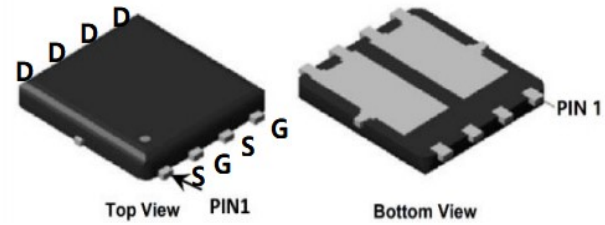
XNM20N04D3

40V N-Channel MOSFET

1.Features

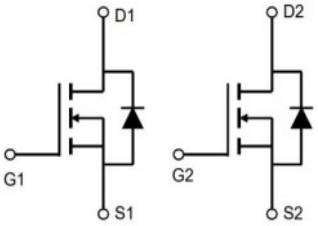
- Advanced trench cell design
- Low Thermal Resistance
- Low Gate Charge
- Fast Switching Speed

PDFN3*3



2.Mechanical Data

- Case:Molded Plastic,PDFN3*3;
- Epoxy:UL 94V-0 rate flame retardant
- Terminals:Plated Leads Solderable per MIL-STD-750,Method-2026.
- Marking: marked on body.
- Mounting Position : Any.



1.Gate
2. Drain
3. Source

3.Absolute Maximum Ratings

Electrical Characteristics (T_A=25℃ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	Ta = 25℃	I_D	20	A
	Ta = 100℃		1.3	
Pulsed Drain Current[1)]		I_{DM}	48	A
Power Dissipation	Ta = 25℃	P_{tot}	20	W
Junction Temperature		T_J	-55~+150	°C
Storage Temperature		T_{STG}	-55~+150	°C
Junction-to-Ambient Thermal Resistance[3)]		$R_{\theta JA}$	6.25	°C/W

4.Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Off Characteristics						
Drain-source breakdown voltage	B_{VDSS}	I_D = 250μA	40	-		V
Gate-source leakage current	I_{DSS}	V_{DS}=30V	-	-	1	μA
Gate threshold voltage	I_{GSS}	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
Drain-to-Source Leakage Current	$V_{GS(th)}$	V_{DS} = V_{GS} , I_D = 250μA	1	1.6	2.5	V
Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 10A	-	17	22	mΩ
		V_{GS} = 4.5V, I_D = 6A	-	22	30	mΩ
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{DS} =20V ,V_{GS}=0V f=1.0MHz	-	1050	-	pF
Output Capacitance	C_{oss}		-	84	-	
Reverse Transfer Capacitance	C_{rss}		-	72	-	
Switching Parameters						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=20V, V_{GS}=10V Rg=3Ω	-	11	-	nS
Turn-on Rise Time	t_r		-	13	-	
Turn-off Delay Time	$t_{d(off)}$		-	36	-	
Turn-off Fail Time	t_f		-	9	-	
Total Gate Charge	Q_g	V_{DS}=20V, I_D=5A V_{GS}=10V	-	11	-	nC
Gate-Source Charge	Q_{gs}		-	1.9	-	
Gate-Drain Charge	Q_{gd}		-	2.2	-	
Drain-Source Diode Characteristics						
Forward Voltage	V_{SD}	V_{GS} = 0V, I_{SD}= 10A	-	-	1.2	V

Notes:
1) Pulse Test: Pulse Width ≤ 100 μs, Duty Cycle ≤ 2%, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$ = 150°C.
2) Limited by $T_{J(MAX)}$, starting T_J = 25 °C
3) Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

5.Rating And Characteristic Curves

Fig. 1 On-Region Characteristics

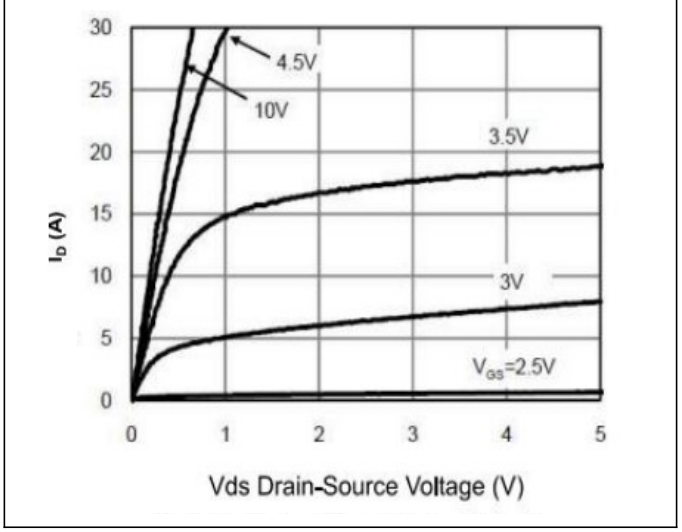


Fig 2 Transfer Characteristics

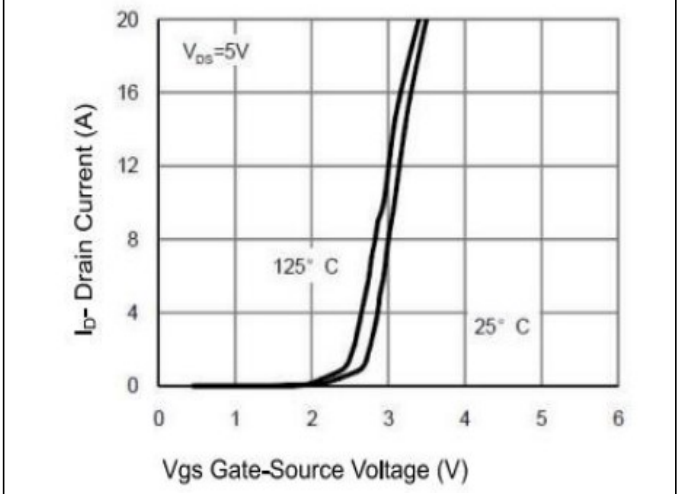


Fig.3 Drain-Source On-Resistance

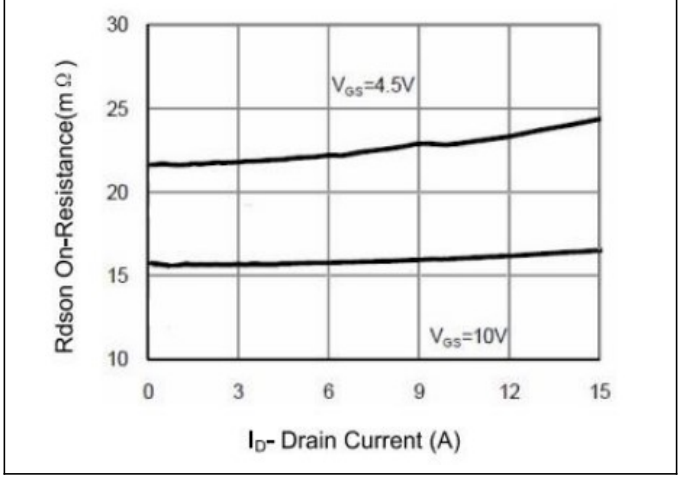


Fig.4 Drain-Source On-Resistance

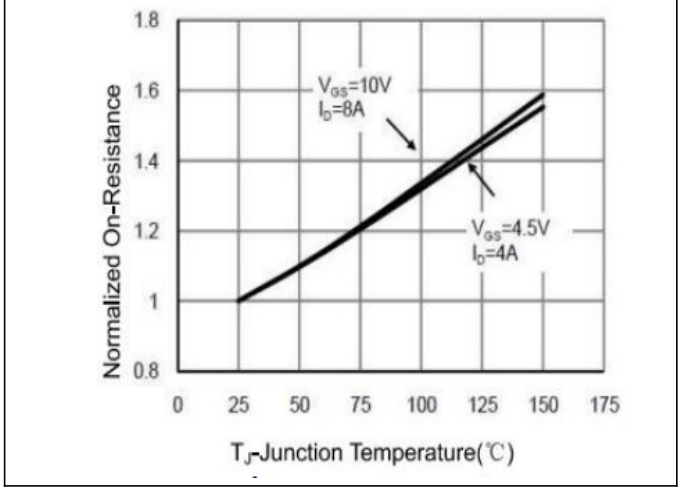


Fig.5 On-Resistance vs. Gate-Source Voltage

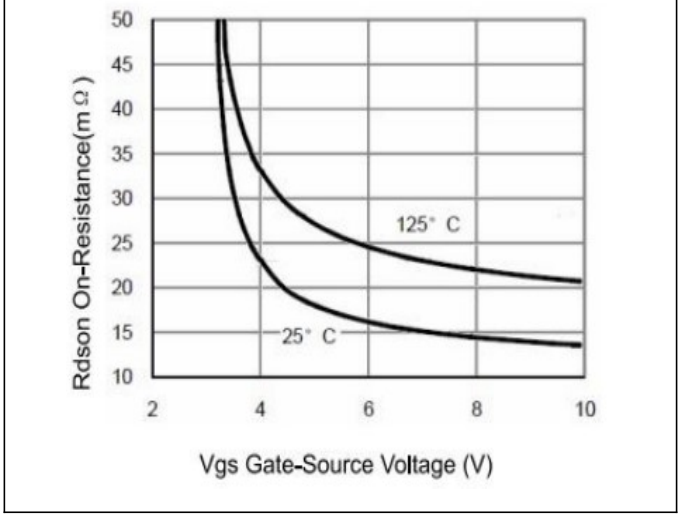


Fig.6 Power Dissipation

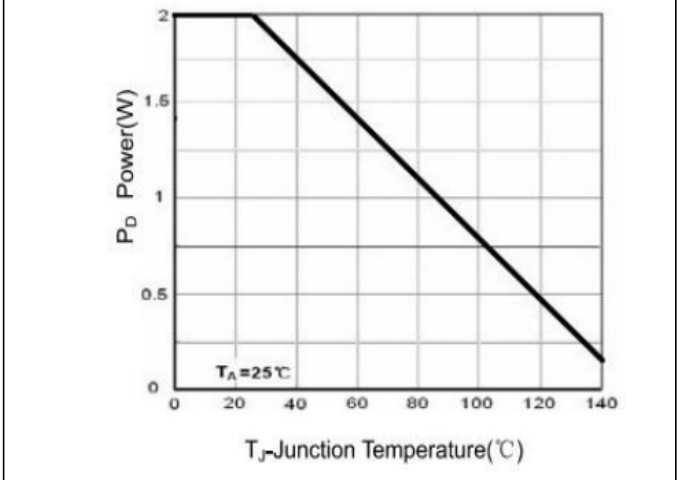


Fig. 7 Gate Charge

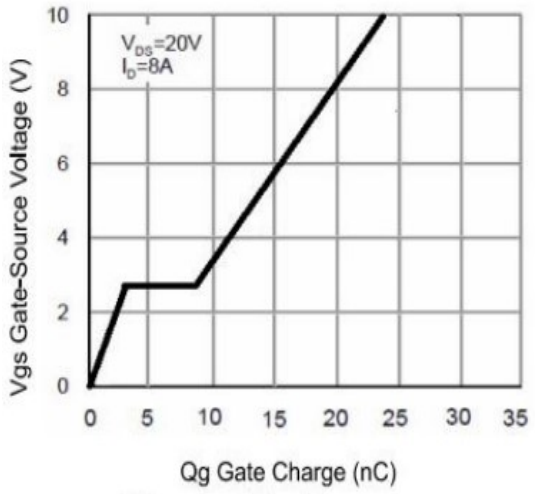


Fig 8 Source- Drain Diode Forward

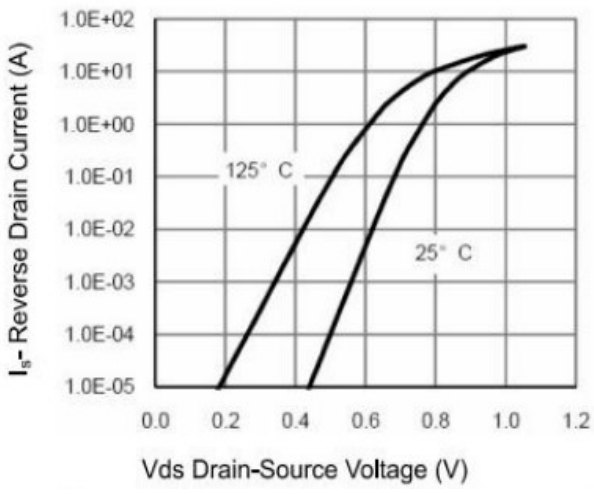


Fig.9 Capacitance vs Vds

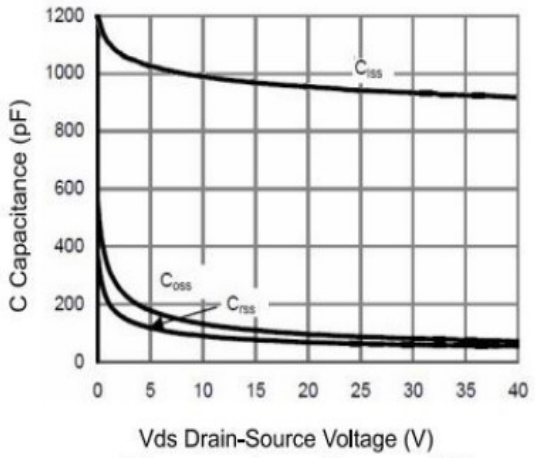
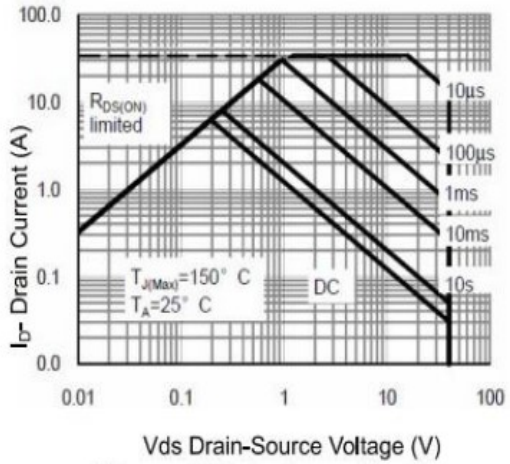


Fig.10 Safe Operation Area



6.Test Circuits

Fig.1-1 Switching times test circuit

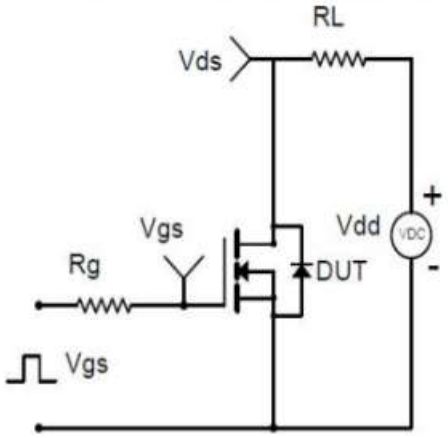


Fig.1-2 Switching Waveform

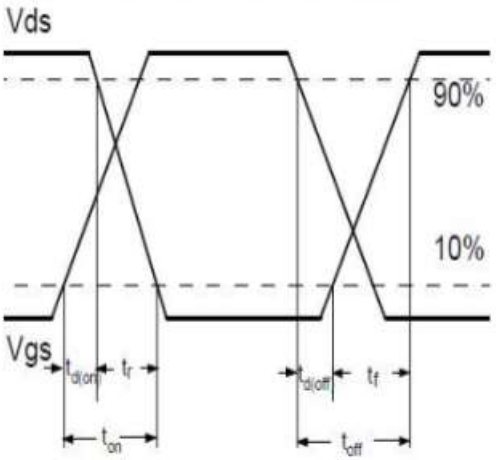


Fig.2-1 Gate charge test circuit

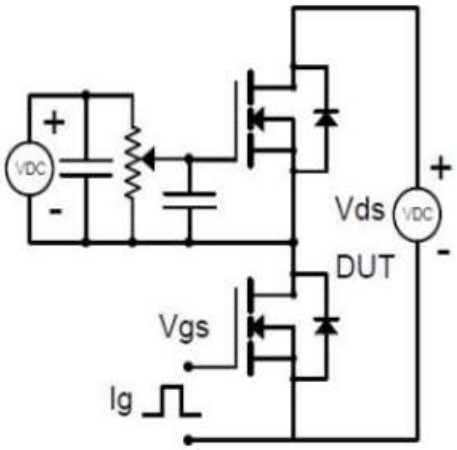


Fig.2-2 Gate charge waveform

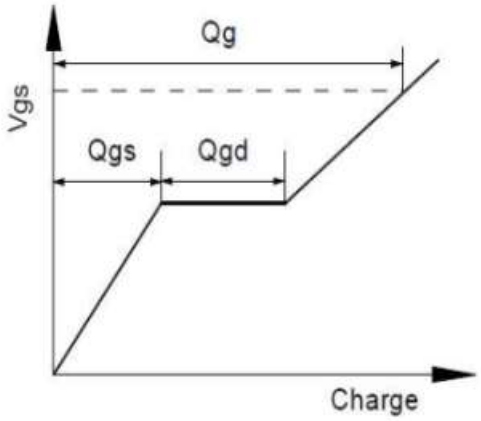


Fig.3-1 Avalanche test circuit

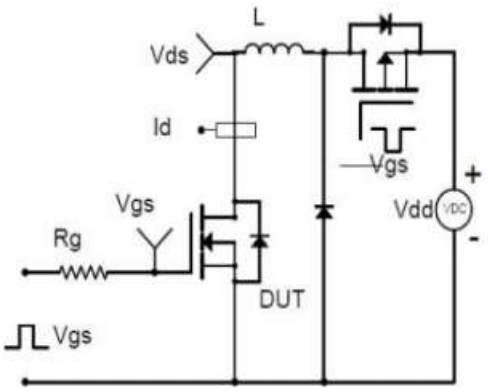
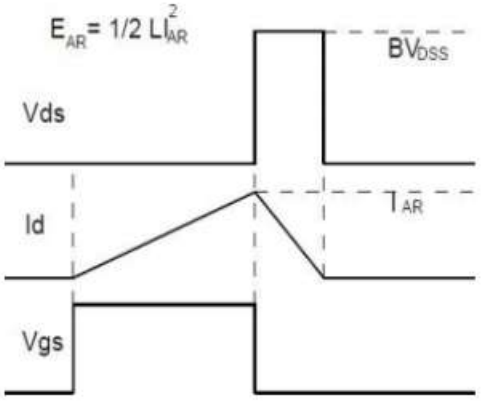
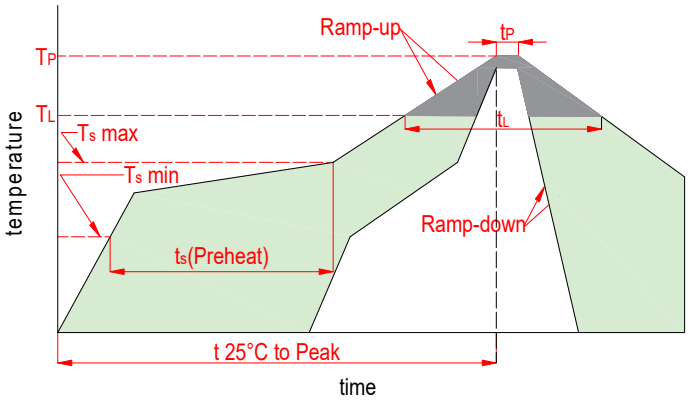


Fig.3-2 Avalanche waveform

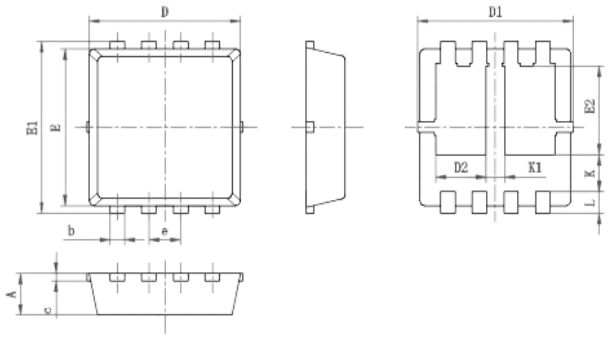


7.Rating And Characteristic Curves

Reflow Condition		Lead-free
Pre Heat	Temp. min($T_{s(min)}$)	150℃
	Temp. max($T_{s(min)}$)	200℃
	Time(min to max)(t_s)	60~180s
Aver. ramp up rate(Liquidus Temp.)(T_L)to peak		3℃/s max
T_S(max) to T_L-Ramp-up Rate		3℃/s max
Reflow	Temp.(T_L)(Liquidus)	217℃
	Temp.(t_L)(Liquidus)	60~150s
Peak Temp.(T_P)		$260^{+0/-5}$℃
Time within actual peak Temp.(t_p)		30s max
Ramp-down Rate		6℃/s max
Time 25℃ to peak Tempe.(T_p)		8 minutes max
Do not exceed		260℃

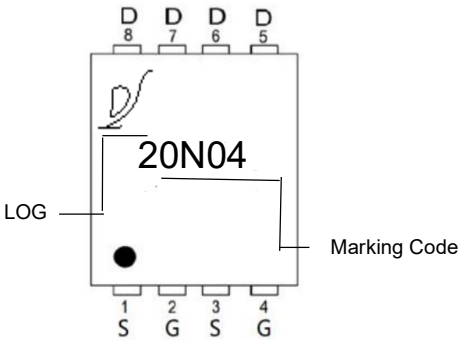


8.Package Drawing



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.028	0.035	0.7	0.9
D	0.118	0.126	3	3.2
D1	0.118	0.134	3	3.4
D2	0.033	0.049	0.84	1.24
E	0.114	0.122	2.9	3.1
E1	0.122	0.138	3.1	3.5
E2	0.061	0.077	1.55	1.95
K	0.65			
K1	0.38			
e	0.65			
b	0.010	0.014	0.25	0.35
c	0.004	0.008	0.1	0.2
L	0.012	0.022	0.3	0.55

9. Part Marking System



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