

### General Description

The WSD45N10GDN56 is the highest performance SGT N-Ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSD45N10GDN56 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
- Green Device Available

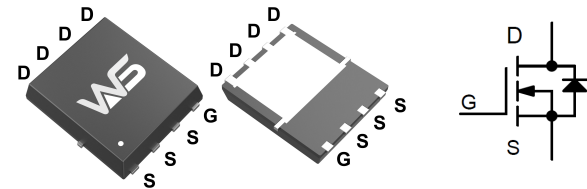
### Product Summary

BVDSS	RDSON	ID
100V	17.5mΩ	45A

### Applications

- DC-DC Converter.
- Motor Control.

### DFN5X6 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	45	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	33	A
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	12	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	9.6	A
$I_{DM}^a$	Pulsed Drain Current	130	A
$E_{AS}^b$	Single Pulse Avalanche Energy	169	mJ
$I_{AS}^b$	Avalanche Current	26	A
$P_D@T_C=25^\circ C$	Total Power Dissipation	95	W
$P_D@T_A=25^\circ C$	Total Power Dissipation	5.0	W
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}^c$	Thermal Resistance Junction-ambient	---	60	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case	---	2.4	$^\circ C/W$

Note a : Pulse width limited by max. junction temperature.

Note b : UIS tested and pulse width limited by maximum junction temperature  $150^\circ C$  (initial temperature  $T_j=25^\circ C$ ).

Note c : Surface Mounted on  $1in^2$  pad area.

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	---	0.0	---	V/ $^\circ\text{C}$
$R_{DS(ON)}^d$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=10V, I_D=26A$	---	14.5	17.5	m $\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	2.0	3.0	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5		mV/ $^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=80V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	-	1	uA
		$V_{DS}=80V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	-	30	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	-	$\pm 100$	nA
$R_g^e$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	1.0	---	$\Omega$
$Q_g^e$	Total Gate Charge (10V)	$V_{DS}=50V, V_{GS}=10V, I_D=26A$	---	42	59	nC
$Q_{gs}^e$	Gate-Source Charge		---	12	--	
$Q_{gd}^e$	Gate-Drain Charge		---	12	---	
$T_{d(on)}^e$	Turn-On Delay Time	$V_{DD}=30V, V_{GEN}=10V, R_G=6\Omega$ $I_D=1A, R_L=30\Omega$	---	19	35	ns
$T_r^e$	Rise Time		---	9	17	
$T_{d(off)}^e$	Turn-Off Delay Time		---	36	65	
$T_f^e$	Fall Time		---	22	40	
$C_{iss}^e$	Input Capacitance	$V_{DS}=30V, V_{GS}=0V, f=1\text{MHz}$	---	1800	---	pF
$C_{oss}^e$	Output Capacitance		---	215	---	
$C_{rss}^e$	Reverse Transfer Capacitance		---	42	---	

**Diode Characteristics**

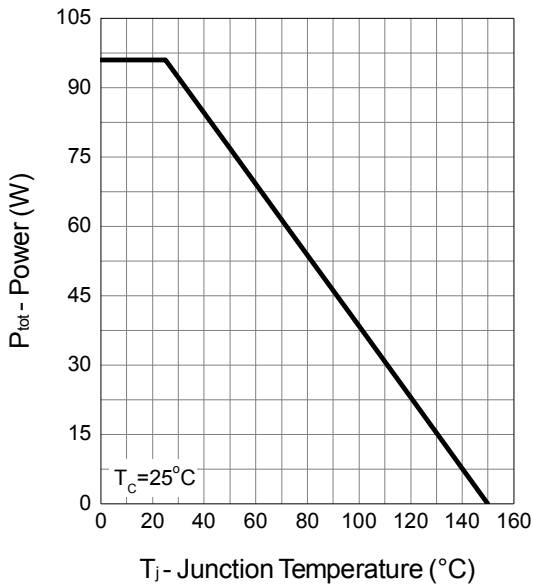
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	-	26	A
$V_{SD}^d$	Diode Forward Voltage	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	-	1.3	V
$t_{rr}$	Reverse Recovery Time	$I_F=20A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	44	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	95	---	nC

Note d : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

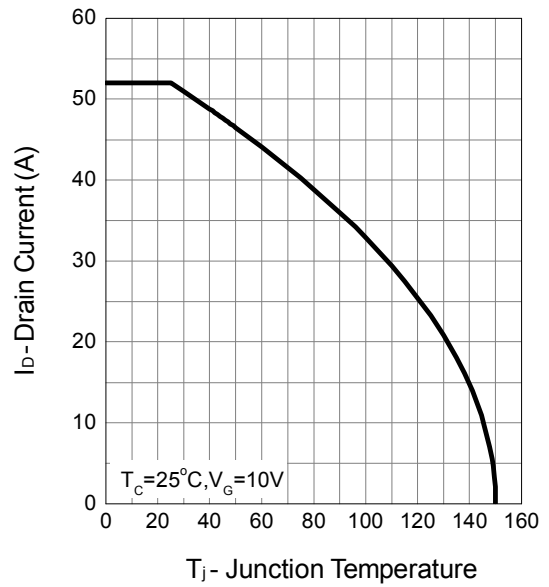
Note e : Guaranteed by design, not subject to production testing.

Typical Characteristics

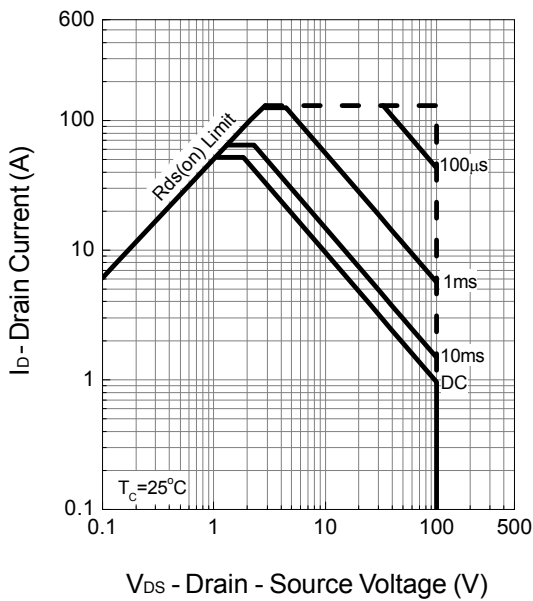
Power Dissipation



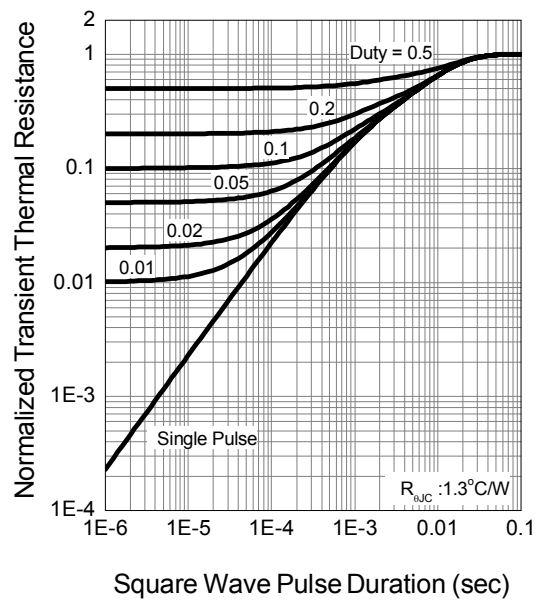
Drain Current



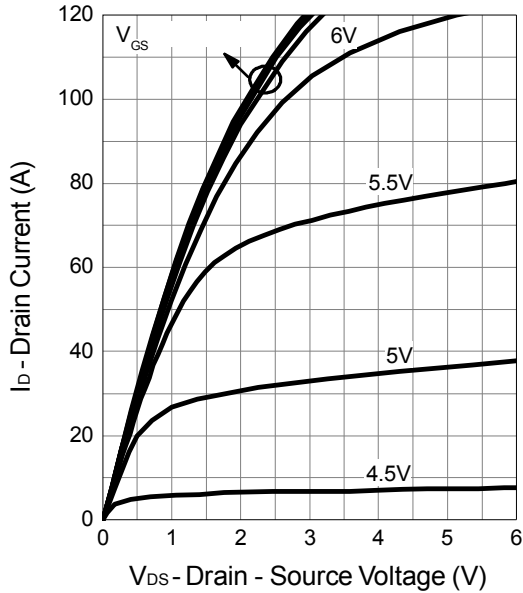
Safe Operation Area



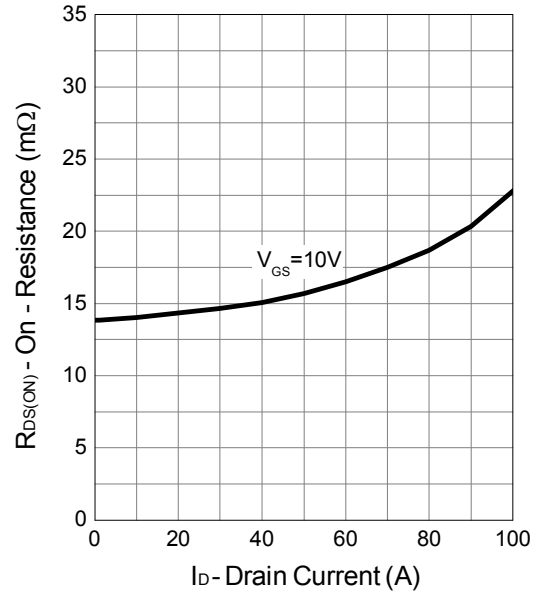
Thermal Transient Impedance



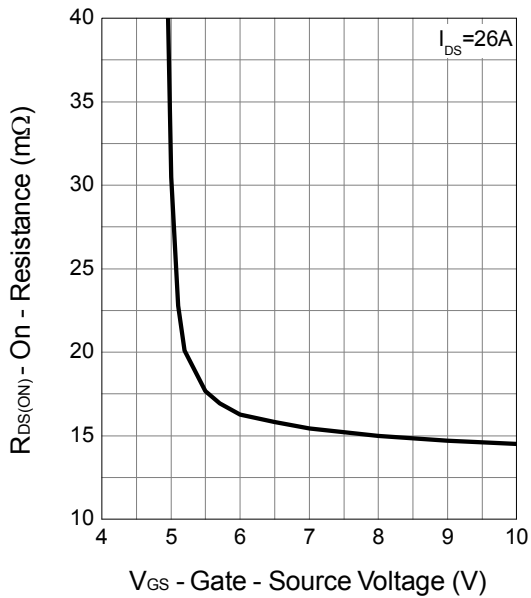
**Output Characteristics**



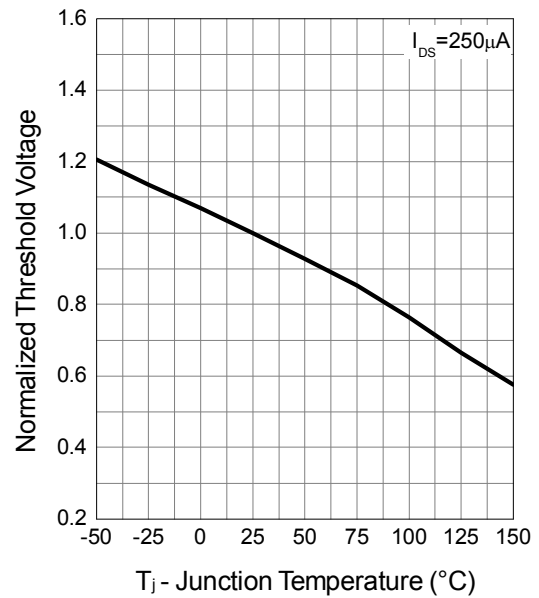
**Drain-Source On Resistance**



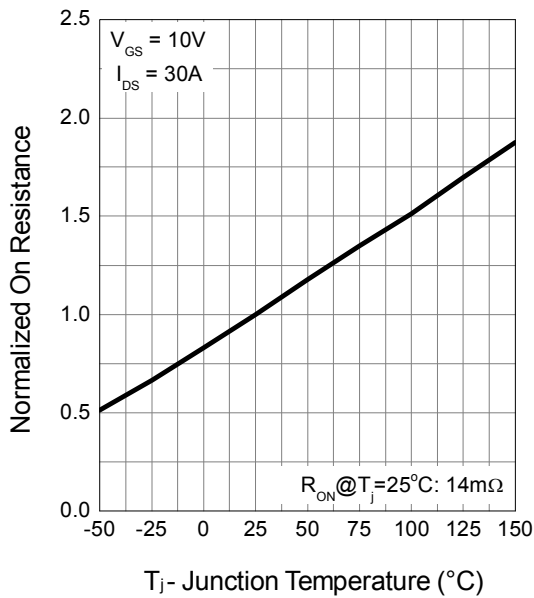
**Gate-Source On Resistance**



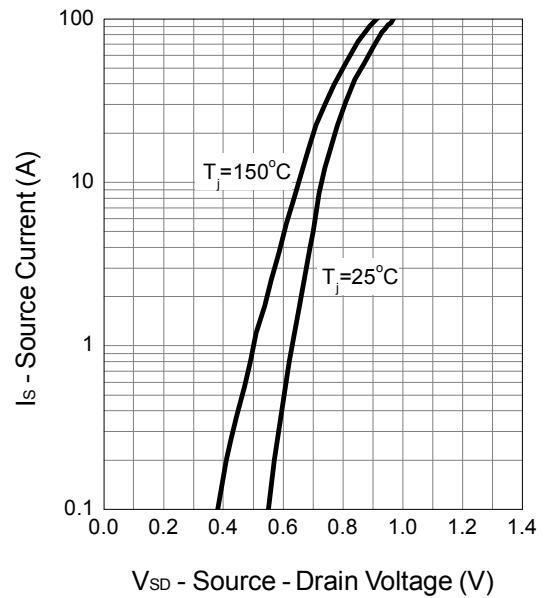
**Gate Threshold Voltage**



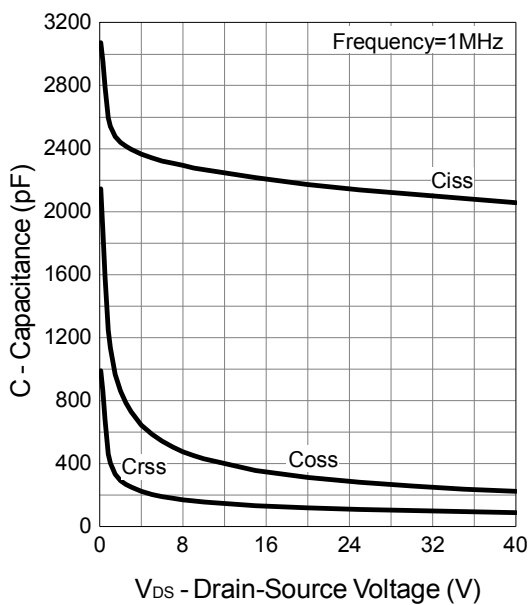
**Drain-Source On Resistance**



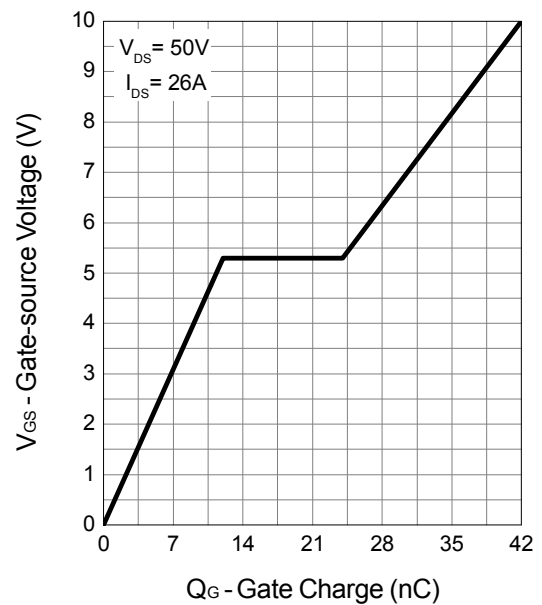
**Source-Drain Diode Forward**



**Capacitance**



**Gate Charge**





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