

## General Description

The WSD90P06DN56 is the highest performance trench P-ch MOSFETs 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 WSD90P06DN56 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

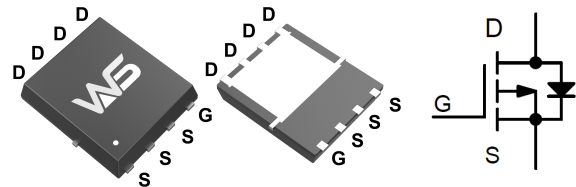
## Product Summary

BVDSS	R <sub>DS(on)</sub>	I <sub>D</sub>
-60V	10.5mΩ	-90A

## Applications

- Power Management
- Load Switch

## DFN5X6\_8L Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-60	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	-90	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, -V <sub>GS</sub> @ -10V	-39.7	A
I <sub>DM</sub>	Pulsed Drain Current	-189	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation	96	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	---	23	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case	---	1.3	°C/W

**P-Channel Electrical Characteristics ( $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-60	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-30A$	---	10.5	13.5	$m\Omega$
		$V_{GS}=-4.5V, I_D=-30A$	---	13.5	17.5	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.85	-2.5	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-32V, V_{GS}=0V, T_J=25^{\circ}\text{C}$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$Q_g$	Total Gate Charge	$V_{DS} = -30V, V_{GS} = -10V,$ $I_D = -17A$	---	121	---	nC
$Q_{gs}$	Gate-Source Charge		---	20	---	
$Q_{gd}$	Gate-Drain Charge		---	32	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD} = -30V, R_L = 30\Omega$ $I_D = -1A, V_{GEN} = -10V, R_g = 6$	---	20	---	ns
$T_r$	Rise Time		---	20	---	
$T_{d(off)}$	Turn-Off Delay Time		---	205	---	
$T_f$	Fall Time		---	90	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, f=1.0\text{MHz}$	---	5600	---	pF
$C_{oss}$	Output Capacitance		---	510	---	
$C_{rss}$	Reverse Transfer Capacitance		---	480	---	

**Diode Characteristics**

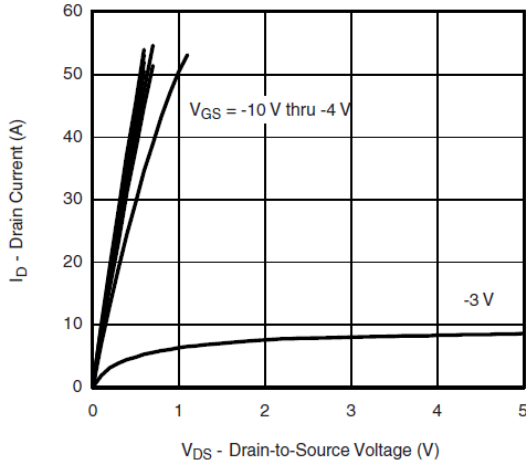
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$T_C=25\text{ }^{\circ}\text{C}$	---	---	-64	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^{\circ}\text{C}$	---	---	-1.2	V

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^{\circ}\text{C}$ . The value in any given application depends on the user's specific board design.

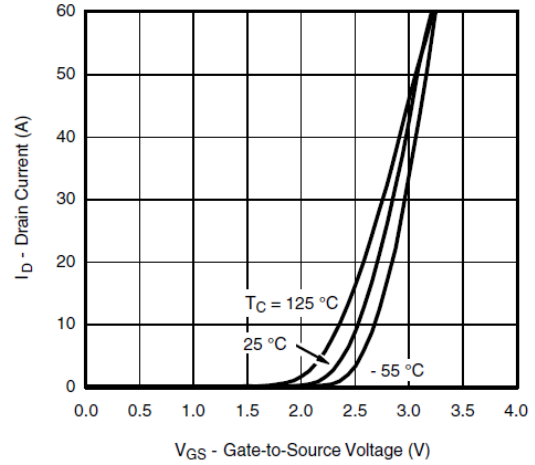
B: Repetitive rating, pulse width limited by junction temperature.

C: The current rating is based on the  $t_s \leq 10s$  junction to ambient thermal resistance rating.

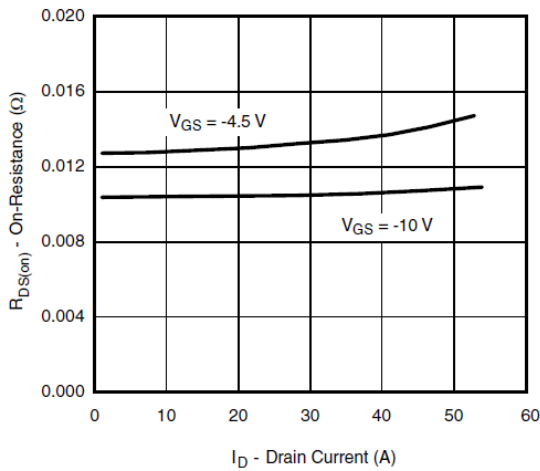
**P-Channel Typical Characteristics**



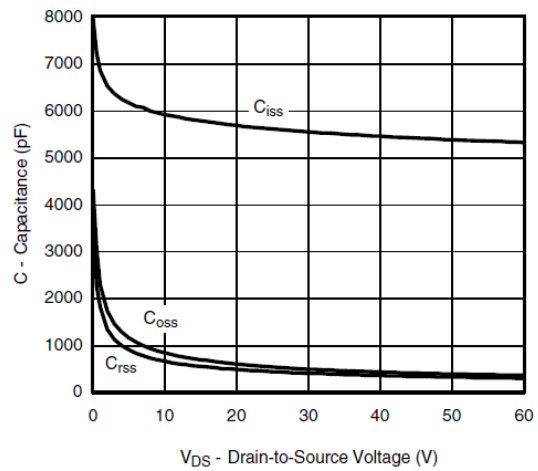
**Output Characteristics**



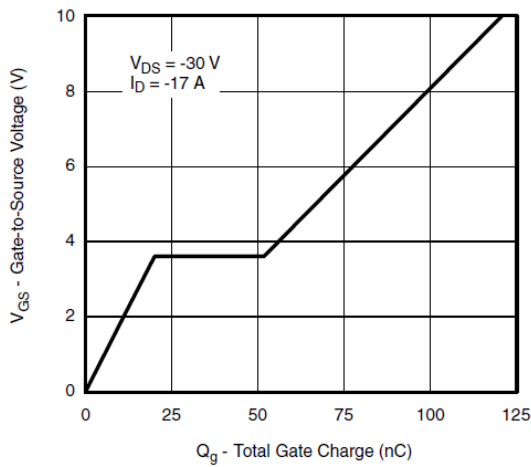
**Transfer Characteristics**



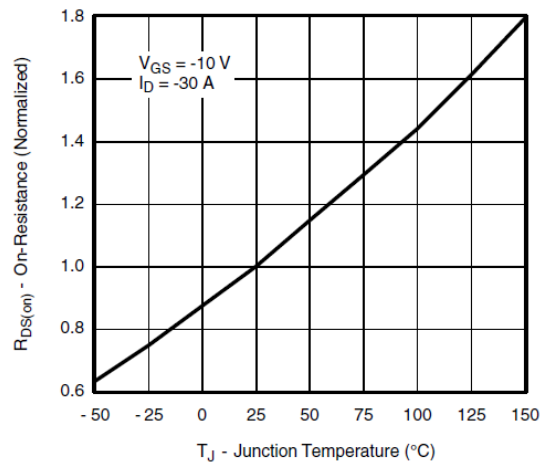
**On-Resistance vs. Drain Current**



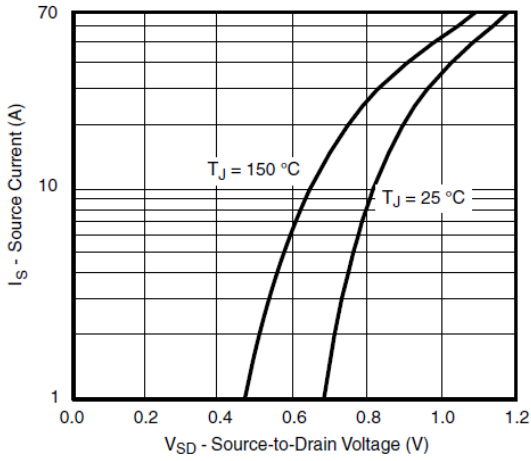
**Capacitance**



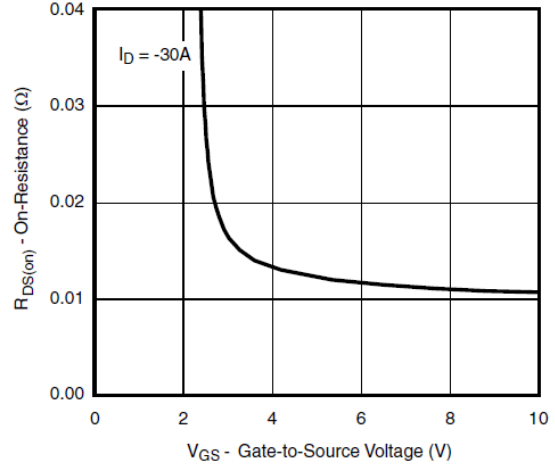
**Gate Charge**



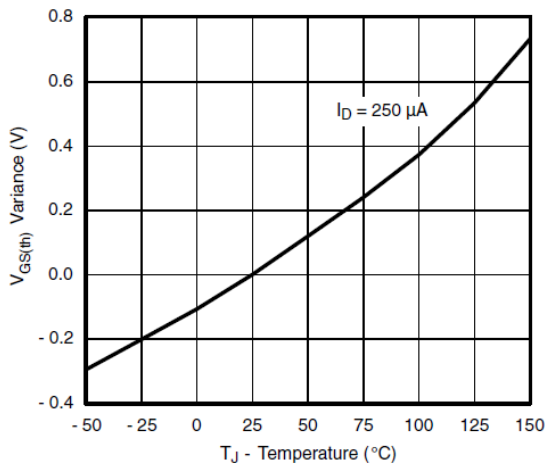
**On-Resistance vs. Junction Temperature**



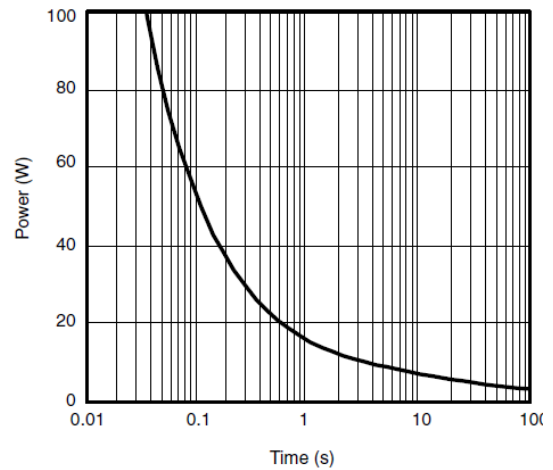
Source-Drain Diode Forward Voltage



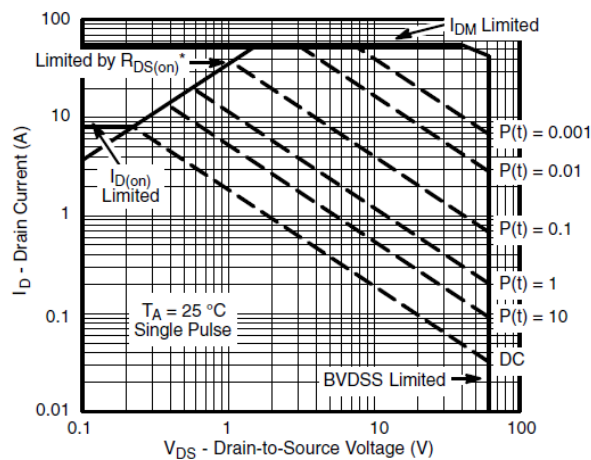
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

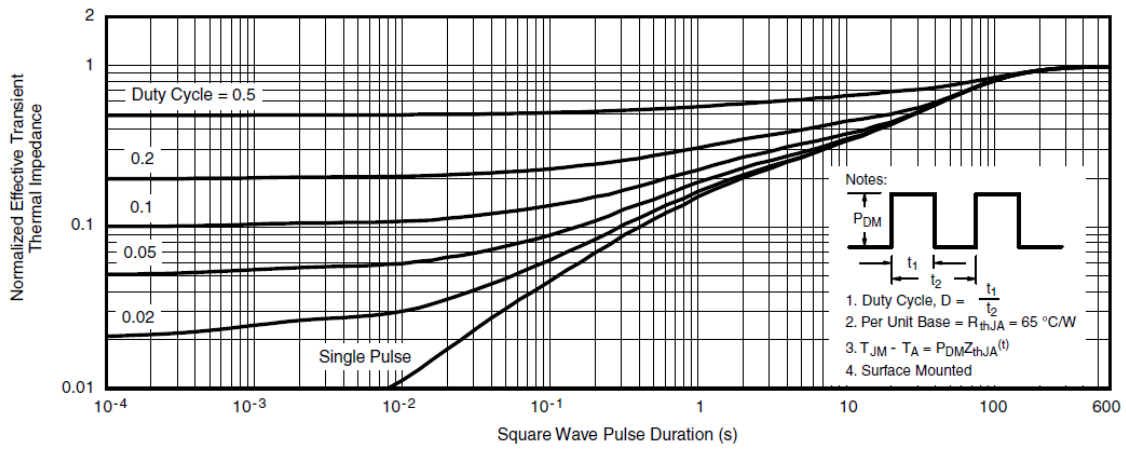


Single Pulse Power, Junction-to-Ambient

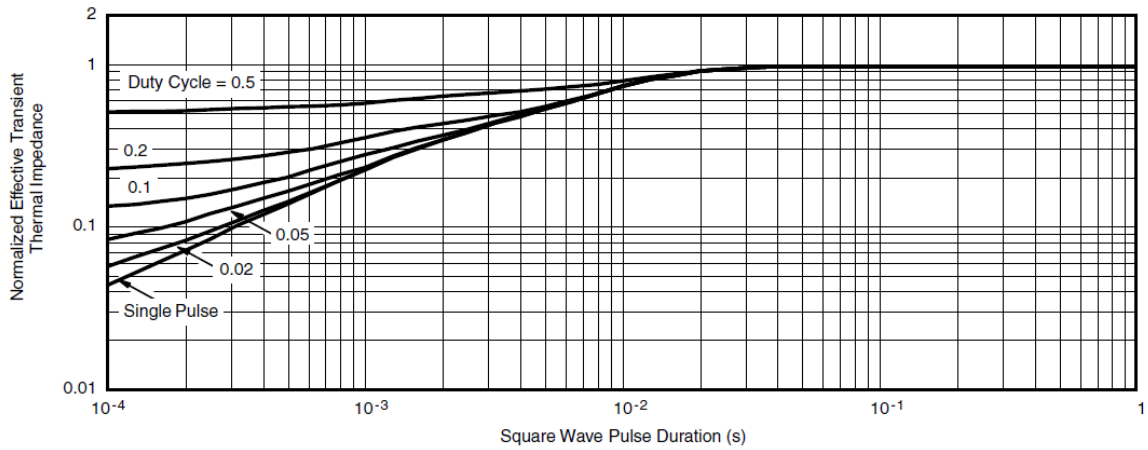


\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case



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