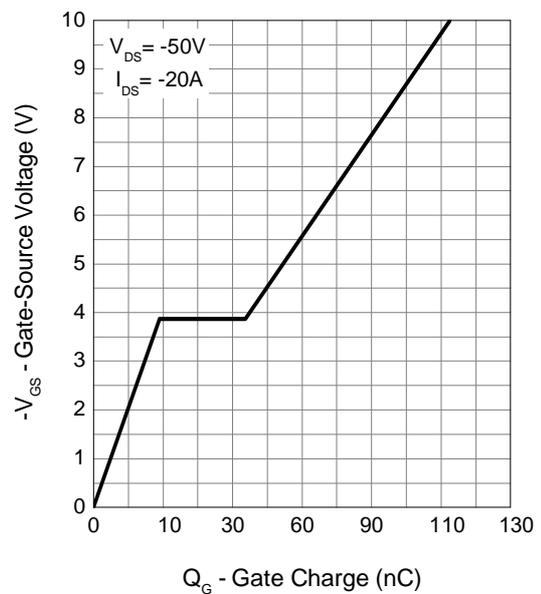
**Source-Drain Diode Forward**



**Capacitance**



**Gate Charge**





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