

N-channel Enhancement Mode Power MOSFET

Features

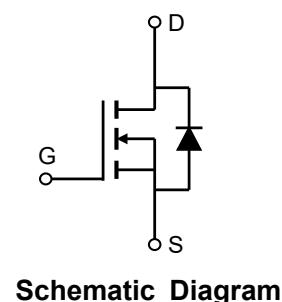
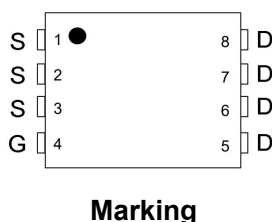
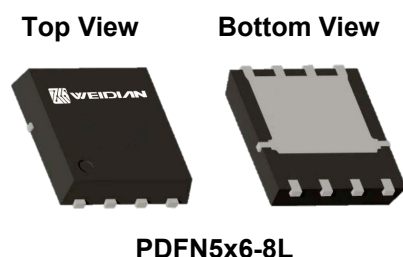
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired
- 100% UIS TESTED!
- 100% ΔV_{ds} TESTED!

Product Summary

Parameters	Value	Unit
V_{DSS}	40	V
$V_{GS(th)_{Typ}}$	1.7	V
$I_D(@V_{GS}=10V)$	210	A
$R_{DS(ON)_{Typ}}(@V_{GS}=10V)$	1.2	$m\Omega$

Applications

- Load Switch
- PWM Application
- Power Management



Ordering Information

Device	Marking	Package	Packing	Reel Size	Tape Width	Reel (pcs)
ZK40N210G	40N210	DFN5x6	Reel	N/A	N/A	5000

MAXIMUM RATINGS ($T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	210	A
		137	
Pulsed Drain Current	I_{DM}	840	A
Single Pulsed Avalanche Energy	E_{AS}	420	mJ
Power Dissipation	P_D	120	W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	$^{\circ}C/W$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^{\circ}C$

MOSFET ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	V _{(BR) DSS}	V _{GS} = 0V, I _D = 1mA	40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 40V, V _{GS} =0V			1.0	μA
Gate-body leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} =±20V			±100	nA
On characteristics ④						
Gate-threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	1.0	1.7	2.5	V
Static drain-source on-sate resistance	R _{DS(on)}	V _{GS} =10V, I _D =30A		1.2	1.6	mΩ
		V _{GS} =4.5V, I _D =20A		2.1	3.0	mΩ
Dynamic characteristics ④ ⑤						
Input capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V f =1MHz		14.7		pF
Output capacitance	C _{oss}			843		
Reverse transfer capacitance	C _{rss}			830		
Switching characteristics ④ ⑤						
Total gate charge	Q _g	V _{GS} =0 to 10V V _{DS} =20V, I _D =30A		95		nC
Gate-source charge	Q _{gs}			15		
Gate-drain charge	Q _{gd}			19		
Turn-on delay time	t _{d(on)}	V _{DD} =20V, I _D =30A V _{GS} =10V, R _{GEN} =3Ω		13		ns
Turn-on rise time	t _r			9		
Turn-off delay time	t _{d(off)}			101		
Turn-off fall time	t _f			15		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _S =100A			1.2	V
Continuous drain-source diode forward current	I _S				210	A
Maximum Pulsed Drain to Source Diode Forward Current	I _{SM}				840	A
Reverse recovery time	t _{rr}	di/dt = 100A/μs, I _F = 50A		35		ns
Reverse recovery charge	Q _{rr}			24.2		nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}$, $V_{GS} = 35V$, $R_G = 25\Omega$, $L = 0.5mH$, $I_{AS} = 41A$
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Figure1: Output Characteristics

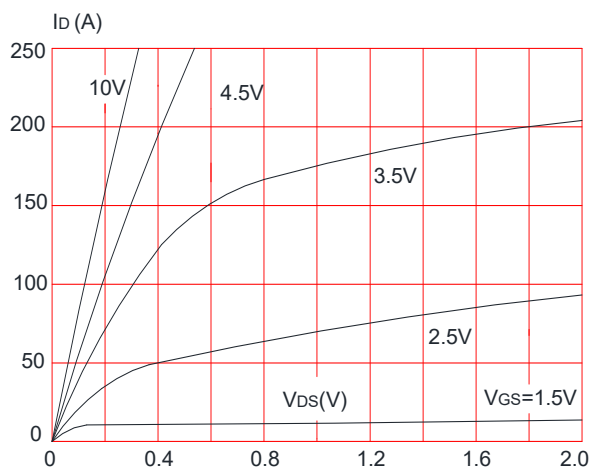


Figure 2: Typical Transfer Characteristics

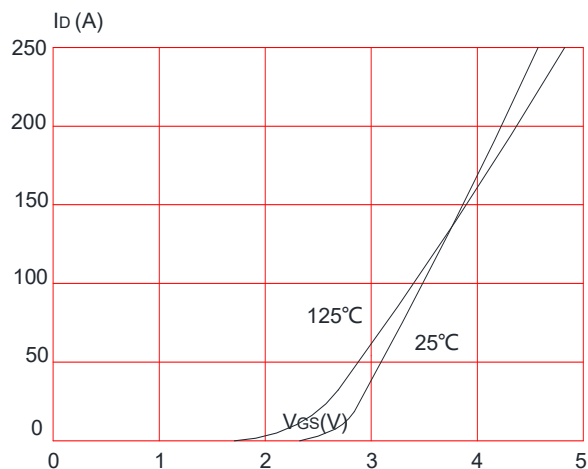


Figure 3: On-resistance vs. Drain Current

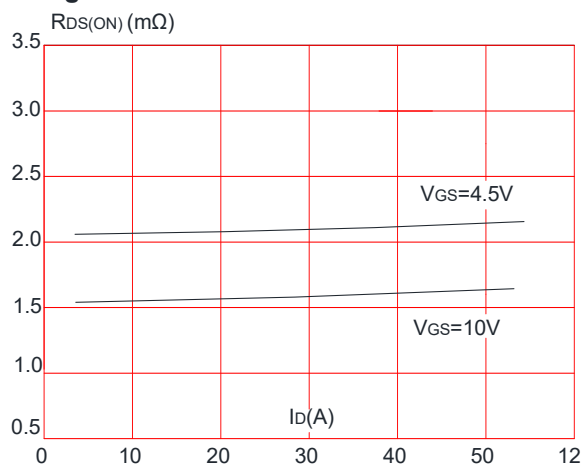


Figure 4: Body Diode Characteristics

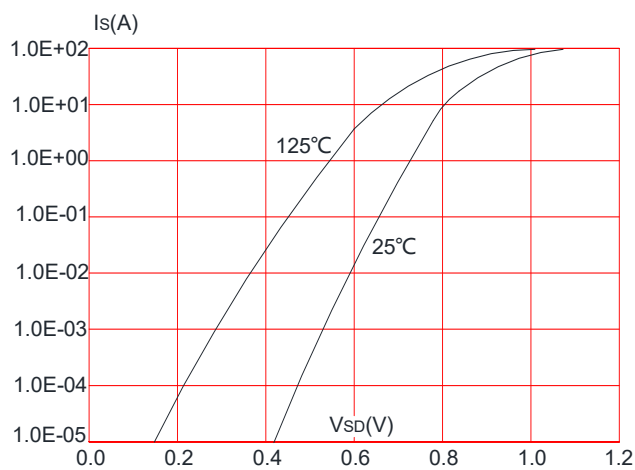


Figure 5: Gate Charge Characteristics

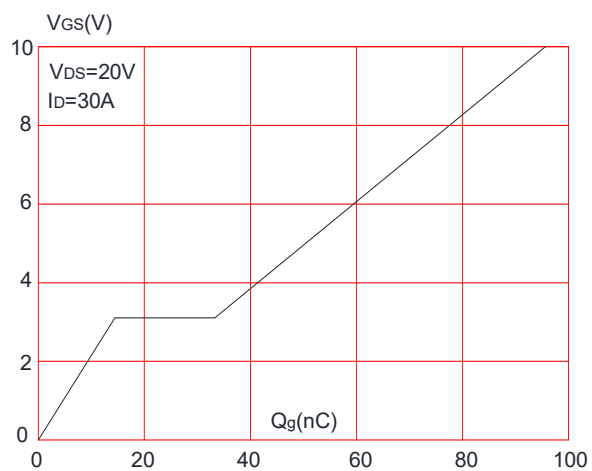
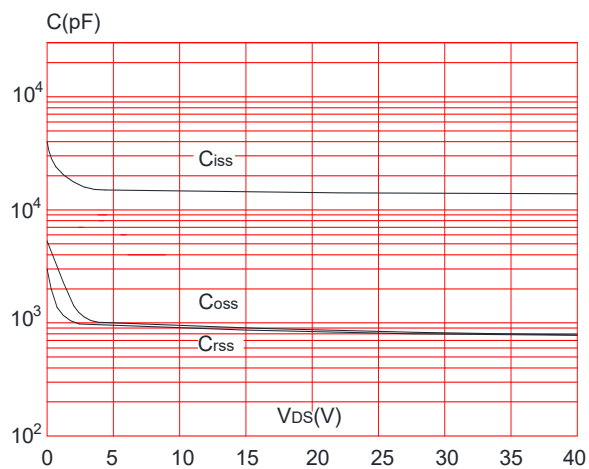


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

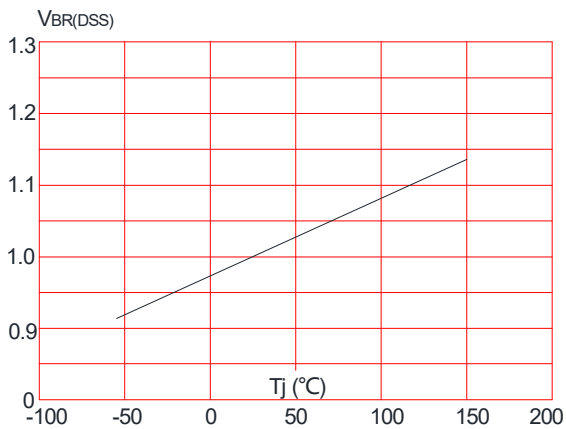


Figure 8: Normalized on Resistance vs. Junction Temperature

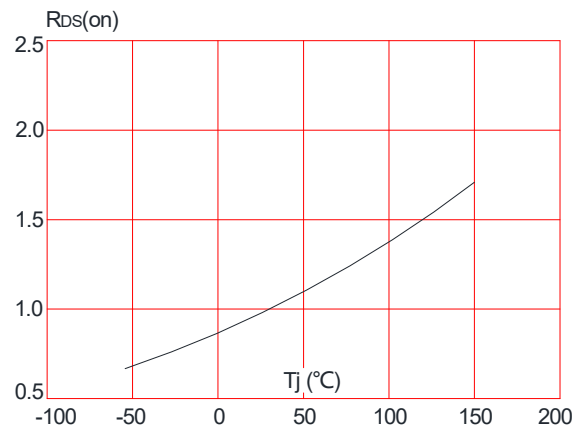


Figure 9: Maximum Safe Operating Area

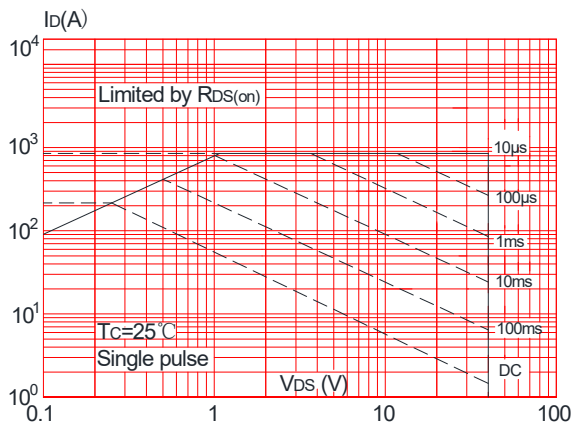


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

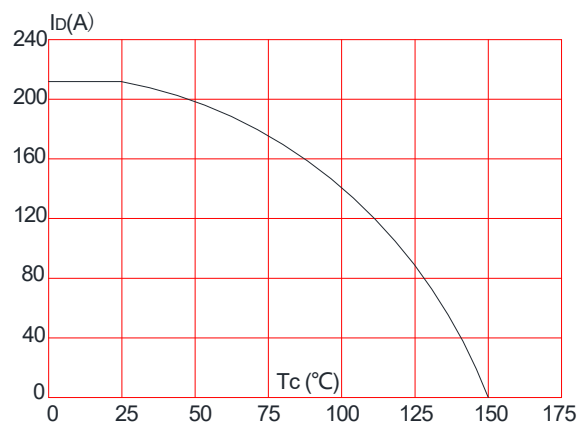
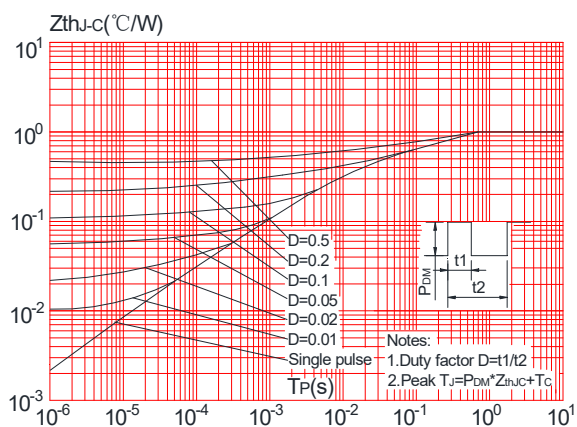


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



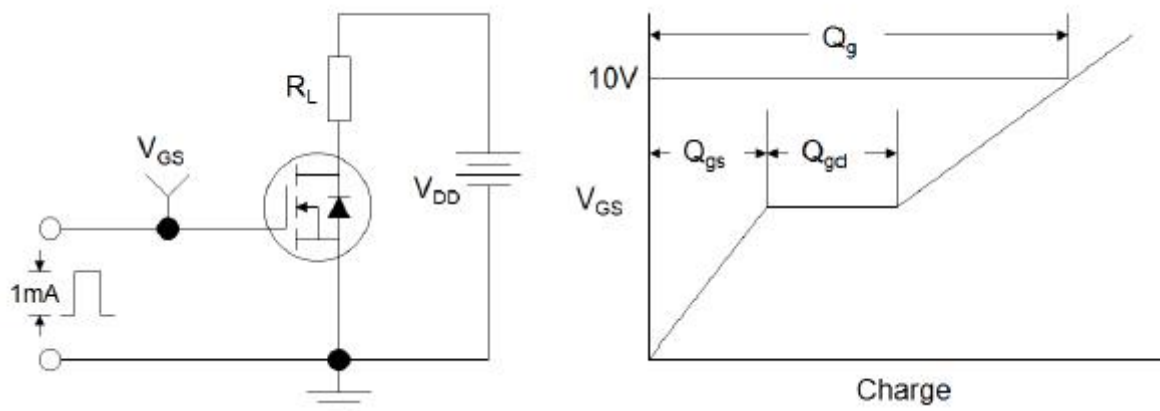


Figure1:Gate Charge Test Circuit & Waveform

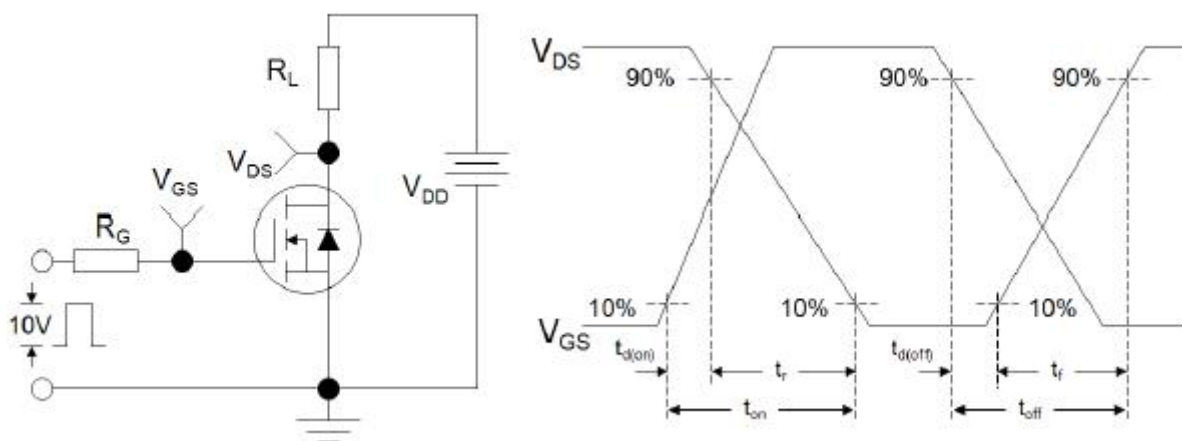


Figure 2: Resistive Switching Test Circuit & Waveforms

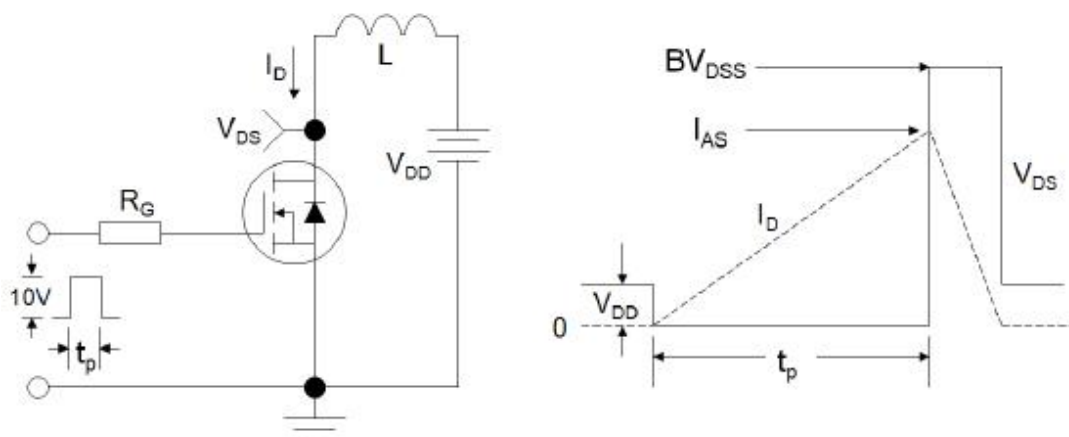
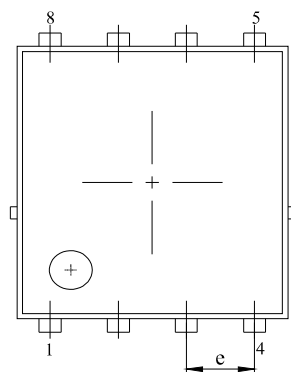
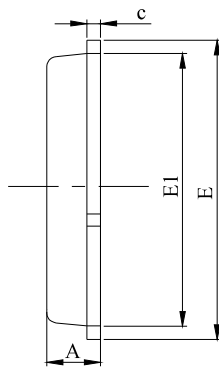


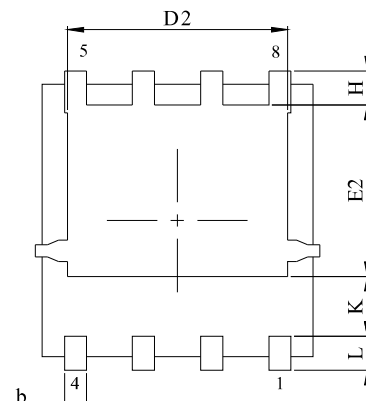
Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



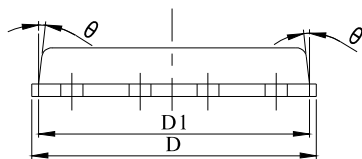
Top View



Side View



Bottom View



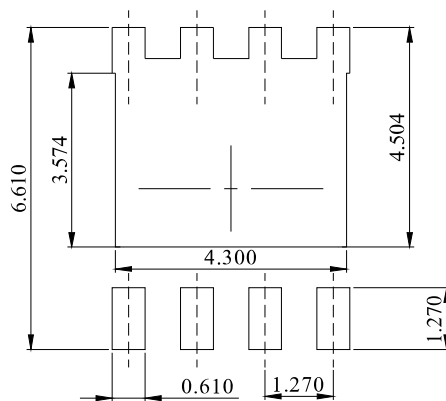
Front View

NOTES:

1. Dimension and tolerance per ASME Y14.5M, 1994.
2. All dimensions in millimeter (angle in degree).
3. Dimensions D1 and E1 do not include mold flash protrusions or gate burrs.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.31	0.41	0.51
c	0.20	0.25	0.30
D	5.00	5.20	5.40
D1	4.95	5.05	5.15
D2	4.00	4.10	4.20
E	6.05	6.15	6.25
E1	5.50	5.60	5.70
E2	3.42	3.53	3.63
e	1.27BSC		
H	0.60	0.70	0.80
L	0.50	0.70	0.80
K	1.23 REF		
θ	-	-	10°

Recommended Soldering Footprint



DIMENSIONS:MILLIMETERS