

General Description

The WSD6040DN56 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent $R_{DS(on)}$ and gate charge for most of the synchronous buck converter applications.

The WSD6040DN56 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Features

- Lead Free and Green Devices Available (RoHS Compliant)
- 100% UIS + Rg Tested
- Reliable and Rugged
- Moisture Sensitivity Level MSL1

(per JED EC J-STD-020D)

Absolute Maximum Ratings @ $T_A=25^{\circ}C$ unless otherwise noted

Symbol	Parameter		Rating	Units
V_{DS}	Drain-Source Voltage		60	V
V_{GS}	Gate-Source Voltage		± 20	V
I_D	Continuous Drain Current	$T_C=25^{\circ}C$	36	A
		$T_C=100^{\circ}C$	22	
I_D	Continuous Drain Current	$T_A=25^{\circ}C$	8.4	A
		$T_A=100^{\circ}C$	6.8	
I_{DM}^a	Pulsed Drain Current	$T_C=25^{\circ}C$	140	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}C$	37.8	W
		$T_C=100^{\circ}C$	15.1	
P_D	Maximum Power Dissipation	$T_A=25^{\circ}C$	2.08	W
		$T_A=70^{\circ}C$	1.33	
I_{AS}^c	Avalanche Current, Single pulse	$L=0.5mH$	16	A
E_{AS}^c	Single Pulse Avalanche Energy	$L=0.5mH$	64	mJ
I_S	Diode Continuous Forward Current	$T_C=25^{\circ}C$	18	A
T_J	Maximum Junction Temperature		150	$^{\circ}C$
T_{STG}	Storage Temperature Range		-55 to 150	$^{\circ}C$
$R_{\theta JA}^b$	Thermal Resistance Junction to ambient	Steady State	60	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	3.3	$^{\circ}C/W$

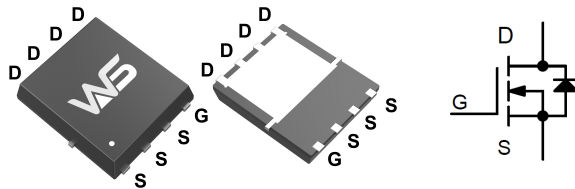
Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D
60V	17.5m Ω	36A

Applications

- Secondary Side Synchronous Rectification
- DC-DC Converter
- Motor Control
- Load Switching

DFN5x6A-8_EP Pin Configuration



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

Note b: Surface Mounted on 1in² pad area.

Note c: UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

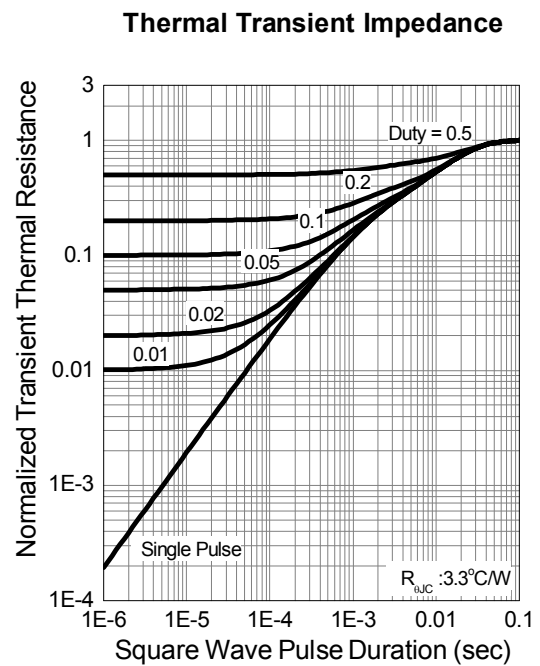
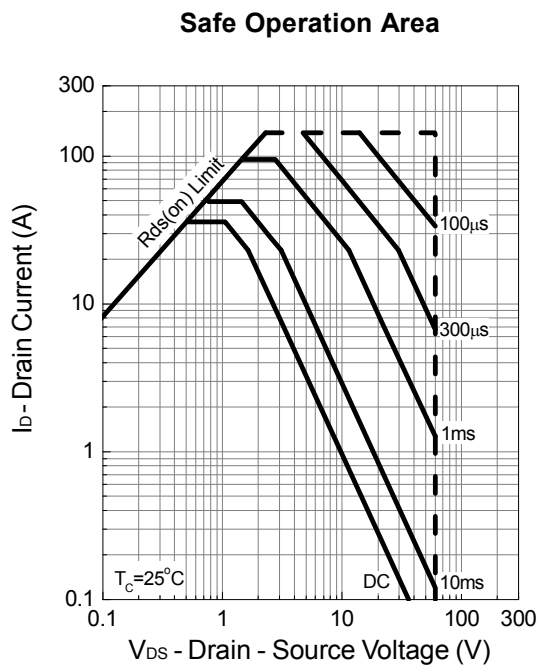
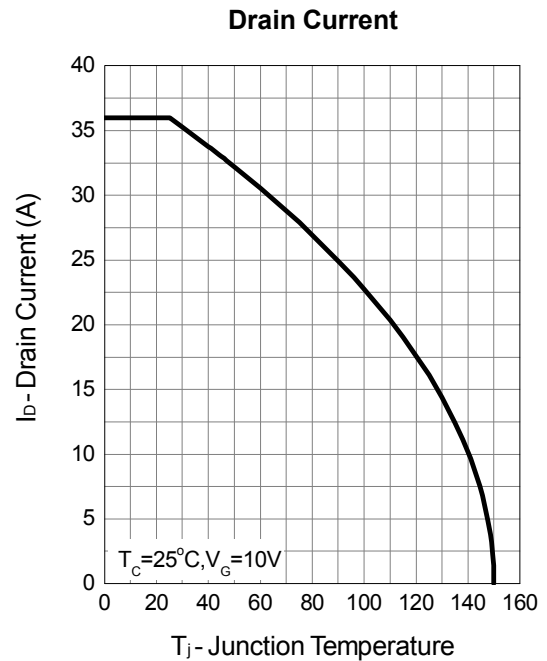
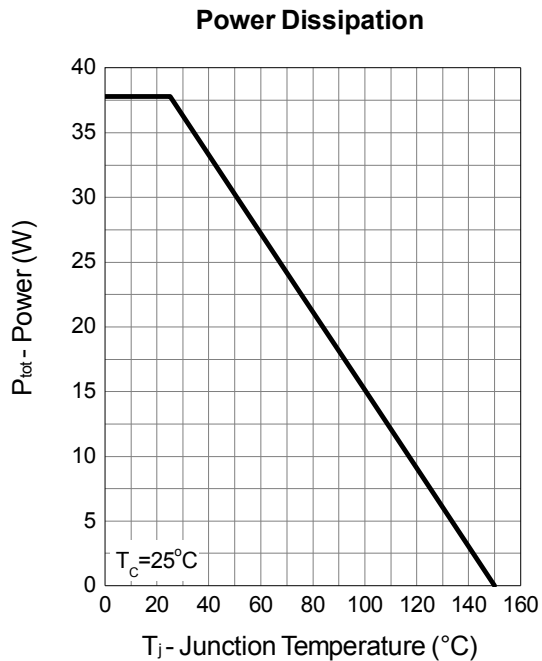
Electrical Characteristics @T_A=25°C unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Static						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 48 V, V _{GS} = 0V			1	μA
		T _J =85°C			30	
I _{GSS}	Gate Leakage Current	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
On Characteristics						
V _{GS(TH)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250μA	1	1.6	2.5	V
R _{DS(on)} ^d	Drain-Source On-state Resistance	V _{GS} = 10V, I _D = 25A		14	17.5	mΩ
		V _{GS} = 4.5V, I _D = 20A		19	22	mΩ
Switching						
Q _g	Total Gate Charge	V _{DS} =30V V _{GS} =10V I _D =25A		42		nC
Q _{gs}	Gate-Source Charge			6.4		nC
Q _{gd}	Gate-Drain Charge			9.6		nC
td (on)	Turn-on Delay Time	V _{GEN} =10V V _{DD} =30V I _D =1A R _G =6Ω R _L =30Ω		17		ns
t _r	Turn-on Rise Time			9		ns
td(off)	Turn-off Delay Time			58		ns
t _f	Turn-off Fall Time			14		ns
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		1.5		Ω
Dynamic						
C _{iss}	In Capacitance	V _{GS} =0V V _{DS} =30V f=1MHz		2100		pF
C _{oss}	Out Capacitance			140		pF
C _{rss}	Reverse Transfer Capacitance			100		pF
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Continuous Source Current	V _G =V _D =0V, Force Current			18	A
I _{SM}	Pulsed Source Current ³				35	A
V _{SD} ^d	Diode Forward Voltage	I _{SD} = 20A, V _{GS} =0V		0.8	1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =25A, dI _{SD} /dt=100A/μs		27		ns
Q _{rr}	Reverse Recovery Charge				33	

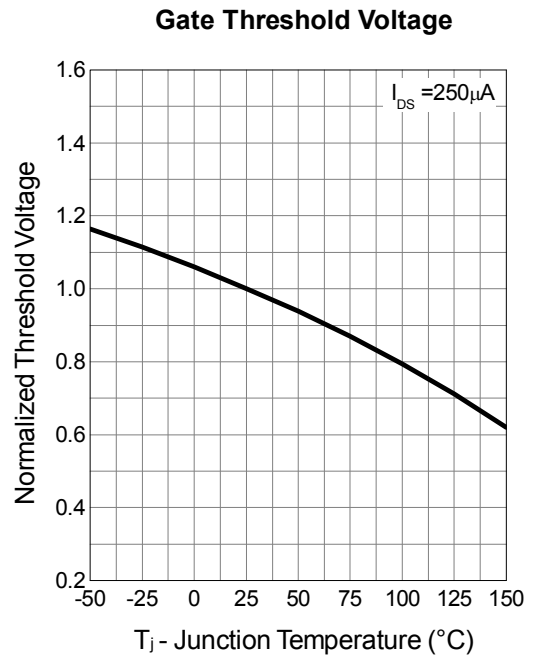
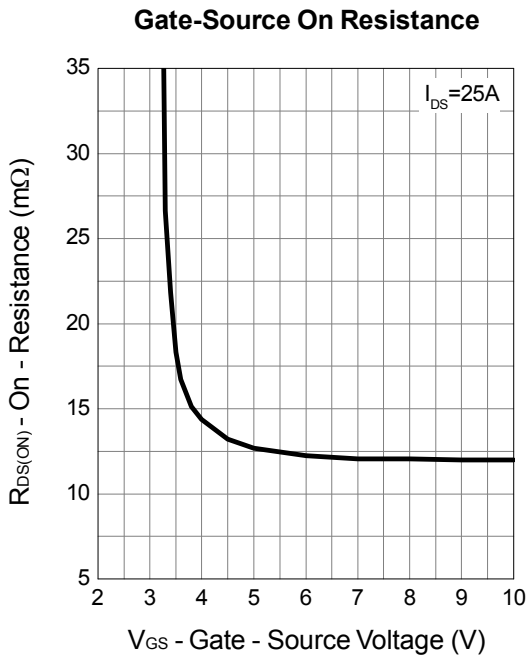
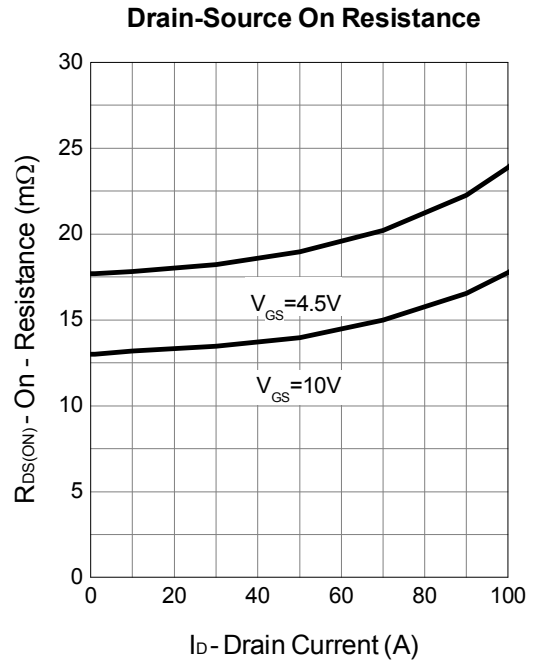
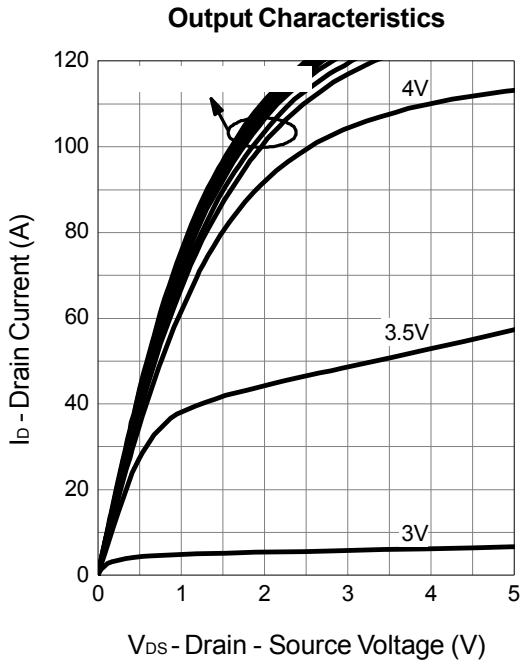
Note d: Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2%.

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

Typical Operating Characteristics

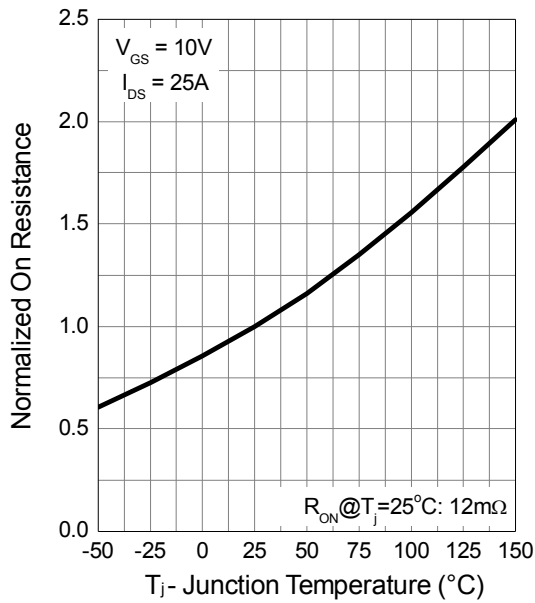


Typical Operating Characteristics (Cont.)

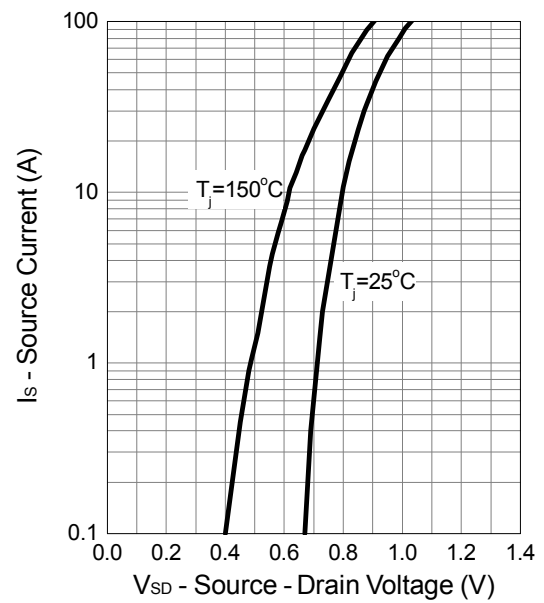


Typical Operating Characteristics (Cont.)

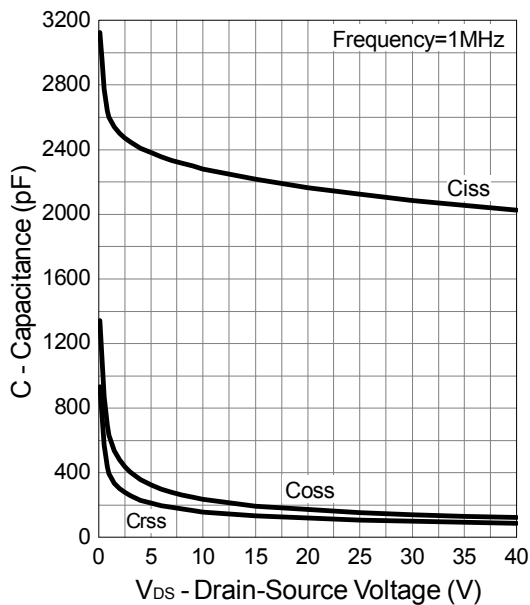
Drain-Source On Resistance



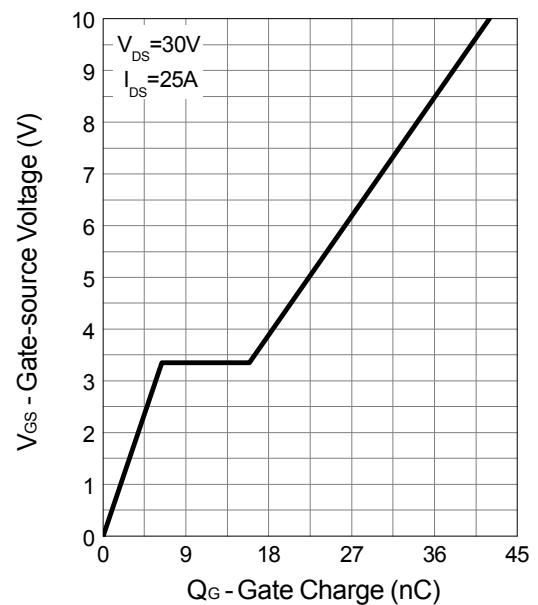
Source-Drain Diode Forward



Capacitance



Gate Charge



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