



WANSEMI
万芯半导体

WX012DN04LL

N-channel Enhancement Mode Power MOSFET

TOLL/40V/±20V/1.65V/210A/1.2mΩ

Rev0.6

40V, 1.2mΩ, 210A, N-channel MOSFET

1.Features

- ◆ Excellent $R_{DS(ON)}$ and Low Gate Charge
- ◆ 100% UIS Tested
- ◆ 100% ΔV_{DS} Tested
- ◆ Halogen-free; RoHS-compliant

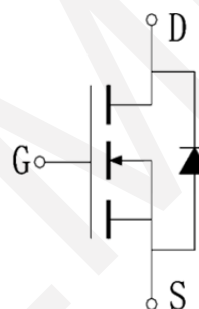
V_{DS}	$R_{DS(on)}$ Typ.	I_D Max.
40V	1.2mΩ @10V	210A
	1.5mΩ @4.5V	

2.Applications

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management



TOLL
Pin Description



Schematic Diagram

3.Package Marking and Ordering Information

Part no.	Package	Marking	PCS/Reel	PCS/CTN.
WX012DN04LL	TOLL	012N04	2,000	16,000

4.Absolute Max Ratings at $T_a=25^{\circ}\text{C}$ (Note1)

Parameter		Symbol	Maximum	Units
Drain to Source Voltage		V_{DSS}	40	V
Gate to Source Voltage		V_{GSS}	± 20	V
Drain Current (DC)	$T_C = 25^{\circ}\text{C}$	I_D	210	A
	$T_C = 100^{\circ}\text{C}$	I_D	137	A
Drain Current (Pulse), $PW \leq 300\mu\text{s}$		I_{DM}	840	A
Avalanche Energy, Single Pulsed		E_{AS}	420	mJ
Total Dissipation	$T_C = 25^{\circ}\text{C}$	P_D	120	W
Junction Temperature		T_j	150	$^{\circ}\text{C}$
Storage Temperature		T_{stg}	-55 to +150	$^{\circ}\text{C}$

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may

be affected.

5. Thermal Resistance Ratings (Note 2)

Parameter	Symbol	Value	Unit
Junction to case	$R_{\theta JC}$	1.0	$^{\circ}\text{C/W}$

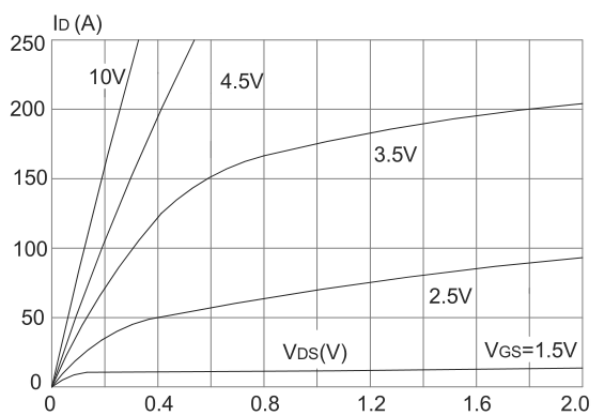
Note 2: When mounted on 1 inch square copper board $t \leq 10\text{sec}$ The value in any given application depends on the user's specific board design.

6. Electrical Characteristics at $T_a=25^{\circ}\text{C}$ (Note 2)

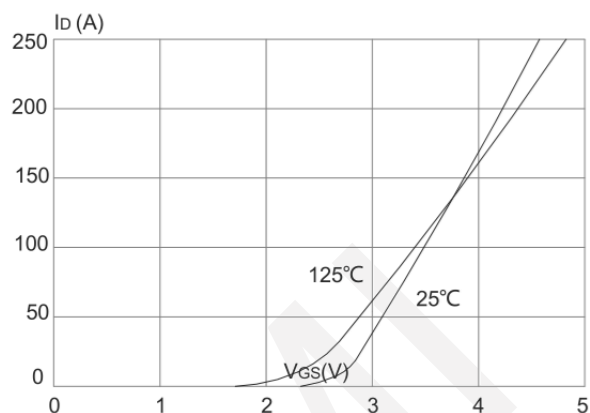
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	40	-	-	V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$	-	-	1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{V}$, $V_{DS} = 0\text{V}$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_{DS}=250\mu\text{A}$	1.0	1.65	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 30\text{A}$, $V_{GS} = 10\text{V}$	-	1.2	1.5	m Ω
		$I_D = 20\text{A}$, $V_{GS} = 4.5\text{V}$	-	1.5	2.0	m Ω
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, Frequency=1.0MHz	-	14700	-	pF
Output Capacitance	C_{oss}		-	843	-	pF
Reverse Transfer Capacitance	C_{rss}		-	830	-	pF
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 20\text{V}$, $I_D = 30\text{A}$ $V_{GS} = 10\text{V}$, $R_{GEN} = 3\Omega$	-	37	-	ns
Rise Time	t_r		-	44	-	ns
Turn-off Delay Time	$t_{d(off)}$		-	115	-	ns
Fall Time	t_f		-	59	-	ns
Total Gate Charge	Q_g	$V_{DS} = 20\text{V}$, $V_{GS} = 10\text{V}$, $I_D = 30\text{A}$	-	95	-	nC
	Q_{gs}		-	15	-	nC
	Q_{gd}		-	19	-	nC
Diode Forward Voltage	V_{FSD}	$I_S = 30\text{A}$, $V_{GS} = 0$	0.4	-	1.2	V

Note 2: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

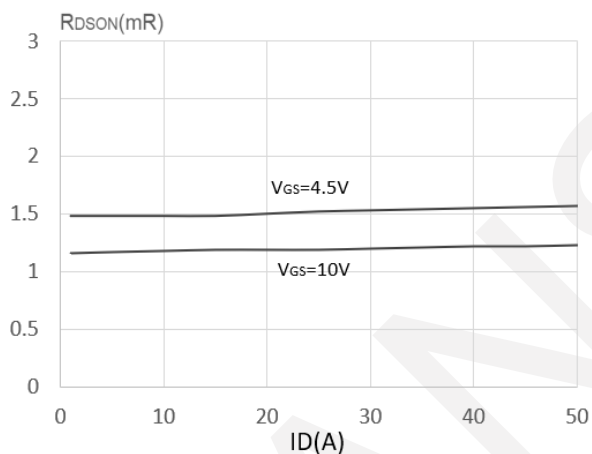
7. Typical electrical and thermal characteristics



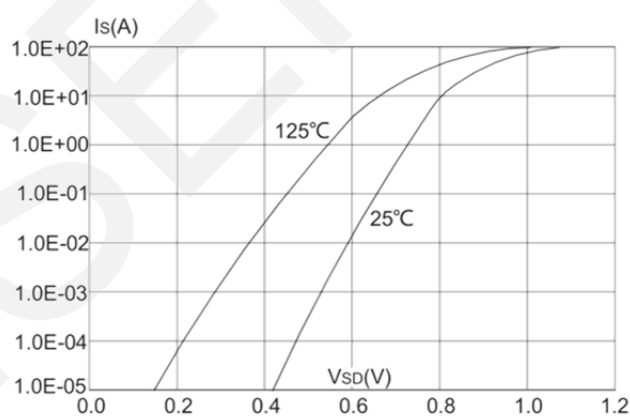
Saturation Characteristics



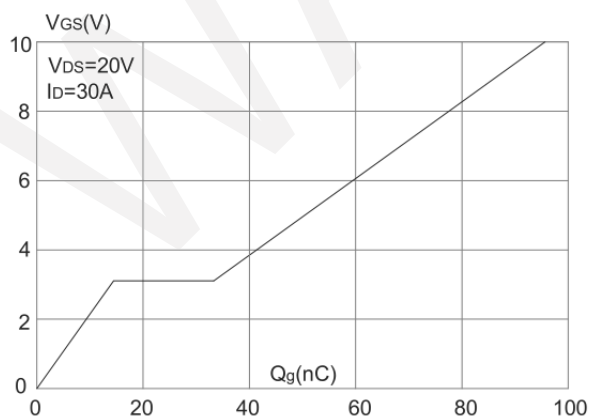
Transfer Characteristics



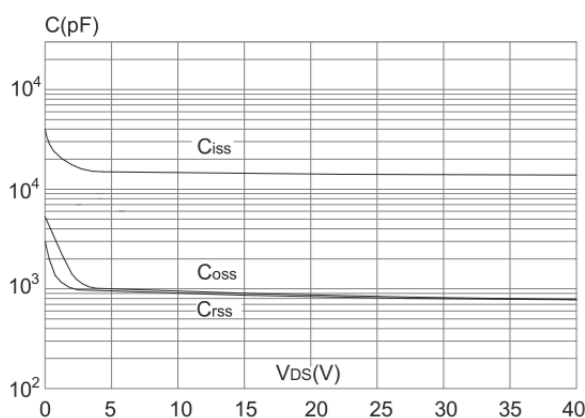
$R_{DS(on)}$ vs. Drain Current



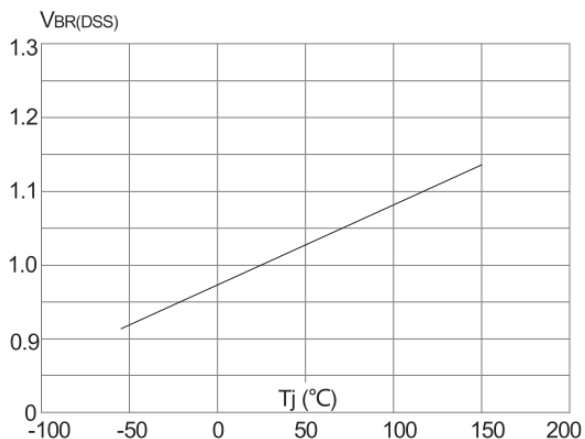
Body-Diode Characteristics



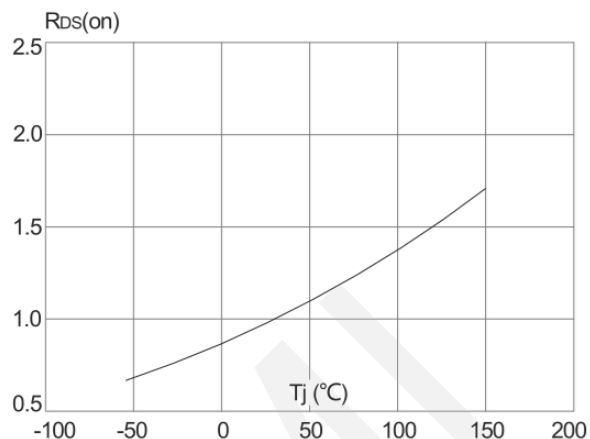
Gate Charge Characteristics



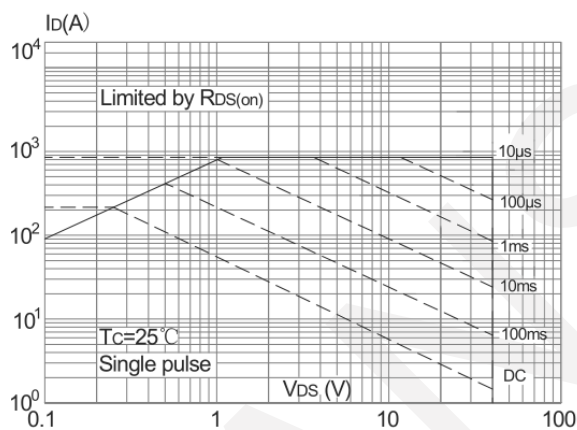
Capacitance Characteristics



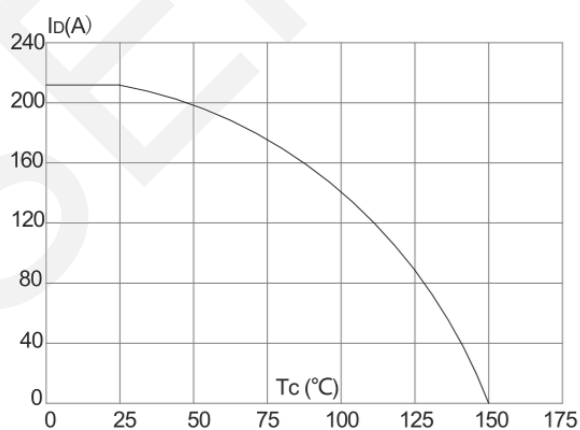
**Normalized Breakdown voltage vs.
Junction Temperature**



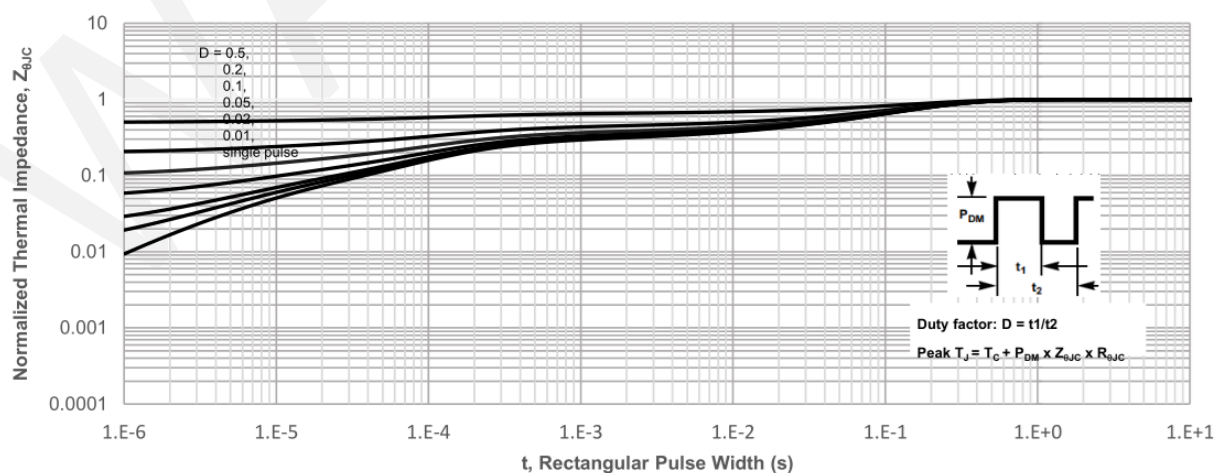
**Normalized on Resistance vs.
Junction Temperature**



Maximum Safe Operating Area

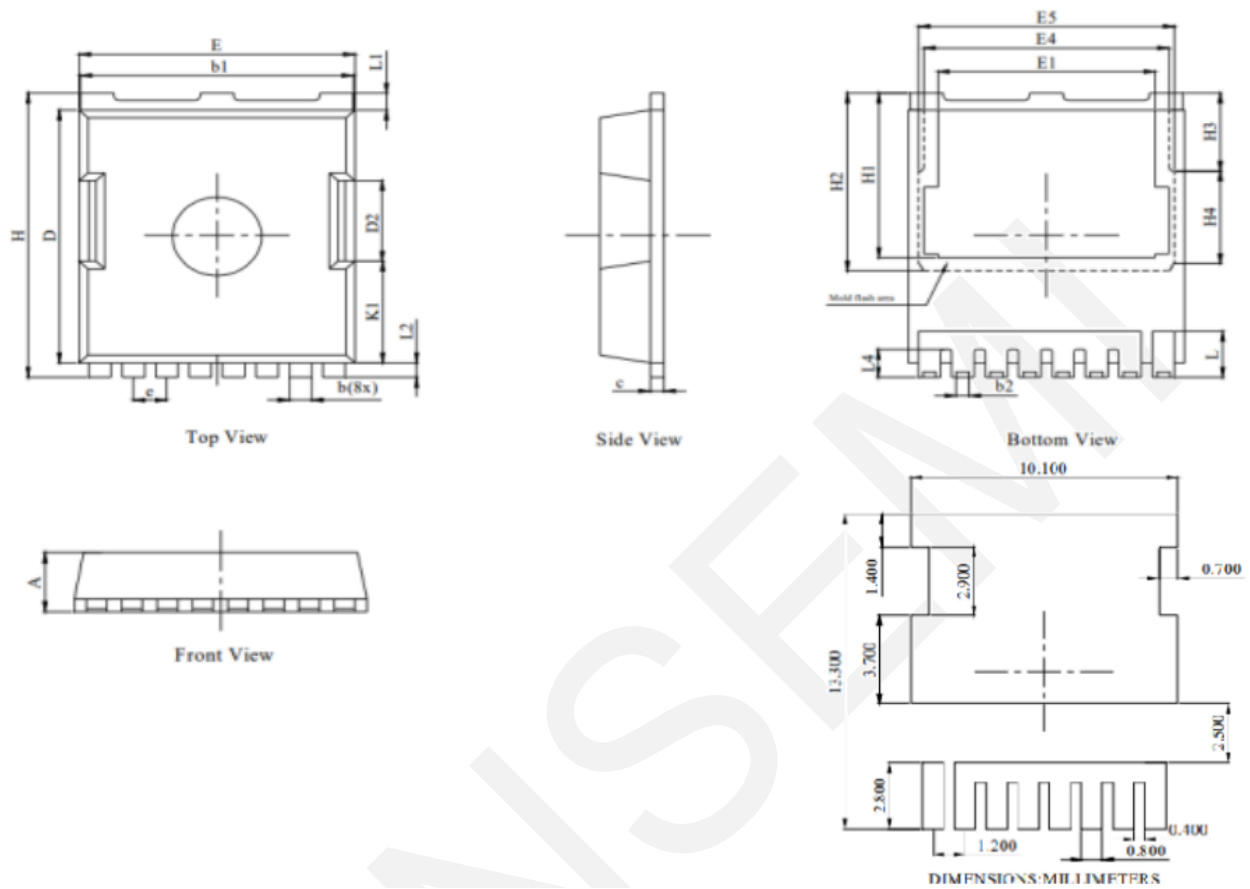


Current De-rating



Normalized Maximum Transient Thermal Impedance

8.Package Dimensions



DIM.	MILLIMETER		
	MIN	NOM	MAX
A	2.20	2.30	2.50
b	0.70	0.80	0.90
b1	9.70	9.80	9.90
b2	0.42	0.46	0.50
C	0.40	0.50	0.65
D	10.28	10.38	10.58
D2	3.30		
E	9.70	9.90	10.10
E1	7.80		
E4	8.80		
E5	9.20		
e	1.20(BSC)		
H	11.48	11.68	11.88
H1	6.55	6.75	6.85
H2	7.30		
H3	3.20		
H4	3.80		
K1	4.18		
L	1.70	1.90	2.10
L1	0.70		
L2	0.60		
L4	1.00	1.15	1.30

9. Important Notice

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