

### General Description

The WSD40N10GDN56 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSD40N10GDN56 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

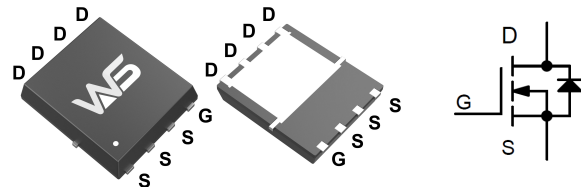
### Product Summary

$BV_{DSS}$	$R_{DSON}$	$I_D$
100V	16mΩ	40A

### Applications

- Power Management in TV Converter.
- DC-DC Converter
- LED TV Back Light

### DFN5X6 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	±20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current	40	A
$I_{DP}$	Pulsed Drain Current	120	A
EAS	Avalanche Energy, Single pulse	30	mJ
$P_D@T_C=25^\circ C$	Total Power Dissipation	72	W
$T_J / T_{STG}$	Operating/Storage Temperature Range	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	62	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	1.74	°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
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8A.	---	16	20	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A.	---	22	26	mΩ
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.0	---	2.5	V
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
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
Q <sub>g</sub>	Total Gate Charge	I <sub>D</sub> =8 A, V <sub>DS</sub> =50 V, V <sub>GS</sub> =10 V	---	19.8	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2.4	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	5.3	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>GS</sub> =10 V, V <sub>DS</sub> =50 V, R <sub>G</sub> =2.2 Ω, I <sub>D</sub> =10 A	---	17.8	---	ns
T <sub>r</sub>	Rise Time		---	3.9	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	33.5	---	
T <sub>f</sub>	Fall Time		---	3.2	---	
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0 V, V <sub>DS</sub> =50 V, f=1 MHz	---	1191	---	pF
C <sub>oss</sub>	Output Capacitance		---	194	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	4.1	---	
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	40	A
I <sub>SP</sub>	Pulsed Source Current		---	---	120	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =12A, T <sub>J</sub> =25 °C	---	---	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =12A, dI/dt=100A/μs, T <sub>J</sub> =25 °C	---	50.2	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	95.1	---	nC

**Note**

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of R<sub>θJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.
- 5) V<sub>DD</sub>=50 V, R<sub>G</sub>=25 Ω, L=0.3 mH, starting T<sub>J</sub>=25 °C.

**Typical Operating Characteristics**

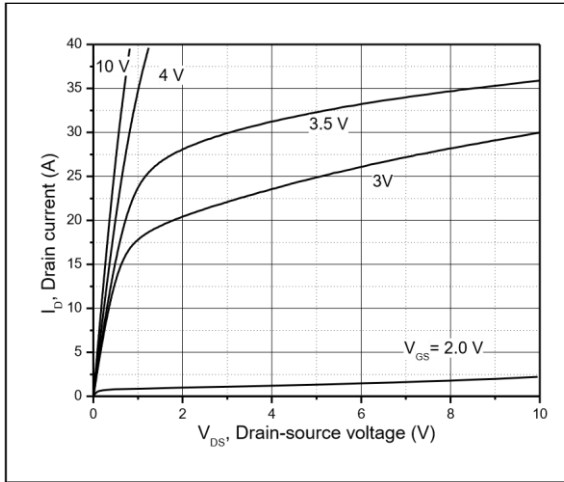


Figure 1, Typ. output characteristics

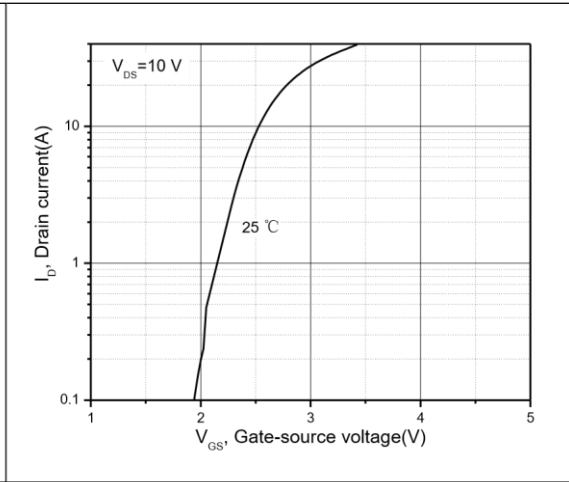


Figure 2, Typ. transfer characteristics

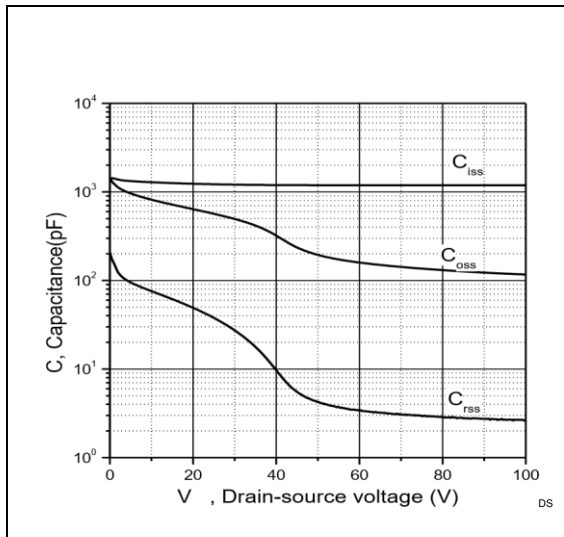


Figure 3, Typ. capacitances

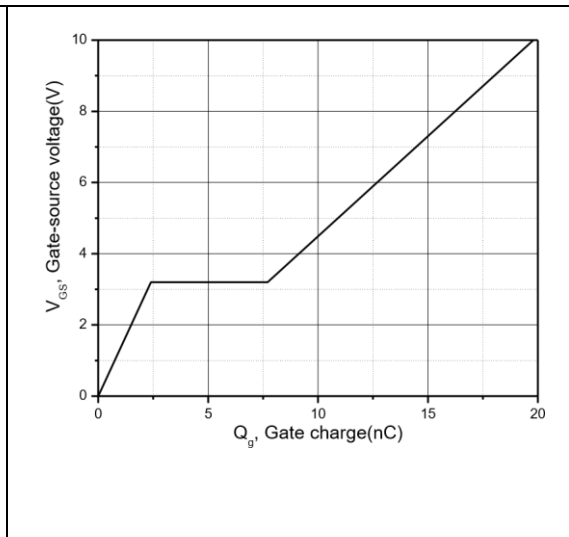


Figure 4, Typ. gate charge

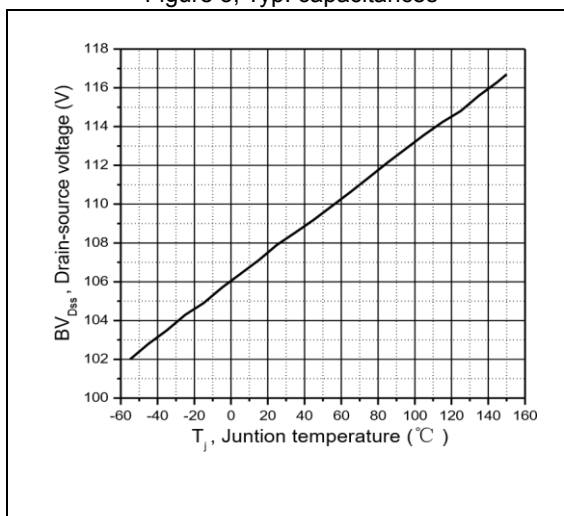


Figure 5, Drain-source breakdown voltage

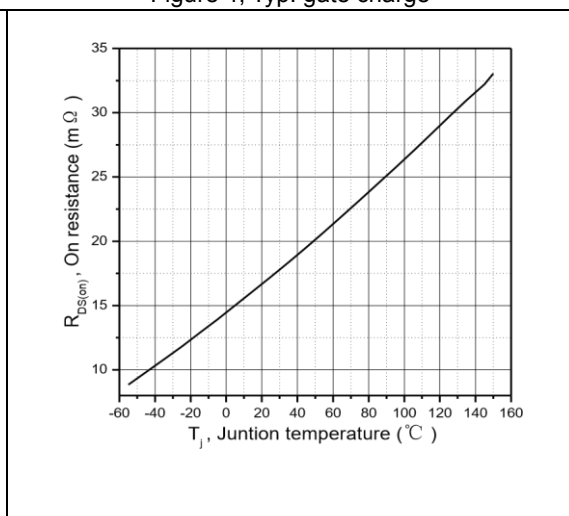


Figure 6, Drain-source on-state resistance

**Typical Operating Characteristics (Cont.)**

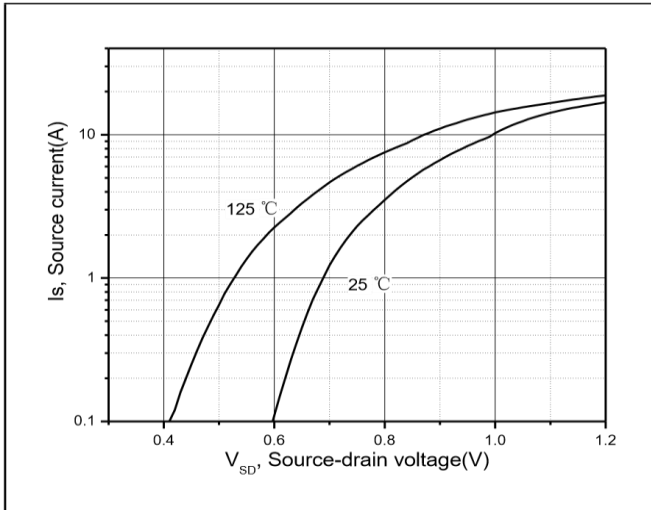


Figure 7, Forward characteristic of body diode

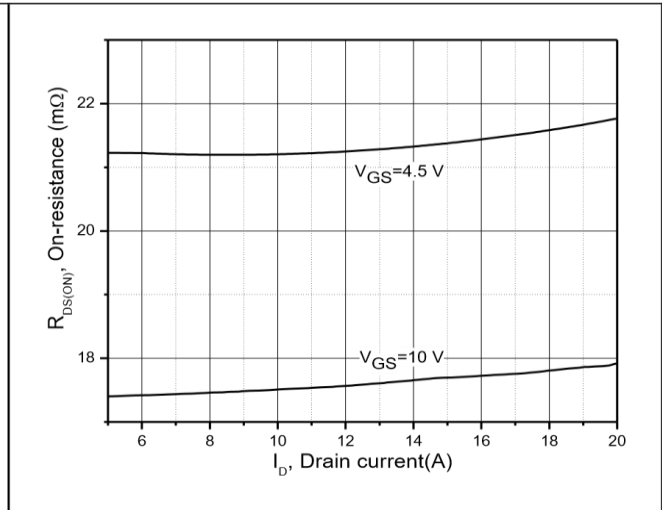


Figure 8, Drain-source on-state resistance

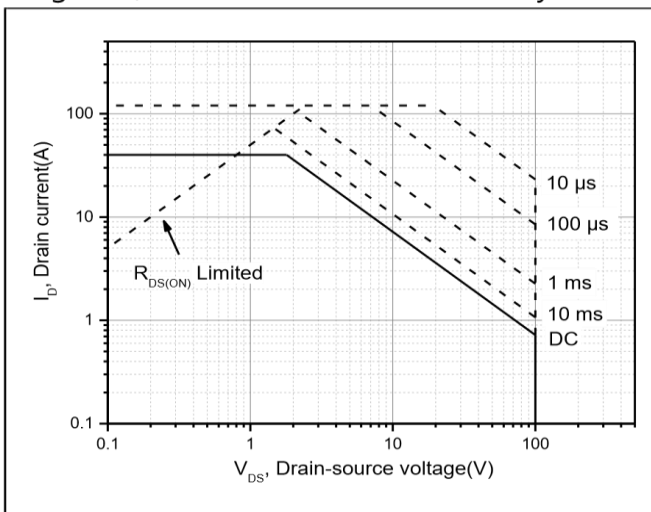


Figure 9, Safe operation area  $T_c=25\text{ }^\circ\text{C}$



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