

N-channel Enhancement Mode Power MOSFET

Features

- Ultra-low $R_{DS(ON)}$
- Advanced TRENCH technology.
- Halogen-free and RoHS-compliant
- Fast switching
- 100% UIS TESTED!, 100% R_g TESTED!

Product Summary

Parameters	Value	Unit
V_{DSS}	30	V
$V_{GS(th)_{Typ}}$	1.5	V
$I_D(@V_{GS}=10V)$	120	A
$R_{DS(ON)_{Typ}} @V_{GS}=10V$	2.5	$m\Omega$
$R_{DS(ON)_{Typ}} @V_{GS}=4.5V$	3.5	$m\Omega$

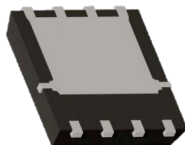
Applications

- PWM Application
- Load Switch
- Power Management

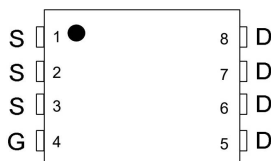
Top View



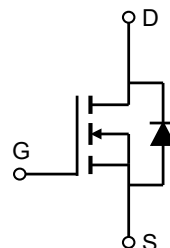
Bottom View



PDFN3x3-8L



Marking



Schematic Diagram

Device	Marking	Package	Packing	Reel Size	Tape Width	Reel (pcs)
ZK30N120Q	30N120	DFN3x3	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}	30	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^{\circ}C$	I_D	120	A
	$T_C = 100^{\circ}C$		78	
Pulsed Drain Current		I_{DM}	480	A
Single Pulsed Avalanche Energy		E_{AS}	168	mJ
Power Dissipation		P_D	58	W
Thermal Resistance, Junction to Case		$R_{\theta JC}$	2.15	$^{\circ}C/W$
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^{\circ}C$

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 = 250 uA	30			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = 30V, 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	1.5	2.2	V
Static drain-source on-sate resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A		2.5	3.1	mΩ
		V _{GS} =4.5V, I _D =15A		3.5	4.5	mΩ
Dynamic characteristics ④ ⑤						
Input capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V f =1MHz		4000		pF
Output capacitance	C _{oss}			437		
Reverse transfer capacitance	C _{rss}			396		
Switching characteristics ④ ⑤						
Total gate charge	Q _g	V _{GS} =0 to 10V V _{DS} =15V, I _D =30A		72		nC
Gate-source charge	Q _{gs}			46		
Gate-drain charge	Q _{gd}			13		
Turn-on delay time	t _{d(on)}	V _{DS} =15V, R _L =3Ω V _{GS} =10V, I _D =30 A		14		ns
Turn-on rise time	t _r			18		
Turn-off delay time	t _{d(off)}			40		
Turn-off fall time	t _f			12		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V _{SD}	V _{GS} =0V, I _{SD} =30A			1.2	V
Continuous drain-source diode forward current	I _S	T _C =25 ℃			120	A
Pulsed Drain-Source Diode Forward Current	I _{SM}				480	A
Reverse recovery time	t _{rr}	di/dt = 100A/μs, I _F = 30A		48		ns
Reverse recovery charge	Q _{rr}			80		nC

Notes:

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2.EAS condition: $T_J = 25^\circ C$, $V_{DD} = 15V$, $V_G = 10V$, $R_G = 25\Omega$, $L = 0.5mH$
- 3.Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycles $\leq 0.5\%$

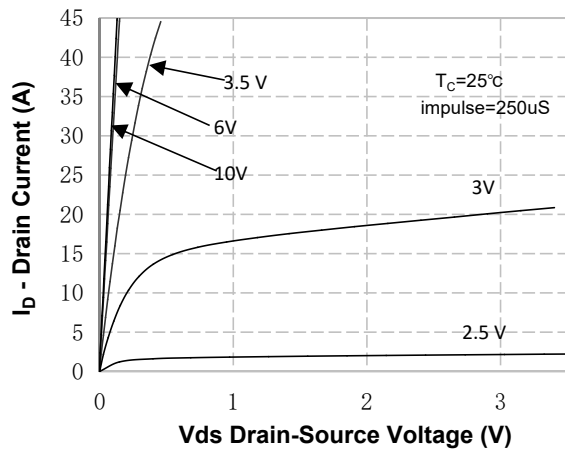


Figure 1. On-Region Characteristics

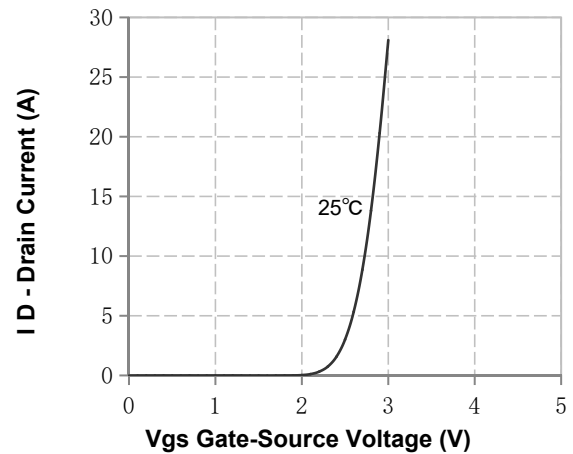


Figure 2. Transfer Characteristics

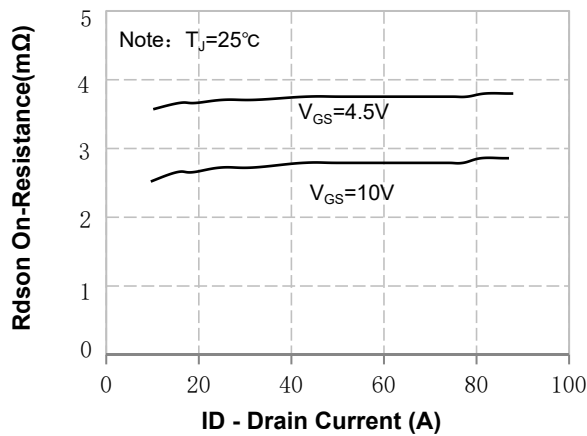


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

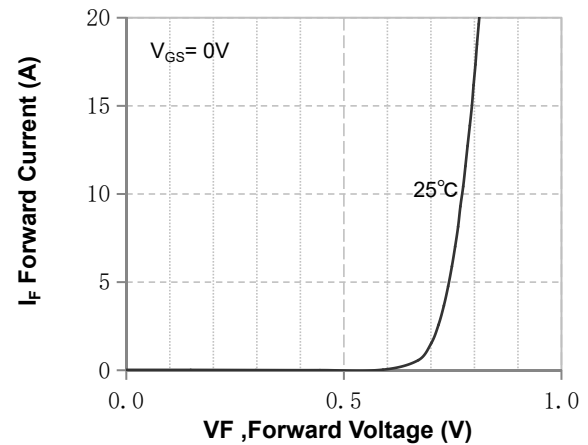


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

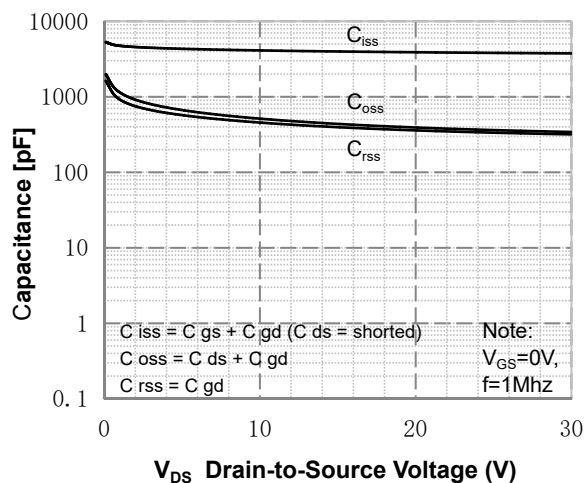


Figure 5. Capacitance Characteristics

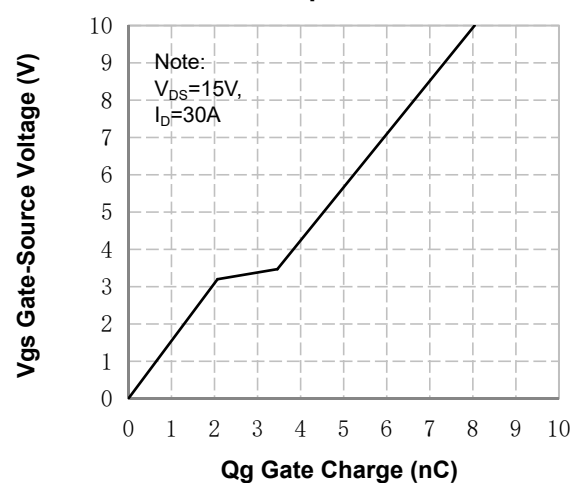


Figure 6. Gate Charge Characteristics

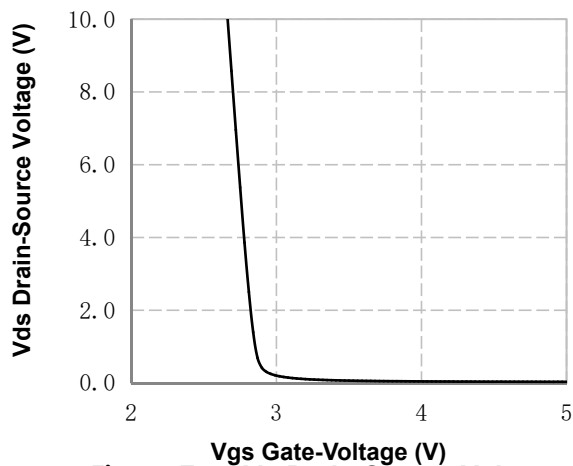


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

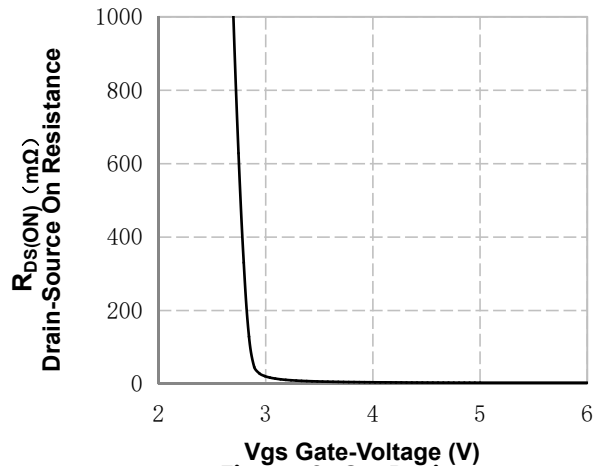


Figure 8. On-Resistance vs Gate Voltage

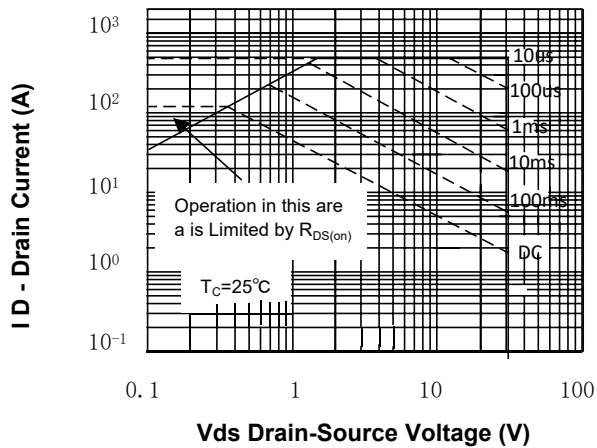


Figure 9. Maximum Safe Operating Area

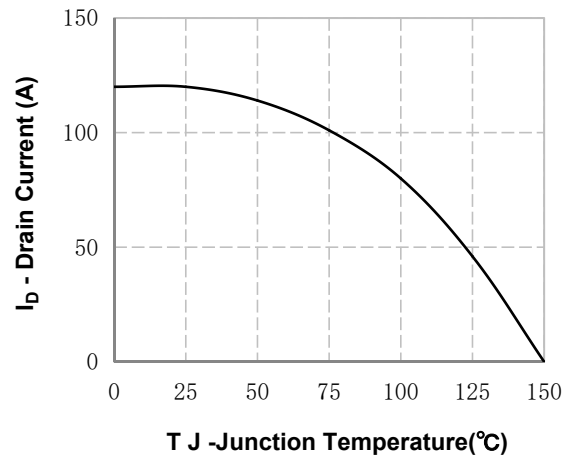


Figure 10. Maximum Continuous Drain Current vs Temperature

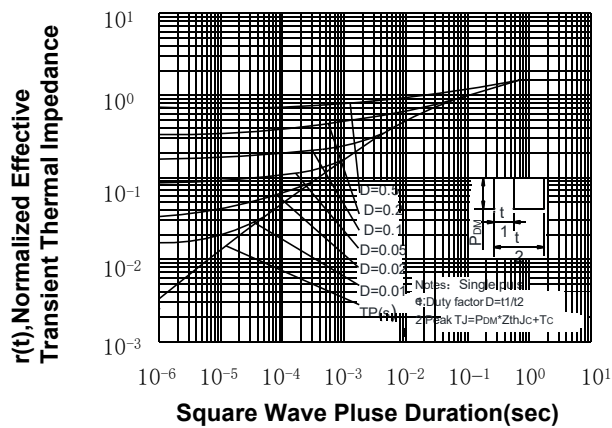
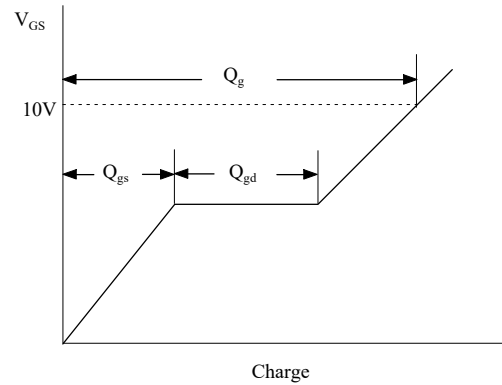
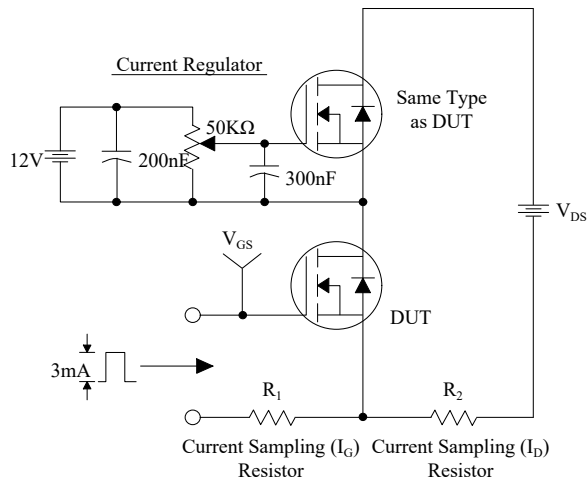
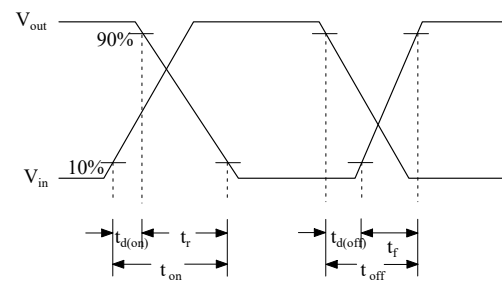
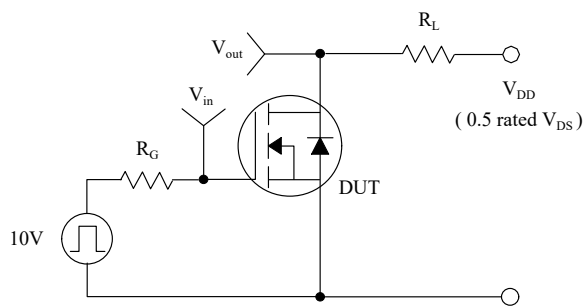


Figure 11. Transient Thermal Response Curve

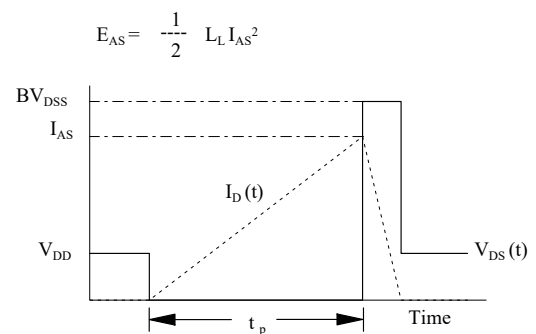
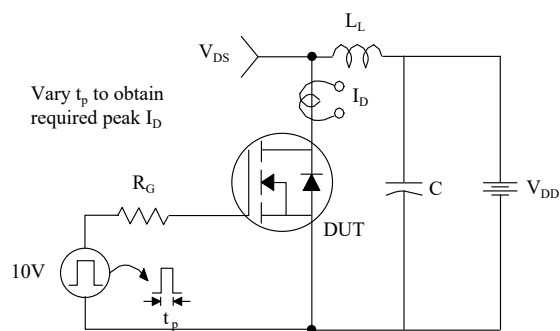
Gate Charge Test Circuit & Waveform



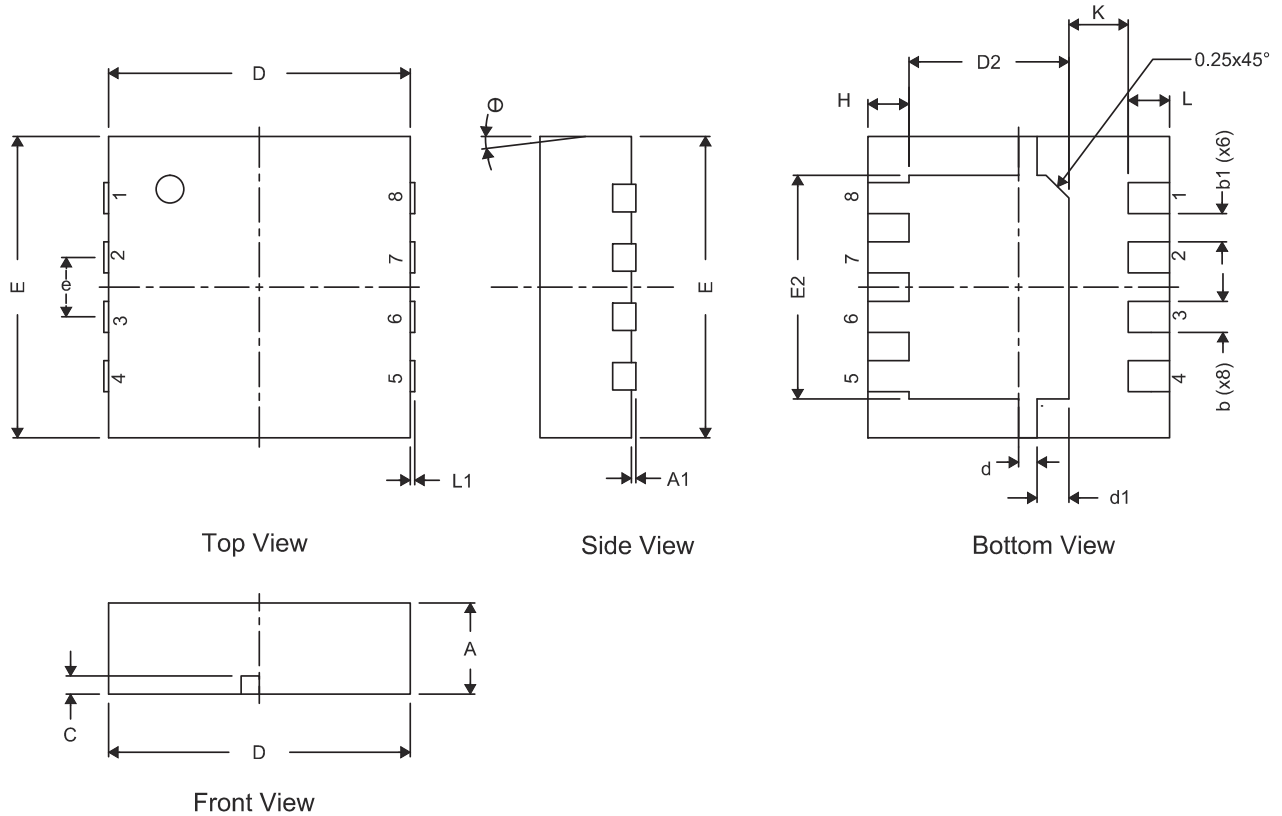
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



PDFN3x3-8L Package Information



DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.950	1.000	1.100	0.037	0.039	0.043
A1	0.000	0.000	0.050	0.000	0.000	0.002
b	0.280	0.340	0.400	0.011	0.013	0.016
b1	0.310 NOM			0.012 NOM		
c	0.150	0.200	0.250	0.006	0.008	0.010
D	3.200	3.300	3.400	0.126	0.130	0.134
D2	1.650	1.750	1.800	0.065	0.069	0.071
d	0.150	0.200	0.250	0.006	0.008	0.010
d1	0.300	0.350	0.400	0.012	0.014	0.016
E	3.200	3.300	3.400	0.126	0.130	0.134
E2	2.350	2.450	2.550	0.093	0.096	0.100
e	0.650 TYP			0.026 TYP		
H	0.35	0.450	0.550	0.014	0.018	0.022
K	0.650 TYP			0.026 TYP		
L	0.35	0.450	0.550	0.014	0.018	0.022
L1	0	—	0	0	—	0
θ	0	—	0	0	—	0